

# STORMWATER REPORT

SHEA CONCRETE PRODUCTS SITE EXPANSION  
160 OLD TURNPIKE ROAD  
NOTTINGHAM, NEW HAMPSHIRE

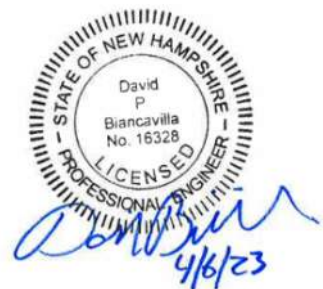
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Prepared For:



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## **SECTION 1.0**

### **PROJECT NARRATIVE**

## **1.01 PROJECT DESCRIPTION**

Shea Concrete Products the “Applicant”, is proposing to expand their existing facility on their property located at 160 160 Old Turnpike Road in Nottingham, New Hampshire. The existing property, approximately 25.1 acres, is currently occupied by a 6,800+/- sf structure, part of which is used as office space and part used as industrial space to produce pre-cast concrete structures. The subject property is bordered on the south by an existing wetland and several existing homes to the north. The applicant owns abutting parcels on the northwest (Nottingham Assessor’s Map 3 Lot 4) and southeast (Nottingham Assessor’s Map 3 Lot 1) which are largely undeveloped. Currently, approximately 6.7 acres of the property is being utilized for the manufacturing and storage of the pre-cast concrete structures and related equipment. This portion of the property consists of primarily gravel surfacing aside from a paved asphalt driveway which provides access to the site from Old Concord Turnpike.

At this time, the applicant has determined that expansion of the existing site is necessary to keep up with product demand while providing a safe, efficient facility for its employees. The applicant proposes to expand the site by constructing a 90’ x 250’ building with space for offices and manufacturing. The proposed building will be surrounded by a 50’ wide concrete apron to allow for safe and efficient maneuvering for employees and equipment. With very little designated parking area available on the existing property, the proposed site improvements include designating space for parking for up to 24 vehicles on the eastern side of the property. This area will remain a gravel surface and will not contribute to the site’s impervious area. Additional proposed site features include a landscape buffer along the property line on the north side of the proposed building, a proposed septic system to accommodate additional flow from the proposed building and associated grading and retaining walls to support the site buildout. To mitigate the increase of impervious area, the proposal is to construct a stormwater management area on the southern side of the proposed building.

The proposed project has been designed to comply with the New Hampshire Department of Environmental Services’ Stormwater Manual, Env-Wq 1500: Alteration of Terrain Permitting Guidelines as well as local standards and By Laws.

## **1.02 METHODOLOGY**

The existing and proposed watersheds were modeled utilizing HydroCad stormwater software. Both existing and proposed watersheds were analyzed using the SCS TR-20 method for hydrograph creation and the Storage-Indication + Translation Method was used for reach routing. A Type III, 24-hour storm hydrograph for the 2-year, 10-year, 25-year and 50-year storm events. Rainfall amounts for these storm events were found using the Cornell Rainfall Data site which is a collaboration between the Northeast Regional Climate Center (NRCC) and the Natural Resources Conservation Service (NRCS). Rainfall amounts for each storm event total 3.02”, 4.55”, 5.75” and 6.86” respectively. The Cornell Rainfall Data is provided in an Appendix to this report.

Existing topography and site features were obtained through survey by BSC Group and aerial imagery. Existing soil conditions were obtained using the NRCS Web Soil Survey and soil test pits conducted by BAG Land Consultants.

## **1.03 PRE-DEVELOPMENT DRAINAGE CONDITIONS**

In its current condition, approximately 6.7 acres has been previous developed for the manufacturing and storage of pre-cast concrete structures. This portion of the property generally slopes from the northern end of the property (approaching Old Turnpike Road) to the existing wetlands on the southern side of the property. Smaller areas of this previously developed part of the property slope generally from the paved driveway to the southeast property line and from the front portion of the lot into smaller wetland areas at the entrance to the site which are connected by an existing RCP culvert. The majority of this developed portion of the site consists of gravel surfaces. Stormwater that

does not infiltrate into the ground drains overland to the low areas described above. In its existing condition, the site can be divided into five (5) subcatchments based on the existing topography (see existing watershed map).

The undeveloped portion of the property (approximately 18.4 acres) is largely comprised of wooded areas and wetlands. The majority of this land slopes from the northern side of the property to the existing wetlands at the southern property lines. There is also a smaller portion of this undeveloped land that slopes towards the properties to the north of the subject property. There are no known stormwater structures on this undeveloped portion of the property and stormwater drains overland to the low areas described above.

#### **1.04 POST-DEVELOPMENT DRAINAGE CONDITIONS**

The proposed development of a 22,500 square foot manufacturing building surrounded by a 44,000 square foot concrete apron. The addition of impervious area to a previously undeveloped portion of the site causes a decrease in infiltration and reduction in time of concentration. This combination causes a potential increase in peak runoff rates from the site. To mitigate the potential for increased stormwater runoff rates and treat stormwater runoff from the site, the following Best Management Practices (BMP's) will be utilized on site.

Stormwater runoff from the landscaped hill on the northeast side of the proposed building (Subcatchments 6 and 7) will be collected via grassed swales and area drain catch basins. This water will then be conveyed via pipe to manholes 105 and 207 before discharge to their respective analysis points. Stormwater runoff generated from the proposed concrete building apron will be collected using concrete trench drains, each connected to a drain manhole fitted with a minimum 3' deep sump for removal of suspended solids and LeBaron "Snout" Trap (or approved equal) for removing floatable debris or liquids. Stormwater is then routed through Oil/Particle separator tanks before discharging into one of the onsite StormTrap infiltration systems (or approved equal). Roof runoff from the proposed building will be collected using a roof drain system and discharged, through an outlet control structure, to a StormTrap system or directly to one of the level spreader discharge points depending on flow conditions. Stormwater from remaining disturbed areas onsite will flow overland to one of the four (4) points of analysis used for this model.

The proposed StormTrap systems on site, each embedded in a gravel field, are designed to both infiltrate and provide attenuation to inflowing stormwater. This proposed system is a combination of ST2 2-6 (30" floor to ceiling height) and ST2 3-0 (36" floor to ceiling height) units arranged to reduce the system footprint while also maintaining the required separation from groundwater. Their shallow profile, yet high strength capabilities make them an ideal fit for the proposed use of this site.

**Specifics of the proposed site stormwater management are as follows:**

Stormwater Peak Runoff Rates

The stormwater management system has been designed such that the post-development conditions result in a decrease in the peak runoff rates for the entire site. The reduction in peak runoff rates is achieved using stormwater Best Management Practices such as careful site grading combined with infiltration and peak flow attenuation.

Table 1.1 – Peak Flow Rates Summary to Wetland at southwest side of site (EX-2R/PR-2R)

	Existing Conditions (cfs)	Proposed Improvements (cfs)	Peak Runoff Decrease (cfs)
2-year Peak Runoff	0.29	0.26	0.03
10-year Peak Runoff	2.19	1.69	0.50
25-year Peak Runoff	4.65	3.89	0.76
50-year Peak Runoff	7.34	6.64	0.70

Table 1.2 – Peak Flow Rates Summary to Wetland at south end of site (EX-4R/PR-4R)

	Existing Conditions (cfs)	Proposed Improvements (cfs)	Peak Runoff Decrease (cfs)
2-year Peak Runoff	4.75	4.38	0.37
10-year Peak Runoff	11.30	10.90	0.40
25-year Peak Runoff	17.08	16.77	0.31
50-year Peak Runoff	22.73	22.64	0.09

Table 1.3 – Peak Flow Rates Summary to Southeastern Wetland (EX-1R/PR-1R)

	Existing Conditions (cfs)	Proposed Improvements (cfs)	Peak Runoff Decrease (cfs)
2-year Peak Runoff	7.18	7.14	0.04
10-year Peak Runoff	13.06	13.00	0.06
25-year Peak Runoff	17.92	17.84	0.08
50-year Peak Runoff	22.52	22.42	0.10

Table 1.4 – Peak Flow Rates Summary to North Side of Site (EX-3R/PR-3R)

	Existing Conditions (cfs)	Proposed Improvements (cfs)	Peak Runoff Decrease (cfs)
2-year Peak Runoff	0.09	0.09	0.00
10-year Peak Runoff	0.93	0.91	0.02
25-year Peak Runoff	2.15	2.09	0.06
50-year Peak Runoff	3.53	3.44	0.07

#### Groundwater Recharge

The existing ground water recharge is estimated based on the New Hampshire Department of Environmental Services Groundwater Recharge Volume Worksheet (attached).

$$R_v = F \times \text{impervious area}$$

$R_v$  = Required Recharge Volume, expressed in Ft<sup>3</sup>, cubic yards, or acre-feet

$F$  = Target Depth Factor associated with each Hydrologic Soil Group

*Impervious Area* = pavement and rooftop area on site

NRCS HYDROLOGIC SOIL TYPE	APPROX. SOIL TEXTURE	TARGET DEPTH FACTOR (F)
A	sand	<b>0.40-inch</b>
B	loam	<b>0.25-inch</b>
C	silty loam	<b>0.10-inch</b>
D	clay	<b>0.00-inch</b>

*Table: Recharge Target Depth by Hydrologic Soil Group*

The Natural Resources Conservation Service (NRCS) classified the site as Canton Fine Sandy Loam, 0 to 8 percent slopes, very stony. This soil type is typically associated with hills, shoulder of slopes and back slopes with parent material described as coarse-loamy over sandy melt out till derived from gneiss, granite and/or schist. This soil is classified as well drained.

BAG Land Consultants evaluated test pits on site in April and May of 2022. Test pits were logged in proposed septic areas, proposed stormwater areas and within the footprint of the proposed building. Exact locations can be seen on the project site plan. As seen in the soil logs attached in this report, the soils on site are largely fine sandy loams which is consistent with the NRCS soil survey's classification of a "B" soil, Canton Fine Sandy Loam.

Based on the above, the following worksheet summarizes the prescribed stormwater runoff volume required to be recharged to the groundwater based on the existing site soil conditions determined from current soils maps of the area along with onsite soil evaluations performed by a State of New Hampshire Certified Soil Scientist.





## GROUNDWATER RECHARGE VOLULME (GRV) CALCULATION (Env-Wq 1507.04)

	ac	Area of HSG A soil that was replaced by impervious cover	0.40"
1.56	ac	Area of HSG B soil that was replaced by impervious cover	0.25"
	ac	Area of HSG C soil that was replaced by impervious cover	0.10"
	ac	Area of HSG D soil or impervious cover that was replaced by impervious cover	0.0"
0.25 inches		Rd = Weighted groundwater recharge depth	
0.39 ac-in		GRV = AI * Rd	
1,416 cf		GRV conversion (ac-in x 43,560 sf/ac x 1ft/12")	

**Provide calculations below showing that the project meets the groundwater recharge requirements (Env-Wq 1507.04):**

Stormtrap Infiltration Basin 1P: Infiltration Volume Provided = 1,478 cf

Stormtrap Infiltration Basin 2P: Infiltration Volume Provided = 5,460 cf

Stormtrap Infiltration Basin 3P: Infiltration Volume Provided = 2,934 cf

Total = 9,872 cf

*Infiltration Practices & Water Quality*

To meet/exceed the prescribed stormwater runoff volume to be recharged to the groundwater, the project proposes the construction of multiple subsurface StormTrap infiltration systems on site (or approved equal). These can be identified as 1P, 2P and 3P. As shown on the following New Hampshire Department of Environmental Services Infiltration Practice worksheets, this combination of chambers will allow the project to meet recharge requirements. Drawdown time is also specified on these worksheets to prove that each practice will drain within 72 hours of a storm event.

The stormwater management system has been designed to provide treatment for stormwater runoff from concrete areas around the proposed building. Manholes fitted with deep sumps are proposed at each trench drain location. Oil particle separators are proposed for additional treatment. Water quality volumes for each practice are provided on the NHDES worksheets below.



## INFILTRATION PRACTICE CRITERIA (Env-Wq 1508.06)

**Type/Node Name:** Stormtrap Infiltration #2P

Enter the type of infiltration practice (e.g., basin, trench) and the node name in the drainage analysis, if applicable.

<b>Yes</b>		Have you reviewed Env-Wq 1508.06(a) to ensure that infiltration is allowed?	← yes
0.94	ac	A = Area draining to the practice	
0.94	ac	A <sub>I</sub> = Impervious area draining to the practice	
1.00	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.95	unitless	R <sub>v</sub> = Runoff coefficient = 0.05 + (0.9 x I)	
0.89	ac-in	WQV = 1" x R <sub>v</sub> x A	
3,224	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
806	cf	25% x WQV (check calc for sediment forebay volume)	
<b>Sump &amp; O/S Sep.</b>			
N/A	cf	V <sub>SED</sub> = Sediment forebay volume, if used for pretreatment	≥ 25%WQV
5,460	cf	V = Volume <sup>1</sup> (attach a stage-storage table)	≥ WQV
6,005	sf	A <sub>SA</sub> = Surface area of the bottom of the pond	
1.00	iph	K <sub>sat</sub> <sub>DESIGN</sub> = Design infiltration rate <sup>2</sup>	
6.4	hours	T <sub>DRAIN</sub> = Drain time = V / (A <sub>SA</sub> * I <sub>DESIGN</sub> )	< 72-hrs
394.00	feet	E <sub>BTM</sub> = Elevation of the bottom of the basin	
391.00	feet	E <sub>SHWT</sub> = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
9.50	feet	E <sub>ROCK</sub> = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
3.00	feet	D <sub>SHWT</sub> = Separation from SHWT	≥ * <sup>3</sup>
384.5	feet	D <sub>ROCK</sub> = Separation from bedrock	≥ * <sup>3</sup>
N/A	ft	D <sub>amend</sub> = Depth of amended soil, if applicable due high infiltration rate	≥ 24"
N/A	ft	D <sub>T</sub> = Depth of trench, if trench proposed	4 - 10 ft
Yes	Yes/No	If a trench or underground system is proposed, has observation well been provided?	← yes
N/A		If a trench is proposed, does material meet Env-Wq 1508.06(k)(2) requirements. <sup>4</sup>	← yes
N/A	Yes/No	If a basin is proposed, Is the perimeter curvilinear, and basin floor flat?	← yes
N/A	:1	If a basin is proposed, pond side slopes.	≥ 3:1
396.01	ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
396.46	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
397.75	ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES		10 peak elevation ≤ Elevation of the top of the trench? <sup>5</sup>	← yes
YES		If a basin is proposed, 50-year peak elevation ≤ Elevation of berm?	← yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. K<sub>sat</sub><sub>DESIGN</sub> includes a factor of safety. See Env-Wq 1504.14 for requirements for determining the infiltr. rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.
4. Clean, washed well graded diameter of 1.5 to 3 inches above the in-situ soil.
5. If 50-year peak elevation exceeds top of trench, the overflow must be routed in HydroCAD as secondary discharge.

**Designer's Notes:** Contributing area includes 100% of runoff from Back half of building roof. Some of this flow bypass' Pond 2P in larger storm events.

**PostDev Stormwater Model\_R2**

Prepared by BSC Group

HydroCAD® 10.00-22 s/n 00904 © 2018 HydroCAD Software Solutions LLC

Type III 24-hr 50-Year Rainfall=6.86"

Printed 5/24/2022

**Stage-Area-Storage for Pond 2P: Storm Trap**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
394.00	6,005	0	396.65	6,005	9,882
394.05	6,005	120	396.70	6,005	10,128
394.10	6,005	240	396.75	6,005	10,373
394.15	6,005	360	396.80	6,005	10,619
394.20	6,005	480	396.85	6,005	10,865
394.25	6,005	601	396.90	6,005	11,110
394.30	6,005	721	396.95	6,005	11,356
394.35	6,005	841	397.00	6,005	11,602
394.40	6,005	961	397.05	6,005	11,848
394.45	6,005	1,081	397.10	6,005	12,093
394.50	6,005	1,201	397.15	6,005	12,339
394.55	6,005	1,321	397.20	6,005	12,585
394.60	6,005	1,441	397.25	6,005	12,830
394.65	6,005	1,561	397.30	6,005	13,076
394.70	6,005	1,682	397.35	6,005	13,322
394.75	6,005	1,802	397.40	6,005	13,567
394.80	6,005	1,922	397.45	6,005	13,813
394.85	6,005	2,042	397.50	6,005	14,059
394.90	6,005	2,162	397.55	6,005	14,304
394.95	6,005	2,282	397.60	6,005	14,550
395.00	6,005	2,402	397.65	6,005	14,796
395.05	6,005	2,522	397.70	6,005	15,041
395.10	6,005	2,642	397.75	6,005	15,287
395.15	6,005	2,763	397.80	6,005	15,302
395.20	6,005	2,883	397.85	6,005	15,316
395.25	6,005	3,003	397.90	6,005	15,330
395.30	6,005	3,248	397.95	6,005	15,345
395.35	6,005	3,494	398.00	6,005	15,359
395.40	6,005	3,740	398.05	6,005	15,373
395.45	6,005	3,985	398.10	6,005	15,388
395.50	6,005	4,231	398.15	6,005	15,402
395.55	6,005	4,477	398.20	6,005	15,416
395.60	6,005	4,723	398.25	6,005	15,431
395.65	6,005	4,968			
395.70	6,005	5,214			
395.75	6,005	5,460			
395.80	6,005	5,705			
395.85	6,005	5,951			
395.90	6,005	6,197			
395.95	6,005	6,442			
396.00	6,005	6,688			
396.05	6,005	6,934			
396.10	6,005	7,179			
396.15	6,005	7,425			
396.20	6,005	7,671			
396.25	6,005	7,917			
396.30	6,005	8,162			
396.35	6,005	8,408			
396.40	6,005	8,654			
396.45	6,005	8,899			
396.50	6,005	9,145			
396.55	6,005	9,391			
396.60	6,005	9,636			

Lowest Outlet = 395.75  
WQV Required = 3,224 cf  
WQV Provided = 5,460 cf



## INFILTRATION PRACTICE CRITERIA (Env-Wq 1508.06)

**Type/Node Name:** **Stormtrap Infiltration #1P & 3P**

Enter the type of infiltration practice (e.g., basin, trench) and the node name in the drainage analysis, if applicable.

<b>Yes</b>		Have you reviewed Env-Wq 1508.06(a) to ensure that infiltration is allowed?	← yes
0.38	ac	A = Area draining to the practice	
0.38	ac	A <sub>I</sub> = Impervious area draining to the practice	
1.00	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.95	unitless	R <sub>v</sub> = Runoff coefficient = 0.05 + (0.9 x I)	
0.36	ac-in	WQV = 1" x R <sub>v</sub> x A	
1,310	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
328	cf	25% x WQV (check calc for sediment forebay volume)	
<b>Sump &amp; O/S Sep.</b>			
N/A	cf	V <sub>SED</sub> = Sediment forebay volume, if used for pretreatment	≥ 25%WQV
4,401	cf	V = Volume <sup>1</sup> (attach a stage-storage table)	≥ WQV
2,879	sf	A <sub>SA</sub> = Surface area of the bottom of the pond	
1.00	iph	K <sub>sat</sub> <sub>DESIGN</sub> = Design infiltration rate <sup>2</sup>	
5.5	hours	T <sub>DRAIN</sub> = Drain time = V / (A <sub>SA</sub> * I <sub>DESIGN</sub> )	< 72-hrs
Varies	feet	E <sub>BTM</sub> = Elevation of the bottom of the basin	
Varies	feet	E <sub>SHWT</sub> = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
Varies	feet	E <sub>ROCK</sub> = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
#VALUE!	feet	D <sub>SHWT</sub> = Separation from SHWT	≥ * <sup>3</sup>
#VALUE!	feet	D <sub>ROCK</sub> = Separation from bedrock	≥ * <sup>3</sup>
N/A	ft	D <sub>amend</sub> = Depth of amended soil, if applicable due high infiltration rate	≥ 24"
N/A	ft	D <sub>T</sub> = Depth of trench, if trench proposed	4 - 10 ft
Yes	Yes/No	If a trench or underground system is proposed, has observation well been provided?	← yes
N/A		If a trench is proposed, does material meet Env-Wq 1508.06(k)(2) requirements. <sup>4</sup>	← yes
N/A	Yes/No	If a basin is proposed, Is the perimeter curvilinear, and basin floor flat?	← yes
N/A	:1	If a basin is proposed, pond side slopes.	≥ 3:1
395.94	ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
396.42	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
396.45	ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES		10 peak elevation ≤ Elevation of the top of the trench? <sup>5</sup>	← yes
YES		If a basin is proposed, 50-year peak elevation ≤ Elevation of berm?	← yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. K<sub>sat</sub><sub>DESIGN</sub> includes a factor of safety. See Env-Wq 1504.14 for requirements for determining the infiltr. rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.
4. Clean, washed well graded diameter of 1.5 to 3 inches above the in-situ soil.
5. If 50-year peak elevation exceeds top of trench, the overflow must be routed in HydroCAD as secondary discharge.

**Designer's Notes:** 1. Area draining to practice includes 18% of roof square footage. Because of proposed outlet control structure, DMH 102, 18% of the roof runoff flow is the highest percentage that contributes to the inflow of ponds 1P & 3P.

2. Depth to groundwater varies based on location but minimum 3' was held for design. See plans for details.

**PostDev Stormwater Model\_R2**

Prepared by BSC Group

HydroCAD® 10.00-22 s/n 00904 © 2018 HydroCAD Software Solutions LLC

Type III 24-hr 2-Year Rainfall=3.02"

Printed 5/25/2022

**Stage-Area-Storage for Pond 1P: Storm Trap**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
394.00	1,241	0	396.65	1,241	1,940
394.05	1,241	25	396.70	1,241	1,987
394.10	1,241	50	396.75	1,241	2,035
394.15	1,241	74	396.80	1,241	2,082
394.20	1,241	99	396.85	1,241	2,129
394.25	1,241	124	396.90	1,241	2,176
394.30	1,241	149	396.95	1,241	2,223
394.35	1,241	174	397.00	1,241	2,270
394.40	1,241	199	397.05	1,241	2,317
394.45	1,241	223	397.10	1,241	2,365
394.50	1,241	248	397.15	1,241	2,412
394.55	1,241	273	397.20	1,241	2,459
394.60	1,241	298	397.25	1,241	2,506
394.65	1,241	323	397.30	1,241	2,553
394.70	1,241	347	397.35	1,241	2,600
394.75	1,241	372	397.40	1,241	2,647
394.80	1,241	397	397.45	1,241	2,695
394.85	1,241	422	397.50	1,241	2,742
394.90	1,241	447	397.55	1,241	2,789
394.95	1,241	471	397.60	1,241	2,836
395.00	1,241	496	397.65	1,241	2,883
395.05	1,241	521	397.70	1,241	2,930
395.10	1,241	546	397.75	1,241	2,977
395.15	1,241	571	397.80	1,241	2,983
395.20	1,241	596	397.85	1,241	2,989
395.25	1,241	620	397.90	1,241	2,994
395.30	1,241	667	397.95	1,241	3,000
395.35	1,241	715	398.00	1,241	3,005
395.40	1,241	762	398.05	1,241	3,011
395.45	1,241	809	398.10	1,241	3,016
395.50	1,241	856	398.15	1,241	3,022
395.55	1,241	903	398.20	1,241	3,028
395.60	1,241	950	398.25	1,241	3,033
395.65	1,241	997			
395.70	1,241	1,045			
395.75	1,241	1,092			
395.80	1,241	1,139			
395.85	1,241	1,186			
395.90	1,241	1,233			
395.95	1,241	1,280			
396.00	1,241	1,327			
396.05	1,241	1,375			
396.10	1,241	1,422			
396.15	1,241	1,469			
396.20	1,241	1,516			
396.25	1,241	1,563			
396.30	1,241	1,610			
396.35	1,241	1,657			
396.40	1,241	1,705			
396.45	1,241	1,752			
396.50	1,241	1,799			
396.55	1,241	1,846			
396.60	1,241	1,893			

Lowest Outlet = 396.16

WQV Required = 1,310 cf (For 1P &amp; 3P Combined)

WQV Provided = 1,478 cf (1P Only)

**PostDev Stormwater Model\_R2**

Prepared by BSC Group

HydroCAD® 10.00-22 s/n 00904 © 2018 HydroCAD Software Solutions LLC

Type III 24-hr 2-Year Rainfall=3.02"

Printed 5/25/2022

**Stage-Area-Storage for Pond 3P: Storm Trap**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
393.25	1,638	0	395.90	1,638	2,603
393.30	1,638	33	395.95	1,638	2,667
393.35	1,638	66	396.00	1,638	2,731
393.40	1,638	98	396.05	1,638	2,794
393.45	1,638	131	396.10	1,638	2,858
393.50	1,638	164	396.15	1,638	2,922
393.55	1,638	197	396.20	1,638	2,985
393.60	1,638	229	396.25	1,638	3,049
393.65	1,638	262	396.30	1,638	3,113
393.70	1,638	295	396.35	1,638	3,177
393.75	1,638	328	396.40		
393.80	1,638	360	396.45		
393.85	1,638	393	396.50		
393.90	1,638	426	396.55		
393.95	1,638	459	396.60	1,638	3,495
394.00	1,638	491	396.65	1,638	3,559
394.05	1,638	524	396.70	1,638	3,623
394.10	1,638	557	396.75	1,638	3,686
394.15	1,638	590	396.80	1,638	3,750
394.20	1,638	622	396.85	1,638	3,814
394.25	1,638	655	396.90	1,638	3,878
394.30	1,638	688	396.95	1,638	3,941
394.35	1,638	721	397.00	1,638	4,005
394.40	1,638	753	397.05	1,638	4,069
394.45	1,638	786	397.10	1,638	4,132
394.50	1,638	819	397.15	1,638	4,196
394.55	1,638	883	397.20	1,638	4,260
394.60	1,638	946	397.25	1,638	4,324
394.65	1,638	1,010	397.30	1,638	4,387
394.70	1,638	1,074	397.35	1,638	4,451
394.75	1,638	1,137	397.40	1,638	4,515
394.80	1,638	1,201	397.45	1,638	4,578
394.85	1,638	1,265	397.50	1,638	4,642
394.90	1,638	1,329	397.55	1,638	4,649
394.95	1,638	1,392	397.60	1,638	4,656
395.00	1,638	1,456	397.65	1,638	4,663
395.05	1,638	1,520	397.70	1,638	4,669
395.10	1,638	1,584	397.75	1,638	4,676
395.15	1,638	1,647	397.80	1,638	4,683
395.20	1,638	1,711	397.85	1,638	4,690
395.25	1,638	1,775	397.90	1,638	4,697
395.30	1,638	1,838	397.95	1,638	4,704
395.35	1,638	1,902	398.00	1,638	<b>4,710</b>
395.40	1,638	1,966			
395.45	1,638	2,030			
395.50	1,638	2,093			
395.55	1,638	2,157			
395.60	1,638	2,221			
395.65	1,638	2,284			
395.70	1,638	2,348			
395.75	1,638	2,412			
395.80	1,638	2,476			
395.85	1,638	2,539			

Lowest Outlet = 396.16  
 WQV Required = 1,310 cf (For 1P & 3P Combined)  
 WQV Provided = 2,934 cf (3P Only)

## **1.05 CONCLUSIONS**

The proposed site development is an effort for the applicant to provide a more efficient, safe and technologically advanced facility to support their employees and future business. The measures that will be taken to mitigate the adverse effects of increased stormwater runoff as part of this project are in line with local and state practices and guidelines and should prove effective in protecting the property, abutting properties, existing wetland areas and other nearby undeveloped lands. The post construction peak runoff rates will decrease or remain the same at each point of analysis for all analyzed storm events. Appropriate steps, including the use of temporary erosion controls, drainage swales, deep sump manholes, oil particle separators, infiltration/attenuation chambers, outlet control structures, level spreaders and proposed site grading inline with stormwater control Best Management Practices, will be taken to control erosion and sedimentation both during and post construction. The applicant will also be provided with information on the guidelines for inspection, operation and maintenance of these systems to ensure they are operating effectively for the future.



## **SECTION 2.0**

### **LONG-TERM POLLUTION PREVENTION & OPERATION & MAINTENANCE PLAN**

## **LONG-TERM POLLUTION PREVENTION & OPERATION & MAINTENANCE PLAN**

As recommended by the New Hampshire Department of Environmental Services Stormwater Manual, this Long-Term Pollution Prevention Plan has been developed for source control and pollution prevention at the site after construction.

### **MAINTENANCE RESPONSIBILITY**

The enforcement of the Long-Term Operation and Maintenance Plan will be the responsibility of the Owner, Shea Concrete, who is the owner and occupant of 160 Old Turnpike Road, Nottingham, New Hampshire.

### **GOOD HOUSEKEEPING PRACTICES**

The site is to be kept clean of trash and debris at all times. Trash, junk, etc. is not to be left outside and will be subject to removal at the owner's expense.

### **VEHICLE WASHING CONTROLS**

The following BMP's, or equivalent measures, methods or practices are required if you are engaged in vehicle washing and/or steam cleaning:

It is allowable to rinse down the body or a vehicle, including the bed of a truck, with just water without doing any wash water control BMP's.

If you wash (with mild detergents) on an area that infiltrates water, such as gravel, grass, or loose soil, it is acceptable to let the wash water infiltrate as long as you only wash the body of vehicles.

However, if you wash on a paved area and use detergents or other cleansers, or if you wash/rinse the engine compartment or the underside of vehicles, you must take the vehicles to a commercial vehicle wash.

### **REQUIREMENTS FOR ROUTINE INSPECTIONS AND MAINTENANCE OF STORMWATER BEST MANAGEMENT PRACTICES**

All stormwater Best Management Practices (BMP's) are to be inspected and maintain as follows. Each inspection report should include photos of each BMP and Inspection & Maintenance Reports shall be provided to NHDES upon request.

#### ***Haybales, Silt Fences, and Other Temporary Measures***

The temporary erosion control measures will be installed up gradient of any wetland resource area where any disturbance or alteration might otherwise allow for erosion or sedimentation. They will be regularly inspected to ensure that they are functioning adequately. Additional supplies of these temporary measures will be stockpiled on site for any immediate needs or routine replacement. Accumulated sediment shall be removed when it reaches a depth of half the height of the TEC measure or one foot, whichever is less.

#### ***Construction Entrance***

Stone used for the construction entrance should be large enough so that it does not get picked up and tracked off of the site by the vehicle traffic. Sharp edged stone should not be used to avoid puncturing tires. Additional stone may have to be added to maintain effectiveness.

If vehicles will be turning onto paved road or drive from the stabilized construction entrance, then an apron should be provided so that vehicles do not go off of the stabilized construction entrance before they leave the site.

The temporary construction entrance may be provided with a vehicle wash rack which drains to a temporary sediment trap or other sediment removing measure. This will allow vehicle tires to be washed prior to leaving the site and ensure that wash water sediments are removed and can be properly disposed of.

### ***Trench Drains***

Trench drains are proposed on site to collect stormwater runoff from the concrete building apron and convey it to the deep sump manholes attached to the outlet of each drain. Regular inspection for sediment and/or leaf/litter buildup is essential for this structure to ensure proper functionality. Remove any build-up of debris that may restrict water flow to the deep sump manholes.

### ***Area Drains/Deep Sump Manholes***

Regular maintenance is essential. Area drains & deep sump manholes remain effective at removing pollutants only if they are cleaned out frequently. Inspect or clean area drains and deep sump manholes at least four times per year and at the end of the foliage and snow removal seasons. Sediments must also be removed four times per year or whenever the depth of the deposits in the area drain and manhole sump is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe.

### ***Pipe Outlet Protection***

The outlet protection should be checked at least annually and after every major storm. If the riprap has been displaced, undermined or damaged, it should be repaired immediately. The channel immediately below the outlet should be checked to see that erosion is not occurring. The downstream channel should be kept clear of obstructions such as fallen trees, debris, and sediment that could change flow patterns and/or tailwater depths on the pipes. Repairs must be carried out immediately to avoid additional damage to the outlet protection apron.

### ***Oil/Particle Separators***

Sediments and associated pollutants and trash are removed only when inlets or sumps are cleaned out, so regular maintenance is essential. Most studies have linked the failure of oil grit separators to the lack of regular maintenance. The more frequent the cleaning, the less likely sediments will be resuspended and subsequently discharged. In addition, frequent cleaning also makes more volume available for future storms and enhances overall performance. Cleaning includes removal of accumulated oil and grease and sediment using a vacuum truck or other ordinary catch basin cleaning device. In areas of high sediment loading, inspect and clean inlets after every major storm. At a minimum, inspect oil grit separators monthly, and clean them out at least twice per year. Polluted water or sediments removed from an oil grit separator should be disposed of in accordance with all applicable local, state and federal laws.

### ***Grass Swale***

Incorporate a maintenance and inspection schedule into the design to ensure the effectiveness of water quality swales. Inspect swales during the first few months after installation to make sure that the vegetation in the swales becomes adequately established. Thereafter, inspect swales twice a

year. During the inspections, check the swales for slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion, ponding and sedimentation.

Regular maintenance includes mowing, fertilizing, liming, watering, pruning, and weed and pest control. Mow swales at least once per year. Do not cut the grass shorter than three to four inches, otherwise the effectiveness of the vegetation in reducing flow velocity and removing pollutants may be reduced. Do not let grass height exceed 6 inches.

Invasive species management of swales shall have a common goal of preventing and controlling the spread of invasive plant, insect, and fungal species. Such that all prohibited invasive species shall only be disposed of in a manner that renders them nonliving and nonviable.

Manually remove sediment and debris at least once per year, and periodically re-seed, if necessary, to maintain a dense growth of vegetation. Take care to protect grass swales from snow removal and disposal practices and off-street parking. When grass swales are located on private residential property, the operation and maintenance plan must clearly identify the property owner who is responsible for carrying out the required maintenance.

### ***Subsurface Infiltration Areas***

Maintenance is required for the proper operation of the underground infiltration systems. Infiltration systems are prone to failure due to clogging if the upstream water quality units are not maintained. The use of pretreatment BMPs will minimize failure and maintenance requirements.

After construction, the infiltration systems should be inspected after every major storm for the first few months to ensure proper stabilization and function. Water levels in the access ports should be recorded over several days to check the drainage of the systems. It is recommended that a logbook be maintained showing the depth of water in the detention/infiltration systems at each observation in order to determine the rate at which the system dewateres after runoff producing storm events. Standing water within the infiltration areas 48 to 72 hours after a storm indicates that the infiltration capacity may have been overestimated or clogging may be occurring. Once the performance characteristics of the detention/infiltration have been verified, the monitoring schedule can be reduced to a bi-annual basis, unless the performance data suggests that a more frequent schedule is required.

Preventive maintenance on subsurface infiltration systems should be performed at least twice a year, and sediment should be removed from any and all pretreatment and collection structures. Sediment should be removed when deposits approach within six inches of the invert heights of connecting pipes, or in sumped inlet structures. Follow StormTrap guidelines and recommendations for additional infiltration system inspection and maintenance guidance.

### ***Level Spreaders***

Inspect level spreaders regularly, especially after large rainfall events. Note and repair any erosion or low spots in the spreader. Keep level spreader areas clean of debris.

### ***Deep Sump Manhole Inserts (SNOUT Trap or Approved Equal)***

Inspect deep sump manhole Inserts per the manufacturer's schedule, and especially after large rainfall events. Inspect the anti-siphon vent and access hatch annually, at a minimum. Flush vent,

or rod gently with flexible wire to maintain anti siphon properties. Refer to SNOUT Trap maintenance guidelines for additional information.

### **SNOW DISPOSAL AND PLOWING PLANS**

The purpose of the snow and snowmelt management plan is to provide guidelines regarding snow disposal site selection, site preparation and maintenance that are acceptable to the Department of Environmental Services. For the areas that require snow removal, snow storage onsite will largely be accomplished by using pervious upland areas away from wetlands as designated on the Site Plans. There are adequate snow storage areas located within parking lot islands and edges of paved areas away from the wetland resource areas for small frequent snowfall events. For larger snowfall events or for additional snow storage space, snowfall will be required to be hauled offsite to a snow stockpile area meeting DES requirements.

Snow disposal areas have been identified on the Site Plans. The key to selecting effective snow disposal sites is to locate them adjacent to or on pervious surfaces in upland areas away from water resources and wells. At these locations, the snow meltwater can filter into the soil, leaving behind sand and debris, which can be removed in the springtime. The following areas should be avoided:

- Avoid dumping of snow into any waterbody, including rivers, the ocean, reservoirs, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.

### **WINTER ROAD SALT AND/OR SAND USE AND STORAGE RESTRICTIONS**

Road salt and sand is prohibited from being stored onsite. All deicing activities are to be monitored and documented in the deicing log, attached at the end of this section.

### **STREET SWEEPING SCHEDULES**

Effective sweeping requires access to the areas to be swept. It is essential that applicants or those responsible for stormwater maintenance have the ability to impose parking regulations to facilitate proper sweeping, particularly in densely populated or heavily traveled areas, so that sweepers can get as close to curbs as possible. Residents are to be notified prior to street sweeping operations so that paved areas can be clear of vehicles and any other items.

There are three types of sweepers: Mechanical, Regenerative Air, and Vacuum Filter. Each has a different ability to remove TSS.

- 1) Mechanical: Mechanical sweepers use brooms or rotary brushes to scour the pavement. Although most of the sweepers currently in use in New Hampshire are mechanical sweepers, they are not effective at removing TSS (from 0% to 20% removal). Mechanical sweepers are especially ineffective at picking up fine particles ("fines") (less than 100 microns).
- 2) Regenerative Air: These sweepers blow air onto the road or parking lot surface, causing fines to rise where they are vacuumed. Regenerative air sweepers may blow fines off the vacuumed portion of the roadway or parking lot, where they contaminate stormwater when it rains.
- 3) Vacuum filter: These sweepers remove fines along roads. Two general types of vacuum filter sweepers are available - wet and dry. The dry type uses a broom in combination with the vacuum. The wet type uses water for dust suppression. Research indicates vacuum sweepers are highly effective in removing TSS.

Regardless of the type chosen, the efficiency of street sweeping is increased when sweepers are operated in tandem. The following table summarizes the frequency of the site street sweeping based on the type of sweeper used.

#### Reuse and Disposal of Street Sweepings

Once removed from paved surfaces, the sweeping must be handled and disposed of properly. Street sweeping waste must be disposed of or reused in accordance with NHDES Environmental Fact Sheet WMD-SW-32, Management of Street Wastes.

#### **TRAINING OF STAFF OR PERSONNEL INVOLVED WITH IMPLEMENTING LONG-TERM POLLUTION PREVENTION & OPERATION & MAINTENANCE PLAN**

The Long-Term Pollution Prevention & Operation & Maintenance Plan is to be implemented by property owner of the site. Trained and, if required, licensed Professionals are to be hired by the owner as applicable to implement the Long-Term Pollution Prevention Plan.

#### **LIST OF EMERGENCY CONTACTS FOR IMPLEMENTING LONG-TERM POLLUTION PREVENTION & OPERATION & MAINTENANCE PLAN**

The Owner along with the Lease holder, if applicable, will be required to maintain an updated list of Emergency Contacts for the site.

## **SECTION 3.0**

### **CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN (STORM WATER POLLUTION PREVENTION PLAN - SWPPP)**

# **CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN**

## **(STORM WATER POLLUTION PREVENTION PLAN - SWPPP)**

This Section specifies requirements and suggestions for implementation of a Storm Water Pollution Prevention Plan (SWPPP) for the development of **160 Old Turnpike Road in Nottingham, New Hampshire**.

The storm water pollution prevention measures contained in this SWPPP shall be at least the minimum required by Local Regulations. The Contractor shall provide additional measures to prevent pollution from stormwater discharges in compliance with the Environmental Protection Agency's (EPA) National Pollution Discharge Elimination System (NPDES) 2022 Construction General Permit requirements and all other local, state and federal requirements.

The Contractor shall NOT begin construction without submitting evidence that a NPDES Notice of Intent (NOI) governing the discharge of storm water from the construction site for the entire construction period has been filed at least fourteen days prior to construction. It is the Contractor's responsibility to complete and file the NOI.

The cost of any fines, construction delays and remedial actions resulting from the Contractor's failure to comply with all provisions of local regulations and Federal NPDES permit requirements shall be paid for by the Contractor at no additional cost to the Owner.

As a requirement of the EPA's NPDES permitting program, each Contractor and Subcontractor responsible for implementing and maintaining stormwater Best Management Practices shall execute a Contractor's Certification form.

The SWPPP shall include provisions for, but not be limited to, the following:

1. Construction Trailers
2. Lay-down Areas
3. Equipment Storage Areas
4. Stockpile Areas
5. Disturbed Areas

### **1.0 Erosion and Sedimentation Control**

The Contractor shall be solely responsible for erosion and sedimentation control at the site. The Contractor shall utilize a system of operations and all necessary erosion and sedimentation control measures, even if not specified herein or elsewhere, to minimize erosion damage at the site to prevent the migration of sediment into environmentally sensitive areas. Environmentally sensitive areas include all wetland resource areas within, and downstream of, the site, and those areas of the site that are not being altered.

Erosion and sedimentation control shall be in accordance with this Section, the design drawings, and the following:

- ☐ "Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices" (EPA 832-R92-005, Sept. 1992).
- ☐ "Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices – Summary Guidance" (EPA 833-R92-001, Oct. 1992).
- ☐ New Hampshire Stormwater Manual (Volumes II & III) issued by the New Hampshire Department of Environmental Services, December, 2008.

The BMP's presented herein should be used as a guide for erosion and sedimentation control and are not intended to be considered specifications for construction. The most important BMP is maintaining a rapid construction process, resulting in prompt stabilization of surfaces, thereby reducing erosion potential. Given the primacy of rapid



construction, these guidelines have been designed to allow construction to progress with essentially no hindrance by the erosion control methods prescribed. These guidelines have also been designed with sufficient flexibility to allow the contractor to modify the suggested methods as required to suit seasonal, atmospheric, and site-specific physical constraints.

Another important BMP is the prevention of concentrated water flow. Sheet flow does not have the erosive potential of a concentrated rivulet. These guidelines recommend construction methods that allow localized erosion control and a system of construction, which inhibits the development of shallow concentrated flow. These BMP's shall be maintained throughout the construction process.

## **2.0 CONTACT INFORMATION AND RESPONSIBLE PARTIES**

The following is a list of all project-associated parties:

### **Owner/Applicant**

Shea Concrete  
87 Haverhill Avenue  
Amesbury, Massachusetts, 01950  
Phone: 978-988-3900

Contact: George Saurman

### **Contractor**

To Be Determined

### **Environmental Consultant**

BSC Group  
803 Summer Street  
Boston, MA 02127

Contact: Taylor Dowdy  
Phone: (617) 896 – 4300  
Email: tdowdy@bscgroup.com

## **3.0 Procedural Conditions of the Construction General Permit (CGP)**

The following list outlines the Storm Water responsibilities for all construction operators working on the Project. The operators below agree through a cooperative agreement to abide by the following conditions throughout the duration of the construction project, effective the date of signature of the required SWPPP. These conditions apply to all operators on the project site.

## **4.0 Project Description and Intended Construction Sequence**

The applicant is planning expand their existing precast concrete production facility on site. The site is currently comprised of a 6,800 square foot building and gravel storage and parking areas. The development will include a proposed 90'x250' manufacturing facility surrounded by a 50' concrete building apron on all sides. A proposed septic system is also proposed to accommodate the new building.

- Construction of a 90'x250' precast concrete structure manufacturing facility
- Construction of a concrete building apron that extends 50' from the proposed building in all directions
- Landscaping, grading and utility installation
- Installation of a 30,000 gallon fire cistern and paved access pad
- Construction of a new septic system to accommodate the proposed building

Soil disturbing activities will include site clearing & grubbing, installing stabilized construction exits, installation of erosion and sedimentation controls, grading, storm drain inlets, utilities, building foundations, final seeding, mulching and landscaping. Please refer to Table 1 for the projects anticipated construction timetable. A description of BMP's associated with project timetable and construction-phasing elements is provided in section 4.2 of this SWPPP.

**Table 1 – Anticipated Construction Timetable**

Construction Phasing Activity	Anticipated Timetable
Grubbing and Stripping of Limits of Construction Phase	To be determined
Rough Site Grading and Site Utilities	To be determined
Installation of drainage features	To be determined
Building Foundation and Shell	To be determined
Landscaping	To be determined
Final Clean-up	To be determined

## **5.0 Potential Sources of Pollution**

Any project site activities that have the potential to add pollutants to runoff are subject to the requirements of this sample SWPPP. Listed below is a description of potential sources of pollution from both sedimentation to Storm Water runoff, and pollutants from sources other than sedimentation.

**Table 2 – Potential Sources of Sediment to Storm Water Runoff**

Potential Source	Activities/Comments
Construction Site Entrance and Site Vehicles	Vehicles leaving the site can track soils onto public roadways. Site Vehicles can readily transport exposed soils throughout the site and off-site areas.
Grading Operations	Exposed soils have the potential for erosion and discharge of sediment to off-site areas.
Material Excavation, Relocation, and Stockpiling	Stockpiling of materials during excavation and relocation of soils can contribute to erosion and sedimentation. In addition fugitive dust from stockpiled material, vehicle transport and site grading can be deposited in wetlands and waterway.
Landscaping Operations	Landscaping operations specifically associated with exposed soils can contribute to erosion and sedimentation. Hydroseeding if not properly applied can runoff to adjacent wetlands and waterways.

**Table 3 – Potential Pollutants and Sources, other than Sediment to Storm Water Runoff**

Potential Source	Activities/Comments
Staging Areas and Construction Vehicles	Vehicle refueling, minor equipment maintenance, sanitary facilities and hazardous waste storage
Materials Storage Area	General building materials, solvents, adhesives, paving materials, paints, aggregates, trash, etc.
Construction Activities	Construction, paving, curb/gutter installation, concrete pouring/mortar/stucco

## **6.0 Erosion and Sedimentation Control Best Management Practices**

The project site is characterized by a mix of gravel parking and storage areas, proposed impervious surface and forested areas. All construction activities will implement Best Management Practices (BMP's) in order to minimize overall site disturbance and impacts to the sites natural features. Please refer to the following sections for a detailed

description of site specific BMP's. In addition, an Erosion and Sedimentation Control Plan is provide in the Site Plans.

## **7.0 Timetable and Construction Phasing**

This section provides the Owner and Contractor with a suggested order of construction that shall minimize erosion and the transport of sediments. The individual objectives of the construction techniques described herein shall be considered an integral component of the project design intent of each project phase. The construction sequence is not intended to prescribe definitive construction methods and should not be interpreted as a construction specification document. However, the Contractor shall follow the general construction phase principles provided below:

- Protect and maintain existing vegetation wherever possible.
- Minimize the area of disturbance.
- To the extent possible, route unpolluted flows around disturbed areas.
- Install mitigation devices as early as possible.
- Minimize the time disturbed areas are left unstabilized.
- Maintain siltation control devices in proper condition.
- The contractor should use the suggested sequence and techniques as a general guide and modify the suggested methods and procedures as required to best suit seasonal, atmospheric, and site specific physical constraints for the purpose of minimizing the environmental impact of construction.

### **Demolition, Grubbing and Stripping of Limits of Construction Phase**

- Install TEC devices as required to prevent sediment transport into resource areas.
- Place a ring of silt socks and/or hay bales around stockpiles.
- Stabilize all exposed surfaces that will not be under immediate construction.
- Store and/or dispose all pavement and building demolition debris as indicated in accordance with all applicable local, state, and federal regulations.

### **Paved Areas Sub-base Construction**

- Install temporary culverts and diversion ditches and additional TEC devices as required by individual construction area constraints to direct potential runoff toward detention areas designated for the current construction phase.
- Compact gravel as work progresses to control erosion potential.
- Apply water to control air suspension of dust.
- Avoid creating an erosive condition due to over-watering.
- Install piped utility systems as required as work progresses, keeping all inlets sealed until all downstream drainage system components are functional.

### **Binder Construction**

- Fine grade gravel base and install processed gravel to the design grades.
- Compact pavement base as work progresses.
- Install pavement binder coat starting from the downhill end of the site and work toward the top.

### **Finish Paving**

- Repair and stabilize damaged side slopes.
- Clean inverts of drainage structures.
- Install final top coat of pavement.

### **Final Clean-up**

- Clean inverts of culverts and catch basins.
- Remove sediment and debris form rip-rap outlet areas.
- Remove TEC devices only after permanent vegetation and erosion control has been fully established.

## **8.0 Site Stabilization**

### **Grubbing Stripping and Grading**

- Erosion control devices shall be in place as shown on the design plans before grading commences.
- Stripping shall be done in a manner, which will not concentrate runoff. If precipitation is expected, earthen berms shall be constructed around the area being stripped, with a silt sock, silt fence or hay bale dike situated in an arc at the low point of the berm.
- If intense precipitation is anticipated, silt socks, hay bales, dikes and /or silt fences shall be used as required to prevent erosion and sediment transport. The materials required shall be stored on site at all time.
- If water is required for soil compaction, it shall be added in a uniform manner that does not allow excess water to flow off the area being compacted.
- Dust shall be held at a minimum by sprinkling exposed soil with an appropriate amount of water.

### **Maintenance of Disturbed Surfaces**

- Runoff shall be diverted from disturbed side slopes in both cut and fill.
- Mulching may be used for temporary stabilization.
- Silt sock, hay bale or silt fences shall be set where required to trap products of erosion and shall be maintained on a continuing basis during the construction process.

### **Loaming and Seeding**

- Loam shall not be placed unless it is to be seeded directly thereafter.
- All disturbed areas shall have a minimum of 4" of loam placed before seeded and mulched.
- Consideration shall be given to hydro-mulching, especially on slopes in excess of 3 to 1.
- Loamed and seeded slopes shall be protected from washout by mulching or other acceptable slope protection until vegetation begins to grow.

### **Storm Water Collection System Installation**

- The Storm Water drainage system shall be installed from the downstream end up and in a manner which will not allow runoff from disturbed areas to enter pipes.
- Excavation for the drainage system shall not be left open when rainfall is expected overnight. If left open under other circumstances, pipe ends shall be closed by a staked board or by an equivalent method.
- All catch basin openings shall be covered by a silt bag between the grate and the frame or protected from sediment by silt fence surrounding the catch basin grate.

### **Completion of Paved Areas**

- During the placement of sub-base and pavement, the entrance to the Storm Water drainage systems shall be sealed when rain is expected. When these entrances are closed, consideration must be given to the direction of run-off and measures shall be undertaken to minimize erosion and to provide for the collection of sediment.
- In some situations it may be necessary to keep catch basins open.
- Appropriate arrangements shall be made downstream to remove all sediment deposition.

### **Stabilization of Surfaces**

- Stabilization of surfaces includes the placement of pavement, rip-rap, wood bark mulch and the establishment of vegetated surfaces.
- Upon completion of construction, all surfaces shall be stabilized even though it is apparent that future construction efforts will cause their disturbance.
- Vegetated cover shall be established during the proper growing season and shall be enhanced by soil adjustment for proper pH, nutrients and moisture content.
- Surfaces that are disturbed by erosion processes or vandalism shall be stabilized as soon as possible.
- Areas where construction activities have permanently or temporarily ceased shall be stabilized within 14 days from the last construction activity, except when construction activity will resume within 21 days (e.g., the total time period that construction activity is temporarily ceased is less than 21 days).

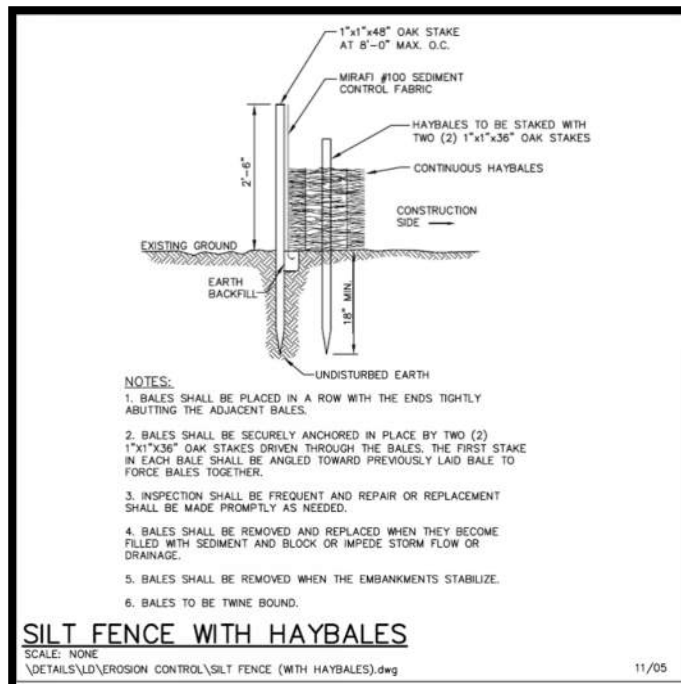
- Hydro-mulching of grass surfaces is recommended, especially if seeding of the surfaces is required outside the normal growing season.
- Hay mulch is an effective method of temporarily stabilizing surfaces, but only if it is properly secured by branches, weighted snow fences or weighted chicken wire.

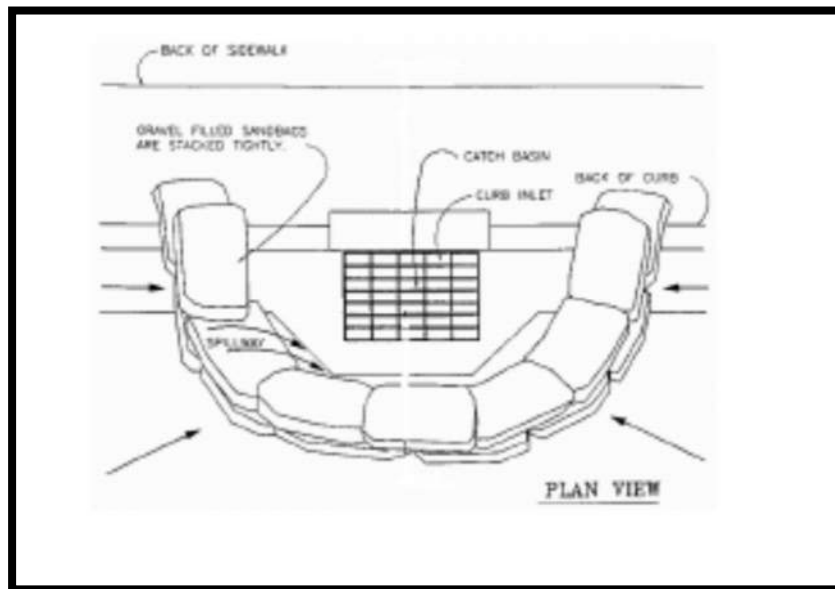
## 9.0 Temporary Structural Erosion Control Measures

Temporary erosion control measures serve to minimize construction-associated impacts to wetland resource and undisturbed areas. Please refer to the following sections for a description of temporary erosion control measures implemented as part of the project and this sample SWPPP.

### 9.01 Silt Socks, Haybales, and Silt Fencing

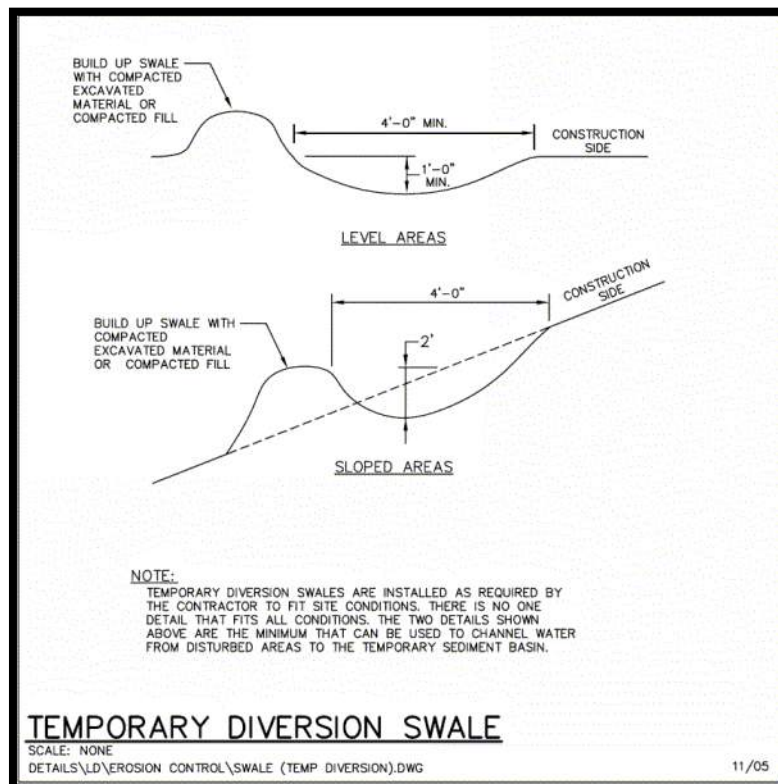
Siltation barriers composed of silt socks and double-staked hay bales and trenched silt fence will be installed within the 100-foot buffer zone along the upland side of delineated wetland resources. The siltation barriers will demarcate the limit of work, form a work envelope and provide additional assurance that construction equipment will not enter the adjacent wetlands or undisturbed portions of the site. All barriers will remain in place until disturbed areas are stabilized.





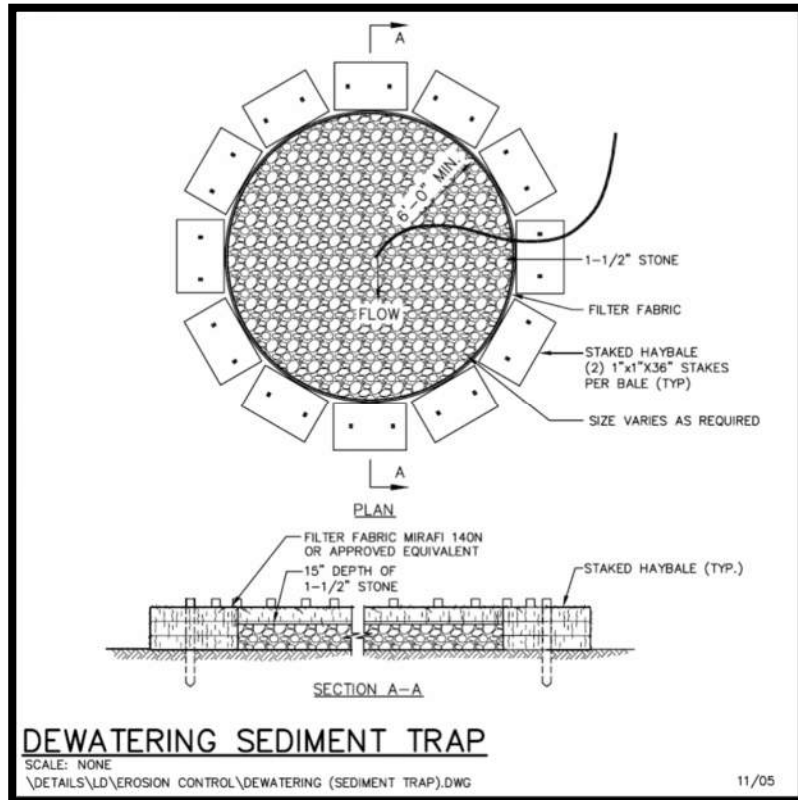
## 9.02 Temporary Storm Water Diversion Swale

A temporary diversion swale is an effective practice for temporarily diverting Storm Water flows and to reduce Storm Water runoff velocities during storm events. The swale channel can be installed before infrastructure construction begins at the site, or as needed throughout the construction process. The diversion swale should be routinely compacted or seeded to minimize the amount of exposed soil.



### 9.03 Dewatering Basins

Dewatering may be required during Storm Water system, foundation construction and utility installation. Should the need for dewatering arise, groundwater will be pumped directly into a temporary settling basin, which will act as a sediment trap during construction. All temporary settling basins will be located within close proximity of daily work activities. Prior to discharge, all groundwater will be treated by means of the settling basin or acceptable substitute. Discharges from sediment basins will be free of visible floating, suspended and settleable solids that would impair the functions of a wetland or degrade the chemical composition of the wetland resource area receiving ground or surface water flows and will be to the combined system.



### 9.04 Material Stockpiling Locations

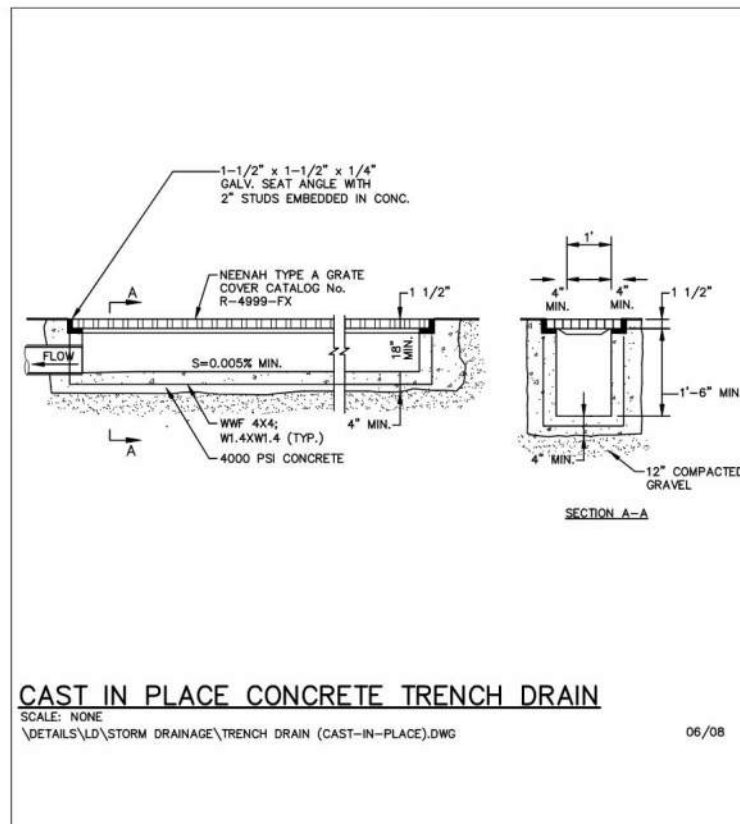
There will be no storage of soil, gravel or construction debris within the 100-foot buffer zone to wetland resource areas. It is anticipated that all excavated material will be placed in a dump truck and stockpiled outside the 100-foot buffer zone during construction activities. Piping and trench excavate associated with the subsurface utility work will be contained with a single row of silt socks and/or hay bales.

## 10.0 Permanent Structural Erosion Control Measures

Permanent erosion control measures serve to minimize post-construction impacts to wetland resource areas and undisturbed areas. Please refer to the following sections for a description of permanent erosion control measures implemented as part of the project and this SWPPP.

### 10.01 Trench Drains with Deep Sump Manholes

Impervious areas will be provided with trench drains, connected to deep sump manholes to collect and treat runoff. The drainage system for the project will be installed in the early phases of the project. The collection system will be installed from the downstream end up, and in a manner which will not allow runoff from disturbed areas to enter the pipes. The deep sump manholes will be inspected and cleaned as necessary when sediment depth of equal to one half the height from the sump to the lowest pipe invert or at least two times per year. Trench drains will be inspected and cleaned at least four times per year and whenever accumulated sediment or debris restricts stormwater flow. The optimum time for cleaning is during the period just after the snowmelt of late winter and prior to the onset of heavy spring precipitation. All sediments and hydrocarbons will be properly handled and disposed of in accordance with local state and federal guidelines and regulations.



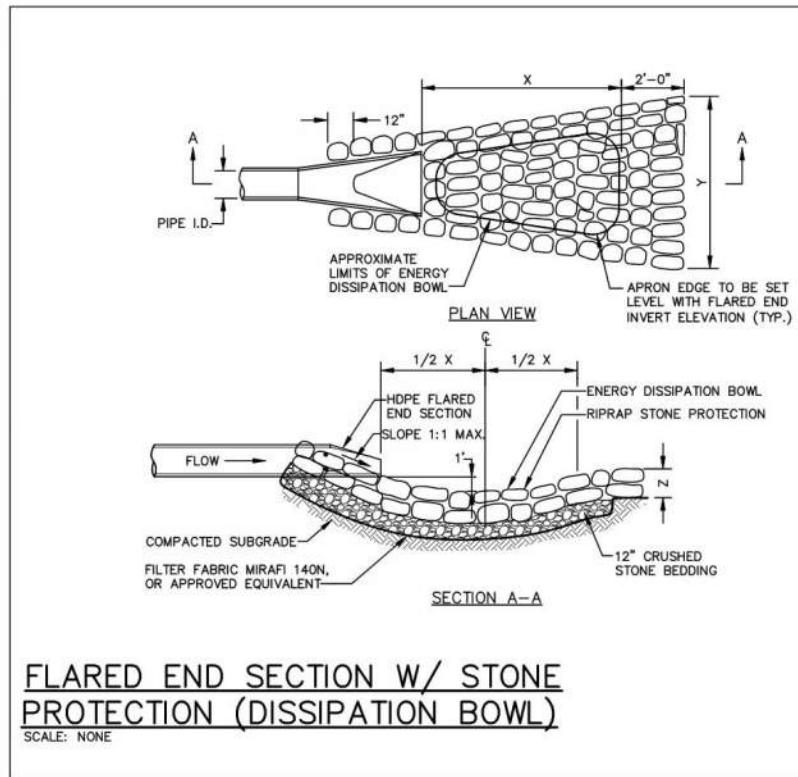
06/08





### 10.02 Flared End Section w/Stone Protection (Dissipation Bowl)

Inspect dissipation bowls regularly, especially after large rainfall events. Note and repair any erosion or low spots in the dissipation bowl. Inspect for and remove any debris, leaf or trash collected in dissipation bowl.



## 11.0 Good Housekeeping Best Management Practices

### 11.01 Material Handling and Waste Management

Solid waste generation during the construction period will be primarily construction debris. The debris will include scrap lumber (used forming and shoring pallets and other shipping containers), waste packaging materials (plastic sheeting and cardboard), scrap cable and wire, roll-off containers (or dumpsters) and will be removed by a contract hauler to a properly licensed landfill. The roll-off containers will be covered with a properly secured tarp before the hauler exists the site. In addition to construction debris, the construction work force will generate some amount of household-type wastes (food packing, soft drink containers, and other paper). Trash containers for these wastes will be located around the site and will be emptied regularly so as to prevent wind-blown litter. This waste will also be removed by a contract hauler.

All hazardous waste material such as oil filters, petroleum products, paint and equipment maintenance fluids will be stored in structurally sound and sealed shipping containers in the hazardous-materials storage area and segregated from other non-waste materials. Secondary containment will be provided for all materials in the hazardous materials storage area and will consist of commercially available spill pallets. Additionally, all hazardous materials will be disposed of in accordance with federal, state and municipal regulations.

Two temporary sanitary facilities (portable toilets) will be provided at the site in the combined staging area. The toilets will be away from a concentrated flow path and traffic flow and will have collection

pans underneath as secondary treatment. All sanitary waste will be collected from an approved party at a minimum of three times per week.

#### **11.02 Building Material Staging Areas**

Construction equipment and maintenance materials will be stored at the combined staging area and materials storage areas. Silt fence will be installed around the perimeter to designate the staging and materials storage area. A watertight shipping container will be used to store hand tools, small parts and other construction materials.

Non-hazardous building materials such as packaging material (wood, plastic and glass) and construction scrap material (brick, wood, steel, metal scraps, and pine cuttings) will be stored in a separate covered storage facility adjacent other stored materials. All hazardous-waste materials such as oil filters, petroleum products, paint and equipment maintenance fluids will be stored in structurally sound and sealed containers under cover within the hazardous materials storage area.

Large items such as framing materials and stockpiled lumber will be stored in the open storage area. Such materials will be elevated on wood blocks to minimize contact with runoff.

The combined storage areas are expected to remain clean, well organized and equipped with ample cleaning supplies as appropriate for the materials being stored. Perimeter controls such as containment structures, covers and liners will be repaired or replaced as necessary to maintain proper function.

#### **11.03 Designated Washout Areas**

Designated temporary, below-ground concrete washout areas will be constructed, as required, to minimize the pollution potential associated with concrete, paint, stucco, mixers etc. Signs will, if required, be posted marking the location of the washout area to ensure that concrete equipment operators use the proper facility. Concrete pours will not be conducted during or before an anticipated precipitation event. All excess concrete and concrete washout slurries from the concrete mixer trucks and chutes will be discharged to the washout area or hauled off-site for disposal.

#### **11.04 Equipment/Vehicle Maintenance and Fueling Areas**

Several types of vehicles and equipment will be used on-site throughout the project including graders, scrapers, excavators, loaders, paving equipment, rollers, trucks and trailers, backhoes and forklifts. All major equipment/vehicle fueling and maintenance will be performed off-site. A small, 20-gallon pickup bed fuel tank will be kept on-site in the combined staging area. When vehicle fueling must occur on-site, the fueling activity will occur in the staging area. Only minor equipment maintenance will occur on-site. All equipment fluids generated from maintenance activities will be disposed of into designated drums stored on spill pallets. Absorbent, spill-cleanup materials and spill kits will be available at the combined staging and materials storage area. Drip pans will be placed under all equipment receiving maintenance and vehicles and equipment parked overnight.

#### **11.05 Equipment/Vehicle Wash down Area**

All equipment and vehicle washing will be performed off-site.

#### **11.06 Spill Prevention Plan**

A spill containment kit will be kept on-site in the Contractors trailer and/or the designated staging area throughout the duration of construction. Should there be an accidental release of petroleum product into a wetland (or within 100-feet of a wetland), the appropriate agencies will be immediately notified.

## **12.0 Inspections**

Maintenance of existing and proposed BMP's to address Storm Water management facilities during construction is an on-going process. The purpose of the inspections is to observe all sources of Storm Water or non-Storm Water discharge as identified in the SWPPP as well as the status of the receiving waters and fulfill the requirements of the Order of Conditions. The following sections describe the appropriate inspection measures to adequately implement the projects SWPPP. A blank inspection form is provided at the end of this section. Completed inspection forms are to be maintained on site.

### **12.01 Inspection Personnel**

The owners appointed representative will be responsible for performing regular inspections of erosion controls and ordering repairs as necessary.

### **12.02 Inspection Frequency**

Inspections will be performed by qualified personnel once every 7 days and within 24-hours after a storm event of greater than one-half inch, in accordance with the CGP and as required by the OOC. The inspections must be documented on the inspection form provided at the end of this section, and completed forms will be provided to the on-site supervisor and maintained at the Owners office throughout the entire duration of construction.

### **12.03 Inspection Reporting**

Each inspection report will summarize the scope of the inspection, name(s) and qualifications of personnel making the inspection, and major observations relating to the implementation of the SWPPP, including compliance and non-compliance items. Completed inspection reports will remain with the completed SWPPP on site.

## SWPPP INSPECTION AND MAINTENANCE REPORT

160 Old Turnpike Road  
Nottingham, New Hampshire

TO BE COMPLETED AT LEAST EVERY 7 DAYS OR EVERY 14 DAYS AND WITHIN 24 HOURS OF A STORM EVENT OF AT LEAST 0.25 INCHES. AFTER SITE STABILIZATION, TO BE COMPLETED AT LEAST ONCE PER MONTH FOR THREE YEARS OR UNTIL A NOTICE OF TERMINATION IS FILED.

INSPECTOR NAME /TITLE: \_\_\_\_\_ DATE: \_\_\_\_\_  
START/END TIME: \_\_\_\_\_

### Type of Inspection

☐ Regular ☐ Pre-storm event ☐ During storm event ☐ Post-storm event (inches \_\_\_\_\_)

Construction Activities: \_\_\_\_\_

Weather at Time of Inspection: \_\_\_\_\_

### Has it rained since the last inspection?

☐ Yes ☐ No

### If yes, provide:

Storm Start Date & Time: \_\_\_\_\_ Storm Duration (hrs): \_\_\_\_\_ Approximate Rainfall (in): \_\_\_\_\_

### Do you suspect that discharges may have occurred since the last inspection?

☐ Yes ☐ No

### Are there any discharges at the time of inspection?

☐ Yes ☐ No

BMP Description	In Conformance	Effective	Notes
Construction Entrance	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Haybales and Silt Fencing	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Storage/Disposal Areas	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Subsurface Infiltration System	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Catch Basins	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Other	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
<u>Other</u>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	

**SITE STABILIZATION STATUS:**

BMP/Activity	Implemented	Maintained	Status/Actions Required
All Slopes and disturbed areas not actively being worked properly stabilized?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<i>Are natural resource areas e.g., stream, wetlands, mature trees, etc.) protected with barriers or similar BMP's?</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are perimeter controls and sediment barriers adequately installed and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are discharge points and receiving waters free of sediment deposits?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are Storm drain inlets properly protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Is there evidence of sediment being tracked into the street?	<input type="checkbox"/> Yes • <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Is trash/littler from work areas collected and placed in covered dumpsters?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are washout facilities available, clearly marked, and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are vehicle and equipment fueling, cleaning and maintenance areas free of spills, leaks or any other deleterious material?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are materials that are potential stormwater contaminants stored inside or under cover?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Other - specify:	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Other - specify:	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

**ADDITIONAL  
OBSERVATIONS:**

---



---



---

**NEXT INSPECTON**

**TO BE PERFORMED BY:** \_\_\_\_\_

**ON OR BEFORE:** \_\_\_\_\_

**Certification statement:**

- “I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

Print name: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## **CONSTRUCTION PHASE INSPECTION SCHEDULE AND EVALUATION CHECKLIST**

<b>Inspection Date</b>	<b>Inspector</b>	<b>BMP Inspected</b>	<b>Inspection Frequency Requirements</b>	<b>Comments</b>	<b>Recommendation</b>	<b>Follow-up Inspection Required (yes/no)</b>
		Haybale & Silt Fence	Weekly and After Major Storm Events			
		Construction Entrance	Weekly and After Major Storm Events			
		Trench Drains & Deep Sump Manholes	Weekly and After Major Storm Events			
		Oil/Particle Separators	Weekly and After Major Storm Events			
		Subsurface Infiltration/Retention System	Weekly and After Major Storm Events			
		Soil Stockpiles Areas	Weekly and After Major Storm Events			

1. Refer to the New Hampshire Stormwater Manual: Volumes 2 & 3 (December 2008) for recommendations regarding frequency for inspections and maintenance of specific BMP's
2. Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.
3. Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.

Other Notes: (Include deviations from Conservation Commission Orders of Conditions, Planning Board Approvals and Approved Plans)



## **POST CONSTRUCTION PHASE INSPECTION SCHEDULE AND EVALUATION** **CHECKLIST**

<b>Inspection Date</b>	<b>Inspector</b>	<b>BMP Inspected</b>	<b>Inspection Frequency Requirements</b>	<b>Comments</b>	<b>Recommendation</b>	<b>Follow-up Inspection Required (yes/no)</b>
		Trench Drains & Deep Sump Manholes	Regular inspections necessary			
		Oil/Particle Separators	Twice Year and After Major Storm Events			
		Subsurface Infiltration/Detention System	Twice Year and After Major Storm Events			
		Pipe Outlet	Twice Year and After Major Storm Events			

1. Refer to the New Hampshire Stormwater Manual: Volumes 2 & 3 (December 2008) for recommendations regarding frequency for inspections and maintenance of specific BMP's
2. Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.
3. Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.

