

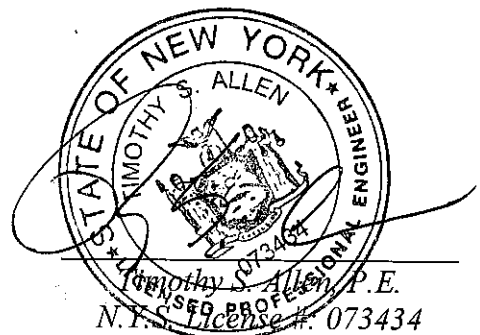


Preliminary
Stormwater Pollution Prevention Plan

The North 60 - Master Plan

Hospital Road & Route 9A
Mount Pleasant (T)

Prepared By:



Rev:

Date: March 9, 2020



Project Information:

Project Title: The North 60 – Master Plan
Project Address: Hospital Road & Route 9A, Mount Pleasant, NY
Tax Map Number: Sheet 116.8, Block 1, Lot(s) 3, 4, 5, 6, 7, 8, 9
Sheet 111.20, Block 1, Lot 80
Project Area: 78.92 +/- Acres

Applicant/Owner Information:

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Short-Term Responsible Party for SWPPP Implementation:

Short-term responsible parties for SWPPP Implementation will be the General Contractor.

Long-Term Responsible Party for SWPPP Implementation:

Long-term responsible parties for SWPPP Implementation will be the Owners.

Potential Party Responsible for Inspections as Required Under SPDES Permit:

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Table of Contents:

1.0 Introduction	Page 3
1.1 Project Description	Page 3
1.2 Existing Conditions	Page 4
1.3 Proposed Conditions	Page 5
2.0 Stormwater Management	Page 6
2.1 NYSDEC Requirements	
2.1.1 Water Quality Volume	Page 12
2.1.2 Runoff Reduction Volume	Page 13
2.1.4 Stream Channel Protection Volume	Page 14
2.1.3 Overbank & Extreme Flood Control	Page 14
3.0 Erosion & Sediment Control	Page 16
3.1 Temporary Erosion & Sediment Control Practices	Page 17
3.2 Permanent Erosion & Sediment Control Practices	Page 20
4.0 Maintenance & Inspection Requirements	Page 21
4.1 Short Term Maintenance & Inspection Requirements	Page 22
4.2 Long Term Maintenance & Inspection Requirements	Page 23
5.0 Outstanding Violations Or Enforcement Actions	Page 24
6.0 Conclusion	Page 24

Appendix A1: Pre-Development HydroCAD Output Reports	
Appendix A2: Post-Development HydroCAD Output Reports	
Appendix B: Water Quality Volume and Runoff Reduction Calculations	
Appendix C: First Defense Stormwater Treatment Chamber Information	
Appendix D: NRCS Soil Map	
Appendix E: Map of Historic Places in Vicinity of Project	
Appendix F: New York State Standards and Specifications for Erosion & Sediment Control Construction Site Log Book	
Appendix G: New York State Stormwater Management Design Manual Maintenance & Inspection Checklist	
Appendix H: Soil Testing Results	
Appendix I: Pocket Wetland Sizing Calculations	
Appendix J: (Reserved for future use)	
Appendix K: Contractor Certification Document	

Figure 1: Pre-Development Watershed Boundary Map	
Figure 2: Post-Development Watershed Boundary Map	
Figure 3: Offsite Watershed Boundary Map	
Figure 4: Soil Testing Map	



1.0 Introduction:

The applicant is proposing to construct a new mixed-use community located on Hospital Road and Route 9A in the Town of Mount Pleasant. The project is entitled, “The North 60”. This report pertains to the full build out of the site, otherwise known as the “Master Plan”.

1.1 Project Description:

The Westchester Medical Village site contains 78.92 acres located on the north side of Hospital Road.

The applicant is proposing to construct a new mixed use community with biomedical research facilities. The project will include the construction of 22 new buildings. The development will consist of a new hotel, retail space, medical office space, and biomedical space. Parking facilities and a new system of roadways will also be constructed as part of the project. A new “Main Street” boulevard connects the development to the existing Hospital Road and the proposed “West Street” will connect Hospital Road to Route 9A (Saw Mill River Road). The proposed area of disturbance for the overall Master Plan is 57.5 acres and the project is located within the Saw Mill River Watershed. Please note, the Project Site discharges to the Saw Mill River (Middle and tribs) which has been identified as a “303(d) Impaired Segment by Construction Related Pollutant(s)” in Appendix E of the NYSDEC SPDES General Permit GP-0-20-001. Uncontrolled and untreated release of stormwater runoff to the 303(d) segment could exacerbate the existing water quality concerns. Therefore, drainage systems designed in accordance with New York State Department of Environmental Conservation (NYSDEC) regulations are proposed to treat stormwater runoff generated by the proposed improvements. The project will be served by the existing public water system and will connect wastewater to the existing public sanitary sewer system in the vicinity of the project. The project will not affect any property listed on the State or National Register of Historic Places. A map



showing historic places in the vicinity of the project can be found in Appendix “E”.

Assuming a timely permitting process, construction is anticipated to begin in the spring of 2020. Ultimate build out of The North 60 Master Plan will take approximately 20 years to complete. It is anticipated that Phase 1 of the development will be completed within the first 5 years and the remaining portion will be constructed subsequently based on market demand.

The following is a list permits that must be obtained:

- Town of Mount Pleasant Town Board Zoning Amendment Approval
- Town of Mount Pleasant Planning Board Site Plan and Subdivision Approval
- Army Corps of Engineers Wetlands Approval
- New York State Department of Environmental Conservation Protection of Waters Permit
- Westchester County Department of Health Public Water Supply and Wastewater Approvals
- NYSDOT Highway Work Permit Approval
- New York State Department of Environmental Conservation SPDES #GP-0-15-002 Notice of Intent for Stormwater Discharges from Construction Activities

1.2 Existing Site Conditions:

The existing 78.92 acre site currently has a parking area and a construction staging area on the south side of the site which is accessed from Hospital Road. There are also several residences and an existing landscape business located on the west side of the site which is accessed from an existing paved driveway connected to Old Saw Mill River Road. A majority of the site is undeveloped woodlands and meadows. Two streams flow through the site to the north where they discharge to the Saw Mill River adjacent to Route 9A. The streams originate from the existing Westchester Medical Center drainage system outfalls.



Slopes vary greatly onsite. The existing parking area and existing construction staging area are located on the mildly sloped ridgeline which extends through the center of the site. The north side of the site contains steep slopes which descend towards Route 9A. Very steep ravines are located along the banks of the two existing streams which separate the site into three distinct areas. NRCS soil boundaries identified onsite and within the boundaries of the analysis consist of Paxton Fine Sandy Loam, Woodbridge Loam, Ridgebury Loam, and Urban Land. Paxton Fine Sandy Loam belongs to hydrologic group “C”, Woodbridge Loam belongs to hydrologic group “C”, and Ridgebury Loam belongs to hydrologic group “D”. The Urban Land areas are treated as hydrologic group “C” for the purposes of this drainage analysis. A soil map for the site area can be found in Appendix “D” of this report.

1.3 Proposed Site Conditions:

The construction of the buildings, roadways, walkways, and parking areas will result in the creation of approximately 33.0 acres of impervious surfaces. Runoff from the proposed improvements is to be collected by a system of catch basins and piping, then captured and treated in stormwater management practices. The existing structures and driveways located onsite are to be removed.

As per the New York State Stormwater Management Design Manual (Stormwater Design Manual) the site planning for the project is required to employ techniques (listed on Table 3.1 of the Manual) which will achieve the preservation of natural resources.

The reduction of clearing and grading on site was a key aspect of the design. Although total disturbance for the site is approximately 57.5 acres, a large portion of the property is proposed to remain as natural wooded areas. The natural areas of the property were also preserved by locating proposed disturbance associated with the construction in areas which had been previously developed. The proposed “Main Street” area of the project is located where the existing paved parking lot and existing construction staging area are currently



located. The proposed “West Street” is located over a portion of the existing paved common driveway which connects the existing onsite residences to Route 9A. This effectively limits the amount of new impervious required for the construction of the roadways.

The table provided on the following page shows a comparison of pre-development impervious cover with post-development impervious cover for each of the sub-watersheds.

Impervious Area Comparison

	A	B	Total
Pre-development Impervious Area (SF)	181,472	0	181,472
Post-development Impervious Area (SF)	1,198,104	259,168	1,457,272
Change in Impervious (SF)	+1,016,632	+259,168	+1,275,800

2.0 Stormwater Management:

The stormwater systems for the project are proposed for the qualitative and quantitative management of stormwater runoff from the site. As the site falls under the requirements of the State SPDES program, all stormwater facilities employed for this site have been designed to meet NYSDEC requirements for water quality volume, stream channel protection volume, overbank flood control, and extreme flood control. The Stormwater Pollution Prevention Plan (SWPPP) for the Project Site has also been designed in accordance with the requirements set forth in the Mount Pleasant Town Code Chapter 183, Stormwater Management and Erosion and Sediment Control.

The stormwater management planning process included several design decisions and techniques to help minimize the impacts of development. Roadway pavement and sidewalk widths were designed with the minimum width practicable while meeting the requirements of the Mount Pleasant Town Code. Preservation of natural buffers and undisturbed areas was also a key element of



the design. A large portion of the north side of the Project Site is proposed to remain undisturbed woodlands as part of the Master Development Plan. Although a portion of the onsite wetland are proposed to be disturbed, the wetland areas were already previously impacted by surrounding development and their health would be improved by the proposed stormwater management plan.

The natural areas of the Project Site were also preserved by locating proposed construction disturbance in areas which had been previously developed. The proposed Main Street area of the Project Site is located where the existing paved parking lot and construction staging area are currently located. The proposed West Street is located over a portion of the existing paved common driveway which connects the existing onsite residences to Route 9A. This effectively limits the amount of new impervious required for the construction of the roadways.

Parking reductions were also a factor in the stormwater planning for the Project Site. The Proposed Action includes realistic parking requirements for each proposed onsite use in order to eliminate any unnecessary parking areas which may be in excess of the actual site needs. Dedicated bicycle paths and the proposed shuttle bus route would help promote less vehicular traffic as well, which helps manage the parking requirements for the Project Site. Multilevel parking structures have been proposed under several of the buildings to eliminate the need for large, surface level parking lots which greatly reduces the amount of impervious surfaces proposed for the site.

The hydrologic model for this project consists of two (2) design points. The two existing watercourses which flow through the site enter into two separate culvert pipes prior to crossing under Old Saw Mill River Road on the northern side of the project site. The entrances of these culverts have been selected as the design points for the project. As part of the stormwater analysis, the contributing offsite areas which are tributary to the design points have been included in hydrologic model for the project. The offsite areas mainly consist of the existing Westchester Medical Center facility located to the south of the project site. These areas flow to existing offsite stormwater ponds and the discharge pipes from the



existing ponds outlet to the watercourses found on the project site. There are (4) subcatchments in pre-development analysis. Each of the predevelopment design points receive runoff from one offsite subcatchment area and each has one onsite subcatchment which is tributary to their respective design point. There is a total of (22) subcatchments in the post development analysis. Once again, the two offsite subcatchment areas located to the south of the project site have been included in the analysis. Each of the stormwater treatment practices proposed for the site have separate subcatchment areas in order to analyze and design each proposed practice. The remaining subcatchments represent all untreated runoff which flows to the existing onsite streams or directly to the design points.

HydroCAD v. 10.0, a computer-modeling program based upon TR-20, was used to generate peak flows from the subcatchments. In the program, the user inputs various characteristics for each subcatchment including a curve number and time of concentration. These two parameters relate runoff to the specific land characteristics of the subcatchment. Based upon the inputted data, peak flows are generated for the 1, 2, 10, 25, 50, and 100-year storm events for the pre-development and post-development subcatchments.

The proposed stormwater management practices contained within the Master Plan of The North 60 Project are described below.

Infiltration Basin (Design I-2)

- o Two (2) infiltration basins will be constructed as part of the Master Plan. The infiltration basins consists of a flat bottom basin located in a highly permeable area of the site and effectively recharges runoff back into the onsite soil which reduces post development runoff volumes from the site. Infiltration Basin #2 located on the northern portion of the site where an existing residence and lawn area is currently located. The existing residence is to be removed from the area during the construction of the basin. Infiltration Basin #3 is to be located on the north side of proposed Buildings B12 and B13. The proposed infiltration basins treat runoff from impervious surfaces located on the proposed main street portion of the site. The two proposed infiltration



basins are both tributary to Design Point “A”. The infiltration basins have been designed with outlet structures which allow for storage of the entire 90% design storm and extended detention for the larger storm events. A rip-rap spillway is provided above the 100-year peak water elevation for emergency use only if the outlet structure fails to control the peak level of the basin.

Subsurface Infiltration Systems (Design I-4)

- o Seven (7) subsurface infiltration systems are proposed for the Master Plan of Development. The infiltration systems consist of Cultec Recharger infiltration chambers situated in gravel beds. The subsurface infiltration systems recharge stormwater runoff back into the onsite soil and each system is designed as an “off-line” practice which treats the 90% design storm and bypasses larger storm events via diversion structures.

Wet Pond (Design P-2)

- o One (1) wet pond is proposed for the project. The wet pond stormwater practice shall consist of a permanent pool of water with extended detention capacity above the permanent pool which is controlled by an outlet structure. A sediment forebay has been designed to provide pretreatment at the inlet side of the pond and the water quality volume associated with the 90% storm is provided partially in the permanent pool and partially in the extended detention area in accordance with the Stormwater Design Manual. The proposed pond is approximately 6 to 7 feet in depth with shallower areas along the side slopes. The wet pond treats the runoff generated from the proposed hotel rooftop and the hotel driveway area. The pond also receives stormwater from the outfall of the existing offsite stormwater basin located to the south of the proposed hotel. The proposed wet pond will be constructed to replace a portion of the existing



watercourse which flows through the site to Design Pont “B”. The existing watercourse suffers from existing erosion problems and carries sediment laden runoff through the project site. The proposed wet pond will detain the stormwater which will allow time for quality treatment of the runoff and ultimately reduced peak runoff rates which flow to the remaining portion of the existing stream.

Pocket Wetland (Design W-4)

- o One (1) pocket wetland is proposed for the project. The pocket wetland consist of a forebay located at the inlet, a shallow marsh area, and a micropool at the outlet structure. The pocket wetland has been designed for extended detention and it provides twenty four hour center of mass detention time for the one year storm event (2.8 inches). The pocket wetland also provides extended detention storage above the permanent pool for the larger storm events. The pocket wetland treats the lower portion of “West Street” in the northwest corner of the project site. A high groundwater table was located in the area of the proposed pocket wetland and the wetland has been designed such that the bottom of the deep pools are into the existing groundwater table. This will help sustain wetland plantings within the basin. The design and sizing calculations for the pocket wetland can be found in Appendix “I” of this report.

Required pretreatment for the stormwater runoff will be accomplished using subsurface Hydro-International First Defense High Capacity hydrodynamic separator chambers prior to each practice. The pretreatment practices are to be sized based on the peak flow generated by the one year storm, 2.79” of rainfall in twenty-four hours. The hydrodynamic separator meets the requirements of propriety treatment systems set forth in the NYSDEC Stormwater Design Manual. See Appendix “C” for the New Jersey DEP certification for the First Defense chamber. Additional information about the capacity, installation, and



maintenance for the pretreatment chamber can also be found in Appendix “C”. All proposed stormwater conveyance piping shall be high density polyethylene pipe (HDPE). Additional pretreatment for the stormwater management systems will consist of 24” sumps in all preceding catch basins.

The stormwater infiltration practices meet the required 3’ separation distance to groundwater or bedrock layer as verified by test pits witnessed by Bibbo Associates, LLP on January 16, 2018 and January 19, 2018. Preliminary infiltration rates have been applied to each practice based on field observations, NRCS soil types, and initial infiltration test runs. Final infiltration testing shall be performed for the practices in order to confirm the preliminary results and the infiltration practices shall be revised accordingly. Please see Appendix “H” of this report for additional soil testing information.

The stormwater management plan for the project must also address the concerns regarding pollutants found in chemical applications such as fertilizers, pesticides, herbicides, and fungicides. Fertilizers and pesticides containing high levels of nutrients such as nitrates can be carried in stormwater runoff and discharged into existing surface waters where the pollutants can cause excess algae growth. Temporary erosion control practices will protect the existing surface waters during the construction process as vegetative cover is being established onsite. As per the Erosion Control Program for the Project Site, all temporary erosion control measures shall remain in place until a firm stand of grass is established on all the disturbed areas not planned for impervious cover. After construction is complete it’s anticipated that the use of fertilizers will be minimal and isolated to the landscaped areas immediately adjacent to the proposed buildings. Runoff reduction practices design in accordance with the Stormwater Design Manual will effectively reduce the impact of these pollutants over the long-term and therefore a separate application plan has not been proposed for the Project Site. Please note, in accordance with the Westchester County Department of Health Pesticide Reduction Law (Chapter 690 of the Laws of Westchester), no pesticides shall be applied to any County-owned property. It is not anticipated that any herbicides, pesticides or fungicides will be used on the



project site and any potential future application plans shall be reviewed and approved by the Westchester County Department of Health.

2.1 NYSDEC Requirements:

2.1.1 Water Quality Volume:

The North 60 Project Property is governed by the New York State Stormwater Management Design Manual (Stormwater Design Manual). In order to improve water quality the best management practices employed have been sized using a 90% rainfall volume of 1.5 inches of rain.

The water quality volumes were calculated using formulation specified in Chapter 4 of the Stormwater Design Manual. A summary table illustrating the required water quality volume versus provided water quality volume for each best management practice is provided below. Calculations for the required water quality volumes can be found in the Appendix "B" of this report.

Summary of Water Quality Volume

<i>SW Practice ID</i>	<i>WQv Required (ft³)</i>	<i>WQv Provided (ft³)</i>
INF-SYS. 1	11,077	11,361
INF-SYS. 2	11,035	11,655
INF-SYS. 4	3,658	4,522
INF-SYS. 5	28,270	28,270*
INF-SYS. 6	10,397	10,397*
INF-SYS. 7	14,782	14,782*
INF-SYS. 8	15,475	14,049*
SWP-1	6,157	6,157
SWP-2	-	-
SWP-3 & SWP-5	56,993	56,993*
SWP-4	6,849	6,849

*WQv provided by combination of available storage volume & volume discarded via exfiltration.



2.1.2 Runoff Reduction Volume:

The water quality volume (WQv) also forms a target for the runoff reduction volume (RRv). The goal is to capture the runoff at the source and treat the stormwater runoff onsite with green infrastructure techniques, upstream of the end of line practice. The proposed infiltration practices are to be utilized as a volume reduction practices when calculating RRv.

A summary table illustrating the required water quality volume versus provided runoff reduction volume is provided on the following page. The table also includes a column for the Minimum RRv. When it can be shown that 100% of the WQv cannot be reduced in green infrastructure practices, it must be shown that at least the Minimum RRv is reduced by the green practices proposed. The Minimum RRv is based on the impervious area introduced by the project and a Hydrologic Soil Group Specific Reduction Factor. Calculations for RRv and the derivation of Minimum RRv are included in the drainage calculations found in the Appendix "B" of this report.

Summary of Runoff Reduction Volume

Infiltrator System ID	Watershed Area (ac.)	WQv (cu.ft.)	Minimum RRv by Specific Reduction Factor (cu.ft.)	Green Practice Vol. Reduction (cu.ft.)	% WQv Reduction
Basin A	38.57	145,288	42,682	132,554	91%
Basin B	8.70	31,526	9,233	19,133	61%

The goal of treating the entire WQv onsite in green practices was not fully achieved, but the Minimum RRv has been obtained for the site. The Minimum RRV represents the volume reduction required for the new impervious areas. There are several reasons why additional green infrastructure techniques were not used to further reduce the WQv.

The steep slopes found onsite limited the amount of green infrastructure practices which were feasible to use onsite. Another factor which limited the amount of green practices used on the project was the significant portion of the property which is either a wetland area or a wetland buffer area. Our goal was to preserve those areas to the furthest extent possible.



2.1.4 Stream Channel Protection Volume:

Stream channel protection volume is designed to protect downstream channels from erosion and is obtained by providing 24-hour (1440 min) extended detention of the one-year, twenty-four hour storm event. The infiltration practices have been designed to capture and infiltrate a majority of the runoff generated by the one year storm event. The pocket wetland and proposed pond have been sized to provide 24-hour extended detention of the one year storm event. The peak flow rates generated by the one year storm event have been reduced at both of the design points.

2.1.3 Overbank & Extreme Flood Control:

Overbank Flood Control is intended to mitigate the frequency and magnitude of out-of-bank flooding due to new development. Overbank Flood Control is achieved through the attenuation of the post-development 24-hour peak discharge from the 10-year storm to predevelopment rates. The post-development peak flows have been reduced to below predevelopment levels thus achieving Overbank Flood Control.

Extreme Flood Control is achieved through the attenuation of the post-development 24-hour peak discharge from the 100-year storm to predevelopment rates. The purpose of Extreme Flood Control is to prevent the risk of flood damage from large storm events, maintain the predevelopment 100-year flood plain boundary, and to physically protect the stormwater management practices at the site. Extreme Flood Control has been achieved for the site.

A summary of the 1, 2, 10, 25, 50, and 100-year pre-development and post-development peak flows can be found in the table provided on the following page. Additionally, the runoff volumes for each storm event have also been provided for comparison purposes. Please see Appendix "A" of this report for detailed HydroCAD Output Reports for each design storm.



Summary of Peak Runoff Rates & Runoff Volumes – Design Point A

1 year storm event	Pre	Post	% Change
Peak flow (cfs)	62.67	45.67	-37.2%
Runoff volume (cf)	277,125	203,727	-36.0%
2 year storm event	Pre	Post	% Change
Peak flow (cfs)	87.57	65.65	-33.4%
Runoff volume (cf)	413,194	301,906	-36.9%
10 year storm event	Pre	Post	% Change
Peak flow (cfs)	152.43	145.62	-4.7%
Runoff volume (cf)	818,458	658,658	-24.3%
25 year storm event	Pre	Post	% Change
Peak flow (cfs)	204.71	204.70	0.0%
Runoff volume (cf)	1,160,846	978,776	-18.6%
50 year storm event	Pre	Post	% Change
Peak flow (cfs)	277.74	256.31	-8.4%
Runoff volume (cf)	1,488,097	1,285,407	-15.8%
100 year storm event	Pre	Post	% Change
Peak flow (cfs)	364.38	313.47	-16.2%
Runoff volume (cf)	1,887,228	1,660,448	-13.7%



Summary of Peak Runoff Rates & Runoff Volumes – Design Point B

1 year storm event	Pre	Post	% Change
Peak flow (cfs)	17.38	9.42	-84.5%
Runoff volume (cf)	230,831	217,564	-6.1%
2 year storm event	Pre	Post	% Change
Peak flow (cfs)	29.43	16.40	-79.5%
Runoff volume (cf)	334,042	315,716	-5.8%
10 year storm event	Pre	Post	% Change
Peak flow (cfs)	68.06	38.59	-76.4%
Runoff volume (cf)	646,182	610,499	-5.8%
25 year storm event	Pre	Post	% Change
Peak flow (cfs)	101.38	77.01	-31.6%
Runoff volume (cf)	912,811	862,523	-5.8%
50 year storm event	Pre	Post	% Change
Peak flow (cfs)	133.15	111.09	-19.9%
Runoff volume (cf)	1,169,050	1,103,018	-6.0%
100 year storm event	Pre	Post	% Change
Peak flow (cfs)	170.39	137.57	-23.9%
Runoff volume (cf)	1,482,781	1,396,173	-6.2%

3.0 Erosion & 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 North 60 Master Plan is to be separated into construction phases to accomplish the goals for the erosion and sediment control program. Phase 1 of the project has already been prepared and broken down into approximately ten (10) sub-phases which detail specific construction activities and the sequence of construction in order to manage onsite disturbance during the course of the



construction process. The Phase 1 Phasing Plan shall be used a template for the following phases. The goal of the Phasing Plan is to divide required construction work in a reasonable and practicable manner so work can progress naturally from one sub-phase to the next sub-phase while limiting total onsite soil disturbance to five (5) acres at any given time in accordance with the requirements of the NYSDEC. If a particular subphase requires five (5) acres to be disturbed to fully complete and stabilize, special coordination shall be conducted with the Town of Mount Pleasant and the NYSDEC and the subphase construction shall not commence until proper authorization is granted for the soil disturbance activity. Please note, following the completion of Phase 1, the remainder of the site is anticipated to be built as market demands dictate. The future phases shall be individually reviewed and approved by all involved agencies with this report serving as an overall guideline for the site as a whole. 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 General Permit GP-0-20-001 permit. As per the SPDES permit onsite, inspections are to be performed by a “Qualified Inspector” on a weekly basis during construction. 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 & Sediment Control Practices:

Listed below are the Temporary Erosion & Sediment Control Practices specified on the Erosion Control Plan. All practices shall be installed and maintained in conformance with the New York Standards & Specifications for Erosion & Sediment Control:

- Silt Fence
- Soil Stockpile
- Construction Entrance
- Drop Inlet Protection
- Dust & Debris Control



- Sediment Trap
- Erosion blankets

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. The silt fencing will also control litter and construction debris from leaving the site and polluting stormwater discharge. There shall be no chemicals stored onsite.

A stabilized construction entrance should be installed where construction vehicles enter on to existing roadways from the site. The construction entrance is designed to prevent outgoing trucks from tracking soil onto the road. Construction details specifying installation requirements can be found on the plan.

Drop inlet protect for the site will consist of silt fencing surrounding the catch basins. The purpose of the staked silt fence is to prevent water with large amounts of sediment to enter the drainage system through the inlets.

A water truck shall be maintained on-site for dust control as required. Construction debris, such as sheet metal and wood scrap, paper and insulation products, styrofoam cups and paper wrappers which could 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 a continuous basis.

Temporary sediment traps are proposed to control sediment laden runoff and store the accumulated sediment for proper disposal. The sediment traps have been designed to meet the standards of the New York Standards & Specifications for Erosion & Sediment Control. Construction details specifying installation and sizing requirements can be found on the plan.

Erosion control blankets (anchored stabilization matting) provide protective cover for newly graded steep slopes, protect against rainwater splashing/overland flow, and help promote seed germination. Erosion blankets shall be installed on all embankments which are graded steeper than 3 horizontal



to 1 vertical. Construction details specifying installation requirements can be found on the plan.

In addition to the temporary erosion and sediment control practices listed above, additional measures shall be implemented to mitigate potential pollution during the construction phase of the project. The general contractor supervising site construction shall be responsible for the implementing the follow measures to control and prevent non-sediment pollution during construction activities; prevent the generation of pollutants due to improper handling, storage, and spills; and prevent the movement of toxic substances from the site into surface waters:

Material Handling & Construction Staging Areas

- All construction waste materials shall be collected and removed from the site regularly by the general contractor. The general contractor shall supply waste barrels for proper disposal of waste materials. All personnel working on the site shall be instructed of the proper procedures for construction waste disposal.
- All construction equipment and maintenance materials shall be stored in a construction staging area. Silt fence shall be installed down gradient of the construction staging area. Shipping containers shall be utilized to store hand tools, small parts, and other construction materials, not taken off site daily. Construction waste barrels, recycling barrels and if necessary hazardous waste containers shall be located within the limits of the construction staging area.

Waste Management & Establishment of Washout Areas

- Although it is not anticipated any hazardous waste materials will be utilized during construction, any hazardous waste materials shall be disposed of in accordance with federal, state, and local regulations. No hazardous waste shall be disposed of onsite. Hazardous waste materials shall be stored in appropriate and clearly marked containers and segregated from the other non-waste materials. All hazardous waste shall be stored in a structurally sound and sealed shipping containers located in the staging areas. Material safety data sheets, material



inventory, and emergency contact numbers will be maintained in the office trailer. All personnel working on the site shall be instructed of the proper procedures for hazardous waste disposal.

- Temporary sanitary facilities (portable toilets) shall be provided onsite during the entire length of construction. The sanitary facilities shall be located in the project staging area, or in an alternate area away from the construction activities on the site. The portable toilets shall be inspected weekly for evidence of leaking holding tanks.
- All recyclables, including wood pallets, cardboard boxes, and all other recyclable construction scraps shall be disposed of in a designated recycling barrel provided by the contractor and removed from the site regularly. All personnel working on the site shall be instructed of the proper procedures for construction waste recycling.

Proper Equipment Fueling & Spill Prevention

- Throughout the construction of the project, several types of vehicles and equipment will be used onsite. Fueling of the equipment shall occur within the limits of the construction staging area. Fuel will be delivered to the site as needed, by the general contractor, or a party chosen by the general contractor. Only minor vehicle equipment maintenance shall occur on-site, all major maintenance shall be performed off-site. All equipment fluids generated from minor maintenance activities shall be disposed of into designated drums and stored in accordance with the hazardous waste storage as previously discussed.

3.2 Permanent Erosion & 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
- Rock Outlet Protection

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 building, driveway, or parking area. 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.

Rock outlet protection is proposed at the outfall of the outlet pipe from the bioretention basin. The intent of the rock outlet protection is to reduce the depth, velocity, and energy of water to prevent downstream erosion. The flows generated by the 10-year storm have been used to size the proposed rock outlet protection areas in association with the requirements provided in “Figure 5B.12” of the New York Standards & Specifications for Erosion & Sediment Control. Details specifying the dimensions of the rock outlet protection areas have been included on the project plans.

4.0 Maintenance & Inspection Requirements:

Maintenance and inspections are required in order to ensure the stormwater and erosion & sediment control practices are acting as designed. Inspections are to be performed by a “Qualified Inspector” on a weekly basis during construction, consistent with the SPDES General Permit. Upon completion of construction and the subsequent filing of the Notice of Termination, maintenance and inspections are expected to be minimal. Temporary and permanent maintenance and inspection requirements are further discussed below. Proper maintenance and inspections will ensure the longevity and effectiveness of the stormwater pollution prevention plan, and erosion and



sediment control plan. The “Construction Site Log Book” from the New York Standards & Specifications for Erosion & Sediment Control provides guidelines for maintenance inspections during construction and has been provided in Appendix “F” of this report.

The Town of Mount Pleasant Stormwater Management Officer may require inspections as necessary to determine compliance with Chapter 183 of the Mount Pleasant Town Code and may either approve that portion of the work completed or notify the applicant wherein the work fails to comply with the requirements of Chapter 183 and the stormwater pollution prevention plan (SWPPP) as approved. To obtain inspections, the applicant shall notify the Town of Mount Pleasant enforcement official at least 48 hours before any of the following as required by the Stormwater Management Officer;

- 1) Start of Construction
- 2) Installation of sediment and erosion control measures
- 3) Completion of site clearing
- 4) Completion of rough grading
- 5) Completion of final grading
- 6) Close of construction season
- 7) Completion of final landscaping
- 8) Successful establishment of landscaping in public areas.

4.1 Short Term Maintenance and Inspection Requirements:

Inspections performed during construction should verify all practices are functioning properly, correctly maintained, and 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 construction plan set 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 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 entrance 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.

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 maintenance and inspections will be limited to the infiltration systems, hydrodynamic separators, and stormwater basins. The owner, its successors and/or assigns shall completely familiarize themselves with the project plans, details and notes. A copy of the Maintenance & Inspection Checklist from the New York State Stormwater Management Design Manual has been included in Appendix “G” of this report to serve as a guide for maintaining and inspecting the infiltrator systems and stormwater basins.

Inspections of the following items should be performed at a minimum annually and following significant rainstorm events (> ½” within 24 hours):

Stormwater Basins and Ponds:

- Inspect basin for build up of trash or debris. Remove any trash to prevent clogging of outlet structure.
- Inspection of basin for accumulation of sediment. Accumulated sediment should be removed immediately.
- Inspect rock outlet protection pad. Replace any rocks that have been displaced by scour.
- Inspection of the outlet of the outflow pipe to ensure it is not plugged or clogged.



Infiltrator Systems:

- Inspection of the infiltrator units to ensure accumulated water is infiltrating into the soil, and debris has not entered the infiltration units. 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.
- Inspect rock outlet protection pad. Replace any rocks that have been displaced by scour.

Catch Basins and Drain Manholes:

- Inspect monthly and after heavy rainstorms for sediment accumulation in sumps. Accumulated sediment should be removed immediately.

Hydro-International First Defense Hydrodynamic Separator:

- Inspection of the treatment unit for sediment accumulation. Any debris and sediment should be removed.
- Refer to Appendix "C" of this report for additional inspection and maintenance information.

5.0 Outstanding Violations or Enforcement Actions:

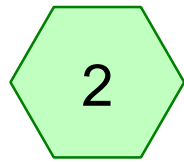
There are no known outstanding violations or enforcement actions against this property, the owner or the applicant. There has been no enforcement actions commenced against the applicant for any alleged violations of law related to the site or the activity for which approval is sought during the 5 years preceding the application.

6.0 Conclusion:

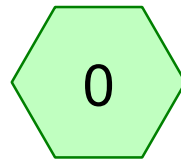
The applicant for the North 60 Project is proposing to construct a new biomedical mixed use community on the project site. The proposed area of disturbance is 57.5 acres. As part of the construction a stormwater management systems will be installed to treat the runoff from the proposed impervious surfaces. The stormwater management system was designed in accordance with the New York State Stormwater Management Design Manual, and shall result in improved stormwater quality as well as reduction in peak runoff flow rates.



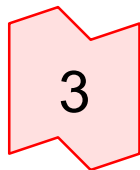
Appendix A-1:
Pre-Development
HydroCAD Output Reports



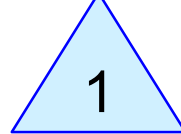
Pre A



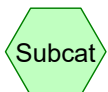
A0 (Offsite)



Design Point A



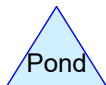
Offsite Pond A



Subcat



Reach



Pond



Link

Routing Diagram for N60 Pre-Dev A

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N60 Pre-Dev A

NRCC 24-hr A 1-yr Rainfall=2.79"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment0: A0 (Offsite)Runoff Area=1,115,060 sf 57.87% Impervious Runoff Depth=1.79"
Flow Length=1,018' Tc=12.5 min CN=90 Runoff=55.28 cfs 166,539 cf**Pond 1: Offsite Pond A**Peak Elev=360.61' Storage=63,532 cf Inflow=55.28 cfs 166,539 cf
Outflow=36.32 cfs 115,344 cf**Subcatchment2: Pre A**Runoff Area=2,349,635 sf 8.44% Impervious Runoff Depth=0.83"
Flow Length=2,614' Tc=34.4 min CN=75 Runoff=30.46 cfs 161,781 cf**Link 3: Design Point A**Inflow=62.67 cfs 277,125 cf
Primary=62.67 cfs 277,125 cf**Total Runoff Area = 3,464,695 sf Runoff Volume = 328,320 cf Average Runoff Depth = 1.14"**
75.65% Pervious = 2,621,024 sf 24.35% Impervious = 843,671 sf

N60 Pre-Dev A

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 0: A0 (Offsite)

Runoff = 55.28 cfs @ 12.20 hrs, Volume= 166,539 cf, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
645,334	98	Paved parking, HSG C
443,611	80	>75% Grass cover, Good, HSG D
23,572	74	>75% Grass cover, Good, HSG C
2,543	61	>75% Grass cover, Good, HSG B
1,115,060	90	Weighted Average
469,726		42.13% Pervious Area
645,334		57.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.6	148	0.0574	3.86		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	740	0.0270	10.25	32.22	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.015 Concrete sewer w/manholes & inlets
12.5	1,018	Total			

N60 Pre-Dev A

Prepared by {enter your company name here}

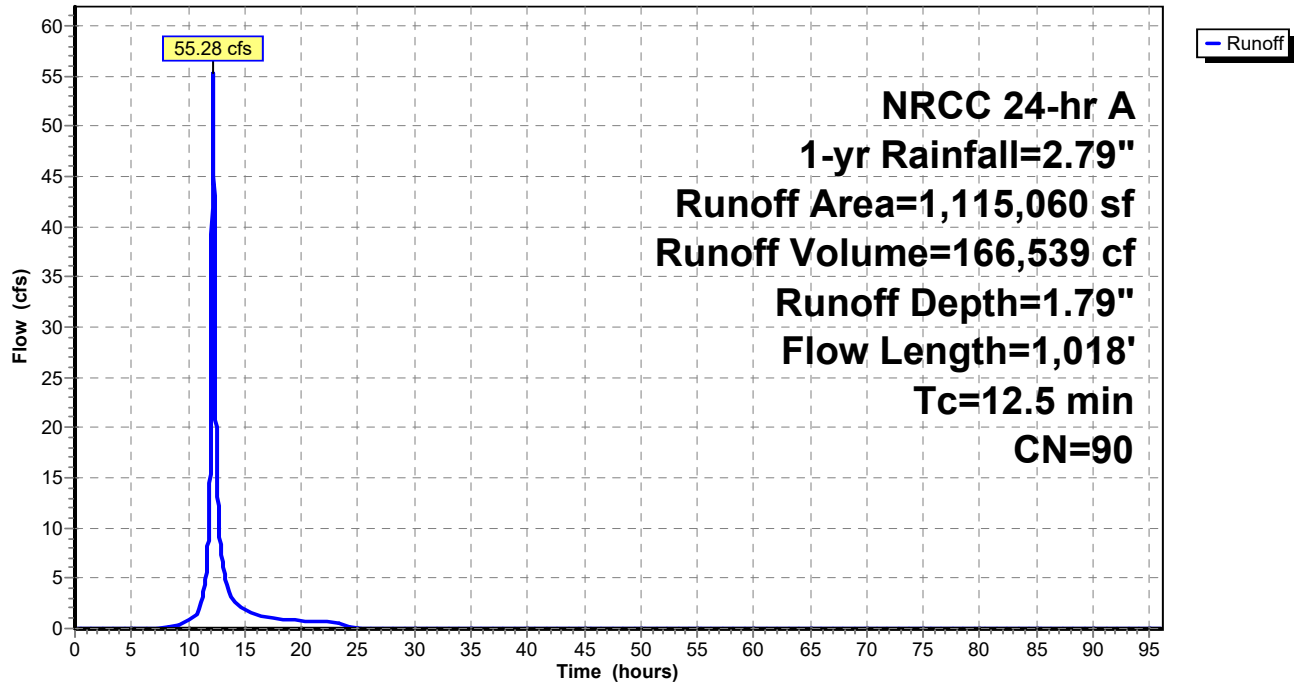
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NRCC 24-hr A 1-yr Rainfall=2.79"

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Subcatchment 0: A0 (Offsite)

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 1: Offsite Pond A

Inflow Area = 1,115,060 sf, 57.87% Impervious, Inflow Depth = 1.79" for 1-yr event
 Inflow = 55.28 cfs @ 12.20 hrs, Volume= 166,539 cf
 Outflow = 36.32 cfs @ 12.33 hrs, Volume= 115,344 cf, Atten= 34%, Lag= 7.3 min
 Primary = 36.32 cfs @ 12.33 hrs, Volume= 115,344 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 360.61' @ 12.33 hrs Surf.Area= 20,903 sf Storage= 63,532 cf

Plug-Flow detention time= 143.7 min calculated for 115,332 cf (69% of inflow)
 Center-of-Mass det. time= 59.3 min (869.2 - 810.0)

Volume	Invert	Avail.Storage	Storage Description		
#1	357.00'	221,816 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)
357.00	14,633	679.0	0	0	14,633
358.00	16,652	698.0	15,632	15,632	16,826
359.00	17,534	715.0	17,091	32,723	18,864
360.00	19,427	745.0	18,472	51,195	22,425
362.00	24,453	804.0	43,784	94,979	29,861
364.00	28,701	854.0	53,097	148,076	36,663
365.00	36,602	901.0	32,572	180,648	43,285
366.00	45,910	1,262.0	41,168	221,816	105,432

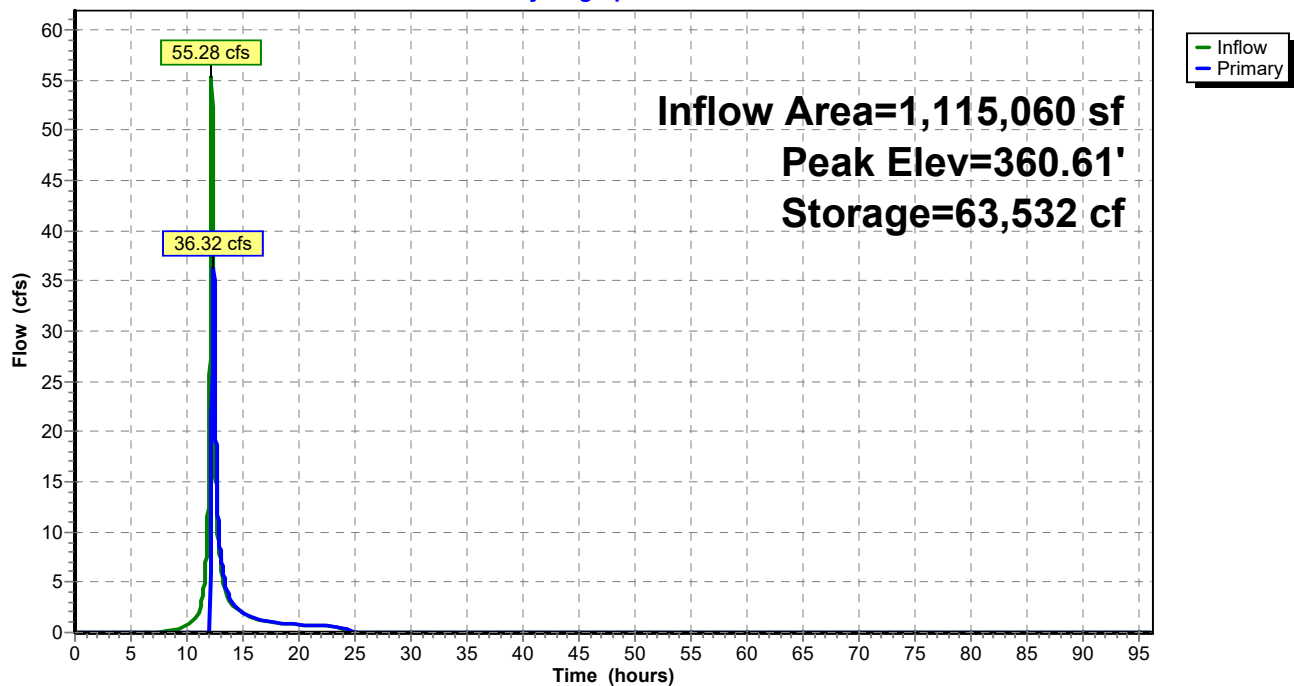
Device	Routing	Invert	Outlet Devices
#1	Primary	357.00'	30.0" Round Culvert L= 125.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 357.00' / 351.00' S= 0.0480 ' S= 0.0480 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	360.00'	36.0" x 48.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	364.75'	150.0' long x 36.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=36.32 cfs @ 12.33 hrs HW=360.61' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 36.32 cfs @ 7.40 fps)
 2=Orifice/Grate (Passes 36.32 cfs of 43.79 cfs potential flow)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1: Offsite Pond A

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 2: Pre A

Runoff = 30.46 cfs @ 12.53 hrs, Volume= 161,781 cf, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

	Area (sf)	CN	Description
*	181,472	98	Paved parking, roofs, HSG C
	159,966	91	Newly graded area, HSG C
	339,282	74	>75% Grass cover, Good, HSG C
	4,702	80	>75% Grass cover, Good, HSG D
	358,470	70	Brush, Fair, HSG C
	77,923	77	Brush, Fair, HSG D
	20,430	60	Woods, Fair, HSG B
	193,986	77	Woods, Good, HSG D
	996,539	70	Woods, Good, HSG C
	16,865	98	Water Surface, HSG D
	2,349,635	75	Weighted Average
	2,151,298		91.56% Pervious Area
	198,337		8.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0250	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
2.4	282	0.0142	1.92		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
13.2	2,232	0.0631	2.83	5.65	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
34.4	2,614	Total			

N60 Pre-Dev A

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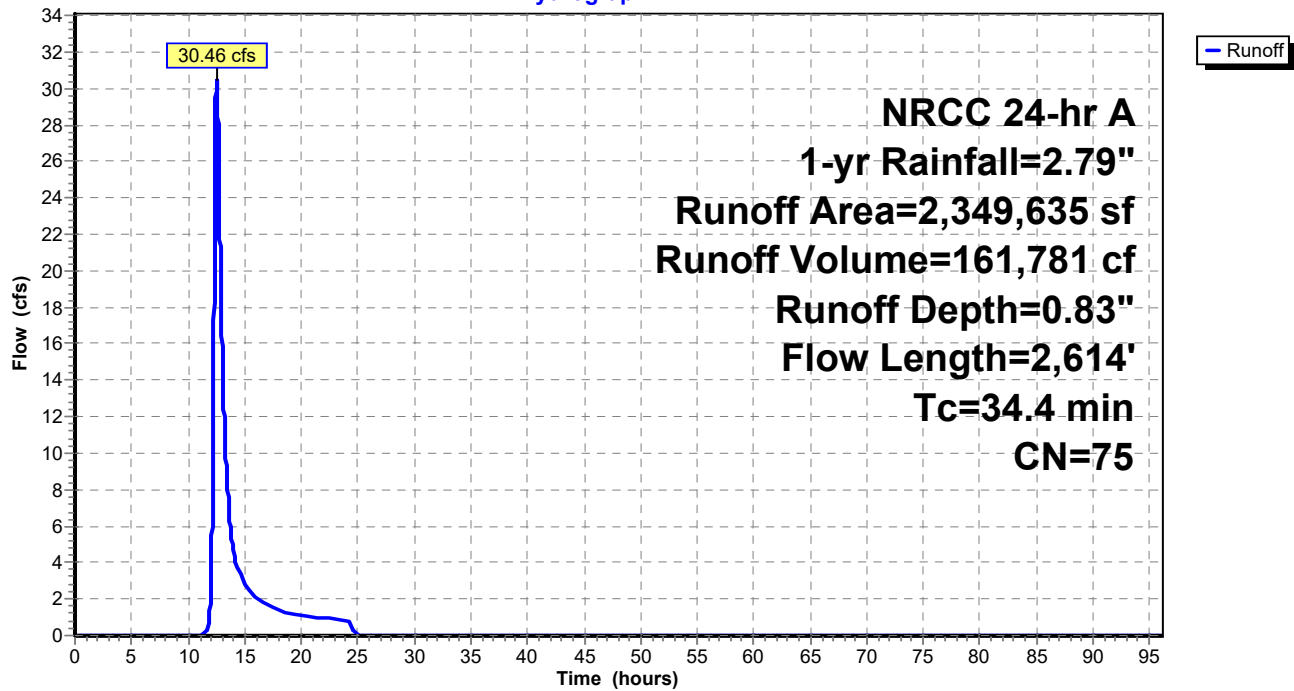
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NRCC 24-hr A 1-yr Rainfall=2.79"

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Subcatchment 2: Pre A

Hydrograph

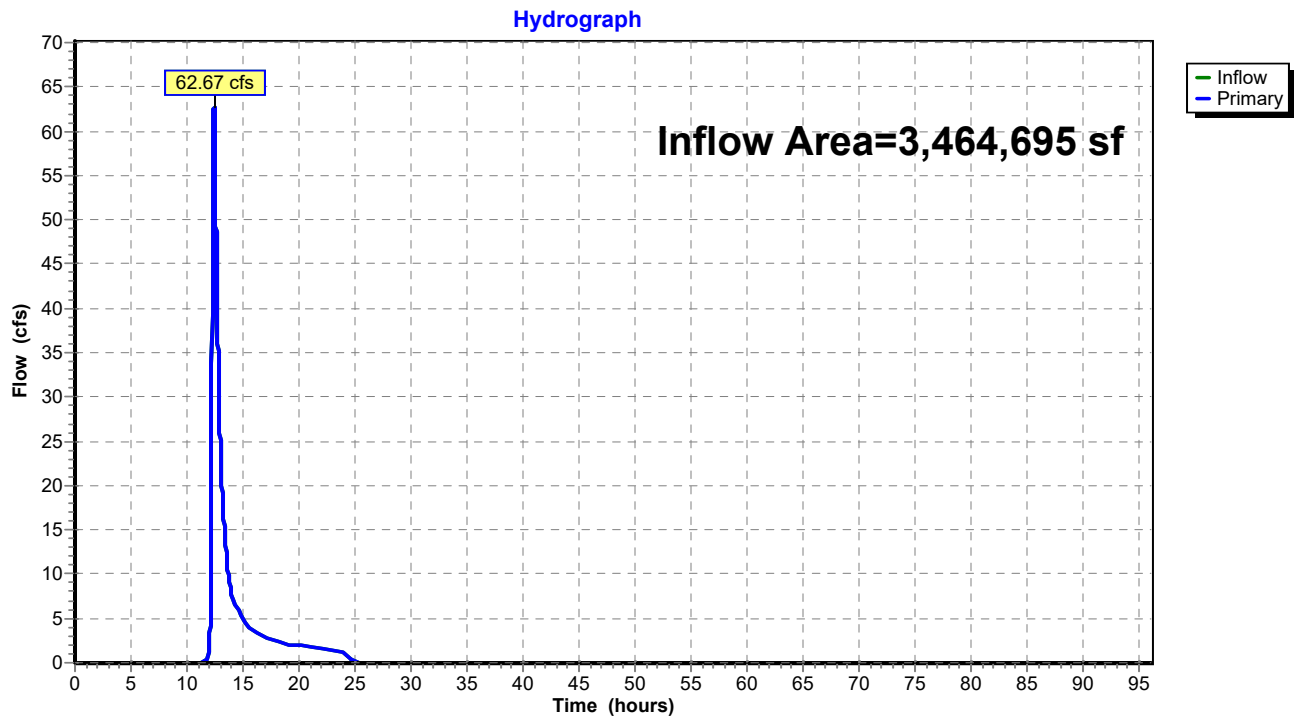


Summary for Link 3: Design Point A

Inflow Area = 3,464,695 sf, 24.35% Impervious, Inflow Depth = 0.96" for 1-yr event
 Inflow = 62.67 cfs @ 12.40 hrs, Volume= 277,125 cf
 Primary = 62.67 cfs @ 12.40 hrs, Volume= 277,125 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 3: Design Point A



N60 Pre-Dev A

NRCC 24-hr A 2-yr Rainfall=3.42"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment0: A0 (Offsite)Runoff Area=1,115,060 sf 57.87% Impervious Runoff Depth=2.37"
Flow Length=1,018' Tc=12.5 min CN=90 Runoff=72.43 cfs 220,520 cf**Pond 1: Offsite Pond A**Peak Elev=361.29' Storage=78,351 cf Inflow=72.43 cfs 220,520 cf
Outflow=41.23 cfs 169,325 cf**Subcatchment2: Pre A**Runoff Area=2,349,635 sf 8.44% Impervious Runoff Depth=1.25"
Flow Length=2,614' Tc=34.4 min CN=75 Runoff=47.89 cfs 243,869 cf**Link 3: Design Point A**Inflow=87.57 cfs 413,194 cf
Primary=87.57 cfs 413,194 cf**Total Runoff Area = 3,464,695 sf Runoff Volume = 464,389 cf Average Runoff Depth = 1.61"**
75.65% Pervious = 2,621,024 sf 24.35% Impervious = 843,671 sf

N60 Pre-Dev A

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 0: A0 (Offsite)

Runoff = 72.43 cfs @ 12.20 hrs, Volume= 220,520 cf, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
645,334	98	Paved parking, HSG C
443,611	80	>75% Grass cover, Good, HSG D
23,572	74	>75% Grass cover, Good, HSG C
2,543	61	>75% Grass cover, Good, HSG B
1,115,060	90	Weighted Average
469,726		42.13% Pervious Area
645,334		57.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.6	148	0.0574	3.86		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	740	0.0270	10.25	32.22	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.015 Concrete sewer w/manholes & inlets
12.5	1,018	Total			

N60 Pre-Dev A

Prepared by {enter your company name here}

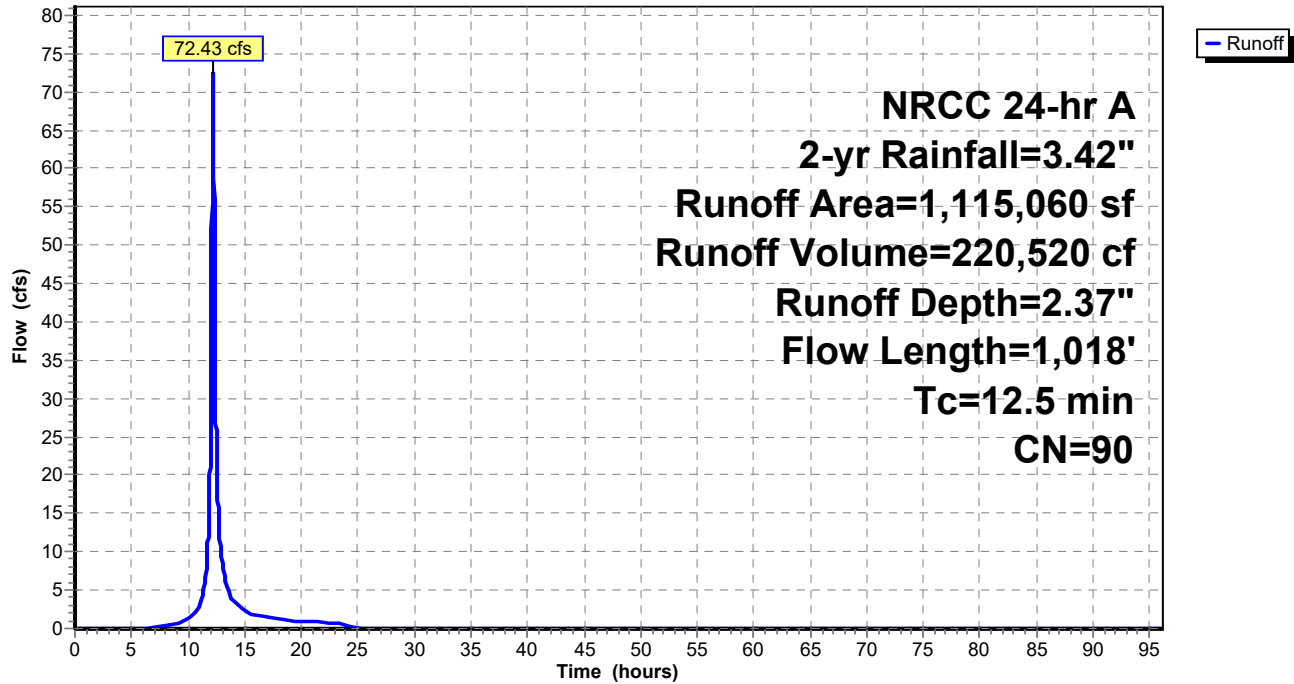
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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Subcatchment 0: A0 (Offsite)

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 2-yr Rainfall=3.42"

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Printed 3/25/2020

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Summary for Pond 1: Offsite Pond A

Inflow Area = 1,115,060 sf, 57.87% Impervious, Inflow Depth = 2.37" for 2-yr event
 Inflow = 72.43 cfs @ 12.20 hrs, Volume= 220,520 cf
 Outflow = 41.23 cfs @ 12.35 hrs, Volume= 169,325 cf, Atten= 43%, Lag= 9.1 min
 Primary = 41.23 cfs @ 12.35 hrs, Volume= 169,325 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 361.29' @ 12.35 hrs Surf.Area= 22,611 sf Storage= 78,351 cf

Plug-Flow detention time= 123.4 min calculated for 169,325 cf (77% of inflow)
 Center-of-Mass det. time= 48.0 min (851.3 - 803.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	357.00'	221,816 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)
357.00	14,633	679.0	0	0	14,633
358.00	16,652	698.0	15,632	15,632	16,826
359.00	17,534	715.0	17,091	32,723	18,864
360.00	19,427	745.0	18,472	51,195	22,425
362.00	24,453	804.0	43,784	94,979	29,861
364.00	28,701	854.0	53,097	148,076	36,663
365.00	36,602	901.0	32,572	180,648	43,285
366.00	45,910	1,262.0	41,168	221,816	105,432

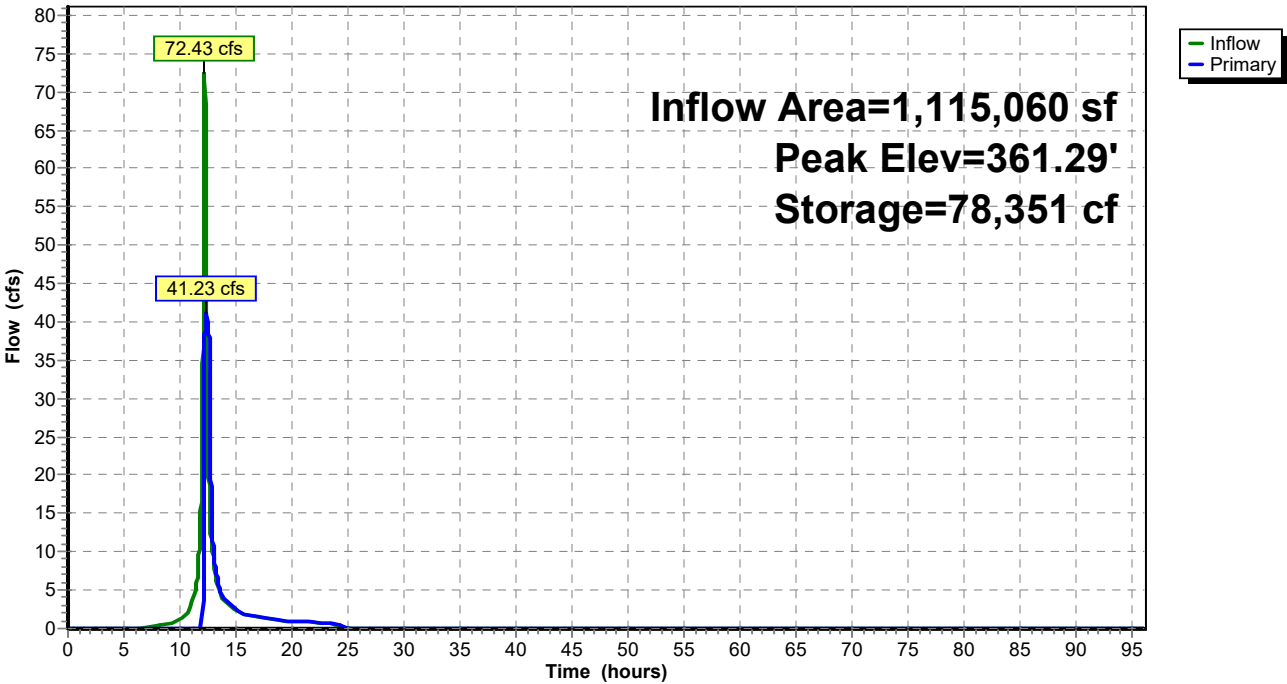
Device	Routing	Invert	Outlet Devices
#1	Primary	357.00'	30.0" Round Culvert L= 125.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 357.00' / 351.00' S= 0.0480 ' S= 0.0480 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	360.00'	36.0" x 48.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	364.75'	150.0' long x 36.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=41.23 cfs @ 12.35 hrs HW=361.29' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 41.23 cfs @ 8.40 fps)
 2=Orifice/Grate (Passes 41.23 cfs of 131.40 cfs potential flow)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1: Offsite Pond A

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 2: Pre A

Runoff = 47.89 cfs @ 12.50 hrs, Volume= 243,869 cf, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

	Area (sf)	CN	Description
*	181,472	98	Paved parking, roofs, HSG C
	159,966	91	Newly graded area, HSG C
	339,282	74	>75% Grass cover, Good, HSG C
	4,702	80	>75% Grass cover, Good, HSG D
	358,470	70	Brush, Fair, HSG C
	77,923	77	Brush, Fair, HSG D
	20,430	60	Woods, Fair, HSG B
	193,986	77	Woods, Good, HSG D
	996,539	70	Woods, Good, HSG C
	16,865	98	Water Surface, HSG D
	2,349,635	75	Weighted Average
	2,151,298		91.56% Pervious Area
	198,337		8.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0250	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
2.4	282	0.0142	1.92		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
13.2	2,232	0.0631	2.83	5.65	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
34.4	2,614	Total			

N60 Pre-Dev A

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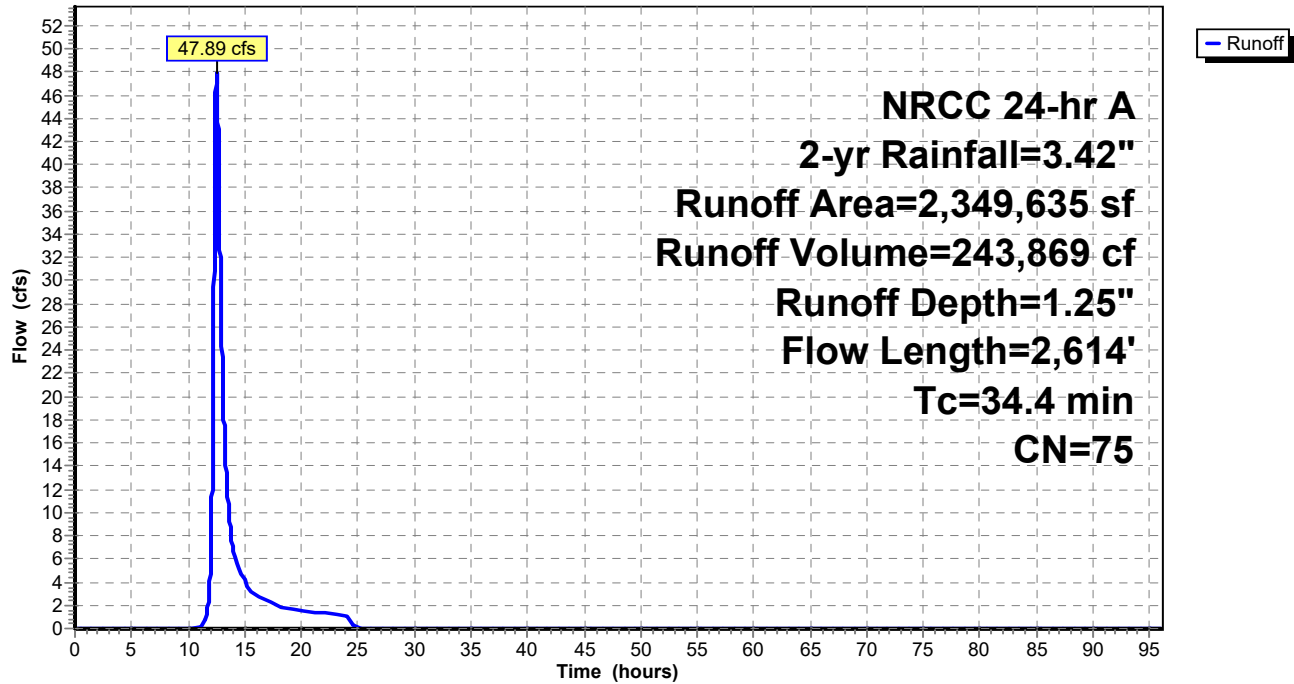
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Subcatchment 2: Pre A

Hydrograph



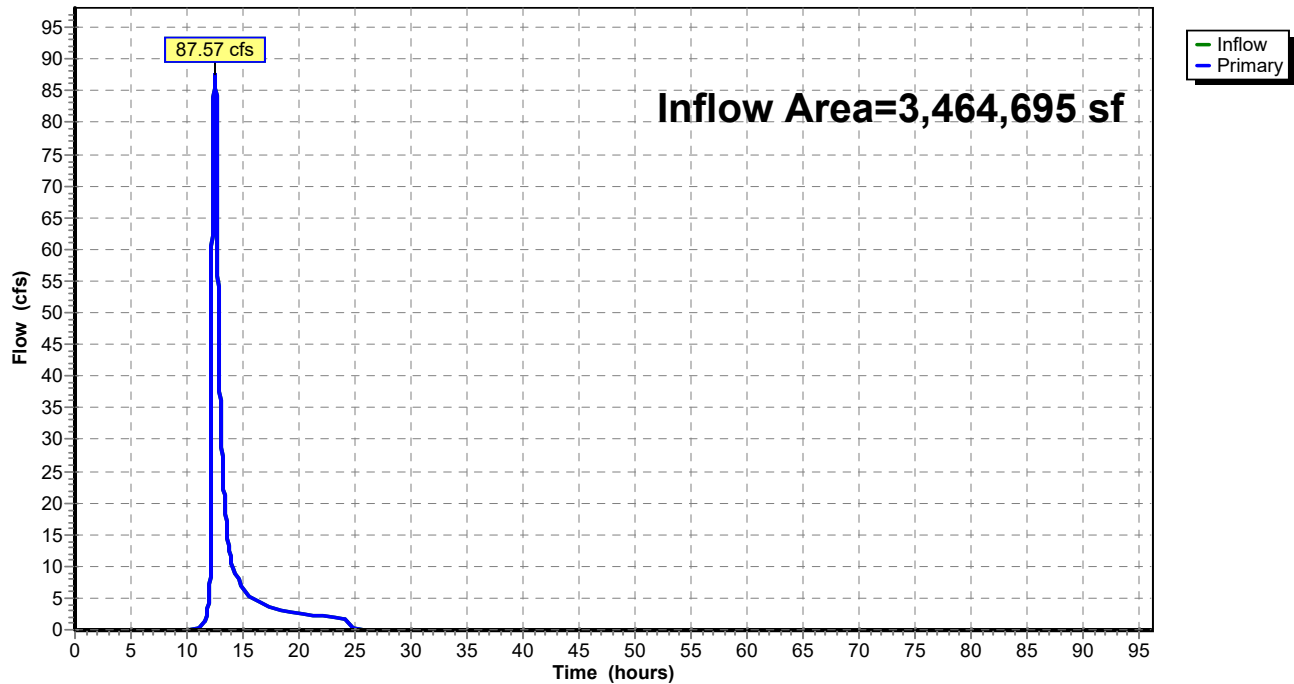
Summary for Link 3: Design Point A

Inflow Area = 3,464,695 sf, 24.35% Impervious, Inflow Depth = 1.43" for 2-yr event
 Inflow = 87.57 cfs @ 12.50 hrs, Volume= 413,194 cf
 Primary = 87.57 cfs @ 12.50 hrs, Volume= 413,194 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 3: Design Point A

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 10-yr Rainfall=5.12"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment0: A0 (Offsite)Runoff Area=1,115,060 sf 57.87% Impervious Runoff Depth=3.99"
Flow Length=1,018' Tc=12.5 min CN=90 Runoff=118.73 cfs 370,955 cf**Pond 1: Offsite Pond A**Peak Elev=363.03' Storage=121,390 cf Inflow=118.73 cfs 370,955 cf
Outflow=51.70 cfs 319,760 cf**Subcatchment2: Pre A**Runoff Area=2,349,635 sf 8.44% Impervious Runoff Depth=2.55"
Flow Length=2,614' Tc=34.4 min CN=75 Runoff=101.19 cfs 498,698 cf**Link 3: Design Point A**Inflow=152.43 cfs 818,458 cf
Primary=152.43 cfs 818,458 cf**Total Runoff Area = 3,464,695 sf Runoff Volume = 869,653 cf Average Runoff Depth = 3.01"**
75.65% Pervious = 2,621,024 sf 24.35% Impervious = 843,671 sf

N60 Pre-Dev A

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 0: A0 (Offsite)

Runoff = 118.73 cfs @ 12.20 hrs, Volume= 370,955 cf, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
645,334	98	Paved parking, HSG C
443,611	80	>75% Grass cover, Good, HSG D
23,572	74	>75% Grass cover, Good, HSG C
2,543	61	>75% Grass cover, Good, HSG B
1,115,060	90	Weighted Average
469,726		42.13% Pervious Area
645,334		57.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.6	148	0.0574	3.86		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	740	0.0270	10.25	32.22	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.015 Concrete sewer w/manholes & inlets
12.5	1,018	Total			

N60 Pre-Dev A

Prepared by {enter your company name here}

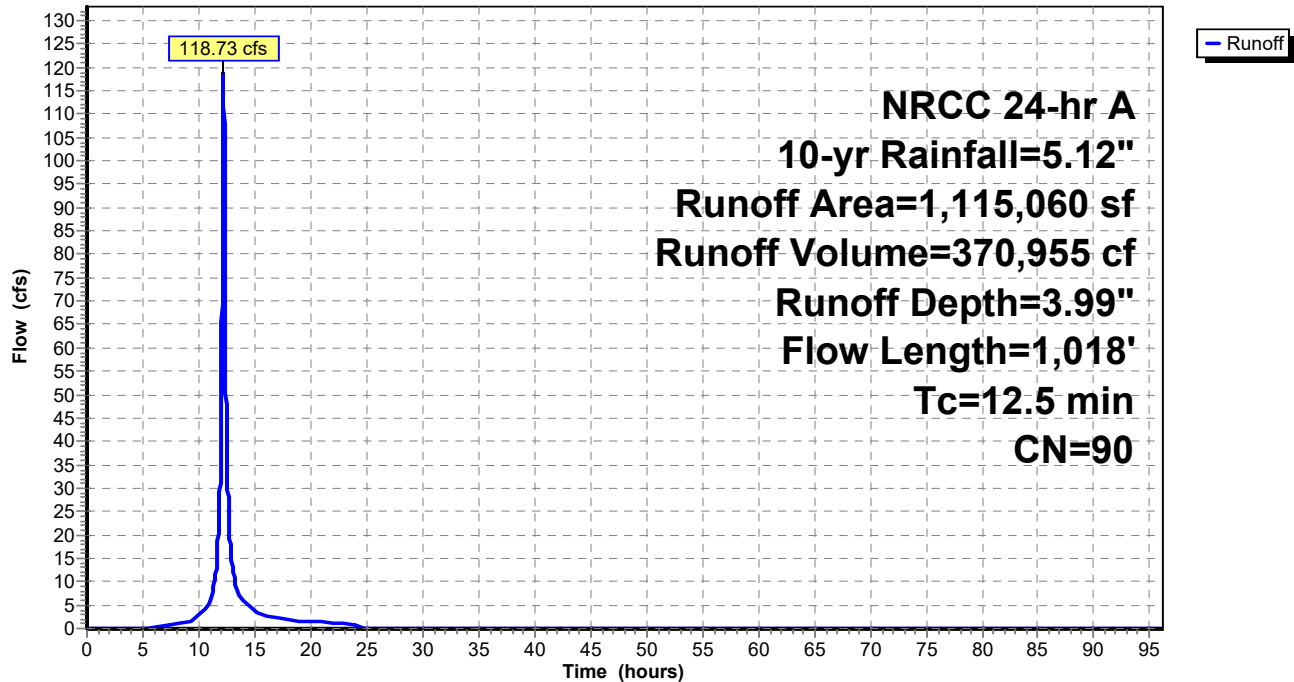
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NRCC 24-hr A 10-yr Rainfall=5.12"

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Subcatchment 0: A0 (Offsite)

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 1: Offsite Pond A

Inflow Area = 1,115,060 sf, 57.87% Impervious, Inflow Depth = 3.99" for 10-yr event
 Inflow = 118.73 cfs @ 12.20 hrs, Volume= 370,955 cf
 Outflow = 51.70 cfs @ 12.41 hrs, Volume= 319,760 cf, Atten= 56%, Lag= 12.7 min
 Primary = 51.70 cfs @ 12.41 hrs, Volume= 319,760 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 363.03' @ 12.41 hrs Surf.Area= 26,608 sf Storage= 121,390 cf

Plug-Flow detention time= 99.2 min calculated for 319,726 cf (86% of inflow)
 Center-of-Mass det. time= 41.8 min (832.7 - 790.9)

Volume	Invert	Avail.Storage	Storage Description		
#1	357.00'	221,816 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)
357.00	14,633	679.0	0	0	14,633
358.00	16,652	698.0	15,632	15,632	16,826
359.00	17,534	715.0	17,091	32,723	18,864
360.00	19,427	745.0	18,472	51,195	22,425
362.00	24,453	804.0	43,784	94,979	29,861
364.00	28,701	854.0	53,097	148,076	36,663
365.00	36,602	901.0	32,572	180,648	43,285
366.00	45,910	1,262.0	41,168	221,816	105,432

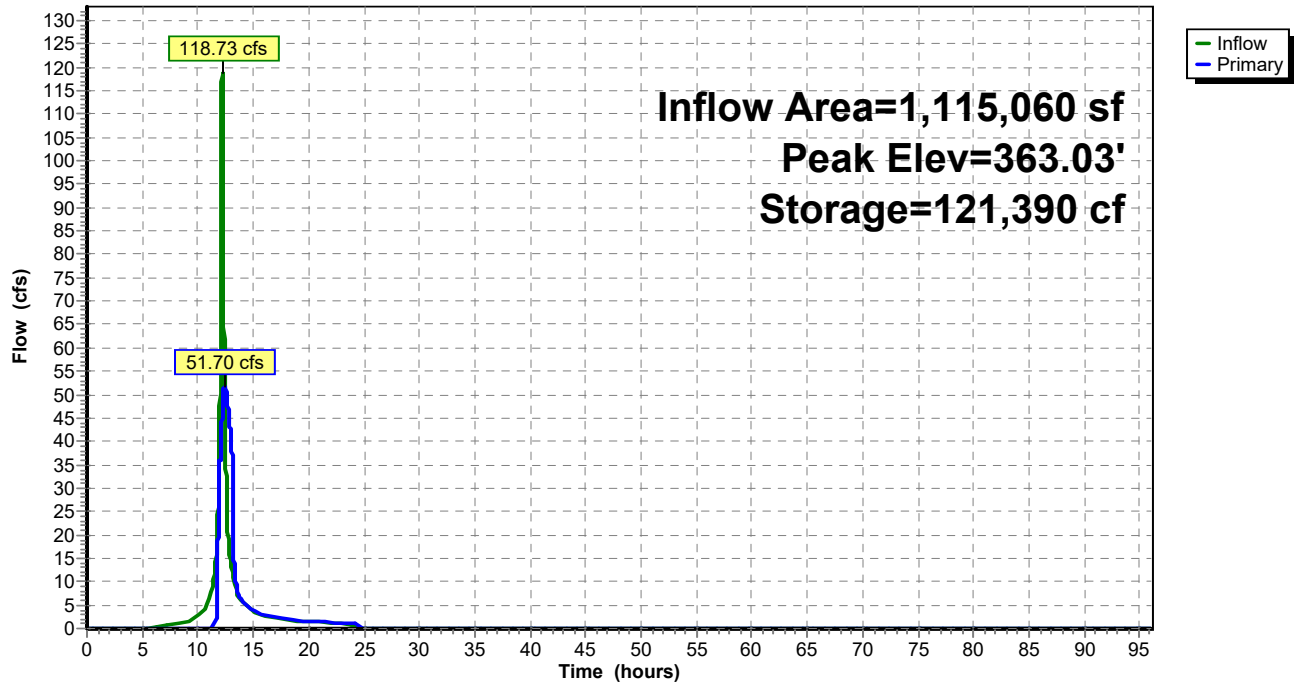
Device	Routing	Invert	Outlet Devices
#1	Primary	357.00'	30.0" Round Culvert L= 125.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 357.00' / 351.00' S= 0.0480 ' S= 0.0480 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	360.00'	36.0" x 48.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	364.75'	150.0' long x 36.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=51.70 cfs @ 12.41 hrs HW=363.03' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 51.70 cfs @ 10.53 fps)
 2=Orifice/Grate (Passes 51.70 cfs of 201.30 cfs potential flow)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1: Offsite Pond A

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 2: Pre A

Runoff = 101.19 cfs @ 12.50 hrs, Volume= 498,698 cf, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

	Area (sf)	CN	Description
*	181,472	98	Paved parking, roofs, HSG C
	159,966	91	Newly graded area, HSG C
	339,282	74	>75% Grass cover, Good, HSG C
	4,702	80	>75% Grass cover, Good, HSG D
	358,470	70	Brush, Fair, HSG C
	77,923	77	Brush, Fair, HSG D
	20,430	60	Woods, Fair, HSG B
	193,986	77	Woods, Good, HSG D
	996,539	70	Woods, Good, HSG C
	16,865	98	Water Surface, HSG D
	2,349,635	75	Weighted Average
	2,151,298		91.56% Pervious Area
	198,337		8.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0250	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
2.4	282	0.0142	1.92		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
13.2	2,232	0.0631	2.83	5.65	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
34.4	2,614	Total			

N60 Pre-Dev A

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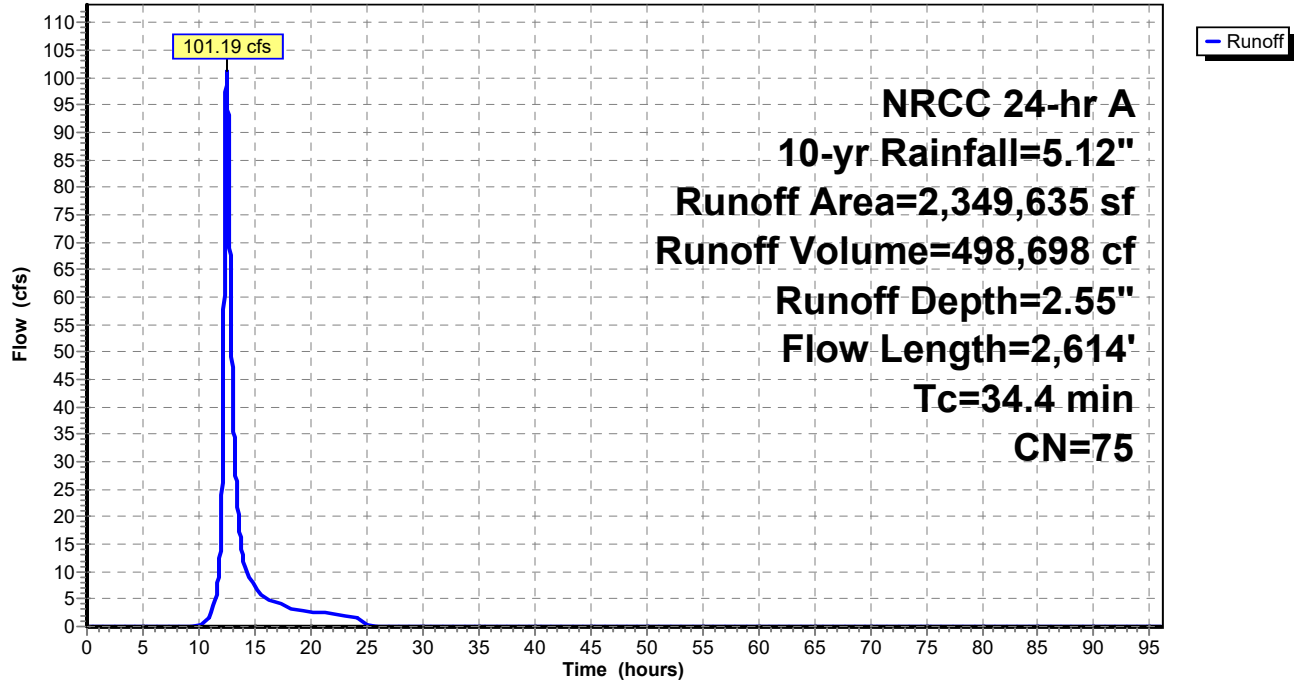
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NRCC 24-hr A 10-yr Rainfall=5.12"

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Subcatchment 2: Pre A

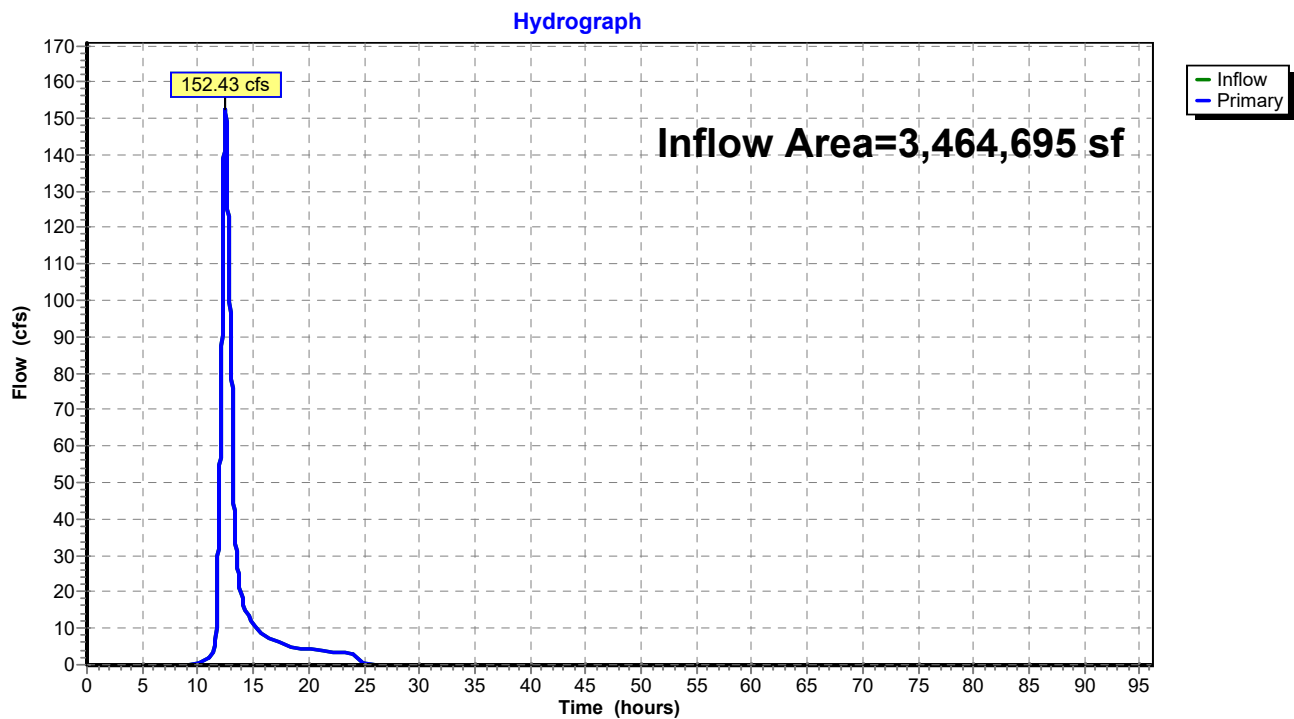
Hydrograph



Summary for Link 3: Design Point A

Inflow Area = 3,464,695 sf, 24.35% Impervious, Inflow Depth = 2.83" for 10-yr event
Inflow = 152.43 cfs @ 12.50 hrs, Volume= 818,458 cf
Primary = 152.43 cfs @ 12.50 hrs, Volume= 818,458 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 3: Design Point A

N60 Pre-Dev A

NRCC 24-hr A 25-yr Rainfall=6.46"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment0: A0 (Offsite)Runoff Area=1,115,060 sf 57.87% Impervious Runoff Depth=5.29"
Flow Length=1,018' Tc=12.5 min CN=90 Runoff=154.93 cfs 491,989 cf**Pond 1: Offsite Pond A**Peak Elev=364.35' Storage=158,428 cf Inflow=154.93 cfs 491,989 cf
Outflow=58.35 cfs 440,794 cf**Subcatchment2: Pre A**Runoff Area=2,349,635 sf 8.44% Impervious Runoff Depth=3.68"
Flow Length=2,614' Tc=34.4 min CN=75 Runoff=146.55 cfs 720,052 cf**Link 3: Design Point A**Inflow=204.71 cfs 1,160,846 cf
Primary=204.71 cfs 1,160,846 cf**Total Runoff Area = 3,464,695 sf Runoff Volume = 1,212,041 cf Average Runoff Depth = 4.20"**
75.65% Pervious = 2,621,024 sf 24.35% Impervious = 843,671 sf

N60 Pre-Dev A

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 0: A0 (Offsite)

Runoff = 154.93 cfs @ 12.20 hrs, Volume= 491,989 cf, Depth= 5.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
645,334	98	Paved parking, HSG C
443,611	80	>75% Grass cover, Good, HSG D
23,572	74	>75% Grass cover, Good, HSG C
2,543	61	>75% Grass cover, Good, HSG B
1,115,060	90	Weighted Average
469,726		42.13% Pervious Area
645,334		57.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.6	148	0.0574	3.86		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	740	0.0270	10.25	32.22	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.015 Concrete sewer w/manholes & inlets
12.5	1,018	Total			

N60 Pre-Dev A

Prepared by {enter your company name here}

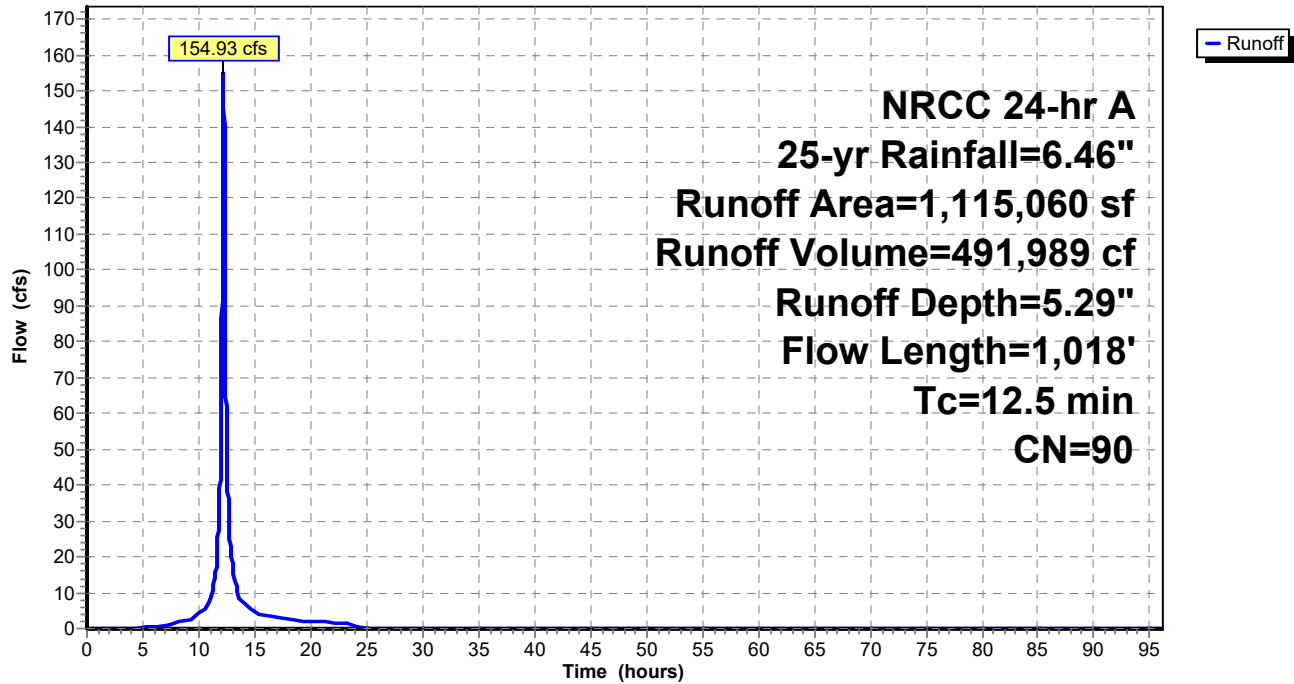
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NRCC 24-hr A 25-yr Rainfall=6.46"

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Subcatchment 0: A0 (Offsite)

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 1: Offsite Pond A

Inflow Area = 1,115,060 sf, 57.87% Impervious, Inflow Depth = 5.29" for 25-yr event
 Inflow = 154.93 cfs @ 12.20 hrs, Volume= 491,989 cf
 Outflow = 58.35 cfs @ 12.45 hrs, Volume= 440,794 cf, Atten= 62%, Lag= 14.8 min
 Primary = 58.35 cfs @ 12.45 hrs, Volume= 440,794 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 364.35' @ 12.45 hrs Surf.Area= 31,319 sf Storage= 158,428 cf

Plug-Flow detention time= 90.4 min calculated for 440,794 cf (90% of inflow)
 Center-of-Mass det. time= 42.1 min (826.5 - 784.4)

Volume	Invert	Avail.Storage	Storage Description		
#1	357.00'	221,816 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)
357.00	14,633	679.0	0	0	14,633
358.00	16,652	698.0	15,632	15,632	16,826
359.00	17,534	715.0	17,091	32,723	18,864
360.00	19,427	745.0	18,472	51,195	22,425
362.00	24,453	804.0	43,784	94,979	29,861
364.00	28,701	854.0	53,097	148,076	36,663
365.00	36,602	901.0	32,572	180,648	43,285
366.00	45,910	1,262.0	41,168	221,816	105,432

Device	Routing	Invert	Outlet Devices
#1	Primary	357.00'	30.0" Round Culvert L= 125.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 357.00' / 351.00' S= 0.0480 ' S= 0.0480 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	360.00'	36.0" x 48.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	364.75'	150.0' long x 36.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=58.35 cfs @ 12.45 hrs HW=364.34' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 58.35 cfs @ 11.89 fps)
 2=Orifice/Grate (Passes 58.35 cfs of 240.87 cfs potential flow)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

N60 Pre-Dev A

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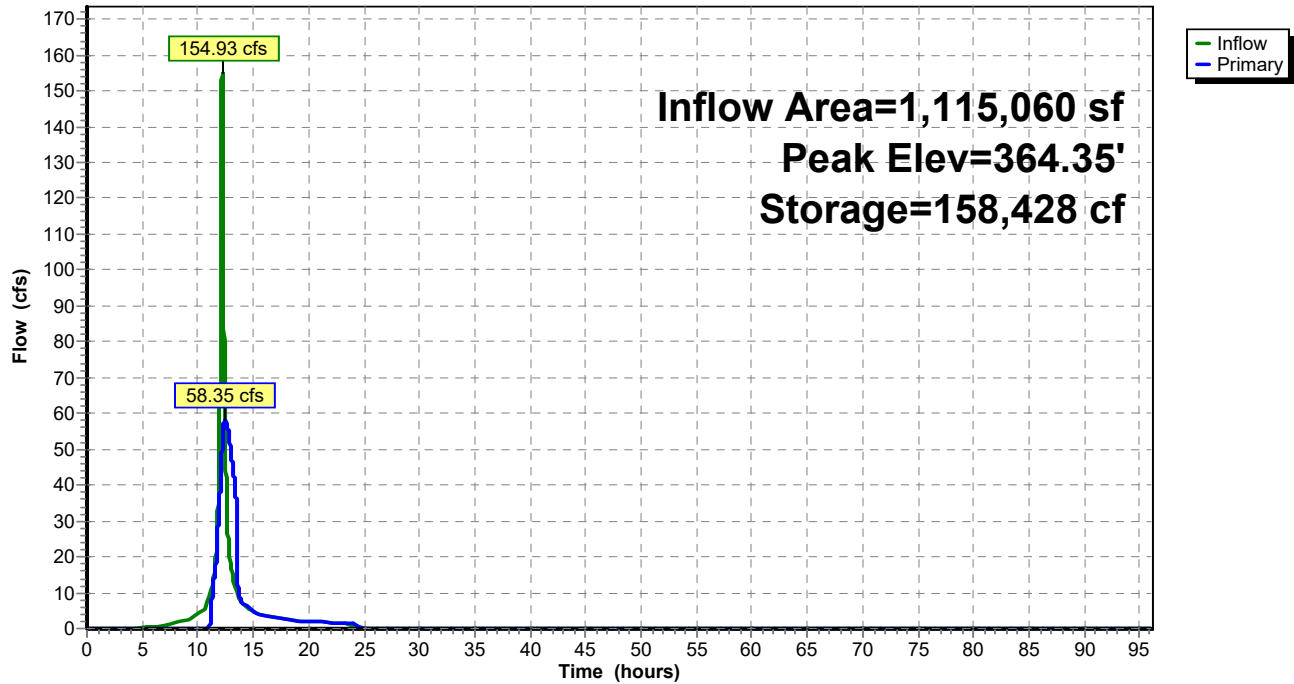
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NRCC 24-hr A 25-yr Rainfall=6.46"

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Pond 1: Offsite Pond A

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 2: Pre A

Runoff = 146.55 cfs @ 12.50 hrs, Volume= 720,052 cf, Depth= 3.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

	Area (sf)	CN	Description
*	181,472	98	Paved parking, roofs, HSG C
	159,966	91	Newly graded area, HSG C
	339,282	74	>75% Grass cover, Good, HSG C
	4,702	80	>75% Grass cover, Good, HSG D
	358,470	70	Brush, Fair, HSG C
	77,923	77	Brush, Fair, HSG D
	20,430	60	Woods, Fair, HSG B
	193,986	77	Woods, Good, HSG D
	996,539	70	Woods, Good, HSG C
	16,865	98	Water Surface, HSG D
	2,349,635	75	Weighted Average
	2,151,298		91.56% Pervious Area
	198,337		8.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0250	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
2.4	282	0.0142	1.92		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
13.2	2,232	0.0631	2.83	5.65	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
34.4	2,614	Total			

N60 Pre-Dev A

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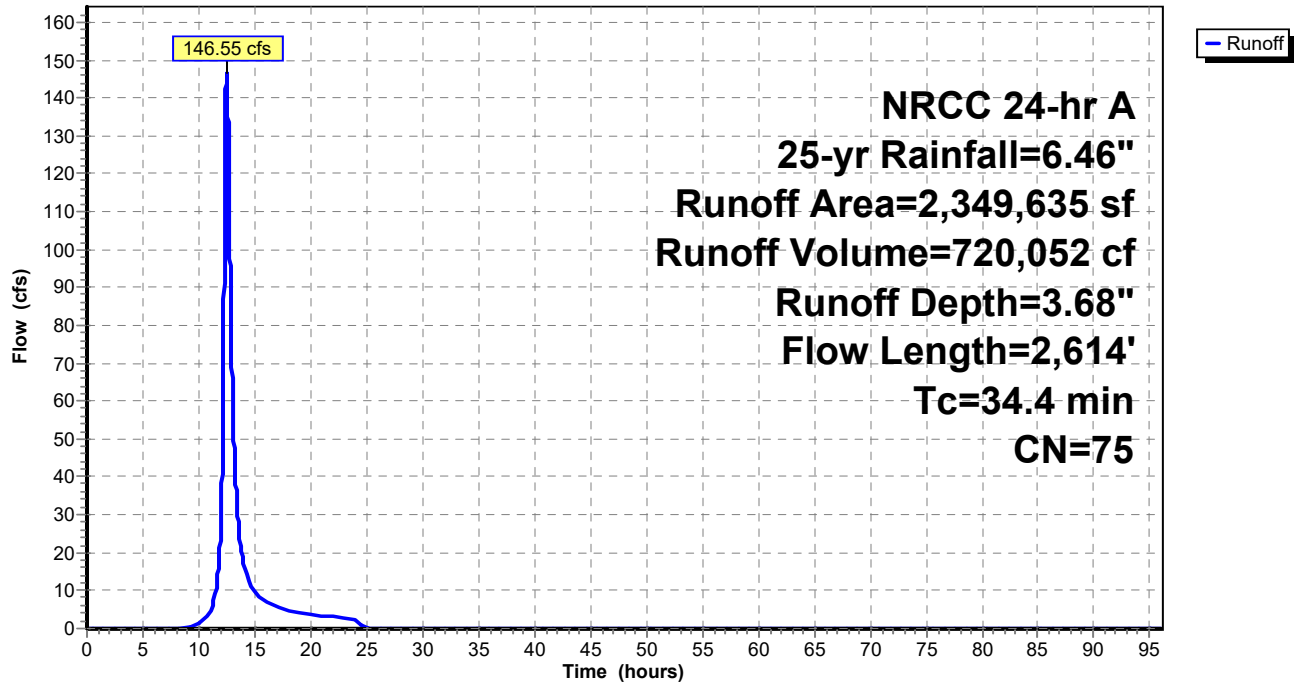
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NRCC 24-hr A 25-yr Rainfall=6.46"

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Subcatchment 2: Pre A

Hydrograph



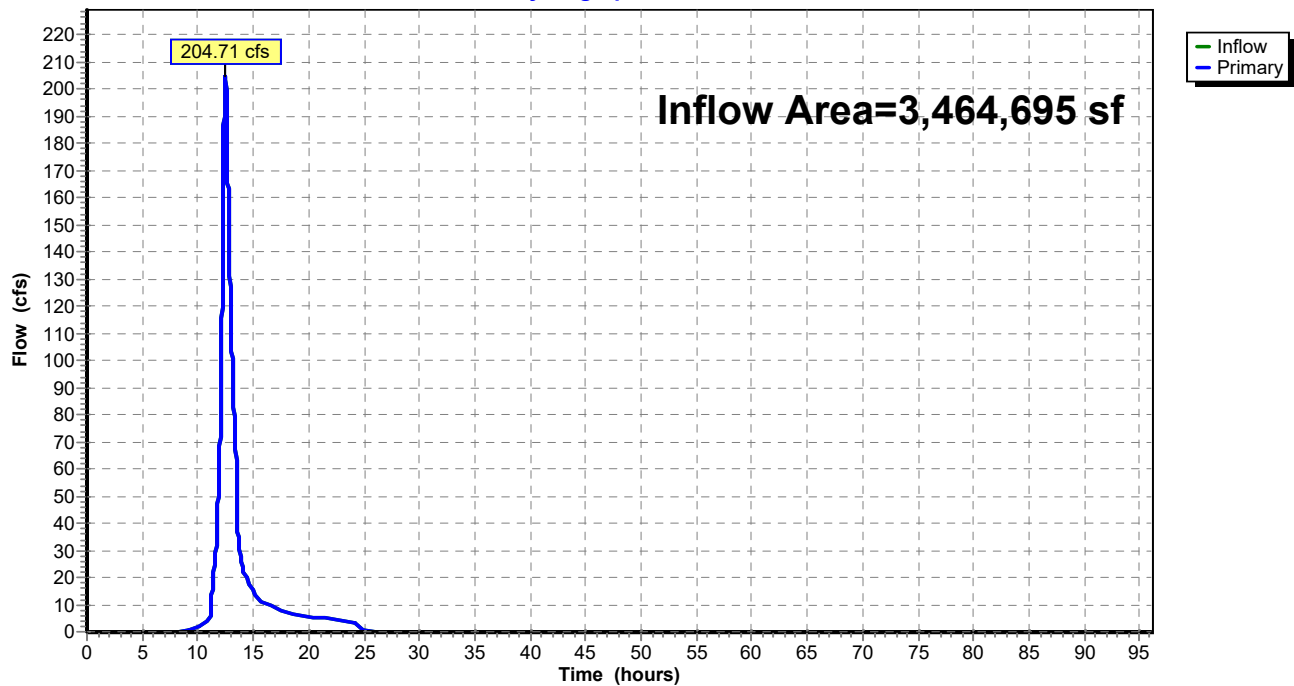
Summary for Link 3: Design Point A

Inflow Area = 3,464,695 sf, 24.35% Impervious, Inflow Depth = 4.02" for 25-yr event
Inflow = 204.71 cfs @ 12.49 hrs, Volume= 1,160,846 cf
Primary = 204.71 cfs @ 12.49 hrs, Volume= 1,160,846 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 3: Design Point A

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 50-yr Rainfall=7.70"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment0: A0 (Offsite)Runoff Area=1,115,060 sf 57.87% Impervious Runoff Depth=6.51"
Flow Length=1,018' Tc=12.5 min CN=90 Runoff=188.18 cfs 604,958 cf**Pond 1: Offsite Pond A**Peak Elev=364.99' Storage=180,130 cf Inflow=188.18 cfs 604,958 cf
Outflow=107.44 cfs 553,763 cf**Subcatchment2: Pre A**Runoff Area=2,349,635 sf 8.44% Impervious Runoff Depth=4.77"
Flow Length=2,614' Tc=34.4 min CN=75 Runoff=189.66 cfs 934,335 cf**Link 3: Design Point A**Inflow=277.74 cfs 1,488,097 cf
Primary=277.74 cfs 1,488,097 cf**Total Runoff Area = 3,464,695 sf Runoff Volume = 1,539,292 cf Average Runoff Depth = 5.33"**
75.65% Pervious = 2,621,024 sf 24.35% Impervious = 843,671 sf

N60 Pre-Dev A

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 0: A0 (Offsite)

Runoff = 188.18 cfs @ 12.20 hrs, Volume= 604,958 cf, Depth= 6.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
645,334	98	Paved parking, HSG C
443,611	80	>75% Grass cover, Good, HSG D
23,572	74	>75% Grass cover, Good, HSG C
2,543	61	>75% Grass cover, Good, HSG B
1,115,060	90	Weighted Average
469,726		42.13% Pervious Area
645,334		57.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.6	148	0.0574	3.86		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	740	0.0270	10.25	32.22	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.015 Concrete sewer w/manholes & inlets
12.5	1,018	Total			

N60 Pre-Dev A

Prepared by {enter your company name here}

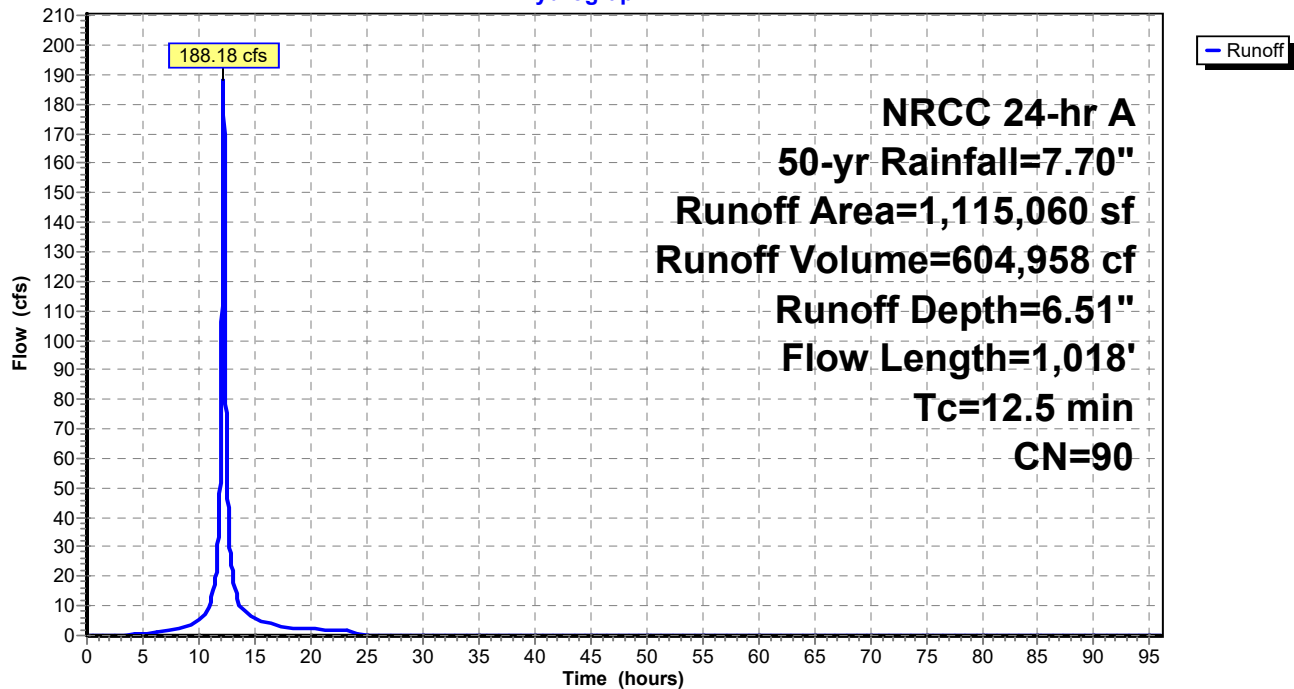
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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Subcatchment 0: A0 (Offsite)

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 1: Offsite Pond A

Inflow Area = 1,115,060 sf, 57.87% Impervious, Inflow Depth = 6.51" for 50-yr event
 Inflow = 188.18 cfs @ 12.20 hrs, Volume= 604,958 cf
 Outflow = 107.44 cfs @ 12.35 hrs, Volume= 553,763 cf, Atten= 43%, Lag= 8.9 min
 Primary = 107.44 cfs @ 12.35 hrs, Volume= 553,763 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 364.99' @ 12.35 hrs Surf.Area= 36,483 sf Storage= 180,130 cf

Plug-Flow detention time= 83.1 min calculated for 553,763 cf (92% of inflow)
 Center-of-Mass det. time= 41.1 min (820.8 - 779.7)

Volume	Invert	Avail.Storage	Storage Description		
#1	357.00'	221,816 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)
357.00	14,633	679.0	0	0	14,633
358.00	16,652	698.0	15,632	15,632	16,826
359.00	17,534	715.0	17,091	32,723	18,864
360.00	19,427	745.0	18,472	51,195	22,425
362.00	24,453	804.0	43,784	94,979	29,861
364.00	28,701	854.0	53,097	148,076	36,663
365.00	36,602	901.0	32,572	180,648	43,285
366.00	45,910	1,262.0	41,168	221,816	105,432

Device	Routing	Invert	Outlet Devices
#1	Primary	357.00'	30.0" Round Culvert L= 125.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 357.00' / 351.00' S= 0.0480 ' S= 0.0480 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	360.00'	36.0" x 48.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	364.75'	150.0' long x 36.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=107.34 cfs @ 12.35 hrs HW=364.99' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 61.34 cfs @ 12.50 fps)
 2=Orifice/Grate (Passes 61.34 cfs of 258.02 cfs potential flow)
 3=Broad-Crested Rectangular Weir (Weir Controls 46.00 cfs @ 1.30 fps)

N60 Pre-Dev A

Prepared by {enter your company name here}

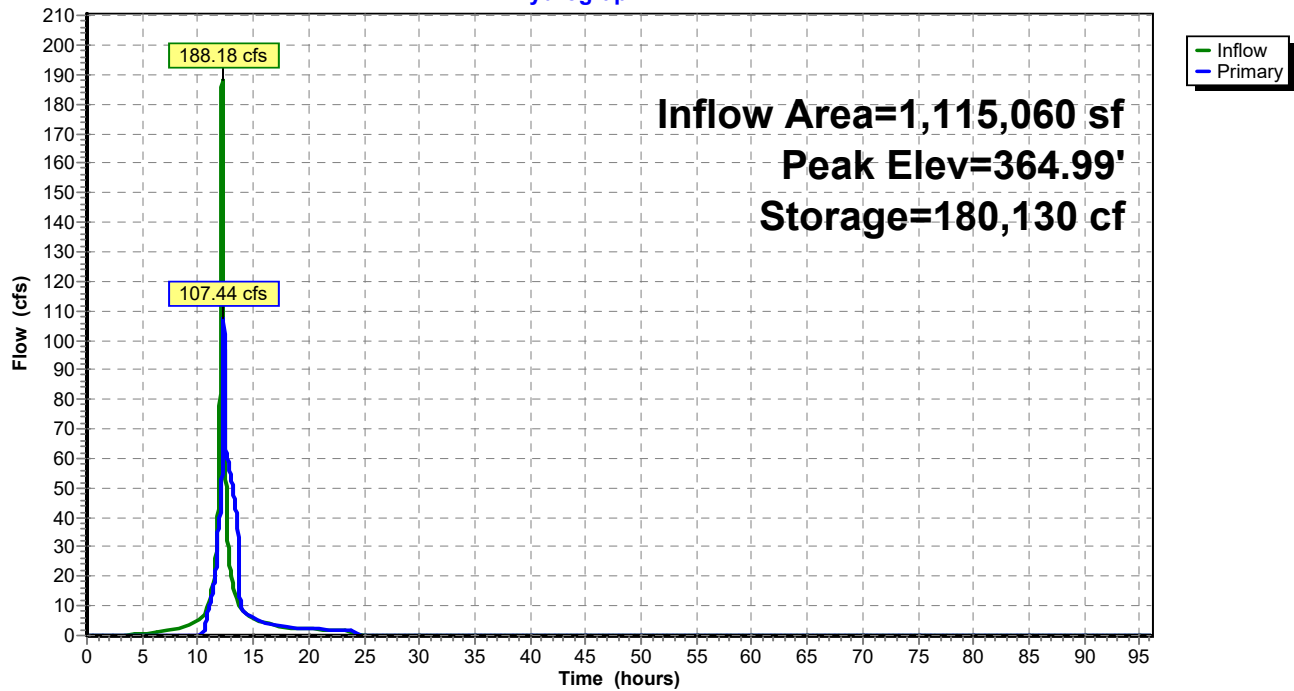
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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Pond 1: Offsite Pond A

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 2: Pre A

Runoff = 189.66 cfs @ 12.49 hrs, Volume= 934,335 cf, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

	Area (sf)	CN	Description
*	181,472	98	Paved parking, roofs, HSG C
	159,966	91	Newly graded area, HSG C
	339,282	74	>75% Grass cover, Good, HSG C
	4,702	80	>75% Grass cover, Good, HSG D
	358,470	70	Brush, Fair, HSG C
	77,923	77	Brush, Fair, HSG D
	20,430	60	Woods, Fair, HSG B
	193,986	77	Woods, Good, HSG D
	996,539	70	Woods, Good, HSG C
	16,865	98	Water Surface, HSG D
	2,349,635	75	Weighted Average
	2,151,298		91.56% Pervious Area
	198,337		8.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0250	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
2.4	282	0.0142	1.92		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
13.2	2,232	0.0631	2.83	5.65	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
34.4	2,614	Total			

N60 Pre-Dev A

Prepared by {enter your company name here}

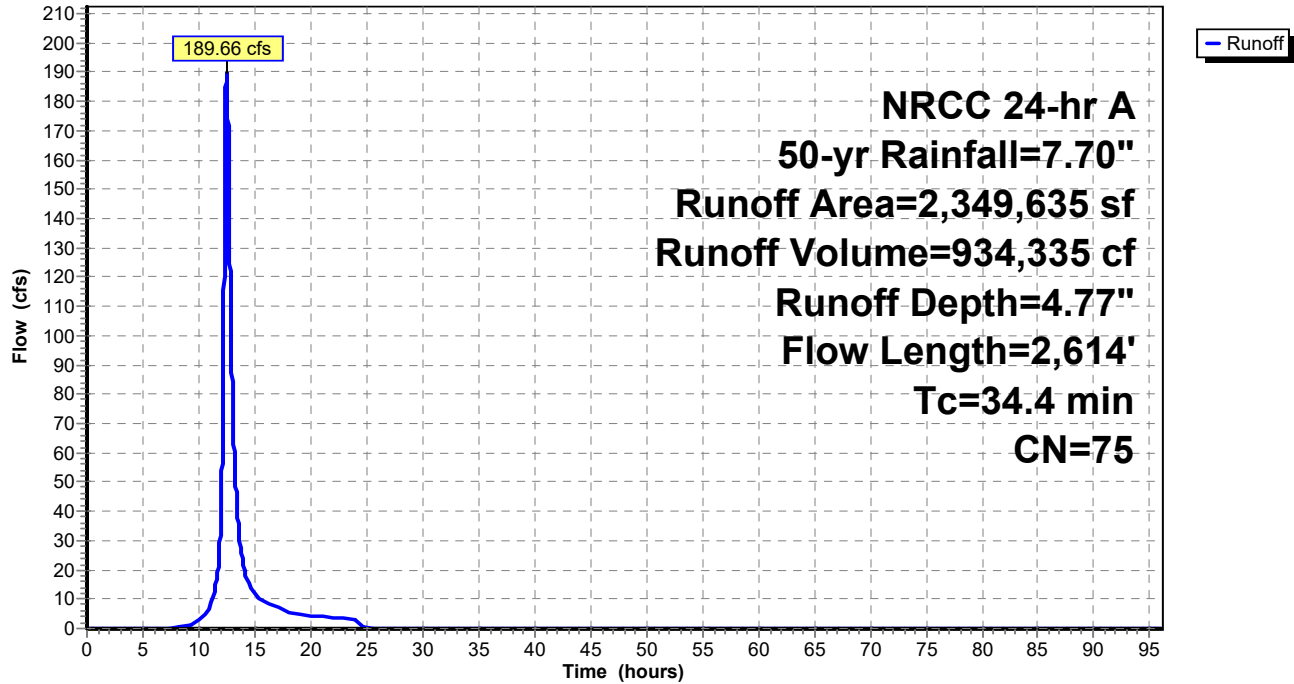
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NRCC 24-hr A 50-yr Rainfall=7.70"

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Subcatchment 2: Pre A

Hydrograph



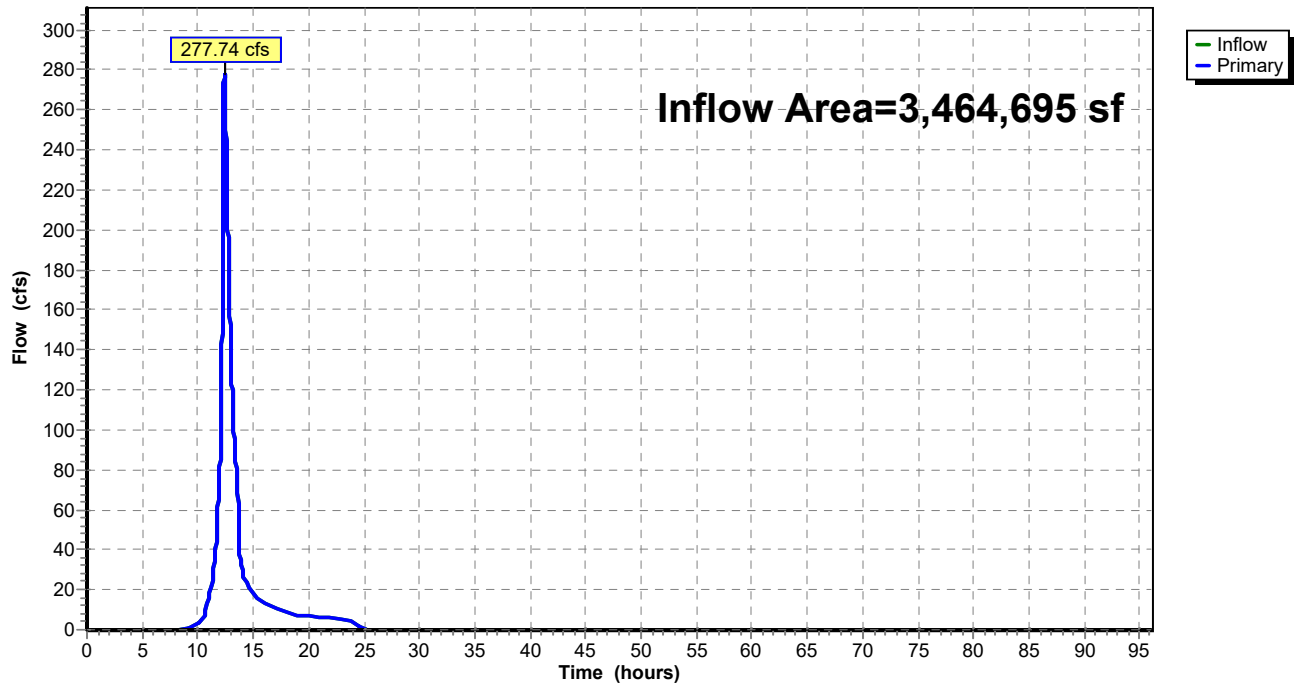
Summary for Link 3: Design Point A

Inflow Area = 3,464,695 sf, 24.35% Impervious, Inflow Depth = 5.15" for 50-yr event
 Inflow = 277.74 cfs @ 12.38 hrs, Volume= 1,488,097 cf
 Primary = 277.74 cfs @ 12.38 hrs, Volume= 1,488,097 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 3: Design Point A

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 100-yr Rainfall=9.18"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment0: A0 (Offsite)Runoff Area=1,115,060 sf 57.87% Impervious Runoff Depth=7.97"
Flow Length=1,018' Tc=12.5 min CN=90 Runoff=227.61 cfs 740,519 cf**Pond 1: Offsite Pond A**Peak Elev=365.20' Storage=188,028 cf Inflow=227.61 cfs 740,519 cf
Outflow=183.31 cfs 689,324 cf**Subcatchment2: Pre A**Runoff Area=2,349,635 sf 8.44% Impervious Runoff Depth=6.12"
Flow Length=2,614' Tc=34.4 min CN=75 Runoff=241.96 cfs 1,197,905 cf**Link 3: Design Point A**Inflow=364.38 cfs 1,887,228 cf
Primary=364.38 cfs 1,887,228 cf**Total Runoff Area = 3,464,695 sf Runoff Volume = 1,938,423 cf Average Runoff Depth = 6.71"**
75.65% Pervious = 2,621,024 sf 24.35% Impervious = 843,671 sf

N60 Pre-Dev A

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 0: A0 (Offsite)

Runoff = 227.61 cfs @ 12.20 hrs, Volume= 740,519 cf, Depth= 7.97"

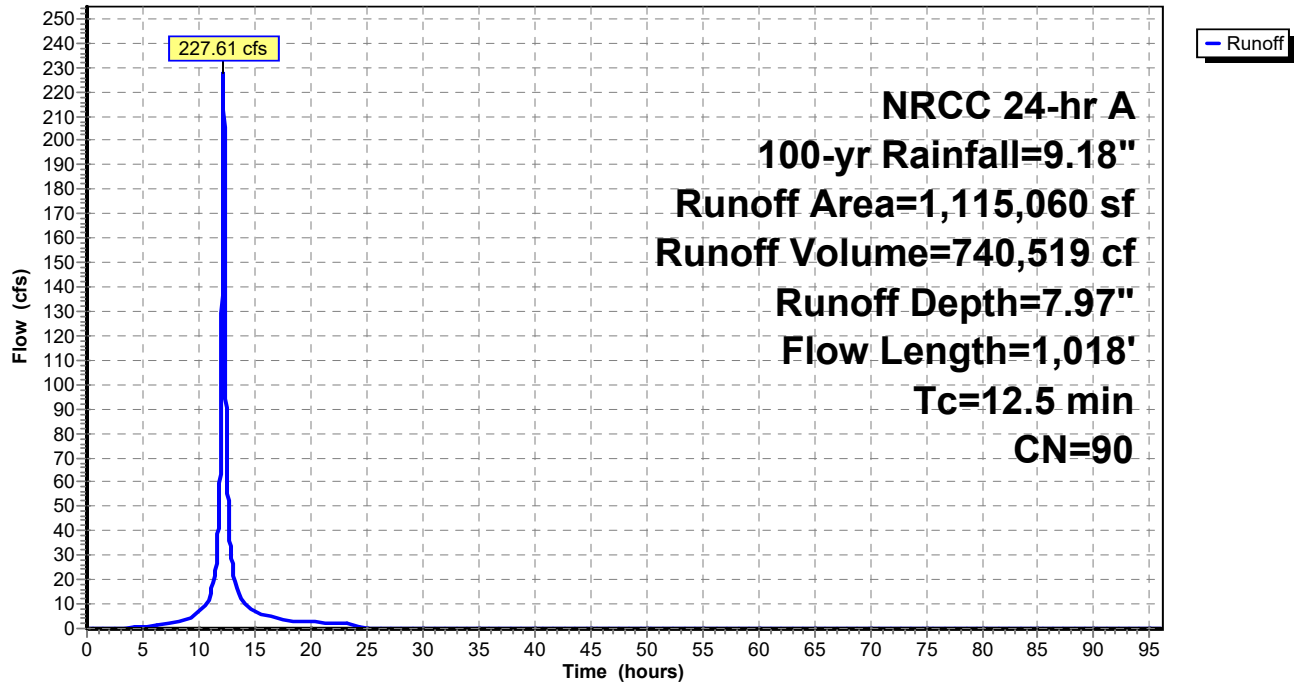
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
645,334	98	Paved parking, HSG C
443,611	80	>75% Grass cover, Good, HSG D
23,572	74	>75% Grass cover, Good, HSG C
2,543	61	>75% Grass cover, Good, HSG B
1,115,060	90	Weighted Average
469,726		42.13% Pervious Area
645,334		57.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.6	148	0.0574	3.86		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	740	0.0270	10.25	32.22	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.015 Concrete sewer w/manholes & inlets
12.5	1,018	Total			

Subcatchment 0: A0 (Offsite)

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 1: Offsite Pond A

Inflow Area = 1,115,060 sf, 57.87% Impervious, Inflow Depth = 7.97" for 100-yr event
 Inflow = 227.61 cfs @ 12.20 hrs, Volume= 740,519 cf
 Outflow = 183.31 cfs @ 12.28 hrs, Volume= 689,324 cf, Atten= 19%, Lag= 4.8 min
 Primary = 183.31 cfs @ 12.28 hrs, Volume= 689,324 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 365.20' @ 12.28 hrs Surf.Area= 38,352 sf Storage= 188,028 cf

Plug-Flow detention time= 74.7 min calculated for 689,324 cf (93% of inflow)
 Center-of-Mass det. time= 38.3 min (813.6 - 775.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	357.00'	221,816 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)
357.00	14,633	679.0	0	0	14,633
358.00	16,652	698.0	15,632	15,632	16,826
359.00	17,534	715.0	17,091	32,723	18,864
360.00	19,427	745.0	18,472	51,195	22,425
362.00	24,453	804.0	43,784	94,979	29,861
364.00	28,701	854.0	53,097	148,076	36,663
365.00	36,602	901.0	32,572	180,648	43,285
366.00	45,910	1,262.0	41,168	221,816	105,432

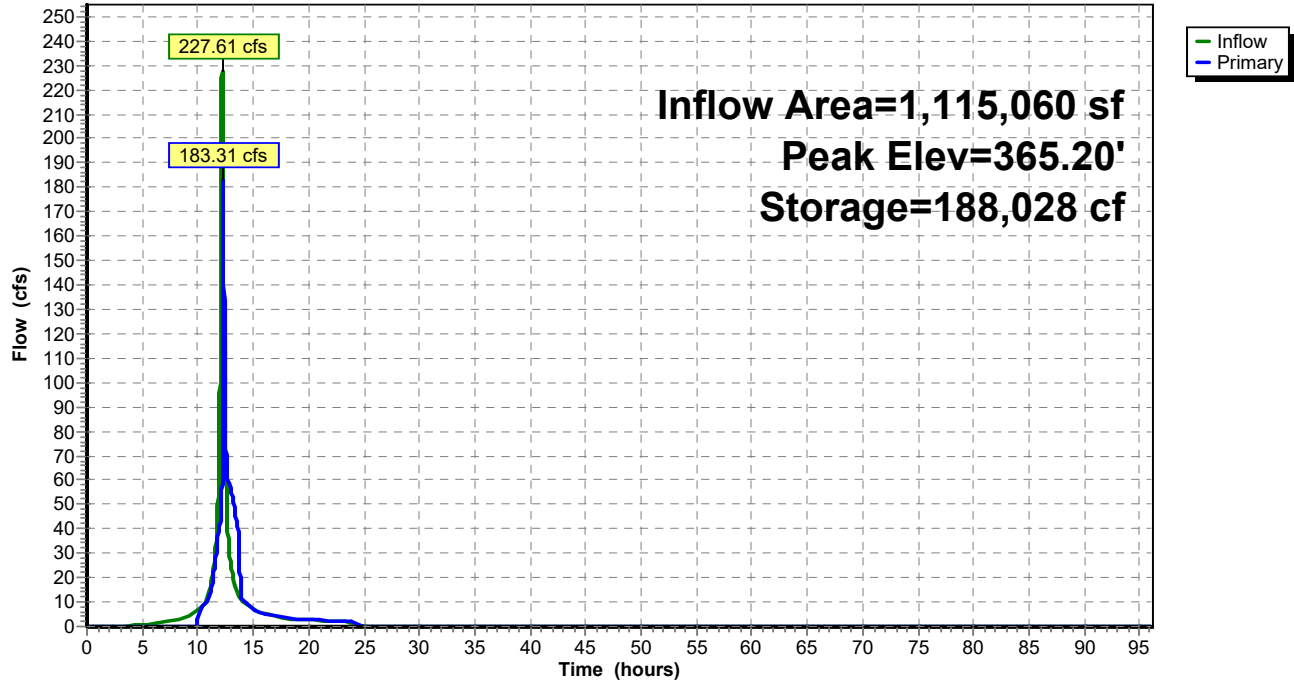
Device	Routing	Invert	Outlet Devices
#1	Primary	357.00'	30.0" Round Culvert L= 125.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 357.00' / 351.00' S= 0.0480 ' S= 0.0480 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	360.00'	36.0" x 48.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	364.75'	150.0' long x 36.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=183.09 cfs @ 12.28 hrs HW=365.20' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 62.29 cfs @ 12.69 fps)
 2=Orifice/Grate (Passes 62.29 cfs of 263.43 cfs potential flow)
 3=Broad-Crested Rectangular Weir (Weir Controls 120.80 cfs @ 1.80 fps)

Pond 1: Offsite Pond A

Hydrograph



N60 Pre-Dev A

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 2: Pre A

Runoff = 241.96 cfs @ 12.49 hrs, Volume= 1,197,905 cf, Depth= 6.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

	Area (sf)	CN	Description
*	181,472	98	Paved parking, roofs, HSG C
	159,966	91	Newly graded area, HSG C
	339,282	74	>75% Grass cover, Good, HSG C
	4,702	80	>75% Grass cover, Good, HSG D
	358,470	70	Brush, Fair, HSG C
	77,923	77	Brush, Fair, HSG D
	20,430	60	Woods, Fair, HSG B
	193,986	77	Woods, Good, HSG D
	996,539	70	Woods, Good, HSG C
	16,865	98	Water Surface, HSG D
	2,349,635	75	Weighted Average
	2,151,298		91.56% Pervious Area
	198,337		8.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0250	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
2.4	282	0.0142	1.92		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
13.2	2,232	0.0631	2.83	5.65	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
34.4	2,614	Total			

N60 Pre-Dev A

Prepared by {enter your company name here}

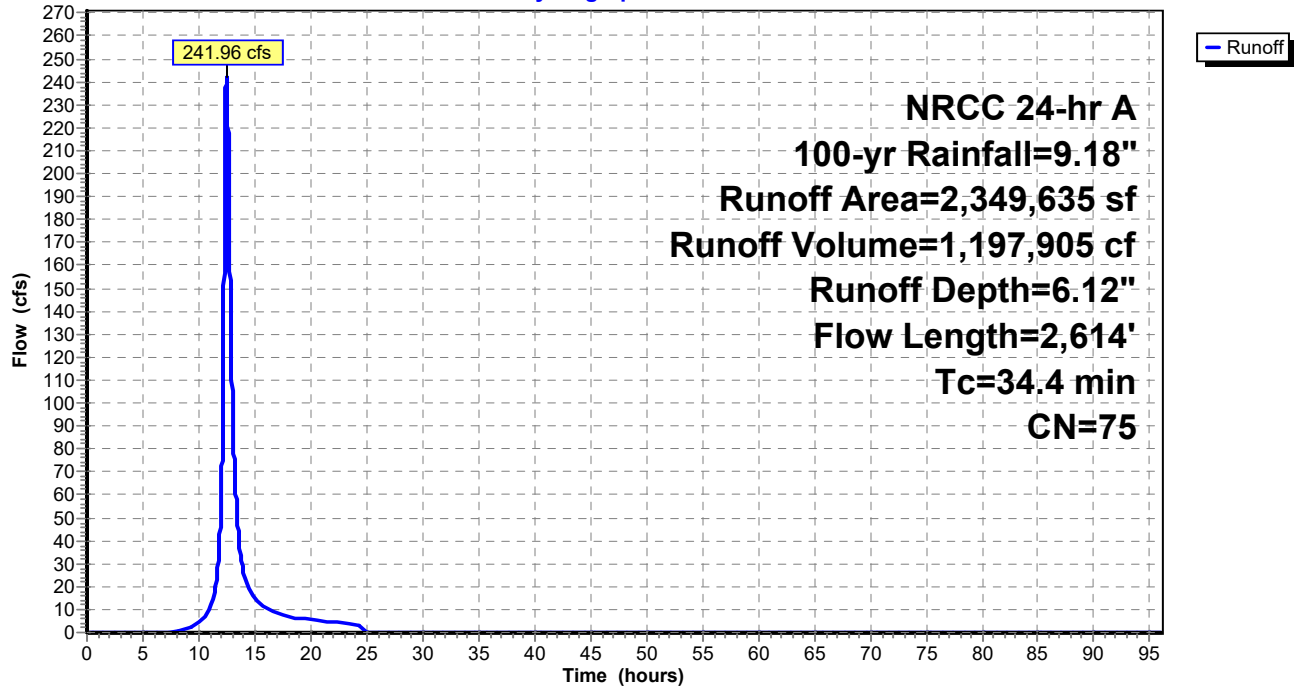
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NRCC 24-hr A 100-yr Rainfall=9.18"

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Subcatchment 2: Pre A

Hydrograph



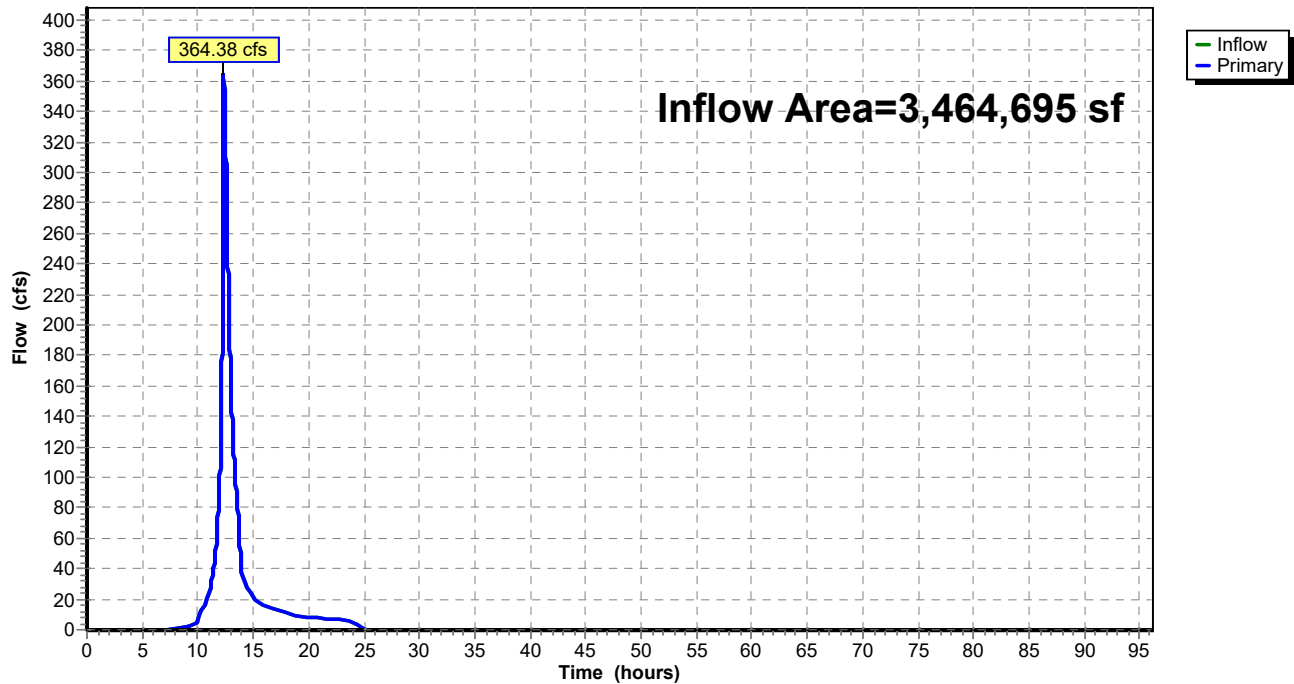
Summary for Link 3: Design Point A

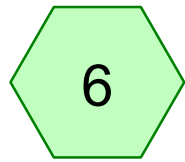
Inflow Area = 3,464,695 sf, 24.35% Impervious, Inflow Depth = 6.54" for 100-yr event
 Inflow = 364.38 cfs @ 12.31 hrs, Volume= 1,887,228 cf
 Primary = 364.38 cfs @ 12.31 hrs, Volume= 1,887,228 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

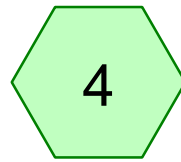
Link 3: Design Point A

Hydrograph

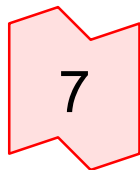




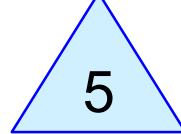
Pre B



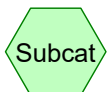
B0 (Offsite)



Design Point B



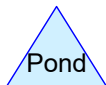
Offsite Pond B



Subcat



Reach



Pond



Link

Routing Diagram for N60 Pre-Dev B

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N60 Pre-Dev B

NRCC 24-hr A 1-yr Rainfall=2.79"

Prepared by {enter your company name here}

Printed 3/25/2020

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment4: B0 (Offsite)Runoff Area=1,510,771 sf 32.24% Impervious Runoff Depth=1.35"
Flow Length=1,871' Tc=32.3 min CN=84 Runoff=35.54 cfs 169,374 cf**Pond 5: Offsite Pond B**Peak Elev=383.46' Storage=75,292 cf Inflow=35.54 cfs 169,374 cf
36.0" Round Culvert n=0.025 L=158.0' S=0.0127 '/' Outflow=10.77 cfs 168,126 cf**Subcatchment6: Pre B**Runoff Area=1,252,502 sf 0.00% Impervious Runoff Depth=0.60"
Flow Length=2,216' Tc=27.6 min CN=70 Runoff=12.14 cfs 62,706 cf**Link 7: Design Point B**Inflow=17.38 cfs 230,831 cf
Primary=17.38 cfs 230,831 cf**Total Runoff Area = 2,763,273 sf Runoff Volume = 232,080 cf Average Runoff Depth = 1.01"**
82.37% Pervious = 2,276,217 sf 17.63% Impervious = 487,056 sf

N60 Pre-Dev B

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 4: B0 (Offsite)

Runoff = 35.54 cfs @ 12.46 hrs, Volume= 169,374 cf, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
487,056	98	Paved parking, HSG C
497,987	77	Woods, Good, HSG D
134,328	70	Woods, Good, HSG C
375,457	80	>75% Grass cover, Good, HSG D
15,943	74	>75% Grass cover, Good, HSG C
1,510,771	84	Weighted Average
1,023,715		67.76% Pervious Area
487,056		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
9.5	848	0.0085	1.48		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	856	0.0093	2.78	3.06	Trap/Vee/Rect Channel Flow, Bot.W=3.00' D=0.33' Z= 1.0 '/' Top.W=3.66' n= 0.022 Earth, clean & straight
0.2	67	0.0150	6.66	64.08	Pipe Channel, 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.025 Corrugated metal
32.3	1,871	Total			

N60 Pre-Dev B

Prepared by {enter your company name here}

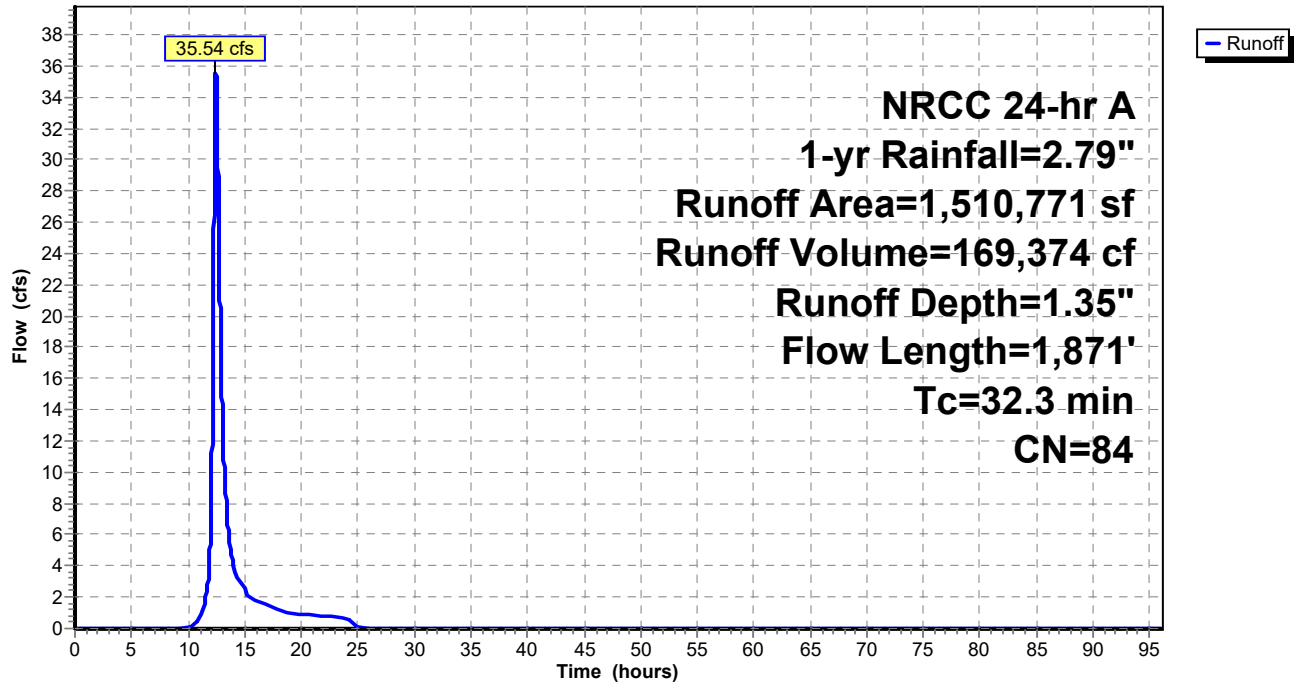
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NRCC 24-hr A 1-yr Rainfall=2.79"

Printed 3/25/2020

Subcatchment 4: B0 (Offsite)

Hydrograph



N60 Pre-Dev B

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 5: Offsite Pond B

Inflow Area = 1,510,771 sf, 32.24% Impervious, Inflow Depth = 1.35" for 1-yr event
 Inflow = 35.54 cfs @ 12.46 hrs, Volume= 169,374 cf
 Outflow = 10.77 cfs @ 13.17 hrs, Volume= 168,126 cf, Atten= 70%, Lag= 42.8 min
 Primary = 10.77 cfs @ 13.17 hrs, Volume= 168,126 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 383.46' @ 13.17 hrs Surf.Area= 68,005 sf Storage= 75,292 cf

Plug-Flow detention time= 205.3 min calculated for 168,126 cf (99% of inflow)
 Center-of-Mass det. time= 200.8 min (1,049.1 - 848.2)

Volume	Invert	Avail.Storage	Storage Description
#1	382.00'	610,998 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)
382.00	36,540	1,177.0	0	0	36,540
384.00	81,987	1,579.0	115,507	115,507	124,748
386.00	96,790	1,622.0	178,572	294,080	136,159
388.00	108,795	1,657.0	205,468	499,548	145,863
389.00	114,127	1,679.0	111,450	610,998	151,937

Device	Routing	Invert	Outlet Devices
#1	Primary	382.00'	36.0" Round Culvert L= 158.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 382.00' / 380.00' S= 0.0127 '/ Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf

Primary OutFlow Max=10.77 cfs @ 13.17 hrs HW=383.46' TW=0.00' (Dynamic Tailwater)
 ↑**1=Culvert** (Barrel Controls 10.77 cfs @ 4.60 fps)

N60 Pre-Dev B

Prepared by {enter your company name here}

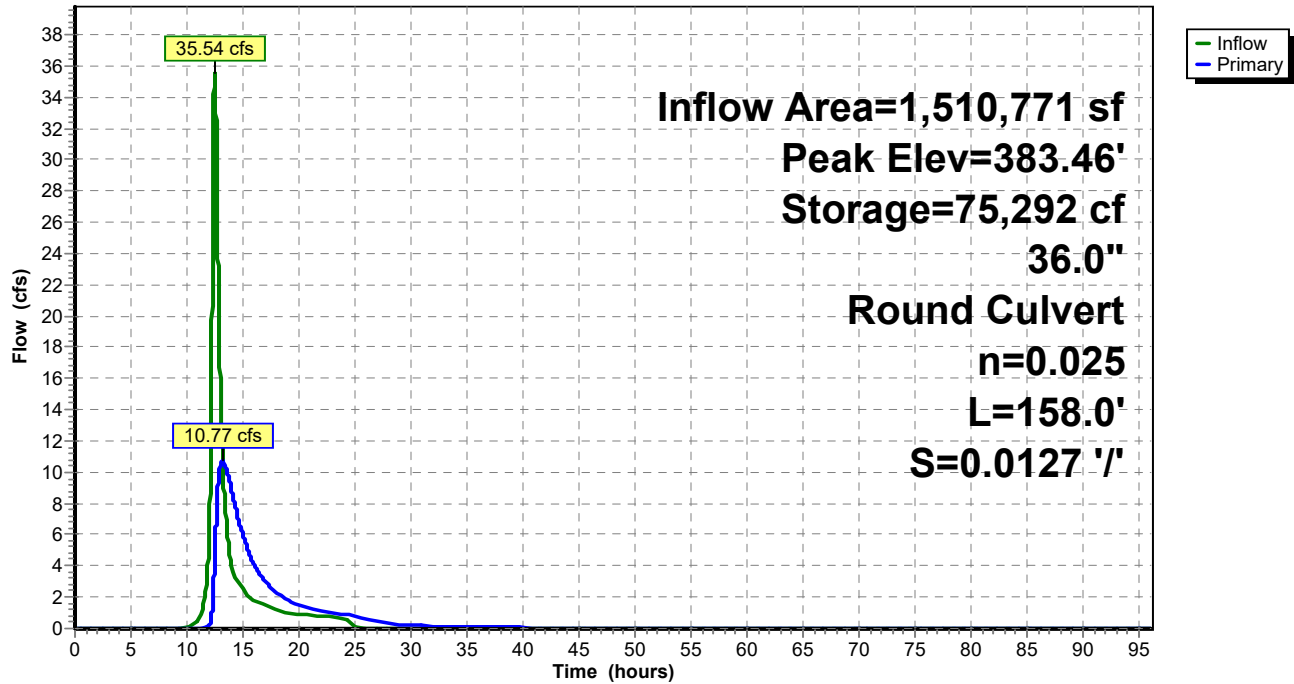
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NRCC 24-hr A 1-yr Rainfall=2.79"

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Pond 5: Offsite Pond B

Hydrograph



N60 Pre-Dev B

Prepared by {enter your company name here}

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NRCC 24-hr A 1-yr Rainfall=2.79"

Printed 3/25/2020

Summary for Subcatchment 6: Pre B

Runoff = 12.14 cfs @ 12.45 hrs, Volume= 62,706 cf, Depth= 0.60"

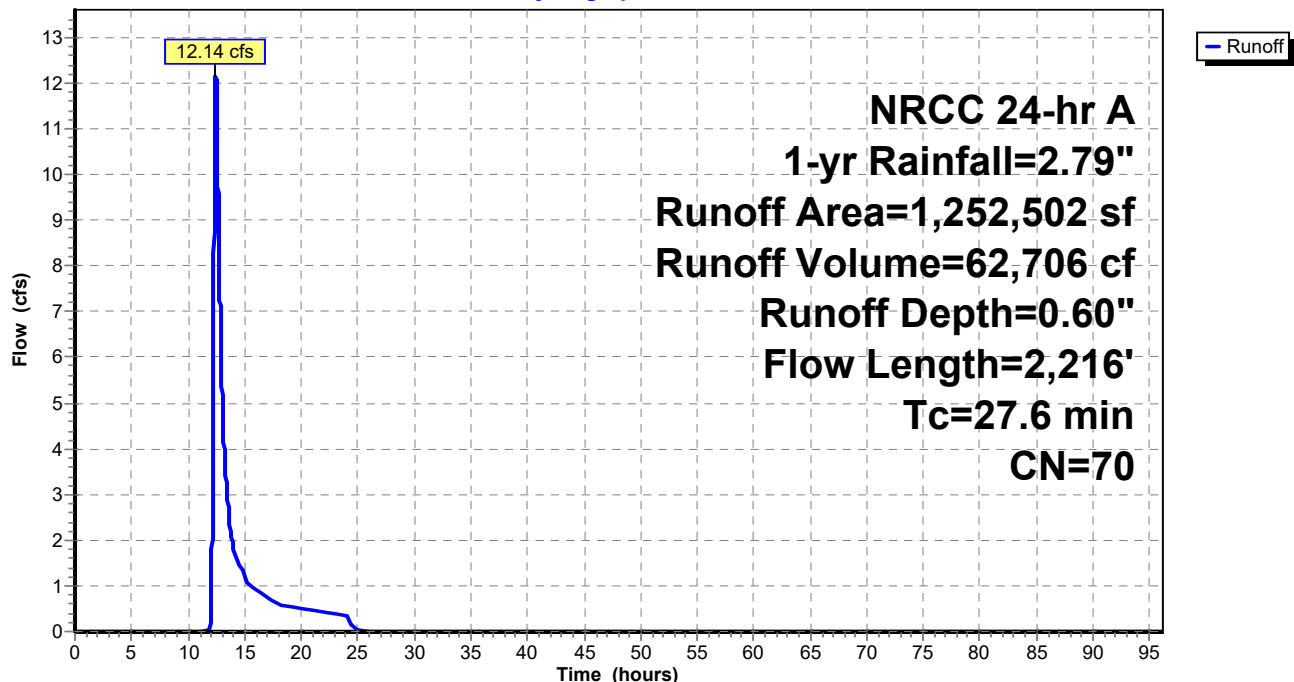
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
31,823	61	>75% Grass cover, Good, HSG B
32,077	55	Woods, Good, HSG B
38,670	91	Newly graded area, HSG C
18,832	91	Newly graded area, HSG C
1,131,100	70	Woods, Good, HSG C
1,252,502	70	Weighted Average
1,252,502		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0400	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	64	0.1875	6.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.8	2,052	0.0663	2.90	5.79	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
27.6	2,216	Total			

Subcatchment 6: Pre B

Hydrograph



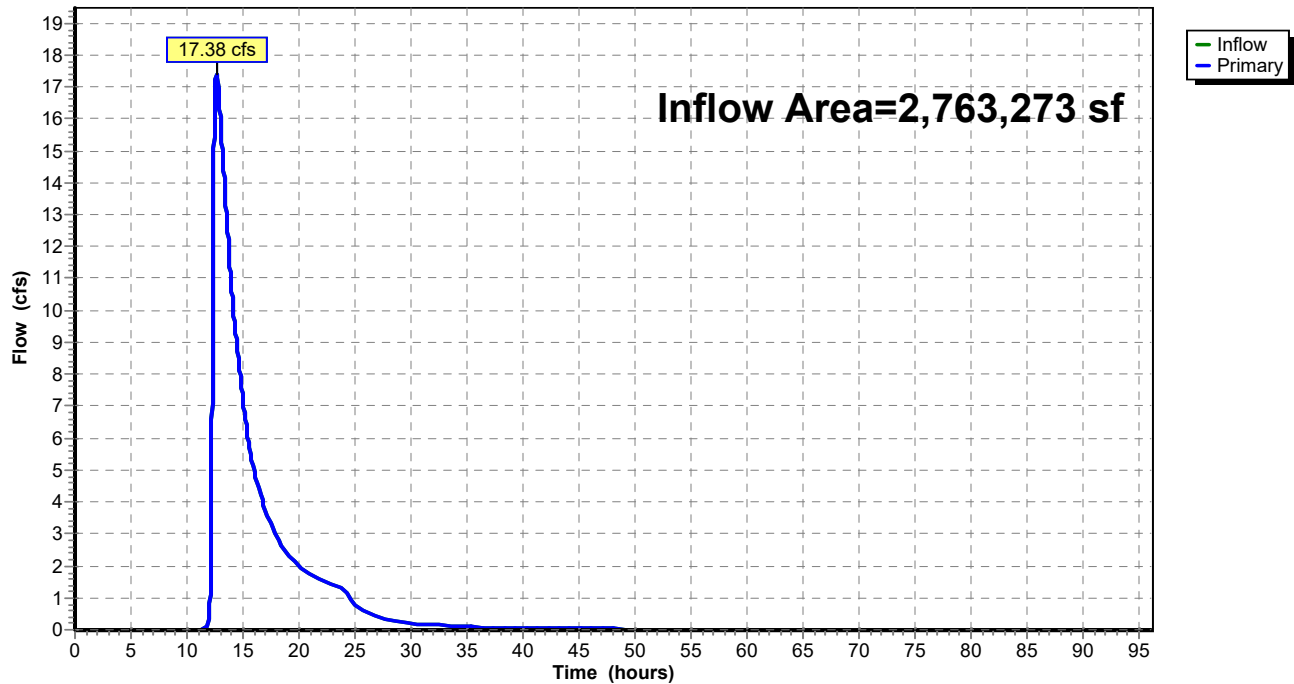
Summary for Link 7: Design Point B

Inflow Area = 2,763,273 sf, 17.63% Impervious, Inflow Depth > 1.00" for 1-yr event
 Inflow = 17.38 cfs @ 12.60 hrs, Volume= 230,831 cf
 Primary = 17.38 cfs @ 12.60 hrs, Volume= 230,831 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 7: Design Point B

Hydrograph



N60 Pre-Dev B

NRCC 24-hr A 2-yr Rainfall=3.42"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment4: B0 (Offsite)Runoff Area=1,510,771 sf 32.24% Impervious Runoff Depth=1.87"
Flow Length=1,871' Tc=32.3 min CN=84 Runoff=49.64 cfs 235,196 cf**Pond 5: Offsite Pond B**Peak Elev=383.84' Storage=102,972 cf Inflow=49.64 cfs 235,196 cf
36.0" Round Culvert n=0.025 L=158.0' S=0.0127 '/' Outflow=16.27 cfs 233,939 cf**Subcatchment6: Pre B**Runoff Area=1,252,502 sf 0.00% Impervious Runoff Depth=0.96"
Flow Length=2,216' Tc=27.6 min CN=70 Runoff=21.10 cfs 100,103 cf**Link 7: Design Point B**Inflow=29.43 cfs 334,042 cf
Primary=29.43 cfs 334,042 cf**Total Runoff Area = 2,763,273 sf Runoff Volume = 335,299 cf Average Runoff Depth = 1.46"**
82.37% Pervious = 2,276,217 sf 17.63% Impervious = 487,056 sf

N60 Pre-Dev B

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 4: B0 (Offsite)

Runoff = 49.64 cfs @ 12.45 hrs, Volume= 235,196 cf, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
487,056	98	Paved parking, HSG C
497,987	77	Woods, Good, HSG D
134,328	70	Woods, Good, HSG C
375,457	80	>75% Grass cover, Good, HSG D
15,943	74	>75% Grass cover, Good, HSG C
1,510,771	84	Weighted Average
1,023,715		67.76% Pervious Area
487,056		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
9.5	848	0.0085	1.48		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	856	0.0093	2.78	3.06	Trap/Vee/Rect Channel Flow, Bot.W=3.00' D=0.33' Z= 1.0 '/' Top.W=3.66' n= 0.022 Earth, clean & straight
0.2	67	0.0150	6.66	64.08	Pipe Channel, 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.025 Corrugated metal
32.3	1,871	Total			

N60 Pre-Dev B

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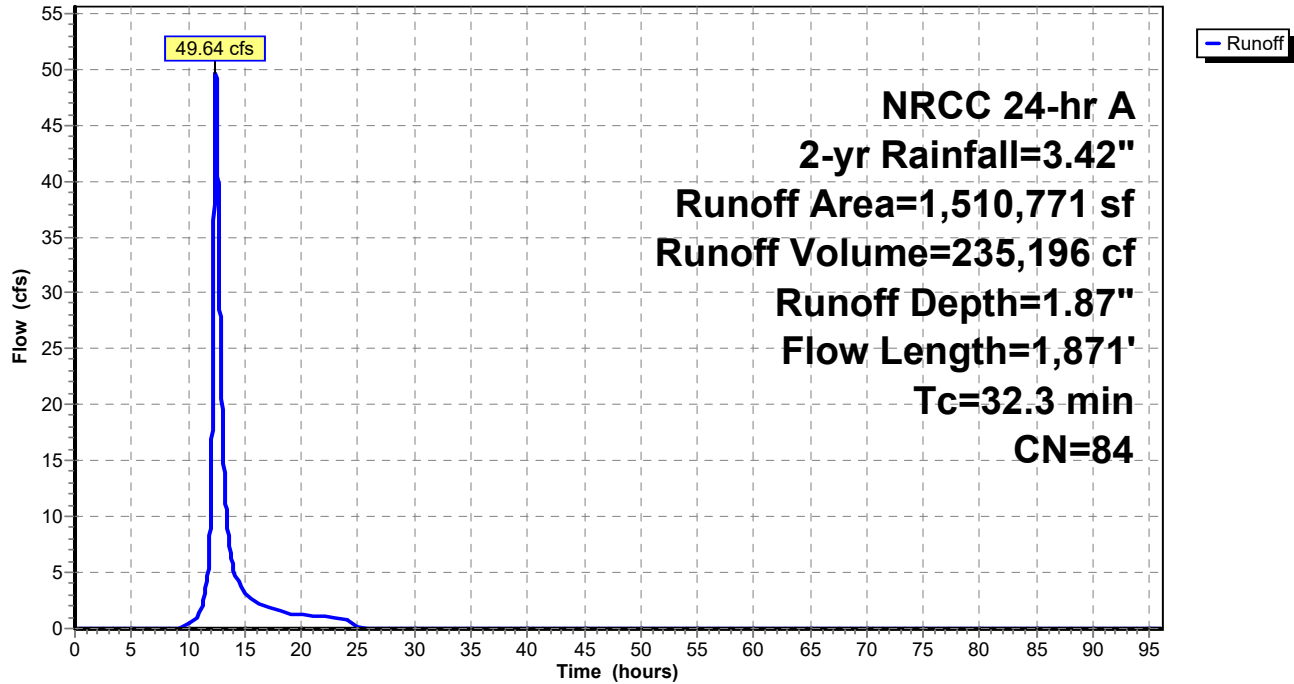
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Subcatchment 4: B0 (Offsite)

Hydrograph



N60 Pre-Dev B

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 5: Offsite Pond B

Inflow Area = 1,510,771 sf, 32.24% Impervious, Inflow Depth = 1.87" for 2-yr event
 Inflow = 49.64 cfs @ 12.45 hrs, Volume= 235,196 cf
 Outflow = 16.27 cfs @ 13.10 hrs, Volume= 233,939 cf, Atten= 67%, Lag= 38.7 min
 Primary = 16.27 cfs @ 13.10 hrs, Volume= 233,939 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 383.84' @ 13.10 hrs Surf.Area= 77,765 sf Storage= 102,972 cf

Plug-Flow detention time= 176.7 min calculated for 233,915 cf (99% of inflow)
 Center-of-Mass det. time= 173.8 min (1,014.1 - 840.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	382.00'	610,998 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)
382.00	36,540	1,177.0	0	0	36,540
384.00	81,987	1,579.0	115,507	115,507	124,748
386.00	96,790	1,622.0	178,572	294,080	136,159
388.00	108,795	1,657.0	205,468	499,548	145,863
389.00	114,127	1,679.0	111,450	610,998	151,937

Device	Routing	Invert	Outlet Devices
#1	Primary	382.00'	36.0" Round Culvert L= 158.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 382.00' / 380.00' S= 0.0127 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf

Primary OutFlow Max=16.27 cfs @ 13.10 hrs HW=383.84' TW=0.00' (Dynamic Tailwater)
 ↑**1=Culvert** (Barrel Controls 16.27 cfs @ 5.11 fps)

N60 Pre-Dev B

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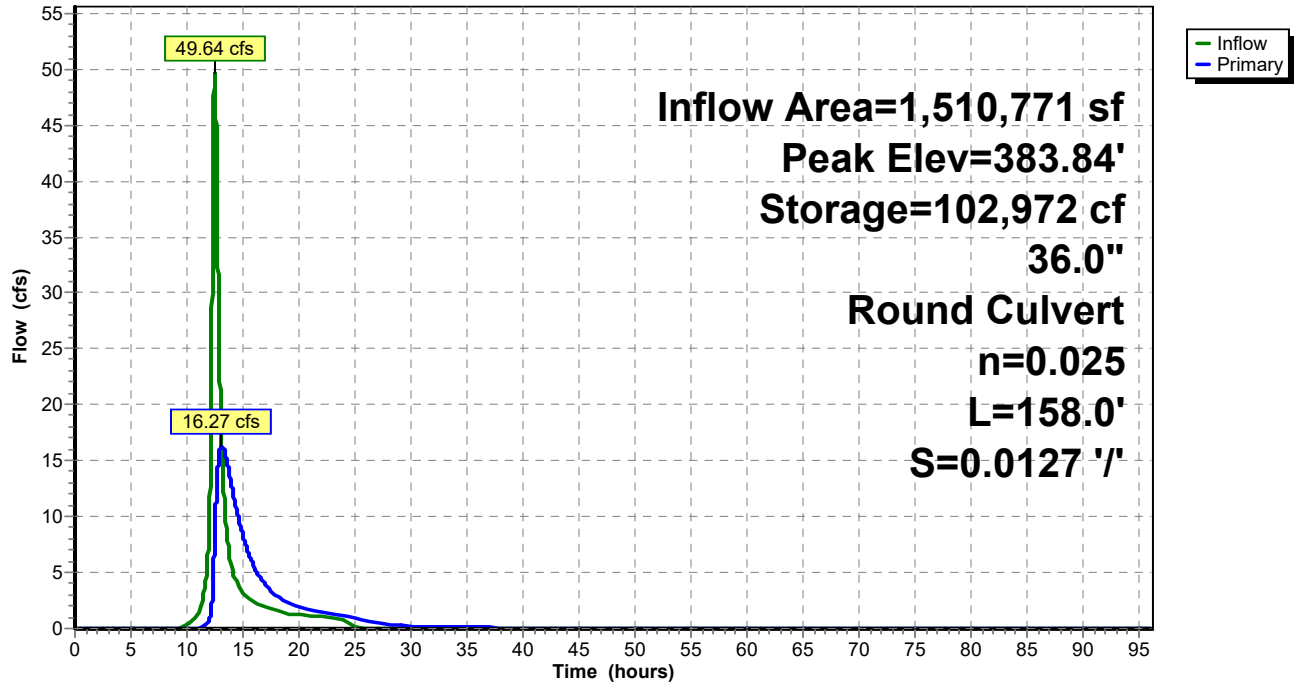
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 5: Offsite Pond B

Hydrograph



N60 Pre-Dev B

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 6: Pre B

Runoff = 21.10 cfs @ 12.42 hrs, Volume= 100,103 cf, Depth= 0.96"

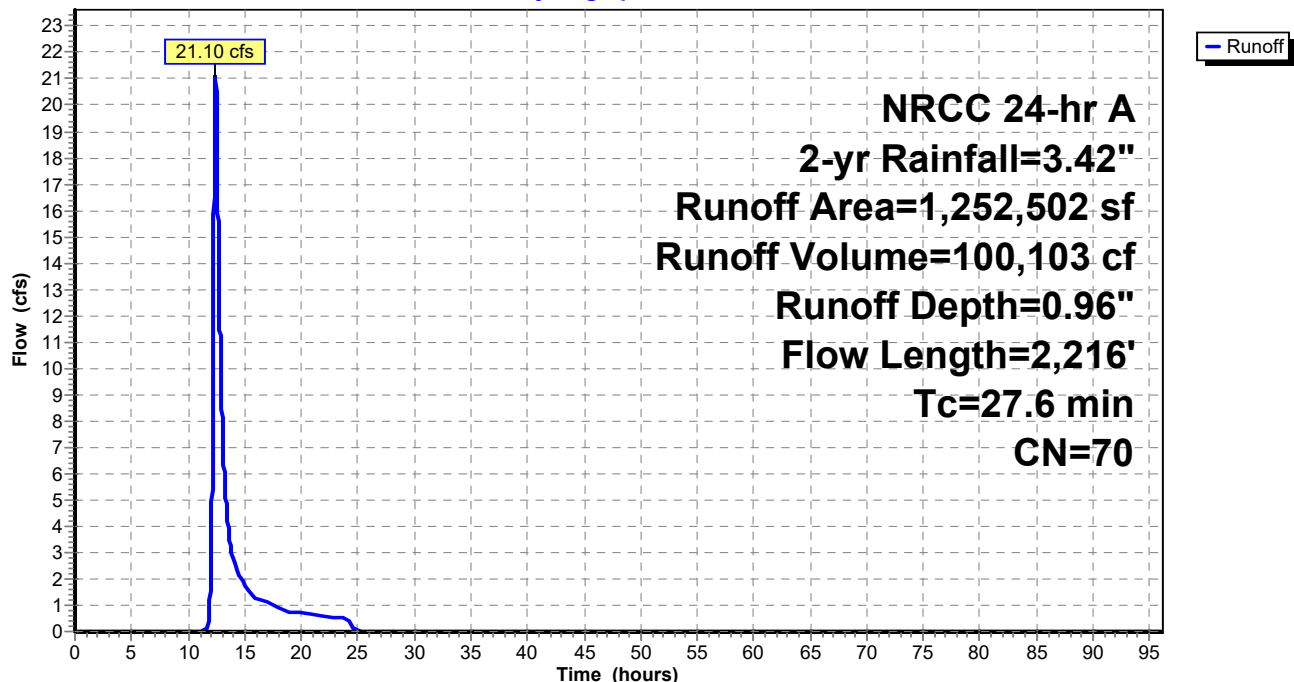
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
31,823	61	>75% Grass cover, Good, HSG B
32,077	55	Woods, Good, HSG B
38,670	91	Newly graded area, HSG C
18,832	91	Newly graded area, HSG C
1,131,100	70	Woods, Good, HSG C
1,252,502	70	Weighted Average
1,252,502		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0400	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	64	0.1875	6.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.8	2,052	0.0663	2.90	5.79	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
27.6	2,216	Total			

Subcatchment 6: Pre B

Hydrograph



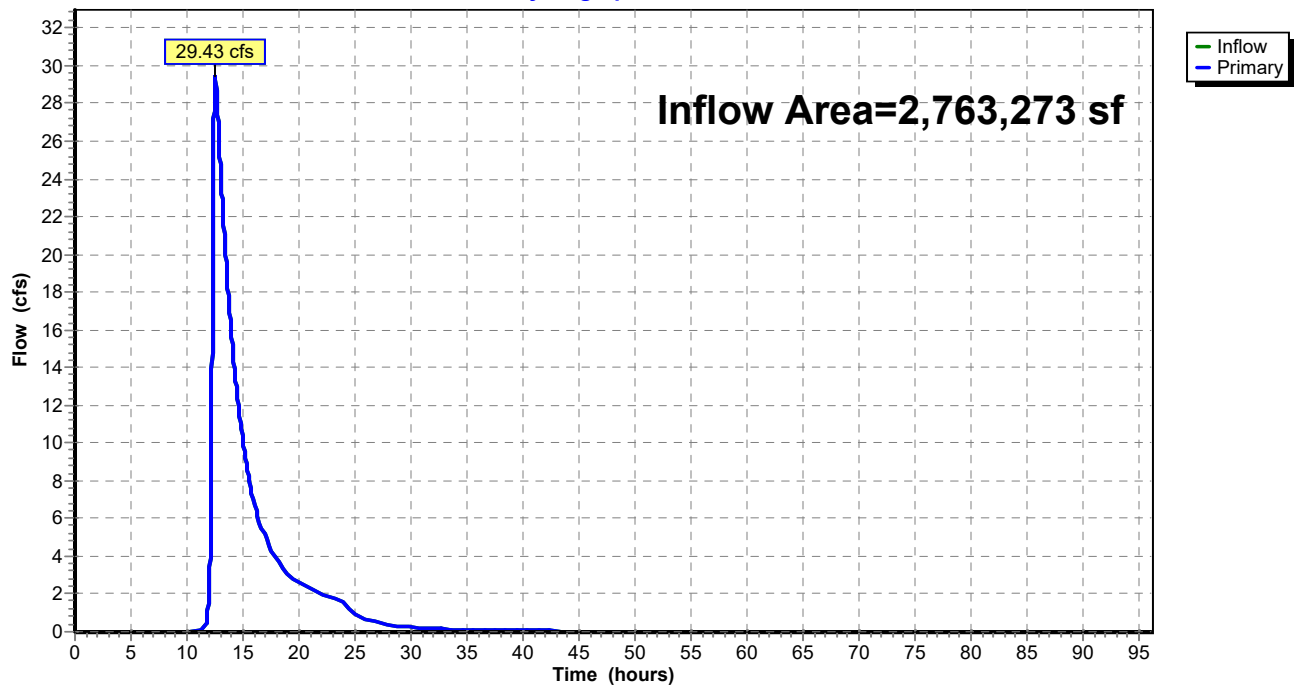
Summary for Link 7: Design Point B

Inflow Area = 2,763,273 sf, 17.63% Impervious, Inflow Depth > 1.45" for 2-yr event
 Inflow = 29.43 cfs @ 12.52 hrs, Volume= 334,042 cf
 Primary = 29.43 cfs @ 12.52 hrs, Volume= 334,042 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 7: Design Point B

Hydrograph



N60 Pre-Dev B

NRCC 24-hr A 10-yr Rainfall=5.12"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment4: B0 (Offsite)Runoff Area=1,510,771 sf 32.24% Impervious Runoff Depth=3.38"
Flow Length=1,871' Tc=32.3 min CN=84 Runoff=89.40 cfs 425,581 cf**Pond 5: Offsite Pond B**Peak Elev=384.79' Storage=182,615 cf Inflow=89.40 cfs 425,581 cf
36.0" Round Culvert n=0.025 L=158.0' S=0.0127 '/' Outflow=31.40 cfs 424,308 cf**Subcatchment6: Pre B**Runoff Area=1,252,502 sf 0.00% Impervious Runoff Depth=2.13"
Flow Length=2,216' Tc=27.6 min CN=70 Runoff=50.08 cfs 221,873 cf**Link 7: Design Point B**Inflow=68.06 cfs 646,182 cf
Primary=68.06 cfs 646,182 cf**Total Runoff Area = 2,763,273 sf Runoff Volume = 647,455 cf Average Runoff Depth = 2.81"**
82.37% Pervious = 2,276,217 sf 17.63% Impervious = 487,056 sf

N60 Pre-Dev B

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 4: B0 (Offsite)

Runoff = 89.40 cfs @ 12.45 hrs, Volume= 425,581 cf, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
487,056	98	Paved parking, HSG C
497,987	77	Woods, Good, HSG D
134,328	70	Woods, Good, HSG C
375,457	80	>75% Grass cover, Good, HSG D
15,943	74	>75% Grass cover, Good, HSG C
1,510,771	84	Weighted Average
1,023,715		67.76% Pervious Area
487,056		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
9.5	848	0.0085	1.48		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	856	0.0093	2.78	3.06	Trap/Vee/Rect Channel Flow, Bot.W=3.00' D=0.33' Z= 1.0 '/' Top.W=3.66' n= 0.022 Earth, clean & straight
0.2	67	0.0150	6.66	64.08	Pipe Channel, 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.025 Corrugated metal
32.3	1,871	Total			

N60 Pre-Dev B

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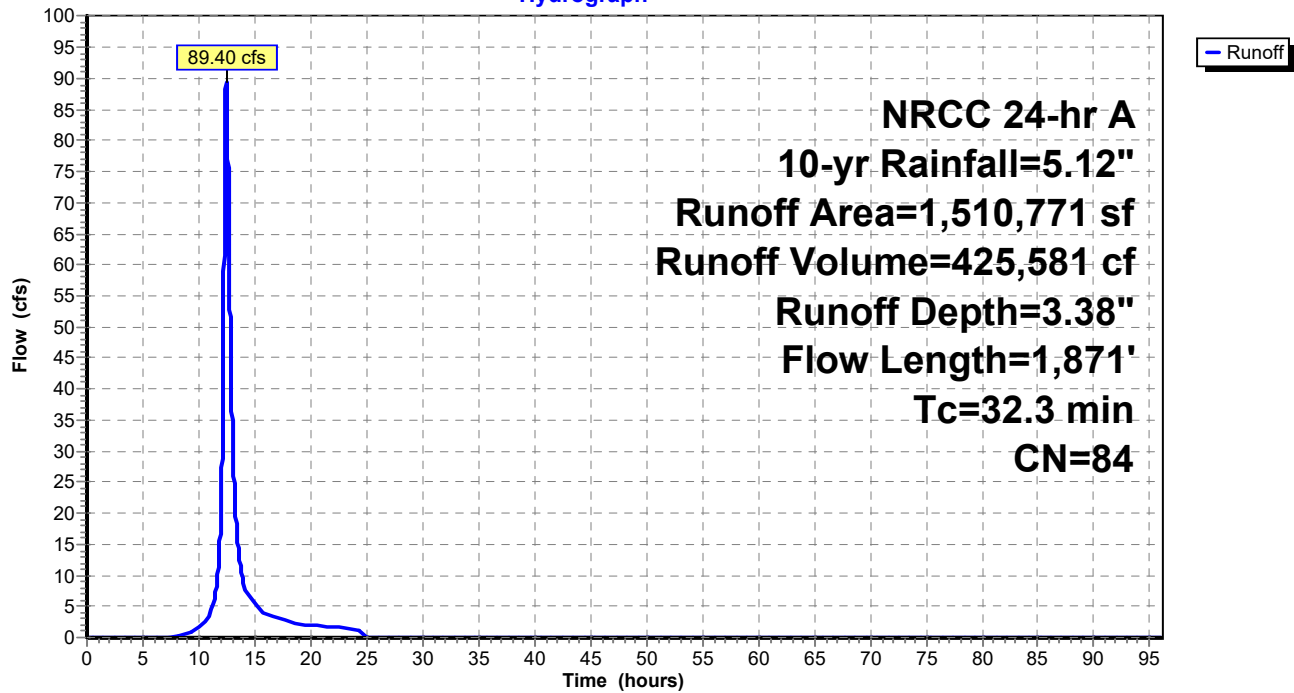
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NRCC 24-hr A 10-yr Rainfall=5.12"

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Subcatchment 4: B0 (Offsite)

Hydrograph



N60 Pre-Dev B

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 5: Offsite Pond B

Inflow Area = 1,510,771 sf, 32.24% Impervious, Inflow Depth = 3.38" for 10-yr event
 Inflow = 89.40 cfs @ 12.45 hrs, Volume= 425,581 cf
 Outflow = 31.40 cfs @ 13.03 hrs, Volume= 424,308 cf, Atten= 65%, Lag= 34.8 min
 Primary = 31.40 cfs @ 13.03 hrs, Volume= 424,308 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 384.79' @ 13.03 hrs Surf.Area= 87,696 sf Storage= 182,615 cf

Plug-Flow detention time= 142.8 min calculated for 424,308 cf (100% of inflow)
 Center-of-Mass det. time= 140.8 min (966.9 - 826.0)

Volume	Invert	Avail.Storage	Storage Description		
#1	382.00'	610,998 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)
382.00	36,540	1,177.0	0	0	36,540
384.00	81,987	1,579.0	115,507	115,507	124,748
386.00	96,790	1,622.0	178,572	294,080	136,159
388.00	108,795	1,657.0	205,468	499,548	145,863
389.00	114,127	1,679.0	111,450	610,998	151,937

Device	Routing	Invert	Outlet Devices
#1	Primary	382.00'	36.0" Round Culvert L= 158.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 382.00' / 380.00' S= 0.0127 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf

Primary OutFlow Max=31.40 cfs @ 13.03 hrs HW=384.79' TW=0.00' (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 31.40 cfs @ 5.96 fps)

N60 Pre-Dev B

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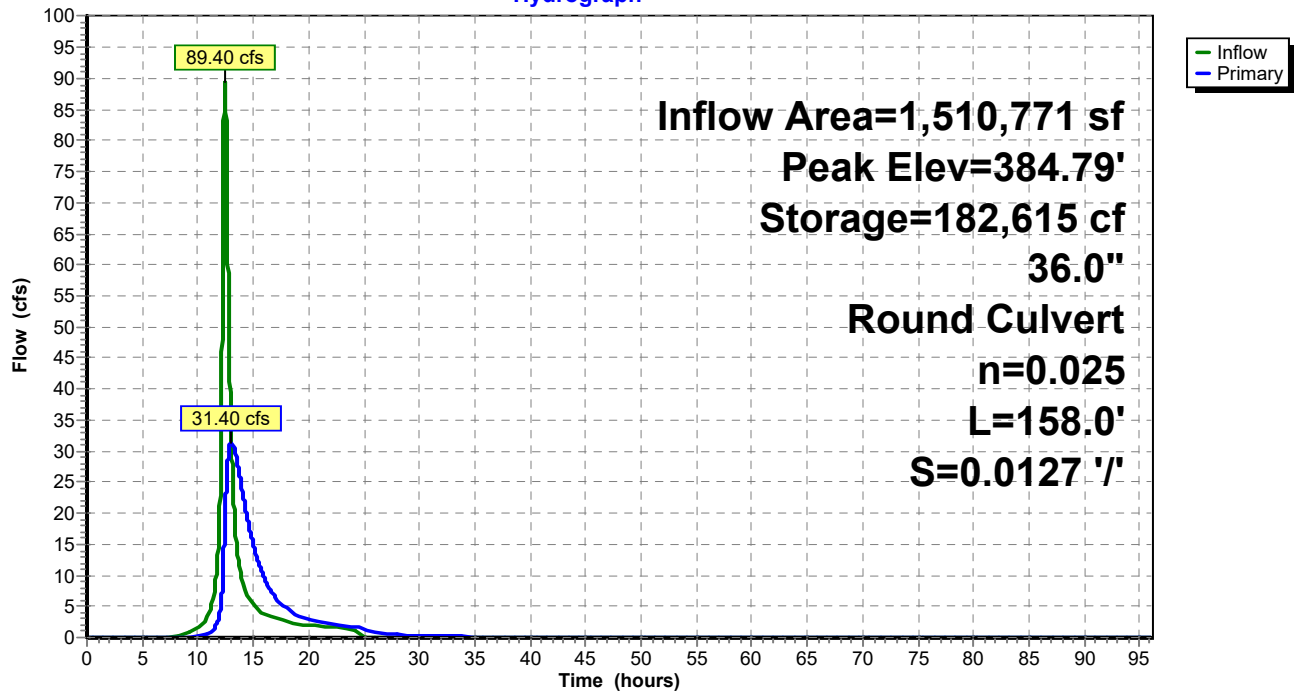
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NRCC 24-hr A 10-yr Rainfall=5.12"

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Pond 5: Offsite Pond B

Hydrograph



N60 Pre-Dev B

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 6: Pre B

Runoff = 50.08 cfs @ 12.42 hrs, Volume= 221,873 cf, Depth= 2.13"

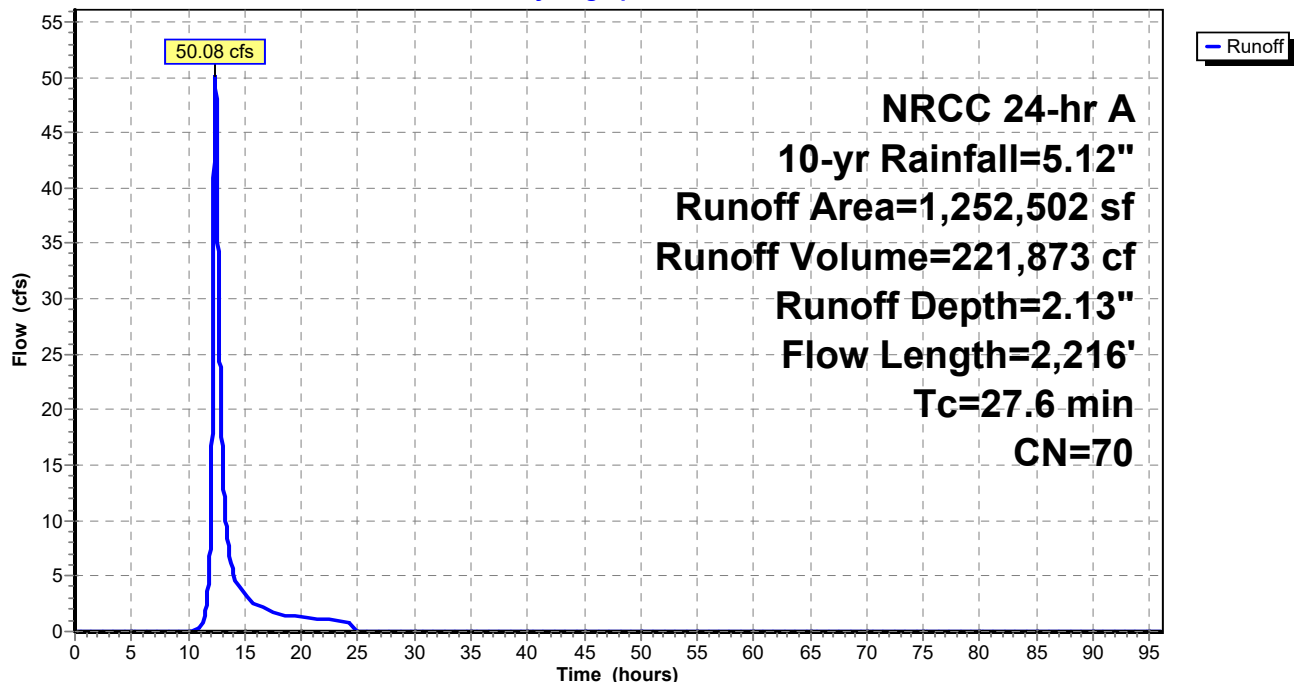
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
31,823	61	>75% Grass cover, Good, HSG B
32,077	55	Woods, Good, HSG B
38,670	91	Newly graded area, HSG C
18,832	91	Newly graded area, HSG C
1,131,100	70	Woods, Good, HSG C
1,252,502	70	Weighted Average
1,252,502		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0400	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	64	0.1875	6.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.8	2,052	0.0663	2.90	5.79	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
27.6	2,216	Total			

Subcatchment 6: Pre B

Hydrograph



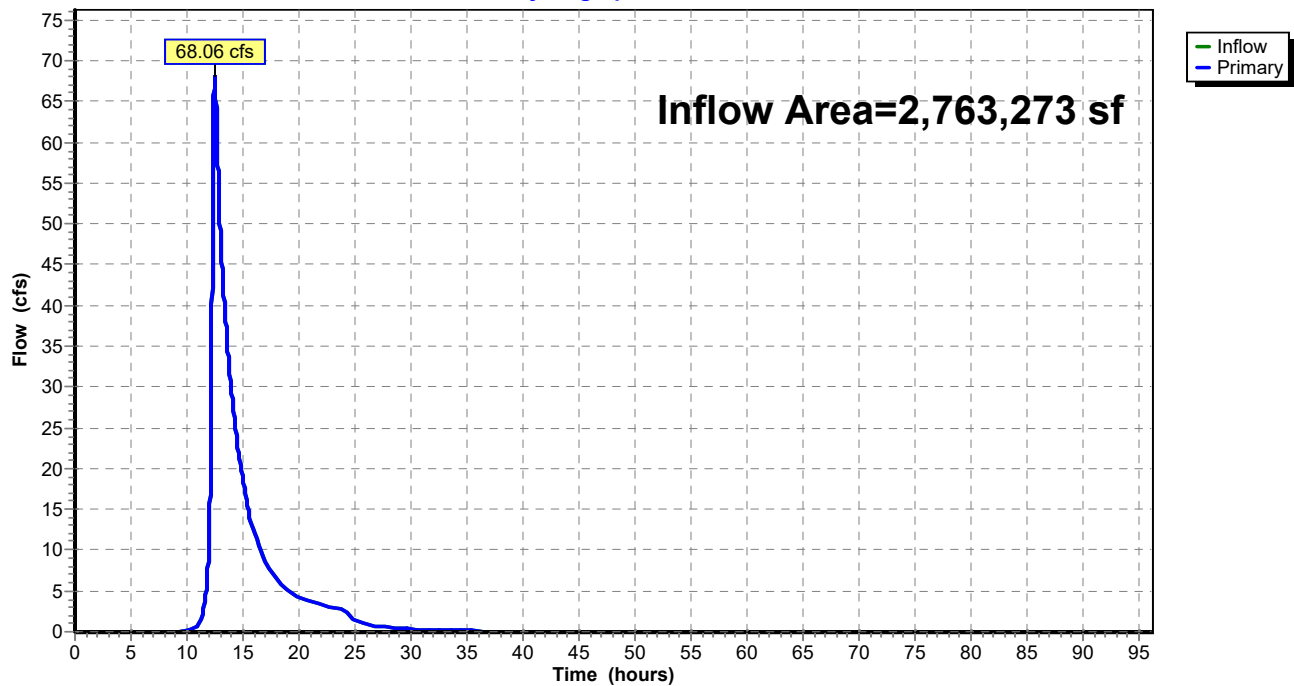
Summary for Link 7: Design Point B

Inflow Area = 2,763,273 sf, 17.63% Impervious, Inflow Depth = 2.81" for 10-yr event
 Inflow = 68.06 cfs @ 12.48 hrs, Volume= 646,182 cf
 Primary = 68.06 cfs @ 12.48 hrs, Volume= 646,182 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 7: Design Point B

Hydrograph



N60 Pre-Dev B

NRCC 24-hr A 25-yr Rainfall=6.46"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment4: B0 (Offsite)Runoff Area=1,510,771 sf 32.24% Impervious Runoff Depth=4.63"
Flow Length=1,871' Tc=32.3 min CN=84 Runoff=121.32 cfs 582,745 cf**Pond 5: Offsite Pond B**Peak Elev=385.54' Storage=249,913 cf Inflow=121.32 cfs 582,745 cf
36.0" Round Culvert n=0.025 L=158.0' S=0.0127 '/' Outflow=41.02 cfs 581,464 cf**Subcatchment6: Pre B**Runoff Area=1,252,502 sf 0.00% Impervious Runoff Depth=3.17"
Flow Length=2,216' Tc=27.6 min CN=70 Runoff=75.66 cfs 331,347 cf**Link 7: Design Point B**Inflow=101.38 cfs 912,811 cf
Primary=101.38 cfs 912,811 cf**Total Runoff Area = 2,763,273 sf Runoff Volume = 914,091 cf Average Runoff Depth = 3.97"**
82.37% Pervious = 2,276,217 sf 17.63% Impervious = 487,056 sf

N60 Pre-Dev B

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 4: B0 (Offsite)

Runoff = 121.32 cfs @ 12.45 hrs, Volume= 582,745 cf, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
487,056	98	Paved parking, HSG C
497,987	77	Woods, Good, HSG D
134,328	70	Woods, Good, HSG C
375,457	80	>75% Grass cover, Good, HSG D
15,943	74	>75% Grass cover, Good, HSG C
1,510,771	84	Weighted Average
1,023,715		67.76% Pervious Area
487,056		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
9.5	848	0.0085	1.48		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	856	0.0093	2.78	3.06	Trap/Vee/Rect Channel Flow, Bot.W=3.00' D=0.33' Z= 1.0 '/' Top.W=3.66' n= 0.022 Earth, clean & straight
0.2	67	0.0150	6.66	64.08	Pipe Channel, 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.025 Corrugated metal
32.3	1,871	Total			

N60 Pre-Dev B

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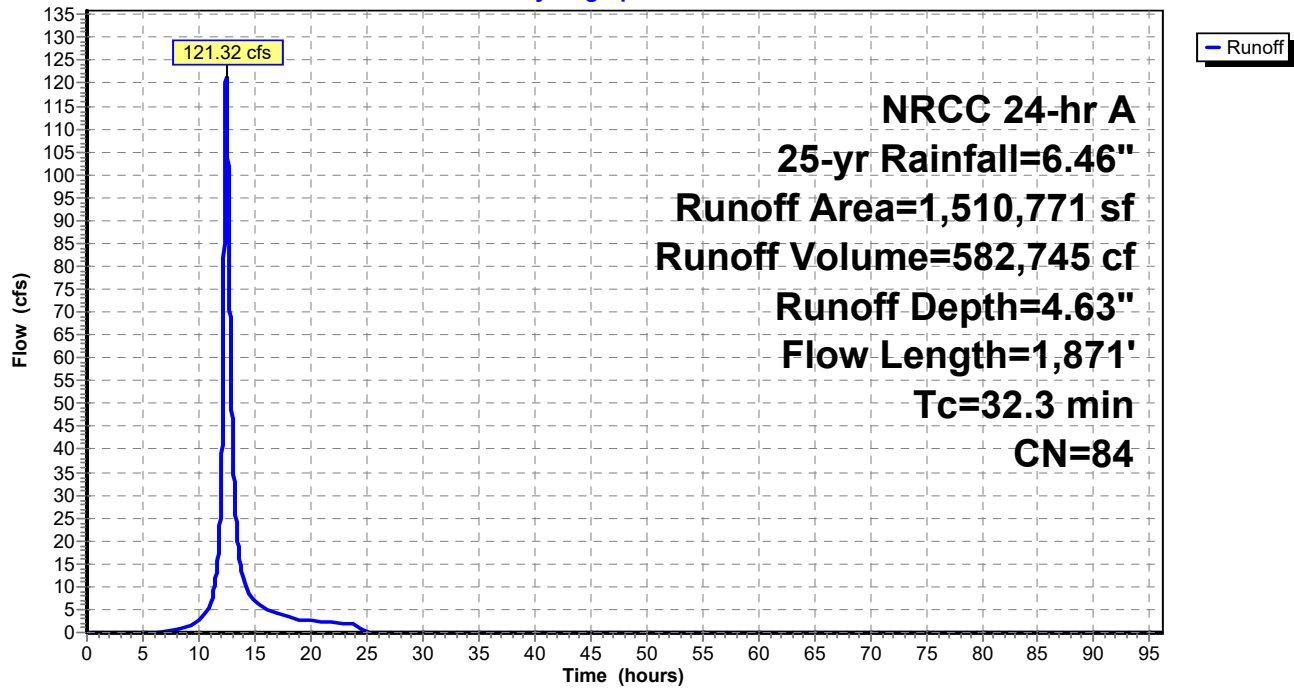
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NRCC 24-hr A 25-yr Rainfall=6.46"

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Subcatchment 4: B0 (Offsite)

Hydrograph



N60 Pre-Dev B

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 5: Offsite Pond B

Inflow Area = 1,510,771 sf, 32.24% Impervious, Inflow Depth = 4.63" for 25-yr event
 Inflow = 121.32 cfs @ 12.45 hrs, Volume= 582,745 cf
 Outflow = 41.02 cfs @ 13.04 hrs, Volume= 581,464 cf, Atten= 66%, Lag= 35.3 min
 Primary = 41.02 cfs @ 13.04 hrs, Volume= 581,464 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 385.54' @ 13.04 hrs Surf.Area= 93,240 sf Storage= 249,913 cf

Plug-Flow detention time= 132.1 min calculated for 581,464 cf (100% of inflow)
 Center-of-Mass det. time= 130.6 min (949.2 - 818.5)

Volume	Invert	Avail.Storage	Storage Description		
#1	382.00'	610,998 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)
382.00	36,540	1,177.0	0	0	36,540
384.00	81,987	1,579.0	115,507	115,507	124,748
386.00	96,790	1,622.0	178,572	294,080	136,159
388.00	108,795	1,657.0	205,468	499,548	145,863
389.00	114,127	1,679.0	111,450	610,998	151,937

Device	Routing	Invert	Outlet Devices
#1	Primary	382.00'	36.0" Round Culvert L= 158.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 382.00' / 380.00' S= 0.0127 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf

Primary OutFlow Max=41.02 cfs @ 13.04 hrs HW=385.54' TW=0.00' (Dynamic Tailwater)
 1=Culvert (Barrel Controls 41.02 cfs @ 6.21 fps)

N60 Pre-Dev B

Prepared by {enter your company name here}

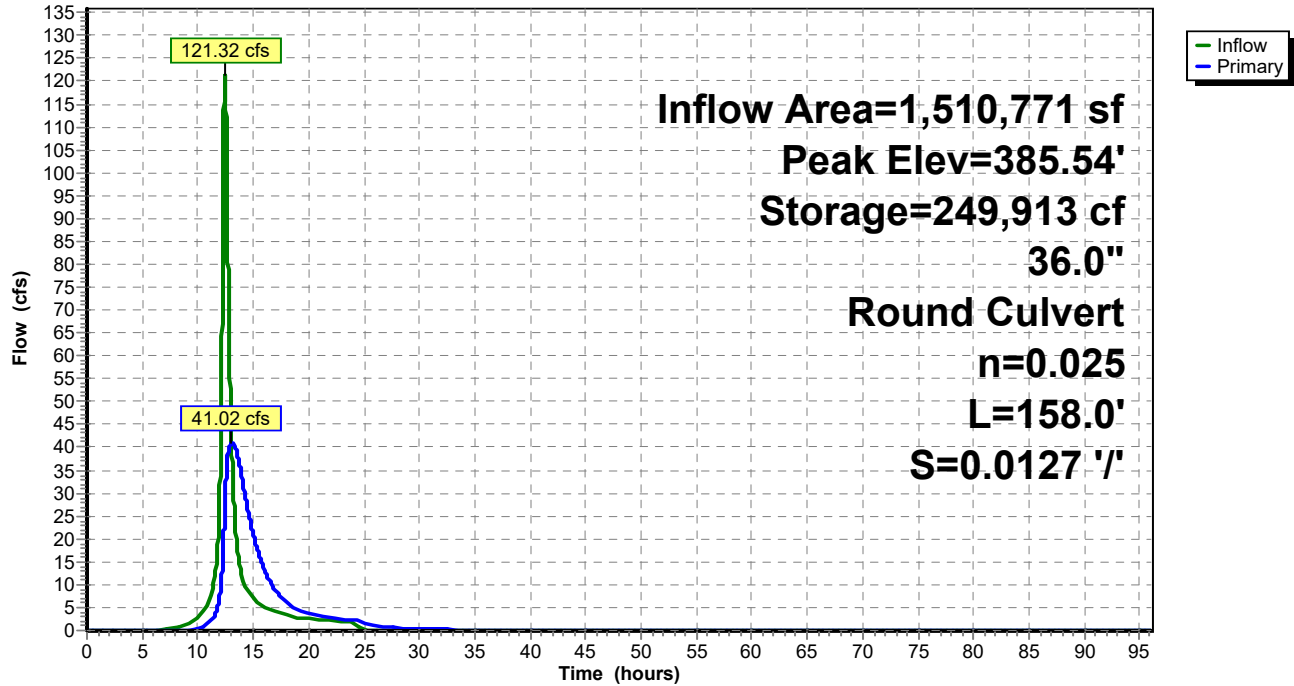
HydroCAD® 10.00-24 s/n 02226 © 2018 HydroCAD Software Solutions LLC

NRCC 24-hr A 25-yr Rainfall=6.46"

Printed 3/25/2020

Pond 5: Offsite Pond B

Hydrograph



N60 Pre-Dev B

Prepared by {enter your company name here}

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NRCC 24-hr A 25-yr Rainfall=6.46"

Printed 3/25/2020

Summary for Subcatchment 6: Pre B

Runoff = 75.66 cfs @ 12.41 hrs, Volume= 331,347 cf, Depth= 3.17"

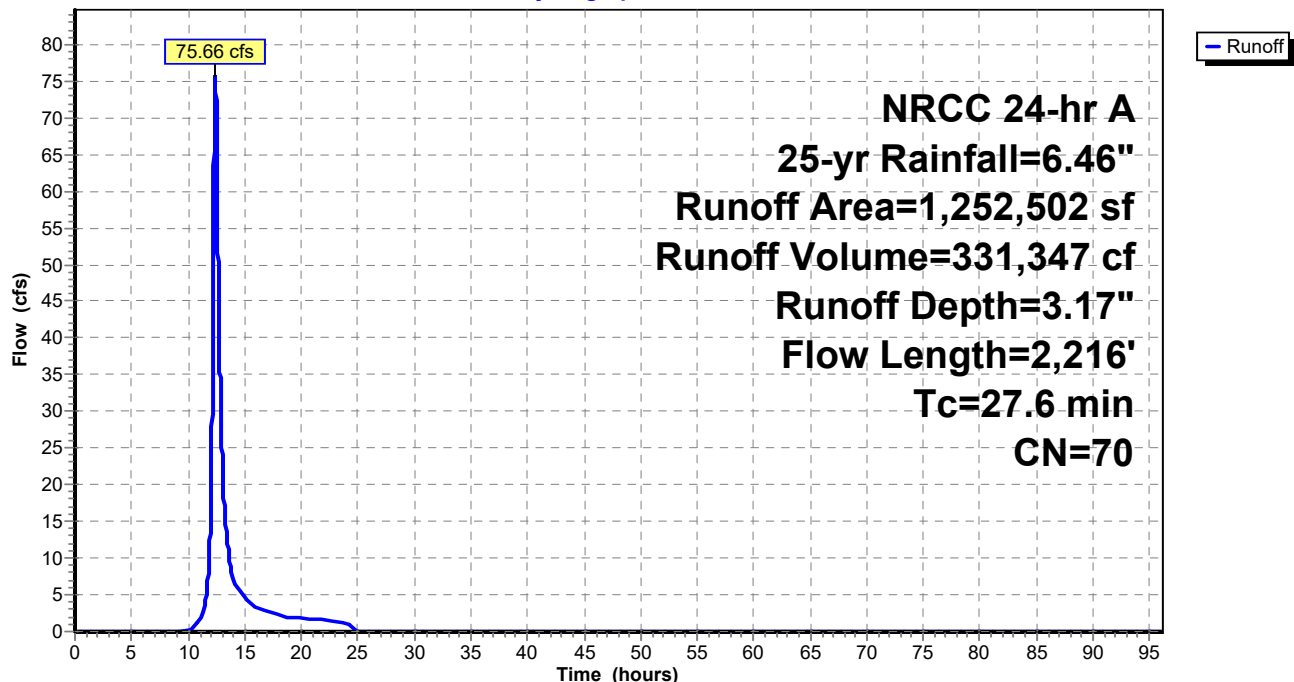
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
31,823	61	>75% Grass cover, Good, HSG B
32,077	55	Woods, Good, HSG B
38,670	91	Newly graded area, HSG C
18,832	91	Newly graded area, HSG C
1,131,100	70	Woods, Good, HSG C
1,252,502	70	Weighted Average
1,252,502		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0400	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	64	0.1875	6.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.8	2,052	0.0663	2.90	5.79	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
27.6	2,216	Total			

