APPENDIX M

Engineering Reports

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APPENDIX M.1

Signature East – Engineer's Report

ENGINEER'S REPORT

Prepared for:

SIGNATURE FLIGHT SUPPORT LLC

Fred Wehran Road
Block 203, Lot 1
Teterboro Borough
Bergen County, New Jersey

Prepared by:

BOHLER

N.J. Certificate of Authorization 24GA28161700

125 Half Mile Road, Suite 207
Red Bank, NJ 07701
(732) 825-6800

Joseph Holzapfel, P.E.
New Jersey Professional Engineer License No. 73500

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1. Introduction

The project site is a proposed lease area approximately 5.251 acres within Teterboro Airport. The overall Teterboro Airport consists of 827 acres and is identified as Block 203; Lot 1 within the Borough of Teterboro, Bergen County, New Jersey. The project is located on the eastern side of the airport located 1,950 FT southwest of the intersection of Route 46 and Fred Wehran Drive and known as “Signature East.”

The project site is located within the Hackensack, Hudson, Pascack Watershed Management Area within the Hackensack River (below/including Hirshfeld Brook) and more specifically, within the Berry’s Creek (above Paterson Avenue) HUC-14 Sub-watershed.

The proposed project includes the construction of a new hangar, associated ramp space, office space and associated parking on the eastern side of the airport in order to address operational congestion experienced on both the western and eastern sides of the airport. This project will also help to address the physical and maintenance demands of the next generation (Technologically Advanced Aircraft) aircraft utilizing the airport facility; reduce arrival and departure delays caused by overcrowded taxiways; improve safety and efficiency with regard to aircraft movement and storage at the airport; and meet the demand of general aviation airplane travelers to and from the New York–New Jersey metropolitan area. This project is a major development due to disturbance greater than one acre and proposed regulated motor vehicle surface area greater than one-quarter acre.

This report summarizes the design objectives, methodology, and calculations for the conveyance, attenuation, treatment, and discharge of stormwater runoff leaving the site and is meant to accompany the Site Plan documents prepared by Bohler. Pre-development and post-development conditions are examined for analysis of the stormwater quantity, water quality, and groundwater recharge based on the *NJDEP Stormwater Management Regulations (NJAC 7:8)* and soil erosion and sediment control based on *The Standards for Soil Erosion and Sediment Control in New Jersey*.

It is important to note that this project has a previous NJDEP Flood Hazard Area Verification and Individual Permit approval that expired May 14, 2022. This current application includes an updated stormwater design to comply with the current stormwater quality, quantity and recharge design and performance standards (N.J.A.C. 7:8). However, the project is unable to meet the green infrastructure standards of N.J.A.C. 7:8 due to site-specific constraints and federal aviation safety requirements. As such, a formal request for a NJDEP Green Infrastructure Hardship Exception has been submitted to demonstrate compliance through feasible stormwater management measures. This request is further detailed in the NJDEP Green Infrastructure Hardship Exception Memo prepared by Bohler and Langan.

2. Stormwater Management Design Methodology

In accordance with the *NJDEP Stormwater Management Regulations*, the proposed development must meet the requirements, if appropriate, for stormwater quantity reductions, water quality, groundwater recharge, etc. The assessment of stormwater runoff has been based upon the Soil Conservation Service Method (SCS) Unit Hydrograph as described in Chapters 7, 9, 10, 15 and 16, Part 630 Hydrology, National Engineering Handbook (NEH) (previously described in Technical Release Number 55 (TR55), “Urban Hydrology for Small Watersheds”). Theoretical storms are modeled with the 24-Hour SCS Unit Dimensionless Hydrograph using the NOAA Atlas 14 Type

D rainfall distribution and recurrence intervals of 2, 10, and 100 years. Hydrograph creation and routings are accomplished using the HydroCAD stormwater modeling program by HydroCAD Software Solutions, LLC.

2.1 Rainfall Data

Rainfall data used in the stormwater calculations of this report are obtained from different sources based on the latest NJ stormwater management regulations *(NJAC 7:8)*. The Water Quality storm event is based on the NJ BMP Manual Chapter 5 definition of having a total rainfall depth of 1.25 inches and a total duration of two (2) hours. Twenty-four-hour rainfall frequency data in Bergen County for all other storms has been obtained from the Engineering Field Handbook NJ Supplement last revised August 2012 (developed from data contained in NOAA Atlas 14 Volume 2). Per amended NJ stormwater management regulations dated July 17, 2023, the precipitation depths for the 2-, 10- and 100-year storm events are determined using adjustment factors applied to the NOAA Atlas 14 rainfall estimates. The rainfall depth values used in this project are listed in Table 2.1 and 2.2.

TABLE 2.1 – Current Adjusted, 24-Hour Rainfall Frequency Data

Event (year)	2	10	100
NOAA Atlas 14 Rainfall (inches)	3.31	5.01	8.28
Adjustment Factor	1.01	1.03	1.06
Current Adjusted Rainfall (inches)	3.34	5.16	8.78

TABLE 2.2 – Future Adjusted, 24-Hour Rainfall Frequency Data

Event (year)	2	10	100
NOAA Atlas 14 Rainfall (inches)	3.31	5.01	8.28
Adjustment Factor	1.20	1.23	1.37
Future Adjusted Rainfall (inches)	3.97	6.16	11.34

2.2 Site Soils

Site soil information has been obtained from the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey database. The soil types present within the studied watershed are shown in Table 2.3. The soils consist of hydrologic soil group (HSG) Type D; therefore, the CN values used in calculations are those associated with Type D soils.

TABLE 2.3 - Site Soil Properties

Soil Symbol	Soil Name	Characteristics	Hydrologic Soil Group Rating
UdwB	Udorthents	Wet substratum, 0-8% slopes	D

2.3 Curve Numbers

For determining the runoff flows, the cover types in combination with the HSG rating must be determined for each drainage area. These are used to determine the runoff curve number (CN) values that are used in the hydraulic calculations. The CN values used in this project are listed in Table 2.4.

TABLE 2.4 - CN Values

Land Cover Description	HSG D
Open space, Good Condition (grass cover >75%)	80
Woods, Good Condition	77
Impervious Surfaces	98

2.4 Time of Concentration

The time of concentration (Tc) is calculated in accordance with Chapter 15 of the NRCS National Engineering Handbook and has been calculated separately for the pervious and impervious areas within each drainage area. Where there is a long stretch of sheet flow in the proposed condition, the McCuen-Spiess formula is used to determine the appropriate length, not to exceed 100 feet. McCuen-Spiess sheet flow length calculations are provided in the beginning of Appendix A, and full Tc calculations for each drainage area can be found in the HydroCAD summaries in Appendices A & B.

3. Pre-Development Site Conditions

The studied watershed area is a total of 6.340 acres in size and consists of two unique drainage areas: Existing Drainage Area #1 and Existing Drainage Area #2, which are described in more detail below.

Currently, the majority of the site is emergent, scrub-shrub and forested wetland habitat. Site drainage is mostly tributary to a ditch paralleling runway #1-19 just west of the site. This ditch is tributary to a headwall at the southerly end and a trunk storm sewer running northwest along taxiway "G". The ditch and trunk storm sewer ultimately discharge into the Teterboro Airport Pump Station and then into the West Riser Ditch on the west side of the airport. The tailwater impacts of the pre- and post- construction conditions have been evaluated and further detailed in section 4.7 and Appendix D.

The remaining area of the site discharges into a swale that flows around the Aviation Hall of Fame just south of the Tower on Fred Wehran Drive and then easterly into a pipe network tributary to the East Riser ditch. The Existing Drainage Area Map in Appendix G illustrates the limits of each existing drainage area and how they relate to the existing site conditions.

3.1 Point of Analysis #1 (East Riser Ditch)

Existing Drainage Area #1 flows to Point of Analysis #1 located near the eastern property line. The Existing Drainage Area Map in Appendix G illustrates the identified point of analysis and how it relates to the existing topography on the site.

3.1.1 Existing Drainage Area #1

Existing Drainage Area #1 contains 1.742 acres of land, of which 0.109 acres are impervious surface, and includes grass and wooded areas around the eastern side of the site. The topography of the area slopes from west to east from a maximum elevation of approximately 16.15 to a minimum elevation of approximately 6.26 with slopes ranging from 0% to 45%. The runoff from Existing Drainage Area #1 flows from west to east and ultimately discharges to the ditch at Point of Analysis #1.

3.2 Point of Analysis #2 (West Riser Ditch)

Existing Drainage Area #2 flows to Point of Analysis #2, an existing ditch located 160 feet to the west of the site paralleling runway #1-19. The Existing Drainage Area Map in Appendix G illustrates the identified point of analysis and how it relates to the existing topography on the site. Ultimately, the runoff will be discharged into the West Riser Ditch through the existing Teterboro Airport Pump Station.

Based on existing drainage watersheds, 578 acres of the airport, including the subject site, are tributary to the Airport pumping station which was upgraded and rebuilt in 2008. The Upgrade Design Report by Dewberry-Goodkind, Inc., dated June 2003, last revised March 2004, anticipated "full development" of the airport for the purposes of upgrading the pump station. The Dewberry pump station design utilized a conservative impervious coverage of 44%. In existing conditions, the airport impervious coverage is only 25.3%.

The project area lies within Watershed DA #3 as seen in the Overall Airport Drainage Exhibits in Appendix G. This watershed encompasses 124.8 acres on the east side of the airport including the proposed site, most of runway #1-19, associated taxiways and aprons, as well as undeveloped wooded swamp areas to the south. The pervious areas between the runway and taxiway as well as the undeveloped area south of the proposed site have low lying elevations up to 5 FT below the airport runways (elevations -0.75 FT to 4.5 FT). These areas provide significant storage volume that was not directly modeled in the Dewberry Report. For DA#3, these areas have been quantified, and the storage volume is

treated as a swale storage in the current model. The West Riser Ditch Pump Station Analysis for existing conditions can be found in Appendix D.

3.2.1 Existing Drainage Area #2

Existing Drainage Area #2 contains 4.598 acres of land, of which 0.218 acres are impervious surface, and includes grass and wooded areas around the western side of the site. The topography of the area slopes from east to west from a maximum elevation of approximately 16.15 to a minimum elevation of approximately 4.55 with slopes ranging from 0% to 45%. The runoff from Existing Drainage Area #2 flows from east to west and ultimately discharges to Point of Analysis #2.

4. Post-Development Site Conditions

The post-development condition for the site includes the construction of a 40,500 SF hangar/office building, 3.90 acres of paved ramp area, with associated parking fields, driveways, sidewalks, utility infrastructure, stormwater infrastructure, and other site improvements. The proposed site is designed in a manner that generally maintains the existing drainage patterns. The studied watershed area in the post-development condition contains the same 6.340-acre area that was studied in the pre-development condition and consists of five unique drainage areas: Proposed Drainage Area #1A, Proposed Drainage Area #1B, Proposed Drainage Area #2A, Proposed Drainage Area #2B, and Proposed Drainage Area #2C, which are described in more detail below.

A proposed stormwater conveyance system will collect the runoff from the proposed building and impervious areas via pervious pavement, inlets, manholes, and stormwater piping and redirect it to the proposed underground detention basin on the site. The construction of the proposed improvements will disturb approximately 6.340 acres of land and will create approximately 5.30 acres of impervious coverage on the site in the post-development condition. The Proposed Drainage Area Map in Appendix G illustrates the limits of each proposed drainage area and how they relate to the proposed site conditions

4.1 Point of Analysis #1 (East Riser Ditch)

Two drainage areas in the post development condition flow to the same Point of Analysis #1 identified in the existing condition, located along the eastern property line. The proposed runoff to Point of Analysis #1 meets the stormwater management criteria set forth in *NJDEP Stormwater Management Regulations* by demonstrating through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the current and projected 2-, 10- and 100-year storm events. The change in volume or timing of stormwater runoff will not increase flood damage at or downstream of the site. Refer to Section 4.3 Stormwater Quantity Controls for a summary of the pre-construction and post-construction flows and volumes.

4.1.1 Proposed Drainage Area #1A

Proposed Drainage Area #1A consists of approximately 0.274 acres of land, of which 0.018 acres are impervious surface, and includes a portion of the sidewalk and grass area in front of the hangar. The runoff from Proposed Drainage Area #1A flows via overland flow to Point of Analysis #1.

4.1.2 Proposed Drainage Area #1B

Proposed Drainage Area #1B consists of approximately 0.174 acres of land, of which 0.129 acres are impervious surface, and includes the utility infrastructure and existing driveway. The drainage area also contains grass and landscape areas. The runoff from Proposed Drainage Area #1B flows via overland flow to Point of Analysis #1.

4.2 Point of Analysis #2 (West Riser Ditch)

Three drainage areas in the post development condition flow to the same Point of Analysis #2 identified in the existing condition, an existing ditch located 160 feet to the west of the site paralleling runway #1-19. The proposed runoff to Point of Analysis #2 meets the stormwater management criteria set forth in *NJDEP Stormwater Management Regulations* by designing the stormwater measures so that the peak post-construction runoff rates from the disturbed areas are 50 and 75 percent of the peak pre-construction runoff rates for the 2, 10 and 100-year design storms respectively.

The runoff from Point of Analysis #2 will ultimately discharge into the Teterboro Airport Pump Station and then into the West Riser Ditch on the west side of the Airport. In proposed conditions, the airport impervious coverage is only 30%, which is still less than the Dewberry pump station design of 44%. The proposed development has been modeled with DA#3 to determine the downstream impacts to the airport pump station in Appendix D.

4.2.1 Proposed Drainage Area #2A

Proposed Drainage Area #2A consists of approximately 0.476 acres of land, of which 0.287 acres are impervious surface, and includes the proposed parking fields, sidewalks, driveways, stormwater and utility infrastructure. The drainage area also contains grass and landscape areas. The runoff from Proposed Drainage Area #2A is routed through the pervious pavement, connects into the underground detention basin within the proposed ramp space, and ultimately flows to the existing pipe network at Point of Analysis #2.

4.2.2 Proposed Drainage Area #2B

Proposed Drainage Area #2B consists of approximately 5.073 acres of land, of which 4.839 acres are impervious surface, and includes the proposed hangar, ramp space, sidewalks, stormwater and utility infrastructure. The drainage area also contains grass areas. The runoff from the proposed ramp space is routed through the proposed trench drains into the proposed water quality units which then flows into the underground detention basin with the runoff from the building area. The basin ultimately flows to the existing pipe network along the western property line and Point of Analysis #2.

4.2.3 Proposed Drainage Area #2C

The remainder of the area of study in the post-development condition falls within Proposed Drainage Area #2C, which contains approximately 0.342 acres of land, of which 0.025 acres are impervious surface, and includes the area within the site that does not flow through the proposed stormwater improvements or detention basins. The runoff from Proposed Drainage Area #2C flows directly off-site to Point of Analysis #2.

4.3 Proposed Structural Stormwater Management Strategies

The five drainage areas in the post development condition flow to the same points of analysis identified in the existing condition. Two of the drainage areas, Proposed Drainage Area #2A and Proposed Drainage Area #2B, flow through the proposed on-site stormwater management system, which is described in more detail below. Drain time specified below is for the 100-year future adjusted storm.

It is important to note that this project has been designed to comply with the current stormwater quality, quantity, and recharge design and performance standards outlined in N.J.A.C. 7:8. However, strict compliance with the green infrastructure requirements cannot be achieved due to limiting site factors, operational constraints, and federal aviation regulations. A formal request for a NJDEP Green Infrastructure Hardship Exception has been submitted to demonstrate that the proposed stormwater design satisfies NJDEP performance standards while maintaining FAA safety requirements. This request is further detailed in the NJDEP Green Infrastructure Hardship Exception Memo prepared by Bohler and Langan.

4.3.1 Manufactured Treatment Devices

Manufactured treatment devices are proposed to treat the runoff from motor vehicle surface areas for the water quality design storm. These units are certified by the NJDEP to provide 80% TSS removal and a copy of the certification is attached in Appendix F. These units are not considered as Green Infrastructure and are proposed as a result of the conditions and requirements described in the NJDEP Green Infrastructure Hardship Exception Memo prepared by Bohler and Langan.

Table 4.1 - Manufactured Treatment Device Summary

Manufactured Treatment Device #	1		2	
Device	(2) 8'x16' Peak Diversion HC Kraken Filter	(2) 8'x14' Offline HC Kraken Filter	(2) 8'x16' Peak Diversion HC Kraken Filter	(2) 8'x14' Offline HC Kraken Filter
Drainage Area (Acres)	1.780		2.364	
Water Quality Flow (CFS)	5.32		6.42	
Max. Water Quality Flow for Device (CFS)	7.0		7.0	
TSS Removal Rate (%)	80		80	

4.3.2 Pervious Paving Systems

Pervious paving materials have been proposed as part of the overall site design and stormwater management system to reduce the impervious surface on site, provide 80% TSS removal for motor vehicle surfaces, and reduce the flow of runoff. The pervious paving systems have been designed to have a maximum ratio of additional inflow area to the pavement surface area of less than 3:1, a maximum surface slope of 5%, a storage bed that fully contains the water quality design storm runoff volume, and to discharge the design storm within 72 hours of a rain event. In addition, underdrains and an impermeable liner have been provided due to the shallow presence of the seasonal high groundwater elevation. The Stormwater Soil Log Findings prepared by GZA GeoEnvironmental, Inc. dated March 20, 2026 (refer to Appendix F) indicate seasonal high groundwater depths ranging from 12-12 inches below ground surface. The subsurface investigation previously conducted by Whitestone Associates is also included within Appendix F to provide supplemental subsurface information related to site conditions. Due to the elevation of the seasonal high groundwater depth, buoyancy calculations are provided in Appendix F.

Table 4.2 - Pervious Paving Systems Summary

Pervious Paving System #	1
Pervious Area (Acres)	0.230
Additional Drainage Area (Acres)	0.246
Drainage Area Ratio	1.07:1
Surface Slope (%)	4.0
Underdrain Size (Inches)	8
Drain Time (Hours)	14.00
Seasonal High Ground Water Elevation	Ranges from elevation 4.5 to 5.5 (TP-20, TP-21, TP-22, TP-23)
Lowest System Bottom Elevation	4.00

4.3.3 Detention Basin

A detention basin is proposed as a part of this project to meet the stormwater quantity reduction requirements outlined in N.J.A.C. 7:8. Although a detention basin is not classified as a green infrastructure BMP under NJDEP regulations, its use in this project is necessary due to limiting site conditions and federal aviation regulations that prevent implementation of compliant green infrastructure measures. As such, a formal hardship exception has been requested to demonstrate compliance with stormwater management standards through feasible design measures. This request is detailed in the NJDEP Green Infrastructure Hardship Exception Memo prepared by Bohler and Langan.

In addition, the Stormwater Soil Log Findings prepared by GZA GeoEnvironmental, Inc. dated March 20, 2026 (refer to Appendix F) indicate seasonal high groundwater depths ranging from 12-12 inches below ground surface. The subsurface investigation previously conducted by Whitestone Associates is also included within Appendix F to provide supplemental subsurface information related to site conditions. The NJDEP BMP requirement of a minimum of one foot of vertical separation between the bottom of the detention basin and the seasonal high water table cannot be achieved at the site due to these existing conditions. Therefore, buoyancy calculations are provided in Appendix F.

Table 4.3 - Detention Basin Summary

Detention Basin #	1
Drainage Area (Acres)	5.549
Pretreatment	WQ Units
Basin Length to Width Ratio	2.20:1
Detention Time (Hours) (1)	43.75
TSS Removal Rate (%)	N/A
Seasonal High Ground Water Elevation	Ranges from elevation 3.58 to 5.17 (TP-3, TP-4, TP-5, TP-6, TP-7,TP-8)
Lowest System Bottom Elevation	0.53

(1) Detention time begins when the maximum storage volume is achieved and end when only 10% of the maximum volume remains.

4.3.4 Pipe Sizing

Calculations for sizing the stormwater pipe networks associated with the proposed stormwater management conveyance system can be found in Appendix E of this report. The Rational Method has been used to size the storm piping for the 25-year storm event, with calculations found in Appendix E. The calculations are based on a minimum time of concentration of 10 minutes to any inlet. An Inlet Area Map is included in Appendix G.

4.4 Stormwater Quantity Controls

The following stormwater quantity standard techniques from the *NJDEP Stormwater Management Regulations* are being applied to each drainage area as noted in Sections 4.1 through 4.2:

1. Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater

leaving the site for the current and projected two-, 10-, and 100-year storm events, as defined and determined pursuant to N.J.A.C. 7:8-5.7(c) and (d), respectively, and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area.

2. The post-development peak runoff rates for the current and future/projected 2-, 10-, and 100-year storm events are reduced to 50, 75, and 80 percent, respectively, of the pre-development peak runoff rates. These reductions only apply to portions of the site that are proposed to be developed, and reductions are not required for undisturbed areas.

Under existing conditions, the site is completely inundated by tidal flood waters during the 100-year storm event. Given that tidal and storm surge events will generate widespread flooding where both Riser ditches will backflow into the site with large volumes of brackish water during the larger storm events, it is clear that the proposed additional site impervious would have no impact on flooding in the surrounding communities. However, the 100-year storm has still been evaluated for quantity reductions along with the 2- and 10-year storms. Refer to Section 4.3 Stormwater Quantity Controls for a summary of the pre-construction, allowable, and post-construction flows.

To Point of Analysis #1, the proposed drainage area outlined in Section 4.1 has decreased in size, reducing the peak flow and total volume in order to utilize technique #1 above. Tables 4.4 and 4.5 summarize the existing and proposed flow rates and volume from the site to Point of Analysis #1, and detailed calculations can be found in Appendices A & B.

To Point of Analysis #2, the project's proposed stormwater management facilities will consist of one pervious pavement system and one underground detention basin to attenuate the flows from the drainage areas outlined in Section 4.2 utilizing technique #2 above. Tables 4.6 and 4.7 summarize the existing, permitted, and proposed flow rates from the site to Point of Analysis #2, and detailed calculations can be found in Appendices A & B.

Table 4.4 - Point of Analysis #1 Existing vs. Proposed Flow Summary
<u>Current Adjusted</u> Precipitation Depths

	Existing Peak Flow	Existing Volume	Proposed Peak Flow	Proposed Volume
	CFS	AF	CFS	AF
2-Year Storm	1.36	0.21	1.01	0.08
10-Year Storm	2.88	0.42	1.81	0.14
100-Year Storm	6.17	0.89	3.42	0.27

Table 4.5 - Point of Analysis #1 Existing vs. Proposed Flow Summary
Future Adjusted Precipitation Depths

	Existing Peak Flow	Existing Volume	Proposed Peak Flow	Proposed Volume
	CFS	AF	CFS	AF
2-Year Storm	1.94	0.28	1.30	0.10
10-Year Storm	3.92	0.55	2.28	0.17
100-Year Storm	8.86	1.25	4.63	0.36

Table 4.6 - Drainage Area #2 Existing vs. Proposed Comparison
Current Adjusted Precipitation Depths

	Existing Peak Flow	Off-Site Peak Flow	Maximum Permitted Peak Flow		Proposed Peak Flow
	CFS	CFS	% of Existing	CFS[(1)]	CFS
2-Year Storm	2.83	0	50%	1.42	1.41
10-Year Storm	5.93	0	75%	4.45	2.30
100-Year Storm	12.58	0	80%	10.06	5.95

Table 4.7 - Drainage Area #2 Existing vs. Proposed Comparison
Future Adjusted Precipitation Depths

	Existing Peak Flow	Off-Site Peak Flow	Maximum Permitted Peak Flow		Proposed Peak Flow
	CFS	CFS	% of Existing	CFS[(1)]	CFS
2-Year Storm	3.98	0	50%	1.99	1.74
10-Year Storm	7.98	0	75%	5.99	2.80
100-Year Storm	17.89	0	80%	14.31	13.90

4.5 Water Quality Controls

As stated in the NJDEP Stormwater Management Regulations, the stormwater runoff quality standards are applicable when the development proposed an increase of one-quarter acre (10,890 square-feet) or more of regulated motor vehicle surfaces. The proposed

development of the site will result in 4.303 acres of new motor vehicle surfaces, and therefore water quality controls apply.

Water quality analysis is based on the requirements of *NJDEP Stormwater Management Regulations*, which requires the use of green infrastructure to provide 80% TSS removal of post-development runoff from new regulated motor vehicle surfaces generated from the water quality design storm before discharging the runoff. The previous pavement sections proposed on-site provide 80% TSS removal for the parking area. To be considered as green infrastructure, the pervious pavement areas are proposed with a maximum additional inflow area of three times the area occupied by the pervious pavement.

Due to FAA regulations, constructability limitations, and structural loading requirements for the airport, the proposed ramp space is unable to comply with green infrastructure requirements. These constraints are further detailed in the NJDEP Green Infrastructure Hardship Exception Memo prepared by Bohler and Langan. The High Capacity (HC) Kraken Filters, NJDEP-certified below-grade manufactured treatment devices (MTDs), proposed on-site provide 80% TSS removal for the apron area which meets the intent of the water quality requirements.

4.6 Groundwater Recharge

Pursuant to the NJDEP Stormwater Management Rules (N.J.A.C. 7:8-5.4), groundwater recharge measures are not provided. The pre-construction groundwater recharge volume is zero, meaning the site does not naturally support groundwater recharge under existing conditions. The groundwater elevation is present just below the surface elevation and the existing soil on site reflects the quality of hydrologic soil group type D. This confirms there is no baseline recharge function to maintain.

Although not required, annual groundwater recharge analysis was prepared using the New Jersey Recharge Spreadsheet (NJGRS), and can be found within Appendix B. The proposed design is in compliance with the NJDEP requirements for groundwater recharge.

4.7 Tailwater

The tailwater analysis to compare pre- and post- construction conditions can be found in Appendix D. The storage representing the existing depression has been modeled to account for the flows from the proposed Signature East development and the remainder of the airport that is included in this drainage area (DA #3 as sketched in the Overall Airport Drainage Exhibit in Appendix G). Link L1 has been inserted downstream of the storage node containing a table with tailwater elevations to accurately model the variable impact to the 30” culvert outlet. Each storm has been modeled separately with its own table. The table was created using the peak water surface elevations calculated in the Dewberry report and a distribution curve similar to the runoff hydrograph of DA #3. The model ultimately concludes that despite the influence of tailwater on site, the culvert controls the discharge.

4.8 Soil Erosion and Sediment Control

The Soil Erosion and Sediment Control plans and details are included within the Site Plan documents prepared by Bohler and must be followed throughout construction. Silt fences, temporary construction fences, wetland and woodland protection fences, a stabilized

construction entrance, a temporary stockpile and inlet filters are proposed during construction. This report and the Site Plan documents prepared by Bohler are being submitted to the Bergen Soil Conservation District for approval.

Off-site stability has been reviewed in accordance with the *Standards for Soil Erosion and Sediment Control in New Jersey (SESC Standards)*. Calculations can be found in Appendix D.

Point of discharge stability has been evaluated using the "Well-defined waterway below the point of discharge" method from the SESC Standards for Point of Analysis #1. The rate of runoff at the discharge point has been maintained or decreased from existing conditions.

For Point of Analysis #2, proposed on-site stormwater facilities discharge to an existing stormwater conveyance network. The rate of runoff at the discharge point has been maintained or decreased.