Other Notes: (Include deviations from Conservation Commission Orders of Conditions, Planning Board Approvals and Approved Plans)

## **SECTION 4.0**

### **PEAK RUNOFF RATE CALCULATIONS**

4.01 PRE-DEVELOPMENT HYDROLOGY WATERSHED PLAN

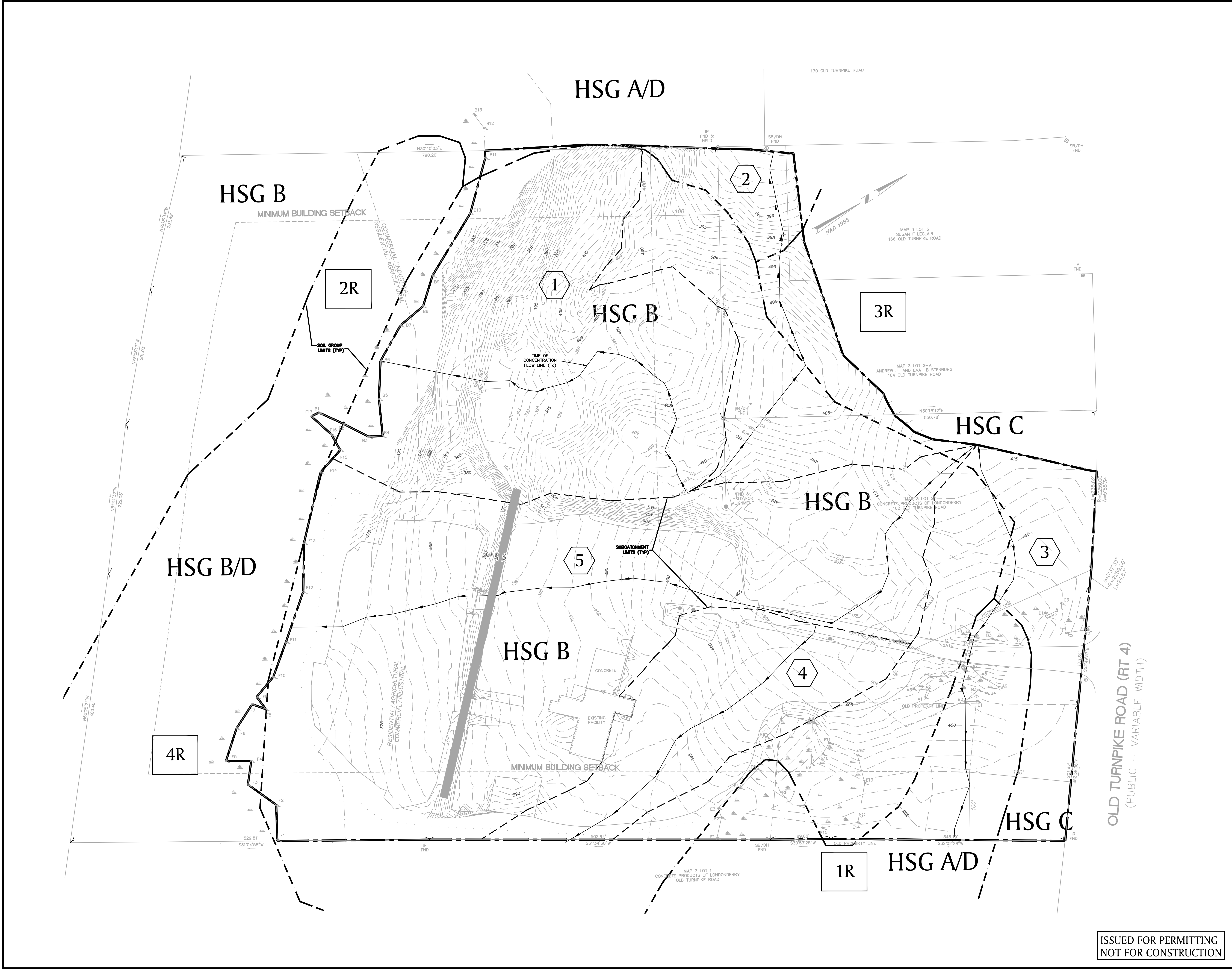
4.02 PRE-DEVELOPMENT HYDROLOGY CALCULATIONS  
(HYDROCAD PRINTOUTS)

4.03 POST DEVELOPMENT HYDROLOGY WATERSHED PLAN

4.04 POST DEVELOPMENT HYDROLOGY CALCULATIONS  
(HYDROCAD PRINTOUTS)

#### **4.01 PRE-DEVELOPMENT HYDROLOGY WATERSHED PLAN**





87 Haverhill Avenue  
Amesbury, Massachusetts 01950

06-29-2022  
DATE

PROFESSIONAL ENGINEER

SHEA CONCRETE  
PROPOSED  
MANUFACTURING  
FACILITY

160 OLD TURNPIKE ROAD  
IN  
NOTTINGHAM  
NEW HAMPSHIRE  
(ROCKINGHAM COUNTY)

EXISTING CONDITIONS  
WATERSHED MAP

JUNE 29, 2022

REVISIONS:		
NO.	DATE	DESC.

PREPARED FOR:  
SHEA CONCRETE  
87 HAVERHILL AVE  
AMESBURY, MA 01950

300 Brickstone Square  
Andover, Massachusetts 01810

617 896 4300

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SCALE: 1" = 50'

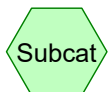
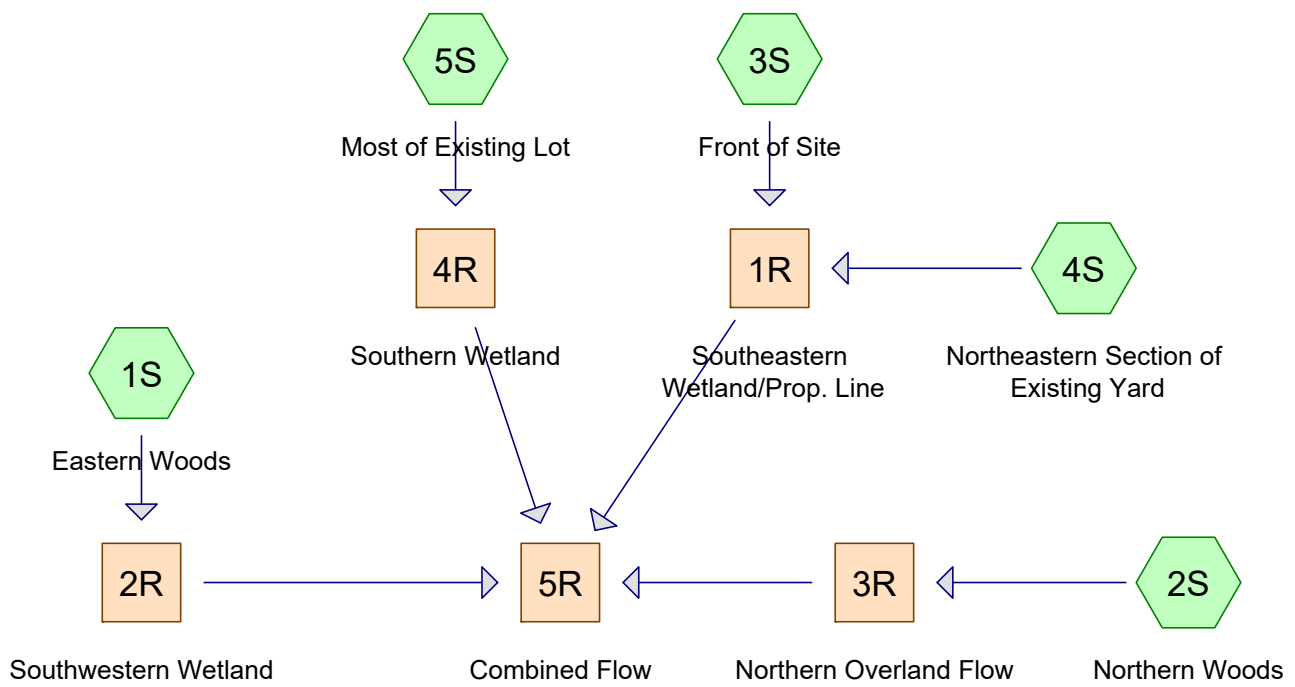
0 25 50 100 feet

FILE: PROJECTS/AND/1360201/C/D/EC-WS  
DWG. NO.:  
JOB. NO: 13602.01 SHEET EC-WS

ISSUED FOR PERMITTING  
NOT FOR CONSTRUCTION



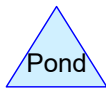
**4.02 PRE-DEVELOPMENT HYDROLOGY WATERSHED CALCULATIONS**  
(HYDROCAD PRINTOUTS)



Subcat



Reach



Pond



Link

#### Routing Diagram for Existing Stormwater Model

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## Existing Stormwater Model

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### Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
123,224	61	>75% Grass cover, Good, HSG B (3S, 5S)
20,473	74	>75% Grass cover, Good, HSG C (3S)
179,421	85	Gravel roads, HSG B (3S, 5S)
76,938	96	Gravel surface, HSG B (4S)
9,975	98	Paved parking, HSG B (3S, 4S, 5S)
3,311	98	Paved parking, HSG C (3S)
2,614	98	Paved parking, HSG D (3S)
12,110	98	Unconnected roofs, HSG B (5S)
16,335	98	Water Surface, HSG B (3S, 4S)
7,754	98	Water Surface, HSG C (3S)
17,163	98	Water Surface, HSG D (3S)
22,711	30	Woods, Good, HSG A (1S, 2S)
364,997	55	Woods, Good, HSG B (1S, 2S, 3S, 4S, 5S)
22,225	70	Woods, Good, HSG C (2S, 5S)
41,725	77	Woods, Good, HSG D (1S, 3S, 5S)
28,406	77	Woods, Poor, HSG C (3S)
<b>949,382</b>	<b>70</b>	<b>TOTAL AREA</b>

## Existing Stormwater Model

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Page 3

### Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
22,711	HSG A	1S, 2S
783,000	HSG B	1S, 2S, 3S, 4S, 5S
82,169	HSG C	2S, 3S, 5S
61,502	HSG D	1S, 3S, 5S
0	Other	
<b>949,382</b>		<b>TOTAL AREA</b>



## Existing Stormwater Model

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Page 4

### Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
0	123,224	20,473	0	0	143,697	>75% Grass cover, Good	
0	179,421	0	0	0	179,421	Gravel roads	
0	76,938	0	0	0	76,938	Gravel surface	
0	9,975	3,311	2,614	0	15,900	Paved parking	
0	12,110	0	0	0	12,110	Unconnected roofs	
0	16,335	7,754	17,163	0	41,252	Water Surface	
22,711	364,997	22,225	41,725	0	451,658	Woods, Good	
0	0	28,406	0	0	28,406	Woods, Poor	
<b>22,711</b>	<b>783,000</b>	<b>82,169</b>	<b>61,502</b>	<b>0</b>	<b>949,382</b>	<b>TOTAL AREA</b>	

## Existing Stormwater Model

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Type III 24-hr 2-Year Rainfall=3.02"

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment 1S: Eastern Woods</b>	Runoff Area=208,610 sf 0.00% Impervious Runoff Depth=0.20" Flow Length=626' Tc=18.2 min CN=55 Runoff=0.29 cfs 3,479 cf
<b>Subcatchment 2S: Northern Woods</b>	Runoff Area=111,181 sf 0.00% Impervious Runoff Depth=0.15" Flow Length=575' Tc=17.6 min CN=53 Runoff=0.09 cfs 1,423 cf
<b>Subcatchment 3S: Front of Site</b>	Runoff Area=194,497 sf 24.46% Impervious Runoff Depth=1.08" Flow Length=619' Tc=19.0 min CN=77 Runoff=3.73 cfs 17,584 cf
<b>Subcatchment 4S: Northeastern Section of</b>	Runoff Area=85,694 sf 4.63% Impervious Runoff Depth=2.37" Flow Length=496' Tc=6.0 min CN=94 Runoff=5.14 cfs 16,921 cf
<b>Subcatchment 5S: Most of Existing Lot</b>	Runoff Area=349,400 sf 5.07% Impervious Runoff Depth=0.87" Flow Length=1,175' Tc=23.1 min UI Adjusted CN=73 Runoff=4.75 cfs 25,322 cf
<b>Reach 1R: Southeastern Wetland/Prop. Line</b>	Inflow=7.18 cfs 34,505 cf Outflow=7.18 cfs 34,505 cf
<b>Reach 2R: Southwestern Wetland</b>	Inflow=0.29 cfs 3,479 cf Outflow=0.29 cfs 3,479 cf
<b>Reach 3R: Northern Overland Flow</b>	Inflow=0.09 cfs 1,423 cf Outflow=0.09 cfs 1,423 cf
<b>Reach 4R: Southern Wetland</b>	Inflow=4.75 cfs 25,322 cf Outflow=4.75 cfs 25,322 cf
<b>Reach 5R: Combined Flow</b>	Inflow=10.57 cfs 64,729 cf Outflow=10.57 cfs 64,729 cf

**Total Runoff Area = 949,382 sf Runoff Volume = 64,729 cf Average Runoff Depth = 0.82"**  
**92.70% Pervious = 880,120 sf 7.30% Impervious = 69,262 sf**

**Existing Stormwater Model**

Prepared by BSC Group

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Type III 24-hr 2-Year Rainfall=3.02"

Printed 6/29/2022

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**Summary for Subcatchment 1S: Eastern Woods**

Runoff = 0.29 cfs @ 12.55 hrs, Volume= 3,479 cf, Depth= 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
205,711	55	Woods, Good, HSG B
806	77	Woods, Good, HSG D
2,093	30	Woods, Good, HSG A
208,610	55	Weighted Average
208,610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	68	0.0600	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
1.3	103	0.0680	1.30		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	78	0.0380	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.2	95	0.0210	0.72		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	105	0.0710	1.33		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.6	177	0.1330	1.82		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
18.2	626	Total			

## Existing Stormwater Model

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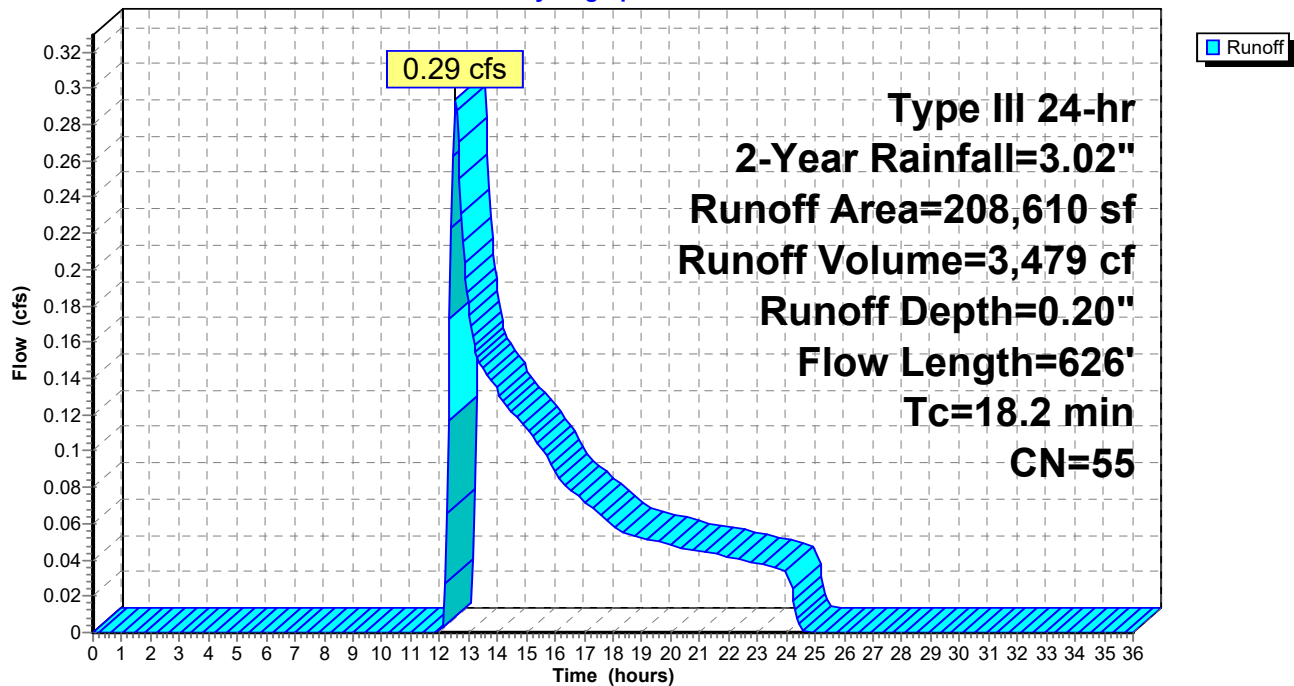
Type III 24-hr 2-Year Rainfall=3.02"

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### Subcatchment 1S: Eastern Woods

Hydrograph



## Existing Stormwater Model

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Type III 24-hr 2-Year Rainfall=3.02"

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### Summary for Subcatchment 2S: Northern Woods

Runoff = 0.09 cfs @ 12.60 hrs, Volume= 1,423 cf, Depth= 0.15"

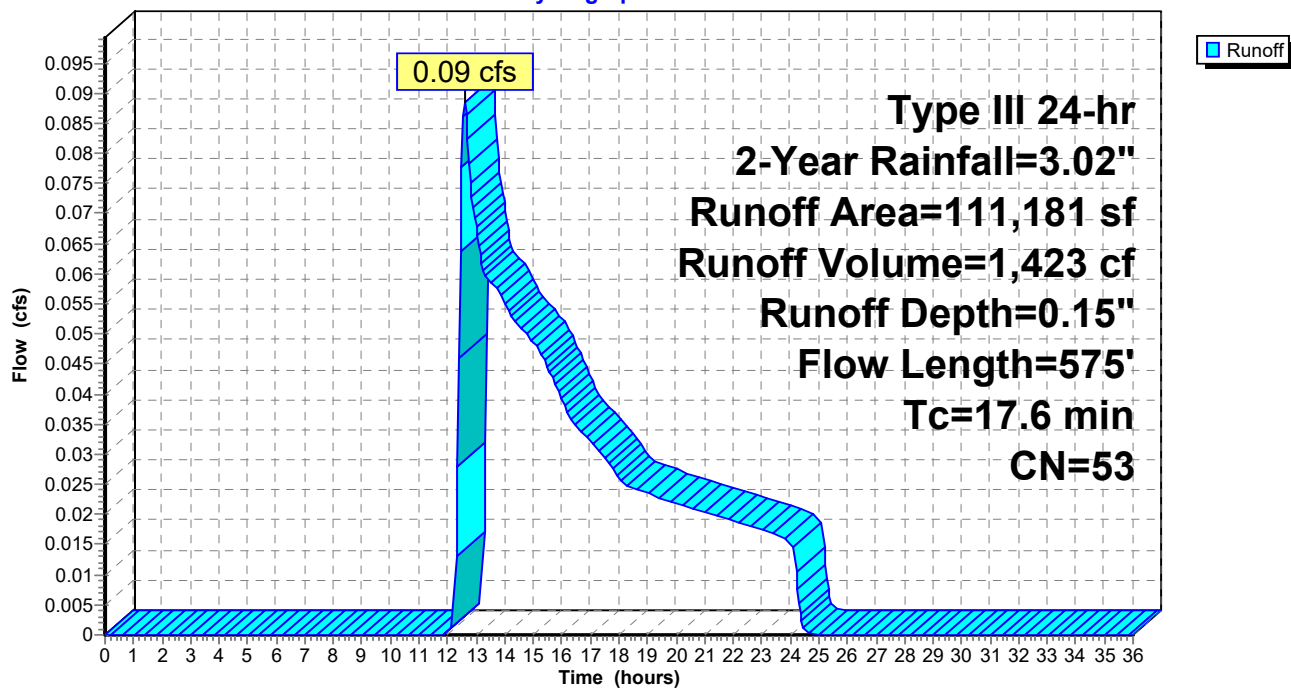
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
68,962	55	Woods, Good, HSG B
21,601	70	Woods, Good, HSG C
20,618	30	Woods, Good, HSG A
111,181	53	Weighted Average
111,181		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
7.9	525	0.0495	1.11		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
17.6	575	Total			

### Subcatchment 2S: Northern Woods

Hydrograph



**Existing Stormwater Model**

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Type III 24-hr 2-Year Rainfall=3.02"

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**Summary for Subcatchment 3S: Front of Site**

Runoff = 3.73 cfs @ 12.28 hrs, Volume= 17,584 cf, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
20,473	74	>75% Grass cover, Good, HSG C
28,406	77	Woods, Poor, HSG C
3,311	98	Paved parking, HSG C
7,754	98	Water Surface, HSG C
2,614	98	Paved parking, HSG D
36,432	77	Woods, Good, HSG D
17,163	98	Water Surface, HSG D
20,976	55	Woods, Good, HSG B
15,333	98	Water Surface, HSG B
8,494	85	Gravel roads, HSG B
1,394	98	Paved parking, HSG B
32,147	61	>75% Grass cover, Good, HSG B
194,497	77	Weighted Average
146,928		75.54% Pervious Area
47,569		24.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
4.9	264	0.0322	0.90		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.4	45	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
4.0	260	0.0460	1.07		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.0	619	Total			

## Existing Stormwater Model

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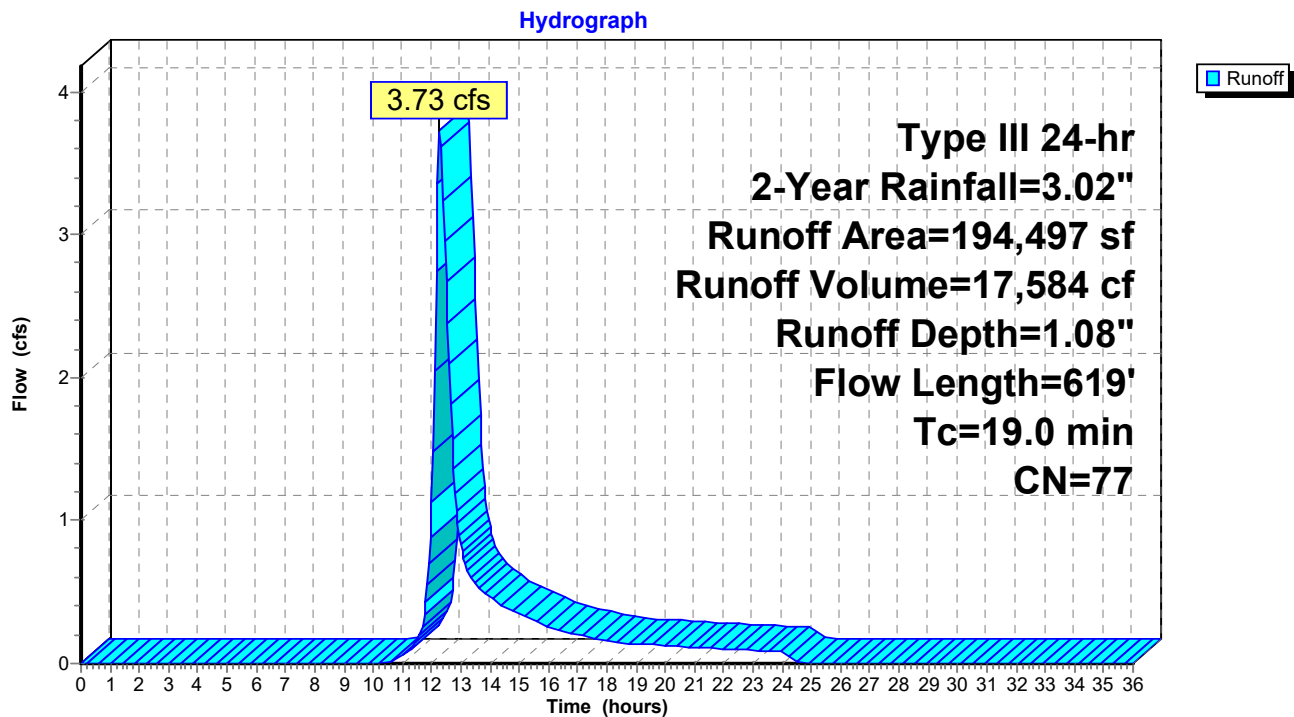
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Type III 24-hr 2-Year Rainfall=3.02"

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### Subcatchment 3S: Front of Site



## Existing Stormwater Model

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Type III 24-hr 2-Year Rainfall=3.02"

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### Summary for Subcatchment 4S: Northeastern Section of Existing Yard

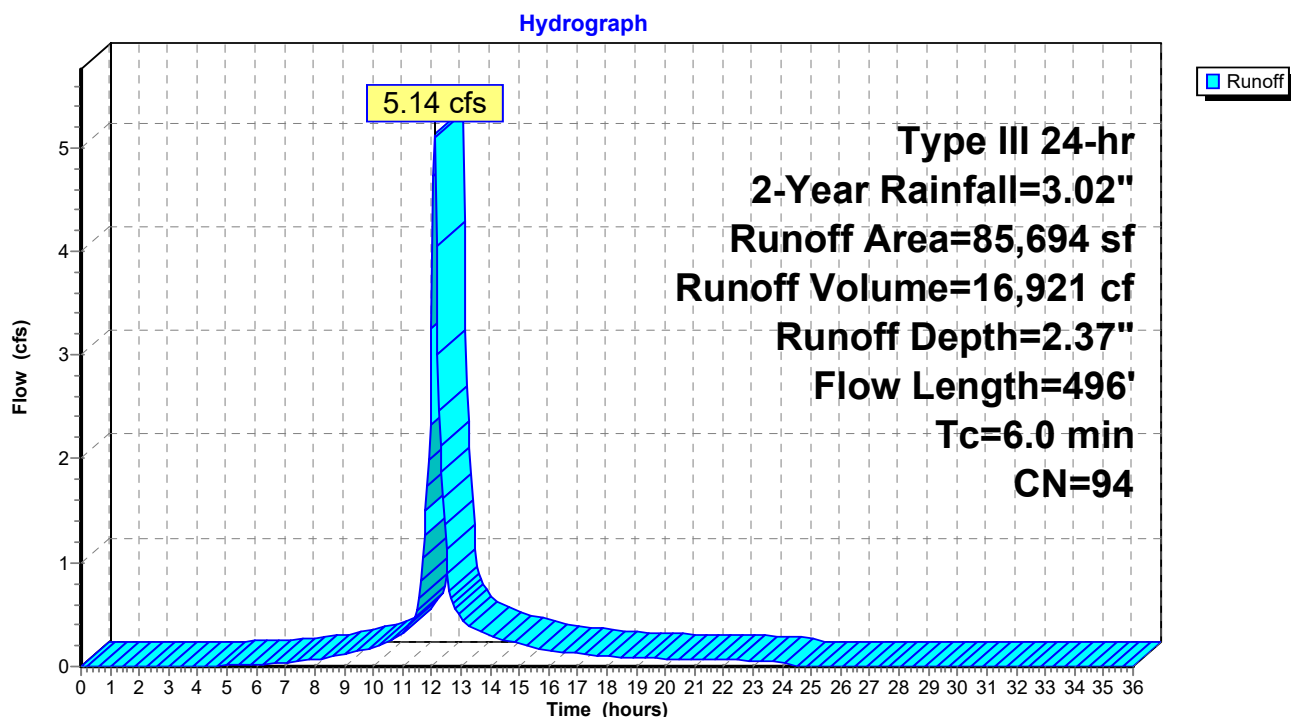
Runoff = 5.14 cfs @ 12.09 hrs, Volume= 16,921 cf, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
4,792	55	Woods, Good, HSG B
2,962	98	Paved parking, HSG B
1,002	98	Water Surface, HSG B
76,938	96	Gravel surface, HSG B
85,694	94	Weighted Average
81,730		95.37% Pervious Area
3,964		4.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0250	1.27		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.00"
2.2	406	0.0375	3.12		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.7	40	0.0375	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.4					<b>Direct Entry,</b>
6.0	496	Total			

### Subcatchment 4S: Northeastern Section of Existing Yard





**Existing Stormwater Model**

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Type III 24-hr 2-Year Rainfall=3.02"

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**Summary for Subcatchment 5S: Most of Existing Lot**

Runoff = 4.75 cfs @ 12.36 hrs, Volume= 25,322 cf, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Adj	Description
64,556	55		Woods, Good, HSG B
4,487	77		Woods, Good, HSG D
170,927	85		Gravel roads, HSG B
5,619	98		Paved parking, HSG B
12,110	98		Unconnected roofs, HSG B
91,077	61		>75% Grass cover, Good, HSG B
624	70		Woods, Good, HSG C
349,400	74	73	Weighted Average, UI Adjusted
331,671			94.93% Pervious Area
17,729			5.07% Impervious Area
12,110			68.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0200	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	164	0.0470	1.08		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.4	259	0.0040	1.28		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
3.0	640	0.0500	3.60		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
1.5	62	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
23.1	1,175	Total			

## Existing Stormwater Model

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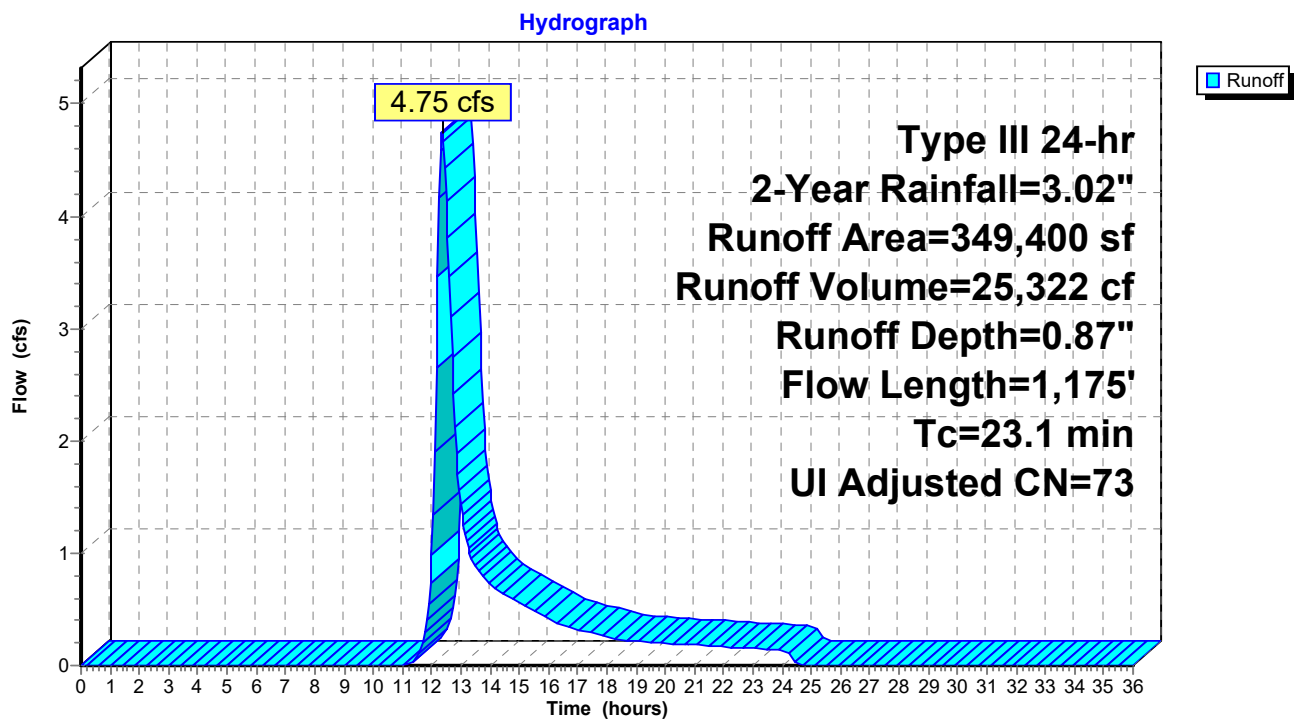
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Type III 24-hr 2-Year Rainfall=3.02"

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### Subcatchment 5S: Most of Existing Lot



## Existing Stormwater Model

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Type III 24-hr 2-Year Rainfall=3.02"

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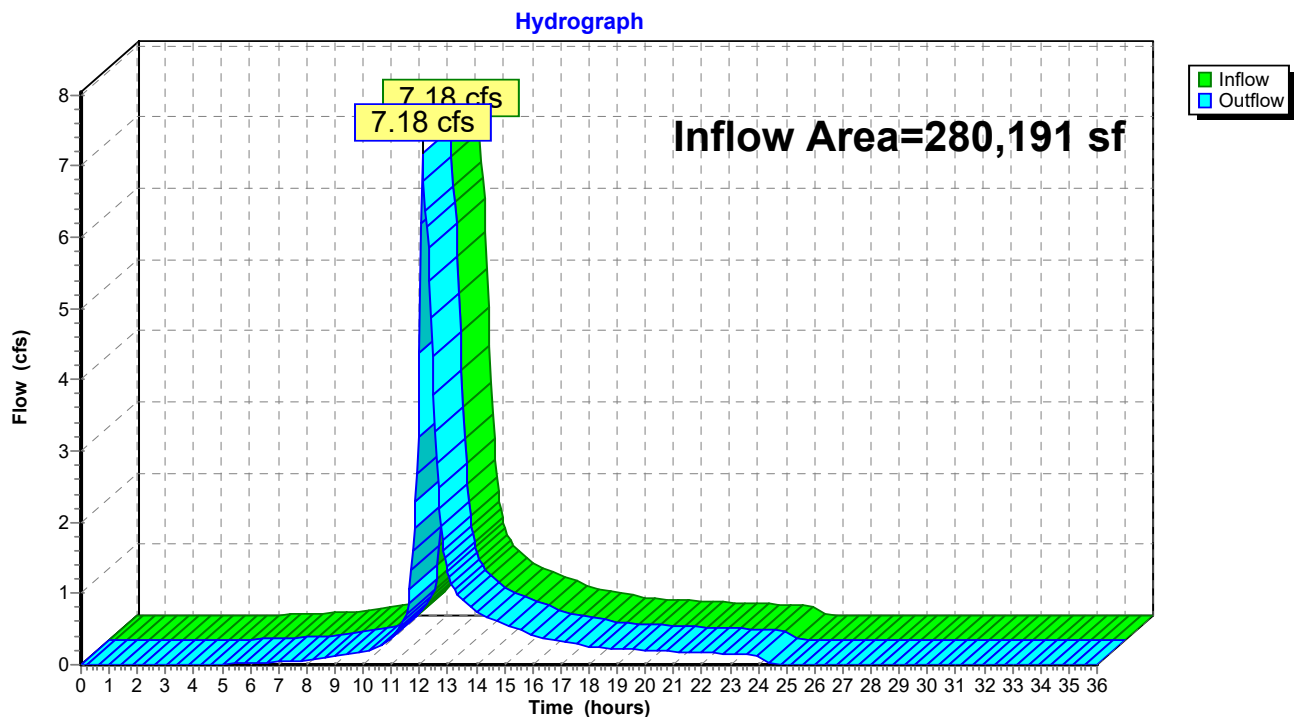
Page 14

### Summary for Reach 1R: Southeastern Wetland/Prop. Line

Inflow Area = 280,191 sf, 18.39% Impervious, Inflow Depth = 1.48" for 2-Year event  
Inflow = 7.18 cfs @ 12.11 hrs, Volume= 34,505 cf  
Outflow = 7.18 cfs @ 12.11 hrs, Volume= 34,505 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 1R: Southeastern Wetland/Prop. Line



## Existing Stormwater Model

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Type III 24-hr 2-Year Rainfall=3.02"

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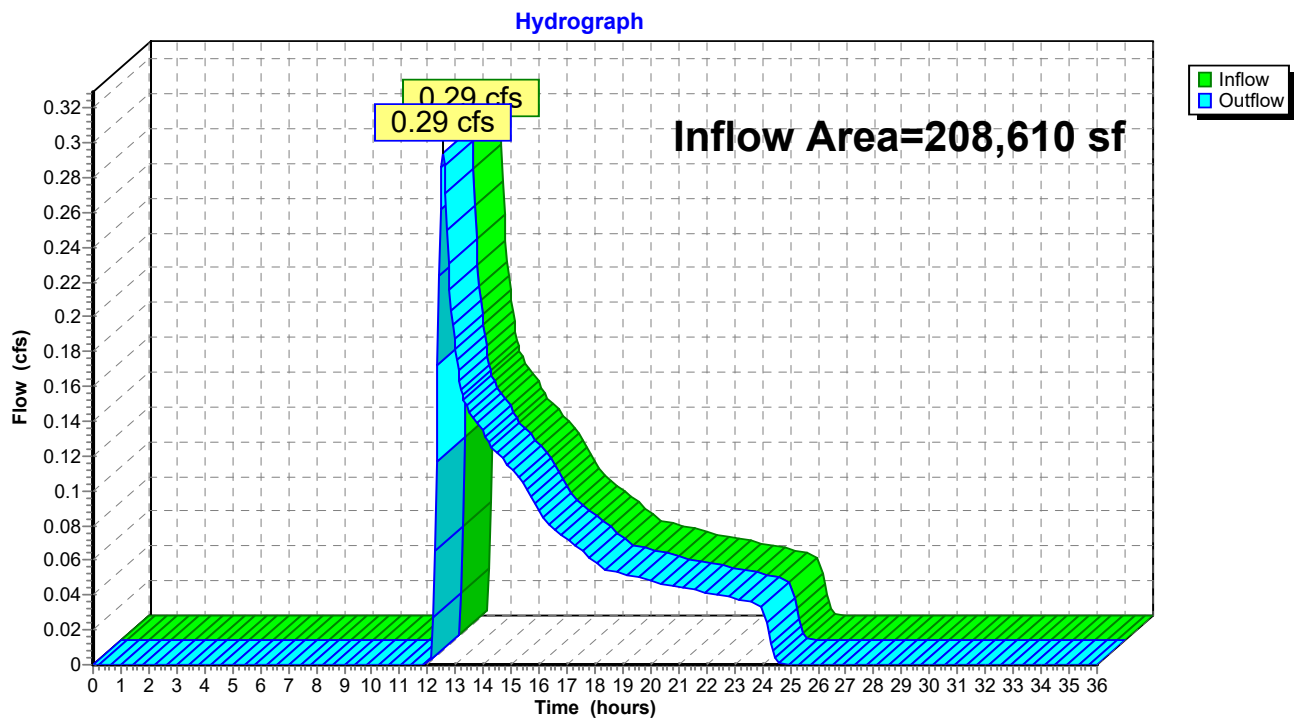
Page 15

### Summary for Reach 2R: Southwestern Wetland

Inflow Area = 208,610 sf, 0.00% Impervious, Inflow Depth = 0.20" for 2-Year event  
Inflow = 0.29 cfs @ 12.55 hrs, Volume= 3,479 cf  
Outflow = 0.29 cfs @ 12.55 hrs, Volume= 3,479 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 2R: Southwestern Wetland



## Existing Stormwater Model

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Type III 24-hr 2-Year Rainfall=3.02"

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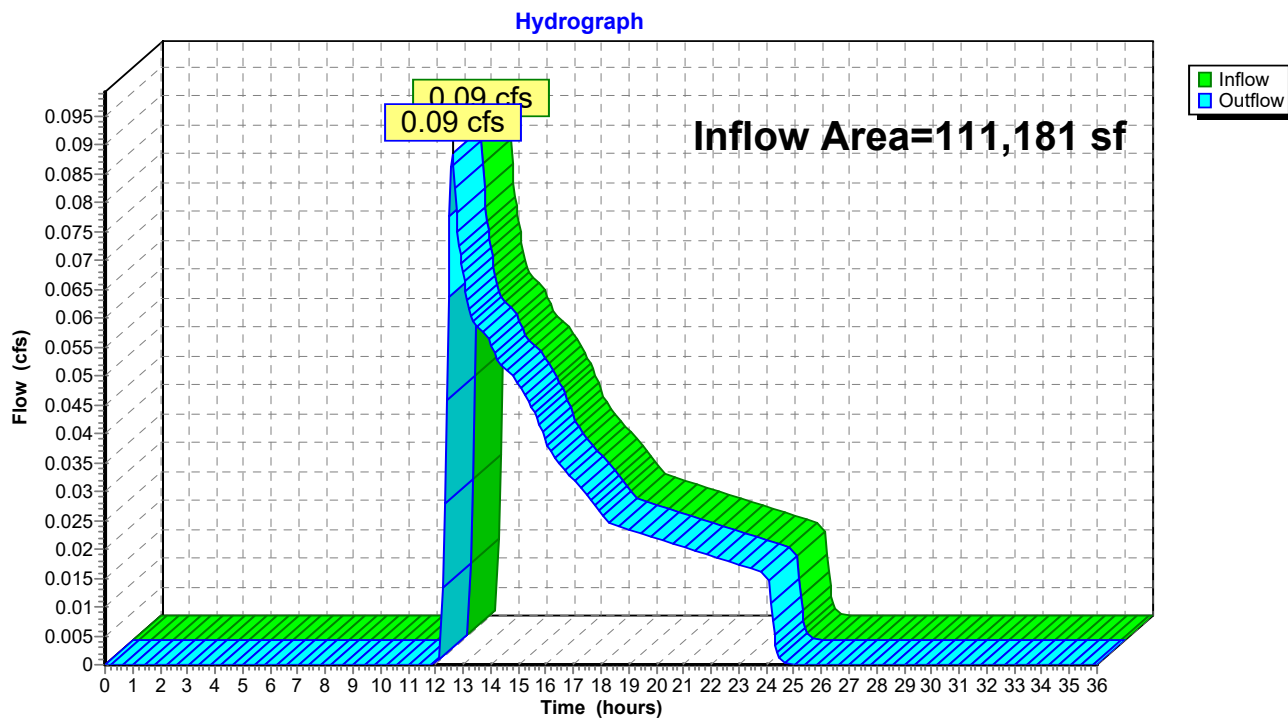
Page 16

### Summary for Reach 3R: Northern Overland Flow

Inflow Area = 111,181 sf, 0.00% Impervious, Inflow Depth = 0.15" for 2-Year event  
Inflow = 0.09 cfs @ 12.60 hrs, Volume= 1,423 cf  
Outflow = 0.09 cfs @ 12.60 hrs, Volume= 1,423 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 3R: Northern Overland Flow



## Existing Stormwater Model

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Type III 24-hr 2-Year Rainfall=3.02"

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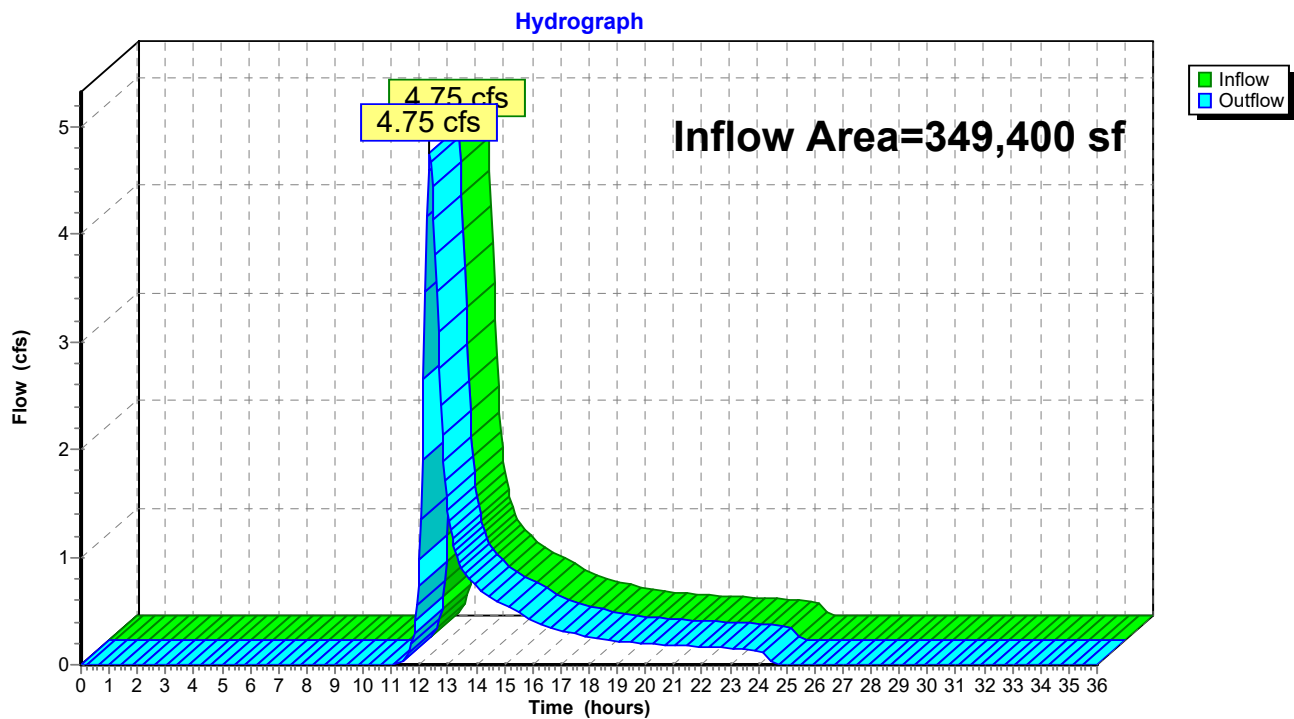
Page 17

### Summary for Reach 4R: Southern Wetland

Inflow Area = 349,400 sf, 5.07% Impervious, Inflow Depth = 0.87" for 2-Year event  
Inflow = 4.75 cfs @ 12.36 hrs, Volume= 25,322 cf  
Outflow = 4.75 cfs @ 12.36 hrs, Volume= 25,322 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 4R: Southern Wetland



## Existing Stormwater Model

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Type III 24-hr 2-Year Rainfall=3.02"

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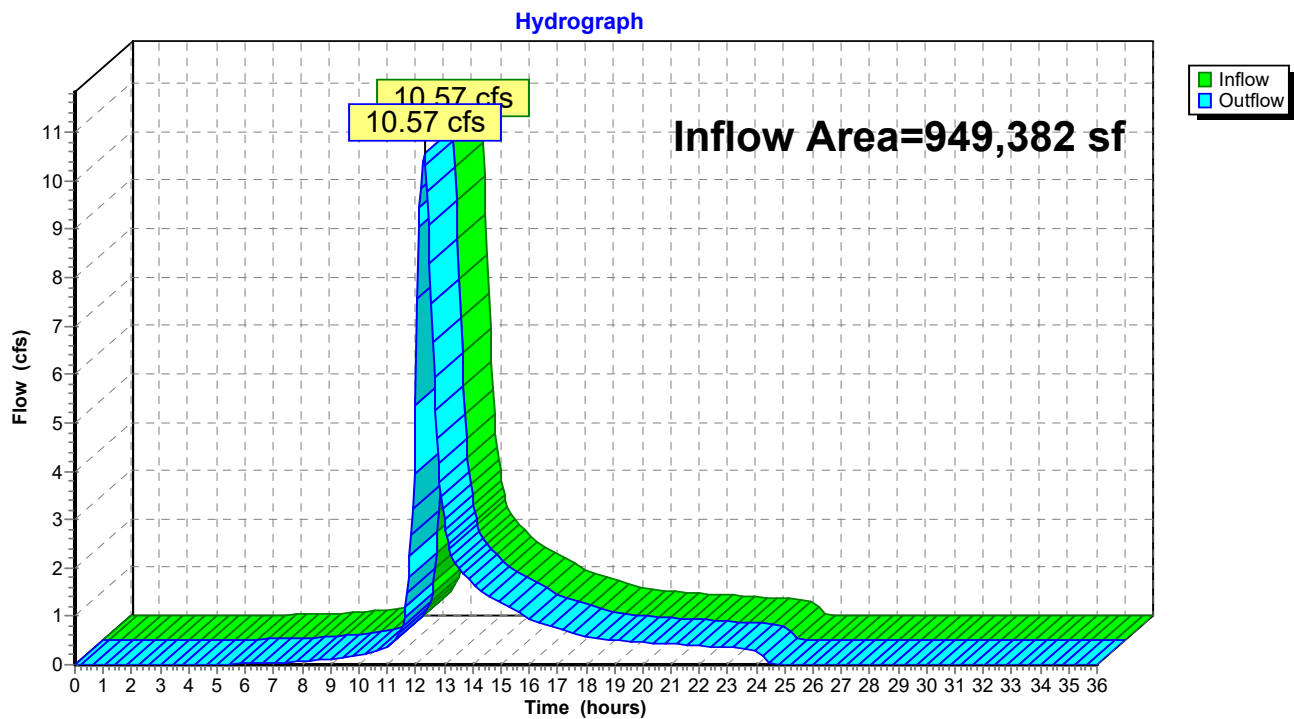
Page 18

### Summary for Reach 5R: Combined Flow

Inflow Area = 949,382 sf, 7.30% Impervious, Inflow Depth = 0.82" for 2-Year event  
Inflow = 10.57 cfs @ 12.30 hrs, Volume= 64,729 cf  
Outflow = 10.57 cfs @ 12.30 hrs, Volume= 64,729 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 5R: Combined Flow



## Existing Stormwater Model

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Type III 24-hr 10-Year Rainfall=4.55"

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: Eastern Woods**      Runoff Area=208,610 sf   0.00% Impervious   Runoff Depth=0.77"  
Flow Length=626'   Tc=18.2 min   CN=55   Runoff=2.19 cfs   13,301 cf

**Subcatchment 2S: Northern Woods**      Runoff Area=111,181 sf   0.00% Impervious   Runoff Depth=0.66"  
Flow Length=575'   Tc=17.6 min   CN=53   Runoff=0.93 cfs   6,133 cf

**Subcatchment 3S: Front of Site**      Runoff Area=194,497 sf   24.46% Impervious   Runoff Depth=2.25"  
Flow Length=619'   Tc=19.0 min   CN=77   Runoff=8.06 cfs   36,489 cf

**Subcatchment 4S: Northeastern Section of**      Runoff Area=85,694 sf   4.63% Impervious   Runoff Depth=3.86"  
Flow Length=496'   Tc=6.0 min   CN=94   Runoff=8.15 cfs   27,597 cf

**Subcatchment 5S: Most of Existing Lot**      Runoff Area=349,400 sf   5.07% Impervious   Runoff Depth=1.93"  
Flow Length=1,175'   Tc=23.1 min   UI Adjusted CN=73   Runoff=11.30 cfs   56,296 cf

**Reach 1R: Southeastern Wetland/Prop. Line**      Inflow=13.06 cfs   64,086 cf  
Outflow=13.06 cfs   64,086 cf

**Reach 2R: Southwestern Wetland**      Inflow=2.19 cfs   13,301 cf  
Outflow=2.19 cfs   13,301 cf

**Reach 3R: Northern Overland Flow**      Inflow=0.93 cfs   6,133 cf  
Outflow=0.93 cfs   6,133 cf

**Reach 4R: Southern Wetland**      Inflow=11.30 cfs   56,296 cf  
Outflow=11.30 cfs   56,296 cf

**Reach 5R: Combined Flow**      Inflow=25.56 cfs   139,817 cf  
Outflow=25.56 cfs   139,817 cf

**Total Runoff Area = 949,382 sf   Runoff Volume = 139,817 cf   Average Runoff Depth = 1.77"**  
**92.70% Pervious = 880,120 sf   7.30% Impervious = 69,262 sf**



**Existing Stormwater Model**

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Type III 24-hr 10-Year Rainfall=4.55"

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**Summary for Subcatchment 1S: Eastern Woods**

Runoff = 2.19 cfs @ 12.33 hrs, Volume= 13,301 cf, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Description
205,711	55	Woods, Good, HSG B
806	77	Woods, Good, HSG D
2,093	30	Woods, Good, HSG A
208,610	55	Weighted Average
208,610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	68	0.0600	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
1.3	103	0.0680	1.30		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	78	0.0380	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.2	95	0.0210	0.72		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	105	0.0710	1.33		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.6	177	0.1330	1.82		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
18.2	626	Total			

## Existing Stormwater Model

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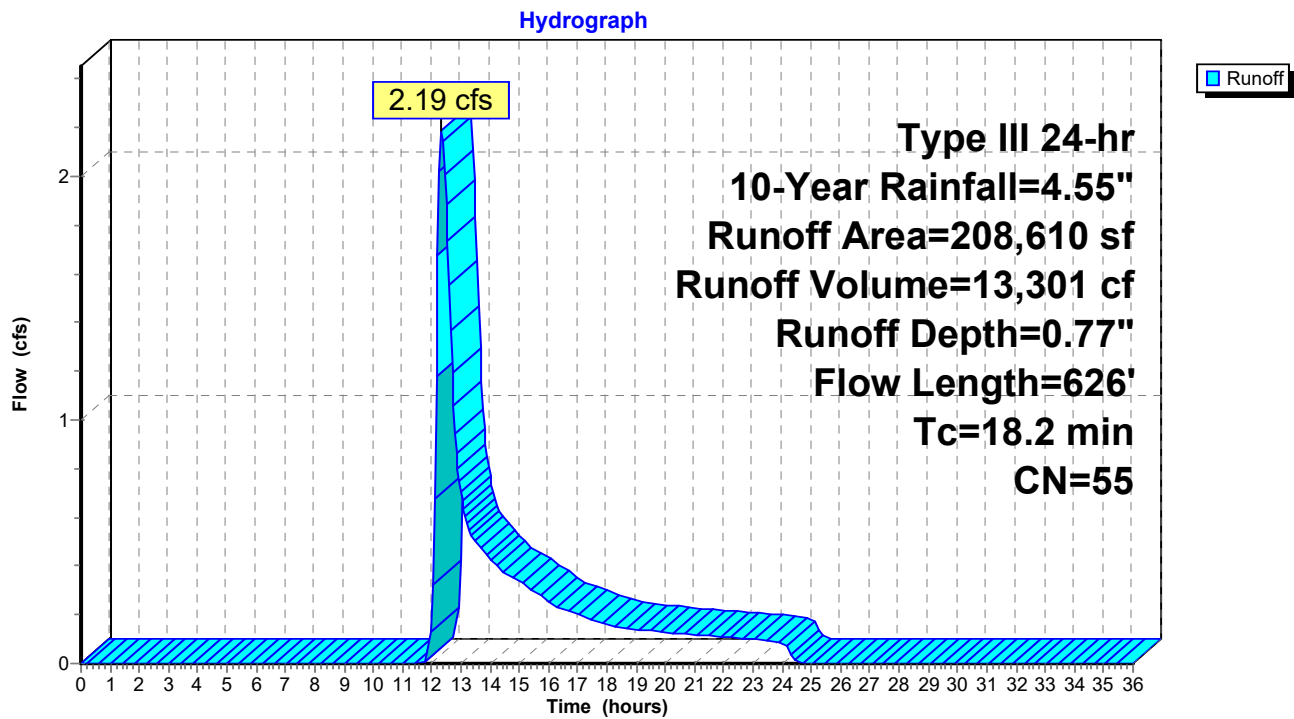
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Type III 24-hr 10-Year Rainfall=4.55"

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### Subcatchment 1S: Eastern Woods



## Existing Stormwater Model

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Type III 24-hr 10-Year Rainfall=4.55"

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### Summary for Subcatchment 2S: Northern Woods

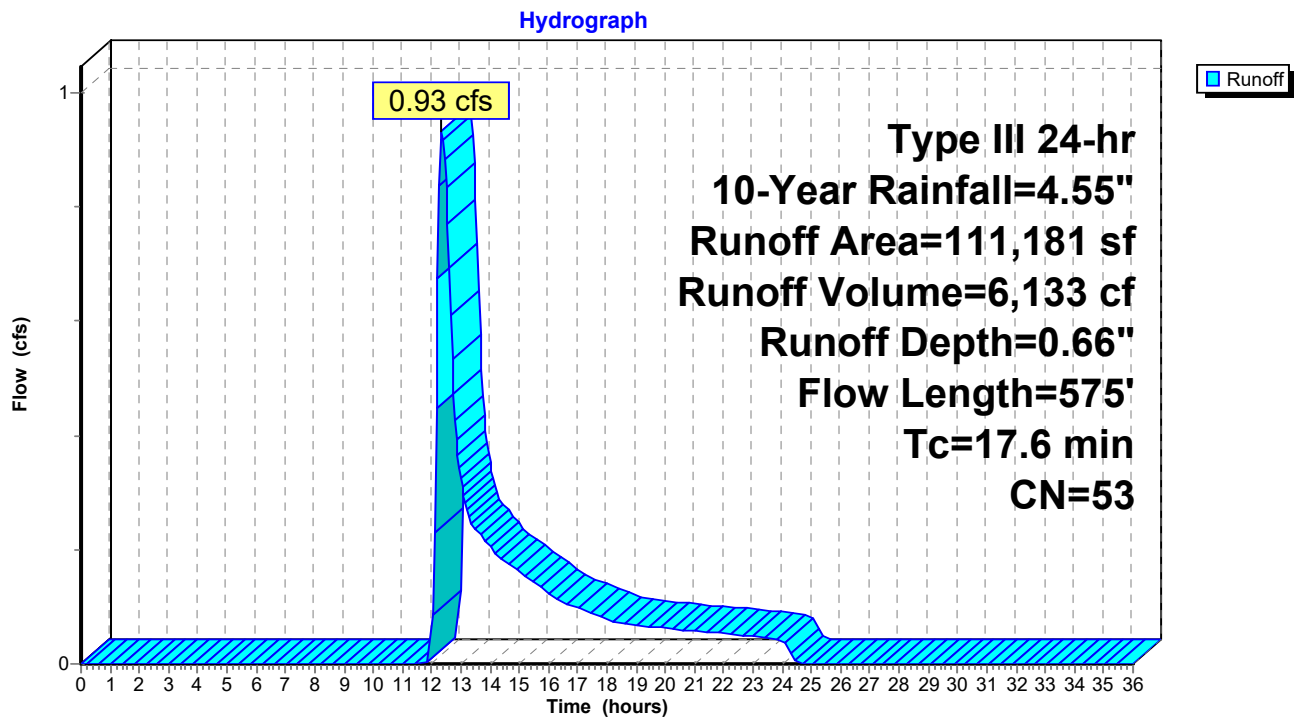
Runoff = 0.93 cfs @ 12.35 hrs, Volume= 6,133 cf, Depth= 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Description
68,962	55	Woods, Good, HSG B
21,601	70	Woods, Good, HSG C
20,618	30	Woods, Good, HSG A
111,181	53	Weighted Average
111,181		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
7.9	525	0.0495	1.11		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
17.6	575	Total			

### Subcatchment 2S: Northern Woods



**Existing Stormwater Model**

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Type III 24-hr 10-Year Rainfall=4.55"

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**Summary for Subcatchment 3S: Front of Site**

Runoff = 8.06 cfs @ 12.27 hrs, Volume= 36,489 cf, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Description
20,473	74	>75% Grass cover, Good, HSG C
28,406	77	Woods, Poor, HSG C
3,311	98	Paved parking, HSG C
7,754	98	Water Surface, HSG C
2,614	98	Paved parking, HSG D
36,432	77	Woods, Good, HSG D
17,163	98	Water Surface, HSG D
20,976	55	Woods, Good, HSG B
15,333	98	Water Surface, HSG B
8,494	85	Gravel roads, HSG B
1,394	98	Paved parking, HSG B
32,147	61	>75% Grass cover, Good, HSG B
194,497	77	Weighted Average
146,928		75.54% Pervious Area
47,569		24.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
4.9	264	0.0322	0.90		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.4	45	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
4.0	260	0.0460	1.07		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.0	619	Total			

## Existing Stormwater Model

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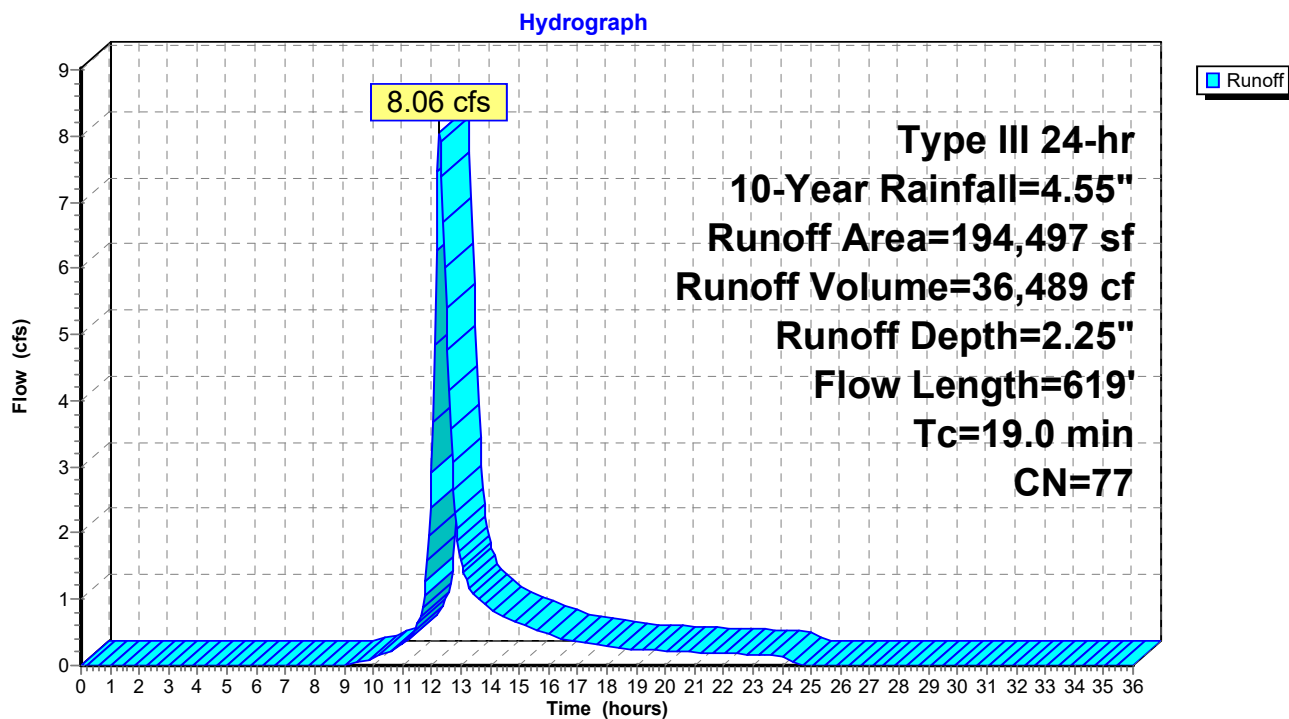
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Type III 24-hr 10-Year Rainfall=4.55"

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### Subcatchment 3S: Front of Site



## Existing Stormwater Model

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Type III 24-hr 10-Year Rainfall=4.55"

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### Summary for Subcatchment 4S: Northeastern Section of Existing Yard

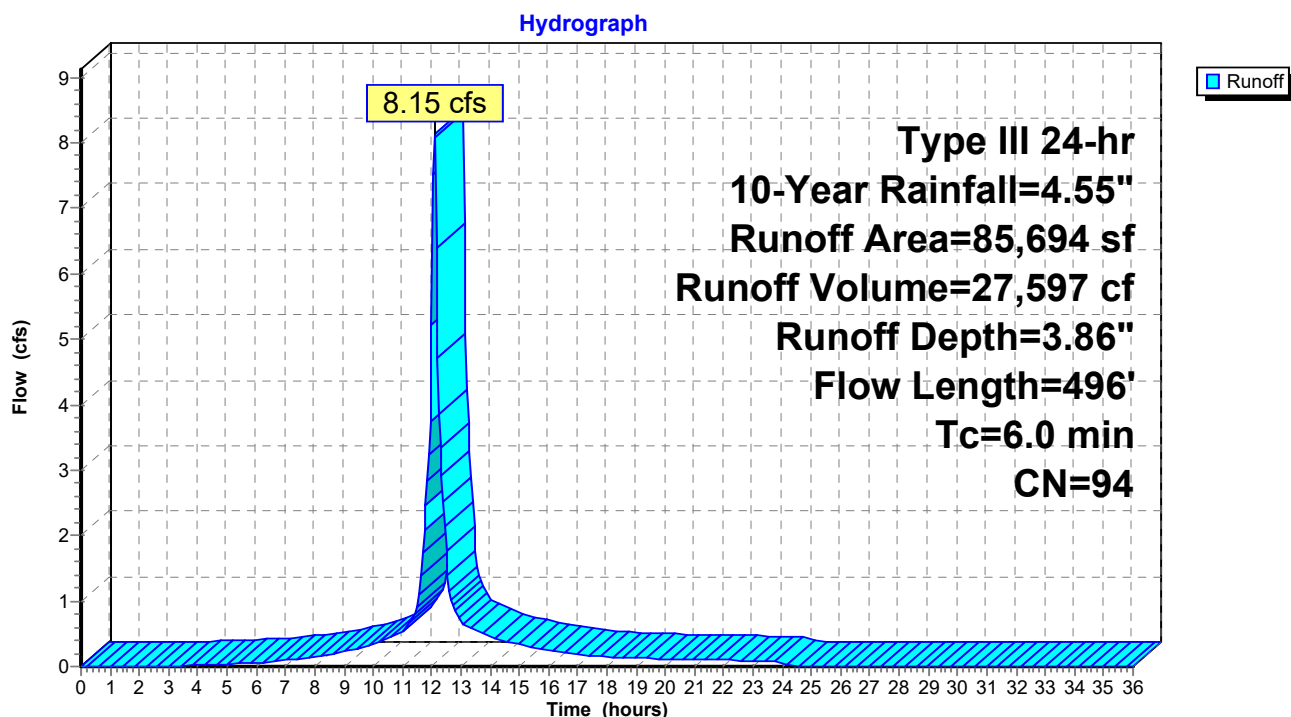
Runoff = 8.15 cfs @ 12.09 hrs, Volume= 27,597 cf, Depth= 3.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Description
4,792	55	Woods, Good, HSG B
2,962	98	Paved parking, HSG B
1,002	98	Water Surface, HSG B
76,938	96	Gravel surface, HSG B
85,694	94	Weighted Average
81,730		95.37% Pervious Area
3,964		4.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0250	1.27		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.00"
2.2	406	0.0375	3.12		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.7	40	0.0375	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.4					<b>Direct Entry,</b>
6.0	496	Total			

### Subcatchment 4S: Northeastern Section of Existing Yard



**Existing Stormwater Model**

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Type III 24-hr 10-Year Rainfall=4.55"

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**Summary for Subcatchment 5S: Most of Existing Lot**

Runoff = 11.30 cfs @ 12.33 hrs, Volume= 56,296 cf, Depth= 1.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Adj	Description
64,556	55		Woods, Good, HSG B
4,487	77		Woods, Good, HSG D
170,927	85		Gravel roads, HSG B
5,619	98		Paved parking, HSG B
12,110	98		Unconnected roofs, HSG B
91,077	61		>75% Grass cover, Good, HSG B
624	70		Woods, Good, HSG C
349,400	74	73	Weighted Average, UI Adjusted
331,671			94.93% Pervious Area
17,729			5.07% Impervious Area
12,110			68.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0200	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	164	0.0470	1.08		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.4	259	0.0040	1.28		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
3.0	640	0.0500	3.60		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
1.5	62	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
23.1	1,175	Total			

## Existing Stormwater Model

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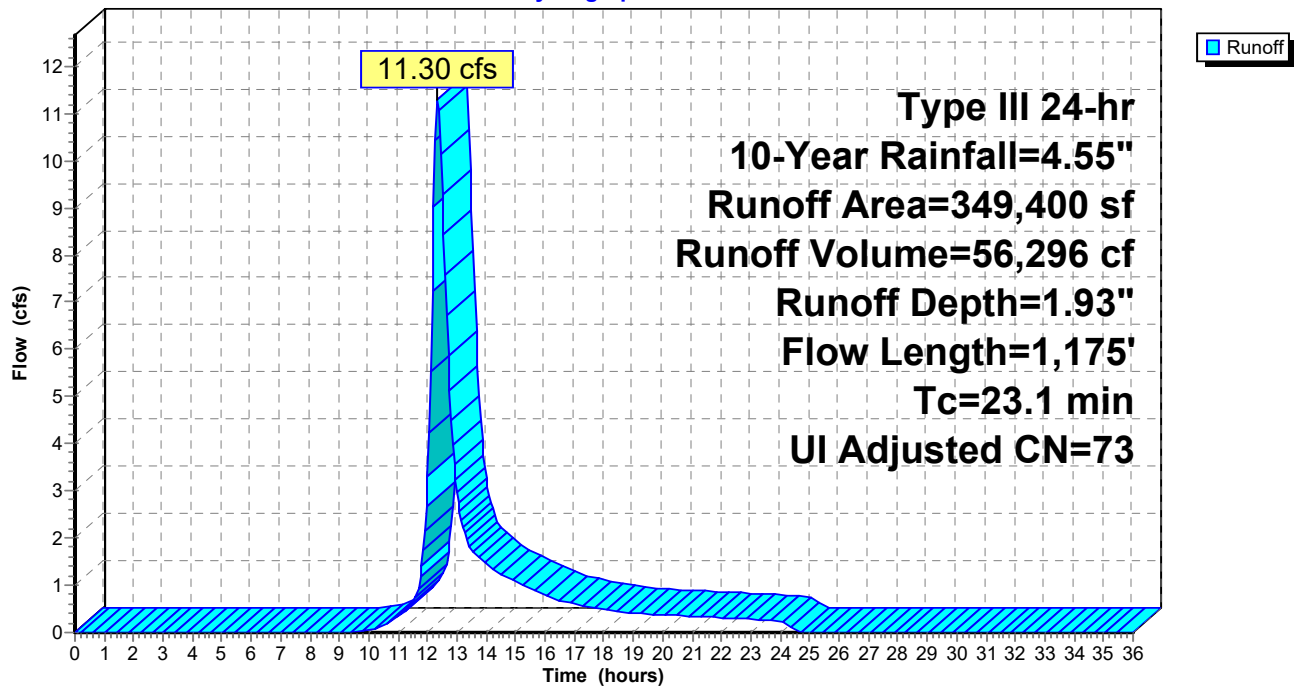
Type III 24-hr 10-Year Rainfall=4.55"

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### Subcatchment 5S: Most of Existing Lot

Hydrograph





## Existing Stormwater Model

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Type III 24-hr 10-Year Rainfall=4.55"

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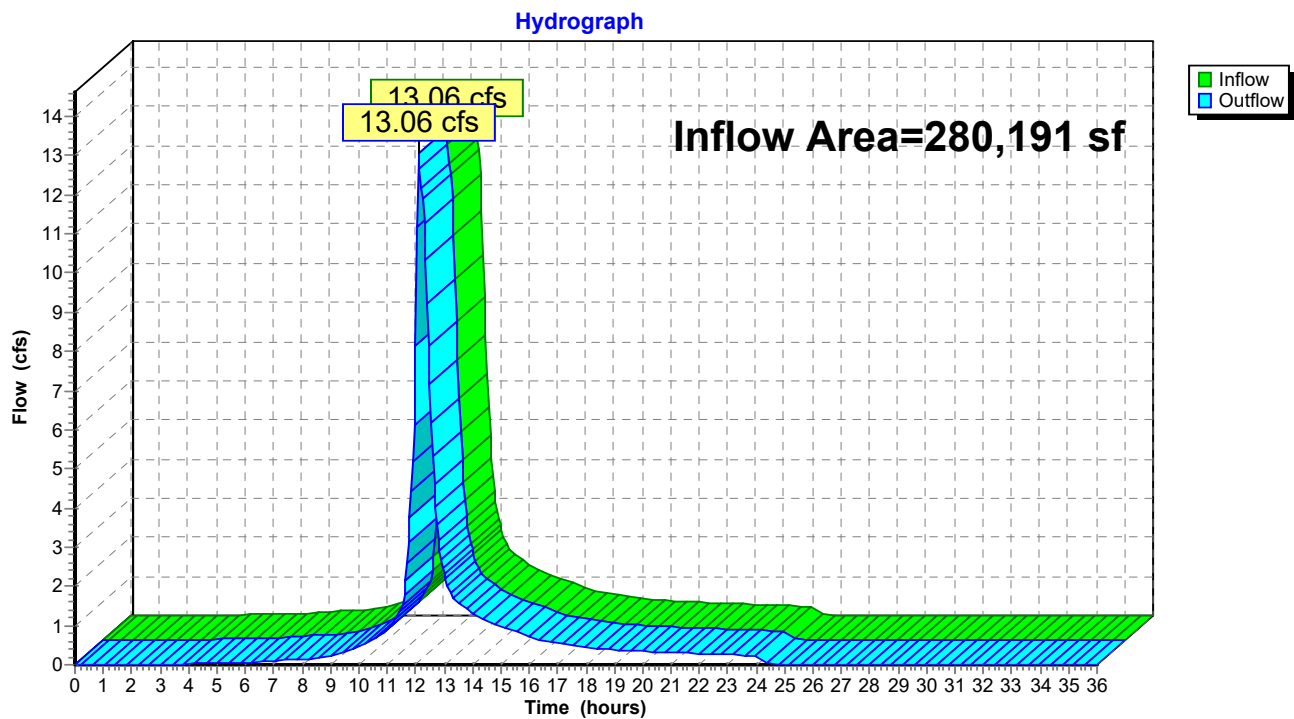
Page 28

### Summary for Reach 1R: Southeastern Wetland/Prop. Line

Inflow Area = 280,191 sf, 18.39% Impervious, Inflow Depth = 2.74" for 10-Year event  
Inflow = 13.06 cfs @ 12.12 hrs, Volume= 64,086 cf  
Outflow = 13.06 cfs @ 12.12 hrs, Volume= 64,086 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 1R: Southeastern Wetland/Prop. Line



## Existing Stormwater Model

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Type III 24-hr 10-Year Rainfall=4.55"

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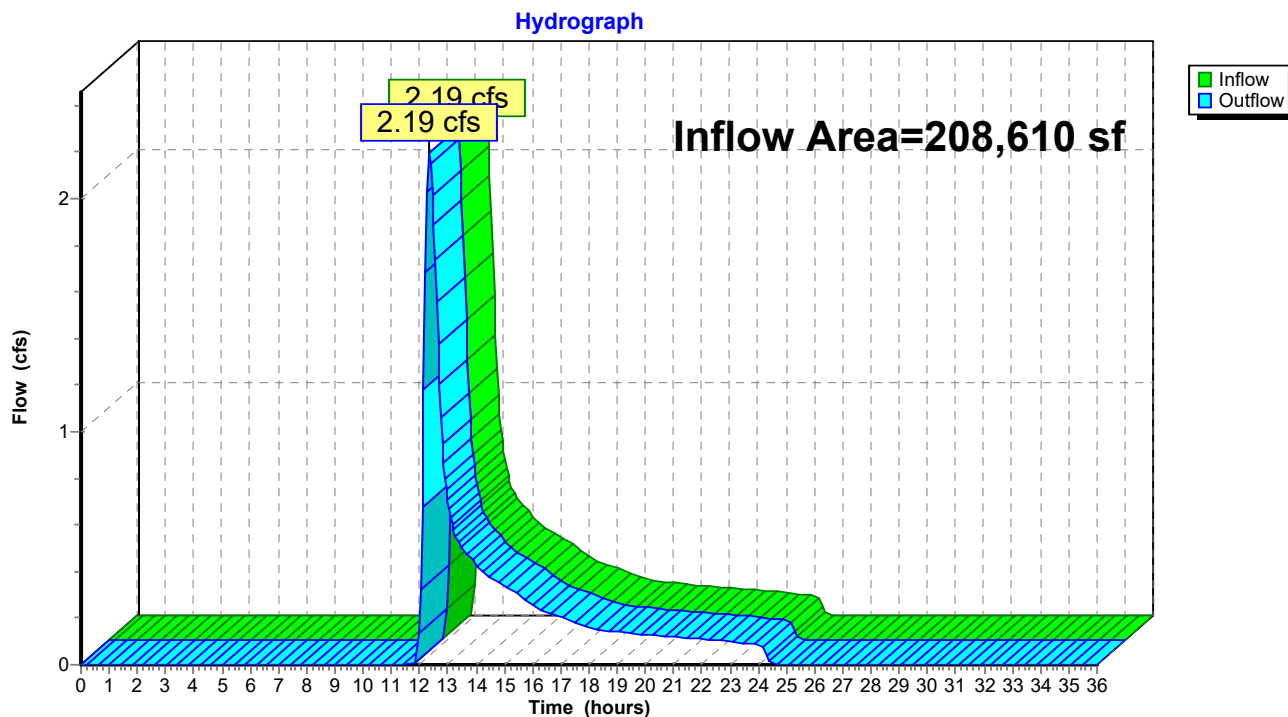
Page 29

### Summary for Reach 2R: Southwestern Wetland

Inflow Area = 208,610 sf, 0.00% Impervious, Inflow Depth = 0.77" for 10-Year event  
Inflow = 2.19 cfs @ 12.33 hrs, Volume= 13,301 cf  
Outflow = 2.19 cfs @ 12.33 hrs, Volume= 13,301 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 2R: Southwestern Wetland



## Existing Stormwater Model

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Type III 24-hr 10-Year Rainfall=4.55"

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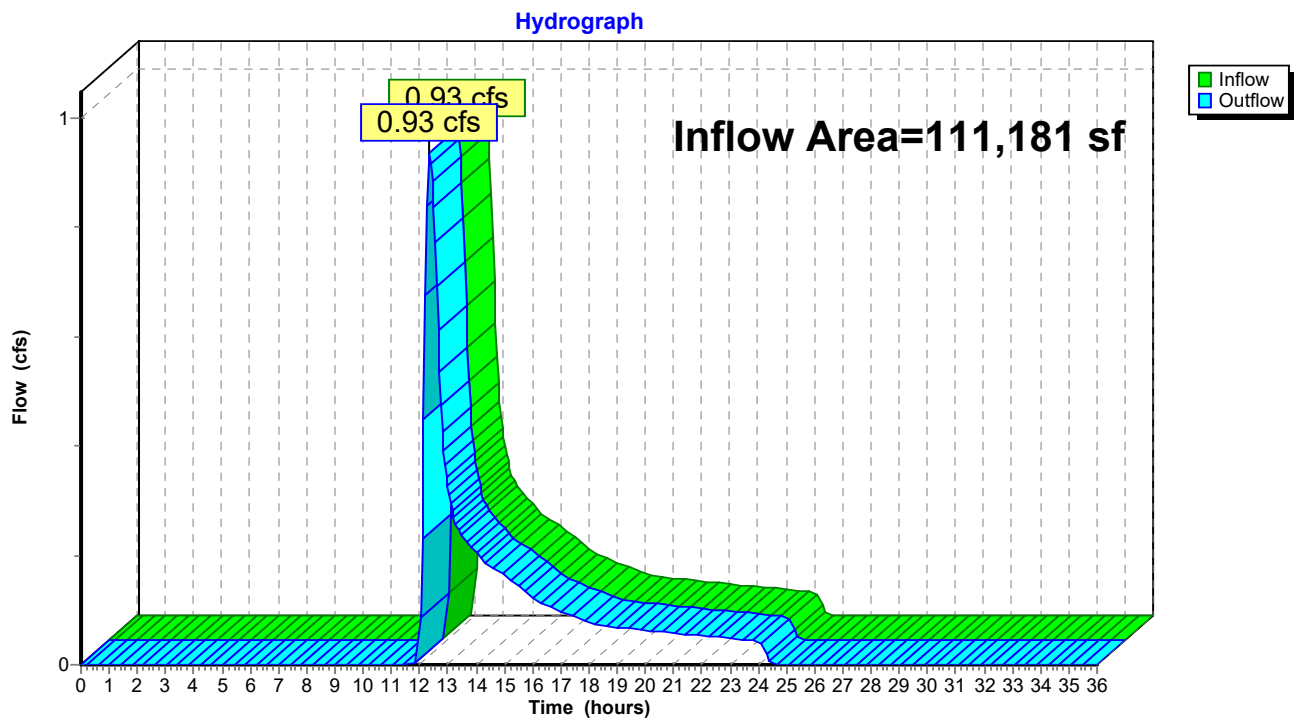
Page 30