Subcatchment 6: Pre B

Hydrograph



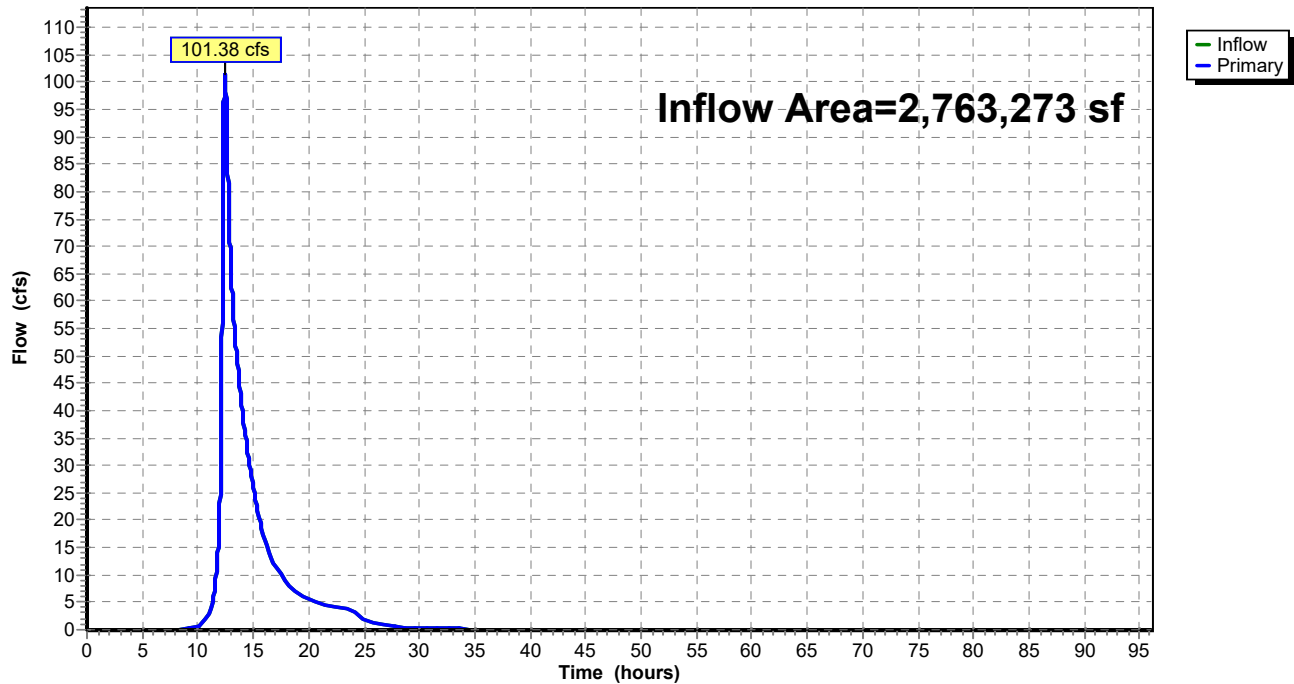
Summary for Link 7: Design Point B

Inflow Area = 2,763,273 sf, 17.63% Impervious, Inflow Depth = 3.96" for 25-yr event
 Inflow = 101.38 cfs @ 12.45 hrs, Volume= 912,811 cf
 Primary = 101.38 cfs @ 12.45 hrs, Volume= 912,811 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 7: Design Point B

Hydrograph



N60 Pre-Dev B

NRCC 24-hr A 50-yr Rainfall=7.70"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment4: B0 (Offsite)Runoff Area=1,510,771 sf 32.24% Impervious Runoff Depth=5.81"
Flow Length=1,871' Tc=32.3 min CN=84 Runoff=150.90 cfs 731,166 cf**Pond 5: Offsite Pond B**Peak Elev=386.31' Storage=324,023 cf Inflow=150.90 cfs 731,166 cf
36.0" Round Culvert n=0.025 L=158.0' S=0.0127 '/' Outflow=43.05 cfs 729,880 cf**Subcatchment6: Pre B**Runoff Area=1,252,502 sf 0.00% Impervious Runoff Depth=4.21"
Flow Length=2,216' Tc=27.6 min CN=70 Runoff=100.65 cfs 439,170 cf**Link 7: Design Point B**Inflow=133.15 cfs 1,169,050 cf
Primary=133.15 cfs 1,169,050 cf**Total Runoff Area = 2,763,273 sf Runoff Volume = 1,170,336 cf Average Runoff Depth = 5.08"**
82.37% Pervious = 2,276,217 sf 17.63% Impervious = 487,056 sf

N60 Pre-Dev B

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 4: B0 (Offsite)

Runoff = 150.90 cfs @ 12.45 hrs, Volume= 731,166 cf, Depth= 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
487,056	98	Paved parking, HSG C
497,987	77	Woods, Good, HSG D
134,328	70	Woods, Good, HSG C
375,457	80	>75% Grass cover, Good, HSG D
15,943	74	>75% Grass cover, Good, HSG C
1,510,771	84	Weighted Average
1,023,715		67.76% Pervious Area
487,056		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
9.5	848	0.0085	1.48		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	856	0.0093	2.78	3.06	Trap/Vee/Rect Channel Flow, Bot.W=3.00' D=0.33' Z= 1.0 '/' Top.W=3.66' n= 0.022 Earth, clean & straight
0.2	67	0.0150	6.66	64.08	Pipe Channel, 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.025 Corrugated metal
32.3	1,871	Total			

N60 Pre-Dev B

Prepared by {enter your company name here}

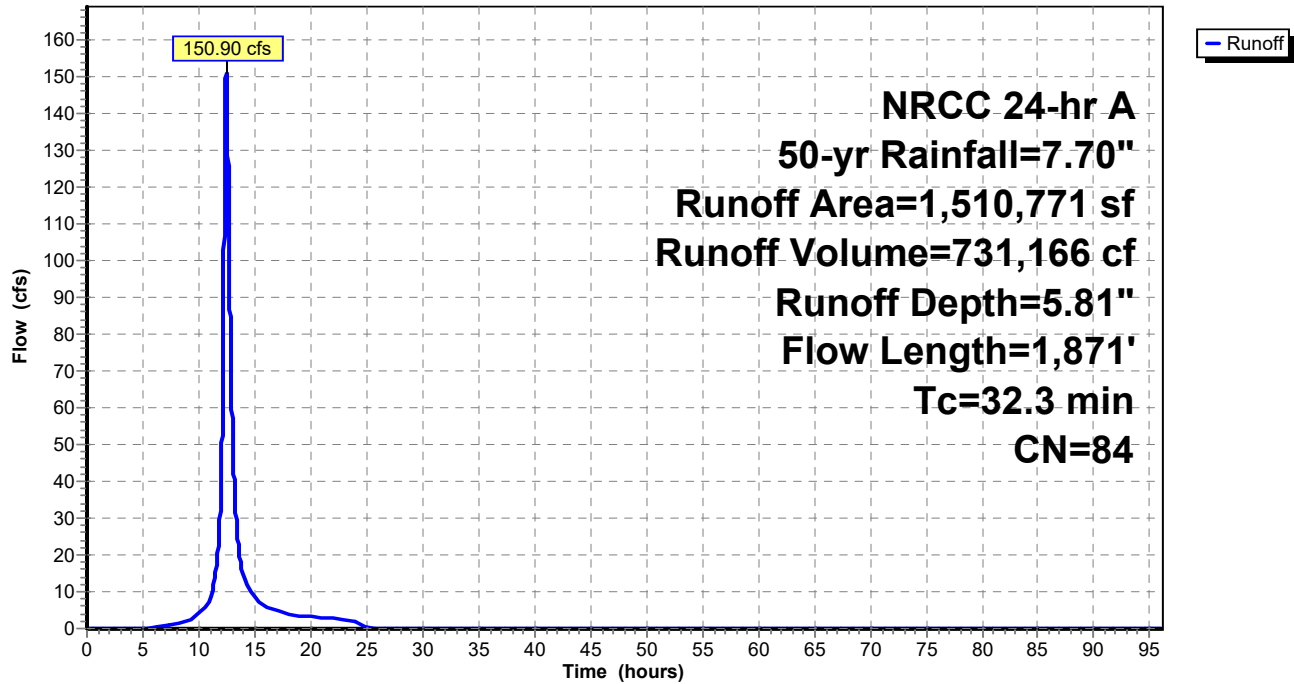
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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Subcatchment 4: B0 (Offsite)

Hydrograph



N60 Pre-Dev B

NRCC 24-hr A 50-yr Rainfall=7.70"

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Printed 3/25/2020

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Summary for Pond 5: Offsite Pond B

Inflow Area = 1,510,771 sf, 32.24% Impervious, Inflow Depth = 5.81" for 50-yr event
 Inflow = 150.90 cfs @ 12.45 hrs, Volume= 731,166 cf
 Outflow = 43.05 cfs @ 13.12 hrs, Volume= 729,880 cf, Atten= 71%, Lag= 40.3 min
 Primary = 43.05 cfs @ 13.12 hrs, Volume= 729,880 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 386.31' @ 13.12 hrs Surf.Area= 98,584 sf Storage= 324,023 cf

Plug-Flow detention time= 131.2 min calculated for 729,804 cf (100% of inflow)
 Center-of-Mass det. time= 130.5 min (943.6 - 813.2)

Volume	Invert	Avail.Storage	Storage Description		
#1	382.00'	610,998 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)
382.00	36,540	1,177.0	0	0	36,540
384.00	81,987	1,579.0	115,507	115,507	124,748
386.00	96,790	1,622.0	178,572	294,080	136,159
388.00	108,795	1,657.0	205,468	499,548	145,863
389.00	114,127	1,679.0	111,450	610,998	151,937

Device	Routing	Invert	Outlet Devices
#1	Primary	382.00'	36.0" Round Culvert L= 158.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 382.00' / 380.00' S= 0.0127 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf

Primary OutFlow Max=43.05 cfs @ 13.12 hrs HW=386.31' TW=0.00' (Dynamic Tailwater)
 ↑**1=Culvert** (Barrel Controls 43.05 cfs @ 6.09 fps)

N60 Pre-Dev B

Prepared by {enter your company name here}

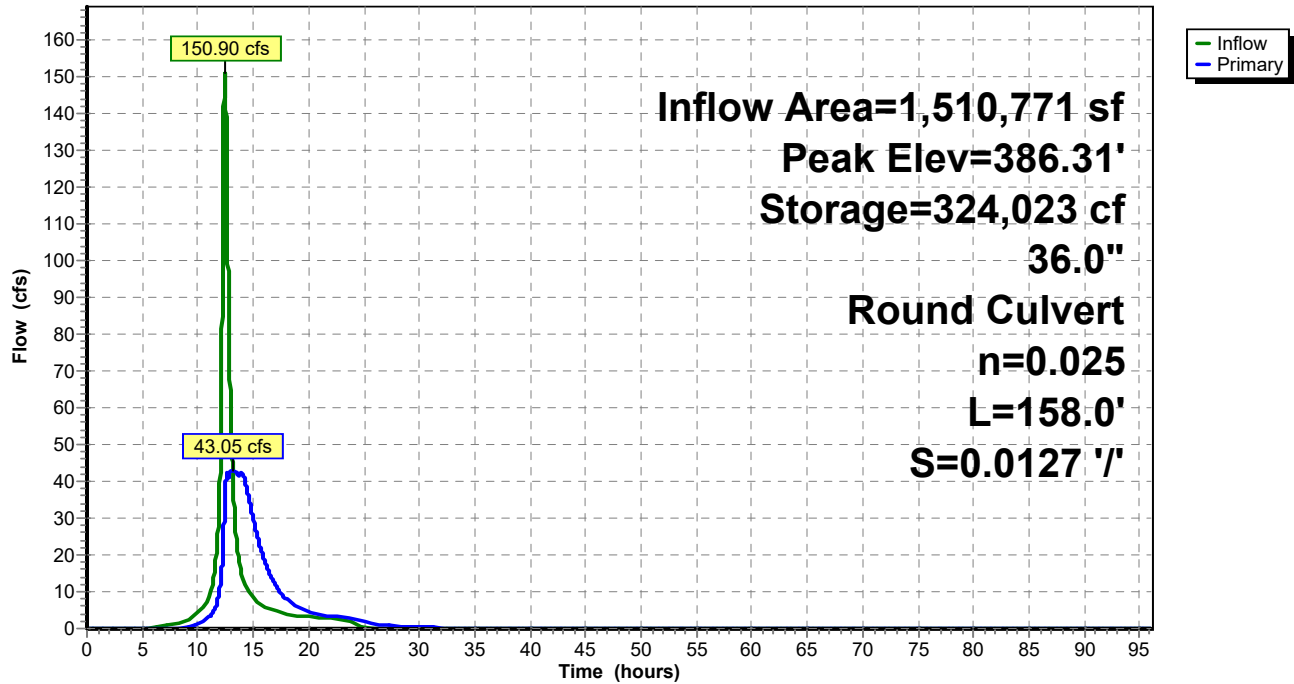
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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Pond 5: Offsite Pond B

Hydrograph



N60 Pre-Dev B

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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Summary for Subcatchment 6: Pre B

Runoff = 100.65 cfs @ 12.39 hrs, Volume= 439,170 cf, Depth= 4.21"

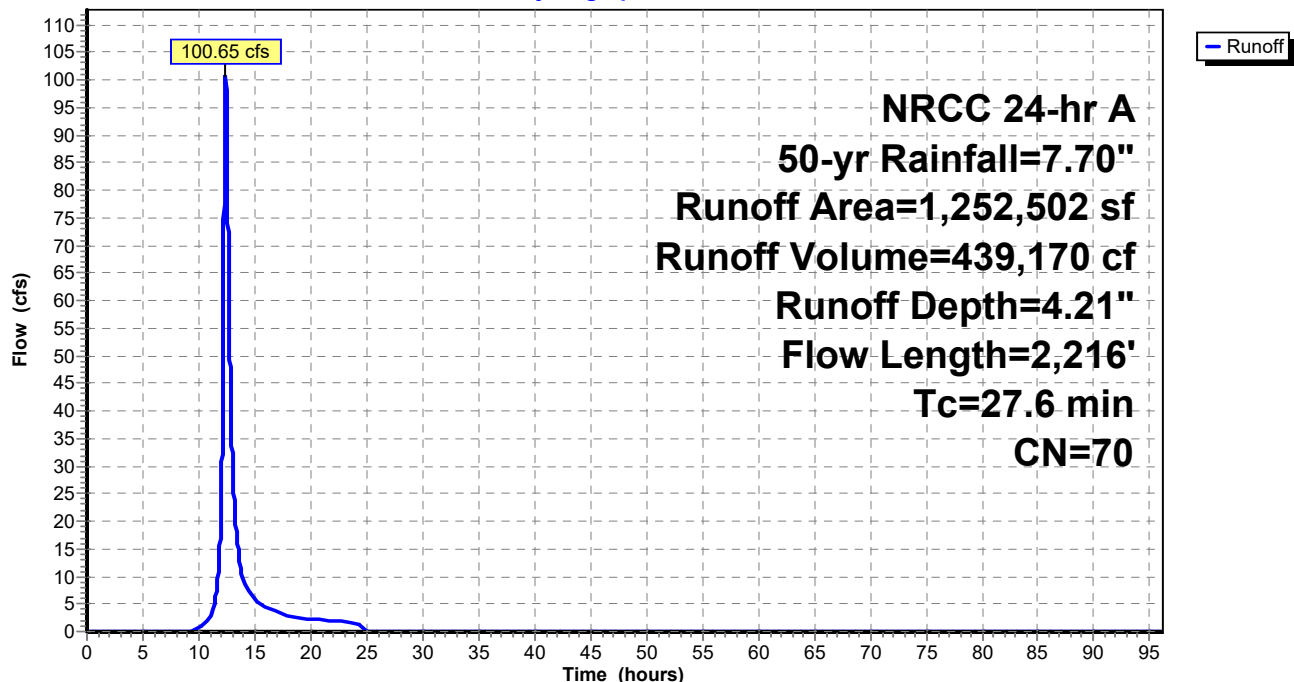
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
31,823	61	>75% Grass cover, Good, HSG B
32,077	55	Woods, Good, HSG B
38,670	91	Newly graded area, HSG C
18,832	91	Newly graded area, HSG C
1,131,100	70	Woods, Good, HSG C
1,252,502	70	Weighted Average
1,252,502		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0400	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	64	0.1875	6.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.8	2,052	0.0663	2.90	5.79	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
27.6	2,216	Total			

Subcatchment 6: Pre B

Hydrograph



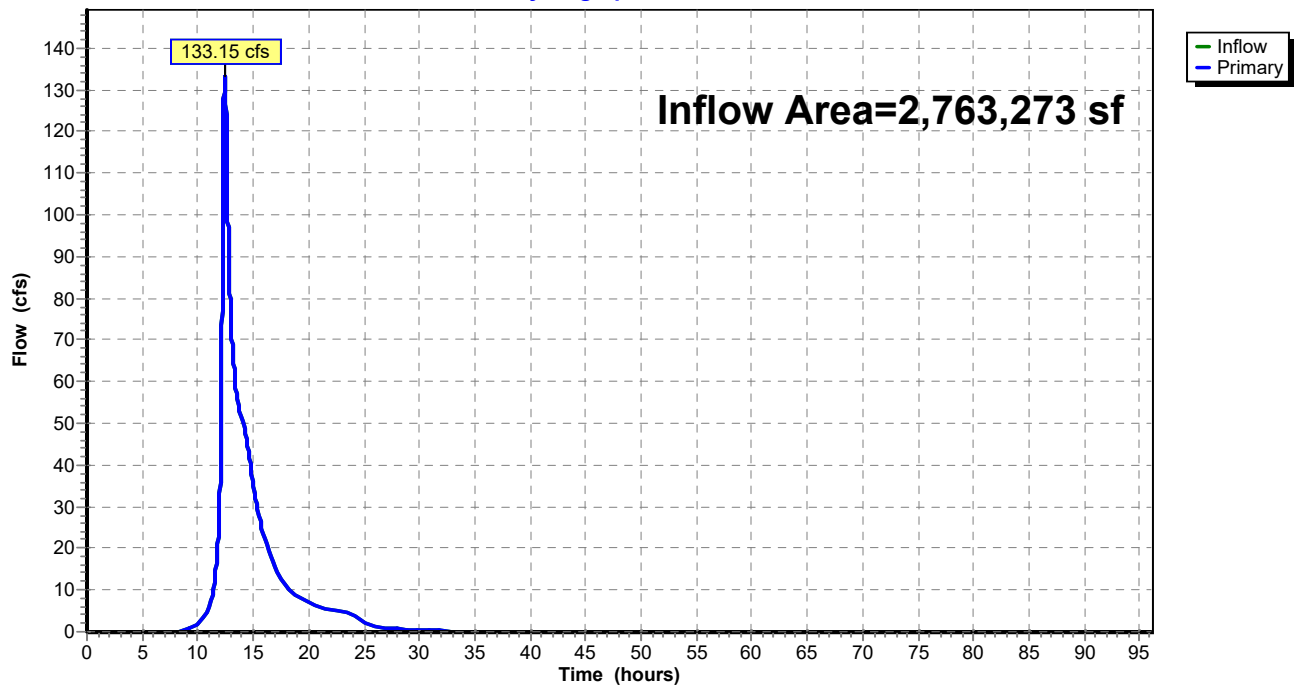
Summary for Link 7: Design Point B

Inflow Area = 2,763,273 sf, 17.63% Impervious, Inflow Depth = 5.08" for 50-yr event
Inflow = 133.15 cfs @ 12.42 hrs, Volume= 1,169,050 cf
Primary = 133.15 cfs @ 12.42 hrs, Volume= 1,169,050 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 7: Design Point B

Hydrograph



N60 Pre-Dev B

NRCC 24-hr A 100-yr Rainfall=9.18"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment4: B0 (Offsite)Runoff Area=1,510,771 sf 32.24% Impervious Runoff Depth=7.23"
Flow Length=1,871' Tc=32.3 min CN=84 Runoff=186.10 cfs 910,648 cf**Pond 5: Offsite Pond B**Peak Elev=387.20' Storage=414,374 cf Inflow=186.10 cfs 910,648 cf
36.0" Round Culvert n=0.025 L=158.0' S=0.0127 '/' Outflow=48.51 cfs 909,356 cf**Subcatchment6: Pre B**Runoff Area=1,252,502 sf 0.00% Impervious Runoff Depth=5.49"
Flow Length=2,216' Tc=27.6 min CN=70 Runoff=131.36 cfs 573,424 cf**Link 7: Design Point B**Inflow=170.39 cfs 1,482,781 cf
Primary=170.39 cfs 1,482,781 cf**Total Runoff Area = 2,763,273 sf Runoff Volume = 1,484,072 cf Average Runoff Depth = 6.44"**
82.37% Pervious = 2,276,217 sf 17.63% Impervious = 487,056 sf

N60 Pre-Dev B

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 4: B0 (Offsite)

Runoff = 186.10 cfs @ 12.45 hrs, Volume= 910,648 cf, Depth= 7.23"

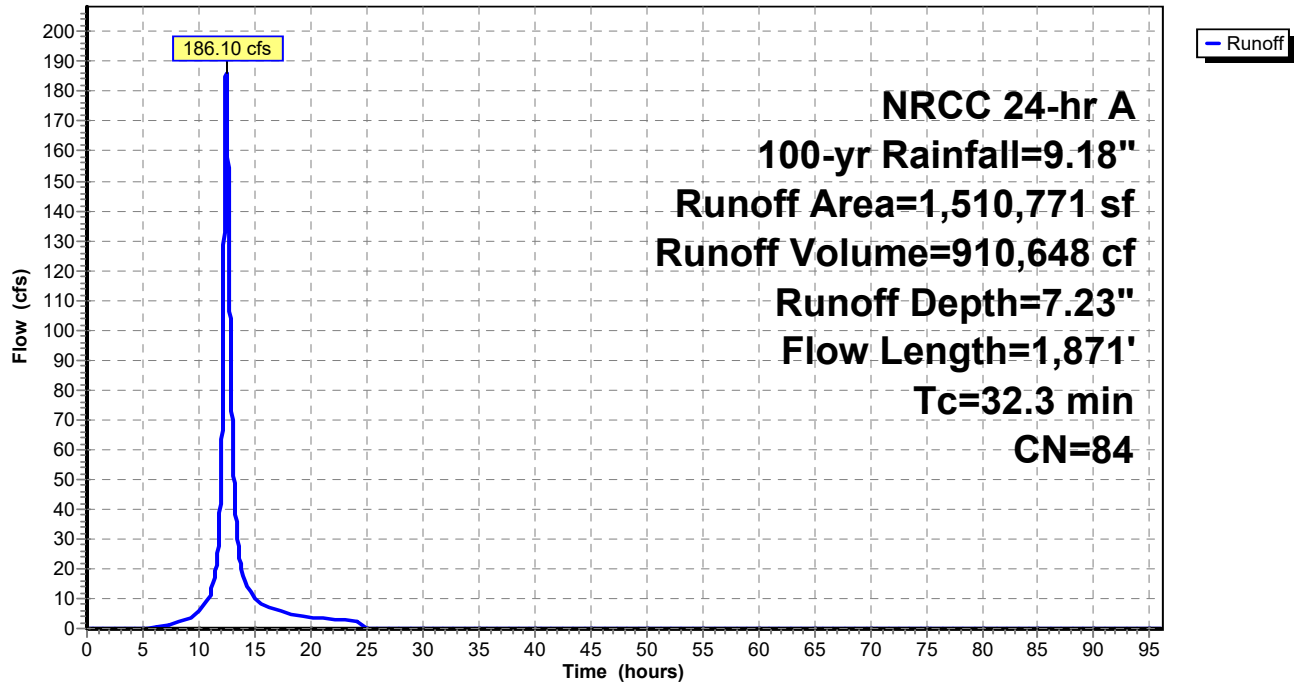
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
487,056	98	Paved parking, HSG C
497,987	77	Woods, Good, HSG D
134,328	70	Woods, Good, HSG C
375,457	80	>75% Grass cover, Good, HSG D
15,943	74	>75% Grass cover, Good, HSG C
1,510,771	84	Weighted Average
1,023,715		67.76% Pervious Area
487,056		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
9.5	848	0.0085	1.48		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	856	0.0093	2.78	3.06	Trap/Vee/Rect Channel Flow, Bot.W=3.00' D=0.33' Z= 1.0 '/' Top.W=3.66' n= 0.022 Earth, clean & straight
0.2	67	0.0150	6.66	64.08	Pipe Channel, 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.025 Corrugated metal
32.3	1,871	Total			

Subcatchment 4: B0 (Offsite)

Hydrograph



N60 Pre-Dev B

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 5: Offsite Pond B

Inflow Area = 1,510,771 sf, 32.24% Impervious, Inflow Depth = 7.23" for 100-yr event
 Inflow = 186.10 cfs @ 12.45 hrs, Volume= 910,648 cf
 Outflow = 48.51 cfs @ 13.17 hrs, Volume= 909,356 cf, Atten= 74%, Lag= 43.1 min
 Primary = 48.51 cfs @ 13.17 hrs, Volume= 909,356 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 387.20' @ 13.17 hrs Surf.Area= 103,903 sf Storage= 414,374 cf

Plug-Flow detention time= 134.0 min calculated for 909,261 cf (100% of inflow)
 Center-of-Mass det. time= 133.5 min (941.5 - 808.0)

Volume	Invert	Avail.Storage	Storage Description		
#1	382.00'	610,998 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)
382.00	36,540	1,177.0	0	0	36,540
384.00	81,987	1,579.0	115,507	115,507	124,748
386.00	96,790	1,622.0	178,572	294,080	136,159
388.00	108,795	1,657.0	205,468	499,548	145,863
389.00	114,127	1,679.0	111,450	610,998	151,937

Device	Routing	Invert	Outlet Devices
#1	Primary	382.00'	36.0" Round Culvert L= 158.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 382.00' / 380.00' S= 0.0127 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf

Primary OutFlow Max=48.51 cfs @ 13.17 hrs HW=387.20' TW=0.00' (Dynamic Tailwater)
 1=Culvert (Barrel Controls 48.51 cfs @ 6.86 fps)

N60 Pre-Dev B

Prepared by {enter your company name here}

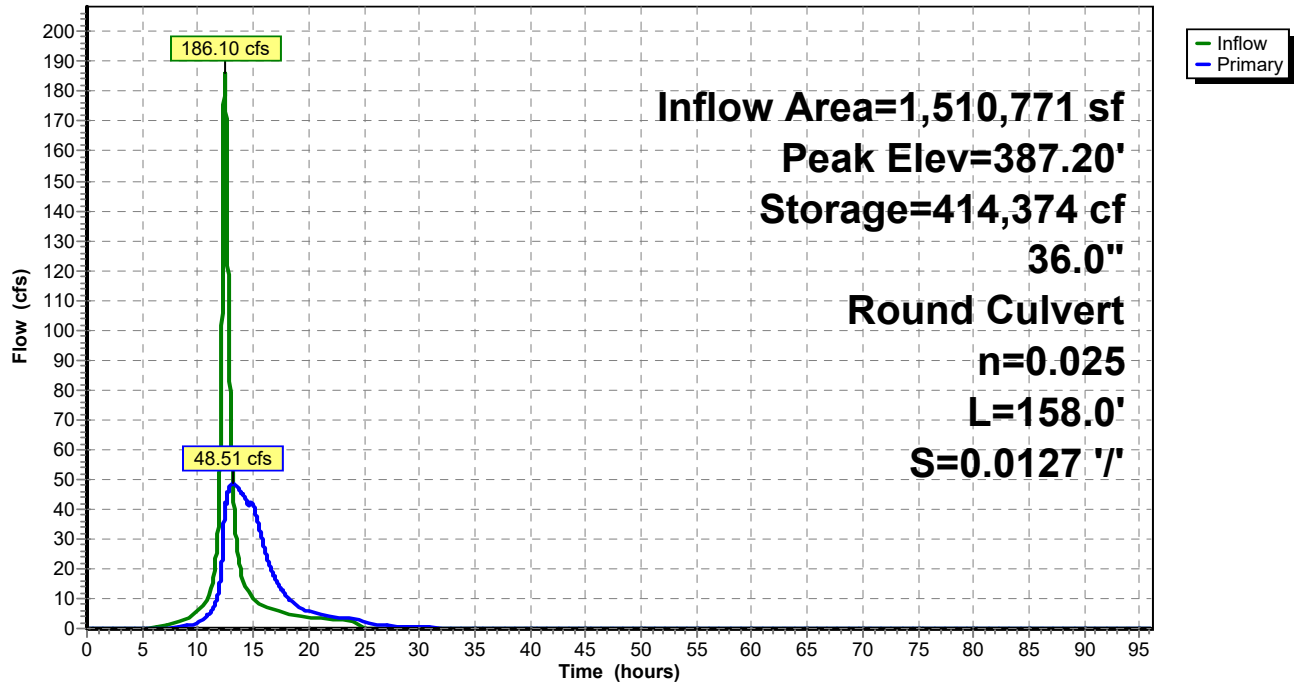
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NRCC 24-hr A 100-yr Rainfall=9.18"

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Pond 5: Offsite Pond B

Hydrograph



N60 Pre-Dev B

Prepared by {enter your company name here}

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NRCC 24-hr A 100-yr Rainfall=9.18"

Printed 3/25/2020

Summary for Subcatchment 6: Pre B

Runoff = 131.36 cfs @ 12.39 hrs, Volume= 573,424 cf, Depth= 5.49"

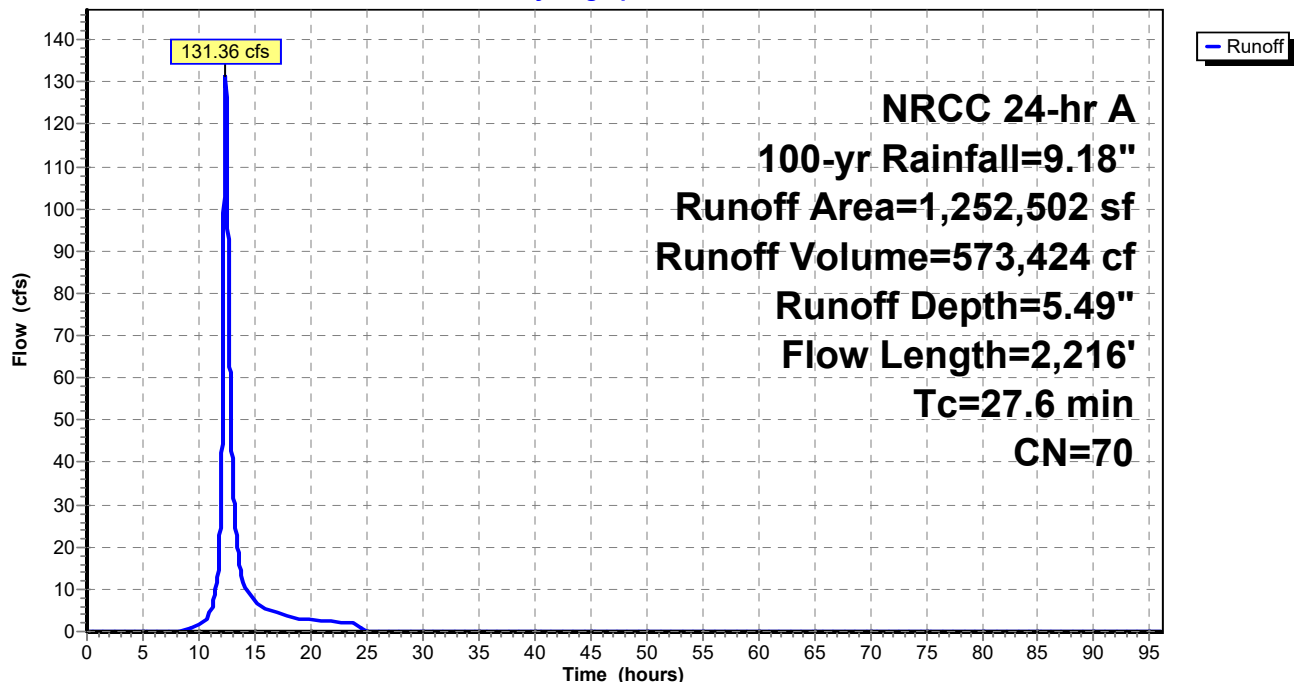
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
31,823	61	>75% Grass cover, Good, HSG B
32,077	55	Woods, Good, HSG B
38,670	91	Newly graded area, HSG C
18,832	91	Newly graded area, HSG C
1,131,100	70	Woods, Good, HSG C
1,252,502	70	Weighted Average
1,252,502		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0400	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	64	0.1875	6.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.8	2,052	0.0663	2.90	5.79	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
27.6	2,216	Total			

Subcatchment 6: Pre B

Hydrograph



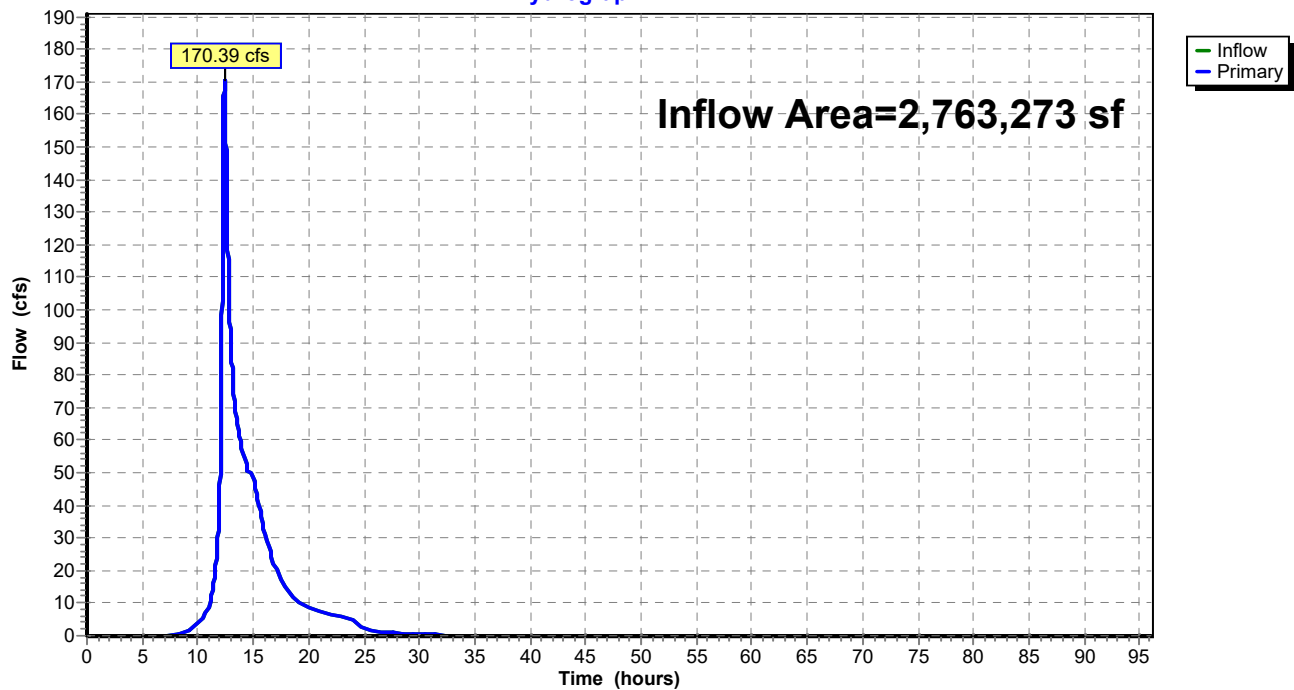
Summary for Link 7: Design Point B

Inflow Area = 2,763,273 sf, 17.63% Impervious, Inflow Depth = 6.44" for 100-yr event
Inflow = 170.39 cfs @ 12.42 hrs, Volume= 1,482,781 cf
Primary = 170.39 cfs @ 12.42 hrs, Volume= 1,482,781 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

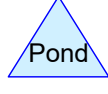
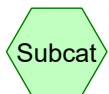
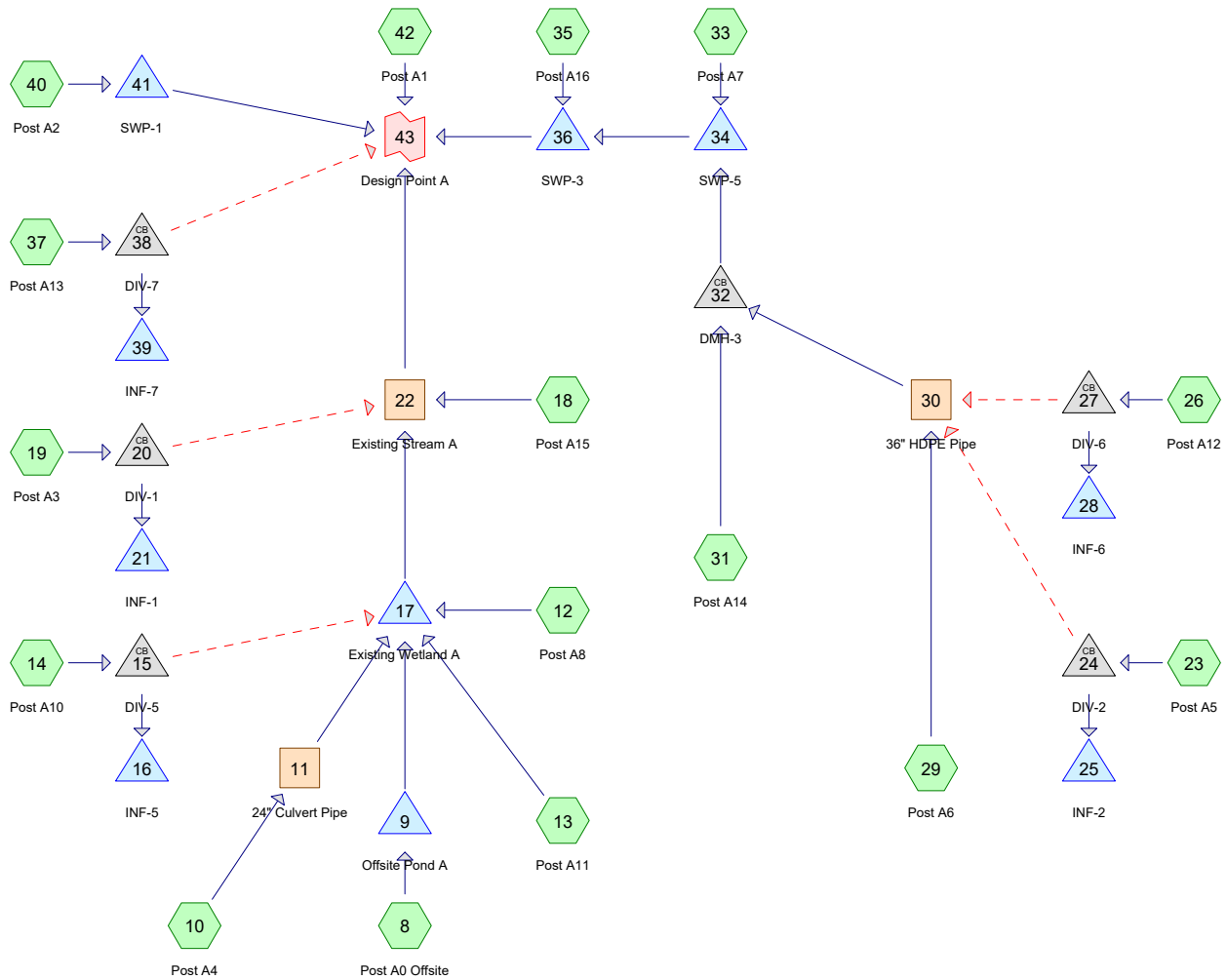
Link 7: Design Point B

Hydrograph





Appendix A-2:
Post-Development
HydroCAD Output Reports



Routing Diagram for North 60 Post A 3-9-20
 Prepared by {enter your company name here}, Printed 3/25/2020
 HydroCAD® 10.00-24 s/n 02226 © 2018 HydroCAD Software Solutions LLC

North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

Prepared by {enter your company name here}

Printed 3/25/2020

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 8: Post A0 OffsiteRunoff Area=1,115,060 sf 57.87% Impervious Runoff Depth=1.79"
Flow Length=1,018' Tc=12.5 min CN=90 Runoff=55.28 cfs 166,539 cf**Pond 9: Offsite Pond A**Peak Elev=360.61' Storage=63,532 cf Inflow=55.28 cfs 166,539 cf
Outflow=36.32 cfs 115,344 cf**Subcatchment 10: Post A4**Runoff Area=164,583 sf 10.25% Impervious Runoff Depth=0.88"
Flow Length=340' Tc=20.5 min CN=76 Runoff=3.04 cfs 12,019 cf**Reach 11: 24" Culvert Pipe**Avg. Flow Depth=0.39' Max Vel=7.11 fps Inflow=3.04 cfs 12,019 cf
24.0" Round Pipe n=0.013 L=112.0' S=0.0268 ' Capacity=37.02 cfs Outflow=3.04 cfs 12,019 cf**Subcatchment 12: Post A8**Runoff Area=210,459 sf 0.00% Impervious Runoff Depth=0.83"
Flow Length=503' Tc=17.8 min CN=75 Runoff=3.89 cfs 14,491 cf**Subcatchment 13: Post A11**Runoff Area=72,242 sf 63.67% Impervious Runoff Depth=1.79"
Tc=6.0 min CN=90 Runoff=4.58 cfs 10,790 cf**Subcatchment 14: Post A10**Runoff Area=304,098 sf 77.08% Impervious Runoff Depth=2.05"
Tc=6.0 min CN=93 Runoff=21.48 cfs 52,046 cf**Pond 15: DIV-5**Peak Elev=338.71' Inflow=21.48 cfs 52,046 cf
Primary=6.22 cfs 41,730 cf Secondary=15.26 cfs 10,316 cf Outflow=21.48 cfs 52,046 cf**Pond 16: INF-5**Peak Elev=336.72' Storage=10,420 cf Inflow=6.22 cfs 41,730 cf
Outflow=1.98 cfs 41,730 cf**Pond 17: Existing Wetland A**Peak Elev=324.09' Storage=6,502 cf Inflow=47.66 cfs 162,959 cf
36.0" Round Culvert n=0.013 L=168.0' S=0.0655 ' Outflow=42.89 cfs 162,959 cf**Subcatchment 18: Post A15**Runoff Area=424,570 sf 0.00% Impervious Runoff Depth=0.69"
Flow Length=270' Tc=5.3 min CN=72 Runoff=10.26 cfs 24,277 cf**Subcatchment 19: Post A3**Runoff Area=93,277 sf 100.00% Impervious Runoff Depth=2.56"
Tc=6.0 min CN=98 Runoff=7.47 cfs 19,893 cf**Pond 20: DIV-1**Peak Elev=327.19' Inflow=7.47 cfs 19,893 cf
Primary=5.59 cfs 19,342 cf Secondary=1.91 cfs 551 cf Outflow=7.47 cfs 19,893 cf**Pond 21: INF-1**Peak Elev=325.71' Storage=5,013 cf Inflow=5.59 cfs 19,342 cf
Outflow=1.18 cfs 19,342 cf**Reach 22: Existing Stream A**Avg. Flow Depth=0.98' Max Vel=7.82 fps Inflow=45.79 cfs 187,787 cf
n=0.040 L=1,360.0' S=0.0721 ' Capacity=291.69 cfs Outflow=45.43 cfs 187,787 cf**Subcatchment 23: Post A5**Runoff Area=92,926 sf 100.00% Impervious Runoff Depth=2.56"
Tc=6.0 min CN=98 Runoff=7.44 cfs 19,818 cf

North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

Prepared by {enter your company name here}

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Pond 24: DIV-2Peak Elev=368.16' Inflow=7.44 cfs 19,818 cf
Primary=6.11 cfs 19,483 cf Secondary=1.44 cfs 335 cf Outflow=7.44 cfs 19,818 cf**Pond 25: INF-2**Peak Elev=366.42' Storage=5,843 cf Inflow=6.11 cfs 19,483 cf
Outflow=0.99 cfs 19,483 cf**Subcatchment26: Post A12**Runoff Area=161,485 sf 51.68% Impervious Runoff Depth=1.48"
Flow Length=1,430' Tc=11.7 min CN=86 Runoff=6.87 cfs 19,971 cf**Pond 27: DIV-6**Peak Elev=364.73' Inflow=6.87 cfs 19,971 cf
Primary=4.40 cfs 18,629 cf Secondary=2.48 cfs 1,343 cf Outflow=6.87 cfs 19,971 cf**Pond 28: INF-6**Peak Elev=362.96' Storage=4,951 cf Inflow=4.40 cfs 18,629 cf
Outflow=1.24 cfs 18,629 cf**Subcatchment29: Post A6**Runoff Area=370,437 sf 77.45% Impervious Runoff Depth=2.05"
Tc=6.0 min CN=93 Runoff=26.17 cfs 63,400 cf**Reach 30: 36" HDPE Pipe**Avg. Flow Depth=0.90' Max Vel=15.93 fps Inflow=28.96 cfs 65,078 cf
36.0" Round Pipe n=0.013 L=805.0' S=0.0471 ' Capacity=144.80 cfs Outflow=28.59 cfs 65,078 cf**Subcatchment31: Post A14**Runoff Area=207,155 sf 90.56% Impervious Runoff Depth=2.35"
Tc=6.0 min CN=96 Runoff=15.95 cfs 40,492 cf**Pond 32: DMH-3**Peak Elev=319.90' Inflow=44.28 cfs 105,569 cf
36.0" Round Culvert x 2.00 n=0.013 L=190.0' S=0.0895 ' Outflow=44.28 cfs 105,569 cf**Subcatchment33: Post A7**Runoff Area=40,130 sf 0.00% Impervious Runoff Depth=0.48"
Flow Length=150' Tc=10.5 min CN=67 Runoff=0.46 cfs 1,619 cf**Pond 34: SWP-5**Peak Elev=302.52' Storage=36,255 cf Inflow=44.63 cfs 107,188 cf
Discarded=5.75 cfs 102,328 cf Primary=3.84 cfs 4,860 cf Outflow=9.60 cfs 107,188 cf**Subcatchment35: Post A16**Runoff Area=50,520 sf 0.00% Impervious Runoff Depth=0.52"
Flow Length=190' Tc=9.9 min CN=68 Runoff=0.67 cfs 2,195 cf**Pond 36: SWP-3**Peak Elev=256.21' Storage=1,555 cf Inflow=4.18 cfs 7,056 cf
Discarded=2.68 cfs 7,056 cf Primary=0.00 cfs 0 cf Outflow=2.68 cfs 7,056 cf**Subcatchment37: Post A13**Runoff Area=160,184 sf 76.47% Impervious Runoff Depth=1.96"
Tc=6.0 min CN=92 Runoff=10.94 cfs 26,209 cf**Pond 38: DIV-7**Peak Elev=315.95' Inflow=10.94 cfs 26,209 cf
Primary=3.99 cfs 22,151 cf Secondary=7.02 cfs 4,058 cf Outflow=10.94 cfs 26,209 cf**Pond 39: INF-7**Peak Elev=314.75' Storage=6,158 cf Inflow=3.99 cfs 22,151 cf
Outflow=1.07 cfs 22,151 cf**Subcatchment40: Post A2**Runoff Area=197,730 sf 24.29% Impervious Runoff Depth=1.04"
Flow Length=446' Tc=5.1 min CN=79 Runoff=7.68 cfs 17,093 cf**Pond 41: SWP-1**Peak Elev=235.94' Storage=23,395 cf Inflow=7.68 cfs 17,093 cf
Outflow=0.04 cfs 9,781 cf

North 60 Post A 3-9-20*NRCC 24-hr A 1-yr Rainfall=2.79"*

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Subcatchment42: Post A1

Runoff Area=20,740 sf 35.22% Impervious Runoff Depth=1.22"

Tc=6.0 min CN=82 Runoff=0.91 cfs 2,101 cf

Link 43: Design Point A

Inflow=45.67 cfs 203,727 cf

Primary=45.67 cfs 203,727 cf

Total Runoff Area = 3,685,596 sf Runoff Volume = 492,952 cf Average Runoff Depth = 1.61"
49.41% Pervious = 1,821,010 sf 50.59% Impervious = 1,864,586 sf

North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 8: Post A0 Offsite

Runoff = 55.28 cfs @ 12.20 hrs, Volume= 166,539 cf, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
645,334	98	Paved parking, HSG C
443,611	80	>75% Grass cover, Good, HSG D
23,572	74	>75% Grass cover, Good, HSG C
2,543	61	>75% Grass cover, Good, HSG B
1,115,060	90	Weighted Average
469,726		42.13% Pervious Area
645,334		57.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.6	148	0.0574	3.86		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	740	0.0270	10.25	32.22	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.015 Concrete sewer w/manholes & inlets
12.5	1,018	Total			

North 60 Post A 3-9-20

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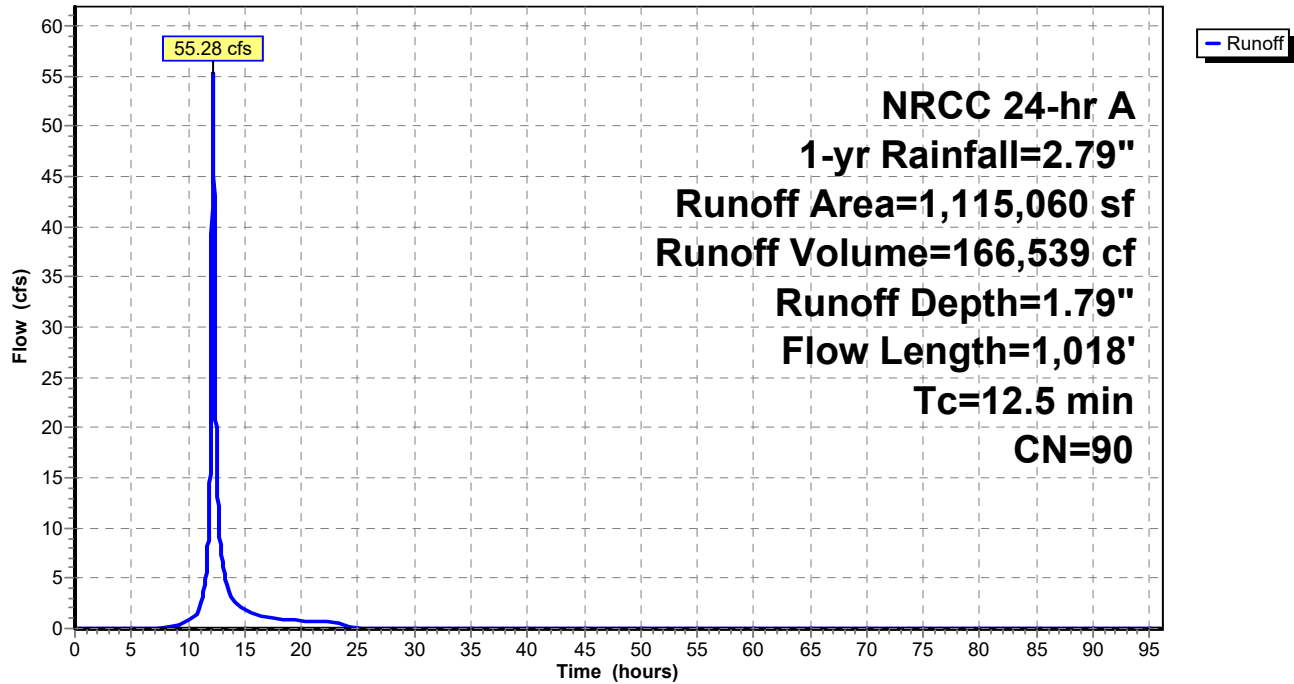
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NRCC 24-hr A 1-yr Rainfall=2.79"

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Subcatchment 8: Post A0 Offsite

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 9: Offsite Pond A

Inflow Area = 1,115,060 sf, 57.87% Impervious, Inflow Depth = 1.79" for 1-yr event
 Inflow = 55.28 cfs @ 12.20 hrs, Volume= 166,539 cf
 Outflow = 36.32 cfs @ 12.33 hrs, Volume= 115,344 cf, Atten= 34%, Lag= 7.3 min
 Primary = 36.32 cfs @ 12.33 hrs, Volume= 115,344 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 360.61' @ 12.33 hrs Surf.Area= 20,903 sf Storage= 63,532 cf

Plug-Flow detention time= 143.7 min calculated for 115,332 cf (69% of inflow)
 Center-of-Mass det. time= 59.3 min (869.2 - 810.0)

Volume	Invert	Avail.Storage	Storage Description
#1	357.00'	221,816 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)
357.00	14,633	679.0	0	0	14,633
358.00	16,652	698.0	15,632	15,632	16,826
359.00	17,534	715.0	17,091	32,723	18,864
360.00	19,427	745.0	18,472	51,195	22,425
362.00	24,453	804.0	43,784	94,979	29,861
364.00	28,701	854.0	53,097	148,076	36,663
365.00	36,602	901.0	32,572	180,648	43,285
366.00	45,910	1,262.0	41,168	221,816	105,432

Device	Routing	Invert	Outlet Devices
#1	Primary	357.00'	30.0" Round Culvert L= 125.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 357.00' / 351.00' S= 0.0480 ' S= 0.0480 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	360.00'	36.0" x 48.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	364.75'	150.0' long x 36.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=36.32 cfs @ 12.33 hrs HW=360.61' TW=323.98' (Dynamic Tailwater)

1=Culvert (Inlet Controls 36.32 cfs @ 7.40 fps)
 2=Orifice/Grate (Passes 36.32 cfs of 43.79 cfs potential flow)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

North 60 Post A 3-9-20

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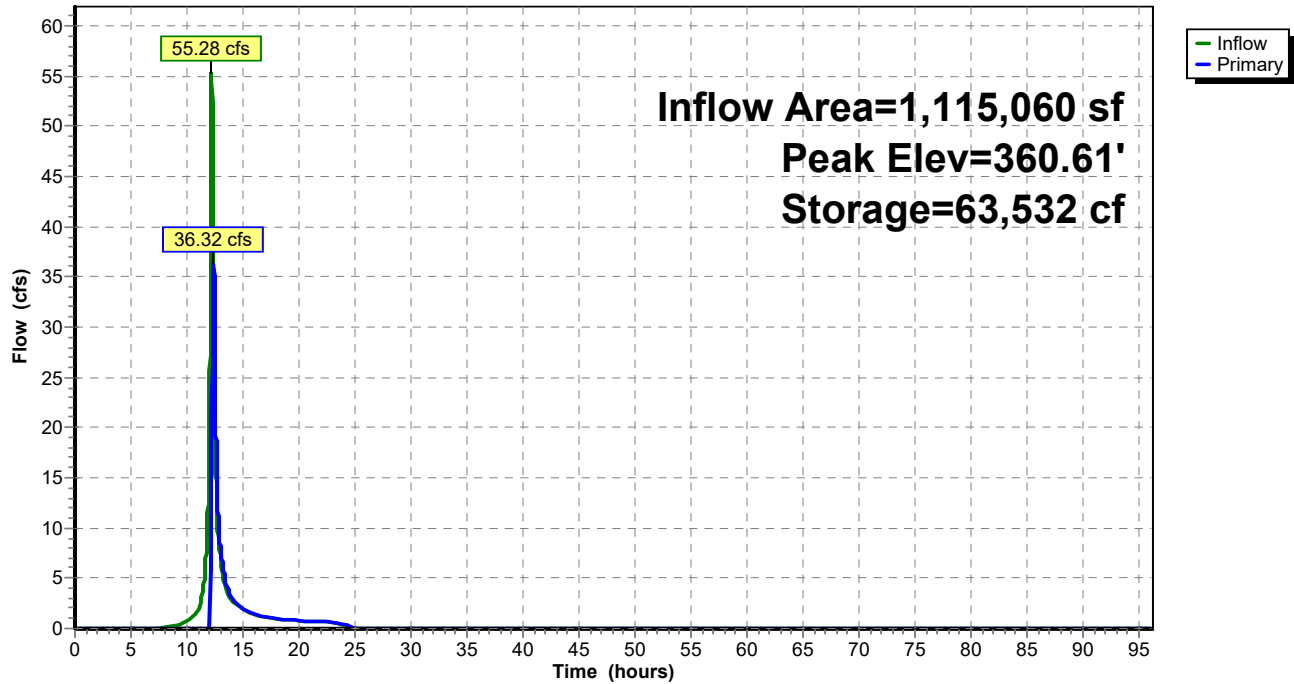
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NRCC 24-hr A 1-yr Rainfall=2.79"

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Pond 9: Offsite Pond A

Hydrograph



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Summary for Subcatchment 10: Post A4

Runoff = 3.04 cfs @ 12.32 hrs, Volume= 12,019 cf, Depth= 0.88"

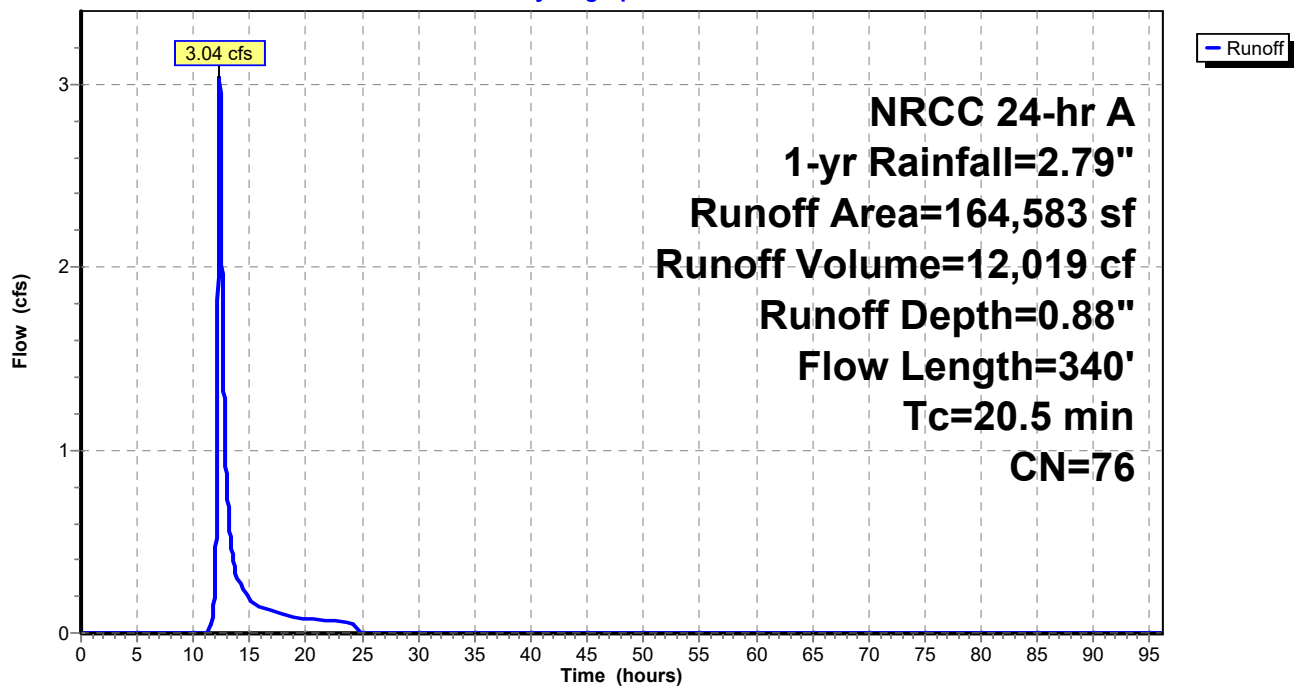
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
15,990	74	>75% Grass cover, Good, HSG C
65,271	70	Woods, Good, HSG C
66,457	77	Woods, Good, HSG D
16,865	98	Water Surface, HSG D
164,583	76	Weighted Average
147,718		89.75% Pervious Area
16,865		10.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0250	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.7	240	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
20.5	340	Total			

Subcatchment 10: Post A4

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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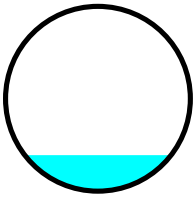
Summary for Reach 11: 24" Culvert Pipe

Inflow Area = 164,583 sf, 10.25% Impervious, Inflow Depth = 0.88" for 1-yr event
Inflow = 3.04 cfs @ 12.32 hrs, Volume= 12,019 cf
Outflow = 3.04 cfs @ 12.33 hrs, Volume= 12,019 cf, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.11 fps, Min. Travel Time= 0.3 min
Avg. Velocity= 2.80 fps, Avg. Travel Time= 0.7 min

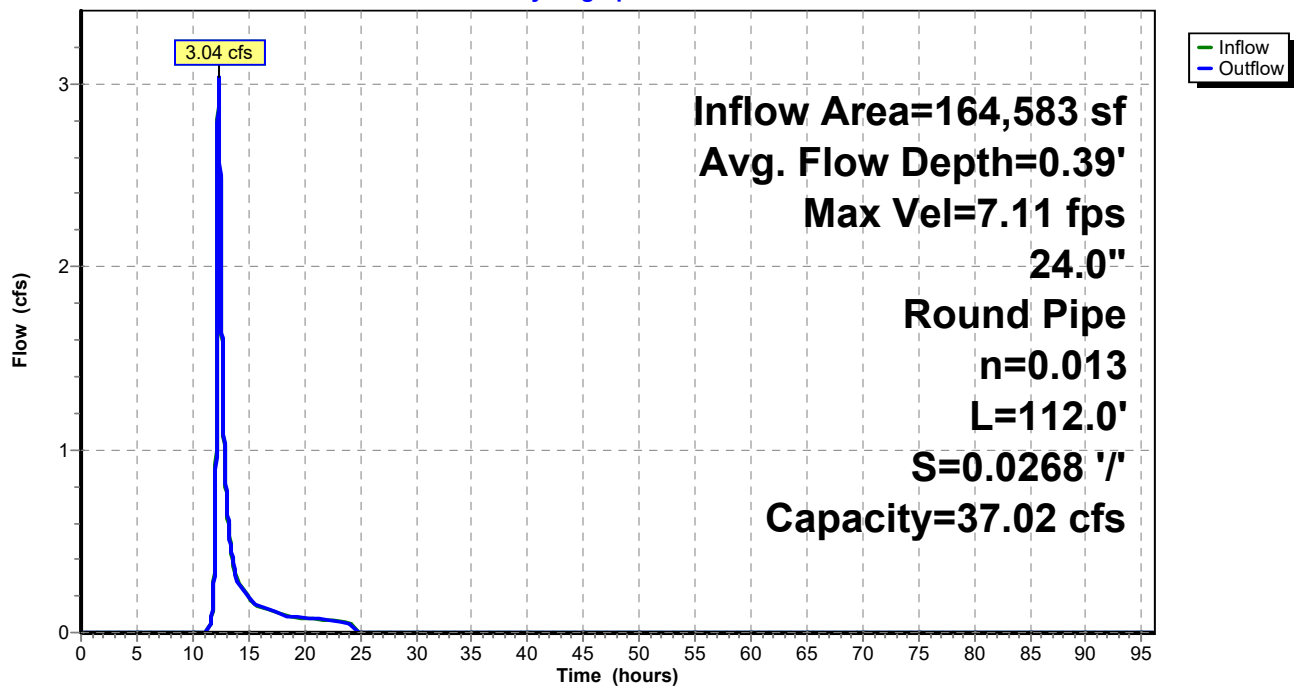
Peak Storage= 48 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.39'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 37.02 cfs

24.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 112.0' Slope= 0.0268 '/'
Inlet Invert= 349.00', Outlet Invert= 346.00'



Reach 11: 24" Culvert Pipe

Hydrograph



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Summary for Subcatchment 12: Post A8

Runoff = 3.89 cfs @ 12.28 hrs, Volume= 14,491 cf, Depth= 0.83"

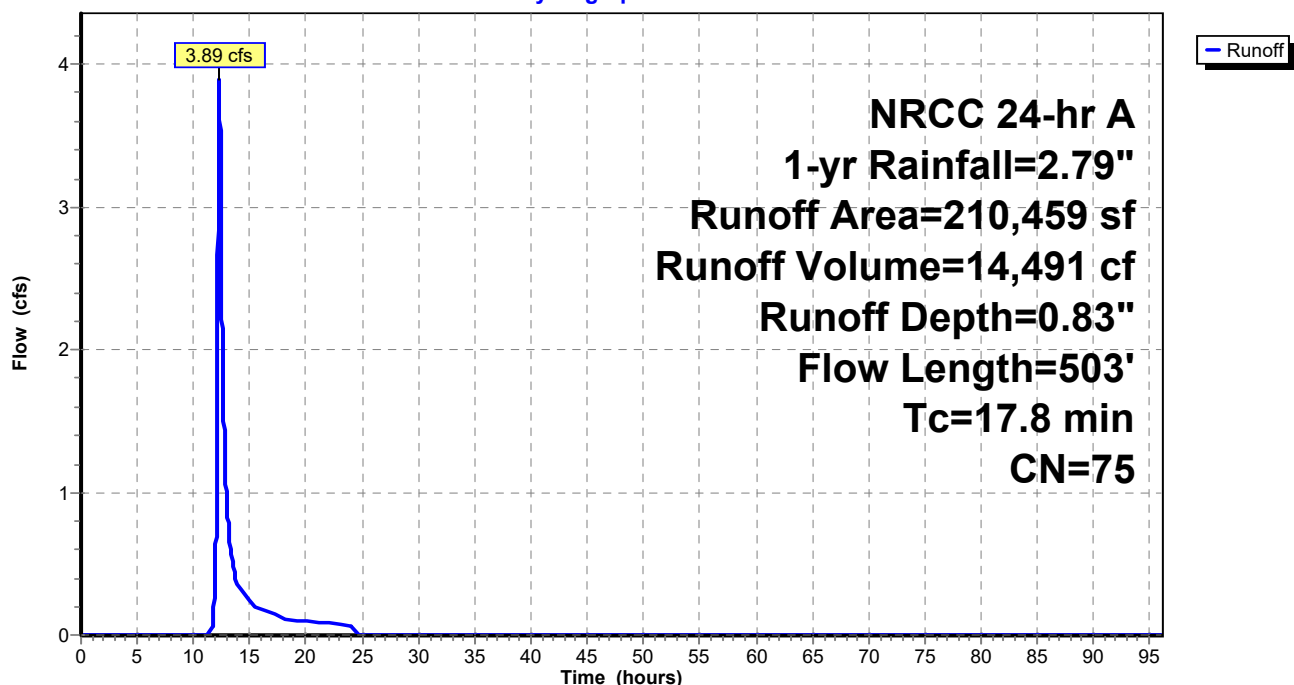
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
31,463	77	Woods, Good, HSG D
57,494	80	>75% Grass cover, Good, HSG D
63,009	70	Woods, Good, HSG C
58,493	74	>75% Grass cover, Good, HSG C
210,459	75	Weighted Average
210,459		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0400	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.4	305	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.8	98	0.0306	1.97	3.94	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
17.8	503	Total			

Subcatchment 12: Post A8

Hydrograph



North 60 Post A 3-9-20

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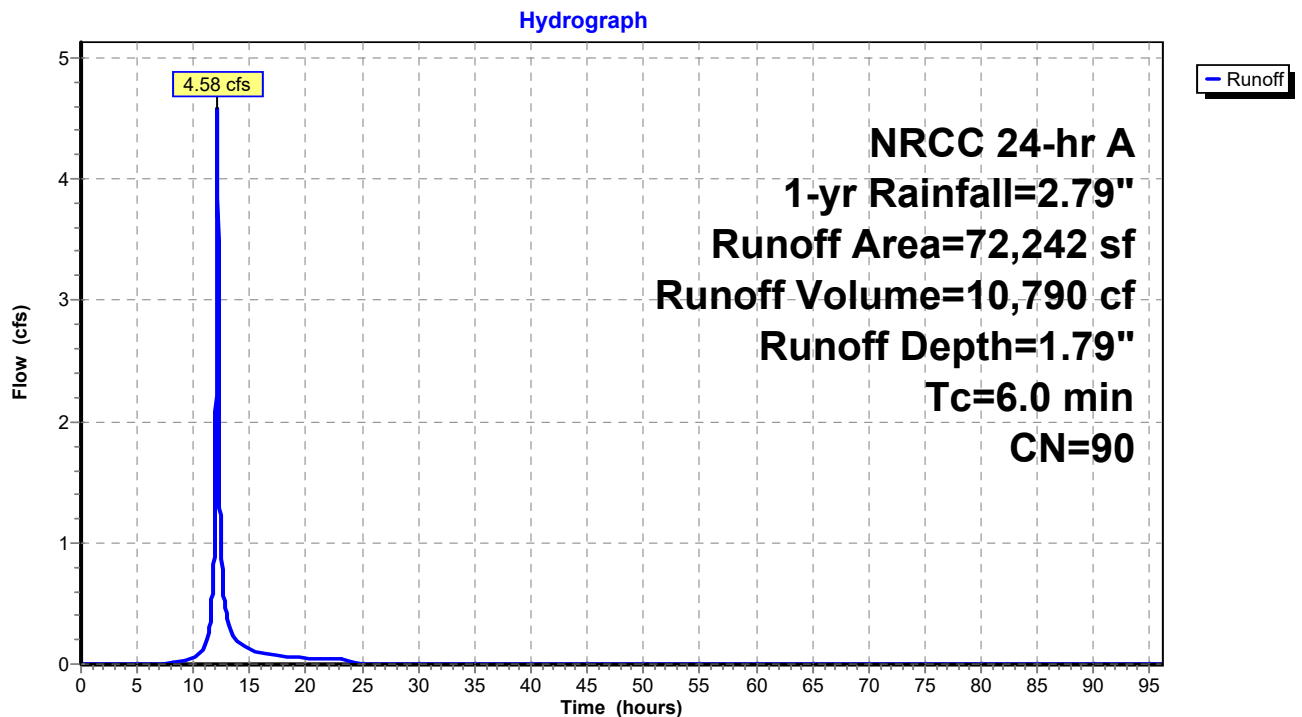
Summary for Subcatchment 13: Post A11

Runoff = 4.58 cfs @ 12.13 hrs, Volume= 10,790 cf, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
46,000	98	Paved parking, HSG C
16,765	74	>75% Grass cover, Good, HSG C
9,477	80	>75% Grass cover, Good, HSG D
72,242	90	Weighted Average
26,242		36.33% Pervious Area
46,000		63.67% Impervious Area

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

Subcatchment 13: Post A11

North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 14: Post A10

Runoff = 21.48 cfs @ 12.13 hrs, Volume= 52,046 cf, Depth= 2.05"

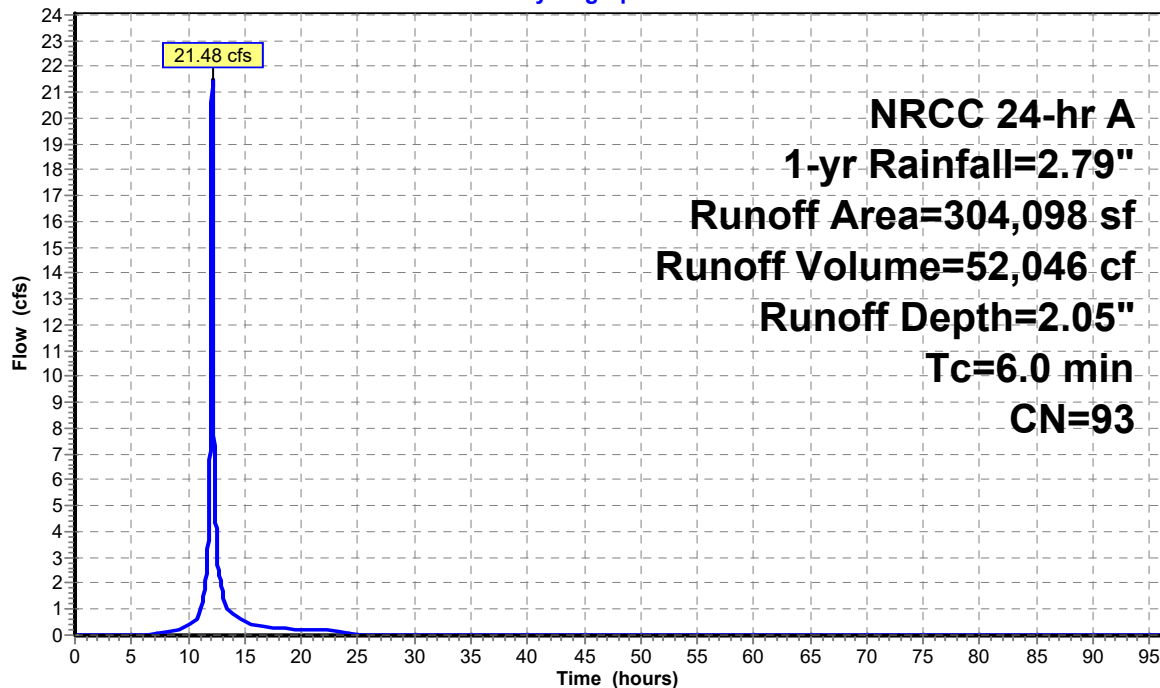
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
234,393	98	Paved parking, HSG C
56,515	74	>75% Grass cover, Good, HSG C
13,190	80	>75% Grass cover, Good, HSG D
304,098	93	Weighted Average
69,705		22.92% Pervious Area
234,393		77.08% Impervious Area

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

Subcatchment 14: Post A10

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 15: DIV-5

Inflow Area = 304,098 sf, 77.08% Impervious, Inflow Depth = 2.05" for 1-yr event
 Inflow = 21.48 cfs @ 12.13 hrs, Volume= 52,046 cf
 Outflow = 21.48 cfs @ 12.13 hrs, Volume= 52,046 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.22 cfs @ 12.13 hrs, Volume= 41,730 cf
 Secondary = 15.26 cfs @ 12.13 hrs, Volume= 10,316 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 338.71' @ 12.13 hrs

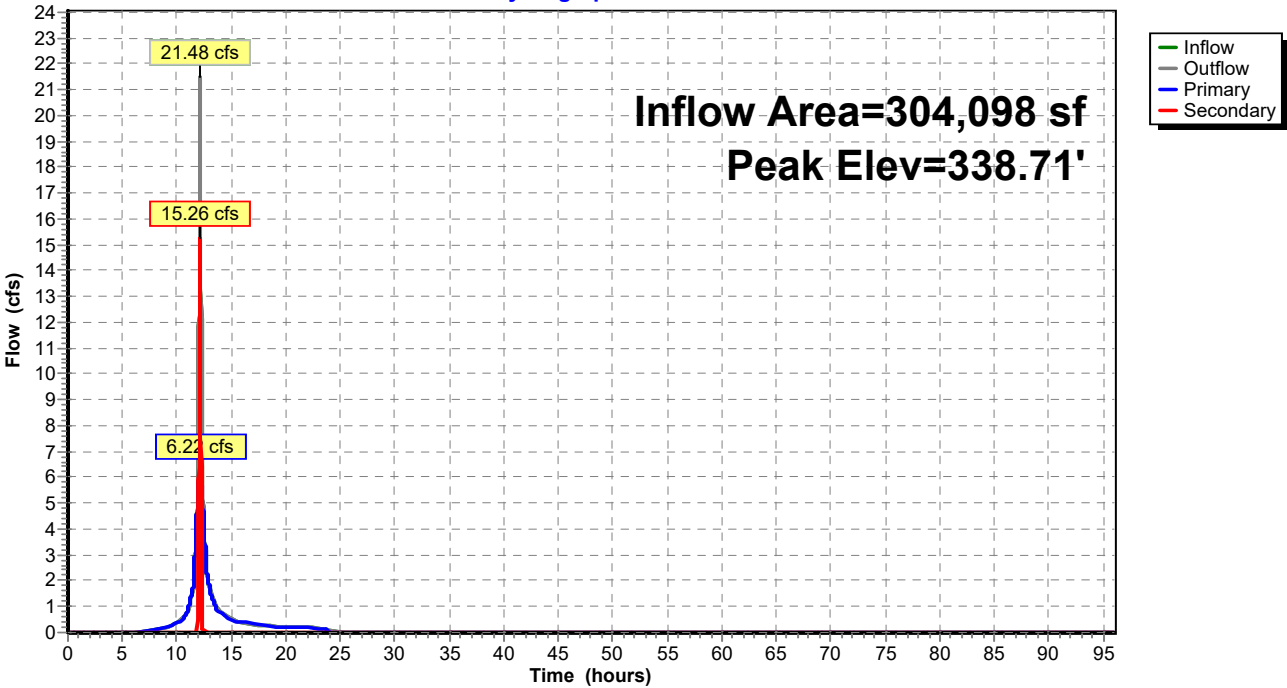
Flood Elev= 342.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	335.50'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 335.50' / 335.50' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	335.50'	36.0" Round Culvert L= 72.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 335.50' / 332.00' S= 0.0486 ' S= 0.0486 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Device 2	338.00'	8.0' 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=6.22 cfs @ 12.13 hrs HW=338.71' TW=335.99' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 6.22 cfs @ 7.92 fps)**Secondary OutFlow** Max=15.25 cfs @ 12.13 hrs HW=338.71' TW=322.79' (Dynamic Tailwater)↑ **2=Culvert** (Passes 15.25 cfs of 44.48 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 15.25 cfs @ 2.69 fps)

Pond 15: DIV-5

Hydrograph



North 60 Post A 3-9-20

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Summary for Pond 16: INF-5

Inflow Area = 304,098 sf, 77.08% Impervious, Inflow Depth = 1.65" for 1-yr event
 Inflow = 6.22 cfs @ 12.13 hrs, Volume= 41,730 cf
 Outflow = 1.98 cfs @ 11.63 hrs, Volume= 41,730 cf, Atten= 68%, Lag= 0.0 min
 Discarded = 1.98 cfs @ 11.63 hrs, Volume= 41,730 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 336.72' @ 12.89 hrs Surf.Area= 8,559 sf Storage= 10,420 cf

Plug-Flow detention time= 33.8 min calculated for 41,726 cf (100% of inflow)
 Center-of-Mass det. time= 33.8 min (841.0 - 807.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	335.00'	9,145 cf	70.25'W x 121.83'L x 4.33'H Field A 37,088 cf Overall - 14,227 cf Embedded = 22,862 cf x 40.0% Voids
#2A	335.50'	14,227 cf	Cultec R-360HD x 384 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 384 Chambers in 12 Rows Cap Storage= +6.5 cf x 2 x 12 rows = 155.0 cf
		23,371 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	335.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.98 cfs @ 11.63 hrs HW=335.05' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.98 cfs)

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Pond 16: INF-5 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 12 rows = 155.0 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

32 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 119.83' Row Length +12.0" End Stone x 2 = 121.83' Base Length

12 Rows x 60.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 70.25' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

384 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 12 Rows = 14,226.6 cf Chamber Storage

37,088.1 cf Field - 14,226.6 cf Chambers = 22,861.5 cf Stone x 40.0% Voids = 9,144.6 cf Stone Storage

Chamber Storage + Stone Storage = 23,371.2 cf = 0.537 af

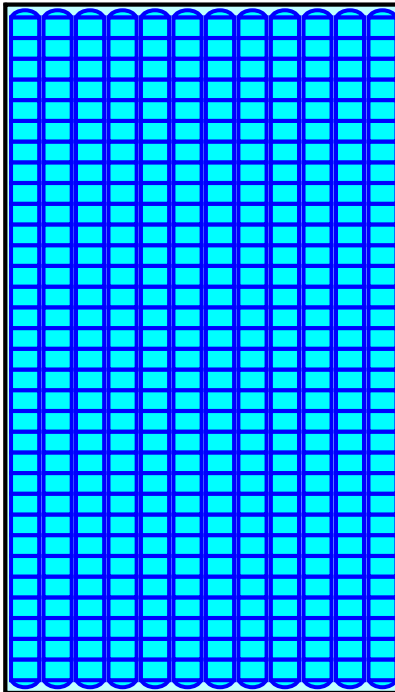
Overall Storage Efficiency = 63.0%

Overall System Size = 121.83' x 70.25' x 4.33'

384 Chambers

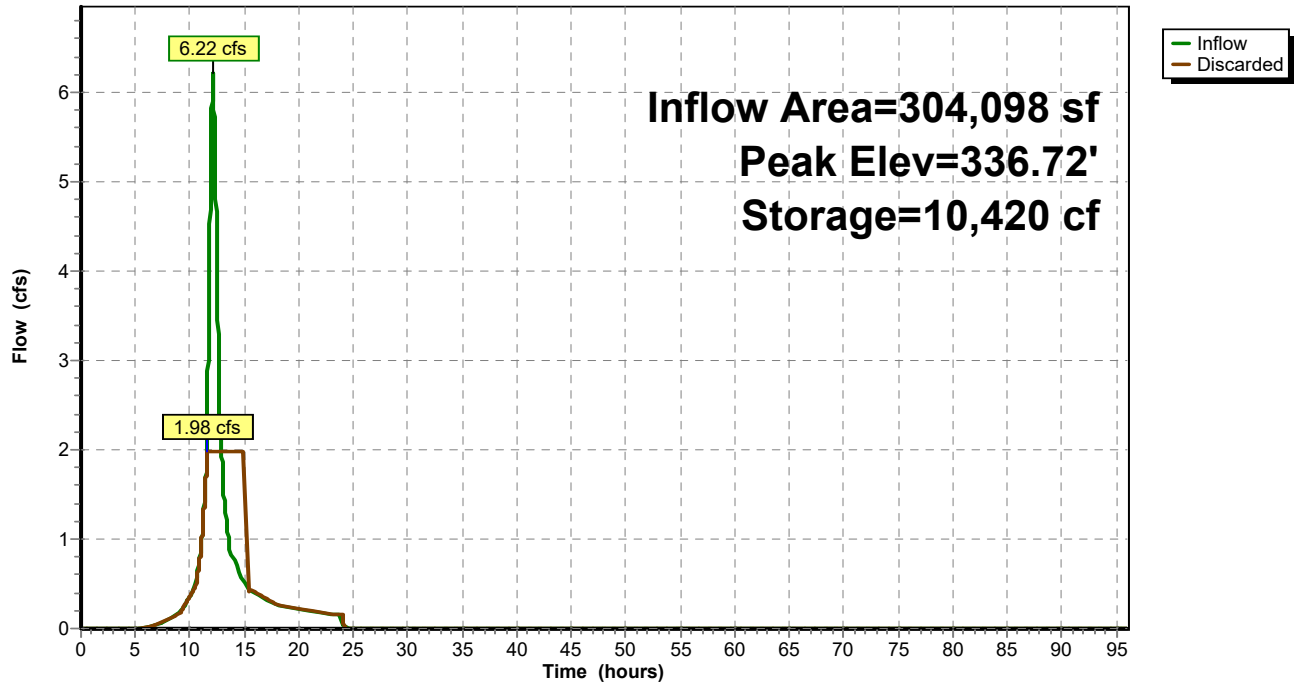
1,373.6 cy Field

846.7 cy Stone



Pond 16: INF-5

Hydrograph



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Summary for Pond 17: Existing Wetland A

Inflow Area = 1,562,344 sf, 45.33% Impervious, Inflow Depth = 1.25" for 1-yr event
 Inflow = 47.66 cfs @ 12.26 hrs, Volume= 162,959 cf
 Outflow = 42.89 cfs @ 12.40 hrs, Volume= 162,959 cf, Atten= 10%, Lag= 8.1 min
 Primary = 42.89 cfs @ 12.40 hrs, Volume= 162,959 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 324.09' @ 12.40 hrs Surf.Area= 5,139 sf Storage= 6,502 cf

Plug-Flow detention time= 1.8 min calculated for 162,959 cf (100% of inflow)
 Center-of-Mass det. time= 1.6 min (856.4 - 854.7)

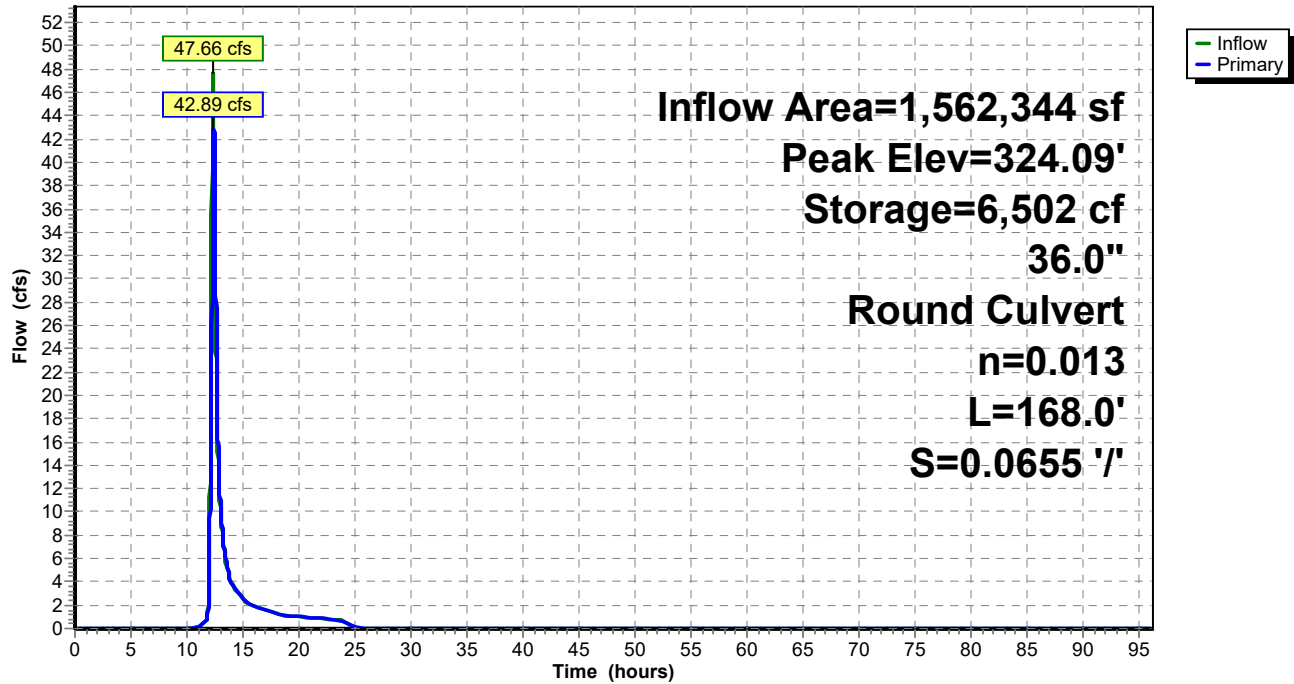
Volume	Invert	Avail.Storage	Storage Description		
#1	321.00'	190,307 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
321.00	124	53.2	0	0	124
322.00	1,084	175.8	525	525	2,361
324.00	4,913	341.5	5,536	6,061	9,202
326.00	11,332	638.2	15,804	21,866	32,354
328.00	20,583	804.3	31,458	53,324	51,475
330.00	34,086	1,075.5	54,104	107,428	92,087
332.00	49,257	1,268.5	82,879	190,307	128,164

Device	Routing	Invert	Outlet Devices
#1	Primary	321.00'	36.0" Round Culvert L= 168.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 321.00' / 310.00' S= 0.0655 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=42.88 cfs @ 12.40 hrs HW=324.09' TW=312.97' (Dynamic Tailwater)
 ↑**1=Culvert** (Inlet Controls 42.88 cfs @ 6.07 fps)

Pond 17: Existing Wetland A

Hydrograph



North 60 Post A 3-9-20

Prepared by {enter your company name here}

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NRCC 24-hr A 1-yr Rainfall=2.79"

Printed 3/25/2020

Summary for Subcatchment 18: Post A15

Runoff = 10.26 cfs @ 12.13 hrs, Volume= 24,277 cf, Depth= 0.69"

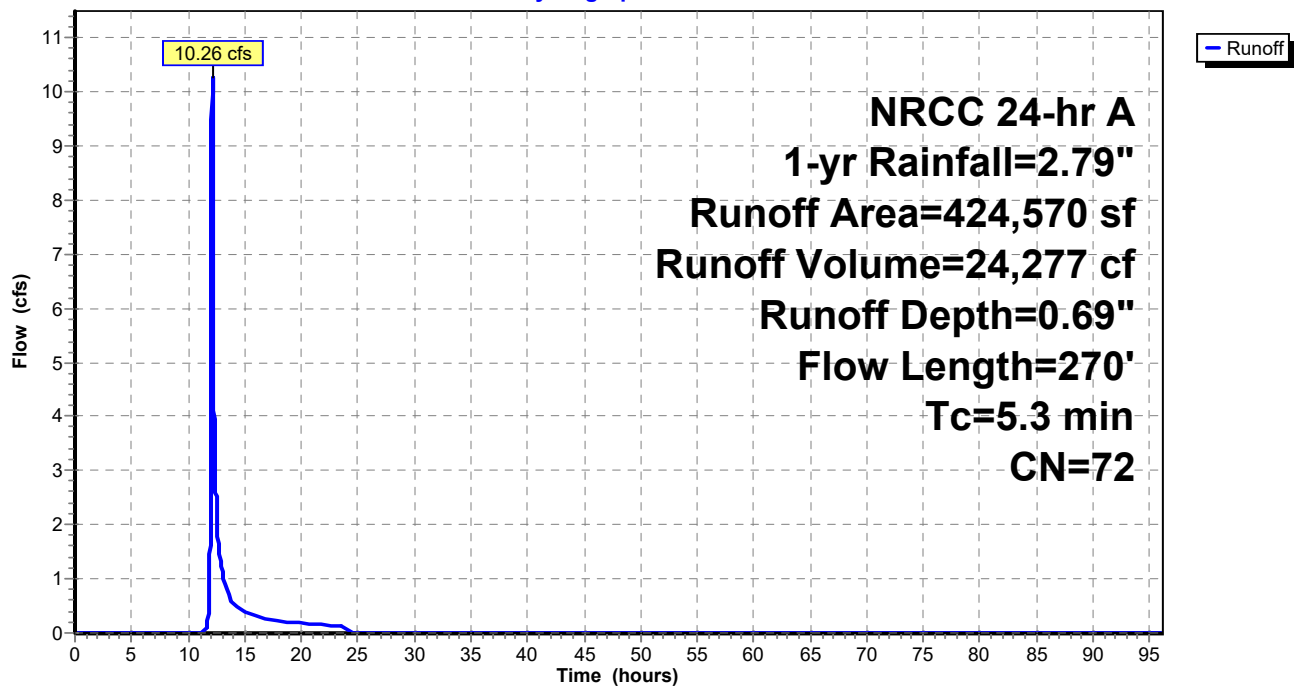
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
21,520	77	Woods, Good, HSG D
33,300	80	>75% Grass cover, Good, HSG D
213,730	70	Woods, Good, HSG C
140,572	74	>75% Grass cover, Good, HSG C
15,448	60	Woods, Fair, HSG B
424,570	72	Weighted Average
424,570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	100	0.1000	0.34		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.4	170	0.2353	7.81		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.3	270	Total			

Subcatchment 18: Post A15

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

Printed 3/25/2020

Summary for Subcatchment 19: Post A3

Runoff = 7.47 cfs @ 12.13 hrs, Volume= 19,893 cf, Depth= 2.56"

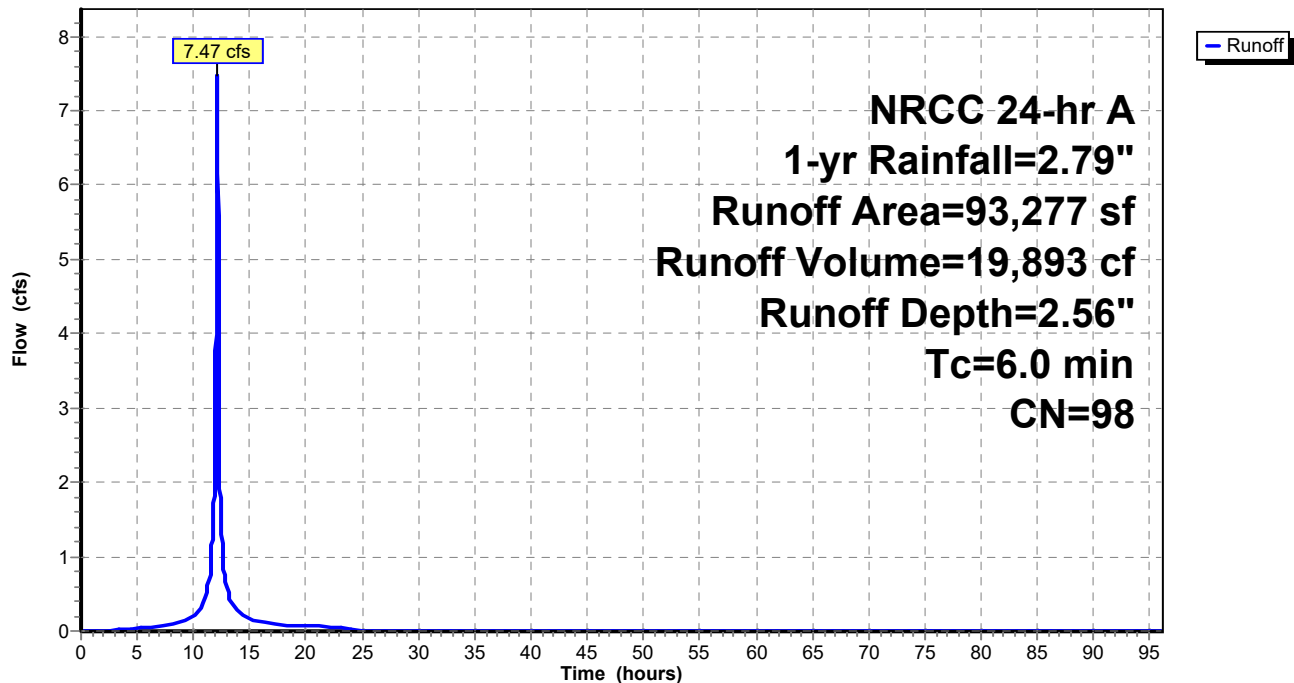
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
93,277	98	Paved parking, HSG C
93,277		100.00% Impervious Area

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

Subcatchment 19: Post A3

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 20: DIV-1

Inflow Area = 93,277 sf, 100.00% Impervious, Inflow Depth = 2.56" for 1-yr event
 Inflow = 7.47 cfs @ 12.13 hrs, Volume= 19,893 cf
 Outflow = 7.47 cfs @ 12.13 hrs, Volume= 19,893 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.59 cfs @ 12.12 hrs, Volume= 19,342 cf
 Secondary = 1.91 cfs @ 12.13 hrs, Volume= 551 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 327.19' @ 12.13 hrs

Flood Elev= 330.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	324.50'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.50' / 324.50' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	324.50'	18.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.50' / 320.00' S= 0.0900 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	327.00'	8.0' 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=5.56 cfs @ 12.12 hrs HW=327.19' TW=325.02' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.56 cfs @ 7.08 fps)**Secondary OutFlow** Max=1.90 cfs @ 12.13 hrs HW=327.19' TW=312.69' (Dynamic Tailwater)↑ **2=Culvert** (Passes 1.90 cfs of 11.86 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 1.90 cfs @ 1.23 fps)

North 60 Post A 3-9-20

Prepared by {enter your company name here}

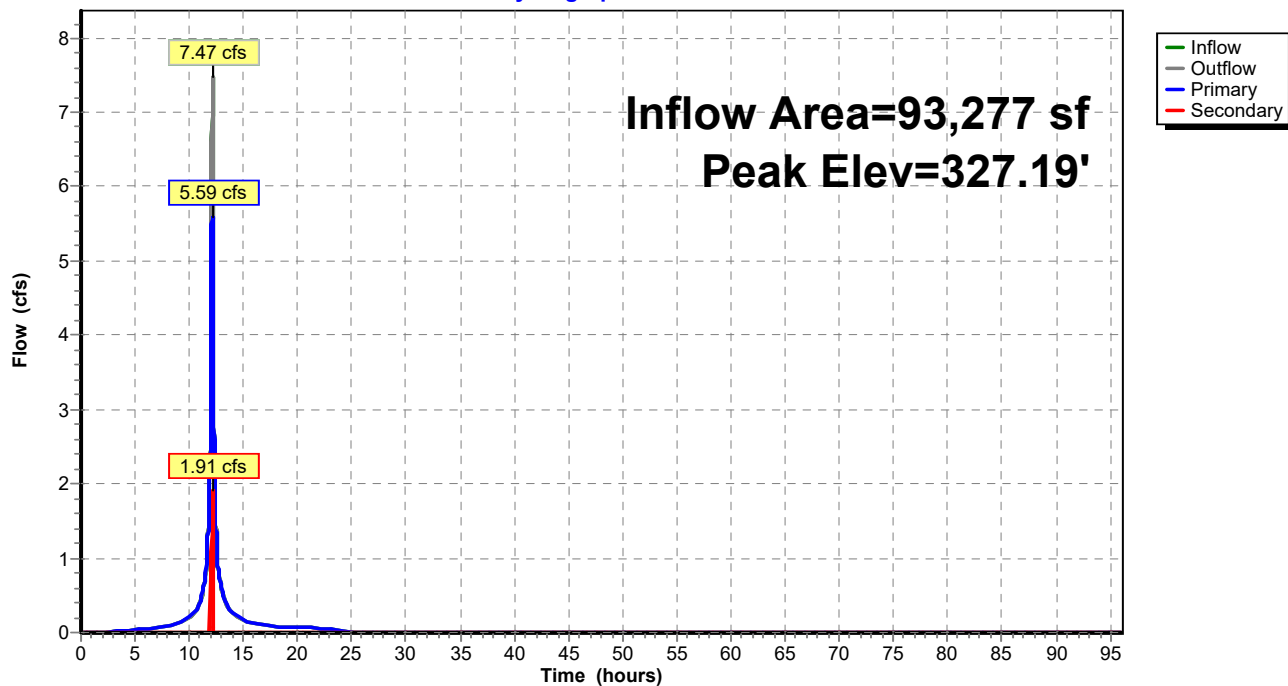
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NRCC 24-hr A 1-yr Rainfall=2.79"

Printed 3/25/2020

Pond 20: DIV-1

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Printed 3/25/2020

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Summary for Pond 21: INF-1

Inflow Area = 93,277 sf, 100.00% Impervious, Inflow Depth = 2.49" for 1-yr event
 Inflow = 5.59 cfs @ 12.12 hrs, Volume= 19,342 cf
 Outflow = 1.18 cfs @ 11.77 hrs, Volume= 19,342 cf, Atten= 79%, Lag= 0.0 min
 Discarded = 1.18 cfs @ 11.77 hrs, Volume= 19,342 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 325.71' @ 12.56 hrs Surf.Area= 4,245 sf Storage= 5,013 cf

Plug-Flow detention time= 23.8 min calculated for 19,340 cf (100% of inflow)
 Center-of-Mass det. time= 23.8 min (782.6 - 758.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	324.00'	4,688 cf	36.75'W x 115.50'L x 4.33'H Field A 18,393 cf Overall - 6,674 cf Embedded = 11,720 cf x 40.0% Voids
#2A	324.50'	6,674 cf	Cultec R-360HD x 180 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 180 Chambers in 6 Rows Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf
11,361 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	324.00'	12.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.18 cfs @ 11.77 hrs HW=324.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.18 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Pond 21: INF-1 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

30 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 112.50' Row Length +18.0" End Stone x 2 = 115.50' Base Length

6 Rows x 60.0" Wide + 9.0" Spacing x 5 + 18.0" Side Stone x 2 = 36.75' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

180 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 6 Rows = 6,673.6 cf Chamber Storage

18,393.4 cf Field - 6,673.6 cf Chambers = 11,719.8 cf Stone x 40.0% Voids = 4,687.9 cf Stone Storage

Chamber Storage + Stone Storage = 11,361.5 cf = 0.261 af

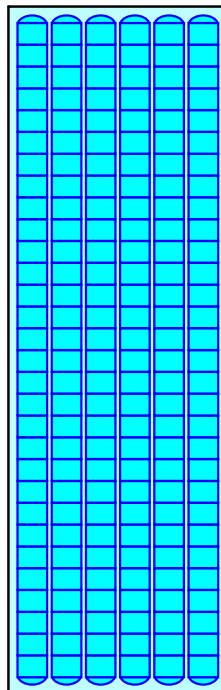
Overall Storage Efficiency = 61.8%

Overall System Size = 115.50' x 36.75' x 4.33'

180 Chambers

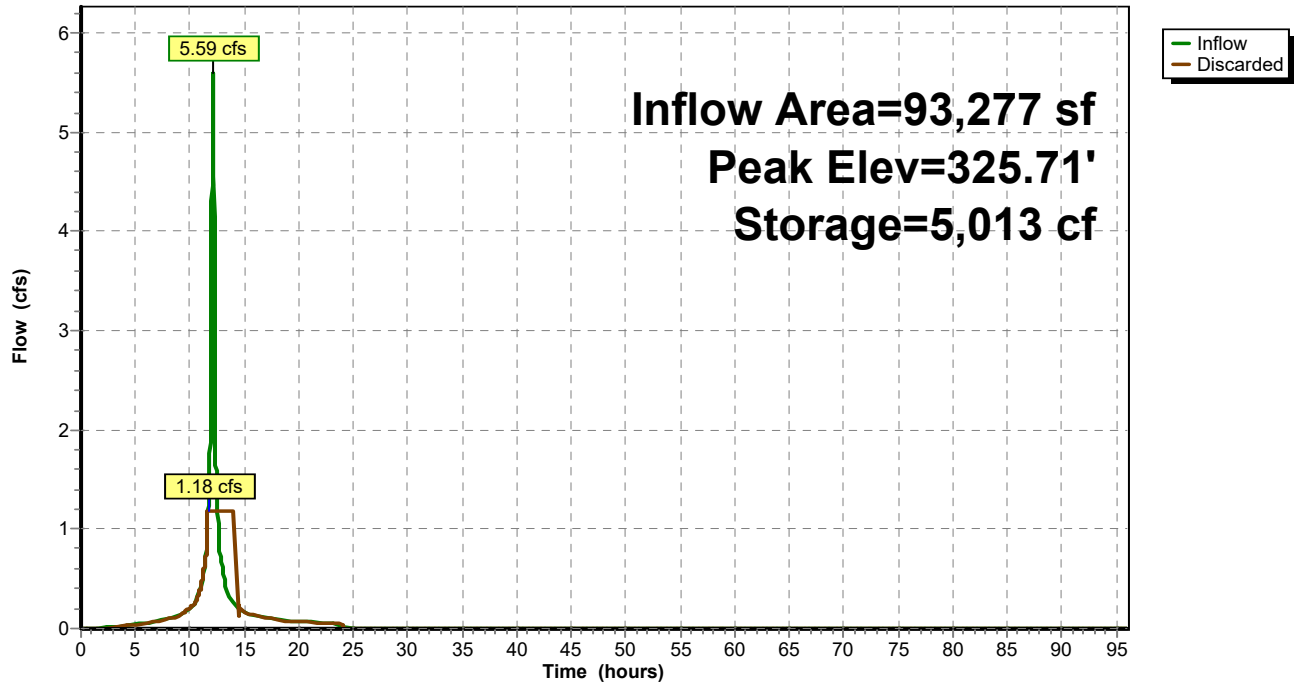
681.2 cy Field

434.1 cy Stone



Pond 21: INF-1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Reach 22: Existing Stream A

Inflow Area = 1,986,914 sf, 35.64% Impervious, Inflow Depth = 1.13" for 1-yr event
Inflow = 45.79 cfs @ 12.37 hrs, Volume= 187,787 cf
Outflow = 45.43 cfs @ 12.42 hrs, Volume= 187,787 cf, Atten= 1%, Lag= 2.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.82 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 1.81 fps, Avg. Travel Time= 12.5 min

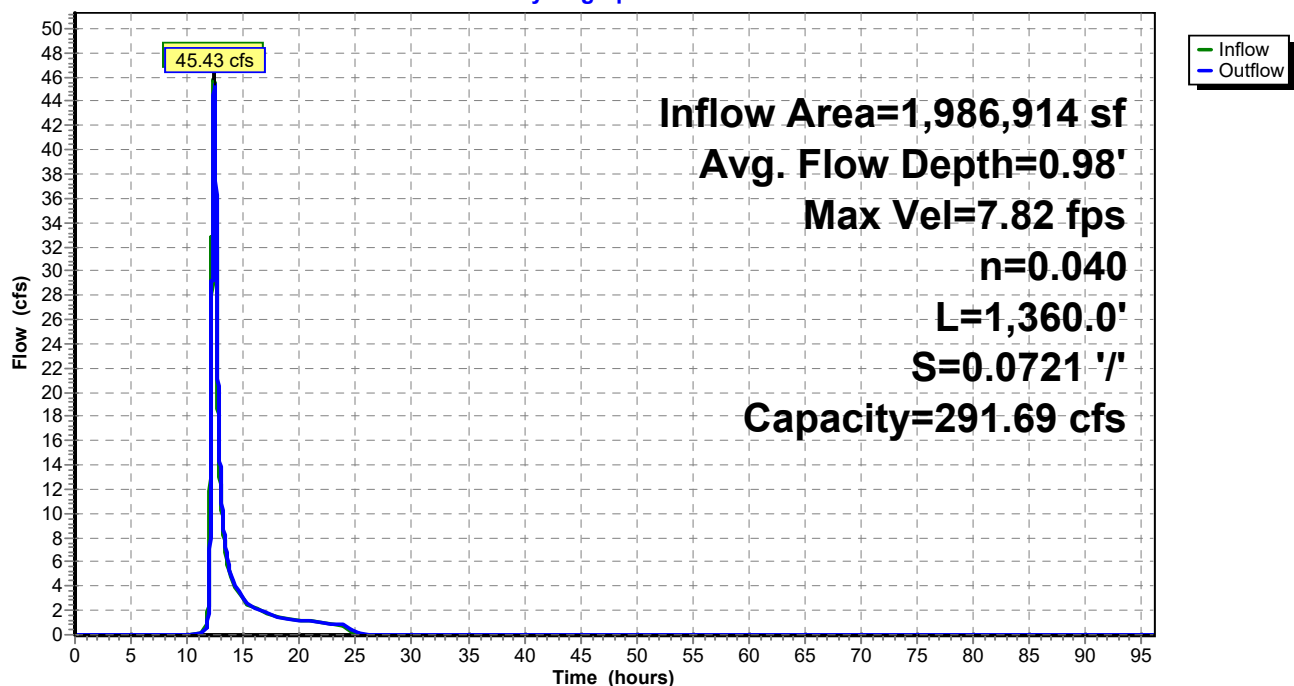
Peak Storage= 7,900 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.98'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 291.69 cfs

4.00' x 2.50' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 ' ' Top Width= 14.00'
Length= 1,360.0' Slope= 0.0721 ' '
Inlet Invert= 312.00', Outlet Invert= 214.00'



Reach 22: Existing Stream A

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 23: Post A5

Runoff = 7.44 cfs @ 12.13 hrs, Volume= 19,818 cf, Depth= 2.56"

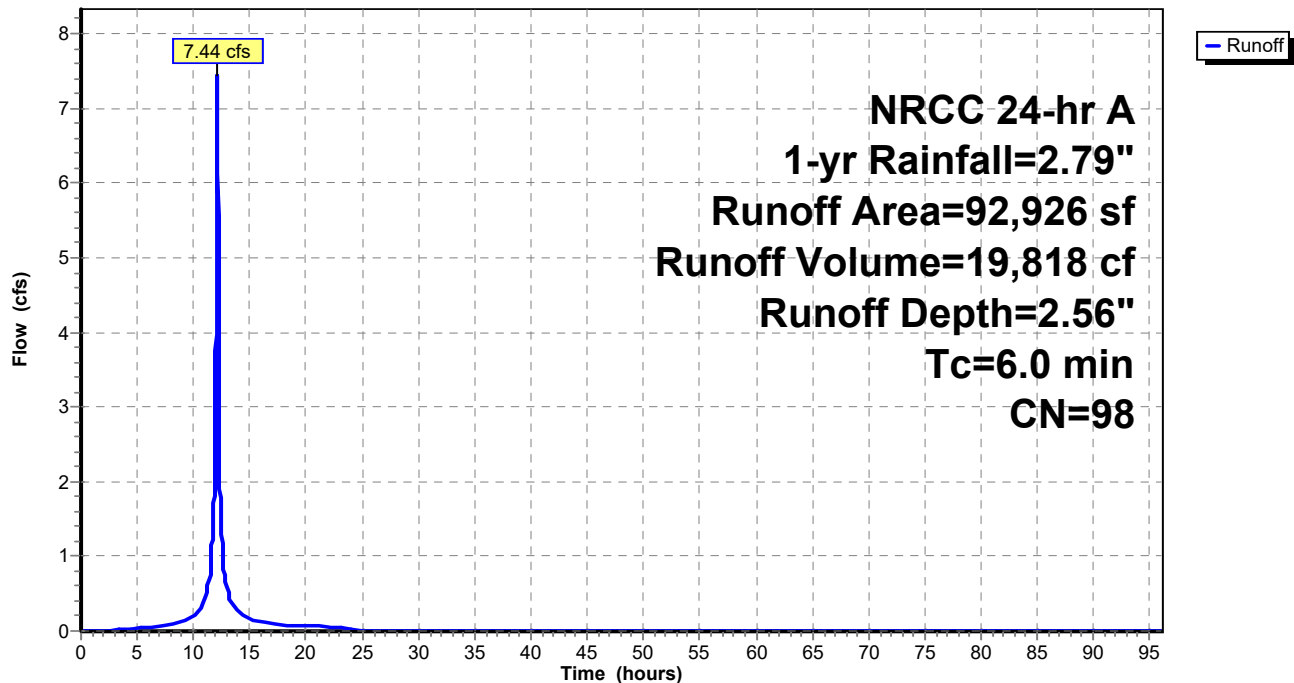
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
92,926	98	Paved parking, HSG C
92,926		100.00% Impervious Area

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

Subcatchment 23: Post A5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 24: DIV-2

Inflow Area = 92,926 sf, 100.00% Impervious, Inflow Depth = 2.56" for 1-yr event
 Inflow = 7.44 cfs @ 12.13 hrs, Volume= 19,818 cf
 Outflow = 7.44 cfs @ 12.13 hrs, Volume= 19,818 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.11 cfs @ 12.10 hrs, Volume= 19,483 cf
 Secondary = 1.44 cfs @ 12.13 hrs, Volume= 335 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 368.16' @ 12.13 hrs

Flood Elev= 371.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	365.00'	12.0" Round Culvert L= 9.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 365.00' / 365.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	366.50'	24.0" Round Culvert L= 550.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 366.50' / 355.00' S= 0.0209 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	368.00'	8.0' 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=6.06 cfs @ 12.10 hrs HW=368.12' TW=365.55' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 6.06 cfs @ 7.72 fps)**Secondary OutFlow** Max=1.42 cfs @ 12.13 hrs HW=368.16' TW=356.83' (Dynamic Tailwater)↑**2=Culvert** (Passes 1.42 cfs of 12.22 cfs potential flow)↑**3=Broad-Crested Rectangular Weir** (Weir Controls 1.42 cfs @ 1.12 fps)

North 60 Post A 3-9-20

Prepared by {enter your company name here}

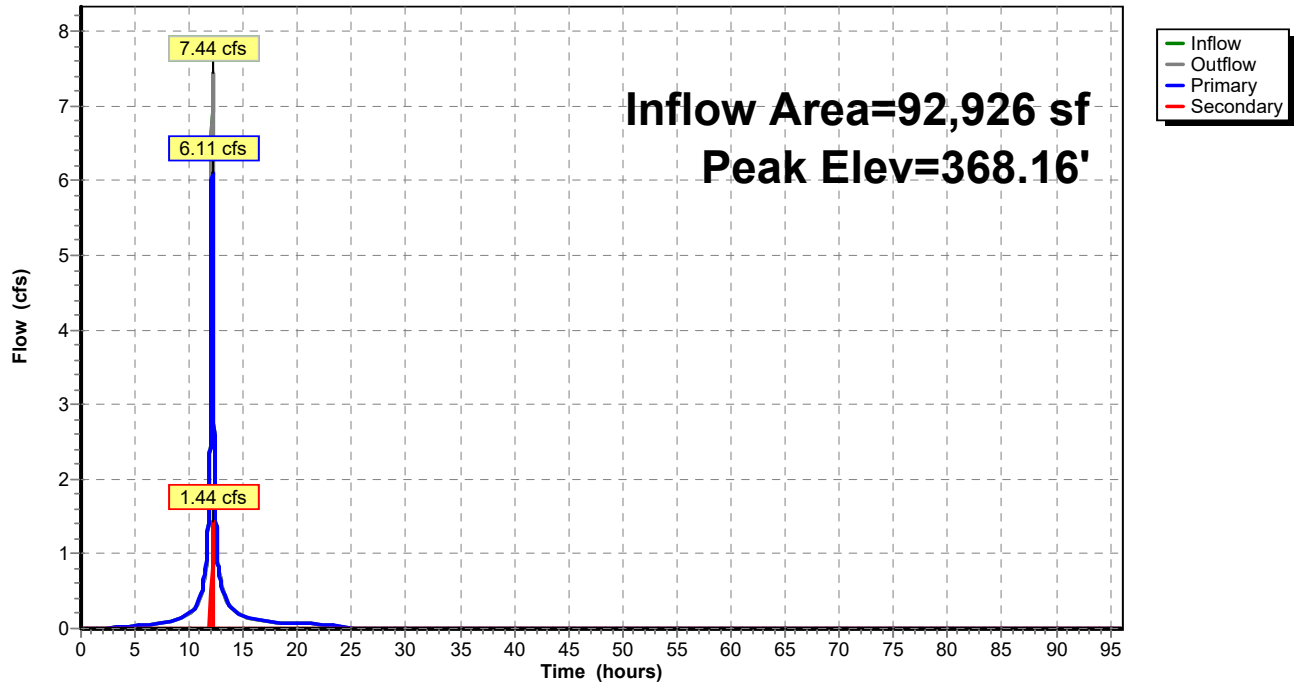
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NRCC 24-hr A 1-yr Rainfall=2.79"

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Pond 24: DIV-2

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 25: INF-2

Inflow Area = 92,926 sf, 100.00% Impervious, Inflow Depth = 2.52" for 1-yr event
 Inflow = 6.11 cfs @ 12.10 hrs, Volume= 19,483 cf
 Outflow = 0.99 cfs @ 11.69 hrs, Volume= 19,483 cf, Atten= 84%, Lag= 0.0 min
 Discarded = 0.99 cfs @ 11.69 hrs, Volume= 19,483 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 366.42' @ 12.60 hrs Surf.Area= 4,295 sf Storage= 5,843 cf

Plug-Flow detention time= 35.2 min calculated for 19,481 cf (100% of inflow)
 Center-of-Mass det. time= 35.2 min (793.6 - 758.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	364.50'	4,639 cf	41.50'W x 103.50'L x 4.33'H Field A 18,613 cf Overall - 7,016 cf Embedded = 11,596 cf x 40.0% Voids
#2A	365.00'	7,016 cf	Cultec R-360HD x 189 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 189 Chambers in 7 Rows Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf
		11,655 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	364.50'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=0.99 cfs @ 11.69 hrs HW=364.55' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.99 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Pond 25: INF-2 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

27 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 101.50' Row Length +12.0" End Stone x 2 = 103.50' Base Length

7 Rows x 60.0" Wide + 9.0" Spacing x 6 + 12.0" Side Stone x 2 = 41.50' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

189 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 7 Rows = 7,016.3 cf Chamber Storage

18,612.7 cf Field - 7,016.3 cf Chambers = 11,596.5 cf Stone x 40.0% Voids = 4,638.6 cf Stone Storage

Chamber Storage + Stone Storage = 11,654.9 cf = 0.268 af

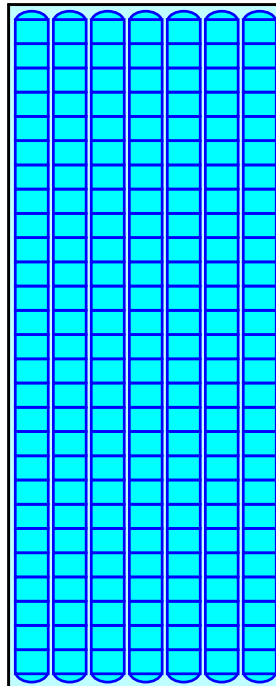
Overall Storage Efficiency = 62.6%

Overall System Size = 103.50' x 41.50' x 4.33'

189 Chambers

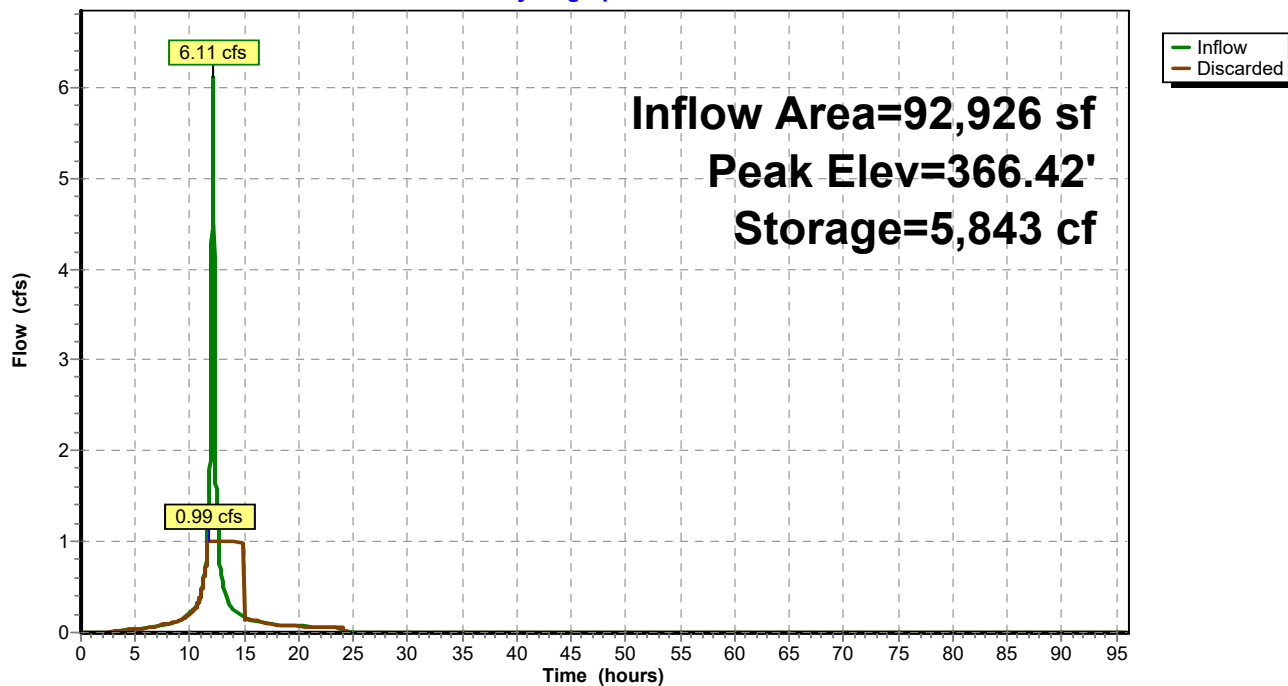
689.4 cy Field

429.5 cy Stone



Pond 25: INF-2

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 26: Post A12

Runoff = 6.87 cfs @ 12.20 hrs, Volume= 19,971 cf, Depth= 1.48"

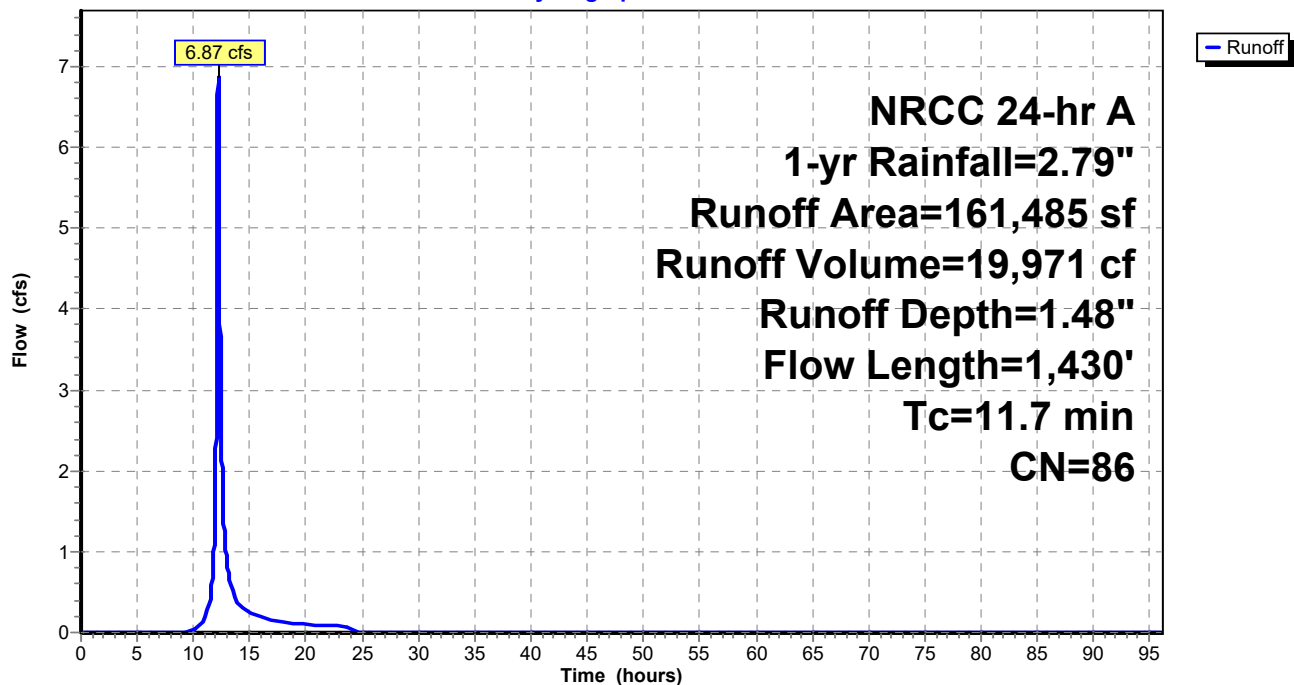
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
83,450	98	Paved parking, HSG C
78,035	74	>75% Grass cover, Good, HSG C
161,485	86	Weighted Average
78,035		48.32% Pervious Area
83,450		51.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	84	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
1.6	201	0.0164	2.06		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,145	0.0339	9.69	11.89	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
11.7	1,430	Total			

Subcatchment 26: Post A12

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 27: DIV-6

Inflow Area = 161,485 sf, 51.68% Impervious, Inflow Depth = 1.48" for 1-yr event
 Inflow = 6.87 cfs @ 12.20 hrs, Volume= 19,971 cf
 Outflow = 6.87 cfs @ 12.20 hrs, Volume= 19,971 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.40 cfs @ 12.19 hrs, Volume= 18,629 cf
 Secondary = 2.48 cfs @ 12.20 hrs, Volume= 1,343 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 364.73' @ 12.20 hrs

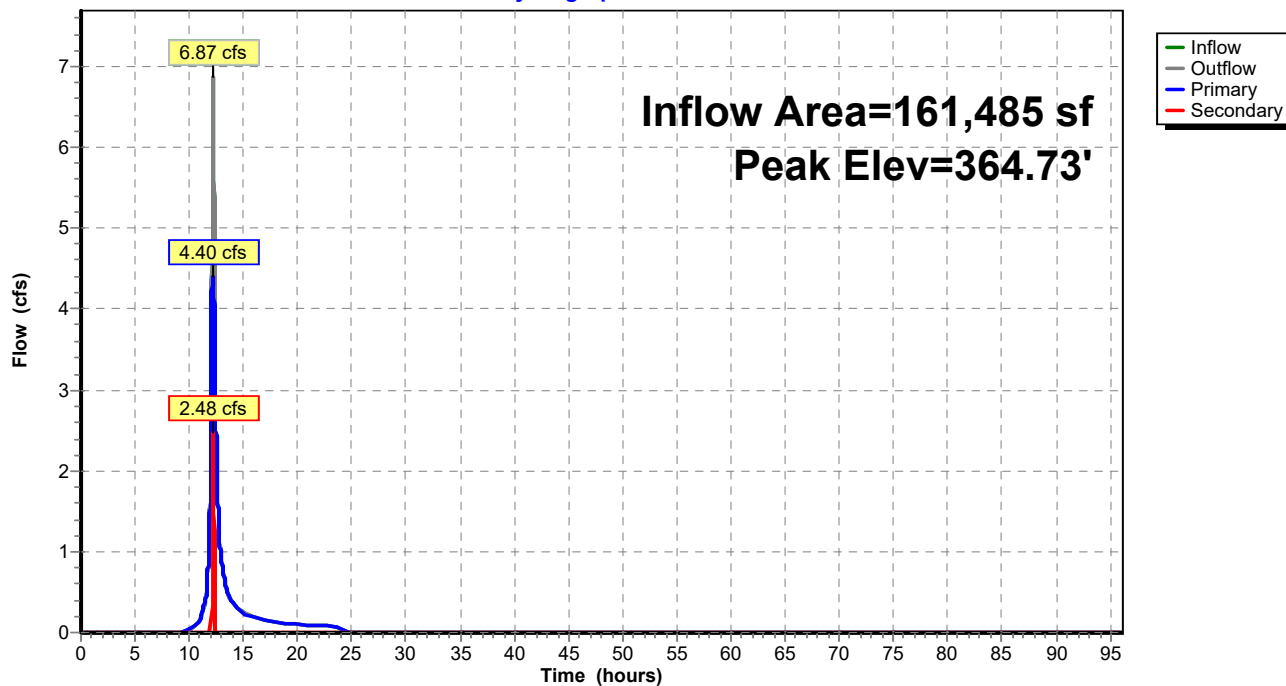
Flood Elev= 366.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	361.50'	10.0" Round Culvert L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 361.50' / 361.50' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	361.50'	24.0" Round Culvert L= 148.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 361.50' / 355.94' S= 0.0376 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	364.50'	8.0' 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=4.40 cfs @ 12.19 hrs HW=364.73' TW=361.92' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 4.40 cfs @ 8.06 fps)**Secondary OutFlow** Max=2.48 cfs @ 12.20 hrs HW=364.73' TW=356.70' (Dynamic Tailwater)↑**2=Culvert** (Passes 2.48 cfs of 22.59 cfs potential flow)↑**3=Broad-Crested Rectangular Weir** (Weir Controls 2.48 cfs @ 1.35 fps)

Pond 27: DIV-6

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 28: INF-6

Inflow Area = 161,485 sf, 51.68% Impervious, Inflow Depth = 1.38" for 1-yr event
 Inflow = 4.40 cfs @ 12.19 hrs, Volume= 18,629 cf
 Outflow = 1.24 cfs @ 11.93 hrs, Volume= 18,629 cf, Atten= 72%, Lag= 0.0 min
 Discarded = 1.24 cfs @ 11.93 hrs, Volume= 18,629 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 362.96' @ 12.73 hrs Surf.Area= 3,569 sf Storage= 4,951 cf

Plug-Flow detention time= 26.2 min calculated for 18,627 cf (100% of inflow)
 Center-of-Mass det. time= 26.2 min (855.6 - 829.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	361.00'	3,393 cf	35.75'W x 99.83'L x 4.00'H Field A 14,276 cf Overall - 5,794 cf Embedded = 8,482 cf x 40.0% Voids
#2A	361.50'	5,794 cf	Cultec R-360HD x 156 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 156 Chambers in 6 Rows Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf
		9,187 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	361.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.24 cfs @ 11.93 hrs HW=361.05' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.24 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Pond 28: INF-6 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

26 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 97.83' Row Length +12.0" End Stone x 2 = 99.83' Base Length

6 Rows x 60.0" Wide + 9.0" Spacing x 5 + 12.0" Side Stone x 2 = 35.75' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

156 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 6 Rows = 5,794.1 cf Chamber Storage

14,276.2 cf Field - 5,794.1 cf Chambers = 8,482.1 cf Stone x 40.0% Voids = 3,392.8 cf Stone Storage

Chamber Storage + Stone Storage = 9,186.9 cf = 0.211 af

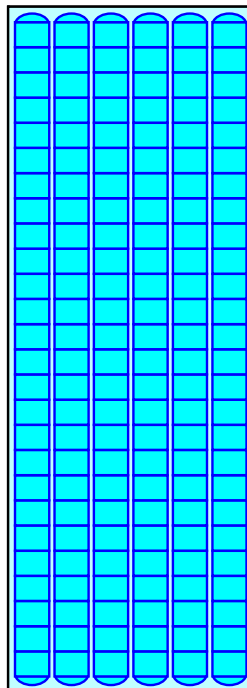
Overall Storage Efficiency = 64.4%

Overall System Size = 99.83' x 35.75' x 4.00'

156 Chambers

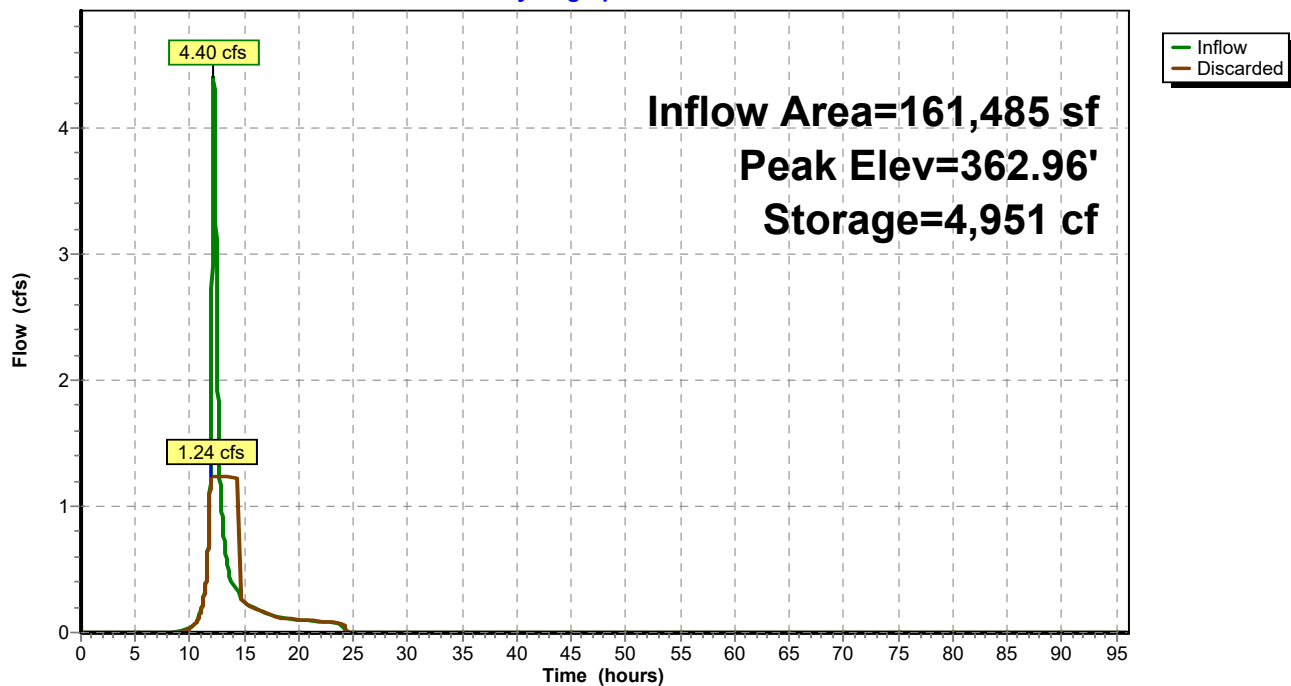
528.7 cy Field

314.2 cy Stone



Pond 28: INF-6

Hydrograph



North 60 Post A 3-9-20

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Summary for Subcatchment 29: Post A6

Runoff = 26.17 cfs @ 12.13 hrs, Volume= 63,400 cf, Depth= 2.05"

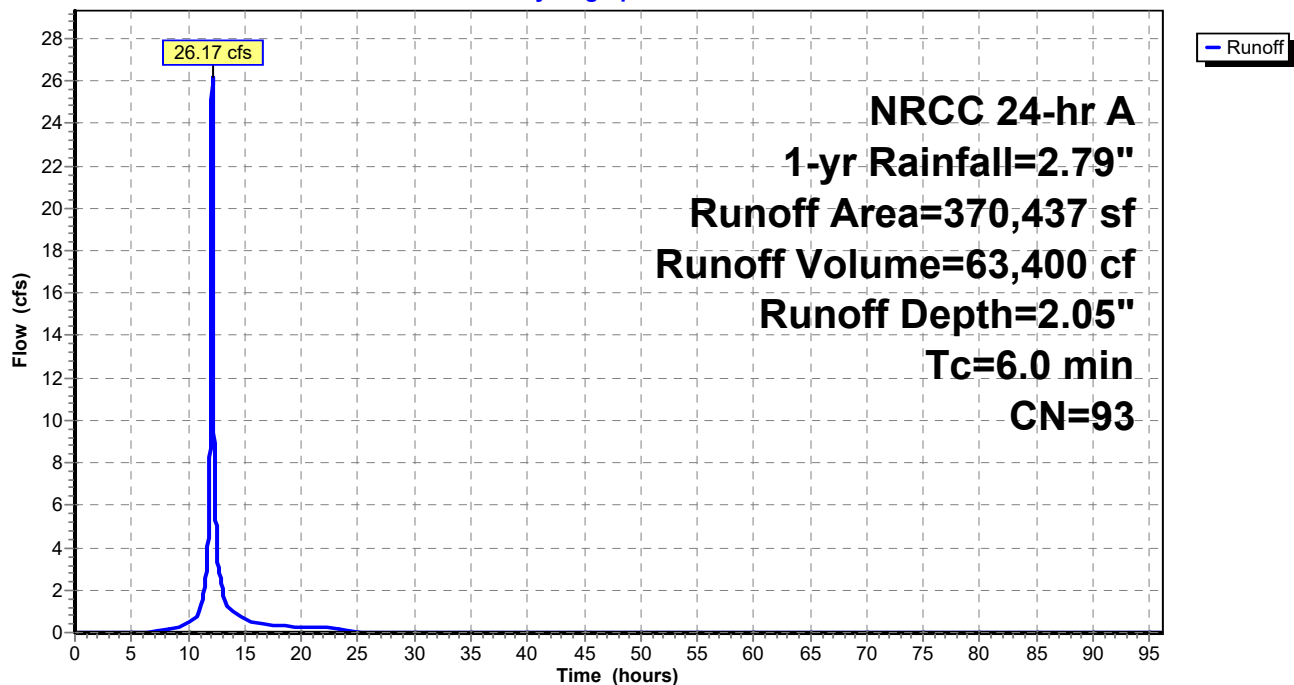
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
286,912	98	Paved parking, HSG C
83,525	74	>75% Grass cover, Good, HSG C
370,437	93	Weighted Average
83,525		22.55% Pervious Area
286,912		77.45% Impervious Area

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

Subcatchment 29: Post A6

Hydrograph



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NRCC 24-hr A 1-yr Rainfall=2.79"

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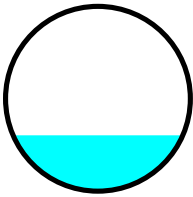
Summary for Reach 30: 36" HDPE Pipe

Inflow Area = 370,437 sf, 77.45% Impervious, Inflow Depth = 2.11" for 1-yr event
Inflow = 28.96 cfs @ 12.14 hrs, Volume= 65,078 cf
Outflow = 28.59 cfs @ 12.14 hrs, Volume= 65,078 cf, Atten= 1%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 15.93 fps, Min. Travel Time= 0.8 min
Avg. Velocity= 4.51 fps, Avg. Travel Time= 3.0 min

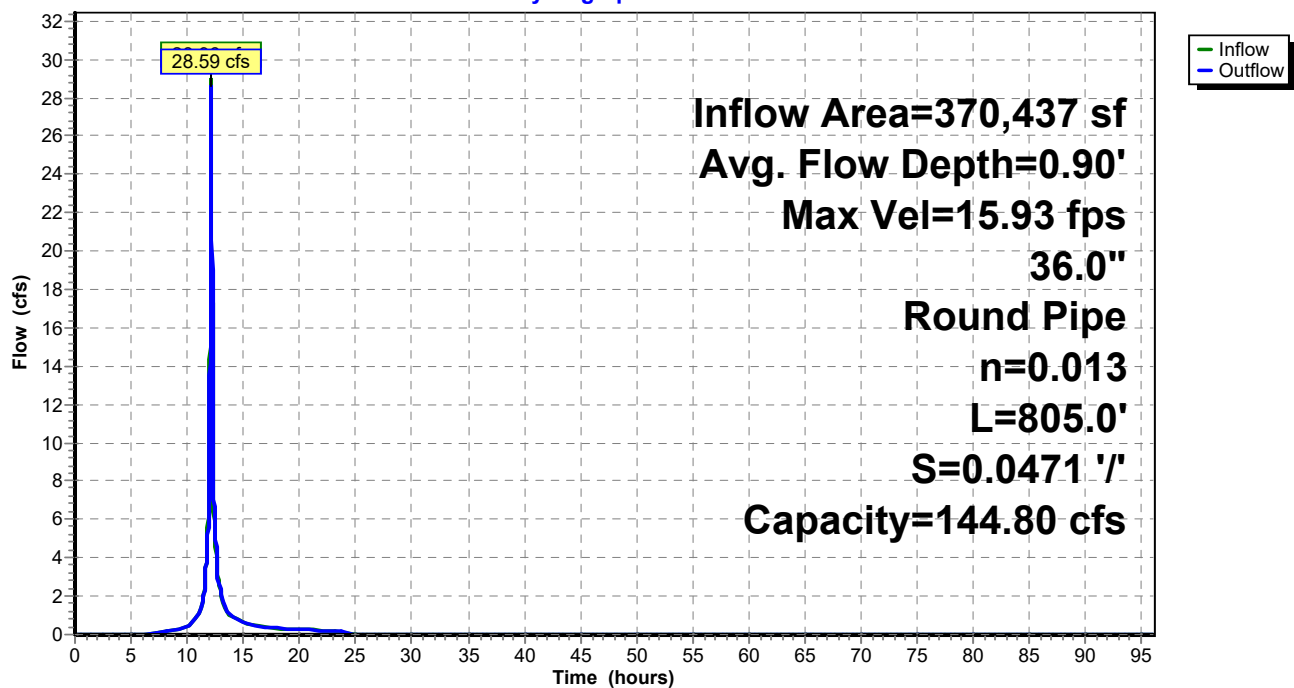
Peak Storage= 1,444 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.90'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 144.80 cfs

36.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 805.0' Slope= 0.0471 '/'
Inlet Invert= 355.94', Outlet Invert= 318.00'



Reach 30: 36" HDPE Pipe

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 31: Post A14

Runoff = 15.95 cfs @ 12.13 hrs, Volume= 40,492 cf, Depth= 2.35"

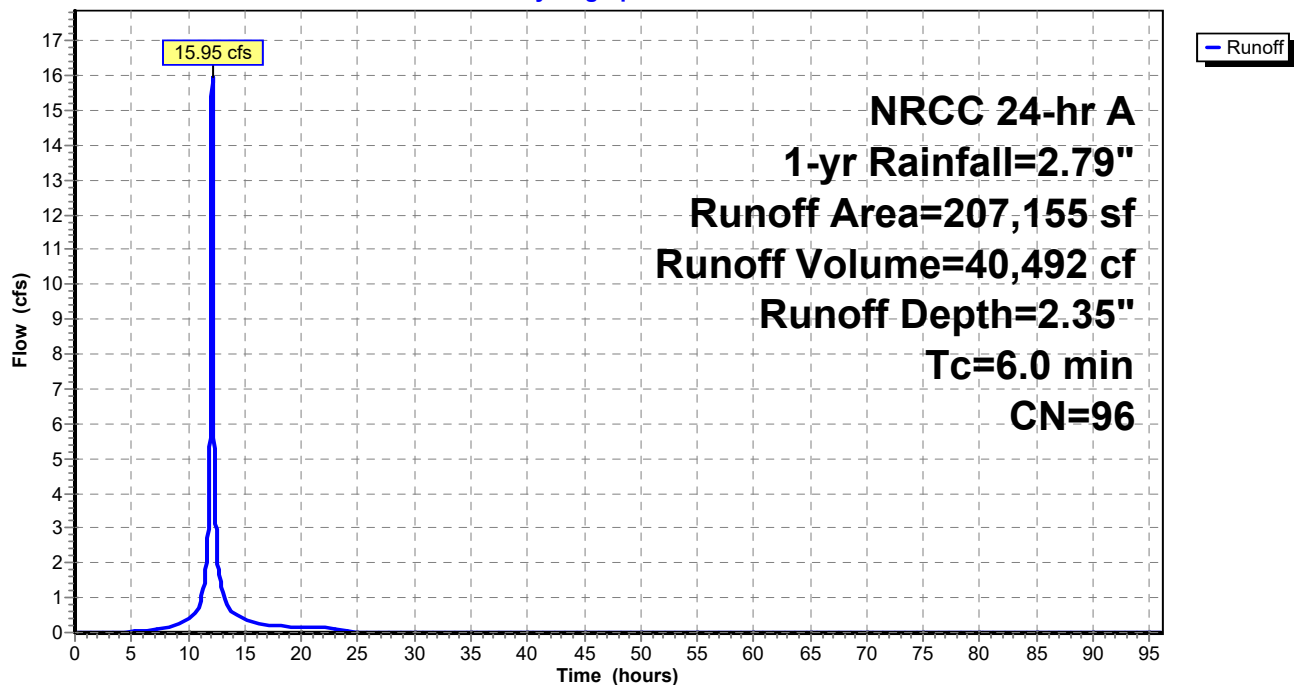
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
187,606	98	Paved parking, HSG C
19,549	74	>75% Grass cover, Good, HSG C
207,155	96	Weighted Average
19,549		9.44% Pervious Area
187,606		90.56% Impervious Area

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

Subcatchment 31: Post A14

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 32: DMH-3

Inflow Area = 577,592 sf, 82.15% Impervious, Inflow Depth = 2.19" for 1-yr event
Inflow = 44.28 cfs @ 12.14 hrs, Volume= 105,569 cf
Outflow = 44.28 cfs @ 12.14 hrs, Volume= 105,569 cf, Atten= 0%, Lag= 0.0 min
Primary = 44.28 cfs @ 12.14 hrs, Volume= 105,569 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

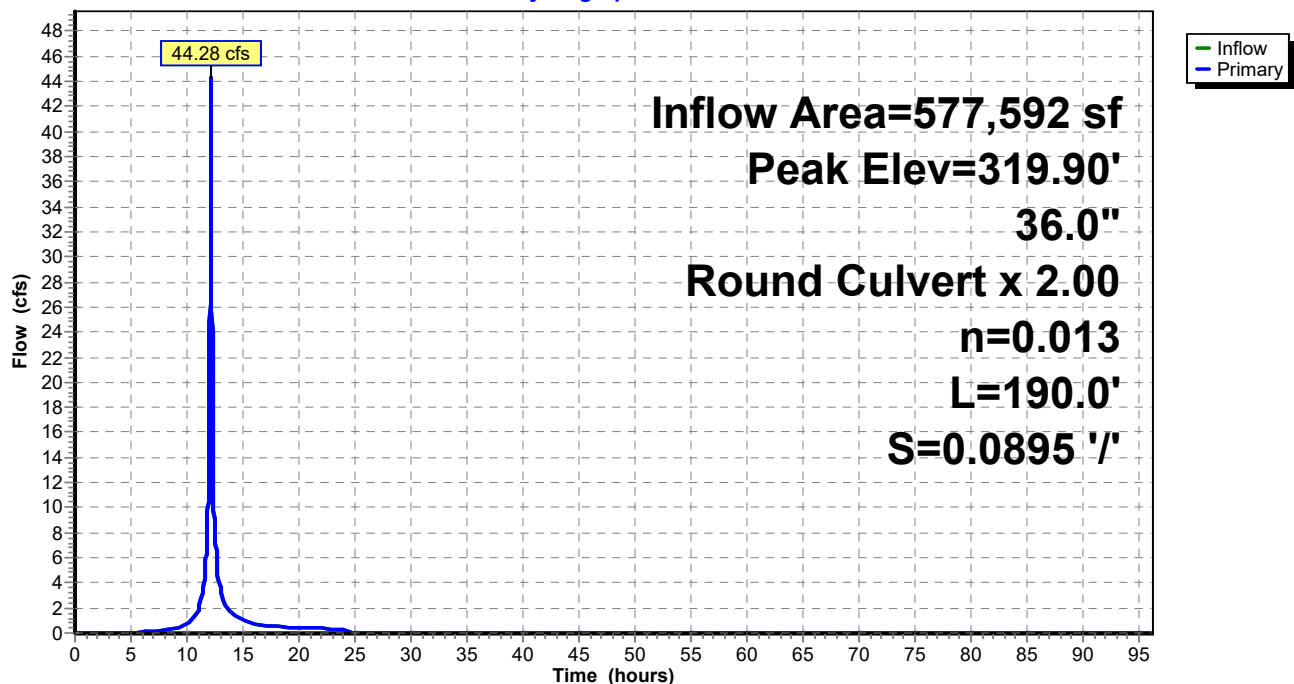
Peak Elev= 319.90' @ 12.14 hrs

Flood Elev= 328.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	318.00'	36.0" Round Culvert X 2.00 L= 190.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 318.00' / 301.00' S= 0.0895 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=44.26 cfs @ 12.14 hrs HW=319.90' TW=301.61' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 44.26 cfs @ 4.69 fps)

Pond 32: DMH-3**Hydrograph**

North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 33: Post A7

Runoff = 0.46 cfs @ 12.20 hrs, Volume= 1,619 cf, Depth= 0.48"

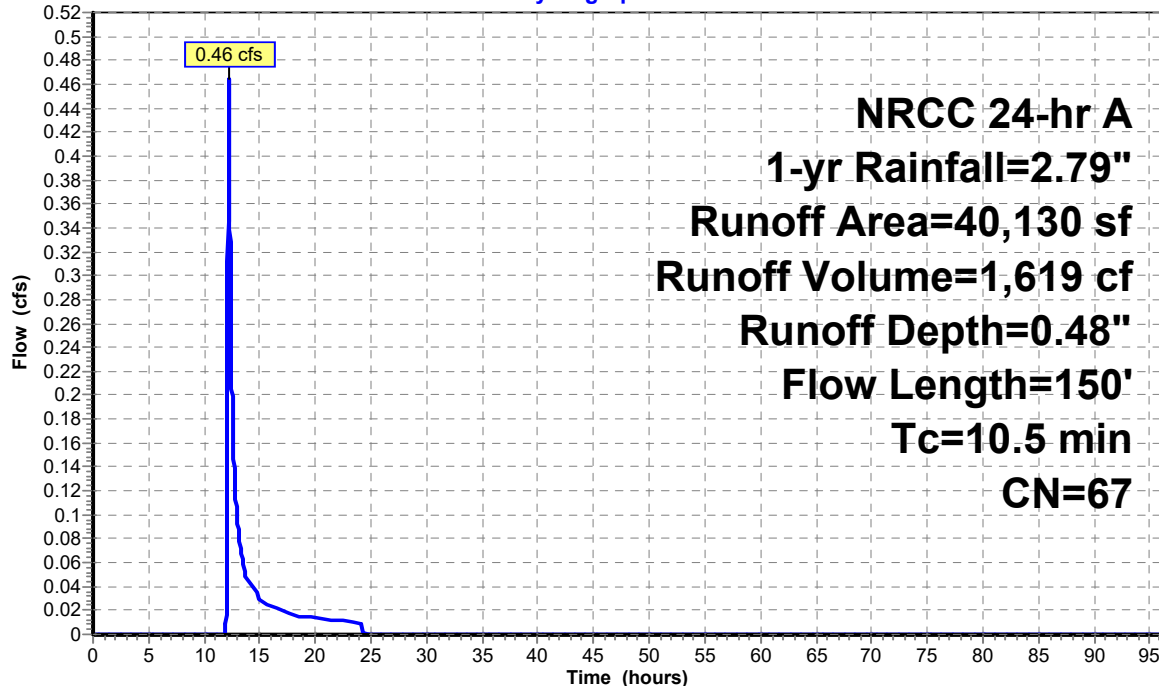
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
23,130	65	Brush, Good, HSG C
17,000	70	Woods, Good, HSG C
40,130	67	Weighted Average
40,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1100	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.1	50	0.2800	8.52		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.5	150	Total			

Subcatchment 33: Post A7

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 34: SWP-5

Inflow Area = 617,722 sf, 76.82% Impervious, Inflow Depth = 2.08" for 1-yr event
 Inflow = 44.63 cfs @ 12.14 hrs, Volume= 107,188 cf
 Outflow = 9.60 cfs @ 12.41 hrs, Volume= 107,188 cf, Atten= 78%, Lag= 16.1 min
 Discarded = 5.75 cfs @ 12.41 hrs, Volume= 102,328 cf
 Primary = 3.84 cfs @ 12.41 hrs, Volume= 4,860 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 302.52' @ 12.41 hrs Surf.Area= 16,567 sf Storage= 36,255 cf

Plug-Flow detention time= 44.5 min calculated for 107,177 cf (100% of inflow)
 Center-of-Mass det. time= 44.5 min (831.1 - 786.6)

Volume	Invert	Avail.Storage	Storage Description
#1	300.00'	105,088 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)
300.00	12,249	547.4	0	0	12,249
301.00	13,920	566.4	13,076	13,076	14,023
302.00	15,648	585.4	14,776	27,851	15,857
303.00	17,432	604.3	16,532	44,383	17,743
304.00	19,274	623.3	18,345	62,728	19,698
305.00	21,173	642.3	20,216	82,945	21,713
306.00	23,128	661.3	22,143	105,088	23,789

Device	Routing	Invert	Outlet Devices
#1	Discarded	300.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'
#2	Primary	298.00'	42.0" Round Culvert L= 189.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 298.00' / 258.00' S= 0.2116 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 9.62 sf
#3	Device 2	302.33'	36.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=5.75 cfs @ 12.41 hrs HW=302.52' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 5.75 cfs)

Primary OutFlow Max=3.84 cfs @ 12.41 hrs HW=302.52' TW=256.12' (Dynamic Tailwater)

↑**2=Culvert** (Passes 3.84 cfs of 77.12 cfs potential flow)

↑**3=Orifice/Grate** (Weir Controls 3.84 cfs @ 1.43 fps)

North 60 Post A 3-9-20

Prepared by {enter your company name here}

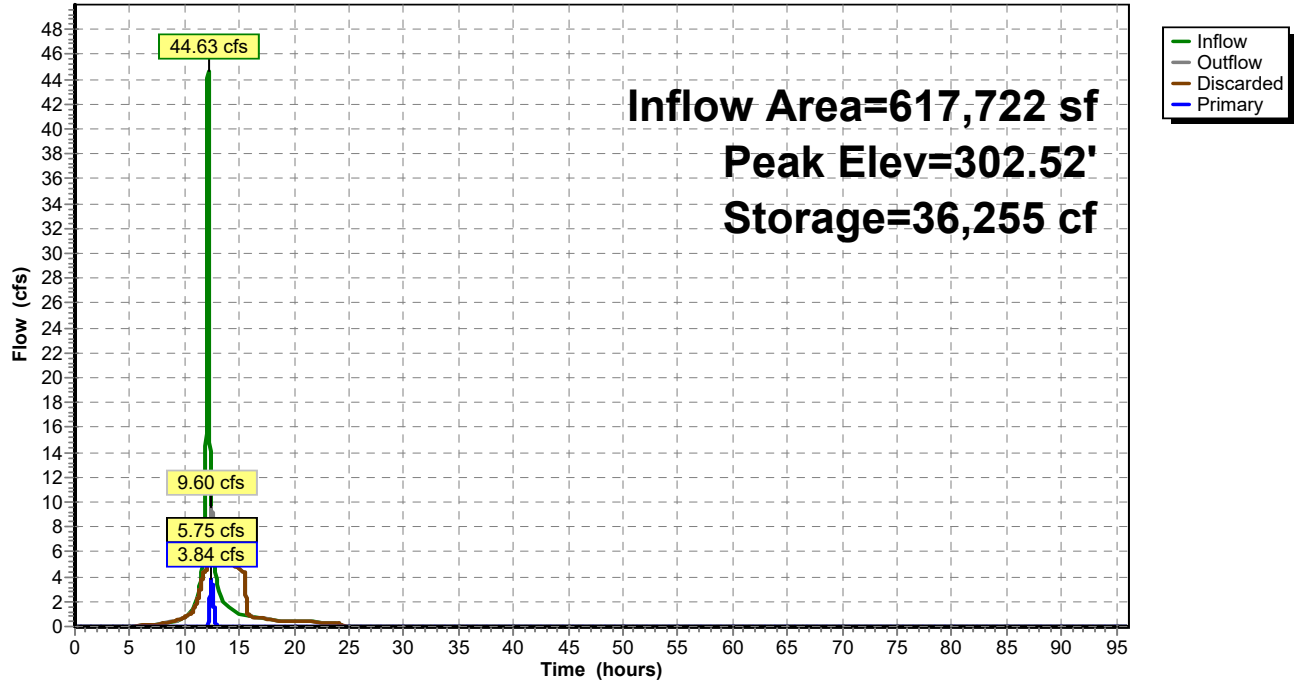
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NRCC 24-hr A 1-yr Rainfall=2.79"

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Pond 34: SWP-5

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 35: Post A16

Runoff = 0.67 cfs @ 12.19 hrs, Volume= 2,195 cf, Depth= 0.52"

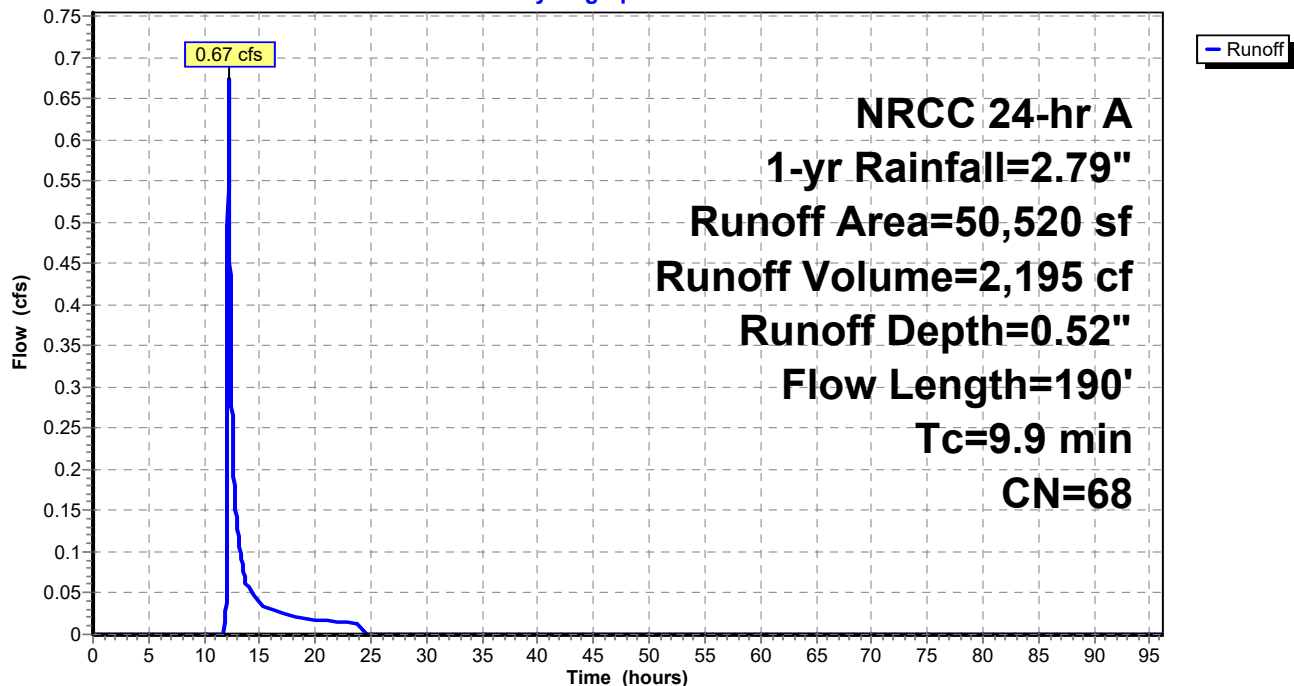
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
16,692	65	Brush, Good, HSG C
33,828	70	Woods, Good, HSG C
50,520	68	Weighted Average
50,520		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.17		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	90	0.3000	8.82		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
9.9	190	Total			

Subcatchment 35: Post A16

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 36: SWP-3

Inflow Area = 668,242 sf, 71.01% Impervious, Inflow Depth = 0.13" for 1-yr event
 Inflow = 4.18 cfs @ 12.40 hrs, Volume= 7,056 cf
 Outflow = 2.68 cfs @ 12.61 hrs, Volume= 7,056 cf, Atten= 36%, Lag= 12.5 min
 Discarded = 2.68 cfs @ 12.61 hrs, Volume= 7,056 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 256.21' @ 12.61 hrs Surf.Area= 7,712 sf Storage= 1,555 cf

Plug-Flow detention time= 6.6 min calculated for 7,055 cf (100% of inflow)
 Center-of-Mass det. time= 6.6 min (797.0 - 790.4)

Volume	Invert	Avail.Storage	Storage Description		
#1	256.00'	71,328 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)
256.00	7,434	457.3	0	0	7,434
257.00	8,834	476.3	8,124	8,124	8,921
258.00	10,292	495.3	9,554	17,678	10,468
259.00	11,806	514.3	11,040	28,718	12,076
260.00	13,378	533.4	12,584	41,302	13,752
261.00	15,006	552.4	14,184	55,486	15,481
262.00	16,692	571.4	15,842	71,328	17,271

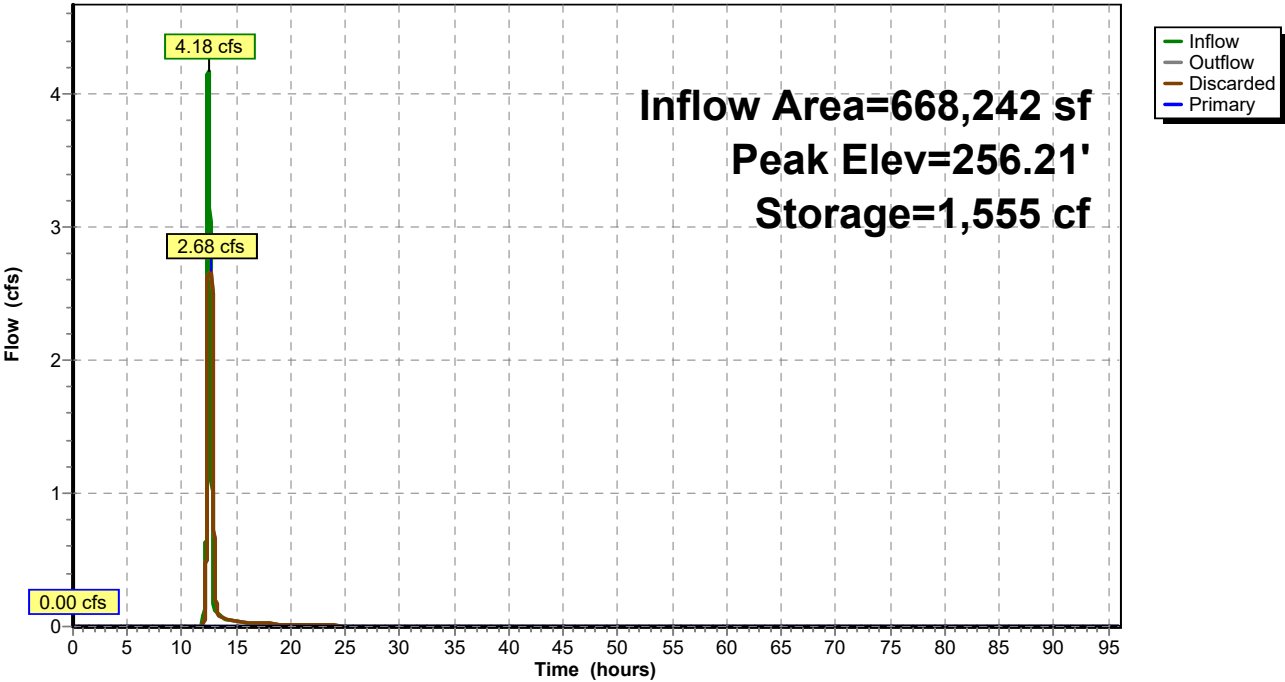
Device	Routing	Invert	Outlet Devices
#1	Primary	254.00'	36.0" Round Culvert L= 128.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 254.00' / 234.00' S= 0.1563 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#2	Device 1	258.00'	36.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	256.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'

Discarded OutFlow Max=2.68 cfs @ 12.61 hrs HW=256.21' (Free Discharge)
 ↳ **3=Exfiltration** (Exfiltration Controls 2.68 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=256.00' TW=0.00' (Dynamic Tailwater)
 ↳ **1=Culvert** (Passes 0.00 cfs of 24.10 cfs potential flow)
 ↳ **2=Orifice/Grate** (Controls 0.00 cfs)

Pond 36: SWP-3

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 37: Post A13

Runoff = 10.94 cfs @ 12.13 hrs, Volume= 26,209 cf, Depth= 1.96"

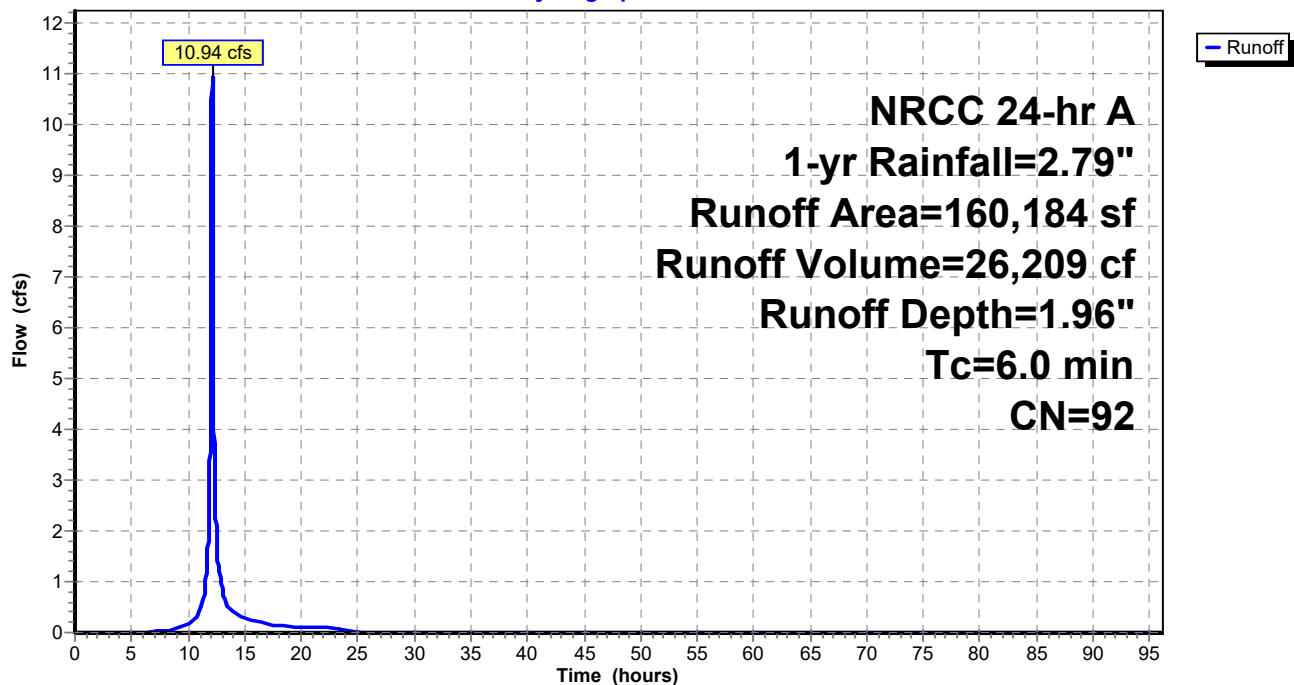
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
122,493	98	Paved parking, HSG C
37,691	74	>75% Grass cover, Good, HSG C
160,184	92	Weighted Average
37,691		23.53% Pervious Area
122,493		76.47% Impervious Area

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

Subcatchment 37: Post A13

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 38: DIV-7

Inflow Area = 160,184 sf, 76.47% Impervious, Inflow Depth = 1.96" for 1-yr event
 Inflow = 10.94 cfs @ 12.13 hrs, Volume= 26,209 cf
 Outflow = 10.94 cfs @ 12.13 hrs, Volume= 26,209 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.99 cfs @ 12.04 hrs, Volume= 22,151 cf
 Secondary = 7.02 cfs @ 12.13 hrs, Volume= 4,058 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 315.95' @ 12.13 hrs

Flood Elev= 319.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	313.00'	10.0" Round Culvert L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 313.00' / 313.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	313.00'	30.0" Round Culvert L= 103.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 313.00' / 303.00' S= 0.0971 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#3	Device 2	315.50'	8.0' 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=3.96 cfs @ 12.04 hrs HW=315.74' TW=313.46' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 3.96 cfs @ 7.26 fps)**Secondary OutFlow** Max=7.00 cfs @ 12.13 hrs HW=315.94' TW=0.00' (Dynamic Tailwater)↑**2=Culvert** (Passes 7.00 cfs of 30.77 cfs potential flow)↑**3=Broad-Crested Rectangular Weir** (Weir Controls 7.00 cfs @ 1.97 fps)

North 60 Post A 3-9-20

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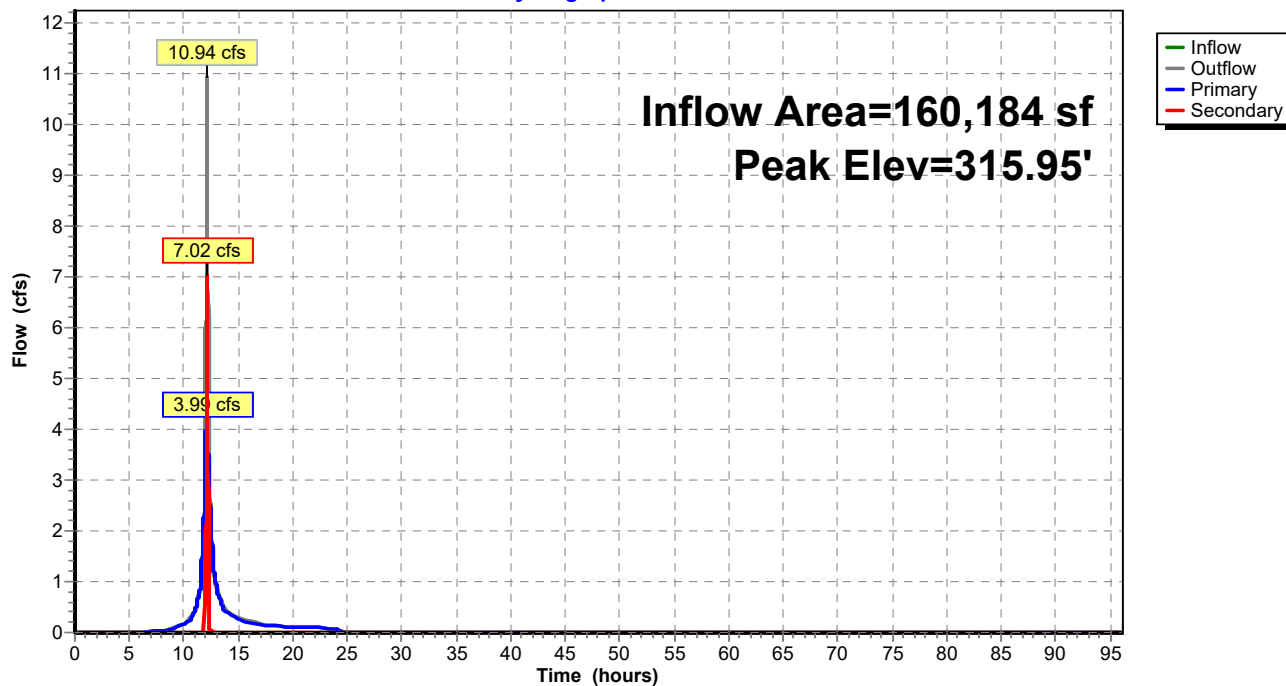
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NRCC 24-hr A 1-yr Rainfall=2.79"

Printed 3/25/2020

Pond 38: DIV-7

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 39: INF-7

Inflow Area = 160,184 sf, 76.47% Impervious, Inflow Depth = 1.66" for 1-yr event
 Inflow = 3.99 cfs @ 12.04 hrs, Volume= 22,151 cf
 Outflow = 1.07 cfs @ 11.64 hrs, Volume= 22,151 cf, Atten= 73%, Lag= 0.0 min
 Discarded = 1.07 cfs @ 11.64 hrs, Volume= 22,151 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 314.75' @ 12.86 hrs Surf.Area= 3,839 sf Storage= 6,158 cf

Plug-Flow detention time= 38.6 min calculated for 22,149 cf (100% of inflow)
 Center-of-Mass det. time= 38.5 min (846.9 - 808.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	312.50'	3,643 cf	41.50'W x 92.50'L x 4.00'H Field A 15,355 cf Overall - 6,247 cf Embedded = 9,108 cf x 40.0% Voids
#2A	313.00'	6,247 cf	Cultec R-360HD x 168 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 168 Chambers in 7 Rows Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf
		9,890 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	312.50'	12.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.07 cfs @ 11.64 hrs HW=312.54' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.07 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Pond 39: INF-7 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

24 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 90.50' Row Length +12.0" End Stone x 2 = 92.50' Base Length

7 Rows x 60.0" Wide + 9.0" Spacing x 6 + 12.0" Side Stone x 2 = 41.50' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

168 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 7 Rows = 6,246.7 cf Chamber Storage

15,355.0 cf Field - 6,246.7 cf Chambers = 9,108.3 cf Stone x 40.0% Voids = 3,643.3 cf Stone Storage

Chamber Storage + Stone Storage = 9,890.0 cf = 0.227 af

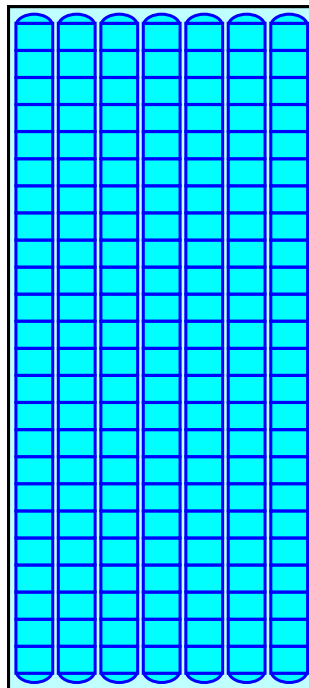
Overall Storage Efficiency = 64.4%

Overall System Size = 92.50' x 41.50' x 4.00'

168 Chambers

568.7 cy Field

337.3 cy Stone



North 60 Post A 3-9-20

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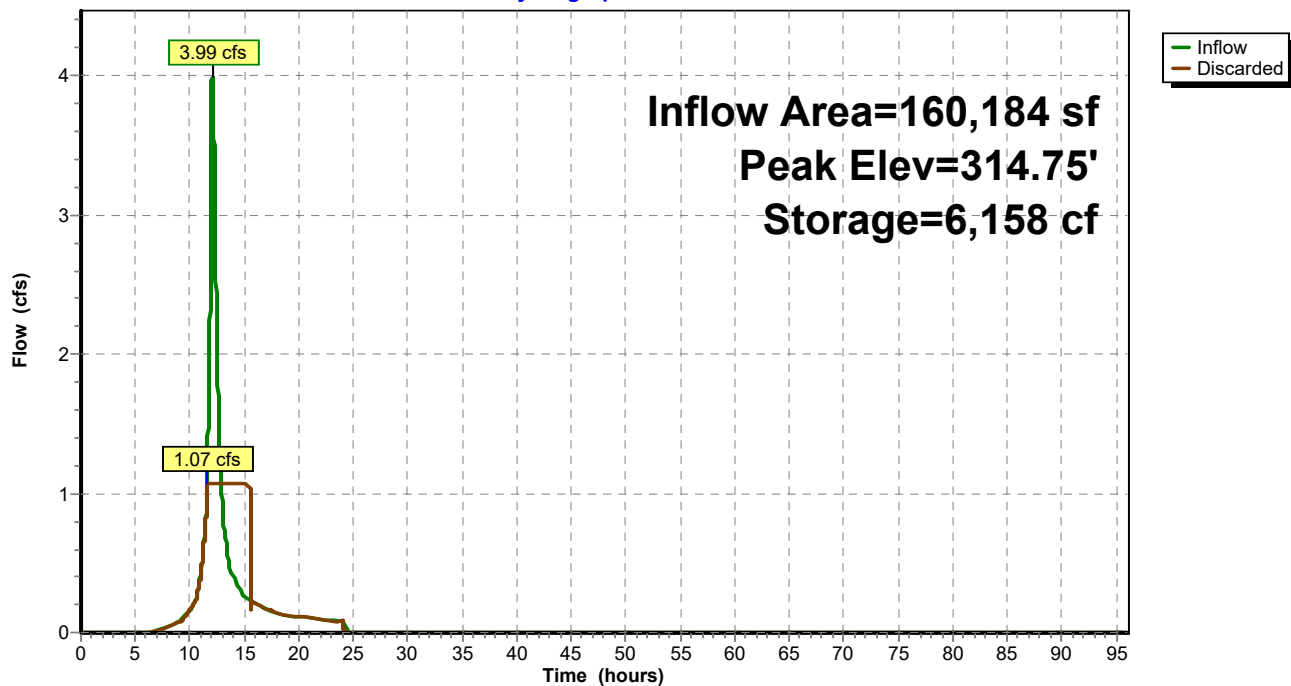
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NRCC 24-hr A 1-yr Rainfall=2.79"

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Pond 39: INF-7

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 40: Post A2

Runoff = 7.68 cfs @ 12.13 hrs, Volume= 17,093 cf, Depth= 1.04"

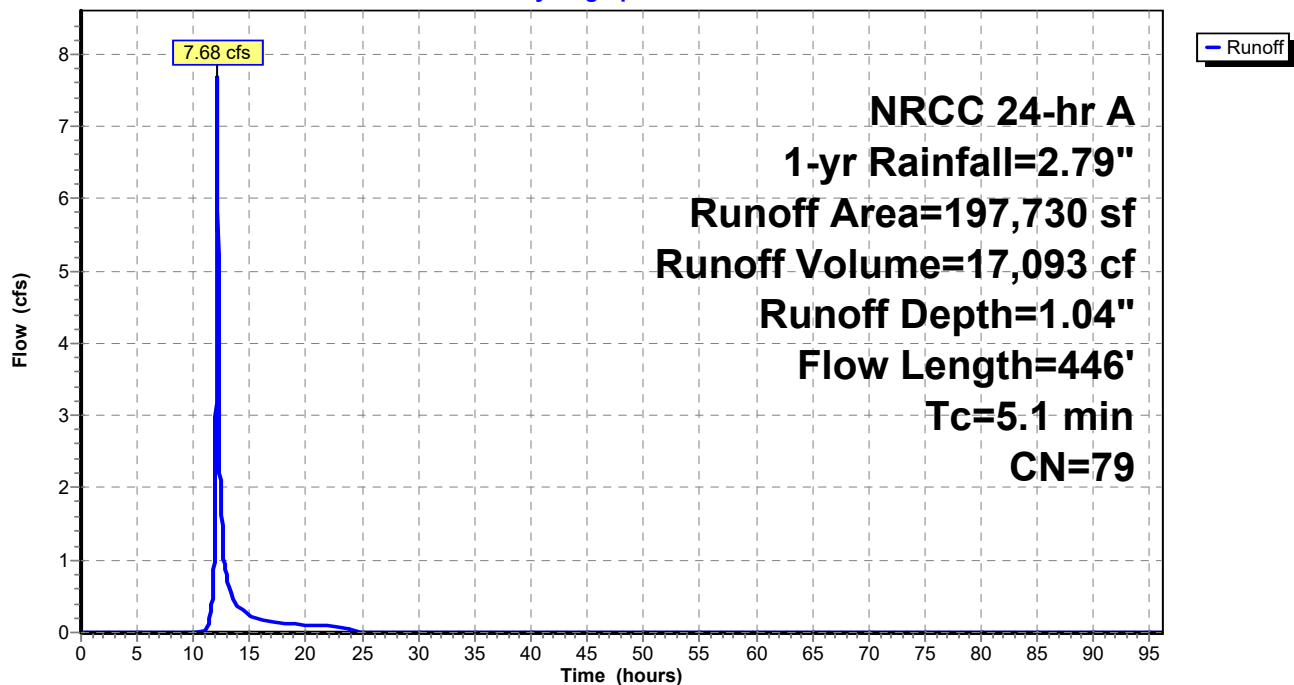
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
43,743	98	Paved parking, HSG C
107,245	74	>75% Grass cover, Good, HSG C
2,876	61	>75% Grass cover, Good, HSG B
39,583	70	Woods, Good, HSG C
4,283	98	Water Surface, HSG C
197,730	79	Weighted Average
149,704		75.71% Pervious Area
48,026		24.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.1500	0.40		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.9	346	0.1734	6.70		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	446	Total			

Subcatchment 40: Post A2

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 41: SWP-1

Inflow Area = 197,730 sf, 24.29% Impervious, Inflow Depth = 1.04" for 1-yr event
 Inflow = 7.68 cfs @ 12.13 hrs, Volume= 17,093 cf
 Outflow = 0.04 cfs @ 24.08 hrs, Volume= 9,781 cf, Atten= 100%, Lag= 717.0 min
 Primary = 0.04 cfs @ 24.08 hrs, Volume= 9,781 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Starting Elev= 234.50' Surf.Area= 12,504 sf Storage= 7,835 cf
 Peak Elev= 235.94' @ 24.08 hrs Surf.Area= 14,916 sf Storage= 23,395 cf (15,560 cf above start)

Plug-Flow detention time= 4,454.7 min calculated for 1,946 cf (11% of inflow)
 Center-of-Mass det. time= 2,263.4 min (3,101.2 - 837.9)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	1,811 cf	Forebay (Irregular) Listed below (Recalc)
#2	230.00'	1,976 cf	Micropool (Irregular) Listed below (Recalc)
#3	233.90'	65,123 cf	Marsh & Storage (Irregular) Listed below (Recalc)
		68,911 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,233	129.1	834	1,811	1,357

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,646	155.1	1,000	1,976	1,942

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
233.90	4,232	530.5	0	0	4,232
234.50	9,625	400.9	4,048	4,048	13,842
235.00	10,440	413.5	5,015	9,063	14,683
236.00	12,144	438.8	11,281	20,344	16,451
237.00	13,950	464.0	13,037	33,381	18,317
238.00	15,856	489.2	14,893	48,273	20,287
239.00	17,864	514.5	16,850	65,123	22,369

Device	Routing	Invert	Outlet Devices
#1	Primary	232.00'	21.0" Round Culvert L= 74.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.00' S= 0.0135 ' / ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.41 sf

North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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#2	Device 1	234.50'	1.1" Vert. Orifice/Grate	C= 0.600
#3	Device 1	237.50'	36.0" x 48.0" Horiz. Orifice/Grate	C= 0.600

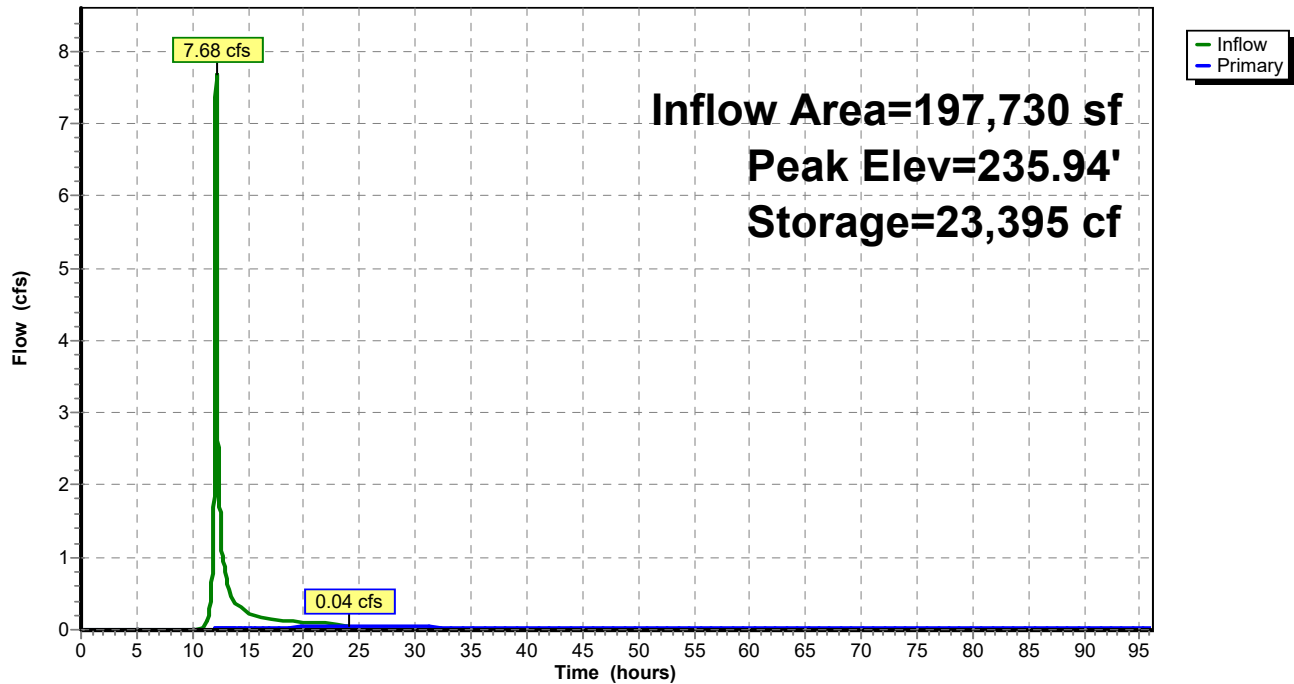
Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 24.08 hrs HW=235.94' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.04 cfs of 14.60 cfs potential flow)
2=Orifice/Grate (Orifice Controls 0.04 cfs @ 5.68 fps)
3=Orifice/Grate (Controls 0.00 cfs)

Pond 41: SWP-1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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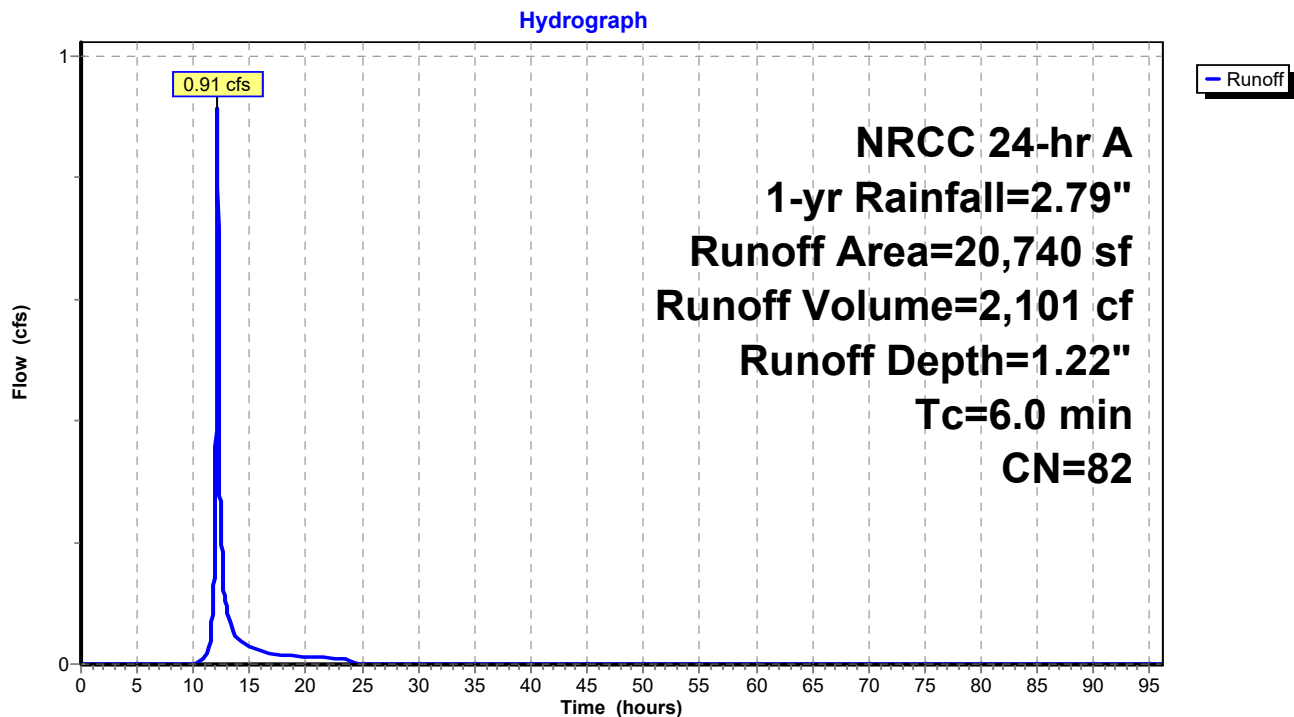
Summary for Subcatchment 42: Post A1

Runoff = 0.91 cfs @ 12.14 hrs, Volume= 2,101 cf, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
7,304	98	Paved parking, HSG C
10,356	74	>75% Grass cover, Good, HSG C
3,080	70	Woods, Good, HSG C
20,740	82	Weighted Average
13,436		64.78% Pervious Area
7,304		35.22% Impervious Area

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

Subcatchment 42: Post A1

North 60 Post A 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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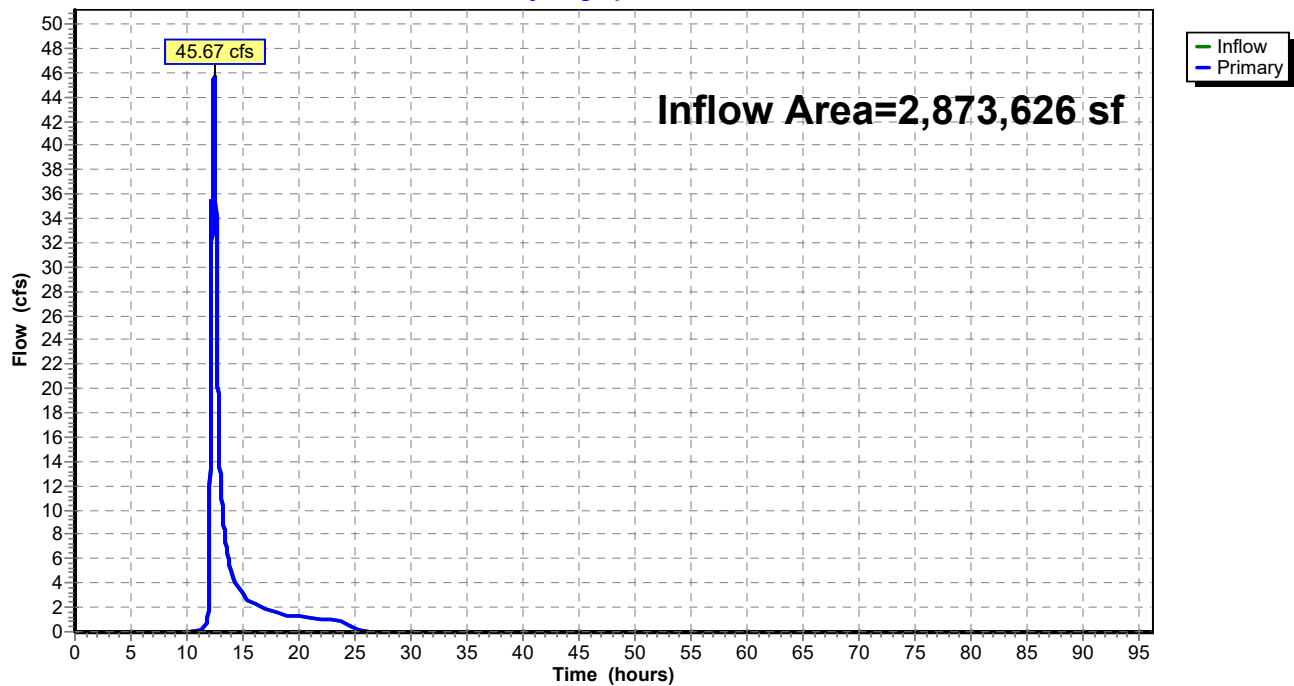
Summary for Link 43: Design Point A

Inflow Area = 2,873,626 sf, 43.08% Impervious, Inflow Depth > 0.85" for 1-yr event
Inflow = 45.67 cfs @ 12.42 hrs, Volume= 203,727 cf
Primary = 45.67 cfs @ 12.42 hrs, Volume= 203,727 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 43: Design Point A

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 8: Post A0 OffsiteRunoff Area=1,115,060 sf 57.87% Impervious Runoff Depth=2.37"
Flow Length=1,018' Tc=12.5 min CN=90 Runoff=72.43 cfs 220,520 cf**Pond 9: Offsite Pond A**Peak Elev=361.29' Storage=78,351 cf Inflow=72.43 cfs 220,520 cf
Outflow=41.23 cfs 169,325 cf**Subcatchment 10: Post A4**Runoff Area=164,583 sf 10.25% Impervious Runoff Depth=1.31"
Flow Length=340' Tc=20.5 min CN=76 Runoff=4.68 cfs 17,934 cf**Reach 11: 24" Culvert Pipe**Avg. Flow Depth=0.48' Max Vel=8.07 fps Inflow=4.68 cfs 17,934 cf
24.0" Round Pipe n=0.013 L=112.0' S=0.0268 '/' Capacity=37.02 cfs Outflow=4.68 cfs 17,934 cf**Subcatchment 12: Post A8**Runoff Area=210,459 sf 0.00% Impervious Runoff Depth=1.25"
Flow Length=503' Tc=17.8 min CN=75 Runoff=6.09 cfs 21,844 cf**Subcatchment 13: Post A11**Runoff Area=72,242 sf 63.67% Impervious Runoff Depth=2.37"
Tc=6.0 min CN=90 Runoff=5.98 cfs 14,287 cf**Subcatchment 14: Post A10**Runoff Area=304,098 sf 77.08% Impervious Runoff Depth=2.66"
Tc=6.0 min CN=93 Runoff=27.36 cfs 67,348 cf**Pond 15: DIV-5**Peak Elev=338.86' Inflow=27.36 cfs 67,348 cf
Primary=6.23 cfs 50,560 cf Secondary=21.14 cfs 16,788 cf Outflow=27.36 cfs 67,348 cf**Pond 16: INF-5**Peak Elev=337.08' Storage=12,803 cf Inflow=6.23 cfs 50,560 cf
Outflow=1.98 cfs 50,560 cf**Pond 17: Existing Wetland A**Peak Elev=325.04' Storage=12,673 cf Inflow=68.16 cfs 240,177 cf
36.0" Round Culvert n=0.013 L=168.0' S=0.0655 '/' Outflow=54.24 cfs 240,177 cf**Subcatchment 18: Post A15**Runoff Area=424,570 sf 0.00% Impervious Runoff Depth=1.07"
Flow Length=270' Tc=5.3 min CN=72 Runoff=16.60 cfs 37,820 cf**Subcatchment 19: Post A3**Runoff Area=93,277 sf 100.00% Impervious Runoff Depth=3.19"
Tc=6.0 min CN=98 Runoff=9.20 cfs 24,771 cf**Pond 20: DIV-1**Peak Elev=327.30' Inflow=9.20 cfs 24,771 cf
Primary=5.57 cfs 23,320 cf Secondary=3.82 cfs 1,451 cf Outflow=9.20 cfs 24,771 cf**Pond 21: INF-1**Peak Elev=326.14' Storage=6,387 cf Inflow=5.57 cfs 23,320 cf
Outflow=1.18 cfs 23,320 cf**Reach 22: Existing Stream A**Avg. Flow Depth=1.13' Max Vel=8.45 fps Inflow=62.36 cfs 279,448 cf
n=0.040 L=1,360.0' S=0.0721 '/' Capacity=291.69 cfs Outflow=59.53 cfs 279,448 cf**Subcatchment 23: Post A5**Runoff Area=92,926 sf 100.00% Impervious Runoff Depth=3.19"
Tc=6.0 min CN=98 Runoff=9.17 cfs 24,677 cf

North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 24: DIV-2Peak Elev=368.28' Inflow=9.17 cfs 24,677 cf
Primary=6.04 cfs 23,552 cf Secondary=3.33 cfs 1,125 cf Outflow=9.17 cfs 24,677 cf**Pond 25: INF-2**Peak Elev=366.90' Storage=7,388 cf Inflow=6.04 cfs 23,552 cf
Outflow=0.99 cfs 23,552 cf**Subcatchment26: Post A12**Runoff Area=161,485 sf 51.68% Impervious Runoff Depth=2.03"
Flow Length=1,430' Tc=11.7 min CN=86 Runoff=9.35 cfs 27,287 cf**Pond 27: DIV-6**Peak Elev=364.86' Inflow=9.35 cfs 27,287 cf
Primary=4.42 cfs 23,564 cf Secondary=5.06 cfs 3,723 cf Outflow=9.35 cfs 27,287 cf**Pond 28: INF-6**Peak Elev=363.54' Storage=6,485 cf Inflow=4.42 cfs 23,564 cf
Outflow=1.24 cfs 23,564 cf**Subcatchment29: Post A6**Runoff Area=370,437 sf 77.45% Impervious Runoff Depth=2.66"
Tc=6.0 min CN=93 Runoff=33.32 cfs 82,040 cf**Reach 30: 36" HDPE Pipe**Avg. Flow Depth=1.07' Max Vel=17.46 fps Inflow=40.08 cfs 86,888 cf
36.0" Round Pipe n=0.013 L=805.0' S=0.0471 ' Capacity=144.80 cfs Outflow=39.68 cfs 86,888 cf**Subcatchment31: Post A14**Runoff Area=207,155 sf 90.56% Impervious Runoff Depth=2.97"
Tc=6.0 min CN=96 Runoff=19.87 cfs 51,206 cf**Pond 32: DMH-3**Peak Elev=320.28' Inflow=59.25 cfs 138,095 cf
36.0" Round Culvert x 2.00 n=0.013 L=190.0' S=0.0895 ' Outflow=59.25 cfs 138,095 cf**Subcatchment33: Post A7**Runoff Area=40,130 sf 0.00% Impervious Runoff Depth=0.81"
Flow Length=150' Tc=10.5 min CN=67 Runoff=0.87 cfs 2,694 cf**Pond 34: SWP-5**Peak Elev=302.90' Storage=42,621 cf Inflow=59.96 cfs 140,788 cf
Discarded=5.99 cfs 117,265 cf Primary=19.62 cfs 23,524 cf Outflow=25.60 cfs 140,788 cf**Subcatchment35: Post A16**Runoff Area=50,520 sf 0.00% Impervious Runoff Depth=0.86"
Flow Length=190' Tc=9.9 min CN=68 Runoff=1.23 cfs 3,601 cf**Pond 36: SWP-3**Peak Elev=257.93' Storage=16,971 cf Inflow=20.53 cfs 27,124 cf
Discarded=3.54 cfs 27,124 cf Primary=0.00 cfs 0 cf Outflow=3.54 cfs 27,124 cf**Subcatchment37: Post A13**Runoff Area=160,184 sf 76.47% Impervious Runoff Depth=2.56"
Tc=6.0 min CN=92 Runoff=14.04 cfs 34,176 cf**Pond 38: DIV-7**Peak Elev=316.06' Inflow=14.04 cfs 34,176 cf
Primary=3.91 cfs 26,764 cf Secondary=10.26 cfs 7,412 cf Outflow=14.04 cfs 34,176 cf**Pond 39: INF-7**Peak Elev=315.19' Storage=7,378 cf Inflow=3.91 cfs 26,764 cf
Outflow=1.07 cfs 26,764 cf**Subcatchment40: Post A2**Runoff Area=197,730 sf 24.29% Impervious Runoff Depth=1.50"
Flow Length=446' Tc=5.1 min CN=79 Runoff=11.19 cfs 24,784 cf**Pond 41: SWP-1**Peak Elev=236.53' Storage=30,767 cf Inflow=11.19 cfs 24,784 cf
Outflow=0.04 cfs 12,079 cf