The downstream off-site stability is met by decreasing the peak flows leaving the site for the 2-year storm and 10-year storm for the areas to be disturbed.

4.9 Low-Impact Development and Nonstructural Stormwater Management Facilities

In accordance with the NJDEP regulations (NJAC 7:8-2.4) and the latest *New Jersey Stormwater Best Management Practices Manual*, several nonstructural stormwater management strategies have been incorporated into the design of the site and are listed below:

1. **Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.**

   The footprint of the improvements has been minimized where possible. Stormwater runoff will be discharged in a similar manner to existing conditions.

2. **Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces.**

   The overall impervious coverage for the entire airport development is approximately 30%. This is less than the 44% that was accounted for when the Airport Pumping Station was designed and upgraded in 2008. As part of the proposed site design, the minimum allowable parking and drive aisle sizes, in accordance with local ordinances, are used in lieu of larger stalls and aisles to reduce the amount of impervious surface in the post-development condition. Pervious pavement sections are proposed in a portion of the parking lot. The roof runoff from the building will be discharged directly to the stormwater conveyance system, however perforated underdrains are utilized.

3. **Maximize the protection of natural drainage features and vegetation.**

   The footprint of the improvements has been minimized to not disturb a large portion of the existing wooded areas. Stormwater runoff will be discharged in a similar manner of existing conditions. Riparian zone and wetland disturbance has been minimized to continue providing water quality benefits. Soil erosion measures are proposed to be utilized during construction to protect the adjoining riparian zones, wetlands, tributary corridors, and undisturbed vegetation.

4. **Minimize the decrease in the "time of concentration" from pre-construction to postconstruction.**

   Pervious pavement has been included within the project's stormwater design to achieve maximized times of concentration. Unretained stormwater runoff from rear yards are discharged through the maintained landscaped areas where possible to increase times of concentration.

5. **Minimize land disturbance, including clearing and grading.**

   The design of the improvements proposed on the site has preserved critical natural areas as part of the development. Heavily wooded and environmentally sensitive areas have been left outside the limits of disturbance of the proposed development where possible. The natural areas will be protected during construction through the use of silt fence, temporary construction fence, and wetland and woodland protection fencing.

6. **Minimize soil compaction.**

   Soil compaction has been minimized within the project limits. The proposed project is within the Teterboro Airport; therefore, the site is exempted from the decompaction requirements from the Soil Erosion & Sediment Control Standard.

7. **Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers, and pesticides.**

   A comprehensive landscape plan has been incorporated into the design of the proposed improvements which includes low maintenance landscaping. The use of lawn areas has been minimized where applicable and fertilizers and pesticides are to be used sparingly.

8. **Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas.**

   Existing vegetated, open channels will remain. The proposed pipe network will connect to an existing system, reducing the existing peak flow, thus minimizing disturbance to the existing stream channel.

9. **Provide other source controls to prevent or minimize the use or exposure of pollutants from development sites in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls include, but are not limited to:**

   i. Development design features that help to prevent accumulation and discharge of trash and debris in drainage systems.

   Proposed stormwater inlets have been specified with "eco" type curb pieces indicating the text "Dump No Waste, Drains to Waterways". In addition, a "Stormwater Management Facilities Operation & Maintenance Manual" has been prepared for use by contractors and the owners that specify that street sweeping must occur on a bi-monthly schedule. Additionally, floatables and total suspended solids are routinely eliminated using a water quality device between the last inlet in the pipe network and the subsurface basin, thereby intercepting floating debris.

ii. Development design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments.

Proposed stormwater management facilities intercept stormwater from the impervious surfaces and the proposed roadways, which will provide a collection point for vehicular pollutants. The proposed pervious pavement and water quality devices will improve water quality from vehicular surfaces by 80%.

iii. When establishing vegetation after land disturbance, applying fertilizer in accordance with the requirements established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and implementing rules.

The soil erosion and sediment control plans address the requirement for establishing vegetation. Preventative source controls include the use of "eco" inlet curb pieces and storm drain inlets. Pollution prevention techniques such as water quality treatment devices and minimized clearing have been implemented in the design. The soil erosion and sediment control plan addresses re-stabilizing vegetation and implementing soil erosion and sediment control protection measures. Prevention and maintenance are also addressed in the Stormwater Operations and Maintenance Manual prepared for the project.

5. Conclusions

As demonstrated in the above sections, the stormwater management plan for the proposed development meets the current *NJDEP Stormwater Management Regulations, Standards for Soil Erosion and Sediment Control in New Jersey, and FAA Regulations,* and addresses the requirements for stormwater quantity reductions, water quality, groundwater recharge, and soil erosion and sediment control. As a result of the design calculations contained herein, Bohler anticipates that the stormwater design will not have a negative impact to surrounding areas.

It is important to note that this project has been designed to comply with the current stormwater quality, quantity, and recharge design and performance standards outlined in N.J.A.C. 7:8. However, due to site-specific constraints and federal aviation regulations, the project is unable to meet the green infrastructure standards specified in N.J.A.C. 7:8-5.3. As such, a formal request for a NJDEP Green Infrastructure Hardship Exception has been submitted to demonstrate that the proposed stormwater design satisfies NJDEP performance standards while maintaining FAA safety requirements. This request is further detailed in the NJDEP Green Infrastructure Hardship Exception Memo prepared by Bohler and Langan.

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A. PRE- vs. POST-DEVELOPMENT HYDROGRAPHS - Current Adjusted Precipitation Depths

- **McCuen-Spiess Sheet Flow Length Calculations**
- **2-Year Storm Event**
- **10-Year Storm Event**
- **100-Year Storm Event**

BOHLER

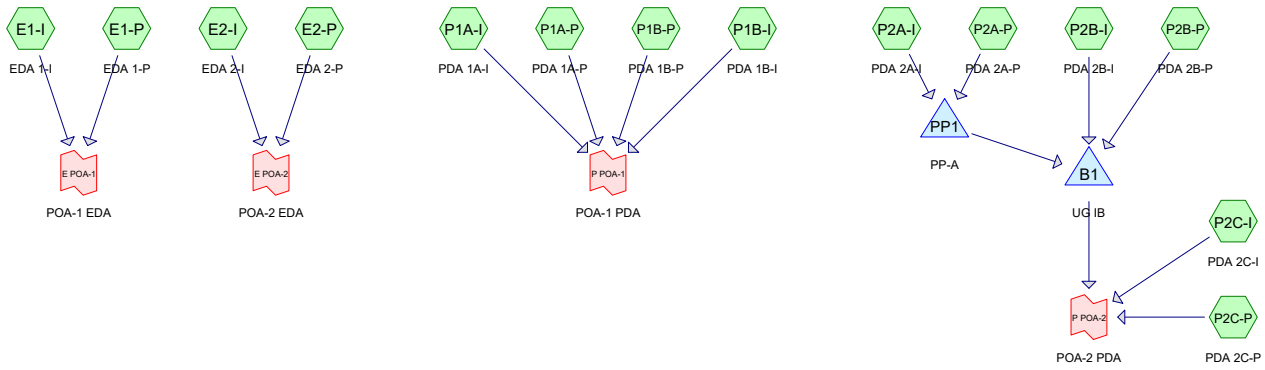
125 Half Mile Road, Suite 207, Red Bank, NJ 07701
(732) 825-6800

Date: 10/14/2025
Project: Teterboro Airport
Project No: NJC240059.00

McCuen-Spiess

$$L = \frac{100\sqrt{S}}{n}$$

PDA 1A Impervious:					
Slope, S = 0.018 ft/ft					
Manning's Roughness Coefficient, n	0.011	L, limiting length of flow, ft	1202.61	100.0	
PDA 1A Pervious:					
Slope, S = 0.030 ft/ft					
Manning's Roughness Coefficient, n	0.150	L, limiting length of flow, ft	115.47	100.0	
PDA 1B Impervious:					
Slope, S = 0.020 ft/ft					
Manning's Roughness Coefficient, n	0.011	L, limiting length of flow, ft	1285.65	100.0	
PDA 1B Pervious:					
Slope, S = 0.136 ft/ft					
Manning's Roughness Coefficient, n	0.150	L, limiting length of flow, ft	245.85	100.0	
PDA 2A Impervious:					
Slope, S = 0.033 ft/ft					
Manning's Roughness Coefficient, n	0.011	L, limiting length of flow, ft	1651.45	100.0	
PDA 2A Pervious:					
Slope, S = 0.008 ft/ft					
Manning's Roughness Coefficient, n	0.150	L, limiting length of flow, ft	59.63	59.6	
PDA 2B Impervious:					
Slope, S = 0.013 ft/ft					
Manning's Roughness Coefficient, n	0.011	L, limiting length of flow, ft	1016.39	100.0	
PDA 2B Pervious:					
Slope, S = 0.025 ft/ft					
Manning's Roughness Coefficient, n	0.150	L, limiting length of flow, ft	105.41	100.0	
PDA 2C Impervious:					
Slope, S = 0.015 ft/ft					
Manning's Roughness Coefficient, n	0.011	L, limiting length of flow, ft	1113.40	100.0	
PDA 2C Pervious:					
Slope, S = 0.120 ft/ft					
Manning's Roughness Coefficient, n	0.150	L, limiting length of flow, ft	230.94	100.0	



Subcat Reach Pond Link

Routing Diagram for Pre vs Post 0d

Prepared by Bohler Engineering, PC, Printed 10/16/2025

HydroCAD® 10.20-7a s/n 03478 © 2025 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC	P2 (inches)
1	2-Year Current	NOAA 24-hr	D	Default	24.00	1	3.34	2	3.34
2	10-Year Current	NOAA 24-hr	D	Default	24.00	1	5.16	2	3.34
3	100-Year Current	NOAA 24-hr	D	Default	24.00	1	8.78	2	3.34

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.022	80	>75% Grass cover, Good, HSG D (E1-P, E2-P, P1A-P, P1B-P, P2A-P, P2B-P, P2C-P)
4.629	98	MVS Paved parking, HSG D (E1-I, E2-I, P1B-I, P2A-I, P2B-I)
0.068	98	Paved parking, HSG D (E1-I, P1A-I, P1B-I, P2A-I, P2C-I)
0.930	98	Roofs, HSG D (P2B-I)
4.032	77	Woods, Good, HSG D (E1-P, E2-P)
12.681	**87**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
12.681	HSG D	E1-I, E1-P, E2-I, E2-P, P1A-I, P1A-P, P1B-I, P1B-P, P2A-I, P2A-P, P2B-I, P2B-P, P2C-I, P2C-P
0.000	Other	
12.681		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	3.022	0.000	3.022	>75% Grass cover, Good	E1-P, E2-P, P1A-P, P1B-P, P2A-P, P2B-P, P2C-P
0.000	0.000	0.000	4.629	0.000	4.629	MVS Paved parking	E1-I, E2-I, P1B-I, P2A-I, P2B-I
0.000	0.000	0.000	0.068	0.000	0.068	Paved parking	E1-I, P1A-I, P1B-I, P2A-I, P2C-I
0.000	0.000	0.000	0.930	0.000	0.930	Roofs	P2B-I
0.000	0.000	0.000	4.032	0.000	4.032	Woods, Good	E1-P, E2-P
0.000	**0.000**	**0.000**	**12.681**	**0.000**	**12.681**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	P2B-I	0.00	0.00	51.0	0.0050	0.011	12.0	12.0	0.0	
2	P2B-I	0.00	0.00	139.0	0.0030	0.011	0.0	18.0	0.0	
3	P2B-I	0.00	0.00	79.0	0.0030	0.011	0.0	18.0	0.0	
4	P2B-P	0.00	0.00	56.0	0.0050	0.011	12.0	12.0	0.0	
5	P2B-P	0.00	0.00	98.0	0.0030	0.011	0.0	18.0	0.0	
6	P2B-P	0.00	0.00	106.0	0.0030	0.011	0.0	18.0	0.0	
7	B1	1.05	0.64	119.0	0.0034	0.013	0.0	24.0	0.0	
8	PP1	3.67	3.38	58.0	0.0050	0.011	0.0	24.0	0.0	

Time span=0.00-100.00 hrs, dt=0.05 hrs, 2001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentE1-I: EDA 1-I Runoff Area=4,731 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=135' Tc=1.2 min CN=98 Runoff=0.38 cfs 0.028 af

SubcatchmentE1-P: EDA 1-P Runoff Area=71,171 sf 0.00% Impervious Runoff Depth=1.31"
Flow Length=181' Slope=0.0100 '/' Tc=30.4 min CN=77 Runoff=1.29 cfs 0.179 af

SubcatchmentE2-I: EDA 2-I Runoff Area=9,500 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=29' Slope=0.0300 '/' Tc=0.4 min CN=98 Runoff=0.76 cfs 0.056 af

SubcatchmentE2-P: EDA 2-P Runoff Area=190,784 sf 0.00% Impervious Runoff Depth=1.38"
Flow Length=431' Slope=0.0050 '/' Tc=51.4 min CN=78 Runoff=2.74 cfs 0.503 af

SubcatchmentP1A-I: PDA 1A-I Runoff Area=791 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=48' Tc=2.9 min CN=98 Runoff=0.06 cfs 0.005 af

SubcatchmentP1A-P: PDA 1A-P Runoff Area=11,157 sf 0.00% Impervious Runoff Depth=1.51"
Flow Length=58' Tc=5.2 min CN=80 Runoff=0.45 cfs 0.032 af

SubcatchmentP1B-I: PDA 1B-I Runoff Area=5,651 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=193' Tc=2.1 min CN=98 Runoff=0.46 cfs 0.034 af

SubcatchmentP1B-P: PDA 1B-P Runoff Area=1,940 sf 0.00% Impervious Runoff Depth=1.51"
Flow Length=11' Slope=0.2000 '/' Tc=0.7 min CN=80 Runoff=0.09 cfs 0.006 af

SubcatchmentP2A-I: PDA 2A-I Runoff Area=12,515 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=49' Tc=0.6 min CN=98 Runoff=1.00 cfs 0.074 af

SubcatchmentP2A-P: PDA 2A-P Runoff Area=8,228 sf 0.00% Impervious Runoff Depth=1.51"
Flow Length=173' Tc=11.9 min CN=80 Runoff=0.27 cfs 0.024 af

SubcatchmentP2B-I: PDA 2B-I Runoff Area=210,769 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=524' Tc=3.6 min CN=98 Runoff=16.22 cfs 1.253 af

SubcatchmentP2B-P: PDA 2B-P Runoff Area=10,222 sf 0.00% Impervious Runoff Depth=1.51"
Flow Length=305' Tc=5.7 min CN=80 Runoff=0.41 cfs 0.030 af

SubcatchmentP2C-I: PDA 2C-I Runoff Area=1,118 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=20' Tc=0.7 min CN=98 Runoff=0.09 cfs 0.007 af

SubcatchmentP2C-P: PDA 2C-P Runoff Area=13,795 sf 0.00% Impervious Runoff Depth=1.51"
Flow Length=25' Slope=0.0180 '/' Tc=3.3 min CN=80 Runoff=0.61 cfs 0.040 af

Pond B1: UG IB Peak Elev=2.18' Storage=33,586 cf Inflow=16.79 cfs 1.380 af
Outflow=0.94 cfs 1.380 af

Pond PP1: PP-A Peak Elev=4.34' Storage=1,366 cf Inflow=1.14 cfs 0.098 af
Outflow=0.24 cfs 0.098 af

Link E POA-1: POA-1 EDA Inflow=1.36 cfs 0.207 af
Primary=1.36 cfs 0.207 af

Link E POA-2: POA-2 EDA Inflow=2.83 cfs 0.559 af
Primary=2.83 cfs 0.559 af

Link P POA-1: POA-1 PDA Inflow=1.01 cfs 0.076 af
Primary=1.01 cfs 0.076 af

Link P POA-2: POA-2 PDA Inflow=1.41 cfs 1.427 af
Primary=1.41 cfs 1.427 af

Total Runoff Area = 12.681 ac Runoff Volume = 2.269 af Average Runoff Depth = 2.15"
55.63% Pervious = 7.055 ac 44.37% Impervious = 5.626 ac

Summary for Subcatchment E1-I: EDA 1-I

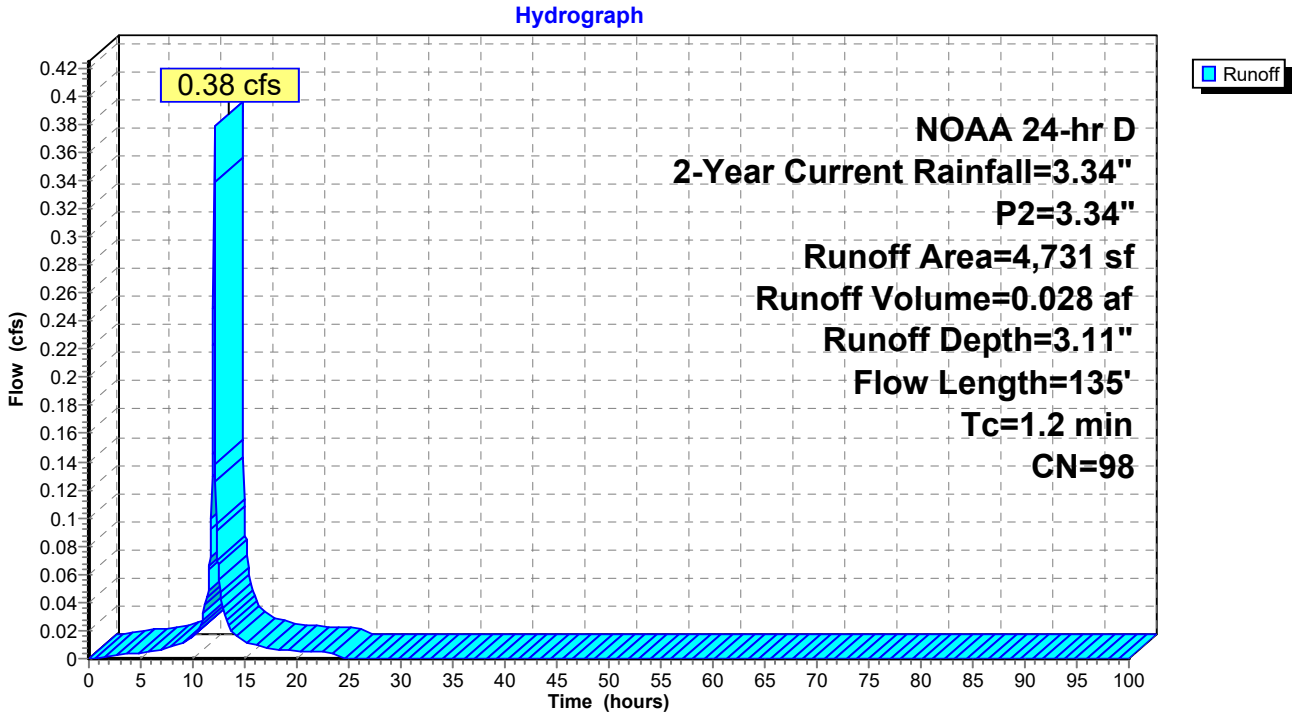
Runoff = 0.38 cfs @ 12.06 hrs, Volume= 0.028 af, Depth= 3.11"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

	Area (sf)	CN	Description
*	4,701	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	4,731	98	Weighted Average
	4,731		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	25	0.0340	1.32		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
0.9	110	0.0100	2.03		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
1.2	135	Total			

Subcatchment E1-I: EDA 1-I



Summary for Subcatchment E1-P: EDA 1-P

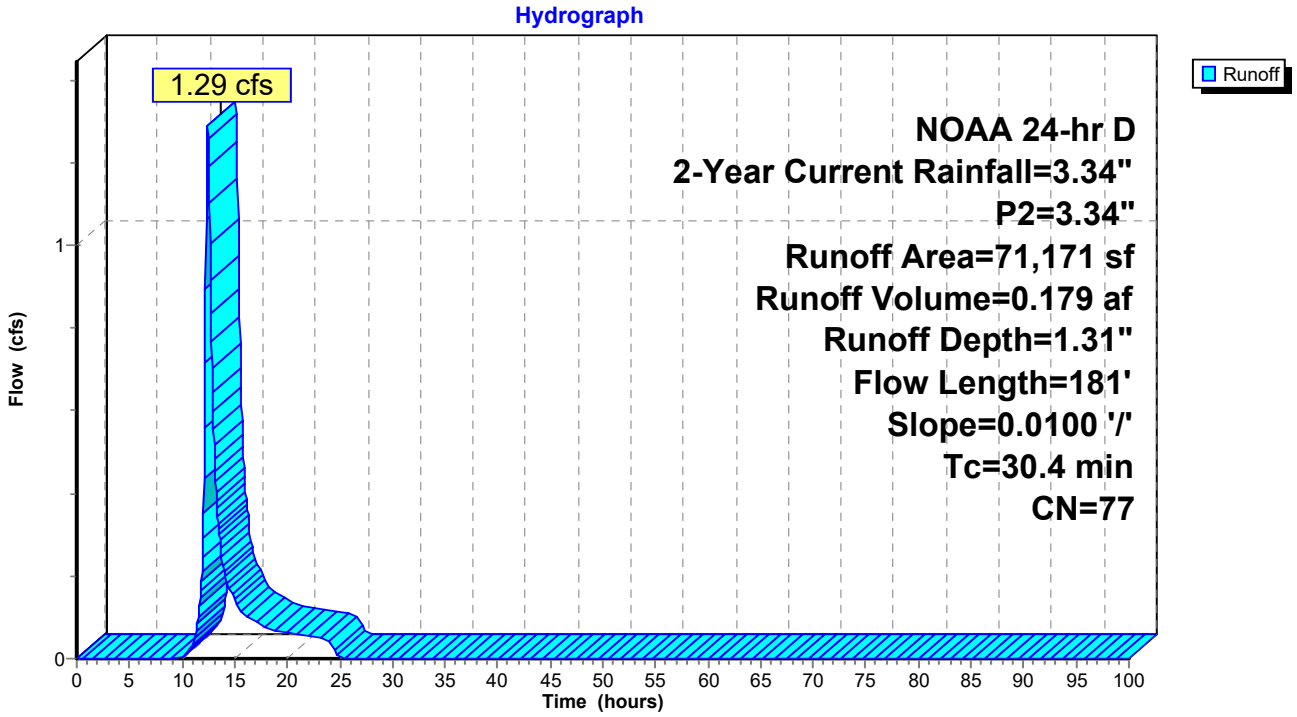
Runoff = 1.29 cfs @ 12.44 hrs, Volume= 0.179 af, Depth= 1.31"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

Area (sf)	CN	Description
8,810	80	>75% Grass cover, Good, HSG D
62,361	77	Woods, Good, HSG D
71,171	77	Weighted Average
71,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	100	0.0100	0.06		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.34"
2.7	81	0.0100	0.50		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
30.4	181	Total			

Subcatchment E1-P: EDA 1-P



Summary for Subcatchment E2-I: EDA 2-I

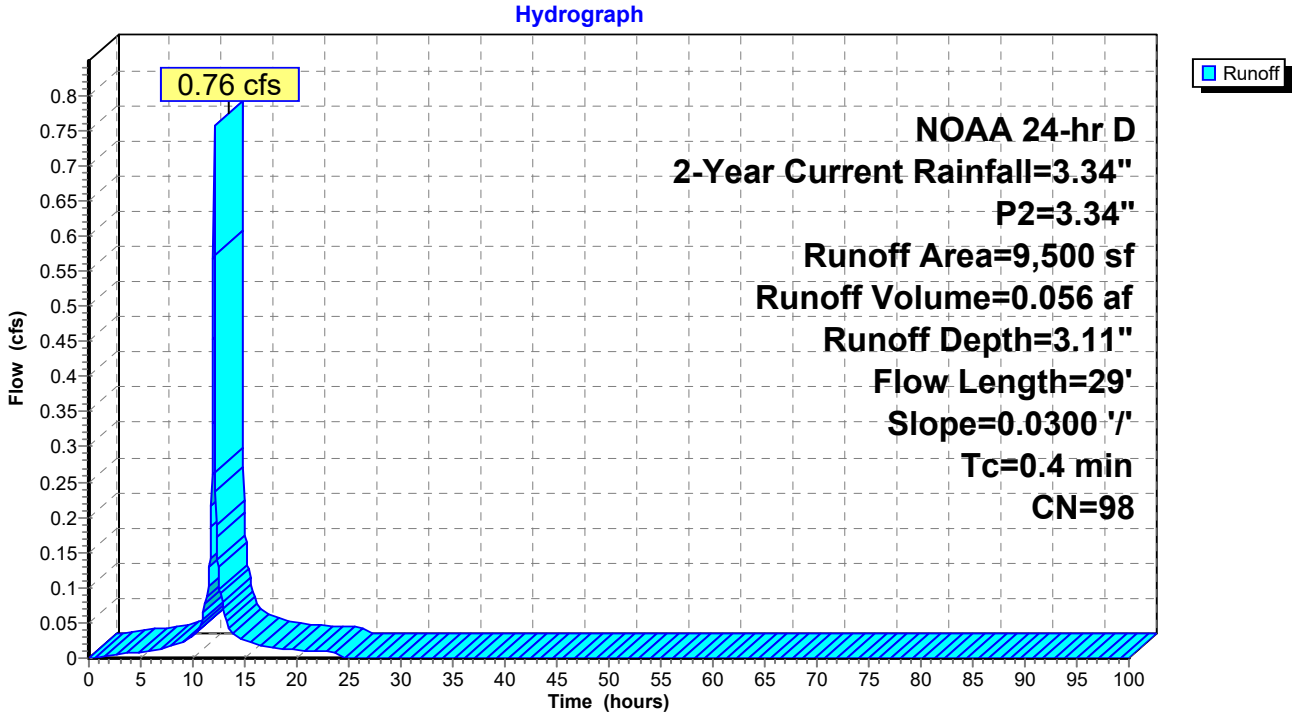
Runoff = 0.76 cfs @ 12.05 hrs, Volume= 0.056 af, Depth= 3.11"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

	Area (sf)	CN	Description
*	9,500	98	MVS Paved parking, HSG D
	9,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	29	0.0300	1.29		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"

