Stormwater Pollution Prevention Plan

for

Southeast Executive Park
Driveway Extension and Parking Area Addition

185 Route 312
Tax Map: Sheet 45, Block 1, Lot 3
Town of Southeast, Putnam County, New York

Revised: August 31, 2018
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Contractor's Certification:

"I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the *owner or operator* must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System ("SPDES") General Permit for Stormwater Discharges from Construction Activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings."

Name & Title: _____

Signature: _____

Company Name: _____

Company Address _____

Phone: _____

Date: _____

Trained Contractor: _____
(On-site, Daily)

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1.0 Introduction

1.1 Project Description

The Southeast Executive Park located at 185 Route 312 in the Town of Southeast is a 7 acre commercial use parcel owned by Ninth Jam Development, LLC. The site contains a 3-story, 50,000 sq. ft. office building which is now entirely occupied by Caremount Medical Group and affiliated users. While the site is provided with parking spaces in excess of the Zoning Code requirement for office use, the available parking for staff and patients of Caremount Medical Group is often insufficient. At times, visitors are parking in other than designated spaces. Short term solutions are being undertaken by the Owner and Caremount. Valet parking is now provided by Caremount. The Owner is installing signs indicating where parking is prohibited.

The longer term solution is provision of additional parking spaces. Space on the site is very limited for additional parking area. The Town of Southeast and NYSEG own property adjacent to the site. The Town parcel is vacant land with the potential to serve as future parkland. The NYSEG property contains elevated electrical transmission cables with supporting poles. The Town has offered space on its 10 acre parcel to provide additional parking. Two tiered parking lots are proposed on Town property which would provide 75 additional spaces. It is intended that the new parking will jointly serve both Caremount Medical Group and attendees of events held at the Town park property.

Critical to the parking plan is the need to access the parking areas from a driveway proposed on lands of NYSEG. The driveway is to extend from the existing driveway at Southeast Executive Park. The Town has requested that the driveway be continued to intersect with Independent Way. A connecting driveway will increase the flexibility of ingress and egress to Southeast Executive Park and provide access to the parking from Independent Way during Town events. The greater portion of the driveway would be located on NYSEG property.

In conjunction with the introduction of new impervious (paved) surfaces, the NYSDEC stormwater regulations require that the initial portion of runoff be directed to Green Infrastructure Practices (GIP's) or standard stormwater management practices with runoff reduction capacity. Infiltration systems are preferred for this purpose. Two (2) below grade systems are proposed on the NYSEG property with connecting storm drain pipe, and concrete manholes, catch basins, and diversion structures. The infiltration systems will provide treatment for stormwater runoff generated by the proposed parking areas and access drive from Independent Way. Overflows from the infiltration systems will be piped to existing storm drain systems connecting to the Highlands stormwater management system.

In addition to the proposed access drive and parking areas the owners of the Southeast Executive Park are proposing to construct a new concrete sidewalk on the west side of the building to provide pedestrian access to the new parking areas. Stormwater runoff generated by the proposed sidewalk will sheet flow to existing

stormwater conveyance measures and existing lawn areas. Water quality treatment for the proposed impervious surface will be provided via tree planting which is designated as a green infrastructure area reduction practice in the NYS Stormwater Design Manual.

The owners of Southeast Executive Park will be responsible for the construction and long term maintenance of the new parking areas, the new driveway and stormwater improvements to be located on NYSEG property. Easement agreements will be required with the Town, NYSEG and Highlands Center. Discussions on the formation of easements have been initiated with the three involved landowners.

The project will require the disturbance of approximately 2.8 acres. New impervious coverage associated with pavement for the drive and parking is 1.05+/- acres. Under New York City Watershed Regulations the thresholds requiring preparation and review of a SWPPP for the project are met; a) the 2.8 acres of disturbance includes areas of slope in excess of 15% and b) the area of new impervious will exceed 40,000 sq. ft. Under the SPDES General Permit for Stormwater Discharges from Construction Activity GP-0-15-002 the area of disturbance exceeds 1 acre and thus meets the requirement for preparation of a SWPPP which includes provisions for post-construction stormwater management practices.

There are no violations pending against the applicant in connection with the project.

The New York State Cultural Resource Information System (CRIS) does not have any indication that the proposed activities will have any effects on properties listed on their historic places registries. The website's map also shows that the extent of the proposed project falls outside of areas designated as archeologically sensitive. Therefore, this project is eligible for coverage under GP-0-15-002.

Assuming a timely permitting process construction is anticipated to begin in the spring of 2019. Ultimate build out will take approximately one year. The following permits are required for the subject project:

Southeast Executive Park – Driveway Extension and Parking Addition

Agency and Approval Required:	Status:
Town of Southeast Planning Board: Amended Site Plan Approval Erosion and Sediment Control Permit	 Pending Pending
New York City Dept. of Environmental Protection: SWPPP Approval	Pending

New York State Dept. of Environmental Conservation: Coverage under SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002)	Pending
New York State Dept. of Transportation Highway Work Permit	Pending

1.2 Existing Conditions

The project will result in coverage on parts of 4 separate parcels; Southeast Executive Park, Town of Southeast, NYSEG, and Highlands Center. Within the 2.8 acres of disturbed area the land coverage is brush and light tree growth. The land slope is moderately steep (10%-15%) in the greater part of the project area. Steeper slopes exist where embankments were formed during the construction of Building Pad #4 of the Highlands Retail Center. Soil in the project area consists of Udorthents (HSG 'B') and Paxton (HSG 'C'). Soil maps and related information are contained in Appendix D.

In accordance with the requirements of the State Stormwater Design Manual, it is proposed to capture WQv runoff from new impervious surfaces as well as vegetated land contributing to the impervious surfaces in runoff reduction practices. Infiltration systems are proposed for this purpose with sufficient volume to contain the runoff from the 1-year storm event. Two (2) systems are proposed on the NYSEG property. Diversion structures are provided at the front of each system which allow storms in excess of the 1-year event to bypass the infiltration systems. The bypass runoff is to be piped to existing storm drain piping which was installed to serve Building Pad #4 of the Highlands Retail Center. This piping connects to 2 water quality basins on Building Pad #4 and outlets under Independent Way to connect to Detention Basin #2 on the main building pad of Highlands. The outlet of Detention Basin #2 was selected as a design point in which to evaluate the hydrologic impacts of the new parking areas and access drive. The outflow from Detention Basin #2 combines with other detained and treated runoff from the Highlands project. After discharging by a culvert beneath Route 312, the runoff contributes to the Middle Branch Reservoir.

It should be noted that planning for the Highlands project included provision for a future driveway connecting the Southeast Executive Park to Independent Way similar to the driveway alignment of the current proposal. Where connections are now proposed to the Highlands drainage system on Building Pad #4, the existing pipe and catch basins were originally installed for the purpose of serving the future driveway.

1.3 Proposed Conditions

The proposed development will include the construction of additional impervious surfaces in the form of proposed parking areas and access drive as described in previous sections. Additional disturbed areas associated with subsurface utility installations and land grading will be stabilized with vegetation and maintained as lawn areas.

Stormwater runoff generated by the proposed site improvements will be captured and treated in two (2) subsurface infiltration systems sized to provide storage volume for 100% of the contributing WQv to each practice in accordance with the NYSDEC WQV and RRv requirements.

Stormwater peak runoff rates following development will not exceed those in the existing condition. As proposed, stormwater runoff rates following development would have no adverse impacts on downstream properties or stormwater conveying systems. Similarly, considering the nature of the existing site conditions and the level of stormwater treatment proposed in the post-development condition, it is predicted that this development will not result in any adverse impacts to downstream reservoirs, streams, wetlands or watercourses.

A comparison of the predevelopment vs post development land cover is summarized in the table below. It should be noted the land cover comparison was completed for the drainage sub areas in which land disturbance and subsequent land cover changes are proposed.

Land Cover Comparison - Existing and Proposed

Land Use		Woods (Acres)	Brush/Meadow (Acres)	Lawn (Acres)	Impervious/Gravel (Acres)	Total Area (Acres)
Existing Conditions	*DP-1*	0.00	4.95	0.42	3.05	8.42
	DP-2	0.00	2.00	0.32	0.84	3.16
	DL-1	8.22	0.00	1.21	2.37	11.8
	DL-2	0.11	0.00	0.89	0.00	1.00
	Total	8.33	6.95	2.84	6.26	24.38
Proposed Conditions	*DP-1*	0.00	4.58	1.00	4.00	9.58
	DP-2	0.00	1.44	0.27	0.82	2.53
	DL-1	7.69	0.00	1.20	2.38	11.27
	DL-2	0.11	0.00	0.886	0.004	1.0
	Total	7.80	6.02	3.356	7.204	24.38
Change		**-0.53**	**- 0.93**	**+ 0.516**	**+ 0.944**	**- 0.00**

2.0 Stormwater Management

2.1 Methodology

Stormwater management computations provided in this report are based upon the Soil Conservation Service (SCS) a.k.a. Natural Resource Conservation Service (NRCS), TR-20 methodologies and recommendations included in the New York State Department of Environmental Conservation Stormwater Management Design Manual Standards and Stormwater Discharges Associated with Construction Activity under State Pollutant Discharge Elimination System General Permit # GP-0-15-002 requirements. Pre-and post-development rates of stormwater runoff have been computed for comparison of the 1, 10, and 100 year storm events using the precip.net, Northeast Regional Climate Center (NRCC) precipitation data website for New York and New England. Extreme precipitation tables for the specific site location for various storms have been provided in appendix L of this report.

The computer software entitled "HydroCAD Version 10.00-21" by Applied Microcomputer Systems has been utilized to determine the peak runoff rates, plug flow and center of mass extended detention times and high water elevations in the stormwater treatment facilities. The precipitation values obtained for the above mentioned storm events are summarized in the Table provided below:

TABLE 1
Precipitation Values based on 24-hours
Accumulation Period and Recurrence Interval

Storm Frequency	Precipitation (inches) – 24 hour
1-year	2.77
10-year	4.96
100-year	8.81
90% Rainfall	1.45

2.2 NYSDEC Requirements

The subject project lies within The New York City East of Hudson watershed as identified in Appendix C of the SPDES General Permit for Construction Activity, GP-0-15-002 and proposes to disturb in excess of 1 acre of land. Therefore a SWPPP with post construction stormwater management practices must be provided, and all proposed stormwater management practices must conform to the Enhanced Phosphorous Removal Standards (Chapter 10) of the New York State Stormwater Management Design Manual (Design Manual).

2.3 Water Quality Volume (WQv) / Runoff Reduction Volume (RRv)

The stormwater management practices employed have been sized to satisfy the minimum Water Quality Volume (RRv) and Runoff Reduction Volume (RRv) requirements specified in the Design Manual. In accordance with chapter 10, the minimum WQv/RRv for the subject project was determined based on the volume of runoff generated by the 1 year 24-hour storm event.

The WQv requirements set forth in the Design Manual specify that the goal for each site is to reduce the entire WQv through the use of green infrastructure practices (GIP's) and standard stormwater management practices (SMP's) with runoff reduction capacity.

Calculations for the required water quality volumes for Design Point 1 can be found in Appendix "A" of this report and are summarized in the table provided below. It should be noted that the table provided below summarizes the required WQv/RRv for areas treated by standard SMP's with runoff reduction capacity. Impervious areas treated through the application of green infrastructure area reduction practices have been excluded.

TABLE 2
Water Quality Volume Summary

Design Point	Watershed Area (SF)*	WQv Required (CF)**	RRv Minimum (CF)***	RRv Provided (CF)****
Design Point 1	107,839	9,365	5,395	9,365

(*) Watershed area identified above is based on contributing drainage area to the proposed infiltration systems. All subcatchments which are either treated through the use of GIP's or do not contain proposed impervious surfaces have been excluded from the WQv calculations summarized above.
(**) Refer to HydroCAD output provided in Appendix C for 1-year storm runoff Volumes.
(***) Refer to Minimum RRv calculations provided in Appendix A.
(****) Refer to stage storage tables in HydroCAD routing contained in Appendix C. 100% RRv has been provided through the use of subsurface infiltration systems.

As indicated in the above table, the project SWPPP provides treatment for 100% of the contributing WQv to the two (2) proposed subsurface infiltration systems which are designated as standard SMP's with runoff reduction capacity. Storage for 100% of the WQv is provided within each infiltration system based on the volume of runoff generated by its contributing area. The HydroCAD routings contained in Appendix C account for an exfiltration rate utilized for modeling purposes to minimize oscillations within the infiltration system outflow hydrographs. The exfiltration rate utilized is based on previously completed infiltration testing in the area of infiltration system #2.

The results of deep test pits and infiltration testing are provided in Appendix E. The test results indicate suitable soils exist within proposed infiltration areas 1 & 2

as well as adequate separation to groundwater or ledge rock.

The infiltration systems have been designed offline. Diversion structures have been provided to divert inflow from storms larger than the 1 year to the existing downstream stormwater basins. Pretreatment for the infiltration systems will consist of ConTech CDS pretreatment units.

Stormwater runoff from proposed impervious surfaces will be directed overland or via a piping network to the stormwater treatment facilities. Pipe sizing calculations for the proposed stormwater conveyance system are included in appendix J of this report.

The following tables provide summary information for each proposed subsurface infiltration system in regards to peak inflow and outflow runoff values, outlet device information, peak water elevations, and associates storage:

TABLE 3
Post-Development
Infiltration System #1 Outlet Characteristics

Design Storm (yr.)	Peak Inflows: Basin/ Div MH (cfs) (**)	Outlet Devices	High Water Elevation (***)	Storage (cf) (***)	Peak Overflow (cfs) (*)
1	1.1	Div MH #1 – 6" dia. primary pipe invert = 635.8 Div MH #1 – 15" secondary pipe invert = 635.8 Div MH #1 – 6'-0" wide weir elevation = 638.2	636.33	2,570	0.00
10	1.3		638.25	6,229	2.0
100	1.0		638.47	6,490	6.8

(*) Secondary outflow from Diversion Manhole #1.
(**) Basin inflow is based on primary outflow from Diversion Manhole #1.
(***) Infiltration system modeled with an exfiltration rate of 1.5 inches/hour. Storage volume based on high water elevation during storm events identified above.

TABLE 4 Post-Development Infiltration System #2 Outlet Characteristics					
Design Storm (yr.)	**Peak Inflows: Basin/ Div MH (cfs) (**)**	**Outlet Devices**	**High Water Elevation (***)**	**Storage (cf) (***)**	**Peak Overflow (cfs) (*)**
1	1.0	Div MH #1 – 8" dia. primary pipe invert = 618.0 Div MH #1 – 15" secondary pipe invert = 618.0 Div MH #1 – 6'-0" wide weir elevation = 620.2	618.34	1,394	0.00
10	1.8		620.25	3,267	0.70
100	1.0		620.59	3,485	4.60

(*) Secondary outflow from Diversion Manhole #2.
(**) Basin inflow is based on primary outflow from Diversion Manhole #2.
(***) Infiltration system modeled with an exfiltration rate of 1.5 inches/hour. Storage volume based on high water elevation during storm events identified above.

2.4 Stream Channel Protection Volume (CPv)

Stream Channel Protection is intended to protect stream channels from erosion and the requirements are met by providing 24-hr extended detention of the 1-yr 24-hr rainfall event. However, this requirement may be waived if the entire Stream

Channel Protection Volume (CP_v) is reduced through the use of green infrastructure practices and or infiltration. Or if the site discharges directly to tidal waters or fifth order or larger streams as determined by the Strahler-Horton methodology (Section 4.3 of the Design Manual).

As a result of the chapter 10 design specifications, this project satisfies the CPv requirement as infiltration has been provided for 100% of the WQv.

2.5 Overbank and Extreme Flood Control

Overbank Flood Control is intended to prevent an increase in the frequency and magnitude of out-of–bank flooding resulting from proposed development. To achieve Overbank Flood Control at a site the post-development peak rate of runoff generated by the 10-yr design storm (4.96" rainfall in a 24-hr period) must be attenuated to pre-development levels. The exception to this is for sites that discharge to fifth order streams or larger.

Extreme Flood Control is intended to prevent the risk of flood damage from large storms, maintain the pre-development 100-yr floodplain boundary, and protect the integrity of stormwater management practices. The requirement for Extreme Flood

Control is met by attenuating the post-development peak flow rates generated by the 100-yr storm event to pre-development levels, unless the site discharges to a fifth order or larger stream.

In order to maintain existing peak flow rates leaving detention basin #2 at Highlands it will be necessary to modify the outlet structure originally provided for the detention basin. Currently, outflow is controlled from a plate with a 30° v-notch weir bolted to the face of a precast concrete sump. The routing calculations have shown that the existing outflow rates can be maintained if the plate is replaced with one provided with a 20° v-notch weir. The requirement for the replacement plate is specified on the project plans.

As shown in the HydroCAD routings contained in Appendix C, as a result of infiltrating the entire 1-year storm runoff volume peak flows from larger storms have been reduced to predevelopment levels with modification of the Detention Basin #2 outlet structure. A summary of the pre development vs post development peak flows is provided below:

TABLE 5
Peak Runoff Discharges to Design Point 1

Design Storm (yr)	Pre-Development Peak Runoff (cfs)	Post-Development Peak Runoff (cfs)
1	0.9	0.9
10	4.1	4.0
100	25.4	25.3

TABLE 6
Peak Runoff Discharges to Design Point 2

Design Storm (yr)	Pre-Development Peak Runoff (cfs)	Post-Development Peak Runoff (cfs)
1	1.7	1.7
10	5.7	5.3
100	13.9	12.3

TABLE 7 Peak Runoff Discharges to Design Line 1		
Design Storm (yr)	**Pre-Development Peak Runoff (cfs)**	**Post-Development Peak Runoff (cfs)**
1	5.5	5.3
10	19.0	18.1
100	47.0	44.8

TABLE 8 Peak Runoff Discharges to Design Line 2		
Design Storm (yr)	**Pre-Development Peak Runoff (cfs)**	**Post-Development Peak Runoff (cfs)**
1	0.2	0.2
10	1.5	1.5
100	4.3	4.3

2.6 NYCDEP Requirements

The subject project is located within the NYC East of Hudson Watershed and a NYCDEP SWPPP approval is required as it meets or exceeds the following thresholds listed in the Rules and Regulations described below:

§18-39(b)(3)(iii): Construction of a new industrial, institutional, municipal, commercial, or multi-family residential project that will result in the creation of an impervious surface totaling over 40,000 square feet in size;

As described in previous sections of this report, the subject project proposes to construct a new access drive and an additional parking area to accommodate 75 parking spaces. The proposed site improvements will result in the creation of new impervious surface in excess of 40,000 s.f., thus exceeding the threshold specified in §18-39(b)(3)(iii) of the Rules and Regulations.

§18-39(b)(3)(iv): A land clearing or land grading project, involving two (2) or more acres, located at least in part within the limiting distance of 100 feet of a watercourse or wetland, or within the limiting distance of 300 feet of a reservoir, reservoir stem or controlled lake or on a slope exceeding 15 percent;

The proposed site improvements will result in land disturbance in excess of 2 acres, a portion of which will take on slopes exceeding 15% thus exceeding the threshold specified in §18-39(b)(3)(iv) of the Rules and Regulations.

The NYCDEP Rules and Regulations generally match the requirements of the NYSDEC and Town of Southeast with several exceptions. There are two (2) exceptions of note discussed below.

The first exception of note being that two (2) different standard SMP's are required in series when the contributing drainage area to that SMP is greater than 20% impervious or an infiltration practice is not provided. Two (2) subsurface infiltration systems are proposed to provide treatment of stormwater runoff from all proposed impervious surfaces, therefore two (2) SMP's in series are not required.

The second exception is the NYCDEP requires that the minimum required stormwater treatment volume used shall be the greater of the 1-year 24 hour storm event or the volume generated by the 90% storm.

An analysis of the stormwater runoff generated by the 90% rainfall event for all subareas is included in Appendix K.

A comparison of the Runoff volumes for each infiltration system's respective contributing area are summarized in the table below:

Water Quality Volume Comparison Summary (90% Storm Runoff Volume vs 1-Year Storm Runoff Volume)					
Sub Area	**P (in.) Rainfall Value**	**Rv**	**Area (sf)**	**WQv (cf) (90% Storm)**	**WQv (cf) (1-Yr Storm)**
1	1.45	0.64	27,554	958	3,223
2	1.45	0.33	80,285	1,263	6,142

As discussed in previous sections of this report all proposed SMP's have been sized based on their contributing runoff volume generated by the 1-year 24 hour storm event, which as summarized above provides the larger runoff volume.

As a result of the proposed development there is an increase in runoff generated by the project site in the post development condition. As noted in previous sections, 100% of the WQv generated by all proposed impervious surfaces has been reduced through the use of infiltration practices. However, the HydroCAD modeling contained in appendix C indicates a small increase in the calculated runoff volume to Design Point 1 during the 10 and 100-year storm events. Below is a table summarizing the calculated pre vs post development runoff volumes for each design point and design line:

Runoff Volumes to Design Point 1			
Design Storm (yr)	**Pre-Development (cf)**	**Post-Development (cf)**	**Post-Development w/o treatment (cf)**
1	48,657	47,828	58,762
10	137,214	138,129	157,644
100	318,597	335,412	356,713

Runoff Volumes to Design Point 2			
Design Storm (yr)	**Pre-Development (cf)**	**Post-Development (cf)**	**Post-Development w/o treatment (cf)**
1	8,756	7,928	n/a
10	26,746	22,956	n/a
100	64,817	54,145	n/a

Runoff Volumes to Design Line 1			
Design Storm (yr)	**Pre-Development (cf)**	**Post-Development (cf)**	**Post-Development w/o treatment (cf)**
1	30,797	29,403	n/a
10	96,268	91,868	n/a
100	236,836	226,076	n/a

Runoff Volumes to Design Line 2			
Design Storm (yr)	**Pre-Development (cf)**	**Post-Development (cf)**	**Post-Development w/o treatment (cf)**
1	1,350	1,350	n/a
10	5,663	5,663	n/a
100	16,161	16,161	n/a

2.7 Phosphorous Loading Analysis

As described in previous sections of this report, stormwater runoff from the proposed development on the Southeast Executive Park site will discharge to the existing Highlands Retail Center Stormwater management system. The existing Highlands Retail Center was designed and constructed in conformance with the NYCDEP Phosphorous Offset Pilot Program. The acceptance of the previously constructed Highlands Retail Center into the NYCDEP Phosphorous Offset Pilot Program was based in part on the provision that multiple stormwater management practices be provided to capture and treat surface runoff in order to satisfy the phosphorous removal requirements specified by the NYCDEP.

The land involved in the proposed parking lot additions and driveway extension to serve the Southeast Executive Park is within the contributing drainage areas to certain Stormwater Management Practices in the Highlands Center. The phosphorous analysis completed for the subject project was prepared to determine the impacts to the existing phosphorous load at the Highlands Design Point from the sub areas which contain proposed impervious surfaces. Phosphorous Loading Calculations are included in Appendix Q of this report and are summarized in the table below:

Phosphorous Loading Analysis Summary at Highlands Design Point			
	Sub Area 1	**Sub Area 2**	**Sub Area 5**
Pre Development TP Load (lbs/yr)	0.01	0.03	0.01
Post Development TP Load (lbs/yr)	0.00	0.00	0.103
TP Load Net Change (lbs/yr)	**-0.01**	**-0.03**	**0.003**

As summarized in the above table it is anticipated that the total phosphorous load to the Highlands Design Point will decrease as a result of the proposed stormwater management practices to be constructed on NYSEG property.

Phosphorous loading rates used for the analysis contained in appendix Q and summarized above are based on methodology and pollutant loading concentrations utilized in previous analyses which were accepted and ultimately approved by the NYCDEP. It is our understanding that the total phosphorous load is measured monthly at the monitoring station located at the Highlands Design Point and results are provided annually to the NYCDEP. Historically, the total phosphorous load

measured at the design point has been well below the 34 lbs/yr allowable limit. The 2017 monthly phosphorous readings and reporting are included in appendix Q for reference, the data indicates a total measured phosphorous load of 24.1 lbs for the year 2017.

2.8 Impact on Existing Stormwater Conveyance System

The drainage system provided for the new parking areas and driveway will connect to the existing storm drain piping installed during construction of Building 4 of the Highlands Center. Site planning for Building 4 included provision for a future driveway connecting Southeast Executive Park to Independent Way. Drain manholes were installed for future connection of the driveway storm drain piping. The drainage design calculations for the Building 4 pad included runoff generated from the future driveway. While the extent of impervious surface associated with the future drive is less than the extent of impervious surface now proposed, the current design provides for infiltration systems which will substantially reduce flow rates generated by the new improvements. To examine the effect of the project on the Building 4 drainage system, DMH #27 can be used as a point of comparison as it received outflow from both water quality basins #4A and 4 on pad #4 prior to discharge under Independent Way to Detention Basin #2. Based on the original site layout, DMH #27 would receive 10 and 100 year storm flows of 3.5 cfs and 28.7 cfs after routing through basins #4A and 4. In the post development condition reflecting addition of the addition of the new driveway and parking areas, flows received at DMH #27 will be 1.9 cfs and 30.3 cfs in the 10 and 100 year events. Therefore the change in coverage associated with the project is hydraulically compatible with the existing stormwater conveyance system on the Building #4 pad.

3.0 Erosion and Sediment Control

The plans provide for specific erosion and sediment controls to be employed during construction. It is the intent to provide effective erosion control by minimizing land disturbance at one given time, containing sediment from disturbed areas, treating runoff where possible, and stabilizing disturbed soils as soon as possible. The directives specified on the plans and in this report serve as a minimum for erosion and sediment control. Further practices and measures may be required pursuant to onsite inspections in conformance with the requirements of the SPDES GP-0-15-002 permit. As per the SPDES permit, onsite inspections are to be performed twice a week and within 24 hours of ½" of rainfall. All erosion and sediment control practices specified for this site shall be in conformance with the New York Standards & Specifications for Erosion & Sediment Control.

3.1 Temporary Erosion and Sediment Control Practices

Listed below are the Temporary Erosion and Sediment Control Practices specified for the subject project. All practices shall be installed and maintained in

conformance with the New York Standards & Specifications for Erosion & Sediment Control:

- Stabilized Construction Entrance
- Silt Fence
- Drop Inlet Protection
- Soil Stockpiles
- Debris Control

A stabilized construction entrance should be installed at the access point for construction vehicles. The construction entrance is designed to prevent outgoing trucks from tracking soil onto the public roads. Construction details specifying installation requirements can be found on the plan.

The silt fence for the site will consist of a geotextile fabric installed at the toe of all disturbed slopes and parallel to the contours. The silt fence is intended to reduce runoff velocity and intercept sediment-laden runoff. Construction details specifying the proposed installation and type of permissible silt fence can be found on the plans.

Drop inlet protection for the site will consist of stone and concrete block wrapped with wire mesh surrounding the catch basins. The purpose of the stone and block inlet protection is to filter stormwater runoff and prevent sediment laden runoff from entering the drainage system through existing or proposed drain inlet structures.

Soil stockpiles are to be stabilized with vegetation and surrounded with silt fencing. This will ensure the topsoil that is stripped from the site during construction will be protected for use during final grading and that no sediment from the stockpiles will be deposited downstream.

Construction debris, such as sheet metal, wood scrap, paper and insulation products, styrofoam cups and paper wrappers can become windblown litter over and off the site if neglected. Suitable and ample refuse containers shall be provided on the site and emptied when full. Any scattered debris shall be picked up and placed in containers on an as needed basis.

3.2 Permanent Erosion and Sediment Control Practices

The intent of the permanent erosion and sediment control practices is to permanently stabilize the ground surface via vegetative and structural practices, while controlling and reducing runoff velocities. The following permanent erosion & sediment control practices are proposed for the site:

- Land Grading
- Vegetation

Land grading is the reshaping of the existing land surface in accordance with the grading plan. Proper land grading is an essential component of the erosion control plan, as well as the stormwater pollution prevention plan. Proper grading will ensure the intended drainage areas are directed to the stormwater management practices.

Vegetation will be provided on all disturbed soils not covered by the proposed parking areas and driveway extensions. Permanent vegetation will reduce runoff velocities, filter stormwater runoff, and minimize soil erosion. Optimum times for planting are the early spring and fall; however, plantings can be started in the summer provided adequate mulch and moisture is supplied.

4.0 Maintenance & Inspection Requirements

4.1 Short Term Maintenance and Inspection Requirements

As per the SPDES permit, onsite inspections are to be performed by a "Qualified Inspector" twice a week and within 24 hours of ½" of rainfall. All erosion and sediment control practices specified for this site shall be in conformance with the New York Standards & Specifications for Erosion & Sediment Control.

Inspections performed during construction should verify that all practices are functioning properly, correctly maintained, and that accumulated sediment is removed from all control structures. The inspector must also examine the site for any evidence of soil erosion, the potential for pollutants to enter the storm drain system, turbid discharge at all outfalls, and the potential for soil and mud to be transported on the public roadway at the site entrance. In addition to these general guidelines, the project plans will provide more specific erosion control guidelines, as well as a construction sequence to guide the contractor through the construction process. Discussed below are specific maintenance and inspection requirements for the temporary practices to be employed at the site.

During construction, the silt fence should be inspected weekly to ensure correct installation. In addition, any accumulated sediment resulting in "bulges" in the silt fence should be removed and mixed with onsite soil. Any damaged or torn silt fence should be replaced.

The construction entrances should be checked to ensure no sediment is being deposited onto the public roadway. Should sediment be observed, it should be removed from the street, and the stone in the construction entrance replaced.

The drop inlet protection shall be checked for accumulated sediment on a monthly basis and after significant rainfall. Any accumulated sediment shall be removed and the crushed stone shall be replaced as needed.

Once construction is completed and the site has been stabilized, a "Notice of Termination" shall be filed. At this point limited maintenance requirements are anticipated.

4.2 Long Term Maintenance and Inspection Requirements

Once final stabilization is achieved and construction complete, only limited maintenance will be required. A copy of the Maintenance and Inspection Checklists from Appendix "G" of the New York State Stormwater Management Design Manual is included in Appendix "G" of this report to serve as a guide for maintaining and inspecting the stormwater infiltration systems.

Inspections of the following items should be performed at a minimum annually and following significant rainstorms in excess of ½" of rainfall within 24 hours.

Infiltration Systems:
Refer to manufacturer's maintenance schedule in Appendix O for more specific maintenance requirements

- Inspect the infiltration systems to ensure accumulated water is infiltrating into the soil, and debris has not entered the diversion manholes and pretreatment structures; any debris should be removed. Once debris is removed, if stormwater is still not infiltrating contact a professional engineer licensed in the State of New York to examine the system.
- Inspection of the outlet of the overflow pipe to ensure it is not plugged or clogged.

Hydrodynamic Separators (CDS) - Pretreatment Units:
Refer to manufacturer's maintenance schedule in Appendix M for more specific maintenance requirements

- Inspect after heavy rainfall greater than ½" in 24 hours for the first year to determine an appropriate maintenance schedule. Subsequent inspections are reduced to quarterly.
- When the sediment volume reaches within 24"-30" of the water surface, the system should be maintained.
- Maintenance is to be performed using a vacuum truck and removing the accumulated sediment pile and debris.

Catch Basins and Drain Manholes:

- Inspect monthly and after heavy rain storms >½" in 24 hours for sediment accumulation in sumps. Accumulated sediment should be removed immediately.

5.0 Outstanding Violations or Enforcement Actions

There are no known outstanding violations or enforcement actions against this property, the owner or the applicant. There are no stormwater discharges associated with industrial activity from this site.

6.0 Conclusion

The Stormwater Pollution Prevention Plan prepared for the subject project has been prudently designed to manage stormwater runoff from both qualitative and quantitative standpoints. Proper implementation of this plan will ensure meeting water quality and quantity standards as required by the NYSDEC based on current New York State guidelines as well as most recent guidelines set forth by the NYCDEP.

Appendix A

Water Quality Volume (WQv) / Runoff Reduction Volume (RRv) Calculations

Water Quality Volume (WQv) / Runoff Reduction Volume (RRv) Calculations:

The required stormwater quality volume will be determined using "New York State Stormwater Management Design Manual - GP-0-15-002 - Unified Stormwater Sizing Criteria". Since the project is located within the NYCDEP Watershed the "Chapter 10- Enhanced Phosphorus Removal Standards" will also apply.

Rainfalls-

Rainfall events for this project has been obtained from *"precip.net:* Northeast Regional Climate Center - NRCC - Precipitation Data website for New York and New England". Extreme Precipitation Tables for the specific site location for various storms have been downloaded to HydroCad Version 10.00-20 computer model. Precipitation distribution curves generated for each grid directly, eliminating the need to use a static Type III curve.

Required Water Quality Volume (WQv) and RRv to Design Point #1

1 Year storm-

Post Development Subareas: (**Sub 1 &2**):

Subareas 5A and 5B have been kept out of this calculation, since there is no proposed imperviousness within these subareas.

Refer to the HydroCad output for the 1 year storm values.

WQv (CF) = 1 year storm runoff volume (Refer to HydroCAD Output in Appendix C)

1 year storm rainfall for the project location in Putnam County (P = 2.77")

From HydroCad Post- Development Analysis:

A = Watershed area in (**Sub 1**) -Weighted CN = 85 - Runoff = 1.40"

Post-Development Sub 1 watershed area = 27,554 SF = 0.63 acres

A = Watershed area in (**Sub 2**) -Weighted CN = 77 - Runoff = 0.91"

Post-Development Sub 2 watershed area = 80,285 SF = 1.84 acres

WQv = 9,365 CF (Refer to HydroCAD Output in Appendix C)

90% Rainfall WQv Check – Refer to the HydroCad output for the 90% Rainfall runoff values.

WQv (CF) = Watershed area (SF) x (90% rainfall runoff)/12

90% Rainfall for the project location in Putnam County (P = 1.45")

From HydroCad Post- Development Analysis:

A = Watershed area in (**Sub 1**) -Weighted CN = 85 - Runoff = 0.42"

Post-Development Sub 1 watershed area = 27,554 SF = 0.63 acres

A = Watershed area in (**Sub 2**) -Weighted CN = 77 - Runoff = 0.19"

Post-Development Sub 2 watershed area = 80,285 SF = 1.84 acres

$WQv_{90\%}$ = 2,222 CF (Refer to HydroCAD Output in Appendix K)

RRv Minimum Calculations

Total New HSG B Post Development New Impervious Area = 31,122 SF

Total New HSG C Post Development New Impervious Area = 11,497 SF

Ai = S x Aic Aic = New Impervious Area

S = 0.40 for HSG B

S = 0.30 for HSG C

Aib = 0.40 x 31,122 = 12,449 SF

Aic = 0.30 x 11,497 = 3,449 SF

Total (Aib + Aic) = 15,898 SF

Rv = 0.95 (100% Impervious)

Minimum RRv = P x Av x Al/12 = (2.77" x 0.95 x 15,898)/12 = **3,486 CF**

Infiltration System 1 Design

Infiltration System 1 will receive stormwater runoff from Sub Area 2.

Total New HSG B Post Development New Impervious Area = 13,138 SF

Total New HSG C Post Development New Impervious Area = 11,497 SF

S = 0.40 for HSG B

S = 0.30 for HSG C

Aib = 0.40 x 13,138 = 5,255 SF

Aic = 0.30 x 11,497 = 3,449 SF

Total (Aib + Aic) = 8,704 SF

Ai = S x Aic Aic = New Impervious Area

Rv = 0.95 (100% Impervious)

RRv Minimum = P x Rv x Ai / 12 = (2.77" x 0.95 x 8,704)/12 = **1,909 CF**

Sub Area 2 WQv = 6,142 CF (refer to HydroCAD Output in Appendix C)

Post Development Percent Imperviousness to Infiltration System 1
New Impervious Area = 24,635 SF based on the Subarea 2 and 3.
Total (Sub 2) = 80,285 SF
Imp. % = [(24,635) / (80,285)] = **0.31**
Since the imperviousness increase does exceed 20%, two in-series SW treatments or one infiltration system is required.

Pretreatment
Pretreatment shall be provided by a ConTech CDS pretreatment unit prior to the infiltration system.

Treatment
Using Cultec R-330 XL HD chambers including crushed stone;
Total Infiltration System Volume (from HydroCAD) = 6,565 CF
Use 78 Cultec R-330 XLHD Units within crushed stone pad.
In accordance the Design Manual, 100% of the contributing WQv to the infiltration practice will be credited towards Runoff Reduction Volume (RRv):
RRv provided = 1.0 x 6,142 CF = 6,142 CF *(Refer to HydroCAD Output)*

Infiltration System 2 Design

Infiltration System 2 will be receiving stormwater runoff from Sub Area 1.
Total New HSG B Post Development New Impervious Area = 17,984 SF
S = 0.40 for HSG B
Aib = 0.40 x 17,984 = 7,194 SF
Ai = S x Aib Aib = New Impervious Area
Rv = 0.95 (100% Impervious)
RRv Minimum = P x Rv x Ai / 12 = (2.77" x 0.95 x 7,194)/12 = **1,578 CF**
Sub Area 1 WQv = 3,223 cf *(Refer to HydroCAD Output)*

Post Development Percent Imperviousness to Infiltration System 2
New Impervious Area = 17,984 SF based on Subarea 1.
Total (Sub 1) = 27,554 SF
Imp. % = [(17,984) / (27,554)] = 0.65
Since the imperviousness increase does exceed 20%, two in-series SW treatments or one infiltration system is required.

Pretreatment
Pretreatment shall be provided by a ConTech CDS pretreatment unit prior to the infiltration system.

Treatment
Using Cultec R-330 XL HD chambers including crushed stone;
Total Infiltration System Volume (From HydroCAD) = 3,551 CF
Use 40 Cultec R-330 XLHD units within crushed stone pad.
In accordance with the design manual, 100% of the contributing WQv to the infiltration practice will be credited towards the Runoff Reduction Volume (RRv):
RRv provided = 1.0 x 3,223 CF = 3,223 CF

Total RRv provided for Design Point 1 = 6,142 CF + 3,223 cf = 9,365 CF
Therefore, 100% WQv provided through Standard SMP's with Runoff Reduction Capacity at Design Point 1

Runoff Reduction Volume (RRv) Provided through Application off Onsite green Infrastructure Practices (GIP's):

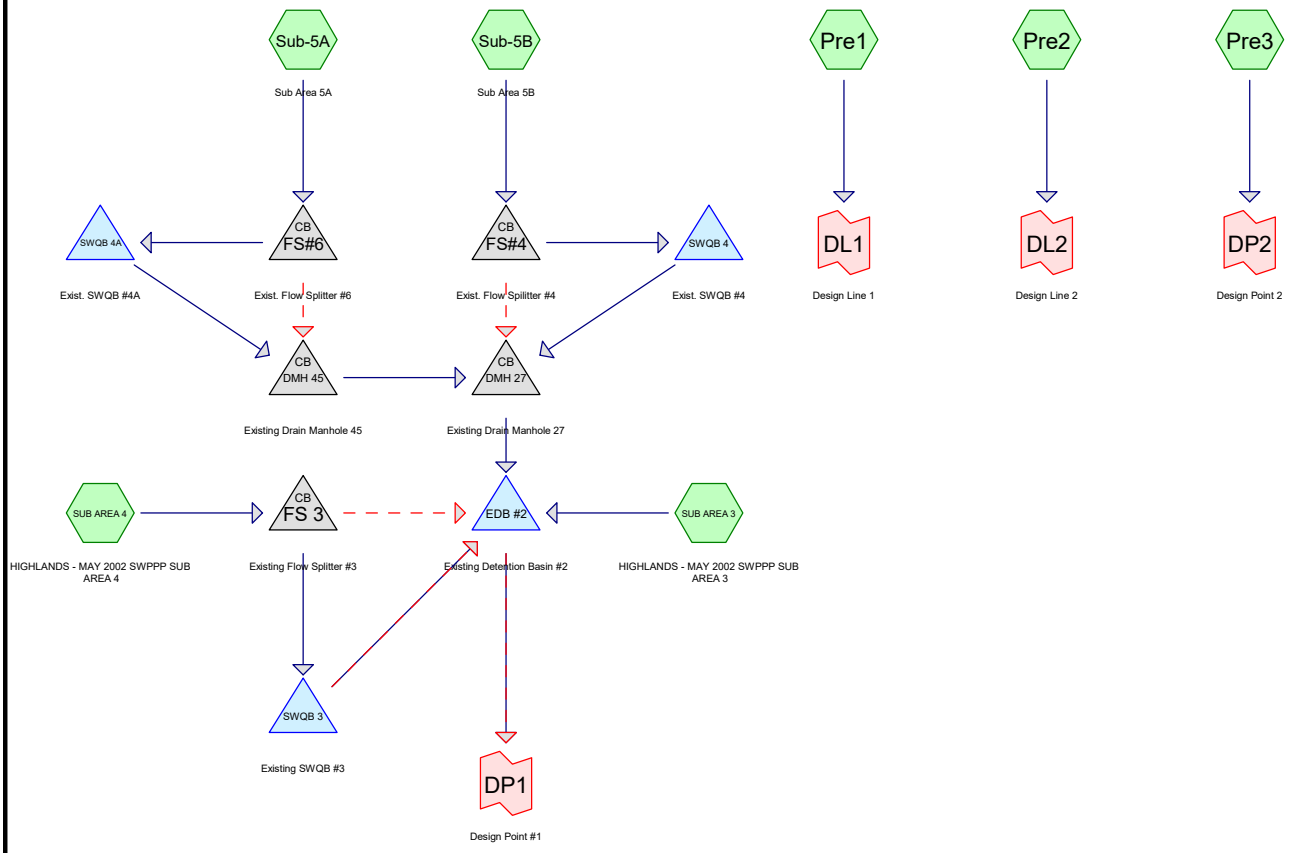
The calculations provided above were utilized in the sizing of the proposed Standard SMP's with RRv capacity implemented to provide treatment of stormwater runoff generated by all proposed impervious surfaces contained within all contributing drainage areas to Design Point 1. As shown on the project drawings and described in previous sections of this report the project includes the construction of new 4' wide concrete sidewalk on the west side of the Southeast Executive Park building. The proposed impervious surfaces associated with the sidewalk are located within the contributing drainage areas to Design Line 1 and Design line 2. Runoff Reduction for these areas will be provided through the application of green infrastructure techniques, specifically tree planting which is classified as an area reduction practice in the NYS Design Manual.

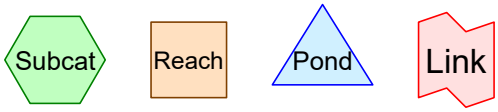
The proposed sidewalk is approximately 190 feet long and will create a total of 760 sf of new impervious surface. In order to provide the required Runoff Reduction for this new impervious area a total of (8) new Crimson Oak trees will be planted adjacent to the new sidewalk. In accordance with the Tree Planting requirements listed in the NYS Design Manual each proposed tree will be planted within 10' of the sidewalk, be at least 2 inches in caliper and 6' in height. A 100 square foot directly connected impervious area reduction is permitted for each tree, as such the (8) total new trees will reduce 100% of the runoff generated by the new sidewalk and provide the necessary runoff reduction for the contributing areas to Design Line 1 and Design line 2.

It should be noted that all impervious surfaces for the new sidewalk were included in the post development peak flow analysis contained in Appendix C, which indicated there would be no increase in peak flows at either design in the post development condition as a result of the proposed site improvements.

Appendix B

Pre Development Peak Flow Analysis
(HydroCAD Output for 1, 10 & 100-year Storm Events)





Routing Diagram for Pre-Dev
Prepared by Bibbo Associates, LLP, Printed 8/30/2018
HydroCAD® 10.00-21 s/n 02226 © 2018 HydroCAD Software Solutions LLC

Summary for Subcatchment Pre1:

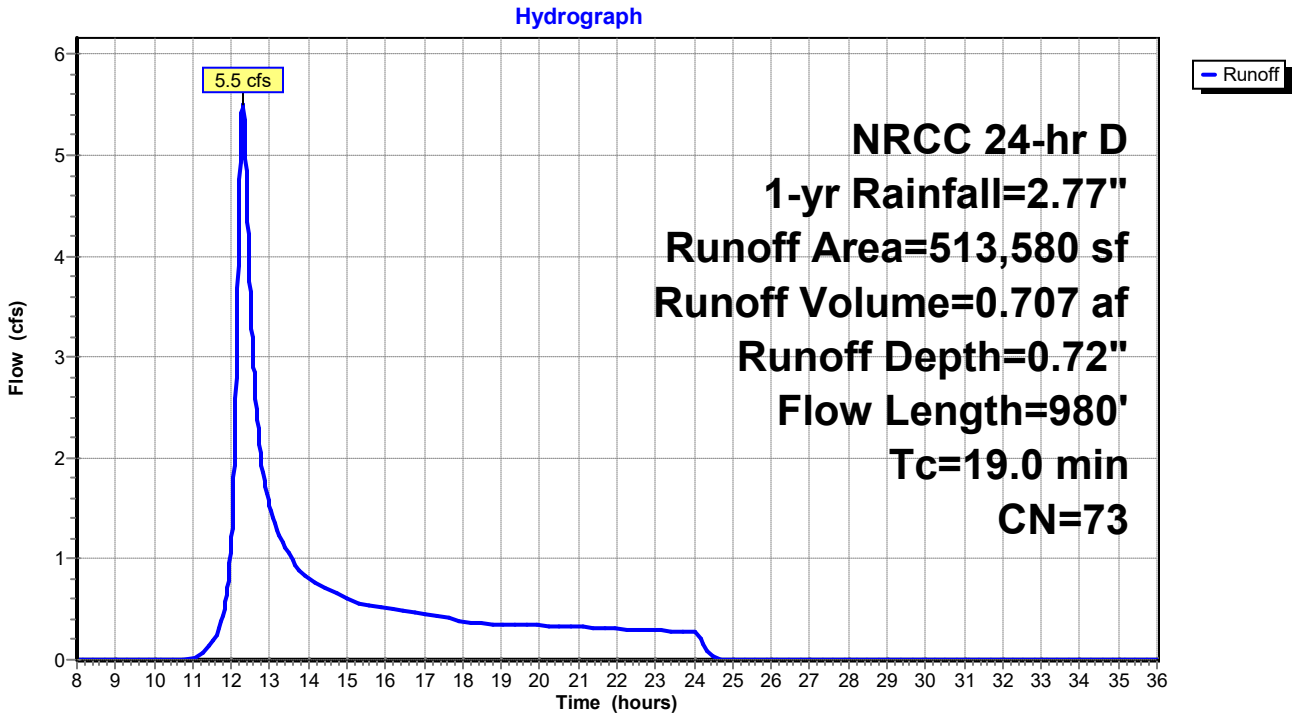
Runoff = 5.5 cfs @ 12.30 hrs, Volume= 0.707 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

Area (sf)	CN	Description
91,490	98	Paved parking, HSG B
11,640	98	Roofs, HSG B
52,590	61	>75% Grass cover, Good, HSG B
39,270	79	Woods, Fair, HSG D
150,200	73	Woods, Fair, HSG C
168,390	60	Woods, Fair, HSG B
513,580	73	Weighted Average
410,450		79.92% Pervious Area
103,130		20.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0750	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.33"
6.6	880	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	980	Total			

Subcatchment Pre1:



Summary for Subcatchment Pre2:

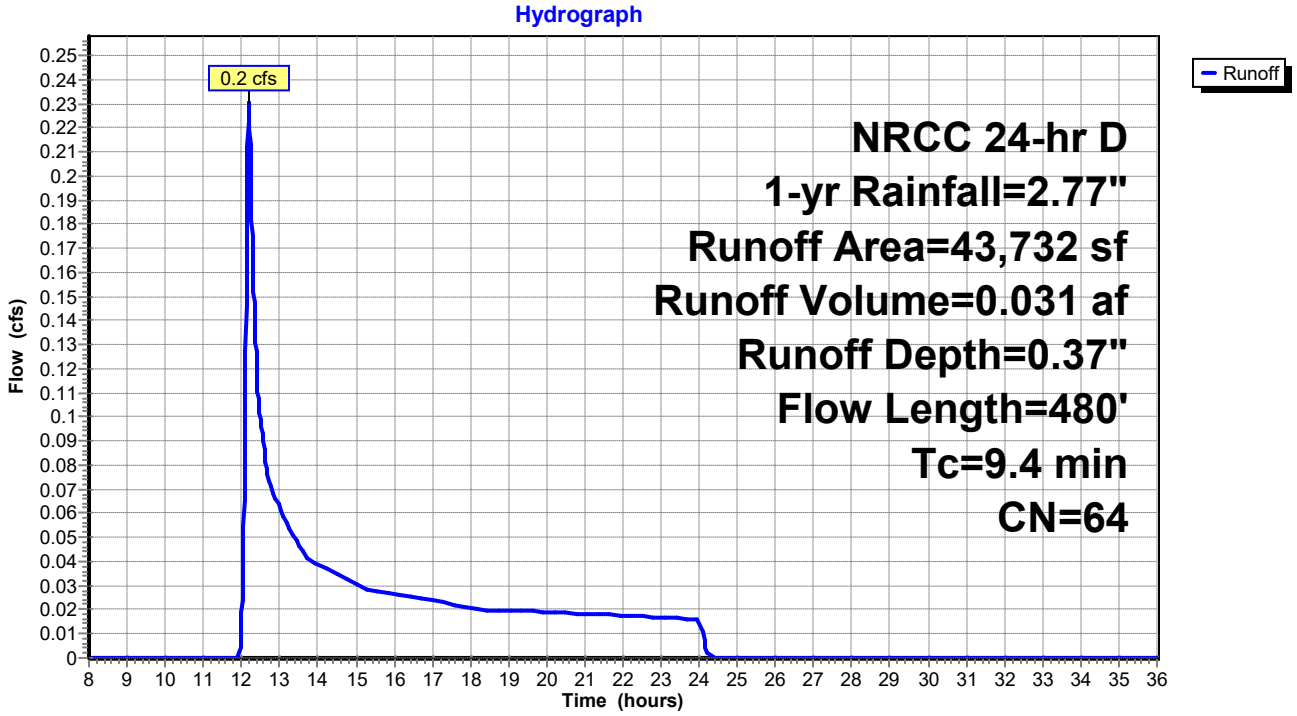
Runoff = 0.2 cfs @ 12.19 hrs, Volume= 0.031 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

Area (sf)	CN	Description
32,217	61	>75% Grass cover, Good, HSG B
6,590	74	>75% Grass cover, Good, HSG C
4,925	73	Woods, Fair, HSG C
43,732	64	Weighted Average
43,732		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	100	0.0550	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.33"
1.7	250	0.1240	2.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	130	0.1150	1.70		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.4	480	Total			

Subcatchment Pre2:



Summary for Subcatchment Pre3:

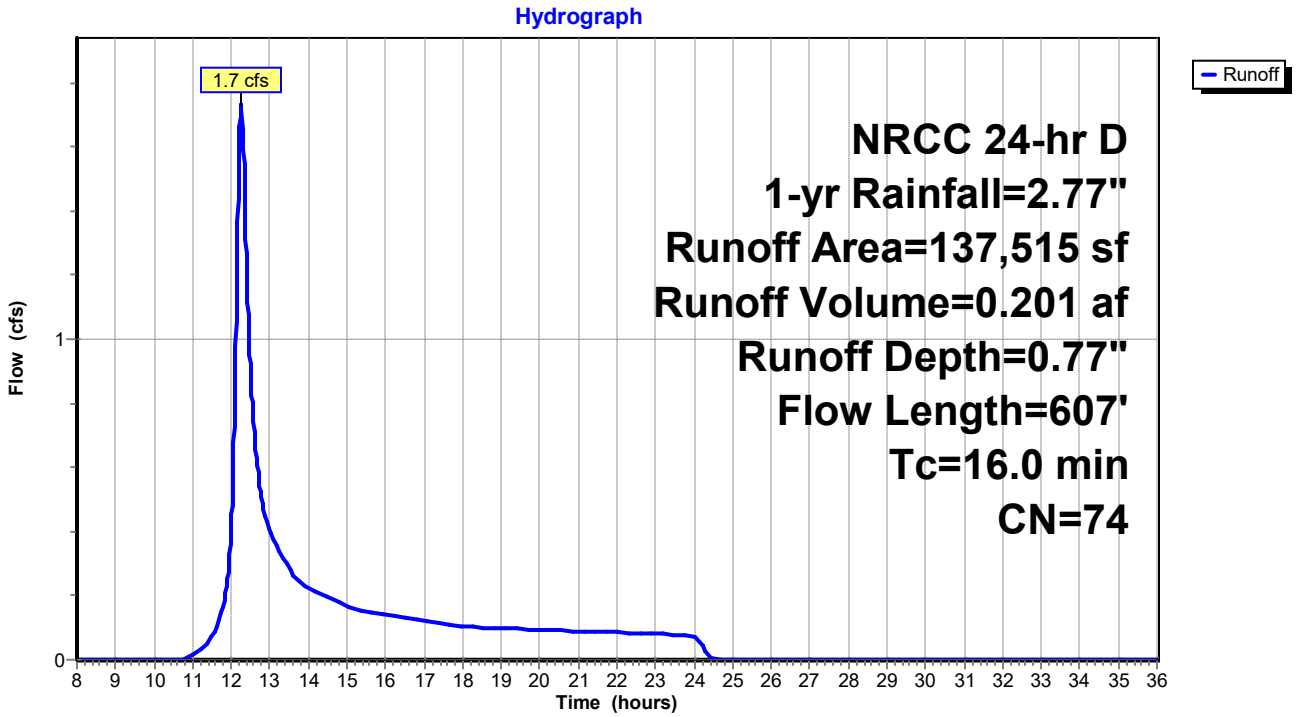
Runoff = 1.7 cfs @ 12.25 hrs, Volume= 0.201 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

Area (sf)	CN	Description
31,955	98	Paved parking, HSG C
4,730	89	Gravel roads, HSG C
14,125	74	>75% Grass cover, Good, HSG C
86,705	65	Brush, Good, HSG C
137,515	74	Weighted Average
105,560		76.76% Pervious Area
31,955		23.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	100	0.0700	0.15		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
4.1	365	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.4	142	0.0840	5.88		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.0	607	Total			

Subcatchment Pre3:



Summary for Subcatchment SUB AREA 3: HIGHLANDS - MAY 2002 SWPPP SUB AREA 3

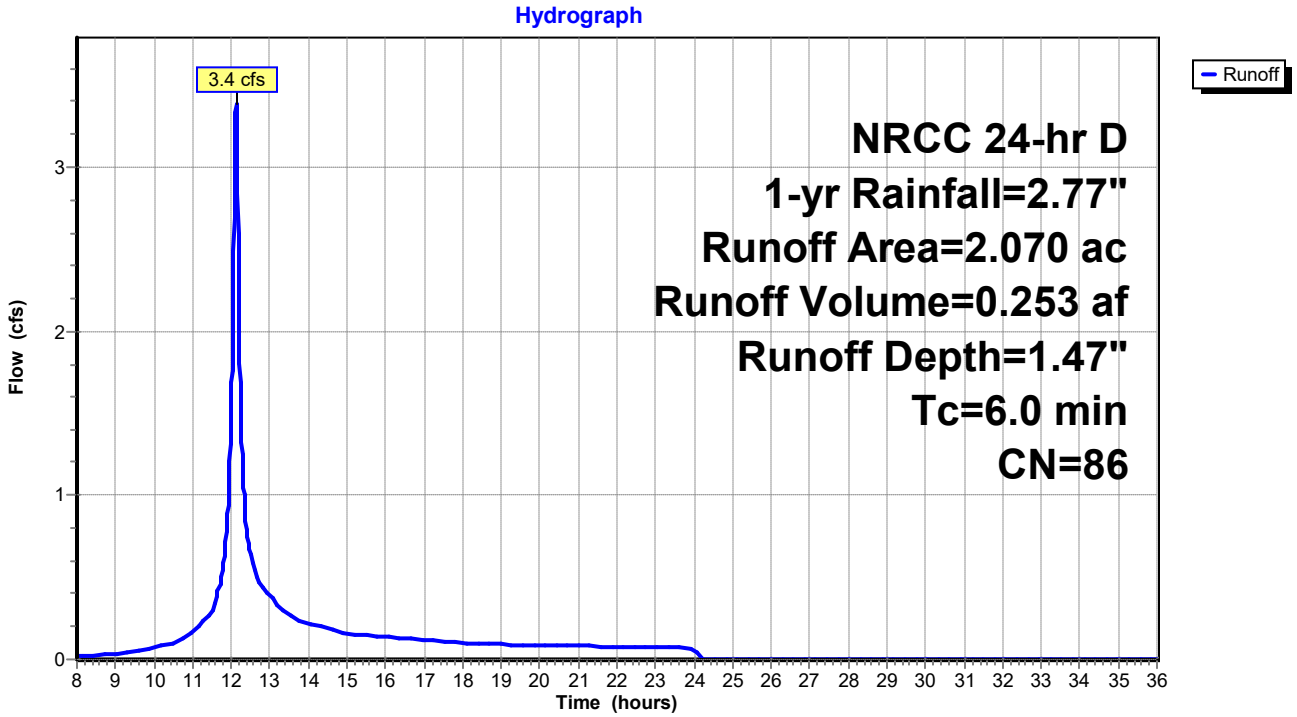
Runoff = 3.4 cfs @ 12.13 hrs, Volume= 0.253 af, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

	Area (ac)	CN	Description
*	2.070	86	
	2.070		100.00% Pervious Area

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

Subcatchment SUB AREA 3: HIGHLANDS - MAY 2002 SWPPP SUB AREA 3



Summary for Subcatchment SUB AREA 4: HIGHLANDS - MAY 2002 SWPPP SUB AREA 4

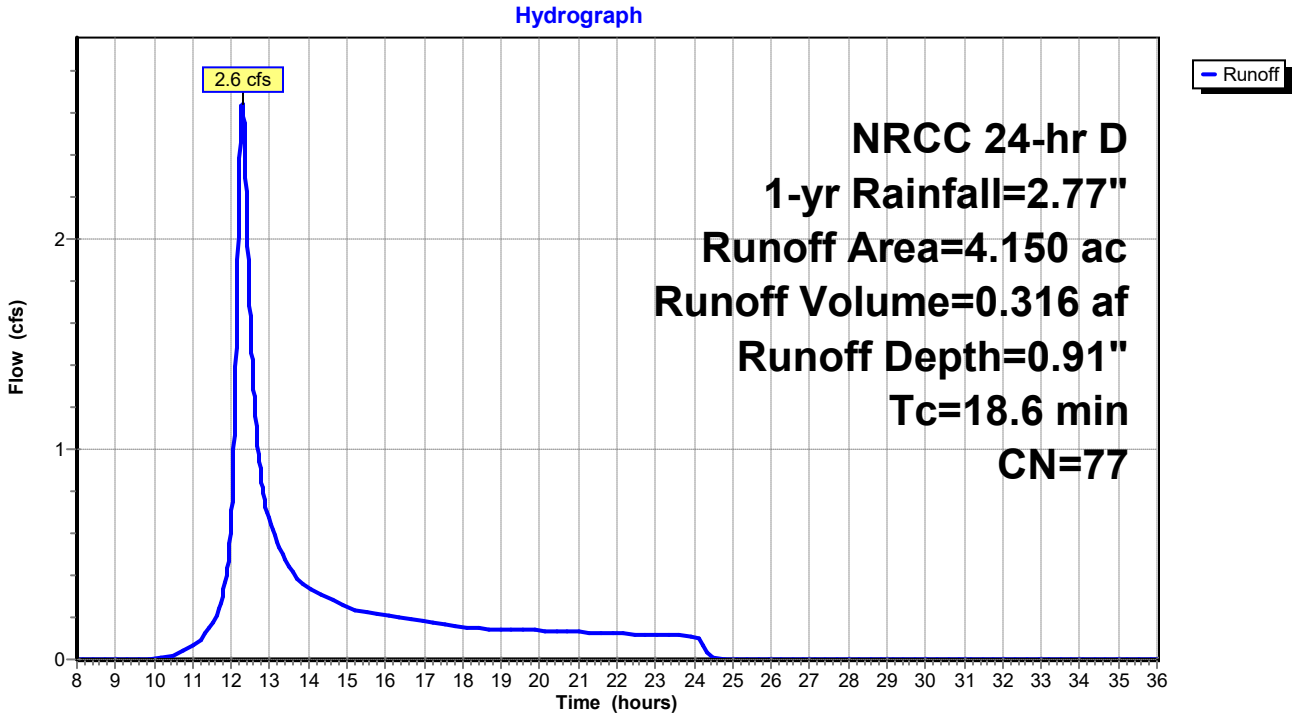
Runoff = 2.6 cfs @ 12.29 hrs, Volume= 0.316 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

	Area (ac)	CN	Description
*	4.150	77	
	4.150		100.00% Pervious Area

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

Subcatchment SUB AREA 4: HIGHLANDS - MAY 2002 SWPPP SUB AREA 4



Summary for Subcatchment Sub-5A: Sub Area 5A

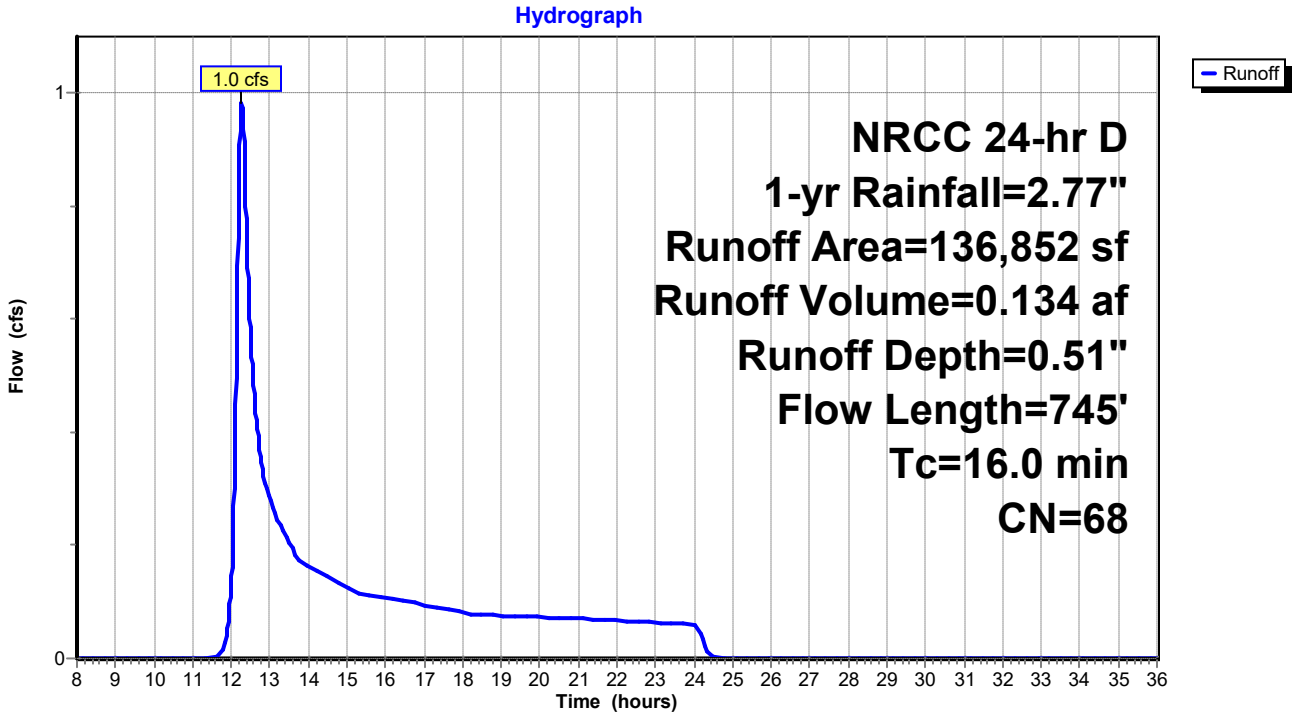
Runoff = 1.0 cfs @ 12.28 hrs, Volume= 0.134 af, Depth= 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

Area (sf)	CN	Description
33,966	98	Paved parking & roofs
1,000	74	>75% Grass cover, Good, HSG C
58,668	65	Brush, Good, HSG C
43,218	48	Brush, Good, HSG B
136,852	68	Weighted Average
102,886		75.18% Pervious Area
33,966		24.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0550	0.13		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
1.5	130	0.0880	1.48		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	165	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	88	0.0342	3.75		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	262	0.0119	5.74	7.05	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.0	745	Total			

Subcatchment Sub-5A: Sub Area 5A



Summary for Subcatchment Sub-5B: Sub Area 5B

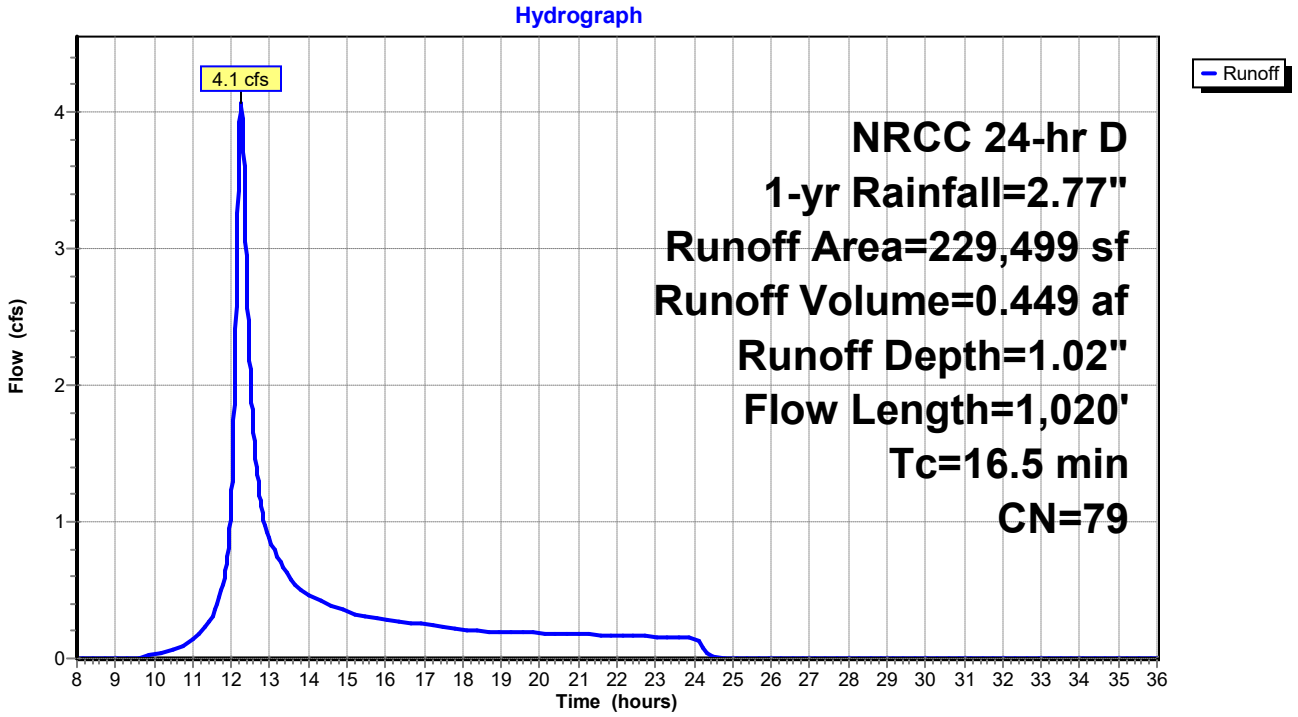
Runoff = 4.1 cfs @ 12.26 hrs, Volume= 0.449 af, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

Area (sf)	CN	Description
98,809	98	Paved parking, HSG C
17,148	74	>75% Grass cover, Good, HSG C
97,461	65	Brush, Good, HSG C
16,081	48	Brush, Good, HSG B
229,499	79	Weighted Average
130,690		56.95% Pervious Area
98,809		43.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0500	0.13		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
1.8	190	0.1240	1.76		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	205	0.2700	3.64		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	525	0.0529	12.11	14.86	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.5	1,020	Total			

Subcatchment Sub-5B: Sub Area 5B



Summary for Pond DMH 27: Existing Drain Manhole 27

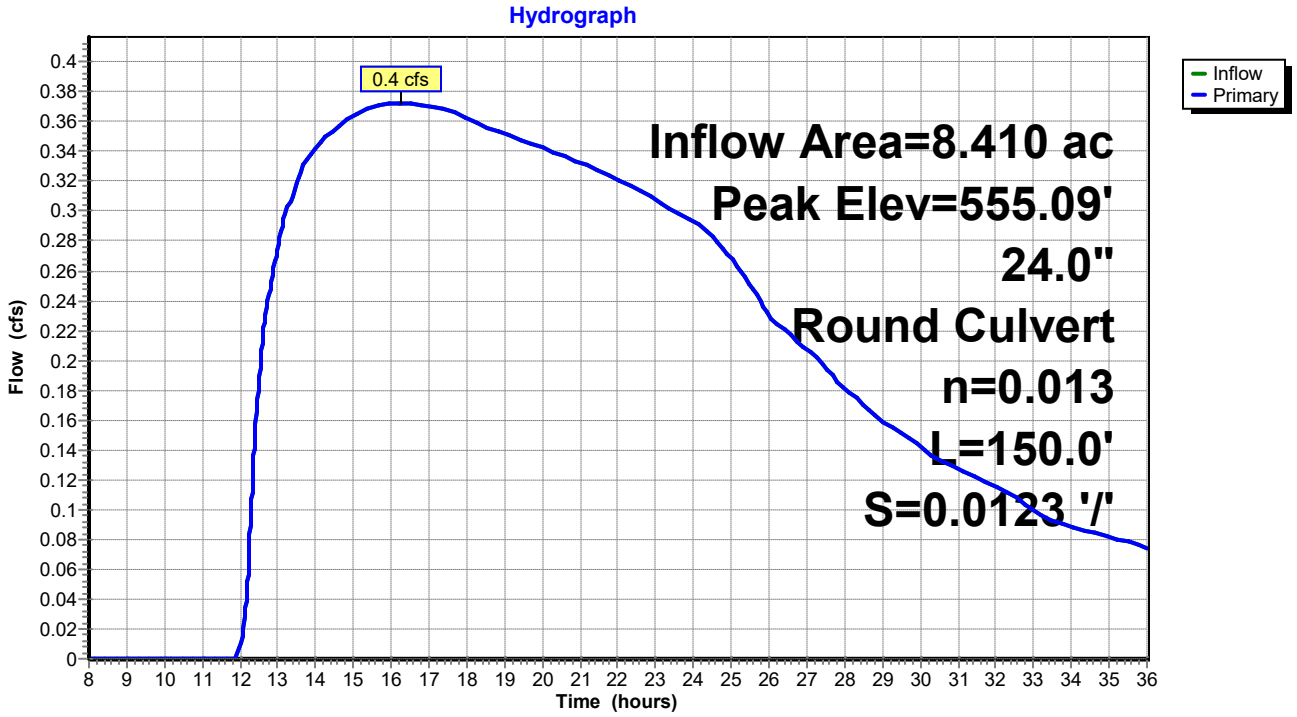
Inflow Area =	8.410 ac, 36.24% Impervious, Inflow Depth > 0.79" for 1-yr event				
Inflow =	0.4 cfs @	16.24 hrs,	Volume=	0.550 af	
Outflow =	0.4 cfs @	16.23 hrs,	Volume=	0.550 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.4 cfs @	16.23 hrs,	Volume=	0.550 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 555.09' @ 16.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	554.84'	**24.0" Round Culvert** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 554.84' / 553.00' S= 0.0123 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.4 cfs @ 16.23 hrs HW=555.09' TW=551.55' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.4 cfs @ 1.69 fps)

Pond DMH 27: Existing Drain Manhole 27



Stage-Area-Storage for Pond DMH 27: Existing Drain Manhole 27

Elevation (feet)	Storage (cubic-feet)
554.84	**0**
554.94	0
555.04	0
555.14	0
555.24	0
555.34	0
555.44	0
555.54	0
555.64	0
555.74	0
555.84	0
555.94	0
556.04	0
556.14	0
556.24	0
556.34	0
556.44	0
556.54	0
556.64	0
556.74	0
556.84	0

Summary for Pond DMH 45: Existing Drain Manhole 45

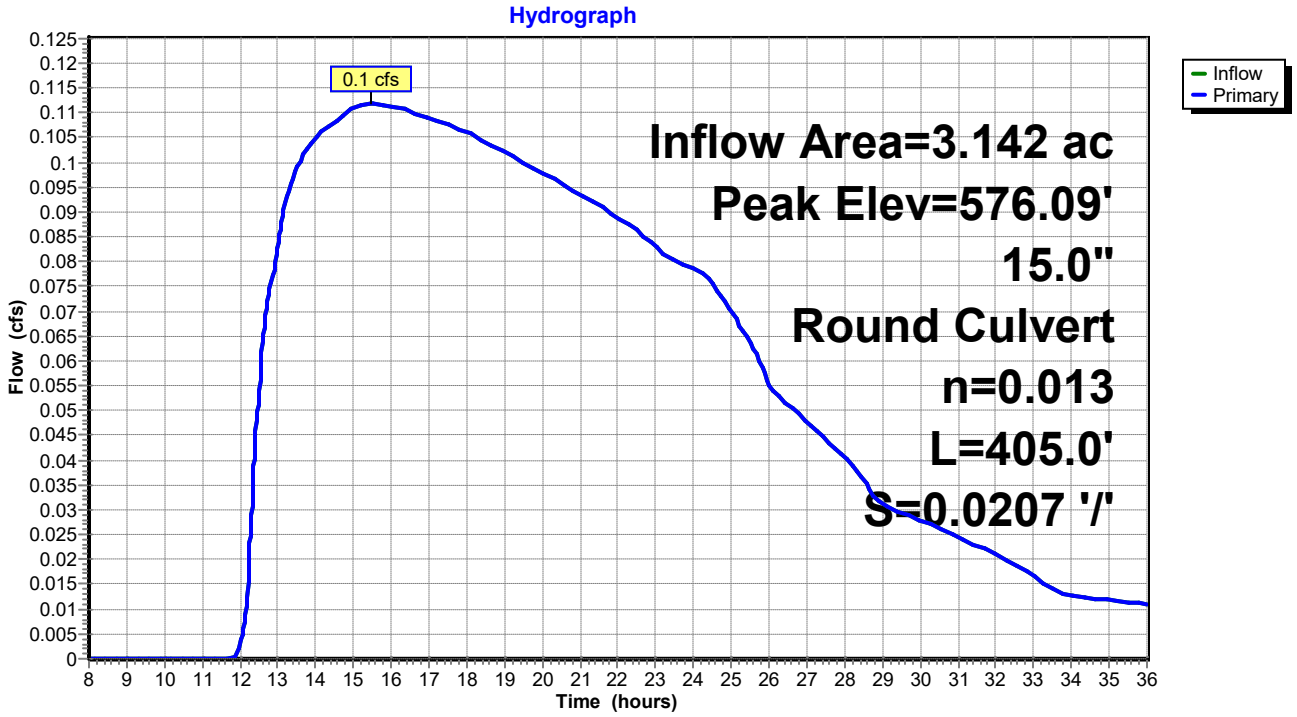
Inflow Area =	3.142 ac, 24.82% Impervious, Inflow Depth = 0.51" for 1-yr event				
Inflow =	0.1 cfs @	15.48 hrs,	Volume=	0.134 af	
Outflow =	0.1 cfs @	15.47 hrs,	Volume=	0.134 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.1 cfs @	15.47 hrs,	Volume=	0.134 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 576.09' @ 15.47 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	575.94'	**15.0" Round Culvert** L= 405.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 575.94' / 567.57' S= 0.0207 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.1 cfs @ 15.47 hrs HW=576.09' TW=555.08' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.1 cfs @ 1.32 fps)

Pond DMH 45: Existing Drain Manhole 45



Stage-Area-Storage for Pond DMH 45: Existing Drain Manhole 45

Elevation (feet)	Storage (cubic-feet)
575.94	**0**
576.04	0
576.14	0
576.24	0
576.34	0
576.44	0
576.54	0
576.64	0
576.74	0
576.84	0
576.94	0
577.04	0
577.14	0

Summary for Pond EDB #2: Existing Detention Basin #2

Inflow Area = 14.630 ac, 20.83% Impervious, Inflow Depth = 0.92" for 1-yr event
Inflow = 5.0 cfs @ 12.15 hrs, Volume= 1.120 af
Outflow = 0.9 cfs @ 13.74 hrs, Volume= 1.117 af, Atten= 81%, Lag= 95.5 min
Primary = 0.9 cfs @ 13.74 hrs, Volume= 1.117 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Starting Elev= 551.00' Surf.Area= 17,383 sf Storage= 61,331 cf
Peak Elev= 551.60' @ 13.74 hrs Surf.Area= 19,027 sf Storage= 72,209 cf (10,877 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 272.4 min (1,457.4 - 1,185.0)

Volume	Invert	Avail.Storage	Storage Description
#1	546.00'	237,385 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

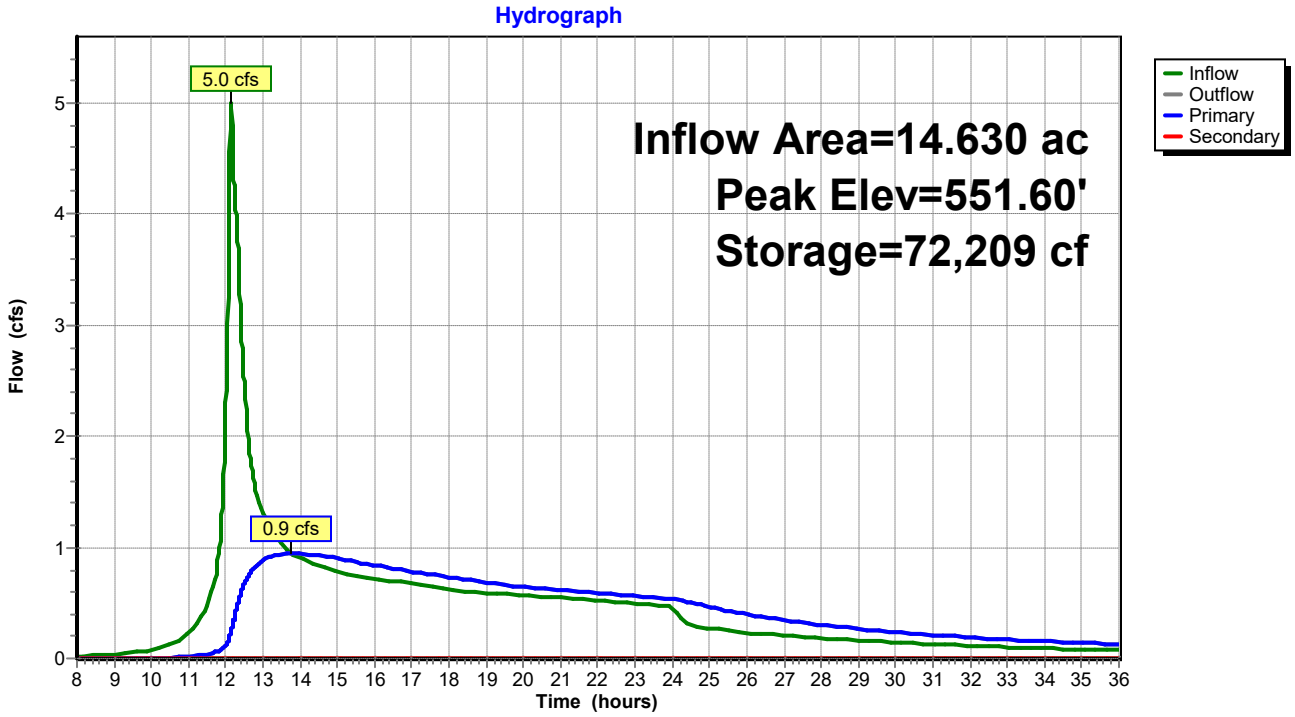
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
546.00	8,325	0	0
548.00	11,185	19,510	19,510
550.00	14,630	25,815	45,325
552.00	20,135	34,765	80,090
554.00	24,105	44,240	124,330
556.00	28,250	52,355	176,685
558.00	32,450	60,700	237,385

Device	Routing	Invert	Outlet Devices
#1	Primary	550.50'	**24.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 550.50' / 549.60' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	551.00'	**30.0 deg x 0.5' long x 4.50' rise Sharp-Crested Vee/Trap Weir** Cv= 2.61 (C= 3.26)
#3	Secondary	555.50'	**30.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.9 cfs @ 13.74 hrs HW=551.60' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.9 cfs of 6.3 cfs potential flow)
└─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.9 cfs @ 2.40 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=551.00' TW=0.00' (Dynamic Tailwater)
└─**3=Orifice/Grate** (Controls 0.0 cfs)

Pond EDB #2: Existing Detention Basin #2



Stage-Area-Storage for Pond EDB #2: Existing Detention Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
546.00	8,325	0	550.68	16,502	55,910
546.09	8,454	755	550.77	16,749	57,406
546.18	8,582	1,522	550.86	16,997	58,925
546.27	8,711	2,300	550.95	17,245	60,466
546.36	8,840	3,090	551.04	17,493	62,029
546.45	8,969	3,891	551.13	17,740	63,614
546.54	9,097	4,704	551.22	17,988	65,222
546.63	9,226	5,529	551.31	18,236	66,852
546.72	9,355	6,365	551.40	18,483	68,504
546.81	9,483	7,212	551.49	18,731	70,179
546.90	9,612	8,072	551.58	18,979	71,876
546.99	9,741	8,943	551.67	19,227	73,595
547.08	9,869	9,825	551.76	19,474	75,337
547.17	9,998	10,719	551.85	19,722	77,101
547.26	10,127	11,625	551.94	19,970	78,887
547.35	10,256	12,542	552.03	20,195	80,695
547.44	10,384	13,471	552.12	20,373	82,520
547.53	10,513	14,411	552.21	20,552	84,362
547.62	10,642	15,363	552.30	20,730	86,220
547.71	10,770	16,326	552.39	20,909	88,094
547.80	10,899	17,302	552.48	21,088	89,983
547.89	11,028	18,288	552.57	21,266	91,889
547.98	11,156	19,287	552.66	21,445	93,811
548.07	11,306	20,297	552.75	21,624	95,750
548.16	11,461	21,322	552.84	21,802	97,704
548.25	11,616	22,360	552.93	21,981	99,674
548.34	11,771	23,412	553.02	22,160	101,660
548.43	11,926	24,479	553.11	22,338	103,663
548.52	12,081	25,559	553.20	22,517	105,681
548.61	12,236	26,653	553.29	22,696	107,716
548.70	12,391	27,762	553.38	22,874	109,766
548.79	12,546	28,884	553.47	23,053	111,833
548.88	12,701	30,020	553.56	23,232	113,916
548.97	12,856	31,170	553.65	23,410	116,015
549.06	13,011	32,334	553.74	23,589	118,130
549.15	13,166	33,512	553.83	23,768	120,261
549.24	13,321	34,704	553.92	23,946	122,408
549.33	13,476	35,910	554.01	24,126	124,571
549.42	13,631	37,129	554.10	24,312	126,751
549.51	13,786	38,363	554.19	24,499	128,947
549.60	13,941	39,611	554.28	24,685	131,161
549.69	14,096	40,872	554.37	24,872	133,391
549.78	14,251	42,148	554.46	25,058	135,638
549.87	14,406	43,438	554.55	25,245	137,901
549.96	14,561	44,741	554.64	25,431	140,182
550.05	14,768	46,060	554.73	25,618	142,479
550.14	15,015	47,400	554.82	25,804	144,793
550.23	15,263	48,763	554.91	25,991	147,124
550.32	15,511	50,148	555.00	26,178	149,471
550.41	15,759	51,555	555.09	26,364	151,836
550.50	16,006	52,984	555.18	26,551	154,217
550.59	16,254	54,436	555.27	26,737	156,615

Stage-Area-Storage for Pond EDB #2: Existing Detention Basin #2 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
555.36	26,924	159,029
555.45	27,110	161,461
555.54	27,297	163,909
555.63	27,483	166,374
555.72	27,670	168,856
555.81	27,856	171,355
555.90	28,043	173,870
555.99	28,229	176,403
556.08	28,418	178,952
556.17	28,607	181,518
556.26	28,796	184,101
556.35	28,985	186,701
556.44	29,174	189,318
556.53	29,363	191,952
556.62	29,552	194,604
556.71	29,741	197,272
556.80	29,930	199,957
556.89	30,119	202,659
556.98	30,308	205,378
557.07	30,497	208,115
557.16	30,686	210,868
557.25	30,875	213,638
557.34	31,064	216,425
557.43	31,253	219,230
557.52	31,442	222,051
557.61	31,631	224,889
557.70	31,820	227,745
557.79	32,009	230,617
557.88	32,198	233,506
557.97	**32,387**	**236,412**

Summary for Pond FS 3: Existing Flow Splitter #3

Inflow Area =	4.150 ac,	0.00% Impervious,	Inflow Depth =	0.91"	for 1-yr event
Inflow =	2.6 cfs @	12.29 hrs,	Volume=	0.316 af	
Outflow =	2.6 cfs @	12.29 hrs,	Volume=	0.316 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.0 cfs @	0.00 hrs,	Volume=	0.000 af	
Secondary =	2.6 cfs @	12.29 hrs,	Volume=	0.316 af	

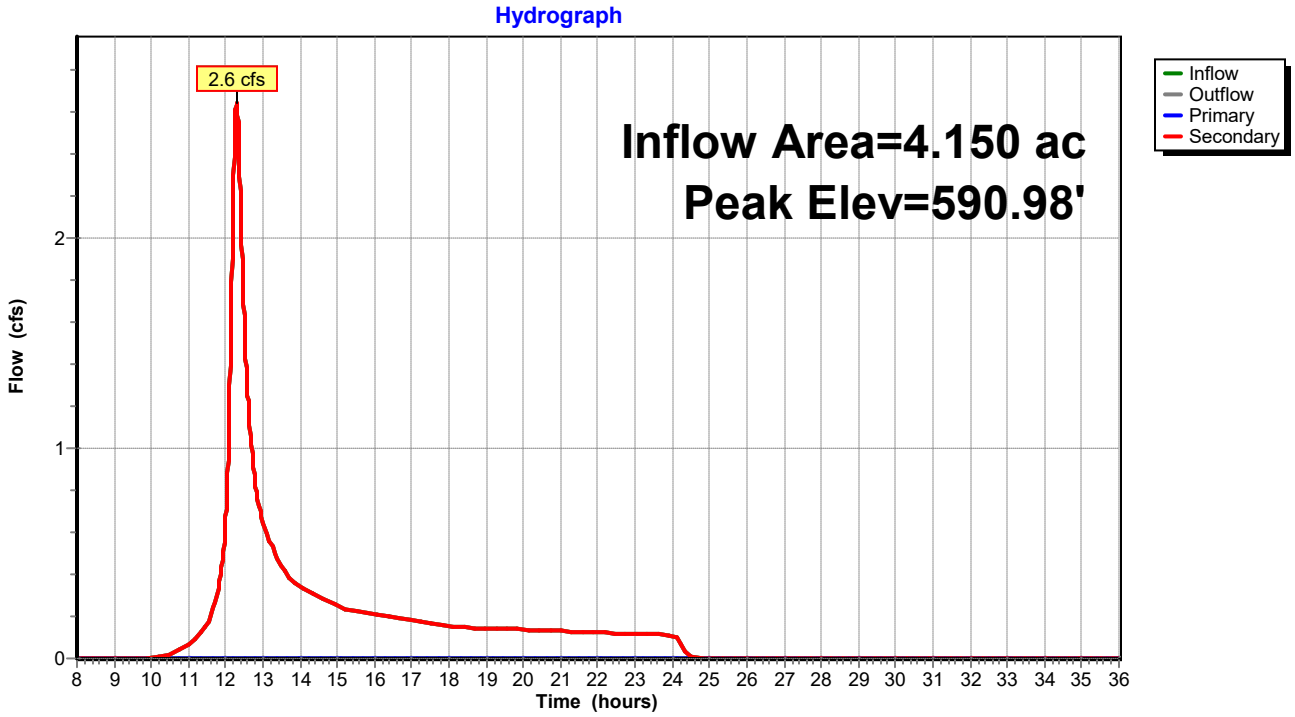
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 590.98' @ 12.29 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	591.20'	**15.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 591.20' / 591.00' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	593.60'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Secondary	590.30'	**24.0" Round Culvert** L= 320.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 590.30' / 552.00' S= 0.1197 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.30' TW=590.00' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.0 cfs)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Secondary OutFlow Max=2.6 cfs @ 12.29 hrs HW=590.98' TW=551.38' (Dynamic Tailwater)
└─**3=Culvert** (Inlet Controls 2.6 cfs @ 2.81 fps)

Pond FS 3: Existing Flow Splitter #3



Stage-Area-Storage for Pond FS 3: Existing Flow Splitter #3

Elevation (feet)	Storage (cubic-feet)
590.30	**0**
590.40	0
590.50	0
590.60	0
590.70	0
590.80	0
590.90	0
591.00	0
591.10	0
591.20	0
591.30	0
591.40	0
591.50	0
591.60	0
591.70	0
591.80	0
591.90	0
592.00	0
592.10	0
592.20	0
592.30	0
592.40	0
592.50	0
592.60	0
592.70	0
592.80	0
592.90	0
593.00	0
593.10	0
593.20	0
593.30	0
593.40	0
593.50	0
593.60	0

Summary for Pond FS#4: Exist. Flow Spilitter #4

Inflow Area =	5.269 ac, 43.05% Impervious, Inflow Depth = 1.02" for 1-yr event			
Inflow =	4.1 cfs @ 12.26 hrs, Volume=	0.449 af		
Outflow =	4.1 cfs @ 12.26 hrs, Volume=	0.449 af, Atten= 0%, Lag= 0.0 min		
Primary =	4.1 cfs @ 12.26 hrs, Volume=	0.449 af		
Secondary =	0.0 cfs @ 0.00 hrs, Volume=	0.000 af		

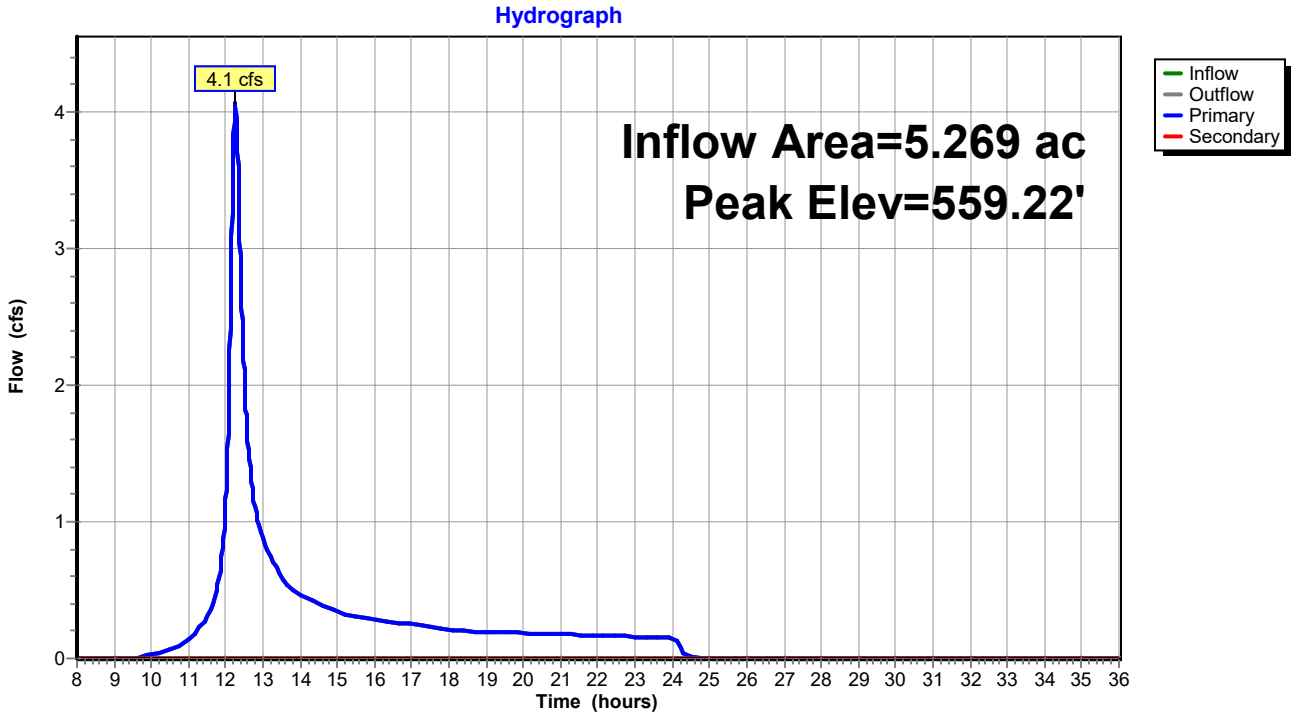
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 559.22' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	558.25'	**18.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 558.25' / 556.80' S= 0.0659 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Secondary	558.15'	**24.0" Round Culvert** L= 61.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 558.15' / 554.84' S= 0.0543 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	561.30'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.1 cfs @ 12.26 hrs HW=559.22' TW=557.28' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.1 cfs @ 3.35 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=558.24' TW=554.84' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.0 cfs of 0.1 cfs potential flow)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond FS#4: Exist. Flow Spilitter #4



Stage-Area-Storage for Pond FS#4: Exist. Flow Spilitter #4

Elevation (feet)	Storage (cubic-feet)
558.15	**0**
558.25	0
558.35	0
558.45	0
558.55	0
558.65	0
558.75	0
558.85	0
558.95	0
559.05	0
559.15	0
559.25	0
559.35	0
559.45	0
559.55	0
559.65	0
559.75	0
559.85	0
559.95	0
560.05	0
560.15	0
560.25	0
560.35	0
560.45	0
560.55	0
560.65	0
560.75	0
560.85	0
560.95	0
561.05	0
561.15	0
561.25	0

Summary for Pond FS#6: Exist. Flow Splitter #6

Inflow Area =	3.142 ac, 24.82% Impervious, Inflow Depth = 0.51" for 1-yr event			
Inflow =	1.0 cfs @ 12.28 hrs, Volume=	0.134 af		
Outflow =	1.0 cfs @ 12.28 hrs, Volume=	0.134 af, Atten= 0%, Lag= 0.0 min		
Primary =	1.0 cfs @ 12.28 hrs, Volume=	0.134 af		
Secondary =	0.0 cfs @ 0.00 hrs, Volume=	0.000 af		

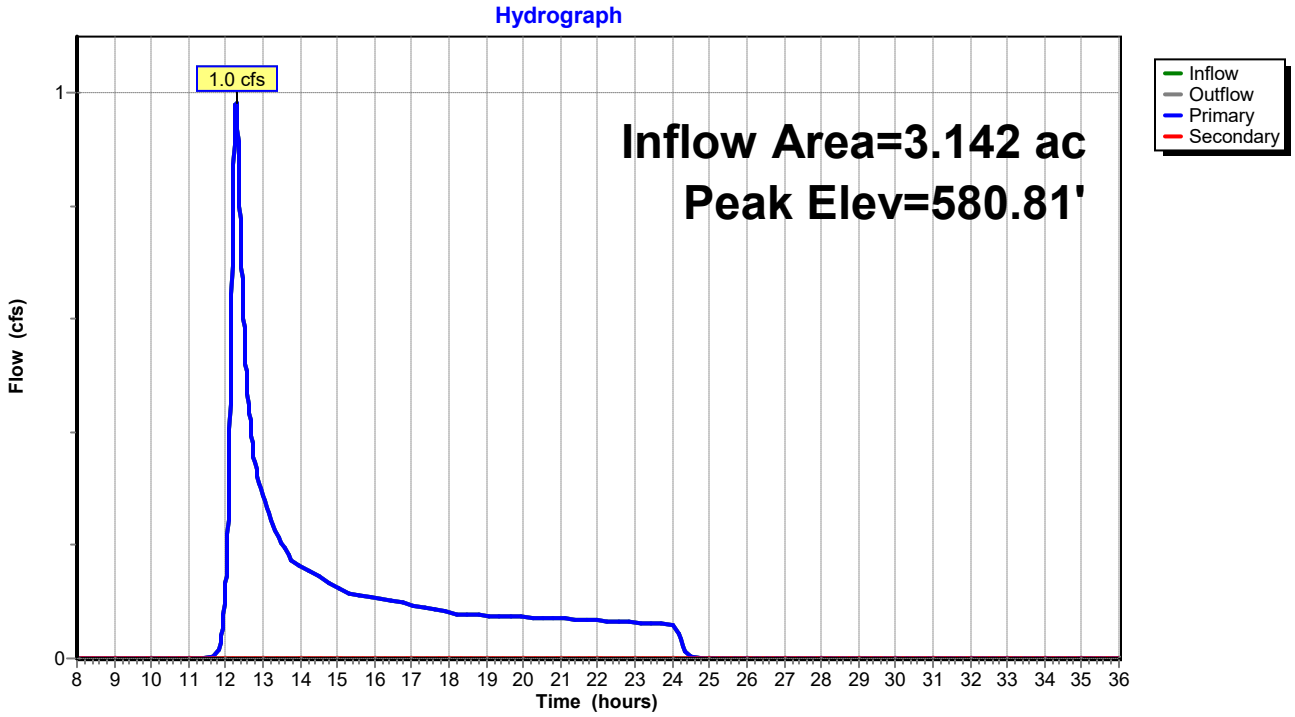
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 580.81' @ 12.28 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	580.30'	**15.0" Round Culvert** L= 39.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.30' / 580.00' S= 0.0077 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	580.47'	**15.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.47' / 579.59' S= 0.0244 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	582.25'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.0 cfs @ 12.28 hrs HW=580.81' TW=578.90' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1.0 cfs @ 3.05 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=580.30' TW=575.94' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.0 cfs)
  └─**3=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond FS#6: Exist. Flow Splitter #6



Stage-Area-Storage for Pond FS#6: Exist. Flow Splitter #6

Elevation (feet)	Storage (cubic-feet)
580.30	**0**
580.40	0
580.50	0
580.60	0
580.70	0
580.80	0
580.90	0
581.00	0
581.10	0
581.20	0
581.30	0
581.40	0
581.50	0
581.60	0
581.70	0
581.80	0
581.90	0
582.00	0
582.10	0
582.20	0

Summary for Pond SWQB 3: Existing SWQB #3

Inflow Area = 4.150 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 590.00' @ 0.00 hrs Surf.Area= 1,330 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	590.00'	33,910 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

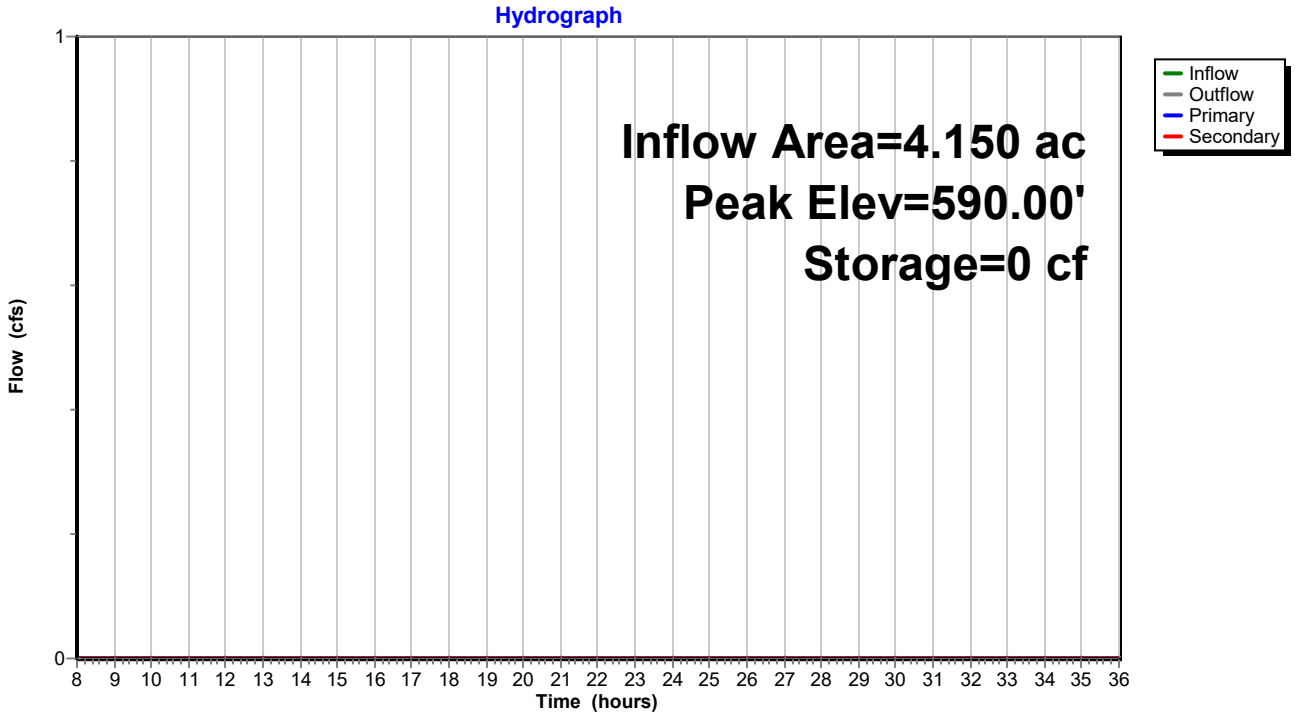
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
590.00	1,330	0	0
592.00	3,725	5,055	5,055
594.00	7,015	10,740	15,795
596.00	11,100	18,115	33,910

Device	Routing	Invert	Outlet Devices
#1	Primary	588.20'	**12.0" Round Culvert** L= 240.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 588.20' / 552.00' S= 0.1508 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	590.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	590.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 18 rows with 3.0" cc spacing C= 0.600
#4	Secondary	594.00'	**30.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.00' TW=551.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.0 cfs of 4.3 cfs potential flow)
  └─**2=Orifice/Grate** (Controls 0.0 cfs)
    └─**3=Orifice/Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.00' TW=551.00' (Dynamic Tailwater)
└─**4=Orifice/Grate** (Controls 0.0 cfs)