North 60 Post A 3-9-20*NRCC 24-hr A 2-yr Rainfall=3.42"*

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Subcatchment42: Post A1

Runoff Area=20,740 sf 35.22% Impervious Runoff Depth=1.72"

Tc=6.0 min CN=82 Runoff=1.29 cfs 2,967 cf

Link 43: Design Point A

Inflow=65.65 cfs 301,906 cf

Primary=65.65 cfs 301,906 cf

Total Runoff Area = 3,685,596 sf Runoff Volume = 657,955 cf Average Runoff Depth = 2.14"
49.41% Pervious = 1,821,010 sf 50.59% Impervious = 1,864,586 sf

North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 8: Post A0 Offsite

Runoff = 72.43 cfs @ 12.20 hrs, Volume= 220,520 cf, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
645,334	98	Paved parking, HSG C
443,611	80	>75% Grass cover, Good, HSG D
23,572	74	>75% Grass cover, Good, HSG C
2,543	61	>75% Grass cover, Good, HSG B
1,115,060	90	Weighted Average
469,726		42.13% Pervious Area
645,334		57.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.6	148	0.0574	3.86		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	740	0.0270	10.25	32.22	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.015 Concrete sewer w/manholes & inlets
12.5	1,018	Total			

North 60 Post A 3-9-20

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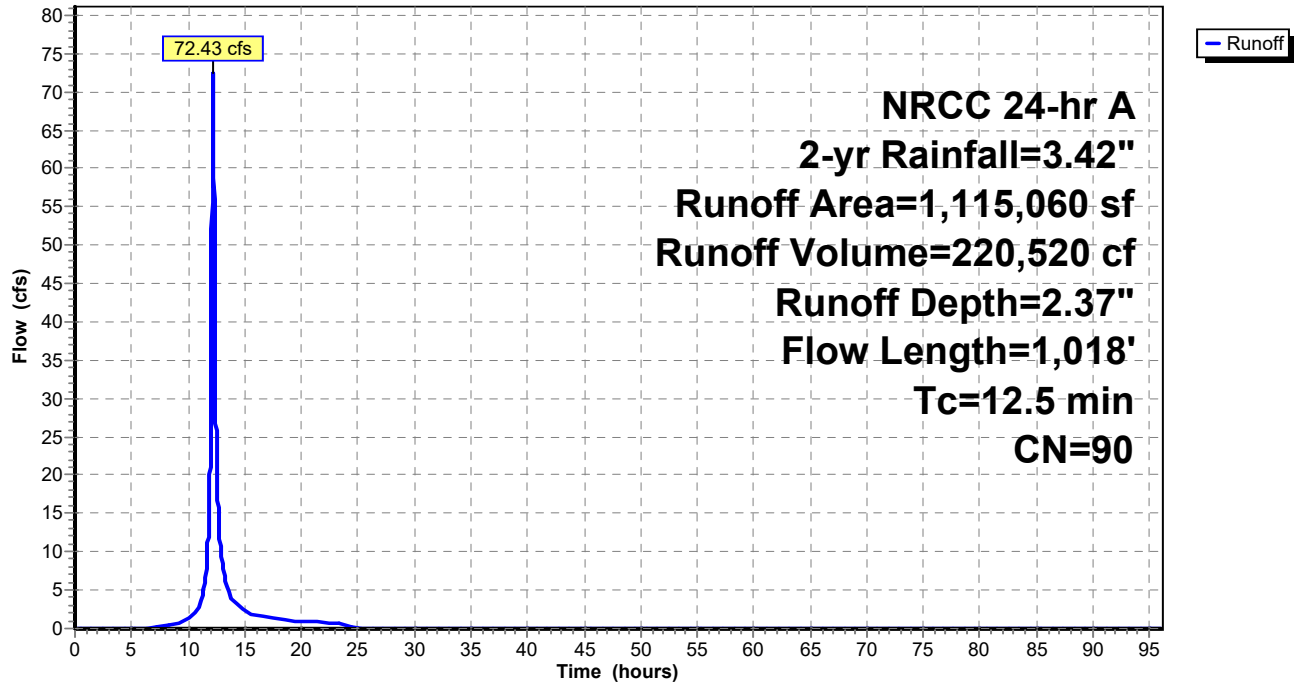
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Subcatchment 8: Post A0 Offsite

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 9: Offsite Pond A

Inflow Area = 1,115,060 sf, 57.87% Impervious, Inflow Depth = 2.37" for 2-yr event
 Inflow = 72.43 cfs @ 12.20 hrs, Volume= 220,520 cf
 Outflow = 41.23 cfs @ 12.35 hrs, Volume= 169,325 cf, Atten= 43%, Lag= 9.1 min
 Primary = 41.23 cfs @ 12.35 hrs, Volume= 169,325 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 361.29' @ 12.35 hrs Surf.Area= 22,611 sf Storage= 78,351 cf

Plug-Flow detention time= 123.4 min calculated for 169,325 cf (77% of inflow)
 Center-of-Mass det. time= 48.0 min (851.3 - 803.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	357.00'	221,816 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)
357.00	14,633	679.0	0	0	14,633
358.00	16,652	698.0	15,632	15,632	16,826
359.00	17,534	715.0	17,091	32,723	18,864
360.00	19,427	745.0	18,472	51,195	22,425
362.00	24,453	804.0	43,784	94,979	29,861
364.00	28,701	854.0	53,097	148,076	36,663
365.00	36,602	901.0	32,572	180,648	43,285
366.00	45,910	1,262.0	41,168	221,816	105,432

Device	Routing	Invert	Outlet Devices
#1	Primary	357.00'	30.0" Round Culvert L= 125.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 357.00' / 351.00' S= 0.0480 ' S= 0.0480 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	360.00'	36.0" x 48.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	364.75'	150.0' long x 36.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=41.23 cfs @ 12.35 hrs HW=361.29' TW=325.03' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 41.23 cfs @ 8.40 fps)
 2=Orifice/Grate (Passes 41.23 cfs of 131.40 cfs potential flow)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

North 60 Post A 3-9-20

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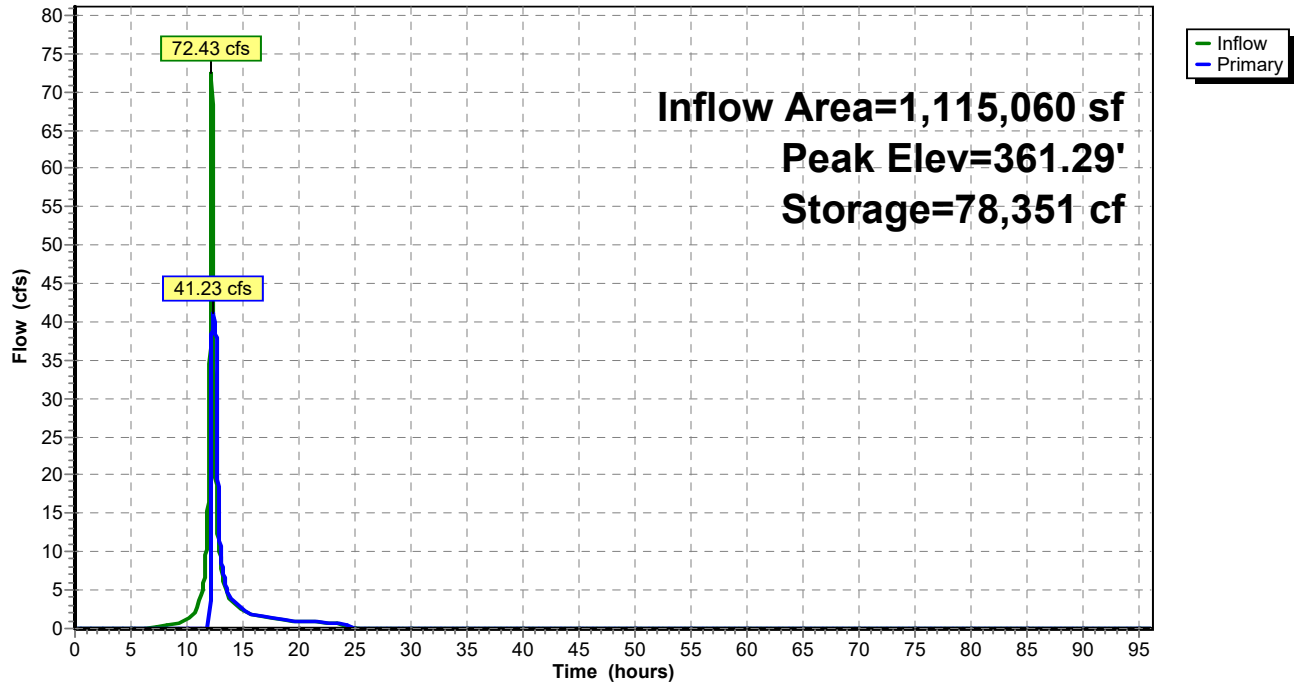
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 9: Offsite Pond A

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 10: Post A4

Runoff = 4.68 cfs @ 12.32 hrs, Volume= 17,934 cf, Depth= 1.31"

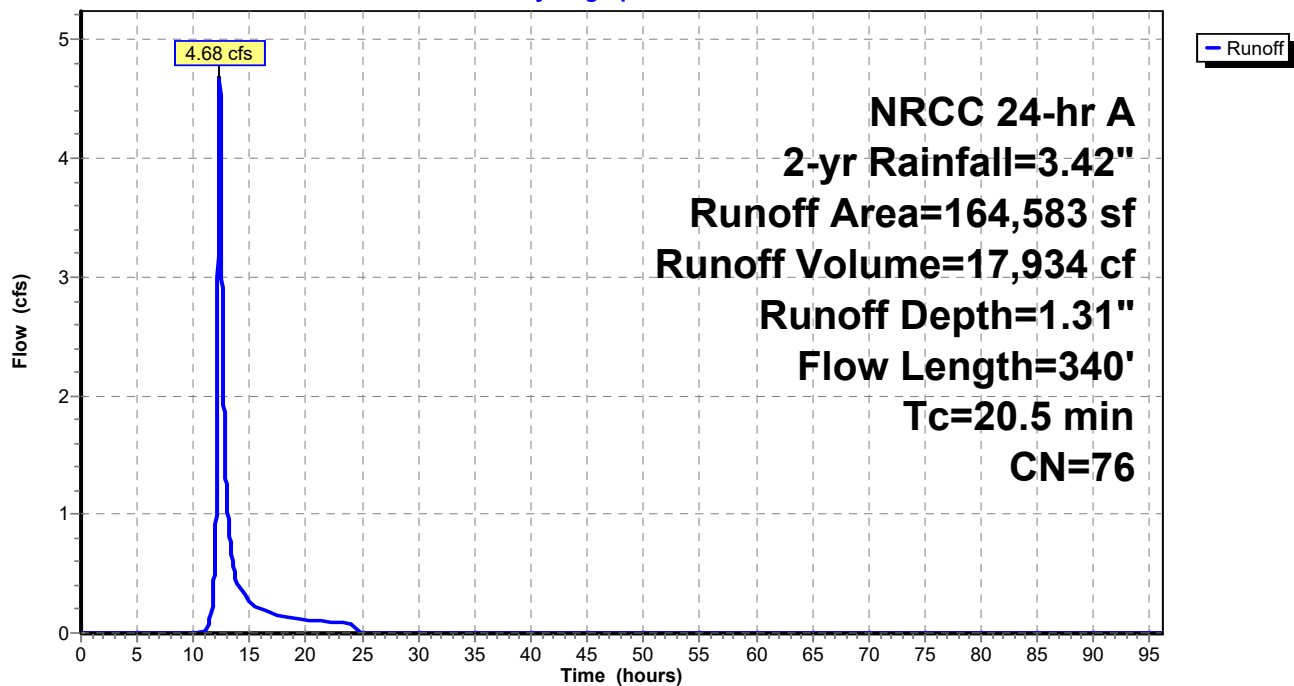
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
15,990	74	>75% Grass cover, Good, HSG C
65,271	70	Woods, Good, HSG C
66,457	77	Woods, Good, HSG D
16,865	98	Water Surface, HSG D
164,583	76	Weighted Average
147,718		89.75% Pervious Area
16,865		10.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0250	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.7	240	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
20.5	340	Total			

Subcatchment 10: Post A4

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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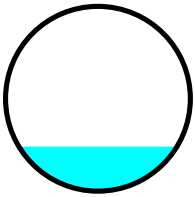
Summary for Reach 11: 24" Culvert Pipe

Inflow Area = 164,583 sf, 10.25% Impervious, Inflow Depth = 1.31" for 2-yr event
Inflow = 4.68 cfs @ 12.32 hrs, Volume= 17,934 cf
Outflow = 4.68 cfs @ 12.32 hrs, Volume= 17,934 cf, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.07 fps, Min. Travel Time= 0.2 min
Avg. Velocity= 3.08 fps, Avg. Travel Time= 0.6 min

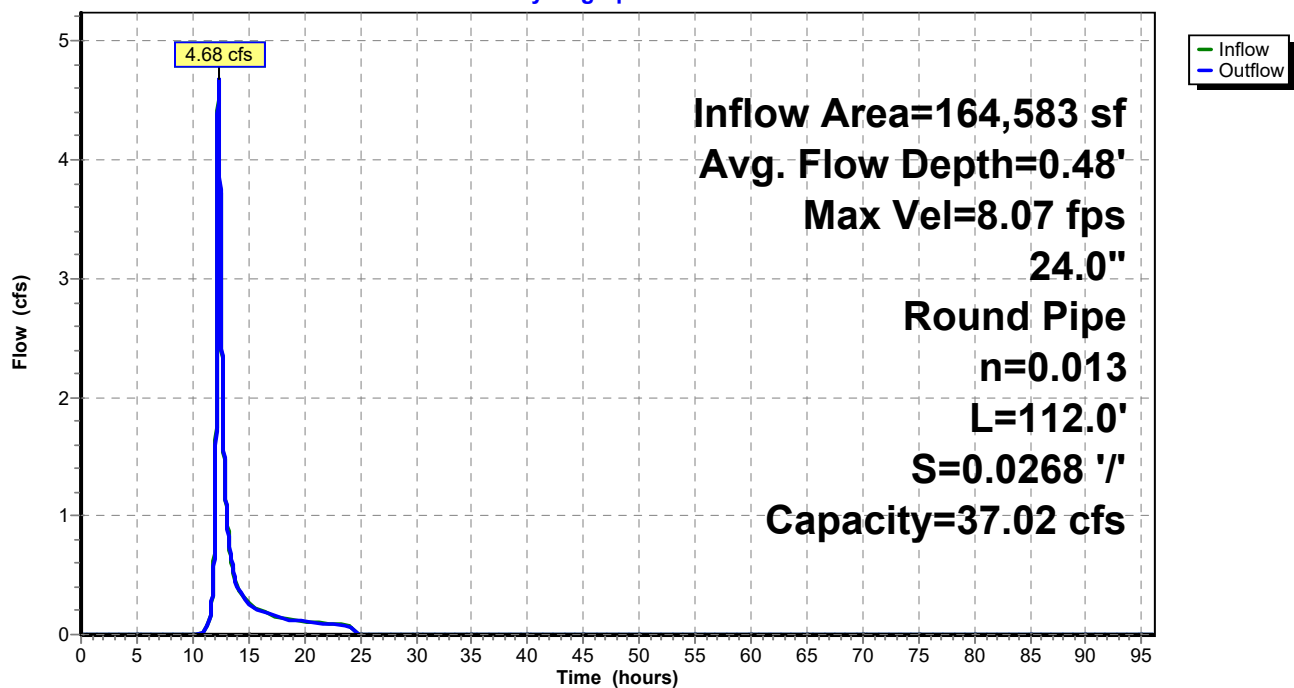
Peak Storage= 65 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 37.02 cfs

24.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 112.0' Slope= 0.0268 '/'
Inlet Invert= 349.00', Outlet Invert= 346.00'



Reach 11: 24" Culvert Pipe

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Summary for Subcatchment 12: Post A8

Runoff = 6.09 cfs @ 12.28 hrs, Volume= 21,844 cf, Depth= 1.25"

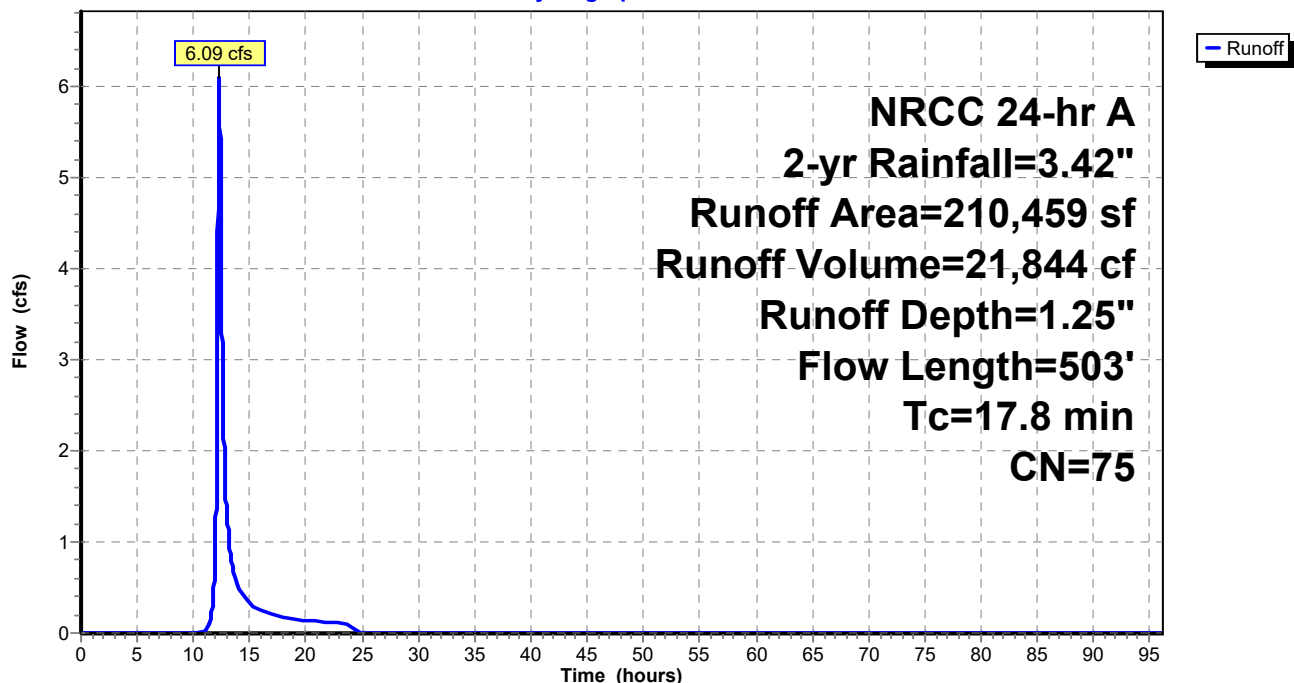
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
31,463	77	Woods, Good, HSG D
57,494	80	>75% Grass cover, Good, HSG D
63,009	70	Woods, Good, HSG C
58,493	74	>75% Grass cover, Good, HSG C
210,459	75	Weighted Average
210,459		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0400	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.4	305	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.8	98	0.0306	1.97	3.94	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
17.8	503	Total			

Subcatchment 12: Post A8

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Summary for Subcatchment 13: Post A11

Runoff = 5.98 cfs @ 12.13 hrs, Volume= 14,287 cf, Depth= 2.37"

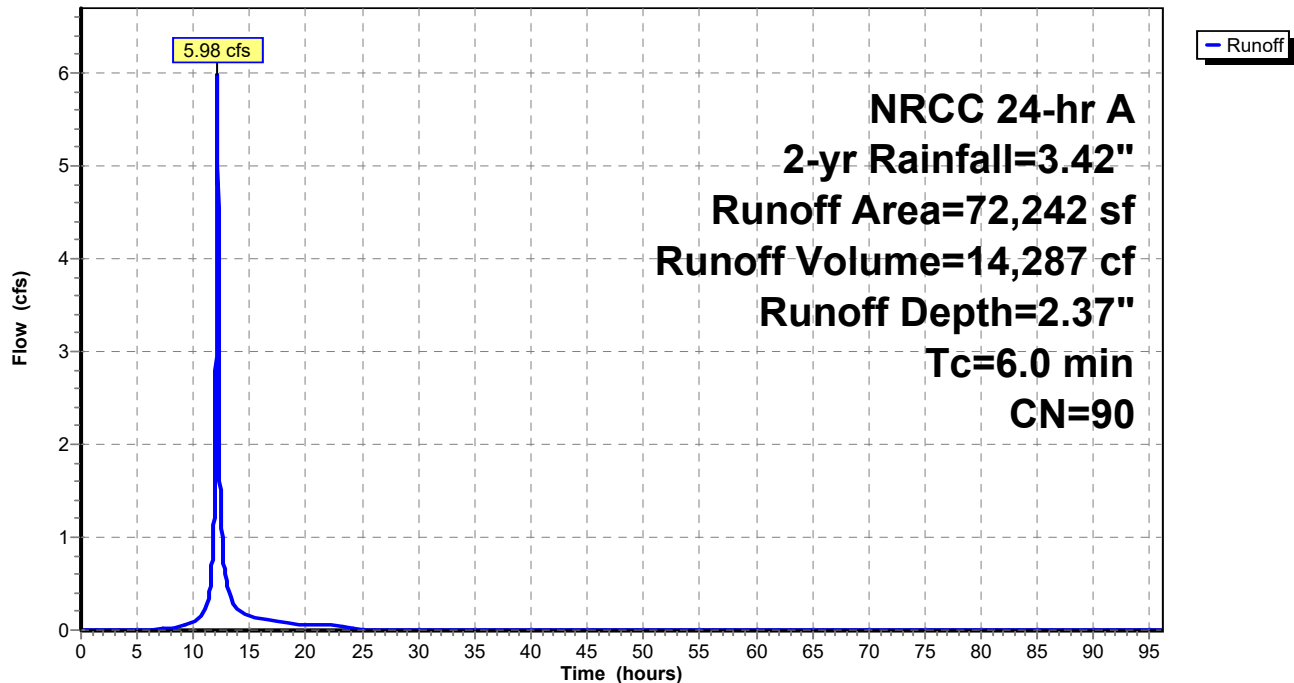
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
46,000	98	Paved parking, HSG C
16,765	74	>75% Grass cover, Good, HSG C
9,477	80	>75% Grass cover, Good, HSG D
72,242	90	Weighted Average
26,242		36.33% Pervious Area
46,000		63.67% Impervious Area

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

Subcatchment 13: Post A11

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 14: Post A10

Runoff = 27.36 cfs @ 12.13 hrs, Volume= 67,348 cf, Depth= 2.66"

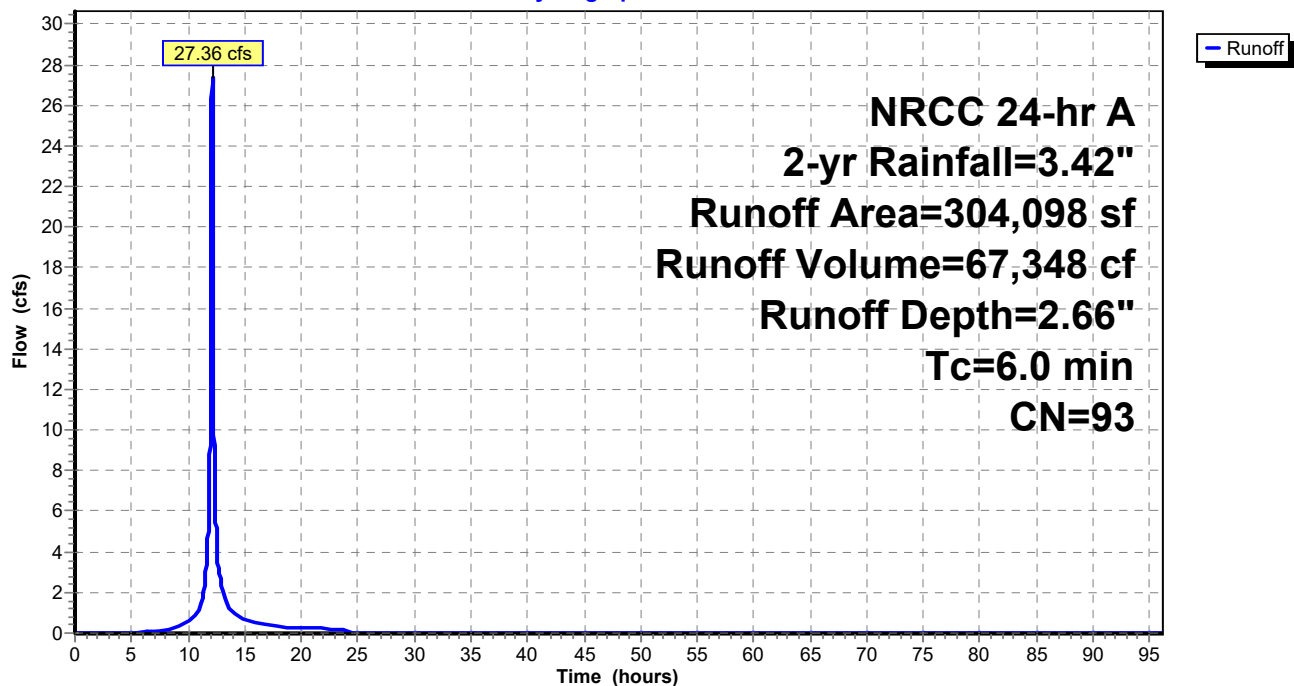
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
234,393	98	Paved parking, HSG C
56,515	74	>75% Grass cover, Good, HSG C
13,190	80	>75% Grass cover, Good, HSG D
304,098	93	Weighted Average
69,705		22.92% Pervious Area
234,393		77.08% Impervious Area

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

Subcatchment 14: Post A10

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 15: DIV-5

Inflow Area = 304,098 sf, 77.08% Impervious, Inflow Depth = 2.66" for 2-yr event
 Inflow = 27.36 cfs @ 12.13 hrs, Volume= 67,348 cf
 Outflow = 27.36 cfs @ 12.13 hrs, Volume= 67,348 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.23 cfs @ 12.11 hrs, Volume= 50,560 cf
 Secondary = 21.14 cfs @ 12.13 hrs, Volume= 16,788 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 338.86' @ 12.13 hrs

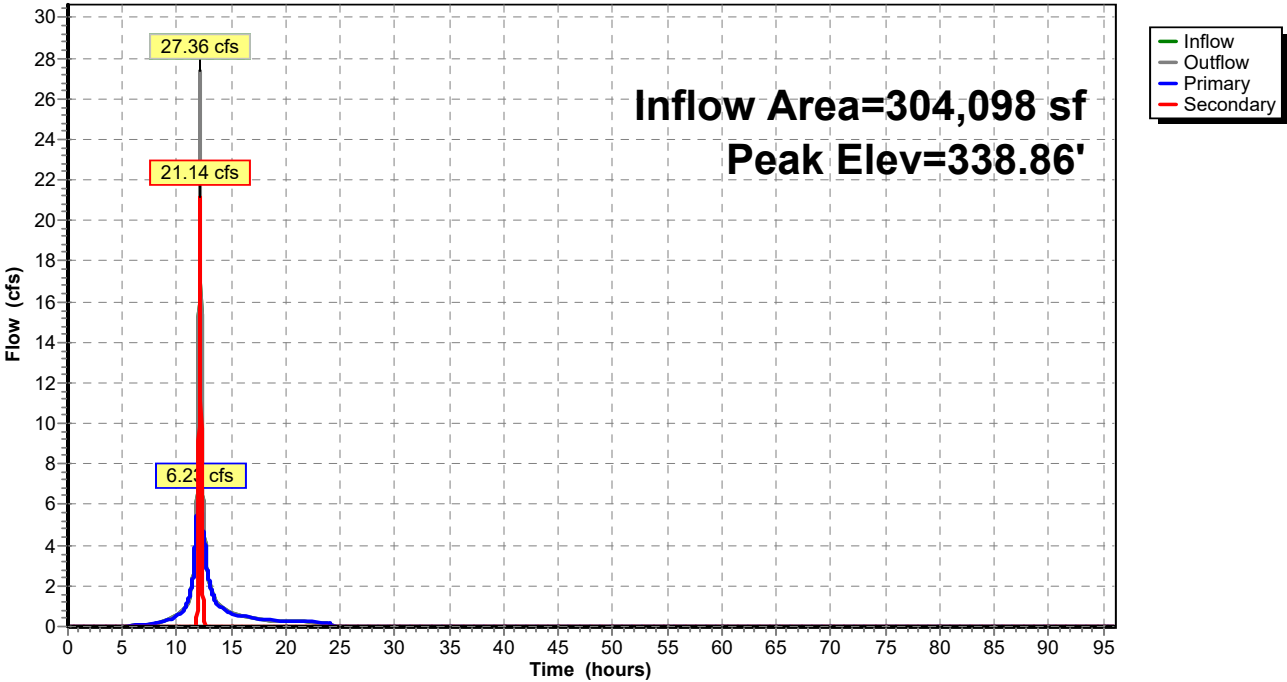
Flood Elev= 342.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	335.50'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 335.50' / 335.50' S= 0.0000 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	335.50'	36.0" Round Culvert L= 72.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 335.50' / 332.00' S= 0.0486 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Device 2	338.00'	8.0' 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=6.20 cfs @ 12.11 hrs HW=338.84' TW=336.15' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 6.20 cfs @ 7.90 fps)**Secondary OutFlow** Max=21.13 cfs @ 12.13 hrs HW=338.86' TW=323.70' (Dynamic Tailwater)↑ **2=Culvert** (Passes 21.13 cfs of 46.43 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 21.13 cfs @ 3.07 fps)

Pond 15: DIV-5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 16: INF-5

Inflow Area = 304,098 sf, 77.08% Impervious, Inflow Depth = 2.00" for 2-yr event
 Inflow = 6.23 cfs @ 12.11 hrs, Volume= 50,560 cf
 Outflow = 1.98 cfs @ 11.51 hrs, Volume= 50,560 cf, Atten= 68%, Lag= 0.0 min
 Discarded = 1.98 cfs @ 11.51 hrs, Volume= 50,560 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 337.08' @ 13.07 hrs Surf.Area= 8,559 sf Storage= 12,803 cf

Plug-Flow detention time= 42.4 min calculated for 50,555 cf (100% of inflow)
 Center-of-Mass det. time= 42.4 min (846.7 - 804.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	335.00'	9,145 cf	70.25'W x 121.83'L x 4.33'H Field A 37,088 cf Overall - 14,227 cf Embedded = 22,862 cf x 40.0% Voids
#2A	335.50'	14,227 cf	Cultec R-360HD x 384 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 384 Chambers in 12 Rows Cap Storage= +6.5 cf x 2 x 12 rows = 155.0 cf
		23,371 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	335.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.98 cfs @ 11.51 hrs HW=335.05' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.98 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 16: INF-5 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 12 rows = 155.0 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

32 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 119.83' Row Length +12.0" End Stone x 2 = 121.83' Base Length

12 Rows x 60.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 70.25' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

384 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 12 Rows = 14,226.6 cf Chamber Storage

37,088.1 cf Field - 14,226.6 cf Chambers = 22,861.5 cf Stone x 40.0% Voids = 9,144.6 cf Stone Storage

Chamber Storage + Stone Storage = 23,371.2 cf = 0.537 af

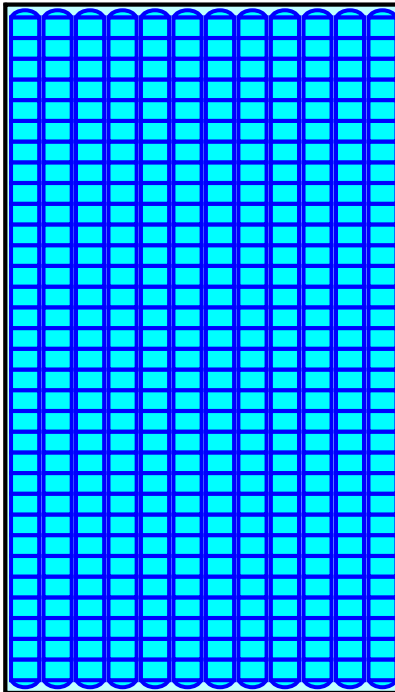
Overall Storage Efficiency = 63.0%

Overall System Size = 121.83' x 70.25' x 4.33'

384 Chambers

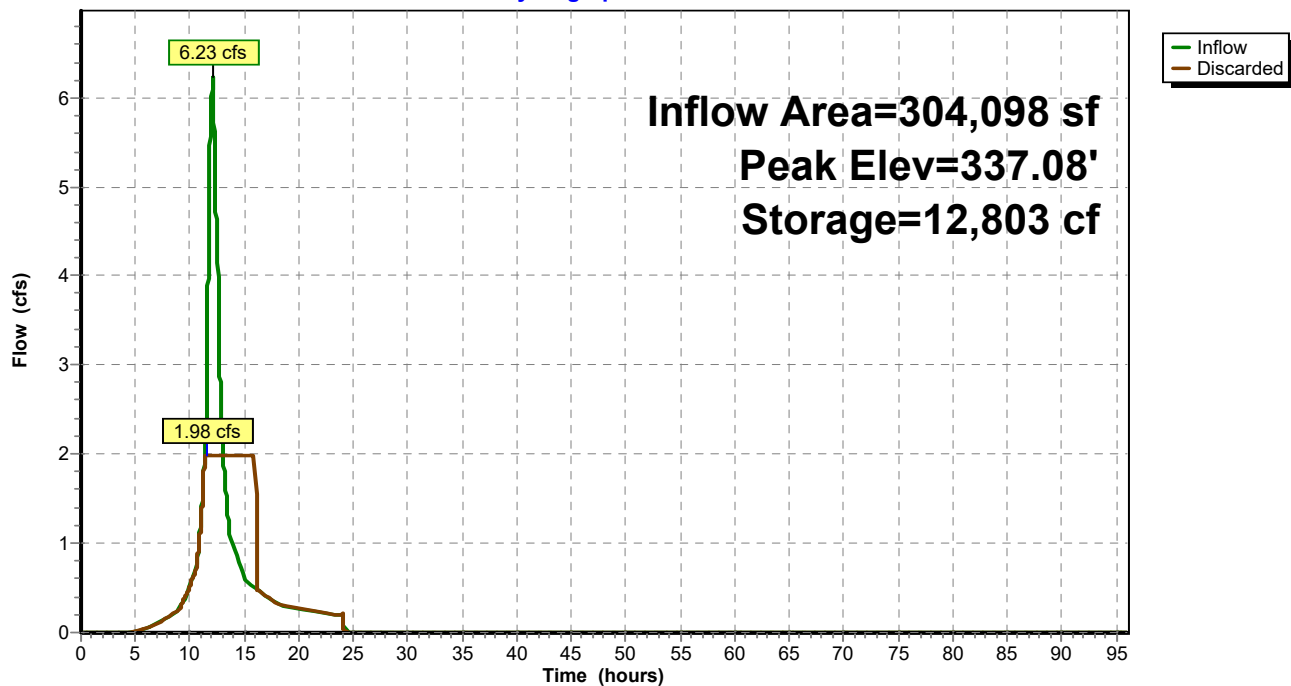
1,373.6 cy Field

846.7 cy Stone



Pond 16: INF-5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 17: Existing Wetland A

Inflow Area = 1,562,344 sf, 45.33% Impervious, Inflow Depth = 1.84" for 2-yr event
 Inflow = 68.16 cfs @ 12.15 hrs, Volume= 240,177 cf
 Outflow = 54.24 cfs @ 12.37 hrs, Volume= 240,177 cf, Atten= 20%, Lag= 13.3 min
 Primary = 54.24 cfs @ 12.37 hrs, Volume= 240,177 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 325.04' @ 12.37 hrs Surf.Area= 7,921 sf Storage= 12,673 cf

Plug-Flow detention time= 2.5 min calculated for 240,177 cf (100% of inflow)
 Center-of-Mass det. time= 2.3 min (841.7 - 839.4)

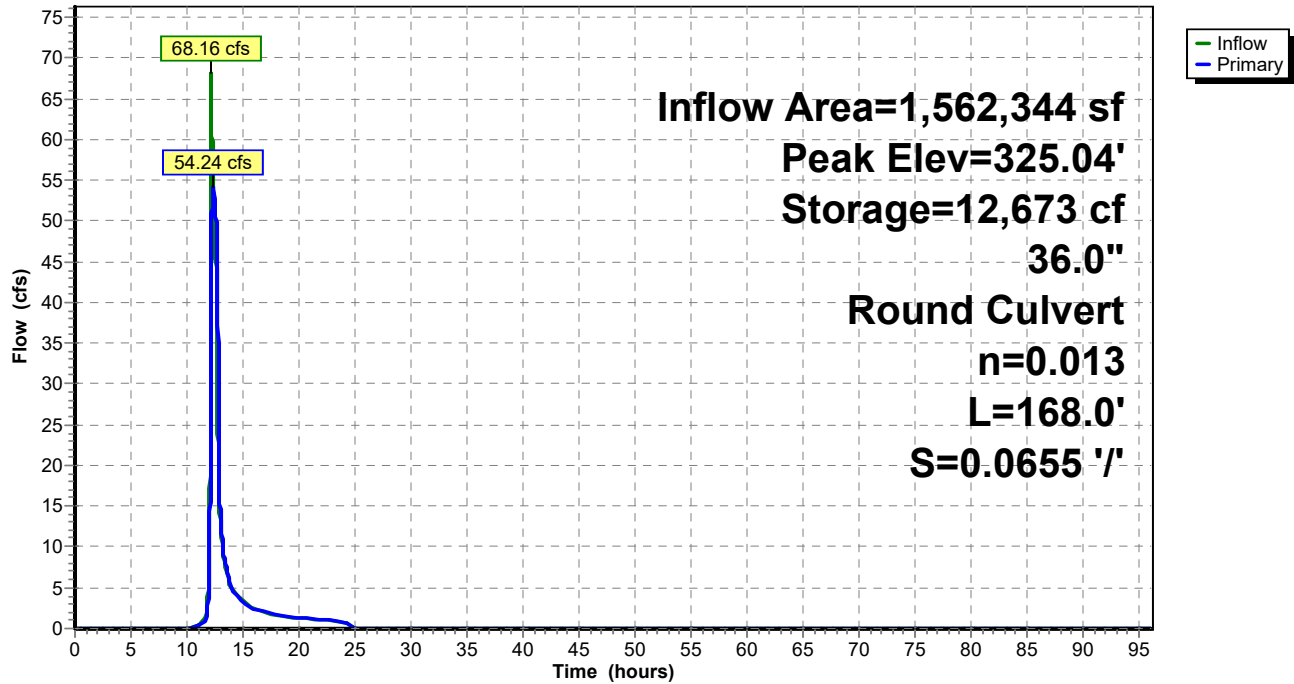
Volume	Invert	Avail.Storage	Storage Description		
#1	321.00'	190,307 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
321.00	124	53.2	0	0	124
322.00	1,084	175.8	525	525	2,361
324.00	4,913	341.5	5,536	6,061	9,202
326.00	11,332	638.2	15,804	21,866	32,354
328.00	20,583	804.3	31,458	53,324	51,475
330.00	34,086	1,075.5	54,104	107,428	92,087
332.00	49,257	1,268.5	82,879	190,307	128,164

Device	Routing	Invert	Outlet Devices
#1	Primary	321.00'	36.0" Round Culvert L= 168.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 321.00' / 310.00' S= 0.0655 ' S= 0.0655 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=54.24 cfs @ 12.37 hrs HW=325.04' TW=313.12' (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 54.24 cfs @ 7.67 fps)

Pond 17: Existing Wetland A

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 18: Post A15

Runoff = 16.60 cfs @ 12.13 hrs, Volume= 37,820 cf, Depth= 1.07"

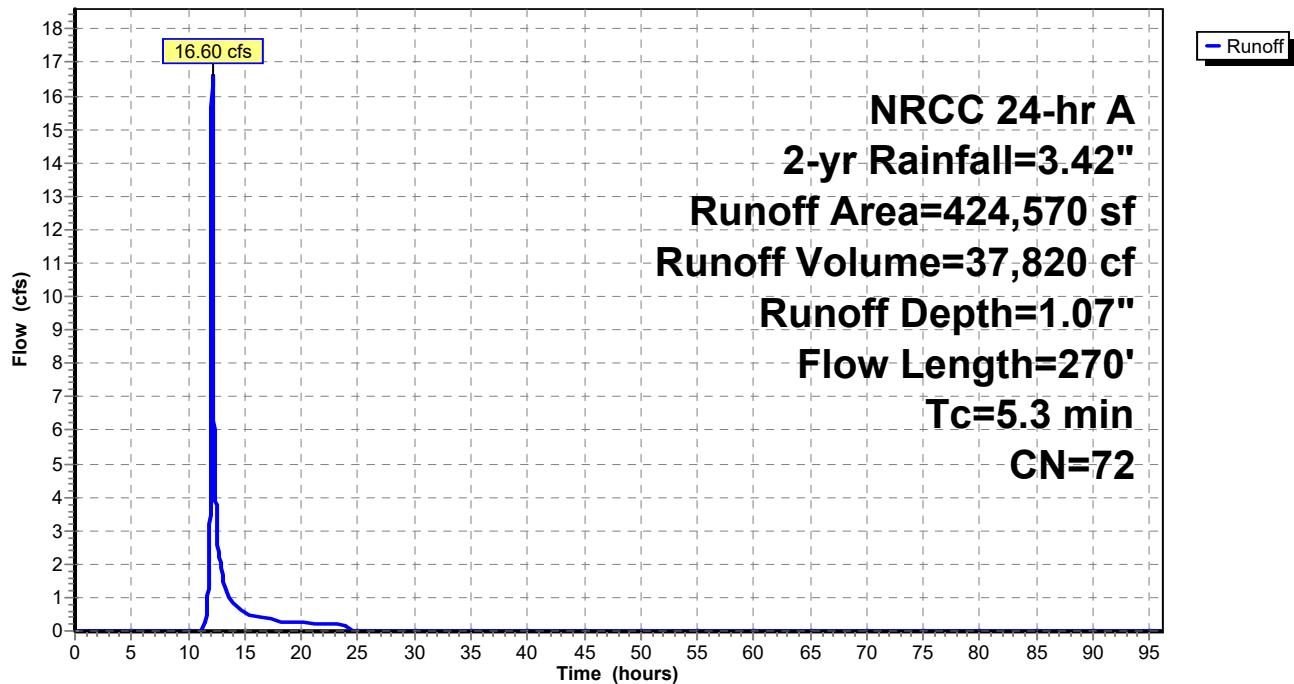
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
21,520	77	Woods, Good, HSG D
33,300	80	>75% Grass cover, Good, HSG D
213,730	70	Woods, Good, HSG C
140,572	74	>75% Grass cover, Good, HSG C
15,448	60	Woods, Fair, HSG B
424,570	72	Weighted Average
424,570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	100	0.1000	0.34		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.4	170	0.2353	7.81		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.3	270	Total			

Subcatchment 18: Post A15

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 19: Post A3

Runoff = 9.20 cfs @ 12.13 hrs, Volume= 24,771 cf, Depth= 3.19"

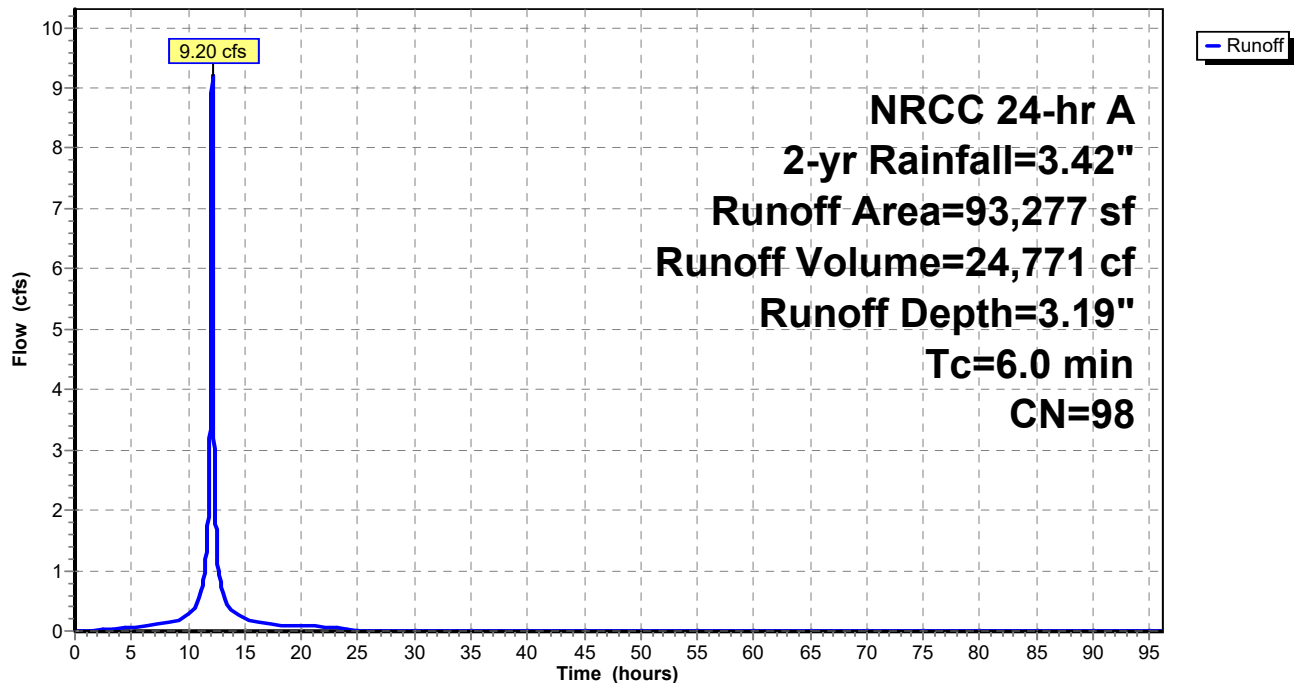
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
93,277	98	Paved parking, HSG C
93,277		100.00% Impervious Area

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

Subcatchment 19: Post A3

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 20: DIV-1

Inflow Area = 93,277 sf, 100.00% Impervious, Inflow Depth = 3.19" for 2-yr event
 Inflow = 9.20 cfs @ 12.13 hrs, Volume= 24,771 cf
 Outflow = 9.20 cfs @ 12.13 hrs, Volume= 24,771 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.57 cfs @ 12.07 hrs, Volume= 23,320 cf
 Secondary = 3.82 cfs @ 12.13 hrs, Volume= 1,451 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 327.30' @ 12.13 hrs

Flood Elev= 330.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	324.50'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.50' / 324.50' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	324.50'	18.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.50' / 320.00' S= 0.0900 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	327.00'	8.0' 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=5.51 cfs @ 12.07 hrs HW=327.18' TW=325.06' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.51 cfs @ 7.01 fps)**Secondary OutFlow** Max=3.80 cfs @ 12.13 hrs HW=327.30' TW=312.95' (Dynamic Tailwater)↑ **2=Culvert** (Passes 3.80 cfs of 12.19 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 3.80 cfs @ 1.57 fps)

North 60 Post A 3-9-20

Prepared by {enter your company name here}

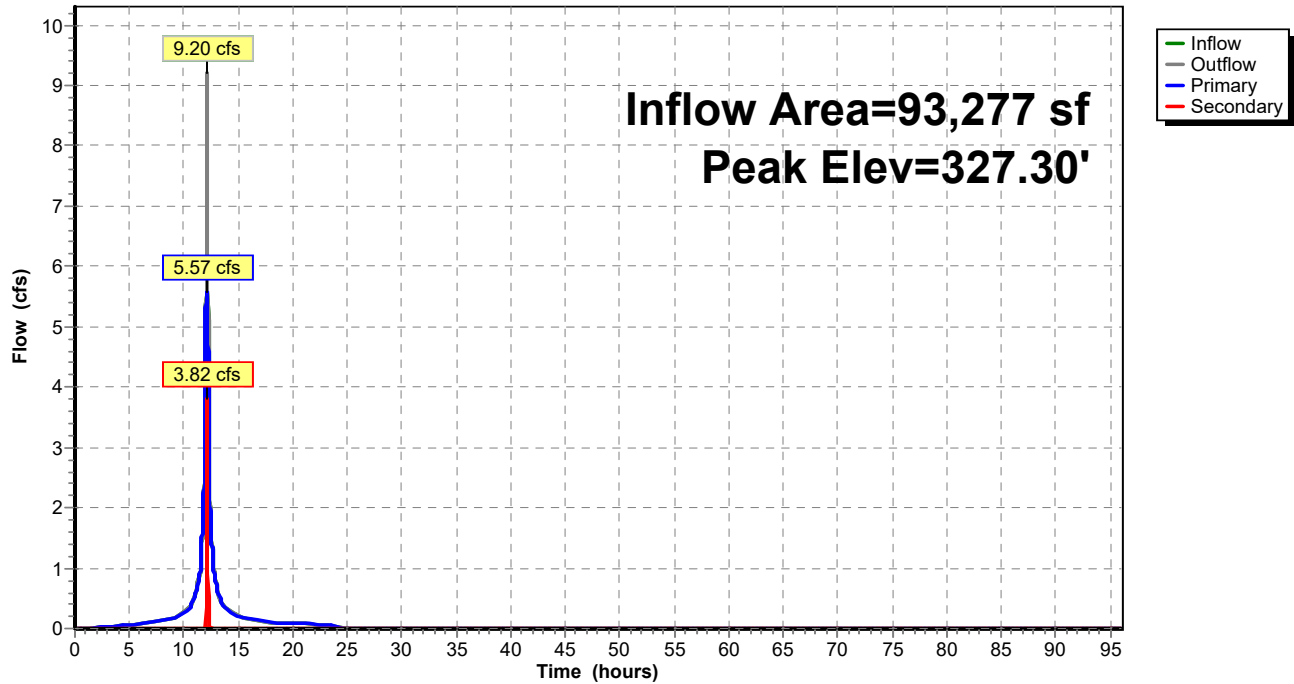
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 20: DIV-1

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 21: INF-1

Inflow Area = 93,277 sf, 100.00% Impervious, Inflow Depth = 3.00" for 2-yr event
 Inflow = 5.57 cfs @ 12.07 hrs, Volume= 23,320 cf
 Outflow = 1.18 cfs @ 11.66 hrs, Volume= 23,320 cf, Atten= 79%, Lag= 0.0 min
 Discarded = 1.18 cfs @ 11.66 hrs, Volume= 23,320 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 326.14' @ 12.61 hrs Surf.Area= 4,245 sf Storage= 6,387 cf

Plug-Flow detention time= 31.4 min calculated for 23,317 cf (100% of inflow)
 Center-of-Mass det. time= 31.4 min (787.0 - 755.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	324.00'	4,688 cf	36.75'W x 115.50'L x 4.33'H Field A 18,393 cf Overall - 6,674 cf Embedded = 11,720 cf x 40.0% Voids
#2A	324.50'	6,674 cf	Cultec R-360HD x 180 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 180 Chambers in 6 Rows Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf
		11,361 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	324.00'	12.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.18 cfs @ 11.66 hrs HW=324.05' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.18 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 21: INF-1 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

30 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 112.50' Row Length +18.0" End Stone x 2 = 115.50' Base Length

6 Rows x 60.0" Wide + 9.0" Spacing x 5 + 18.0" Side Stone x 2 = 36.75' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

180 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 6 Rows = 6,673.6 cf Chamber Storage

18,393.4 cf Field - 6,673.6 cf Chambers = 11,719.8 cf Stone x 40.0% Voids = 4,687.9 cf Stone Storage

Chamber Storage + Stone Storage = 11,361.5 cf = 0.261 af

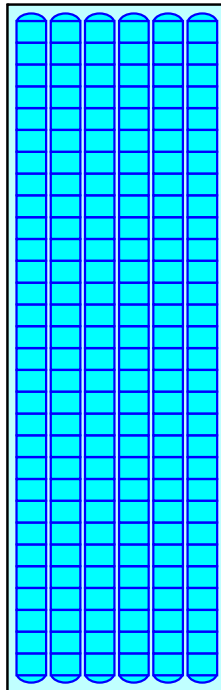
Overall Storage Efficiency = 61.8%

Overall System Size = 115.50' x 36.75' x 4.33'

180 Chambers

681.2 cy Field

434.1 cy Stone



North 60 Post A 3-9-20

Prepared by {enter your company name here}

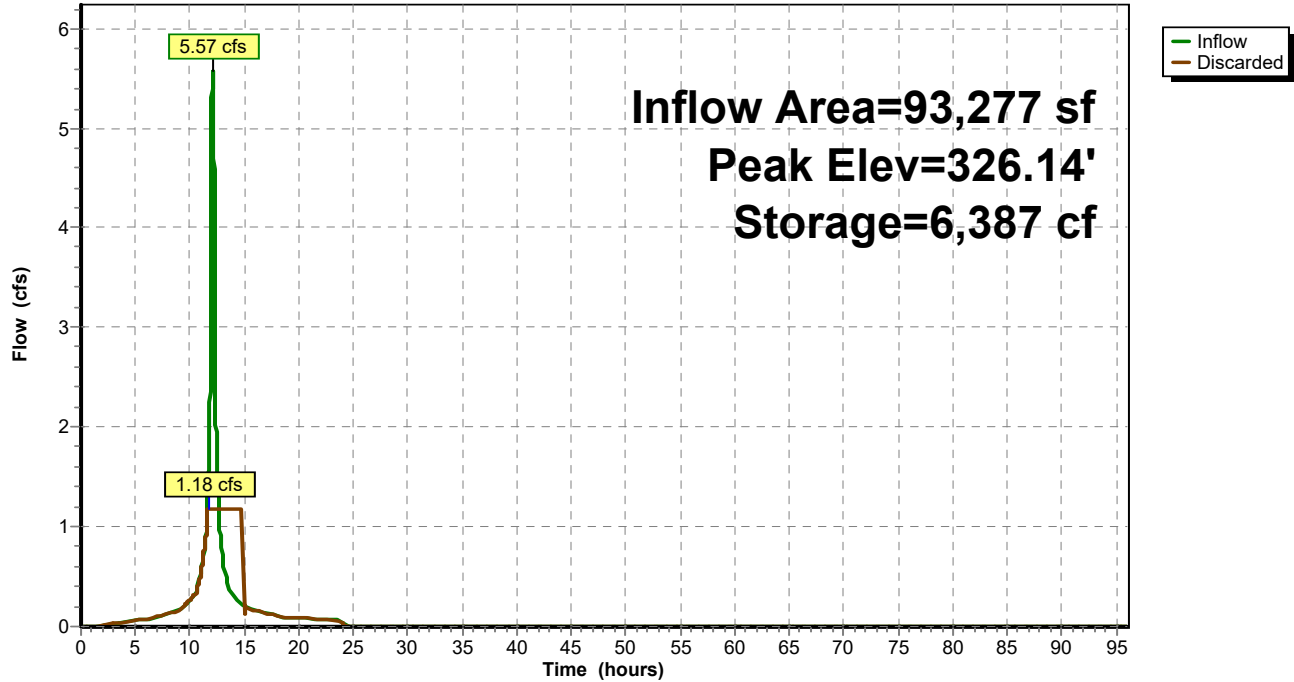
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 21: INF-1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Reach 22: Existing Stream A

Inflow Area = 1,986,914 sf, 35.64% Impervious, Inflow Depth = 1.69" for 2-yr event
Inflow = 62.36 cfs @ 12.16 hrs, Volume= 279,448 cf
Outflow = 59.53 cfs @ 12.26 hrs, Volume= 279,448 cf, Atten= 5%, Lag= 5.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.45 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 1.94 fps, Avg. Travel Time= 11.7 min

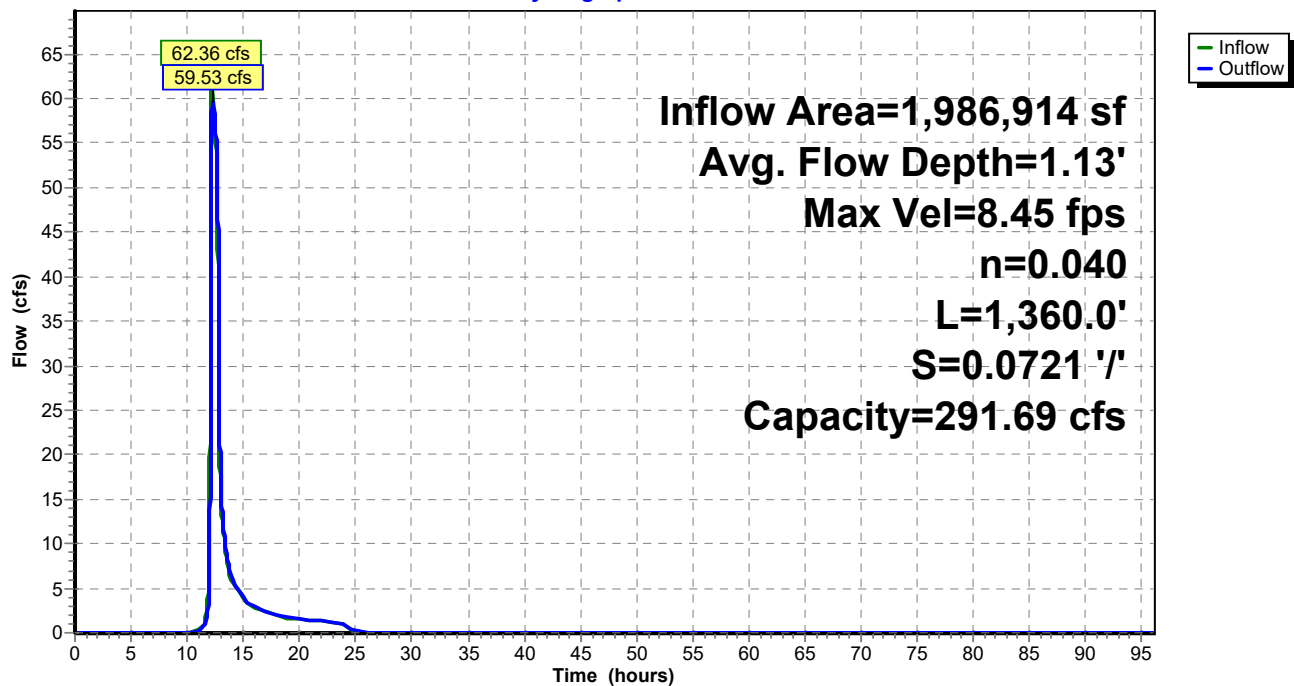
Peak Storage= 9,584 cf @ 12.26 hrs
Average Depth at Peak Storage= 1.13'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 291.69 cfs

4.00' x 2.50' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 1,360.0' Slope= 0.0721 '/'
Inlet Invert= 312.00', Outlet Invert= 214.00'



Reach 22: Existing Stream A

Hydrograph



North 60 Post A 3-9-20

Prepared by {enter your company name here}

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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Summary for Subcatchment 23: Post A5

Runoff = 9.17 cfs @ 12.13 hrs, Volume= 24,677 cf, Depth= 3.19"

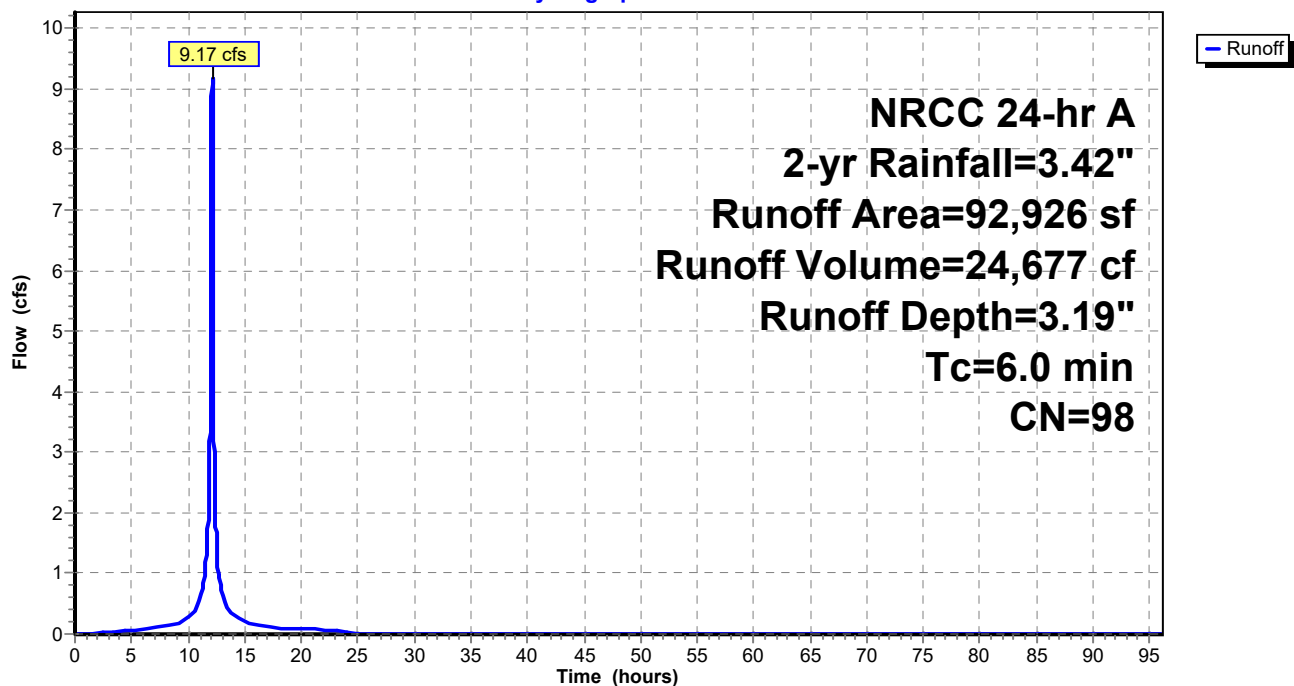
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
92,926	98	Paved parking, HSG C
92,926		100.00% Impervious Area

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

Subcatchment 23: Post A5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Printed 3/25/2020

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Summary for Pond 24: DIV-2

Inflow Area = 92,926 sf, 100.00% Impervious, Inflow Depth = 3.19" for 2-yr event
 Inflow = 9.17 cfs @ 12.13 hrs, Volume= 24,677 cf
 Outflow = 9.17 cfs @ 12.13 hrs, Volume= 24,677 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.04 cfs @ 12.06 hrs, Volume= 23,552 cf
 Secondary = 3.33 cfs @ 12.13 hrs, Volume= 1,125 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 368.28' @ 12.13 hrs

Flood Elev= 371.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	365.00'	12.0" Round Culvert L= 9.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 365.00' / 365.00' S= 0.0000 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	366.50'	24.0" Round Culvert L= 550.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 366.50' / 355.00' S= 0.0209 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	368.00'	8.0' 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=5.98 cfs @ 12.06 hrs HW=368.10' TW=365.60' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.98 cfs @ 7.61 fps)**Secondary OutFlow** Max=3.31 cfs @ 12.13 hrs HW=368.28' TW=357.00' (Dynamic Tailwater)↑ **2=Culvert** (Passes 3.31 cfs of 13.38 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 3.31 cfs @ 1.50 fps)

North 60 Post A 3-9-20

Prepared by {enter your company name here}

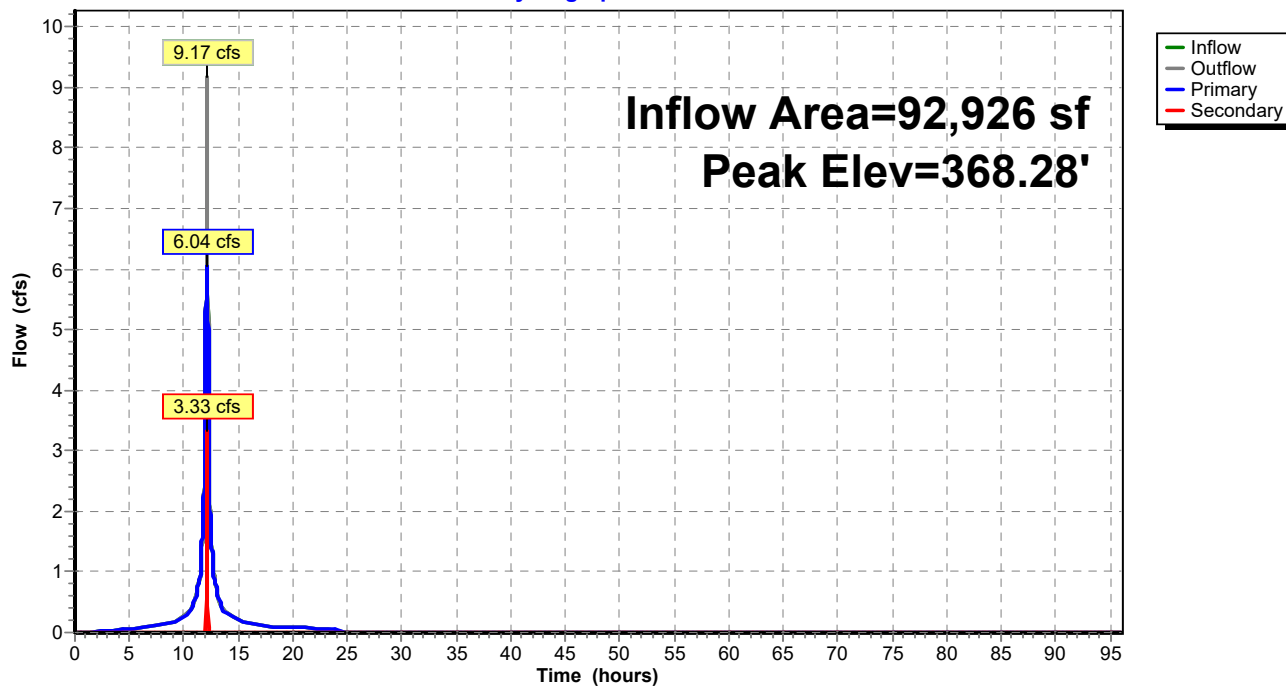
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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Pond 24: DIV-2

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 25: INF-2

Inflow Area = 92,926 sf, 100.00% Impervious, Inflow Depth = 3.04" for 2-yr event
 Inflow = 6.04 cfs @ 12.06 hrs, Volume= 23,552 cf
 Outflow = 0.99 cfs @ 11.62 hrs, Volume= 23,552 cf, Atten= 84%, Lag= 0.0 min
 Discarded = 0.99 cfs @ 11.62 hrs, Volume= 23,552 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 366.90' @ 12.68 hrs Surf.Area= 4,295 sf Storage= 7,388 cf

Plug-Flow detention time= 46.0 min calculated for 23,550 cf (100% of inflow)
 Center-of-Mass det. time= 46.0 min (801.2 - 755.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	364.50'	4,639 cf	41.50'W x 103.50'L x 4.33'H Field A 18,613 cf Overall - 7,016 cf Embedded = 11,596 cf x 40.0% Voids
#2A	365.00'	7,016 cf	Cultec R-360HD x 189 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 189 Chambers in 7 Rows Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf
		11,655 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	364.50'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=0.99 cfs @ 11.62 hrs HW=364.55' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.99 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 25: INF-2 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

27 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 101.50' Row Length +12.0" End Stone x 2 = 103.50' Base Length

7 Rows x 60.0" Wide + 9.0" Spacing x 6 + 12.0" Side Stone x 2 = 41.50' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

189 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 7 Rows = 7,016.3 cf Chamber Storage

18,612.7 cf Field - 7,016.3 cf Chambers = 11,596.5 cf Stone x 40.0% Voids = 4,638.6 cf Stone Storage

Chamber Storage + Stone Storage = 11,654.9 cf = 0.268 af

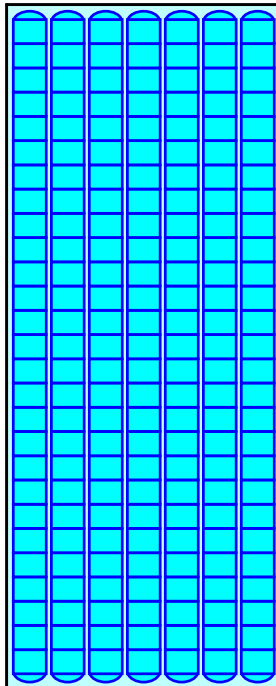
Overall Storage Efficiency = 62.6%

Overall System Size = 103.50' x 41.50' x 4.33'

189 Chambers

689.4 cy Field

429.5 cy Stone



North 60 Post A 3-9-20

Prepared by {enter your company name here}

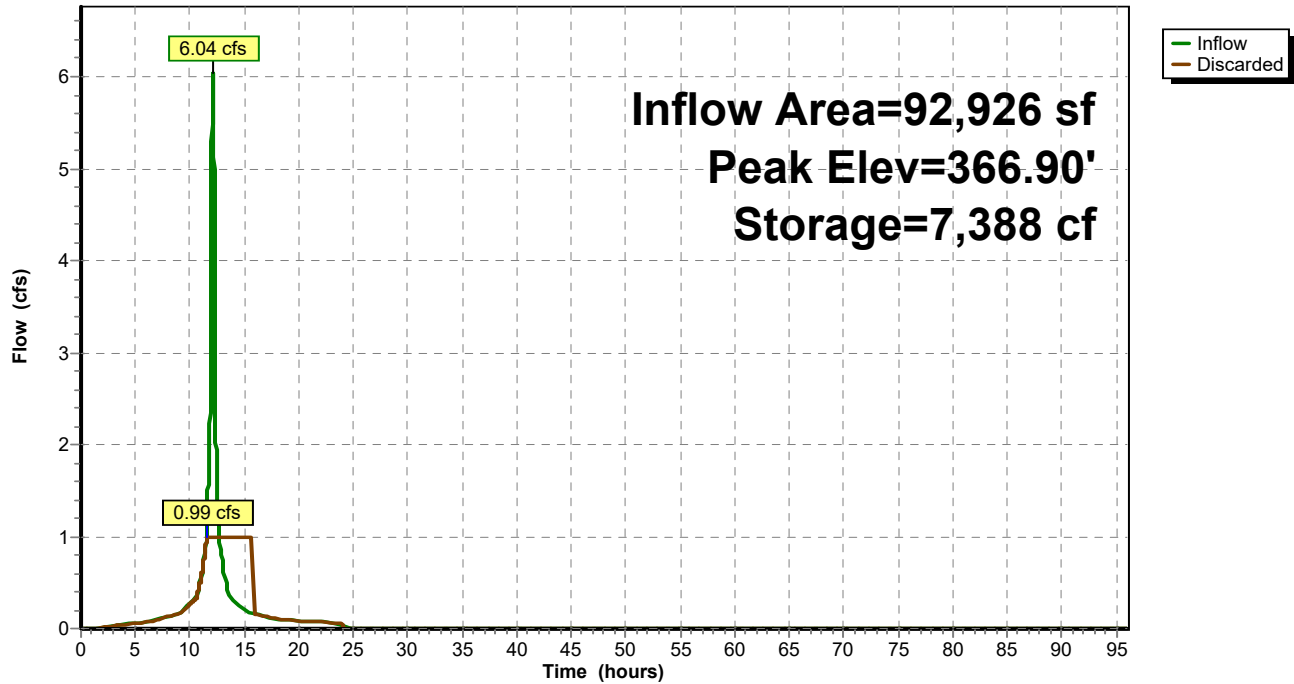
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 25: INF-2

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Summary for Subcatchment 26: Post A12

Runoff = 9.35 cfs @ 12.19 hrs, Volume= 27,287 cf, Depth= 2.03"

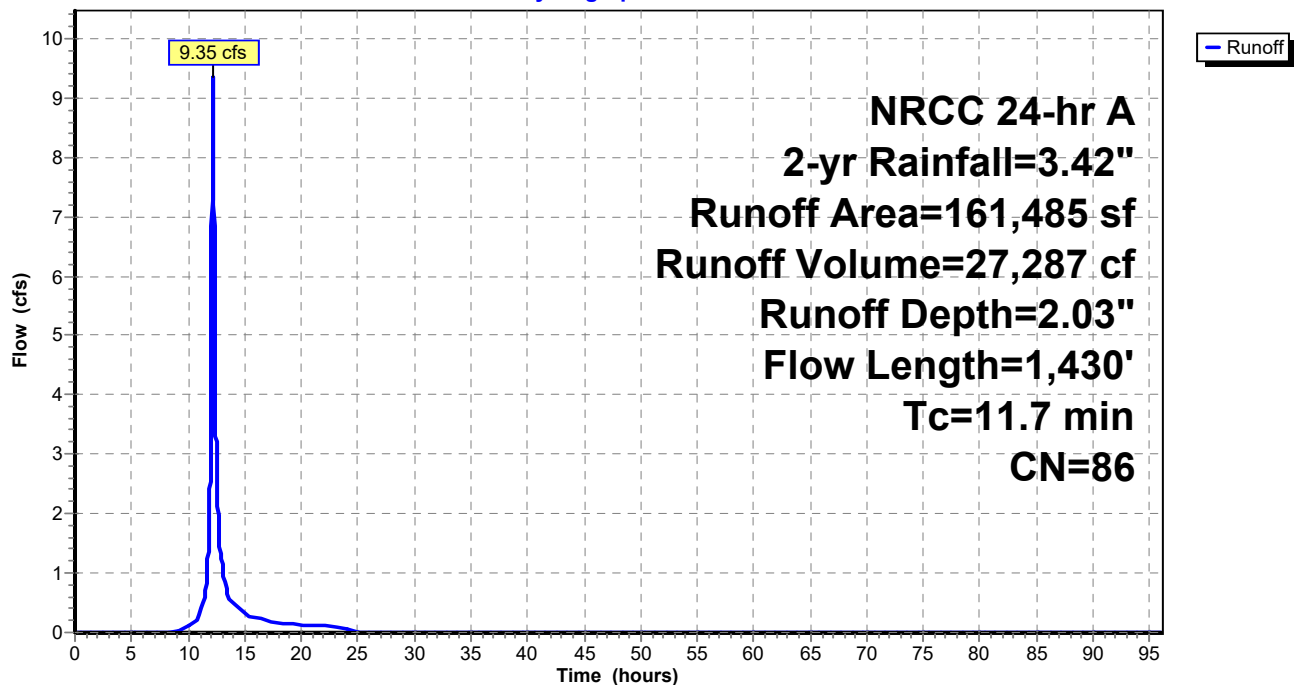
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
83,450	98	Paved parking, HSG C
78,035	74	>75% Grass cover, Good, HSG C
161,485	86	Weighted Average
78,035		48.32% Pervious Area
83,450		51.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	84	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
1.6	201	0.0164	2.06		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,145	0.0339	9.69	11.89	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
11.7	1,430	Total			

Subcatchment 26: Post A12

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 27: DIV-6

Inflow Area = 161,485 sf, 51.68% Impervious, Inflow Depth = 2.03" for 2-yr event
 Inflow = 9.35 cfs @ 12.19 hrs, Volume= 27,287 cf
 Outflow = 9.35 cfs @ 12.19 hrs, Volume= 27,287 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.42 cfs @ 12.12 hrs, Volume= 23,564 cf
 Secondary = 5.06 cfs @ 12.20 hrs, Volume= 3,723 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 364.86' @ 12.20 hrs

Flood Elev= 366.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	361.50'	10.0" Round Culvert L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 361.50' / 361.50' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	361.50'	24.0" Round Culvert L= 148.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 361.50' / 355.94' S= 0.0376 ' S= 0.0376 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	364.50'	8.0' 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=4.40 cfs @ 12.12 hrs HW=364.76' TW=361.96' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 4.40 cfs @ 8.06 fps)**Secondary OutFlow** Max=5.05 cfs @ 12.20 hrs HW=364.86' TW=356.85' (Dynamic Tailwater)↑ **2=Culvert** (Passes 5.05 cfs of 23.25 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 5.05 cfs @ 1.74 fps)

North 60 Post A 3-9-20

Prepared by {enter your company name here}

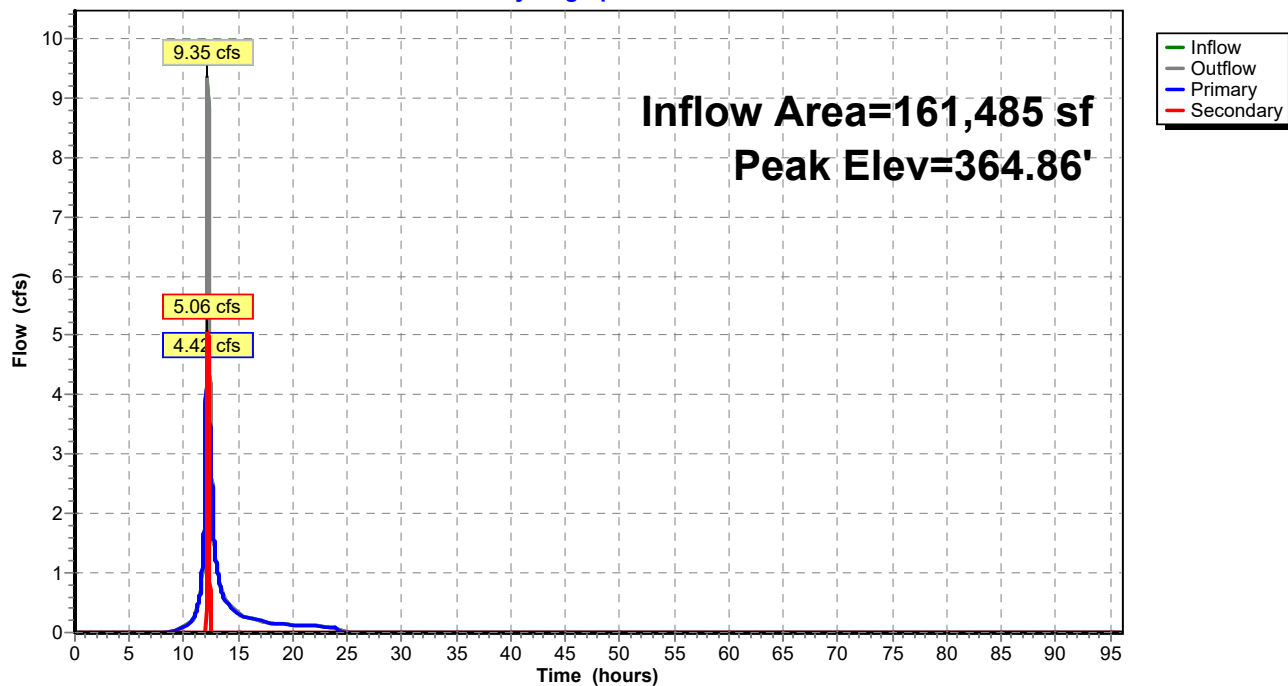
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 27: DIV-6

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 28: INF-6

Inflow Area = 161,485 sf, 51.68% Impervious, Inflow Depth = 1.75" for 2-yr event
 Inflow = 4.42 cfs @ 12.12 hrs, Volume= 23,564 cf
 Outflow = 1.24 cfs @ 11.82 hrs, Volume= 23,564 cf, Atten= 72%, Lag= 0.0 min
 Discarded = 1.24 cfs @ 11.82 hrs, Volume= 23,564 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 363.54' @ 12.92 hrs Surf.Area= 3,569 sf Storage= 6,485 cf

Plug-Flow detention time= 35.6 min calculated for 23,562 cf (100% of inflow)
 Center-of-Mass det. time= 35.6 min (864.0 - 828.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	361.00'	3,393 cf	35.75'W x 99.83'L x 4.00'H Field A 14,276 cf Overall - 5,794 cf Embedded = 8,482 cf x 40.0% Voids
#2A	361.50'	5,794 cf	Cultec R-360HD x 156 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 156 Chambers in 6 Rows Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf
		9,187 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	361.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.24 cfs @ 11.82 hrs HW=361.05' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.24 cfs)

North 60 Post A 3-9-20

Prepared by {enter your company name here}

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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Pond 28: INF-6 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

26 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 97.83' Row Length +12.0" End Stone x 2 = 99.83' Base Length

6 Rows x 60.0" Wide + 9.0" Spacing x 5 + 12.0" Side Stone x 2 = 35.75' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

156 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 6 Rows = 5,794.1 cf Chamber Storage

14,276.2 cf Field - 5,794.1 cf Chambers = 8,482.1 cf Stone x 40.0% Voids = 3,392.8 cf Stone Storage

Chamber Storage + Stone Storage = 9,186.9 cf = 0.211 af

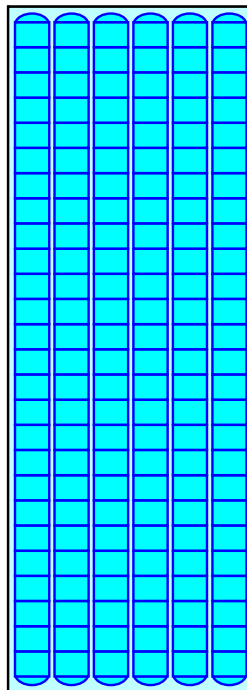
Overall Storage Efficiency = 64.4%

Overall System Size = 99.83' x 35.75' x 4.00'

156 Chambers

528.7 cy Field

314.2 cy Stone



North 60 Post A 3-9-20

Prepared by {enter your company name here}

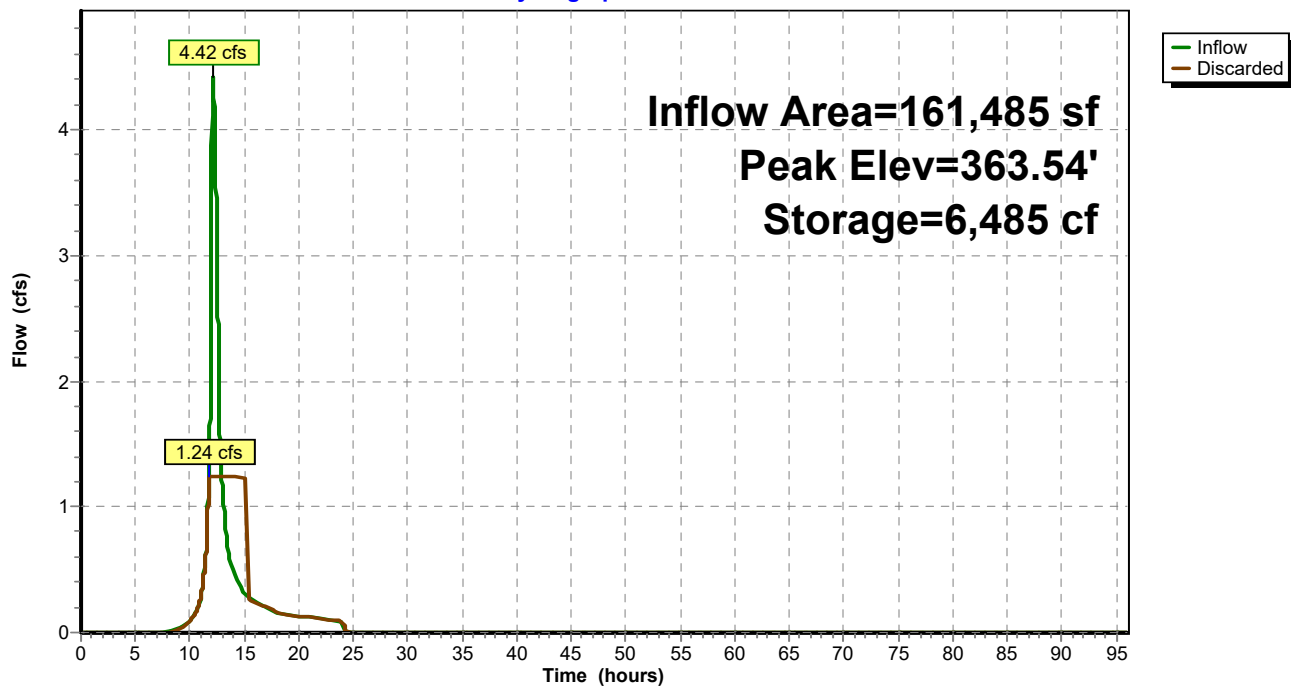
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 28: INF-6

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Summary for Subcatchment 29: Post A6

Runoff = 33.32 cfs @ 12.13 hrs, Volume= 82,040 cf, Depth= 2.66"

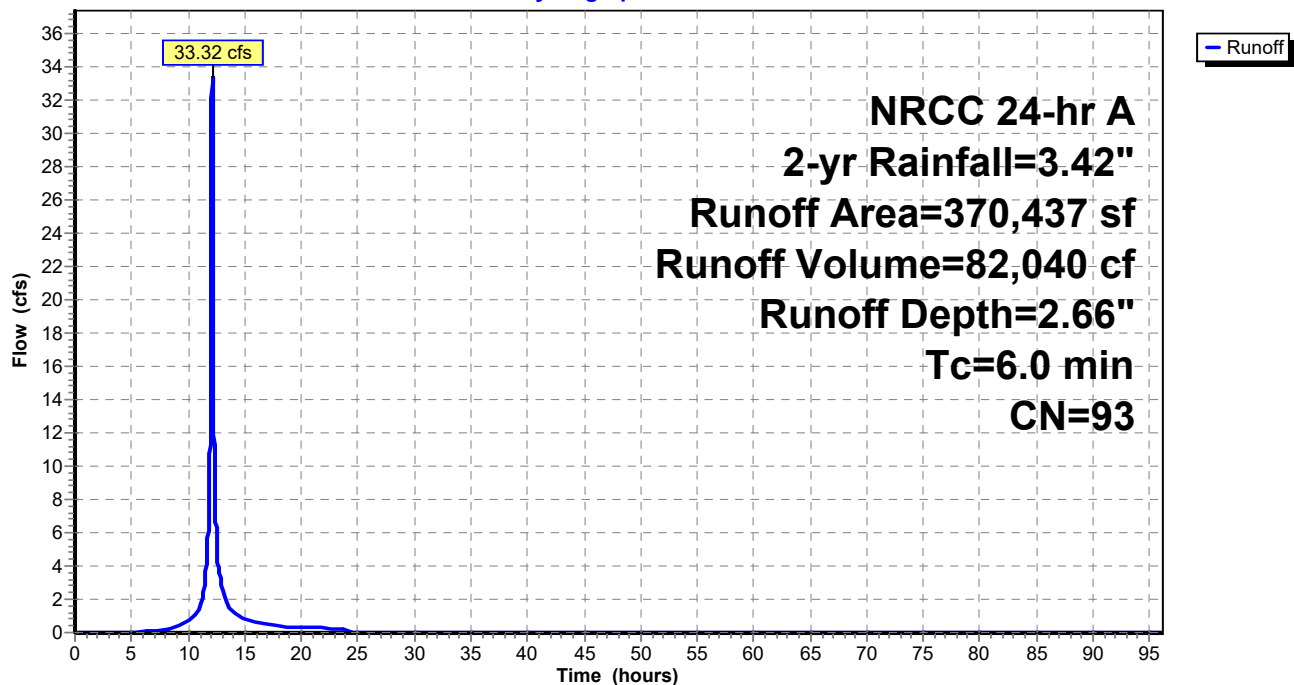
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
286,912	98	Paved parking, HSG C
83,525	74	>75% Grass cover, Good, HSG C
370,437	93	Weighted Average
83,525		22.55% Pervious Area
286,912		77.45% Impervious Area

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

Subcatchment 29: Post A6

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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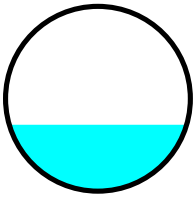
Summary for Reach 30: 36" HDPE Pipe

Inflow Area = 370,437 sf, 77.45% Impervious, Inflow Depth = 2.81" for 2-yr event
Inflow = 40.08 cfs @ 12.14 hrs, Volume= 86,888 cf
Outflow = 39.68 cfs @ 12.14 hrs, Volume= 86,888 cf, Atten= 1%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 17.46 fps, Min. Travel Time= 0.8 min
Avg. Velocity= 4.81 fps, Avg. Travel Time= 2.8 min

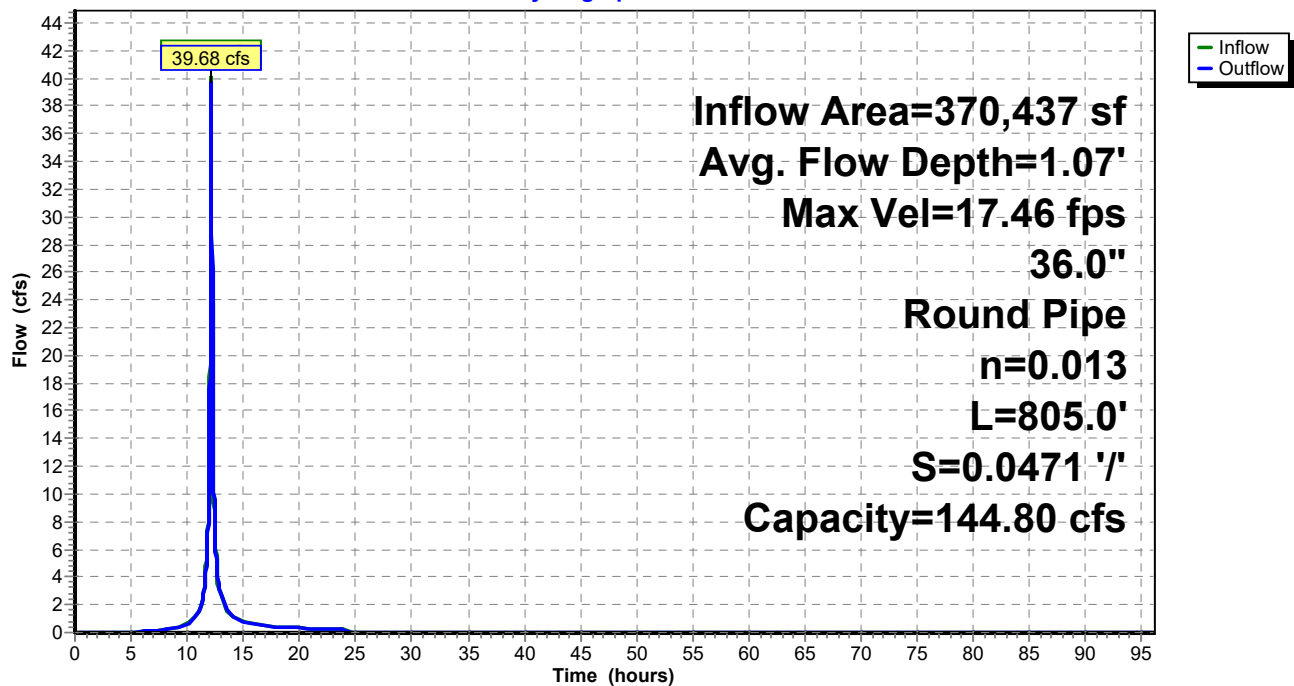
Peak Storage= 1,829 cf @ 12.14 hrs
Average Depth at Peak Storage= 1.07'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 144.80 cfs

36.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 805.0' Slope= 0.0471 '/'
Inlet Invert= 355.94', Outlet Invert= 318.00'



Reach 30: 36" HDPE Pipe

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 31: Post A14

Runoff = 19.87 cfs @ 12.13 hrs, Volume= 51,206 cf, Depth= 2.97"

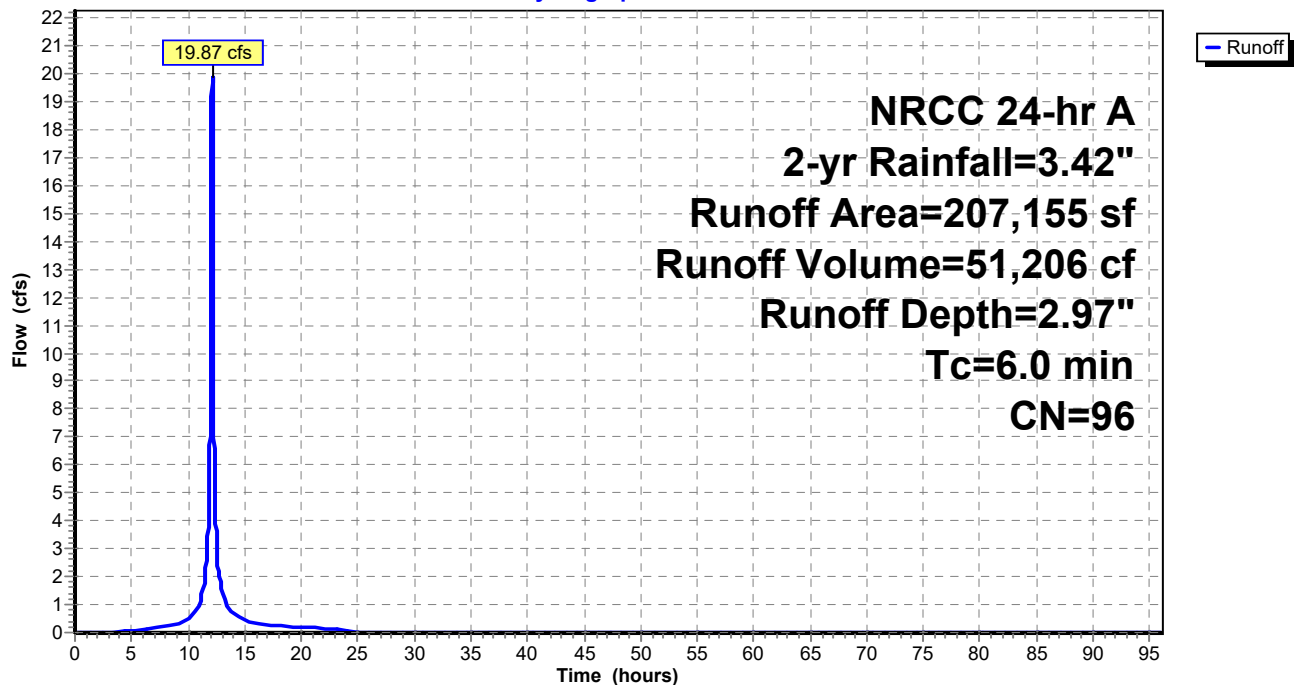
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
187,606	98	Paved parking, HSG C
19,549	74	>75% Grass cover, Good, HSG C
207,155	96	Weighted Average
19,549		9.44% Pervious Area
187,606		90.56% Impervious Area

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

Subcatchment 31: Post A14

Hydrograph



North 60 Post A 3-9-20

Prepared by {enter your company name here}

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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Summary for Pond 32: DMH-3

Inflow Area = 577,592 sf, 82.15% Impervious, Inflow Depth = 2.87" for 2-yr event
Inflow = 59.25 cfs @ 12.14 hrs, Volume= 138,095 cf
Outflow = 59.25 cfs @ 12.14 hrs, Volume= 138,095 cf, Atten= 0%, Lag= 0.0 min
Primary = 59.25 cfs @ 12.14 hrs, Volume= 138,095 cf

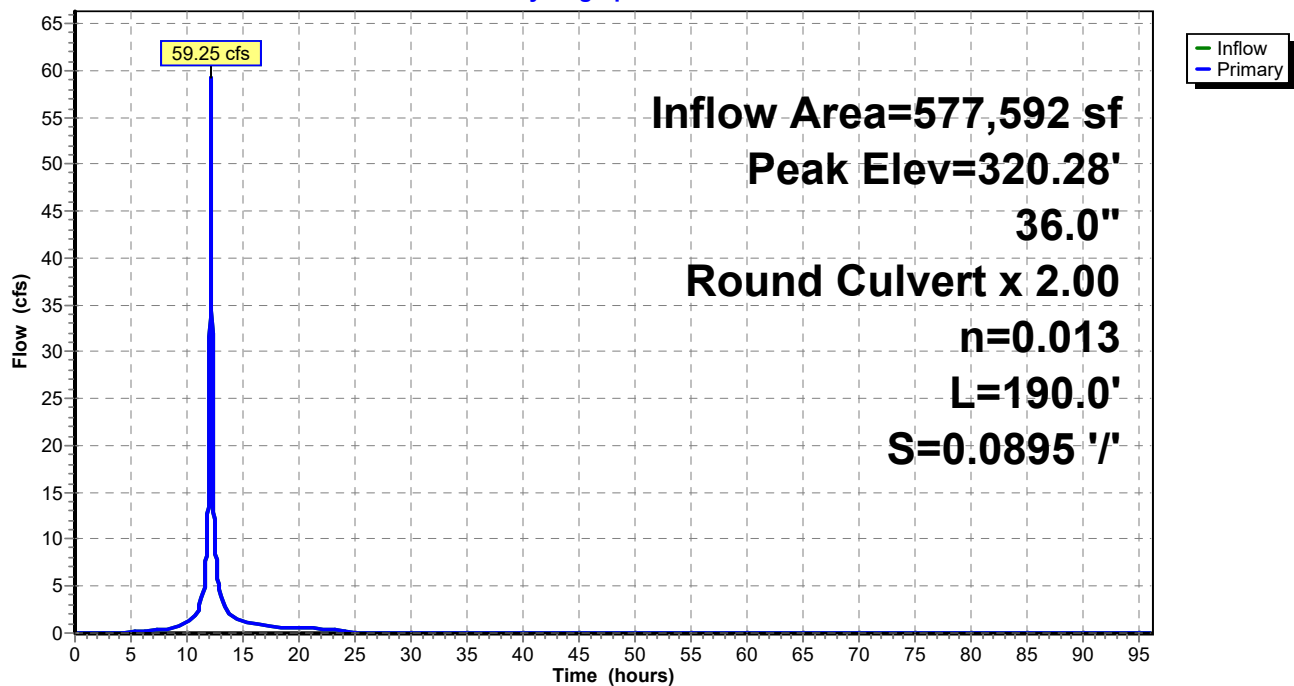
Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 320.28' @ 12.14 hrs

Flood Elev= 328.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	318.00'	36.0" Round Culvert X 2.00 L= 190.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 318.00' / 301.00' S= 0.0895 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=59.18 cfs @ 12.14 hrs HW=320.28' TW=302.22' (Dynamic Tailwater)
↑ **1=Culvert** (Inlet Controls 59.18 cfs @ 5.14 fps)

Pond 32: DMH-3**Hydrograph**

North 60 Post A 3-9-20

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 02226 © 2018 HydroCAD Software Solutions LLC

NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Summary for Subcatchment 33: Post A7

Runoff = 0.87 cfs @ 12.19 hrs, Volume= 2,694 cf, Depth= 0.81"

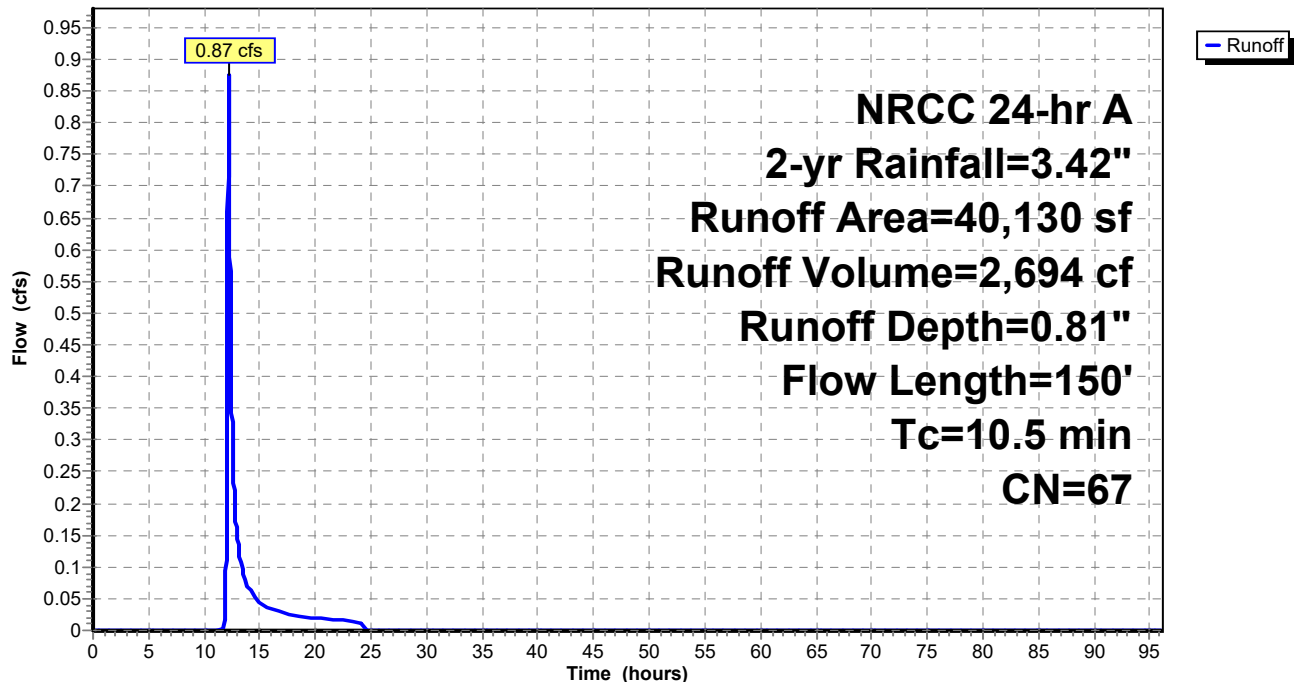
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
23,130	65	Brush, Good, HSG C
17,000	70	Woods, Good, HSG C
40,130	67	Weighted Average
40,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1100	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.1	50	0.2800	8.52		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.5	150	Total			

Subcatchment 33: Post A7

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

Prepared by {enter your company name here}

Printed 3/25/2020

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Summary for Pond 34: SWP-5

Inflow Area = 617,722 sf, 76.82% Impervious, Inflow Depth = 2.73" for 2-yr event
 Inflow = 59.96 cfs @ 12.14 hrs, Volume= 140,788 cf
 Outflow = 25.60 cfs @ 12.27 hrs, Volume= 140,788 cf, Atten= 57%, Lag= 7.8 min
 Discarded = 5.99 cfs @ 12.27 hrs, Volume= 117,265 cf
 Primary = 19.62 cfs @ 12.27 hrs, Volume= 23,524 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 302.90' @ 12.27 hrs Surf.Area= 17,246 sf Storage= 42,621 cf

Plug-Flow detention time= 39.7 min calculated for 140,774 cf (100% of inflow)
 Center-of-Mass det. time= 39.7 min (820.0 - 780.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	300.00'	105,088 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)
300.00	12,249	547.4	0	0	12,249
301.00	13,920	566.4	13,076	13,076	14,023
302.00	15,648	585.4	14,776	27,851	15,857
303.00	17,432	604.3	16,532	44,383	17,743
304.00	19,274	623.3	18,345	62,728	19,698
305.00	21,173	642.3	20,216	82,945	21,713
306.00	23,128	661.3	22,143	105,088	23,789

Device	Routing	Invert	Outlet Devices
#1	Discarded	300.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'
#2	Primary	298.00'	42.0" Round Culvert L= 189.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 298.00' / 258.00' S= 0.2116 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 9.62 sf
#3	Device 2	302.33'	36.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=5.99 cfs @ 12.27 hrs HW=302.90' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 5.99 cfs)

Primary OutFlow Max=19.61 cfs @ 12.27 hrs HW=302.90' TW=256.67' (Dynamic Tailwater)
 ↑ **2=Culvert** (Passes 19.61 cfs of 82.20 cfs potential flow)
 ↑ **3=Orifice/Grate** (Weir Controls 19.61 cfs @ 2.47 fps)

North 60 Post A 3-9-20

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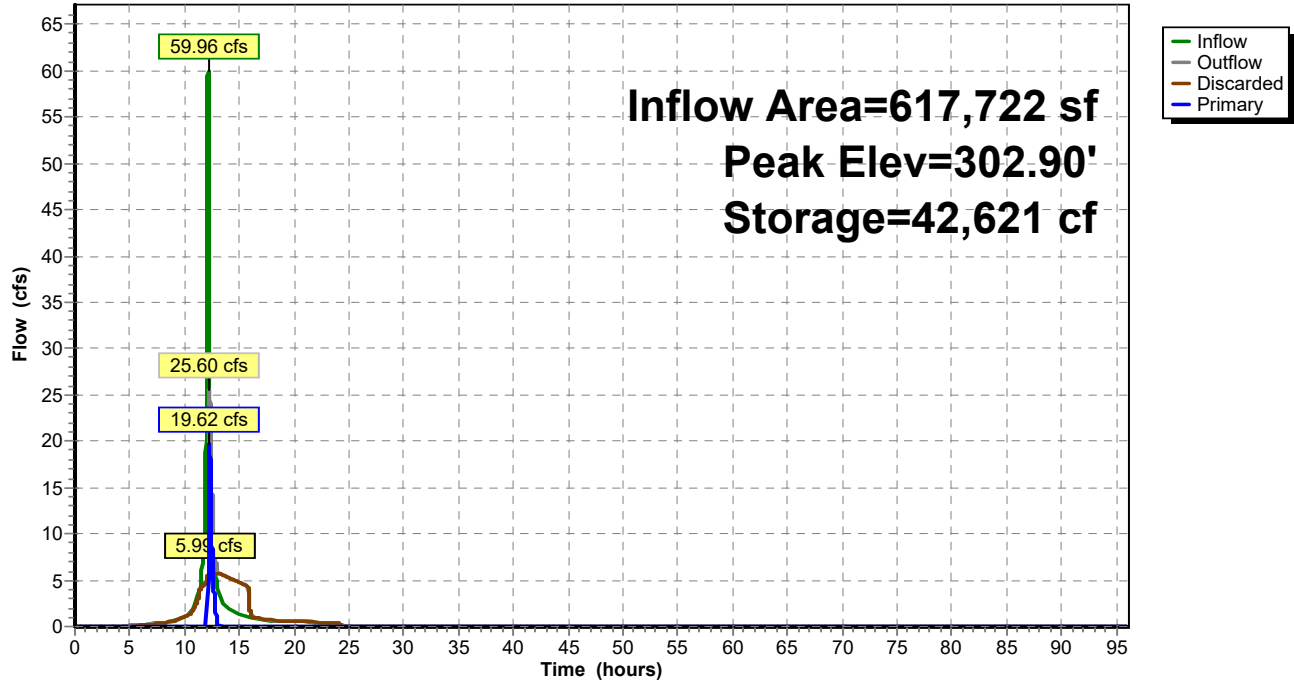
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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Pond 34: SWP-5

Hydrograph



North 60 Post A 3-9-20

Prepared by {enter your company name here}

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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Summary for Subcatchment 35: Post A16

Runoff = 1.23 cfs @ 12.18 hrs, Volume= 3,601 cf, Depth= 0.86"

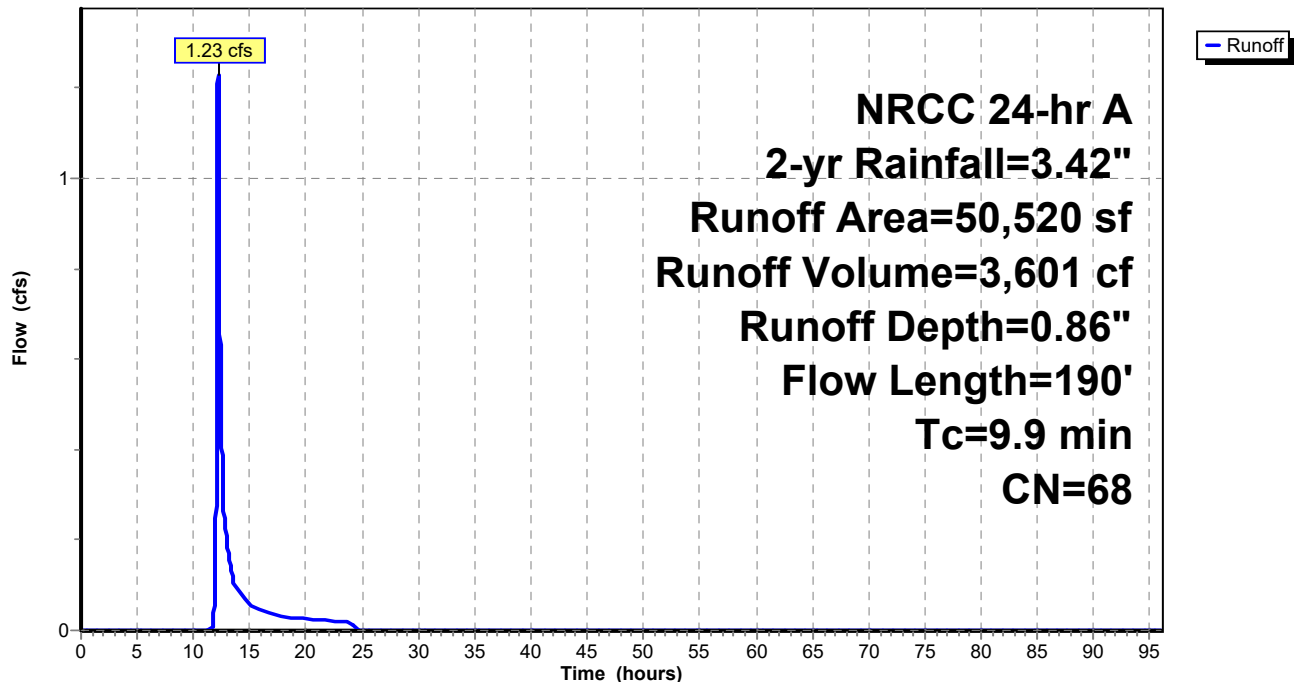
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
16,692	65	Brush, Good, HSG C
33,828	70	Woods, Good, HSG C
50,520	68	Weighted Average
50,520		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.17		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	90	0.3000	8.82		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
9.9	190	Total			

Subcatchment 35: Post A16

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 36: SWP-3

Inflow Area = 668,242 sf, 71.01% Impervious, Inflow Depth = 0.49" for 2-yr event
 Inflow = 20.53 cfs @ 12.27 hrs, Volume= 27,124 cf
 Outflow = 3.54 cfs @ 12.71 hrs, Volume= 27,124 cf, Atten= 83%, Lag= 26.4 min
 Discarded = 3.54 cfs @ 12.71 hrs, Volume= 27,124 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 257.93' @ 12.71 hrs Surf.Area= 10,188 sf Storage= 16,971 cf

Plug-Flow detention time= 48.0 min calculated for 27,122 cf (100% of inflow)
 Center-of-Mass det. time= 48.0 min (808.2 - 760.2)

Volume	Invert	Avail.Storage	Storage Description		
#1	256.00'	71,328 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)
256.00	7,434	457.3	0	0	7,434
257.00	8,834	476.3	8,124	8,124	8,921
258.00	10,292	495.3	9,554	17,678	10,468
259.00	11,806	514.3	11,040	28,718	12,076
260.00	13,378	533.4	12,584	41,302	13,752
261.00	15,006	552.4	14,184	55,486	15,481
262.00	16,692	571.4	15,842	71,328	17,271

Device	Routing	Invert	Outlet Devices
#1	Primary	254.00'	36.0" Round Culvert L= 128.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 254.00' / 234.00' S= 0.1563 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#2	Device 1	258.00'	36.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	256.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'

Discarded OutFlow Max=3.54 cfs @ 12.71 hrs HW=257.93' (Free Discharge)

↑**3=Exfiltration** (Exfiltration Controls 3.54 cfs)

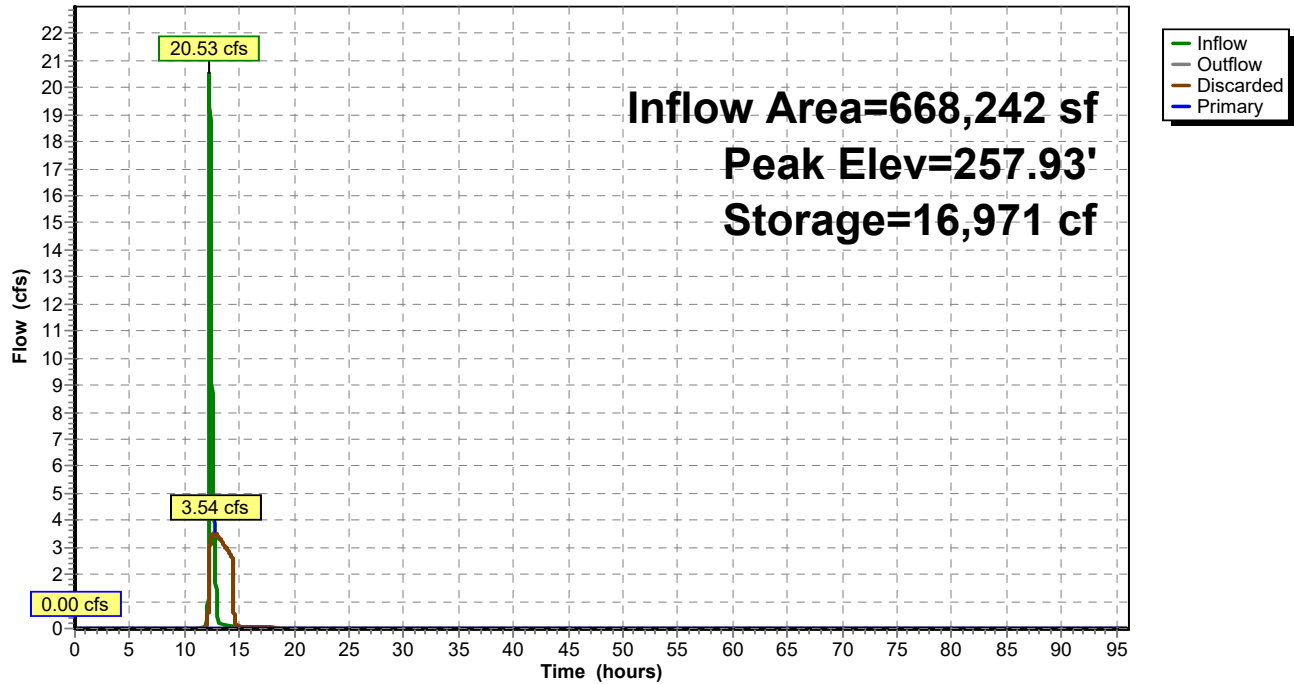
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=256.00' TW=0.00' (Dynamic Tailwater)

↑**1=Culvert** (Passes 0.00 cfs of 24.10 cfs potential flow)

↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 36: SWP-3

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 37: Post A13

Runoff = 14.04 cfs @ 12.13 hrs, Volume= 34,176 cf, Depth= 2.56"

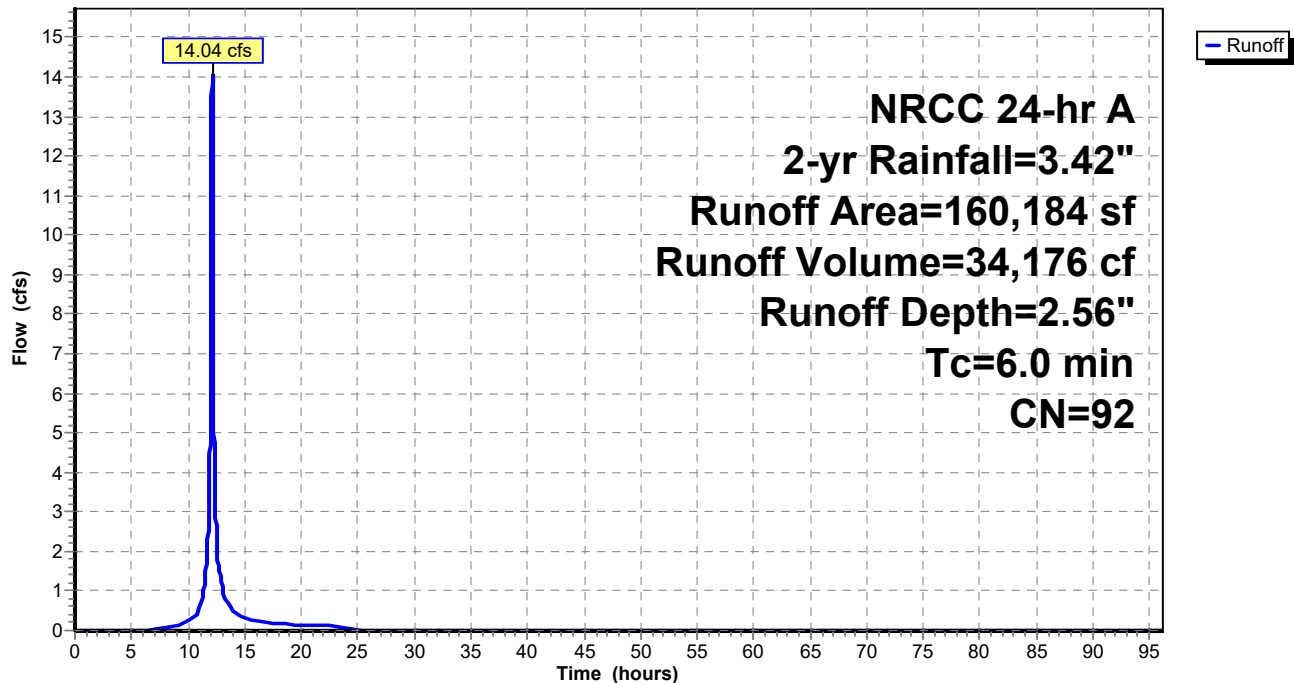
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
122,493	98	Paved parking, HSG C
37,691	74	>75% Grass cover, Good, HSG C
160,184	92	Weighted Average
37,691		23.53% Pervious Area
122,493		76.47% Impervious Area

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

Subcatchment 37: Post A13

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 38: DIV-7

Inflow Area = 160,184 sf, 76.47% Impervious, Inflow Depth = 2.56" for 2-yr event
 Inflow = 14.04 cfs @ 12.13 hrs, Volume= 34,176 cf
 Outflow = 14.04 cfs @ 12.13 hrs, Volume= 34,176 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.91 cfs @ 11.95 hrs, Volume= 26,764 cf
 Secondary = 10.26 cfs @ 12.13 hrs, Volume= 7,412 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 316.06' @ 12.13 hrs

Flood Elev= 319.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	313.00'	10.0" Round Culvert L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 313.00' / 313.00' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	313.00'	30.0" Round Culvert L= 103.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 313.00' / 303.00' S= 0.0971 ' S= 0.0971 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#3	Device 2	315.50'	8.0' 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=3.88 cfs @ 11.95 hrs HW=315.63' TW=313.45' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 3.88 cfs @ 7.12 fps)**Secondary OutFlow** Max=10.25 cfs @ 12.13 hrs HW=316.06' TW=0.00' (Dynamic Tailwater)↑ **2=Culvert** (Passes 10.25 cfs of 31.81 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 10.25 cfs @ 2.28 fps)

North 60 Post A 3-9-20

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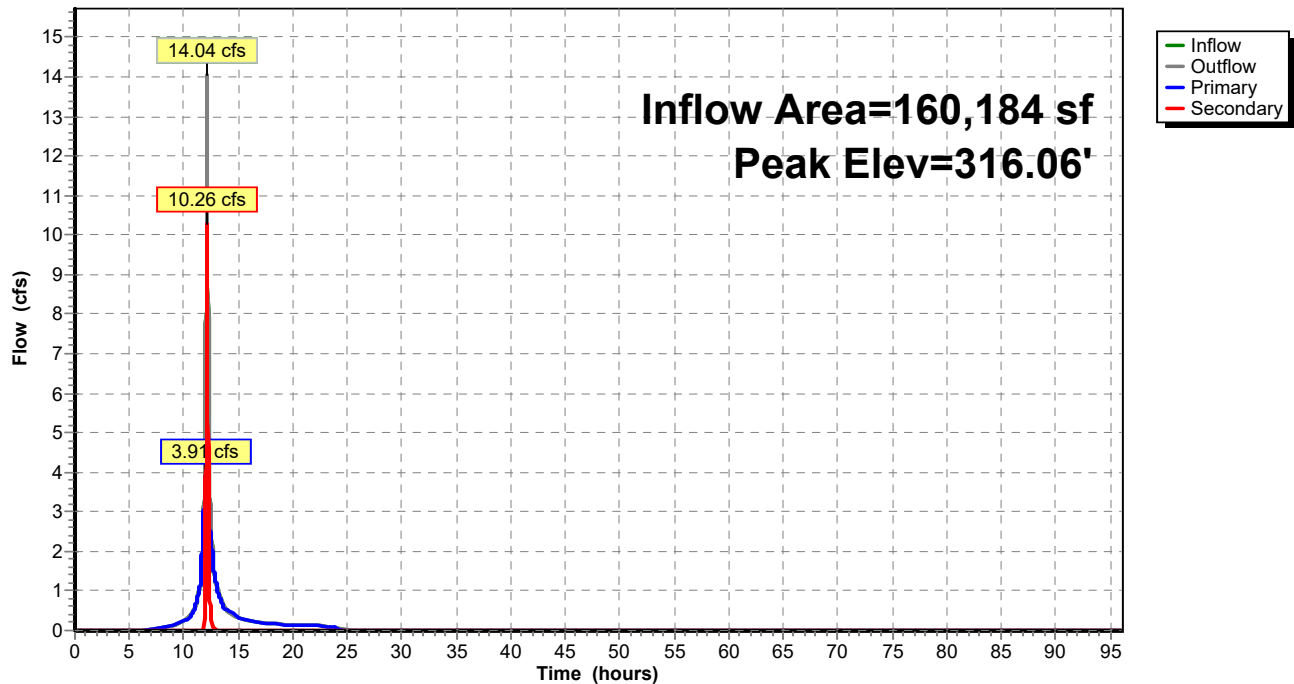
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 38: DIV-7

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 39: INF-7

Inflow Area = 160,184 sf, 76.47% Impervious, Inflow Depth = 2.00" for 2-yr event
 Inflow = 3.91 cfs @ 11.95 hrs, Volume= 26,764 cf
 Outflow = 1.07 cfs @ 11.56 hrs, Volume= 26,764 cf, Atten= 73%, Lag= 0.0 min
 Discarded = 1.07 cfs @ 11.56 hrs, Volume= 26,764 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 315.19' @ 13.05 hrs Surf.Area= 3,839 sf Storage= 7,378 cf

Plug-Flow detention time= 46.9 min calculated for 26,761 cf (100% of inflow)
 Center-of-Mass det. time= 46.9 min (853.3 - 806.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	312.50'	3,643 cf	41.50'W x 92.50'L x 4.00'H Field A 15,355 cf Overall - 6,247 cf Embedded = 9,108 cf x 40.0% Voids
#2A	313.00'	6,247 cf	Cultec R-360HD x 168 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 168 Chambers in 7 Rows Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf
		9,890 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	312.50'	12.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.07 cfs @ 11.56 hrs HW=312.55' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.07 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 39: INF-7 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

24 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 90.50' Row Length +12.0" End Stone x 2 = 92.50' Base Length

7 Rows x 60.0" Wide + 9.0" Spacing x 6 + 12.0" Side Stone x 2 = 41.50' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

168 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 7 Rows = 6,246.7 cf Chamber Storage

15,355.0 cf Field - 6,246.7 cf Chambers = 9,108.3 cf Stone x 40.0% Voids = 3,643.3 cf Stone Storage

Chamber Storage + Stone Storage = 9,890.0 cf = 0.227 af

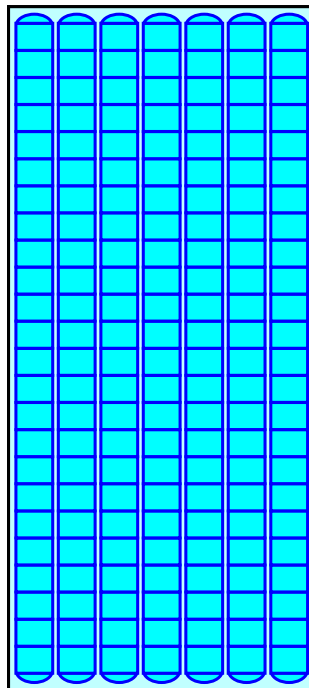
Overall Storage Efficiency = 64.4%

Overall System Size = 92.50' x 41.50' x 4.00'

168 Chambers

568.7 cy Field

337.3 cy Stone



North 60 Post A 3-9-20

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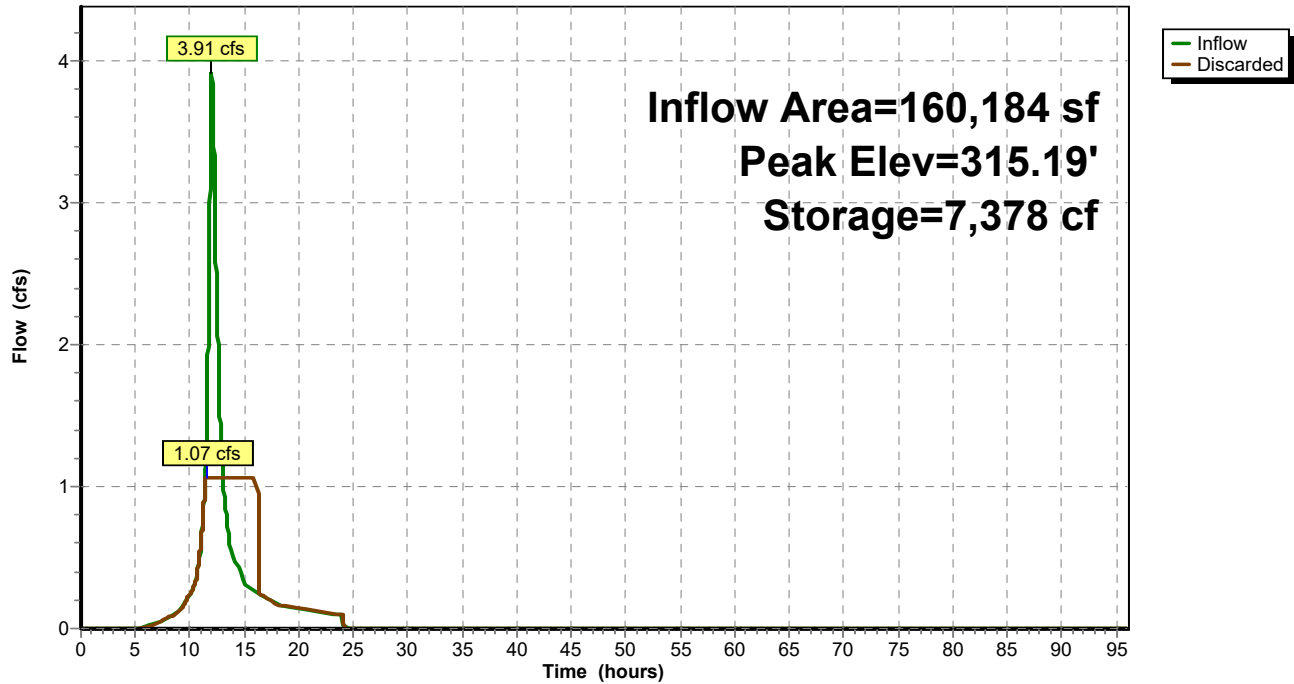
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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Pond 39: INF-7

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 40: Post A2

Runoff = 11.19 cfs @ 12.13 hrs, Volume= 24,784 cf, Depth= 1.50"

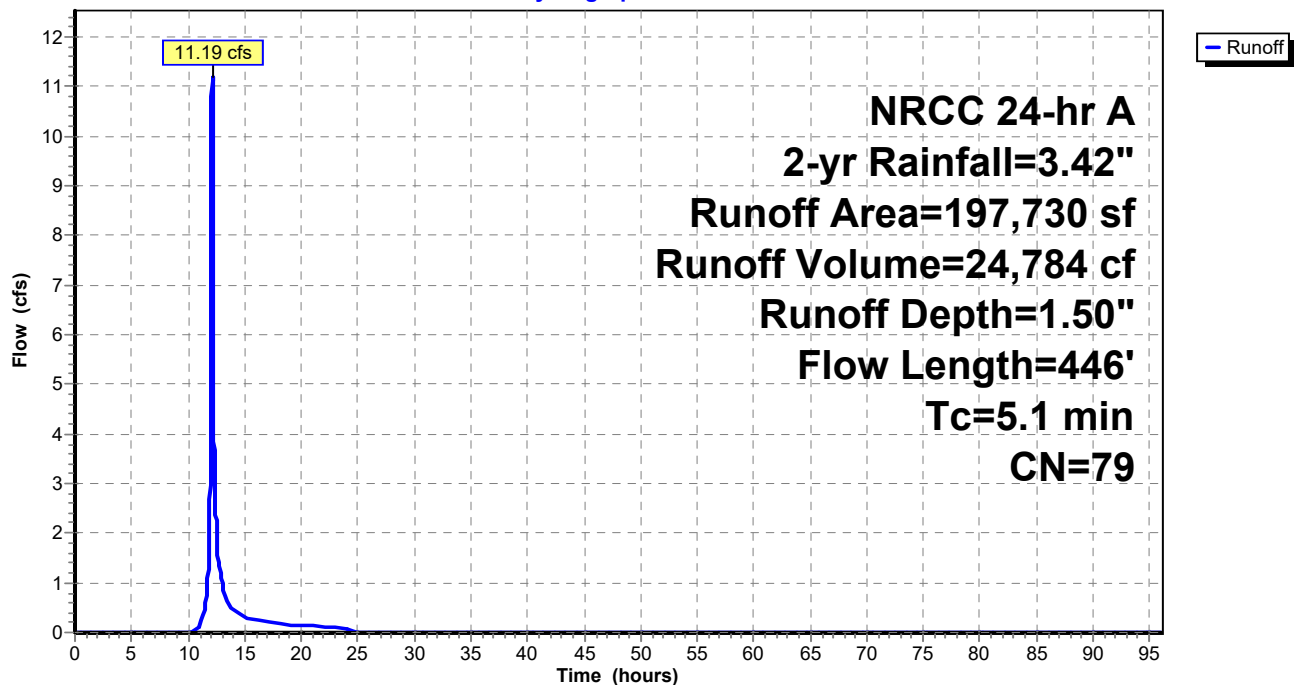
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
43,743	98	Paved parking, HSG C
107,245	74	>75% Grass cover, Good, HSG C
2,876	61	>75% Grass cover, Good, HSG B
39,583	70	Woods, Good, HSG C
4,283	98	Water Surface, HSG C
197,730	79	Weighted Average
149,704		75.71% Pervious Area
48,026		24.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.1500	0.40		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.9	346	0.1734	6.70		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	446	Total			

Subcatchment 40: Post A2

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 41: SWP-1

Inflow Area = 197,730 sf, 24.29% Impervious, Inflow Depth = 1.50" for 2-yr event
 Inflow = 11.19 cfs @ 12.13 hrs, Volume= 24,784 cf
 Outflow = 0.04 cfs @ 24.08 hrs, Volume= 12,079 cf, Atten= 100%, Lag= 717.3 min
 Primary = 0.04 cfs @ 24.08 hrs, Volume= 12,079 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Starting Elev= 234.50' Surf.Area= 12,504 sf Storage= 7,835 cf
 Peak Elev= 236.53' @ 24.08 hrs Surf.Area= 15,958 sf Storage= 30,767 cf (22,932 cf above start)

Plug-Flow detention time= 4,066.3 min calculated for 4,243 cf (17% of inflow)
 Center-of-Mass det. time= 2,308.4 min (3,136.8 - 828.5)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	1,811 cf	Forebay (Irregular) Listed below (Recalc)
#2	230.00'	1,976 cf	Micropool (Irregular) Listed below (Recalc)
#3	233.90'	65,123 cf	Marsh & Storage (Irregular) Listed below (Recalc)
		68,911 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,233	129.1	834	1,811	1,357

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,646	155.1	1,000	1,976	1,942

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
233.90	4,232	530.5	0	0	4,232
234.50	9,625	400.9	4,048	4,048	13,842
235.00	10,440	413.5	5,015	9,063	14,683
236.00	12,144	438.8	11,281	20,344	16,451
237.00	13,950	464.0	13,037	33,381	18,317
238.00	15,856	489.2	14,893	48,273	20,287
239.00	17,864	514.5	16,850	65,123	22,369

Device	Routing	Invert	Outlet Devices
#1	Primary	232.00'	21.0" Round Culvert L= 74.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.00' S= 0.0135 ' / ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.41 sf

North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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#2	Device 1	234.50'	1.1" Vert. Orifice/Grate	C= 0.600
#3	Device 1	237.50'	36.0" x 48.0" Horiz. Orifice/Grate	C= 0.600

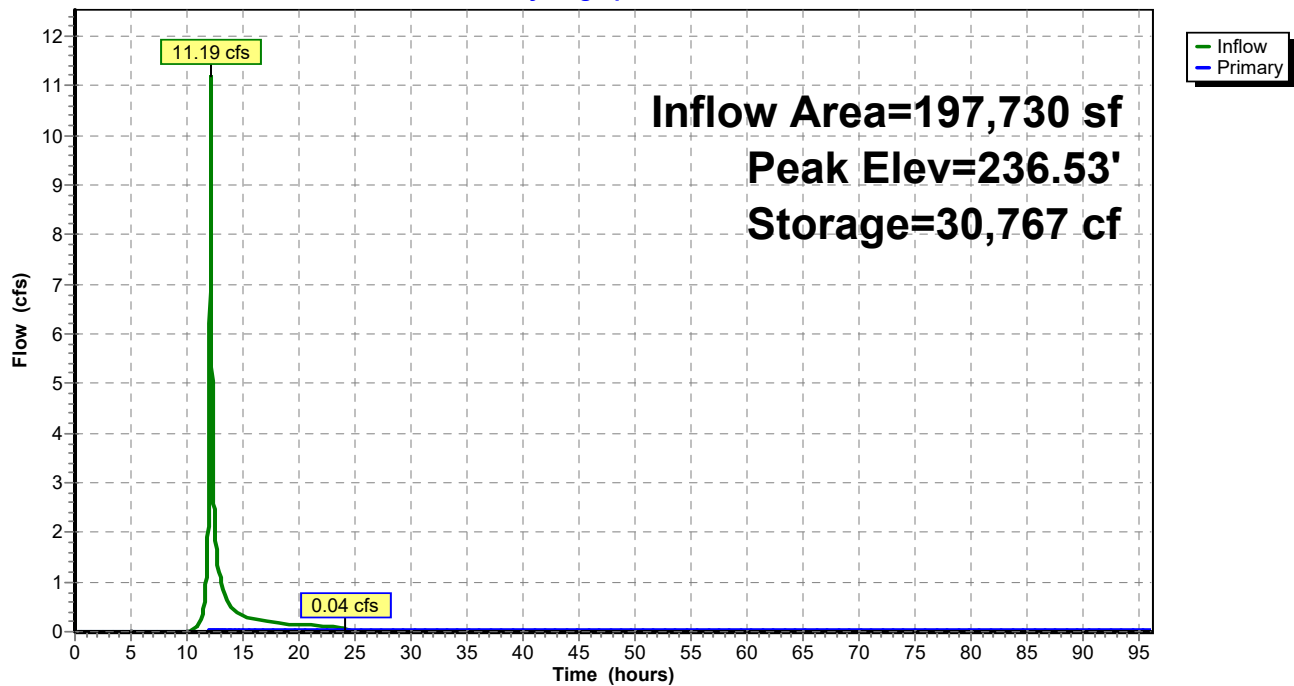
Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 24.08 hrs HW=236.53' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.04 cfs of 15.89 cfs potential flow)
2=Orifice/Grate (Orifice Controls 0.04 cfs @ 6.78 fps)
3=Orifice/Grate (Controls 0.00 cfs)

Pond 41: SWP-1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 42: Post A1

Runoff = 1.29 cfs @ 12.13 hrs, Volume= 2,967 cf, Depth= 1.72"

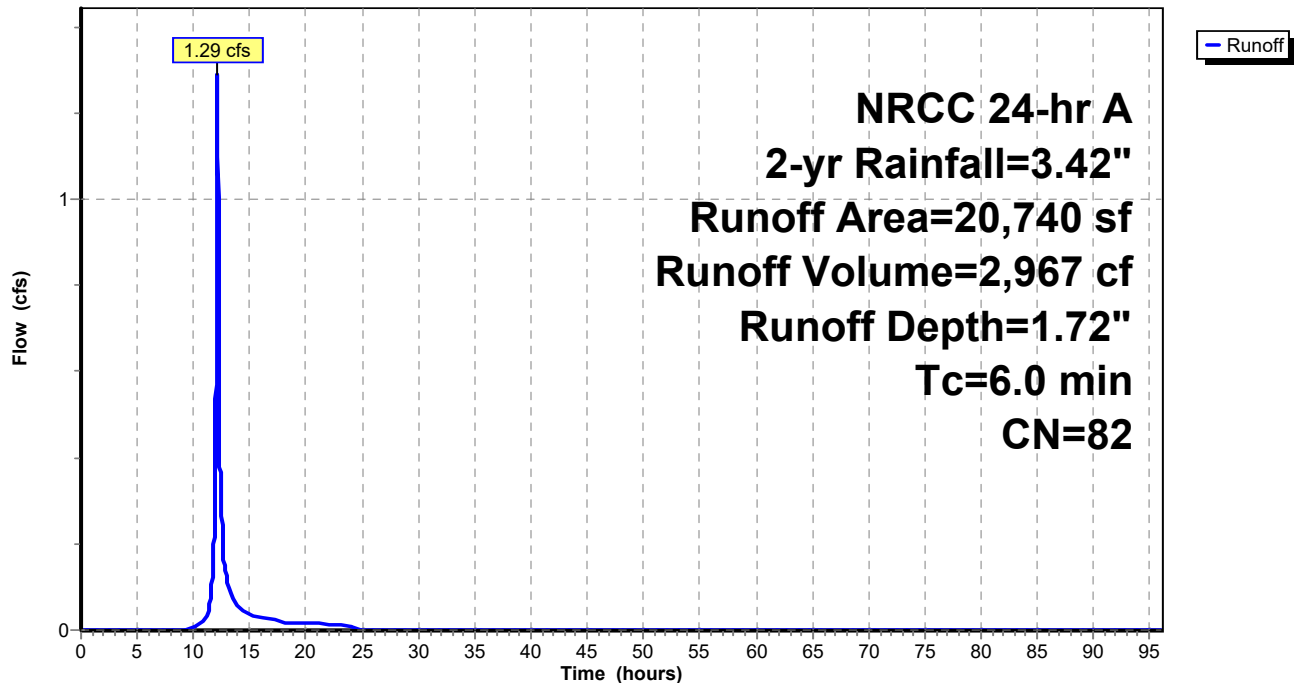
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
7,304	98	Paved parking, HSG C
10,356	74	>75% Grass cover, Good, HSG C
3,080	70	Woods, Good, HSG C
20,740	82	Weighted Average
13,436		64.78% Pervious Area
7,304		35.22% Impervious Area

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

Subcatchment 42: Post A1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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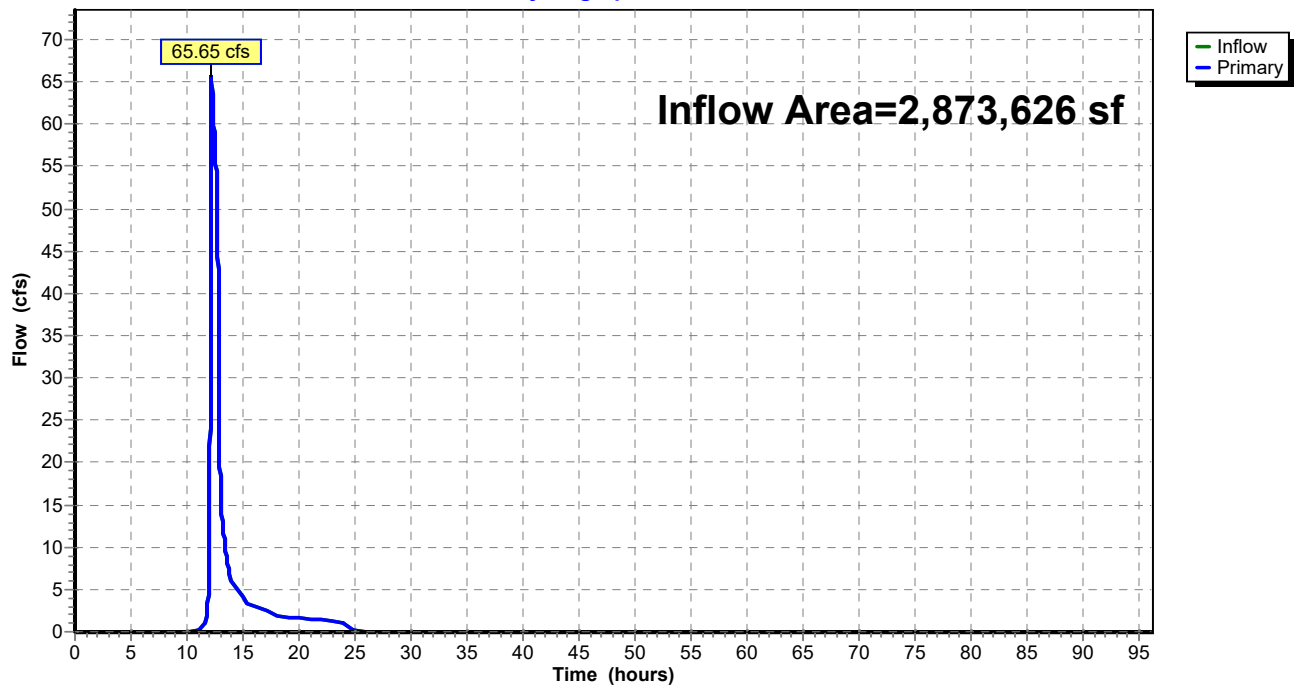
Summary for Link 43: Design Point A

Inflow Area = 2,873,626 sf, 43.08% Impervious, Inflow Depth > 1.26" for 2-yr event
Inflow = 65.65 cfs @ 12.18 hrs, Volume= 301,906 cf
Primary = 65.65 cfs @ 12.18 hrs, Volume= 301,906 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 43: Design Point A

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 8: Post A0 OffsiteRunoff Area=1,115,060 sf 57.87% Impervious Runoff Depth=3.99"
Flow Length=1,018' Tc=12.5 min CN=90 Runoff=118.73 cfs 370,955 cf**Pond 9: Offsite Pond A**Peak Elev=363.03' Storage=121,390 cf Inflow=118.73 cfs 370,955 cf
Outflow=51.70 cfs 319,760 cf**Subcatchment 10: Post A4**Runoff Area=164,583 sf 10.25% Impervious Runoff Depth=2.63"
Flow Length=340' Tc=20.5 min CN=76 Runoff=9.63 cfs 36,136 cf**Reach 11: 24" Culvert Pipe**Avg. Flow Depth=0.70' Max Vel=9.90 fps Inflow=9.63 cfs 36,136 cf
24.0" Round Pipe n=0.013 L=112.0' S=0.0268 ' Capacity=37.02 cfs Outflow=9.63 cfs 36,136 cf**Subcatchment 12: Post A8**Runoff Area=210,459 sf 0.00% Impervious Runoff Depth=2.55"
Flow Length=503' Tc=17.8 min CN=75 Runoff=12.77 cfs 44,669 cf**Subcatchment 13: Post A11**Runoff Area=72,242 sf 63.67% Impervious Runoff Depth=3.99"
Tc=6.0 min CN=90 Runoff=9.75 cfs 24,033 cf**Subcatchment 14: Post A10**Runoff Area=304,098 sf 77.08% Impervious Runoff Depth=4.32"
Tc=6.0 min CN=93 Runoff=43.04 cfs 109,368 cf**Pond 15: DIV-5**Peak Elev=339.25' Inflow=43.04 cfs 109,368 cf
Primary=6.10 cfs 69,986 cf Secondary=36.95 cfs 39,383 cf Outflow=43.04 cfs 109,368 cf**Pond 16: INF-5**Peak Elev=337.70' Storage=16,656 cf Inflow=6.10 cfs 69,986 cf
Outflow=1.98 cfs 69,986 cf**Pond 17: Existing Wetland A**Peak Elev=327.17' Storage=37,951 cf Inflow=101.44 cfs 463,980 cf
36.0" Round Culvert n=0.013 L=168.0' S=0.0655 ' Outflow=73.53 cfs 463,980 cf**Subcatchment 18: Post A15**Runoff Area=424,570 sf 0.00% Impervious Runoff Depth=2.29"
Flow Length=270' Tc=5.3 min CN=72 Runoff=36.27 cfs 81,046 cf**Subcatchment 19: Post A3**Runoff Area=93,277 sf 100.00% Impervious Runoff Depth=4.88"
Tc=6.0 min CN=98 Runoff=13.86 cfs 37,956 cf**Pond 20: DIV-1**Peak Elev=327.51' Inflow=13.86 cfs 37,956 cf
Primary=5.37 cfs 32,111 cf Secondary=8.88 cfs 5,845 cf Outflow=13.86 cfs 37,956 cf**Pond 21: INF-1**Peak Elev=326.92' Storage=8,656 cf Inflow=5.37 cfs 32,111 cf
Outflow=1.18 cfs 32,111 cf**Reach 22: Existing Stream A**Avg. Flow Depth=1.50' Max Vel=9.86 fps Inflow=107.87 cfs 550,871 cf
n=0.040 L=1,360.0' S=0.0721 ' Capacity=291.69 cfs Outflow=103.92 cfs 550,871 cf**Subcatchment 23: Post A5**Runoff Area=92,926 sf 100.00% Impervious Runoff Depth=4.88"
Tc=6.0 min CN=98 Runoff=13.81 cfs 37,813 cf

North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Pond 24: DIV-2Peak Elev=368.50' Inflow=13.81 cfs 37,813 cf
Primary=5.81 cfs 32,380 cf Secondary=8.44 cfs 5,433 cf Outflow=13.81 cfs 37,813 cf**Pond 25: INF-2**Peak Elev=367.98' Storage=10,191 cf Inflow=5.81 cfs 32,380 cf
Outflow=0.99 cfs 32,380 cf**Subcatchment26: Post A12**Runoff Area=161,485 sf 51.68% Impervious Runoff Depth=3.58"
Flow Length=1,430' Tc=11.7 min CN=86 Runoff=16.19 cfs 48,165 cf**Pond 27: DIV-6**Peak Elev=365.12' Inflow=16.19 cfs 48,165 cf
Primary=4.27 cfs 33,562 cf Secondary=12.24 cfs 14,603 cf Outflow=16.19 cfs 48,165 cf**Pond 28: INF-6**Peak Elev=364.33' Storage=8,199 cf Inflow=4.27 cfs 33,562 cf
Outflow=1.24 cfs 33,562 cf**Subcatchment29: Post A6**Runoff Area=370,437 sf 77.45% Impervious Runoff Depth=4.32"
Tc=6.0 min CN=93 Runoff=52.43 cfs 133,227 cf**Reach 30: 36" HDPE Pipe**Avg. Flow Depth=1.47' Max Vel=20.32 fps Inflow=70.58 cfs 153,263 cf
36.0" Round Pipe n=0.013 L=805.0' S=0.0471 ' Capacity=144.80 cfs Outflow=70.09 cfs 153,263 cf**Subcatchment31: Post A14**Runoff Area=207,155 sf 90.56% Impervious Runoff Depth=4.65"
Tc=6.0 min CN=96 Runoff=30.35 cfs 80,304 cf**Pond 32: DMH-3**Peak Elev=321.66' Inflow=100.05 cfs 233,567 cf
36.0" Round Culvert x 2.00 n=0.013 L=190.0' S=0.0895 ' Outflow=100.05 cfs 233,567 cf**Subcatchment33: Post A7**Runoff Area=40,130 sf 0.00% Impervious Runoff Depth=1.89"
Flow Length=150' Tc=10.5 min CN=67 Runoff=2.24 cfs 6,311 cf**Pond 34: SWP-5**Peak Elev=303.70' Storage=56,958 cf Inflow=101.98 cfs 239,878 cf
Discarded=6.49 cfs 153,342 cf Primary=67.53 cfs 86,536 cf Outflow=74.03 cfs 239,878 cf**Subcatchment35: Post A16**Runoff Area=50,520 sf 0.00% Impervious Runoff Depth=1.97"
Flow Length=190' Tc=9.9 min CN=68 Runoff=3.03 cfs 8,275 cf**Pond 36: SWP-3**Peak Elev=259.08' Storage=29,615 cf Inflow=70.50 cfs 94,810 cf
Discarded=4.14 cfs 37,397 cf Primary=51.07 cfs 57,413 cf Outflow=55.21 cfs 94,810 cf**Subcatchment37: Post A13**Runoff Area=160,184 sf 76.47% Impervious Runoff Depth=4.21"
Tc=6.0 min CN=92 Runoff=22.34 cfs 56,152 cf**Pond 38: DIV-7**Peak Elev=316.30' Inflow=22.34 cfs 56,152 cf
Primary=3.71 cfs 35,431 cf Secondary=18.97 cfs 20,720 cf Outflow=22.34 cfs 56,152 cf**Pond 39: INF-7**Peak Elev=315.45' Storage=8,022 cf Inflow=3.71 cfs 35,431 cf
Outflow=1.07 cfs 35,431 cf**Subcatchment40: Post A2**Runoff Area=197,730 sf 24.29% Impervious Runoff Depth=2.91"
Flow Length=446' Tc=5.1 min CN=79 Runoff=21.35 cfs 47,871 cf**Pond 41: SWP-1**Peak Elev=237.55' Storage=45,110 cf Inflow=21.35 cfs 47,871 cf
Outflow=0.55 cfs 24,146 cf

North 60 Post A 3-9-20*NRCC 24-hr A 10-yr Rainfall=5.12"*

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Subcatchment42: Post A1

Runoff Area=20,740 sf 35.22% Impervious Runoff Depth=3.19"

Tc=6.0 min CN=82 Runoff=2.35 cfs 5,508 cf

Link 43: Design Point A

Inflow=145.62 cfs 658,658 cf

Primary=145.62 cfs 658,658 cf

Total Runoff Area = 3,685,596 sf Runoff Volume = 1,127,788 cf Average Runoff Depth = 3.67"
49.41% Pervious = 1,821,010 sf 50.59% Impervious = 1,864,586 sf

North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 8: Post A0 Offsite

Runoff = 118.73 cfs @ 12.20 hrs, Volume= 370,955 cf, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
645,334	98	Paved parking, HSG C
443,611	80	>75% Grass cover, Good, HSG D
23,572	74	>75% Grass cover, Good, HSG C
2,543	61	>75% Grass cover, Good, HSG B
1,115,060	90	Weighted Average
469,726		42.13% Pervious Area
645,334		57.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.6	148	0.0574	3.86		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	740	0.0270	10.25	32.22	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.015 Concrete sewer w/manholes & inlets
12.5	1,018	Total			

North 60 Post A 3-9-20

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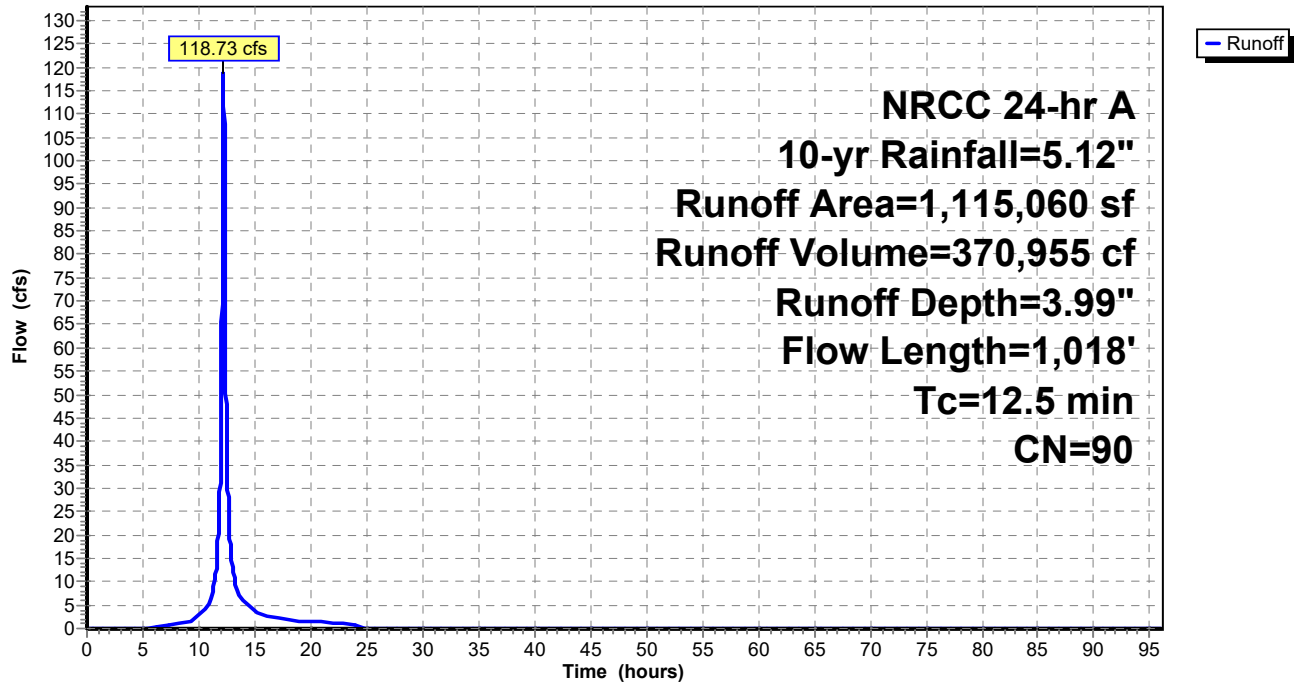
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NRCC 24-hr A 10-yr Rainfall=5.12"

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Subcatchment 8: Post A0 Offsite

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 9: Offsite Pond A

Inflow Area = 1,115,060 sf, 57.87% Impervious, Inflow Depth = 3.99" for 10-yr event
 Inflow = 118.73 cfs @ 12.20 hrs, Volume= 370,955 cf
 Outflow = 51.70 cfs @ 12.41 hrs, Volume= 319,760 cf, Atten= 56%, Lag= 12.7 min
 Primary = 51.70 cfs @ 12.41 hrs, Volume= 319,760 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 363.03' @ 12.41 hrs Surf.Area= 26,608 sf Storage= 121,390 cf

Plug-Flow detention time= 99.2 min calculated for 319,726 cf (86% of inflow)
 Center-of-Mass det. time= 41.8 min (832.7 - 790.9)

Volume	Invert	Avail.Storage	Storage Description		
#1	357.00'	221,816 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)
357.00	14,633	679.0	0	0	14,633
358.00	16,652	698.0	15,632	15,632	16,826
359.00	17,534	715.0	17,091	32,723	18,864
360.00	19,427	745.0	18,472	51,195	22,425
362.00	24,453	804.0	43,784	94,979	29,861
364.00	28,701	854.0	53,097	148,076	36,663
365.00	36,602	901.0	32,572	180,648	43,285
366.00	45,910	1,262.0	41,168	221,816	105,432

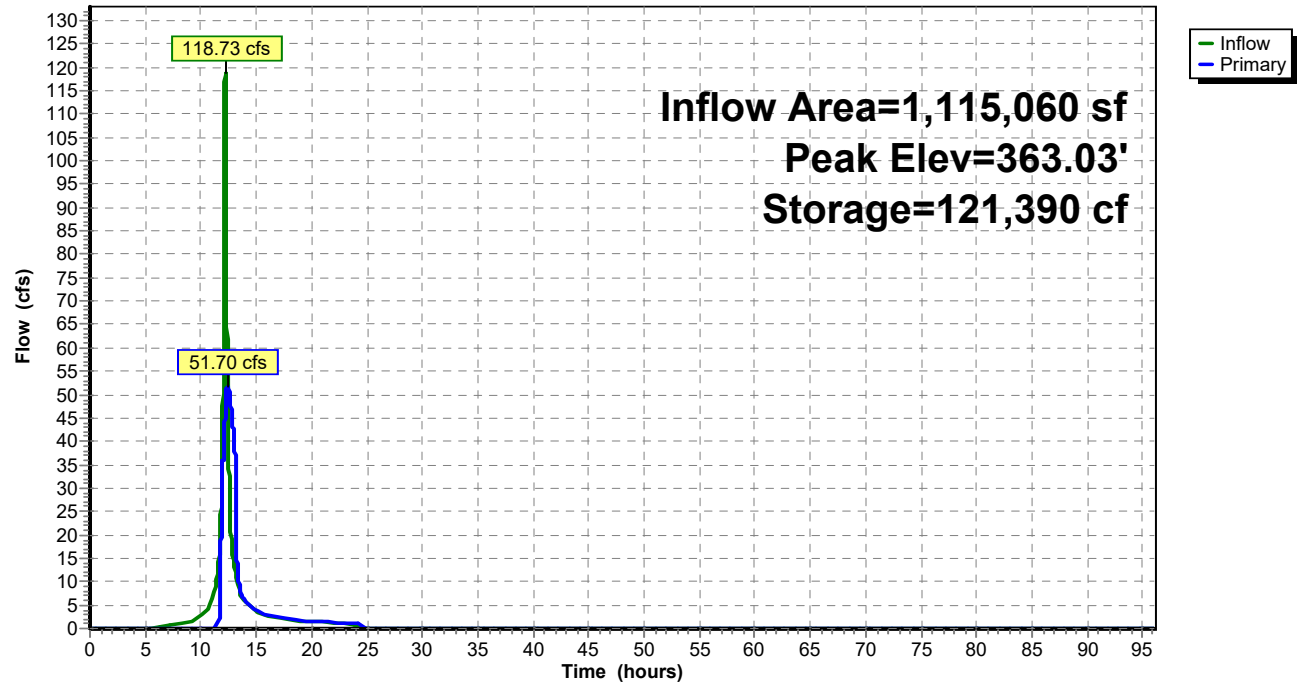
Device	Routing	Invert	Outlet Devices
#1	Primary	357.00'	30.0" Round Culvert L= 125.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 357.00' / 351.00' S= 0.0480 ' S= 0.0480 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	360.00'	36.0" x 48.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	364.75'	150.0' long x 36.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=51.70 cfs @ 12.41 hrs HW=363.03' TW=327.16' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 51.70 cfs @ 10.53 fps)
 2=Orifice/Grate (Passes 51.70 cfs of 201.30 cfs potential flow)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 9: Offsite Pond A

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 10: Post A4

Runoff = 9.63 cfs @ 12.30 hrs, Volume= 36,136 cf, Depth= 2.63"

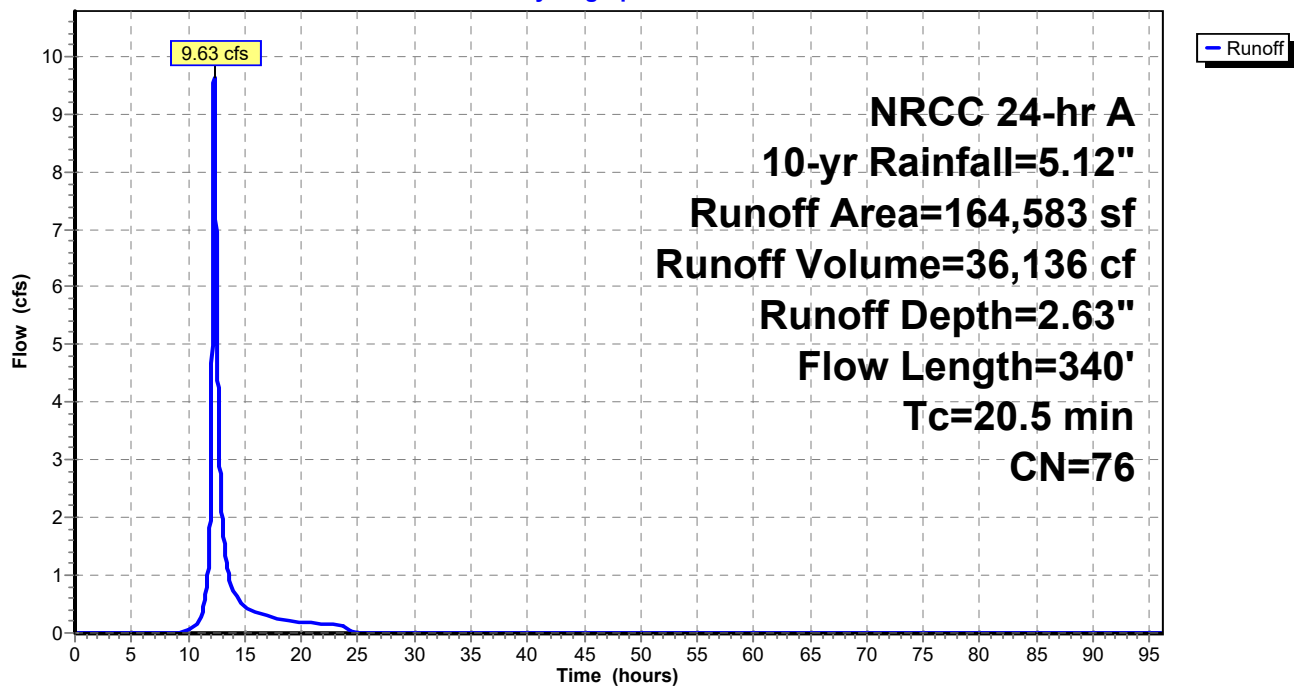
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
15,990	74	>75% Grass cover, Good, HSG C
65,271	70	Woods, Good, HSG C
66,457	77	Woods, Good, HSG D
16,865	98	Water Surface, HSG D
164,583	76	Weighted Average
147,718		89.75% Pervious Area
16,865		10.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0250	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.7	240	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
20.5	340	Total			

Subcatchment 10: Post A4

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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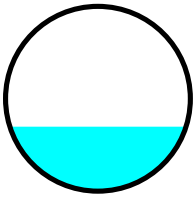
Summary for Reach 11: 24" Culvert Pipe

Inflow Area = 164,583 sf, 10.25% Impervious, Inflow Depth = 2.63" for 10-yr event
Inflow = 9.63 cfs @ 12.30 hrs, Volume= 36,136 cf
Outflow = 9.63 cfs @ 12.31 hrs, Volume= 36,136 cf, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.90 fps, Min. Travel Time= 0.2 min
Avg. Velocity= 3.58 fps, Avg. Travel Time= 0.5 min

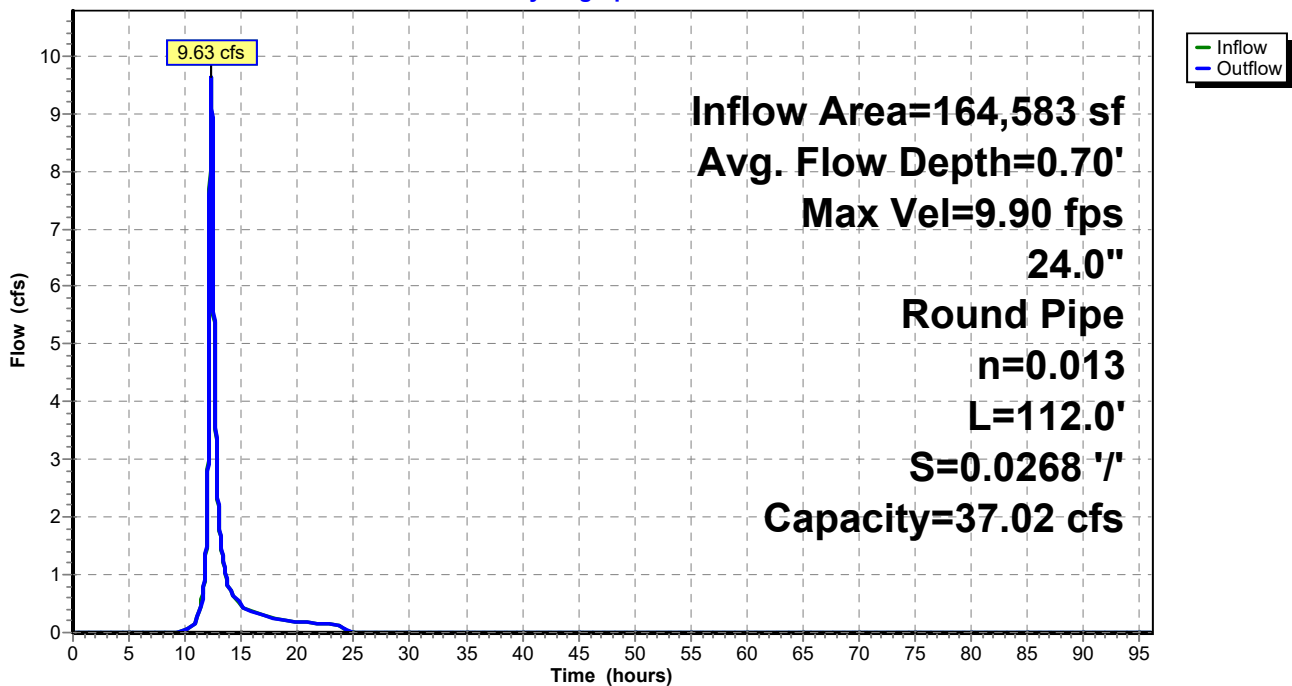
Peak Storage= 109 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.70'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 37.02 cfs

24.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 112.0' Slope= 0.0268 '/'
Inlet Invert= 349.00', Outlet Invert= 346.00'



Reach 11: 24" Culvert Pipe

Hydrograph



North 60 Post A 3-9-20

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Summary for Subcatchment 12: Post A8

Runoff = 12.77 cfs @ 12.27 hrs, Volume= 44,669 cf, Depth= 2.55"

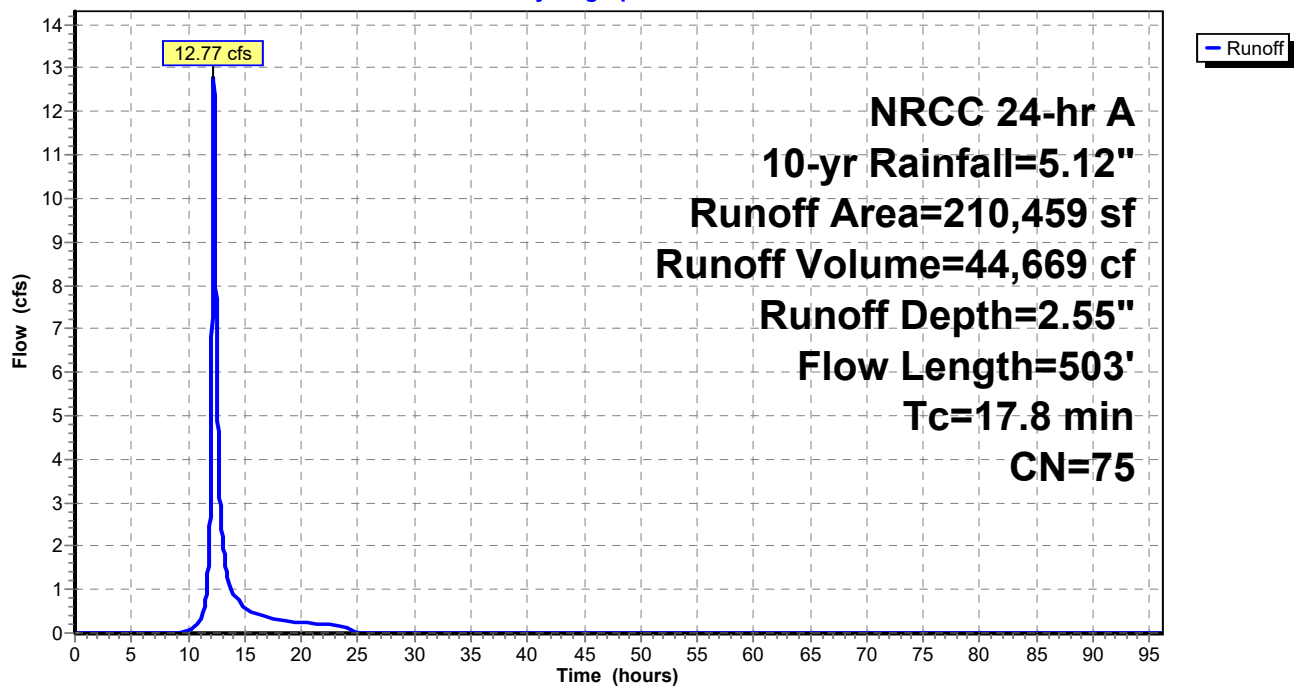
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
31,463	77	Woods, Good, HSG D
57,494	80	>75% Grass cover, Good, HSG D
63,009	70	Woods, Good, HSG C
58,493	74	>75% Grass cover, Good, HSG C
210,459	75	Weighted Average
210,459		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0400	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.4	305	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.8	98	0.0306	1.97	3.94	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
17.8	503	Total			

Subcatchment 12: Post A8

Hydrograph



North 60 Post A 3-9-20

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Summary for Subcatchment 13: Post A11

Runoff = 9.75 cfs @ 12.13 hrs, Volume= 24,033 cf, Depth= 3.99"

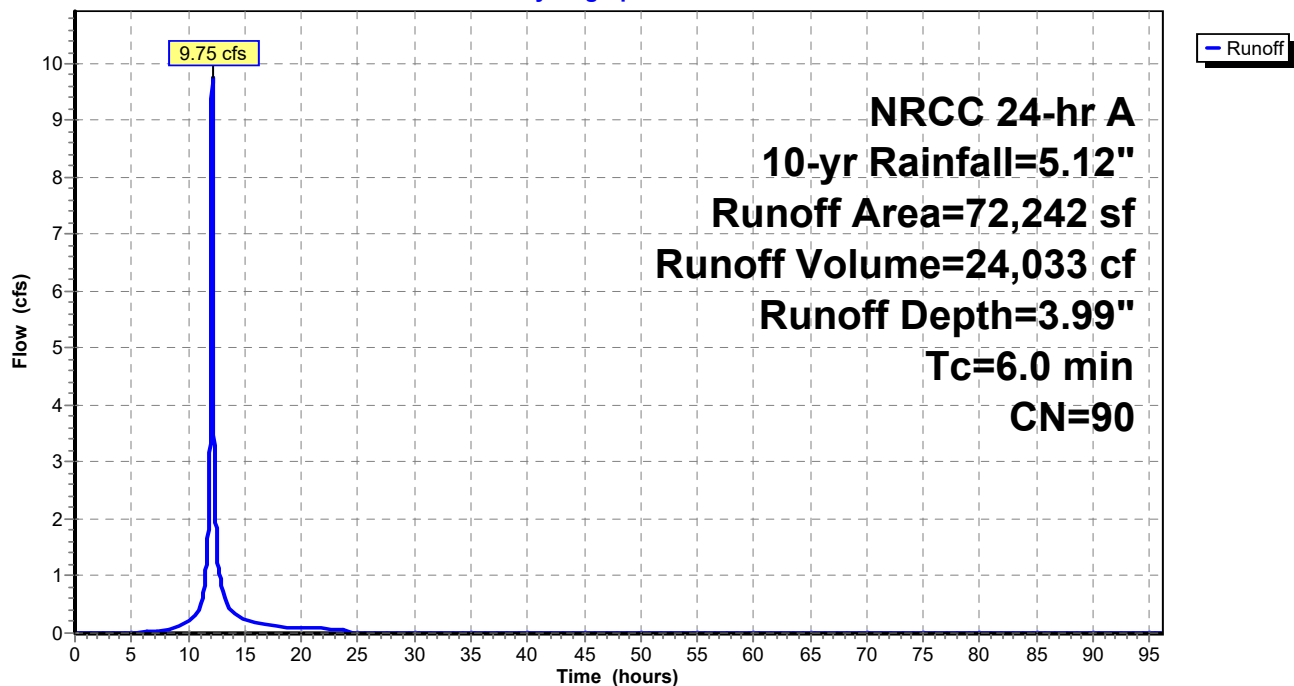
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
46,000	98	Paved parking, HSG C
16,765	74	>75% Grass cover, Good, HSG C
9,477	80	>75% Grass cover, Good, HSG D
72,242	90	Weighted Average
26,242		36.33% Pervious Area
46,000		63.67% Impervious Area

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

Subcatchment 13: Post A11

Hydrograph



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Summary for Subcatchment 14: Post A10

Runoff = 43.04 cfs @ 12.13 hrs, Volume= 109,368 cf, Depth= 4.32"

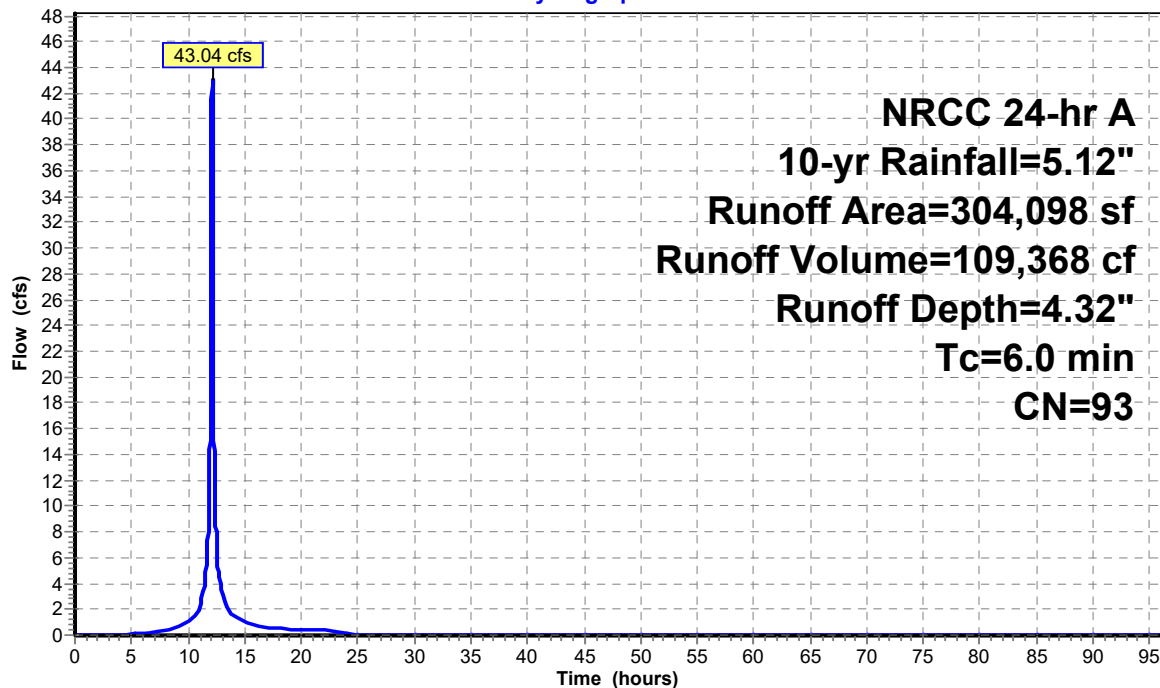
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
234,393	98	Paved parking, HSG C
56,515	74	>75% Grass cover, Good, HSG C
13,190	80	>75% Grass cover, Good, HSG D
304,098	93	Weighted Average
69,705		22.92% Pervious Area
234,393		77.08% Impervious Area

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

Subcatchment 14: Post A10

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 15: DIV-5

Inflow Area = 304,098 sf, 77.08% Impervious, Inflow Depth = 4.32" for 10-yr event
 Inflow = 43.04 cfs @ 12.13 hrs, Volume= 109,368 cf
 Outflow = 43.04 cfs @ 12.13 hrs, Volume= 109,368 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.10 cfs @ 12.12 hrs, Volume= 69,986 cf
 Secondary = 36.95 cfs @ 12.13 hrs, Volume= 39,383 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 339.25' @ 12.13 hrs

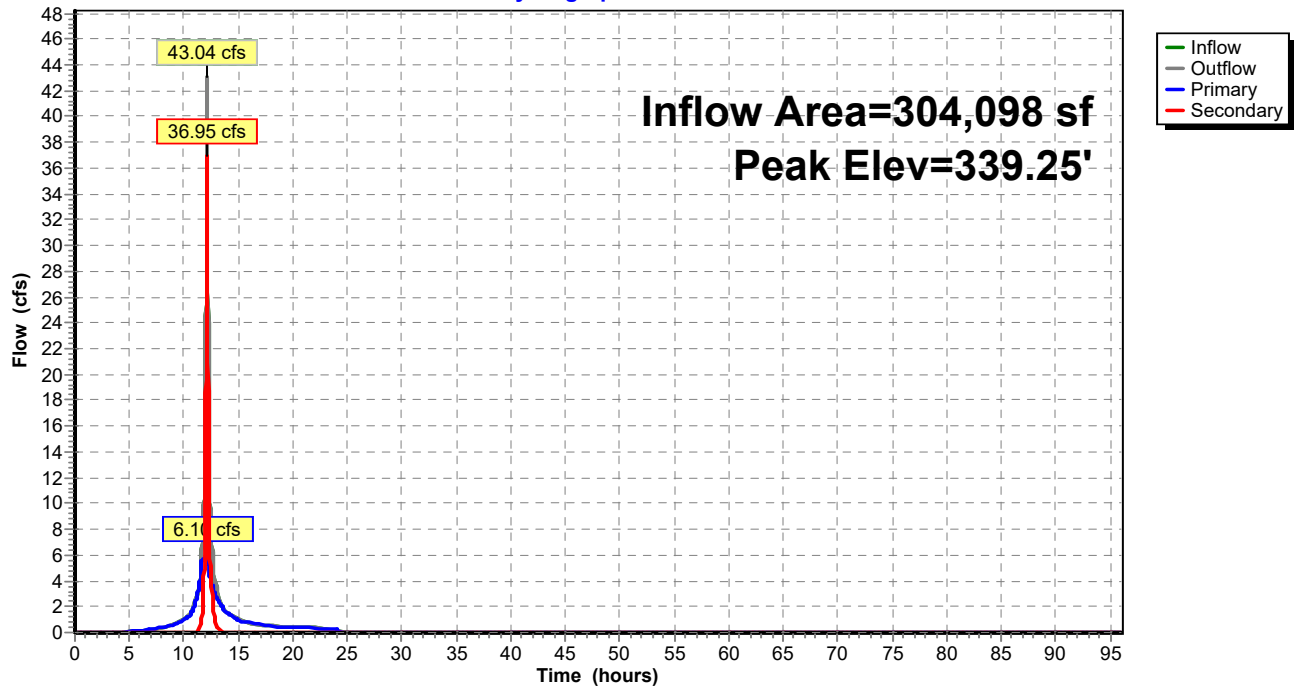
Flood Elev= 342.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	335.50'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 335.50' / 335.50' S= 0.0000 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	335.50'	36.0" Round Culvert L= 72.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 335.50' / 332.00' S= 0.0486 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Device 2	338.00'	8.0' 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=6.07 cfs @ 12.12 hrs HW=339.23' TW=336.65' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 6.07 cfs @ 7.73 fps)**Secondary OutFlow** Max=36.94 cfs @ 12.13 hrs HW=339.25' TW=325.85' (Dynamic Tailwater)↑ **2=Culvert** (Passes 36.94 cfs of 51.01 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 36.94 cfs @ 3.71 fps)

Pond 15: DIV-5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 16: INF-5

Inflow Area = 304,098 sf, 77.08% Impervious, Inflow Depth = 2.76" for 10-yr event
 Inflow = 6.10 cfs @ 12.12 hrs, Volume= 69,986 cf
 Outflow = 1.98 cfs @ 11.09 hrs, Volume= 69,986 cf, Atten= 68%, Lag= 0.0 min
 Discarded = 1.98 cfs @ 11.09 hrs, Volume= 69,986 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 337.70' @ 13.50 hrs Surf.Area= 8,559 sf Storage= 16,656 cf

Plug-Flow detention time= 58.3 min calculated for 69,979 cf (100% of inflow)
 Center-of-Mass det. time= 58.3 min (857.2 - 799.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	335.00'	9,145 cf	70.25'W x 121.83'L x 4.33'H Field A 37,088 cf Overall - 14,227 cf Embedded = 22,862 cf x 40.0% Voids
#2A	335.50'	14,227 cf	Cultec R-360HD x 384 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 384 Chambers in 12 Rows Cap Storage= +6.5 cf x 2 x 12 rows = 155.0 cf
		23,371 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	335.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.98 cfs @ 11.09 hrs HW=335.05' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.98 cfs)

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Pond 16: INF-5 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 12 rows = 155.0 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

32 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 119.83' Row Length +12.0" End Stone x 2 = 121.83' Base Length

12 Rows x 60.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 70.25' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

384 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 12 Rows = 14,226.6 cf Chamber Storage

37,088.1 cf Field - 14,226.6 cf Chambers = 22,861.5 cf Stone x 40.0% Voids = 9,144.6 cf Stone Storage

Chamber Storage + Stone Storage = 23,371.2 cf = 0.537 af

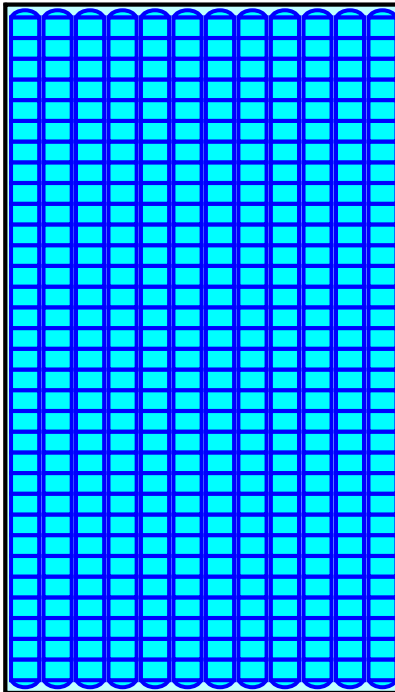
Overall Storage Efficiency = 63.0%

Overall System Size = 121.83' x 70.25' x 4.33'

384 Chambers

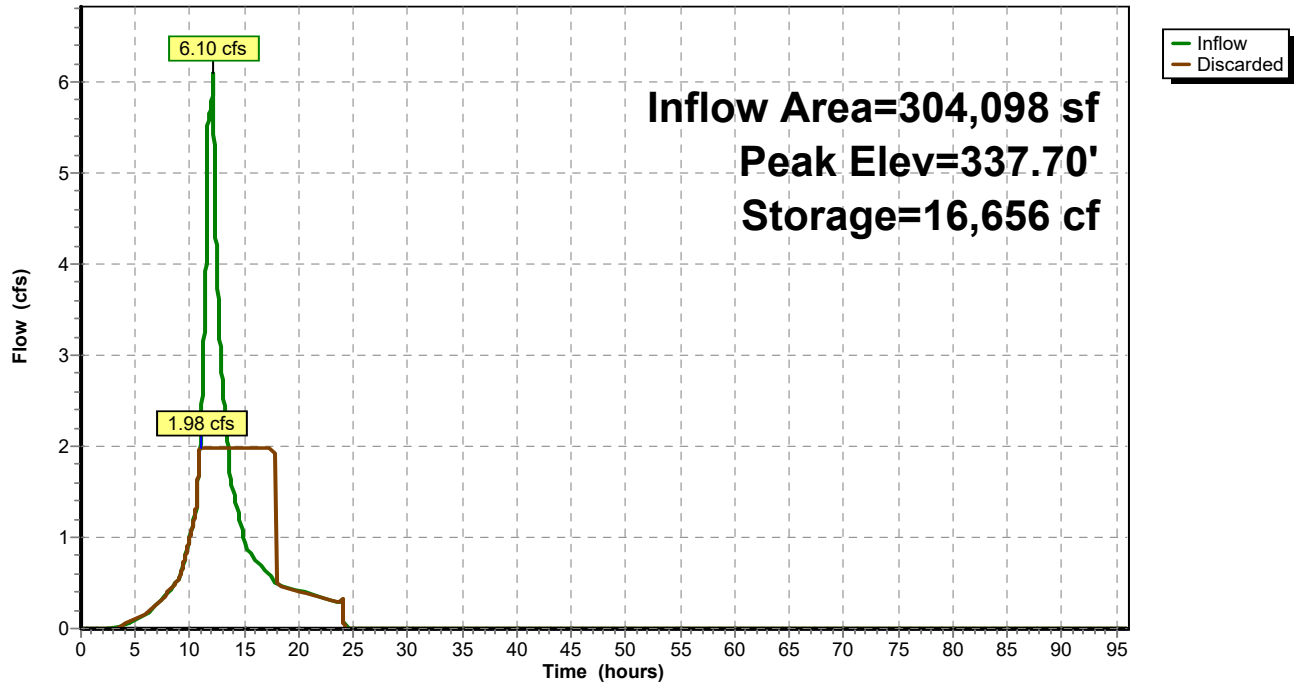
1,373.6 cy Field

846.7 cy Stone



Pond 16: INF-5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

Prepared by {enter your company name here}

Printed 3/25/2020

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Summary for Pond 17: Existing Wetland A

Inflow Area = 1,562,344 sf, 45.33% Impervious, Inflow Depth = 3.56" for 10-yr event
 Inflow = 101.44 cfs @ 12.14 hrs, Volume= 463,980 cf
 Outflow = 73.53 cfs @ 12.45 hrs, Volume= 463,980 cf, Atten= 28%, Lag= 18.3 min
 Primary = 73.53 cfs @ 12.45 hrs, Volume= 463,980 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 327.17' @ 12.45 hrs Surf.Area= 16,396 sf Storage= 37,951 cf

Plug-Flow detention time= 4.7 min calculated for 463,980 cf (100% of inflow)
 Center-of-Mass det. time= 4.6 min (826.2 - 821.6)

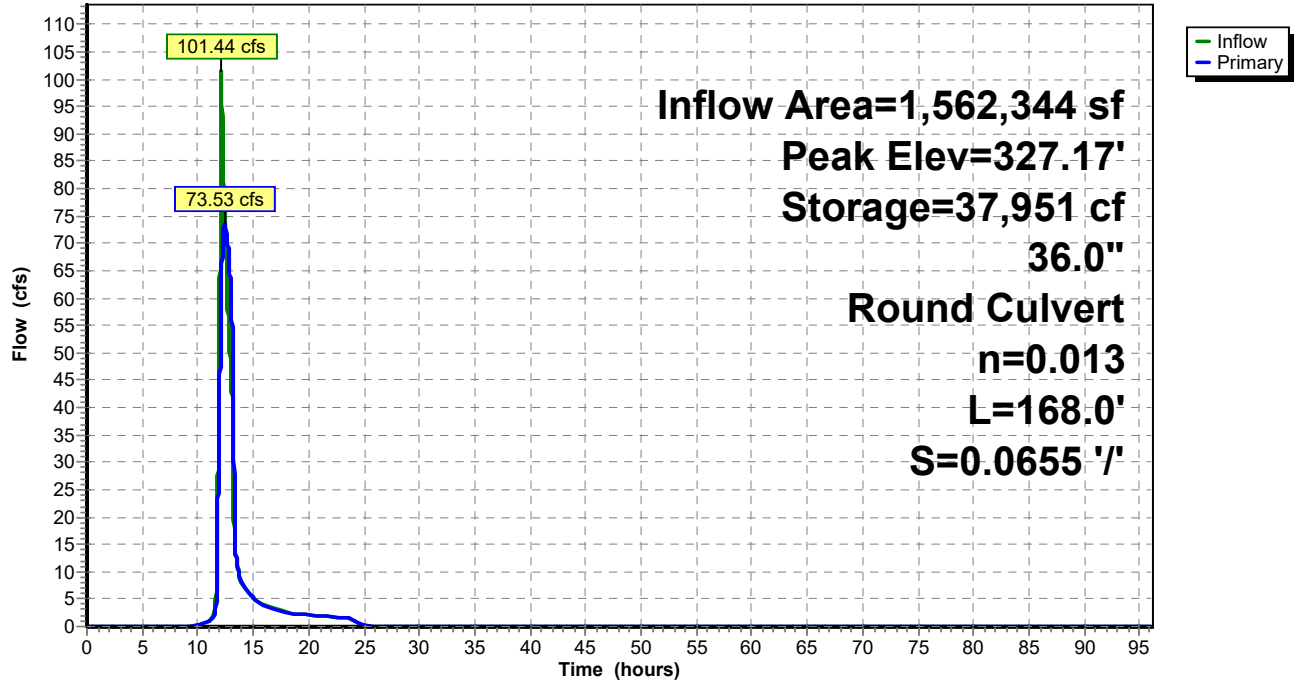
Volume	Invert	Avail.Storage	Storage Description		
#1	321.00'	190,307 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
321.00	124	53.2	0	0	124
322.00	1,084	175.8	525	525	2,361
324.00	4,913	341.5	5,536	6,061	9,202
326.00	11,332	638.2	15,804	21,866	32,354
328.00	20,583	804.3	31,458	53,324	51,475
330.00	34,086	1,075.5	54,104	107,428	92,087
332.00	49,257	1,268.5	82,879	190,307	128,164

Device	Routing	Invert	Outlet Devices
#1	Primary	321.00'	36.0" Round Culvert L= 168.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 321.00' / 310.00' S= 0.0655 ' S= 0.0655 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=73.52 cfs @ 12.45 hrs HW=327.17' TW=313.33' (Dynamic Tailwater)
 ↑**1=Culvert** (Inlet Controls 73.52 cfs @ 10.40 fps)

Pond 17: Existing Wetland A

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 18: Post A15

Runoff = 36.27 cfs @ 12.13 hrs, Volume= 81,046 cf, Depth= 2.29"

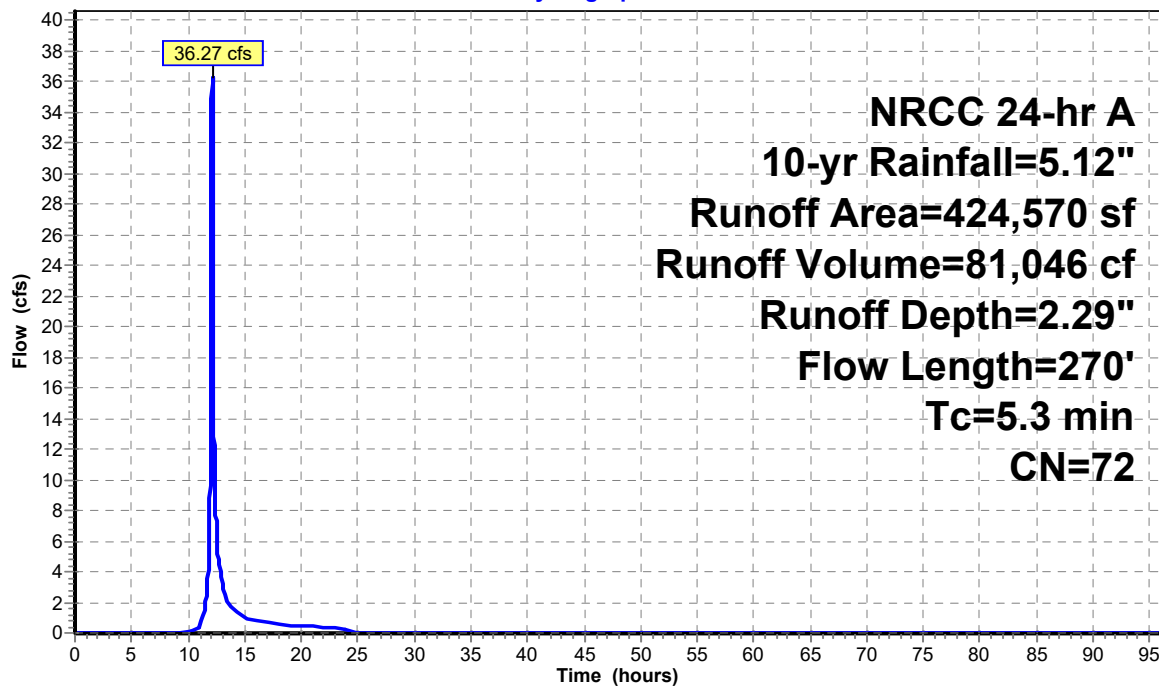
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
21,520	77	Woods, Good, HSG D
33,300	80	>75% Grass cover, Good, HSG D
213,730	70	Woods, Good, HSG C
140,572	74	>75% Grass cover, Good, HSG C
15,448	60	Woods, Fair, HSG B
424,570	72	Weighted Average
424,570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	100	0.1000	0.34		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.4	170	0.2353	7.81		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.3	270	Total			

Subcatchment 18: Post A15

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 19: Post A3

Runoff = 13.86 cfs @ 12.13 hrs, Volume= 37,956 cf, Depth= 4.88"

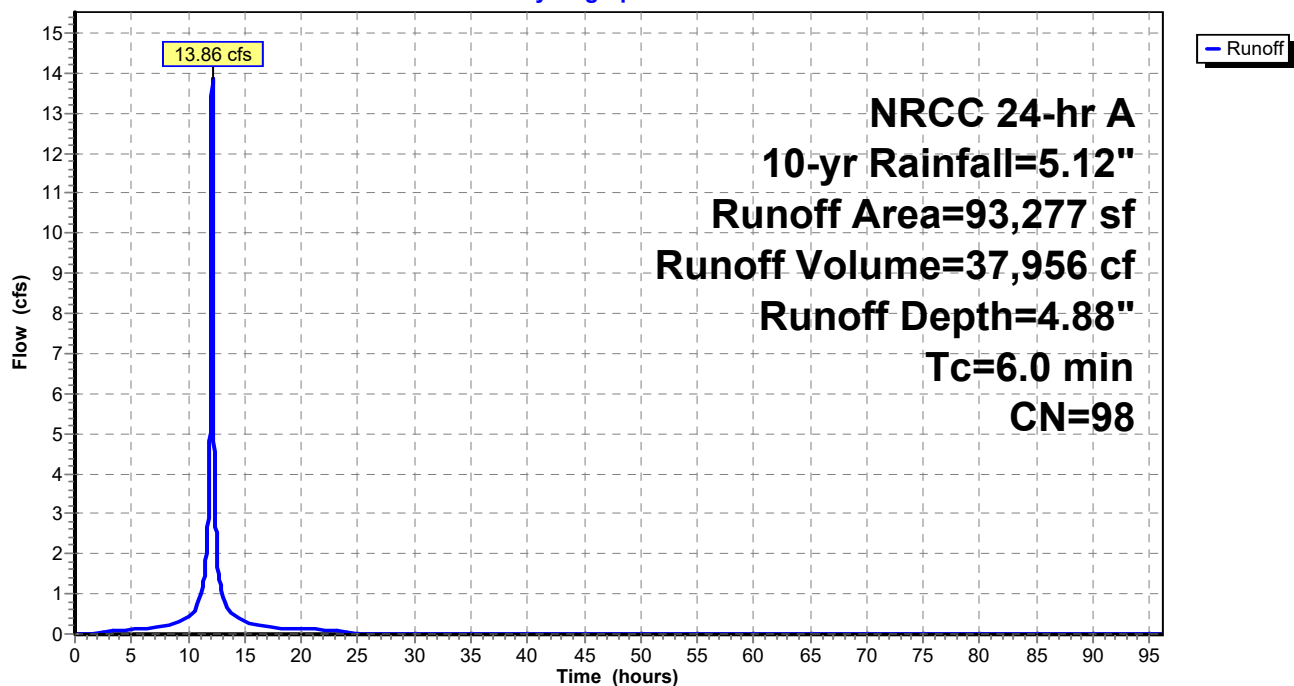
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
93,277	98	Paved parking, HSG C
93,277		100.00% Impervious Area

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

Subcatchment 19: Post A3

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 20: DIV-1

Inflow Area = 93,277 sf, 100.00% Impervious, Inflow Depth = 4.88" for 10-yr event
 Inflow = 13.86 cfs @ 12.13 hrs, Volume= 37,956 cf
 Outflow = 13.86 cfs @ 12.13 hrs, Volume= 37,956 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.37 cfs @ 11.97 hrs, Volume= 32,111 cf
 Secondary = 8.88 cfs @ 12.13 hrs, Volume= 5,845 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 327.51' @ 12.13 hrs