Subcatchment E2-I: EDA 2-I



Summary for Subcatchment E2-P: EDA 2-P

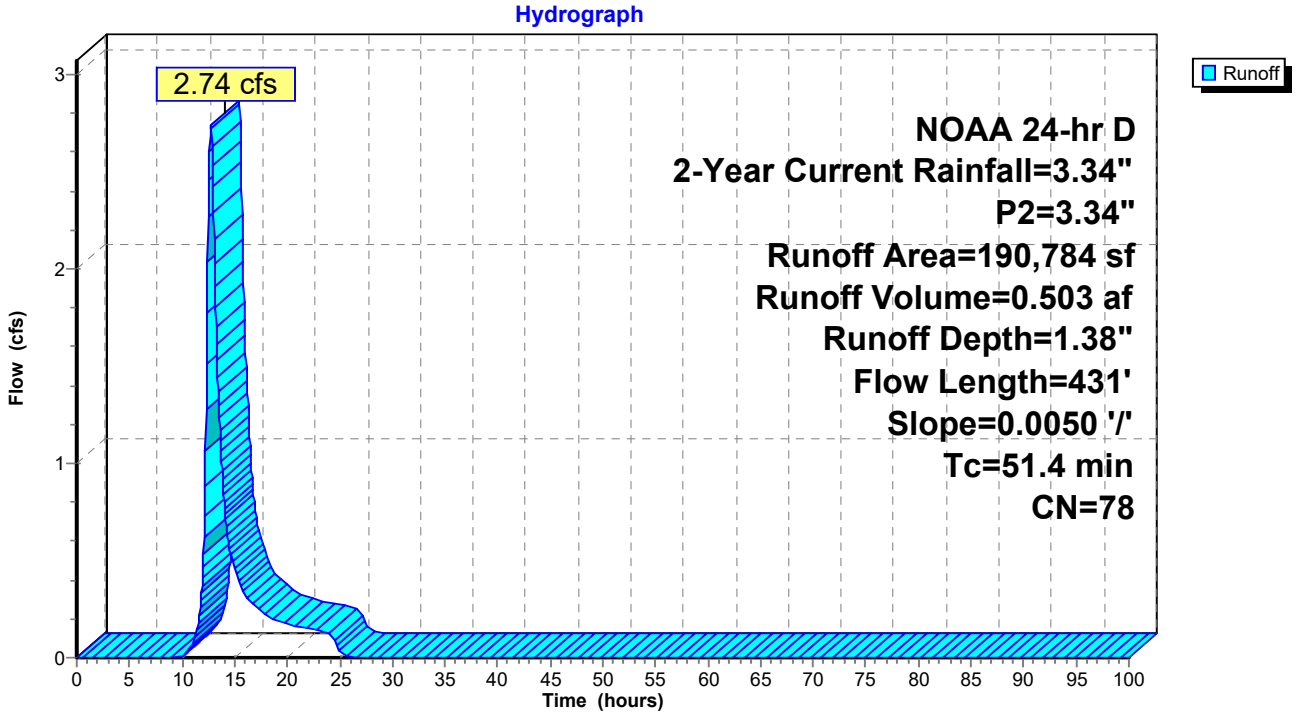
Runoff = 2.74 cfs @ 12.73 hrs, Volume= 0.503 af, Depth= 1.38"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

Area (sf)	CN	Description
77,501	80	>75% Grass cover, Good, HSG D
113,283	77	Woods, Good, HSG D
190,784	78	Weighted Average
190,784		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.6	100	0.0050	0.05		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.34"
12.9	274	0.0050	0.35		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
1.9	57	0.0050	0.49		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
51.4	431	Total			

Subcatchment E2-P: EDA 2-P



Summary for Subcatchment P1A-I: PDA 1A-I

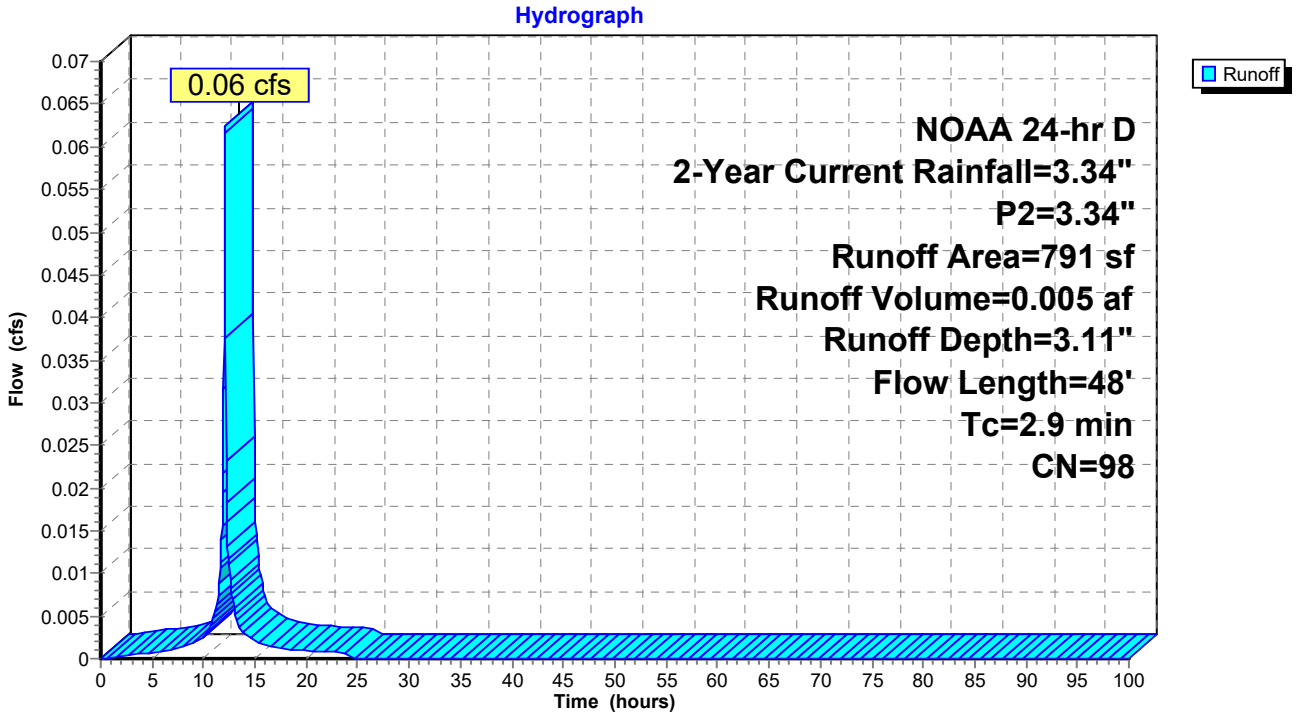
Runoff = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af, Depth= 3.11"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

Area (sf)	CN	Description
791	98	Paved parking, HSG D
791		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	12	0.0175	0.87		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
1.3	14	0.0550	0.18		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.34"
1.4	22	0.1140	0.26		**Sheet Flow, CD** Grass: Short n= 0.150 P2= 3.34"
2.9	48	Total			

Subcatchment P1A-I: PDA 1A-I



Summary for Subcatchment P1A-P: PDA 1A-P

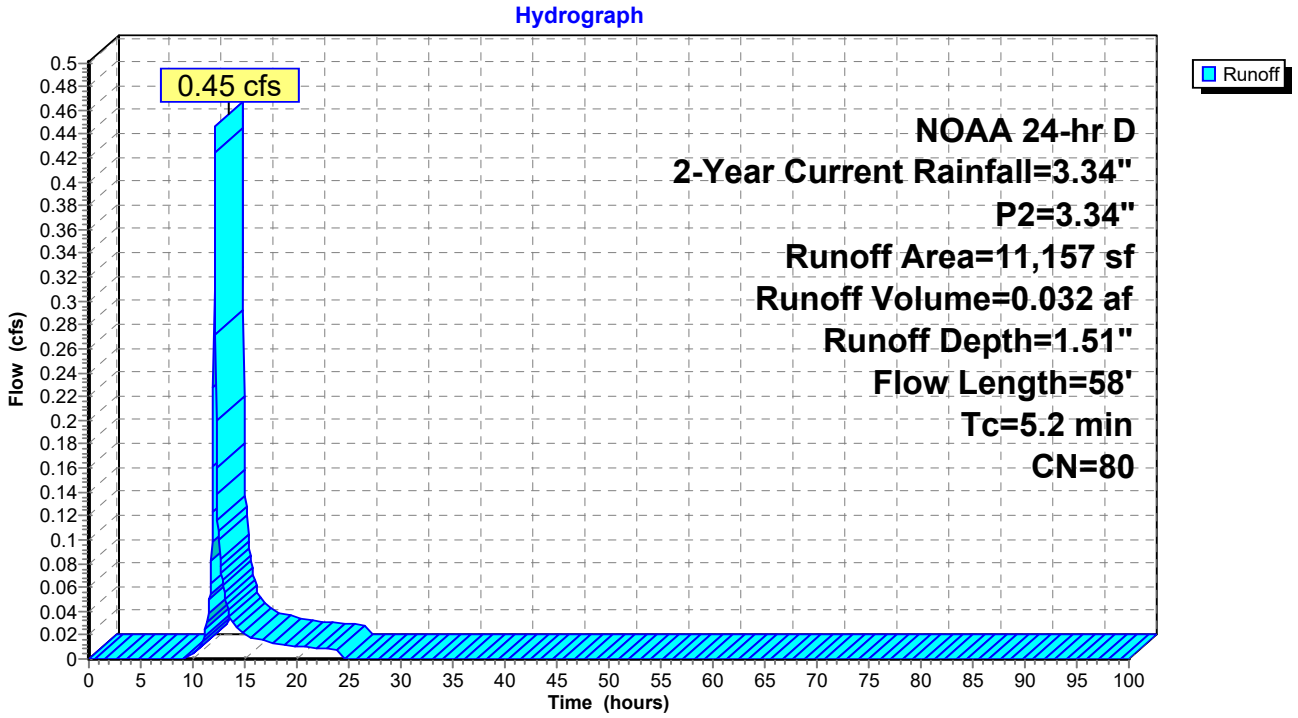
Runoff = 0.45 cfs @ 12.12 hrs, Volume= 0.032 af, Depth= 1.51"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

Area (sf)	CN	Description
11,157	80	>75% Grass cover, Good, HSG D
11,157		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	33	0.0300	0.16		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"
1.8	25	0.0800	0.23		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.34"
5.2	58	Total			

Subcatchment P1A-P: PDA 1A-P



Summary for Subcatchment P1B-I: PDA 1B-I

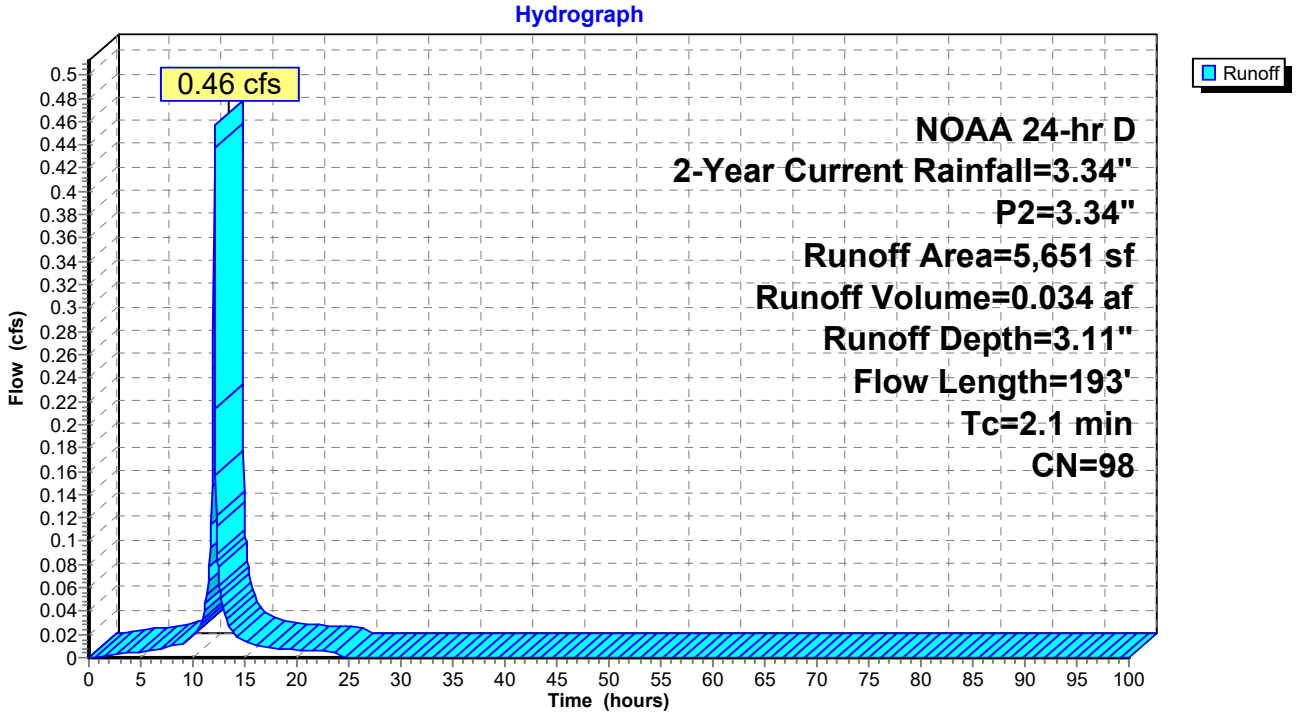
Runoff = 0.46 cfs @ 12.08 hrs, Volume= 0.034 af, Depth= 3.11"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

	Area (sf)	CN	Description
*	5,621	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	5,651	98	Weighted Average
	5,651		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	84	0.0209	1.38		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
0.3	16	0.0130	0.82		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.34"
0.8	93	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
2.1	193	Total			

Subcatchment P1B-I: PDA 1B-I



Summary for Subcatchment P1B-P: PDA 1B-P

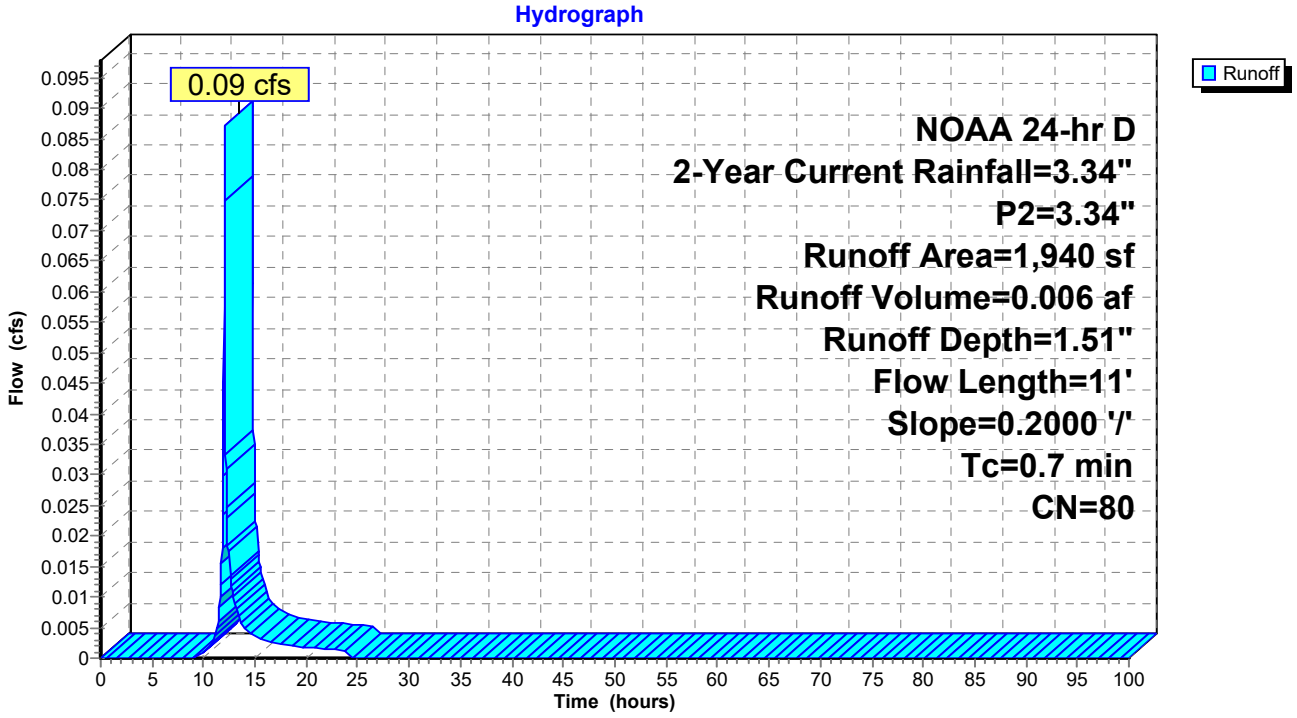
Runoff = 0.09 cfs @ 12.06 hrs, Volume= 0.006 af, Depth= 1.51"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

Area (sf)	CN	Description
1,940	80	>75% Grass cover, Good, HSG D
1,940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	11	0.2000	0.28		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"

Subcatchment P1B-P: PDA 1B-P



Summary for Subcatchment P2A-I: PDA 2A-I

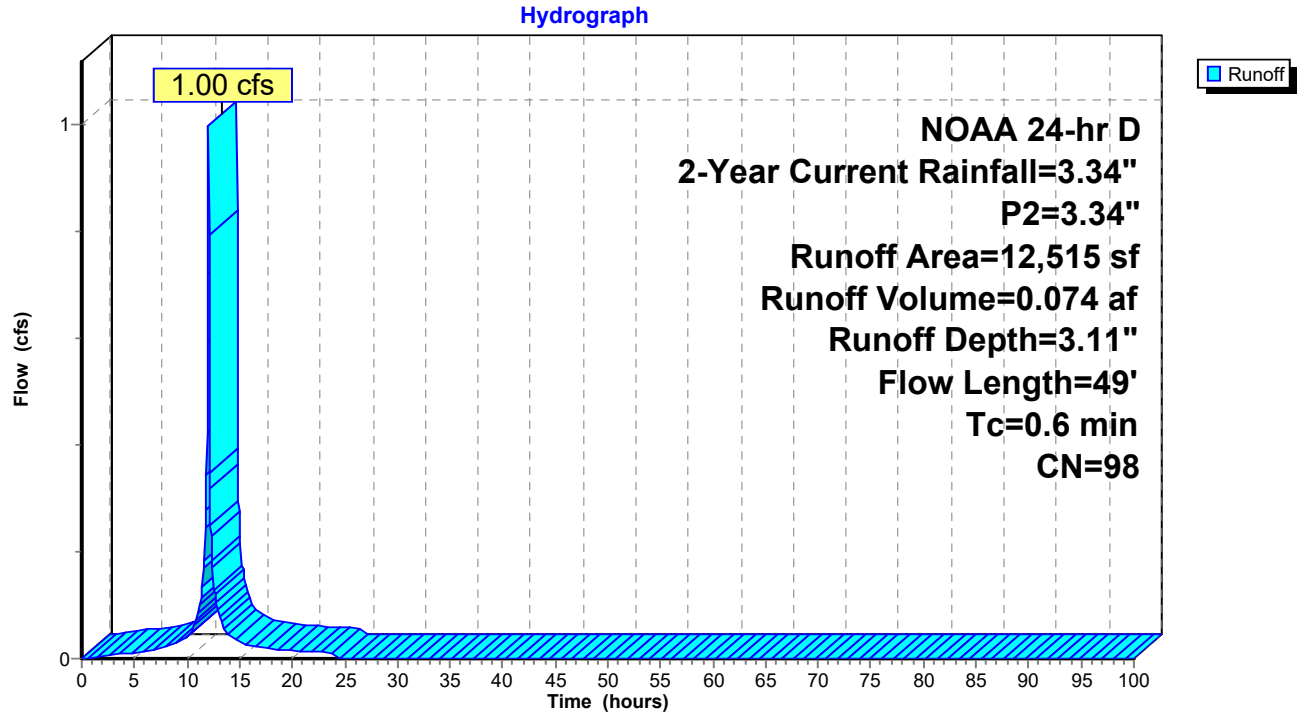
Runoff = 1.00 cfs @ 12.05 hrs, Volume= 0.074 af, Depth= 3.11"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

	Area (sf)	CN	Description
*	11,539	98	MVS Paved parking, HSG D
	976	98	Paved parking, HSG D
	12,515	98	Weighted Average
	12,515		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	30	0.0330	1.35		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
0.2	19	0.0105	2.08		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.6	49	Total			

Subcatchment P2A-I: PDA 2A-I



Summary for Subcatchment P2A-P: PDA 2A-P

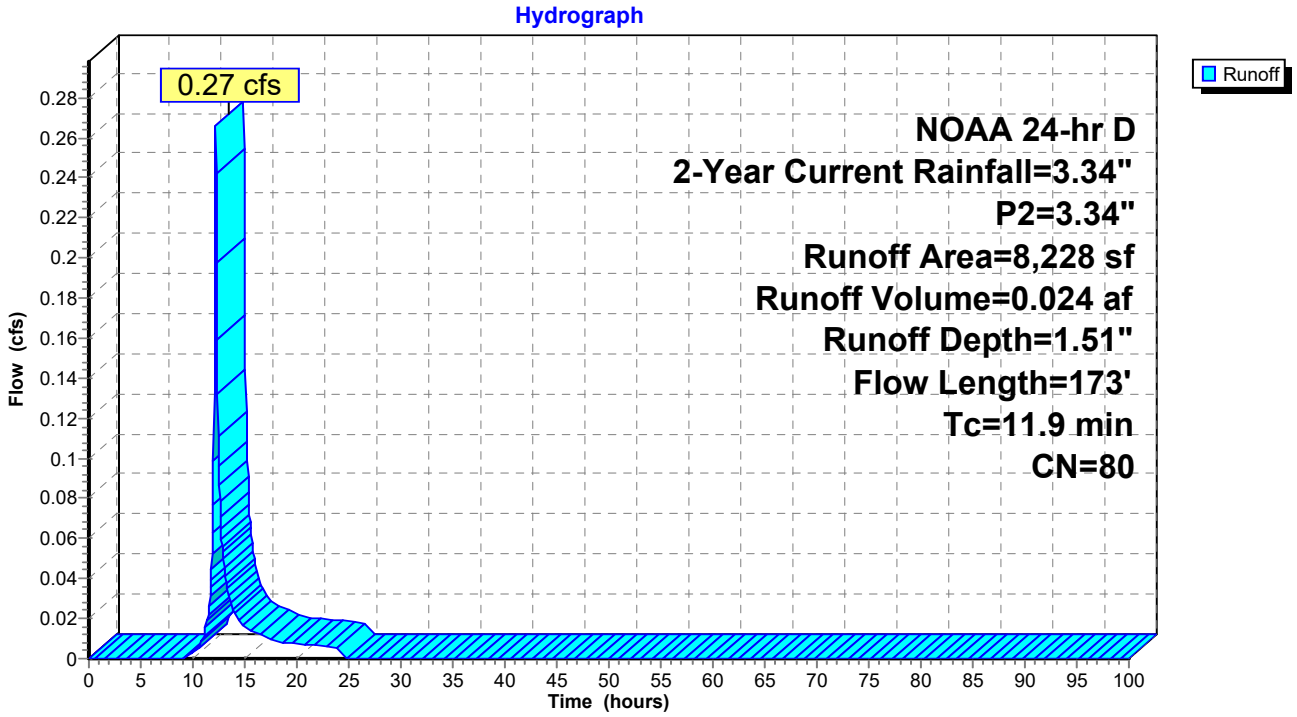
Runoff = 0.27 cfs @ 12.20 hrs, Volume= 0.024 af, Depth= 1.51"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

Area (sf)	CN	Description
8,228	80	>75% Grass cover, Good, HSG D
8,228		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	60	0.0080	0.11		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"
2.6	96	0.0080	0.63		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
11.9	173	Total			

Subcatchment P2A-P: PDA 2A-P



Summary for Subcatchment P2B-I: PDA 2B-I

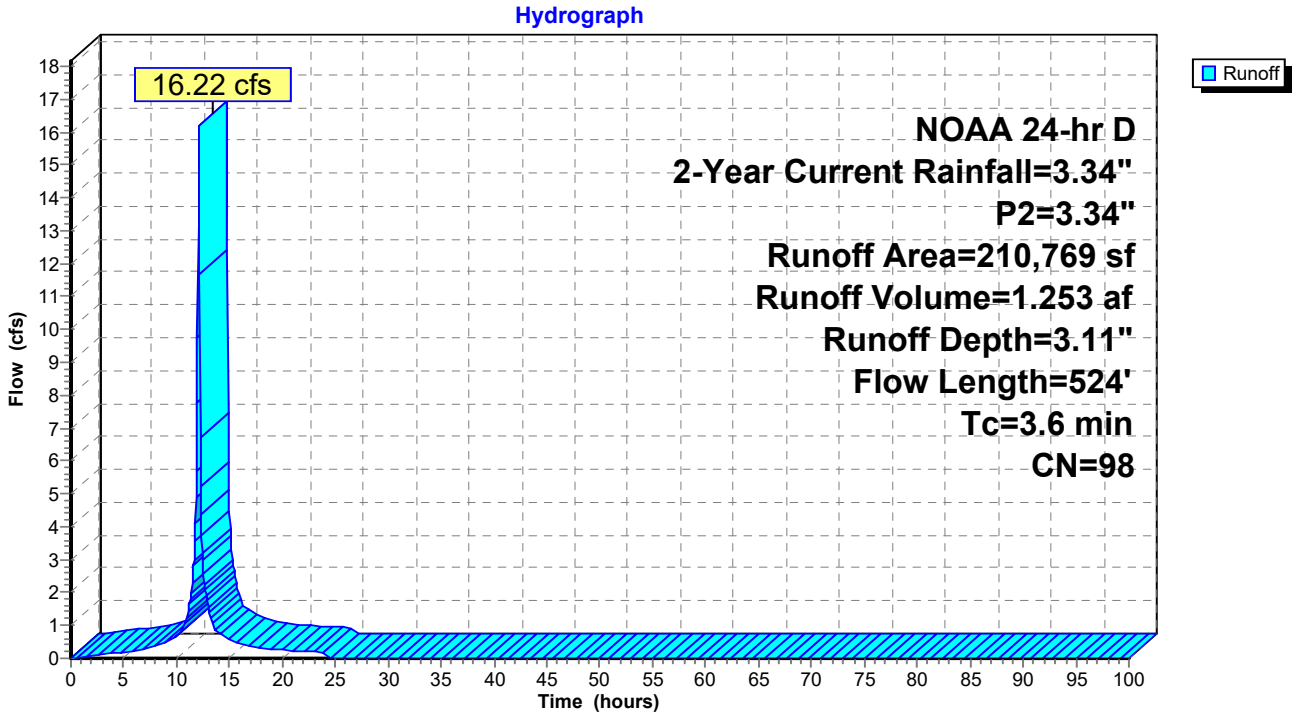
Runoff = 16.22 cfs @ 12.09 hrs, Volume= 1.253 af, Depth= 3.11"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

	Area (sf)	CN	Description
*	170,269	98	MVS Paved parking, HSG D
	40,500	98	Roofs, HSG D
	210,769	98	Weighted Average
	210,769		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0136	1.20		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
1.1	155	0.0136	2.37		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.2	51	0.0050	3.79	3.79	**Pipe Channel, CD** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.6	139	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	79	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
3.6	524	Total			