### Summary for Reach 3R: Northern Overland Flow

Inflow Area = 111,181 sf, 0.00% Impervious, Inflow Depth = 0.66" for 10-Year event  
Inflow = 0.93 cfs @ 12.35 hrs, Volume= 6,133 cf  
Outflow = 0.93 cfs @ 12.35 hrs, Volume= 6,133 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 3R: Northern Overland Flow



## Existing Stormwater Model

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Type III 24-hr 10-Year Rainfall=4.55"

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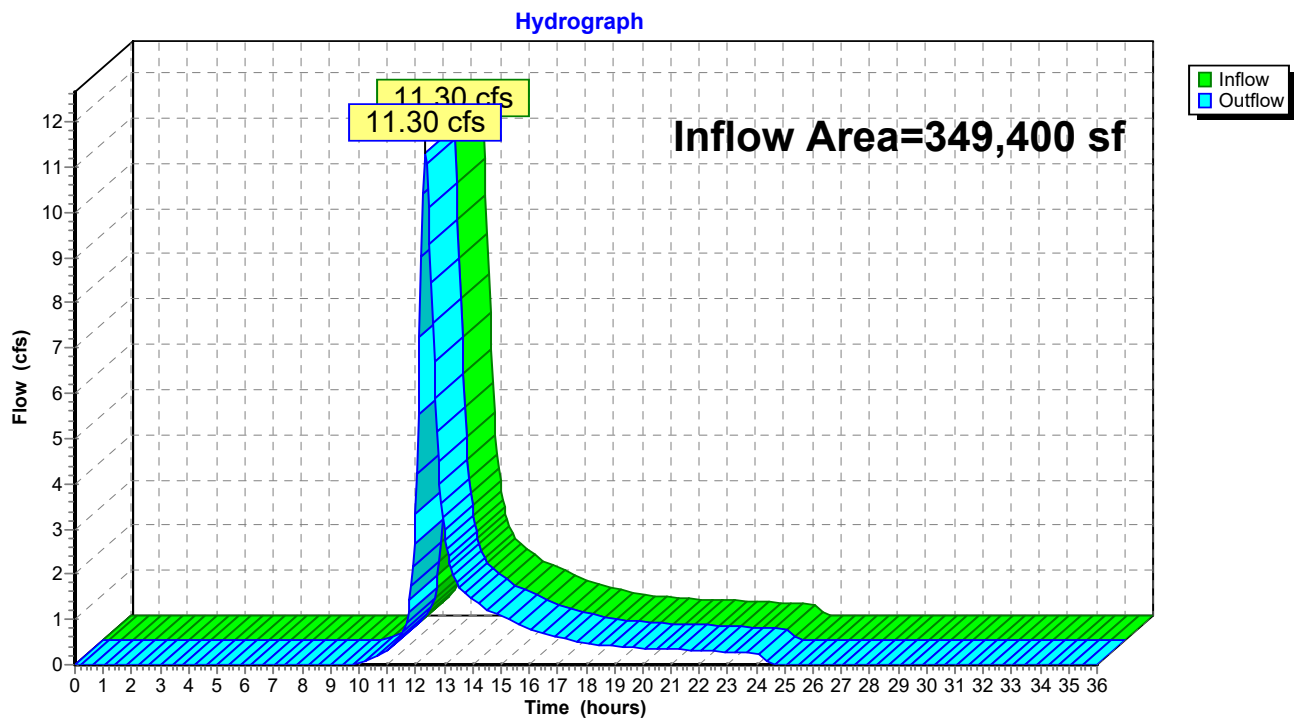
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### Summary for Reach 4R: Southern Wetland

Inflow Area = 349,400 sf, 5.07% Impervious, Inflow Depth = 1.93" for 10-Year event  
Inflow = 11.30 cfs @ 12.33 hrs, Volume= 56,296 cf  
Outflow = 11.30 cfs @ 12.33 hrs, Volume= 56,296 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 4R: Southern Wetland



## Existing Stormwater Model

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Type III 24-hr 10-Year Rainfall=4.55"

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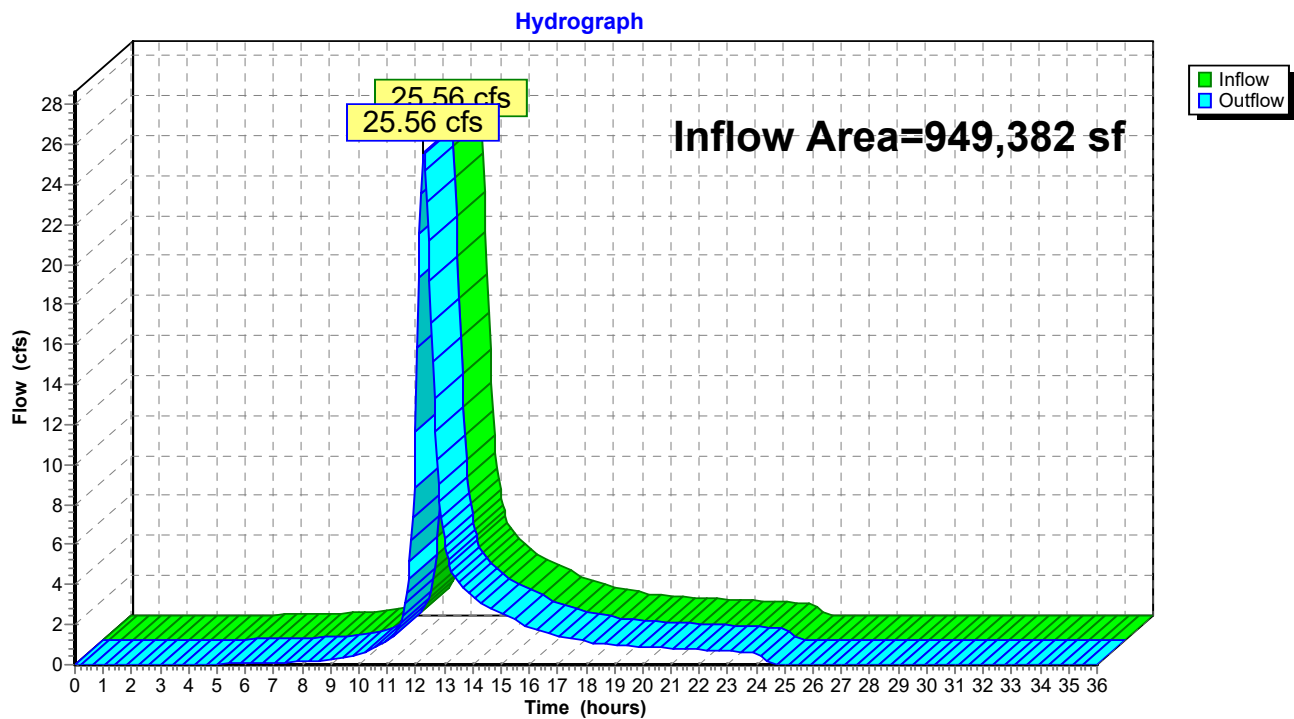
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### Summary for Reach 5R: Combined Flow

Inflow Area = 949,382 sf, 7.30% Impervious, Inflow Depth = 1.77" for 10-Year event  
Inflow = 25.56 cfs @ 12.29 hrs, Volume= 139,817 cf  
Outflow = 25.56 cfs @ 12.29 hrs, Volume= 139,817 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 5R: Combined Flow



## Existing Stormwater Model

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Type III 24-hr 25-Year Rainfall=5.75"

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment 1S: Eastern Woods</b>	Runoff Area=208,610 sf 0.00% Impervious Runoff Depth=1.38" Flow Length=626' Tc=18.2 min CN=55 Runoff=4.65 cfs 23,926 cf
<b>Subcatchment 2S: Northern Woods</b>	Runoff Area=111,181 sf 0.00% Impervious Runoff Depth=1.23" Flow Length=575' Tc=17.6 min CN=53 Runoff=2.15 cfs 11,406 cf
<b>Subcatchment 3S: Front of Site</b>	Runoff Area=194,497 sf 24.46% Impervious Runoff Depth=3.26" Flow Length=619' Tc=19.0 min CN=77 Runoff=11.74 cfs 52,866 cf
<b>Subcatchment 4S: Northeastern Section of</b>	Runoff Area=85,694 sf 4.63% Impervious Runoff Depth=5.05" Flow Length=496' Tc=6.0 min CN=94 Runoff=10.48 cfs 36,057 cf
<b>Subcatchment 5S: Most of Existing Lot</b>	Runoff Area=349,400 sf 5.07% Impervious Runoff Depth=2.88" Flow Length=1,175' Tc=23.1 min UI Adjusted CN=73 Runoff=17.08 cfs 83,927 cf
<b>Reach 1R: Southeastern Wetland/Prop. Line</b>	Inflow=17.92 cfs 88,923 cf Outflow=17.92 cfs 88,923 cf
<b>Reach 2R: Southwestern Wetland</b>	Inflow=4.65 cfs 23,926 cf Outflow=4.65 cfs 23,926 cf
<b>Reach 3R: Northern Overland Flow</b>	Inflow=2.15 cfs 11,406 cf Outflow=2.15 cfs 11,406 cf
<b>Reach 4R: Southern Wetland</b>	Inflow=17.08 cfs 83,927 cf Outflow=17.08 cfs 83,927 cf
<b>Reach 5R: Combined Flow</b>	Inflow=39.66 cfs 208,181 cf Outflow=39.66 cfs 208,181 cf

**Total Runoff Area = 949,382 sf Runoff Volume = 208,181 cf Average Runoff Depth = 2.63"**  
**92.70% Pervious = 880,120 sf 7.30% Impervious = 69,262 sf**

**Existing Stormwater Model**

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Type III 24-hr 25-Year Rainfall=5.75"

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**Summary for Subcatchment 1S: Eastern Woods**

Runoff = 4.65 cfs @ 12.29 hrs, Volume= 23,926 cf, Depth= 1.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Description
205,711	55	Woods, Good, HSG B
806	77	Woods, Good, HSG D
2,093	30	Woods, Good, HSG A
208,610	55	Weighted Average
208,610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	68	0.0600	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
1.3	103	0.0680	1.30		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	78	0.0380	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.2	95	0.0210	0.72		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	105	0.0710	1.33		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.6	177	0.1330	1.82		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
18.2	626	Total			

## Existing Stormwater Model

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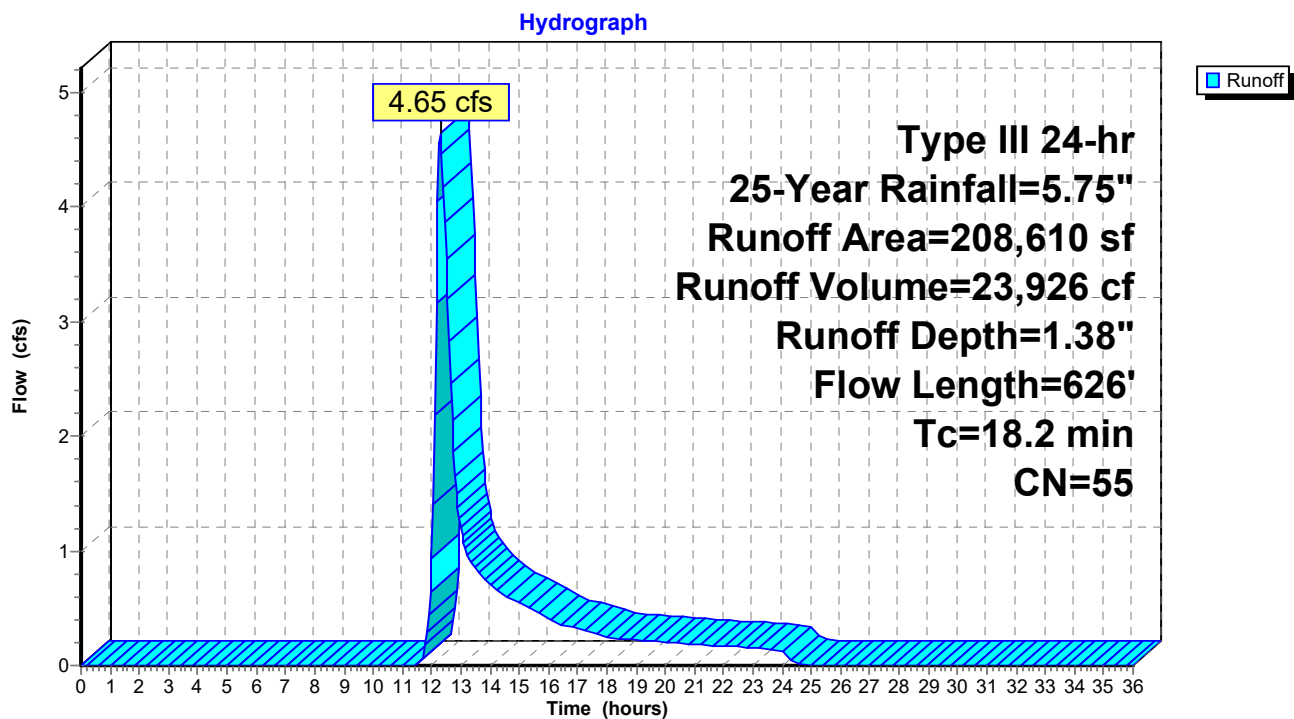
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Type III 24-hr 25-Year Rainfall=5.75"

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### Subcatchment 1S: Eastern Woods





## Existing Stormwater Model

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Type III 24-hr 25-Year Rainfall=5.75"

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### Summary for Subcatchment 2S: Northern Woods

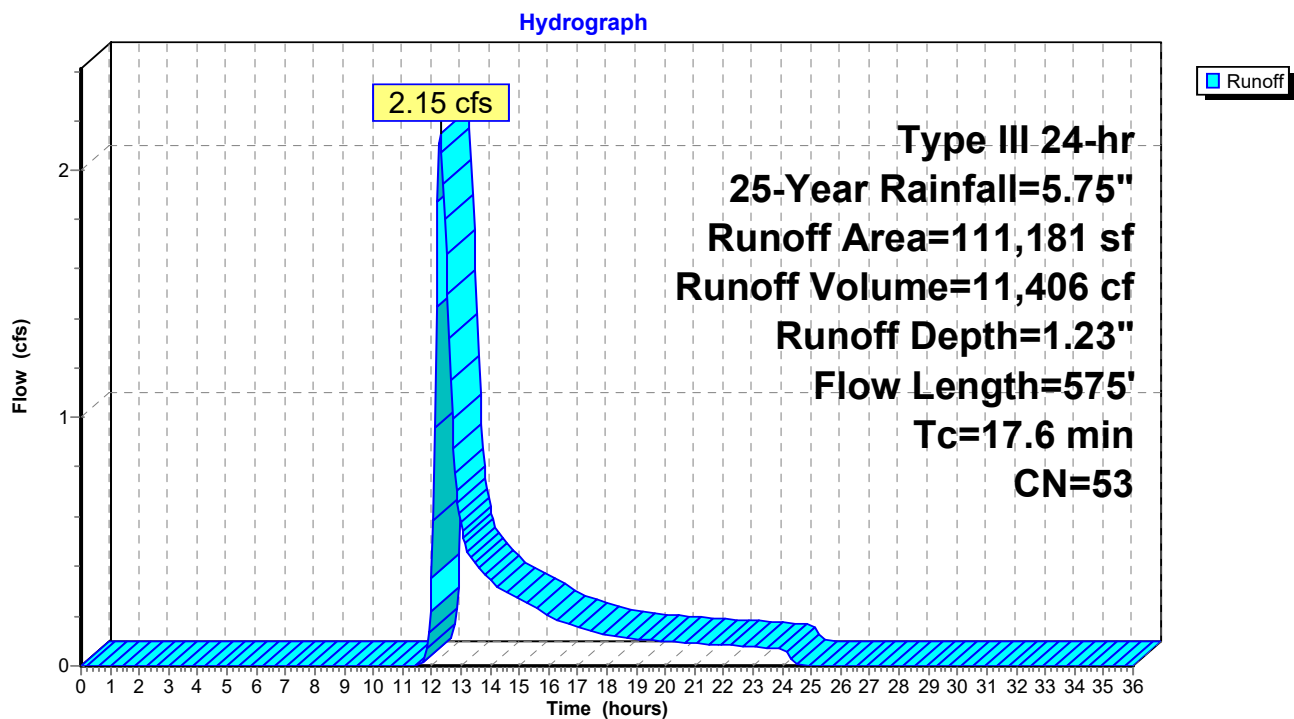
Runoff = 2.15 cfs @ 12.29 hrs, Volume= 11,406 cf, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Description
68,962	55	Woods, Good, HSG B
21,601	70	Woods, Good, HSG C
20,618	30	Woods, Good, HSG A
111,181	53	Weighted Average
111,181		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
7.9	525	0.0495	1.11		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
17.6	575	Total			

### Subcatchment 2S: Northern Woods



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Type III 24-hr 25-Year Rainfall=5.75"

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**Summary for Subcatchment 3S: Front of Site**

Runoff = 11.74 cfs @ 12.26 hrs, Volume= 52,866 cf, Depth= 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Description
20,473	74	>75% Grass cover, Good, HSG C
28,406	77	Woods, Poor, HSG C
3,311	98	Paved parking, HSG C
7,754	98	Water Surface, HSG C
2,614	98	Paved parking, HSG D
36,432	77	Woods, Good, HSG D
17,163	98	Water Surface, HSG D
20,976	55	Woods, Good, HSG B
15,333	98	Water Surface, HSG B
8,494	85	Gravel roads, HSG B
1,394	98	Paved parking, HSG B
32,147	61	>75% Grass cover, Good, HSG B
194,497	77	Weighted Average
146,928		75.54% Pervious Area
47,569		24.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
4.9	264	0.0322	0.90		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.4	45	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
4.0	260	0.0460	1.07		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.0	619	Total			

## Existing Stormwater Model

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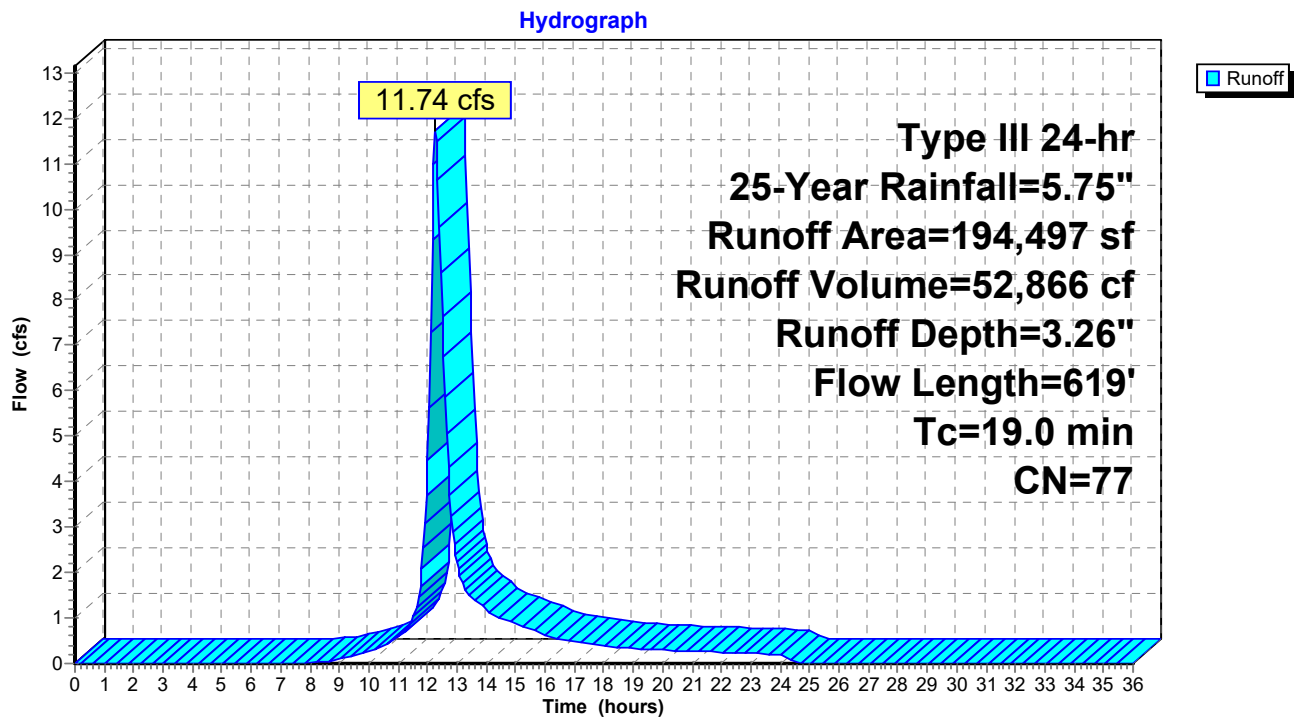
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Type III 24-hr 25-Year Rainfall=5.75"

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### Subcatchment 3S: Front of Site



## Existing Stormwater Model

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Type III 24-hr 25-Year Rainfall=5.75"

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### Summary for Subcatchment 4S: Northeastern Section of Existing Yard

Runoff = 10.48 cfs @ 12.09 hrs, Volume= 36,057 cf, Depth= 5.05"

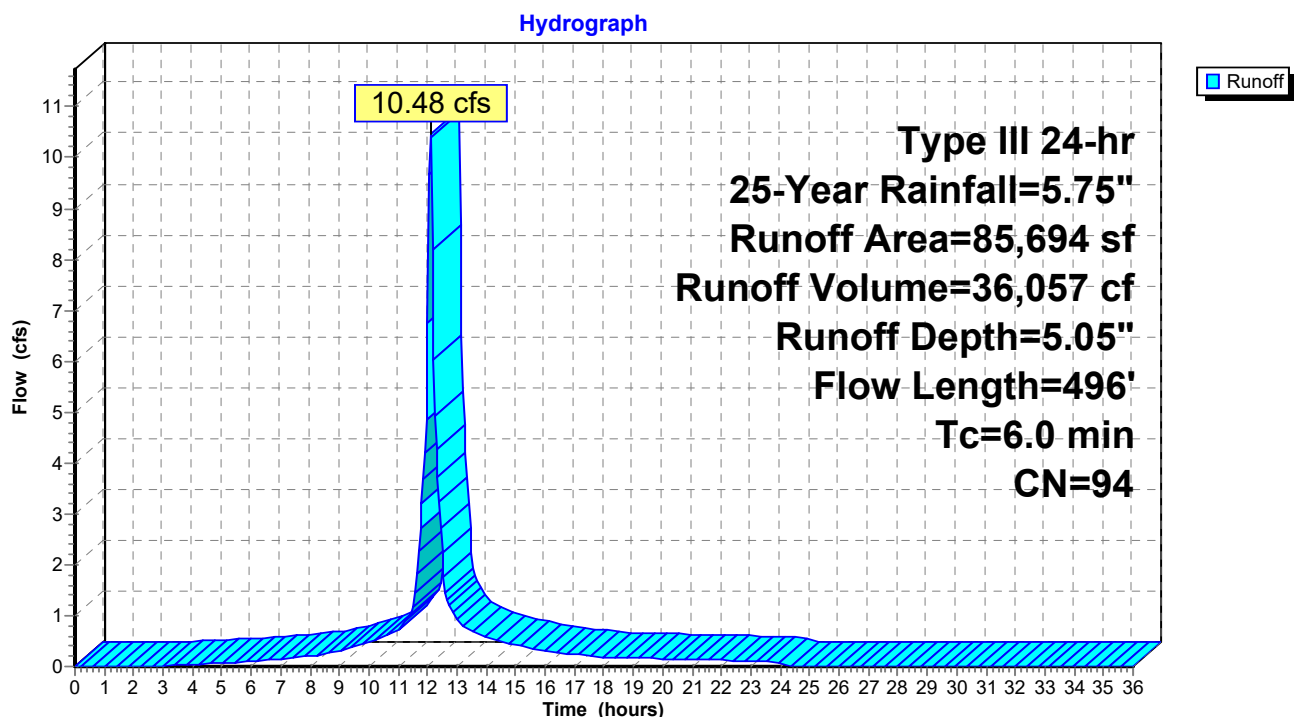
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Description
4,792	55	Woods, Good, HSG B
2,962	98	Paved parking, HSG B
1,002	98	Water Surface, HSG B
76,938	96	Gravel surface, HSG B
85,694	94	Weighted Average
81,730		95.37% Pervious Area
3,964		4.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0250	1.27		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.00"
2.2	406	0.0375	3.12		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.7	40	0.0375	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.4					<b>Direct Entry,</b>
6.0	496	Total			

### Subcatchment 4S: Northeastern Section of Existing Yard



**Existing Stormwater Model**

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Type III 24-hr 25-Year Rainfall=5.75"

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**Summary for Subcatchment 5S: Most of Existing Lot**

Runoff = 17.08 cfs @ 12.33 hrs, Volume= 83,927 cf, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Adj	Description
64,556	55		Woods, Good, HSG B
4,487	77		Woods, Good, HSG D
170,927	85		Gravel roads, HSG B
5,619	98		Paved parking, HSG B
12,110	98		Unconnected roofs, HSG B
91,077	61		>75% Grass cover, Good, HSG B
624	70		Woods, Good, HSG C
349,400	74	73	Weighted Average, UI Adjusted
331,671			94.93% Pervious Area
17,729			5.07% Impervious Area
12,110			68.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0200	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	164	0.0470	1.08		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.4	259	0.0040	1.28		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
3.0	640	0.0500	3.60		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
1.5	62	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
23.1	1,175	Total			

## Existing Stormwater Model

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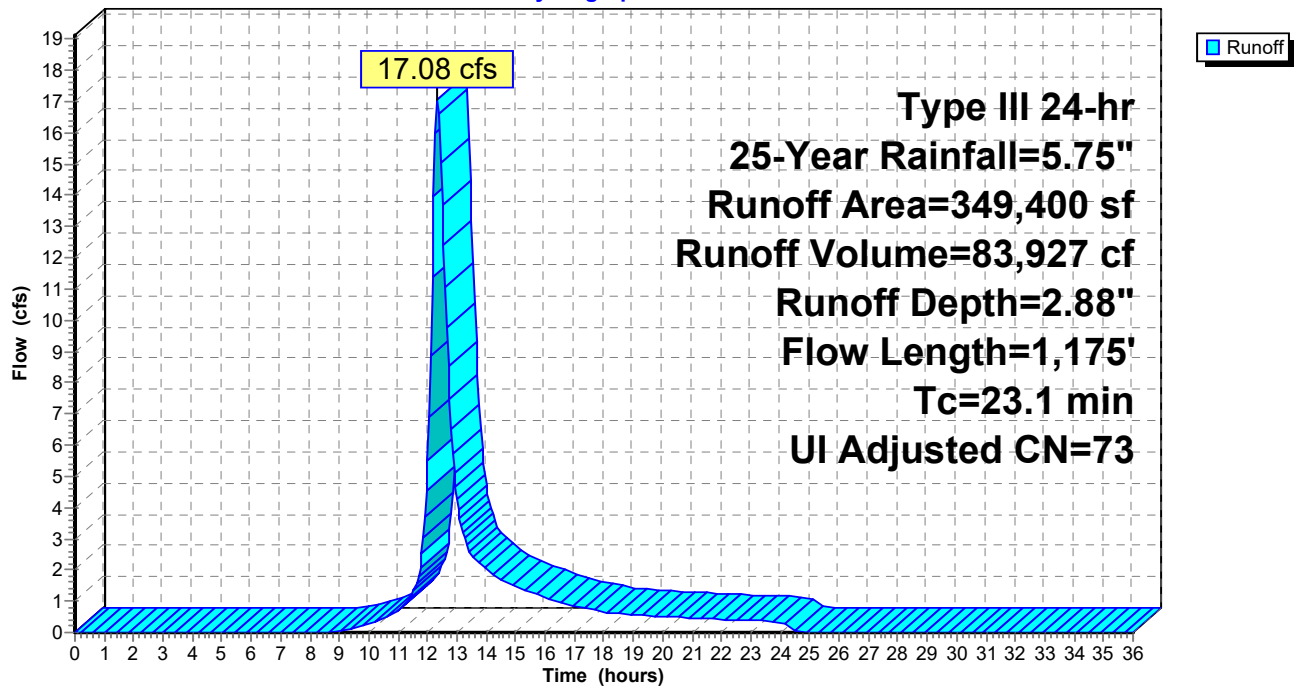
Type III 24-hr 25-Year Rainfall=5.75"

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### Subcatchment 5S: Most of Existing Lot

Hydrograph



## Existing Stormwater Model

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Type III 24-hr 25-Year Rainfall=5.75"

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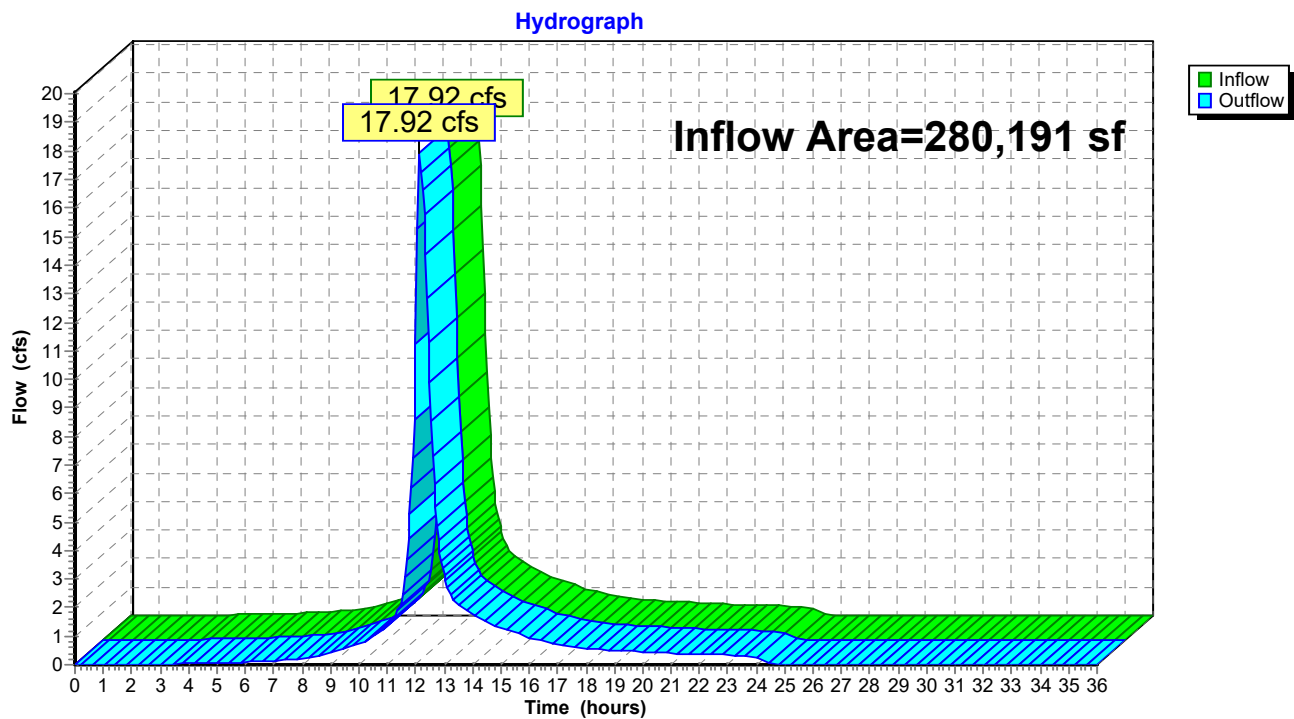
Page 42

### Summary for Reach 1R: Southeastern Wetland/Prop. Line

Inflow Area = 280,191 sf, 18.39% Impervious, Inflow Depth = 3.81" for 25-Year event  
Inflow = 17.92 cfs @ 12.12 hrs, Volume= 88,923 cf  
Outflow = 17.92 cfs @ 12.12 hrs, Volume= 88,923 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 1R: Southeastern Wetland/Prop. Line



## Existing Stormwater Model

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Type III 24-hr 25-Year Rainfall=5.75"

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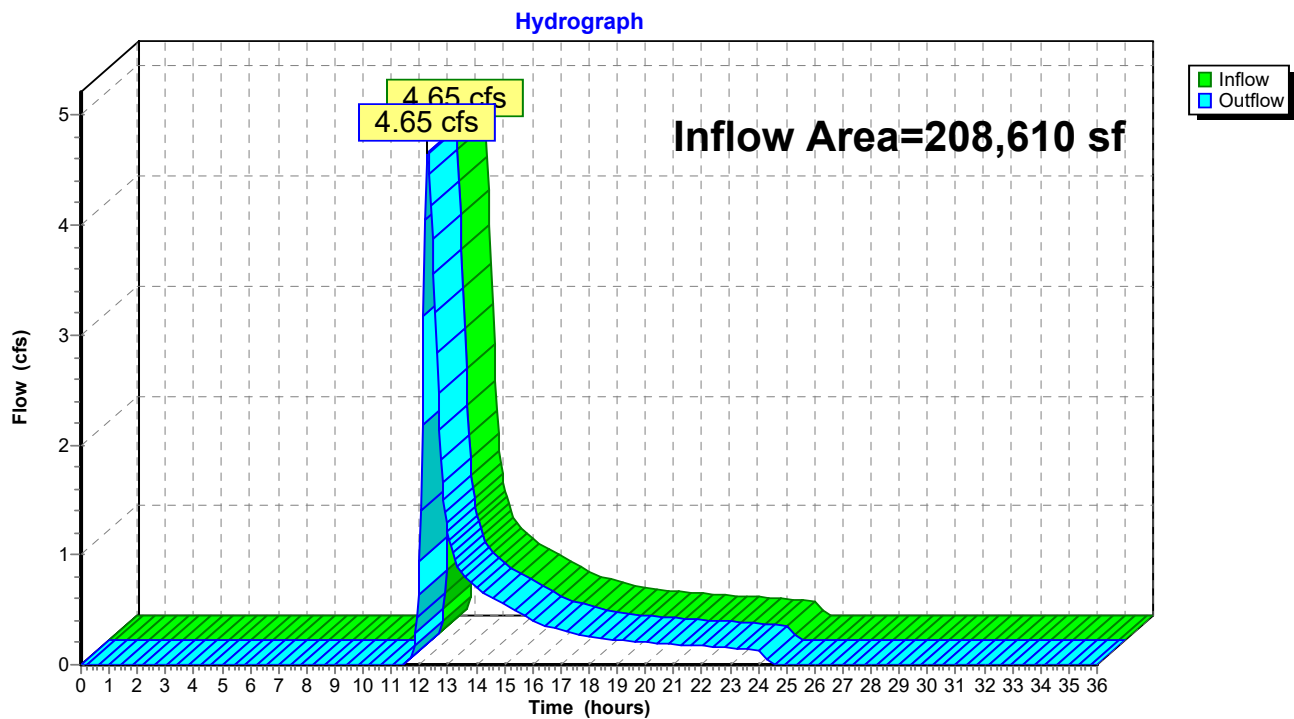
Page 43

### Summary for Reach 2R: Southwestern Wetland

Inflow Area = 208,610 sf, 0.00% Impervious, Inflow Depth = 1.38" for 25-Year event  
Inflow = 4.65 cfs @ 12.29 hrs, Volume= 23,926 cf  
Outflow = 4.65 cfs @ 12.29 hrs, Volume= 23,926 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 2R: Southwestern Wetland





## Existing Stormwater Model

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Type III 24-hr 25-Year Rainfall=5.75"

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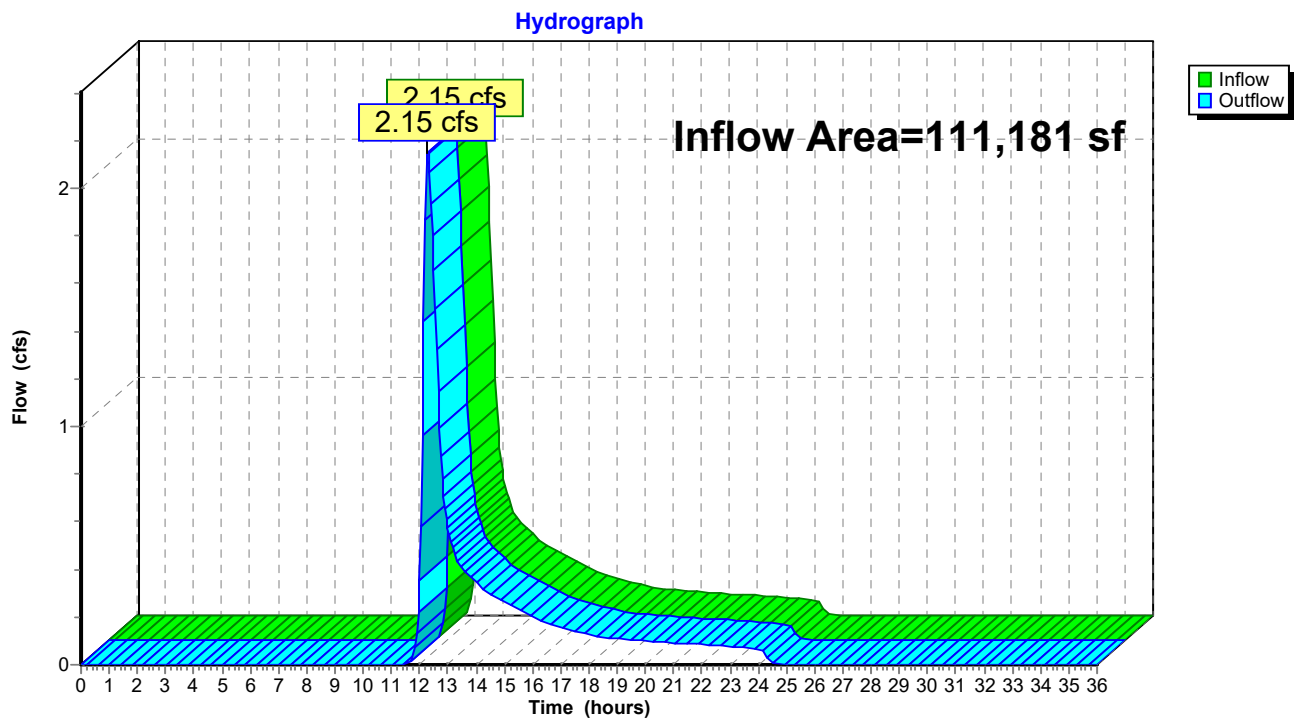
Page 44

### Summary for Reach 3R: Northern Overland Flow

Inflow Area = 111,181 sf, 0.00% Impervious, Inflow Depth = 1.23" for 25-Year event  
Inflow = 2.15 cfs @ 12.29 hrs, Volume= 11,406 cf  
Outflow = 2.15 cfs @ 12.29 hrs, Volume= 11,406 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 3R: Northern Overland Flow



## Existing Stormwater Model

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Type III 24-hr 25-Year Rainfall=5.75"

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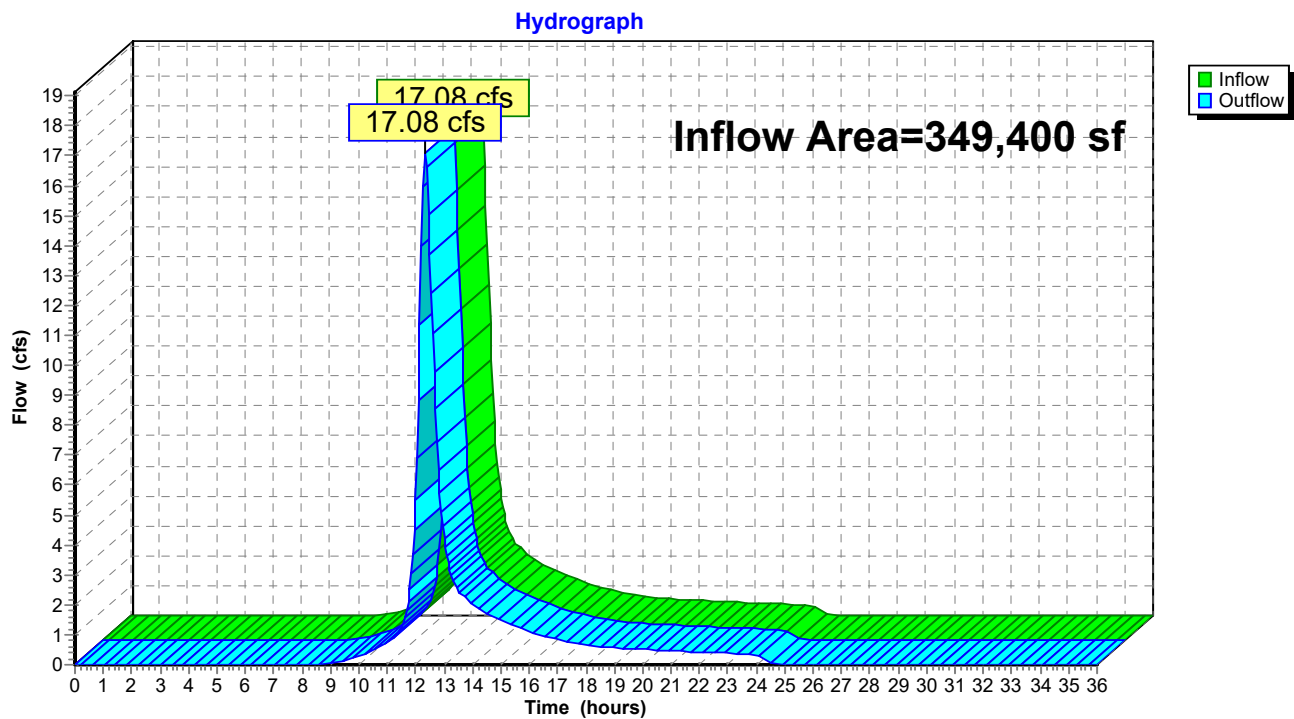
Page 45

### Summary for Reach 4R: Southern Wetland

Inflow Area = 349,400 sf, 5.07% Impervious, Inflow Depth = 2.88" for 25-Year event  
Inflow = 17.08 cfs @ 12.33 hrs, Volume= 83,927 cf  
Outflow = 17.08 cfs @ 12.33 hrs, Volume= 83,927 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 4R: Southern Wetland



## Existing Stormwater Model

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Type III 24-hr 25-Year Rainfall=5.75"

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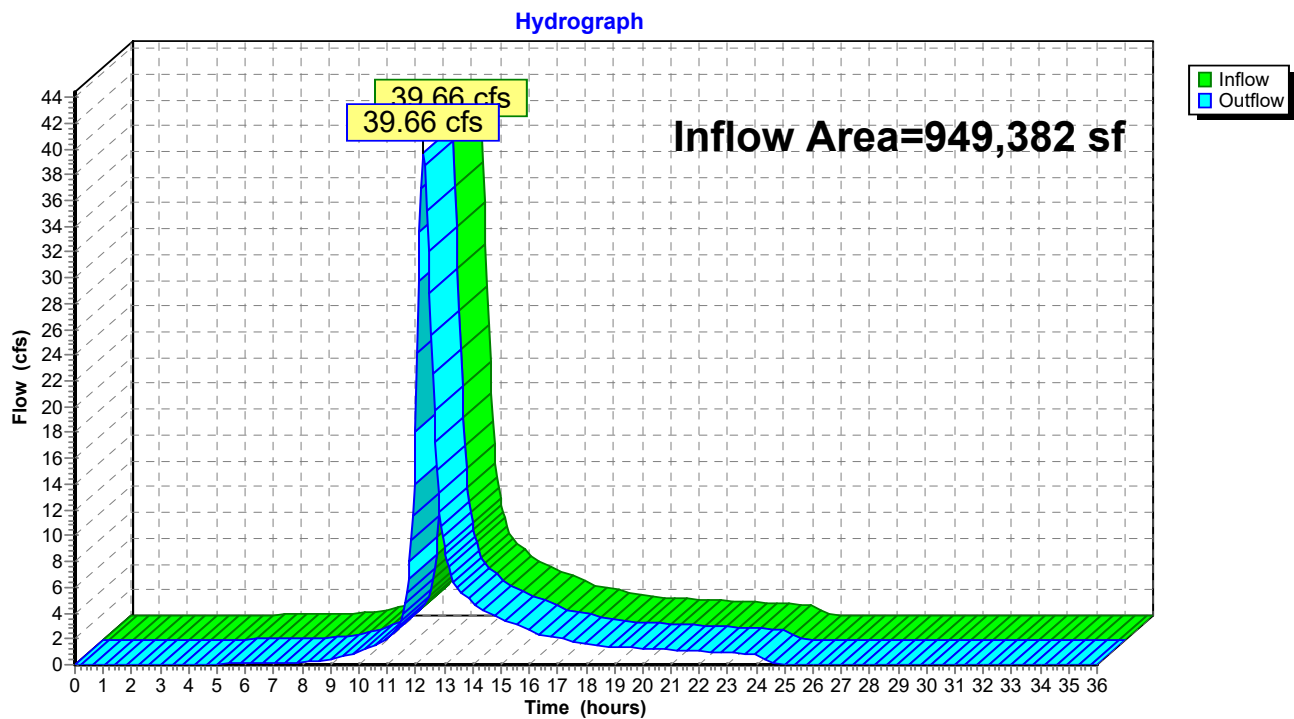
Page 46

### Summary for Reach 5R: Combined Flow

Inflow Area = 949,382 sf, 7.30% Impervious, Inflow Depth = 2.63" for 25-Year event  
Inflow = 39.66 cfs @ 12.28 hrs, Volume= 208,181 cf  
Outflow = 39.66 cfs @ 12.28 hrs, Volume= 208,181 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 5R: Combined Flow



## Existing Stormwater Model

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Type III 24-hr 50-Year Rainfall=6.86"

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment 1S: Eastern Woods</b>	Runoff Area=208,610 sf 0.00% Impervious Runoff Depth=2.04" Flow Length=626' Tc=18.2 min CN=55 Runoff=7.34 cfs 35,385 cf
<b>Subcatchment 2S: Northern Woods</b>	Runoff Area=111,181 sf 0.00% Impervious Runoff Depth=1.85" Flow Length=575' Tc=17.6 min CN=53 Runoff=3.53 cfs 17,178 cf
<b>Subcatchment 3S: Front of Site</b>	Runoff Area=194,497 sf 24.46% Impervious Runoff Depth=4.24" Flow Length=619' Tc=19.0 min CN=77 Runoff=15.23 cfs 68,725 cf
<b>Subcatchment 4S: Northeastern Section of</b>	Runoff Area=85,694 sf 4.63% Impervious Runoff Depth=6.15" Flow Length=496' Tc=6.0 min CN=94 Runoff=12.63 cfs 43,913 cf
<b>Subcatchment 5S: Most of Existing Lot</b>	Runoff Area=349,400 sf 5.07% Impervious Runoff Depth=3.81" Flow Length=1,175' Tc=23.1 min UI Adjusted CN=73 Runoff=22.73 cfs 111,076 cf
<b>Reach 1R: Southeastern Wetland/Prop. Line</b>	Inflow=22.52 cfs 112,639 cf Outflow=22.52 cfs 112,639 cf
<b>Reach 2R: Southwestern Wetland</b>	Inflow=7.34 cfs 35,385 cf Outflow=7.34 cfs 35,385 cf
<b>Reach 3R: Northern Overland Flow</b>	Inflow=3.53 cfs 17,178 cf Outflow=3.53 cfs 17,178 cf
<b>Reach 4R: Southern Wetland</b>	Inflow=22.73 cfs 111,076 cf Outflow=22.73 cfs 111,076 cf
<b>Reach 5R: Combined Flow</b>	Inflow=53.66 cfs 276,277 cf Outflow=53.66 cfs 276,277 cf

**Total Runoff Area = 949,382 sf Runoff Volume = 276,277 cf Average Runoff Depth = 3.49"**  
**92.70% Pervious = 880,120 sf 7.30% Impervious = 69,262 sf**

**Existing Stormwater Model**

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Type III 24-hr 50-Year Rainfall=6.86"

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**Summary for Subcatchment 1S: Eastern Woods**

Runoff = 7.34 cfs @ 12.28 hrs, Volume= 35,385 cf, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Description
205,711	55	Woods, Good, HSG B
806	77	Woods, Good, HSG D
2,093	30	Woods, Good, HSG A
208,610	55	Weighted Average
208,610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	68	0.0600	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
1.3	103	0.0680	1.30		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	78	0.0380	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.2	95	0.0210	0.72		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	105	0.0710	1.33		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.6	177	0.1330	1.82		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
18.2	626	Total			

## Existing Stormwater Model

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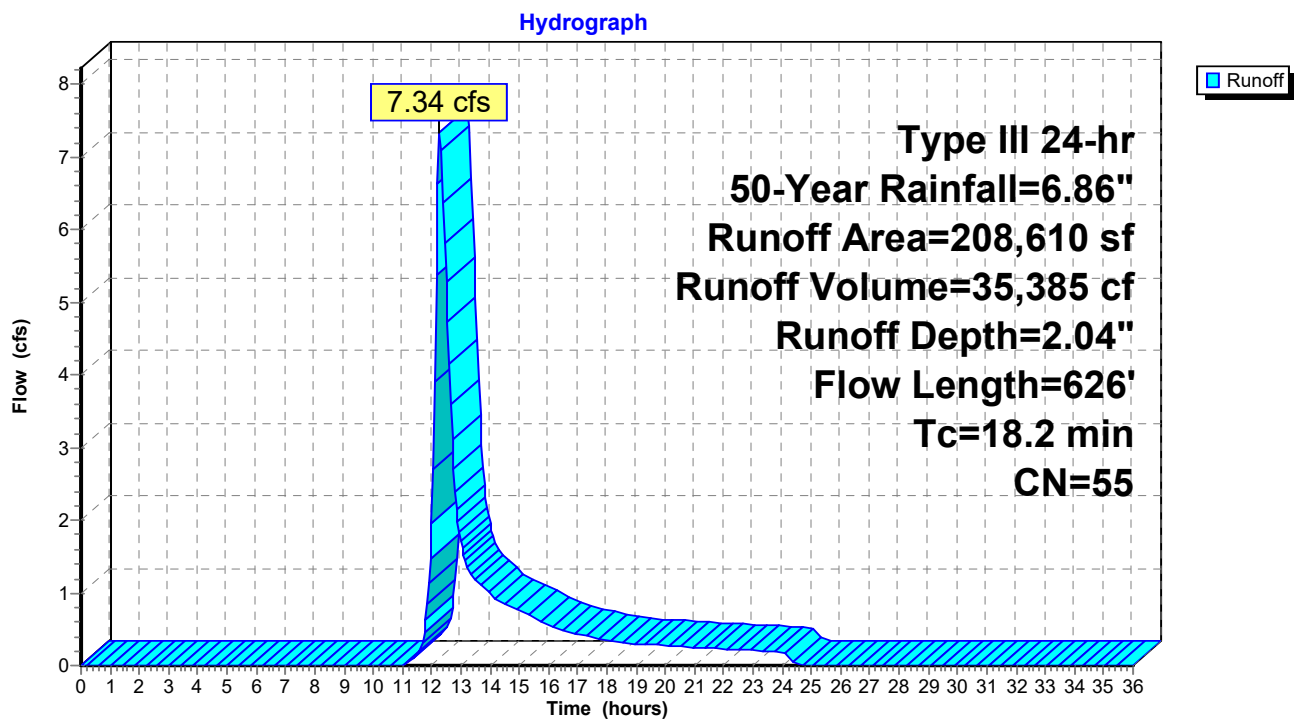
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### Subcatchment 1S: Eastern Woods



## Existing Stormwater Model

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Type III 24-hr 50-Year Rainfall=6.86"

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### Summary for Subcatchment 2S: Northern Woods

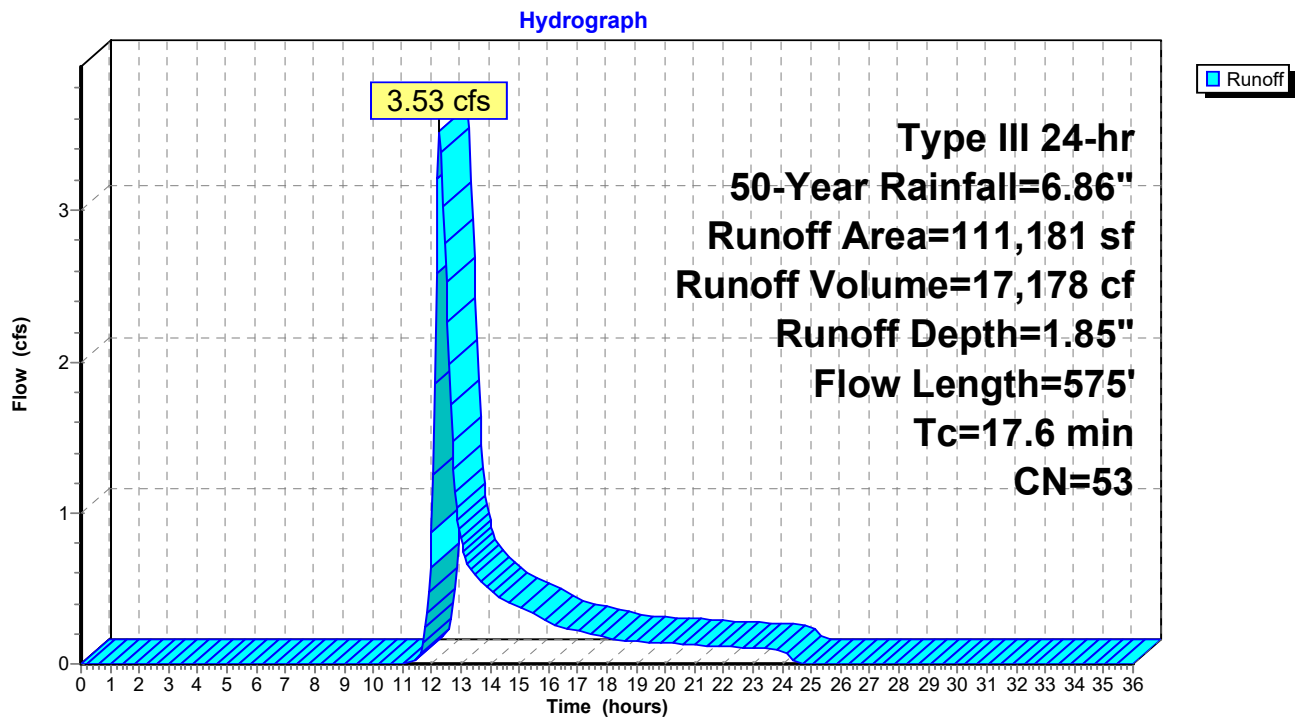
Runoff = 3.53 cfs @ 12.27 hrs, Volume= 17,178 cf, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Description
68,962	55	Woods, Good, HSG B
21,601	70	Woods, Good, HSG C
20,618	30	Woods, Good, HSG A
111,181	53	Weighted Average
111,181		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
7.9	525	0.0495	1.11		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
17.6	575	Total			

### Subcatchment 2S: Northern Woods



**Existing Stormwater Model**

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Type III 24-hr 50-Year Rainfall=6.86"

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**Summary for Subcatchment 3S: Front of Site**

Runoff = 15.23 cfs @ 12.26 hrs, Volume= 68,725 cf, Depth= 4.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Description
20,473	74	>75% Grass cover, Good, HSG C
28,406	77	Woods, Poor, HSG C
3,311	98	Paved parking, HSG C
7,754	98	Water Surface, HSG C
2,614	98	Paved parking, HSG D
36,432	77	Woods, Good, HSG D
17,163	98	Water Surface, HSG D
20,976	55	Woods, Good, HSG B
15,333	98	Water Surface, HSG B
8,494	85	Gravel roads, HSG B
1,394	98	Paved parking, HSG B
32,147	61	>75% Grass cover, Good, HSG B
194,497	77	Weighted Average
146,928		75.54% Pervious Area
47,569		24.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
4.9	264	0.0322	0.90		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.4	45	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
4.0	260	0.0460	1.07		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.0	619	Total			



## Existing Stormwater Model

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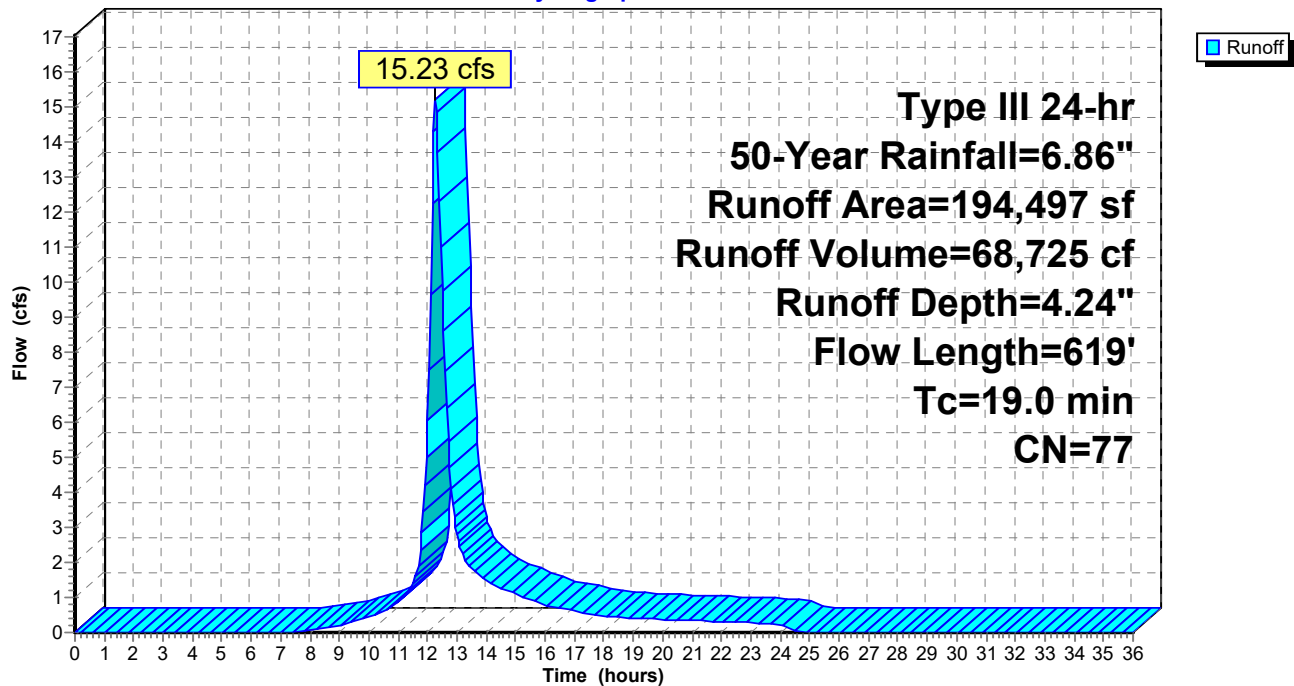
Type III 24-hr 50-Year Rainfall=6.86"

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### Subcatchment 3S: Front of Site

Hydrograph



## Existing Stormwater Model

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Type III 24-hr 50-Year Rainfall=6.86"

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### Summary for Subcatchment 4S: Northeastern Section of Existing Yard

Runoff = 12.63 cfs @ 12.09 hrs, Volume= 43,913 cf, Depth= 6.15"

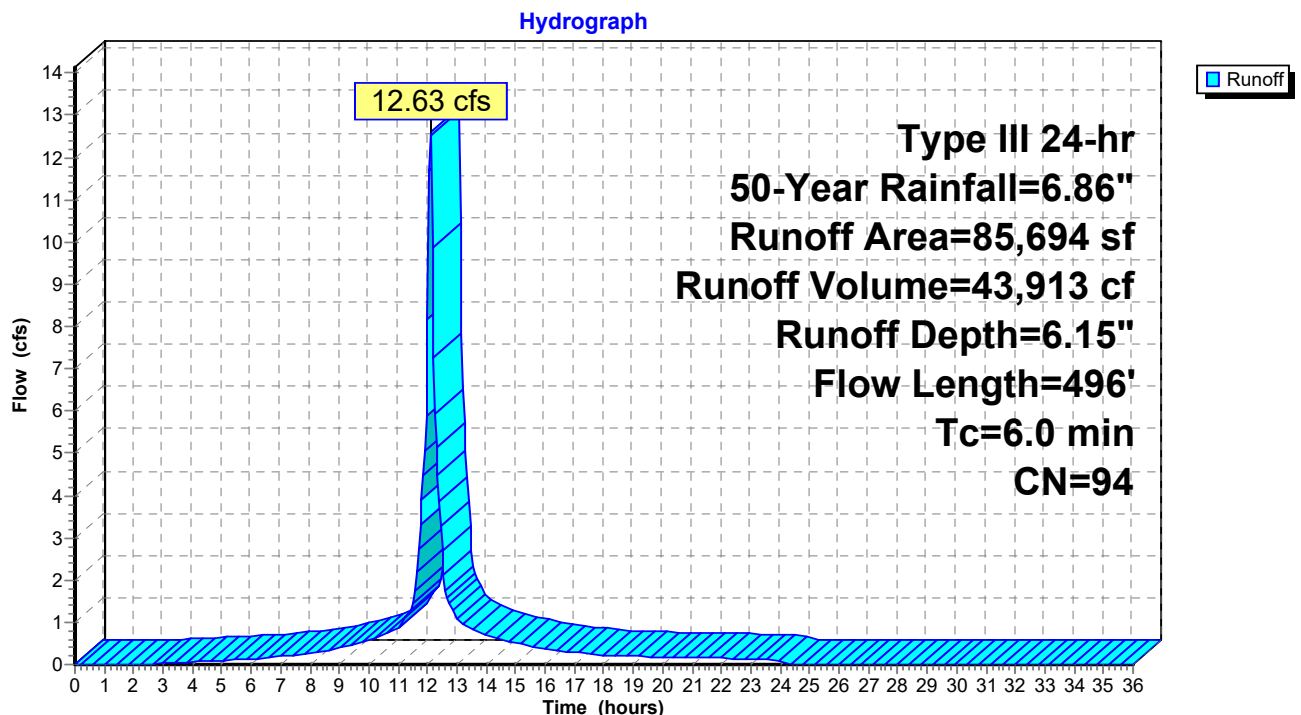
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Description
4,792	55	Woods, Good, HSG B
2,962	98	Paved parking, HSG B
1,002	98	Water Surface, HSG B
76,938	96	Gravel surface, HSG B
85,694	94	Weighted Average
81,730		95.37% Pervious Area
3,964		4.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0250	1.27		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.00"
2.2	406	0.0375	3.12		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.7	40	0.0375	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.4					<b>Direct Entry,</b>
6.0	496	Total			

### Subcatchment 4S: Northeastern Section of Existing Yard



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Type III 24-hr 50-Year Rainfall=6.86"

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**Summary for Subcatchment 5S: Most of Existing Lot**

Runoff = 22.73 cfs @ 12.32 hrs, Volume= 111,076 cf, Depth= 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Adj	Description
64,556	55		Woods, Good, HSG B
4,487	77		Woods, Good, HSG D
170,927	85		Gravel roads, HSG B
5,619	98		Paved parking, HSG B
12,110	98		Unconnected roofs, HSG B
91,077	61		>75% Grass cover, Good, HSG B
624	70		Woods, Good, HSG C
349,400	74	73	Weighted Average, UI Adjusted
331,671			94.93% Pervious Area
17,729			5.07% Impervious Area
12,110			68.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0200	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	164	0.0470	1.08		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.4	259	0.0040	1.28		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
3.0	640	0.0500	3.60		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
1.5	62	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
23.1	1,175	Total			

## Existing Stormwater Model

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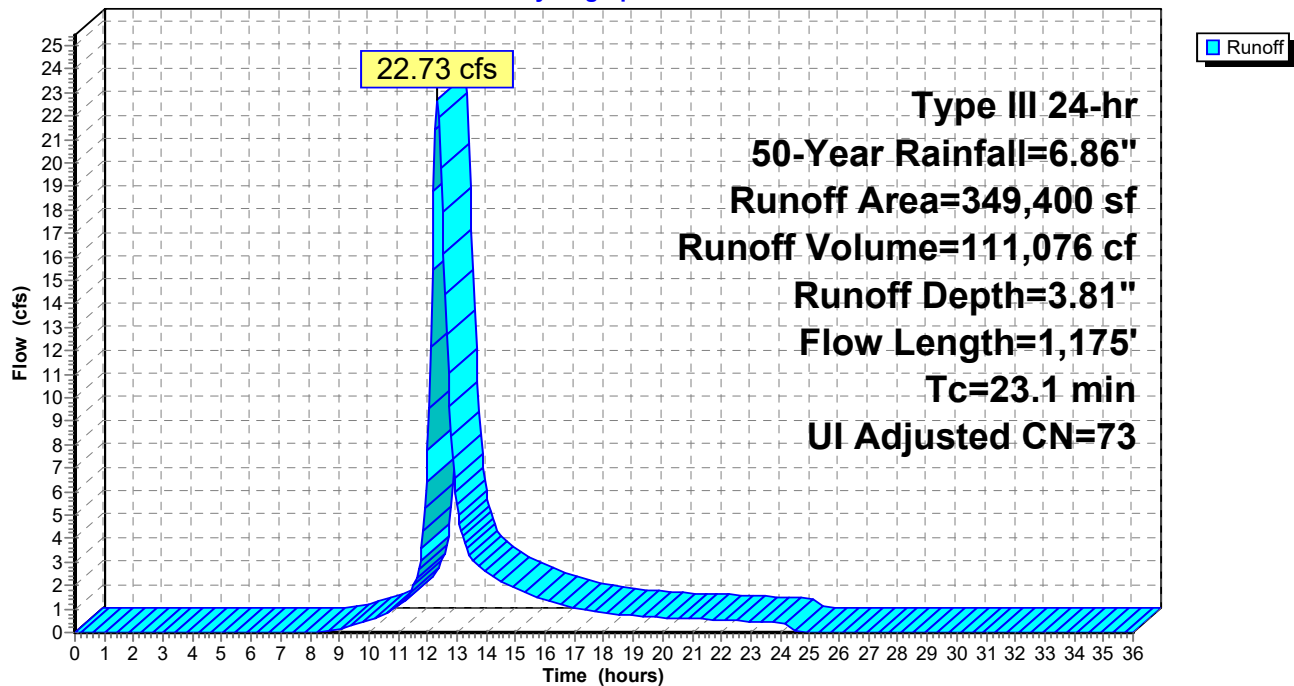
Type III 24-hr 50-Year Rainfall=6.86"

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### Subcatchment 5S: Most of Existing Lot

Hydrograph



## Existing Stormwater Model

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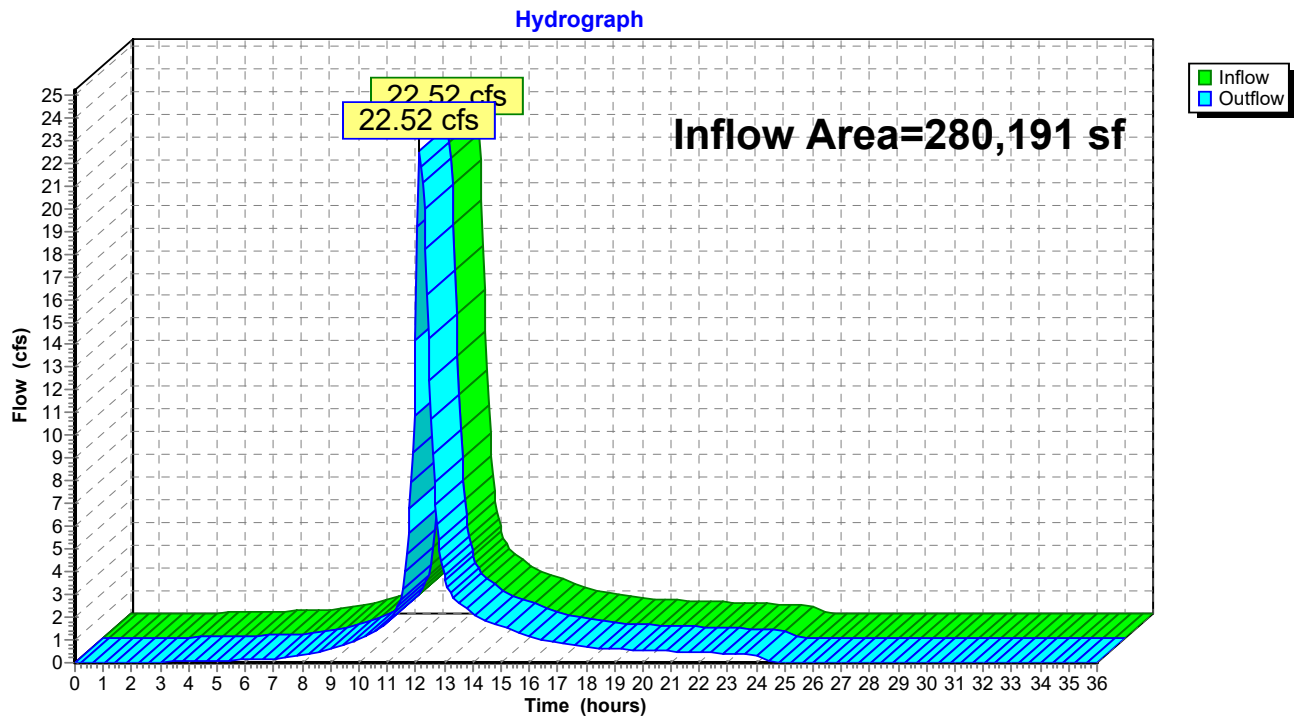
Page 56

### Summary for Reach 1R: Southeastern Wetland/Prop. Line

Inflow Area = 280,191 sf, 18.39% Impervious, Inflow Depth = 4.82" for 50-Year event  
Inflow = 22.52 cfs @ 12.12 hrs, Volume= 112,639 cf  
Outflow = 22.52 cfs @ 12.12 hrs, Volume= 112,639 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 1R: Southeastern Wetland/Prop. Line



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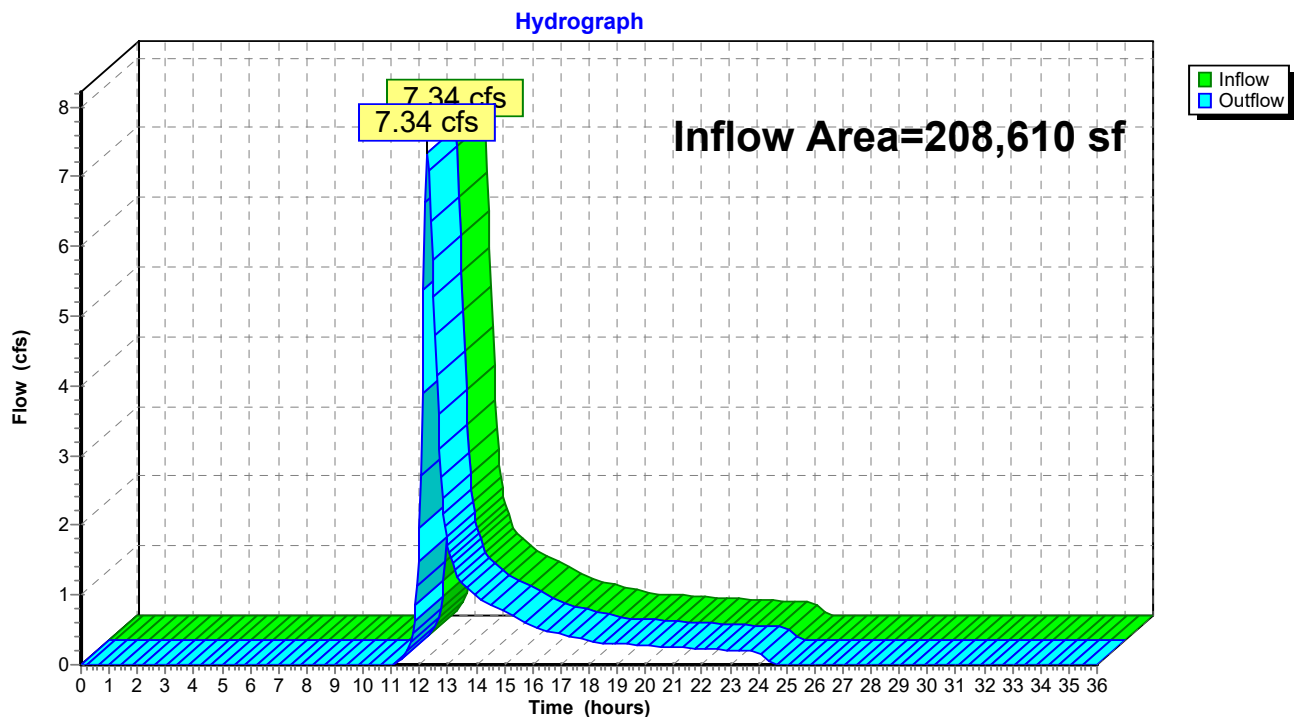
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### Summary for Reach 2R: Southwestern Wetland

Inflow Area = 208,610 sf, 0.00% Impervious, Inflow Depth = 2.04" for 50-Year event  
Inflow = 7.34 cfs @ 12.28 hrs, Volume= 35,385 cf  
Outflow = 7.34 cfs @ 12.28 hrs, Volume= 35,385 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 2R: Southwestern Wetland



## Existing Stormwater Model

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Type III 24-hr 50-Year Rainfall=6.86"

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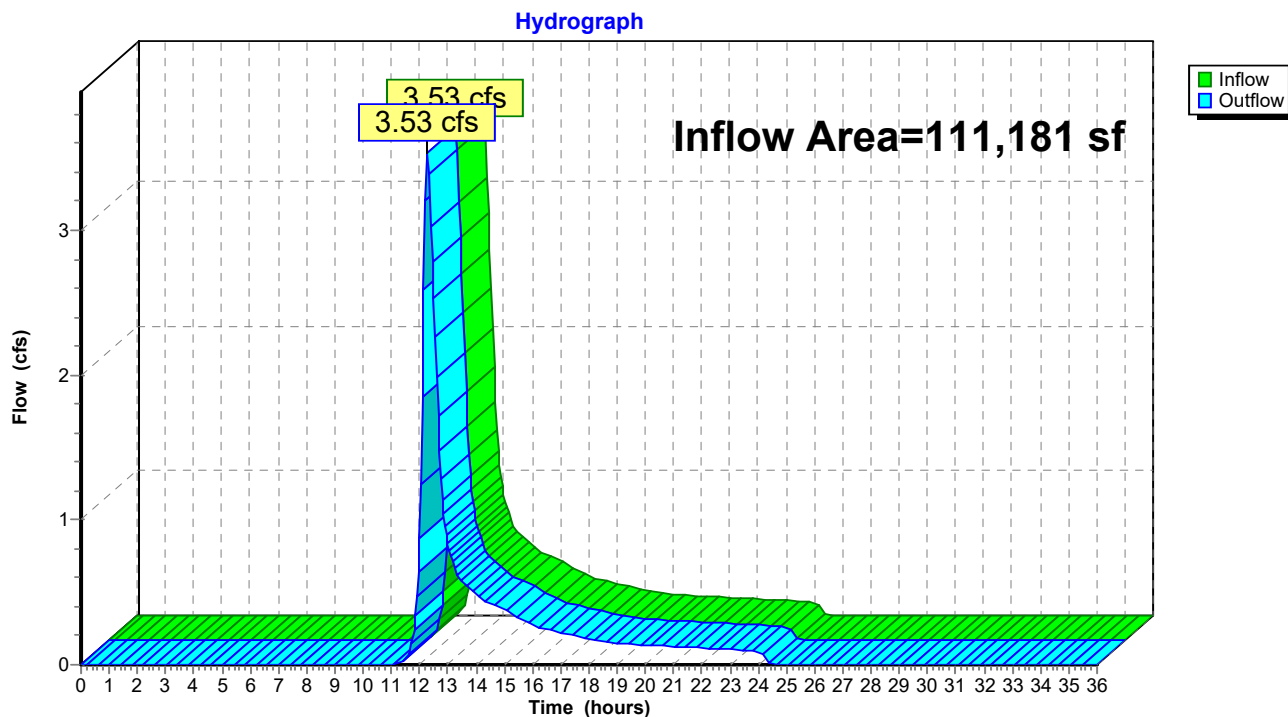
Page 58

### Summary for Reach 3R: Northern Overland Flow

Inflow Area = 111,181 sf, 0.00% Impervious, Inflow Depth = 1.85" for 50-Year event  
Inflow = 3.53 cfs @ 12.27 hrs, Volume= 17,178 cf  
Outflow = 3.53 cfs @ 12.27 hrs, Volume= 17,178 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 3R: Northern Overland Flow



## Existing Stormwater Model

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Type III 24-hr 50-Year Rainfall=6.86"

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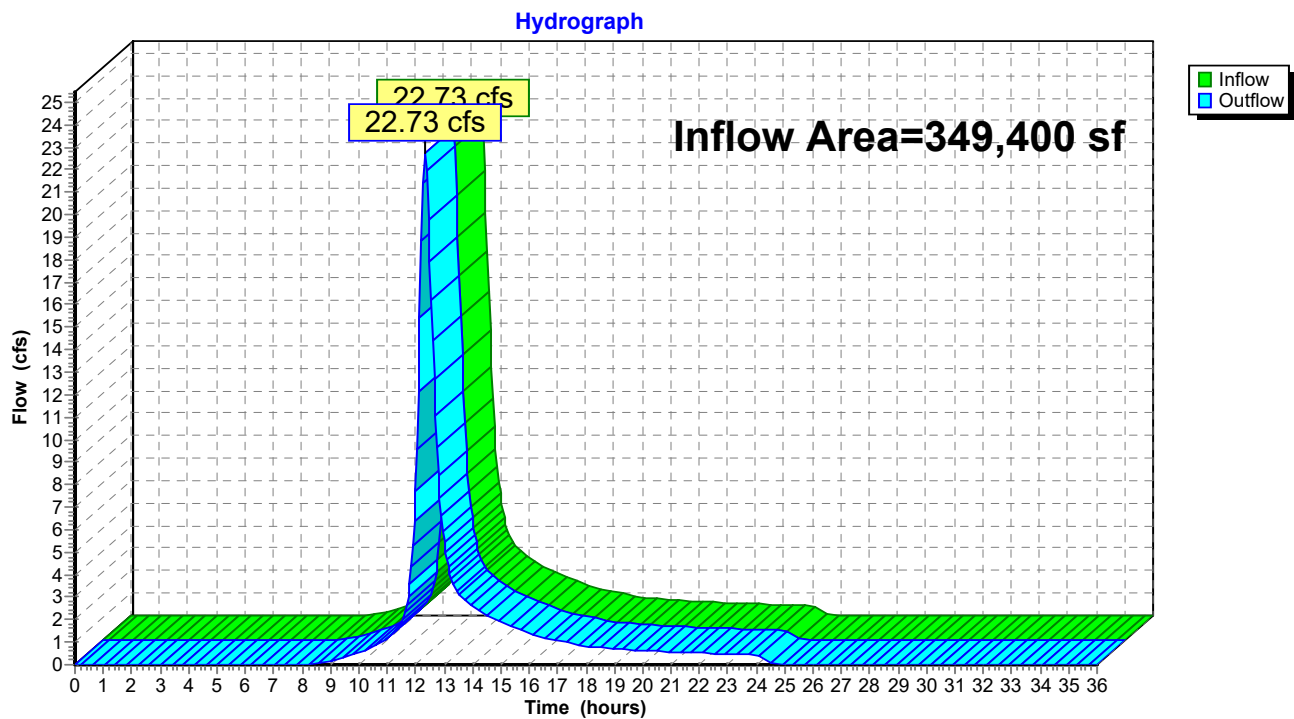
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### Summary for Reach 4R: Southern Wetland

Inflow Area = 349,400 sf, 5.07% Impervious, Inflow Depth = 3.81" for 50-Year event  
Inflow = 22.73 cfs @ 12.32 hrs, Volume= 111,076 cf  
Outflow = 22.73 cfs @ 12.32 hrs, Volume= 111,076 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 4R: Southern Wetland





## Existing Stormwater Model

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Type III 24-hr 50-Year Rainfall=6.86"

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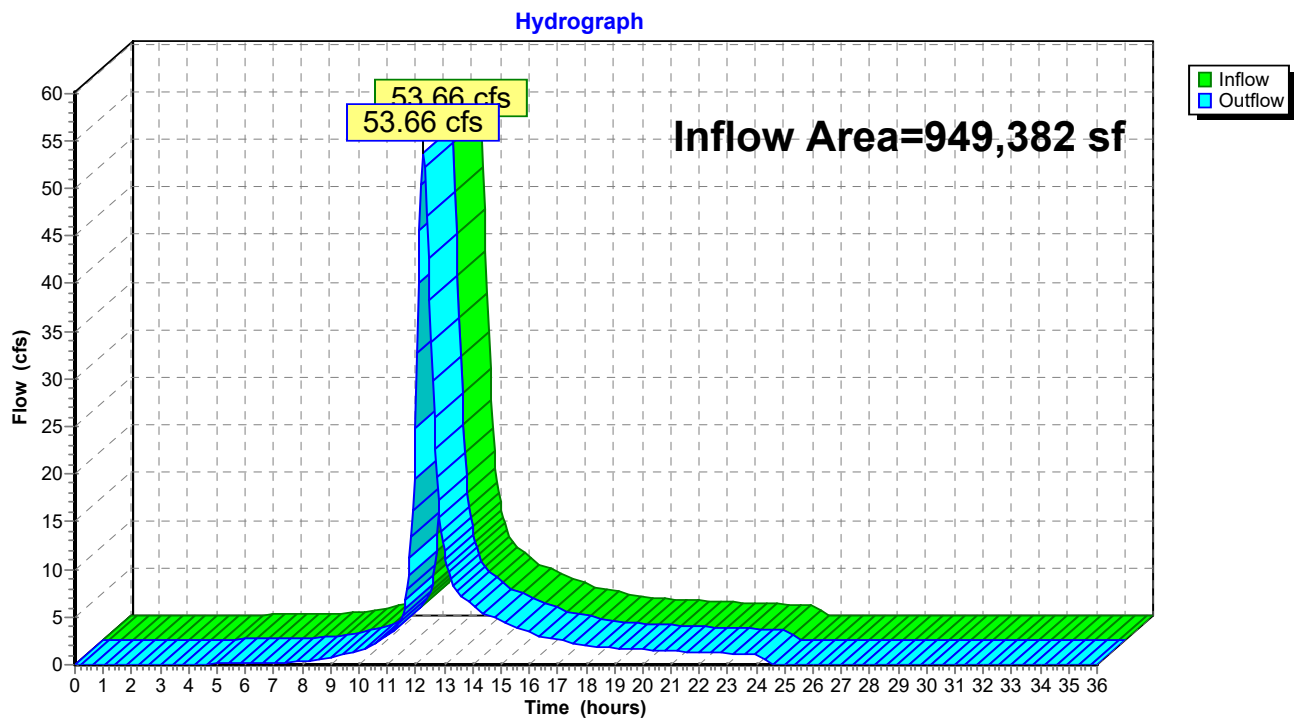
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### Summary for Reach 5R: Combined Flow

Inflow Area = 949,382 sf, 7.30% Impervious, Inflow Depth = 3.49" for 50-Year event  
Inflow = 53.66 cfs @ 12.28 hrs, Volume= 276,277 cf  
Outflow = 53.66 cfs @ 12.28 hrs, Volume= 276,277 cf, Atten= 0%, Lag= 0.0 min

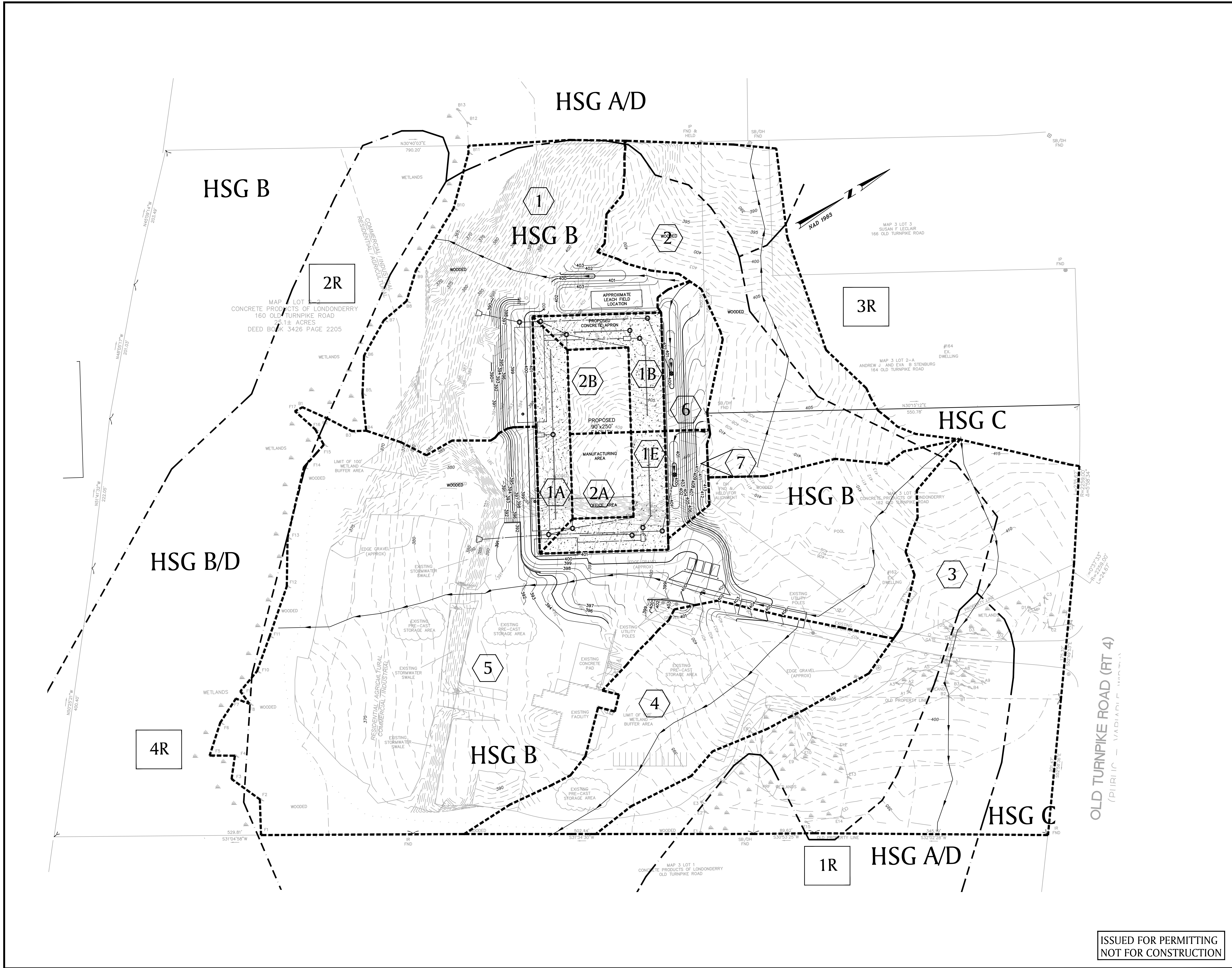
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

### Reach 5R: Combined Flow



#### **4.03 POST-DEVELOPMENT HYDROLOGY WATERSHED PLAN**





87 Haverhill Avenue  
Amesbury, Massachusetts 01950

06-29-2022  
DATE

PROFESSIONAL ENGINEER

SHEA CONCRETE  
PROPOSED  
MANUFACTURING  
FACILITY

160 OLD TURNPIKE ROAD

IN  
NOTTINGHAM  
NEW HAMPSHIRE  
(ROCKINGHAM COUNTY)

PROPOSED  
CONDITIONS  
WATERSHED MAP

JUNE 29, 2022

REVISIONS:		
NO.	DATE	DESC.