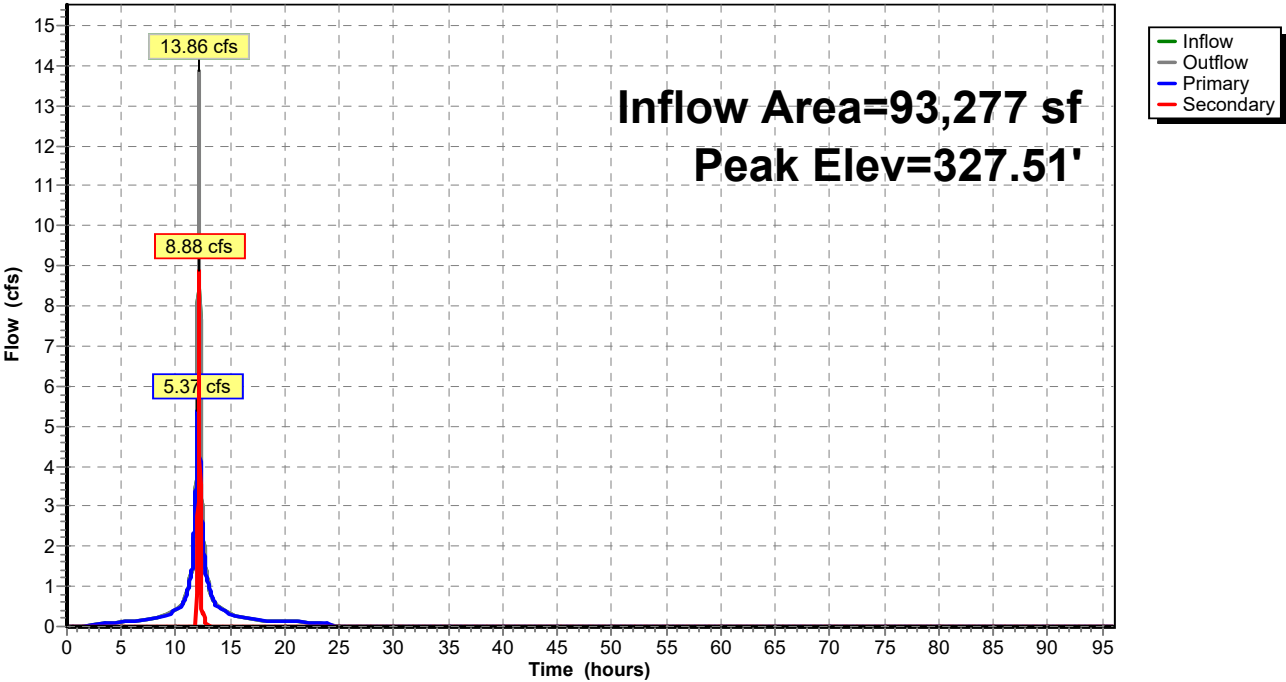
Flood Elev= 330.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	324.50'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.50' / 324.50' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	324.50'	18.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.50' / 320.00' S= 0.0900 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	327.00'	8.0' 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=5.31 cfs @ 11.97 hrs HW=327.09' TW=325.12' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.31 cfs @ 6.76 fps)**Secondary OutFlow** Max=8.87 cfs @ 12.13 hrs HW=327.51' TW=313.47' (Dynamic Tailwater)↑ **2=Culvert** (Passes 8.87 cfs of 12.80 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 8.87 cfs @ 2.16 fps)

Pond 20: DIV-1

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 21: INF-1

Inflow Area = 93,277 sf, 100.00% Impervious, Inflow Depth = 4.13" for 10-yr event
 Inflow = 5.37 cfs @ 11.97 hrs, Volume= 32,111 cf
 Outflow = 1.18 cfs @ 11.45 hrs, Volume= 32,111 cf, Atten= 78%, Lag= 0.0 min
 Discarded = 1.18 cfs @ 11.45 hrs, Volume= 32,111 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 326.92' @ 12.88 hrs Surf.Area= 4,245 sf Storage= 8,656 cf

Plug-Flow detention time= 44.4 min calculated for 32,108 cf (100% of inflow)
 Center-of-Mass det. time= 44.4 min (794.7 - 750.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	324.00'	4,688 cf	36.75'W x 115.50'L x 4.33'H Field A 18,393 cf Overall - 6,674 cf Embedded = 11,720 cf x 40.0% Voids
#2A	324.50'	6,674 cf	Cultec R-360HD x 180 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 180 Chambers in 6 Rows Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf
		11,361 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	324.00'	12.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.18 cfs @ 11.45 hrs HW=324.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.18 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Pond 21: INF-1 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

30 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 112.50' Row Length +18.0" End Stone x 2 = 115.50' Base Length

6 Rows x 60.0" Wide + 9.0" Spacing x 5 + 18.0" Side Stone x 2 = 36.75' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

180 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 6 Rows = 6,673.6 cf Chamber Storage

18,393.4 cf Field - 6,673.6 cf Chambers = 11,719.8 cf Stone x 40.0% Voids = 4,687.9 cf Stone Storage

Chamber Storage + Stone Storage = 11,361.5 cf = 0.261 af

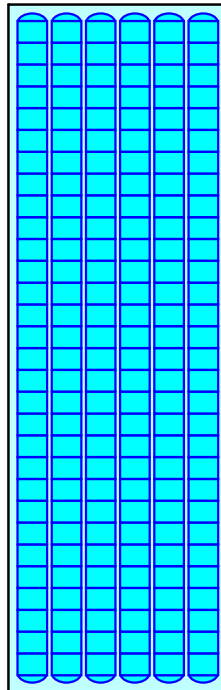
Overall Storage Efficiency = 61.8%

Overall System Size = 115.50' x 36.75' x 4.33'

180 Chambers

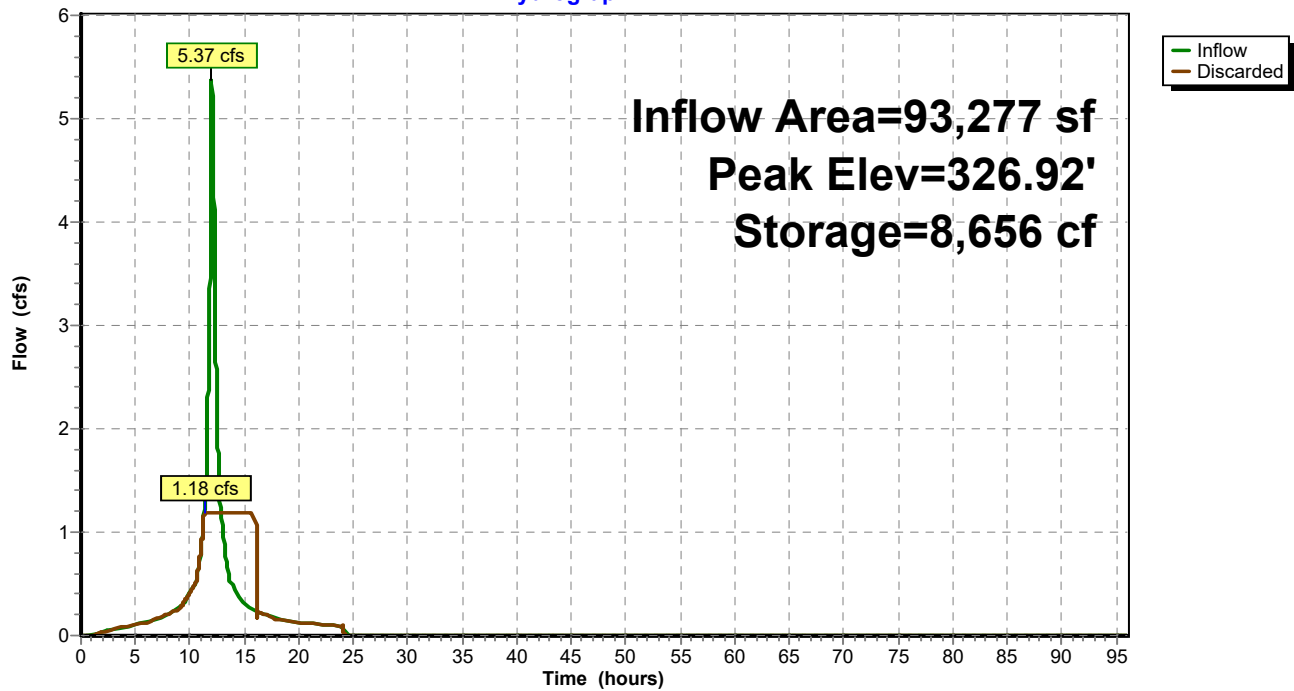
681.2 cy Field

434.1 cy Stone



Pond 21: INF-1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

Printed 3/25/2020

Summary for Reach 22: Existing Stream A

Inflow Area = 1,986,914 sf, 35.64% Impervious, Inflow Depth = 3.33" for 10-yr event
Inflow = 107.87 cfs @ 12.14 hrs, Volume= 550,871 cf
Outflow = 103.92 cfs @ 12.16 hrs, Volume= 550,871 cf, Atten= 4%, Lag= 1.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.86 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 2.24 fps, Avg. Travel Time= 10.1 min

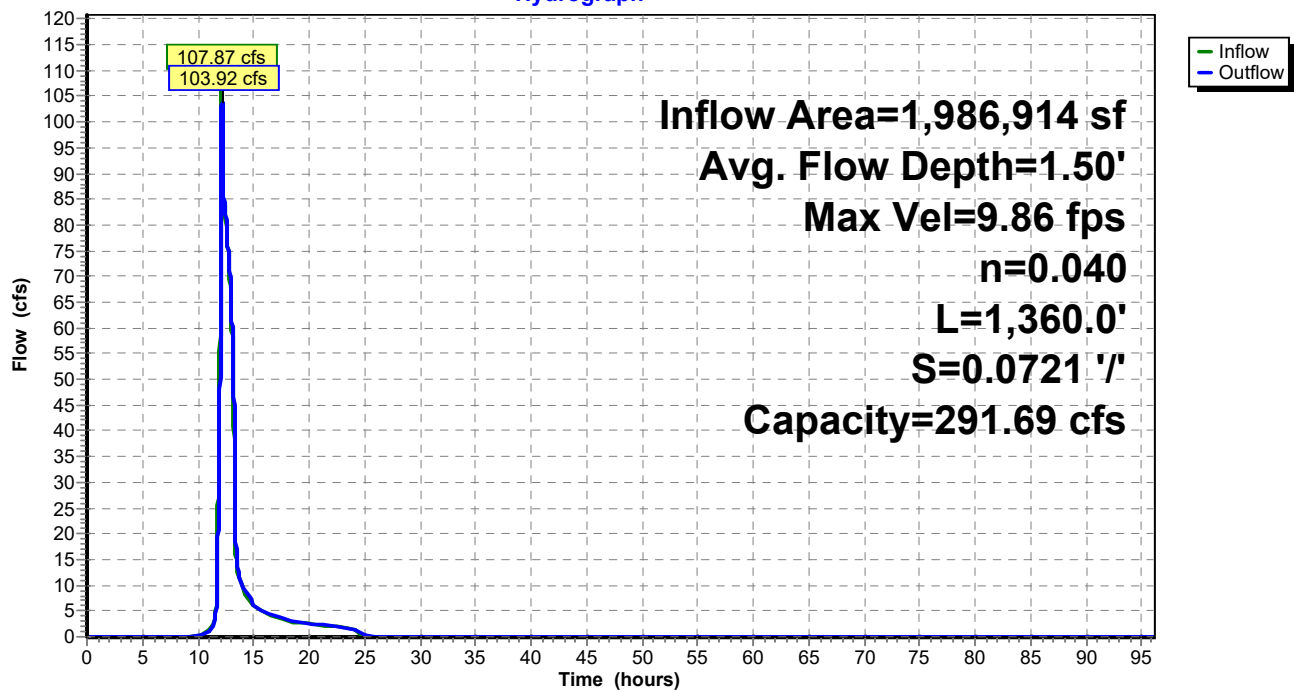
Peak Storage= 14,337 cf @ 12.16 hrs
Average Depth at Peak Storage= 1.50'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 291.69 cfs

4.00' x 2.50' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 1,360.0' Slope= 0.0721 '/'
Inlet Invert= 312.00', Outlet Invert= 214.00'



Reach 22: Existing Stream A

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 23: Post A5

Runoff = 13.81 cfs @ 12.13 hrs, Volume= 37,813 cf, Depth= 4.88"

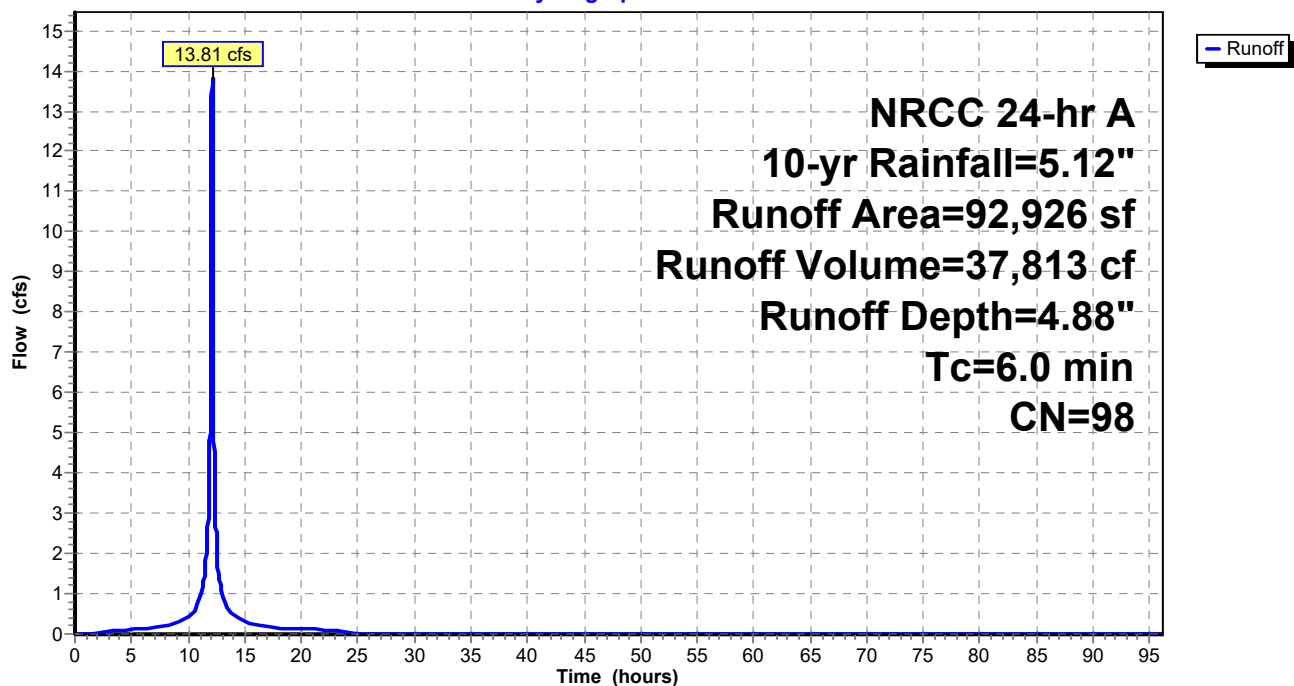
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
92,926	98	Paved parking, HSG C
92,926		100.00% Impervious Area

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

Subcatchment 23: Post A5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 24: DIV-2

Inflow Area = 92,926 sf, 100.00% Impervious, Inflow Depth = 4.88" for 10-yr event
 Inflow = 13.81 cfs @ 12.13 hrs, Volume= 37,813 cf
 Outflow = 13.81 cfs @ 12.13 hrs, Volume= 37,813 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.81 cfs @ 11.97 hrs, Volume= 32,380 cf
 Secondary = 8.44 cfs @ 12.13 hrs, Volume= 5,433 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 368.50' @ 12.13 hrs

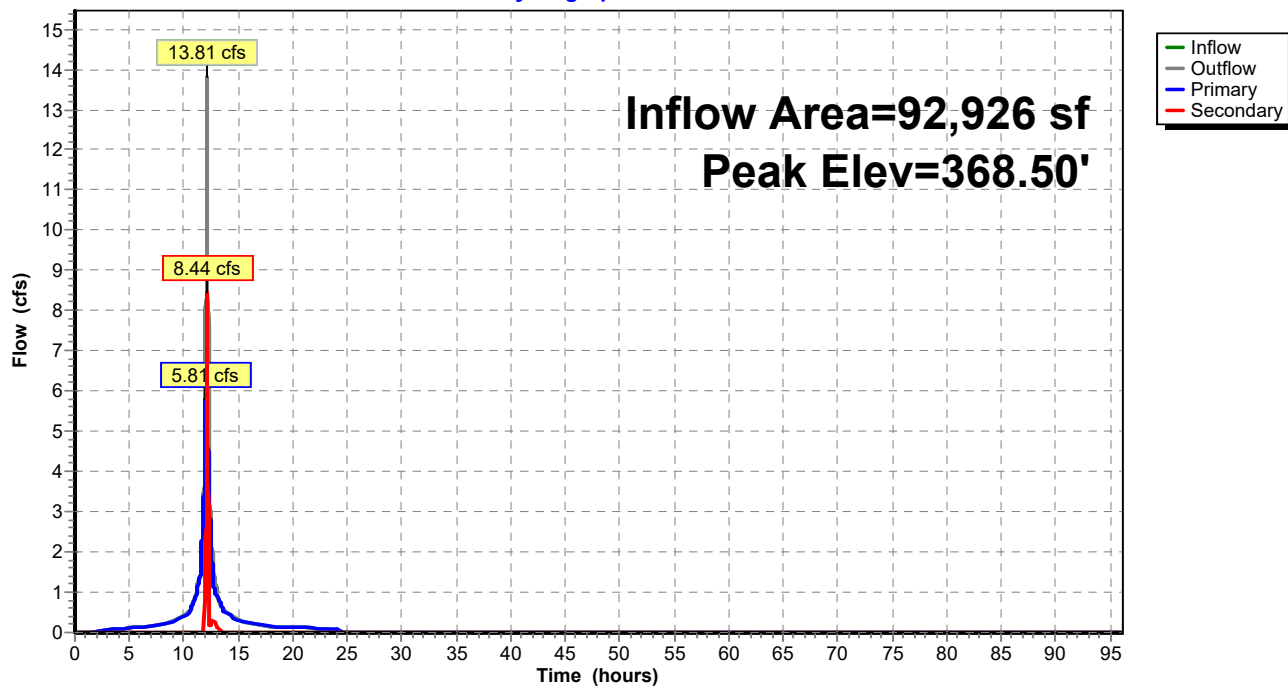
Flood Elev= 371.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	365.00'	12.0" Round Culvert L= 9.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 365.00' / 365.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	366.50'	24.0" Round Culvert L= 550.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 366.50' / 355.00' S= 0.0209 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	368.00'	8.0' 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=5.75 cfs @ 11.97 hrs HW=368.06' TW=365.75' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.75 cfs @ 7.31 fps)**Secondary OutFlow** Max=8.43 cfs @ 12.13 hrs HW=368.50' TW=357.40' (Dynamic Tailwater)↑ **2=Culvert** (Passes 8.43 cfs of 15.12 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 8.43 cfs @ 2.12 fps)

Pond 24: DIV-2

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 25: INF-2

Inflow Area = 92,926 sf, 100.00% Impervious, Inflow Depth = 4.18" for 10-yr event
 Inflow = 5.81 cfs @ 11.97 hrs, Volume= 32,380 cf
 Outflow = 0.99 cfs @ 11.32 hrs, Volume= 32,380 cf, Atten= 83%, Lag= 0.0 min
 Discarded = 0.99 cfs @ 11.32 hrs, Volume= 32,380 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 367.98' @ 12.86 hrs Surf.Area= 4,295 sf Storage= 10,191 cf

Plug-Flow detention time= 66.2 min calculated for 32,376 cf (100% of inflow)
 Center-of-Mass det. time= 66.2 min (815.8 - 749.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	364.50'	4,639 cf	41.50'W x 103.50'L x 4.33'H Field A 18,613 cf Overall - 7,016 cf Embedded = 11,596 cf x 40.0% Voids
#2A	365.00'	7,016 cf	Cultec R-360HD x 189 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 189 Chambers in 7 Rows Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf
		11,655 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	364.50'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=0.99 cfs @ 11.32 hrs HW=364.55' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.99 cfs)

North 60 Post A 3-9-20

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Pond 25: INF-2 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

27 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 101.50' Row Length +12.0" End Stone x 2 = 103.50' Base Length

7 Rows x 60.0" Wide + 9.0" Spacing x 6 + 12.0" Side Stone x 2 = 41.50' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

189 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 7 Rows = 7,016.3 cf Chamber Storage

18,612.7 cf Field - 7,016.3 cf Chambers = 11,596.5 cf Stone x 40.0% Voids = 4,638.6 cf Stone Storage

Chamber Storage + Stone Storage = 11,654.9 cf = 0.268 af

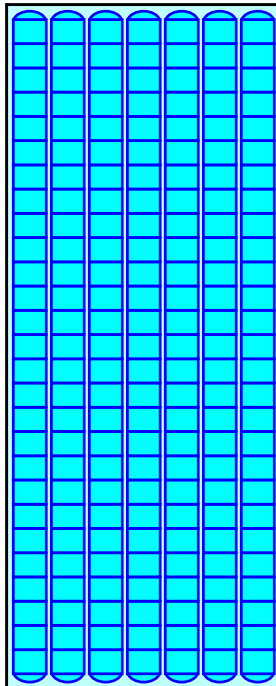
Overall Storage Efficiency = 62.6%

Overall System Size = 103.50' x 41.50' x 4.33'

189 Chambers

689.4 cy Field

429.5 cy Stone



North 60 Post A 3-9-20

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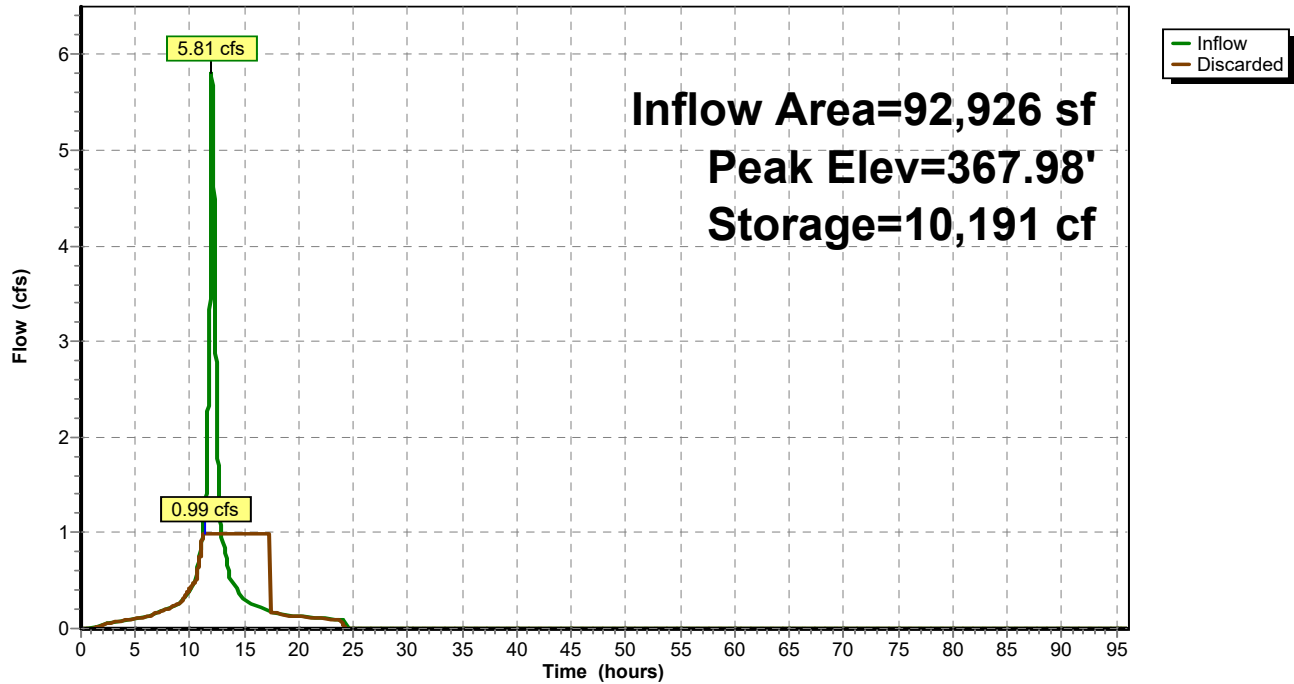
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Pond 25: INF-2

Hydrograph



North 60 Post A 3-9-20

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Summary for Subcatchment 26: Post A12

Runoff = 16.19 cfs @ 12.19 hrs, Volume= 48,165 cf, Depth= 3.58"

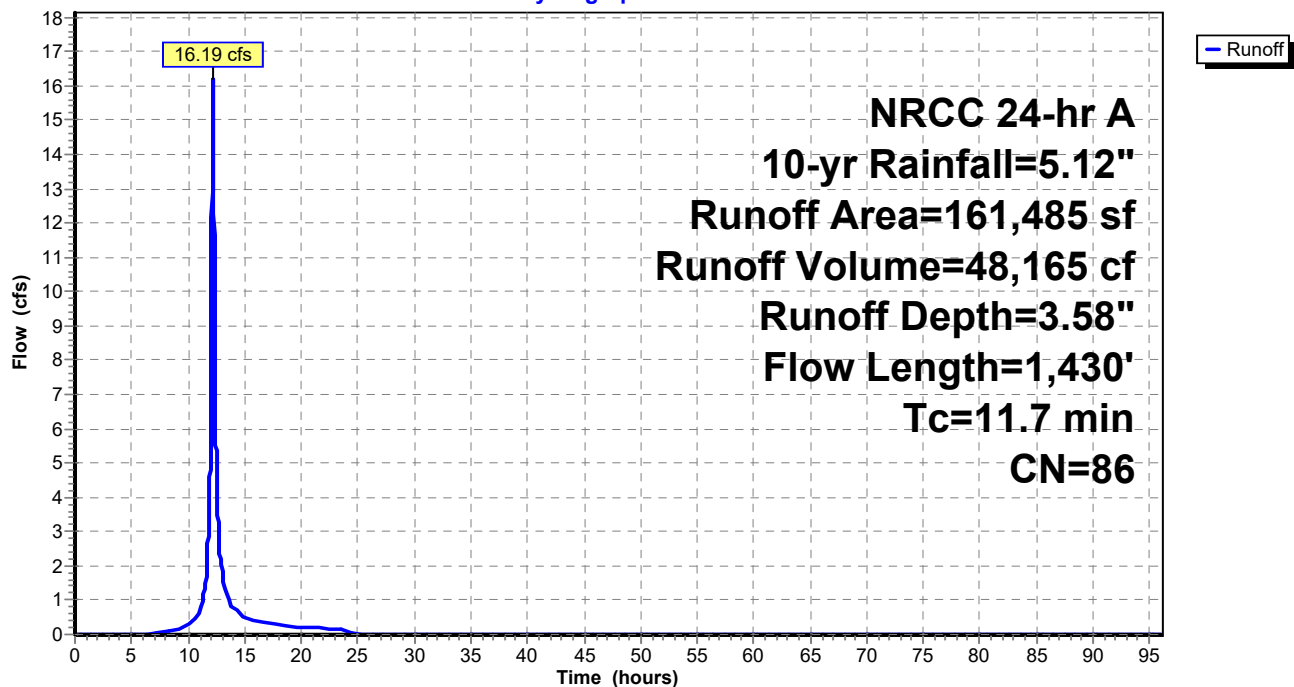
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
83,450	98	Paved parking, HSG C
78,035	74	>75% Grass cover, Good, HSG C
161,485	86	Weighted Average
78,035		48.32% Pervious Area
83,450		51.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	84	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
1.6	201	0.0164	2.06		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,145	0.0339	9.69	11.89	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
11.7	1,430	Total			

Subcatchment 26: Post A12

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 27: DIV-6

Inflow Area = 161,485 sf, 51.68% Impervious, Inflow Depth = 3.58" for 10-yr event
 Inflow = 16.19 cfs @ 12.19 hrs, Volume= 48,165 cf
 Outflow = 16.19 cfs @ 12.19 hrs, Volume= 48,165 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.27 cfs @ 11.93 hrs, Volume= 33,562 cf
 Secondary = 12.24 cfs @ 12.19 hrs, Volume= 14,603 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 365.12' @ 12.19 hrs

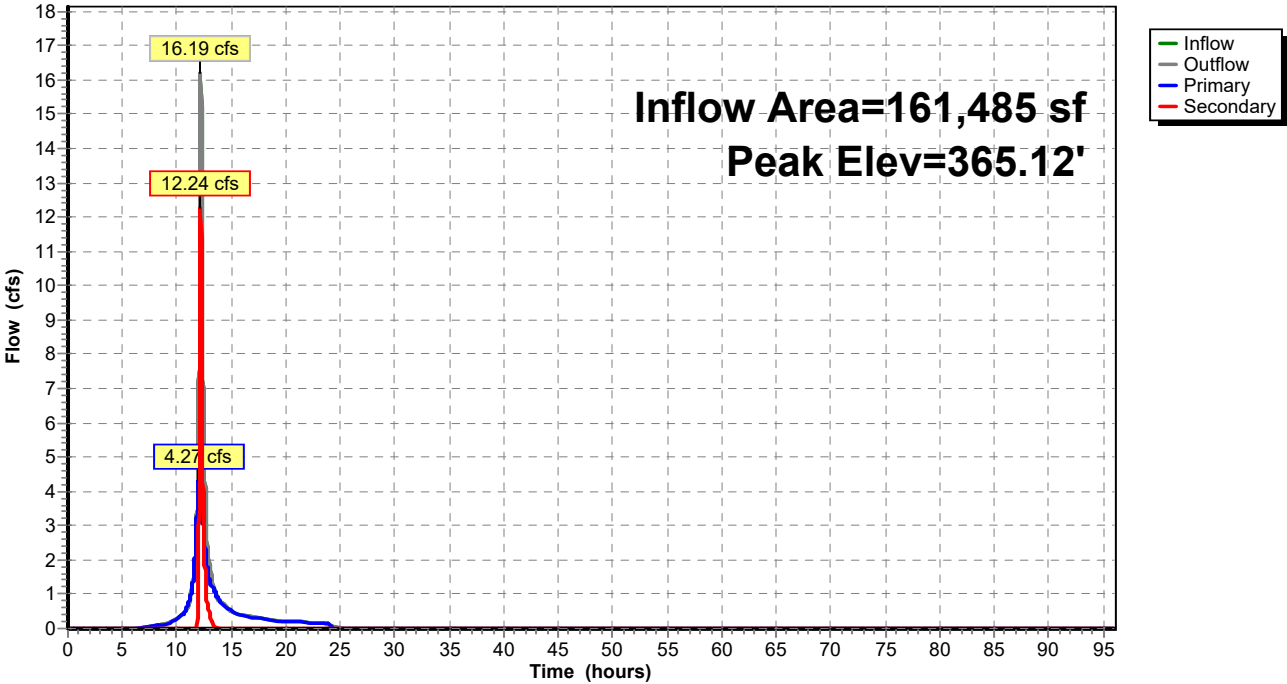
Flood Elev= 366.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	361.50'	10.0" Round Culvert L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 361.50' / 361.50' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	361.50'	24.0" Round Culvert L= 148.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 361.50' / 355.94' S= 0.0376 ' S= 0.0376 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	364.50'	8.0' 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=4.24 cfs @ 11.93 hrs HW=364.57' TW=361.95' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 4.24 cfs @ 7.78 fps)**Secondary OutFlow** Max=12.23 cfs @ 12.19 hrs HW=365.12' TW=357.22' (Dynamic Tailwater)↑ **2=Culvert** (Passes 12.23 cfs of 24.50 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 12.23 cfs @ 2.45 fps)

Pond 27: DIV-6

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 28: INF-6

Inflow Area = 161,485 sf, 51.68% Impervious, Inflow Depth = 2.49" for 10-yr event
 Inflow = 4.27 cfs @ 11.93 hrs, Volume= 33,562 cf
 Outflow = 1.24 cfs @ 11.53 hrs, Volume= 33,562 cf, Atten= 71%, Lag= 0.0 min
 Discarded = 1.24 cfs @ 11.53 hrs, Volume= 33,562 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 364.33' @ 13.18 hrs Surf.Area= 3,569 sf Storage= 8,199 cf

Plug-Flow detention time= 46.9 min calculated for 33,559 cf (100% of inflow)
 Center-of-Mass det. time= 46.9 min (876.6 - 829.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	361.00'	3,393 cf	35.75'W x 99.83'L x 4.00'H Field A 14,276 cf Overall - 5,794 cf Embedded = 8,482 cf x 40.0% Voids
#2A	361.50'	5,794 cf	Cultec R-360HD x 156 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 156 Chambers in 6 Rows Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf
		9,187 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	361.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.24 cfs @ 11.53 hrs HW=361.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.24 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Pond 28: INF-6 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

26 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 97.83' Row Length +12.0" End Stone x 2 = 99.83' Base Length

6 Rows x 60.0" Wide + 9.0" Spacing x 5 + 12.0" Side Stone x 2 = 35.75' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

156 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 6 Rows = 5,794.1 cf Chamber Storage

14,276.2 cf Field - 5,794.1 cf Chambers = 8,482.1 cf Stone x 40.0% Voids = 3,392.8 cf Stone Storage

Chamber Storage + Stone Storage = 9,186.9 cf = 0.211 af

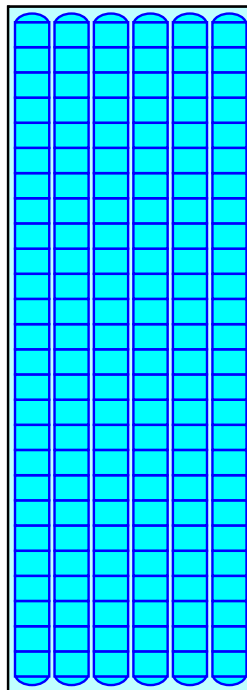
Overall Storage Efficiency = 64.4%

Overall System Size = 99.83' x 35.75' x 4.00'

156 Chambers

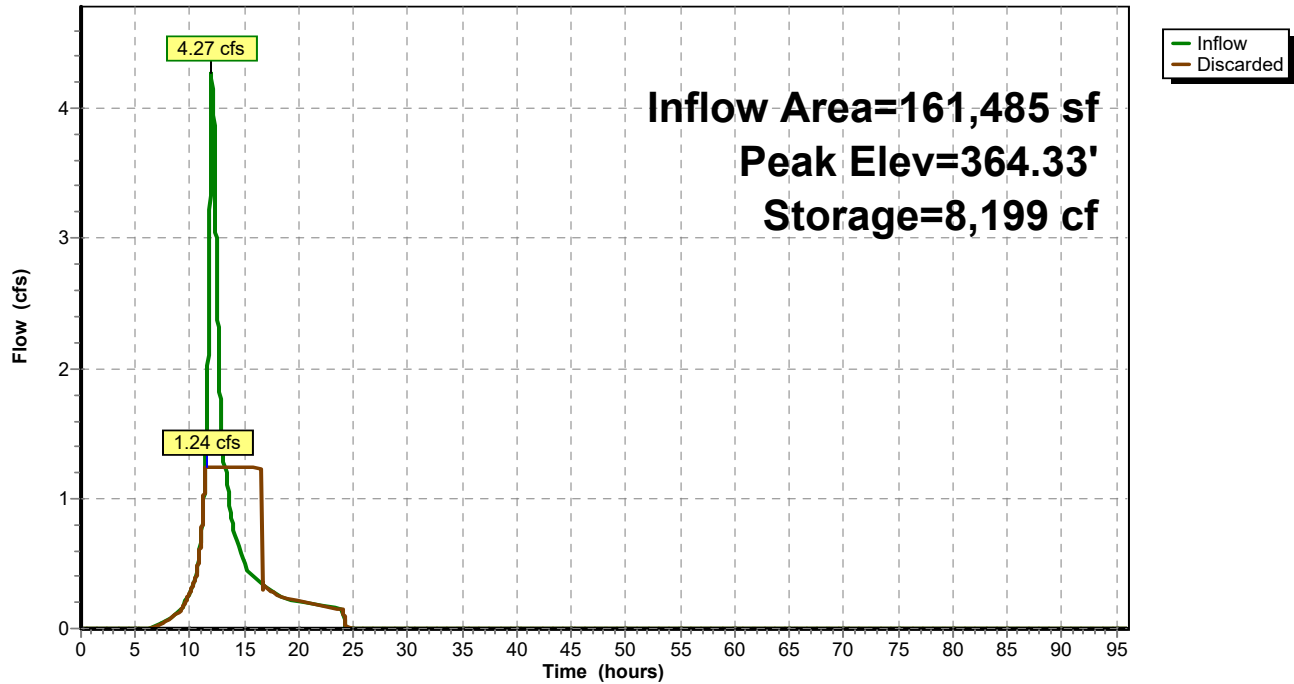
528.7 cy Field

314.2 cy Stone



Pond 28: INF-6

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 29: Post A6

Runoff = 52.43 cfs @ 12.13 hrs, Volume= 133,227 cf, Depth= 4.32"

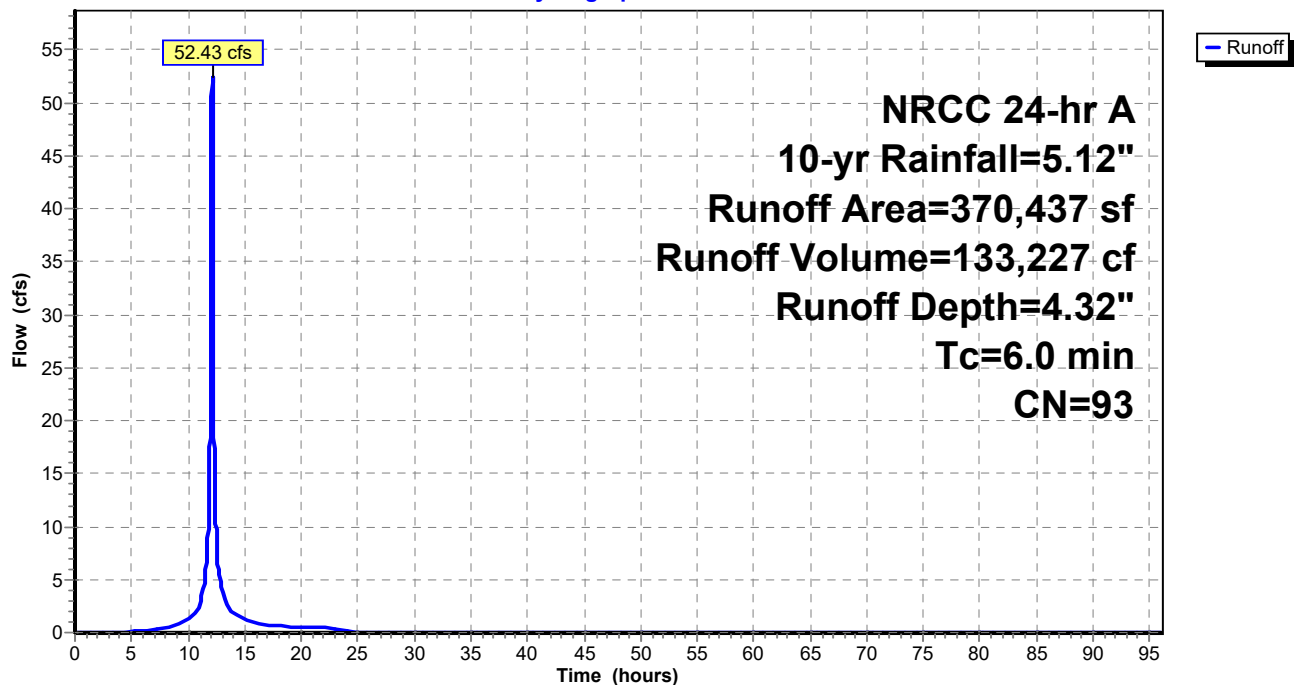
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
286,912	98	Paved parking, HSG C
83,525	74	>75% Grass cover, Good, HSG C
370,437	93	Weighted Average
83,525		22.55% Pervious Area
286,912		77.45% Impervious Area

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

Subcatchment 29: Post A6

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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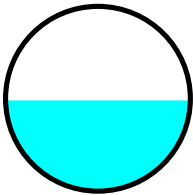
Summary for Reach 30: 36" HDPE Pipe

Inflow Area = 370,437 sf, 77.45% Impervious, Inflow Depth = 4.96" for 10-yr event
Inflow = 70.58 cfs @ 12.13 hrs, Volume= 153,263 cf
Outflow = 70.09 cfs @ 12.14 hrs, Volume= 153,263 cf, Atten= 1%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 20.32 fps, Min. Travel Time= 0.7 min
Avg. Velocity= 5.49 fps, Avg. Travel Time= 2.4 min

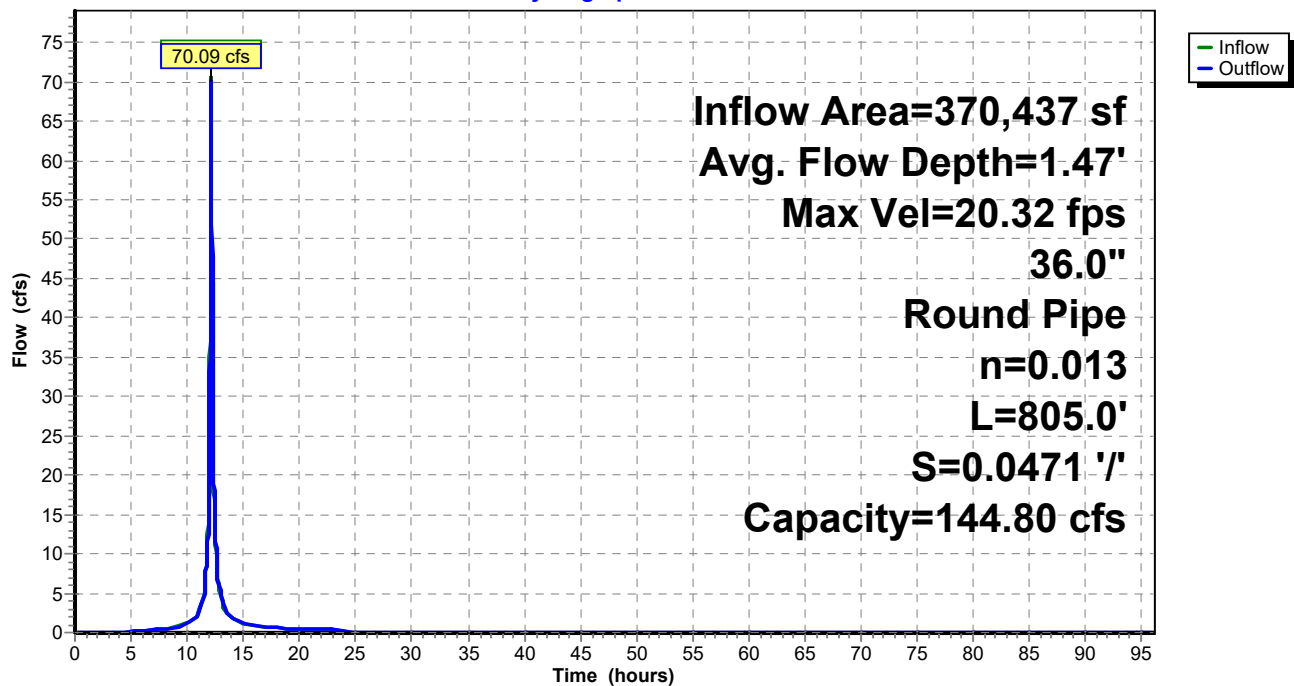
Peak Storage= 2,777 cf @ 12.14 hrs
Average Depth at Peak Storage= 1.47'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 144.80 cfs

36.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 805.0' Slope= 0.0471 '/'
Inlet Invert= 355.94', Outlet Invert= 318.00'



Reach 30: 36" HDPE Pipe

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 31: Post A14

Runoff = 30.35 cfs @ 12.13 hrs, Volume= 80,304 cf, Depth= 4.65"

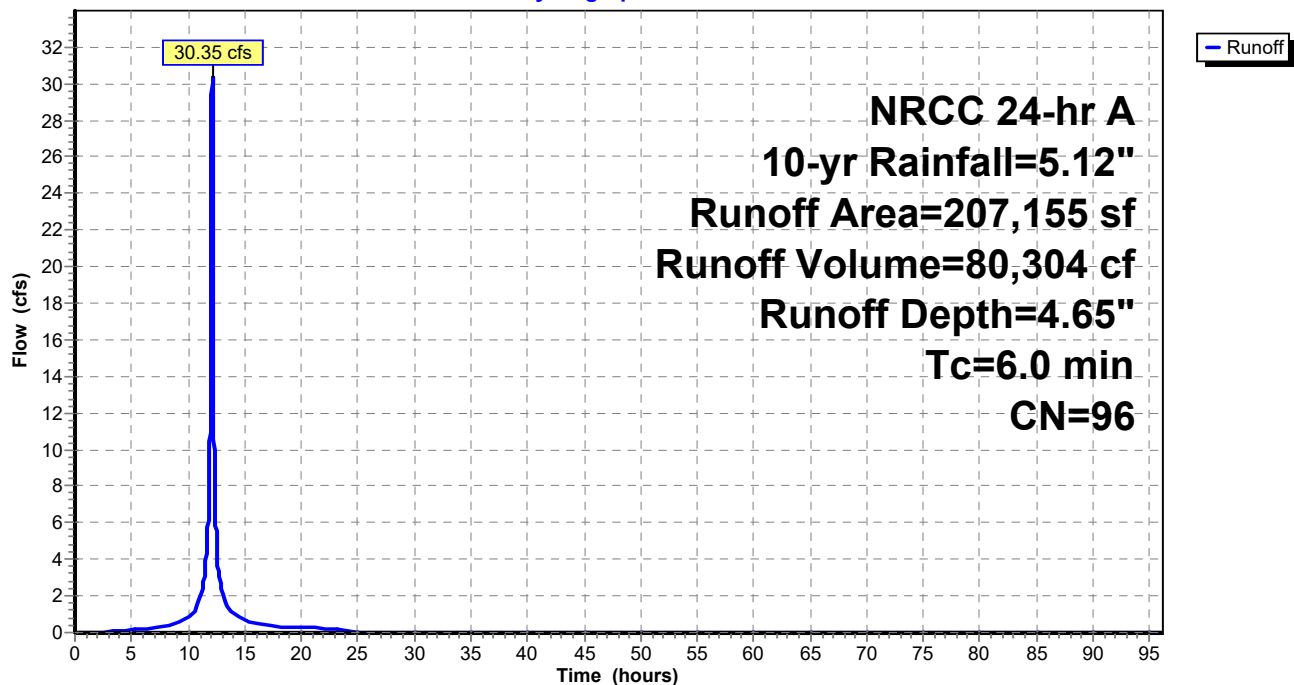
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
187,606	98	Paved parking, HSG C
19,549	74	>75% Grass cover, Good, HSG C
207,155	96	Weighted Average
19,549		9.44% Pervious Area
187,606		90.56% Impervious Area

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

Subcatchment 31: Post A14

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 32: DMH-3

Inflow Area = 577,592 sf, 82.15% Impervious, Inflow Depth = 4.85" for 10-yr event
Inflow = 100.05 cfs @ 12.14 hrs, Volume= 233,567 cf
Outflow = 100.05 cfs @ 12.14 hrs, Volume= 233,567 cf, Atten= 0%, Lag= 0.0 min
Primary = 100.05 cfs @ 12.14 hrs, Volume= 233,567 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

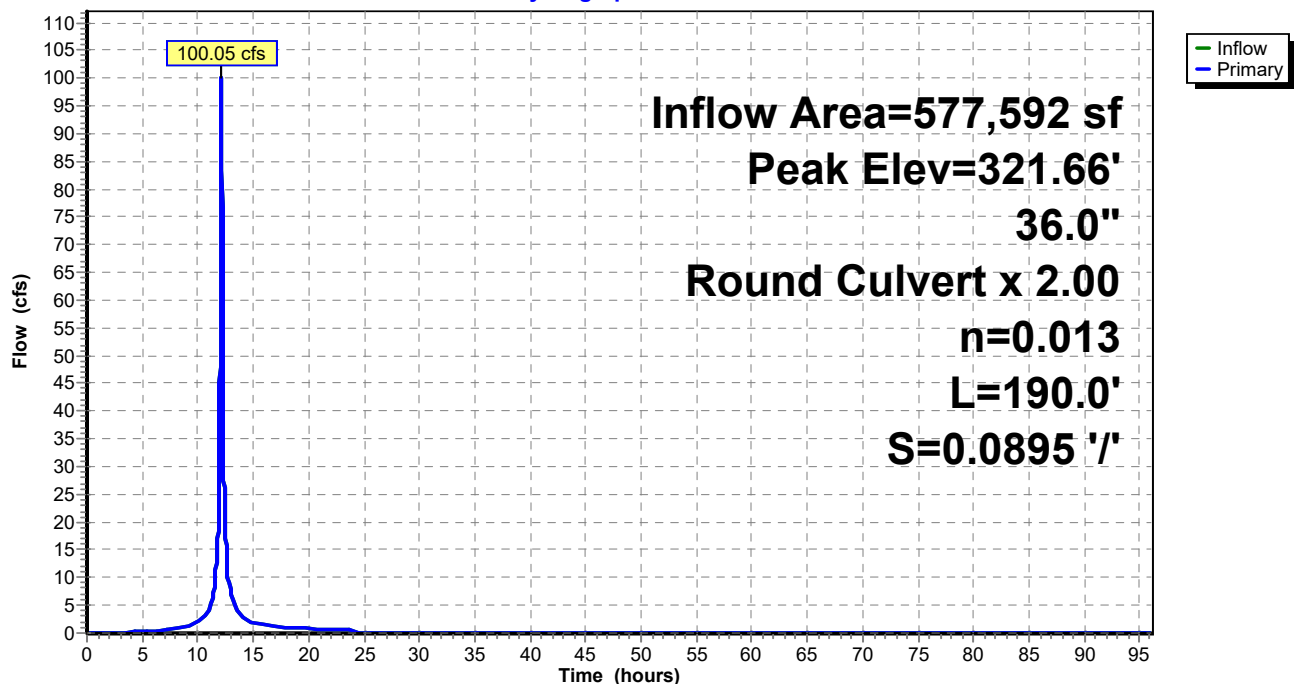
Peak Elev= 321.66' @ 12.14 hrs

Flood Elev= 328.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	318.00'	36.0" Round Culvert X 2.00 L= 190.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 318.00' / 301.00' S= 0.0895 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=99.88 cfs @ 12.14 hrs HW=321.65' TW=303.46' (Dynamic Tailwater)

1=Culvert (Inlet Controls 99.88 cfs @ 7.07 fps)

Pond 32: DMH-3**Hydrograph**

North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 33: Post A7

Runoff = 2.24 cfs @ 12.19 hrs, Volume= 6,311 cf, Depth= 1.89"

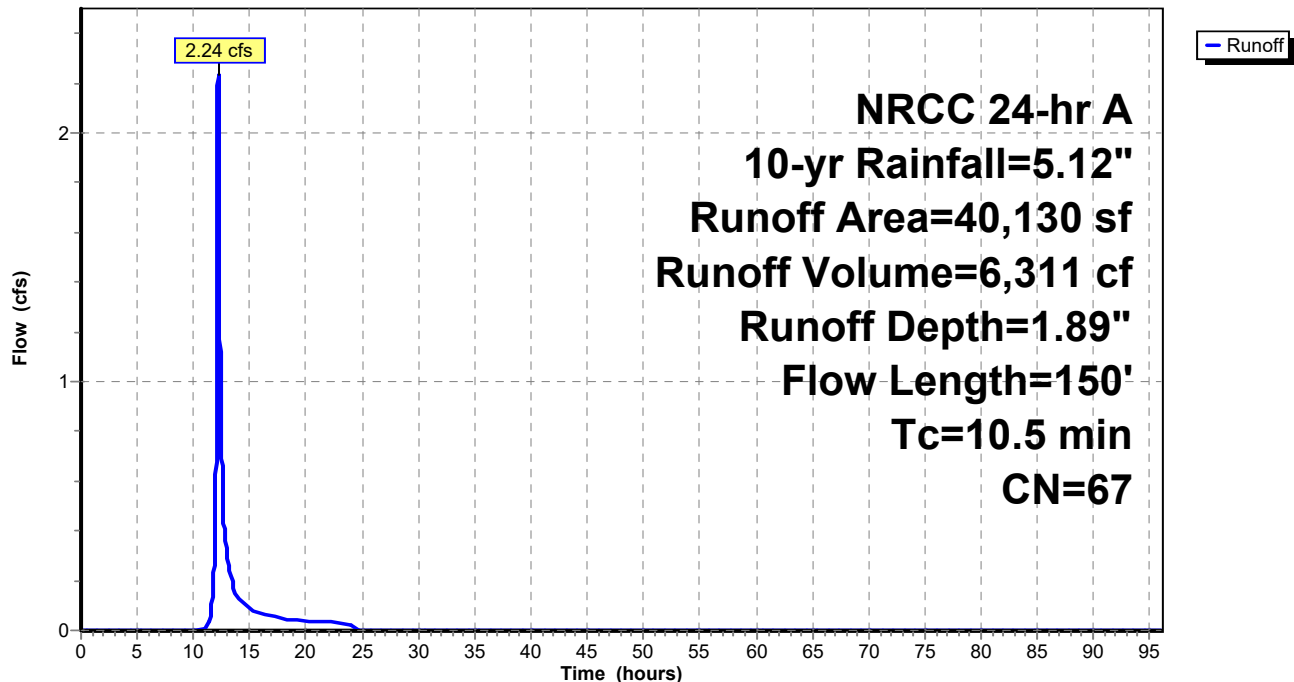
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
23,130	65	Brush, Good, HSG C
17,000	70	Woods, Good, HSG C
40,130	67	Weighted Average
40,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1100	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.1	50	0.2800	8.52		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.5	150	Total			

Subcatchment 33: Post A7

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 34: SWP-5

Inflow Area = 617,722 sf, 76.82% Impervious, Inflow Depth = 4.66" for 10-yr event
 Inflow = 101.98 cfs @ 12.14 hrs, Volume= 239,878 cf
 Outflow = 74.03 cfs @ 12.20 hrs, Volume= 239,878 cf, Atten= 27%, Lag= 3.6 min
 Discarded = 6.49 cfs @ 12.20 hrs, Volume= 153,342 cf
 Primary = 67.53 cfs @ 12.20 hrs, Volume= 86,536 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 303.70' @ 12.20 hrs Surf.Area= 18,704 sf Storage= 56,958 cf

Plug-Flow detention time= 31.8 min calculated for 239,853 cf (100% of inflow)
 Center-of-Mass det. time= 31.8 min (800.8 - 769.0)

Volume	Invert	Avail.Storage	Storage Description
#1	300.00'	105,088 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)
300.00	12,249	547.4	0	0	12,249
301.00	13,920	566.4	13,076	13,076	14,023
302.00	15,648	585.4	14,776	27,851	15,857
303.00	17,432	604.3	16,532	44,383	17,743
304.00	19,274	623.3	18,345	62,728	19,698
305.00	21,173	642.3	20,216	82,945	21,713
306.00	23,128	661.3	22,143	105,088	23,789

Device	Routing	Invert	Outlet Devices
#1	Discarded	300.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'
#2	Primary	298.00'	42.0" Round Culvert L= 189.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 298.00' / 258.00' S= 0.2116 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 9.62 sf
#3	Device 2	302.33'	36.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=6.49 cfs @ 12.20 hrs HW=303.70' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 6.49 cfs)

Primary OutFlow Max=67.51 cfs @ 12.20 hrs HW=303.70' TW=258.43' (Dynamic Tailwater)

↑**2=Culvert** (Passes 67.51 cfs of 92.01 cfs potential flow)

↑**3=Orifice/Grate** (Orifice Controls 67.51 cfs @ 5.63 fps)

North 60 Post A 3-9-20

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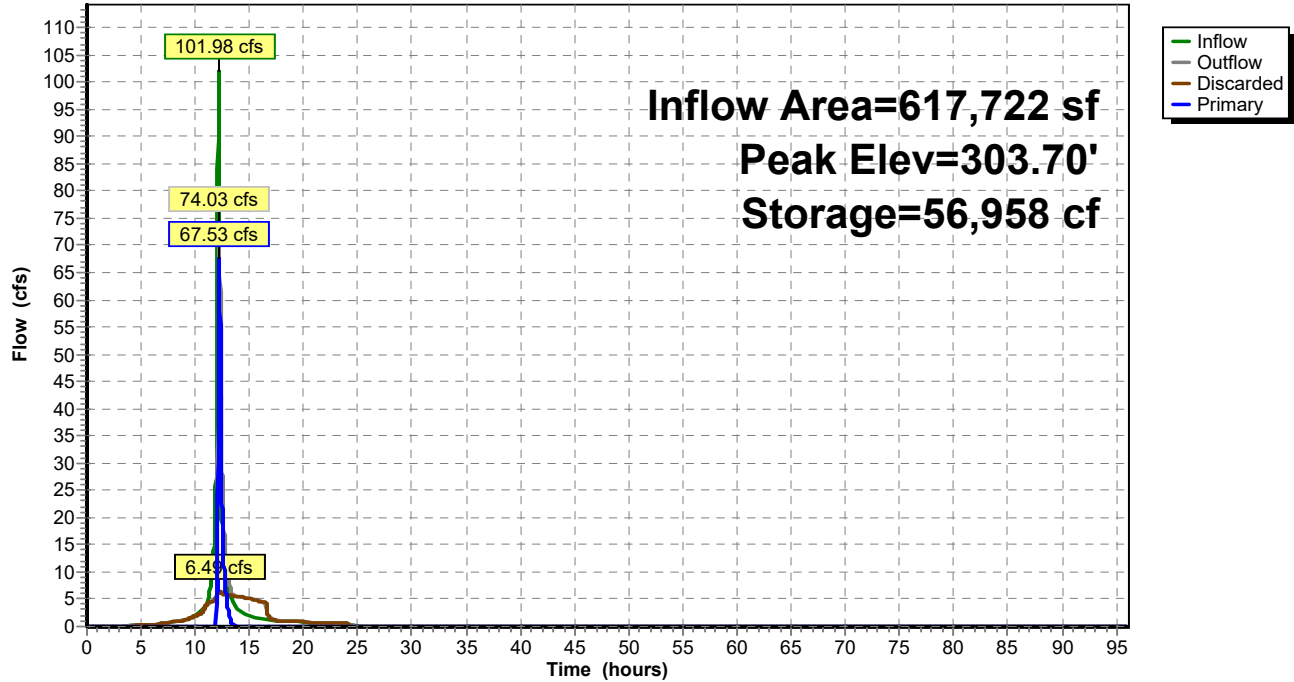
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NRCC 24-hr A 10-yr Rainfall=5.12"

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Pond 34: SWP-5

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 35: Post A16

Runoff = 3.03 cfs @ 12.18 hrs, Volume= 8,275 cf, Depth= 1.97"

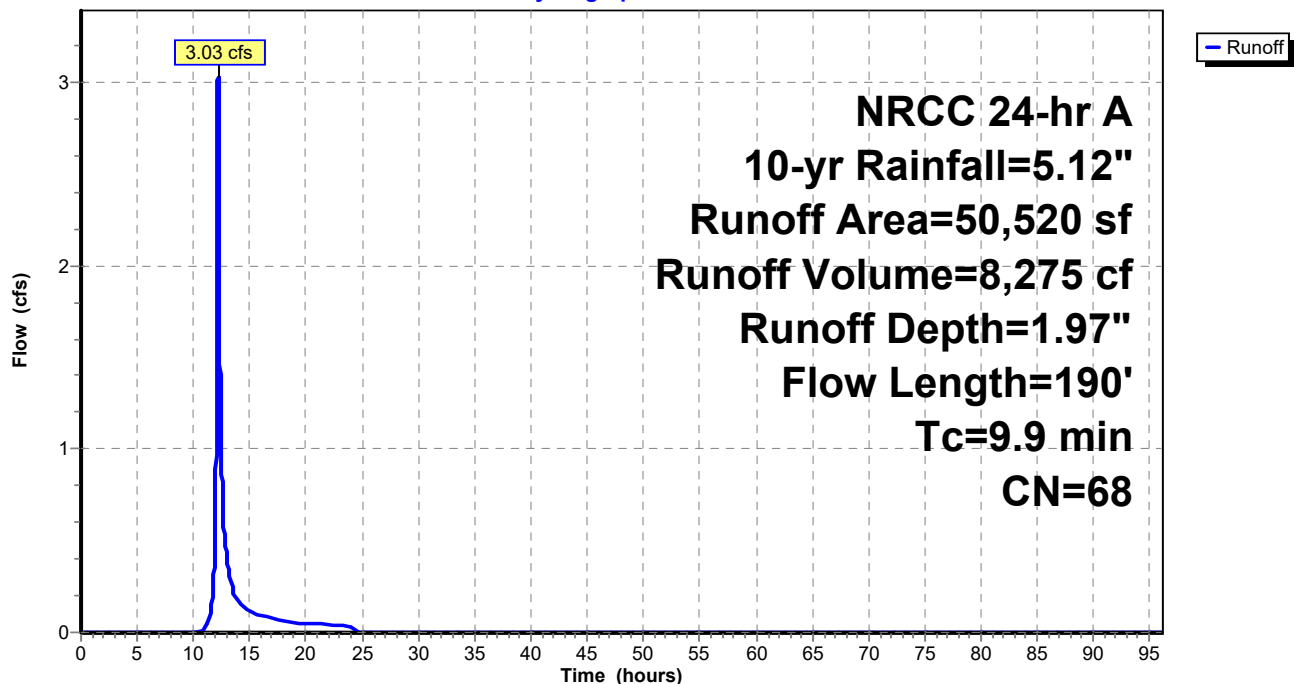
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
16,692	65	Brush, Good, HSG C
33,828	70	Woods, Good, HSG C
50,520	68	Weighted Average
50,520		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.17		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	90	0.3000	8.82		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
9.9	190	Total			

Subcatchment 35: Post A16

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 36: SWP-3

Inflow Area = 668,242 sf, 71.01% Impervious, Inflow Depth = 1.70" for 10-yr event
 Inflow = 70.50 cfs @ 12.20 hrs, Volume= 94,810 cf
 Outflow = 55.21 cfs @ 12.29 hrs, Volume= 94,810 cf, Atten= 22%, Lag= 5.5 min
 Discarded = 4.14 cfs @ 12.29 hrs, Volume= 37,397 cf
 Primary = 51.07 cfs @ 12.29 hrs, Volume= 57,413 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 259.08' @ 12.29 hrs Surf.Area= 11,921 sf Storage= 29,615 cf

Plug-Flow detention time= 24.8 min calculated for 94,810 cf (100% of inflow)
 Center-of-Mass det. time= 24.8 min (775.1 - 750.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	256.00'	71,328 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)
256.00	7,434	457.3	0	0	7,434
257.00	8,834	476.3	8,124	8,124	8,921
258.00	10,292	495.3	9,554	17,678	10,468
259.00	11,806	514.3	11,040	28,718	12,076
260.00	13,378	533.4	12,584	41,302	13,752
261.00	15,006	552.4	14,184	55,486	15,481
262.00	16,692	571.4	15,842	71,328	17,271

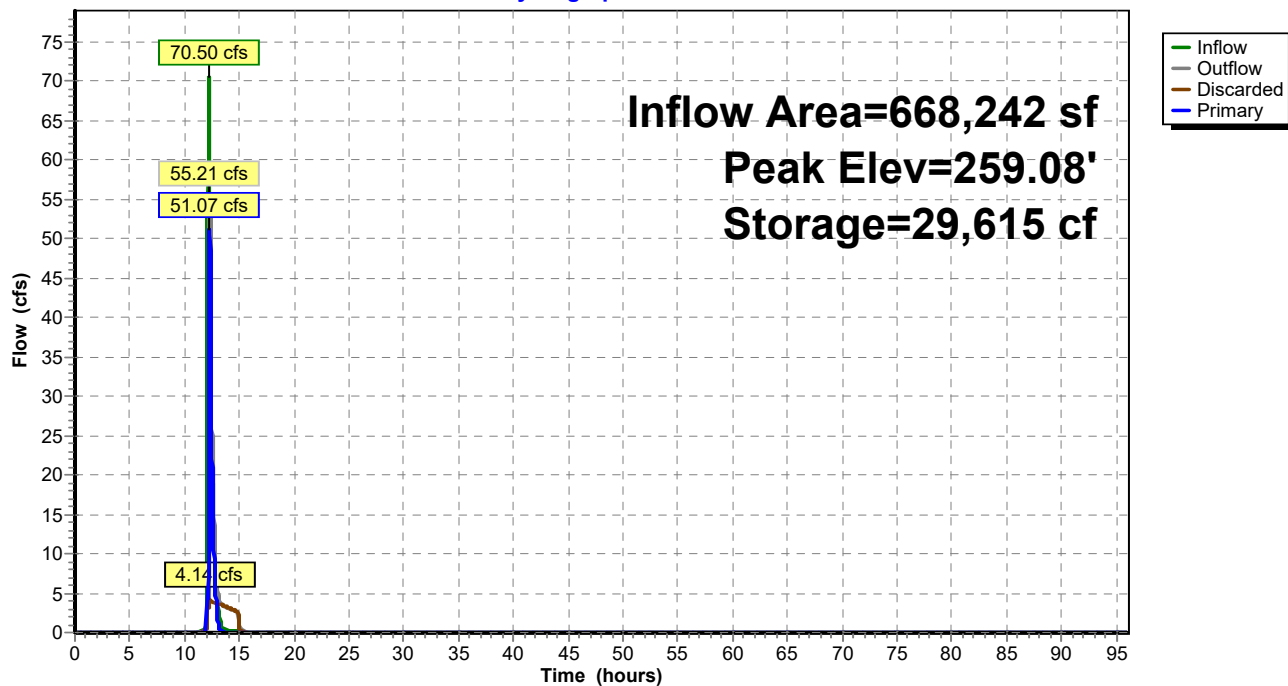
Device	Routing	Invert	Outlet Devices
#1	Primary	254.00'	36.0" Round Culvert L= 128.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 254.00' / 234.00' S= 0.1563 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#2	Device 1	258.00'	36.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	256.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'

Discarded OutFlow Max=4.14 cfs @ 12.29 hrs HW=259.07' (Free Discharge)
 ↳ **3=Exfiltration** (Exfiltration Controls 4.14 cfs)

Primary OutFlow Max=51.02 cfs @ 12.29 hrs HW=259.07' TW=0.00' (Dynamic Tailwater)
 ↳ **1=Culvert** (Passes 51.02 cfs of 64.35 cfs potential flow)
 ↳ **2=Orifice/Grate** (Weir Controls 51.02 cfs @ 3.39 fps)

Pond 36: SWP-3

Hydrograph



North 60 Post A 3-9-20

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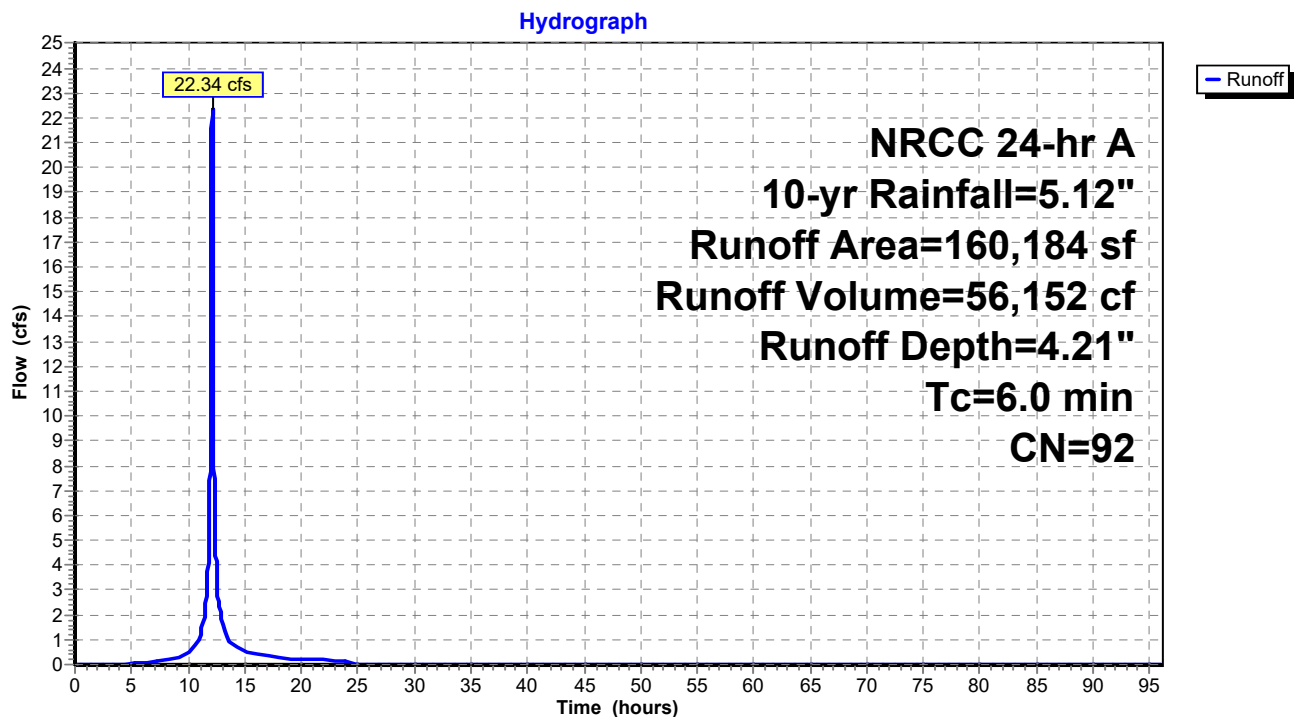
Summary for Subcatchment 37: Post A13

Runoff = 22.34 cfs @ 12.13 hrs, Volume= 56,152 cf, Depth= 4.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
122,493	98	Paved parking, HSG C
37,691	74	>75% Grass cover, Good, HSG C
160,184	92	Weighted Average
37,691		23.53% Pervious Area
122,493		76.47% Impervious Area

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

Subcatchment 37: Post A13

North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 38: DIV-7

Inflow Area = 160,184 sf, 76.47% Impervious, Inflow Depth = 4.21" for 10-yr event
 Inflow = 22.34 cfs @ 12.13 hrs, Volume= 56,152 cf
 Outflow = 22.34 cfs @ 12.13 hrs, Volume= 56,152 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.71 cfs @ 11.74 hrs, Volume= 35,431 cf
 Secondary = 18.97 cfs @ 12.13 hrs, Volume= 20,720 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 316.30' @ 12.13 hrs

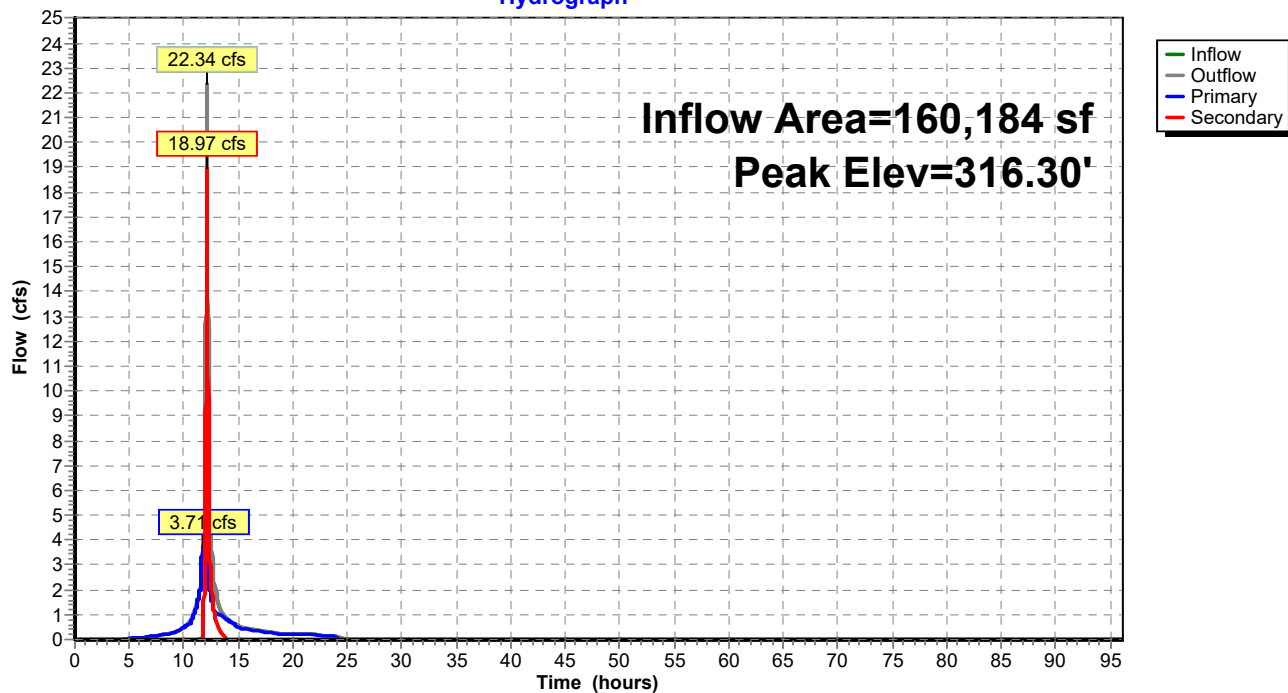
Flood Elev= 319.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	313.00'	10.0" Round Culvert L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 313.00' / 313.00' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	313.00'	30.0" Round Culvert L= 103.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 313.00' / 303.00' S= 0.0971 ' S= 0.0971 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#3	Device 2	315.50'	8.0' 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=3.68 cfs @ 11.74 hrs HW=315.52' TW=313.56' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 3.68 cfs @ 6.75 fps)**Secondary OutFlow** Max=18.96 cfs @ 12.13 hrs HW=316.30' TW=0.00' (Dynamic Tailwater)↑ **2=Culvert** (Passes 18.96 cfs of 33.86 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 18.96 cfs @ 2.96 fps)

Pond 38: DIV-7

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 39: INF-7

Inflow Area = 160,184 sf, 76.47% Impervious, Inflow Depth = 2.65" for 10-yr event
 Inflow = 3.71 cfs @ 11.74 hrs, Volume= 35,431 cf
 Outflow = 1.07 cfs @ 11.13 hrs, Volume= 35,431 cf, Atten= 71%, Lag= 0.0 min
 Discarded = 1.07 cfs @ 11.13 hrs, Volume= 35,431 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 315.45' @ 12.92 hrs Surf.Area= 3,839 sf Storage= 8,022 cf

Plug-Flow detention time= 52.6 min calculated for 35,428 cf (100% of inflow)
 Center-of-Mass det. time= 52.6 min (856.4 - 803.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	312.50'	3,643 cf	41.50'W x 92.50'L x 4.00'H Field A 15,355 cf Overall - 6,247 cf Embedded = 9,108 cf x 40.0% Voids
#2A	313.00'	6,247 cf	Cultec R-360HD x 168 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 168 Chambers in 7 Rows Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf
		9,890 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	312.50'	12.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.07 cfs @ 11.13 hrs HW=312.55' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.07 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Pond 39: INF-7 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

24 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 90.50' Row Length +12.0" End Stone x 2 = 92.50' Base Length

7 Rows x 60.0" Wide + 9.0" Spacing x 6 + 12.0" Side Stone x 2 = 41.50' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

168 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 7 Rows = 6,246.7 cf Chamber Storage

15,355.0 cf Field - 6,246.7 cf Chambers = 9,108.3 cf Stone x 40.0% Voids = 3,643.3 cf Stone Storage

Chamber Storage + Stone Storage = 9,890.0 cf = 0.227 af

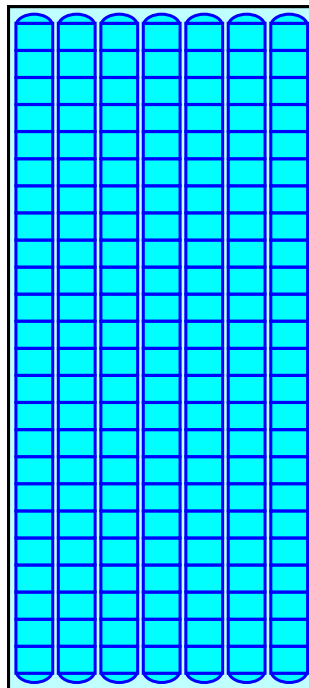
Overall Storage Efficiency = 64.4%

Overall System Size = 92.50' x 41.50' x 4.00'

168 Chambers

568.7 cy Field

337.3 cy Stone



North 60 Post A 3-9-20

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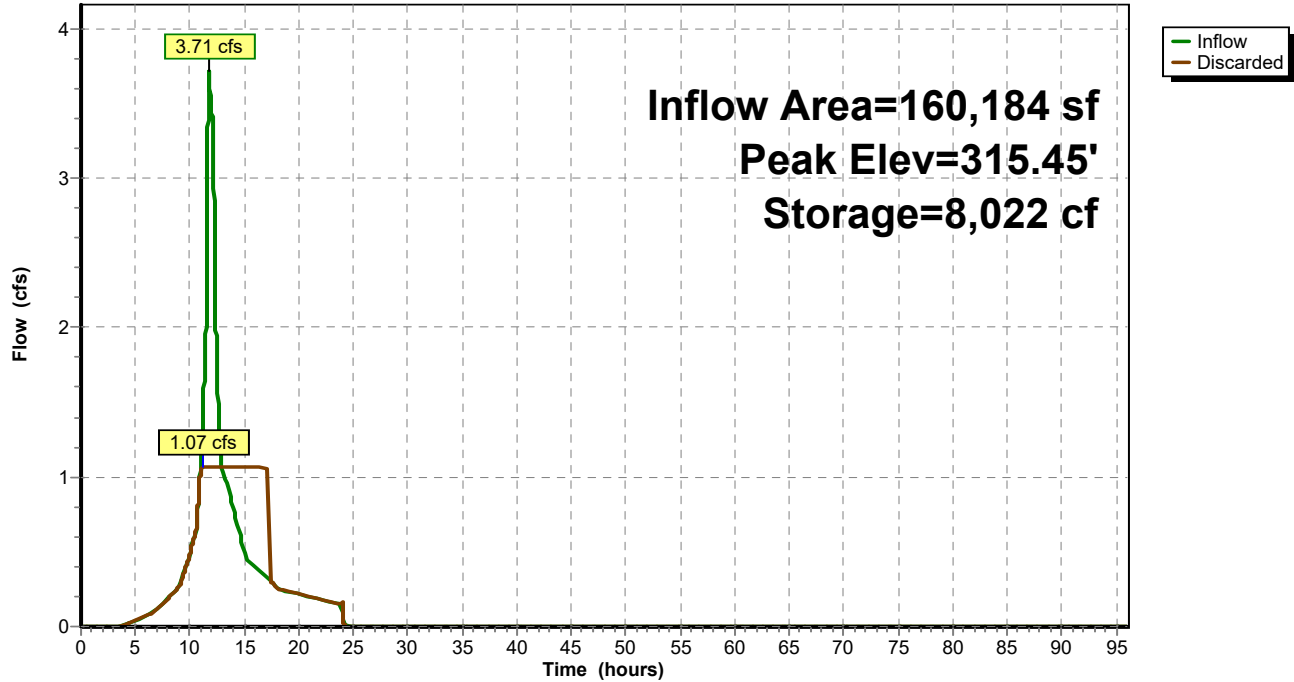
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NRCC 24-hr A 10-yr Rainfall=5.12"

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Pond 39: INF-7

Hydrograph



North 60 Post A 3-9-20

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Summary for Subcatchment 40: Post A2

Runoff = 21.35 cfs @ 12.12 hrs, Volume= 47,871 cf, Depth= 2.91"

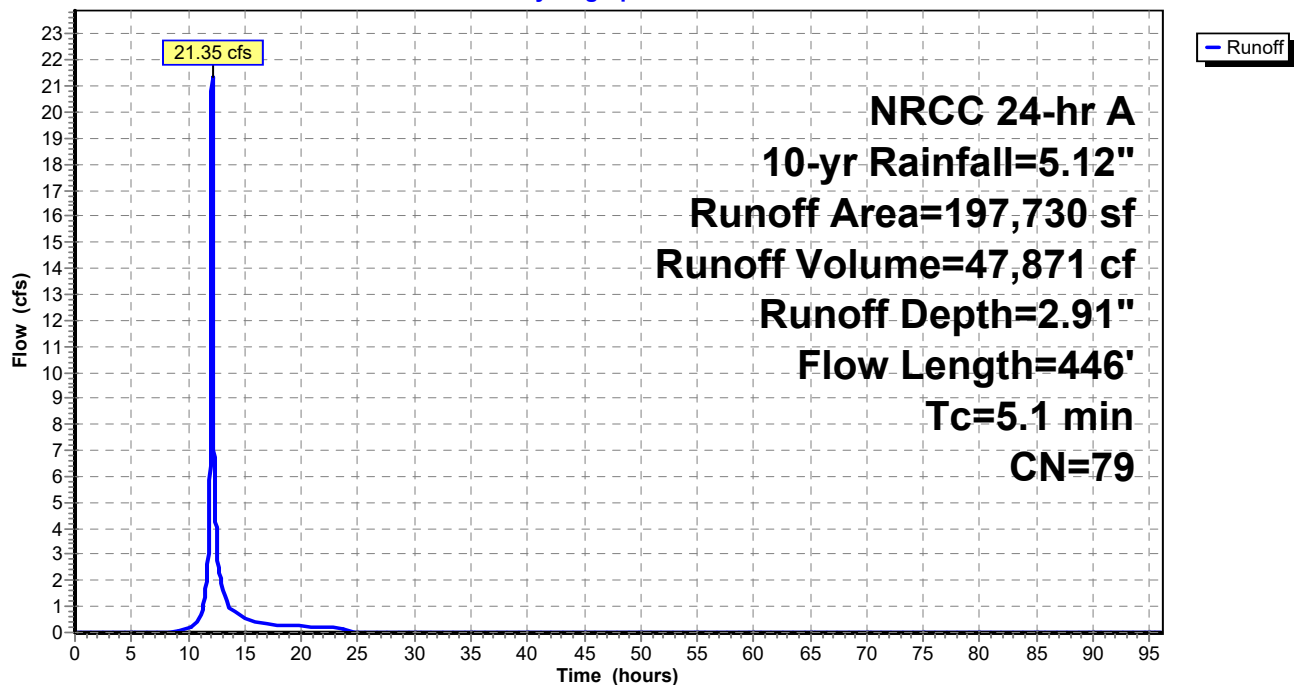
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
43,743	98	Paved parking, HSG C
107,245	74	>75% Grass cover, Good, HSG C
2,876	61	>75% Grass cover, Good, HSG B
39,583	70	Woods, Good, HSG C
4,283	98	Water Surface, HSG C
197,730	79	Weighted Average
149,704		75.71% Pervious Area
48,026		24.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.1500	0.40		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.9	346	0.1734	6.70		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	446	Total			

Subcatchment 40: Post A2

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 41: SWP-1

Inflow Area = 197,730 sf, 24.29% Impervious, Inflow Depth = 2.91" for 10-yr event
 Inflow = 21.35 cfs @ 12.12 hrs, Volume= 47,871 cf
 Outflow = 0.55 cfs @ 14.92 hrs, Volume= 24,146 cf, Atten= 97%, Lag= 167.5 min
 Primary = 0.55 cfs @ 14.92 hrs, Volume= 24,146 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Starting Elev= 234.50' Surf.Area= 12,504 sf Storage= 7,835 cf
 Peak Elev= 237.55' @ 14.92 hrs Surf.Area= 17,861 sf Storage= 45,110 cf (37,275 cf above start)

Plug-Flow detention time= 2,377.3 min calculated for 16,309 cf (34% of inflow)

Center-of-Mass det. time= 1,589.6 min (2,402.0 - 812.4)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	1,811 cf	Forebay (Irregular) Listed below (Recalc)
#2	230.00'	1,976 cf	Micropool (Irregular) Listed below (Recalc)
#3	233.90'	65,123 cf	Marsh & Storage (Irregular) Listed below (Recalc)
		68,911 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,233	129.1	834	1,811	1,357

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,646	155.1	1,000	1,976	1,942

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
233.90	4,232	530.5	0	0	4,232
234.50	9,625	400.9	4,048	4,048	13,842
235.00	10,440	413.5	5,015	9,063	14,683
236.00	12,144	438.8	11,281	20,344	16,451
237.00	13,950	464.0	13,037	33,381	18,317
238.00	15,856	489.2	14,893	48,273	20,287
239.00	17,864	514.5	16,850	65,123	22,369

Device	Routing	Invert	Outlet Devices
#1	Primary	232.00'	21.0" Round Culvert L= 74.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.00' S= 0.0135 ' / ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.41 sf

North 60 Post A 3-9-20

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#2	Device 1	234.50'	1.1" Vert. Orifice/Grate	C= 0.600
#3	Device 1	237.50'	36.0" x 48.0" Horiz. Orifice/Grate	C= 0.600

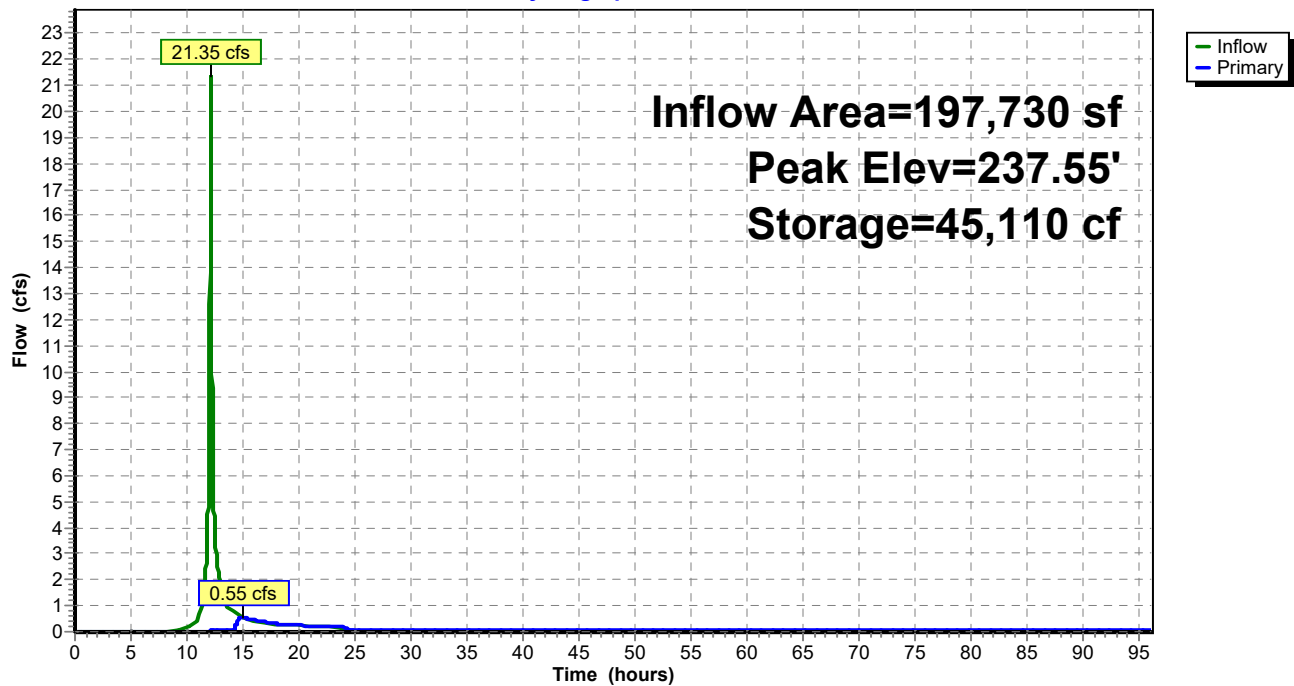
Limited to weir flow at low heads

Primary OutFlow Max=0.55 cfs @ 14.92 hrs HW=237.55' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.55 cfs of 17.91 cfs potential flow)
2=Orifice/Grate (Orifice Controls 0.06 cfs @ 8.34 fps)
3=Orifice/Grate (Weir Controls 0.50 cfs @ 0.72 fps)

Pond 41: SWP-1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 42: Post A1

Runoff = 2.35 cfs @ 12.13 hrs, Volume= 5,508 cf, Depth= 3.19"

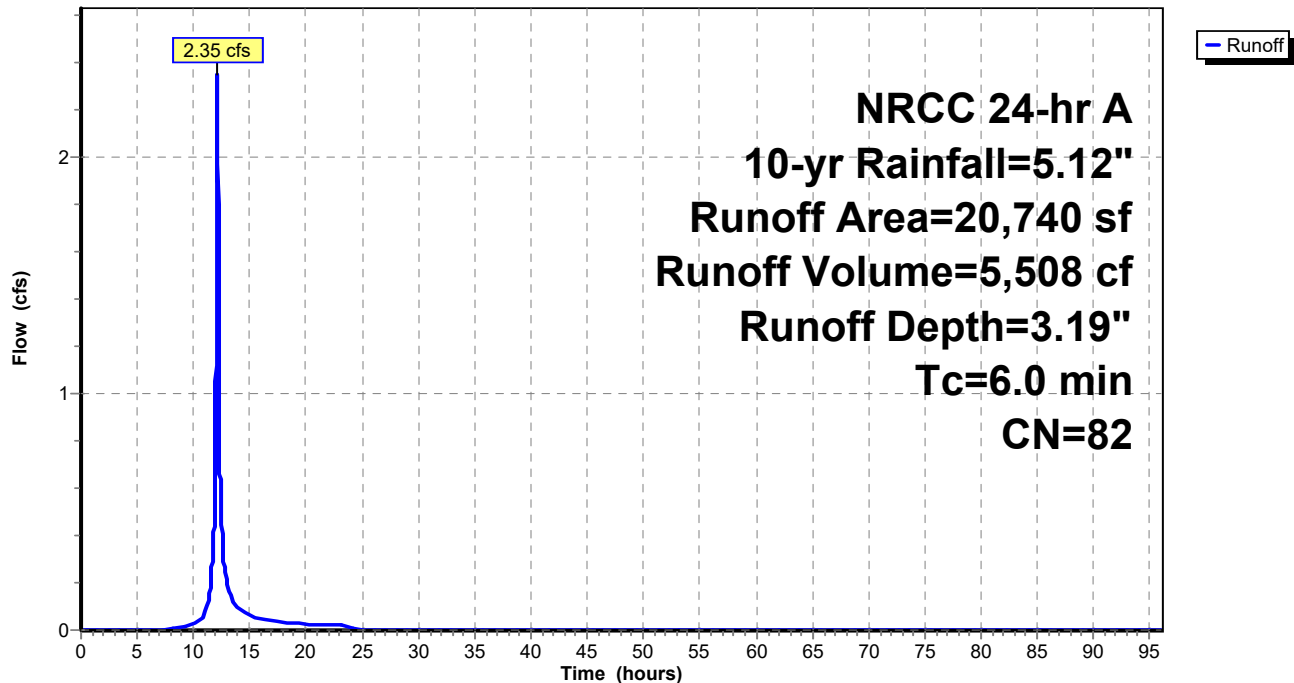
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
7,304	98	Paved parking, HSG C
10,356	74	>75% Grass cover, Good, HSG C
3,080	70	Woods, Good, HSG C
20,740	82	Weighted Average
13,436		64.78% Pervious Area
7,304		35.22% Impervious Area

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

Subcatchment 42: Post A1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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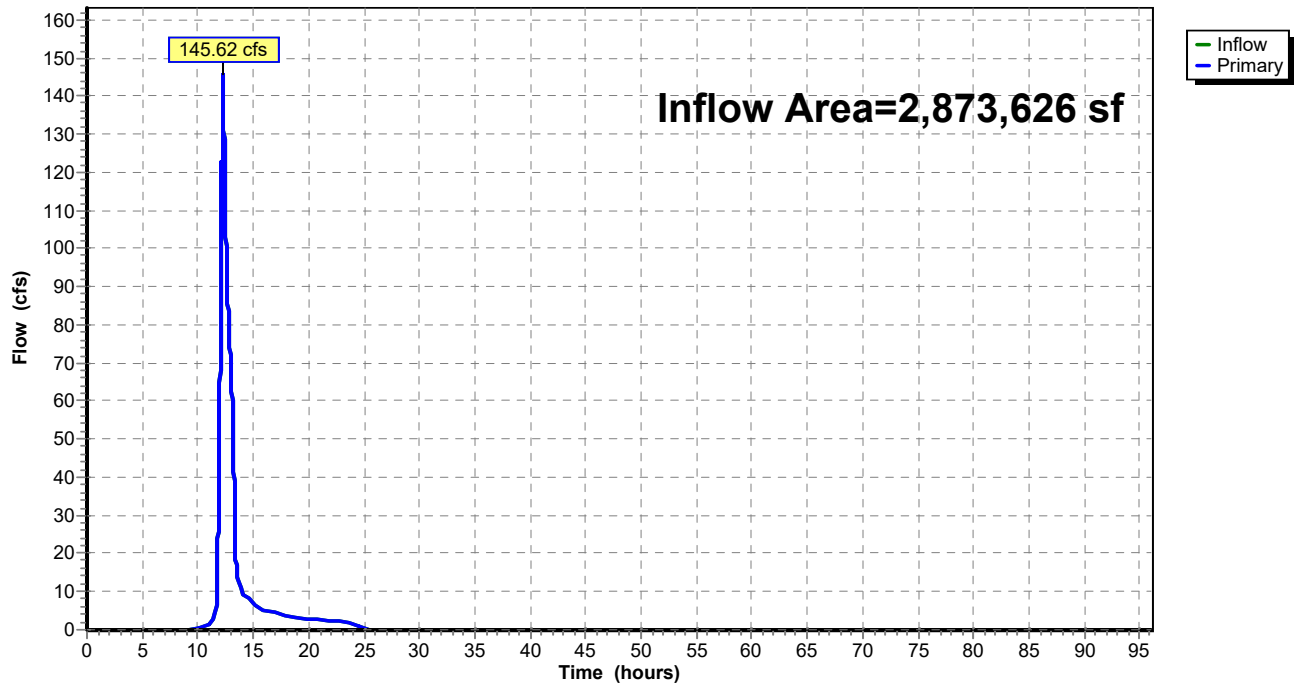
Summary for Link 43: Design Point A

Inflow Area = 2,873,626 sf, 43.08% Impervious, Inflow Depth > 2.75" for 10-yr event
Inflow = 145.62 cfs @ 12.27 hrs, Volume= 658,658 cf
Primary = 145.62 cfs @ 12.27 hrs, Volume= 658,658 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 43: Design Point A

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 8: Post A0 OffsiteRunoff Area=1,115,060 sf 57.87% Impervious Runoff Depth=5.29"
Flow Length=1,018' Tc=12.5 min CN=90 Runoff=154.93 cfs 491,989 cf**Pond 9: Offsite Pond A**Peak Elev=364.35' Storage=158,428 cf Inflow=154.93 cfs 491,989 cf
Outflow=58.35 cfs 440,794 cf**Subcatchment 10: Post A4**Runoff Area=164,583 sf 10.25% Impervious Runoff Depth=3.78"
Flow Length=340' Tc=20.5 min CN=76 Runoff=13.82 cfs 51,847 cf**Reach 11: 24" Culvert Pipe**Avg. Flow Depth=0.85' Max Vel=10.93 fps Inflow=13.82 cfs 51,847 cf
24.0" Round Pipe n=0.013 L=112.0' S=0.0268 '/' Capacity=37.02 cfs Outflow=13.81 cfs 51,847 cf**Subcatchment 12: Post A8**Runoff Area=210,459 sf 0.00% Impervious Runoff Depth=3.68"
Flow Length=503' Tc=17.8 min CN=75 Runoff=18.46 cfs 64,496 cf**Subcatchment 13: Post A11**Runoff Area=72,242 sf 63.67% Impervious Runoff Depth=5.29"
Tc=6.0 min CN=90 Runoff=12.70 cfs 31,875 cf**Subcatchment 14: Post A10**Runoff Area=304,098 sf 77.08% Impervious Runoff Depth=5.64"
Tc=6.0 min CN=93 Runoff=55.26 cfs 142,850 cf**Pond 15: DIV-5**Peak Elev=339.51' Inflow=55.26 cfs 142,850 cf
Primary=5.99 cfs 81,647 cf Secondary=49.28 cfs 61,202 cf Outflow=55.26 cfs 142,850 cf**Pond 16: INF-5**Peak Elev=337.85' Storage=17,493 cf Inflow=5.99 cfs 81,647 cf
Outflow=1.98 cfs 81,647 cf**Pond 17: Existing Wetland A**Peak Elev=328.49' Storage=64,117 cf Inflow=127.36 cfs 650,214 cf
36.0" Round Culvert n=0.013 L=168.0' S=0.0655 '/' Outflow=83.29 cfs 650,214 cf**Subcatchment 18: Post A15**Runoff Area=424,570 sf 0.00% Impervious Runoff Depth=3.37"
Flow Length=270' Tc=5.3 min CN=72 Runoff=53.19 cfs 119,355 cf**Subcatchment 19: Post A3**Runoff Area=93,277 sf 100.00% Impervious Runoff Depth=6.22"
Tc=6.0 min CN=98 Runoff=17.52 cfs 48,359 cf**Pond 20: DIV-1**Peak Elev=327.64' Inflow=17.52 cfs 48,359 cf
Primary=5.21 cfs 36,723 cf Secondary=12.90 cfs 11,637 cf Outflow=17.52 cfs 48,359 cf**Pond 21: INF-1**Peak Elev=327.02' Storage=8,913 cf Inflow=5.21 cfs 36,723 cf
Outflow=1.18 cfs 36,723 cf**Reach 22: Existing Stream A**Avg. Flow Depth=1.69' Max Vel=10.50 fps Inflow=135.96 cfs 781,206 cf
n=0.040 L=1,360.0' S=0.0721 '/' Capacity=291.69 cfs Outflow=131.29 cfs 781,206 cf**Subcatchment 23: Post A5**Runoff Area=92,926 sf 100.00% Impervious Runoff Depth=6.22"
Tc=6.0 min CN=98 Runoff=17.45 cfs 48,177 cf

North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Pond 24: DIV-2 Peak Elev=368.63' Inflow=17.45 cfs 48,177 cf
Primary=5.58 cfs 36,654 cf Secondary=12.50 cfs 11,524 cf Outflow=17.45 cfs 48,177 cf

Pond 25: INF-2 Peak Elev=368.08' Storage=10,364 cf Inflow=5.58 cfs 36,654 cf
Outflow=0.99 cfs 36,654 cf

Subcatchment26: Post A12 Runoff Area=161,485 sf 51.68% Impervious Runoff Depth=4.85"
Flow Length=1,430' Tc=11.7 min CN=86 Runoff=21.61 cfs 65,239 cf

Pond 27: DIV-6 Peak Elev=365.28' Inflow=21.61 cfs 65,239 cf
Primary=4.15 cfs 39,493 cf Secondary=17.96 cfs 25,745 cf Outflow=21.61 cfs 65,239 cf

Pond 28: INF-6 Peak Elev=364.44' Storage=8,384 cf Inflow=4.15 cfs 39,493 cf
Outflow=1.24 cfs 39,493 cf

Subcatchment29: Post A6 Runoff Area=370,437 sf 77.45% Impervious Runoff Depth=5.64"
Tc=6.0 min CN=93 Runoff=67.32 cfs 174,013 cf

Reach 30: 36" HDPE Pipe Avg. Flow Depth=1.76' Max Vel=21.80 fps Inflow=94.56 cfs 211,282 cf
36.0" Round Pipe n=0.013 L=805.0' S=0.0471 ' Capacity=144.80 cfs Outflow=93.98 cfs 211,282 cf

Subcatchment31: Post A14 Runoff Area=207,155 sf 90.56% Impervious Runoff Depth=5.99"
Tc=6.0 min CN=96 Runoff=38.54 cfs 103,328 cf

Pond 32: DMH-3 Peak Elev=323.26' Inflow=132.05 cfs 314,610 cf
36.0" Round Culvert x 2.00 n=0.013 L=190.0' S=0.0895 ' Outflow=132.05 cfs 314,610 cf

Subcatchment33: Post A7 Runoff Area=40,130 sf 0.00% Impervious Runoff Depth=2.88"
Flow Length=150' Tc=10.5 min CN=67 Runoff=3.46 cfs 9,638 cf

Pond 34: SWP-5 Peak Elev=304.40' Storage=70,637 cf Inflow=135.10 cfs 324,248 cf
Discarded=6.95 cfs 179,437 cf Primary=83.18 cfs 144,812 cf Outflow=90.13 cfs 324,248 cf

Subcatchment35: Post A16 Runoff Area=50,520 sf 0.00% Impervious Runoff Depth=2.98"
Flow Length=190' Tc=9.9 min CN=68 Runoff=4.64 cfs 12,541 cf

Pond 36: SWP-3 Peak Elev=259.65' Storage=36,764 cf Inflow=87.57 cfs 157,353 cf
Discarded=4.45 cfs 43,559 cf Primary=69.36 cfs 113,793 cf Outflow=73.82 cfs 157,353 cf

Subcatchment37: Post A13 Runoff Area=160,184 sf 76.47% Impervious Runoff Depth=5.52"
Tc=6.0 min CN=92 Runoff=28.82 cfs 73,714 cf

Pond 38: DIV-7 Peak Elev=316.48' Inflow=28.82 cfs 73,714 cf
Primary=3.67 cfs 41,263 cf Secondary=25.67 cfs 32,451 cf Outflow=28.82 cfs 73,714 cf

Pond 39: INF-7 Peak Elev=315.59' Storage=8,346 cf Inflow=3.67 cfs 41,263 cf
Outflow=1.07 cfs 41,263 cf

Subcatchment40: Post A2 Runoff Area=197,730 sf 24.29% Impervious Runoff Depth=4.09"
Flow Length=446' Tc=5.1 min CN=79 Runoff=29.67 cfs 67,443 cf

Pond 41: SWP-1 Peak Elev=237.70' Storage=47,442 cf Inflow=29.67 cfs 67,443 cf
Outflow=4.25 cfs 43,700 cf

North 60 Post A 3-9-20*NRCC 24-hr A 25-yr Rainfall=6.46"*

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Subcatchment42: Post A1

Runoff Area=20,740 sf 35.22% Impervious Runoff Depth=4.41"

Tc=6.0 min CN=82 Runoff=3.20 cfs 7,626 cf

Link 43: Design Point A

Inflow=204.70 cfs 978,776 cf

Primary=204.70 cfs 978,776 cf

Total Runoff Area = 3,685,596 sf Runoff Volume = 1,512,490 cf Average Runoff Depth = 4.92"
49.41% Pervious = 1,821,010 sf 50.59% Impervious = 1,864,586 sf

North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 8: Post A0 Offsite

Runoff = 154.93 cfs @ 12.20 hrs, Volume= 491,989 cf, Depth= 5.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
645,334	98	Paved parking, HSG C
443,611	80	>75% Grass cover, Good, HSG D
23,572	74	>75% Grass cover, Good, HSG C
2,543	61	>75% Grass cover, Good, HSG B
1,115,060	90	Weighted Average
469,726		42.13% Pervious Area
645,334		57.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.6	148	0.0574	3.86		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	740	0.0270	10.25	32.22	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.015 Concrete sewer w/manholes & inlets
12.5	1,018	Total			

North 60 Post A 3-9-20

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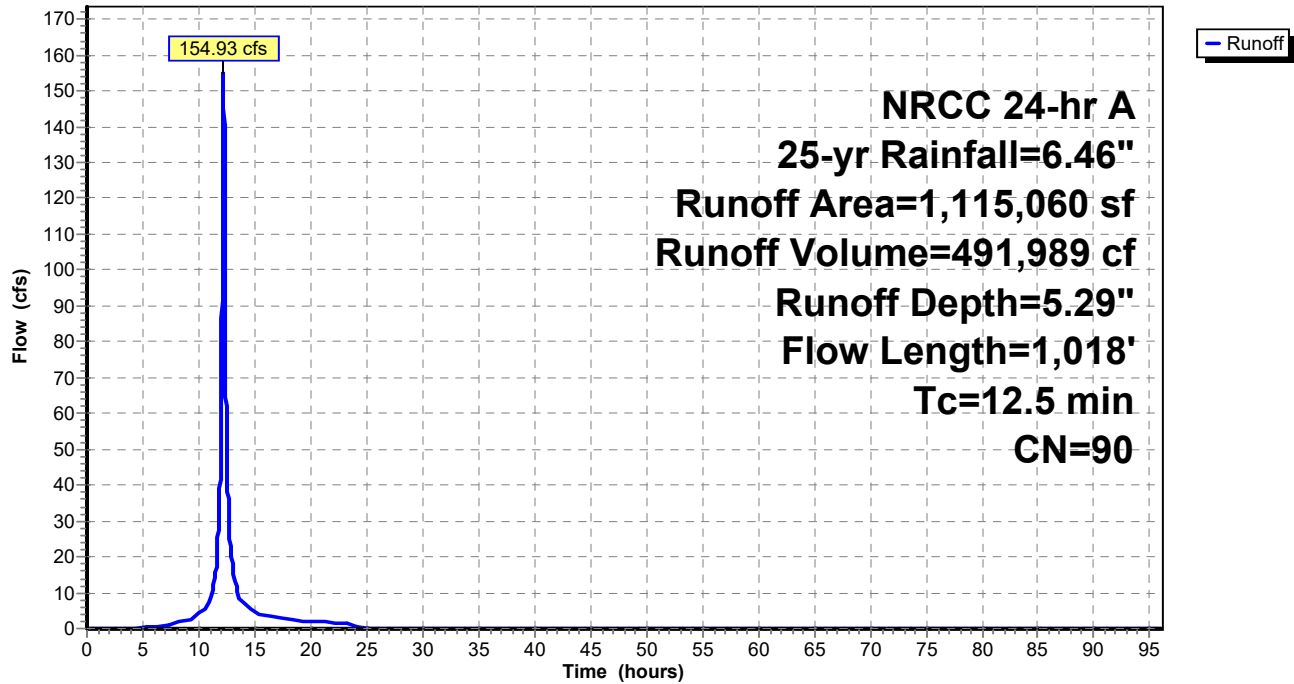
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Subcatchment 8: Post A0 Offsite

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 9: Offsite Pond A

Inflow Area = 1,115,060 sf, 57.87% Impervious, Inflow Depth = 5.29" for 25-yr event
 Inflow = 154.93 cfs @ 12.20 hrs, Volume= 491,989 cf
 Outflow = 58.35 cfs @ 12.45 hrs, Volume= 440,794 cf, Atten= 62%, Lag= 14.8 min
 Primary = 58.35 cfs @ 12.45 hrs, Volume= 440,794 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 364.35' @ 12.45 hrs Surf.Area= 31,319 sf Storage= 158,428 cf

Plug-Flow detention time= 90.4 min calculated for 440,794 cf (90% of inflow)
 Center-of-Mass det. time= 42.1 min (826.5 - 784.4)

Volume	Invert	Avail.Storage	Storage Description		
#1	357.00'	221,816 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)
357.00	14,633	679.0	0	0	14,633
358.00	16,652	698.0	15,632	15,632	16,826
359.00	17,534	715.0	17,091	32,723	18,864
360.00	19,427	745.0	18,472	51,195	22,425
362.00	24,453	804.0	43,784	94,979	29,861
364.00	28,701	854.0	53,097	148,076	36,663
365.00	36,602	901.0	32,572	180,648	43,285
366.00	45,910	1,262.0	41,168	221,816	105,432

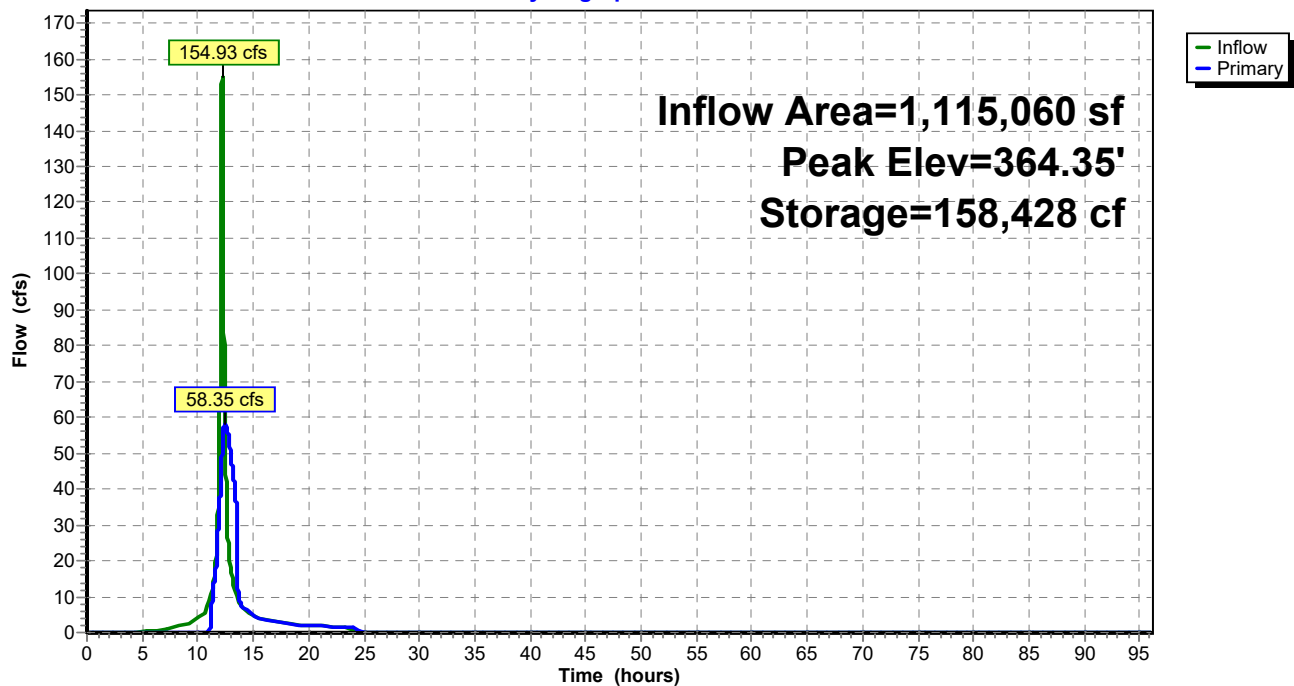
Device	Routing	Invert	Outlet Devices
#1	Primary	357.00'	30.0" Round Culvert L= 125.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 357.00' / 351.00' S= 0.0480 ' S= 0.0480 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	360.00'	36.0" x 48.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	364.75'	150.0' long x 36.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=58.35 cfs @ 12.45 hrs HW=364.34' TW=328.44' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 58.35 cfs @ 11.89 fps)
 2=Orifice/Grate (Passes 58.35 cfs of 240.87 cfs potential flow)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 9: Offsite Pond A

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 10: Post A4

Runoff = 13.82 cfs @ 12.30 hrs, Volume= 51,847 cf, Depth= 3.78"

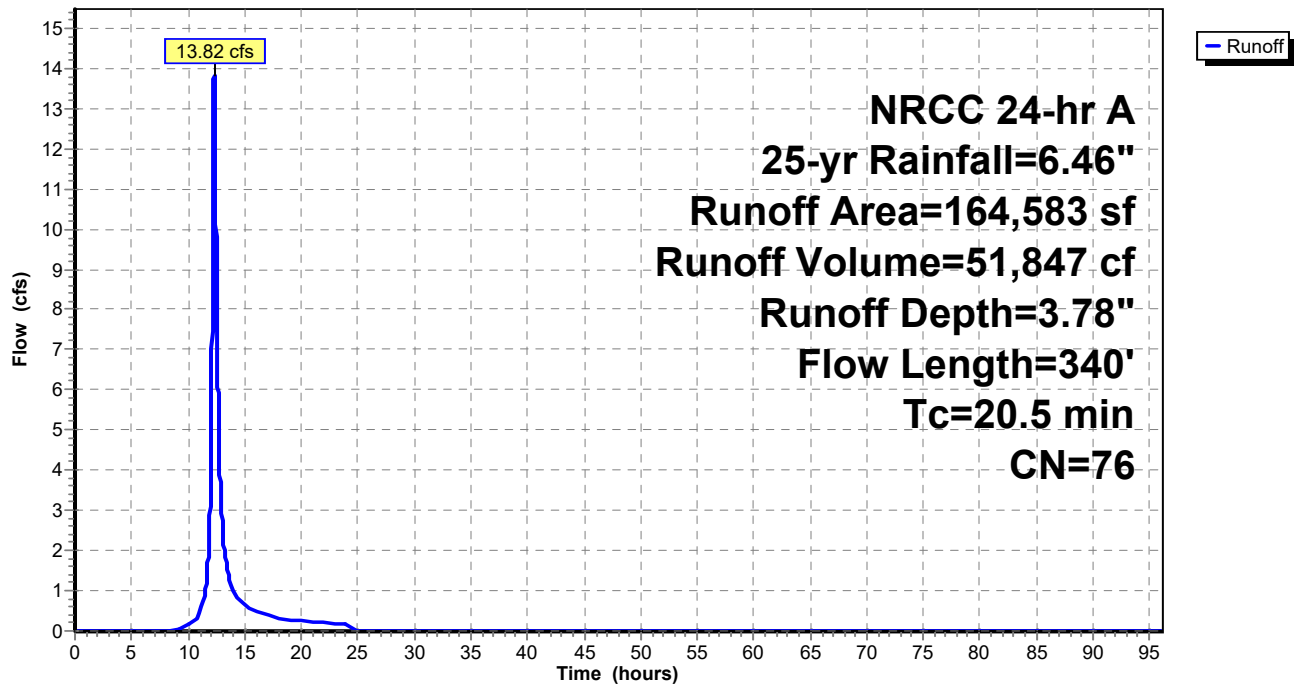
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
15,990	74	>75% Grass cover, Good, HSG C
65,271	70	Woods, Good, HSG C
66,457	77	Woods, Good, HSG D
16,865	98	Water Surface, HSG D
164,583	76	Weighted Average
147,718		89.75% Pervious Area
16,865		10.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0250	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.7	240	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
20.5	340	Total			

Subcatchment 10: Post A4

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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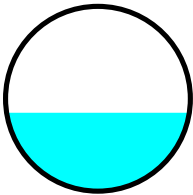
Summary for Reach 11: 24" Culvert Pipe

Inflow Area = 164,583 sf, 10.25% Impervious, Inflow Depth = 3.78" for 25-yr event
Inflow = 13.82 cfs @ 12.30 hrs, Volume= 51,847 cf
Outflow = 13.81 cfs @ 12.30 hrs, Volume= 51,847 cf, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.93 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.86 fps, Avg. Travel Time= 0.5 min

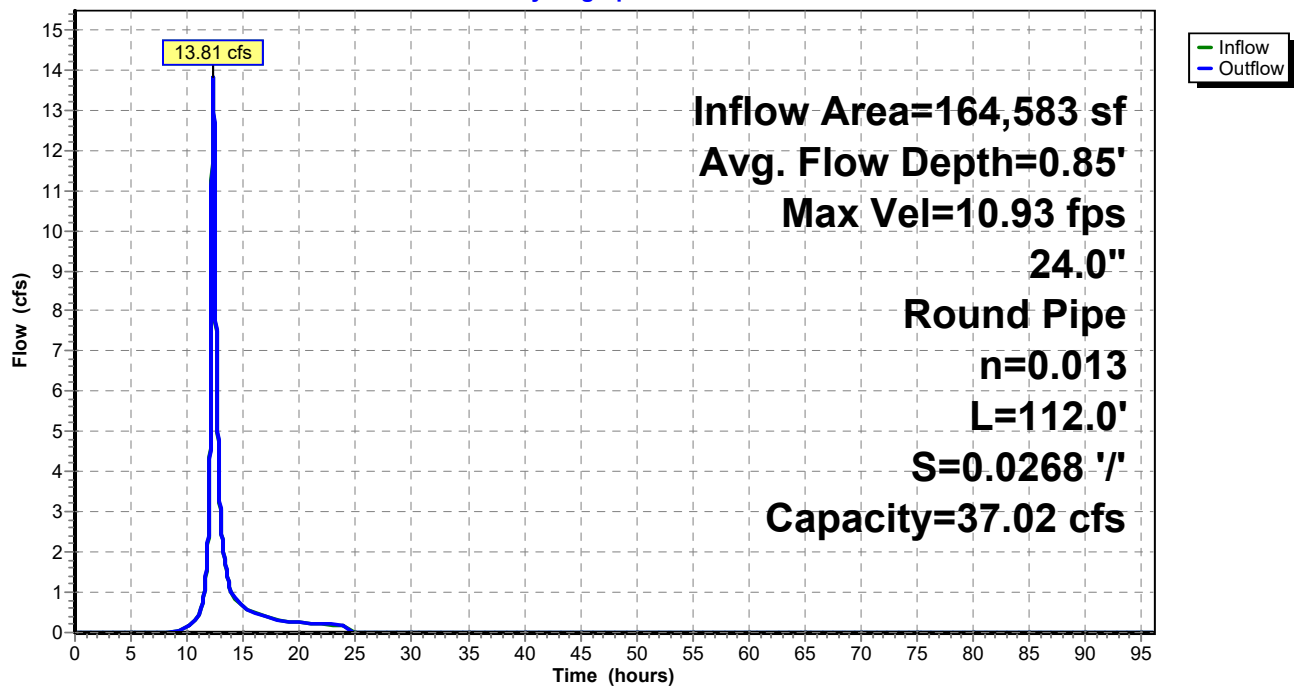
Peak Storage= 142 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.85'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 37.02 cfs

24.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 112.0' Slope= 0.0268 '/
Inlet Invert= 349.00', Outlet Invert= 346.00'



Reach 11: 24" Culvert Pipe

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 12: Post A8

Runoff = 18.46 cfs @ 12.27 hrs, Volume= 64,496 cf, Depth= 3.68"

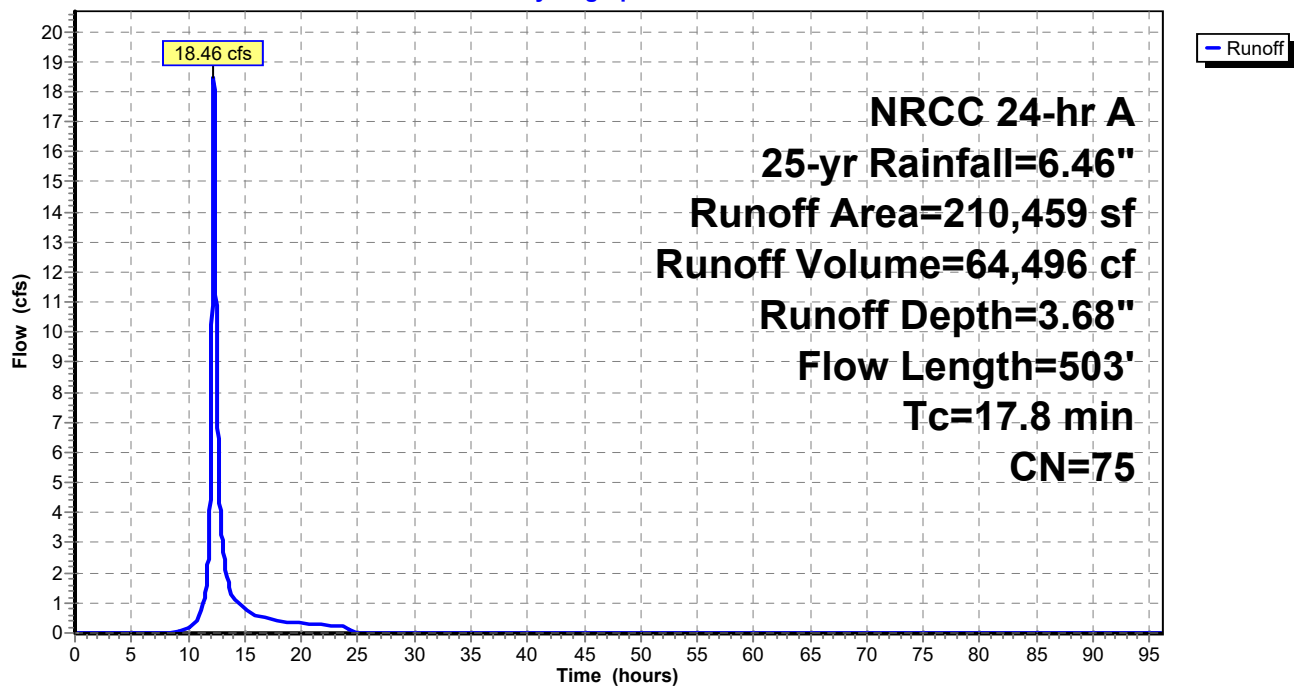
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
31,463	77	Woods, Good, HSG D
57,494	80	>75% Grass cover, Good, HSG D
63,009	70	Woods, Good, HSG C
58,493	74	>75% Grass cover, Good, HSG C
210,459	75	Weighted Average
210,459		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0400	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.4	305	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.8	98	0.0306	1.97	3.94	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
17.8	503	Total			

Subcatchment 12: Post A8

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 13: Post A11

Runoff = 12.70 cfs @ 12.13 hrs, Volume= 31,875 cf, Depth= 5.29"

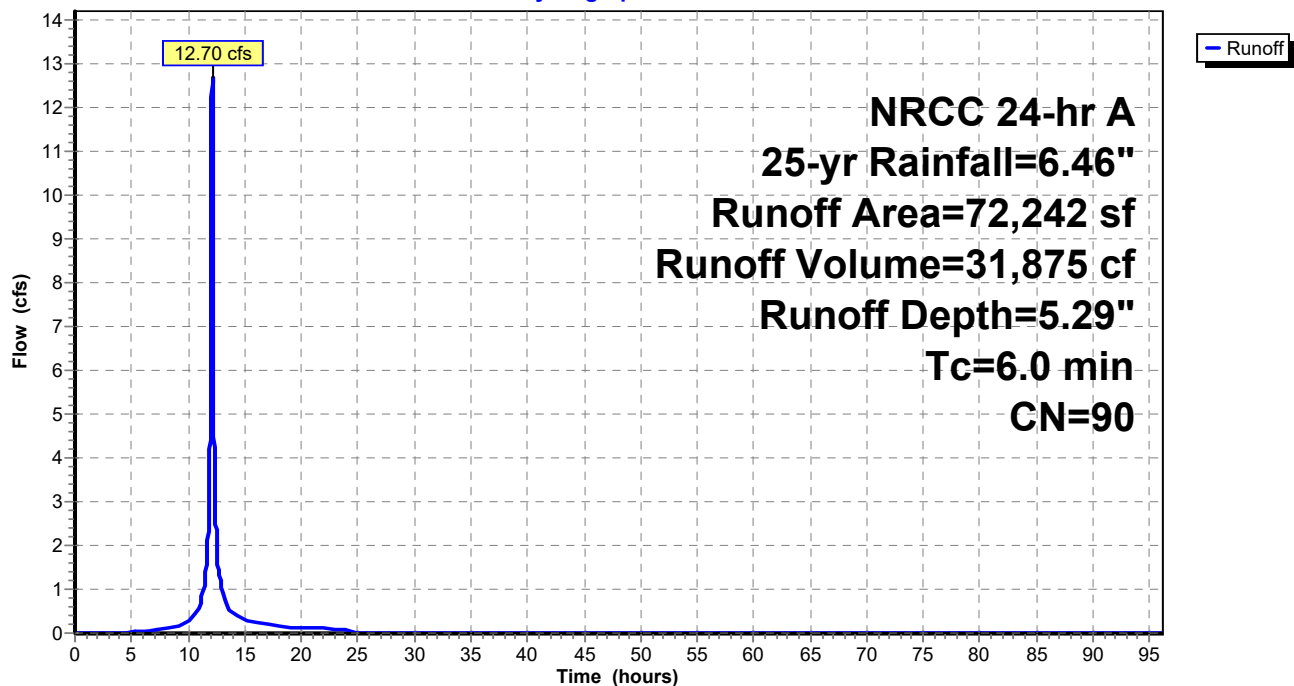
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
46,000	98	Paved parking, HSG C
16,765	74	>75% Grass cover, Good, HSG C
9,477	80	>75% Grass cover, Good, HSG D
72,242	90	Weighted Average
26,242		36.33% Pervious Area
46,000		63.67% Impervious Area

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

Subcatchment 13: Post A11

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 14: Post A10

Runoff = 55.26 cfs @ 12.13 hrs, Volume= 142,850 cf, Depth= 5.64"

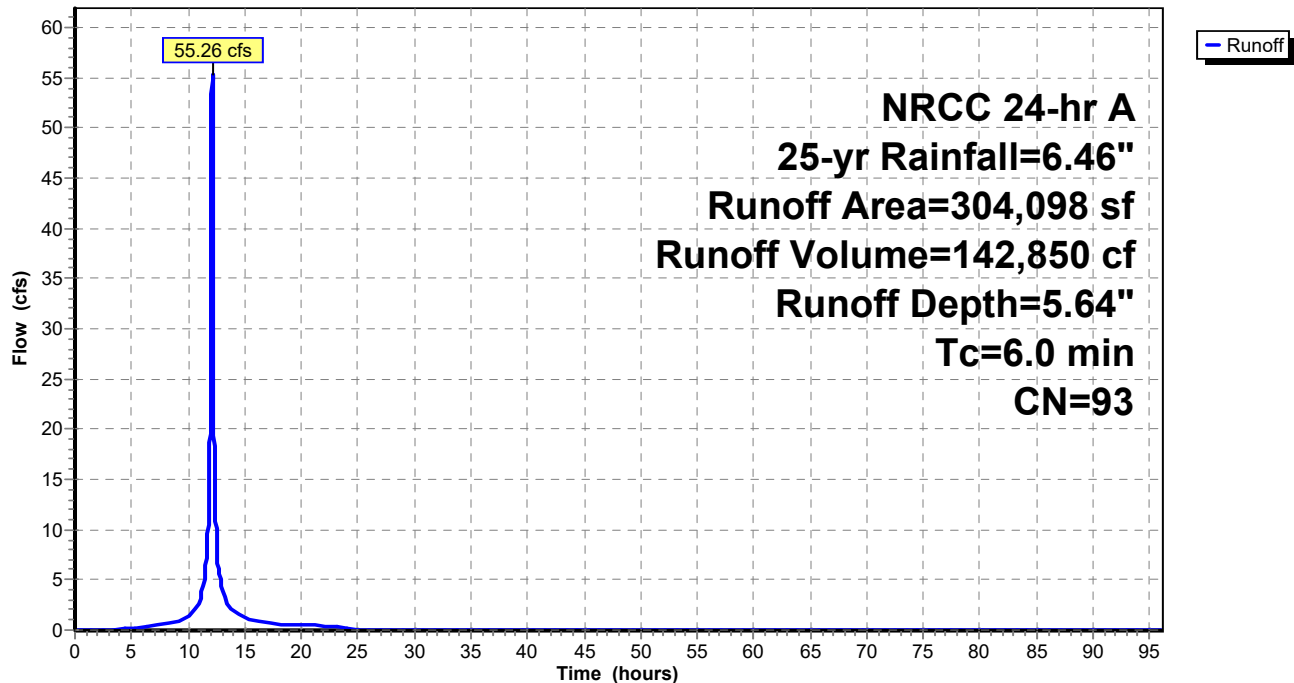
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
234,393	98	Paved parking, HSG C
56,515	74	>75% Grass cover, Good, HSG C
13,190	80	>75% Grass cover, Good, HSG D
304,098	93	Weighted Average
69,705		22.92% Pervious Area
234,393		77.08% Impervious Area

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

Subcatchment 14: Post A10

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 15: DIV-5

Inflow Area = 304,098 sf, 77.08% Impervious, Inflow Depth = 5.64" for 25-yr event
 Inflow = 55.26 cfs @ 12.13 hrs, Volume= 142,850 cf
 Outflow = 55.26 cfs @ 12.13 hrs, Volume= 142,850 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.99 cfs @ 12.12 hrs, Volume= 81,647 cf
 Secondary = 49.28 cfs @ 12.13 hrs, Volume= 61,202 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 339.51' @ 12.13 hrs

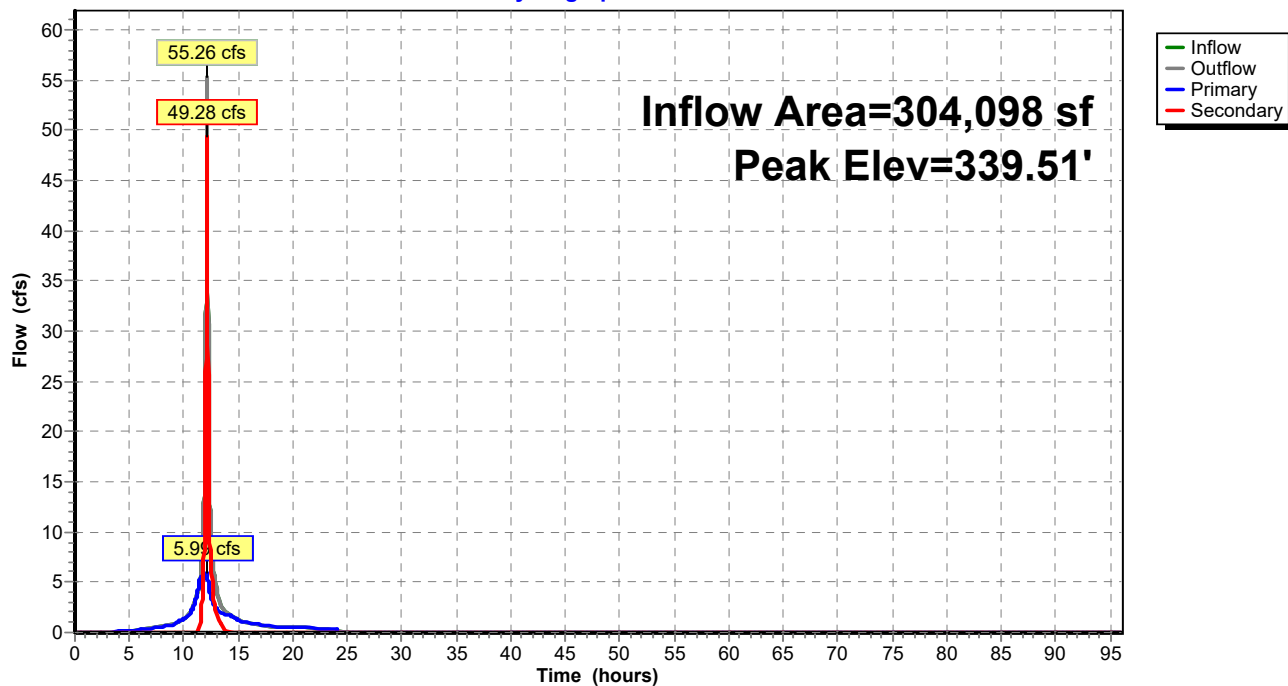
Flood Elev= 342.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	335.50'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 335.50' / 335.50' S= 0.0000 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	335.50'	36.0" Round Culvert L= 72.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 335.50' / 332.00' S= 0.0486 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Device 2	338.00'	8.0' 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=5.96 cfs @ 12.12 hrs HW=339.50' TW=337.01' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.96 cfs @ 7.59 fps)**Secondary OutFlow** Max=49.25 cfs @ 12.13 hrs HW=339.51' TW=326.70' (Dynamic Tailwater)↑ **2=Culvert** (Passes 49.25 cfs of 53.92 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 49.25 cfs @ 4.08 fps)

Pond 15: DIV-5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 16: INF-5

Inflow Area = 304,098 sf, 77.08% Impervious, Inflow Depth = 3.22" for 25-yr event
 Inflow = 5.99 cfs @ 12.12 hrs, Volume= 81,647 cf
 Outflow = 1.98 cfs @ 10.80 hrs, Volume= 81,647 cf, Atten= 67%, Lag= 0.0 min
 Discarded = 1.98 cfs @ 10.80 hrs, Volume= 81,647 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 337.85' @ 13.35 hrs Surf.Area= 8,559 sf Storage= 17,493 cf

Plug-Flow detention time= 63.5 min calculated for 81,639 cf (100% of inflow)
 Center-of-Mass det. time= 63.5 min (858.4 - 794.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	335.00'	9,145 cf	70.25'W x 121.83'L x 4.33'H Field A 37,088 cf Overall - 14,227 cf Embedded = 22,862 cf x 40.0% Voids
#2A	335.50'	14,227 cf	Cultec R-360HD x 384 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 384 Chambers in 12 Rows Cap Storage= +6.5 cf x 2 x 12 rows = 155.0 cf
		23,371 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	335.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.98 cfs @ 10.80 hrs HW=335.05' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.98 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Pond 16: INF-5 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 12 rows = 155.0 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

32 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 119.83' Row Length +12.0" End Stone x 2 = 121.83' Base Length

12 Rows x 60.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 70.25' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

384 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 12 Rows = 14,226.6 cf Chamber Storage

37,088.1 cf Field - 14,226.6 cf Chambers = 22,861.5 cf Stone x 40.0% Voids = 9,144.6 cf Stone Storage

Chamber Storage + Stone Storage = 23,371.2 cf = 0.537 af

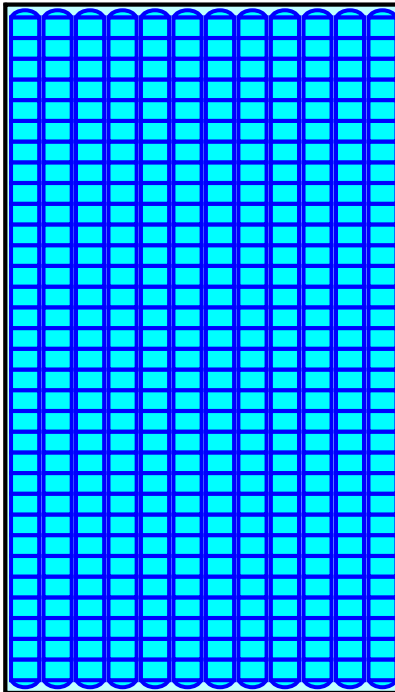
Overall Storage Efficiency = 63.0%

Overall System Size = 121.83' x 70.25' x 4.33'

384 Chambers

1,373.6 cy Field

846.7 cy Stone



North 60 Post A 3-9-20

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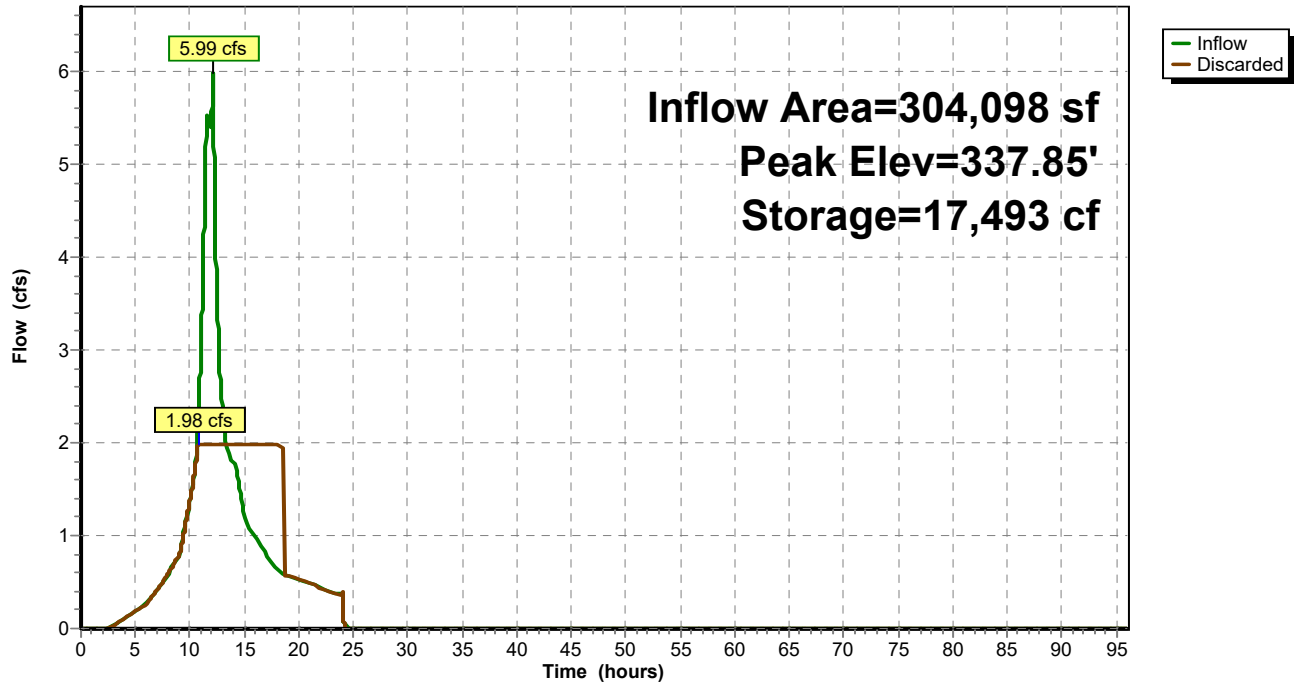
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NRCC 24-hr A 25-yr Rainfall=6.46"

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Pond 16: INF-5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 17: Existing Wetland A

Inflow Area = 1,562,344 sf, 45.33% Impervious, Inflow Depth = 4.99" for 25-yr event
 Inflow = 127.36 cfs @ 12.14 hrs, Volume= 650,214 cf
 Outflow = 83.29 cfs @ 12.54 hrs, Volume= 650,214 cf, Atten= 35%, Lag= 23.6 min
 Primary = 83.29 cfs @ 12.54 hrs, Volume= 650,214 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 328.49' @ 12.54 hrs Surf.Area= 23,573 sf Storage= 64,117 cf

Plug-Flow detention time= 6.6 min calculated for 650,146 cf (100% of inflow)
 Center-of-Mass det. time= 6.6 min (821.5 - 814.9)

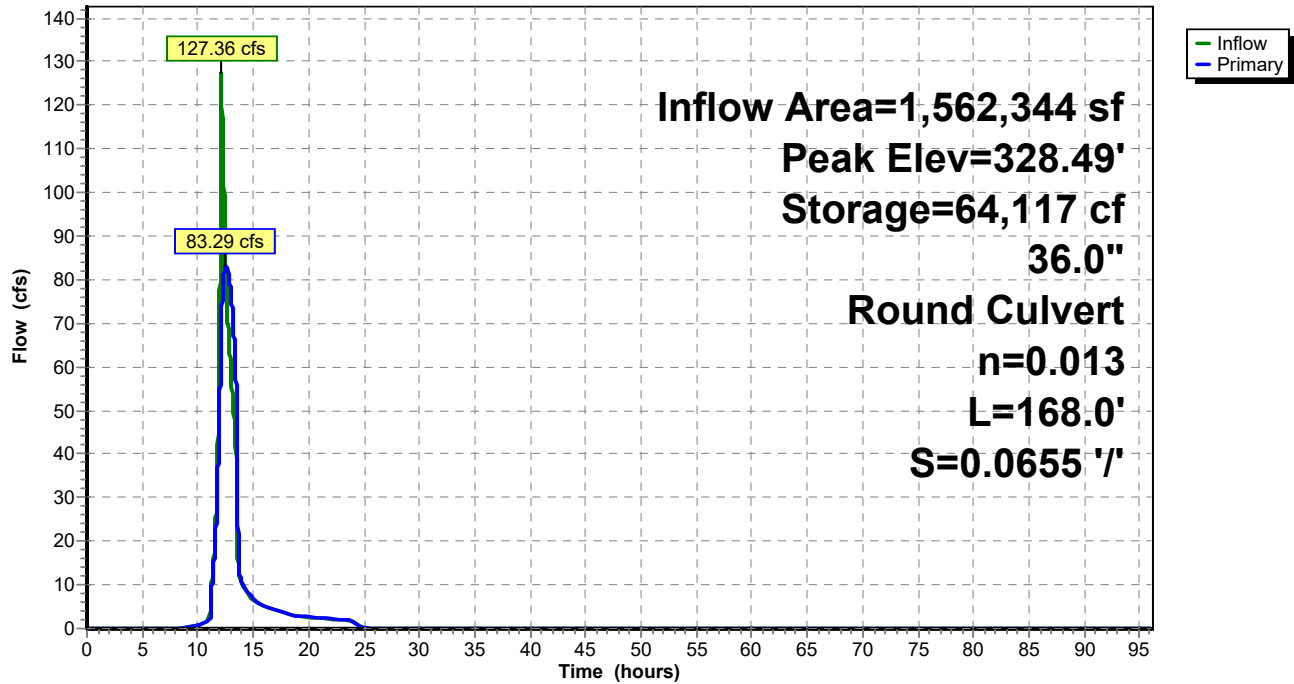
Volume	Invert	Avail.Storage	Storage Description		
#1	321.00'	190,307 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
321.00	124	53.2	0	0	124
322.00	1,084	175.8	525	525	2,361
324.00	4,913	341.5	5,536	6,061	9,202
326.00	11,332	638.2	15,804	21,866	32,354
328.00	20,583	804.3	31,458	53,324	51,475
330.00	34,086	1,075.5	54,104	107,428	92,087
332.00	49,257	1,268.5	82,879	190,307	128,164

Device	Routing	Invert	Outlet Devices
#1	Primary	321.00'	36.0" Round Culvert L= 168.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 321.00' / 310.00' S= 0.0655 ' S= 0.0655 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=83.29 cfs @ 12.54 hrs HW=328.49' TW=313.44' (Dynamic Tailwater)
 1=Culvert (Inlet Controls 83.29 cfs @ 11.78 fps)

Pond 17: Existing Wetland A

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 18: Post A15

Runoff = 53.19 cfs @ 12.13 hrs, Volume= 119,355 cf, Depth= 3.37"

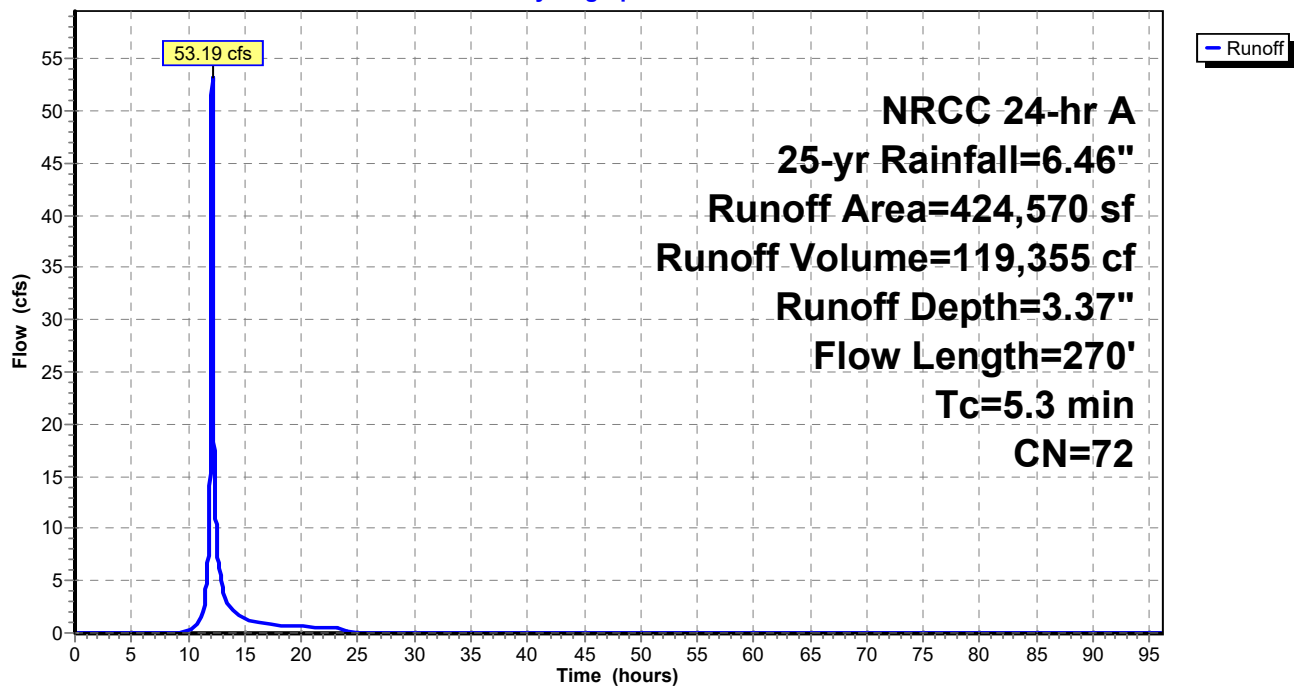
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
21,520	77	Woods, Good, HSG D
33,300	80	>75% Grass cover, Good, HSG D
213,730	70	Woods, Good, HSG C
140,572	74	>75% Grass cover, Good, HSG C
15,448	60	Woods, Fair, HSG B
424,570	72	Weighted Average
424,570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	100	0.1000	0.34		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.4	170	0.2353	7.81		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.3	270	Total			

Subcatchment 18: Post A15

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 19: Post A3

Runoff = 17.52 cfs @ 12.13 hrs, Volume= 48,359 cf, Depth= 6.22"

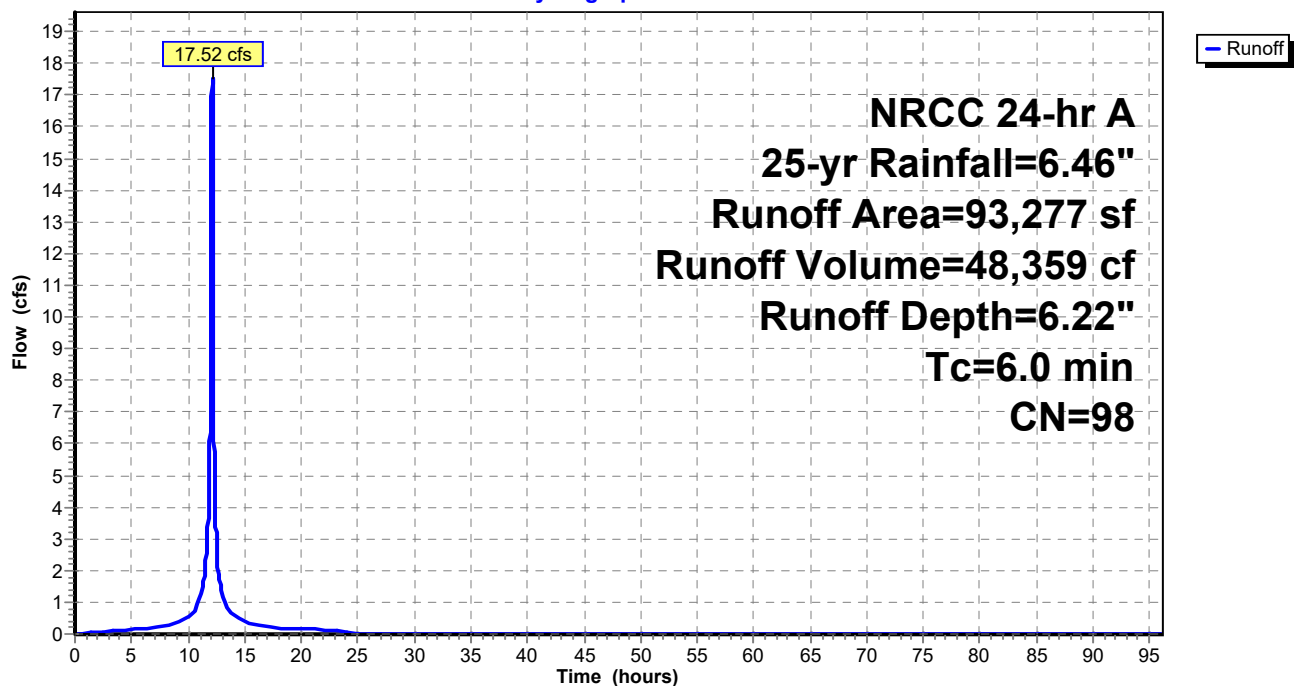
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
93,277	98	Paved parking, HSG C
93,277		100.00% Impervious Area

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

Subcatchment 19: Post A3

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 20: DIV-1

Inflow Area = 93,277 sf, 100.00% Impervious, Inflow Depth = 6.22" for 25-yr event
 Inflow = 17.52 cfs @ 12.13 hrs, Volume= 48,359 cf
 Outflow = 17.52 cfs @ 12.13 hrs, Volume= 48,359 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.21 cfs @ 11.88 hrs, Volume= 36,723 cf
 Secondary = 12.90 cfs @ 12.13 hrs, Volume= 11,637 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 327.64' @ 12.13 hrs

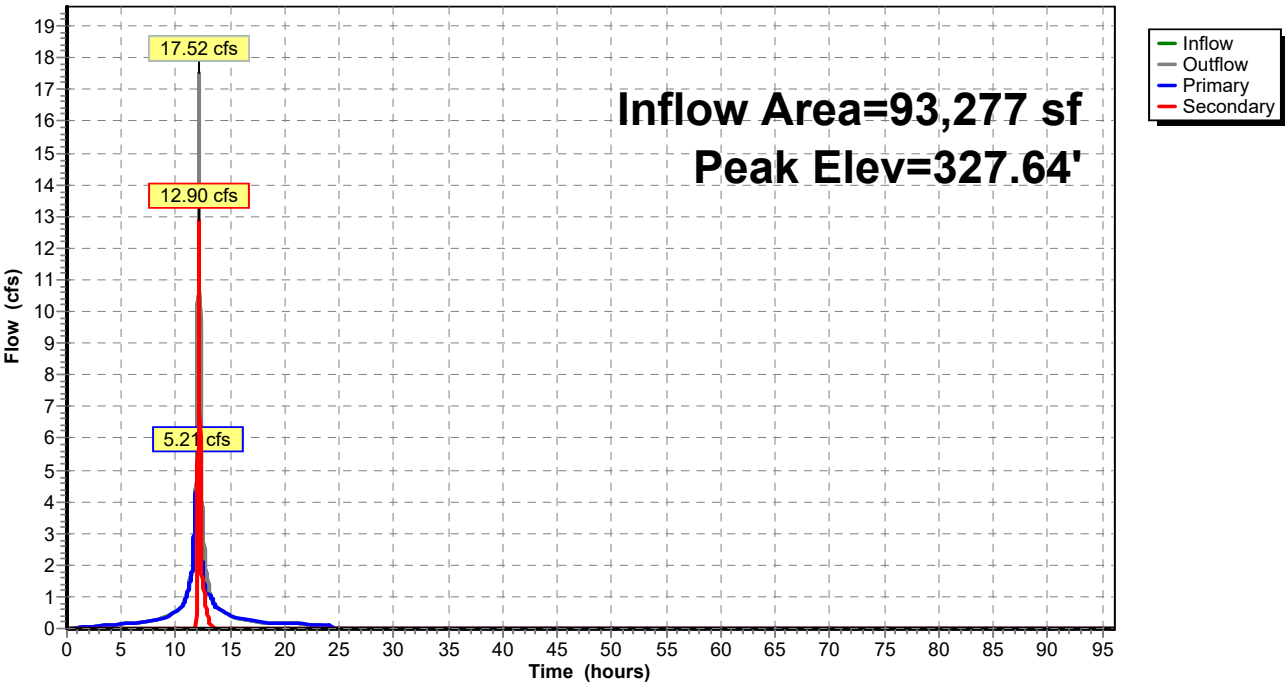
Flood Elev= 330.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	324.50'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.50' / 324.50' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	324.50'	18.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.50' / 320.00' S= 0.0900 ' S= 0.0900 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	327.00'	8.0' 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=5.12 cfs @ 11.88 hrs HW=327.03' TW=325.19' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.12 cfs @ 6.52 fps)**Secondary OutFlow** Max=12.89 cfs @ 12.13 hrs HW=327.64' TW=313.66' (Dynamic Tailwater)↑ **2=Culvert** (Passes 12.89 cfs of 13.16 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 12.89 cfs @ 2.51 fps)

Pond 20: DIV-1

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 21: INF-1

Inflow Area = 93,277 sf, 100.00% Impervious, Inflow Depth = 4.72" for 25-yr event
 Inflow = 5.21 cfs @ 11.88 hrs, Volume= 36,723 cf
 Outflow = 1.18 cfs @ 11.25 hrs, Volume= 36,723 cf, Atten= 77%, Lag= 0.0 min
 Discarded = 1.18 cfs @ 11.25 hrs, Volume= 36,723 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 327.02' @ 12.64 hrs Surf.Area= 4,245 sf Storage= 8,913 cf

Plug-Flow detention time= 45.7 min calculated for 36,719 cf (100% of inflow)
 Center-of-Mass det. time= 45.7 min (792.7 - 747.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	324.00'	4,688 cf	36.75'W x 115.50'L x 4.33'H Field A 18,393 cf Overall - 6,674 cf Embedded = 11,720 cf x 40.0% Voids
#2A	324.50'	6,674 cf	Cultec R-360HD x 180 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 180 Chambers in 6 Rows Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf
		11,361 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	324.00'	12.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.18 cfs @ 11.25 hrs HW=324.05' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.18 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Pond 21: INF-1 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

30 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 112.50' Row Length +18.0" End Stone x 2 = 115.50' Base Length

6 Rows x 60.0" Wide + 9.0" Spacing x 5 + 18.0" Side Stone x 2 = 36.75' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

180 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 6 Rows = 6,673.6 cf Chamber Storage

18,393.4 cf Field - 6,673.6 cf Chambers = 11,719.8 cf Stone x 40.0% Voids = 4,687.9 cf Stone Storage

Chamber Storage + Stone Storage = 11,361.5 cf = 0.261 af

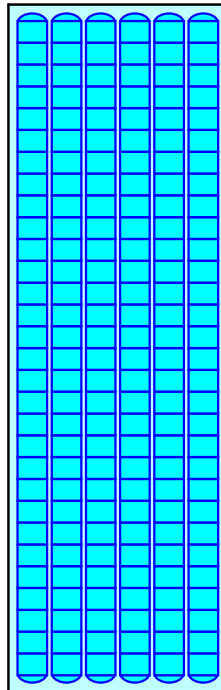
Overall Storage Efficiency = 61.8%

Overall System Size = 115.50' x 36.75' x 4.33'

180 Chambers

681.2 cy Field

434.1 cy Stone



North 60 Post A 3-9-20

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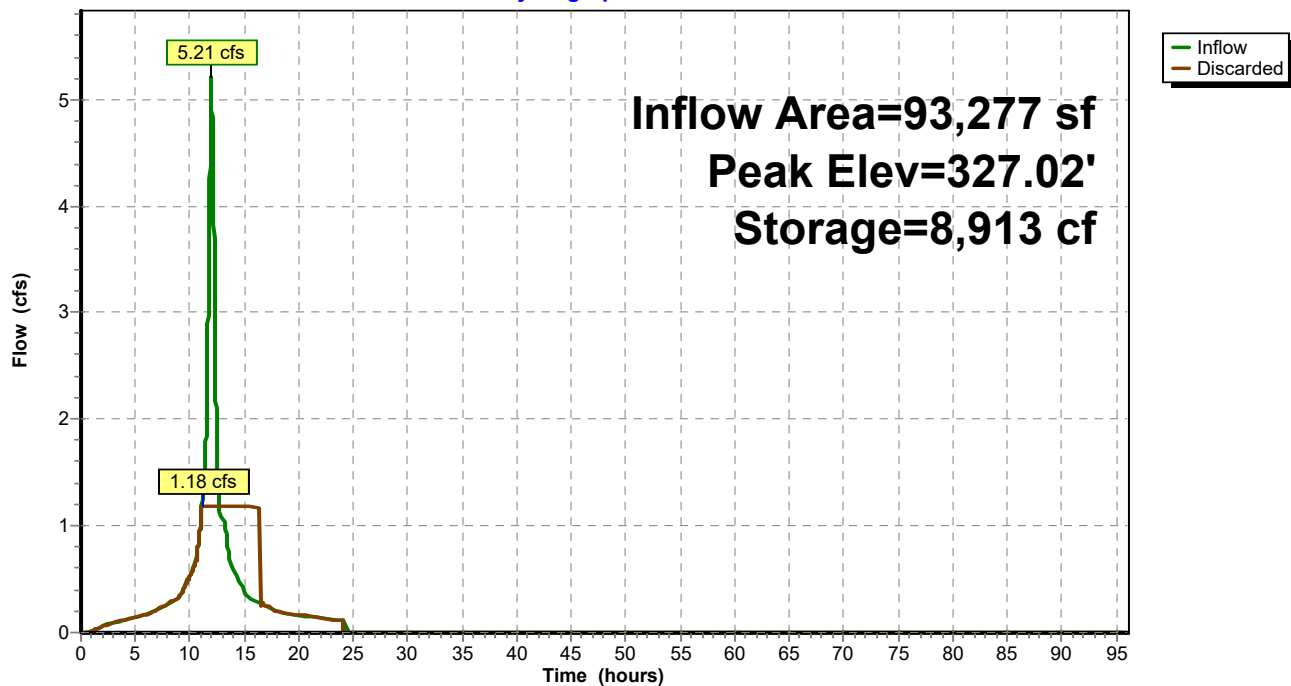
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NRCC 24-hr A 25-yr Rainfall=6.46"

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Pond 21: INF-1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Reach 22: Existing Stream A

Inflow Area = 1,986,914 sf, 35.64% Impervious, Inflow Depth = 4.72" for 25-yr event
Inflow = 135.96 cfs @ 12.13 hrs, Volume= 781,206 cf
Outflow = 131.29 cfs @ 12.16 hrs, Volume= 781,206 cf, Atten= 3%, Lag= 1.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.50 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 2.46 fps, Avg. Travel Time= 9.2 min

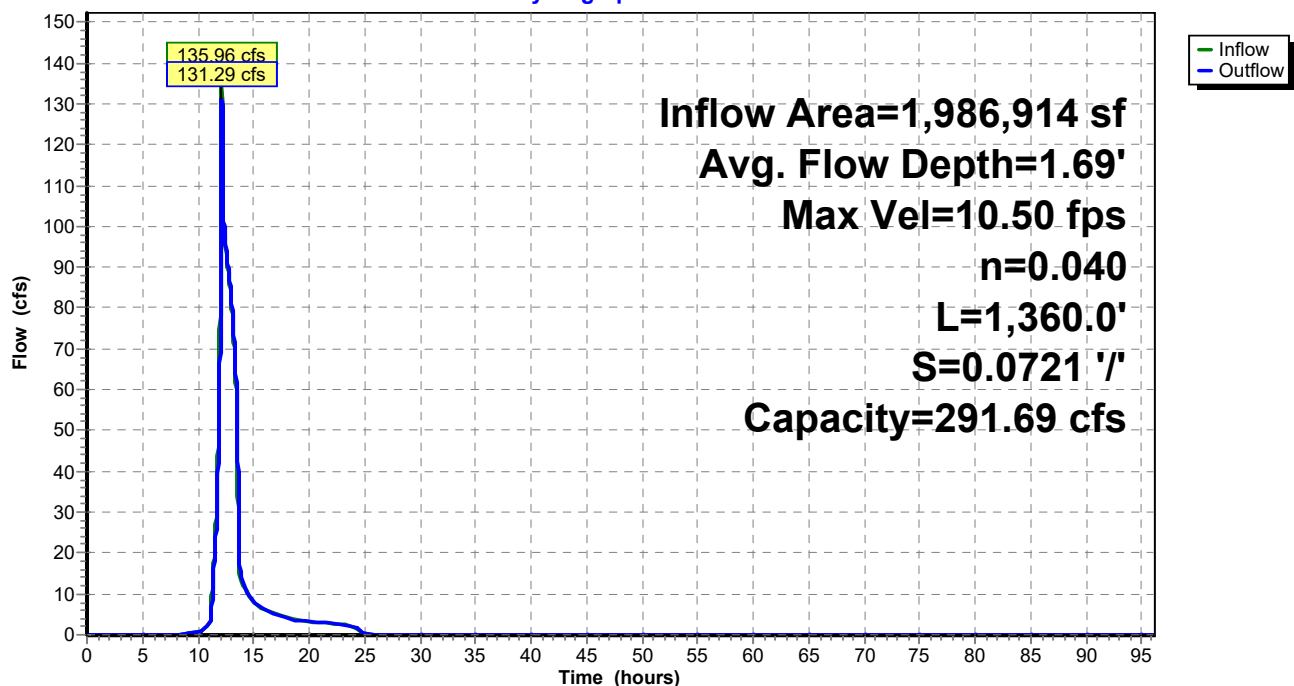
Peak Storage= 17,004 cf @ 12.16 hrs
Average Depth at Peak Storage= 1.69'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 291.69 cfs

4.00' x 2.50' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 1,360.0' Slope= 0.0721 '/'
Inlet Invert= 312.00', Outlet Invert= 214.00'



Reach 22: Existing Stream A

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 23: Post A5

Runoff = 17.45 cfs @ 12.13 hrs, Volume= 48,177 cf, Depth= 6.22"

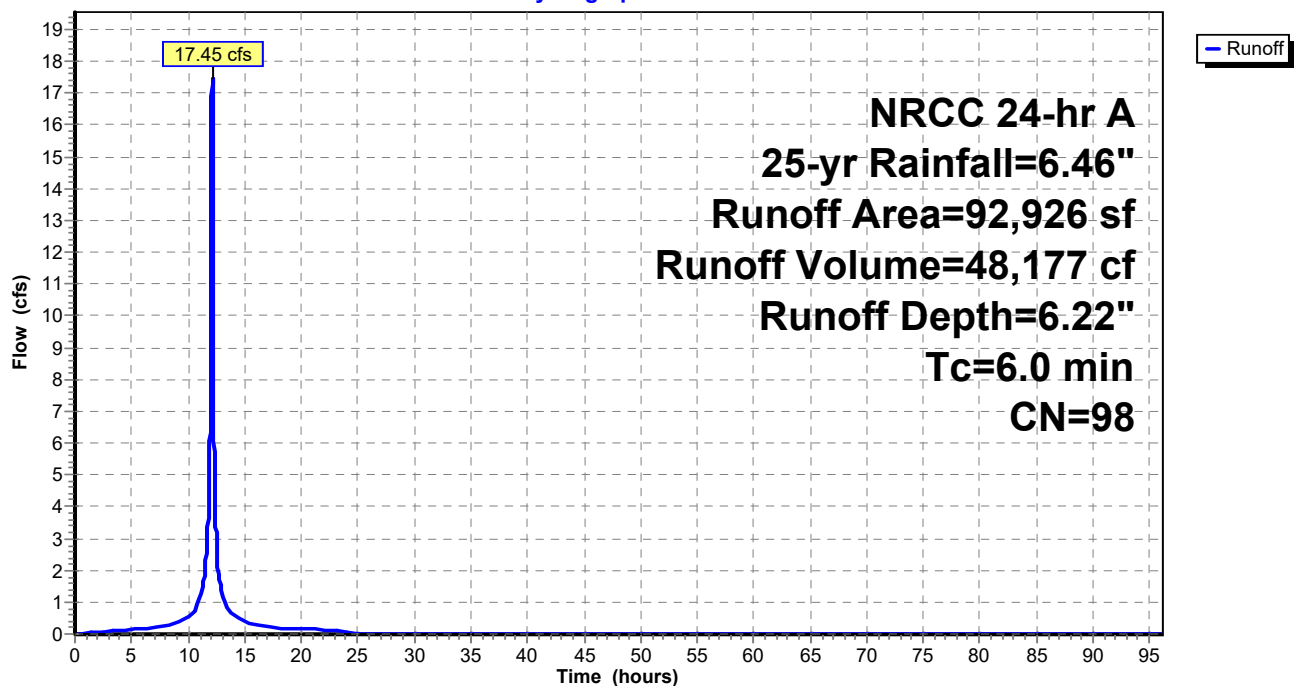
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
92,926	98	Paved parking, HSG C
92,926		100.00% Impervious Area

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

Subcatchment 23: Post A5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 24: DIV-2

Inflow Area = 92,926 sf, 100.00% Impervious, Inflow Depth = 6.22" for 25-yr event
 Inflow = 17.45 cfs @ 12.13 hrs, Volume= 48,177 cf
 Outflow = 17.45 cfs @ 12.13 hrs, Volume= 48,177 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.58 cfs @ 11.90 hrs, Volume= 36,654 cf
 Secondary = 12.50 cfs @ 12.13 hrs, Volume= 11,524 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 368.63' @ 12.13 hrs

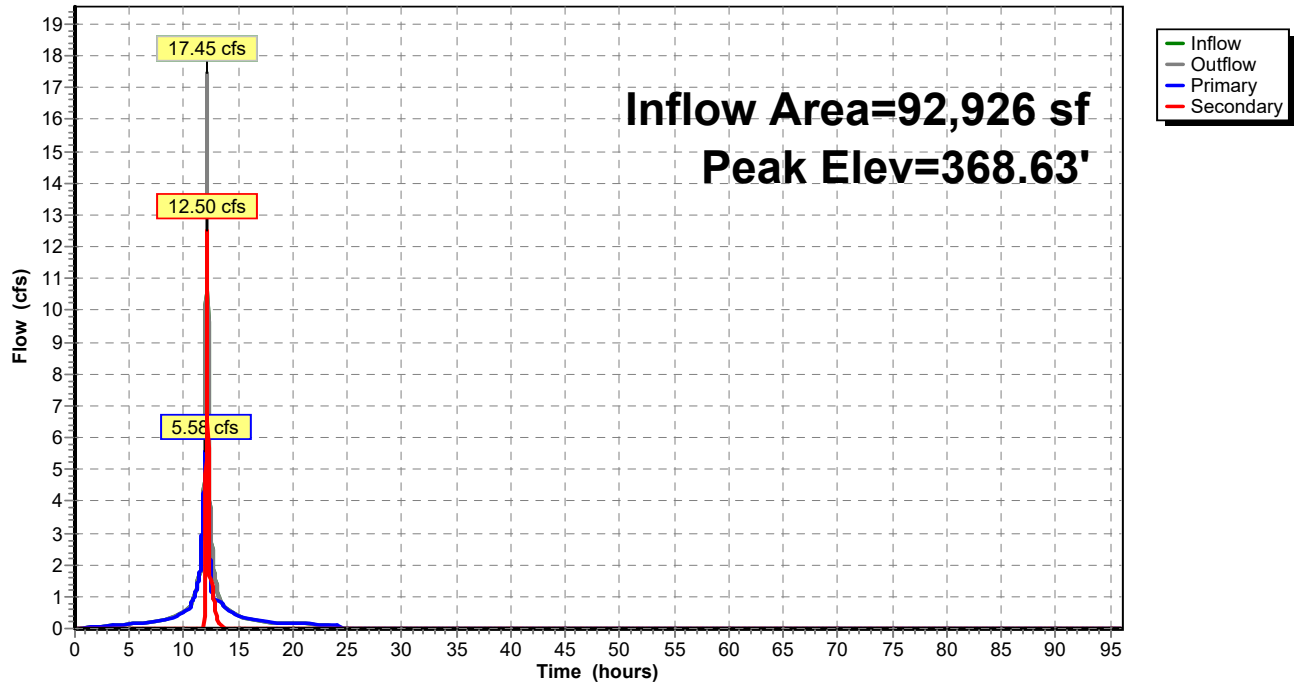
Flood Elev= 371.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	365.00'	12.0" Round Culvert L= 9.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 365.00' / 365.00' S= 0.0000 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	366.50'	24.0" Round Culvert L= 550.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 366.50' / 355.00' S= 0.0209 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	368.00'	8.0' 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=5.50 cfs @ 11.90 hrs HW=368.02' TW=365.91' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.50 cfs @ 7.00 fps)**Secondary OutFlow** Max=12.49 cfs @ 12.13 hrs HW=368.63' TW=357.69' (Dynamic Tailwater)↑ **2=Culvert** (Passes 12.49 cfs of 16.09 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 12.49 cfs @ 2.47 fps)

Pond 24: DIV-2

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 25: INF-2

Inflow Area = 92,926 sf, 100.00% Impervious, Inflow Depth = 4.73" for 25-yr event
 Inflow = 5.58 cfs @ 11.90 hrs, Volume= 36,654 cf
 Outflow = 0.99 cfs @ 11.13 hrs, Volume= 36,654 cf, Atten= 82%, Lag= 0.0 min
 Discarded = 0.99 cfs @ 11.13 hrs, Volume= 36,654 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 368.08' @ 12.60 hrs Surf.Area= 4,295 sf Storage= 10,364 cf

Plug-Flow detention time= 67.3 min calculated for 36,650 cf (100% of inflow)
 Center-of-Mass det. time= 67.3 min (813.6 - 746.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	364.50'	4,639 cf	41.50'W x 103.50'L x 4.33'H Field A 18,613 cf Overall - 7,016 cf Embedded = 11,596 cf x 40.0% Voids
#2A	365.00'	7,016 cf	Cultec R-360HD x 189 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 189 Chambers in 7 Rows Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf
		11,655 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	364.50'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=0.99 cfs @ 11.13 hrs HW=364.55' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.99 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Pond 25: INF-2 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

27 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 101.50' Row Length +12.0" End Stone x 2 = 103.50' Base Length

7 Rows x 60.0" Wide + 9.0" Spacing x 6 + 12.0" Side Stone x 2 = 41.50' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

189 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 7 Rows = 7,016.3 cf Chamber Storage

18,612.7 cf Field - 7,016.3 cf Chambers = 11,596.5 cf Stone x 40.0% Voids = 4,638.6 cf Stone Storage

Chamber Storage + Stone Storage = 11,654.9 cf = 0.268 af

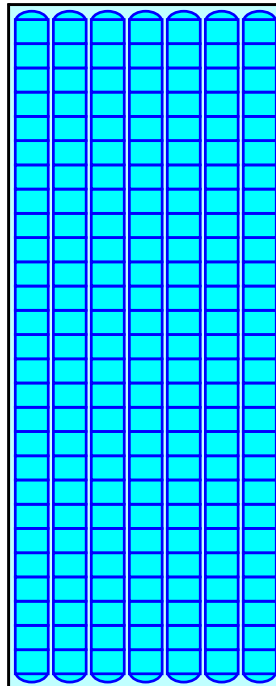
Overall Storage Efficiency = 62.6%

Overall System Size = 103.50' x 41.50' x 4.33'

189 Chambers

689.4 cy Field

429.5 cy Stone



North 60 Post A 3-9-20

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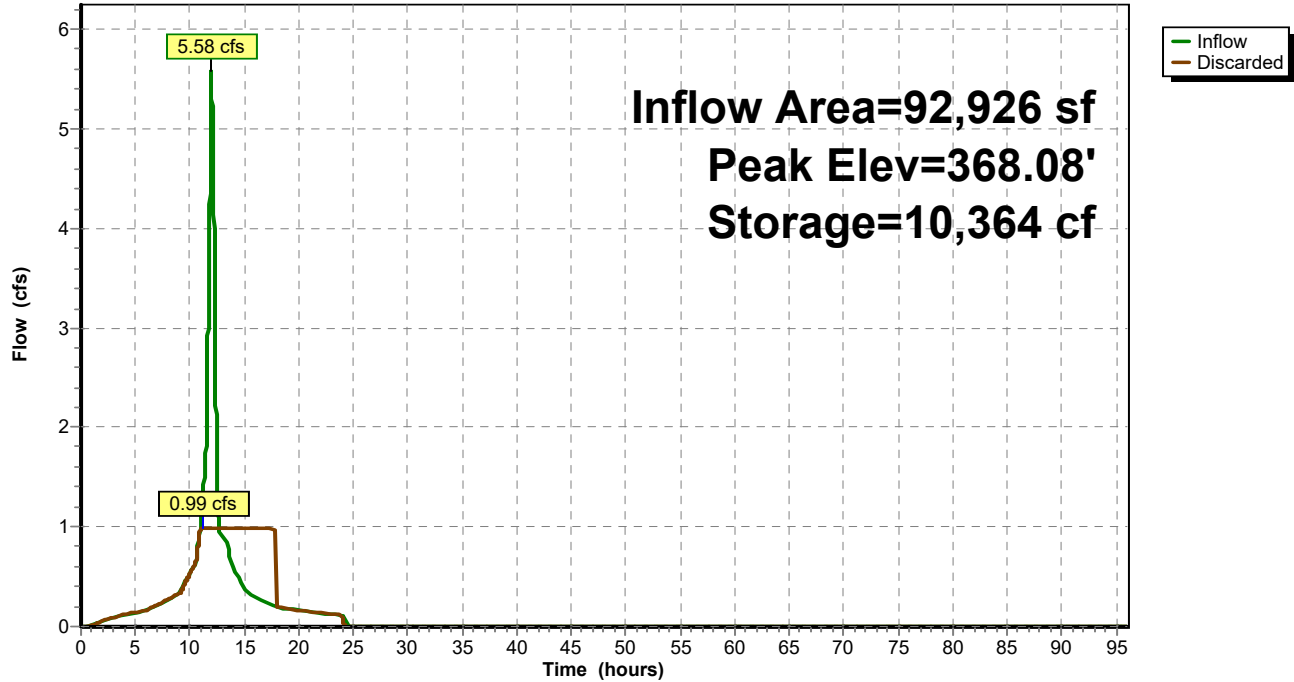
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NRCC 24-hr A 25-yr Rainfall=6.46"

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Pond 25: INF-2

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 26: Post A12

Runoff = 21.61 cfs @ 12.19 hrs, Volume= 65,239 cf, Depth= 4.85"

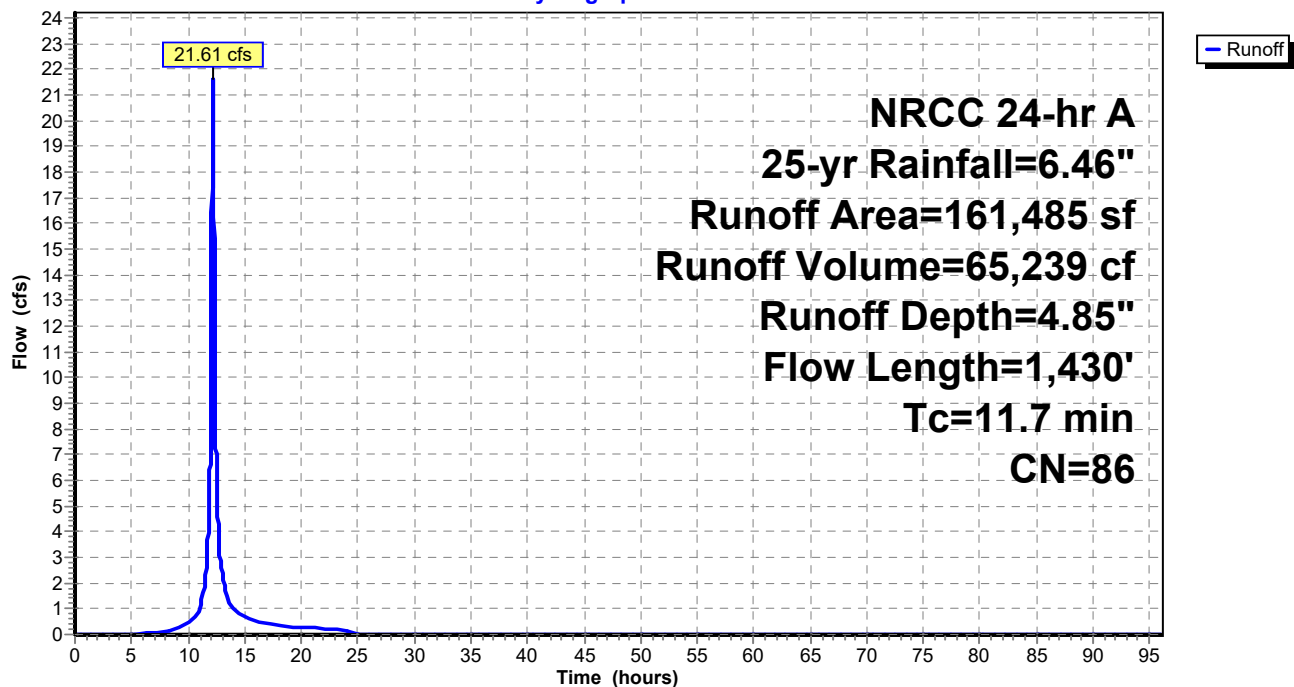
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
83,450	98	Paved parking, HSG C
78,035	74	>75% Grass cover, Good, HSG C
161,485	86	Weighted Average
78,035		48.32% Pervious Area
83,450		51.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	84	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
1.6	201	0.0164	2.06		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,145	0.0339	9.69	11.89	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
11.7	1,430	Total			

Subcatchment 26: Post A12

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 27: DIV-6

Inflow Area = 161,485 sf, 51.68% Impervious, Inflow Depth = 4.85" for 25-yr event
 Inflow = 21.61 cfs @ 12.19 hrs, Volume= 65,239 cf
 Outflow = 21.61 cfs @ 12.19 hrs, Volume= 65,239 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.15 cfs @ 11.81 hrs, Volume= 39,493 cf
 Secondary = 17.96 cfs @ 12.19 hrs, Volume= 25,745 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 365.28' @ 12.19 hrs

Flood Elev= 366.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	361.50'	10.0" Round Culvert L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 361.50' / 361.50' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	361.50'	24.0" Round Culvert L= 148.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 361.50' / 355.94' S= 0.0376 ' S= 0.0376 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	364.50'	8.0' 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=4.12 cfs @ 11.81 hrs HW=364.52' TW=362.06' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 4.12 cfs @ 7.55 fps)**Secondary OutFlow** Max=17.95 cfs @ 12.19 hrs HW=365.28' TW=357.47' (Dynamic Tailwater)↑ **2=Culvert** (Passes 17.95 cfs of 25.21 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 17.95 cfs @ 2.89 fps)

North 60 Post A 3-9-20

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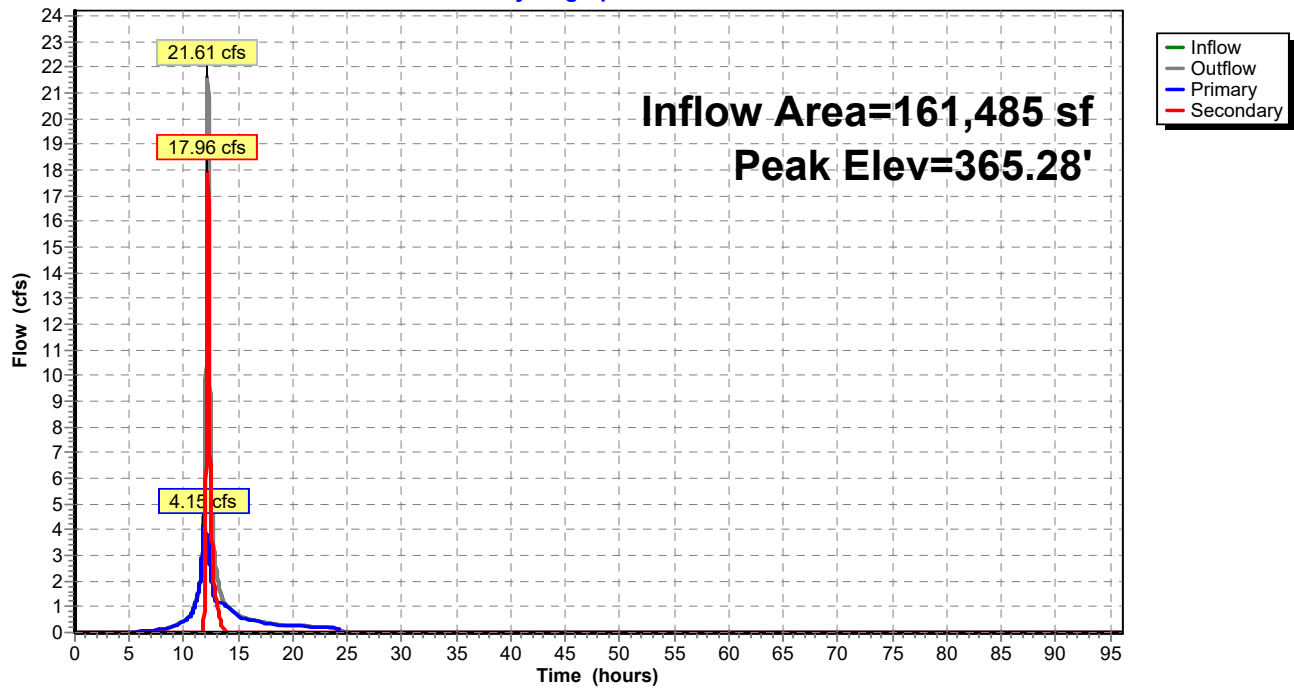
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NRCC 24-hr A 25-yr Rainfall=6.46"

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Pond 27: DIV-6

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 28: INF-6

Inflow Area = 161,485 sf, 51.68% Impervious, Inflow Depth = 2.93" for 25-yr event
 Inflow = 4.15 cfs @ 11.81 hrs, Volume= 39,493 cf
 Outflow = 1.24 cfs @ 11.26 hrs, Volume= 39,493 cf, Atten= 70%, Lag= 0.0 min
 Discarded = 1.24 cfs @ 11.26 hrs, Volume= 39,493 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 364.44' @ 12.90 hrs Surf.Area= 3,569 sf Storage= 8,384 cf

Plug-Flow detention time= 48.9 min calculated for 39,489 cf (100% of inflow)
 Center-of-Mass det. time= 48.9 min (879.1 - 830.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	361.00'	3,393 cf	35.75'W x 99.83'L x 4.00'H Field A 14,276 cf Overall - 5,794 cf Embedded = 8,482 cf x 40.0% Voids
#2A	361.50'	5,794 cf	Cultec R-360HD x 156 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 156 Chambers in 6 Rows Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf
		9,187 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	361.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.24 cfs @ 11.26 hrs HW=361.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.24 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Pond 28: INF-6 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

26 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 97.83' Row Length +12.0" End Stone x 2 = 99.83' Base Length

6 Rows x 60.0" Wide + 9.0" Spacing x 5 + 12.0" Side Stone x 2 = 35.75' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

156 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 6 Rows = 5,794.1 cf Chamber Storage

14,276.2 cf Field - 5,794.1 cf Chambers = 8,482.1 cf Stone x 40.0% Voids = 3,392.8 cf Stone Storage

Chamber Storage + Stone Storage = 9,186.9 cf = 0.211 af

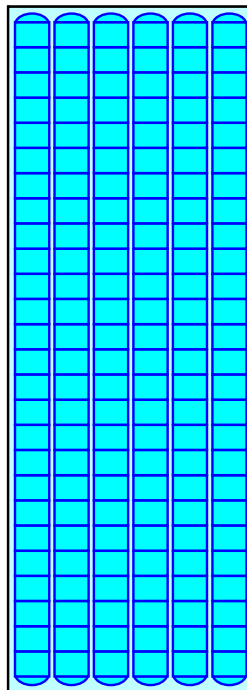
Overall Storage Efficiency = 64.4%

Overall System Size = 99.83' x 35.75' x 4.00'

156 Chambers

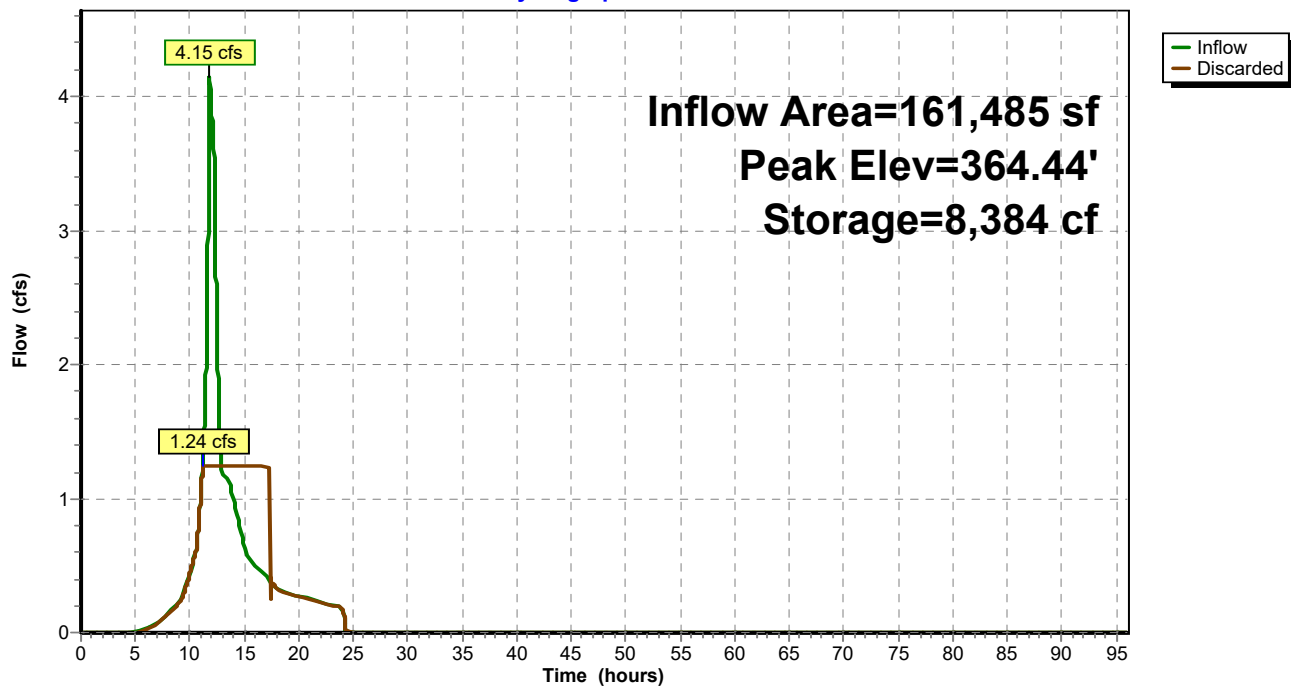
528.7 cy Field

314.2 cy Stone



Pond 28: INF-6

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 29: Post A6

Runoff = 67.32 cfs @ 12.13 hrs, Volume= 174,013 cf, Depth= 5.64"

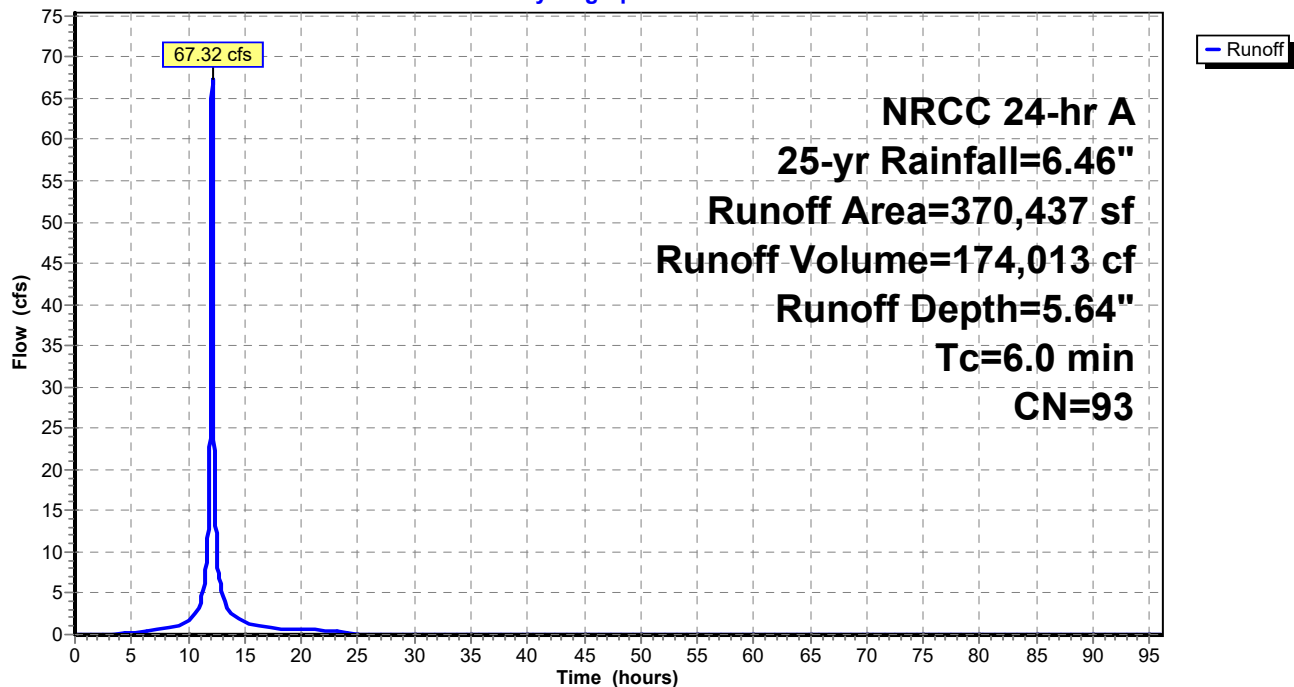
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
286,912	98	Paved parking, HSG C
83,525	74	>75% Grass cover, Good, HSG C
370,437	93	Weighted Average
83,525		22.55% Pervious Area
286,912		77.45% Impervious Area

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

Subcatchment 29: Post A6

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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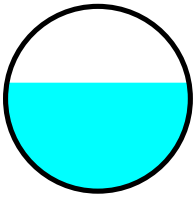
Summary for Reach 30: 36" HDPE Pipe

Inflow Area = 370,437 sf, 77.45% Impervious, Inflow Depth = 6.84" for 25-yr event
Inflow = 94.56 cfs @ 12.13 hrs, Volume= 211,282 cf
Outflow = 93.98 cfs @ 12.14 hrs, Volume= 211,282 cf, Atten= 1%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 21.80 fps, Min. Travel Time= 0.6 min
Avg. Velocity= 5.94 fps, Avg. Travel Time= 2.3 min

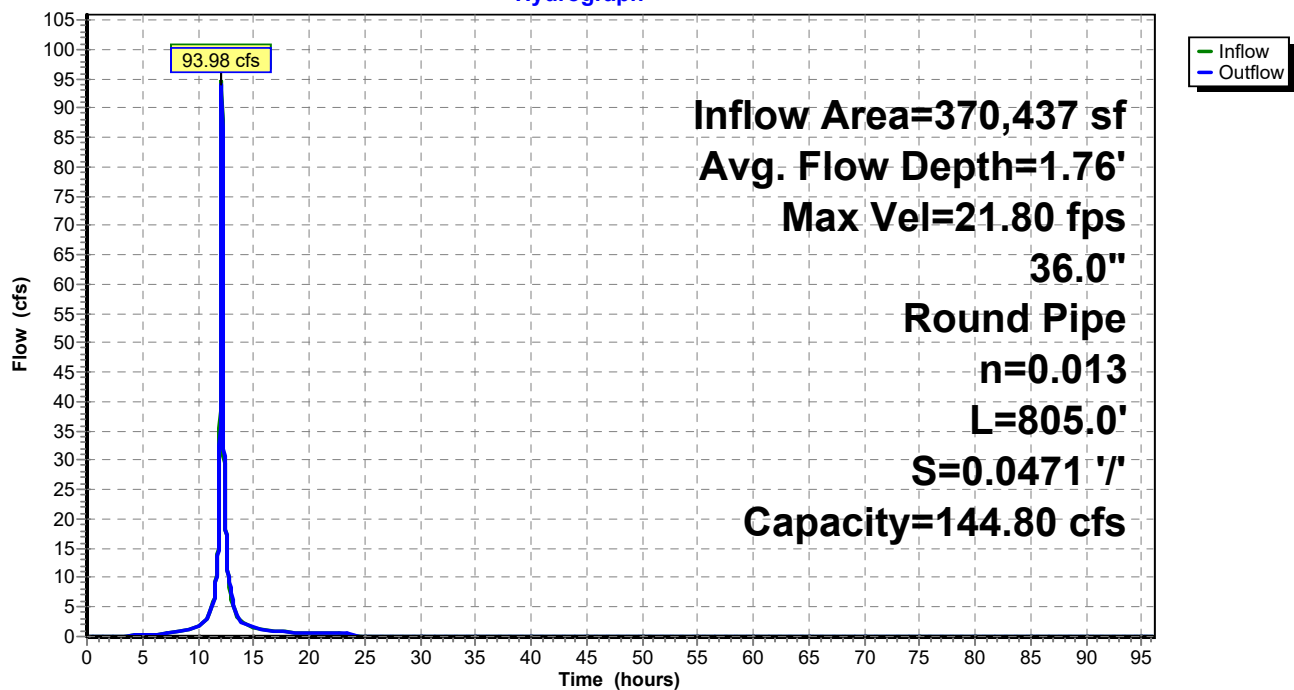
Peak Storage= 3,470 cf @ 12.14 hrs
Average Depth at Peak Storage= 1.76'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 144.80 cfs

36.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 805.0' Slope= 0.0471 '/'
Inlet Invert= 355.94', Outlet Invert= 318.00'



Reach 30: 36" HDPE Pipe

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 31: Post A14

Runoff = 38.54 cfs @ 12.13 hrs, Volume= 103,328 cf, Depth= 5.99"

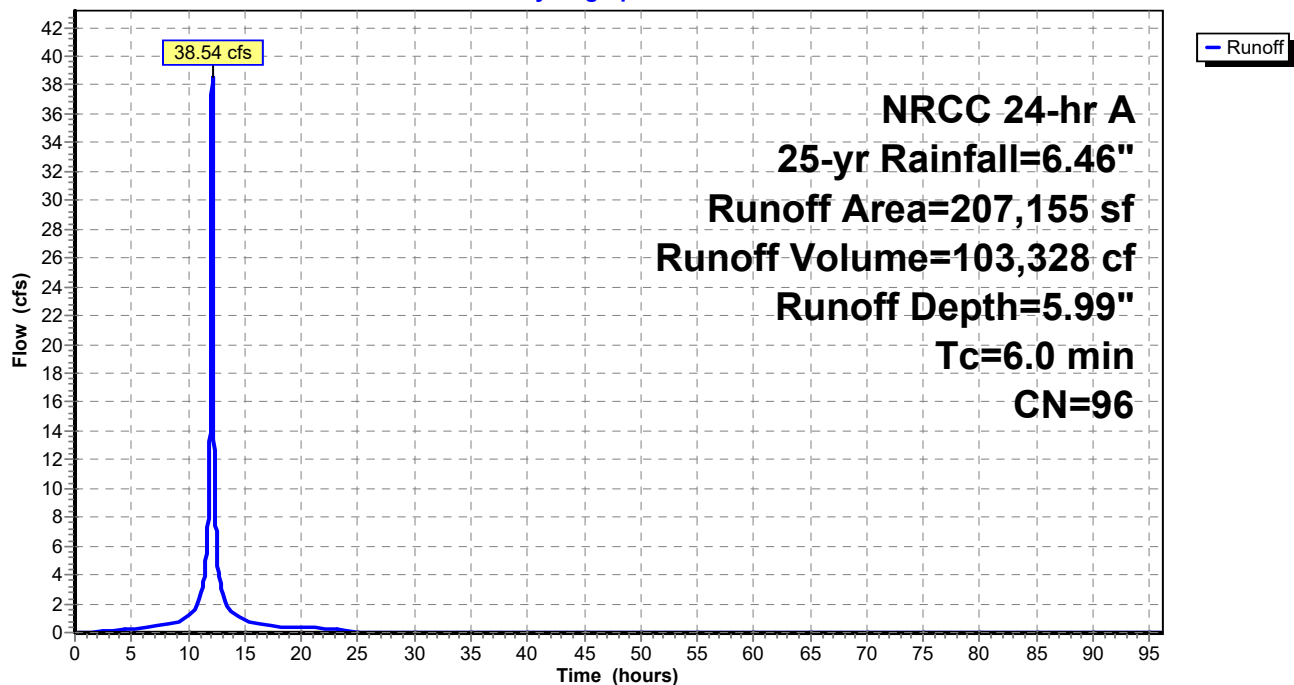
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
187,606	98	Paved parking, HSG C
19,549	74	>75% Grass cover, Good, HSG C
207,155	96	Weighted Average
19,549		9.44% Pervious Area
187,606		90.56% Impervious Area