Subcatchment P2B-I: PDA 2B-I



Summary for Subcatchment P2B-P: PDA 2B-P

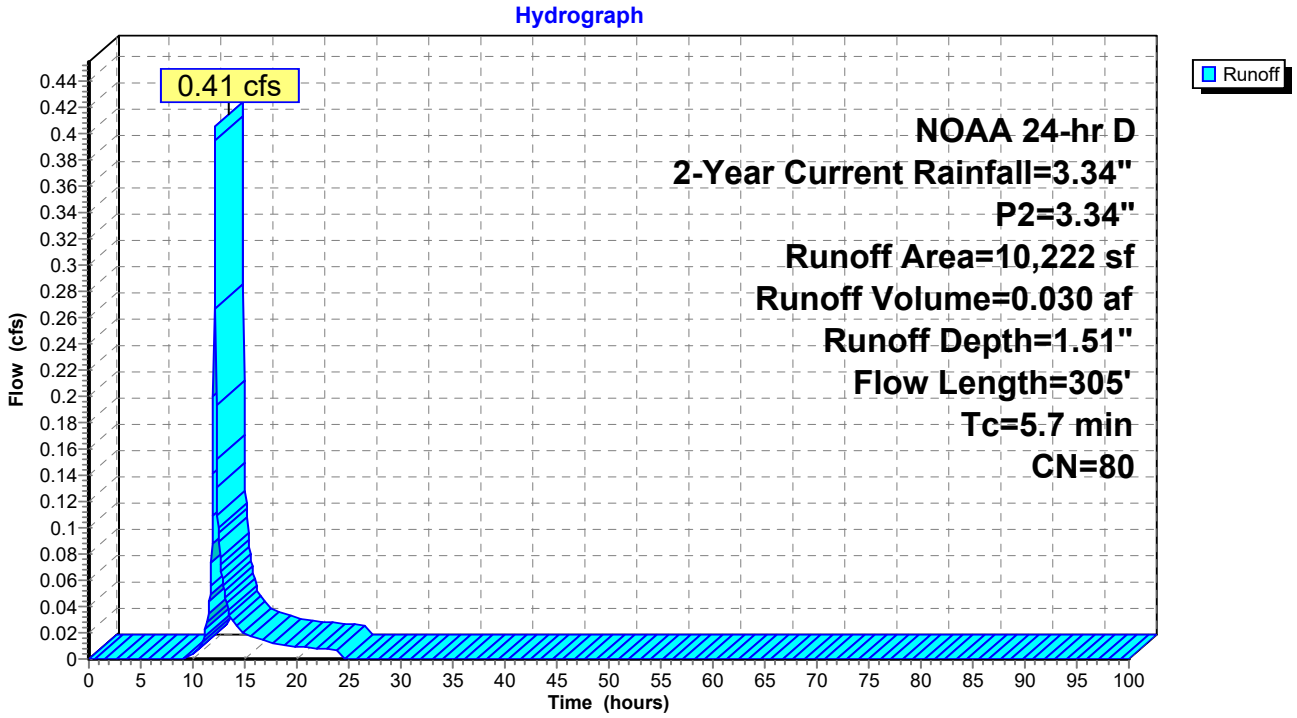
Runoff = 0.41 cfs @ 12.13 hrs, Volume= 0.030 af, Depth= 1.51"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

Area (sf)	CN	Description
10,222	80	>75% Grass cover, Good, HSG D
10,222		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	45	0.0250	0.16		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"
0.2	56	0.0050	3.79	3.79	**Pipe Channel, BC** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.4	98	0.0030	3.85	6.80	**Pipe Channel, CD** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.5	106	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
5.7	305	Total			

Subcatchment P2B-P: PDA 2B-P



Summary for Subcatchment P2C-I: PDA 2C-I

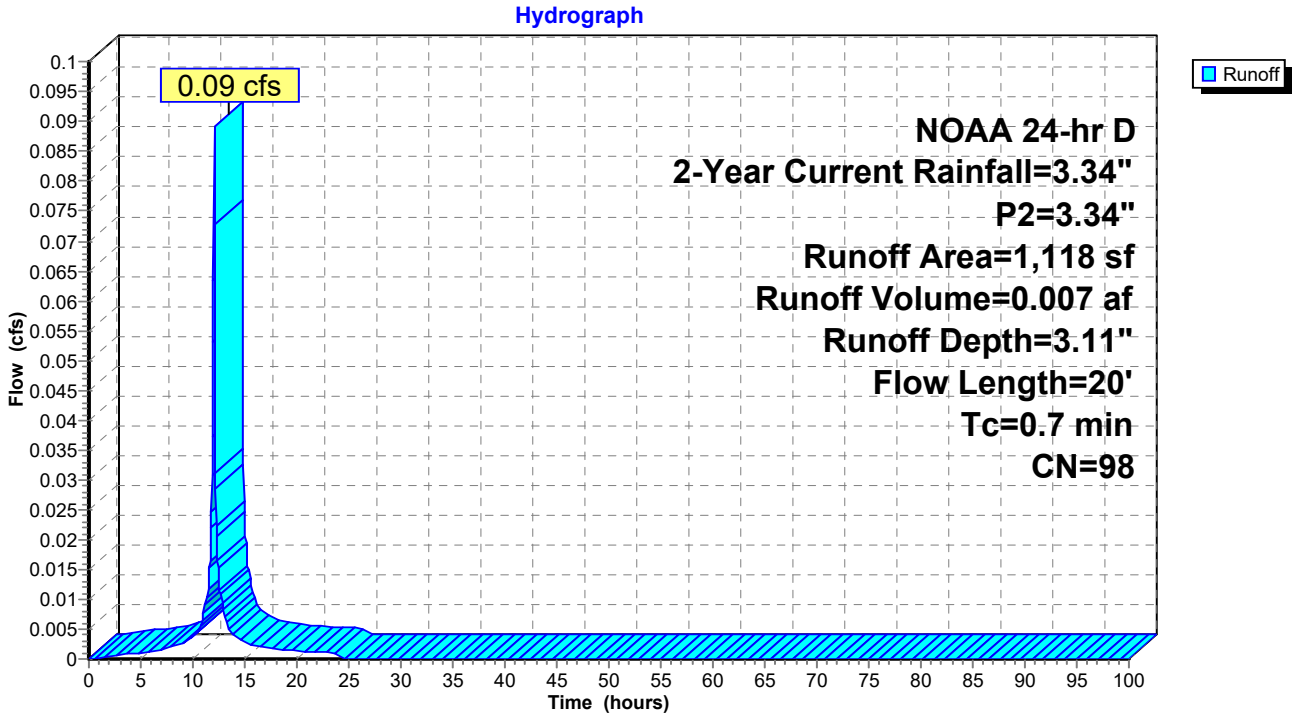
Runoff = 0.09 cfs @ 12.06 hrs, Volume= 0.007 af, Depth= 3.11"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

Area (sf)	CN	Description
1,118	98	Paved parking, HSG D
1,118		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	10	0.0150	0.79		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
0.5	10	0.3000	0.32		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.34"
0.7	20	Total			

Subcatchment P2C-I: PDA 2C-I



Summary for Subcatchment P2C-P: PDA 2C-P

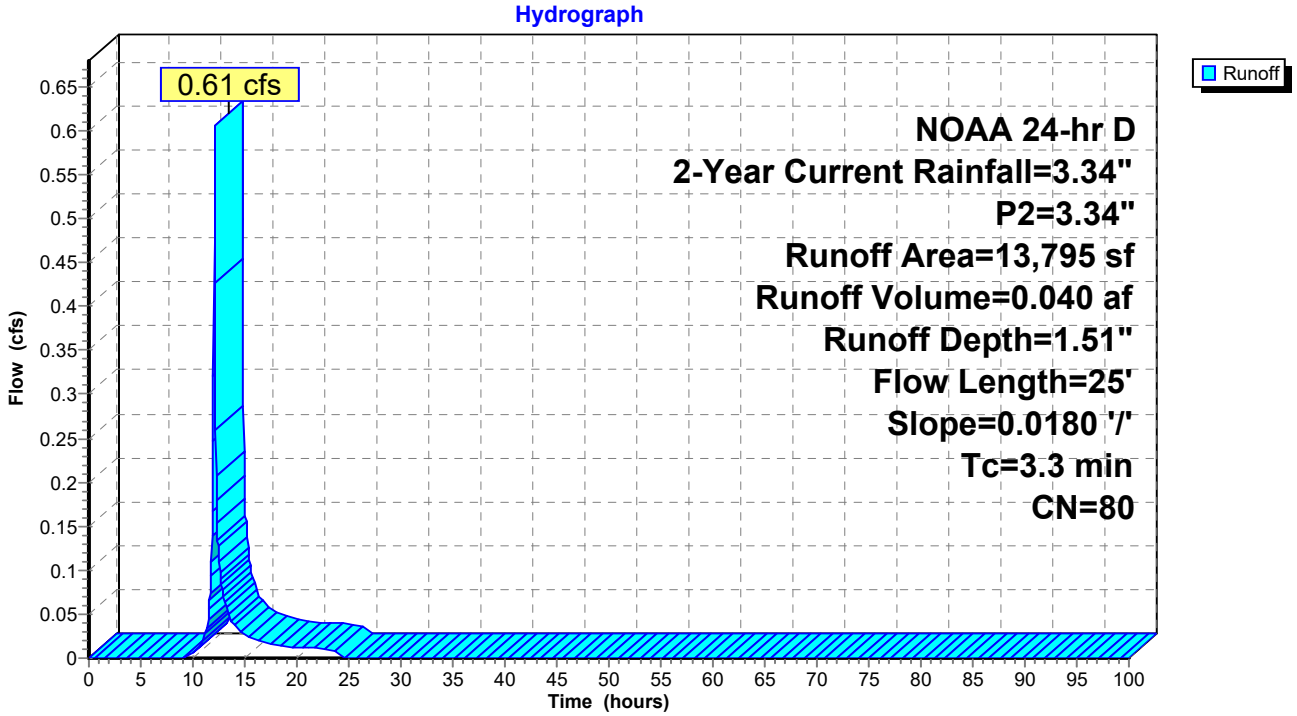
Runoff = 0.61 cfs @ 12.10 hrs, Volume= 0.040 af, Depth= 1.51"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Current Rainfall=3.34", P2=3.34"

Area (sf)	CN	Description
13,795	80	>75% Grass cover, Good, HSG D
13,795		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	25	0.0180	0.13		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"

Subcatchment P2C-P: PDA 2C-P



Summary for Pond B1: UG IB

Inflow Area = 5.549 ac, 92.37% Impervious, Inflow Depth = 2.99" for 2-Year Current event
Inflow = 16.79 cfs @ 12.10 hrs, Volume= 1.380 af
Outflow = 0.94 cfs @ 14.13 hrs, Volume= 1.380 af, Atten= 94%, Lag= 122.0 min
Primary = 0.94 cfs @ 14.13 hrs, Volume= 1.380 af
Routed to Link P POA-2 : POA-2 PDA

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 2.18' @ 14.13 hrs Surf.Area= 38,229 sf Storage= 33,586 cf

Plug-Flow detention time= 466.8 min calculated for 1.380 af (100% of inflow)
Center-of-Mass det. time= 466.8 min (1,230.3 - 763.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1.05'	48 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	1.20'	102,602 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 114,639 cf Overall x 89.5% Voids
		102,650 cf	Total Available Storage

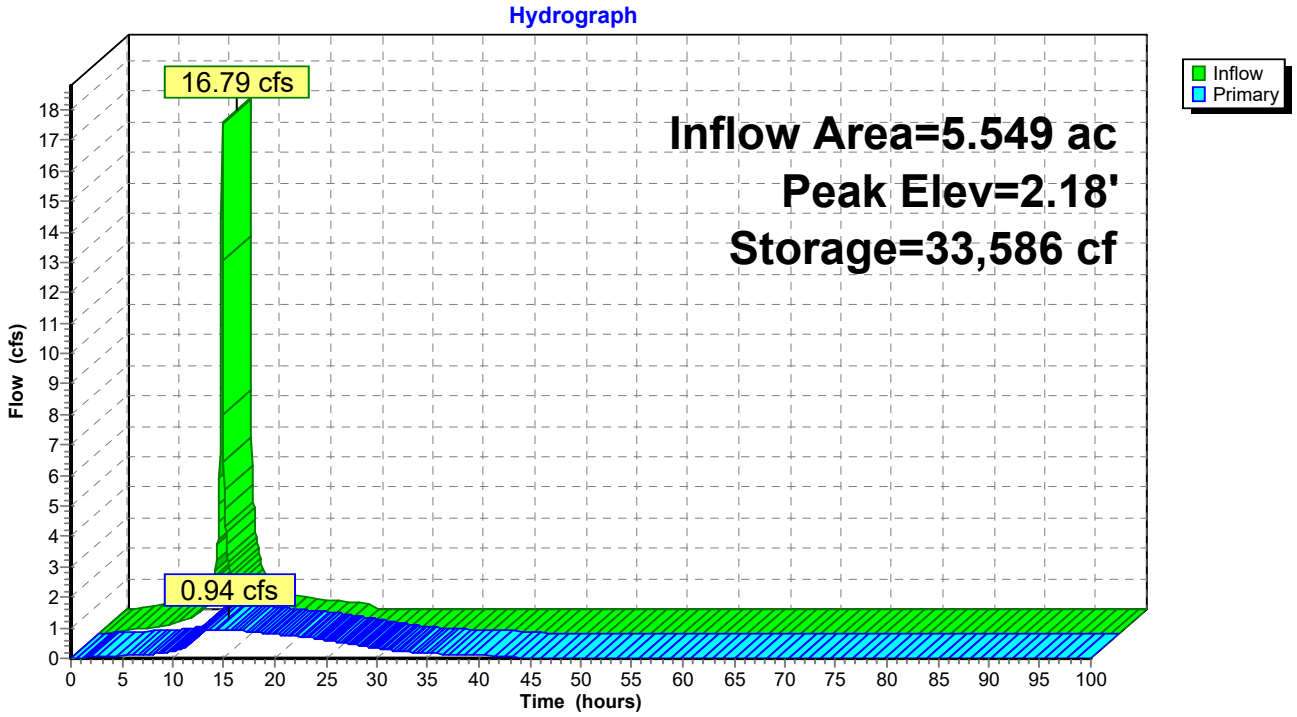
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.05	16	0	0
4.05	16	48	48

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.20	38,213	0	0
4.20	38,213	114,639	114,639

Device	Routing	Invert	Outlet Devices
#1	Primary	1.05'	**24.0" Round Culvert** L= 119.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 1.05' / 0.64' S= 0.0034 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	1.05'	**6.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	3.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.94 cfs @ 14.13 hrs HW=2.18' (Free Discharge)
└**1=Culvert** (Passes 0.94 cfs of 4.96 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 0.94 cfs @ 4.50 fps)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B1: UG IB


Hydrograph
16.79 cfs
0.94 cfs
Inflow Area=5.549 ac
Peak Elev=2.18'
Storage=33,586 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Summary for Pond PP1: PP-A

Inflow Area = 0.476 ac, 60.33% Impervious, Inflow Depth = 2.47" for 2-Year Current event
Inflow = 1.14 cfs @ 12.06 hrs, Volume= 0.098 af
Outflow = 0.24 cfs @ 12.52 hrs, Volume= 0.098 af, Atten= 79%, Lag= 27.8 min
Primary = 0.24 cfs @ 12.52 hrs, Volume= 0.098 af
Routed to Pond B1 : UG IB

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 4.34' @ 12.52 hrs Surf.Area= 10,028 sf Storage= 1,366 cf

Plug-Flow detention time= 65.8 min calculated for 0.098 af (100% of inflow)
Center-of-Mass det. time= 65.7 min (843.5 - 777.7)

Volume	Invert	Avail.Storage	Storage Description
#1	4.00'	7,129 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 17,821 cf Overall x 40.0% Voids
#2	3.90'	30 cf	**Outlet Structure Storage (Prismatic)** Listed below (Recalc)
		7,159 cf	Total Available Storage

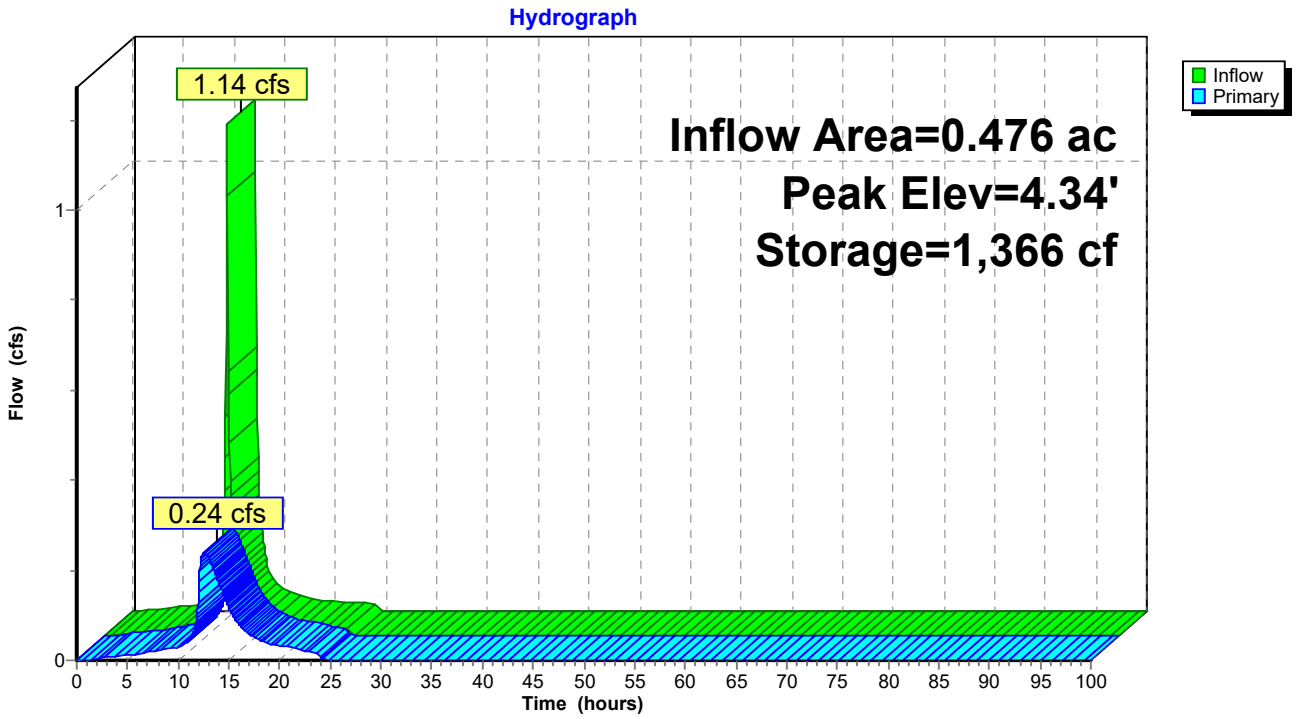
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.00	10,012	0	0
5.00	10,012	10,012	10,012
5.78	10,012	7,809	17,821

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
3.90	16	0	0
5.78	16	30	30

Device	Routing	Invert	Outlet Devices
#1	Primary	3.67'	**24.0" Round Culvert** L= 58.0' Ke= 0.200 Inlet / Outlet Invert= 3.67' / 3.38' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	3.90'	**4.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	5.18'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.24 cfs @ 12.52 hrs HW=4.34' (Free Discharge)
└**1=Culvert** (Passes 0.24 cfs of 2.23 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 0.24 cfs @ 2.47 fps)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PP1: PP-A

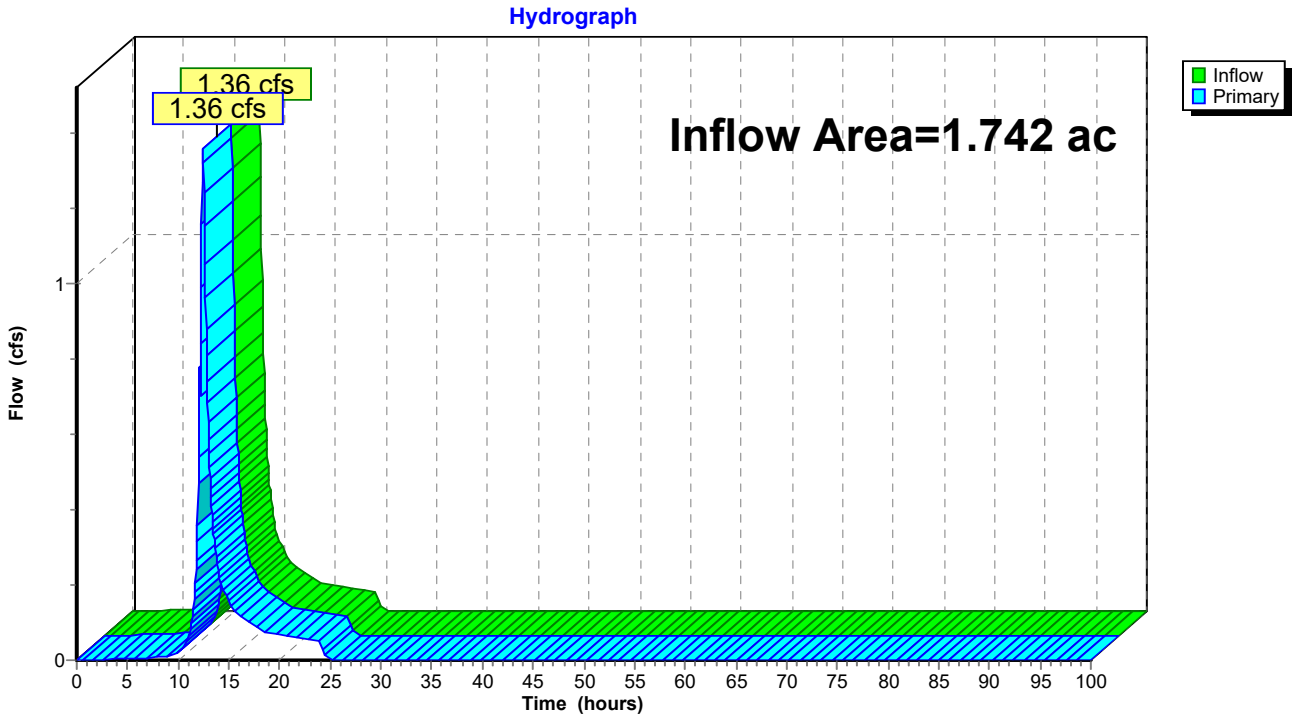

Hydrograph
1.14 cfs
0.24 cfs
Inflow Area=0.476 ac
Peak Elev=4.34'
Storage=1,366 cf
Inflow
Primary
Flow (cfs)
0
1
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
Time (hours)

Summary for Link E POA-1: POA-1 EDA

Inflow Area = 1.742 ac, 6.23% Impervious, Inflow Depth = 1.42" for 2-Year Current event
Inflow = 1.36 cfs @ 12.44 hrs, Volume= 0.207 af
Primary = 1.36 cfs @ 12.44 hrs, Volume= 0.207 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-1: POA-1 EDA

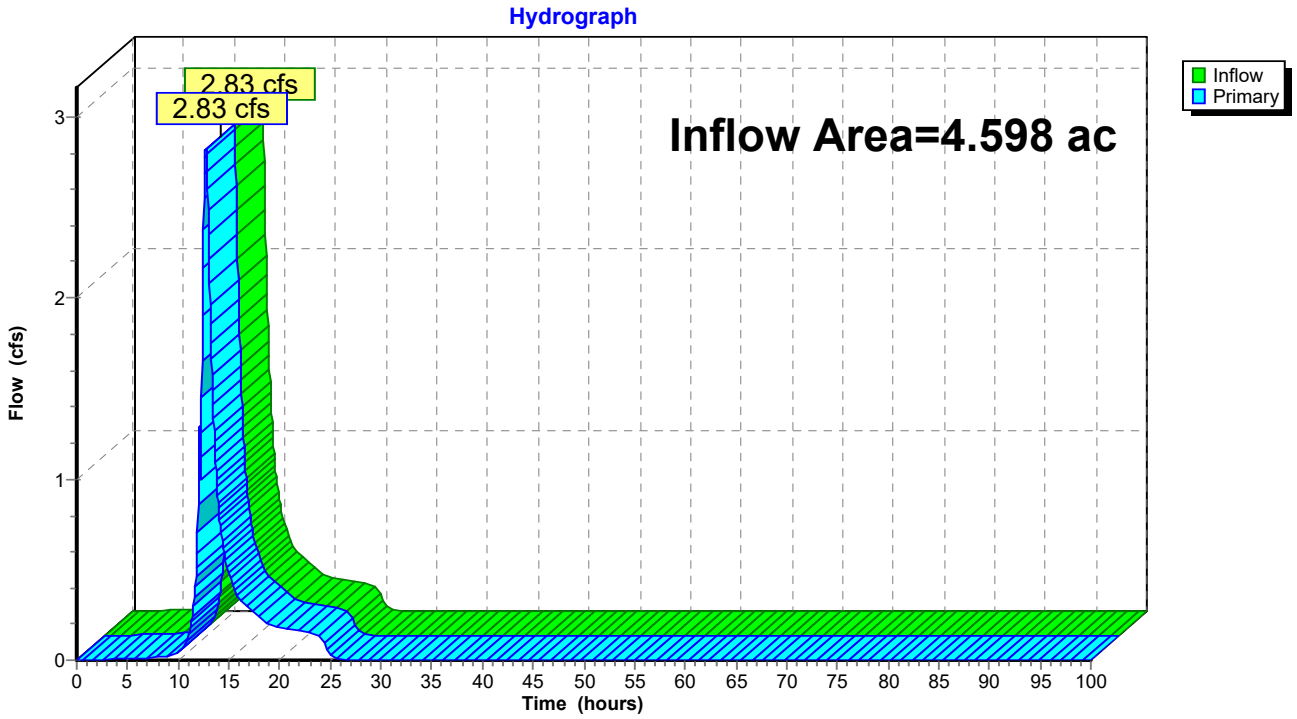


Summary for Link E POA-2: POA-2 EDA

Inflow Area = 4.598 ac, 4.74% Impervious, Inflow Depth = 1.46" for 2-Year Current event
Inflow = 2.83 cfs @ 12.73 hrs, Volume= 0.559 af
Primary = 2.83 cfs @ 12.73 hrs, Volume= 0.559 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-2: POA-2 EDA