PREPARED FOR:  
SHEA CONCRETE  
87 HAVERHILL AVE  
AMESBURY, MA 01950

300 Brickstone Square  
Andover, Massachusetts 01810

617 896 4300

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SCALE: 1" = 50'

0 25 50 100 feet

FILE: PROJECTS\AND\1360201\C\D\GR

DWG. NO: 13602.01

JOB. NO: 13602.01

SHEET PR-WS

ISSUED FOR PERMITTING  
NOT FOR CONSTRUCTION



**4.04 POST-DEVELOPMENT HYDROLOGY WATERSHED CALCULATIONS**  
(HYDROCAD PRINTOUTS)

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Page 2

### Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.02	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.55	2
3	25-Year	Type III 24-hr		Default	24.00	1	5.75	2
4	50-Year	Type III 24-hr		Default	24.00	1	6.86	2

**2023-03-14\_PostDev Stormwater Model\_R2**

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**Area Listing (all nodes)**

Area (sq-ft)	CN	Description (subcatchment-numbers)
173,650	61	>75% Grass cover, Good, HSG B (1, 3, 5, 6, 7)
20,473	74	>75% Grass cover, Good, HSG C (3)
159,647	85	Gravel roads, HSG B (3, 5)
77,760	96	Gravel surface, HSG B (1, 4)
53,975	98	Paved parking, HSG B (1A, 1B, 1E, 3, 4, 5)
3,311	98	Paved parking, HSG C (3)
2,614	98	Paved parking, HSG D (3)
34,610	98	Unconnected roofs, HSG B (2A, 2B, 5)
16,335	98	Water Surface, HSG B (3, 4)
7,754	98	Water Surface, HSG C (3)
17,163	98	Water Surface, HSG D (3)
22,711	30	Woods, Good, HSG A (1, 2)
267,023	55	Woods, Good, HSG B (1, 2, 3, 4, 5, 6)
21,606	70	Woods, Good, HSG C (2)
41,725	77	Woods, Good, HSG D (3, 5)
29,025	77	Woods, Poor, HSG C (3, 5)
<b>949,382</b>	<b>72</b>	<b>TOTAL AREA</b>

## 2023-03-14\_PostDev Stormwater Model\_R2

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### Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
22,711	HSG A	1, 2
783,000	HSG B	1, 1A, 1B, 1E, 2, 2A, 2B, 3, 4, 5, 6, 7
82,169	HSG C	2, 3, 5
61,502	HSG D	3, 5
0	Other	
<b>949,382</b>		<b>TOTAL AREA</b>



**2023-03-14\_PostDev Stormwater Model\_R2**

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**Ground Covers (all nodes)**

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
0	173,650	20,473	0	0	194,123	>75% Grass cover, Good
0	159,647	0	0	0	159,647	Gravel roads
0	77,760	0	0	0	77,760	Gravel surface
0	53,975	3,311	2,614	0	59,900	Paved parking
0	34,610	0	0	0	34,610	Unconnected roofs
0	16,335	7,754	17,163	0	41,252	Water Surface
22,711	267,023	21,606	41,725	0	353,065	Woods, Good
0	0	29,025	0	0	29,025	Woods, Poor
<b>22,711</b>	<b>783,000</b>	<b>82,169</b>	<b>61,502</b>	<b>0</b>	<b>949,382</b>	<b>TOTAL AREA</b>

**2023-03-14\_PostDev Stormwater Model\_R2**

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**Pipe Listing (all nodes)**

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1P	396.16	396.06	10.0	0.0100	0.012	0.0	12.0	0.0
2	2P	395.75	395.65	10.0	0.0100	0.012	0.0	12.0	0.0
3	2P	395.95	395.85	10.0	0.0100	0.012	0.0	6.0	0.0
4	3P	396.16	396.06	10.0	0.0100	0.012	0.0	12.0	0.0
5	3P	395.75	395.75	5.0	0.0000	0.012	0.0	12.0	0.0
6	102P	396.65	395.35	52.0	0.0250	0.012	0.0	12.0	0.0
7	102P	396.78	396.48	30.0	0.0100	0.012	0.0	4.0	0.0
8	105P	391.00	382.00	96.0	0.0938	0.012	0.0	12.0	0.0
9	203P	396.75	396.50	30.0	0.0083	0.012	0.0	12.0	0.0
10	203P	397.10	397.00	10.0	0.0100	0.012	0.0	12.0	0.0
11	207P	392.50	392.30	15.0	0.0133	0.012	0.0	12.0	0.0

**2023-03-14\_PostDev Stormwater Model\_R2**

Type III 24-hr 2-Year Rainfall=3.02"

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment1: Southeast Woods</b>	Runoff Area=117,278 sf 0.00% Impervious Runoff Depth=0.23" Flow Length=372' Tc=15.7 min CN=56 Runoff=0.22 cfs 2,204 cf
<b>Subcatchment1A: Concrete Pad (Left</b>	Runoff Area=14,500 sf 100.00% Impervious Runoff Depth=2.79" Tc=6.0 min CN=98 Runoff=0.95 cfs 3,369 cf
<b>Subcatchment1B: Concrete Pad (Left</b>	Runoff Area=15,000 sf 100.00% Impervious Runoff Depth=2.79" Tc=6.0 min CN=98 Runoff=0.98 cfs 3,485 cf
<b>Subcatchment1E: Concrete Pad (Front</b>	Runoff Area=14,500 sf 100.00% Impervious Runoff Depth=2.79" Tc=6.0 min CN=98 Runoff=0.95 cfs 3,369 cf
<b>Subcatchment2: Northern Woods</b>	Runoff Area=108,191 sf 0.00% Impervious Runoff Depth=0.15" Flow Length=575' Tc=17.6 min CN=53 Runoff=0.09 cfs 1,385 cf
<b>Subcatchment2A: Proposed Building</b>	Runoff Area=11,250 sf 100.00% Impervious Runoff Depth=2.79" Tc=6.0 min CN=98 Runoff=0.74 cfs 2,614 cf
<b>Subcatchment2B: Proposed Building</b>	Runoff Area=11,250 sf 100.00% Impervious Runoff Depth=2.79" Tc=6.0 min CN=98 Runoff=0.74 cfs 2,614 cf
<b>Subcatchment3: Abutting Old Tpk Road</b>	Runoff Area=194,497 sf 24.46% Impervious Runoff Depth=1.08" Flow Length=619' Tc=19.0 min CN=77 Runoff=3.73 cfs 17,584 cf
<b>Subcatchment4: Northeastern Section of</b>	Runoff Area=84,996 sf 4.66% Impervious Runoff Depth=2.37" Flow Length=496' Tc=6.0 min CN=94 Runoff=5.09 cfs 16,783 cf
<b>Subcatchment5: Southern Developed Area</b>	Runoff Area=353,615 sf 5.01% Impervious Runoff Depth=0.77" Flow Length=1,175' Tc=23.1 min UI Adjusted CN=71 Runoff=4.13 cfs 22,747 cf
<b>Subcatchment6: Landscaped Hill - Rear</b>	Runoff Area=15,891 sf 0.00% Impervious Runoff Depth=0.34" Flow Length=140' Tc=6.9 min CN=60 Runoff=0.07 cfs 451 cf
<b>Subcatchment7: Landscaped Hill - Front</b>	Runoff Area=8,414 sf 0.00% Impervious Runoff Depth=0.37" Tc=6.0 min CN=61 Runoff=0.05 cfs 261 cf
<b>Reach 1R: Southeastern Wetland/Prop. Line</b>	Inflow=7.14 cfs 34,367 cf Outflow=7.14 cfs 34,367 cf
<b>Reach 2R: Southwestern Wetland</b>	Inflow=0.26 cfs 2,677 cf Outflow=0.26 cfs 2,677 cf
<b>Reach 3R: Northern Overland Flow</b>	Inflow=0.09 cfs 1,385 cf Outflow=0.09 cfs 1,385 cf
<b>Reach 4R: Southern Wetland</b>	Inflow=4.38 cfs 25,463 cf Outflow=4.38 cfs 25,463 cf

**Reach 5R: Combined Flow**

Inflow=10.29 cfs 63,892 cf

Outflow=10.29 cfs 63,892 cf

**Pond 1P: Storm Trap**Peak Elev=394.18' Storage=90 cf Inflow=0.13 cfs 160 cf  
Discarded=0.03 cfs 160 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 160 cf**Pond 2P: Storm Trap**Peak Elev=395.52' Storage=4,317 cf Inflow=2.62 cfs 9,446 cf  
Discarded=0.14 cfs 9,446 cf Primary=0.00 cfs 0 cf Outflow=0.14 cfs 9,446 cf**Pond 3P: Storm Trap**Peak Elev=395.22' Storage=1,734 cf Inflow=0.95 cfs 3,369 cf  
Discarded=0.04 cfs 3,369 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.04 cfs 3,369 cf**Pond 102P: DMH-102**Peak Elev=397.10' Inflow=0.74 cfs 2,614 cf  
Primary=0.61 cfs 2,454 cf Secondary=0.13 cfs 160 cf Outflow=0.74 cfs 2,614 cf**Pond 105P: DMH-105**Peak Elev=391.46' Inflow=0.65 cfs 2,715 cf  
12.0" Round Culvert n=0.012 L=96.0' S=0.0938 '/' Outflow=0.65 cfs 2,715 cf**Pond 203P: DMH-203**Peak Elev=397.23' Inflow=0.74 cfs 2,614 cf  
Primary=0.68 cfs 2,592 cf Secondary=0.05 cfs 22 cf Outflow=0.74 cfs 2,614 cf**Pond 207P: DMH-207**Peak Elev=392.68' Inflow=0.11 cfs 473 cf  
12.0" Round Culvert n=0.012 L=15.0' S=0.0133 '/' Outflow=0.11 cfs 473 cf**Total Runoff Area = 949,382 sf Runoff Volume = 76,867 cf Average Runoff Depth = 0.97"**  
**85.70% Pervious = 813,620 sf 14.30% Impervious = 135,762 sf**

### Summary for Subcatchment 1: Southeast Woods

Runoff = 0.22 cfs @ 12.49 hrs, Volume= 2,204 cf, Depth= 0.23"  
Routed to Reach 2R : Southwestern Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.02"

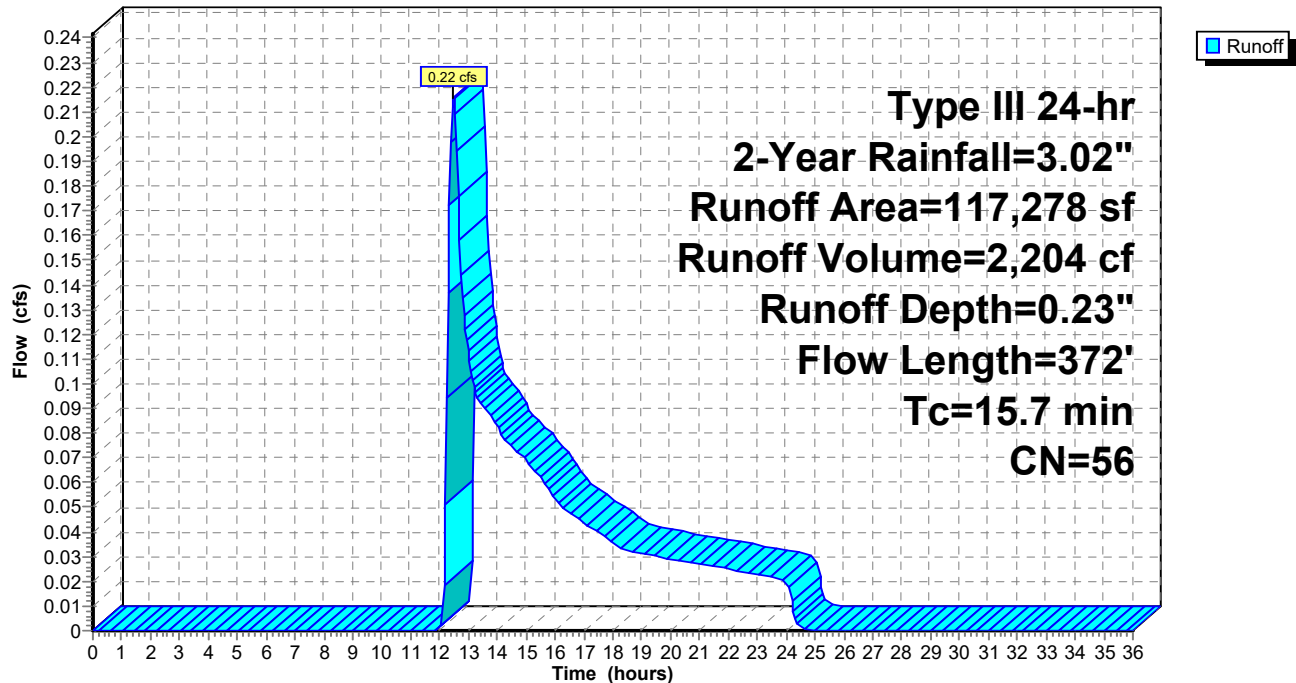
Area (sf)	CN	Description
86,662	55	Woods, Good, HSG B
2,127	30	Woods, Good, HSG A
26,969	61	>75% Grass cover, Good, HSG B
1,520	96	Gravel surface, HSG B
117,278	56	Weighted Average
117,278		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0200	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
3.0	322	0.1240	1.76		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
15.7	372	Total			

### Subcatchment 1: Southeast Woods

Hydrograph



## Summary for Subcatchment 1A: Concrete Pad (Left Side, Back, Right Side Rear of Building)

Runoff = 0.95 cfs @ 12.09 hrs, Volume= 3,369 cf, Depth= 2.79"  
Routed to Pond 2P : Storm Trap

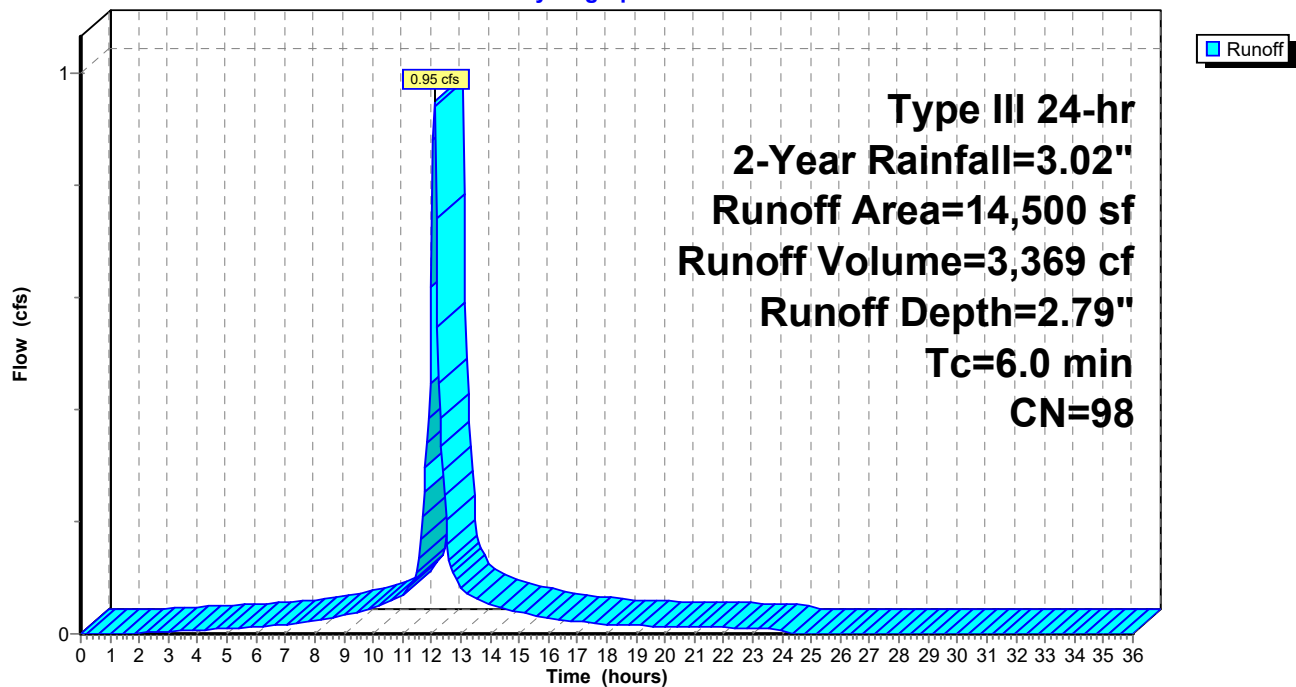
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
14,500	98	Paved parking, HSG B
14,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Concrete Runoff

## Subcatchment 1A: Concrete Pad (Left Side, Back, Right Side Rear of Building)

Hydrograph



**Summary for Subcatchment 1B: Concrete Pad (Left Side Building)**

Runoff = 0.98 cfs @ 12.09 hrs, Volume= 3,485 cf, Depth= 2.79"  
 Routed to Pond 2P : Storm Trap

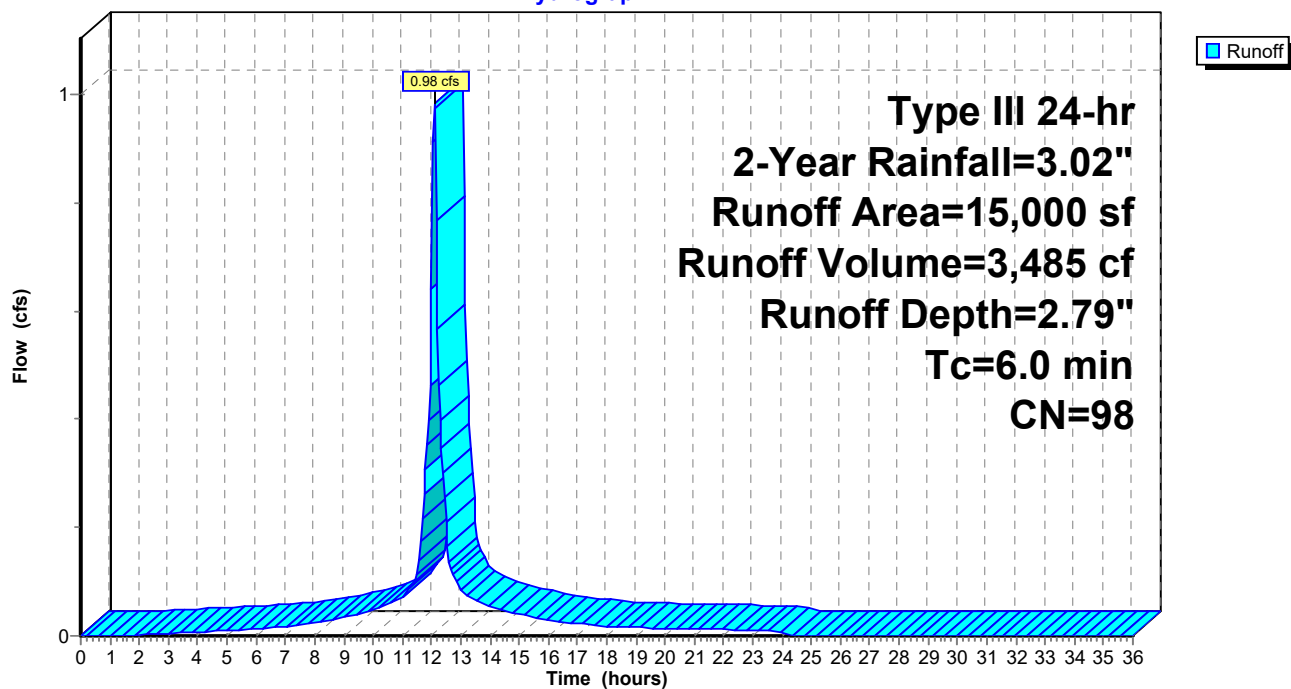
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
15,000	98	Paved parking, HSG B
15,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Concrete Runoff

**Subcatchment 1B: Concrete Pad (Left Side Building)**

Hydrograph



**Summary for Subcatchment 1E: Concrete Pad (Front and Right Side)**

Runoff = 0.95 cfs @ 12.09 hrs, Volume= 3,369 cf, Depth= 2.79"  
 Routed to Pond 3P : Storm Trap

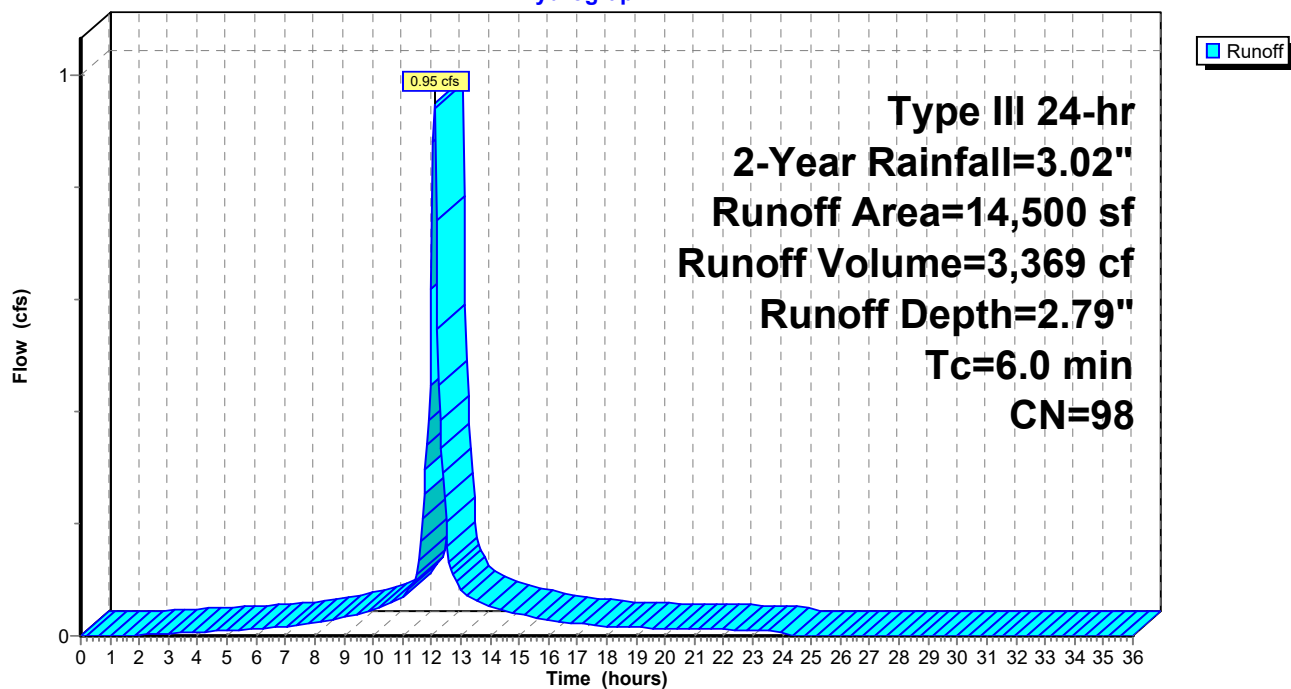
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
14,500	98	Paved parking, HSG B
14,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Concrete Runoff

**Subcatchment 1E: Concrete Pad (Front and Right Side)**

Hydrograph





## Summary for Subcatchment 2: Northern Woods

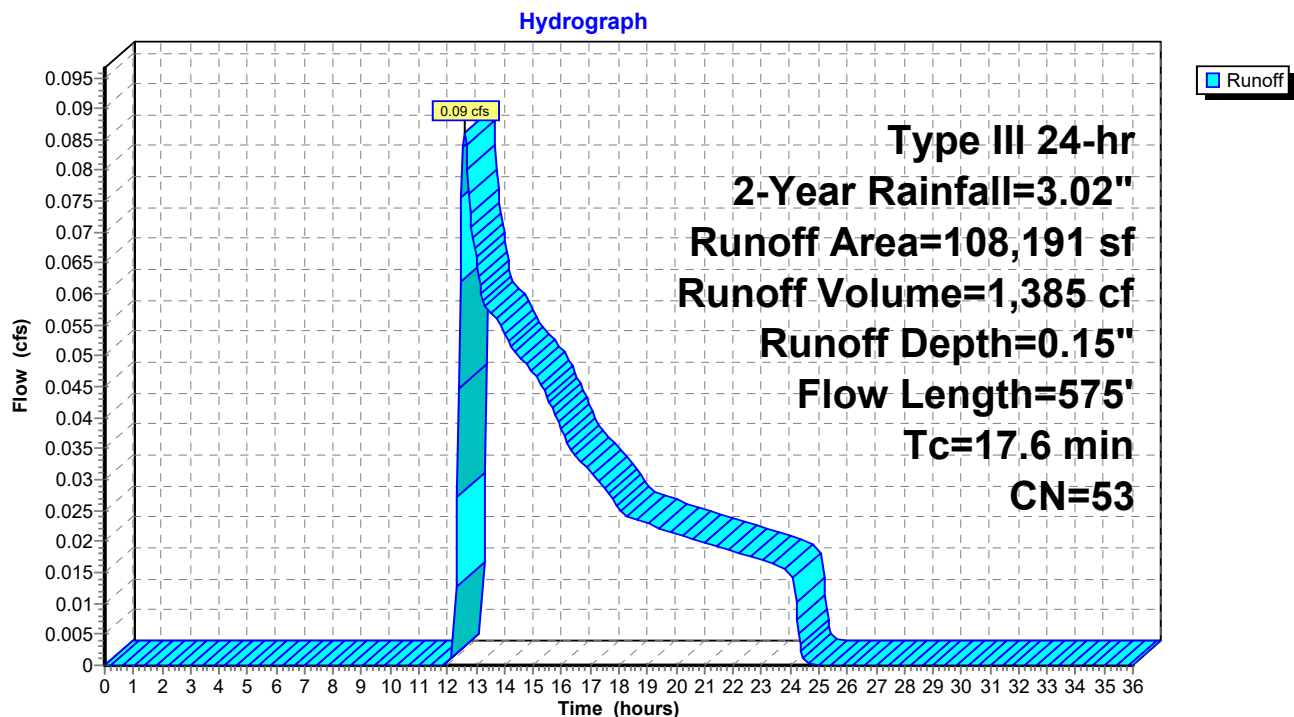
Runoff = 0.09 cfs @ 12.60 hrs, Volume= 1,385 cf, Depth= 0.15"  
Routed to Reach 3R : Northern Overland Flow

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
66,001	55	Woods, Good, HSG B
21,606	70	Woods, Good, HSG C
20,584	30	Woods, Good, HSG A
108,191	53	Weighted Average
108,191		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
7.9	525	0.0495	1.11		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
17.6	575	Total			

## Subcatchment 2: Northern Woods



**Summary for Subcatchment 2A: Proposed Building (Front Half Roof)**

Runoff = 0.74 cfs @ 12.09 hrs, Volume= 2,614 cf, Depth= 2.79"  
 Routed to Pond 102P : DMH-102

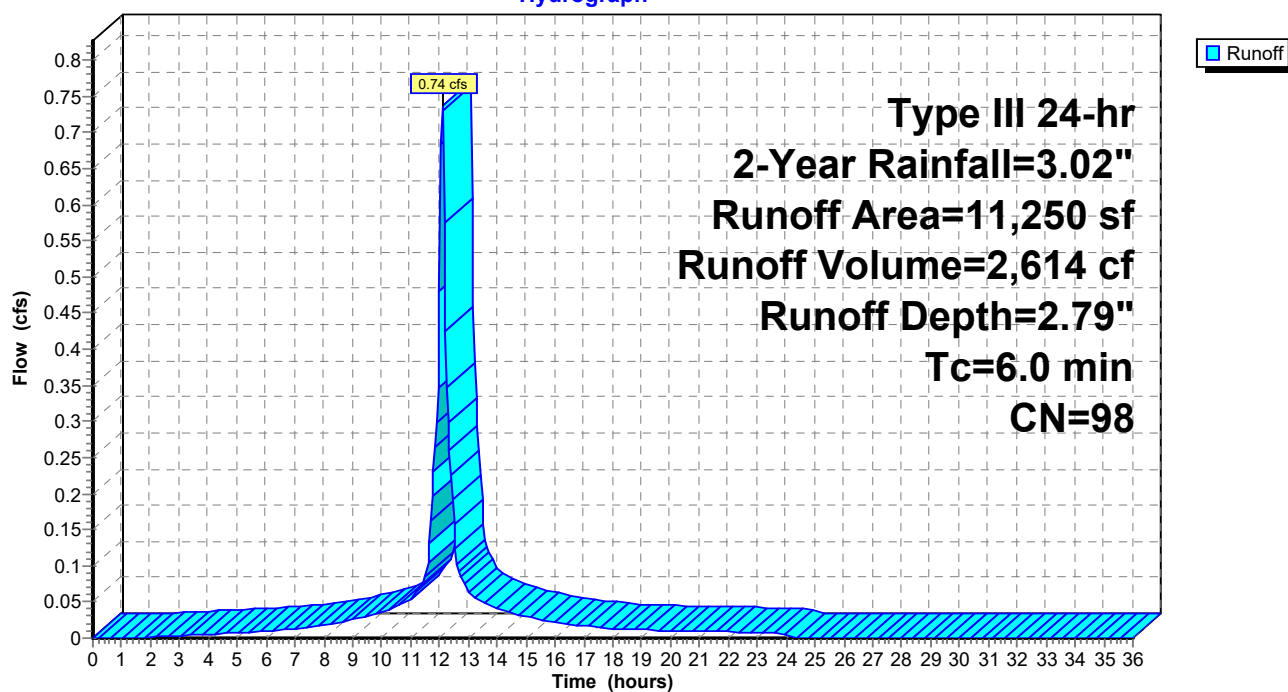
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
11,250	98	Unconnected roofs, HSG B
11,250		100.00% Impervious Area
11,250		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Roof runoff

**Subcatchment 2A: Proposed Building (Front Half Roof)**

Hydrograph



**Summary for Subcatchment 2B: Proposed Building (Back Half Roof)**

Runoff = 0.74 cfs @ 12.09 hrs, Volume= 2,614 cf, Depth= 2.79"  
 Routed to Pond 203P : DMH-203

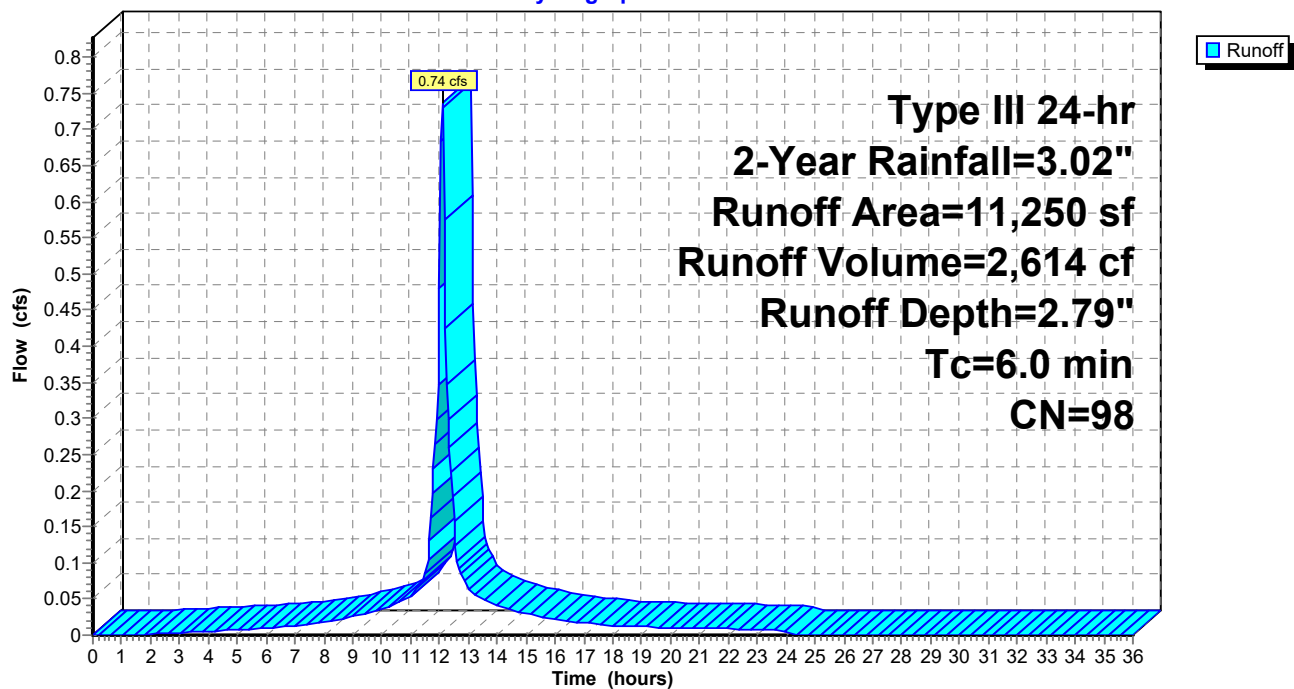
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
11,250	98	Unconnected roofs, HSG B
11,250		100.00% Impervious Area
11,250		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Roof runoff

**Subcatchment 2B: Proposed Building (Back Half Roof)**

Hydrograph



**Summary for Subcatchment 3: Abutting Old Tpk Road**

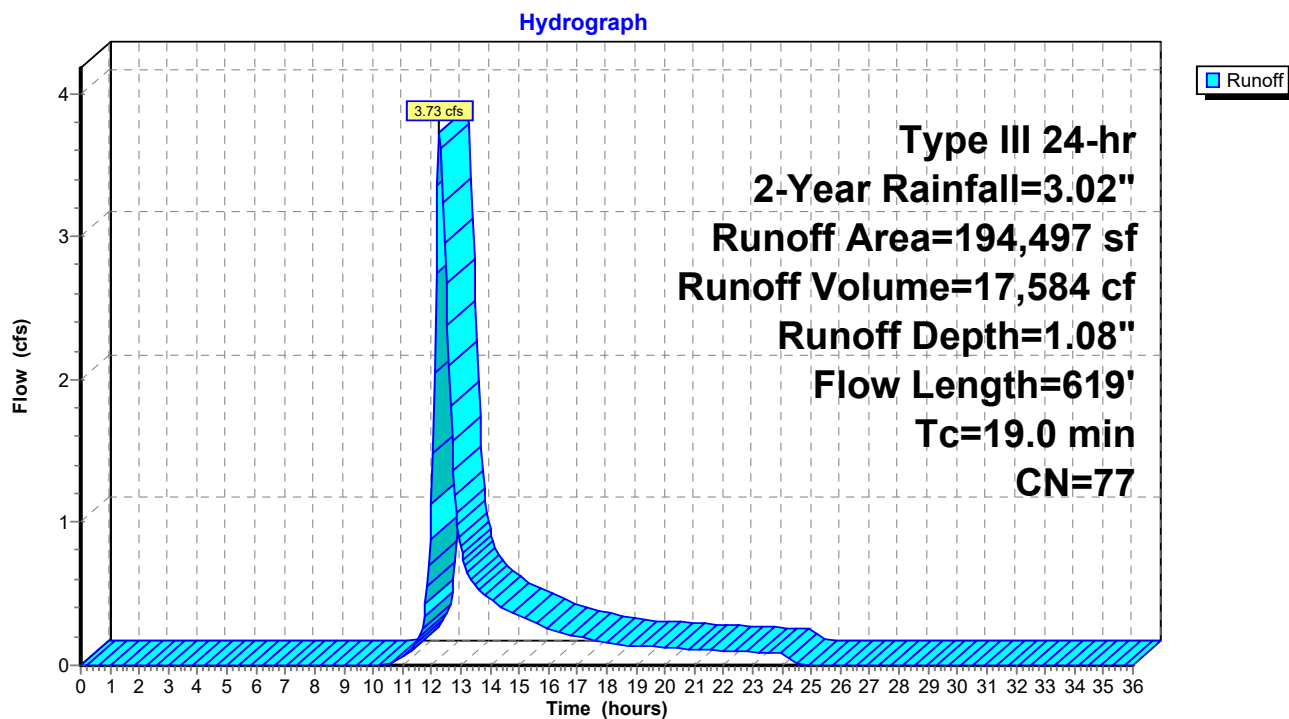
Runoff = 3.73 cfs @ 12.28 hrs, Volume= 17,584 cf, Depth= 1.08"

Routed to Reach 1R : Southeastern Wetland/Prop. Line

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
20,473	74	>75% Grass cover, Good, HSG C
28,140	77	Woods, Poor, HSG C
3,311	98	Paved parking, HSG C
7,754	98	Water Surface, HSG C
2,614	98	Paved parking, HSG D
36,432	77	Woods, Good, HSG D
17,163	98	Water Surface, HSG D
21,242	55	Woods, Good, HSG B
15,333	98	Water Surface, HSG B
8,494	85	Gravel roads, HSG B
1,394	98	Paved parking, HSG B
32,147	61	>75% Grass cover, Good, HSG B
194,497	77	Weighted Average
146,928		75.54% Pervious Area
47,569		24.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
4.9	264	0.0322	0.90		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.4	45	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
4.0	260	0.0460	1.07		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.0	619	Total			

**Subcatchment 3: Abutting Old Tpk Road**

**Summary for Subcatchment 4: Northeastern Section of Existing Yard**

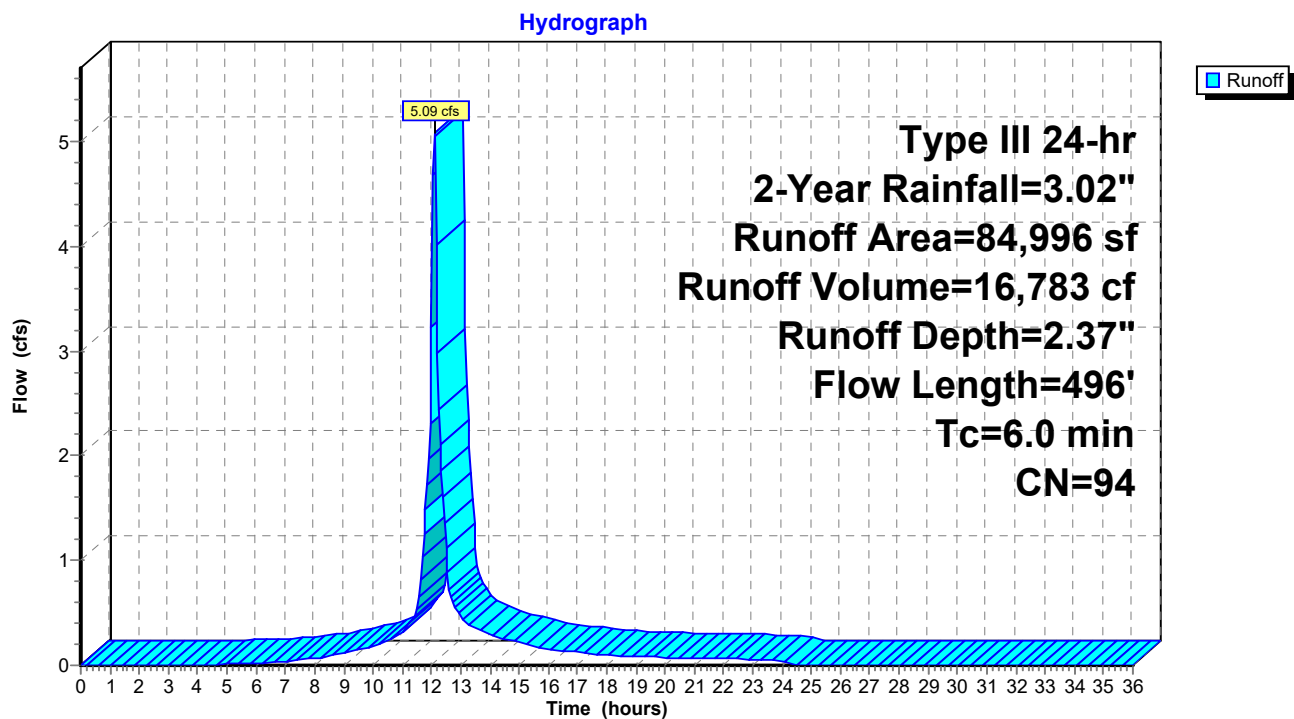
Runoff = 5.09 cfs @ 12.09 hrs, Volume= 16,783 cf, Depth= 2.37"  
 Routed to Reach 1R : Southeastern Wetland/Prop. Line

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
4,792	55	Woods, Good, HSG B
2,962	98	Paved parking, HSG B
1,002	98	Water Surface, HSG B
76,240	96	Gravel surface, HSG B
84,996	94	Weighted Average
81,032		95.34% Pervious Area
3,964		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0250	1.27		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.00"
2.2	406	0.0375	3.12		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.7	40	0.0375	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.4					<b>Direct Entry,</b>
6.0	496	Total			

**Subcatchment 4: Northeastern Section of Existing Yard**

### Summary for Subcatchment 5: Southern Developed Area

Runoff = 4.13 cfs @ 12.37 hrs, Volume= 22,747 cf, Depth= 0.77"  
 Routed to Reach 4R : Southern Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Rainfall=3.02"

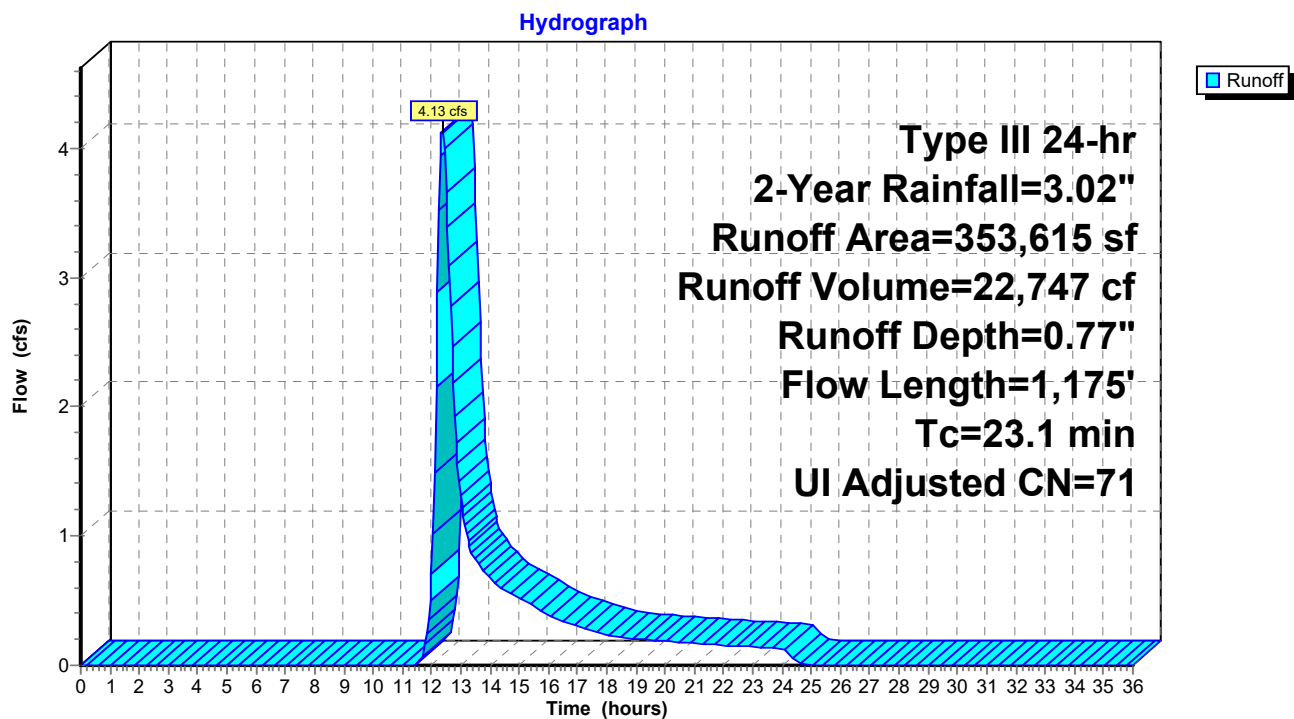
Area (sf)	CN	Adj	Description
86,017	55		Woods, Good, HSG B
5,293	77		Woods, Good, HSG D
151,153	85		Gravel roads, HSG B
5,619	98		Paved parking, HSG B
12,110	98		Unconnected roofs, HSG B
92,538	61		>75% Grass cover, Good, HSG B
885	77		Woods, Poor, HSG C
353,615	72	71	Weighted Average, UI Adjusted
335,886			94.99% Pervious Area
17,729			5.01% Impervious Area
12,110			68.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0200	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	164	0.0470	1.08		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.4	259	0.0040	1.28		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
3.0	640	0.0500	3.60		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
1.5	62	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
23.1	1,175	Total			



## Subcatchment 5: Southern Developed Area



### Summary for Subcatchment 6: Landscaped Hill - Rear Portion

Runoff = 0.07 cfs @ 12.17 hrs, Volume= 451 cf, Depth= 0.34"  
Routed to Pond 207P : DMH-207

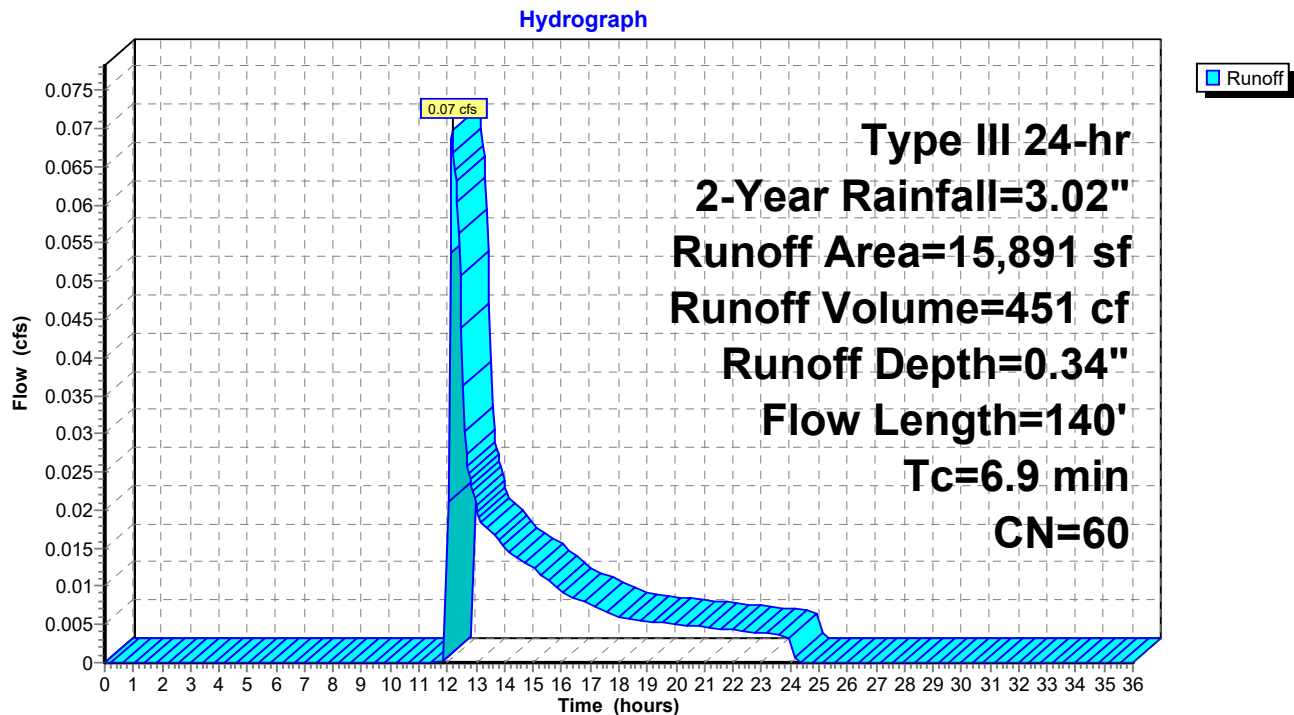
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
2,309	55	Woods, Good, HSG B
13,582	61	>75% Grass cover, Good, HSG B
15,891	60	Weighted Average
15,891		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0600	0.15		<b>Sheet Flow, OVERLAND</b>
					Grass: Dense n= 0.240 P2= 3.00"
1.4	90	0.0240	1.08		<b>Shallow Concentrated Flow, SWALE</b>
					Short Grass Pasture Kv= 7.0 fps
6.9	140	Total			

### Subcatchment 6: Landscaped Hill - Rear Portion



### Summary for Subcatchment 7: Landscaped Hill - Front Portion

Runoff = 0.05 cfs @ 12.15 hrs, Volume= 261 cf, Depth= 0.37"  
Routed to Pond 105P : DMH-105

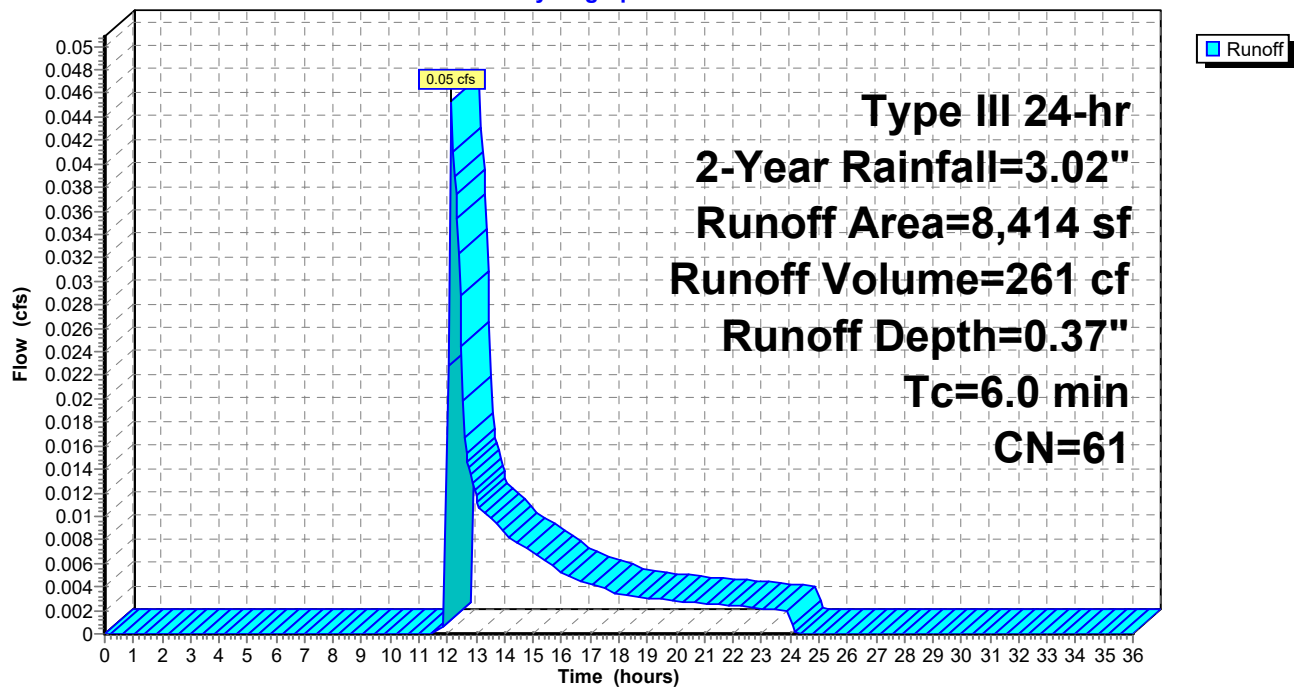
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.02"

Area (sf)	CN	Description
8,414	61	>75% Grass cover, Good, HSG B
8,414		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Overland <6min

### Subcatchment 7: Landscaped Hill - Front Portion

Hydrograph



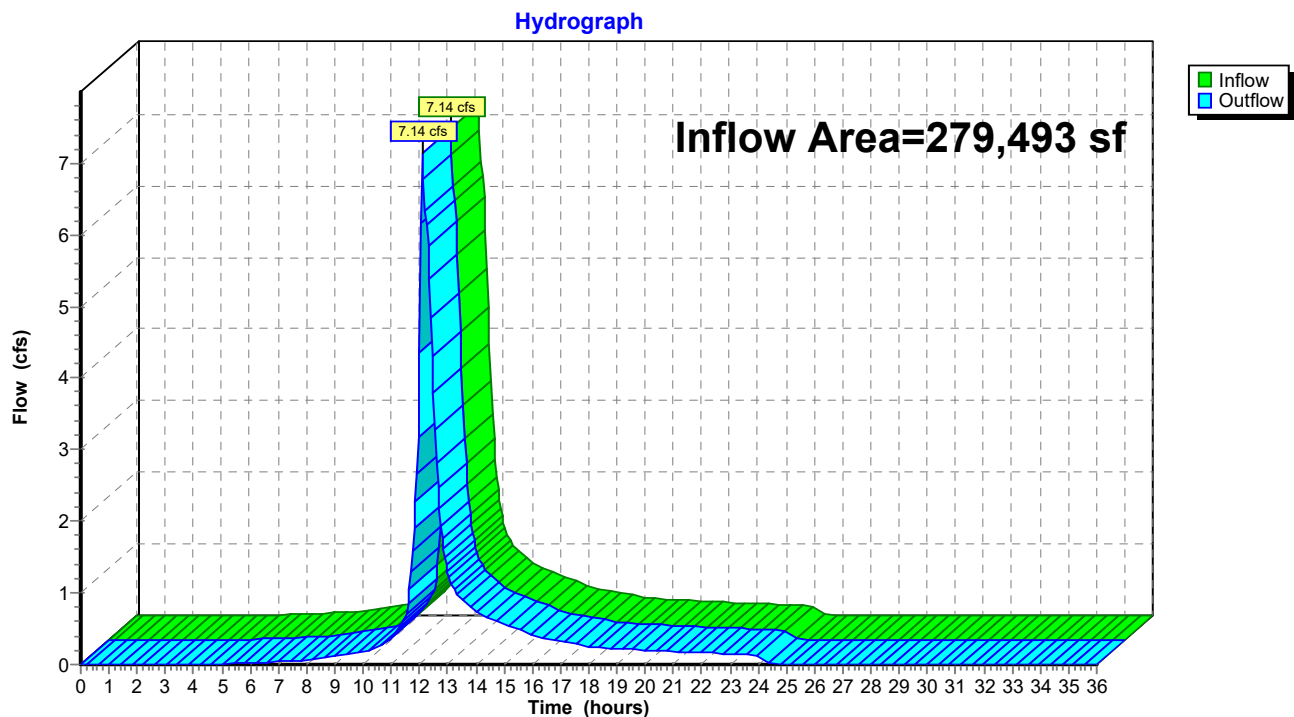
## Summary for Reach 1R: Southeastern Wetland/Prop. Line

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 279,493 sf, 18.44% Impervious, Inflow Depth = 1.48" for 2-Year event  
 Inflow = 7.14 cfs @ 12.11 hrs, Volume= 34,367 cf  
 Outflow = 7.14 cfs @ 12.11 hrs, Volume= 34,367 cf, Atten= 0%, Lag= 0.0 min  
 Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

## Reach 1R: Southeastern Wetland/Prop. Line

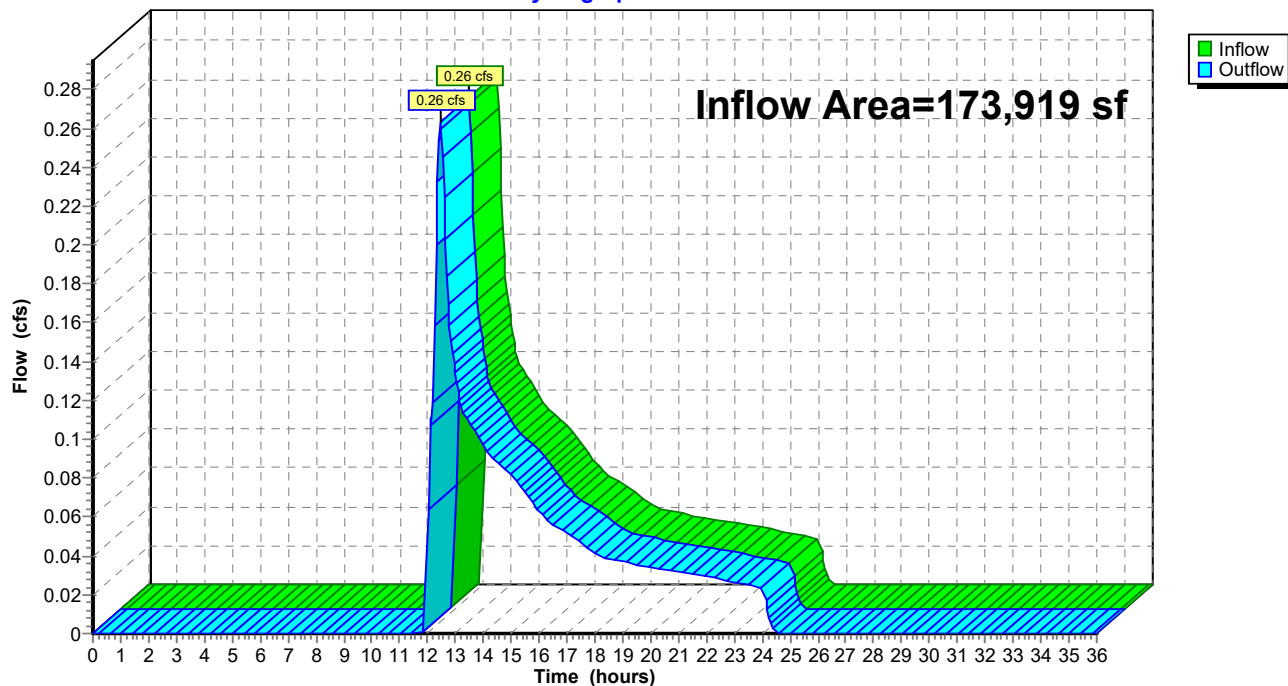


**Summary for Reach 2R: Southwestern Wetland**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 173,919 sf, 23.43% Impervious, Inflow Depth = 0.18" for 2-Year event  
Inflow = 0.26 cfs @ 12.46 hrs, Volume= 2,677 cf  
Outflow = 0.26 cfs @ 12.46 hrs, Volume= 2,677 cf, Atten= 0%, Lag= 0.0 min  
Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

**Reach 2R: Southwestern Wetland****Hydrograph**

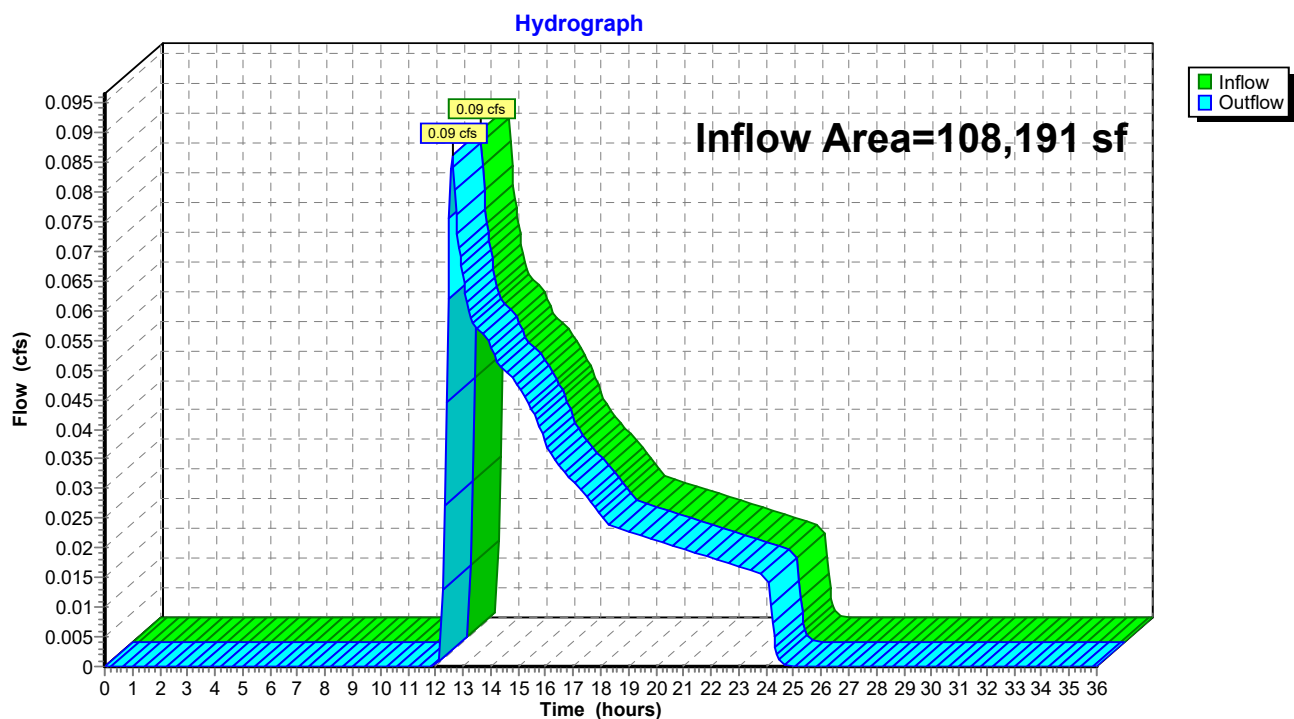
## Summary for Reach 3R: Northern Overland Flow

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 108,191 sf, 0.00% Impervious, Inflow Depth = 0.15" for 2-Year event  
 Inflow = 0.09 cfs @ 12.60 hrs, Volume= 1,385 cf  
 Outflow = 0.09 cfs @ 12.60 hrs, Volume= 1,385 cf, Atten= 0%, Lag= 0.0 min  
 Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

## Reach 3R: Northern Overland Flow

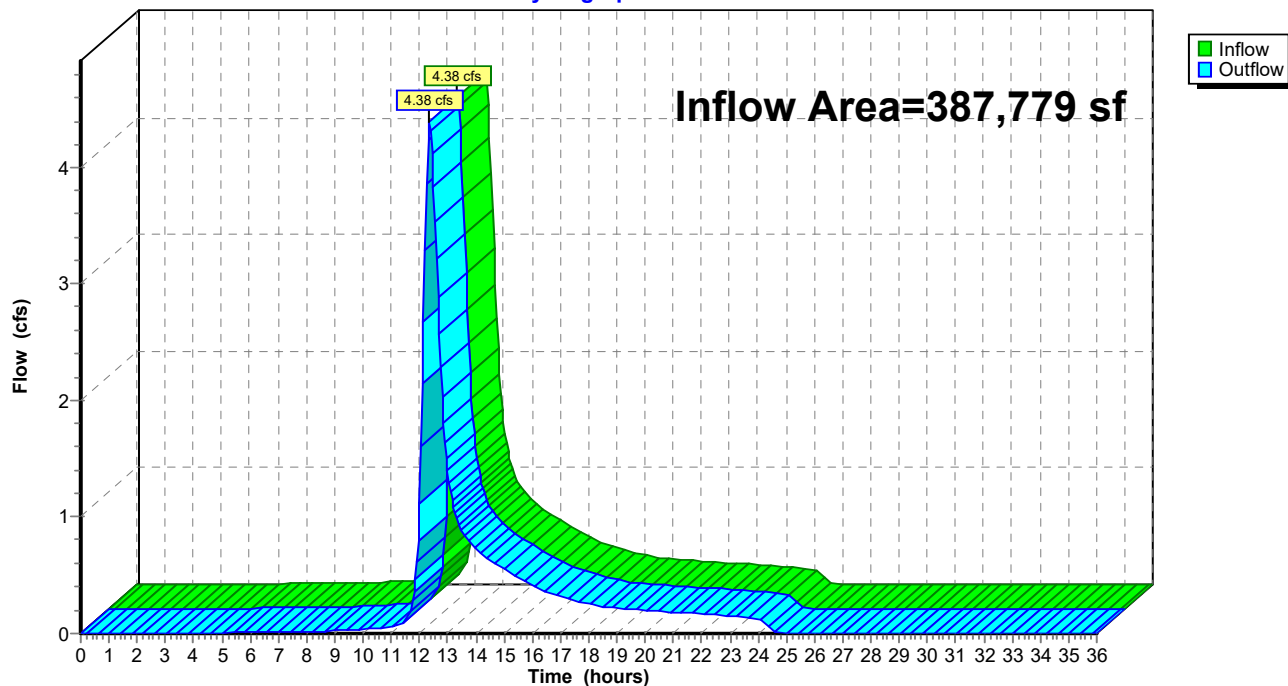


**Summary for Reach 4R: Southern Wetland**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 387,779 sf, 11.21% Impervious, Inflow Depth = 0.79" for 2-Year event  
Inflow = 4.38 cfs @ 12.36 hrs, Volume= 25,463 cf  
Outflow = 4.38 cfs @ 12.36 hrs, Volume= 25,463 cf, Atten= 0%, Lag= 0.0 min  
Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

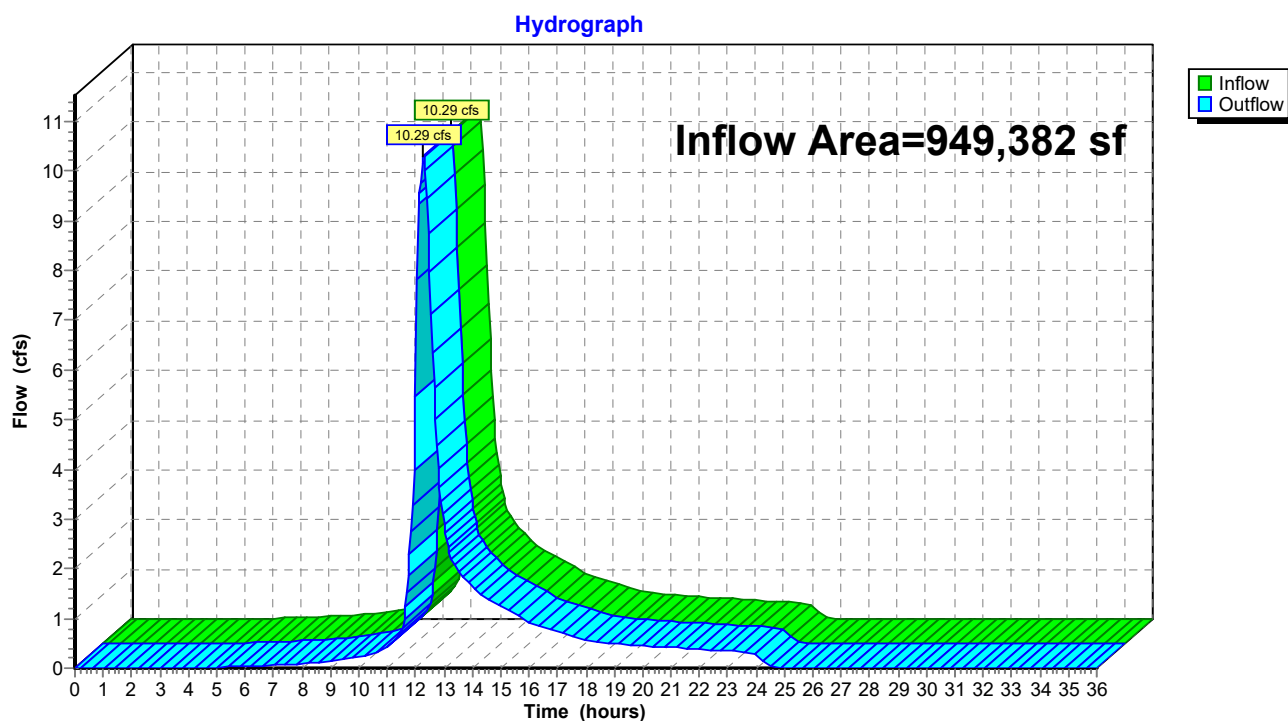
**Reach 4R: Southern Wetland****Hydrograph**