Pond SWQB 3: Existing SWQB #3



Stage-Area-Storage for Pond SWQB 3: Existing SWQB #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
590.00	1,330	0
590.10	1,450	139
590.20	1,570	290
590.30	1,689	453
590.40	1,809	628
590.50	1,929	815
590.60	2,049	1,014
590.70	2,168	1,224
590.80	2,288	1,447
590.90	2,408	1,682
591.00	2,528	1,929
591.10	2,647	2,187
591.20	2,767	2,458
591.30	2,887	2,741
591.40	3,006	3,036
591.50	3,126	3,342
591.60	3,246	3,661
591.70	3,366	3,991
591.80	3,485	4,334
591.90	3,605	4,688
592.00	3,725	5,055
592.10	3,890	5,436
592.20	4,054	5,833
592.30	4,218	6,247
592.40	4,383	6,677
592.50	4,548	7,123
592.60	4,712	7,586
592.70	4,877	8,066
592.80	5,041	8,561
592.90	5,205	9,074
593.00	5,370	9,603
593.10	5,535	10,148
593.20	5,699	10,709
593.30	5,863	11,288
593.40	6,028	11,882
593.50	6,193	12,493
593.60	6,357	13,121
593.70	6,522	13,765
593.80	6,686	14,425
593.90	6,850	15,102
594.00	7,015	15,795
594.10	7,219	16,507
594.20	7,424	17,239
594.30	7,628	17,991
594.40	7,832	18,764
594.50	8,036	19,558
594.60	8,241	20,372
594.70	8,445	21,206
594.80	8,649	22,061
594.90	8,853	22,936
595.00	9,058	23,831
595.10	9,262	24,747
595.20	9,466	25,684
595.30	9,670	26,640
595.40	9,874	27,618
595.50	10,079	28,615
595.60	10,283	29,633
595.70	10,487	30,672
595.80	10,691	31,731
595.90	10,896	32,810
596.00	**11,100**	**33,910**

Summary for Pond SWQB 4: Exist. SWQB #4

Inflow Area = 5.269 ac, 43.05% Impervious, Inflow Depth = 1.02" for 1-yr event
Inflow = 4.1 cfs @ 12.26 hrs, Volume= 0.449 af
Outflow = 0.3 cfs @ 16.66 hrs, Volume= 0.416 af, Atten= 94%, Lag= 264.2 min
Primary = 0.3 cfs @ 16.66 hrs, Volume= 0.416 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 558.80' @ 16.66 hrs Surf.Area= 5,199 sf Storage= 10,851 cf

Plug-Flow detention time= 706.8 min calculated for 0.416 af (93% of inflow)
Center-of-Mass det. time= 669.0 min (1,563.4 - 894.4)

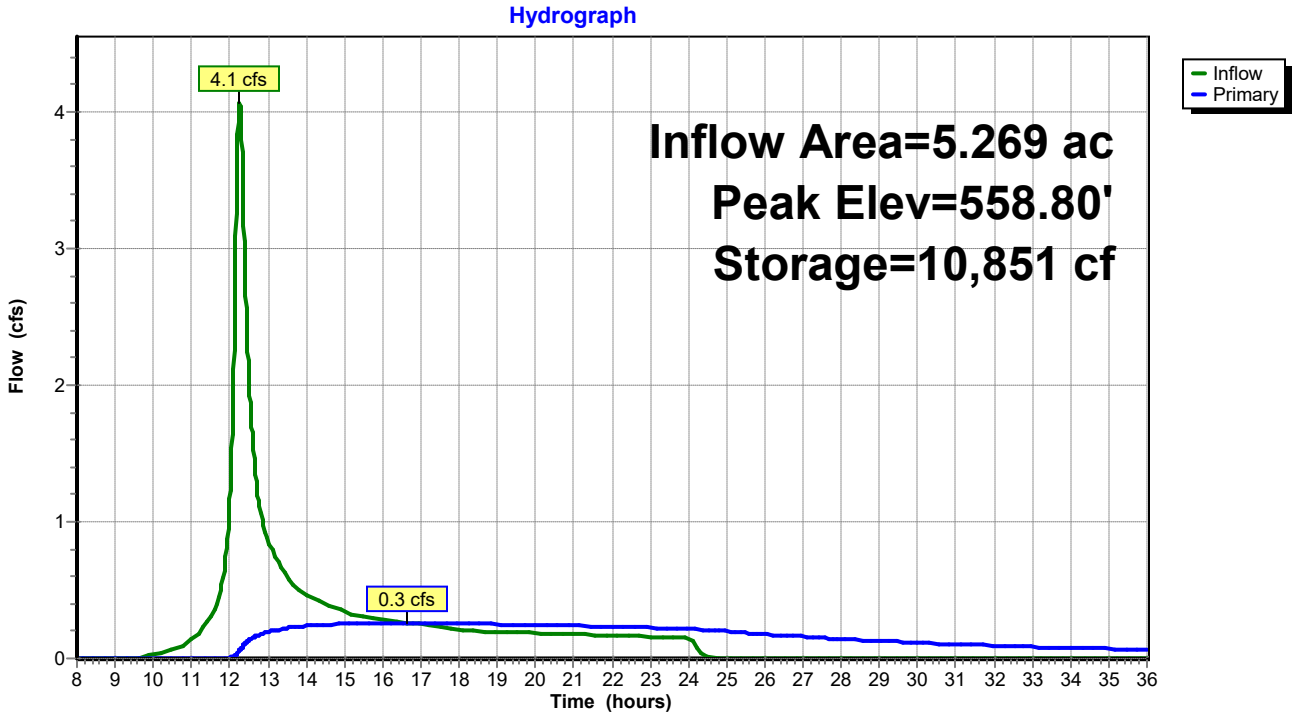
Volume	Invert	Avail.Storage	Storage Description
#1	556.00'	53,446 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
556.00	2,625	212.0	0	0	2,625
558.00	4,450	278.0	6,995	6,995	5,245
560.00	6,430	341.0	10,819	17,815	8,409
562.00	8,860	408.0	15,225	33,040	12,472
564.00	11,608	478.0	20,406	53,446	17,487

Device	Routing	Invert	Outlet Devices
#1	Primary	556.00'	**12.0" Round Culvert** L= 63.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 556.00' / 554.84' S= 0.0184 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	561.80'	**33.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	556.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	556.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 23 rows with 3.0" cc spacing C= 0.600

Primary OutFlow Max=0.3 cfs @ 16.66 hrs HW=558.80' TW=555.09' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.3 cfs of 5.7 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.0 cfs)
  └─**3=Orifice/Grate** (Passes 0.3 cfs of 0.6 cfs potential flow)
    └─**4=Orifice/Grate** (Orifice Controls 0.3 cfs @ 4.80 fps)

Pond SWQB 4: Exist. SWQB #4



Stage-Area-Storage for Pond SWQB 4: Exist. SWQB #4

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
556.00	2,625	0
556.10	2,705	266
556.20	2,786	541
556.30	2,868	824
556.40	2,952	1,115
556.50	3,036	1,414
556.60	3,122	1,722
556.70	3,209	2,039
556.80	3,298	2,364
556.90	3,387	2,698
557.00	3,478	3,041
557.10	3,569	3,394
557.20	3,663	3,755
557.30	3,757	4,126
557.40	3,852	4,507
557.50	3,949	4,897
557.60	4,047	5,296
557.70	4,146	5,706
557.80	4,246	6,126
557.90	4,347	6,555
558.00	4,450	6,995
558.10	4,540	7,445
558.20	4,632	7,903
558.30	4,724	8,371
558.40	4,817	8,848
558.50	4,911	9,334
558.60	5,006	9,830
558.70	5,102	10,336
558.80	5,198	10,851
558.90	5,296	11,375
559.00	5,395	11,910
559.10	5,494	12,454
559.20	5,594	13,009
559.30	5,696	13,573
559.40	5,798	14,148
559.50	5,901	14,733
559.60	6,005	15,328
559.70	6,110	15,934
559.80	6,216	16,550
559.90	6,322	17,177
560.00	6,430	17,815
560.10	6,542	18,463
560.20	6,656	19,123
560.30	6,770	19,794
560.40	6,885	20,477
560.50	7,001	21,171
560.60	7,118	21,877
560.70	7,236	22,595
560.80	7,355	23,325
560.90	7,475	24,066
561.00	7,596	24,820
561.10	7,718	25,585
561.20	7,841	26,363
561.30	7,965	27,154
561.40	8,090	27,957
561.50	8,216	28,772
561.60	8,343	29,600
561.70	8,471	30,440
561.80	8,600	31,294
561.90	8,729	32,160
562.00	8,860	33,040
562.10	8,989	33,932
562.20	9,118	34,838
562.30	9,249	35,756
562.40	9,380	36,687
562.50	9,512	37,632
562.60	9,645	38,590
562.70	9,780	39,561
562.80	9,915	40,546
562.90	10,051	41,544
563.00	10,188	42,556
563.10	10,326	43,582
563.20	10,464	44,621
563.30	10,604	45,675
563.40	10,745	46,742
563.50	10,886	47,823
563.60	11,029	48,919
563.70	11,172	50,029
563.80	11,317	51,154
563.90	11,462	52,293
564.00	**11,608**	**53,446**

Summary for Pond SWQB 4A: Exist. SWQB #4A

Inflow Area = 3.142 ac, 24.82% Impervious, Inflow Depth = 0.51" for 1-yr event
Inflow = 1.0 cfs @ 12.28 hrs, Volume= 0.134 af
Outflow = 0.1 cfs @ 15.48 hrs, Volume= 0.134 af, Atten= 89%, Lag= 192.0 min
Primary = 0.1 cfs @ 15.48 hrs, Volume= 0.134 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Starting Elev= 578.50' Surf.Area= 1,337 sf Storage= 590 cf
Peak Elev= 579.77' @ 15.48 hrs Surf.Area= 2,301 sf Storage= 2,878 cf (2,288 cf above start)

Plug-Flow detention time= 456.1 min calculated for 0.120 af (90% of inflow)
Center-of-Mass det. time= 351.5 min (1,297.7 - 946.2)

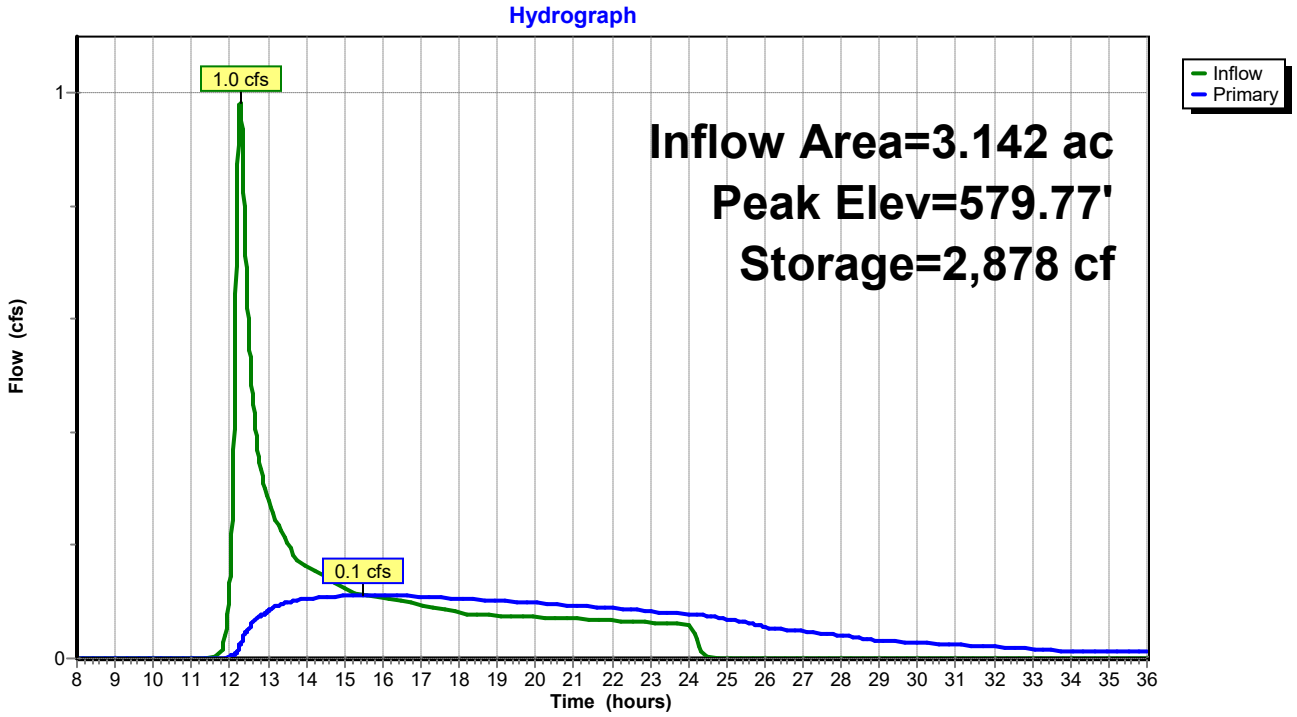
Volume	Invert	Avail.Storage	Storage Description
#1	578.00'	37,725 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
578.00	1,030	148.0	0	0	1,030
580.00	2,500	251.0	3,423	3,423	4,325
582.00	4,386	315.0	6,798	10,221	7,262
584.00	6,847	383.0	11,142	21,363	11,103
586.00	9,592	437.0	16,362	37,725	14,721

Device	Routing	Invert	Outlet Devices
#1	Primary	578.04'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 578.04' / 576.09' S= 0.0390 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	583.14'	**33.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	578.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	578.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 18 rows with 3.0" cc spacing C= 0.600

Primary OutFlow Max=0.1 cfs @ 15.48 hrs HW=579.77' TW=576.09' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.1 cfs of 4.2 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.0 cfs)
  └─**3=Orifice/Grate** (Passes 0.1 cfs of 0.4 cfs potential flow)
    └─**4=Orifice/Grate** (Orifice Controls 0.1 cfs @ 3.68 fps)

Pond SWQB 4A: Exist. SWQB #4A



Stage-Area-Storage for Pond SWQB 4A: Exist. SWQB #4A

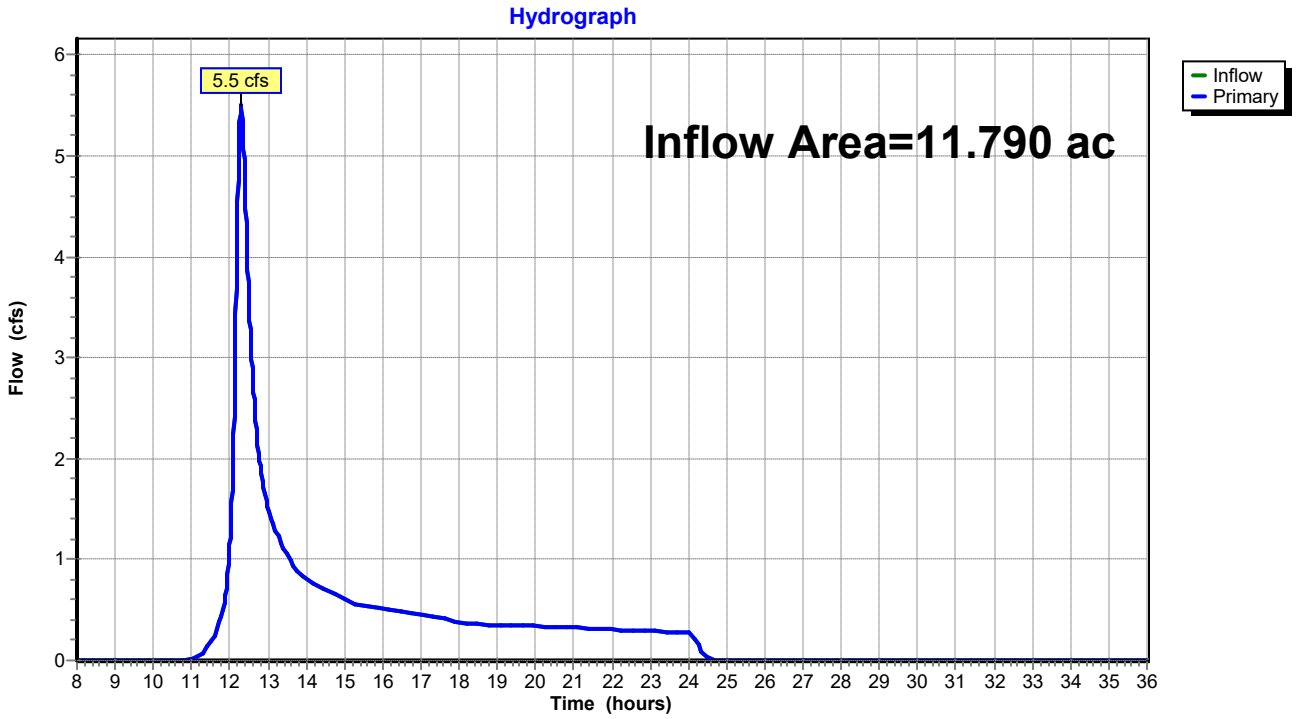
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
578.00	1,030	0
578.10	1,088	106
578.20	1,148	218
578.30	1,210	336
578.40	1,273	460
578.50	1,337	590
578.60	1,404	727
578.70	1,472	871
578.80	1,541	1,022
578.90	1,612	1,179
579.00	1,685	1,344
579.10	1,759	1,516
579.20	1,835	1,696
579.30	1,913	1,883
579.40	1,992	2,079
579.50	2,072	2,282
579.60	2,155	2,493
579.70	2,239	2,713
579.80	2,324	2,941
579.90	2,411	3,178
580.00	2,500	3,423
580.10	2,582	3,677
580.20	2,665	3,940
580.30	2,749	4,210
580.40	2,835	4,489
580.50	2,922	4,777
580.60	3,011	5,074
580.70	3,100	5,379
580.80	3,191	5,694
580.90	3,284	6,018
581.00	3,377	6,351
581.10	3,472	6,693
581.20	3,568	7,045
581.30	3,666	7,407
581.40	3,765	7,778
581.50	3,865	8,160
581.60	3,967	8,552
581.70	4,070	8,953
581.80	4,174	9,365
581.90	4,279	9,788
582.00	4,386	10,221
582.10	4,496	10,665
582.20	4,608	11,121
582.30	4,720	11,587
582.40	4,835	12,065
582.50	4,950	12,554
582.60	5,067	13,055
582.70	5,185	13,567
582.80	5,305	14,092
582.90	5,426	14,628
583.00	5,548	15,177
583.10	5,672	15,738
583.20	5,797	16,312
583.30	5,924	16,898
583.40	6,051	17,496
583.50	6,181	18,108
583.60	6,311	18,732
583.70	6,443	19,370
583.80	6,576	20,021
583.90	6,711	20,685
584.00	6,847	21,363
584.10	6,973	22,054
584.20	7,101	22,758
584.30	7,229	23,475
584.40	7,359	24,204
584.50	7,490	24,946
584.60	7,622	25,702
584.70	7,755	26,471
584.80	7,890	27,253
584.90	8,025	28,049
585.00	8,162	28,858
585.10	8,300	29,681
585.20	8,439	30,518
585.30	8,579	31,369
585.40	8,720	32,234
585.50	8,862	33,113
585.60	9,006	34,006
585.70	9,151	34,914
585.80	9,297	35,837
585.90	9,444	36,774
586.00	**9,592**	**37,725**

Summary for Link DL1: Design Line 1

Inflow Area = 11.790 ac, 20.08% Impervious, Inflow Depth = 0.72" for 1-yr event
Inflow = 5.5 cfs @ 12.30 hrs, Volume= 0.707 af
Primary = 5.5 cfs @ 12.30 hrs, Volume= 0.707 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DL1: Design Line 1

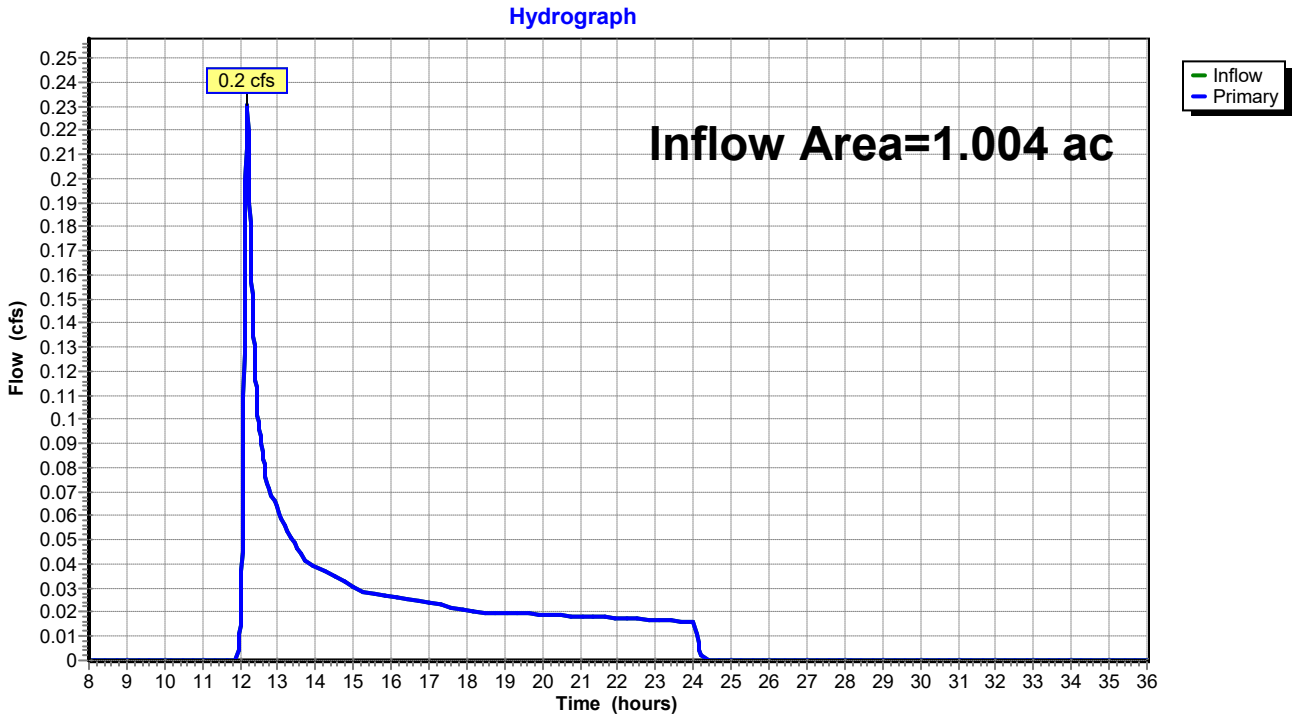


Summary for Link DL2: Design Line 2

Inflow Area = 1.004 ac, 0.00% Impervious, Inflow Depth = 0.37" for 1-yr event
Inflow = 0.2 cfs @ 12.19 hrs, Volume= 0.031 af
Primary = 0.2 cfs @ 12.19 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DL2: Design Line 2

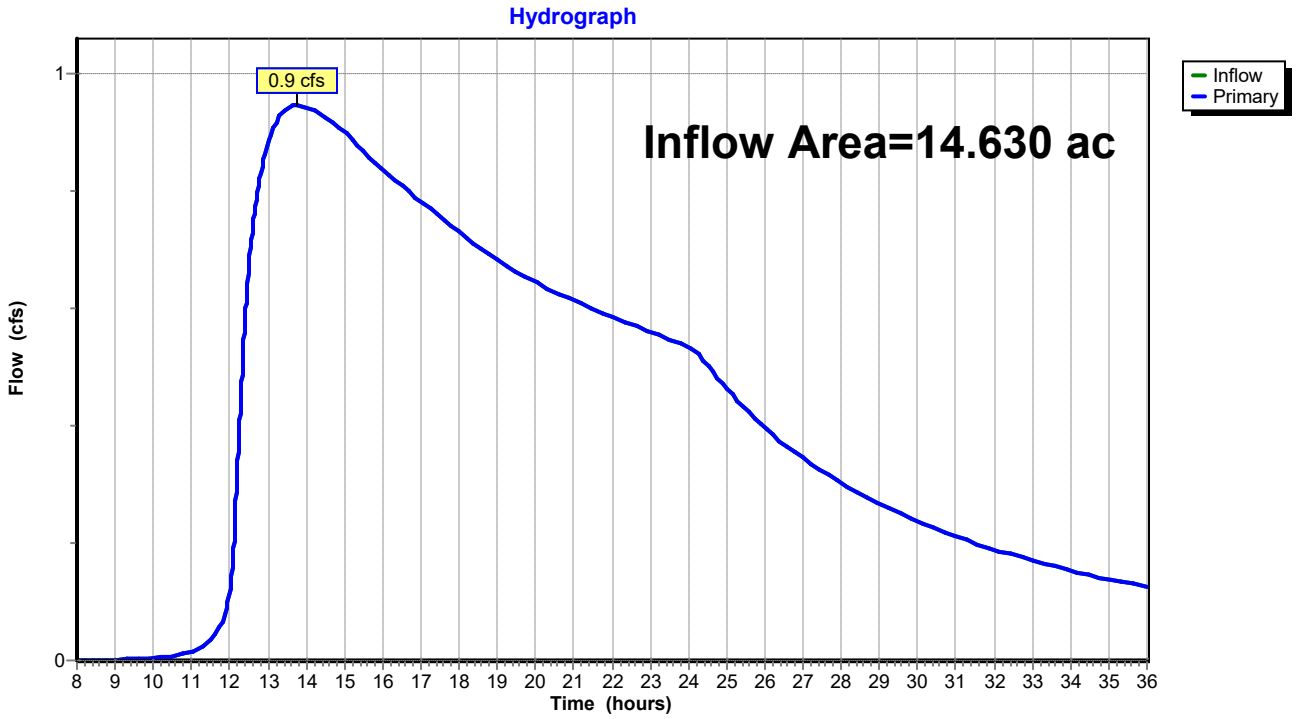


Summary for Link DP1: Design Point #1

Inflow Area = 14.630 ac, 20.83% Impervious, Inflow Depth > 0.92" for 1-yr event
Inflow = 0.9 cfs @ 13.74 hrs, Volume= 1.117 af
Primary = 0.9 cfs @ 13.74 hrs, Volume= 1.117 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DP1: Design Point #1

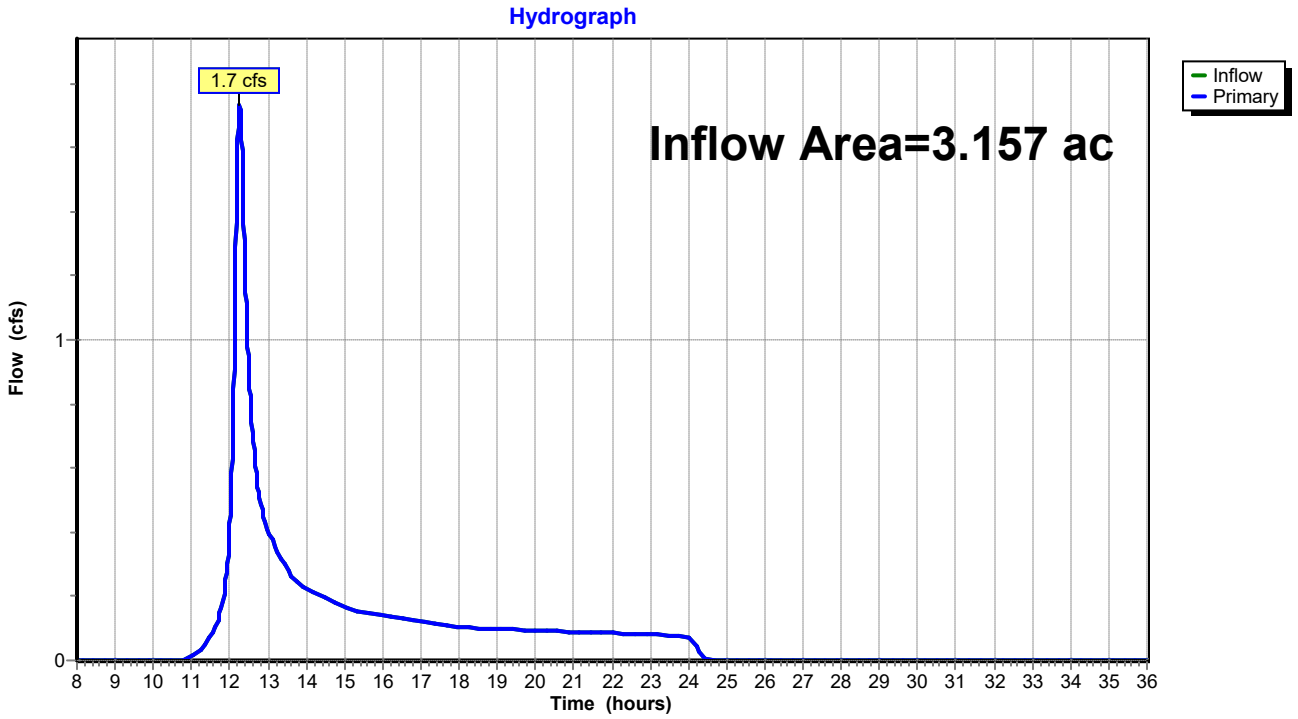


Summary for Link DP2: Design Point 2

Inflow Area = 3.157 ac, 23.24% Impervious, Inflow Depth = 0.77" for 1-yr event
Inflow = 1.7 cfs @ 12.25 hrs, Volume= 0.201 af
Primary = 1.7 cfs @ 12.25 hrs, Volume= 0.201 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DP2: Design Point 2



Summary for Subcatchment Pre1:

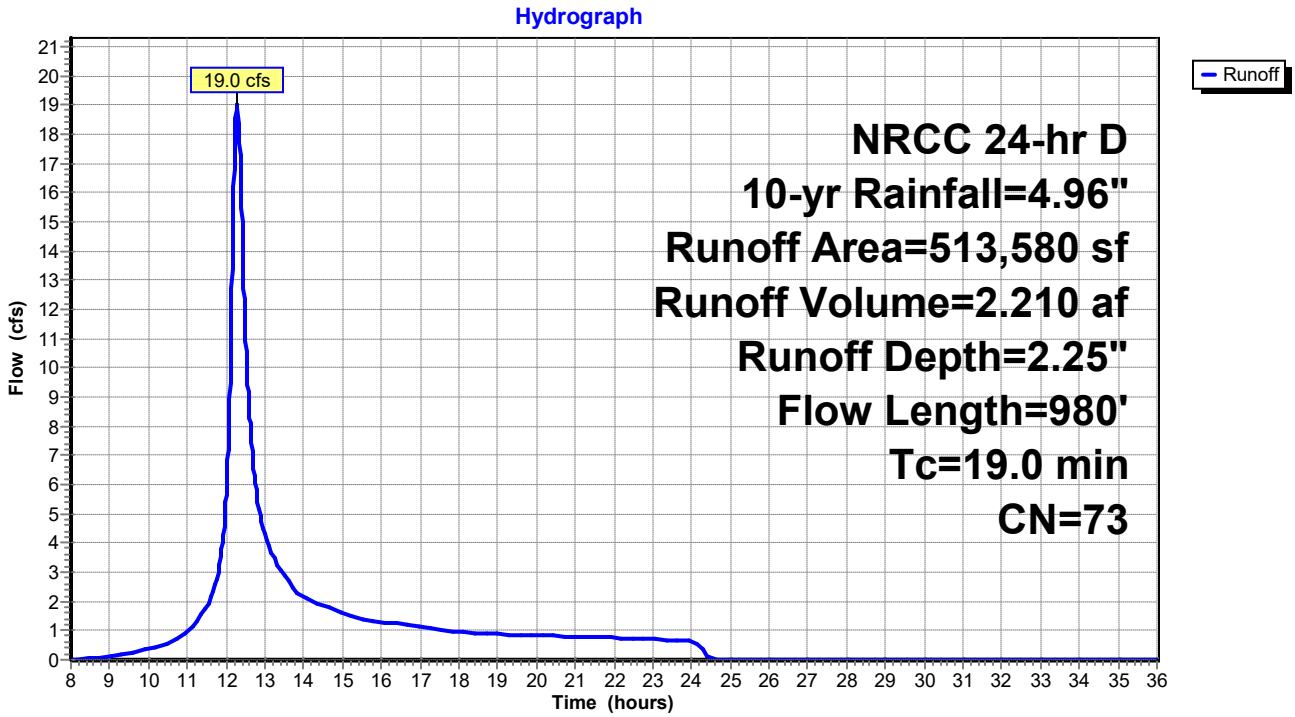
Runoff = 19.0 cfs @ 12.28 hrs, Volume= 2.210 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

Area (sf)	CN	Description
91,490	98	Paved parking, HSG B
11,640	98	Roofs, HSG B
52,590	61	>75% Grass cover, Good, HSG B
39,270	79	Woods, Fair, HSG D
150,200	73	Woods, Fair, HSG C
168,390	60	Woods, Fair, HSG B
513,580	73	Weighted Average
410,450		79.92% Pervious Area
103,130		20.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0750	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.33"
6.6	880	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	980	Total			

Subcatchment Pre1:



Summary for Subcatchment Pre2:

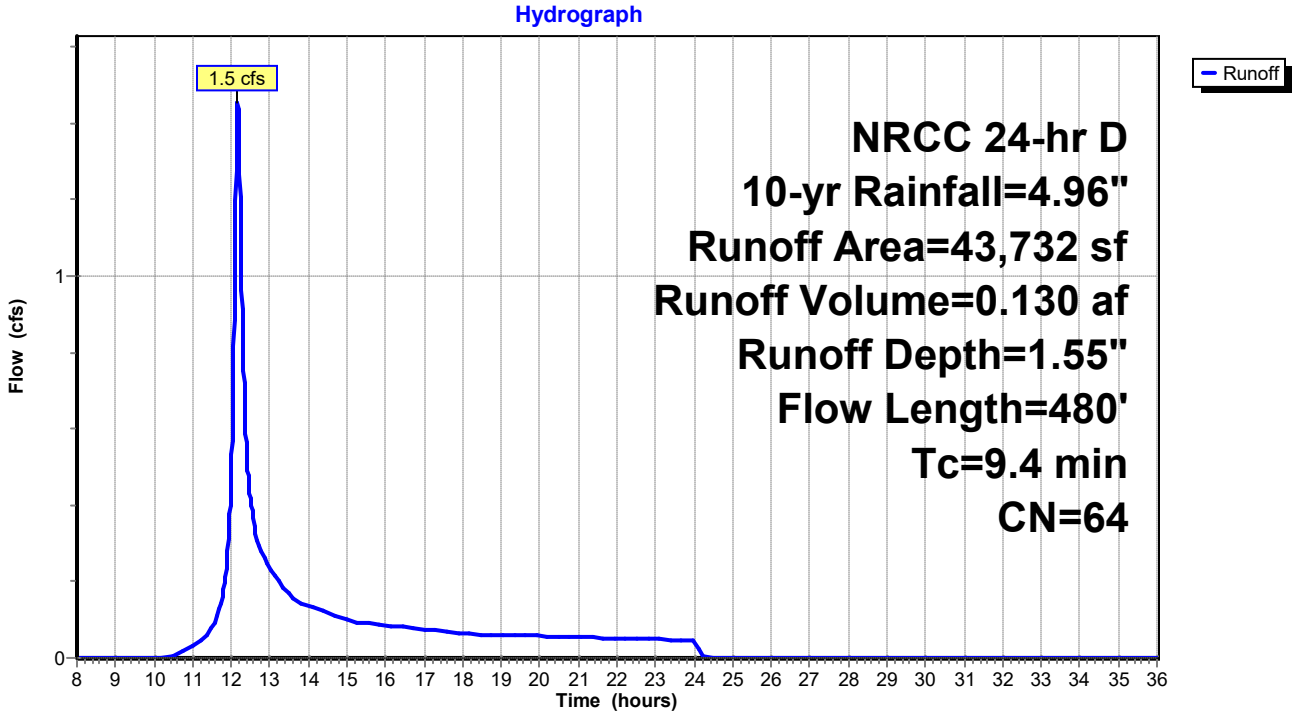
Runoff = 1.5 cfs @ 12.17 hrs, Volume= 0.130 af, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

Area (sf)	CN	Description
32,217	61	>75% Grass cover, Good, HSG B
6,590	74	>75% Grass cover, Good, HSG C
4,925	73	Woods, Fair, HSG C
43,732	64	Weighted Average
43,732		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	100	0.0550	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.33"
1.7	250	0.1240	2.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	130	0.1150	1.70		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.4	480	Total			

Subcatchment Pre2:



Summary for Subcatchment Pre3:

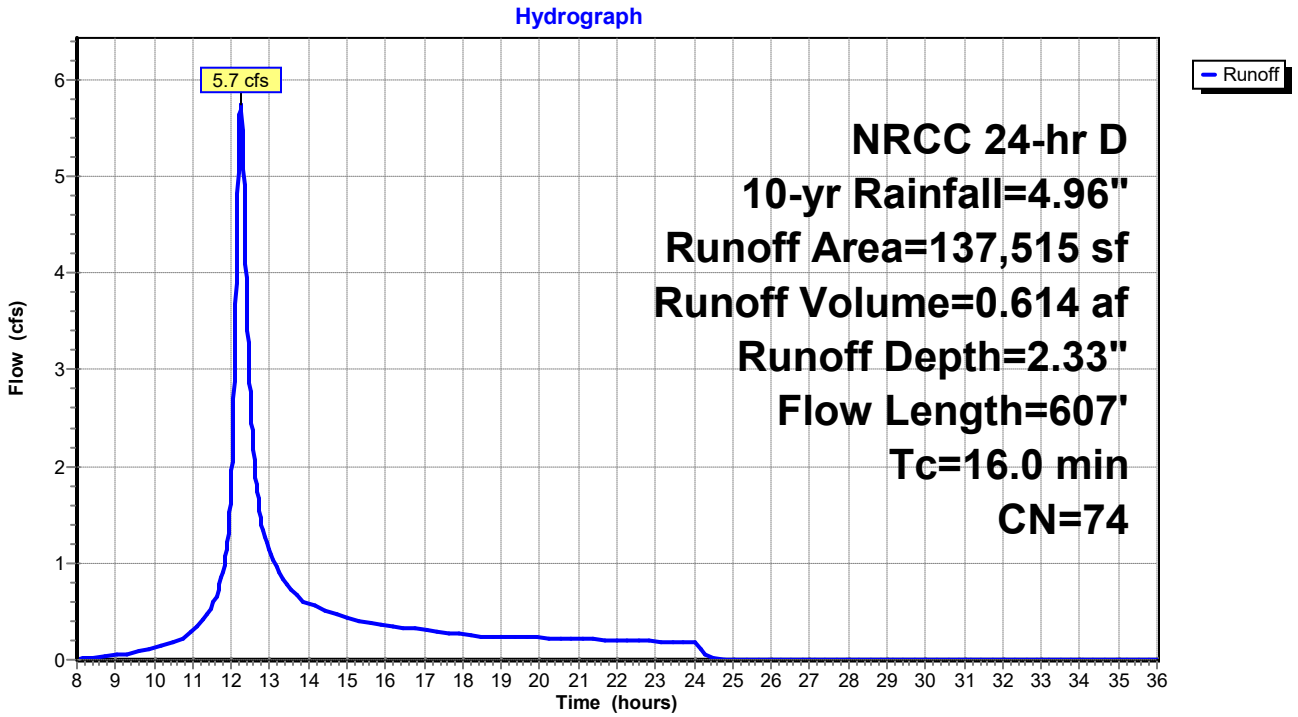
Runoff = 5.7 cfs @ 12.25 hrs, Volume= 0.614 af, Depth= 2.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

Area (sf)	CN	Description
31,955	98	Paved parking, HSG C
4,730	89	Gravel roads, HSG C
14,125	74	>75% Grass cover, Good, HSG C
86,705	65	Brush, Good, HSG C
137,515	74	Weighted Average
105,560		76.76% Pervious Area
31,955		23.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	100	0.0700	0.15		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
4.1	365	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.4	142	0.0840	5.88		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.0	607	Total			

Subcatchment Pre3:



Summary for Subcatchment SUB AREA 3: HIGHLANDS - MAY 2002 SWPPP SUB AREA 3

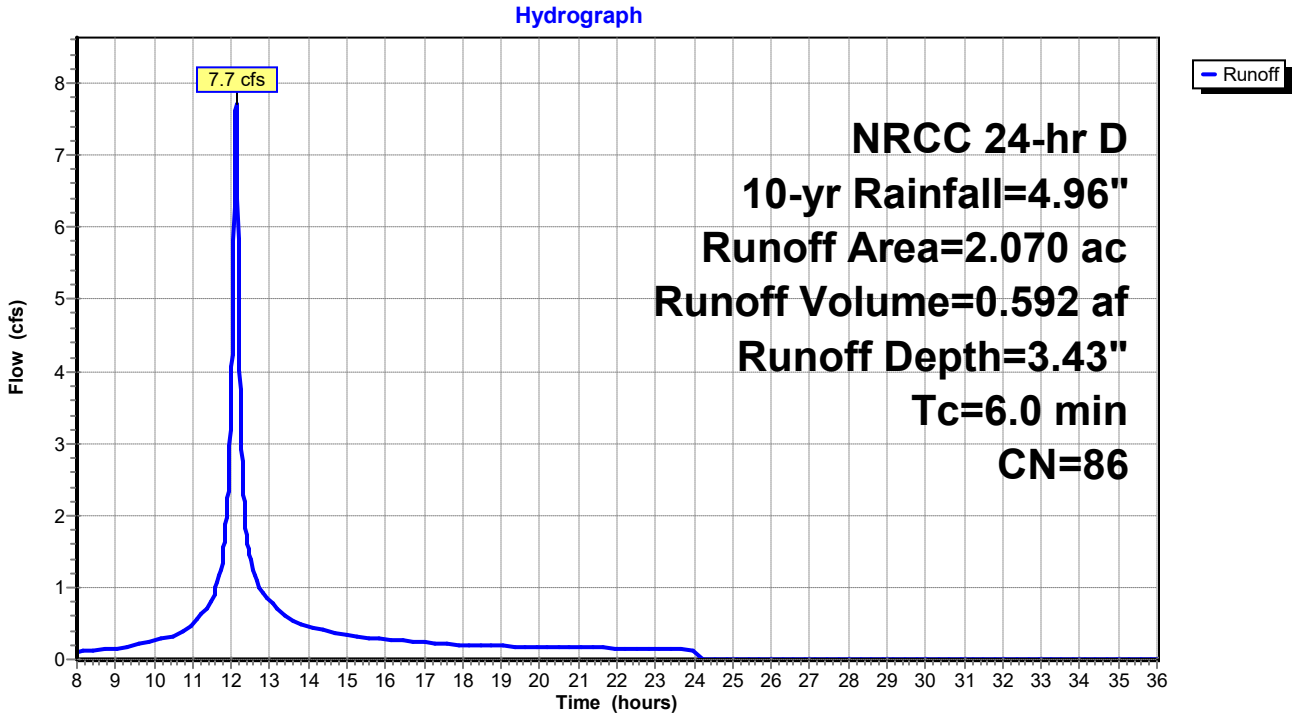
Runoff = 7.7 cfs @ 12.13 hrs, Volume= 0.592 af, Depth= 3.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

	Area (ac)	CN	Description
*	2.070	86	
	2.070		100.00% Pervious Area

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

Subcatchment SUB AREA 3: HIGHLANDS - MAY 2002 SWPPP SUB AREA 3



Summary for Subcatchment SUB AREA 4: HIGHLANDS - MAY 2002 SWPPP SUB AREA 4

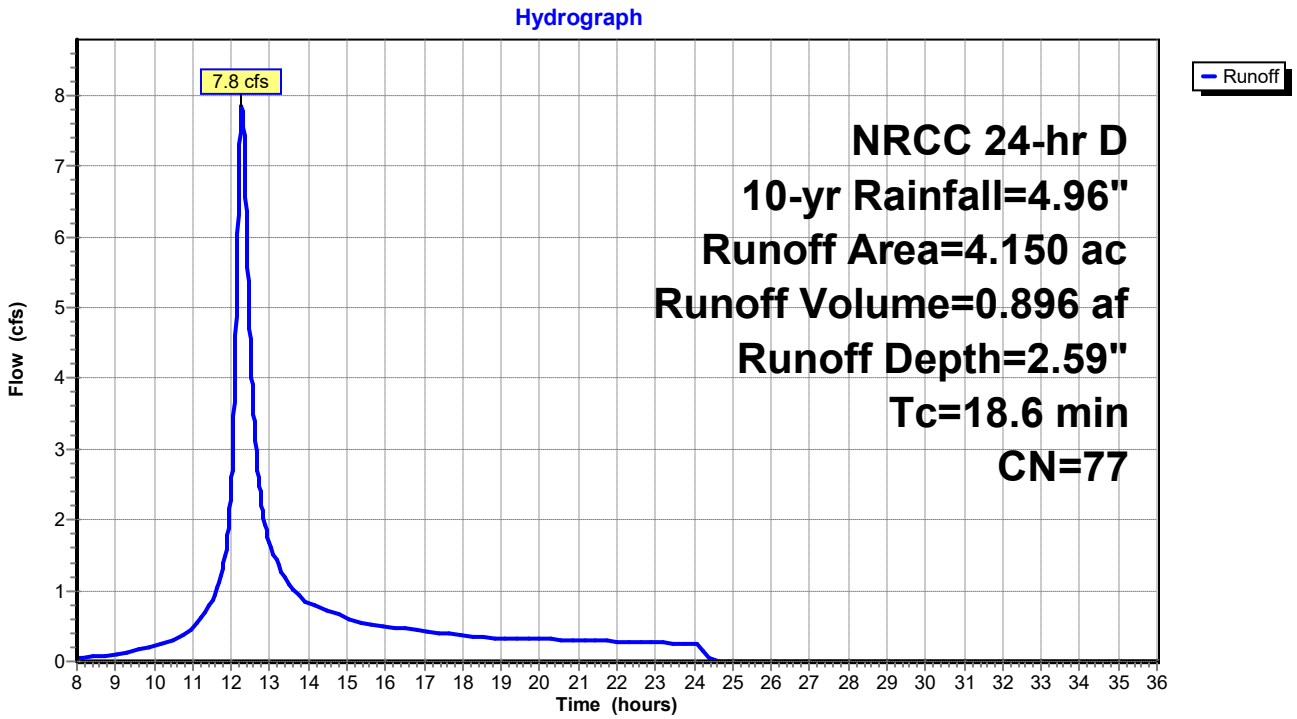
Runoff = 7.8 cfs @ 12.28 hrs, Volume= 0.896 af, Depth= 2.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

	Area (ac)	CN	Description
*	4.150	77	
	4.150		100.00% Pervious Area

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

Subcatchment SUB AREA 4: HIGHLANDS - MAY 2002 SWPPP SUB AREA 4



Summary for Subcatchment Sub-5A: Sub Area 5A

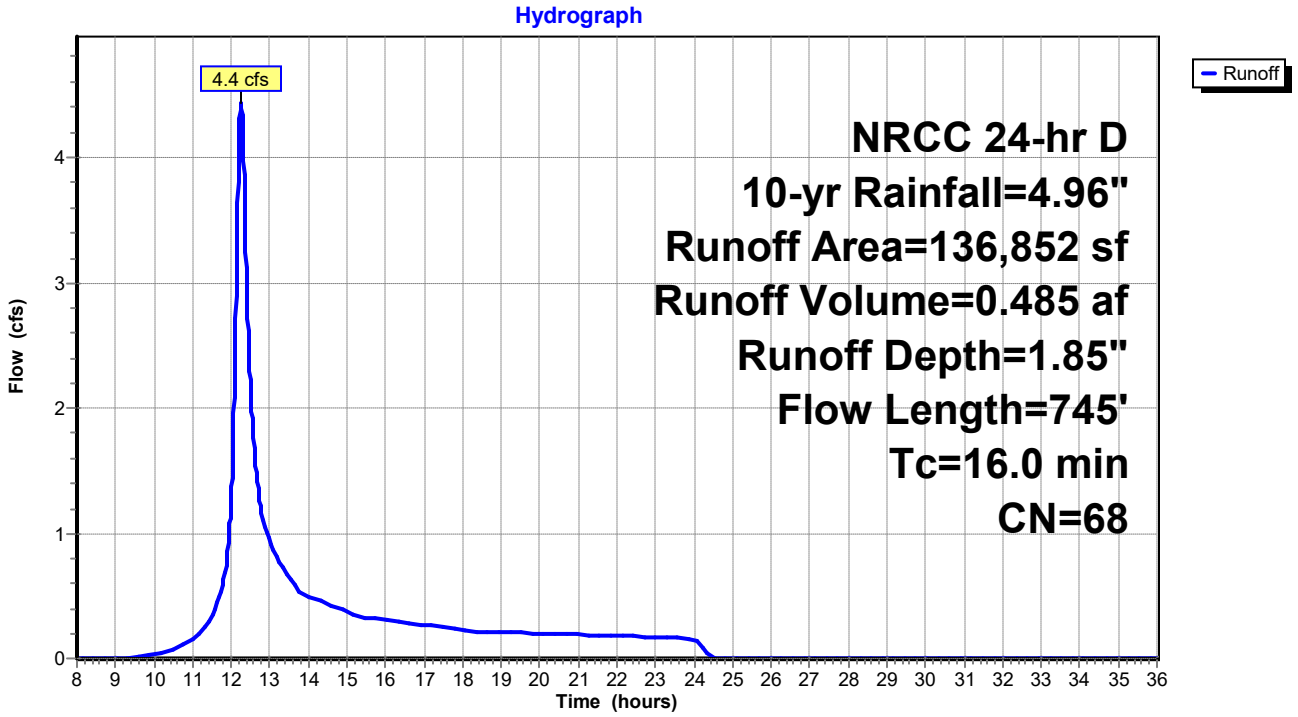
Runoff = 4.4 cfs @ 12.25 hrs, Volume= 0.485 af, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

Area (sf)	CN	Description
33,966	98	Paved parking & roofs
1,000	74	>75% Grass cover, Good, HSG C
58,668	65	Brush, Good, HSG C
43,218	48	Brush, Good, HSG B
136,852	68	Weighted Average
102,886		75.18% Pervious Area
33,966		24.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0550	0.13		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
1.5	130	0.0880	1.48		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	165	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	88	0.0342	3.75		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	262	0.0119	5.74	7.05	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.0	745	Total			

Subcatchment Sub-5A: Sub Area 5A



Summary for Subcatchment Sub-5B: Sub Area 5B

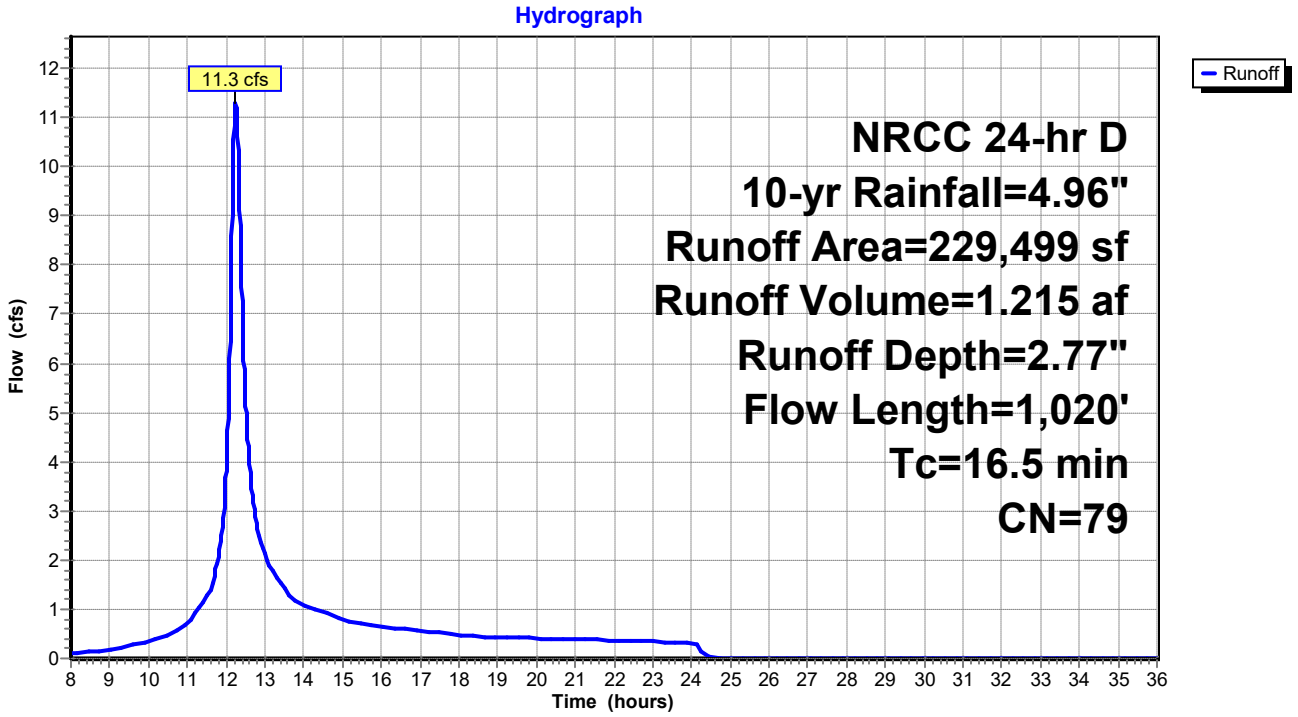
Runoff = 11.3 cfs @ 12.25 hrs, Volume= 1.215 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

Area (sf)	CN	Description
98,809	98	Paved parking, HSG C
17,148	74	>75% Grass cover, Good, HSG C
97,461	65	Brush, Good, HSG C
16,081	48	Brush, Good, HSG B
229,499	79	Weighted Average
130,690		56.95% Pervious Area
98,809		43.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0500	0.13		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
1.8	190	0.1240	1.76		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	205	0.2700	3.64		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	525	0.0529	12.11	14.86	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.5	1,020	Total			

Subcatchment Sub-5B: Sub Area 5B



Summary for Pond DMH 27: Existing Drain Manhole 27

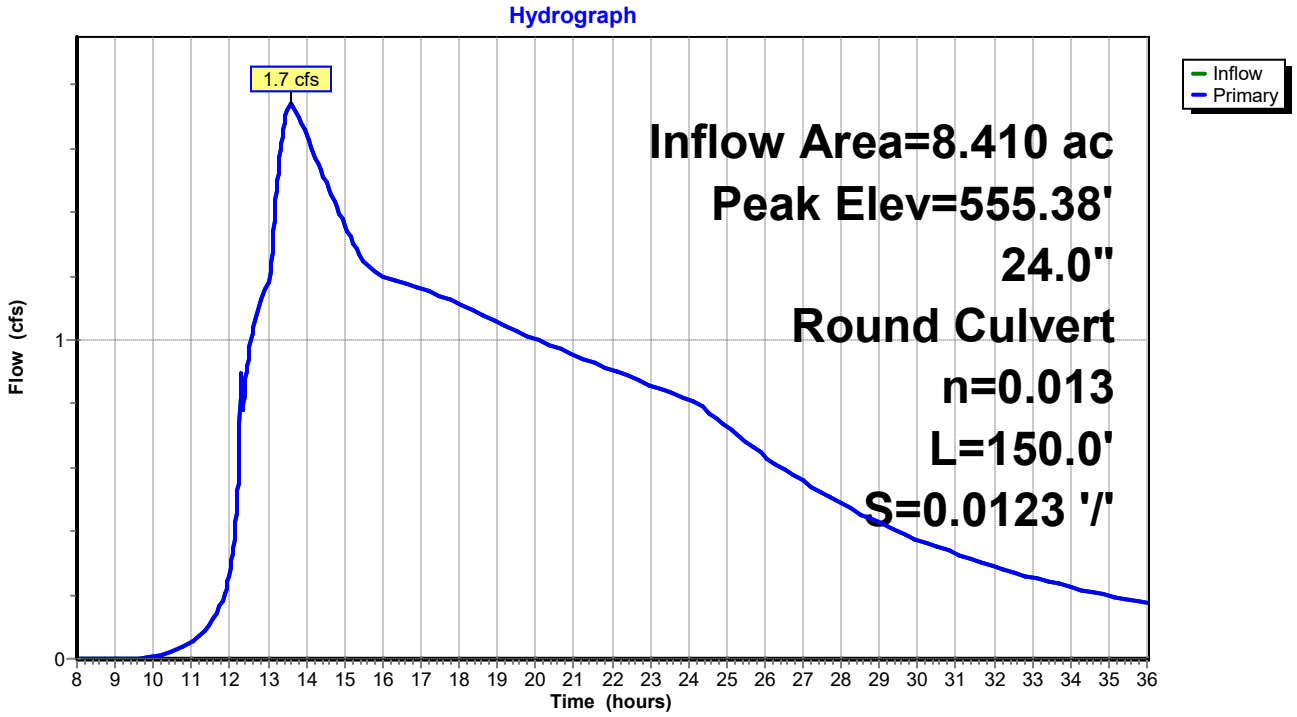
Inflow Area =	8.410 ac, 36.24% Impervious, Inflow Depth = 2.38" for 10-yr event				
Inflow =	1.7 cfs @ 13.62 hrs, Volume=	1.667 af			
Outflow =	1.7 cfs @ 13.62 hrs, Volume=	1.667 af, Atten= 0%, Lag= 0.0 min			
Primary =	1.7 cfs @ 13.62 hrs, Volume=	1.667 af			

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 555.38' @ 13.62 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	554.84'	**24.0" Round Culvert** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 554.84' / 553.00' S= 0.0123 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=1.7 cfs @ 13.62 hrs HW=555.38' TW=552.31' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.7 cfs @ 2.51 fps)

Pond DMH 27: Existing Drain Manhole 27



Stage-Area-Storage for Pond DMH 27: Existing Drain Manhole 27

Elevation (feet)	Storage (cubic-feet)
554.84	**0**
554.94	0
555.04	0
555.14	0
555.24	0
555.34	0
555.44	0
555.54	0
555.64	0
555.74	0
555.84	0
555.94	0
556.04	0
556.14	0
556.24	0
556.34	0
556.44	0
556.54	0
556.64	0
556.74	0
556.84	0

Summary for Pond DMH 45: Existing Drain Manhole 45

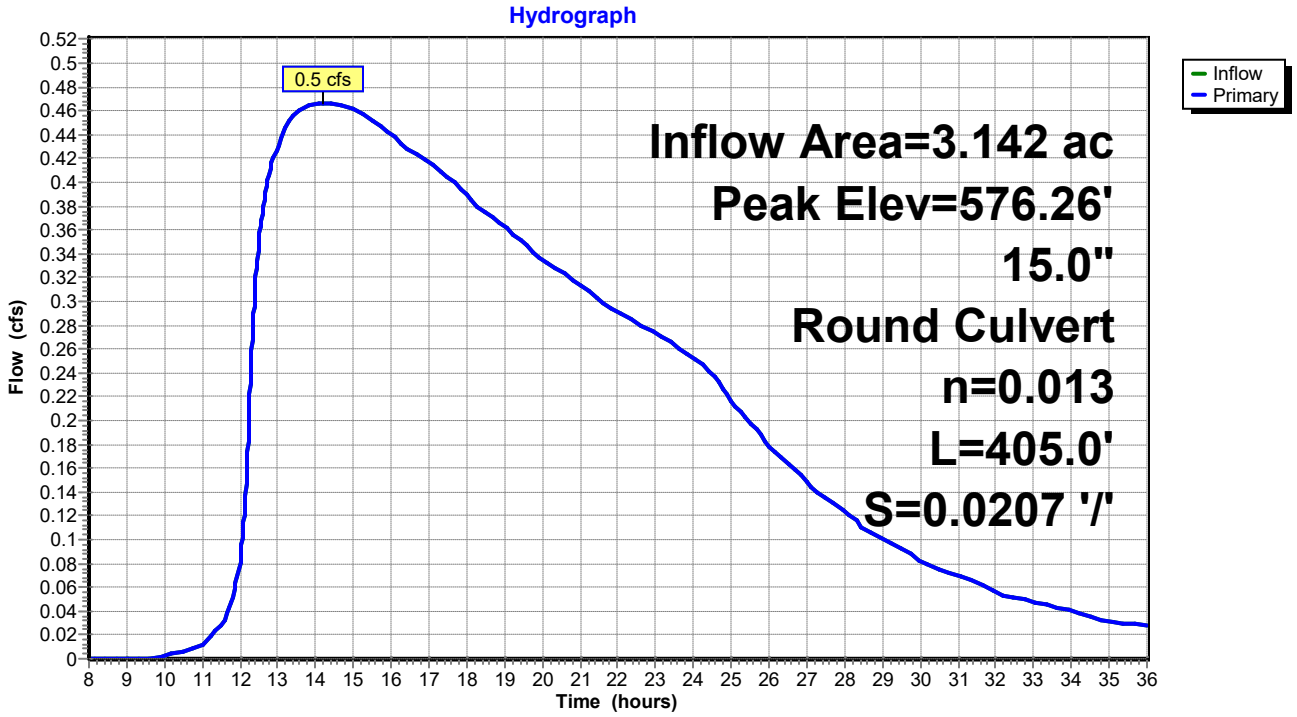
Inflow Area =	3.142 ac, 24.82% Impervious, Inflow Depth = 1.85" for 10-yr event				
Inflow =	0.5 cfs @	14.22 hrs,	Volume=	0.485 af	
Outflow =	0.5 cfs @	14.22 hrs,	Volume=	0.485 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.5 cfs @	14.22 hrs,	Volume=	0.485 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 576.26' @ 14.22 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	575.94'	**15.0" Round Culvert** L= 405.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 575.94' / 567.57' S= 0.0207 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.5 cfs @ 14.22 hrs HW=576.26' TW=555.36' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.5 cfs @ 1.91 fps)

Pond DMH 45: Existing Drain Manhole 45



Stage-Area-Storage for Pond DMH 45: Existing Drain Manhole 45

Elevation (feet)	Storage (cubic-feet)
575.94	**0**
576.04	0
576.14	0
576.24	0
576.34	0
576.44	0
576.54	0
576.64	0
576.74	0
576.84	0
576.94	0
577.04	0
577.14	0

Summary for Pond EDB #2: Existing Detention Basin #2

Inflow Area = 14.630 ac, 20.83% Impervious, Inflow Depth = 2.59" for 10-yr event
Inflow = 13.2 cfs @ 12.15 hrs, Volume= 3.154 af
Outflow = 4.1 cfs @ 12.84 hrs, Volume= 3.150 af, Atten= 69%, Lag= 41.3 min
Primary = 4.1 cfs @ 12.84 hrs, Volume= 3.150 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Starting Elev= 551.00' Surf.Area= 17,383 sf Storage= 61,331 cf
Peak Elev= 552.36' @ 12.84 hrs Surf.Area= 20,854 sf Storage= 87,508 cf (26,177 cf above start)

Plug-Flow detention time= 864.3 min calculated for 1.742 af (55% of inflow)
Center-of-Mass det. time= 177.3 min (1,302.0 - 1,124.7)

Volume	Invert	Avail.Storage	Storage Description
#1	546.00'	237,385 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

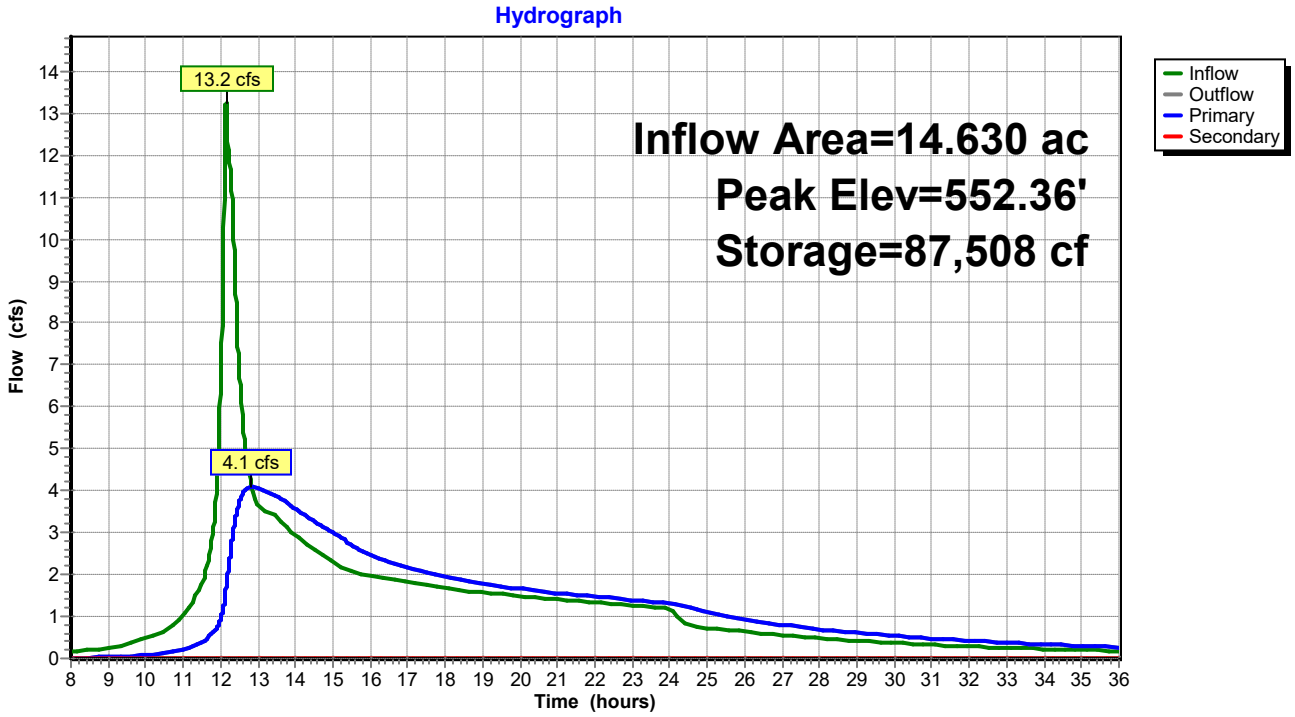
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
546.00	8,325	0	0
548.00	11,185	19,510	19,510
550.00	14,630	25,815	45,325
552.00	20,135	34,765	80,090
554.00	24,105	44,240	124,330
556.00	28,250	52,355	176,685
558.00	32,450	60,700	237,385

Device	Routing	Invert	Outlet Devices
#1	Primary	550.50'	**24.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 550.50' / 549.60' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	551.00'	**30.0 deg x 0.5' long x 4.50' rise Sharp-Crested Vee/Trap Weir** Cv= 2.61 (C= 3.26)
#3	Secondary	555.50'	**30.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.1 cfs @ 12.84 hrs HW=552.36' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 4.1 cfs of 14.2 cfs potential flow)
└─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 4.1 cfs @ 3.49 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=551.00' TW=0.00' (Dynamic Tailwater)
└─**3=Orifice/Grate** (Controls 0.0 cfs)

Pond EDB #2: Existing Detention Basin #2



Stage-Area-Storage for Pond EDB #2: Existing Detention Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
546.00	8,325	0	550.68	16,502	55,910
546.09	8,454	755	550.77	16,749	57,406
546.18	8,582	1,522	550.86	16,997	58,925
546.27	8,711	2,300	550.95	17,245	60,466
546.36	8,840	3,090	551.04	17,493	62,029
546.45	8,969	3,891	551.13	17,740	63,614
546.54	9,097	4,704	551.22	17,988	65,222
546.63	9,226	5,529	551.31	18,236	66,852
546.72	9,355	6,365	551.40	18,483	68,504
546.81	9,483	7,212	551.49	18,731	70,179
546.90	9,612	8,072	551.58	18,979	71,876
546.99	9,741	8,943	551.67	19,227	73,595
547.08	9,869	9,825	551.76	19,474	75,337
547.17	9,998	10,719	551.85	19,722	77,101
547.26	10,127	11,625	551.94	19,970	78,887
547.35	10,256	12,542	552.03	20,195	80,695
547.44	10,384	13,471	552.12	20,373	82,520
547.53	10,513	14,411	552.21	20,552	84,362
547.62	10,642	15,363	552.30	20,730	86,220
547.71	10,770	16,326	552.39	20,909	88,094
547.80	10,899	17,302	552.48	21,088	89,983
547.89	11,028	18,288	552.57	21,266	91,889
547.98	11,156	19,287	552.66	21,445	93,811
548.07	11,306	20,297	552.75	21,624	95,750
548.16	11,461	21,322	552.84	21,802	97,704
548.25	11,616	22,360	552.93	21,981	99,674
548.34	11,771	23,412	553.02	22,160	101,660
548.43	11,926	24,479	553.11	22,338	103,663
548.52	12,081	25,559	553.20	22,517	105,681
548.61	12,236	26,653	553.29	22,696	107,716
548.70	12,391	27,762	553.38	22,874	109,766
548.79	12,546	28,884	553.47	23,053	111,833
548.88	12,701	30,020	553.56	23,232	113,916
548.97	12,856	31,170	553.65	23,410	116,015
549.06	13,011	32,334	553.74	23,589	118,130
549.15	13,166	33,512	553.83	23,768	120,261
549.24	13,321	34,704	553.92	23,946	122,408
549.33	13,476	35,910	554.01	24,126	124,571
549.42	13,631	37,129	554.10	24,312	126,751
549.51	13,786	38,363	554.19	24,499	128,947
549.60	13,941	39,611	554.28	24,685	131,161
549.69	14,096	40,872	554.37	24,872	133,391
549.78	14,251	42,148	554.46	25,058	135,638
549.87	14,406	43,438	554.55	25,245	137,901
549.96	14,561	44,741	554.64	25,431	140,182
550.05	14,768	46,060	554.73	25,618	142,479
550.14	15,015	47,400	554.82	25,804	144,793
550.23	15,263	48,763	554.91	25,991	147,124
550.32	15,511	50,148	555.00	26,178	149,471
550.41	15,759	51,555	555.09	26,364	151,836
550.50	16,006	52,984	555.18	26,551	154,217
550.59	16,254	54,436	555.27	26,737	156,615

Stage-Area-Storage for Pond EDB #2: Existing Detention Basin #2 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
555.36	26,924	159,029
555.45	27,110	161,461
555.54	27,297	163,909
555.63	27,483	166,374
555.72	27,670	168,856
555.81	27,856	171,355
555.90	28,043	173,870
555.99	28,229	176,403
556.08	28,418	178,952
556.17	28,607	181,518
556.26	28,796	184,101
556.35	28,985	186,701
556.44	29,174	189,318
556.53	29,363	191,952
556.62	29,552	194,604
556.71	29,741	197,272
556.80	29,930	199,957
556.89	30,119	202,659
556.98	30,308	205,378
557.07	30,497	208,115
557.16	30,686	210,868
557.25	30,875	213,638
557.34	31,064	216,425
557.43	31,253	219,230
557.52	31,442	222,051
557.61	31,631	224,889
557.70	31,820	227,745
557.79	32,009	230,617
557.88	32,198	233,506
557.97	**32,387**	**236,412**

Summary for Pond FS 3: Existing Flow Splitter #3

Inflow Area =	4.150 ac,	0.00% Impervious,	Inflow Depth =	2.59"	for 10-yr event
Inflow =	7.8 cfs @	12.28 hrs,	Volume=	0.896 af	
Outflow =	7.8 cfs @	12.28 hrs,	Volume=	0.896 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.0 cfs @	0.00 hrs,	Volume=	0.000 af	
Secondary =	7.8 cfs @	12.28 hrs,	Volume=	0.896 af	

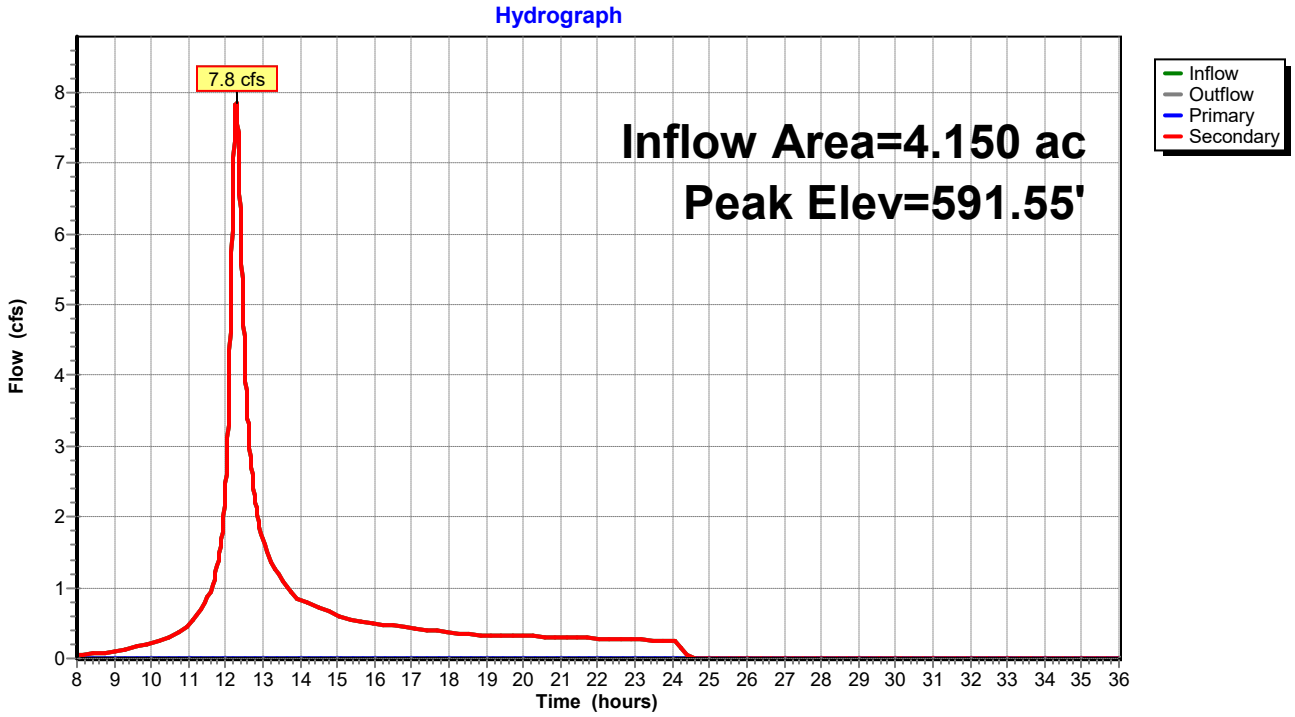
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 591.55' @ 12.28 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	591.20'	**15.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 591.20' / 591.00' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	593.60'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Secondary	590.30'	**24.0" Round Culvert** L= 320.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 590.30' / 552.00' S= 0.1197 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.30' TW=590.00' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.0 cfs)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Secondary OutFlow Max=7.8 cfs @ 12.28 hrs HW=591.55' TW=552.07' (Dynamic Tailwater)
└─**3=Culvert** (Inlet Controls 7.8 cfs @ 3.80 fps)

Pond FS 3: Existing Flow Splitter #3



Stage-Area-Storage for Pond FS 3: Existing Flow Splitter #3

Elevation (feet)	Storage (cubic-feet)
590.30	**0**
590.40	0
590.50	0
590.60	0
590.70	0
590.80	0
590.90	0
591.00	0
591.10	0
591.20	0
591.30	0
591.40	0
591.50	0
591.60	0
591.70	0
591.80	0
591.90	0
592.00	0
592.10	0
592.20	0
592.30	0
592.40	0
592.50	0
592.60	0
592.70	0
592.80	0
592.90	0
593.00	0
593.10	0
593.20	0
593.30	0
593.40	0
593.50	0
593.60	0

Summary for Pond FS#4: Exist. Flow Spilitter #4

Inflow Area =	5.269 ac, 43.05% Impervious, Inflow Depth = 2.77" for 10-yr event				
Inflow =	11.3 cfs @	12.25 hrs,	Volume=	1.215 af	
Outflow =	11.3 cfs @	12.25 hrs,	Volume=	1.215 af,	Atten= 0%, Lag= 0.0 min
Primary =	11.3 cfs @	12.25 hrs,	Volume=	1.159 af	
Secondary =	0.5 cfs @	13.61 hrs,	Volume=	0.056 af	

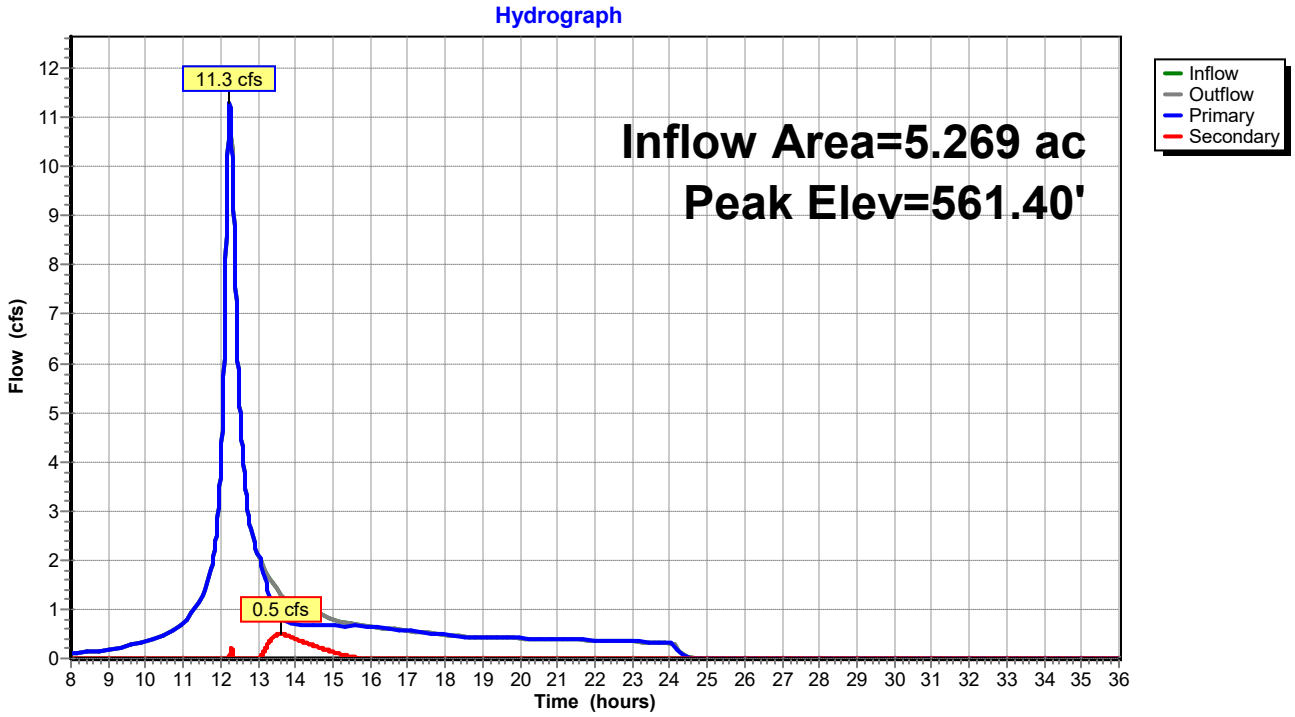
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 561.40' @ 13.61 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	558.25'	**18.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 558.25' / 556.80' S= 0.0659 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Secondary	558.15'	**24.0" Round Culvert** L= 61.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 558.15' / 554.84' S= 0.0543 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	561.30'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=11.3 cfs @ 12.25 hrs HW=561.28' TW=559.52' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 11.3 cfs @ 6.38 fps)

Secondary OutFlow Max=0.5 cfs @ 13.61 hrs HW=561.40' TW=555.38' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.5 cfs of 22.7 cfs potential flow)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 0.5 cfs @ 0.86 fps)

Pond FS#4: Exist. Flow Spilitter #4



Stage-Area-Storage for Pond FS#4: Exist. Flow Spilitter #4

Elevation (feet)	Storage (cubic-feet)
558.15	**0**
558.25	0
558.35	0
558.45	0
558.55	0
558.65	0
558.75	0
558.85	0
558.95	0
559.05	0
559.15	0
559.25	0
559.35	0
559.45	0
559.55	0
559.65	0
559.75	0
559.85	0
559.95	0
560.05	0
560.15	0
560.25	0
560.35	0
560.45	0
560.55	0
560.65	0
560.75	0
560.85	0
560.95	0
561.05	0
561.15	0
561.25	0
561.35	0

Summary for Pond FS#6: Exist. Flow Splitter #6

Inflow Area =	3.142 ac, 24.82% Impervious, Inflow Depth = 1.85" for 10-yr event			
Inflow =	4.4 cfs @	12.25 hrs, Volume=	0.485 af	
Outflow =	4.4 cfs @	12.25 hrs, Volume=	0.485 af, Atten= 0%, Lag= 0.0 min	
Primary =	4.4 cfs @	12.25 hrs, Volume=	0.485 af	
Secondary =	0.0 cfs @	0.00 hrs, Volume=	0.000 af	

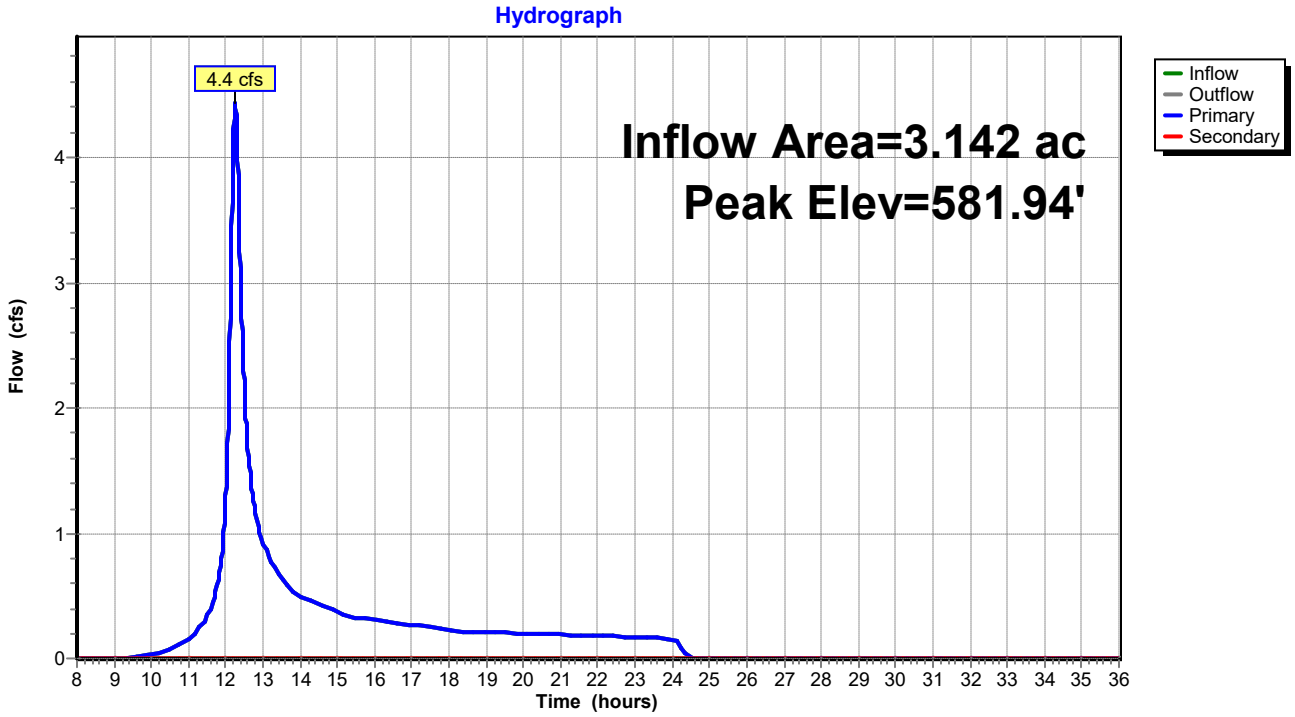
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 581.94' @ 14.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	580.30'	**15.0" Round Culvert** L= 39.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.30' / 580.00' S= 0.0077 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	580.47'	**15.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.47' / 579.59' S= 0.0244 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	582.25'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.4 cfs @ 12.25 hrs HW=581.61' TW=580.50' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 4.4 cfs @ 4.28 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=580.30' TW=575.94' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.0 cfs)
  └─**3=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond FS#6: Exist. Flow Splitter #6



Stage-Area-Storage for Pond FS#6: Exist. Flow Splitter #6

Elevation (feet)	Storage (cubic-feet)
580.30	**0**
580.40	0
580.50	0
580.60	0
580.70	0
580.80	0
580.90	0
581.00	0
581.10	0
581.20	0
581.30	0
581.40	0
581.50	0
581.60	0
581.70	0
581.80	0
581.90	0
582.00	0
582.10	0
582.20	0

Summary for Pond SWQB 3: Existing SWQB #3

Inflow Area = 4.150 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 590.00' @ 0.00 hrs Surf.Area= 1,330 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	590.00'	33,910 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

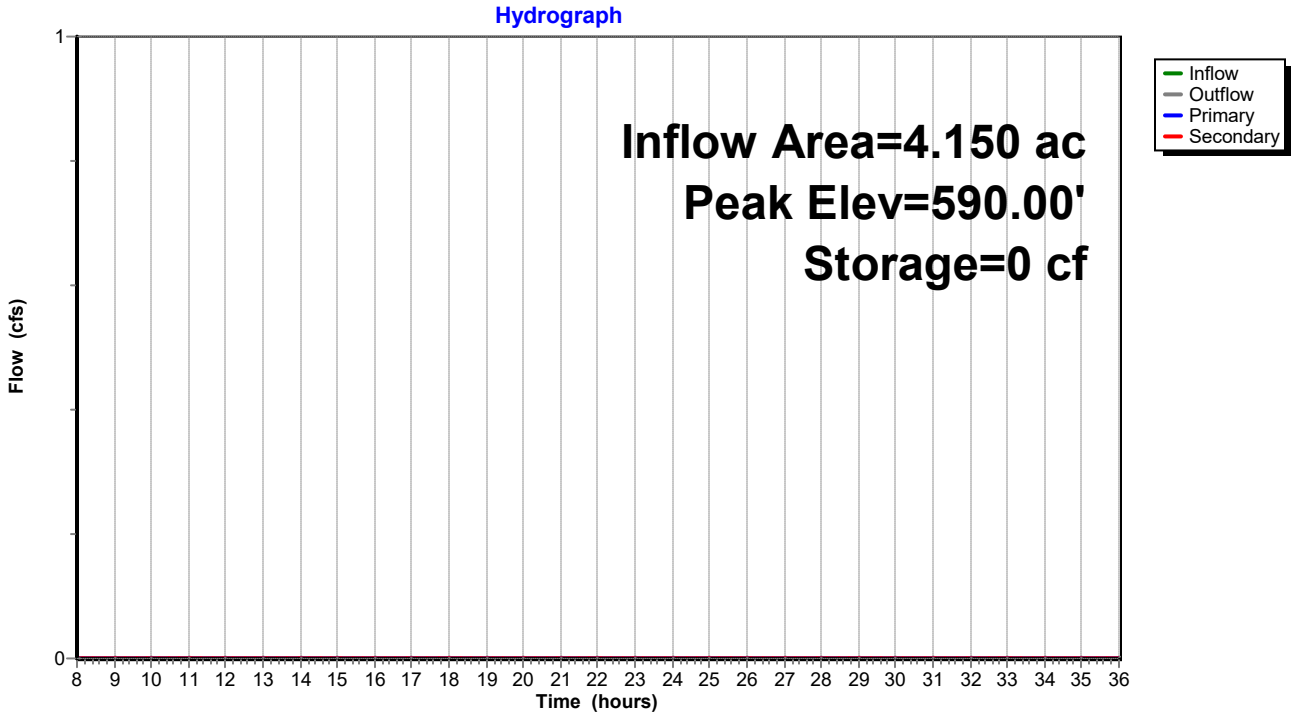
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
590.00	1,330	0	0
592.00	3,725	5,055	5,055
594.00	7,015	10,740	15,795
596.00	11,100	18,115	33,910

Device	Routing	Invert	Outlet Devices
#1	Primary	588.20'	**12.0" Round Culvert** L= 240.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 588.20' / 552.00' S= 0.1508 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	590.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	590.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 18 rows with 3.0" cc spacing C= 0.600
#4	Secondary	594.00'	**30.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.00' TW=551.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.0 cfs of 4.3 cfs potential flow)
  └─**2=Orifice/Grate** (Controls 0.0 cfs)
    └─**3=Orifice/Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.00' TW=551.00' (Dynamic Tailwater)
└─**4=Orifice/Grate** (Controls 0.0 cfs)

Pond SWQB 3: Existing SWQB #3



Stage-Area-Storage for Pond SWQB 3: Existing SWQB #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
590.00	1,330	0
590.10	1,450	139
590.20	1,570	290
590.30	1,689	453
590.40	1,809	628
590.50	1,929	815
590.60	2,049	1,014
590.70	2,168	1,224
590.80	2,288	1,447
590.90	2,408	1,682
591.00	2,528	1,929
591.10	2,647	2,187
591.20	2,767	2,458
591.30	2,887	2,741
591.40	3,006	3,036
591.50	3,126	3,342
591.60	3,246	3,661
591.70	3,366	3,991
591.80	3,485	4,334
591.90	3,605	4,688
592.00	3,725	5,055
592.10	3,890	5,436
592.20	4,054	5,833
592.30	4,218	6,247
592.40	4,383	6,677
592.50	4,548	7,123
592.60	4,712	7,586
592.70	4,877	8,066
592.80	5,041	8,561
592.90	5,205	9,074
593.00	5,370	9,603
593.10	5,535	10,148
593.20	5,699	10,709
593.30	5,863	11,288
593.40	6,028	11,882
593.50	6,193	12,493
593.60	6,357	13,121
593.70	6,522	13,765
593.80	6,686	14,425
593.90	6,850	15,102
594.00	7,015	15,795
594.10	7,219	16,507
594.20	7,424	17,239
594.30	7,628	17,991
594.40	7,832	18,764
594.50	8,036	19,558
594.60	8,241	20,372
594.70	8,445	21,206
594.80	8,649	22,061
594.90	8,853	22,936
595.00	9,058	23,831
595.10	9,262	24,747
595.20	9,466	25,684
595.30	9,670	26,640
595.40	9,874	27,618
595.50	10,079	28,615
595.60	10,283	29,633
595.70	10,487	30,672
595.80	10,691	31,731
595.90	10,896	32,810
596.00	**11,100**	**33,910**

Summary for Pond SWQB 4: Exist. SWQB #4

Inflow Area = 5.269 ac, 43.05% Impervious, Inflow Depth = 2.64" for 10-yr event
Inflow = 11.3 cfs @ 12.25 hrs, Volume= 1.159 af
Outflow = 0.8 cfs @ 13.66 hrs, Volume= 1.126 af, Atten= 93%, Lag= 85.0 min
Primary = 0.8 cfs @ 13.66 hrs, Volume= 1.126 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 561.39' @ 13.66 hrs Surf.Area= 8,073 sf Storage= 27,846 cf

Plug-Flow detention time= 618.2 min calculated for 1.126 af (97% of inflow)
Center-of-Mass det. time= 601.8 min (1,459.9 - 858.1)

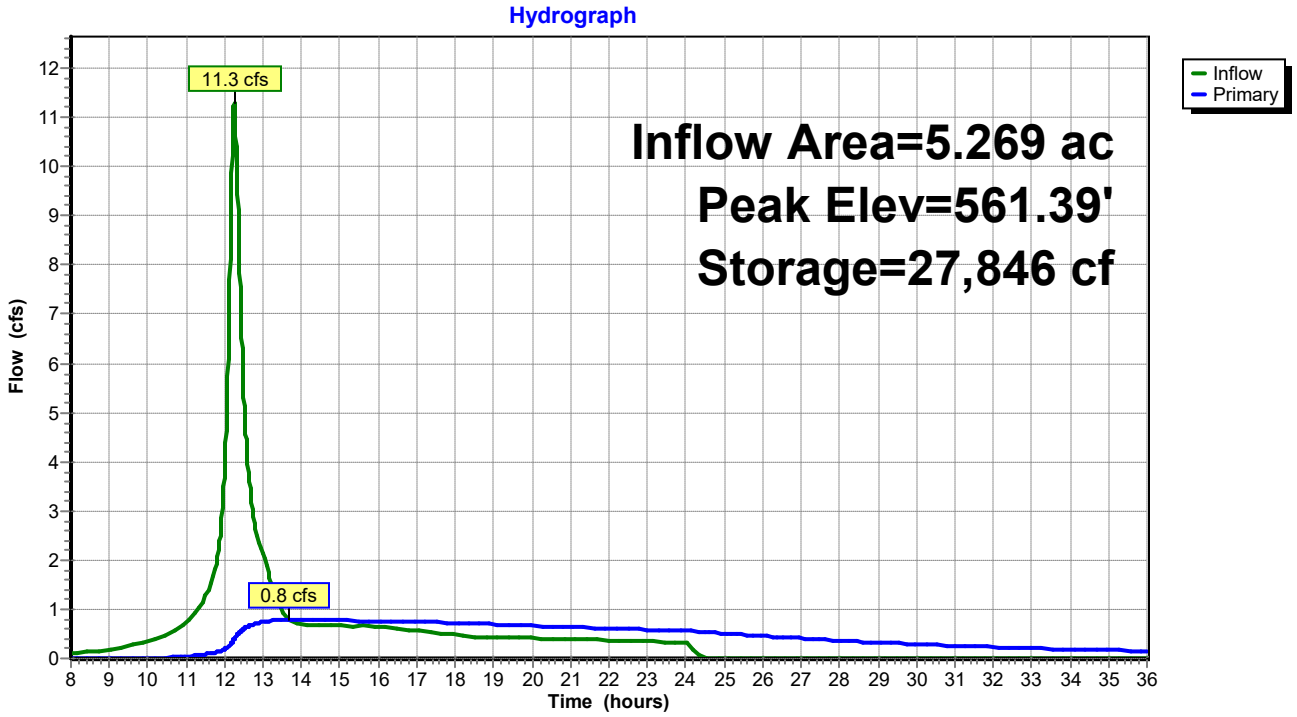
Volume	Invert	Avail.Storage	Storage Description
#1	556.00'	53,446 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
556.00	2,625	212.0	0	0	2,625
558.00	4,450	278.0	6,995	6,995	5,245
560.00	6,430	341.0	10,819	17,815	8,409
562.00	8,860	408.0	15,225	33,040	12,472
564.00	11,608	478.0	20,406	53,446	17,487

Device	Routing	Invert	Outlet Devices
#1	Primary	556.00'	**12.0" Round Culvert** L= 63.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 556.00' / 554.84' S= 0.0184 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	561.80'	**33.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	556.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	556.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 23 rows with 3.0" cc spacing C= 0.600

Primary OutFlow Max=0.8 cfs @ 13.66 hrs HW=561.39' TW=555.38' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.8 cfs of 8.0 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.0 cfs)
  └─**3=Orifice/Grate** (Passes 0.8 cfs of 0.9 cfs potential flow)
    └─**4=Orifice/Grate** (Orifice Controls 0.8 cfs @ 7.17 fps)

Pond SWQB 4: Exist. SWQB #4



Stage-Area-Storage for Pond SWQB 4: Exist. SWQB #4

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
556.00	2,625	0
556.10	2,705	266
556.20	2,786	541
556.30	2,868	824
556.40	2,952	1,115
556.50	3,036	1,414
556.60	3,122	1,722
556.70	3,209	2,039
556.80	3,298	2,364
556.90	3,387	2,698
557.00	3,478	3,041
557.10	3,569	3,394
557.20	3,663	3,755
557.30	3,757	4,126
557.40	3,852	4,507
557.50	3,949	4,897
557.60	4,047	5,296
557.70	4,146	5,706
557.80	4,246	6,126
557.90	4,347	6,555
558.00	4,450	6,995
558.10	4,540	7,445
558.20	4,632	7,903
558.30	4,724	8,371
558.40	4,817	8,848
558.50	4,911	9,334
558.60	5,006	9,830
558.70	5,102	10,336
558.80	5,198	10,851
558.90	5,296	11,375
559.00	5,395	11,910
559.10	5,494	12,454
559.20	5,594	13,009
559.30	5,696	13,573
559.40	5,798	14,148
559.50	5,901	14,733
559.60	6,005	15,328
559.70	6,110	15,934
559.80	6,216	16,550
559.90	6,322	17,177
560.00	6,430	17,815
560.10	6,542	18,463
560.20	6,656	19,123
560.30	6,770	19,794
560.40	6,885	20,477
560.50	7,001	21,171
560.60	7,118	21,877
560.70	7,236	22,595
560.80	7,355	23,325
560.90	7,475	24,066
561.00	7,596	24,820
561.10	7,718	25,585
561.20	7,841	26,363
561.30	7,965	27,154
561.40	8,090	27,957
561.50	8,216	28,772
561.60	8,343	29,600
561.70	8,471	30,440
561.80	8,600	31,294
561.90	8,729	32,160
562.00	8,860	33,040
562.10	8,989	33,932
562.20	9,118	34,838
562.30	9,249	35,756
562.40	9,380	36,687
562.50	9,512	37,632
562.60	9,645	38,590
562.70	9,780	39,561
562.80	9,915	40,546
562.90	10,051	41,544
563.00	10,188	42,556
563.10	10,326	43,582
563.20	10,464	44,621
563.30	10,604	45,675
563.40	10,745	46,742
563.50	10,886	47,823
563.60	11,029	48,919
563.70	11,172	50,029
563.80	11,317	51,154
563.90	11,462	52,293
564.00	**11,608**	**53,446**

Summary for Pond SWQB 4A: Exist. SWQB #4A

Inflow Area = 3.142 ac, 24.82% Impervious, Inflow Depth = 1.85" for 10-yr event
Inflow = 4.4 cfs @ 12.25 hrs, Volume= 0.485 af
Outflow = 0.5 cfs @ 14.22 hrs, Volume= 0.485 af, Atten= 89%, Lag= 118.1 min
Primary = 0.5 cfs @ 14.22 hrs, Volume= 0.485 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Starting Elev= 578.50' Surf.Area= 1,337 sf Storage= 590 cf
Peak Elev= 581.93' @ 14.22 hrs Surf.Area= 4,315 sf Storage= 9,934 cf (9,344 cf above start)

Plug-Flow detention time= 363.1 min calculated for 0.471 af (97% of inflow)
Center-of-Mass det. time= 333.8 min (1,226.9 - 893.1)

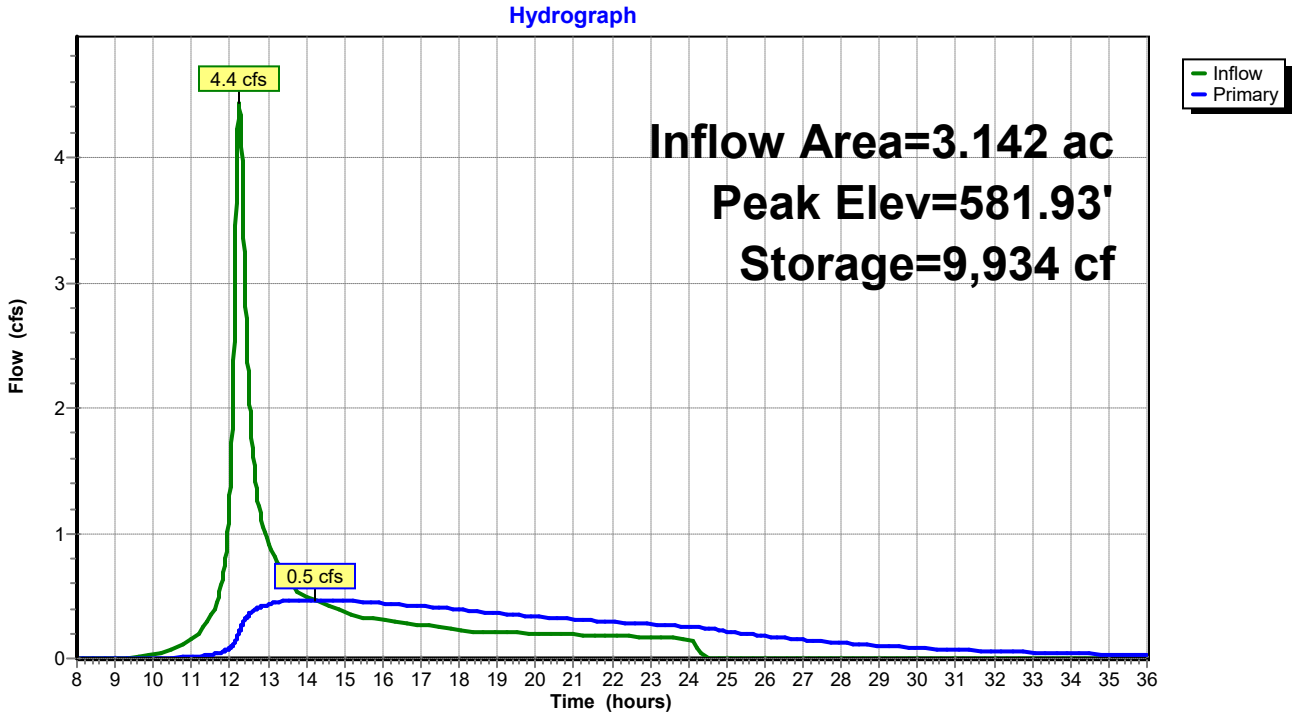
Volume	Invert	Avail.Storage	Storage Description
#1	578.00'	37,725 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
578.00	1,030	148.0	0	0	1,030
580.00	2,500	251.0	3,423	3,423	4,325
582.00	4,386	315.0	6,798	10,221	7,262
584.00	6,847	383.0	11,142	21,363	11,103
586.00	9,592	437.0	16,362	37,725	14,721

Device	Routing	Invert	Outlet Devices
#1	Primary	578.04'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 578.04' / 576.09' S= 0.0390 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	583.14'	**33.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	578.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	578.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 18 rows with 3.0" cc spacing C= 0.600

Primary OutFlow Max=0.5 cfs @ 14.22 hrs HW=581.93' TW=576.26' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.5 cfs of 7.0 cfs potential flow)
  - **2=Orifice/Grate** (Controls 0.0 cfs)
  - **3=Orifice/Grate** (Passes 0.5 cfs of 0.8 cfs potential flow)
    - **4=Orifice/Grate** (Orifice Controls 0.5 cfs @ 6.10 fps)