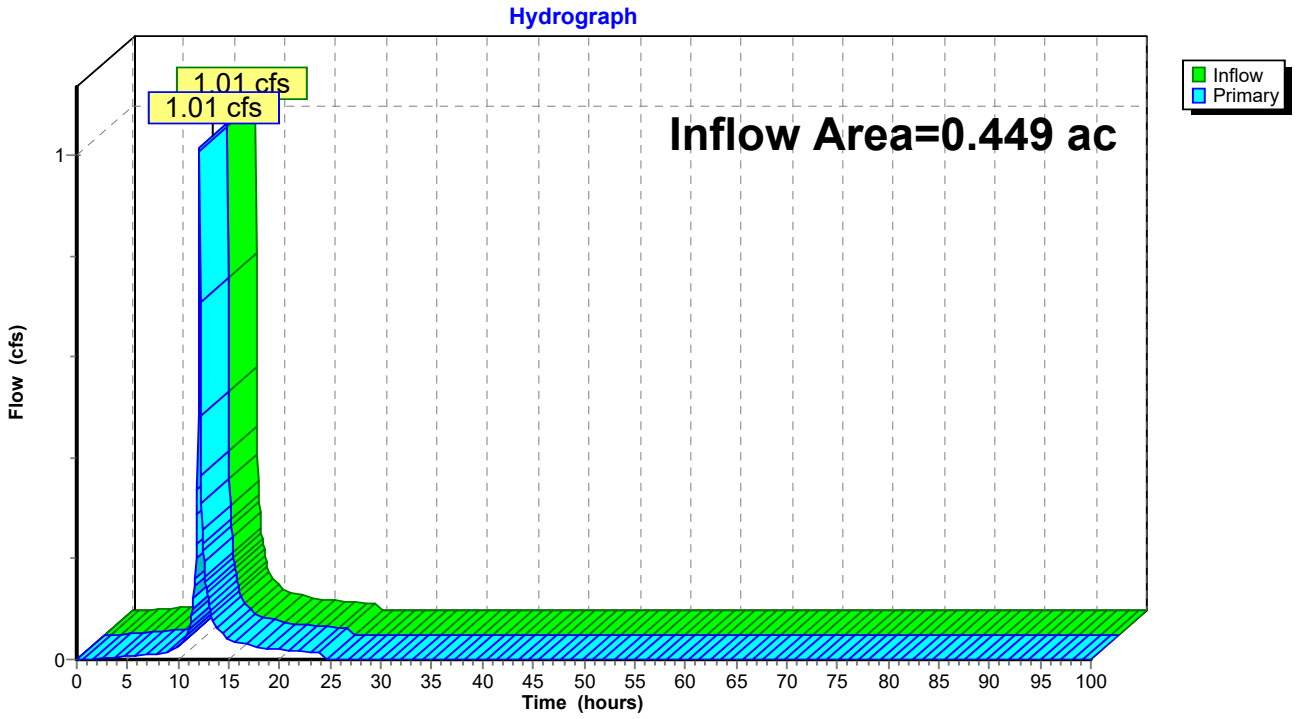


Summary for Link P POA-1: POA-1 PDA

Inflow Area = 0.449 ac, 32.97% Impervious, Inflow Depth = 2.04" for 2-Year Current event
Inflow = 1.01 cfs @ 12.09 hrs, Volume= 0.076 af
Primary = 1.01 cfs @ 12.09 hrs, Volume= 0.076 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-1: POA-1 PDA

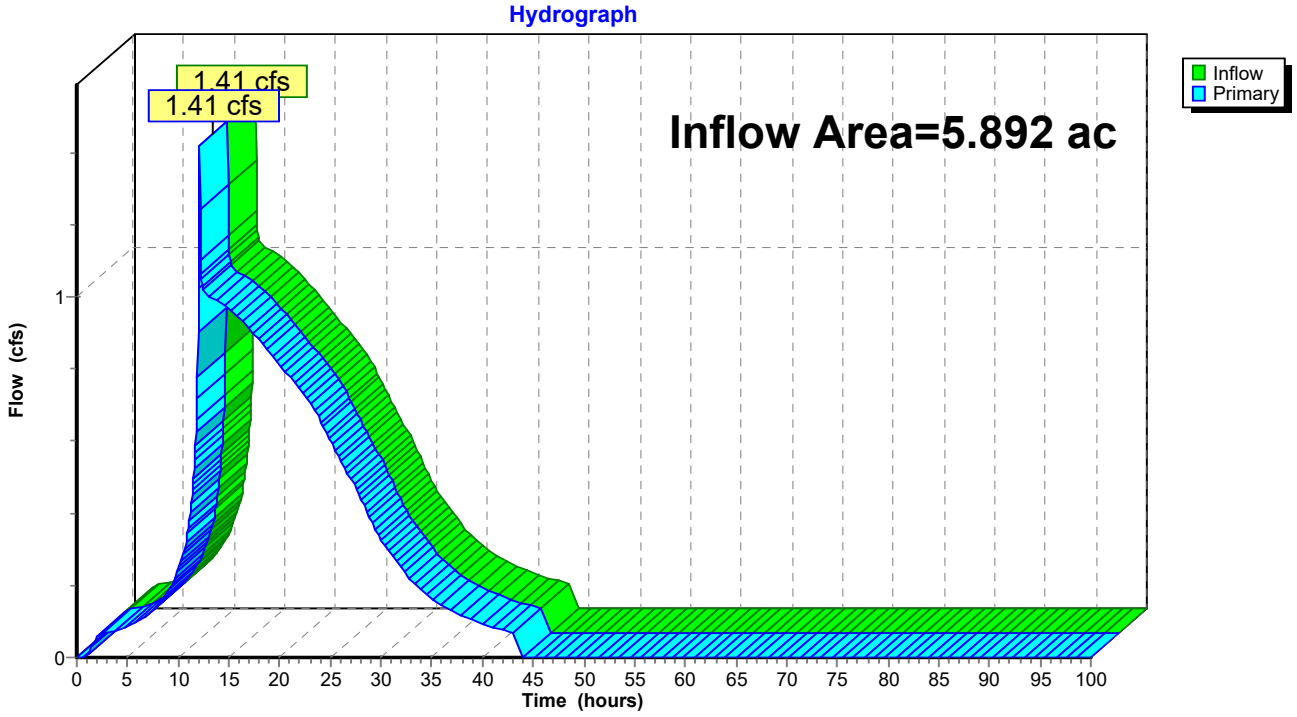


Summary for Link P POA-2: POA-2 PDA

Inflow Area = 5.892 ac, 87.44% Impervious, Inflow Depth = 2.91" for 2-Year Current event
Inflow = 1.41 cfs @ 12.10 hrs, Volume= 1.427 af
Primary = 1.41 cfs @ 12.10 hrs, Volume= 1.427 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-2: POA-2 PDA



Time span=0.00-100.00 hrs, dt=0.05 hrs, 2001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentE1-I: EDA 1-I Runoff Area=4,731 sf 100.00% Impervious Runoff Depth=4.92"
Flow Length=135' Tc=1.2 min CN=98 Runoff=0.59 cfs 0.045 af

SubcatchmentE1-P: EDA 1-P Runoff Area=71,171 sf 0.00% Impervious Runoff Depth=2.76"
Flow Length=181' Slope=0.0100 '/' Tc=30.4 min CN=77 Runoff=2.78 cfs 0.375 af

SubcatchmentE2-I: EDA 2-I Runoff Area=9,500 sf 100.00% Impervious Runoff Depth=4.92"
Flow Length=29' Slope=0.0300 '/' Tc=0.4 min CN=98 Runoff=1.18 cfs 0.089 af

SubcatchmentE2-P: EDA 2-P Runoff Area=190,784 sf 0.00% Impervious Runoff Depth=2.85"
Flow Length=431' Slope=0.0050 '/' Tc=51.4 min CN=78 Runoff=5.80 cfs 1.039 af

SubcatchmentP1A-I: PDA 1A-I Runoff Area=791 sf 100.00% Impervious Runoff Depth=4.92"
Flow Length=48' Tc=2.9 min CN=98 Runoff=0.10 cfs 0.007 af

SubcatchmentP1A-P: PDA 1A-P Runoff Area=11,157 sf 0.00% Impervious Runoff Depth=3.03"
Flow Length=58' Tc=5.2 min CN=80 Runoff=0.89 cfs 0.065 af

SubcatchmentP1B-I: PDA 1B-I Runoff Area=5,651 sf 100.00% Impervious Runoff Depth=4.92"
Flow Length=193' Tc=2.1 min CN=98 Runoff=0.71 cfs 0.053 af

SubcatchmentP1B-P: PDA 1B-P Runoff Area=1,940 sf 0.00% Impervious Runoff Depth=3.03"
Flow Length=11' Slope=0.2000 '/' Tc=0.7 min CN=80 Runoff=0.17 cfs 0.011 af

SubcatchmentP2A-I: PDA 2A-I Runoff Area=12,515 sf 100.00% Impervious Runoff Depth=4.92"
Flow Length=49' Tc=0.6 min CN=98 Runoff=1.55 cfs 0.118 af

SubcatchmentP2A-P: PDA 2A-P Runoff Area=8,228 sf 0.00% Impervious Runoff Depth=3.03"
Flow Length=173' Tc=11.9 min CN=80 Runoff=0.53 cfs 0.048 af

SubcatchmentP2B-I: PDA 2B-I Runoff Area=210,769 sf 100.00% Impervious Runoff Depth=4.92"
Flow Length=524' Tc=3.6 min CN=98 Runoff=25.21 cfs 1.985 af

SubcatchmentP2B-P: PDA 2B-P Runoff Area=10,222 sf 0.00% Impervious Runoff Depth=3.03"
Flow Length=305' Tc=5.7 min CN=80 Runoff=0.81 cfs 0.059 af

SubcatchmentP2C-I: PDA 2C-I Runoff Area=1,118 sf 100.00% Impervious Runoff Depth=4.92"
Flow Length=20' Tc=0.7 min CN=98 Runoff=0.14 cfs 0.011 af

SubcatchmentP2C-P: PDA 2C-P Runoff Area=13,795 sf 0.00% Impervious Runoff Depth=3.03"
Flow Length=25' Slope=0.0180 '/' Tc=3.3 min CN=80 Runoff=1.21 cfs 0.080 af

Pond B1: UG IB Peak Elev=2.84' Storage=56,110 cf Inflow=26.26 cfs 2.210 af
Outflow=1.25 cfs 2.210 af

Pond PP1: PP-A Peak Elev=4.62' Storage=2,502 cf Inflow=1.85 cfs 0.166 af
Outflow=0.34 cfs 0.166 af

Link E POA-1: POA-1 EDA Inflow=2.88 cfs 0.420 af
Primary=2.88 cfs 0.420 af

Link E POA-2: POA-2 EDA Inflow=5.93 cfs 1.129 af
Primary=5.93 cfs 1.129 af

Link P POA-1: POA-1 PDA Inflow=1.81 cfs 0.137 af
Primary=1.81 cfs 0.137 af

Link P POA-2: POA-2 PDA Inflow=2.30 cfs 2.301 af
Primary=2.30 cfs 2.301 af

Total Runoff Area = 12.681 ac Runoff Volume = 3.986 af Average Runoff Depth = 3.77"
55.63% Pervious = 7.055 ac 44.37% Impervious = 5.626 ac

Summary for Subcatchment E1-I: EDA 1-I

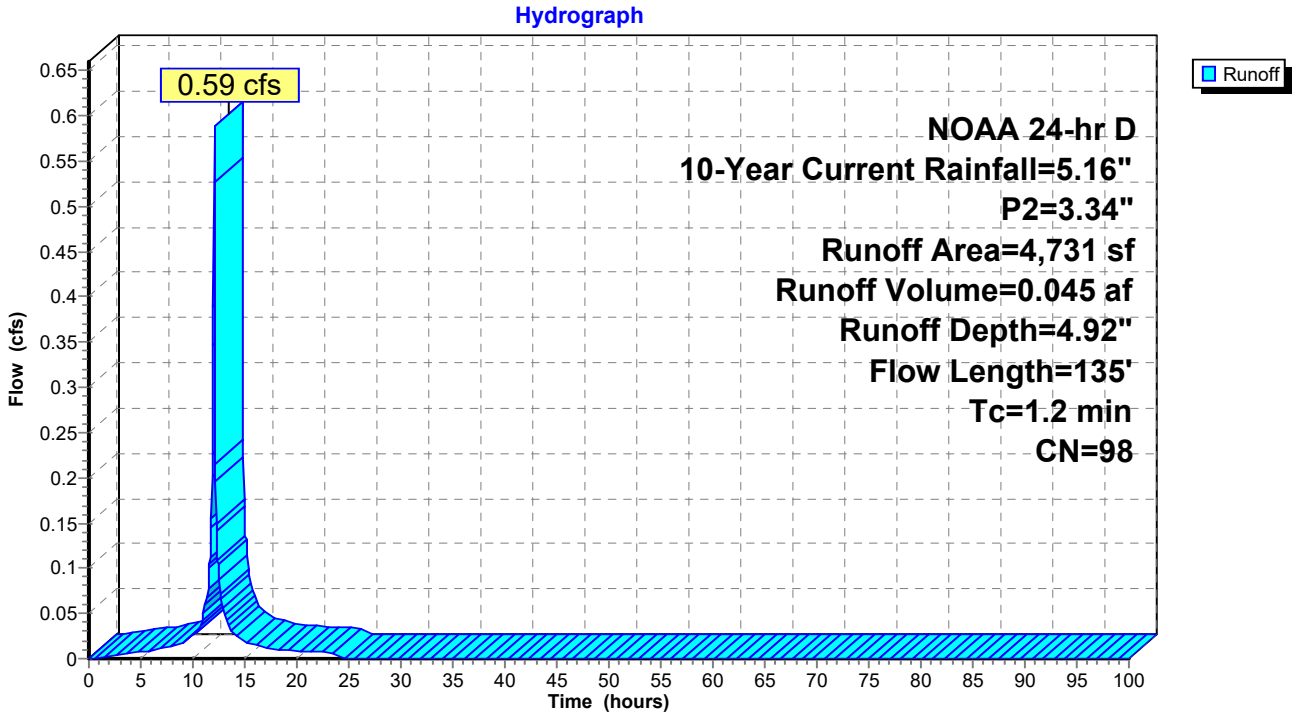
Runoff = 0.59 cfs @ 12.06 hrs, Volume= 0.045 af, Depth= 4.92"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

	Area (sf)	CN	Description
*	4,701	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	4,731	98	Weighted Average
	4,731		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	25	0.0340	1.32		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
0.9	110	0.0100	2.03		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
1.2	135	Total			

Subcatchment E1-I: EDA 1-I



Summary for Subcatchment E1-P: EDA 1-P

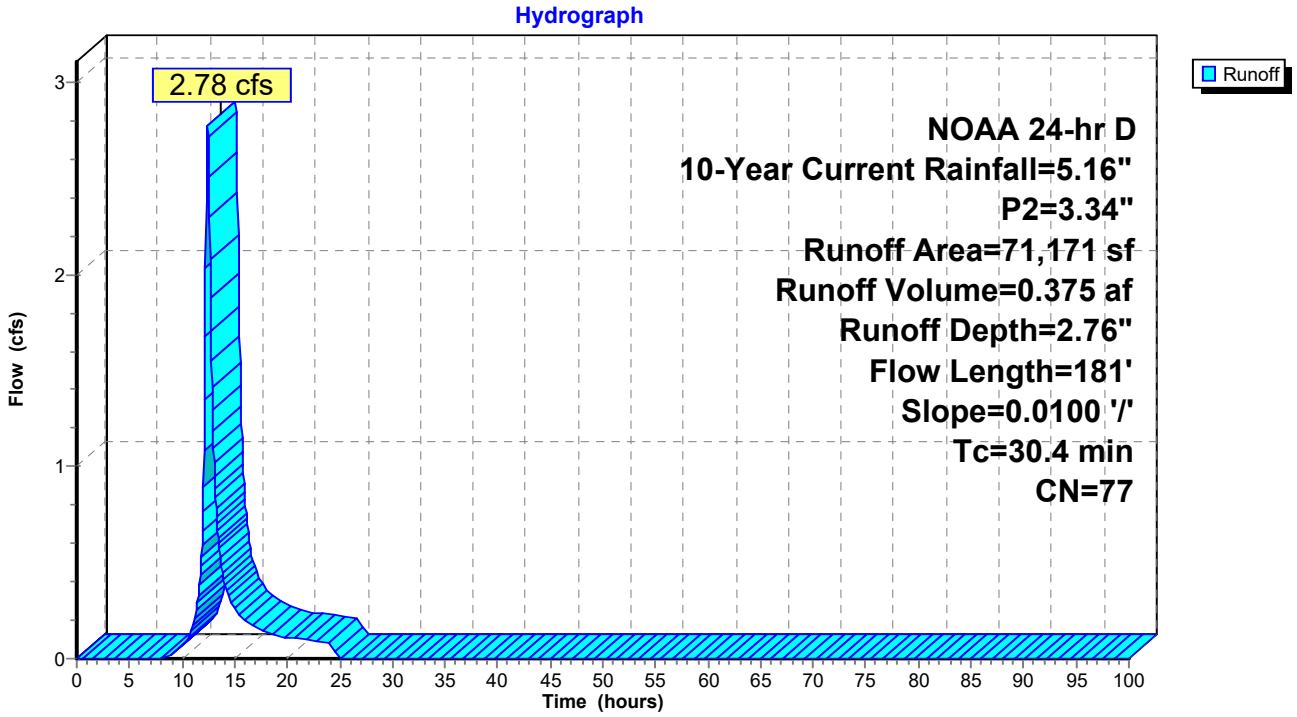
Runoff = 2.78 cfs @ 12.43 hrs, Volume= 0.375 af, Depth= 2.76"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

Area (sf)	CN	Description
8,810	80	>75% Grass cover, Good, HSG D
62,361	77	Woods, Good, HSG D
71,171	77	Weighted Average
71,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	100	0.0100	0.06		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.34"
2.7	81	0.0100	0.50		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
30.4	181	Total			

Subcatchment E1-P: EDA 1-P



Summary for Subcatchment E2-I: EDA 2-I

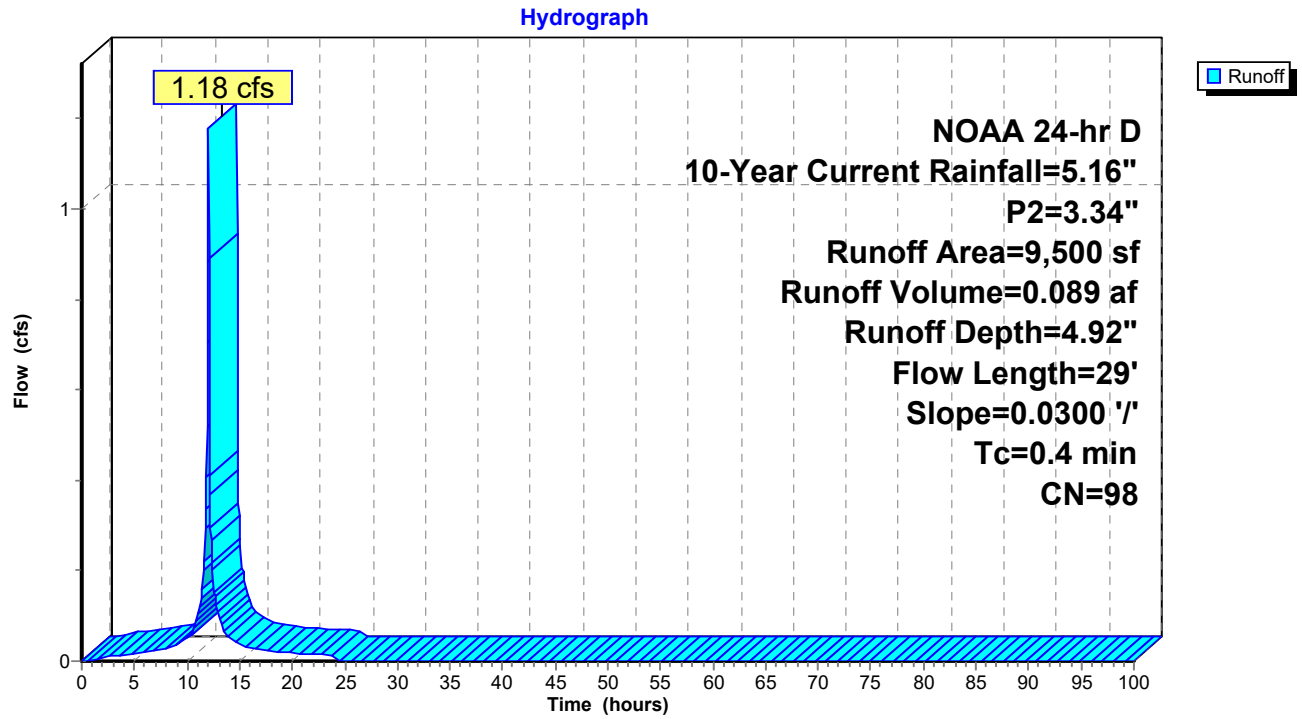
Runoff = 1.18 cfs @ 12.05 hrs, Volume= 0.089 af, Depth= 4.92"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

	Area (sf)	CN	Description
*	9,500	98	MVS Paved parking, HSG D
	9,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	29	0.0300	1.29		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"

Subcatchment E2-I: EDA 2-I



Summary for Subcatchment E2-P: EDA 2-P

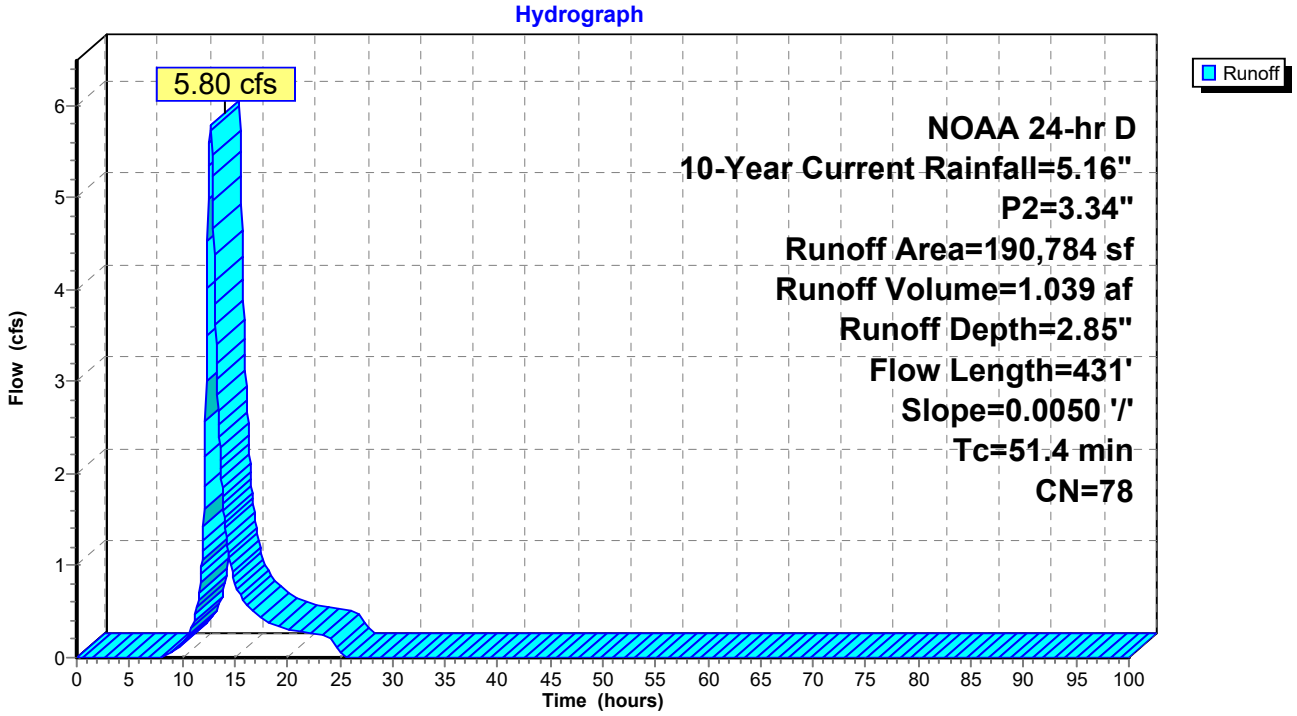
Runoff = 5.80 cfs @ 12.71 hrs, Volume= 1.039 af, Depth= 2.85"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

Area (sf)	CN	Description
77,501	80	>75% Grass cover, Good, HSG D
113,283	77	Woods, Good, HSG D
190,784	78	Weighted Average
190,784		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.6	100	0.0050	0.05		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.34"
12.9	274	0.0050	0.35		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
1.9	57	0.0050	0.49		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
51.4	431	Total			

Subcatchment E2-P: EDA 2-P



Summary for Subcatchment P1A-I: PDA 1A-I

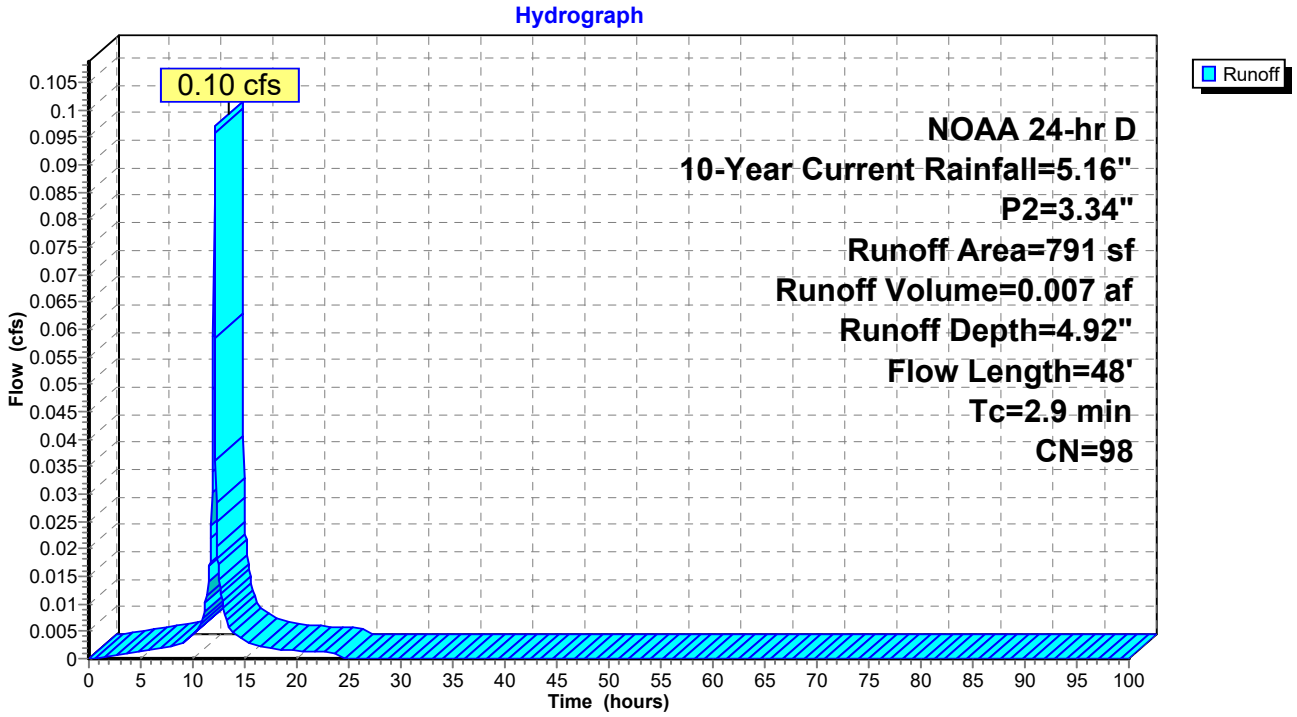
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 0.007 af, Depth= 4.92"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

Area (sf)	CN	Description
791	98	Paved parking, HSG D
791		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	12	0.0175	0.87		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
1.3	14	0.0550	0.18		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.34"
1.4	22	0.1140	0.26		**Sheet Flow, CD** Grass: Short n= 0.150 P2= 3.34"
2.9	48	Total			