**Summary for Reach 5R: Combined Flow**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 949,382 sf, 14.30% Impervious, Inflow Depth = 0.81" for 2-Year event  
Inflow = 10.29 cfs @ 12.29 hrs, Volume= 63,892 cf  
Outflow = 10.29 cfs @ 12.29 hrs, Volume= 63,892 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

**Reach 5R: Combined Flow**



### Summary for Pond 1P: Storm Trap

Inflow = 0.13 cfs @ 12.09 hrs, Volume= 160 cf  
 Outflow = 0.03 cfs @ 12.00 hrs, Volume= 160 cf, Atten= 78%, Lag= 0.0 min  
 Discarded = 0.03 cfs @ 12.00 hrs, Volume= 160 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Pond 105P : DMH-105

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Peak Elev= 394.18' @ 12.37 hrs Surf.Area= 1,241 sf Storage= 90 cf  
 Flood Elev= 396.48' Surf.Area= 1,241 sf Storage= 1,780 cf

Plug-Flow detention time= 30.8 min calculated for 160 cf (100% of inflow)  
 Center-of-Mass det. time= 30.9 min ( 756.6 - 725.8 )

Volume	Invert	Avail.Storage	Storage Description
#1A	394.00'	956 cf	<b>25.79'W x 48.10'L x 4.25'H Field A</b> 5,273 cf Overall - 2,883 cf Embedded = 2,390 cf x 40.0% Voids
#2A	395.25'	2,077 cf	<b>StormTrap ST2 SingleTrap 2-6x2 Inside #1</b> Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 8.48' x 30.79' Core + 6.66' Border = 21.79' x 44.10' System
		3,033 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	396.16'	<b>12.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 396.16' / 396.06' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	394.00'	<b>1.000 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.03 cfs @ 12.00 hrs HW=394.05' (Free Discharge)  
 ↑ **2=Exfiltration** (Exfiltration Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=394.00' (Free Discharge)  
 ↑ **1=Culvert** ( Controls 0.00 cfs)

**Pond 1P: Storm Trap - Chamber Wizard Field A****Chamber Model = StormTrapST2 SingleTrap 2-6 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 30.0"H =&gt; 18.82 sf x 15.40'L = 289.8 cf

Outside= 101.7"W x 36.0"H =&gt; 25.44 sf x 15.40'L = 391.6 cf

2 Chambers/Row x 15.40' Long = 30.79' Row Length +79.9" Border x 2 +24.0" End Stone x 2 = 48.10'  
Base Length

1 Rows x 101.7" Wide + 79.9" Side Border x 2 + 24.0" Side Stone x 2 = 25.79' Base Width

15.0" Stone Base + 36.0" Chamber Height = 4.25' Field Height

2 Chambers x 289.8 cf + 1,497.8 cf Border = 2,077.4 cf Chamber Storage

2 Chambers x 391.6 cf + 2,100.0 cf Border = 2,883.3 cf Displacement

5,272.9 cf Field - 2,883.3 cf Chambers = 2,389.6 cf Stone x 40.0% Voids = 955.8 cf Stone Storage

Chamber Storage + Stone Storage = 3,033.3 cf = 0.070 af

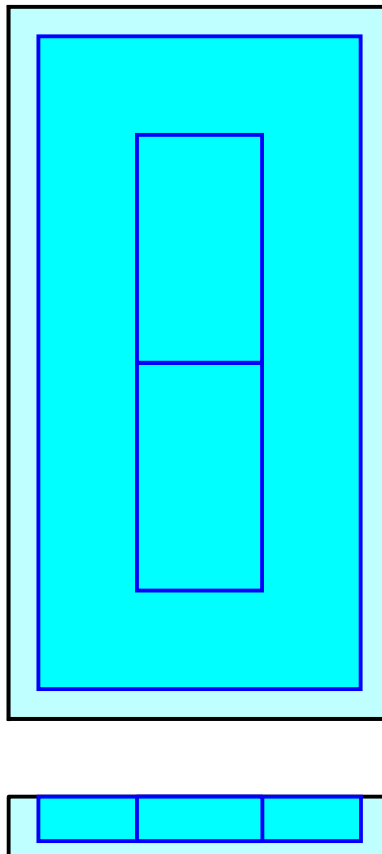
Overall Storage Efficiency = 57.5%

Overall System Size = 48.10' x 25.79' x 4.25'

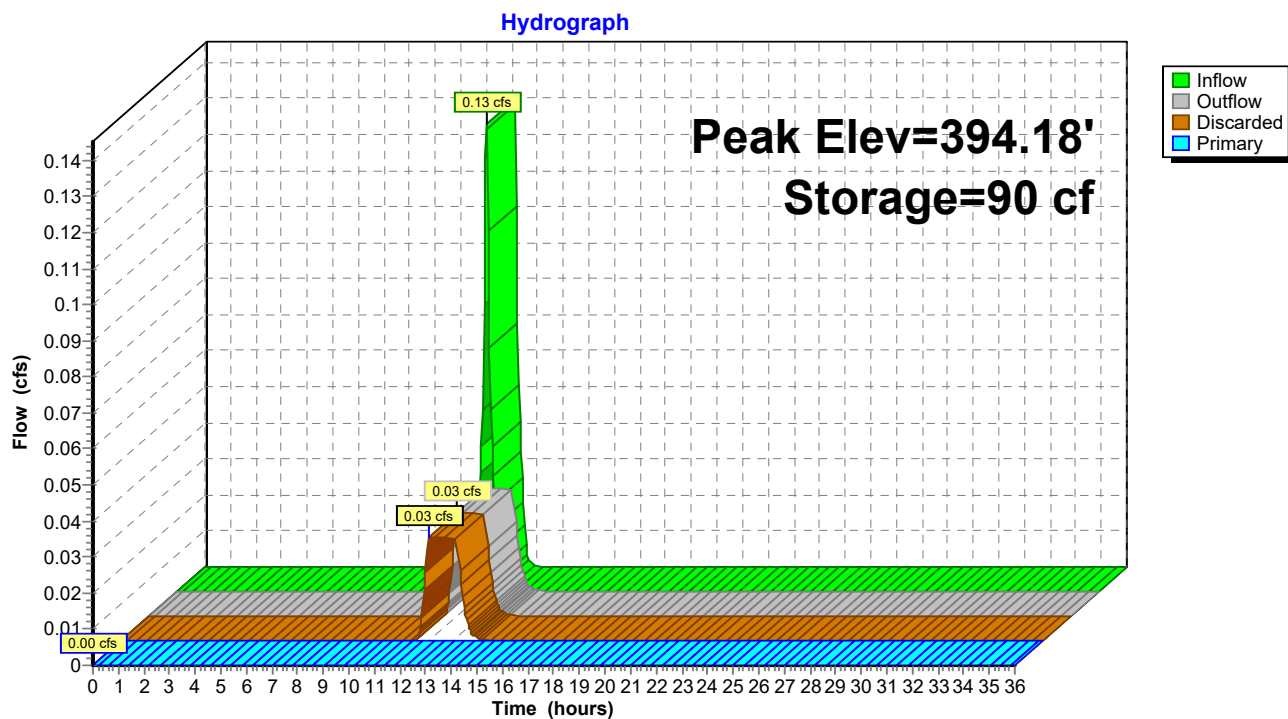
2 Chambers (plus border)

195.3 cy Field

88.5 cy Stone



# Pond 1P: Storm Trap



### Summary for Pond 2P: Storm Trap

Inflow Area = 40,750 sf, 100.00% Impervious, Inflow Depth = 2.78" for 2-Year event  
 Inflow = 2.62 cfs @ 12.09 hrs, Volume= 9,446 cf  
 Outflow = 0.14 cfs @ 10.45 hrs, Volume= 9,446 cf, Atten= 95%, Lag= 0.0 min  
 Discarded = 0.14 cfs @ 10.45 hrs, Volume= 9,446 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Pond 207P : DMH-207

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Peak Elev= 395.52' @ 14.10 hrs Surf.Area= 6,005 sf Storage= 4,317 cf

Plug-Flow detention time= 261.3 min calculated for 9,433 cf (100% of inflow)  
 Center-of-Mass det. time= 261.2 min ( 1,018.9 - 757.7 )

Volume	Invert	Avail.Storage	Storage Description
#1A	394.00'	3,863 cf	<b>42.75'W x 140.48'L x 4.25'H Field A</b> 25,523 cf Overall - 15,866 cf Embedded = 9,658 cf x 40.0% Voids
#2A	395.25'	11,568 cf	<b>StormTrap ST2 SingleTrap 2-6x 24 Inside #1</b> Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 24 Chambers in 3 Rows 25.44' x 123.17' Core + 6.66' Border = 38.75' x 136.48' System
		15,431 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	395.75'	<b>12.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 395.75' / 395.65' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	394.00'	<b>1.000 in/hr Exfiltration over Surface area</b>
#3	Primary	395.95'	<b>6.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 395.95' / 395.85' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf

**Discarded OutFlow** Max=0.14 cfs @ 10.45 hrs HW=394.04' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.14 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=394.00' (Free Discharge)

↑ **1=Culvert** ( Controls 0.00 cfs)

↑ **3=Culvert** ( Controls 0.00 cfs)

**Pond 2P: Storm Trap - Chamber Wizard Field A****Chamber Model = StormTrapST2 SingleTrap 2-6 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 30.0"H =&gt; 18.82 sf x 15.40'L = 289.8 cf

Outside= 101.7"W x 36.0"H =&gt; 25.44 sf x 15.40'L = 391.6 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 +24.0" End Stone x 2 = 140.48'  
Base Length

3 Rows x 101.7" Wide + 79.9" Side Border x 2 + 24.0" Side Stone x 2 = 42.75' Base Width

15.0" Stone Base + 36.0" Chamber Height = 4.25' Field Height

24 Chambers x 289.8 cf + 4,612.1 cf Border = 11,567.5 cf Chamber Storage

24 Chambers x 391.6 cf + 6,466.5 cf Border = 15,865.7 cf Displacement

25,523.3 cf Field - 15,865.7 cf Chambers = 9,657.6 cf Stone x 40.0% Voids = 3,863.0 cf Stone Storage

Chamber Storage + Stone Storage = 15,430.6 cf = 0.354 af

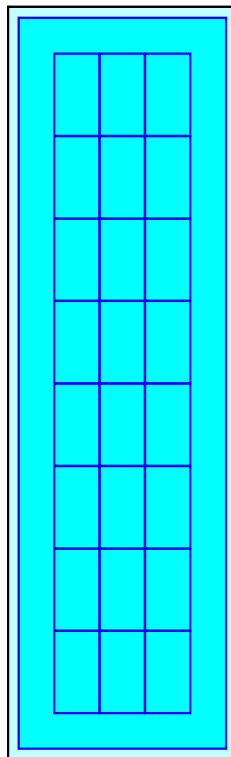
Overall Storage Efficiency = 60.5%

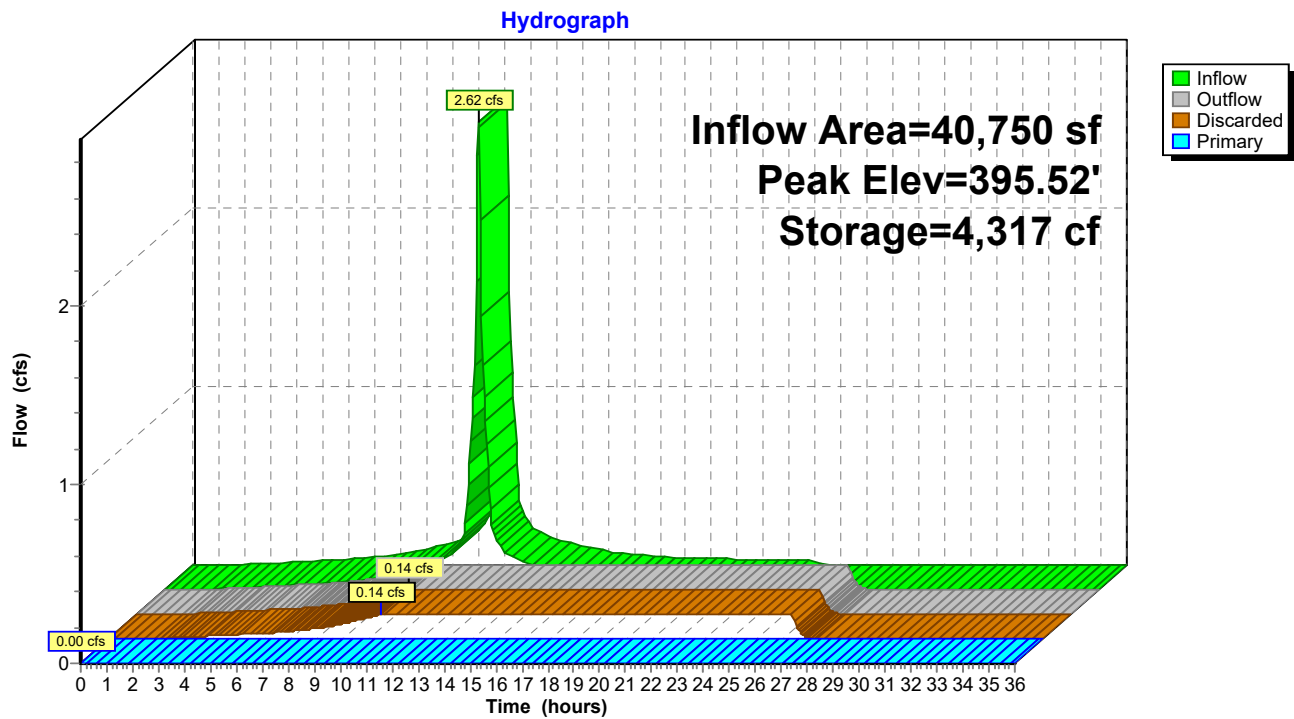
Overall System Size = 140.48' x 42.75' x 4.25'

24 Chambers (plus border)

945.3 cy Field

357.7 cy Stone



**Pond 2P: Storm Trap**

**Summary for Pond 3P: Storm Trap**

Inflow Area = 14,500 sf, 100.00% Impervious, Inflow Depth = 2.79" for 2-Year event  
 Inflow = 0.95 cfs @ 12.09 hrs, Volume= 3,369 cf  
 Outflow = 0.04 cfs @ 9.70 hrs, Volume= 3,369 cf, Atten= 96%, Lag= 0.0 min  
 Discarded = 0.04 cfs @ 9.70 hrs, Volume= 3,369 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
     Routed to Pond 105P : DMH-105  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
     Routed to Pond 1P : Storm Trap

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Peak Elev= 395.22' @ 15.08 hrs Surf.Area= 1,638 sf Storage= 1,734 cf  
 Flood Elev= 396.48' Surf.Area= 1,638 sf Storage= 3,342 cf

Plug-Flow detention time= 396.0 min calculated for 3,364 cf (100% of inflow)  
 Center-of-Mass det. time= 396.1 min ( 1,153.7 - 757.6 )

Volume	Invert	Avail.Storage	Storage Description
#1A	393.25'	1,297 cf	<b>25.79'W x 63.50'L x 4.75'H Field A</b> 7,779 cf Overall - 4,538 cf Embedded = 3,241 cf x 40.0% Voids
#2A	394.50'	3,414 cf	<b>StormTrap ST2 SingleTrap 3-0 x 3 Inside #1</b> Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf 8.48' x 46.19' Core + 6.66' Border = 21.79' x 59.50' System
		4,710 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	396.16'	<b>12.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 396.16' / 396.06' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	393.25'	<b>1.000 in/hr Exfiltration over Surface area</b>
#3	Secondary	395.75'	<b>12.0" Round Culvert</b> L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 395.75' / 395.75' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

**Discarded OutFlow** Max=0.04 cfs @ 9.70 hrs HW=393.30' (Free Discharge)  
 ↑**2=Exfiltration** (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=393.25' (Free Discharge)  
 ↑**1=Culvert** ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=393.25' (Free Discharge)  
 ↑**3=Culvert** ( Controls 0.00 cfs)

**Pond 3P: Storm Trap - Chamber Wizard Field A****Chamber Model = StormTrapST2 SingleTrap 3-0 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 36.0"H =&gt; 22.99 sf x 15.40'L = 354.0 cf

Outside= 101.7"W x 42.0"H =&gt; 29.68 sf x 15.40'L = 456.9 cf

3 Chambers/Row x 15.40' Long = 46.19' Row Length +79.9" Border x 2 +24.0" End Stone x 2 = 63.50'  
Base Length

1 Rows x 101.7" Wide + 79.9" Side Border x 2 + 24.0" Side Stone x 2 = 25.79' Base Width

15.0" Stone Base + 42.0" Chamber Height = 4.75' Field Height

3 Chambers x 354.0 cf + 2,351.9 cf Border = 3,413.9 cf Chamber Storage

3 Chambers x 456.9 cf + 3,167.4 cf Border = 4,538.1 cf Displacement

7,779.4 cf Field - 4,538.1 cf Chambers = 3,241.3 cf Stone x 40.0% Voids = 1,296.5 cf Stone Storage

Chamber Storage + Stone Storage = 4,710.4 cf = 0.108 af

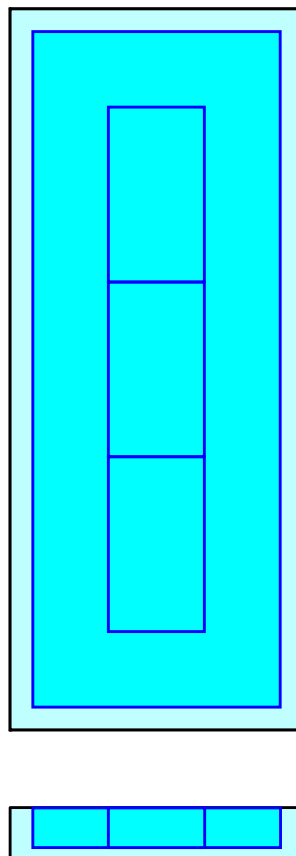
Overall Storage Efficiency = 60.5%

Overall System Size = 63.50' x 25.79' x 4.75'

3 Chambers (plus border)

288.1 cy Field

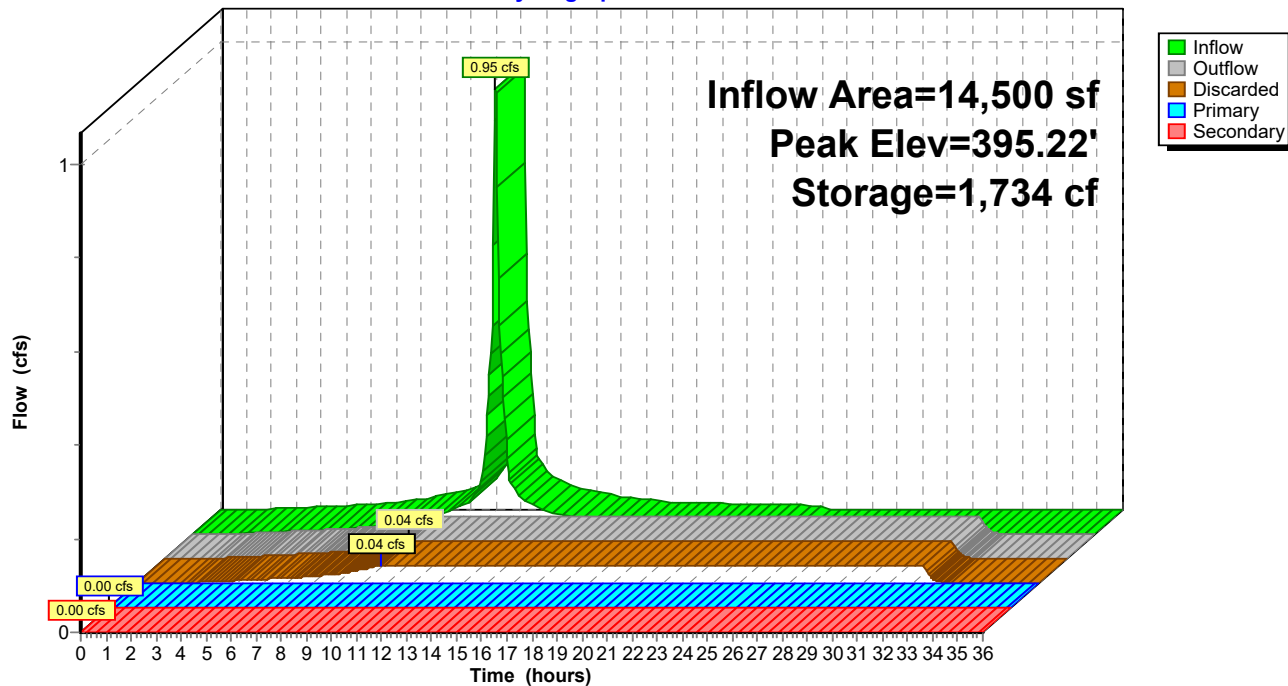
120.0 cy Stone





## Pond 3P: Storm Trap

### Hydrograph



**2023-03-14\_PostDev Stormwater Model\_R2**

Type III 24-hr 10-Year Rainfall=4.55"

Prepared by BSC Group

Printed 4/6/2023

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment1: Southeast Woods</b>	Runoff Area=117,278 sf 0.00% Impervious Runoff Depth=0.82" Flow Length=372' Tc=15.7 min CN=56 Runoff=1.45 cfs 8,002 cf
<b>Subcatchment1A: Concrete Pad (Left</b>	Runoff Area=14,500 sf 100.00% Impervious Runoff Depth=4.31" Tc=6.0 min CN=98 Runoff=1.45 cfs 5,213 cf
<b>Subcatchment1B: Concrete Pad (Left</b>	Runoff Area=15,000 sf 100.00% Impervious Runoff Depth=4.31" Tc=6.0 min CN=98 Runoff=1.50 cfs 5,392 cf
<b>Subcatchment1E: Concrete Pad (Front</b>	Runoff Area=14,500 sf 100.00% Impervious Runoff Depth=4.31" Tc=6.0 min CN=98 Runoff=1.45 cfs 5,213 cf
<b>Subcatchment2: Northern Woods</b>	Runoff Area=108,191 sf 0.00% Impervious Runoff Depth=0.66" Flow Length=575' Tc=17.6 min CN=53 Runoff=0.91 cfs 5,968 cf
<b>Subcatchment2A: Proposed Building</b>	Runoff Area=11,250 sf 100.00% Impervious Runoff Depth=4.31" Tc=6.0 min CN=98 Runoff=1.12 cfs 4,044 cf
<b>Subcatchment2B: Proposed Building</b>	Runoff Area=11,250 sf 100.00% Impervious Runoff Depth=4.31" Tc=6.0 min CN=98 Runoff=1.12 cfs 4,044 cf
<b>Subcatchment3: Abutting Old Tpk Road</b>	Runoff Area=194,497 sf 24.46% Impervious Runoff Depth=2.25" Flow Length=619' Tc=19.0 min CN=77 Runoff=8.06 cfs 36,489 cf
<b>Subcatchment4: Northeastern Section of</b>	Runoff Area=84,996 sf 4.66% Impervious Runoff Depth=3.86" Flow Length=496' Tc=6.0 min CN=94 Runoff=8.08 cfs 27,373 cf
<b>Subcatchment5: Southern Developed Area</b>	Runoff Area=353,615 sf 5.01% Impervious Runoff Depth=1.78" Flow Length=1,175' Tc=23.1 min UI Adjusted CN=71 Runoff=10.44 cfs 52,531 cf
<b>Subcatchment6: Landscaped Hill - Rear</b>	Runoff Area=15,891 sf 0.00% Impervious Runoff Depth=1.05" Flow Length=140' Tc=6.9 min CN=60 Runoff=0.37 cfs 1,386 cf
<b>Subcatchment7: Landscaped Hill - Front</b>	Runoff Area=8,414 sf 0.00% Impervious Runoff Depth=1.11" Tc=6.0 min CN=61 Runoff=0.22 cfs 776 cf
<b>Reach 1R: Southeastern Wetland/Prop. Line</b>	Inflow=13.00 cfs 63,862 cf Outflow=13.00 cfs 63,862 cf
<b>Reach 2R: Southwestern Wetland</b>	Inflow=1.69 cfs 11,412 cf Outflow=1.69 cfs 11,412 cf
<b>Reach 3R: Northern Overland Flow</b>	Inflow=0.91 cfs 5,968 cf Outflow=0.91 cfs 5,968 cf
<b>Reach 4R: Southern Wetland</b>	Inflow=10.90 cfs 57,066 cf Outflow=10.90 cfs 57,066 cf

**2023-03-14\_PostDev Stormwater Model\_R2***Type III 24-hr 10-Year Rainfall=4.55"*

Prepared by BSC Group

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**Reach 5R: Combined Flow**

Inflow=24.67 cfs 138,308 cf

Outflow=24.67 cfs 138,308 cf

**Pond 1P: Storm Trap**Peak Elev=394.90' Storage=447 cf Inflow=0.17 cfs 929 cf  
Discarded=0.03 cfs 929 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 929 cf**Pond 2P: Storm Trap**Peak Elev=396.01' Storage=6,728 cf Inflow=3.89 cfs 14,556 cf  
Discarded=0.14 cfs 12,626 cf Primary=0.22 cfs 1,930 cf Outflow=0.36 cfs 14,556 cf**Pond 3P: Storm Trap**Peak Elev=395.94' Storage=2,656 cf Inflow=1.45 cfs 5,213 cf  
Discarded=0.04 cfs 4,187 cf Primary=0.00 cfs 0 cf Secondary=0.08 cfs 644 cf Outflow=0.12 cfs 4,830 cf**Pond 102P: DMH-102**Peak Elev=397.22' Inflow=1.12 cfs 4,044 cf  
Primary=0.95 cfs 3,759 cf Secondary=0.17 cfs 286 cf Outflow=1.12 cfs 4,044 cf**Pond 105P: DMH-105**Peak Elev=391.65' Inflow=1.16 cfs 4,535 cf  
12.0" Round Culvert n=0.012 L=96.0' S=0.0938 ' / ' Outflow=1.16 cfs 4,535 cf**Pond 203P: DMH-203**Peak Elev=397.33' Inflow=1.12 cfs 4,044 cf  
Primary=0.95 cfs 3,951 cf Secondary=0.17 cfs 93 cf Outflow=1.12 cfs 4,044 cf**Pond 207P: DMH-207**Peak Elev=392.91' Inflow=0.53 cfs 3,410 cf  
12.0" Round Culvert n=0.012 L=15.0' S=0.0133 ' / ' Outflow=0.53 cfs 3,410 cf**Total Runoff Area = 949,382 sf Runoff Volume = 156,432 cf Average Runoff Depth = 1.98"**  
**85.70% Pervious = 813,620 sf 14.30% Impervious = 135,762 sf**

### Summary for Subcatchment 1: Southeast Woods

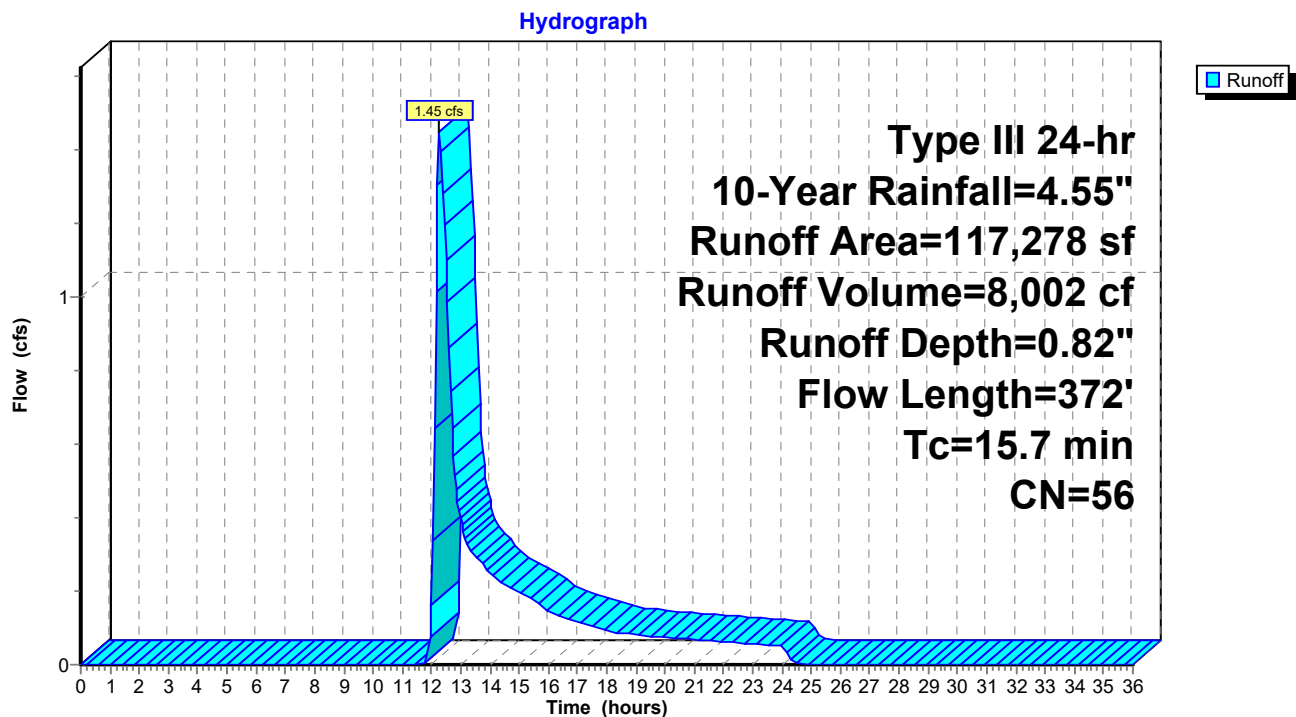
Runoff = 1.45 cfs @ 12.27 hrs, Volume= 8,002 cf, Depth= 0.82"  
Routed to Reach 2R : Southwestern Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Description
86,662	55	Woods, Good, HSG B
2,127	30	Woods, Good, HSG A
26,969	61	>75% Grass cover, Good, HSG B
1,520	96	Gravel surface, HSG B
117,278	56	Weighted Average
117,278		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0200	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
3.0	322	0.1240	1.76		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
15.7	372	Total			

### Subcatchment 1: Southeast Woods



## Summary for Subcatchment 1A: Concrete Pad (Left Side, Back, Right Side Rear of Building)

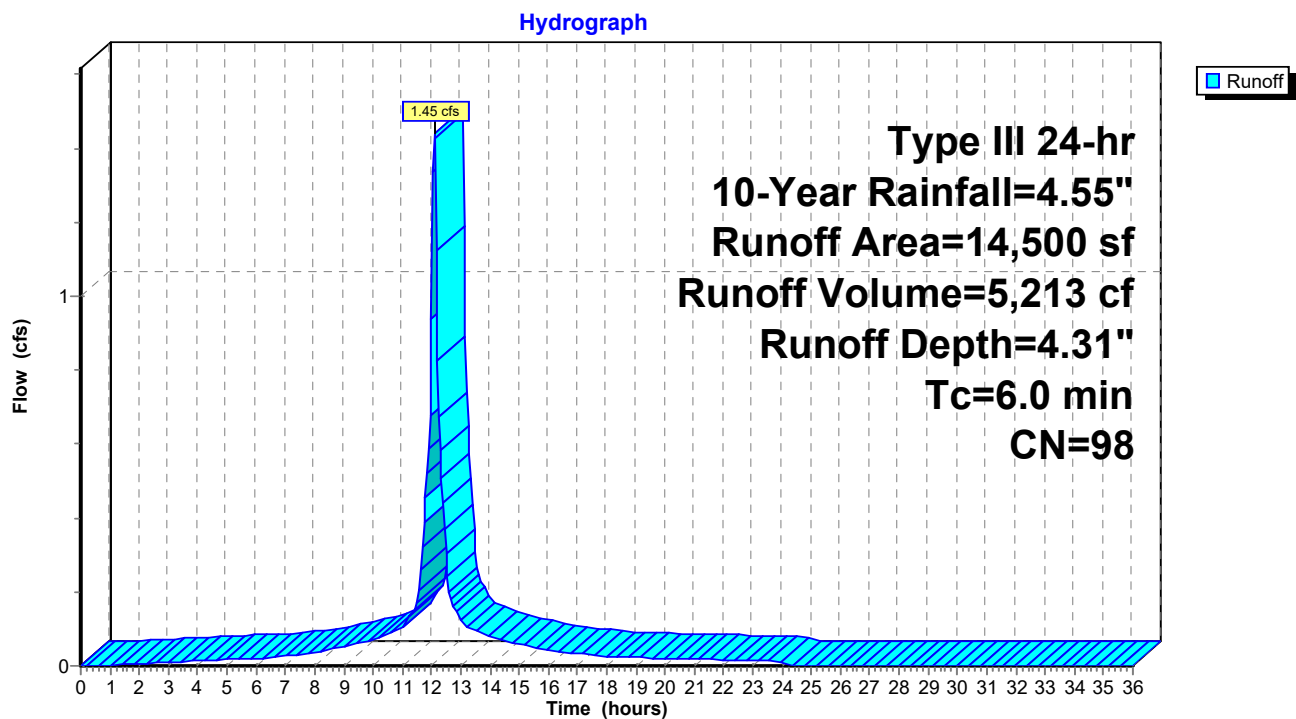
Runoff = 1.45 cfs @ 12.09 hrs, Volume= 5,213 cf, Depth= 4.31"  
Routed to Pond 2P : Storm Trap

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Description
14,500	98	Paved parking, HSG B
14,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Concrete Runoff

## Subcatchment 1A: Concrete Pad (Left Side, Back, Right Side Rear of Building)



**Summary for Subcatchment 1B: Concrete Pad (Left Side Building)**

Runoff = 1.50 cfs @ 12.09 hrs, Volume= 5,392 cf, Depth= 4.31"  
 Routed to Pond 2P : Storm Trap

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-Year Rainfall=4.55"

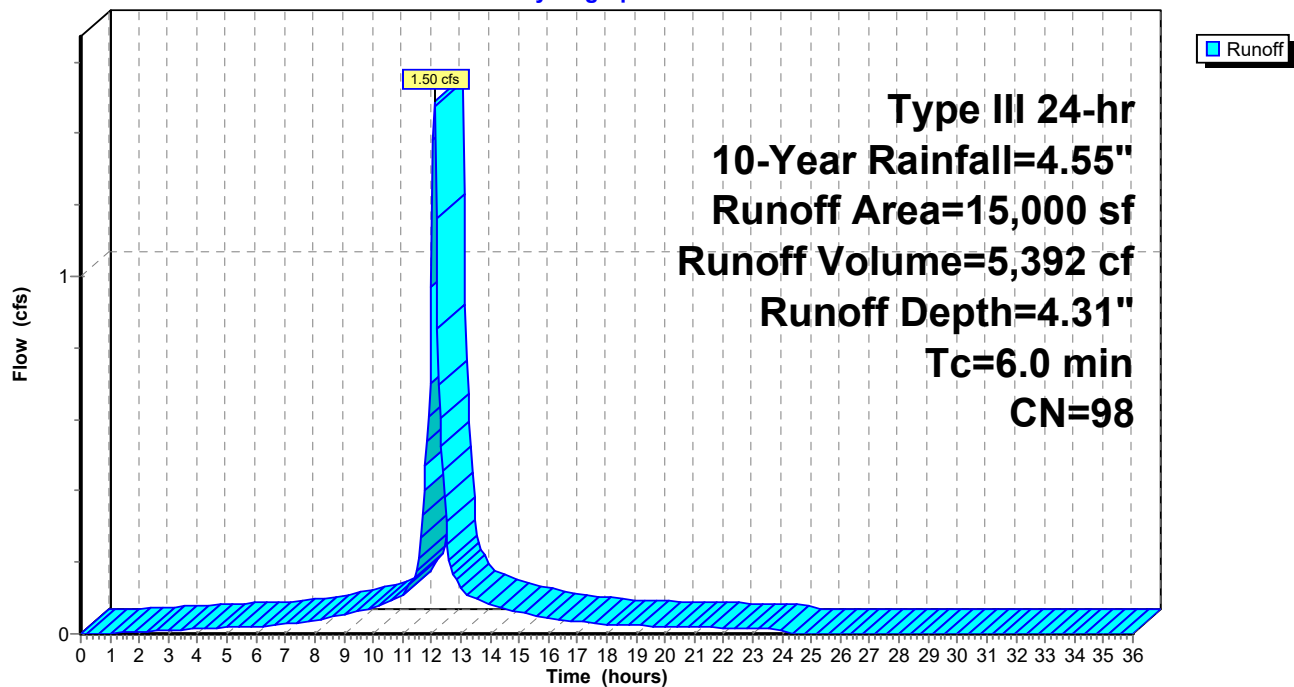
Area (sf)	CN	Description
15,000	98	Paved parking, HSG B
15,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Concrete Runoff

**Subcatchment 1B: Concrete Pad (Left Side Building)**

Hydrograph



**Summary for Subcatchment 1E: Concrete Pad (Front and Right Side)**

Runoff = 1.45 cfs @ 12.09 hrs, Volume= 5,213 cf, Depth= 4.31"  
 Routed to Pond 3P : Storm Trap

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-Year Rainfall=4.55"

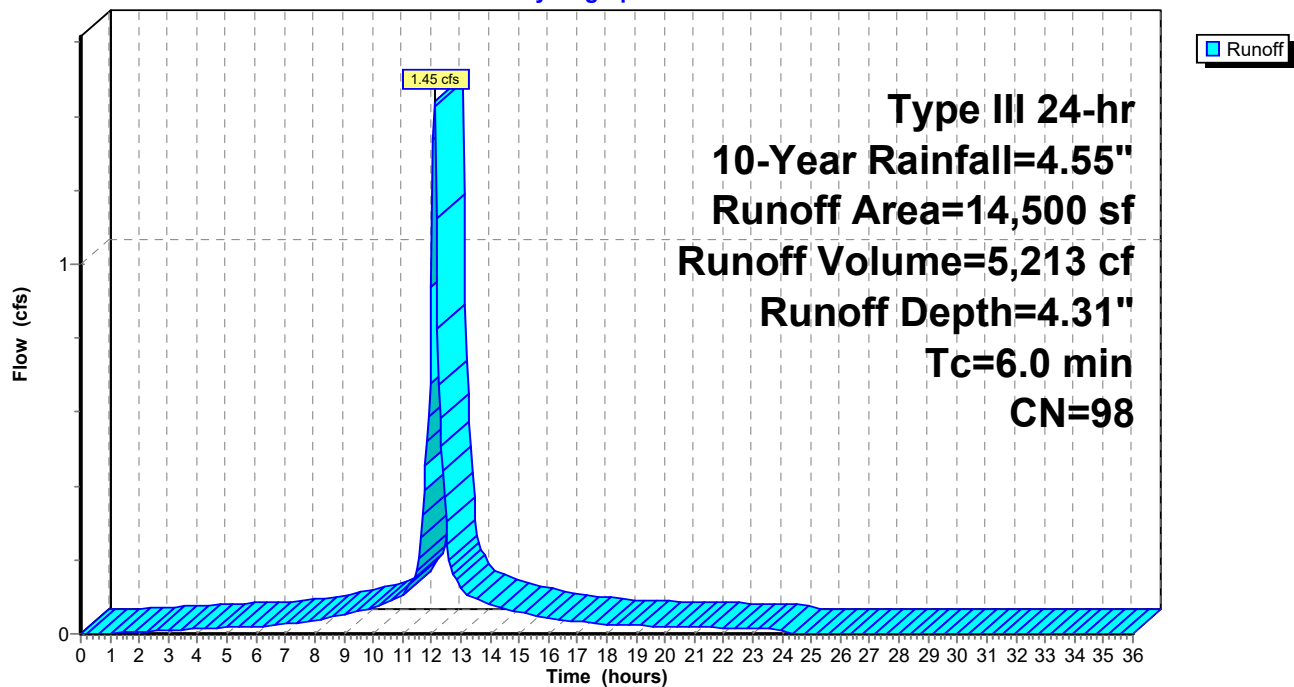
Area (sf)	CN	Description
14,500	98	Paved parking, HSG B
14,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Concrete Runoff

**Subcatchment 1E: Concrete Pad (Front and Right Side)**

Hydrograph



## Summary for Subcatchment 2: Northern Woods

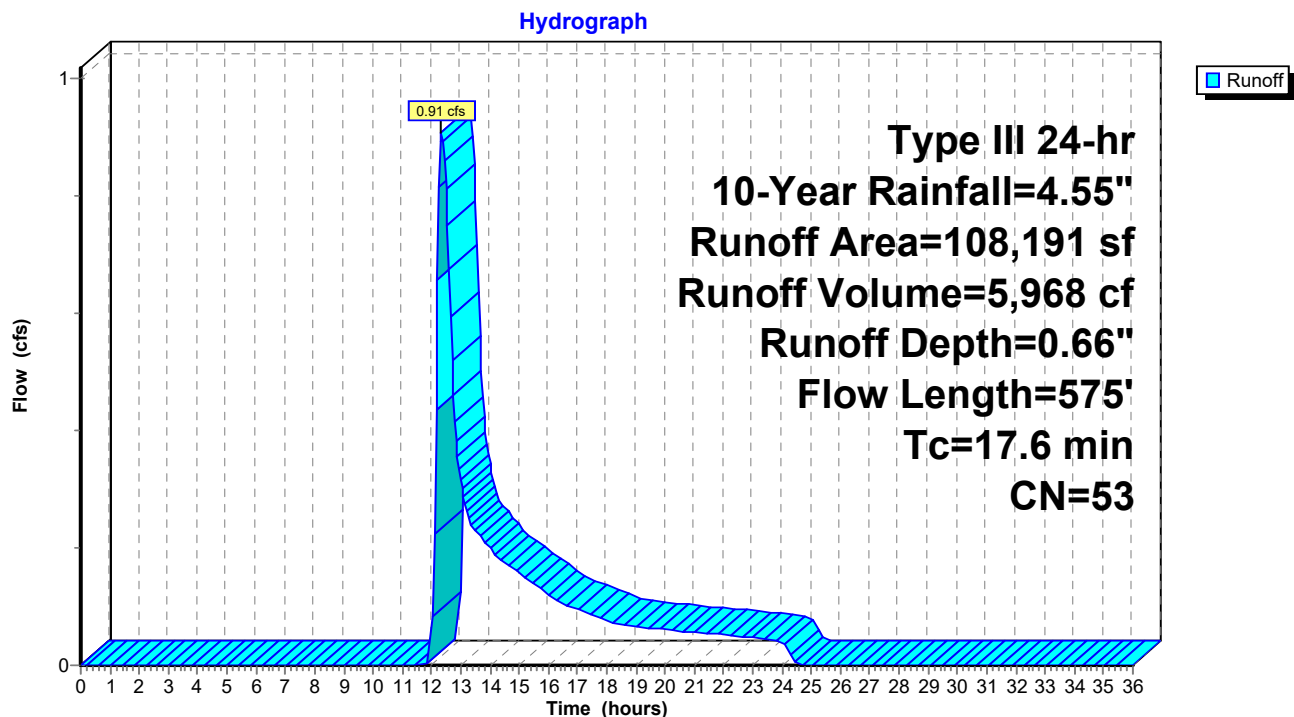
Runoff = 0.91 cfs @ 12.35 hrs, Volume= 5,968 cf, Depth= 0.66"  
Routed to Reach 3R : Northern Overland Flow

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Description
66,001	55	Woods, Good, HSG B
21,606	70	Woods, Good, HSG C
20,584	30	Woods, Good, HSG A
108,191	53	Weighted Average
108,191		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
7.9	525	0.0495	1.11		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
17.6	575	Total			

## Subcatchment 2: Northern Woods





**Summary for Subcatchment 2A: Proposed Building (Front Half Roof)**

Runoff = 1.12 cfs @ 12.09 hrs, Volume= 4,044 cf, Depth= 4.31"  
 Routed to Pond 102P : DMH-102

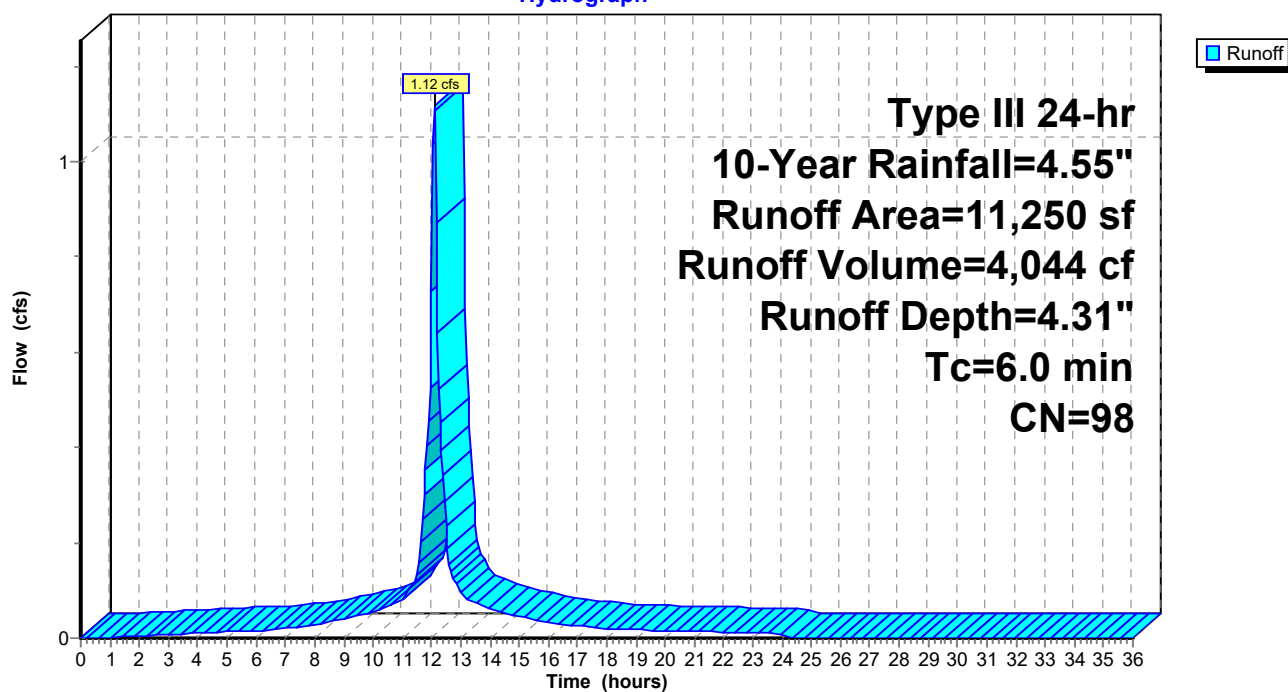
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Description
11,250	98	Unconnected roofs, HSG B
11,250		100.00% Impervious Area
11,250		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Roof runoff

**Subcatchment 2A: Proposed Building (Front Half Roof)**

Hydrograph



**Summary for Subcatchment 2B: Proposed Building (Back Half Roof)**

Runoff = 1.12 cfs @ 12.09 hrs, Volume= 4,044 cf, Depth= 4.31"  
 Routed to Pond 203P : DMH-203

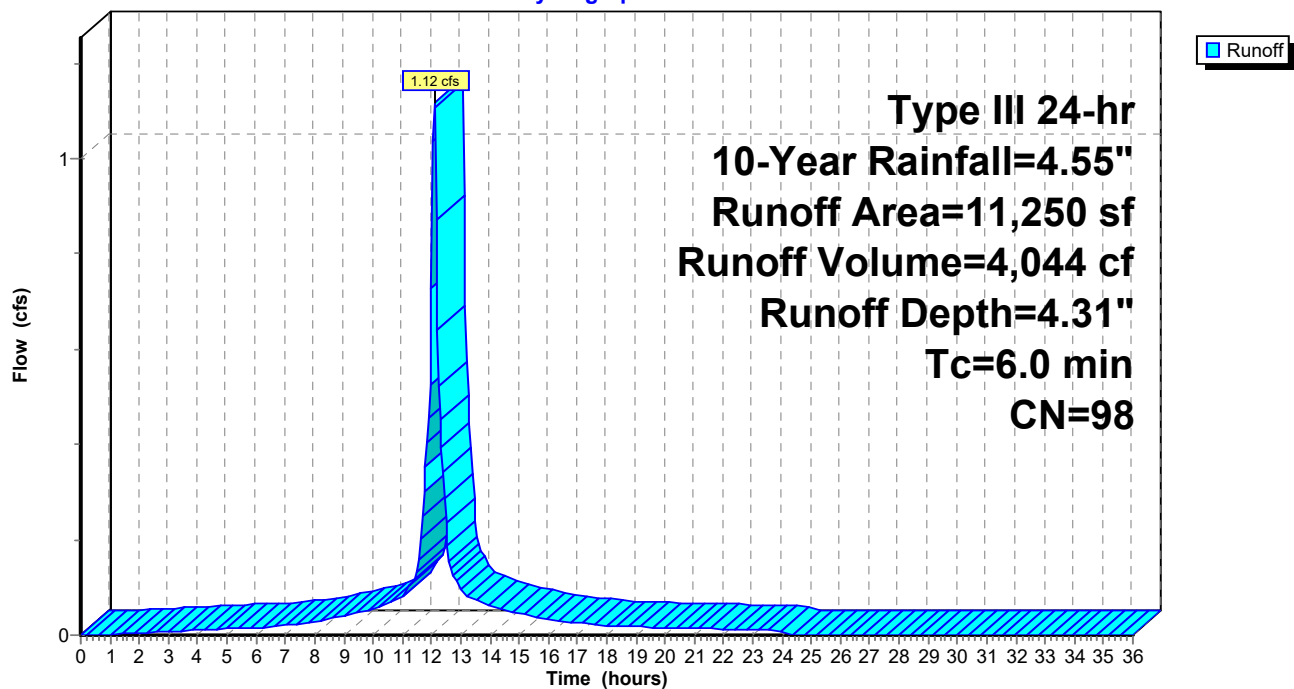
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Description
11,250	98	Unconnected roofs, HSG B
11,250		100.00% Impervious Area
11,250		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Roof runoff

**Subcatchment 2B: Proposed Building (Back Half Roof)**

Hydrograph



**Summary for Subcatchment 3: Abutting Old Tpk Road**

Runoff = 8.06 cfs @ 12.27 hrs, Volume= 36,489 cf, Depth= 2.25"

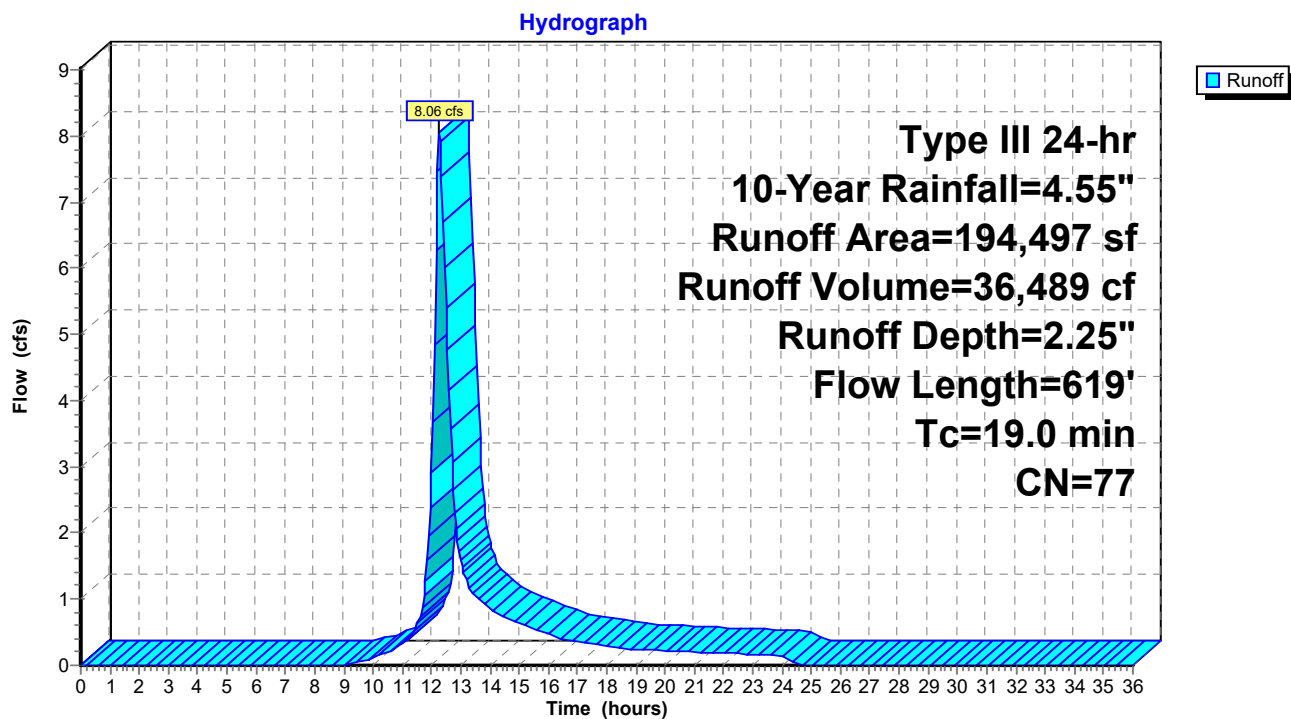
Routed to Reach 1R : Southeastern Wetland/Prop. Line

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Description
20,473	74	>75% Grass cover, Good, HSG C
28,140	77	Woods, Poor, HSG C
3,311	98	Paved parking, HSG C
7,754	98	Water Surface, HSG C
2,614	98	Paved parking, HSG D
36,432	77	Woods, Good, HSG D
17,163	98	Water Surface, HSG D
21,242	55	Woods, Good, HSG B
15,333	98	Water Surface, HSG B
8,494	85	Gravel roads, HSG B
1,394	98	Paved parking, HSG B
32,147	61	>75% Grass cover, Good, HSG B
194,497	77	Weighted Average
146,928		75.54% Pervious Area
47,569		24.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
4.9	264	0.0322	0.90		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.4	45	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
4.0	260	0.0460	1.07		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.0	619	Total			

### Subcatchment 3: Abutting Old Tpk Road



**Summary for Subcatchment 4: Northeastern Section of Existing Yard**

Runoff = 8.08 cfs @ 12.09 hrs, Volume= 27,373 cf, Depth= 3.86"  
 Routed to Reach 1R : Southeastern Wetland/Prop. Line

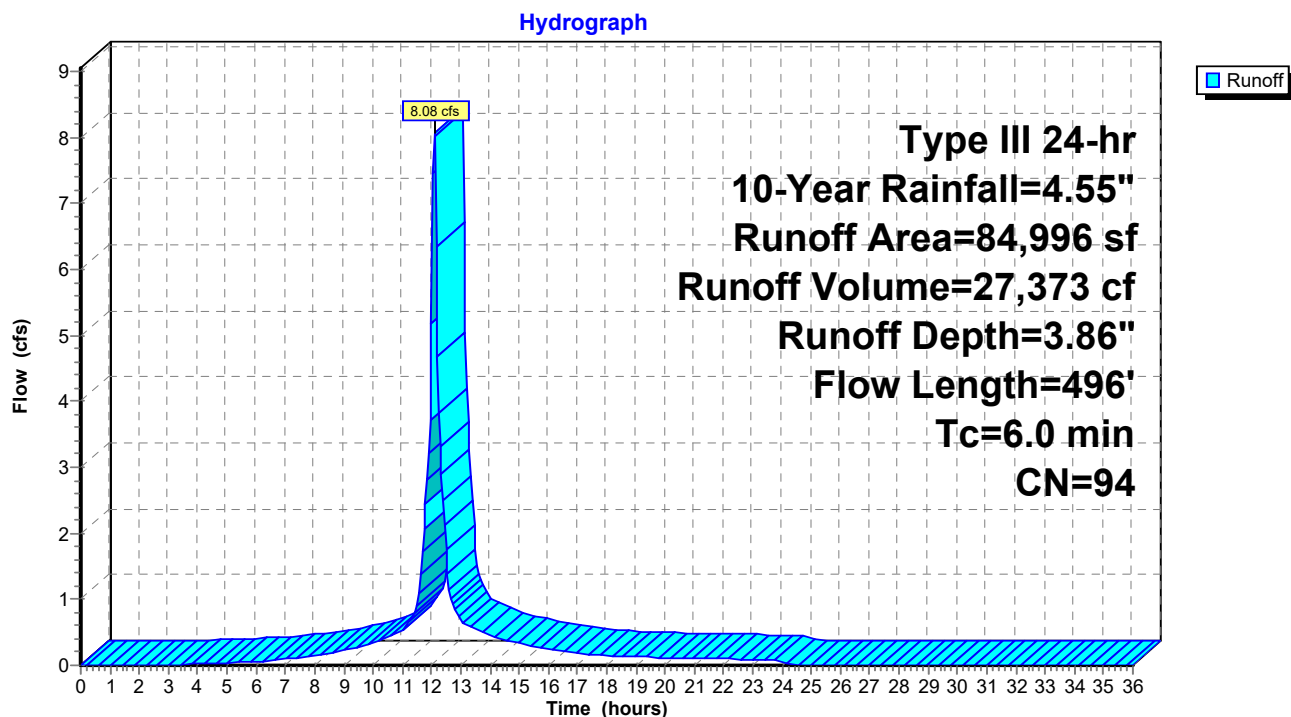
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Description
4,792	55	Woods, Good, HSG B
2,962	98	Paved parking, HSG B
1,002	98	Water Surface, HSG B
76,240	96	Gravel surface, HSG B
84,996	94	Weighted Average
81,032		95.34% Pervious Area
3,964		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0250	1.27		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.00"
2.2	406	0.0375	3.12		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.7	40	0.0375	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.4					<b>Direct Entry,</b>
6.0	496	Total			

### Subcatchment 4: Northeastern Section of Existing Yard



### Summary for Subcatchment 5: Southern Developed Area

Runoff = 10.44 cfs @ 12.34 hrs, Volume= 52,531 cf, Depth= 1.78"  
Routed to Reach 4R : Southern Wetland

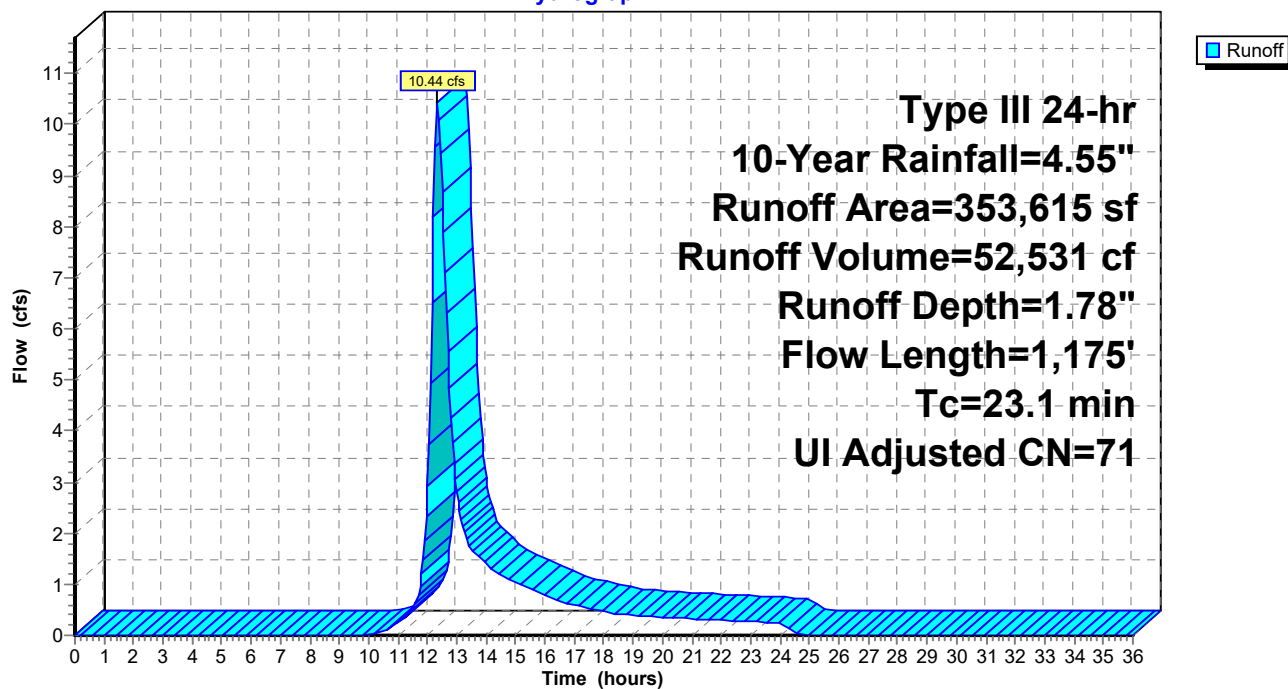
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Adj	Description
86,017	55		Woods, Good, HSG B
5,293	77		Woods, Good, HSG D
151,153	85		Gravel roads, HSG B
5,619	98		Paved parking, HSG B
12,110	98		Unconnected roofs, HSG B
92,538	61		>75% Grass cover, Good, HSG B
885	77		Woods, Poor, HSG C
353,615	72	71	Weighted Average, UI Adjusted
335,886			94.99% Pervious Area
17,729			5.01% Impervious Area
12,110			68.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0200	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	164	0.0470	1.08		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.4	259	0.0040	1.28		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
3.0	640	0.0500	3.60		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
1.5	62	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
23.1	1,175	Total			

## Subcatchment 5: Southern Developed Area

Hydrograph





### Summary for Subcatchment 6: Landscaped Hill - Rear Portion

Runoff = 0.37 cfs @ 12.12 hrs, Volume= 1,386 cf, Depth= 1.05"  
Routed to Pond 207P : DMH-207

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.55"

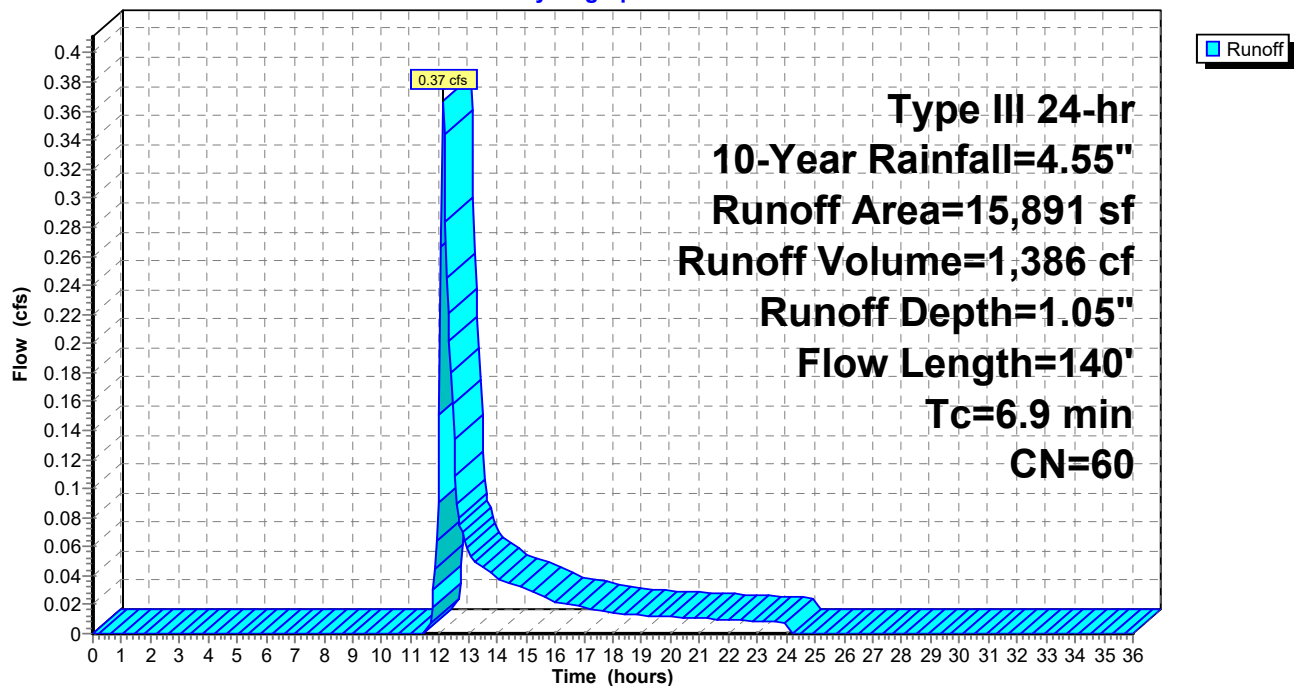
Area (sf)	CN	Description
2,309	55	Woods, Good, HSG B
13,582	61	>75% Grass cover, Good, HSG B
15,891	60	Weighted Average
15,891		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0600	0.15		<b>Sheet Flow, OVERLAND</b>
					Grass: Dense n= 0.240 P2= 3.00"
1.4	90	0.0240	1.08		<b>Shallow Concentrated Flow, SWALE</b>
					Short Grass Pasture Kv= 7.0 fps
6.9	140	Total			

### Subcatchment 6: Landscaped Hill - Rear Portion

Hydrograph



### Summary for Subcatchment 7: Landscaped Hill - Front Portion

Runoff = 0.22 cfs @ 12.11 hrs, Volume= 776 cf, Depth= 1.11"  
Routed to Pond 105P : DMH-105

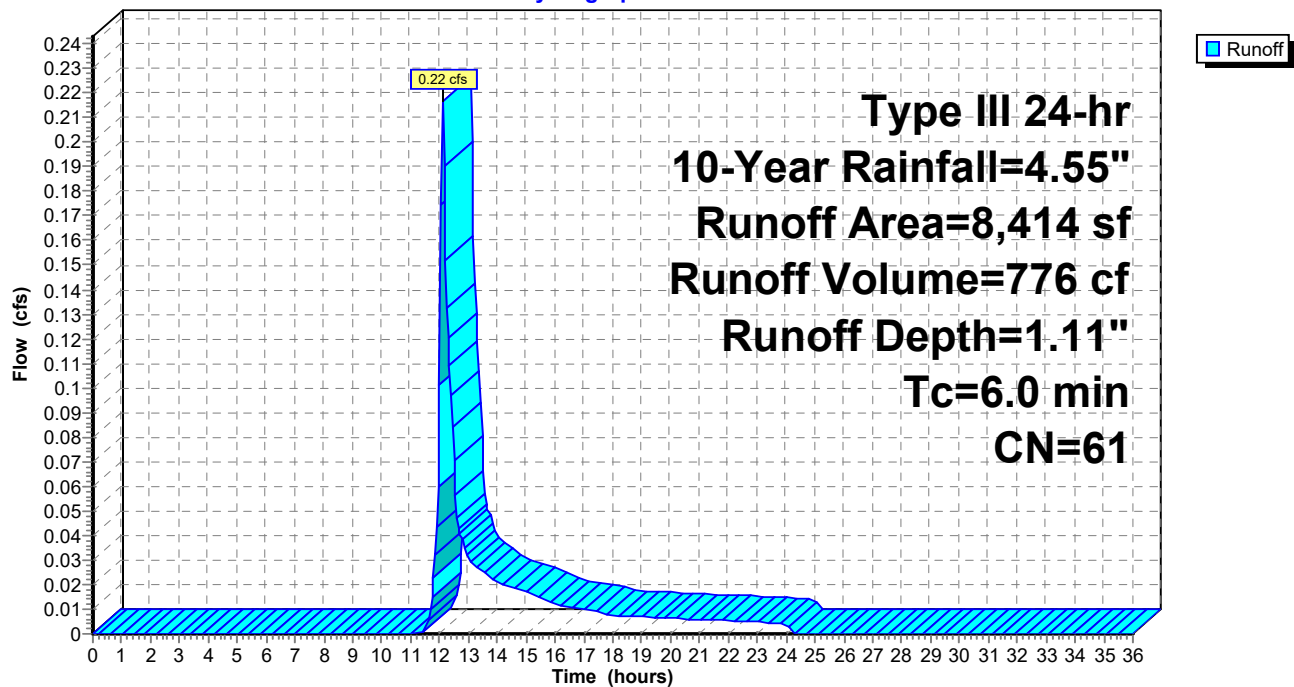
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.55"

Area (sf)	CN	Description
8,414	61	>75% Grass cover, Good, HSG B
8,414		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Overland <6min

### Subcatchment 7: Landscaped Hill - Front Portion

Hydrograph



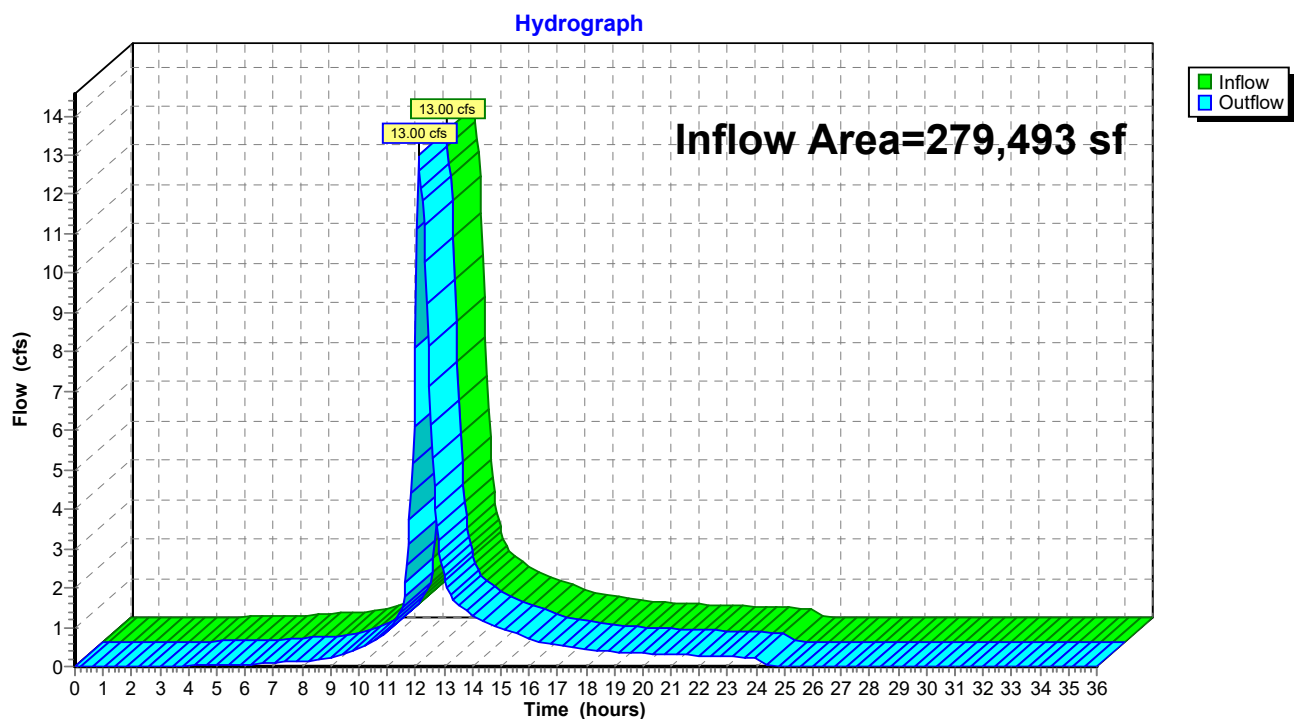
## Summary for Reach 1R: Southeastern Wetland/Prop. Line

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 279,493 sf, 18.44% Impervious, Inflow Depth = 2.74" for 10-Year event  
 Inflow = 13.00 cfs @ 12.12 hrs, Volume= 63,862 cf  
 Outflow = 13.00 cfs @ 12.12 hrs, Volume= 63,862 cf, Atten= 0%, Lag= 0.0 min  
 Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

## Reach 1R: Southeastern Wetland/Prop. Line



## Summary for Reach 2R: Southwestern Wetland

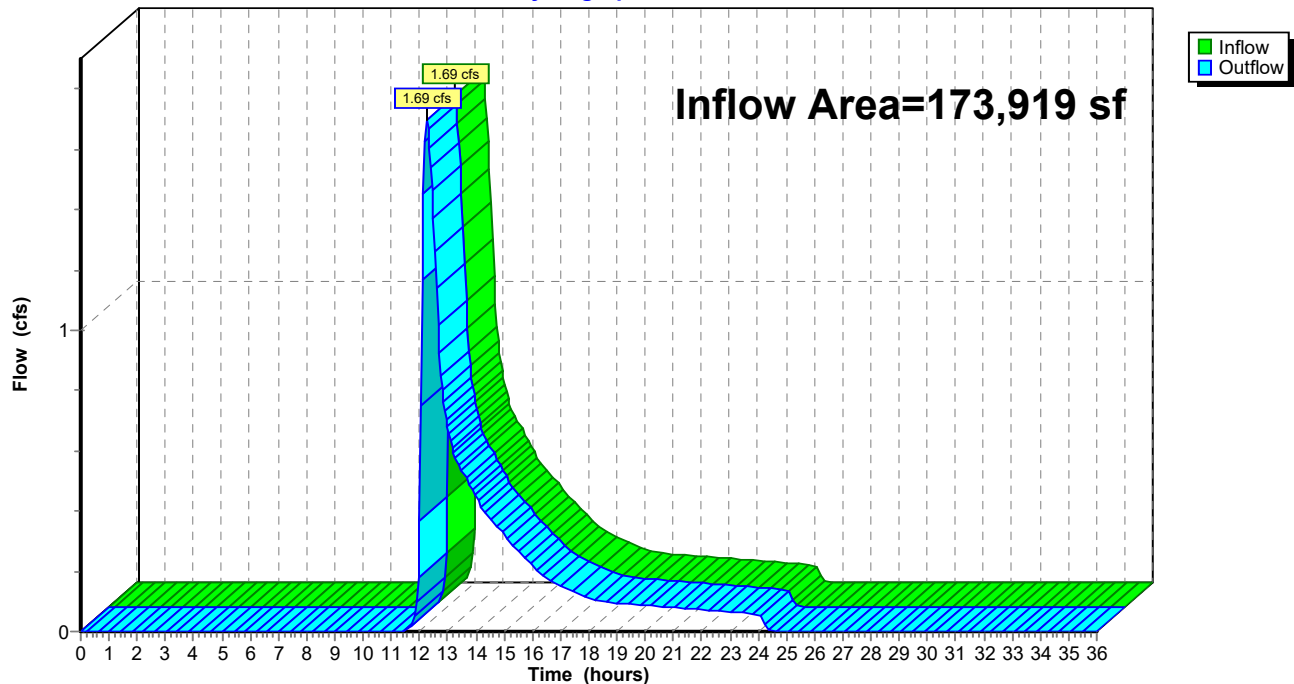
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 173,919 sf, 23.43% Impervious, Inflow Depth = 0.79" for 10-Year event  
 Inflow = 1.69 cfs @ 12.26 hrs, Volume= 11,412 cf  
 Outflow = 1.69 cfs @ 12.26 hrs, Volume= 11,412 cf, Atten= 0%, Lag= 0.0 min  
 Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