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

Subcatchment 31: Post A14

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 32: DMH-3

Inflow Area = 577,592 sf, 82.15% Impervious, Inflow Depth = 6.54" for 25-yr event
Inflow = 132.05 cfs @ 12.14 hrs, Volume= 314,610 cf
Outflow = 132.05 cfs @ 12.14 hrs, Volume= 314,610 cf, Atten= 0%, Lag= 0.0 min
Primary = 132.05 cfs @ 12.14 hrs, Volume= 314,610 cf

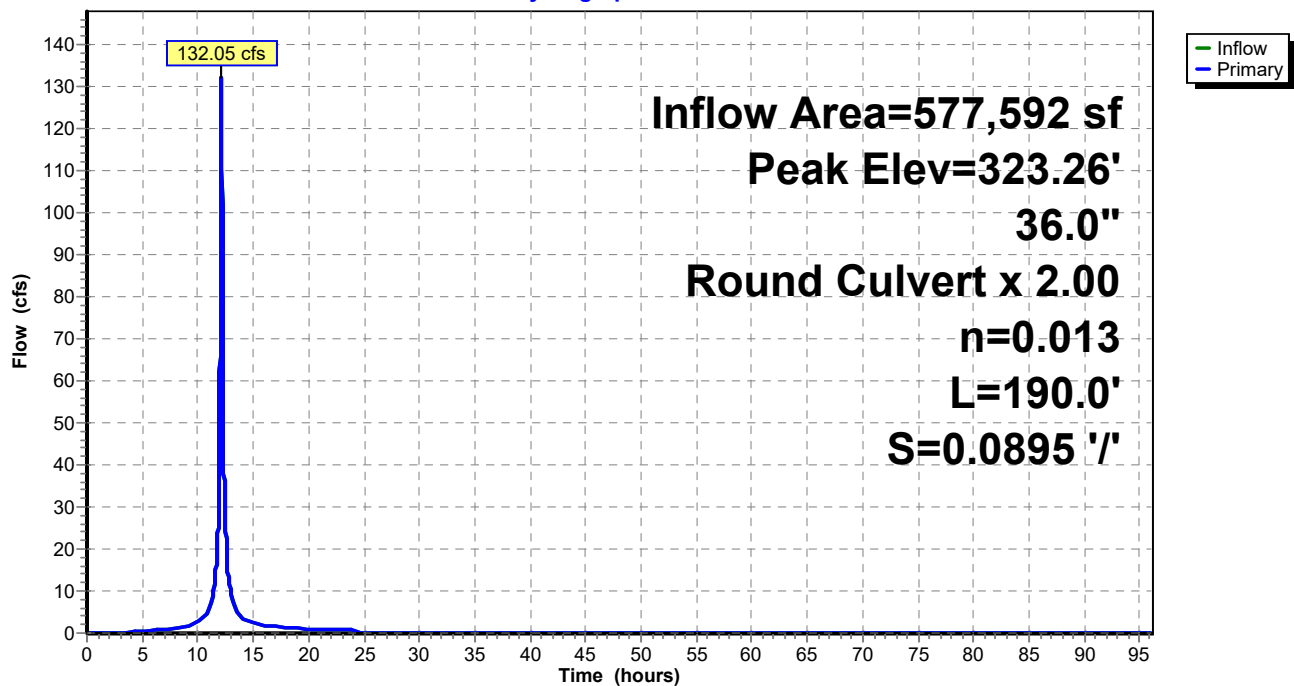
Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 323.26' @ 12.14 hrs

Flood Elev= 328.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	318.00'	36.0" Round Culvert X 2.00 L= 190.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 318.00' / 301.00' S= 0.0895 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=131.82 cfs @ 12.14 hrs HW=323.25' TW=304.02' (Dynamic Tailwater)
↑ **1=Culvert** (Inlet Controls 131.82 cfs @ 9.32 fps)

Pond 32: DMH-3**Hydrograph**

North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 33: Post A7

Runoff = 3.46 cfs @ 12.19 hrs, Volume= 9,638 cf, Depth= 2.88"

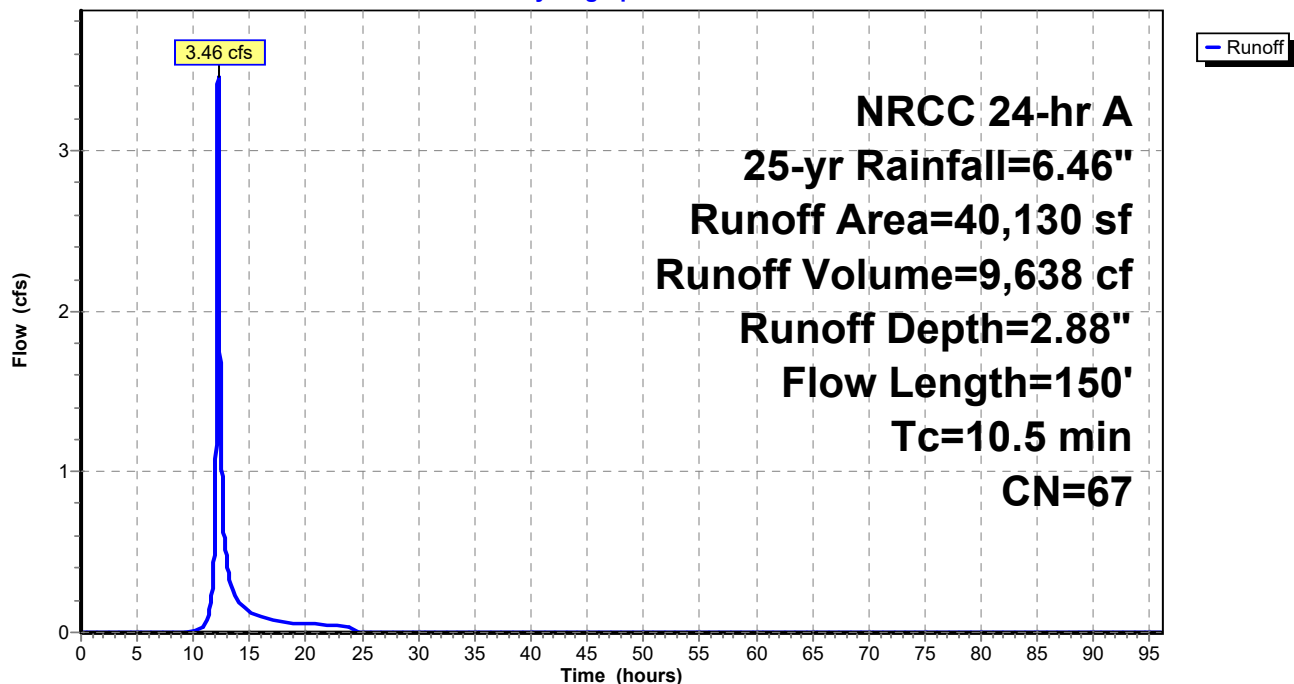
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
23,130	65	Brush, Good, HSG C
17,000	70	Woods, Good, HSG C
40,130	67	Weighted Average
40,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1100	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.1	50	0.2800	8.52		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.5	150	Total			

Subcatchment 33: Post A7

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 34: SWP-5

Inflow Area = 617,722 sf, 76.82% Impervious, Inflow Depth = 6.30" for 25-yr event
 Inflow = 135.10 cfs @ 12.14 hrs, Volume= 324,248 cf
 Outflow = 90.13 cfs @ 12.21 hrs, Volume= 324,248 cf, Atten= 33%, Lag= 4.3 min
 Discarded = 6.95 cfs @ 12.21 hrs, Volume= 179,437 cf
 Primary = 83.18 cfs @ 12.21 hrs, Volume= 144,812 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 304.40' @ 12.21 hrs Surf.Area= 20,028 sf Storage= 70,637 cf

Plug-Flow detention time= 28.8 min calculated for 324,215 cf (100% of inflow)
 Center-of-Mass det. time= 28.8 min (792.3 - 763.5)

Volume	Invert	Avail.Storage	Storage Description
#1	300.00'	105,088 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)
300.00	12,249	547.4	0	0	12,249
301.00	13,920	566.4	13,076	13,076	14,023
302.00	15,648	585.4	14,776	27,851	15,857
303.00	17,432	604.3	16,532	44,383	17,743
304.00	19,274	623.3	18,345	62,728	19,698
305.00	21,173	642.3	20,216	82,945	21,713
306.00	23,128	661.3	22,143	105,088	23,789

Device	Routing	Invert	Outlet Devices
#1	Discarded	300.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'
#2	Primary	298.00'	42.0" Round Culvert L= 189.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 298.00' / 258.00' S= 0.2116 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 9.62 sf
#3	Device 2	302.33'	36.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=6.95 cfs @ 12.21 hrs HW=304.40' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 6.95 cfs)

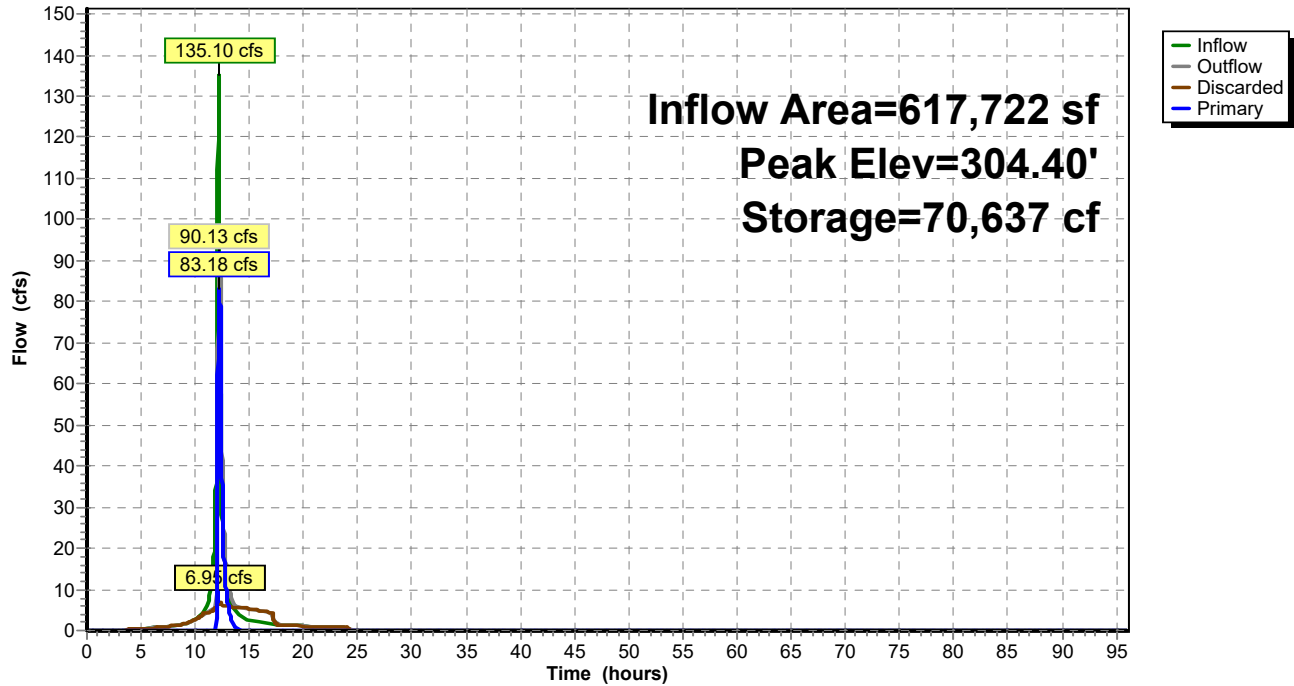
Primary OutFlow Max=83.18 cfs @ 12.21 hrs HW=304.40' TW=259.32' (Dynamic Tailwater)

↑**2=Culvert** (Passes 83.18 cfs of 99.92 cfs potential flow)

↑**3=Orifice/Grate** (Orifice Controls 83.18 cfs @ 6.93 fps)

Pond 34: SWP-5

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

Printed 3/25/2020

Summary for Subcatchment 35: Post A16

Runoff = 4.64 cfs @ 12.18 hrs, Volume= 12,541 cf, Depth= 2.98"

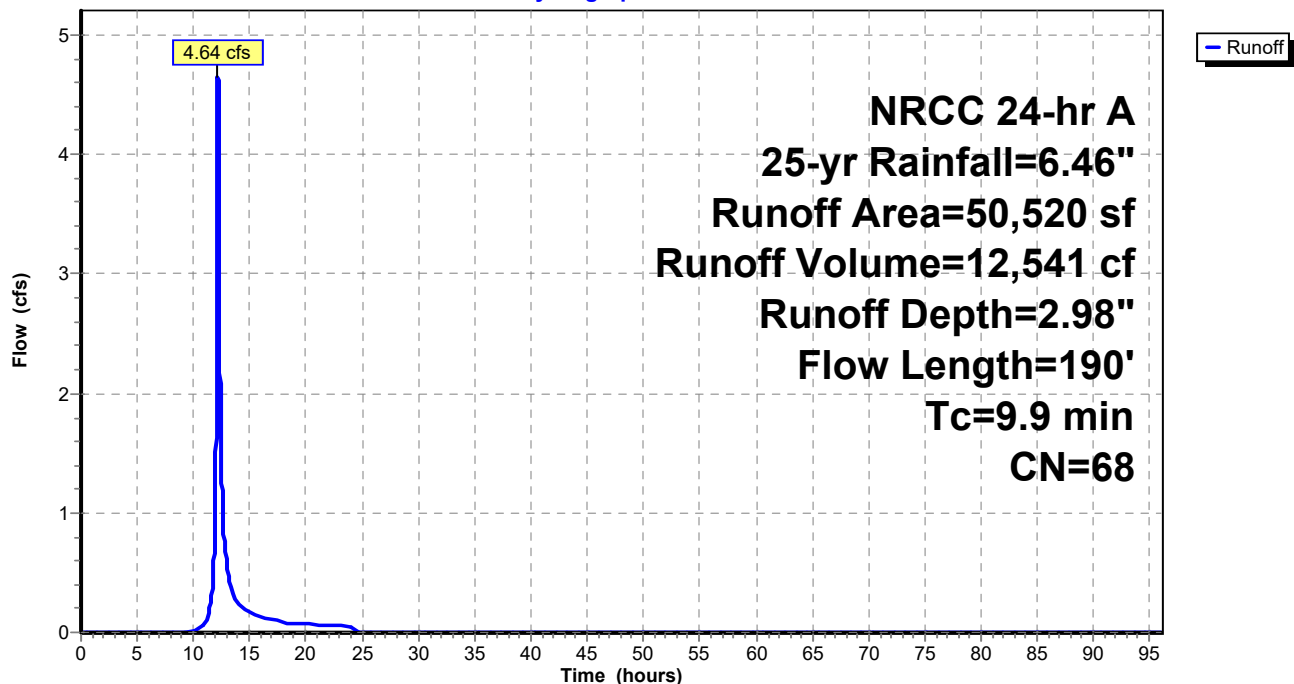
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
16,692	65	Brush, Good, HSG C
33,828	70	Woods, Good, HSG C
50,520	68	Weighted Average
50,520		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.17		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	90	0.3000	8.82		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
9.9	190	Total			

Subcatchment 35: Post A16

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 36: SWP-3

Inflow Area = 668,242 sf, 71.01% Impervious, Inflow Depth = 2.83" for 25-yr event
 Inflow = 87.57 cfs @ 12.20 hrs, Volume= 157,353 cf
 Outflow = 73.82 cfs @ 12.33 hrs, Volume= 157,353 cf, Atten= 16%, Lag= 7.9 min
 Discarded = 4.45 cfs @ 12.33 hrs, Volume= 43,559 cf
 Primary = 69.36 cfs @ 12.33 hrs, Volume= 113,793 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 259.65' @ 12.33 hrs Surf.Area= 12,822 sf Storage= 36,764 cf

Plug-Flow detention time= 18.8 min calculated for 157,353 cf (100% of inflow)
 Center-of-Mass det. time= 18.8 min (768.0 - 749.2)

Volume	Invert	Avail.Storage	Storage Description		
#1	256.00'	71,328 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)
256.00	7,434	457.3	0	0	7,434
257.00	8,834	476.3	8,124	8,124	8,921
258.00	10,292	495.3	9,554	17,678	10,468
259.00	11,806	514.3	11,040	28,718	12,076
260.00	13,378	533.4	12,584	41,302	13,752
261.00	15,006	552.4	14,184	55,486	15,481
262.00	16,692	571.4	15,842	71,328	17,271

Device	Routing	Invert	Outlet Devices
#1	Primary	254.00'	36.0" Round Culvert L= 128.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 254.00' / 234.00' S= 0.1563 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#2	Device 1	258.00'	36.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	256.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'

Discarded OutFlow Max=4.45 cfs @ 12.33 hrs HW=259.65' (Free Discharge)
 ↳ **3=Exfiltration** (Exfiltration Controls 4.45 cfs)

Primary OutFlow Max=69.36 cfs @ 12.33 hrs HW=259.65' TW=0.00' (Dynamic Tailwater)
 ↳ **1=Culvert** (Inlet Controls 69.36 cfs @ 9.81 fps)
 ↳ **2=Orifice/Grate** (Passes 69.36 cfs of 74.29 cfs potential flow)

North 60 Post A 3-9-20

Prepared by {enter your company name here}

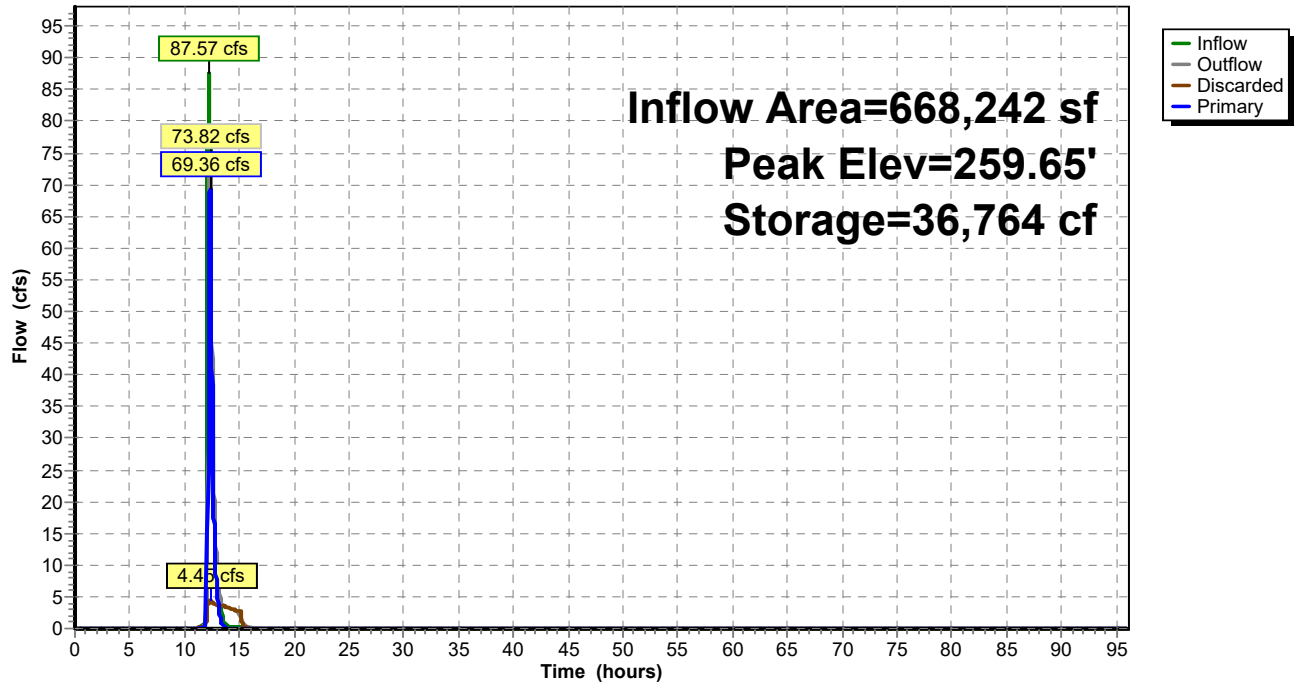
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NRCC 24-hr A 25-yr Rainfall=6.46"

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Pond 36: SWP-3

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

Printed 3/25/2020

Summary for Subcatchment 37: Post A13

Runoff = 28.82 cfs @ 12.13 hrs, Volume= 73,714 cf, Depth= 5.52"

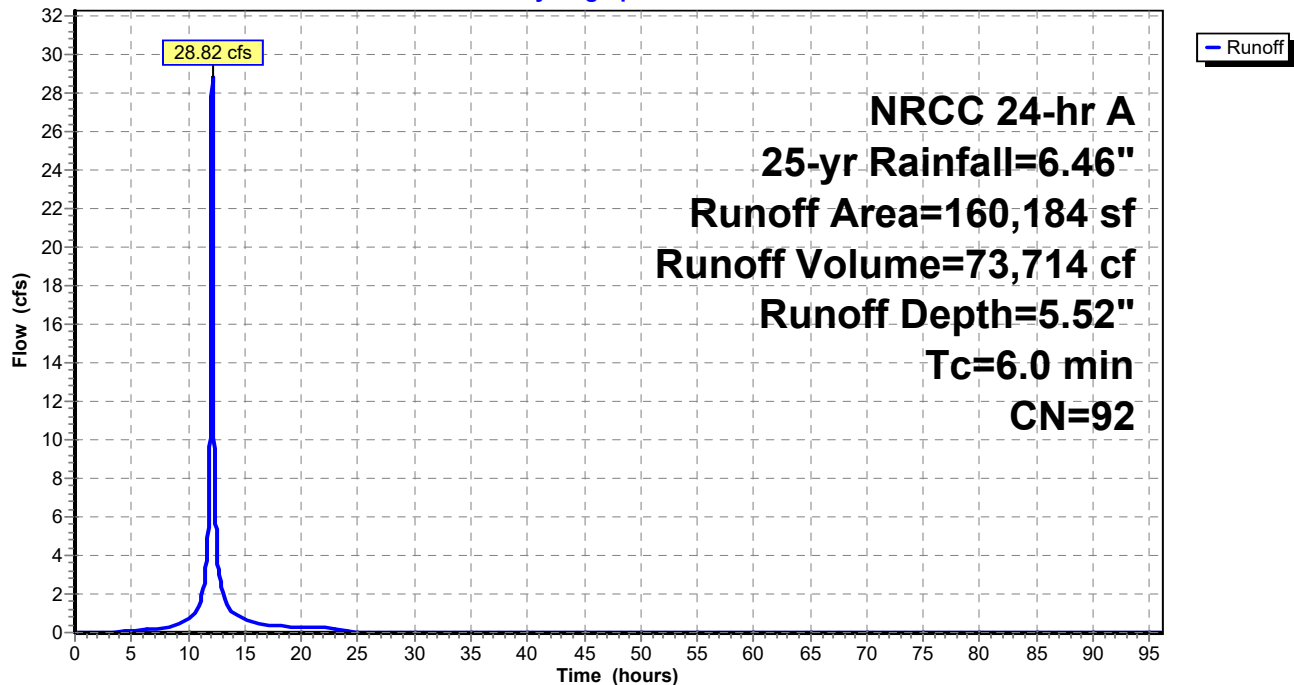
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
122,493	98	Paved parking, HSG C
37,691	74	>75% Grass cover, Good, HSG C
160,184	92	Weighted Average
37,691		23.53% Pervious Area
122,493		76.47% Impervious Area

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

Subcatchment 37: Post A13

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 38: DIV-7

Inflow Area = 160,184 sf, 76.47% Impervious, Inflow Depth = 5.52" for 25-yr event
 Inflow = 28.82 cfs @ 12.13 hrs, Volume= 73,714 cf
 Outflow = 28.82 cfs @ 12.13 hrs, Volume= 73,714 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.67 cfs @ 11.59 hrs, Volume= 41,263 cf
 Secondary = 25.67 cfs @ 12.13 hrs, Volume= 32,451 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 316.48' @ 12.13 hrs

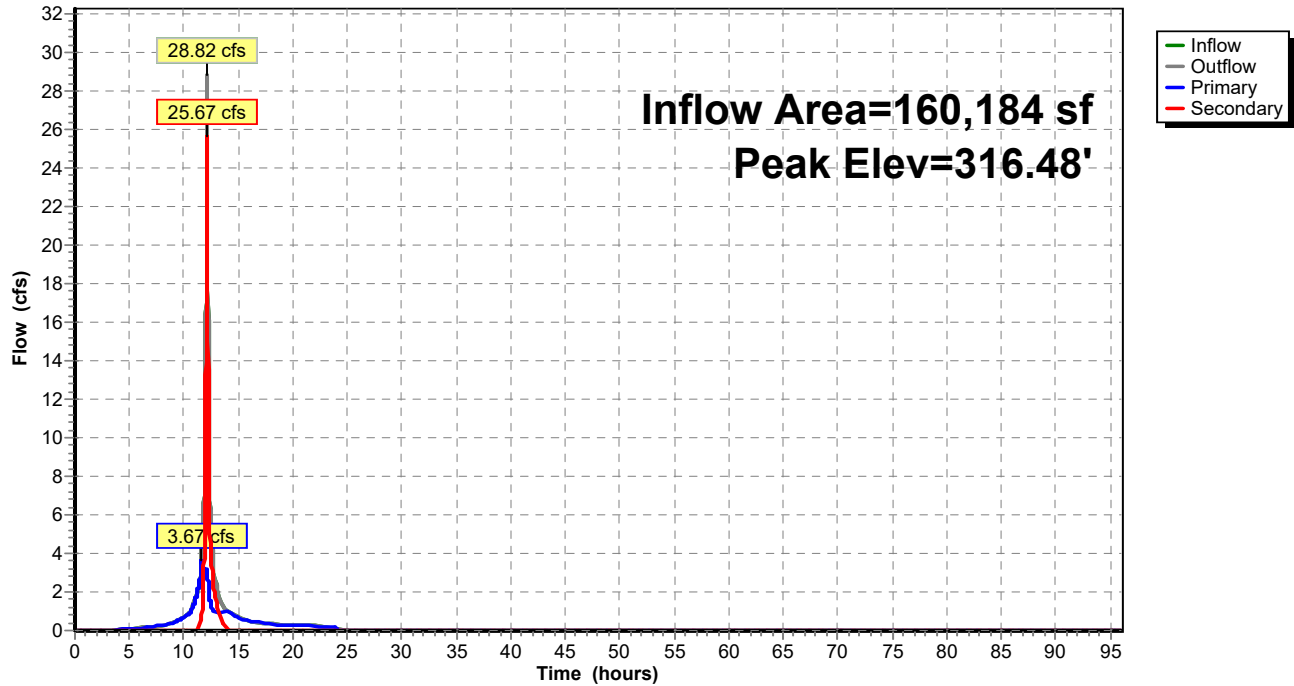
Flood Elev= 319.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	313.00'	10.0" Round Culvert L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 313.00' / 313.00' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	313.00'	30.0" Round Culvert L= 103.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 313.00' / 303.00' S= 0.0971 ' S= 0.0971 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#3	Device 2	315.50'	8.0' 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=3.63 cfs @ 11.59 hrs HW=315.54' TW=313.63' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 3.63 cfs @ 6.66 fps)**Secondary OutFlow** Max=25.67 cfs @ 12.13 hrs HW=316.48' TW=0.00' (Dynamic Tailwater)↑ **2=Culvert** (Passes 25.67 cfs of 35.28 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 25.67 cfs @ 3.28 fps)

Pond 38: DIV-7

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 39: INF-7

Inflow Area = 160,184 sf, 76.47% Impervious, Inflow Depth = 3.09" for 25-yr event
 Inflow = 3.67 cfs @ 11.59 hrs, Volume= 41,263 cf
 Outflow = 1.07 cfs @ 10.83 hrs, Volume= 41,263 cf, Atten= 71%, Lag= 0.0 min
 Discarded = 1.07 cfs @ 10.83 hrs, Volume= 41,263 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 315.59' @ 12.59 hrs Surf.Area= 3,839 sf Storage= 8,346 cf

Plug-Flow detention time= 54.9 min calculated for 41,258 cf (100% of inflow)
 Center-of-Mass det. time= 54.9 min (855.8 - 800.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	312.50'	3,643 cf	41.50'W x 92.50'L x 4.00'H Field A 15,355 cf Overall - 6,247 cf Embedded = 9,108 cf x 40.0% Voids
#2A	313.00'	6,247 cf	Cultec R-360HD x 168 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 168 Chambers in 7 Rows Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf
		9,890 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	312.50'	12.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.07 cfs @ 10.83 hrs HW=312.54' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.07 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Pond 39: INF-7 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

24 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 90.50' Row Length +12.0" End Stone x 2 = 92.50' Base Length

7 Rows x 60.0" Wide + 9.0" Spacing x 6 + 12.0" Side Stone x 2 = 41.50' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

168 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 7 Rows = 6,246.7 cf Chamber Storage

15,355.0 cf Field - 6,246.7 cf Chambers = 9,108.3 cf Stone x 40.0% Voids = 3,643.3 cf Stone Storage

Chamber Storage + Stone Storage = 9,890.0 cf = 0.227 af

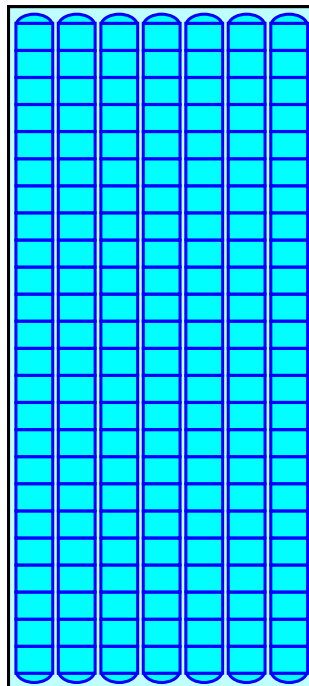
Overall Storage Efficiency = 64.4%

Overall System Size = 92.50' x 41.50' x 4.00'

168 Chambers

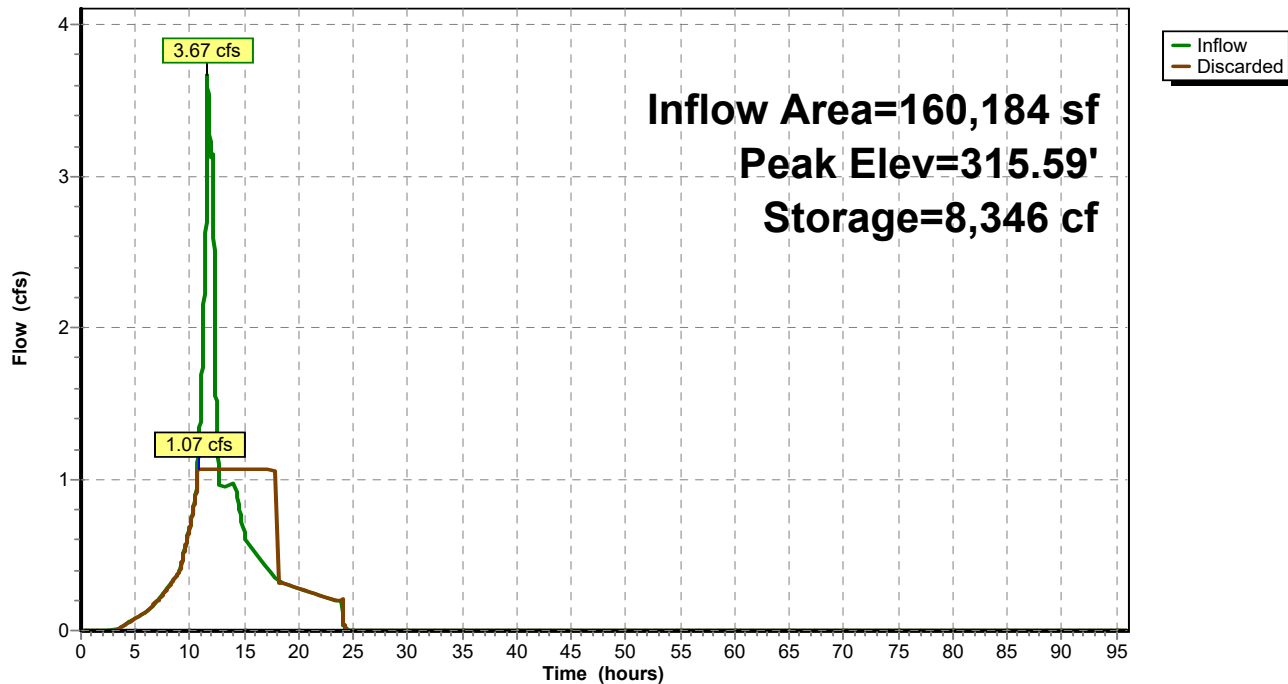
568.7 cy Field

337.3 cy Stone



Pond 39: INF-7

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 40: Post A2

Runoff = 29.67 cfs @ 12.12 hrs, Volume= 67,443 cf, Depth= 4.09"

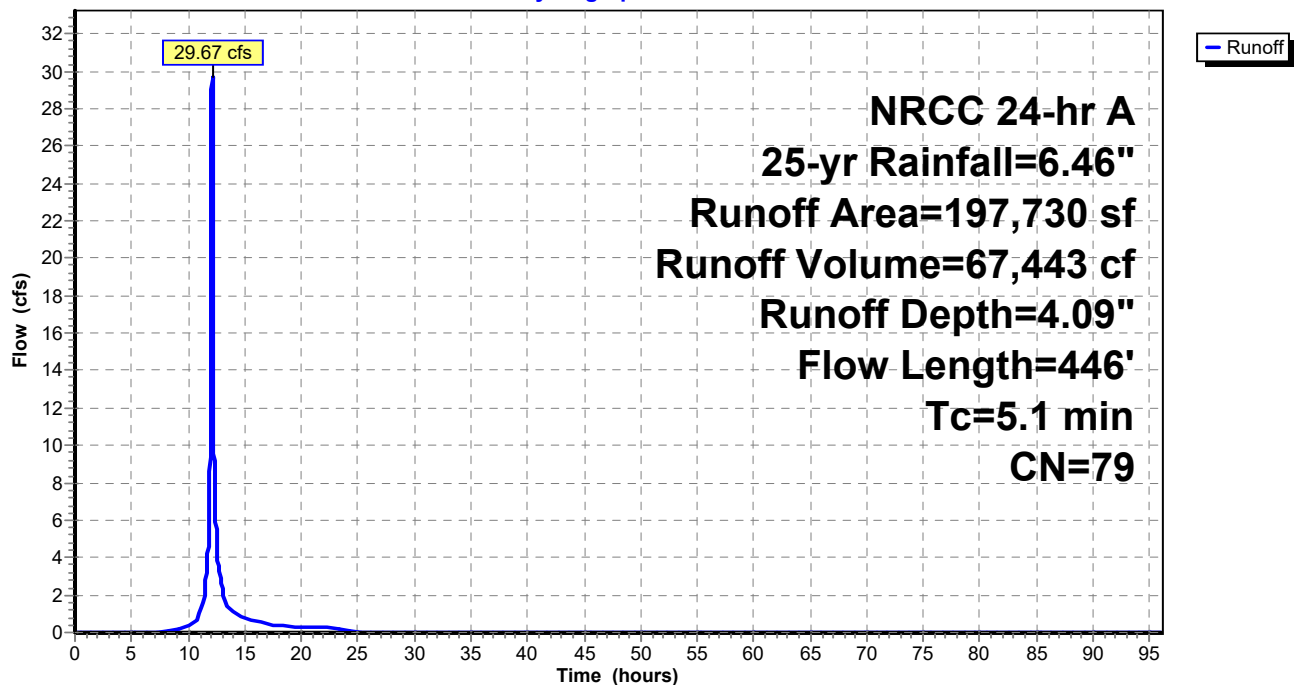
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
43,743	98	Paved parking, HSG C
107,245	74	>75% Grass cover, Good, HSG C
2,876	61	>75% Grass cover, Good, HSG B
39,583	70	Woods, Good, HSG C
4,283	98	Water Surface, HSG C
197,730	79	Weighted Average
149,704		75.71% Pervious Area
48,026		24.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.1500	0.40		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.9	346	0.1734	6.70		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	446	Total			

Subcatchment 40: Post A2

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 41: SWP-1

Inflow Area = 197,730 sf, 24.29% Impervious, Inflow Depth = 4.09" for 25-yr event
 Inflow = 29.67 cfs @ 12.12 hrs, Volume= 67,443 cf
 Outflow = 4.25 cfs @ 12.58 hrs, Volume= 43,700 cf, Atten= 86%, Lag= 27.5 min
 Primary = 4.25 cfs @ 12.58 hrs, Volume= 43,700 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Starting Elev= 234.50' Surf.Area= 12,504 sf Storage= 7,835 cf
 Peak Elev= 237.70' @ 12.58 hrs Surf.Area= 18,157 sf Storage= 47,442 cf (39,607 cf above start)

Plug-Flow detention time= 1,202.7 min calculated for 35,861 cf (53% of inflow)

Center-of-Mass det. time= 901.0 min (1,705.2 - 804.2)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	1,811 cf	Forebay (Irregular) Listed below (Recalc)
#2	230.00'	1,976 cf	Micropool (Irregular) Listed below (Recalc)
#3	233.90'	65,123 cf	Marsh & Storage (Irregular) Listed below (Recalc)
		68,911 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,233	129.1	834	1,811	1,357

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,646	155.1	1,000	1,976	1,942

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
233.90	4,232	530.5	0	0	4,232
234.50	9,625	400.9	4,048	4,048	13,842
235.00	10,440	413.5	5,015	9,063	14,683
236.00	12,144	438.8	11,281	20,344	16,451
237.00	13,950	464.0	13,037	33,381	18,317
238.00	15,856	489.2	14,893	48,273	20,287
239.00	17,864	514.5	16,850	65,123	22,369

Device	Routing	Invert	Outlet Devices
#1	Primary	232.00'	21.0" Round Culvert L= 74.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.00' S= 0.0135 ' / ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.41 sf

North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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#2	Device 1	234.50'	1.1" Vert. Orifice/Grate	C= 0.600
#3	Device 1	237.50'	36.0" x 48.0" Horiz. Orifice/Grate	C= 0.600

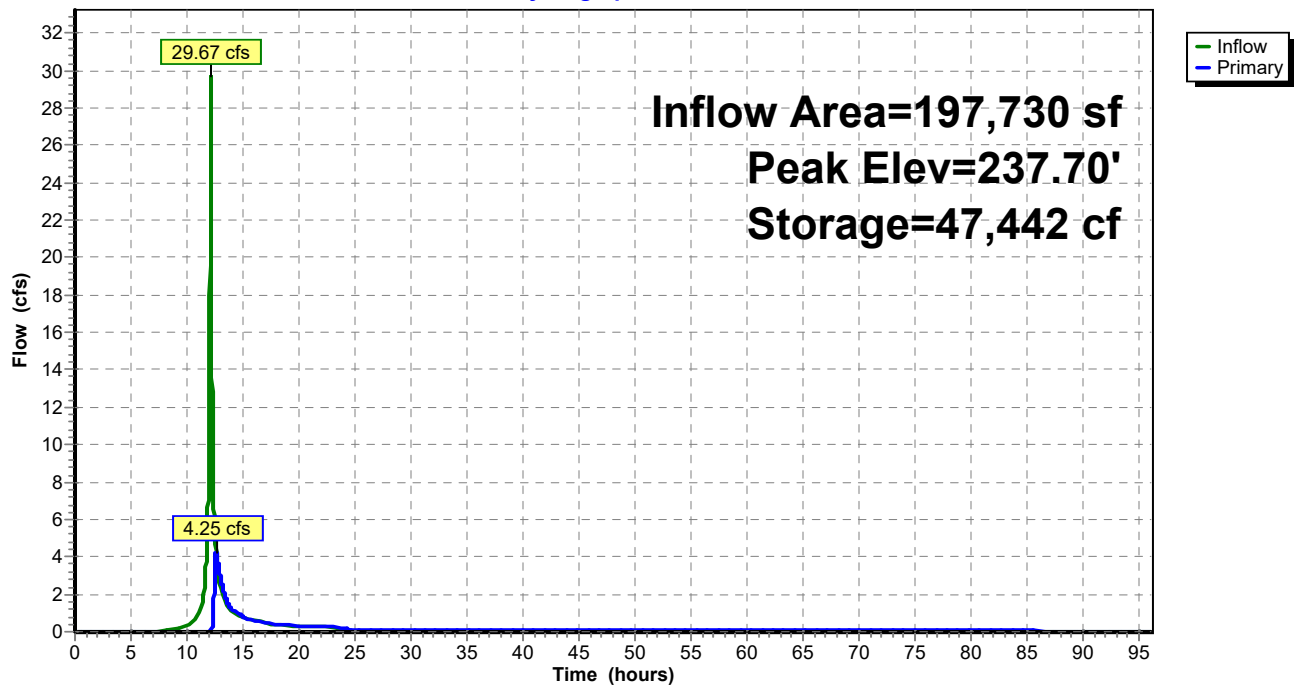
Limited to weir flow at low heads

Primary OutFlow Max=4.25 cfs @ 12.58 hrs HW=237.70' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 4.25 cfs of 18.19 cfs potential flow)
2=Orifice/Grate (Orifice Controls 0.06 cfs @ 8.56 fps)
3=Orifice/Grate (Weir Controls 4.19 cfs @ 1.47 fps)

Pond 41: SWP-1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 42: Post A1

Runoff = 3.20 cfs @ 12.13 hrs, Volume= 7,626 cf, Depth= 4.41"

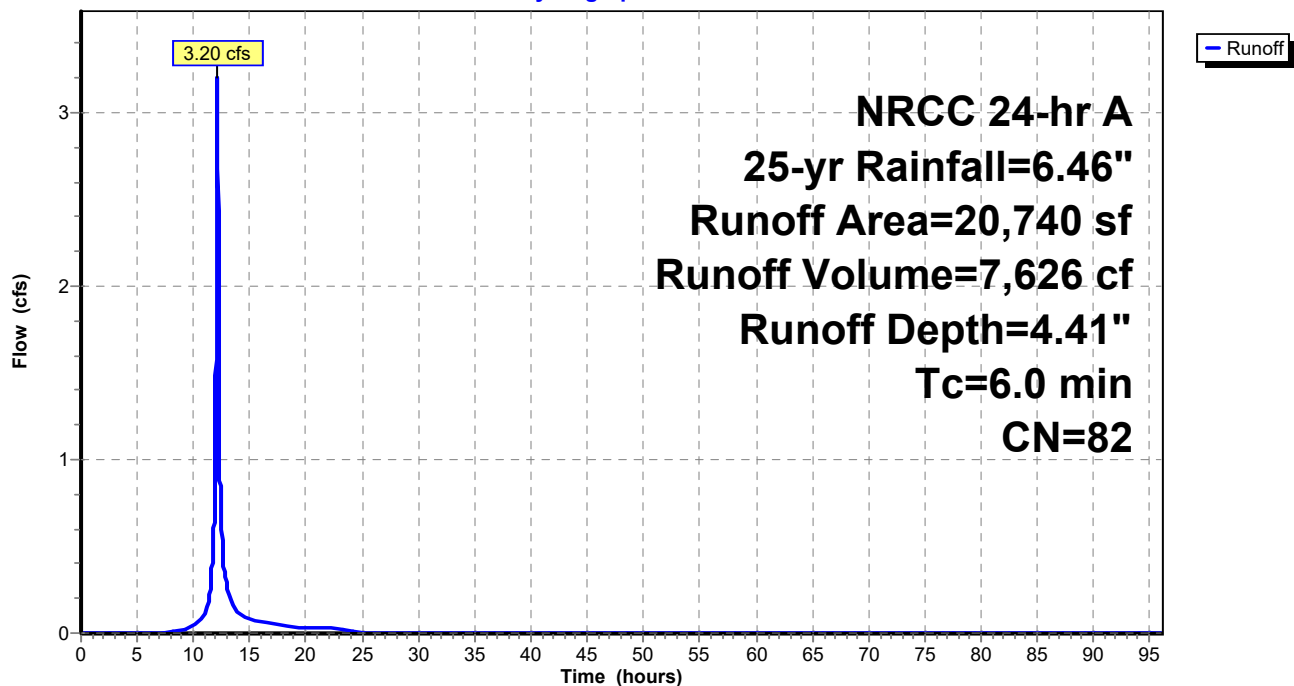
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
7,304	98	Paved parking, HSG C
10,356	74	>75% Grass cover, Good, HSG C
3,080	70	Woods, Good, HSG C
20,740	82	Weighted Average
13,436		64.78% Pervious Area
7,304		35.22% Impervious Area

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

Subcatchment 42: Post A1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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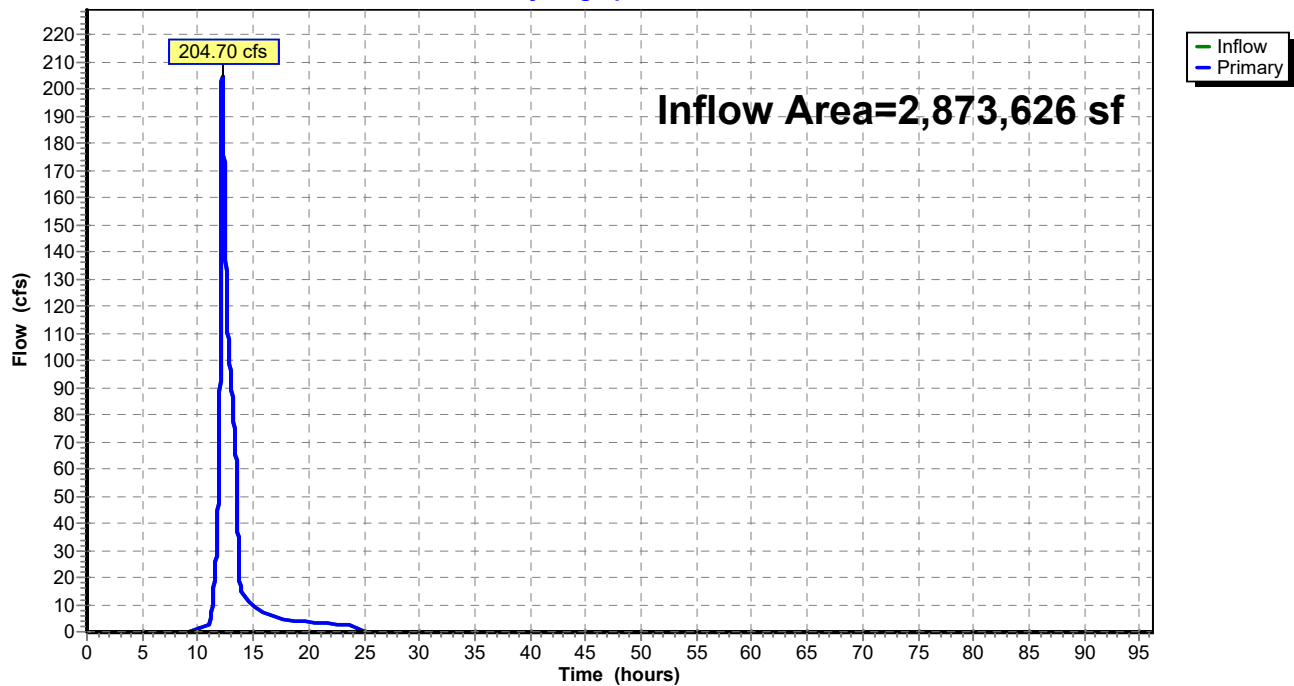
Summary for Link 43: Design Point A

Inflow Area = 2,873,626 sf, 43.08% Impervious, Inflow Depth > 4.09" for 25-yr event
Inflow = 204.70 cfs @ 12.19 hrs, Volume= 978,776 cf
Primary = 204.70 cfs @ 12.19 hrs, Volume= 978,776 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 43: Design Point A

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 8: Post A0 OffsiteRunoff Area=1,115,060 sf 57.87% Impervious Runoff Depth=6.51"
Flow Length=1,018' Tc=12.5 min CN=90 Runoff=188.18 cfs 604,958 cf**Pond 9: Offsite Pond A**Peak Elev=364.99' Storage=180,130 cf Inflow=188.18 cfs 604,958 cf
Outflow=107.44 cfs 553,763 cf**Subcatchment 10: Post A4**Runoff Area=164,583 sf 10.25% Impervious Runoff Depth=4.89"
Flow Length=340' Tc=20.5 min CN=76 Runoff=17.79 cfs 67,008 cf**Reach 11: 24" Culvert Pipe**Avg. Flow Depth=0.98' Max Vel=11.67 fps Inflow=17.79 cfs 67,008 cf
24.0" Round Pipe n=0.013 L=112.0' S=0.0268 '/' Capacity=37.02 cfs Outflow=17.78 cfs 67,008 cf**Subcatchment 12: Post A8**Runoff Area=210,459 sf 0.00% Impervious Runoff Depth=4.77"
Flow Length=503' Tc=17.8 min CN=75 Runoff=23.88 cfs 83,689 cf**Subcatchment 13: Post A11**Runoff Area=72,242 sf 63.67% Impervious Runoff Depth=6.51"
Tc=6.0 min CN=90 Runoff=15.40 cfs 39,194 cf**Subcatchment 14: Post A10**Runoff Area=304,098 sf 77.08% Impervious Runoff Depth=6.87"
Tc=6.0 min CN=93 Runoff=66.50 cfs 173,970 cf**Pond 15: DIV-5**Peak Elev=340.12' Inflow=66.50 cfs 173,970 cf
Primary=6.36 cfs 91,080 cf Secondary=60.14 cfs 82,890 cf Outflow=66.50 cfs 173,970 cf**Pond 16: INF-5**Peak Elev=337.97' Storage=18,182 cf Inflow=6.36 cfs 91,080 cf
Outflow=1.98 cfs 91,080 cf**Pond 17: Existing Wetland A**Peak Elev=330.11' Storage=111,371 cf Inflow=164.26 cfs 826,544 cf
36.0" Round Culvert n=0.013 L=168.0' S=0.0655 '/' Outflow=93.92 cfs 826,544 cf**Subcatchment 18: Post A15**Runoff Area=424,570 sf 0.00% Impervious Runoff Depth=4.43"
Flow Length=270' Tc=5.3 min CN=72 Runoff=69.36 cfs 156,815 cf**Subcatchment 19: Post A3**Runoff Area=93,277 sf 100.00% Impervious Runoff Depth=7.46"
Tc=6.0 min CN=98 Runoff=20.90 cfs 57,990 cf**Pond 20: DIV-1**Peak Elev=328.55' Inflow=20.90 cfs 57,990 cf
Primary=5.45 cfs 40,647 cf Secondary=15.46 cfs 17,343 cf Outflow=20.90 cfs 57,990 cf**Pond 21: INF-1**Peak Elev=327.13' Storage=9,187 cf Inflow=5.45 cfs 40,647 cf
Outflow=1.18 cfs 40,647 cf**Reach 22: Existing Stream A**Avg. Flow Depth=1.84' Max Vel=10.98 fps Inflow=160.10 cfs 1,000,703 cf
n=0.040 L=1,360.0' S=0.0721 '/' Capacity=291.69 cfs Outflow=155.06 cfs 1,000,703 cf**Subcatchment 23: Post A5**Runoff Area=92,926 sf 100.00% Impervious Runoff Depth=7.46"
Tc=6.0 min CN=98 Runoff=20.82 cfs 57,772 cf

North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Pond 24: DIV-2 Peak Elev=368.73' Inflow=20.82 cfs 57,772 cf
Primary=5.36 cfs 40,322 cf Secondary=16.26 cfs 17,450 cf Outflow=20.82 cfs 57,772 cf

Pond 25: INF-2 Peak Elev=368.17' Storage=10,517 cf Inflow=5.36 cfs 40,322 cf
Outflow=0.99 cfs 40,322 cf

Subcatchment26: Post A12 Runoff Area=161,485 sf 51.68% Impervious Runoff Depth=6.04"
Flow Length=1,430' Tc=11.7 min CN=86 Runoff=26.61 cfs 81,293 cf

Pond 27: DIV-6 Peak Elev=365.42' Inflow=26.61 cfs 81,293 cf
Primary=4.09 cfs 44,622 cf Secondary=23.21 cfs 36,671 cf Outflow=26.61 cfs 81,293 cf

Pond 28: INF-6 Peak Elev=364.58' Storage=8,593 cf Inflow=4.09 cfs 44,622 cf
Outflow=1.24 cfs 44,622 cf

Subcatchment29: Post A6 Runoff Area=370,437 sf 77.45% Impervious Runoff Depth=6.87"
Tc=6.0 min CN=93 Runoff=81.01 cfs 211,921 cf

Reach 30: 36" HDPE Pipe Avg. Flow Depth=2.03' Max Vel=22.76 fps Inflow=116.64 cfs 266,042 cf
36.0" Round Pipe n=0.013 L=805.0' S=0.0471 ' Capacity=144.80 cfs Outflow=115.93 cfs 266,042 cf

Subcatchment31: Post A14 Runoff Area=207,155 sf 90.56% Impervious Runoff Depth=7.22"
Tc=6.0 min CN=96 Runoff=46.10 cfs 124,666 cf

Pond 32: DMH-3 Peak Elev=325.13' Inflow=161.48 cfs 390,708 cf
36.0" Round Culvert x 2.00 n=0.013 L=190.0' S=0.0895 ' Outflow=161.48 cfs 390,708 cf

Subcatchment33: Post A7 Runoff Area=40,130 sf 0.00% Impervious Runoff Depth=3.87"
Flow Length=150' Tc=10.5 min CN=67 Runoff=4.66 cfs 12,954 cf

Pond 34: SWP-5 Peak Elev=305.08' Storage=84,719 cf Inflow=165.63 cfs 403,662 cf
Discarded=7.41 cfs 202,357 cf Primary=95.88 cfs 201,305 cf Outflow=103.28 cfs 403,662 cf

Subcatchment35: Post A16 Runoff Area=50,520 sf 0.00% Impervious Runoff Depth=3.98"
Flow Length=190' Tc=9.9 min CN=68 Runoff=6.22 cfs 16,775 cf

Pond 36: SWP-3 Peak Elev=260.48' Storage=47,898 cf Inflow=101.52 cfs 218,080 cf
Discarded=4.91 cfs 49,256 cf Primary=75.95 cfs 168,825 cf Outflow=80.86 cfs 218,080 cf

Subcatchment37: Post A13 Runoff Area=160,184 sf 76.47% Impervious Runoff Depth=6.75"
Tc=6.0 min CN=92 Runoff=34.76 cfs 90,058 cf

Pond 38: DIV-7 Peak Elev=316.63' Inflow=34.76 cfs 90,058 cf
Primary=3.41 cfs 46,223 cf Secondary=31.82 cfs 43,835 cf Outflow=34.76 cfs 90,058 cf

Pond 39: INF-7 Peak Elev=315.75' Storage=8,677 cf Inflow=3.41 cfs 46,223 cf
Outflow=1.07 cfs 46,223 cf

Subcatchment40: Post A2 Runoff Area=197,730 sf 24.29% Impervious Runoff Depth=5.23"
Flow Length=446' Tc=5.1 min CN=79 Runoff=37.45 cfs 86,164 cf

Pond 41: SWP-1 Peak Elev=237.90' Storage=50,432 cf Inflow=37.45 cfs 86,164 cf
Outflow=11.49 cfs 62,409 cf

North 60 Post A 3-9-20*NRCC 24-hr A 50-yr Rainfall=7.70"*

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Subcatchment42: Post A1

Runoff Area=20,740 sf 35.22% Impervious Runoff Depth=5.58"

Tc=6.0 min CN=82 Runoff=3.99 cfs 9,636 cf

Link 43: Design Point A

Inflow=256.31 cfs 1,285,407 cf

Primary=256.31 cfs 1,285,407 cf

Total Runoff Area = 3,685,596 sf Runoff Volume = 1,874,864 cf Average Runoff Depth = 6.10"
49.41% Pervious = 1,821,010 sf 50.59% Impervious = 1,864,586 sf

North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 8: Post A0 Offsite

Runoff = 188.18 cfs @ 12.20 hrs, Volume= 604,958 cf, Depth= 6.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
645,334	98	Paved parking, HSG C
443,611	80	>75% Grass cover, Good, HSG D
23,572	74	>75% Grass cover, Good, HSG C
2,543	61	>75% Grass cover, Good, HSG B
1,115,060	90	Weighted Average
469,726		42.13% Pervious Area
645,334		57.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.6	148	0.0574	3.86		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	740	0.0270	10.25	32.22	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.015 Concrete sewer w/manholes & inlets
12.5	1,018	Total			

North 60 Post A 3-9-20

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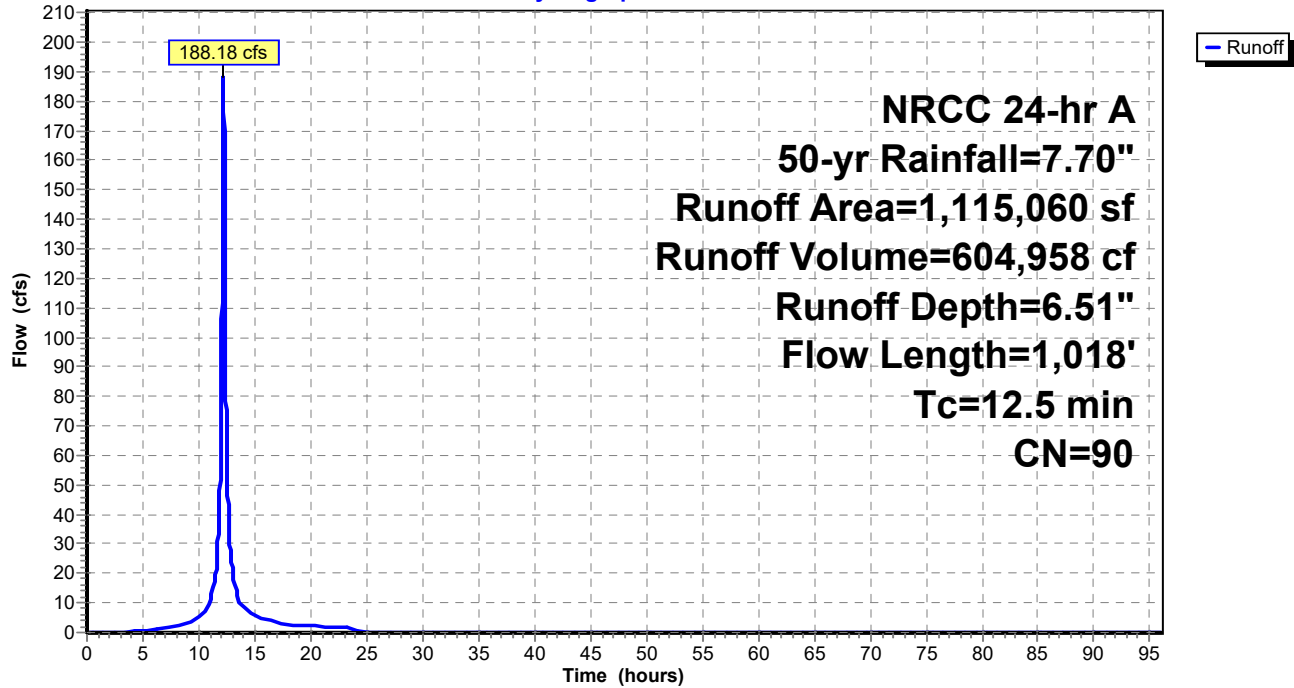
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NRCC 24-hr A 50-yr Rainfall=7.70"

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Subcatchment 8: Post A0 Offsite

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 9: Offsite Pond A

Inflow Area = 1,115,060 sf, 57.87% Impervious, Inflow Depth = 6.51" for 50-yr event
 Inflow = 188.18 cfs @ 12.20 hrs, Volume= 604,958 cf
 Outflow = 107.44 cfs @ 12.35 hrs, Volume= 553,763 cf, Atten= 43%, Lag= 8.9 min
 Primary = 107.44 cfs @ 12.35 hrs, Volume= 553,763 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 364.99' @ 12.35 hrs Surf.Area= 36,483 sf Storage= 180,130 cf

Plug-Flow detention time= 83.1 min calculated for 553,763 cf (92% of inflow)
 Center-of-Mass det. time= 41.1 min (820.8 - 779.7)

Volume	Invert	Avail.Storage	Storage Description
#1	357.00'	221,816 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)
357.00	14,633	679.0	0	0	14,633
358.00	16,652	698.0	15,632	15,632	16,826
359.00	17,534	715.0	17,091	32,723	18,864
360.00	19,427	745.0	18,472	51,195	22,425
362.00	24,453	804.0	43,784	94,979	29,861
364.00	28,701	854.0	53,097	148,076	36,663
365.00	36,602	901.0	32,572	180,648	43,285
366.00	45,910	1,262.0	41,168	221,816	105,432

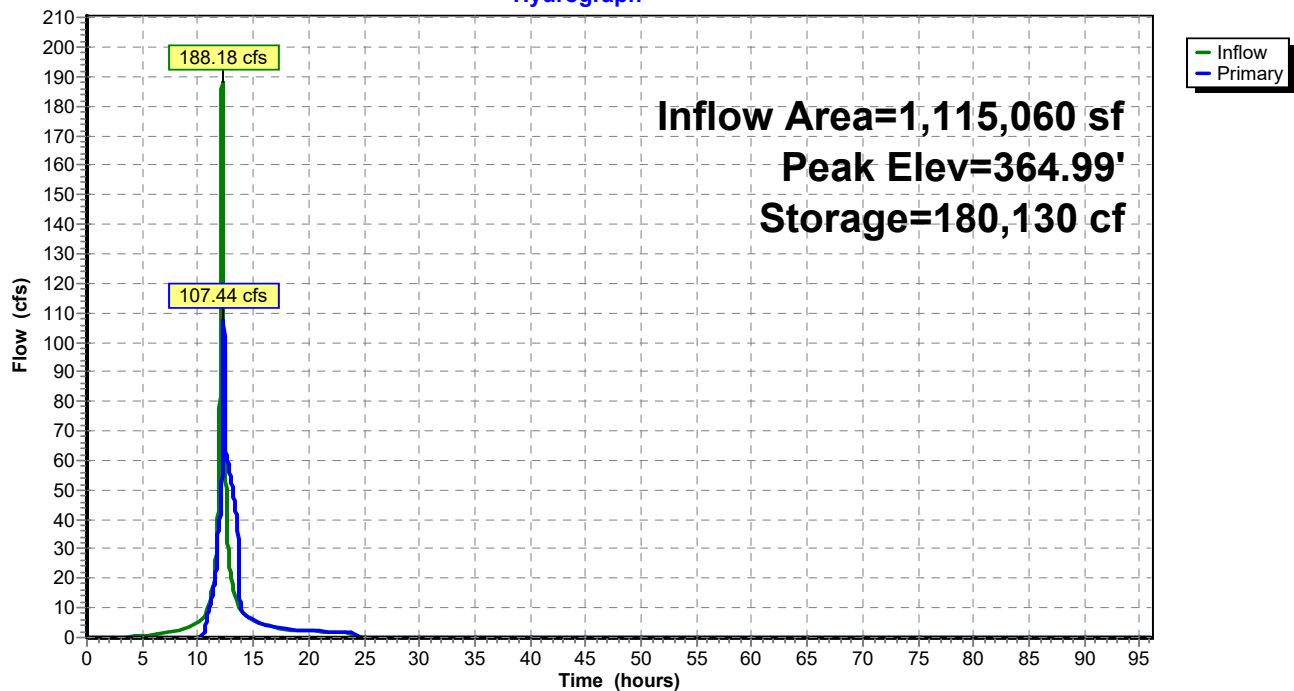
Device	Routing	Invert	Outlet Devices
#1	Primary	357.00'	30.0" Round Culvert L= 125.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 357.00' / 351.00' S= 0.0480 ' S= 0.0480 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	360.00'	36.0" x 48.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	364.75'	150.0' long x 36.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=107.34 cfs @ 12.35 hrs HW=364.99' TW=329.38' (Dynamic Tailwater)

1=Culvert (Inlet Controls 61.34 cfs @ 12.50 fps)
 2=Orifice/Grate (Passes 61.34 cfs of 258.02 cfs potential flow)
 3=Broad-Crested Rectangular Weir (Weir Controls 46.00 cfs @ 1.30 fps)

Pond 9: Offsite Pond A

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 10: Post A4

Runoff = 17.79 cfs @ 12.30 hrs, Volume= 67,008 cf, Depth= 4.89"

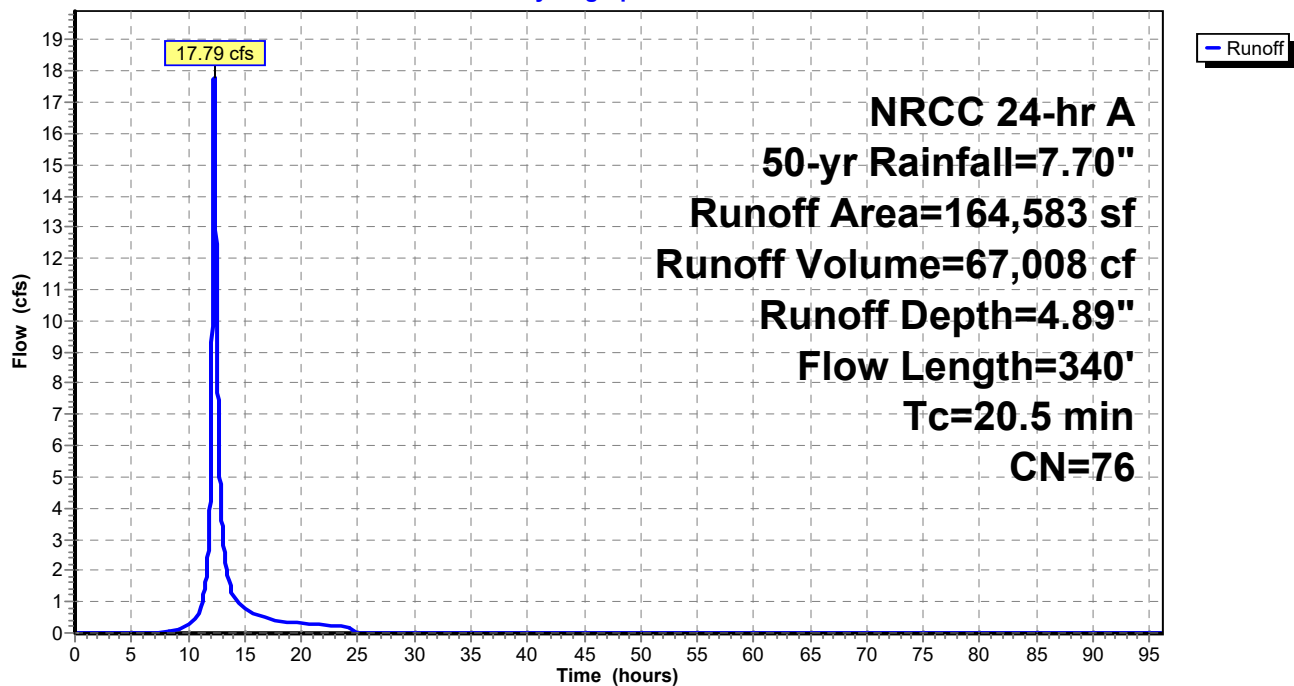
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
15,990	74	>75% Grass cover, Good, HSG C
65,271	70	Woods, Good, HSG C
66,457	77	Woods, Good, HSG D
16,865	98	Water Surface, HSG D
164,583	76	Weighted Average
147,718		89.75% Pervious Area
16,865		10.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0250	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.7	240	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
20.5	340	Total			

Subcatchment 10: Post A4

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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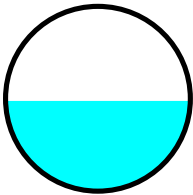
Summary for Reach 11: 24" Culvert Pipe

Inflow Area = 164,583 sf, 10.25% Impervious, Inflow Depth = 4.89" for 50-yr event
Inflow = 17.79 cfs @ 12.30 hrs, Volume= 67,008 cf
Outflow = 17.78 cfs @ 12.30 hrs, Volume= 67,008 cf, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 11.67 fps, Min. Travel Time= 0.2 min
Avg. Velocity= 4.08 fps, Avg. Travel Time= 0.5 min

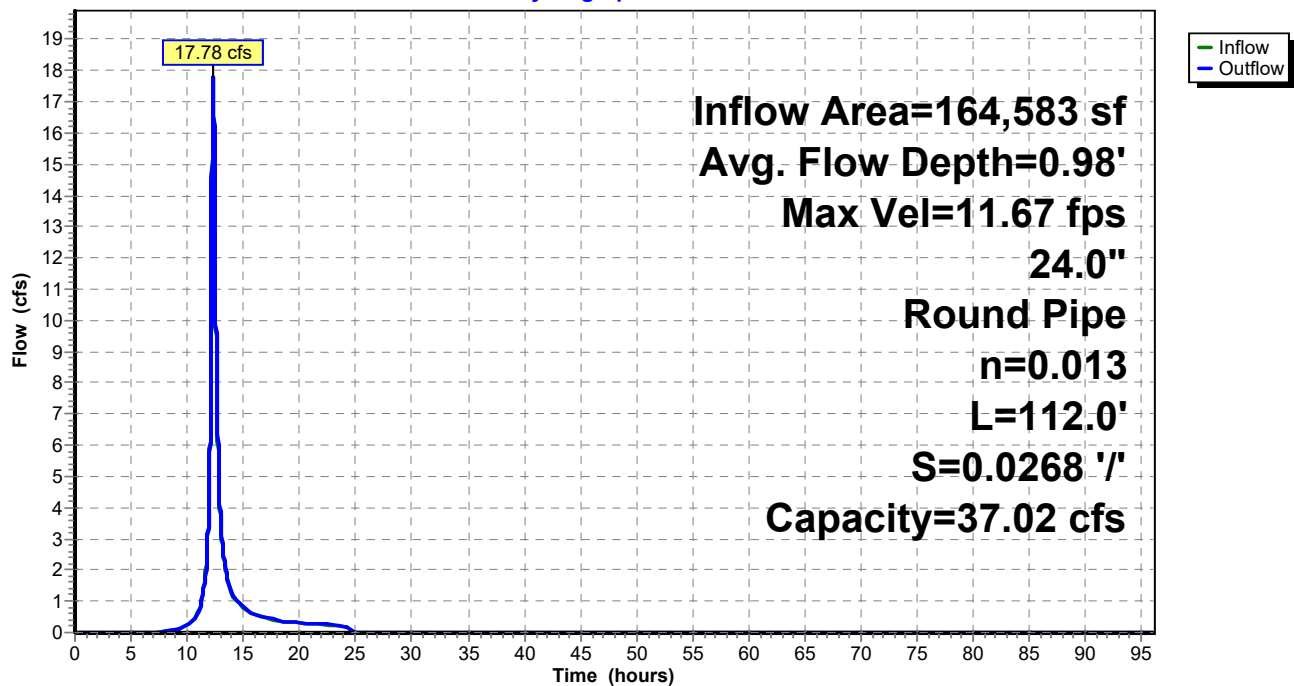
Peak Storage= 171 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.98'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 37.02 cfs

24.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 112.0' Slope= 0.0268 '/
Inlet Invert= 349.00', Outlet Invert= 346.00'



Reach 11: 24" Culvert Pipe

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 12: Post A8

Runoff = 23.88 cfs @ 12.26 hrs, Volume= 83,689 cf, Depth= 4.77"

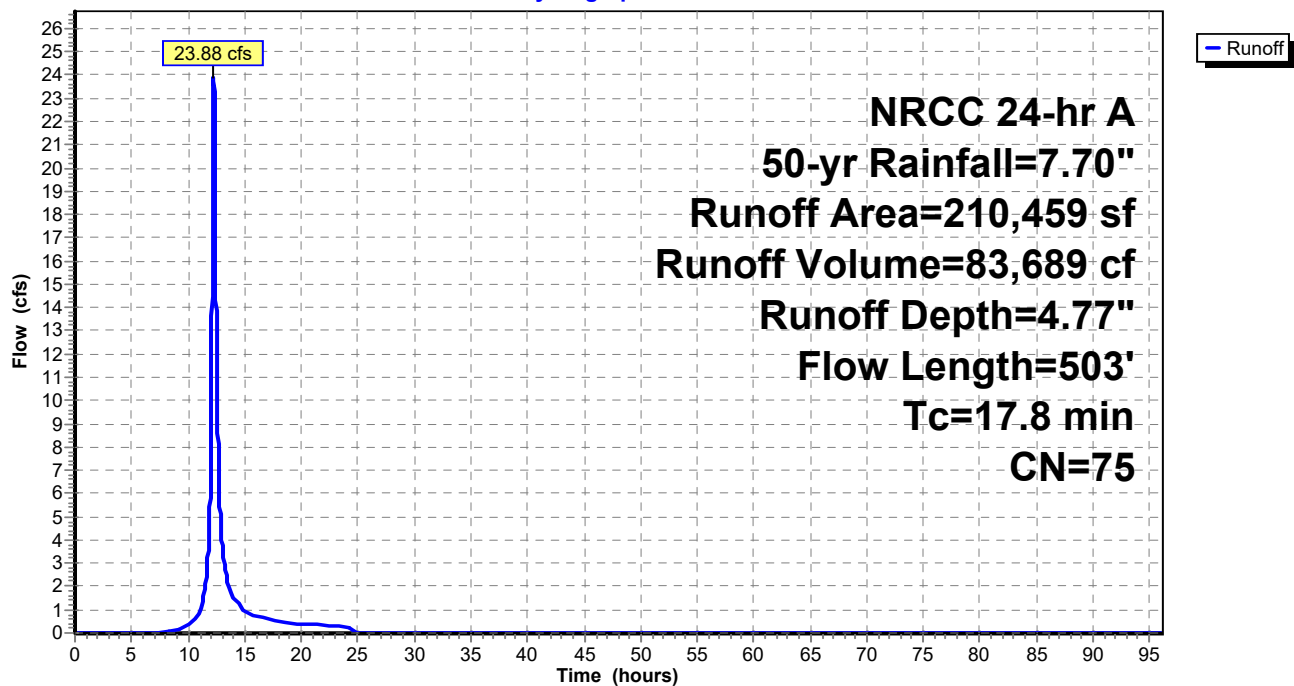
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
31,463	77	Woods, Good, HSG D
57,494	80	>75% Grass cover, Good, HSG D
63,009	70	Woods, Good, HSG C
58,493	74	>75% Grass cover, Good, HSG C
210,459	75	Weighted Average
210,459		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0400	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.4	305	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.8	98	0.0306	1.97	3.94	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
17.8	503	Total			

Subcatchment 12: Post A8

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 13: Post A11

Runoff = 15.40 cfs @ 12.13 hrs, Volume= 39,194 cf, Depth= 6.51"

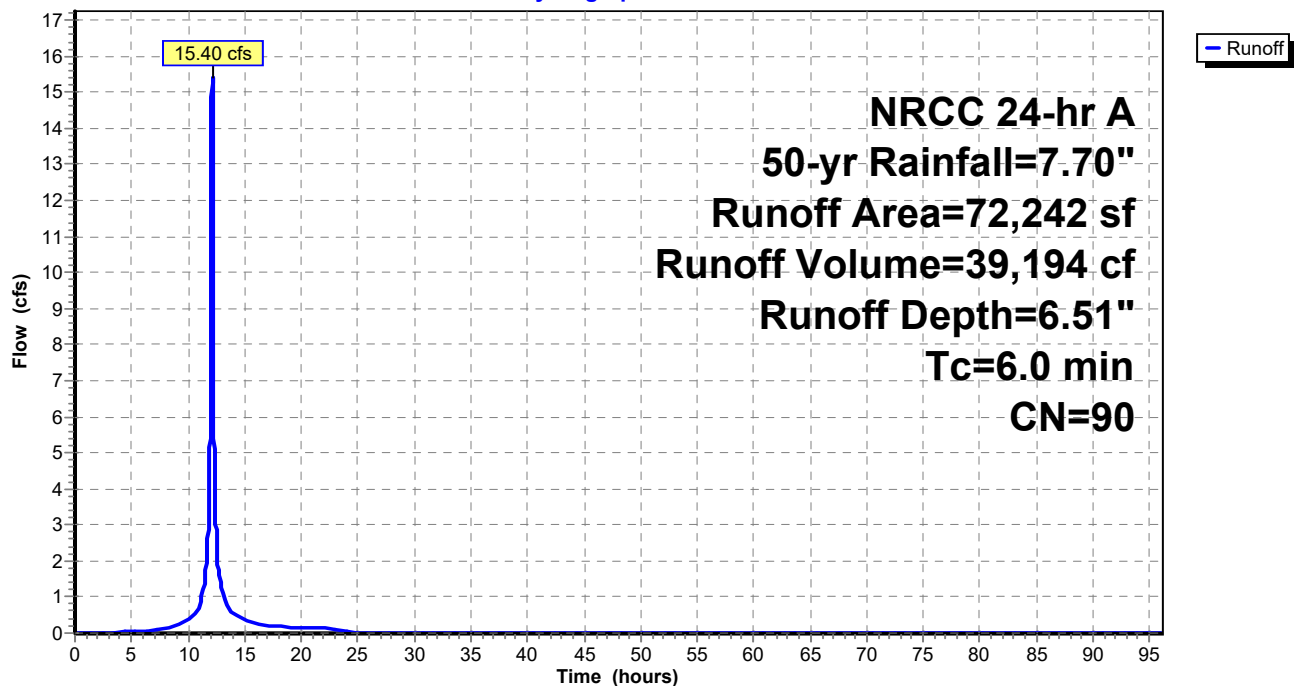
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
46,000	98	Paved parking, HSG C
16,765	74	>75% Grass cover, Good, HSG C
9,477	80	>75% Grass cover, Good, HSG D
72,242	90	Weighted Average
26,242		36.33% Pervious Area
46,000		63.67% Impervious Area

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

Subcatchment 13: Post A11

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 14: Post A10

Runoff = 66.50 cfs @ 12.13 hrs, Volume= 173,970 cf, Depth= 6.87"

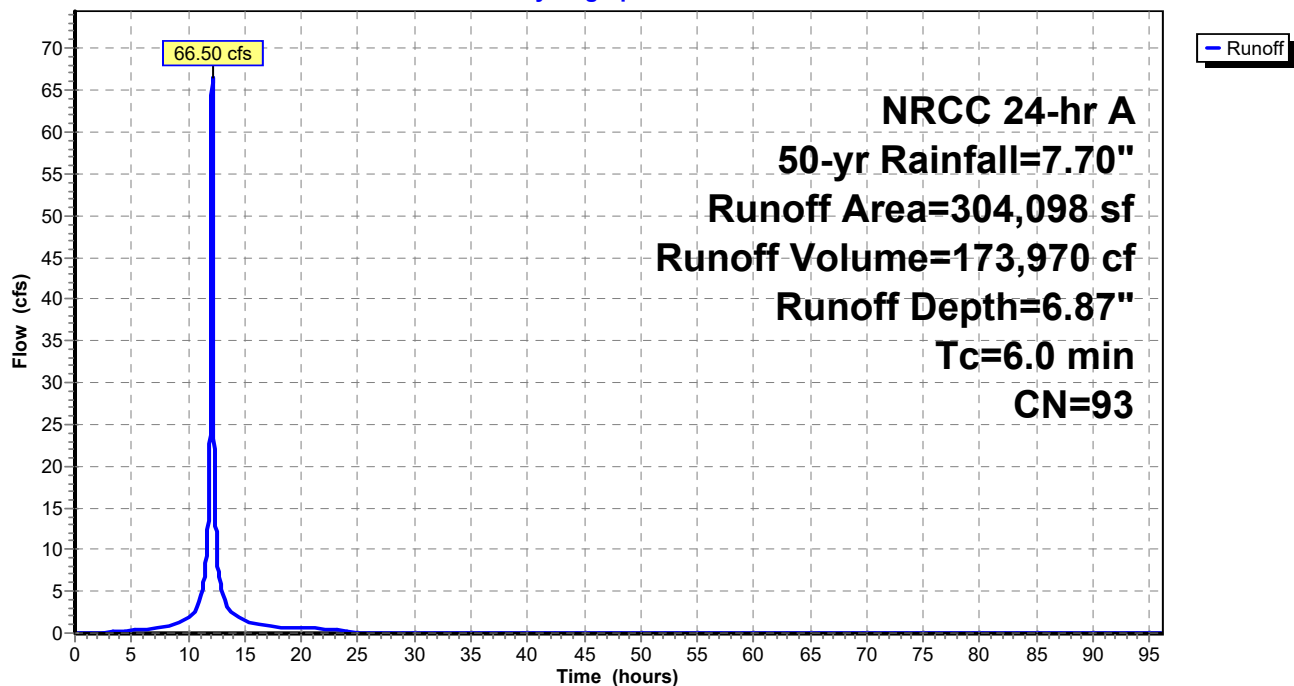
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
234,393	98	Paved parking, HSG C
56,515	74	>75% Grass cover, Good, HSG C
13,190	80	>75% Grass cover, Good, HSG D
304,098	93	Weighted Average
69,705		22.92% Pervious Area
234,393		77.08% Impervious Area

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

Subcatchment 14: Post A10

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 15: DIV-5

Inflow Area = 304,098 sf, 77.08% Impervious, Inflow Depth = 6.87" for 50-yr event
 Inflow = 66.50 cfs @ 12.13 hrs, Volume= 173,970 cf
 Outflow = 66.50 cfs @ 12.13 hrs, Volume= 173,970 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.36 cfs @ 12.13 hrs, Volume= 91,080 cf
 Secondary = 60.14 cfs @ 12.13 hrs, Volume= 82,890 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 340.12' @ 12.13 hrs

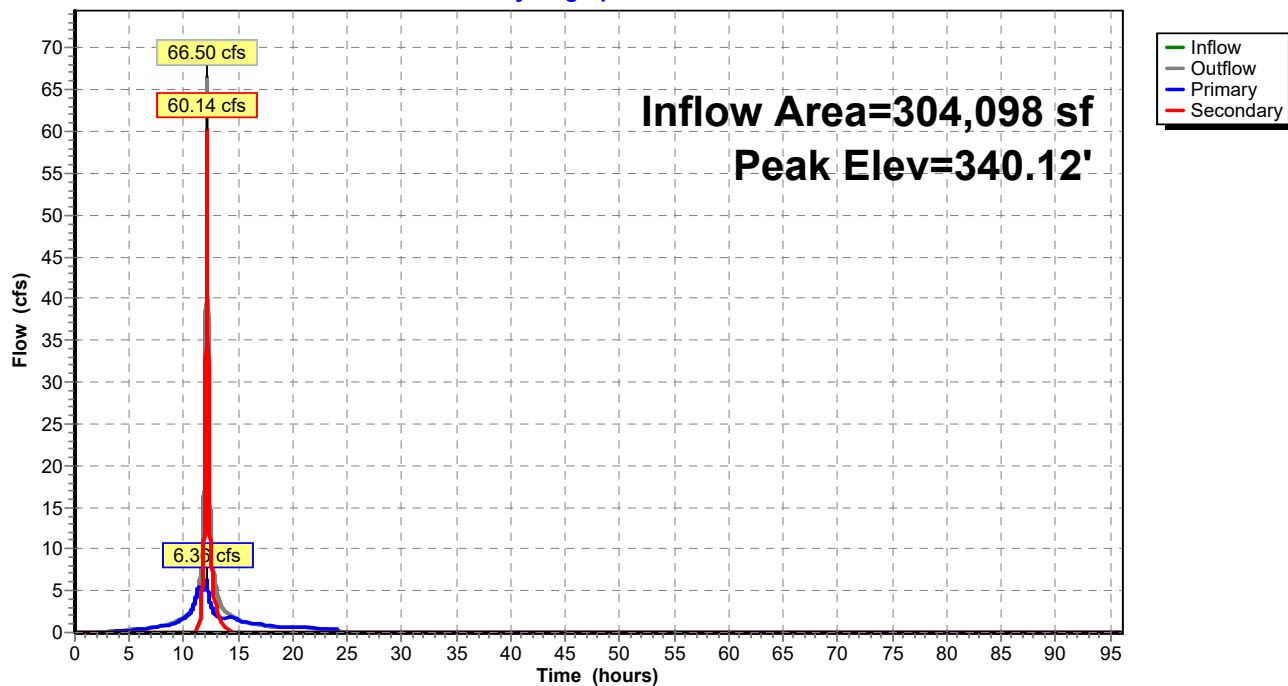
Flood Elev= 342.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	335.50'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 335.50' / 335.50' S= 0.0000 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	335.50'	36.0" Round Culvert L= 72.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 335.50' / 332.00' S= 0.0486 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Device 2	338.00'	8.0' 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=6.32 cfs @ 12.13 hrs HW=340.11' TW=337.32' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 6.32 cfs @ 8.04 fps)**Secondary OutFlow** Max=60.10 cfs @ 12.13 hrs HW=340.12' TW=327.39' (Dynamic Tailwater)↑**2=Culvert** (Inlet Controls 60.10 cfs @ 8.50 fps)↑**3=Broad-Crested Rectangular Weir** (Passes 60.10 cfs of 81.87 cfs potential flow)

Pond 15: DIV-5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 16: INF-5

Inflow Area = 304,098 sf, 77.08% Impervious, Inflow Depth = 3.59" for 50-yr event
 Inflow = 6.36 cfs @ 12.13 hrs, Volume= 91,080 cf
 Outflow = 1.98 cfs @ 10.55 hrs, Volume= 91,080 cf, Atten= 69%, Lag= 0.0 min
 Discarded = 1.98 cfs @ 10.55 hrs, Volume= 91,080 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 337.97' @ 13.06 hrs Surf.Area= 8,559 sf Storage= 18,182 cf

Plug-Flow detention time= 66.2 min calculated for 91,070 cf (100% of inflow)
 Center-of-Mass det. time= 66.2 min (857.2 - 791.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	335.00'	9,145 cf	70.25'W x 121.83'L x 4.33'H Field A 37,088 cf Overall - 14,227 cf Embedded = 22,862 cf x 40.0% Voids
#2A	335.50'	14,227 cf	Cultec R-360HD x 384 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 384 Chambers in 12 Rows Cap Storage= +6.5 cf x 2 x 12 rows = 155.0 cf
		23,371 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	335.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.98 cfs @ 10.55 hrs HW=335.05' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.98 cfs)

North 60 Post A 3-9-20

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Pond 16: INF-5 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 12 rows = 155.0 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

32 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 119.83' Row Length +12.0" End Stone x 2 = 121.83' Base Length

12 Rows x 60.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 70.25' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

384 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 12 Rows = 14,226.6 cf Chamber Storage

37,088.1 cf Field - 14,226.6 cf Chambers = 22,861.5 cf Stone x 40.0% Voids = 9,144.6 cf Stone Storage

Chamber Storage + Stone Storage = 23,371.2 cf = 0.537 af

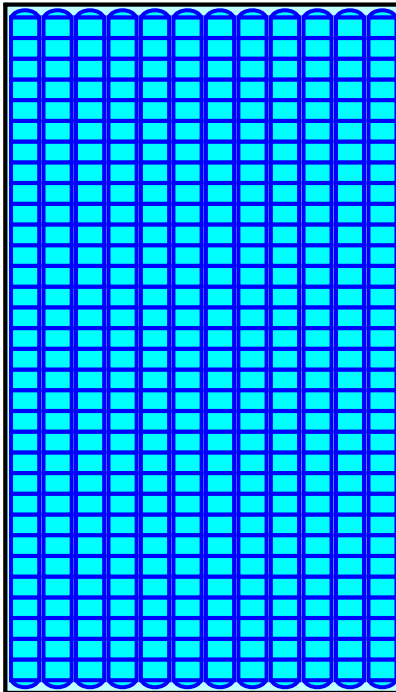
Overall Storage Efficiency = 63.0%

Overall System Size = 121.83' x 70.25' x 4.33'

384 Chambers

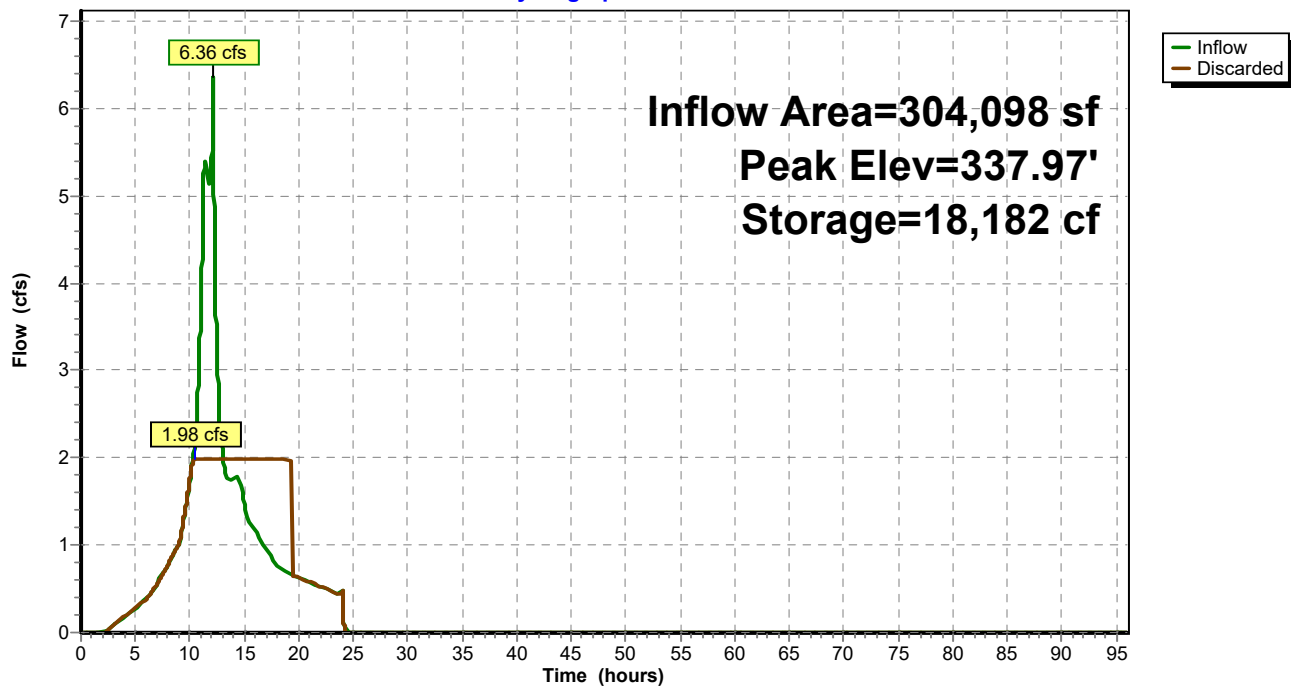
1,373.6 cy Field

846.7 cy Stone



Pond 16: INF-5

Hydrograph



North 60 Post A 3-9-20

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Summary for Pond 17: Existing Wetland A

Inflow Area = 1,562,344 sf, 45.33% Impervious, Inflow Depth = 6.35" for 50-yr event
 Inflow = 164.26 cfs @ 12.34 hrs, Volume= 826,544 cf
 Outflow = 93.92 cfs @ 12.55 hrs, Volume= 826,544 cf, Atten= 43%, Lag= 12.4 min
 Primary = 93.92 cfs @ 12.55 hrs, Volume= 826,544 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 330.11' @ 12.55 hrs Surf.Area= 34,878 sf Storage= 111,371 cf

Plug-Flow detention time= 9.6 min calculated for 826,544 cf (100% of inflow)
 Center-of-Mass det. time= 9.5 min (818.9 - 809.5)

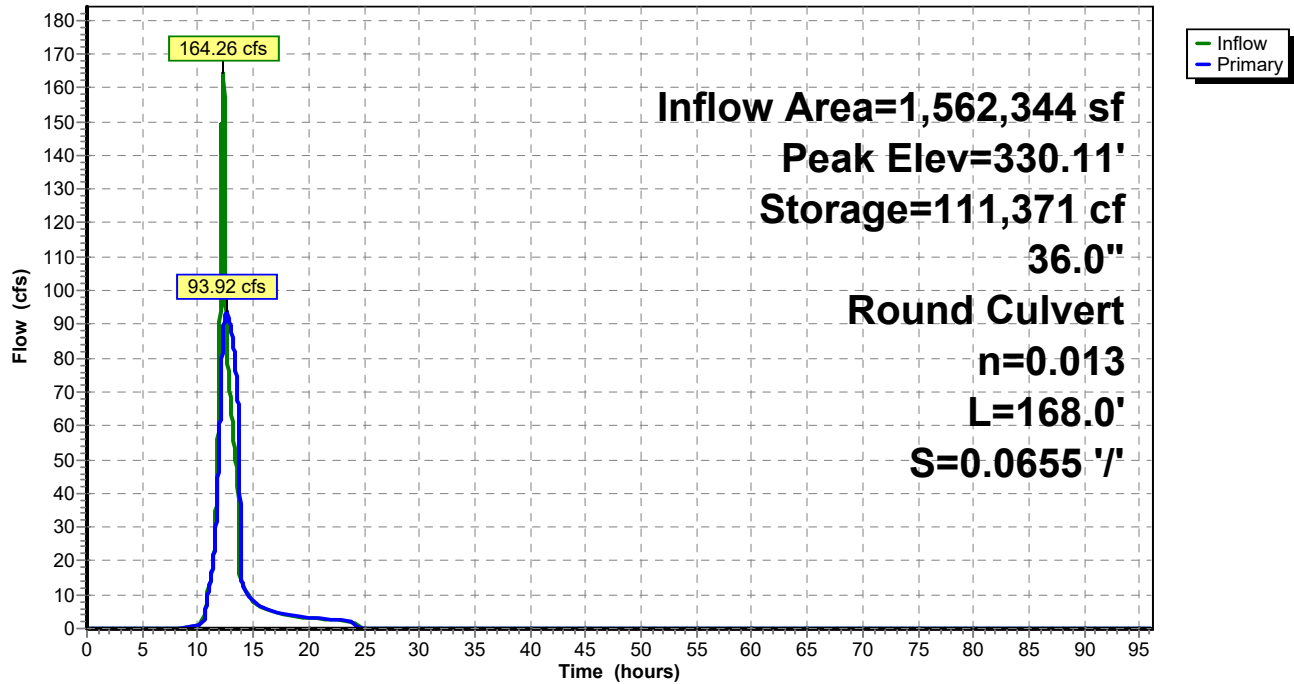
Volume	Invert	Avail.Storage	Storage Description		
#1	321.00'	190,307 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
321.00	124	53.2	0	0	124
322.00	1,084	175.8	525	525	2,361
324.00	4,913	341.5	5,536	6,061	9,202
326.00	11,332	638.2	15,804	21,866	32,354
328.00	20,583	804.3	31,458	53,324	51,475
330.00	34,086	1,075.5	54,104	107,428	92,087
332.00	49,257	1,268.5	82,879	190,307	128,164

Device	Routing	Invert	Outlet Devices
#1	Primary	321.00'	36.0" Round Culvert L= 168.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 321.00' / 310.00' S= 0.0655 ' S= 0.0655 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=93.92 cfs @ 12.55 hrs HW=330.11' TW=313.54' (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 93.92 cfs @ 13.29 fps)

Pond 17: Existing Wetland A

Hydrograph



North 60 Post A 3-9-20

Prepared by {enter your company name here}

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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Summary for Subcatchment 18: Post A15

Runoff = 69.36 cfs @ 12.13 hrs, Volume= 156,815 cf, Depth= 4.43"

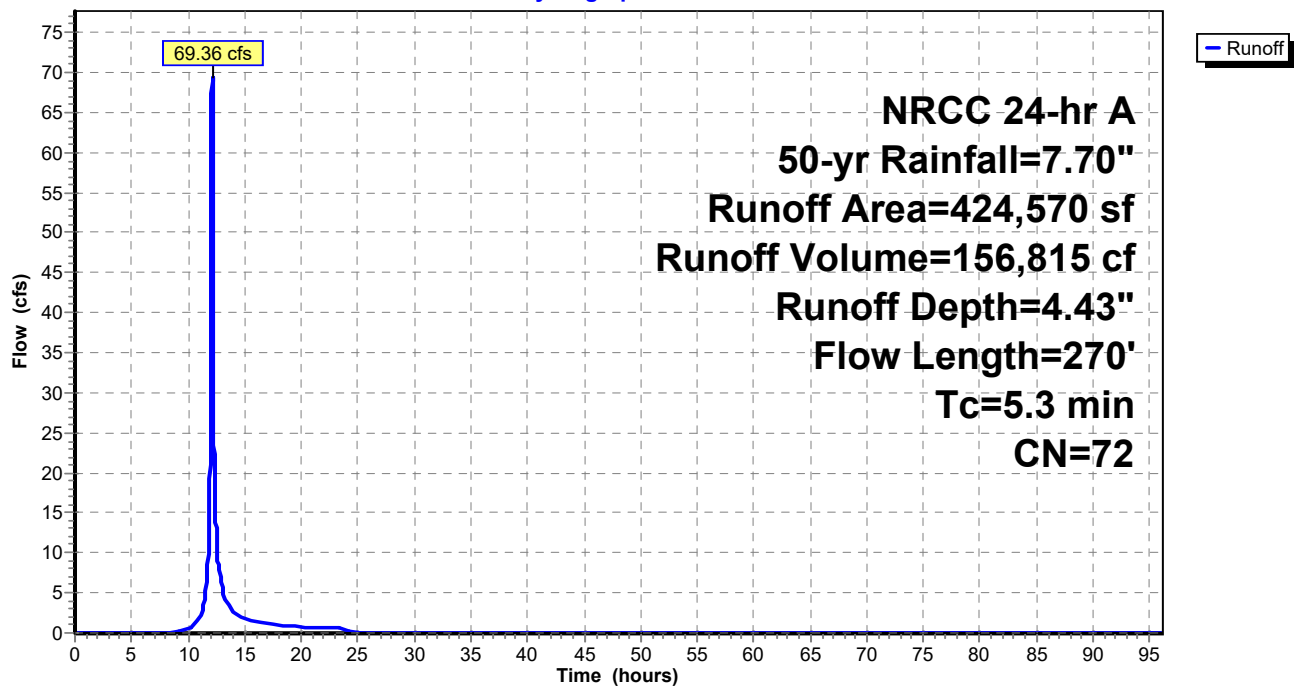
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
21,520	77	Woods, Good, HSG D
33,300	80	>75% Grass cover, Good, HSG D
213,730	70	Woods, Good, HSG C
140,572	74	>75% Grass cover, Good, HSG C
15,448	60	Woods, Fair, HSG B
424,570	72	Weighted Average
424,570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	100	0.1000	0.34		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.4	170	0.2353	7.81		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.3	270	Total			

Subcatchment 18: Post A15

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Summary for Subcatchment 19: Post A3

Runoff = 20.90 cfs @ 12.13 hrs, Volume= 57,990 cf, Depth= 7.46"

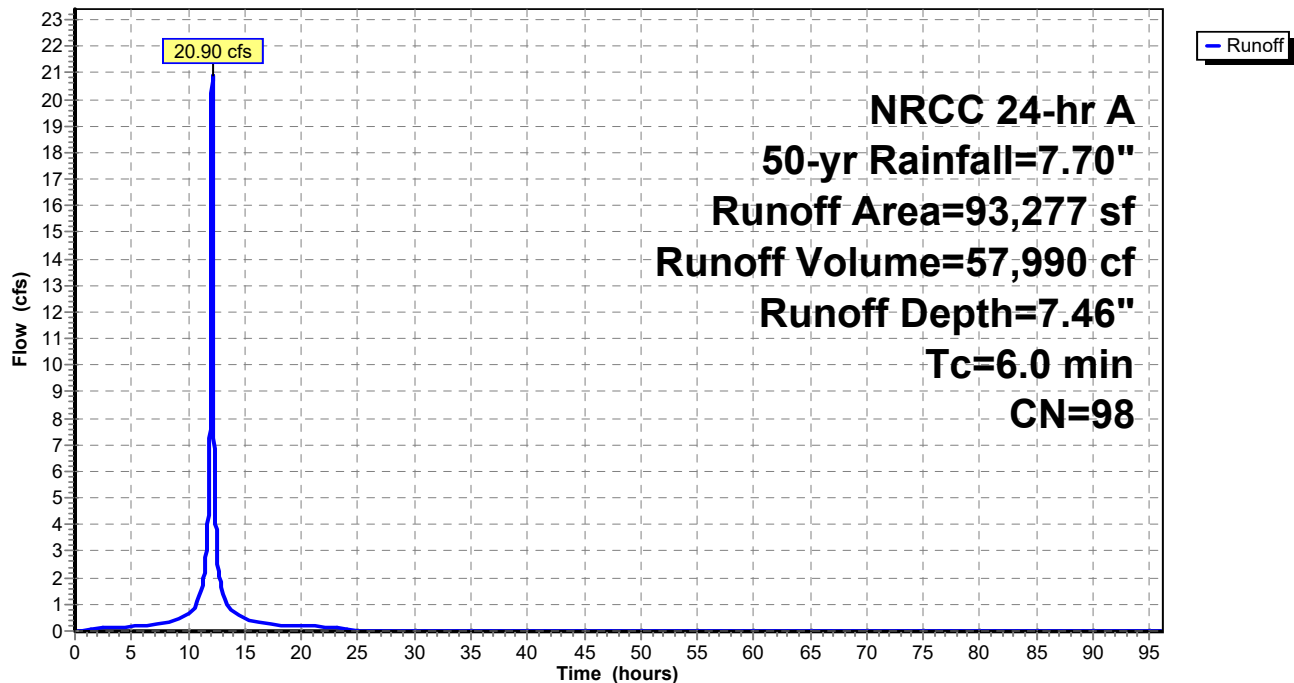
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
93,277	98	Paved parking, HSG C
93,277		100.00% Impervious Area

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

Subcatchment 19: Post A3

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 20: DIV-1

Inflow Area = 93,277 sf, 100.00% Impervious, Inflow Depth = 7.46" for 50-yr event
 Inflow = 20.90 cfs @ 12.13 hrs, Volume= 57,990 cf
 Outflow = 20.90 cfs @ 12.13 hrs, Volume= 57,990 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.45 cfs @ 12.13 hrs, Volume= 40,647 cf
 Secondary = 15.46 cfs @ 12.13 hrs, Volume= 17,343 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 328.55' @ 12.13 hrs

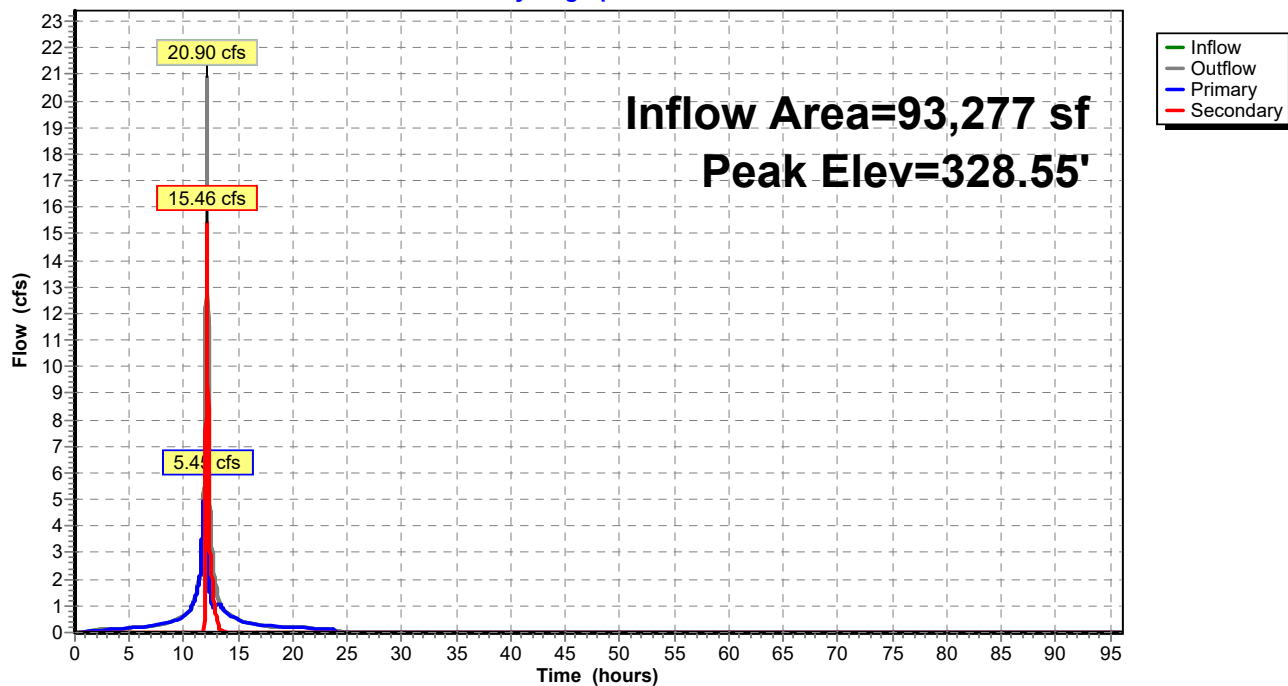
Flood Elev= 330.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	324.50'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.50' / 324.50' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	324.50'	18.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.50' / 320.00' S= 0.0900 ' S= 0.0900 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	327.00'	8.0' 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=5.36 cfs @ 12.13 hrs HW=328.52' TW=326.51' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.36 cfs @ 6.83 fps)**Secondary OutFlow** Max=15.45 cfs @ 12.13 hrs HW=328.55' TW=313.81' (Dynamic Tailwater)↑ **2=Culvert** (Inlet Controls 15.45 cfs @ 8.74 fps)↑ **3=Broad-Crested Rectangular Weir** (Passes 15.45 cfs of 51.18 cfs potential flow)

Pond 20: DIV-1

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 21: INF-1

Inflow Area = 93,277 sf, 100.00% Impervious, Inflow Depth = 5.23" for 50-yr event
 Inflow = 5.45 cfs @ 12.13 hrs, Volume= 40,647 cf
 Outflow = 1.18 cfs @ 11.10 hrs, Volume= 40,647 cf, Atten= 78%, Lag= 0.0 min
 Discarded = 1.18 cfs @ 11.10 hrs, Volume= 40,647 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 327.13' @ 12.54 hrs Surf.Area= 4,245 sf Storage= 9,187 cf

Plug-Flow detention time= 46.6 min calculated for 40,643 cf (100% of inflow)
 Center-of-Mass det. time= 46.6 min (791.0 - 744.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	324.00'	4,688 cf	36.75'W x 115.50'L x 4.33'H Field A 18,393 cf Overall - 6,674 cf Embedded = 11,720 cf x 40.0% Voids
#2A	324.50'	6,674 cf	Cultec R-360HD x 180 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 180 Chambers in 6 Rows Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf
		11,361 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	324.00'	12.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.18 cfs @ 11.10 hrs HW=324.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.18 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Pond 21: INF-1 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

30 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 112.50' Row Length +18.0" End Stone x 2 = 115.50' Base Length

6 Rows x 60.0" Wide + 9.0" Spacing x 5 + 18.0" Side Stone x 2 = 36.75' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

180 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 6 Rows = 6,673.6 cf Chamber Storage

18,393.4 cf Field - 6,673.6 cf Chambers = 11,719.8 cf Stone x 40.0% Voids = 4,687.9 cf Stone Storage

Chamber Storage + Stone Storage = 11,361.5 cf = 0.261 af

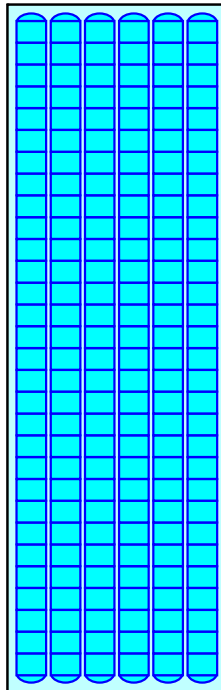
Overall Storage Efficiency = 61.8%

Overall System Size = 115.50' x 36.75' x 4.33'

180 Chambers

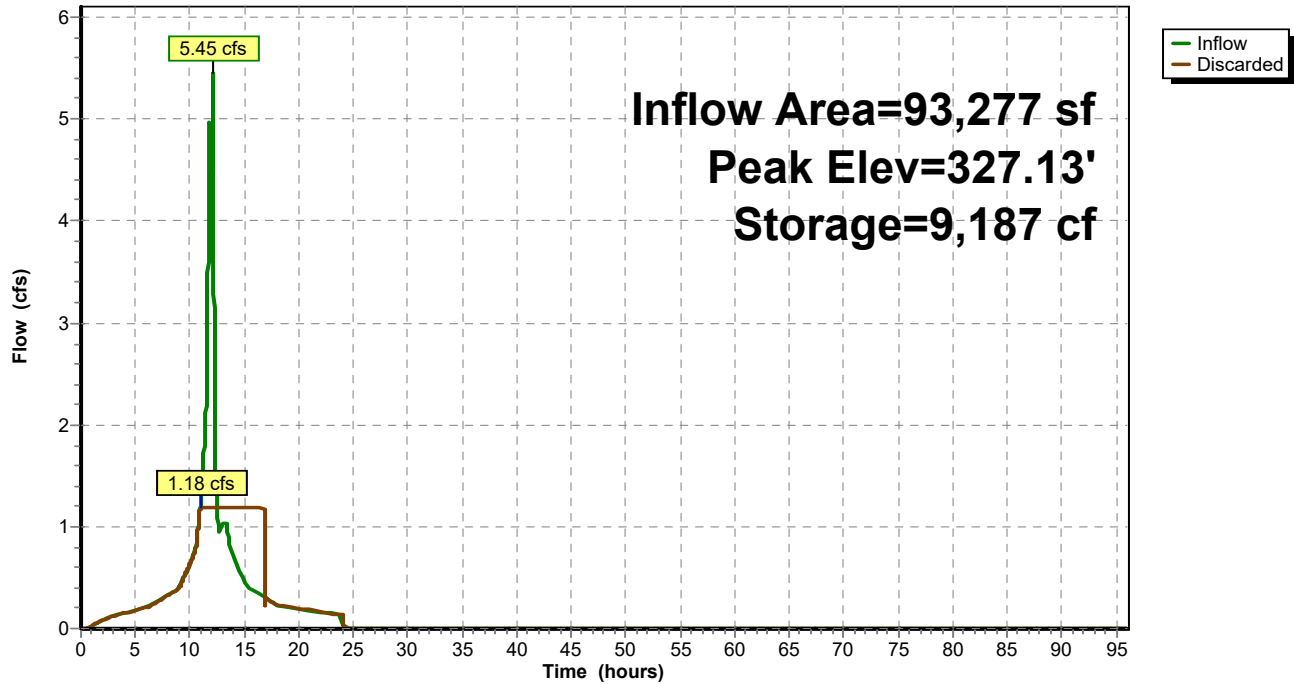
681.2 cy Field

434.1 cy Stone



Pond 21: INF-1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Reach 22: Existing Stream A

Inflow Area = 1,986,914 sf, 35.64% Impervious, Inflow Depth = 6.04" for 50-yr event
Inflow = 160.10 cfs @ 12.13 hrs, Volume= 1,000,703 cf
Outflow = 155.06 cfs @ 12.15 hrs, Volume= 1,000,703 cf, Atten= 3%, Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.98 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 2.65 fps, Avg. Travel Time= 8.6 min

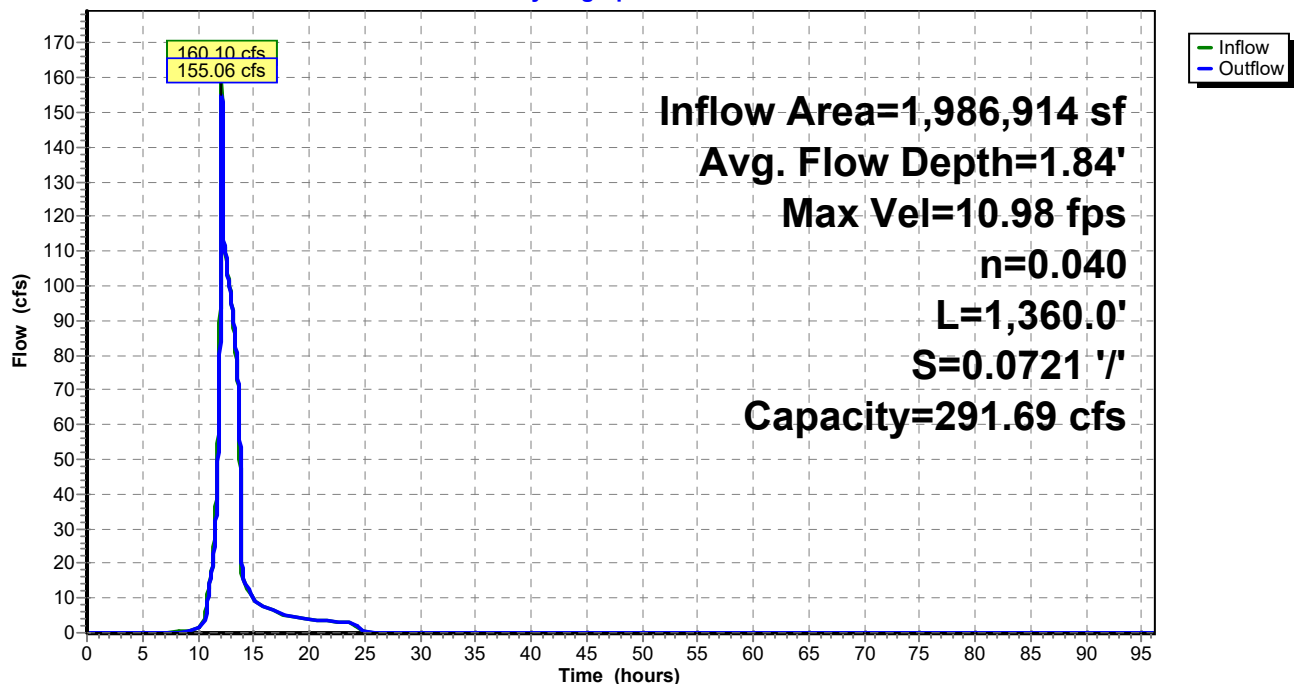
Peak Storage= 19,207 cf @ 12.15 hrs
Average Depth at Peak Storage= 1.84'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 291.69 cfs

4.00' x 2.50' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 1,360.0' Slope= 0.0721 '/'
Inlet Invert= 312.00', Outlet Invert= 214.00'



Reach 22: Existing Stream A

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 23: Post A5

Runoff = 20.82 cfs @ 12.13 hrs, Volume= 57,772 cf, Depth= 7.46"

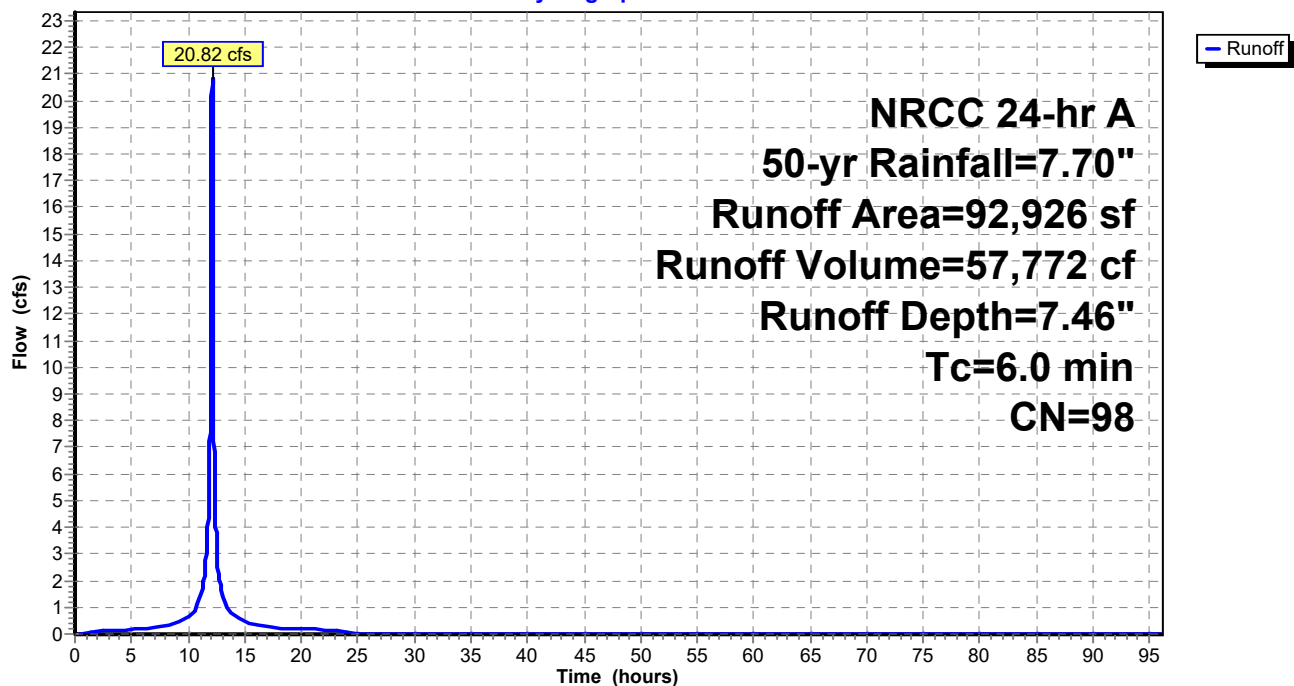
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
92,926	98	Paved parking, HSG C
92,926		100.00% Impervious Area

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

Subcatchment 23: Post A5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 24: DIV-2

Inflow Area = 92,926 sf, 100.00% Impervious, Inflow Depth = 7.46" for 50-yr event
 Inflow = 20.82 cfs @ 12.13 hrs, Volume= 57,772 cf
 Outflow = 20.82 cfs @ 12.13 hrs, Volume= 57,772 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.36 cfs @ 11.85 hrs, Volume= 40,322 cf
 Secondary = 16.26 cfs @ 12.13 hrs, Volume= 17,450 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 368.73' @ 12.13 hrs

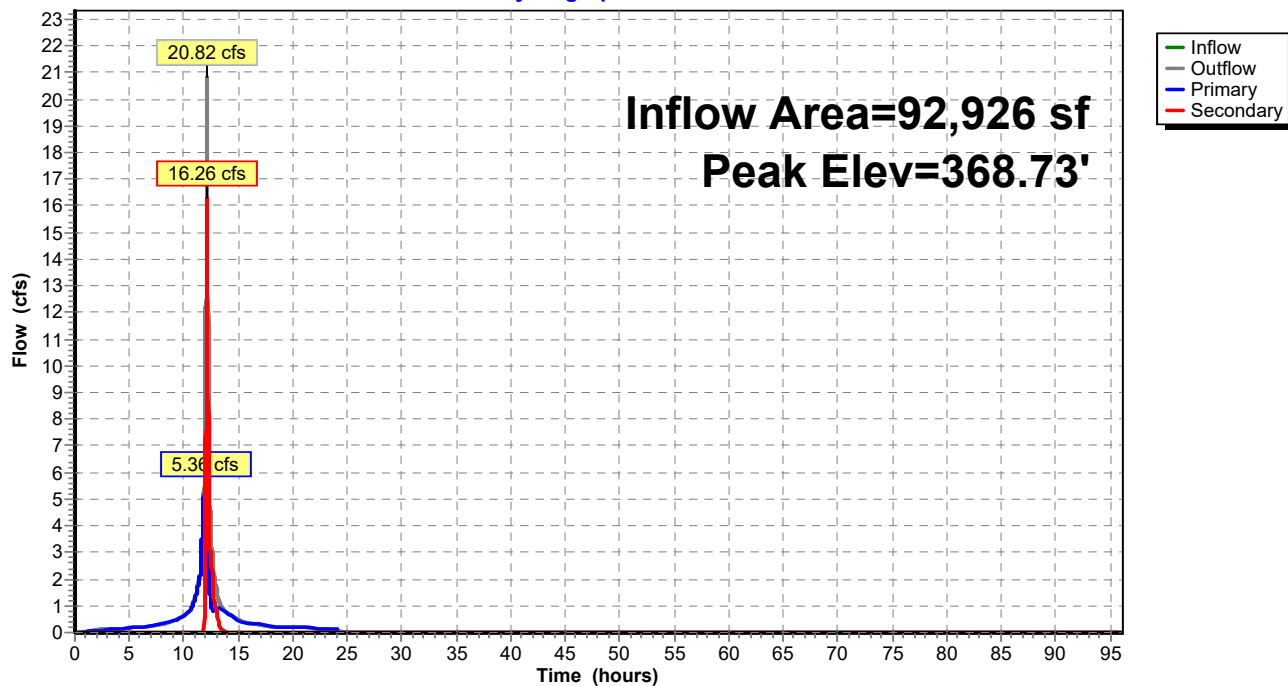
Flood Elev= 371.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	365.00'	12.0" Round Culvert L= 9.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 365.00' / 365.00' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	366.50'	24.0" Round Culvert L= 550.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 366.50' / 355.00' S= 0.0209 ' S= 0.0209 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	368.00'	8.0' 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=5.28 cfs @ 11.85 hrs HW=368.04' TW=366.09' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.28 cfs @ 6.72 fps)**Secondary OutFlow** Max=16.25 cfs @ 12.13 hrs HW=368.73' TW=357.95' (Dynamic Tailwater)↑ **2=Culvert** (Passes 16.25 cfs of 16.81 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 16.25 cfs @ 2.77 fps)

Pond 24: DIV-2

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 25: INF-2

Inflow Area = 92,926 sf, 100.00% Impervious, Inflow Depth = 5.21" for 50-yr event
 Inflow = 5.36 cfs @ 11.85 hrs, Volume= 40,322 cf
 Outflow = 0.99 cfs @ 10.94 hrs, Volume= 40,322 cf, Atten= 81%, Lag= 0.0 min
 Discarded = 0.99 cfs @ 10.94 hrs, Volume= 40,322 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 368.17' @ 12.52 hrs Surf.Area= 4,295 sf Storage= 10,517 cf

Plug-Flow detention time= 68.4 min calculated for 40,318 cf (100% of inflow)
 Center-of-Mass det. time= 68.4 min (812.2 - 743.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	364.50'	4,639 cf	41.50'W x 103.50'L x 4.33'H Field A 18,613 cf Overall - 7,016 cf Embedded = 11,596 cf x 40.0% Voids
#2A	365.00'	7,016 cf	Cultec R-360HD x 189 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 189 Chambers in 7 Rows Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf
		11,655 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	364.50'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=0.99 cfs @ 10.94 hrs HW=364.55' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.99 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Pond 25: INF-2 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

27 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 101.50' Row Length +12.0" End Stone x 2 = 103.50' Base Length

7 Rows x 60.0" Wide + 9.0" Spacing x 6 + 12.0" Side Stone x 2 = 41.50' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

189 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 7 Rows = 7,016.3 cf Chamber Storage

18,612.7 cf Field - 7,016.3 cf Chambers = 11,596.5 cf Stone x 40.0% Voids = 4,638.6 cf Stone Storage

Chamber Storage + Stone Storage = 11,654.9 cf = 0.268 af

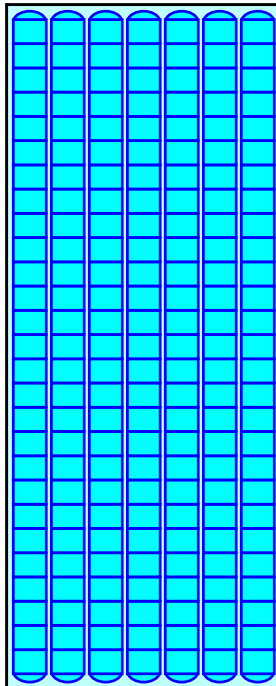
Overall Storage Efficiency = 62.6%

Overall System Size = 103.50' x 41.50' x 4.33'

189 Chambers

689.4 cy Field

429.5 cy Stone



North 60 Post A 3-9-20

Prepared by {enter your company name here}

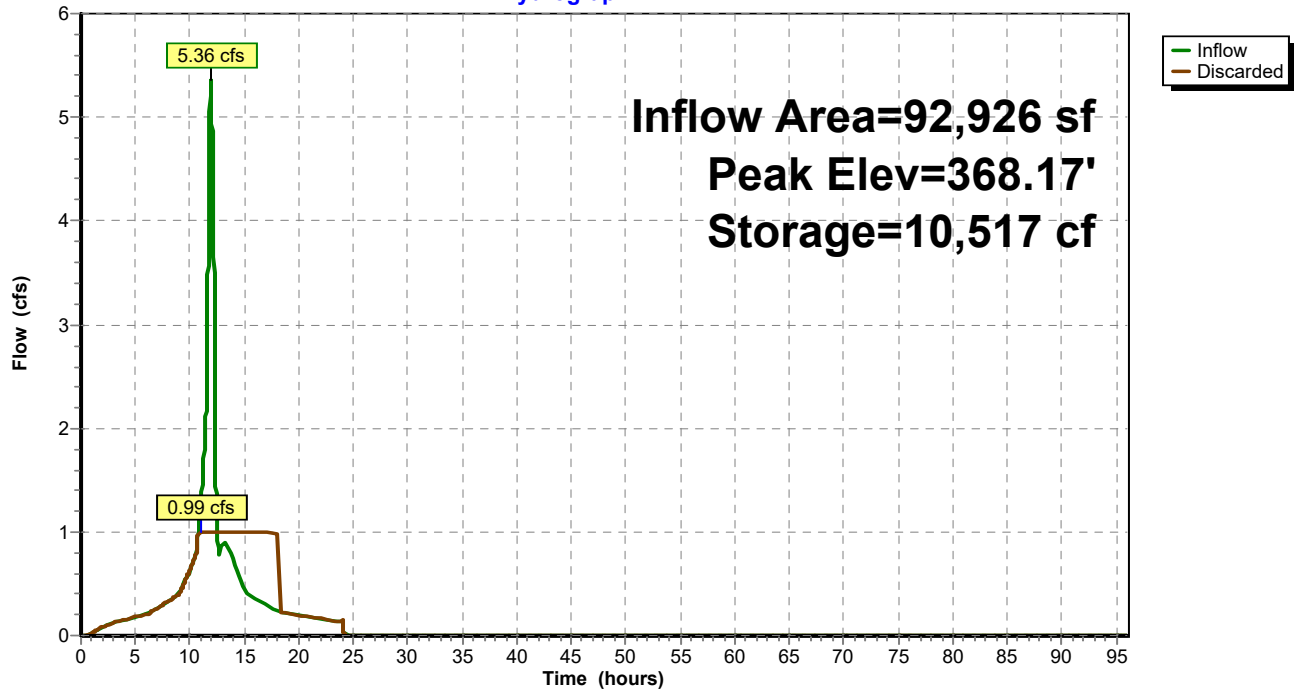
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NRCC 24-hr A 50-yr Rainfall=7.70"

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Pond 25: INF-2

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 26: Post A12

Runoff = 26.61 cfs @ 12.19 hrs, Volume= 81,293 cf, Depth= 6.04"

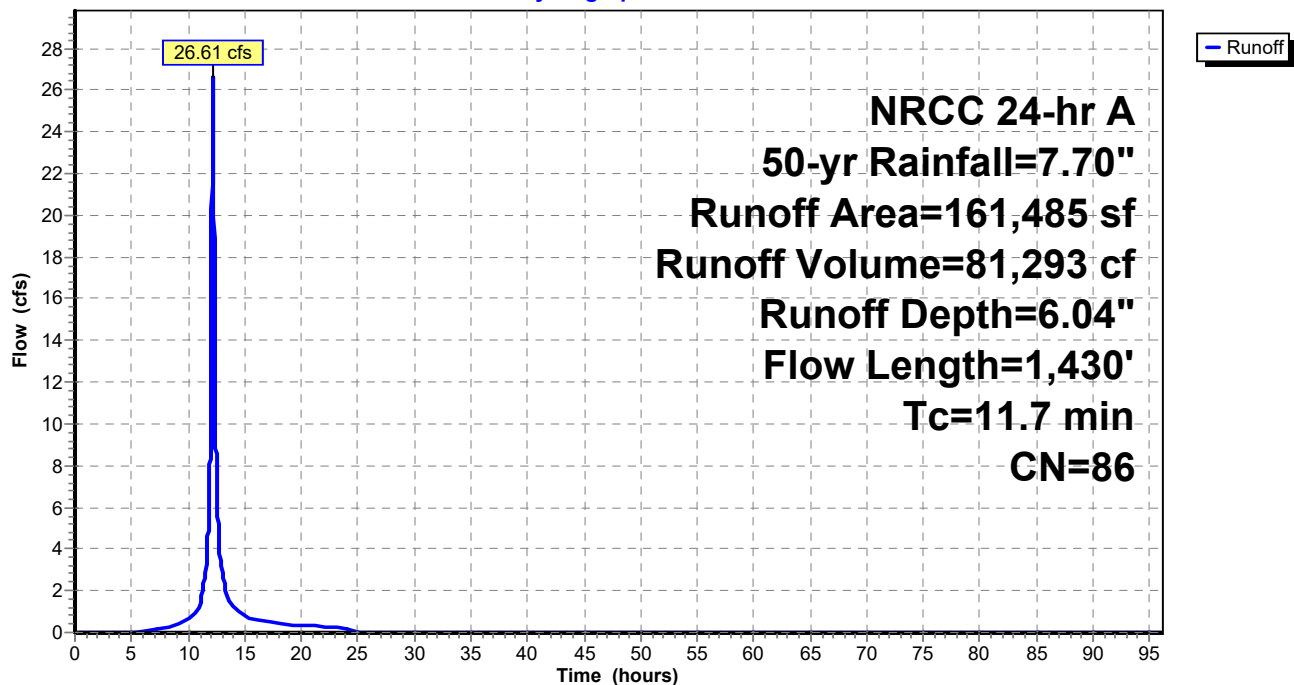
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
83,450	98	Paved parking, HSG C
78,035	74	>75% Grass cover, Good, HSG C
161,485	86	Weighted Average
78,035		48.32% Pervious Area
83,450		51.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	84	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
1.6	201	0.0164	2.06		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,145	0.0339	9.69	11.89	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
11.7	1,430	Total			

Subcatchment 26: Post A12

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 27: DIV-6

Inflow Area = 161,485 sf, 51.68% Impervious, Inflow Depth = 6.04" for 50-yr event
 Inflow = 26.61 cfs @ 12.19 hrs, Volume= 81,293 cf
 Outflow = 26.61 cfs @ 12.19 hrs, Volume= 81,293 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.09 cfs @ 11.69 hrs, Volume= 44,622 cf
 Secondary = 23.21 cfs @ 12.19 hrs, Volume= 36,671 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 365.42' @ 12.19 hrs

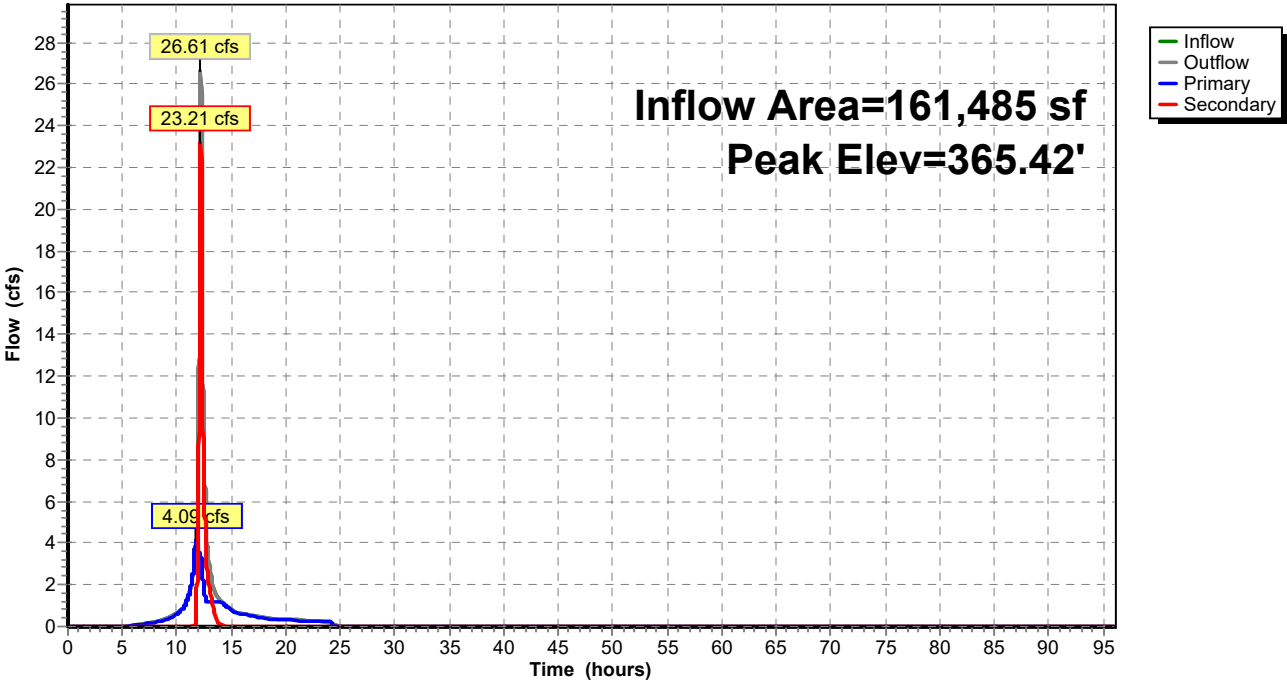
Flood Elev= 366.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	361.50'	10.0" Round Culvert L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 361.50' / 361.50' S= 0.0000 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	361.50'	24.0" Round Culvert L= 148.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 361.50' / 355.94' S= 0.0376 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	364.50'	8.0' 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=4.05 cfs @ 11.69 hrs HW=364.53' TW=362.14' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 4.05 cfs @ 7.43 fps)**Secondary OutFlow** Max=23.20 cfs @ 12.19 hrs HW=365.42' TW=357.69' (Dynamic Tailwater)↑ **2=Culvert** (Passes 23.20 cfs of 25.83 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 23.20 cfs @ 3.17 fps)

Pond 27: DIV-6

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 28: INF-6

Inflow Area = 161,485 sf, 51.68% Impervious, Inflow Depth = 3.32" for 50-yr event
 Inflow = 4.09 cfs @ 11.69 hrs, Volume= 44,622 cf
 Outflow = 1.24 cfs @ 11.05 hrs, Volume= 44,622 cf, Atten= 70%, Lag= 0.0 min
 Discarded = 1.24 cfs @ 11.05 hrs, Volume= 44,622 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 364.58' @ 12.66 hrs Surf.Area= 3,569 sf Storage= 8,593 cf

Plug-Flow detention time= 50.7 min calculated for 44,617 cf (100% of inflow)
 Center-of-Mass det. time= 50.7 min (880.2 - 829.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	361.00'	3,393 cf	35.75'W x 99.83'L x 4.00'H Field A 14,276 cf Overall - 5,794 cf Embedded = 8,482 cf x 40.0% Voids
#2A	361.50'	5,794 cf	Cultec R-360HD x 156 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 156 Chambers in 6 Rows Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf
		9,187 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	361.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.24 cfs @ 11.05 hrs HW=361.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.24 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Pond 28: INF-6 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

26 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 97.83' Row Length +12.0" End Stone x 2 = 99.83' Base Length

6 Rows x 60.0" Wide + 9.0" Spacing x 5 + 12.0" Side Stone x 2 = 35.75' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

156 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 6 Rows = 5,794.1 cf Chamber Storage

14,276.2 cf Field - 5,794.1 cf Chambers = 8,482.1 cf Stone x 40.0% Voids = 3,392.8 cf Stone Storage

Chamber Storage + Stone Storage = 9,186.9 cf = 0.211 af

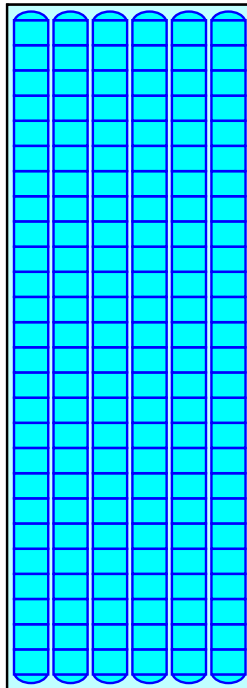
Overall Storage Efficiency = 64.4%

Overall System Size = 99.83' x 35.75' x 4.00'

156 Chambers

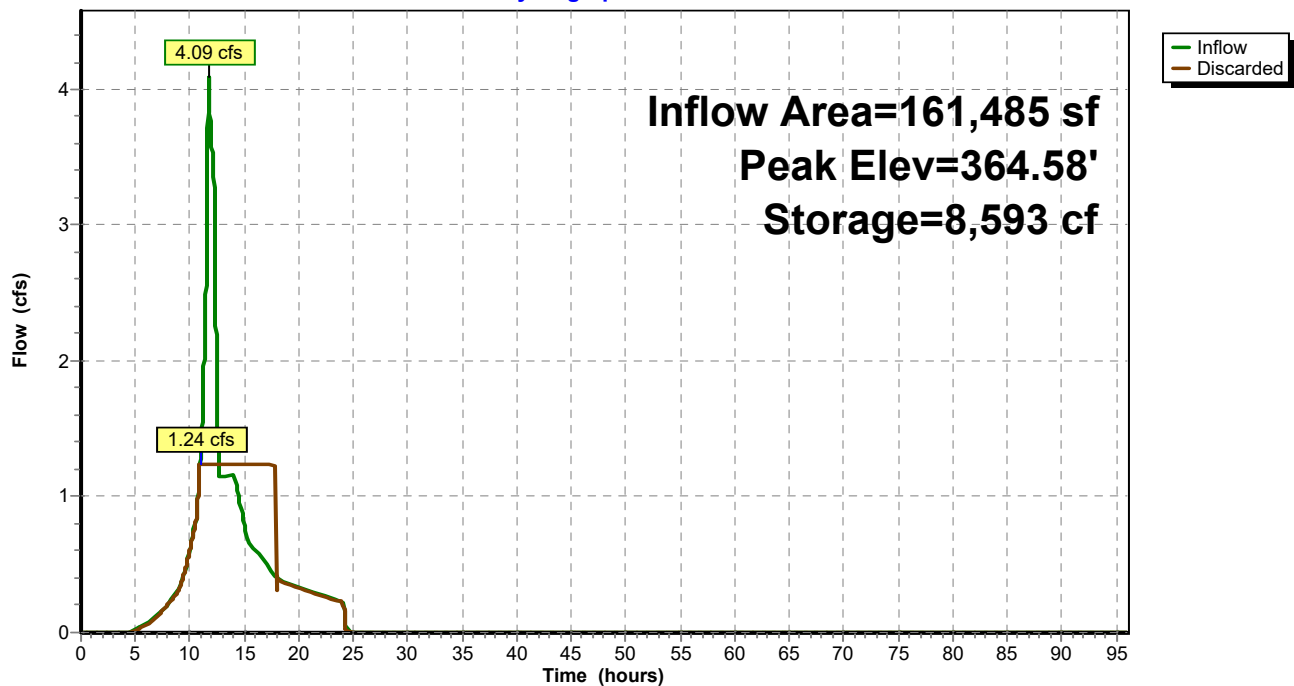
528.7 cy Field

314.2 cy Stone



Pond 28: INF-6

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 29: Post A6

Runoff = 81.01 cfs @ 12.13 hrs, Volume= 211,921 cf, Depth= 6.87"

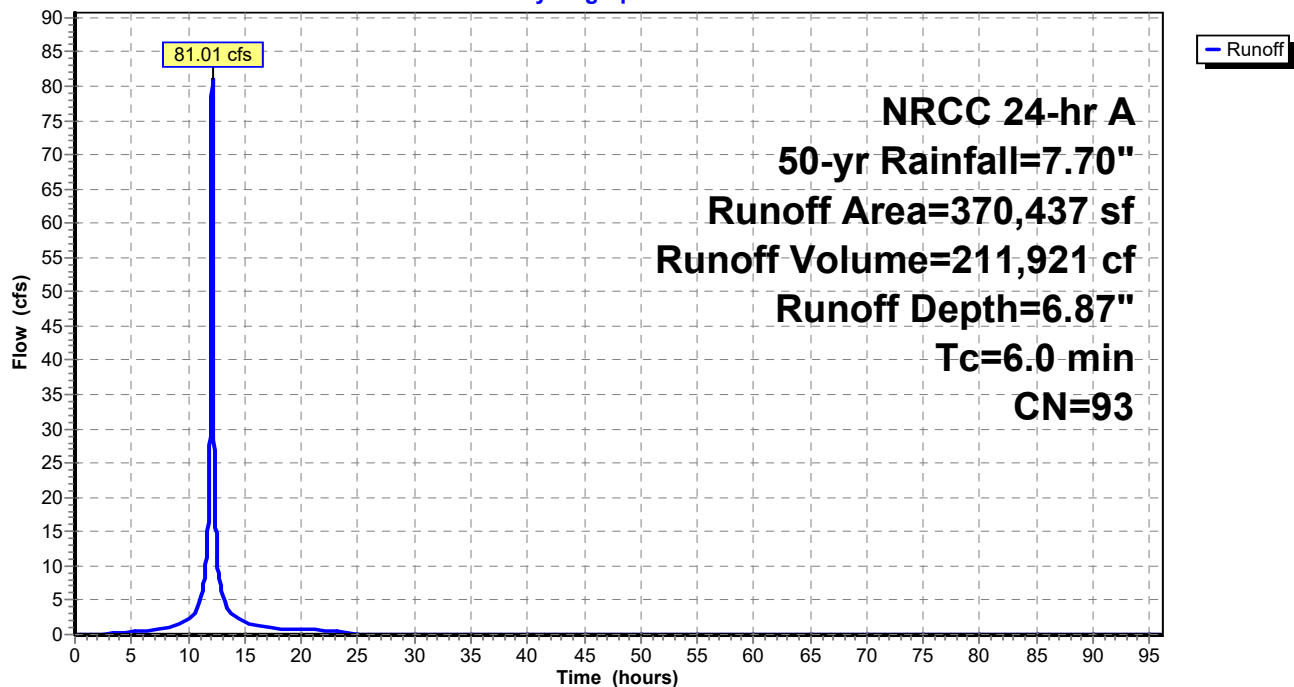
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
286,912	98	Paved parking, HSG C
83,525	74	>75% Grass cover, Good, HSG C
370,437	93	Weighted Average
83,525		22.55% Pervious Area
286,912		77.45% Impervious Area

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

Subcatchment 29: Post A6

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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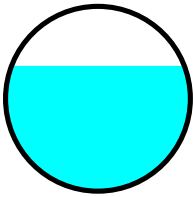
Summary for Reach 30: 36" HDPE Pipe

Inflow Area = 370,437 sf, 77.45% Impervious, Inflow Depth = 8.62" for 50-yr event
Inflow = 116.64 cfs @ 12.13 hrs, Volume= 266,042 cf
Outflow = 115.93 cfs @ 12.14 hrs, Volume= 266,042 cf, Atten= 1%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 22.76 fps, Min. Travel Time= 0.6 min
Avg. Velocity= 6.31 fps, Avg. Travel Time= 2.1 min

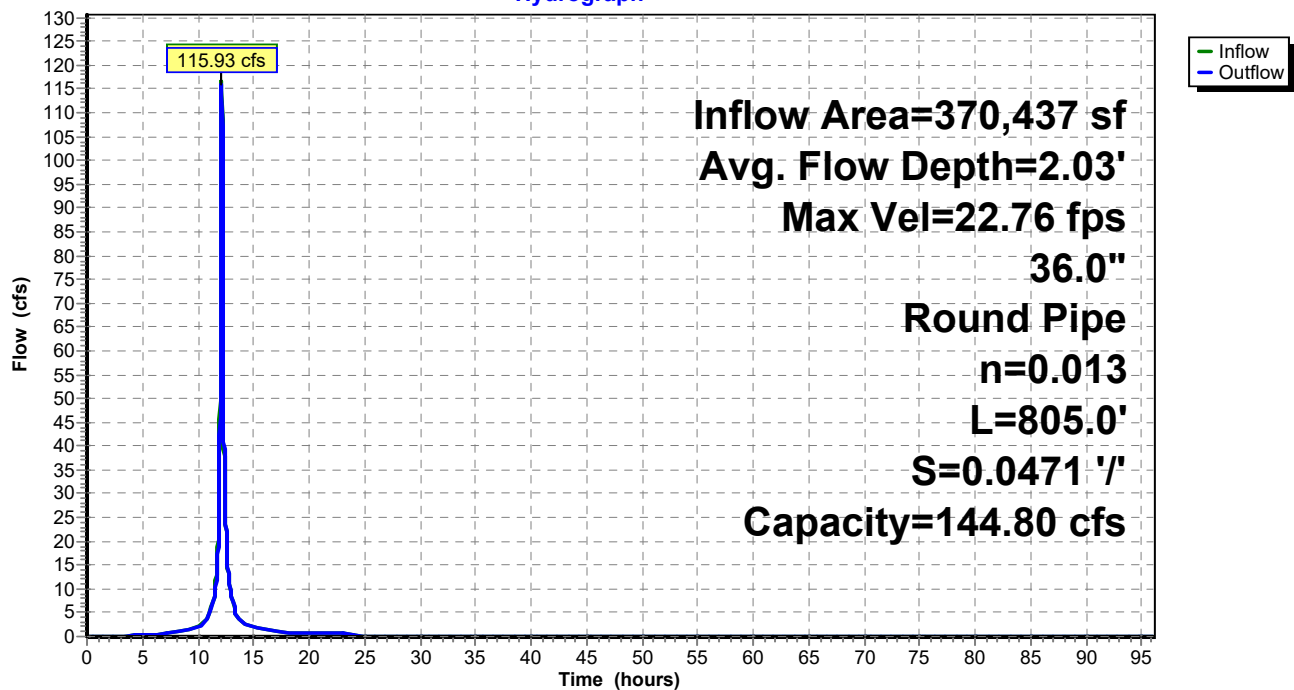
Peak Storage= 4,100 cf @ 12.14 hrs
Average Depth at Peak Storage= 2.03'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 144.80 cfs

36.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 805.0' Slope= 0.0471 '/'
Inlet Invert= 355.94', Outlet Invert= 318.00'



Reach 30: 36" HDPE Pipe

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Summary for Subcatchment 31: Post A14

Runoff = 46.10 cfs @ 12.13 hrs, Volume= 124,666 cf, Depth= 7.22"

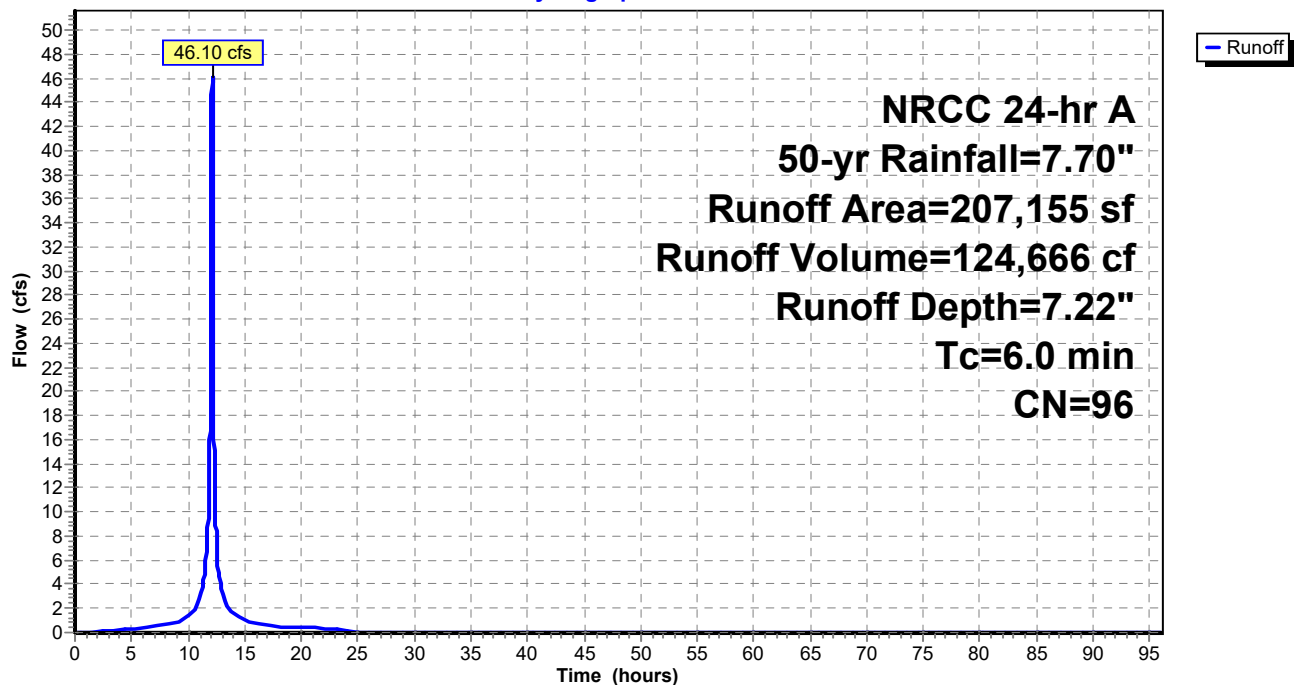
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
187,606	98	Paved parking, HSG C
19,549	74	>75% Grass cover, Good, HSG C
207,155	96	Weighted Average
19,549		9.44% Pervious Area
187,606		90.56% Impervious Area

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

Subcatchment 31: Post A14

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 32: DMH-3

Inflow Area = 577,592 sf, 82.15% Impervious, Inflow Depth = 8.12" for 50-yr event
Inflow = 161.48 cfs @ 12.14 hrs, Volume= 390,708 cf
Outflow = 161.48 cfs @ 12.14 hrs, Volume= 390,708 cf, Atten= 0%, Lag= 0.0 min
Primary = 161.48 cfs @ 12.14 hrs, Volume= 390,708 cf

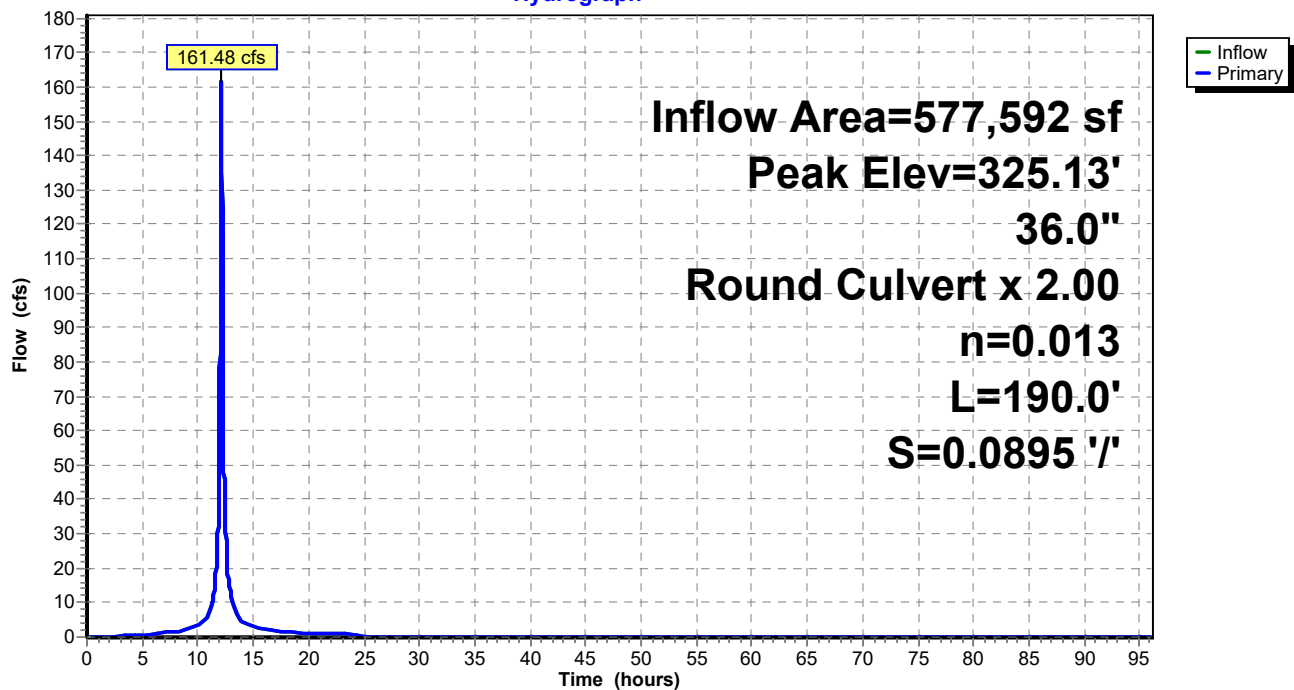
Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 325.13' @ 12.14 hrs

Flood Elev= 328.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	318.00'	36.0" Round Culvert X 2.00 L= 190.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 318.00' / 301.00' S= 0.0895 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=161.19 cfs @ 12.14 hrs HW=325.11' TW=304.53' (Dynamic Tailwater)
↑ **1=Culvert** (Inlet Controls 161.19 cfs @ 11.40 hrs)

Pond 32: DMH-3**Hydrograph**

North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Summary for Subcatchment 33: Post A7

Runoff = 4.66 cfs @ 12.18 hrs, Volume= 12,954 cf, Depth= 3.87"

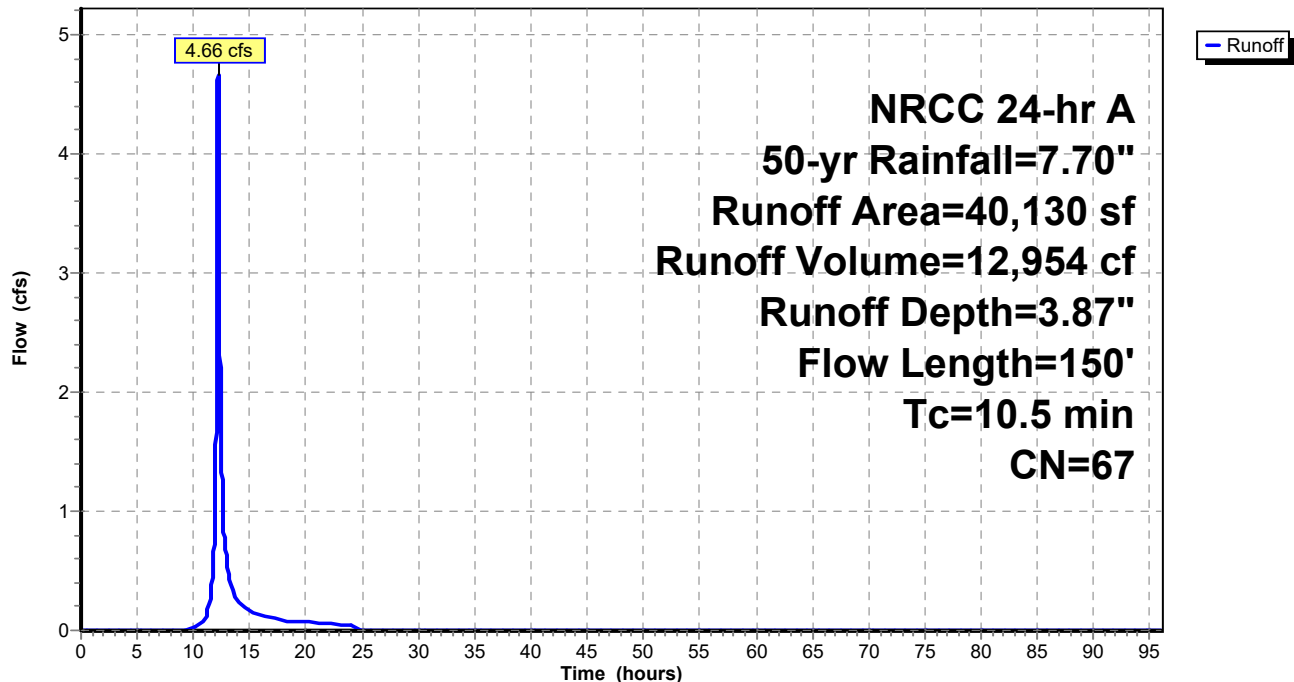
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
23,130	65	Brush, Good, HSG C
17,000	70	Woods, Good, HSG C
40,130	67	Weighted Average
40,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1100	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.1	50	0.2800	8.52		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.5	150	Total			

Subcatchment 33: Post A7

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 34: SWP-5

Inflow Area = 617,722 sf, 76.82% Impervious, Inflow Depth = 7.84" for 50-yr event
 Inflow = 165.63 cfs @ 12.14 hrs, Volume= 403,662 cf
 Outflow = 103.28 cfs @ 12.22 hrs, Volume= 403,662 cf, Atten= 38%, Lag= 4.9 min
 Discarded = 7.41 cfs @ 12.22 hrs, Volume= 202,357 cf
 Primary = 95.88 cfs @ 12.22 hrs, Volume= 201,305 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 305.08' @ 12.22 hrs Surf.Area= 21,333 sf Storage= 84,719 cf

Plug-Flow detention time= 27.3 min calculated for 403,620 cf (100% of inflow)
 Center-of-Mass det. time= 27.3 min (787.1 - 759.9)

Volume	Invert	Avail.Storage	Storage Description
#1	300.00'	105,088 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)
300.00	12,249	547.4	0	0	12,249
301.00	13,920	566.4	13,076	13,076	14,023
302.00	15,648	585.4	14,776	27,851	15,857
303.00	17,432	604.3	16,532	44,383	17,743
304.00	19,274	623.3	18,345	62,728	19,698
305.00	21,173	642.3	20,216	82,945	21,713
306.00	23,128	661.3	22,143	105,088	23,789

Device	Routing	Invert	Outlet Devices
#1	Discarded	300.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'
#2	Primary	298.00'	42.0" Round Culvert L= 189.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 298.00' / 258.00' S= 0.2116 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 9.62 sf
#3	Device 2	302.33'	36.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=7.41 cfs @ 12.22 hrs HW=305.08' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 7.41 cfs)

Primary OutFlow Max=95.88 cfs @ 12.22 hrs HW=305.08' TW=259.85' (Dynamic Tailwater)

↑**2=Culvert** (Passes 95.88 cfs of 106.98 cfs potential flow)

↑**3=Orifice/Grate** (Orifice Controls 95.88 cfs @ 7.99 fps)

North 60 Post A 3-9-20

Prepared by {enter your company name here}

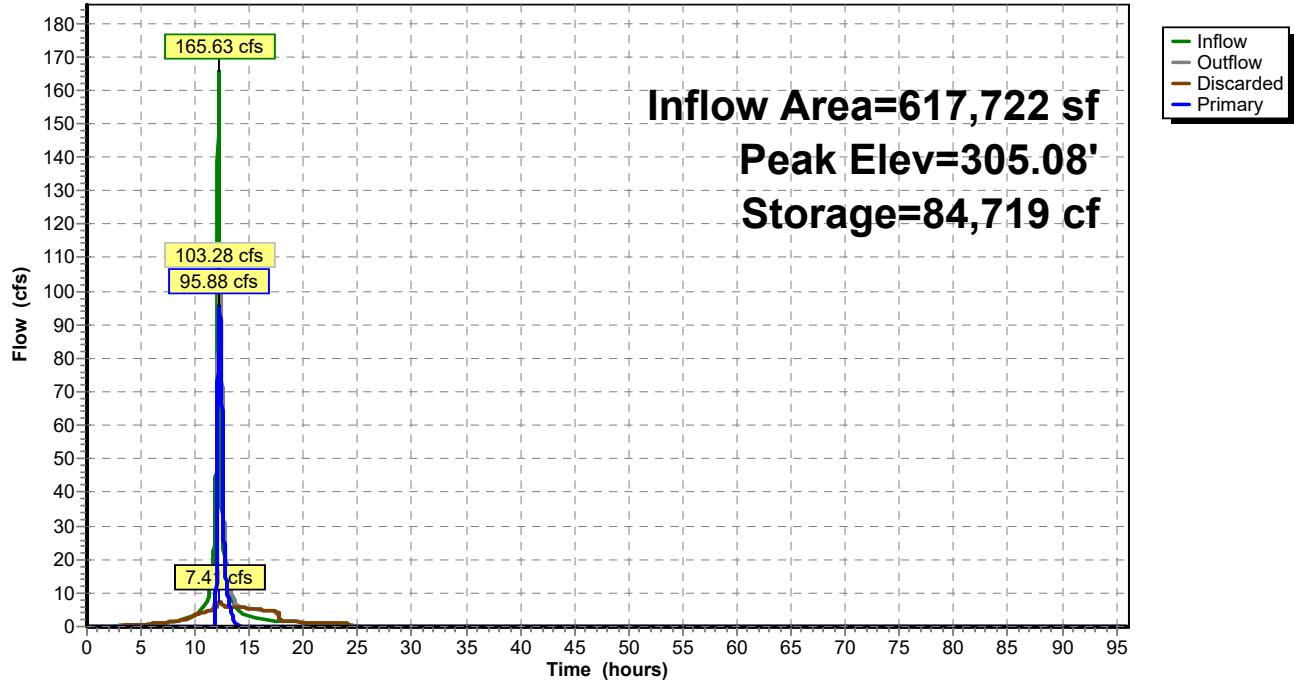
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NRCC 24-hr A 50-yr Rainfall=7.70"

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Pond 34: SWP-5

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 35: Post A16

Runoff = 6.22 cfs @ 12.18 hrs, Volume= 16,775 cf, Depth= 3.98"

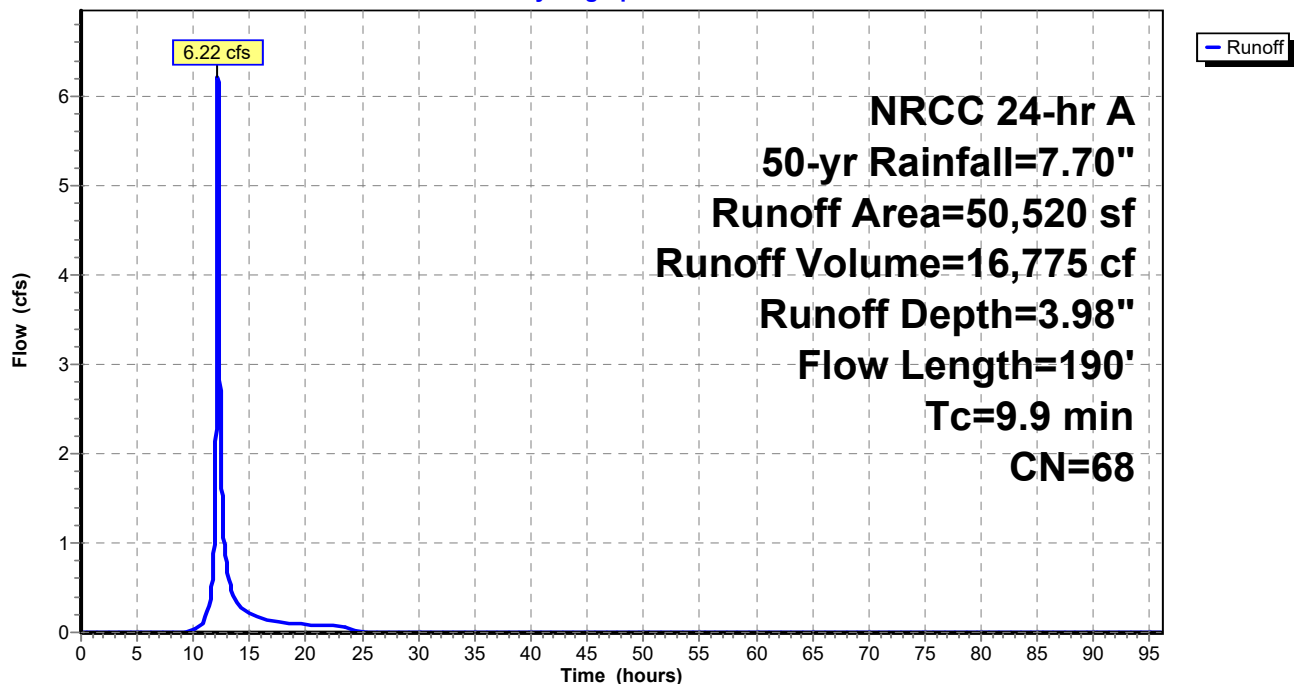
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
16,692	65	Brush, Good, HSG C
33,828	70	Woods, Good, HSG C
50,520	68	Weighted Average
50,520		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.17		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	90	0.3000	8.82		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
9.9	190	Total			

Subcatchment 35: Post A16

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 36: SWP-3

Inflow Area = 668,242 sf, 71.01% Impervious, Inflow Depth = 3.92" for 50-yr event
 Inflow = 101.52 cfs @ 12.21 hrs, Volume= 218,080 cf
 Outflow = 80.86 cfs @ 12.39 hrs, Volume= 218,080 cf, Atten= 20%, Lag= 10.9 min
 Discarded = 4.91 cfs @ 12.39 hrs, Volume= 49,256 cf
 Primary = 75.95 cfs @ 12.39 hrs, Volume= 168,825 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 260.48' @ 12.39 hrs Surf.Area= 14,147 sf Storage= 47,898 cf

Plug-Flow detention time= 16.7 min calculated for 218,058 cf (100% of inflow)
 Center-of-Mass det. time= 16.7 min (765.6 - 748.9)

Volume	Invert	Avail.Storage	Storage Description		
#1	256.00'	71,328 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)
256.00	7,434	457.3	0	0	7,434
257.00	8,834	476.3	8,124	8,124	8,921
258.00	10,292	495.3	9,554	17,678	10,468
259.00	11,806	514.3	11,040	28,718	12,076
260.00	13,378	533.4	12,584	41,302	13,752
261.00	15,006	552.4	14,184	55,486	15,481
262.00	16,692	571.4	15,842	71,328	17,271

Device	Routing	Invert	Outlet Devices
#1	Primary	254.00'	36.0" Round Culvert L= 128.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 254.00' / 234.00' S= 0.1563 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#2	Device 1	258.00'	36.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	256.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'

Discarded OutFlow Max=4.91 cfs @ 12.39 hrs HW=260.48' (Free Discharge)
 ↳ **3=Exfiltration** (Exfiltration Controls 4.91 cfs)

Primary OutFlow Max=75.95 cfs @ 12.39 hrs HW=260.48' TW=0.00' (Dynamic Tailwater)
 ↳ **1=Culvert** (Inlet Controls 75.95 cfs @ 10.74 fps)
 ↳ **2=Orifice/Grate** (Passes 75.95 cfs of 90.97 cfs potential flow)

North 60 Post A 3-9-20

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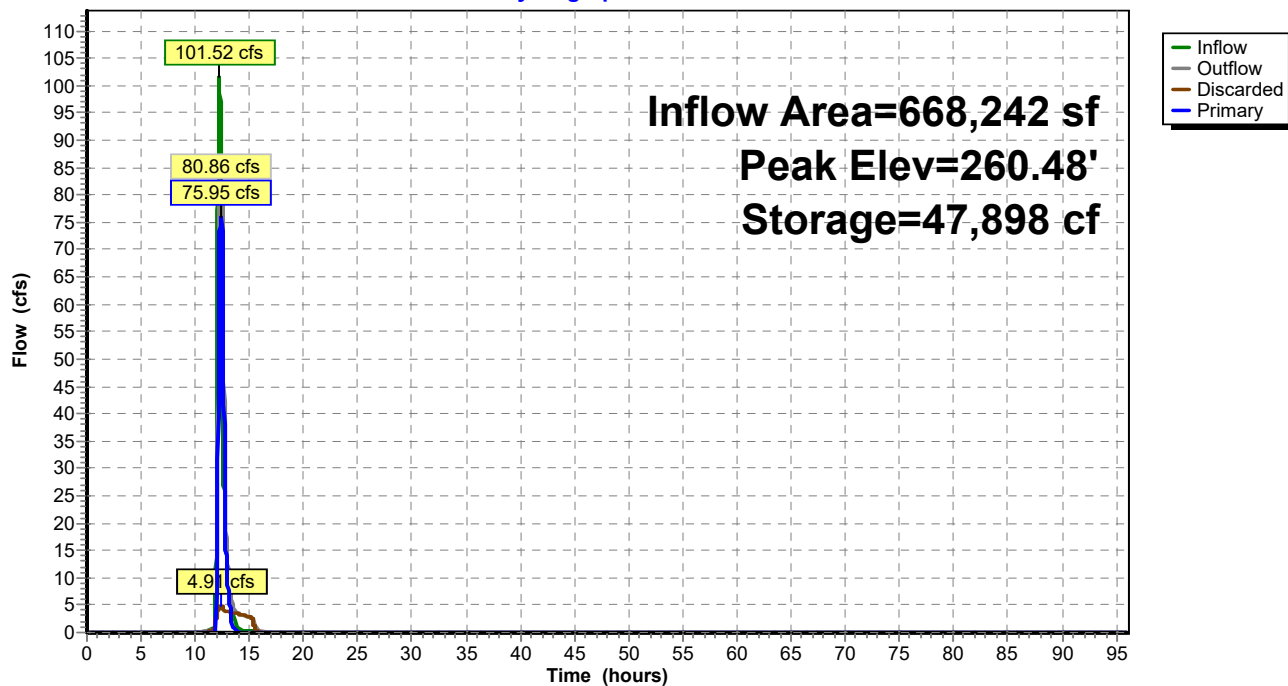
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NRCC 24-hr A 50-yr Rainfall=7.70"

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Pond 36: SWP-3

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 37: Post A13

Runoff = 34.76 cfs @ 12.13 hrs, Volume= 90,058 cf, Depth= 6.75"

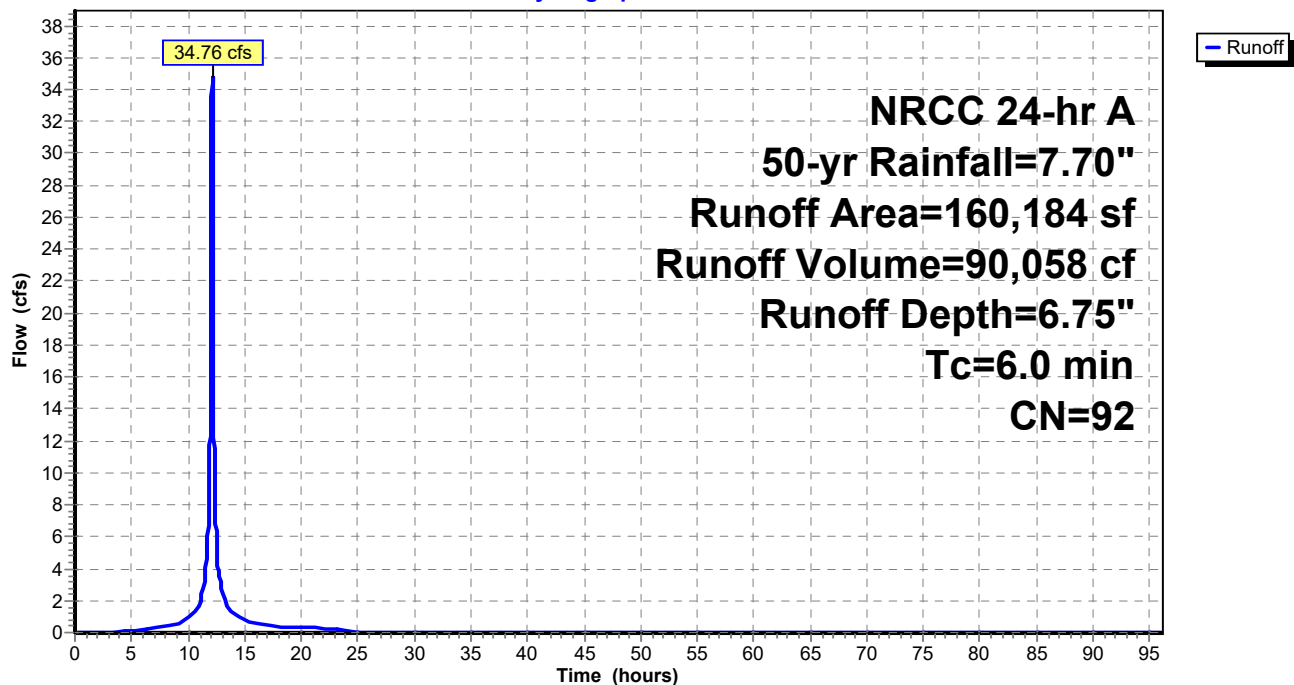
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
122,493	98	Paved parking, HSG C
37,691	74	>75% Grass cover, Good, HSG C
160,184	92	Weighted Average
37,691		23.53% Pervious Area
122,493		76.47% Impervious Area

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

Subcatchment 37: Post A13

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 38: DIV-7

Inflow Area = 160,184 sf, 76.47% Impervious, Inflow Depth = 6.75" for 50-yr event
 Inflow = 34.76 cfs @ 12.13 hrs, Volume= 90,058 cf
 Outflow = 34.76 cfs @ 12.13 hrs, Volume= 90,058 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.41 cfs @ 11.50 hrs, Volume= 46,223 cf
 Secondary = 31.82 cfs @ 12.13 hrs, Volume= 43,835 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 316.63' @ 12.13 hrs

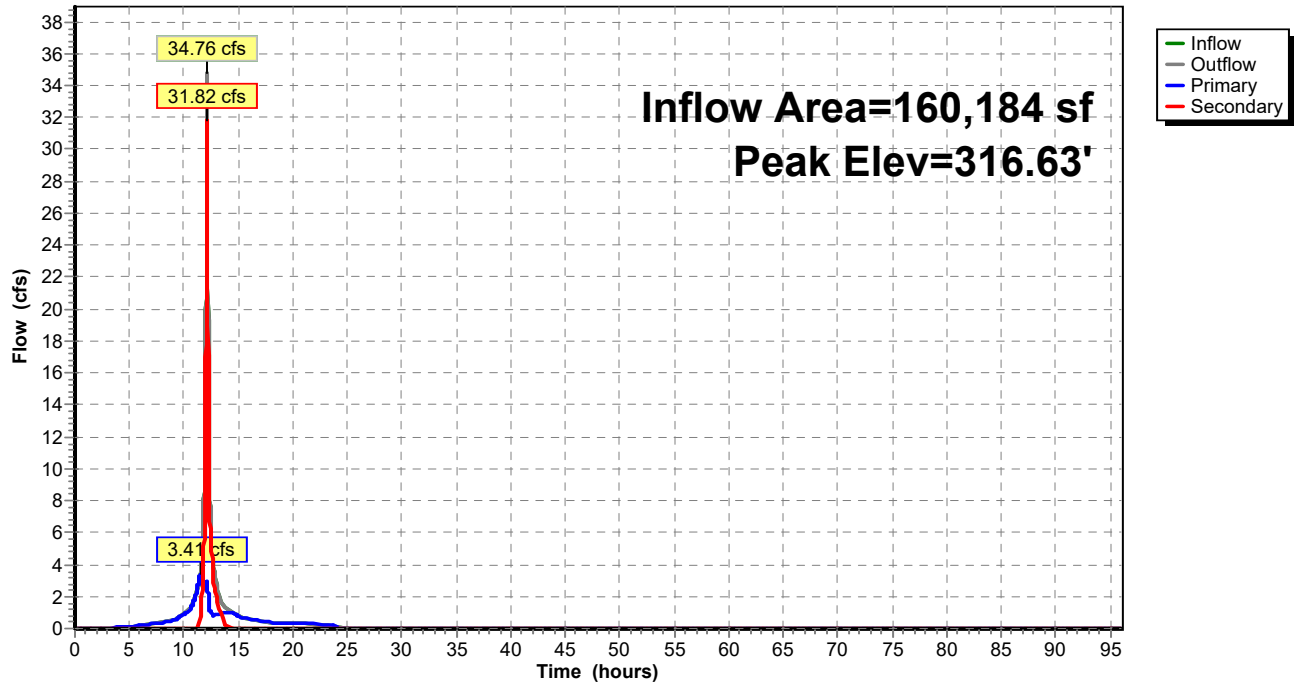
Flood Elev= 319.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	313.00'	10.0" Round Culvert L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 313.00' / 313.00' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	313.00'	30.0" Round Culvert L= 103.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 313.00' / 303.00' S= 0.0971 ' S= 0.0971 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#3	Device 2	315.50'	8.0' 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=3.38 cfs @ 11.50 hrs HW=315.50' TW=313.85' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 3.38 cfs @ 6.19 fps)**Secondary OutFlow** Max=31.80 cfs @ 12.13 hrs HW=316.63' TW=0.00' (Dynamic Tailwater)↑ **2=Culvert** (Passes 31.80 cfs of 36.44 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 31.80 cfs @ 3.53 fps)

Pond 38: DIV-7

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 39: INF-7

Inflow Area = 160,184 sf, 76.47% Impervious, Inflow Depth = 3.46" for 50-yr event
 Inflow = 3.41 cfs @ 11.50 hrs, Volume= 46,223 cf
 Outflow = 1.07 cfs @ 10.62 hrs, Volume= 46,223 cf, Atten= 69%, Lag= 0.0 min
 Discarded = 1.07 cfs @ 10.62 hrs, Volume= 46,223 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 315.75' @ 12.41 hrs Surf.Area= 3,839 sf Storage= 8,677 cf

Plug-Flow detention time= 56.6 min calculated for 46,219 cf (100% of inflow)
 Center-of-Mass det. time= 56.6 min (854.4 - 797.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	312.50'	3,643 cf	41.50'W x 92.50'L x 4.00'H Field A 15,355 cf Overall - 6,247 cf Embedded = 9,108 cf x 40.0% Voids
#2A	313.00'	6,247 cf	Cultec R-360HD x 168 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 168 Chambers in 7 Rows Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf
9,890 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	312.50'	12.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.07 cfs @ 10.62 hrs HW=312.54' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.07 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Pond 39: INF-7 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

24 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 90.50' Row Length +12.0" End Stone x 2 = 92.50' Base Length

7 Rows x 60.0" Wide + 9.0" Spacing x 6 + 12.0" Side Stone x 2 = 41.50' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

168 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 7 Rows = 6,246.7 cf Chamber Storage

15,355.0 cf Field - 6,246.7 cf Chambers = 9,108.3 cf Stone x 40.0% Voids = 3,643.3 cf Stone Storage

Chamber Storage + Stone Storage = 9,890.0 cf = 0.227 af

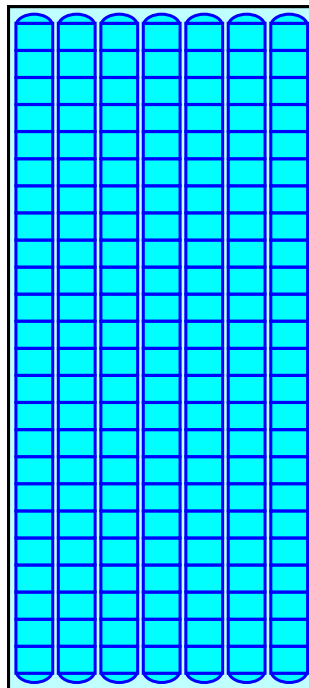
Overall Storage Efficiency = 64.4%

Overall System Size = 92.50' x 41.50' x 4.00'

168 Chambers

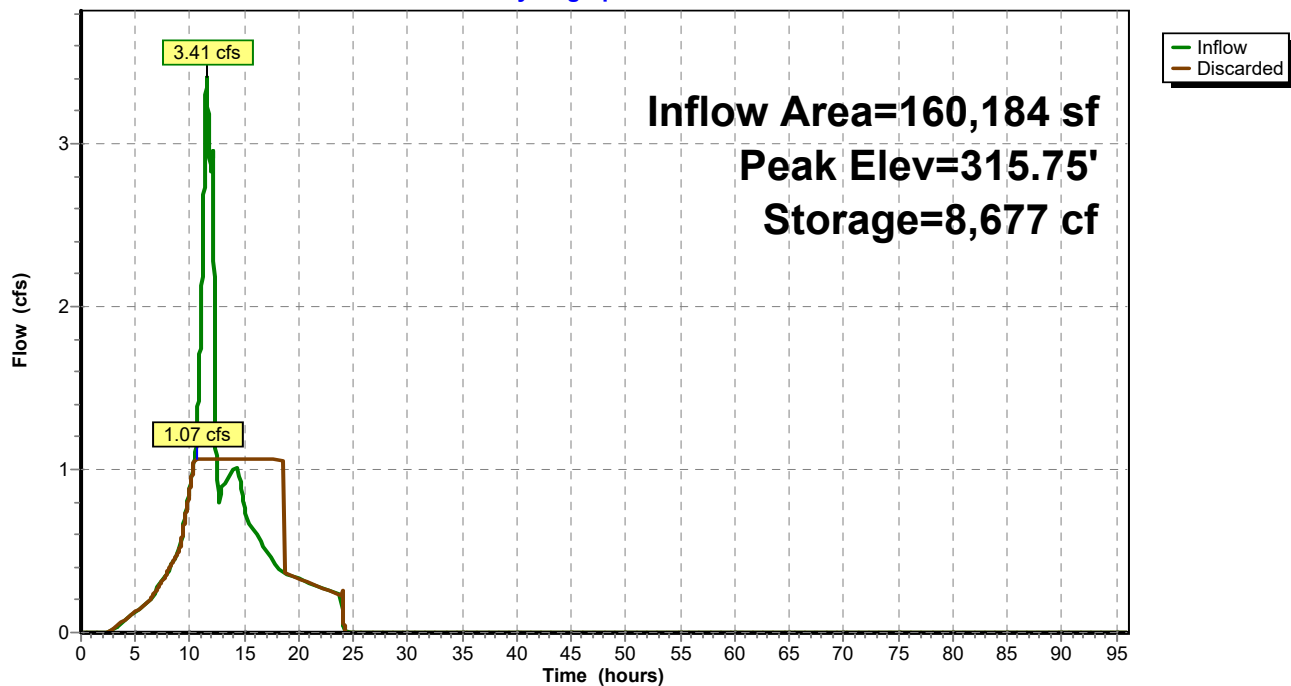
568.7 cy Field

337.3 cy Stone



Pond 39: INF-7

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 40: Post A2

Runoff = 37.45 cfs @ 12.12 hrs, Volume= 86,164 cf, Depth= 5.23"

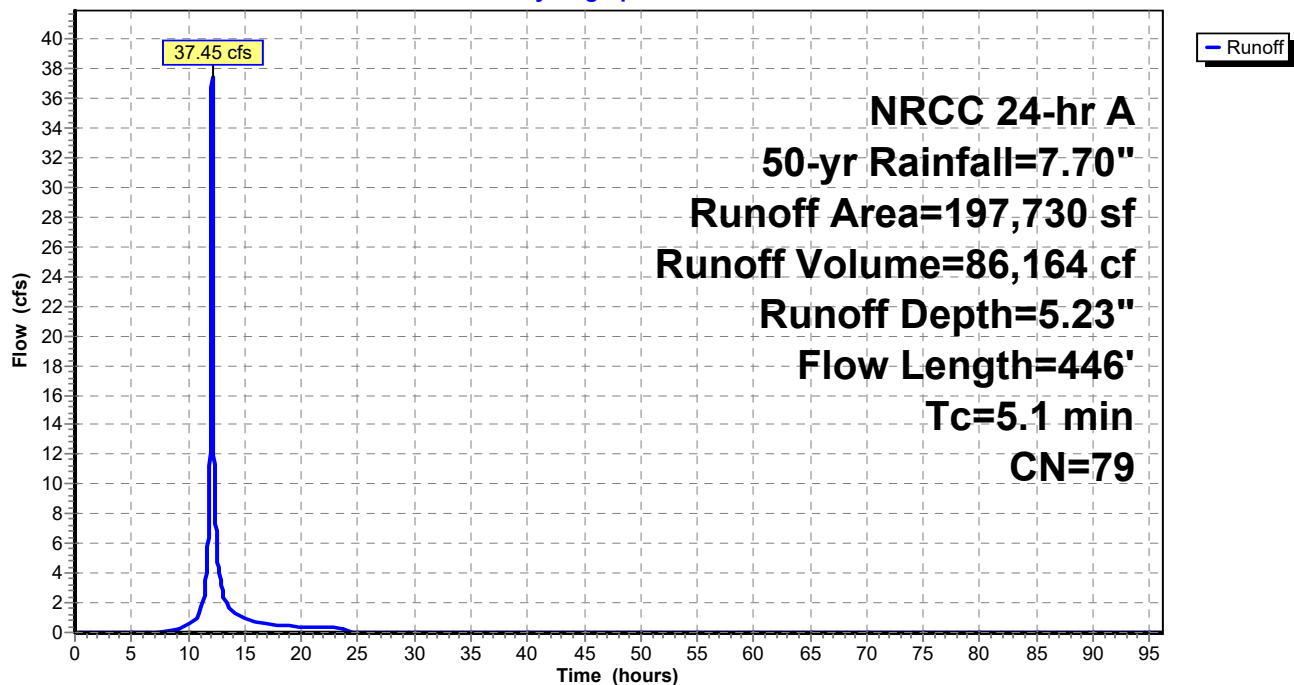
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
43,743	98	Paved parking, HSG C
107,245	74	>75% Grass cover, Good, HSG C
2,876	61	>75% Grass cover, Good, HSG B
39,583	70	Woods, Good, HSG C
4,283	98	Water Surface, HSG C
197,730	79	Weighted Average
149,704		75.71% Pervious Area
48,026		24.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.1500	0.40		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.9	346	0.1734	6.70		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	446	Total			

Subcatchment 40: Post A2

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 41: SWP-1

Inflow Area = 197,730 sf, 24.29% Impervious, Inflow Depth = 5.23" for 50-yr event
 Inflow = 37.45 cfs @ 12.12 hrs, Volume= 86,164 cf
 Outflow = 11.49 cfs @ 12.29 hrs, Volume= 62,409 cf, Atten= 69%, Lag= 9.9 min
 Primary = 11.49 cfs @ 12.29 hrs, Volume= 62,409 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Starting Elev= 234.50' Surf.Area= 12,504 sf Storage= 7,835 cf
 Peak Elev= 237.90' @ 12.29 hrs Surf.Area= 18,532 sf Storage= 50,432 cf (42,597 cf above start)

Plug-Flow detention time= 827.1 min calculated for 54,568 cf (63% of inflow)
 Center-of-Mass det. time= 638.8 min (1,437.1 - 798.3)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	1,811 cf	Forebay (Irregular) Listed below (Recalc)
#2	230.00'	1,976 cf	Micropool (Irregular) Listed below (Recalc)
#3	233.90'	65,123 cf	Marsh & Storage (Irregular) Listed below (Recalc)
		68,911 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,233	129.1	834	1,811	1,357

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,646	155.1	1,000	1,976	1,942

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
233.90	4,232	530.5	0	0	4,232
234.50	9,625	400.9	4,048	4,048	13,842
235.00	10,440	413.5	5,015	9,063	14,683
236.00	12,144	438.8	11,281	20,344	16,451
237.00	13,950	464.0	13,037	33,381	18,317
238.00	15,856	489.2	14,893	48,273	20,287
239.00	17,864	514.5	16,850	65,123	22,369

Device	Routing	Invert	Outlet Devices
#1	Primary	232.00'	21.0" Round Culvert L= 74.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.00' S= 0.0135 ' / ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.41 sf

North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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#2	Device 1	234.50'	1.1" Vert. Orifice/Grate	C= 0.600
#3	Device 1	237.50'	36.0" x 48.0" Horiz. Orifice/Grate	C= 0.600

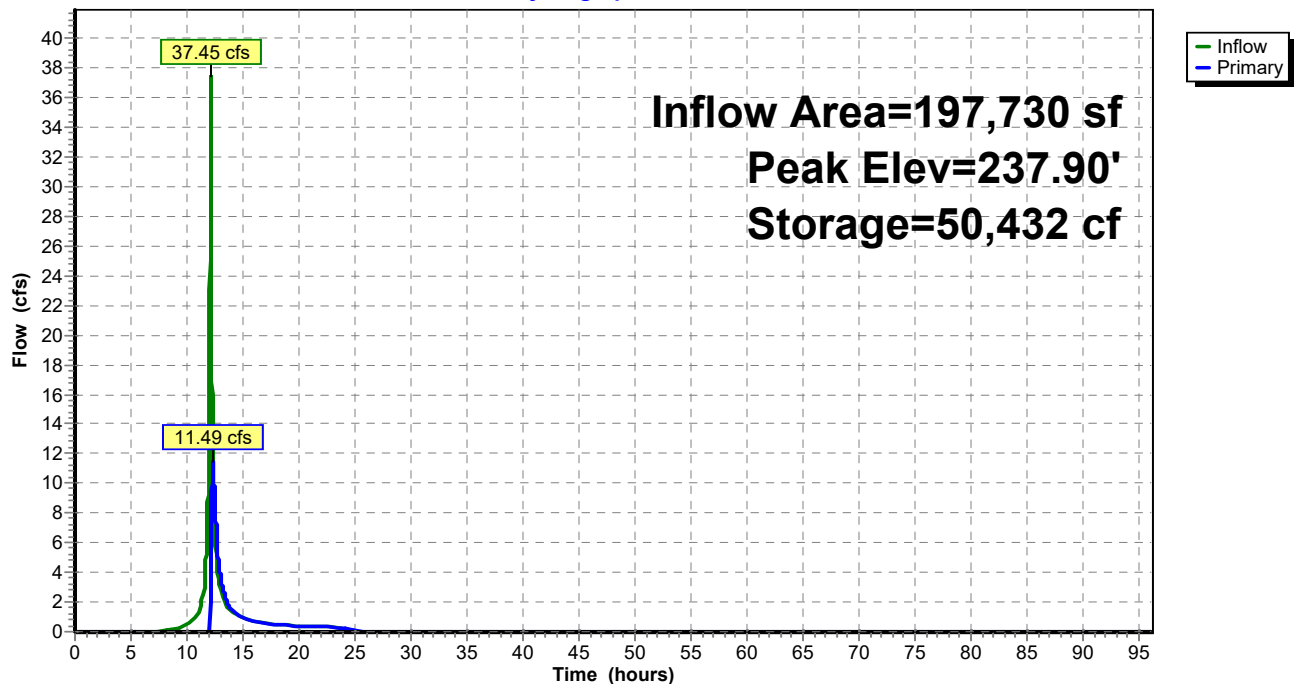
Limited to weir flow at low heads

Primary OutFlow Max=11.49 cfs @ 12.29 hrs HW=237.90' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 11.49 cfs of 18.55 cfs potential flow)
2=Orifice/Grate (Orifice Controls 0.06 cfs @ 8.81 fps)
3=Orifice/Grate (Weir Controls 11.43 cfs @ 2.06 fps)

Pond 41: SWP-1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 42: Post A1

Runoff = 3.99 cfs @ 12.13 hrs, Volume= 9,636 cf, Depth= 5.58"

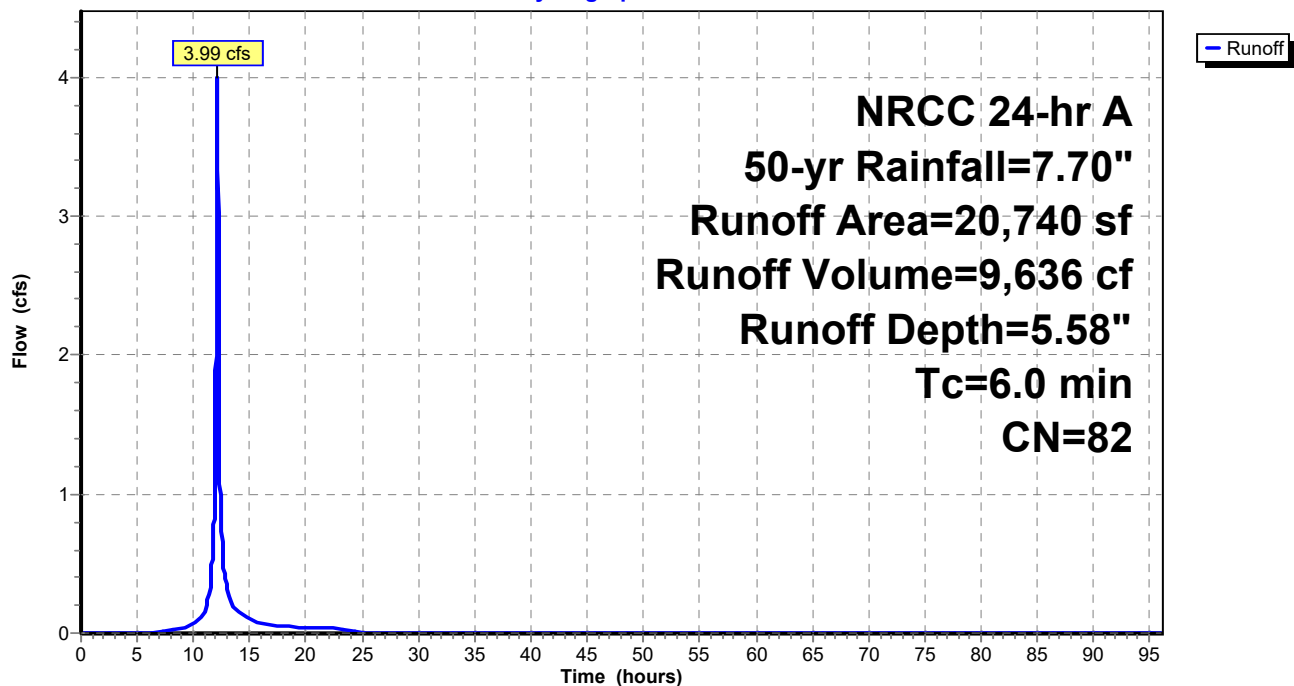
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
7,304	98	Paved parking, HSG C
10,356	74	>75% Grass cover, Good, HSG C
3,080	70	Woods, Good, HSG C
20,740	82	Weighted Average
13,436		64.78% Pervious Area
7,304		35.22% Impervious Area