Subcatchment P1A-I: PDA 1A-I



Summary for Subcatchment P1A-P: PDA 1A-P

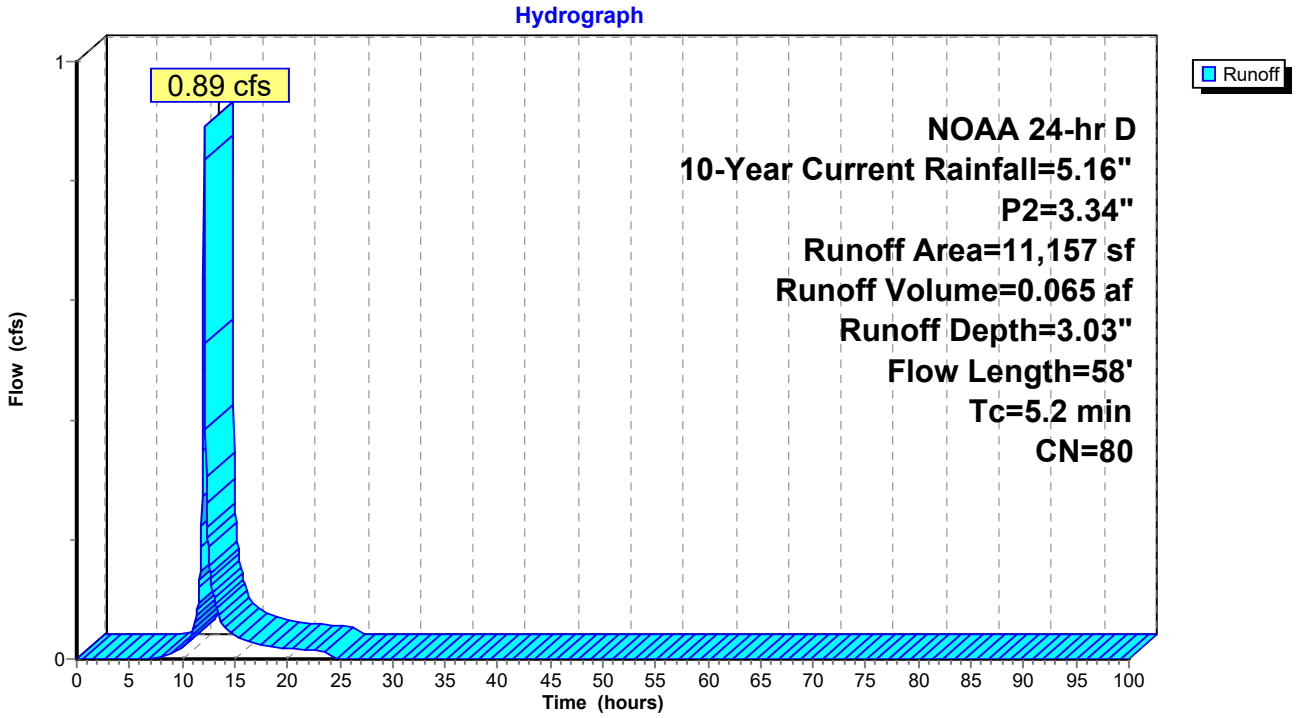
Runoff = 0.89 cfs @ 12.12 hrs, Volume= 0.065 af, Depth= 3.03"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

Area (sf)	CN	Description
11,157	80	>75% Grass cover, Good, HSG D
11,157		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	33	0.0300	0.16		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"
1.8	25	0.0800	0.23		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.34"
5.2	58	Total			

Subcatchment P1A-P: PDA 1A-P



Summary for Subcatchment P1B-I: PDA 1B-I

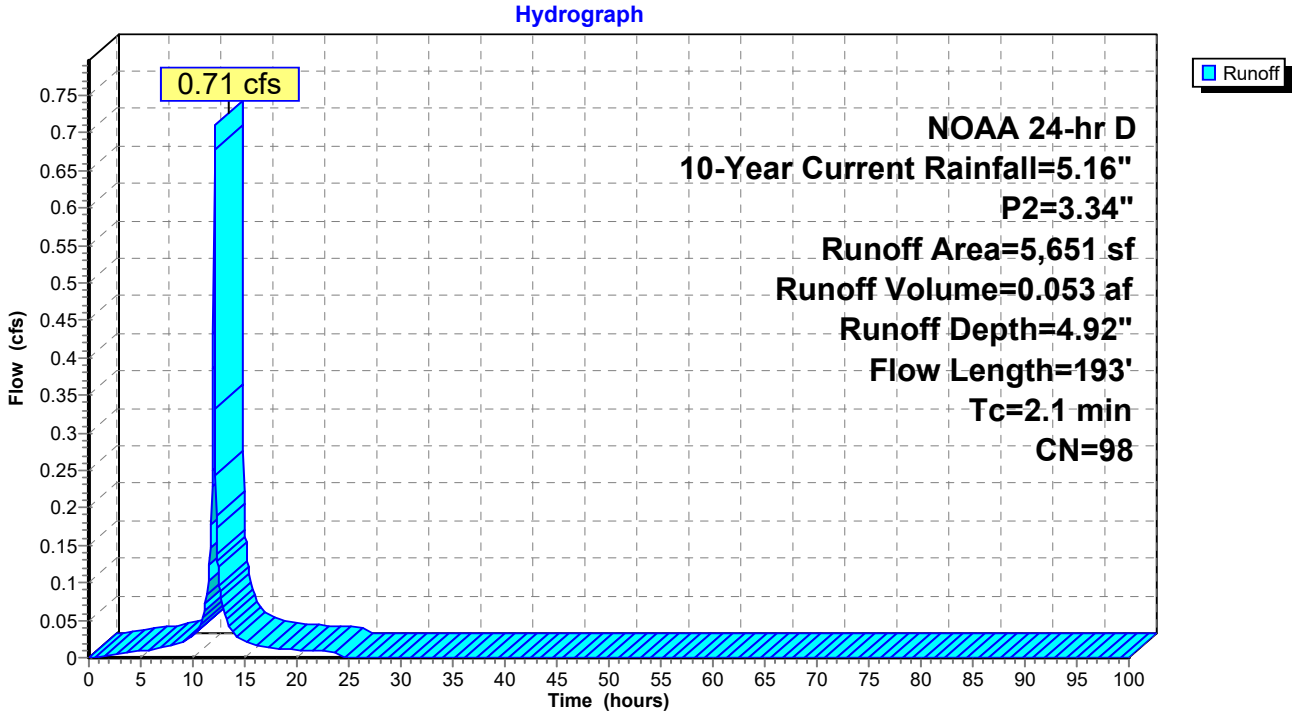
Runoff = 0.71 cfs @ 12.08 hrs, Volume= 0.053 af, Depth= 4.92"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

	Area (sf)	CN	Description
*	5,621	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	5,651	98	Weighted Average
	5,651		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	84	0.0209	1.38		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
0.3	16	0.0130	0.82		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.34"
0.8	93	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
2.1	193	Total			

Subcatchment P1B-I: PDA 1B-I



Summary for Subcatchment P1B-P: PDA 1B-P

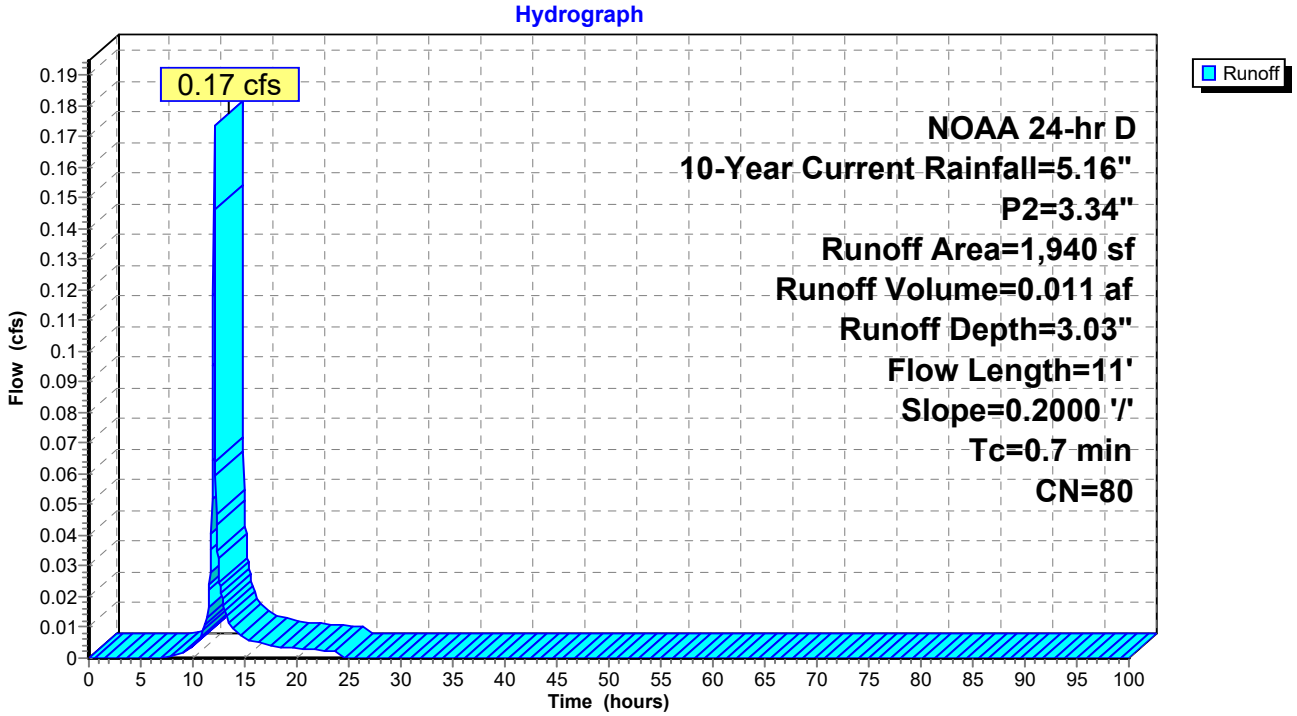
Runoff = 0.17 cfs @ 12.06 hrs, Volume= 0.011 af, Depth= 3.03"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

Area (sf)	CN	Description
1,940	80	>75% Grass cover, Good, HSG D
1,940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	11	0.2000	0.28		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"

Subcatchment P1B-P: PDA 1B-P



Summary for Subcatchment P2A-I: PDA 2A-I

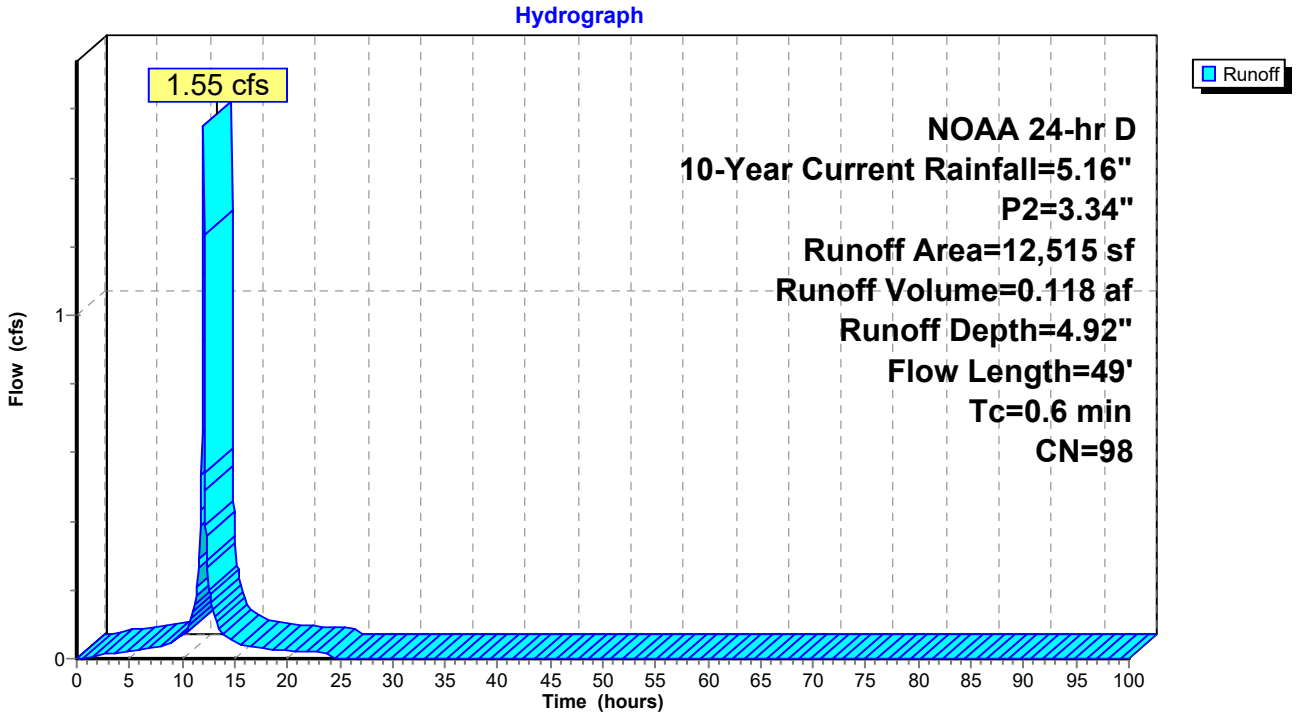
Runoff = 1.55 cfs @ 12.05 hrs, Volume= 0.118 af, Depth= 4.92"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

	Area (sf)	CN	Description
*	11,539	98	MVS Paved parking, HSG D
	976	98	Paved parking, HSG D
	12,515	98	Weighted Average
	12,515		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	30	0.0330	1.35		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
0.2	19	0.0105	2.08		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.6	49	Total			

Subcatchment P2A-I: PDA 2A-I



Summary for Subcatchment P2A-P: PDA 2A-P

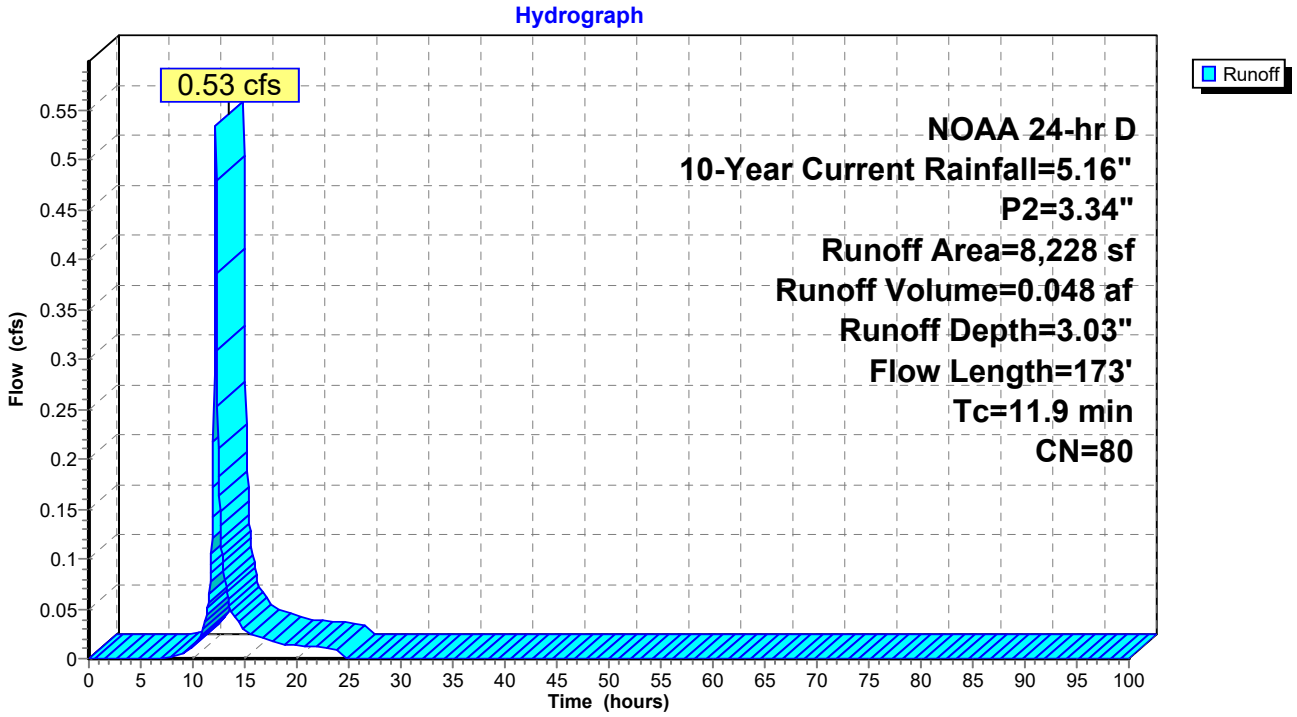
Runoff = 0.53 cfs @ 12.20 hrs, Volume= 0.048 af, Depth= 3.03"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

Area (sf)	CN	Description
8,228	80	>75% Grass cover, Good, HSG D
8,228		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	60	0.0080	0.11		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"
2.6	96	0.0080	0.63		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
11.9	173	Total			

Subcatchment P2A-P: PDA 2A-P



Summary for Subcatchment P2B-I: PDA 2B-I

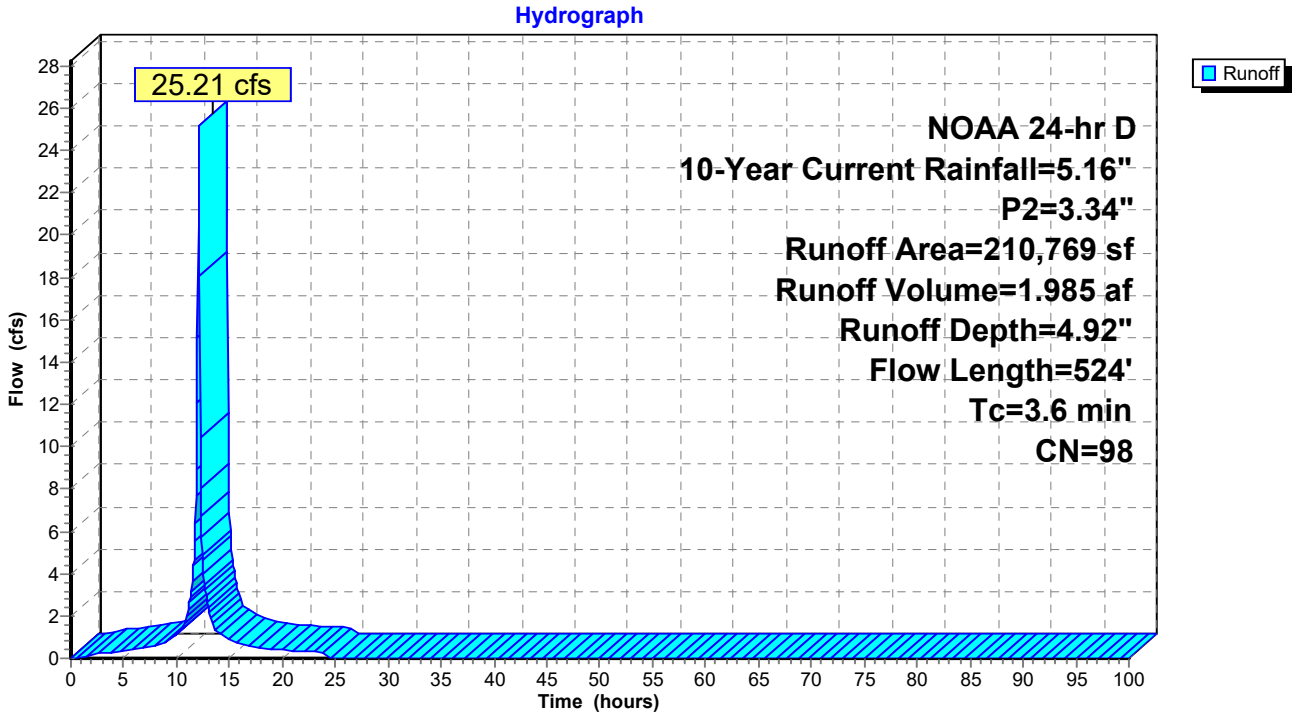
Runoff = 25.21 cfs @ 12.09 hrs, Volume= 1.985 af, Depth= 4.92"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

	Area (sf)	CN	Description
*	170,269	98	MVS Paved parking, HSG D
	40,500	98	Roofs, HSG D
	210,769	98	Weighted Average
	210,769		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0136	1.20		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
1.1	155	0.0136	2.37		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.2	51	0.0050	3.79	3.79	**Pipe Channel, CD** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.6	139	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	79	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
3.6	524	Total			

Subcatchment P2B-I: PDA 2B-I



Summary for Subcatchment P2B-P: PDA 2B-P

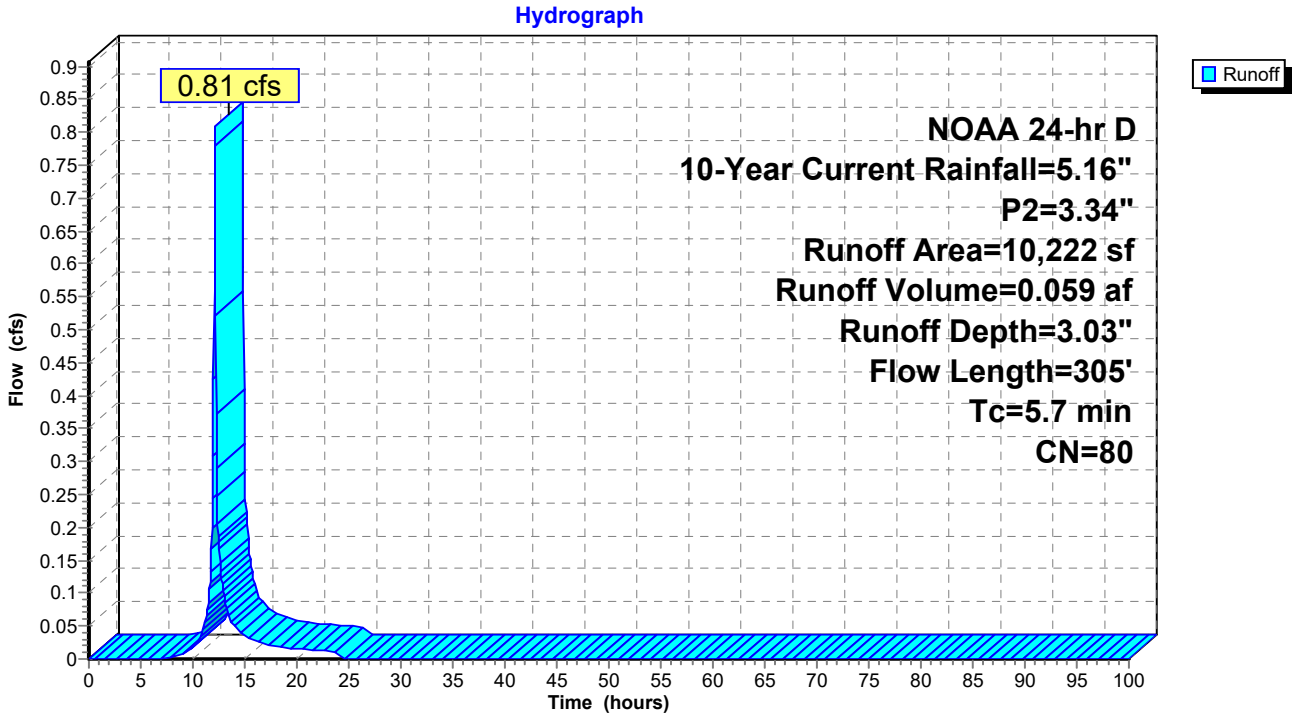
Runoff = 0.81 cfs @ 12.13 hrs, Volume= 0.059 af, Depth= 3.03"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

Area (sf)	CN	Description
10,222	80	>75% Grass cover, Good, HSG D
10,222		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	45	0.0250	0.16		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"
0.2	56	0.0050	3.79	3.79	**Pipe Channel, BC** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.4	98	0.0030	3.85	6.80	**Pipe Channel, CD** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.5	106	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
5.7	305	Total			

Subcatchment P2B-P: PDA 2B-P



Summary for Subcatchment P2C-I: PDA 2C-I

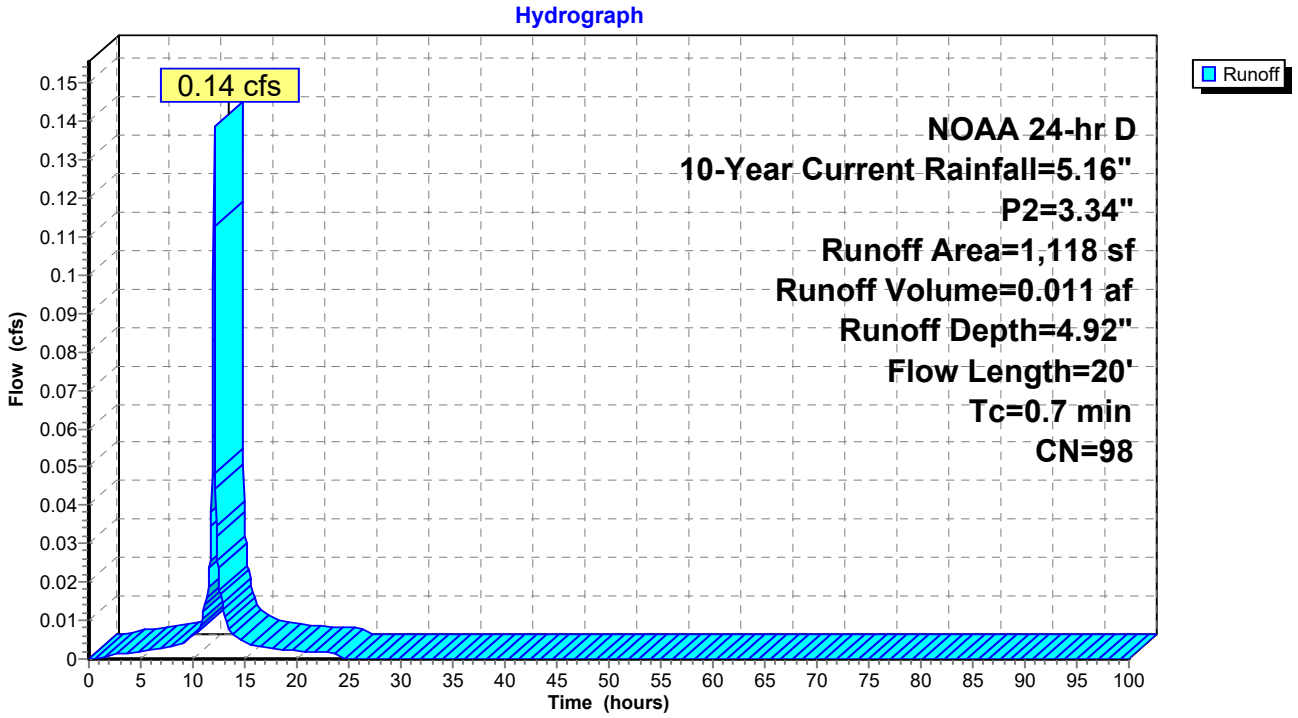
Runoff = 0.14 cfs @ 12.06 hrs, Volume= 0.011 af, Depth= 4.92"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

Area (sf)	CN	Description
1,118	98	Paved parking, HSG D
1,118		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	10	0.0150	0.79		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
0.5	10	0.3000	0.32		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.34"
0.7	20	Total			