Pond SWQB 4A: Exist. SWQB #4A



Stage-Area-Storage for Pond SWQB 4A: Exist. SWQB #4A

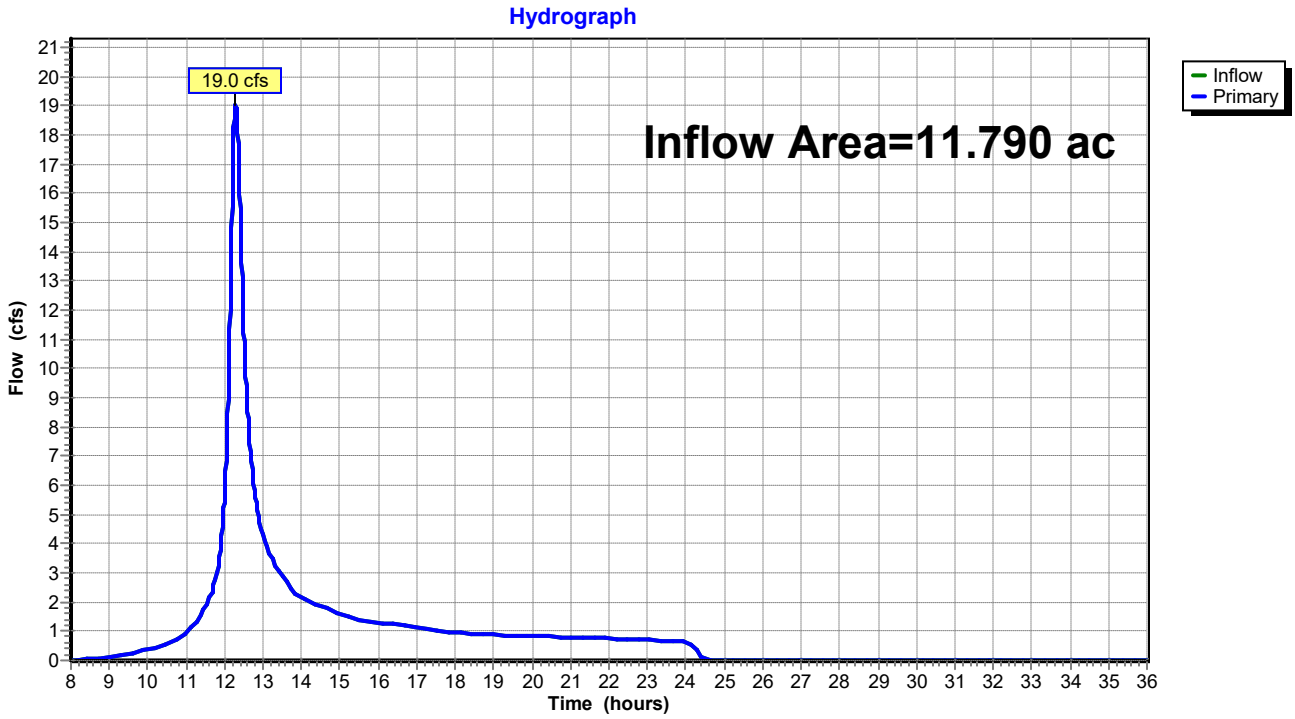
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
578.00	1,030	0
578.10	1,088	106
578.20	1,148	218
578.30	1,210	336
578.40	1,273	460
578.50	1,337	590
578.60	1,404	727
578.70	1,472	871
578.80	1,541	1,022
578.90	1,612	1,179
579.00	1,685	1,344
579.10	1,759	1,516
579.20	1,835	1,696
579.30	1,913	1,883
579.40	1,992	2,079
579.50	2,072	2,282
579.60	2,155	2,493
579.70	2,239	2,713
579.80	2,324	2,941
579.90	2,411	3,178
580.00	2,500	3,423
580.10	2,582	3,677
580.20	2,665	3,940
580.30	2,749	4,210
580.40	2,835	4,489
580.50	2,922	4,777
580.60	3,011	5,074
580.70	3,100	5,379
580.80	3,191	5,694
580.90	3,284	6,018
581.00	3,377	6,351
581.10	3,472	6,693
581.20	3,568	7,045
581.30	3,666	7,407
581.40	3,765	7,778
581.50	3,865	8,160
581.60	3,967	8,552
581.70	4,070	8,953
581.80	4,174	9,365
581.90	4,279	9,788
582.00	4,386	10,221
582.10	4,496	10,665
582.20	4,608	11,121
582.30	4,720	11,587
582.40	4,835	12,065
582.50	4,950	12,554
582.60	5,067	13,055
582.70	5,185	13,567
582.80	5,305	14,092
582.90	5,426	14,628
583.00	5,548	15,177
583.10	5,672	15,738
583.20	5,797	16,312
583.30	5,924	16,898
583.40	6,051	17,496
583.50	6,181	18,108
583.60	6,311	18,732
583.70	6,443	19,370
583.80	6,576	20,021
583.90	6,711	20,685
584.00	6,847	21,363
584.10	6,973	22,054
584.20	7,101	22,758
584.30	7,229	23,475
584.40	7,359	24,204
584.50	7,490	24,946
584.60	7,622	25,702
584.70	7,755	26,471
584.80	7,890	27,253
584.90	8,025	28,049
585.00	8,162	28,858
585.10	8,300	29,681
585.20	8,439	30,518
585.30	8,579	31,369
585.40	8,720	32,234
585.50	8,862	33,113
585.60	9,006	34,006
585.70	9,151	34,914
585.80	9,297	35,837
585.90	9,444	36,774
586.00	**9,592**	**37,725**

Summary for Link DL1: Design Line 1

Inflow Area = 11.790 ac, 20.08% Impervious, Inflow Depth = 2.25" for 10-yr event
Inflow = 19.0 cfs @ 12.28 hrs, Volume= 2.210 af
Primary = 19.0 cfs @ 12.28 hrs, Volume= 2.210 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DL1: Design Line 1

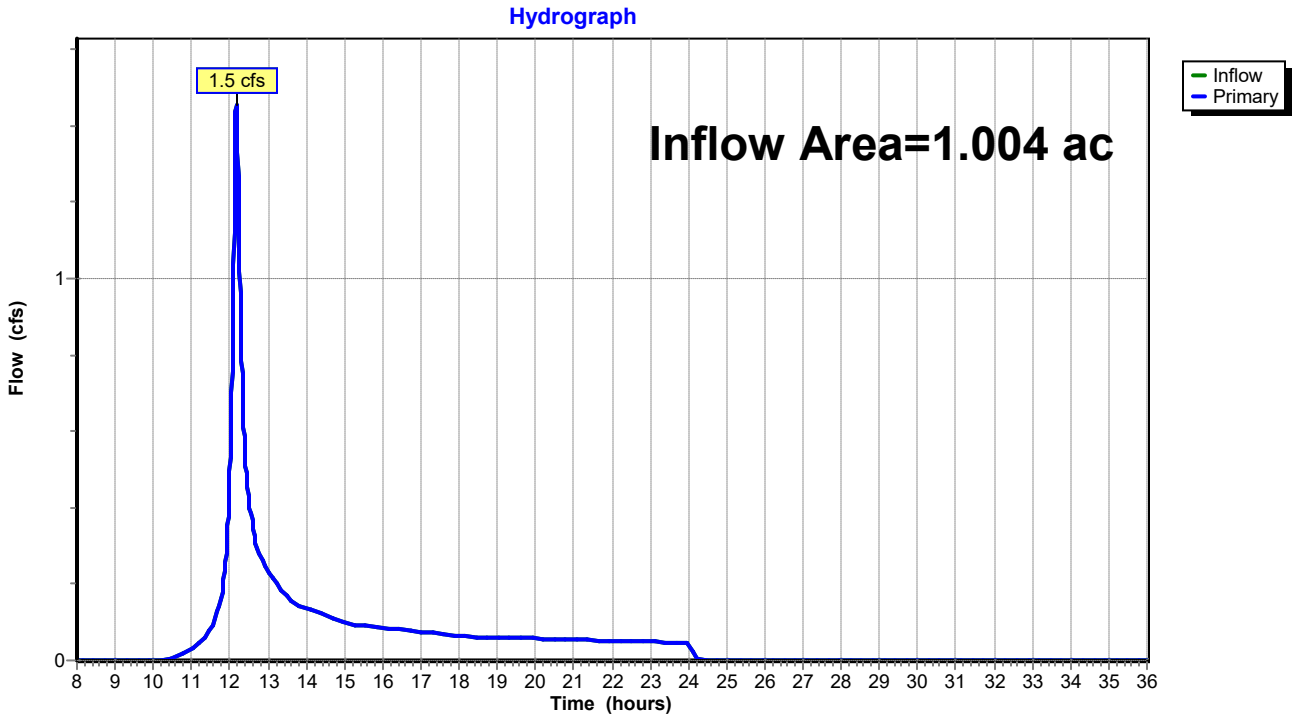


Summary for Link DL2: Design Line 2

Inflow Area = 1.004 ac, 0.00% Impervious, Inflow Depth = 1.55" for 10-yr event
Inflow = 1.5 cfs @ 12.17 hrs, Volume= 0.130 af
Primary = 1.5 cfs @ 12.17 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DL2: Design Line 2

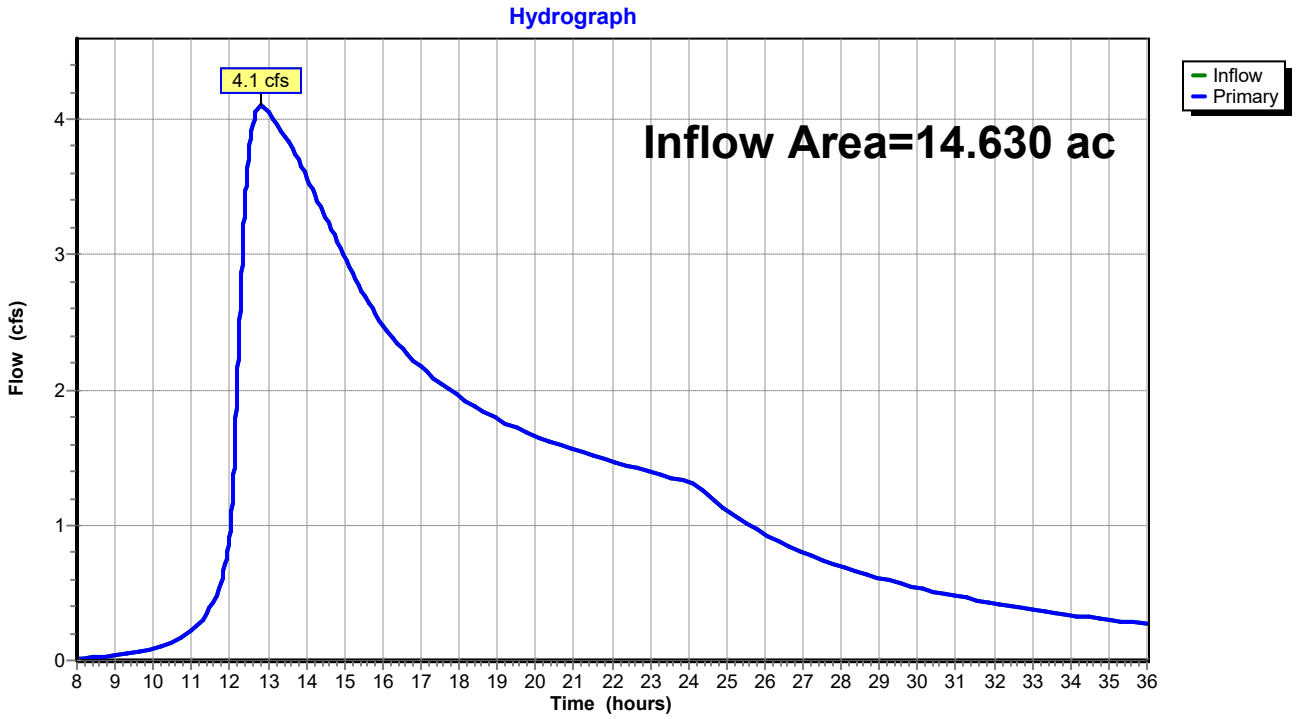


Summary for Link DP1: Design Point #1

Inflow Area = 14.630 ac, 20.83% Impervious, Inflow Depth > 2.58" for 10-yr event
Inflow = 4.1 cfs @ 12.84 hrs, Volume= 3.150 af
Primary = 4.1 cfs @ 12.84 hrs, Volume= 3.150 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DP1: Design Point #1

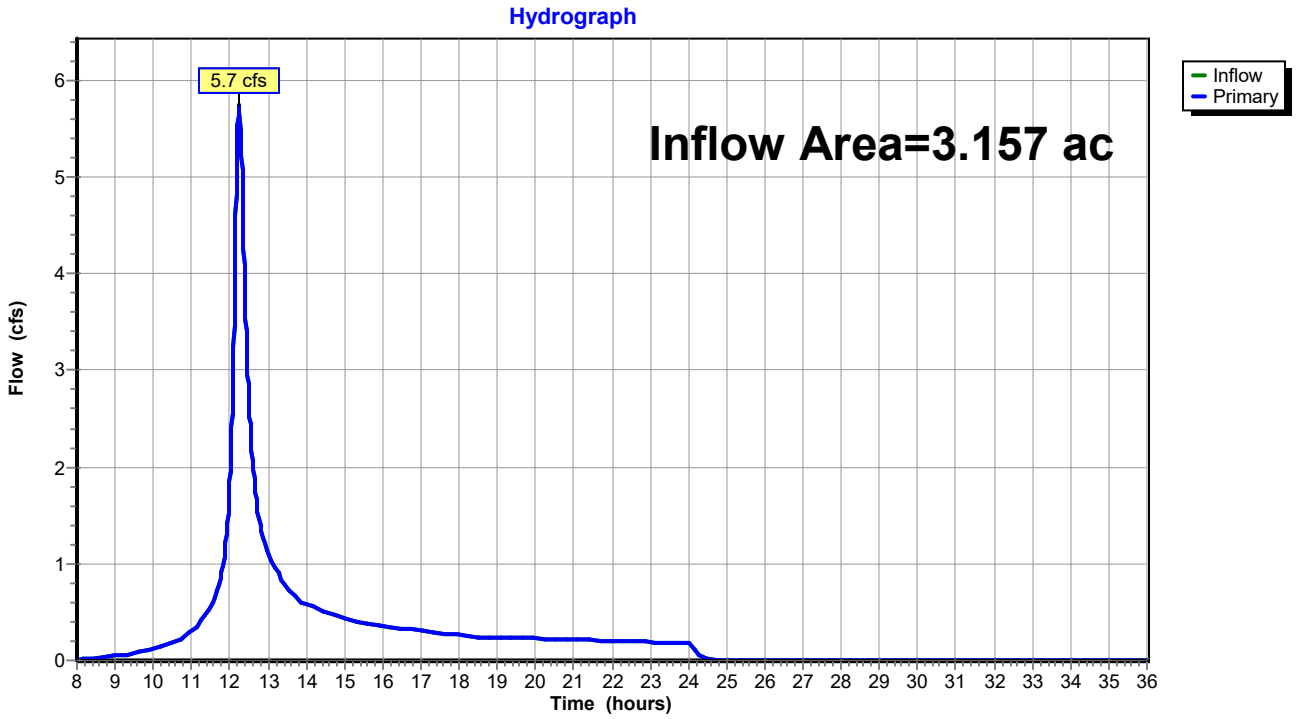


Summary for Link DP2: Design Point 2

Inflow Area = 3.157 ac, 23.24% Impervious, Inflow Depth = 2.33" for 10-yr event
Inflow = 5.7 cfs @ 12.25 hrs, Volume= 0.614 af
Primary = 5.7 cfs @ 12.25 hrs, Volume= 0.614 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DP2: Design Point 2



Summary for Subcatchment Pre1:

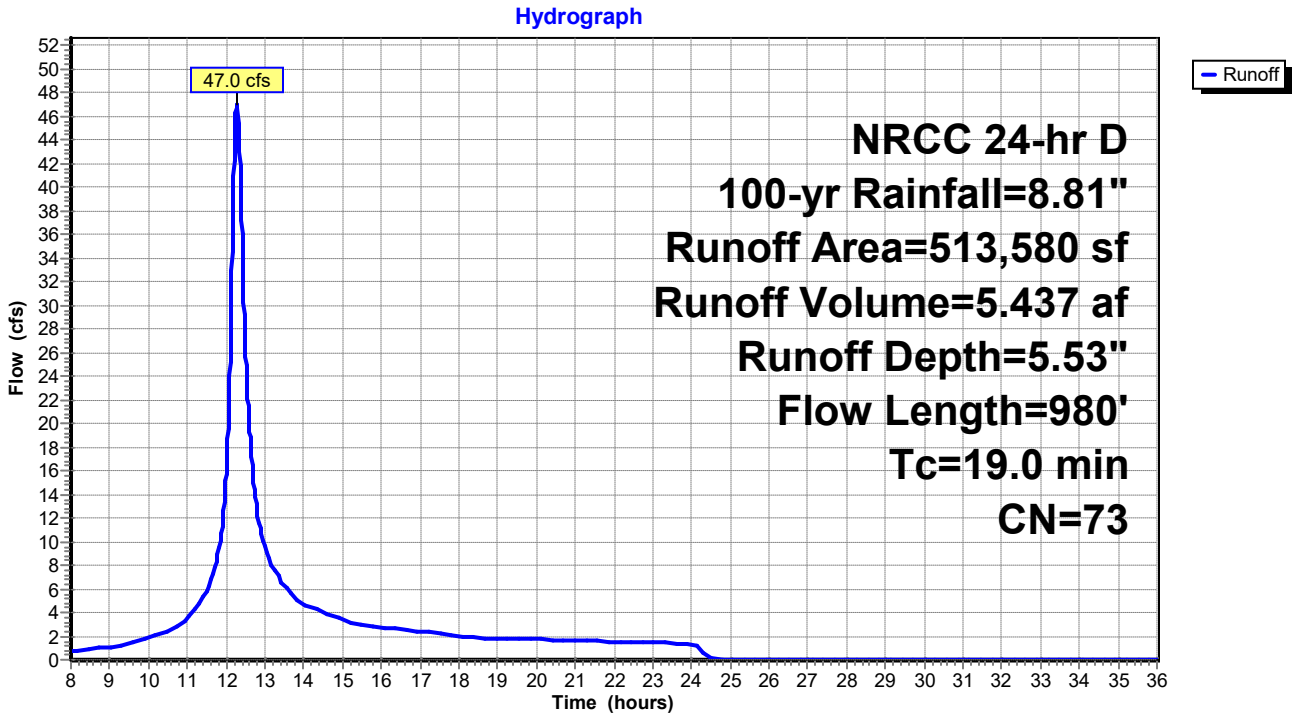
Runoff = 47.0 cfs @ 12.27 hrs, Volume= 5.437 af, Depth= 5.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

Area (sf)	CN	Description
91,490	98	Paved parking, HSG B
11,640	98	Roofs, HSG B
52,590	61	>75% Grass cover, Good, HSG B
39,270	79	Woods, Fair, HSG D
150,200	73	Woods, Fair, HSG C
168,390	60	Woods, Fair, HSG B
513,580	73	Weighted Average
410,450		79.92% Pervious Area
103,130		20.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0750	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.33"
6.6	880	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	980	Total			

Subcatchment Pre1:



Summary for Subcatchment Pre2:

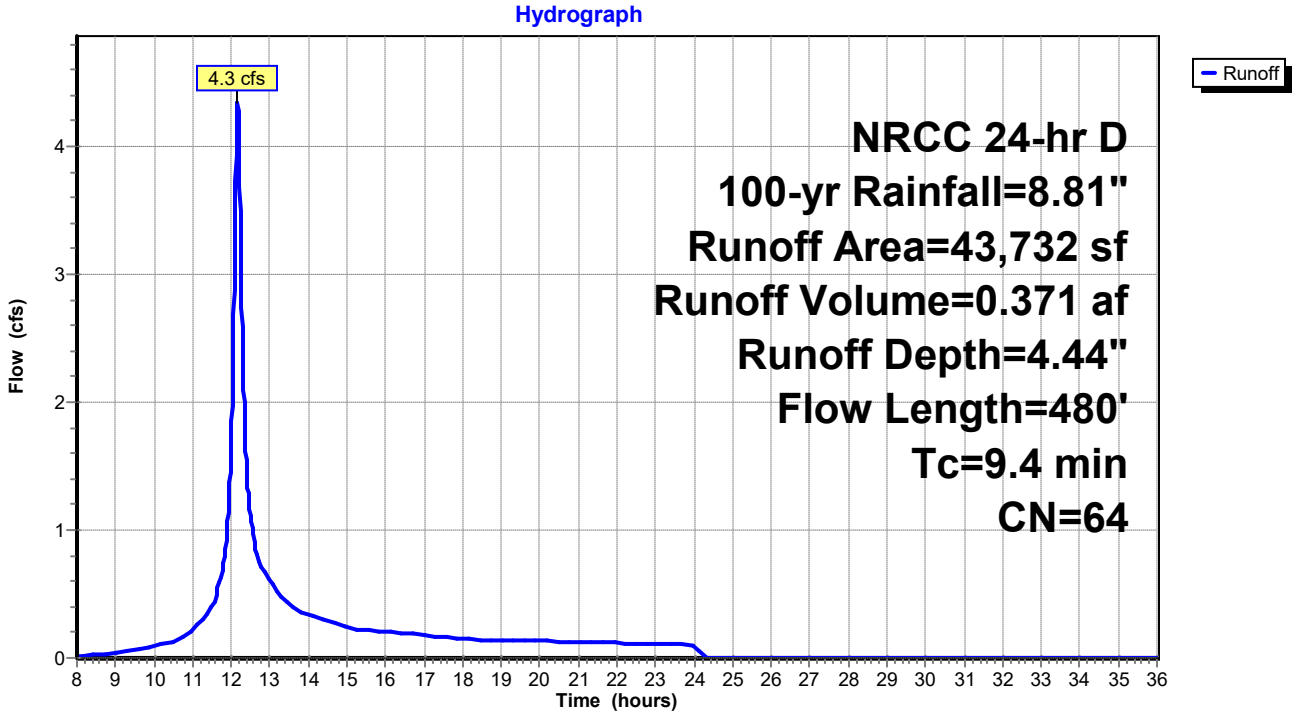
Runoff = 4.3 cfs @ 12.17 hrs, Volume= 0.371 af, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

Area (sf)	CN	Description
32,217	61	>75% Grass cover, Good, HSG B
6,590	74	>75% Grass cover, Good, HSG C
4,925	73	Woods, Fair, HSG C
43,732	64	Weighted Average
43,732		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	100	0.0550	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.33"
1.7	250	0.1240	2.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	130	0.1150	1.70		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.4	480	Total			

Subcatchment Pre2:



Summary for Subcatchment Pre3:

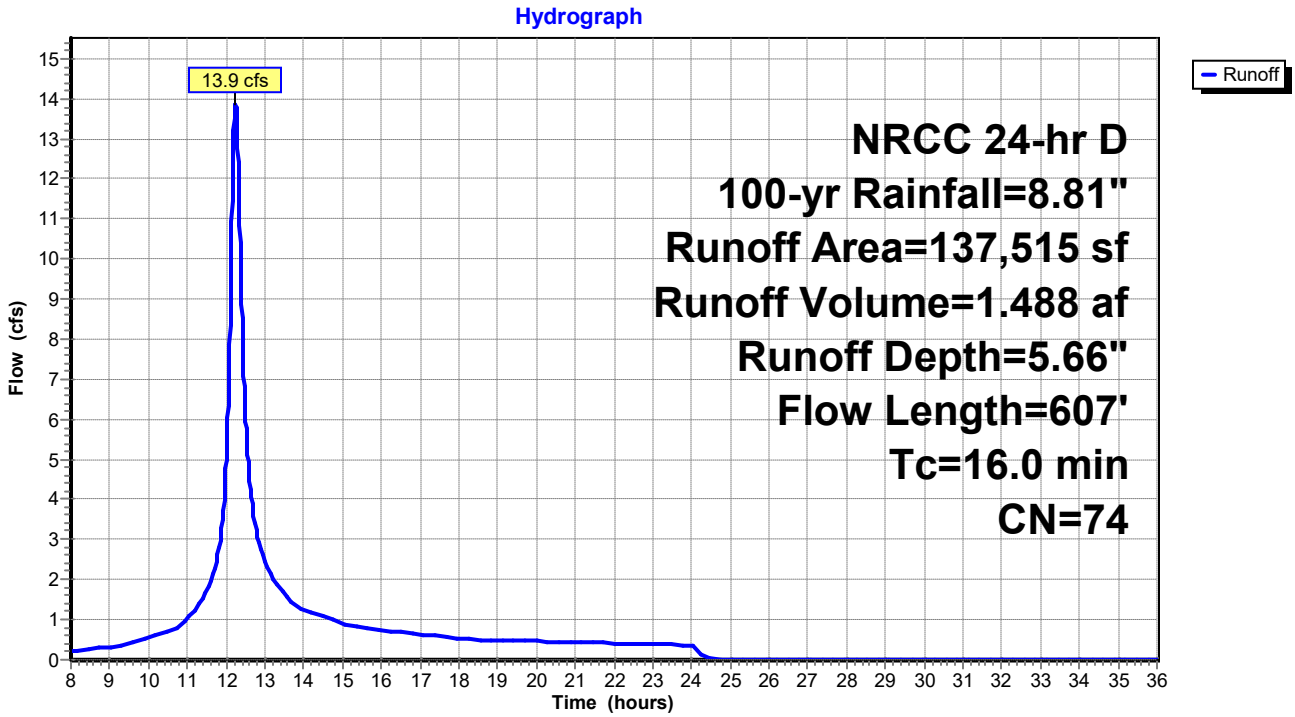
Runoff = 13.9 cfs @ 12.24 hrs, Volume= 1.488 af, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

Area (sf)	CN	Description
31,955	98	Paved parking, HSG C
4,730	89	Gravel roads, HSG C
14,125	74	>75% Grass cover, Good, HSG C
86,705	65	Brush, Good, HSG C
137,515	74	Weighted Average
105,560		76.76% Pervious Area
31,955		23.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	100	0.0700	0.15		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
4.1	365	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.4	142	0.0840	5.88		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.0	607	Total			

Subcatchment Pre3:



Summary for Subcatchment SUB AREA 3: HIGHLANDS - MAY 2002 SWPPP SUB AREA 3

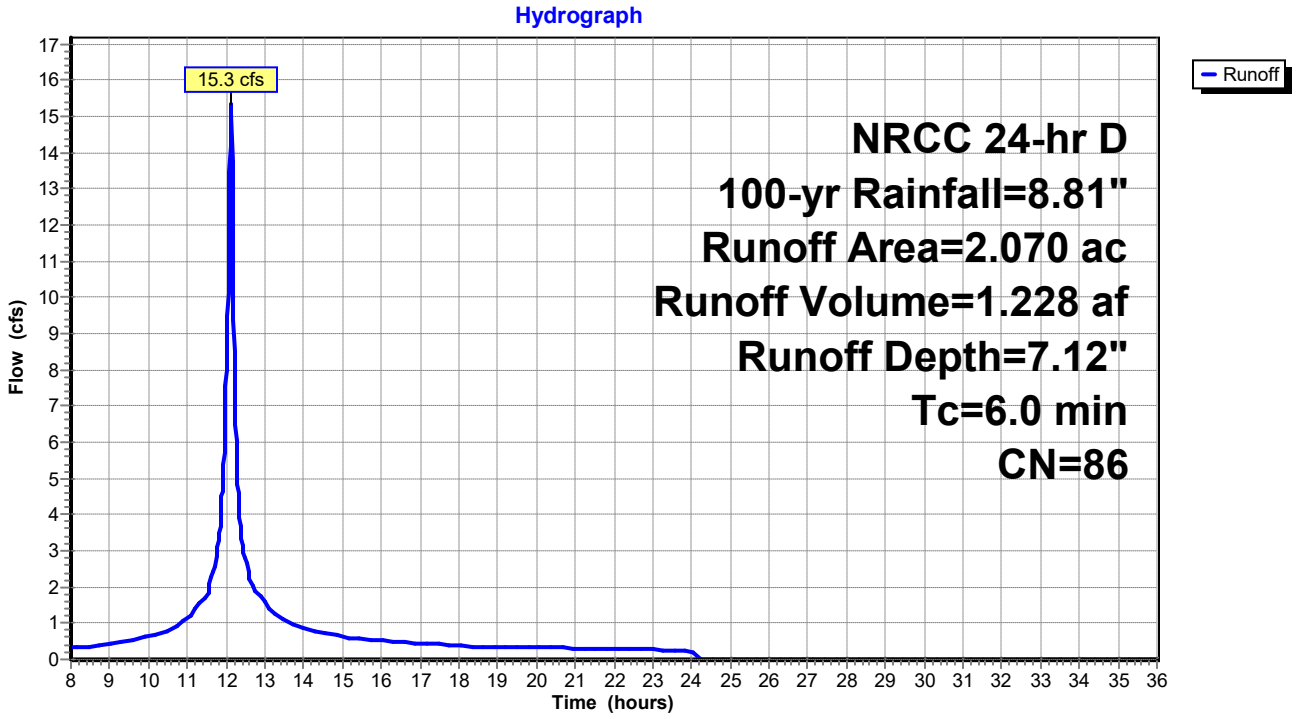
Runoff = 15.3 cfs @ 12.13 hrs, Volume= 1.228 af, Depth= 7.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

	Area (ac)	CN	Description
*	2.070	86	
	2.070		100.00% Pervious Area

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

Subcatchment SUB AREA 3: HIGHLANDS - MAY 2002 SWPPP SUB AREA 3



Summary for Subcatchment SUB AREA 4: HIGHLANDS - MAY 2002 SWPPP SUB AREA 4

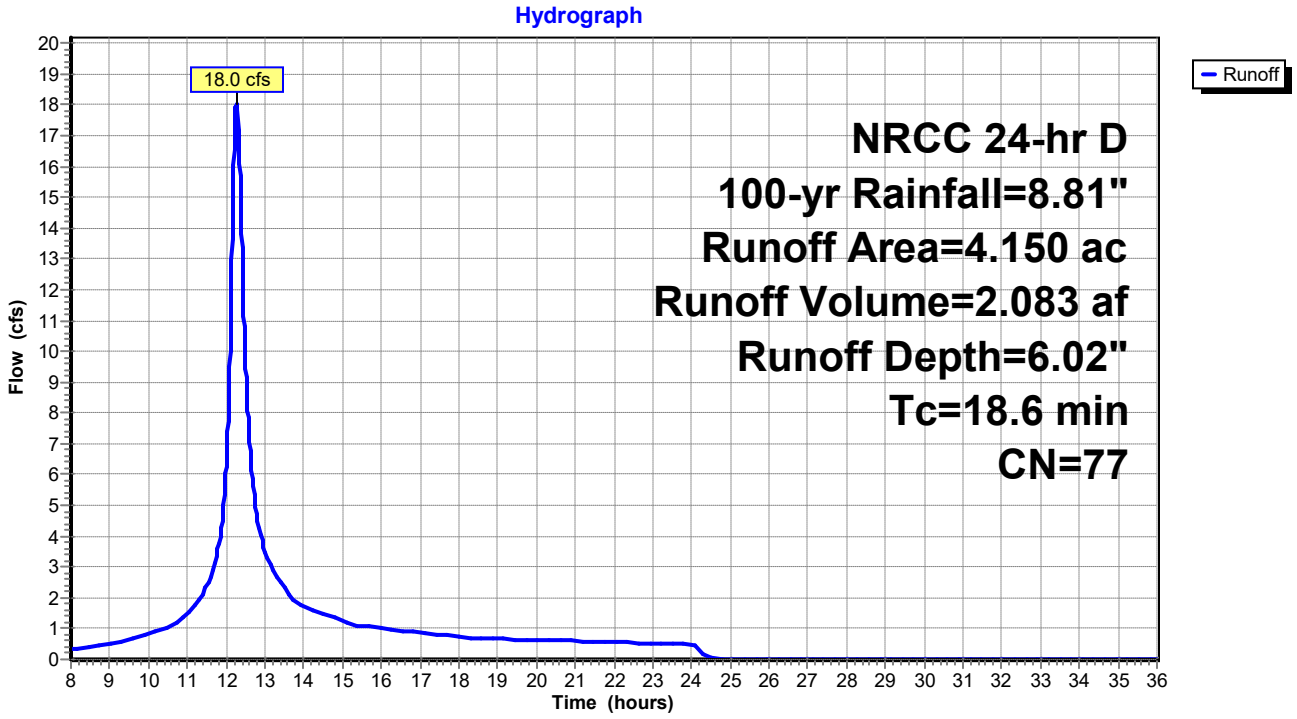
Runoff = 18.0 cfs @ 12.27 hrs, Volume= 2.083 af, Depth= 6.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

	Area (ac)	CN	Description
*	4.150	77	
	4.150		100.00% Pervious Area

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

Subcatchment SUB AREA 4: HIGHLANDS - MAY 2002 SWPPP SUB AREA 4



Summary for Subcatchment Sub-5A: Sub Area 5A

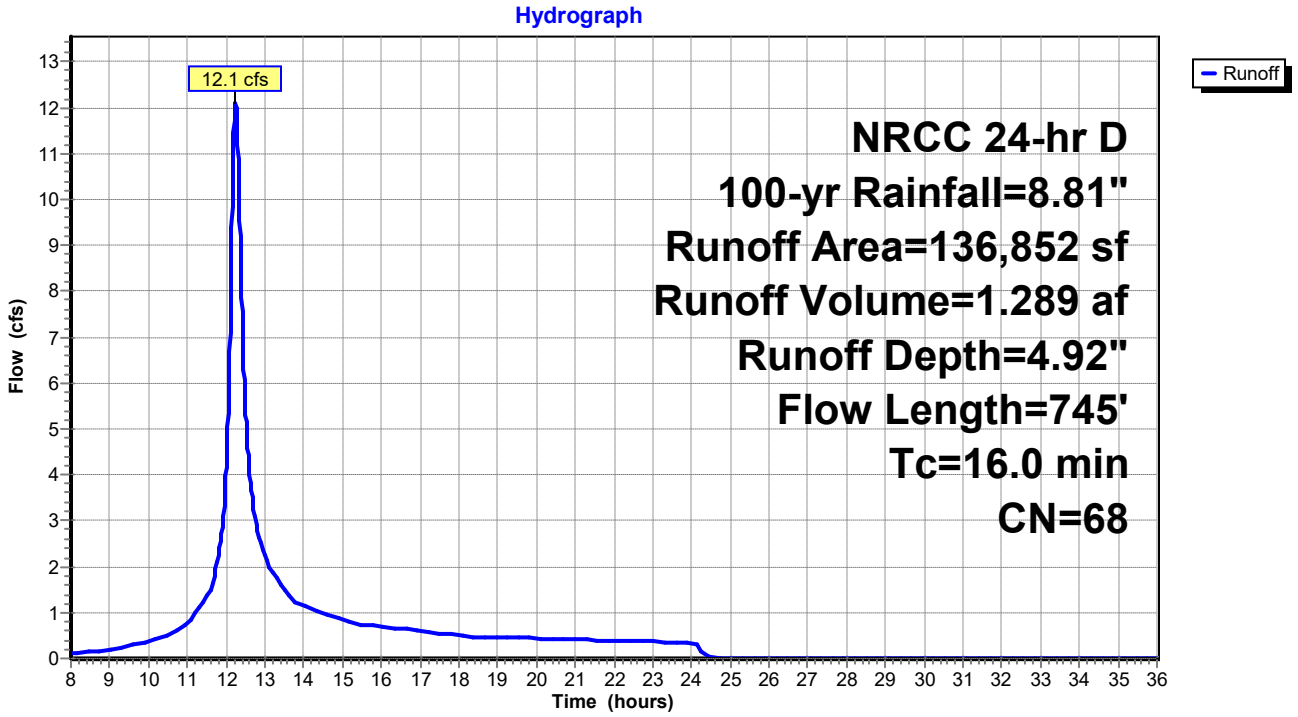
Runoff = 12.1 cfs @ 12.25 hrs, Volume= 1.289 af, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

Area (sf)	CN	Description
33,966	98	Paved parking & roofs
1,000	74	>75% Grass cover, Good, HSG C
58,668	65	Brush, Good, HSG C
43,218	48	Brush, Good, HSG B
136,852	68	Weighted Average
102,886		75.18% Pervious Area
33,966		24.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0550	0.13		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
1.5	130	0.0880	1.48		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	165	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	88	0.0342	3.75		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	262	0.0119	5.74	7.05	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.0	745	Total			

Subcatchment Sub-5A: Sub Area 5A



Summary for Subcatchment Sub-5B: Sub Area 5B

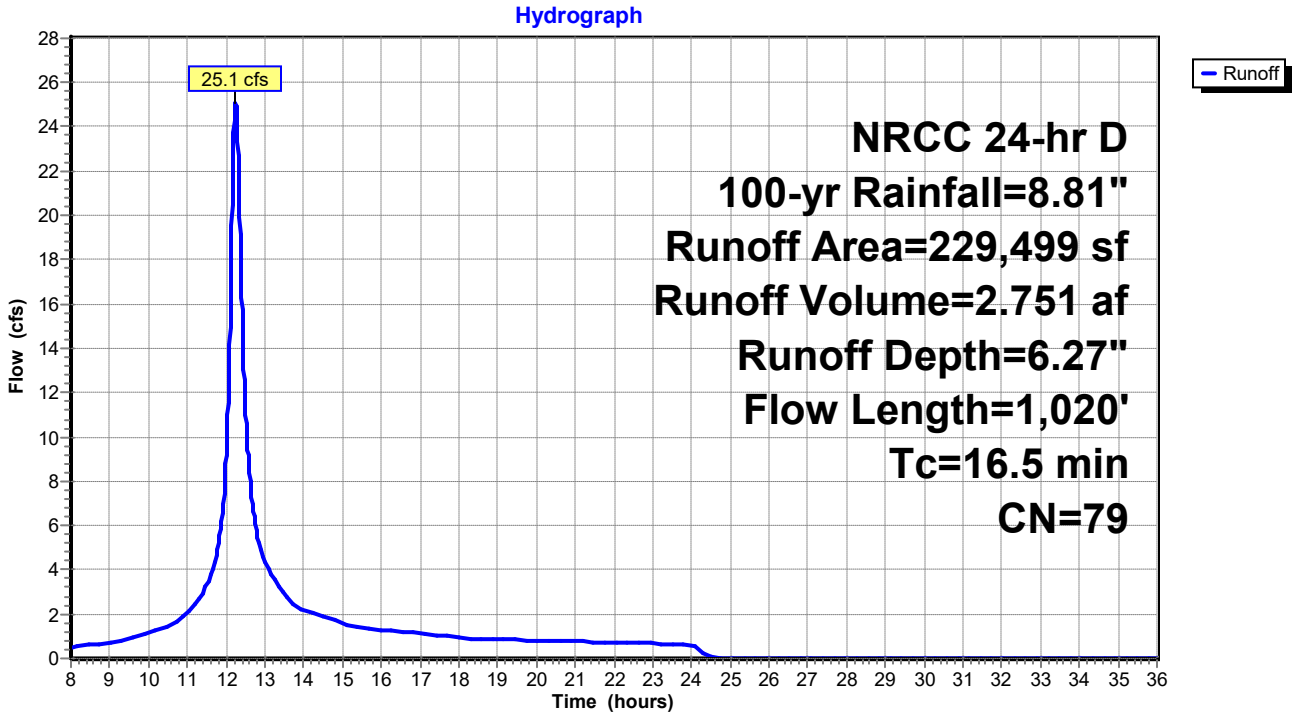
Runoff = 25.1 cfs @ 12.24 hrs, Volume= 2.751 af, Depth= 6.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

Area (sf)	CN	Description
98,809	98	Paved parking, HSG C
17,148	74	>75% Grass cover, Good, HSG C
97,461	65	Brush, Good, HSG C
16,081	48	Brush, Good, HSG B
229,499	79	Weighted Average
130,690		56.95% Pervious Area
98,809		43.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0500	0.13		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
1.8	190	0.1240	1.76		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	205	0.2700	3.64		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	525	0.0529	12.11	14.86	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.5	1,020	Total			

Subcatchment Sub-5B: Sub Area 5B



Summary for Pond DMH 27: Existing Drain Manhole 27

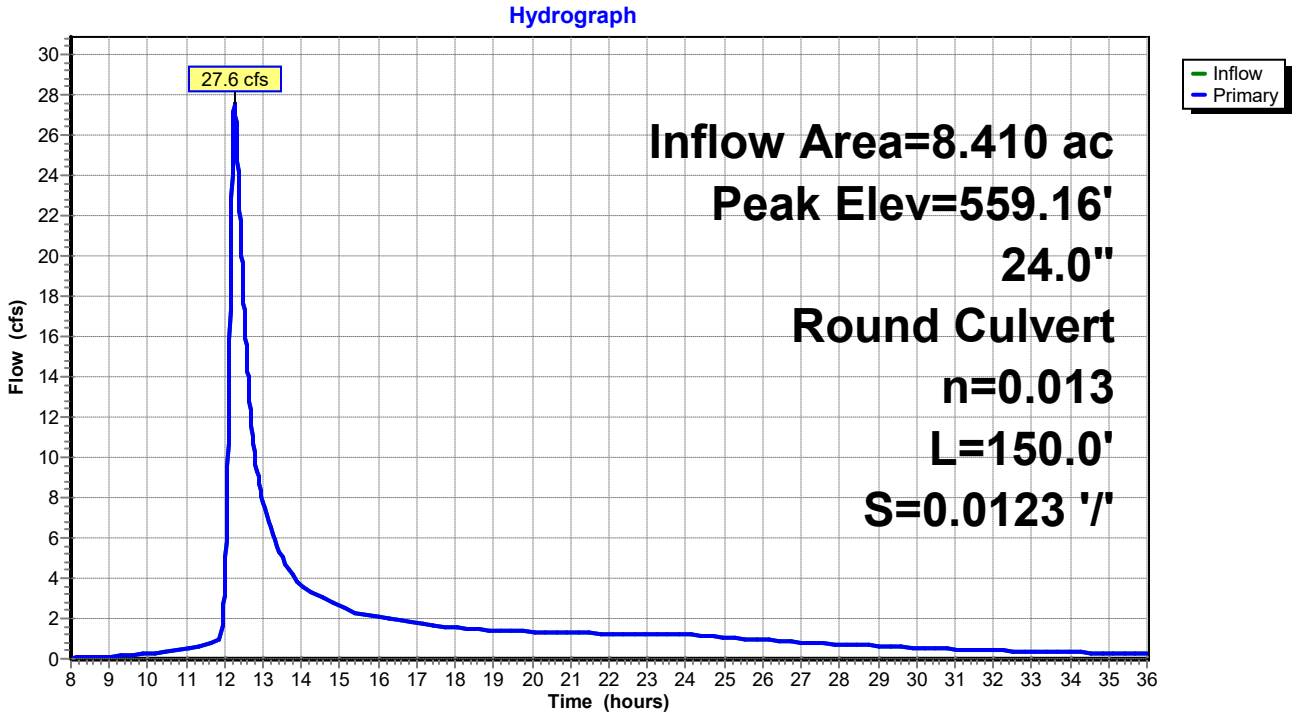
Inflow Area =	8.410 ac, 36.24% Impervious, Inflow Depth = 5.72" for 100-yr event				
Inflow =	27.6 cfs @ 12.26 hrs, Volume=	4.007 af			
Outflow =	27.6 cfs @ 12.26 hrs, Volume=	4.007 af, Atten= 0%, Lag= 0.0 min			
Primary =	27.6 cfs @ 12.26 hrs, Volume=	4.007 af			

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 559.16' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	554.84'	**24.0" Round Culvert** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 554.84' / 553.00' S= 0.0123 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=27.6 cfs @ 12.26 hrs HW=559.16' TW=553.66' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 27.6 cfs @ 8.77 fps)

Pond DMH 27: Existing Drain Manhole 27



Stage-Area-Storage for Pond DMH 27: Existing Drain Manhole 27

Elevation (feet)	Storage (cubic-feet)
554.84	**0**
554.94	0
555.04	0
555.14	0
555.24	0
555.34	0
555.44	0
555.54	0
555.64	0
555.74	0
555.84	0
555.94	0
556.04	0
556.14	0
556.24	0
556.34	0
556.44	0
556.54	0
556.64	0
556.74	0
556.84	0
556.94	0
557.04	0
557.14	0
557.24	0
557.34	0
557.44	0
557.54	0
557.64	0
557.74	0
557.84	0
557.94	0
558.04	0
558.14	0
558.24	0
558.34	0
558.44	0
558.54	0
558.64	0
558.74	0
558.84	0
558.94	0
559.04	0
559.14	0

Summary for Pond DMH 45: Existing Drain Manhole 45

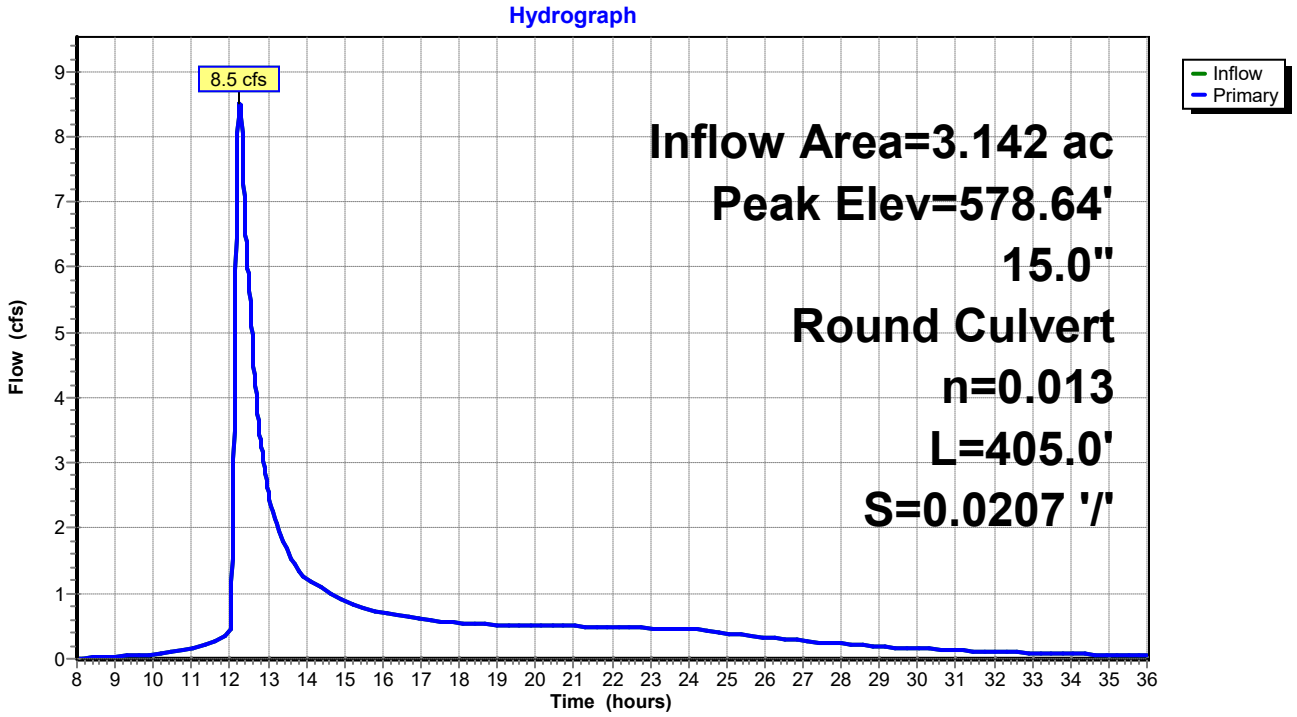
Inflow Area =	3.142 ac, 24.82% Impervious, Inflow Depth = 4.92" for 100-yr event				
Inflow =	8.5 cfs @	12.26 hrs,	Volume=	1.289 af	
Outflow =	8.5 cfs @	12.26 hrs,	Volume=	1.289 af,	Atten= 0%, Lag= 0.0 min
Primary =	8.5 cfs @	12.26 hrs,	Volume=	1.289 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 578.64' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	575.94'	**15.0" Round Culvert** L= 405.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 575.94' / 567.57' S= 0.0207 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=8.5 cfs @ 12.26 hrs HW=578.64' TW=559.16' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 8.5 cfs @ 6.93 fps)

Pond DMH 45: Existing Drain Manhole 45



Stage-Area-Storage for Pond DMH 45: Existing Drain Manhole 45

Elevation (feet)	Storage (cubic-feet)
575.94	**0**
576.04	0
576.14	0
576.24	0
576.34	0
576.44	0
576.54	0
576.64	0
576.74	0
576.84	0
576.94	0
577.04	0
577.14	0
577.24	0
577.34	0
577.44	0
577.54	0
577.64	0
577.74	0
577.84	0
577.94	0
578.04	0
578.14	0
578.24	0
578.34	0
578.44	0
578.54	0
578.64	0

Summary for Pond EDB #2: Existing Detention Basin #2

Inflow Area = 14.630 ac, 20.83% Impervious, Inflow Depth = 6.00" for 100-yr event
Inflow = 51.9 cfs @ 12.24 hrs, Volume= 7.318 af
Outflow = 25.4 cfs @ 12.57 hrs, Volume= 7.314 af, Atten= 51%, Lag= 20.0 min
Primary = 25.4 cfs @ 12.57 hrs, Volume= 7.314 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Starting Elev= 551.00' Surf.Area= 17,383 sf Storage= 61,331 cf
Peak Elev= 554.41' @ 12.57 hrs Surf.Area= 24,964 sf Storage= 134,496 cf (73,165 cf above start)

Plug-Flow detention time= 377.0 min calculated for 5.906 af (81% of inflow)
Center-of-Mass det. time= 115.2 min (1,097.3 - 982.1)

Volume	Invert	Avail.Storage	Storage Description
#1	546.00'	237,385 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

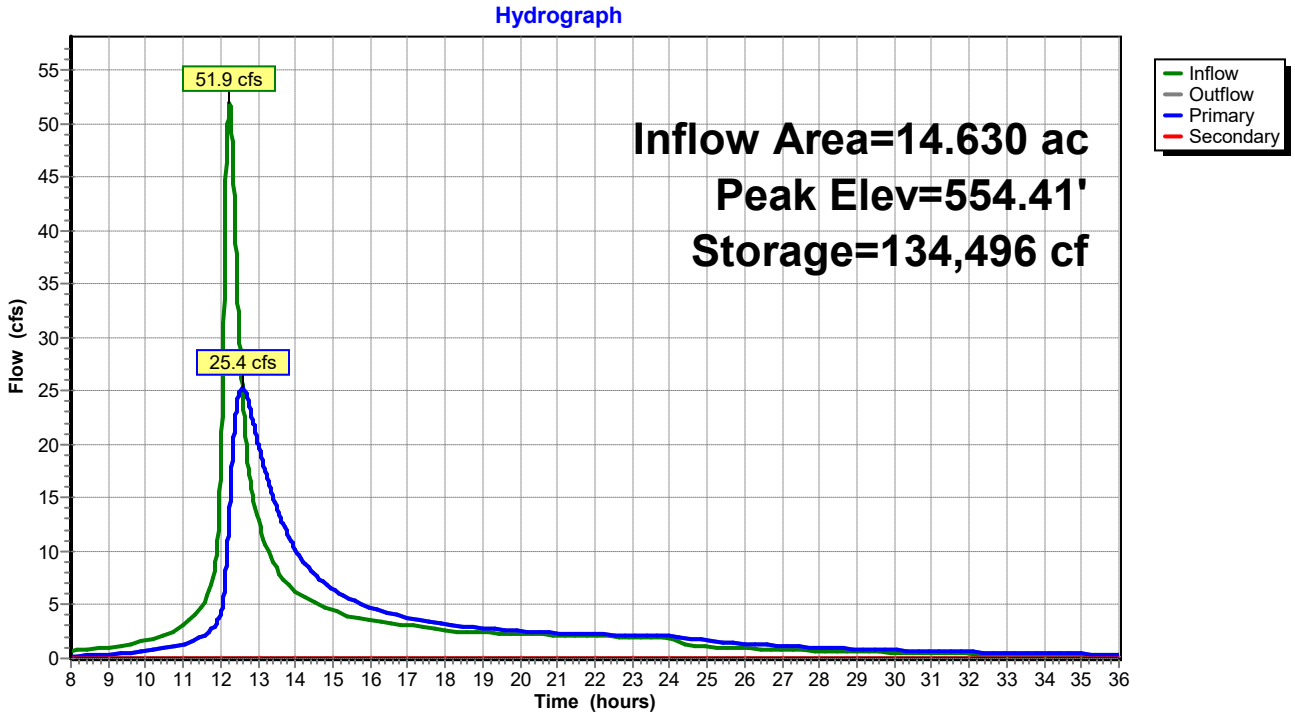
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
546.00	8,325	0	0
548.00	11,185	19,510	19,510
550.00	14,630	25,815	45,325
552.00	20,135	34,765	80,090
554.00	24,105	44,240	124,330
556.00	28,250	52,355	176,685
558.00	32,450	60,700	237,385

Device	Routing	Invert	Outlet Devices
#1	Primary	550.50'	**24.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 550.50' / 549.60' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	551.00'	**30.0 deg x 0.5' long x 4.50' rise Sharp-Crested Vee/Trap Weir** Cv= 2.61 (C= 3.26)
#3	Secondary	555.50'	**30.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=25.4 cfs @ 12.57 hrs HW=554.41' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 25.4 cfs of 25.8 cfs potential flow)
└─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 25.4 cfs @ 5.25 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=551.00' TW=0.00' (Dynamic Tailwater)
└─**3=Orifice/Grate** (Controls 0.0 cfs)

Pond EDB #2: Existing Detention Basin #2



Stage-Area-Storage for Pond EDB #2: Existing Detention Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
546.00	8,325	0	550.68	16,502	55,910
546.09	8,454	755	550.77	16,749	57,406
546.18	8,582	1,522	550.86	16,997	58,925
546.27	8,711	2,300	550.95	17,245	60,466
546.36	8,840	3,090	551.04	17,493	62,029
546.45	8,969	3,891	551.13	17,740	63,614
546.54	9,097	4,704	551.22	17,988	65,222
546.63	9,226	5,529	551.31	18,236	66,852
546.72	9,355	6,365	551.40	18,483	68,504
546.81	9,483	7,212	551.49	18,731	70,179
546.90	9,612	8,072	551.58	18,979	71,876
546.99	9,741	8,943	551.67	19,227	73,595
547.08	9,869	9,825	551.76	19,474	75,337
547.17	9,998	10,719	551.85	19,722	77,101
547.26	10,127	11,625	551.94	19,970	78,887
547.35	10,256	12,542	552.03	20,195	80,695
547.44	10,384	13,471	552.12	20,373	82,520
547.53	10,513	14,411	552.21	20,552	84,362
547.62	10,642	15,363	552.30	20,730	86,220
547.71	10,770	16,326	552.39	20,909	88,094
547.80	10,899	17,302	552.48	21,088	89,983
547.89	11,028	18,288	552.57	21,266	91,889
547.98	11,156	19,287	552.66	21,445	93,811
548.07	11,306	20,297	552.75	21,624	95,750
548.16	11,461	21,322	552.84	21,802	97,704
548.25	11,616	22,360	552.93	21,981	99,674
548.34	11,771	23,412	553.02	22,160	101,660
548.43	11,926	24,479	553.11	22,338	103,663
548.52	12,081	25,559	553.20	22,517	105,681
548.61	12,236	26,653	553.29	22,696	107,716
548.70	12,391	27,762	553.38	22,874	109,766
548.79	12,546	28,884	553.47	23,053	111,833
548.88	12,701	30,020	553.56	23,232	113,916
548.97	12,856	31,170	553.65	23,410	116,015
549.06	13,011	32,334	553.74	23,589	118,130
549.15	13,166	33,512	553.83	23,768	120,261
549.24	13,321	34,704	553.92	23,946	122,408
549.33	13,476	35,910	554.01	24,126	124,571
549.42	13,631	37,129	554.10	24,312	126,751
549.51	13,786	38,363	554.19	24,499	128,947
549.60	13,941	39,611	554.28	24,685	131,161
549.69	14,096	40,872	554.37	24,872	133,391
549.78	14,251	42,148	554.46	25,058	135,638
549.87	14,406	43,438	554.55	25,245	137,901
549.96	14,561	44,741	554.64	25,431	140,182
550.05	14,768	46,060	554.73	25,618	142,479
550.14	15,015	47,400	554.82	25,804	144,793
550.23	15,263	48,763	554.91	25,991	147,124
550.32	15,511	50,148	555.00	26,178	149,471
550.41	15,759	51,555	555.09	26,364	151,836
550.50	16,006	52,984	555.18	26,551	154,217
550.59	16,254	54,436	555.27	26,737	156,615

Stage-Area-Storage for Pond EDB #2: Existing Detention Basin #2 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
555.36	26,924	159,029
555.45	27,110	161,461
555.54	27,297	163,909
555.63	27,483	166,374
555.72	27,670	168,856
555.81	27,856	171,355
555.90	28,043	173,870
555.99	28,229	176,403
556.08	28,418	178,952
556.17	28,607	181,518
556.26	28,796	184,101
556.35	28,985	186,701
556.44	29,174	189,318
556.53	29,363	191,952
556.62	29,552	194,604
556.71	29,741	197,272
556.80	29,930	199,957
556.89	30,119	202,659
556.98	30,308	205,378
557.07	30,497	208,115
557.16	30,686	210,868
557.25	30,875	213,638
557.34	31,064	216,425
557.43	31,253	219,230
557.52	31,442	222,051
557.61	31,631	224,889
557.70	31,820	227,745
557.79	32,009	230,617
557.88	32,198	233,506
557.97	**32,387**	**236,412**

Summary for Pond FS 3: Existing Flow Splitter #3

Inflow Area =	4.150 ac,	0.00% Impervious,	Inflow Depth =	6.02"	for 100-yr event
Inflow =	18.0 cfs @	12.27 hrs,	Volume=	2.083 af	
Outflow =	18.0 cfs @	12.27 hrs,	Volume=	2.083 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.0 cfs @	0.00 hrs,	Volume=	0.000 af	
Secondary =	18.0 cfs @	12.27 hrs,	Volume=	2.083 af	

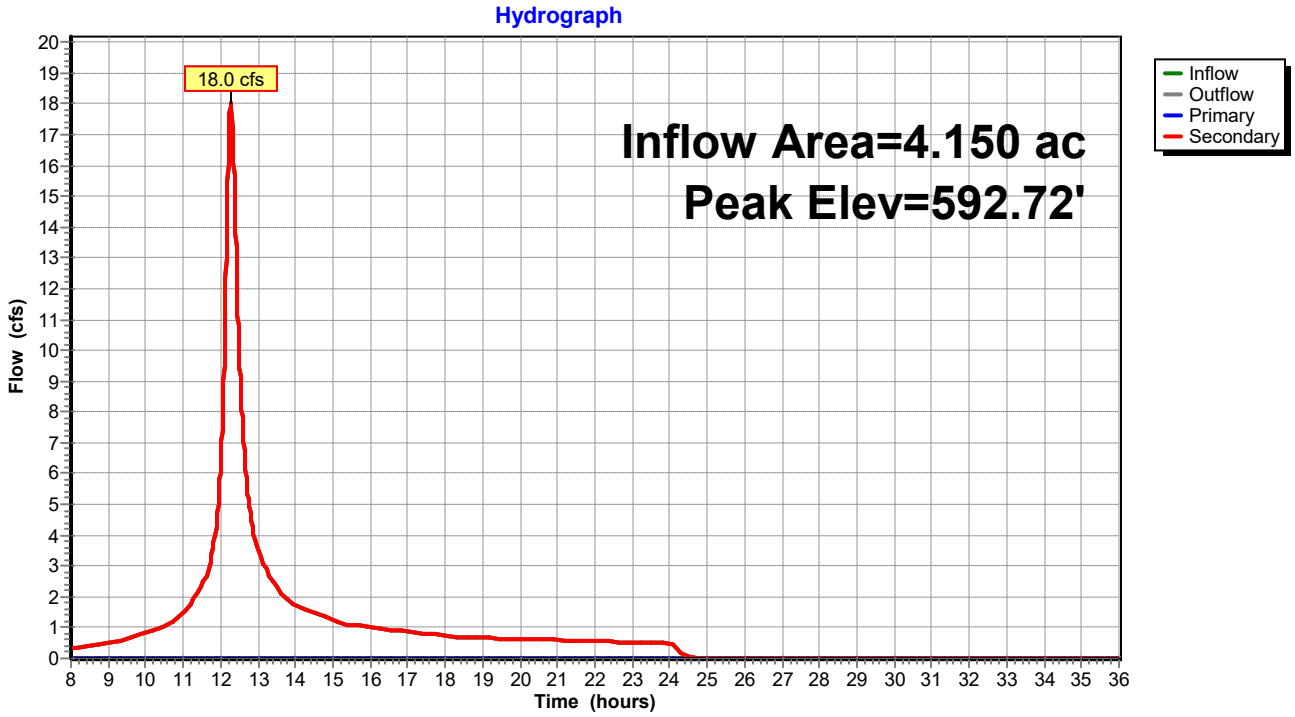
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 592.72' @ 12.27 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	591.20'	**15.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 591.20' / 591.00' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	593.60'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Secondary	590.30'	**24.0" Round Culvert** L= 320.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 590.30' / 552.00' S= 0.1197 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.30' TW=590.00' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.0 cfs)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Secondary OutFlow Max=18.0 cfs @ 12.27 hrs HW=592.72' TW=553.71' (Dynamic Tailwater)
└─**3=Culvert** (Inlet Controls 18.0 cfs @ 5.74 fps)

Pond FS 3: Existing Flow Splitter #3



Stage-Area-Storage for Pond FS 3: Existing Flow Splitter #3

Elevation (feet)	Storage (cubic-feet)
590.30	**0**
590.40	0
590.50	0
590.60	0
590.70	0
590.80	0
590.90	0
591.00	0
591.10	0
591.20	0
591.30	0
591.40	0
591.50	0
591.60	0
591.70	0
591.80	0
591.90	0
592.00	0
592.10	0
592.20	0
592.30	0
592.40	0
592.50	0
592.60	0
592.70	0
592.80	0
592.90	0
593.00	0
593.10	0
593.20	0
593.30	0
593.40	0
593.50	0
593.60	0

Summary for Pond FS#4: Exist. Flow Spilitter #4

Inflow Area =	5.269 ac, 43.05% Impervious, Inflow Depth = 6.27" for 100-yr event				
Inflow =	25.1 cfs @	12.24 hrs,	Volume=	2.751 af	
Outflow =	25.1 cfs @	12.24 hrs,	Volume=	2.751 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.1 cfs @	12.19 hrs,	Volume=	1.498 af	
Secondary =	18.4 cfs @	12.26 hrs,	Volume=	1.253 af	

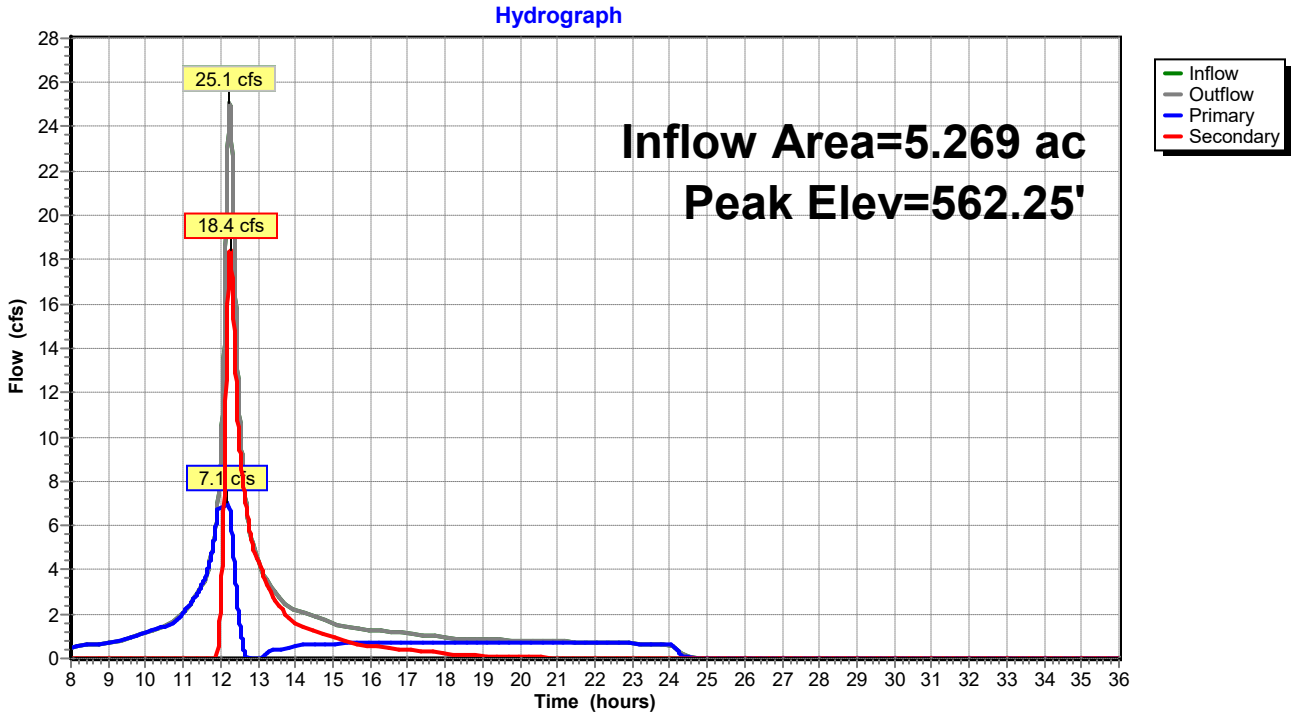
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 562.25' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	558.25'	**18.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 558.25' / 556.80' S= 0.0659 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Secondary	558.15'	**24.0" Round Culvert** L= 61.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 558.15' / 554.84' S= 0.0543 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	561.30'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=7.1 cfs @ 12.19 hrs HW=562.16' TW=561.47' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.1 cfs @ 3.99 fps)

Secondary OutFlow Max=18.4 cfs @ 12.26 hrs HW=562.25' TW=559.16' (Dynamic Tailwater)
└─**2=Culvert** (Passes 18.4 cfs of 26.6 cfs potential flow)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 18.4 cfs @ 3.23 fps)

Pond FS#4: Exist. Flow Spilitter #4



Stage-Area-Storage for Pond FS#4: Exist. Flow Spilitter #4

Elevation (feet)	Storage (cubic-feet)
558.15	**0**
558.25	0
558.35	0
558.45	0
558.55	0
558.65	0
558.75	0
558.85	0
558.95	0
559.05	0
559.15	0
559.25	0
559.35	0
559.45	0
559.55	0
559.65	0
559.75	0
559.85	0
559.95	0
560.05	0
560.15	0
560.25	0
560.35	0
560.45	0
560.55	0
560.65	0
560.75	0
560.85	0
560.95	0
561.05	0
561.15	0
561.25	0
561.35	0
561.45	0
561.55	0
561.65	0
561.75	0
561.85	0
561.95	0
562.05	0
562.15	0
562.25	0

Summary for Pond FS#6: Exist. Flow Splitter #6

Inflow Area =	3.142 ac, 24.82% Impervious, Inflow Depth = 4.92" for 100-yr event			
Inflow =	12.1 cfs @	12.25 hrs, Volume=	1.289 af	
Outflow =	12.1 cfs @	12.25 hrs, Volume=	1.289 af, Atten= 0%, Lag= 0.0 min	
Primary =	4.6 cfs @	12.04 hrs, Volume=	0.766 af	
Secondary =	7.9 cfs @	12.26 hrs, Volume=	0.523 af	

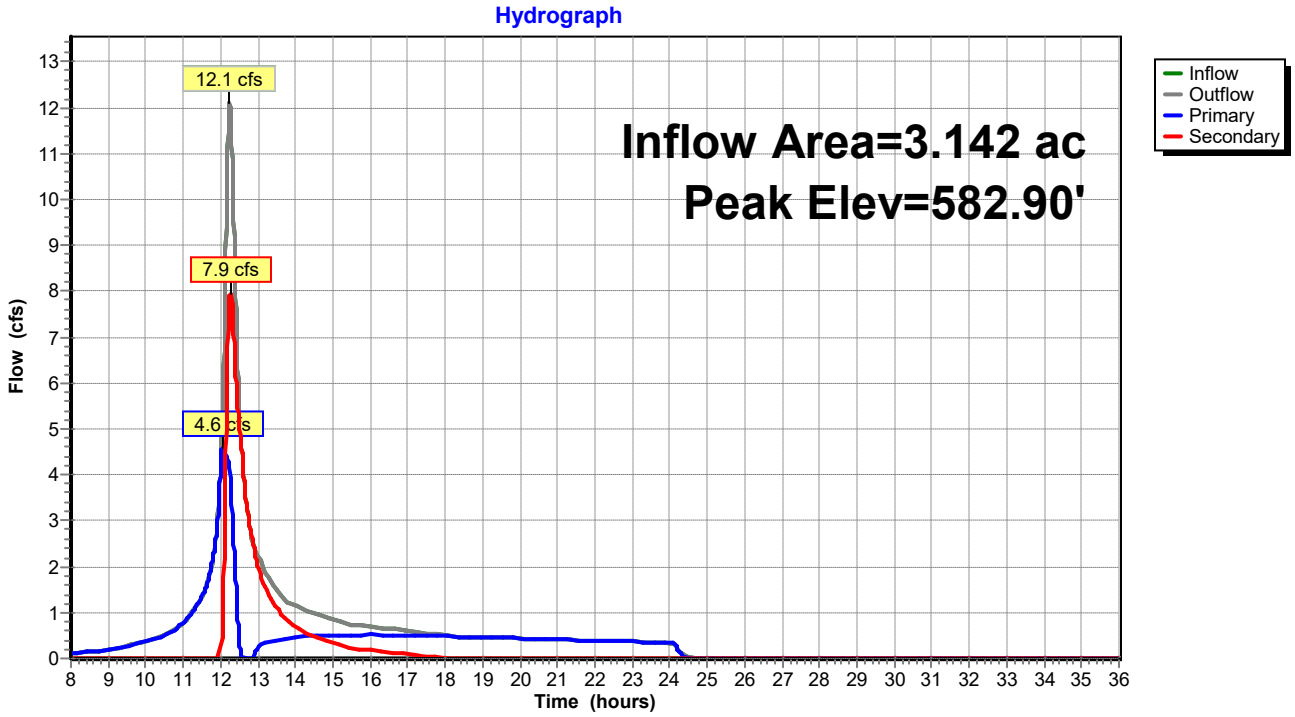
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 582.90' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	580.30'	**15.0" Round Culvert** L= 39.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.30' / 580.00' S= 0.0077 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	580.47'	**15.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.47' / 579.59' S= 0.0244 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	582.25'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.6 cfs @ 12.04 hrs HW=582.33' TW=581.73' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.6 cfs @ 3.73 fps)

Secondary OutFlow Max=7.9 cfs @ 12.26 hrs HW=582.90' TW=578.64' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 7.9 cfs @ 6.47 fps)
└─**3=Broad-Crested Rectangular Weir** (Passes 7.9 cfs of 9.8 cfs potential flow)

Pond FS#6: Exist. Flow Splitter #6



Stage-Area-Storage for Pond FS#6: Exist. Flow Splitter #6

Elevation (feet)	Storage (cubic-feet)
580.30	**0**
580.40	0
580.50	0
580.60	0
580.70	0
580.80	0
580.90	0
581.00	0
581.10	0
581.20	0
581.30	0
581.40	0
581.50	0
581.60	0
581.70	0
581.80	0
581.90	0
582.00	0
582.10	0
582.20	0
582.30	0
582.40	0
582.50	0
582.60	0
582.70	0
582.80	0
582.90	0

Summary for Pond SWQB 3: Existing SWQB #3

Inflow Area = 4.150 ac, 0.00% Impervious, Inflow Depth = 0.00" for 100-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 590.00' @ 0.00 hrs Surf.Area= 1,330 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	590.00'	33,910 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

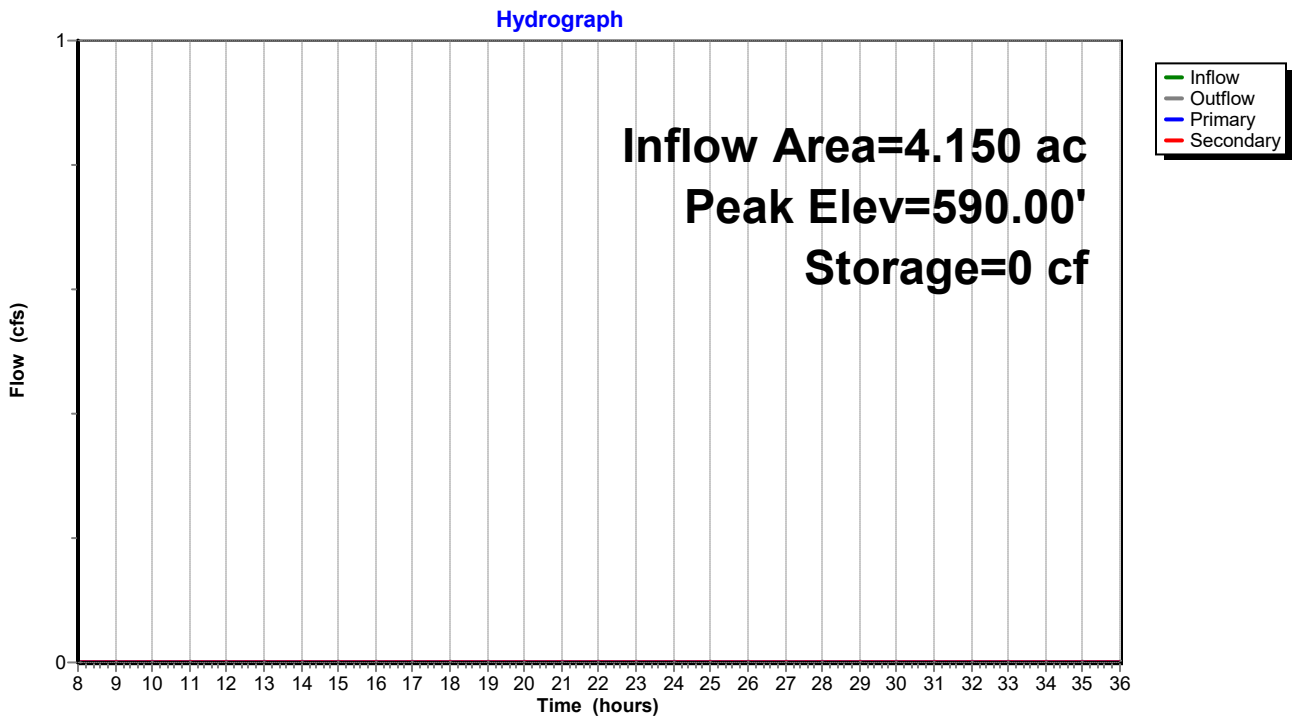
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
590.00	1,330	0	0
592.00	3,725	5,055	5,055
594.00	7,015	10,740	15,795
596.00	11,100	18,115	33,910

Device	Routing	Invert	Outlet Devices
#1	Primary	588.20'	**12.0" Round Culvert** L= 240.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 588.20' / 552.00' S= 0.1508 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	590.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	590.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 18 rows with 3.0" cc spacing C= 0.600
#4	Secondary	594.00'	**30.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.00' TW=551.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.0 cfs of 4.3 cfs potential flow)
  └─**2=Orifice/Grate** (Controls 0.0 cfs)
    └─**3=Orifice/Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.00' TW=551.00' (Dynamic Tailwater)
└─**4=Orifice/Grate** (Controls 0.0 cfs)

Pond SWQB 3: Existing SWQB #3



Stage-Area-Storage for Pond SWQB 3: Existing SWQB #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
590.00	1,330	0
590.10	1,450	139
590.20	1,570	290
590.30	1,689	453
590.40	1,809	628
590.50	1,929	815
590.60	2,049	1,014
590.70	2,168	1,224
590.80	2,288	1,447
590.90	2,408	1,682
591.00	2,528	1,929
591.10	2,647	2,187
591.20	2,767	2,458
591.30	2,887	2,741
591.40	3,006	3,036
591.50	3,126	3,342
591.60	3,246	3,661
591.70	3,366	3,991
591.80	3,485	4,334
591.90	3,605	4,688
592.00	3,725	5,055
592.10	3,890	5,436
592.20	4,054	5,833
592.30	4,218	6,247
592.40	4,383	6,677
592.50	4,548	7,123
592.60	4,712	7,586
592.70	4,877	8,066
592.80	5,041	8,561
592.90	5,205	9,074
593.00	5,370	9,603
593.10	5,535	10,148
593.20	5,699	10,709
593.30	5,863	11,288
593.40	6,028	11,882
593.50	6,193	12,493
593.60	6,357	13,121
593.70	6,522	13,765
593.80	6,686	14,425
593.90	6,850	15,102
594.00	7,015	15,795
594.10	7,219	16,507
594.20	7,424	17,239
594.30	7,628	17,991
594.40	7,832	18,764
594.50	8,036	19,558
594.60	8,241	20,372
594.70	8,445	21,206
594.80	8,649	22,061
594.90	8,853	22,936
595.00	9,058	23,831
595.10	9,262	24,747
595.20	9,466	25,684
595.30	9,670	26,640
595.40	9,874	27,618
595.50	10,079	28,615
595.60	10,283	29,633
595.70	10,487	30,672
595.80	10,691	31,731
595.90	10,896	32,810
596.00	**11,100**	**33,910**

Summary for Pond SWQB 4: Exist. SWQB #4

Inflow Area = 5.269 ac, 43.05% Impervious, Inflow Depth = 3.41" for 100-yr event
Inflow = 7.1 cfs @ 12.19 hrs, Volume= 1.498 af
Outflow = 2.4 cfs @ 12.46 hrs, Volume= 1.465 af, Atten= 66%, Lag= 16.3 min
Primary = 2.4 cfs @ 12.46 hrs, Volume= 1.465 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 561.91' @ 12.45 hrs Surf.Area= 8,742 sf Storage= 32,245 cf

Plug-Flow detention time= 600.8 min calculated for 1.465 af (98% of inflow)
Center-of-Mass det. time= 588.0 min (1,441.0 - 852.9)

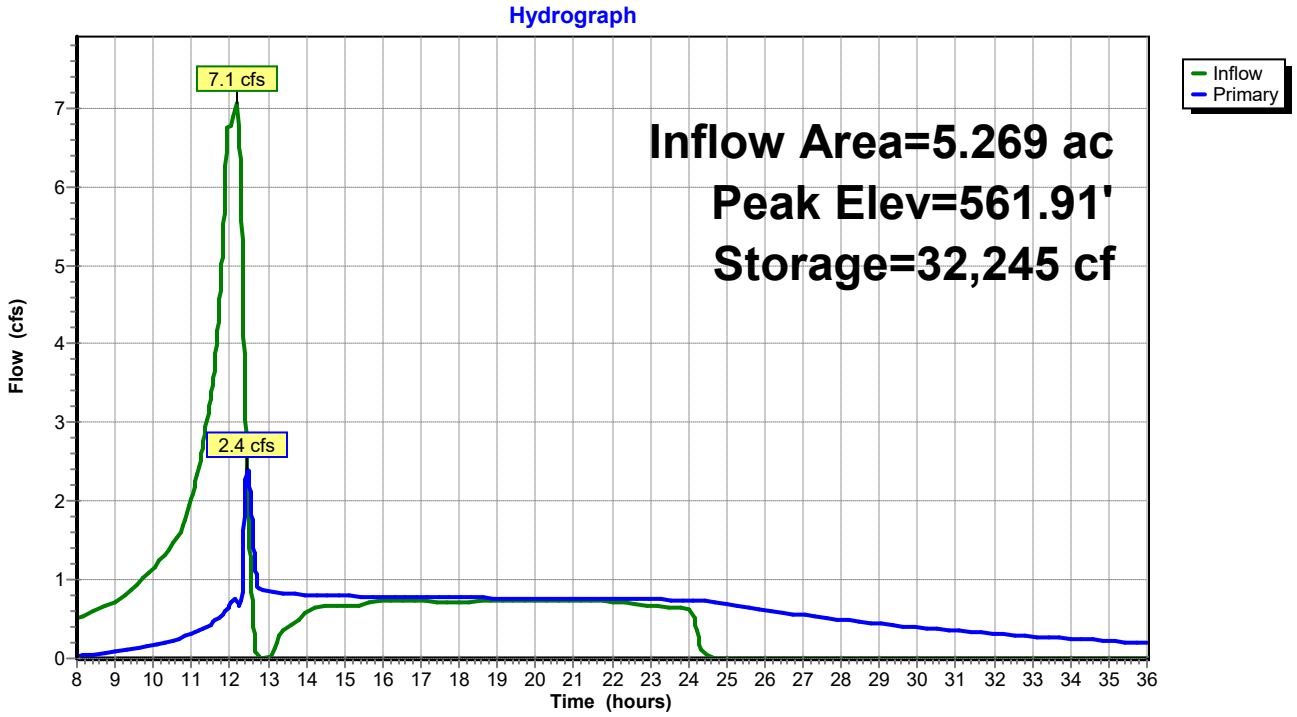
Volume	Invert	Avail.Storage	Storage Description
#1	556.00'	53,446 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
556.00	2,625	212.0	0	0	2,625
558.00	4,450	278.0	6,995	6,995	5,245
560.00	6,430	341.0	10,819	17,815	8,409
562.00	8,860	408.0	15,225	33,040	12,472
564.00	11,608	478.0	20,406	53,446	17,487

Device	Routing	Invert	Outlet Devices
#1	Primary	556.00'	**12.0" Round Culvert** L= 63.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 556.00' / 554.84' S= 0.0184 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	561.80'	**33.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	556.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	556.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 23 rows with 3.0" cc spacing C= 0.600

Primary OutFlow Max=2.4 cfs @ 12.46 hrs HW=561.91' TW=557.46' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.4 cfs of 7.1 cfs potential flow)
  ├─**2=Orifice/Grate** (Weir Controls 1.5 cfs @ 1.08 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.9 cfs @ 10.15 fps)
    └─**4=Orifice/Grate** (Passes 0.9 cfs of 0.9 cfs potential flow)

Pond SWQB 4: Exist. SWQB #4



Stage-Area-Storage for Pond SWQB 4: Exist. SWQB #4

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
556.00	2,625	0
556.10	2,705	266
556.20	2,786	541
556.30	2,868	824
556.40	2,952	1,115
556.50	3,036	1,414
556.60	3,122	1,722
556.70	3,209	2,039
556.80	3,298	2,364
556.90	3,387	2,698
557.00	3,478	3,041
557.10	3,569	3,394
557.20	3,663	3,755
557.30	3,757	4,126
557.40	3,852	4,507
557.50	3,949	4,897
557.60	4,047	5,296
557.70	4,146	5,706
557.80	4,246	6,126
557.90	4,347	6,555
558.00	4,450	6,995
558.10	4,540	7,445
558.20	4,632	7,903
558.30	4,724	8,371
558.40	4,817	8,848
558.50	4,911	9,334
558.60	5,006	9,830
558.70	5,102	10,336
558.80	5,198	10,851
558.90	5,296	11,375
559.00	5,395	11,910
559.10	5,494	12,454
559.20	5,594	13,009
559.30	5,696	13,573
559.40	5,798	14,148
559.50	5,901	14,733
559.60	6,005	15,328
559.70	6,110	15,934
559.80	6,216	16,550
559.90	6,322	17,177
560.00	6,430	17,815
560.10	6,542	18,463
560.20	6,656	19,123
560.30	6,770	19,794
560.40	6,885	20,477
560.50	7,001	21,171
560.60	7,118	21,877
560.70	7,236	22,595
560.80	7,355	23,325
560.90	7,475	24,066
561.00	7,596	24,820
561.10	7,718	25,585
561.20	7,841	26,363
561.30	7,965	27,154
561.40	8,090	27,957
561.50	8,216	28,772
561.60	8,343	29,600
561.70	8,471	30,440
561.80	8,600	31,294
561.90	8,729	32,160
562.00	8,860	33,040
562.10	8,989	33,932
562.20	9,118	34,838
562.30	9,249	35,756
562.40	9,380	36,687
562.50	9,512	37,632
562.60	9,645	38,590
562.70	9,780	39,561
562.80	9,915	40,546
562.90	10,051	41,544
563.00	10,188	42,556
563.10	10,326	43,582
563.20	10,464	44,621
563.30	10,604	45,675
563.40	10,745	46,742
563.50	10,886	47,823
563.60	11,029	48,919
563.70	11,172	50,029
563.80	11,317	51,154
563.90	11,462	52,293
564.00	**11,608**	**53,446**

Summary for Pond SWQB 4A: Exist. SWQB #4A

Inflow Area = 3.142 ac, 24.82% Impervious, Inflow Depth = 2.93" for 100-yr event
Inflow = 4.6 cfs @ 12.04 hrs, Volume= 0.766 af
Outflow = 0.6 cfs @ 12.48 hrs, Volume= 0.766 af, Atten= 86%, Lag= 26.5 min
Primary = 0.6 cfs @ 12.48 hrs, Volume= 0.766 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Starting Elev= 578.50' Surf.Area= 1,337 sf Storage= 590 cf
Peak Elev= 582.69' @ 12.48 hrs Surf.Area= 5,168 sf Storage= 13,491 cf (12,901 cf above start)

Plug-Flow detention time= 359.0 min calculated for 0.752 af (98% of inflow)
Center-of-Mass det. time= 338.0 min (1,246.0 - 908.0)

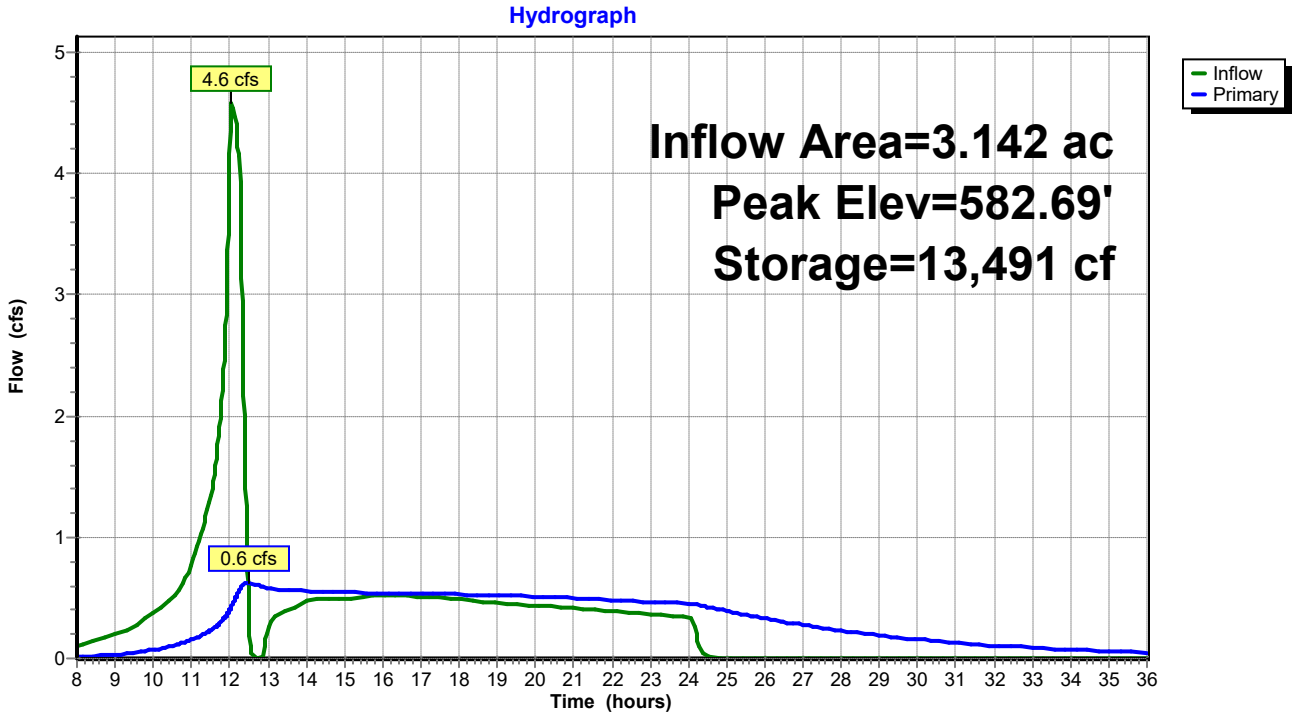
Volume	Invert	Avail.Storage	Storage Description
#1	578.00'	37,725 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
578.00	1,030	148.0	0	0	1,030
580.00	2,500	251.0	3,423	3,423	4,325
582.00	4,386	315.0	6,798	10,221	7,262
584.00	6,847	383.0	11,142	21,363	11,103
586.00	9,592	437.0	16,362	37,725	14,721

Device	Routing	Invert	Outlet Devices
#1	Primary	578.04'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 578.04' / 576.09' S= 0.0390 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	583.14'	**33.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	578.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	578.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 18 rows with 3.0" cc spacing C= 0.600

Primary OutFlow Max=0.6 cfs @ 12.48 hrs HW=582.69' TW=577.57' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.6 cfs of 7.7 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.0 cfs)
  └─**3=Orifice/Grate** (Passes 0.6 cfs of 0.8 cfs potential flow)
    └─**4=Orifice/Grate** (Orifice Controls 0.6 cfs @ 6.71 fps)

Pond SWQB 4A: Exist. SWQB #4A



Stage-Area-Storage for Pond SWQB 4A: Exist. SWQB #4A

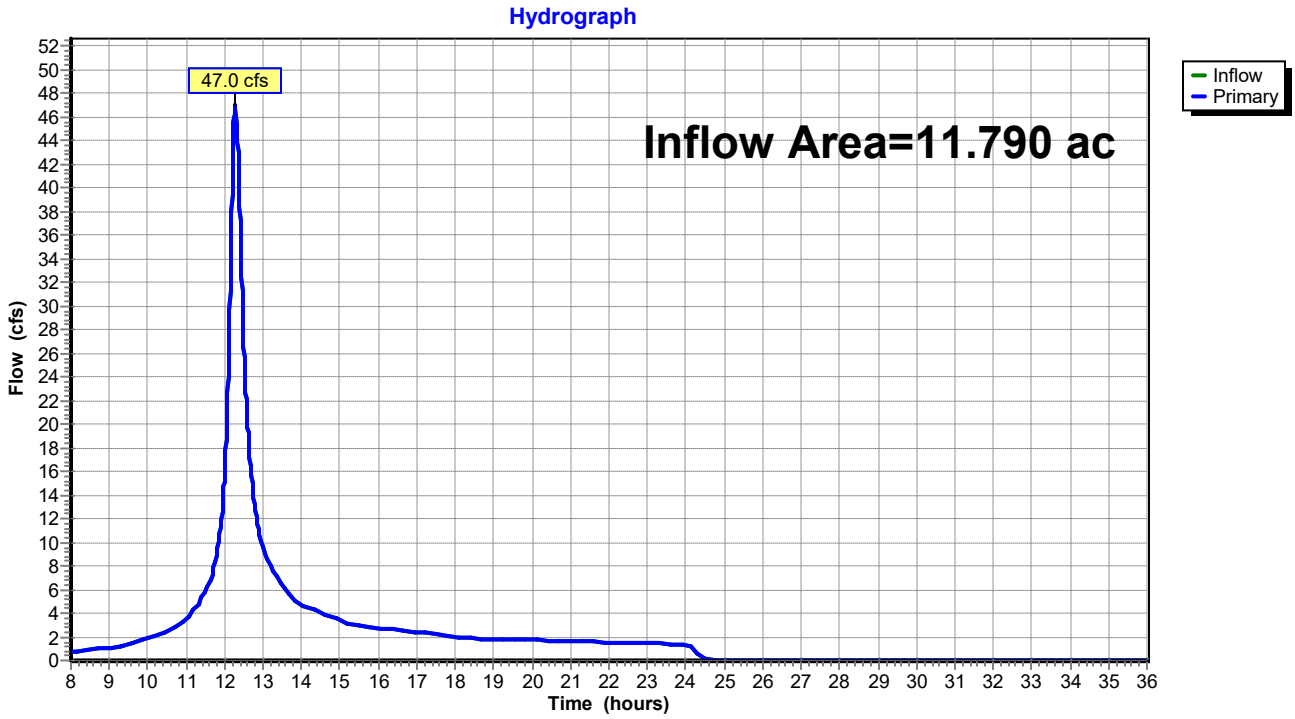
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
578.00	1,030	0
578.10	1,088	106
578.20	1,148	218
578.30	1,210	336
578.40	1,273	460
578.50	1,337	590
578.60	1,404	727
578.70	1,472	871
578.80	1,541	1,022
578.90	1,612	1,179
579.00	1,685	1,344
579.10	1,759	1,516
579.20	1,835	1,696
579.30	1,913	1,883
579.40	1,992	2,079
579.50	2,072	2,282
579.60	2,155	2,493
579.70	2,239	2,713
579.80	2,324	2,941
579.90	2,411	3,178
580.00	2,500	3,423
580.10	2,582	3,677
580.20	2,665	3,940
580.30	2,749	4,210
580.40	2,835	4,489
580.50	2,922	4,777
580.60	3,011	5,074
580.70	3,100	5,379
580.80	3,191	5,694
580.90	3,284	6,018
581.00	3,377	6,351
581.10	3,472	6,693
581.20	3,568	7,045
581.30	3,666	7,407
581.40	3,765	7,778
581.50	3,865	8,160
581.60	3,967	8,552
581.70	4,070	8,953
581.80	4,174	9,365
581.90	4,279	9,788
582.00	4,386	10,221
582.10	4,496	10,665
582.20	4,608	11,121
582.30	4,720	11,587
582.40	4,835	12,065
582.50	4,950	12,554
582.60	5,067	13,055
582.70	5,185	13,567
582.80	5,305	14,092
582.90	5,426	14,628
583.00	5,548	15,177
583.10	5,672	15,738
583.20	5,797	16,312
583.30	5,924	16,898
583.40	6,051	17,496
583.50	6,181	18,108
583.60	6,311	18,732
583.70	6,443	19,370
583.80	6,576	20,021
583.90	6,711	20,685
584.00	6,847	21,363
584.10	6,973	22,054
584.20	7,101	22,758
584.30	7,229	23,475
584.40	7,359	24,204
584.50	7,490	24,946
584.60	7,622	25,702
584.70	7,755	26,471
584.80	7,890	27,253
584.90	8,025	28,049
585.00	8,162	28,858
585.10	8,300	29,681
585.20	8,439	30,518
585.30	8,579	31,369
585.40	8,720	32,234
585.50	8,862	33,113
585.60	9,006	34,006
585.70	9,151	34,914
585.80	9,297	35,837
585.90	9,444	36,774
586.00	**9,592**	**37,725**

Summary for Link DL1: Design Line 1

Inflow Area = 11.790 ac, 20.08% Impervious, Inflow Depth = 5.53" for 100-yr event
Inflow = 47.0 cfs @ 12.27 hrs, Volume= 5.437 af
Primary = 47.0 cfs @ 12.27 hrs, Volume= 5.437 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DL1: Design Line 1

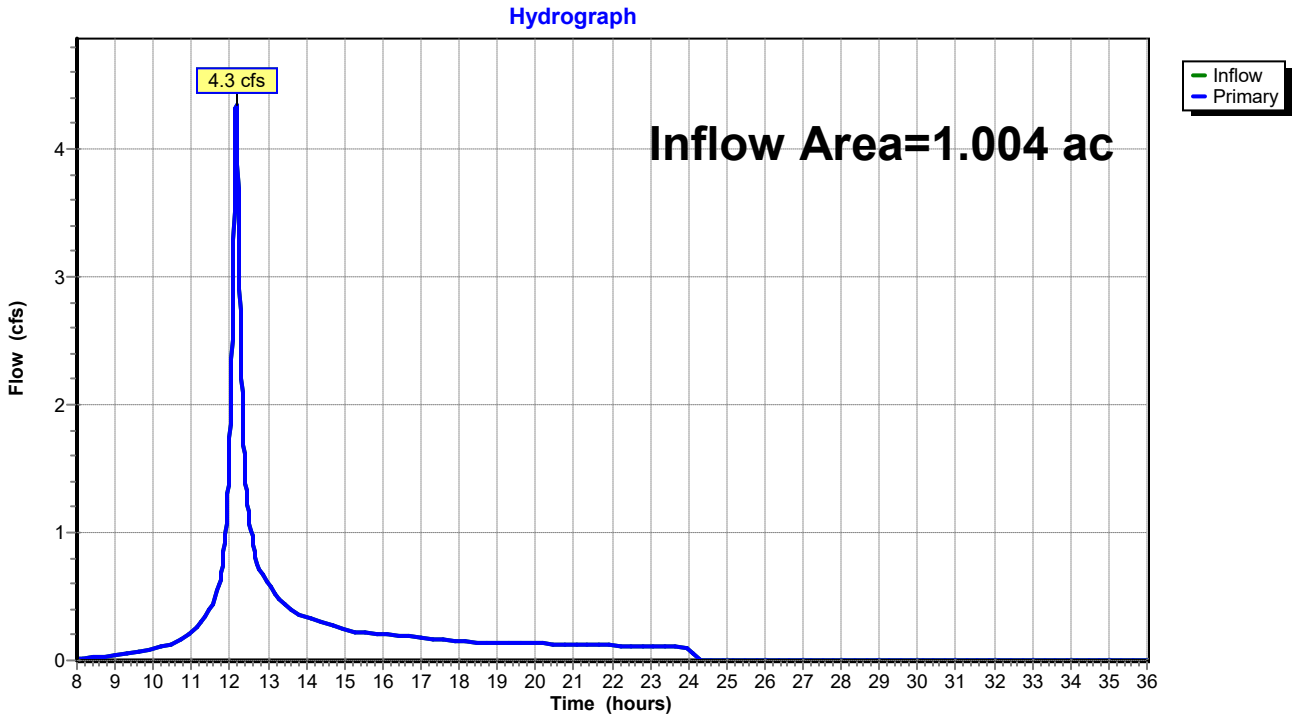


Summary for Link DL2: Design Line 2

Inflow Area = 1.004 ac, 0.00% Impervious, Inflow Depth = 4.44" for 100-yr event
Inflow = 4.3 cfs @ 12.17 hrs, Volume= 0.371 af
Primary = 4.3 cfs @ 12.17 hrs, Volume= 0.371 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DL2: Design Line 2

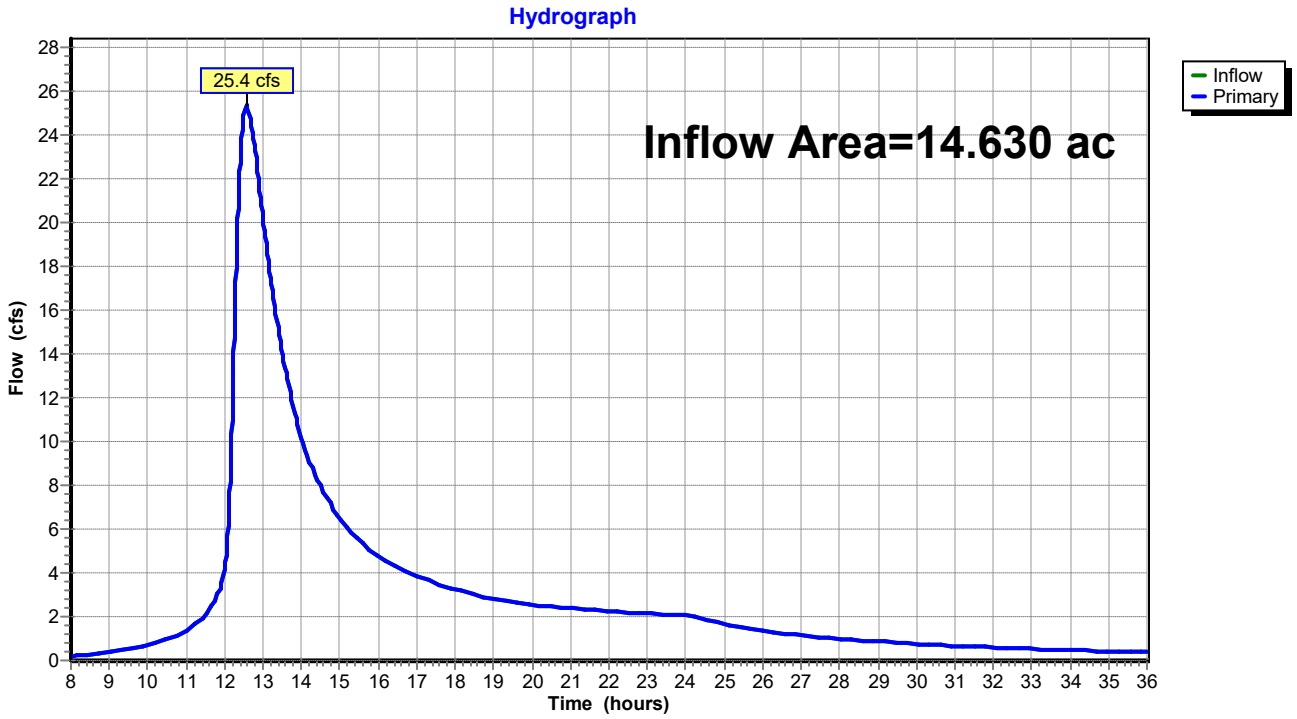


Summary for Link DP1: Design Point #1

Inflow Area = 14.630 ac, 20.83% Impervious, Inflow Depth = 6.00" for 100-yr event
Inflow = 25.4 cfs @ 12.57 hrs, Volume= 7.314 af
Primary = 25.4 cfs @ 12.57 hrs, Volume= 7.314 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DP1: Design Point #1

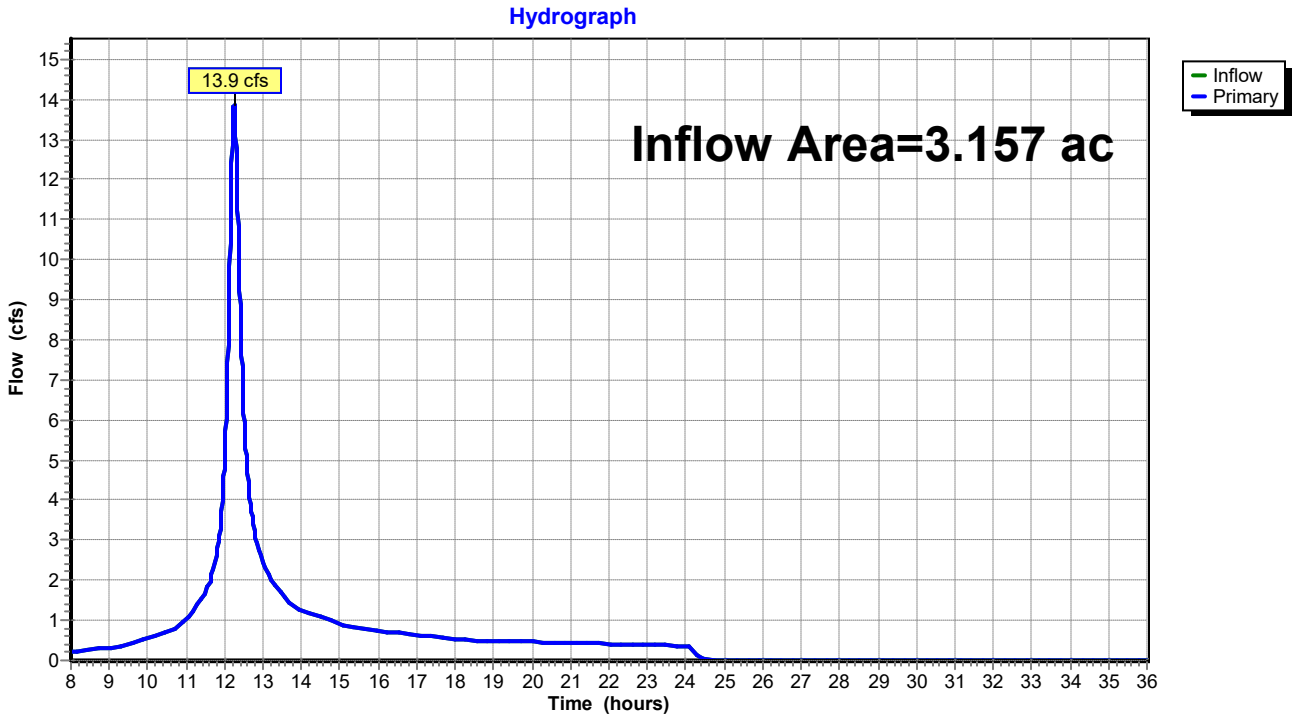


Summary for Link DP2: Design Point 2

Inflow Area = 3.157 ac, 23.24% Impervious, Inflow Depth = 5.66" for 100-yr event
Inflow = 13.9 cfs @ 12.24 hrs, Volume= 1.488 af
Primary = 13.9 cfs @ 12.24 hrs, Volume= 1.488 af, Atten= 0%, Lag= 0.0 min