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

Subcatchment 42: Post A1

Hydrograph



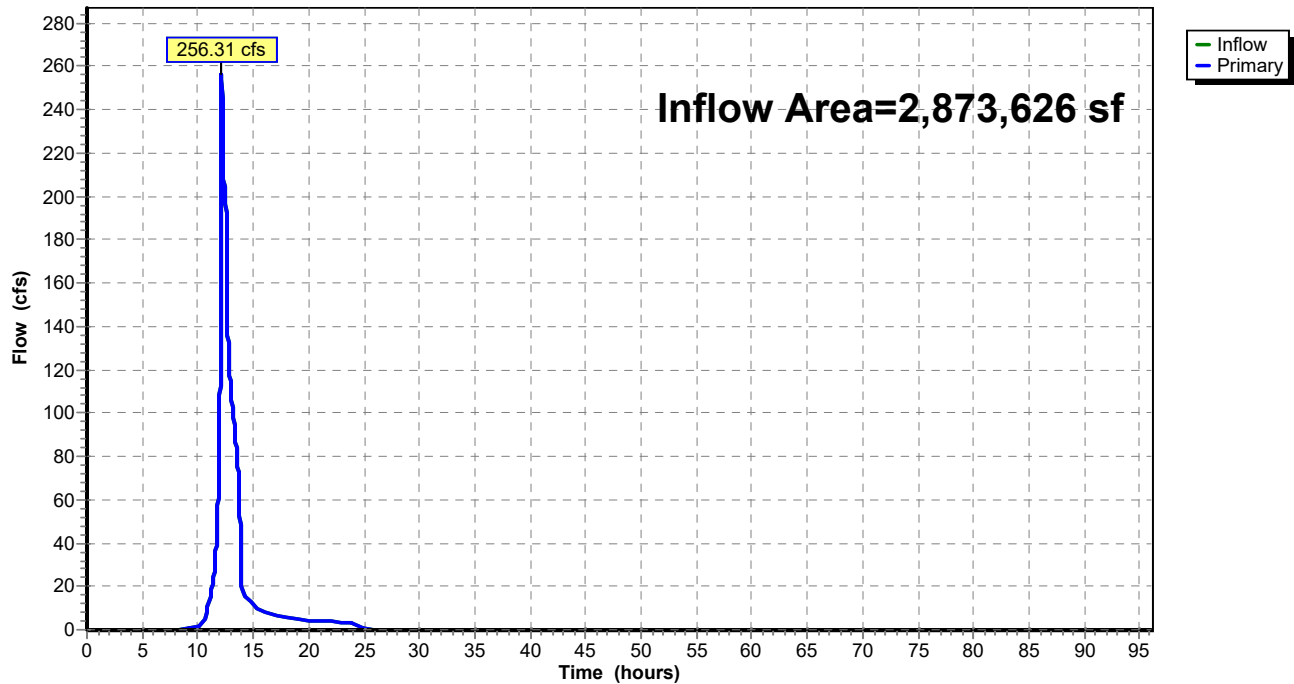
Summary for Link 43: Design Point A

Inflow Area = 2,873,626 sf, 43.08% Impervious, Inflow Depth > 5.37" for 50-yr event
 Inflow = 256.31 cfs @ 12.15 hrs, Volume= 1,285,407 cf
 Primary = 256.31 cfs @ 12.15 hrs, Volume= 1,285,407 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 43: Design Point A

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 8: Post A0 Offsite

Runoff Area=1,115,060 sf 57.87% Impervious Runoff Depth=7.97"
Flow Length=1,018' Tc=12.5 min CN=90 Runoff=227.61 cfs 740,519 cf

Pond 9: Offsite Pond A

Peak Elev=365.20' Storage=188,028 cf Inflow=227.61 cfs 740,519 cf
Outflow=183.31 cfs 689,324 cf

Subcatchment 10: Post A4

Runoff Area=164,583 sf 10.25% Impervious Runoff Depth=6.24"
Flow Length=340' Tc=20.5 min CN=76 Runoff=22.58 cfs 85,616 cf

Reach 11: 24" Culvert Pipe

Avg. Flow Depth=1.13' Max Vel=12.36 fps Inflow=22.58 cfs 85,616 cf
24.0" Round Pipe n=0.013 L=112.0' S=0.0268 ' Capacity=37.02 cfs Outflow=22.57 cfs 85,616 cf

Subcatchment 12: Post A8

Runoff Area=210,459 sf 0.00% Impervious Runoff Depth=6.12"
Flow Length=503' Tc=17.8 min CN=75 Runoff=30.43 cfs 107,297 cf

Subcatchment 13: Post A11

Runoff Area=72,242 sf 63.67% Impervious Runoff Depth=7.97"
Tc=6.0 min CN=90 Runoff=18.61 cfs 47,976 cf

Subcatchment 14: Post A10

Runoff Area=304,098 sf 77.08% Impervious Runoff Depth=8.33"
Tc=6.0 min CN=93 Runoff=79.85 cfs 211,214 cf

Pond 15: DIV-5

Peak Elev=341.52' Inflow=79.85 cfs 211,214 cf
Primary=7.46 cfs 101,112 cf Secondary=72.39 cfs 110,102 cf Outflow=79.85 cfs 211,214 cf

Pond 16: INF-5

Peak Elev=338.17' Storage=19,190 cf Inflow=7.46 cfs 101,112 cf
Outflow=1.98 cfs 101,112 cf

Pond 17: Existing Wetland A

Peak Elev=332.00' Storage=190,109 cf Inflow=267.69 cfs 1,040,315 cf
36.0" Round Culvert n=0.013 L=168.0' S=0.0655 ' Outflow=104.88 cfs 1,040,315 cf

Subcatchment 18: Post A15

Runoff Area=424,570 sf 0.00% Impervious Runoff Depth=5.74"
Flow Length=270' Tc=5.3 min CN=72 Runoff=88.98 cfs 203,219 cf

Subcatchment 19: Post A3

Runoff Area=93,277 sf 100.00% Impervious Runoff Depth=8.94"
Tc=6.0 min CN=98 Runoff=24.93 cfs 69,488 cf

Pond 20: DIV-1

Peak Elev=329.91' Inflow=24.93 cfs 69,488 cf
Primary=6.58 cfs 45,032 cf Secondary=18.36 cfs 24,456 cf Outflow=24.93 cfs 69,488 cf

Pond 21: INF-1

Peak Elev=327.41' Storage=9,785 cf Inflow=6.58 cfs 45,032 cf
Outflow=1.18 cfs 45,032 cf

Reach 22: Existing Stream A

Avg. Flow Depth=1.99' Max Vel=11.46 fps Inflow=188.04 cfs 1,267,991 cf
n=0.040 L=1,360.0' S=0.0721 ' Capacity=291.69 cfs Outflow=182.37 cfs 1,267,991 cf

Subcatchment 23: Post A5

Runoff Area=92,926 sf 100.00% Impervious Runoff Depth=8.94"
Tc=6.0 min CN=98 Runoff=24.84 cfs 69,226 cf

North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Pond 24: DIV-2 Peak Elev=369.27' Inflow=24.84 cfs 69,226 cf
Primary=5.16 cfs 44,464 cf Secondary=20.11 cfs 24,762 cf Outflow=24.84 cfs 69,226 cf

Pond 25: INF-2 Peak Elev=368.33' Storage=10,798 cf Inflow=5.16 cfs 44,464 cf
Outflow=0.99 cfs 44,464 cf

Subcatchment26: Post A12 Runoff Area=161,485 sf 51.68% Impervious Runoff Depth=7.48"
Flow Length=1,430' Tc=11.7 min CN=86 Runoff=32.54 cfs 100,650 cf

Pond 27: DIV-6 Peak Elev=366.14' Inflow=32.54 cfs 100,650 cf
Primary=3.88 cfs 50,266 cf Secondary=28.87 cfs 50,384 cf Outflow=32.54 cfs 100,650 cf

Pond 28: INF-6 Peak Elev=364.81' Storage=8,919 cf Inflow=3.88 cfs 50,266 cf
Outflow=1.24 cfs 50,266 cf

Subcatchment29: Post A6 Runoff Area=370,437 sf 77.45% Impervious Runoff Depth=8.33"
Tc=6.0 min CN=93 Runoff=97.27 cfs 257,290 cf

Reach 30: 36" HDPE Pipe Avg. Flow Depth=2.39' Max Vel=23.34 fps Inflow=142.24 cfs 332,436 cf
36.0" Round Pipe n=0.013 L=805.0' S=0.0471 ' Capacity=144.80 cfs Outflow=141.23 cfs 332,436 cf

Subcatchment31: Post A14 Runoff Area=207,155 sf 90.56% Impervious Runoff Depth=8.70"
Tc=6.0 min CN=96 Runoff=55.10 cfs 150,157 cf

Pond 32: DMH-3 Peak Elev=327.76' Inflow=195.60 cfs 482,593 cf
36.0" Round Culvert x 2.00 n=0.013 L=190.0' S=0.0895 ' Outflow=195.60 cfs 482,593 cf

Subcatchment33: Post A7 Runoff Area=40,130 sf 0.00% Impervious Runoff Depth=5.12"
Flow Length=150' Tc=10.5 min CN=67 Runoff=6.15 cfs 17,117 cf

Pond 34: SWP-5 Peak Elev=305.91' Storage=103,067 cf Inflow=201.13 cfs 499,710 cf
Discarded=7.97 cfs 228,031 cf Primary=109.36 cfs 271,679 cf Outflow=117.33 cfs 499,710 cf

Subcatchment35: Post A16 Runoff Area=50,520 sf 0.00% Impervious Runoff Depth=5.24"
Flow Length=190' Tc=9.9 min CN=68 Runoff=8.15 cfs 22,076 cf

Pond 36: SWP-3 Peak Elev=261.50' Storage=63,124 cf Inflow=116.44 cfs 293,755 cf
Discarded=5.50 cfs 56,680 cf Primary=83.34 cfs 237,075 cf Outflow=88.83 cfs 293,755 cf

Subcatchment37: Post A13 Runoff Area=160,184 sf 76.47% Impervious Runoff Depth=8.21"
Tc=6.0 min CN=92 Runoff=41.82 cfs 109,634 cf

Pond 38: DIV-7 Peak Elev=316.96' Inflow=41.82 cfs 109,634 cf
Primary=3.39 cfs 51,559 cf Secondary=38.89 cfs 58,074 cf Outflow=41.82 cfs 109,634 cf

Pond 39: INF-7 Peak Elev=316.00' Storage=9,118 cf Inflow=3.39 cfs 51,559 cf
Outflow=1.07 cfs 51,559 cf

Subcatchment40: Post A2 Runoff Area=197,730 sf 24.29% Impervious Runoff Depth=6.62"
Flow Length=446' Tc=5.1 min CN=79 Runoff=46.74 cfs 109,000 cf

Pond 41: SWP-1 Peak Elev=238.29' Storage=56,677 cf Inflow=46.74 cfs 109,000 cf
Outflow=19.23 cfs 85,233 cf

North 60 Post A 3-9-20*NRCC 24-hr A 100-yr Rainfall=9.18"*

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Subcatchment42: Post A1

Runoff Area=20,740 sf 35.22% Impervious Runoff Depth=6.99"

Tc=6.0 min CN=82 Runoff=4.94 cfs 12,075 cf

Link 43: Design Point A

Inflow=313.47 cfs 1,660,448 cf

Primary=313.47 cfs 1,660,448 cf

Total Runoff Area = 3,685,596 sf Runoff Volume = 2,312,555 cf Average Runoff Depth = 7.53"
49.41% Pervious = 1,821,010 sf 50.59% Impervious = 1,864,586 sf

North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 8: Post A0 Offsite

Runoff = 227.61 cfs @ 12.20 hrs, Volume= 740,519 cf, Depth= 7.97"

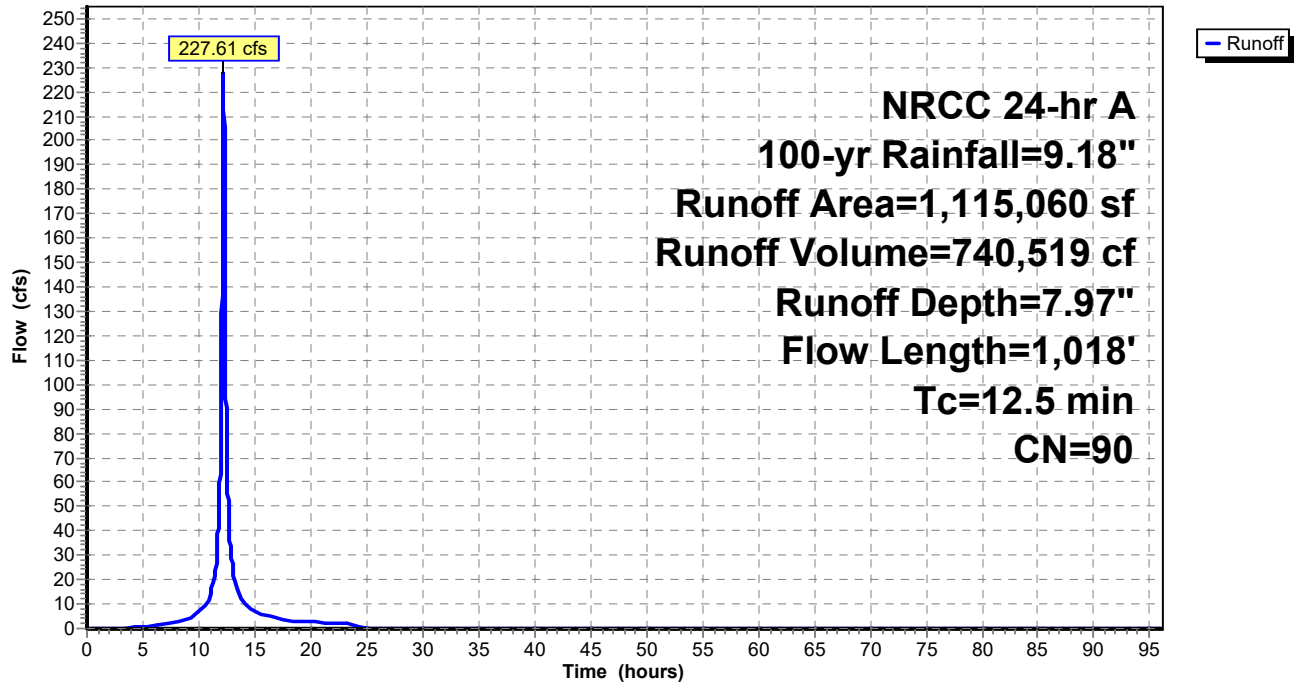
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
645,334	98	Paved parking, HSG C
443,611	80	>75% Grass cover, Good, HSG D
23,572	74	>75% Grass cover, Good, HSG C
2,543	61	>75% Grass cover, Good, HSG B
1,115,060	90	Weighted Average
469,726		42.13% Pervious Area
645,334		57.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.6	148	0.0574	3.86		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	740	0.0270	10.25	32.22	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.015 Concrete sewer w/manholes & inlets
12.5	1,018	Total			

Subcatchment 8: Post A0 Offsite

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 9: Offsite Pond A

Inflow Area = 1,115,060 sf, 57.87% Impervious, Inflow Depth = 7.97" for 100-yr event
 Inflow = 227.61 cfs @ 12.20 hrs, Volume= 740,519 cf
 Outflow = 183.31 cfs @ 12.28 hrs, Volume= 689,324 cf, Atten= 19%, Lag= 4.8 min
 Primary = 183.31 cfs @ 12.28 hrs, Volume= 689,324 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 365.20' @ 12.28 hrs Surf.Area= 38,352 sf Storage= 188,028 cf

Plug-Flow detention time= 74.7 min calculated for 689,324 cf (93% of inflow)
 Center-of-Mass det. time= 38.3 min (813.6 - 775.3)

Volume	Invert	Avail.Storage	Storage Description
#1	357.00'	221,816 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)
357.00	14,633	679.0	0	0	14,633
358.00	16,652	698.0	15,632	15,632	16,826
359.00	17,534	715.0	17,091	32,723	18,864
360.00	19,427	745.0	18,472	51,195	22,425
362.00	24,453	804.0	43,784	94,979	29,861
364.00	28,701	854.0	53,097	148,076	36,663
365.00	36,602	901.0	32,572	180,648	43,285
366.00	45,910	1,262.0	41,168	221,816	105,432

Device	Routing	Invert	Outlet Devices
#1	Primary	357.00'	30.0" Round Culvert L= 125.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 357.00' / 351.00' S= 0.0480 ' S= 0.0480 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	360.00'	36.0" x 48.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	364.75'	150.0' long x 36.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=183.09 cfs @ 12.28 hrs HW=365.20' TW=330.24' (Dynamic Tailwater)

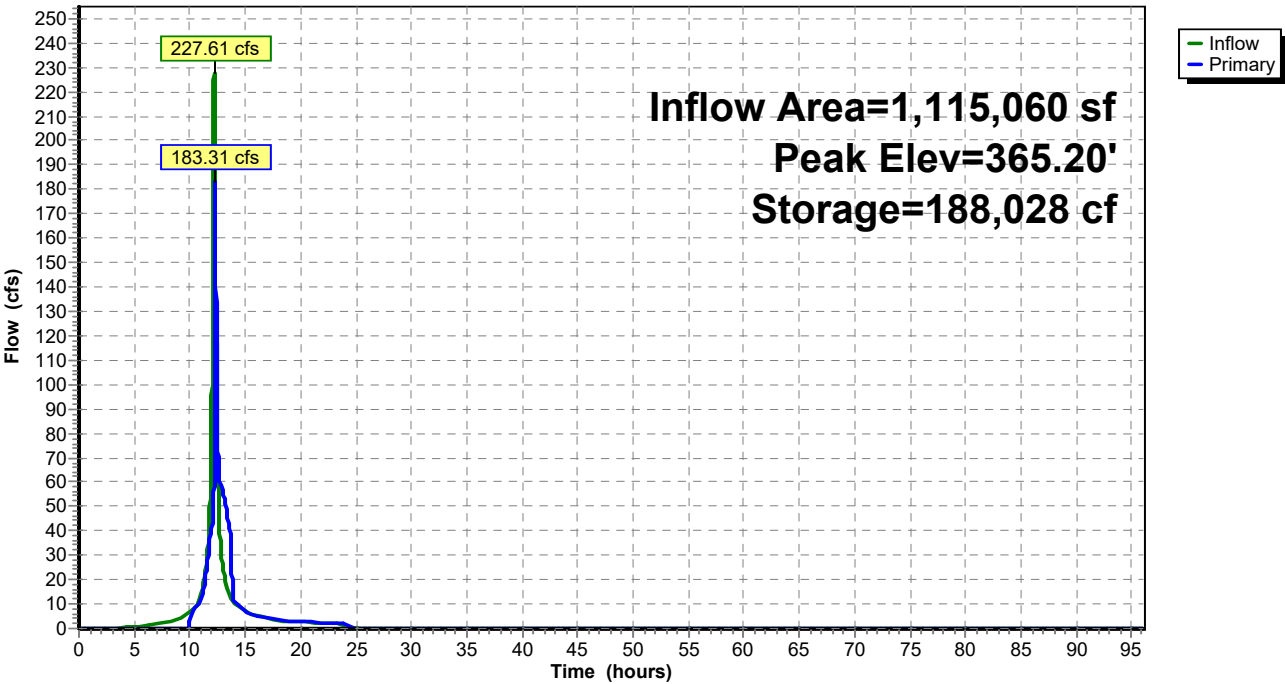
1=Culvert (Inlet Controls 62.29 cfs @ 12.69 fps)

2=Orifice/Grate (Passes 62.29 cfs of 263.43 cfs potential flow)

3=Broad-Crested Rectangular Weir (Weir Controls 120.80 cfs @ 1.80 fps)

Pond 9: Offsite Pond A

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

Printed 3/25/2020

Summary for Subcatchment 10: Post A4

Runoff = 22.58 cfs @ 12.30 hrs, Volume= 85,616 cf, Depth= 6.24"

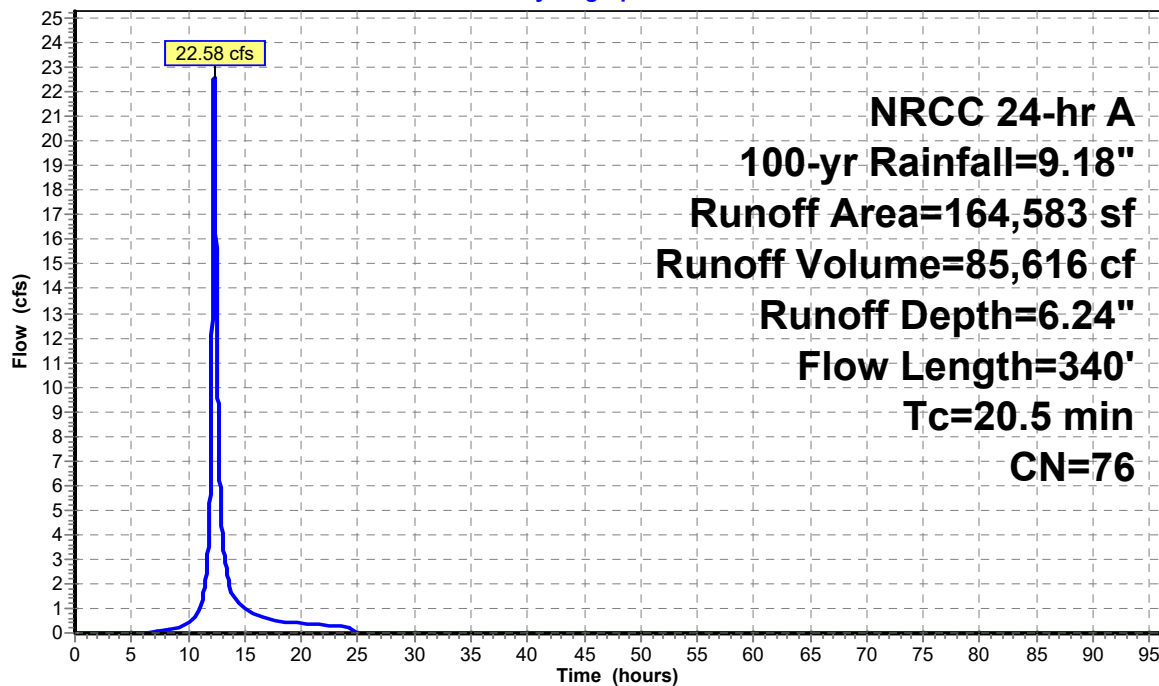
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
15,990	74	>75% Grass cover, Good, HSG C
65,271	70	Woods, Good, HSG C
66,457	77	Woods, Good, HSG D
16,865	98	Water Surface, HSG D
164,583	76	Weighted Average
147,718		89.75% Pervious Area
16,865		10.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0250	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.7	240	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
20.5	340	Total			

Subcatchment 10: Post A4

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

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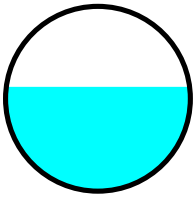
Summary for Reach 11: 24" Culvert Pipe

Inflow Area = 164,583 sf, 10.25% Impervious, Inflow Depth = 6.24" for 100-yr event
Inflow = 22.58 cfs @ 12.30 hrs, Volume= 85,616 cf
Outflow = 22.57 cfs @ 12.30 hrs, Volume= 85,616 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 12.36 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 4.31 fps, Avg. Travel Time= 0.4 min

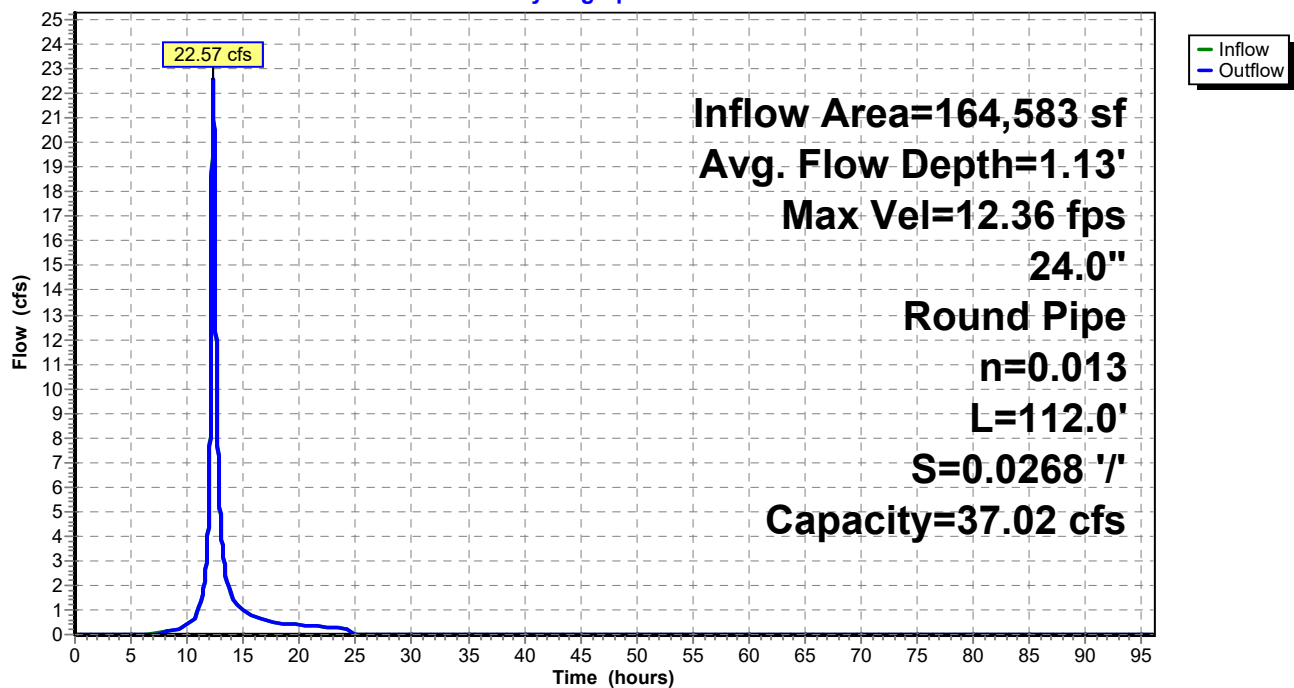
Peak Storage= 204 cf @ 12.30 hrs
Average Depth at Peak Storage= 1.13'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 37.02 cfs

24.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 112.0' Slope= 0.0268 '/
Inlet Invert= 349.00', Outlet Invert= 346.00'



Reach 11: 24" Culvert Pipe

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

Printed 3/25/2020

Summary for Subcatchment 12: Post A8

Runoff = 30.43 cfs @ 12.26 hrs, Volume= 107,297 cf, Depth= 6.12"

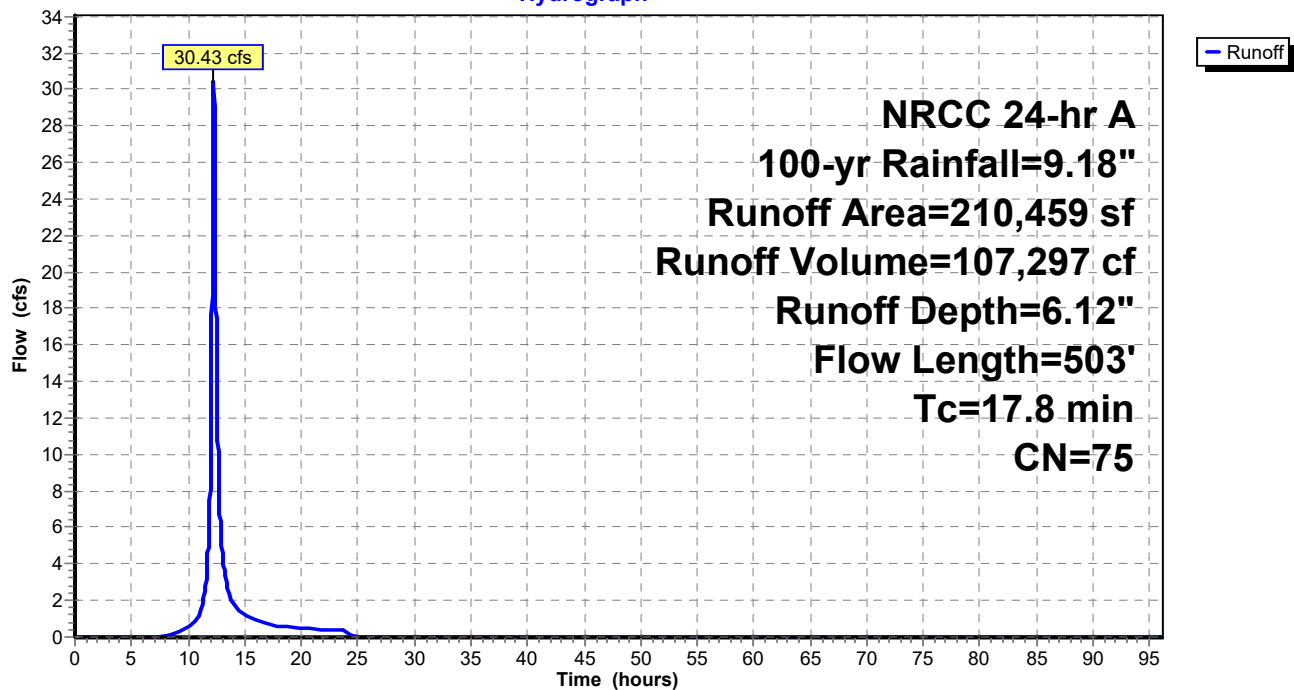
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
31,463	77	Woods, Good, HSG D
57,494	80	>75% Grass cover, Good, HSG D
63,009	70	Woods, Good, HSG C
58,493	74	>75% Grass cover, Good, HSG C
210,459	75	Weighted Average
210,459		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0400	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.4	305	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.8	98	0.0306	1.97	3.94	Channel Flow, Area= 2.0 sf Perim= 12.0' r= 0.17' n= 0.040 Winding stream, pools & shoals
17.8	503	Total			

Subcatchment 12: Post A8

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 13: Post A11

Runoff = 18.61 cfs @ 12.13 hrs, Volume= 47,976 cf, Depth= 7.97"

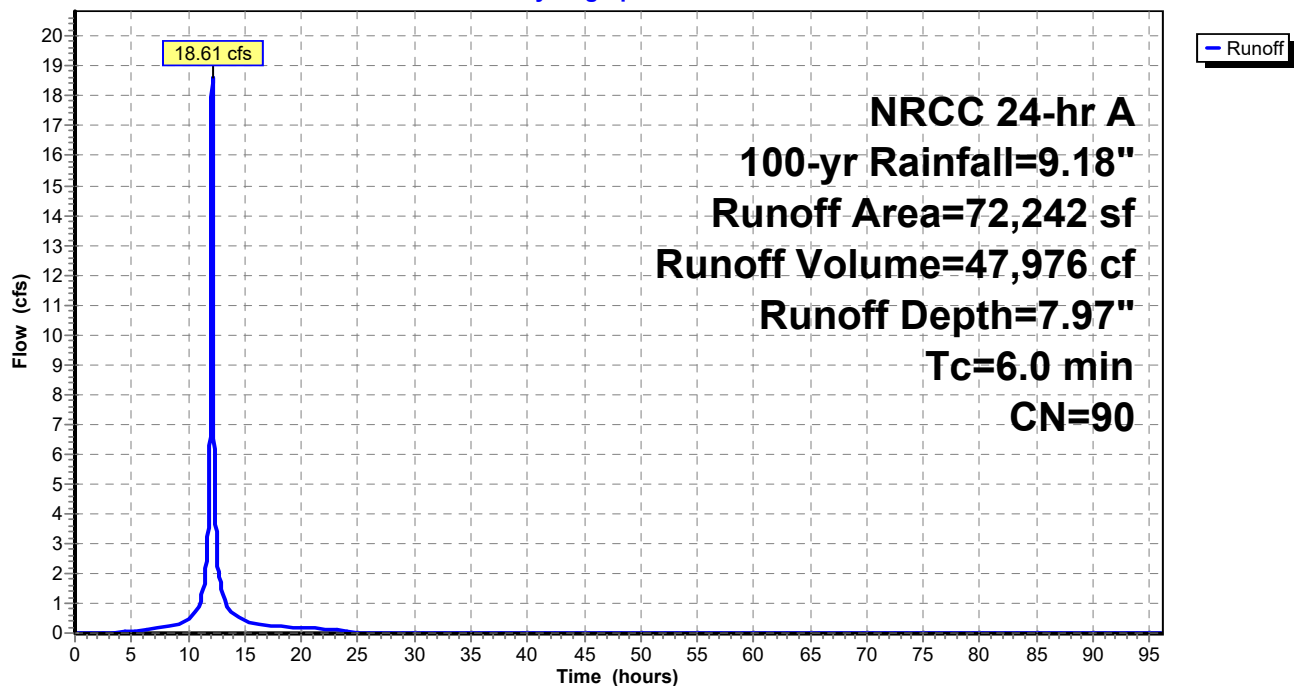
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
46,000	98	Paved parking, HSG C
16,765	74	>75% Grass cover, Good, HSG C
9,477	80	>75% Grass cover, Good, HSG D
72,242	90	Weighted Average
26,242		36.33% Pervious Area
46,000		63.67% Impervious Area

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

Subcatchment 13: Post A11

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 14: Post A10

Runoff = 79.85 cfs @ 12.13 hrs, Volume= 211,214 cf, Depth= 8.33"

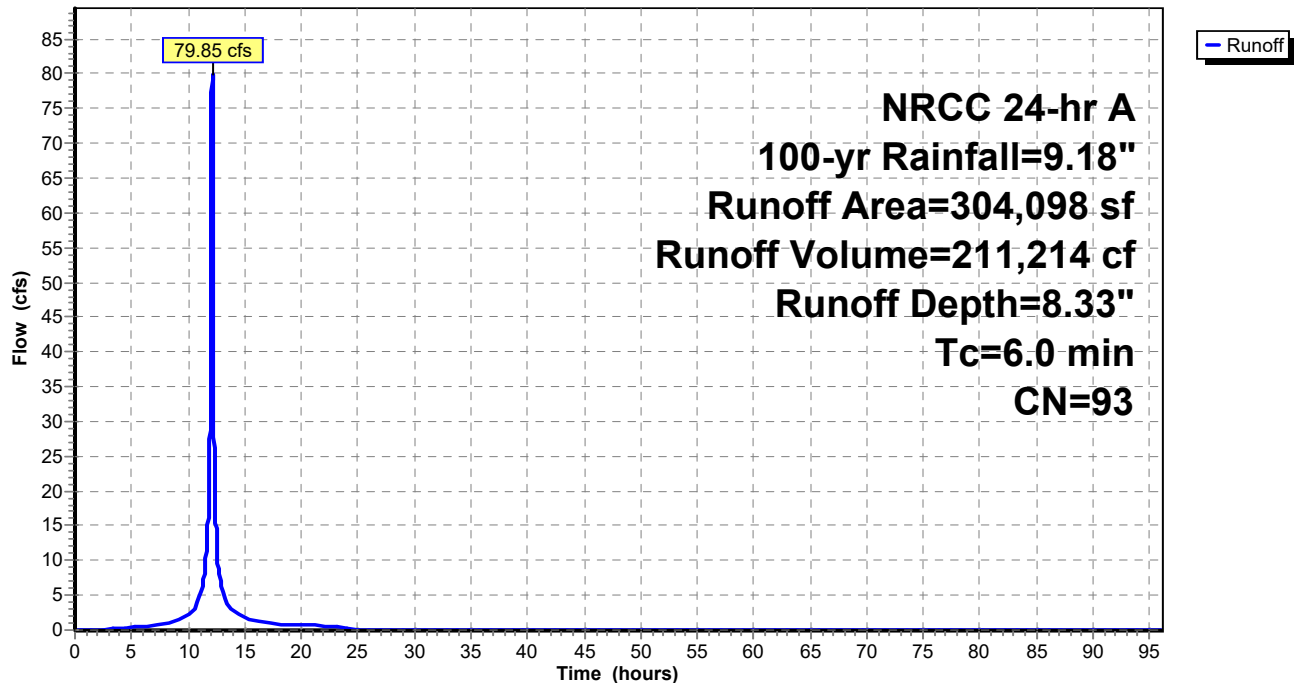
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
234,393	98	Paved parking, HSG C
56,515	74	>75% Grass cover, Good, HSG C
13,190	80	>75% Grass cover, Good, HSG D
304,098	93	Weighted Average
69,705		22.92% Pervious Area
234,393		77.08% Impervious Area

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

Subcatchment 14: Post A10

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 15: DIV-5

Inflow Area = 304,098 sf, 77.08% Impervious, Inflow Depth = 8.33" for 100-yr event
 Inflow = 79.85 cfs @ 12.13 hrs, Volume= 211,214 cf
 Outflow = 79.85 cfs @ 12.13 hrs, Volume= 211,214 cf, Atten= 0%, Lag= 0.0 min
 Primary = 7.46 cfs @ 12.13 hrs, Volume= 101,112 cf
 Secondary = 72.39 cfs @ 12.13 hrs, Volume= 110,102 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 341.52' @ 12.13 hrs

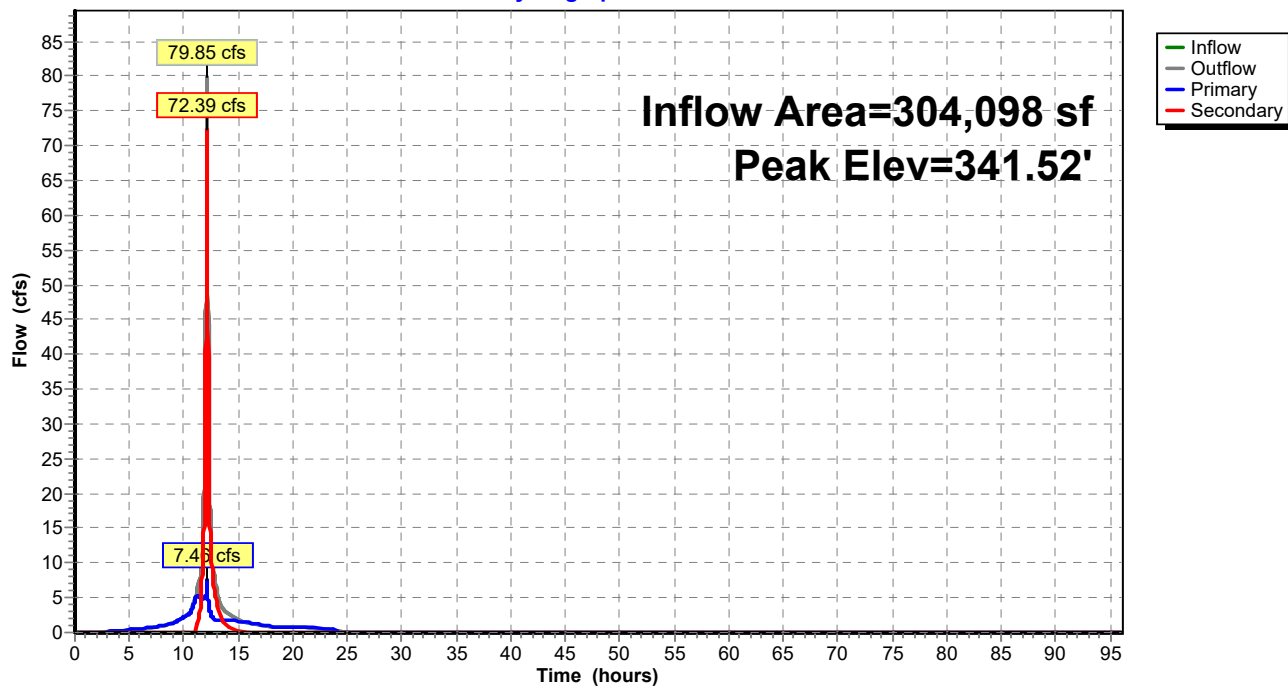
Flood Elev= 342.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	335.50'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 335.50' / 335.50' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	335.50'	36.0" Round Culvert L= 72.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 335.50' / 332.00' S= 0.0486 ' S= 0.0486 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Device 2	338.00'	8.0' 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=7.41 cfs @ 12.13 hrs HW=341.50' TW=337.66' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 7.41 cfs @ 9.44 fps)**Secondary OutFlow** Max=72.33 cfs @ 12.13 hrs HW=341.52' TW=328.14' (Dynamic Tailwater)↑ **2=Culvert** (Inlet Controls 72.33 cfs @ 10.23 fps)↑ **3=Broad-Crested Rectangular Weir** (Passes 72.33 cfs of 175.16 cfs potential flow)

Pond 15: DIV-5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 16: INF-5

Inflow Area = 304,098 sf, 77.08% Impervious, Inflow Depth = 3.99" for 100-yr event
 Inflow = 7.46 cfs @ 12.13 hrs, Volume= 101,112 cf
 Outflow = 1.98 cfs @ 10.04 hrs, Volume= 101,112 cf, Atten= 73%, Lag= 0.0 min
 Discarded = 1.98 cfs @ 10.04 hrs, Volume= 101,112 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 338.17' @ 12.66 hrs Surf.Area= 8,559 sf Storage= 19,190 cf

Plug-Flow detention time= 69.7 min calculated for 101,101 cf (100% of inflow)
 Center-of-Mass det. time= 69.7 min (856.3 - 786.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	335.00'	9,145 cf	70.25'W x 121.83'L x 4.33'H Field A 37,088 cf Overall - 14,227 cf Embedded = 22,862 cf x 40.0% Voids
#2A	335.50'	14,227 cf	Cultec R-360HD x 384 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 384 Chambers in 12 Rows Cap Storage= +6.5 cf x 2 x 12 rows = 155.0 cf
		23,371 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	335.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.98 cfs @ 10.04 hrs HW=335.04' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 1.98 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

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Pond 16: INF-5 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 12 rows = 155.0 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

32 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 119.83' Row Length +12.0" End Stone x 2 = 121.83' Base Length

12 Rows x 60.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 70.25' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

384 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 12 Rows = 14,226.6 cf Chamber Storage

37,088.1 cf Field - 14,226.6 cf Chambers = 22,861.5 cf Stone x 40.0% Voids = 9,144.6 cf Stone Storage

Chamber Storage + Stone Storage = 23,371.2 cf = 0.537 af

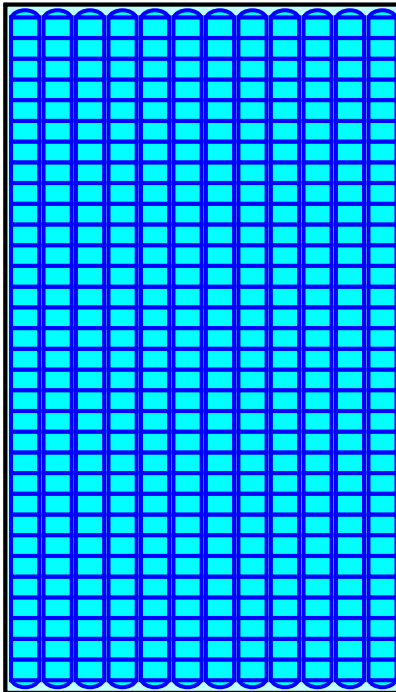
Overall Storage Efficiency = 63.0%

Overall System Size = 121.83' x 70.25' x 4.33'

384 Chambers

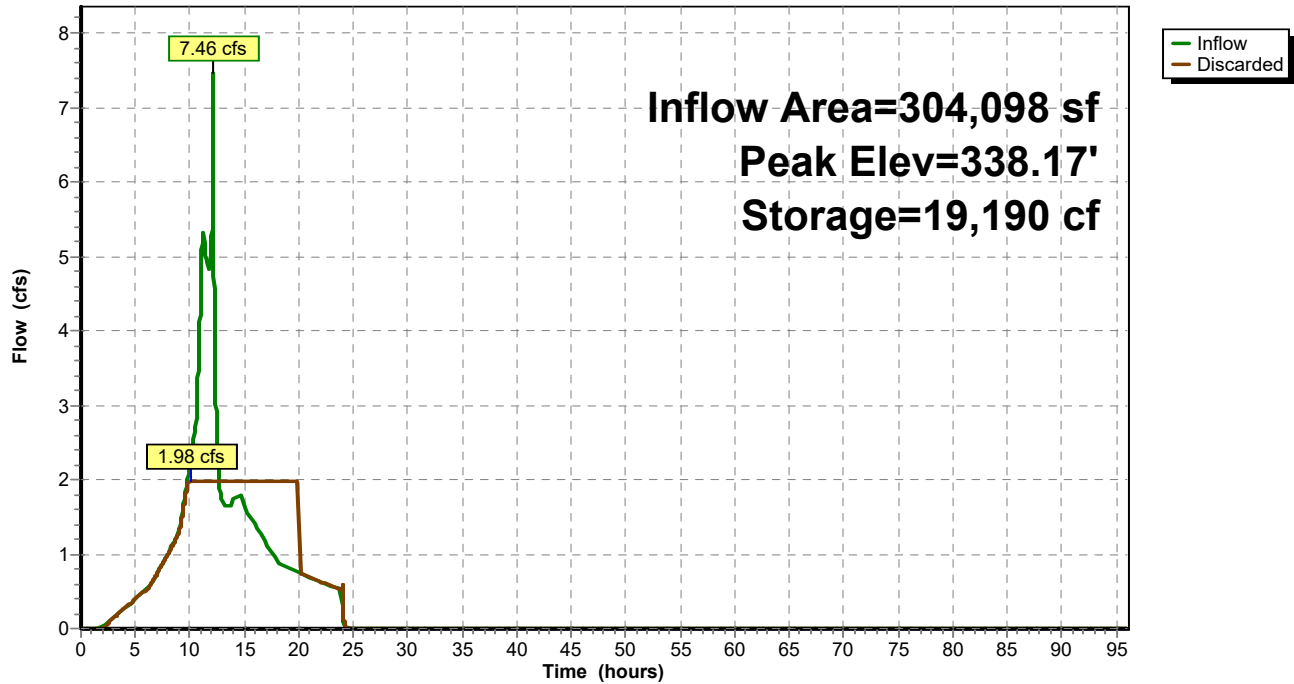
1,373.6 cy Field

846.7 cy Stone



Pond 16: INF-5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 17: Existing Wetland A

Inflow Area = 1,562,344 sf, 45.33% Impervious, Inflow Depth = 7.99" for 100-yr event
 Inflow = 267.69 cfs @ 12.27 hrs, Volume= 1,040,315 cf
 Outflow = 104.88 cfs @ 12.57 hrs, Volume= 1,040,315 cf, Atten= 61%, Lag= 17.8 min
 Primary = 104.88 cfs @ 12.57 hrs, Volume= 1,040,315 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 332.00' @ 12.57 hrs Surf.Area= 49,224 sf Storage= 190,109 cf

Plug-Flow detention time= 14.3 min calculated for 1,040,315 cf (100% of inflow)
 Center-of-Mass det. time= 14.1 min (817.2 - 803.1)

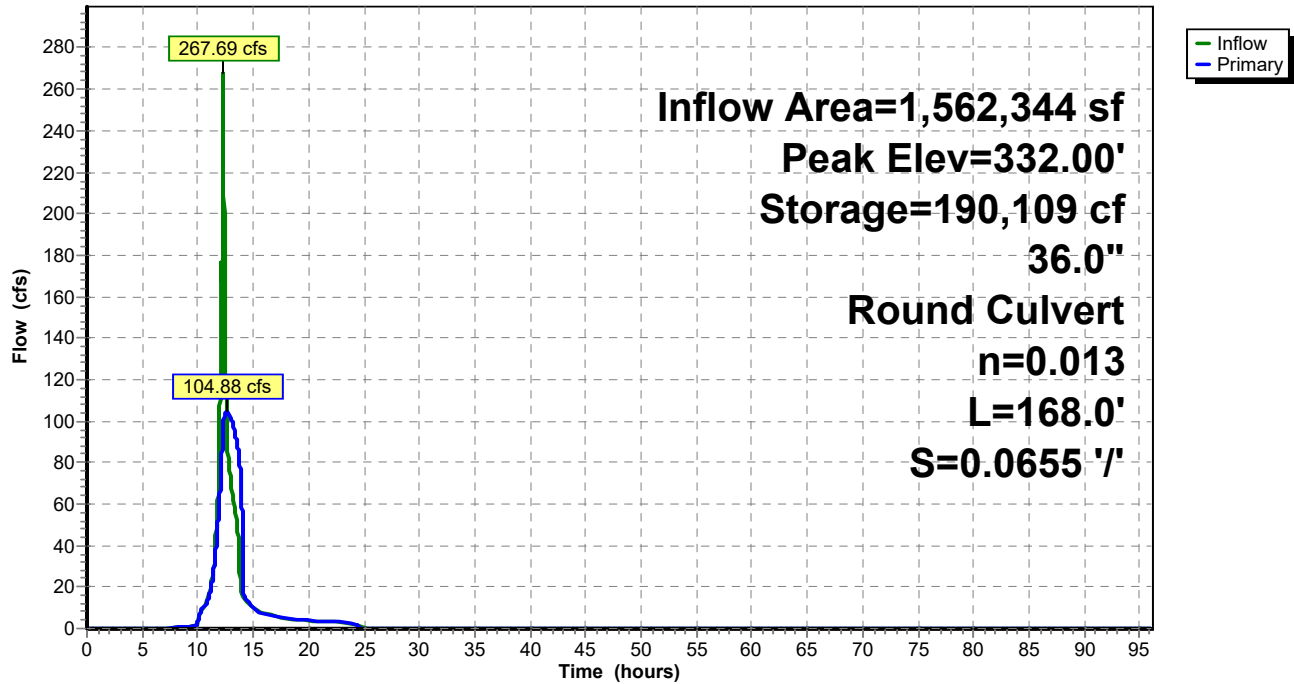
Volume	Invert	Avail.Storage	Storage Description		
#1	321.00'	190,307 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
321.00	124	53.2	0	0	124
322.00	1,084	175.8	525	525	2,361
324.00	4,913	341.5	5,536	6,061	9,202
326.00	11,332	638.2	15,804	21,866	32,354
328.00	20,583	804.3	31,458	53,324	51,475
330.00	34,086	1,075.5	54,104	107,428	92,087
332.00	49,257	1,268.5	82,879	190,307	128,164

Device	Routing	Invert	Outlet Devices
#1	Primary	321.00'	36.0" Round Culvert L= 168.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 321.00' / 310.00' S= 0.0655 ' S Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=104.88 cfs @ 12.57 hrs HW=332.00' TW=313.64' (Dynamic Tailwater)
 ↑**1=Culvert** (Inlet Controls 104.88 cfs @ 14.84 fps)

Pond 17: Existing Wetland A

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 18: Post A15

Runoff = 88.98 cfs @ 12.13 hrs, Volume= 203,219 cf, Depth= 5.74"

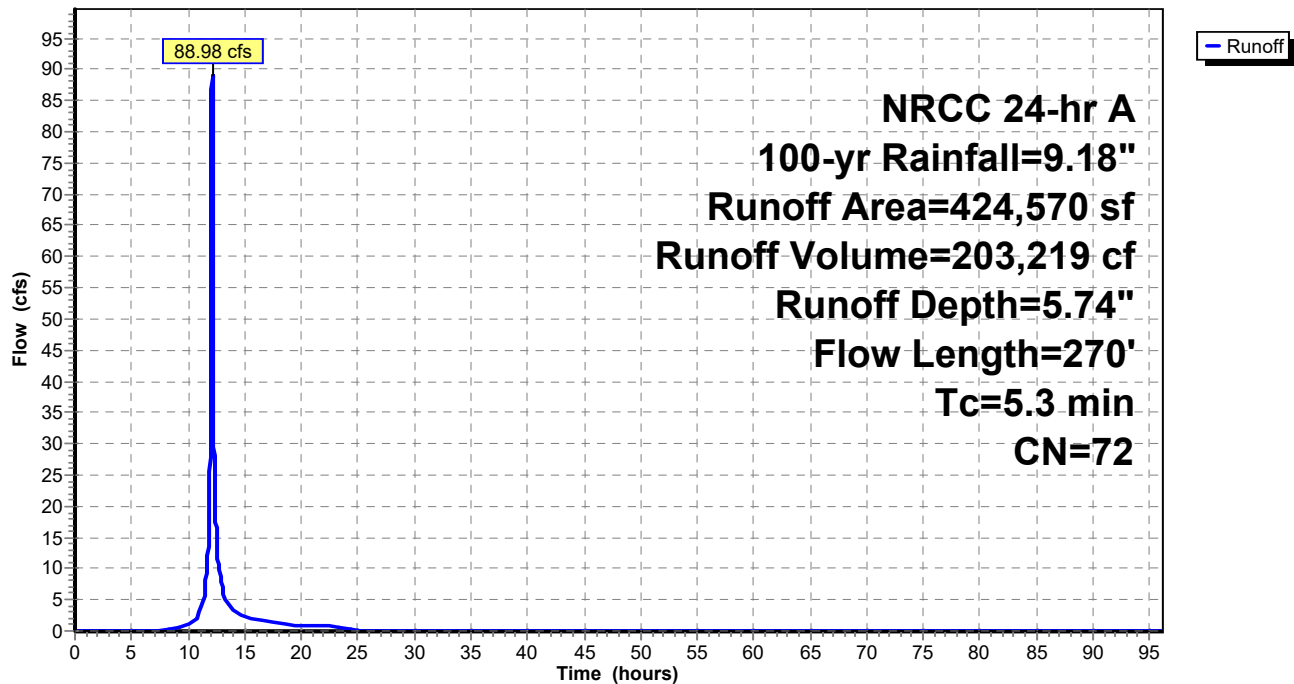
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
21,520	77	Woods, Good, HSG D
33,300	80	>75% Grass cover, Good, HSG D
213,730	70	Woods, Good, HSG C
140,572	74	>75% Grass cover, Good, HSG C
15,448	60	Woods, Fair, HSG B
424,570	72	Weighted Average
424,570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	100	0.1000	0.34		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.4	170	0.2353	7.81		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.3	270	Total			

Subcatchment 18: Post A15

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 19: Post A3

Runoff = 24.93 cfs @ 12.13 hrs, Volume= 69,488 cf, Depth= 8.94"

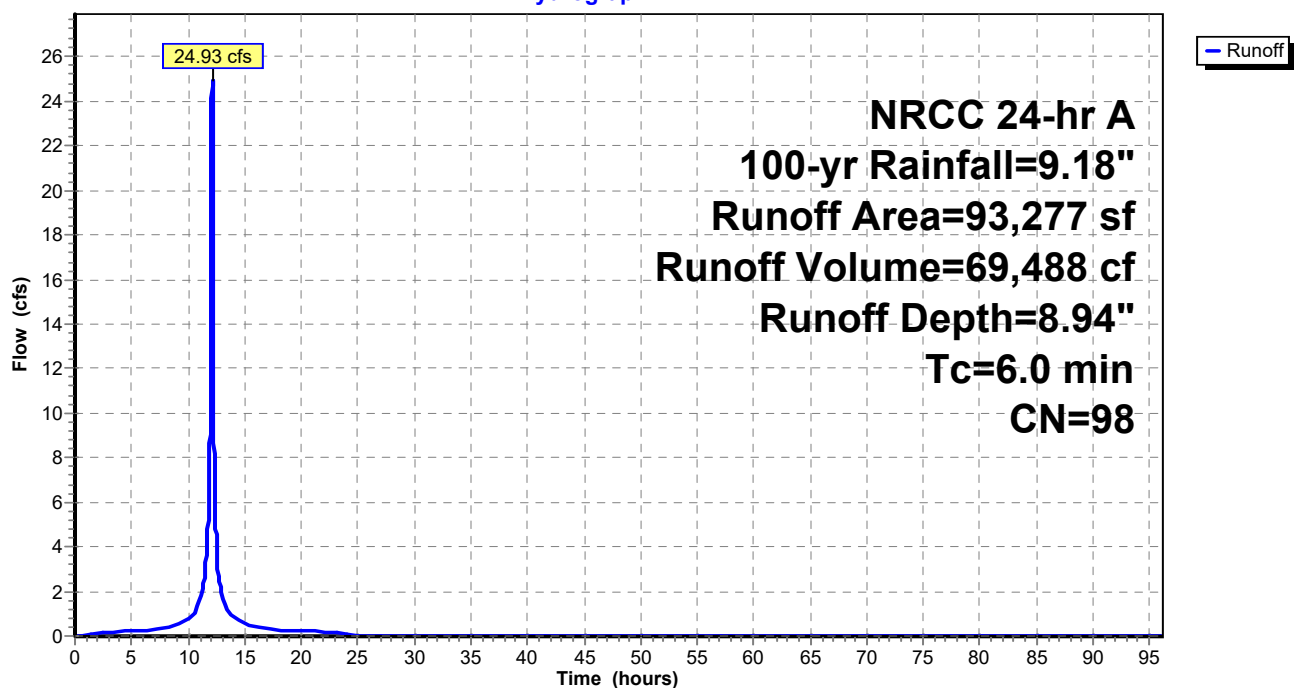
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
93,277	98	Paved parking, HSG C
93,277		100.00% Impervious Area

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

Subcatchment 19: Post A3

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 20: DIV-1

Inflow Area = 93,277 sf, 100.00% Impervious, Inflow Depth = 8.94" for 100-yr event
 Inflow = 24.93 cfs @ 12.13 hrs, Volume= 69,488 cf
 Outflow = 24.93 cfs @ 12.13 hrs, Volume= 69,488 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.58 cfs @ 12.13 hrs, Volume= 45,032 cf
 Secondary = 18.36 cfs @ 12.13 hrs, Volume= 24,456 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 329.91' @ 12.13 hrs

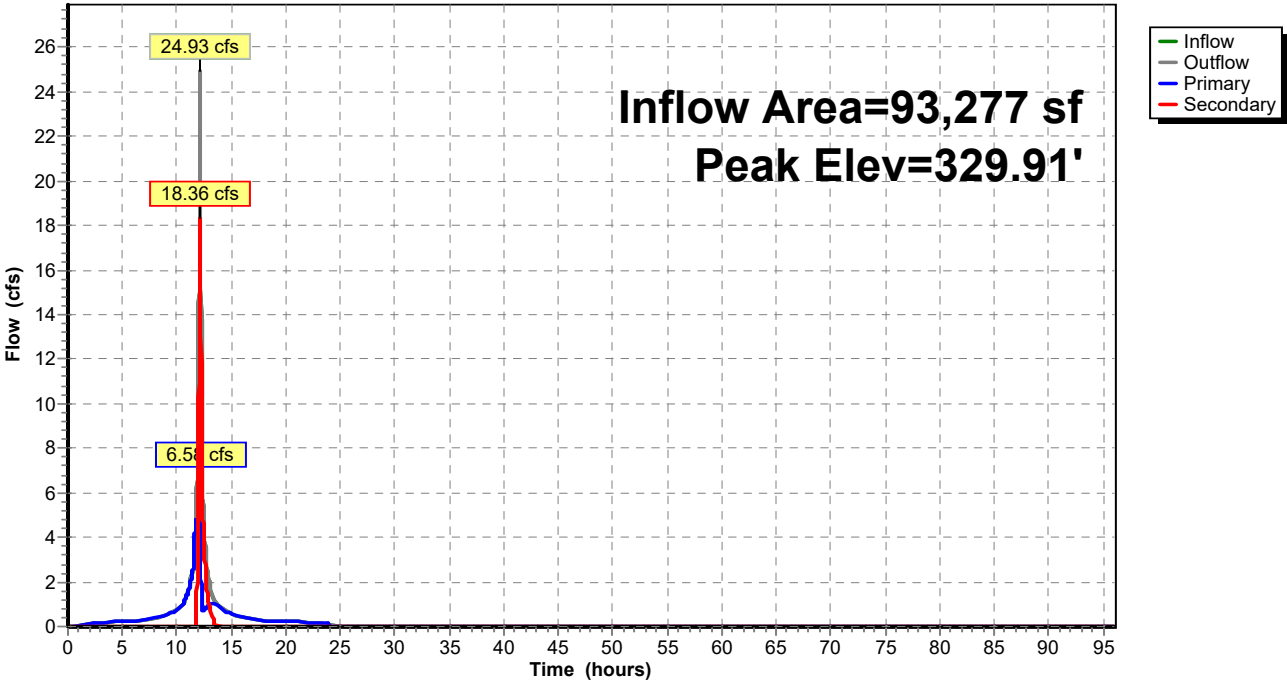
Flood Elev= 330.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	324.50'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.50' / 324.50' S= 0.0000 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	324.50'	18.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.50' / 320.00' S= 0.0900 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	327.00'	8.0' 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=6.48 cfs @ 12.13 hrs HW=329.87' TW=326.94' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 6.48 cfs @ 8.25 fps)**Secondary OutFlow** Max=18.36 cfs @ 12.13 hrs HW=329.91' TW=313.97' (Dynamic Tailwater)↑ **2=Culvert** (Inlet Controls 18.36 cfs @ 10.39 fps)↑ **3=Broad-Crested Rectangular Weir** (Passes 18.36 cfs of 131.60 cfs potential flow)

Pond 20: DIV-1

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 21: INF-1

Inflow Area = 93,277 sf, 100.00% Impervious, Inflow Depth = 5.79" for 100-yr event
 Inflow = 6.58 cfs @ 12.13 hrs, Volume= 45,032 cf
 Outflow = 1.18 cfs @ 10.91 hrs, Volume= 45,032 cf, Atten= 82%, Lag= 0.0 min
 Discarded = 1.18 cfs @ 10.91 hrs, Volume= 45,032 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 327.41' @ 12.26 hrs Surf.Area= 4,245 sf Storage= 9,785 cf

Plug-Flow detention time= 47.8 min calculated for 45,027 cf (100% of inflow)
 Center-of-Mass det. time= 47.8 min (789.5 - 741.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	324.00'	4,688 cf	36.75'W x 115.50'L x 4.33'H Field A 18,393 cf Overall - 6,674 cf Embedded = 11,720 cf x 40.0% Voids
#2A	324.50'	6,674 cf	Cultec R-360HD x 180 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 180 Chambers in 6 Rows Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf
11,361 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	324.00'	12.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.18 cfs @ 10.91 hrs HW=324.05' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.18 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

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Pond 21: INF-1 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

30 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 112.50' Row Length +18.0" End Stone x 2 = 115.50' Base Length

6 Rows x 60.0" Wide + 9.0" Spacing x 5 + 18.0" Side Stone x 2 = 36.75' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

180 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 6 Rows = 6,673.6 cf Chamber Storage

18,393.4 cf Field - 6,673.6 cf Chambers = 11,719.8 cf Stone x 40.0% Voids = 4,687.9 cf Stone Storage

Chamber Storage + Stone Storage = 11,361.5 cf = 0.261 af

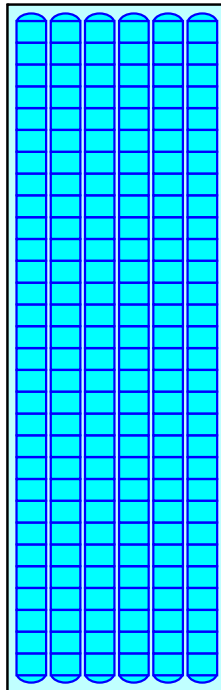
Overall Storage Efficiency = 61.8%

Overall System Size = 115.50' x 36.75' x 4.33'

180 Chambers

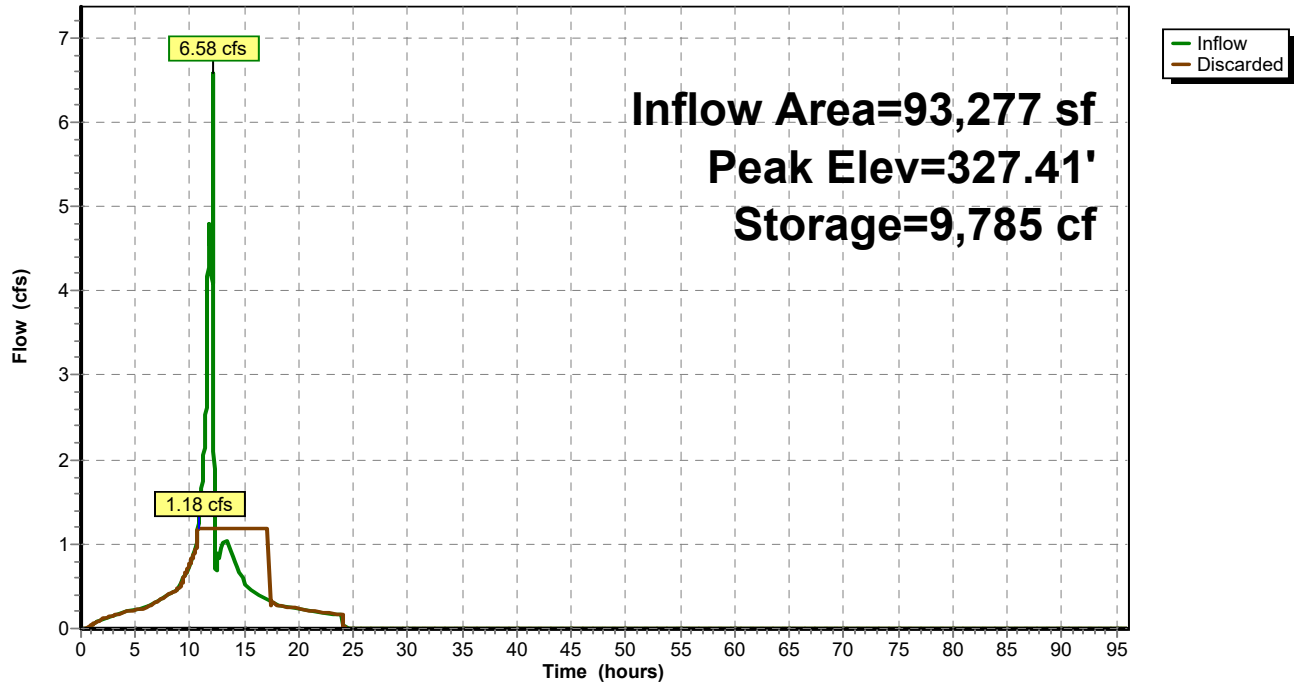
681.2 cy Field

434.1 cy Stone



Pond 21: INF-1

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Reach 22: Existing Stream A

Inflow Area = 1,986,914 sf, 35.64% Impervious, Inflow Depth = 7.66" for 100-yr event
Inflow = 188.04 cfs @ 12.13 hrs, Volume= 1,267,991 cf
Outflow = 182.37 cfs @ 12.15 hrs, Volume= 1,267,991 cf, Atten= 3%, Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 11.46 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 2.86 fps, Avg. Travel Time= 7.9 min

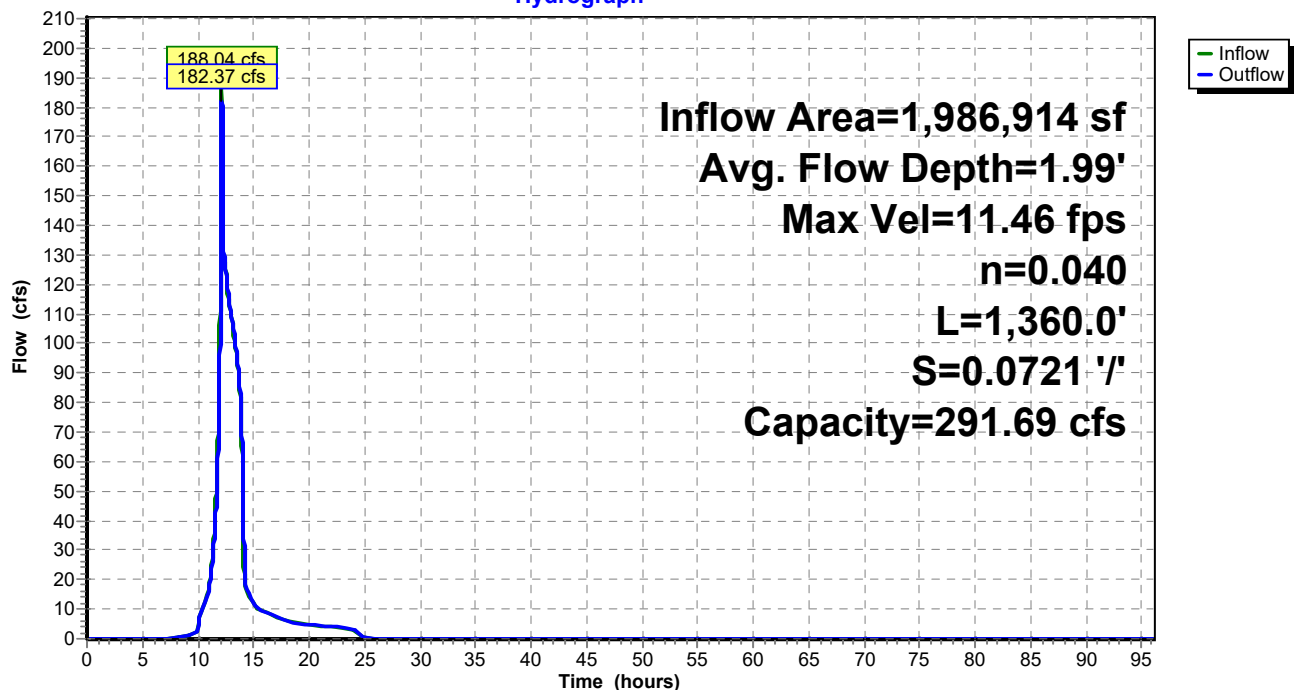
Peak Storage= 21,638 cf @ 12.15 hrs
Average Depth at Peak Storage= 1.99'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 291.69 cfs

4.00' x 2.50' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 1,360.0' Slope= 0.0721 '/'
Inlet Invert= 312.00', Outlet Invert= 214.00'



Reach 22: Existing Stream A

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 23: Post A5

Runoff = 24.84 cfs @ 12.13 hrs, Volume= 69,226 cf, Depth= 8.94"

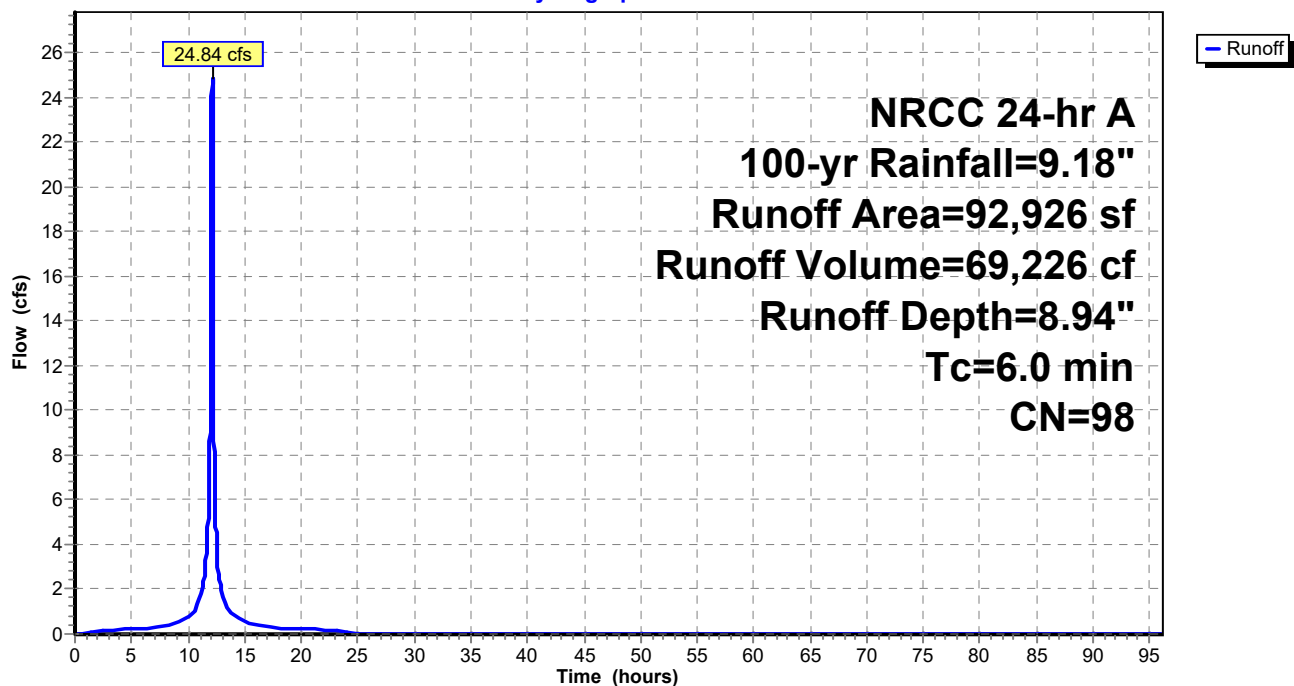
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
92,926	98	Paved parking, HSG C
92,926		100.00% Impervious Area

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

Subcatchment 23: Post A5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 24: DIV-2

Inflow Area = 92,926 sf, 100.00% Impervious, Inflow Depth = 8.94" for 100-yr event
 Inflow = 24.84 cfs @ 12.13 hrs, Volume= 69,226 cf
 Outflow = 24.84 cfs @ 12.13 hrs, Volume= 69,226 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.16 cfs @ 11.78 hrs, Volume= 44,464 cf
 Secondary = 20.11 cfs @ 12.13 hrs, Volume= 24,762 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 369.27' @ 12.13 hrs

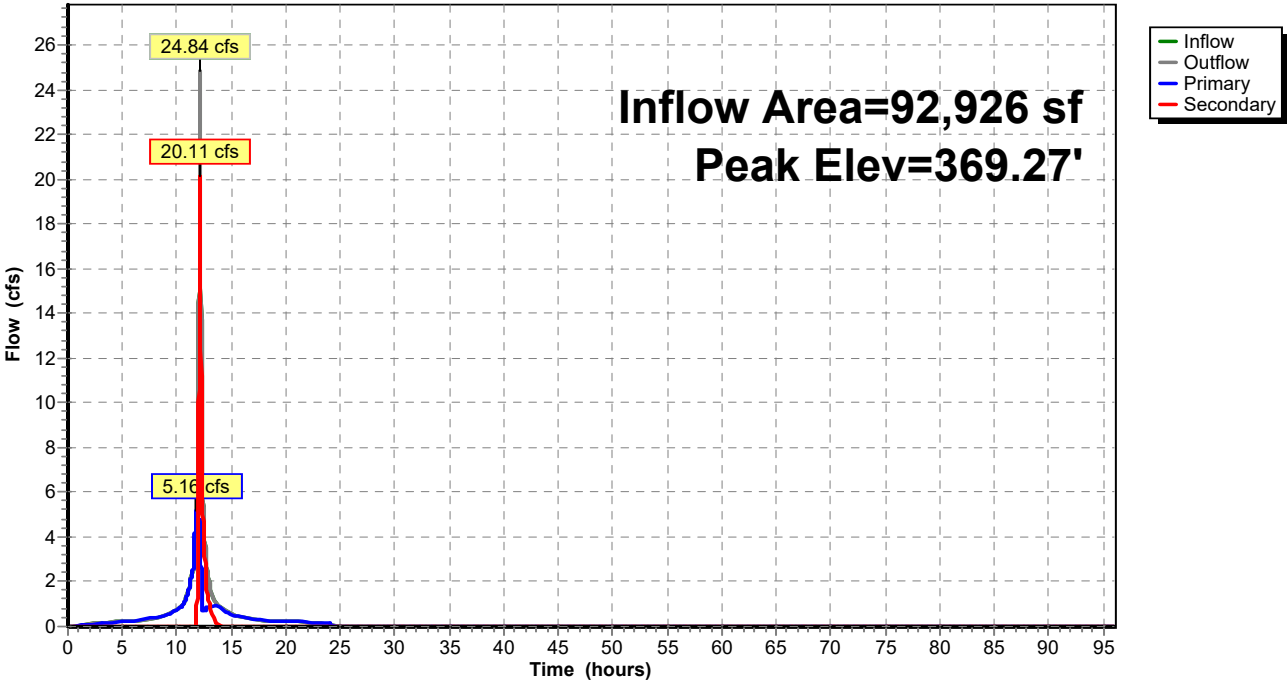
Flood Elev= 371.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	365.00'	12.0" Round Culvert L= 9.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 365.00' / 365.00' S= 0.0000 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	366.50'	24.0" Round Culvert L= 550.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 366.50' / 355.00' S= 0.0209 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	368.00'	8.0' 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=5.09 cfs @ 11.78 hrs HW=368.04' TW=366.23' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.09 cfs @ 6.48 fps)**Secondary OutFlow** Max=20.10 cfs @ 12.13 hrs HW=369.27' TW=358.30' (Dynamic Tailwater)↑ **2=Culvert** (Inlet Controls 20.10 cfs @ 6.40 fps)↑ **3=Broad-Crested Rectangular Weir** (Passes 20.10 cfs of 37.84 cfs potential flow)

Pond 24: DIV-2

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 25: INF-2

Inflow Area = 92,926 sf, 100.00% Impervious, Inflow Depth = 5.74" for 100-yr event
 Inflow = 5.16 cfs @ 11.78 hrs, Volume= 44,464 cf
 Outflow = 0.99 cfs @ 10.76 hrs, Volume= 44,464 cf, Atten= 81%, Lag= 0.0 min
 Discarded = 0.99 cfs @ 10.76 hrs, Volume= 44,464 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 368.33' @ 12.33 hrs Surf.Area= 4,295 sf Storage= 10,798 cf

Plug-Flow detention time= 69.9 min calculated for 44,459 cf (100% of inflow)
 Center-of-Mass det. time= 69.9 min (811.1 - 741.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	364.50'	4,639 cf	41.50'W x 103.50'L x 4.33'H Field A 18,613 cf Overall - 7,016 cf Embedded = 11,596 cf x 40.0% Voids
#2A	365.00'	7,016 cf	Cultec R-360HD x 189 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 189 Chambers in 7 Rows Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf
		11,655 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	364.50'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=0.99 cfs @ 10.76 hrs HW=364.55' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.99 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

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Pond 25: INF-2 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

27 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 101.50' Row Length +12.0" End Stone x 2 = 103.50' Base Length

7 Rows x 60.0" Wide + 9.0" Spacing x 6 + 12.0" Side Stone x 2 = 41.50' Base Width

6.0" Base + 36.0" Chamber Height + 10.0" Cover = 4.33' Field Height

189 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 7 Rows = 7,016.3 cf Chamber Storage

18,612.7 cf Field - 7,016.3 cf Chambers = 11,596.5 cf Stone x 40.0% Voids = 4,638.6 cf Stone Storage

Chamber Storage + Stone Storage = 11,654.9 cf = 0.268 af

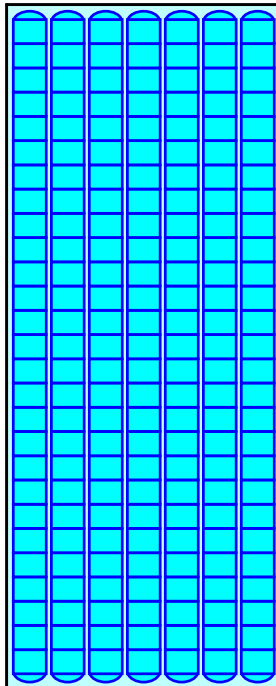
Overall Storage Efficiency = 62.6%

Overall System Size = 103.50' x 41.50' x 4.33'

189 Chambers

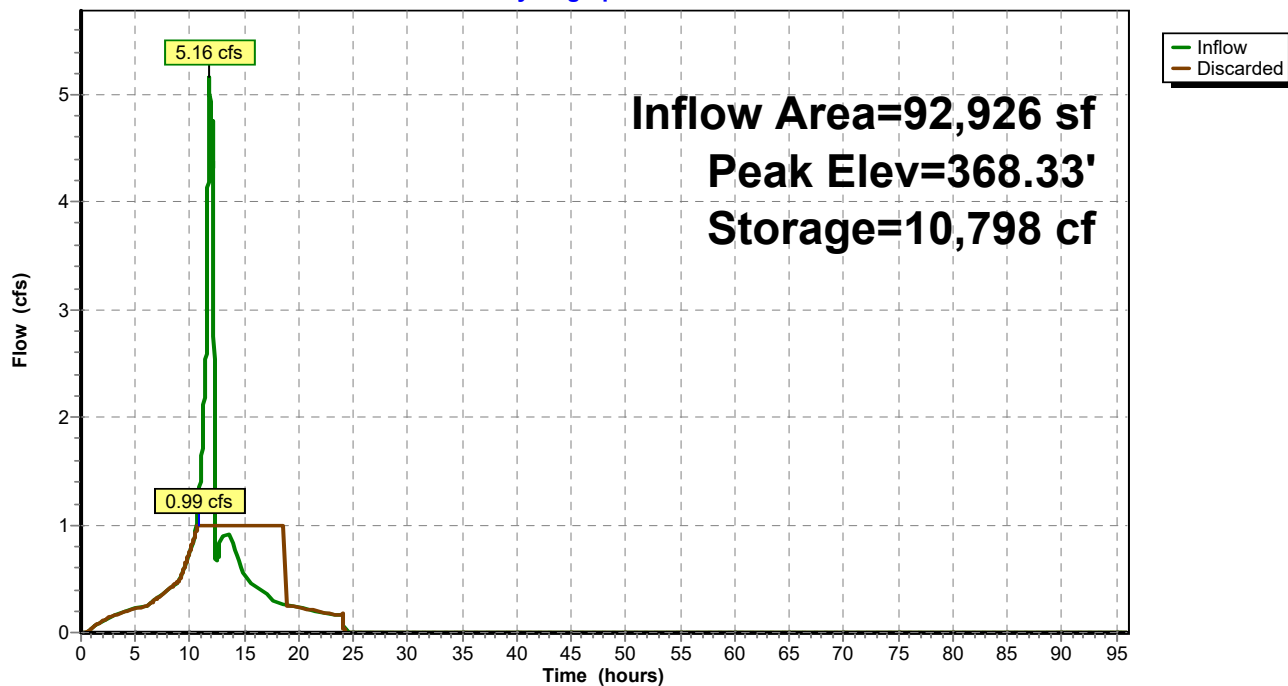
689.4 cy Field

429.5 cy Stone



Pond 25: INF-2

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 26: Post A12

Runoff = 32.54 cfs @ 12.19 hrs, Volume= 100,650 cf, Depth= 7.48"

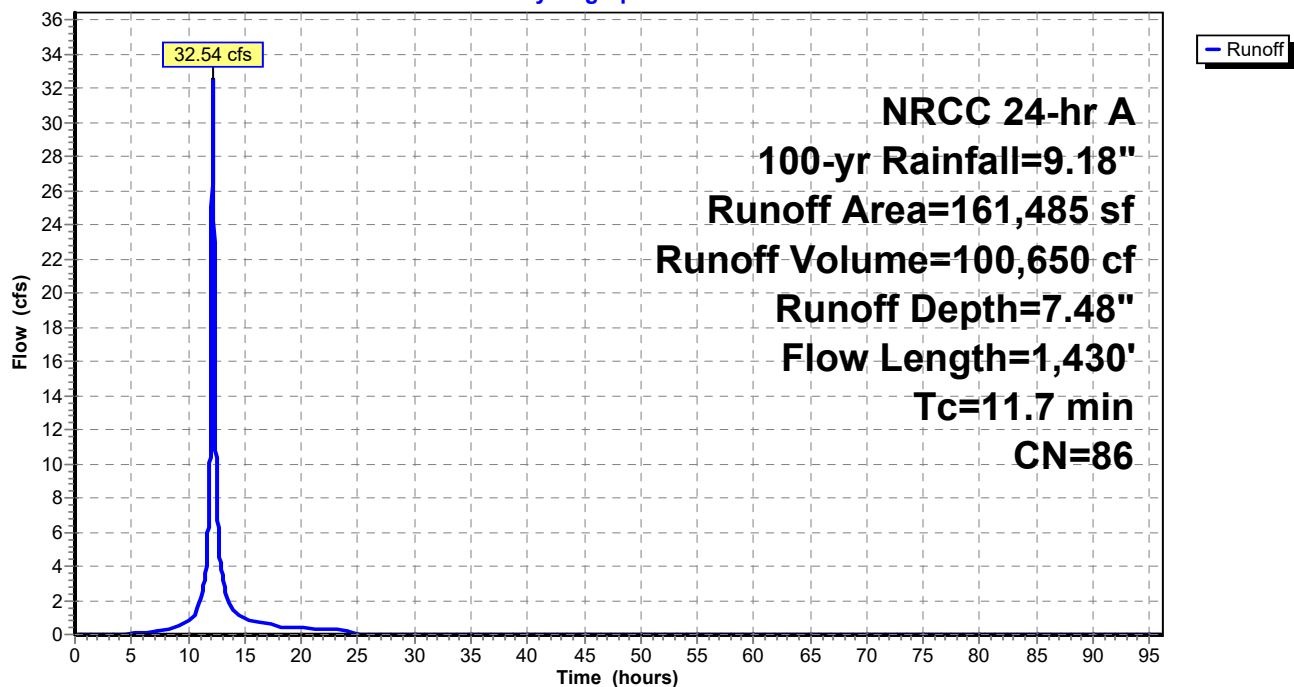
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
83,450	98	Paved parking, HSG C
78,035	74	>75% Grass cover, Good, HSG C
161,485	86	Weighted Average
78,035		48.32% Pervious Area
83,450		51.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	84	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
1.6	201	0.0164	2.06		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,145	0.0339	9.69	11.89	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
11.7	1,430	Total			

Subcatchment 26: Post A12

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 27: DIV-6

Inflow Area = 161,485 sf, 51.68% Impervious, Inflow Depth = 7.48" for 100-yr event
 Inflow = 32.54 cfs @ 12.19 hrs, Volume= 100,650 cf
 Outflow = 32.54 cfs @ 12.19 hrs, Volume= 100,650 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.88 cfs @ 11.59 hrs, Volume= 50,266 cf
 Secondary = 28.87 cfs @ 12.19 hrs, Volume= 50,384 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 366.14' @ 12.19 hrs

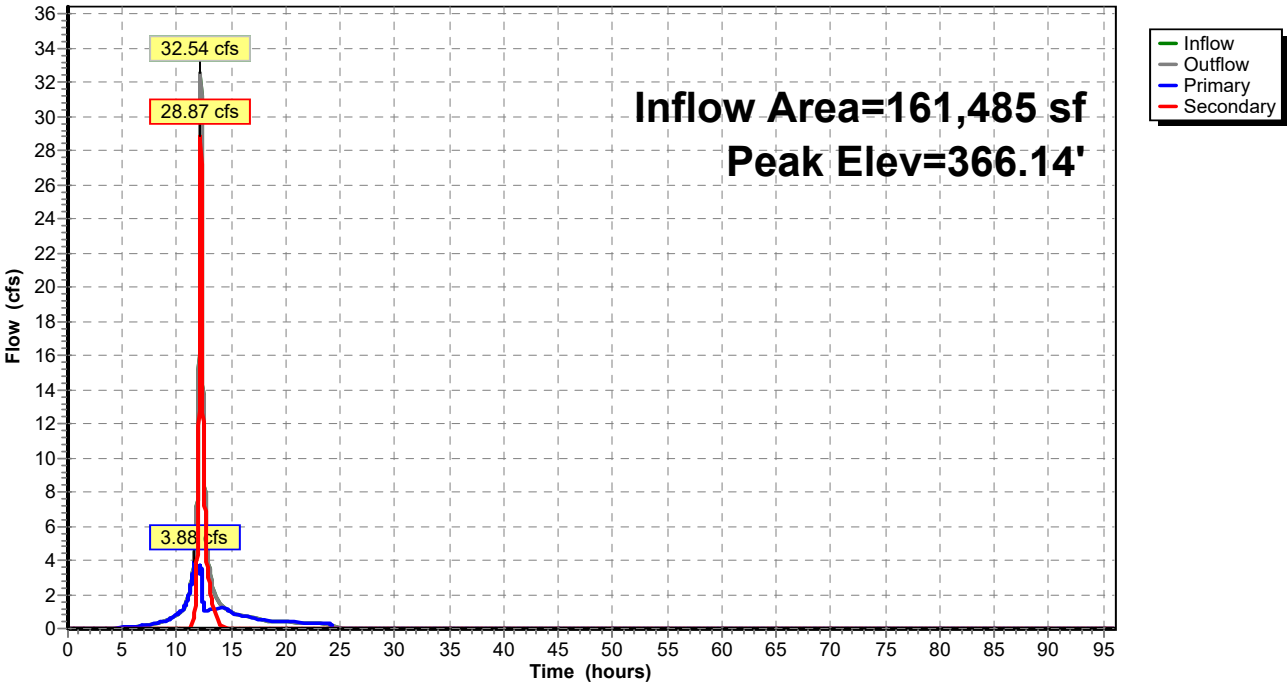
Flood Elev= 366.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	361.50'	10.0" Round Culvert L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 361.50' / 361.50' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	361.50'	24.0" Round Culvert L= 148.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 361.50' / 355.94' S= 0.0376 ' S= 0.0376 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	364.50'	8.0' 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=3.84 cfs @ 11.59 hrs HW=364.51' TW=362.37' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 3.84 cfs @ 7.04 fps)**Secondary OutFlow** Max=28.86 cfs @ 12.19 hrs HW=366.14' TW=357.96' (Dynamic Tailwater)↑ **2=Culvert** (Inlet Controls 28.86 cfs @ 9.19 fps)↑ **3=Broad-Crested Rectangular Weir** (Passes 28.86 cfs of 55.82 cfs potential flow)

Pond 27: DIV-6

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 28: INF-6

Inflow Area = 161,485 sf, 51.68% Impervious, Inflow Depth = 3.74" for 100-yr event
 Inflow = 3.88 cfs @ 11.59 hrs, Volume= 50,266 cf
 Outflow = 1.24 cfs @ 10.82 hrs, Volume= 50,266 cf, Atten= 68%, Lag= 0.0 min
 Discarded = 1.24 cfs @ 10.82 hrs, Volume= 50,266 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 364.81' @ 12.46 hrs Surf.Area= 3,569 sf Storage= 8,919 cf

Plug-Flow detention time= 52.5 min calculated for 50,261 cf (100% of inflow)
 Center-of-Mass det. time= 52.4 min (880.2 - 827.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	361.00'	3,393 cf	35.75'W x 99.83'L x 4.00'H Field A 14,276 cf Overall - 5,794 cf Embedded = 8,482 cf x 40.0% Voids
#2A	361.50'	5,794 cf	Cultec R-360HD x 156 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 156 Chambers in 6 Rows Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf
		9,187 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	361.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.24 cfs @ 10.82 hrs HW=361.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.24 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

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Pond 28: INF-6 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 6 rows = 77.5 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

26 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 97.83' Row Length +12.0" End Stone x 2 = 99.83' Base Length

6 Rows x 60.0" Wide + 9.0" Spacing x 5 + 12.0" Side Stone x 2 = 35.75' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

156 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 6 Rows = 5,794.1 cf Chamber Storage

14,276.2 cf Field - 5,794.1 cf Chambers = 8,482.1 cf Stone x 40.0% Voids = 3,392.8 cf Stone Storage

Chamber Storage + Stone Storage = 9,186.9 cf = 0.211 af

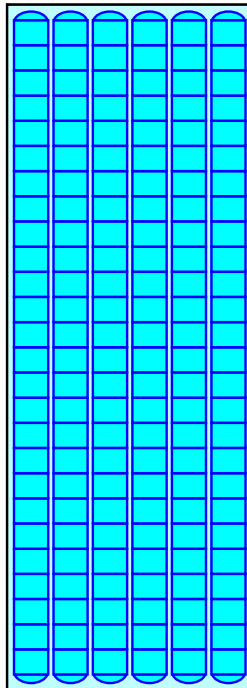
Overall Storage Efficiency = 64.4%

Overall System Size = 99.83' x 35.75' x 4.00'

156 Chambers

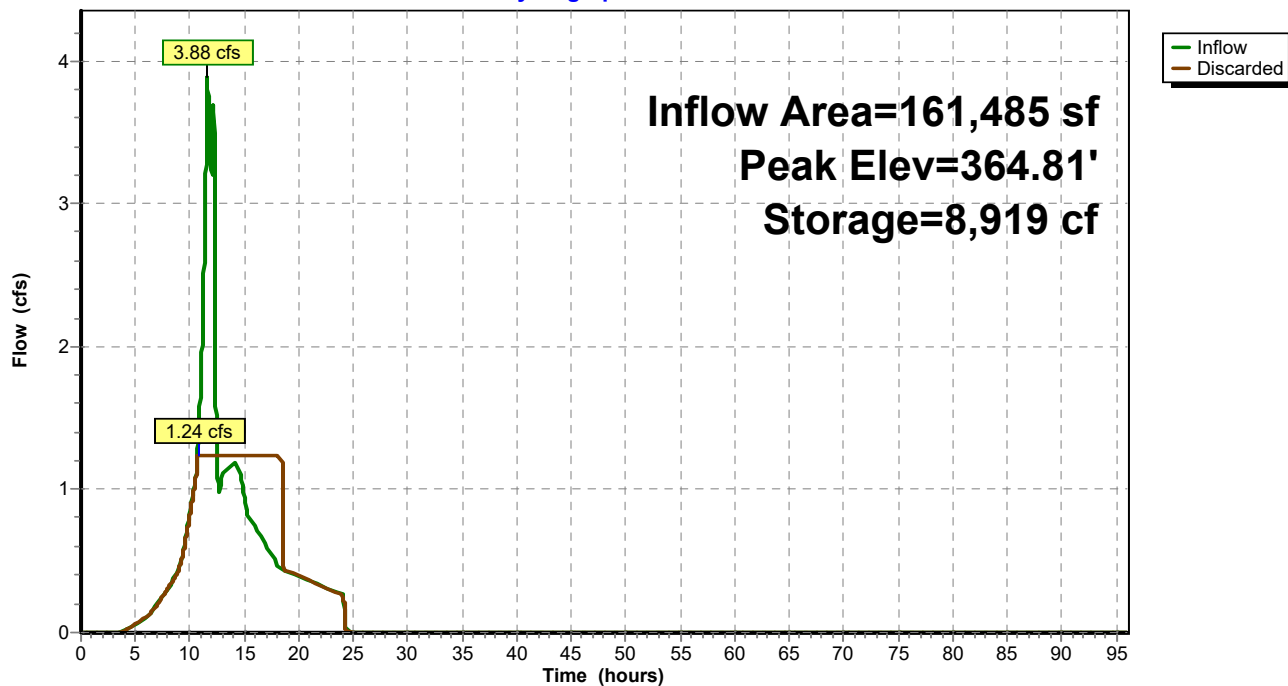
528.7 cy Field

314.2 cy Stone



Pond 28: INF-6

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 29: Post A6

Runoff = 97.27 cfs @ 12.13 hrs, Volume= 257,290 cf, Depth= 8.33"

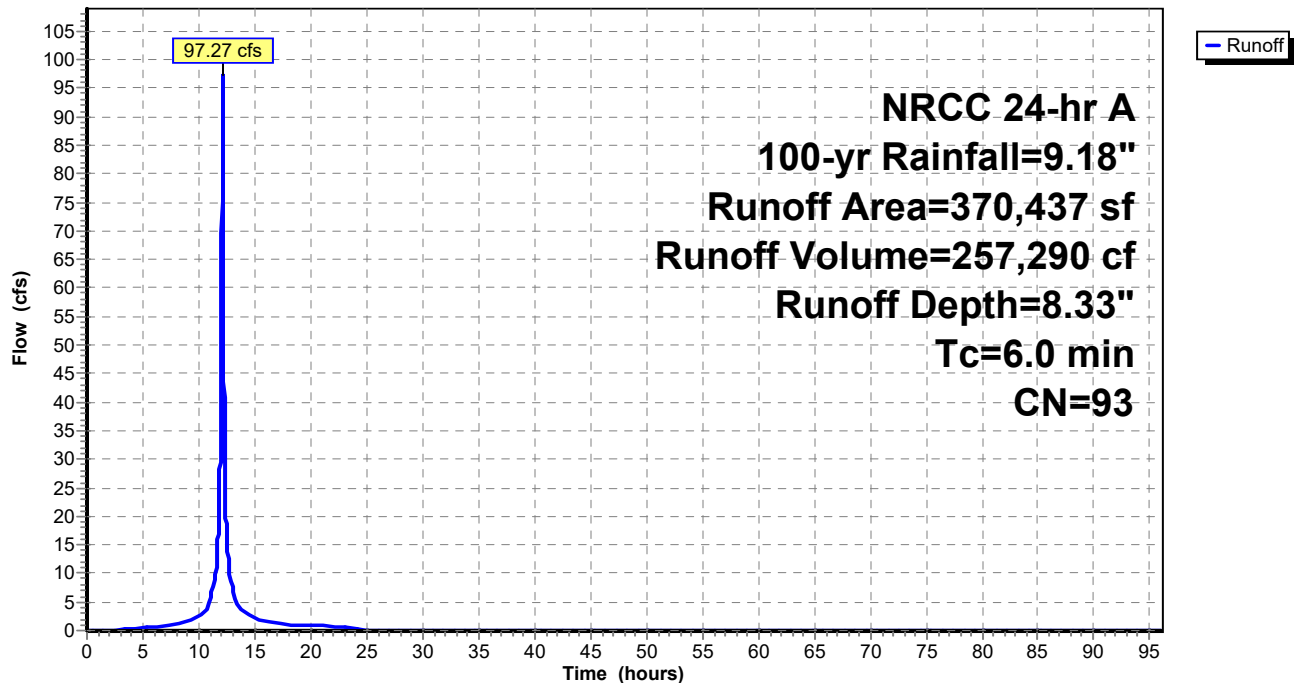
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
286,912	98	Paved parking, HSG C
83,525	74	>75% Grass cover, Good, HSG C
370,437	93	Weighted Average
83,525		22.55% Pervious Area
286,912		77.45% Impervious Area

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

Subcatchment 29: Post A6

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

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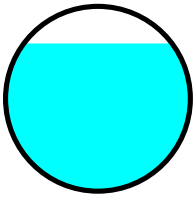
Summary for Reach 30: 36" HDPE Pipe

Inflow Area = 370,437 sf, 77.45% Impervious, Inflow Depth = 10.77" for 100-yr event
Inflow = 142.24 cfs @ 12.13 hrs, Volume= 332,436 cf
Outflow = 141.23 cfs @ 12.14 hrs, Volume= 332,436 cf, Atten= 1%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 23.34 fps, Min. Travel Time= 0.6 min
Avg. Velocity= 6.69 fps, Avg. Travel Time= 2.0 min

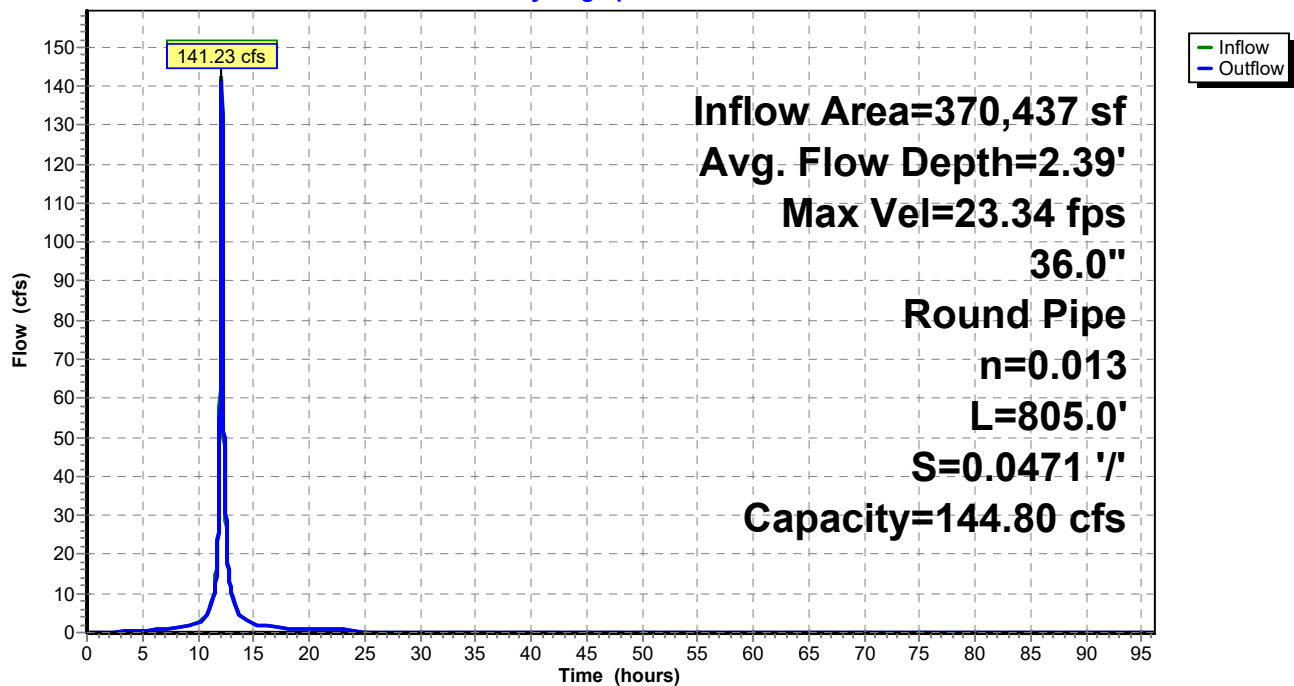
Peak Storage= 4,870 cf @ 12.14 hrs
Average Depth at Peak Storage= 2.39'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 144.80 cfs

36.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 805.0' Slope= 0.0471 '/'
Inlet Invert= 355.94', Outlet Invert= 318.00'



Reach 30: 36" HDPE Pipe

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 31: Post A14

Runoff = 55.10 cfs @ 12.13 hrs, Volume= 150,157 cf, Depth= 8.70"

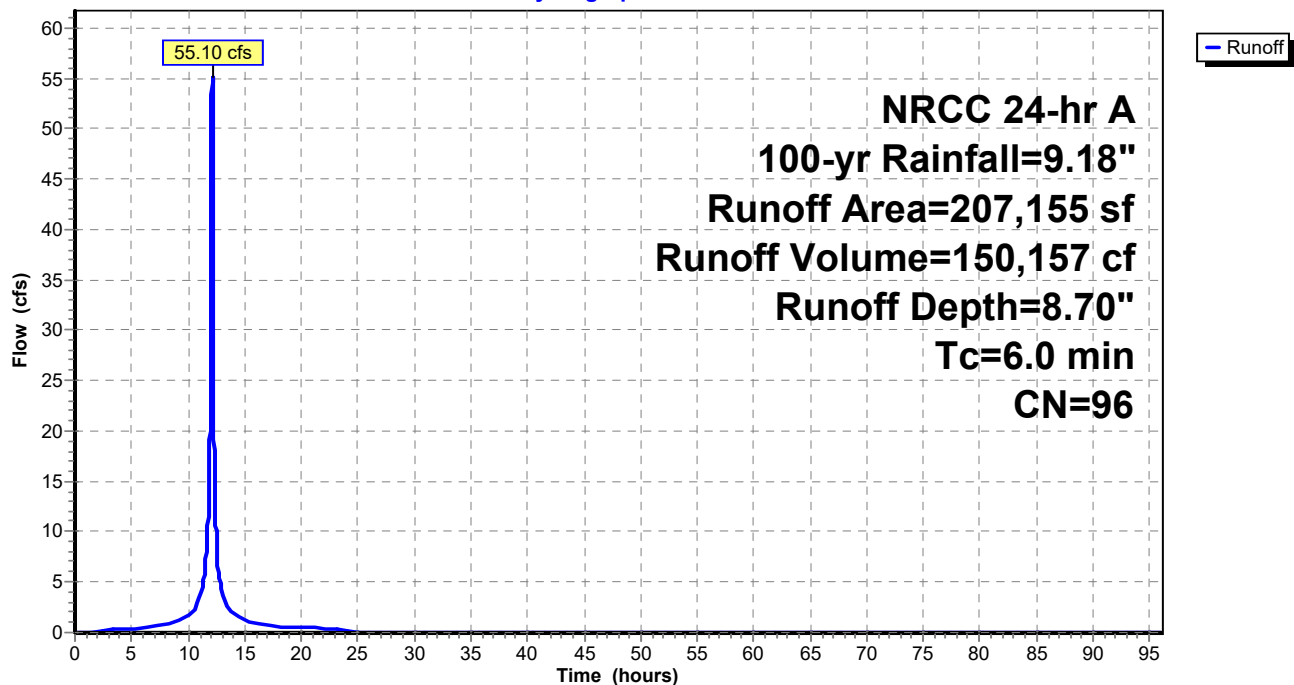
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
187,606	98	Paved parking, HSG C
19,549	74	>75% Grass cover, Good, HSG C
207,155	96	Weighted Average
19,549		9.44% Pervious Area
187,606		90.56% Impervious Area

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

Subcatchment 31: Post A14

Hydrograph



North 60 Post A 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 32: DMH-3

Inflow Area = 577,592 sf, 82.15% Impervious, Inflow Depth = 10.03" for 100-yr event
Inflow = 195.60 cfs @ 12.14 hrs, Volume= 482,593 cf
Outflow = 195.60 cfs @ 12.14 hrs, Volume= 482,593 cf, Atten= 0%, Lag= 0.0 min
Primary = 195.60 cfs @ 12.14 hrs, Volume= 482,593 cf

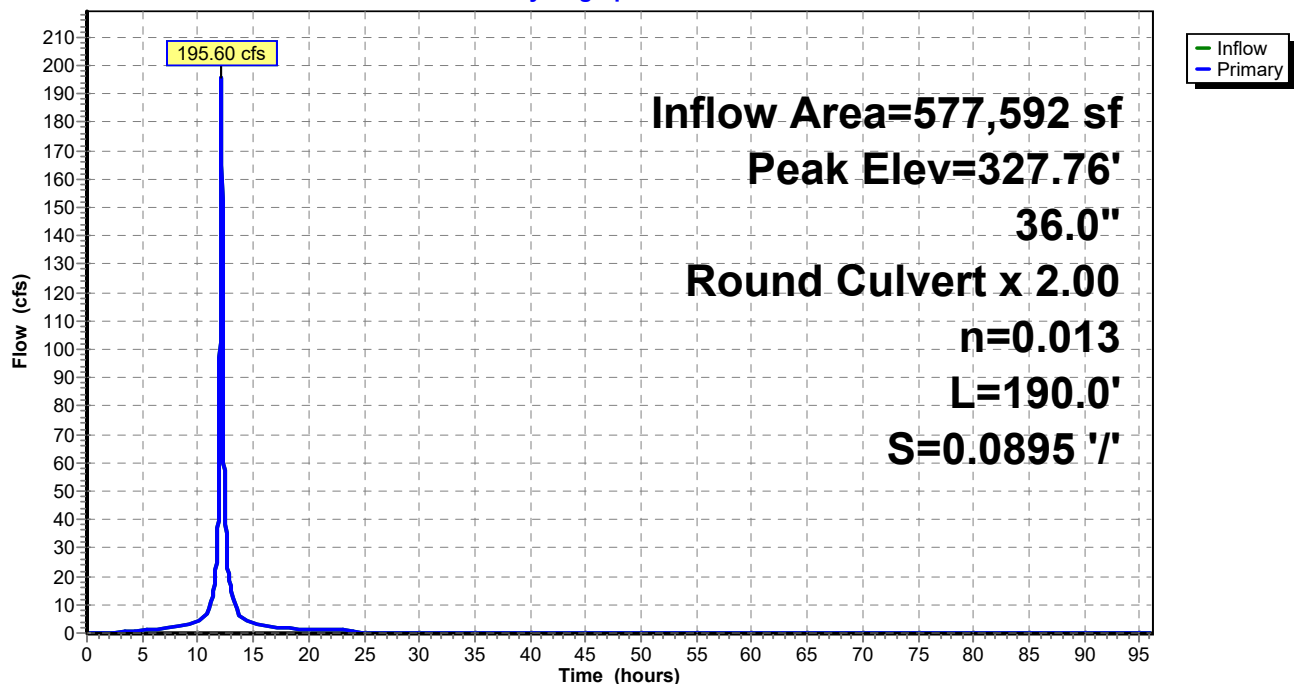
Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 327.76' @ 12.14 hrs

Flood Elev= 328.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	318.00'	36.0" Round Culvert X 2.00 L= 190.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 318.00' / 301.00' S= 0.0895 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=195.29 cfs @ 12.14 hrs HW=327.73' TW=305.15' (Dynamic Tailwater)
↑ **1=Culvert** (Inlet Controls 195.29 cfs @ 13.81 fps)

Pond 32: DMH-3**Hydrograph**

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NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 33: Post A7

Runoff = 6.15 cfs @ 12.18 hrs, Volume= 17,117 cf, Depth= 5.12"

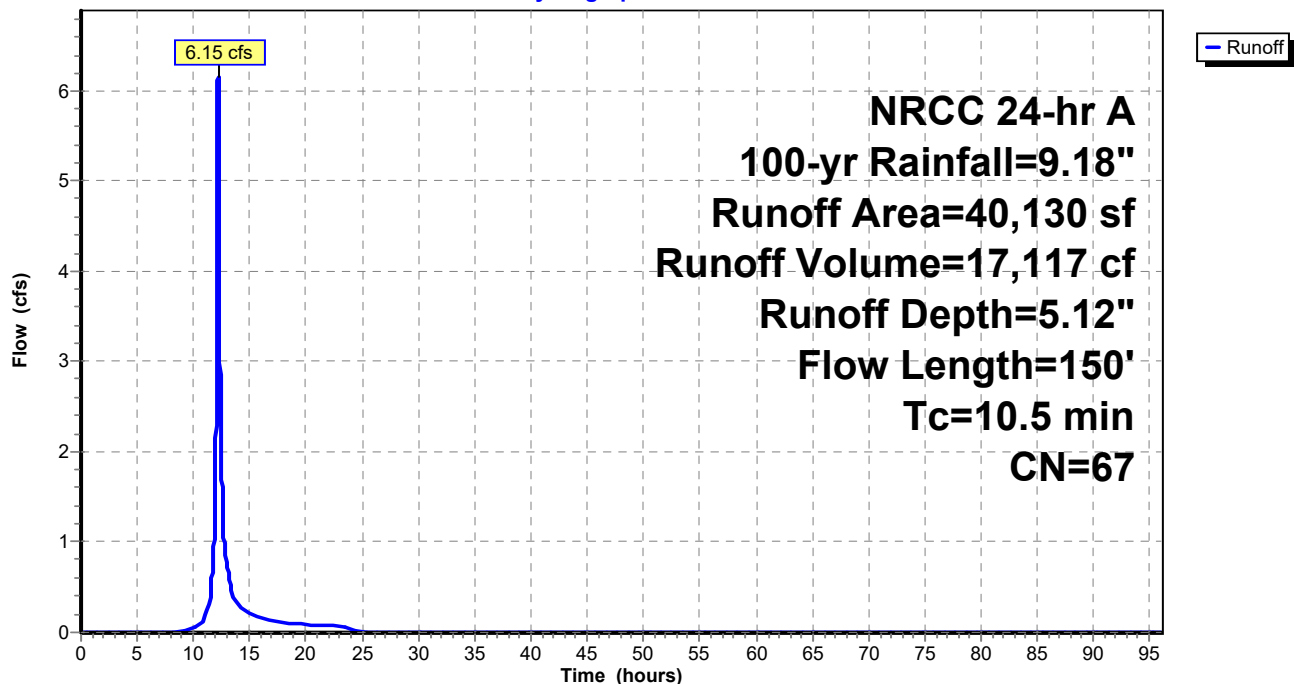
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
23,130	65	Brush, Good, HSG C
17,000	70	Woods, Good, HSG C
40,130	67	Weighted Average
40,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1100	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.1	50	0.2800	8.52		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.5	150	Total			

Subcatchment 33: Post A7

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 34: SWP-5

Inflow Area = 617,722 sf, 76.82% Impervious, Inflow Depth = 9.71" for 100-yr event
 Inflow = 201.13 cfs @ 12.14 hrs, Volume= 499,710 cf
 Outflow = 117.33 cfs @ 12.23 hrs, Volume= 499,710 cf, Atten= 42%, Lag= 5.6 min
 Discarded = 7.97 cfs @ 12.23 hrs, Volume= 228,031 cf
 Primary = 109.36 cfs @ 12.23 hrs, Volume= 271,679 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 305.91' @ 12.23 hrs Surf.Area= 22,953 sf Storage= 103,067 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 26.3 min (782.9 - 756.6)

Volume	Invert	Avail.Storage	Storage Description
#1	300.00'	105,088 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)
300.00	12,249	547.4	0	0	12,249
301.00	13,920	566.4	13,076	13,076	14,023
302.00	15,648	585.4	14,776	27,851	15,857
303.00	17,432	604.3	16,532	44,383	17,743
304.00	19,274	623.3	18,345	62,728	19,698
305.00	21,173	642.3	20,216	82,945	21,713
306.00	23,128	661.3	22,143	105,088	23,789

Device	Routing	Invert	Outlet Devices
#1	Discarded	300.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'
#2	Primary	298.00'	42.0" Round Culvert L= 189.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 298.00' / 258.00' S= 0.2116 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 9.62 sf
#3	Device 2	302.33'	36.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=7.97 cfs @ 12.23 hrs HW=305.91' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 7.97 cfs)

Primary OutFlow Max=109.34 cfs @ 12.23 hrs HW=305.91' TW=260.53' (Dynamic Tailwater)
 ↑ **2=Culvert** (Passes 109.34 cfs of 114.99 cfs potential flow)
 ↑ **3=Orifice/Grate** (Orifice Controls 109.34 cfs @ 9.11 fps)

North 60 Post A 3-9-20

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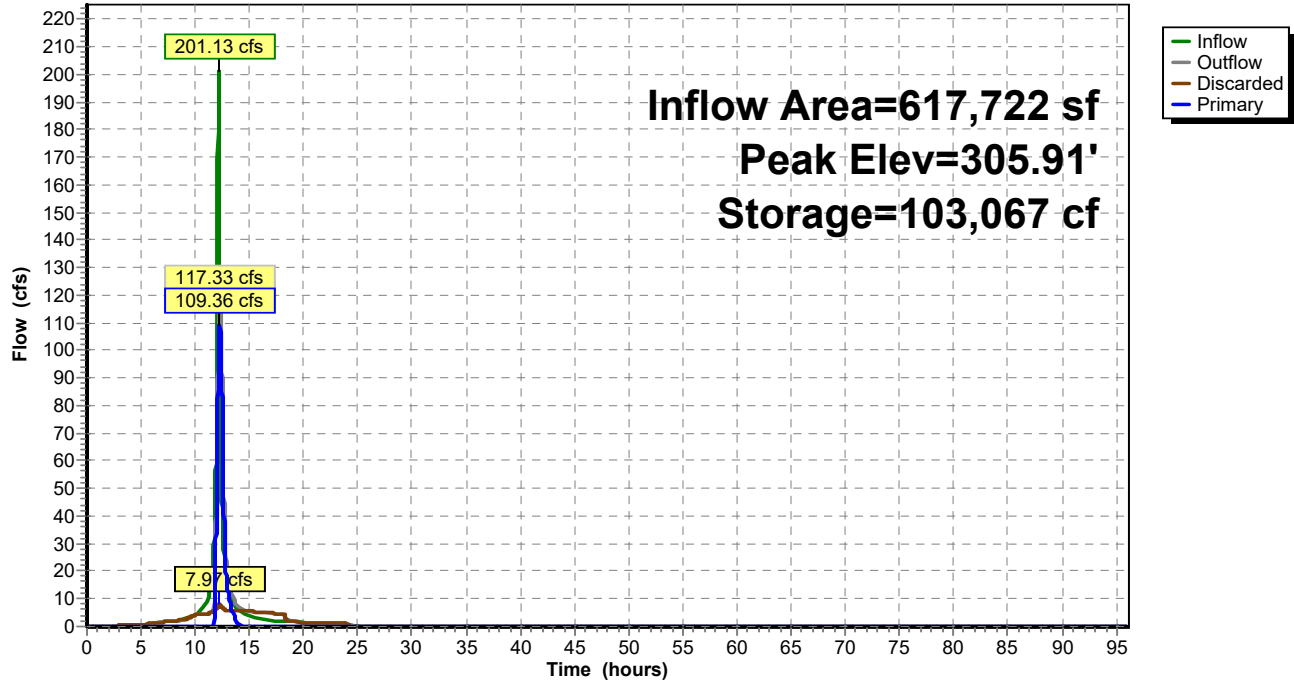
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NRCC 24-hr A 100-yr Rainfall=9.18"

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Pond 34: SWP-5

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 35: Post A16

Runoff = 8.15 cfs @ 12.17 hrs, Volume= 22,076 cf, Depth= 5.24"

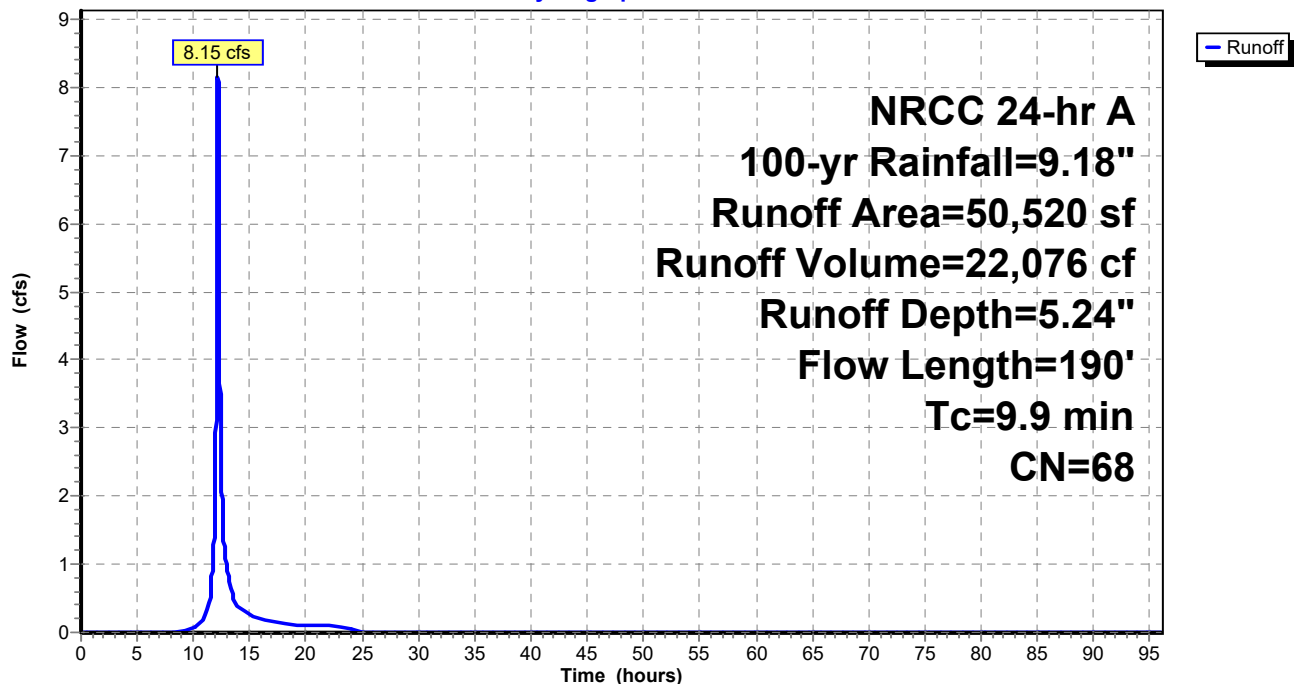
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
16,692	65	Brush, Good, HSG C
33,828	70	Woods, Good, HSG C
50,520	68	Weighted Average
50,520		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.17		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	90	0.3000	8.82		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
9.9	190	Total			

Subcatchment 35: Post A16

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 36: SWP-3

Inflow Area = 668,242 sf, 71.01% Impervious, Inflow Depth = 5.28" for 100-yr event
 Inflow = 116.44 cfs @ 12.22 hrs, Volume= 293,755 cf
 Outflow = 88.83 cfs @ 12.45 hrs, Volume= 293,755 cf, Atten= 24%, Lag= 14.1 min
 Discarded = 5.50 cfs @ 12.45 hrs, Volume= 56,680 cf
 Primary = 83.34 cfs @ 12.45 hrs, Volume= 237,075 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 261.50' @ 12.45 hrs Surf.Area= 15,830 sf Storage= 63,124 cf

Plug-Flow detention time= 16.0 min calculated for 293,725 cf (100% of inflow)
 Center-of-Mass det. time= 16.0 min (764.9 - 748.9)

Volume	Invert	Avail.Storage	Storage Description		
#1	256.00'	71,328 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)
256.00	7,434	457.3	0	0	7,434
257.00	8,834	476.3	8,124	8,124	8,921
258.00	10,292	495.3	9,554	17,678	10,468
259.00	11,806	514.3	11,040	28,718	12,076
260.00	13,378	533.4	12,584	41,302	13,752
261.00	15,006	552.4	14,184	55,486	15,481
262.00	16,692	571.4	15,842	71,328	17,271

Device	Routing	Invert	Outlet Devices
#1	Primary	254.00'	36.0" Round Culvert L= 128.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 254.00' / 234.00' S= 0.1563 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#2	Device 1	258.00'	36.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	256.00'	15.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'

Discarded OutFlow Max=5.50 cfs @ 12.45 hrs HW=261.50' (Free Discharge)

↑**3=Exfiltration** (Exfiltration Controls 5.50 cfs)

Primary OutFlow Max=83.33 cfs @ 12.45 hrs HW=261.50' TW=0.00' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 83.33 cfs @ 11.79 fps)

↑**2=Orifice/Grate** (Passes 83.33 cfs of 108.02 cfs potential flow)

North 60 Post A 3-9-20

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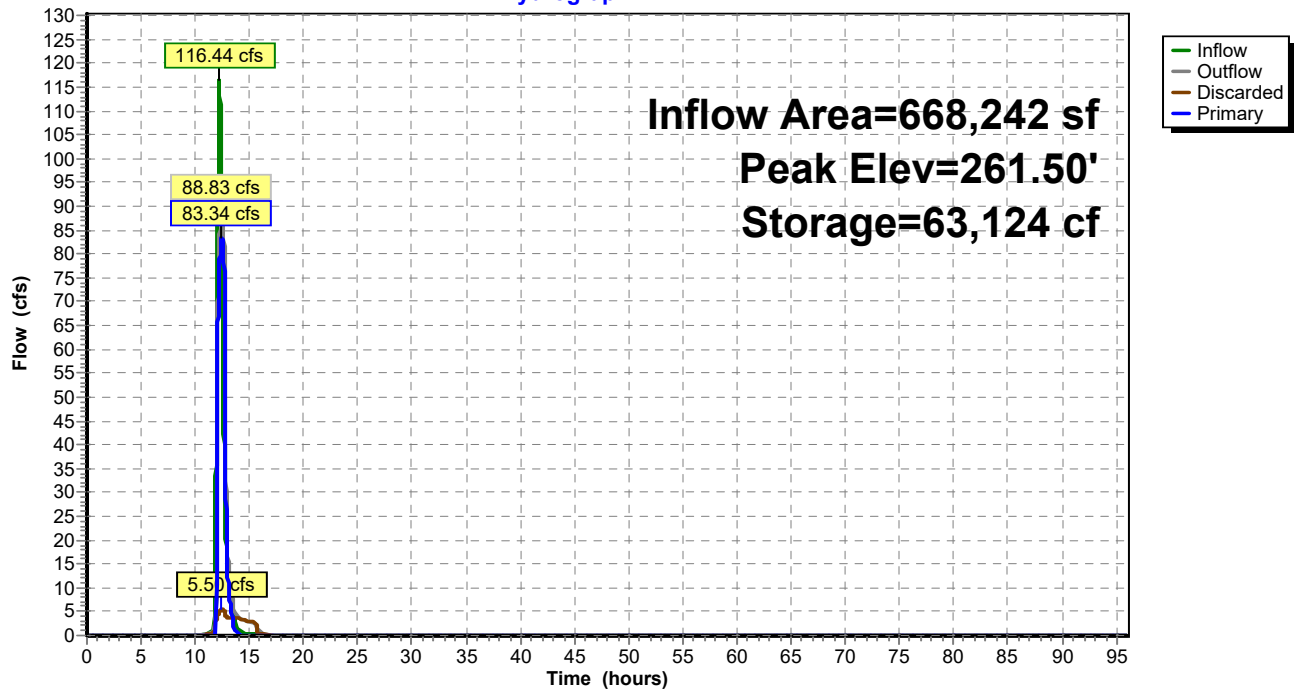
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NRCC 24-hr A 100-yr Rainfall=9.18"

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Pond 36: SWP-3

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 37: Post A13

Runoff = 41.82 cfs @ 12.13 hrs, Volume= 109,634 cf, Depth= 8.21"

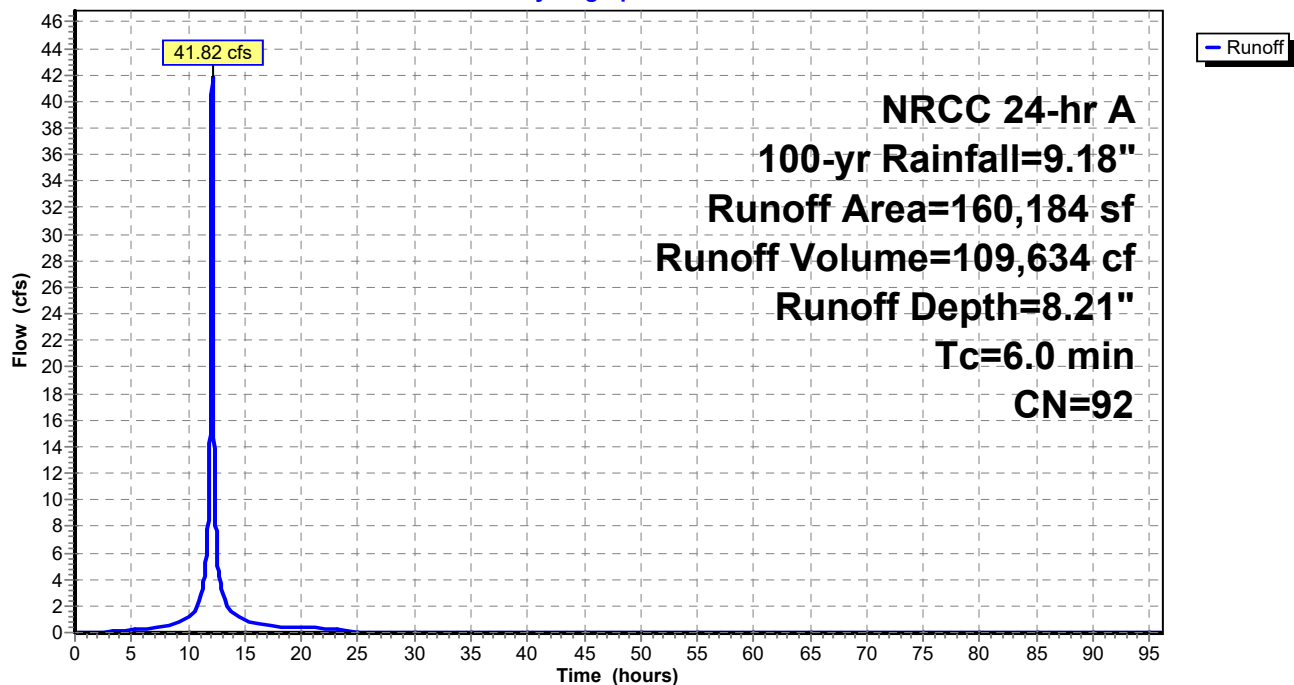
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
122,493	98	Paved parking, HSG C
37,691	74	>75% Grass cover, Good, HSG C
160,184	92	Weighted Average
37,691		23.53% Pervious Area
122,493		76.47% Impervious Area

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

Subcatchment 37: Post A13

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 38: DIV-7

Inflow Area = 160,184 sf, 76.47% Impervious, Inflow Depth = 8.21" for 100-yr event
 Inflow = 41.82 cfs @ 12.13 hrs, Volume= 109,634 cf
 Outflow = 41.82 cfs @ 12.13 hrs, Volume= 109,634 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.39 cfs @ 11.30 hrs, Volume= 51,559 cf
 Secondary = 38.89 cfs @ 12.13 hrs, Volume= 58,074 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 316.96' @ 12.13 hrs

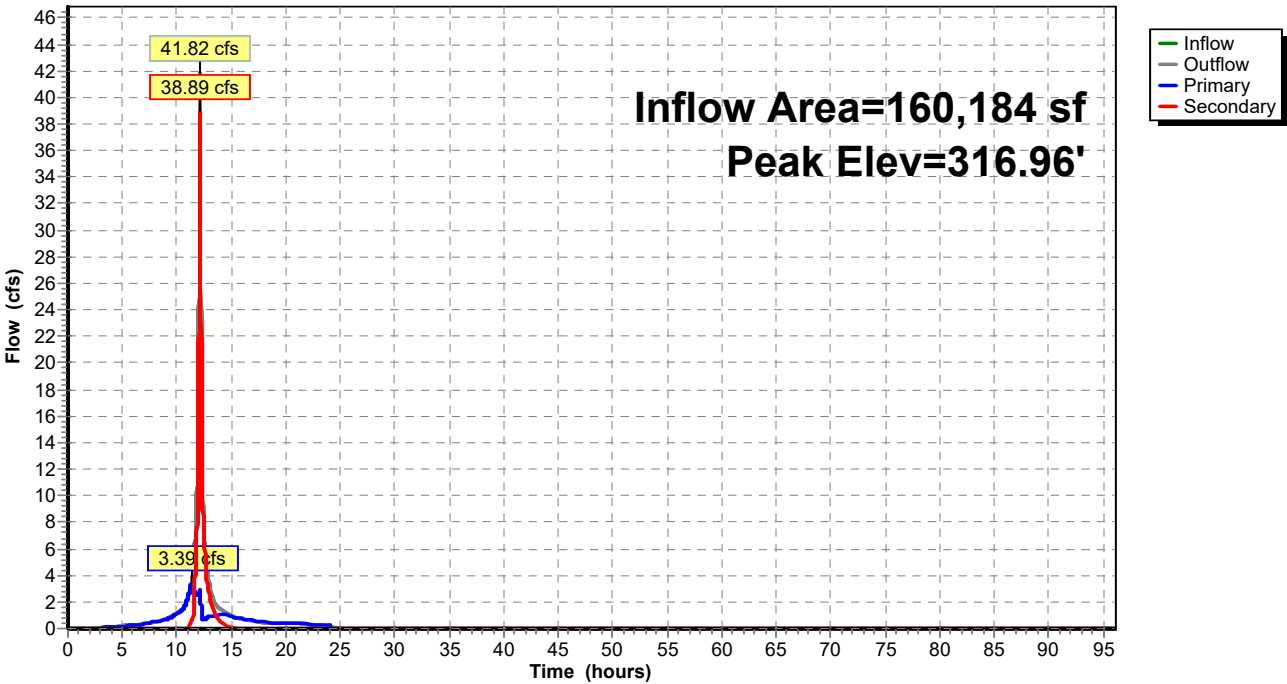
Flood Elev= 319.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	313.00'	10.0" Round Culvert L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 313.00' / 313.00' S= 0.0000 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	313.00'	30.0" Round Culvert L= 103.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 313.00' / 303.00' S= 0.0971 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#3	Device 2	315.50'	8.0' 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=3.36 cfs @ 11.30 hrs HW=315.51' TW=313.87' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 3.36 cfs @ 6.16 fps)**Secondary OutFlow** Max=38.87 cfs @ 12.13 hrs HW=316.95' TW=0.00' (Dynamic Tailwater)↑ **2=Culvert** (Inlet Controls 38.87 cfs @ 7.92 fps)↑ **3=Broad-Crested Rectangular Weir** (Passes 38.87 cfs of 46.59 cfs potential flow)

Pond 38: DIV-7

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 39: INF-7

Inflow Area = 160,184 sf, 76.47% Impervious, Inflow Depth = 3.86" for 100-yr event
 Inflow = 3.39 cfs @ 11.30 hrs, Volume= 51,559 cf
 Outflow = 1.07 cfs @ 10.13 hrs, Volume= 51,559 cf, Atten= 69%, Lag= 0.0 min
 Discarded = 1.07 cfs @ 10.13 hrs, Volume= 51,559 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 316.00' @ 12.28 hrs Surf.Area= 3,839 sf Storage= 9,118 cf

Plug-Flow detention time= 58.9 min calculated for 51,554 cf (100% of inflow)
 Center-of-Mass det. time= 58.9 min (853.1 - 794.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	312.50'	3,643 cf	41.50'W x 92.50'L x 4.00'H Field A 15,355 cf Overall - 6,247 cf Embedded = 9,108 cf x 40.0% Voids
#2A	313.00'	6,247 cf	Cultec R-360HD x 168 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 168 Chambers in 7 Rows Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf
9,890 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	312.50'	12.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=1.07 cfs @ 10.13 hrs HW=312.54' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.07 cfs)

North 60 Post A 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

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Pond 39: INF-7 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 7 rows = 90.4 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

24 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 90.50' Row Length +12.0" End Stone x 2 = 92.50' Base Length

7 Rows x 60.0" Wide + 9.0" Spacing x 6 + 12.0" Side Stone x 2 = 41.50' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

168 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 7 Rows = 6,246.7 cf Chamber Storage

15,355.0 cf Field - 6,246.7 cf Chambers = 9,108.3 cf Stone x 40.0% Voids = 3,643.3 cf Stone Storage

Chamber Storage + Stone Storage = 9,890.0 cf = 0.227 af

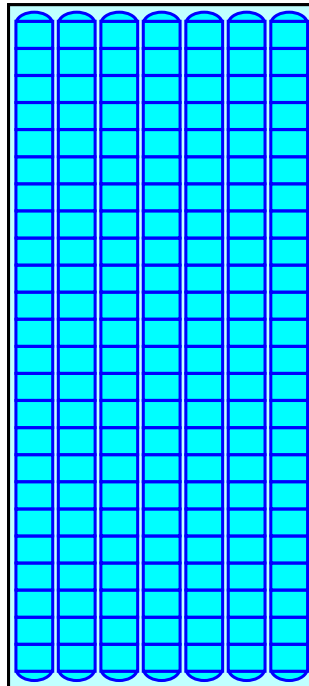
Overall Storage Efficiency = 64.4%

Overall System Size = 92.50' x 41.50' x 4.00'

168 Chambers

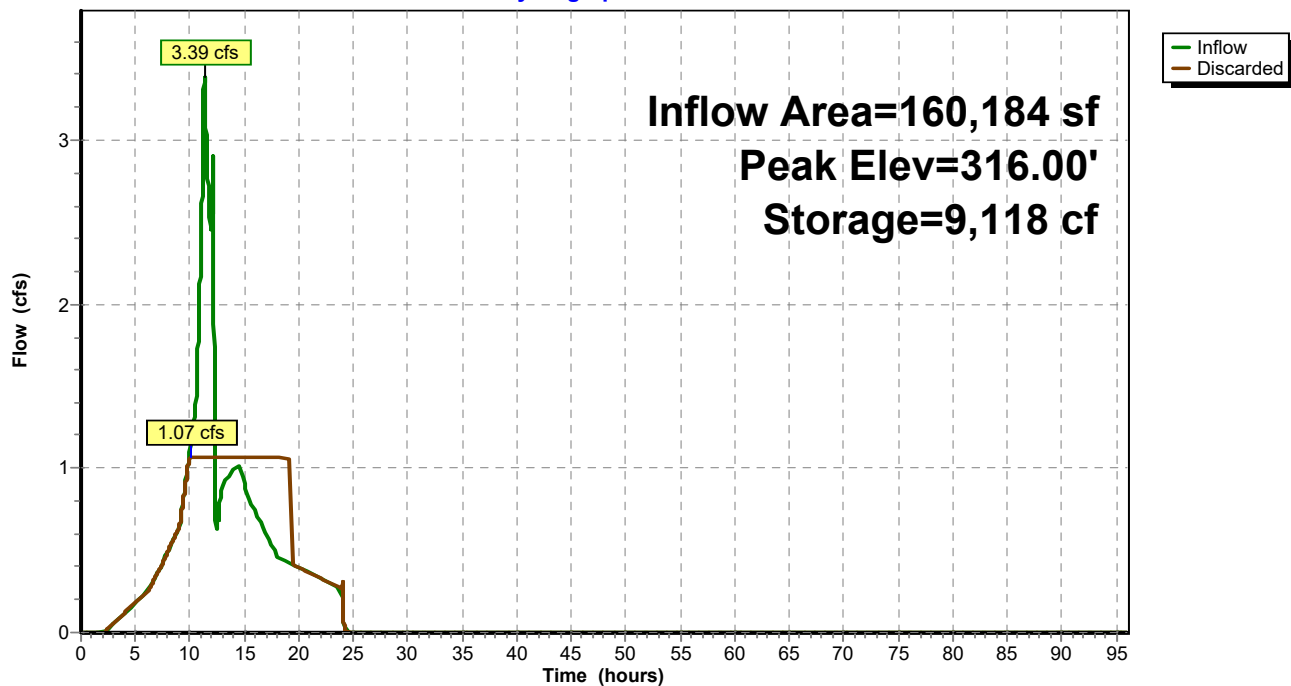
568.7 cy Field

337.3 cy Stone



Pond 39: INF-7

Hydrograph



North 60 Post A 3-9-20

Prepared by {enter your company name here}

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 40: Post A2

Runoff = 46.74 cfs @ 12.12 hrs, Volume= 109,000 cf, Depth= 6.62"

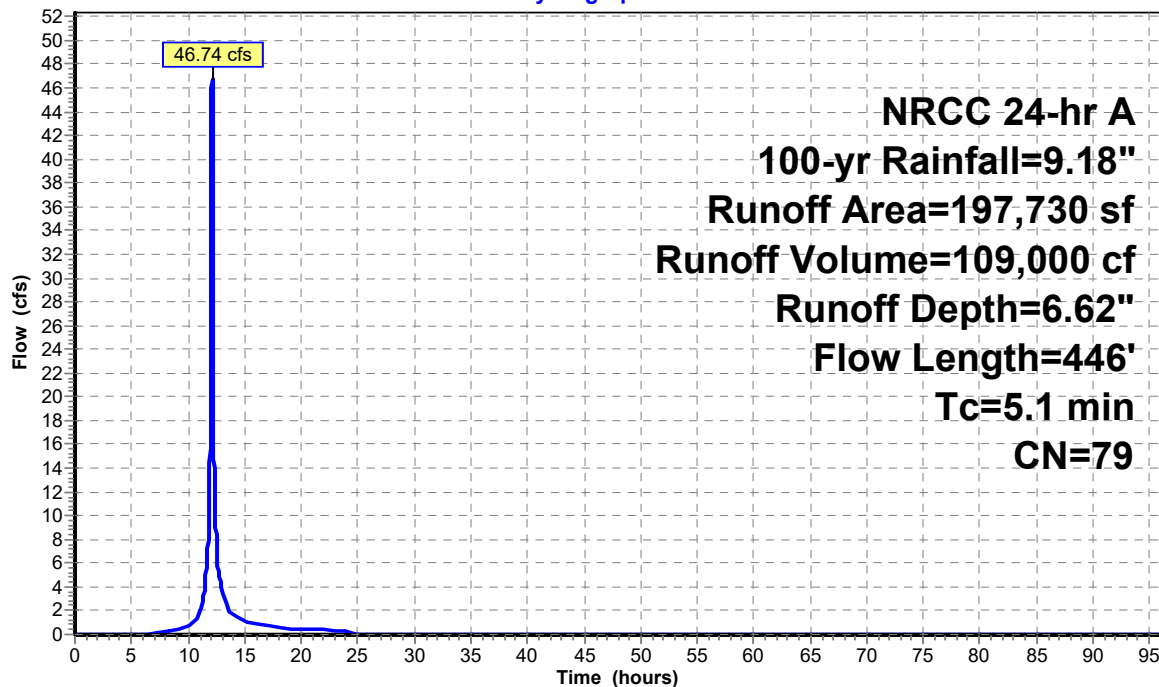
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
43,743	98	Paved parking, HSG C
107,245	74	>75% Grass cover, Good, HSG C
2,876	61	>75% Grass cover, Good, HSG B
39,583	70	Woods, Good, HSG C
4,283	98	Water Surface, HSG C
197,730	79	Weighted Average
149,704		75.71% Pervious Area
48,026		24.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.1500	0.40		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.9	346	0.1734	6.70		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	446	Total			

Subcatchment 40: Post A2

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 41: SWP-1

Inflow Area = 197,730 sf, 24.29% Impervious, Inflow Depth = 6.62" for 100-yr event
 Inflow = 46.74 cfs @ 12.12 hrs, Volume= 109,000 cf
 Outflow = 19.23 cfs @ 12.23 hrs, Volume= 85,233 cf, Atten= 59%, Lag= 6.7 min
 Primary = 19.23 cfs @ 12.23 hrs, Volume= 85,233 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Starting Elev= 234.50' Surf.Area= 12,504 sf Storage= 7,835 cf
 Peak Elev= 238.29' @ 12.23 hrs Surf.Area= 19,297 sf Storage= 56,677 cf (48,842 cf above start)

Plug-Flow detention time= 610.4 min calculated for 77,390 cf (71% of inflow)
 Center-of-Mass det. time= 475.2 min (1,268.0 - 792.7)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	1,811 cf	Forebay (Irregular) Listed below (Recalc)
#2	230.00'	1,976 cf	Micropool (Irregular) Listed below (Recalc)
#3	233.90'	65,123 cf	Marsh & Storage (Irregular) Listed below (Recalc)
		68,911 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,233	129.1	834	1,811	1,357

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,646	155.1	1,000	1,976	1,942

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
233.90	4,232	530.5	0	0	4,232
234.50	9,625	400.9	4,048	4,048	13,842
235.00	10,440	413.5	5,015	9,063	14,683
236.00	12,144	438.8	11,281	20,344	16,451
237.00	13,950	464.0	13,037	33,381	18,317
238.00	15,856	489.2	14,893	48,273	20,287
239.00	17,864	514.5	16,850	65,123	22,369

Device	Routing	Invert	Outlet Devices
#1	Primary	232.00'	21.0" Round Culvert L= 74.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.00' S= 0.0135 ' / ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.41 sf

North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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#2	Device 1	234.50'	1.1" Vert. Orifice/Grate	C= 0.600
#3	Device 1	237.50'	36.0" x 48.0" Horiz. Orifice/Grate	C= 0.600

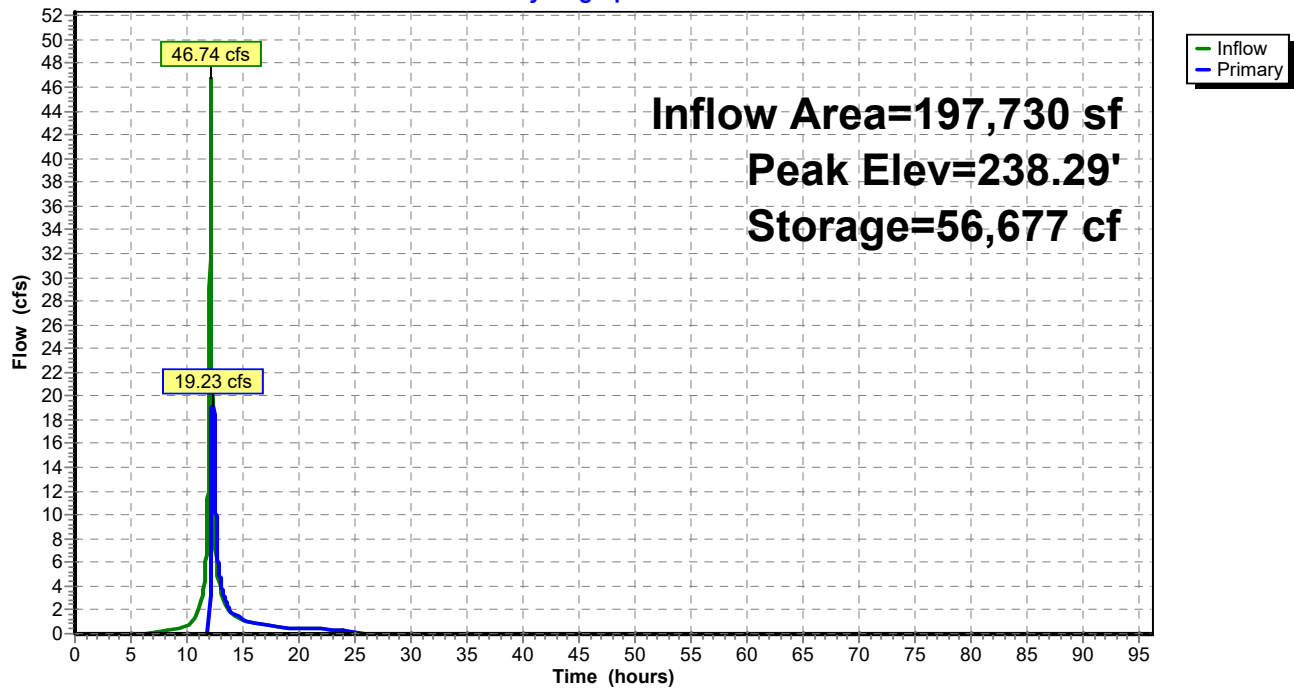
Limited to weir flow at low heads

Primary OutFlow Max=19.23 cfs @ 12.23 hrs HW=238.29' TW=0.00' (Dynamic Tailwater)

1=Culvert (Barrel Controls 19.23 cfs @ 8.00 fps)
2=Orifice/Grate (Passes < 0.06 cfs potential flow)
3=Orifice/Grate (Passes < 31.89 cfs potential flow)

Pond 41: SWP-1

Hydrograph



North 60 Post A 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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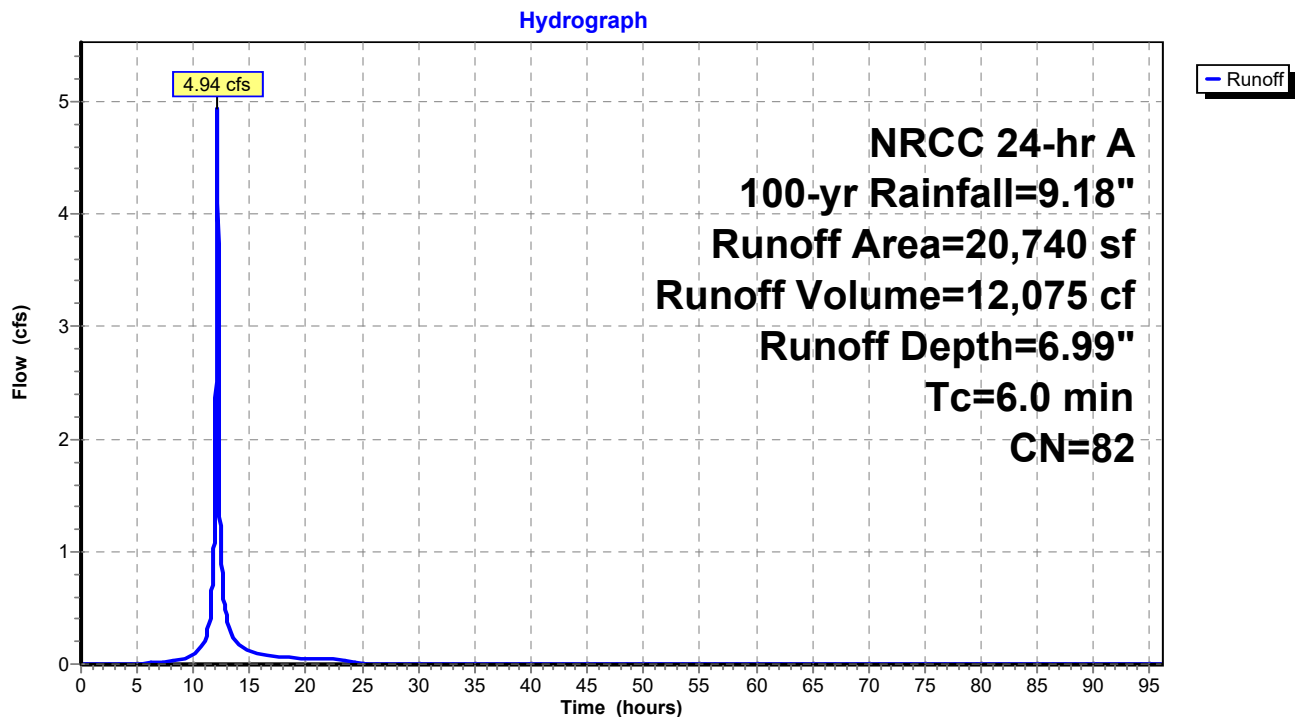
Summary for Subcatchment 42: Post A1

Runoff = 4.94 cfs @ 12.13 hrs, Volume= 12,075 cf, Depth= 6.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
7,304	98	Paved parking, HSG C
10,356	74	>75% Grass cover, Good, HSG C
3,080	70	Woods, Good, HSG C
20,740	82	Weighted Average
13,436		64.78% Pervious Area
7,304		35.22% Impervious Area

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

Subcatchment 42: Post A1

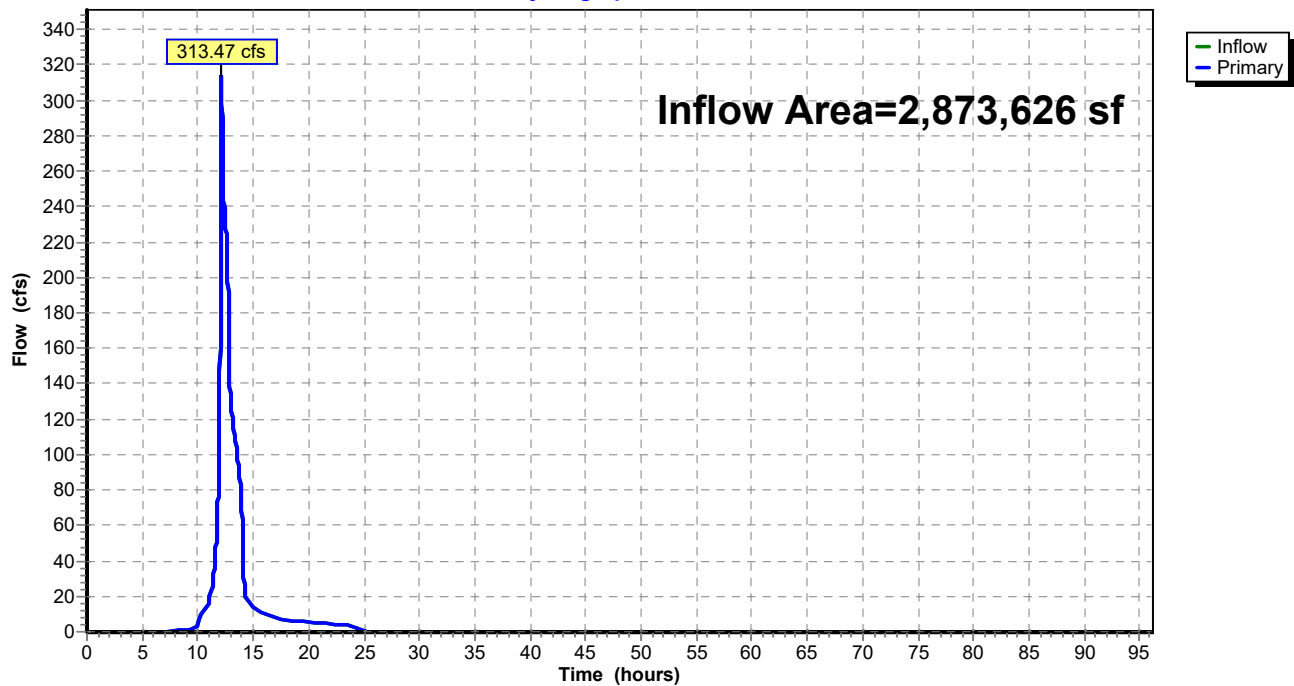
Summary for Link 43: Design Point A

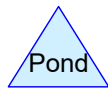
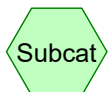
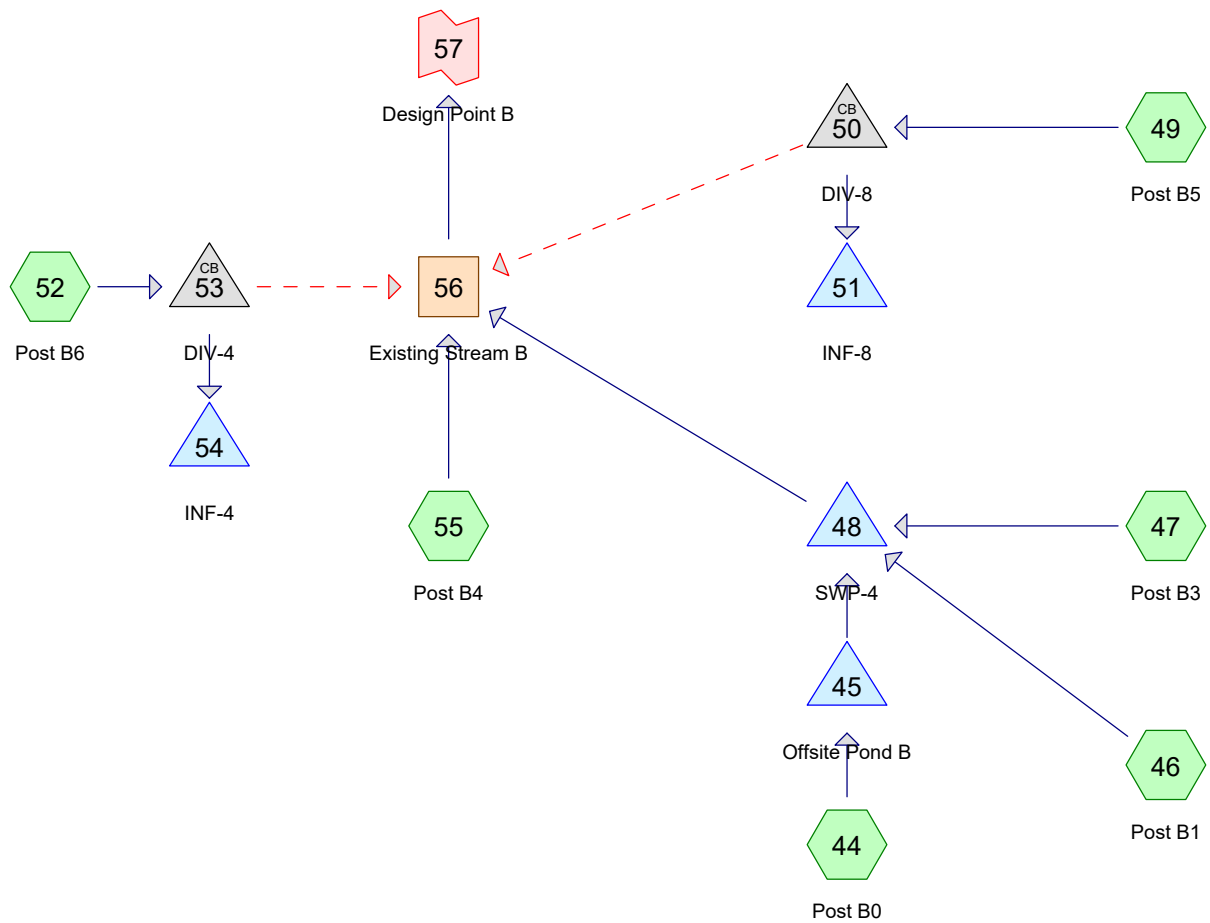
Inflow Area = 2,873,626 sf, 43.08% Impervious, Inflow Depth > 6.93" for 100-yr event
 Inflow = 313.47 cfs @ 12.15 hrs, Volume= 1,660,448 cf
 Primary = 313.47 cfs @ 12.15 hrs, Volume= 1,660,448 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 43: Design Point A

Hydrograph





Routing Diagram for North 60 Post B 3-9-20

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North 60 Post B 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment44: Post B0Runoff Area=1,510,771 sf 32.24% Impervious Runoff Depth=1.35"
Flow Length=1,871' Tc=32.3 min CN=84 Runoff=35.54 cfs 169,374 cf**Pond 45: Offsite Pond B**Peak Elev=383.46' Storage=75,292 cf Inflow=35.54 cfs 169,374 cf
36.0" Round Culvert n=0.025 L=158.0' S=0.0127 ' Outflow=10.77 cfs 168,126 cf**Subcatchment46: Post B1**Runoff Area=195,784 sf 50.71% Impervious Runoff Depth=1.48"
Tc=6.0 min CN=86 Runoff=10.47 cfs 24,213 cf**Subcatchment47: Post B3**Runoff Area=118,108 sf 37.49% Impervious Runoff Depth=0.93"
Tc=6.0 min CN=77 Runoff=3.90 cfs 9,135 cf**Pond 48: SWP-4**Peak Elev=377.32' Storage=198,115 cf Inflow=14.93 cfs 201,474 cf
Outflow=8.73 cfs 186,908 cf**Subcatchment49: Post B5**Runoff Area=152,601 sf 84.59% Impervious Runoff Depth=2.15"
Tc=6.0 min CN=94 Runoff=11.13 cfs 27,309 cf**Pond 50: DIV-8**Peak Elev=373.86' Inflow=11.13 cfs 27,309 cf
Primary=6.28 cfs 25,354 cf Secondary=4.95 cfs 1,955 cf Outflow=11.13 cfs 27,309 cf**Pond 51: INF-8**Peak Elev=372.07' Storage=8,021 cf Inflow=6.28 cfs 25,354 cf
Outflow=1.26 cfs 25,354 cf**Subcatchment52: Post B6**Runoff Area=30,800 sf 100.00% Impervious Runoff Depth=2.56"
Tc=6.0 min CN=98 Runoff=2.47 cfs 6,569 cf**Pond 53: DIV-4**Peak Elev=351.01' Inflow=2.47 cfs 6,569 cf
Primary=2.47 cfs 6,569 cf Secondary=0.00 cfs 0 cf Outflow=2.47 cfs 6,569 cf**Pond 54: INF-4**Peak Elev=350.33' Storage=1,691 cf Inflow=2.47 cfs 6,569 cf
Outflow=0.44 cfs 6,569 cf**Subcatchment55: Post B4**Runoff Area=576,333 sf 0.00% Impervious Runoff Depth=0.60"
Flow Length=675' Tc=15.1 min CN=70 Runoff=7.65 cfs 28,854 cf**Reach 56: Existing Stream B**Avg. Flow Depth=0.41' Max Vel=4.82 fps Inflow=9.44 cfs 217,716 cf
n=0.040 L=1,360.0' S=0.0721 ' Capacity=291.69 cfs Outflow=9.42 cfs 217,564 cf**Link 57: Design Point B**Inflow=9.42 cfs 217,564 cf
Primary=9.42 cfs 217,564 cf**Total Runoff Area = 2,584,397 sf Runoff Volume = 265,454 cf Average Runoff Depth = 1.23"**
69.41% Pervious = 1,793,897 sf 30.59% Impervious = 790,500 sf

North 60 Post B 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 44: Post B0

Runoff = 35.54 cfs @ 12.46 hrs, Volume= 169,374 cf, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
487,056	98	Paved parking, HSG C
497,987	77	Woods, Good, HSG D
134,328	70	Woods, Good, HSG C
375,457	80	>75% Grass cover, Good, HSG D
15,943	74	>75% Grass cover, Good, HSG C
1,510,771	84	Weighted Average
1,023,715		67.76% Pervious Area
487,056		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
9.5	848	0.0085	1.48		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	856	0.0093	2.78	3.06	Trap/Vee/Rect Channel Flow, Bot.W=3.00' D=0.33' Z= 1.0 '/' Top.W=3.66' n= 0.022 Earth, clean & straight
0.2	67	0.0150	6.66	64.08	Pipe Channel, 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.025 Corrugated metal
32.3	1,871	Total			

North 60 Post B 3-9-20

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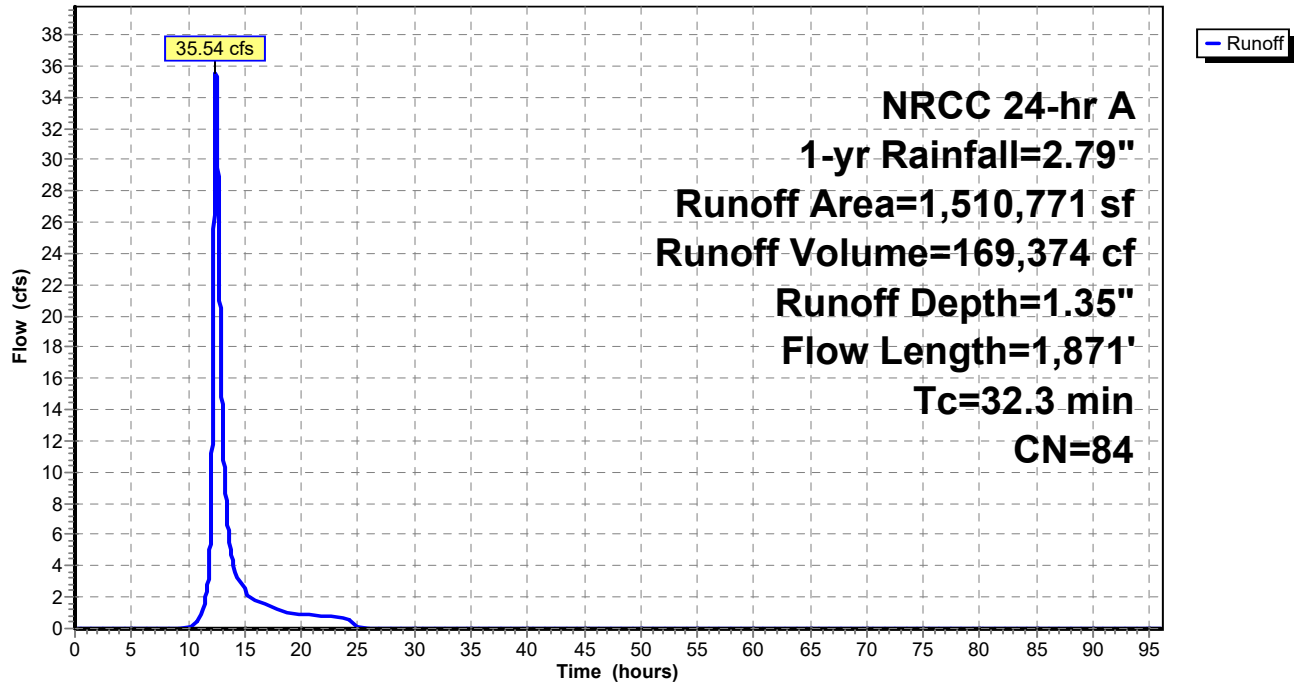
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NRCC 24-hr A 1-yr Rainfall=2.79"

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Subcatchment 44: Post B0

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 45: Offsite Pond B

Inflow Area = 1,510,771 sf, 32.24% Impervious, Inflow Depth = 1.35" for 1-yr event
 Inflow = 35.54 cfs @ 12.46 hrs, Volume= 169,374 cf
 Outflow = 10.77 cfs @ 13.17 hrs, Volume= 168,126 cf, Atten= 70%, Lag= 42.8 min
 Primary = 10.77 cfs @ 13.17 hrs, Volume= 168,126 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 383.46' @ 13.17 hrs Surf.Area= 68,005 sf Storage= 75,292 cf

Plug-Flow detention time= 205.3 min calculated for 168,126 cf (99% of inflow)
 Center-of-Mass det. time= 200.8 min (1,049.1 - 848.2)

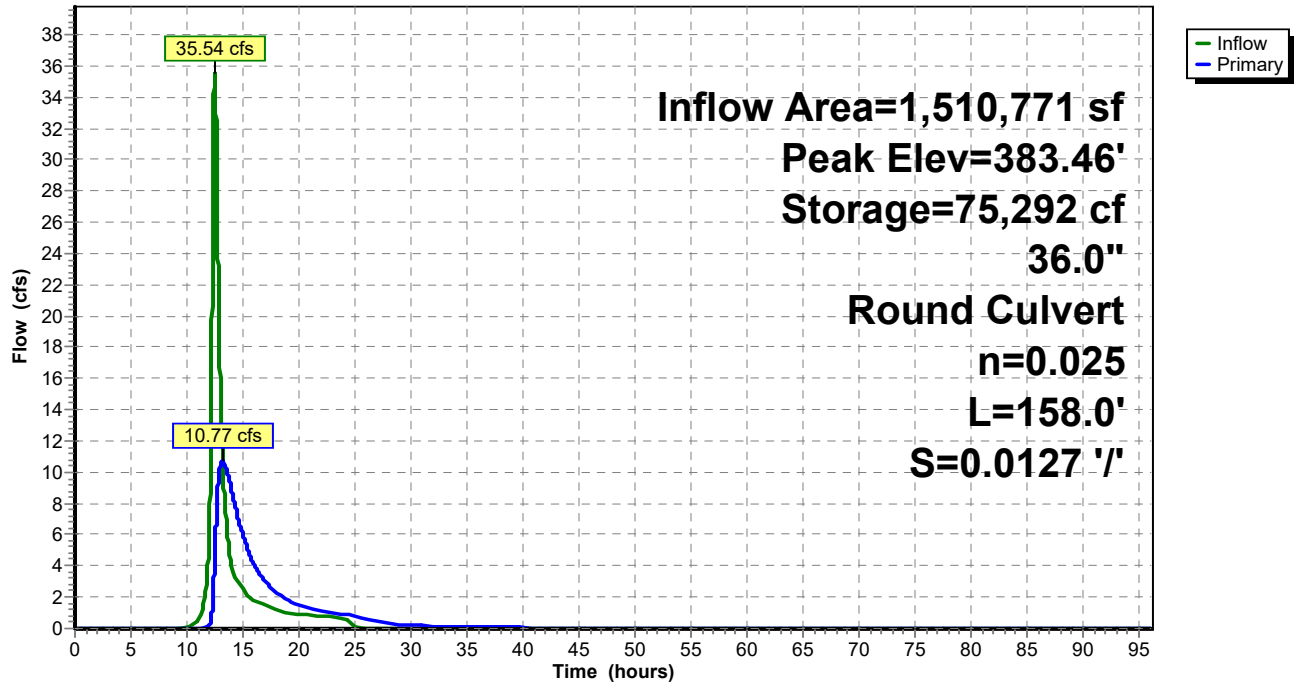
Volume	Invert	Avail.Storage	Storage Description		
#1	382.00'	610,998 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
382.00	36,540	1,177.0	0	0	36,540
384.00	81,987	1,579.0	115,507	115,507	124,748
386.00	96,790	1,622.0	178,572	294,080	136,159
388.00	108,795	1,657.0	205,468	499,548	145,863
389.00	114,127	1,679.0	111,450	610,998	151,937

Device	Routing	Invert	Outlet Devices
#1	Primary	382.00'	36.0" Round Culvert L= 158.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 382.00' / 380.00' S= 0.0127 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf

Primary OutFlow Max=10.77 cfs @ 13.17 hrs HW=383.46' TW=376.99' (Dynamic Tailwater)
 ↑**1=Culvert** (Barrel Controls 10.77 cfs @ 4.60 fps)

Pond 45: Offsite Pond B

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 46: Post B1

Runoff = 10.47 cfs @ 12.13 hrs, Volume= 24,213 cf, Depth= 1.48"

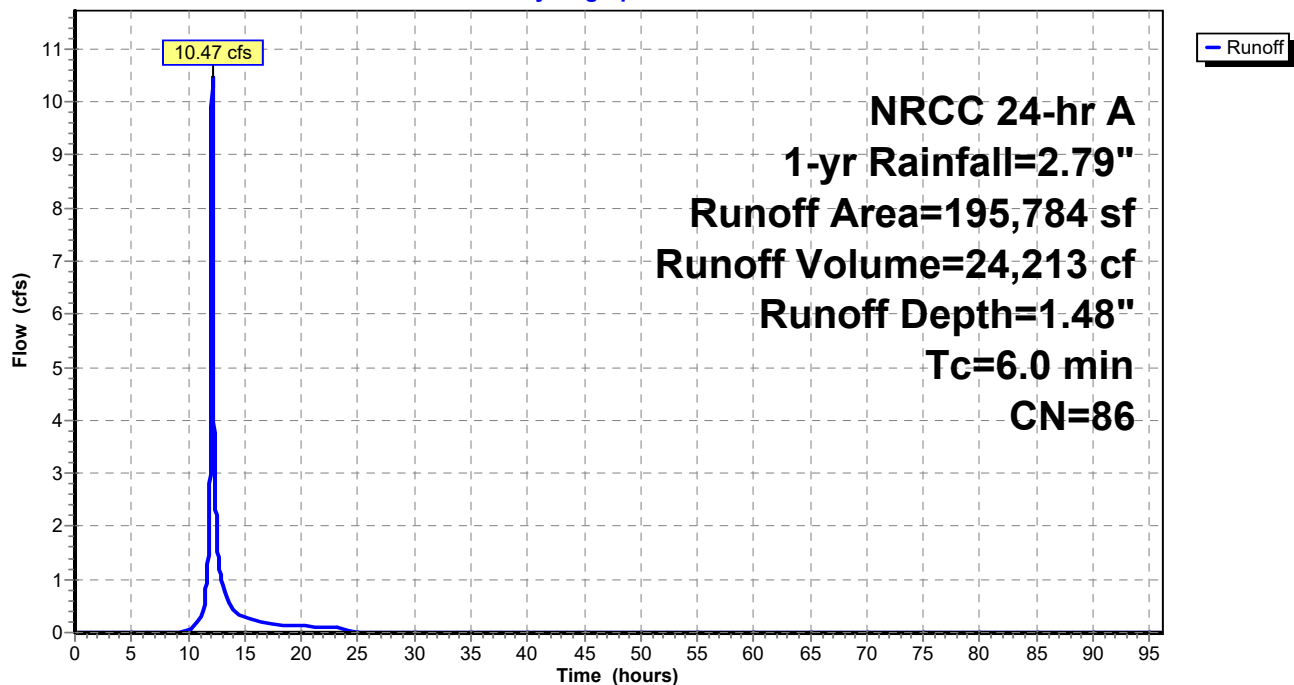
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
99,286	98	Paved parking, HSG C
96,498	74	>75% Grass cover, Good, HSG C
195,784	86	Weighted Average
96,498		49.29% Pervious Area
99,286		50.71% Impervious Area

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

Subcatchment 46: Post B1

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 47: Post B3

Runoff = 3.90 cfs @ 12.14 hrs, Volume= 9,135 cf, Depth= 0.93"

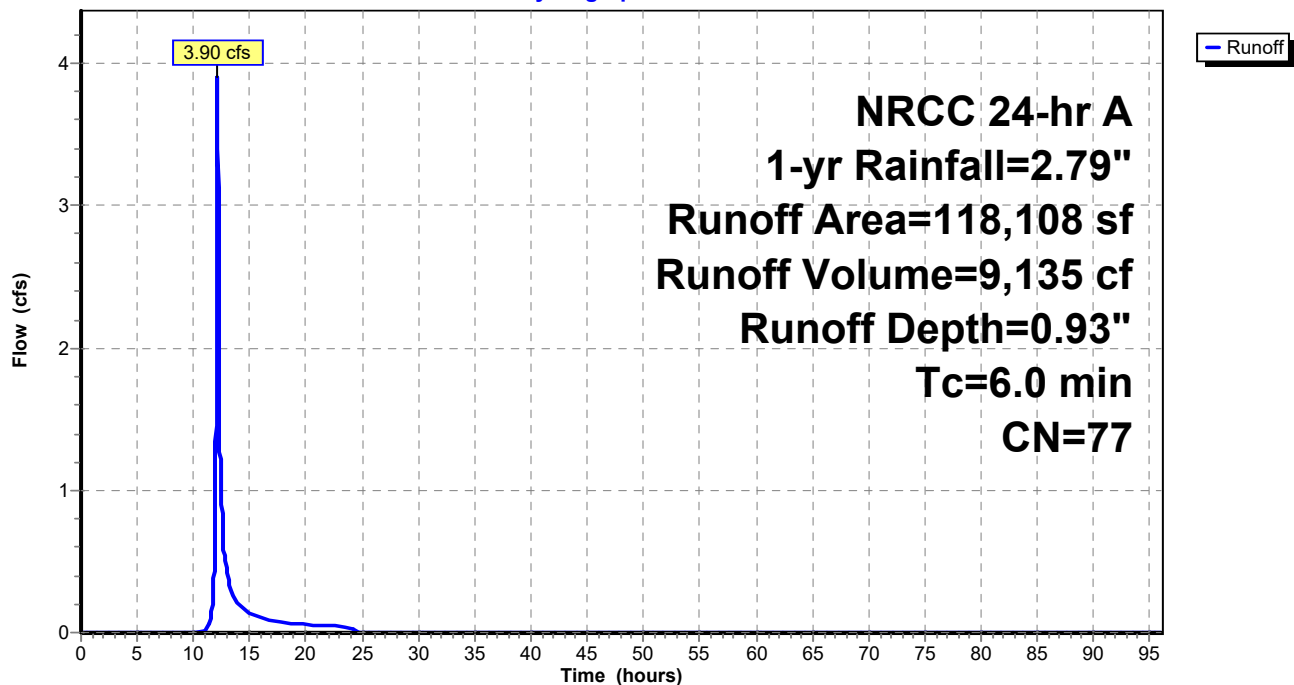
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
73,832	65	Brush, Good, HSG C
44,276	98	Water Surface, HSG C
118,108	77	Weighted Average
73,832		62.51% Pervious Area
44,276		37.49% Impervious Area

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

Subcatchment 47: Post B3

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 48: SWP-4

Inflow Area = 1,824,663 sf, 34.56% Impervious, Inflow Depth > 1.33" for 1-yr event
 Inflow = 14.93 cfs @ 12.14 hrs, Volume= 201,474 cf
 Outflow = 8.73 cfs @ 14.18 hrs, Volume= 186,908 cf, Atten= 42%, Lag= 122.7 min
 Primary = 8.73 cfs @ 14.18 hrs, Volume= 186,908 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Starting Elev= 376.00' Surf.Area= 88,186 sf Storage= 134,213 cf
 Peak Elev= 377.32' @ 14.18 hrs Surf.Area= 95,100 sf Storage= 198,115 cf (63,902 cf above start)

Plug-Flow detention time= 2,322.0 min calculated for 52,689 cf (26% of inflow)
 Center-of-Mass det. time= 579.7 min (1,591.7 - 1,012.0)

Volume	Invert	Avail.Storage	Storage Description
#1	372.00'	7,914 cf	Forebay (Irregular) Listed below (Recalc)
#2	372.00'	121,847 cf	Permanent Pool (Irregular) Listed below (Recalc)
#3	375.90'	259,334 cf	Additional Storage (Irregular) Listed below (Recalc)
		389,094 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
372.00	885	114.0	0	0	885
373.00	1,392	139.2	1,129	1,129	1,408
374.00	1,998	164.4	1,686	2,815	2,036
375.00	2,707	189.5	2,344	5,158	2,764
375.90	3,430	212.2	2,755	7,914	3,512

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
372.00	22,804	1,051.3	0	0	22,804
373.00	27,060	1,076.5	24,902	24,902	27,202
374.00	31,416	1,101.7	29,211	54,113	31,703
375.00	35,874	1,127.0	33,620	87,733	36,327
375.90	39,971	1,149.7	34,114	121,847	40,565

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
375.90	44,276	1,380.7	0	0	44,276
377.00	50,030	1,294.2	51,836	51,836	62,747
378.00	55,257	1,319.4	52,622	104,458	68,149
379.00	60,586	1,344.7	57,901	162,359	73,675
380.00	66,015	1,370.0	63,281	225,640	79,307
380.50	68,768	1,382.6	33,693	259,334	82,151

Device	Routing	Invert	Outlet Devices
#1	Primary	372.00'	24.0" Round Culvert L= 227.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 372.00' / 347.00' S= 0.1101 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	376.00'	3.0" Vert. Orifice/Grate C= 0.600

North 60 Post B 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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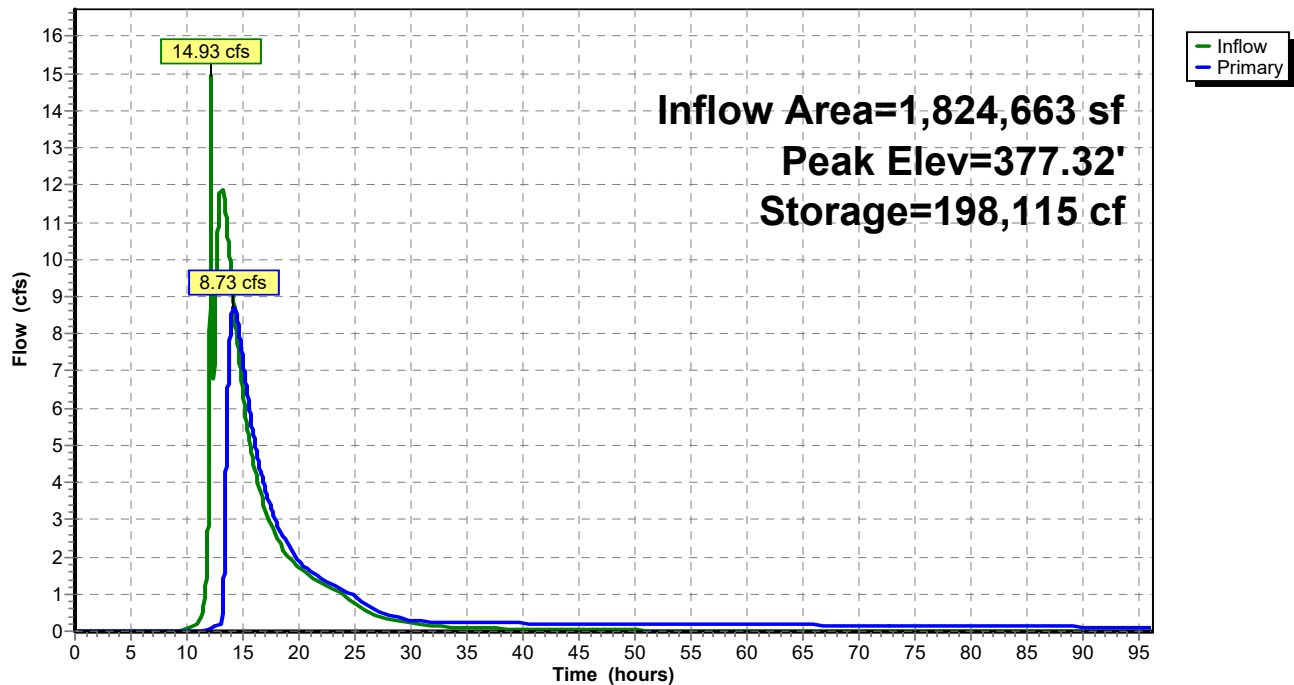
#3 Device 1 377.00' **36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=8.73 cfs @ 14.18 hrs HW=377.32' TW=312.41' (Dynamic Tailwater)

- 1=Culvert (Passes 8.73 cfs of 31.46 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.26 cfs @ 5.27 fps)
- 3=Orifice/Grate (Weir Controls 8.47 cfs @ 1.86 fps)

Pond 48: SWP-4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 49: Post B5

Runoff = 11.13 cfs @ 12.13 hrs, Volume= 27,309 cf, Depth= 2.15"

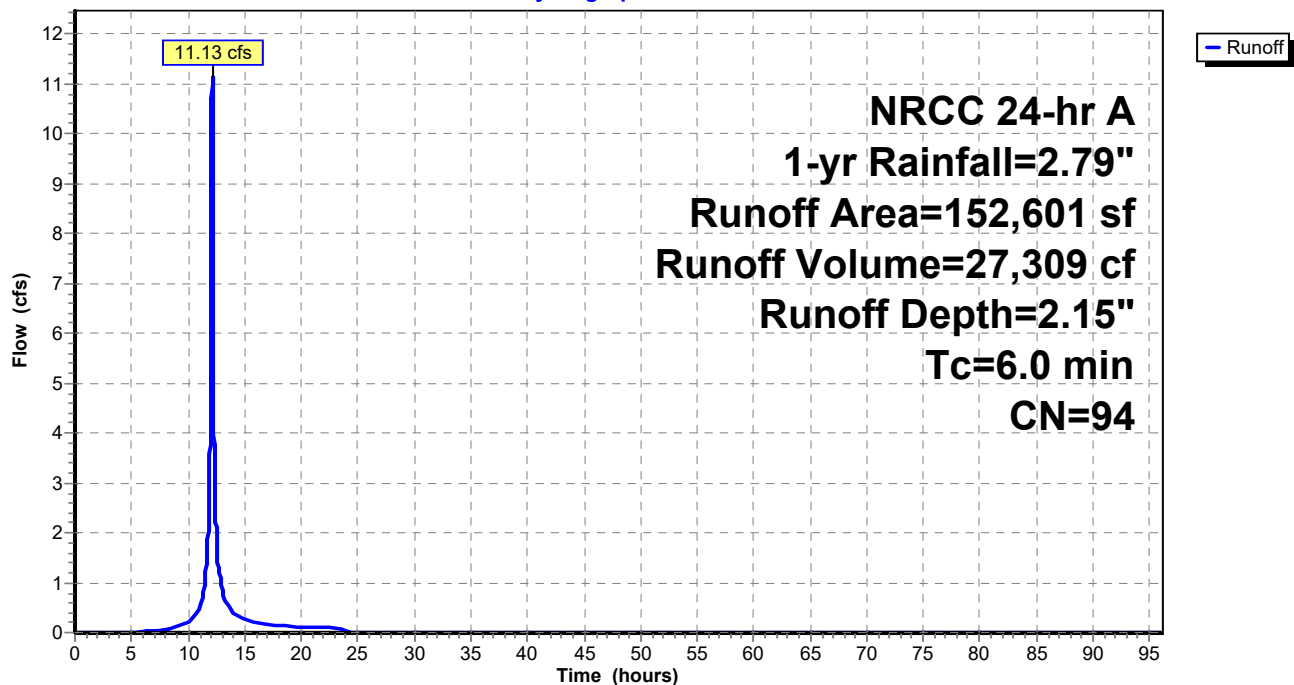
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
129,082	98	Paved parking, HSG C
23,519	74	>75% Grass cover, Good, HSG C
152,601	94	Weighted Average
23,519		15.41% Pervious Area
129,082		84.59% Impervious Area

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

Subcatchment 49: Post B5

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 50: DIV-8

Inflow Area = 152,601 sf, 84.59% Impervious, Inflow Depth = 2.15" for 1-yr event
 Inflow = 11.13 cfs @ 12.13 hrs, Volume= 27,309 cf
 Outflow = 11.13 cfs @ 12.13 hrs, Volume= 27,309 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.28 cfs @ 12.09 hrs, Volume= 25,354 cf
 Secondary = 4.95 cfs @ 12.13 hrs, Volume= 1,955 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 373.86' @ 12.13 hrs

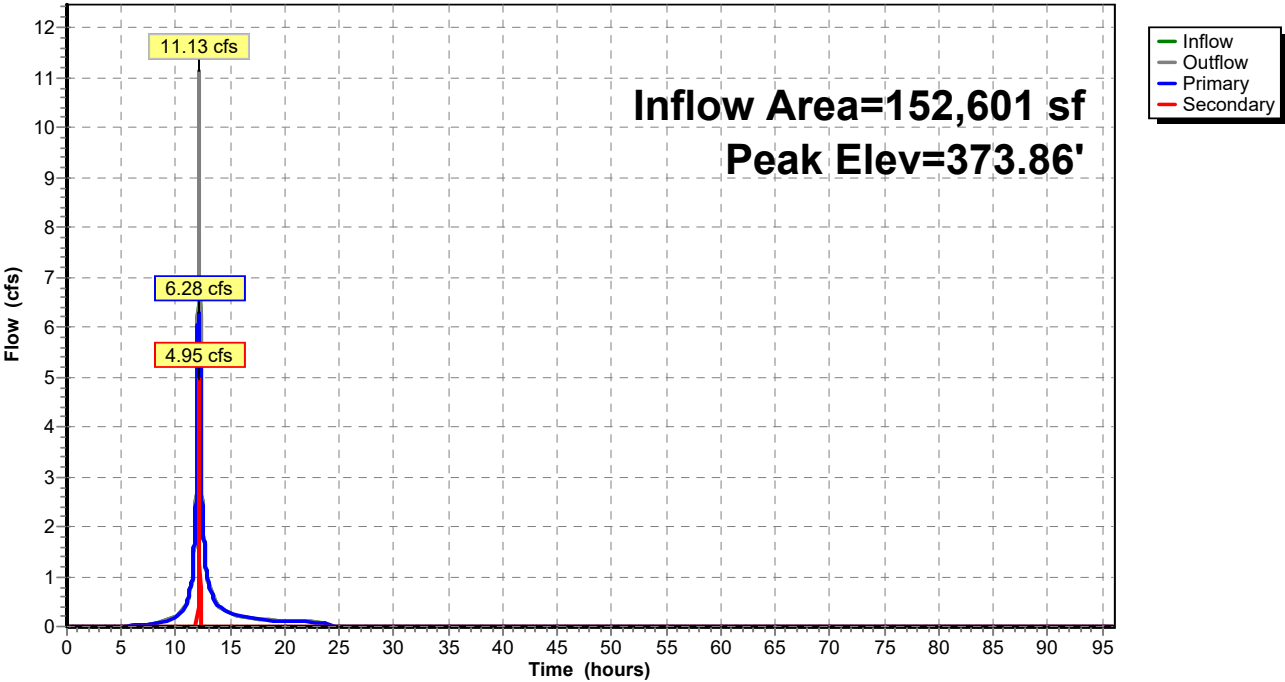
Flood Elev= 379.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	370.50'	12.0" Round Culvert L= 9.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.50' / 370.50' S= 0.0000 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	370.50'	24.0" Round Culvert L= 92.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.50' / 369.50' S= 0.0109 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	373.50'	8.0' 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=6.23 cfs @ 12.09 hrs HW=373.78' TW=371.06' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 6.23 cfs @ 7.94 fps)**Secondary OutFlow** Max=4.93 cfs @ 12.13 hrs HW=373.86' TW=312.26' (Dynamic Tailwater)↑**2=Culvert** (Passes 4.93 cfs of 23.22 cfs potential flow)↑**3=Broad-Crested Rectangular Weir** (Weir Controls 4.93 cfs @ 1.73 fps)

Pond 50: DIV-8

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 51: INF-8

Inflow Area = 152,601 sf, 84.59% Impervious, Inflow Depth = 1.99" for 1-yr event
 Inflow = 6.28 cfs @ 12.09 hrs, Volume= 25,354 cf
 Outflow = 1.26 cfs @ 11.67 hrs, Volume= 25,354 cf, Atten= 80%, Lag= 0.0 min
 Discarded = 1.26 cfs @ 11.67 hrs, Volume= 25,354 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 372.07' @ 12.68 hrs Surf.Area= 5,434 sf Storage= 8,021 cf

Plug-Flow detention time= 43.5 min calculated for 25,352 cf (100% of inflow)
 Center-of-Mass det. time= 43.5 min (834.5 - 791.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	370.00'	5,125 cf	58.75'W x 92.50'L x 4.00'H Field A 21,738 cf Overall - 8,924 cf Embedded = 12,814 cf x 40.0% Voids
#2A	370.50'	8,924 cf	Cultec R-360HD x 240 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 240 Chambers in 10 Rows Cap Storage= +6.5 cf x 2 x 10 rows = 129.2 cf
		14,049 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	370.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'

Discarded OutFlow Max=1.26 cfs @ 11.67 hrs HW=370.12' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.26 cfs)

North 60 Post B 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Pond 51: INF-8 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 10 rows = 129.2 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

24 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 90.50' Row Length +12.0" End Stone x 2 = 92.50' Base Length

10 Rows x 60.0" Wide + 9.0" Spacing x 9 + 12.0" Side Stone x 2 = 58.75' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

240 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 10 Rows = 8,923.9 cf Chamber Storage

21,737.5 cf Field - 8,923.9 cf Chambers = 12,813.6 cf Stone x 40.0% Voids = 5,125.4 cf Stone Storage

Chamber Storage + Stone Storage = 14,049.4 cf = 0.323 af

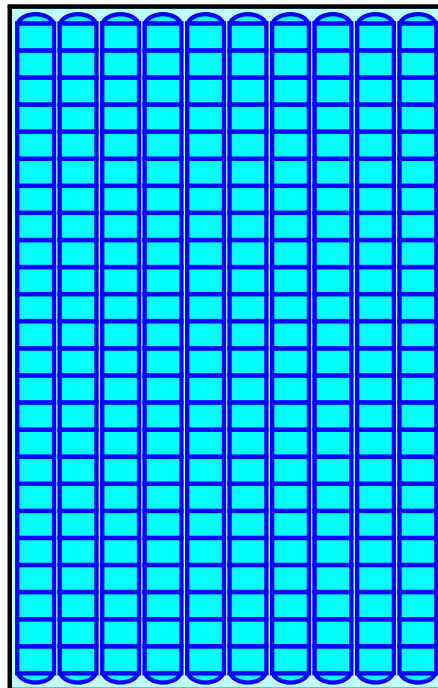
Overall Storage Efficiency = 64.6%

Overall System Size = 92.50' x 58.75' x 4.00'

240 Chambers

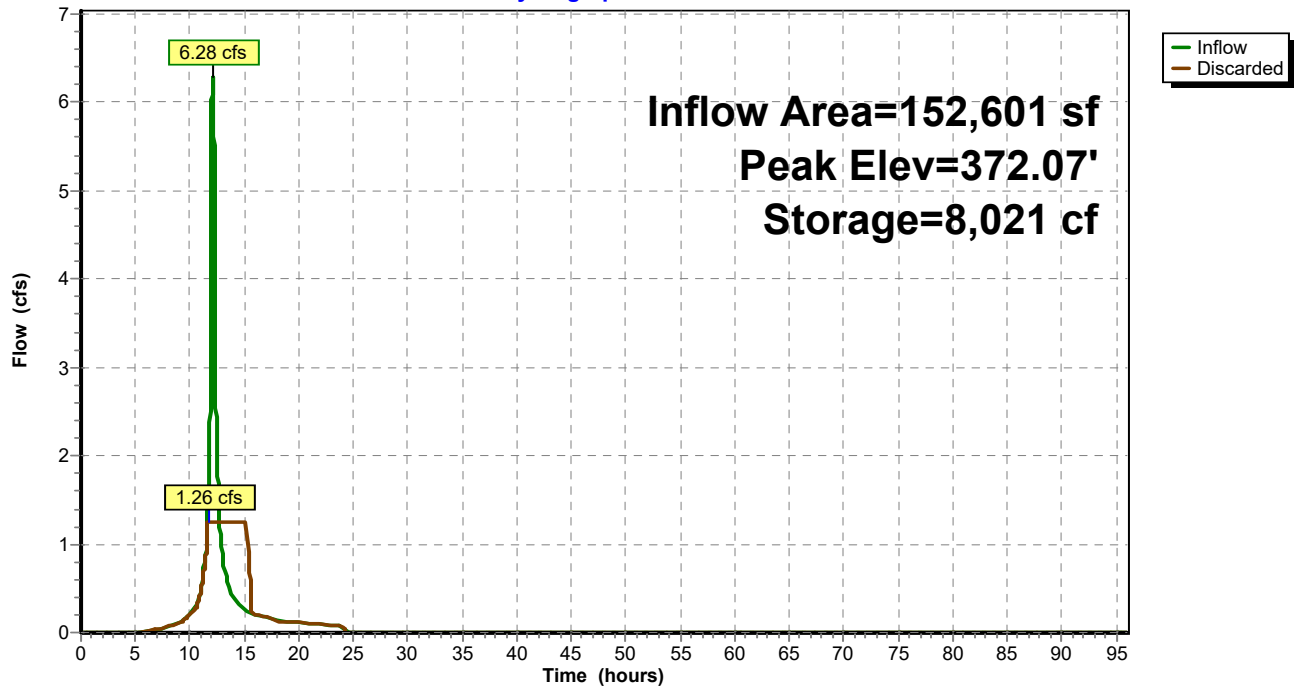
805.1 cy Field

474.6 cy Stone



Pond 51: INF-8

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Subcatchment 52: Post B6

Runoff = 2.47 cfs @ 12.13 hrs, Volume= 6,569 cf, Depth= 2.56"

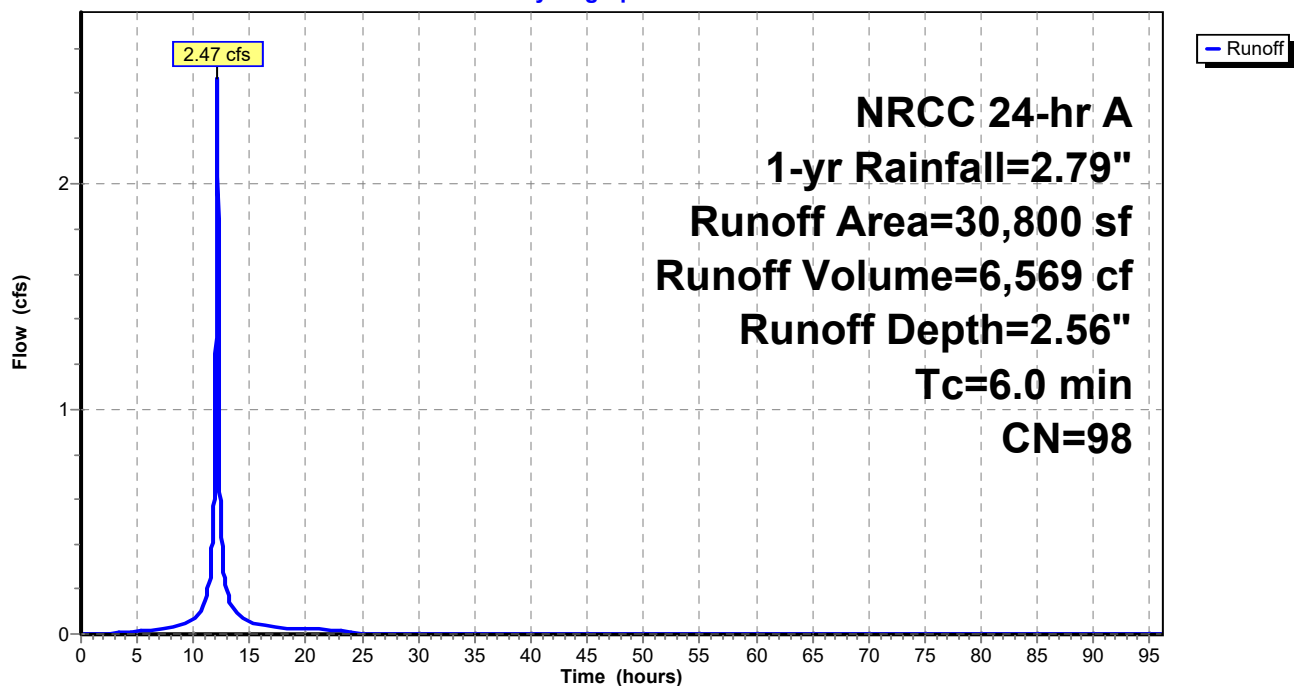
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
30,800	98	Paved parking, HSG C
30,800		100.00% Impervious Area

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

Subcatchment 52: Post B6

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 53: DIV-4

Inflow Area = 30,800 sf, 100.00% Impervious, Inflow Depth = 2.56" for 1-yr event
 Inflow = 2.47 cfs @ 12.13 hrs, Volume= 6,569 cf
 Outflow = 2.47 cfs @ 12.13 hrs, Volume= 6,569 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.47 cfs @ 12.13 hrs, Volume= 6,569 cf
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 351.01' @ 12.13 hrs