Subcatchment P2C-I: PDA 2C-I



Summary for Subcatchment P2C-P: PDA 2C-P

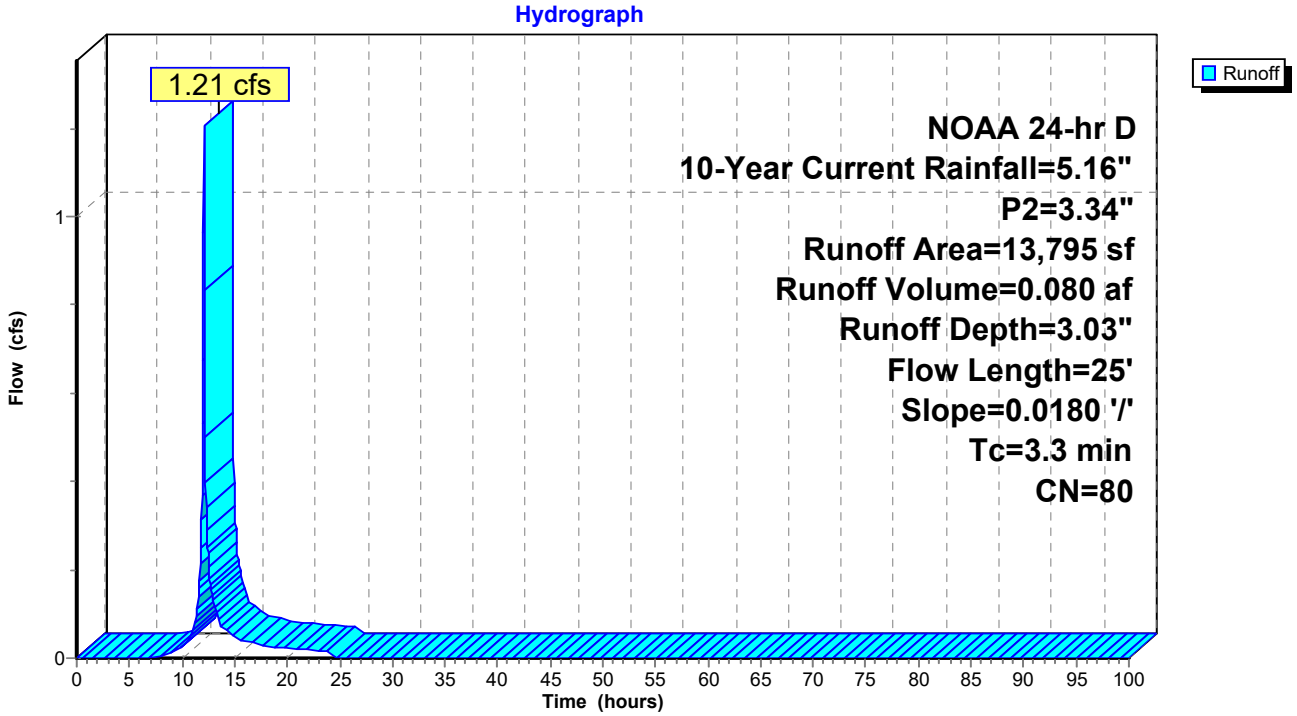
Runoff = 1.21 cfs @ 12.09 hrs, Volume= 0.080 af, Depth= 3.03"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Current Rainfall=5.16", P2=3.34"

Area (sf)	CN	Description
13,795	80	>75% Grass cover, Good, HSG D
13,795		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	25	0.0180	0.13		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"

Subcatchment P2C-P: PDA 2C-P



Summary for Pond B1: UG IB

Inflow Area = 5.549 ac, 92.37% Impervious, Inflow Depth = 4.78" for 10-Year Current event
Inflow = 26.26 cfs @ 12.10 hrs, Volume= 2.210 af
Outflow = 1.25 cfs @ 14.64 hrs, Volume= 2.210 af, Atten= 95%, Lag= 152.4 min
Primary = 1.25 cfs @ 14.64 hrs, Volume= 2.210 af
Routed to Link P POA-2 : POA-2 PDA

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 2.84' @ 14.64 hrs Surf.Area= 38,229 sf Storage= 56,110 cf

Plug-Flow detention time= 573.9 min calculated for 2.209 af (100% of inflow)
Center-of-Mass det. time= 574.4 min (1,331.2 - 756.8)

Volume	Invert	Avail.Storage	Storage Description
#1	1.05'	48 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	1.20'	102,602 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 114,639 cf Overall x 89.5% Voids
		102,650 cf	Total Available Storage

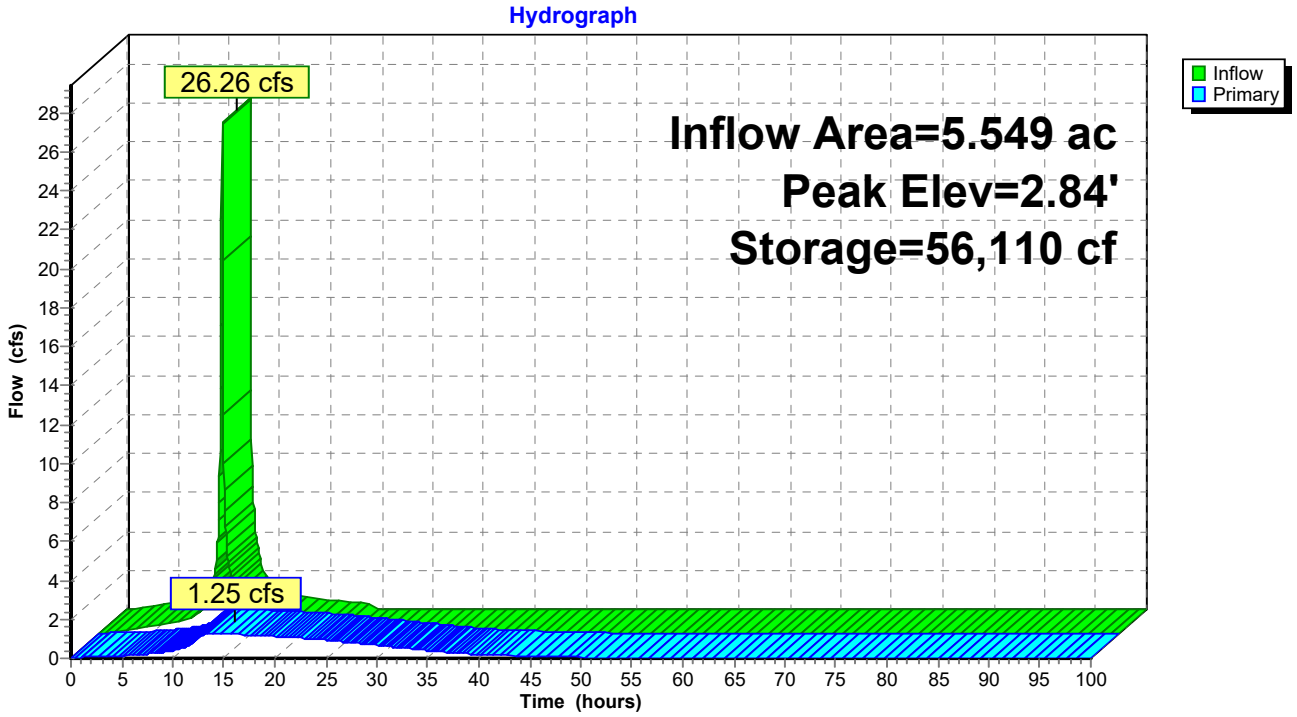
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.05	16	0	0
4.05	16	48	48

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.20	38,213	0	0
4.20	38,213	114,639	114,639

Device	Routing	Invert	Outlet Devices
#1	Primary	1.05'	**24.0" Round Culvert** L= 119.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 1.05' / 0.64' S= 0.0034 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	1.05'	**6.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	3.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.25 cfs @ 14.64 hrs HW=2.84' (Free Discharge)
└**1=Culvert** (Passes 1.25 cfs of 10.74 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 1.25 cfs @ 5.96 fps)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B1: UG IB


Hydrograph
26.26 cfs
1.25 cfs
Inflow Area=5.549 ac
Peak Elev=2.84'
Storage=56,110 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100

Summary for Pond PP1: PP-A

Inflow Area = 0.476 ac, 60.33% Impervious, Inflow Depth = 4.17" for 10-Year Current event
Inflow = 1.85 cfs @ 12.06 hrs, Volume= 0.166 af
Outflow = 0.34 cfs @ 12.60 hrs, Volume= 0.166 af, Atten= 81%, Lag= 32.4 min
Primary = 0.34 cfs @ 12.60 hrs, Volume= 0.166 af
Routed to Pond B1 : UG IB

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 4.62' @ 12.60 hrs Surf.Area= 10,028 sf Storage= 2,502 cf

Plug-Flow detention time= 84.7 min calculated for 0.166 af (100% of inflow)
Center-of-Mass det. time= 84.7 min (854.7 - 770.0)

Volume	Invert	Avail.Storage	Storage Description
#1	4.00'	7,129 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 17,821 cf Overall x 40.0% Voids
#2	3.90'	30 cf	**Outlet Structure Storage (Prismatic)** Listed below (Recalc)
		7,159 cf	Total Available Storage

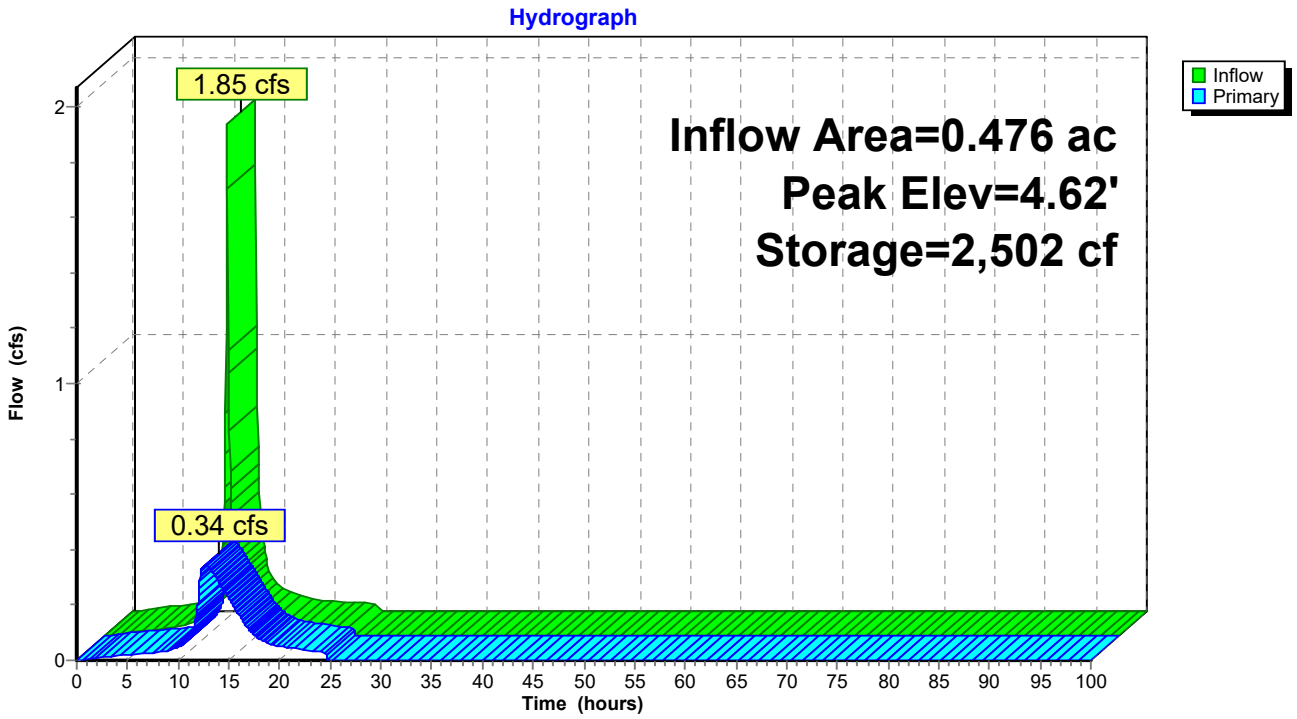
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.00	10,012	0	0
5.00	10,012	10,012	10,012
5.78	10,012	7,809	17,821

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
3.90	16	0	0
5.78	16	30	30

Device	Routing	Invert	Outlet Devices
#1	Primary	3.67'	**24.0" Round Culvert** L= 58.0' Ke= 0.200 Inlet / Outlet Invert= 3.67' / 3.38' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	3.90'	**4.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	5.18'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.34 cfs @ 12.60 hrs HW=4.62' (Free Discharge)
└**1=Culvert** (Passes 0.34 cfs of 4.24 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.34 cfs @ 3.56 fps)
  └**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PP1: PP-A

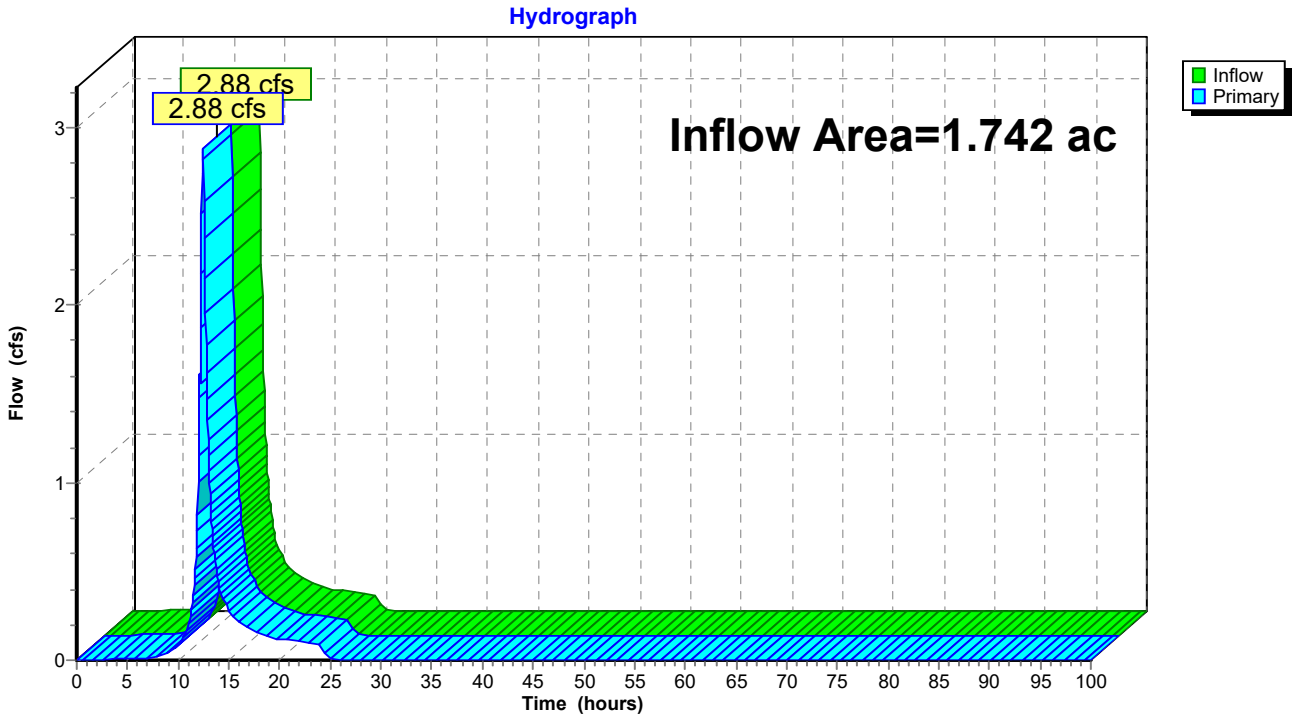

Hydrograph
1.85 cfs
0.34 cfs
Inflow Area=0.476 ac
Peak Elev=4.62'
Storage=2,502 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Summary for Link E POA-1: POA-1 EDA

Inflow Area = 1.742 ac, 6.23% Impervious, Inflow Depth = 2.89" for 10-Year Current event
Inflow = 2.88 cfs @ 12.43 hrs, Volume= 0.420 af
Primary = 2.88 cfs @ 12.43 hrs, Volume= 0.420 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-1: POA-1 EDA

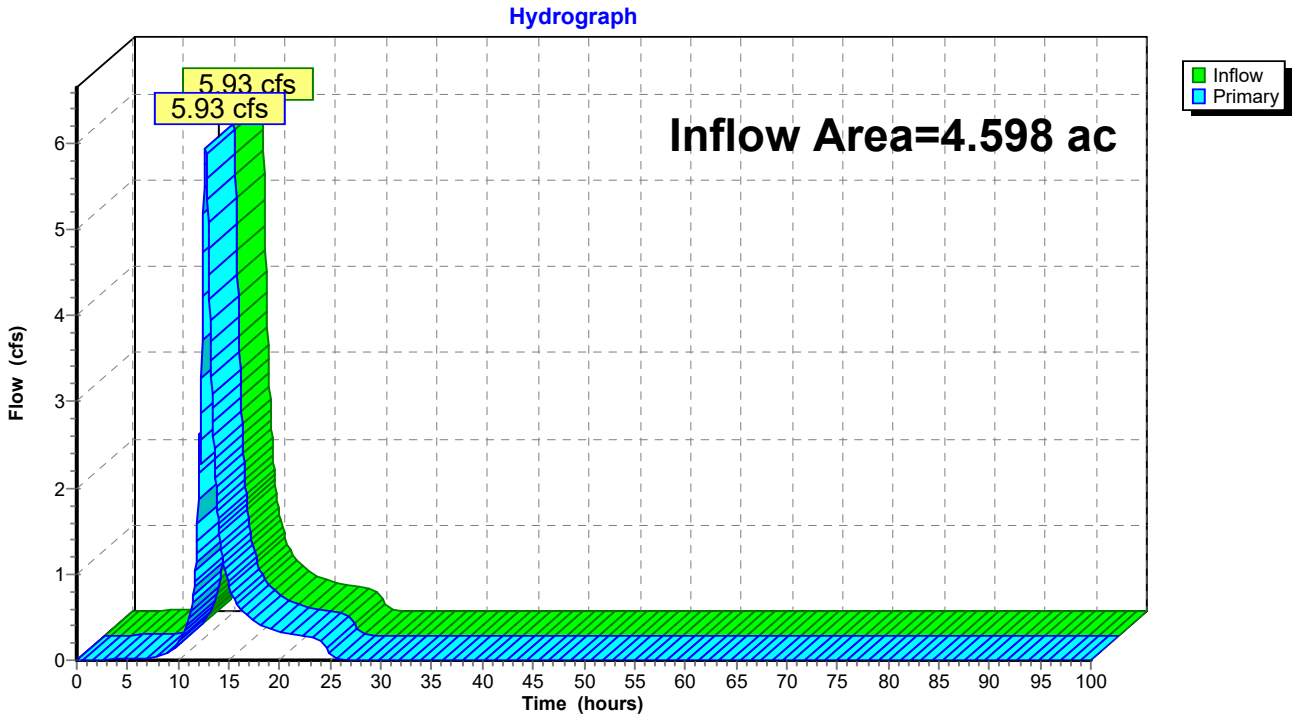


Summary for Link E POA-2: POA-2 EDA

Inflow Area = 4.598 ac, 4.74% Impervious, Inflow Depth = 2.95" for 10-Year Current event
Inflow = 5.93 cfs @ 12.70 hrs, Volume= 1.129 af
Primary = 5.93 cfs @ 12.70 hrs, Volume= 1.129 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-2: POA-2 EDA

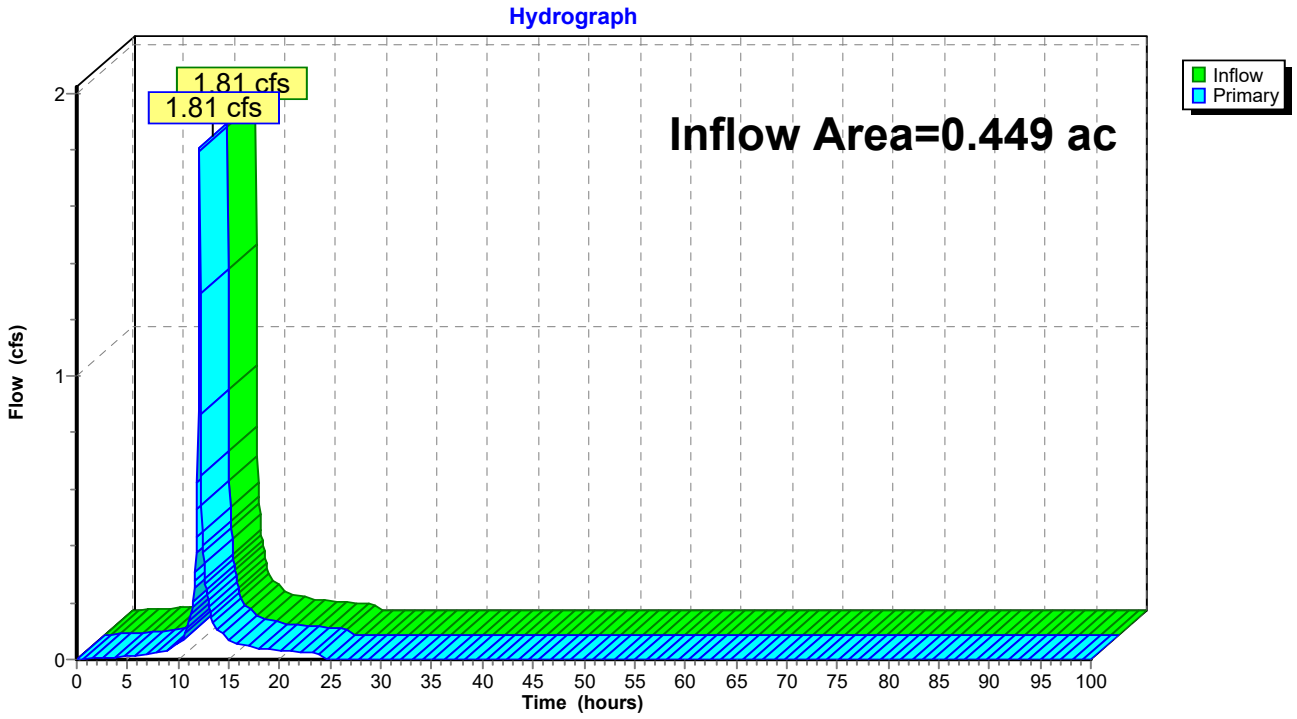


Summary for Link P POA-1: POA-1 PDA

Inflow Area = 0.449 ac, 32.97% Impervious, Inflow Depth = 3.66" for 10-Year Current event
Inflow = 1.81 cfs @ 12.09 hrs, Volume= 0.137 af
Primary = 1.81 cfs @ 12.09 hrs, Volume= 0.137 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-1: POA-1 PDA

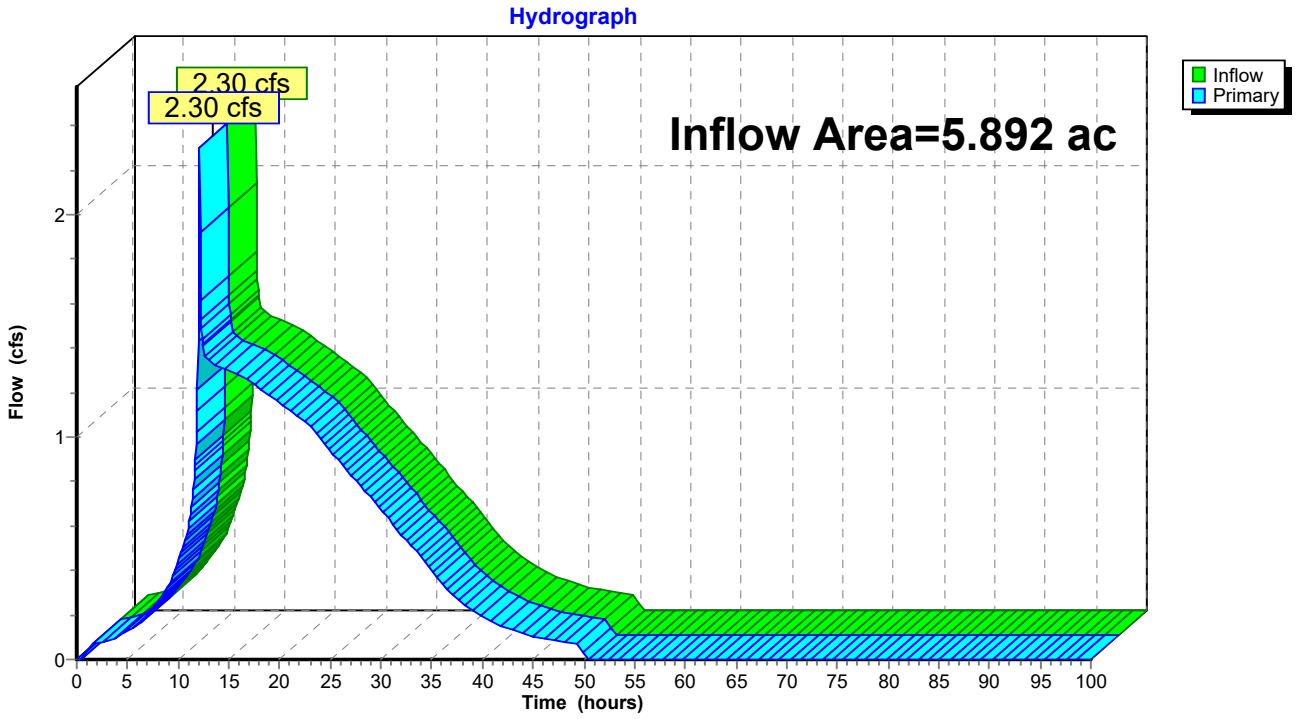


Summary for Link P POA-2: POA-2 PDA

Inflow Area = 5.892 ac, 87.44% Impervious, Inflow Depth = 4.69" for 10-Year Current event
Inflow = 2.30 cfs @ 12.10 hrs, Volume= 2.301 af
Primary = 2.30 cfs @ 12.10 hrs, Volume= 2.301 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-2: POA-2 PDA



Time span=0.00-100.00 hrs, dt=0.05 hrs, 2001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentE1-I: EDA 1-I Runoff Area=4,731 sf 100.00% Impervious Runoff Depth=8.54"
Flow Length=135' Tc=1.2 min CN=98 Runoff=1.01 cfs 0.077 af

SubcatchmentE1-P: EDA 1-P Runoff Area=71,171 sf 0.00% Impervious Runoff Depth=5.99"
Flow Length=181' Slope=0.0100 '/' Tc=30.4 min CN=77 Runoff=5.99 cfs 0.816 af

SubcatchmentE2-I: EDA 2-I Runoff Area=9,500 sf 100.00% Impervious Runoff Depth=8.54"
Flow Length=29' Slope=0.0300 '/' Tc=0.4 min CN=98 Runoff=2.01 cfs 0.155 af

SubcatchmentE2-P: EDA 2-P Runoff Area=190,784 sf 0.00% Impervious Runoff Depth=6.12"
Flow Length=431' Slope=0.0050 '/' Tc=51.4 min CN=78 Runoff=12.34 cfs 2.232 af

SubcatchmentP1A-I: PDA 1A-I Runoff Area=791 sf 100.00% Impervious Runoff Depth=8.54"
Flow Length=48' Tc=2.9 min CN=98 Runoff=0.17 cfs 0.013 af