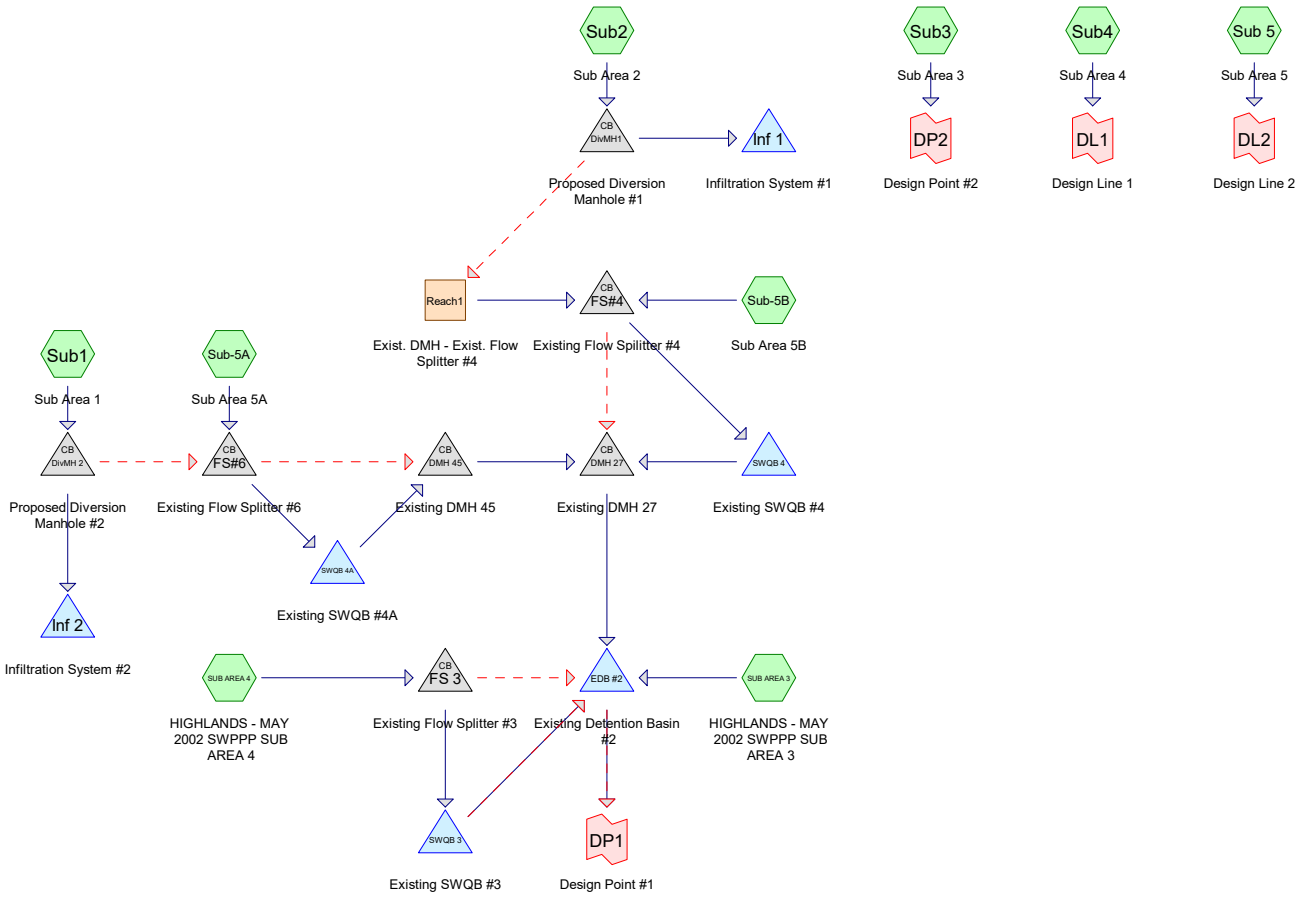
Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

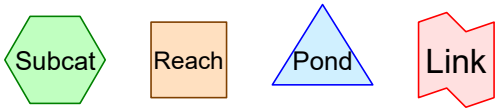
Link DP2: Design Point 2



Appendix C

Post Development Peak Flow Analysis
(HydroCAD Output for 1, 10 & 100-year Storm Events)





Routing Diagram for Post-Dev
Prepared by Bibbo Associates, LLP, Printed 8/30/2018
HydroCAD® 10.00-21 s/n 02226 © 2018 HydroCAD Software Solutions LLC

Summary for Subcatchment Sub 5: Sub Area 5

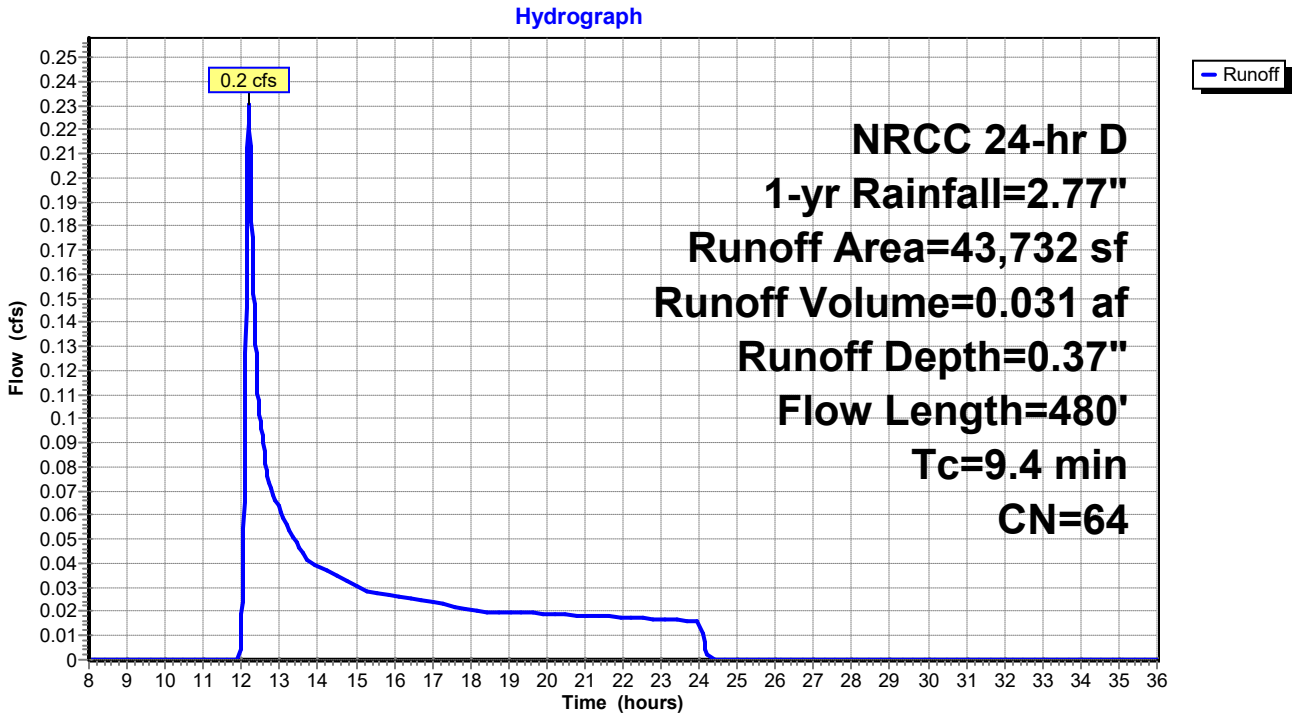
Runoff = 0.2 cfs @ 12.19 hrs, Volume= 0.031 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

Area (sf)	CN	Description
32,017	61	>75% Grass cover, Good, HSG B
6,590	74	>75% Grass cover, Good, HSG C
4,925	73	Woods, Fair, HSG C
200	98	Paved parking, HSG B
43,732	64	Weighted Average
43,532		99.54% Pervious Area
200		0.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	100	0.0550	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.33"
1.7	250	0.1240	2.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	130	0.1150	1.70		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.4	480	Total			

Subcatchment Sub 5: Sub Area 5



Summary for Subcatchment SUB AREA 3: HIGHLANDS - MAY 2002 SWPPP SUB AREA 3

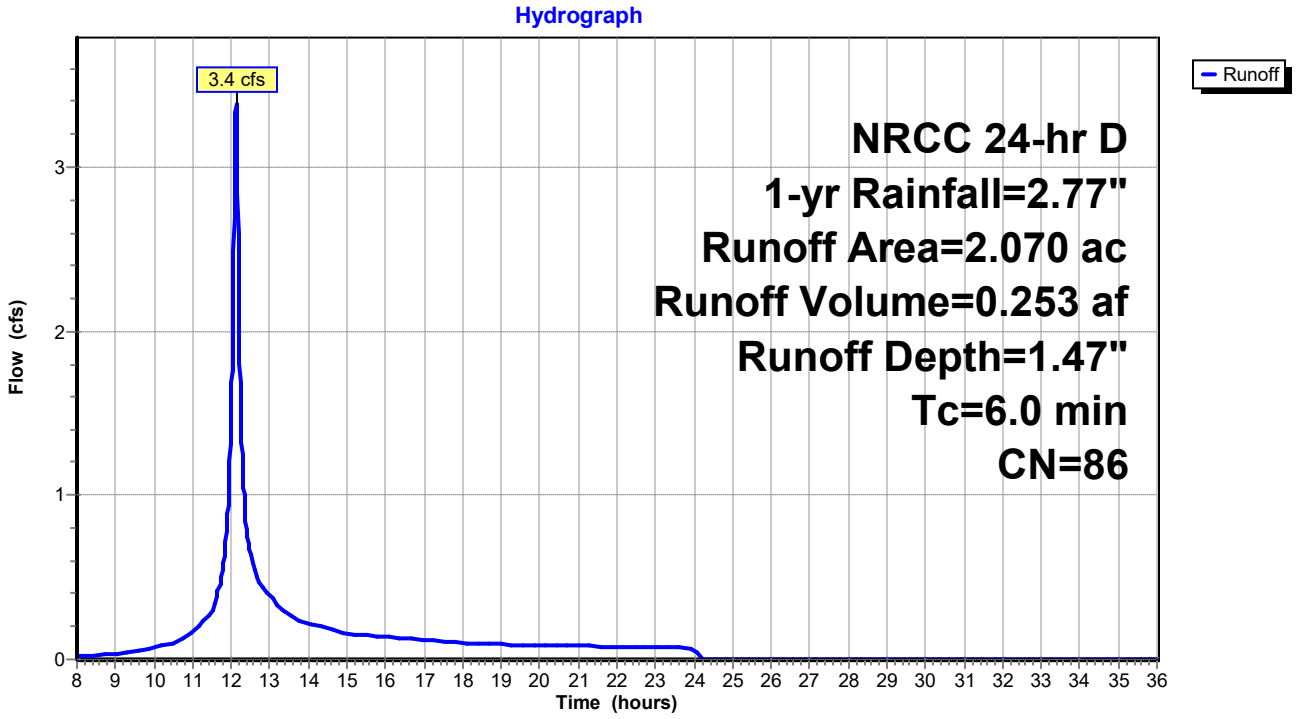
Runoff = 3.4 cfs @ 12.13 hrs, Volume= 0.253 af, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

	Area (ac)	CN	Description
*	2.070	86	
	2.070		100.00% Pervious Area

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

Subcatchment SUB AREA 3: HIGHLANDS - MAY 2002 SWPPP SUB AREA 3



Summary for Subcatchment SUB AREA 4: HIGHLANDS - MAY 2002 SWPPP SUB AREA 4

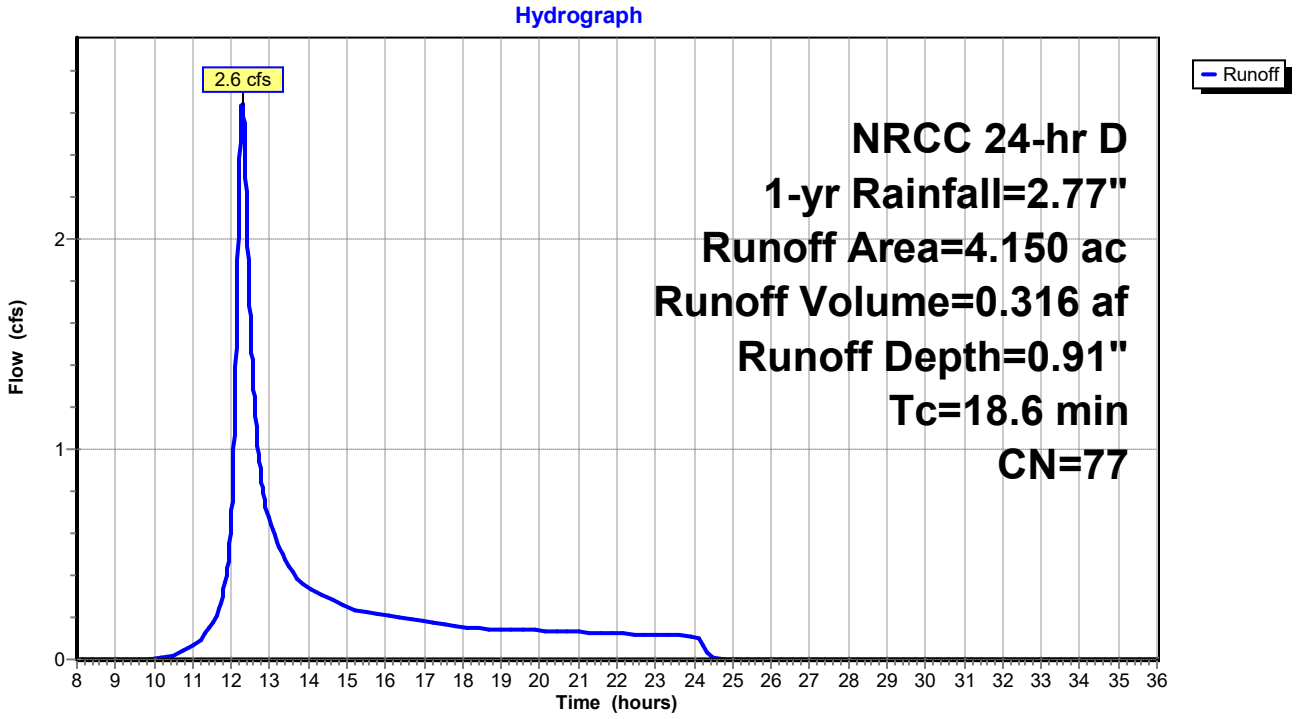
Runoff = 2.6 cfs @ 12.29 hrs, Volume= 0.316 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

	Area (ac)	CN	Description
*	4.150	77	
	4.150		100.00% Pervious Area

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

Subcatchment SUB AREA 4: HIGHLANDS - MAY 2002 SWPPP SUB AREA 4



Summary for Subcatchment Sub-5A: Sub Area 5A

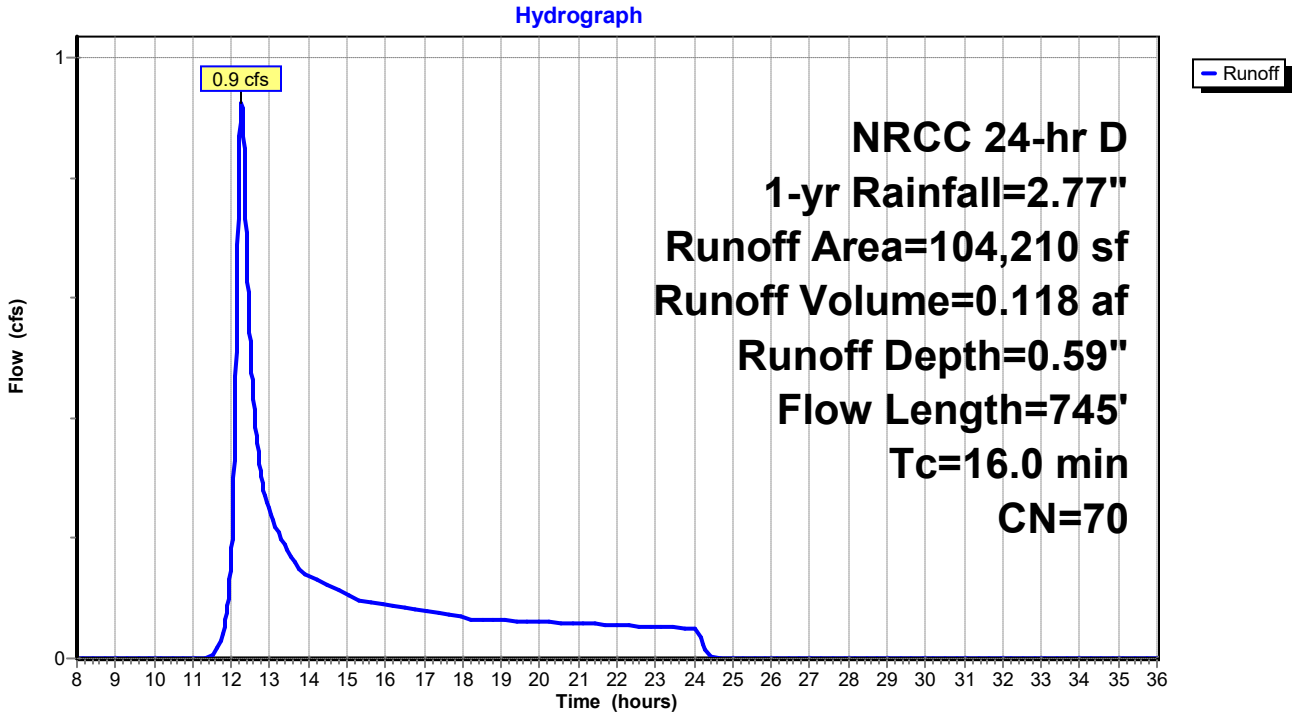
Runoff = 0.9 cfs @ 12.27 hrs, Volume= 0.118 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

Area (sf)	CN	Description
32,866	98	Paved parking & roofs
35,215	65	Brush, Good, HSG C
36,129	48	Brush, Good, HSG B
104,210	70	Weighted Average
71,344		68.46% Pervious Area
32,866		31.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0550	0.13		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
1.5	130	0.0880	1.48		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	165	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	88	0.0342	3.75		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	262	0.0119	5.74	7.05	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.0	745	Total			

Subcatchment Sub-5A: Sub Area 5A



Summary for Subcatchment Sub-5B: Sub Area 5B

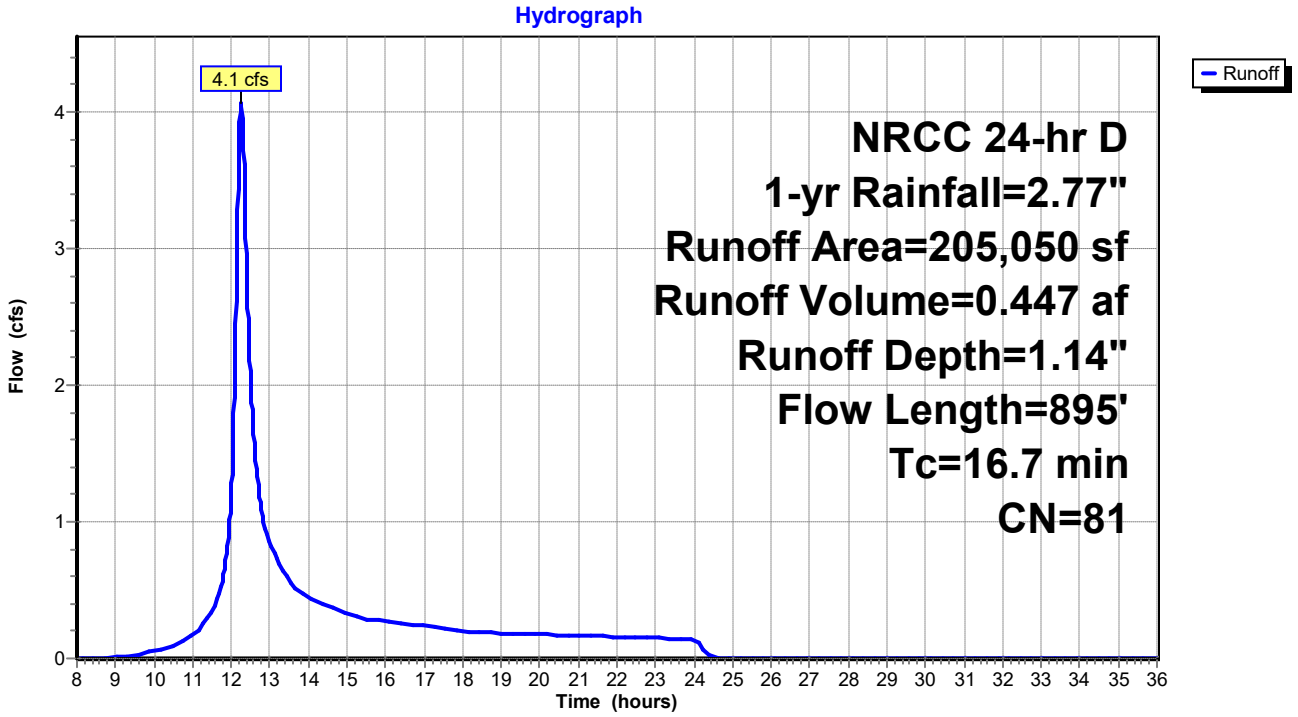
Runoff = 4.1 cfs @ 12.26 hrs, Volume= 0.447 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

Area (sf)	CN	Description
98,809	98	Paved parking, HSG C
17,148	74	>75% Grass cover, Good, HSG C
26,843	71	Meadow, non-grazed, HSG C
47,007	65	Brush, Good, HSG C
15,243	48	Brush, Good, HSG B
205,050	81	Weighted Average
106,241		51.81% Pervious Area
98,809		48.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.1100	0.13		**Sheet Flow, Brush** n= 0.500 P2= 3.33"
0.7	90	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	77	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	628	0.1090	17.38	21.33	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.7	895	Total			

Subcatchment Sub-5B: Sub Area 5B



Summary for Subcatchment Sub1: Sub Area 1

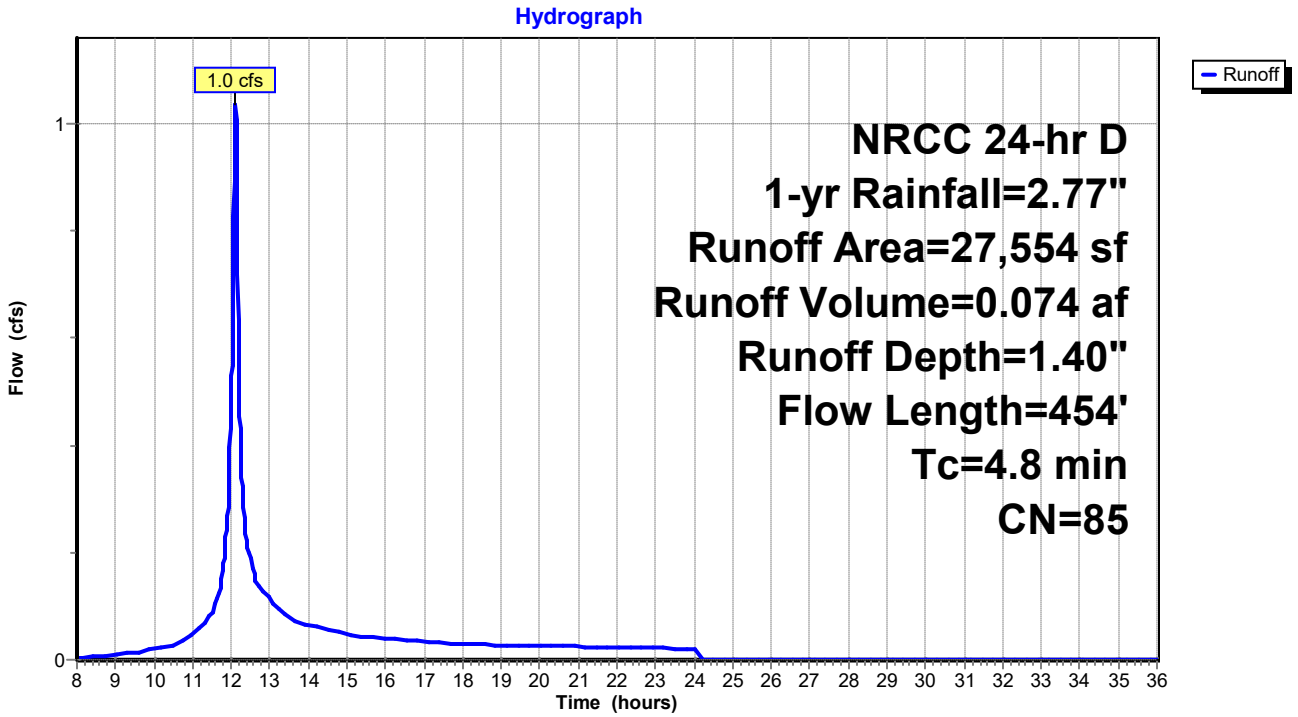
Runoff = 1.0 cfs @ 12.12 hrs, Volume= 0.074 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

Area (sf)	CN	Description
17,984	98	Paved parking & roofs
8,870	61	>75% Grass cover, Good, HSG B
700	48	Brush, Good, HSG B
27,554	85	Weighted Average
9,570		34.73% Pervious Area
17,984		65.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	82	0.1230	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.33"
0.4	102	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	270	0.0450	11.17	13.70	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
4.8	454	Total			

Subcatchment Sub1: Sub Area 1



Summary for Subcatchment Sub2: Sub Area 2

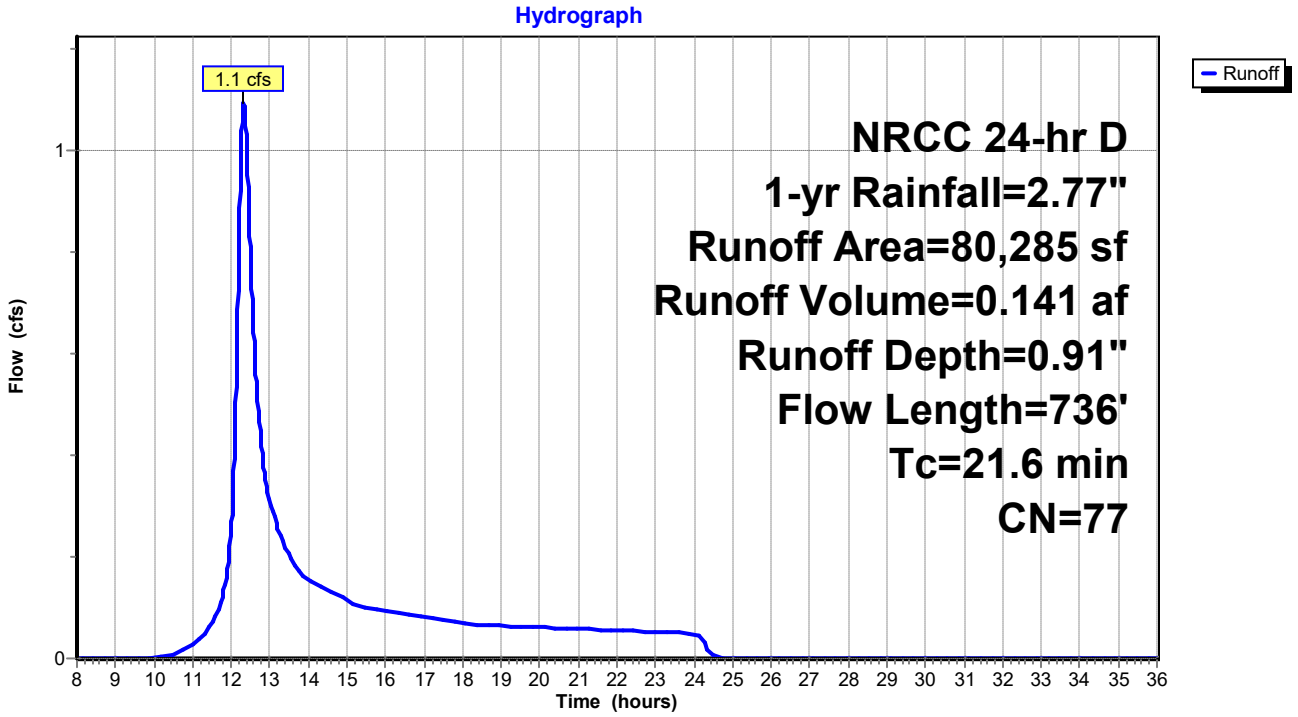
Runoff = 1.1 cfs @ 12.32 hrs, Volume= 0.141 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

Area (sf)	CN	Description
24,635	98	Paved parking, HSG B
15,380	74	>75% Grass cover, Good, HSG C
2,350	61	>75% Grass cover, Good, HSG B
37,260	65	Brush, Good, HSG C
660	48	Brush, Good, HSG B
80,285	77	Weighted Average
55,650		69.32% Pervious Area
24,635		30.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.0	100	0.0400	0.10		**Sheet Flow, Brush** Woods: Light underbrush n= 0.400 P2= 3.33"
4.7	340	0.0590	1.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	17	0.1760	2.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	106	0.0660	5.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.5	173	0.0107	5.45	6.68	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
21.6	736	Total			

Subcatchment Sub2: Sub Area 2



Summary for Subcatchment Sub3: Sub Area 3

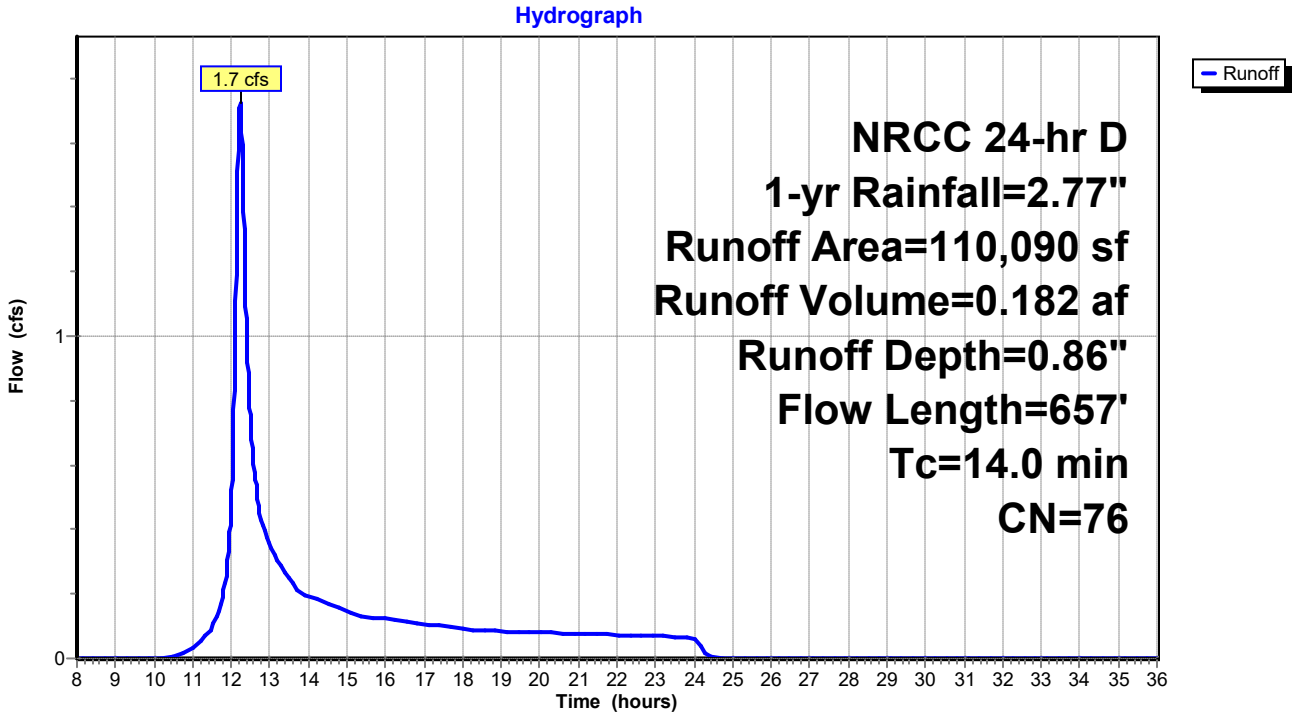
Runoff = 1.7 cfs @ 12.23 hrs, Volume= 0.182 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

Area (sf)	CN	Description
31,115	98	Paved parking, HSG C
4,730	89	Gravel roads, HSG C
11,825	74	>75% Grass cover, Good, HSG C
62,420	65	Brush, Good, HSG C
110,090	76	Weighted Average
78,975		71.74% Pervious Area
31,115		28.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	100	0.0600	0.14		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
1.4	157	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	100	0.0860	15.44	18.94	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
0.3	300	0.0710	15.19	18.65	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
14.0	657	Total			

Subcatchment Sub3: Sub Area 3



Summary for Subcatchment Sub4: Sub Area 4

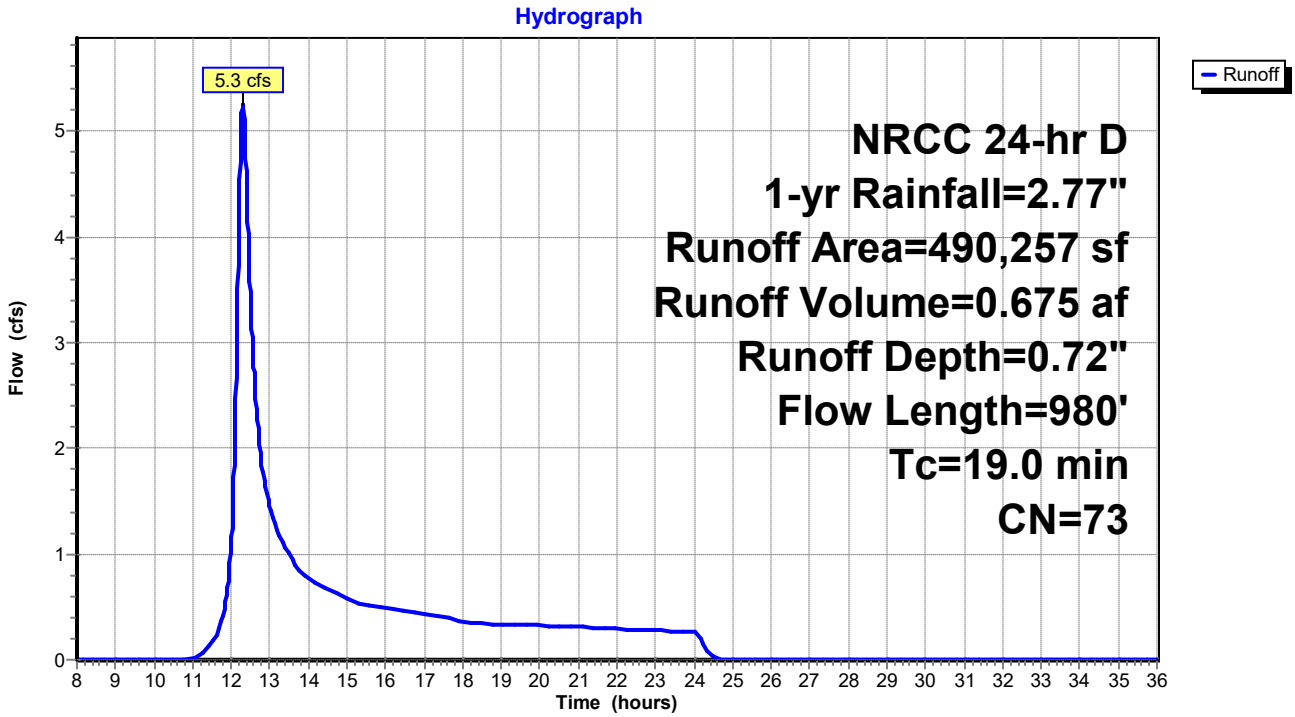
Runoff = 5.3 cfs @ 12.30 hrs, Volume= 0.675 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 1-yr Rainfall=2.77"

Area (sf)	CN	Description
92,030	98	Paved parking, HSG B
11,640	98	Roofs, HSG B
52,050	61	>75% Grass cover, Good, HSG B
39,270	79	Woods, Fair, HSG D
144,065	73	Woods, Fair, HSG C
151,202	60	Woods, Fair, HSG B
490,257	73	Weighted Average
386,587		78.85% Pervious Area
103,670		21.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0750	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.33"
6.6	880	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	980	Total			

Subcatchment Sub4: Sub Area 4



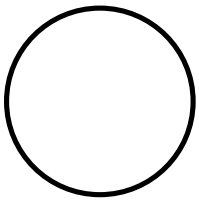
Summary for Reach Reach1: Exist. DMH - Exist. Flow Splitter #4

Inflow	=	0.0 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow	=	0.0 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

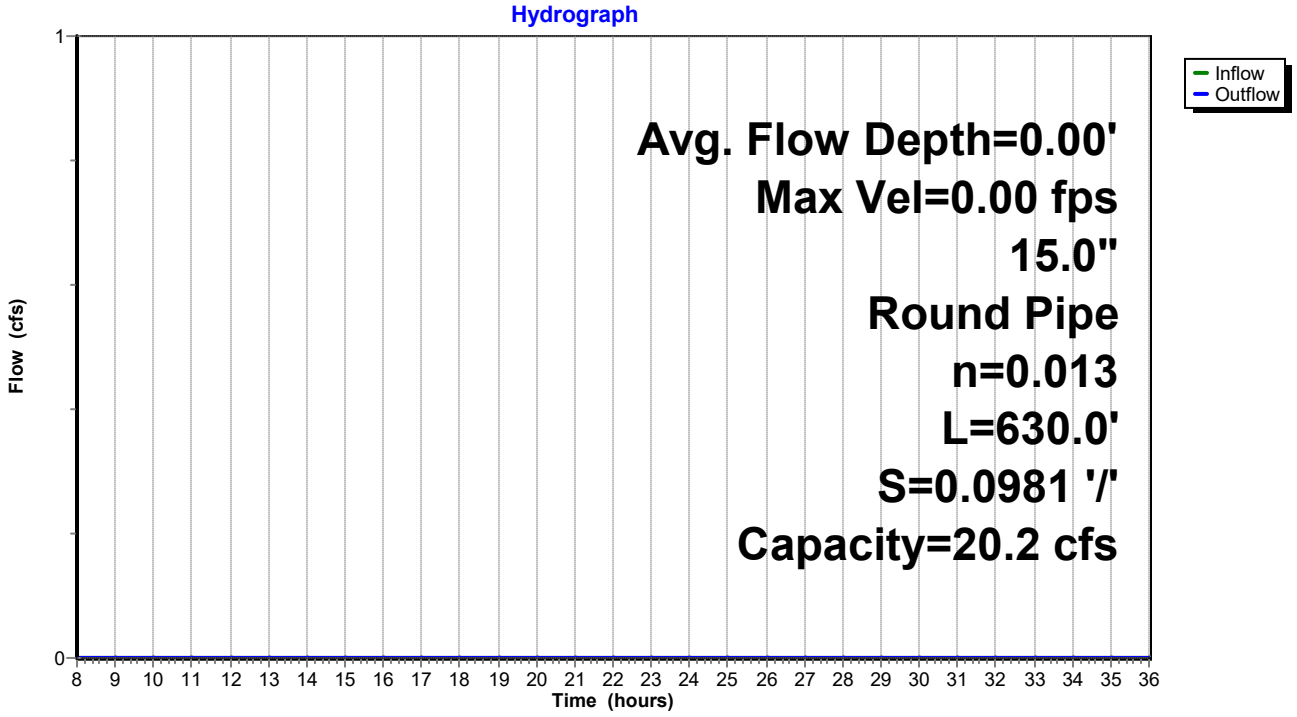
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 20.2 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 630.0' Slope= 0.0981 '/'
Inlet Invert= 623.27', Outlet Invert= 561.45'



Reach Reach1: Exist. DMH - Exist. Flow Splitter #4



Stage-Area-Storage for Reach Reach1: Exist. DMH - Exist. Flow Splitter #4

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
623.27	0.0	0
623.37	0.0	29
623.47	0.1	80
623.57	0.2	143
623.67	0.3	213
623.77	0.5	289
623.87	0.6	367
623.97	0.7	445
624.07	0.8	523
624.17	0.9	596
624.27	1.1	663
624.37	1.1	721
624.47	**1.2**	**763**

Summary for Pond DivMH 2: Proposed Diversion Manhole #2

Inflow Area =	0.633 ac, 65.27% Impervious, Inflow Depth = 1.40" for 1-yr event			
Inflow =	1.0 cfs @ 12.12 hrs, Volume=	0.074 af		
Outflow =	1.0 cfs @ 12.12 hrs, Volume=	0.074 af, Atten= 0%, Lag= 0.0 min		
Primary =	1.0 cfs @ 12.12 hrs, Volume=	0.074 af		
Secondary =	0.0 cfs @ 0.00 hrs, Volume=	0.000 af		

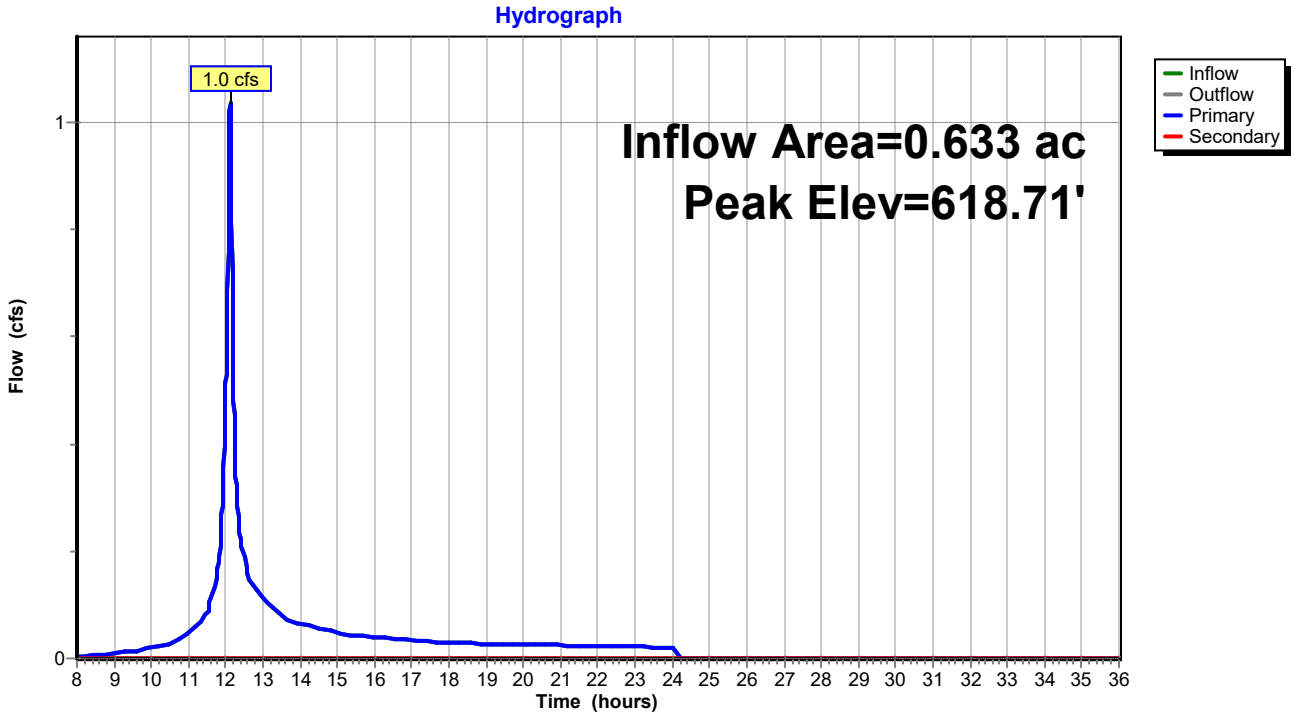
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 618.71' @ 12.12 hrs
Flood Elev= 620.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	618.00'	**8.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 618.00' / 617.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Secondary	618.00'	**15.0" Round Culvert** L= 439.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 618.00' / 582.22' S= 0.0815 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	620.20'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.0 cfs @ 12.12 hrs HW=618.71' TW=617.76' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.0 cfs @ 2.96 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=618.00' TW=580.30' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.0 cfs)
  └─**3=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond DivMH 2: Proposed Diversion Manhole #2



Stage-Area-Storage for Pond DivMH 2: Proposed Diversion Manhole #2

Elevation (feet)	Storage (cubic-feet)
618.00	**0**
618.10	0
618.20	0
618.30	0
618.40	0
618.50	0
618.60	0
618.70	0
618.80	0
618.90	0
619.00	0
619.10	0
619.20	0
619.30	0
619.40	0
619.50	0
619.60	0
619.70	0
619.80	0
619.90	0
620.00	0
620.10	0
620.20	0
620.30	0
620.40	0
620.50	0

Summary for Pond DivMH1: Proposed Diversion Manhole #1

Inflow Area =	1.843 ac, 30.68% Impervious, Inflow Depth = 0.91" for 1-yr event			
Inflow =	1.1 cfs @ 12.32 hrs, Volume=	0.141 af		
Outflow =	1.1 cfs @ 12.32 hrs, Volume=	0.141 af, Atten= 0%, Lag= 0.0 min		
Primary =	1.1 cfs @ 12.32 hrs, Volume=	0.141 af		
Secondary =	0.0 cfs @ 0.00 hrs, Volume=	0.000 af		

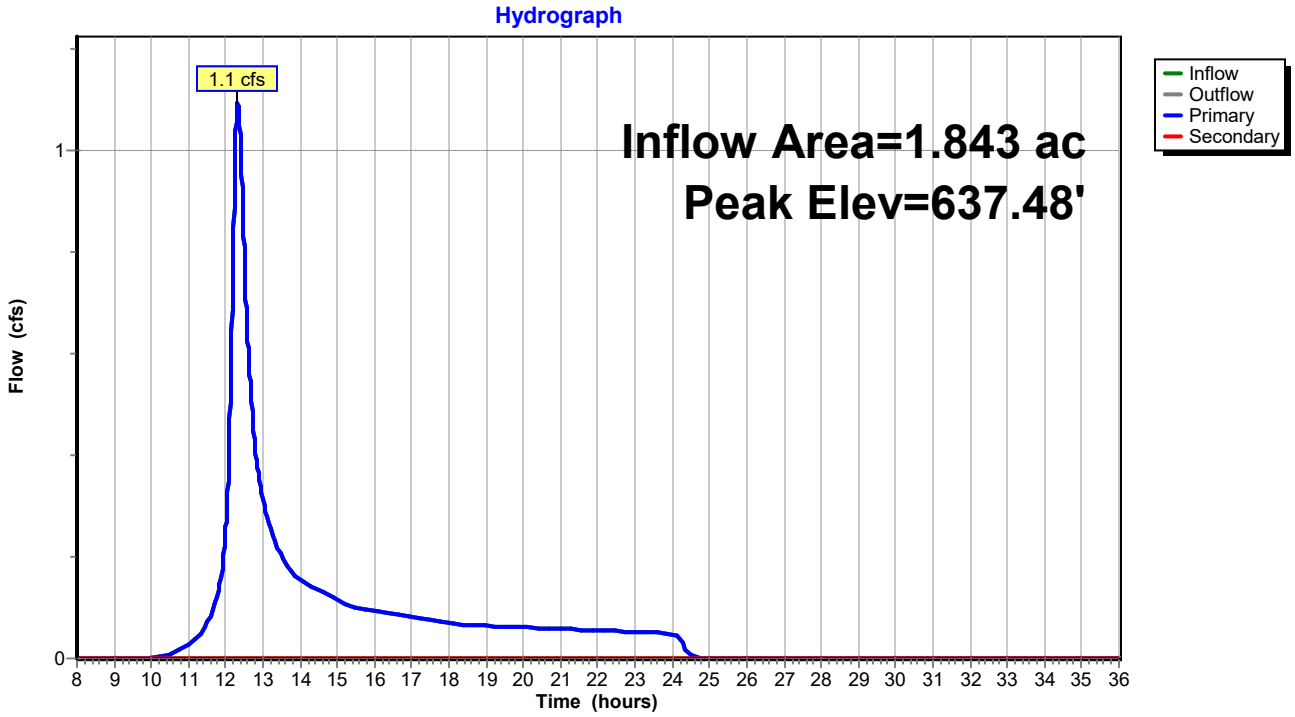
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 637.48' @ 12.32 hrs
Flood Elev= 639.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	635.80'	**6.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 635.80' / 635.50' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Secondary	635.80'	**15.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 635.80' / 633.50' S= 0.0460 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	638.20'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.1 cfs @ 12.32 hrs HW=637.48' TW=635.59' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1.1 cfs @ 5.56 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=635.80' TW=623.27' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.0 cfs)
  └─**3=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond DivMH1: Proposed Diversion Manhole #1



Stage-Area-Storage for Pond DivMH1: Proposed Diversion Manhole #1

Elevation (feet)	Storage (cubic-feet)
635.80	**0**
635.90	0
636.00	0
636.10	0
636.20	0
636.30	0
636.40	0
636.50	0
636.60	0
636.70	0
636.80	0
636.90	0
637.00	0
637.10	0
637.20	0
637.30	0
637.40	0
637.50	0
637.60	0
637.70	0
637.80	0
637.90	0
638.00	0
638.10	0
638.20	0
638.30	0
638.40	0
638.50	0
638.60	0
638.70	0
638.80	0
638.90	0
639.00	0

Summary for Pond DMH 27: Existing DMH 27

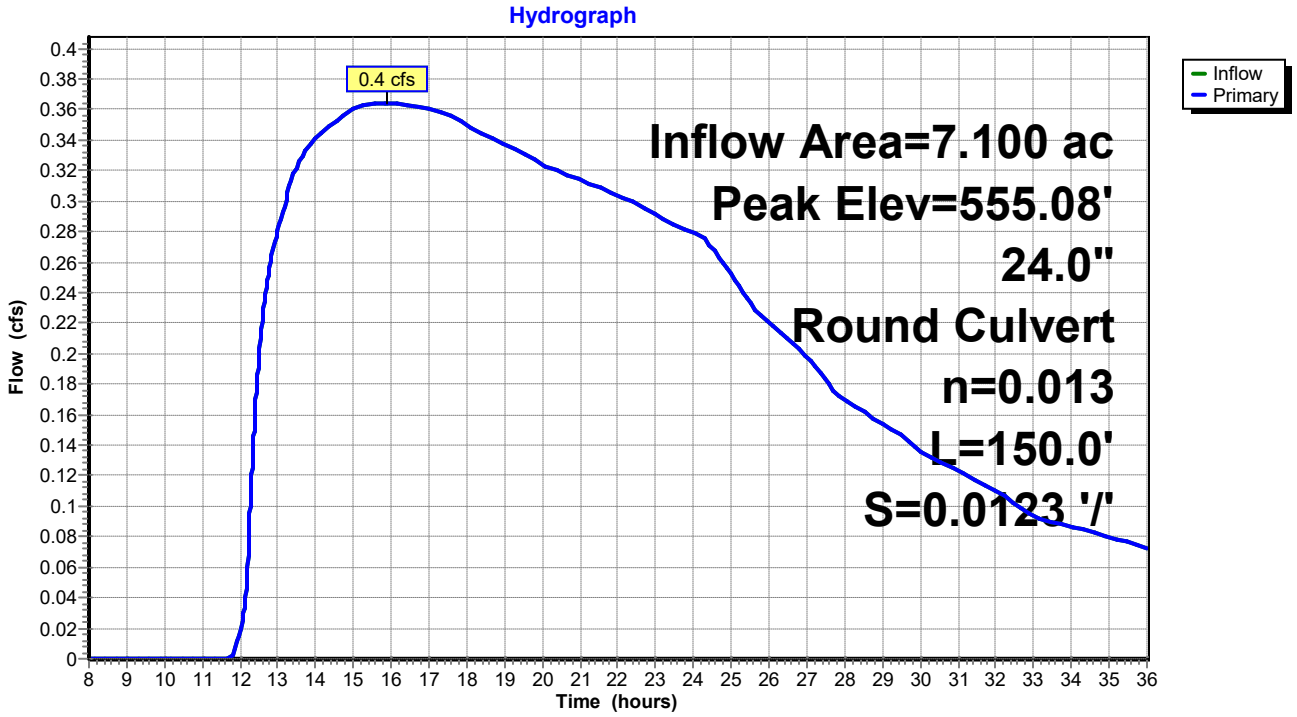
Inflow Area =	7.100 ac, 42.58% Impervious, Inflow Depth > 0.90" for 1-yr event				
Inflow =	0.4 cfs @	15.89 hrs,	Volume=	0.532 af	
Outflow =	0.4 cfs @	15.89 hrs,	Volume=	0.532 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.4 cfs @	15.89 hrs,	Volume=	0.532 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 555.08' @ 15.89 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	554.84'	**24.0" Round Culvert** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 554.84' / 553.00' S= 0.0123 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.4 cfs @ 15.89 hrs HW=555.08' TW=551.57' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.4 cfs @ 1.68 fps)

Pond DMH 27: Existing DMH 27



Stage-Area-Storage for Pond DMH 27: Existing DMH 27

Elevation (feet)	Storage (cubic-feet)
554.84	**0**
554.94	0
555.04	0
555.14	0
555.24	0
555.34	0
555.44	0
555.54	0
555.64	0
555.74	0
555.84	0
555.94	0
556.04	0
556.14	0
556.24	0
556.34	0
556.44	0
556.54	0
556.64	0
556.74	0
556.84	0

Summary for Pond DMH 45: Existing DMH 45

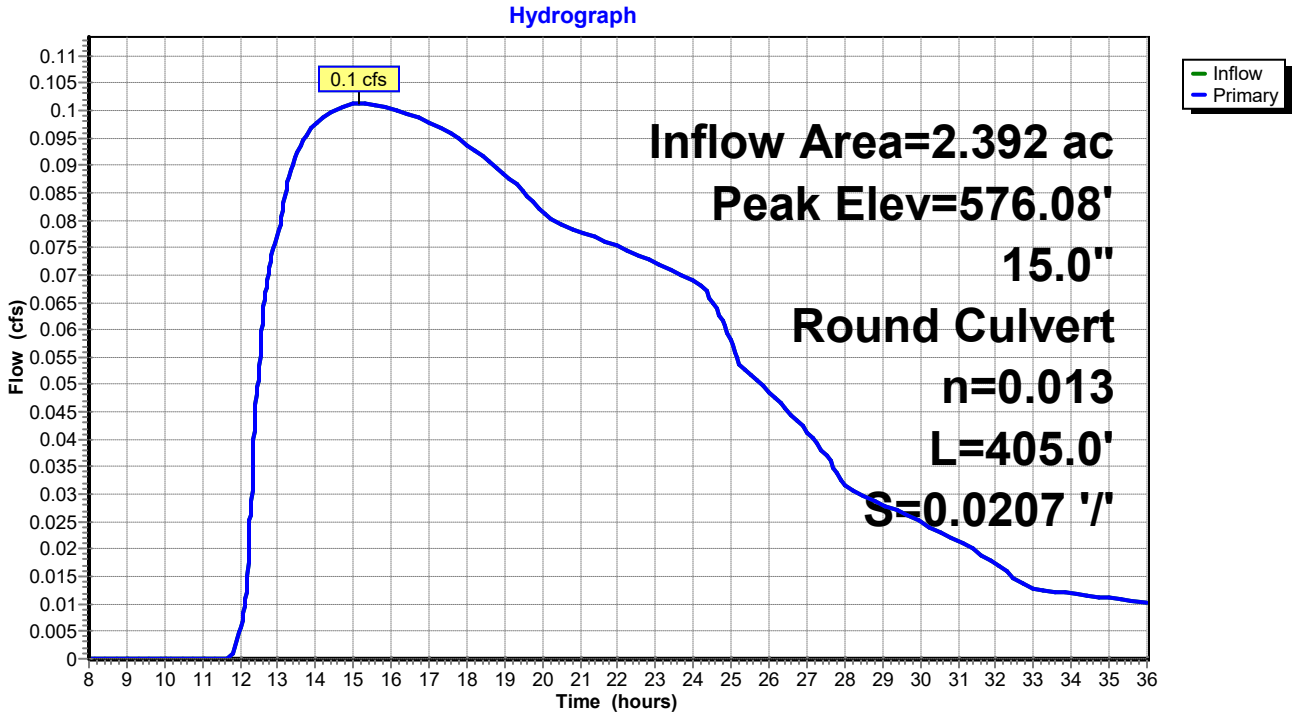
Inflow Area =	2.392 ac, 31.54% Impervious, Inflow Depth = 0.59" for 1-yr event				
Inflow =	0.1 cfs @	15.14 hrs,	Volume=	0.118 af	
Outflow =	0.1 cfs @	15.14 hrs,	Volume=	0.118 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.1 cfs @	15.14 hrs,	Volume=	0.118 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 576.08' @ 15.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	575.94'	**15.0" Round Culvert** L= 405.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 575.94' / 567.57' S= 0.0207 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.1 cfs @ 15.14 hrs HW=576.08' TW=555.08' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.1 cfs @ 1.29 fps)

Pond DMH 45: Existing DMH 45



Stage-Area-Storage for Pond DMH 45: Existing DMH 45

Elevation (feet)	Storage (cubic-feet)
575.94	**0**
576.04	0
576.14	0
576.24	0
576.34	0
576.44	0
576.54	0
576.64	0
576.74	0
576.84	0
576.94	0
577.04	0
577.14	0

Summary for Pond EDB #2: Existing Detention Basin #2

Inflow Area = 13.320 ac, 22.69% Impervious, Inflow Depth = 0.99" for 1-yr event
Inflow = 5.0 cfs @ 12.15 hrs, Volume= 1.101 af
Outflow = 0.9 cfs @ 13.82 hrs, Volume= 1.098 af, Atten= 81%, Lag= 100.2 min
Primary = 0.9 cfs @ 13.82 hrs, Volume= 1.098 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Starting Elev= 551.00' Surf.Area= 17,383 sf Storage= 61,331 cf
Peak Elev= 551.61' @ 13.82 hrs Surf.Area= 19,049 sf Storage= 72,360 cf (11,029 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 276.5 min (1,455.2 - 1,178.7)

Volume	Invert	Avail.Storage	Storage Description
#1	546.00'	237,385 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

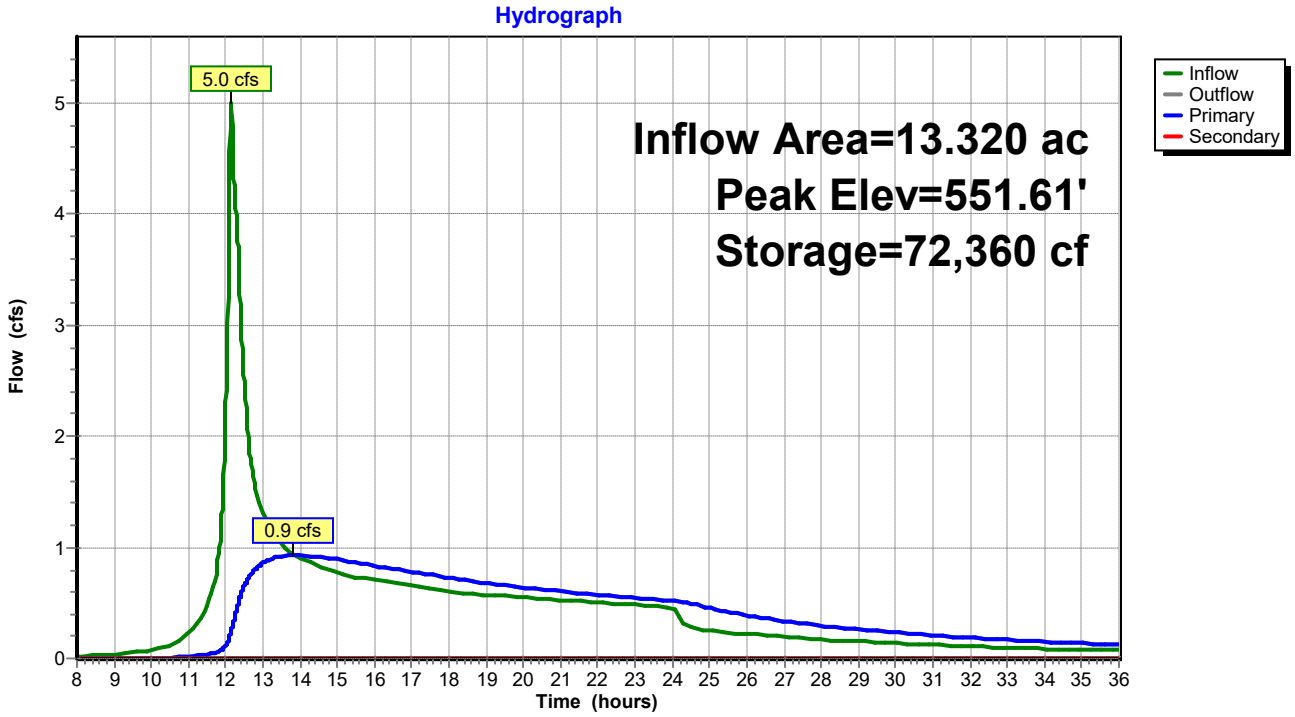
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
546.00	8,325	0	0
548.00	11,185	19,510	19,510
550.00	14,630	25,815	45,325
552.00	20,135	34,765	80,090
554.00	24,105	44,240	124,330
556.00	28,250	52,355	176,685
558.00	32,450	60,700	237,385

Device	Routing	Invert	Outlet Devices
#1	Primary	550.50'	**24.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 550.50' / 549.60' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	551.00'	**20.0 deg x 0.5' long x 4.50' rise Sharp-Crested Vee/Trap Weir** Cv= 2.69 (C= 3.36)
#3	Secondary	555.50'	**30.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.9 cfs @ 13.82 hrs HW=551.61' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.9 cfs of 6.4 cfs potential flow)
└─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.9 cfs @ 2.52 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=551.00' TW=0.00' (Dynamic Tailwater)
└─**3=Orifice/Grate** (Controls 0.0 cfs)

Pond EDB #2: Existing Detention Basin #2



Stage-Area-Storage for Pond EDB #2: Existing Detention Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
546.00	8,325	0	550.68	16,502	55,910
546.09	8,454	755	550.77	16,749	57,406
546.18	8,582	1,522	550.86	16,997	58,925
546.27	8,711	2,300	550.95	17,245	60,466
546.36	8,840	3,090	551.04	17,493	62,029
546.45	8,969	3,891	551.13	17,740	63,614
546.54	9,097	4,704	551.22	17,988	65,222
546.63	9,226	5,529	551.31	18,236	66,852
546.72	9,355	6,365	551.40	18,483	68,504
546.81	9,483	7,212	551.49	18,731	70,179
546.90	9,612	8,072	551.58	18,979	71,876
546.99	9,741	8,943	551.67	19,227	73,595
547.08	9,869	9,825	551.76	19,474	75,337
547.17	9,998	10,719	551.85	19,722	77,101
547.26	10,127	11,625	551.94	19,970	78,887
547.35	10,256	12,542	552.03	20,195	80,695
547.44	10,384	13,471	552.12	20,373	82,520
547.53	10,513	14,411	552.21	20,552	84,362
547.62	10,642	15,363	552.30	20,730	86,220
547.71	10,770	16,326	552.39	20,909	88,094
547.80	10,899	17,302	552.48	21,088	89,983
547.89	11,028	18,288	552.57	21,266	91,889
547.98	11,156	19,287	552.66	21,445	93,811
548.07	11,306	20,297	552.75	21,624	95,750
548.16	11,461	21,322	552.84	21,802	97,704
548.25	11,616	22,360	552.93	21,981	99,674
548.34	11,771	23,412	553.02	22,160	101,660
548.43	11,926	24,479	553.11	22,338	103,663
548.52	12,081	25,559	553.20	22,517	105,681
548.61	12,236	26,653	553.29	22,696	107,716
548.70	12,391	27,762	553.38	22,874	109,766
548.79	12,546	28,884	553.47	23,053	111,833
548.88	12,701	30,020	553.56	23,232	113,916
548.97	12,856	31,170	553.65	23,410	116,015
549.06	13,011	32,334	553.74	23,589	118,130
549.15	13,166	33,512	553.83	23,768	120,261
549.24	13,321	34,704	553.92	23,946	122,408
549.33	13,476	35,910	554.01	24,126	124,571
549.42	13,631	37,129	554.10	24,312	126,751
549.51	13,786	38,363	554.19	24,499	128,947
549.60	13,941	39,611	554.28	24,685	131,161
549.69	14,096	40,872	554.37	24,872	133,391
549.78	14,251	42,148	554.46	25,058	135,638
549.87	14,406	43,438	554.55	25,245	137,901
549.96	14,561	44,741	554.64	25,431	140,182
550.05	14,768	46,060	554.73	25,618	142,479
550.14	15,015	47,400	554.82	25,804	144,793
550.23	15,263	48,763	554.91	25,991	147,124
550.32	15,511	50,148	555.00	26,178	149,471
550.41	15,759	51,555	555.09	26,364	151,836
550.50	16,006	52,984	555.18	26,551	154,217
550.59	16,254	54,436	555.27	26,737	156,615

Stage-Area-Storage for Pond EDB #2: Existing Detention Basin #2 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
555.36	26,924	159,029
555.45	27,110	161,461
555.54	27,297	163,909
555.63	27,483	166,374
555.72	27,670	168,856
555.81	27,856	171,355
555.90	28,043	173,870
555.99	28,229	176,403
556.08	28,418	178,952
556.17	28,607	181,518
556.26	28,796	184,101
556.35	28,985	186,701
556.44	29,174	189,318
556.53	29,363	191,952
556.62	29,552	194,604
556.71	29,741	197,272
556.80	29,930	199,957
556.89	30,119	202,659
556.98	30,308	205,378
557.07	30,497	208,115
557.16	30,686	210,868
557.25	30,875	213,638
557.34	31,064	216,425
557.43	31,253	219,230
557.52	31,442	222,051
557.61	31,631	224,889
557.70	31,820	227,745
557.79	32,009	230,617
557.88	32,198	233,506
557.97	**32,387**	**236,412**

Summary for Pond FS 3: Existing Flow Splitter #3

Inflow Area =	4.150 ac,	0.00% Impervious,	Inflow Depth =	0.91"	for 1-yr event
Inflow =	2.6 cfs @	12.29 hrs,	Volume=	0.316 af	
Outflow =	2.6 cfs @	12.29 hrs,	Volume=	0.316 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.0 cfs @	0.00 hrs,	Volume=	0.000 af	
Secondary =	2.6 cfs @	12.29 hrs,	Volume=	0.316 af	

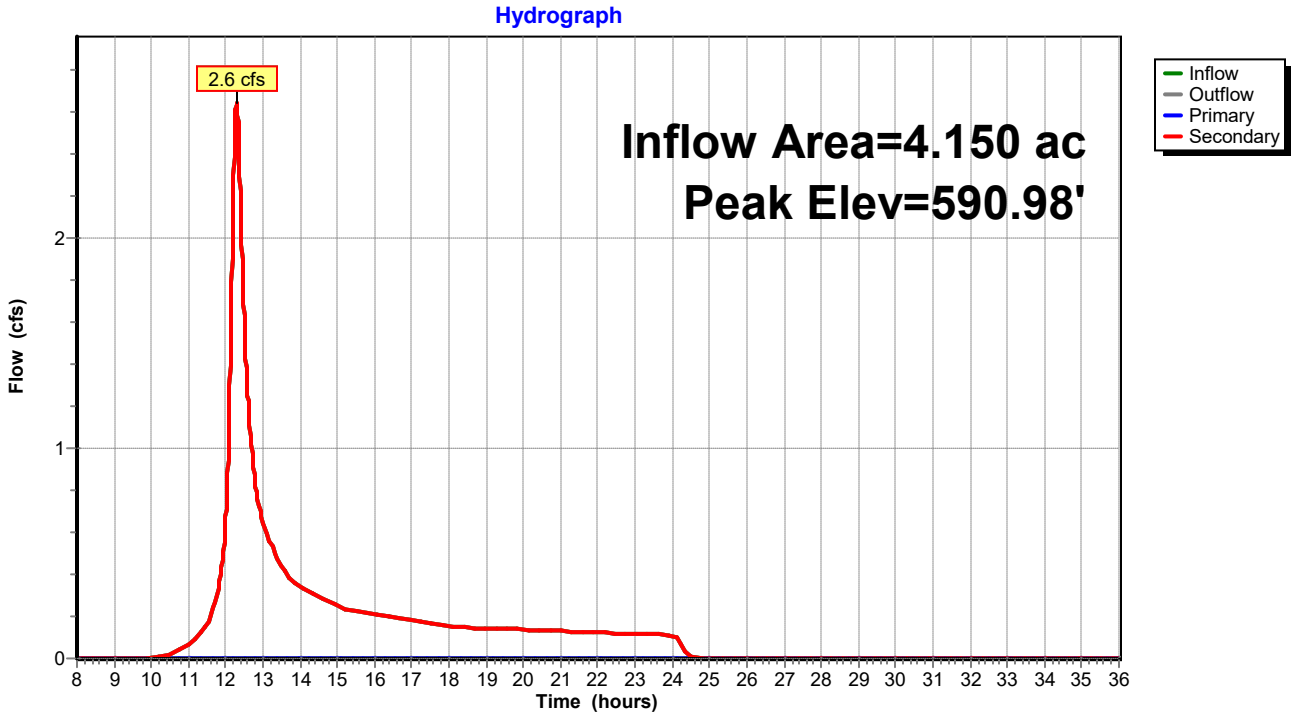
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 590.98' @ 12.29 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	591.20'	**15.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 591.20' / 591.00' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	593.60'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Secondary	590.30'	**24.0" Round Culvert** L= 320.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 590.30' / 552.00' S= 0.1197 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.30' TW=590.00' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.0 cfs)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Secondary OutFlow Max=2.6 cfs @ 12.29 hrs HW=590.98' TW=551.38' (Dynamic Tailwater)
└─**3=Culvert** (Inlet Controls 2.6 cfs @ 2.81 fps)

Pond FS 3: Existing Flow Splitter #3



Stage-Area-Storage for Pond FS 3: Existing Flow Splitter #3

Elevation (feet)	Storage (cubic-feet)
590.30	**0**
590.40	0
590.50	0
590.60	0
590.70	0
590.80	0
590.90	0
591.00	0
591.10	0
591.20	0
591.30	0
591.40	0
591.50	0
591.60	0
591.70	0
591.80	0
591.90	0
592.00	0
592.10	0
592.20	0
592.30	0
592.40	0
592.50	0
592.60	0
592.70	0
592.80	0
592.90	0
593.00	0
593.10	0
593.20	0
593.30	0
593.40	0
593.50	0
593.60	0

Summary for Pond FS#4: Existing Flow Spilitter #4

Inflow Area =	4.707 ac, 48.19% Impervious, Inflow Depth = 1.14" for 1-yr event			
Inflow =	4.1 cfs @	12.26 hrs, Volume=	0.447 af	
Outflow =	4.1 cfs @	12.26 hrs, Volume=	0.447 af, Atten= 0%, Lag= 0.0 min	
Primary =	4.1 cfs @	12.26 hrs, Volume=	0.447 af	
Secondary =	0.0 cfs @	0.00 hrs, Volume=	0.000 af	

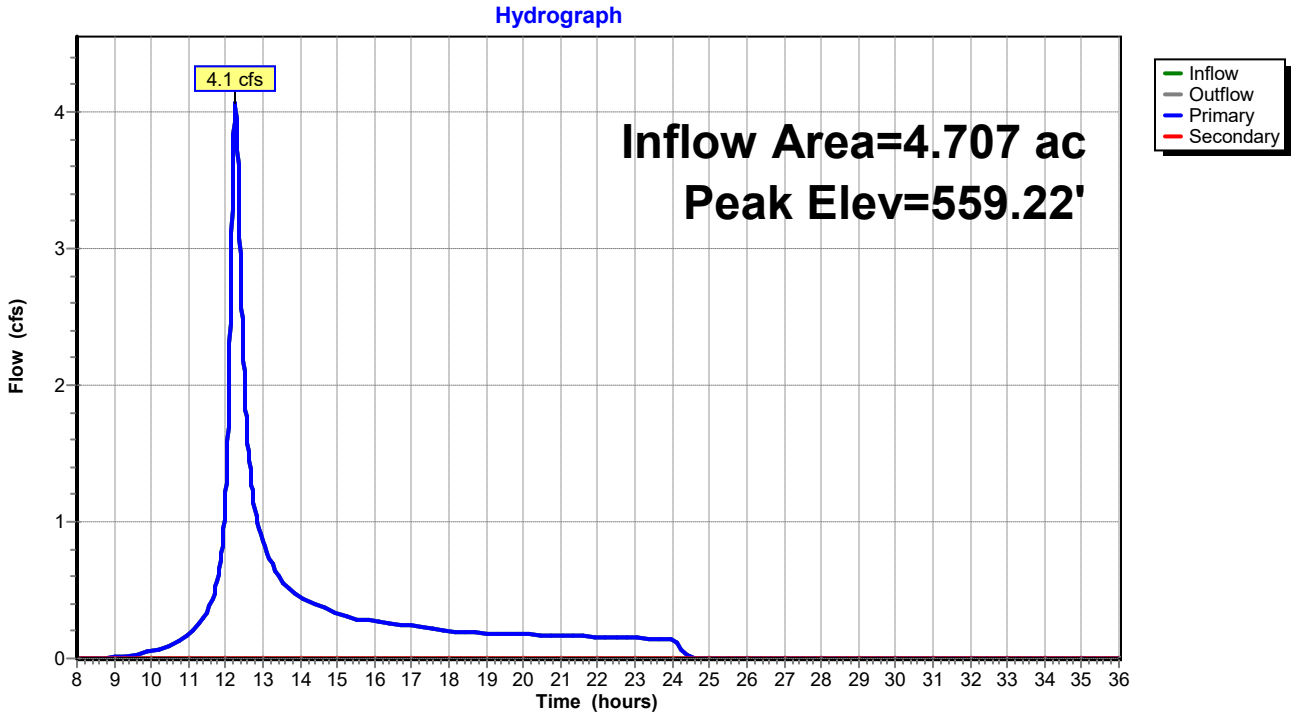
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 559.22' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	558.25'	**18.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 558.25' / 556.80' S= 0.0659 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Secondary	558.15'	**24.0" Round Culvert** L= 61.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 558.15' / 554.84' S= 0.0543 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	561.30'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.1 cfs @ 12.26 hrs HW=559.22' TW=557.38' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.1 cfs @ 3.36 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=558.24' TW=554.84' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.0 cfs of 0.1 cfs potential flow)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond FS#4: Existing Flow Spilitter #4



Stage-Area-Storage for Pond FS#4: Existing Flow Spilitter #4

Elevation (feet)	Storage (cubic-feet)
558.15	**0**
558.25	0
558.35	0
558.45	0
558.55	0
558.65	0
558.75	0
558.85	0
558.95	0
559.05	0
559.15	0
559.25	0
559.35	0
559.45	0
559.55	0
559.65	0
559.75	0
559.85	0
559.95	0
560.05	0
560.15	0
560.25	0
560.35	0
560.45	0
560.55	0
560.65	0
560.75	0
560.85	0
560.95	0
561.05	0
561.15	0
561.25	0

Summary for Pond FS#6: Existing Flow Splitter #6

Inflow Area =	2.392 ac, 31.54% Impervious, Inflow Depth = 0.59" for 1-yr event			
Inflow =	0.9 cfs @ 12.27 hrs, Volume=	0.118 af		
Outflow =	0.9 cfs @ 12.27 hrs, Volume=	0.118 af, Atten= 0%, Lag= 0.0 min		
Primary =	0.9 cfs @ 12.27 hrs, Volume=	0.118 af		
Secondary =	0.0 cfs @ 0.00 hrs, Volume=	0.000 af		

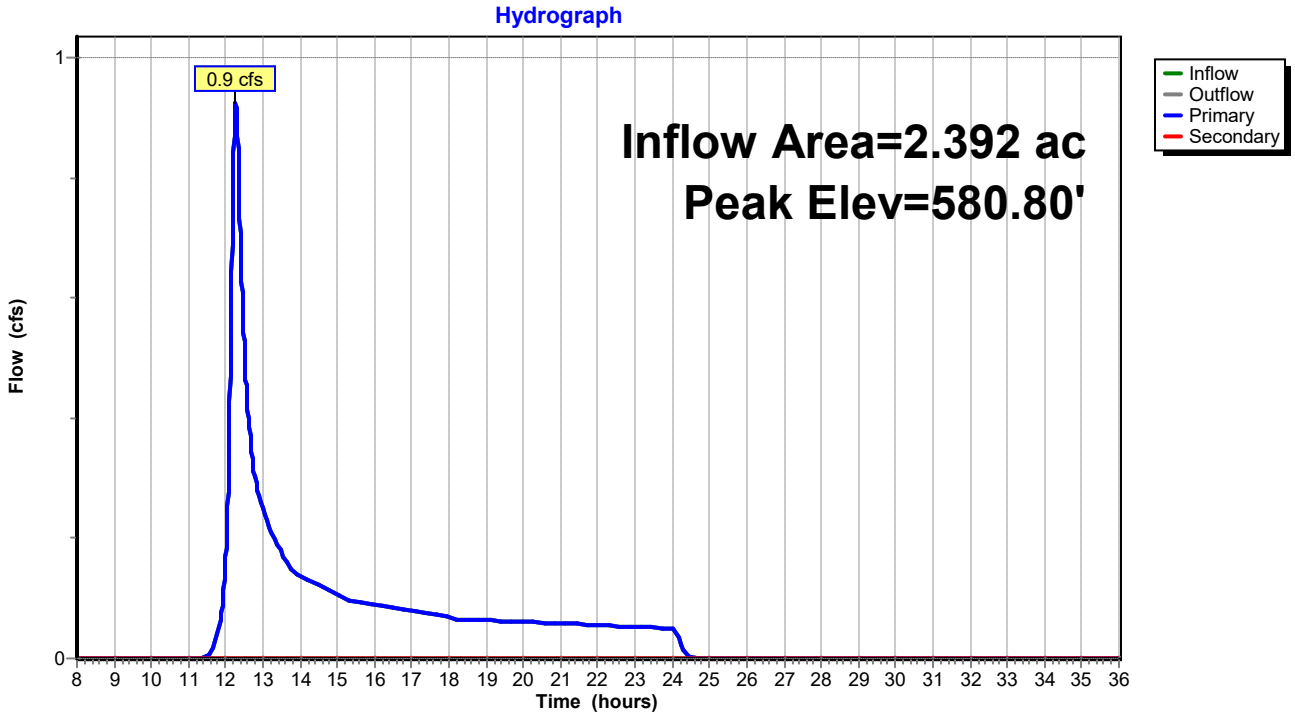
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 580.80' @ 12.27 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	580.30'	**15.0" Round Culvert** L= 39.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.30' / 580.00' S= 0.0077 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	580.47'	**15.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.47' / 579.59' S= 0.0220 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	582.25'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.9 cfs @ 12.27 hrs HW=580.80' TW=578.90' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.9 cfs @ 3.01 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=580.30' TW=575.94' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.0 cfs)
  └─**3=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond FS#6: Existing Flow Splitter #6



Stage-Area-Storage for Pond FS#6: Existing Flow Splitter #6

Elevation (feet)	Storage (cubic-feet)
580.30	**0**
580.40	0
580.50	0
580.60	0
580.70	0
580.80	0
580.90	0
581.00	0
581.10	0
581.20	0
581.30	0
581.40	0
581.50	0
581.60	0
581.70	0
581.80	0
581.90	0
582.00	0
582.10	0
582.20	0

Summary for Pond Inf 1: Infiltration System #1

Inflow Area = 1.843 ac, 30.68% Impervious, Inflow Depth = 0.91" for 1-yr event
Inflow = 1.1 cfs @ 12.32 hrs, Volume= 0.141 af
Outflow = 0.1 cfs @ 11.94 hrs, Volume= 0.141 af, Atten= 91%, Lag= 0.0 min
Discarded = 0.1 cfs @ 11.94 hrs, Volume= 0.141 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 636.33' @ 15.46 hrs Surf.Area= 0.066 ac Storage= 0.059 af

Plug-Flow detention time= 288.9 min calculated for 0.140 af (100% of inflow)
Center-of-Mass det. time= 288.9 min (1,196.8 - 907.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	635.00'	0.056 af	**30.50'W x 94.50'L x 3.54'H Field A** 0.234 af Overall - 0.095 af Embedded = 0.139 af x 40.0% Voids
#2A	635.50'	0.095 af	**Cultec R-330XLHD** x 78 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 6 rows
		0.151 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	635.00'	**1.500 in/hr Exfiltration over Horizontal area** Phase-In= 0.10'

Discarded OutFlow Max=0.1 cfs @ 11.94 hrs HW=635.11' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Pond Inf 1: Infiltration System #1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 6 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

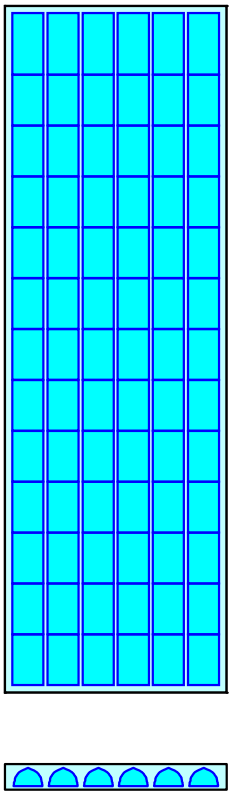
13 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 92.50' Row Length +12.0" End Stone x 2 = 94.50' Base Length
6 Rows x 52.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.50' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

78 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 6 Rows = 4,135.3 cf Chamber Storage

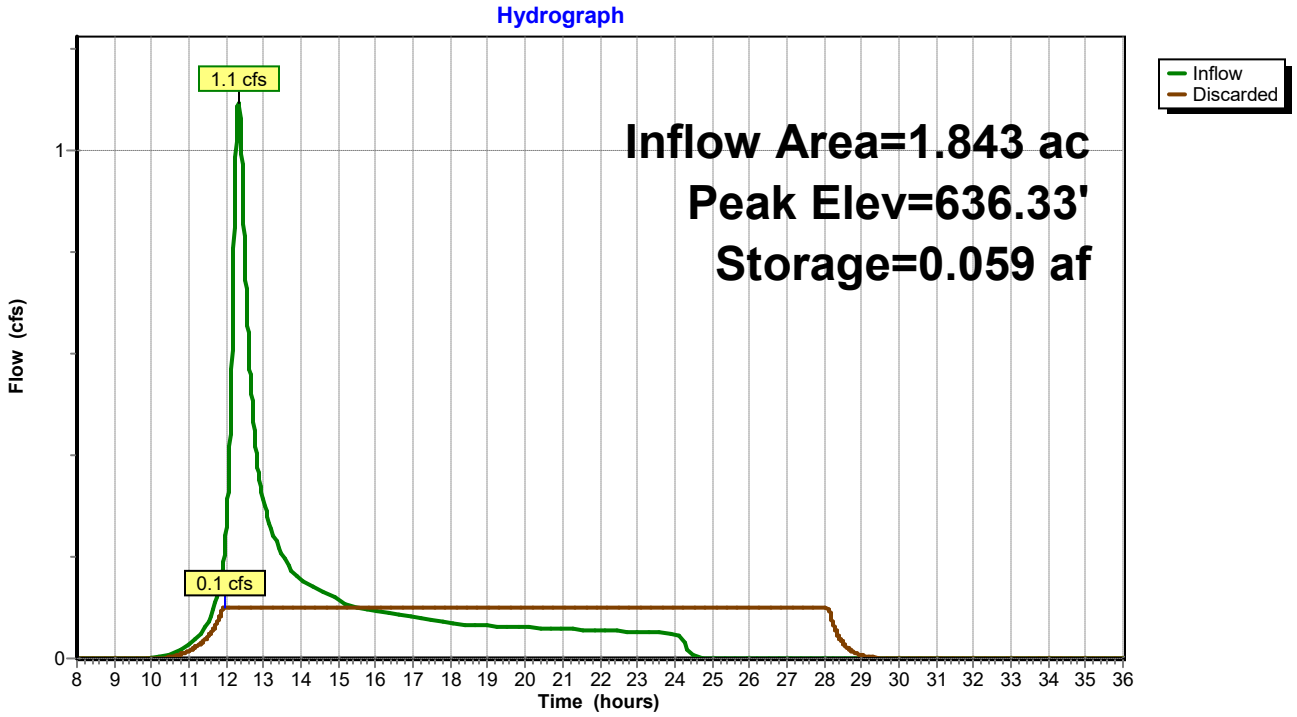
10,208.0 cf Field - 4,135.3 cf Chambers = 6,072.7 cf Stone x 40.0% Voids = 2,429.1 cf Stone Storage

Chamber Storage + Stone Storage = 6,564.4 cf = 0.151 af
Overall Storage Efficiency = 64.3%
Overall System Size = 94.50' x 30.50' x 3.54'

78 Chambers
378.1 cy Field
224.9 cy Stone



Pond Inf 1: Infiltration System #1



Stage-Area-Storage for Pond Inf 1: Infiltration System #1

Elevation (feet)	Horizontal (acres)	Storage (acre-feet)
635.00	**0.066**	0.000
635.10	0.066	0.003
635.20	0.066	0.005
635.30	0.066	0.008
635.40	0.066	0.011
635.50	0.066	0.013
635.60	0.066	0.019
635.70	0.066	0.025
635.80	0.066	0.030
635.90	0.066	0.036
636.00	0.066	0.041
636.10	0.066	0.047
636.20	0.066	0.052
636.30	0.066	0.058
636.40	0.066	0.063
636.50	0.066	0.069
636.60	0.066	0.074
636.70	0.066	0.079
636.80	0.066	0.085
636.90	0.066	0.090
637.00	0.066	0.095
637.10	0.066	0.100
637.20	0.066	0.105
637.30	0.066	0.110
637.40	0.066	0.114
637.50	0.066	0.119
637.60	0.066	0.123
637.70	0.066	0.127
637.80	0.066	0.130
637.90	0.066	0.134
638.00	0.066	0.136
638.10	0.066	0.139
638.20	0.066	0.142
638.30	0.066	0.144
638.40	0.066	0.147
638.50	0.066	**0.150**

Summary for Pond Inf 2: Infiltration System #2

Inflow Area = 0.633 ac, 65.27% Impervious, Inflow Depth = 1.40" for 1-yr event
Inflow = 1.0 cfs @ 12.12 hrs, Volume= 0.074 af
Outflow = 0.1 cfs @ 11.44 hrs, Volume= 0.074 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.1 cfs @ 11.44 hrs, Volume= 0.074 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 618.34' @ 14.67 hrs Surf.Area= 0.035 ac Storage= 0.032 af

Plug-Flow detention time= 264.9 min calculated for 0.074 af (100% of inflow)
Center-of-Mass det. time= 264.9 min (1,121.4 - 856.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	617.00'	0.032 af	**25.67'W x 59.50'L x 3.71'H Field A** 0.130 af Overall - 0.049 af Embedded = 0.081 af x 40.0% Voids
#2A	617.50'	0.049 af	**Cultec R-330XLHD** x 40 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		0.082 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	617.00'	**1.500 in/hr Exfiltration over Horizontal area** Phase-In= 0.10'

Discarded OutFlow Max=0.1 cfs @ 11.44 hrs HW=617.11' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Pond Inf 2: Infiltration System #2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

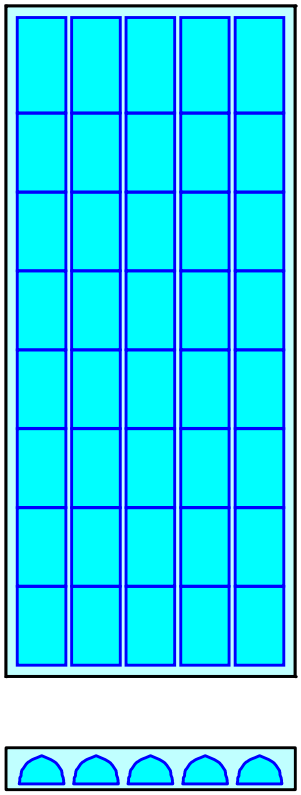
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +12.0" End Stone x 2 = 59.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Base + 30.5" Chamber Height + 8.0" Cover = 3.71' Field Height

40 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,142.2 cf Chamber Storage

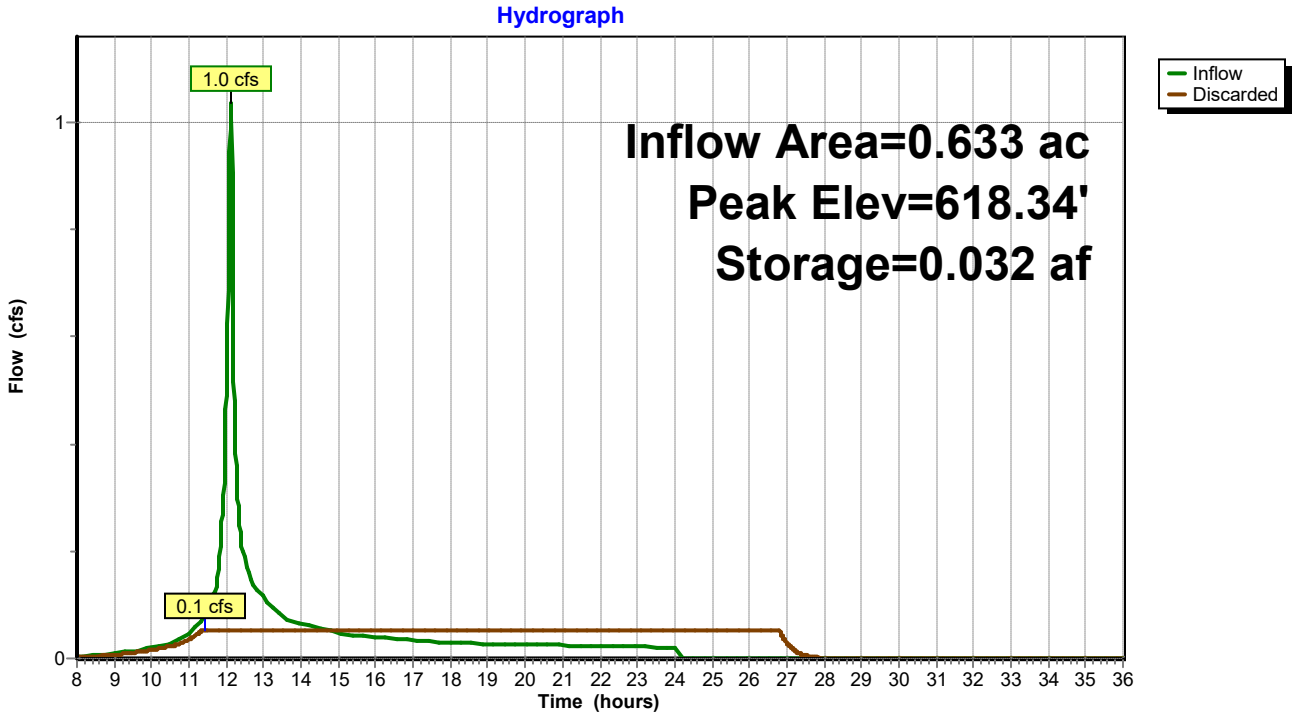
5,663.2 cf Field - 2,142.2 cf Chambers = 3,521.1 cf Stone x 40.0% Voids = 1,408.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,550.6 cf = 0.082 af
Overall Storage Efficiency = 62.7%
Overall System Size = 59.50' x 25.67' x 3.71'

40 Chambers
209.7 cy Field
130.4 cy Stone



Pond Inf 2: Infiltration System #2



Stage-Area-Storage for Pond Inf 2: Infiltration System #2

Elevation (feet)	Horizontal (acres)	Storage (acre-feet)
617.00	**0.035**	0.000
617.10	0.035	0.001
617.20	0.035	0.003
617.30	0.035	0.004
617.40	0.035	0.006
617.50	0.035	0.007
617.60	0.035	0.010
617.70	0.035	0.013
617.80	0.035	0.016
617.90	0.035	0.019
618.00	0.035	0.022
618.10	0.035	0.025
618.20	0.035	0.028
618.30	0.035	0.030
618.40	0.035	0.033
618.50	0.035	0.036
618.60	0.035	0.039
618.70	0.035	0.042
618.80	0.035	0.044
618.90	0.035	0.047
619.00	0.035	0.050
619.10	0.035	0.052
619.20	0.035	0.055
619.30	0.035	0.057
619.40	0.035	0.060
619.50	0.035	0.062
619.60	0.035	0.064
619.70	0.035	0.066
619.80	0.035	0.068
619.90	0.035	0.070
620.00	0.035	0.072
620.10	0.035	0.073
620.20	0.035	0.074
620.30	0.035	0.076
620.40	0.035	0.077
620.50	0.035	0.079
620.60	0.035	0.080
620.70	0.035	**0.081**

Summary for Pond SWQB 3: Existing SWQB #3

Inflow Area = 4.150 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 590.00' @ 0.00 hrs Surf.Area= 1,330 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	590.00'	33,910 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

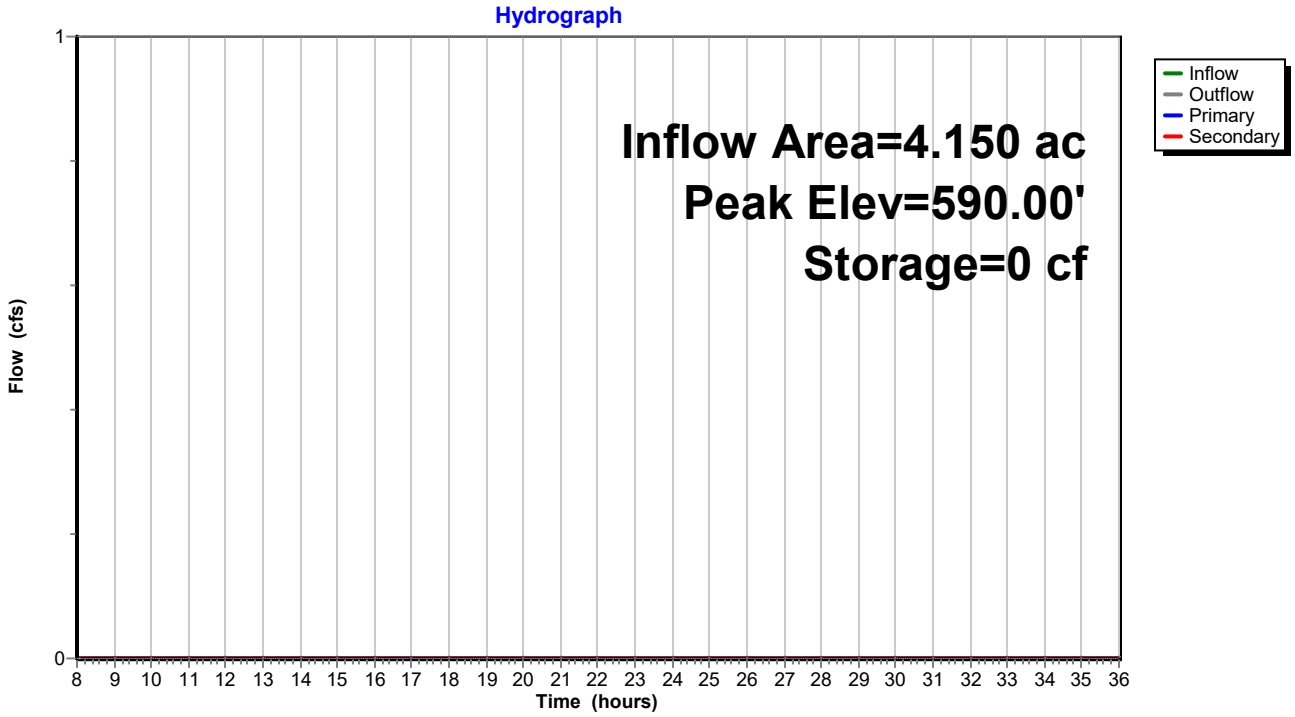
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
590.00	1,330	0	0
592.00	3,725	5,055	5,055
594.00	7,015	10,740	15,795
596.00	11,100	18,115	33,910

Device	Routing	Invert	Outlet Devices
#1	Primary	588.20'	**12.0" Round Culvert** L= 240.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 588.20' / 552.00' S= 0.1508 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	590.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	590.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 18 rows with 3.0" cc spacing C= 0.600
#4	Secondary	594.00'	**30.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.00' TW=551.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.0 cfs of 4.3 cfs potential flow)
  └─**2=Orifice/Grate** (Controls 0.0 cfs)
    └─**3=Orifice/Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.00' TW=551.00' (Dynamic Tailwater)
└─**4=Orifice/Grate** (Controls 0.0 cfs)

Pond SWQB 3: Existing SWQB #3



Stage-Area-Storage for Pond SWQB 3: Existing SWQB #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
590.00	1,330	0
590.10	1,450	139
590.20	1,570	290
590.30	1,689	453
590.40	1,809	628
590.50	1,929	815
590.60	2,049	1,014
590.70	2,168	1,224
590.80	2,288	1,447
590.90	2,408	1,682
591.00	2,528	1,929
591.10	2,647	2,187
591.20	2,767	2,458
591.30	2,887	2,741
591.40	3,006	3,036
591.50	3,126	3,342
591.60	3,246	3,661
591.70	3,366	3,991
591.80	3,485	4,334
591.90	3,605	4,688
592.00	3,725	5,055
592.10	3,890	5,436
592.20	4,054	5,833
592.30	4,218	6,247
592.40	4,383	6,677
592.50	4,548	7,123
592.60	4,712	7,586
592.70	4,877	8,066
592.80	5,041	8,561
592.90	5,205	9,074
593.00	5,370	9,603
593.10	5,535	10,148
593.20	5,699	10,709
593.30	5,863	11,288
593.40	6,028	11,882
593.50	6,193	12,493
593.60	6,357	13,121
593.70	6,522	13,765
593.80	6,686	14,425
593.90	6,850	15,102
594.00	7,015	15,795
594.10	7,219	16,507
594.20	7,424	17,239
594.30	7,628	17,991
594.40	7,832	18,764
594.50	8,036	19,558
594.60	8,241	20,372
594.70	8,445	21,206
594.80	8,649	22,061
594.90	8,853	22,936
595.00	9,058	23,831
595.10	9,262	24,747
595.20	9,466	25,684
595.30	9,670	26,640
595.40	9,874	27,618
595.50	10,079	28,615
595.60	10,283	29,633
595.70	10,487	30,672
595.80	10,691	31,731
595.90	10,896	32,810
596.00	**11,100**	**33,910**

Summary for Pond SWQB 4: Existing SWQB #4

Inflow Area = 4.707 ac, 48.19% Impervious, Inflow Depth = 1.14" for 1-yr event
Inflow = 4.1 cfs @ 12.26 hrs, Volume= 0.447 af
Outflow = 0.3 cfs @ 16.25 hrs, Volume= 0.414 af, Atten= 94%, Lag= 239.7 min
Primary = 0.3 cfs @ 16.25 hrs, Volume= 0.414 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 558.81' @ 16.25 hrs Surf.Area= 5,209 sf Storage= 10,909 cf

Plug-Flow detention time= 708.5 min calculated for 0.414 af (93% of inflow)
Center-of-Mass det. time= 669.7 min (1,555.5 - 885.8)

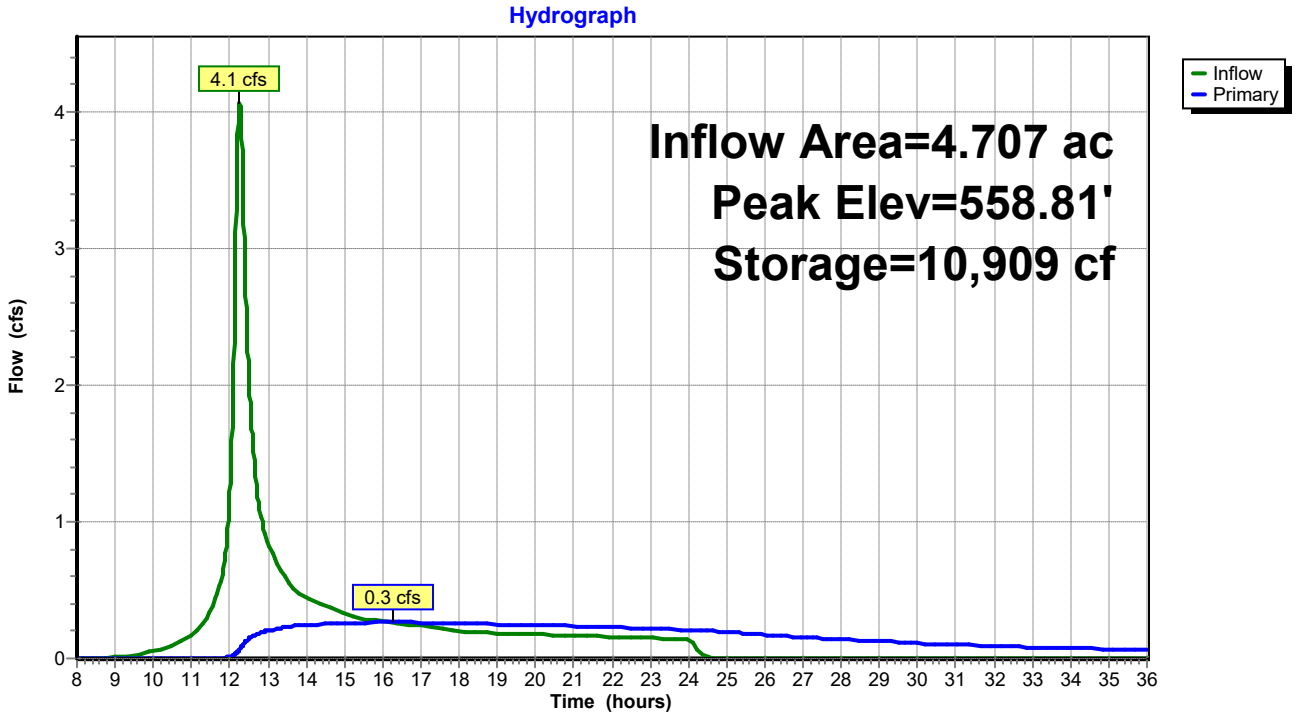
Volume	Invert	Avail.Storage	Storage Description
#1	556.00'	53,446 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
556.00	2,625	212.0	0	0	2,625
558.00	4,450	278.0	6,995	6,995	5,245
560.00	6,430	341.0	10,819	17,815	8,409
562.00	8,860	408.0	15,225	33,040	12,472
564.00	11,608	478.0	20,406	53,446	17,487