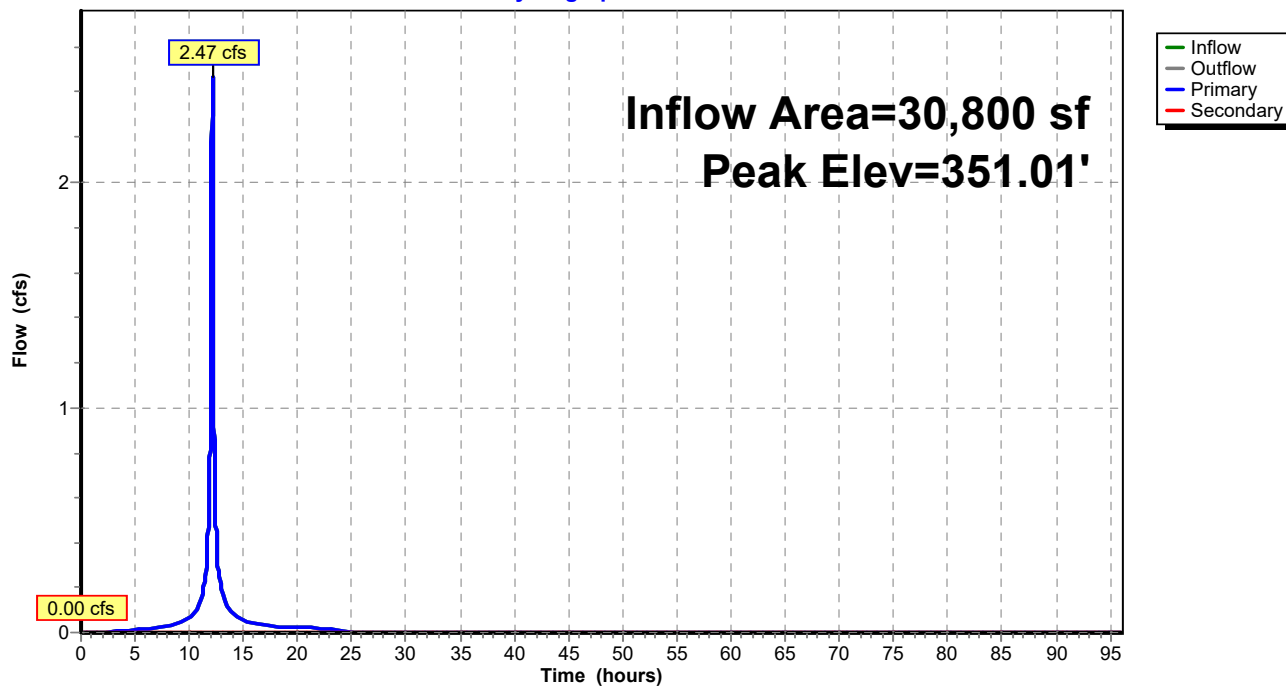
Flood Elev= 355.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	349.50'	10.0" Round Culvert L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.50' / 349.50' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	349.50'	18.0" Round Culvert L= 70.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.50' / 348.00' S= 0.0214 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	352.50'	8.0' 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=2.46 cfs @ 12.13 hrs HW=351.01' TW=349.86' (Dynamic Tailwater)↑ **1=Culvert** (Barrel Controls 2.46 cfs @ 4.52 fps)**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=349.50' TW=312.00' (Dynamic Tailwater)↑ **2=Culvert** (Controls 0.00 cfs)↑ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 53: DIV-4

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 1-yr Rainfall=2.79"

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Summary for Pond 54: INF-4

Inflow Area = 30,800 sf, 100.00% Impervious, Inflow Depth = 2.56" for 1-yr event
 Inflow = 2.47 cfs @ 12.13 hrs, Volume= 6,569 cf
 Outflow = 0.44 cfs @ 11.83 hrs, Volume= 6,569 cf, Atten= 82%, Lag= 0.0 min
 Discarded = 0.44 cfs @ 11.83 hrs, Volume= 6,569 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 350.33' @ 12.52 hrs Surf.Area= 1,887 sf Storage= 1,691 cf

Plug-Flow detention time= 21.5 min calculated for 6,568 cf (100% of inflow)
 Center-of-Mass det. time= 21.5 min (779.4 - 757.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	349.00'	1,859 cf	25.67'W x 73.50'L x 3.88'H Field A 7,310 cf Overall - 2,664 cf Embedded = 4,646 cf x 40.0% Voids
#2A	349.50'	2,664 cf	Cultec R-330XLHD x 50 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
		4,522 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	349.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=0.44 cfs @ 11.83 hrs HW=349.05' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.44 cfs)

North 60 Post B 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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Pond 54: INF-4 - 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

10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +12.0" End Stone x 2 = 73.50' 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 + 10.0" Cover = 3.88' Field Height

50 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,663.7 cf Chamber Storage

7,310.2 cf Field - 2,663.7 cf Chambers = 4,646.5 cf Stone x 40.0% Voids = 1,858.6 cf Stone Storage

Chamber Storage + Stone Storage = 4,522.3 cf = 0.104 af

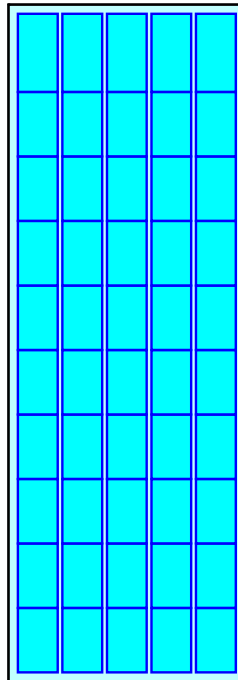
Overall Storage Efficiency = 61.9%

Overall System Size = 73.50' x 25.67' x 3.88'

50 Chambers

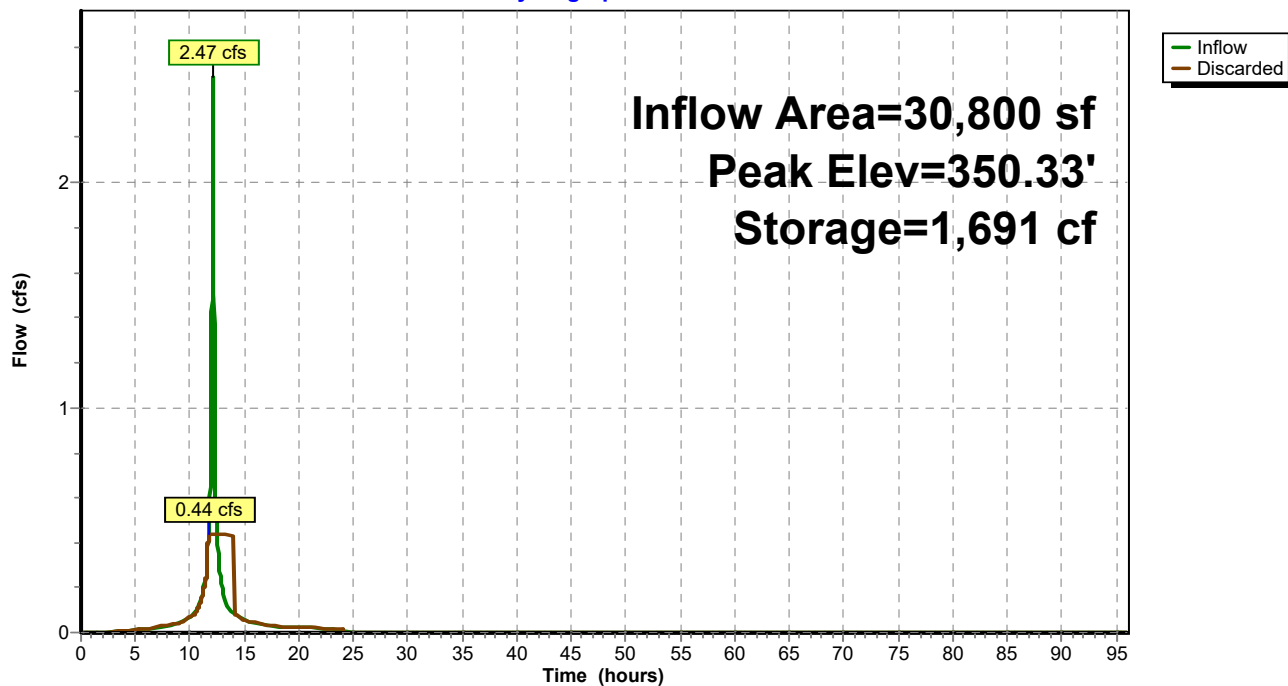
270.7 cy Field

172.1 cy Stone



Pond 54: INF-4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

Printed 3/25/2020

Summary for Subcatchment 55: Post B4

Runoff = 7.65 cfs @ 12.26 hrs, Volume= 28,854 cf, Depth= 0.60"

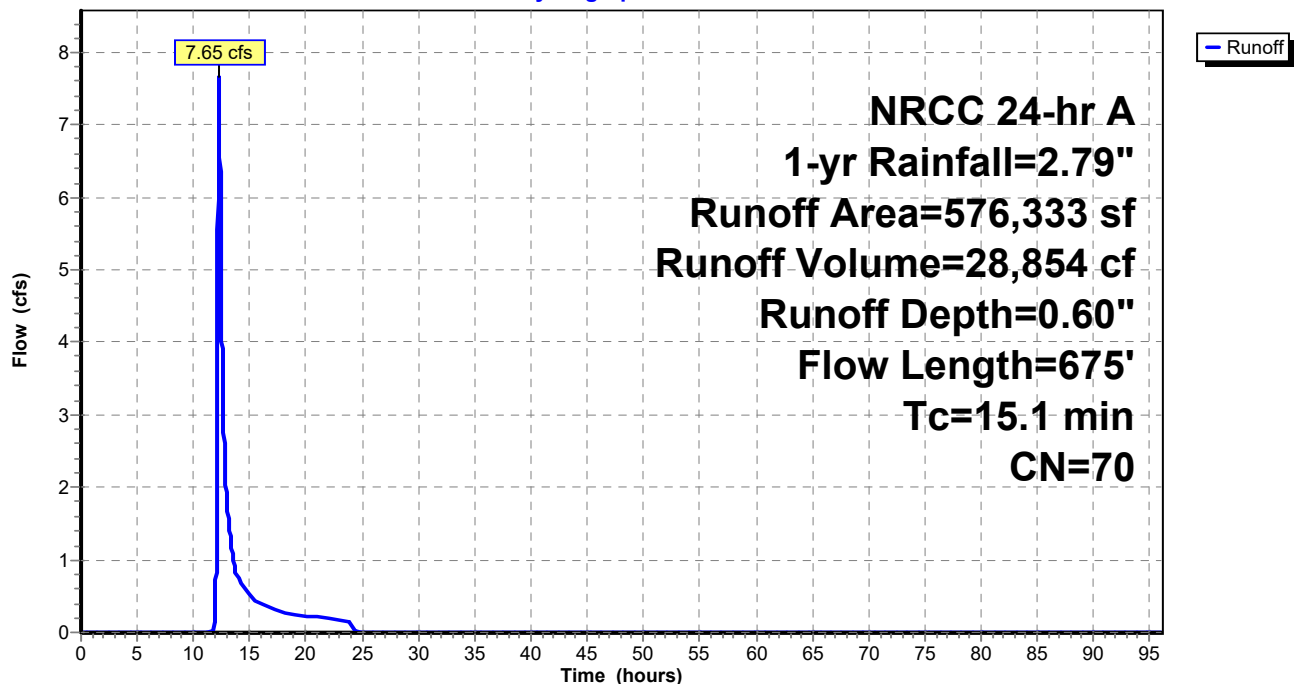
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 1-yr Rainfall=2.79"

Area (sf)	CN	Description
515,493	70	Woods, Good, HSG C
60,840	74	>75% Grass cover, Good, HSG C
576,333	70	Weighted Average
576,333		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0600	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.9	575	0.0950	4.96		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.1	675	Total			

Subcatchment 55: Post B4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

Printed 3/25/2020

Summary for Reach 56: Existing Stream B

Inflow Area = 2,400,996 sf, 26.26% Impervious, Inflow Depth > 1.09" for 1-yr event
Inflow = 9.44 cfs @ 14.15 hrs, Volume= 217,716 cf
Outflow = 9.42 cfs @ 14.21 hrs, Volume= 217,564 cf, Atten= 0%, Lag= 3.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.82 fps, Min. Travel Time= 4.7 min
Avg. Velocity = 1.49 fps, Avg. Travel Time= 15.2 min

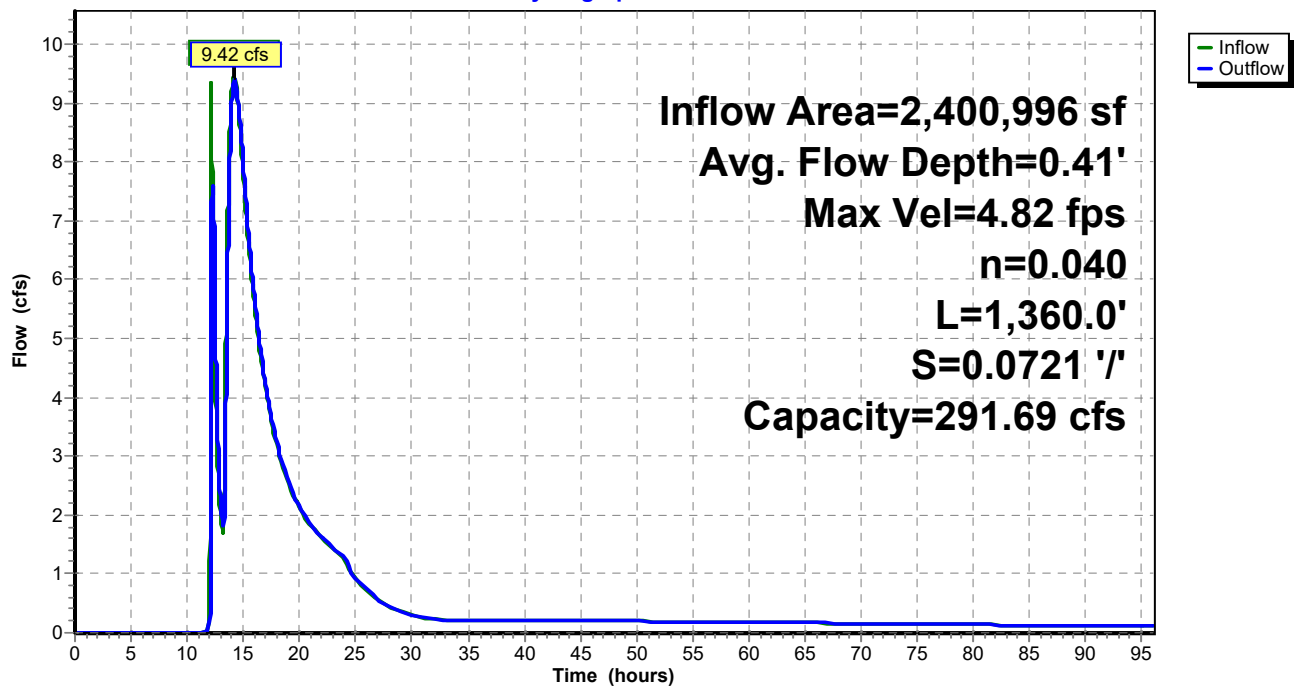
Peak Storage= 2,657 cf @ 14.21 hrs
Average Depth at Peak Storage= 0.41'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 291.69 cfs

4.00' x 2.50' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 1,360.0' Slope= 0.0721 '/'
Inlet Invert= 312.00', Outlet Invert= 214.00'



Reach 56: Existing Stream B

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 1-yr Rainfall=2.79"

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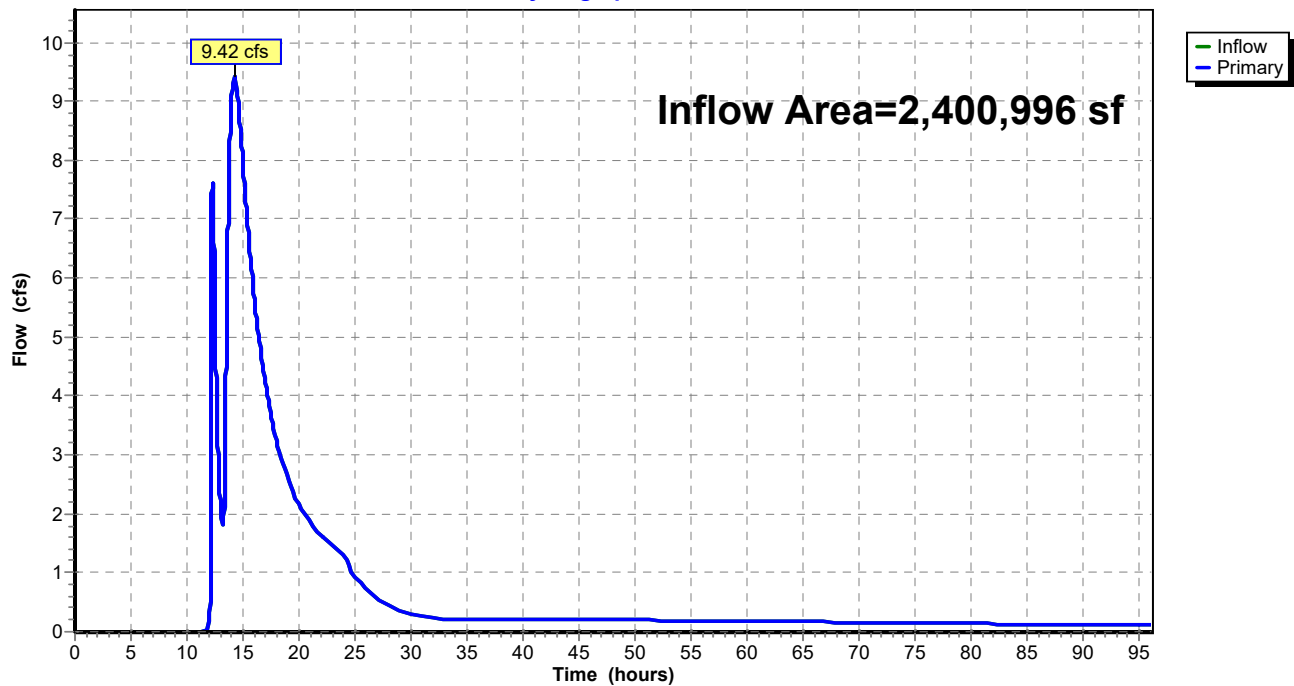
Summary for Link 57: Design Point B

Inflow Area = 2,400,996 sf, 26.26% Impervious, Inflow Depth > 1.09" for 1-yr event
Inflow = 9.42 cfs @ 14.21 hrs, Volume= 217,564 cf
Primary = 9.42 cfs @ 14.21 hrs, Volume= 217,564 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 57: Design Point B

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Printed 3/25/2020

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment44: Post B0Runoff Area=1,510,771 sf 32.24% Impervious Runoff Depth=1.87"
Flow Length=1,871' Tc=32.3 min CN=84 Runoff=49.64 cfs 235,196 cf**Pond 45: Offsite Pond B**Peak Elev=383.84' Storage=102,972 cf Inflow=49.64 cfs 235,196 cf
36.0" Round Culvert n=0.025 L=158.0' S=0.0127 ' Outflow=16.27 cfs 233,939 cf**Subcatchment46: Post B1**Runoff Area=195,784 sf 50.71% Impervious Runoff Depth=2.03"
Tc=6.0 min CN=86 Runoff=14.18 cfs 33,082 cf**Subcatchment47: Post B3**Runoff Area=118,108 sf 37.49% Impervious Runoff Depth=1.37"
Tc=6.0 min CN=77 Runoff=5.85 cfs 13,497 cf**Pond 48: SWP-4**Peak Elev=377.47' Storage=205,770 cf Inflow=21.58 cfs 280,519 cf
Outflow=15.11 cfs 265,731 cf**Subcatchment49: Post B5**Runoff Area=152,601 sf 84.59% Impervious Runoff Depth=2.76"
Tc=6.0 min CN=94 Runoff=14.06 cfs 35,069 cf**Pond 50: DIV-8**Peak Elev=373.98' Inflow=14.06 cfs 35,069 cf
Primary=6.18 cfs 30,993 cf Secondary=8.03 cfs 4,076 cf Outflow=14.06 cfs 35,069 cf**Pond 51: INF-8**Peak Elev=372.58' Storage=10,065 cf Inflow=6.18 cfs 30,993 cf
Outflow=1.26 cfs 30,993 cf**Subcatchment52: Post B6**Runoff Area=30,800 sf 100.00% Impervious Runoff Depth=3.19"
Tc=6.0 min CN=98 Runoff=3.04 cfs 8,179 cf**Pond 53: DIV-4**Peak Elev=351.43' Inflow=3.04 cfs 8,179 cf
Primary=3.04 cfs 8,179 cf Secondary=0.00 cfs 0 cf Outflow=3.04 cfs 8,179 cf**Pond 54: INF-4**Peak Elev=350.81' Storage=2,418 cf Inflow=3.04 cfs 8,179 cf
Outflow=0.44 cfs 8,179 cf**Subcatchment55: Post B4**Runoff Area=576,333 sf 0.00% Impervious Runoff Depth=0.96"
Flow Length=675' Tc=15.1 min CN=70 Runoff=13.21 cfs 46,062 cf**Reach 56: Existing Stream B**Avg. Flow Depth=0.56' Max Vel=5.76 fps Inflow=16.69 cfs 315,869 cf
n=0.040 L=1,360.0' S=0.0721 ' Capacity=291.69 cfs Outflow=16.40 cfs 315,716 cf**Link 57: Design Point B**Inflow=16.40 cfs 315,716 cf
Primary=16.40 cfs 315,716 cf**Total Runoff Area = 2,584,397 sf Runoff Volume = 371,086 cf Average Runoff Depth = 1.72"**
69.41% Pervious = 1,793,897 sf 30.59% Impervious = 790,500 sf

North 60 Post B 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 44: Post B0

Runoff = 49.64 cfs @ 12.45 hrs, Volume= 235,196 cf, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
487,056	98	Paved parking, HSG C
497,987	77	Woods, Good, HSG D
134,328	70	Woods, Good, HSG C
375,457	80	>75% Grass cover, Good, HSG D
15,943	74	>75% Grass cover, Good, HSG C
1,510,771	84	Weighted Average
1,023,715		67.76% Pervious Area
487,056		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
9.5	848	0.0085	1.48		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	856	0.0093	2.78	3.06	Trap/Vee/Rect Channel Flow, Bot.W=3.00' D=0.33' Z= 1.0 '/' Top.W=3.66' n= 0.022 Earth, clean & straight
0.2	67	0.0150	6.66	64.08	Pipe Channel, 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.025 Corrugated metal
32.3	1,871	Total			

North 60 Post B 3-9-20

Prepared by {enter your company name here}

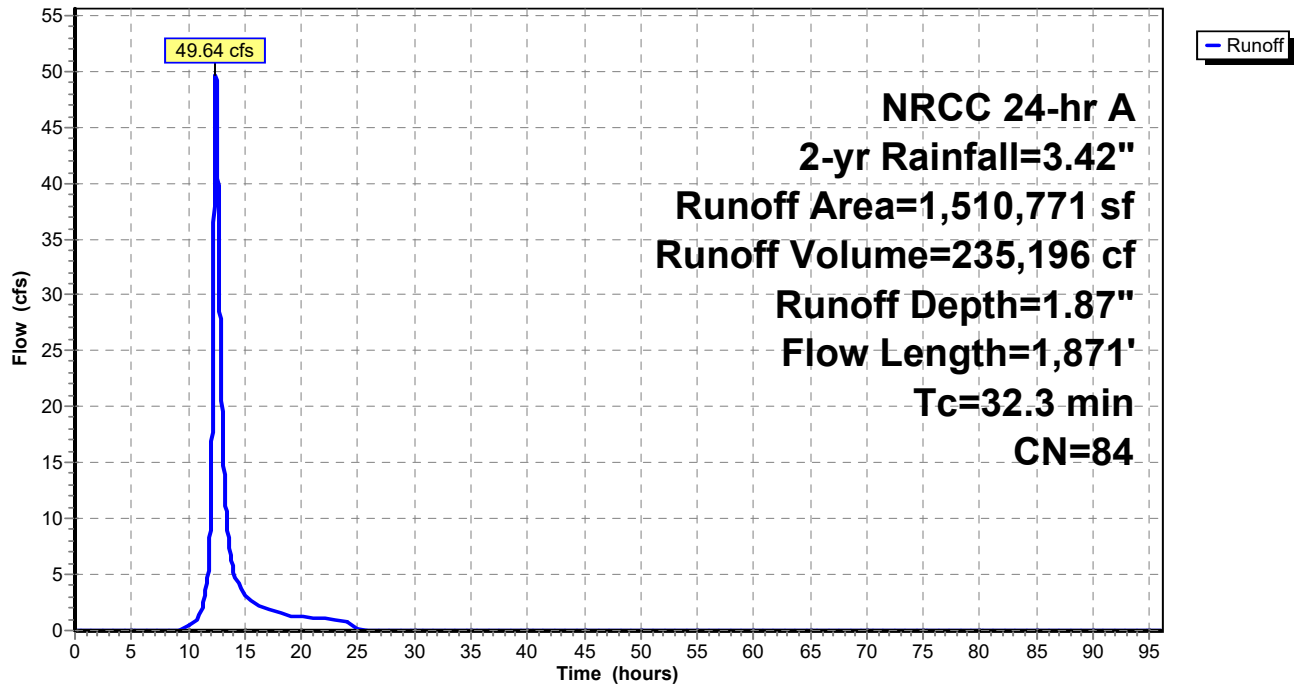
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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Subcatchment 44: Post B0

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 45: Offsite Pond B

Inflow Area = 1,510,771 sf, 32.24% Impervious, Inflow Depth = 1.87" for 2-yr event
 Inflow = 49.64 cfs @ 12.45 hrs, Volume= 235,196 cf
 Outflow = 16.27 cfs @ 13.10 hrs, Volume= 233,939 cf, Atten= 67%, Lag= 38.7 min
 Primary = 16.27 cfs @ 13.10 hrs, Volume= 233,939 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 383.84' @ 13.10 hrs Surf.Area= 77,765 sf Storage= 102,972 cf

Plug-Flow detention time= 176.7 min calculated for 233,915 cf (99% of inflow)
 Center-of-Mass det. time= 173.8 min (1,014.1 - 840.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	382.00'	610,998 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)
382.00	36,540	1,177.0	0	0	36,540
384.00	81,987	1,579.0	115,507	115,507	124,748
386.00	96,790	1,622.0	178,572	294,080	136,159
388.00	108,795	1,657.0	205,468	499,548	145,863
389.00	114,127	1,679.0	111,450	610,998	151,937

Device	Routing	Invert	Outlet Devices
#1	Primary	382.00'	36.0" Round Culvert L= 158.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 382.00' / 380.00' S= 0.0127 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf

Primary OutFlow Max=16.27 cfs @ 13.10 hrs HW=383.84' TW=377.33' (Dynamic Tailwater)
 ↑**1=Culvert** (Barrel Controls 16.27 cfs @ 5.11 fps)

North 60 Post B 3-9-20

Prepared by {enter your company name here}

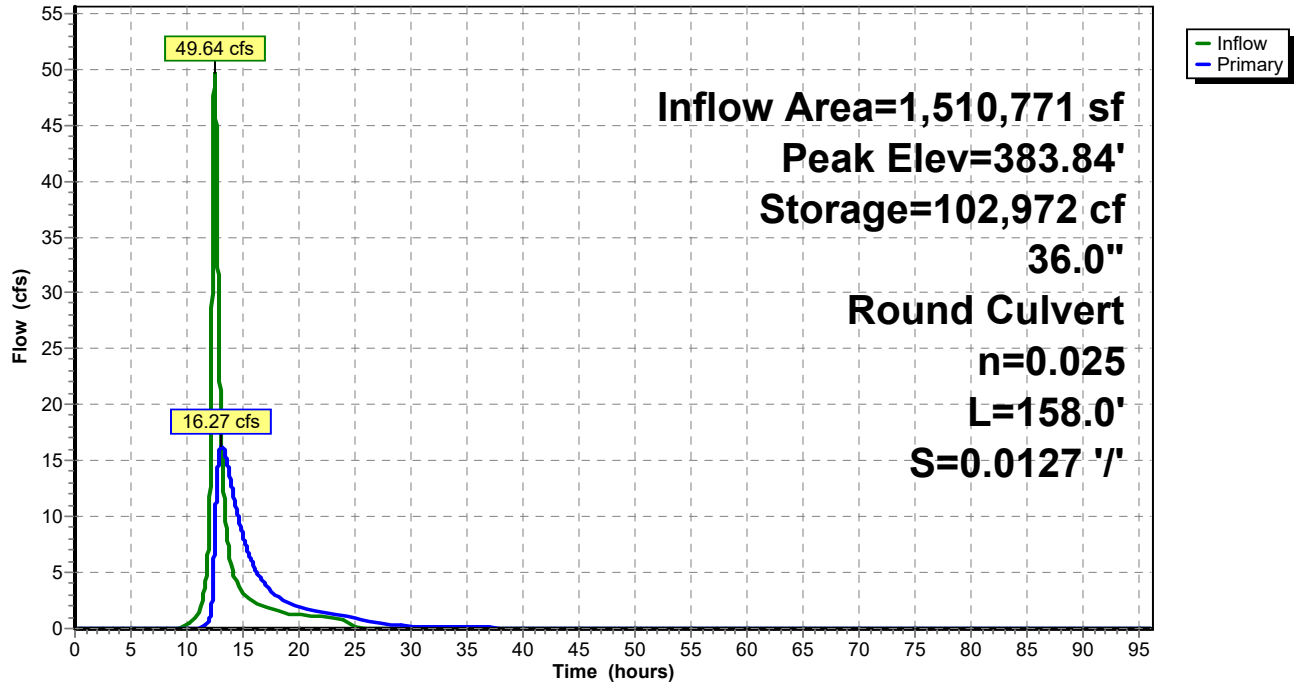
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 45: Offsite Pond B

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 46: Post B1

Runoff = 14.18 cfs @ 12.13 hrs, Volume= 33,082 cf, Depth= 2.03"

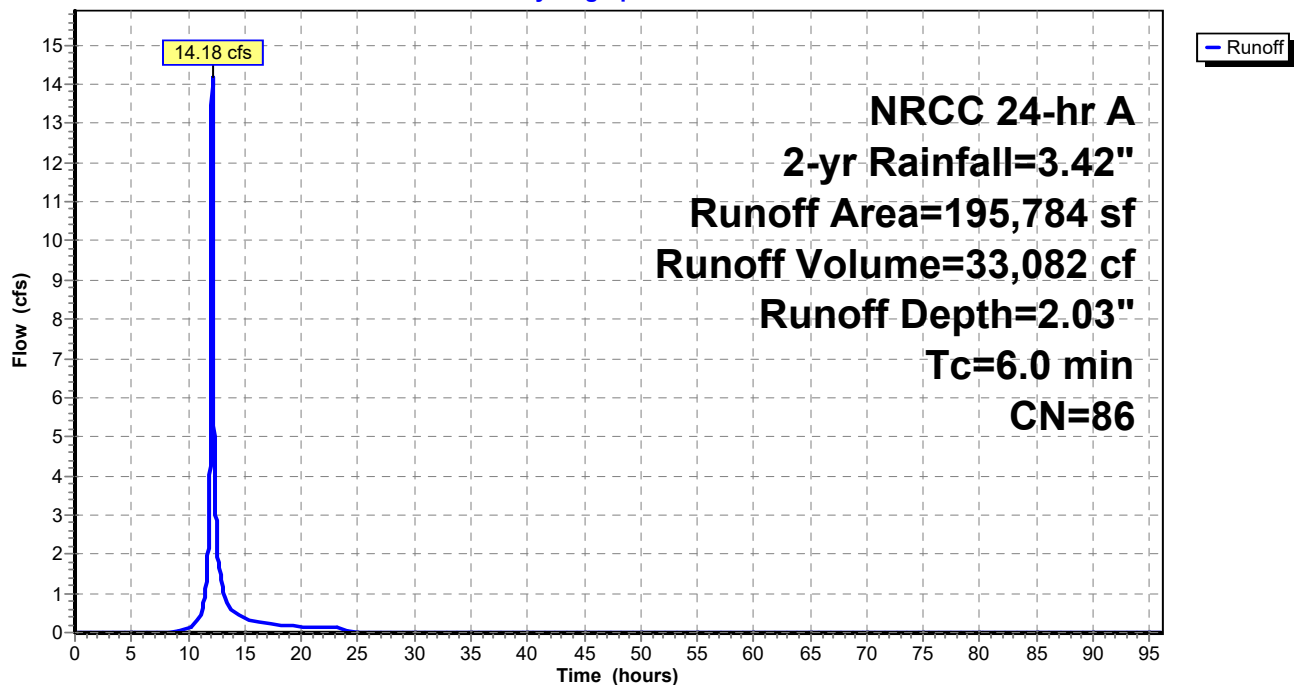
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
99,286	98	Paved parking, HSG C
96,498	74	>75% Grass cover, Good, HSG C
195,784	86	Weighted Average
96,498		49.29% Pervious Area
99,286		50.71% Impervious Area

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

Subcatchment 46: Post B1

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 47: Post B3

Runoff = 5.85 cfs @ 12.14 hrs, Volume= 13,497 cf, Depth= 1.37"

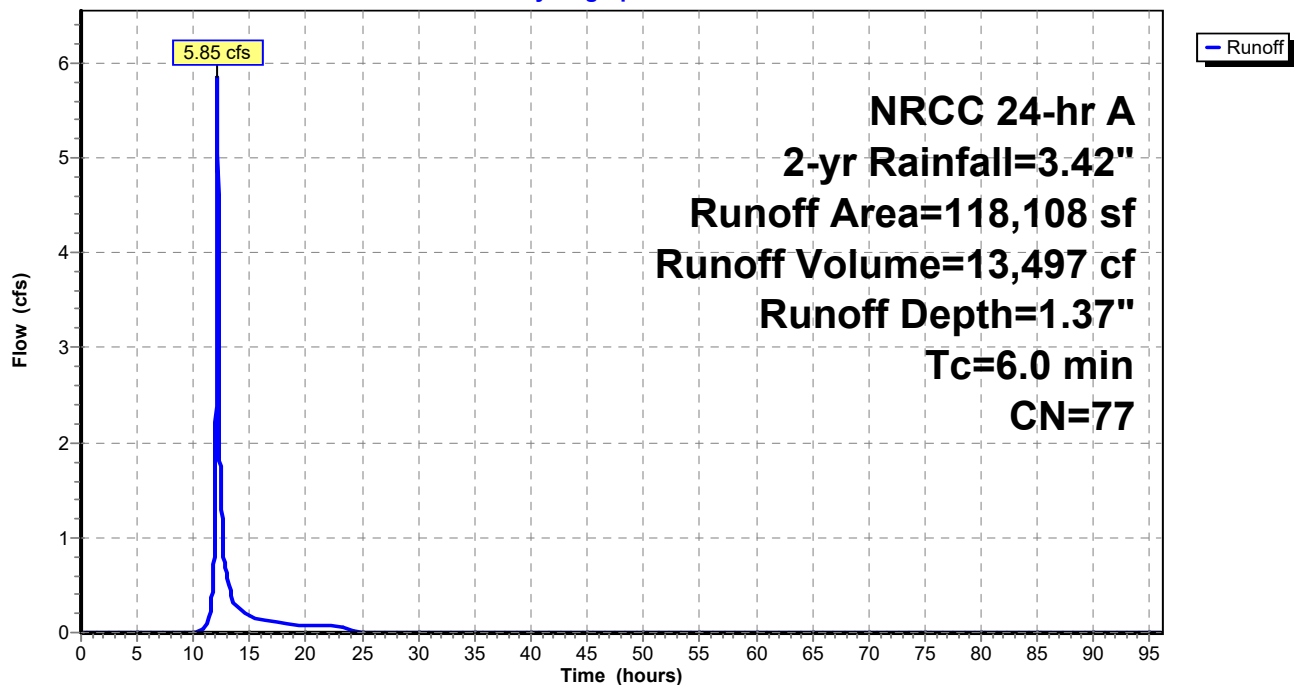
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
73,832	65	Brush, Good, HSG C
44,276	98	Water Surface, HSG C
118,108	77	Weighted Average
73,832		62.51% Pervious Area
44,276		37.49% Impervious Area

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

Subcatchment 47: Post B3

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 48: SWP-4

Inflow Area = 1,824,663 sf, 34.56% Impervious, Inflow Depth > 1.84" for 2-yr event
 Inflow = 21.58 cfs @ 12.14 hrs, Volume= 280,519 cf
 Outflow = 15.11 cfs @ 13.71 hrs, Volume= 265,731 cf, Atten= 30%, Lag= 94.3 min
 Primary = 15.11 cfs @ 13.71 hrs, Volume= 265,731 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Starting Elev= 376.00' Surf.Area= 88,186 sf Storage= 134,213 cf
 Peak Elev= 377.47' @ 13.71 hrs Surf.Area= 95,864 sf Storage= 205,770 cf (71,556 cf above start)

Plug-Flow detention time= 1,162.6 min calculated for 131,518 cf (47% of inflow)
 Center-of-Mass det. time= 417.8 min (1,399.1 - 981.4)

Volume	Invert	Avail.Storage	Storage Description
#1	372.00'	7,914 cf	Forebay (Irregular) Listed below (Recalc)
#2	372.00'	121,847 cf	Permanent Pool (Irregular) Listed below (Recalc)
#3	375.90'	259,334 cf	Additional Storage (Irregular) Listed below (Recalc)
		389,094 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
372.00	885	114.0	0	0	885
373.00	1,392	139.2	1,129	1,129	1,408
374.00	1,998	164.4	1,686	2,815	2,036
375.00	2,707	189.5	2,344	5,158	2,764
375.90	3,430	212.2	2,755	7,914	3,512

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
372.00	22,804	1,051.3	0	0	22,804
373.00	27,060	1,076.5	24,902	24,902	27,202
374.00	31,416	1,101.7	29,211	54,113	31,703
375.00	35,874	1,127.0	33,620	87,733	36,327
375.90	39,971	1,149.7	34,114	121,847	40,565

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
375.90	44,276	1,380.7	0	0	44,276
377.00	50,030	1,294.2	51,836	51,836	62,747
378.00	55,257	1,319.4	52,622	104,458	68,149
379.00	60,586	1,344.7	57,901	162,359	73,675
380.00	66,015	1,370.0	63,281	225,640	79,307
380.50	68,768	1,382.6	33,693	259,334	82,151

Device	Routing	Invert	Outlet Devices
#1	Primary	372.00'	24.0" Round Culvert L= 227.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 372.00' / 347.00' S= 0.1101 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	376.00'	3.0" Vert. Orifice/Grate C= 0.600

North 60 Post B 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

#3 Device 1 377.00' **36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=15.11 cfs @ 13.71 hrs HW=377.47' TW=312.56' (Dynamic Tailwater)

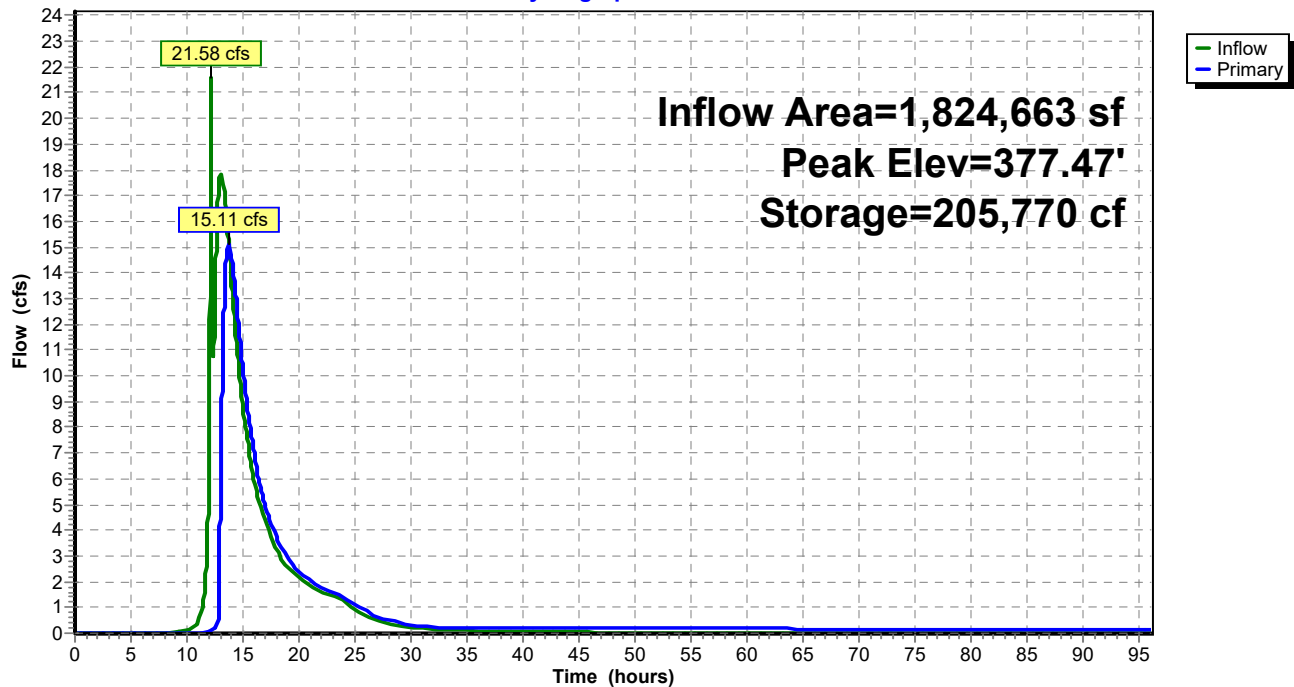
1=Culvert (Passes 15.11 cfs of 31.99 cfs potential flow)

2=Orifice/Grate (Orifice Controls 0.27 cfs @ 5.59 fps)

3=Orifice/Grate (Weir Controls 14.83 cfs @ 2.25 fps)

Pond 48: SWP-4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 49: Post B5

Runoff = 14.06 cfs @ 12.13 hrs, Volume= 35,069 cf, Depth= 2.76"

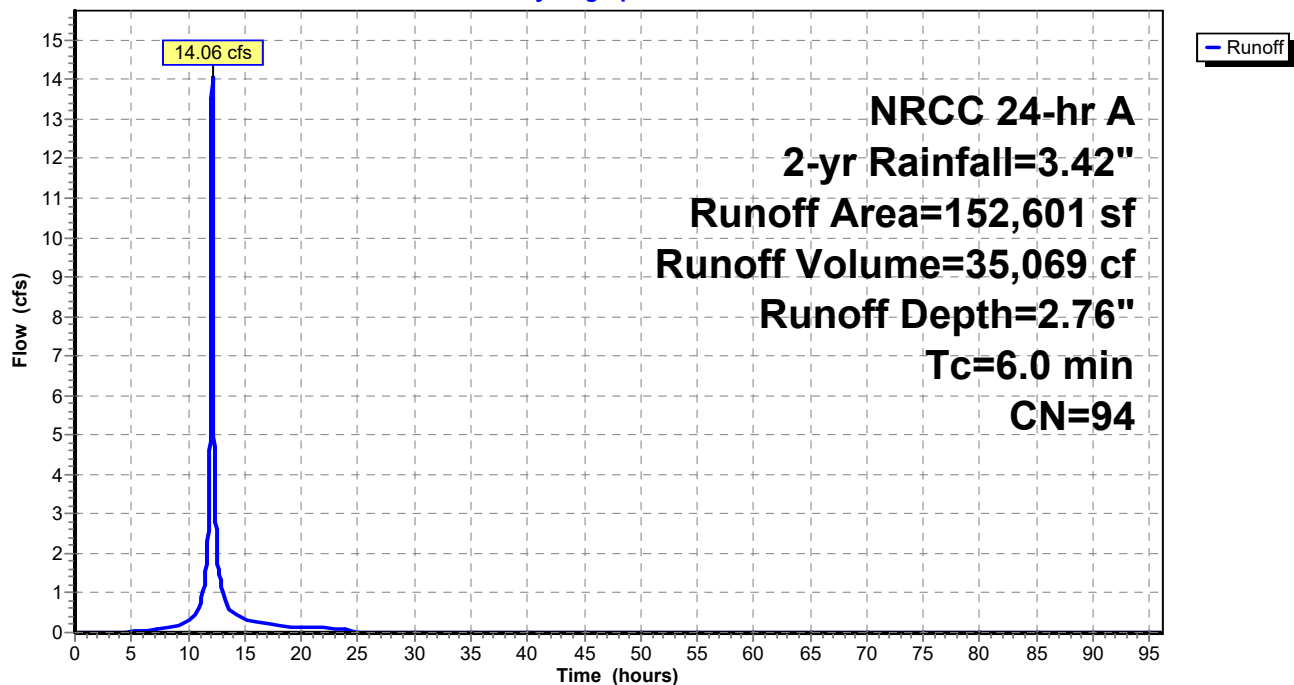
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
129,082	98	Paved parking, HSG C
23,519	74	>75% Grass cover, Good, HSG C
152,601	94	Weighted Average
23,519		15.41% Pervious Area
129,082		84.59% Impervious Area

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

Subcatchment 49: Post B5

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 50: DIV-8

Inflow Area = 152,601 sf, 84.59% Impervious, Inflow Depth = 2.76" for 2-yr event
 Inflow = 14.06 cfs @ 12.13 hrs, Volume= 35,069 cf
 Outflow = 14.06 cfs @ 12.13 hrs, Volume= 35,069 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.18 cfs @ 12.02 hrs, Volume= 30,993 cf
 Secondary = 8.03 cfs @ 12.13 hrs, Volume= 4,076 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 373.98' @ 12.13 hrs

Flood Elev= 379.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	370.50'	12.0" Round Culvert L= 9.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.50' / 370.50' S= 0.0000 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	370.50'	24.0" Round Culvert L= 92.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.50' / 369.50' S= 0.0109 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	373.50'	8.0' 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=6.14 cfs @ 12.02 hrs HW=373.68' TW=371.04' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 6.14 cfs @ 7.82 fps)**Secondary OutFlow** Max=8.01 cfs @ 12.13 hrs HW=373.98' TW=312.43' (Dynamic Tailwater)↑**2=Culvert** (Passes 8.01 cfs of 23.83 cfs potential flow)↑**3=Broad-Crested Rectangular Weir** (Weir Controls 8.01 cfs @ 2.07 fps)

North 60 Post B 3-9-20

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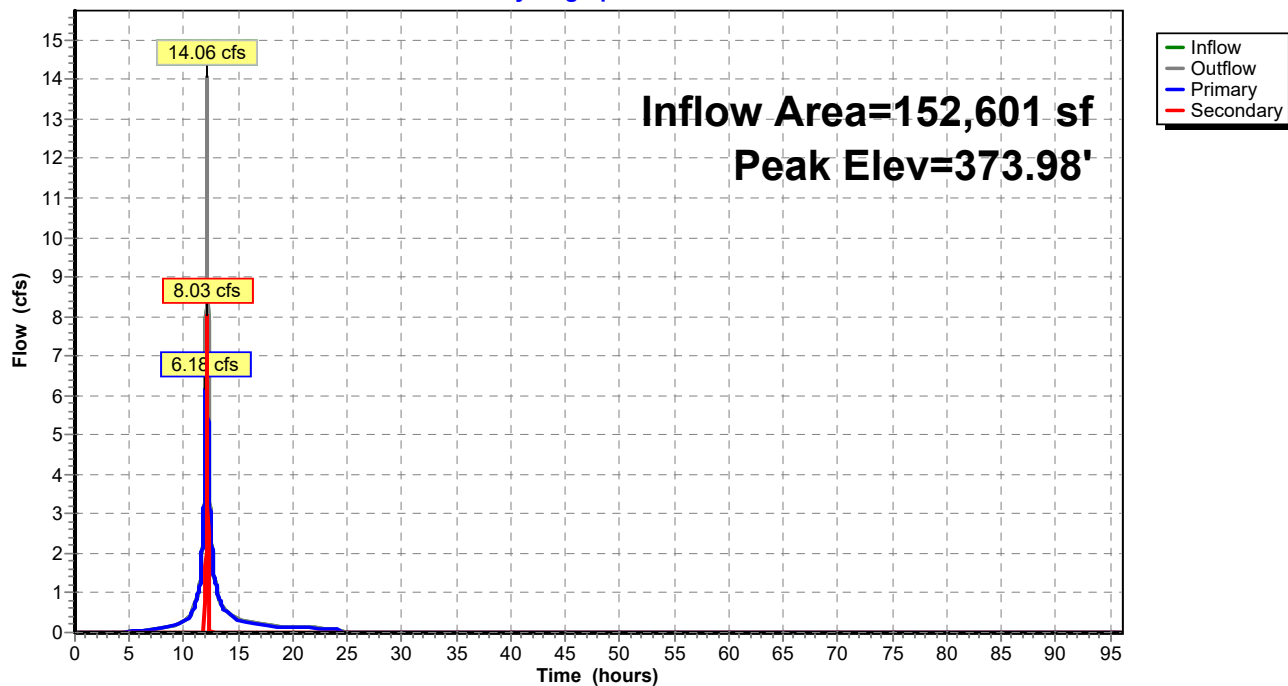
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 50: DIV-8

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 51: INF-8

Inflow Area = 152,601 sf, 84.59% Impervious, Inflow Depth = 2.44" for 2-yr event
 Inflow = 6.18 cfs @ 12.02 hrs, Volume= 30,993 cf
 Outflow = 1.26 cfs @ 11.59 hrs, Volume= 30,993 cf, Atten= 80%, Lag= 0.0 min
 Discarded = 1.26 cfs @ 11.59 hrs, Volume= 30,993 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 372.58' @ 12.89 hrs Surf.Area= 5,434 sf Storage= 10,065 cf

Plug-Flow detention time= 55.5 min calculated for 30,990 cf (100% of inflow)
 Center-of-Mass det. time= 55.5 min (843.1 - 787.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	370.00'	5,125 cf	58.75'W x 92.50'L x 4.00'H Field A 21,738 cf Overall - 8,924 cf Embedded = 12,814 cf x 40.0% Voids
#2A	370.50'	8,924 cf	Cultec R-360HD x 240 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 240 Chambers in 10 Rows Cap Storage= +6.5 cf x 2 x 10 rows = 129.2 cf
		14,049 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	370.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'

Discarded OutFlow Max=1.26 cfs @ 11.59 hrs HW=370.12' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.26 cfs)

North 60 Post B 3-9-20

Prepared by {enter your company name here}

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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Pond 51: INF-8 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 10 rows = 129.2 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

24 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 90.50' Row Length +12.0" End Stone x 2 = 92.50' Base Length

10 Rows x 60.0" Wide + 9.0" Spacing x 9 + 12.0" Side Stone x 2 = 58.75' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

240 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 10 Rows = 8,923.9 cf Chamber Storage

21,737.5 cf Field - 8,923.9 cf Chambers = 12,813.6 cf Stone x 40.0% Voids = 5,125.4 cf Stone Storage

Chamber Storage + Stone Storage = 14,049.4 cf = 0.323 af

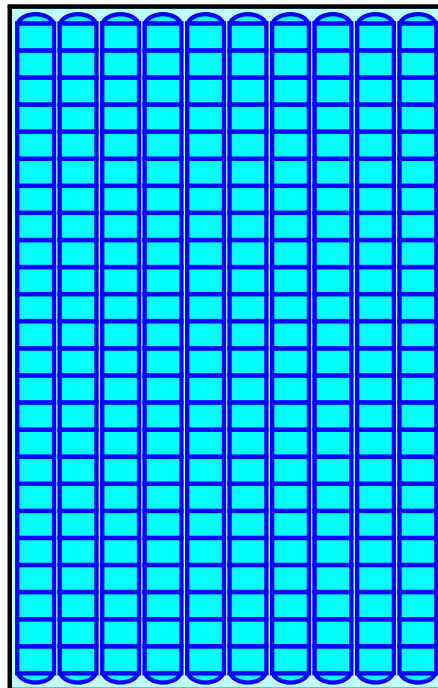
Overall Storage Efficiency = 64.6%

Overall System Size = 92.50' x 58.75' x 4.00'

240 Chambers

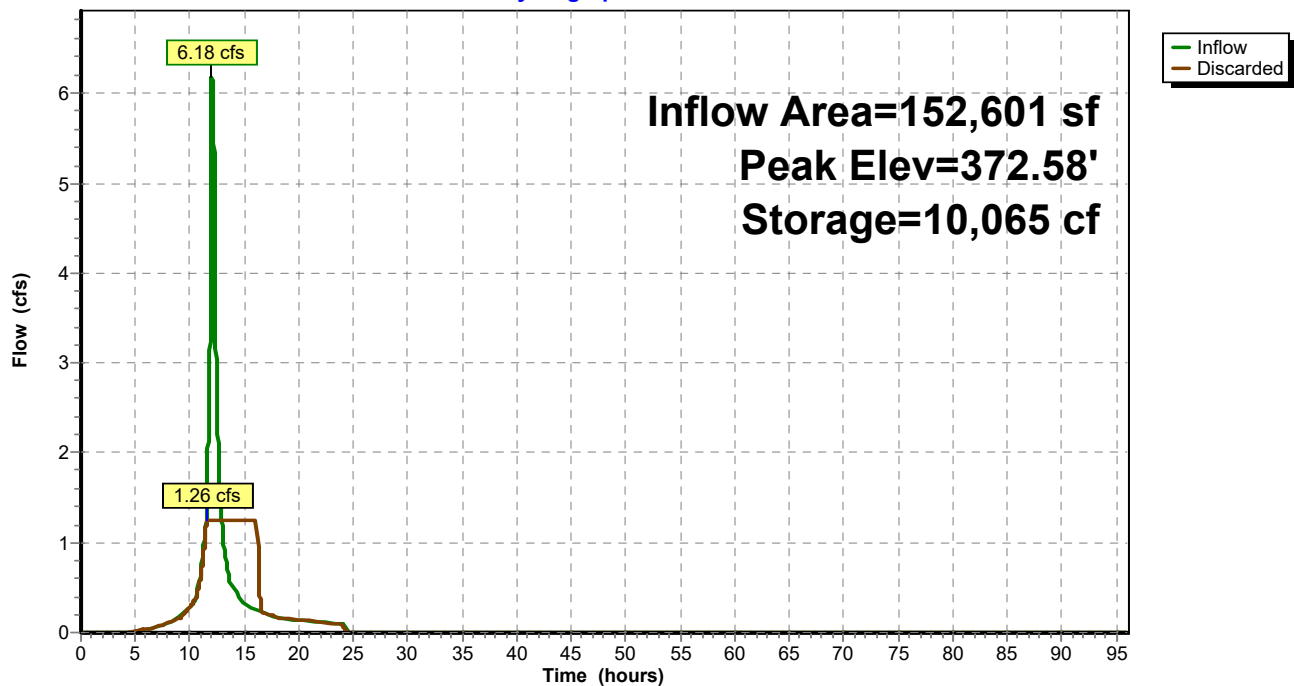
805.1 cy Field

474.6 cy Stone



Pond 51: INF-8

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

Printed 3/25/2020

Summary for Subcatchment 52: Post B6

Runoff = 3.04 cfs @ 12.13 hrs, Volume= 8,179 cf, Depth= 3.19"

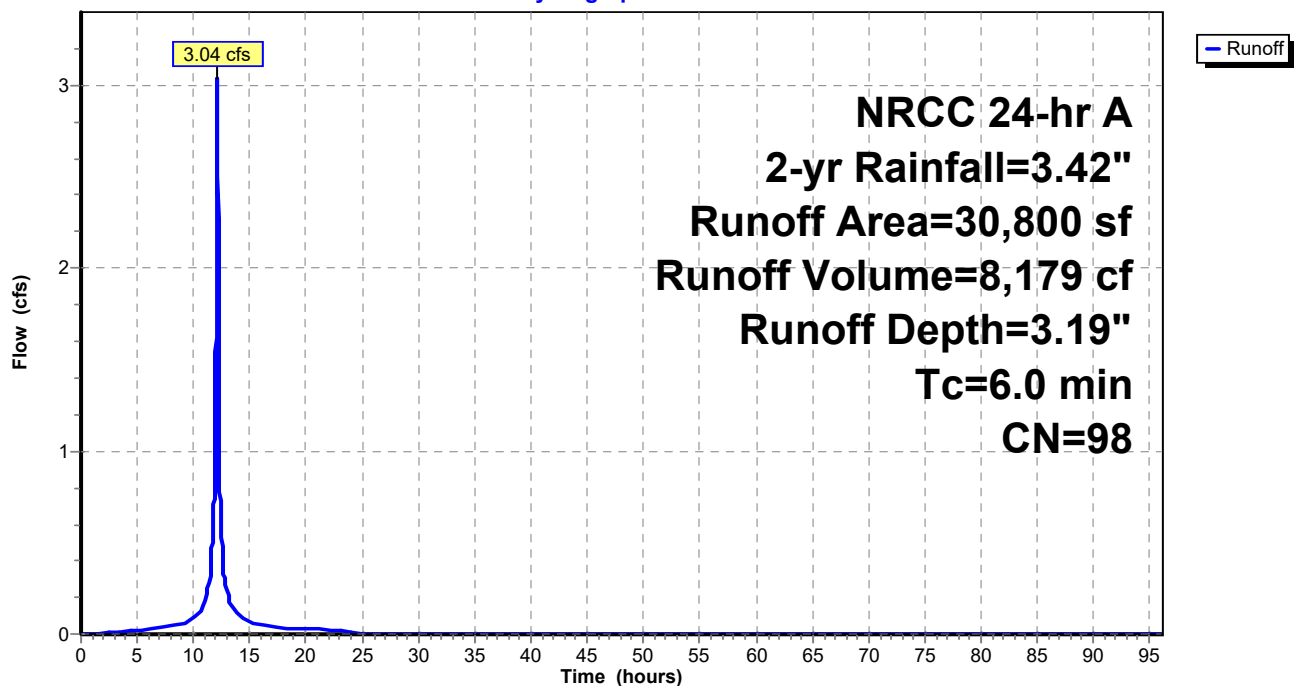
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
30,800	98	Paved parking, HSG C
30,800		100.00% Impervious Area

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

Subcatchment 52: Post B6

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Printed 3/25/2020

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Summary for Pond 53: DIV-4

Inflow Area = 30,800 sf, 100.00% Impervious, Inflow Depth = 3.19" for 2-yr event
 Inflow = 3.04 cfs @ 12.13 hrs, Volume= 8,179 cf
 Outflow = 3.04 cfs @ 12.13 hrs, Volume= 8,179 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.04 cfs @ 12.13 hrs, Volume= 8,179 cf
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 351.43' @ 12.14 hrs

Flood Elev= 355.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	349.50'	10.0" Round Culvert L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.50' / 349.50' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	349.50'	18.0" Round Culvert L= 70.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.50' / 348.00' S= 0.0214 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	352.50'	8.0' 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=2.97 cfs @ 12.13 hrs HW=351.40' TW=350.12' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 2.97 cfs @ 5.45 fps)**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=349.50' TW=312.00' (Dynamic Tailwater)↑**2=Culvert** (Controls 0.00 cfs)↑**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

North 60 Post B 3-9-20

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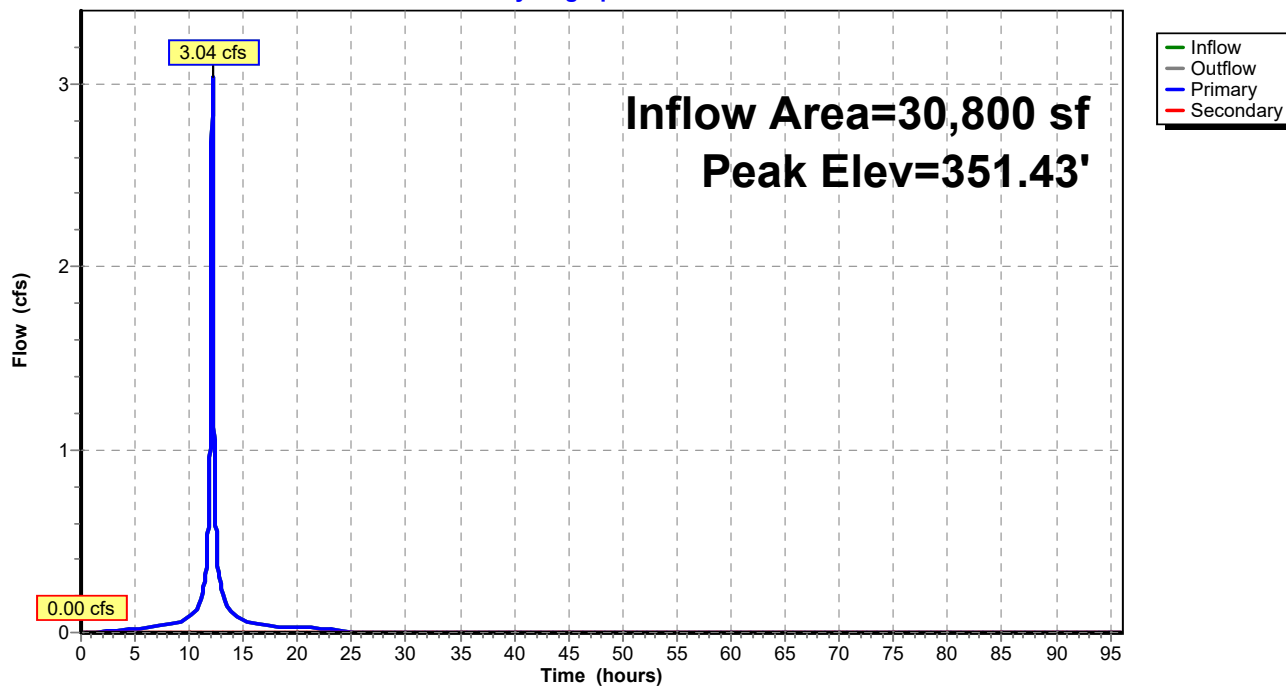
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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 53: DIV-4

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Pond 54: INF-4

Inflow Area = 30,800 sf, 100.00% Impervious, Inflow Depth = 3.19" for 2-yr event
 Inflow = 3.04 cfs @ 12.13 hrs, Volume= 8,179 cf
 Outflow = 0.44 cfs @ 11.71 hrs, Volume= 8,179 cf, Atten= 86%, Lag= 0.0 min
 Discarded = 0.44 cfs @ 11.71 hrs, Volume= 8,179 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 350.81' @ 12.58 hrs Surf.Area= 1,887 sf Storage= 2,418 cf

Plug-Flow detention time= 32.5 min calculated for 8,178 cf (100% of inflow)
 Center-of-Mass det. time= 32.5 min (786.4 - 753.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	349.00'	1,859 cf	25.67'W x 73.50'L x 3.88'H Field A 7,310 cf Overall - 2,664 cf Embedded = 4,646 cf x 40.0% Voids
#2A	349.50'	2,664 cf	Cultec R-330XLHD x 50 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
		4,522 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	349.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=0.44 cfs @ 11.71 hrs HW=349.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.44 cfs)

North 60 Post B 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Pond 54: INF-4 - 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

10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +12.0" End Stone x 2 = 73.50' 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 + 10.0" Cover = 3.88' Field Height

50 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,663.7 cf Chamber Storage

7,310.2 cf Field - 2,663.7 cf Chambers = 4,646.5 cf Stone x 40.0% Voids = 1,858.6 cf Stone Storage

Chamber Storage + Stone Storage = 4,522.3 cf = 0.104 af

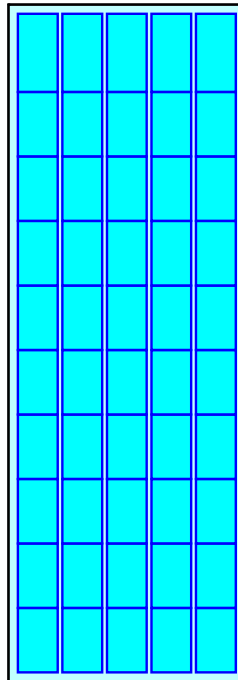
Overall Storage Efficiency = 61.9%

Overall System Size = 73.50' x 25.67' x 3.88'

50 Chambers

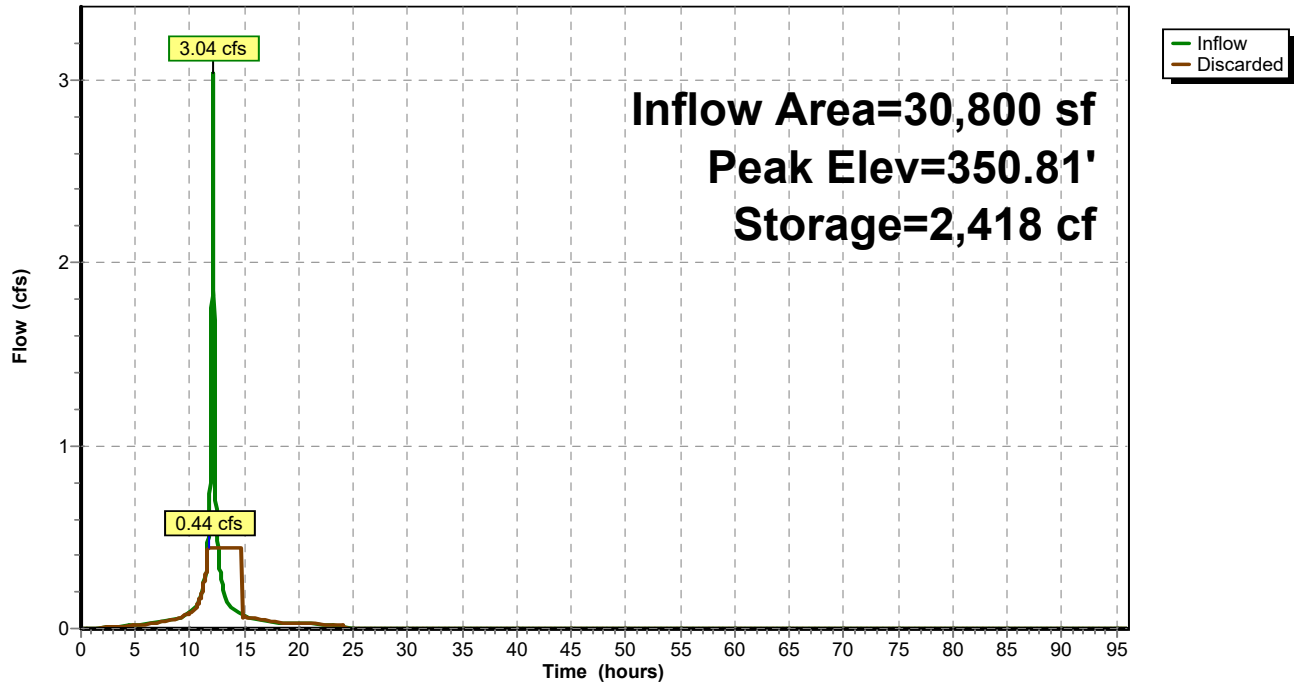
270.7 cy Field

172.1 cy Stone



Pond 54: INF-4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Subcatchment 55: Post B4

Runoff = 13.21 cfs @ 12.25 hrs, Volume= 46,062 cf, Depth= 0.96"

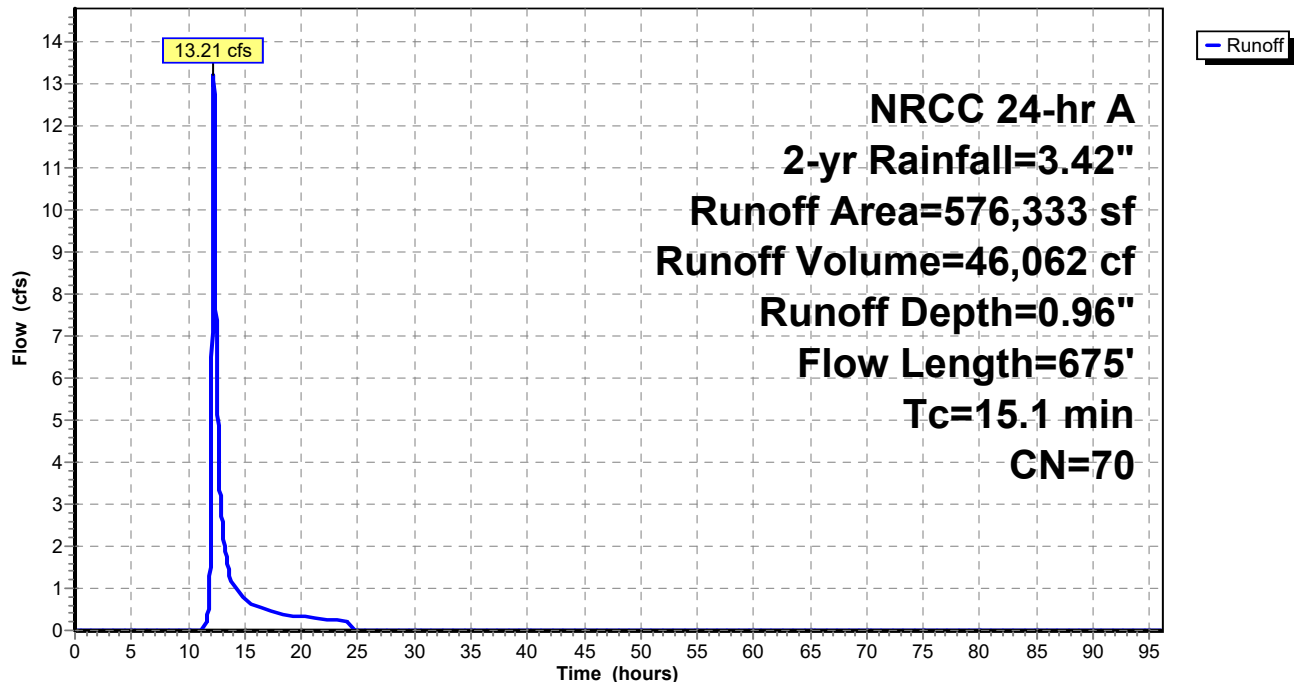
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 2-yr Rainfall=3.42"

Area (sf)	CN	Description
515,493	70	Woods, Good, HSG C
60,840	74	>75% Grass cover, Good, HSG C
576,333	70	Weighted Average
576,333		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0600	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.9	575	0.0950	4.96		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.1	675	Total			

Subcatchment 55: Post B4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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Summary for Reach 56: Existing Stream B

Inflow Area = 2,400,996 sf, 26.26% Impervious, Inflow Depth > 1.58" for 2-yr event
Inflow = 16.69 cfs @ 12.15 hrs, Volume= 315,869 cf
Outflow = 16.40 cfs @ 13.69 hrs, Volume= 315,716 cf, Atten= 2%, Lag= 92.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.76 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 1.57 fps, Avg. Travel Time= 14.4 min

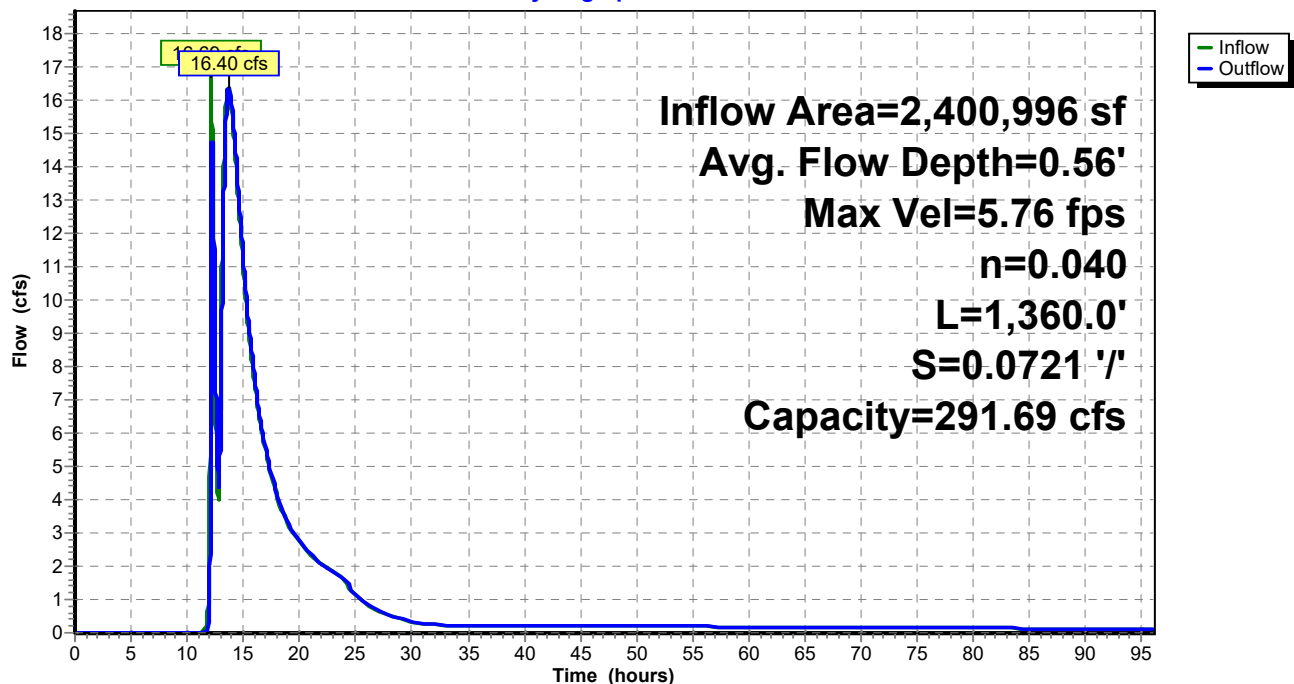
Peak Storage= 3,873 cf @ 13.69 hrs
Average Depth at Peak Storage= 0.56'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 291.69 cfs

4.00' x 2.50' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 ' ' Top Width= 14.00'
Length= 1,360.0' Slope= 0.0721 ' '
Inlet Invert= 312.00', Outlet Invert= 214.00'



Reach 56: Existing Stream B

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 2-yr Rainfall=3.42"

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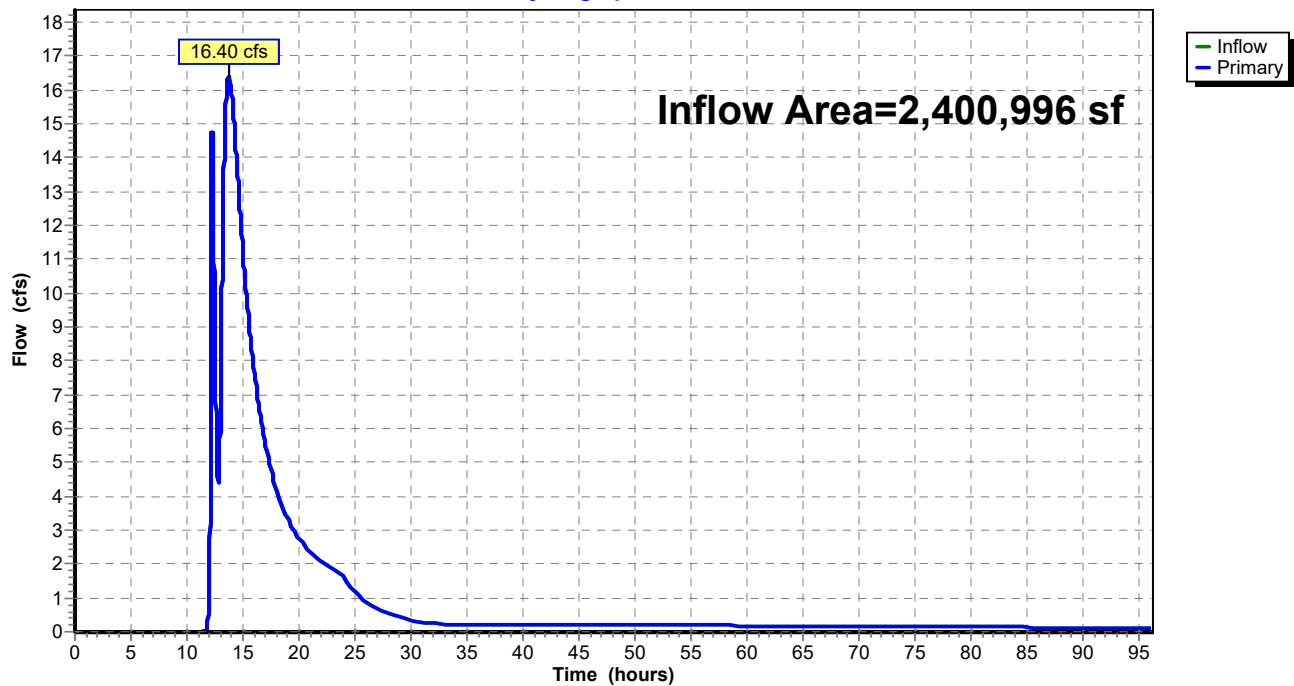
Summary for Link 57: Design Point B

Inflow Area = 2,400,996 sf, 26.26% Impervious, Inflow Depth > 1.58" for 2-yr event
Inflow = 16.40 cfs @ 13.69 hrs, Volume= 315,716 cf
Primary = 16.40 cfs @ 13.69 hrs, Volume= 315,716 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 57: Design Point B

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment44: Post B0

Runoff Area=1,510,771 sf 32.24% Impervious Runoff Depth=3.38"
Flow Length=1,871' Tc=32.3 min CN=84 Runoff=89.40 cfs 425,581 cf

Pond 45: Offsite Pond B

Peak Elev=384.79' Storage=182,615 cf Inflow=89.40 cfs 425,581 cf
36.0" Round Culvert n=0.025 L=158.0' S=0.0127 ' Outflow=31.40 cfs 424,308 cf

Subcatchment46: Post B1

Runoff Area=195,784 sf 50.71% Impervious Runoff Depth=3.58"
Tc=6.0 min CN=86 Runoff=24.40 cfs 58,395 cf

Subcatchment47: Post B3

Runoff Area=118,108 sf 37.49% Impervious Runoff Depth=2.72"
Tc=6.0 min CN=77 Runoff=11.59 cfs 26,808 cf

Pond 48: SWP-4

Peak Elev=377.79' Storage=222,807 cf Inflow=42.18 cfs 509,511 cf
Outflow=32.53 cfs 494,348 cf

Subcatchment49: Post B5

Runoff Area=152,601 sf 84.59% Impervious Runoff Depth=4.43"
Tc=6.0 min CN=94 Runoff=21.88 cfs 56,289 cf

Pond 50: DIV-8

Peak Elev=374.24' Inflow=21.88 cfs 56,289 cf
Primary=5.88 cfs 42,385 cf Secondary=16.33 cfs 13,905 cf Outflow=21.88 cfs 56,289 cf

Pond 51: INF-8

Peak Elev=373.46' Storage=12,876 cf Inflow=5.88 cfs 42,385 cf
Outflow=1.26 cfs 42,385 cf

Subcatchment52: Post B6

Runoff Area=30,800 sf 100.00% Impervious Runoff Depth=4.88"
Tc=6.0 min CN=98 Runoff=4.58 cfs 12,533 cf

Pond 53: DIV-4

Peak Elev=352.63' Inflow=4.58 cfs 12,533 cf
Primary=3.82 cfs 12,227 cf Secondary=1.00 cfs 306 cf Outflow=4.58 cfs 12,533 cf

Pond 54: INF-4

Peak Elev=352.50' Storage=4,238 cf Inflow=3.82 cfs 12,227 cf
Outflow=0.44 cfs 12,227 cf

Subcatchment55: Post B4

Runoff Area=576,333 sf 0.00% Impervious Runoff Depth=2.13"
Flow Length=675' Tc=15.1 min CN=70 Runoff=31.10 cfs 102,094 cf

Reach 56: Existing Stream B

Avg. Flow Depth=0.89' Max Vel=7.46 fps Inflow=39.98 cfs 610,654 cf
n=0.040 L=1,360.0' S=0.0721 ' Capacity=291.69 cfs Outflow=38.59 cfs 610,499 cf

Link 57: Design Point B

Inflow=38.59 cfs 610,499 cf
Primary=38.59 cfs 610,499 cf

Total Runoff Area = 2,584,397 sf Runoff Volume = 681,700 cf Average Runoff Depth = 3.17"
69.41% Pervious = 1,793,897 sf 30.59% Impervious = 790,500 sf

North 60 Post B 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 44: Post B0

Runoff = 89.40 cfs @ 12.45 hrs, Volume= 425,581 cf, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
487,056	98	Paved parking, HSG C
497,987	77	Woods, Good, HSG D
134,328	70	Woods, Good, HSG C
375,457	80	>75% Grass cover, Good, HSG D
15,943	74	>75% Grass cover, Good, HSG C
1,510,771	84	Weighted Average
1,023,715		67.76% Pervious Area
487,056		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
9.5	848	0.0085	1.48		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	856	0.0093	2.78	3.06	Trap/Vee/Rect Channel Flow, Bot.W=3.00' D=0.33' Z= 1.0 '/' Top.W=3.66' n= 0.022 Earth, clean & straight
0.2	67	0.0150	6.66	64.08	Pipe Channel, 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.025 Corrugated metal
32.3	1,871	Total			

North 60 Post B 3-9-20

Prepared by {enter your company name here}

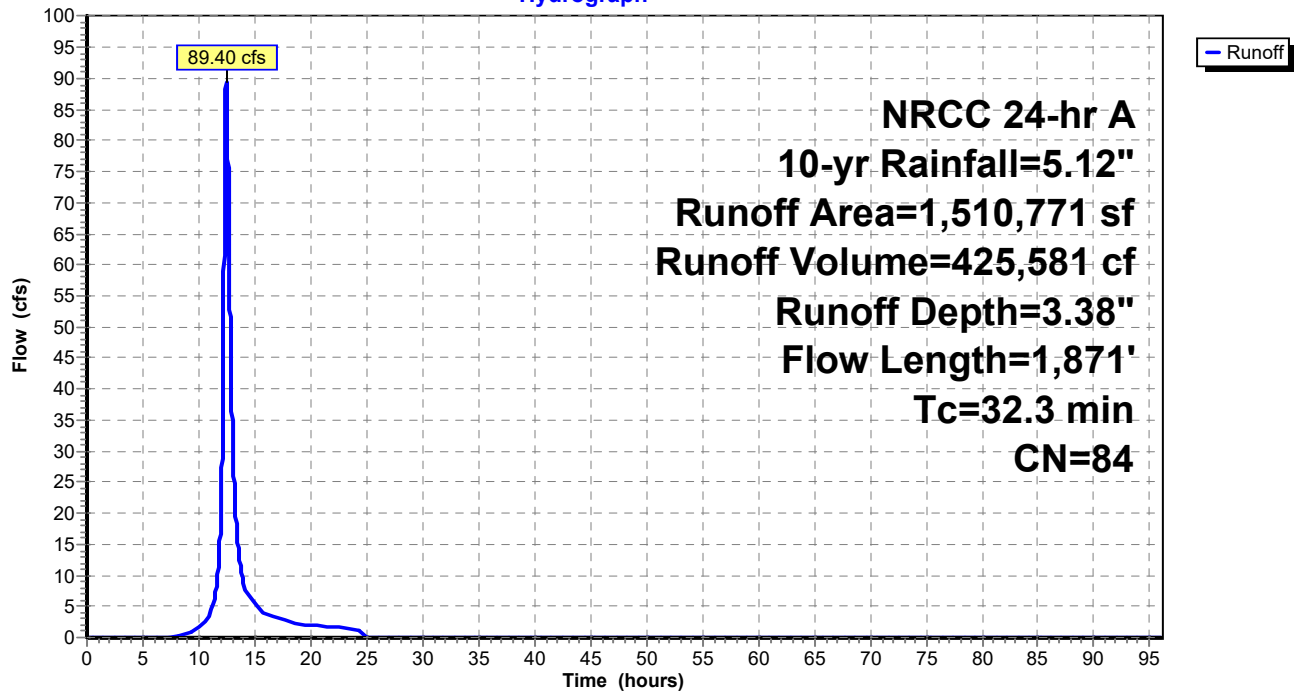
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NRCC 24-hr A 10-yr Rainfall=5.12"

Printed 3/25/2020

Subcatchment 44: Post B0

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 45: Offsite Pond B

Inflow Area = 1,510,771 sf, 32.24% Impervious, Inflow Depth = 3.38" for 10-yr event
 Inflow = 89.40 cfs @ 12.45 hrs, Volume= 425,581 cf
 Outflow = 31.40 cfs @ 13.03 hrs, Volume= 424,308 cf, Atten= 65%, Lag= 34.8 min
 Primary = 31.40 cfs @ 13.03 hrs, Volume= 424,308 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 384.79' @ 13.03 hrs Surf.Area= 87,696 sf Storage= 182,615 cf

Plug-Flow detention time= 142.8 min calculated for 424,308 cf (100% of inflow)
 Center-of-Mass det. time= 140.8 min (966.9 - 826.0)

Volume	Invert	Avail.Storage	Storage Description		
#1	382.00'	610,998 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)
382.00	36,540	1,177.0	0	0	36,540
384.00	81,987	1,579.0	115,507	115,507	124,748
386.00	96,790	1,622.0	178,572	294,080	136,159
388.00	108,795	1,657.0	205,468	499,548	145,863
389.00	114,127	1,679.0	111,450	610,998	151,937

Device	Routing	Invert	Outlet Devices
#1	Primary	382.00'	36.0" Round Culvert L= 158.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 382.00' / 380.00' S= 0.0127 '/ Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf

Primary OutFlow Max=31.40 cfs @ 13.03 hrs HW=384.79' TW=377.76' (Dynamic Tailwater)
 ↑**1=Culvert** (Barrel Controls 31.40 cfs @ 5.96 fps)

North 60 Post B 3-9-20

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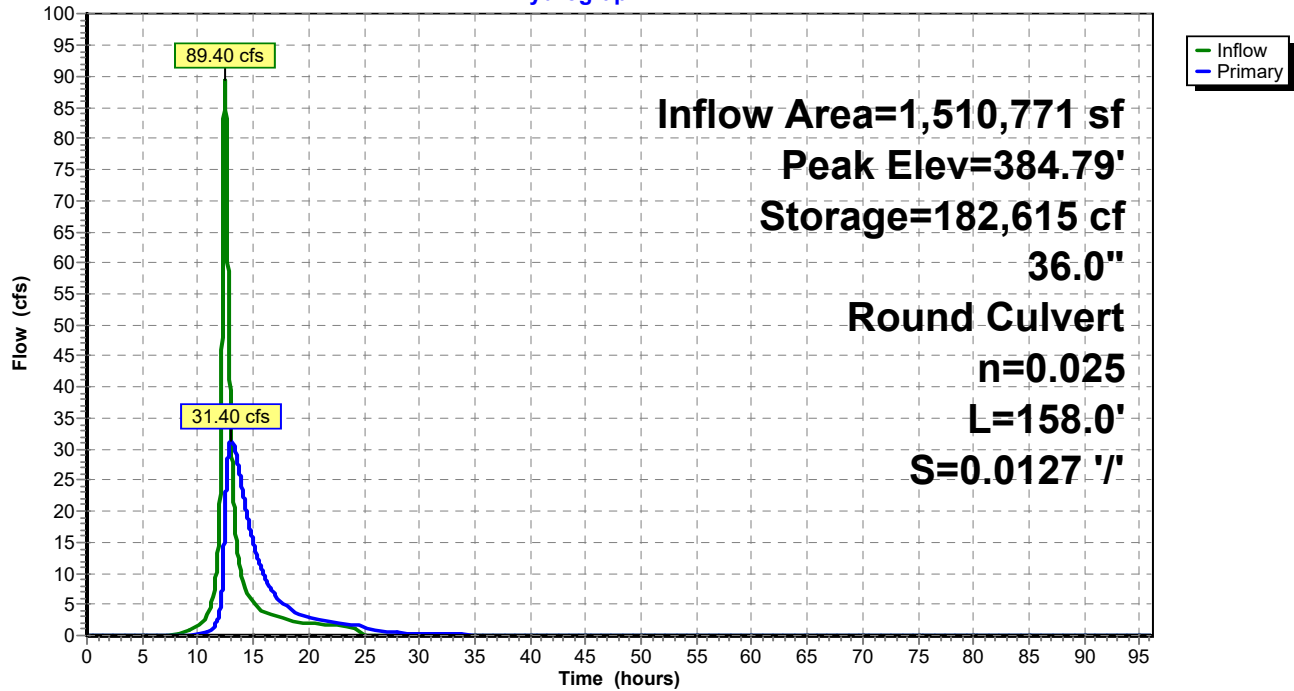
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NRCC 24-hr A 10-yr Rainfall=5.12"

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Pond 45: Offsite Pond B

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

Printed 3/25/2020

Summary for Subcatchment 46: Post B1

Runoff = 24.40 cfs @ 12.13 hrs, Volume= 58,395 cf, Depth= 3.58"

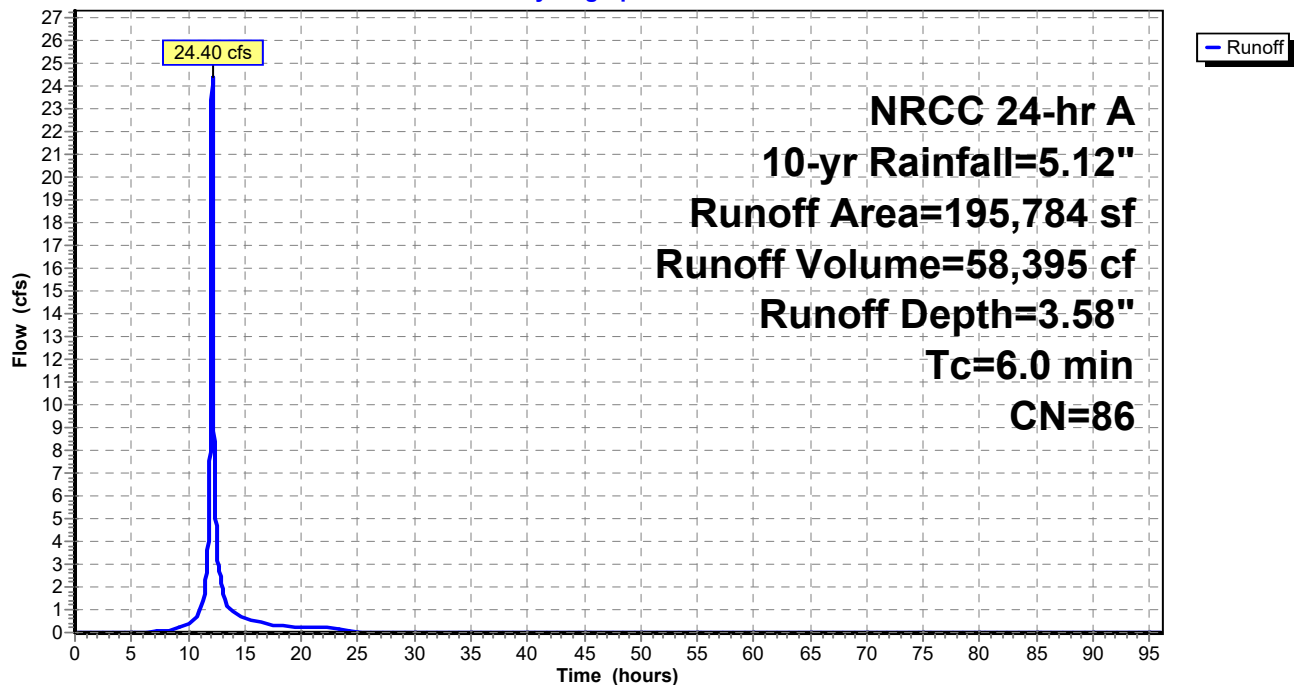
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
99,286	98	Paved parking, HSG C
96,498	74	>75% Grass cover, Good, HSG C
195,784	86	Weighted Average
96,498		49.29% Pervious Area
99,286		50.71% Impervious Area

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

Subcatchment 46: Post B1

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

Printed 3/25/2020

Summary for Subcatchment 47: Post B3

Runoff = 11.59 cfs @ 12.13 hrs, Volume= 26,808 cf, Depth= 2.72"

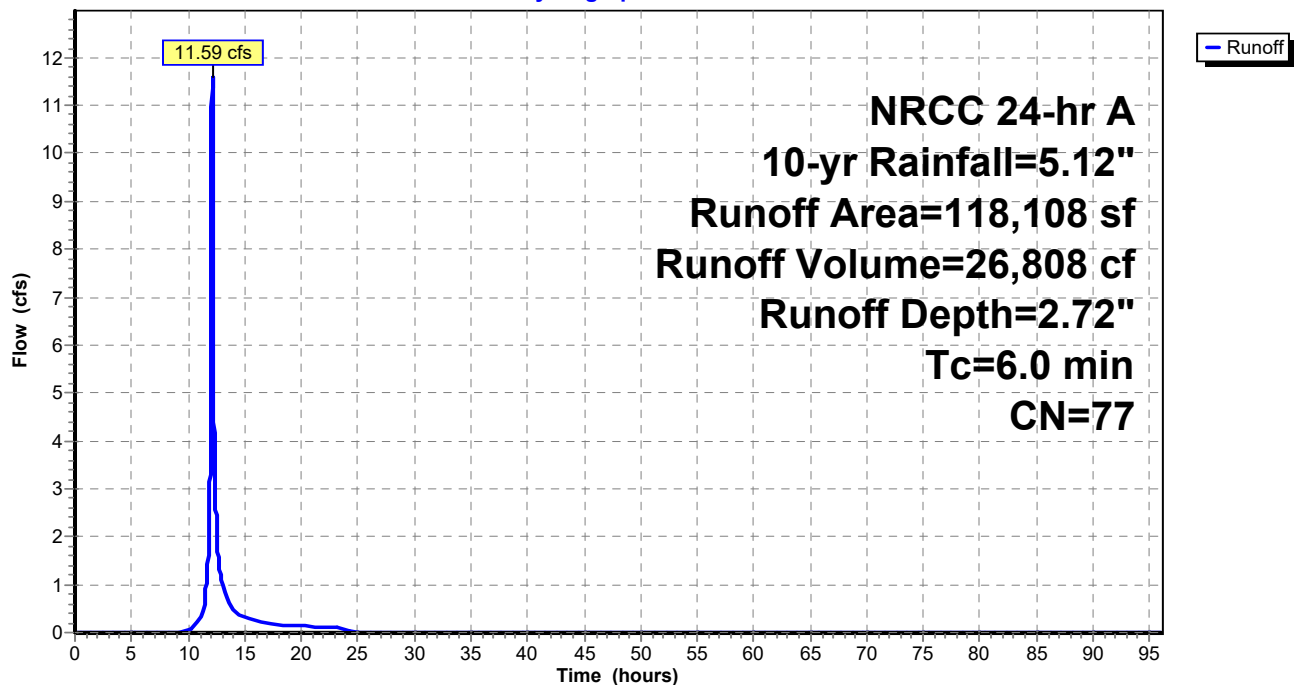
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
73,832	65	Brush, Good, HSG C
44,276	98	Water Surface, HSG C
118,108	77	Weighted Average
73,832		62.51% Pervious Area
44,276		37.49% Impervious Area

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

Subcatchment 47: Post B3

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 48: SWP-4

Inflow Area = 1,824,663 sf, 34.56% Impervious, Inflow Depth > 3.35" for 10-yr event
 Inflow = 42.18 cfs @ 12.13 hrs, Volume= 509,511 cf
 Outflow = 32.53 cfs @ 13.30 hrs, Volume= 494,348 cf, Atten= 23%, Lag= 70.1 min
 Primary = 32.53 cfs @ 13.30 hrs, Volume= 494,348 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Starting Elev= 376.00' Surf.Area= 88,186 sf Storage= 134,213 cf
 Peak Elev= 377.79' @ 13.30 hrs Surf.Area= 97,546 sf Storage= 222,807 cf (88,593 cf above start)

Plug-Flow detention time= 514.8 min calculated for 360,135 cf (71% of inflow)
 Center-of-Mass det. time= 237.0 min (1,176.5 - 939.5)

Volume	Invert	Avail.Storage	Storage Description
#1	372.00'	7,914 cf	Forebay (Irregular) Listed below (Recalc)
#2	372.00'	121,847 cf	Permanent Pool (Irregular) Listed below (Recalc)
#3	375.90'	259,334 cf	Additional Storage (Irregular) Listed below (Recalc)
		389,094 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
372.00	885	114.0	0	0	885
373.00	1,392	139.2	1,129	1,129	1,408
374.00	1,998	164.4	1,686	2,815	2,036
375.00	2,707	189.5	2,344	5,158	2,764
375.90	3,430	212.2	2,755	7,914	3,512

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
372.00	22,804	1,051.3	0	0	22,804
373.00	27,060	1,076.5	24,902	24,902	27,202
374.00	31,416	1,101.7	29,211	54,113	31,703
375.00	35,874	1,127.0	33,620	87,733	36,327
375.90	39,971	1,149.7	34,114	121,847	40,565

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
375.90	44,276	1,380.7	0	0	44,276
377.00	50,030	1,294.2	51,836	51,836	62,747
378.00	55,257	1,319.4	52,622	104,458	68,149
379.00	60,586	1,344.7	57,901	162,359	73,675
380.00	66,015	1,370.0	63,281	225,640	79,307
380.50	68,768	1,382.6	33,693	259,334	82,151

Device	Routing	Invert	Outlet Devices
#1	Primary	372.00'	24.0" Round Culvert L= 227.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 372.00' / 347.00' S= 0.1101 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	376.00'	3.0" Vert. Orifice/Grate C= 0.600

North 60 Post B 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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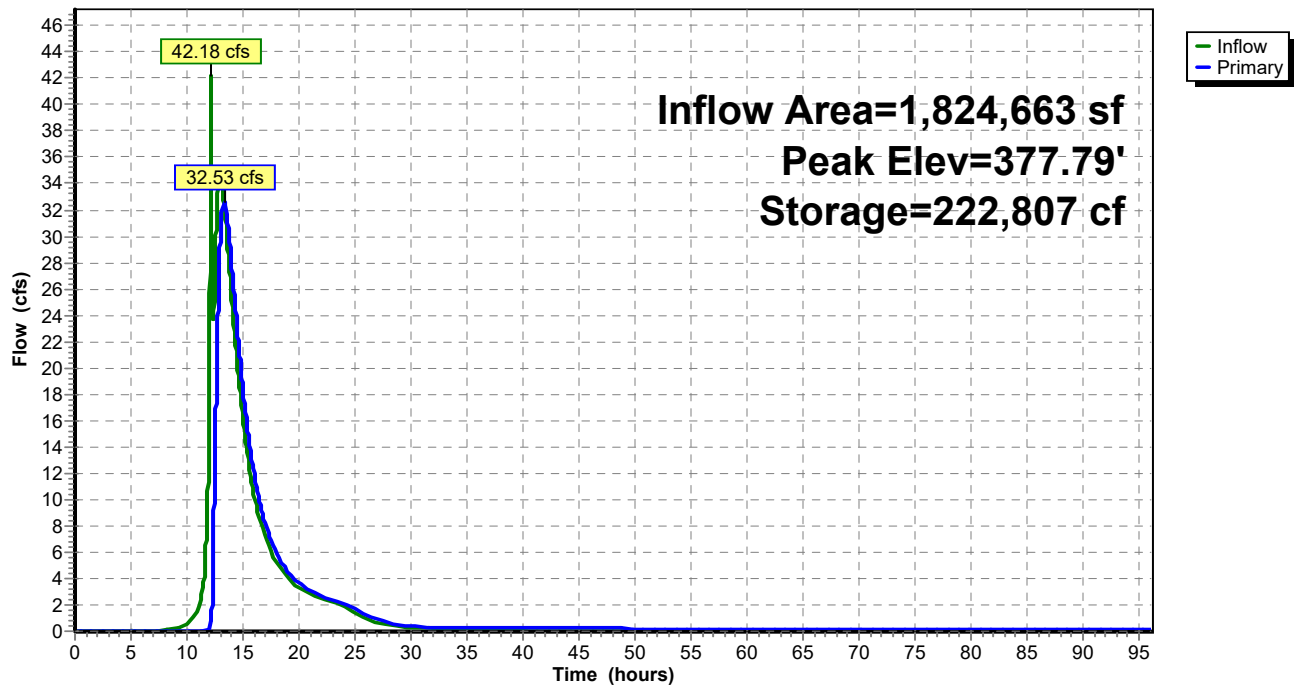
#3 Device 1 377.00' **36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=32.53 cfs @ 13.30 hrs HW=377.79' TW=312.87' (Dynamic Tailwater)

- 1=Culvert (Passes 32.53 cfs of 33.11 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.31 cfs @ 6.22 fps)
- 3=Orifice/Grate (Weir Controls 32.23 cfs @ 2.91 fps)

Pond 48: SWP-4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Subcatchment 49: Post B5

Runoff = 21.88 cfs @ 12.13 hrs, Volume= 56,289 cf, Depth= 4.43"

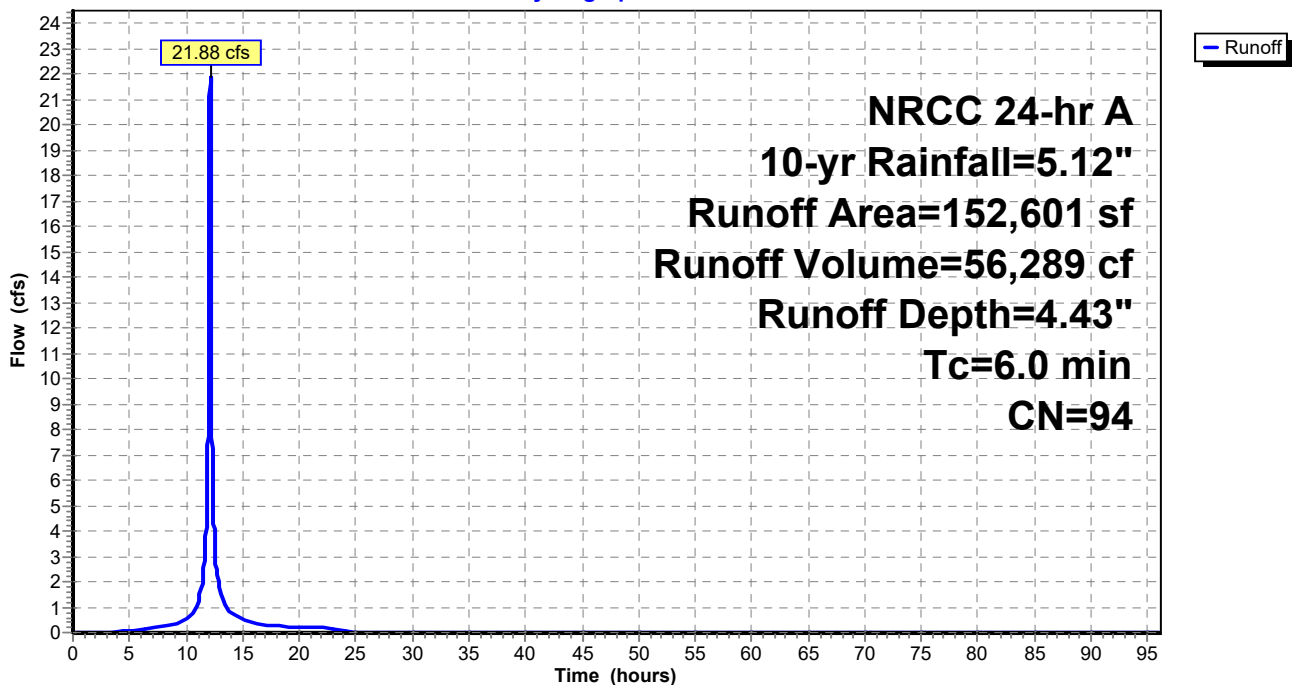
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
129,082	98	Paved parking, HSG C
23,519	74	>75% Grass cover, Good, HSG C
152,601	94	Weighted Average
23,519		15.41% Pervious Area
129,082		84.59% Impervious Area

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

Subcatchment 49: Post B5

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 50: DIV-8

Inflow Area = 152,601 sf, 84.59% Impervious, Inflow Depth = 4.43" for 10-yr event
 Inflow = 21.88 cfs @ 12.13 hrs, Volume= 56,289 cf
 Outflow = 21.88 cfs @ 12.13 hrs, Volume= 56,289 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.88 cfs @ 11.88 hrs, Volume= 42,385 cf
 Secondary = 16.33 cfs @ 12.13 hrs, Volume= 13,905 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 374.24' @ 12.13 hrs

Flood Elev= 379.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	370.50'	12.0" Round Culvert L= 9.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.50' / 370.50' S= 0.0000 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	370.50'	24.0" Round Culvert L= 92.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.50' / 369.50' S= 0.0109 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	373.50'	8.0' 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=5.83 cfs @ 11.88 hrs HW=373.55' TW=371.18' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.83 cfs @ 7.43 fps)**Secondary OutFlow** Max=16.32 cfs @ 12.13 hrs HW=374.24' TW=312.78' (Dynamic Tailwater)↑ **2=Culvert** (Passes 16.32 cfs of 25.02 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 16.32 cfs @ 2.77 fps)

North 60 Post B 3-9-20

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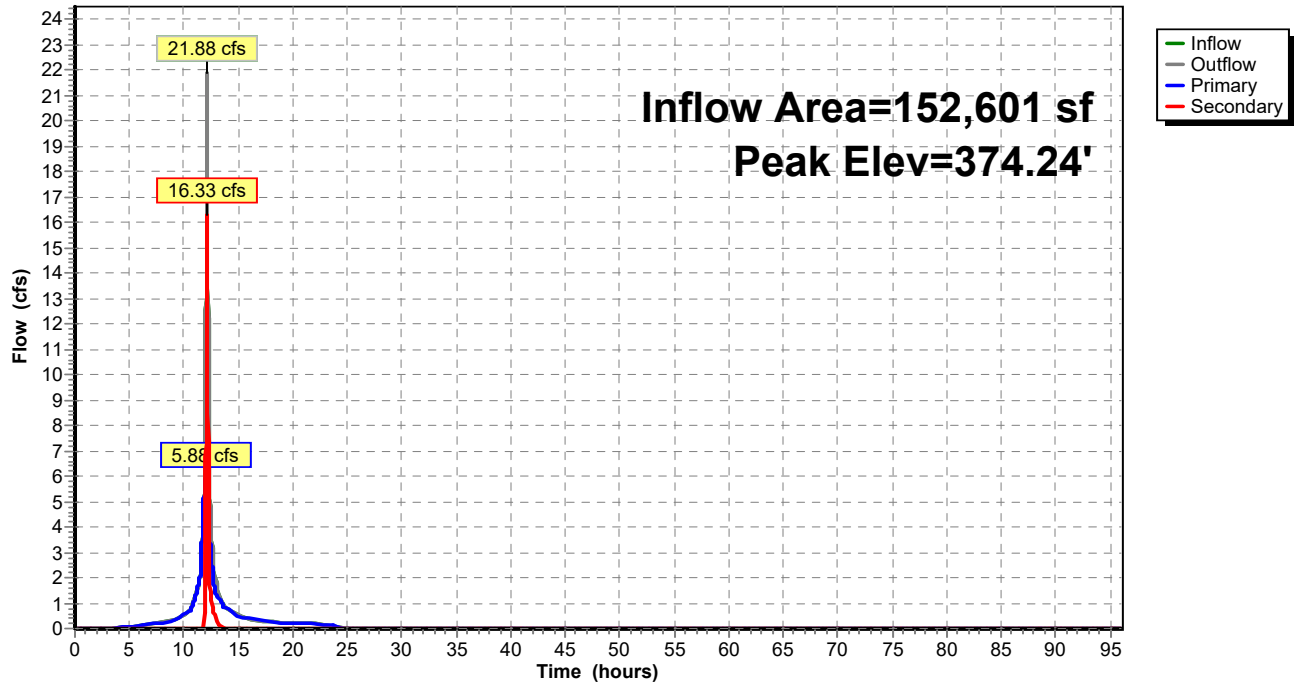
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NRCC 24-hr A 10-yr Rainfall=5.12"

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Pond 50: DIV-8

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 51: INF-8

Inflow Area = 152,601 sf, 84.59% Impervious, Inflow Depth = 3.33" for 10-yr event
 Inflow = 5.88 cfs @ 11.88 hrs, Volume= 42,385 cf
 Outflow = 1.26 cfs @ 11.20 hrs, Volume= 42,385 cf, Atten= 79%, Lag= 0.0 min
 Discarded = 1.26 cfs @ 11.20 hrs, Volume= 42,385 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 373.46' @ 13.00 hrs Surf.Area= 5,434 sf Storage= 12,876 cf

Plug-Flow detention time= 72.8 min calculated for 42,385 cf (100% of inflow)
 Center-of-Mass det. time= 72.8 min (855.1 - 782.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	370.00'	5,125 cf	58.75'W x 92.50'L x 4.00'H Field A 21,738 cf Overall - 8,924 cf Embedded = 12,814 cf x 40.0% Voids
#2A	370.50'	8,924 cf	Cultec R-360HD x 240 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 240 Chambers in 10 Rows Cap Storage= +6.5 cf x 2 x 10 rows = 129.2 cf
		14,049 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	370.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'

Discarded OutFlow Max=1.26 cfs @ 11.20 hrs HW=370.12' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.26 cfs)

North 60 Post B 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Pond 51: INF-8 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 10 rows = 129.2 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

24 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 90.50' Row Length +12.0" End Stone x 2 = 92.50' Base Length

10 Rows x 60.0" Wide + 9.0" Spacing x 9 + 12.0" Side Stone x 2 = 58.75' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

240 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 10 Rows = 8,923.9 cf Chamber Storage

21,737.5 cf Field - 8,923.9 cf Chambers = 12,813.6 cf Stone x 40.0% Voids = 5,125.4 cf Stone Storage

Chamber Storage + Stone Storage = 14,049.4 cf = 0.323 af

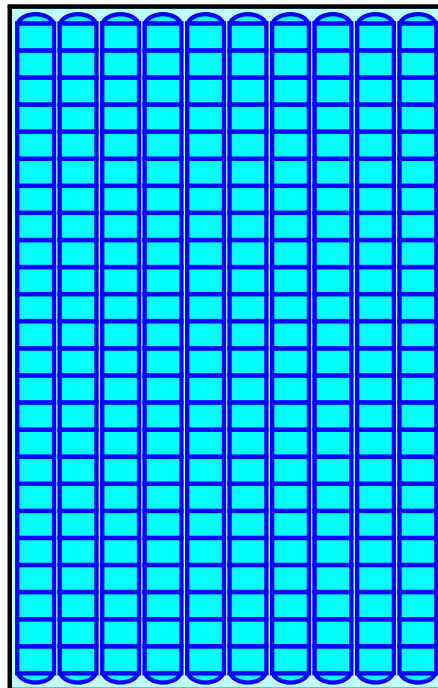
Overall Storage Efficiency = 64.6%

Overall System Size = 92.50' x 58.75' x 4.00'

240 Chambers

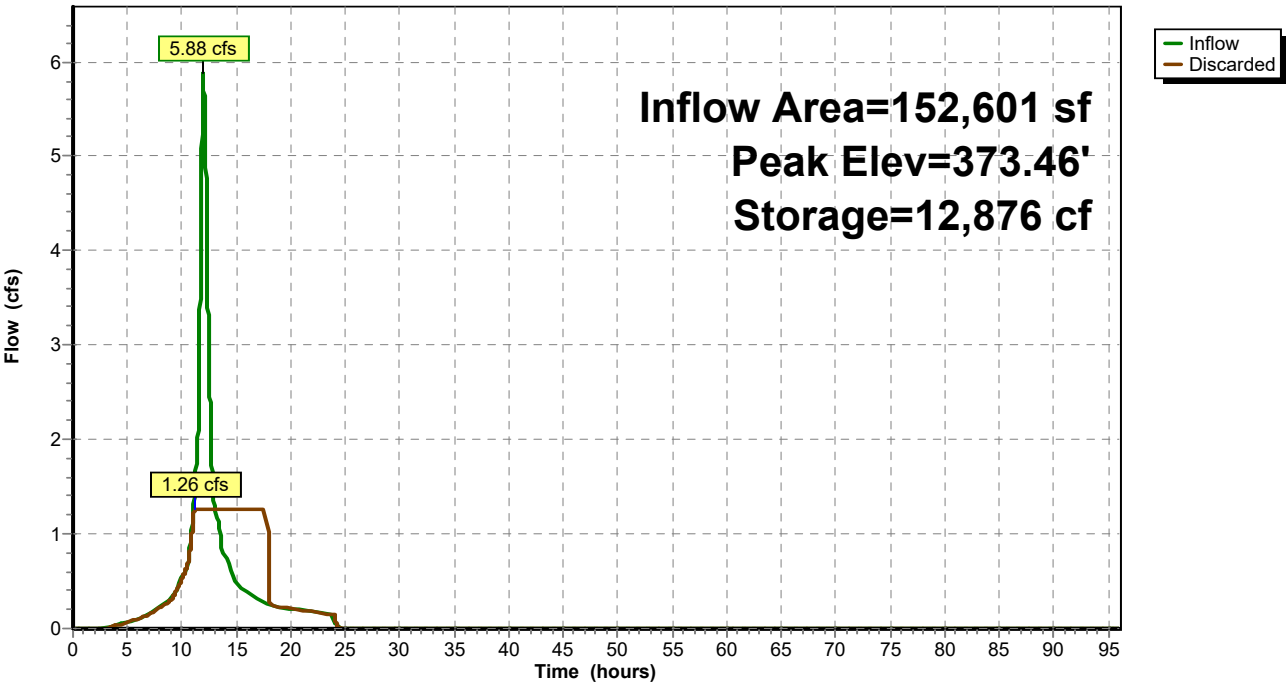
805.1 cy Field

474.6 cy Stone



Pond 51: INF-8

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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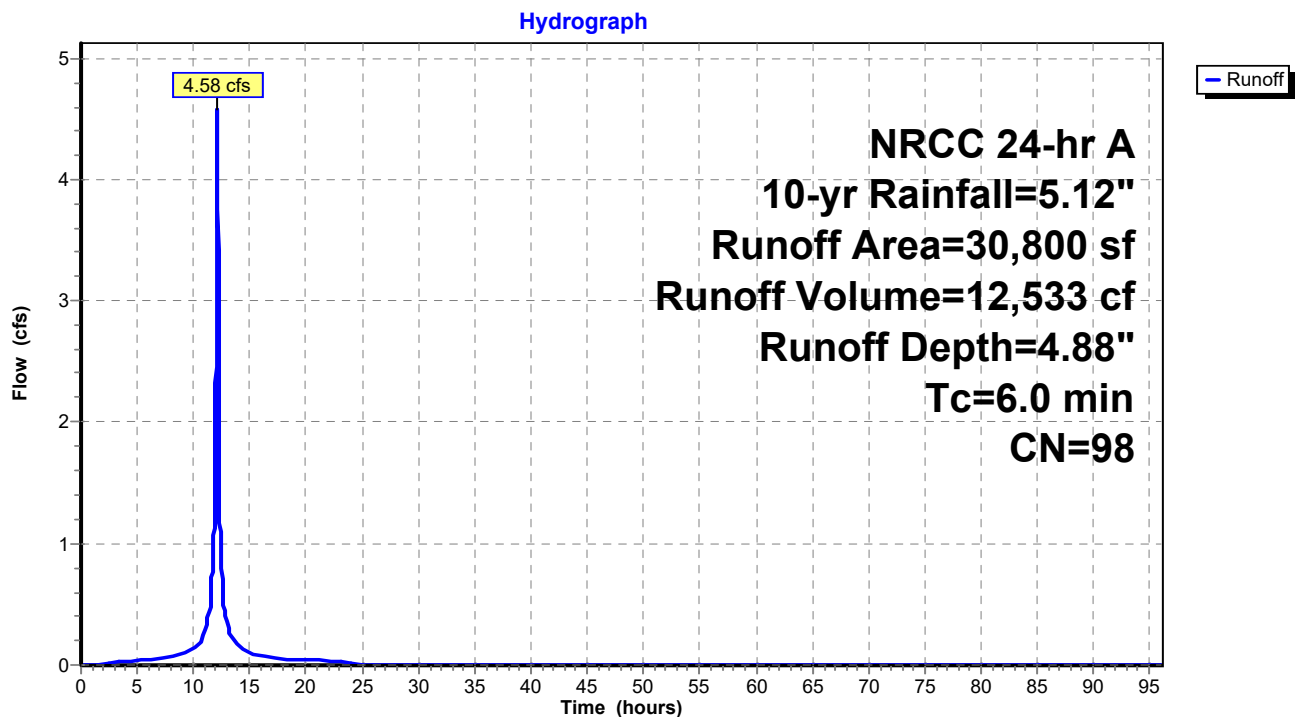
Summary for Subcatchment 52: Post B6

Runoff = 4.58 cfs @ 12.13 hrs, Volume= 12,533 cf, Depth= 4.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
30,800	98	Paved parking, HSG C
30,800		100.00% Impervious Area

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

Subcatchment 52: Post B6

North 60 Post B 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 53: DIV-4

Inflow Area = 30,800 sf, 100.00% Impervious, Inflow Depth = 4.88" for 10-yr event
 Inflow = 4.58 cfs @ 12.13 hrs, Volume= 12,533 cf
 Outflow = 4.58 cfs @ 12.13 hrs, Volume= 12,533 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.82 cfs @ 12.09 hrs, Volume= 12,227 cf
 Secondary = 1.00 cfs @ 12.14 hrs, Volume= 306 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

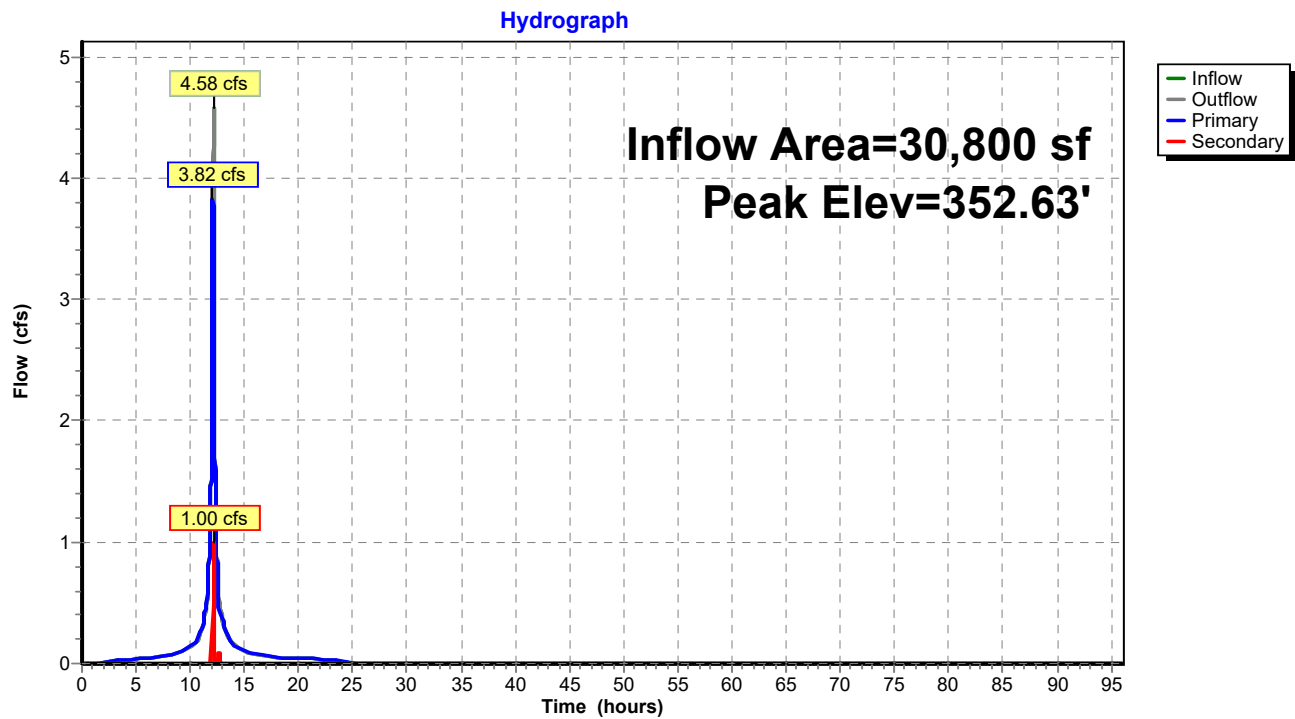
Peak Elev= 352.63' @ 12.14 hrs

Flood Elev= 355.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	349.50'	10.0" Round Culvert L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.50' / 349.50' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	349.50'	18.0" Round Culvert L= 70.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.50' / 348.00' S= 0.0214 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	352.50'	8.0' 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=3.74 cfs @ 12.09 hrs HW=352.52' TW=350.49' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 3.74 cfs @ 6.86 fps)**Secondary OutFlow** Max=0.99 cfs @ 12.14 hrs HW=352.62' TW=312.80' (Dynamic Tailwater)↑**2=Culvert** (Passes 0.99 cfs of 13.11 cfs potential flow)↑**3=Broad-Crested Rectangular Weir** (Weir Controls 0.99 cfs @ 0.99 fps)

Pond 53: DIV-4



North 60 Post B 3-9-20

NRCC 24-hr A 10-yr Rainfall=5.12"

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Summary for Pond 54: INF-4

Inflow Area = 30,800 sf, 100.00% Impervious, Inflow Depth = 4.76" for 10-yr event
 Inflow = 3.82 cfs @ 12.09 hrs, Volume= 12,227 cf
 Outflow = 0.44 cfs @ 11.57 hrs, Volume= 12,227 cf, Atten= 89%, Lag= 0.0 min
 Discarded = 0.44 cfs @ 11.57 hrs, Volume= 12,227 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 352.50' @ 12.65 hrs Surf.Area= 1,887 sf Storage= 4,238 cf

Plug-Flow detention time= 62.2 min calculated for 12,225 cf (100% of inflow)
 Center-of-Mass det. time= 62.2 min (809.5 - 747.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	349.00'	1,859 cf	25.67'W x 73.50'L x 3.88'H Field A 7,310 cf Overall - 2,664 cf Embedded = 4,646 cf x 40.0% Voids
#2A	349.50'	2,664 cf	Cultec R-330XLHD x 50 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
		4,522 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	349.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=0.44 cfs @ 11.57 hrs HW=349.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.44 cfs)

North 60 Post B 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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Pond 54: INF-4 - 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

10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +12.0" End Stone x 2 = 73.50' 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 + 10.0" Cover = 3.88' Field Height

50 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,663.7 cf Chamber Storage

7,310.2 cf Field - 2,663.7 cf Chambers = 4,646.5 cf Stone x 40.0% Voids = 1,858.6 cf Stone Storage

Chamber Storage + Stone Storage = 4,522.3 cf = 0.104 af

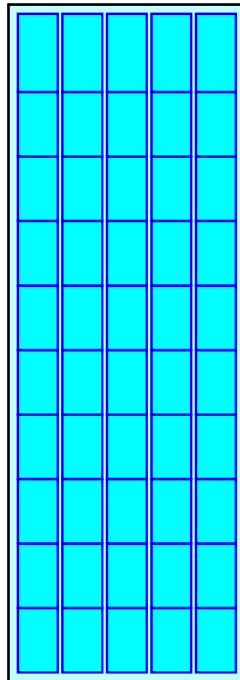
Overall Storage Efficiency = 61.9%

Overall System Size = 73.50' x 25.67' x 3.88'

50 Chambers

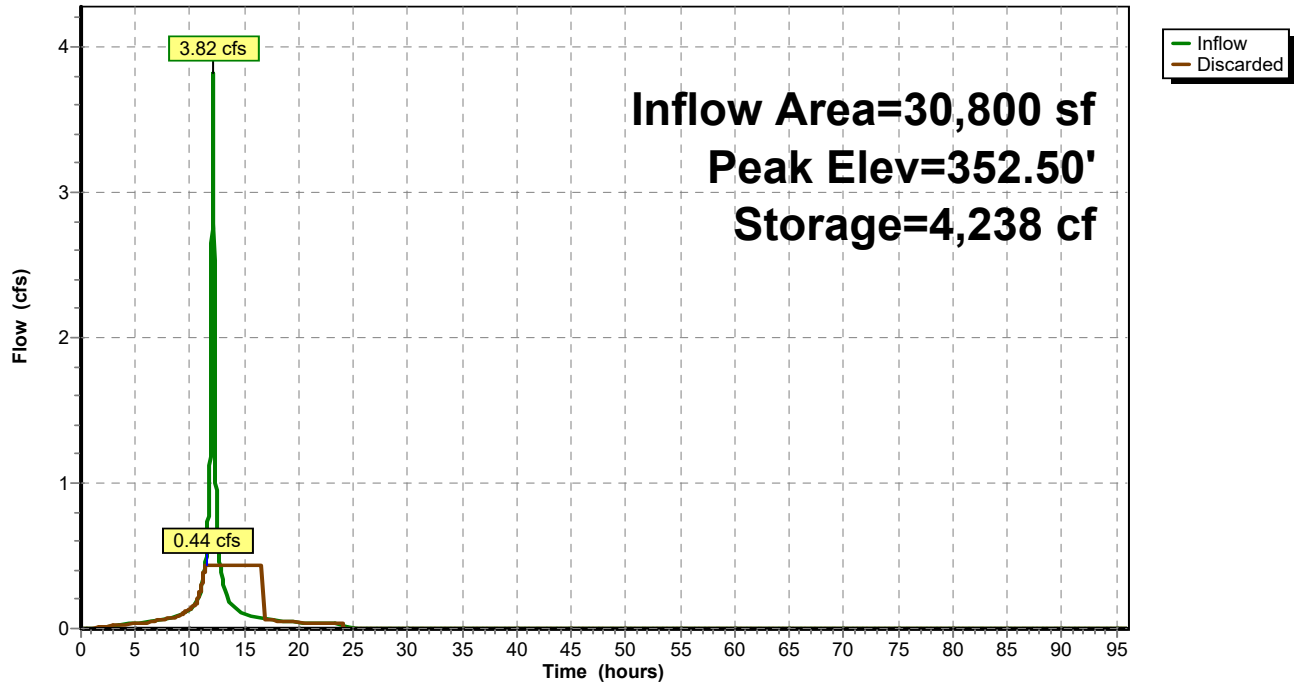
270.7 cy Field

172.1 cy Stone



Pond 54: INF-4

Hydrograph



North 60 Post B 3-9-20

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Summary for Subcatchment 55: Post B4

Runoff = 31.10 cfs @ 12.24 hrs, Volume= 102,094 cf, Depth= 2.13"

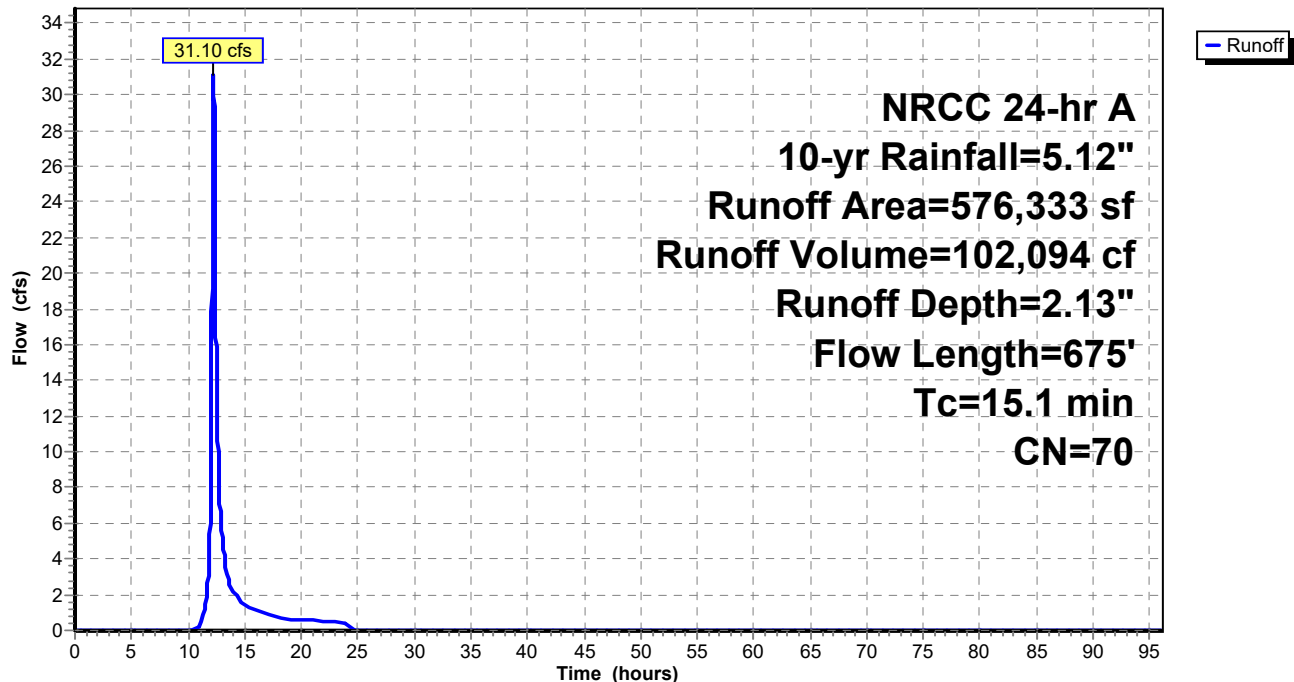
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 10-yr Rainfall=5.12"

Area (sf)	CN	Description
515,493	70	Woods, Good, HSG C
60,840	74	>75% Grass cover, Good, HSG C
576,333	70	Weighted Average
576,333		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0600	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.9	575	0.0950	4.96		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.1	675	Total			

Subcatchment 55: Post B4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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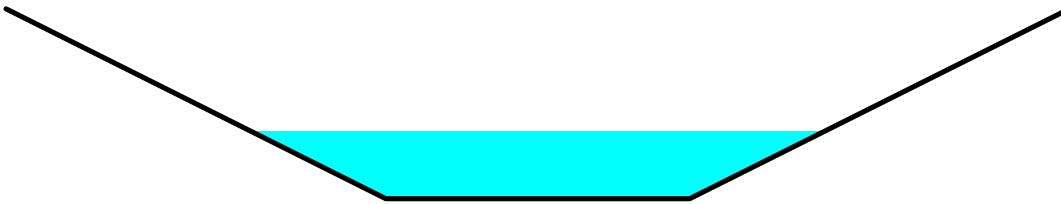
Summary for Reach 56: Existing Stream B

Inflow Area = 2,400,996 sf, 26.26% Impervious, Inflow Depth > 3.05" for 10-yr event
Inflow = 39.98 cfs @ 12.16 hrs, Volume= 610,654 cf
Outflow = 38.59 cfs @ 12.26 hrs, Volume= 610,499 cf, Atten= 3%, Lag= 5.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.46 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 1.72 fps, Avg. Travel Time= 13.2 min

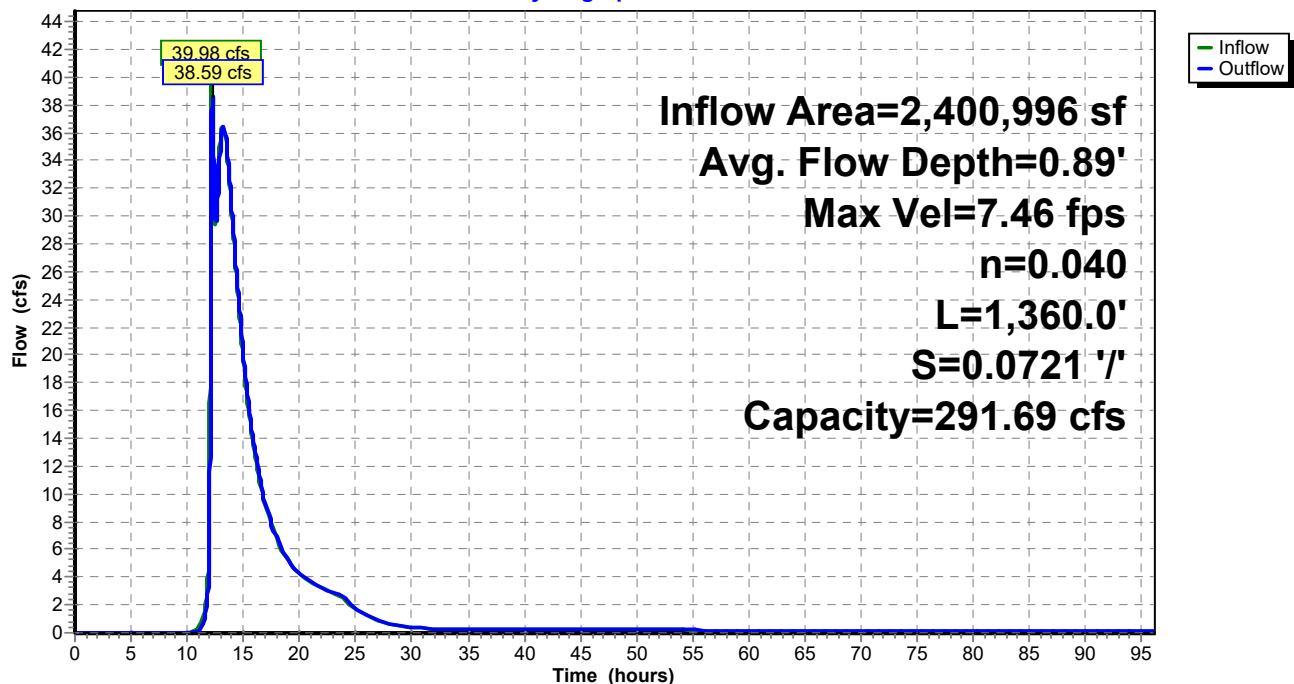
Peak Storage= 7,036 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.89'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 291.69 cfs

4.00' x 2.50' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 ' ' Top Width= 14.00'
Length= 1,360.0' Slope= 0.0721 ' '
Inlet Invert= 312.00', Outlet Invert= 214.00'



Reach 56: Existing Stream B

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 10-yr Rainfall=5.12"

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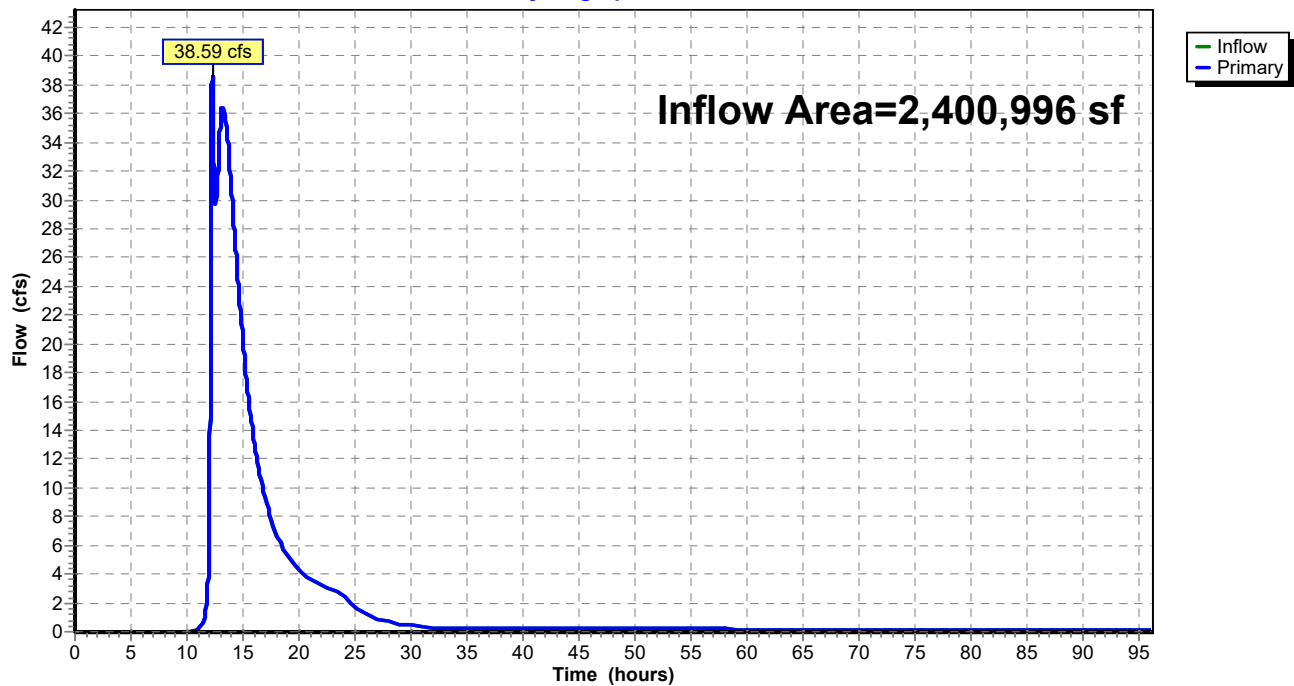
Summary for Link 57: Design Point B

Inflow Area = 2,400,996 sf, 26.26% Impervious, Inflow Depth > 3.05" for 10-yr event
Inflow = 38.59 cfs @ 12.26 hrs, Volume= 610,499 cf
Primary = 38.59 cfs @ 12.26 hrs, Volume= 610,499 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 57: Design Point B

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment44: Post B0Runoff Area=1,510,771 sf 32.24% Impervious Runoff Depth=4.63"
Flow Length=1,871' Tc=32.3 min CN=84 Runoff=121.32 cfs 582,745 cf**Pond 45: Offsite Pond B**Peak Elev=385.54' Storage=249,913 cf Inflow=121.32 cfs 582,745 cf
36.0" Round Culvert n=0.025 L=158.0' S=0.0127 ' Outflow=41.02 cfs 581,464 cf**Subcatchment46: Post B1**Runoff Area=195,784 sf 50.71% Impervious Runoff Depth=4.85"
Tc=6.0 min CN=86 Runoff=32.47 cfs 79,095 cf**Subcatchment47: Post B3**Runoff Area=118,108 sf 37.49% Impervious Runoff Depth=3.88"
Tc=6.0 min CN=77 Runoff=16.36 cfs 38,226 cf**Pond 48: SWP-4**Peak Elev=378.47' Storage=260,899 cf Inflow=59.51 cfs 698,785 cf
Outflow=35.39 cfs 683,435 cf**Subcatchment49: Post B5**Runoff Area=152,601 sf 84.59% Impervious Runoff Depth=5.75"
Tc=6.0 min CN=94 Runoff=27.98 cfs 73,153 cf**Pond 50: DIV-8**Peak Elev=374.40' Inflow=27.98 cfs 73,153 cf
Primary=5.68 cfs 48,553 cf Secondary=22.80 cfs 24,600 cf Outflow=27.98 cfs 73,153 cf**Pond 51: INF-8**Peak Elev=373.57' Storage=13,121 cf Inflow=5.68 cfs 48,553 cf
Outflow=1.26 cfs 48,553 cf**Subcatchment52: Post B6**Runoff Area=30,800 sf 100.00% Impervious Runoff Depth=6.22"
Tc=6.0 min CN=98 Runoff=5.78 cfs 15,968 cf**Pond 53: DIV-4**Peak Elev=352.74' Inflow=5.78 cfs 15,968 cf
Primary=3.67 cfs 13,792 cf Secondary=2.58 cfs 2,176 cf Outflow=5.78 cfs 15,968 cf**Pond 54: INF-4**Peak Elev=352.58' Storage=4,301 cf Inflow=3.67 cfs 13,792 cf
Outflow=0.44 cfs 13,792 cf**Subcatchment55: Post B4**Runoff Area=576,333 sf 0.00% Impervious Runoff Depth=3.17"
Flow Length=675' Tc=15.1 min CN=70 Runoff=46.96 cfs 152,468 cf**Reach 56: Existing Stream B**Avg. Flow Depth=1.29' Max Vel=9.08 fps Inflow=77.94 cfs 862,679 cf
n=0.040 L=1,360.0' S=0.0721 ' Capacity=291.69 cfs Outflow=77.01 cfs 862,523 cf**Link 57: Design Point B**Inflow=77.01 cfs 862,523 cf
Primary=77.01 cfs 862,523 cf**Total Runoff Area = 2,584,397 sf Runoff Volume = 941,655 cf Average Runoff Depth = 4.37"**
69.41% Pervious = 1,793,897 sf 30.59% Impervious = 790,500 sf

North 60 Post B 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 44: Post B0

Runoff = 121.32 cfs @ 12.45 hrs, Volume= 582,745 cf, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
487,056	98	Paved parking, HSG C
497,987	77	Woods, Good, HSG D
134,328	70	Woods, Good, HSG C
375,457	80	>75% Grass cover, Good, HSG D
15,943	74	>75% Grass cover, Good, HSG C
1,510,771	84	Weighted Average
1,023,715		67.76% Pervious Area
487,056		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
9.5	848	0.0085	1.48		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	856	0.0093	2.78	3.06	Trap/Vee/Rect Channel Flow, Bot.W=3.00' D=0.33' Z= 1.0 '/' Top.W=3.66' n= 0.022 Earth, clean & straight
0.2	67	0.0150	6.66	64.08	Pipe Channel, 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.025 Corrugated metal
32.3	1,871	Total			

North 60 Post B 3-9-20

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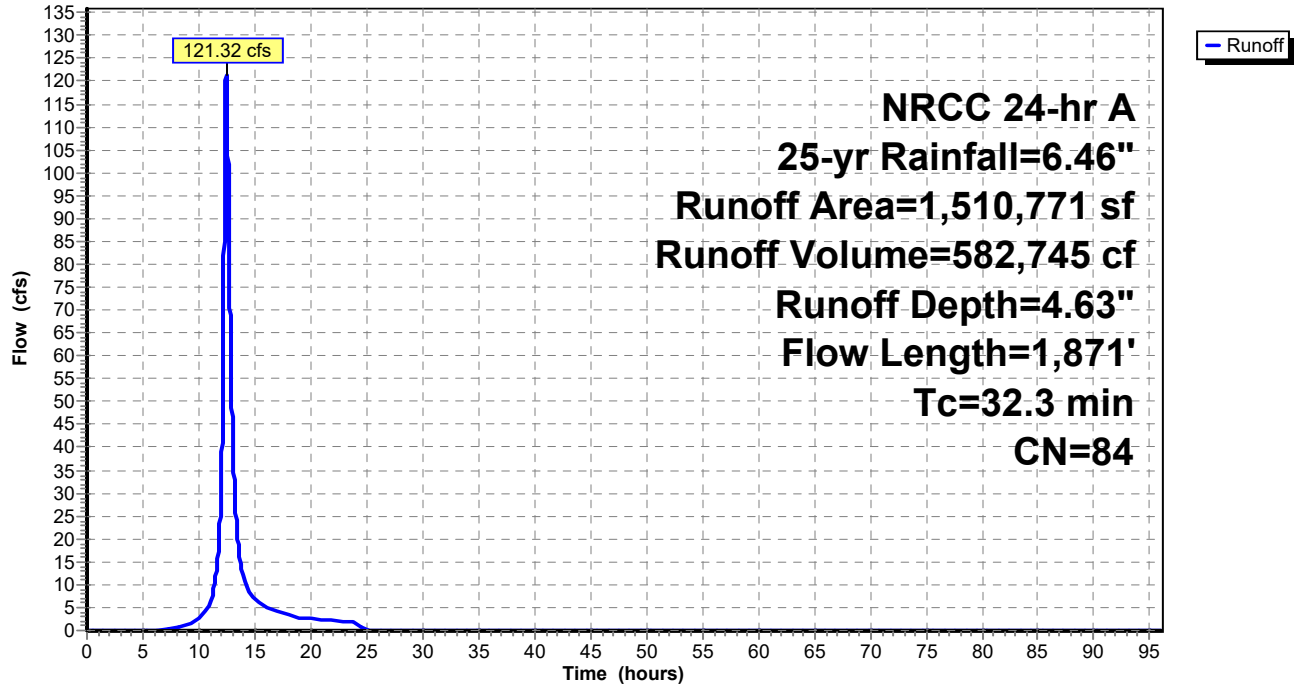
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NRCC 24-hr A 25-yr Rainfall=6.46"

Printed 3/25/2020

Subcatchment 44: Post B0

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 45: Offsite Pond B

Inflow Area = 1,510,771 sf, 32.24% Impervious, Inflow Depth = 4.63" for 25-yr event
 Inflow = 121.32 cfs @ 12.45 hrs, Volume= 582,745 cf
 Outflow = 41.02 cfs @ 13.04 hrs, Volume= 581,464 cf, Atten= 66%, Lag= 35.3 min
 Primary = 41.02 cfs @ 13.04 hrs, Volume= 581,464 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 385.54' @ 13.04 hrs Surf.Area= 93,240 sf Storage= 249,913 cf

Plug-Flow detention time= 132.1 min calculated for 581,464 cf (100% of inflow)
 Center-of-Mass det. time= 130.6 min (949.2 - 818.5)

Volume	Invert	Avail.Storage	Storage Description
#1	382.00'	610,998 cf	Custom Stage Data (Irregular) Listed below (Recalc)

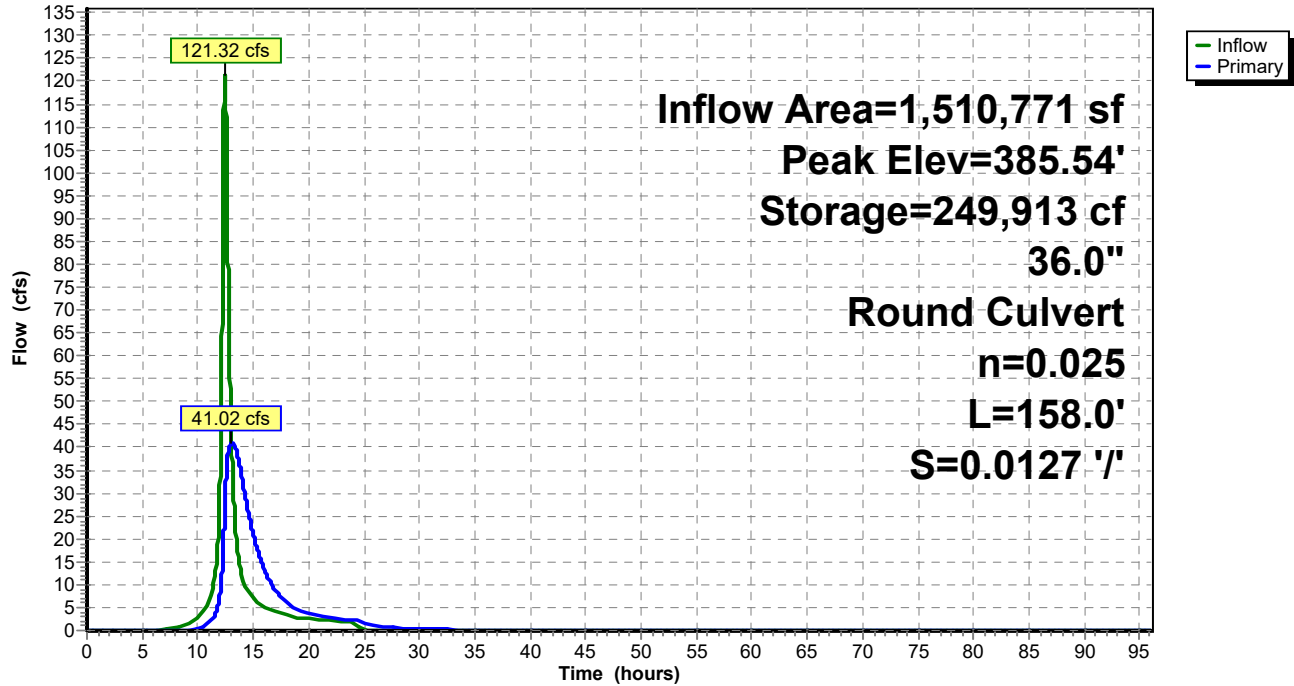
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
382.00	36,540	1,177.0	0	0	36,540
384.00	81,987	1,579.0	115,507	115,507	124,748
386.00	96,790	1,622.0	178,572	294,080	136,159
388.00	108,795	1,657.0	205,468	499,548	145,863
389.00	114,127	1,679.0	111,450	610,998	151,937

Device	Routing	Invert	Outlet Devices
#1	Primary	382.00'	36.0" Round Culvert L= 158.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 382.00' / 380.00' S= 0.0127 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf

Primary OutFlow Max=41.02 cfs @ 13.04 hrs HW=385.54' TW=378.13' (Dynamic Tailwater)
 ↑**1=Culvert** (Barrel Controls 41.02 cfs @ 6.21 fps)

Pond 45: Offsite Pond B

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 46: Post B1

Runoff = 32.47 cfs @ 12.13 hrs, Volume= 79,095 cf, Depth= 4.85"

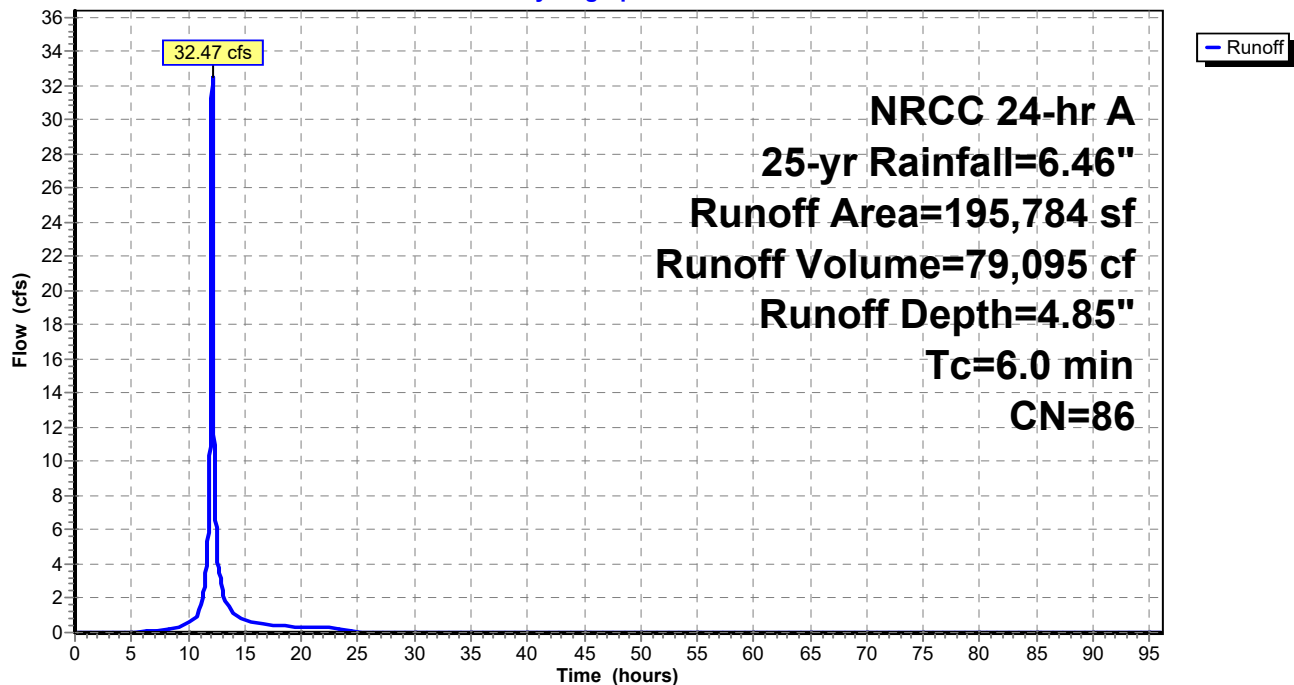
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
99,286	98	Paved parking, HSG C
96,498	74	>75% Grass cover, Good, HSG C
195,784	86	Weighted Average
96,498		49.29% Pervious Area
99,286		50.71% Impervious Area

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

Subcatchment 46: Post B1

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 47: Post B3

Runoff = 16.36 cfs @ 12.13 hrs, Volume= 38,226 cf, Depth= 3.88"

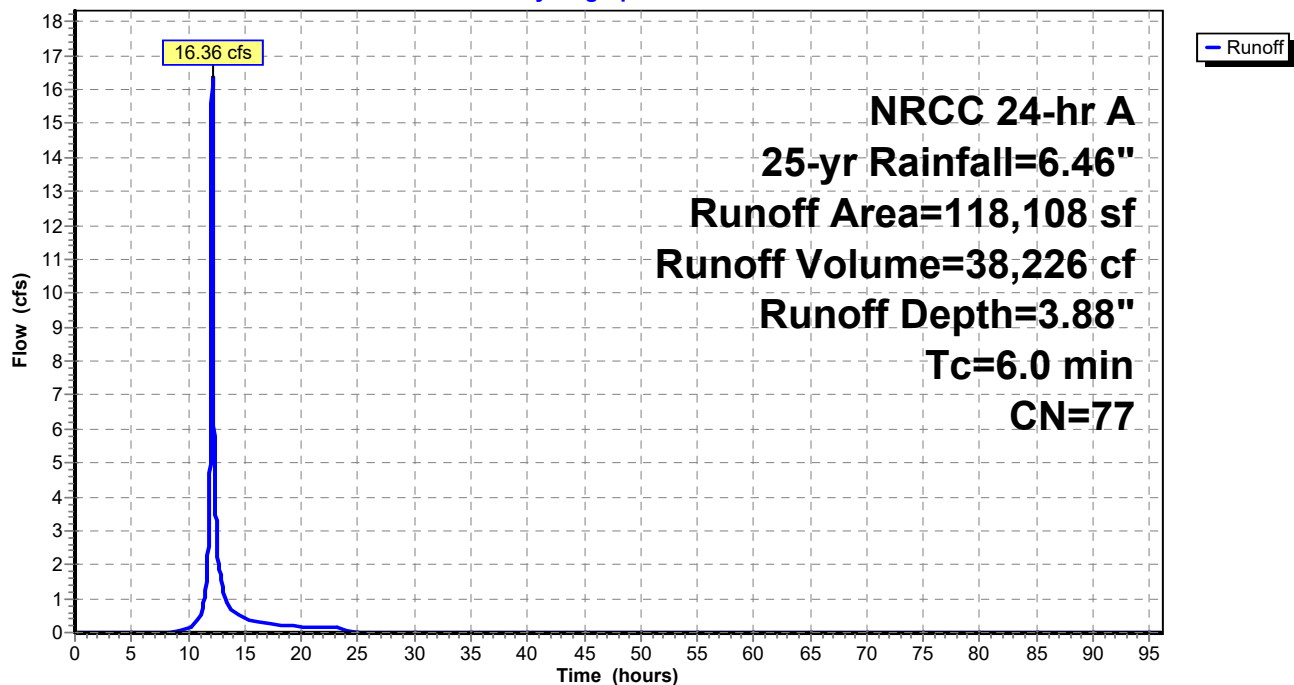
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
73,832	65	Brush, Good, HSG C
44,276	98	Water Surface, HSG C
118,108	77	Weighted Average
73,832		62.51% Pervious Area
44,276		37.49% Impervious Area

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

Subcatchment 47: Post B3

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 48: SWP-4

Inflow Area = 1,824,663 sf, 34.56% Impervious, Inflow Depth = 4.60" for 25-yr event
 Inflow = 59.51 cfs @ 12.13 hrs, Volume= 698,785 cf
 Outflow = 35.39 cfs @ 13.96 hrs, Volume= 683,435 cf, Atten= 41%, Lag= 109.7 min
 Primary = 35.39 cfs @ 13.96 hrs, Volume= 683,435 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Starting Elev= 376.00' Surf.Area= 88,186 sf Storage= 134,213 cf
 Peak Elev= 378.47' @ 13.96 hrs Surf.Area= 101,144 sf Storage= 260,899 cf (126,685 cf above start)

Plug-Flow detention time= 373.3 min calculated for 549,222 cf (79% of inflow)

Center-of-Mass det. time= 183.7 min (1,107.2 - 923.4)

Volume	Invert	Avail.Storage	Storage Description
#1	372.00'	7,914 cf	Forebay (Irregular) Listed below (Recalc)
#2	372.00'	121,847 cf	Permanent Pool (Irregular) Listed below (Recalc)
#3	375.90'	259,334 cf	Additional Storage (Irregular) Listed below (Recalc)
		389,094 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
372.00	885	114.0	0	0	885
373.00	1,392	139.2	1,129	1,129	1,408
374.00	1,998	164.4	1,686	2,815	2,036
375.00	2,707	189.5	2,344	5,158	2,764
375.90	3,430	212.2	2,755	7,914	3,512

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
372.00	22,804	1,051.3	0	0	22,804
373.00	27,060	1,076.5	24,902	24,902	27,202
374.00	31,416	1,101.7	29,211	54,113	31,703
375.00	35,874	1,127.0	33,620	87,733	36,327
375.90	39,971	1,149.7	34,114	121,847	40,565

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
375.90	44,276	1,380.7	0	0	44,276
377.00	50,030	1,294.2	51,836	51,836	62,747
378.00	55,257	1,319.4	52,622	104,458	68,149
379.00	60,586	1,344.7	57,901	162,359	73,675
380.00	66,015	1,370.0	63,281	225,640	79,307
380.50	68,768	1,382.6	33,693	259,334	82,151

Device	Routing	Invert	Outlet Devices
#1	Primary	372.00'	24.0" Round Culvert L= 227.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 372.00' / 347.00' S= 0.1101 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	376.00'	3.0" Vert. Orifice/Grate C= 0.600

North 60 Post B 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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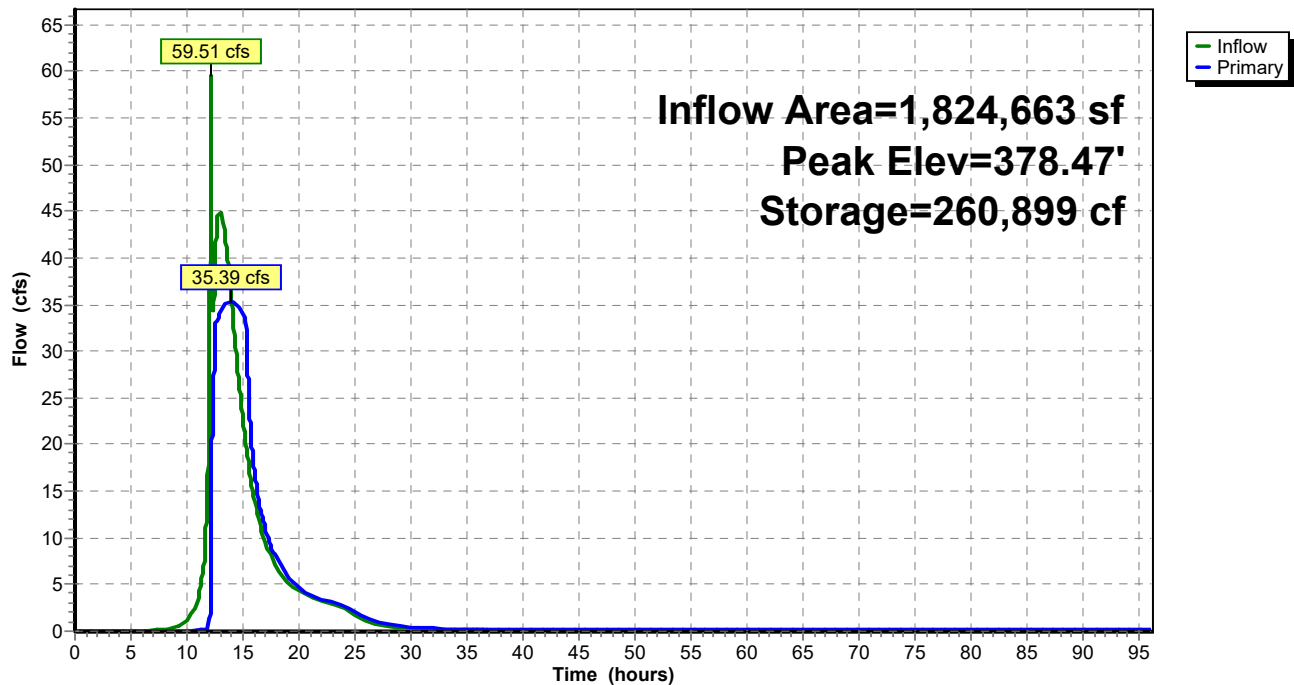
#3 Device 1 377.00' **36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=35.39 cfs @ 13.96 hrs HW=378.47' TW=312.89' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 35.39 cfs @ 11.26 fps)
- 2=Orifice/Grate (Passes < 0.36 cfs potential flow)
- 3=Orifice/Grate (Passes < 70.11 cfs potential flow)

Pond 48: SWP-4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 49: Post B5

Runoff = 27.98 cfs @ 12.13 hrs, Volume= 73,153 cf, Depth= 5.75"

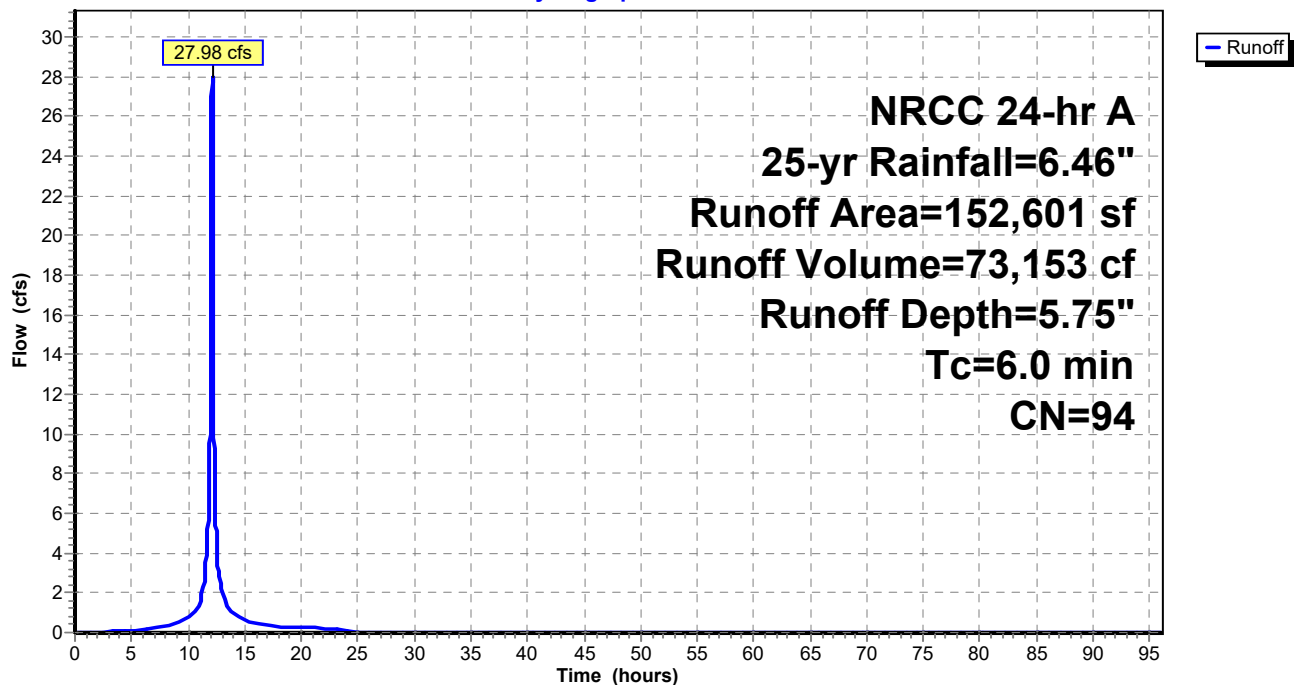
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
129,082	98	Paved parking, HSG C
23,519	74	>75% Grass cover, Good, HSG C
152,601	94	Weighted Average
23,519		15.41% Pervious Area
129,082		84.59% Impervious Area

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

Subcatchment 49: Post B5

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 50: DIV-8

Inflow Area = 152,601 sf, 84.59% Impervious, Inflow Depth = 5.75" for 25-yr event
 Inflow = 27.98 cfs @ 12.13 hrs, Volume= 73,153 cf
 Outflow = 27.98 cfs @ 12.13 hrs, Volume= 73,153 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.68 cfs @ 11.78 hrs, Volume= 48,553 cf
 Secondary = 22.80 cfs @ 12.13 hrs, Volume= 24,600 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 374.40' @ 12.13 hrs

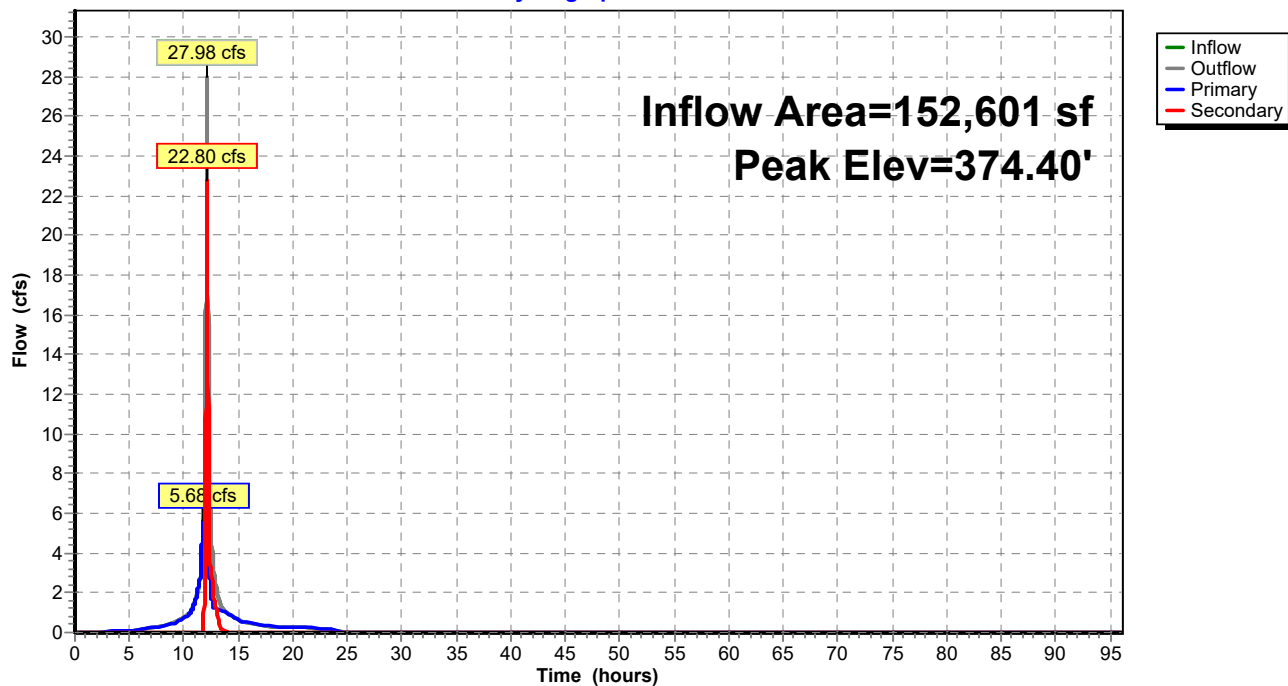
Flood Elev= 379.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	370.50'	12.0" Round Culvert L= 9.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.50' / 370.50' S= 0.0000 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	370.50'	24.0" Round Culvert L= 92.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.50' / 369.50' S= 0.0109 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	373.50'	8.0' 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=5.61 cfs @ 11.78 hrs HW=373.54' TW=371.33' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.61 cfs @ 7.15 fps)**Secondary OutFlow** Max=22.80 cfs @ 12.13 hrs HW=374.40' TW=313.07' (Dynamic Tailwater)↑ **2=Culvert** (Passes 22.80 cfs of 25.78 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 22.80 cfs @ 3.15 fps)

Pond 50: DIV-8

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 51: INF-8

Inflow Area = 152,601 sf, 84.59% Impervious, Inflow Depth = 3.82" for 25-yr event
 Inflow = 5.68 cfs @ 11.78 hrs, Volume= 48,553 cf
 Outflow = 1.26 cfs @ 10.95 hrs, Volume= 48,553 cf, Atten= 78%, Lag= 0.0 min
 Discarded = 1.26 cfs @ 10.95 hrs, Volume= 48,553 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 373.57' @ 12.69 hrs Surf.Area= 5,434 sf Storage= 13,121 cf

Plug-Flow detention time= 74.7 min calculated for 48,548 cf (100% of inflow)
 Center-of-Mass det. time= 74.7 min (853.8 - 779.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	370.00'	5,125 cf	58.75'W x 92.50'L x 4.00'H Field A 21,738 cf Overall - 8,924 cf Embedded = 12,814 cf x 40.0% Voids
#2A	370.50'	8,924 cf	Cultec R-360HD x 240 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 240 Chambers in 10 Rows Cap Storage= +6.5 cf x 2 x 10 rows = 129.2 cf
		14,049 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	370.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'

Discarded OutFlow Max=1.26 cfs @ 10.95 hrs HW=370.12' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.26 cfs)

North 60 Post B 3-9-20

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Pond 51: INF-8 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 10 rows = 129.2 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

24 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 90.50' Row Length +12.0" End Stone x 2 = 92.50' Base Length

10 Rows x 60.0" Wide + 9.0" Spacing x 9 + 12.0" Side Stone x 2 = 58.75' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

240 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 10 Rows = 8,923.9 cf Chamber Storage

21,737.5 cf Field - 8,923.9 cf Chambers = 12,813.6 cf Stone x 40.0% Voids = 5,125.4 cf Stone Storage

Chamber Storage + Stone Storage = 14,049.4 cf = 0.323 af

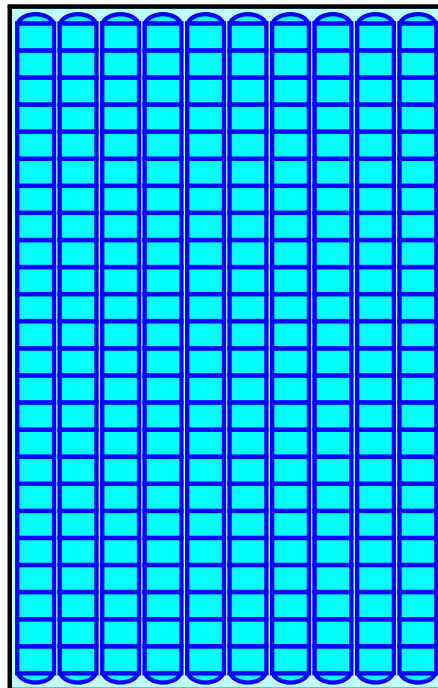
Overall Storage Efficiency = 64.6%

Overall System Size = 92.50' x 58.75' x 4.00'

240 Chambers

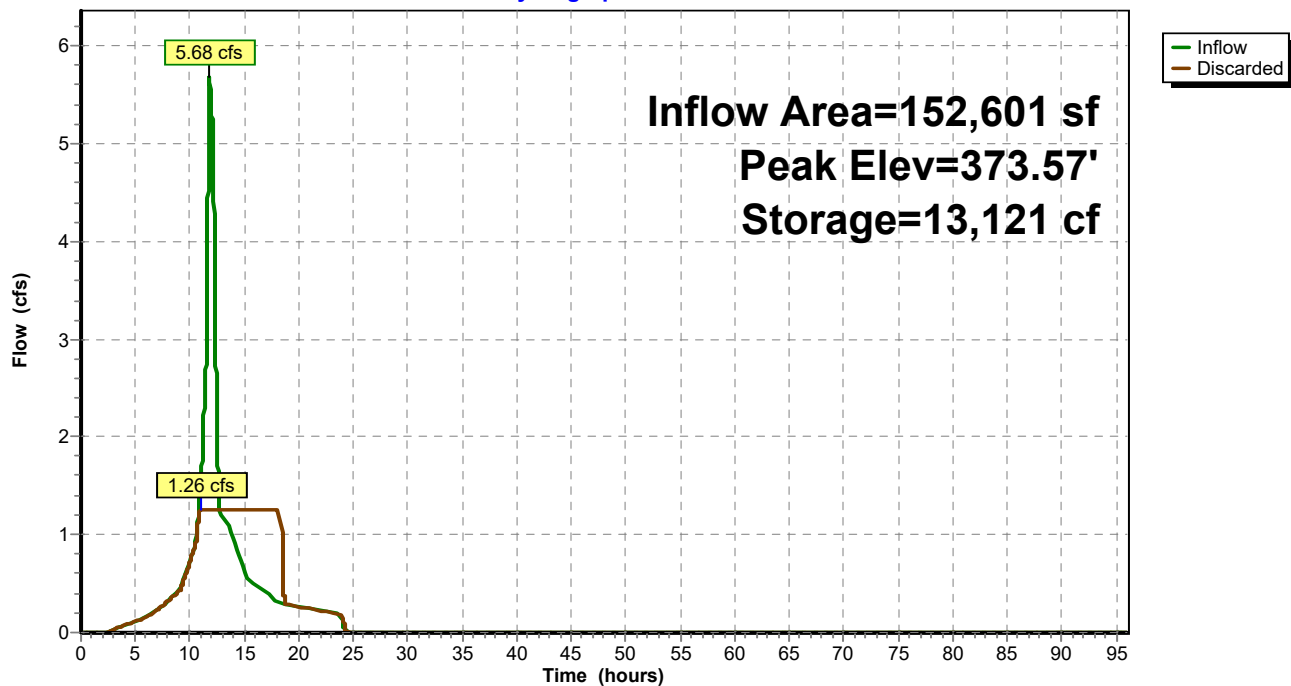
805.1 cy Field

474.6 cy Stone



Pond 51: INF-8

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 52: Post B6

Runoff = 5.78 cfs @ 12.13 hrs, Volume= 15,968 cf, Depth= 6.22"

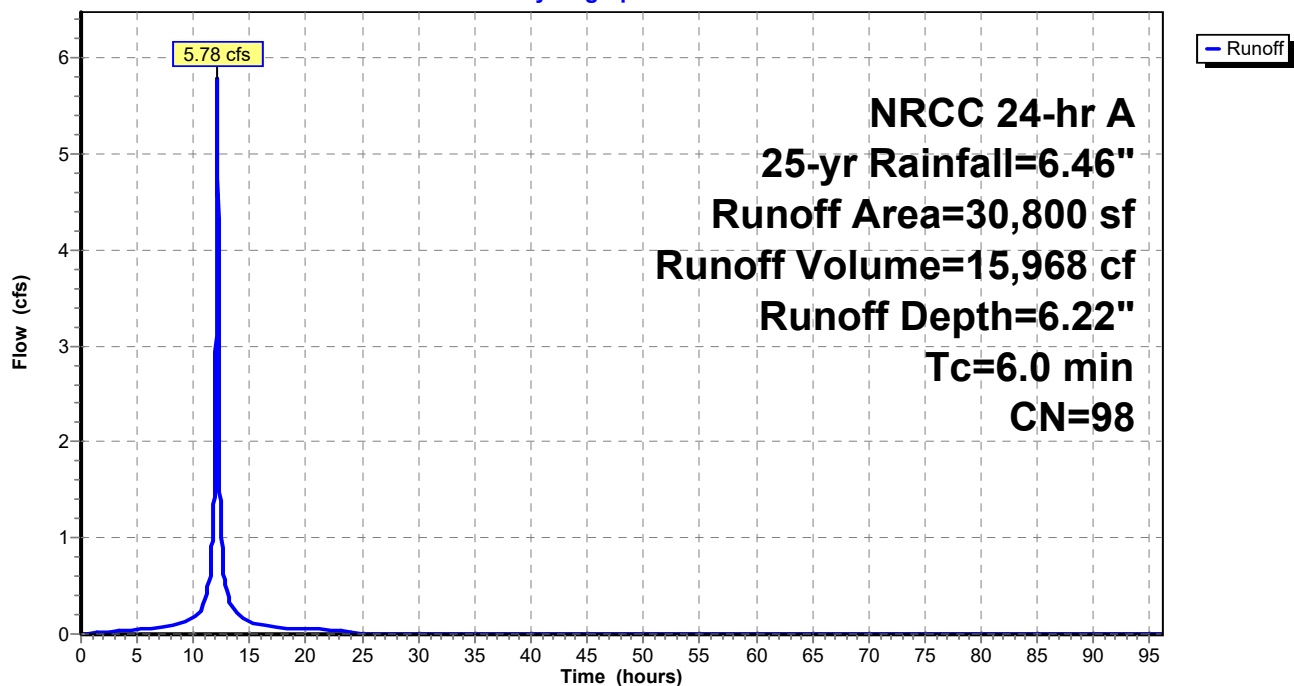
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
30,800	98	Paved parking, HSG C
30,800		100.00% Impervious Area

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

Subcatchment 52: Post B6

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 53: DIV-4

Inflow Area = 30,800 sf, 100.00% Impervious, Inflow Depth = 6.22" for 25-yr event
 Inflow = 5.78 cfs @ 12.13 hrs, Volume= 15,968 cf
 Outflow = 5.78 cfs @ 12.13 hrs, Volume= 15,968 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.67 cfs @ 12.04 hrs, Volume= 13,792 cf
 Secondary = 2.58 cfs @ 12.14 hrs, Volume= 2,176 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 352.74' @ 12.14 hrs

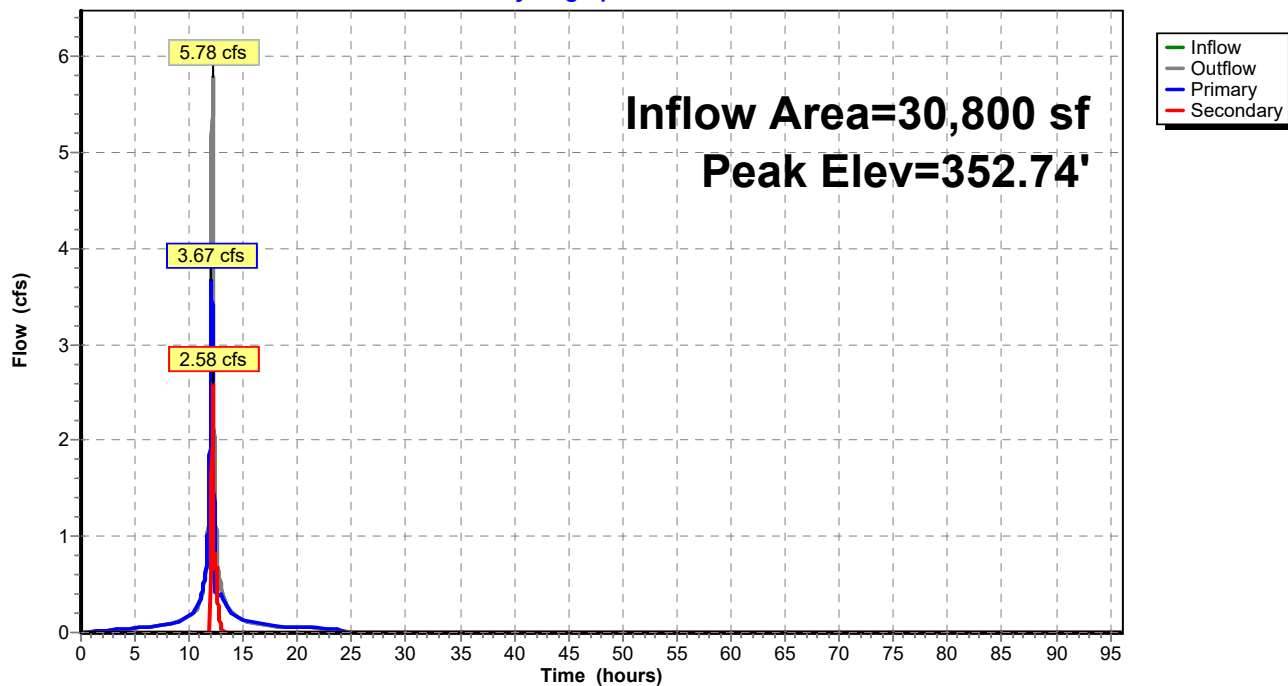
Flood Elev= 355.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	349.50'	10.0" Round Culvert L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.50' / 349.50' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	349.50'	18.0" Round Culvert L= 70.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.50' / 348.00' S= 0.0214 ' S= 0.0214 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	352.50'	8.0' 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=3.57 cfs @ 12.04 hrs HW=352.51' TW=350.66' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 3.57 cfs @ 6.55 fps)**Secondary OutFlow** Max=2.57 cfs @ 12.14 hrs HW=352.73' TW=313.09' (Dynamic Tailwater)↑ **2=Culvert** (Passes 2.57 cfs of 13.41 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 2.57 cfs @ 1.37 fps)

Pond 53: DIV-4

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Pond 54: INF-4

Inflow Area = 30,800 sf, 100.00% Impervious, Inflow Depth = 5.37" for 25-yr event
 Inflow = 3.67 cfs @ 12.04 hrs, Volume= 13,792 cf
 Outflow = 0.44 cfs @ 11.34 hrs, Volume= 13,792 cf, Atten= 88%, Lag= 0.0 min
 Discarded = 0.44 cfs @ 11.34 hrs, Volume= 13,792 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 352.58' @ 12.40 hrs Surf.Area= 1,887 sf Storage= 4,301 cf

Plug-Flow detention time= 62.7 min calculated for 13,791 cf (100% of inflow)
 Center-of-Mass det. time= 62.7 min (807.2 - 744.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	349.00'	1,859 cf	25.67'W x 73.50'L x 3.88'H Field A 7,310 cf Overall - 2,664 cf Embedded = 4,646 cf x 40.0% Voids
#2A	349.50'	2,664 cf	Cultec R-330XLHD x 50 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
		4,522 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	349.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=0.44 cfs @ 11.34 hrs HW=349.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.44 cfs)

North 60 Post B 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Pond 54: INF-4 - 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

10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +12.0" End Stone x 2 = 73.50' 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 + 10.0" Cover = 3.88' Field Height

50 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,663.7 cf Chamber Storage

7,310.2 cf Field - 2,663.7 cf Chambers = 4,646.5 cf Stone x 40.0% Voids = 1,858.6 cf Stone Storage

Chamber Storage + Stone Storage = 4,522.3 cf = 0.104 af

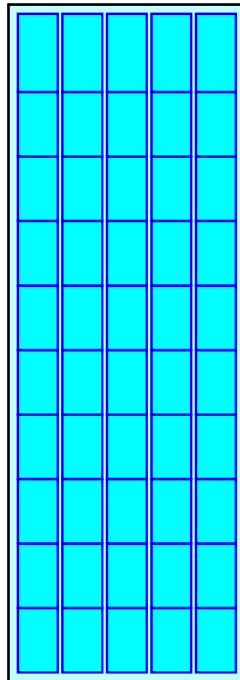
Overall Storage Efficiency = 61.9%

Overall System Size = 73.50' x 25.67' x 3.88'

50 Chambers

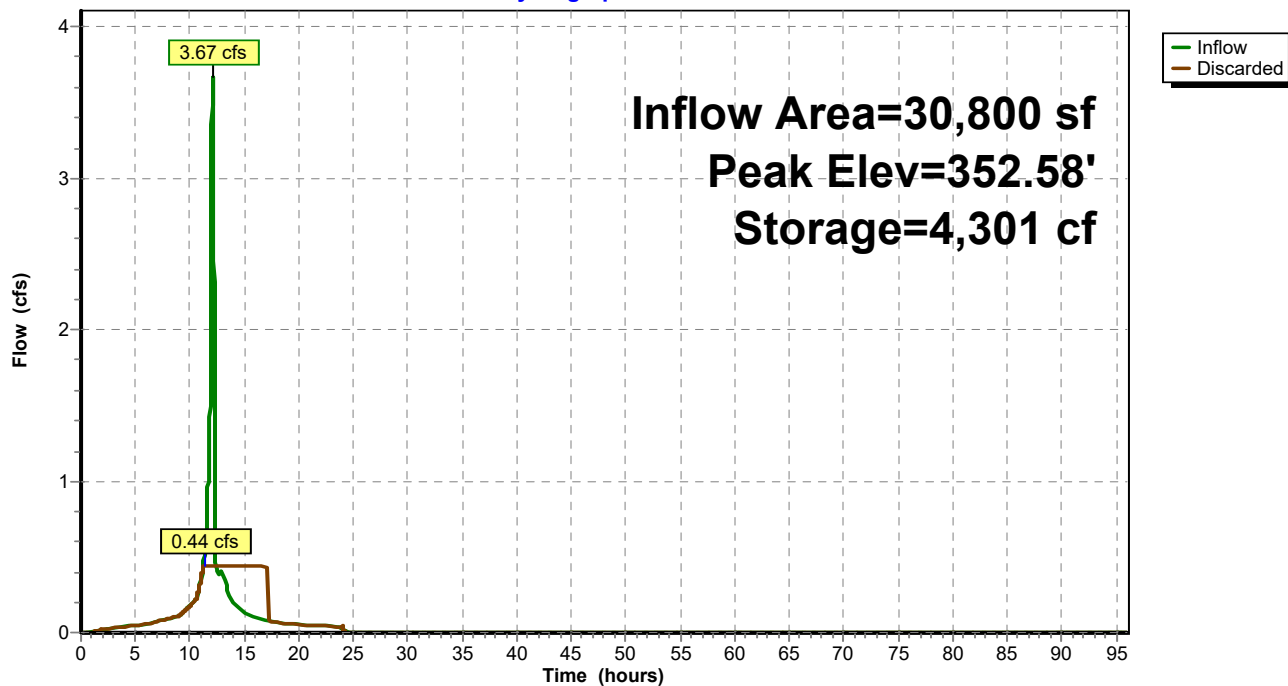
270.7 cy Field

172.1 cy Stone



Pond 54: INF-4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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Summary for Subcatchment 55: Post B4

Runoff = 46.96 cfs @ 12.23 hrs, Volume= 152,468 cf, Depth= 3.17"

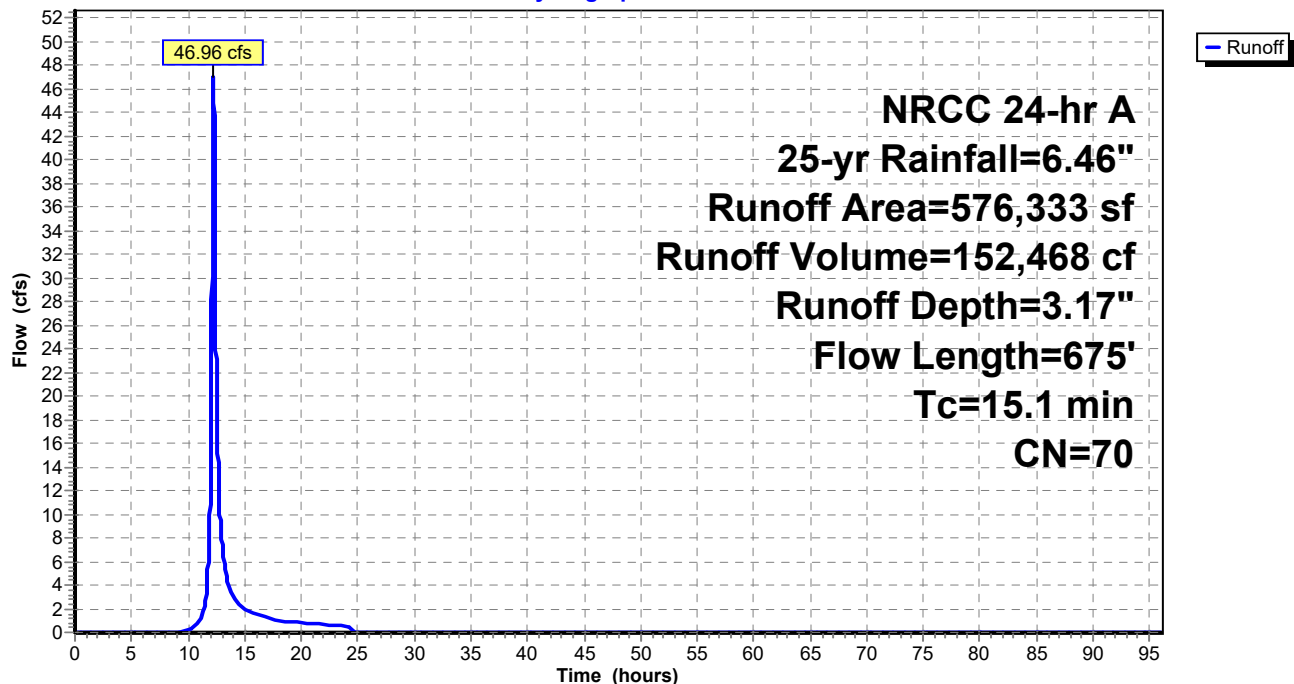
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 25-yr Rainfall=6.46"

Area (sf)	CN	Description
515,493	70	Woods, Good, HSG C
60,840	74	>75% Grass cover, Good, HSG C
576,333	70	Weighted Average
576,333		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0600	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.9	575	0.0950	4.96		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.1	675	Total			

Subcatchment 55: Post B4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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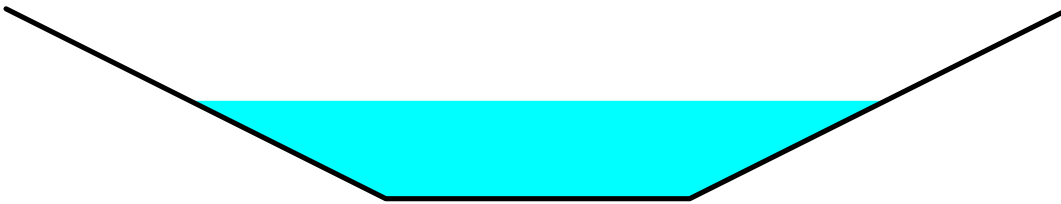
Summary for Reach 56: Existing Stream B

Inflow Area = 2,400,996 sf, 26.26% Impervious, Inflow Depth > 4.31" for 25-yr event
Inflow = 77.94 cfs @ 12.23 hrs, Volume= 862,679 cf
Outflow = 77.01 cfs @ 12.26 hrs, Volume= 862,523 cf, Atten= 1%, Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.08 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 1.81 fps, Avg. Travel Time= 12.5 min

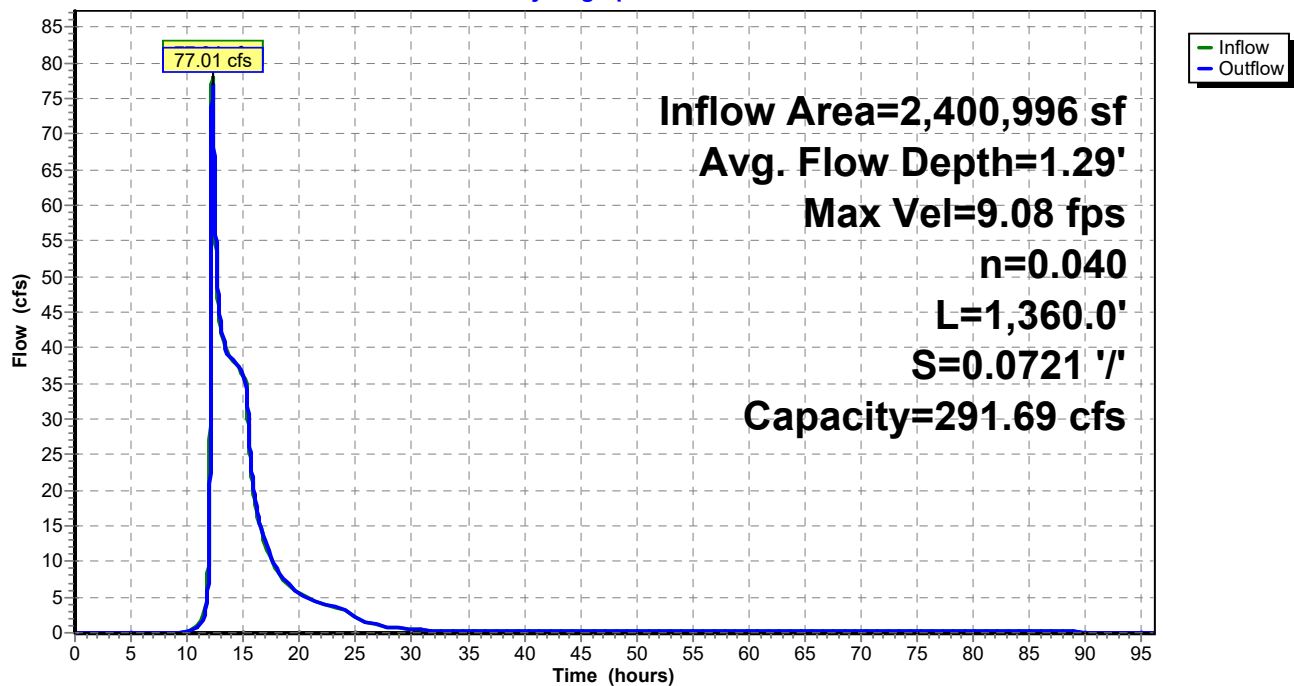
Peak Storage= 11,537 cf @ 12.26 hrs
Average Depth at Peak Storage= 1.29'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 291.69 cfs

4.00' x 2.50' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 ' ' Top Width= 14.00'
Length= 1,360.0' Slope= 0.0721 ' '
Inlet Invert= 312.00', Outlet Invert= 214.00'



Reach 56: Existing Stream B

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 25-yr Rainfall=6.46"

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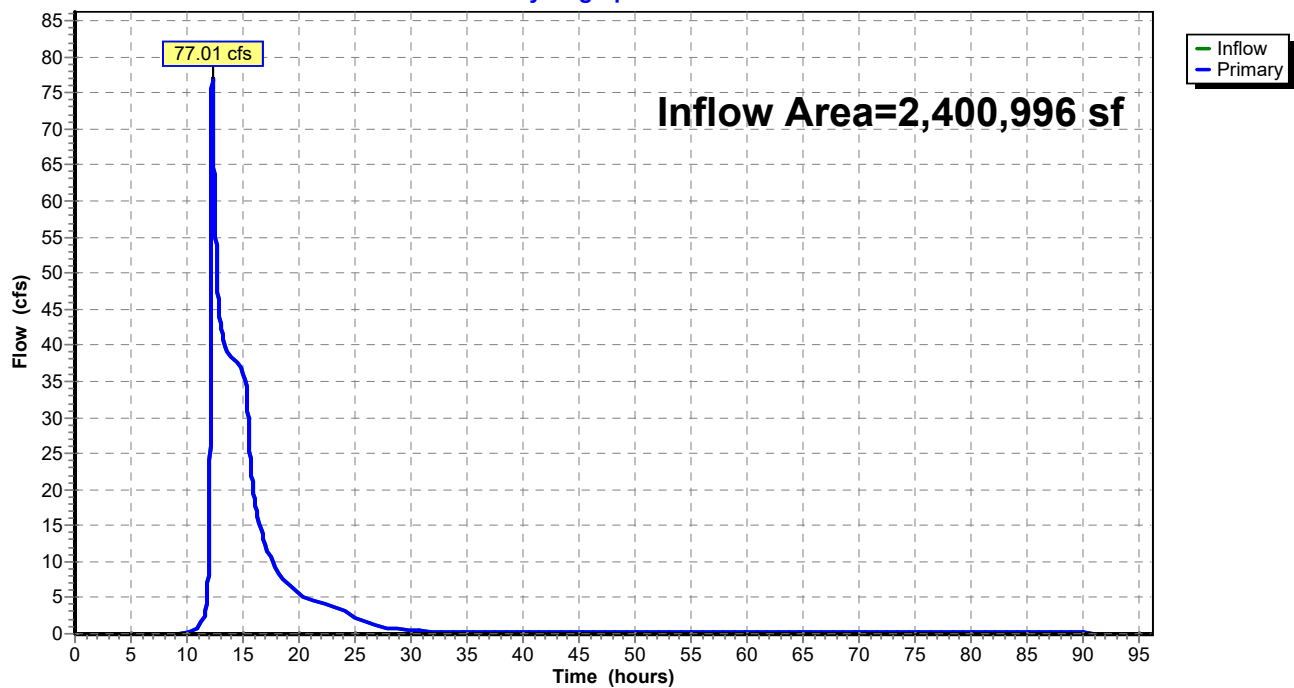
Summary for Link 57: Design Point B