## Reach 2R: Southwestern Wetland

Hydrograph

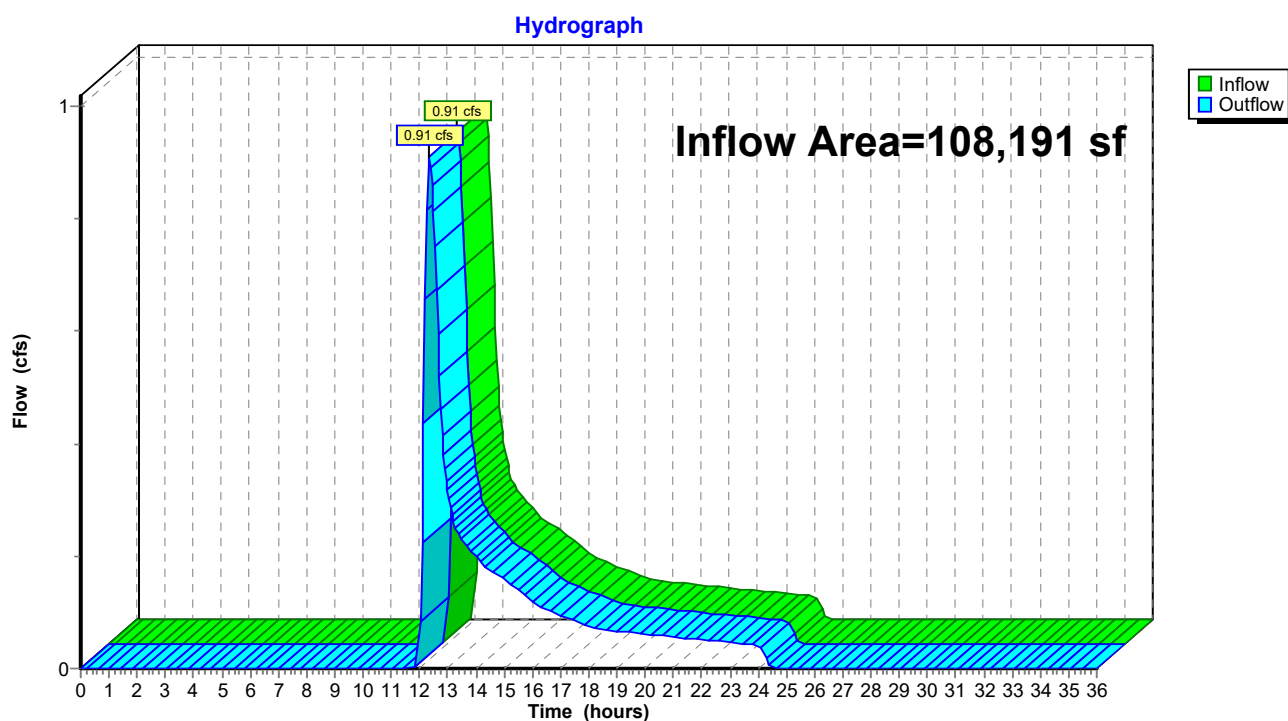


**Summary for Reach 3R: Northern Overland Flow**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 108,191 sf, 0.00% Impervious, Inflow Depth = 0.66" for 10-Year event  
Inflow = 0.91 cfs @ 12.35 hrs, Volume= 5,968 cf  
Outflow = 0.91 cfs @ 12.35 hrs, Volume= 5,968 cf, Atten= 0%, Lag= 0.0 min  
Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

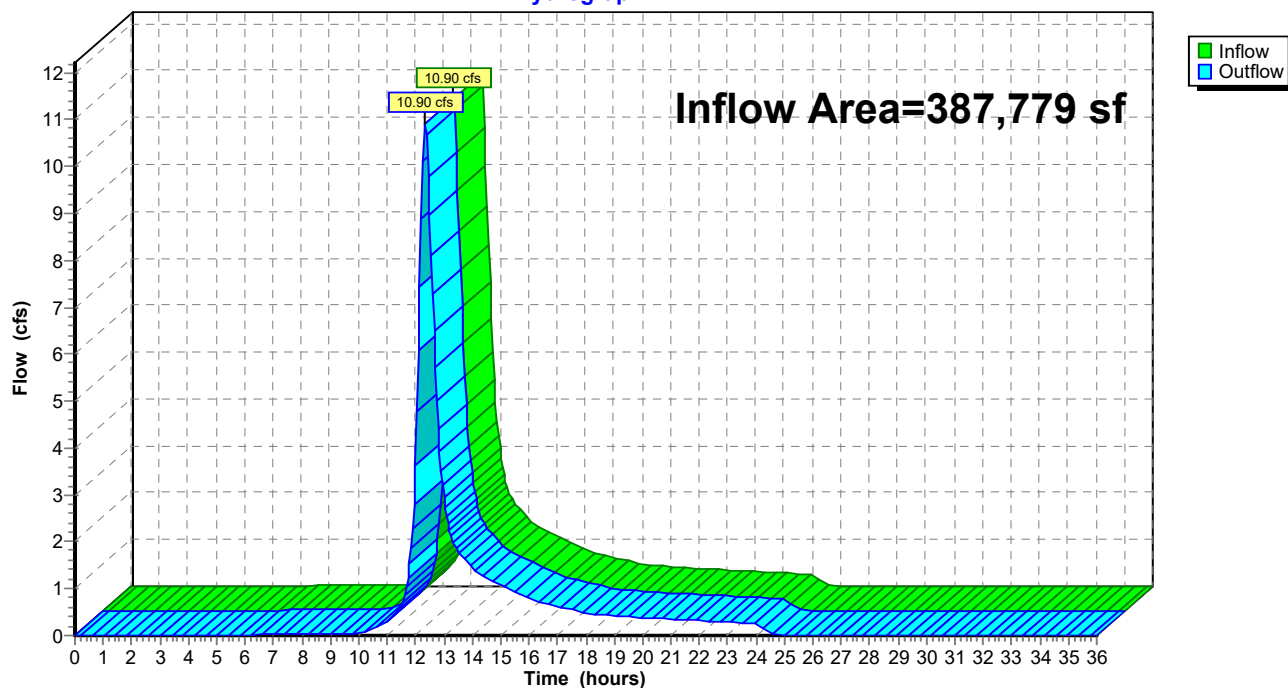
**Reach 3R: Northern Overland Flow**

**Summary for Reach 4R: Southern Wetland**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 387,779 sf, 11.21% Impervious, Inflow Depth = 1.77" for 10-Year event  
Inflow = 10.90 cfs @ 12.33 hrs, Volume= 57,066 cf  
Outflow = 10.90 cfs @ 12.33 hrs, Volume= 57,066 cf, Atten= 0%, Lag= 0.0 min  
Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

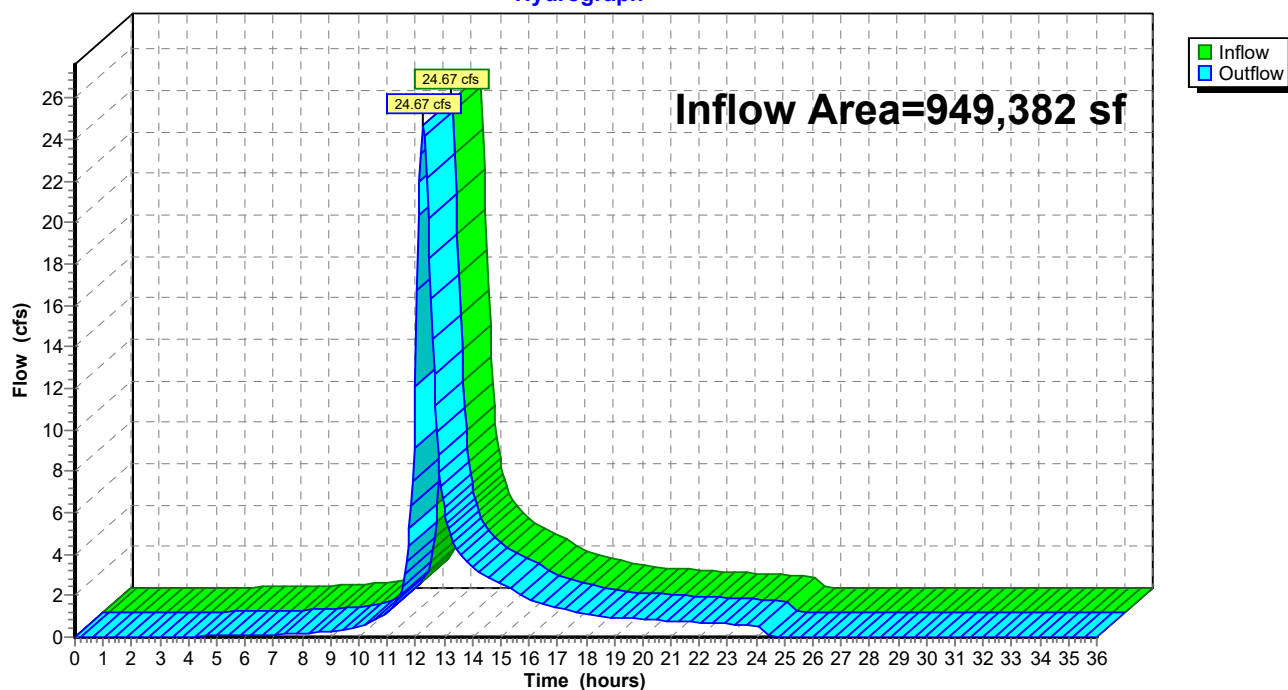
**Reach 4R: Southern Wetland****Hydrograph**

**Summary for Reach 5R: Combined Flow**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 949,382 sf, 14.30% Impervious, Inflow Depth = 1.75" for 10-Year event  
Inflow = 24.67 cfs @ 12.28 hrs, Volume= 138,308 cf  
Outflow = 24.67 cfs @ 12.28 hrs, Volume= 138,308 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

**Reach 5R: Combined Flow****Hydrograph**

**Summary for Pond 1P: Storm Trap**

Inflow = 0.17 cfs @ 12.09 hrs, Volume= 929 cf  
 Outflow = 0.03 cfs @ 11.85 hrs, Volume= 929 cf, Atten= 84%, Lag= 0.0 min  
 Discarded = 0.03 cfs @ 11.85 hrs, Volume= 929 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Pond 105P : DMH-105

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Peak Elev= 394.90' @ 15.18 hrs Surf.Area= 1,241 sf Storage= 447 cf  
 Flood Elev= 396.48' Surf.Area= 1,241 sf Storage= 1,780 cf

Plug-Flow detention time= 158.9 min calculated for 928 cf (100% of inflow)  
 Center-of-Mass det. time= 159.0 min ( 968.9 - 809.9 )

Volume	Invert	Avail.Storage	Storage Description
#1A	394.00'	956 cf	<b>25.79'W x 48.10'L x 4.25'H Field A</b> 5,273 cf Overall - 2,883 cf Embedded = 2,390 cf x 40.0% Voids
#2A	395.25'	2,077 cf	<b>StormTrap ST2 SingleTrap 2-6x2 Inside #1</b> Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 8.48' x 30.79' Core + 6.66' Border = 21.79' x 44.10' System
		3,033 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	396.16'	<b>12.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 396.16' / 396.06' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	394.00'	<b>1.000 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.03 cfs @ 11.85 hrs HW=394.05' (Free Discharge)  
 ↑ **2=Exfiltration** (Exfiltration Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=394.00' (Free Discharge)  
 ↑ **1=Culvert** ( Controls 0.00 cfs)



**Pond 1P: Storm Trap - Chamber Wizard Field A****Chamber Model = StormTrapST2 SingleTrap 2-6 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 30.0"H =&gt; 18.82 sf x 15.40'L = 289.8 cf

Outside= 101.7"W x 36.0"H =&gt; 25.44 sf x 15.40'L = 391.6 cf

2 Chambers/Row x 15.40' Long = 30.79' Row Length +79.9" Border x 2 +24.0" End Stone x 2 = 48.10'  
Base Length

1 Rows x 101.7" Wide + 79.9" Side Border x 2 + 24.0" Side Stone x 2 = 25.79' Base Width

15.0" Stone Base + 36.0" Chamber Height = 4.25' Field Height

2 Chambers x 289.8 cf + 1,497.8 cf Border = 2,077.4 cf Chamber Storage

2 Chambers x 391.6 cf + 2,100.0 cf Border = 2,883.3 cf Displacement

5,272.9 cf Field - 2,883.3 cf Chambers = 2,389.6 cf Stone x 40.0% Voids = 955.8 cf Stone Storage

Chamber Storage + Stone Storage = 3,033.3 cf = 0.070 af

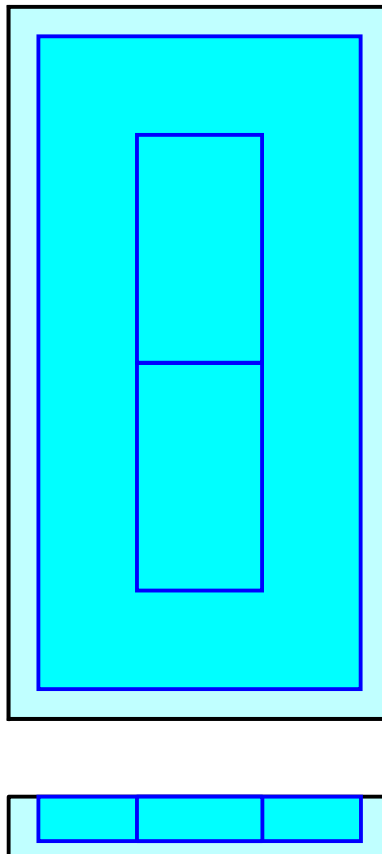
Overall Storage Efficiency = 57.5%

Overall System Size = 48.10' x 25.79' x 4.25'

2 Chambers (plus border)

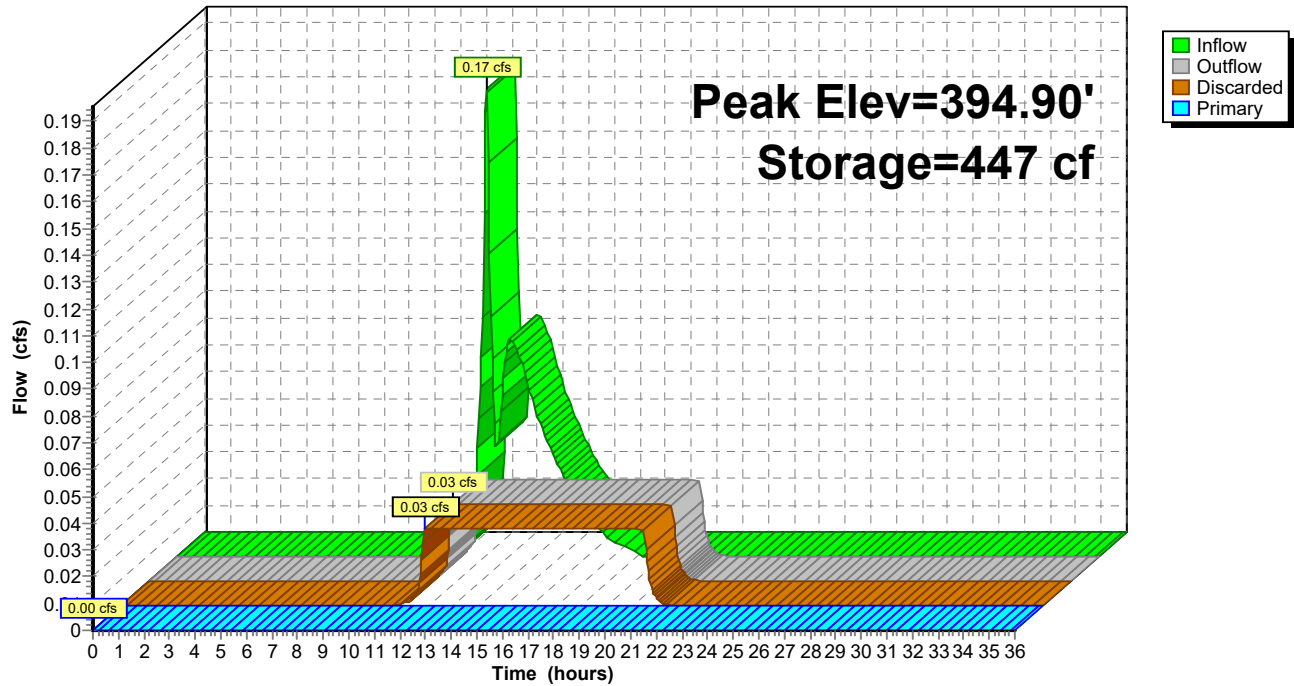
195.3 cy Field

88.5 cy Stone



# Pond 1P: Storm Trap

## Hydrograph



### Summary for Pond 2P: Storm Trap

Inflow Area = 40,750 sf, 100.00% Impervious, Inflow Depth = 4.29" for 10-Year event  
 Inflow = 3.89 cfs @ 12.09 hrs, Volume= 14,556 cf  
 Outflow = 0.36 cfs @ 12.96 hrs, Volume= 14,556 cf, Atten= 91%, Lag= 52.7 min  
 Discarded = 0.14 cfs @ 9.10 hrs, Volume= 12,626 cf  
 Primary = 0.22 cfs @ 12.96 hrs, Volume= 1,930 cf  
 Routed to Pond 207P : DMH-207

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Peak Elev= 396.01' @ 12.96 hrs Surf.Area= 6,005 sf Storage= 6,728 cf

Plug-Flow detention time= 330.3 min calculated for 14,536 cf (100% of inflow)  
 Center-of-Mass det. time= 330.5 min ( 1,080.3 - 749.8 )

Volume	Invert	Avail.Storage	Storage Description
#1A	394.00'	3,863 cf	<b>42.75'W x 140.48'L x 4.25'H Field A</b> 25,523 cf Overall - 15,866 cf Embedded = 9,658 cf x 40.0% Voids
#2A	395.25'	11,568 cf	<b>StormTrap ST2 SingleTrap 2-6x 24 Inside #1</b> Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 24 Chambers in 3 Rows 25.44' x 123.17' Core + 6.66' Border = 38.75' x 136.48' System
		15,431 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	395.75'	<b>12.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 395.75' / 395.65' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	394.00'	<b>1.000 in/hr Exfiltration over Surface area</b>
#3	Primary	395.95'	<b>6.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 395.95' / 395.85' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf

**Discarded OutFlow** Max=0.14 cfs @ 9.10 hrs HW=394.04' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.14 cfs)

**Primary OutFlow** Max=0.22 cfs @ 12.96 hrs HW=396.01' (Free Discharge)

↑ **1=Culvert** (Barrel Controls 0.21 cfs @ 2.01 fps)

↑ **3=Culvert** (Inlet Controls 0.01 cfs @ 0.65 fps)

**Pond 2P: Storm Trap - Chamber Wizard Field A****Chamber Model = StormTrapST2 SingleTrap 2-6 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 30.0"H =&gt; 18.82 sf x 15.40'L = 289.8 cf

Outside= 101.7"W x 36.0"H =&gt; 25.44 sf x 15.40'L = 391.6 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 +24.0" End Stone x 2 = 140.48'  
Base Length

3 Rows x 101.7" Wide + 79.9" Side Border x 2 + 24.0" Side Stone x 2 = 42.75' Base Width

15.0" Stone Base + 36.0" Chamber Height = 4.25' Field Height

24 Chambers x 289.8 cf + 4,612.1 cf Border = 11,567.5 cf Chamber Storage

24 Chambers x 391.6 cf + 6,466.5 cf Border = 15,865.7 cf Displacement

25,523.3 cf Field - 15,865.7 cf Chambers = 9,657.6 cf Stone x 40.0% Voids = 3,863.0 cf Stone Storage

Chamber Storage + Stone Storage = 15,430.6 cf = 0.354 af

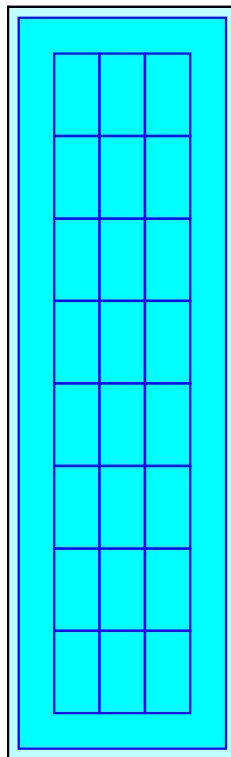
Overall Storage Efficiency = 60.5%

Overall System Size = 140.48' x 42.75' x 4.25'

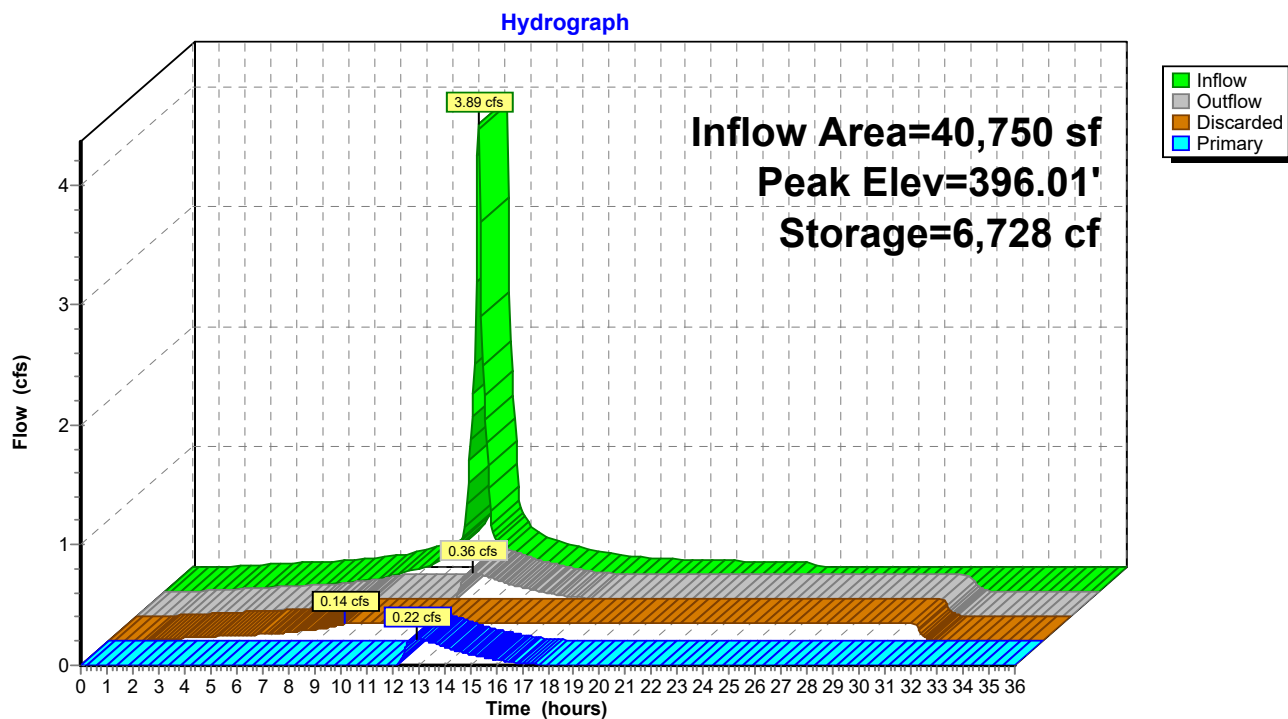
24 Chambers (plus border)

945.3 cy Field

357.7 cy Stone



## Pond 2P: Storm Trap



**Summary for Pond 3P: Storm Trap**

Inflow Area = 14,500 sf, 100.00% Impervious, Inflow Depth = 4.31" for 10-Year event  
 Inflow = 1.45 cfs @ 12.09 hrs, Volume= 5,213 cf  
 Outflow = 0.12 cfs @ 13.06 hrs, Volume= 4,830 cf, Atten= 92%, Lag= 58.2 min  
 Discarded = 0.04 cfs @ 8.40 hrs, Volume= 4,187 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
     Routed to Pond 105P : DMH-105  
 Secondary = 0.08 cfs @ 13.06 hrs, Volume= 644 cf  
     Routed to Pond 1P : Storm Trap

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Peak Elev= 395.94' @ 13.06 hrs Surf.Area= 1,638 sf Storage= 2,656 cf  
 Flood Elev= 396.48' Surf.Area= 1,638 sf Storage= 3,342 cf

Plug-Flow detention time= 473.7 min calculated for 4,824 cf (93% of inflow)  
 Center-of-Mass det. time= 434.7 min ( 1,184.3 - 749.6 )

Volume	Invert	Avail.Storage	Storage Description
#1A	393.25'	1,297 cf	<b>25.79'W x 63.50'L x 4.75'H Field A</b> 7,779 cf Overall - 4,538 cf Embedded = 3,241 cf x 40.0% Voids
#2A	394.50'	3,414 cf	<b>StormTrap ST2 SingleTrap 3-0 x 3 Inside #1</b> Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf 8.48' x 46.19' Core + 6.66' Border = 21.79' x 59.50' System
		4,710 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	396.16'	<b>12.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 396.16' / 396.06' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	393.25'	<b>1.000 in/hr Exfiltration over Surface area</b>
#3	Secondary	395.75'	<b>12.0" Round Culvert</b> L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 395.75' / 395.75' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

**Discarded OutFlow** Max=0.04 cfs @ 8.40 hrs HW=393.30' (Free Discharge)

↑**2=Exfiltration** (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=393.25' (Free Discharge)

↑**1=Culvert** ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.08 cfs @ 13.06 hrs HW=395.94' (Free Discharge)

↑**3=Culvert** (Barrel Controls 0.08 cfs @ 1.13 fps)

**Pond 3P: Storm Trap - Chamber Wizard Field A****Chamber Model = StormTrapST2 SingleTrap 3-0 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 36.0"H =&gt; 22.99 sf x 15.40'L = 354.0 cf

Outside= 101.7"W x 42.0"H =&gt; 29.68 sf x 15.40'L = 456.9 cf

3 Chambers/Row x 15.40' Long = 46.19' Row Length +79.9" Border x 2 +24.0" End Stone x 2 = 63.50'  
Base Length

1 Rows x 101.7" Wide + 79.9" Side Border x 2 + 24.0" Side Stone x 2 = 25.79' Base Width

15.0" Stone Base + 42.0" Chamber Height = 4.75' Field Height

3 Chambers x 354.0 cf + 2,351.9 cf Border = 3,413.9 cf Chamber Storage

3 Chambers x 456.9 cf + 3,167.4 cf Border = 4,538.1 cf Displacement

7,779.4 cf Field - 4,538.1 cf Chambers = 3,241.3 cf Stone x 40.0% Voids = 1,296.5 cf Stone Storage

Chamber Storage + Stone Storage = 4,710.4 cf = 0.108 af

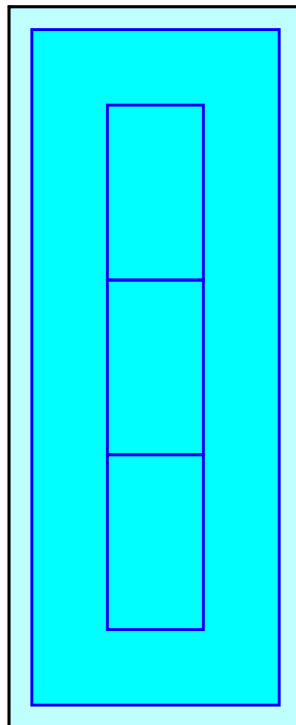
Overall Storage Efficiency = 60.5%

Overall System Size = 63.50' x 25.79' x 4.75'

3 Chambers (plus border)

288.1 cy Field

120.0 cy Stone



**2023-03-14\_PostDev Stormwater Model\_R2***Type III 24-hr 25-Year Rainfall=5.75"*

Prepared by BSC Group

Printed 4/6/2023

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment1: Southeast Woods</b>	Runoff Area=117,278 sf 0.00% Impervious Runoff Depth=1.45" Flow Length=372' Tc=15.7 min CN=56 Runoff=2.97 cfs 14,178 cf
<b>Subcatchment1A: Concrete Pad (Left</b>	Runoff Area=14,500 sf 100.00% Impervious Runoff Depth=5.51" Tc=6.0 min CN=98 Runoff=1.83 cfs 6,661 cf
<b>Subcatchment1B: Concrete Pad (Left</b>	Runoff Area=15,000 sf 100.00% Impervious Runoff Depth=5.51" Tc=6.0 min CN=98 Runoff=1.89 cfs 6,890 cf
<b>Subcatchment1E: Concrete Pad (Front</b>	Runoff Area=14,500 sf 100.00% Impervious Runoff Depth=5.51" Tc=6.0 min CN=98 Runoff=1.83 cfs 6,661 cf
<b>Subcatchment2: Northern Woods</b>	Runoff Area=108,191 sf 0.00% Impervious Runoff Depth=1.23" Flow Length=575' Tc=17.6 min CN=53 Runoff=2.09 cfs 11,099 cf
<b>Subcatchment2A: Proposed Building</b>	Runoff Area=11,250 sf 100.00% Impervious Runoff Depth=5.51" Tc=6.0 min CN=98 Runoff=1.42 cfs 5,168 cf
<b>Subcatchment2B: Proposed Building</b>	Runoff Area=11,250 sf 100.00% Impervious Runoff Depth=5.51" Tc=6.0 min CN=98 Runoff=1.42 cfs 5,168 cf
<b>Subcatchment3: Abutting Old Tpk Road</b>	Runoff Area=194,497 sf 24.46% Impervious Runoff Depth=3.26" Flow Length=619' Tc=19.0 min CN=77 Runoff=11.74 cfs 52,866 cf
<b>Subcatchment4: Northeastern Section of</b>	Runoff Area=84,996 sf 4.66% Impervious Runoff Depth=5.05" Flow Length=496' Tc=6.0 min CN=94 Runoff=10.39 cfs 35,763 cf
<b>Subcatchment5: Southern Developed Area</b>	Runoff Area=353,615 sf 5.01% Impervious Runoff Depth=2.70" Flow Length=1,175' Tc=23.1 min UI Adjusted CN=71 Runoff=16.12 cfs 79,524 cf
<b>Subcatchment6: Landscaped Hill - Rear</b>	Runoff Area=15,891 sf 0.00% Impervious Runoff Depth=1.76" Flow Length=140' Tc=6.9 min CN=60 Runoff=0.67 cfs 2,331 cf
<b>Subcatchment7: Landscaped Hill - Front</b>	Runoff Area=8,414 sf 0.00% Impervious Runoff Depth=1.84" Tc=6.0 min CN=61 Runoff=0.39 cfs 1,290 cf
<b>Reach 1R: Southeastern Wetland/Prop. Line</b>	Inflow=17.84 cfs 88,629 cf Outflow=17.84 cfs 88,629 cf
<b>Reach 2R: Southwestern Wetland</b>	Inflow=3.89 cfs 21,639 cf Outflow=3.89 cfs 21,639 cf
<b>Reach 3R: Northern Overland Flow</b>	Inflow=2.09 cfs 11,099 cf Outflow=2.09 cfs 11,099 cf
<b>Reach 4R: Southern Wetland</b>	Inflow=16.77 cfs 85,707 cf Outflow=16.77 cfs 85,707 cf



**Reach 5R: Combined Flow**Inflow=38.51 cfs 207,074 cf  
Outflow=38.51 cfs 207,074 cf**Pond 1P: Storm Trap**Peak Elev=396.23' Storage=1,547 cf Inflow=0.50 cfs 2,203 cf  
Discarded=0.03 cfs 2,092 cf Primary=0.02 cfs 110 cf Outflow=0.05 cfs 2,203 cf**Pond 2P: Storm Trap**Peak Elev=396.26' Storage=7,973 cf Inflow=4.88 cfs 18,541 cf  
Discarded=0.14 cfs 13,588 cf Primary=0.90 cfs 4,953 cf Outflow=1.04 cfs 18,541 cf**Pond 3P: Storm Trap**Peak Elev=396.20' Storage=2,990 cf Inflow=1.83 cfs 6,661 cf  
Discarded=0.04 cfs 4,325 cf Primary=0.01 cfs 4 cf Secondary=0.44 cfs 1,813 cf Outflow=0.49 cfs 6,142 cf**Pond 102P: DMH-102**Peak Elev=397.32' Inflow=1.42 cfs 5,168 cf  
Primary=1.22 cfs 4,778 cf Secondary=0.20 cfs 390 cf Outflow=1.42 cfs 5,168 cf**Pond 105P: DMH-105**Peak Elev=391.79' Inflow=1.60 cfs 6,183 cf  
12.0" Round Culvert n=0.012 L=96.0' S=0.0938 ' / ' Outflow=1.60 cfs 6,183 cf**Pond 203P: DMH-203**Peak Elev=397.39' Inflow=1.42 cfs 5,168 cf  
Primary=1.15 cfs 4,991 cf Secondary=0.27 cfs 177 cf Outflow=1.42 cfs 5,168 cf**Pond 207P: DMH-207**Peak Elev=393.14' Inflow=1.13 cfs 7,461 cf  
12.0" Round Culvert n=0.012 L=15.0' S=0.0133 ' / ' Outflow=1.13 cfs 7,461 cf**Total Runoff Area = 949,382 sf Runoff Volume = 227,598 cf Average Runoff Depth = 2.88"**  
**85.70% Pervious = 813,620 sf 14.30% Impervious = 135,762 sf**

### Summary for Subcatchment 1: Southeast Woods

Runoff = 2.97 cfs @ 12.25 hrs, Volume= 14,178 cf, Depth= 1.45"  
Routed to Reach 2R : Southwestern Wetland

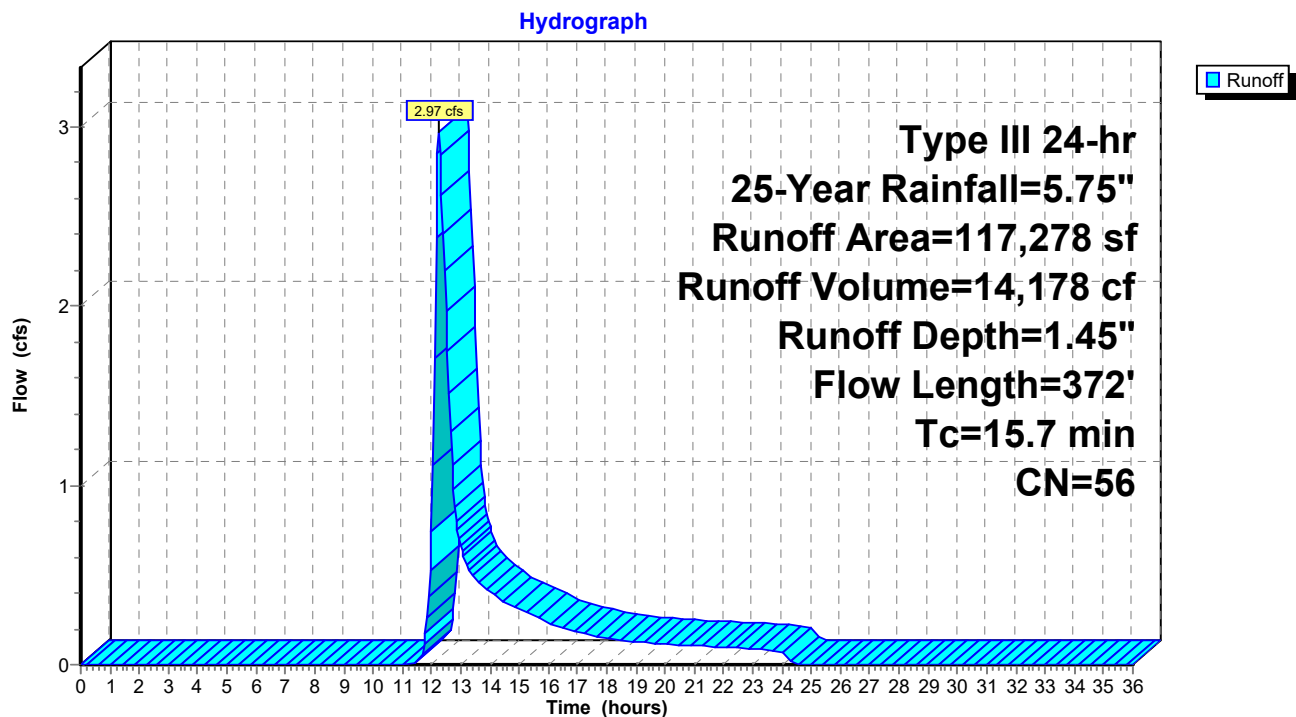
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Description
86,662	55	Woods, Good, HSG B
2,127	30	Woods, Good, HSG A
26,969	61	>75% Grass cover, Good, HSG B
1,520	96	Gravel surface, HSG B
117,278	56	Weighted Average
117,278		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0200	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
3.0	322	0.1240	1.76		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
15.7	372	Total			

### Subcatchment 1: Southeast Woods



## Summary for Subcatchment 1A: Concrete Pad (Left Side, Back, Right Side Rear of Building)

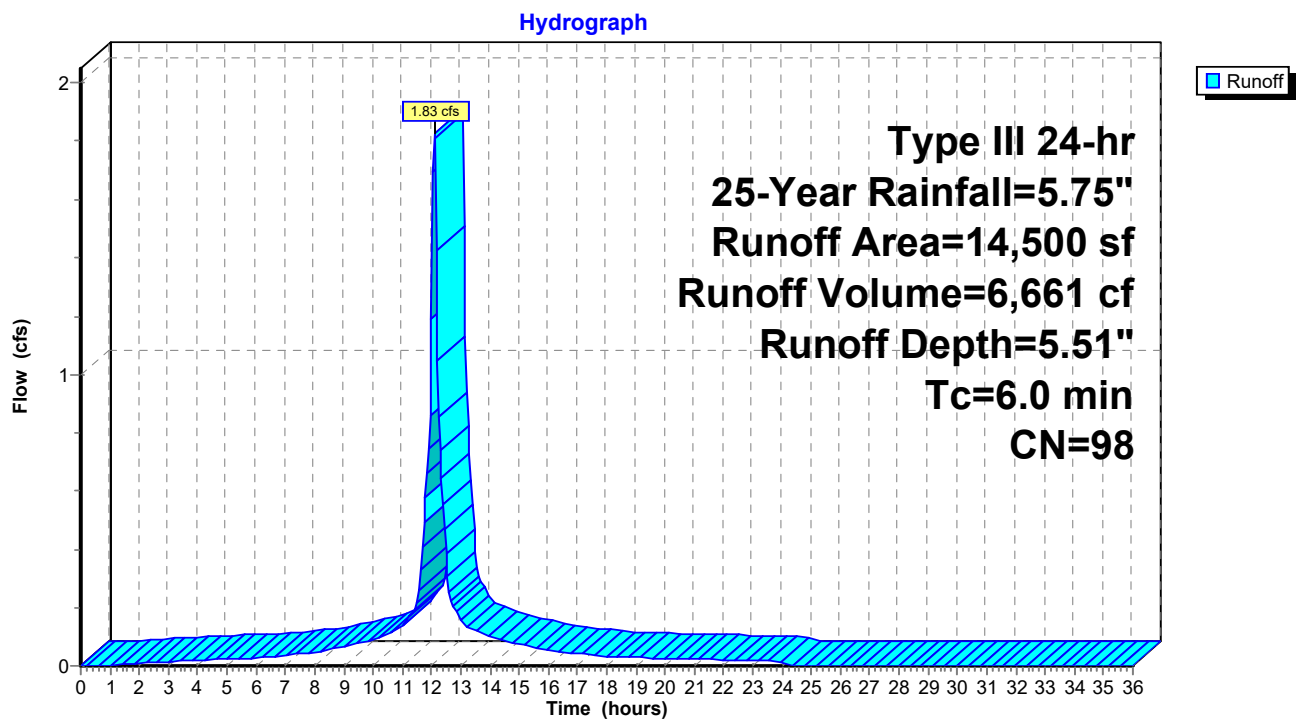
Runoff = 1.83 cfs @ 12.09 hrs, Volume= 6,661 cf, Depth= 5.51"  
Routed to Pond 2P : Storm Trap

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Description
14,500	98	Paved parking, HSG B
14,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Concrete Runoff

## Subcatchment 1A: Concrete Pad (Left Side, Back, Right Side Rear of Building)



### Summary for Subcatchment 1B: Concrete Pad (Left Side Building)

Runoff = 1.89 cfs @ 12.09 hrs, Volume= 6,890 cf, Depth= 5.51"  
Routed to Pond 2P : Storm Trap

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.75"

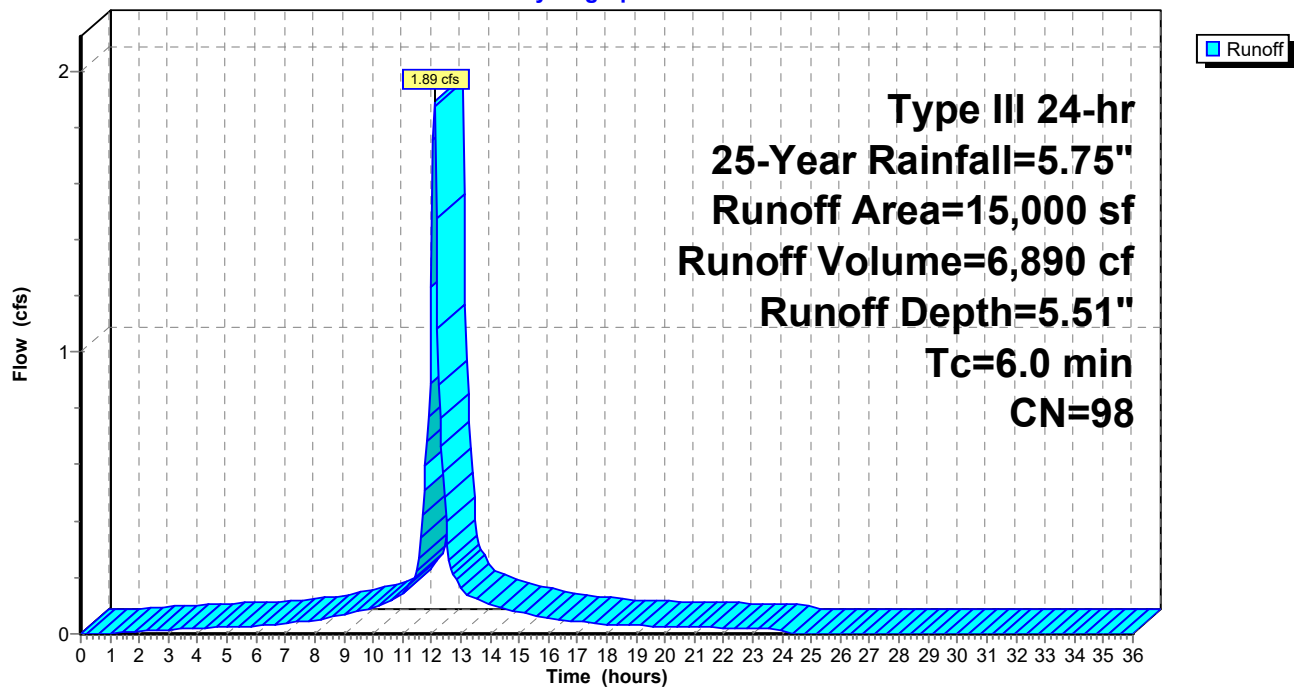
Area (sf)	CN	Description
15,000	98	Paved parking, HSG B
15,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Concrete Runoff

### Subcatchment 1B: Concrete Pad (Left Side Building)

Hydrograph



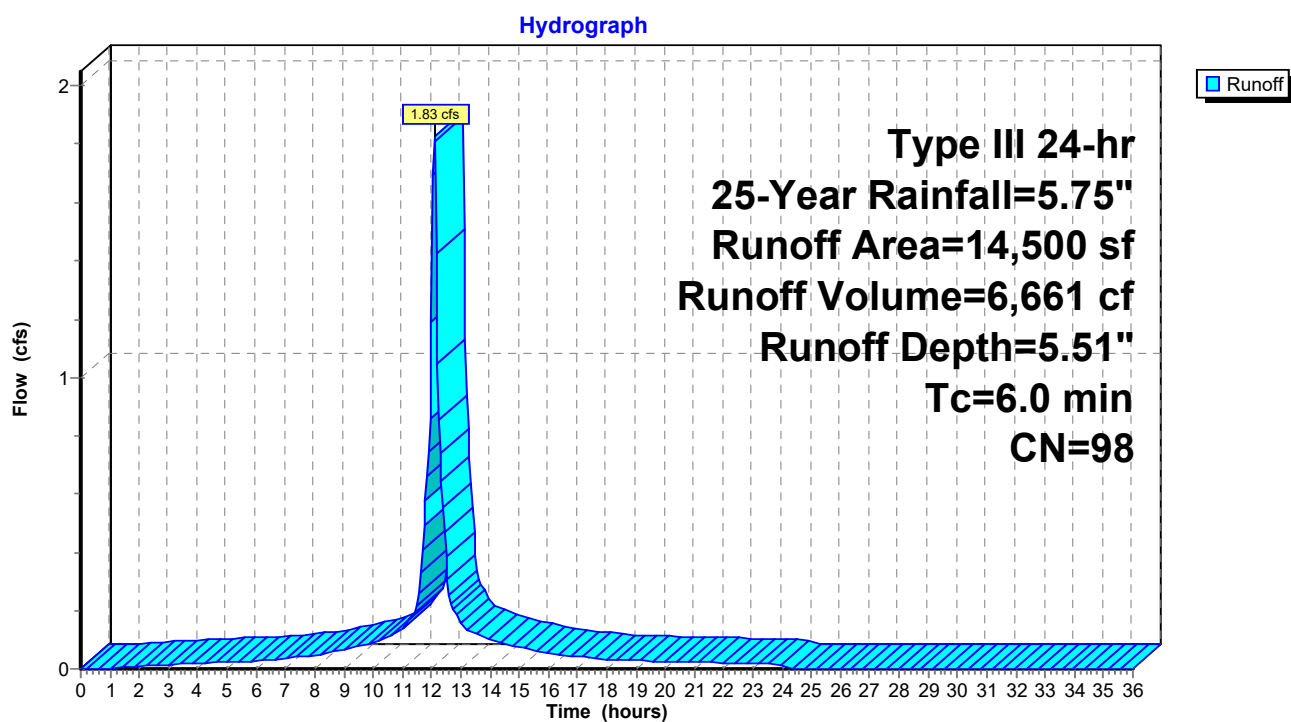
**Summary for Subcatchment 1E: Concrete Pad (Front and Right Side)**

Runoff = 1.83 cfs @ 12.09 hrs, Volume= 6,661 cf, Depth= 5.51"  
 Routed to Pond 3P : Storm Trap

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Description
14,500	98	Paved parking, HSG B
14,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Concrete Runoff

**Subcatchment 1E: Concrete Pad (Front and Right Side)**

## Summary for Subcatchment 2: Northern Woods

Runoff = 2.09 cfs @ 12.29 hrs, Volume= 11,099 cf, Depth= 1.23"  
Routed to Reach 3R : Northern Overland Flow

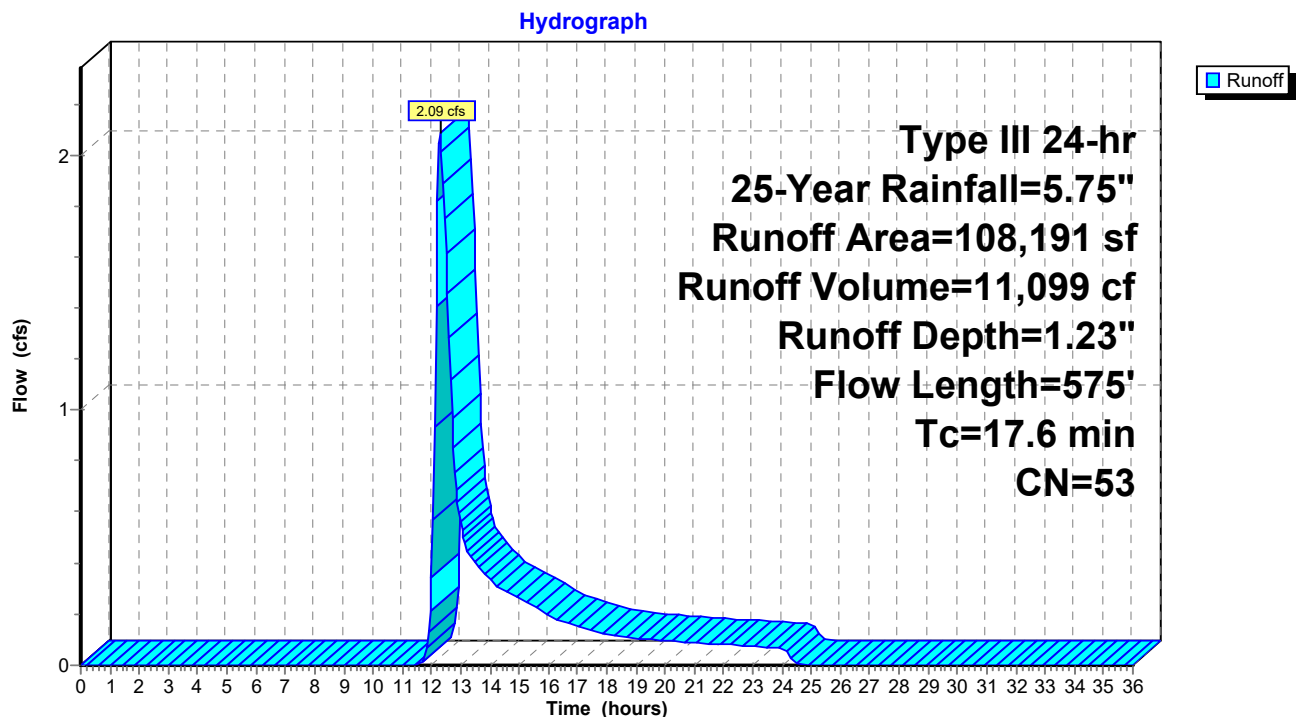
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Description
66,001	55	Woods, Good, HSG B
21,606	70	Woods, Good, HSG C
20,584	30	Woods, Good, HSG A
108,191	53	Weighted Average
108,191		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
7.9	525	0.0495	1.11		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
17.6	575	Total			

## Subcatchment 2: Northern Woods



**Summary for Subcatchment 2A: Proposed Building (Front Half Roof)**

Runoff = 1.42 cfs @ 12.09 hrs, Volume= 5,168 cf, Depth= 5.51"  
 Routed to Pond 102P : DMH-102

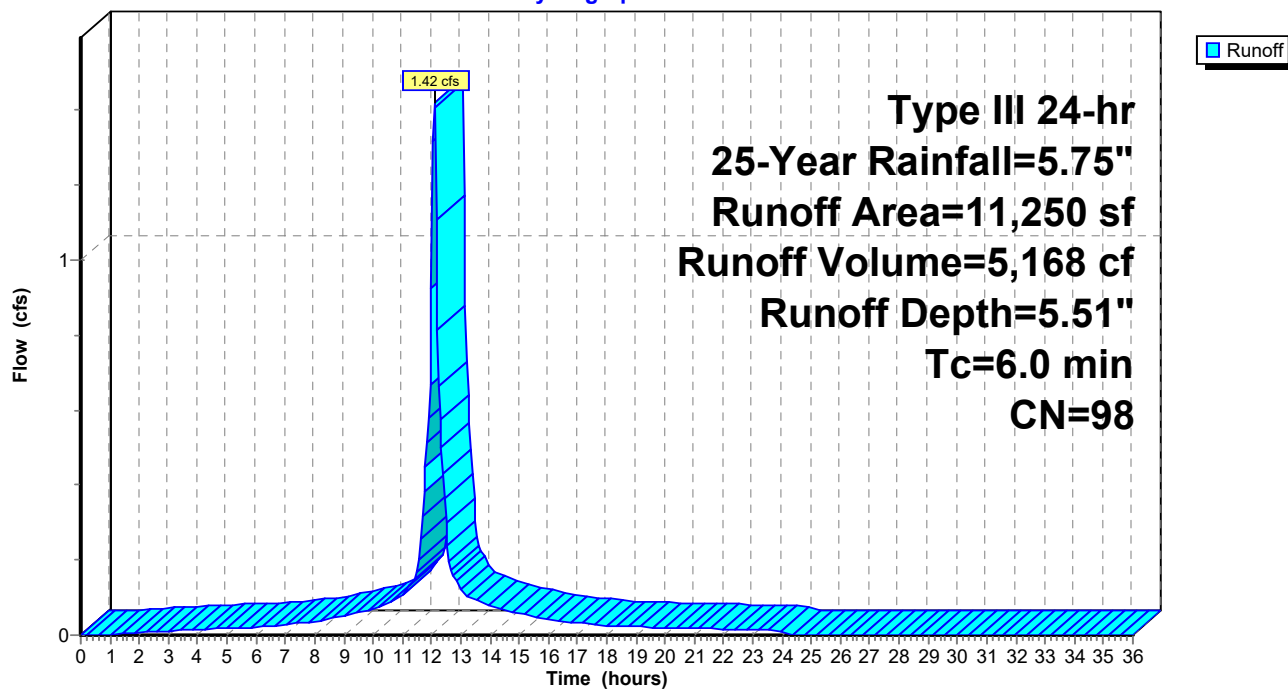
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Description
11,250	98	Unconnected roofs, HSG B
11,250		100.00% Impervious Area
11,250		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Roof runoff

**Subcatchment 2A: Proposed Building (Front Half Roof)**

Hydrograph



**Summary for Subcatchment 2B: Proposed Building (Back Half Roof)**

Runoff = 1.42 cfs @ 12.09 hrs, Volume= 5,168 cf, Depth= 5.51"  
 Routed to Pond 203P : DMH-203

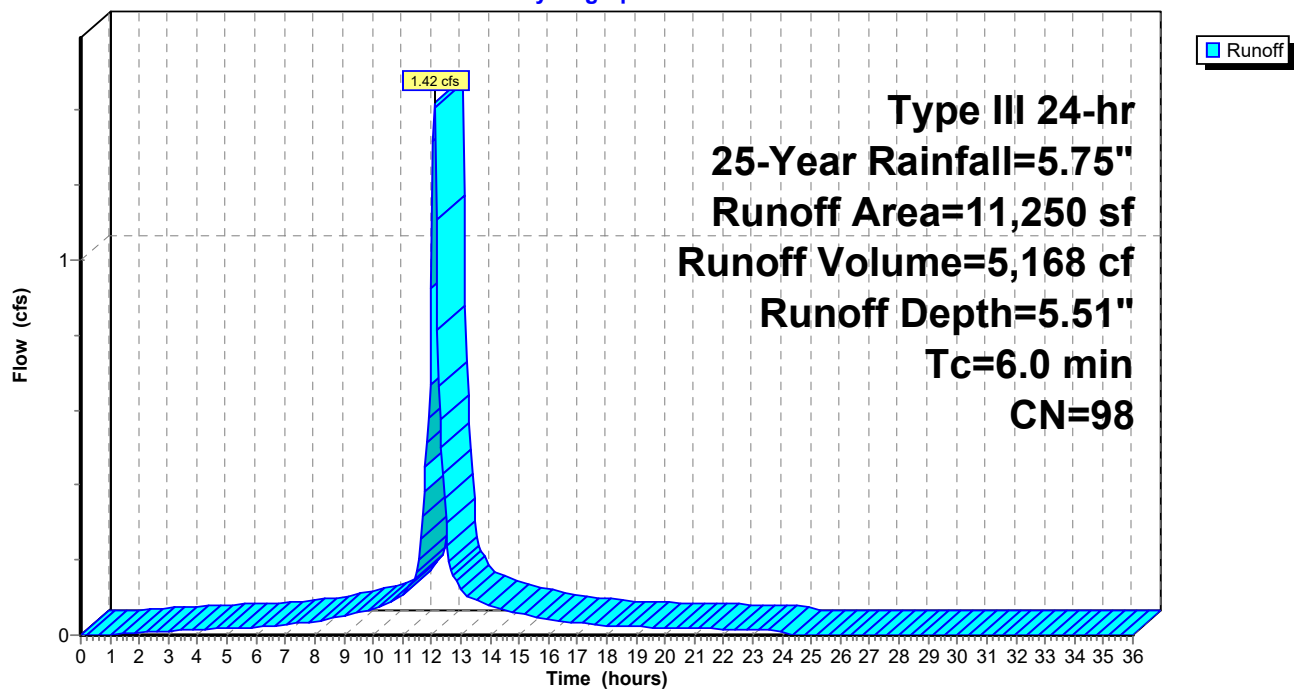
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Description
11,250	98	Unconnected roofs, HSG B
11,250		100.00% Impervious Area
11,250		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Roof runoff

**Subcatchment 2B: Proposed Building (Back Half Roof)**

Hydrograph





**Summary for Subcatchment 3: Abutting Old Tpk Road**

Runoff = 11.74 cfs @ 12.26 hrs, Volume= 52,866 cf, Depth= 3.26"

Routed to Reach 1R : Southeastern Wetland/Prop. Line

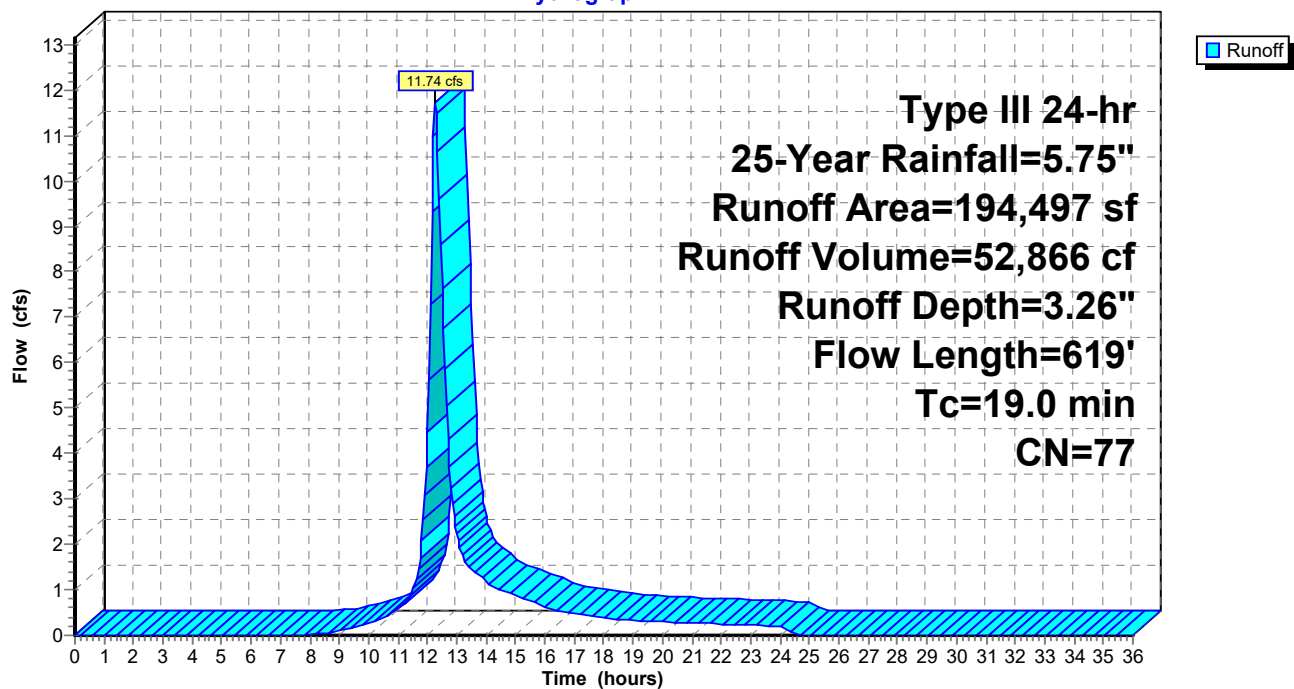
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Description
20,473	74	>75% Grass cover, Good, HSG C
28,140	77	Woods, Poor, HSG C
3,311	98	Paved parking, HSG C
7,754	98	Water Surface, HSG C
2,614	98	Paved parking, HSG D
36,432	77	Woods, Good, HSG D
17,163	98	Water Surface, HSG D
21,242	55	Woods, Good, HSG B
15,333	98	Water Surface, HSG B
8,494	85	Gravel roads, HSG B
1,394	98	Paved parking, HSG B
32,147	61	>75% Grass cover, Good, HSG B
194,497	77	Weighted Average
146,928		75.54% Pervious Area
47,569		24.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
4.9	264	0.0322	0.90		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.4	45	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
4.0	260	0.0460	1.07		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.0	619	Total			

**Subcatchment 3: Abutting Old Tpk Road**

Hydrograph



**Summary for Subcatchment 4: Northeastern Section of Existing Yard**

Runoff = 10.39 cfs @ 12.09 hrs, Volume= 35,763 cf, Depth= 5.05"

Routed to Reach 1R : Southeastern Wetland/Prop. Line

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

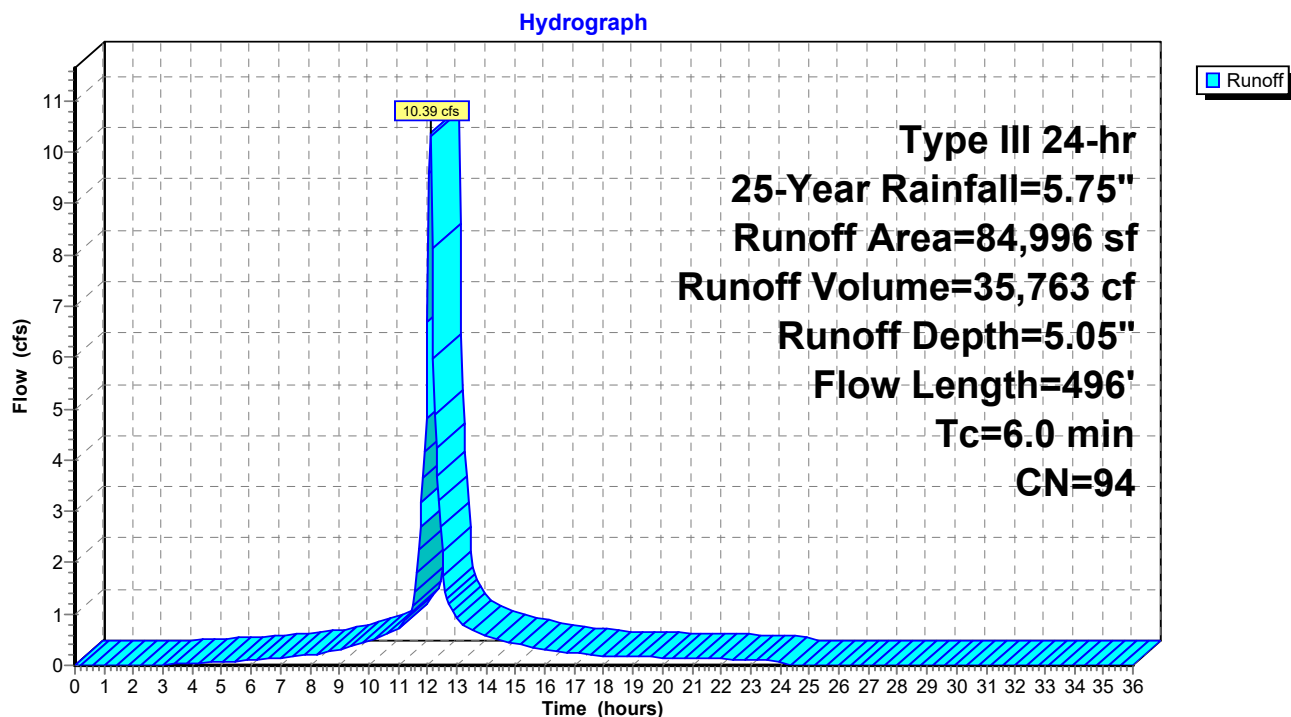
Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Description
4,792	55	Woods, Good, HSG B
2,962	98	Paved parking, HSG B
1,002	98	Water Surface, HSG B
76,240	96	Gravel surface, HSG B
84,996	94	Weighted Average
81,032		95.34% Pervious Area
3,964		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0250	1.27		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.00"
2.2	406	0.0375	3.12		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.7	40	0.0375	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.4					<b>Direct Entry,</b>
6.0	496	Total			

### Subcatchment 4: Northeastern Section of Existing Yard



### Summary for Subcatchment 5: Southern Developed Area

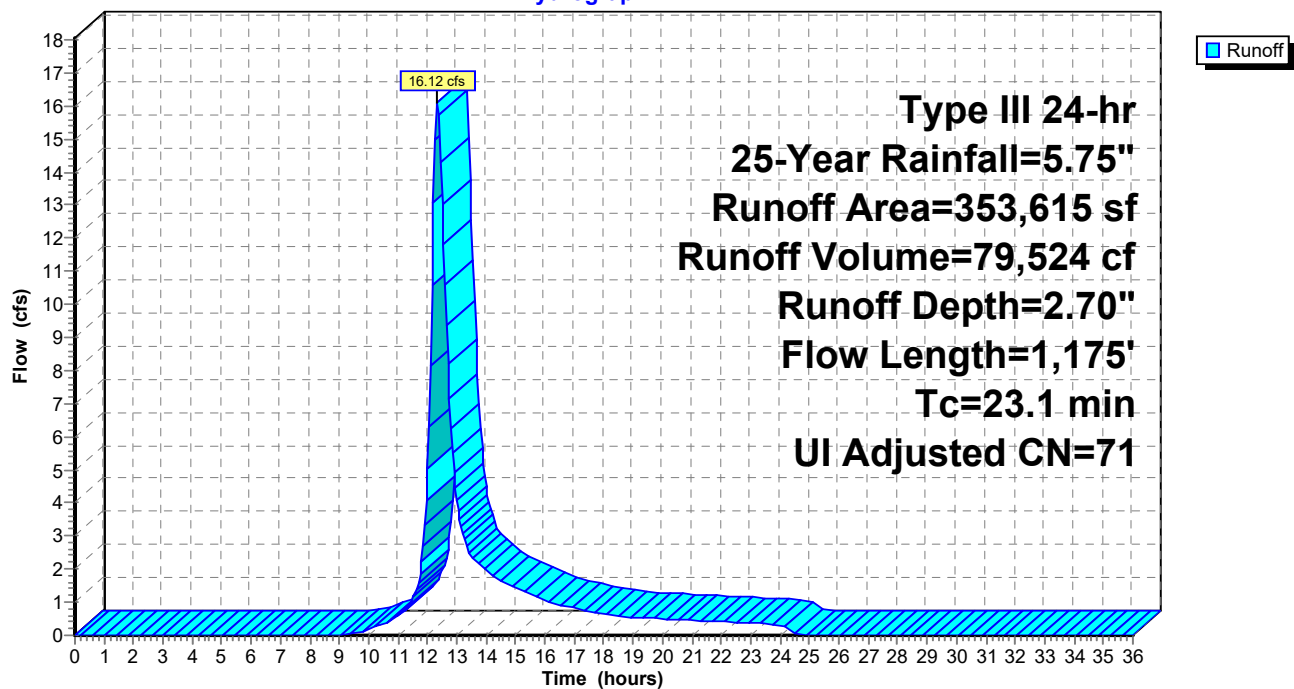
Runoff = 16.12 cfs @ 12.33 hrs, Volume= 79,524 cf, Depth= 2.70"  
Routed to Reach 4R : Southern Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Adj	Description
86,017	55		Woods, Good, HSG B
5,293	77		Woods, Good, HSG D
151,153	85		Gravel roads, HSG B
5,619	98		Paved parking, HSG B
12,110	98		Unconnected roofs, HSG B
92,538	61		>75% Grass cover, Good, HSG B
885	77		Woods, Poor, HSG C
353,615	72	71	Weighted Average, UI Adjusted
335,886			94.99% Pervious Area
17,729			5.01% Impervious Area
12,110			68.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0200	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	164	0.0470	1.08		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.4	259	0.0040	1.28		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
3.0	640	0.0500	3.60		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
1.5	62	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
23.1	1,175	Total			

**Subcatchment 5: Southern Developed Area****Hydrograph**

### Summary for Subcatchment 6: Landscaped Hill - Rear Portion

Runoff = 0.67 cfs @ 12.11 hrs, Volume= 2,331 cf, Depth= 1.76"  
Routed to Pond 207P : DMH-207

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.75"

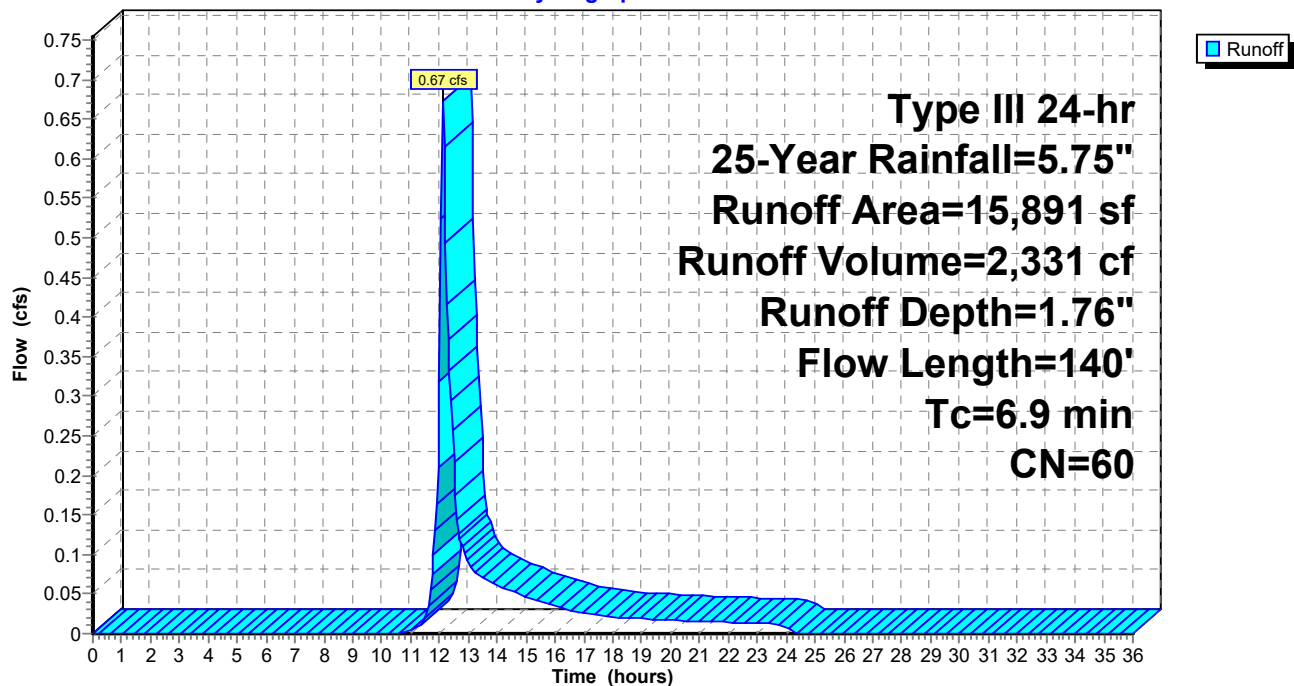
Area (sf)	CN	Description
2,309	55	Woods, Good, HSG B
13,582	61	>75% Grass cover, Good, HSG B
15,891	60	Weighted Average
15,891		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0600	0.15		<b>Sheet Flow, OVERLAND</b>
					Grass: Dense n= 0.240 P2= 3.00"
1.4	90	0.0240	1.08		<b>Shallow Concentrated Flow, SWALE</b>
					Short Grass Pasture Kv= 7.0 fps
6.9	140	Total			

### Subcatchment 6: Landscaped Hill - Rear Portion

Hydrograph



**Summary for Subcatchment 7: Landscaped Hill - Front Portion**

Runoff = 0.39 cfs @ 12.10 hrs, Volume= 1,290 cf, Depth= 1.84"  
 Routed to Pond 105P : DMH-105

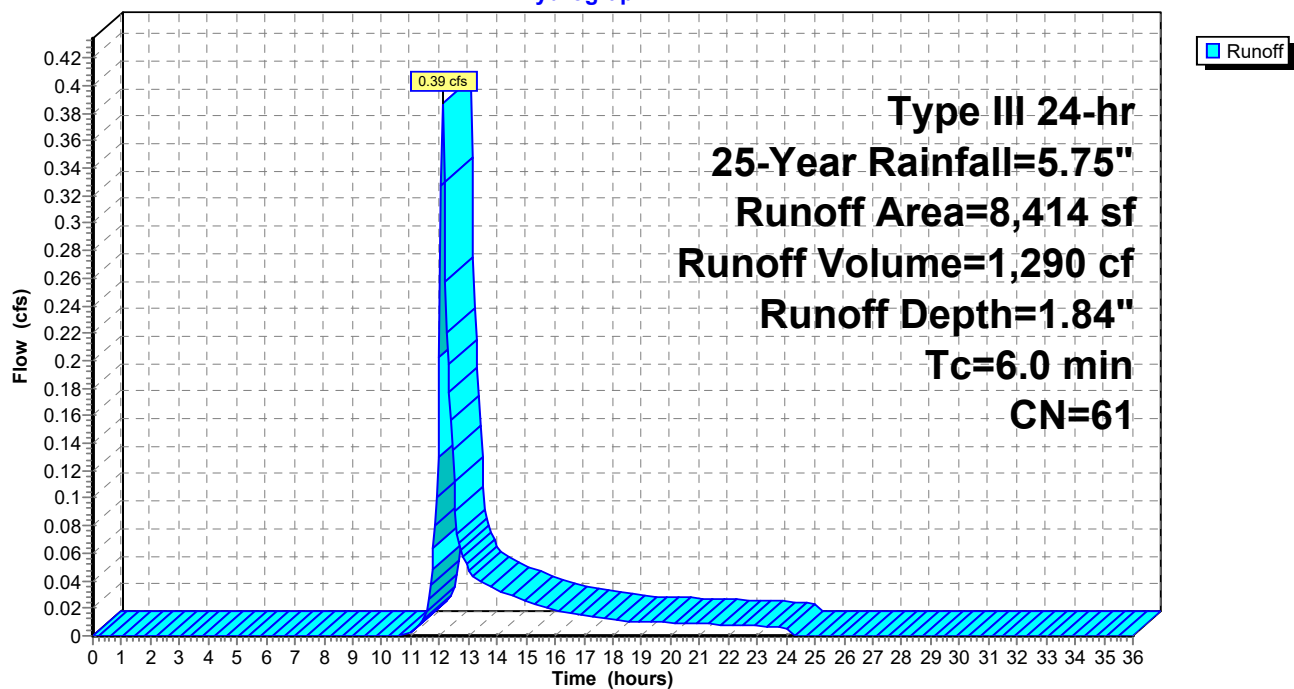
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=5.75"

Area (sf)	CN	Description
8,414	61	>75% Grass cover, Good, HSG B
8,414		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Overland <6min

**Subcatchment 7: Landscaped Hill - Front Portion**

Hydrograph





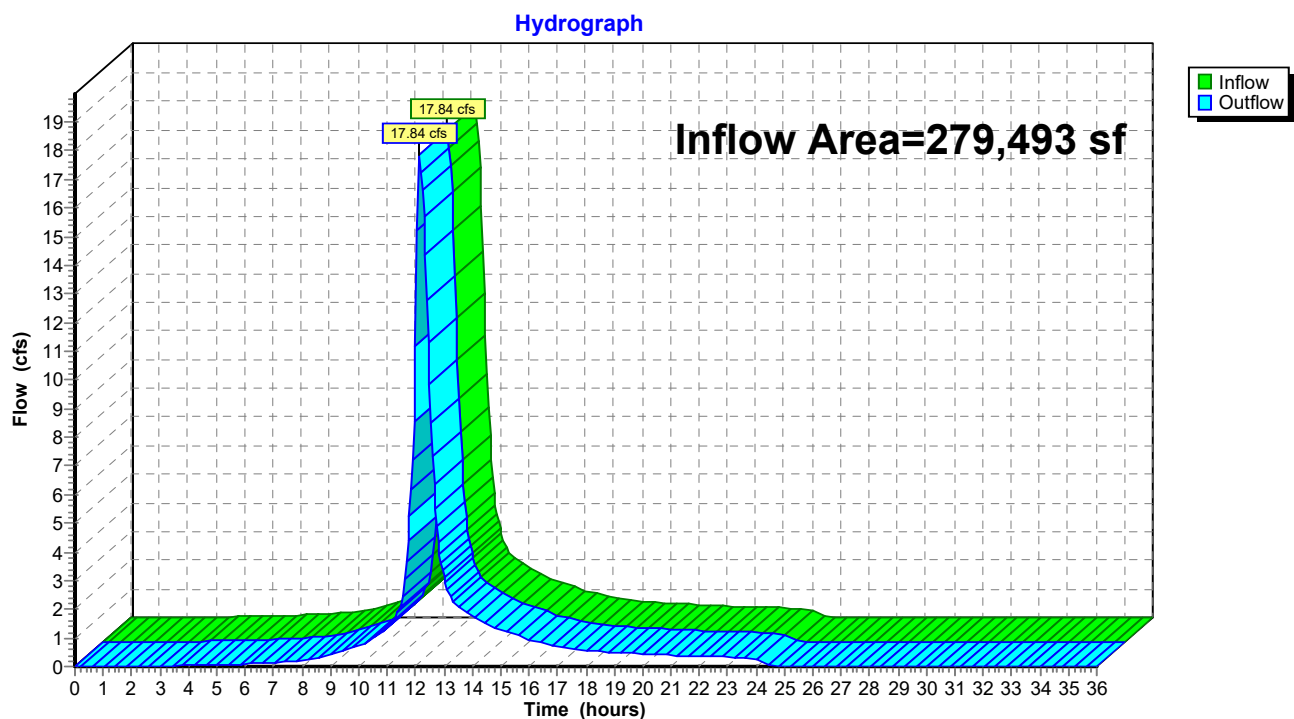
## Summary for Reach 1R: Southeastern Wetland/Prop. Line

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 279,493 sf, 18.44% Impervious, Inflow Depth = 3.81" for 25-Year event  
 Inflow = 17.84 cfs @ 12.12 hrs, Volume= 88,629 cf  
 Outflow = 17.84 cfs @ 12.12 hrs, Volume= 88,629 cf, Atten= 0%, Lag= 0.0 min  
 Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