Device	Routing	Invert	Outlet Devices
#1	Primary	556.00'	**12.0" Round Culvert** L= 63.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 556.00' / 554.84' S= 0.0184 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	561.80'	**33.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	556.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	556.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 23 rows with 3.0" cc spacing C= 0.600

Primary OutFlow Max=0.3 cfs @ 16.25 hrs HW=558.81' TW=555.08' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.3 cfs of 5.7 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.0 cfs)
  └─**3=Orifice/Grate** (Passes 0.3 cfs of 0.6 cfs potential flow)
    └─**4=Orifice/Grate** (Orifice Controls 0.3 cfs @ 4.83 fps)

Pond SWQB 4: Existing SWQB #4



Stage-Area-Storage for Pond SWQB 4: Existing SWQB #4

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
556.00	2,625	0
556.10	2,705	266
556.20	2,786	541
556.30	2,868	824
556.40	2,952	1,115
556.50	3,036	1,414
556.60	3,122	1,722
556.70	3,209	2,039
556.80	3,298	2,364
556.90	3,387	2,698
557.00	3,478	3,041
557.10	3,569	3,394
557.20	3,663	3,755
557.30	3,757	4,126
557.40	3,852	4,507
557.50	3,949	4,897
557.60	4,047	5,296
557.70	4,146	5,706
557.80	4,246	6,126
557.90	4,347	6,555
558.00	4,450	6,995
558.10	4,540	7,445
558.20	4,632	7,903
558.30	4,724	8,371
558.40	4,817	8,848
558.50	4,911	9,334
558.60	5,006	9,830
558.70	5,102	10,336
558.80	5,198	10,851
558.90	5,296	11,375
559.00	5,395	11,910
559.10	5,494	12,454
559.20	5,594	13,009
559.30	5,696	13,573
559.40	5,798	14,148
559.50	5,901	14,733
559.60	6,005	15,328
559.70	6,110	15,934
559.80	6,216	16,550
559.90	6,322	17,177
560.00	6,430	17,815
560.10	6,542	18,463
560.20	6,656	19,123
560.30	6,770	19,794
560.40	6,885	20,477
560.50	7,001	21,171
560.60	7,118	21,877
560.70	7,236	22,595
560.80	7,355	23,325
560.90	7,475	24,066
561.00	7,596	24,820
561.10	7,718	25,585
561.20	7,841	26,363
561.30	7,965	27,154
561.40	8,090	27,957
561.50	8,216	28,772
561.60	8,343	29,600
561.70	8,471	30,440
561.80	8,600	31,294
561.90	8,729	32,160
562.00	8,860	33,040
562.10	8,989	33,932
562.20	9,118	34,838
562.30	9,249	35,756
562.40	9,380	36,687
562.50	9,512	37,632
562.60	9,645	38,590
562.70	9,780	39,561
562.80	9,915	40,546
562.90	10,051	41,544
563.00	10,188	42,556
563.10	10,326	43,582
563.20	10,464	44,621
563.30	10,604	45,675
563.40	10,745	46,742
563.50	10,886	47,823
563.60	11,029	48,919
563.70	11,172	50,029
563.80	11,317	51,154
563.90	11,462	52,293
564.00	**11,608**	**53,446**

Summary for Pond SWQB 4A: Existing SWQB #4A

Inflow Area = 2.392 ac, 31.54% Impervious, Inflow Depth = 0.59" for 1-yr event
Inflow = 0.9 cfs @ 12.27 hrs, Volume= 0.118 af
Outflow = 0.1 cfs @ 15.14 hrs, Volume= 0.118 af, Atten= 89%, Lag= 172.4 min
Primary = 0.1 cfs @ 15.14 hrs, Volume= 0.118 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Starting Elev= 578.50' Surf.Area= 1,337 sf Storage= 590 cf
Peak Elev= 579.67' @ 15.14 hrs Surf.Area= 2,216 sf Storage= 2,653 cf (2,063 cf above start)

Plug-Flow detention time= 472.0 min calculated for 0.104 af (88% of inflow)
Center-of-Mass det. time= 353.5 min (1,289.0 - 935.5)

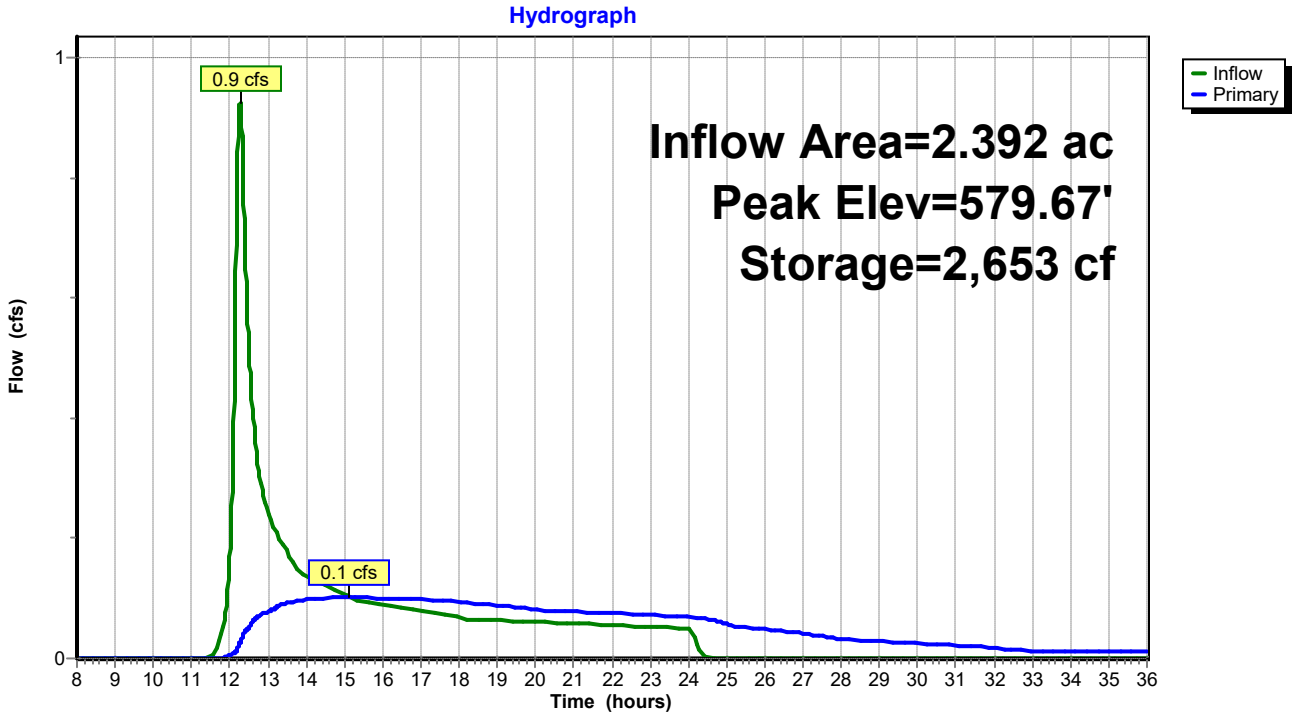
Volume	Invert	Avail.Storage	Storage Description
#1	578.00'	37,725 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
578.00	1,030	148.0	0	0	1,030
580.00	2,500	251.0	3,423	3,423	4,325
582.00	4,386	315.0	6,798	10,221	7,262
584.00	6,847	383.0	11,142	21,363	11,103
586.00	9,592	437.0	16,362	37,725	14,721

Device	Routing	Invert	Outlet Devices
#1	Primary	578.04'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 578.04' / 576.09' S= 0.0390 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	583.14'	**33.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	578.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	578.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 18 rows with 3.0" cc spacing C= 0.600

Primary OutFlow Max=0.1 cfs @ 15.14 hrs HW=579.67' TW=576.08' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.1 cfs of 4.0 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.0 cfs)
  └─**3=Orifice/Grate** (Passes 0.1 cfs of 0.4 cfs potential flow)
    └─**4=Orifice/Grate** (Orifice Controls 0.1 cfs @ 3.71 fps)

Pond SWQB 4A: Existing SWQB #4A



Stage-Area-Storage for Pond SWQB 4A: Existing SWQB #4A

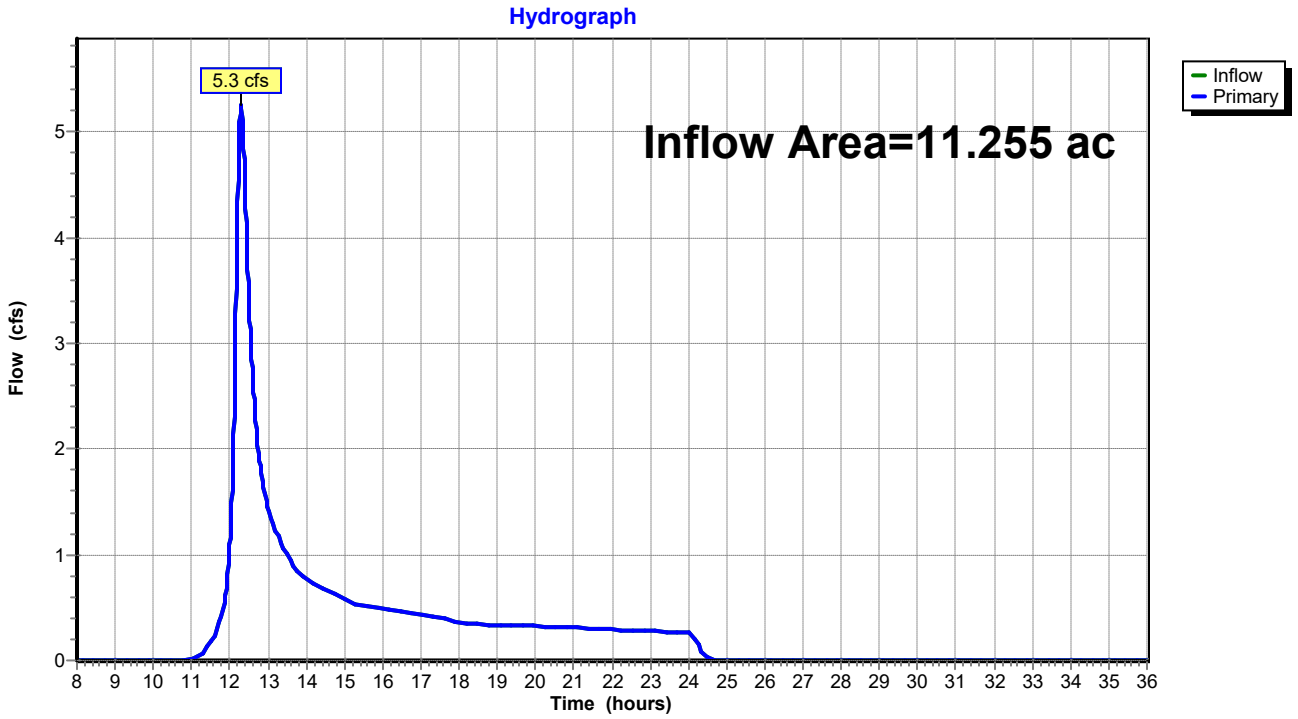
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
578.00	1,030	0
578.10	1,088	106
578.20	1,148	218
578.30	1,210	336
578.40	1,273	460
578.50	1,337	590
578.60	1,404	727
578.70	1,472	871
578.80	1,541	1,022
578.90	1,612	1,179
579.00	1,685	1,344
579.10	1,759	1,516
579.20	1,835	1,696
579.30	1,913	1,883
579.40	1,992	2,079
579.50	2,072	2,282
579.60	2,155	2,493
579.70	2,239	2,713
579.80	2,324	2,941
579.90	2,411	3,178
580.00	2,500	3,423
580.10	2,582	3,677
580.20	2,665	3,940
580.30	2,749	4,210
580.40	2,835	4,489
580.50	2,922	4,777
580.60	3,011	5,074
580.70	3,100	5,379
580.80	3,191	5,694
580.90	3,284	6,018
581.00	3,377	6,351
581.10	3,472	6,693
581.20	3,568	7,045
581.30	3,666	7,407
581.40	3,765	7,778
581.50	3,865	8,160
581.60	3,967	8,552
581.70	4,070	8,953
581.80	4,174	9,365
581.90	4,279	9,788
582.00	4,386	10,221
582.10	4,496	10,665
582.20	4,608	11,121
582.30	4,720	11,587
582.40	4,835	12,065
582.50	4,950	12,554
582.60	5,067	13,055
582.70	5,185	13,567
582.80	5,305	14,092
582.90	5,426	14,628
583.00	5,548	15,177
583.10	5,672	15,738
583.20	5,797	16,312
583.30	5,924	16,898
583.40	6,051	17,496
583.50	6,181	18,108
583.60	6,311	18,732
583.70	6,443	19,370
583.80	6,576	20,021
583.90	6,711	20,685
584.00	6,847	21,363
584.10	6,973	22,054
584.20	7,101	22,758
584.30	7,229	23,475
584.40	7,359	24,204
584.50	7,490	24,946
584.60	7,622	25,702
584.70	7,755	26,471
584.80	7,890	27,253
584.90	8,025	28,049
585.00	8,162	28,858
585.10	8,300	29,681
585.20	8,439	30,518
585.30	8,579	31,369
585.40	8,720	32,234
585.50	8,862	33,113
585.60	9,006	34,006
585.70	9,151	34,914
585.80	9,297	35,837
585.90	9,444	36,774
586.00	**9,592**	**37,725**

Summary for Link DL1: Design Line 1

Inflow Area = 11.255 ac, 21.15% Impervious, Inflow Depth = 0.72" for 1-yr event
Inflow = 5.3 cfs @ 12.30 hrs, Volume= 0.675 af
Primary = 5.3 cfs @ 12.30 hrs, Volume= 0.675 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DL1: Design Line 1

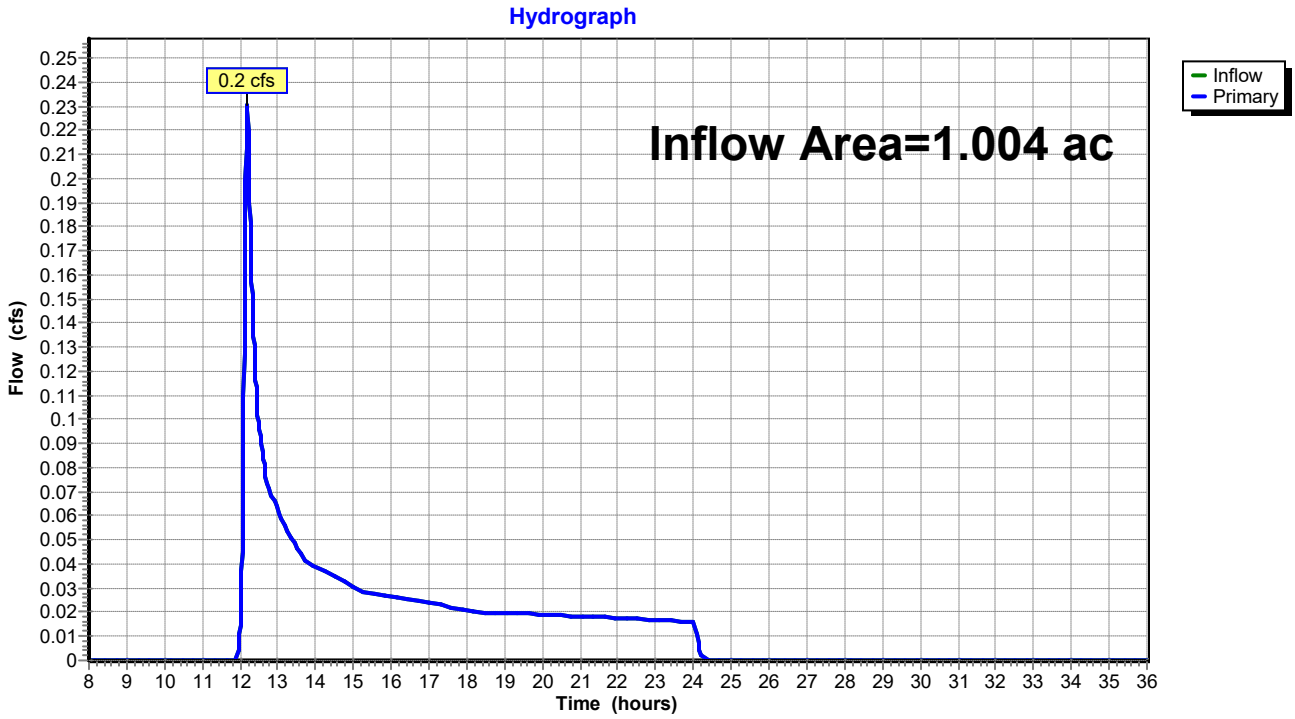


Summary for Link DL2: Design Line 2

Inflow Area = 1.004 ac, 0.46% Impervious, Inflow Depth = 0.37" for 1-yr event
Inflow = 0.2 cfs @ 12.19 hrs, Volume= 0.031 af
Primary = 0.2 cfs @ 12.19 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DL2: Design Line 2

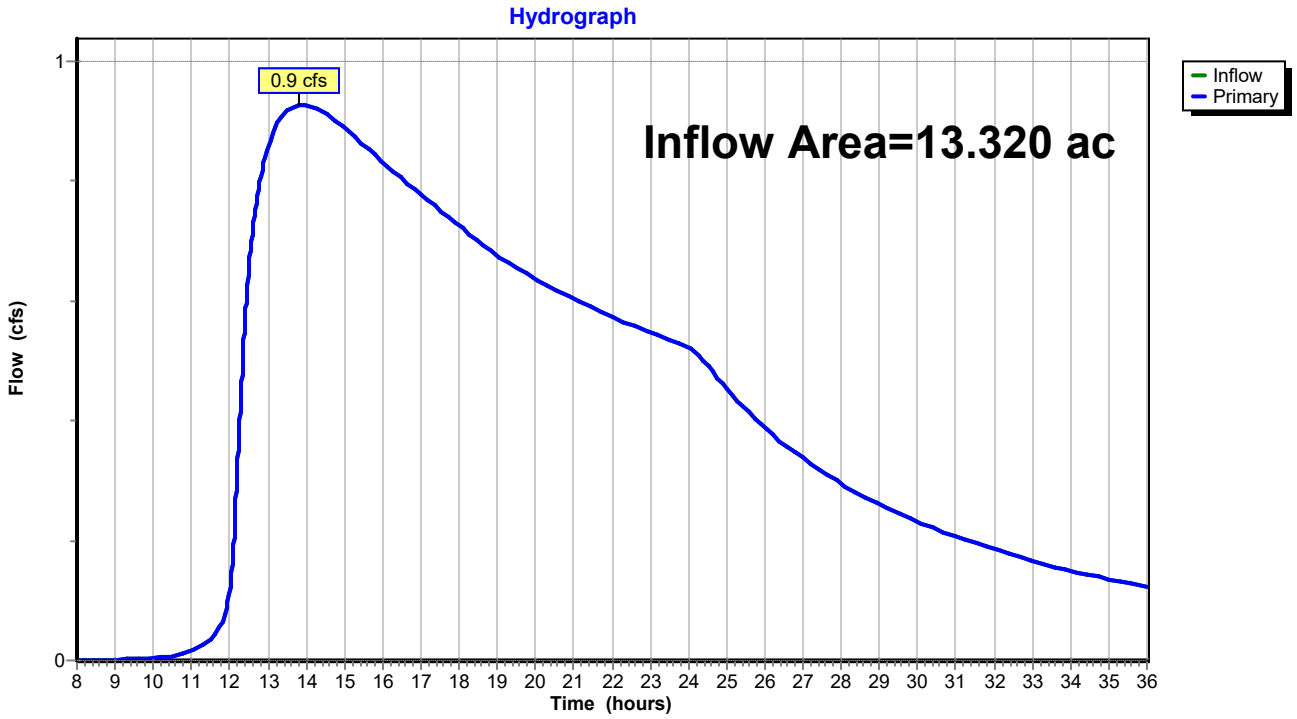


Summary for Link DP1: Design Point #1

Inflow Area = 13.320 ac, 22.69% Impervious, Inflow Depth > 0.99" for 1-yr event
Inflow = 0.9 cfs @ 13.82 hrs, Volume= 1.098 af
Primary = 0.9 cfs @ 13.82 hrs, Volume= 1.098 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DP1: Design Point #1

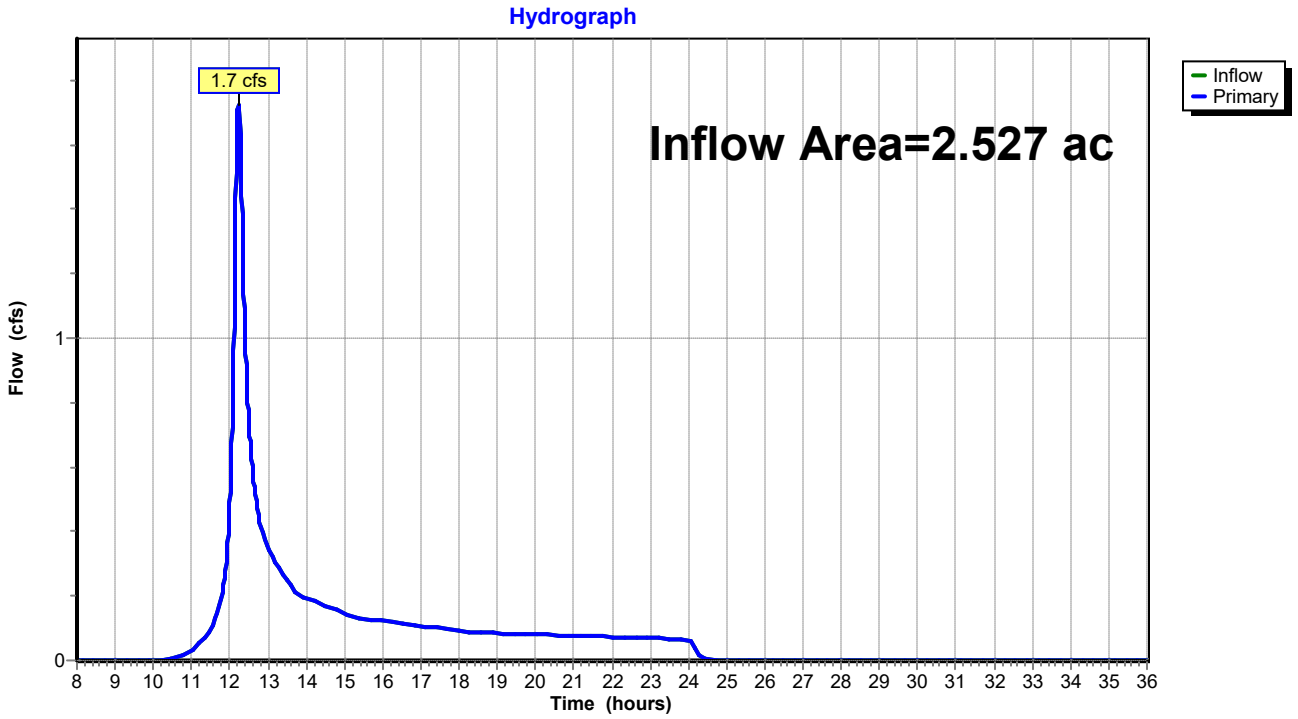


Summary for Link DP2: Design Point #2

Inflow Area = 2.527 ac, 28.26% Impervious, Inflow Depth = 0.86" for 1-yr event
Inflow = 1.7 cfs @ 12.23 hrs, Volume= 0.182 af
Primary = 1.7 cfs @ 12.23 hrs, Volume= 0.182 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DP2: Design Point #2



Summary for Subcatchment Sub 5: Sub Area 5

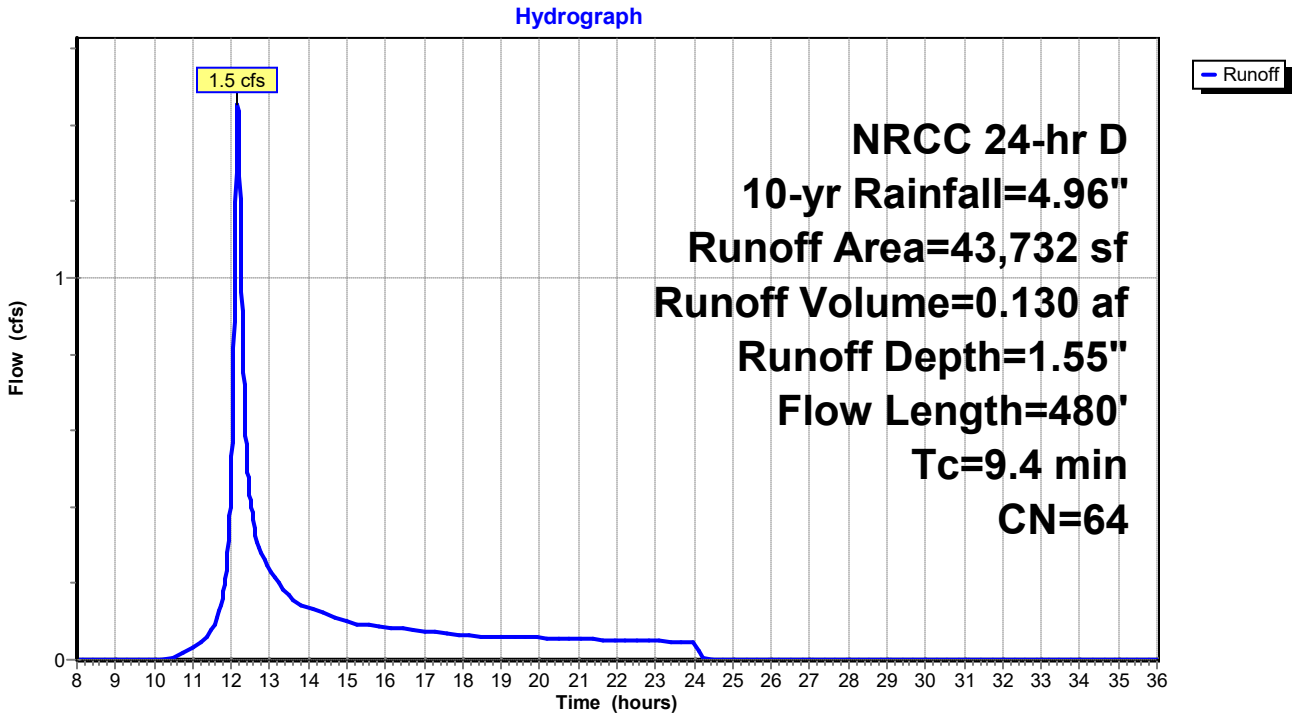
Runoff = 1.5 cfs @ 12.17 hrs, Volume= 0.130 af, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

Area (sf)	CN	Description
32,017	61	>75% Grass cover, Good, HSG B
6,590	74	>75% Grass cover, Good, HSG C
4,925	73	Woods, Fair, HSG C
200	98	Paved parking, HSG B
43,732	64	Weighted Average
43,532		99.54% Pervious Area
200		0.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	100	0.0550	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.33"
1.7	250	0.1240	2.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	130	0.1150	1.70		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.4	480	Total			

Subcatchment Sub 5: Sub Area 5



Summary for Subcatchment SUB AREA 3: HIGHLANDS - MAY 2002 SWPPP SUB AREA 3

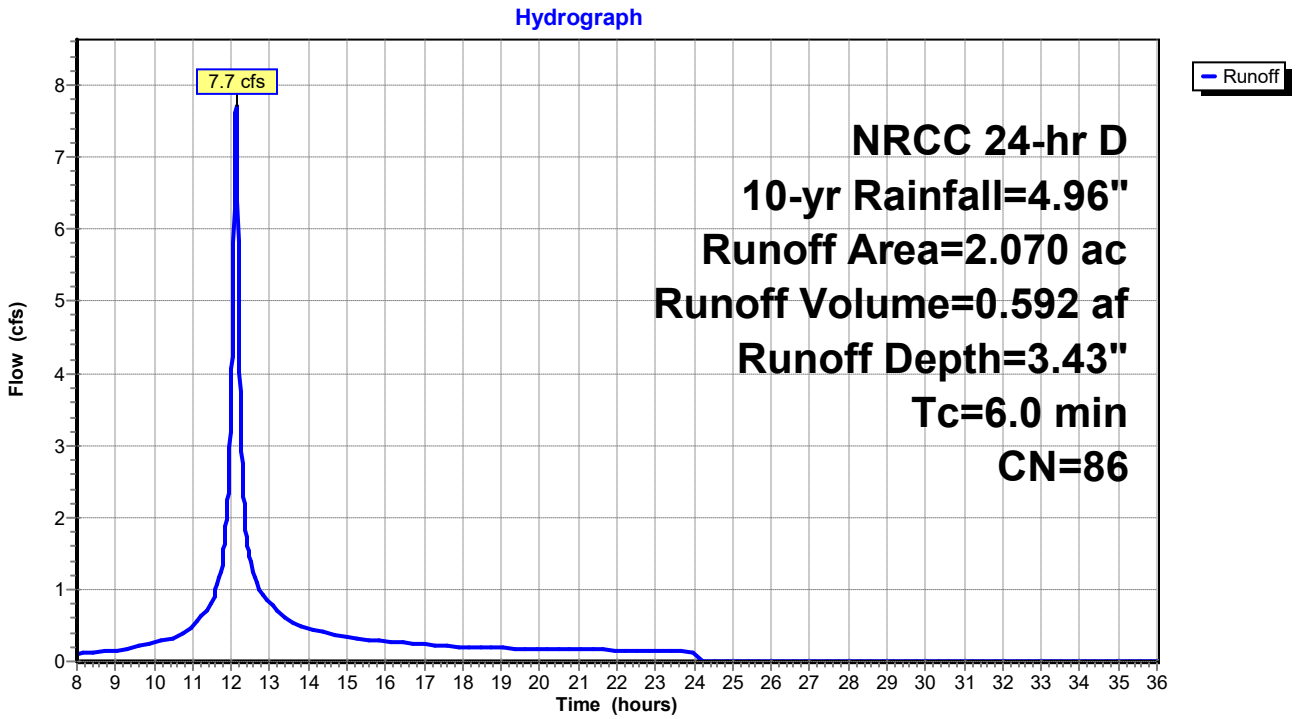
Runoff = 7.7 cfs @ 12.13 hrs, Volume= 0.592 af, Depth= 3.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

	Area (ac)	CN	Description
*	2.070	86	
	2.070		100.00% Pervious Area

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

Subcatchment SUB AREA 3: HIGHLANDS - MAY 2002 SWPPP SUB AREA 3



Summary for Subcatchment SUB AREA 4: HIGHLANDS - MAY 2002 SWPPP SUB AREA 4

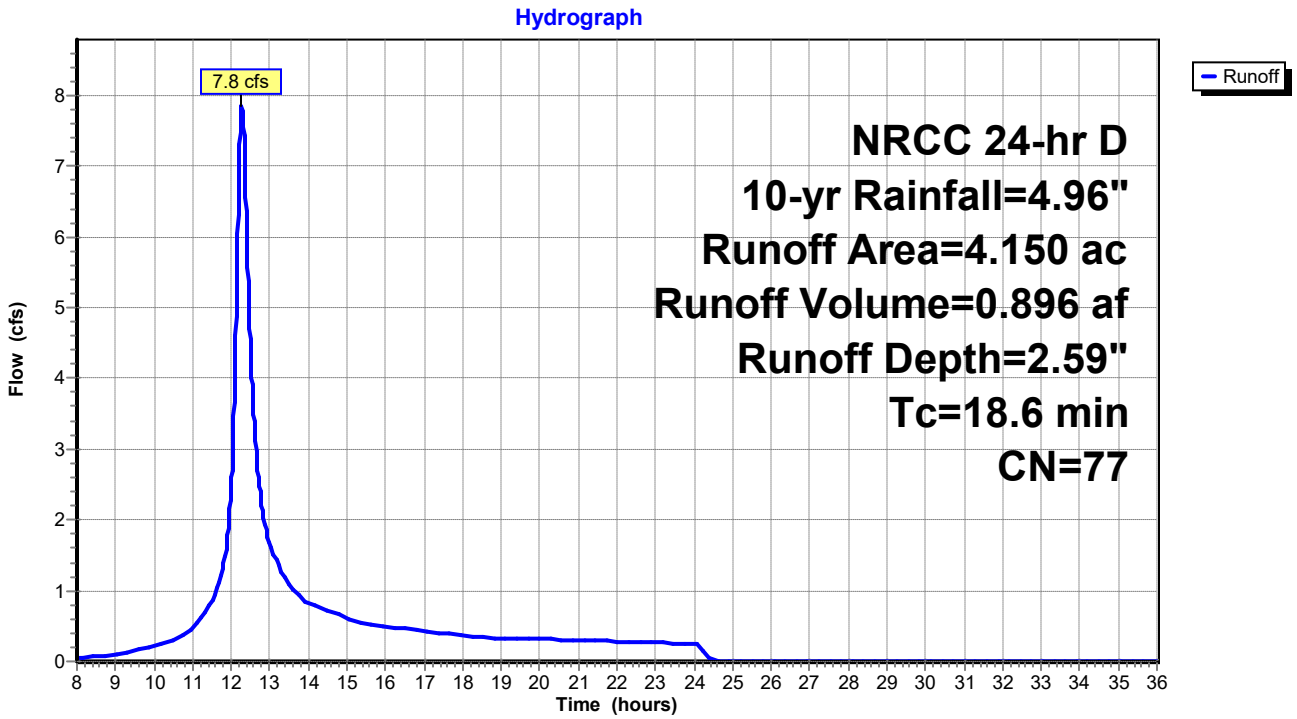
Runoff = 7.8 cfs @ 12.28 hrs, Volume= 0.896 af, Depth= 2.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

	Area (ac)	CN	Description
*	4.150	77	
	4.150		100.00% Pervious Area

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

Subcatchment SUB AREA 4: HIGHLANDS - MAY 2002 SWPPP SUB AREA 4



Summary for Subcatchment Sub-5A: Sub Area 5A

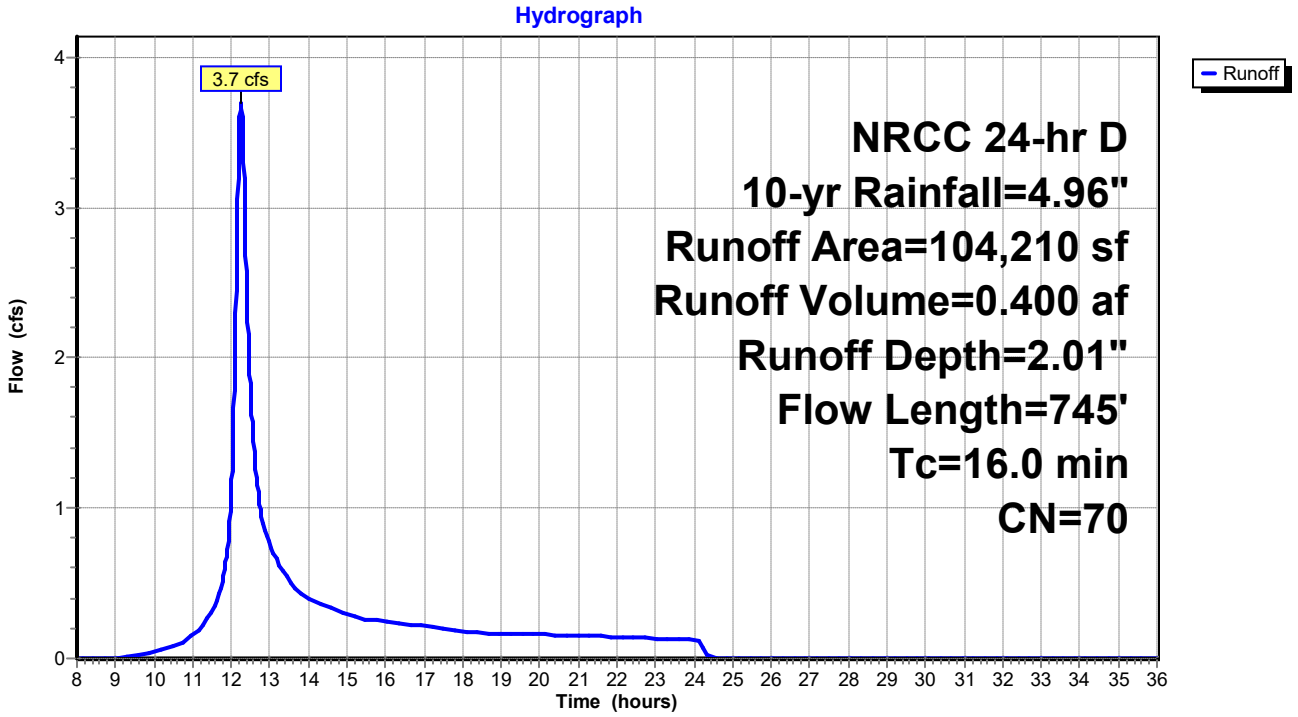
Runoff = 3.7 cfs @ 12.25 hrs, Volume= 0.400 af, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

Area (sf)	CN	Description
32,866	98	Paved parking & roofs
35,215	65	Brush, Good, HSG C
36,129	48	Brush, Good, HSG B
104,210	70	Weighted Average
71,344		68.46% Pervious Area
32,866		31.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0550	0.13		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
1.5	130	0.0880	1.48		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	165	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	88	0.0342	3.75		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	262	0.0119	5.74	7.05	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.0	745	Total			

Subcatchment Sub-5A: Sub Area 5A



Summary for Subcatchment Sub-5B: Sub Area 5B

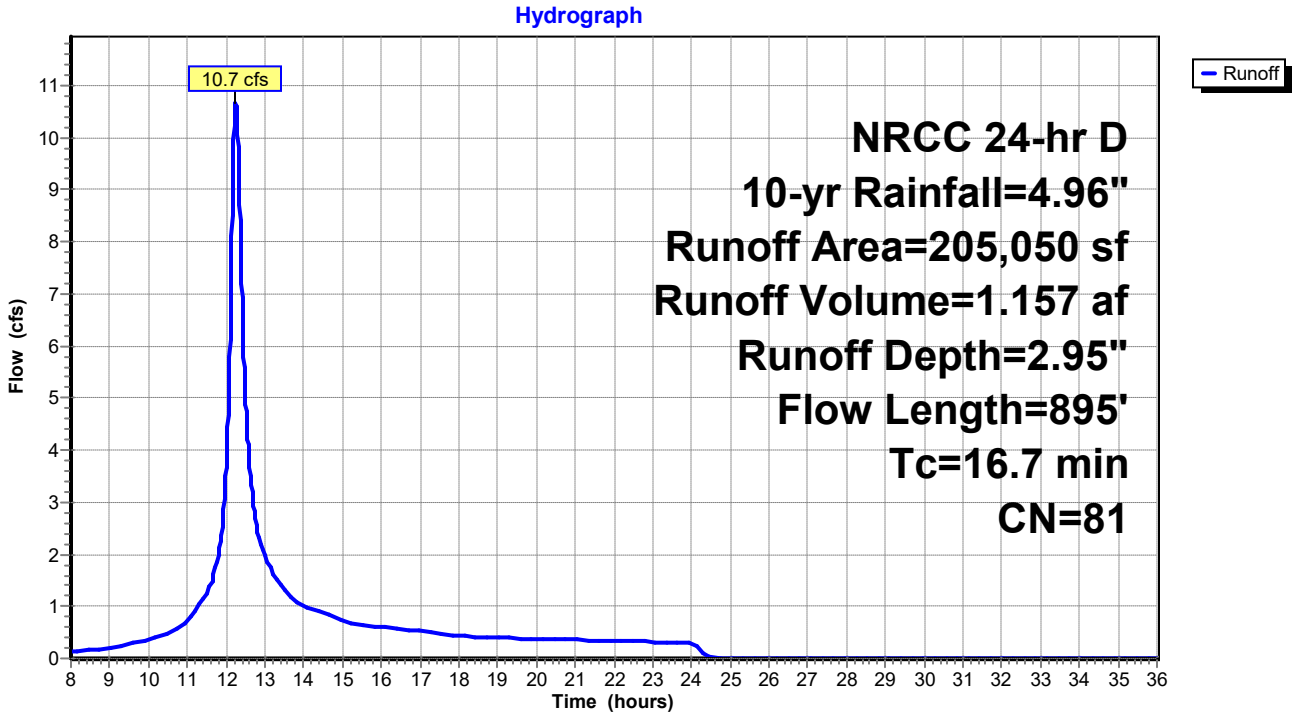
Runoff = 10.7 cfs @ 12.25 hrs, Volume= 1.157 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

Area (sf)	CN	Description
98,809	98	Paved parking, HSG C
17,148	74	>75% Grass cover, Good, HSG C
26,843	71	Meadow, non-grazed, HSG C
47,007	65	Brush, Good, HSG C
15,243	48	Brush, Good, HSG B
205,050	81	Weighted Average
106,241		51.81% Pervious Area
98,809		48.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.1100	0.13		**Sheet Flow, Brush** n= 0.500 P2= 3.33"
0.7	90	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	77	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	628	0.1090	17.38	21.33	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.7	895	Total			

Subcatchment Sub-5B: Sub Area 5B



Summary for Subcatchment Sub1: Sub Area 1

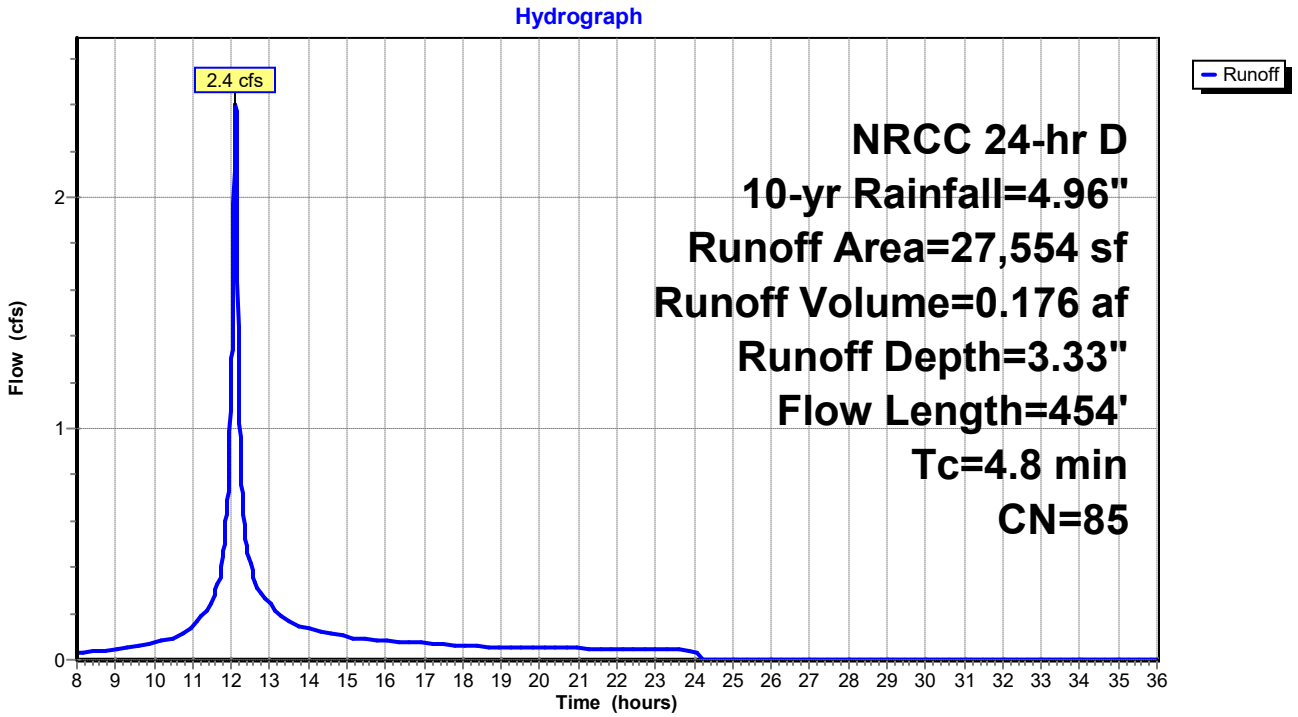
Runoff = 2.4 cfs @ 12.12 hrs, Volume= 0.176 af, Depth= 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

Area (sf)	CN	Description
17,984	98	Paved parking & roofs
8,870	61	>75% Grass cover, Good, HSG B
700	48	Brush, Good, HSG B
27,554	85	Weighted Average
9,570		34.73% Pervious Area
17,984		65.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	82	0.1230	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.33"
0.4	102	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	270	0.0450	11.17	13.70	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
4.8	454	Total			

Subcatchment Sub1: Sub Area 1



Summary for Subcatchment Sub2: Sub Area 2

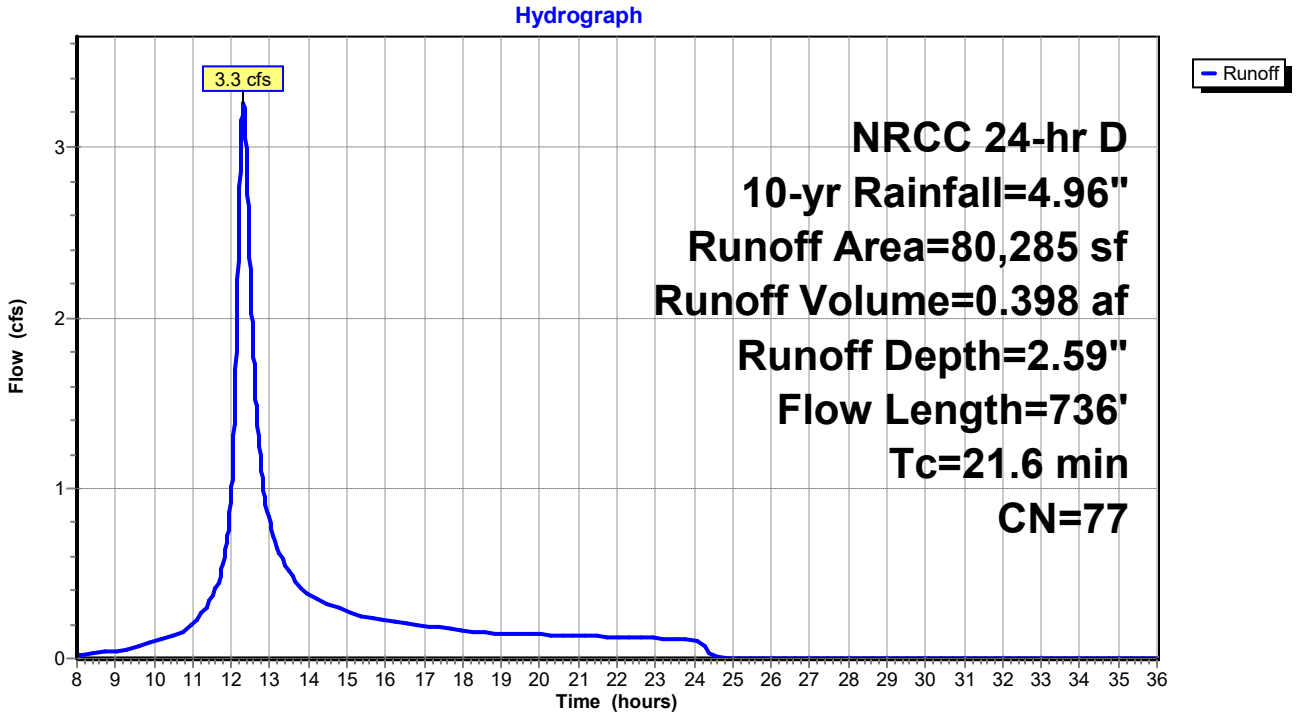
Runoff = 3.3 cfs @ 12.31 hrs, Volume= 0.398 af, Depth= 2.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

Area (sf)	CN	Description
24,635	98	Paved parking, HSG B
15,380	74	>75% Grass cover, Good, HSG C
2,350	61	>75% Grass cover, Good, HSG B
37,260	65	Brush, Good, HSG C
660	48	Brush, Good, HSG B
80,285	77	Weighted Average
55,650		69.32% Pervious Area
24,635		30.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.0	100	0.0400	0.10		**Sheet Flow, Brush** Woods: Light underbrush n= 0.400 P2= 3.33"
4.7	340	0.0590	1.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	17	0.1760	2.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	106	0.0660	5.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.5	173	0.0107	5.45	6.68	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
21.6	736	Total			

Subcatchment Sub2: Sub Area 2



Summary for Subcatchment Sub3: Sub Area 3

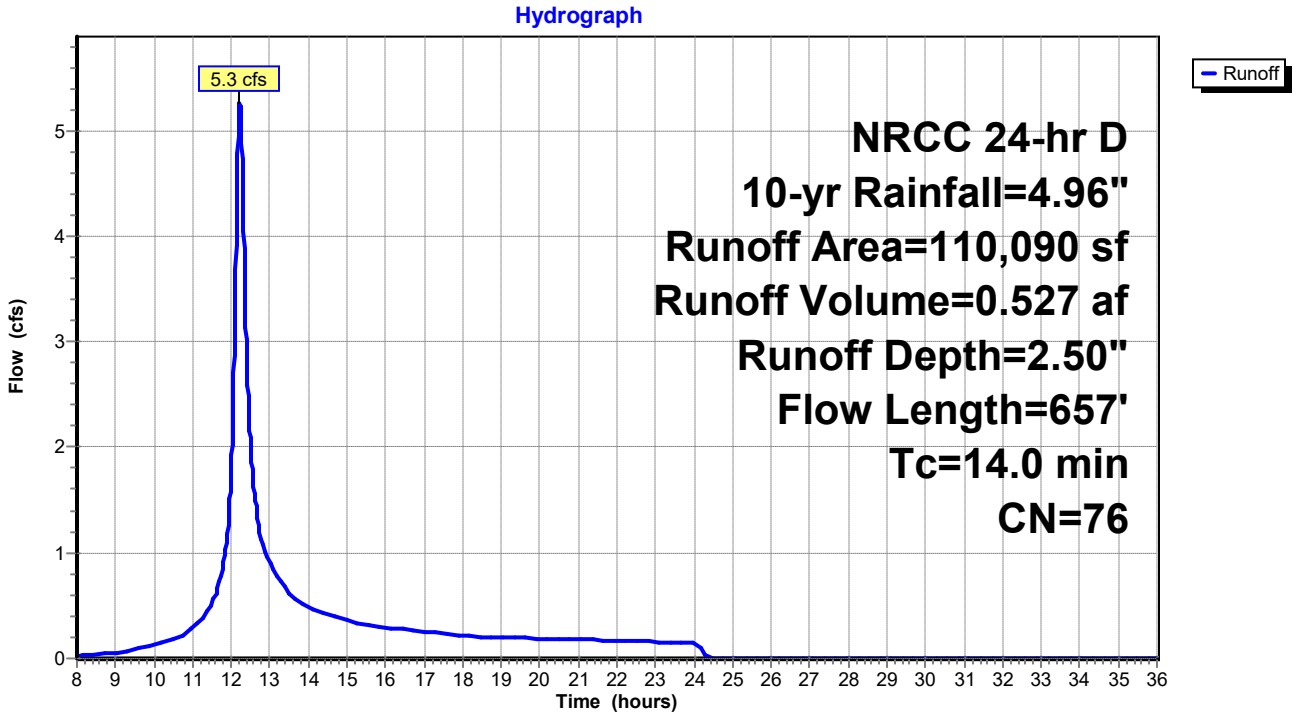
Runoff = 5.3 cfs @ 12.22 hrs, Volume= 0.527 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

Area (sf)	CN	Description
31,115	98	Paved parking, HSG C
4,730	89	Gravel roads, HSG C
11,825	74	>75% Grass cover, Good, HSG C
62,420	65	Brush, Good, HSG C
110,090	76	Weighted Average
78,975		71.74% Pervious Area
31,115		28.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	100	0.0600	0.14		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
1.4	157	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	100	0.0860	15.44	18.94	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
0.3	300	0.0710	15.19	18.65	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
14.0	657	Total			

Subcatchment Sub3: Sub Area 3



Summary for Subcatchment Sub4: Sub Area 4

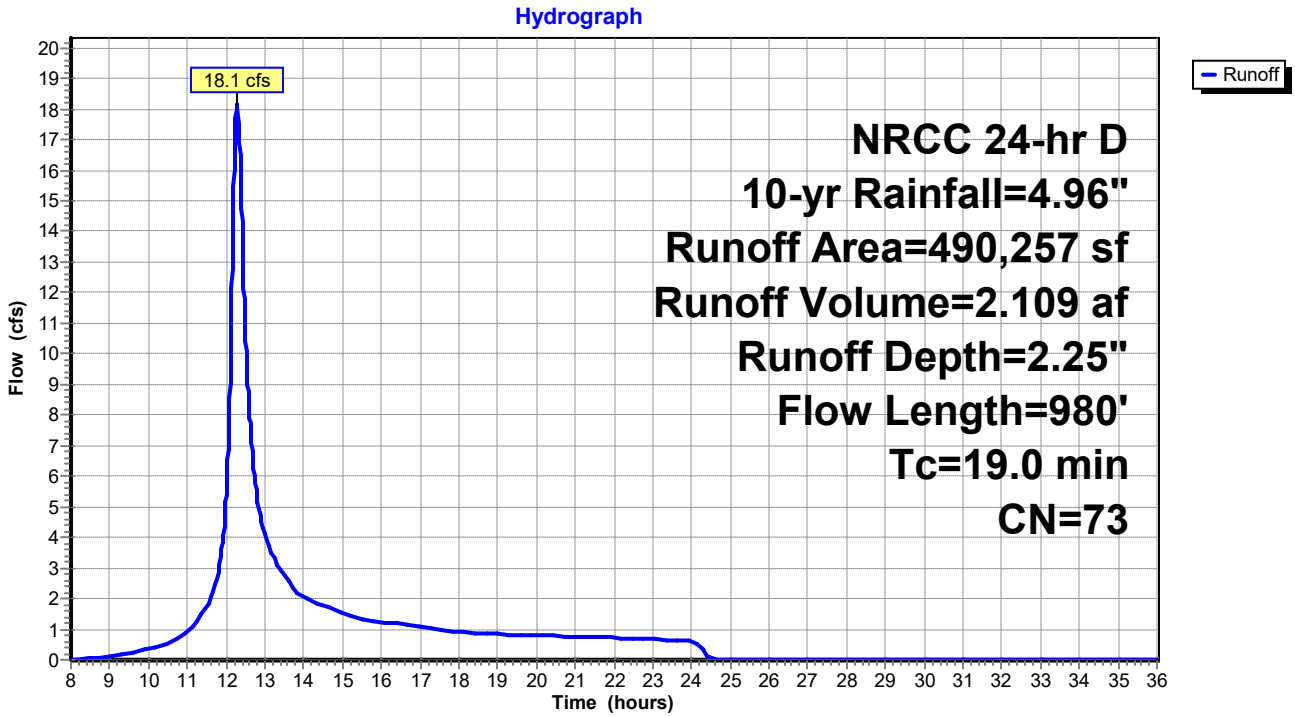
Runoff = 18.1 cfs @ 12.28 hrs, Volume= 2.109 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-yr Rainfall=4.96"

Area (sf)	CN	Description
92,030	98	Paved parking, HSG B
11,640	98	Roofs, HSG B
52,050	61	>75% Grass cover, Good, HSG B
39,270	79	Woods, Fair, HSG D
144,065	73	Woods, Fair, HSG C
151,202	60	Woods, Fair, HSG B
490,257	73	Weighted Average
386,587		78.85% Pervious Area
103,670		21.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0750	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.33"
6.6	880	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	980	Total			

Subcatchment Sub4: Sub Area 4



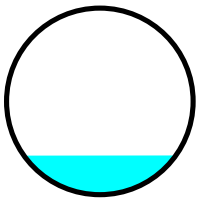
Summary for Reach Reach1: Exist. DMH - Exist. Flow Splitter #4

Inflow	=	2.0 cfs @	12.31 hrs,	Volume=	0.131 af
Outflow	=	2.0 cfs @	12.33 hrs,	Volume=	0.131 af, Atten= 1%, Lag= 0.9 min

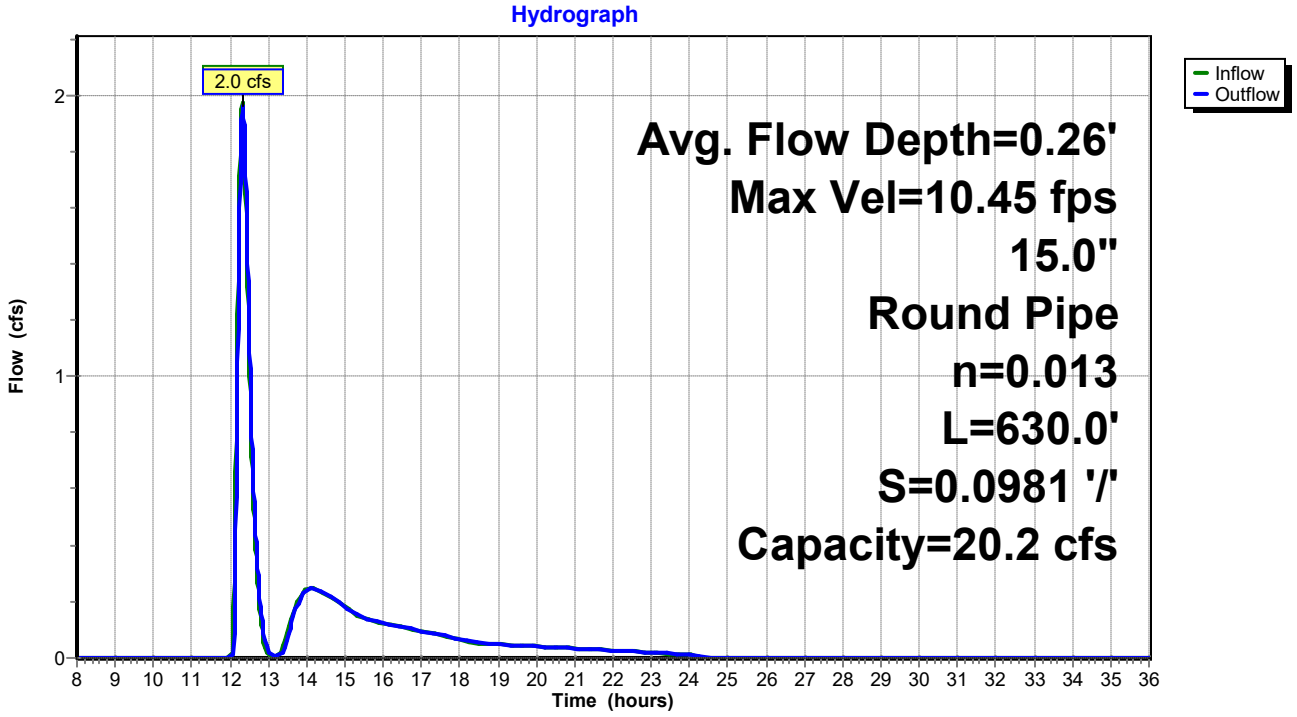
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Max. Velocity= 10.45 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 3.84 fps, Avg. Travel Time= 2.7 min

Peak Storage= 118 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 20.2 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 630.0' Slope= 0.0981 '/'
Inlet Invert= 623.27', Outlet Invert= 561.45'



Reach Reach1: Exist. DMH - Exist. Flow Splitter #4



Stage-Area-Storage for Reach Reach1: Exist. DMH - Exist. Flow Splitter #4

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
623.27	0.0	0
623.37	0.0	29
623.47	0.1	80
623.57	0.2	143
623.67	0.3	213
623.77	0.5	289
623.87	0.6	367
623.97	0.7	445
624.07	0.8	523
624.17	0.9	596
624.27	1.1	663
624.37	1.1	721
624.47	**1.2**	**763**

Summary for Pond DivMH 2: Proposed Diversion Manhole #2

Inflow Area =	0.633 ac, 65.27% Impervious, Inflow Depth = 3.33" for 10-yr event				
Inflow =	2.4 cfs @	12.12 hrs,	Volume=	0.176 af	
Outflow =	2.4 cfs @	12.12 hrs,	Volume=	0.176 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.8 cfs @	12.06 hrs,	Volume=	0.144 af	
Secondary =	0.7 cfs @	12.12 hrs,	Volume=	0.032 af	

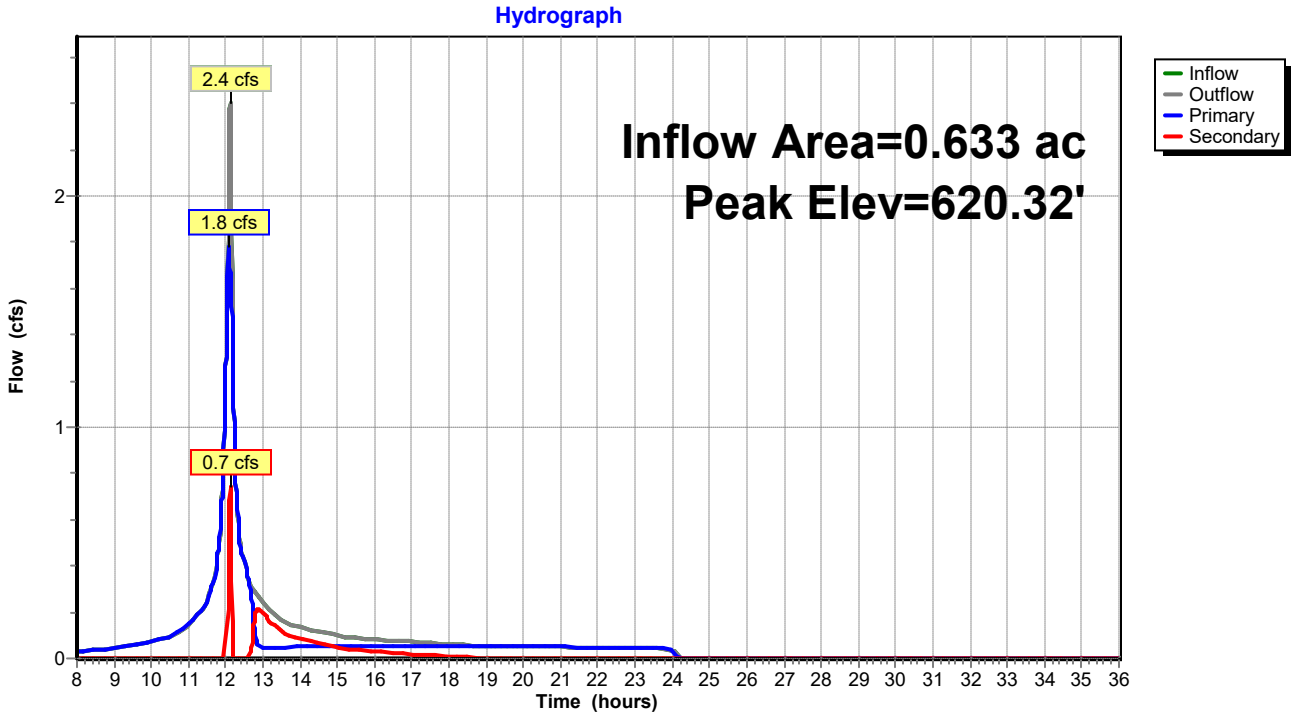
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 620.32' @ 12.12 hrs
Flood Elev= 620.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	618.00'	**8.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 618.00' / 617.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Secondary	618.00'	**15.0" Round Culvert** L= 439.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 618.00' / 582.22' S= 0.0815 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	620.20'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.8 cfs @ 12.06 hrs HW=620.23' TW=618.56' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.8 cfs @ 5.07 fps)

Secondary OutFlow Max=0.7 cfs @ 12.12 hrs HW=620.32' TW=581.32' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.7 cfs of 7.7 cfs potential flow)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 0.7 cfs @ 0.99 fps)

Pond DivMH 2: Proposed Diversion Manhole #2



Stage-Area-Storage for Pond DivMH 2: Proposed Diversion Manhole #2

Elevation (feet)	Storage (cubic-feet)
618.00	**0**
618.10	0
618.20	0
618.30	0
618.40	0
618.50	0
618.60	0
618.70	0
618.80	0
618.90	0
619.00	0
619.10	0
619.20	0
619.30	0
619.40	0
619.50	0
619.60	0
619.70	0
619.80	0
619.90	0
620.00	0
620.10	0
620.20	0
620.30	0
620.40	0
620.50	0

Summary for Pond DivMH1: Proposed Diversion Manhole #1

Inflow Area =	1.843 ac, 30.68% Impervious, Inflow Depth = 2.59" for 10-yr event			
Inflow =	3.3 cfs @ 12.31 hrs, Volume=	0.398 af		
Outflow =	3.3 cfs @ 12.31 hrs, Volume=	0.398 af, Atten= 0%, Lag= 0.0 min		
Primary =	1.3 cfs @ 12.11 hrs, Volume=	0.267 af		
Secondary =	2.0 cfs @ 12.31 hrs, Volume=	0.131 af		

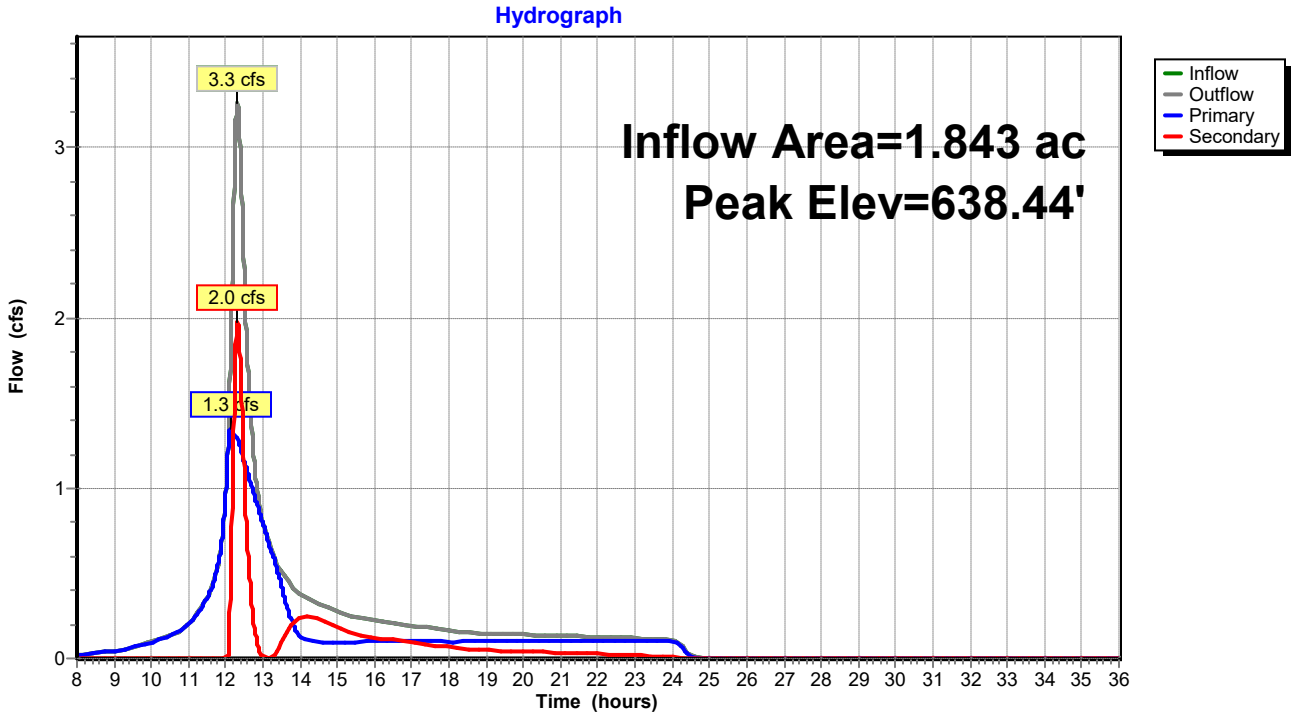
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 638.44' @ 12.31 hrs
Flood Elev= 639.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	635.80'	**6.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 635.80' / 635.50' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Secondary	635.80'	**15.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 635.80' / 633.50' S= 0.0460 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	638.20'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.3 cfs @ 12.11 hrs HW=638.27' TW=636.01' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.3 cfs @ 6.87 fps)

Secondary OutFlow Max=2.0 cfs @ 12.31 hrs HW=638.44' TW=623.53' (Dynamic Tailwater)
└─**2=Culvert** (Passes 2.0 cfs of 8.4 cfs potential flow)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 2.0 cfs @ 1.38 fps)

Pond DivMH1: Proposed Diversion Manhole #1



Stage-Area-Storage for Pond DivMH1: Proposed Diversion Manhole #1

Elevation (feet)	Storage (cubic-feet)
635.80	**0**
635.90	0
636.00	0
636.10	0
636.20	0
636.30	0
636.40	0
636.50	0
636.60	0
636.70	0
636.80	0
636.90	0
637.00	0
637.10	0
637.20	0
637.30	0
637.40	0
637.50	0
637.60	0
637.70	0
637.80	0
637.90	0
638.00	0
638.10	0
638.20	0
638.30	0
638.40	0
638.50	0
638.60	0
638.70	0
638.80	0
638.90	0
639.00	0

Summary for Pond DMH 27: Existing DMH 27

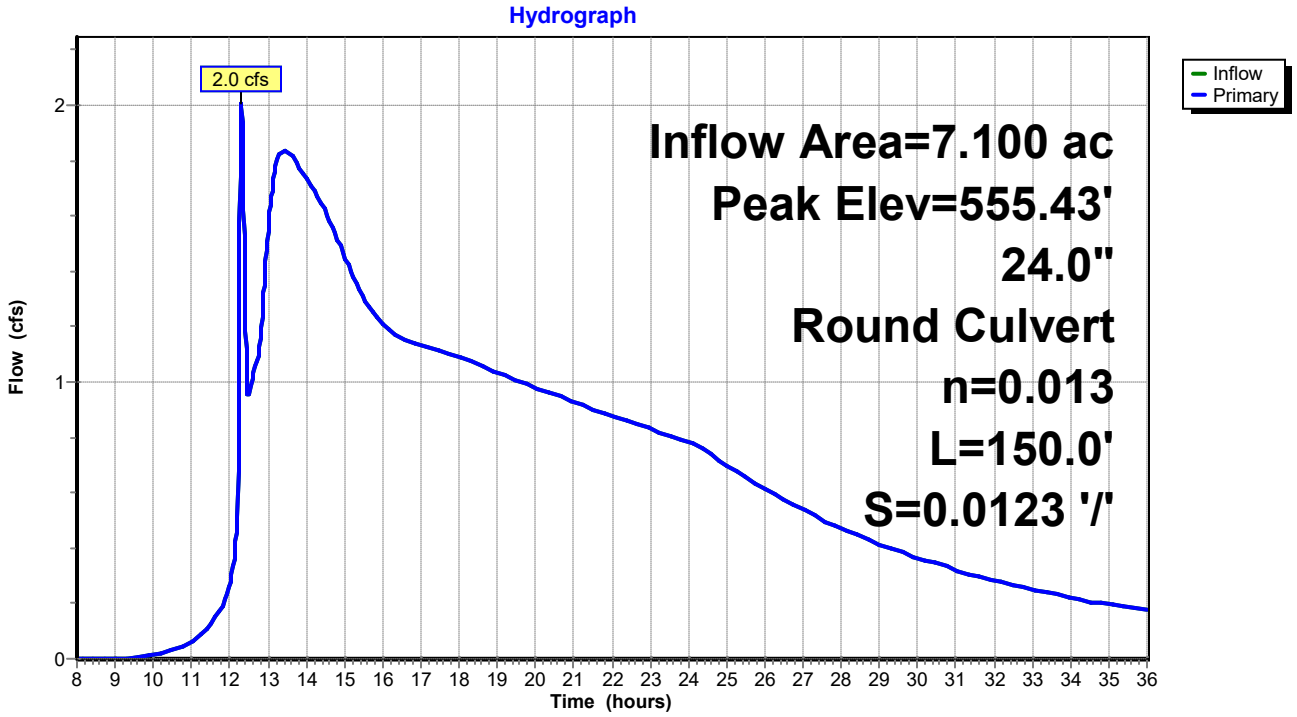
Inflow Area =	7.100 ac, 42.58% Impervious, Inflow Depth = 2.85" for 10-yr event				
Inflow =	2.0 cfs @	12.31 hrs,	Volume=	1.687 af	
Outflow =	2.0 cfs @	12.31 hrs,	Volume=	1.687 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.0 cfs @	12.31 hrs,	Volume=	1.687 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 555.43' @ 12.31 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	554.84'	**24.0" Round Culvert** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 554.84' / 553.00' S= 0.0123 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=2.0 cfs @ 12.31 hrs HW=555.43' TW=552.14' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.0 cfs @ 2.61 fps)

Pond DMH 27: Existing DMH 27



Stage-Area-Storage for Pond DMH 27: Existing DMH 27

Elevation (feet)	Storage (cubic-feet)
554.84	**0**
554.94	0
555.04	0
555.14	0
555.24	0
555.34	0
555.44	0
555.54	0
555.64	0
555.74	0
555.84	0
555.94	0
556.04	0
556.14	0
556.24	0
556.34	0
556.44	0
556.54	0
556.64	0
556.74	0
556.84	0

Summary for Pond DMH 45: Existing DMH 45

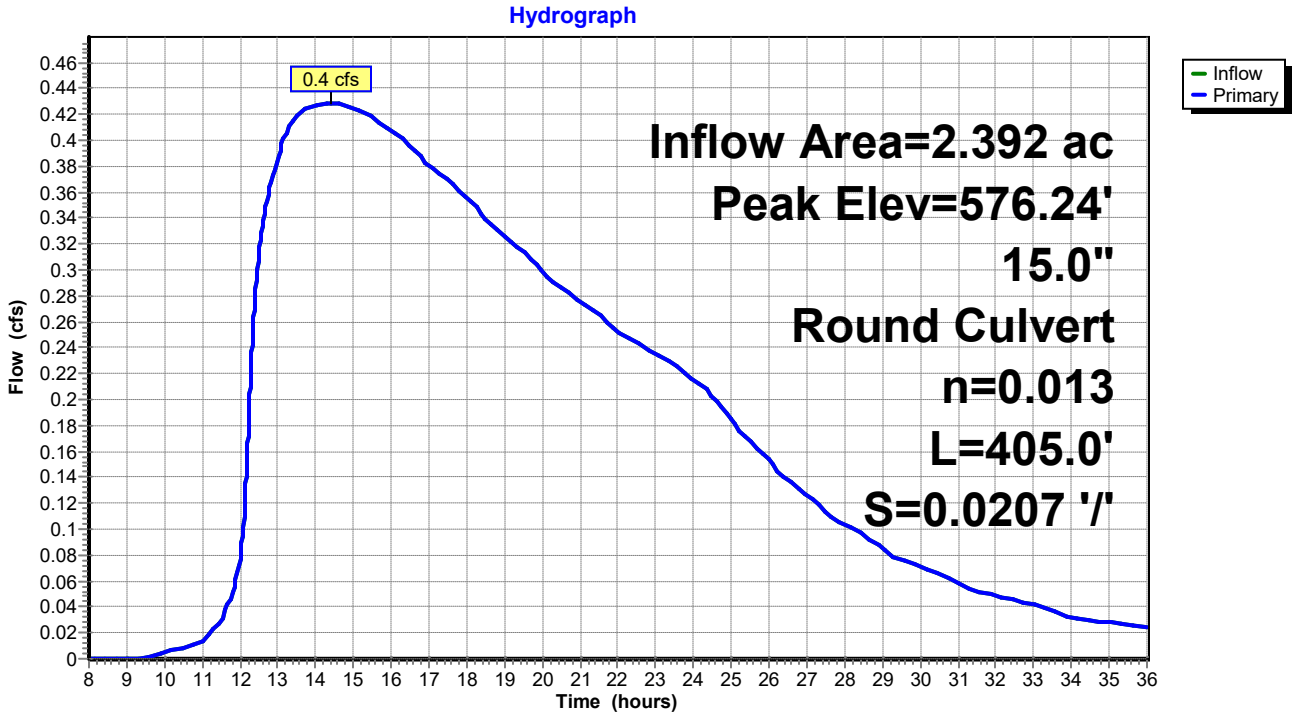
Inflow Area =	2.392 ac, 31.54% Impervious, Inflow Depth = 2.17" for 10-yr event				
Inflow =	0.4 cfs @	14.39 hrs,	Volume=	0.432 af	
Outflow =	0.4 cfs @	14.39 hrs,	Volume=	0.432 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.4 cfs @	14.39 hrs,	Volume=	0.432 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 576.24' @ 14.39 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	575.94'	**15.0" Round Culvert** L= 405.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 575.94' / 567.57' S= 0.0207 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.4 cfs @ 14.39 hrs HW=576.24' TW=555.37' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.4 cfs @ 1.87 fps)

Pond DMH 45: Existing DMH 45



Stage-Area-Storage for Pond DMH 45: Existing DMH 45

Elevation (feet)	Storage (cubic-feet)
575.94	**0**
576.04	0
576.14	0
576.24	0
576.34	0
576.44	0
576.54	0
576.64	0
576.74	0
576.84	0
576.94	0
577.04	0
577.14	0

Summary for Pond EDB #2: Existing Detention Basin #2

Inflow Area = 13.320 ac, 22.69% Impervious, Inflow Depth = 2.86" for 10-yr event
Inflow = 13.2 cfs @ 12.15 hrs, Volume= 3.174 af
Outflow = 4.0 cfs @ 13.07 hrs, Volume= 3.171 af, Atten= 70%, Lag= 55.3 min
Primary = 4.0 cfs @ 13.07 hrs, Volume= 3.171 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Starting Elev= 551.00' Surf.Area= 17,383 sf Storage= 61,331 cf
Peak Elev= 552.42' @ 13.07 hrs Surf.Area= 20,964 sf Storage= 88,671 cf (27,340 cf above start)

Plug-Flow detention time= 858.9 min calculated for 1.763 af (56% of inflow)
Center-of-Mass det. time= 181.9 min (1,299.3 - 1,117.4)

Volume	Invert	Avail.Storage	Storage Description
#1	546.00'	237,385 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

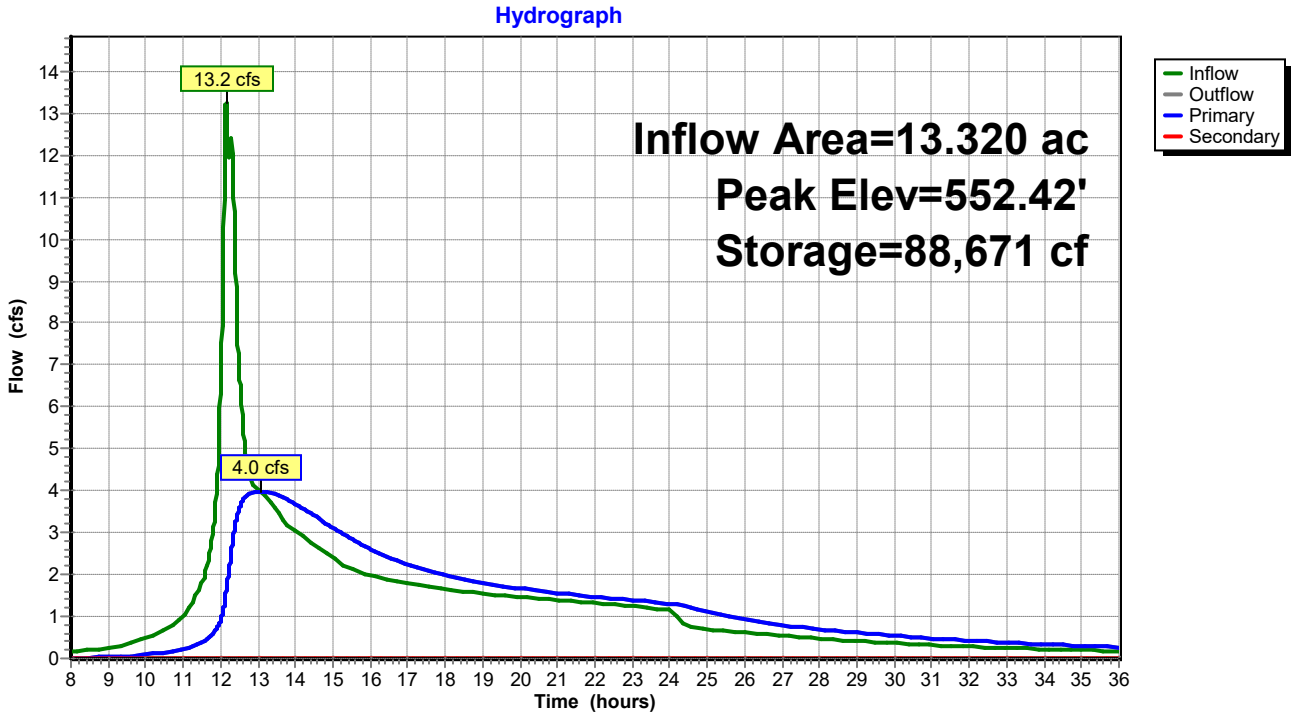
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
546.00	8,325	0	0
548.00	11,185	19,510	19,510
550.00	14,630	25,815	45,325
552.00	20,135	34,765	80,090
554.00	24,105	44,240	124,330
556.00	28,250	52,355	176,685
558.00	32,450	60,700	237,385

Device	Routing	Invert	Outlet Devices
#1	Primary	550.50'	**24.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 550.50' / 549.60' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	551.00'	**20.0 deg x 0.5' long x 4.50' rise Sharp-Crested Vee/Trap Weir** Cv= 2.69 (C= 3.36)
#3	Secondary	555.50'	**30.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.0 cfs @ 13.07 hrs HW=552.42' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 4.0 cfs of 14.6 cfs potential flow)
└─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 4.0 cfs @ 3.74 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=551.00' TW=0.00' (Dynamic Tailwater)
└─**3=Orifice/Grate** (Controls 0.0 cfs)

Pond EDB #2: Existing Detention Basin #2



Stage-Area-Storage for Pond EDB #2: Existing Detention Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
546.00	8,325	0	550.68	16,502	55,910
546.09	8,454	755	550.77	16,749	57,406
546.18	8,582	1,522	550.86	16,997	58,925
546.27	8,711	2,300	550.95	17,245	60,466
546.36	8,840	3,090	551.04	17,493	62,029
546.45	8,969	3,891	551.13	17,740	63,614
546.54	9,097	4,704	551.22	17,988	65,222
546.63	9,226	5,529	551.31	18,236	66,852
546.72	9,355	6,365	551.40	18,483	68,504
546.81	9,483	7,212	551.49	18,731	70,179
546.90	9,612	8,072	551.58	18,979	71,876
546.99	9,741	8,943	551.67	19,227	73,595
547.08	9,869	9,825	551.76	19,474	75,337
547.17	9,998	10,719	551.85	19,722	77,101
547.26	10,127	11,625	551.94	19,970	78,887
547.35	10,256	12,542	552.03	20,195	80,695
547.44	10,384	13,471	552.12	20,373	82,520
547.53	10,513	14,411	552.21	20,552	84,362
547.62	10,642	15,363	552.30	20,730	86,220
547.71	10,770	16,326	552.39	20,909	88,094
547.80	10,899	17,302	552.48	21,088	89,983
547.89	11,028	18,288	552.57	21,266	91,889
547.98	11,156	19,287	552.66	21,445	93,811
548.07	11,306	20,297	552.75	21,624	95,750
548.16	11,461	21,322	552.84	21,802	97,704
548.25	11,616	22,360	552.93	21,981	99,674
548.34	11,771	23,412	553.02	22,160	101,660
548.43	11,926	24,479	553.11	22,338	103,663
548.52	12,081	25,559	553.20	22,517	105,681
548.61	12,236	26,653	553.29	22,696	107,716
548.70	12,391	27,762	553.38	22,874	109,766
548.79	12,546	28,884	553.47	23,053	111,833
548.88	12,701	30,020	553.56	23,232	113,916
548.97	12,856	31,170	553.65	23,410	116,015
549.06	13,011	32,334	553.74	23,589	118,130
549.15	13,166	33,512	553.83	23,768	120,261
549.24	13,321	34,704	553.92	23,946	122,408
549.33	13,476	35,910	554.01	24,126	124,571
549.42	13,631	37,129	554.10	24,312	126,751
549.51	13,786	38,363	554.19	24,499	128,947
549.60	13,941	39,611	554.28	24,685	131,161
549.69	14,096	40,872	554.37	24,872	133,391
549.78	14,251	42,148	554.46	25,058	135,638
549.87	14,406	43,438	554.55	25,245	137,901
549.96	14,561	44,741	554.64	25,431	140,182
550.05	14,768	46,060	554.73	25,618	142,479
550.14	15,015	47,400	554.82	25,804	144,793
550.23	15,263	48,763	554.91	25,991	147,124
550.32	15,511	50,148	555.00	26,178	149,471
550.41	15,759	51,555	555.09	26,364	151,836
550.50	16,006	52,984	555.18	26,551	154,217
550.59	16,254	54,436	555.27	26,737	156,615

Stage-Area-Storage for Pond EDB #2: Existing Detention Basin #2 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
555.36	26,924	159,029
555.45	27,110	161,461
555.54	27,297	163,909
555.63	27,483	166,374
555.72	27,670	168,856
555.81	27,856	171,355
555.90	28,043	173,870
555.99	28,229	176,403
556.08	28,418	178,952
556.17	28,607	181,518
556.26	28,796	184,101
556.35	28,985	186,701
556.44	29,174	189,318
556.53	29,363	191,952
556.62	29,552	194,604
556.71	29,741	197,272
556.80	29,930	199,957
556.89	30,119	202,659
556.98	30,308	205,378
557.07	30,497	208,115
557.16	30,686	210,868
557.25	30,875	213,638
557.34	31,064	216,425
557.43	31,253	219,230
557.52	31,442	222,051
557.61	31,631	224,889
557.70	31,820	227,745
557.79	32,009	230,617
557.88	32,198	233,506
557.97	**32,387**	**236,412**

Summary for Pond FS 3: Existing Flow Splitter #3

Inflow Area =	4.150 ac,	0.00% Impervious,	Inflow Depth =	2.59"	for 10-yr event
Inflow =	7.8 cfs @	12.28 hrs,	Volume=	0.896 af	
Outflow =	7.8 cfs @	12.28 hrs,	Volume=	0.896 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.0 cfs @	0.00 hrs,	Volume=	0.000 af	
Secondary =	7.8 cfs @	12.28 hrs,	Volume=	0.896 af	

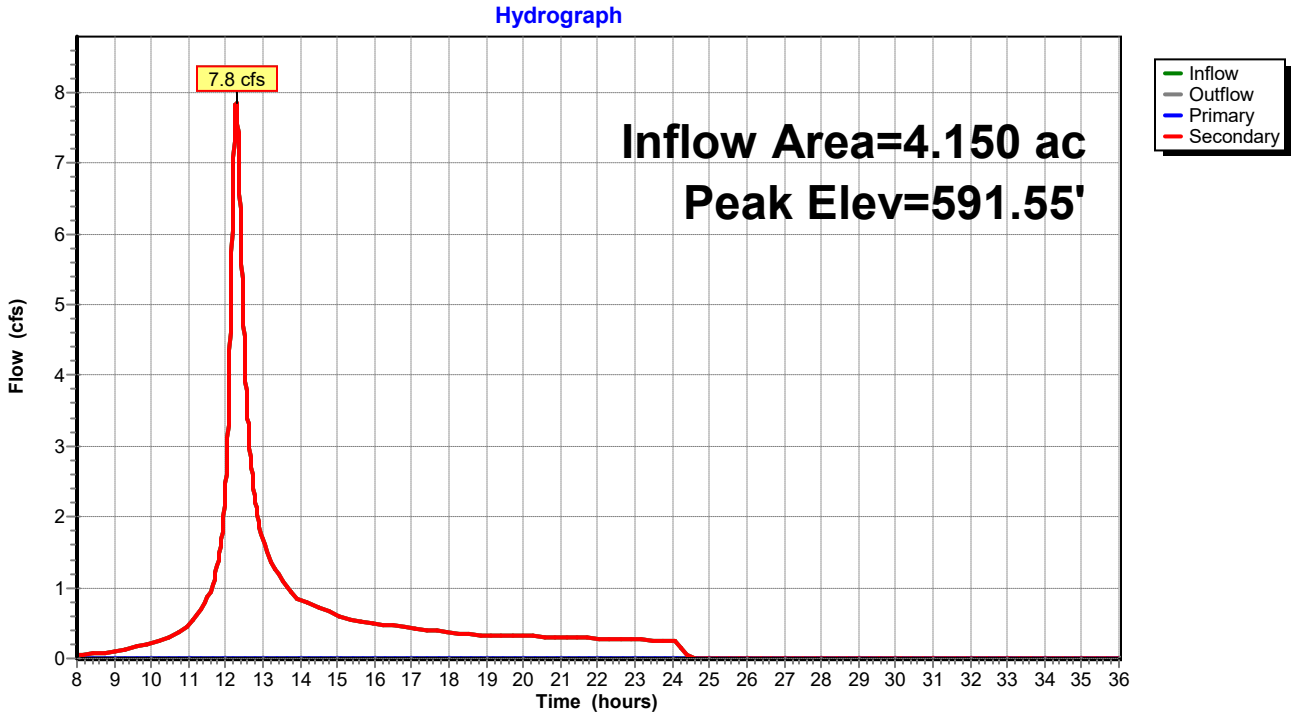
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 591.55' @ 12.28 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	591.20'	**15.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 591.20' / 591.00' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	593.60'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Secondary	590.30'	**24.0" Round Culvert** L= 320.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 590.30' / 552.00' S= 0.1197 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.30' TW=590.00' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.0 cfs)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Secondary OutFlow Max=7.8 cfs @ 12.28 hrs HW=591.55' TW=552.08' (Dynamic Tailwater)
└─**3=Culvert** (Inlet Controls 7.8 cfs @ 3.80 fps)

Pond FS 3: Existing Flow Splitter #3



Stage-Area-Storage for Pond FS 3: Existing Flow Splitter #3

Elevation (feet)	Storage (cubic-feet)
590.30	**0**
590.40	0
590.50	0
590.60	0
590.70	0
590.80	0
590.90	0
591.00	0
591.10	0
591.20	0
591.30	0
591.40	0
591.50	0
591.60	0
591.70	0
591.80	0
591.90	0
592.00	0
592.10	0
592.20	0
592.30	0
592.40	0
592.50	0
592.60	0
592.70	0
592.80	0
592.90	0
593.00	0
593.10	0
593.20	0
593.30	0
593.40	0
593.50	0
593.60	0

Summary for Pond FS#4: Existing Flow Spilitter #4

Inflow Area =	4.707 ac, 48.19% Impervious, Inflow Depth = 3.28" for 10-yr event				
Inflow =	12.3 cfs @	12.26 hrs,	Volume=	1.288 af	
Outflow =	12.3 cfs @	12.26 hrs,	Volume=	1.288 af,	Atten= 0%, Lag= 0.0 min
Primary =	11.7 cfs @	12.23 hrs,	Volume=	1.178 af	
Secondary =	1.3 cfs @	12.30 hrs,	Volume=	0.111 af	

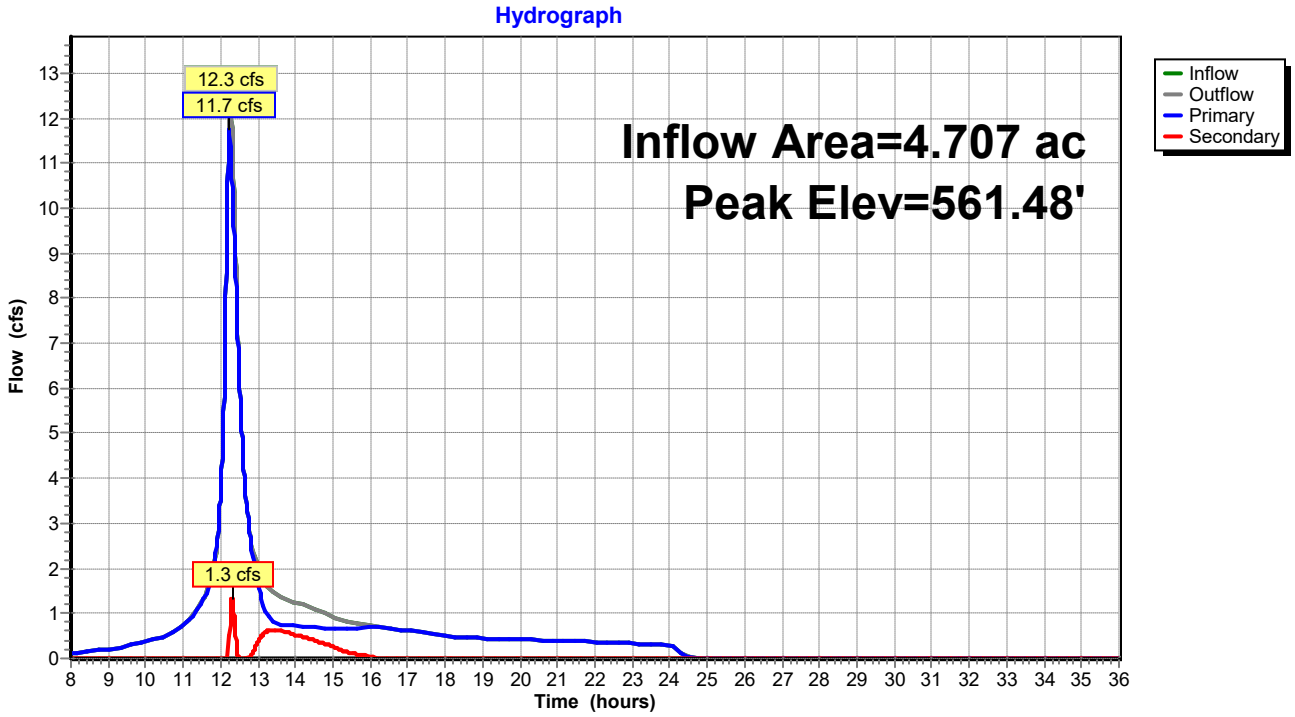
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 561.48' @ 12.30 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	558.25'	**18.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 558.25' / 556.80' S= 0.0659 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Secondary	558.15'	**24.0" Round Culvert** L= 61.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 558.15' / 554.84' S= 0.0543 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	561.30'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=11.7 cfs @ 12.23 hrs HW=561.33' TW=559.44' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 11.7 cfs @ 6.63 fps)

Secondary OutFlow Max=1.3 cfs @ 12.30 hrs HW=561.48' TW=555.43' (Dynamic Tailwater)
└─**2=Culvert** (Passes 1.3 cfs of 23.1 cfs potential flow)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 1.3 cfs @ 1.19 fps)

Pond FS#4: Existing Flow Spilitter #4



Stage-Area-Storage for Pond FS#4: Existing Flow Spilitter #4

Elevation (feet)	Storage (cubic-feet)
558.15	**0**
558.25	0
558.35	0
558.45	0
558.55	0
558.65	0
558.75	0
558.85	0
558.95	0
559.05	0
559.15	0
559.25	0
559.35	0
559.45	0
559.55	0
559.65	0
559.75	0
559.85	0
559.95	0
560.05	0
560.15	0
560.25	0
560.35	0
560.45	0
560.55	0
560.65	0
560.75	0
560.85	0
560.95	0
561.05	0
561.15	0
561.25	0
561.35	0
561.45	0

Summary for Pond FS#6: Existing Flow Splitter #6

Inflow Area =	2.392 ac, 31.54% Impervious, Inflow Depth = 2.17" for 10-yr event			
Inflow =	3.7 cfs @ 12.25 hrs, Volume=	0.432 af		
Outflow =	3.7 cfs @ 12.25 hrs, Volume=	0.432 af, Atten= 0%, Lag= 0.0 min		
Primary =	3.7 cfs @ 12.25 hrs, Volume=	0.432 af		
Secondary =	0.0 cfs @ 0.00 hrs, Volume=	0.000 af		

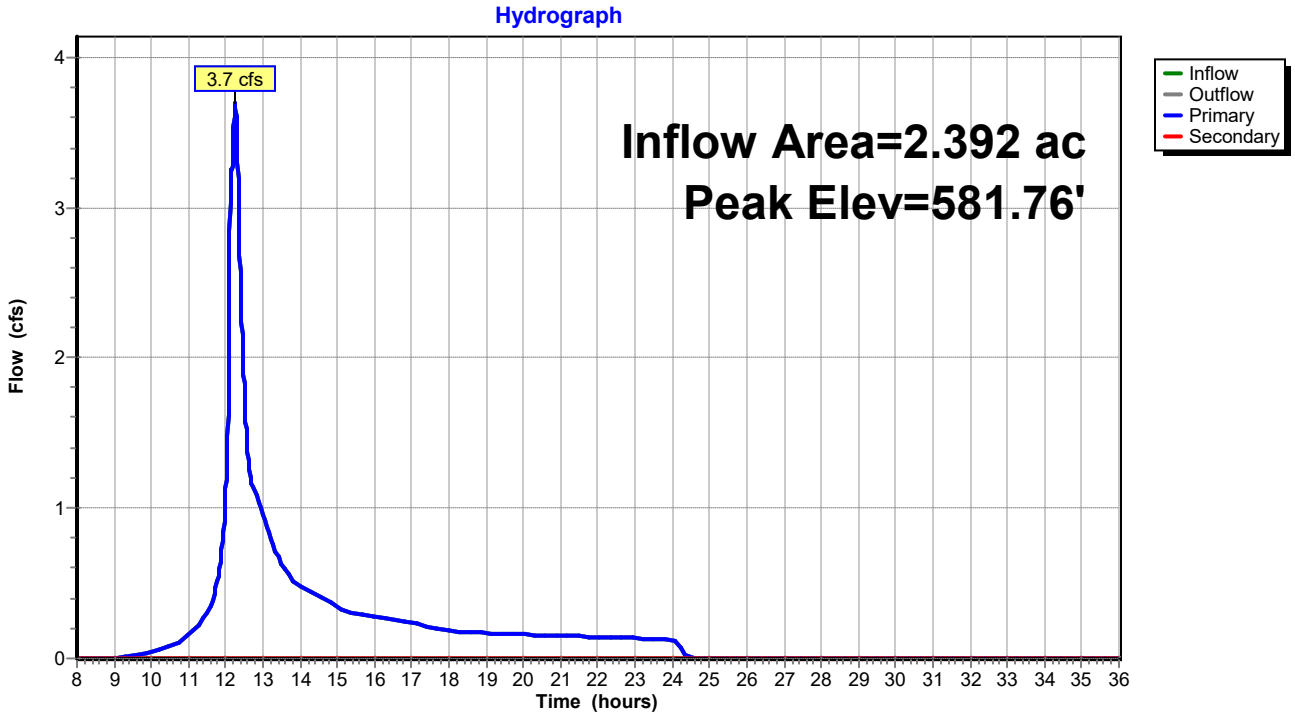
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 581.76' @ 14.37 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	580.30'	**15.0" Round Culvert** L= 39.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.30' / 580.00' S= 0.0077 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	580.47'	**15.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.47' / 579.59' S= 0.0220 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	582.25'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.7 cfs @ 12.25 hrs HW=581.44' TW=580.39' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 3.7 cfs @ 4.11 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=580.30' TW=575.94' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.0 cfs)
  └─**3=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond FS#6: Existing Flow Splitter #6



Stage-Area-Storage for Pond FS#6: Existing Flow Splitter #6

Elevation (feet)	Storage (cubic-feet)
580.30	**0**
580.40	0
580.50	0
580.60	0
580.70	0
580.80	0
580.90	0
581.00	0
581.10	0
581.20	0
581.30	0
581.40	0
581.50	0
581.60	0
581.70	0
581.80	0
581.90	0
582.00	0
582.10	0
582.20	0

Summary for Pond Inf 1: Infiltration System #1

Inflow Area = 1.843 ac, 30.68% Impervious, Inflow Depth = 1.74" for 10-yr event
Inflow = 1.3 cfs @ 12.11 hrs, Volume= 0.267 af
Outflow = 0.1 cfs @ 10.45 hrs, Volume= 0.267 af, Atten= 93%, Lag= 0.0 min
Discarded = 0.1 cfs @ 10.45 hrs, Volume= 0.267 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 638.25' @ 14.25 hrs Surf.Area= 0.066 ac Storage= 0.143 af

Plug-Flow detention time= 655.4 min calculated for 0.267 af (100% of inflow)
Center-of-Mass det. time= 655.5 min (1,520.3 - 864.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	635.00'	0.056 af	**30.50'W x 94.50'L x 3.54'H Field A** 0.234 af Overall - 0.095 af Embedded = 0.139 af x 40.0% Voids
#2A	635.50'	0.095 af	**Cultec R-330XLHD** x 78 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 6 rows
		0.151 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	635.00'	**1.500 in/hr Exfiltration over Horizontal area** Phase-In= 0.10'

Discarded OutFlow Max=0.1 cfs @ 10.45 hrs HW=635.11' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Pond Inf 1: Infiltration System #1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 6 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

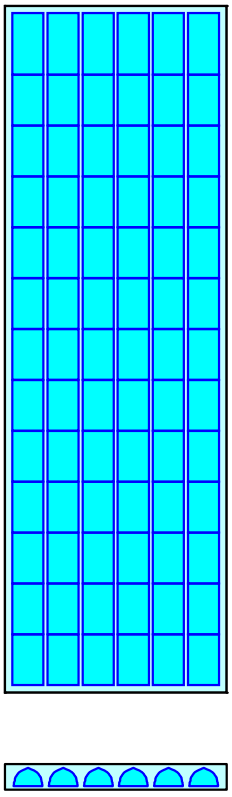
13 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 92.50' Row Length +12.0" End Stone x 2 = 94.50' Base Length
6 Rows x 52.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.50' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

78 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 6 Rows = 4,135.3 cf Chamber Storage