Inflow Area = 2,400,996 sf, 26.26% Impervious, Inflow Depth > 4.31" for 25-yr event
Inflow = 77.01 cfs @ 12.26 hrs, Volume= 862,523 cf
Primary = 77.01 cfs @ 12.26 hrs, Volume= 862,523 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 57: Design Point B

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment44: Post B0Runoff Area=1,510,771 sf 32.24% Impervious Runoff Depth=5.81"
Flow Length=1,871' Tc=32.3 min CN=84 Runoff=150.90 cfs 731,166 cf**Pond 45: Offsite Pond B**Peak Elev=386.31' Storage=324,023 cf Inflow=150.90 cfs 731,166 cf
36.0" Round Culvert n=0.025 L=158.0' S=0.0127 '/' Outflow=43.05 cfs 729,880 cf**Subcatchment46: Post B1**Runoff Area=195,784 sf 50.71% Impervious Runoff Depth=6.04"
Tc=6.0 min CN=86 Runoff=39.91 cfs 98,559 cf**Subcatchment47: Post B3**Runoff Area=118,108 sf 37.49% Impervious Runoff Depth=5.00"
Tc=6.0 min CN=77 Runoff=20.84 cfs 49,211 cf**Pond 48: SWP-4**Peak Elev=379.23' Storage=306,227 cf Inflow=75.64 cfs 877,650 cf
Outflow=37.76 cfs 862,168 cf**Subcatchment49: Post B5**Runoff Area=152,601 sf 84.59% Impervious Runoff Depth=6.98"
Tc=6.0 min CN=94 Runoff=33.60 cfs 88,810 cf**Pond 50: DIV-8**Peak Elev=374.97' Inflow=33.60 cfs 88,810 cf
Primary=5.56 cfs 53,893 cf Secondary=28.17 cfs 34,916 cf Outflow=33.60 cfs 88,810 cf**Pond 51: INF-8**Peak Elev=373.72' Storage=13,435 cf Inflow=5.56 cfs 53,893 cf
Outflow=1.26 cfs 53,893 cf**Subcatchment52: Post B6**Runoff Area=30,800 sf 100.00% Impervious Runoff Depth=7.46"
Tc=6.0 min CN=98 Runoff=6.90 cfs 19,148 cf**Pond 53: DIV-4**Peak Elev=352.82' Inflow=6.90 cfs 19,148 cf
Primary=3.59 cfs 15,141 cf Secondary=4.09 cfs 4,008 cf Outflow=6.90 cfs 19,148 cf**Pond 54: INF-4**Peak Elev=352.64' Storage=4,347 cf Inflow=3.59 cfs 15,141 cf
Outflow=0.44 cfs 15,141 cf**Subcatchment55: Post B4**Runoff Area=576,333 sf 0.00% Impervious Runoff Depth=4.21"
Flow Length=675' Tc=15.1 min CN=70 Runoff=62.33 cfs 202,082 cf**Reach 56: Existing Stream B**Avg. Flow Depth=1.56' Max Vel=10.04 fps Inflow=114.05 cfs 1,103,174 cf
n=0.040 L=1,360.0' S=0.0721 '/' Capacity=291.69 cfs Outflow=111.09 cfs 1,103,018 cf**Link 57: Design Point B**Inflow=111.09 cfs 1,103,018 cf
Primary=111.09 cfs 1,103,018 cf**Total Runoff Area = 2,584,397 sf Runoff Volume = 1,188,976 cf Average Runoff Depth = 5.52"**
69.41% Pervious = 1,793,897 sf 30.59% Impervious = 790,500 sf

North 60 Post B 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 44: Post B0

Runoff = 150.90 cfs @ 12.45 hrs, Volume= 731,166 cf, Depth= 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
487,056	98	Paved parking, HSG C
497,987	77	Woods, Good, HSG D
134,328	70	Woods, Good, HSG C
375,457	80	>75% Grass cover, Good, HSG D
15,943	74	>75% Grass cover, Good, HSG C
1,510,771	84	Weighted Average
1,023,715		67.76% Pervious Area
487,056		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
9.5	848	0.0085	1.48		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	856	0.0093	2.78	3.06	Trap/Vee/Rect Channel Flow, Bot.W=3.00' D=0.33' Z= 1.0 '/' Top.W=3.66' n= 0.022 Earth, clean & straight
0.2	67	0.0150	6.66	64.08	Pipe Channel, 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.025 Corrugated metal
32.3	1,871	Total			

North 60 Post B 3-9-20

Prepared by {enter your company name here}

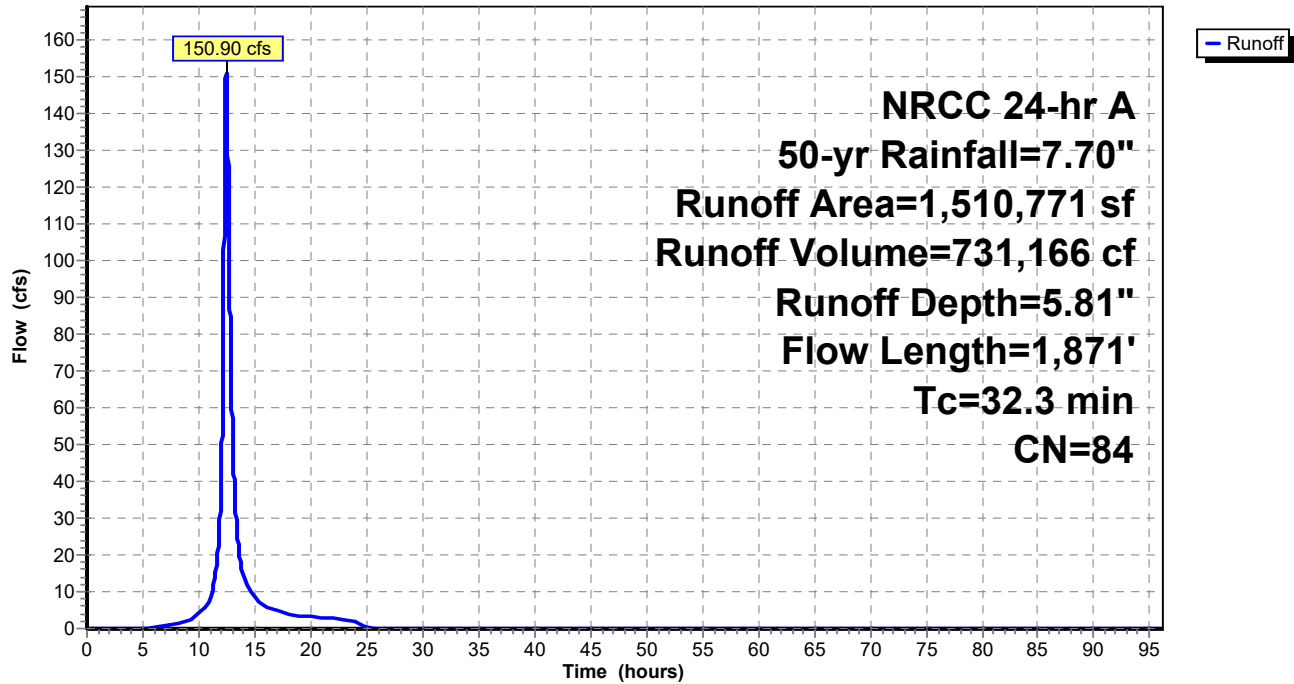
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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Subcatchment 44: Post B0

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 45: Offsite Pond B

Inflow Area = 1,510,771 sf, 32.24% Impervious, Inflow Depth = 5.81" for 50-yr event
 Inflow = 150.90 cfs @ 12.45 hrs, Volume= 731,166 cf
 Outflow = 43.05 cfs @ 13.12 hrs, Volume= 729,880 cf, Atten= 71%, Lag= 40.3 min
 Primary = 43.05 cfs @ 13.12 hrs, Volume= 729,880 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 386.31' @ 13.12 hrs Surf.Area= 98,584 sf Storage= 324,023 cf

Plug-Flow detention time= 131.2 min calculated for 729,804 cf (100% of inflow)
 Center-of-Mass det. time= 130.5 min (943.6 - 813.2)

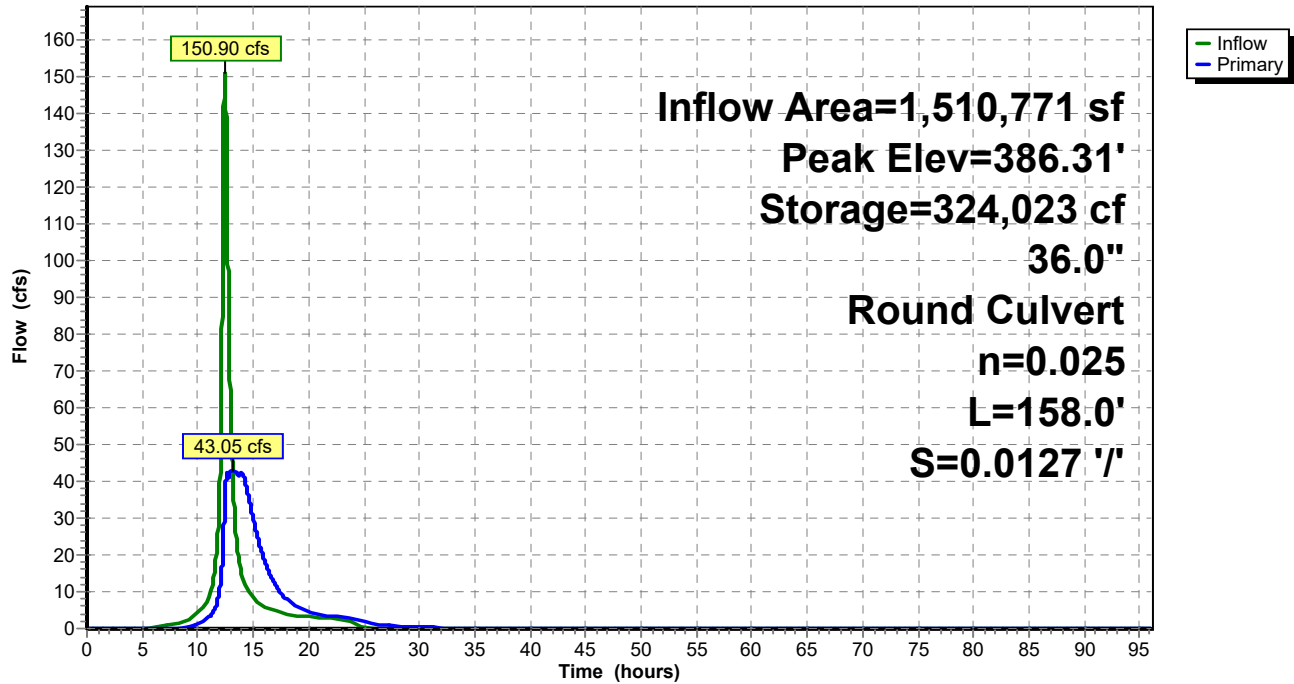
Volume	Invert	Avail.Storage	Storage Description		
#1	382.00'	610,998 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
382.00	36,540	1,177.0	0	0	36,540
384.00	81,987	1,579.0	115,507	115,507	124,748
386.00	96,790	1,622.0	178,572	294,080	136,159
388.00	108,795	1,657.0	205,468	499,548	145,863
389.00	114,127	1,679.0	111,450	610,998	151,937

Device	Routing	Invert	Outlet Devices
#1	Primary	382.00'	36.0" Round Culvert L= 158.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 382.00' / 380.00' S= 0.0127 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf

Primary OutFlow Max=43.05 cfs @ 13.12 hrs HW=386.31' TW=378.65' (Dynamic Tailwater)
 ↑**1=Culvert** (Barrel Controls 43.05 cfs @ 6.09 fps)

Pond 45: Offsite Pond B

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 46: Post B1

Runoff = 39.91 cfs @ 12.13 hrs, Volume= 98,559 cf, Depth= 6.04"

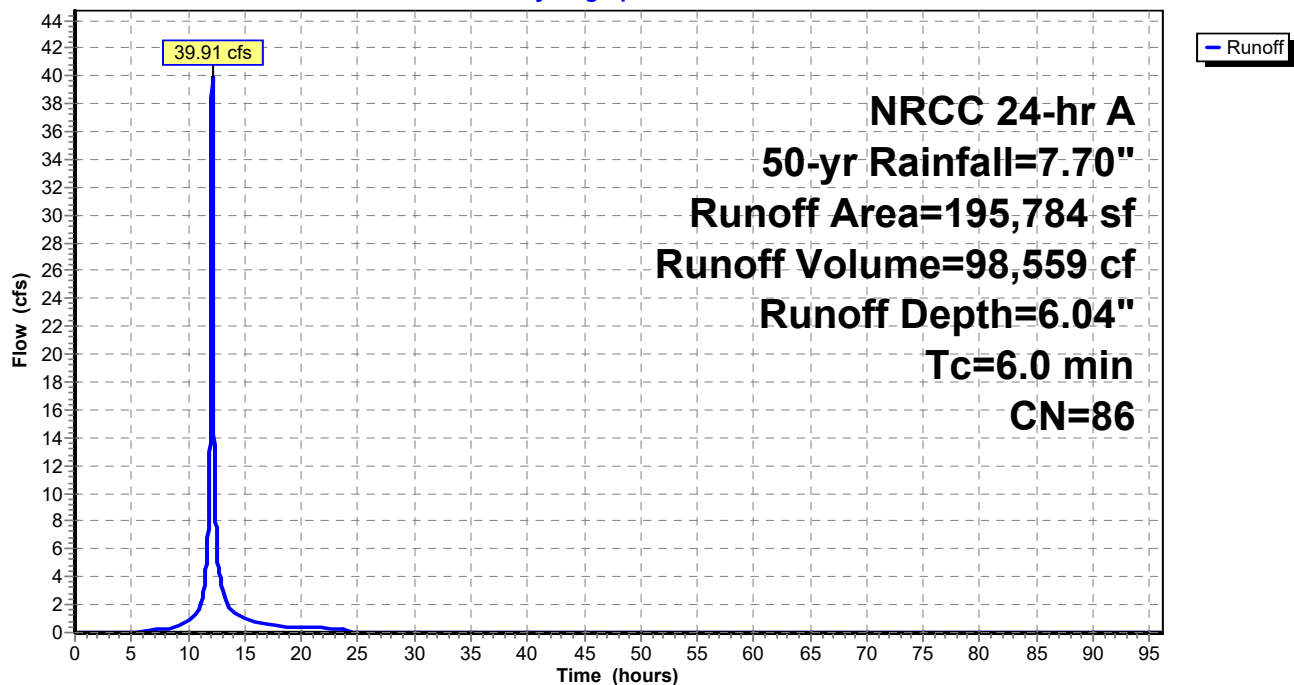
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
99,286	98	Paved parking, HSG C
96,498	74	>75% Grass cover, Good, HSG C
195,784	86	Weighted Average
96,498		49.29% Pervious Area
99,286		50.71% Impervious Area

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

Subcatchment 46: Post B1

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Summary for Subcatchment 47: Post B3

Runoff = 20.84 cfs @ 12.13 hrs, Volume= 49,211 cf, Depth= 5.00"

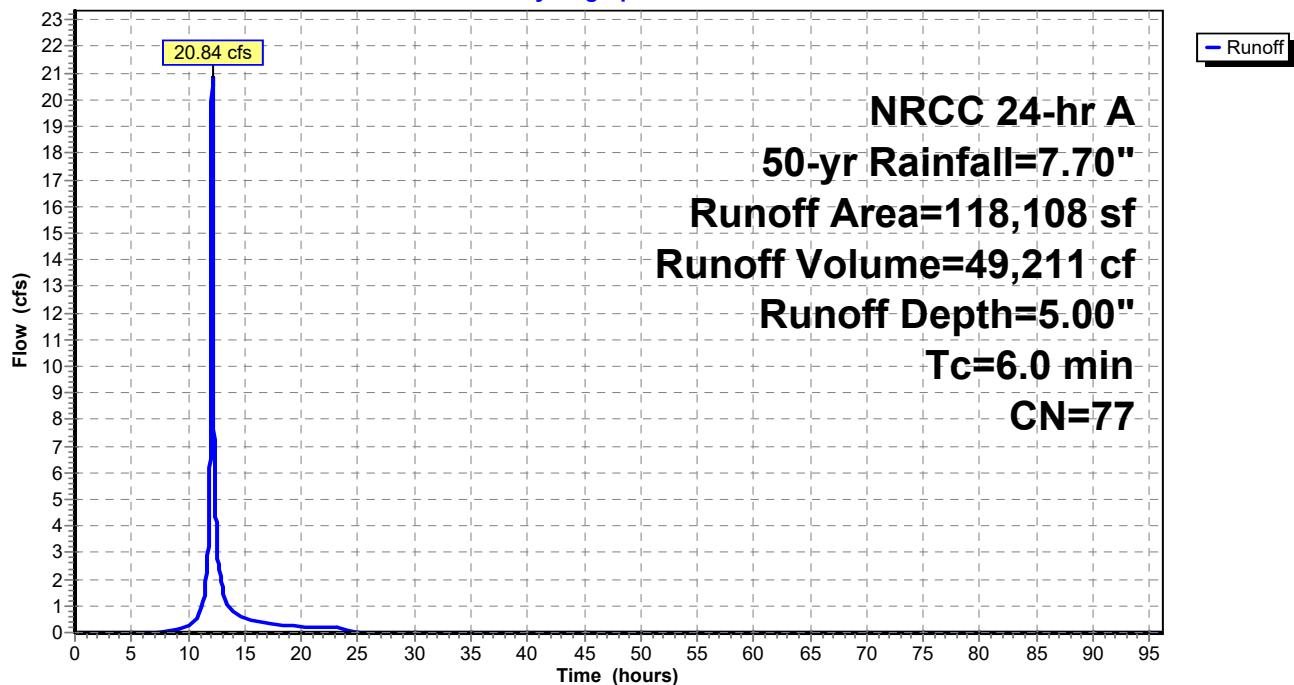
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
73,832	65	Brush, Good, HSG C
44,276	98	Water Surface, HSG C
118,108	77	Weighted Average
73,832		62.51% Pervious Area
44,276		37.49% Impervious Area

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

Subcatchment 47: Post B3

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 48: SWP-4

Inflow Area = 1,824,663 sf, 34.56% Impervious, Inflow Depth = 5.77" for 50-yr event
 Inflow = 75.64 cfs @ 12.13 hrs, Volume= 877,650 cf
 Outflow = 37.76 cfs @ 14.56 hrs, Volume= 862,168 cf, Atten= 50%, Lag= 145.9 min
 Primary = 37.76 cfs @ 14.56 hrs, Volume= 862,168 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Starting Elev= 376.00' Surf.Area= 88,186 sf Storage= 134,213 cf
 Peak Elev= 379.23' @ 14.56 hrs Surf.Area= 105,218 sf Storage= 306,227 cf (172,013 cf above start)

Plug-Flow detention time= 311.5 min calculated for 727,955 cf (83% of inflow)
 Center-of-Mass det. time= 162.0 min (1,079.9 - 917.8)

Volume	Invert	Avail.Storage	Storage Description
#1	372.00'	7,914 cf	Forebay (Irregular) Listed below (Recalc)
#2	372.00'	121,847 cf	Permanent Pool (Irregular) Listed below (Recalc)
#3	375.90'	259,334 cf	Additional Storage (Irregular) Listed below (Recalc)
		389,094 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
372.00	885	114.0	0	0	885
373.00	1,392	139.2	1,129	1,129	1,408
374.00	1,998	164.4	1,686	2,815	2,036
375.00	2,707	189.5	2,344	5,158	2,764
375.90	3,430	212.2	2,755	7,914	3,512

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
372.00	22,804	1,051.3	0	0	22,804
373.00	27,060	1,076.5	24,902	24,902	27,202
374.00	31,416	1,101.7	29,211	54,113	31,703
375.00	35,874	1,127.0	33,620	87,733	36,327
375.90	39,971	1,149.7	34,114	121,847	40,565

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
375.90	44,276	1,380.7	0	0	44,276
377.00	50,030	1,294.2	51,836	51,836	62,747
378.00	55,257	1,319.4	52,622	104,458	68,149
379.00	60,586	1,344.7	57,901	162,359	73,675
380.00	66,015	1,370.0	63,281	225,640	79,307
380.50	68,768	1,382.6	33,693	259,334	82,151

Device	Routing	Invert	Outlet Devices
#1	Primary	372.00'	24.0" Round Culvert L= 227.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 372.00' / 347.00' S= 0.1101 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	376.00'	3.0" Vert. Orifice/Grate C= 0.600

North 60 Post B 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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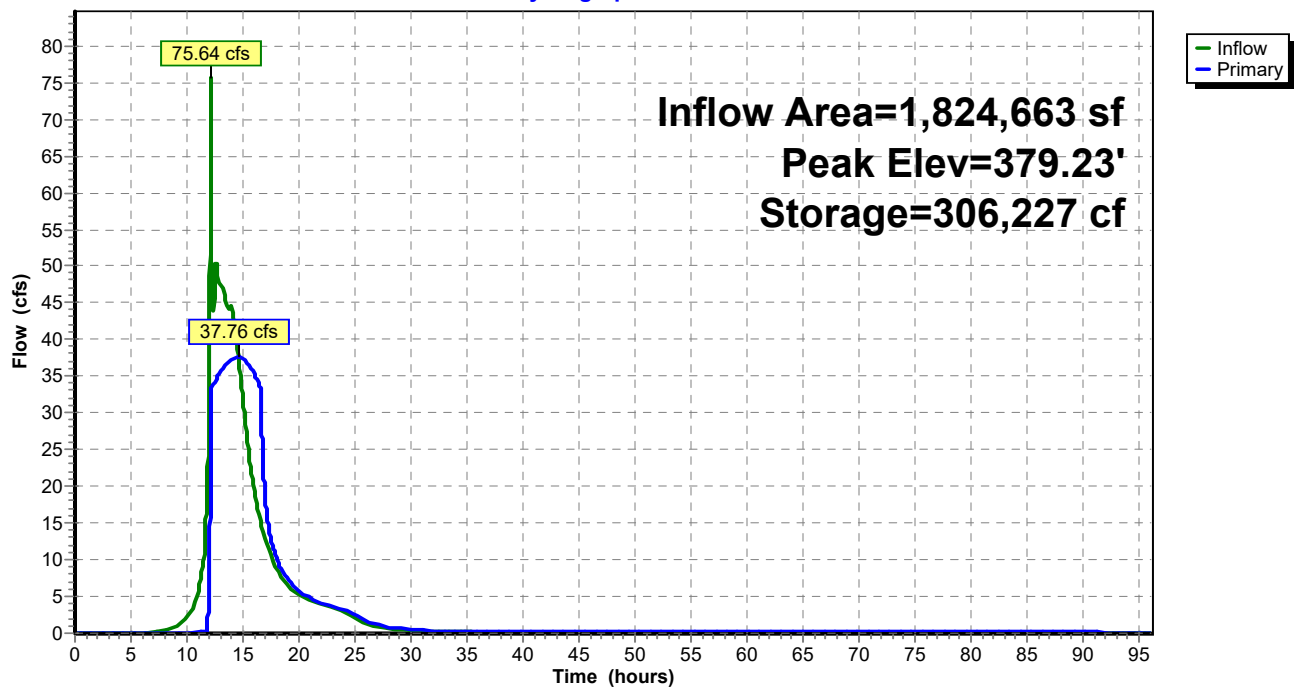
#3 Device 1 377.00' **36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=37.76 cfs @ 14.56 hrs HW=379.23' TW=312.92' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 37.76 cfs @ 12.02 fps)
- 2=Orifice/Grate (Passes < 0.42 cfs potential flow)
- 3=Orifice/Grate (Passes < 86.29 cfs potential flow)

Pond 48: SWP-4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 49: Post B5

Runoff = 33.60 cfs @ 12.13 hrs, Volume= 88,810 cf, Depth= 6.98"

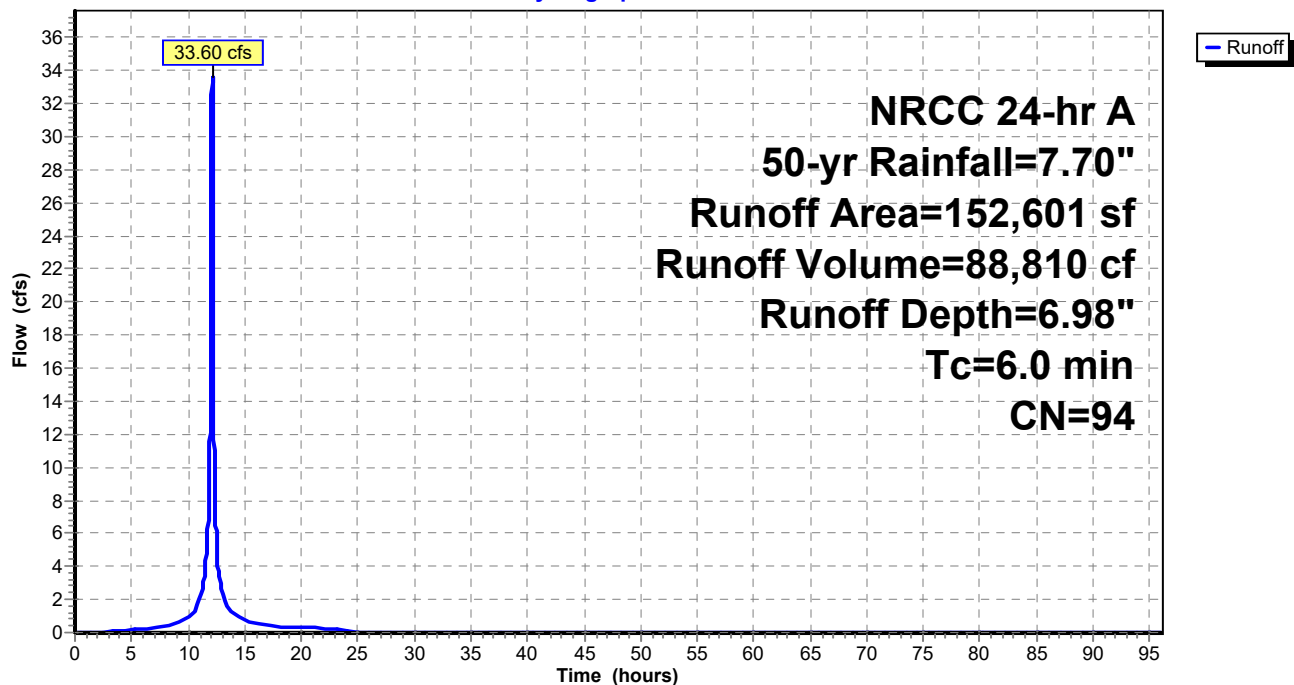
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
129,082	98	Paved parking, HSG C
23,519	74	>75% Grass cover, Good, HSG C
152,601	94	Weighted Average
23,519		15.41% Pervious Area
129,082		84.59% Impervious Area

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

Subcatchment 49: Post B5

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Printed 3/25/2020

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Summary for Pond 50: DIV-8

Inflow Area = 152,601 sf, 84.59% Impervious, Inflow Depth = 6.98" for 50-yr event
 Inflow = 33.60 cfs @ 12.13 hrs, Volume= 88,810 cf
 Outflow = 33.60 cfs @ 12.13 hrs, Volume= 88,810 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.56 cfs @ 11.67 hrs, Volume= 53,893 cf
 Secondary = 28.17 cfs @ 12.13 hrs, Volume= 34,916 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 374.97' @ 12.13 hrs

Flood Elev= 379.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	370.50'	12.0" Round Culvert L= 9.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.50' / 370.50' S= 0.0000 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	370.50'	24.0" Round Culvert L= 92.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.50' / 369.50' S= 0.0109 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	373.50'	8.0' 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=5.51 cfs @ 11.67 hrs HW=373.50' TW=371.38' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 5.51 cfs @ 7.01 fps)**Secondary OutFlow** Max=28.16 cfs @ 12.13 hrs HW=374.97' TW=313.38' (Dynamic Tailwater)↑ **2=Culvert** (Inlet Controls 28.16 cfs @ 8.97 fps)↑ **3=Broad-Crested Rectangular Weir** (Passes 28.16 cfs of 47.18 cfs potential flow)

North 60 Post B 3-9-20

Prepared by {enter your company name here}

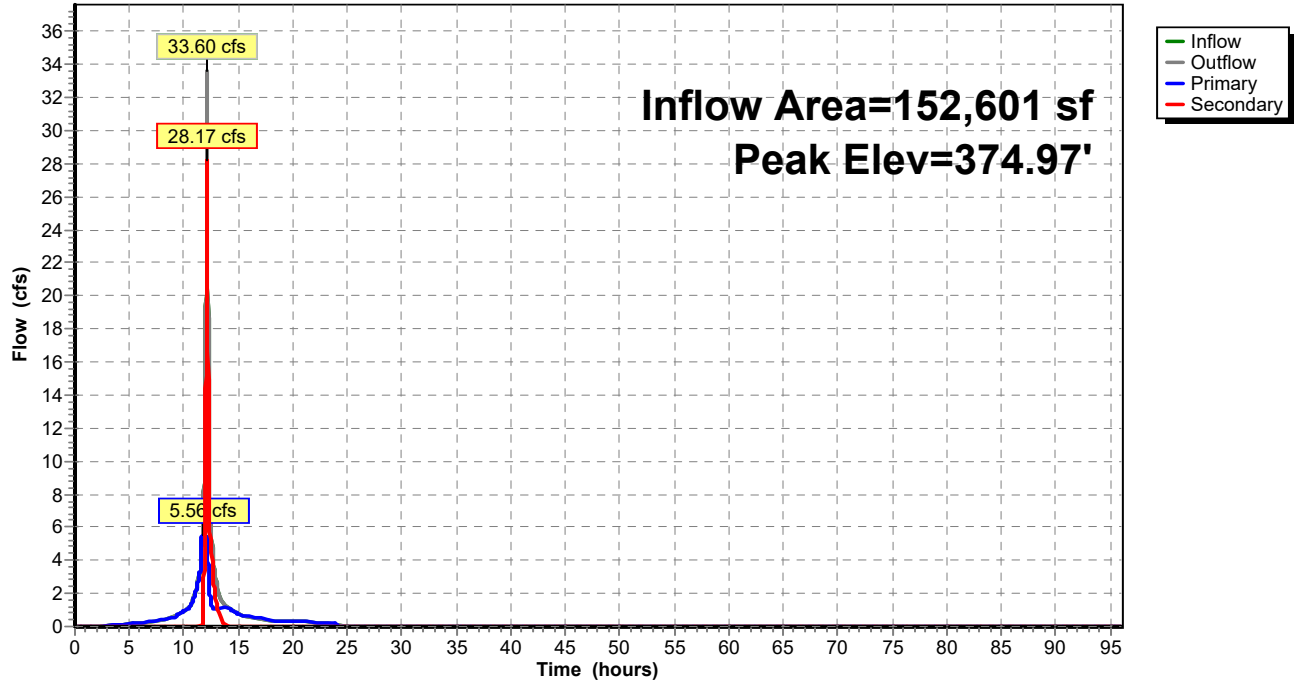
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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Pond 50: DIV-8

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

Prepared by {enter your company name here}

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Summary for Pond 51: INF-8

Inflow Area = 152,601 sf, 84.59% Impervious, Inflow Depth = 4.24" for 50-yr event
 Inflow = 5.56 cfs @ 11.67 hrs, Volume= 53,893 cf
 Outflow = 1.26 cfs @ 10.75 hrs, Volume= 53,893 cf, Atten= 77%, Lag= 0.0 min
 Discarded = 1.26 cfs @ 10.75 hrs, Volume= 53,893 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 373.72' @ 12.55 hrs Surf.Area= 5,434 sf Storage= 13,435 cf

Plug-Flow detention time= 76.5 min calculated for 53,893 cf (100% of inflow)
 Center-of-Mass det. time= 76.5 min (852.9 - 776.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	370.00'	5,125 cf	58.75'W x 92.50'L x 4.00'H Field A 21,738 cf Overall - 8,924 cf Embedded = 12,814 cf x 40.0% Voids
#2A	370.50'	8,924 cf	Cultec R-360HD x 240 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 240 Chambers in 10 Rows Cap Storage= +6.5 cf x 2 x 10 rows = 129.2 cf
		14,049 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	370.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'

Discarded OutFlow Max=1.26 cfs @ 10.75 hrs HW=370.12' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.26 cfs)

North 60 Post B 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Pond 51: INF-8 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 10 rows = 129.2 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

24 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 90.50' Row Length +12.0" End Stone x 2 = 92.50' Base Length

10 Rows x 60.0" Wide + 9.0" Spacing x 9 + 12.0" Side Stone x 2 = 58.75' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

240 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 10 Rows = 8,923.9 cf Chamber Storage

21,737.5 cf Field - 8,923.9 cf Chambers = 12,813.6 cf Stone x 40.0% Voids = 5,125.4 cf Stone Storage

Chamber Storage + Stone Storage = 14,049.4 cf = 0.323 af

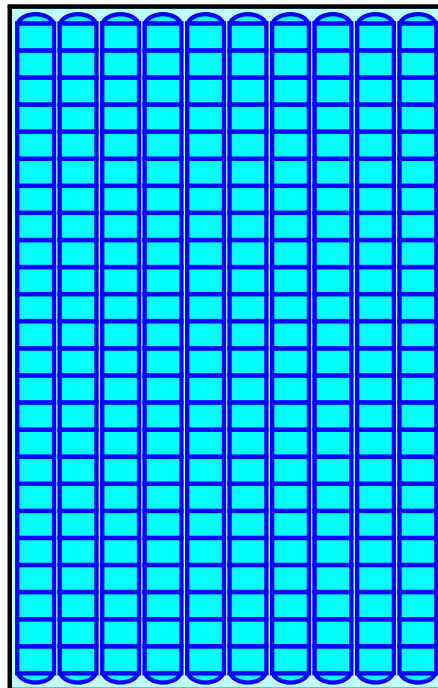
Overall Storage Efficiency = 64.6%

Overall System Size = 92.50' x 58.75' x 4.00'

240 Chambers

805.1 cy Field

474.6 cy Stone



North 60 Post B 3-9-20

Prepared by {enter your company name here}

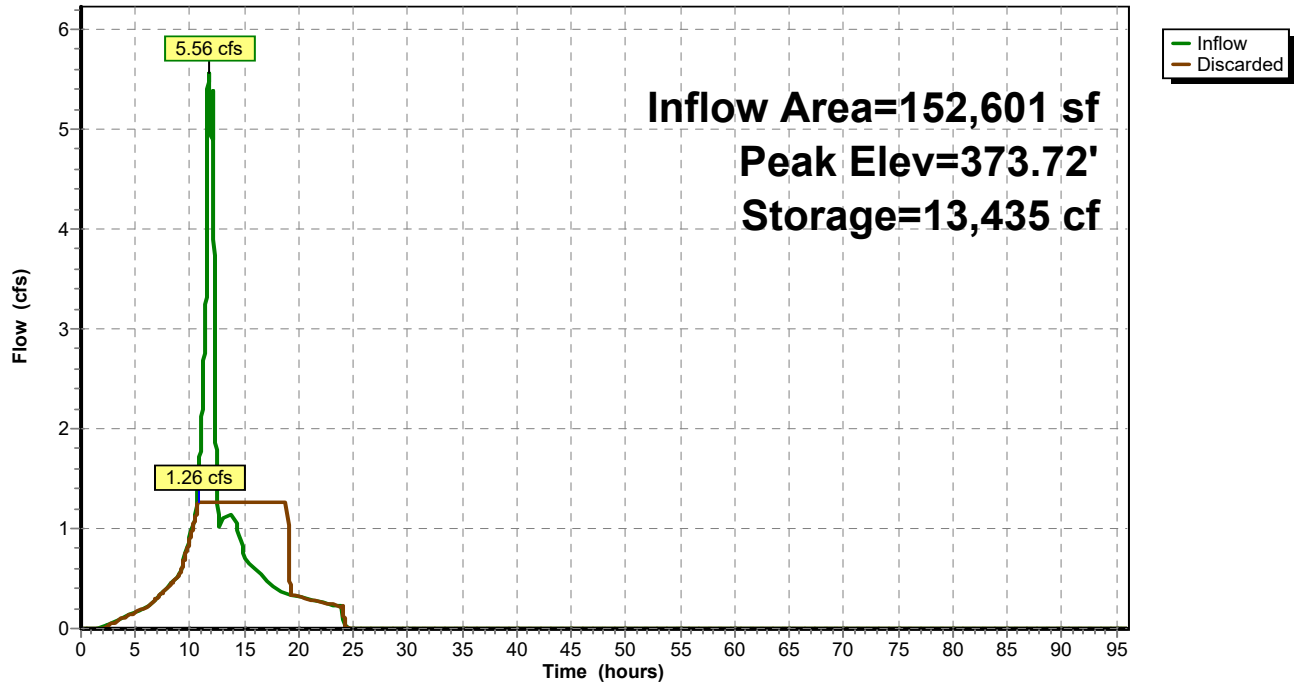
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NRCC 24-hr A 50-yr Rainfall=7.70"

Printed 3/25/2020

Pond 51: INF-8

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 52: Post B6

Runoff = 6.90 cfs @ 12.13 hrs, Volume= 19,148 cf, Depth= 7.46"

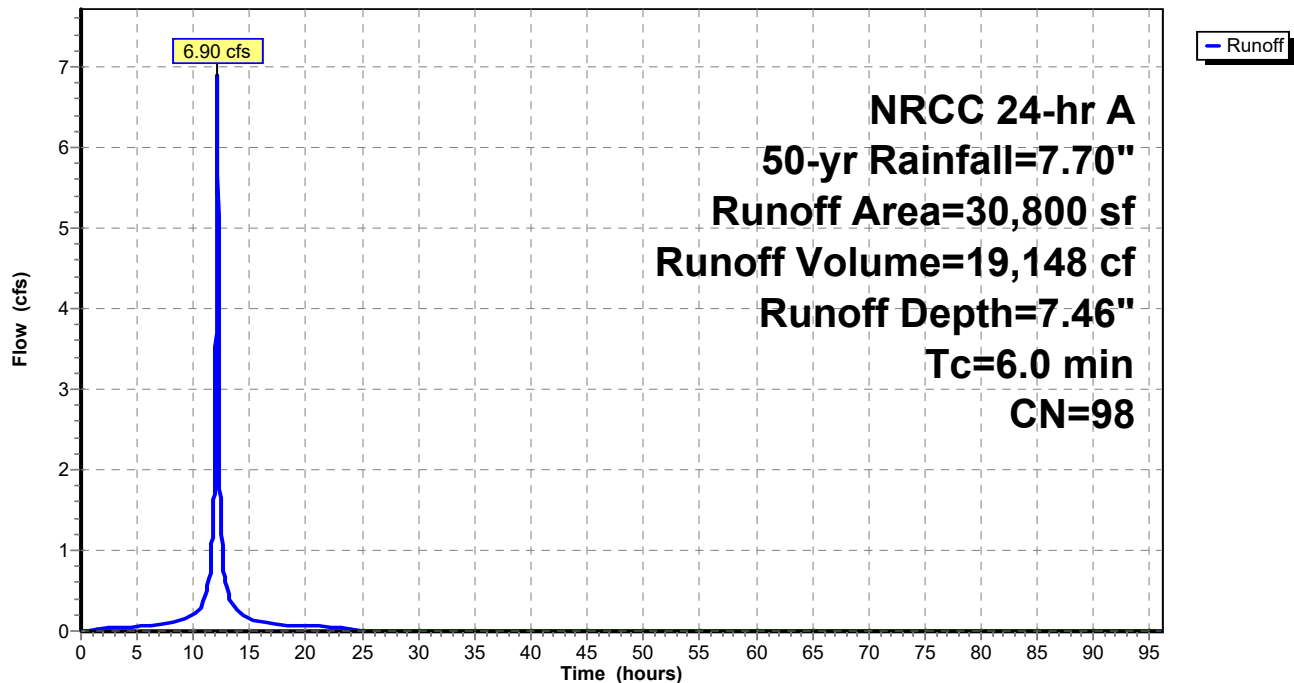
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
30,800	98	Paved parking, HSG C
30,800		100.00% Impervious Area

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

Subcatchment 52: Post B6

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 53: DIV-4

Inflow Area = 30,800 sf, 100.00% Impervious, Inflow Depth = 7.46" for 50-yr event
 Inflow = 6.90 cfs @ 12.13 hrs, Volume= 19,148 cf
 Outflow = 6.90 cfs @ 12.13 hrs, Volume= 19,148 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.59 cfs @ 12.00 hrs, Volume= 15,141 cf
 Secondary = 4.09 cfs @ 12.14 hrs, Volume= 4,008 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 352.82' @ 12.14 hrs

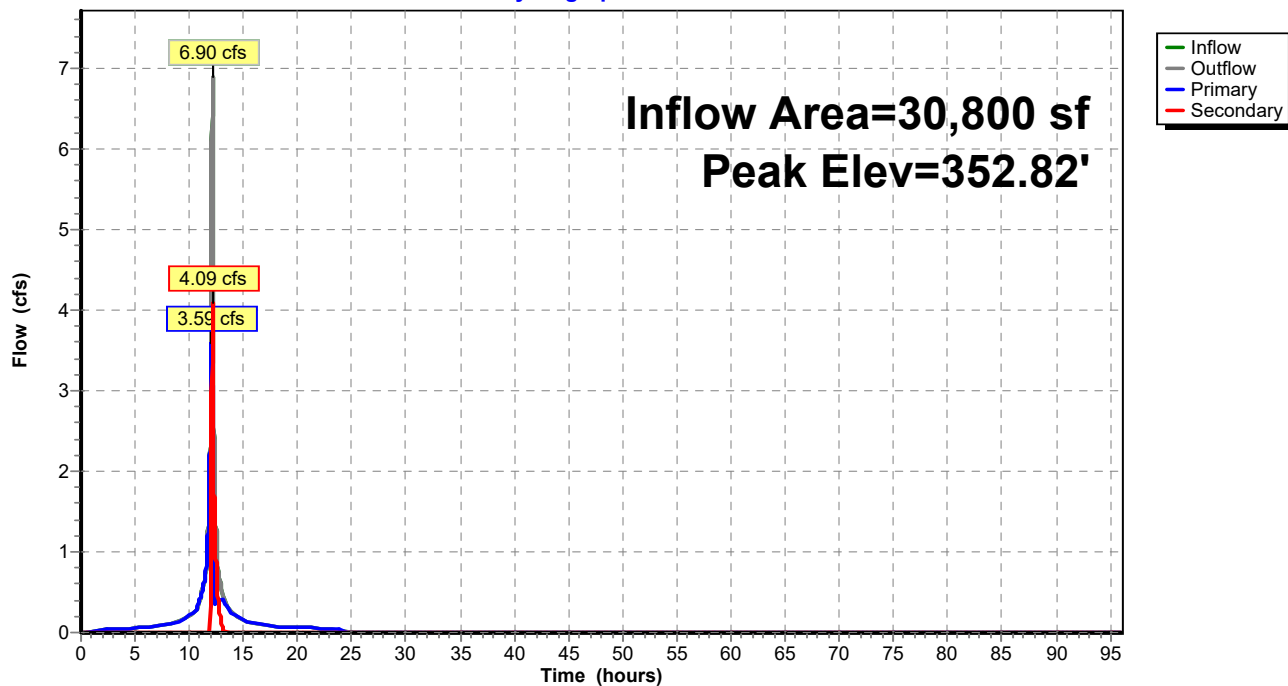
Flood Elev= 355.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	349.50'	10.0" Round Culvert L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.50' / 349.50' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	349.50'	18.0" Round Culvert L= 70.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.50' / 348.00' S= 0.0214 ' S= 0.0214 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	352.50'	8.0' 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=3.51 cfs @ 12.00 hrs HW=352.53' TW=350.75' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 3.51 cfs @ 6.44 fps)**Secondary OutFlow** Max=4.07 cfs @ 12.14 hrs HW=352.82' TW=313.41' (Dynamic Tailwater)↑ **2=Culvert** (Passes 4.07 cfs of 13.63 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 4.07 cfs @ 1.61 fps)

Pond 53: DIV-4

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Pond 54: INF-4

Inflow Area = 30,800 sf, 100.00% Impervious, Inflow Depth = 5.90" for 50-yr event
 Inflow = 3.59 cfs @ 12.00 hrs, Volume= 15,141 cf
 Outflow = 0.44 cfs @ 11.20 hrs, Volume= 15,141 cf, Atten= 88%, Lag= 0.0 min
 Discarded = 0.44 cfs @ 11.20 hrs, Volume= 15,141 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 352.64' @ 12.32 hrs Surf.Area= 1,887 sf Storage= 4,347 cf

Plug-Flow detention time= 63.1 min calculated for 15,139 cf (100% of inflow)
 Center-of-Mass det. time= 63.1 min (805.6 - 742.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	349.00'	1,859 cf	25.67'W x 73.50'L x 3.88'H Field A 7,310 cf Overall - 2,664 cf Embedded = 4,646 cf x 40.0% Voids
#2A	349.50'	2,664 cf	Cultec R-330XLHD x 50 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
		4,522 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	349.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=0.44 cfs @ 11.20 hrs HW=349.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.44 cfs)

North 60 Post B 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Pond 54: INF-4 - 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

10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +12.0" End Stone x 2 = 73.50' 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 + 10.0" Cover = 3.88' Field Height

50 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,663.7 cf Chamber Storage

7,310.2 cf Field - 2,663.7 cf Chambers = 4,646.5 cf Stone x 40.0% Voids = 1,858.6 cf Stone Storage

Chamber Storage + Stone Storage = 4,522.3 cf = 0.104 af

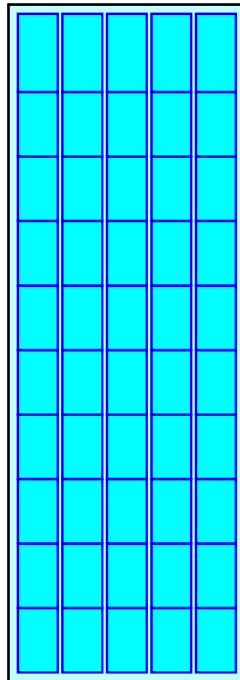
Overall Storage Efficiency = 61.9%

Overall System Size = 73.50' x 25.67' x 3.88'

50 Chambers

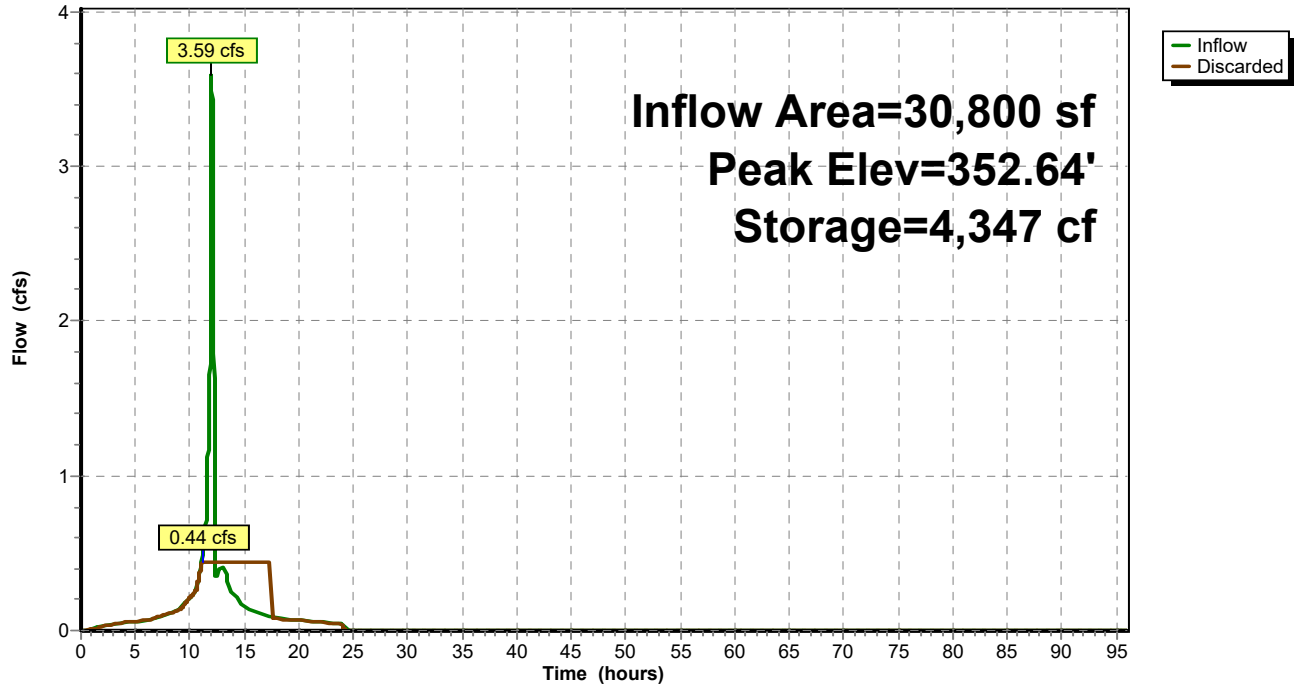
270.7 cy Field

172.1 cy Stone



Pond 54: INF-4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Subcatchment 55: Post B4

Runoff = 62.33 cfs @ 12.23 hrs, Volume= 202,082 cf, Depth= 4.21"

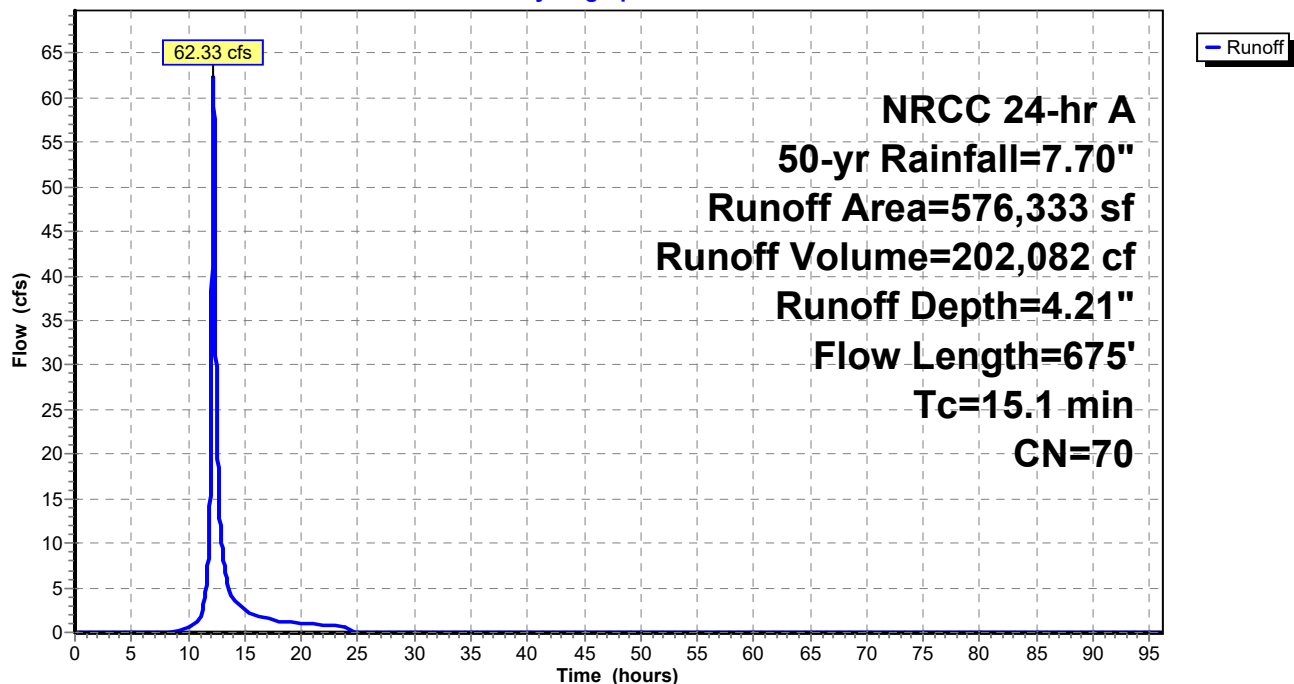
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 50-yr Rainfall=7.70"

Area (sf)	CN	Description
515,493	70	Woods, Good, HSG C
60,840	74	>75% Grass cover, Good, HSG C
576,333	70	Weighted Average
576,333		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0600	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.9	575	0.0950	4.96		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.1	675	Total			

Subcatchment 55: Post B4

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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Summary for Reach 56: Existing Stream B

Inflow Area = 2,400,996 sf, 26.26% Impervious, Inflow Depth > 5.51" for 50-yr event
Inflow = 114.05 cfs @ 12.16 hrs, Volume= 1,103,174 cf
Outflow = 111.09 cfs @ 12.22 hrs, Volume= 1,103,018 cf, Atten= 3%, Lag= 3.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.04 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.89 fps, Avg. Travel Time= 12.0 min

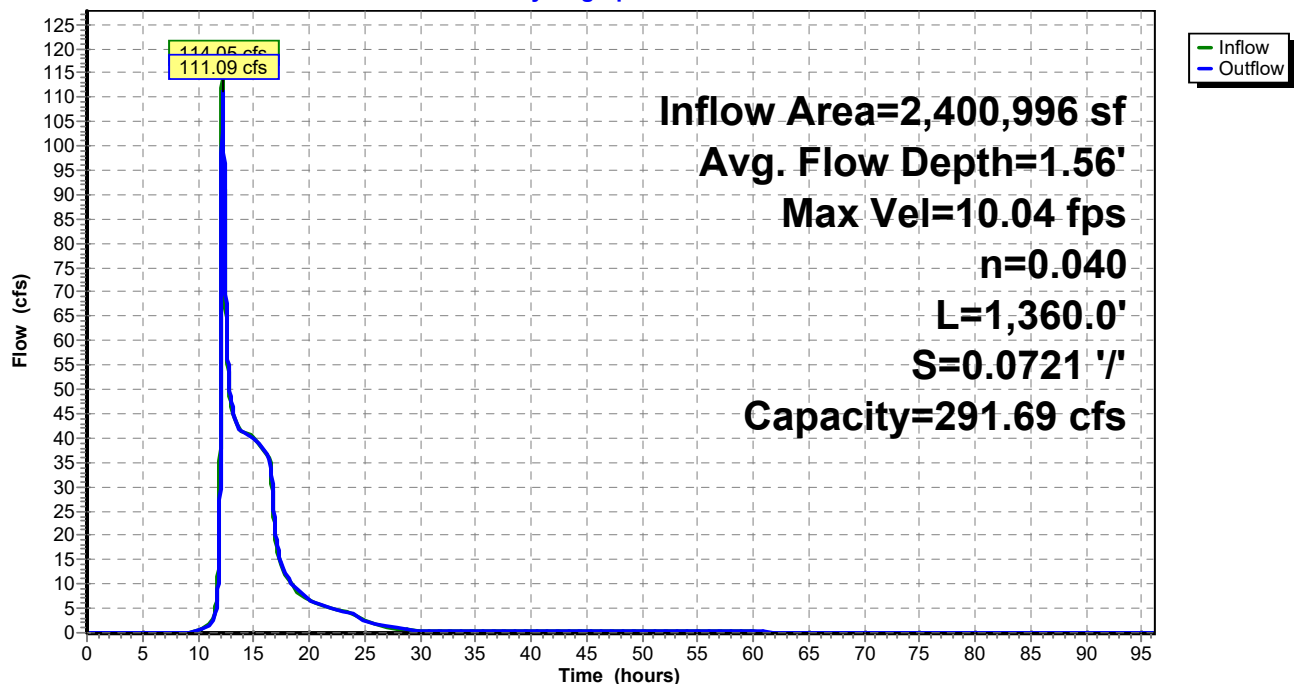
Peak Storage= 15,051 cf @ 12.22 hrs
Average Depth at Peak Storage= 1.56'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 291.69 cfs

4.00' x 2.50' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 1,360.0' Slope= 0.0721 '/'
Inlet Invert= 312.00', Outlet Invert= 214.00'



Reach 56: Existing Stream B

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 50-yr Rainfall=7.70"

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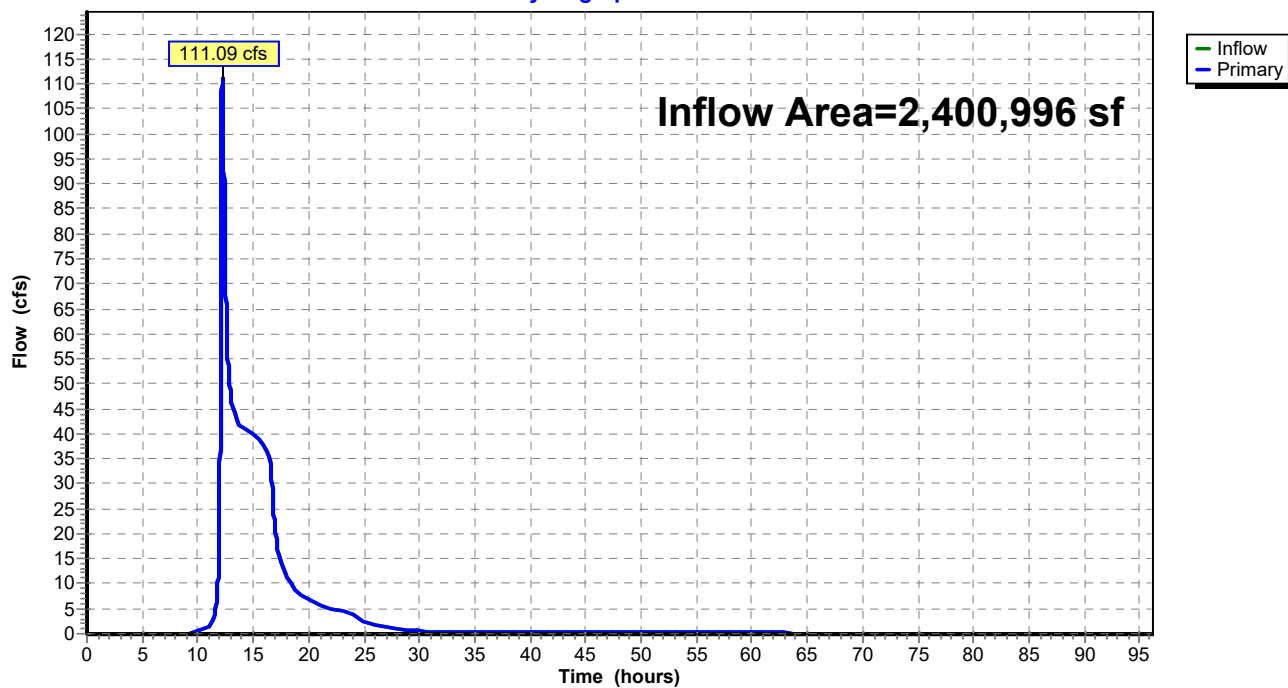
Summary for Link 57: Design Point B

Inflow Area = 2,400,996 sf, 26.26% Impervious, Inflow Depth > 5.51" for 50-yr event
Inflow = 111.09 cfs @ 12.22 hrs, Volume= 1,103,018 cf
Primary = 111.09 cfs @ 12.22 hrs, Volume= 1,103,018 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 57: Design Point B

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment44: Post B0

Runoff Area=1,510,771 sf 32.24% Impervious Runoff Depth=7.23"
Flow Length=1,871' Tc=32.3 min CN=84 Runoff=186.10 cfs 910,648 cf

Pond 45: Offsite Pond B

Peak Elev=387.20' Storage=414,374 cf Inflow=186.10 cfs 910,648 cf
36.0" Round Culvert n=0.025 L=158.0' S=0.0127 '/' Outflow=48.51 cfs 909,356 cf

Subcatchment46: Post B1

Runoff Area=195,784 sf 50.71% Impervious Runoff Depth=7.48"
Tc=6.0 min CN=86 Runoff=48.72 cfs 122,028 cf

Subcatchment47: Post B3

Runoff Area=118,108 sf 37.49% Impervious Runoff Depth=6.37"
Tc=6.0 min CN=77 Runoff=26.23 cfs 62,664 cf

Pond 48: SWP-4

Peak Elev=380.15' Storage=365,623 cf Inflow=94.69 cfs 1,094,048 cf
Outflow=40.46 cfs 1,078,440 cf

Subcatchment49: Post B5

Runoff Area=152,601 sf 84.59% Impervious Runoff Depth=8.46"
Tc=6.0 min CN=94 Runoff=40.27 cfs 107,534 cf

Pond 50: DIV-8

Peak Elev=376.45' Inflow=40.27 cfs 107,534 cf
Primary=6.62 cfs 59,792 cf Secondary=33.66 cfs 47,742 cf Outflow=40.27 cfs 107,534 cf

Pond 51: INF-8

Peak Elev=373.99' Storage=14,036 cf Inflow=6.62 cfs 59,792 cf
Outflow=1.26 cfs 59,792 cf

Subcatchment52: Post B6

Runoff Area=30,800 sf 100.00% Impervious Runoff Depth=8.94"
Tc=6.0 min CN=98 Runoff=8.23 cfs 22,945 cf

Pond 53: DIV-4

Peak Elev=352.91' Inflow=8.23 cfs 22,945 cf
Primary=3.41 cfs 16,655 cf Secondary=6.08 cfs 6,290 cf Outflow=8.23 cfs 22,945 cf

Pond 54: INF-4

Peak Elev=352.75' Storage=4,425 cf Inflow=3.41 cfs 16,655 cf
Outflow=0.44 cfs 16,655 cf

Subcatchment55: Post B4

Runoff Area=576,333 sf 0.00% Impervious Runoff Depth=5.49"
Flow Length=675' Tc=15.1 min CN=70 Runoff=81.16 cfs 263,859 cf

Reach 56: Existing Stream B

Avg. Flow Depth=1.73' Max Vel=10.63 fps Inflow=139.55 cfs 1,396,330 cf
n=0.040 L=1,360.0' S=0.0721 '/' Capacity=291.69 cfs Outflow=137.57 cfs 1,396,173 cf

Link 57: Design Point B

Inflow=137.57 cfs 1,396,173 cf
Primary=137.57 cfs 1,396,173 cf

Total Runoff Area = 2,584,397 sf Runoff Volume = 1,489,677 cf Average Runoff Depth = 6.92"
69.41% Pervious = 1,793,897 sf 30.59% Impervious = 790,500 sf

North 60 Post B 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 44: Post B0

Runoff = 186.10 cfs @ 12.45 hrs, Volume= 910,648 cf, Depth= 7.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
487,056	98	Paved parking, HSG C
497,987	77	Woods, Good, HSG D
134,328	70	Woods, Good, HSG C
375,457	80	>75% Grass cover, Good, HSG D
15,943	74	>75% Grass cover, Good, HSG C
1,510,771	84	Weighted Average
1,023,715		67.76% Pervious Area
487,056		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
9.5	848	0.0085	1.48		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
5.1	856	0.0093	2.78	3.06	Trap/Vee/Rect Channel Flow, Bot.W=3.00' D=0.33' Z= 1.0 '/' Top.W=3.66' n= 0.022 Earth, clean & straight
0.2	67	0.0150	6.66	64.08	Pipe Channel, 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.025 Corrugated metal
32.3	1,871	Total			

North 60 Post B 3-9-20

Prepared by {enter your company name here}

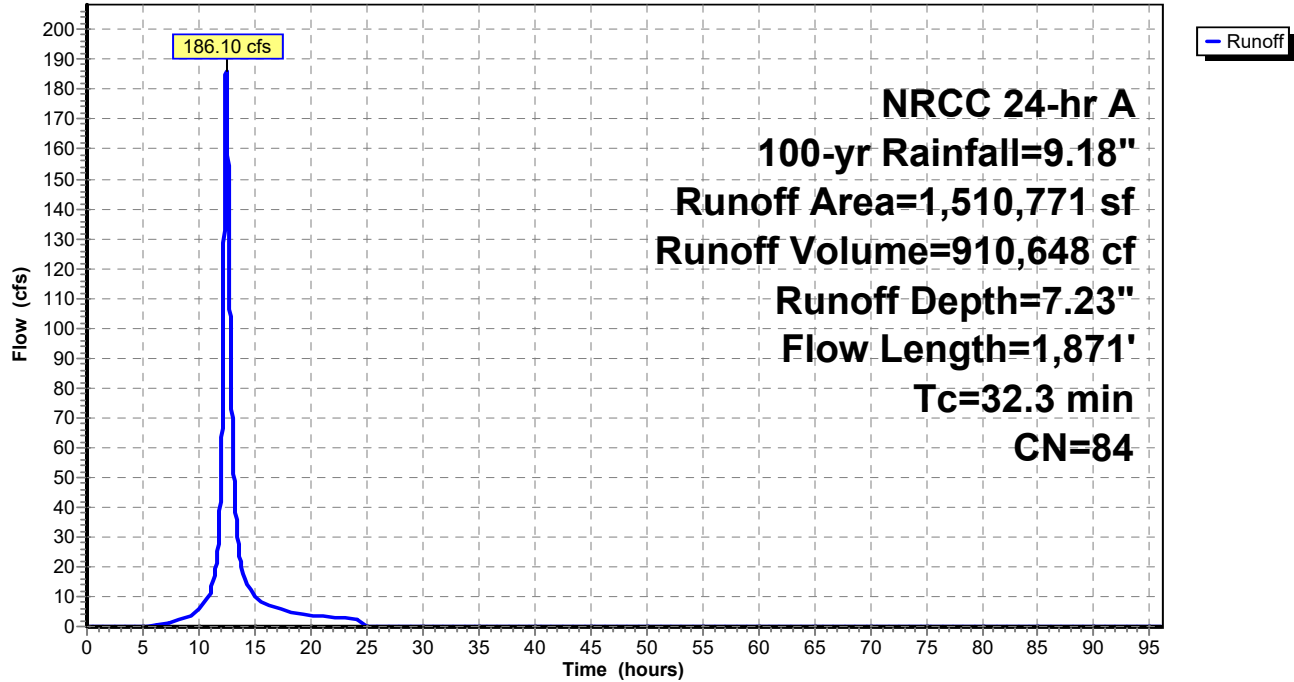
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NRCC 24-hr A 100-yr Rainfall=9.18"

Printed 3/25/2020

Subcatchment 44: Post B0

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 45: Offsite Pond B

Inflow Area = 1,510,771 sf, 32.24% Impervious, Inflow Depth = 7.23" for 100-yr event
 Inflow = 186.10 cfs @ 12.45 hrs, Volume= 910,648 cf
 Outflow = 48.51 cfs @ 13.17 hrs, Volume= 909,356 cf, Atten= 74%, Lag= 43.1 min
 Primary = 48.51 cfs @ 13.17 hrs, Volume= 909,356 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 387.20' @ 13.17 hrs Surf.Area= 103,903 sf Storage= 414,374 cf

Plug-Flow detention time= 134.0 min calculated for 909,261 cf (100% of inflow)
 Center-of-Mass det. time= 133.5 min (941.5 - 808.0)

Volume	Invert	Avail.Storage	Storage Description
#1	382.00'	610,998 cf	Custom Stage Data (Irregular) Listed below (Recalc)

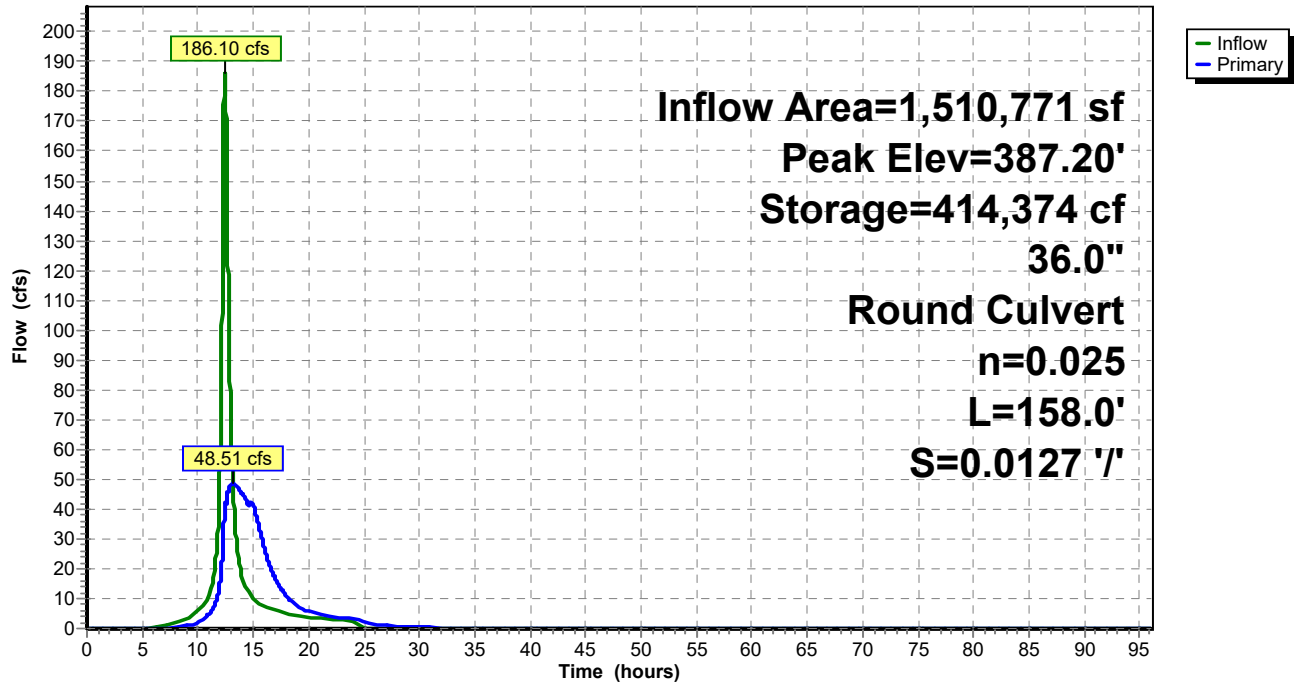
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
382.00	36,540	1,177.0	0	0	36,540
384.00	81,987	1,579.0	115,507	115,507	124,748
386.00	96,790	1,622.0	178,572	294,080	136,159
388.00	108,795	1,657.0	205,468	499,548	145,863
389.00	114,127	1,679.0	111,450	610,998	151,937

Device	Routing	Invert	Outlet Devices
#1	Primary	382.00'	36.0" Round Culvert L= 158.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 382.00' / 380.00' S= 0.0127 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf

Primary OutFlow Max=48.51 cfs @ 13.17 hrs HW=387.20' TW=379.32' (Dynamic Tailwater)
 1=Culvert (Barrel Controls 48.51 cfs @ 6.86 fps)

Pond 45: Offsite Pond B

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 46: Post B1

Runoff = 48.72 cfs @ 12.13 hrs, Volume= 122,028 cf, Depth= 7.48"

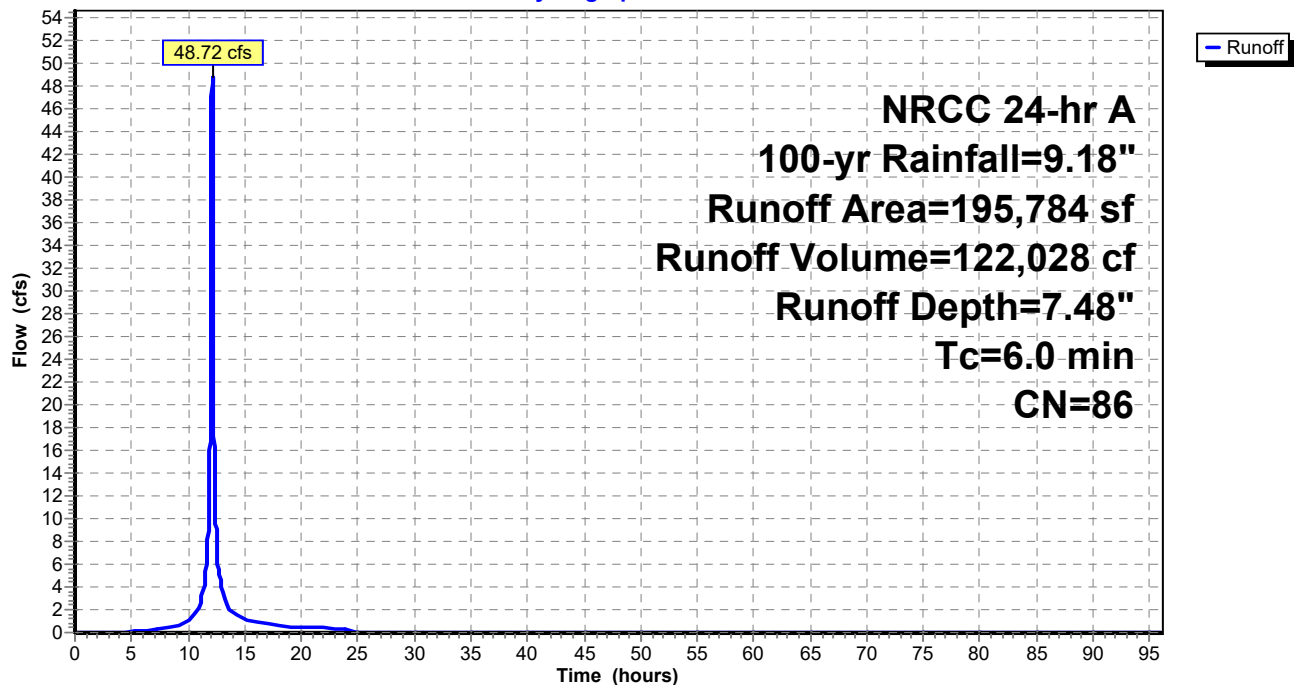
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
99,286	98	Paved parking, HSG C
96,498	74	>75% Grass cover, Good, HSG C
195,784	86	Weighted Average
96,498		49.29% Pervious Area
99,286		50.71% Impervious Area

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

Subcatchment 46: Post B1

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 47: Post B3

Runoff = 26.23 cfs @ 12.13 hrs, Volume= 62,664 cf, Depth= 6.37"

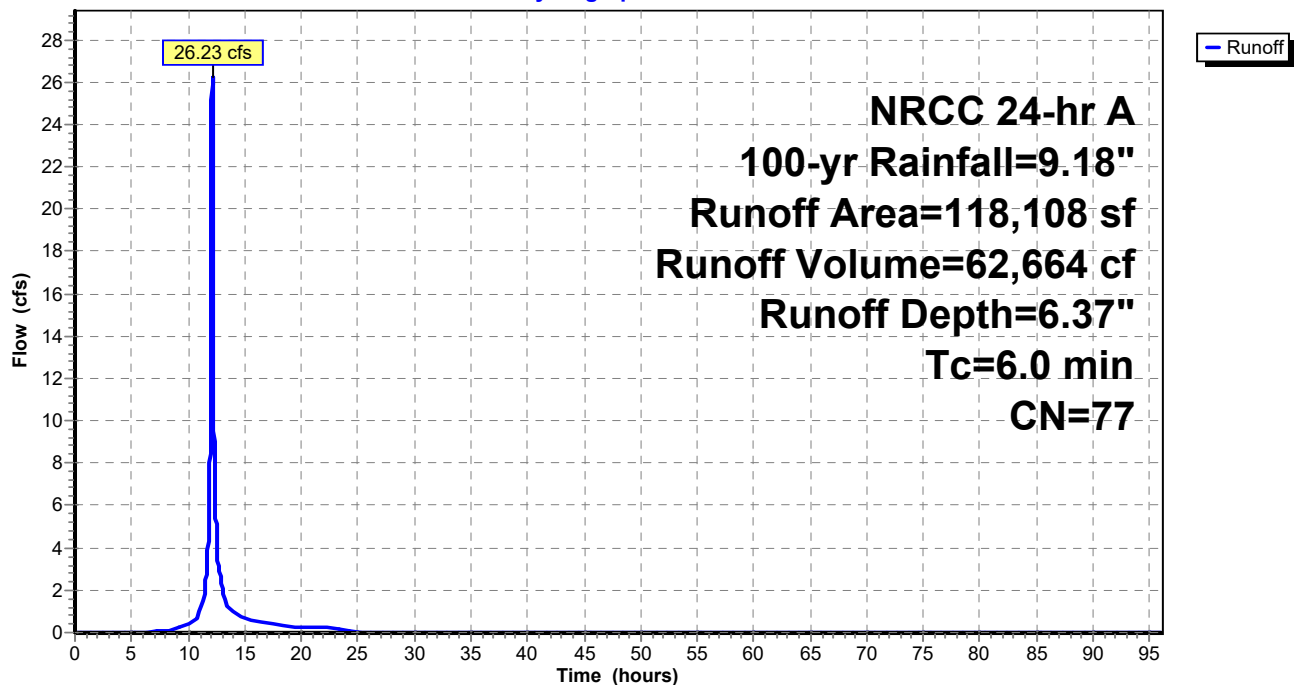
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
73,832	65	Brush, Good, HSG C
44,276	98	Water Surface, HSG C
118,108	77	Weighted Average
73,832		62.51% Pervious Area
44,276		37.49% Impervious Area

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

Subcatchment 47: Post B3

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 48: SWP-4

Inflow Area = 1,824,663 sf, 34.56% Impervious, Inflow Depth = 7.20" for 100-yr event
 Inflow = 94.69 cfs @ 12.13 hrs, Volume= 1,094,048 cf
 Outflow = 40.46 cfs @ 15.18 hrs, Volume= 1,078,440 cf, Atten= 57%, Lag= 182.8 min
 Primary = 40.46 cfs @ 15.18 hrs, Volume= 1,078,440 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Starting Elev= 376.00' Surf.Area= 88,186 sf Storage= 134,213 cf
 Peak Elev= 380.15' @ 15.18 hrs Surf.Area= 110,257 sf Storage= 365,623 cf (231,409 cf above start)

Plug-Flow detention time= 273.5 min calculated for 944,227 cf (86% of inflow)
 Center-of-Mass det. time= 151.9 min (1,067.0 - 915.1)

Volume	Invert	Avail.Storage	Storage Description
#1	372.00'	7,914 cf	Forebay (Irregular) Listed below (Recalc)
#2	372.00'	121,847 cf	Permanent Pool (Irregular) Listed below (Recalc)
#3	375.90'	259,334 cf	Additional Storage (Irregular) Listed below (Recalc)
		389,094 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
372.00	885	114.0	0	0	885
373.00	1,392	139.2	1,129	1,129	1,408
374.00	1,998	164.4	1,686	2,815	2,036
375.00	2,707	189.5	2,344	5,158	2,764
375.90	3,430	212.2	2,755	7,914	3,512

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
372.00	22,804	1,051.3	0	0	22,804
373.00	27,060	1,076.5	24,902	24,902	27,202
374.00	31,416	1,101.7	29,211	54,113	31,703
375.00	35,874	1,127.0	33,620	87,733	36,327
375.90	39,971	1,149.7	34,114	121,847	40,565

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
375.90	44,276	1,380.7	0	0	44,276
377.00	50,030	1,294.2	51,836	51,836	62,747
378.00	55,257	1,319.4	52,622	104,458	68,149
379.00	60,586	1,344.7	57,901	162,359	73,675
380.00	66,015	1,370.0	63,281	225,640	79,307
380.50	68,768	1,382.6	33,693	259,334	82,151

Device	Routing	Invert	Outlet Devices
#1	Primary	372.00'	24.0" Round Culvert L= 227.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 372.00' / 347.00' S= 0.1101 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	376.00'	3.0" Vert. Orifice/Grate C= 0.600

North 60 Post B 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

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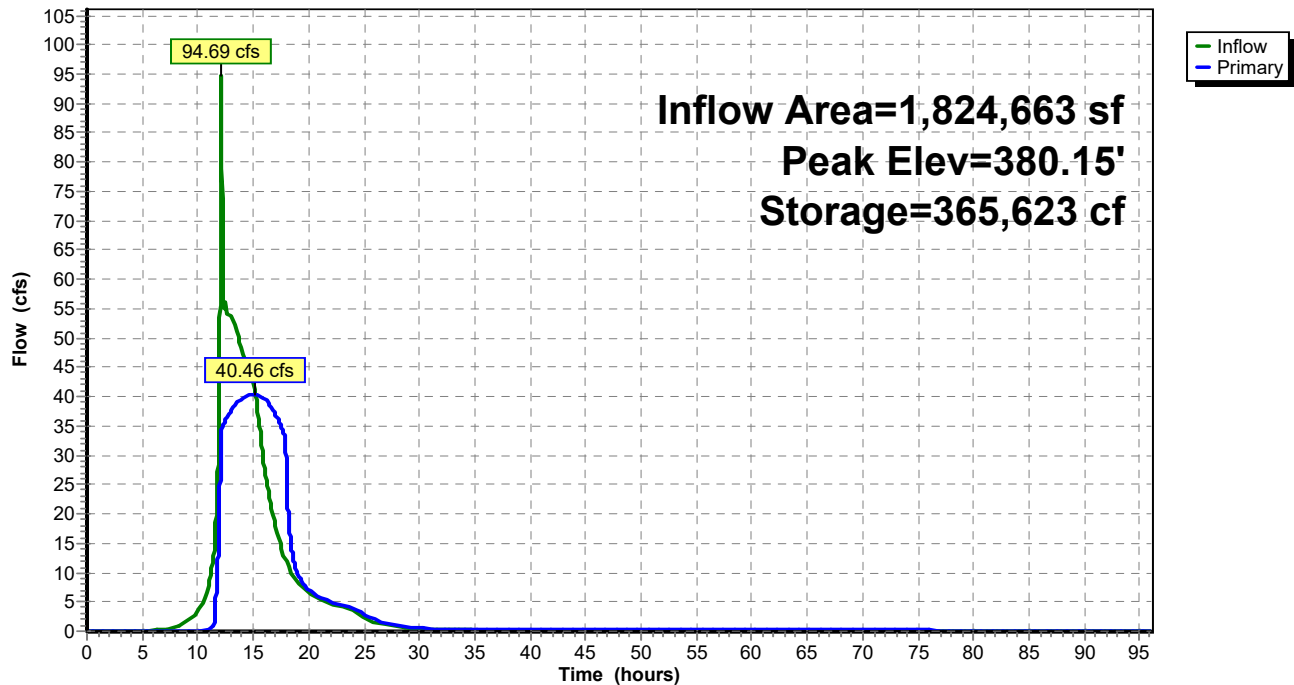
#3 Device 1 377.00' **36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=40.46 cfs @ 15.18 hrs HW=380.15' TW=312.95' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 40.46 cfs @ 12.88 fps)
- 2=Orifice/Grate (Passes < 0.47 cfs potential flow)
- 3=Orifice/Grate (Passes < 102.61 cfs potential flow)

Pond 48: SWP-4

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 49: Post B5

Runoff = 40.27 cfs @ 12.13 hrs, Volume= 107,534 cf, Depth= 8.46"

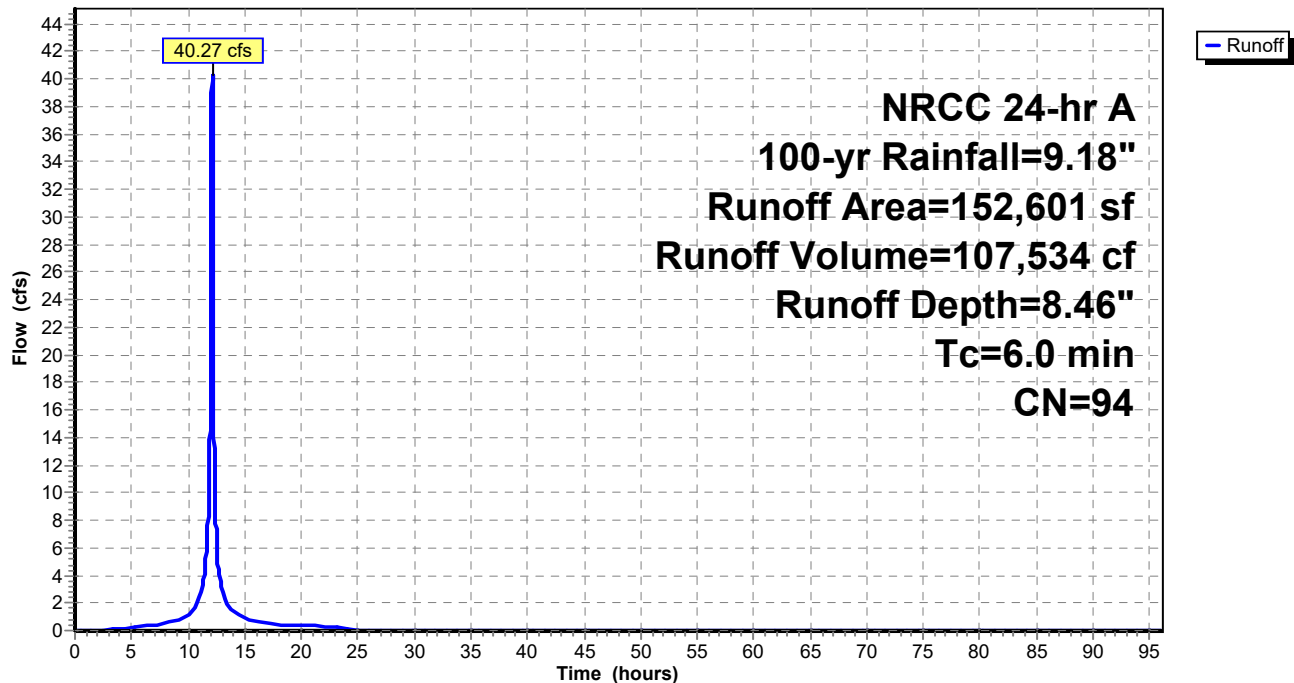
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
129,082	98	Paved parking, HSG C
23,519	74	>75% Grass cover, Good, HSG C
152,601	94	Weighted Average
23,519		15.41% Pervious Area
129,082		84.59% Impervious Area

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

Subcatchment 49: Post B5

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 50: DIV-8

Inflow Area = 152,601 sf, 84.59% Impervious, Inflow Depth = 8.46" for 100-yr event
 Inflow = 40.27 cfs @ 12.13 hrs, Volume= 107,534 cf
 Outflow = 40.27 cfs @ 12.13 hrs, Volume= 107,534 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.62 cfs @ 12.13 hrs, Volume= 59,792 cf
 Secondary = 33.66 cfs @ 12.13 hrs, Volume= 47,742 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 376.45' @ 12.13 hrs

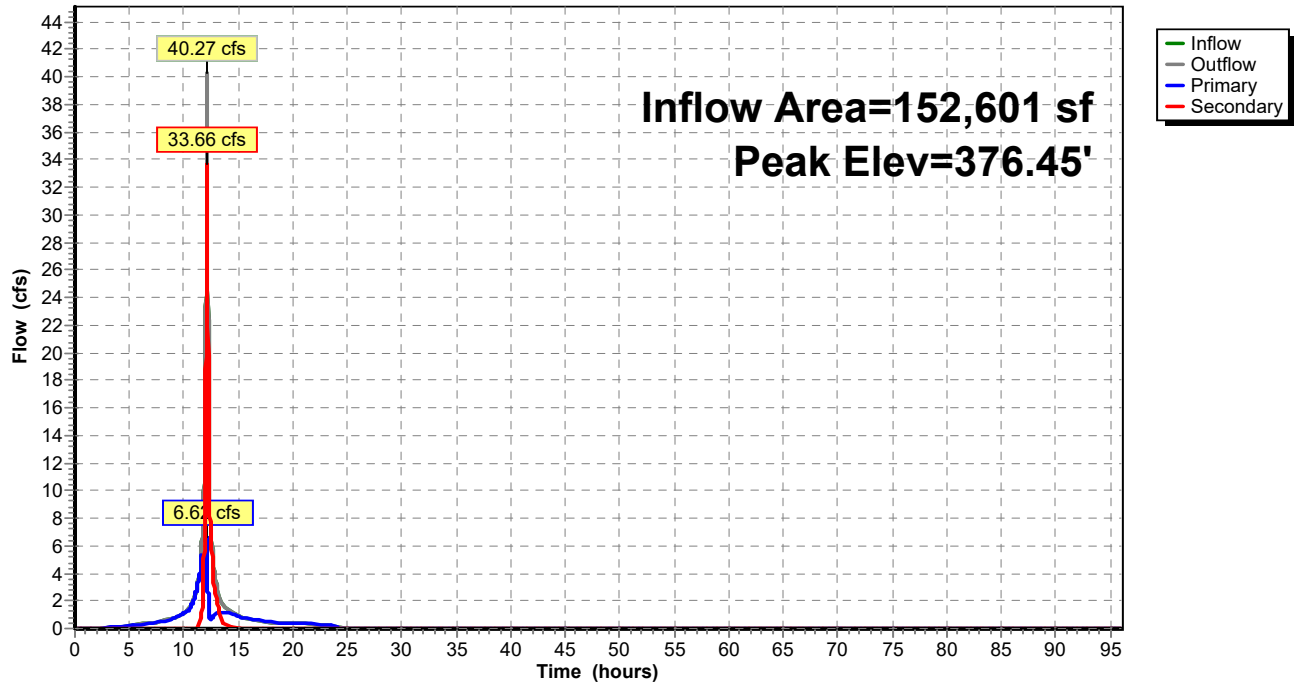
Flood Elev= 379.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	370.50'	12.0" Round Culvert L= 9.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.50' / 370.50' S= 0.0000 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	370.50'	24.0" Round Culvert L= 92.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.50' / 369.50' S= 0.0109 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	373.50'	8.0' 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=6.51 cfs @ 12.13 hrs HW=376.41' TW=373.45' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 6.51 cfs @ 8.29 fps)**Secondary OutFlow** Max=33.66 cfs @ 12.13 hrs HW=376.45' TW=313.61' (Dynamic Tailwater)↑ **2=Culvert** (Inlet Controls 33.66 cfs @ 10.71 fps)↑ **3=Broad-Crested Rectangular Weir** (Passes 33.66 cfs of 134.68 cfs potential flow)

Pond 50: DIV-8

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 51: INF-8

Inflow Area = 152,601 sf, 84.59% Impervious, Inflow Depth = 4.70" for 100-yr event
 Inflow = 6.62 cfs @ 12.13 hrs, Volume= 59,792 cf
 Outflow = 1.26 cfs @ 10.46 hrs, Volume= 59,792 cf, Atten= 81%, Lag= 0.0 min
 Discarded = 1.26 cfs @ 10.46 hrs, Volume= 59,792 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 373.99' @ 12.30 hrs Surf.Area= 5,434 sf Storage= 14,036 cf

Plug-Flow detention time= 78.5 min calculated for 59,786 cf (100% of inflow)
 Center-of-Mass det. time= 78.5 min (851.5 - 773.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	370.00'	5,125 cf	58.75'W x 92.50'L x 4.00'H Field A 21,738 cf Overall - 8,924 cf Embedded = 12,814 cf x 40.0% Voids
#2A	370.50'	8,924 cf	Cultec R-360HD x 240 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 240 Chambers in 10 Rows Cap Storage= +6.5 cf x 2 x 10 rows = 129.2 cf
		14,049 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	370.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.10'

Discarded OutFlow Max=1.26 cfs @ 10.46 hrs HW=370.12' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 1.26 cfs)

North 60 Post B 3-9-20

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Pond 51: INF-8 - Chamber Wizard Field A

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)

Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf

Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap

Cap Storage= +6.5 cf x 2 x 10 rows = 129.2 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

24 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 90.50' Row Length +12.0" End Stone x 2 = 92.50' Base Length

10 Rows x 60.0" Wide + 9.0" Spacing x 9 + 12.0" Side Stone x 2 = 58.75' Base Width

6.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.00' Field Height

240 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 10 Rows = 8,923.9 cf Chamber Storage

21,737.5 cf Field - 8,923.9 cf Chambers = 12,813.6 cf Stone x 40.0% Voids = 5,125.4 cf Stone Storage

Chamber Storage + Stone Storage = 14,049.4 cf = 0.323 af

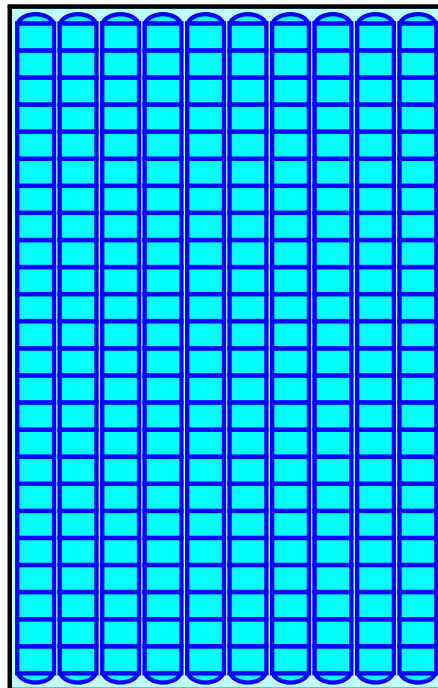
Overall Storage Efficiency = 64.6%

Overall System Size = 92.50' x 58.75' x 4.00'

240 Chambers

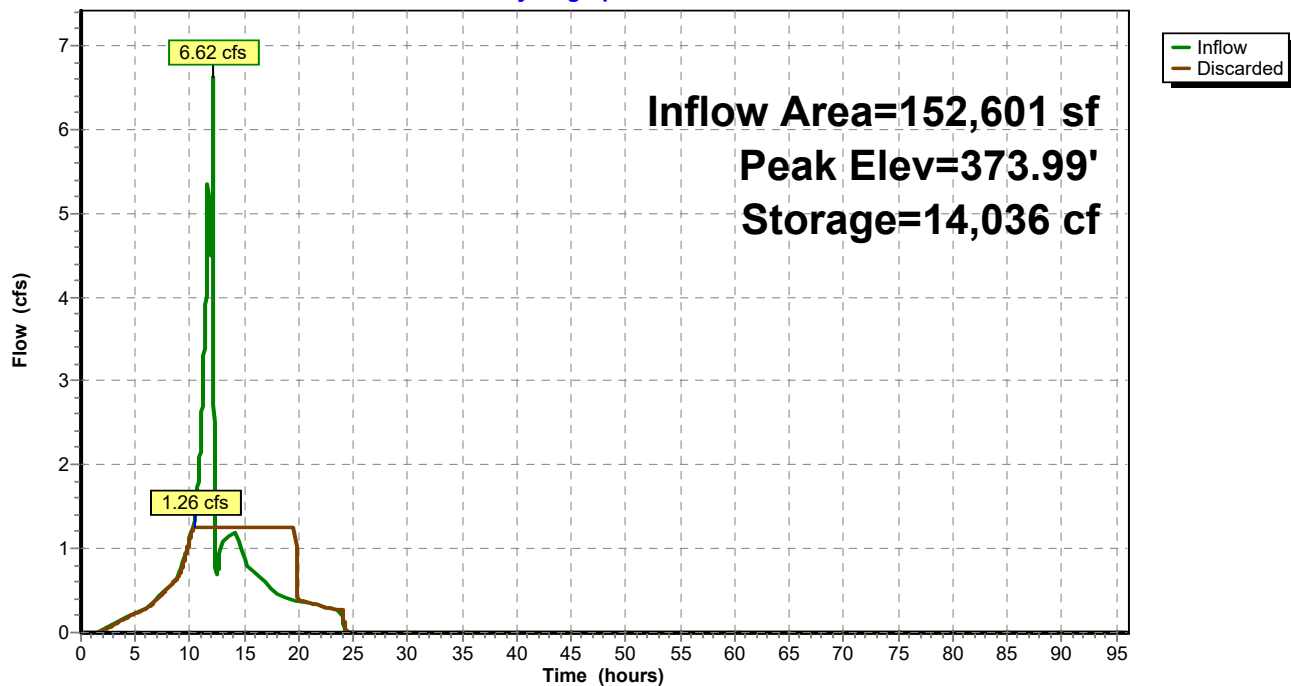
805.1 cy Field

474.6 cy Stone



Pond 51: INF-8

Hydrograph



North 60 Post B 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

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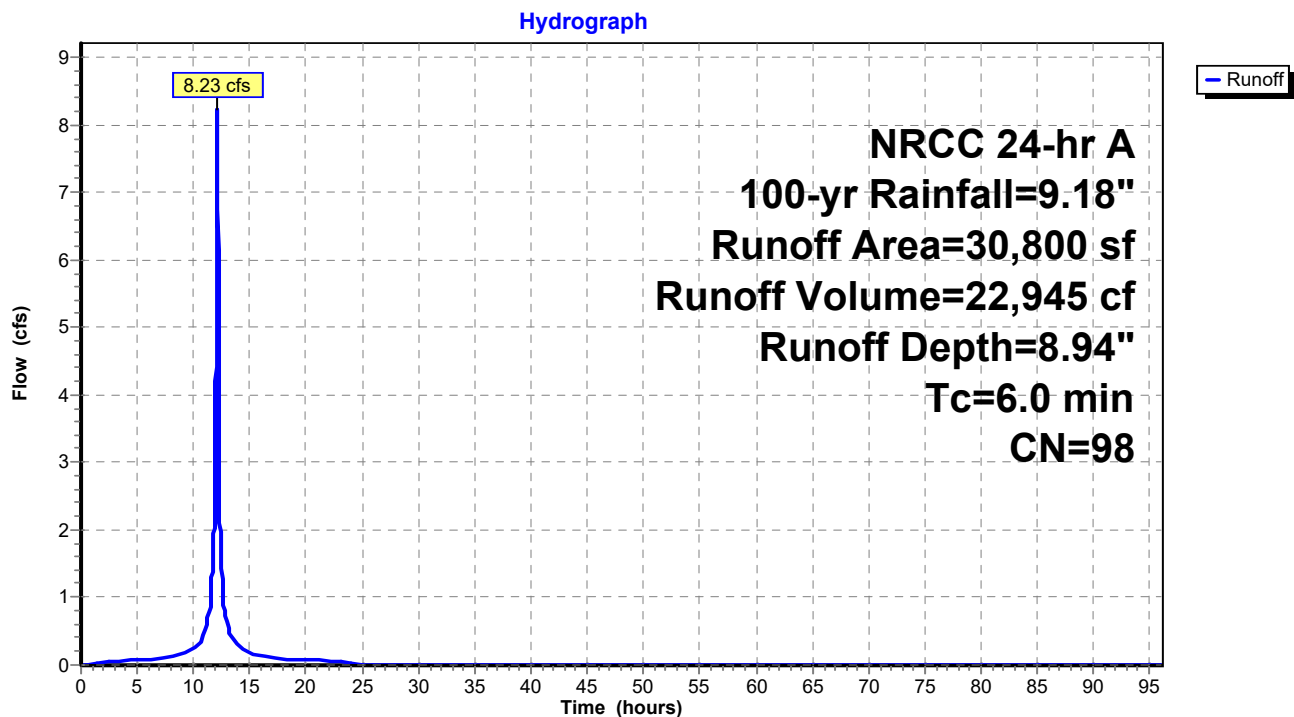
Summary for Subcatchment 52: Post B6

Runoff = 8.23 cfs @ 12.13 hrs, Volume= 22,945 cf, Depth= 8.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
30,800	98	Paved parking, HSG C
30,800		100.00% Impervious Area

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

Subcatchment 52: Post B6

North 60 Post B 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 53: DIV-4

Inflow Area = 30,800 sf, 100.00% Impervious, Inflow Depth = 8.94" for 100-yr event
 Inflow = 8.23 cfs @ 12.13 hrs, Volume= 22,945 cf
 Outflow = 8.23 cfs @ 12.13 hrs, Volume= 22,945 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.41 cfs @ 11.96 hrs, Volume= 16,655 cf
 Secondary = 6.08 cfs @ 12.14 hrs, Volume= 6,290 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 352.91' @ 12.14 hrs

Flood Elev= 355.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	349.50'	10.0" Round Culvert L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.50' / 349.50' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	349.50'	18.0" Round Culvert L= 70.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.50' / 348.00' S= 0.0214 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	352.50'	8.0' 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=3.30 cfs @ 11.96 hrs HW=352.53' TW=350.95' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 3.30 cfs @ 6.06 fps)**Secondary OutFlow** Max=6.06 cfs @ 12.14 hrs HW=352.91' TW=313.63' (Dynamic Tailwater)↑**2=Culvert** (Passes 6.06 cfs of 13.87 cfs potential flow)↑**3=Broad-Crested Rectangular Weir** (Weir Controls 6.06 cfs @ 1.86 fps)

North 60 Post B 3-9-20

Prepared by {enter your company name here}

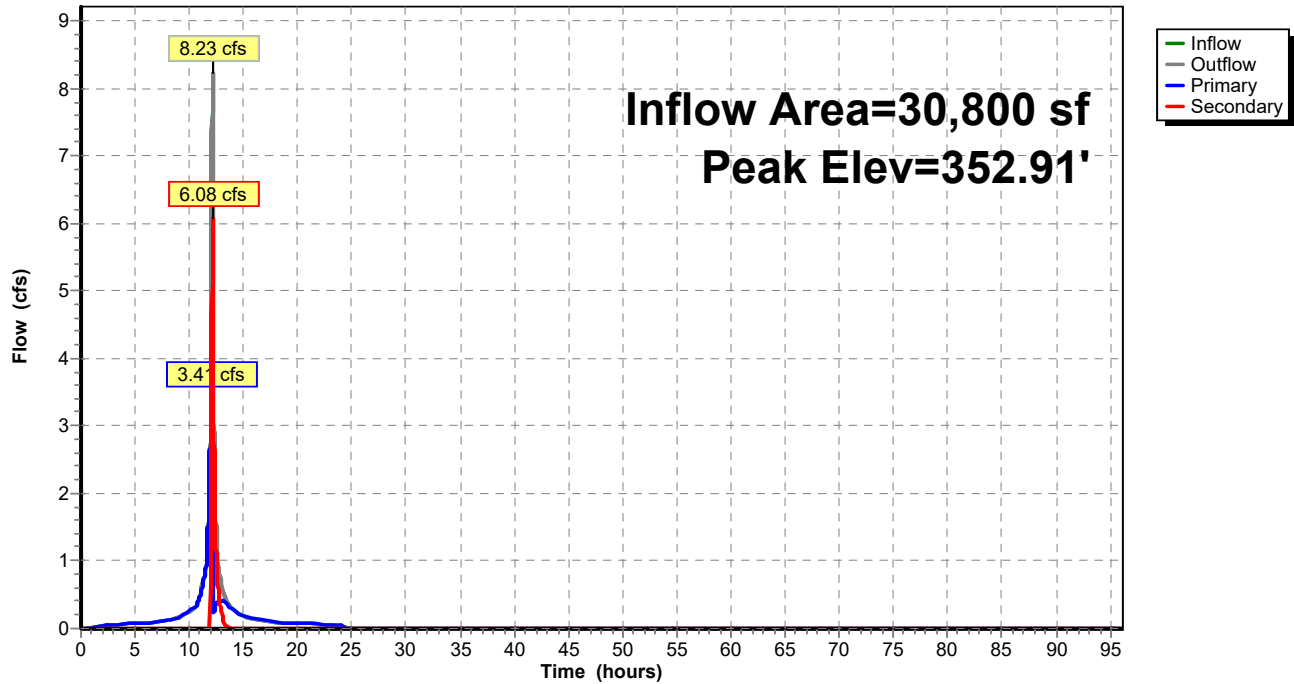
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NRCC 24-hr A 100-yr Rainfall=9.18"

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Pond 53: DIV-4

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Pond 54: INF-4

Inflow Area = 30,800 sf, 100.00% Impervious, Inflow Depth = 6.49" for 100-yr event
 Inflow = 3.41 cfs @ 11.96 hrs, Volume= 16,655 cf
 Outflow = 0.44 cfs @ 11.04 hrs, Volume= 16,655 cf, Atten= 87%, Lag= 0.0 min
 Discarded = 0.44 cfs @ 11.04 hrs, Volume= 16,655 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 352.75' @ 12.24 hrs Surf.Area= 1,887 sf Storage= 4,425 cf

Plug-Flow detention time= 63.8 min calculated for 16,654 cf (100% of inflow)
 Center-of-Mass det. time= 63.8 min (804.1 - 740.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	349.00'	1,859 cf	25.67'W x 73.50'L x 3.88'H Field A 7,310 cf Overall - 2,664 cf Embedded = 4,646 cf x 40.0% Voids
#2A	349.50'	2,664 cf	Cultec R-330XLHD x 50 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
		4,522 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	349.00'	10.000 in/hr Exfiltration over Horizontal area Phase-In= 0.01'

Discarded OutFlow Max=0.44 cfs @ 11.04 hrs HW=349.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.44 cfs)

North 60 Post B 3-9-20

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NRCC 24-hr A 100-yr Rainfall=9.18"

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Pond 54: INF-4 - 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

10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +12.0" End Stone x 2 = 73.50' 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 + 10.0" Cover = 3.88' Field Height

50 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,663.7 cf Chamber Storage

7,310.2 cf Field - 2,663.7 cf Chambers = 4,646.5 cf Stone x 40.0% Voids = 1,858.6 cf Stone Storage

Chamber Storage + Stone Storage = 4,522.3 cf = 0.104 af

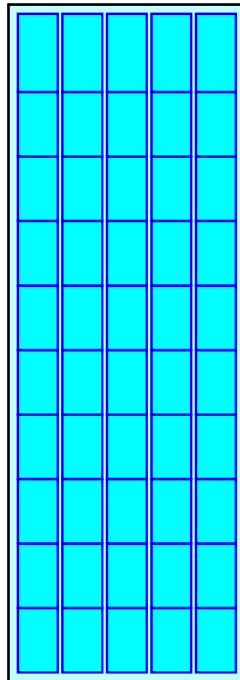
Overall Storage Efficiency = 61.9%

Overall System Size = 73.50' x 25.67' x 3.88'

50 Chambers

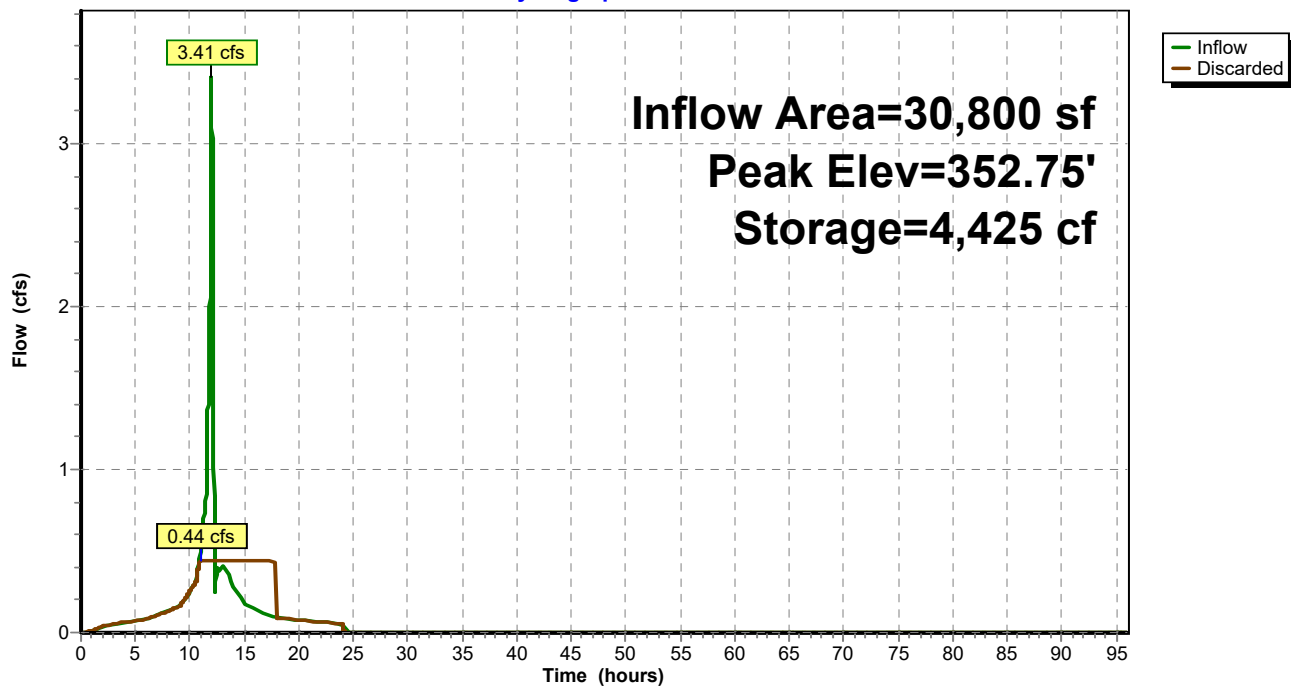
270.7 cy Field

172.1 cy Stone



Pond 54: INF-4

Hydrograph



North 60 Post B 3-9-20

NRCC 24-hr A 100-yr Rainfall=9.18"

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Summary for Subcatchment 55: Post B4

Runoff = 81.16 cfs @ 12.23 hrs, Volume= 263,859 cf, Depth= 5.49"

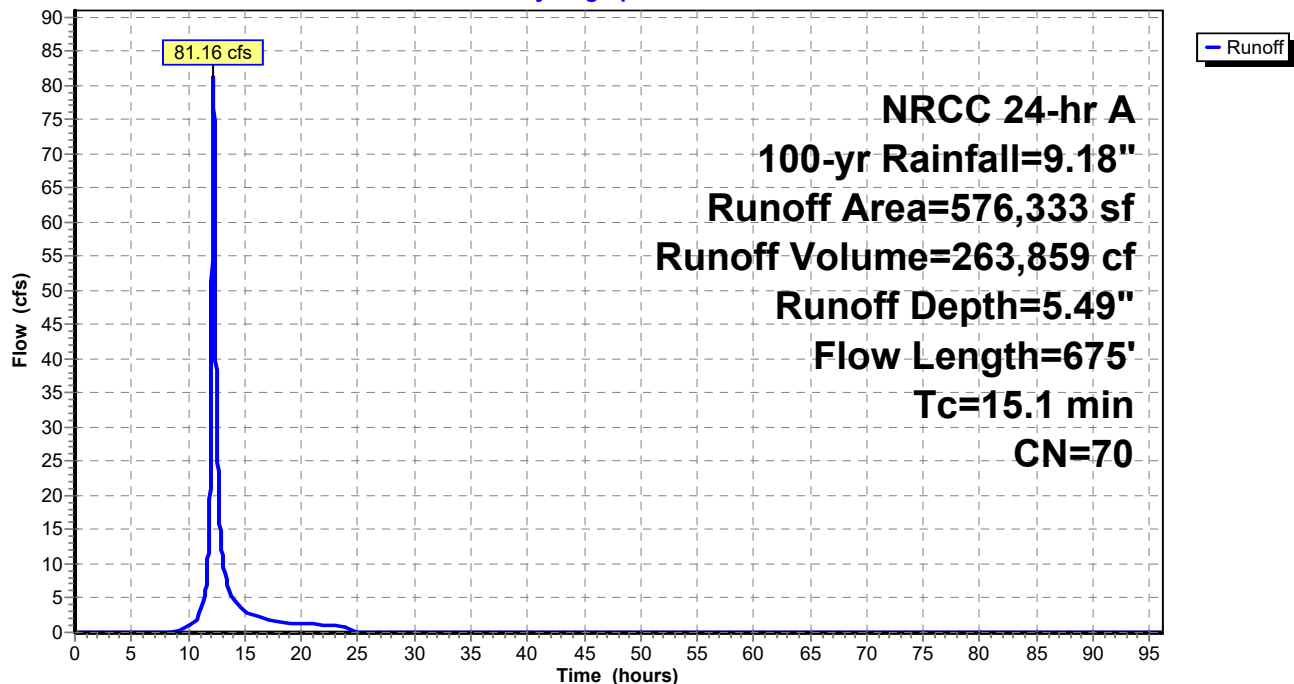
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
NRCC 24-hr A 100-yr Rainfall=9.18"

Area (sf)	CN	Description
515,493	70	Woods, Good, HSG C
60,840	74	>75% Grass cover, Good, HSG C
576,333	70	Weighted Average
576,333		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0600	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.9	575	0.0950	4.96		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.1	675	Total			

Subcatchment 55: Post B4

Hydrograph



North 60 Post B 3-9-20

Prepared by {enter your company name here}

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NRCC 24-hr A 100-yr Rainfall=9.18"

Printed 3/25/2020

Summary for Reach 56: Existing Stream B

Inflow Area = 2,400,996 sf, 26.26% Impervious, Inflow Depth > 6.98" for 100-yr event
Inflow = 139.55 cfs @ 12.18 hrs, Volume= 1,396,330 cf
Outflow = 137.57 cfs @ 12.21 hrs, Volume= 1,396,173 cf, Atten= 1%, Lag= 2.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.63 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.98 fps, Avg. Travel Time= 11.4 min

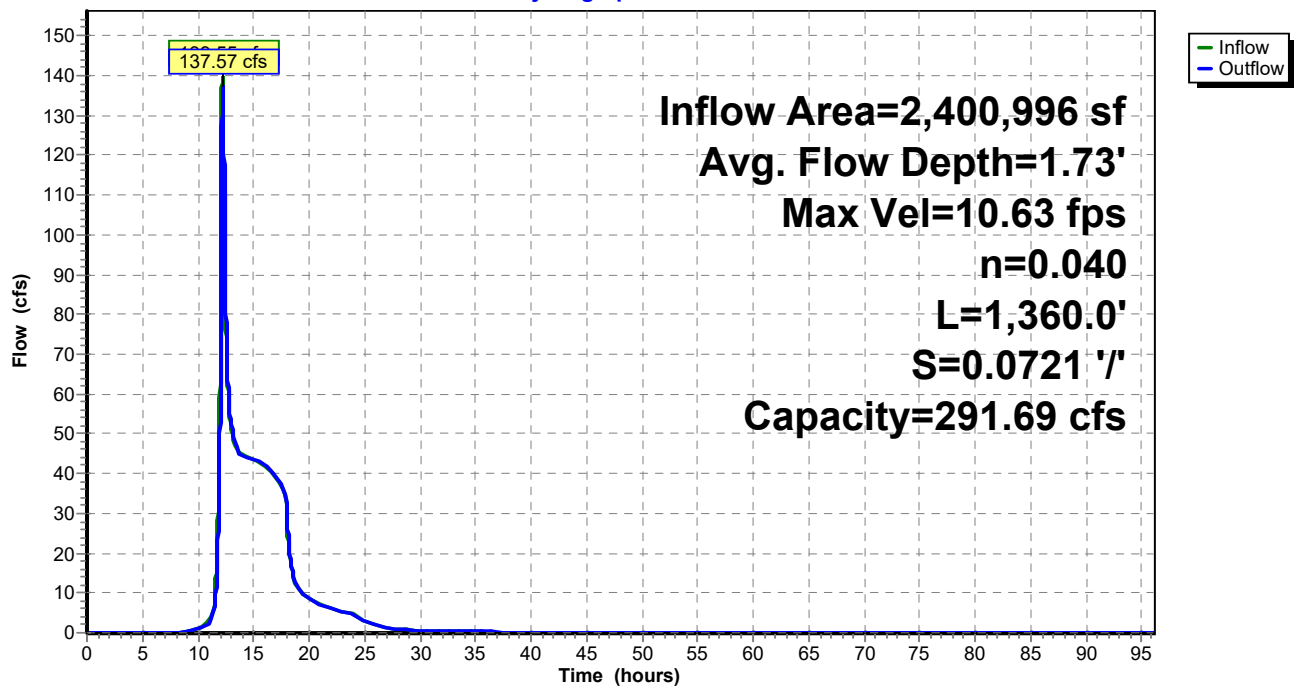
Peak Storage= 17,595 cf @ 12.21 hrs
Average Depth at Peak Storage= 1.73'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 291.69 cfs

4.00' x 2.50' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 ' ' Top Width= 14.00'
Length= 1,360.0' Slope= 0.0721 ' '
Inlet Invert= 312.00', Outlet Invert= 214.00'



Reach 56: Existing Stream B

Hydrograph



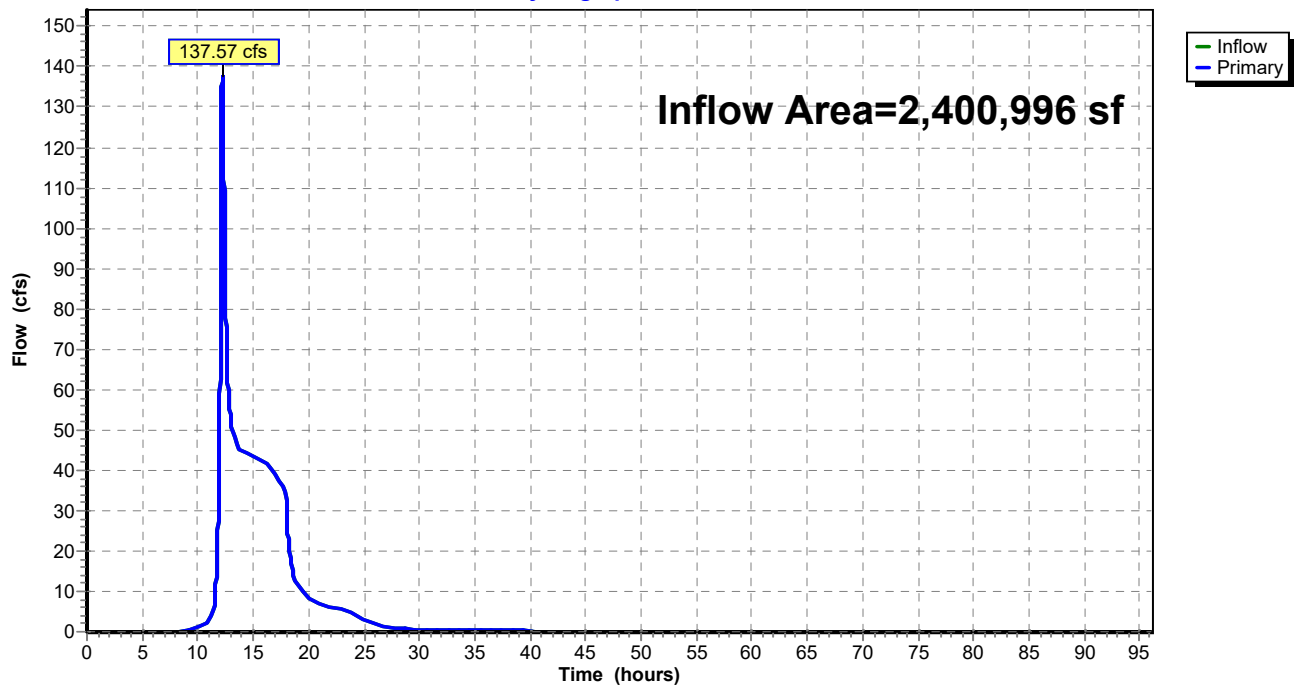
Summary for Link 57: Design Point B

Inflow Area = 2,400,996 sf, 26.26% Impervious, Inflow Depth > 6.98" for 100-yr event
 Inflow = 137.57 cfs @ 12.21 hrs, Volume= 1,396,173 cf
 Primary = 137.57 cfs @ 12.21 hrs, Volume= 1,396,173 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link 57: Design Point B

Hydrograph





Appendix B:
Water Quality Volume &
Runoff Reduction Calculations

Project The North 60 - Master Plan**Water Quality Volume (WQv) Calculation**Basin ID: **Basin A****90% WQv:**

Subcatchment Area (A): 1,680,274 sq.ft.
Rainfall (P): 1.5 in.
Impervious Area 1,198,104 sq.ft.*
Percent Imperviousness(I): 71.30 %
 $R_v = .05 + .009(I)$ 0.69174
 $R_v =$ 0.6917368 **
 $WQv = (P) (R_v) (A) / 12$ 145,288 cu.ft.
or
3.3354 ac.ft.

** Minimum $R_v = 0.2$ **Area Reduced WQv:**

Subcatchment Area (A): 1,680,274 sq.ft.
Rainfall (P): 1.5 in.
Impervious Area 1,198,104 sq.ft.
Percent Imperviousness(I): 71.30 %
 $R_v = .05 + .009(I)$ 0.69174
 $R_v =$ 0.6917368 **
 $WQv = (P) (R_v) (A) / 12$ 145,288 cu.ft.
or
3.3354 ac.ft.

** Minimum $R_v = 0.2$

Project The North 60 - Master Plan**Specified Runoff Reduction Volume (S-RRv)**

$$\text{RRv (in acre-feet of storage)} = [(P)(Rv)(Ai)] / 12$$

Basin ID: **Basin A**HSG: **C**

P = Rainfall (inches)

1.5 in

Rv = 0.05+0.009(I) where I is 100% impervious

0.95

Aic = Total area of new impervious cover

1,198,104 ft²S = Hydrologic Soil Group (HSG) Specific Reduction Factor (S)

0.30

HSG A = 0.55

HSG C = 0.30

HSG B = 0.40

HSG D = 0.20

Ai = (S)(Aic)

359,431 ft²

Ai = impervious cover targeted for runoff reduction

therefore:

RRv =

$$\begin{array}{ccccccc} [(P) & (Rv) & (Ai)] & / & 12 \\ 1.5 & 0.95 & 359,431 & / & 12 = \end{array}$$

42,682 cu-ft**0.9799 ac-ft**



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Area Reduction Practices

Basin ID: **Basin A**

	<u>Total Area</u>	<u>Area of Impervious (AI)</u>
<i>Original Drainage Area (DA):</i>	1,680,274 sq.ft.	1,198,104 sq.ft.
Conservation of Natural Areas:	- 0 sq.ft.	- 0 sq.ft.
Riparian Buffers / Filter Strips:	- 0 sq.ft.	- 0 sq.ft.
Tree Planting / Tree Preservation:	- 0 sq.ft.	- 0 sq.ft.
Total Area Reduction:	= 0 sq.ft.	
Total AI Reduction:	=	0 sq.ft.
<i>Remaining DA:</i>	1,680,274 sq.ft.	-
<i>Remaining AI:</i>	-	1,198,104 sq.ft.
or	38.5738 Acres	27.5047 Acres



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Roof Top Disconnect

Basin ID: **Basin A**

Total Area of Roof To Be Disconnected:

Total Area:

0 sq.ft.

Recalculate WQv:

Subcatchment Area (A):	1,680,274 sq.ft.
Rainfall (P):	1.5 in.
Impervious Area	1,198,104 sq.ft.
Percent Imperviousness(I):	71.30 %
$R_v = .05 + .009(I)$	0.69174
$R_v =$	0.6917368
WQv =	145,288 cu.ft.
	or
	3.3354 ac.ft.



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Project The North 60 - Master Plan

Source Control Practices

Basin ID: Infiltrator System 1

HSG: C

Practice Type: I = Infiltration

(I)=Infiltration, (B)=Bioretention, (D)=Dry Swale, (V)=Vegetated Swale, (G)=Green Roof, (R)=Rain Garden,
(S)=Stormwater Planters, (C)=Cisterns/Rain Barrels, (P)=Porous Pavement

Total Area:

DA Tributary to Practice(s):

93,277 sq.ft.

AI to Practice(s):

93,277 sq.ft.

Subcatchment Area (A): 93,277 sq.ft.

Rainfall (P): 1.5 in.

Impervious Area 93,277 sq.ft.

Percent Imperviousness(I): 100.00 %

WQv 11,077 cu.ft.

or

0.2543 ac.ft.

Allowable Runoff Reduction Volume (RRv)

Practice Type: I = Infiltration

HSG: C

Allowable runoff reduction volume for Infiltration in C soil = 100% of WQv

11,077 x 1.00 = 11,077 cu.ft.

or

0.2543 ac.ft.



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Source Control Practices

Basin ID: Infiltrator System 2

HSG: C

Practice Type: I = Infiltration

(I)=Infiltration, (B)=Bioretention, (D)=Dry Swale, (V)=Vegetated Swale, (G)=Green Roof, (R)=Rain Garden,
(S)=Stormwater Planters, (C)=Cisterns/Rain Barrels, (P)=Porous Pavement

Total Area:

DA Tributary to Practice(s):

92,926 sq.ft.

AI to Practice(s):

92,926 sq.ft.

Subcatchment Area (A): 92,926 sq.ft.
Rainfall (P): 1.5 in.
Impervious Area 92,926 sq.ft.
Percent Imperviousness(I): 100.00 %

WQv 11,035 cu.ft.
or
0.2533 ac.ft.

Allowable Runoff Reduction Volume (RRv)

Practice Type: I = Infiltration

HSG: C

Allowable runoff reduction volume for Infiltration in C soil = 100% of WQv

11,035 x 1.00 = 11,035 cu.ft.
or
0.2533 ac.ft.



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Project The North 60 - Master Plan

Source Control Practices

Basin ID: Infiltration System 5

HSG: C

Practice Type: I = Infiltration

(I)=Infiltration, (B)=Bioretention, (D)=Dry Swale, (V)=Vegetated Swale, (G)=Green Roof, (R)=Rain Garden,
(S)=Stormwater Planters, (C)=Cisterns/Rain Barrels, (P)=Porous Pavement

Total Area:

DA Tributary to Practice(s):

304,098 sq.ft.

AI to Practice(s):

234,393 sq.ft.

Subcatchment Area (A): 304,098 sq.ft.

Rainfall (P): 1.5 in.

Impervious Area 234,393 sq.ft.

Percent Imperviousness(I): 77.08 %

WQv 28,270 cu.ft.

or

0.6490 ac.ft.

Allowable Runoff Reduction Volume (RRv)

Practice Type: I = Infiltration

HSG: C

Allowable runoff reduction volume for Infiltration in C soil = 100% of WQv

28,270 x 1.00 = 28,270 cu.ft.

or

0.6490 ac.ft.



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Source Control Practices

Basin ID: Infiltration System 6

HSG: C

Practice Type: I = Infiltration

(I)=Infiltration, (B)=Bioretention, (D)=Dry Swale, (V)=Vegetated Swale, (G)=Green Roof, (R)=Rain Garden,
(S)=Stormwater Planters, (C)=Cisterns/Rain Barrels, (P)=Porous Pavement

Total Area:

DA Tributary to Practice(s):

161,485 sq.ft.

AI to Practice(s):

83,450 sq.ft.

Subcatchment Area (A): 161,485 sq.ft.

Rainfall (P): 1.5 in.

Impervious Area 83,450 sq.ft.

Percent Imperviousness(I): 51.68 %

WQv 10,397 cu.ft.

or

0.2387 ac.ft.

Allowable Runoff Reduction Volume (RRv)

Practice Type: I = Infiltration

HSG: C

Allowable runoff reduction volume for Infiltration in C soil = 100% of WQv

10,397 x 1.00 = 10,397 cu.ft.

or

0.2387 ac.ft.



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Project The North 60 - Master Plan

Source Control Practices

Basin ID: Infiltration System 7

HSG: C

Practice Type: I = Infiltration

(I)=Infiltration, (B)=Bioretention, (D)=Dry Swale, (V)=Vegetated Swale, (G)=Green Roof, (R)=Rain Garden,
(S)=Stormwater Planters, (C)=Cisterns/Rain Barrels, (P)=Porous Pavement

DA Tributary to Practice(s):

Total Area:

160,184 sq.ft.

AI to Practice(s):

122,493 sq.ft.

Subcatchment Area (A): 160,184 sq.ft.

Rainfall (P): 1.5 in.

Impervious Area 122,493 sq.ft.

Percent Imperviousness(I): 76.47 %

WQv 14,782 cu.ft.

or

0.3393 ac.ft.

Allowable Runoff Reduction Volume (RRv)

Practice Type: I = Infiltration

HSG: C

Allowable runoff reduction volume for Infiltration in C soil = 100% of WQv

14,782 x 1.00 = 14,782 cu.ft.

or

0.3393 ac.ft.



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Project The North 60 - Master Plan

Source Control Practices

Basin ID: Infiltration Basin 3 (SWP-5)

HSG: C

Practice Type: I = Infiltration

(I)=Infiltration, (B)=Bioretention, (D)=Dry Swale, (V)=Vegetated Swale, (G)=Green Roof, (R)=Rain Garden,
(S)=Stormwater Planters, (C)=Cisterns/Rain Barrels, (P)=Porous Pavement

Total Area:

DA Tributary to Practice(s):

577,592 sq.ft.

AI to Practice(s):

474,518 sq.ft.

Subcatchment Area (A): 577,592 sq.ft.

Rainfall (P): 1.5 in.

Impervious Area 474,518 sq.ft.

Percent Imperviousness(I): 82.15 %

WQv 56,993 cu.ft.

or

1.3084 ac.ft.

Allowable Runoff Reduction Volume (RRv)

Practice Type: I = Infiltration

HSG: C

Allowable runoff reduction volume for Infiltration in C soil = 100% of WQv

56,993 x 1.00 = 56,993 cu.ft.

or

1.3084 ac.ft.



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Total Runoff Reduction Volume

Basin ID: Post A

Total RRv provided:

				RRv
Original WQv - Area Reduced WQv:	145,288	-	145,288	= 0 cu.ft.
Roof Top Disconnection:				= 0 cu.ft.
Source Control WQv Treatment Practices:				
<u>Basin:</u>				
Infiltrator System 1		=		11,077 cu.ft.
Infiltrator System 2		=		11,035 cu.ft.
Infiltration System 5		=		28,270 cu.ft.
Infiltration System 6		=		10,397 cu.ft.
Infiltration System 7		=		14,782 cu.ft.
Infiltration Basin 3 (SWP-5)		=		56,993 cu.ft.

Total RRv provided: 132,554 cu.ft.
or
3.043 ac.ft.

Is RRv provided 3.043 ac. ft. $\geq$ Original WQv 3.335 ac. ft.

No

Is RRv provided 3.043 ac. ft. $\geq$ S-RRv (min. RRv) 0.980 ac. ft.

Yes

Total drainage area treated with runoff reduction / source control practices:

Area Reduction Practices:	0 sq.ft.	or	0.000 Acres
Source Control Practices:	490,301 sq.ft.	or	11.256 Acres
Total:			11.256 Acres

Project The North 60 - Master Plan**Water Quality Volume (WQv) Calculation**Basin ID: **Basin B**

90% WQv:

Subcatchment Area (A):	379,185 sq.ft.	
Rainfall (P):	1.5 in.	
Impervious Area	259,168 sq.ft.*	
Percent Imperviousness(I):	68.35 %	
$R_v = .05 + .009(I)$	0.66514	
$R_v =$	0.6651383 **	** Minimum $R_v = 0.2$
$WQv = (P) (R_v) (A) / 12$	31,526 cu.ft.	
	or	
	0.7237 ac.ft.	

Area Reduced WQv:

Subcatchment Area (A):	379,185 sq.ft.	
Rainfall (P):	1.5 in.	
Impervious Area	259,168 sq.ft.	
Percent Imperviousness(I):	68.35 %	
$R_v = .05 + .009(I)$	0.66514	
$R_v =$	0.6651383 **	** Minimum $R_v = 0.2$
$WQv = (P) (R_v) (A) / 12$	31,526 cu.ft.	
	or	
	0.7237 ac.ft.	

Project The North 60 - Master Plan**Specified Runoff Reduction Volume (S-RRv)**

$$\text{RRv (in acre-feet of storage)} = [(P)(Rv)(Ai)] / 12$$

Basin ID: **Basin B**HSG: **C**

P = Rainfall (inches)

1.5 in

Rv = 0.05+0.009(I) where I is 100% impervious

0.95

Aic = Total area of new impervious cover

259,168 ft²S = Hydrologic Soil Group (HSG) Specific Reduction Factor (S)

0.30

HSG A = 0.55

HSG C = 0.30

HSG B = 0.40

HSG D = 0.20

Ai = (S)(Aic)

77,750 ft²

Ai = impervious cover targeted for runoff reduction

therefore:

RRv =

$$\begin{array}{ccccccc} [(P) & (Rv) & (Ai)] & & / & 12 \\ 1.5 & 0.95 & 77,750 & & / & 12 = \end{array}$$

9,233 cu-ft**0.2120 ac-ft**

Project The North 60 - Master Plan**Area Reduction Practices**Basin ID: **Basin B**

	<u>Total Area</u>	<u>Area of Impervious (AI)</u>
<i>Original Drainage Area (DA):</i>	379,185 sq.ft.	259,168 sq.ft.
Conservation of Natural Areas:	- 0 sq.ft.	- 0 sq.ft.
Riparian Buffers / Filter Strips:	- 0 sq.ft.	- 0 sq.ft.
Tree Planting / Tree Preservation:	- 0 sq.ft.	- 0 sq.ft.
Total Area Reduction:	= 0 sq.ft.	
Total AI Reduction:	=	0 sq.ft.
<i>Remaining DA:</i>	379,185 sq.ft.	-
<i>Remaining AI:</i>	-	259,168 sq.ft.
or	8.7049 Acres	5.9497 Acres



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Roof Top Disconnect

Basin ID: **Basin B**

Total Area of Roof To Be Disconnected:

Total Area:

0 sq.ft.

Recalculate WQv:

Subcatchment Area (A):	379,185 sq.ft.
Rainfall (P):	1.5 in.
Impervious Area	259,168 sq.ft.
Percent Imperviousness(I):	68.35 %
$R_v = .05 + .009(I)$	0.66514
Rv =	0.6651383
WQv =	31,526 cu.ft.
	or
	0.7237 ac.ft.



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Project The North 60 - Master Plan

Source Control Practices

Basin ID: Infiltrator System 4

HSG: C

Practice Type: I = Infiltration

(I)=Infiltration, (B)=Bioretention, (D)=Dry Swale, (V)=Vegetated Swale, (G)=Green Roof, (R)=Rain Garden,
(S)=Stormwater Planters, (C)=Cisterns/Rain Barrels, (P)=Porous Pavement

DA Tributary to Practice(s):

AI to Practice(s):

Total Area:

30,800 sq.ft.

30,800 sq.ft.

Subcatchment Area (A): 30,800 sq.ft.

Rainfall (P): 1.5 in.

Impervious Area 30,800 sq.ft.

Percent Imperviousness(I): 100.00 %

WQv 3,658 cu.ft.

or

0.0840 ac.ft.

Allowable Runoff Reduction Volume (RRv)

Practice Type: I = Infiltration

HSG: C

Allowable runoff reduction volume for Infiltration in C soil = 100% of WQv

3,658 x 1.00 = 3,658 cu.ft.

or

0.0840 ac.ft.



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Project The North 60 - Master Plan

Source Control Practices

Basin ID: Infiltrator System 8

HSG: C

Practice Type: I = Infiltration

(I)=Infiltration, (B)=Bioretention, (D)=Dry Swale, (V)=Vegetated Swale, (G)=Green Roof, (R)=Rain Garden,
(S)=Stormwater Planters, (C)=Cisterns/Rain Barrels, (P)=Porous Pavement

DA Tributary to Practice(s):

Total Area:

152,601 sq.ft.

AI to Practice(s):

129,082 sq.ft.

Subcatchment Area (A): 152,601 sq.ft.

Rainfall (P): 1.5 in.

Impervious Area 129,082 sq.ft.

Percent Imperviousness(I): 84.59 %

WQv 15,475 cu.ft.

or

0.3553 ac.ft.

Allowable Runoff Reduction Volume (RRv)

Practice Type: I = Infiltration HSG: C

Allowable runoff reduction volume for Infiltration in C soil = 100% of WQv

15,475 x 1.00 = 15,475 cu.ft.

or

0.3553 ac.ft.



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Total Runoff Reduction Volume

Basin ID: Post B

Total RRv provided:

Original WQv - Area Reduced WQv:	31,526	-	31,526	=	<u>RRv</u>	0 cu.ft.
Roof Top Disconnection:				=		0 cu.ft.
Source Control WQv Treatment Practices:						
<u>Basin:</u>						
Infiltrator System 4				=		3,658 cu.ft.
Infiltrator System 8				=		15,475 cu.ft.

Total RRv provided: 19,133 cu.ft.
or
0.439 ac.ft.

Is RRv provided 0.439 ac. ft. ≥ Original WQv 0.724 ac. ft.

No

Is RRv provided 0.439 ac. ft. ≥ S-RRv (min. RRv) 0.212 ac. ft.

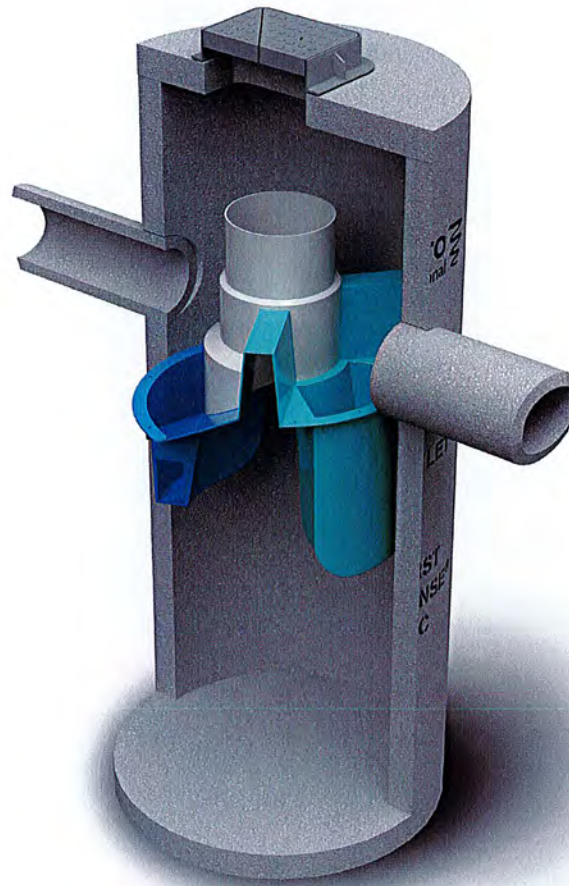
Yes

Total drainage area treated with runoff reduction / source control practices:

Area Reduction Practices:	0 sq.ft.	or	0.000 Acres
Source Control Practices:	183,401 sq.ft.	or	4.210 Acres
Total:			4.210 Acres



Appendix C:
First Defense Stormwater Treatment
Chamber Information



Operation and Maintenance Manual

First Defense® and First Defense® High Capacity

Vortex Separator for Stormwater Treatment

Table of Contents

3	FIRST DEFENSE® BY HYDRO INTERNATIONAL
	- INTRODUCTION
	- OPERATION
	- POLLUTANT CAPTURE AND RETENTION
4	MODEL SIZES & CONFIGURATIONS
	- FIRST DEFENSE® COMPONENTS
5	MAINTENANCE
	- OVERVIEW
	- MAINTENANCE EQUIPMENT CONSIDERATIONS
	- DETERMINING YOUR MAINTENANCE SCHEDULE
6	MAINTENANCE PROCEDURES
	- INSPECTION
	- FLOATABLES AND SEDIMENT CLEAN OUT
8	FIRST DEFENSE® INSTALLATION LOG
9	FIRST DEFENSE® INSPECTION AND MAINTENANCE LOG

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I. First Defense® by Hydro International

Introduction

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations (refer to Section II, Model Sizes & Configurations, page 4) to accommodate a wide range of pipe sizes, peak flows and depth constraints.

Operation

The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space entry are avoided.

Pollutant Capture and Retention

The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for "offline" arrangements using separate junction manholes
- Proven to prevent pollutant washout at up to 500% of its treatment flow
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

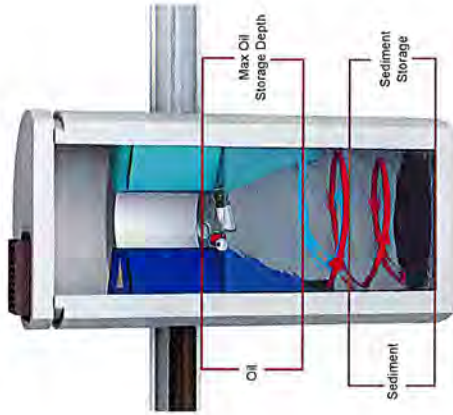


Fig 1 Pollutant storage volumes in the First Defense®.

II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components of the First Defense®-4HC and First Defense®-6HC have modified geometries as to allow greater design flexibility needed to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2a - 2b). First Defense® model parameters and design criteria are shown in Table 1.

First Defense® Components

1. Built-In Bypass
2. Inlet Pipe
3. Inlet Chute
4. Floatables Draw-off Port
5. Outlet Pipe
6. Floatables Storage
7. Sediment Storage
8. Inlet Grate or Cover

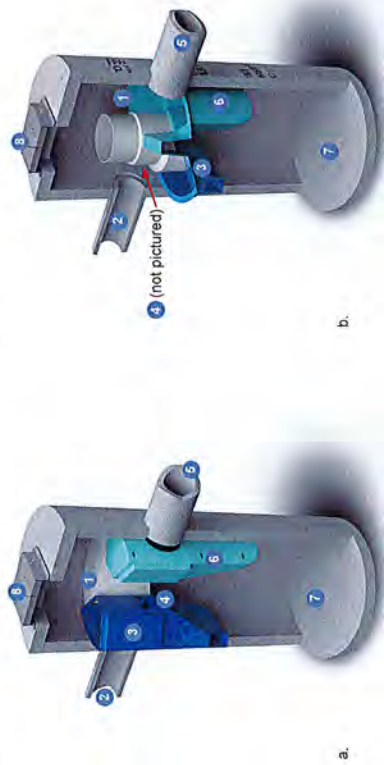


Fig.2a) First Defense®-4 and First Defense®-6; b) First Defense®-4HC and First Defense®-6HC, with higher capacity dual internal bypass and larger maximum pipe diameter.

First Defense® High Capacity Model Number	Diameter (ft / m)	Typical Treatment Flow Rates		Peak Online Flow Rate	Maximum Pipe Diameter¹	Oil Storage Capacity	Typical Sediment Storage Capacity²	Minimum Distance from Outlet Invert to Top of Rim³	Chamber Depth
		(cfs / L/s)	(gals / L/s)						
FD-3HC	3 / 0.9	0.85 / 24.0	15 / 424	18 / 457	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.75 / 1.14	
FD-4HC	4 / 1.2	1.50 / 42.4	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	5.00 / 1.52	
FD-5HC	5 / 1.5	2.35 / 66.2	20 / 566	24 / 609	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.25 / 1.60	
FD-6HC	6 / 1.8	3.38 / 95.7	32 / 905	30 / 750	496 / 1878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	6.25 / 1.90	
FD-7HC	7 / 2.1	4.60 / 130.2	40 / 1133	42 / 1067	750 / 2839	2.1 / 1.9	3.0 - 5.5 / 0.9 - 1.7	7.25 / 2.20	
FD-8HC	8 / 2.4	6.00 / 169.9	50 / 1,415	48 / 1219	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 - 1.8	8.00 / 2.43	

¹Contact Hydro International when larger pipe sizes are required.

²Contact Hydro International when custom sediment storage capacity is required.

³Minimum distance for models depends on pipe diameter.

III. Maintenance

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil. Maximum pollutant storage capacities are provided in Table 1.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense®-HC have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.



Fig.3 The central opening to the sump of the First Defense®-HC is 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / floatables removal, for a 6-ft First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.
4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.
5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.
6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.
7. Securely replace the grate or lid.
8. Take down safety equipment.
9. Notify Hydro International of any irregularities noted during inspection.

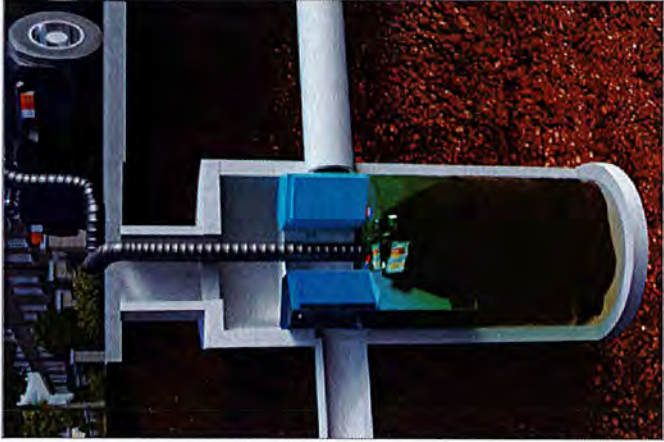


Fig.4 Floatables are removed with a vector hose (First Defense model FD-4, shown).

Floatables and Sediment Clean Out

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.5).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vector hose and skimmer pole to be lowered to the base of the sump.

Scheduling

- Floatables and sump clean out are typically conducted once a year during any season.
- Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vector truck (flexible hose recommended)
- First Defense® Maintenance Log

Floatables and sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. Remove oil and floatables stored on the surface of the water with the vector hose (Fig.5) or with the skimmer or net (not pictured).
5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).
6. Once all floatables have been removed, drop the vector hose to the base of the sump. Vector out the sediment and gross debris off the sump floor (Fig.5).
7. Retract the vector hose from the vessel.
8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.
9. Securely replace the grate or lid.

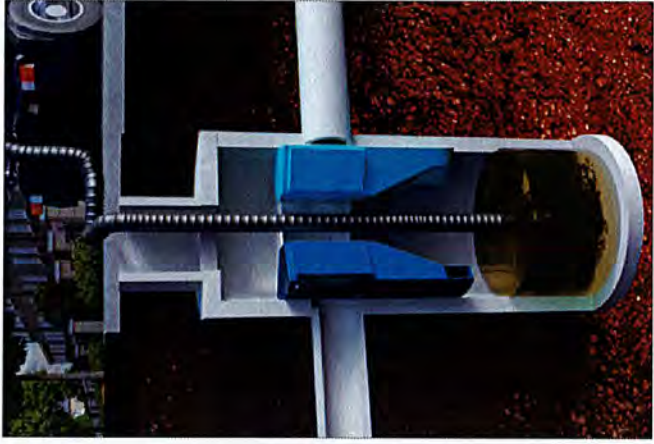


Fig.5 Sediment is removed with a vector hose (First Defense model FD-4, shown).

Maintenance at a Glance

Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area
NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.	



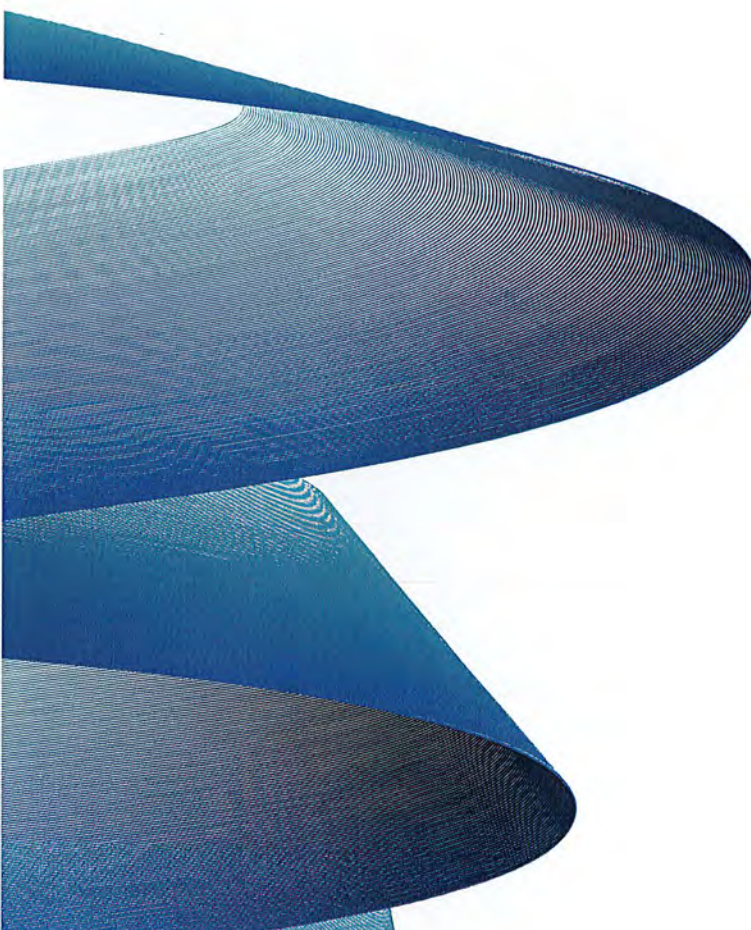
First Defense® Inspection and Maintenance Log

[illegible]

MODEL SIZE (CIRCLE ONE):

[illegible]

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com



Stormwater Solutions

94 Hutchins Drive
Portland, ME 04102

Tel: (207) 756-6200

Fax: (207) 756-6212

stormwaterinquiry@hydro-int.com

www.hydro-int.com

Turning Water Around...®

FDHC_O+M_H_1703



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B

Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432

http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

March 9, 2017

Mr. Dave Scott
Technical Product Manager
Hydro International
94 Hutchins Drive
Portland, ME 04102

Re: MTD Lab Certification
First Defense® HC (FDHC) Stormwater Treatment Device by Hydro International
On-line Installation

TSS Removal Rate 50%

Dear Mr. Scott:

This revised certification letter supersedes the Department's prior certification dated April 4, 2016. This revision was completed to reflect the updated Manufactured Treatment Device (MTD) scaling methodology as agreed upon by the manufacturers' working group on September 19, 2016. In part, the updated scaling for hydrodynamic MTDs is based on the depth of the reference (tested) MTD from the top of the false floor utilized during removal efficiency testing, not from the physical bottom of the unit. Based on the above decision, Table A-2 of the NJCAT Technology Verification report located at <http://www.njcat.org/uploads/newDocs/FDHCVerificationReportFinal.pdf> has been revised, and Table 1 noted below has been updated as well.

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested an MTD Laboratory Certification for the First Defense® HC Stormwater Treatment Device.

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report dated February 2016 (Revised

January 2017) with the Verification Appendix for this device is published online at <http://www.njcat.org/verification-process/technology-verification-database.html>.

The NJDEP certifies the use of the First Defense® HC Stormwater Treatment Device by Hydro International at a TSS removal rate of 50% when designed, operated and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.
2. The First Defense® HC Stormwater Treatment Device shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.
3. This First Defense® HC Stormwater Treatment Device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhance removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.
4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.
5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the First Defense® HC Stormwater Treatment Device, which is attached to this document. However, it is recommended to review the maintenance manual at <http://a2795.actonsoftware.com/acton/attachment/2795/f-0132/1/-/-/-/Hydro-International-First-Defense-Treatment-System.pdf> for any changes to the maintenance requirements.
6. Sizing Requirements:

The example below demonstrates the sizing procedure for the First Defense® HC Stormwater Treatment Device:

Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using a First Defense® HC Stormwater Treatment Device. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was based on the following:

time of concentration = 10 minutes

i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)

c=0.99 (curve number for impervious)

$Q=ciA=0.99 \times 3.2 \times 0.25 = 0.79$ cfs

Given the site runoff is 0.79 cfs and based on Table 1 below, the First Defense® HC Model 3-ft with a MTFR of 0.85 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1 and Table A-2.

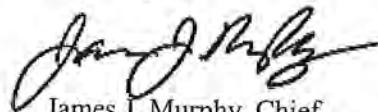
Table 1 First Defense® HC Models

First Defense® Model	Manhole Diameter (ft)	Maximum Treatment Flowrate, MTFR (cfs)
3-ft	3	0.85
4-ft	4	1.5
5-ft	5	2.35
6-ft	6	3.38
7-ft	7	4.60
8-ft	8	6.00

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Mr. Shashi Nayak of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

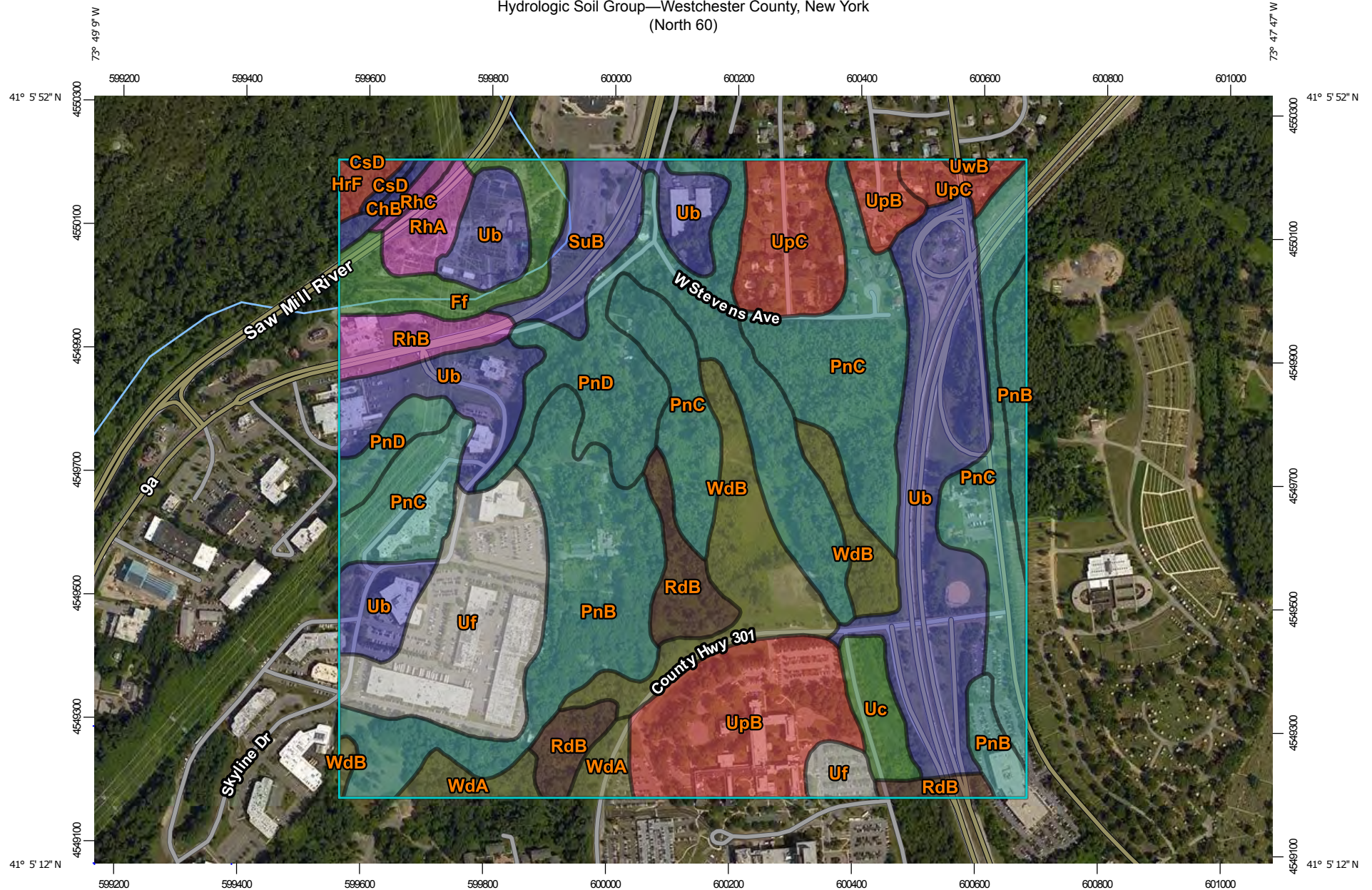
Attachment: Maintenance Plan

C: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP - BNPC

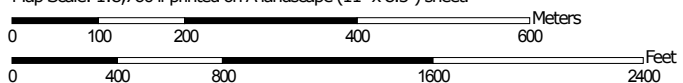


Appendix D:
NRCS Soil Map

Hydrologic Soil Group—Westchester County, New York (North 60)



Map Scale: 1:8,760 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

12/6/2017
Page 1 of 4

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 1:12,000.

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: Westchester County, New York
 Survey Area Data: Version 13, 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: Jul 21, 2014—Aug 27, 2014

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
ChB	Charlton fine sandy loam, 3 to 8 percent slopes	B	1.2	0.4%
CsD	Chatfield-Charlton complex, 15 to 35 percent slopes, very rocky	B	0.6	0.2%
Ff	Fluvaquents-Udifulvents complex, frequently flooded	A/D	8.6	3.0%
HrF	Hollis-Rock outcrop complex, 35 to 60 percent slopes	D	1.4	0.5%
PnB	Paxton fine sandy loam, 3 to 8 percent slopes	C	32.3	11.3%
PnC	Paxton fine sandy loam, 8 to 15 percent slopes	C	47.3	16.5%
PnD	Paxton fine sandy loam, 15 to 25 percent slopes	C	31.1	10.9%
RdB	Ridgebury loam, 3 to 8 percent slopes	B/D	9.5	3.3%
RhA	Riverhead loam, 0 to 3 percent slopes	A	3.8	1.3%
RhB	Riverhead loam, 3 to 8 percent slopes	A	5.1	1.8%
RhC	Riverhead loam, 8 to 15 percent slopes	A	0.9	0.3%
SuB	Sutton loam, 3 to 8 percent slopes	B	7.7	2.7%
Ub	Udorthents, smoothed	B	51.7	18.0%
Uc	Udorthents, wet substratum	A/D	4.3	1.5%
Uf	Urban land		23.4	8.2%
UpB	Urban land-Paxton complex, 3 to 8 percent slopes	D	21.8	7.6%
UpC	Urban land-Paxton complex, 8 to 15 percent slopes	D	12.4	4.3%
UwB	Urban land-Woodbridge complex, 3 to 8 percent slopes	D	0.3	0.1%
WdA	Woodbridge loam, 0 to 3 percent slopes	C/D	5.0	1.7%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
WdB	Woodbridge loam, 3 to 8 percent slopes	C/D	18.3	6.4%
Totals for Area of Interest			286.9	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

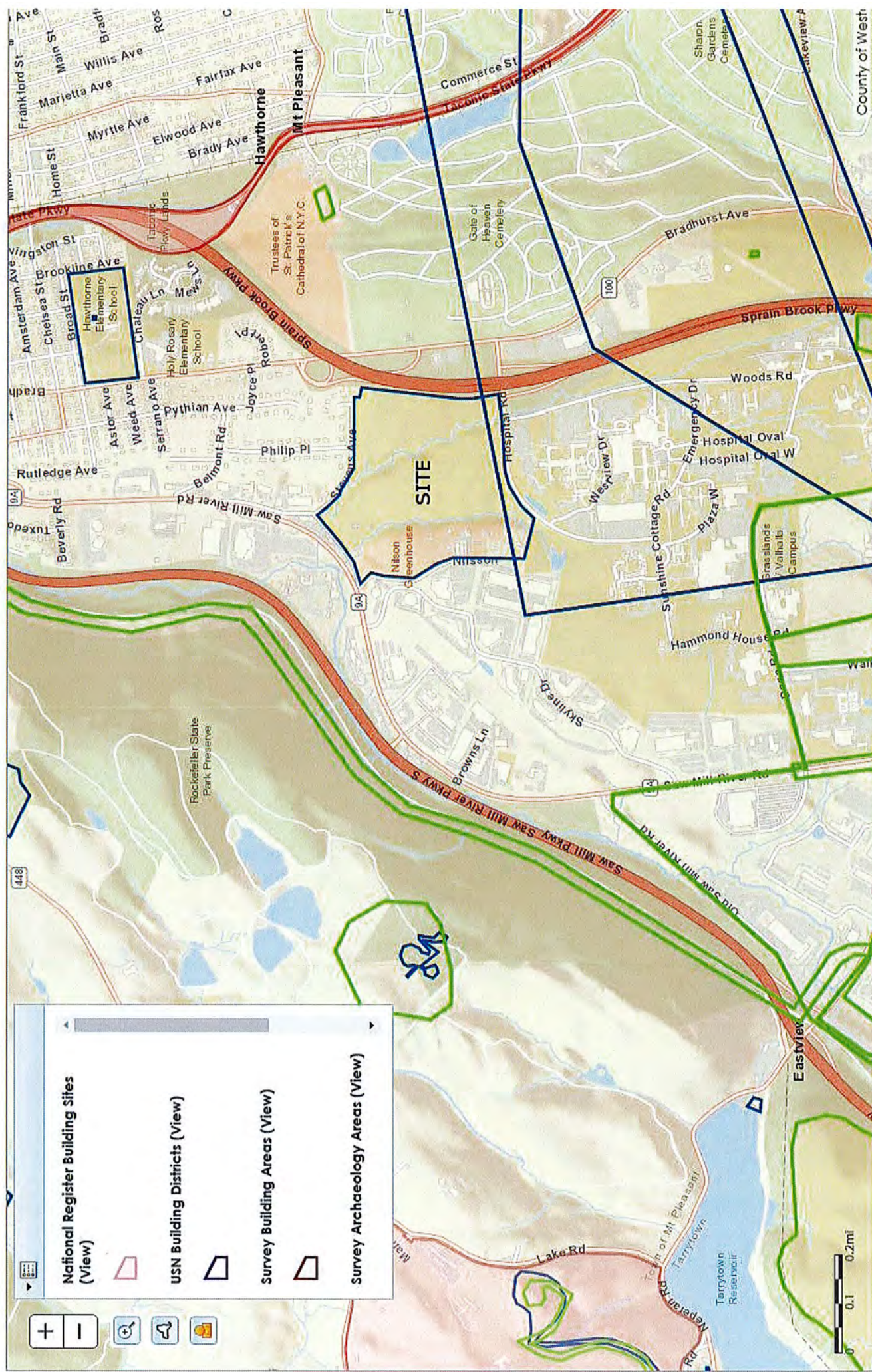
Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Appendix E:
Map of Historic Places
In Vicinity of Project

MAP OF HISTORIC PLACES IN VICINITY OF PROJECT





Appendix F:
NYSDEC 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 inspector¹ conduct an assessment of the site prior to the commencement of construction² 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 stabilization³ 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:This image shows a full page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for handwriting practice or general writing. There are no margins, text, or other markings on the page.



Appendix G:
New York State Stormwater Management Design Manual
Maintenance & Inspection Checklist

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 dewaterers 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:
Soil Testing Results

STORMWATER SOIL TESTING RESULTS				
TEST PIT I.D.	DESCRIPTION	FULL DEPTH	DEPTH TO LEDGEROCK	DEPTH TO GROUNDWATER
#1	6" TOP SOIL, 36" FINE SANDY LOAM, 102" MED/FINE SANDS W/ BLDRS, 12" FINE GREY SAND	13'	-	-
#2	6" TOP SOIL, 36" FINE SANDY LOAM, 96" MED/FINE SANDS MODERATE COMPACTION, 30" MED SAND/GRAVEL	14'	-	SEEPAGE @ 11'
#3	6" TOP SOIL, 36" FINE SANDY LOAM, 96" MED/FINE SANDS, 30" MED SAND/GRAVEL LIGHT COMPACTION	13.5'	-	-
#4	6" TOP SOIL, 30" FINE SANDY LOAM, 96" MED/FINE SANDS MODERATE COMPACTION	11'	11'	-
#5	6" TOP SOIL, 30" FINE SANDY LOAM, 102" MED/COARSE SANDY LOAM, DECAYED ROCK	8'	8'	-
#6	24" TOP SOIL, 96" MISC FILL/ORGANIC MATERIAL	10'	-	-
#7	24" TOP SOIL, 96" MISC FILL/ORGANIC MATERIAL	10'	-	-
#8	6" TOP SOIL, 36" FINE SANDY LOAM, 102" MED/FINE SANDS W/ SILT MODERATE COMPACTION	12'	-	-
#9	6" TOP SOIL, 36" FINE SANDY LOAM, 102" MED/FINE SANDS W/ BLDRS MODERATE COMPACTION	12'	-	-
#10	6" TOP SOIL, 24" FINE SANDY LOAM, 90" FINE GREY SANDS HEAVY COMPACTION	10'	-	MOTTILING @ 9'
#11	6" TOP SOIL, 30" FINE SANDY LOAM, 96" MED/FINE GREY SANDS WITH SILT	11'	-	-
#12	12" TOP SOIL, 24" FINE SANDY LOAM W/ SILT, 96" FINE GREY SANDS MODERATE COMPACTION	11'	-	-
#13	6" TOP SOIL, 36" FINE SANDY LOAM, 102" MED/FINE SANDS W/ SOME SILT MODERATE COMPACTION	12'	-	-
#14	6" TOP SOIL, 36" FINE SANDY LOAM, 102" MED/FINE SANDS W/ SOME SILT MODERATE COMPACTION	12'	-	-
#15	6" TOP SOIL, 36" FINE SANDY LOAM, 114" MED/FINE SANDS W/ SOME SILT MODERATE COMPACTION	13'	-	-
#16	LEDGEROCK ENCOUNTERED AT SURFACE	1'	1'	-
#17	6" TOP SOIL, 54" RED/ORANGE SILTY LOAM, 60" MED YELLOW SANDS MODERATE COMPACTION	10'	-	-
#18	6" TOP SOIL, 150" SANDY LOAM LIGHT COMPACTION	13'	-	-
#19	6" TOP SOIL, 42" FINE SANDY LOAM, 108" MED SANDS W/ BLDRS MODERATE COMPACTION	13'	-	-
#20	6" TOP SOIL, 60" FINE SANDY LOAM W/ SILT, 90" MED YELLOW SANDS LIGHT COMPACTION	-	-	MOTTILING @ 7'
#21	6" TOP SOIL, 36" FINE SANDY LOAM, 90" MED/FINE SANDS MODERATE COMPACTION	11'	-	-
#22	6" TOP SOIL, 36" FINE SANDY LOAM, 90" FINE SANDS W/ SILT MODERATE COMPACTION	12.5'	-	MOTTILING @ 10'
#23	6" TOP SOIL, 42" FINE SANDY LOAM, 48" FINE GREY SANDS W/ SILT MODERATE COMPACTION, 60" MED/FINE YELLOW/BROWN SANDS	13'	-	-
#24	24" TOP SOIL, 108" MISC FILL/ORGANIC MATERIAL	10'	-	WATER @ 8'
#25	12" TOP SOIL, 36" FINE SANDY LOAM, 108" MISC FILL/ORGANIC MATERIAL	10'	-	SEEPAGE @ 8'
#26	6" TOP SOIL, 138" YELLOW/WHITE MED/FINE SANDS LOOSE COMPACTION	12'	-	-
#27	6" TOP SOIL, 42" BROWN FINE SANDY LOAM W/ BOULDERS, 102" YELLOW/WHITE MED/FINE SANDS LOOSE COMPACTION	12.5'	-	-
DEEP TEST PITS BY: JP NILSEN WITNESSED BY: BIBBO ASSOCIATES DATE OF TESTING: 01/16/2018 & 01/19/2018				

(SEE FIGURE 3 LOCATED AT THE END OF THE REPORT FOR SOIL TESTING LOCATIONS)

PRELIMINARY STORMWATER SOIL INFILTRATION RATES	
SW PRACTICE I.D.	INFILTRATION RATE (INCHES PER HOUR)
INF-1	12.0 IN/HR
INF-2	10.0 IN/HR
INF-3	10.0 IN/HR
INF-4	12.0 IN/HR
INF-5	10.0 IN/HR
INF-6	15.0 IN/HR
INF-7	10.0 IN/HR
INF-8	10.0 IN/HR
SWP-2	15.0 IN/HR
SWP-3	15.0 IN/HR
INFILTRATION RATES BASED ON PRELIMINARY TEST RUNS AND DEEP TEST SOIL OBSERVATIONS. FINAL TESTING SHALL BE PERFORMED TO CONFIRM THESE RATES AND THE INFILTRATION PRACTICES SHALL BE REVISED ACCORDINGLY.	



Appendix I:
Pocket Wetland Sizing Calculations

Project The North 60 - Master Plan**Pocket Wetland Sizing Calculations***Required Elements*

Practice ID	SWP-1
Area of Contributory Watershed: ACW (s.f.)	197,730
WQv (90% Storm) (cu.ft.)	6,157
Permanent Pool Volume required = 50% WQv (cu.ft.)	3,079
Provided (cu.ft.)	7,835
Forebay Volume Required = 10% WQv (cu.ft.)	616
Provided (cu.ft.)	1,811
Wetland Surface Area (Perm. Pool Surface Area) Required = 1% ACW (s.f.)	1,977
Total Provided (s.f.)	9,625
< 6" depth permanent pool required area = 35% Total	3,369
Area Provided (s.f.)	5,393
provided %	56
< 18" depth permanent pool required area = 65% Total	6,256
Area Provided (s.f.)	8,323
provided %	86

Basin ID: **Post A2**

90% WQv: Subcatchment Area (A): 197,730 sq.ft.
 Rainfall (P): 1.5 in.
 Impervious Area 43,743 sq.ft.*
 Percent Imperviousness(I): 22.12 %
 $R_v = .05 + .009(I)$ 0.24910
 $R_v = 0.249103$ **
 $WQv = (P)(R_v)(A) / 12$ 6,157 cu.ft.
 or
 0.1413 ac.ft.

** Minimum $R_v = 0.2$

N60 Phase 1 Drainage A 6-11-19

Prepared by Bibbo Associates, LLP

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Type III 24-hr 100-year storm Rainfall=9.00"

Printed 6/12/2019

Stage-Area-Storage for Pond 44P: Pocket Wetland

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
230.00	0	231.32	449	232.64	1,520	233.96	4,054
230.02	3	231.34	460	232.66	1,542	233.98	4,149
230.04	7	231.36	471	232.68	1,564	234.00	4,247
230.06	11	231.38	482	232.70	1,587	234.02	4,349
230.08	14	231.40	493	232.72	1,610	234.04	4,453
230.10	18	231.42	505	232.74	1,633	234.06	4,560
230.12	22	231.44	517	232.76	1,657	234.08	4,671
230.14	26	231.46	528	232.78	1,680	234.10	4,785
230.16	30	231.48	540	232.80	1,704	234.12	4,903
230.18	34	231.50	552	232.82	1,728	234.14	5,023
230.20	39	231.52	565	232.84	1,752	234.16	5,148
230.22	43	231.54	577	232.86	1,777	234.18	5,275
230.24	47	231.56	590	232.88	1,801	234.20	5,407
230.26	52	231.58	602	232.90	1,826	234.22	5,542
230.28	57	231.60	615	232.92	1,851	234.24	5,680
230.30	61	231.62	628	232.94	1,877	234.26	5,822
230.32	66	231.64	641	232.96	1,902	234.28	5,968
230.34	71	231.66	655	232.98	1,928	234.30	6,118
230.36	76	231.68	668	233.00	1,954	234.32	6,272
230.38	81	231.70	682	233.02	1,980	234.34	6,429
230.40	86	231.72	696	233.04	2,007	234.36	6,591
230.42	92	231.74	710	233.06	2,034	234.38	6,756
230.44	97	231.76	724	233.08	2,062	234.40	6,926
230.46	102	231.78	738	233.10	2,091	234.42	7,099
230.48	108	231.80	752	233.12	2,120	234.44	7,277
230.50	114	231.82	767	233.14	2,150	234.46	7,459
230.52	120	231.84	782	233.16	2,180	234.48	7,645
230.54	126	231.86	797	233.18	2,211	234.50	7,835
230.56	132	231.88	812	233.20	2,243	234.52	8,028
230.58	138	231.90	827	233.22	2,275	234.54	8,221
230.60	144	231.92	843	233.24	2,308	234.56	8,416
230.62	150	231.94	858	233.26	2,342	234.58	8,610
230.64	157	231.96	874	233.28	2,376	234.60	8,806
230.66	163	231.98	890	233.30	2,411	234.62	9,002
230.68	170	232.00	906	233.32	2,446	234.64	9,198
230.70	177	232.02	923	233.34	2,482	234.66	9,396
230.72	184	232.04	939	233.36	2,519	234.68	9,594
230.74	191	232.06	956	233.38	2,557	234.70	9,792
230.76	198	232.08	973	233.40	2,595	234.72	9,992
230.78	205	232.10	990	233.42	2,634	234.74	10,191
230.80	213	232.12	1,007	233.44	2,673	234.76	10,392
230.82	220	232.14	1,024	233.46	2,713	234.78	10,593
230.84	228	232.16	1,042	233.48	2,754	234.80	10,795
230.86	235	232.18	1,060	233.50	2,796	234.82	10,998
230.88	243	232.20	1,077	233.52	2,838	234.84	11,201
230.90	251	232.22	1,096	233.54	2,881	234.86	11,405
230.92	259	232.24	1,114	233.56	2,925	234.88	11,609
230.94	268	232.26	1,132	233.58	2,970	234.90	11,814
230.96	276	232.28	1,151	233.60	3,015	234.92	12,020
230.98	284	232.30	1,170	233.62	3,061	234.94	12,227
231.00	293	232.32	1,189	233.64	3,108	234.96	12,434
231.02	302	232.34	1,208	233.66	3,155	234.98	12,642
231.04	311	232.36	1,228	233.68	3,204	235.00	12,850
231.06	320	232.38	1,247	233.70	3,253	235.02	13,059
231.08	329	232.40	1,267	233.72	3,302	235.04	13,269
231.10	338	232.42	1,287	233.74	3,353	235.06	13,479
231.12	347	232.44	1,307	233.76	3,405	235.08	13,690
231.14	357	232.46	1,327	233.78	3,457	235.10	13,902
231.16	367	232.48	1,348	233.80	3,510	235.12	14,115
231.18	376	232.50	1,369	233.82	3,564	235.14	14,328
231.20	386	232.52	1,390	233.84	3,618	235.16	14,542
231.22	396	232.54	1,411	233.86	3,674	235.18	14,756
231.24	407	232.56	1,432	233.88	3,730	235.20	14,971
231.26	417	232.58	1,454	233.90	3,787	235.22	15,187
231.28	428	232.60	1,475	233.92	3,873	235.24	15,403
231.30	438	232.62	1,497	233.94	3,962	235.26	15,620

N60 Phase 1 Drainage A 6-11-19

Prepared by Bibbo Associates, LLP

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Type III 24-hr 100-year storm Rainfall=9.00"

Printed 6/12/2019

Stage-Area-Storage for Pond 44P: Pocket Wetland (continued)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
235.28	15,838	236.60	31,736	237.92	50,799
235.30	16,056	236.62	32,001	237.94	51,113
235.32	16,275	236.64	32,266	237.96	51,428
235.34	16,495	236.66	32,532	237.98	51,744
235.36	16,716	236.68	32,799	238.00	52,061
235.38	16,937	236.70	33,066	238.02	52,378
235.40	17,159	236.72	33,335	238.04	52,697
235.42	17,381	236.74	33,604	238.06	53,016
235.44	17,604	236.76	33,873	238.08	53,335
235.46	17,828	236.78	34,144	238.10	53,656
235.48	18,052	236.80	34,415	238.12	53,977
235.50	18,278	236.82	34,687	238.14	54,300
235.52	18,504	236.84	34,960	238.16	54,623
235.54	18,730	236.86	35,233	238.18	54,946
235.56	18,957	236.88	35,507	238.20	55,271
235.58	19,185	236.90	35,782	238.22	55,596
235.60	19,414	236.92	36,058	238.24	55,923
235.62	19,643	236.94	36,334	238.26	56,249
235.64	19,873	236.96	36,611	238.28	56,577
235.66	20,104	236.98	36,889	238.30	56,906
235.68	20,335	237.00	37,168	238.32	57,235
235.70	20,567	237.02	37,447	238.34	57,565
235.72	20,800	237.04	37,727	238.36	57,896
235.74	21,033	237.06	38,008	238.38	58,228
235.76	21,267	237.08	38,290	238.40	58,560
235.78	21,502	237.10	38,572	238.42	58,894
235.80	21,738	237.12	38,855	238.44	59,228
235.82	21,974	237.14	39,139	238.46	59,563
235.84	22,211	237.16	39,424	238.48	59,898
235.86	22,448	237.18	39,709	238.50	60,235
235.88	22,687	237.20	39,995	238.52	60,572
235.90	22,926	237.22	40,282	238.54	60,910
235.92	23,165	237.24	40,569	238.56	61,249
235.94	23,406	237.26	40,858	238.58	61,589
235.96	23,647	237.28	41,147	238.60	61,929
235.98	23,889	237.30	41,436	238.62	62,271
236.00	24,131	237.32	41,727	238.64	62,613
236.02	24,375	237.34	42,018	238.66	62,956
236.04	24,618	237.36	42,310	238.68	63,299
236.06	24,863	237.38	42,603	238.70	63,644
236.08	25,108	237.40	42,897	238.72	63,989
236.10	25,354	237.42	43,191	238.74	64,336
236.12	25,601	237.44	43,486	238.76	64,683
236.14	25,849	237.46	43,782	238.78	65,030
236.16	26,097	237.48	44,079	238.80	65,379
236.18	26,346	237.50	44,376	238.82	65,729
236.20	26,595	237.52	44,674	238.84	66,079
236.22	26,845	237.54	44,973	238.86	66,430
236.24	27,096	237.56	45,273	238.88	66,782
236.26	27,348	237.58	45,573	238.90	67,135
236.28	27,600	237.60	45,874	238.92	67,488
236.30	27,854	237.62	46,176	238.94	67,843
236.32	28,107	237.64	46,479	238.96	68,198
236.34	28,362	237.66	46,783	238.98	68,554
236.36	28,617	237.68	47,087	239.00	68,911
236.38	28,873	237.70	47,392		
236.40	29,130	237.72	47,698		
236.42	29,387	237.74	48,004		
236.44	29,645	237.76	48,312		
236.46	29,904	237.78	48,620		
236.48	30,164	237.80	48,929		
236.50	30,424	237.82	49,238		
236.52	30,685	237.84	49,549		
236.54	30,947	237.86	49,860		
236.56	31,209	237.88	50,172		
236.58	31,472	237.90	50,485		

N60 Phase 1 Drainage A 6-11-19

Prepared by Bibbo Associates, LLP

HydroCAD® 10.00-24 s/n 02226 © 2018 HydroCAD Software Solutions LLC

Type III 24-hr 100-year storm Rainfall=9.00"

Printed 6/12/2019

Summary for Pond 44P: Pocket Wetland

Inflow Area = 231,706 sf, 20.73% Impervious, Inflow Depth = 6.20" for 100-year storm event
 Inflow = 27.13 cfs @ 12.24 hrs, Volume= 119,695 cf
 Outflow = 18.88 cfs @ 12.43 hrs, Volume= 95,883 cf, Atten= 30%, Lag= 11.3 min
 Primary = 18.88 cfs @ 12.43 hrs, Volume= 95,883 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Starting Elev= 234.50' Surf.Area= 12,504 sf Storage= 7,835 cf

Peak Elev= 238.08' @ 12.43 hrs Surf.Area= 18,895 sf Storage= 53,363 cf (45,528 cf above start)

Plug-Flow detention time= 563.9 min calculated for 88,048 cf (74% of inflow)

Center-of-Mass det. time= 430.2 min (1,246.2 - 816.0)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	1,811 cf	Forebay (Irregular) Listed below (Recalc)
#2	230.00'	1,976 cf	Micropool (Irregular) Listed below (Recalc)
#3	233.90'	65,123 cf	Marsh & Storage (Irregular) Listed below (Recalc)
		68,911 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,233	129.1	834	1,811	1,357

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
230.00	86	34.2	0	0	86
231.00	217	53.2	147	147	225
232.00	406	72.3	307	453	426
233.00	651	91.4	524	977	688
233.90	1,646	155.1	1,000	1,976	1,942

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
233.90	4,232	530.5	0	0	4,232
234.50	9,625	400.9	4,048	4,048	13,842
235.00	10,440	413.5	5,015	9,063	14,683
236.00	12,144	438.8	11,281	20,344	16,451
237.00	13,950	464.0	13,037	33,381	18,317
238.00	15,856	489.2	14,893	48,273	20,287
239.00	17,864	514.5	16,850	65,123	22,369

Device	Routing	Invert	Outlet Devices
#1	Primary	232.00'	21.0" Round Culvert L= 74.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.00' S= 0.0135 ' S= 0.0135 ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 2.41 sf
#2	Device 1	234.50'	1.1" Vert. Orifice/Grate C= 0.600
#3	Device 1	237.50'	36.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=18.88 cfs @ 12.43 hrs HW=238.08' TW=0.00' (Dynamic Tailwater)

1=Culvert (Barrel Controls 18.88 cfs @ 7.85 fps)

2=Orifice/Grate (Passes < 0.06 cfs potential flow)

3=Orifice/Grate (Passes < 20.31 cfs potential flow)



Appendix J:
(Reserved)



Appendix K:
Contractor Certification Document

**Contact Information and Certification:**

Prior to the commencement of construction activity, the owner or operator must identify the contractor(s) and subcontractor(s) that will be responsible for installing, constructing, repairing, replacing, inspecting and maintaining the erosion and sediment control practices included in the this Stormwater Pollution Prevention Plan (SWPPP); and the contractor(s) and subcontractor(s) that will be responsible for constructing the post-construction stormwater management practices as shown on the Construction Plans included in the SWPPP.

The owner or operator shall have each of the contractors and subcontractors identify at least one person from their company that will be responsible for implementation of the SWPPP. This person shall be known as the trained contractor. The owner or operator shall ensure that at least one trained contractor is on site on a daily basis when soil disturbance activities are being performed.

The owner or operator shall have each of the contractors and subcontractors identified above sign a copy of the certification statement on the next page before they commence any construction activity.

In addition to signing the certification statement, the certification page must also identify the specific elements of the SWPPP that each contractor and subcontractor will be responsible for and include the name and title of the person providing the signature; the name and title of the trained contractor responsible for SWPPP implementation; the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification statement is signed. The owner or operator shall attach the certification statement(s) to the copy of the SWPPP that is maintained at the construction site. If new or additional contractors are hired to implement measures identified in the SWPPP after construction has commenced, they must also sign the certification statement and provide the information listed above.

CONTRACTOR'S CERTIFICATION

PROJECT NAME: THE NORTH 60

PROJECT ADDRESS: HOSPITAL ROAD & ROUTE 9A, MOUNT PLEASANT, NY

"I hereby certify under penalty of law 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 most current version 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 am aware that there are significant penalties for submitting false information that I do not believe to be true, including the possibility of fine and imprisonment for knowing violations"

Name: _____

Business Name: _____

Address: _____

Phone: _____

Trained Contractor Signature

Date



CONTRACTOR'S RESPONSIBILITY CERTIFICATION

PROJECT NAME: THE NORTH 60
PROJECT ADDRESS: HOSPITAL ROAD & ROUTE 9A, MOUNT PLEASANT, NY

Name: _____
Title: _____
Business Name: _____
Address: _____
Phone: _____

Specific element of the SWPPP Responsible for: _____
(i.e. silt fence, stabilized construction entrance, inlet protection, post-construction stormwater management practices installation, etc.)

Contractor Signature

Date

Trained Contractor responsible for SWPPP implementation:
(Individual listed on certification page above)

Name: _____
Business Name: _____
Address: _____
Phone: _____

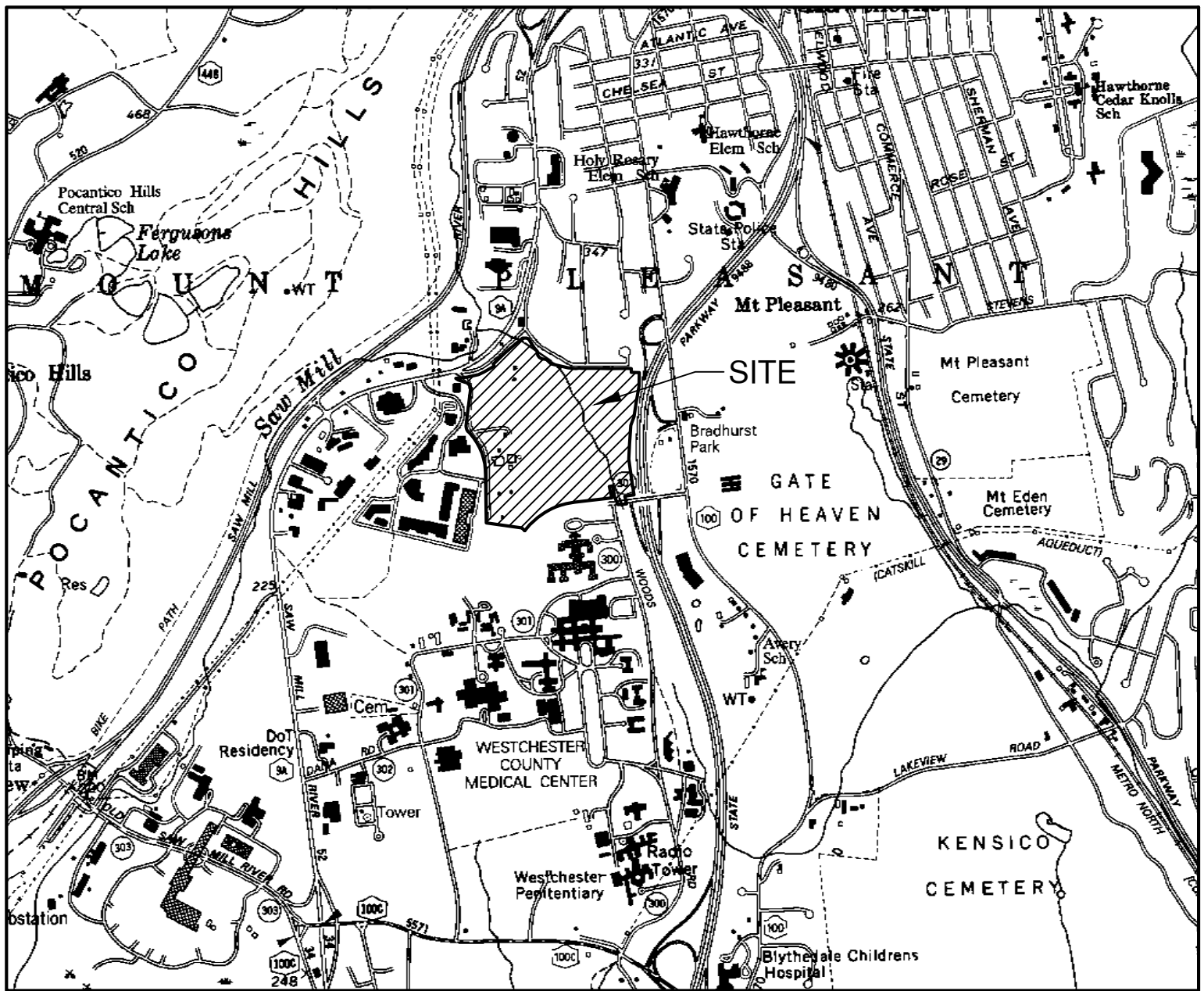
(MAKE ADDITIONAL COPIES AS NEEDED)



Figure 1:
Pre-Development Watershed Boundary Map



Figure 2:
Post-Development Watershed Boundary Map



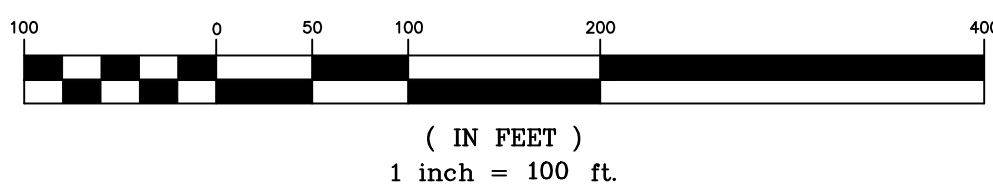
LOCATION MAP
N.T.S.

LEGEND

- EXISTING PROPERTY LINE
- WETLAND AREA
- WETLAND SETBACK LINE
- EXISTING STONE WALL
- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPOSED STORMWATER TREATMENT AREA
- PROPOSED SOIL TEST LOCATION
- PROPOSED 10' CONTOUR
- PROPOSED 2' CONTOUR
- SOIL BOUNDARY LINE
- USGS SOIL CLASSIFICATION
- HYDROLOGIC SOIL GROUP
- WATERSHED BOUNDARY LINE
- WATERSHED IDENTIFICATION
- TIME OF CONCENTRATION (Tc PATH)
- B5 PROPOSED BUILDING I.D.

PLAN

GRAPHIC SCALE



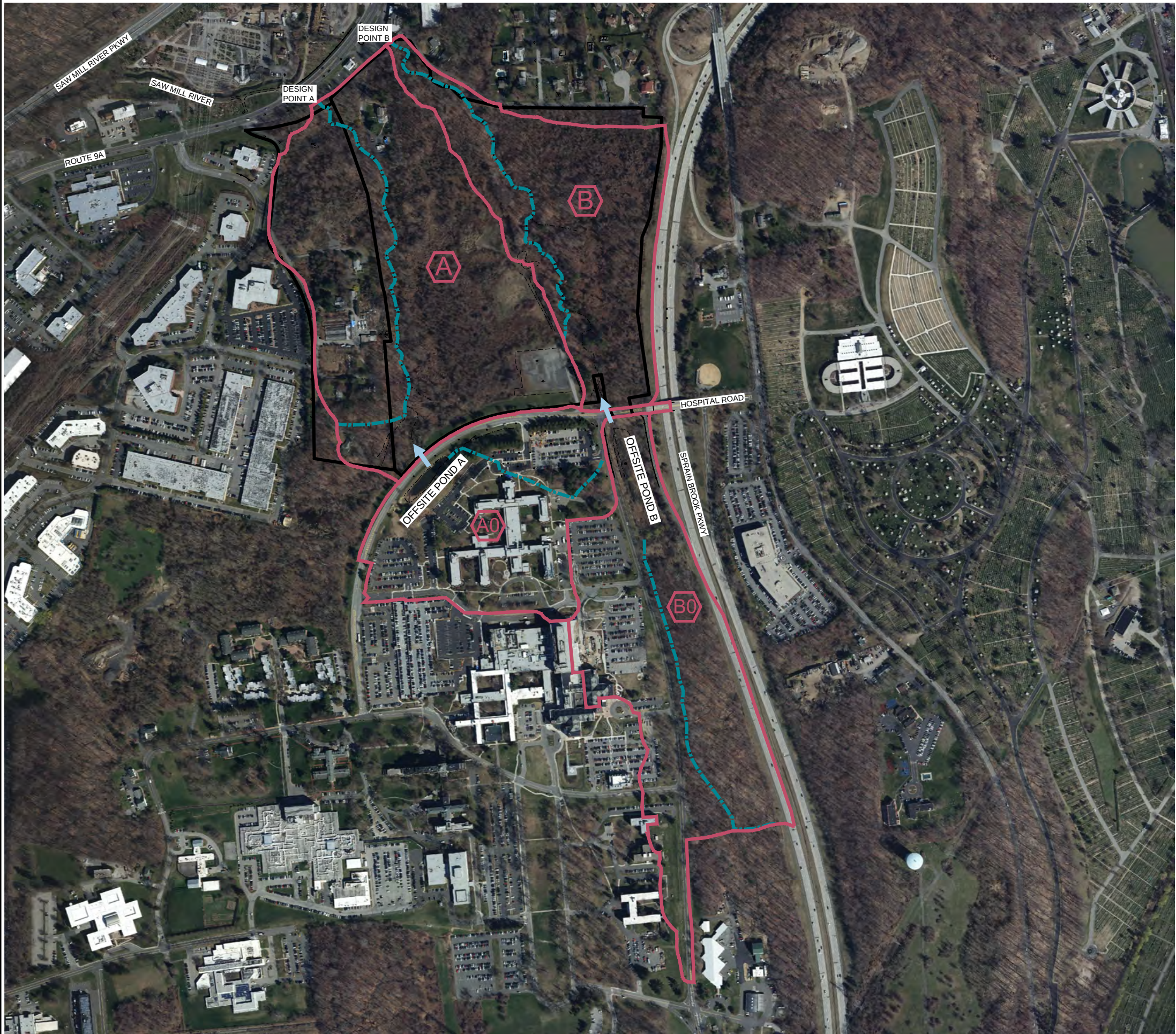
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REVISIONS			POST-DEVELOPMENT WATERSHED BOUNDARY MAP		
DATE:	DESCRIPTION	BY/CK:	DATE:	DESCRIPTION	BY/CK:
			THE NORTH 60		
			HOSPITAL ROAD & ROUTE 9A		
			TOWN OF MOUNT PLEASANT, WESTCHESTER COUNTY		
			BIBBO ASSOCIATES, LLP		
			293 ROUTE 100 SUITE 203		
			SOMERS, NEW YORK 10589		
			TEL: 914 277 5805		
			DATE: MAR. 9, 2020		
			SCALE: 1" = 100'		
			FILE: 12-D		
			DSGN / NGTA		
			CHK: NG		
			DRN BY: NG		
			SHT NO. FIGURE 2		
			DWG NO. POST		

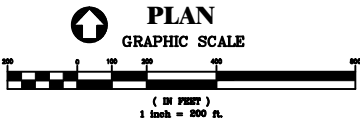


Figure 3:
Offsite Watershed Boundary Map



LEGEND

-  WATERSHED BOUNDARY LINE
-  WATERSHED IDENTIFICATION
-  TIME OF CONCENTRATION (T_c) PATH
-  LOCATION OF OFFSITE POND OUTLET ONTO PROJECT SITE



REPRODUCTION, ALTERATION AND EXTENSION
OF THIS MAP WITHOUT THE WRITTEN
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NOTE: OFFSITE CONTRIBUTING WATERSHED AREAS HAVE BEEN DELINEATED BASED ON
INFORMATION PROVIDED FROM WESTCHESTER COUNTY DEPARTMENT OF PUBLIC WORKS,
TOPOGRAPHY SUPPLIED BY WESTCHESTER COUNTY GIS MAPPING, AND FIELD OBSERVATIONS.

DESIGNER	DATE	DESCRIPTION	BY/CHK	DATE	DESCRIPTION	BY/CHK
OFFSITE WATERSHED BOUNDARY MAP			DATE:	JUNE 3, 2019	SCALE:	1" = 200'
WESTCHESTER MEDICAL VILLAGE			FILE:	12-D	DESIGN /	NG/TA
STREET ADDRESS			CHK:		DRN. BY:	NG
TOWN OF MOUNT PLEASANT, WESTCHESTER COUNTY			SHT. NO.	FIGURE 3	DWG. NO.	OW
 BIBBO ASSOCIATES, LLP 293 ROUTE 100 SUITE 203 SOMERS, NEW YORK 10589 TEL. 914.277.5855						



Figure 4:
Soil Testing Map



- LEGEND**
- EXISTING PROPERTY LINE
 - WETLAND AREA
 - WETLAND SETBACK LINE
 - EXISTING STONE WALL
 - EXISTING 2' CONTOUR
 - EXISTING 10' CONTOUR
 - 10 DEEP TEST PIT LOCATION
 - SOIL BOUNDARY LINE
 - USGS SOIL CLASSIFICATION
 - HYDROLOGIC SOIL GROUP

PLAN
GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft.

DATE:	DESCRIPTION:	BY/CHK:	DATE:	DESCRIPTION:	BY/CHK:
SOIL TESTING MAP					
THE NORTH 60					
TOWN OF MOUNT PLEASANT, WESTCHESTER COUNTY					
			DATE:	JAN. 23, 2018	
			SCALE:	1" = 100'	
			FILE:	12-D	
			DSGN /	NGTA	
			CHK:		
			DRN. BY:	NG	
			SHT. NO.		
			DWG. NO.		
					ST-1