## Reach 1R: Southeastern Wetland/Prop. Line



## Summary for Reach 2R: Southwestern Wetland

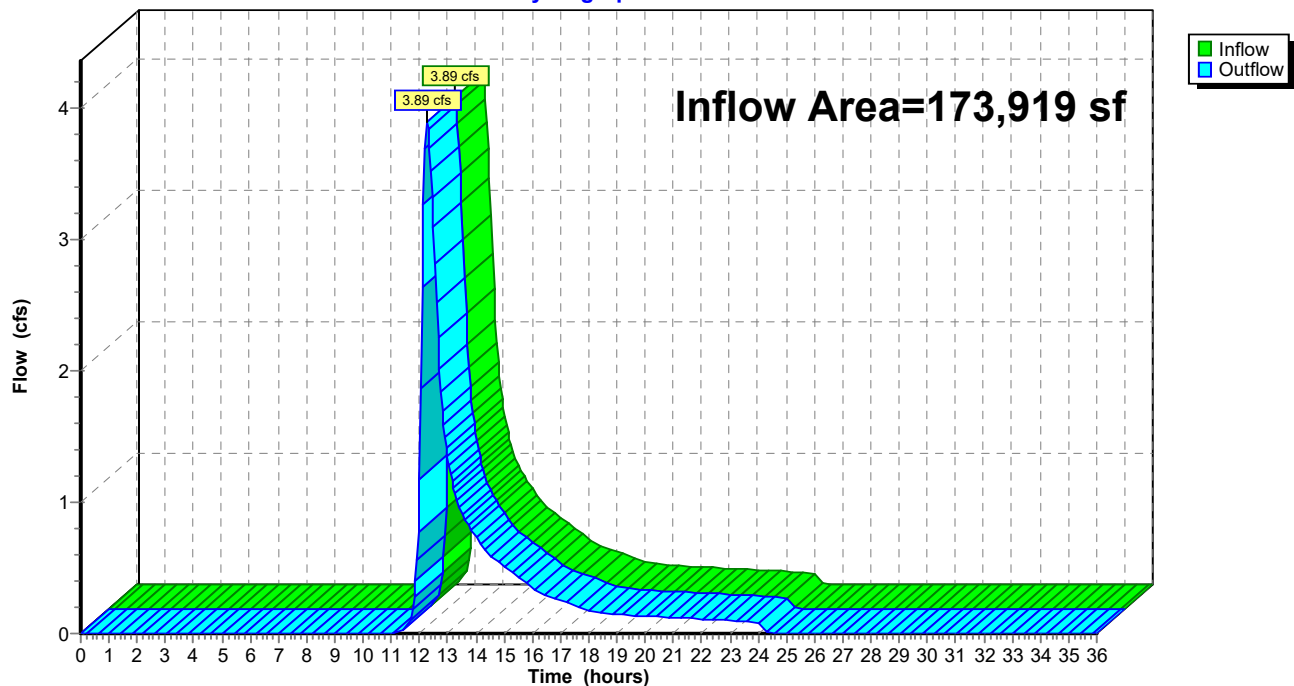
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 173,919 sf, 23.43% Impervious, Inflow Depth = 1.49" for 25-Year event  
 Inflow = 3.89 cfs @ 12.27 hrs, Volume= 21,639 cf  
 Outflow = 3.89 cfs @ 12.27 hrs, Volume= 21,639 cf, Atten= 0%, Lag= 0.0 min  
 Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

## Reach 2R: Southwestern Wetland

Hydrograph

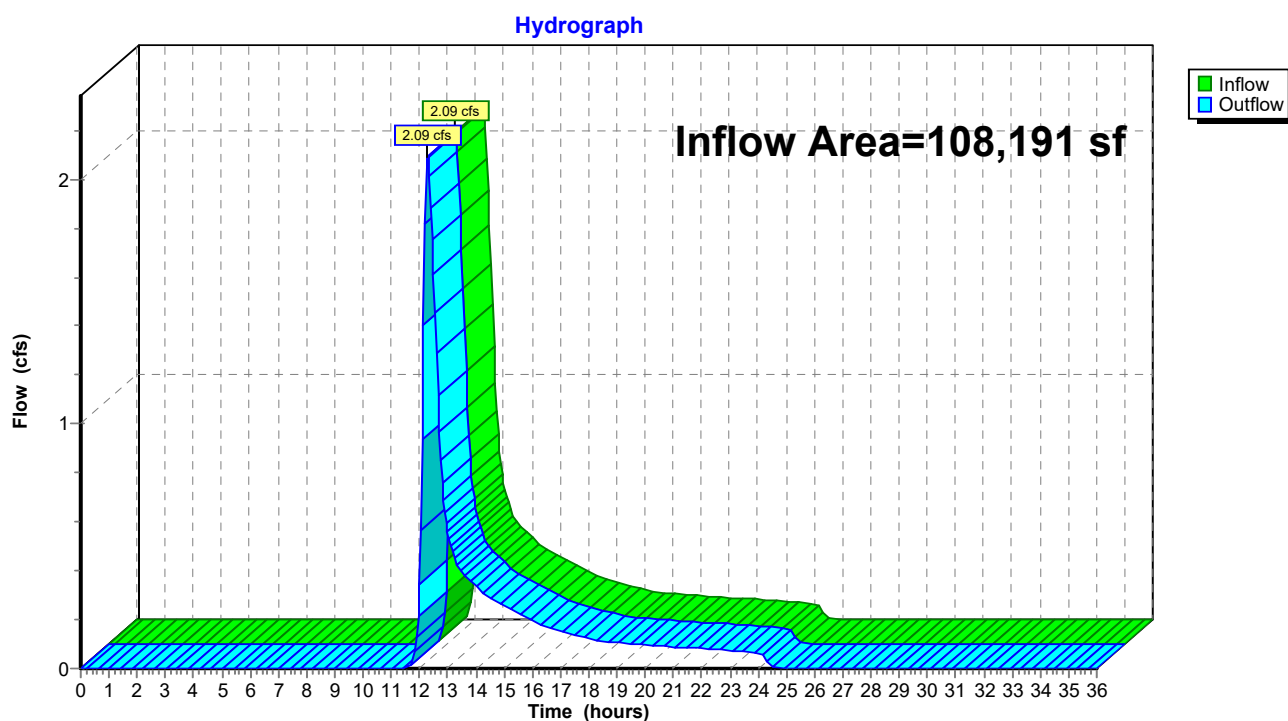


**Summary for Reach 3R: Northern Overland Flow**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 108,191 sf, 0.00% Impervious, Inflow Depth = 1.23" for 25-Year event  
Inflow = 2.09 cfs @ 12.29 hrs, Volume= 11,099 cf  
Outflow = 2.09 cfs @ 12.29 hrs, Volume= 11,099 cf, Atten= 0%, Lag= 0.0 min  
Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

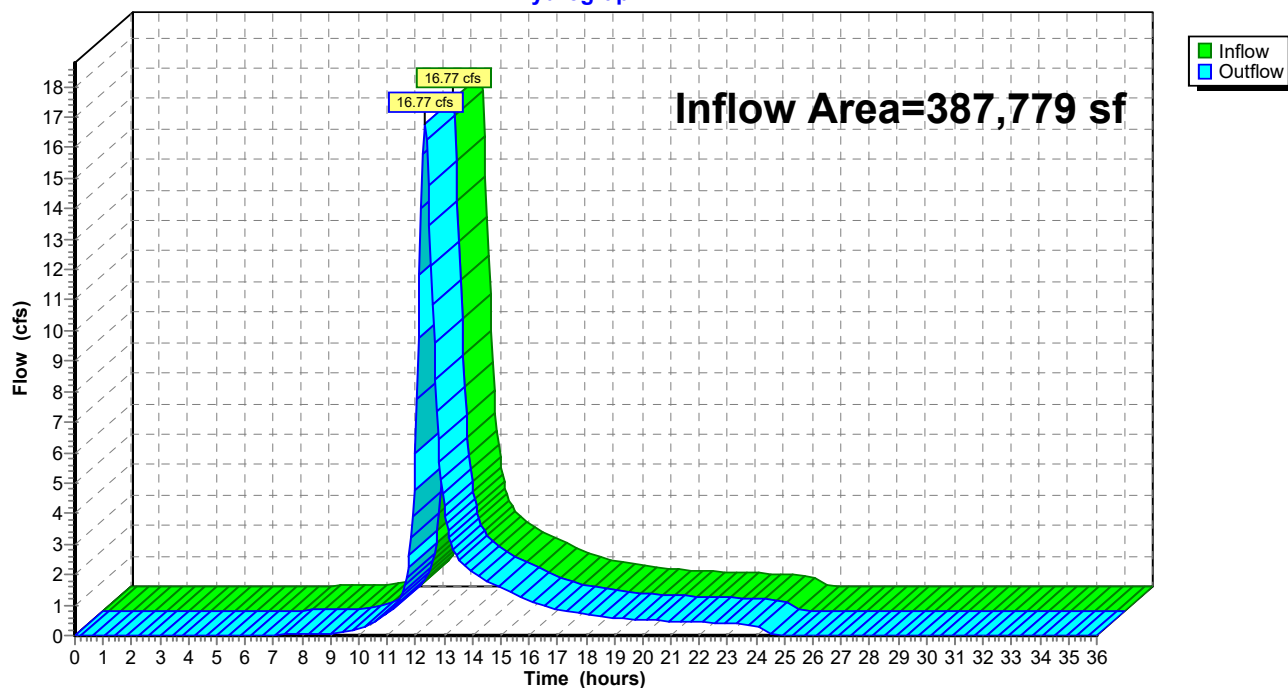
**Reach 3R: Northern Overland Flow**

**Summary for Reach 4R: Southern Wetland**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 387,779 sf, 11.21% Impervious, Inflow Depth = 2.65" for 25-Year event  
Inflow = 16.77 cfs @ 12.32 hrs, Volume= 85,707 cf  
Outflow = 16.77 cfs @ 12.32 hrs, Volume= 85,707 cf, Atten= 0%, Lag= 0.0 min  
Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

**Reach 4R: Southern Wetland****Hydrograph**

**Summary for Reach 5R: Combined Flow**

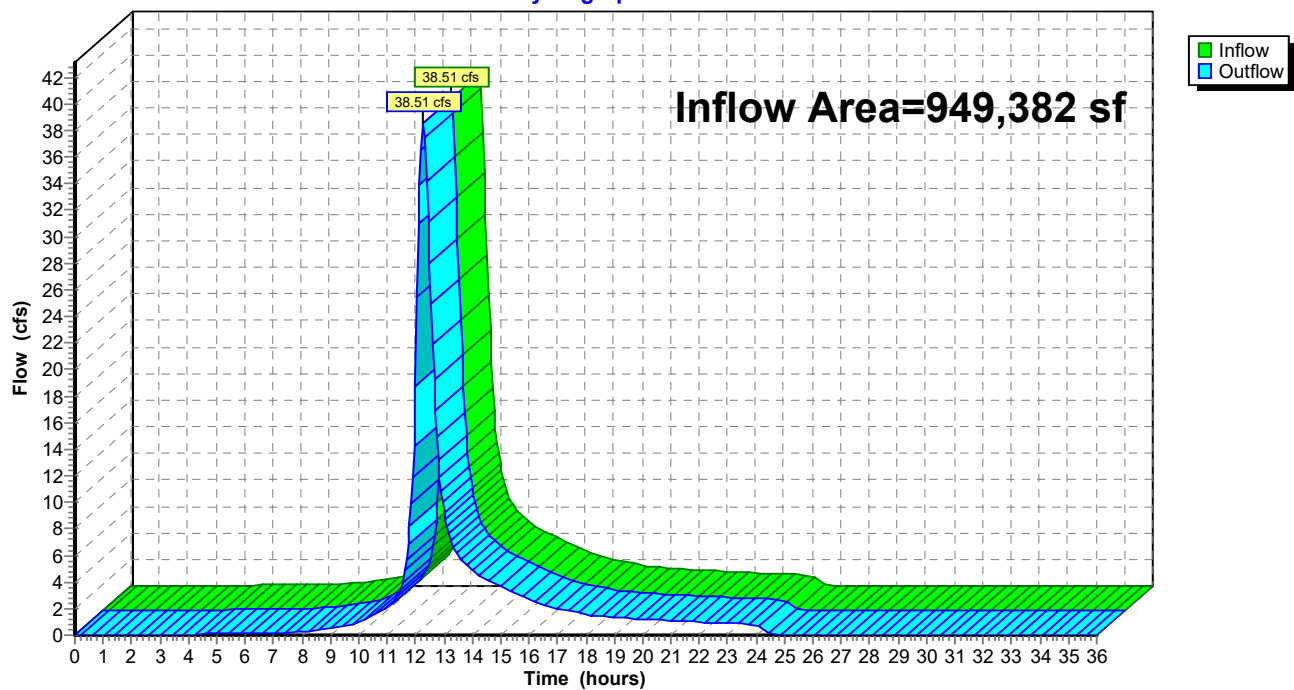
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 949,382 sf, 14.30% Impervious, Inflow Depth = 2.62" for 25-Year event  
Inflow = 38.51 cfs @ 12.28 hrs, Volume= 207,074 cf  
Outflow = 38.51 cfs @ 12.28 hrs, Volume= 207,074 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

**Reach 5R: Combined Flow**

Hydrograph



### Summary for Pond 1P: Storm Trap

[81] Warning: Exceeded Pond 3P by 0.34' @ 15.95 hrs

Inflow = 0.50 cfs @ 12.41 hrs, Volume= 2,203 cf  
 Outflow = 0.05 cfs @ 15.00 hrs, Volume= 2,203 cf, Atten= 90%, Lag= 155.4 min  
 Discarded = 0.03 cfs @ 11.80 hrs, Volume= 2,092 cf  
 Primary = 0.02 cfs @ 15.00 hrs, Volume= 110 cf  
 Routed to Pond 105P : DMH-105

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Peak Elev= 396.23' @ 15.00 hrs Surf.Area= 1,241 sf Storage= 1,547 cf  
 Flood Elev= 396.48' Surf.Area= 1,241 sf Storage= 1,780 cf

Plug-Flow detention time= 482.4 min calculated for 2,203 cf (100% of inflow)  
 Center-of-Mass det. time= 482.3 min ( 1,277.7 - 795.4 )

Volume	Invert	Avail.Storage	Storage Description
#1A	394.00'	956 cf	<b>25.79'W x 48.10'L x 4.25'H Field A</b> 5,273 cf Overall - 2,883 cf Embedded = 2,390 cf x 40.0% Voids
#2A	395.25'	2,077 cf	<b>StormTrap ST2 SingleTrap 2-6x2 Inside #1</b> Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 8.48' x 30.79' Core + 6.66' Border = 21.79' x 44.10' System
		3,033 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	396.16'	<b>12.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 396.16' / 396.06' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	394.00'	<b>1.000 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.03 cfs @ 11.80 hrs HW=394.05' (Free Discharge)  
 ↑ **2=Exfiltration** (Exfiltration Controls 0.03 cfs)

**Primary OutFlow** Max=0.02 cfs @ 15.00 hrs HW=396.23' (Free Discharge)  
 ↑ **1=Culvert** (Inlet Controls 0.02 cfs @ 0.72 fps)

**Pond 1P: Storm Trap - Chamber Wizard Field A****Chamber Model = StormTrapST2 SingleTrap 2-6 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 30.0"H =&gt; 18.82 sf x 15.40'L = 289.8 cf

Outside= 101.7"W x 36.0"H =&gt; 25.44 sf x 15.40'L = 391.6 cf

2 Chambers/Row x 15.40' Long = 30.79' Row Length +79.9" Border x 2 +24.0" End Stone x 2 = 48.10'  
Base Length

1 Rows x 101.7" Wide + 79.9" Side Border x 2 + 24.0" Side Stone x 2 = 25.79' Base Width

15.0" Stone Base + 36.0" Chamber Height = 4.25' Field Height

2 Chambers x 289.8 cf + 1,497.8 cf Border = 2,077.4 cf Chamber Storage

2 Chambers x 391.6 cf + 2,100.0 cf Border = 2,883.3 cf Displacement

5,272.9 cf Field - 2,883.3 cf Chambers = 2,389.6 cf Stone x 40.0% Voids = 955.8 cf Stone Storage

Chamber Storage + Stone Storage = 3,033.3 cf = 0.070 af

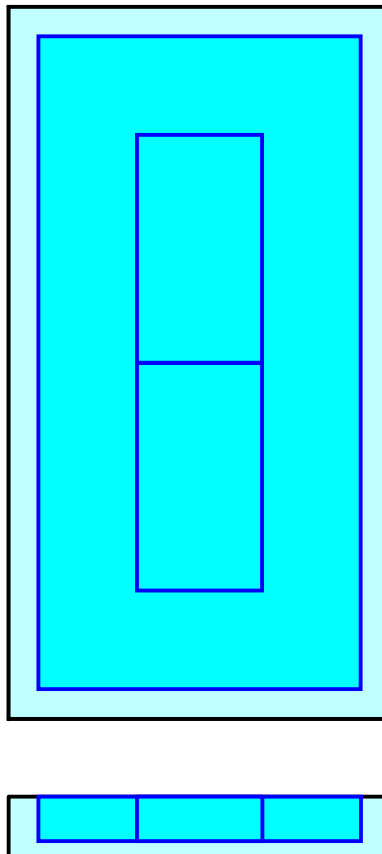
Overall Storage Efficiency = 57.5%

Overall System Size = 48.10' x 25.79' x 4.25'

2 Chambers (plus border)

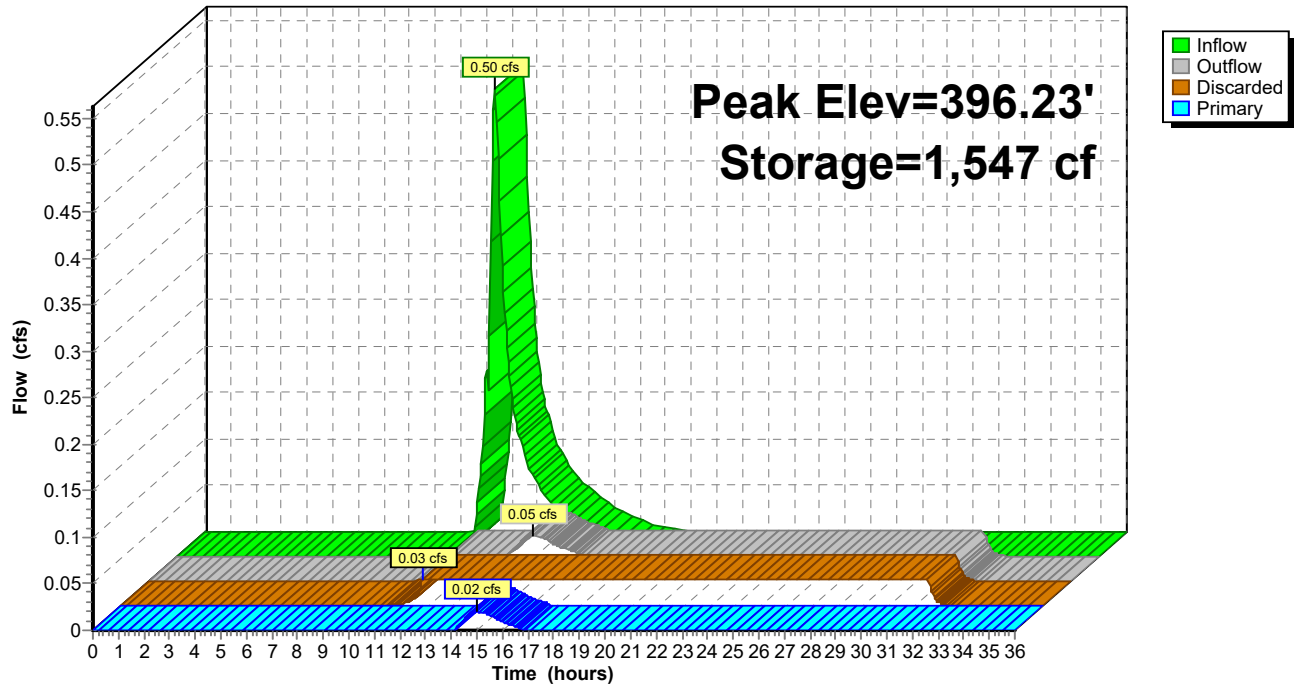
195.3 cy Field

88.5 cy Stone



# Pond 1P: Storm Trap

## Hydrograph





### Summary for Pond 2P: Storm Trap

Inflow Area = 40,750 sf, 100.00% Impervious, Inflow Depth = 5.46" for 25-Year event  
 Inflow = 4.88 cfs @ 12.09 hrs, Volume= 18,541 cf  
 Outflow = 1.04 cfs @ 12.51 hrs, Volume= 18,541 cf, Atten= 79%, Lag= 25.6 min  
 Discarded = 0.14 cfs @ 8.40 hrs, Volume= 13,588 cf  
 Primary = 0.90 cfs @ 12.51 hrs, Volume= 4,953 cf  
 Routed to Pond 207P : DMH-207

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Peak Elev= 396.26' @ 12.51 hrs Surf.Area= 6,005 sf Storage= 7,973 cf

Plug-Flow detention time= 291.1 min calculated for 18,516 cf (100% of inflow)  
 Center-of-Mass det. time= 291.5 min ( 1,037.4 - 746.0 )

Volume	Invert	Avail.Storage	Storage Description
#1A	394.00'	3,863 cf	<b>42.75'W x 140.48'L x 4.25'H Field A</b> 25,523 cf Overall - 15,866 cf Embedded = 9,658 cf x 40.0% Voids
#2A	395.25'	11,568 cf	<b>StormTrap ST2 SingleTrap 2-6x 24 Inside #1</b> Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 24 Chambers in 3 Rows 25.44' x 123.17' Core + 6.66' Border = 38.75' x 136.48' System
		15,431 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	395.75'	<b>12.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 395.75' / 395.65' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	394.00'	<b>1.000 in/hr Exfiltration over Surface area</b>
#3	Primary	395.95'	<b>6.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 395.95' / 395.85' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf

**Discarded OutFlow** Max=0.14 cfs @ 8.40 hrs HW=394.04' (Free Discharge)  
 ↑ **2=Exfiltration** (Exfiltration Controls 0.14 cfs)

**Primary OutFlow** Max=0.89 cfs @ 12.51 hrs HW=396.26' (Free Discharge)  
 ↑ **1=Culvert** (Barrel Controls 0.71 cfs @ 2.56 fps)  
 ↑ **3=Culvert** (Barrel Controls 0.19 cfs @ 2.09 fps)

**Pond 2P: Storm Trap - Chamber Wizard Field A****Chamber Model = StormTrapST2 SingleTrap 2-6 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 30.0"H =&gt; 18.82 sf x 15.40'L = 289.8 cf

Outside= 101.7"W x 36.0"H =&gt; 25.44 sf x 15.40'L = 391.6 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 +24.0" End Stone x 2 = 140.48'  
Base Length

3 Rows x 101.7" Wide + 79.9" Side Border x 2 + 24.0" Side Stone x 2 = 42.75' Base Width

15.0" Stone Base + 36.0" Chamber Height = 4.25' Field Height

24 Chambers x 289.8 cf + 4,612.1 cf Border = 11,567.5 cf Chamber Storage

24 Chambers x 391.6 cf + 6,466.5 cf Border = 15,865.7 cf Displacement

25,523.3 cf Field - 15,865.7 cf Chambers = 9,657.6 cf Stone x 40.0% Voids = 3,863.0 cf Stone Storage

Chamber Storage + Stone Storage = 15,430.6 cf = 0.354 af

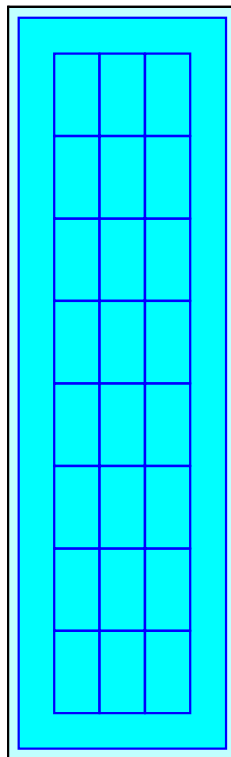
Overall Storage Efficiency = 60.5%

Overall System Size = 140.48' x 42.75' x 4.25'

24 Chambers (plus border)

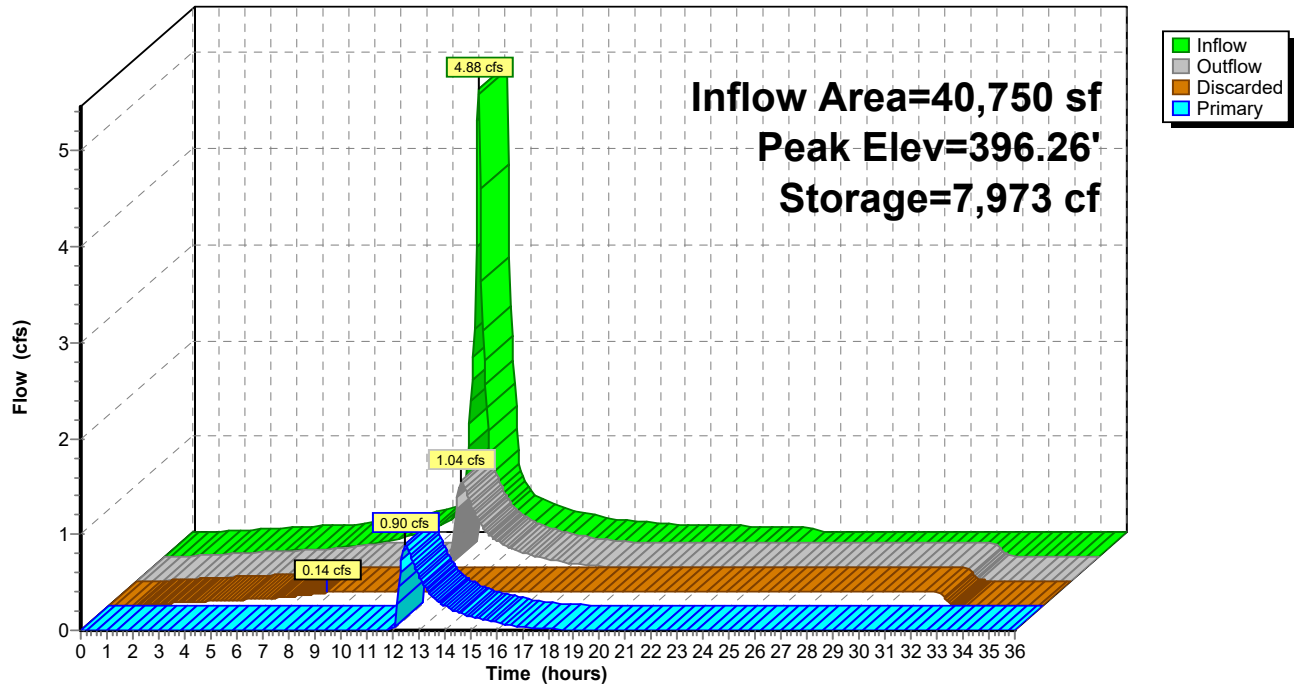
945.3 cy Field

357.7 cy Stone



# Pond 2P: Storm Trap

## Hydrograph



**Summary for Pond 3P: Storm Trap**

Inflow Area = 14,500 sf, 100.00% Impervious, Inflow Depth = 5.51" for 25-Year event  
 Inflow = 1.83 cfs @ 12.09 hrs, Volume= 6,661 cf  
 Outflow = 0.49 cfs @ 12.44 hrs, Volume= 6,142 cf, Atten= 73%, Lag= 21.5 min  
 Discarded = 0.04 cfs @ 7.45 hrs, Volume= 4,325 cf  
 Primary = 0.01 cfs @ 12.44 hrs, Volume= 4 cf  
     Routed to Pond 105P : DMH-105  
 Secondary = 0.44 cfs @ 12.44 hrs, Volume= 1,813 cf  
     Routed to Pond 1P : Storm Trap

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Peak Elev= 396.20' @ 12.44 hrs Surf.Area= 1,638 sf Storage= 2,990 cf  
 Flood Elev= 396.48' Surf.Area= 1,638 sf Storage= 3,342 cf

Plug-Flow detention time= 384.5 min calculated for 6,134 cf (92% of inflow)  
 Center-of-Mass det. time= 343.6 min ( 1,089.4 - 745.8 )

Volume	Invert	Avail.Storage	Storage Description
#1A	393.25'	1,297 cf	<b>25.79'W x 63.50'L x 4.75'H Field A</b> 7,779 cf Overall - 4,538 cf Embedded = 3,241 cf x 40.0% Voids
#2A	394.50'	3,414 cf	<b>StormTrap ST2 SingleTrap 3-0 x 3 Inside #1</b> Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf 8.48' x 46.19' Core + 6.66' Border = 21.79' x 59.50' System
		4,710 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	396.16'	<b>12.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 396.16' / 396.06' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	393.25'	<b>1.000 in/hr Exfiltration over Surface area</b>
#3	Secondary	395.75'	<b>12.0" Round Culvert</b> L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 395.75' / 395.75' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

**Discarded OutFlow** Max=0.04 cfs @ 7.45 hrs HW=393.30' (Free Discharge)

↑**2=Exfiltration** (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=0.01 cfs @ 12.44 hrs HW=396.20' (Free Discharge)

↑**1=Culvert** (Inlet Controls 0.01 cfs @ 0.56 fps)

**Secondary OutFlow** Max=0.44 cfs @ 12.44 hrs HW=396.20' (Free Discharge)

↑**3=Culvert** (Barrel Controls 0.44 cfs @ 1.87 fps)

**Pond 3P: Storm Trap - Chamber Wizard Field A****Chamber Model = StormTrapST2 SingleTrap 3-0 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 36.0"H =&gt; 22.99 sf x 15.40'L = 354.0 cf

Outside= 101.7"W x 42.0"H =&gt; 29.68 sf x 15.40'L = 456.9 cf

3 Chambers/Row x 15.40' Long = 46.19' Row Length +79.9" Border x 2 +24.0" End Stone x 2 = 63.50'  
Base Length

1 Rows x 101.7" Wide + 79.9" Side Border x 2 + 24.0" Side Stone x 2 = 25.79' Base Width

15.0" Stone Base + 42.0" Chamber Height = 4.75' Field Height

3 Chambers x 354.0 cf + 2,351.9 cf Border = 3,413.9 cf Chamber Storage

3 Chambers x 456.9 cf + 3,167.4 cf Border = 4,538.1 cf Displacement

7,779.4 cf Field - 4,538.1 cf Chambers = 3,241.3 cf Stone x 40.0% Voids = 1,296.5 cf Stone Storage

Chamber Storage + Stone Storage = 4,710.4 cf = 0.108 af

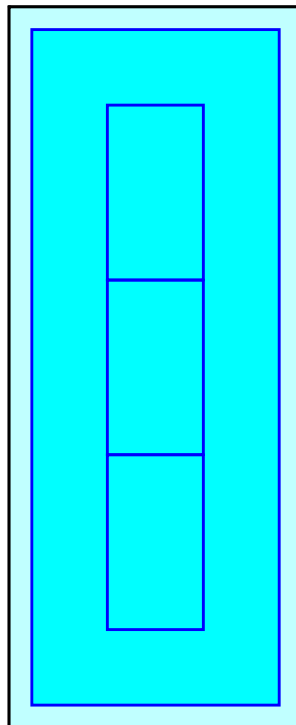
Overall Storage Efficiency = 60.5%

Overall System Size = 63.50' x 25.79' x 4.75'

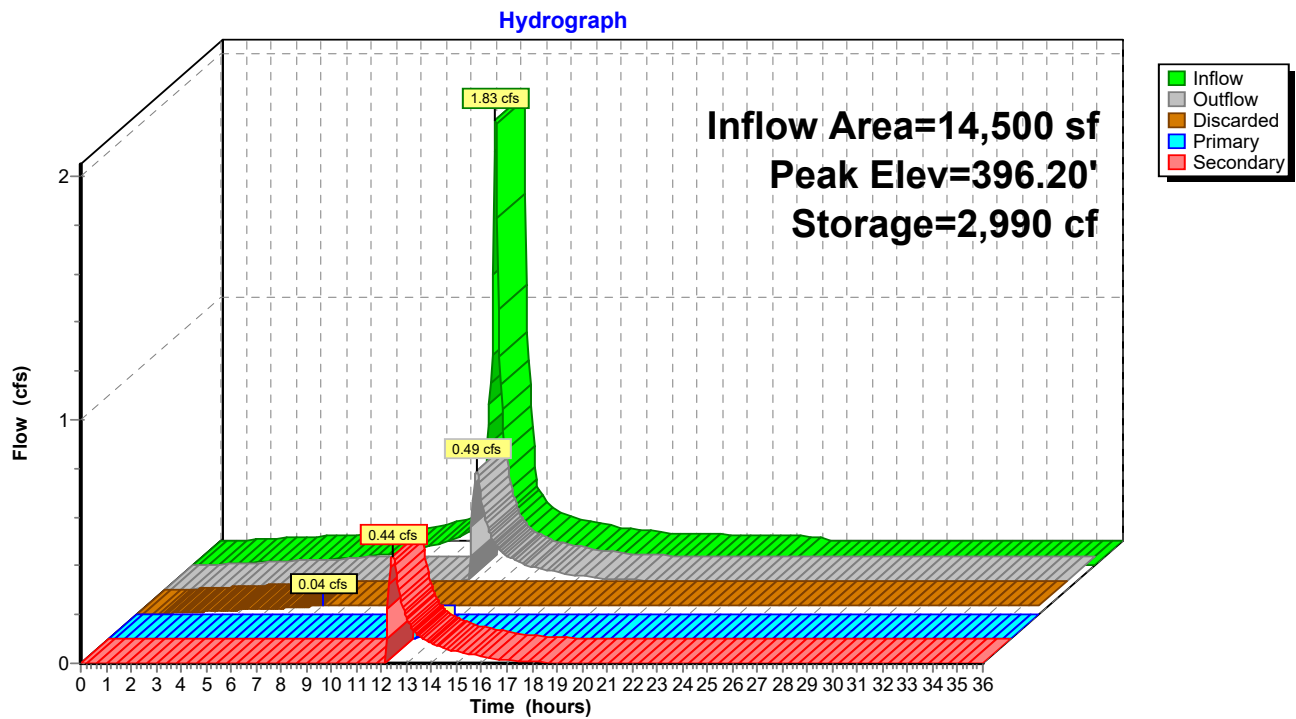
3 Chambers (plus border)

288.1 cy Field

120.0 cy Stone



# Pond 3P: Storm Trap



**2023-03-14\_PostDev Stormwater Model\_R2**

Type III 24-hr 50-Year Rainfall=6.86"

Prepared by BSC Group

Printed 4/6/2023

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment1: Southeast Woods</b>	Runoff Area=117,278 sf 0.00% Impervious Runoff Depth=2.13" Flow Length=372' Tc=15.7 min CN=56 Runoff=4.61 cfs 20,794 cf
<b>Subcatchment1A: Concrete Pad (Left</b>	Runoff Area=14,500 sf 100.00% Impervious Runoff Depth=6.62" Tc=6.0 min CN=98 Runoff=2.19 cfs 8,000 cf
<b>Subcatchment1B: Concrete Pad (Left</b>	Runoff Area=15,000 sf 100.00% Impervious Runoff Depth=6.62" Tc=6.0 min CN=98 Runoff=2.26 cfs 8,276 cf
<b>Subcatchment1E: Concrete Pad (Front</b>	Runoff Area=14,500 sf 100.00% Impervious Runoff Depth=6.62" Tc=6.0 min CN=98 Runoff=2.19 cfs 8,000 cf
<b>Subcatchment2: Northern Woods</b>	Runoff Area=108,191 sf 0.00% Impervious Runoff Depth=1.85" Flow Length=575' Tc=17.6 min CN=53 Runoff=3.44 cfs 16,716 cf
<b>Subcatchment2A: Proposed Building</b>	Runoff Area=11,250 sf 100.00% Impervious Runoff Depth=6.62" Tc=6.0 min CN=98 Runoff=1.70 cfs 6,207 cf
<b>Subcatchment2B: Proposed Building</b>	Runoff Area=11,250 sf 100.00% Impervious Runoff Depth=6.62" Tc=6.0 min CN=98 Runoff=1.70 cfs 6,207 cf
<b>Subcatchment3: Abutting Old Tpk Road</b>	Runoff Area=194,497 sf 24.46% Impervious Runoff Depth=4.24" Flow Length=619' Tc=19.0 min CN=77 Runoff=15.23 cfs 68,725 cf
<b>Subcatchment4: Northeastern Section of</b>	Runoff Area=84,996 sf 4.66% Impervious Runoff Depth=6.15" Flow Length=496' Tc=6.0 min CN=94 Runoff=12.52 cfs 43,556 cf
<b>Subcatchment5: Southern Developed Area</b>	Runoff Area=353,615 sf 5.01% Impervious Runoff Depth=3.61" Flow Length=1,175' Tc=23.1 min UI Adjusted CN=71 Runoff=21.71 cfs 106,258 cf
<b>Subcatchment6: Landscaped Hill - Rear</b>	Runoff Area=15,891 sf 0.00% Impervious Runoff Depth=2.50" Flow Length=140' Tc=6.9 min CN=60 Runoff=0.99 cfs 3,317 cf
<b>Subcatchment7: Landscaped Hill - Front</b>	Runoff Area=8,414 sf 0.00% Impervious Runoff Depth=2.60" Tc=6.0 min CN=61 Runoff=0.56 cfs 1,824 cf
<b>Reach 1R: Southeastern Wetland/Prop. Line</b>	Inflow=22.42 cfs 112,281 cf Outflow=22.42 cfs 112,281 cf
<b>Reach 2R: Southwestern Wetland</b>	Inflow=6.64 cfs 32,259 cf Outflow=6.64 cfs 32,259 cf
<b>Reach 3R: Northern Overland Flow</b>	Inflow=3.44 cfs 16,716 cf Outflow=3.44 cfs 16,716 cf
<b>Reach 4R: Southern Wetland</b>	Inflow=22.64 cfs 115,058 cf Outflow=22.64 cfs 115,058 cf

**2023-03-14\_PostDev Stormwater Model\_R2***Type III 24-hr 50-Year Rainfall=6.86"*

Prepared by BSC Group

Printed 4/6/2023

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**Reach 5R: Combined Flow**

Inflow=52.80 cfs 276,314 cf

Outflow=52.80 cfs 276,314 cf

**Pond 1P: Storm Trap**Peak Elev=396.42' Storage=1,720 cf Inflow=0.93 cfs 3,295 cf  
Discarded=0.03 cfs 2,184 cf Primary=0.21 cfs 1,111 cf Outflow=0.24 cfs 3,295 cf**Pond 2P: Storm Trap**Peak Elev=396.46' Storage=8,969 cf Inflow=5.78 cfs 22,211 cf  
Discarded=0.14 cfs 14,335 cf Primary=1.62 cfs 7,875 cf Outflow=1.76 cfs 22,211 cf**Pond 3P: Storm Trap**Peak Elev=396.37' Storage=3,208 cf Inflow=2.19 cfs 8,000 cf  
Discarded=0.04 cfs 4,429 cf Primary=0.15 cfs 147 cf Secondary=0.80 cfs 2,805 cf Outflow=0.99 cfs 7,381 cf**Pond 102P: DMH-102**Peak Elev=397.40' Inflow=1.70 cfs 6,207 cf  
Primary=1.47 cfs 5,717 cf Secondary=0.22 cfs 490 cf Outflow=1.70 cfs 6,207 cf**Pond 105P: DMH-105**Peak Elev=391.95' Inflow=2.03 cfs 8,800 cf  
12.0" Round Culvert n=0.012 L=96.0' S=0.0938 ' / ' Outflow=2.03 cfs 8,800 cf**Pond 203P: DMH-203**Peak Elev=397.45' Inflow=1.70 cfs 6,207 cf  
Primary=1.33 cfs 5,934 cf Secondary=0.37 cfs 273 cf Outflow=1.70 cfs 6,207 cf**Pond 207P: DMH-207**Peak Elev=393.48' Inflow=2.08 cfs 11,466 cf  
12.0" Round Culvert n=0.012 L=15.0' S=0.0133 ' / ' Outflow=2.08 cfs 11,466 cf**Total Runoff Area = 949,382 sf Runoff Volume = 297,881 cf Average Runoff Depth = 3.77"**  
**85.70% Pervious = 813,620 sf 14.30% Impervious = 135,762 sf**



### Summary for Subcatchment 1: Southeast Woods

Runoff = 4.61 cfs @ 12.24 hrs, Volume= 20,794 cf, Depth= 2.13"  
Routed to Reach 2R : Southwestern Wetland

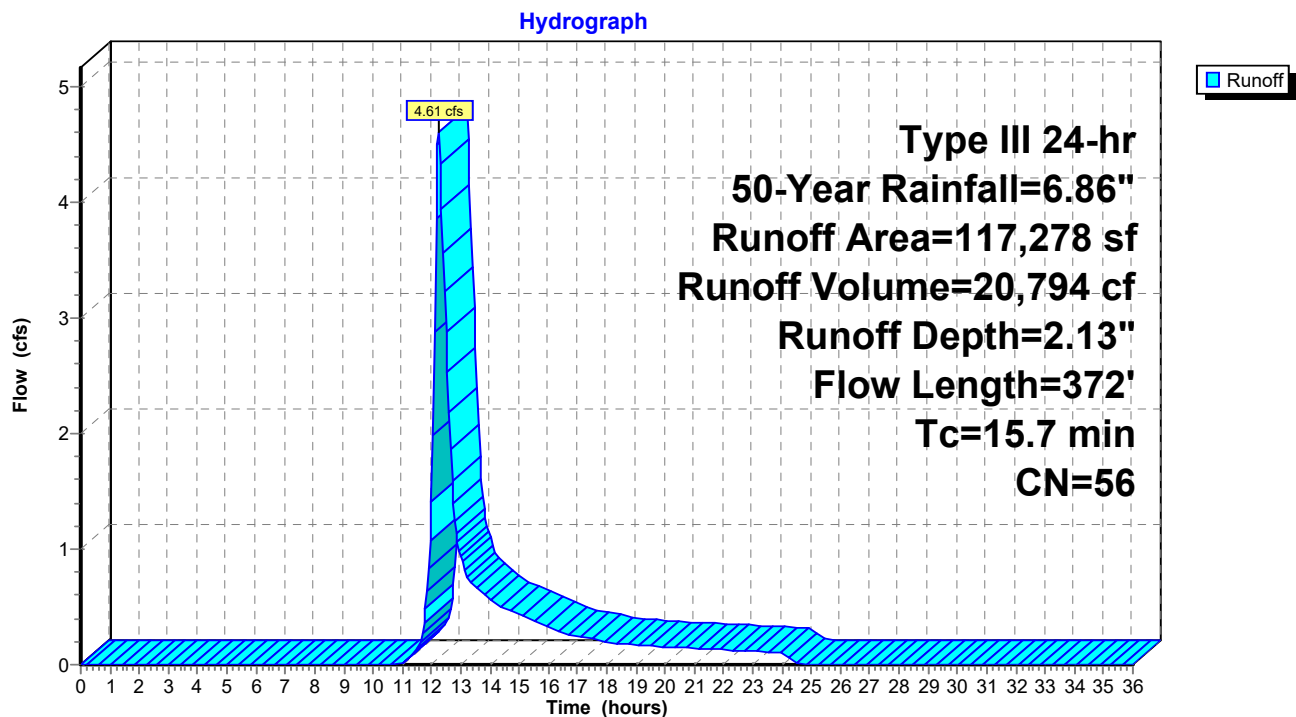
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Description
86,662	55	Woods, Good, HSG B
2,127	30	Woods, Good, HSG A
26,969	61	>75% Grass cover, Good, HSG B
1,520	96	Gravel surface, HSG B
117,278	56	Weighted Average
117,278		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0200	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
3.0	322	0.1240	1.76		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
15.7	372	Total			

### Subcatchment 1: Southeast Woods



## Summary for Subcatchment 1A: Concrete Pad (Left Side, Back, Right Side Rear of Building)

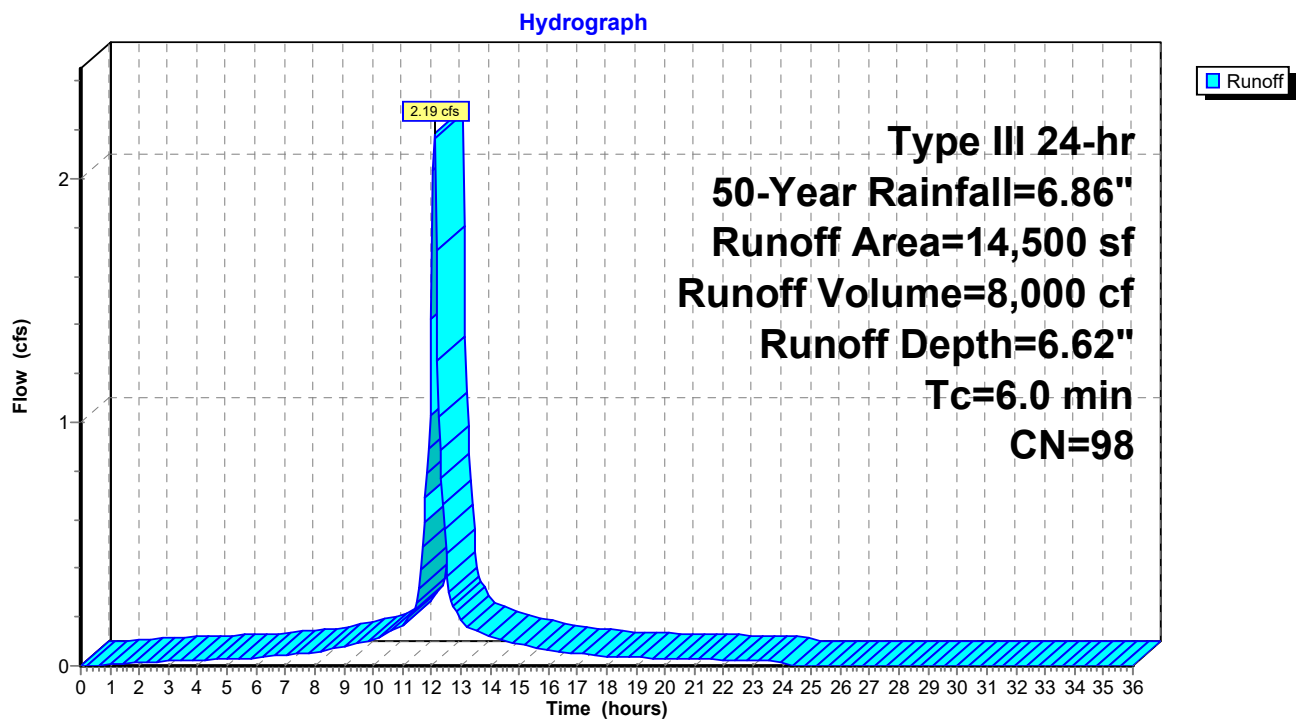
Runoff = 2.19 cfs @ 12.09 hrs, Volume= 8,000 cf, Depth= 6.62"  
Routed to Pond 2P : Storm Trap

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Description
14,500	98	Paved parking, HSG B
14,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Concrete Runoff

## Subcatchment 1A: Concrete Pad (Left Side, Back, Right Side Rear of Building)



### Summary for Subcatchment 1B: Concrete Pad (Left Side Building)

Runoff = 2.26 cfs @ 12.09 hrs, Volume= 8,276 cf, Depth= 6.62"  
Routed to Pond 2P : Storm Trap

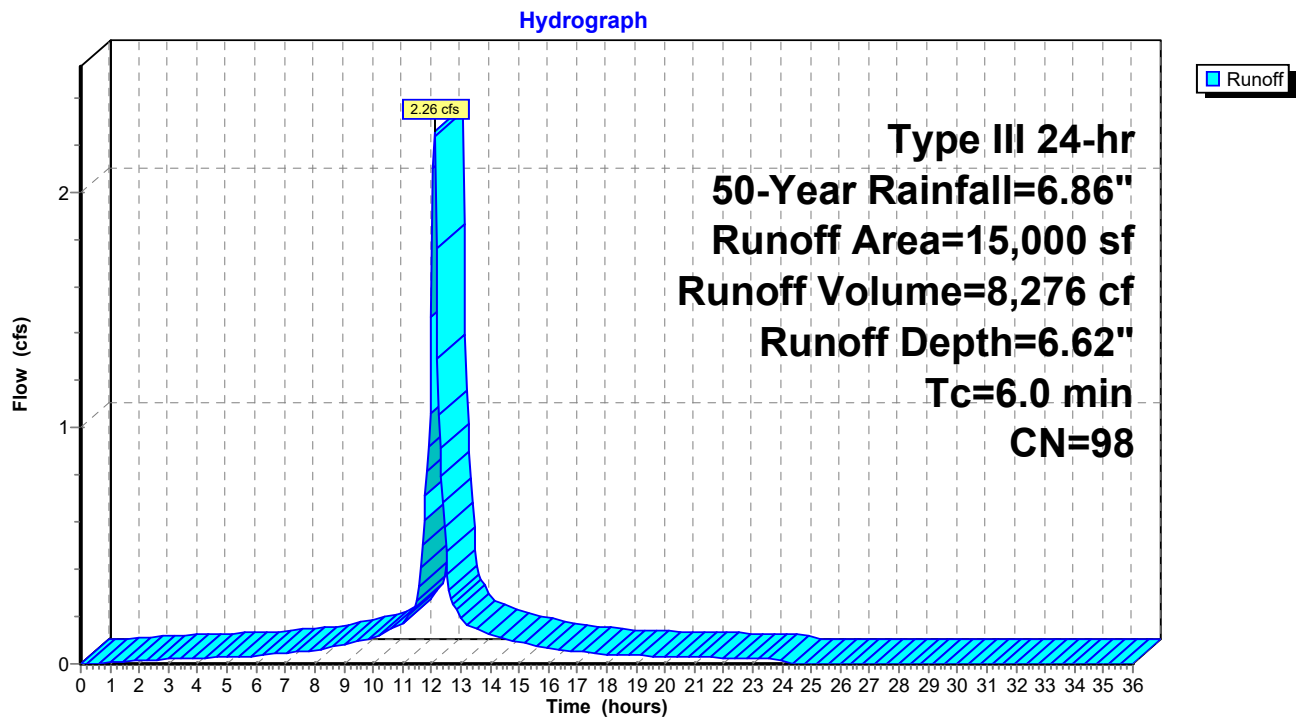
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Description
15,000	98	Paved parking, HSG B
15,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Concrete Runoff

### Subcatchment 1B: Concrete Pad (Left Side Building)



**Summary for Subcatchment 1E: Concrete Pad (Front and Right Side)**

Runoff = 2.19 cfs @ 12.09 hrs, Volume= 8,000 cf, Depth= 6.62"  
 Routed to Pond 3P : Storm Trap

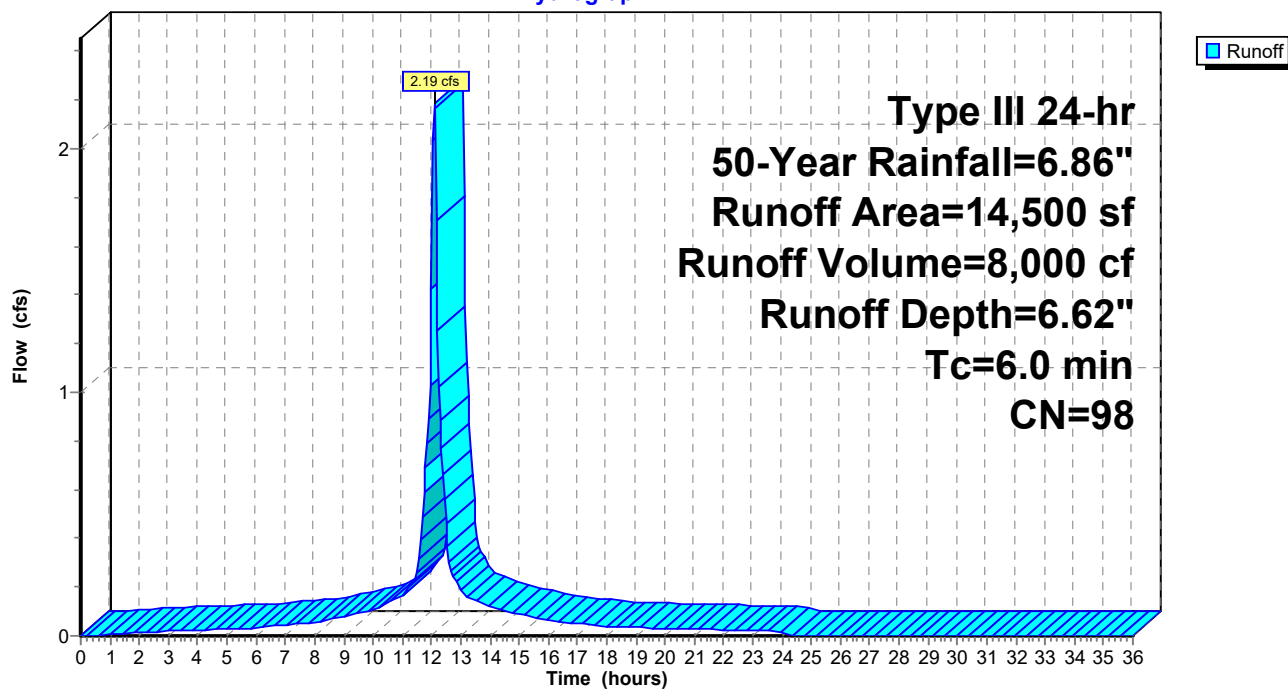
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Description
14,500	98	Paved parking, HSG B
14,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Concrete Runoff

**Subcatchment 1E: Concrete Pad (Front and Right Side)**

Hydrograph



## Summary for Subcatchment 2: Northern Woods

Runoff = 3.44 cfs @ 12.27 hrs, Volume= 16,716 cf, Depth= 1.85"  
Routed to Reach 3R : Northern Overland Flow

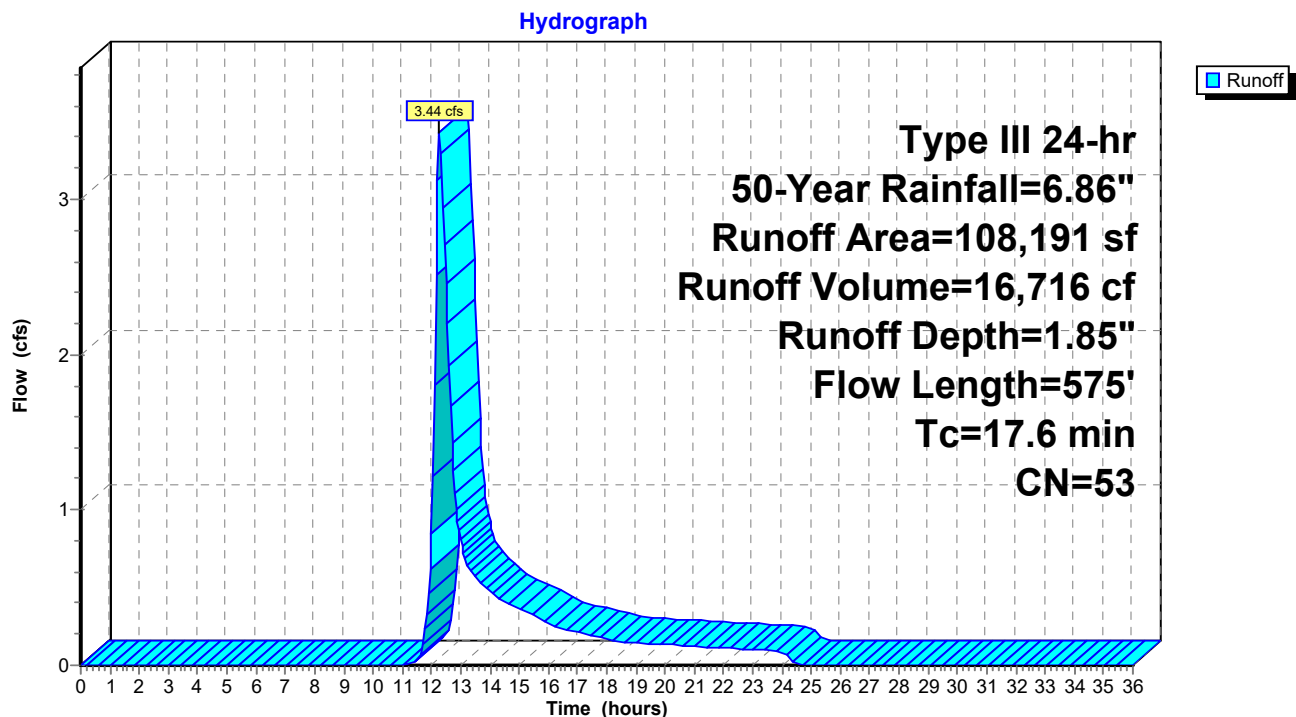
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Description
66,001	55	Woods, Good, HSG B
21,606	70	Woods, Good, HSG C
20,584	30	Woods, Good, HSG A
108,191	53	Weighted Average
108,191		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b>
					Woods: Light underbrush n= 0.400 P2= 3.00"
7.9	525	0.0495	1.11		<b>Shallow Concentrated Flow,</b>
					Woodland Kv= 5.0 fps
17.6	575	Total			

## Subcatchment 2: Northern Woods



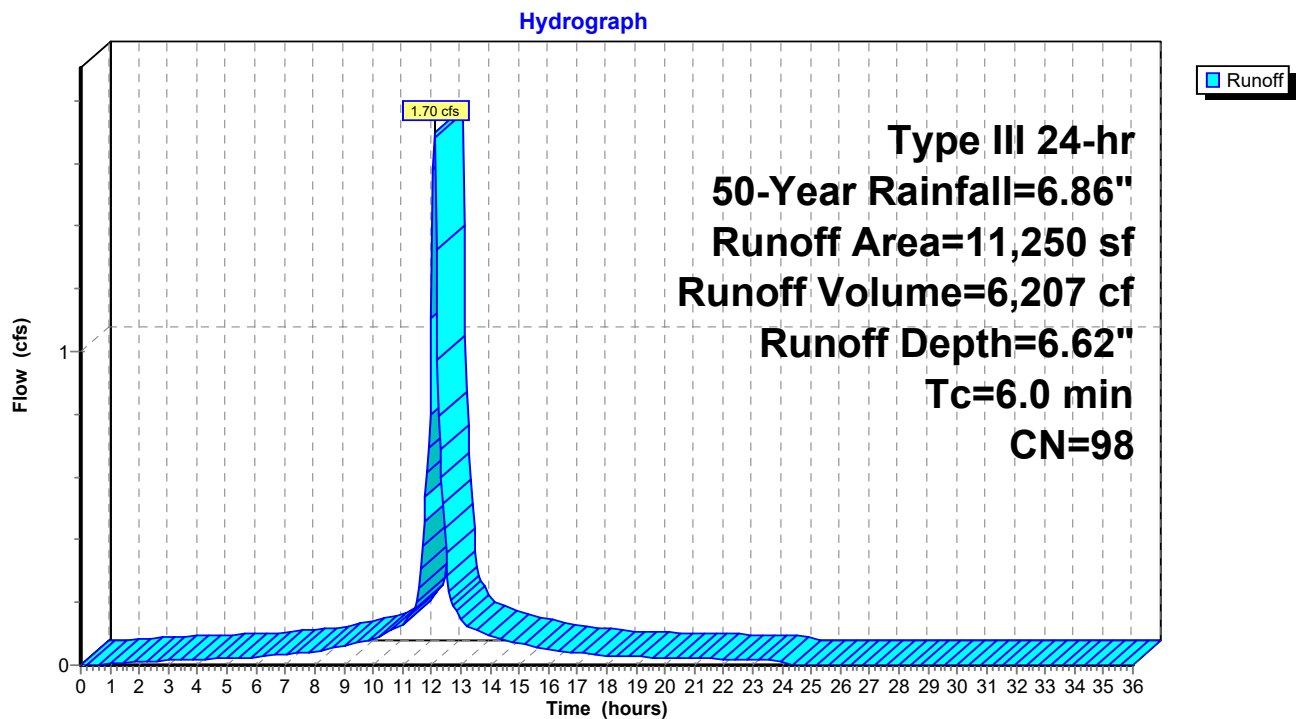
**Summary for Subcatchment 2A: Proposed Building (Front Half Roof)**

Runoff = 1.70 cfs @ 12.09 hrs, Volume= 6,207 cf, Depth= 6.62"  
 Routed to Pond 102P : DMH-102

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Description
11,250	98	Unconnected roofs, HSG B
11,250		100.00% Impervious Area
11,250		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Roof runoff

**Subcatchment 2A: Proposed Building (Front Half Roof)**

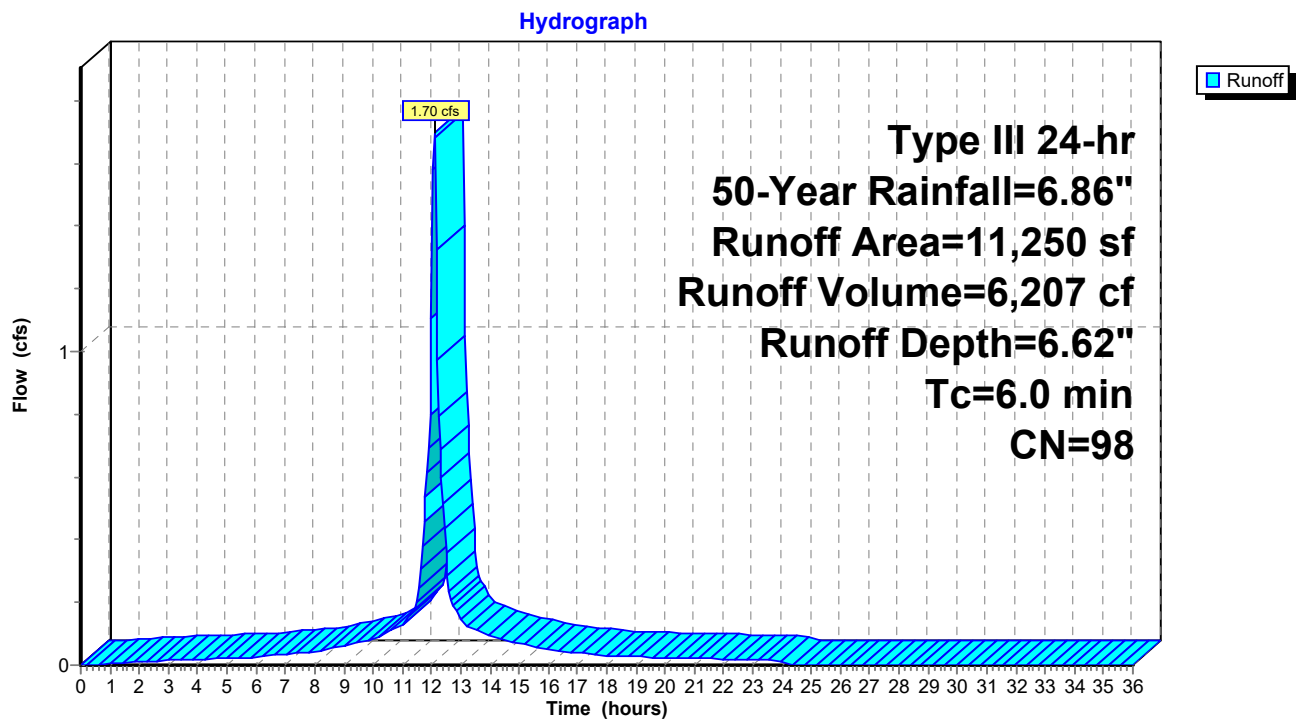
**Summary for Subcatchment 2B: Proposed Building (Back Half Roof)**

Runoff = 1.70 cfs @ 12.09 hrs, Volume= 6,207 cf, Depth= 6.62"  
 Routed to Pond 203P : DMH-203

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Description
11,250	98	Unconnected roofs, HSG B
11,250		100.00% Impervious Area
11,250		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Roof runoff

**Subcatchment 2B: Proposed Building (Back Half Roof)**

**Summary for Subcatchment 3: Abutting Old Tpk Road**

Runoff = 15.23 cfs @ 12.26 hrs, Volume= 68,725 cf, Depth= 4.24"

Routed to Reach 1R : Southeastern Wetland/Prop. Line

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 50-Year Rainfall=6.86"

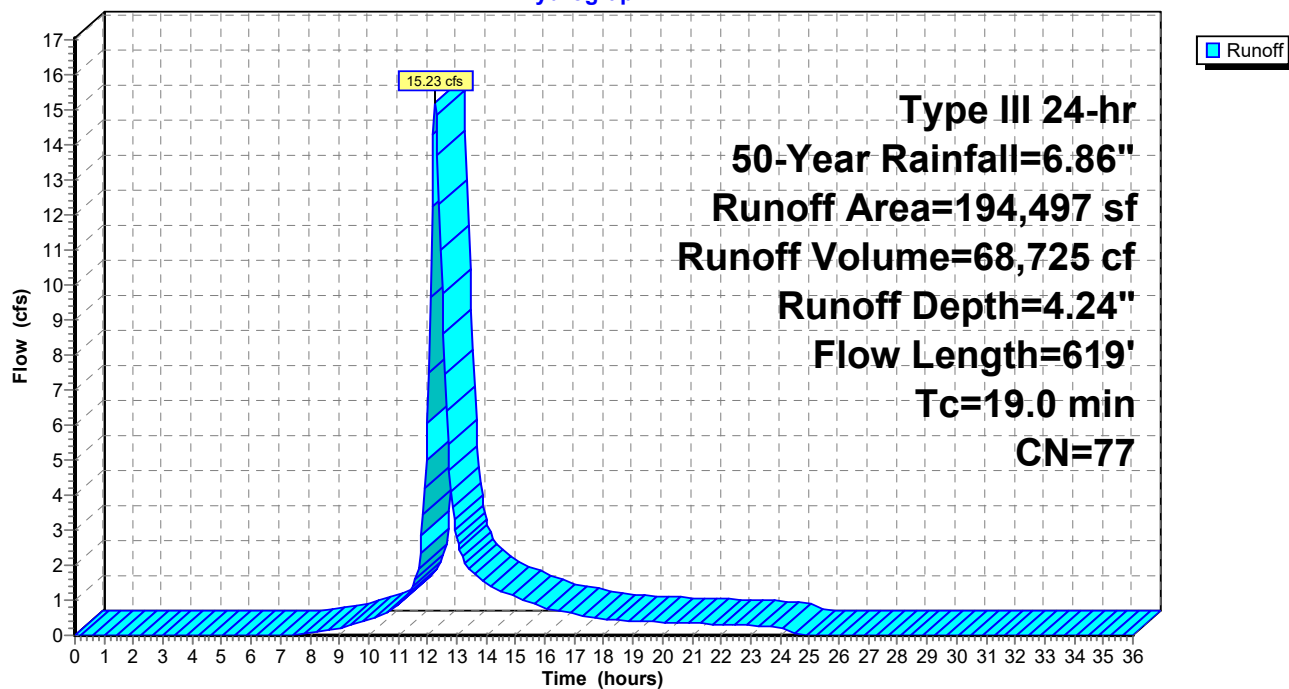
Area (sf)	CN	Description
20,473	74	>75% Grass cover, Good, HSG C
28,140	77	Woods, Poor, HSG C
3,311	98	Paved parking, HSG C
7,754	98	Water Surface, HSG C
2,614	98	Paved parking, HSG D
36,432	77	Woods, Good, HSG D
17,163	98	Water Surface, HSG D
21,242	55	Woods, Good, HSG B
15,333	98	Water Surface, HSG B
8,494	85	Gravel roads, HSG B
1,394	98	Paved parking, HSG B
32,147	61	>75% Grass cover, Good, HSG B
194,497	77	Weighted Average
146,928		75.54% Pervious Area
47,569		24.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
4.9	264	0.0322	0.90		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.4	45	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
4.0	260	0.0460	1.07		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.0	619	Total			



**Subcatchment 3: Abutting Old Tpk Road**

Hydrograph



**Summary for Subcatchment 4: Northeastern Section of Existing Yard**

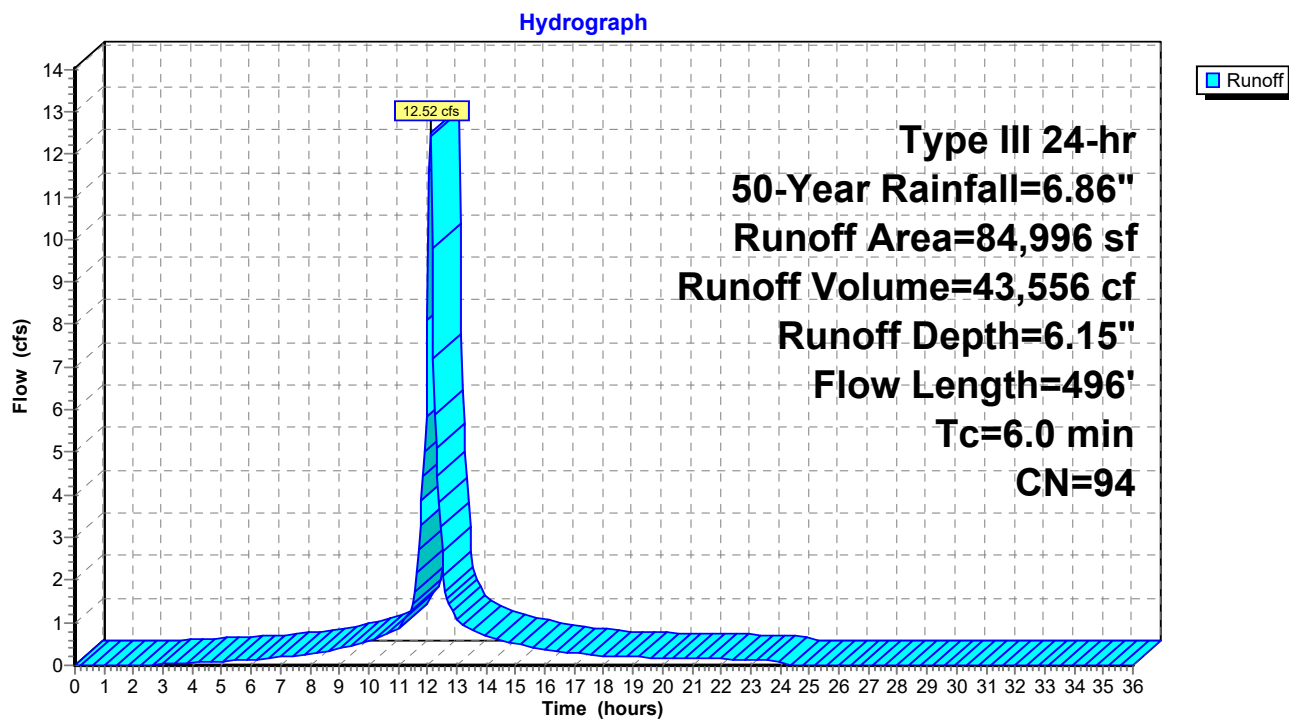
Runoff = 12.52 cfs @ 12.09 hrs, Volume= 43,556 cf, Depth= 6.15"  
 Routed to Reach 1R : Southeastern Wetland/Prop. Line

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Description
4,792	55	Woods, Good, HSG B
2,962	98	Paved parking, HSG B
1,002	98	Water Surface, HSG B
76,240	96	Gravel surface, HSG B
84,996	94	Weighted Average
81,032		95.34% Pervious Area
3,964		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0250	1.27		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.00"
2.2	406	0.0375	3.12		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.7	40	0.0375	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.4					<b>Direct Entry,</b>
6.0	496	Total			

**Subcatchment 4: Northeastern Section of Existing Yard**

### Summary for Subcatchment 5: Southern Developed Area

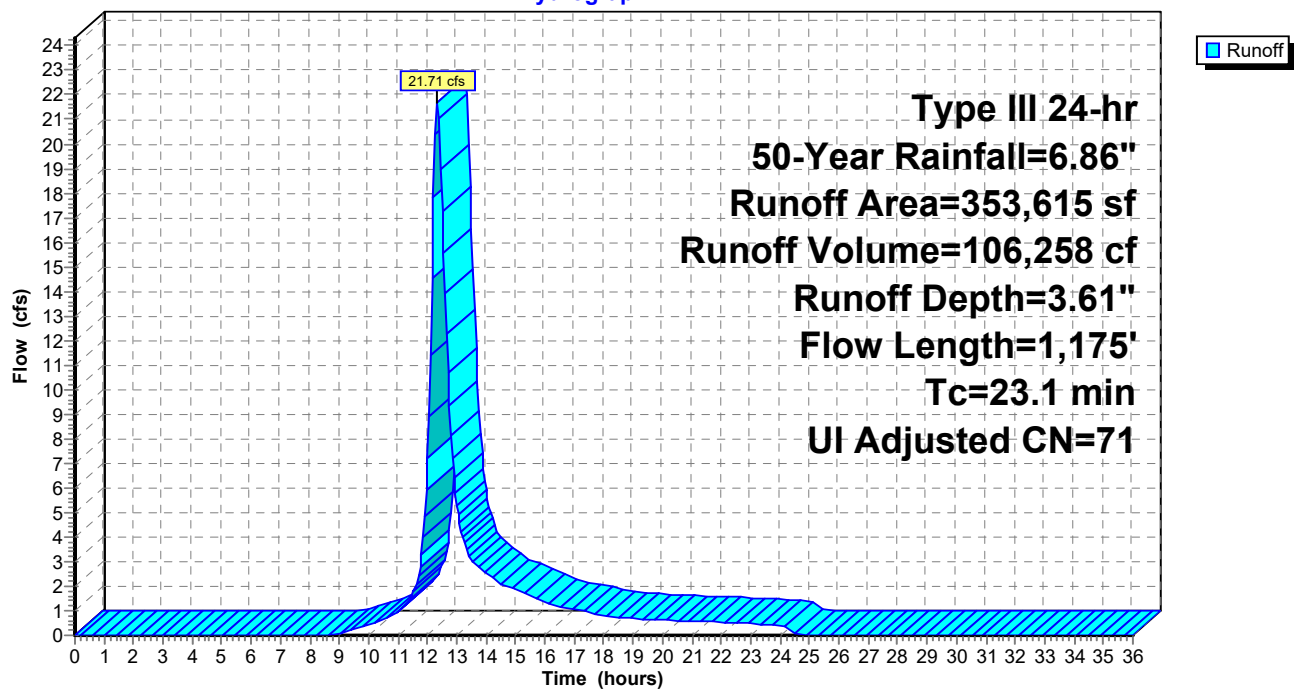
Runoff = 21.71 cfs @ 12.32 hrs, Volume= 106,258 cf, Depth= 3.61"  
Routed to Reach 4R : Southern Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Adj	Description
86,017	55		Woods, Good, HSG B
5,293	77		Woods, Good, HSG D
151,153	85		Gravel roads, HSG B
5,619	98		Paved parking, HSG B
12,110	98		Unconnected roofs, HSG B
92,538	61		>75% Grass cover, Good, HSG B
885	77		Woods, Poor, HSG C
353,615	72	71	Weighted Average, UI Adjusted
335,886			94.99% Pervious Area
17,729			5.01% Impervious Area
12,110			68.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0200	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	164	0.0470	1.08		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.4	259	0.0040	1.28		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
3.0	640	0.0500	3.60		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
1.5	62	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
23.1	1,175	Total			

**Subcatchment 5: Southern Developed Area****Hydrograph**

**Summary for Subcatchment 6: Landscaped Hill - Rear Portion**

Runoff = 0.99 cfs @ 12.11 hrs, Volume= 3,317 cf, Depth= 2.50"  
 Routed to Pond 207P : DMH-207

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 50-Year Rainfall=6.86"