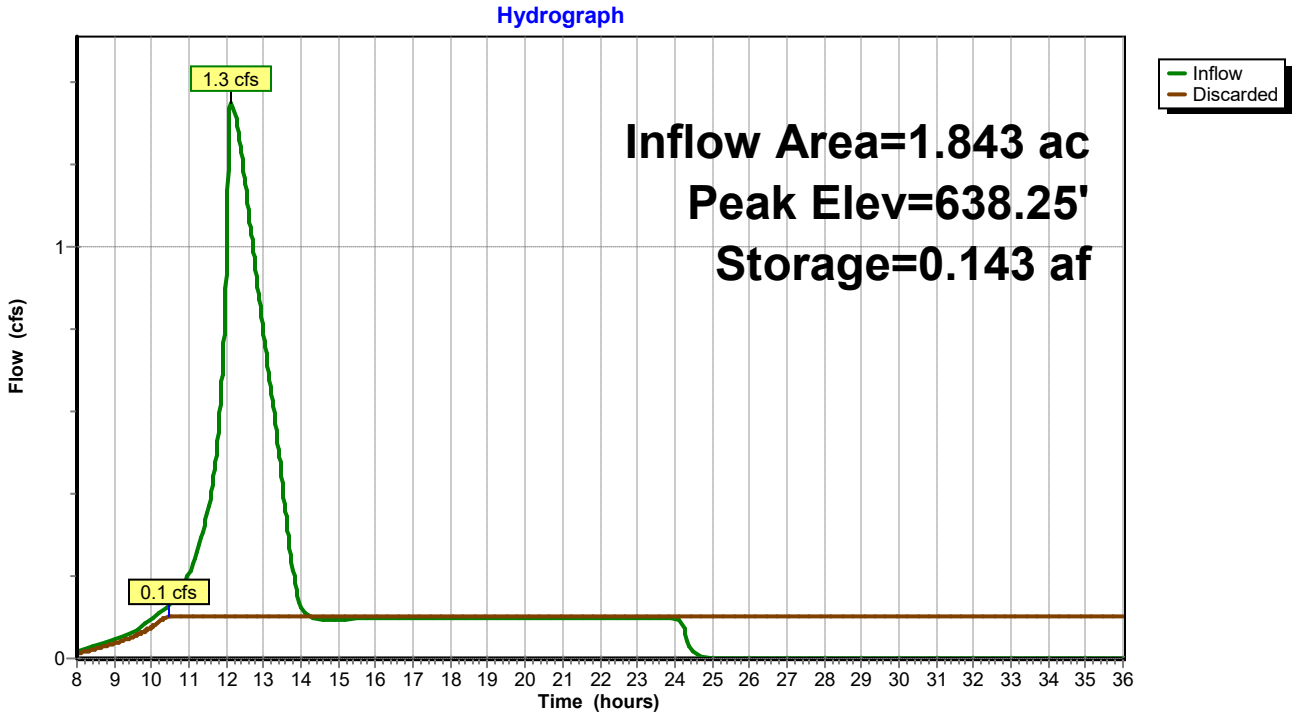
10,208.0 cf Field - 4,135.3 cf Chambers = 6,072.7 cf Stone x 40.0% Voids = 2,429.1 cf Stone Storage

Chamber Storage + Stone Storage = 6,564.4 cf = 0.151 af
Overall Storage Efficiency = 64.3%
Overall System Size = 94.50' x 30.50' x 3.54'

78 Chambers
378.1 cy Field
224.9 cy Stone



Pond Inf 1: Infiltration System #1



Stage-Area-Storage for Pond Inf 1: Infiltration System #1

Elevation (feet)	Horizontal (acres)	Storage (acre-feet)
635.00	**0.066**	0.000
635.10	0.066	0.003
635.20	0.066	0.005
635.30	0.066	0.008
635.40	0.066	0.011
635.50	0.066	0.013
635.60	0.066	0.019
635.70	0.066	0.025
635.80	0.066	0.030
635.90	0.066	0.036
636.00	0.066	0.041
636.10	0.066	0.047
636.20	0.066	0.052
636.30	0.066	0.058
636.40	0.066	0.063
636.50	0.066	0.069
636.60	0.066	0.074
636.70	0.066	0.079
636.80	0.066	0.085
636.90	0.066	0.090
637.00	0.066	0.095
637.10	0.066	0.100
637.20	0.066	0.105
637.30	0.066	0.110
637.40	0.066	0.114
637.50	0.066	0.119
637.60	0.066	0.123
637.70	0.066	0.127
637.80	0.066	0.130
637.90	0.066	0.134
638.00	0.066	0.136
638.10	0.066	0.139
638.20	0.066	0.142
638.30	0.066	0.144
638.40	0.066	0.147
638.50	0.066	**0.150**

Summary for Pond Inf 2: Infiltration System #2

Inflow Area = 0.633 ac, 65.27% Impervious, Inflow Depth = 2.73" for 10-yr event
Inflow = 1.8 cfs @ 12.06 hrs, Volume= 0.144 af
Outflow = 0.1 cfs @ 9.81 hrs, Volume= 0.144 af, Atten= 97%, Lag= 0.0 min
Discarded = 0.1 cfs @ 9.81 hrs, Volume= 0.144 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 620.25' @ 12.87 hrs Surf.Area= 0.035 ac Storage= 0.075 af

Plug-Flow detention time= 627.6 min calculated for 0.144 af (100% of inflow)
Center-of-Mass det. time= 627.7 min (1,449.1 - 821.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	617.00'	0.032 af	**25.67'W x 59.50'L x 3.71'H Field A** 0.130 af Overall - 0.049 af Embedded = 0.081 af x 40.0% Voids
#2A	617.50'	0.049 af	**Cultec R-330XLHD** x 40 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		0.082 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	617.00'	**1.500 in/hr Exfiltration over Horizontal area** Phase-In= 0.10'

Discarded OutFlow Max=0.1 cfs @ 9.81 hrs HW=617.11' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Pond Inf 2: Infiltration System #2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

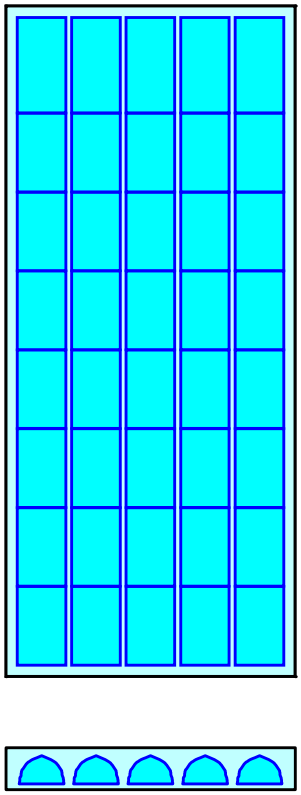
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +12.0" End Stone x 2 = 59.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Base + 30.5" Chamber Height + 8.0" Cover = 3.71' Field Height

40 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,142.2 cf Chamber Storage

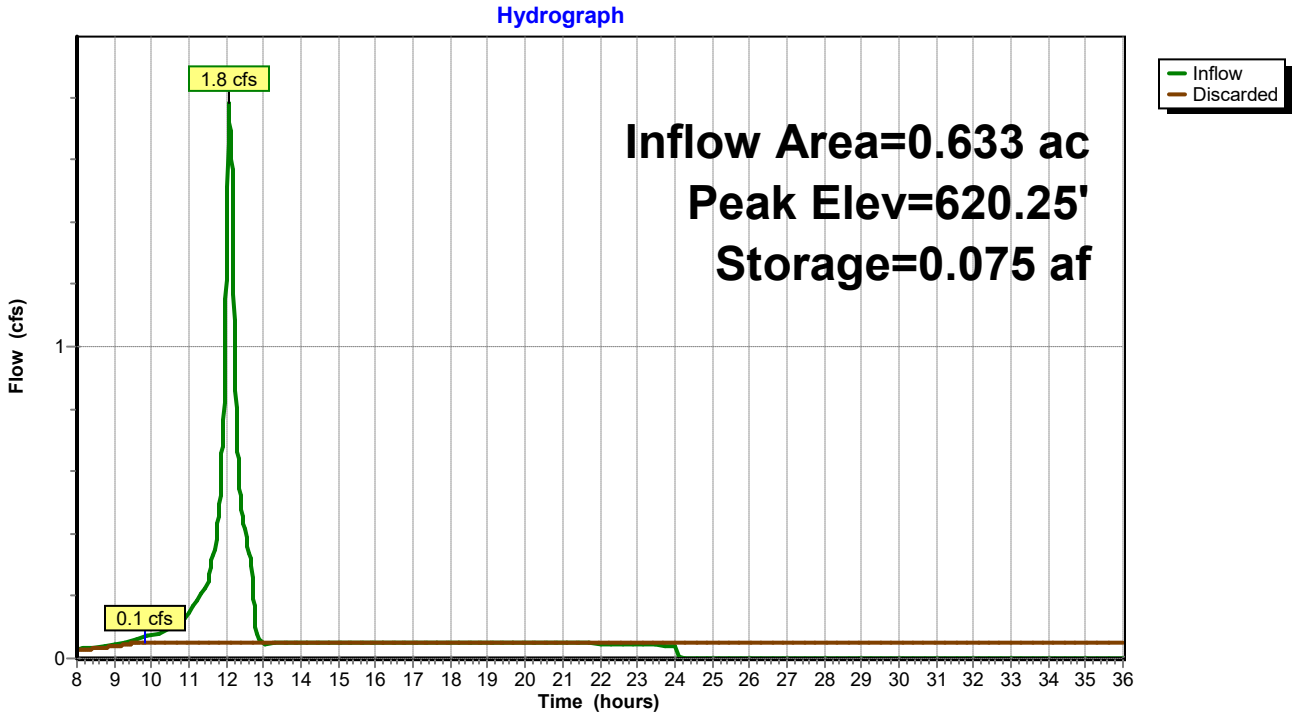
5,663.2 cf Field - 2,142.2 cf Chambers = 3,521.1 cf Stone x 40.0% Voids = 1,408.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,550.6 cf = 0.082 af
Overall Storage Efficiency = 62.7%
Overall System Size = 59.50' x 25.67' x 3.71'

40 Chambers
209.7 cy Field
130.4 cy Stone



Pond Inf 2: Infiltration System #2



Stage-Area-Storage for Pond Inf 2: Infiltration System #2

Elevation (feet)	Horizontal (acres)	Storage (acre-feet)
617.00	**0.035**	0.000
617.10	0.035	0.001
617.20	0.035	0.003
617.30	0.035	0.004
617.40	0.035	0.006
617.50	0.035	0.007
617.60	0.035	0.010
617.70	0.035	0.013
617.80	0.035	0.016
617.90	0.035	0.019
618.00	0.035	0.022
618.10	0.035	0.025
618.20	0.035	0.028
618.30	0.035	0.030
618.40	0.035	0.033
618.50	0.035	0.036
618.60	0.035	0.039
618.70	0.035	0.042
618.80	0.035	0.044
618.90	0.035	0.047
619.00	0.035	0.050
619.10	0.035	0.052
619.20	0.035	0.055
619.30	0.035	0.057
619.40	0.035	0.060
619.50	0.035	0.062
619.60	0.035	0.064
619.70	0.035	0.066
619.80	0.035	0.068
619.90	0.035	0.070
620.00	0.035	0.072
620.10	0.035	0.073
620.20	0.035	0.074
620.30	0.035	0.076
620.40	0.035	0.077
620.50	0.035	0.079
620.60	0.035	0.080
620.70	0.035	**0.081**

Summary for Pond SWQB 3: Existing SWQB #3

Inflow Area = 4.150 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 590.00' @ 0.00 hrs Surf.Area= 1,330 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	590.00'	33,910 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

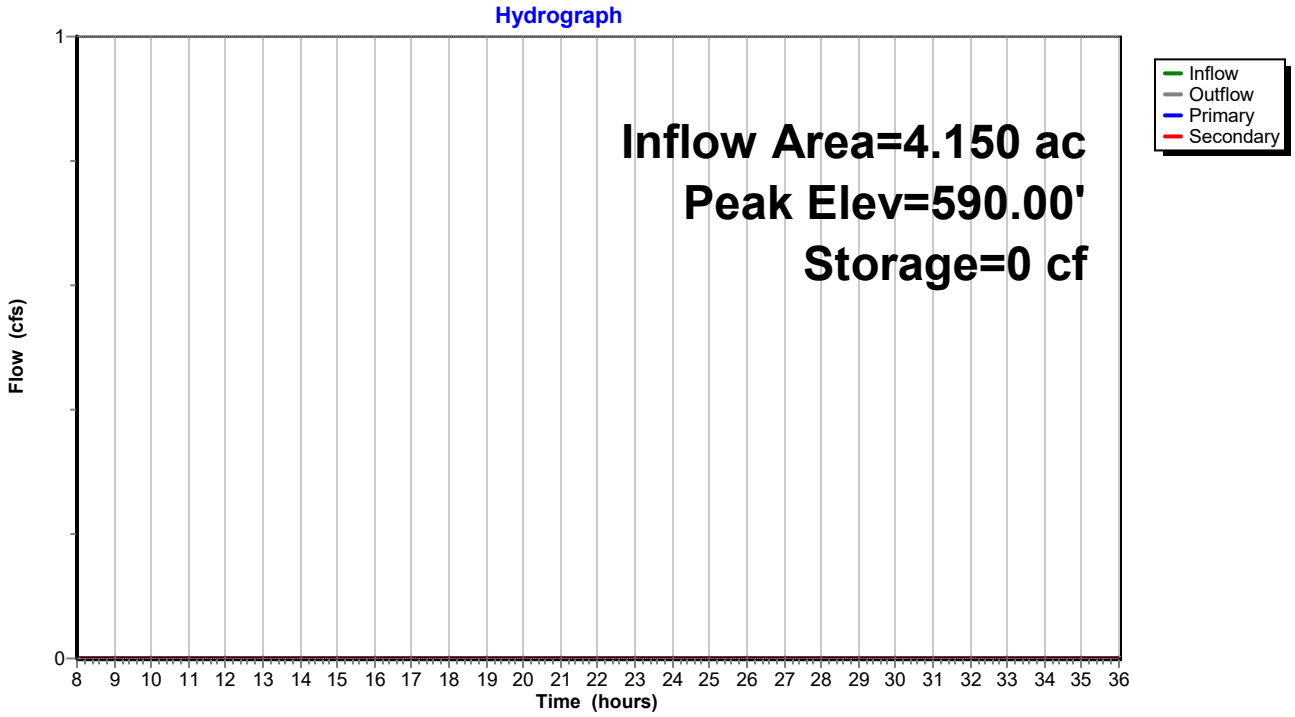
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
590.00	1,330	0	0
592.00	3,725	5,055	5,055
594.00	7,015	10,740	15,795
596.00	11,100	18,115	33,910

Device	Routing	Invert	Outlet Devices
#1	Primary	588.20'	**12.0" Round Culvert** L= 240.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 588.20' / 552.00' S= 0.1508 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	590.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	590.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 18 rows with 3.0" cc spacing C= 0.600
#4	Secondary	594.00'	**30.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.00' TW=551.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.0 cfs of 4.3 cfs potential flow)
  └─**2=Orifice/Grate** (Controls 0.0 cfs)
    └─**3=Orifice/Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.00' TW=551.00' (Dynamic Tailwater)
└─**4=Orifice/Grate** (Controls 0.0 cfs)

Pond SWQB 3: Existing SWQB #3



Stage-Area-Storage for Pond SWQB 3: Existing SWQB #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
590.00	1,330	0
590.10	1,450	139
590.20	1,570	290
590.30	1,689	453
590.40	1,809	628
590.50	1,929	815
590.60	2,049	1,014
590.70	2,168	1,224
590.80	2,288	1,447
590.90	2,408	1,682
591.00	2,528	1,929
591.10	2,647	2,187
591.20	2,767	2,458
591.30	2,887	2,741
591.40	3,006	3,036
591.50	3,126	3,342
591.60	3,246	3,661
591.70	3,366	3,991
591.80	3,485	4,334
591.90	3,605	4,688
592.00	3,725	5,055
592.10	3,890	5,436
592.20	4,054	5,833
592.30	4,218	6,247
592.40	4,383	6,677
592.50	4,548	7,123
592.60	4,712	7,586
592.70	4,877	8,066
592.80	5,041	8,561
592.90	5,205	9,074
593.00	5,370	9,603
593.10	5,535	10,148
593.20	5,699	10,709
593.30	5,863	11,288
593.40	6,028	11,882
593.50	6,193	12,493
593.60	6,357	13,121
593.70	6,522	13,765
593.80	6,686	14,425
593.90	6,850	15,102
594.00	7,015	15,795
594.10	7,219	16,507
594.20	7,424	17,239
594.30	7,628	17,991
594.40	7,832	18,764
594.50	8,036	19,558
594.60	8,241	20,372
594.70	8,445	21,206
594.80	8,649	22,061
594.90	8,853	22,936
595.00	9,058	23,831
595.10	9,262	24,747
595.20	9,466	25,684
595.30	9,670	26,640
595.40	9,874	27,618
595.50	10,079	28,615
595.60	10,283	29,633
595.70	10,487	30,672
595.80	10,691	31,731
595.90	10,896	32,810
596.00	**11,100**	**33,910**

Summary for Pond SWQB 4: Existing SWQB #4

Inflow Area = 4.707 ac, 48.19% Impervious, Inflow Depth = 3.00" for 10-yr event
Inflow = 11.7 cfs @ 12.23 hrs, Volume= 1.178 af
Outflow = 0.8 cfs @ 13.46 hrs, Volume= 1.145 af, Atten= 93%, Lag= 74.2 min
Primary = 0.8 cfs @ 13.46 hrs, Volume= 1.145 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 561.40' @ 13.46 hrs Surf.Area= 8,096 sf Storage= 27,991 cf

Plug-Flow detention time= 617.7 min calculated for 1.145 af (97% of inflow)
Center-of-Mass det. time= 602.0 min (1,457.6 - 855.7)

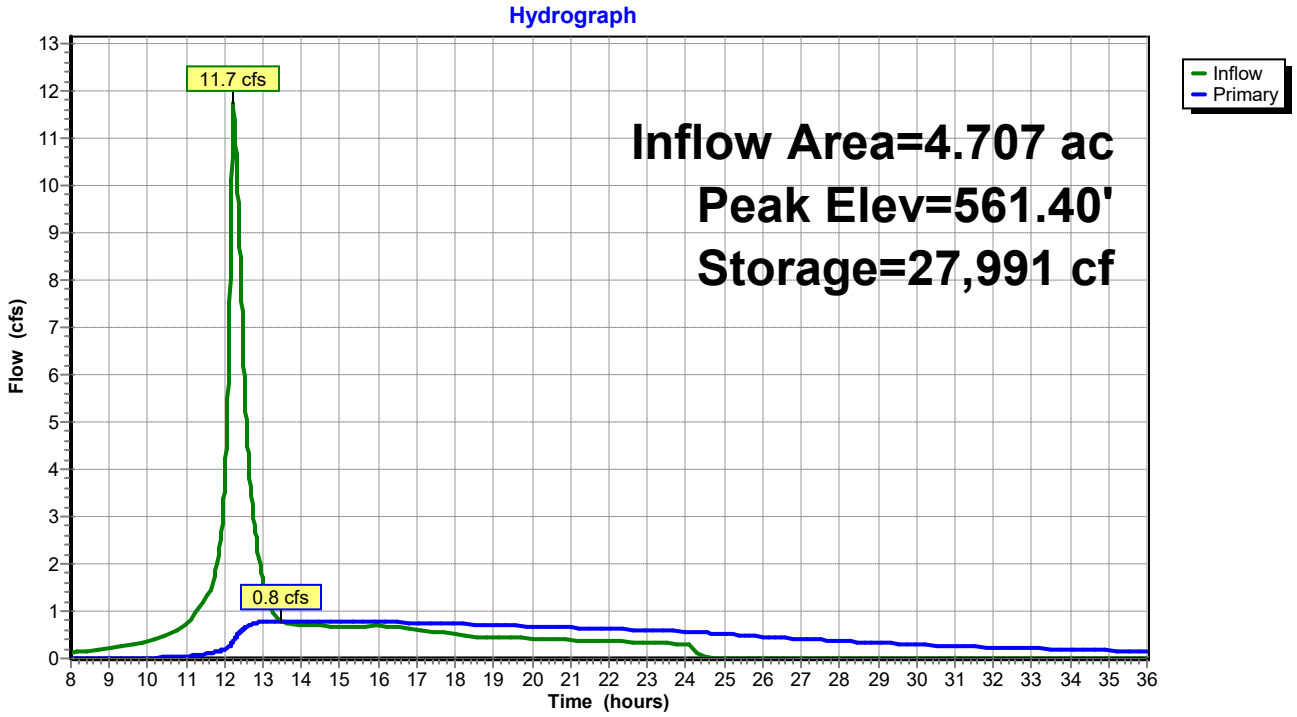
Volume	Invert	Avail.Storage	Storage Description
#1	556.00'	53,446 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
556.00	2,625	212.0	0	0	2,625
558.00	4,450	278.0	6,995	6,995	5,245
560.00	6,430	341.0	10,819	17,815	8,409
562.00	8,860	408.0	15,225	33,040	12,472
564.00	11,608	478.0	20,406	53,446	17,487

Device	Routing	Invert	Outlet Devices
#1	Primary	556.00'	**12.0" Round Culvert** L= 63.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 556.00' / 554.84' S= 0.0184 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	561.80'	**33.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	556.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	556.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 23 rows with 3.0" cc spacing C= 0.600

Primary OutFlow Max=0.8 cfs @ 13.46 hrs HW=561.40' TW=555.40' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.8 cfs of 8.0 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.0 cfs)
  └─**3=Orifice/Grate** (Passes 0.8 cfs of 0.9 cfs potential flow)
    └─**4=Orifice/Grate** (Orifice Controls 0.8 cfs @ 7.20 fps)

Pond SWQB 4: Existing SWQB #4



Stage-Area-Storage for Pond SWQB 4: Existing SWQB #4

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
556.00	2,625	0
556.10	2,705	266
556.20	2,786	541
556.30	2,868	824
556.40	2,952	1,115
556.50	3,036	1,414
556.60	3,122	1,722
556.70	3,209	2,039
556.80	3,298	2,364
556.90	3,387	2,698
557.00	3,478	3,041
557.10	3,569	3,394
557.20	3,663	3,755
557.30	3,757	4,126
557.40	3,852	4,507
557.50	3,949	4,897
557.60	4,047	5,296
557.70	4,146	5,706
557.80	4,246	6,126
557.90	4,347	6,555
558.00	4,450	6,995
558.10	4,540	7,445
558.20	4,632	7,903
558.30	4,724	8,371
558.40	4,817	8,848
558.50	4,911	9,334
558.60	5,006	9,830
558.70	5,102	10,336
558.80	5,198	10,851
558.90	5,296	11,375
559.00	5,395	11,910
559.10	5,494	12,454
559.20	5,594	13,009
559.30	5,696	13,573
559.40	5,798	14,148
559.50	5,901	14,733
559.60	6,005	15,328
559.70	6,110	15,934
559.80	6,216	16,550
559.90	6,322	17,177
560.00	6,430	17,815
560.10	6,542	18,463
560.20	6,656	19,123
560.30	6,770	19,794
560.40	6,885	20,477
560.50	7,001	21,171
560.60	7,118	21,877
560.70	7,236	22,595
560.80	7,355	23,325
560.90	7,475	24,066
561.00	7,596	24,820
561.10	7,718	25,585
561.20	7,841	26,363
561.30	7,965	27,154
561.40	8,090	27,957
561.50	8,216	28,772
561.60	8,343	29,600
561.70	8,471	30,440
561.80	8,600	31,294
561.90	8,729	32,160
562.00	8,860	33,040
562.10	8,989	33,932
562.20	9,118	34,838
562.30	9,249	35,756
562.40	9,380	36,687
562.50	9,512	37,632
562.60	9,645	38,590
562.70	9,780	39,561
562.80	9,915	40,546
562.90	10,051	41,544
563.00	10,188	42,556
563.10	10,326	43,582
563.20	10,464	44,621
563.30	10,604	45,675
563.40	10,745	46,742
563.50	10,886	47,823
563.60	11,029	48,919
563.70	11,172	50,029
563.80	11,317	51,154
563.90	11,462	52,293
564.00	**11,608**	**53,446**

Summary for Pond SWQB 4A: Existing SWQB #4A

Inflow Area = 2.392 ac, 31.54% Impervious, Inflow Depth = 2.17" for 10-yr event
Inflow = 3.7 cfs @ 12.25 hrs, Volume= 0.432 af
Outflow = 0.4 cfs @ 14.39 hrs, Volume= 0.432 af, Atten= 88%, Lag= 128.7 min
Primary = 0.4 cfs @ 14.39 hrs, Volume= 0.432 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Starting Elev= 578.50' Surf.Area= 1,337 sf Storage= 590 cf
Peak Elev= 581.75' @ 14.39 hrs Surf.Area= 4,123 sf Storage= 9,162 cf (8,572 cf above start)

Plug-Flow detention time= 366.9 min calculated for 0.418 af (97% of inflow)
Center-of-Mass det. time= 333.6 min (1,216.5 - 883.0)

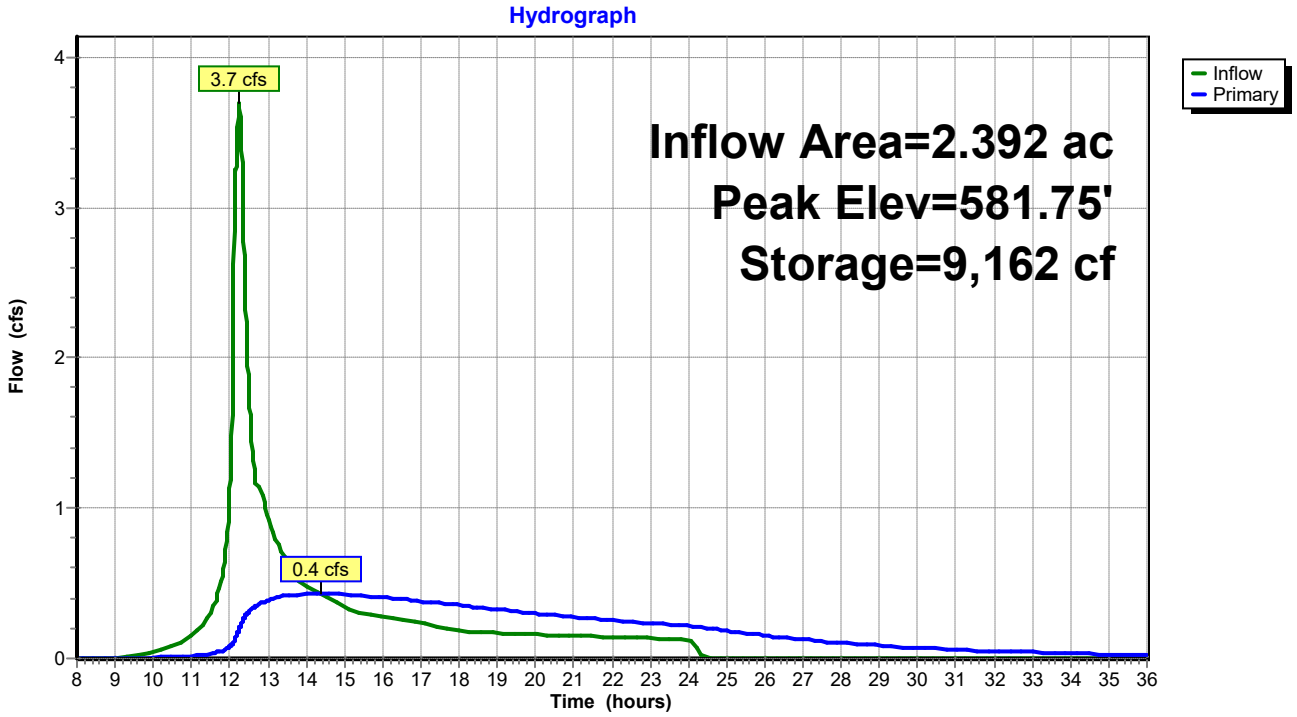
Volume	Invert	Avail.Storage	Storage Description
#1	578.00'	37,725 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
578.00	1,030	148.0	0	0	1,030
580.00	2,500	251.0	3,423	3,423	4,325
582.00	4,386	315.0	6,798	10,221	7,262
584.00	6,847	383.0	11,142	21,363	11,103
586.00	9,592	437.0	16,362	37,725	14,721

Device	Routing	Invert	Outlet Devices
#1	Primary	578.04'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 578.04' / 576.09' S= 0.0390 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	583.14'	**33.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	578.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	578.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 18 rows with 3.0" cc spacing C= 0.600

Primary OutFlow Max=0.4 cfs @ 14.39 hrs HW=581.75' TW=576.24' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.4 cfs of 6.8 cfs potential flow)
  - **2=Orifice/Grate** (Controls 0.0 cfs)
  - **3=Orifice/Grate** (Passes 0.4 cfs of 0.7 cfs potential flow)
    - **4=Orifice/Grate** (Orifice Controls 0.4 cfs @ 6.04 fps)

Pond SWQB 4A: Existing SWQB #4A



Stage-Area-Storage for Pond SWQB 4A: Existing SWQB #4A

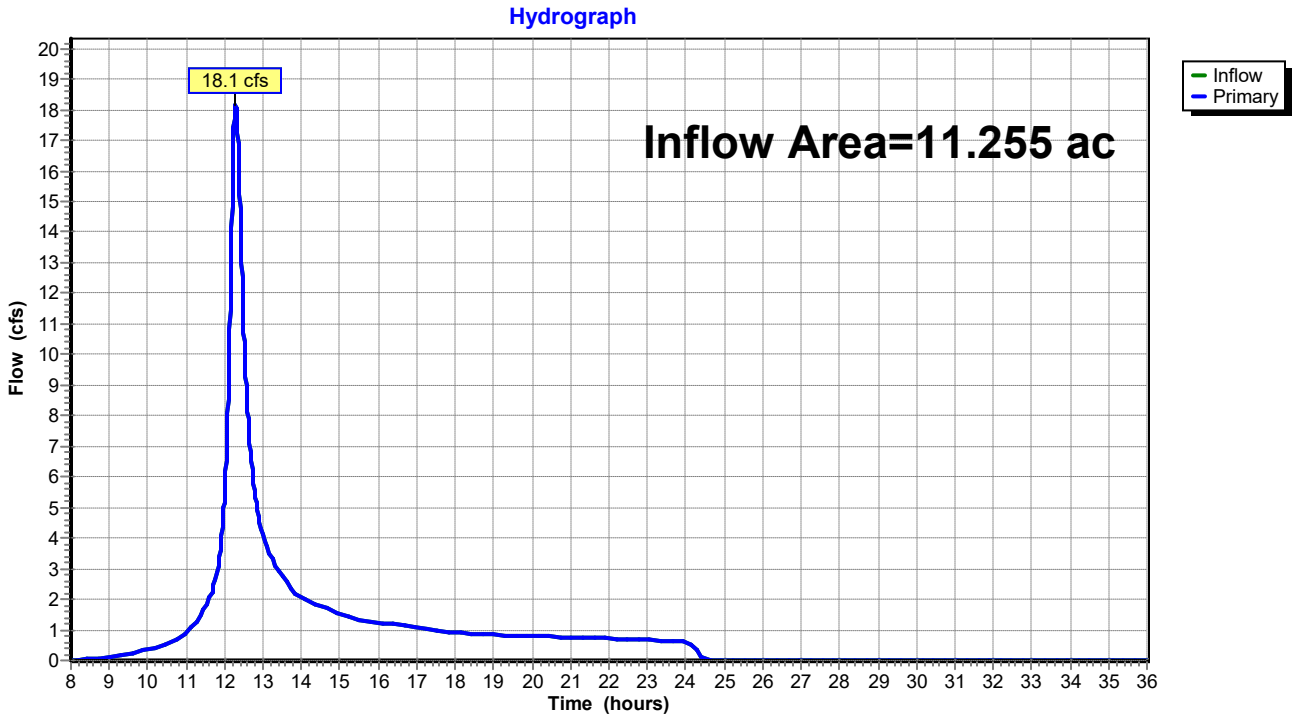
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
578.00	1,030	0
578.10	1,088	106
578.20	1,148	218
578.30	1,210	336
578.40	1,273	460
578.50	1,337	590
578.60	1,404	727
578.70	1,472	871
578.80	1,541	1,022
578.90	1,612	1,179
579.00	1,685	1,344
579.10	1,759	1,516
579.20	1,835	1,696
579.30	1,913	1,883
579.40	1,992	2,079
579.50	2,072	2,282
579.60	2,155	2,493
579.70	2,239	2,713
579.80	2,324	2,941
579.90	2,411	3,178
580.00	2,500	3,423
580.10	2,582	3,677
580.20	2,665	3,940
580.30	2,749	4,210
580.40	2,835	4,489
580.50	2,922	4,777
580.60	3,011	5,074
580.70	3,100	5,379
580.80	3,191	5,694
580.90	3,284	6,018
581.00	3,377	6,351
581.10	3,472	6,693
581.20	3,568	7,045
581.30	3,666	7,407
581.40	3,765	7,778
581.50	3,865	8,160
581.60	3,967	8,552
581.70	4,070	8,953
581.80	4,174	9,365
581.90	4,279	9,788
582.00	4,386	10,221
582.10	4,496	10,665
582.20	4,608	11,121
582.30	4,720	11,587
582.40	4,835	12,065
582.50	4,950	12,554
582.60	5,067	13,055
582.70	5,185	13,567
582.80	5,305	14,092
582.90	5,426	14,628
583.00	5,548	15,177
583.10	5,672	15,738
583.20	5,797	16,312
583.30	5,924	16,898
583.40	6,051	17,496
583.50	6,181	18,108
583.60	6,311	18,732
583.70	6,443	19,370
583.80	6,576	20,021
583.90	6,711	20,685
584.00	6,847	21,363
584.10	6,973	22,054
584.20	7,101	22,758
584.30	7,229	23,475
584.40	7,359	24,204
584.50	7,490	24,946
584.60	7,622	25,702
584.70	7,755	26,471
584.80	7,890	27,253
584.90	8,025	28,049
585.00	8,162	28,858
585.10	8,300	29,681
585.20	8,439	30,518
585.30	8,579	31,369
585.40	8,720	32,234
585.50	8,862	33,113
585.60	9,006	34,006
585.70	9,151	34,914
585.80	9,297	35,837
585.90	9,444	36,774
586.00	**9,592**	**37,725**

Summary for Link DL1: Design Line 1

Inflow Area = 11.255 ac, 21.15% Impervious, Inflow Depth = 2.25" for 10-yr event
Inflow = 18.1 cfs @ 12.28 hrs, Volume= 2.109 af
Primary = 18.1 cfs @ 12.28 hrs, Volume= 2.109 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DL1: Design Line 1

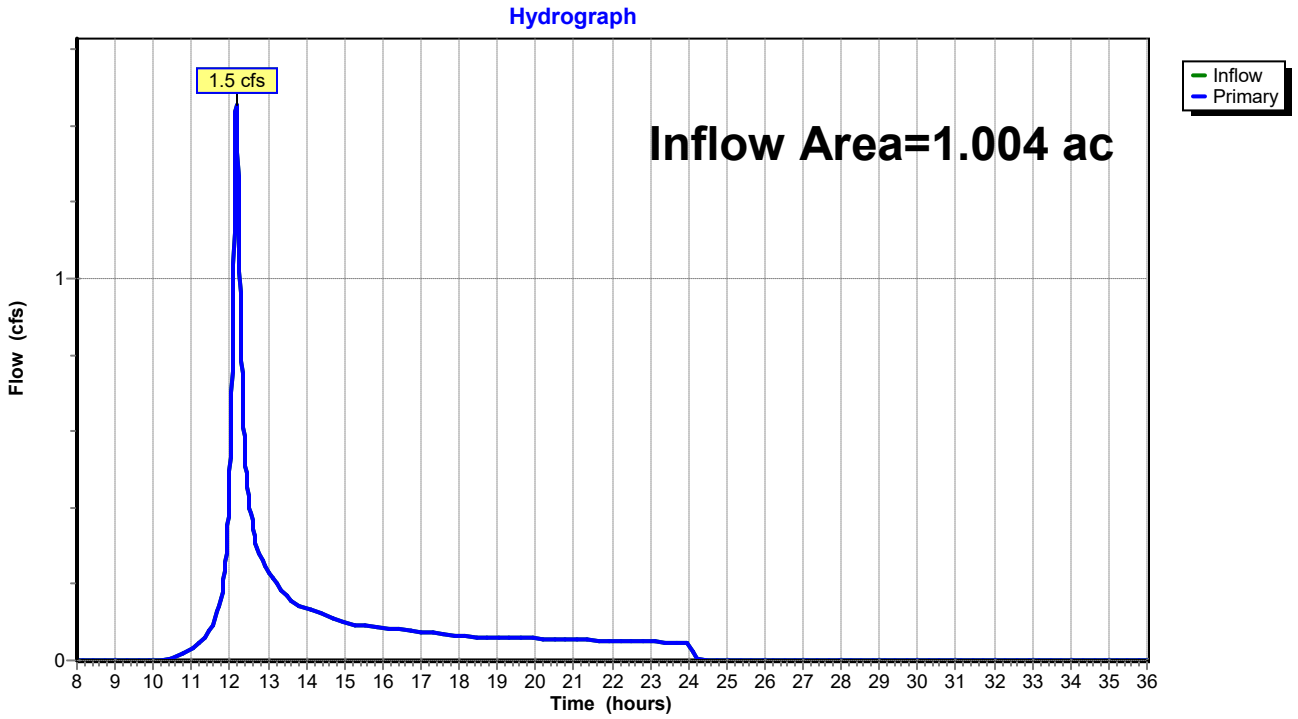


Summary for Link DL2: Design Line 2

Inflow Area = 1.004 ac, 0.46% Impervious, Inflow Depth = 1.55" for 10-yr event
Inflow = 1.5 cfs @ 12.17 hrs, Volume= 0.130 af
Primary = 1.5 cfs @ 12.17 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DL2: Design Line 2

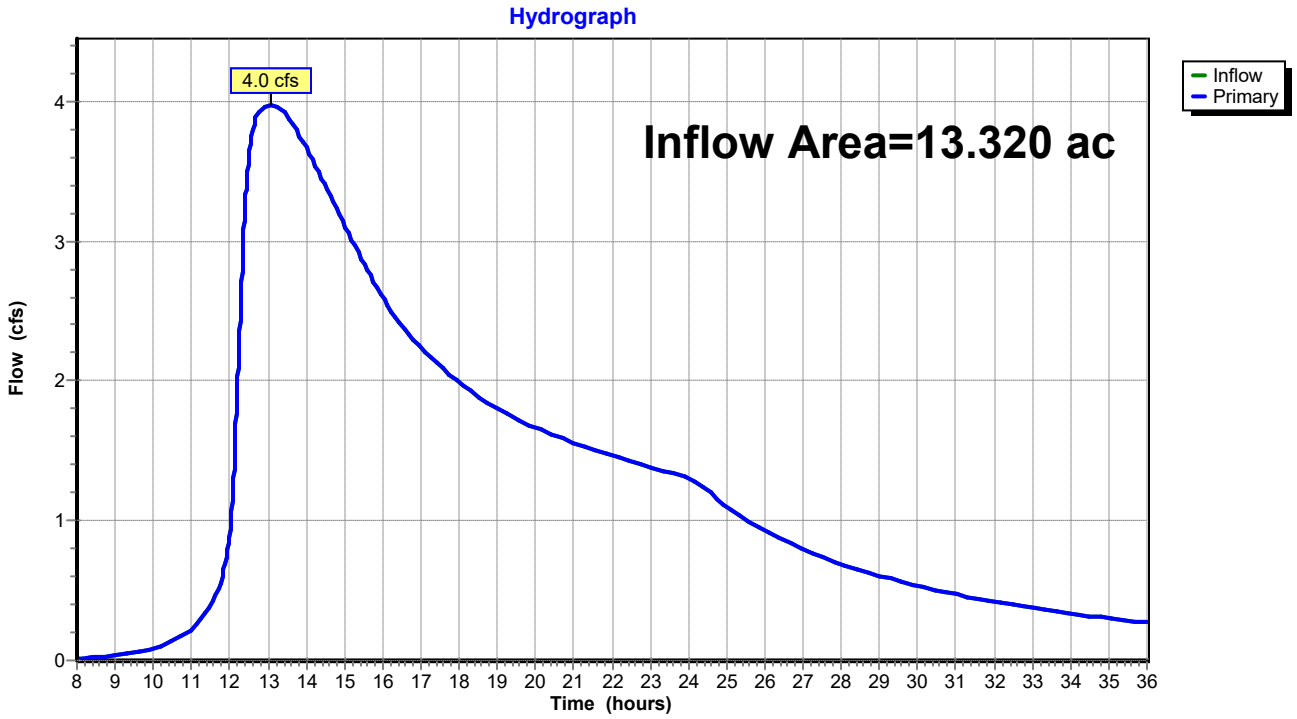


Summary for Link DP1: Design Point #1

Inflow Area = 13.320 ac, 22.69% Impervious, Inflow Depth > 2.86" for 10-yr event
Inflow = 4.0 cfs @ 13.07 hrs, Volume= 3.171 af
Primary = 4.0 cfs @ 13.07 hrs, Volume= 3.171 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DP1: Design Point #1

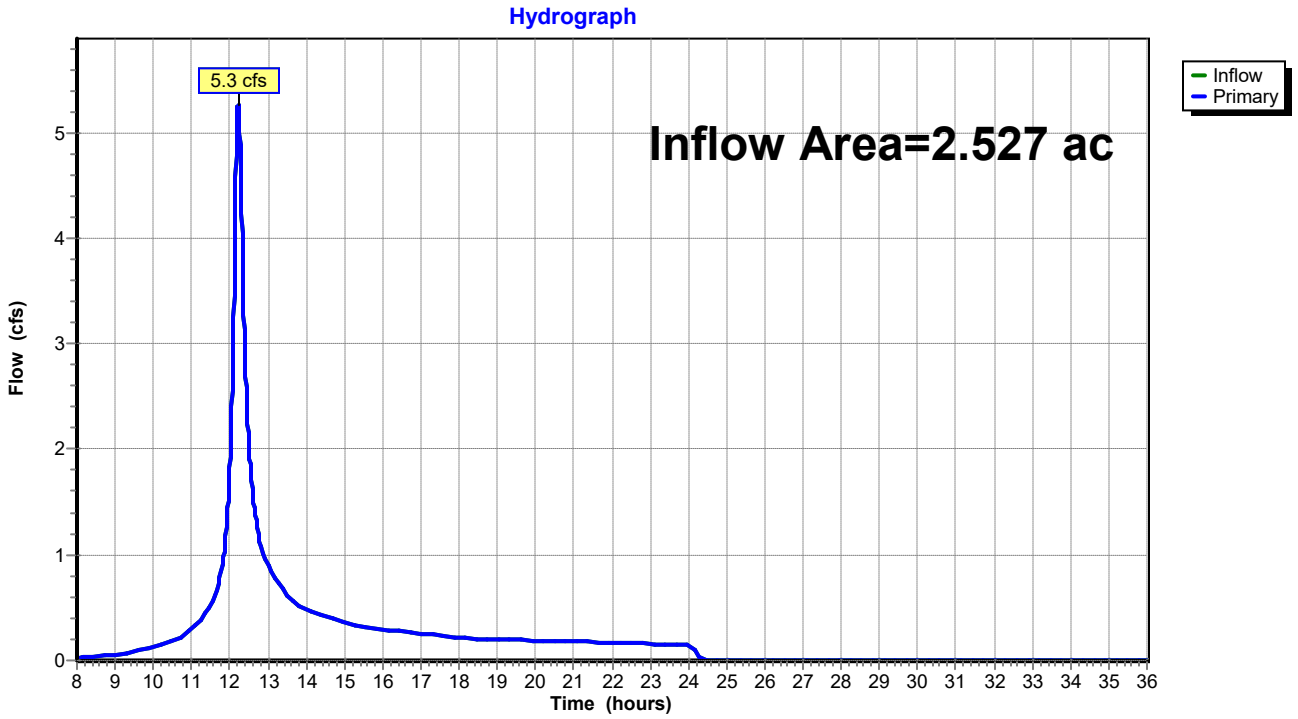


Summary for Link DP2: Design Point #2

Inflow Area = 2.527 ac, 28.26% Impervious, Inflow Depth = 2.50" for 10-yr event
Inflow = 5.3 cfs @ 12.22 hrs, Volume= 0.527 af
Primary = 5.3 cfs @ 12.22 hrs, Volume= 0.527 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DP2: Design Point #2



Summary for Subcatchment Sub 5: Sub Area 5

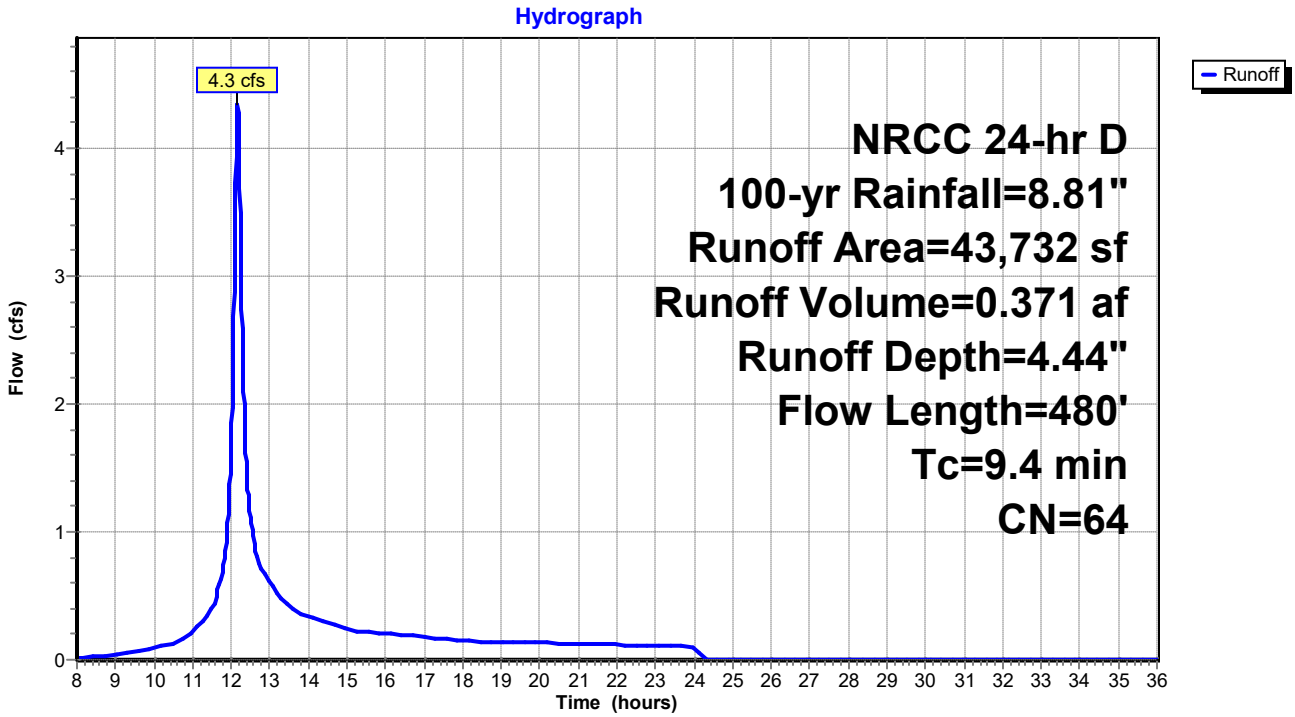
Runoff = 4.3 cfs @ 12.17 hrs, Volume= 0.371 af, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

Area (sf)	CN	Description
32,017	61	>75% Grass cover, Good, HSG B
6,590	74	>75% Grass cover, Good, HSG C
4,925	73	Woods, Fair, HSG C
200	98	Paved parking, HSG B
43,732	64	Weighted Average
43,532		99.54% Pervious Area
200		0.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	100	0.0550	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.33"
1.7	250	0.1240	2.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	130	0.1150	1.70		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.4	480	Total			

Subcatchment Sub 5: Sub Area 5



Summary for Subcatchment SUB AREA 3: HIGHLANDS - MAY 2002 SWPPP SUB AREA 3

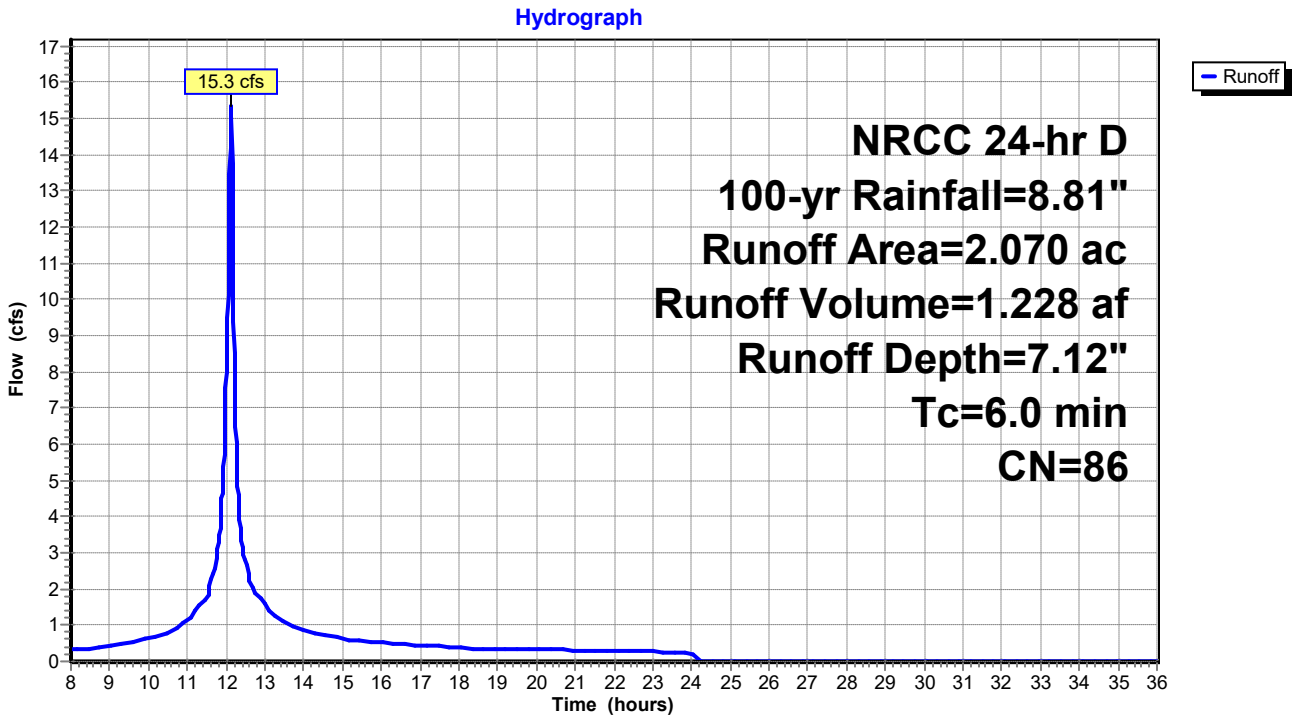
Runoff = 15.3 cfs @ 12.13 hrs, Volume= 1.228 af, Depth= 7.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

	Area (ac)	CN	Description
*	2.070	86	
	2.070		100.00% Pervious Area

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

Subcatchment SUB AREA 3: HIGHLANDS - MAY 2002 SWPPP SUB AREA 3



Summary for Subcatchment SUB AREA 4: HIGHLANDS - MAY 2002 SWPPP SUB AREA 4

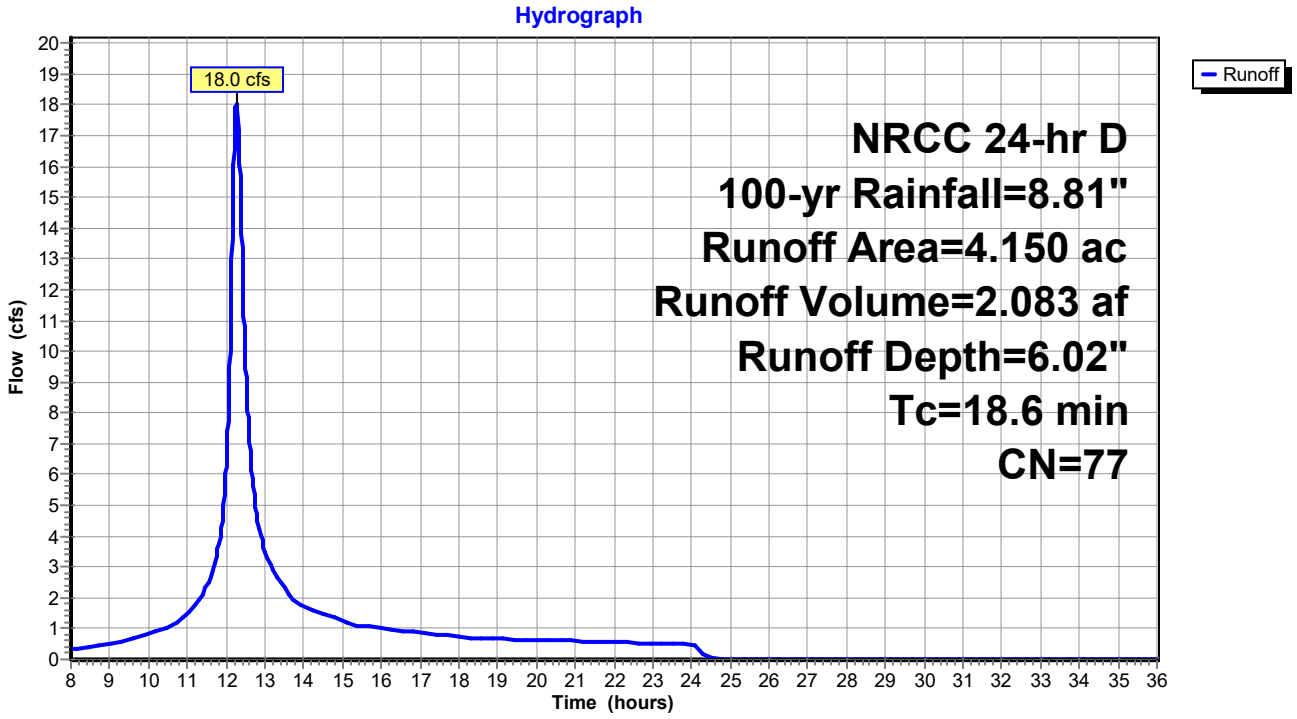
Runoff = 18.0 cfs @ 12.27 hrs, Volume= 2.083 af, Depth= 6.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

	Area (ac)	CN	Description
*	4.150	77	
	4.150		100.00% Pervious Area

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

Subcatchment SUB AREA 4: HIGHLANDS - MAY 2002 SWPPP SUB AREA 4



Summary for Subcatchment Sub-5A: Sub Area 5A

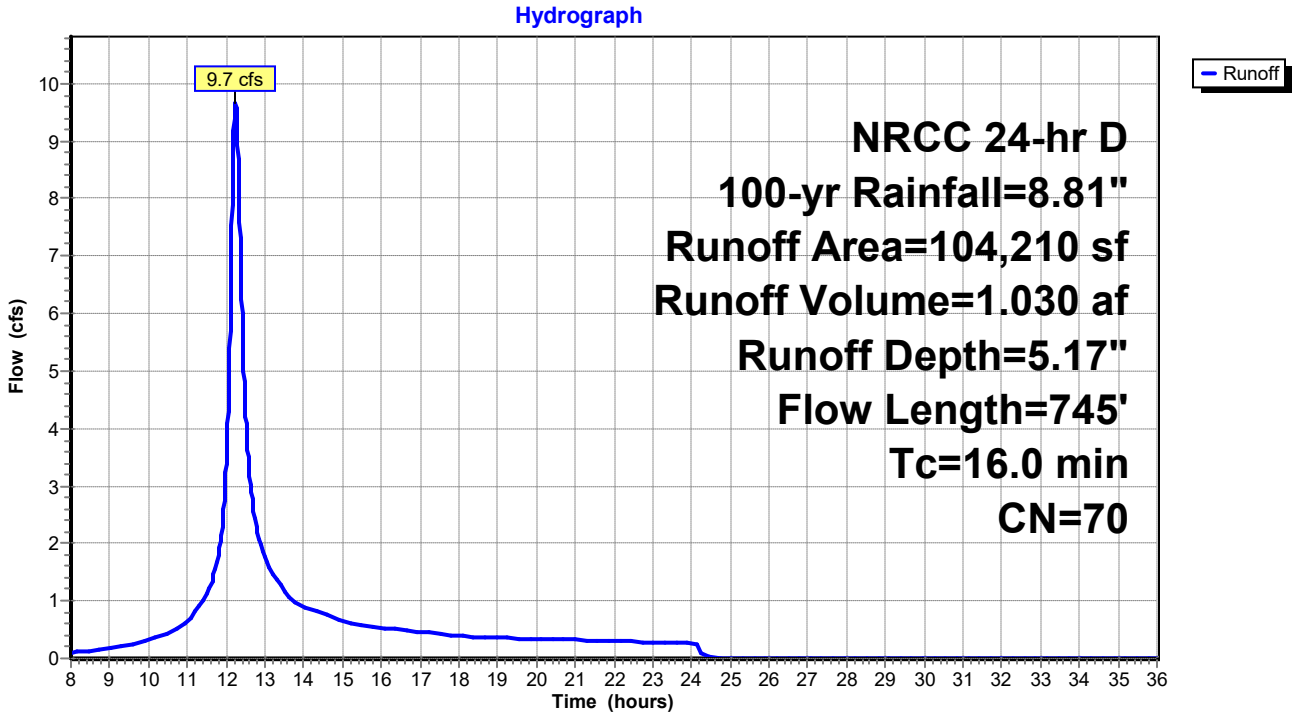
Runoff = 9.7 cfs @ 12.25 hrs, Volume= 1.030 af, Depth= 5.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

Area (sf)	CN	Description
32,866	98	Paved parking & roofs
35,215	65	Brush, Good, HSG C
36,129	48	Brush, Good, HSG B
104,210	70	Weighted Average
71,344		68.46% Pervious Area
32,866		31.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0550	0.13		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
1.5	130	0.0880	1.48		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	165	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	88	0.0342	3.75		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	262	0.0119	5.74	7.05	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.0	745	Total			

Subcatchment Sub-5A: Sub Area 5A



Summary for Subcatchment Sub-5B: Sub Area 5B

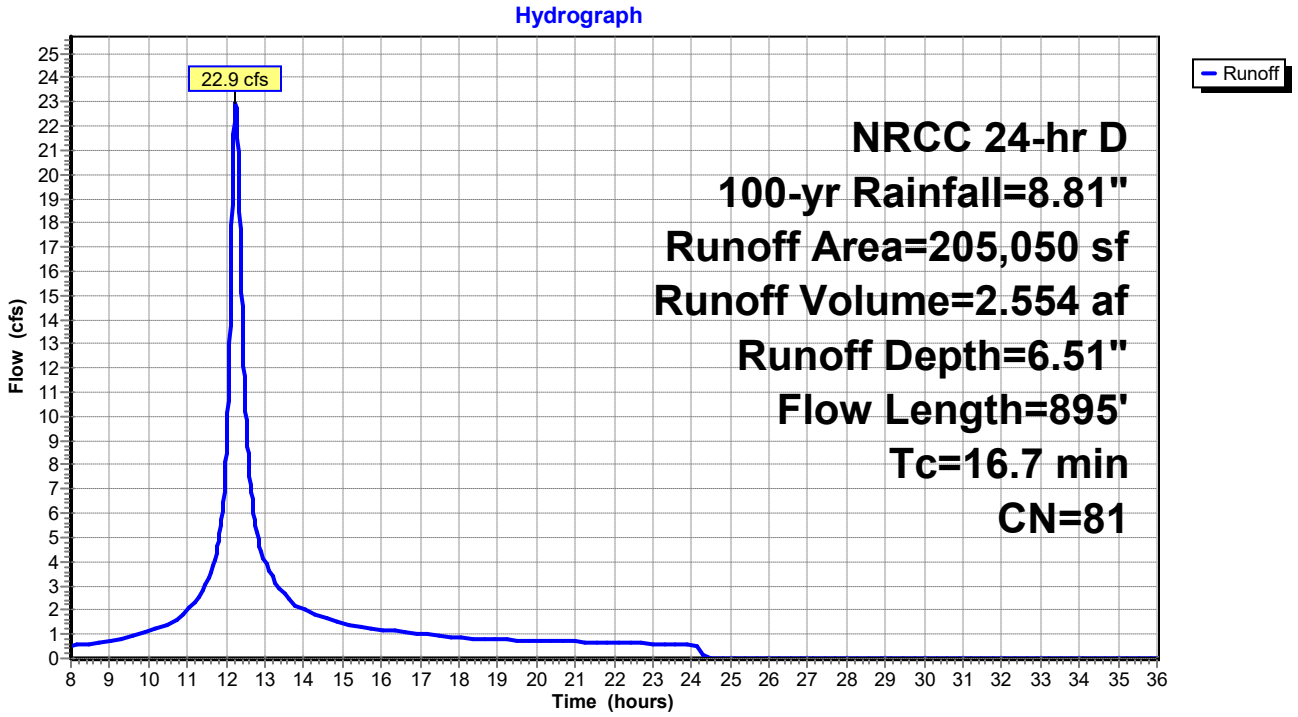
Runoff = 22.9 cfs @ 12.25 hrs, Volume= 2.554 af, Depth= 6.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

Area (sf)	CN	Description
98,809	98	Paved parking, HSG C
17,148	74	>75% Grass cover, Good, HSG C
26,843	71	Meadow, non-grazed, HSG C
47,007	65	Brush, Good, HSG C
15,243	48	Brush, Good, HSG B
205,050	81	Weighted Average
106,241		51.81% Pervious Area
98,809		48.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.1100	0.13		**Sheet Flow, Brush** n= 0.500 P2= 3.33"
0.7	90	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	77	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	628	0.1090	17.38	21.33	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.7	895	Total			

Subcatchment Sub-5B: Sub Area 5B



Summary for Subcatchment Sub1: Sub Area 1

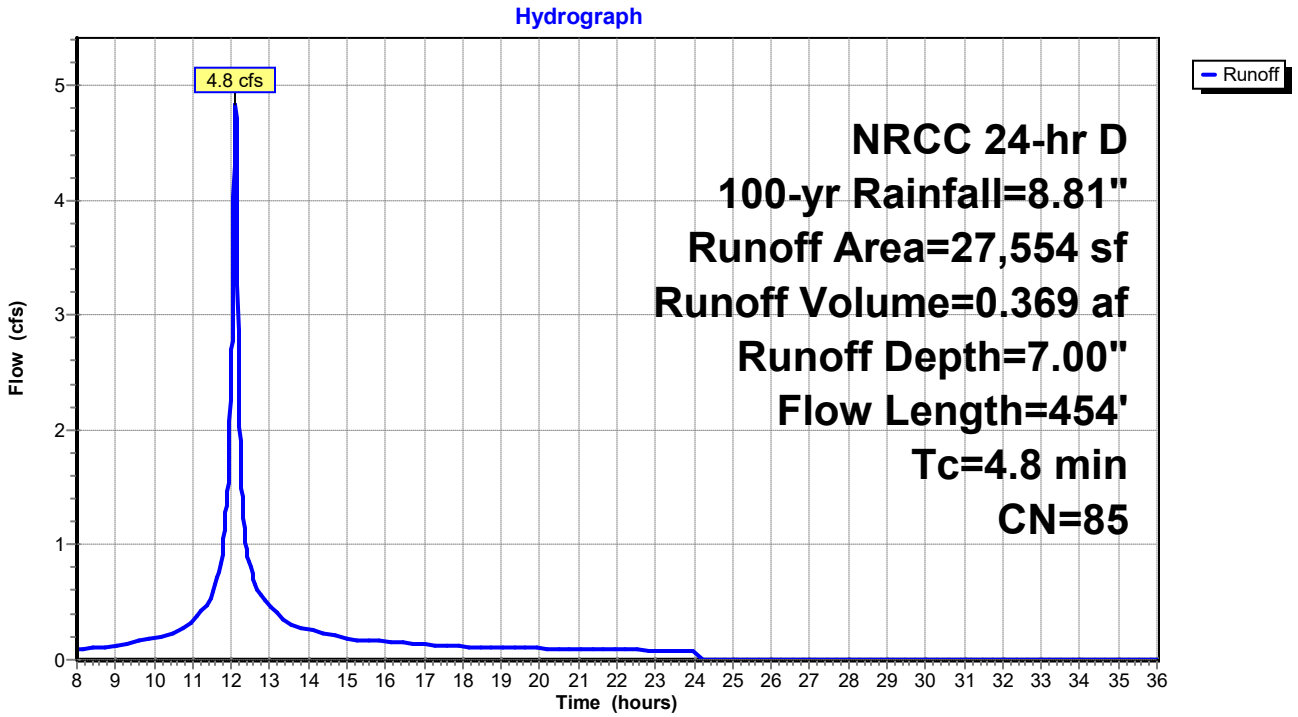
Runoff = 4.8 cfs @ 12.12 hrs, Volume= 0.369 af, Depth= 7.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

Area (sf)	CN	Description
17,984	98	Paved parking & roofs
8,870	61	>75% Grass cover, Good, HSG B
700	48	Brush, Good, HSG B
27,554	85	Weighted Average
9,570		34.73% Pervious Area
17,984		65.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	82	0.1230	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.33"
0.4	102	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	270	0.0450	11.17	13.70	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
4.8	454	Total			

Subcatchment Sub1: Sub Area 1



Summary for Subcatchment Sub2: Sub Area 2

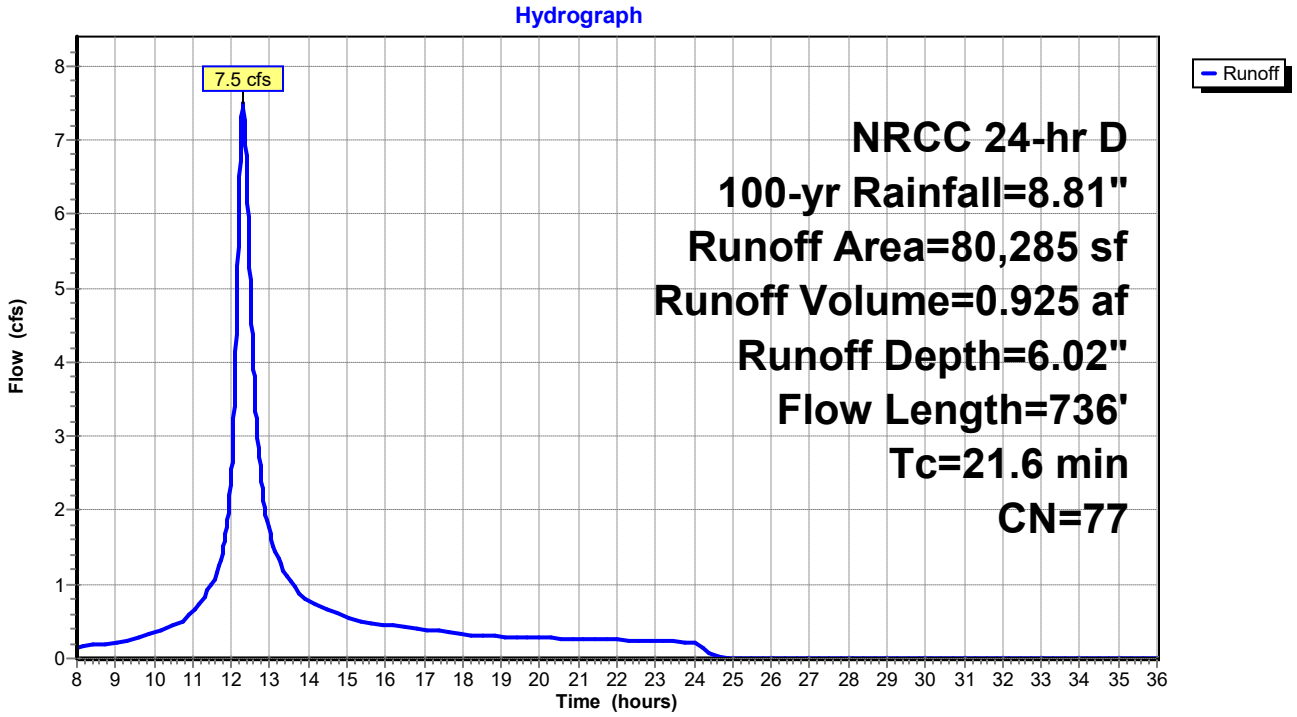
Runoff = 7.5 cfs @ 12.31 hrs, Volume= 0.925 af, Depth= 6.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

Area (sf)	CN	Description
24,635	98	Paved parking, HSG B
15,380	74	>75% Grass cover, Good, HSG C
2,350	61	>75% Grass cover, Good, HSG B
37,260	65	Brush, Good, HSG C
660	48	Brush, Good, HSG B
80,285	77	Weighted Average
55,650		69.32% Pervious Area
24,635		30.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.0	100	0.0400	0.10		**Sheet Flow, Brush** Woods: Light underbrush n= 0.400 P2= 3.33"
4.7	340	0.0590	1.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	17	0.1760	2.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	106	0.0660	5.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.5	173	0.0107	5.45	6.68	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
21.6	736	Total			

Subcatchment Sub2: Sub Area 2



Summary for Subcatchment Sub3: Sub Area 3

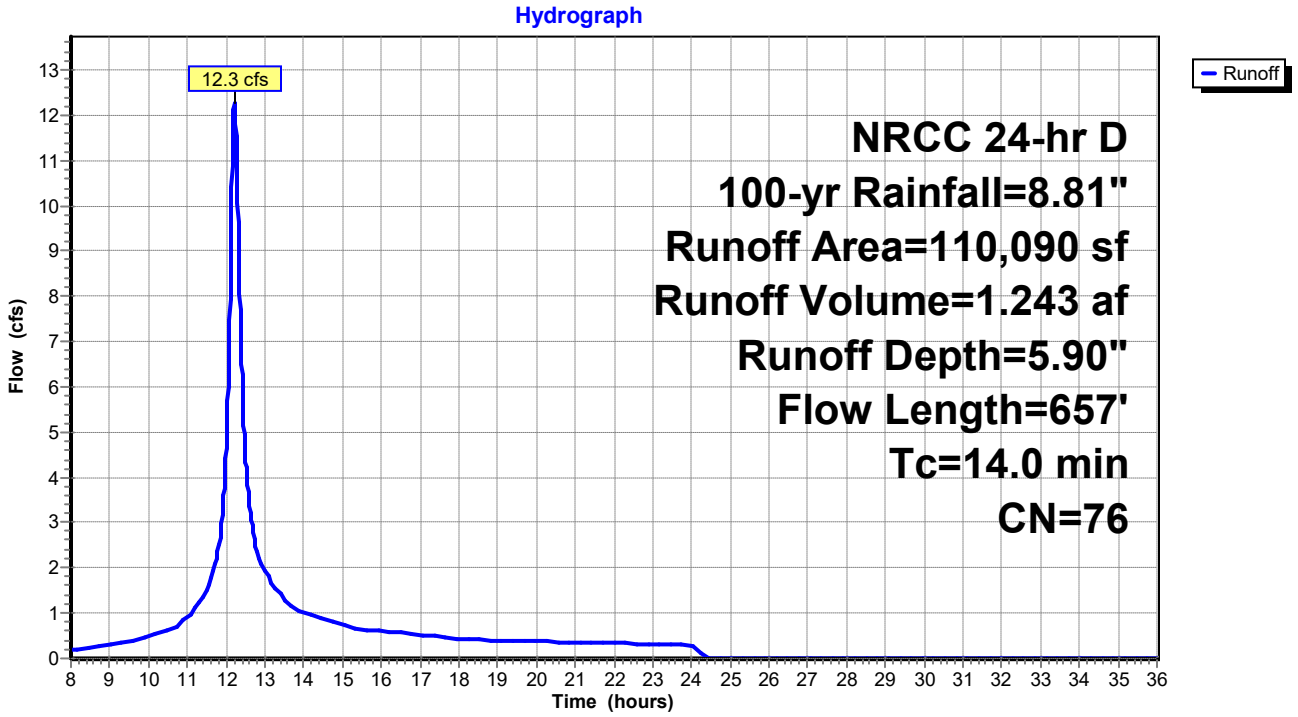
Runoff = 12.3 cfs @ 12.21 hrs, Volume= 1.243 af, Depth= 5.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

Area (sf)	CN	Description
31,115	98	Paved parking, HSG C
4,730	89	Gravel roads, HSG C
11,825	74	>75% Grass cover, Good, HSG C
62,420	65	Brush, Good, HSG C
110,090	76	Weighted Average
78,975		71.74% Pervious Area
31,115		28.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	100	0.0600	0.14		**Sheet Flow, Brush** n= 0.350 P2= 3.33"
1.4	157	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	100	0.0860	15.44	18.94	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
0.3	300	0.0710	15.19	18.65	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
14.0	657	Total			

Subcatchment Sub3: Sub Area 3



Summary for Subcatchment Sub4: Sub Area 4

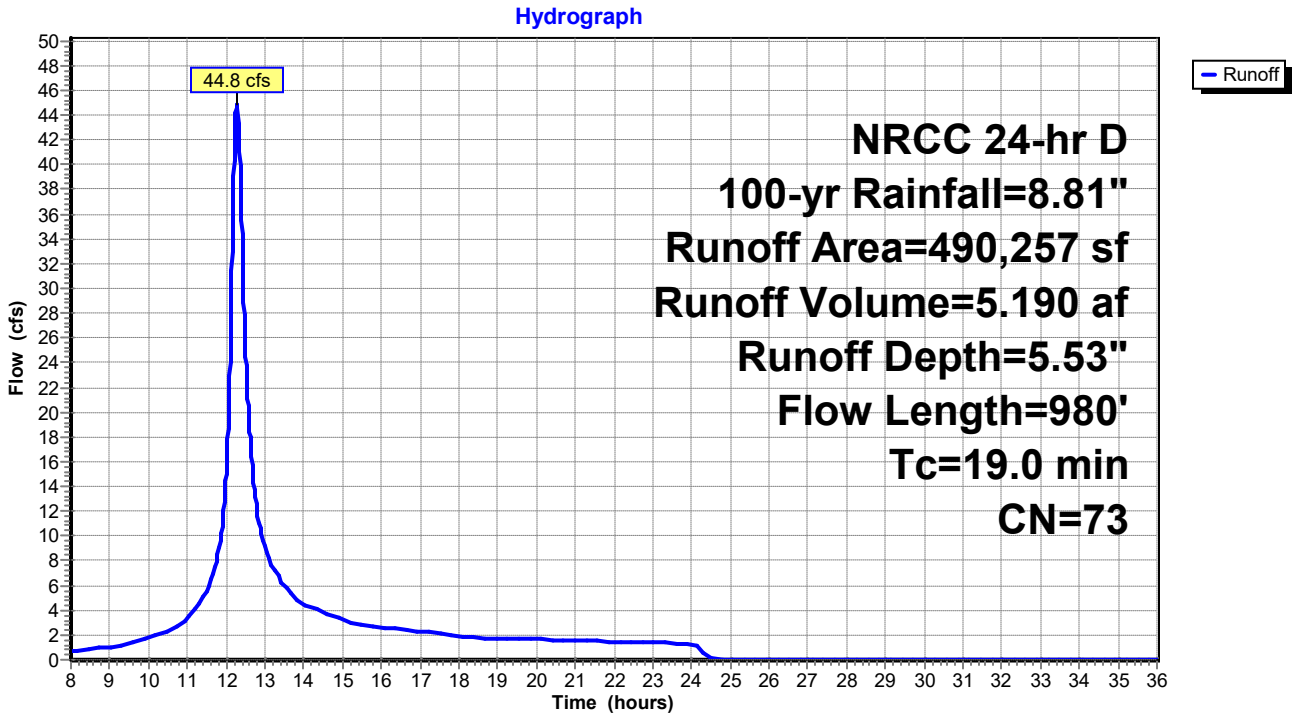
Runoff = 44.8 cfs @ 12.27 hrs, Volume= 5.190 af, Depth= 5.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-yr Rainfall=8.81"

Area (sf)	CN	Description
92,030	98	Paved parking, HSG B
11,640	98	Roofs, HSG B
52,050	61	>75% Grass cover, Good, HSG B
39,270	79	Woods, Fair, HSG D
144,065	73	Woods, Fair, HSG C
151,202	60	Woods, Fair, HSG B
490,257	73	Weighted Average
386,587		78.85% Pervious Area
103,670		21.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0750	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.33"
6.6	880	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	980	Total			

Subcatchment Sub4: Sub Area 4



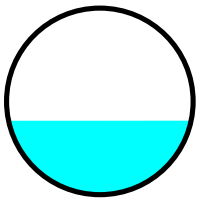
Summary for Reach Reach1: Exist. DMH - Exist. Flow Splitter #4

Inflow	=	6.8 cfs @	12.31 hrs,	Volume=	0.632 af
Outflow	=	6.7 cfs @	12.32 hrs,	Volume=	0.632 af, Atten= 0%, Lag= 0.5 min

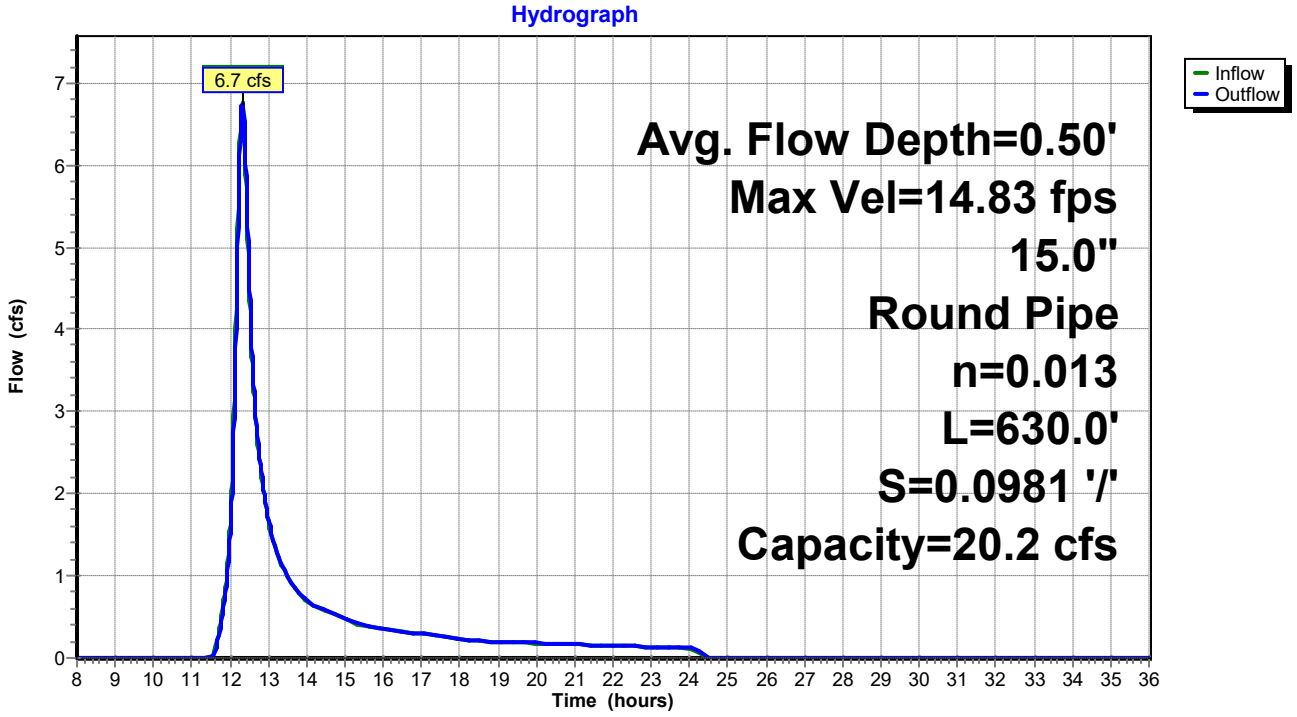
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Max. Velocity= 14.83 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 6.13 fps, Avg. Travel Time= 1.7 min

Peak Storage= 286 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.50'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 20.2 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 630.0' Slope= 0.0981 '/'
Inlet Invert= 623.27', Outlet Invert= 561.45'



Reach Reach1: Exist. DMH - Exist. Flow Splitter #4



Stage-Area-Storage for Reach Reach1: Exist. DMH - Exist. Flow Splitter #4

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
623.27	0.0	0
623.37	0.0	29
623.47	0.1	80
623.57	0.2	143
623.67	0.3	213
623.77	0.5	289
623.87	0.6	367
623.97	0.7	445
624.07	0.8	523
624.17	0.9	596
624.27	1.1	663
624.37	1.1	721
624.47	**1.2**	**763**

Summary for Pond DivMH 2: Proposed Diversion Manhole #2

Inflow Area =	0.633 ac, 65.27% Impervious, Inflow Depth = 7.00" for 100-yr event			
Inflow =	4.8 cfs @	12.12 hrs, Volume=	0.369 af	
Outflow =	4.8 cfs @	12.12 hrs, Volume=	0.369 af, Atten= 0%, Lag= 0.0 min	
Primary =	1.0 cfs @	11.80 hrs, Volume=	0.159 af	
Secondary =	4.6 cfs @	12.12 hrs, Volume=	0.210 af	

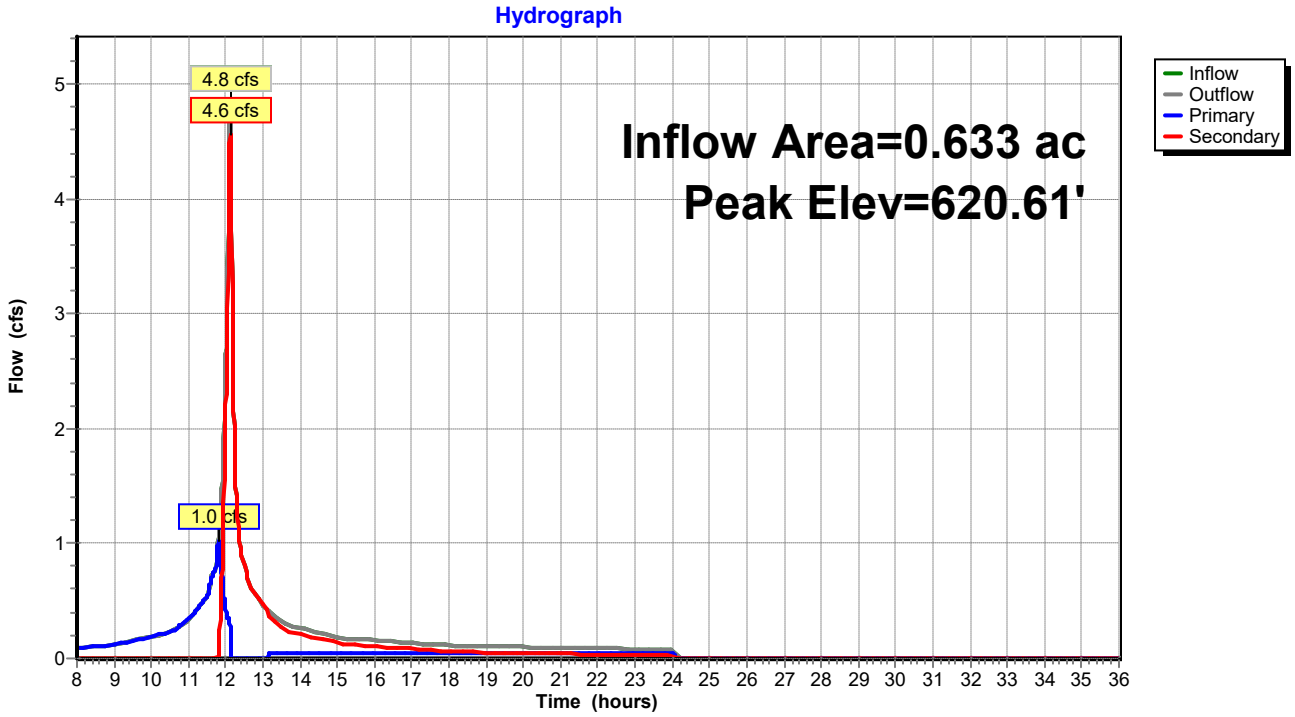
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 620.61' @ 12.12 hrs
Flood Elev= 620.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	618.00'	**8.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 618.00' / 617.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Secondary	618.00'	**15.0" Round Culvert** L= 439.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 618.00' / 582.22' S= 0.0815 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	620.20'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.0 cfs @ 11.80 hrs HW=620.19' TW=619.65' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.0 cfs @ 2.90 fps)

Secondary OutFlow Max=4.6 cfs @ 12.12 hrs HW=620.61' TW=582.73' (Dynamic Tailwater)
└─**2=Culvert** (Passes 4.6 cfs of 8.3 cfs potential flow)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 4.6 cfs @ 1.87 fps)

Pond DivMH 2: Proposed Diversion Manhole #2



Stage-Area-Storage for Pond DivMH 2: Proposed Diversion Manhole #2

Elevation (feet)	Storage (cubic-feet)
618.00	**0**
618.10	0
618.20	0
618.30	0
618.40	0
618.50	0
618.60	0
618.70	0
618.80	0
618.90	0
619.00	0
619.10	0
619.20	0
619.30	0
619.40	0
619.50	0
619.60	0
619.70	0
619.80	0
619.90	0
620.00	0
620.10	0
620.20	0
620.30	0
620.40	0
620.50	0
620.60	0

Summary for Pond DivMH1: Proposed Diversion Manhole #1

Inflow Area =	1.843 ac, 30.68% Impervious, Inflow Depth = 6.02" for 100-yr event			
Inflow =	7.5 cfs @	12.31 hrs, Volume=	0.925 af	
Outflow =	7.5 cfs @	12.31 hrs, Volume=	0.925 af, Atten= 0%, Lag= 0.0 min	
Primary =	1.0 cfs @	11.53 hrs, Volume=	0.292 af	
Secondary =	6.8 cfs @	12.31 hrs, Volume=	0.632 af	

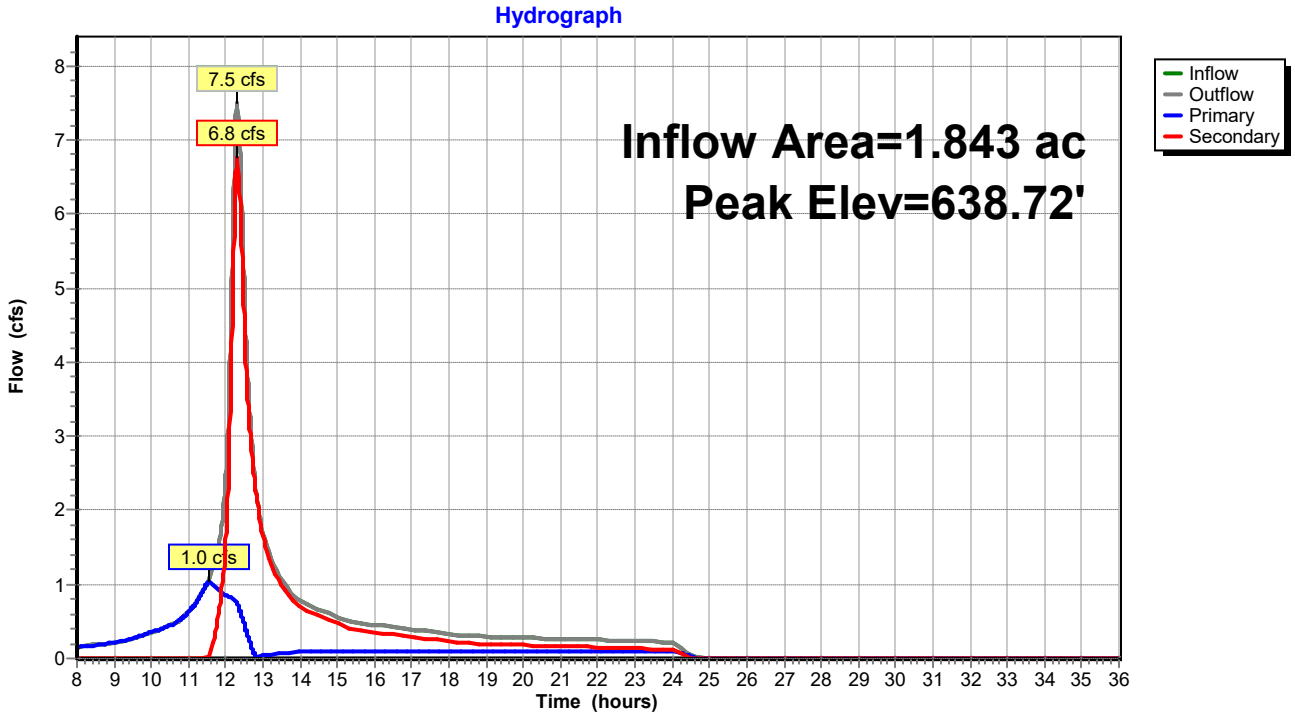
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 638.72' @ 12.31 hrs
Flood Elev= 639.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	635.80'	**6.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 635.80' / 635.50' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Secondary	635.80'	**15.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 635.80' / 633.50' S= 0.0460 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	638.20'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.0 cfs @ 11.53 hrs HW=638.20' TW=636.84' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.0 cfs @ 5.33 fps)

Secondary OutFlow Max=6.8 cfs @ 12.31 hrs HW=638.72' TW=623.77' (Dynamic Tailwater)
└─**2=Culvert** (Passes 6.8 cfs of 8.9 cfs potential flow)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 6.8 cfs @ 2.17 fps)

Pond DivMH1: Proposed Diversion Manhole #1



Stage-Area-Storage for Pond DivMH1: Proposed Diversion Manhole #1

Elevation (feet)	Storage (cubic-feet)
635.80	**0**
635.90	0
636.00	0
636.10	0
636.20	0
636.30	0
636.40	0
636.50	0
636.60	0
636.70	0
636.80	0
636.90	0
637.00	0
637.10	0
637.20	0
637.30	0
637.40	0
637.50	0
637.60	0
637.70	0
637.80	0
637.90	0
638.00	0
638.10	0
638.20	0
638.30	0
638.40	0
638.50	0
638.60	0
638.70	0
638.80	0
638.90	0
639.00	0

Summary for Pond DMH 27: Existing DMH 27

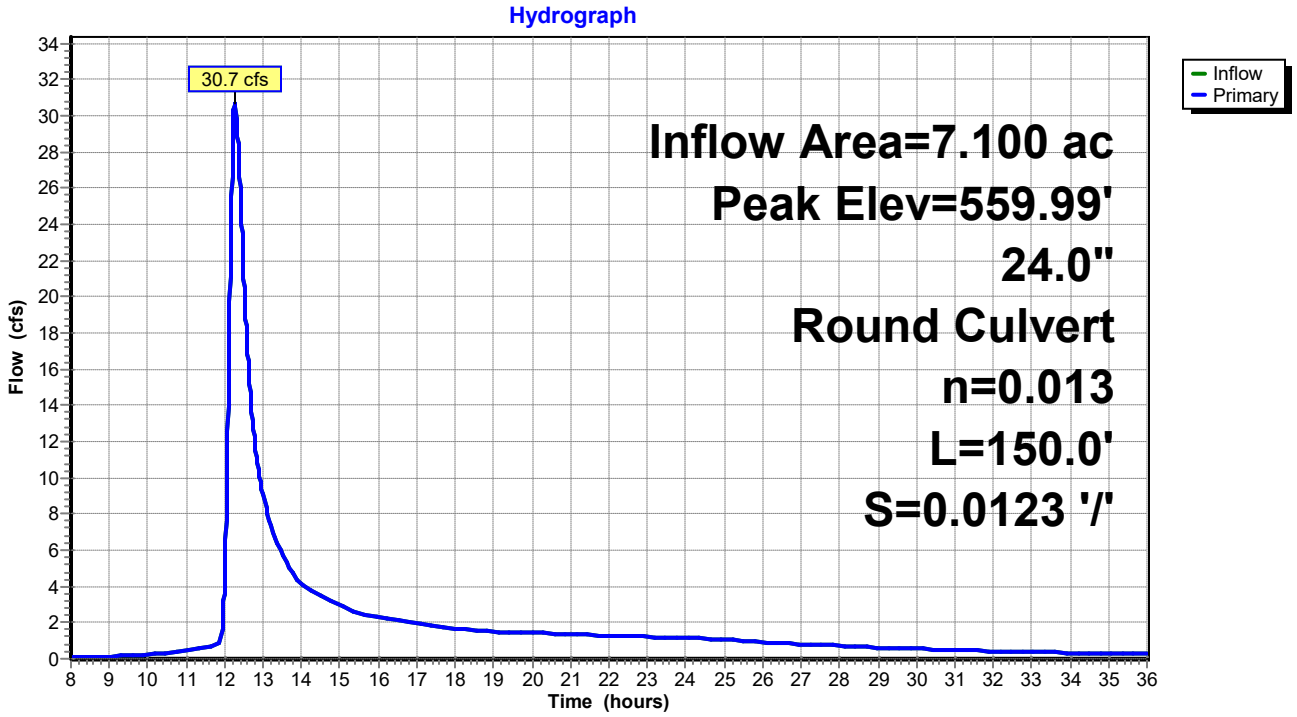
Inflow Area =	7.100 ac, 42.58% Impervious, Inflow Depth = 7.43" for 100-yr event				
Inflow =	30.7 cfs @	12.26 hrs,	Volume=	4.393 af	
Outflow =	30.7 cfs @	12.26 hrs,	Volume=	4.393 af,	Atten= 0%, Lag= 0.0 min
Primary =	30.7 cfs @	12.26 hrs,	Volume=	4.393 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 559.99' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	554.84'	**24.0" Round Culvert** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 554.84' / 553.00' S= 0.0123 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=30.6 cfs @ 12.26 hrs HW=559.98' TW=553.86' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 30.6 cfs @ 9.76 fps)

Pond DMH 27: Existing DMH 27



Stage-Area-Storage for Pond DMH 27: Existing DMH 27

Elevation (feet)	Storage (cubic-feet)
554.84	**0**
554.94	0
555.04	0
555.14	0
555.24	0
555.34	0
555.44	0
555.54	0
555.64	0
555.74	0
555.84	0
555.94	0
556.04	0
556.14	0
556.24	0
556.34	0
556.44	0
556.54	0
556.64	0
556.74	0
556.84	0
556.94	0
557.04	0
557.14	0
557.24	0
557.34	0
557.44	0
557.54	0
557.64	0
557.74	0
557.84	0
557.94	0
558.04	0
558.14	0
558.24	0
558.34	0
558.44	0
558.54	0
558.64	0
558.74	0
558.84	0
558.94	0
559.04	0
559.14	0
559.24	0
559.34	0
559.44	0
559.54	0
559.64	0
559.74	0
559.84	0
559.94	0

Summary for Pond DMH 45: Existing DMH 45

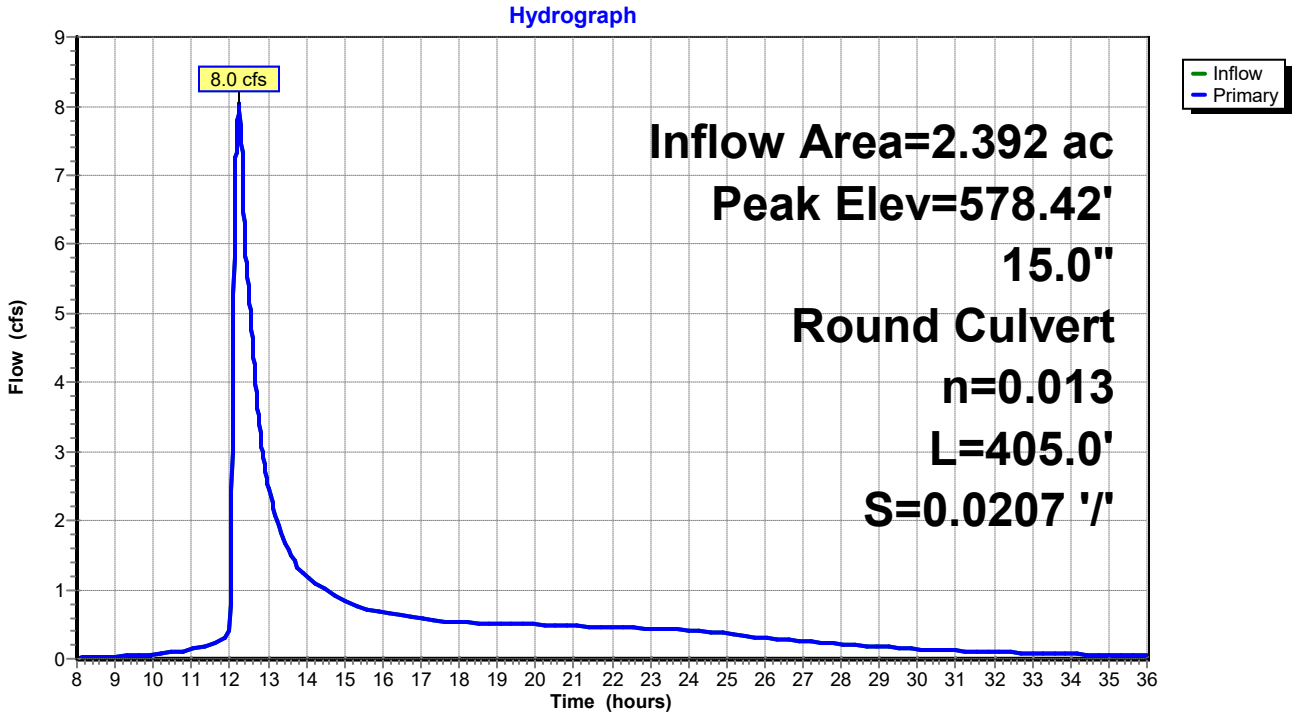
Inflow Area =	2.392 ac, 31.54% Impervious, Inflow Depth = 6.22" for 100-yr event				
Inflow =	8.0 cfs @	12.25 hrs,	Volume=	1.240 af	
Outflow =	8.0 cfs @	12.25 hrs,	Volume=	1.240 af,	Atten= 0%, Lag= 0.0 min
Primary =	8.0 cfs @	12.25 hrs,	Volume=	1.240 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 578.42' @ 12.25 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	575.94'	**15.0" Round Culvert** L= 405.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 575.94' / 567.57' S= 0.0207 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=8.0 cfs @ 12.25 hrs HW=578.41' TW=559.91' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 8.0 cfs @ 6.54 fps)

Pond DMH 45: Existing DMH 45



Stage-Area-Storage for Pond DMH 45: Existing DMH 45

Elevation (feet)	Storage (cubic-feet)
575.94	**0**
576.04	0
576.14	0
576.24	0
576.34	0
576.44	0
576.54	0
576.64	0
576.74	0
576.84	0
576.94	0
577.04	0
577.14	0
577.24	0
577.34	0
577.44	0
577.54	0
577.64	0
577.74	0
577.84	0
577.94	0
578.04	0
578.14	0
578.24	0
578.34	0

Summary for Pond EDB #2: Existing Detention Basin #2

Inflow Area = 13.320 ac, 22.69% Impervious, Inflow Depth = 6.94" for 100-yr event
Inflow = 54.9 cfs @ 12.25 hrs, Volume= 7.704 af
Outflow = 25.3 cfs @ 12.62 hrs, Volume= 7.700 af, Atten= 54%, Lag= 22.1 min
Primary = 25.3 cfs @ 12.62 hrs, Volume= 7.700 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Starting Elev= 551.00' Surf.Area= 17,383 sf Storage= 61,331 cf
Peak Elev= 554.76' @ 12.62 hrs Surf.Area= 25,689 sf Storage= 143,359 cf (82,028 cf above start)

Plug-Flow detention time= 364.2 min calculated for 6.292 af (82% of inflow)
Center-of-Mass det. time= 118.0 min (1,092.0 - 973.9)

Volume	Invert	Avail.Storage	Storage Description
#1	546.00'	237,385 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

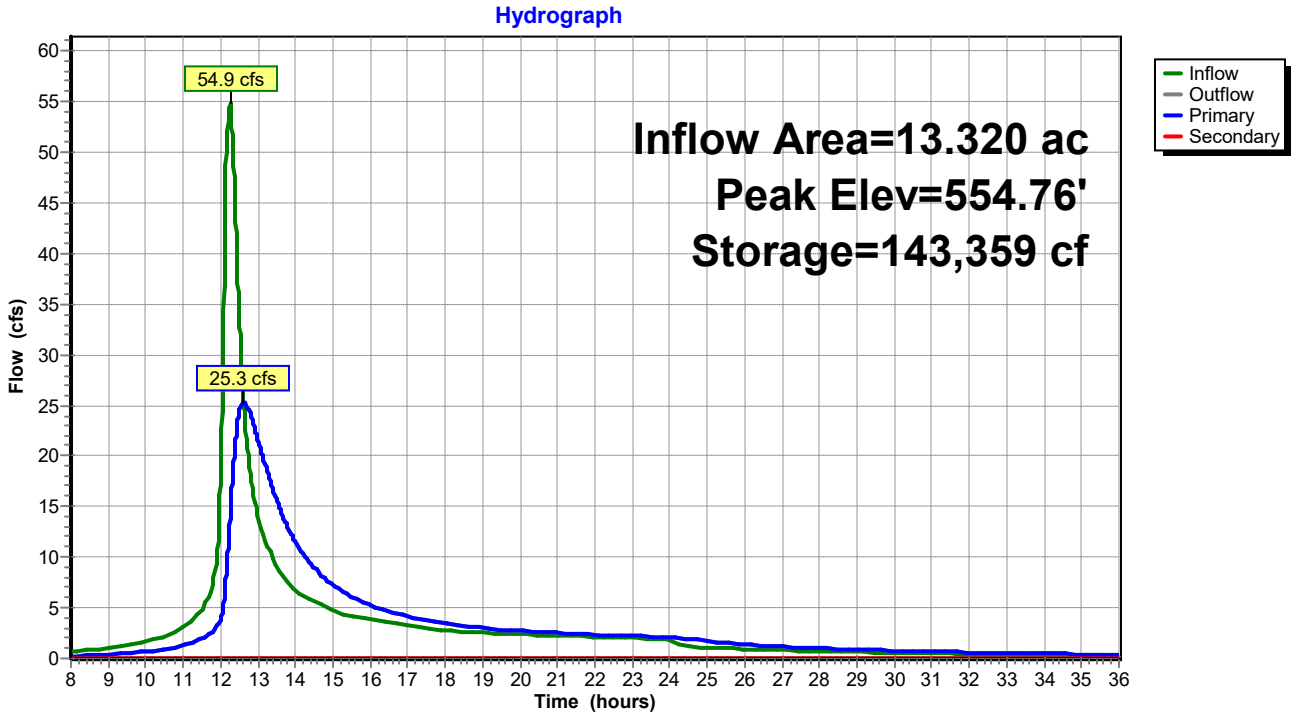
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
546.00	8,325	0	0
548.00	11,185	19,510	19,510
550.00	14,630	25,815	45,325
552.00	20,135	34,765	80,090
554.00	24,105	44,240	124,330
556.00	28,250	52,355	176,685
558.00	32,450	60,700	237,385