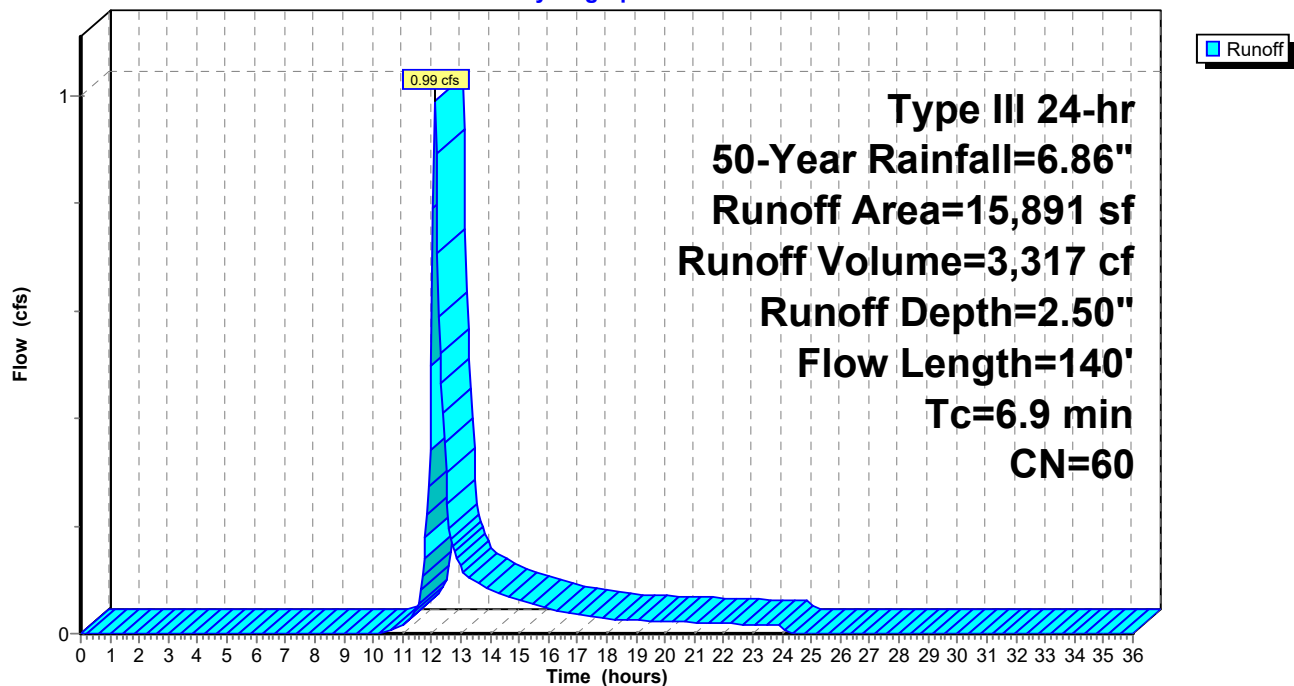
Area (sf)	CN	Description
2,309	55	Woods, Good, HSG B
13,582	61	>75% Grass cover, Good, HSG B
15,891	60	Weighted Average
15,891		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0600	0.15		<b>Sheet Flow, OVERLAND</b>
					Grass: Dense n= 0.240 P2= 3.00"
1.4	90	0.0240	1.08		<b>Shallow Concentrated Flow, SWALE</b>
					Short Grass Pasture Kv= 7.0 fps
6.9	140	Total			

**Subcatchment 6: Landscaped Hill - Rear Portion**

Hydrograph



### Summary for Subcatchment 7: Landscaped Hill - Front Portion

Runoff = 0.56 cfs @ 12.10 hrs, Volume= 1,824 cf, Depth= 2.60"  
Routed to Pond 105P : DMH-105

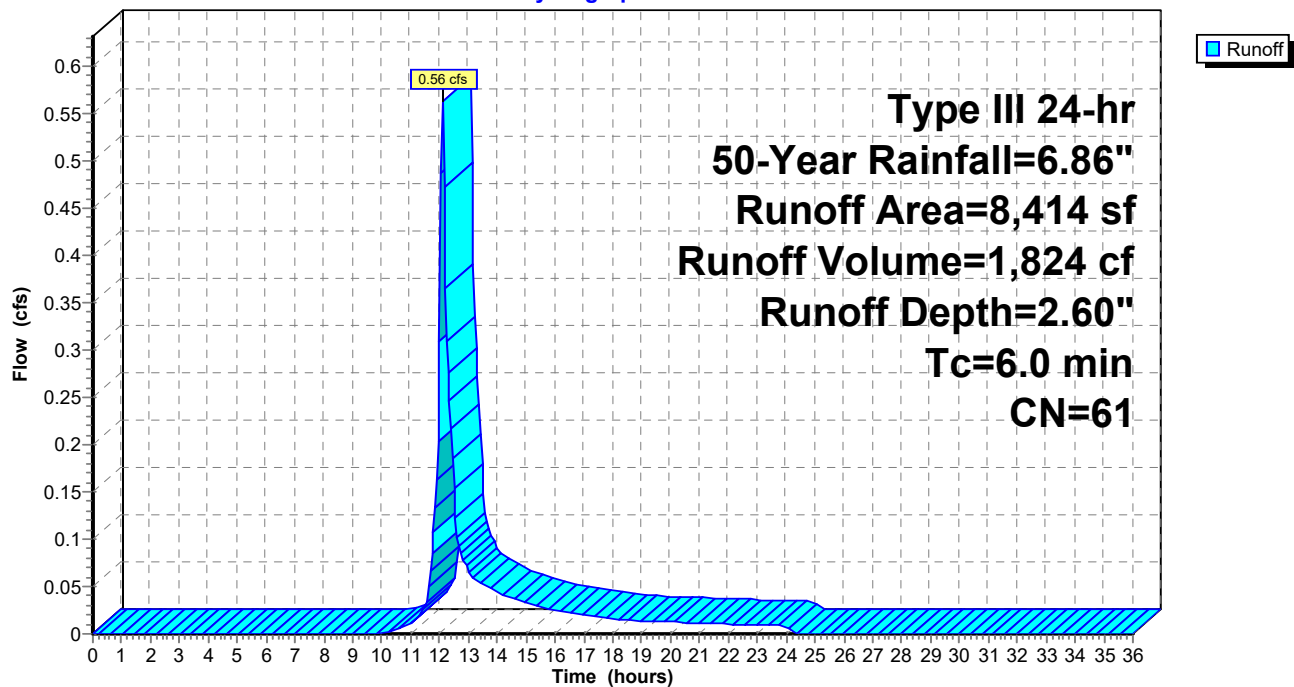
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
Type III 24-hr 50-Year Rainfall=6.86"

Area (sf)	CN	Description
8,414	61	>75% Grass cover, Good, HSG B
8,414		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Overland <6min

### Subcatchment 7: Landscaped Hill - Front Portion

Hydrograph

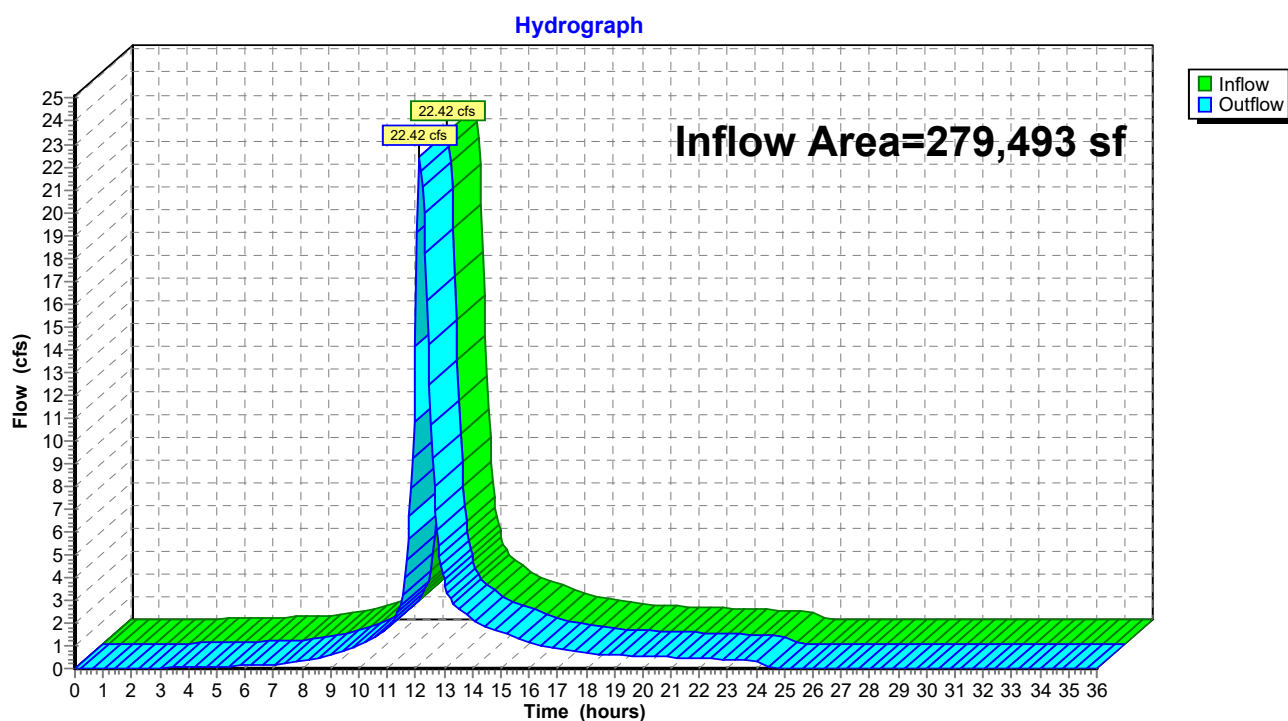


**Summary for Reach 1R: Southeastern Wetland/Prop. Line**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 279,493 sf, 18.44% Impervious, Inflow Depth = 4.82" for 50-Year event  
Inflow = 22.42 cfs @ 12.12 hrs, Volume= 112,281 cf  
Outflow = 22.42 cfs @ 12.12 hrs, Volume= 112,281 cf, Atten= 0%, Lag= 0.0 min  
Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

**Reach 1R: Southeastern Wetland/Prop. Line**

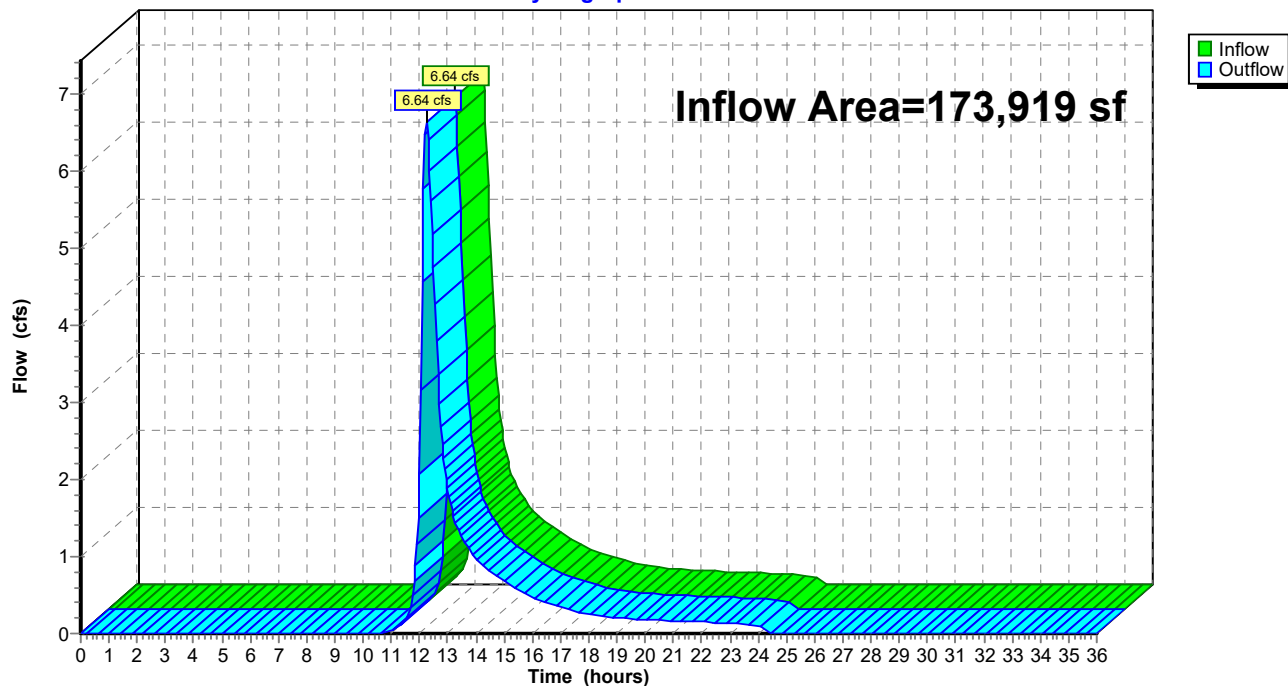


**Summary for Reach 2R: Southwestern Wetland**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 173,919 sf, 23.43% Impervious, Inflow Depth = 2.23" for 50-Year event  
Inflow = 6.64 cfs @ 12.25 hrs, Volume= 32,259 cf  
Outflow = 6.64 cfs @ 12.25 hrs, Volume= 32,259 cf, Atten= 0%, Lag= 0.0 min  
Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

**Reach 2R: Southwestern Wetland****Hydrograph**

**Summary for Reach 3R: Northern Overland Flow**

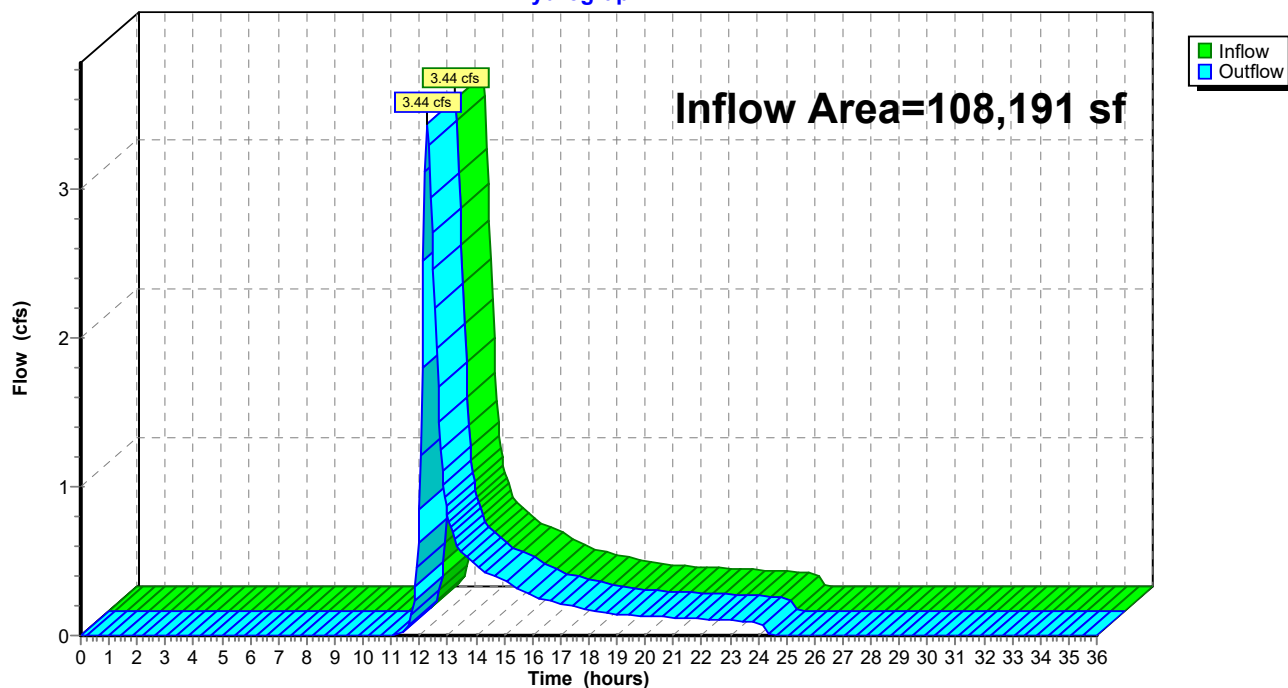
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 108,191 sf, 0.00% Impervious, Inflow Depth = 1.85" for 50-Year event  
Inflow = 3.44 cfs @ 12.27 hrs, Volume= 16,716 cf  
Outflow = 3.44 cfs @ 12.27 hrs, Volume= 16,716 cf, Atten= 0%, Lag= 0.0 min  
Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

**Reach 3R: Northern Overland Flow**

Hydrograph

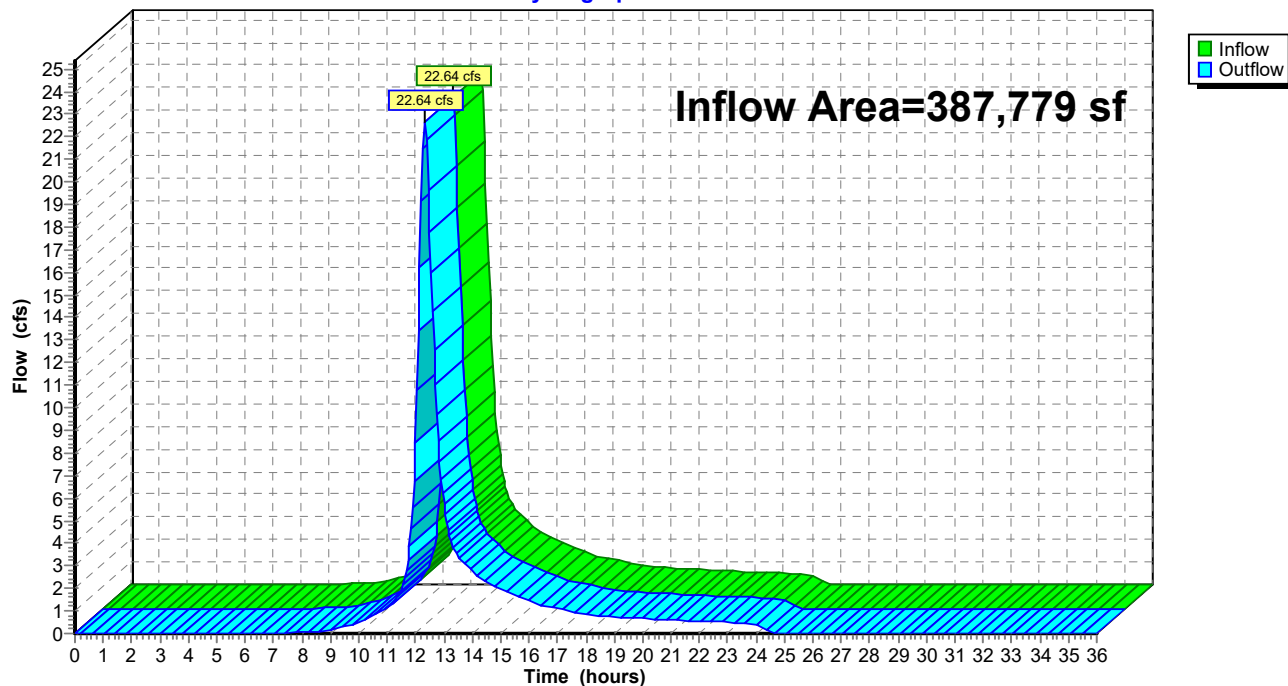


**Summary for Reach 4R: Southern Wetland**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 387,779 sf, 11.21% Impervious, Inflow Depth = 3.56" for 50-Year event  
Inflow = 22.64 cfs @ 12.32 hrs, Volume= 115,058 cf  
Outflow = 22.64 cfs @ 12.32 hrs, Volume= 115,058 cf, Atten= 0%, Lag= 0.0 min  
Routed to Reach 5R : Combined Flow

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

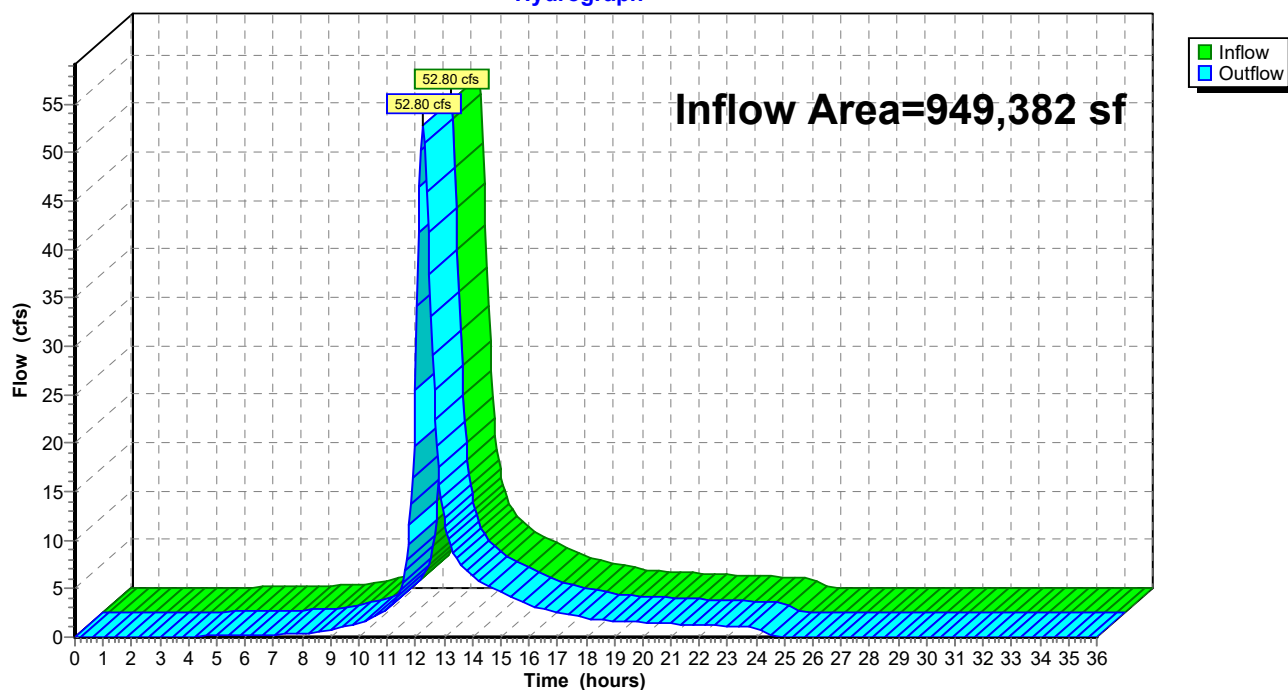
**Reach 4R: Southern Wetland****Hydrograph**

**Summary for Reach 5R: Combined Flow**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 949,382 sf, 14.30% Impervious, Inflow Depth = 3.49" for 50-Year event  
Inflow = 52.80 cfs @ 12.27 hrs, Volume= 276,314 cf  
Outflow = 52.80 cfs @ 12.27 hrs, Volume= 276,314 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

**Reach 5R: Combined Flow****Hydrograph**

### Summary for Pond 1P: Storm Trap

[81] Warning: Exceeded Pond 3P by 0.37' @ 13.30 hrs

Inflow = 0.93 cfs @ 12.26 hrs, Volume= 3,295 cf  
 Outflow = 0.24 cfs @ 13.00 hrs, Volume= 3,295 cf, Atten= 74%, Lag= 44.5 min  
 Discarded = 0.03 cfs @ 11.75 hrs, Volume= 2,184 cf  
 Primary = 0.21 cfs @ 13.00 hrs, Volume= 1,111 cf  
 Routed to Pond 105P : DMH-105

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Peak Elev= 396.42' @ 13.00 hrs Surf.Area= 1,241 sf Storage= 1,720 cf  
 Flood Elev= 396.48' Surf.Area= 1,241 sf Storage= 1,780 cf

Plug-Flow detention time= 358.9 min calculated for 3,290 cf (100% of inflow)  
 Center-of-Mass det. time= 359.5 min ( 1,150.8 - 791.3 )

Volume	Invert	Avail.Storage	Storage Description
#1A	394.00'	956 cf	<b>25.79'W x 48.10'L x 4.25'H Field A</b> 5,273 cf Overall - 2,883 cf Embedded = 2,390 cf x 40.0% Voids
#2A	395.25'	2,077 cf	<b>StormTrap ST2 SingleTrap 2-6x2 Inside #1</b> Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 8.48' x 30.79' Core + 6.66' Border = 21.79' x 44.10' System
		3,033 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	396.16'	<b>12.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 396.16' / 396.06' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	394.00'	<b>1.000 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.03 cfs @ 11.75 hrs HW=394.05' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.03 cfs)

**Primary OutFlow** Max=0.21 cfs @ 13.00 hrs HW=396.42' (Free Discharge)

↑ **1=Culvert** (Barrel Controls 0.21 cfs @ 2.00 fps)

**Pond 1P: Storm Trap - Chamber Wizard Field A****Chamber Model = StormTrapST2 SingleTrap 2-6 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 30.0"H =&gt; 18.82 sf x 15.40'L = 289.8 cf

Outside= 101.7"W x 36.0"H =&gt; 25.44 sf x 15.40'L = 391.6 cf

2 Chambers/Row x 15.40' Long = 30.79' Row Length +79.9" Border x 2 +24.0" End Stone x 2 = 48.10'  
Base Length

1 Rows x 101.7" Wide + 79.9" Side Border x 2 + 24.0" Side Stone x 2 = 25.79' Base Width

15.0" Stone Base + 36.0" Chamber Height = 4.25' Field Height

2 Chambers x 289.8 cf + 1,497.8 cf Border = 2,077.4 cf Chamber Storage

2 Chambers x 391.6 cf + 2,100.0 cf Border = 2,883.3 cf Displacement

5,272.9 cf Field - 2,883.3 cf Chambers = 2,389.6 cf Stone x 40.0% Voids = 955.8 cf Stone Storage

Chamber Storage + Stone Storage = 3,033.3 cf = 0.070 af

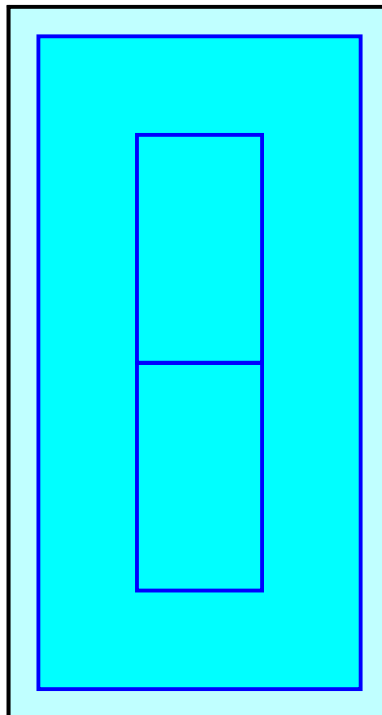
Overall Storage Efficiency = 57.5%

Overall System Size = 48.10' x 25.79' x 4.25'

2 Chambers (plus border)

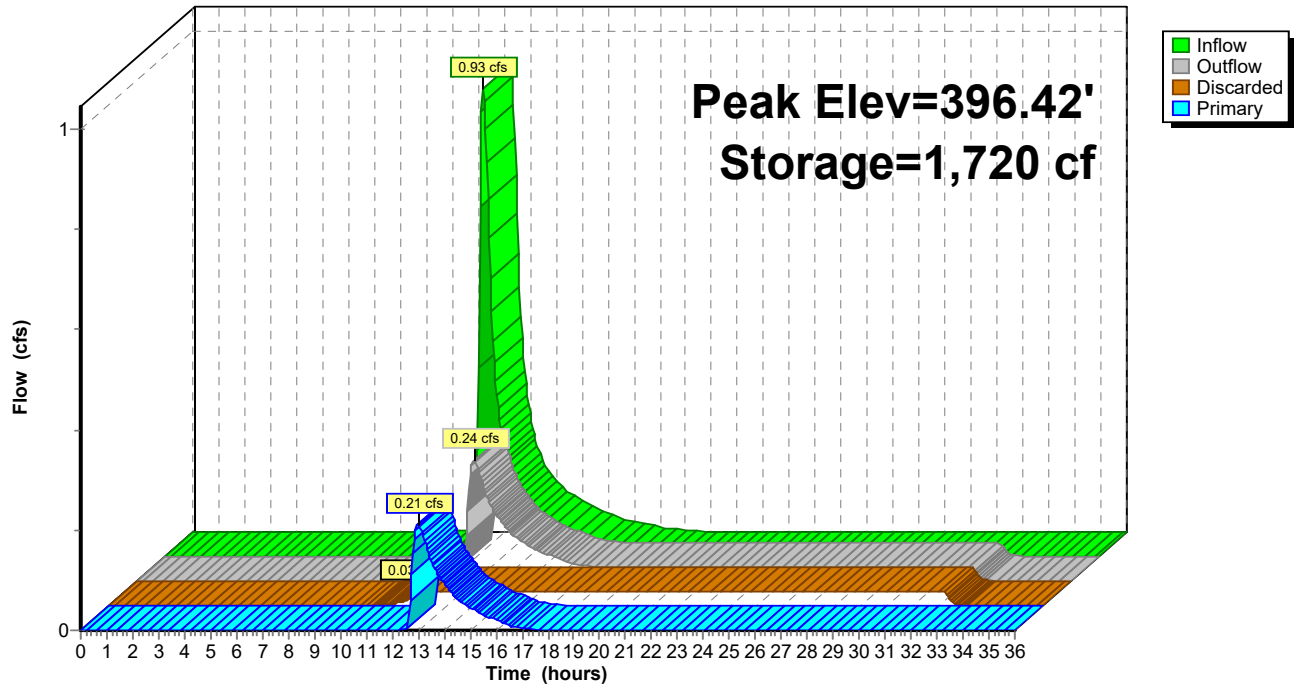
195.3 cy Field

88.5 cy Stone



# Pond 1P: Storm Trap

## Hydrograph



### Summary for Pond 2P: Storm Trap

Inflow Area = 40,750 sf, 100.00% Impervious, Inflow Depth = 6.54" for 50-Year event  
 Inflow = 5.78 cfs @ 12.09 hrs, Volume= 22,211 cf  
 Outflow = 1.76 cfs @ 12.42 hrs, Volume= 22,211 cf, Atten= 70%, Lag= 19.9 min  
 Discarded = 0.14 cfs @ 7.70 hrs, Volume= 14,335 cf  
 Primary = 1.62 cfs @ 12.42 hrs, Volume= 7,875 cf  
 Routed to Pond 207P : DMH-207

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Peak Elev= 396.46' @ 12.42 hrs Surf.Area= 6,005 sf Storage= 8,969 cf

Plug-Flow detention time= 264.2 min calculated for 22,180 cf (100% of inflow)  
 Center-of-Mass det. time= 264.6 min ( 1,008.0 - 743.4 )

Volume	Invert	Avail.Storage	Storage Description
#1A	394.00'	3,863 cf	<b>42.75'W x 140.48'L x 4.25'H Field A</b> 25,523 cf Overall - 15,866 cf Embedded = 9,658 cf x 40.0% Voids
#2A	395.25'	11,568 cf	<b>StormTrap ST2 SingleTrap 2-6x 24 Inside #1</b> Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 24 Chambers in 3 Rows 25.44' x 123.17' Core + 6.66' Border = 38.75' x 136.48' System
		15,431 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	395.75'	<b>12.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 395.75' / 395.65' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	394.00'	<b>1.000 in/hr Exfiltration over Surface area</b>
#3	Primary	395.95'	<b>6.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 395.95' / 395.85' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf

**Discarded OutFlow** Max=0.14 cfs @ 7.70 hrs HW=394.04' (Free Discharge)  
 ↑ **2=Exfiltration** (Exfiltration Controls 0.14 cfs)

**Primary OutFlow** Max=1.62 cfs @ 12.42 hrs HW=396.46' (Free Discharge)  
 ↑ **1=Culvert** (Barrel Controls 1.23 cfs @ 2.88 fps)  
 ↑ **3=Culvert** (Inlet Controls 0.38 cfs @ 1.95 fps)



**Pond 2P: Storm Trap - Chamber Wizard Field A****Chamber Model = StormTrapST2 SingleTrap 2-6 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 30.0"H =&gt; 18.82 sf x 15.40'L = 289.8 cf

Outside= 101.7"W x 36.0"H =&gt; 25.44 sf x 15.40'L = 391.6 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 +24.0" End Stone x 2 = 140.48'  
Base Length

3 Rows x 101.7" Wide + 79.9" Side Border x 2 + 24.0" Side Stone x 2 = 42.75' Base Width

15.0" Stone Base + 36.0" Chamber Height = 4.25' Field Height

24 Chambers x 289.8 cf + 4,612.1 cf Border = 11,567.5 cf Chamber Storage

24 Chambers x 391.6 cf + 6,466.5 cf Border = 15,865.7 cf Displacement

25,523.3 cf Field - 15,865.7 cf Chambers = 9,657.6 cf Stone x 40.0% Voids = 3,863.0 cf Stone Storage

Chamber Storage + Stone Storage = 15,430.6 cf = 0.354 af

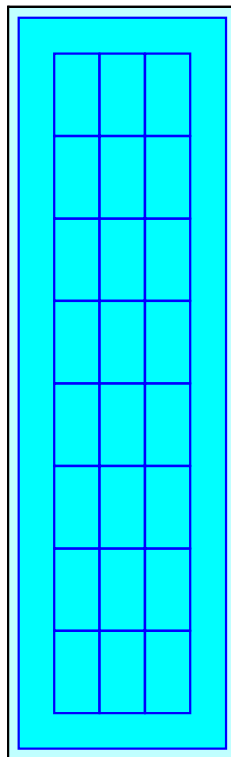
Overall Storage Efficiency = 60.5%

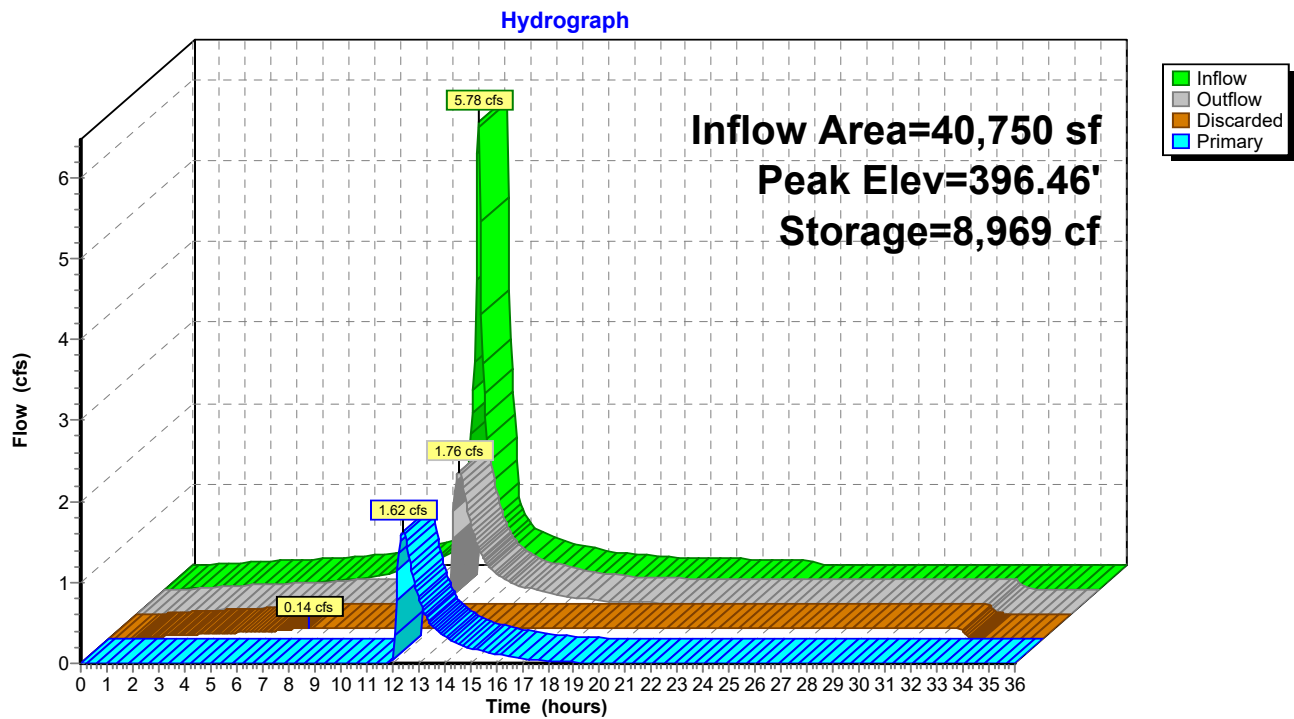
Overall System Size = 140.48' x 42.75' x 4.25'

24 Chambers (plus border)

945.3 cy Field

357.7 cy Stone



**Pond 2P: Storm Trap**

### Summary for Pond 3P: Storm Trap

Inflow Area = 14,500 sf, 100.00% Impervious, Inflow Depth = 6.62" for 50-Year event  
 Inflow = 2.19 cfs @ 12.09 hrs, Volume= 8,000 cf  
 Outflow = 0.99 cfs @ 12.27 hrs, Volume= 7,381 cf, Atten= 55%, Lag= 11.0 min  
 Discarded = 0.04 cfs @ 6.75 hrs, Volume= 4,429 cf  
 Primary = 0.15 cfs @ 12.27 hrs, Volume= 147 cf  
 Routed to Pond 105P : DMH-105  
 Secondary = 0.80 cfs @ 12.27 hrs, Volume= 2,805 cf  
 Routed to Pond 1P : Storm Trap

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs  
 Peak Elev= 396.37' @ 12.27 hrs Surf.Area= 1,638 sf Storage= 3,208 cf  
 Flood Elev= 396.48' Surf.Area= 1,638 sf Storage= 3,342 cf

Plug-Flow detention time= 329.2 min calculated for 7,381 cf (92% of inflow)  
 Center-of-Mass det. time= 287.4 min ( 1,030.6 - 743.2 )

Volume	Invert	Avail.Storage	Storage Description
#1A	393.25'	1,297 cf	<b>25.79'W x 63.50'L x 4.75'H Field A</b> 7,779 cf Overall - 4,538 cf Embedded = 3,241 cf x 40.0% Voids
#2A	394.50'	3,414 cf	<b>StormTrap ST2 SingleTrap 3-0 x 3 Inside #1</b> Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf 8.48' x 46.19' Core + 6.66' Border = 21.79' x 59.50' System
		4,710 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	396.16'	<b>12.0" Round Culvert</b> L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 396.16' / 396.06' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	393.25'	<b>1.000 in/hr Exfiltration over Surface area</b>
#3	Secondary	395.75'	<b>12.0" Round Culvert</b> L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 395.75' / 395.75' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

**Discarded OutFlow** Max=0.04 cfs @ 6.75 hrs HW=393.30' (Free Discharge)

↑**2=Exfiltration** (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=0.15 cfs @ 12.27 hrs HW=396.37' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.15 cfs @ 1.86 fps)

**Secondary OutFlow** Max=0.79 cfs @ 12.27 hrs HW=396.37' (Free Discharge)

↑**3=Culvert** (Barrel Controls 0.79 cfs @ 2.21 fps)

**Pond 3P: Storm Trap - Chamber Wizard Field A****Chamber Model = StormTrapST2 SingleTrap 3-0 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 36.0"H =&gt; 22.99 sf x 15.40'L = 354.0 cf

Outside= 101.7"W x 42.0"H =&gt; 29.68 sf x 15.40'L = 456.9 cf

3 Chambers/Row x 15.40' Long = 46.19' Row Length +79.9" Border x 2 +24.0" End Stone x 2 = 63.50'  
Base Length

1 Rows x 101.7" Wide + 79.9" Side Border x 2 + 24.0" Side Stone x 2 = 25.79' Base Width

15.0" Stone Base + 42.0" Chamber Height = 4.75' Field Height

3 Chambers x 354.0 cf + 2,351.9 cf Border = 3,413.9 cf Chamber Storage

3 Chambers x 456.9 cf + 3,167.4 cf Border = 4,538.1 cf Displacement

7,779.4 cf Field - 4,538.1 cf Chambers = 3,241.3 cf Stone x 40.0% Voids = 1,296.5 cf Stone Storage

Chamber Storage + Stone Storage = 4,710.4 cf = 0.108 af

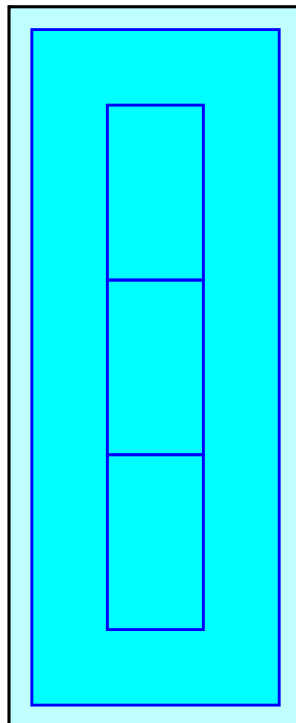
Overall Storage Efficiency = 60.5%

Overall System Size = 63.50' x 25.79' x 4.75'

3 Chambers (plus border)

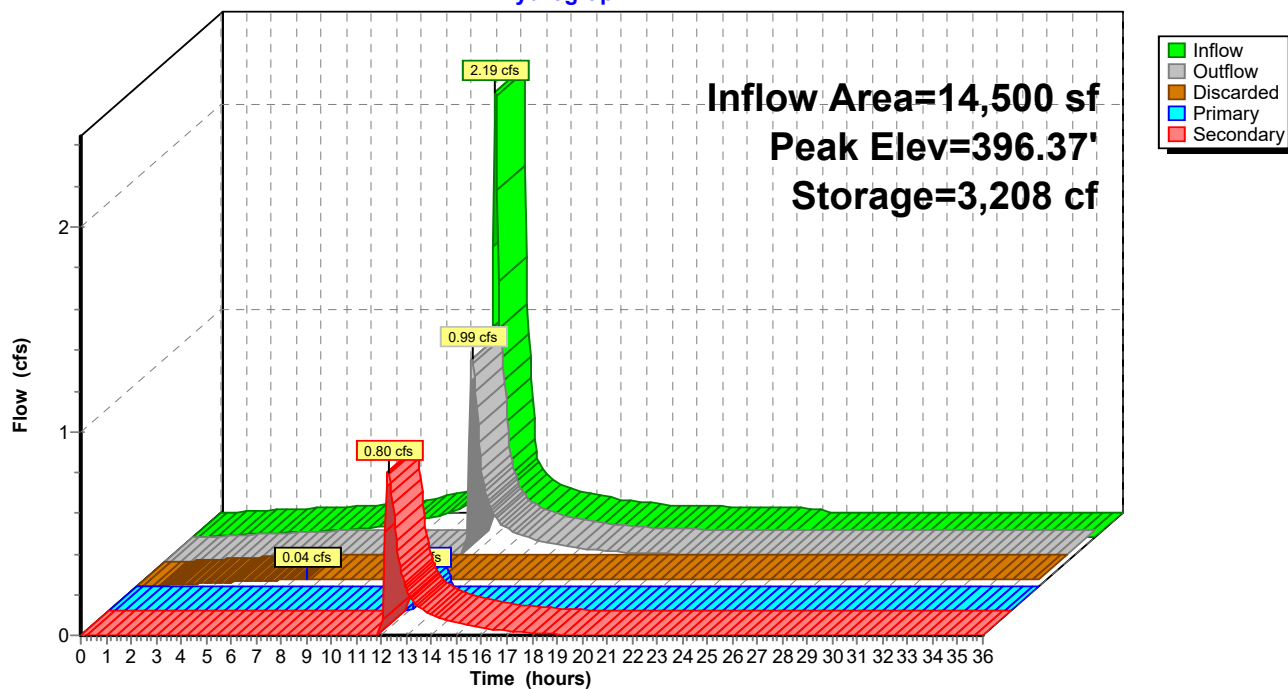
288.1 cy Field

120.0 cy Stone



# Pond 3P: Storm Trap

## Hydrograph



## **SECTION 5.0**

### **ADDITIONAL DRAINAGE CALCULATIONS**

5.01 TOTAL SUSPENDED SOLIDS REMOVAL (TSS)

5.02 PIPE OUTLET PROTECTION CALCULATION

### **5.01 TOTAL SUSPENDED SOLIDS REMOVAL (TSS)**

## TSS Removal Calculation Worksheet

Location: 160 Old Turnpike Road, Nottingham, NH

Project: 1-3602.01



Prepared By: J. White

Date: 05/26/22

### AREA 1 - Subcatchment 1A

Total Impervious Area, Acres= 0.333

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
DMH w/Deep Sump & Hood	0.15	1.00	0.15	0.85
Oil/Particle Separator		0.85		0.85
Stormtrap Infiltration Basin	0.9	0.85	0.77	0.09

TSS Removal = 0.92

### AREA 2 - Subcatchment 1B

Total Impervious Area, Acres= 0.344

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
DMH w/Deep Sump & Hood	0.15	1.00	0.15	0.85
Oil/Particle Separator		0.85		0.85
Stormtrap Infiltration Basin	0.9	0.85	0.77	0.09

TSS Removal = 0.92

### AREA 3 - Subcatchment 1E

Total Impervious Area, Acres= 0.333

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
DMH w/Deep Sump & Hood	0.15	1.00	0.15	0.85
Oil/Particle Separator		0.85		0.85
Stormtrap Infiltration Basin	0.9	0.85	0.77	0.09

TSS Removal = 0.92

### Weighted Annual Average TSS Removal Rate

[TSS Removal-1 (Area-1) + TSS Removal-2 (Area-2) + ...] / [Area-1 + Area-2 + ...] = 0.92

Project Site TSS Removal = 0.92



## **5.02 PIPE OUTLET PROTECTION CALCULATIONS**

# OUTLET PROTECTION SIZING



Project No. 1.3602.01  
 Subject Outlet Protection Sizing Calcs  
 Location Shea Concrete, Nottingham, NH

Calc By J. White  
 Date 5/31/2022  
 Checked by  
 Date

## FES-1

Q=Design Discharge, (ft<sup>3</sup>/s) = 1.98 cfs  
 D=Culvert Diameter, (ft) = 1.00 ft  
 TW=Tailwater Depth, (ft) = 0.4 ft, (0.4xD for unknown tailwater, or enter known tailwater)  
 (Tailwater depth is to be limited to between 0.4D and 1.0D)

Riprap Rock Sizing

$D_{50} = 0.2D \left[ \frac{Q}{\sqrt{gD^{2.5}}} \right]^{4/3} \left[ \frac{D}{TW} \right]$   $g=32.2 \text{ fps}$   
 $D_{50} = \text{median rock size, ft}$

$D_{50} = 0.2 \left| \frac{1.98}{5.67} \right|^{(4/3)} \left| \frac{1.00}{0.40} \right| = 0.12 \text{ ft}$   
 = 1 inches

Table 1 : Riprap Classes and Apron Dimensions

Class	D <sub>50</sub> (in)	Apron Length	Apron Depth
1	5	4D	3.5D <sub>50</sub>
<b>2</b>	<b>6</b>	<b>4D</b>	<b>3.5D<sub>50</sub></b>
3	10	5D	3.3D <sub>50</sub>
4	14	6D	2.2D <sub>50</sub>
5	20	7D	2.0D <sub>50</sub>
6	22	8D	2.0D <sub>50</sub>

Use Class 2

Apron Dimensions

Length, L=4D = 4 ft  
 Depth=3.5D<sub>50</sub> = 5.16 Inches  
 Width=3D+(2/3)L = 5.67 ft (at apron end)

Riprap Rock Sizing Gradation

% of Weight Smaller than Given Size	Size of Stone, inches		
100	2	to	3
85	2	to	3
50	1	to	2
15	2	to	1

# OUTLET PROTECTION SIZING



Project No. 1.3602.01  
 Subject Outlet Protection Sizing Calcs  
 Location Shea Concrete, Nottingham, NH

Calc By J. White  
 Date 5/31/2022  
 Checked by  
 Date

## FES-2

Q=Design Discharge, (ft<sup>3</sup>/s) = 2.12 cfs  
 D=Culvert Diameter, (ft) = 1.00 ft  
 TW=Tailwater Depth, (ft) = 0.4 ft, (0.4xD for unknown tailwater, or enter known tailwater)  
 (Tailwater depth is to be limited to between 0.4D and 1.0D)

Riprap Rock Sizing

$D_{50} = 0.2D \left[ \frac{Q}{\sqrt{gD^{2.5}}} \right]^{4/3} \left[ \frac{D}{TW} \right]$   $g=32.2 \text{ fps}$   
 $D_{50} = \text{median rock size, ft}$

$D_{50} = 0.2 \left| \frac{2.12}{5.67} \right|^{(4/3)} \left| \frac{1.00}{0.40} \right| = 0.13 \text{ ft}$   
 = 2 inches

Table 1 : Riprap Classes and Apron Dimensions

Class	D <sub>50</sub> (in)	Apron Length	Apron Depth
1	5	4D	3.5D <sub>50</sub>
<b>2</b>	<b>6</b>	<b>4D</b>	<b>3.5D<sub>50</sub></b>
3	10	5D	3.3D <sub>50</sub>
4	14	6D	2.2D <sub>50</sub>
5	20	7D	2.0D <sub>50</sub>
6	22	8D	2.0D <sub>50</sub>

Use Class 2

Apron Dimensions

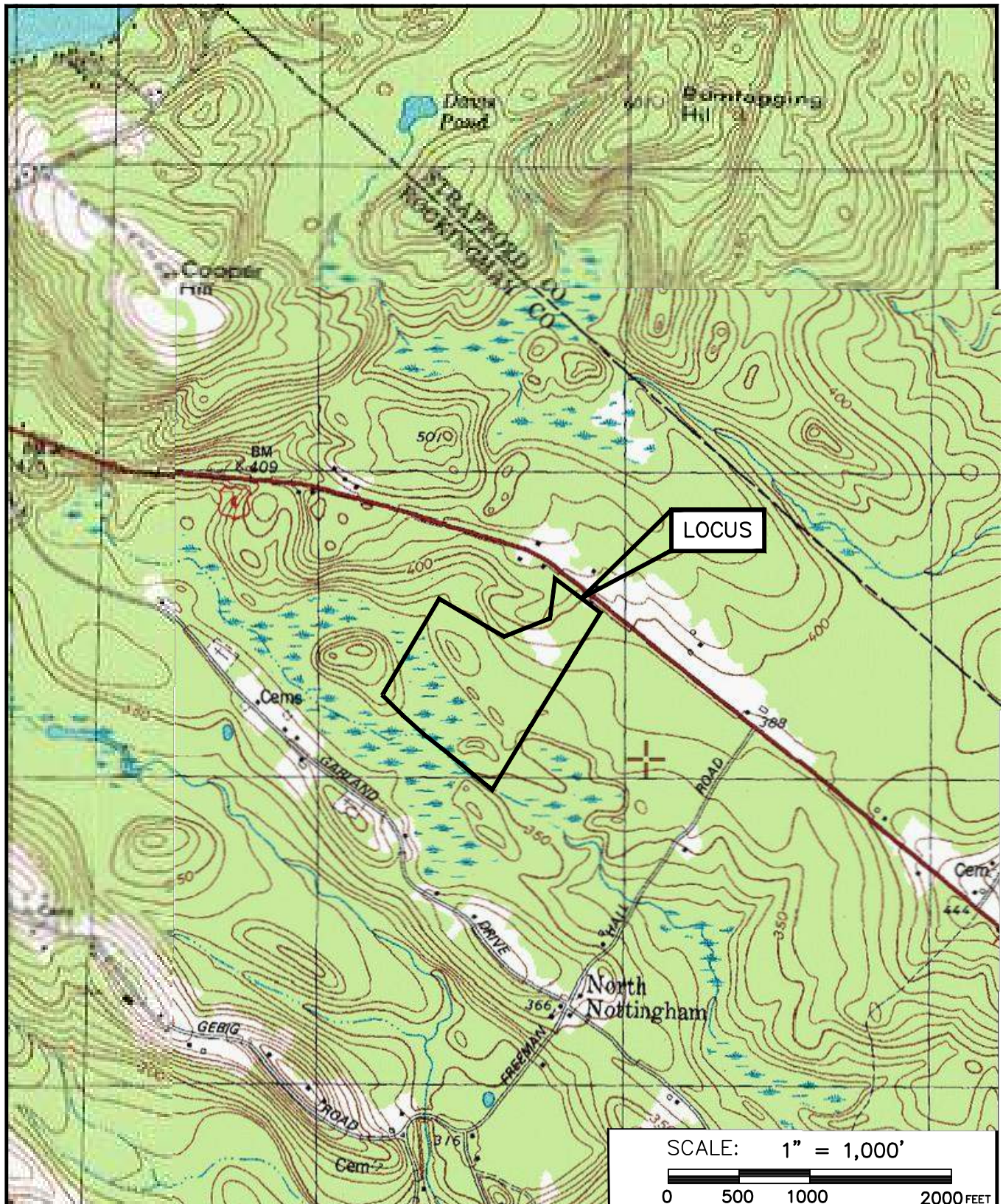
Length, L=4D = 4 ft  
 Depth=3.5D<sub>50</sub> = 5.65 Inches  
 Width=3D+(2/3)L = 5.67 ft (at apron end)

Riprap Rock Sizing Gradation

% of Weight Smaller than Given Size	Size of Stone, inches		
100	2	to	3
85	2	to	3
50	2	to	2
15	2	to	1

## **APPENDICES**

## **USGS LOCUS MAP**



PREPARED FOR:

SHEA CONCRETE  
87 HAVERHILL AVE  
AMESBURY, MA 01950

## USGS LOCUS

Source:

SHEA CONCRETE PROPOSED  
MANUFACTURING FACILITY  
160 OLD TURNPIKE ROAD  
NOTTINGHAM, NH

SCALE: 1" = 1,000'

0 500 1000 2000 FEET



300 Brickstone Square, Suite 901A  
Andover, Massachusetts  
01810

617 896 4300

Job No.: 1-3602.01 Date: MAY 26, 2022  
Scale: X"=XX' Revised: \_\_\_\_\_  
Dwg. No: \_\_\_\_\_ Figure: \_\_\_\_\_

## **EXTREME PRECIPITATION TABLES**

# Extreme Precipitation Tables

## Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

<b>Smoothing</b>	Yes
<b>State</b>	New Hampshire
<b>Location</b>	
<b>Longitude</b>	71.107 degrees West
<b>Latitude</b>	43.178 degrees North
<b>Elevation</b>	0 feet
<b>Date/Time</b>	Thu, 26 May 2022 08:22:14 -0400

## Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.26	0.40	0.49	0.65	0.81	1.02	<b>1yr</b>	0.70	0.98	1.19	1.52	1.95	2.52	2.76	<b>1yr</b>	2.23	2.66	3.07	3.78	4.36	<b>1yr</b>
<b>2yr</b>	0.32	0.49	0.61	0.80	1.01	1.28	<b>2yr</b>	0.87	1.16	1.48	1.88	2.38	3.02	3.36	<b>2yr</b>	2.67	3.23	3.74	4.45	5.08	<b>2yr</b>
<b>5yr</b>	0.37	0.57	0.72	0.97	1.23	1.58	<b>5yr</b>	1.07	1.44	1.85	2.35	2.99	3.81	4.30	<b>5yr</b>	3.37	4.13	4.75	5.61	6.34	<b>5yr</b>
<b>10yr</b>	0.41	0.64	0.81	1.10	1.44	1.86	<b>10yr</b>	1.24	1.70	2.18	2.80	3.57	4.55	5.17	<b>10yr</b>	4.02	4.97	5.69	6.68	7.51	<b>10yr</b>
<b>25yr</b>	0.47	0.75	0.96	1.32	1.76	2.30	<b>25yr</b>	1.52	2.10	2.72	3.50	4.50	5.75	6.61	<b>25yr</b>	5.09	6.36	7.24	8.43	9.40	<b>25yr</b>
<b>50yr</b>	0.53	0.85	1.09	1.53	2.06	2.72	<b>50yr</b>	1.78	2.48	3.22	4.17	5.37	6.86	7.97	<b>50yr</b>	6.07	7.67	8.70	10.05	11.15	<b>50yr</b>
<b>100yr</b>	0.59	0.96	1.24	1.76	2.40	3.21	<b>100yr</b>	2.07	2.92	3.83	4.97	6.41	8.20	9.61	<b>100yr</b>	7.26	9.24	10.44	11.99	13.23	<b>100yr</b>
<b>200yr</b>	0.67	1.10	1.42	2.04	2.81	3.79	<b>200yr</b>	2.43	3.45	4.52	5.91	7.63	9.80	11.59	<b>200yr</b>	8.67	11.15	12.54	14.31	15.70	<b>200yr</b>
<b>500yr</b>	0.80	1.31	1.71	2.48	3.47	4.71	<b>500yr</b>	2.99	4.30	5.65	7.42	9.64	12.42	14.86	<b>500yr</b>	10.99	14.29	15.99	18.11	19.72	<b>500yr</b>

## Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.23	0.36	0.43	0.58	0.72	0.89	<b>1yr</b>	0.62	0.87	0.95	1.27	1.53	2.00	2.47	<b>1yr</b>	1.77	2.38	2.82	3.37	3.76	<b>1yr</b>
<b>2yr</b>	0.31	0.48	0.59	0.80	0.99	1.17	<b>2yr</b>	0.86	1.15	1.35	1.80	2.31	2.91	3.22	<b>2yr</b>	2.58	3.10	3.59	4.34	4.95	<b>2yr</b>
<b>5yr</b>	0.35	0.54	0.67	0.92	1.17	1.40	<b>5yr</b>	1.01	1.37	1.60	2.11	2.73	3.42	3.82	<b>5yr</b>	3.03	3.68	4.25	5.26	5.75	<b>5yr</b>
<b>10yr</b>	0.39	0.59	0.73	1.03	1.33	1.59	<b>10yr</b>	1.14	1.56	1.80	2.40	3.08	3.85	4.33	<b>10yr</b>	3.41	4.16	4.83	6.08	6.42	<b>10yr</b>
<b>25yr</b>	0.44	0.68	0.84	1.20	1.58	1.90	<b>25yr</b>	1.36	1.86	2.11	2.79	3.60	4.46	5.08	<b>25yr</b>	3.95	4.89	5.71	7.38	8.21	<b>25yr</b>
<b>50yr</b>	0.49	0.75	0.93	1.34	1.80	2.17	<b>50yr</b>	1.55	2.12	2.37	3.14	4.05	4.96	5.70	<b>50yr</b>	4.39	5.48	6.47	8.53	9.46	<b>50yr</b>
<b>100yr</b>	0.55	0.83	1.04	1.51	2.07	2.49	<b>100yr</b>	1.78	2.43	2.68	3.53	4.54	5.51	6.39	<b>100yr</b>	4.88	6.14	7.36	9.87	10.85	<b>100yr</b>
<b>200yr</b>	0.61	0.93	1.17	1.70	2.37	2.84	<b>200yr</b>	2.04	2.78	3.01	3.96	5.10	6.08	8.75	<b>200yr</b>	5.38	8.41	8.36	11.42	12.46	<b>200yr</b>
<b>500yr</b>	0.72	1.07	1.38	2.01	2.85	3.42	<b>500yr</b>	2.46	3.34	3.53	4.61	5.97	6.88	10.61	<b>500yr</b>	6.09	10.21	9.90	13.87	14.92	<b>500yr</b>

## Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.28	0.44	0.53	0.72	0.88	1.07	<b>1yr</b>	0.76	1.05	1.23	1.69	2.14	2.77	3.17	<b>1yr</b>	2.45	3.04	3.45	4.07	4.81	<b>1yr</b>
<b>2yr</b>	0.33	0.50	0.62	0.84	1.04	1.24	<b>2yr</b>	0.90	1.22	1.45	1.91	2.45	3.20	3.56	<b>2yr</b>	2.83	3.42	3.94	4.58	5.22	<b>2yr</b>
<b>5yr</b>	0.40	0.61	0.76	1.04	1.32	1.57	<b>5yr</b>	1.14	1.54	1.83	2.43	3.11	4.22	4.80	<b>5yr</b>	3.73	4.62	5.27	5.95	6.97	<b>5yr</b>
<b>10yr</b>	0.46	0.71	0.88	1.23	1.59	1.91	<b>10yr</b>	1.38	1.87	2.20	2.94	3.73	5.25	6.06	<b>10yr</b>	4.65	5.83	6.61	7.27	8.61	<b>10yr</b>
<b>25yr</b>	0.57	0.87	1.08	1.54	2.03	2.46	<b>25yr</b>	1.75	2.41	2.83	3.79	4.76	7.04	8.30	<b>25yr</b>	6.23	7.98	8.90	9.51	10.55	<b>25yr</b>
<b>50yr</b>	0.66	1.01	1.26	1.81	2.44	2.98	<b>50yr</b>	2.10	2.92	3.43	4.58	5.74	8.79	10.55	<b>50yr</b>	7.78	10.14	11.16	11.64	12.84	<b>50yr</b>
<b>100yr</b>	0.78	1.18	1.48	2.14	2.93	3.61	<b>100yr</b>	2.53	3.53	4.15	5.57	6.93	10.99	13.40	<b>100yr</b>	9.73	12.89	14.01	14.27	15.63	<b>100yr</b>
<b>200yr</b>	0.91	1.38	1.74	2.52	3.52	4.38	<b>200yr</b>	3.04	4.28	5.04	6.76	8.36	13.80	14.70	<b>200yr</b>	12.22	14.13	17.57	17.47	19.07	<b>200yr</b>
<b>500yr</b>	1.13	1.69	2.17	3.15	4.48	5.65	<b>500yr</b>	3.87	5.52	6.49	8.76	10.74	18.66	19.67	<b>500yr</b>	16.51	18.91	23.71	22.89	24.82	<b>500yr</b>



## **SOIL SURVEY MAP**



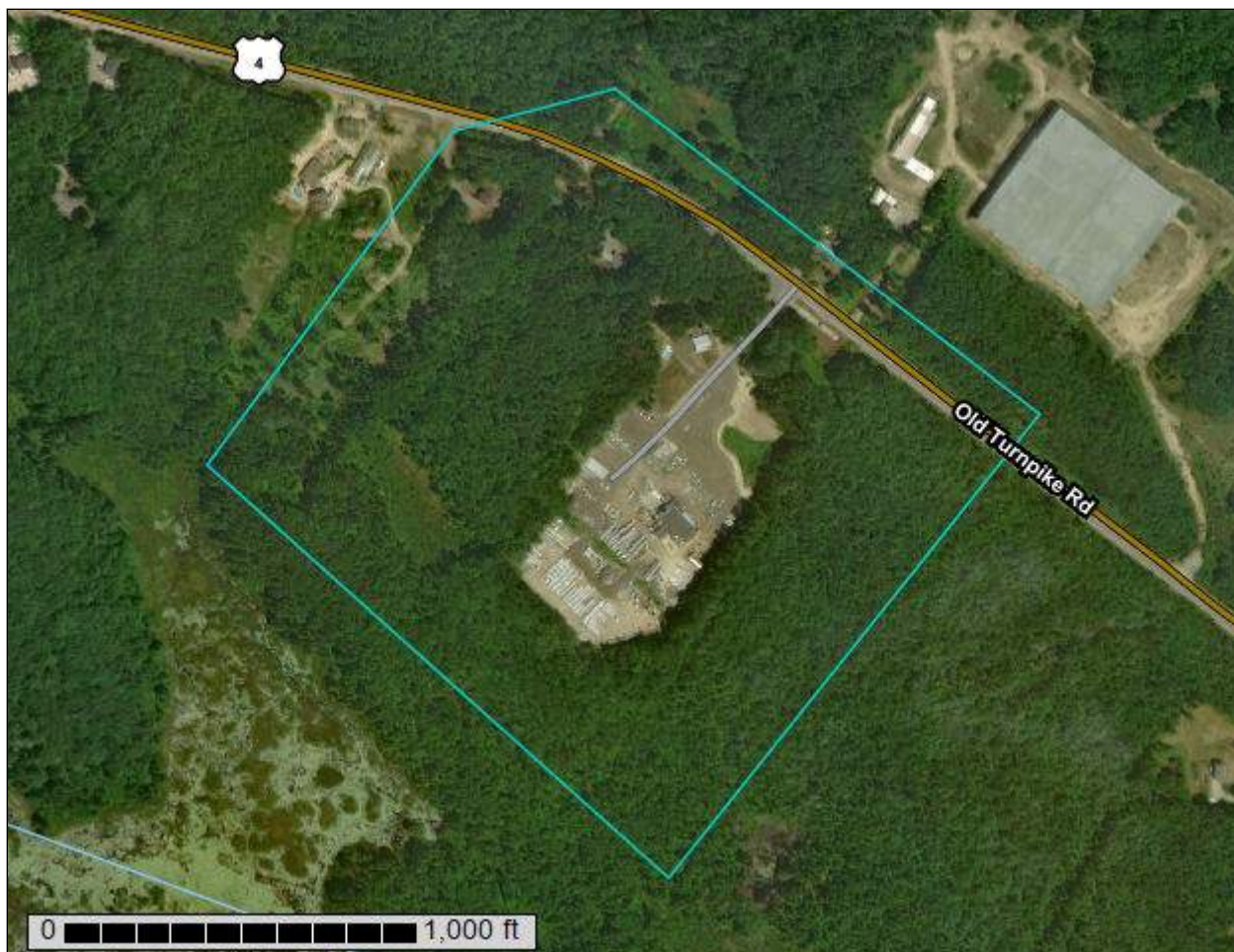
United States  
Department of  
Agriculture

**NRCS**

Natural  
Resources  
Conservation  
Service

A product of the National  
Cooperative Soil Survey,  
a joint effort of the United  
States Department of  
Agriculture and other  
Federal agencies, State  
agencies including the  
Agricultural Experiment  
Stations, and local  
participants

# Custom Soil Resource Report for **Rockingham County, New Hampshire**



March 25, 2022

# Soil Map

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The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



# Custom Soil Resource Report Soil Map






# Custom Soil Resource Report

## MAP LEGEND




















### Area of Interest (AOI)







Area of Interest (AOI)

### Soils


-  Soil Map Unit Polygons
-  Soil Map Unit Lines
-  Soil Map Unit Points

### Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

### Water Features

-  Streams and Canals

### Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

### Background

-  Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:  
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Rockingham County, New Hampshire  
Survey Area Data: Version 24, Aug 31, 2021

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

Date(s) aerial images were photographed: Aug 28, 2015—May 15, 2017

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
42B	Canton fine sandy loam, 3 to 8 percent slopes	2.8	4.2%
43B	Canton fine sandy loam, 0 to 8 percent slopes, very stony	10.8	16.5%
43C	Canton fine sandy loam, 8 to 15 percent slopes, very stony	10.9	16.7%
43D	Canton fine sandy loam, 15 to 25 percent slopes, very stony	4.9	7.5%
395	Swansea mucky peat, 0 to 2 percent slopes	6.3	9.6%
447A	Scituate-Newfields complex, 0 to 3 percent slopes, very stony	14.4	22.1%
547A	Walpole very fine sandy loam, 0 to 3 percent slopes, very stony	9.8	15.1%
547B	Walpole very fine sandy loam, 3 to 8 percent slopes, very stony	5.4	8.3%
<b>Totals for Area of Interest</b>		<b>65.3</b>	<b>100.0%</b>

## Map Unit Descriptions

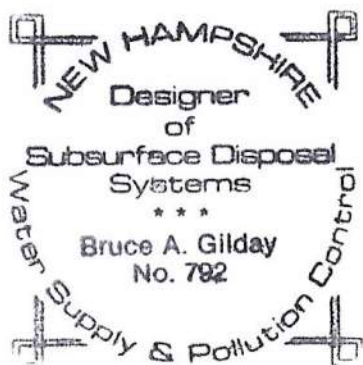
The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They

## **SOIL EVALUATOR FORMS**





LAND CONSULTANTS



DATE: 04/07/22  
JOB NO: 3353  
INVESTIGATOR BAGilday

PROJECT SITE: Route 4, Nottingham NH

APPLICANT / OWNER: Shea Concrete Products

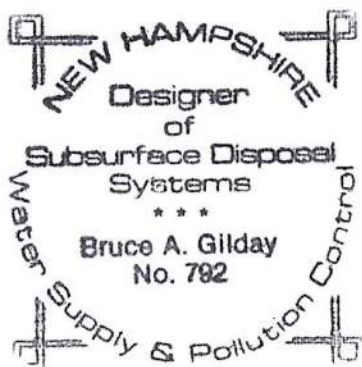
TP# #1

HOR.	DEPTH	MATRIX COLOR	TEXTURE	STRUCTURE	CONSISTENCY
A	0-8"	10YR 2/2	FSL	1.FGR	VFR
Bw <sub>1</sub>	8-20"	7.5YR 6/6	FSL	1.FGR	VFR
Bw <sub>2</sub>	20-36"	2.5YR 6/4	FSL	2.FGR	FR
C	36-80"	10YR 6/4	FSL	MASSIVE	FR

MOTTLE REMARKS: E.S.H.W.T. = 64" // Est. Perc Rate = 4 min/in @ 32" Depth  
Redox (7.5YR 5/6) Observed @ 64" [Distinct & Common]

OTHER COMMENTS: No Water Observed @ 80" // Very Few Boulders Stones Observed @ 80"  
Glacial Till Parent Material // No Hardpan Observed @ 80"





DATE: 04/07/22  
 JOB NO: 3353  
 INVESTIGATOR: BAGilday

PROJECT SITE: Route 4, Nottingham NH

APPLICANT / OWNER: Shea Concrete Products

TP# #2

HOR.	DEPTH	MATRIX COLOR	TEXTURE	STRUCTURE	CONSISTENCY
A	0-5"	10YR 2/2	FSL	1.FGR	VFR
B <sub>w1</sub>	5-15"	7.5YR 6/6	FSL	1FG <sub>r</sub>	VFR
B <sub>w2</sub>	15-30"	10YR 6/4	FSL	2FGR	FR
C	30-82"	2.5Y6/4	FSL	MASSIVE	FR

MOTTLE REMARKS: E.S.H.W.T. = 60"  
 Redox (7.5YR 5/6) Observed @ 60" [Distinct & Common]

OTHER COMMENTS: No Water Observed @ 82" // No Boulders & Few Stones Observed @ 82"  
 Glacial Till Parent Material // No Hardpan Observed @ 82"



LAND CONSULTANTS

DATE: 04/07/22

JOB NO: 3353

INVESTIGATOR BAGilday

PROJECT SITE: Route 4, Nottingham NH

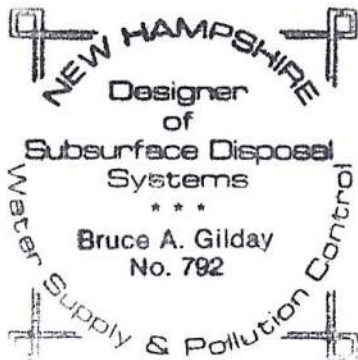
APPLICANT / OWNER: Shea Concrete Products

TP# #3

HOR.	DEPTH	MATRIX COLOR	TEXTURE	STRUCTURE	CONSISTENCY
A	0-7"	10YR 2/2	FSL	1.FGR	VFR
B <sub>w1</sub>	7-23"	7.5YR 6/6	FSL	1.FGR	FR
B <sub>w2</sub>	23-35"	10YR 5/6	FSL	2.FGR	FR
C	35-78"	2.5Y 6/4	FSL	MASSIVE	FR

MOTTLE REMARKS: E.S.H.W.T. = 46"  
Redox (7.5YR 5/6) Observed @ 46" [Distinct & Common]

OTHER COMMENTS: No Water Observed @ 78" // No Boulders & Few Stones Observed @ 78"  
Glacial Till Parent Material // No Hardpan Observed @ 78"



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LAND CONSULTANTS

DATE: 04/07/22

JOB NO: 3353

INVESTIGATOR BAGilday

PROJECT SITE: Route 4, Nottingham NH

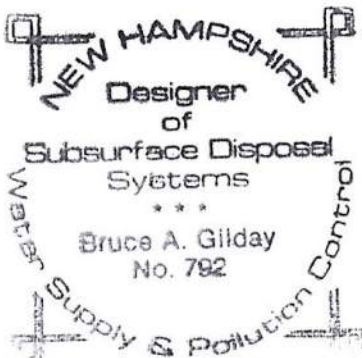
APPLICANT / OWNER: Shea Concrete Products

TP# #4

HOR.	DEPTH	MATRIX COLOR	TEXTURE	STRUCTURE	CONSISTENCY
A	0-5"	10YR 2/2	FSL	1.FGR	VFR
B <sub>w1</sub>	5-28"	7.5YR 6/6	FSL	2.FGR	FR
B <sub>w2</sub>	28-36"	2.5Y 6/4	FSL	SUB	FR
C	36-66"	2.5Y 5/3	FSL	PLATY	FIRM

MOTTLE REMARKS: E.S.H.W.T. = 36"  
Redox (7.5YR 5/6) Observed @ 36"

OTHER COMMENTS: Water Observed @ 38" // Few Boulder & Stones observed @ 36"  
Glacial Till Parent Material // Hardpan Observed @ 42"



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www.bag-landconsultants.com

DATE: 5-23-22

JOB NO:

INVESTIGATOR

BAGilday

PROJECT SITE:

NH RTE 4, Nottingham, NH

Lot:

APPLICANT / OWNER:

Shea Concrete

TP#

5

HOR.	DEPTH	MATRIX COLOR	TEXTURE	STRUCTURE	CONSISTENCY
A	0-9"	10YR 2/2	FSL	1 fgr	V.FR
Bw <sub>1</sub>	9-17"	10YR 5/4	FSL	1 fgr	V.FR
Bw <sub>2</sub>	17-29"	10YR 6/6	FSL	2 fgr	FR
C	29-96"	10YR 6/4	FSL	MASSIVE	FR

BOTTLE REMARKS:

E.S.H.W.T. = 54"

Redox (7.5pH) Observed @ 54" [Distinct &amp; Common]

OTHER COMMENTS:

No Water Observed @ 96" // Few Boulders & Stones observed @ 36"  
Glacial Till Parent Material // No Hardpan Observed @ 96"



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DATE: 5-23-01

JOB NO:

INVESTIGATOR: BAGilday

PROJECT SITE:

NH RTE 4; Nottingham, NH

Lot:

APPLICANT / OWNER:

Shen Concrete

TP#

6

HOR.	DEPTH	MATRIX COLOR	TEXTURE	STRUCTURE	CONSISTENCY
A	0-6"	10YR 2 1/2	FSL	1 fgr	VFR
B1	6-18"	10YR 5/4	FSL	1 fgr	VFR
B2	18-28"	10YR 6/4	FSL	2 fgr	FR
C	28-88"	10YR 6/3	FSL	MASSIVE	FR

NOTTLE REMARKS:

E.S.H.W.T. = 56"

Redox (7.5/8.5/6) Observed @ 56" [Distinct & Common]

OTHER COMMENTS:

No Water Observed @ 88" // Boulders & Stones observed @ 36"  
Glacial Till Parent Material // No Hardpan Observed @ 88"



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DATE:

5-23-22

JOB NO:

INVESTIGATOR

BAGilday

PROJECT SITE:

NH Rte 4; Nottingham, NH

Lot:

APPLICANT / OWNER:

Shen Concrete

TP#

7

HOR.	DEPTH	MATRIX COLOR	TEXTURE	STRUCTURE	CONSISTENCY
A	0-6	10YR 2/2	FSL	1 layer	VFE
B <sub>u</sub>	6-14	10YR 5/4	FSL	2 layer	FR
B <sub>u</sub>	14-28"	10YR 6/6	FSL	2 layer	FR
C	28-86"	10YR 6/3	FSL	MASSIVE	FR

BOTTLE REMARKS:

E.S.H.W.T. = 62"

Redox (Fe<sup>2+</sup>/Fe<sup>3+</sup>) Observed @ 62" [Distinct & Common]

OTHER COMMENTS:

No Water Observed @ 86" // Few Stones observed @ 40"

Glacial Till Parent Material // (No Hardpan Observed @ 86")





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Page: 1 of 10

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DATE: 5-23-22

JOB NO:

INVESTIGATOR

BAGilday

PROJECT SITE:

NH RTE 4; Nottingham, NH

Lot:

APPLICANT / OWNER:

Shea. Converse

TP#

8

HOR.	DEPTH	MATRIX COLOR	TEXTURE	STRUCTURE	CONSISTENCY
A	0-5"	10YR 2/2	FSL	1.5gr	V.FR
B <sub>1</sub>	5-14	10YR 5/4	FSL	1.5gr	V.FR
B <sub>2</sub>	14-30	10YR 5/6	FSL	2 Fgr	FR
C	30-88"	10YR 4/3	FSL	Massive	FR

BOTTLE REMARKS:

E.S.H.W.T. = 64"

Redox (75YR 5/6) Observed @ 64" [Distinct & Common]

OTHER COMMENTS:

No Water Observed @ 88" // Boulders & Stones observed @ 36"  
Glacial Till Parent Material // No Hardpan Observed @ 88"



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DATE: 5-23-22

JOB NO:

INVESTIGATOR: BAGilday

PROJECT SITE:

NH RE-4; Nottingham, NH

Lot:

APPLICANT / OWNER:

Shea Concrete

TP#

9

HOR.	DEPTH	MATRIX COLOR	TEXTURE	STRUCTURE	CONSISTENCY
A	0-5"	10YR 3/2	FSL	1.FGR	VFR
B <sub>1</sub>	5-14"	10YR 4/4	FSL	1.FGR	VFR
B <sub>2</sub>	14-25"	10YR 5/6	FSL	2.FGR	FR
C	25-92"	10YR 6/4	FSL	MASSIVE	FR

NOTTLE REMARKS:

E.S.H.W.T. = 64"

Redox (7.5/9.5) Observed @ 64" [Distinct &amp; Common]

OTHER COMMENTS:

Water Observed 92" // Few

Glacial Till Parent Material // No Hardpan Observed @ 92"





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DATE: 5-23-02

JOB NO: \_\_\_\_\_

INVESTIGATOR BAGilday

PROJECT SITE:

NH RTE 4; Nottingham, NH

Lot: \_\_\_\_\_

APPLICANT / OWNER:

Shen Concrete

TP#

10

HOR.	DEPTH	MATRIX COLOR	TEXTURE	STRUCTURE	CONSISTENCY
A	0-5"	10YR 7/2	FSL	1-fgr	VER
B <sub>w1</sub>	5-17"	10YR 5/4	FSL	1-fgr	V-tr
B <sub>w2</sub>	17-36"	10YR 5/6	FSL	2-fgr	FR
C	36-84"	10YR 9/3	FSL	MASSIVE	FR

BOTTLE REMARKS:

E.S.H.W.T. = 64"  
Redox (75YR 6/8) Observed @ 64" [Distinct & Common]

OTHER COMMENTS:

No Water Observed 84" // Few Boulders & Stones observed @  
Glacial Till Parent Material // No Hardpan Observed @ 84"