Device	Routing	Invert	Outlet Devices
#1	Primary	550.50'	**24.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 550.50' / 549.60' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	551.00'	**20.0 deg x 0.5' long x 4.50' rise Sharp-Crested Vee/Trap Weir** Cv= 2.69 (C= 3.36)
#3	Secondary	555.50'	**30.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=25.3 cfs @ 12.62 hrs HW=554.76' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 25.3 cfs of 27.3 cfs potential flow)
└─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 25.3 cfs @ 5.78 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=551.00' TW=0.00' (Dynamic Tailwater)
└─**3=Orifice/Grate** (Controls 0.0 cfs)

Pond EDB #2: Existing Detention Basin #2



Stage-Area-Storage for Pond EDB #2: Existing Detention Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
546.00	8,325	0	550.68	16,502	55,910
546.09	8,454	755	550.77	16,749	57,406
546.18	8,582	1,522	550.86	16,997	58,925
546.27	8,711	2,300	550.95	17,245	60,466
546.36	8,840	3,090	551.04	17,493	62,029
546.45	8,969	3,891	551.13	17,740	63,614
546.54	9,097	4,704	551.22	17,988	65,222
546.63	9,226	5,529	551.31	18,236	66,852
546.72	9,355	6,365	551.40	18,483	68,504
546.81	9,483	7,212	551.49	18,731	70,179
546.90	9,612	8,072	551.58	18,979	71,876
546.99	9,741	8,943	551.67	19,227	73,595
547.08	9,869	9,825	551.76	19,474	75,337
547.17	9,998	10,719	551.85	19,722	77,101
547.26	10,127	11,625	551.94	19,970	78,887
547.35	10,256	12,542	552.03	20,195	80,695
547.44	10,384	13,471	552.12	20,373	82,520
547.53	10,513	14,411	552.21	20,552	84,362
547.62	10,642	15,363	552.30	20,730	86,220
547.71	10,770	16,326	552.39	20,909	88,094
547.80	10,899	17,302	552.48	21,088	89,983
547.89	11,028	18,288	552.57	21,266	91,889
547.98	11,156	19,287	552.66	21,445	93,811
548.07	11,306	20,297	552.75	21,624	95,750
548.16	11,461	21,322	552.84	21,802	97,704
548.25	11,616	22,360	552.93	21,981	99,674
548.34	11,771	23,412	553.02	22,160	101,660
548.43	11,926	24,479	553.11	22,338	103,663
548.52	12,081	25,559	553.20	22,517	105,681
548.61	12,236	26,653	553.29	22,696	107,716
548.70	12,391	27,762	553.38	22,874	109,766
548.79	12,546	28,884	553.47	23,053	111,833
548.88	12,701	30,020	553.56	23,232	113,916
548.97	12,856	31,170	553.65	23,410	116,015
549.06	13,011	32,334	553.74	23,589	118,130
549.15	13,166	33,512	553.83	23,768	120,261
549.24	13,321	34,704	553.92	23,946	122,408
549.33	13,476	35,910	554.01	24,126	124,571
549.42	13,631	37,129	554.10	24,312	126,751
549.51	13,786	38,363	554.19	24,499	128,947
549.60	13,941	39,611	554.28	24,685	131,161
549.69	14,096	40,872	554.37	24,872	133,391
549.78	14,251	42,148	554.46	25,058	135,638
549.87	14,406	43,438	554.55	25,245	137,901
549.96	14,561	44,741	554.64	25,431	140,182
550.05	14,768	46,060	554.73	25,618	142,479
550.14	15,015	47,400	554.82	25,804	144,793
550.23	15,263	48,763	554.91	25,991	147,124
550.32	15,511	50,148	555.00	26,178	149,471
550.41	15,759	51,555	555.09	26,364	151,836
550.50	16,006	52,984	555.18	26,551	154,217
550.59	16,254	54,436	555.27	26,737	156,615

Stage-Area-Storage for Pond EDB #2: Existing Detention Basin #2 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
555.36	26,924	159,029
555.45	27,110	161,461
555.54	27,297	163,909
555.63	27,483	166,374
555.72	27,670	168,856
555.81	27,856	171,355
555.90	28,043	173,870
555.99	28,229	176,403
556.08	28,418	178,952
556.17	28,607	181,518
556.26	28,796	184,101
556.35	28,985	186,701
556.44	29,174	189,318
556.53	29,363	191,952
556.62	29,552	194,604
556.71	29,741	197,272
556.80	29,930	199,957
556.89	30,119	202,659
556.98	30,308	205,378
557.07	30,497	208,115
557.16	30,686	210,868
557.25	30,875	213,638
557.34	31,064	216,425
557.43	31,253	219,230
557.52	31,442	222,051
557.61	31,631	224,889
557.70	31,820	227,745
557.79	32,009	230,617
557.88	32,198	233,506
557.97	**32,387**	**236,412**

Summary for Pond FS 3: Existing Flow Splitter #3

Inflow Area =	4.150 ac,	0.00% Impervious,	Inflow Depth =	6.02"	for 100-yr event
Inflow =	18.0 cfs @	12.27 hrs,	Volume=	2.083 af	
Outflow =	18.0 cfs @	12.27 hrs,	Volume=	2.083 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.0 cfs @	0.00 hrs,	Volume=	0.000 af	
Secondary =	18.0 cfs @	12.27 hrs,	Volume=	2.083 af	

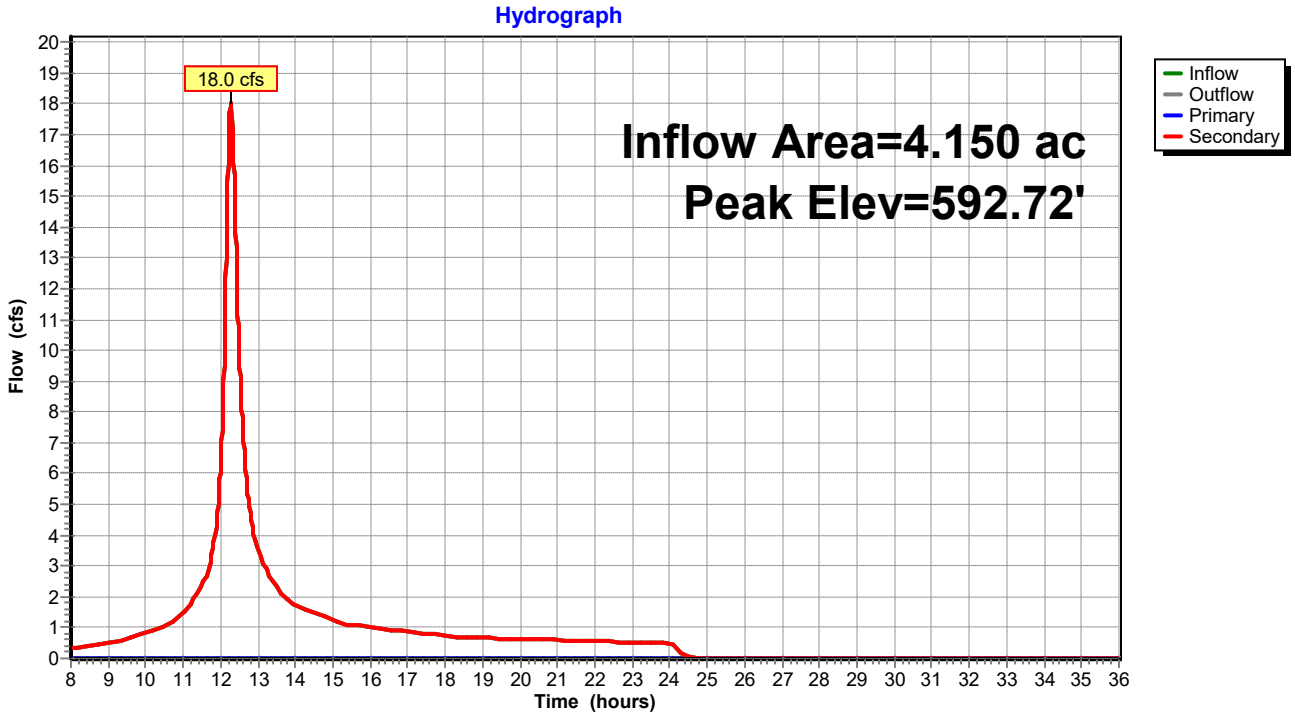
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 592.72' @ 12.27 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	591.20'	**15.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 591.20' / 591.00' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	593.60'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Secondary	590.30'	**24.0" Round Culvert** L= 320.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 590.30' / 552.00' S= 0.1197 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.30' TW=590.00' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.0 cfs)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Secondary OutFlow Max=18.0 cfs @ 12.27 hrs HW=592.72' TW=553.87' (Dynamic Tailwater)
└─**3=Culvert** (Inlet Controls 18.0 cfs @ 5.74 fps)

Pond FS 3: Existing Flow Splitter #3



Stage-Area-Storage for Pond FS 3: Existing Flow Splitter #3

Elevation (feet)	Storage (cubic-feet)
590.30	**0**
590.40	0
590.50	0
590.60	0
590.70	0
590.80	0
590.90	0
591.00	0
591.10	0
591.20	0
591.30	0
591.40	0
591.50	0
591.60	0
591.70	0
591.80	0
591.90	0
592.00	0
592.10	0
592.20	0
592.30	0
592.40	0
592.50	0
592.60	0
592.70	0
592.80	0
592.90	0
593.00	0
593.10	0
593.20	0
593.30	0
593.40	0
593.50	0
593.60	0

Summary for Pond FS#4: Existing Flow Spilitter #4

Inflow Area =	4.707 ac, 48.19% Impervious, Inflow Depth = 8.12" for 100-yr event				
Inflow =	29.1 cfs @	12.26 hrs,	Volume=	3.186 af	
Outflow =	29.1 cfs @	12.26 hrs,	Volume=	3.186 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.4 cfs @	12.19 hrs,	Volume=	1.551 af	
Secondary =	22.2 cfs @	12.27 hrs,	Volume=	1.635 af	

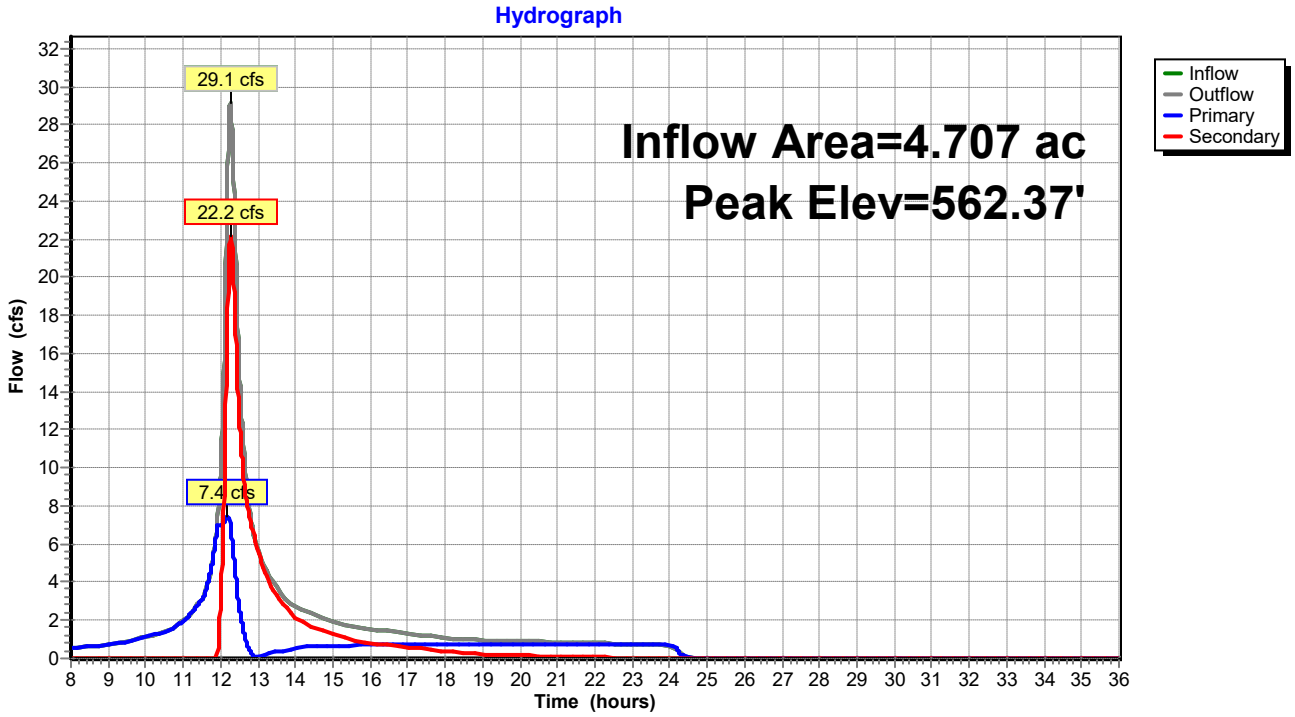
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 562.37' @ 12.27 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	558.25'	**18.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 558.25' / 556.80' S= 0.0659 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Secondary	558.15'	**24.0" Round Culvert** L= 61.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 558.15' / 554.84' S= 0.0543 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	561.30'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=7.4 cfs @ 12.19 hrs HW=562.26' TW=561.50' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.4 cfs @ 4.19 fps)

Secondary OutFlow Max=22.2 cfs @ 12.27 hrs HW=562.37' TW=559.98' (Dynamic Tailwater)
└─**2=Culvert** (Passes 22.2 cfs of 23.4 cfs potential flow)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 22.2 cfs @ 3.44 fps)

Pond FS#4: Existing Flow Spilitter #4



Stage-Area-Storage for Pond FS#4: Existing Flow Spilitter #4

Elevation (feet)	Storage (cubic-feet)
558.15	**0**
558.25	0
558.35	0
558.45	0
558.55	0
558.65	0
558.75	0
558.85	0
558.95	0
559.05	0
559.15	0
559.25	0
559.35	0
559.45	0
559.55	0
559.65	0
559.75	0
559.85	0
559.95	0
560.05	0
560.15	0
560.25	0
560.35	0
560.45	0
560.55	0
560.65	0
560.75	0
560.85	0
560.95	0
561.05	0
561.15	0
561.25	0
561.35	0
561.45	0
561.55	0
561.65	0
561.75	0
561.85	0
561.95	0
562.05	0
562.15	0
562.25	0
562.35	0

Summary for Pond FS#6: Existing Flow Splitter #6

Inflow Area =	2.392 ac, 31.54% Impervious, Inflow Depth = 6.22" for 100-yr event				
Inflow =	11.7 cfs @	12.15 hrs,	Volume=	1.240 af	
Outflow =	11.7 cfs @	12.15 hrs,	Volume=	1.240 af,	Atten= 0%, Lag= 0.0 min
Primary =	5.5 cfs @	12.00 hrs,	Volume=	0.733 af	
Secondary =	7.5 cfs @	12.25 hrs,	Volume=	0.507 af	

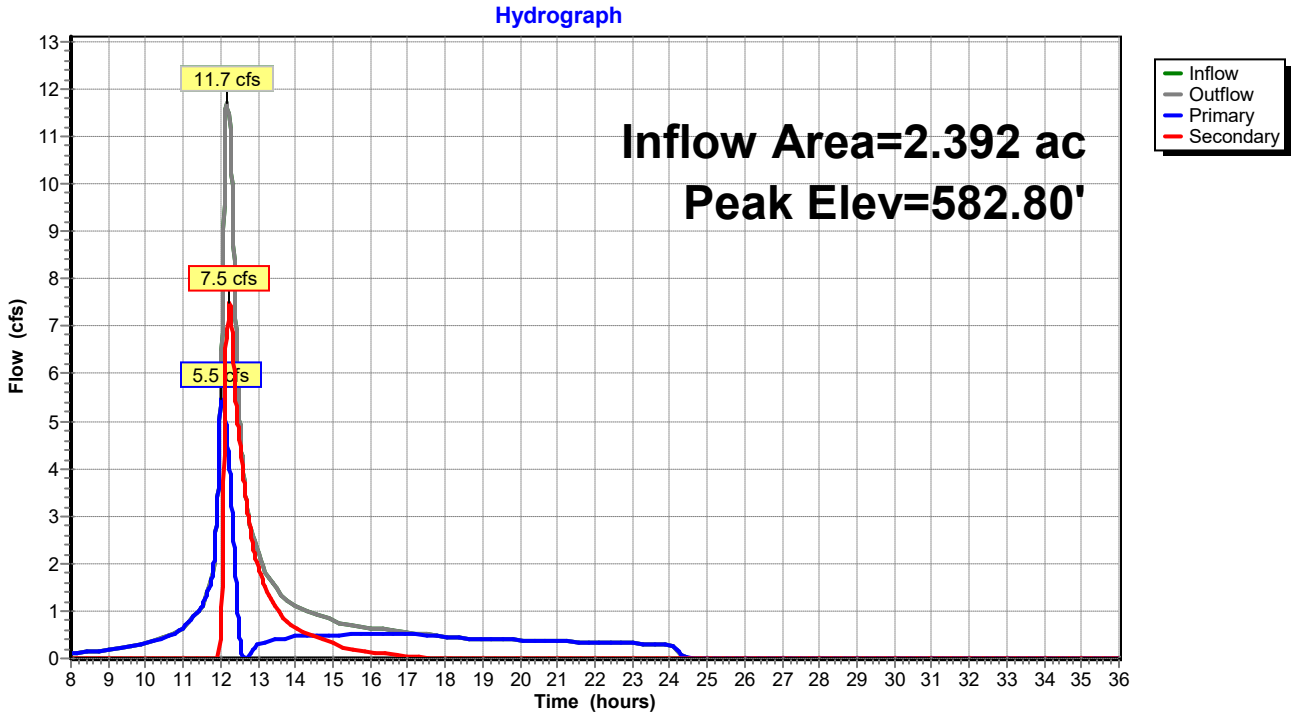
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 582.80' @ 12.25 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	580.30'	**15.0" Round Culvert** L= 39.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.30' / 580.00' S= 0.0077 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	580.47'	**15.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.47' / 579.59' S= 0.0220 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	582.25'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=5.4 cfs @ 12.00 hrs HW=582.31' TW=581.46' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 5.4 cfs @ 4.43 fps)

Secondary OutFlow Max=7.5 cfs @ 12.25 hrs HW=582.80' TW=578.41' (Dynamic Tailwater)
└─**2=Culvert** (Passes 7.5 cfs of 7.7 cfs potential flow)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 7.5 cfs @ 2.26 fps)

Pond FS#6: Existing Flow Splitter #6



Stage-Area-Storage for Pond FS#6: Existing Flow Splitter #6

Elevation (feet)	Storage (cubic-feet)
580.30	**0**
580.40	0
580.50	0
580.60	0
580.70	0
580.80	0
580.90	0
581.00	0
581.10	0
581.20	0
581.30	0
581.40	0
581.50	0
581.60	0
581.70	0
581.80	0
581.90	0
582.00	0
582.10	0
582.20	0
582.30	0
582.40	0
582.50	0
582.60	0
582.70	0
582.80	0

Summary for Pond Inf 1: Infiltration System #1

Inflow Area = 1.843 ac, 30.68% Impervious, Inflow Depth = 1.90" for 100-yr event
Inflow = 1.0 cfs @ 11.53 hrs, Volume= 0.292 af
Outflow = 0.1 cfs @ 7.57 hrs, Volume= 0.292 af, Atten= 90%, Lag= 0.0 min
Discarded = 0.1 cfs @ 7.57 hrs, Volume= 0.292 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 638.47' @ 12.73 hrs Surf.Area= 0.066 ac Storage= 0.149 af

Plug-Flow detention time= 646.5 min calculated for 0.292 af (100% of inflow)
Center-of-Mass det. time= 646.5 min (1,435.5 - 788.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	635.00'	0.056 af	**30.50'W x 94.50'L x 3.54'H Field A** 0.234 af Overall - 0.095 af Embedded = 0.139 af x 40.0% Voids
#2A	635.50'	0.095 af	**Cultec R-330XLHD** x 78 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 6 rows
		0.151 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	635.00'	**1.500 in/hr Exfiltration over Horizontal area** Phase-In= 0.10'

Discarded OutFlow Max=0.1 cfs @ 7.57 hrs HW=635.11' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Pond Inf 1: Infiltration System #1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 6 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

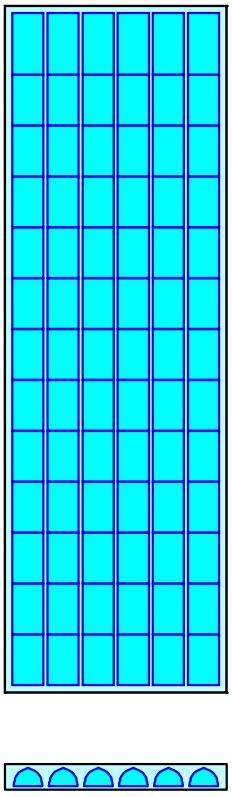
13 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 92.50' Row Length +12.0" End Stone x 2 = 94.50' Base Length
6 Rows x 52.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.50' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

78 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 6 Rows = 4,135.3 cf Chamber Storage

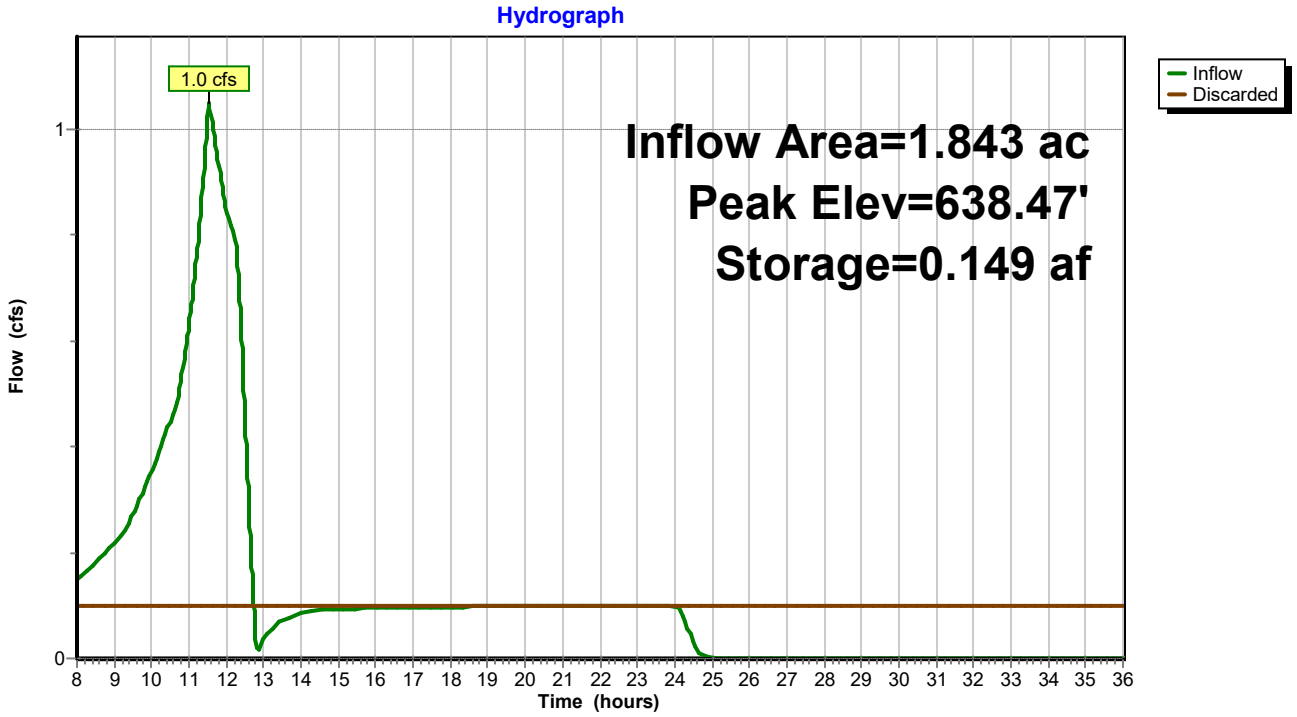
10,208.0 cf Field - 4,135.3 cf Chambers = 6,072.7 cf Stone x 40.0% Voids = 2,429.1 cf Stone Storage

Chamber Storage + Stone Storage = 6,564.4 cf = 0.151 af
Overall Storage Efficiency = 64.3%
Overall System Size = 94.50' x 30.50' x 3.54'

78 Chambers
378.1 cy Field
224.9 cy Stone



Pond Inf 1: Infiltration System #1



Stage-Area-Storage for Pond Inf 1: Infiltration System #1

Elevation (feet)	Horizontal (acres)	Storage (acre-feet)
635.00	**0.066**	0.000
635.10	0.066	0.003
635.20	0.066	0.005
635.30	0.066	0.008
635.40	0.066	0.011
635.50	0.066	0.013
635.60	0.066	0.019
635.70	0.066	0.025
635.80	0.066	0.030
635.90	0.066	0.036
636.00	0.066	0.041
636.10	0.066	0.047
636.20	0.066	0.052
636.30	0.066	0.058
636.40	0.066	0.063
636.50	0.066	0.069
636.60	0.066	0.074
636.70	0.066	0.079
636.80	0.066	0.085
636.90	0.066	0.090
637.00	0.066	0.095
637.10	0.066	0.100
637.20	0.066	0.105
637.30	0.066	0.110
637.40	0.066	0.114
637.50	0.066	0.119
637.60	0.066	0.123
637.70	0.066	0.127
637.80	0.066	0.130
637.90	0.066	0.134
638.00	0.066	0.136
638.10	0.066	0.139
638.20	0.066	0.142
638.30	0.066	0.144
638.40	0.066	0.147
638.50	0.066	**0.150**

Summary for Pond Inf 2: Infiltration System #2

Inflow Area = 0.633 ac, 65.27% Impervious, Inflow Depth = 3.02" for 100-yr event
Inflow = 1.0 cfs @ 11.80 hrs, Volume= 0.159 af
Outflow = 0.1 cfs @ 6.81 hrs, Volume= 0.159 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.1 cfs @ 6.81 hrs, Volume= 0.159 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 620.59' @ 12.15 hrs Surf.Area= 0.035 ac Storage= 0.080 af

Plug-Flow detention time= 618.7 min calculated for 0.159 af (100% of inflow)
Center-of-Mass det. time= 618.7 min (1,375.5 - 756.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	617.00'	0.032 af	**25.67'W x 59.50'L x 3.71'H Field A** 0.130 af Overall - 0.049 af Embedded = 0.081 af x 40.0% Voids
#2A	617.50'	0.049 af	**Cultec R-330XLHD** x 40 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		0.082 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	617.00'	**1.500 in/hr Exfiltration over Horizontal area** Phase-In= 0.10'

Discarded OutFlow Max=0.1 cfs @ 6.81 hrs HW=617.11' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Pond Inf 2: Infiltration System #2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

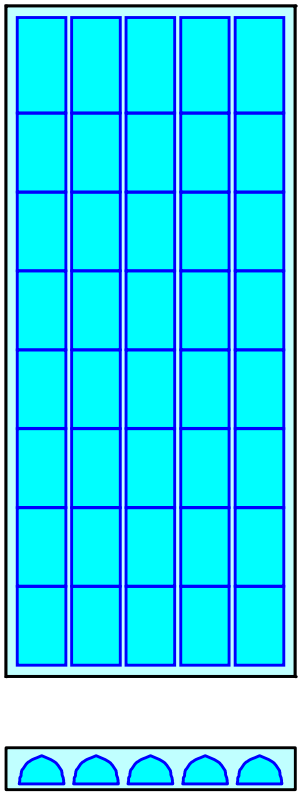
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +12.0" End Stone x 2 = 59.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Base + 30.5" Chamber Height + 8.0" Cover = 3.71' Field Height

40 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,142.2 cf Chamber Storage

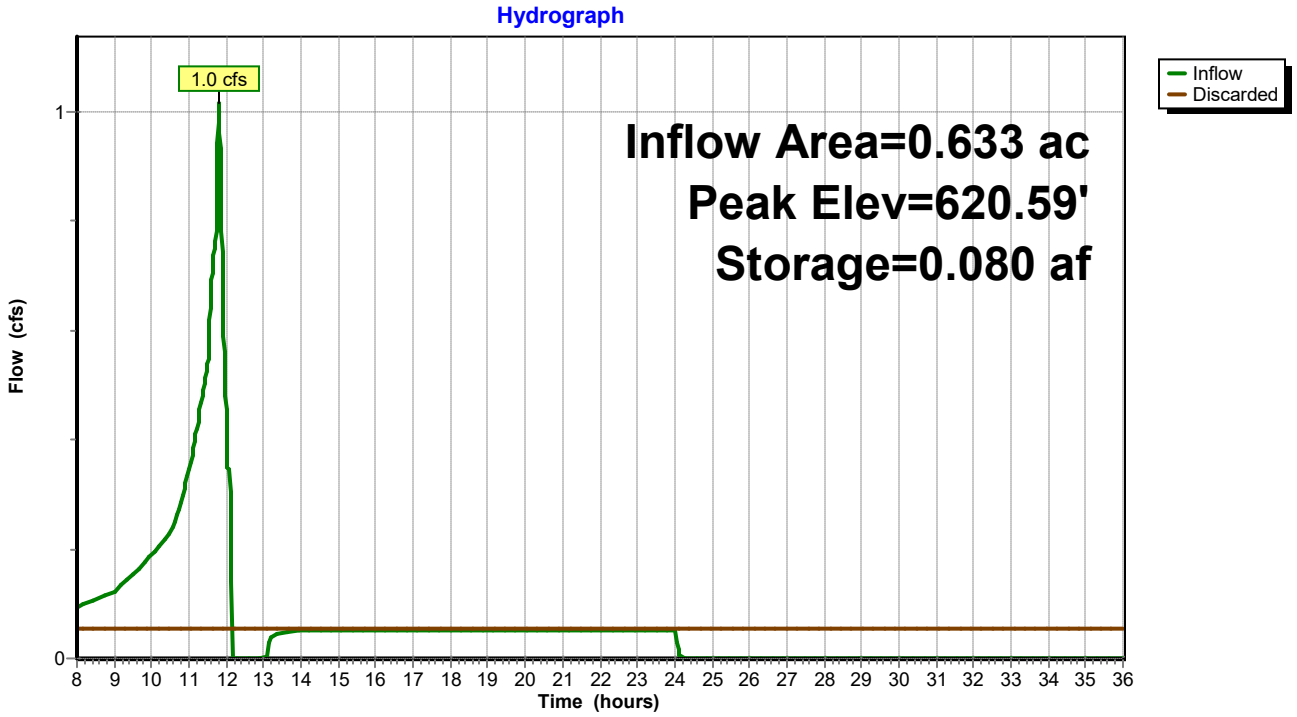
5,663.2 cf Field - 2,142.2 cf Chambers = 3,521.1 cf Stone x 40.0% Voids = 1,408.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,550.6 cf = 0.082 af
Overall Storage Efficiency = 62.7%
Overall System Size = 59.50' x 25.67' x 3.71'

40 Chambers
209.7 cy Field
130.4 cy Stone



Pond Inf 2: Infiltration System #2



Stage-Area-Storage for Pond Inf 2: Infiltration System #2

Elevation (feet)	Horizontal (acres)	Storage (acre-feet)
617.00	**0.035**	0.000
617.10	0.035	0.001
617.20	0.035	0.003
617.30	0.035	0.004
617.40	0.035	0.006
617.50	0.035	0.007
617.60	0.035	0.010
617.70	0.035	0.013
617.80	0.035	0.016
617.90	0.035	0.019
618.00	0.035	0.022
618.10	0.035	0.025
618.20	0.035	0.028
618.30	0.035	0.030
618.40	0.035	0.033
618.50	0.035	0.036
618.60	0.035	0.039
618.70	0.035	0.042
618.80	0.035	0.044
618.90	0.035	0.047
619.00	0.035	0.050
619.10	0.035	0.052
619.20	0.035	0.055
619.30	0.035	0.057
619.40	0.035	0.060
619.50	0.035	0.062
619.60	0.035	0.064
619.70	0.035	0.066
619.80	0.035	0.068
619.90	0.035	0.070
620.00	0.035	0.072
620.10	0.035	0.073
620.20	0.035	0.074
620.30	0.035	0.076
620.40	0.035	0.077
620.50	0.035	0.079
620.60	0.035	0.080
620.70	0.035	**0.081**

Summary for Pond SWQB 3: Existing SWQB #3

Inflow Area = 4.150 ac, 0.00% Impervious, Inflow Depth = 0.00" for 100-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 590.00' @ 0.00 hrs Surf.Area= 1,330 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	590.00'	33,910 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

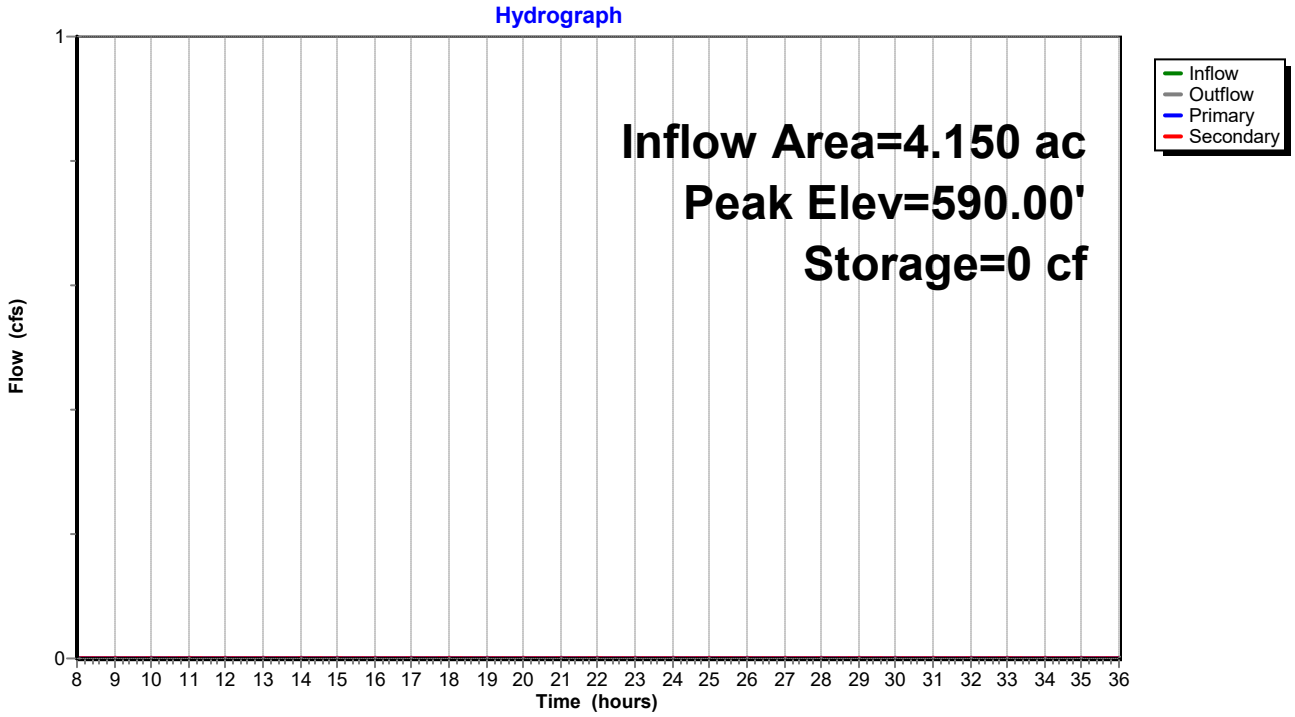
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
590.00	1,330	0	0
592.00	3,725	5,055	5,055
594.00	7,015	10,740	15,795
596.00	11,100	18,115	33,910

Device	Routing	Invert	Outlet Devices
#1	Primary	588.20'	**12.0" Round Culvert** L= 240.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 588.20' / 552.00' S= 0.1508 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	590.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	590.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 18 rows with 3.0" cc spacing C= 0.600
#4	Secondary	594.00'	**30.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.00' TW=551.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.0 cfs of 4.3 cfs potential flow)
  └─**2=Orifice/Grate** (Controls 0.0 cfs)
    └─**3=Orifice/Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=590.00' TW=551.00' (Dynamic Tailwater)
└─**4=Orifice/Grate** (Controls 0.0 cfs)

Pond SWQB 3: Existing SWQB #3



Stage-Area-Storage for Pond SWQB 3: Existing SWQB #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
590.00	1,330	0
590.10	1,450	139
590.20	1,570	290
590.30	1,689	453
590.40	1,809	628
590.50	1,929	815
590.60	2,049	1,014
590.70	2,168	1,224
590.80	2,288	1,447
590.90	2,408	1,682
591.00	2,528	1,929
591.10	2,647	2,187
591.20	2,767	2,458
591.30	2,887	2,741
591.40	3,006	3,036
591.50	3,126	3,342
591.60	3,246	3,661
591.70	3,366	3,991
591.80	3,485	4,334
591.90	3,605	4,688
592.00	3,725	5,055
592.10	3,890	5,436
592.20	4,054	5,833
592.30	4,218	6,247
592.40	4,383	6,677
592.50	4,548	7,123
592.60	4,712	7,586
592.70	4,877	8,066
592.80	5,041	8,561
592.90	5,205	9,074
593.00	5,370	9,603
593.10	5,535	10,148
593.20	5,699	10,709
593.30	5,863	11,288
593.40	6,028	11,882
593.50	6,193	12,493
593.60	6,357	13,121
593.70	6,522	13,765
593.80	6,686	14,425
593.90	6,850	15,102
594.00	7,015	15,795
594.10	7,219	16,507
594.20	7,424	17,239
594.30	7,628	17,991
594.40	7,832	18,764
594.50	8,036	19,558
594.60	8,241	20,372
594.70	8,445	21,206
594.80	8,649	22,061
594.90	8,853	22,936
595.00	9,058	23,831
595.10	9,262	24,747
595.20	9,466	25,684
595.30	9,670	26,640
595.40	9,874	27,618
595.50	10,079	28,615
595.60	10,283	29,633
595.70	10,487	30,672
595.80	10,691	31,731
595.90	10,896	32,810
596.00	**11,100**	**33,910**

Summary for Pond SWQB 4: Existing SWQB #4

Inflow Area = 4.707 ac, 48.19% Impervious, Inflow Depth = 3.95" for 100-yr event
Inflow = 7.4 cfs @ 12.19 hrs, Volume= 1.551 af
Outflow = 3.4 cfs @ 12.46 hrs, Volume= 1.518 af, Atten= 54%, Lag= 15.9 min
Primary = 3.4 cfs @ 12.46 hrs, Volume= 1.518 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 561.96' @ 12.45 hrs Surf.Area= 8,802 sf Storage= 32,647 cf

Plug-Flow detention time= 589.0 min calculated for 1.518 af (98% of inflow)
Center-of-Mass det. time= 576.2 min (1,428.3 - 852.1)

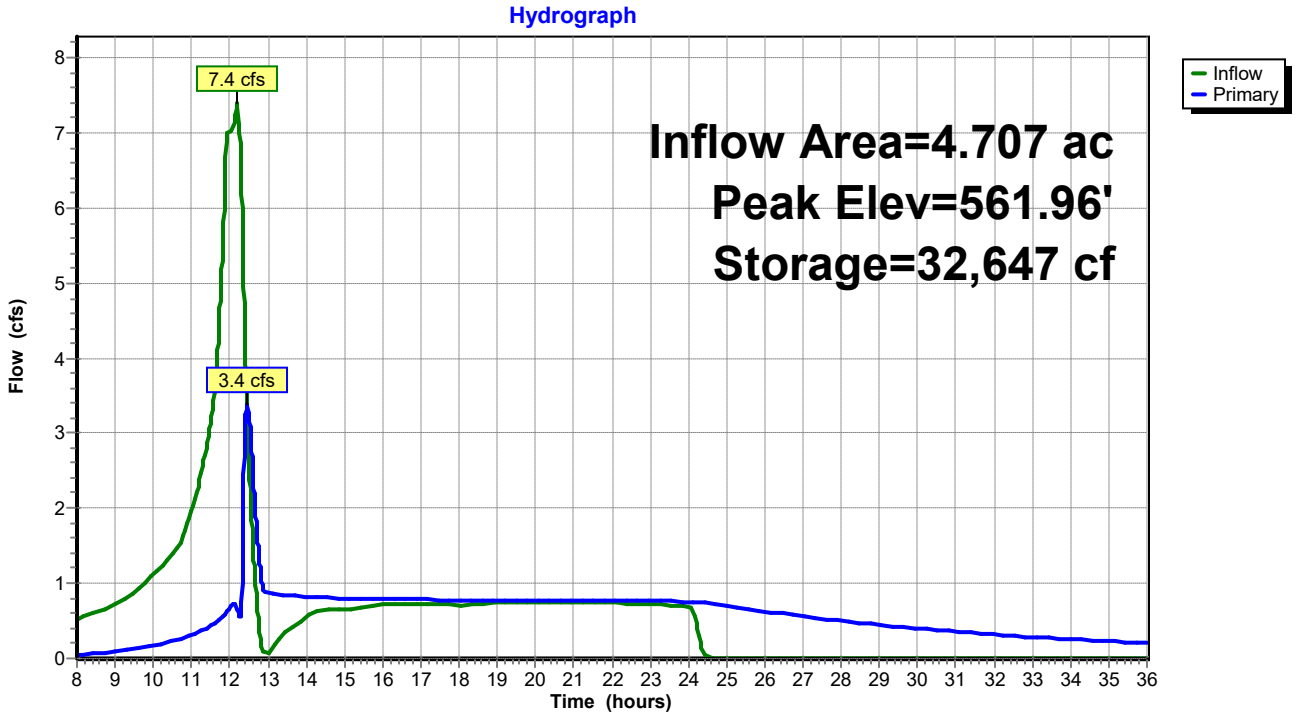
Volume	Invert	Avail.Storage	Storage Description
#1	556.00'	53,446 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
556.00	2,625	212.0	0	0	2,625
558.00	4,450	278.0	6,995	6,995	5,245
560.00	6,430	341.0	10,819	17,815	8,409
562.00	8,860	408.0	15,225	33,040	12,472
564.00	11,608	478.0	20,406	53,446	17,487

Device	Routing	Invert	Outlet Devices
#1	Primary	556.00'	**12.0" Round Culvert** L= 63.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 556.00' / 554.84' S= 0.0184 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	561.80'	**33.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	556.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	556.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 23 rows with 3.0" cc spacing C= 0.600

Primary OutFlow Max=3.4 cfs @ 12.46 hrs HW=561.96' TW=558.19' (Dynamic Tailwater)
└─**1=Culvert** (Passes 3.4 cfs of 6.6 cfs potential flow)
  ├─**2=Orifice/Grate** (Weir Controls 2.6 cfs @ 1.29 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.8 cfs @ 9.35 fps)
    └─**4=Orifice/Grate** (Passes 0.8 cfs of 0.9 cfs potential flow)

Pond SWQB 4: Existing SWQB #4



Stage-Area-Storage for Pond SWQB 4: Existing SWQB #4

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
556.00	2,625	0
556.10	2,705	266
556.20	2,786	541
556.30	2,868	824
556.40	2,952	1,115
556.50	3,036	1,414
556.60	3,122	1,722
556.70	3,209	2,039
556.80	3,298	2,364
556.90	3,387	2,698
557.00	3,478	3,041
557.10	3,569	3,394
557.20	3,663	3,755
557.30	3,757	4,126
557.40	3,852	4,507
557.50	3,949	4,897
557.60	4,047	5,296
557.70	4,146	5,706
557.80	4,246	6,126
557.90	4,347	6,555
558.00	4,450	6,995
558.10	4,540	7,445
558.20	4,632	7,903
558.30	4,724	8,371
558.40	4,817	8,848
558.50	4,911	9,334
558.60	5,006	9,830
558.70	5,102	10,336
558.80	5,198	10,851
558.90	5,296	11,375
559.00	5,395	11,910
559.10	5,494	12,454
559.20	5,594	13,009
559.30	5,696	13,573
559.40	5,798	14,148
559.50	5,901	14,733
559.60	6,005	15,328
559.70	6,110	15,934
559.80	6,216	16,550
559.90	6,322	17,177
560.00	6,430	17,815
560.10	6,542	18,463
560.20	6,656	19,123
560.30	6,770	19,794
560.40	6,885	20,477
560.50	7,001	21,171
560.60	7,118	21,877
560.70	7,236	22,595
560.80	7,355	23,325
560.90	7,475	24,066
561.00	7,596	24,820
561.10	7,718	25,585
561.20	7,841	26,363
561.30	7,965	27,154
561.40	8,090	27,957
561.50	8,216	28,772
561.60	8,343	29,600
561.70	8,471	30,440
561.80	8,600	31,294
561.90	8,729	32,160
562.00	8,860	33,040
562.10	8,989	33,932
562.20	9,118	34,838
562.30	9,249	35,756
562.40	9,380	36,687
562.50	9,512	37,632
562.60	9,645	38,590
562.70	9,780	39,561
562.80	9,915	40,546
562.90	10,051	41,544
563.00	10,188	42,556
563.10	10,326	43,582
563.20	10,464	44,621
563.30	10,604	45,675
563.40	10,745	46,742
563.50	10,886	47,823
563.60	11,029	48,919
563.70	11,172	50,029
563.80	11,317	51,154
563.90	11,462	52,293
564.00	**11,608**	**53,446**

Summary for Pond SWQB 4A: Existing SWQB #4A

Inflow Area = 2.392 ac, 31.54% Impervious, Inflow Depth = 3.68" for 100-yr event
Inflow = 5.5 cfs @ 12.00 hrs, Volume= 0.733 af
Outflow = 0.6 cfs @ 12.49 hrs, Volume= 0.733 af, Atten= 89%, Lag= 29.3 min
Primary = 0.6 cfs @ 12.49 hrs, Volume= 0.733 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 4
Starting Elev= 578.50' Surf.Area= 1,337 sf Storage= 590 cf
Peak Elev= 582.65' @ 12.49 hrs Surf.Area= 5,129 sf Storage= 13,324 cf (12,734 cf above start)

Plug-Flow detention time= 360.2 min calculated for 0.720 af (98% of inflow)
Center-of-Mass det. time= 337.7 min (1,235.0 - 897.2)

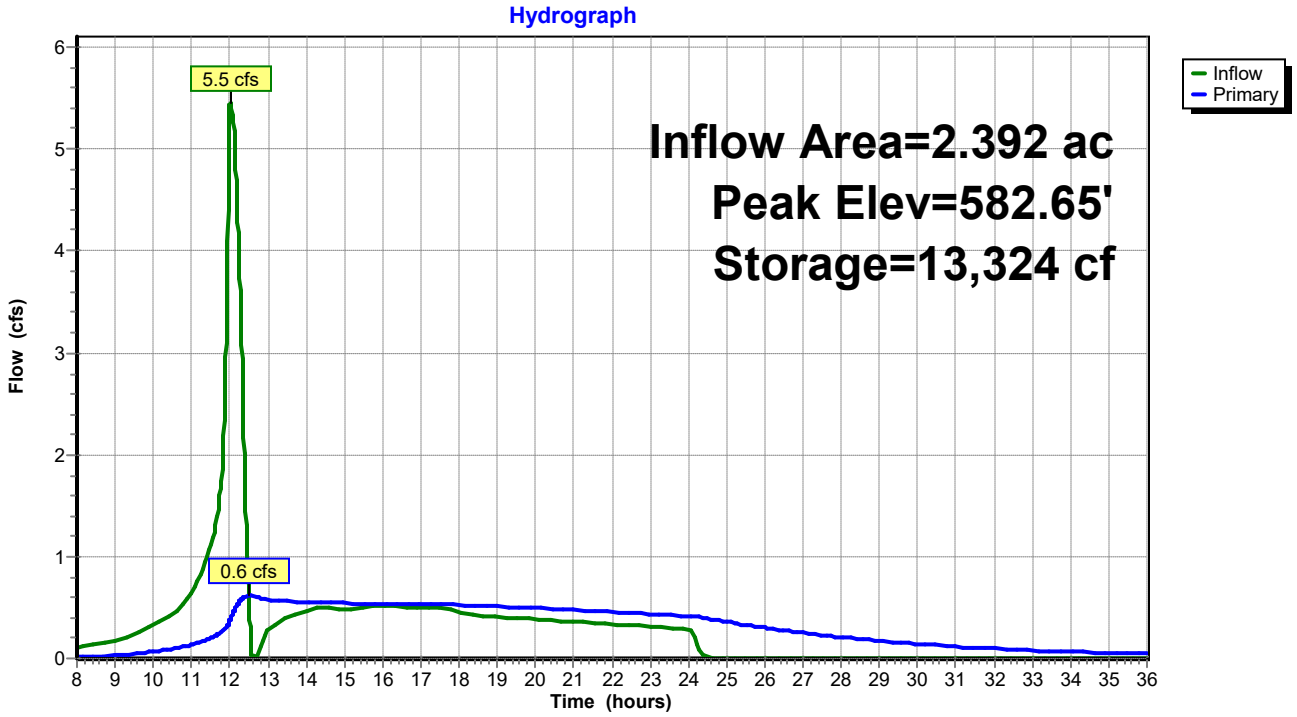
Volume	Invert	Avail.Storage	Storage Description
#1	578.00'	37,725 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
578.00	1,030	148.0	0	0	1,030
580.00	2,500	251.0	3,423	3,423	4,325
582.00	4,386	315.0	6,798	10,221	7,262
584.00	6,847	383.0	11,142	21,363	11,103
586.00	9,592	437.0	16,362	37,725	14,721

Device	Routing	Invert	Outlet Devices
#1	Primary	578.04'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 578.04' / 576.09' S= 0.0390 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	583.14'	**33.0" x 44.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	578.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	578.50'	**0.5" Vert. Orifice/Grate X 4.00 columns** X 18 rows with 3.0" cc spacing C= 0.600

Primary OutFlow Max=0.6 cfs @ 12.49 hrs HW=582.65' TW=577.37' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.6 cfs of 7.7 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.0 cfs)
  └─**3=Orifice/Grate** (Passes 0.6 cfs of 0.8 cfs potential flow)
    └─**4=Orifice/Grate** (Orifice Controls 0.6 cfs @ 6.64 fps)

Pond SWQB 4A: Existing SWQB #4A



Stage-Area-Storage for Pond SWQB 4A: Existing SWQB #4A

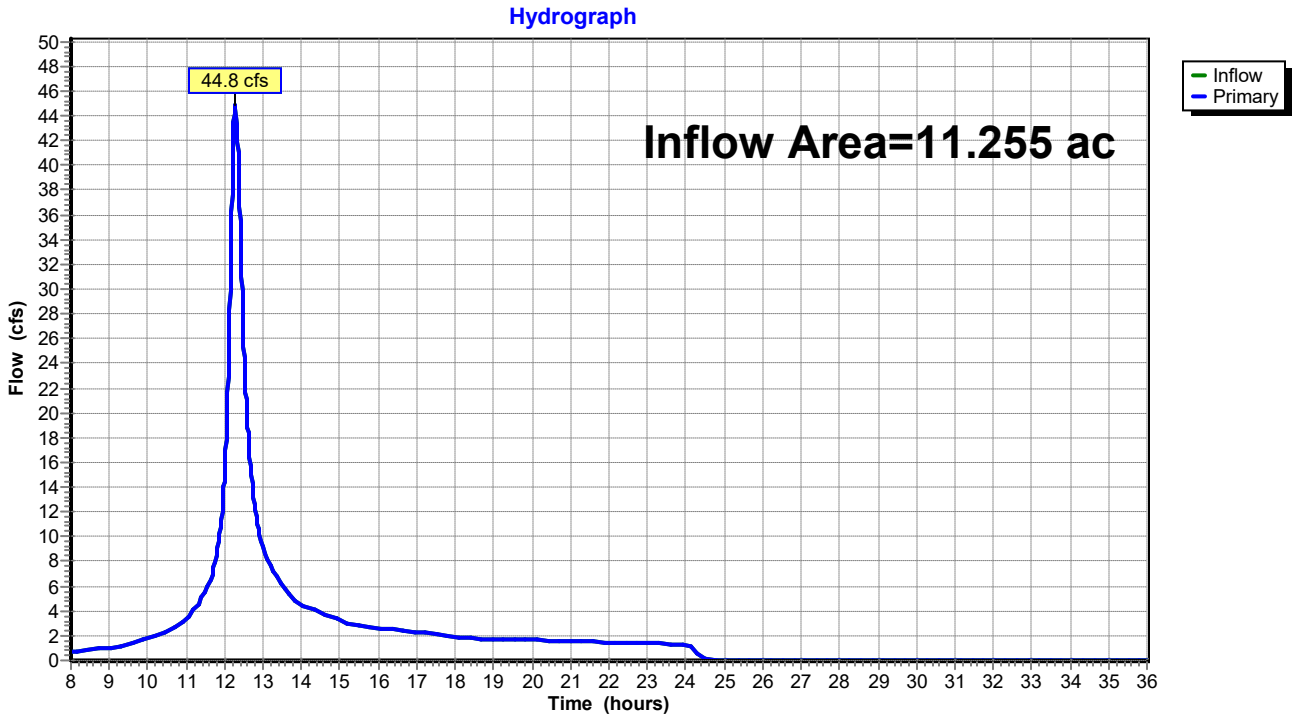
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
578.00	1,030	0
578.10	1,088	106
578.20	1,148	218
578.30	1,210	336
578.40	1,273	460
578.50	1,337	590
578.60	1,404	727
578.70	1,472	871
578.80	1,541	1,022
578.90	1,612	1,179
579.00	1,685	1,344
579.10	1,759	1,516
579.20	1,835	1,696
579.30	1,913	1,883
579.40	1,992	2,079
579.50	2,072	2,282
579.60	2,155	2,493
579.70	2,239	2,713
579.80	2,324	2,941
579.90	2,411	3,178
580.00	2,500	3,423
580.10	2,582	3,677
580.20	2,665	3,940
580.30	2,749	4,210
580.40	2,835	4,489
580.50	2,922	4,777
580.60	3,011	5,074
580.70	3,100	5,379
580.80	3,191	5,694
580.90	3,284	6,018
581.00	3,377	6,351
581.10	3,472	6,693
581.20	3,568	7,045
581.30	3,666	7,407
581.40	3,765	7,778
581.50	3,865	8,160
581.60	3,967	8,552
581.70	4,070	8,953
581.80	4,174	9,365
581.90	4,279	9,788
582.00	4,386	10,221
582.10	4,496	10,665
582.20	4,608	11,121
582.30	4,720	11,587
582.40	4,835	12,065
582.50	4,950	12,554
582.60	5,067	13,055
582.70	5,185	13,567
582.80	5,305	14,092
582.90	5,426	14,628
583.00	5,548	15,177
583.10	5,672	15,738
583.20	5,797	16,312
583.30	5,924	16,898
583.40	6,051	17,496
583.50	6,181	18,108
583.60	6,311	18,732
583.70	6,443	19,370
583.80	6,576	20,021
583.90	6,711	20,685
584.00	6,847	21,363
584.10	6,973	22,054
584.20	7,101	22,758
584.30	7,229	23,475
584.40	7,359	24,204
584.50	7,490	24,946
584.60	7,622	25,702
584.70	7,755	26,471
584.80	7,890	27,253
584.90	8,025	28,049
585.00	8,162	28,858
585.10	8,300	29,681
585.20	8,439	30,518
585.30	8,579	31,369
585.40	8,720	32,234
585.50	8,862	33,113
585.60	9,006	34,006
585.70	9,151	34,914
585.80	9,297	35,837
585.90	9,444	36,774
586.00	**9,592**	**37,725**

Summary for Link DL1: Design Line 1

Inflow Area = 11.255 ac, 21.15% Impervious, Inflow Depth = 5.53" for 100-yr event
Inflow = 44.8 cfs @ 12.27 hrs, Volume= 5.190 af
Primary = 44.8 cfs @ 12.27 hrs, Volume= 5.190 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DL1: Design Line 1

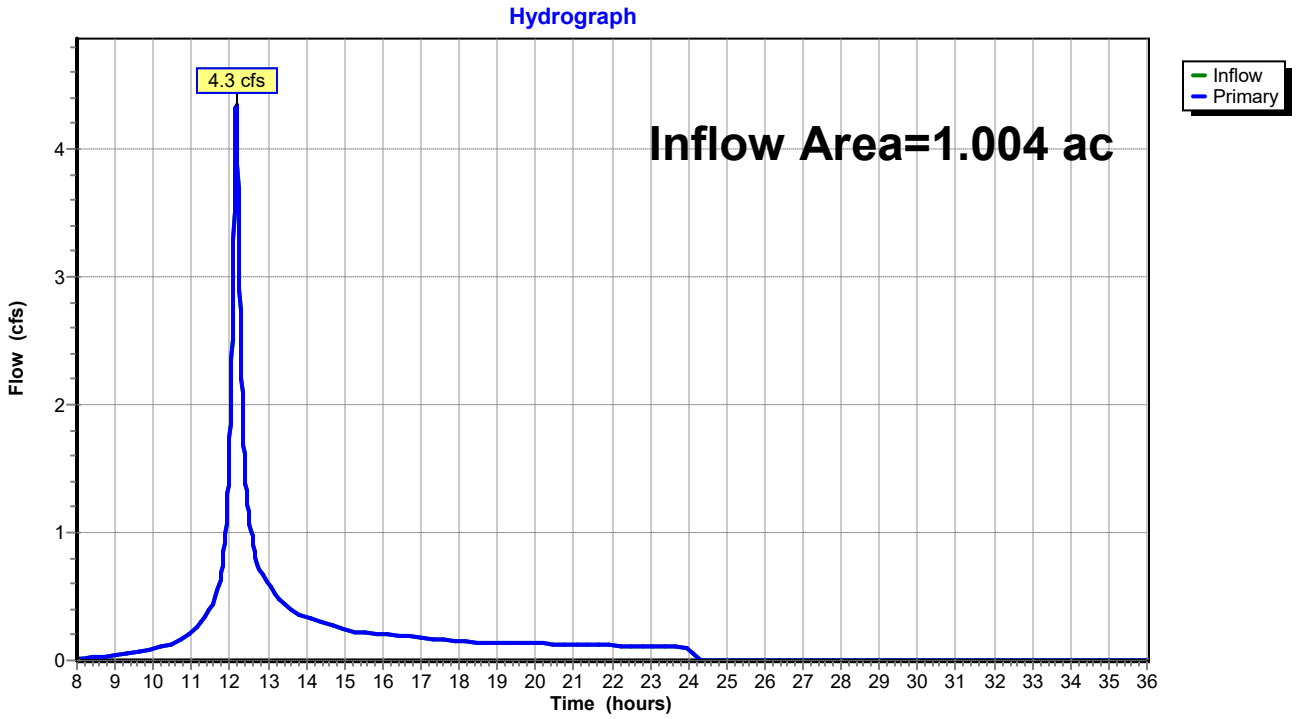


Summary for Link DL2: Design Line 2

Inflow Area = 1.004 ac, 0.46% Impervious, Inflow Depth = 4.44" for 100-yr event
Inflow = 4.3 cfs @ 12.17 hrs, Volume= 0.371 af
Primary = 4.3 cfs @ 12.17 hrs, Volume= 0.371 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DL2: Design Line 2

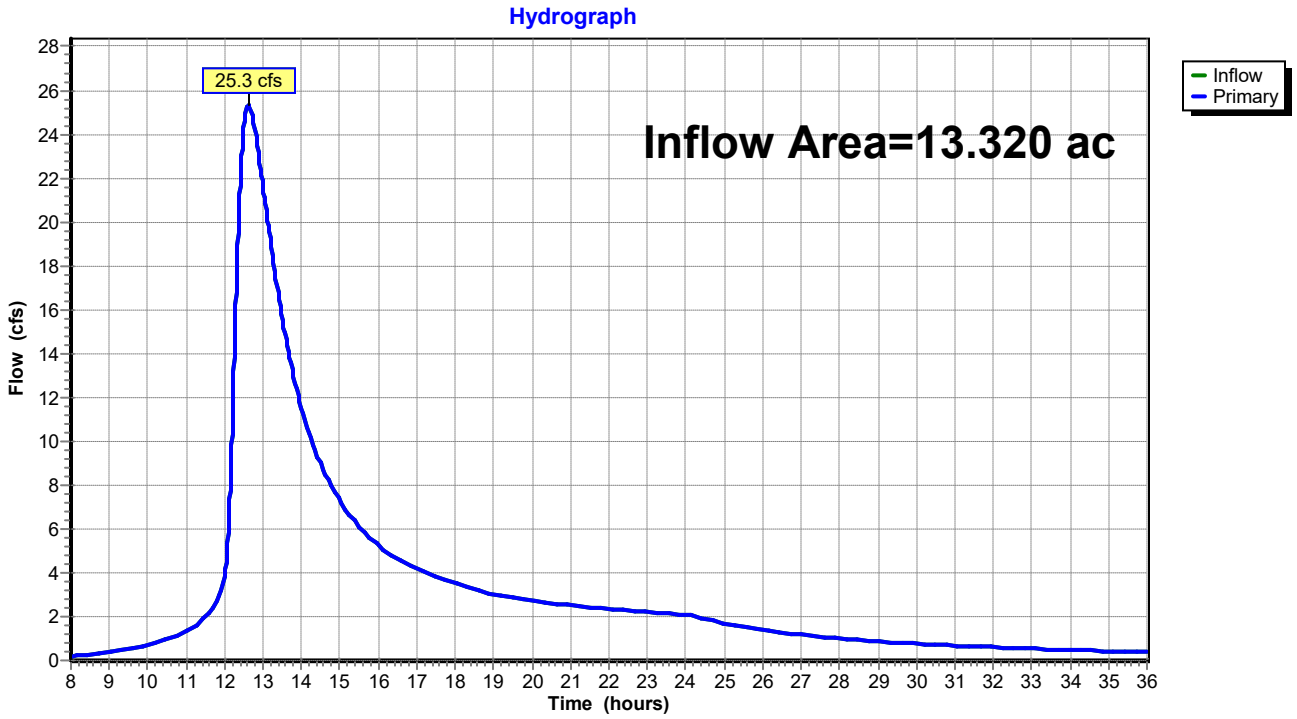


Summary for Link DP1: Design Point #1

Inflow Area = 13.320 ac, 22.69% Impervious, Inflow Depth = 6.94" for 100-yr event
Inflow = 25.3 cfs @ 12.62 hrs, Volume= 7.700 af
Primary = 25.3 cfs @ 12.62 hrs, Volume= 7.700 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DP1: Design Point #1

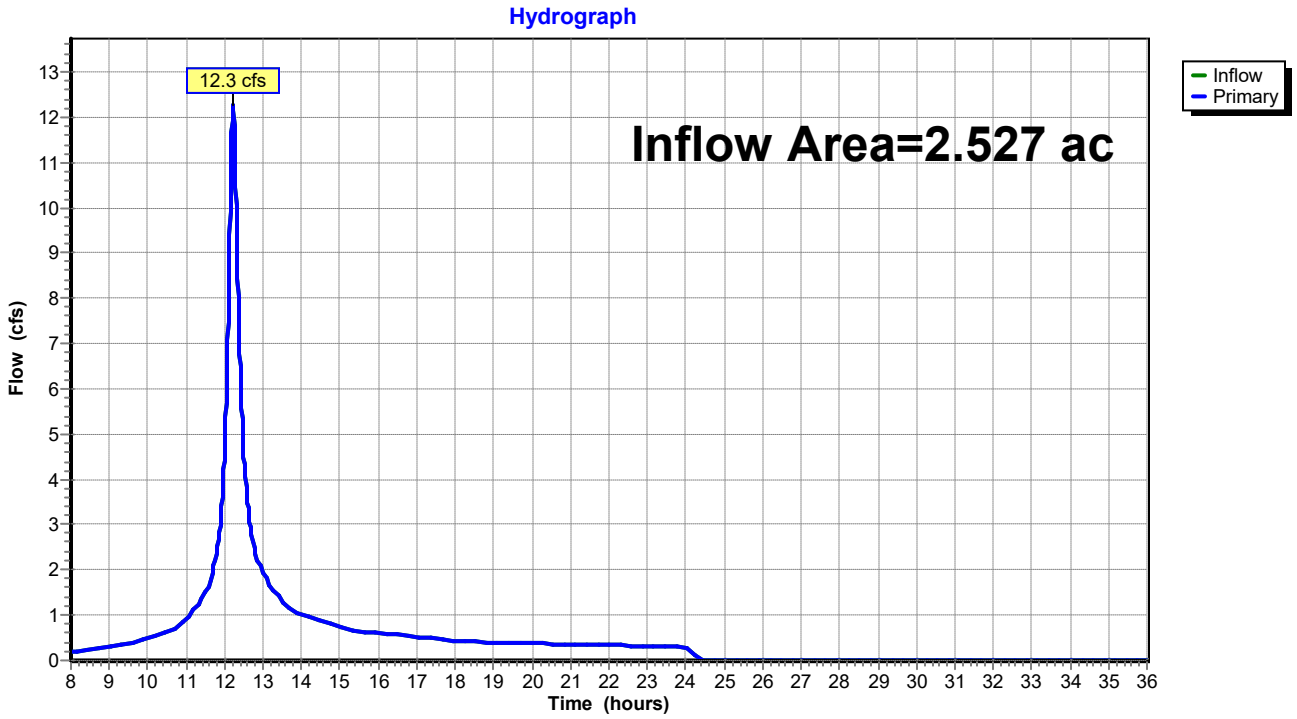


Summary for Link DP2: Design Point #2

Inflow Area = 2.527 ac, 28.26% Impervious, Inflow Depth = 5.90" for 100-yr event
Inflow = 12.3 cfs @ 12.21 hrs, Volume= 1.243 af
Primary = 12.3 cfs @ 12.21 hrs, Volume= 1.243 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Link DP2: Design Point #2



Appendix D

NRCS Soil Mapping

Hydrologic Soil Group—Putnam County, New York
(VanGuard Southeast Executive Park)

Map Scale: 1:3,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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: Putnam County, New York
Survey Area Data: Version 14, Oct 8, 2017

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

Date(s) aerial images were photographed: Dec 31, 2009—Oct 5, 2016

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CrC	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	B	1.2	2.8%
PnB	Paxton fine sandy loam, 3 to 8 percent slopes	C	7.1	16.0%
PnC	Paxton fine sandy loam, 8 to 15 percent slopes	C	0.8	1.8%
RdB	Ridgebury loam, 3 to 8 percent slopes	B/D	6.8	15.3%
RgB	Ridgebury loam, 2 to 8 percent slopes, very stony	B/D	1.9	4.4%
Ub	Udorthents, smoothed	B	16.2	36.7%
Uc	Udorthents, wet substratum	A/D	5.9	13.3%
WdB	Woodbridge loam, 3 to 8 percent slopes	C/D	4.3	9.7%
Totals for Area of Interest			**44.2**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix E

Soil Testing Results

BIBBO ASSOCIATES, LLP
Consulting Engineers

Sheet: 1 of 1

Project: Vanguard Investors, Ltd.
Independent Way
Southeast (T)
Feature: Infiltration Test Results

Recorded By:
Joe Buschynski
Date: 11/26/2013 TEST
11/25/2013 PRE-SOAK
07/18/2018 PRE-SOAK
07/19/2018 TEST

Hole ID:	Run #	Time Start (Hr : Min.)	Time Stop (Hr : Min.)	Depth to Water From Ground Surface From (In.)	To (In.)	Time (Min.)	Drop (In.)	Rate (Min / In..)
P-1	1	8:27 AM	9:27 AM	61.25	63.50	60	2.25	26.70
	2	9:28 AM	10:28 AM	60.50	62.75	60	2.25	26.70
	3	10:30 AM	11:30 AM	60.50	62.75	60	2.25	26.70
	4	11:32 AM	12:32 AM	60.75	62.75	60	2.00	30.00
P-2	1	8:32 AM	9:32 AM	73.37	75.37	60	2.00	30.00
	2	9:33 AM	10:33 AM	73.25	74.87	60	1.62	37.00
	3	10:35 AM	11:35 AM	73.50	75.00	60	1.50	40.00
	4	11:37 AM	12:37 AM	73.25	74.75	60	1.50	40.00

Witnessed by: JM ROCHE,(NYCDEP) 11-26-13

P-1A	1	9:48 AM	10:48 AM	54.00	66.00	60	12.00	5.00
	2	10:50 AM	11:50 AM	54.00	63.50	60	9.50	6.32
	3	11:51 AM	12:51 PM	54.00	63.00	60	9.00	6.67
	4	12:52 PM	1:52 PM	54.00	63.00	60	9.00	6.67
P-2A	1	9:43 AM	10:43 AM	54.00	73.00	60	19.00	3.16
	2	10:45 AM	11:45 AM	54.00	70.50	60	16.50	3.64
	3	11:46 AM	12:46 PM	54.00	68.00	60	14.00	4.29
	4	12:47 PM	1:47 PM	54.00	67.50	60	13.50	4.44

Witnessed by: JASON COPPOLA, P.E. (NYCDEP) 07-19-18

Appendix F

NYSDEC Notice of Intent

0644089821

NOTICE OF INTENT

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

NYR _____
(for DEC use only)

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-0-15-002

All sections must be completed unless otherwise noted. Failure to complete all items may result in this form being returned to you, thereby delaying your coverage under this General Permit. Applicants must read and understand the conditions of the permit and prepare a Stormwater Pollution Prevention Plan prior to submitting this NOI. Applicants are responsible for identifying and obtaining other DEC permits that may be required.

-IMPORTANT-
RETURN THIS FORM TO THE ADDRESS ABOVE
OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)
NINTH JAM DEVELOPMENT, LLC

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
GETZ

Owner/Operator Contact Person First Name
ALAN

Owner/Operator Mailing Address
501 FIFTH AVE., SUITE 704

City
NEW YORK

State
NY

Zip
10017 -

Phone (Owner/Operator)
212 - 683 - 2233

Fax (Owner/Operator)
212 - 683 - 0374

Email (Owner/Operator)
AGETZ@VANGUARDINVESTORS.NET

FED TAX ID
__ - _____ (not required for individuals)

Project Site Information

Project/Site Name

SOUTHEAST EXECUTIVE PARK-PARKING PROJECT

Street Address (NOT P.O. BOX)

185 ROUTE 312

Side of Street

○ **North** ● **South** ○ **East** ○ **West**

City/Town/Village (THAT ISSUES BUILDING PERMIT)

SOUTHEAST

State: NY

Zip: 10509 -

County: PUTNAM

DEC Region: 3

Name of Nearest Cross Street

INDEPENDENT WAY

Distance to Nearest Cross Street (Feet)

570

Project In Relation to Cross Street

○ **North** ○ **South** ○ **East** ● **West**

Tax Map Numbers
Section-Block-Parcel

45.1-1-3

45.1-1-2

Tax Map Numbers

56.-1-31

56.-1-32.112

1. Provide the Geographic Coordinates for the project site in NYTM Units. To do this you **must** go to the NYSDEC Stormwater Interactive Map on the DEC website at:

www.dec.ny.gov/imsmaps/stormwater/viewer.htm

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located your project site, go to the tool boxes on the top and choose "i"(identify). Then click on the center of your site and a new window containing the X, Y coordinates in UTM will pop up. Transcribe these coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting): 614348

Y Coordinates (Northing): 4586497

2. What is the nature of this construction project?

● **New Construction**

○ **Redevelopment with increase in impervious area**

○ **Redevelopment with no increase in impervious area**

3. Select the predominant land use for both pre and post development conditions.
SELECT ONLY ONE CHOICE FOR EACH

Pre-Development Existing Land Use

- ○ FOREST
- ○ PASTURE/OPEN LAND
- ○ CULTIVATED LAND
- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ● COMMERCIAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY
- ○ PARKING LOT
- ○ OTHER

Post-Development Future Land Use

Number of Lots

- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ● COMMERCIAL
- ○ MUNICIPAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY (water, sewer, gas, etc.)
- ○ PARKING LOT
- ○ CLEARING/GRADING ONLY
- ○ DEMOLITION, NO REDEVELOPMENT
- ○ WELL DRILLING ACTIVITY *(Oil, Gas, etc.)
- ○ OTHER

***Note**: for gas well drilling, non-high volume hydraulic fractured wells only

4. In accordance with the larger common plan of development or sale, enter the total project site area; the total area to be disturbed; existing impervious area to be disturbed (for redevelopment activities); and the future impervious area constructed within the disturbed area. (Round to the nearest tenth of an acre.)

Total Site Area	Total Area To Be Disturbed	Existing Impervious Area To Be Disturbed	Future Impervious Area Within Disturbed Area
29.3	2.8	0.0	1.0

5. Do you plan to disturb more than 5 acres of soil at any one time? ○ **Yes** ● **No**

6. Indicate the percentage of each Hydrologic Soil Group(HSG) at the site.

A	B	C	D
0%	49%	51%	0%

7. Is this a phased project? ○ **Yes** ● **No**

8. Enter the planned start and end dates of the disturbance activities.

Start Date 01/01/2019 - **End Date** 04/01/2020

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.

Name

NYSDEC WETLAND BR-18

9a. Type of waterbody identified in Question 9?

- ● Wetland / State Jurisdiction On Site (Answer 9b)
- ○ Wetland / State Jurisdiction Off Site
- ○ Wetland / Federal Jurisdiction On Site (Answer 9b)
- ○ Wetland / Federal Jurisdiction Off Site
- ○ Stream / Creek On Site
- ○ Stream / Creek Off Site
- ○ River On Site
- ○ River Off Site
- ○ Lake On Site
- ○ Lake Off Site
- ○ Other Type On Site
- ○ Other Type Off Site

9b. How was the wetland identified?

- ● Regulatory Map
- ○ Delineated by Consultant
- ○ Delineated by Army Corps of Engineers
- ○ Other (identify)

10. Has the surface waterbody(ies) in question 9 been identified as a 303(d) segment in Appendix E of GP-0-15-002? ○ **Yes** ● **No**

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-15-002? ● **Yes** ○ **No**

12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters? ● **Yes** ○ **No**
If no, skip question 13.

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey? ○ **Yes** ● **No**
If Yes, what is the acreage to be disturbed?

.

14. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area? ○ **Yes** ● **No**

15. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)? ● Yes ○ No ○ Unknown

16. What is the name of the municipality/entity that owns the separate storm sewer system?

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17. Does any runoff from the site enter a sewer classified as a Combined Sewer? ○ Yes ● No ○ Unknown

18. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law? ○ Yes ● No

19. Is this property owned by a state authority, state agency, federal government or local government? ● Yes ○ No

20. Is this a remediation project being done under a Department approved work plan? (i.e. CERCLA, RCRA, Voluntary Cleanup Agreement, etc.) ○ Yes ● No

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)? ● Yes ○ No

22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)? ● Yes ○ No
If No, skip questions 23 and 27-39.

23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual? ● Yes ○ No

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:

- ● **Professional Engineer (P.E.)**
- ○ **Soil and Water Conservation District (SWCD)**
- ○ **Registered Landscape Architect (R.L.A)**
- ○ **Certified Professional in Erosion and Sediment Control (CPESC)**
- ○ **Owner/Operator**
- ○ **Other**

SWPPP Preparer
BIBBO ASSOCIATES, LLP

Contact Name (Last, Space, First)
BARISSER, SABRI

Mailing Address
293 ROUTE 100, SUITE 203

City
SOMERS

State NY Zip 10589-

Phone 914-277-5805

Fax 914-277-8210

Email
SBARISSER@BIBBOASSOCIATES.COM

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-15-002. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

First Name SABRI

MI

Last Name BARISSER

Signature

Date / /

25. Has a construction sequence schedule for the planned management practices been prepared? ● Yes ○ No

26. Select **all** of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural

- ○ Check Dams
- ○ Construction Road Stabilization
- ○ Dust Control
- ○ Earth Dike
- ○ Level Spreader
- ○ Perimeter Dike/Swale
- ○ Pipe Slope Drain
- ○ Portable Sediment Tank
- ○ Rock Dam
- ○ Sediment Basin
- ○ Sediment Traps
- ● Silt Fence
- ● Stabilized Construction Entrance
- ● Storm Drain Inlet Protection
- ○ Straw/Hay Bale Dike
- ○ Temporary Access Waterway Crossing
- ○ Temporary Stormdrain Diversion
- ○ Temporary Swale
- ○ Turbidity Curtain
- ○ Water bars

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

- ○ Brush Matting
- ○ Dune Stabilization
- ○ Grassed Waterway
- ● Mulching
- ○ Protecting Vegetation
- ○ Recreation Area Improvement
- ● Seeding
- ○ Sodding
- ○ Straw/Hay Bale Dike
- ○ Streambank Protection
- ○ Temporary Swale
- ● Topsoiling
- ○ Vegetating Waterways

Permanent Structural

- ○ Debris Basin
- ○ Diversion
- ○ Grade Stabilization Structure
- ● Land Grading
- ○ Lined Waterway (Rock)
- ○ Paved Channel (Concrete)
- ○ Paved Flume
- ● Retaining Wall
- ○ Riprap Slope Protection
- ● Rock Outlet Protection
- ○ Streambank Protection

Other

Post-construction Stormwater Management Practice (SMP) Requirements

Important: Completion of Questions 27-39 is not required if response to Question 22 is No.

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.

- ○ **Preservation of Undisturbed Areas**
- ○ **Preservation of Buffers**
- ● **Reduction of Clearing and Grading**
- ● **Locating Development in Less Sensitive Areas**
- ○ **Roadway Reduction**
- ○ **Sidewalk Reduction**
- ○ **Driveway Reduction**
- ○ **Cul-de-sac Reduction**
- ○ **Building Footprint Reduction**
- ○ **Parking Reduction**

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).

- ● All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).
- ○ Compacted areas were considered as impervious cover when calculating the **WQv Required**, and the compacted areas were assigned a post-construction Hydrologic Soil Group (HSG) designation that is one level less permeable than existing conditions for the hydrology analysis.

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout).

Total WQv Required

		0	.	2	1	5	**acre-feet**

29. Identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity in Table 1 (See Page 9) that were used to reduce the Total WQv Required(#28).

Also, provide in Table 1 the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use Tables 1 and 2 to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

Table 1 - Runoff Reduction (RR) Techniques and Standard Stormwater Management Practices (SMPs)

	Total Contributing Area (acres)		Total Contributing Impervious Area(acres)
RR Techniques (Area Reduction)			
○ Conservation of Natural Areas (RR-1)		and/or	
○ Sheetflow to Riparian Buffers/Filters Strips (RR-2)		and/or	
● Tree Planting/Tree Pit (RR-3)		and/or	0.017
○ Disconnection of Rooftop Runoff (RR-4)		and/or	
RR Techniques (Volume Reduction)			
○ Vegetated Swale (RR-5)			
○ Rain Garden (RR-6)			
○ Stormwater Planter (RR-7)			
○ Rain Barrel/Cistern (RR-8)			
○ Porous Pavement (RR-9)			
○ Green Roof (RR-10)			
Standard SMPs with RRv Capacity			
○ Infiltration Trench (I-1)			
○ Infiltration Basin (I-2)			
○ Dry Well (I-3)			
● Underground Infiltration System (I-4)			0.978
○ Bioretention (F-5)			
○ Dry Swale (O-1)			
Standard SMPs			
○ Micropool Extended Detention (P-1)			
○ Wet Pond (P-2)			
○ Wet Extended Detention (P-3)			
○ Multiple Pond System (P-4)			
○ Pocket Pond (P-5)			
○ Surface Sand Filter (F-1)			
○ Underground Sand Filter (F-2)			
○ Perimeter Sand Filter (F-3)			
○ Organic Filter (F-4)			
○ Shallow Wetland (W-1)			
○ Extended Detention Wetland (W-2)			
○ Pond/Wetland System (W-3)			
○ Pocket Wetland (W-4)			
○ Wet Swale (O-2)			

Table 2 - Alternative SMPs (DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)

Alternative SMP	Total Contributing Impervious Area(acres)
○ **Hydrodynamic**	___.___
○ **Wet Vault**	___.___
○ **Media Filter**	___.___
○ **Other** _____	___.___

Provide the name and manufacturer of the Alternative SMPs (i.e. proprietary practice(s)) being used for WQv treatment.

Name _____

Manufacturer _____

Note: Redevelopment projects which do not use RR techniques, shall use questions 28, 29, 33 and 33a to provide SMPs used, total WQv required and total WQv provided for the project.

30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29.

Total RRv provided

0.215 **acre-feet**

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28).

● **Yes** ○ **No**

If Yes, go to question 36.
If No, go to question 32.

32. Provide the Minimum RRv required based on HSG.
[Minimum RRv Required = (P)(0.95)(Ai)/12, Ai=(S)(Aic)]

Minimum RRv Required

___.___ **acre-feet**

32a. Is the Total RRv provided (#30) greater than or equal to the Minimum RRv Required (#32)?

○ **Yes** ○ **No**

If Yes, go to question 33.
Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. Identify the Standard SMPs in Table 1 and, if applicable, the Alternative SMPs in Table 2 that were used to treat the remaining total WQv(=Total WQv Required in 28 - Total RRv Provided in 30).

Also, provide in Table 1 and 2 the total impervious area that contributes runoff to each practice selected.

Note: Use Tables 1 and 2 to identify the SMPs used on Redevelopment projects.

33a. Indicate the Total WQv provided (i.e. WQv treated) by the SMPs identified in question #33 and Standard SMPs with RRv Capacity identified in question 29.

WQv Provided

[ ][ ][ ].[ ][ ][ ] **acre-feet**

Note: For the standard SMPs with RRv capacity, the WQv provided by each practice = the WQv calculated using the contributing drainage area to the practice - RRv provided by the practice. (See Table 3.5 in Design Manual)

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a). [ ][ ][ ].[ ][ ][ ]

35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)? ○ **Yes** ○ **No**

If Yes, go to question 36.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

36. Provide the total Channel Protection Storage Volume (CPv) required and provided or select waiver (36a), if applicable.

CPv Required

[ ][ ][ ].[ ][ ][ ] **acre-feet**

CPv Provided

[ ][ ][ ].[ ][ ][ ] **acre-feet**

36a. The need to provide channel protection has been waived because:

○ Site discharges directly to tidal waters or a fifth order or larger stream.

● Reduction of the total CPv is achieved on site through runoff reduction techniques or infiltration systems.

37. Provide the Overbank Flood (Qp) and Extreme Flood (Qf) control criteria or select waiver (37a), if applicable.

Total Overbank Flood Control Criteria (Qp)

Pre-Development

[ ][3][0].[3][ ][ ] **CFS**

Post-development

[ ][2][8].[9][ ][ ] **CFS**

Total Extreme Flood Control Criteria (Qf)

Pre-Development

[ ][9][0].[6][ ][ ] **CFS**

Post-development

[ ][8][6].[7][ ][ ] **CFS**

37a. The need to meet the Qp and Qf criteria has been waived because:

- ○ Site discharges directly to tidal waters or a fifth order or larger stream.
- ○ Downstream analysis reveals that the Qp and Qf controls are not required

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed? ● **Yes** ○ **No**

If Yes, Identify the entity responsible for the long term Operation and Maintenance

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39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required(#28). (See question 32a) This space can also be used for other pertinent project information.

40. Identify other DEC permits, existing and new, that are required for this project/facility.

○ Air Pollution Control

○ Coastal Erosion

○ Hazardous Waste

○ Long Island Wells

○ Mined Land Reclamation

○ Solid Waste

○ Navigable Waters Protection / Article 15

○ Water Quality Certificate

○ Dam Safety

○ Water Supply

○ Freshwater Wetlands/Article 24

○ Tidal Wetlands

○ Wild, Scenic and Recreational Rivers

○ Stream Bed or Bank Protection / Article 15

○ Endangered or Threatened Species(Incidental Take Permit)

○ Individual SPDES

○ SPDES Multi-Sector GP N Y R

○ Other

● None

41. Does this project require a US Army Corps of Engineers Wetland Permit? ○ **Yes** ● **No**
If Yes, Indicate Size of Impact. .

42. Is this project subject to the requirements of a regulated, traditional land use control MS4? ● **Yes** ○ **No**
(If No, skip question 43)

43. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI? ● **Yes** ○ **No**

44. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned. N Y R

Owner/Operator Certification

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Print First Name: ALAN

MI:

Print Last Name: GETZ

Owner/Operator Signature:

Date: / /

Appendix G

New York State Stormwater Management Design Manual Maintenance and Inspection Checklist.

Appendix G

Stormwater Pond/Wetland Operation, Maintenance and Management Inspection Checklist

Project _____
Location: _____
Site Status: _____

Date: _____
Time: _____

Inspector: _____

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Embankment and emergency spillway (Annual, After Major Storms)		
1. Vegetation and ground cover adequate		
2. Embankment erosion		
3. Animal burrows		
4. Unauthorized planting		
5. Cracking, bulging, or sliding of dam		
a. Upstream face		
b. Downstream face		
c. At or beyond toe		
downstream		
upstream		
d. Emergency spillway		
6.Pond, toe & chimney drains clear and functioning		
7.Seeps/leaks on downstream face		
8.Slope protection or riprap failure		
9. Vertical/horizontal alignment of top of dam “As-Built”		

Maintenance Item	**Satisfactory/ Unsatisfactory**	**Comments**
10. Emergency spillway clear of obstructions and debris		
11. Other (specify)		
2. Riser and principal spillway (Annual)		
Type: Reinforced concrete _____ Corrugated pipe _____ Masonry _____ 1. Low flow orifice obstructed		
2. Low flow trash rack. a. Debris removal necessary		
b. Corrosion control		
3. Weir trash rack maintenance a. Debris removal necessary		
b. corrosion control		
4. Excessive sediment accumulation insider riser		
5. Concrete/masonry condition riser and barrels a. cracks or displacement		
b. Minor spalling (<1")		
c. Major spalling (rebars exposed)		
d. Joint failures		
e. Water tightness		
6. Metal pipe condition		
7. Control valve a. Operational/exercised		
b. Chained and locked		
8. Pond drain valve a. Operational/exercised		
b. Chained and locked		
9. Outfall channels functioning		
10. Other (specify)		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
3. Permanent Pool (Wet Ponds) (monthly)		
1. Undesirable vegetative growth		
2. Floating or floatable debris removal required		
3. Visible pollution		
4. Shoreline problem		
5. Other (specify)		
4. Sediment Forebays		
1.Sedimentation noted		
2. Sediment cleanout when depth < 50% design depth		
5. Dry Pond Areas		
1. Vegetation adequate		
2. Undesirable vegetative growth		
3. Undesirable woody vegetation		
4. Low flow channels clear of obstructions		
5. Standing water or wet spots		
6. Sediment and / or trash accumulation		
7. Other (specify)		
6. Condition of Outfalls (Annual , After Major Storms)		
1. Riprap failures		
2. Slope erosion		
3. Storm drain pipes		
4.Endwalls / Headwalls		
5. Other (specify)		
7. Other (Monthly)		
1. Encroachment on pond, wetland or easement area		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
2. Complaints from residents		
3.Aesthetics a. Grass growing required		
b. Graffiti removal needed		
c. Other (specify)		
4. Conditions of maintenance access routes.		
5. Signs of hydrocarbon build-up		
6. Any public hazards (specify)		
8. Wetland Vegetation (Annual)		
1. Vegetation healthy and growing Wetland maintaining 50% surface area coverage of wetland plants after the second growing season. (If unsatisfactory, reinforcement plantings needed)		
2. Dominant wetland plants: Survival of desired wetland plant species Distribution according to landscaping plan?		
3. Evidence of invasive species		
4. Maintenance of adequate water depths for desired wetland plant species		
5. Harvesting of emergent plantings needed		
6. Have sediment accumulations reduced pool volume significantly or are plants “choked” with sediment		
7. Eutrophication level of the wetland.		
8. Other (specify)		

Comments:

Actions to be Taken:

Infiltration Trench Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Trench surface clear of debris		
Inflow pipes clear of debris		
Overflow spillway clear of debris		
Inlet area clear of debris		
2. Sediment Traps or Forebays (Annual)		
Obviously trapping sediment		
Greater than 50% of storage volume remaining		
3. Dewatering (Monthly)		
Trench dewaters between storms		
4. Sediment Cleanout of Trench (Annual)		
No evidence of sedimentation in trench		
Sediment accumulation doesn't yet require cleanout		
5. Inlets (Annual)		

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Good condition		
No evidence of erosion		
6. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repair		
No evidence of erosion		
7. Aggregate Repairs (Annual)		
Surface of aggregate clean		
Top layer of stone does not need replacement		
Trench does not need rehabilitation		

Comments:

_____

_____

_____

_____

_____

_____

Actions to be Taken:

_____

_____

_____

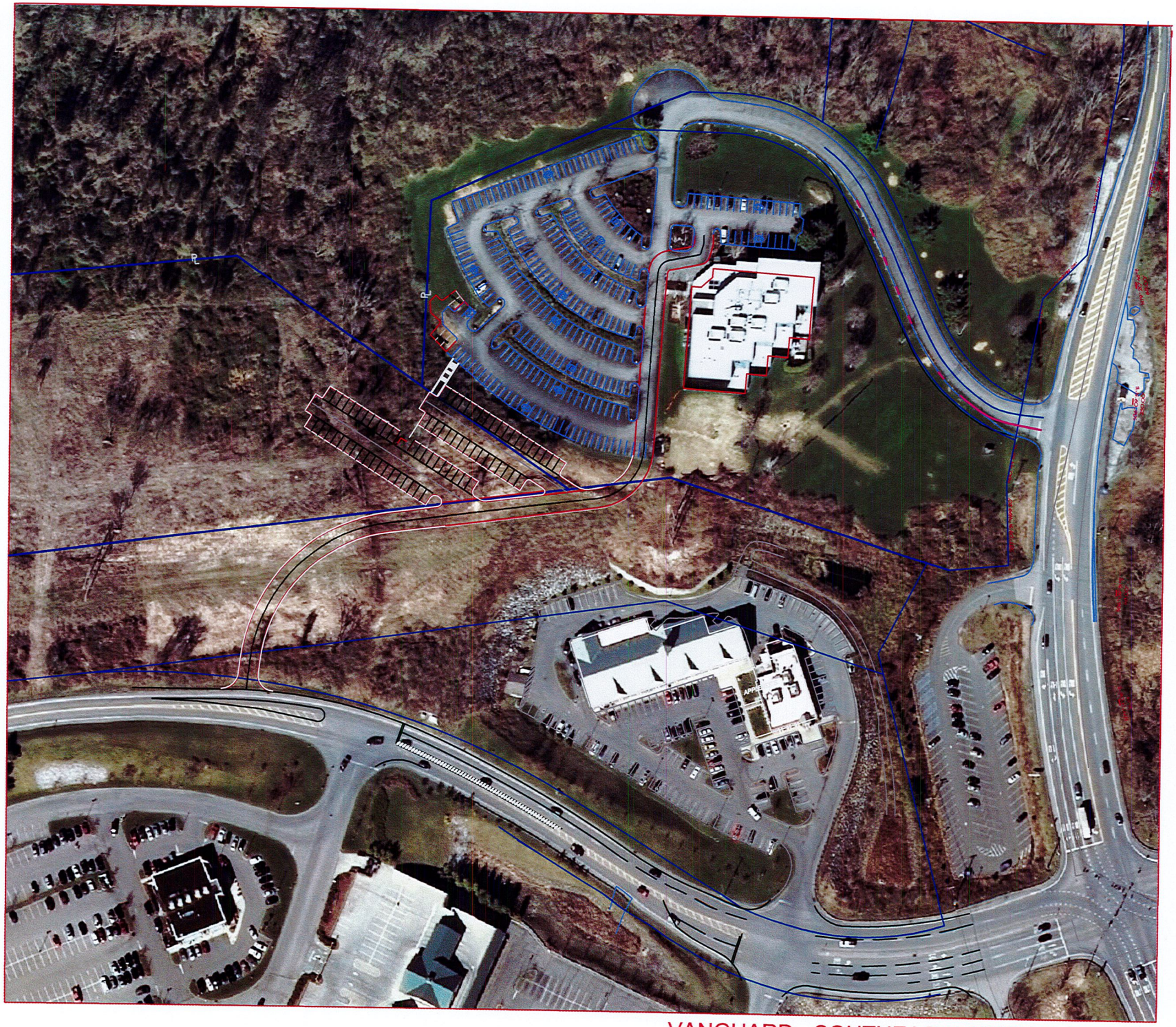
_____

_____

_____

Appendix H

Aerial Map



VANGUARD - SOUTHEAST EXECUTIVE PARK
AERIAL MAP

Appendix I

New York Standards and Specifications for Erosion and Sediment Control Construction Site Log Book

APPENDIX F
CONSTRUCTION SITE INSPECTION AND MAINTENANCE LOG BOOK

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION ACTIVITIES

SAMPLE CONSTRUCTION SITE LOG BOOK

Table of Contents

I. Pre-Construction Meeting Documents
   a. Preamble to Site Assessment and Inspections
   b. Pre-Construction Site Assessment Checklist

II. Construction Duration Inspections
   a. Directions
   b. Modification to the SWPPP

I. PRE-CONSTRUCTION MEETING DOCUMENTS

Project Name _____

Permit No. _____ **Date of Authorization** _____

Name of Operator _____

Prime Contractor _____

a. Preamble to Site Assessment and Inspections

The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified inspector[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements. A preconstruction meeting should be held to review all of the SWPPP requirements with construction personnel.

When construction starts, site inspections shall be conducted by the qualified inspector at least every 7 calendar days. The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified inspector perform a final site inspection. The qualified inspector shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

1 Refer to "Qualified Inspector" inspection requirements in the current SPDES General Permit for Stormwater Discharges from Construction Activity for complete list of inspection requirements.
2 "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.
3 "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

b. Pre-construction Site Assessment Checklist
(NOTE: Provide comments below as necessary)

1. Notice of Intent, SWPPP, and Contractors Certification:

Yes No NA
[ ] [ ] [ ] Has a Notice of Intent been filed with the NYS Department of Conservation?
[ ] [ ] [ ] Is the SWPPP on-site? Where?_____
[ ] [ ] [ ] Is the Plan current? What is the latest revision date?_____
[ ] [ ] [ ] Is a copy of the NOI (with brief description) onsite? Where?_____
[ ] [ ] [ ] Have all contractors involved with stormwater related activities signed a contractor's certification?

2. Resource Protection

Yes No NA
[ ] [ ] [ ] Are construction limits clearly flagged or fenced?
[ ] [ ] [ ] Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.
[ ] [ ] [ ] Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection

Yes No NA
[ ] [ ] [ ] Clean stormwater runoff has been diverted from areas to be disturbed.
[ ] [ ] [ ] Bodies of water located either on site or in the vicinity of the site have been identified and protected.
[ ] [ ] [ ] Appropriate practices to protect on-site or downstream surface water are installed.
[ ] [ ] [ ] Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Access

Yes No NA
[ ] [ ] [ ] A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.
[ ] [ ] [ ] Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.
[ ] [ ] [ ] Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Sediment Controls

Yes No NA
[ ] [ ] [ ] Silt fence material and installation comply with the standard drawing and specifications.
[ ] [ ] [ ] Silt fences are installed at appropriate spacing intervals
[ ] [ ] [ ] Sediment/detention basin was installed as first land disturbing activity.
[ ] [ ] [ ] Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials

Yes No NA
[ ] [ ] [ ] The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.
[ ] [ ] [ ] The plan is contained in the SWPPP on page _____
[ ] [ ] [ ] Appropriate materials to control spills are onsite. Where? _____

II. CONSTRUCTION DURATION INSPECTIONS

a. Directions:

Inspection Forms will be filled out during the entire construction phase of the project.

Required Elements:

1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;

4) Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);

5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and

6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

SITE PLAN/SKETCH

_____	_____
Inspector (print name)	**Date of Inspection**
_____	_____
Qualified Inspector (print name)	**Qualified Inspector Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

Maintaining Water Quality

Yes No NA
[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions at the outfalls?
[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease at the outfalls?
[ ] [ ] [ ] All disturbance is within the limits of the approved plans.
[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Housekeeping

1. General Site Conditions

Yes No NA
[ ] [ ] [ ] Is construction site litter, debris and spoils appropriately managed?
[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?
[ ] [ ] [ ] Is construction impacting the adjacent property?
[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing

Yes No NA
[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.
[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.
[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?
[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

3. Stabilized Construction Access

Yes No NA
[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

Runoff Control Practices

1. Excavation Dewatering

Yes No NA
[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.
[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.
[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.
[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

Runoff Control Practices (continued)

2. Flow Spreader

Yes No NA
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.
[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales

Yes No NA
[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.
[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

4. Stone Check Dam

Yes No NA
[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).
[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).
[ ] [ ] [ ] Has accumulated sediment been removed?.

5. Rock Outlet Protection

Yes No NA
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles

Yes No NA
[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation

Yes No NA
[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

Sediment Control Practices

1. Silt Fence and Linear Barriers

Yes No NA
[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
Sediment accumulation is ___% of design capacity.

Sediment Control Practices (continued)

2. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated; Filter Sock or Manufactured practices)

Yes No NA
[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2” x 4” frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
[ ] [ ] [ ] Manufactured insert fabric is free of tears and punctures.
[ ] [ ] [ ] Filter Sock is not torn or flattened and fill material is contained within the mesh sock.
Sediment accumulation ___% of design capacity.

3. Temporary Sediment Trap

Yes No NA
[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.
[ ] [ ] [ ] Sediment trap slopes and disturbed areas are stabilized.
Sediment accumulation is ___% of design capacity.

4. Temporary Sediment Basin

Yes No NA
[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.
[ ] [ ] [ ] Sediment basin dewatering pool is dewatering at appropriate rate.
Sediment accumulation is ___% of design capacity.

Note: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design. All practices shall be maintained in accordance with their respective standards.

Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

CONSTRUCTION DURATION INSPECTIONS

b. Modifications to the SWPPP (To be completed as described below)

The Operator shall amend the SWPPP whenever:

1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the SWPPP; or
2. The SWPPP proves to be ineffective in:
   a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this permit; or
   b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

Modification & Reason:

Appendix J

Pipe Sizing Calculations

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Southeast Executive Park
Pipe Sizing Calculations

Sub-area #	Total Area	Impervious (CN=98)		Lawn "C" (CN=74)		Brush ("C") (CN=65)		Lawn "B" (CN=61)		Brush "B" (CN=48)		Weighted CN	Tc (hr)
		Area	%	Area	%	Area	%	Area	%	Area	%		
CB 1	8,440	5,367	63.6	1,795	21.3	1,278	15.1	0	0.0	0	0.0	88	0.1
CB 2	27,147	10,256	37.8	2,048	7.5	12,471	45.9	2,372	8.7	0	0.0	78	0.1
CB 3	9,820	7,420	75.6	0	0.0	0	0.0	2,400	24.4	0	0.0	89	0.1
CB 3A	2,830	2,830	100.0	0	0.0	0	0.0	0	0.0	0	0.0	98	0.1
CB 4	7,800	6,100	78.2	0	0.0	0	0.0	1,700	21.8	0	0.0	90	0.1
CB 5	6,700	2,800	41.8	0	0.0	0	0.0	3,900	58.2	0	0.0	76	0.1
CB 6	2,650	2,200	83.0	0	0.0	0	0.0	450	17.0	0	0.0	92	0.1
CB 7	17,360	3,691	21.3	3,068	17.7	10,601	61.1	0	0.0	0	0.0	74	0.1
CB 8	12,291	1,034	8.4	3,721	30.3	7,536	61.3	0	0.0	0	0.0	71	0.1
CB 9	9,852	1,133	11.5	2,685	27.3	6,034	61.2	0	0.0	0	0.0	71	0.1
CB 10	2,545	954	37.5	1,591	62.5	0	0.0	0	0.0	0	0.0	83	0.1
CB 11	45,600	9,186	20.1	0	0.0	36,414	79.9	0	0.0	0	0.0	72	0.1
YD 1	530	530	100.0	0	0.0	0	0.0	0	0.0	0	0.0	98	0.1

BIBBO ASSOCIATES, LLP
Consulting Engineers

Southeast Executive Park
Pipe Sizing Calculations

10 yr. Storm Brush ("C") (CN=65) Brush "B" (CN=48)

Subarea #	Total Area (ft²)	Area (Ac)	Sq. Miles	CN	Runoff (in)	Tc (hr)	CSM/in.	Q peak (cfs)
CB 1	8,440	0.194	3.027E-04	88	3.68	0.10	662	0.74
CB 2	27,147	0.623	9.738E-04	78	2.71	0.10	662	1.75
CB 3	9,820	0.225	3.522E-04	89	3.78	0.10	662	0.88
CB 3A	2,830	0.065	1.015E-04	98	4.76	0.10	662	0.32
CB 4	7,800	0.179	2.798E-04	90	3.88	0.10	662	0.72
CB 5	6,700	0.154	2.403E-04	76	2.54	0.10	662	0.40
CB 6	2,650	0.061	9.506E-05	92	4.10	0.10	662	0.26
CB 7	17,360	0.399	6.227E-04	74	2.37	0.10	662	0.98
CB 8	12,291	0.282	4.409E-04	71	2.12	0.10	662	0.62
CB 9	9,852	0.226	3.534E-04	71	2.12	0.10	662	0.50
CB 10	2,545	0.058	9.129E-05	83	3.18	0.10	662	0.19
CB 11	45,600	1.047	1.636E-03	72	2.20	0.10	662	2.38
YD 1	530	0.012	1.901E-05	98	4.76	0.10	662	0.06

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Southeast Executive Park
Pipe Sizing Calculations

Pipe Material: ADS HDPE
Manning's #: 0.013

10 Year Storm Pipe Sizing Calculations

Structure				Accumulated Flow (cfs)	Vertical Dfference (ft)	Length (ft)	Pipe Dia. (ft)	Slope	Full Pipe Flow (cfs)	$A R^{2/3}$	$A R^{2/3} / d_o^{8/3}$	y/d_o	Flow Depth (ft.)	A / d_o^2	Flow Area (s.f.)	Velocity (fps)
From	Pipe inv.	To	Pipe Inv.													
CB 1	644.70	CB 2	638.10	0.74	6.60	126	**1.25**	5.24%	14.82	0.03	0.02	0.15	0.19	0.08	0.12	6.31
CB 2	638.10	CB 6	637.65	2.49	0.45	30	**1.25**	1.50%	7.93	0.18	0.10	0.38	0.48	0.28	0.43	5.73
CB 6	637.65	Div MH 1	636.25	2.75	1.40	138	**1.25**	1.01%	6.52	0.24	0.13	0.45	0.57	0.35	0.54	5.09
CB 10	646.75	CB 9	646.25	0.19	0.50	18	**1.25**	2.78%	10.80	0.01	0.01	0.09	0.11	0.03	0.05	3.70
CB 9	646.25	CB 8	641.55	0.69	4.70	95	**1.25**	4.95%	14.41	0.03	0.01	0.15	0.19	0.07	0.11	6.06
CB 8	641.55	CB 7	638.65	1.31	2.90	60	**1.25**	4.83%	14.24	0.05	0.03	0.20	0.26	0.12	0.18	7.26
CB 7	638.65	Div MH 1	636.25	2.29	2.40	224	**1.25**	1.07%	6.70	0.19	0.11	0.40	0.50	0.30	0.46	4.95
Div MH 1	635.80	CDS 1	635.70													
CDS 1	635.60	INF 1	635.50	See HydroCAD Design												
Div MH 1	635.80	Ex. DMH	623.92													
CB 5	633.30	CB 4	629.00	0.40	4.30	92	**1.25**	4.67%	14.00	0.02	0.01	0.11	0.14	0.05	0.08	5.12
CB 4	629.00	CB 3	621.50	1.12	7.50	93	**1.25**	8.06%	18.39	0.03	0.02	0.17	0.21	0.09	0.13	8.36
YD 1	629.50	CB 3	621.50	0.06	8.00	258	**0.50**	3.10%	0.99	0.00	0.02	0.17	0.08	0.09	0.02	2.81
CB 3	621.50	CB 3A	621.30	2.06	0.20	18	**1.25**	1.11%	6.83	0.17	0.09	0.38	0.47	0.27	0.42	4.88
CB 3A	621.30	Div MH 2	620.08	2.38	1.22	50	**1.25**	2.44%	10.12	0.13	0.07	0.33	0.41	0.23	0.35	6.75
Div MH 2	618.00	CDS 2	617.90													
CDS 2	617.80	INF 2	617.50	See HydroCAD Design												
Div MH 2	618.00	DMH 1	582.22													

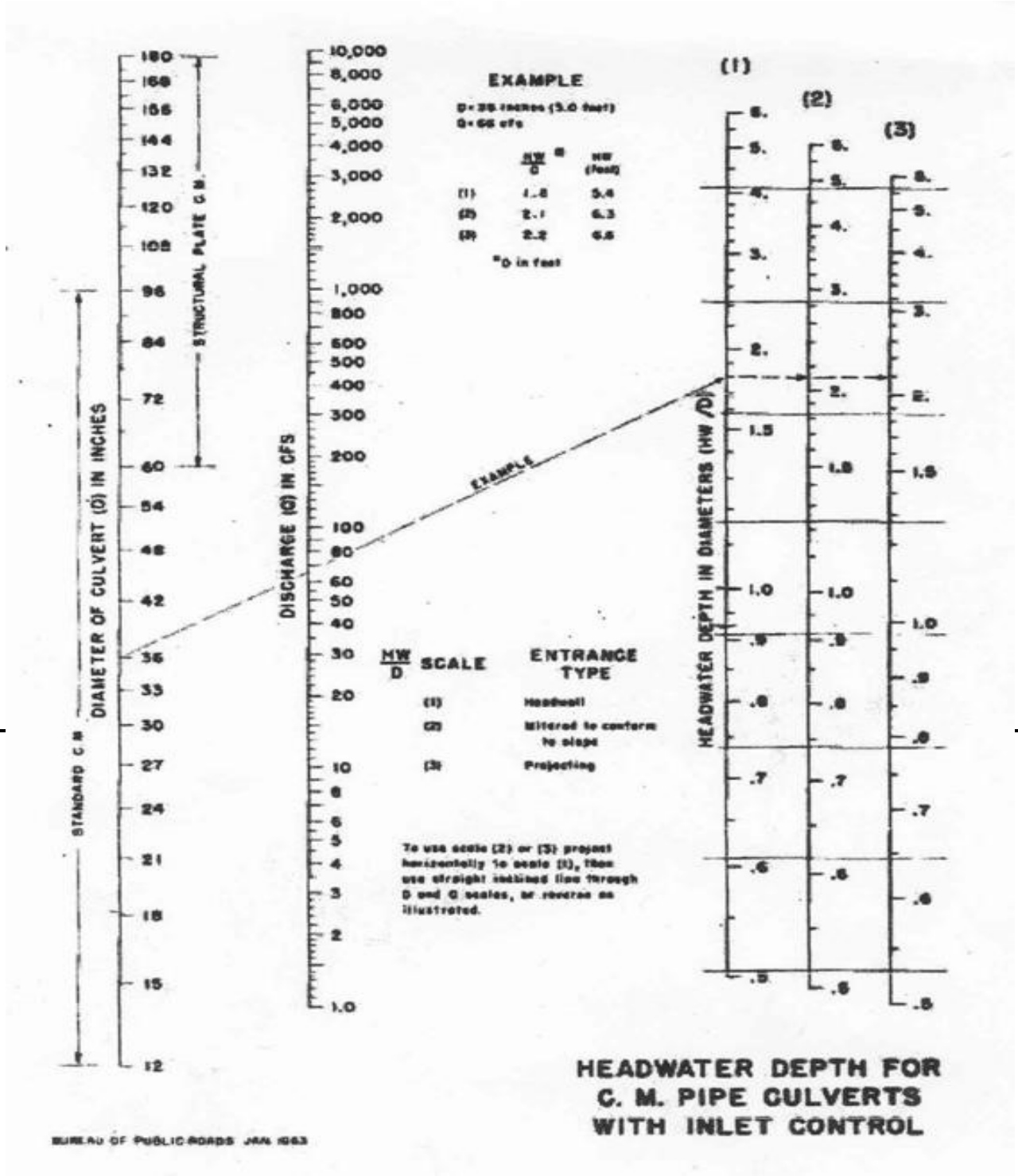
BIBBO ASSOCIATES, LLP
Consulting Engineers

Southeast Executive Park

Pipe Material: ADS HDPE
Manning's #: 0.013

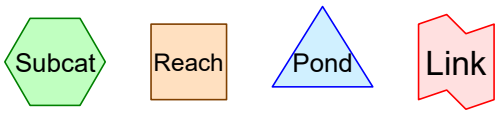
$$Hw= \{1+ K_e+(29n^2L/R^{1.33})\}(V^2/2*32.16\ ft/sec^2)$$

Structure			Pipe Dia. (ft)	Accumulated Flow (cfs)	HW/D From Attached Nomograph	Head Water Required (ft)	Head Water Provided	
From	To	Rim					Structure	(ft)
CB 1	CB 2	648.20	1.25	0.74	0.50	0.63	CB 1	3.5
CB 2	CB 6	642.00	1.25	2.49	0.74	0.93	CB 2	3.9
CB 6	Div MH 1	644.00	1.25	2.75	0.75	0.94	CB 6	6.4
CB 10	CB 9	650.37	1.25	0.19	0.50	0.63	CB 10	3.6
CB 9	CB 8	650.37	1.25	0.69	0.50	0.63	CB 9	4.1
CB 8	CB 7	645.50	1.25	1.31	0.50	0.63	CB 8	4.0
CB 7	Div MH 1	643.00	1.25	2.29	0.65	0.81	CB 7	4.4
Div MH 1	CDS 1	643.00	See HydroCAD Design					
CDS 1	INF 1	642.00						
Div MH 1	Ex. DMH	643.00						
CB 5	CB 4	636.80	1.25	0.40	0.50	0.63	CB 5	3.5
CB 4	CB 3	632.50	1.25	1.12	0.50	0.63	CB 4	3.5
YD 1	CB 3	632.00	0.50	0.06	0.50	0.25	YD 1	2.5
CB 3	CB 3A	625.00	1.25	2.06	0.50	0.63	CB 3	3.5
CB 3A	Div MH 2	625.00	1.25	2.38	0.68	0.85	CB 3A	3.7
Div MH 2	CDS 2	626.75	See HydroCAD Design					
CDS 2	INF 2	626.00						
Div MH 2	DMH 1	626.75						


EXAMPLE
D = 36 inches (3.0 feet)
Q = 66 cfs
HW/D* | HW (feet)
(1) 1.8 | 5.4
(2) 2.1 | 6.3
(3) 2.2 | 6.6
*D in feet
DIAMETER OF CULVERT (D) IN INCHES
STRUCTURAL PLATE C.M.
STANDARD C.M.
DISCHARGE (Q) IN CFS
EXAMPLE
HW/D SCALE
ENTRANCE TYPE
(1) Headwall
(2) Mitered to conform to slope
(3) Projecting
To use scale (2) or (3) project horizontally to scale (1), then use straight inclined line through D and Q scales, or reverse as illustrated.
HEADWATER DEPTH IN DIAMETERS (HW/D)
(1)
(2)
(3)
HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL
BUREAU OF PUBLIC ROADS JAN 1963

Appendix K

90% Rainfall Event Evaluation (HydroCAD Output)



Routing Diagram for Post-Dev
Prepared by Bibbo Associates, LLP, Printed 8/30/2018
HydroCAD® 10.00-21 s/n 02226 © 2018 HydroCAD Software Solutions LLC

Summary for Subcatchment Sub1: Sub Area 1

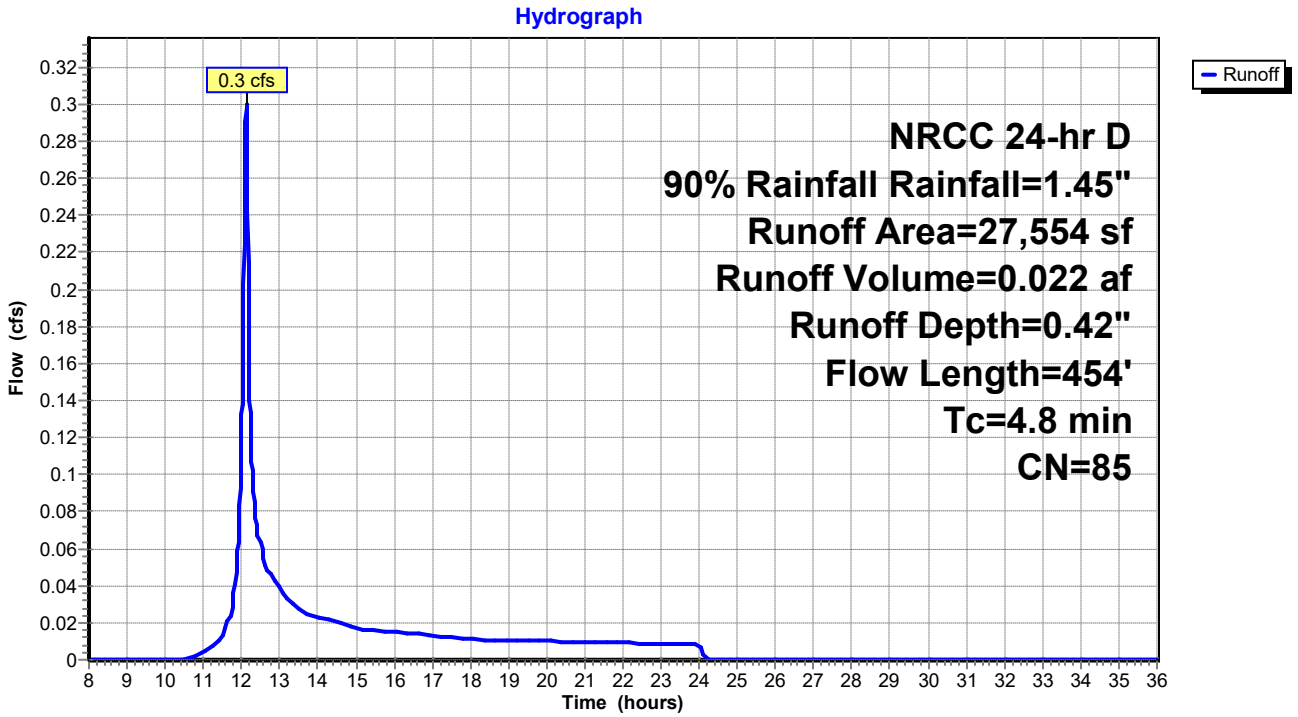
Runoff = 0.3 cfs @ 12.13 hrs, Volume= 0.022 af, Depth= 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 90% Rainfall Rainfall=1.45"

Area (sf)	CN	Description
17,984	98	Paved parking & roofs
8,870	61	>75% Grass cover, Good, HSG B
700	48	Brush, Good, HSG B
27,554	85	Weighted Average
9,570		34.73% Pervious Area
17,984		65.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	82	0.1230	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.33"
0.4	102	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	270	0.0450	11.17	13.70	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
4.8	454	Total			

Subcatchment Sub1: Sub Area 1



Summary for Subcatchment Sub2: Sub Area 2

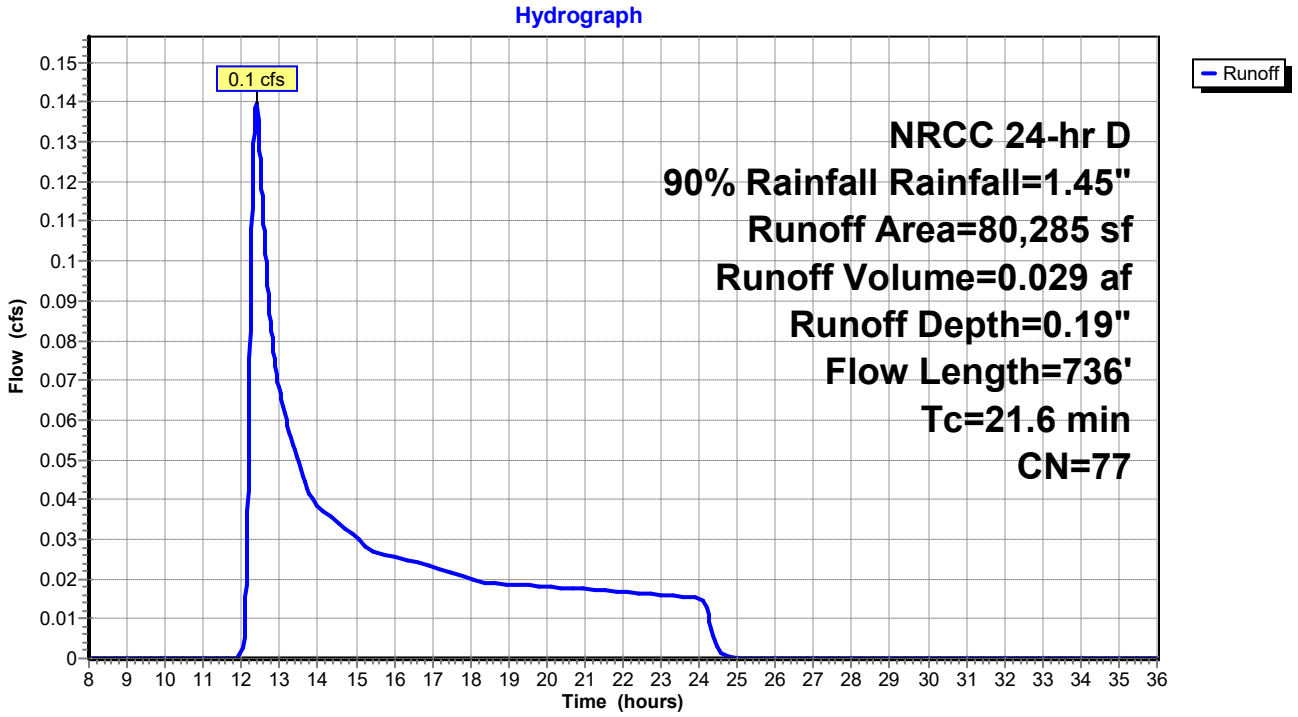
Runoff = 0.1 cfs @ 12.39 hrs, Volume= 0.029 af, Depth= 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 90% Rainfall Rainfall=1.45"

Area (sf)	CN	Description
24,635	98	Paved parking, HSG B
15,380	74	>75% Grass cover, Good, HSG C
2,350	61	>75% Grass cover, Good, HSG B
37,260	65	Brush, Good, HSG C
660	48	Brush, Good, HSG B
80,285	77	Weighted Average
55,650		69.32% Pervious Area
24,635		30.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.0	100	0.0400	0.10		**Sheet Flow, Brush** Woods: Light underbrush n= 0.400 P2= 3.33"
4.7	340	0.0590	1.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	17	0.1760	2.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	106	0.0660	5.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.5	173	0.0107	5.45	6.68	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
21.6	736	Total			

Subcatchment Sub2: Sub Area 2



Appendix L

Northeast Regional Climate Center Precipitation Estimates

Northeast Regional Climate Center Extreme Precipitation estimates (inches)
Point Estimates, Unsmoothed
Data series, Partial duration series
State, New York
Location,
Lon (dd), -73.631
Lat (dd), 41.422
Elev (feet), 0

MEAN PRECIPITATION FREQUENCY ESTIMATES

Freq
(yr),5-min,10-min,15-min,30-min,60-min,120-min,3-hr,6-hr,12-hr,24-hr,2-day,4-day,7-d
ay,10-day
1, 0.33, 0.50, 0.61, 0.82, 1.01, 1.23, 1.40, 1.76, 2.21, 2.77, 3.11, 3.46, 4.14,
4.78
2, 0.38, 0.59, 0.73, 0.99, 1.22, 1.46, 1.67, 2.14, 2.71, 3.33, 3.73, 4.12, 4.86,
5.52
5, 0.45, 0.70, 0.87, 1.20, 1.52, 1.80, 2.05, 2.65, 3.37, 4.18, 4.72, 5.24, 6.09,
6.85
10, 0.52, 0.80, 0.99, 1.39, 1.79, 2.11, 2.40, 3.12, 3.97, 4.96, 5.65, 6.30, 7.22,
8.07
25, 0.63, 0.96, 1.19, 1.70, 2.24, 2.60, 2.95, 3.87, 4.95, 6.23, 7.16, 8.03,
9.04,10.04
50, 0.72, 1.10, 1.37, 1.97, 2.65, 3.05, 3.46, 4.56, 5.85, 7.41, 8.58,
9.66,10.72,11.84
100, 0.84, 1.27, 1.59, 2.29, 3.15, 3.58, 4.05, 5.37, 6.91,
8.81,10.28,11.62,12.72,13.97
200, 0.97, 1.46, 1.85, 2.67, 3.73, 4.21, 4.75, 6.33,
8.18,10.48,12.32,13.99,15.10,16.48
500, 1.19, 1.76, 2.27, 3.29, 4.69, 5.20, 5.88,
7.89,10.21,13.20,15.67,17.89,18.95,20.53

UPPER LIMIT PRECIPITATION FREQUENCY ESTIMATES

Freq
(yr),5-min,10-min,15-min,30-min,60-min,120-min,3-hr,6-hr,12-hr,24-hr,2-day,4-day,7-d
ay,10-day
1, 0.37, 0.56, 0.69, 0.93, 1.14, 1.37, 1.55, 1.97, 2.45, 2.97, 3.33, 3.71, 4.38,
5.06
2, 0.41, 0.63, 0.78, 1.05, 1.30, 1.52, 1.77, 2.20, 2.80, 3.42, 3.82, 4.23, 4.98,
5.72
5, 0.49, 0.76, 0.94, 1.29, 1.64, 1.94, 2.20, 2.88, 3.63, 4.40, 5.00, 5.53, 6.44,
7.26
10, 0.58, 0.89, 1.11, 1.55, 2.00, 2.34, 2.65, 3.52, 4.47, 5.35, 6.14, 6.82, 7.83,
8.78
25, 0.73, 1.12, 1.39, 1.99, 2.61, 3.03, 3.39, 4.61, 5.89, 6.94, 8.07,
8.98,10.16,11.33
50, 0.87, 1.33, 1.65, 2.38, 3.20, 3.68, 4.11, 5.65, 7.27, 8.46,
9.92,11.06,12.37,13.74
100, 1.05, 1.59, 1.99, 2.87, 3.94, 4.48, 4.97, 6.94,
9.27,10.30,12.18,13.64,15.05,16.65
200, 1.26, 1.90, 2.40, 3.48, 4.85, 5.43, 6.01,
8.51,11.48,12.55,14.94,16.81,18.33,20.21
500, 1.62, 2.41, 3.11, 4.51, 6.42, 7.03,
7.74,11.19,15.31,16.28,19.59,22.18,23.81,26.13

LOWER LIMIT PRECIPITATION FREQUENCY ESTIMATES

Freq
(yr),5-min,10-min,15-min,30-min,60-min,120-min,3-hr,6-hr,12-hr,24-hr,2-day,4-day,7-d
ay,10-day
1, 0.22, 0.34, 0.42, 0.56, 0.69, 0.97, 1.16, 1.52, 1.99, 2.52, 2.87, 3.23, 3.83,
4.40
2, 0.38, 0.58, 0.71, 0.97, 1.19, 1.42, 1.62, 2.07, 2.63, 3.27, 3.66, 4.03, 4.77,
5.42
5, 0.42, 0.64, 0.79, 1.09, 1.39, 1.67, 1.89, 2.43, 3.06, 3.95, 4.49, 4.93, 5.73,

```
6.48
10, 0.45, 0.70, 0.86, 1.21, 1.56, 1.87, 2.12, 2.73, 3.43, 4.53, 5.22, 5.72, 6.58,
7.36
25, 0.50, 0.76, 0.95, 1.36, 1.78, 2.15, 2.42, 3.21, 3.98, 5.43, 6.39, 6.96, 7.90,
8.72
50, 0.54, 0.82, 1.03, 1.47, 1.98, 2.39, 2.69, 3.63, 4.45, 6.22, 7.45, 8.07, 9.08,
9.90
100, 0.58, 0.88, 1.10, 1.59, 2.18, 2.65, 2.99, 4.11, 4.90, 7.14, 8.72,
9.38,10.45,11.22
200, 0.63, 0.94, 1.19, 1.73, 2.41, 2.93, 3.33, 4.64, 5.46,
8.20,10.23,10.91,12.02,12.76
500, 0.69, 1.03, 1.32, 1.92, 2.73, 3.38, 3.86, 5.49, 6.27,
9.86,12.65,13.32,14.48,15.08

Date/time: Tue Jan 30 11:11:23 EST 2018
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Appendix M

Contech CDS Stormwater Pre Treatment Chamber Maintenance Requirements and Specifications

CONTECH®
ENGINEERED SOLUTIONS

CDS Guide
Operation, Design, Performance and Maintenance

CDS®

Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, and minimize the re-suspension and release of previously trapped pollutants. Inline units can treat up to 6 cfs, and internally bypass flows in excess of 50 cfs (1416 L/s). Available precast or cast-in-place, offline units can treat flows from 1 to 300 cfs (28.3 to 8495 L/s). The pollutant removal capacity of the CDS system has been proven in lab and field testing.

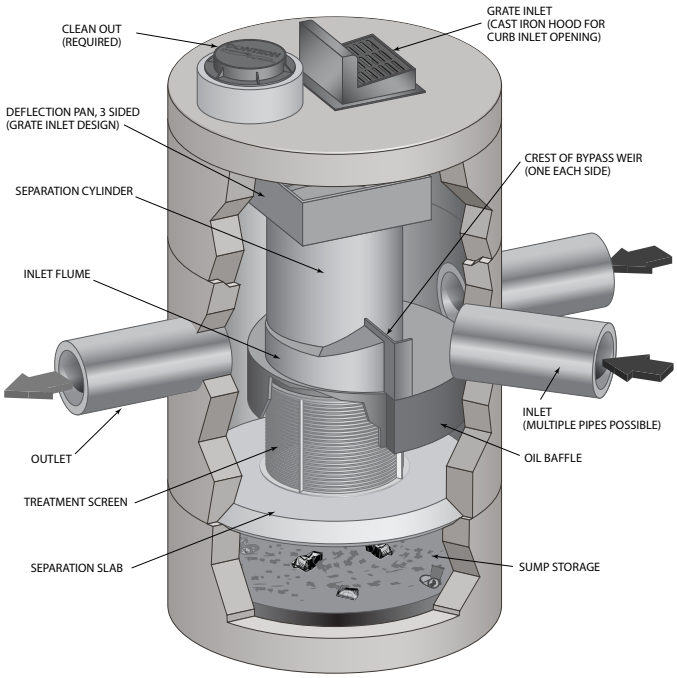
Operation Overview

Stormwater enters the diversion chamber where the diversion weir guides the flow into the unit's separation chamber and pollutants are removed from the flow. All flows up to the system's treatment design capacity enter the separation chamber and are treated.

Swirl concentration and screen deflection force floatables and solids to the center of the separation chamber where 100% of floatables and neutrally buoyant debris larger than the screen apertures are trapped.

Stormwater then moves through the separation screen, under the oil baffle and exits the system. The separation screen remains clog free due to continuous deflection.

During the flow events exceeding the treatment design capacity, the diversion weir bypasses excessive flows around the separation chamber, so captured pollutants are retained in the separation cylinder.



Design Basics

There are three primary methods of sizing a CDS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow rate for a defined particle size. The Rational Rainfall Method™ or the and Probabilistic Method is used when a specific removal efficiency of the net annual sediment load is required.

Typically in the Unites States, CDS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a gradation with an average particle size (d50) of 125 microns (μm). For some regulatory environments, CDS systems can also be designed to achieve an 80% annual solids load reduction based on an average particle size (d50) of 75 microns (μm) or 50 microns (μm).

Water Quality Flow Rate Method

In some cases, regulations require that a specific treatment rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval, e.g. the six-month storm, or a water quality depth, e.g. 1/2-inch (13 mm) of rainfall.

The CDS is designed to treat all flows up to the WQQ. At influent rates higher than the WQQ, the diversion weir will direct most flow exceeding the WQQ around the separation chamber. This allows removal efficiency to remain relatively constant in the separation chamber and eliminates the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the CDS will remove a specific gradation of sediment at a specific removal efficiency. Therefore the treatment flow rate is variable, based on the gradation and removal efficiency specified by the design engineer.

Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. It is important to take these factors into consideration when estimating the long-term performance of any stormwater treatment system. The Rational Rainfall Method combines site-specific information with laboratory generated performance data, and local historical precipitation records to estimate removal efficiencies as accurately as possible.

Short duration rain gauge records from across the United States and Canada were analyzed to determine the percent of the total annual rainfall that fell at a range of intensities. US stations' depths were totaled every 15 minutes, or hourly, and recorded in 0.01-inch increments. Depths were recorded hourly with 1-mm resolution at Canadian stations. One trend was consistent at all sites; the vast majority of precipitation fell at low intensities and high intensity storms contributed relatively little to the total annual depth.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Rainfall Method. Since most sites are relatively small and highly impervious, the Rational Rainfall Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS system are

determined. Performance efficiency curve determined from full scale laboratory tests on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Probabilistic Rational Method

The Probabilistic Rational Method is a sizing program Contech developed to estimate a net annual sediment load reduction for a particular CDS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics.

The Probabilistic Method is an extension of the Rational Method used to estimate peak discharge rates generated by storm events of varying statistical return frequencies (e.g. 2-year storm event). Under the Rational Method, an adjustment factor is used to adjust the runoff coefficient estimated for the 10-year event, correlating a known hydrologic parameter with the target storm event. The rainfall intensities vary depending on the return frequency of the storm event under consideration. In general, these two frequency dependent parameters (rainfall intensity and runoff coefficient) increase as the return frequency increases while the drainage area remains constant.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Method. Since most sites are relatively small and highly impervious, the Rational Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS are determined. Performance efficiency curve on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Treatment Flow Rate

The inlet throat area is sized to ensure that the WQQ passes through the separation chamber at a water surface elevation equal to the crest of the diversion weir. The diversion weir bypasses excessive flows around the separation chamber, thus preventing re-suspension or re-entrainment of previously captured particles.

Hydraulic Capacity

The hydraulic capacity of a CDS system is determined by the length and height of the diversion weir and by the maximum allowable head in the system. Typical configurations allow hydraulic capacities of up to ten times the treatment flow rate. The crest of the diversion weir may be lowered and the inlet throat may be widened to increase the capacity of the system at a given water surface elevation. The unit is designed to meet project specific hydraulic requirements.

Performance

Full-Scale Laboratory Test Results

A full-scale CDS system (Model CDS2020-5B) was tested at the facility of University of Florida, Gainesville, FL. This CDS unit was evaluated under controlled laboratory conditions of influent flow rate and addition of sediment.

Two different gradations of silica sand material (UF Sediment & OK-110) were used in the CDS performance evaluation. The particle size distributions (PSDs) of the test materials were analyzed using standard method "Gradation ASTM D-422 "Standard Test Method for Particle-Size Analysis of Soils" by a certified laboratory.

UF Sediment is a mixture of three different products produced by the U.S. Silica Company: "Sil-Co-Sil 106", "#1 DRY" and "20/40 Oil Frac". Particle size distribution analysis shows that the UF Sediment has a very fine gradation (d50 = 20 to 30 μm) covering a wide size range (Coefficient of Uniformity, C averaged at 10.6). In comparison with the hypothetical TSS gradation specified in the NJDEP (New Jersey Department of Environmental Protection) and NJCAT (New Jersey Corporation for Advanced Technology) protocol for lab testing, the UF Sediment covers a similar range of particle size but with a finer d50 (d50 for NJDEP is approximately 50 μm) (NJDEP, 2003).

The OK-110 silica sand is a commercial product of U.S. Silica Sand. The particle size distribution analysis of this material, also included in Figure 1, shows that 99.9% of the OK-110 sand is finer than 250 microns, with a mean particle size (d50) of 106 microns. The PSDs for the test material are shown in Figure 1.

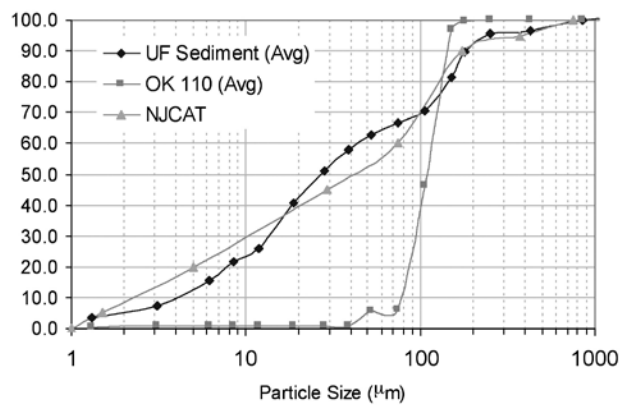


Figure 1. Particle size distributions

Tests were conducted to quantify the performance of a specific CDS unit (1.1 cfs (31.3-L/s) design capacity) at various flow rates, ranging from 1% up to 125% of the treatment design capacity of the unit, using the 2400 micron screen. All tests were conducted with controlled influent concentrations of approximately 200 mg/L. Effluent samples were taken at equal time intervals across the entire duration of each test run. These samples were then processed with a Dekaport Cone sample splitter to obtain representative sub-samples for Suspended Sediment Concentration (SSC) testing using ASTM D3977-97 "Standard Test Methods for Determining Sediment Concentration in Water Samples", and particle size distribution analysis.

Results and Modeling

Based on the data from the University of Florida, a performance model was developed for the CDS system. A regression analysis was used to develop a fitting curve representative of the scattered data points at various design flow rates. This model, which demonstrated good agreement with the laboratory data, can then be used to predict CDS system performance with respect

to SSC removal for any particle size gradation, assuming the particles are inorganic sandy-silt. Figure 2 shows CDS predictive performance for two typical particle size gradations (NJCAT gradation and OK-110 sand) as a function of operating rate.

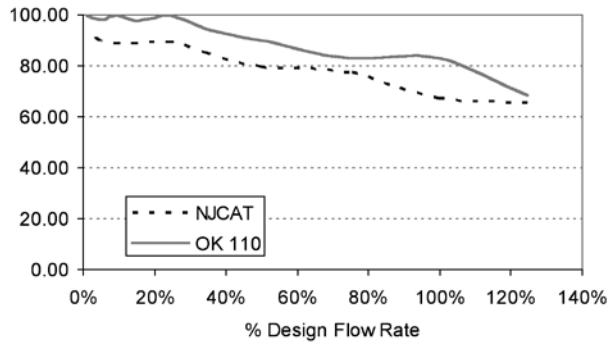


Figure 2. CDS stormwater treatment predictive performance for various particle gradations as a function of operating rate.

Many regulatory jurisdictions set a performance standard for hydrodynamic devices by stating that the devices shall be capable of achieving an 80% removal efficiency for particles having a mean particle size (d50) of 125 microns (e.g. Washington State Department of Ecology — WASDOE - 2008). The model can be used to calculate the expected performance of such a PSD (shown in Figure 3). The model indicates (Figure 4) that the CDS system with 2400 micron screen achieves approximately 80% removal at the design (100%) flow rate, for this particle size distribution (d50 = 125 μm).

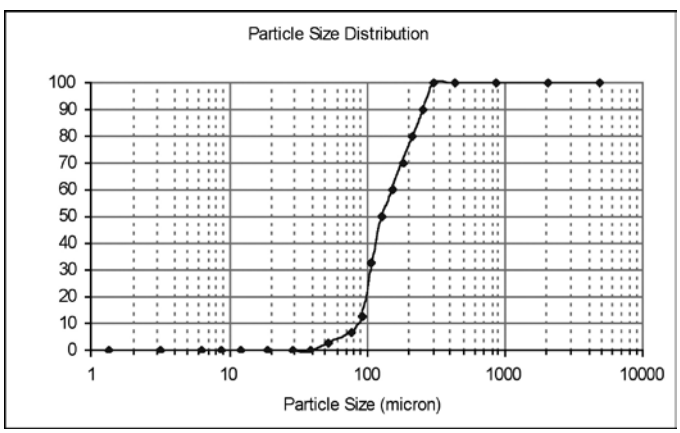


Figure 3. WASDOE PSD

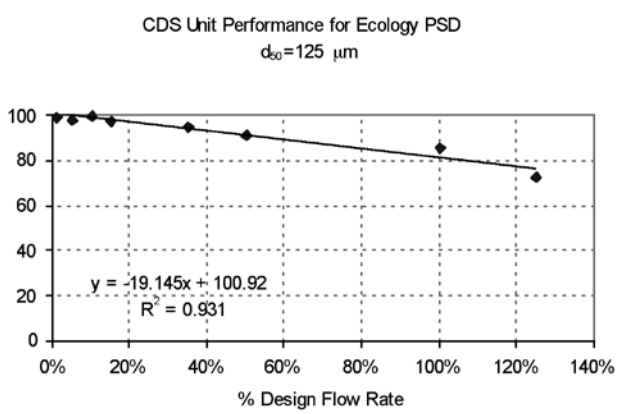


Figure 4. Modeled performance for WASDOE PSD.

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified

during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

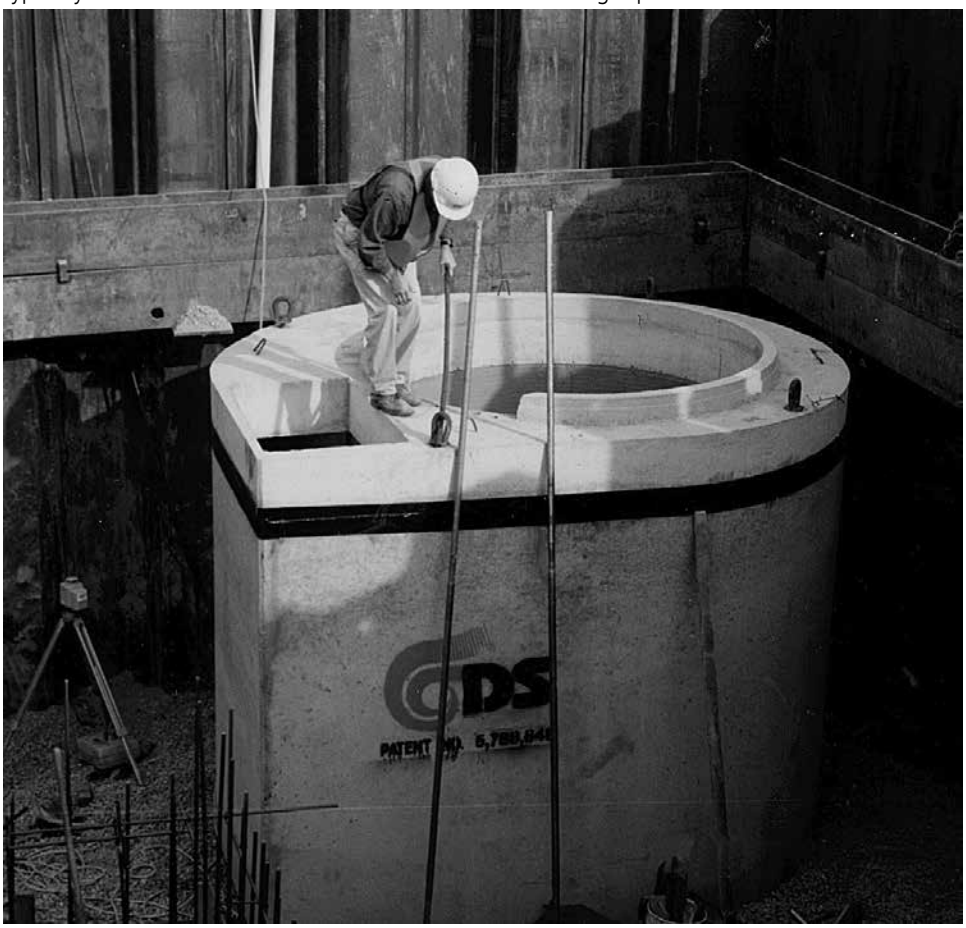
In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be cleaned to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Note: To avoid underestimating the volume of sediment in the chamber, carefully lower the measuring device to the top of the sediment pile. Finer silty particles at the top of the pile may be more difficult to feel with a measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.



CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile**.

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

SUPPORT

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

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www.ContechES.com

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The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; related foreign patents or other patents pending.

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RECYCLED PAPER

SECTION (_____)
STORM WATER TREATMENT DEVICE

1.0 GENERAL

1.1 This item shall govern the furnishing and installation of the CDS® by Contech Engineered Solutions LLC, complete and operable as shown and as specified herein, in accordance with the requirements of the plans and contract documents.

1.2 The Contractor shall furnish all labor, equipment and materials necessary to install the storm water treatment device(s) (SWTD) and appurtenances specified in the Drawings and these specifications.

1.3 The manufacturer of the SWTD shall be one that is regularly engaged in the engineering design and production of systems deployed for the treatment of storm water runoff for at least five (5) years and which have a history of successful production, acceptable to the Engineer. In accordance with the Drawings, the SWTD(s) shall be a CDS® device manufactured by:

Contech Engineered Solutions LLC
9025 Centre Pointe Drive
West Chester, OH, 45069
Tel: 1 800 338 1122

1.4 Related Sections

1.4.1 Section 02240: Dewatering
1.4.2 Section 02260: Excavation Support and Protection
1.4.3 Section 02315: Excavation and Fill
1.4.4 Section 02340: Soil Stabilization

1.5 All components shall be subject to inspection by the engineer at the place of manufacture and/or installation. All components are subject to being rejected or identified for repair if the quality of materials and manufacturing do not comply with the requirements of this specification. Components which have been identified as defective may be subject for repair where final acceptance of the component is contingent on the discretion of the Engineer.

1.6 The manufacturer shall guarantee the SWTD components against all manufacturer originated defects in materials or workmanship for a period of twelve (12) months from the date the components are delivered to the owner for installation. The manufacturer shall upon its determination repair, correct or replace any manufacturer originated defects advised in writing to the manufacturer within the referenced warranty period. The use of SWTD components shall be limited to the application for which it was specifically designed.

1.7 The SWTD manufacturer shall submit to the Engineer of Record a “Manufacturer’s Performance Certification” certifying that each SWTD is capable of achieving the specified removal efficiencies listed in these specifications. The certification shall be supported by independent third-party research

1.8 No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the Engineer of Record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

2.0 MATERIALS

2.1 Housing unit of stormwater treatment device shall be constructed of pre-cast or cast-in-place concrete, no exceptions. Precast concrete components shall conform to applicable sections of ASTM C 478, ASTM C 857 and ASTM C 858 and the following:

- 2.1.1 Concrete shall achieve a minimum 28-day compressive strength of 4,000 pounds per square-inch (psi);
- 2.1.2 Unless otherwise noted, the precast concrete sections shall be designed to withstand lateral earth and AASHTO H-20 traffic loads;
- 2.1.3 Cement shall be Type III Portland Cement conforming to ASTM C 150;
- 2.1.4 Aggregates shall conform to ASTM C 33;
- 2.1.5 Reinforcing steel shall be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 185, or A 497.
- 2.1.6 Joints shall be sealed with preformed joint sealing compound conforming to ASTM C 990.
- 2.1.7 Shipping of components shall not be initiated until a minimum compressive strength of 4,000 psi is attained or five (5) calendar days after fabrication has expired, whichever occurs first.

2.2 Internal Components and appurtenances shall conform to the following:

- 2.2.1 Screen and support structure shall be manufactured of Type 316 and 316L stainless steel conforming to ASTM F 1267-01;
- 2.2.2 Hardware shall be manufactured of Type 316 stainless steel conforming to ASTM A 320;
- 2.2.3 Fiberglass components shall conform to the ASTM D-4097
- 2.2.4 Access system(s) conform to the following:
- 2.2.5 Manhole castings shall be designed to withstand AASHTO H-20 loadings and manufactured of cast-iron conforming to ASTM A 48 Class 30.

3.0 PERFORMANCE

3.1 The SWTD shall be sized to either achieve an 80 percent average annual reduction in the total suspended solid load or treat a flow rate designated by the jurisdiction in which the project is located. Both methods should be sized using a particle size distribution having a mean particle size (d_{50}) of 125 microns unless otherwise stated.

3.2 The SWTD shall be capable of capturing and retaining 100 percent of pollutants greater than or equal to 2.4 millimeters (mm) regardless of the pollutant's specific gravity (i.e.: floatable and neutrally buoyant materials) for flows up to the device's rated-treatment capacity. The SWTD shall be designed to retain all previously captured pollutants addressed by this subsection under all flow conditions. The SWTD shall be capable of capturing and retaining total petroleum hydrocarbons. The SWTD shall be capable of achieving a removal efficiency of 92 and 78 percent when the device is operating at 25 and 50 percent of its rated-treatment capacity. These removal efficiencies shall be based on independent third-party research for influent oil concentrations representative of storm water runoff (20 ± 5 mg/L). The SWTD shall be greater than 99 percent effective in controlling dry-weather accidental oil spills.

3.3 The SWTD shall be designed with a sump chamber for the storage of captured sediments and other negatively buoyant pollutants in between maintenance cycles. The minimum storage capacity provided by the sump chamber shall be in accordance with the volume listed in Table 1. The boundaries of the sump chamber shall be limited to that which do not degrade the SWTD's treatment efficiency as captured pollutants accumulate. The sump chamber shall be separate from the treatment processing portion(s) of the SWTD to minimize the probability of fine particle re-suspension. In order to not restrict the Owner's ability to maintain the SWTD, the minimum dimension providing access from the ground surface to the sump chamber shall be 16 inches in diameter.

3.4 The SWTD shall be designed to capture and retain Total Petroleum Hydrocarbons generated by wet-weather flow and dry-weather gross spills and have a capacity listed in Table 1 of the required unit.

3.5 The SWTD shall convey the flow from the peak storm event of the drainage network, in accordance with required hydraulic upstream conditions as defined by the Engineer. If a substitute SWTD is proposed, supporting documentation shall be submitted that demonstrates equal or better upstream hydraulic conditions compared to that specified herein. This documentation shall be signed and sealed by a Professional Engineer registered in the State of the work. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.6 The SWTD shall have completed field tested following TARP Tier II protocol requirements

4.0 EXECUTION

4.1 The contractor shall exercise care in the storage and handling of the SWTD components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be borne by the contractor.

4.2 The SWTD shall be installed in accordance with the manufacturer's recommendations and related sections of the contract documents. The manufacturer shall provide the contractor installation instructions and offer on-site guidance during the important stages of the installation as identified by the manufacturer at no additional expense. A minimum of 72 hours notice shall be provided to the manufacturer prior to their performance of the services included under this subsection.

4.3 The contractor shall fill all voids associated with lifting provisions provided by the manufacturer. These voids shall be filled with non-shrinking grout providing a finished surface consistent with adjacent surfaces. The contractor shall trim all protruding lifting provisions flush with the adjacent concrete surface in a manner, which leaves no sharp points or edges.

4.4 The contractor shall removal all loose material and pooling water from the SWTD prior to the transfer of operational responsibility to the Owner.

TABLE 1
Storm Water Treatment Device
Storage Capacities

CDS Model	Minimum Sump Storage Capacity (yd^3)/(m^3)	Minimum Oil Storage Capacity (gal)/(L)
CDS2015-4	0.9(0.7)	61(232)
CDS2015-5	1.5(1.1)	83(313)
CDS2020-5	1.5(1.1)	99(376)
CDS2025-5	1.5(1.1)	116(439)
CDS3020-6	2.1 (1.6)	184(696)
CDS3025-6	2.1(1.6)	210(795)
CDS3030-6	2.1 (1.6)	236(895)
CDS3035-6	2.1 (1.6)	263(994)
CDS3535-7	2.9(2.2)	377(1426)
CDS4030-8	5.6(4.3)	426(1612)
CDS4040-8	5.6 (4.3)	520(1970)
CDS4045-8	5.6 (4.3)	568(2149)
CDS5640-10	8.7(6.7)	758(2869)
CDS5653-10	8.7(6.7)	965(3652)
CDS5668-10	8.7(6.7)	1172(4435)
CDS5678-10	8.7(6.7)	1309(4956)
CDS7070-DV	3.6(2.8)	914 (3459)
CDS10060-DV	5.0 (3.8)	792 (2997)
CDS10080-DV	5.0 (3.8)	1057 (4000)
CDS100100-DV	5.0 (3.8)	1320 (4996)

END OF SECTION

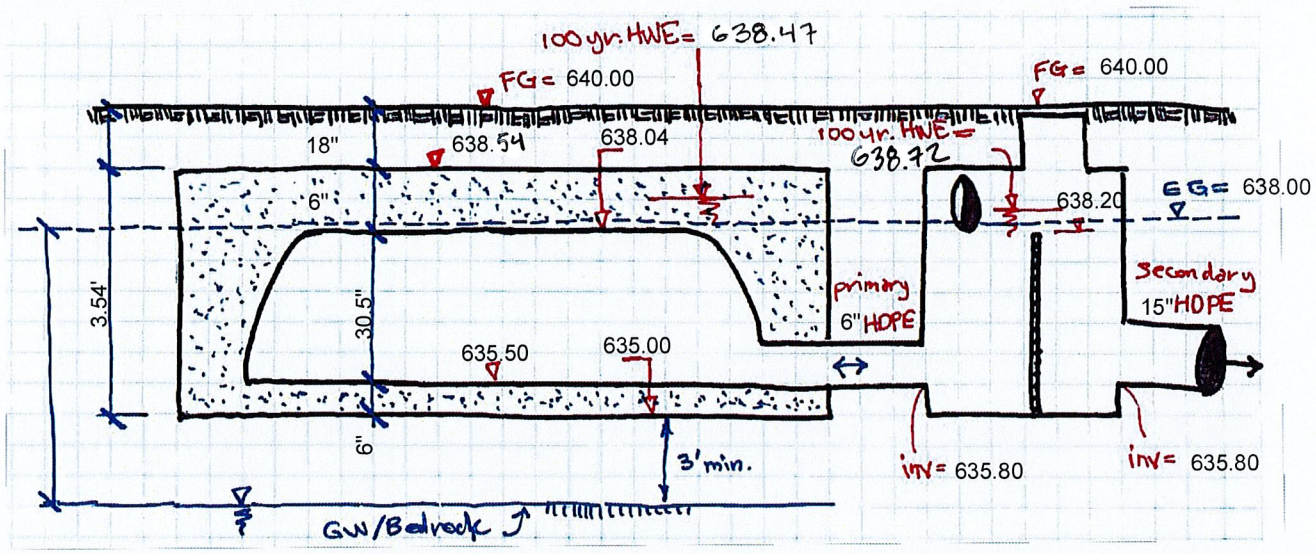
Appendix N

Proposed Infiltration System Cross Sections

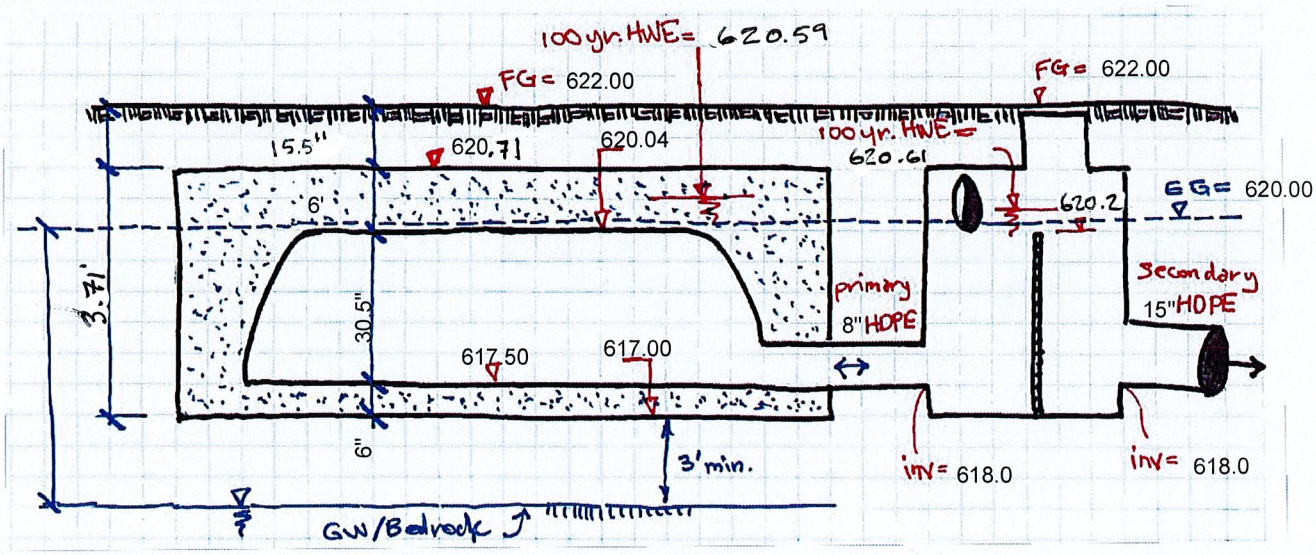
8-31-18

Lowest existing grade and highest groundwater elevations within the Infiltration Areas are shown.

INFILTRATION SYSTEM #1 -



INFILTRATION SYSTEM #2-



Appendix O

Cultec Infiltration Chamber Operation and Maintenance Requirements

Contactor® & Recharger®
Stormwater Chambers

Operation and Maintenance Guidelines
for CULTEC Stormwater Management Systems

The Founder of Plastic Chamber Technology

www.cultec.com | 1(800) 4-CULTEC |

CULTEC®

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www.cultec.com

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Contact Information:
For general information on our other products and services, please contact our offices within the United States at (800)428-5832, (203)775-4416 ext. 202, or e-mail us at custservice@cultec.com.

For technical support, please call (203)775-4416 ext. 203 or e-mail tech@cultec.com.

Visit www.cultec.com/downloads.html for Product Downloads and CAD details.

Doc ID: CULG008 05-17
May 2017

These instructions are for single-layer traffic applications only. For multi-layer applications, contact CULTEC.
All illustrations and photos shown herein are examples of typical situations. Be sure to follow the engineer's drawings.
Actual designs may vary.

This manual contains guidelines recommended by CULTEC, Inc. and may be used in conjunction with, but not to supersede, local regulations or regulatory authorities. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Introduction

The CULTEC Subsurface Stormwater Management System is a high-density polyethylene (HDPE) chamber system arranged in parallel rows surrounded by washed stone. The CULTEC chambers create arch-shaped voids within the washed stone to provide stormwater detention, retention, infiltration, and reclamation. Filter fabric is placed between the native soil and stone interface to prevent the intrusion of fines into the system. In order to minimize the amount of sediment which may enter the CULTEC system, a sediment collection device (stormwater pretreatment device) is recommended upstream from the CULTEC chamber system. Examples of pretreatment devices include, but are not limited to, an appropriately sized catch basin with sump, pretreatment catchment device, oil grit separator, or baffled distribution box. Manufactured pretreatment devices may also be used in accordance with CULTEC chambers. Installation, operation, and maintenance of these devices shall be in accordance with manufacturer's recommendations. Almost all of the sediment entering the stormwater management system will be collected within the pretreatment device.

Best Management Practices allow for the maintenance of the preliminary collection systems prior to feeding the CULTEC chambers. The pretreatment structures shall be inspected for any debris that will restrict inlet flow rates. Outfall structures, if any, such as outlet control must also be inspected for any obstructions that would restrict outlet flow rates. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Operation and Maintenance Requirements

I. Operation

CULTEC stormwater management systems shall be operated to receive only stormwater run-off in accordance with applicable local regulations. CULTEC subsurface stormwater management chambers operate at peak performance when installed in series with pretreatment. Pretreatment of suspended solids is superior to treatment of solids once they have been introduced into the system. The use of pretreatment is adequate as long as the structure is maintained and the site remains stable with finished impervious surfaces such as parking lots, walkways, and pervious areas are properly maintained. If there is to be an unstable condition, such as improvements to buildings or parking areas, all proper silt control measures shall be implemented according to local regulations.

II. Inspection and Maintenance Options

A. The CULTEC system may be equipped with an inspection port located on the inlet row. The inspection port is a circular cast box placed in a rectangular concrete collar. When the lid is removed, a 6-inch (150 mm) pipe with a screw-in plug will be exposed. Remove the plug. This will provide access to the CULTEC Chamber row below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment if any in this row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through an upstream manhole or through the CULTEC StormFilter Unit (or other pre-treatment device). CCTV inspection of this row can be deployed through this access port to deter mine if any sediment has accumulated in the inlet row.

B. If the CULTEC bed is not equipped with an inspection port, then access to the inlet row will be through an upstream manhole or the CULTEC StormFilter.

1. Manhole Access

This inspection should only be carried out by persons trained in confined space entry and sewer inspection services. After the manhole cover has been removed a gas detector must be lowered into the manhole to ensure that there are not high concentrations of toxic gases present. The inspector should be lowered into the manhole with the proper safety equipment as per OSHA requirements. The inspector may be able to observe sediment from this location. If this is not possible, the inspector will need to deploy a CCTV robot to permit viewing of the sediment.

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2. **StormFilter Access**
Remove the manhole cover to allow access to the unit. Typically a 30-inch (750 mm) pipe is used as a riser from the StormFilter to the surface. As in the case with manhole access, this access point requires a technician trained in confined space entry with proper gas detection equipment. This individual must be equipped with the proper safety equipment for entry into the StormFilter. The technician will be lowered onto the StormFilter unit. The hatch on the unit must be removed. Inside the unit are two filters which may be removed according to StormFilter maintenance guidelines. Once these filters are removed the inspector can enter the StormFilter unit to launch the CCTV camera robot.

C. The inlet row of the CULTEC system is placed on a polyethylene liner to prevent scouring of the washed stone beneath this row. This also facilitates the flushing of this row with high pressure water through a culvert cleaning nozzle. The nozzle is deployed through a manhole or the StormFilter and extended to the end of the row. The water is turned on and the inlet row is back-flushed into the manhole or StormFilter. This water is to be removed from the manhole or StormFilter using a vacuum truck.

III. Maintenance Guidelines

The following guidelines shall be adhered to for the operation and maintenance of the CULTEC stormwater management system:

A. The owner shall keep a maintenance log which shall include details of any events which would have an effect on the system's operational capacity.

B. The operation and maintenance procedure shall be reviewed periodically and changed to meet site conditions.

C. Maintenance of the stormwater management system shall be performed by qualified workers and shall follow applicable occupational health and safety requirements.

D. Debris removed from the stormwater management system shall be disposed of in accordance with applicable laws and regulations.

IV. Suggested Maintenance Schedules

A. Minor Maintenance
The following suggested schedule shall be followed for routine maintenance during the regular operation of the stormwater system:

Frequency	Action
Monthly in first year	Check inlets and outlets for clogging and remove any debris, as required.
Spring and Fall	Check inlets and outlets for clogging and remove any debris, as required.
One year after commissioning and every third year following	Check inlets and outlets for clogging and remove any debris, as required.

B. Major Maintenance
The following suggested maintenance schedule shall be followed to maintain the performance of the CULTEC stormwater management chambers. Additional work may be necessary due to insufficient performance and other issues that might be found during the inspection of the stormwater management chambers. (See table on next page)

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	Frequency	Action
Inlets and Outlets	Every 3 years	• Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
	Spring and Fall	• Check inlet and outlets for clogging and remove any debris as required.
CULTEC Stormwater Chambers	2 years after commissioning	• Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
	9 years after commissioning every 9 years following	• Clean stormwater management chambers and feed connectors of any debris. • Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	45 years after commissioning	• Clean stormwater management chambers and feed connectors of any debris. • Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. • Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. • Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. • Attain the appropriate approvals as required. • Establish a new operation and maintenance schedule.
Surrounding Site	Monthly in 1st year	• Check for depressions in areas over and surrounding the stormwater management system.
	Spring and Fall	• Check for depressions in areas over and surrounding the stormwater management system.
	Yearly	• Confirm that no unauthorized modifications have been performed to the site.

For additional information concerning the maintenance of CULTEC Subsurface Stormwater Management Chambers, please contact CULTEC, Inc. at 1-800-428-5832.

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WQMP
Operation & Maintenance (O&M) Plan

Project Name:_____

Prepared for:

Project Name: _____

Address:_____

City, State Zip:_____

Prepared on:

Date:_____

For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.

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This O&M Plan describes the designated responsible party for implementation of this WQMP, including: operation and maintenance of all the structural BMP(s), conducting the training/educational program and duties, and any other necessary activities. The O&M Plan includes detailed inspection and maintenance requirements for all structural BMPs, including copies of any maintenance contract agreements, manufacturer's maintenance requirements, permits, etc.

8.1.1 Project Information

Project name	
Address	
City, State Zip	
Site size	
List of structural BMPs, number of each	
Other notes	

8.1.2 Responsible Party

The responsible party for implementation of this WQMP is:

Name of Person or HOA Property Manager	
Address	
City, State Zip	
Phone number	
24-Hour Emergency Contact number	
Email	

8.1.3 Record Keeping

Parties responsible for the O&M plan shall retain records for at least 5 years.

All training and educational activities and BMP operation and maintenance shall be documented to verify compliance with this O&M Plan. A sample Training Log and Inspection and Maintenance Log are included in this document.

8.1.4 Electronic Data Submittal

This document along with the Site Plan and Attachments shall be provided in PDF format. AutoCAD files and/or GIS coordinates of BMPs shall also be submitted to the City.

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Appendix ____

BMP SITE PLAN

Site plan is preferred on minimum 11” by 17” colored sheets, as long as legible.

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BMP OPERATION & MAINTENANCE LOG

Project Name: _____

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

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Minor Maintenance

Frequency		Action
Monthly in first year		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Month 1	Date:	
□ Month 2	Date:	
□ Month 3	Date:	
□ Month 4	Date	
□ Month 5	Date:	
□ Month 6	Date:	
□ Month 7	Date:	
□ Month 8	Date:	
□ Month 9	Date:	
□ Month 10	Date:	
□ Month 11	Date:	
□ Month 12	Date:	
Spring and Fall		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
One year after commissioning and every third year following		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Year 1	Date:	
□ Year 4	Date:	
□ Year 7	Date:	
□ Year 10	Date:	
□ Year 13	Date:	
□ Year 16	Date:	
□ Year 19	Date:	
□ Year 22	Date:	

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Major Maintenance

	Frequency		Action
Inlets and Outlets	**Every 3 years**		Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
			Notes
	□ Year 1	Date:	
	□ Year 4	Date:	
	□ Year 7	Date:	
	□ Year 10	Date:	
	□ Year 13	Date:	
	□ Year 16	Date:	
	□ Year 19	Date:	
	□ Year 22	Date:	
	Spring and Fall		Check inlet and outlets for clogging and remove any debris, as required.
			Notes
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
CULTEC Stormwater Chambers	**2 years after commissioning**		□ Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. □ Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
			Notes
	□ Year 2	Date:	

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Major Maintenance

	Frequency		Action
CULTEC Stormwater Chambers	**9 years after commissioning every 9 years following**		□ Clean stormwater management chambers and feed connectors of any debris. □ Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. □ Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
			Notes
	□ Year 9	Date:	
	□ Year 18	Date:	
	□ Year 27	Date:	
	□ Year 36	Date:	
	45 years after commissioning		□ Clean stormwater management chambers and feed connectors of any debris. □ Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. □ Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. □ Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. □ Attain the appropriate approvals as required. □ Establish a new operation and maintenance schedule.
			Notes
	□ Year 45	Date:	

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Major Maintenance

	Frequency		Action
Surrounding Site	**Monthly in 1st year**		□ Check for depressions in areas over and surrounding the stormwater management system.
			Notes
	□ Month 1	Date:	
	□ Month 2	Date:	
	□ Month 3	Date:	
	□ Month 4	Date:	
	□ Month 5	Date:	
	□ Month 6	Date:	
	□ Month 7	Date:	
	□ Month 8	Date:	
	□ Month 9	Date:	
	□ Month 10	Date:	
	□ Month 11	Date:	
	□ Month 12	Date:	
	Spring and Fall		□ Check for depressions in areas over and surrounding the stormwater management system.
			Notes
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	Yearly		□ Confirm that no unauthorized modifications have been performed to the site.
			Notes
	□ Year 1	Date:	
	□ Year 2	Date:	
	□ Year 3	Date:	
	□ Year 4	Date:	
	□ Year 5	Date:	
	□ Year 6	Date:	
	□ Year 7	Date:	

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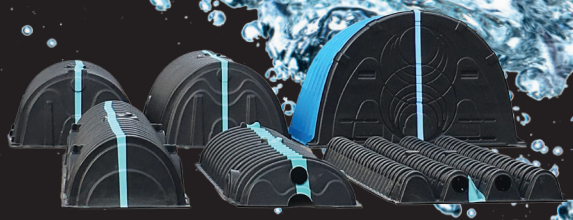


CULG008 05-17

Appendix P

Stormwater Control Facility Maintenance and Access Agreement

STORMWATER MANAGEMENT FACILITIES MAINTENANCE AGREEMENT

THIS AGREEMENT, made this ___ day of _____, 2018 by Ninth Jam Development, LLC, being the owner of the premises known as Southeast Executive Park located at 185 Route 312, Brewster, New York 10509 (the "Owner") in favor of the **TOWN OF SOUTHEAST,** a municipal corporation having an office at Town Hall, 1360 NYS Route 22, Brewster, New York 10509 ("Town").

WITNESSETH:

WHEREAS, Owner is the current owner of premises located in the Town of Southeast, County of Putnam and State of New York, commonly known as Southeast Executive Park, shown on the Town of Southeast Tax Map as 45.-1-3, and described by metes and bounds on **Schedule A** annexed hereto (the "Premises"); and

WHEREAS, site development plan approval for the Premises was granted by the Town for land development activity at the Premises, in connection with which stormwater management facilities (the "Facilities") as required have been constructed and installed on the Premises in accordance with the Town of Southeast Code (the "Code") and New York State Department of Environmental Conservation ("DEC") Regulations; and

WHEREAS, as a condition to the issuance of such approval the Code further requires Owner to execute a maintenance agreement if required by the Town's Stormwater Management Officer ("SMO") and record the same in the Office of the Putnam County Clerk.

NOW THEREFORE, for valuable consideration received, the Owner and the Town hereby agree as follows:

1. The Owner, or upon Owner's conveyance of the Premises, its successors and assigns, shall at all times properly operate and maintain all Facilities and all related systems of stormwater treatment and control in accordance with the provisions of the Code and applicable DEC regulations, standards and guidelines, as the same may be in effect and as the same may be amended from time to time.

2. In accordance with the terms and conditions of a Stormwater Management Facilities Inspection and Maintenance Easement ("Easement") of even date herewith, to be recorded in the Putnam County Clerk's Office, Owner has granted unto the Town, its successors and assigns forever, a perpetual easement and right-of-way to enter upon the Premises in order to access the Facilities at reasonable times and in a reasonable manner for periodic inspection by the Town, with notice given to Owner a minimum of 24 hours prior to entry, to ensure that the Facilities are maintained in proper working condition to meet design standards and any other provisions established by the Code in effect as of the date of the Easement and as amended hereafter.

3. This agreement shall not confer upon the Town any duty or obligation to fix or maintain the Facilities. Further, the Town's acceptance of any rights pursuant to this Agreement and any applicable provisions of the Code of the Town of Southeast shall not be deemed or construed as acceptance by the Town of any duty or obligation to fix or maintain the Facilities.

4. The Owner, or upon Owner's conveyance of the Premises, its successors and assigns, shall be bound to the maintenance provisions depicted in the approved project plans for the Facilities, which plans are available in the Office of the Building Inspector of the Town of Southeast, in accordance with all applicable provisions of the Code and the DEC regulations, standards and guidelines.

5. The Owner, or upon Owner's conveyance of the Premises, its successors and assigns, shall maintain, clean, repair, replace and continue the stormwater control measures for the Facilities as necessary to ensure effective stormwater control measures consistent with the aforementioned plans, in accordance with all applicable provisions of the Code and the DEC regulations, standards and guidelines, as the same may be currently in effect and as may be amended from time to time.

6. The Owner, or upon Owner's conveyance of the Premises, its successors and assigns, shall be responsible for all expenses related to the maintenance of the stormwater control measures for the Facilities.

7. The Owner, or upon Owner's conveyance of the Premises, its successors and assigns, shall provide for the periodic inspection of the stormwater control measures for the Facilities, not less than once in every five-year period (or at such frequency as set forth in the operation, monitoring and maintenance plan approved by the Planning Board), to determine the condition and integrity of the measures. A professional engineer licensed by the State of New York shall perform such inspection. The inspecting engineer shall prepare and submit to the SMO, within thirty (30) days of the inspection, a written report of the findings, including recommendations for those actions necessary for the continuation of the stormwater control measures for the Facility.

8. The Owner, or upon Owner's conveyance of the Premises, its successors and assigns, shall not authorize, undertake or permit alteration, abandonment, modification or discontinuation of the Facilities' stormwater control measures except in accordance with prior written approval of the SMO.

9. The Owner, or upon Owner's conveyance of the Premises, its successors and assigns, shall promptly undertake necessary repairs and replacement of the Facilities' stormwater control measures at the direction of the SMO or in accordance with the recommendations of the inspecting engineer upon notice from the SMO. Any such notice shall be sent to Owner by certified mail to the address for such Owner as shown on the records of the Town Assessor. The Owner shall have thirty five (35) days from the mailing of such notice to (a) complete or timely

commence corrective action or (b) appeal any such determination to the Town Board. The Owner may appeal any final determination of the Town Board pursuant to Article 78 of the New York Civil Practice Laws and Rules.

10. In the event that the Owner is (a) duly notified by the SMO to undertake such corrective action or maintenance pursuant to Paragraph 9, above, and (b) either (i) does not appeal said notification or (ii) the SMO determination is upheld by the Town Board or a court of competent jurisdiction, and the Owner fails to undertake such corrective action or maintenance in accordance with the project plans or has failed to undertake corrective action specified by the SMO or by the inspecting engineer, the SMO is authorized to undertake such steps as reasonably necessary for the construction, preservation, continuation or maintenance of the Facilities' stormwater control measures. The Facilities owner shall be responsible to reimburse the Town for funds expended to compensate for services rendered to the Town under the Code. In the event of failure to reimburse the Town for such fees, the Town may seek recovery in the manner provided by law.

11. Any damage to the Facilities caused by the Town in inspecting the said stormwater control system shall be restored, repaired or otherwise remedied by the Town. Owner shall be compensated by the Town for any expenses paid as a result of damage caused by the Town, including damage caused by the SMO, in inspecting the said stormwater control system.

12. In the event that the DEC serves a notice of violation upon the Town, brings an administrative complaint against the Town and/or commences a civil suit against the Town due to an alleged violation of the SPDES General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems, and such notice of violation, administrative complaint or civil suit is a result of, due to a consequence of or the outcome of any action by the Owner, or its successors or assigns, in violation of any of the provisions of this Agreement, the Code or the DEC regulations, standards and guidelines, the Owner or its successors or assigns shall indemnify and hold harmless the Town for any and all fines, damages or penalties imposed by the DEC upon the Town.

13. Owner hereby covenants that the Owner is seized of the Premises in fee simple and has good right to execute this Agreement; shall do nothing in the Premises which would prevent, impede or disturb the full use and intended purpose of this Agreement; and shall execute and deliver any further documents reasonably necessary to assure the benefits of this Agreement to the Town.

14. This Agreement shall run with the land in perpetuity and is binding upon the Owner, its successors and assigns.

IN WITNESS WHEREOF, the Owner and the Town have executed this Agreement as of the date first herein above set forth.

AS TO OWNER:

_____

By:_____

AS TO TOWN:

TOWN OF SOUTHEAST

By: _____
Tony Hay, Supervisor

ACKNOWLEDGMENTS

STATE OF NEW YORK)
COUNTY OF _____) SS:

On this day _____ of _____ 20___, before me personally came _____, to me known, who being duly sworn, did depose and say that s/he resides as _____; that s/he is the _____ of the _____, the corporation described in and which executed the foregoing instrument; and that s/he signed his/her name thereto by order of the Board of Directors of said corporation.

_____
Notary Public

STATE OF NEW YORK)
COUNTY OF PUTNAM) SS:

On this day _____ of _____ 20___, before me personally came TONY HAY, to me known, who being duly sworn, did depose and say that he resides in Brewster, New York; that he is the Supervisor of the Town of Southeast, a municipal corporation duly organized and existing pursuant to the laws of the State of New York, which is described in and which executed the foregoing instrument; and that he signed his name thereto by authority of the Town Board of said municipal corporation.

_____
Notary Public

SCHEDULE A

[Property Description]

MAINTENANCE & EROSION CONTROL INSPECTION REQUIREMENTS

SHORT TERM RESPONSIBLE PARTY:NINTH JAM DEVELOPMENT, LLC

LONG TERM RESPONSIBLE PARTY:NINTH JAM DEVELOPMENT, LLC

PRACTICE: EROSION CONTROLS

Maintenance Item	Frequency of Inspection					
	Short Term				Long Term	
	Following Major Rainfall	Daily	Weekly	Monthly	Yearly	Following Major Rainfall
Silt Fence (not knocked down or bulging)	X	X				
Construction Entrance (silt accumulation)	X	X				
Soil Stockpile	X			X		
Seeding/Mulching	X			X		
Site Stabilization	X		X			
Catch Basin Inlet Protection	X		X			
Use of Construction Staging Areas	X	X				
General Site Appearance	X	X				
Debris/Litter Control	X	X				
Need to Clean Road Surface	X	X				
Stormwater Discharge Quality	X	X			X	X

PRACTICE: INFILTRATION SYSTEMS

Maintenance Item	Frequency of Inspection						
	Short Term				Long Term		
	Following Major Rainfall	Daily	Weekly	Monthly	Monthly	Yearly	Following Major Rainfall
Inflow Pipes Clear	X					X	X
Outlet Structure	X					X	X
Diversion Manhole / Outlets	X		X	X	X	X	X
No Evidence of Downstream Erosion	X						X
Dewaters Between Storms	X						X
Upland Area Clear of Debris	X						X
Forebay Silt Accumulation > 6”	X					X	X

PRACTICE: CATCH BASINS, DRAIN MANHOLES & DIVERSION STRUCTURES

Maintenance Item	Frequency of Inspection							
	Short Term				Long Term			
	Following Major Rainfall	Daily	Weekly	Monthly	Monthly	Bi-monthly*	Yearly	Following Major Rainfall
Inflow Pipes & Rims Clear	X			X		X	X	X
Sediment Accumulation in Sumps	X			X			X	X
Accumulation of larger trash	X			X	X		X	X
Outlets Unobstructed	X			X		X	C	X

* For catch basins located in grassy areas only.

PRACTICE: CDS PRETREATMENT UNITS

Maintenance Item	Frequency of Inspection							
	Short Term				Long Term			
	Following Major Rainfall	Daily	Weekly	Monthly	Monthly	Quarterly*	Yearly	Following Major Rainfall
Inflow Pipes & Rims Clear	X			X		X	X	X
Sediment Accumulation in Sumps	X			X		X	X	X
Accumulation of larger trash	X			X		X	X	X
Outlets Unobstructed	X			X		X	X	X

*During first year only.

PRACTICE: ROCK OUTLET PROTECTION

Maintenance Item	Frequency of Inspection						
	Short Term				Long Term		
	Following Major Rainfall	Daily	Weekly	Monthly	Monthly	Yearly	Following Major Rainfall
Debris Cleanout	X					X	X
Vegetation	X		X			X	X
Sediment Deposition	X		X			X	X
Dislodged Stone	X			X	X		X

MAINTENANCE REQUIREMENTS

Inspections of the following items should be performed at a minimum annually and following significant rainstorm events, based on the inspection observations, maintenance requirements should be performed as follows:

Infiltration Systems:
(Refer to manufacturer's maintenance schedule in Appendix 'P' for more specific maintenance requirements)

- Inspect the infiltration systems (x3) to ensure accumulated water is infiltrating into the soil and that debris has not entered the infiltration basins. Any debris should be removed. Once debris is removed, if stormwater is still not infiltrating contact a professional engineer licensed in the State of New York to examine the system.
- Inspection of the outlet of the overflow pipe to ensure it is not plugged or clogged.

Catch Basins, Drain Manholes and Diversion Structures:

- Inspection of structures for accumulated sediment, debris, and trash.
- Deep Sump Drain Manhole with EnviroHood should be inspected once per month for the first year, or until the site has stabilized. Subsequent inspection should be done annually or following a major rainfall., The Drain Manhole shall be cleaned if accumulated debris is equal or greater to the following:
  a. debris in sump - 18" max
  b. floatable debris - 6" max

Hydrodynamic Separators (CDS) - Pretreatment Units:
(Refer to manufacturer's maintenance schedule in Appendix 'M' for more specific maintenance requirements)

- Inspect after heavy rainfall greater than ½" in 24 hours for the first year to determine an appropriate maintenance schedule. Subsequent inspections are reduced to quarterly.
- When the sediment volume reaches within 24"-30" of the water surface, the system should be maintained
- Maintenance is to be performed using a vacuum truck and removing the accumulated sediment pile and debris.

Rock Outlet Protection:

- Inspection of the rock pad to ensure no stones have become dislodged. Any missing stones should be replaced.
- Inspection for accumulated debris.

STORMWATER MANAGEMENT FACILITIES
INSPECTION AND MAINTENANCE EASEMENT

THIS EASEMENT, made this ___ day of _____, 2018 by Ninth Jam Development, LLC having an office at 501 Fifth Avenue, Suite 704, New York, NY 10017, (the "Grantor") in favor of the **TOWN OF SOUTHEAST,** a municipal corporation having an office at Town Hall, 1360 NYS Route 22, Brewster, New York 10509 ("Grantee").

WITNESSETH:

WHEREAS, Grantor is the current premises located in the Town of Southeast, County of Putnam and State of New York, commonly known as Southeast Executive Park, and shown on the Town of Southeast Tax Map as Sec.45, Blk. 1, Lot 3, and described by metes and bounds on **Schedule A** annexed hereto (the "Premises"); and

WHEREAS, site development plan approval for the Premises was granted by the Town for land development activity at the Premises, in connection with which stormwater management facilities (the "Facilities") as required have been constructed and installed on the Premises in accordance with the Town Code of the Town of Southeast (the "Code"); and

WHEREAS, as a condition to the issuance of such approval the Code further requires Grantor to execute this Easement and record the same in the Office of the Putnam County Clerk.

NOW, THEREFORE, for valuable consideration received, the Grantor hereby agrees as follows:

1. Grantor does hereby grant unto Grantee, its successors and assigns forever, a perpetual easement and right-of-way (but Grantee shall have no obligation), to enter upon the Premises in order to access the Facilities at reasonable times and in a reasonable manner for periodic inspection by Grantee, with notice given to Grantor of periodic inspection a minimum of 24 hours prior to entry, to ensure that the Facilities are maintained in proper working condition to meet design standards and any other provisions established by the Code in effect as of the date of this Easement and as amended hereafter and all applicable New York State Department of Environmental Conservation ("NYSDEC") regulations, standards and guidelines, as the same may be amended from time to time.

2. The Grantee is further authorized to undertake such steps as are reasonably necessary for the construction, preservation, continuation or maintenance of the Facilities for the Premises in the event the Grantor or current owner has failed to construct or maintain the stormwater control measures in accordance with the project plan for the Facilities, applicable NYSDEC regulations, standards and guidelines, or has failed to undertake corrective action specified by the Town of Southeast Stormwater Management Officer ("SMO") or his/her duly authorized

deputy, agent or representative, all in accordance with a certain Stormwater Management Facilities Maintenance Agreement executed by Grantor and the Grantee of even date herewith.

3. Grantor hereby covenants that the Grantor is seized of the Premises in fee simple and has good right to grant this Easement; shall do nothing in the Premises which would prevent, impede or disturb the full use and intended purpose of this Easement by the Grantee; and shall execute and deliver any further documents reasonably necessary to assure the Easement and rights granted herein to the Grantee.

4. This Easement shall not confer unto the Grantee any duty or obligation to fix or maintain the Facilities. Further, Grantee's acceptance of any rights pursuant to this easement shall not be deemed as the acceptance of any duty or obligation to fix or maintain the Facilities.

5. This Easement shall be recorded, shall be deemed a covenant running with the lands affected hereby, and shall inure to the benefit of and be binding upon the Grantor, all subsequent owners, and their successors and assigns.

IN WITNESS WHEREOF, the Grantor has executed this Easement as of the date first herein above set forth.

GRANTOR: _____

By: _____
_____

ACKNOWLEDGMENT

STATE OF NEW YORK)
COUNTY OF _____) SS:

On this day _____ of _____ 20___, before me personally came _____, to me known, who being duly sworn, did depose and say that s/he resides as _____; that s/he is the _____ of the _____, the corporation described in and which executed the foregoing instrument; and that s/he signed his/her name thereto by order of the Board of Directors of said corporation.

_____
Notary Public

RECORD AND RETURN TO:
Town Attorney
Town of Southeast
1360 Route 22
Brewster, NY 10509

FORM TP-584 REQUIRED

SCHEDULE A

[Description]

Appendix Q

Phosphorous Loading Analysis

SOUTHEAST EXECUTIVE PARK - DRIVEWAY EXTENSION AND PARKING ADDITIONS

TABLE 1 Impact on Phosphorus Loads Received in Existing Highlands Stormwater Management System from Proposed Development within Sub Area 1
Pre-Development Condition: Brush
Area of Project Coverage: 0.633 acres TP Annual Loading Rate: 0.1 lb/ac/yr Existing Annual TP Load: 0.633 ac. x 0.1 lb/ac/yr = 0.063 lb/yr
Runoff from sub area 1 in the predevelopment condition is captured in the existing Highlands stormwater collection system and conveyed through existing SWQB #4 and Stormwater Detention Basin 2 before ultimately discharging to the Highlands Design Point.
SWQB #4 = Design 3; TP removal = 60%
TP Load Out = 0.063 – (60% x 0.) = 0.03 lb/yr
Detention Basin #2 = Design 6; TP removal = 60%
Predevelopment TP Load Out = 0.03 – (60% x 0.03) = **0.01 lb/yr**
Post-Development Condition *A. Contributing area to Infiltration System #2 (Sub Area 1)*
Coverage: Lawn = 0.204 acres Brush = 0.016 acres Pavement = 0.413 acres
TP Annual Loading Rate: Lawn = 0.1 lb/ac/yr Brush/Meadow = 0.1 lb/ac/yr Pavement = 1.0 lb/ac/yr
Annual TP Load to Infiltration System #2 0.204 ac. x 0.1 lb/ac/yr = 0.020 0.016 ac. x 0.1 lb/ac/yr = 0.001 0.413 ac. x 1.0 lb/ac/yr = 0.413 0.434 lb/yr TP Removal in Infiltration System = 100%
TP Load Received at Connection to Highlands Drainage System (Existing CB 83): TP = 0.434 – (1000% x 0.434) = 0.00 lb/yr
In accordance with the phosphorus removal efficiencies specified in the NYC East of Hudson Watershed Retrofit Deign Manual, Green Infrastructure practices including subsurface infiltration provide phosphorous removal equivalent to the percentage of the WQv treated in the practice. All SMP's have been designed to provide treatment for 100% of the WQv or 1-year storm runoff volume in accordance with the Enhanced Phosphorus Removal standards specified in chapter 10 of the NYS Stormwater Management Design Manual. Therefore, 100% phosphorus removal efficiencies can be credited to each proposed infiltration system.

SOUTHEAST EXECUTIVE PARK - DRIVEWAY EXTENSION AND PARKING ADDITIONS

TABLE 2 Impact on Phosphorus Loads Received in Existing Highlands Stormwater Management System from Proposed Development within Sub Area 2
Pre-Development Condition: Brush
Area of Project Coverage: 1.84 acres TP Annual Loading Rate: 0.1 lb/ac/yr Existing Annual TP Load: 1.84 ac. x 0.1 lb/ac/yr = 0.184 lb/yr
Runoff from sub area 2 in the predevelopment condition is captured in the existing Highlands stormwater collection system and conveyed through existing SWQB #4 and Stormwater Detention Basin 2 before ultimately discharging to the Highlands Design Point.
SWQB #4 = Design 3; TP removal = 60%
TP Load Out = 0.184 – (60% x 0.07) = 0. 074 lb/yr
Detention Basin #2 = Design 6; TP removal = 60%
Predevelopment TP Load Out = 0.074 – (60% x 0.074) = **0.03 lb/yr**
Post-Development Condition *A. Sub Area 2 – Contributing drainage area to Infiltration System #1*
Coverage: Lawn = 0.407 acres Brush = 0.871 acres Pavement = 0.566 acres
TP Annual Loading Rate: Lawn = 0.1 lb/ac/yr Brush = 0.1 lb/ac/yr Pavement = 1.0 lb/ac/yr
Annual TP Load to Infiltration System #1 0.407 ac. x 0.1 lb/ac/yr = 0.041 0.871 ac. x 0.1 lb/ac/yr = 0.087 0.566 ac. x 1.0 lb/ac/yr = 0.566 0.694 lb/yr TP Removal in Infiltration System = 100%
TP Load Received at Connection to Highlands Drainage System (Existing DMH #41): TP = 0.694 – (100% x 0.694) = 0.00 lb/yr
In accordance with the phosphorus removal efficiencies specified in the NYC East of Hudson Watershed Retrofit Deign Manual, Green Infrastructure practices including subsurface infiltration provide phosphorous removal equivalent to the percentage of the WQv treated in the practice. All SMP's have been designed to provide treatment for 100% of the WQv or 1-year storm runoff volume in accordance with the Enhanced Phosphorus Removal standards specified in chapter 10 of the NYS Stormwater Management Design Manual. Therefore, 100% phosphorus removal efficiencies can be credited to each proposed infiltration system.

SOUTHEAST EXECUTIVE PARK - DRIVEWAY EXTENSION AND PARKING ADDITIONS

TABLE 3 Impact on Phosphorus Loads Received in Existing Highlands Stormwater Management System from Proposed Development within Sub Area 5
Pre-Development Condition: Lawn/Woods
Coverage: Lawn = 0.89 acres Woods = 0.11 acres TP Annual Loading Rate: Lawn = 0.1 lb/ac/yr Woods = 0.1 lb/ac/yr Existing Annual TP Load: 1.00 ac. x 0.1 lb/ac/yr = 0.10 lb/yr
Runoff from sub area 5 in the predevelopment condition is captured in the existing Highlands stormwater collection system and conveyed directly to the Highlands Design Point without receiving any treatment.
Post-Development Condition *A. Sub Area 5 – Contributing drainage area to Design Line 2*
Coverage: Lawn = 0.886 acres Woods = 0.11 acres Pavement = 0.004 acres
TP Annual Loading Rate: Lawn = 0.1 lb/ac/yr Woods = 0.1 lb/ac/yr Pavement = 1.0 lb/ac/yr
Annual TP Load to Infiltration System #1 0.886 ac. x 0.1 lb/ac/yr = 0.088 0.11 ac. x 0.1 lb/ac/yr = 0.011 0.004 ac. x 1.0 lb/ac/yr = 0.004 0.103 lb/yr
Runoff from sub area 5 in the post development condition is captured in the existing Highlands stormwater collection system and conveyed directly to the Highlands Design Point without receiving any treatment.

Thomas DiMauro

1102 Deerfield Rd
Monroe, NY 10950
914-456-9349
nikon_tom@yahoo.com

February 5, 2017

John Muro II, President
Allied Pollution Control, Inc.
Water & Wastewater Specialists
1273 Route 311
Patterson, NY 12563

Dear John,

With regard to Monitoring Station #4 (MS#4) at the Highland Plaza please note the following for January 2017:

Flow - During this time we had a flow volume for the interval of 7,396,500 total gallons with a daily average of 238,597 gallons.

Grab Samples - During the month I was able to obtain only one grab samples. The average phosphorous level was 0.049 mg/L. See attached reports.

If you have any questions please contact me at the above number or email.

Sincerely yours,

Thomas DiMauro

Thomas DiMauro

1102 Deerfield Rd
Monroe, NY 10950
914-456-9349
nikon_tom@yahoo.com

March 4, 2017

John Muro II, President
Allied Pollution Control, Inc.
Water & Wastewater Specialists
1273 Route 311
Patterson, NY 12563

Dear John,

With regard to Monitoring Station #4 (MS#4) at the Highland Plaza please note the following for February 2017:

Flow - During this time we had a flow volume for the interval of 3,860,100 total gallons with a daily average of 137,861 gallons.

Grab Samples - During the month I was able to obtain two grab samples. The average phosphorous level was 0.028 mg/L. See attached reports.

If you have any questions please contact me at the above number or email.

Sincerely yours,

Thomas DiMauro

Thomas DiMauro

1102 Deerfield Rd
Monroe, NY 10950
914-456-9349
nikon_tom@yahoo.com

Apri; 4, 2017

John Muro II, President
Allied Pollution Control, Inc.
Water & Wastewater Specialists
1273 Route 311
Patterson, NY 12563

Dear John,

With regard to Monitoring Station #4 (MS#4) at the Highland Plaza please note the following for March 2017:

Flow - During this time we had a flow volume for the interval of 39,261,900 total gallons with a daily average of 1,266,513 gallons.

Grab Samples - During the month I was able to obtain two grab samples. The average phosphorous level was 0.045 mg/L. See attached reports.

If you have any questions please contact me at the above number or email.

Sincerely yours,

Thomas DiMauro

Thomas DiMauro

1102 Deerfield Rd
Monroe, NY 10950
914-456-9349
nikon_tom@yahoo.com

May 4, 2017

John Muro II, President
Allied Pollution Control, Inc.
Water & Wastewater Specialists
1273 Route 311
Patterson, NY 12563

Dear John,

With regard to Monitoring Station #4 (MS#4) at the Highland Plaza please note the following for April 2017:

Flow - During this time we had a flow volume for the interval of 5,711,500 total gallons with a daily average of 190,383 gallons.

Grab Samples - During the month I was able to obtain one grab sample and one duplicate. The average phosphorous level was 0.024 mg/L. See attached reports.

If you have any questions please contact me at the above number or email.

Sincerely yours,

Thomas DiMauro

Thomas DiMauro

1102 Deerfield Rd
Monroe, NY 10950
914-456-9349
nikon_tom@yahoo.com

June 22, 2017

John Muro II, President
Allied Pollution Control, Inc.
Water & Wastewater Specialists
1273 Route 311
Patterson, NY 12563

Dear John,

With regard to Monitoring Station #4 (MS#4) at the Highland Plaza please note the following for May 2017:

Flow - During this time we had a flow volume for the interval of 5,817,500 total gallons with a daily average of 187,661 gallons.

Grab Samples - During the month I was able to obtain three grab samples. The average phosphorous level was 0.0263 mg/L. (Corrected from previous report.) See attached reports.

If you have any questions please contact me at the above number or email.

Sincerely yours,

Thomas DiMauro

Thomas DiMauro

1102 Deerfield Rd
Monroe, NY 10950
914-456-9349
nikon_tom@yahoo.com

July 11, 2017

John Muro II, President
Allied Pollution Control, Inc.
Water & Wastewater Specialists
1273 Route 311
Patterson, NY 12563

Dear John,

With regard to Monitoring Station #4 (MS#4) at the Highland Plaza please note the following for June 2017:

Flow - During this time we had a flow volume for the interval of 3,521,000 total gallons with a daily average of 117,367 gallons.

Grab Samples - During the month I was able to obtain three grab samples. The average phosphorous level was 0.033 mg/L. See attached reports.

If you have any questions please contact me at the above number or email.

Sincerely yours,

Thomas DiMauro

Thomas DiMauro

1102 Deerfield Rd
Monroe, NY 10950
914-456-9349
nikon_tom@yahoo.com

August 5, 2017

John Muro II, President
Allied Pollution Control, Inc.
Water & Wastewater Specialists
1273 Route 311
Patterson, NY 12563

Dear John,

With regard to Monitoring Station #4 (MS#4) at the Highland Plaza please note the following for July 2017:

Flow - During this time we had a flow volume for the interval of 7,452,900 total gallons with a daily average of 240,416 gallons.

Grab Samples - During the month I was able to obtain one grab samples. The phosphorous level was 0.038 mg/L. See attached reports.

If you have any questions please contact me at the above number or email.

Sincerely yours,

Thomas DiMauro

Thomas DiMauro

1102 Deerfield Rd
Monroe, NY 10950
914-456-9349
nikon_tom@yahoo.com

September 7, 2017

John Muro II, President
Allied Pollution Control, Inc.
Water & Wastewater Specialists
1273 Route 311
Patterson, NY 12563

Dear John,

With regard to Monitoring Station #4 (MS#4) at the Highland Plaza please note the following for August 2017:

Flow - During this time we had a flow volume for the interval of 1,873,400 total gallons with a daily average of 60,432 gallons.

Grab Samples - During the month I was able to obtain two grab samples. The phosphorous level was 0.036 mg/L. See attached reports.

If you have any questions please contact me at the above number or email.

Sincerely yours,

Thomas DiMauro

Thomas DiMauro

1102 Deerfield Rd
Monroe, NY 10950
914-456-9349
nikon_tom@yahoo.com

October 5, 2017

John Muro II, President
Allied Pollution Control, Inc.
Water & Wastewater Specialists
1273 Route 311
Patterson, NY 12563

Dear John,

With regard to Monitoring Station #4 (MS#4) at the Highland Plaza please note the following for September 2017:

Flow - During this time we had a flow volume for the interval of 5,860,800 total gallons with a daily average of 195,360 gallons.

Grab Samples - During the month I was able to obtain one grab sample. The phosphorous level was 0.025 mg/L. See attached reports.

If you have any questions please contact me at the above number or email.

Sincerely yours,

Thomas DiMauro

Thomas DiMauro

1102 Deerfield Rd
Monroe, NY 10950
914-456-9349
nikon_tom@yahoo.com

November 8, 2017

John Muro II, President
Allied Pollution Control, Inc.
Water & Wastewater Specialists
1273 Route 311
Patterson, NY 12563

Dear John,

With regard to Monitoring Station #4 (MS#4) at the Highland Plaza please note the following for October 2017:

Flow - During this time we had a flow volume for the interval of 4,005,000 total gallons with a daily average of 129,194 gallons.

Grab Samples - During the month I was able to obtain two grab samples. The phosphorous level was 0.016 mg/L. See attached reports.

If you have any questions please contact me at the above number or email.

Sincerely yours,

Thomas DiMauro

Thomas DiMauro

1102 Deerfield Rd
Monroe, NY 10950
914-456-9349
nikon_tom@yahoo.com

December 5, 2017

John Muro II, President
Allied Pollution Control, Inc.
Water & Wastewater Specialists
1273 Route 311
Patterson, NY 12563

Dear John,

With regard to Monitoring Station #4 (MS#4) at the Highland Plaza please note the following for November 2017:

Flow - During this time we had a flow volume for the interval of 6,447,400 total gallons with a daily average of 214,913 gallons.

Grab Samples - During the month I was able to obtain two grab samples. The phosphorous level was 0.0215 mg/L. See attached reports.

If you have any questions please contact me at the above number or email.

Sincerely yours,

Thomas DiMauro

Thomas DiMauro

1102 Deerfield Rd
Monroe, NY 10950
914-456-9349
nikon_tom@yahoo.com

January 5, 2018

John Muro II, President
Allied Pollution Control, Inc.
Water & Wastewater Specialists
1273 Route 311
Patterson, NY 12563

Dear John,

With regard to Monitoring Station #4 (MS#4) at the Highland Plaza please note the following for December 2017:

Flow - During this time we had a flow volume for the interval of 5,150,600 total gallons with a daily average of 166,148 gallons.

Grab Samples - During the month I was able to obtain two grab samples. The phosphorous level was 0.018 mg/L. See attached reports.

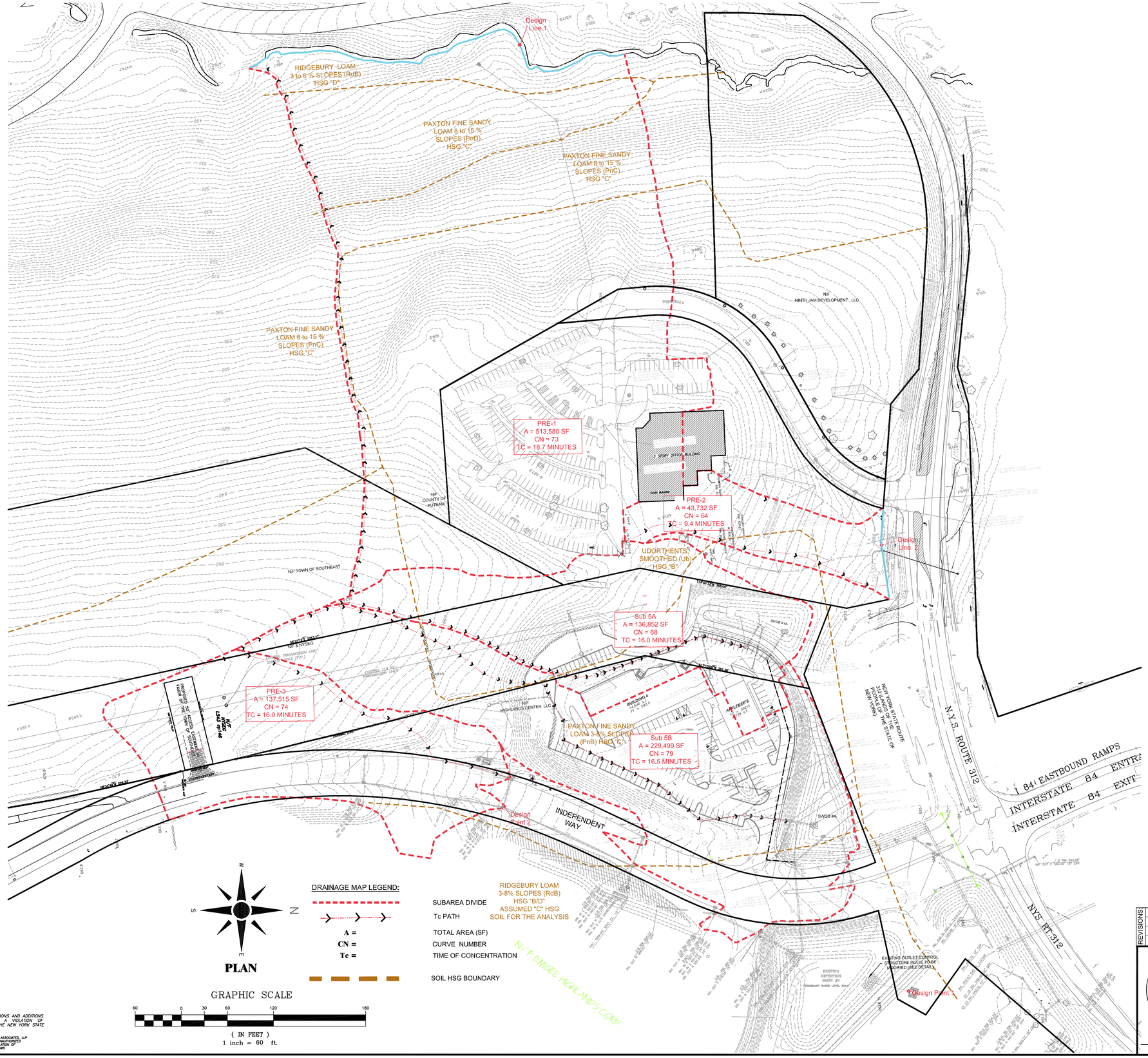
If you have any questions please contact me at the above number or email.

Sincerely yours,

Thomas DiMauro

Figure 1

Pre-development Drainage Basin Plan



NOTE:

REFER TO POST DEVELOPMENT DRAINAGE BASIN MAPS FROM APPROVED SWPPP PREPARED FOR THE HIGHLANDS DATED JANUARY 26, 1998 FOR SUB AREA BOUNDARIES CONTRIBUTING TO EXISTING SWQB 3 AND DETENTION BASIN # 2

DRAINAGE MAP LEGEND:

SUBAREA DIVIDE

Tc PATH

A =

CN =

Tc =

TOTAL AREA (SF)

CURVE NUMBER

TIME OF CONCENTRATION

SOIL HSG BOUNDARY

RIDGEBURY LOAM 3-8% SLOPES (RdB) HSG "B/D" ASSUMED "C" HSG SOIL FOR THE ANALYSIS

PLAN

GRAPHIC SCALE

60 0 30 60 120 180

(IN FEET)
1 inch = 60 ft.

UNAUTHORIZED ALTERATIONS AND ADDITIONS TO THIS DRAWING IS A VIOLATION OF SECTION 7209 (2) OF THE NEW YORK STATE EDUCATION LAW.

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REVISIONS

DATE:	DESCRIPTION	BY/CK	DATE:	DESCRIPTION	BY/CK
8/31/18	REVISED PER NYCDEP COMMENTS	DK/MG			

STATE OF NEW YORK · SABRI BARISSER · 075545 · LICENSED PROFESSIONAL ENGINEER

SABRI BARISSER P.E.

PRE-DEVELOPMENT WATERSHED MAP

SOUTHEAST EXECUTIVE PARK

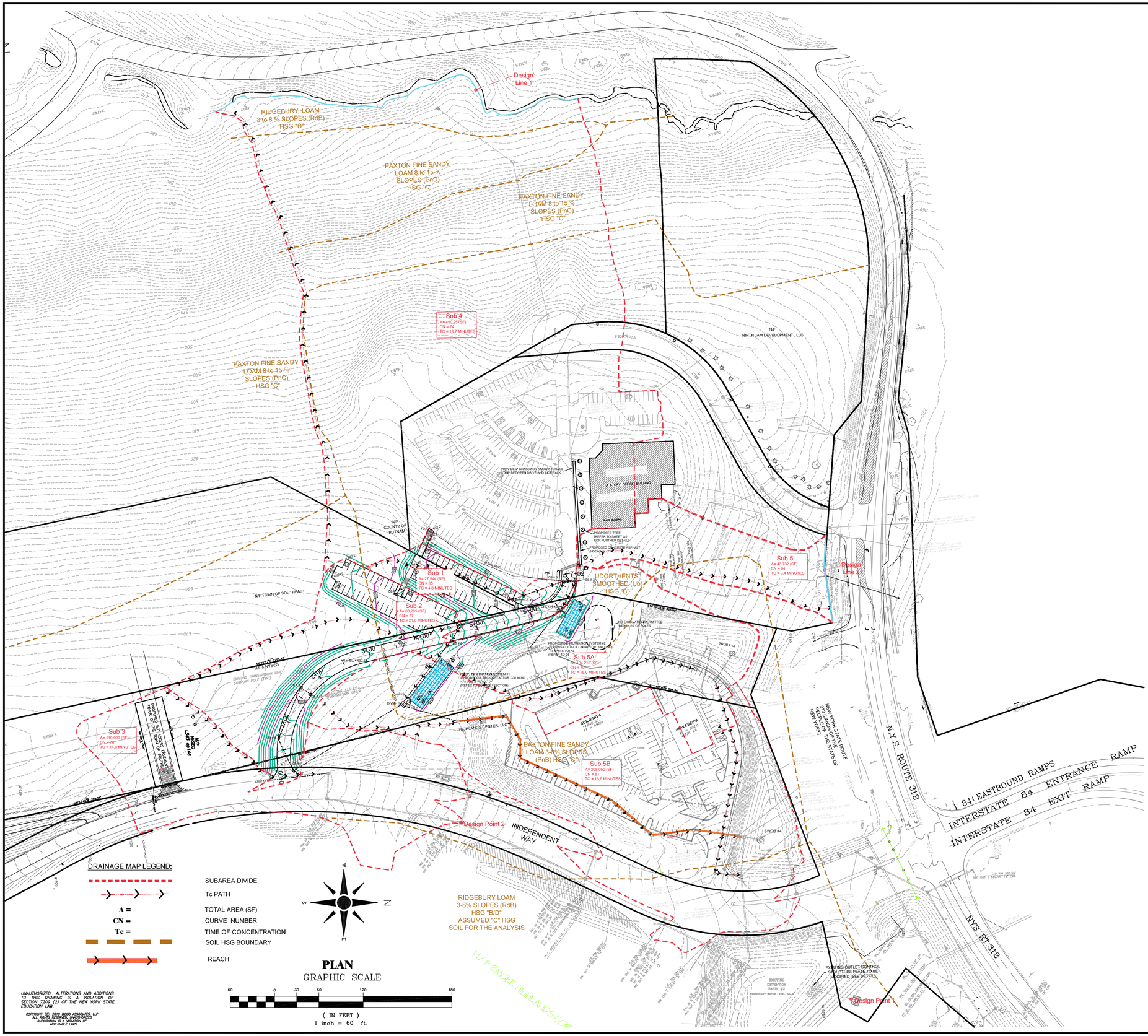
185 ROUTE 312
TOWN OF SOUTHEAST ,PUTNAM COUNTY, NY

BIBBO ASSOCIATES, LLP
293 ROUTE 100 SUITE 203
SOMERS, NEW YORK 10589
TEL. 914 277 5805

DATE:	04-24-18
SCALE:	1" = 80'
FILE:	
DSGN / CHK:	JB /SB
DRN. BY:	DK
SHT NO.	1 OF 2
DWG NO.	PRE

Figure 2

Post-development Drainage Basin Plan



NOTE:

REFER TO POST DEVELOPMENT DRAINAGE BASIN MAPS FROM APPROVED SWPPP PREPARED FOR THE HIGHLANDS DATED JANUARY 26, 1998 FOR SUB AREA BOUNDARIES CONTRIBUTING TO EXISTING SWQB 3 AND DETENTION BASIN # 2

REVISIONS					
8/31/18	REVISED PER NYCDEP COMMENTS	DK/MG			
DATE:	DESCRIPTION	BY/CK	DATE:	DESCRIPTION	BY/CK

STATE OF NEW YORK · SABRI BARISSER · 075545 · LICENSED PROFESSIONAL ENGINEER

SABRI BARISSER P.E.

POST-DEVELOPMENT WATERSHED MAP

SOUTHEAST EXECUTIVE PARK
185 ROUTE 312
TOWN OF SOUTHEAST, PUTNAM COUNTY, NY

BIBBO ASSOCIATES, LLP
293 ROUTE 100 SUITE 203
SOMERS, NEW YORK 10589
TEL. 914 277 5805

DATE:	04-24-18
SCALE:	1" = 80'
FILE:	
DSGN / CHK:	JB / SB
DRN. BY:	DK
SHT NO.	2 OF 2
DWG NO.	POST

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