SubcatchmentP1A-P: PDA 1A-P Runoff Area=11,157 sf 0.00% Impervious Runoff Depth=6.36"
Flow Length=58' Tc=5.2 min CN=80 Runoff=1.82 cfs 0.136 af

SubcatchmentP1B-I: PDA 1B-I Runoff Area=5,651 sf 100.00% Impervious Runoff Depth=8.54"
Flow Length=193' Tc=2.1 min CN=98 Runoff=1.21 cfs 0.092 af

SubcatchmentP1B-P: PDA 1B-P Runoff Area=1,940 sf 0.00% Impervious Runoff Depth=6.36"
Flow Length=11' Slope=0.2000 '/' Tc=0.7 min CN=80 Runoff=0.35 cfs 0.024 af

SubcatchmentP2A-I: PDA 2A-I Runoff Area=12,515 sf 100.00% Impervious Runoff Depth=8.54"
Flow Length=49' Tc=0.6 min CN=98 Runoff=2.65 cfs 0.204 af

SubcatchmentP2A-P: PDA 2A-P Runoff Area=8,228 sf 0.00% Impervious Runoff Depth=6.36"
Flow Length=173' Tc=11.9 min CN=80 Runoff=1.09 cfs 0.100 af

SubcatchmentP2B-I: PDA 2B-I Runoff Area=210,769 sf 100.00% Impervious Runoff Depth=8.54"
Flow Length=524' Tc=3.6 min CN=98 Runoff=43.04 cfs 3.443 af

SubcatchmentP2B-P: PDA 2B-P Runoff Area=10,222 sf 0.00% Impervious Runoff Depth=6.36"
Flow Length=305' Tc=5.7 min CN=80 Runoff=1.63 cfs 0.124 af

SubcatchmentP2C-I: PDA 2C-I Runoff Area=1,118 sf 100.00% Impervious Runoff Depth=8.54"
Flow Length=20' Tc=0.7 min CN=98 Runoff=0.24 cfs 0.018 af

SubcatchmentP2C-P: PDA 2C-P Runoff Area=13,795 sf 0.00% Impervious Runoff Depth=6.36"
Flow Length=25' Slope=0.0180 '/' Tc=3.3 min CN=80 Runoff=2.45 cfs 0.168 af

Pond B1: UG IB Peak Elev=3.72' Storage=86,101 cf Inflow=45.01 cfs 3.872 af
Outflow=5.64 cfs 3.872 af

Pond PP1: PP-A Peak Elev=5.23' Storage=4,934 cf Inflow=3.29 cfs 0.305 af
Outflow=0.63 cfs 0.305 af

Link E POA-1: POA-1 EDA Inflow=6.17 cfs 0.893 af
Primary=6.17 cfs 0.893 af

Link E POA-2: POA-2 EDA Inflow=12.58 cfs 2.388 af
Primary=12.58 cfs 2.388 af

Link P POA-1: POA-1 PDA Inflow=3.42 cfs 0.265 af
Primary=3.42 cfs 0.265 af

Link P POA-2: POA-2 PDA Inflow=5.95 cfs 4.058 af
Primary=5.95 cfs 4.058 af

Total Runoff Area = 12.681 ac Runoff Volume = 7.604 af Average Runoff Depth = 7.20"
55.63% Pervious = 7.055 ac 44.37% Impervious = 5.626 ac

Summary for Subcatchment E1-I: EDA 1-I

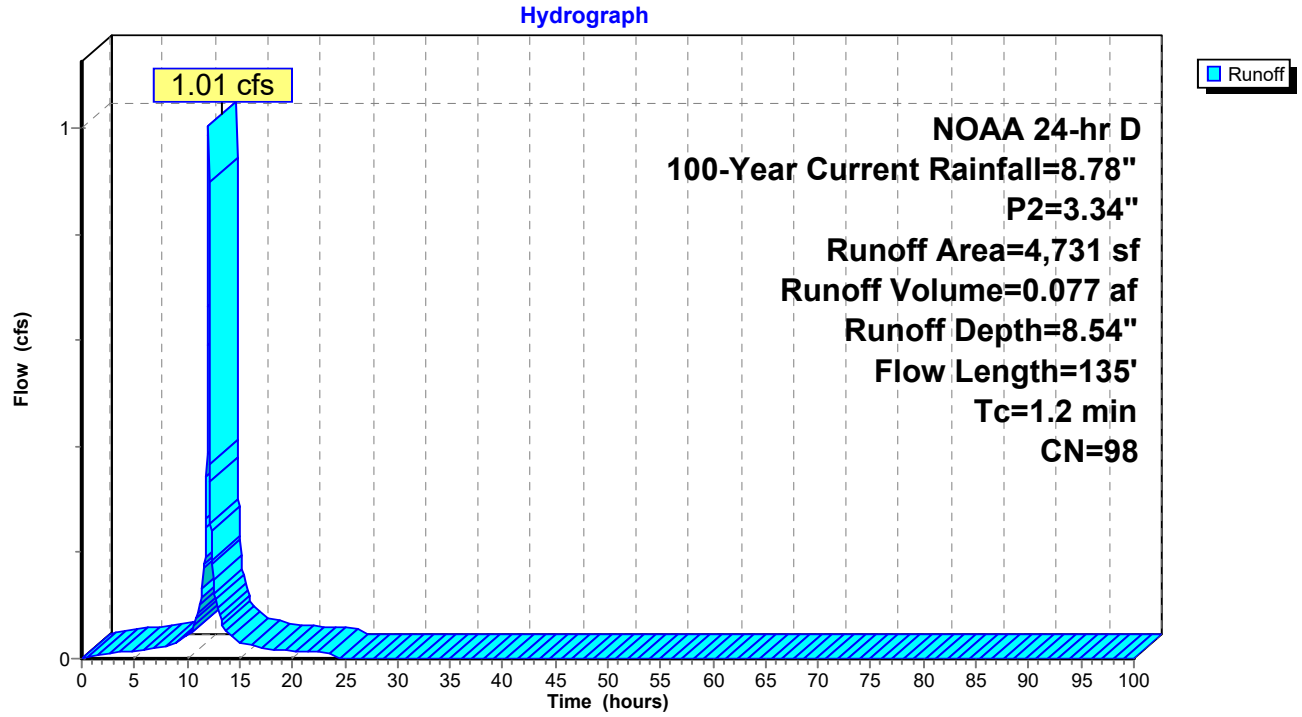
Runoff = 1.01 cfs @ 12.06 hrs, Volume= 0.077 af, Depth= 8.54"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

	Area (sf)	CN	Description
*	4,701	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	4,731	98	Weighted Average
	4,731		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	25	0.0340	1.32		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
0.9	110	0.0100	2.03		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
1.2	135	Total			

Subcatchment E1-I: EDA 1-I



Summary for Subcatchment E1-P: EDA 1-P

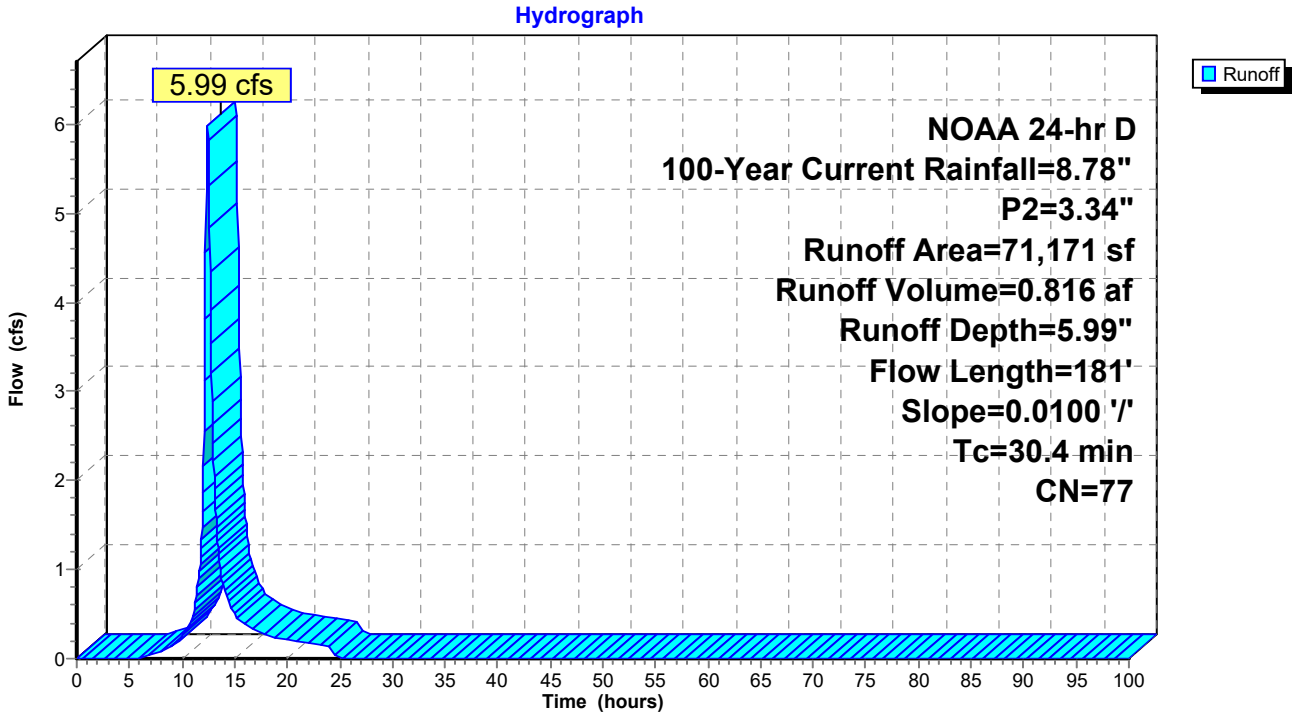
Runoff = 5.99 cfs @ 12.42 hrs, Volume= 0.816 af, Depth= 5.99"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

Area (sf)	CN	Description
8,810	80	>75% Grass cover, Good, HSG D
62,361	77	Woods, Good, HSG D
71,171	77	Weighted Average
71,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	100	0.0100	0.06		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.34"
2.7	81	0.0100	0.50		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
30.4	181	Total			

Subcatchment E1-P: EDA 1-P



Summary for Subcatchment E2-I: EDA 2-I

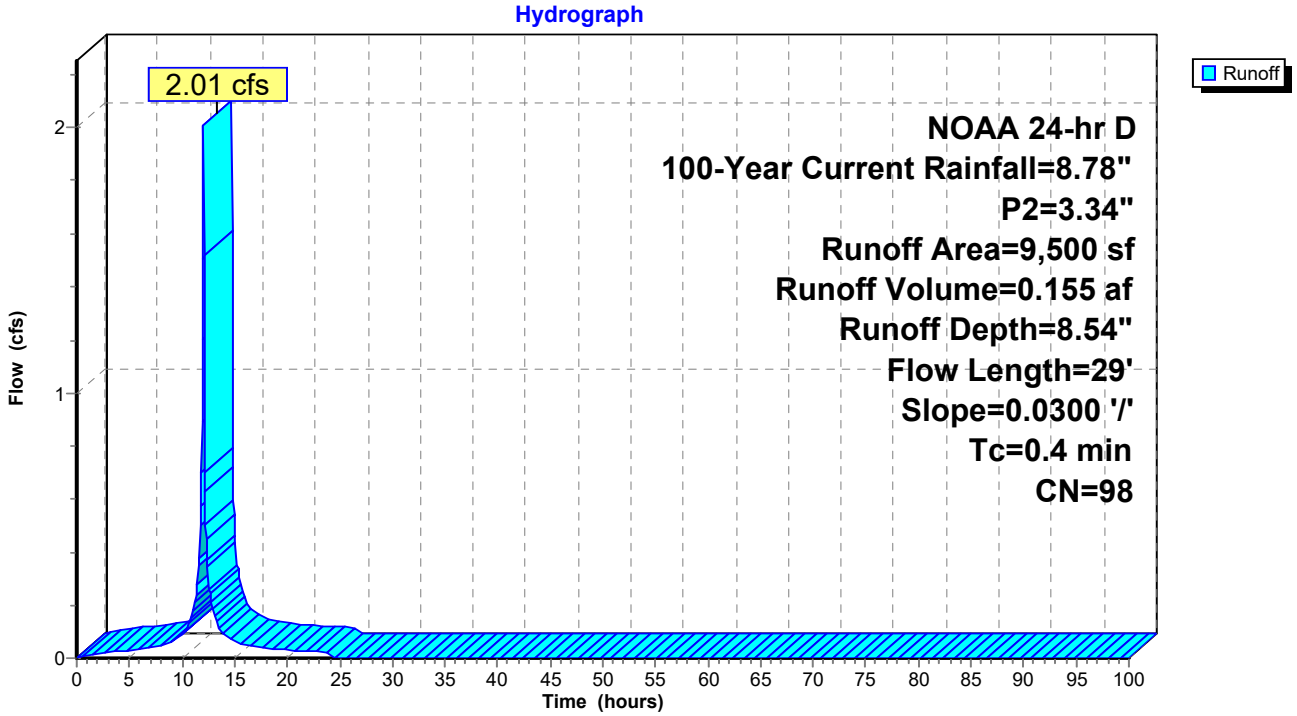
Runoff = 2.01 cfs @ 12.05 hrs, Volume= 0.155 af, Depth= 8.54"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

	Area (sf)	CN	Description
*	9,500	98	MVS Paved parking, HSG D
	9,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	29	0.0300	1.29		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"

Subcatchment E2-I: EDA 2-I



Summary for Subcatchment E2-P: EDA 2-P

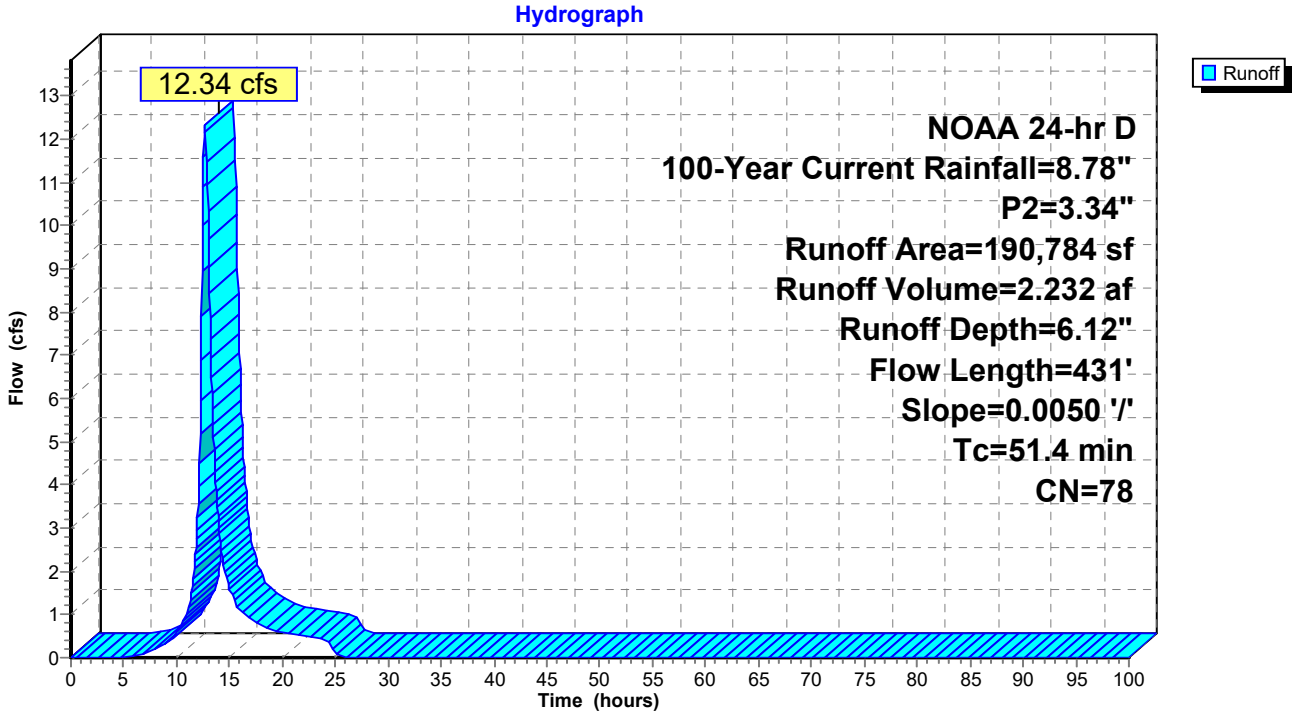
Runoff = 12.34 cfs @ 12.69 hrs, Volume= 2.232 af, Depth= 6.12"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

Area (sf)	CN	Description
77,501	80	>75% Grass cover, Good, HSG D
113,283	77	Woods, Good, HSG D
190,784	78	Weighted Average
190,784		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.6	100	0.0050	0.05		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.34"
12.9	274	0.0050	0.35		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
1.9	57	0.0050	0.49		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
51.4	431	Total			

Subcatchment E2-P: EDA 2-P



Summary for Subcatchment P1A-I: PDA 1A-I

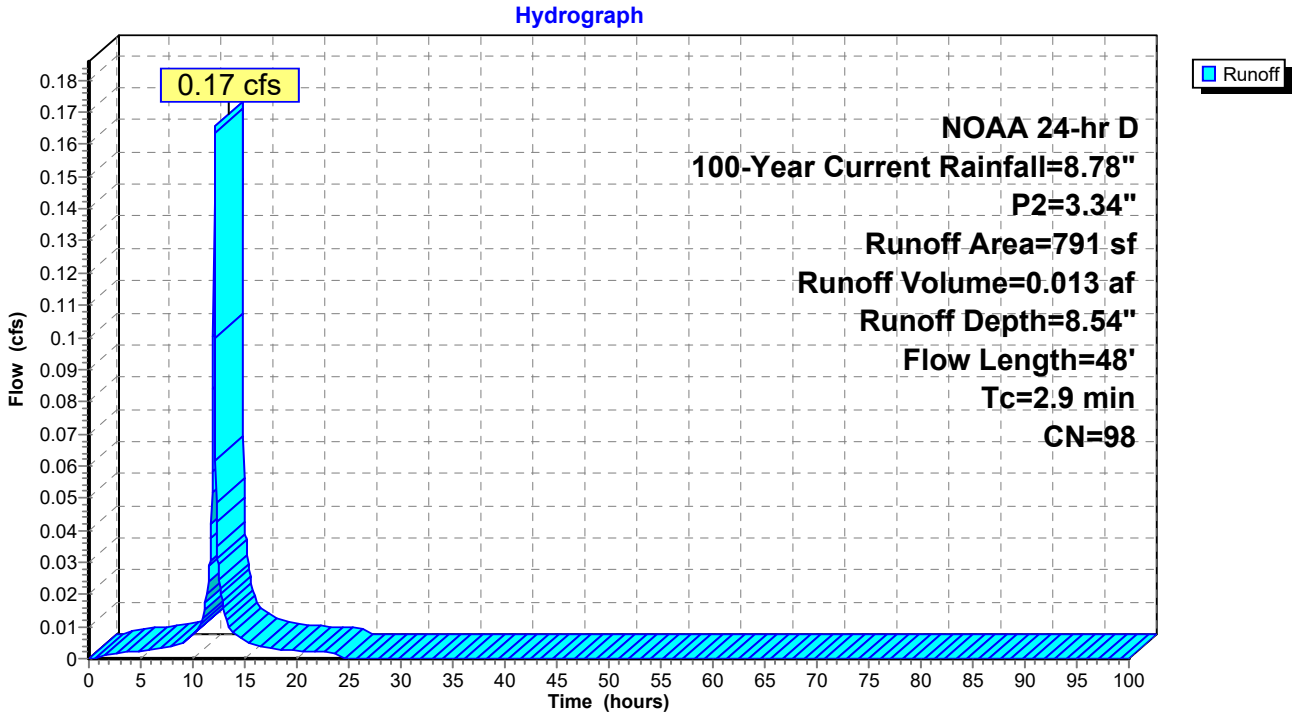
Runoff = 0.17 cfs @ 12.09 hrs, Volume= 0.013 af, Depth= 8.54"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

Area (sf)	CN	Description
791	98	Paved parking, HSG D
791		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	12	0.0175	0.87		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
1.3	14	0.0550	0.18		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.34"
1.4	22	0.1140	0.26		**Sheet Flow, CD** Grass: Short n= 0.150 P2= 3.34"
2.9	48	Total			

Subcatchment P1A-I: PDA 1A-I



Summary for Subcatchment P1A-P: PDA 1A-P

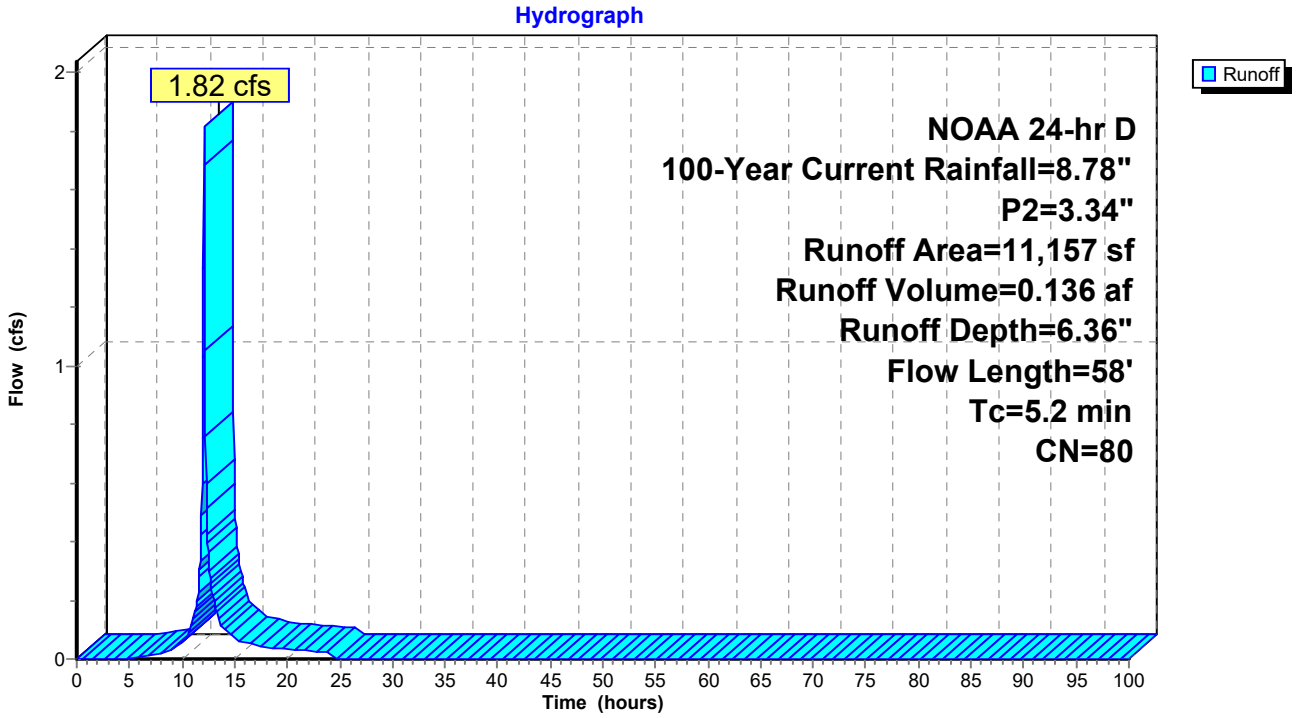
Runoff = 1.82 cfs @ 12.12 hrs, Volume= 0.136 af, Depth= 6.36"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

Area (sf)	CN	Description
11,157	80	>75% Grass cover, Good, HSG D
11,157		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	33	0.0300	0.16		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"
1.8	25	0.0800	0.23		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.34"
5.2	58	Total			

Subcatchment P1A-P: PDA 1A-P



Summary for Subcatchment P1B-I: PDA 1B-I

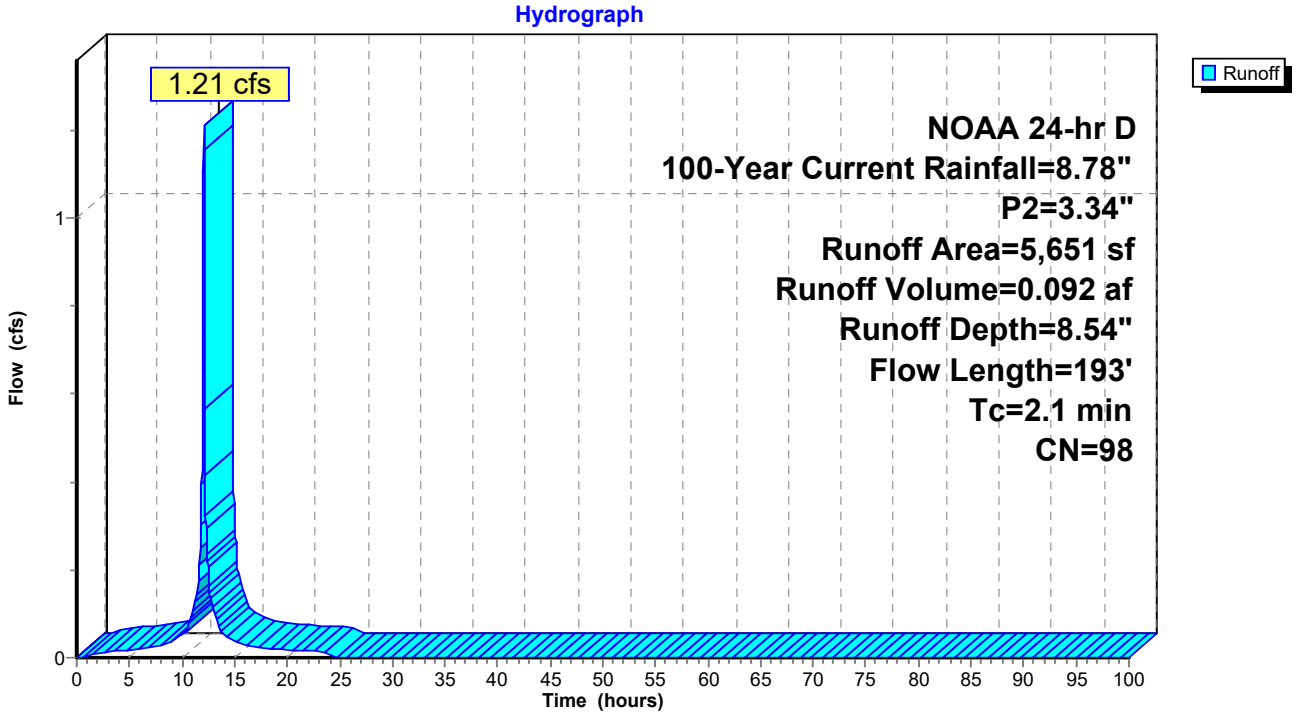
Runoff = 1.21 cfs @ 12.08 hrs, Volume= 0.092 af, Depth= 8.54"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

	Area (sf)	CN	Description
*	5,621	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	5,651	98	Weighted Average
	5,651		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	84	0.0209	1.38		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
0.3	16	0.0130	0.82		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.34"
0.8	93	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
2.1	193	Total			

Subcatchment P1B-I: PDA 1B-I



Summary for Subcatchment P1B-P: PDA 1B-P

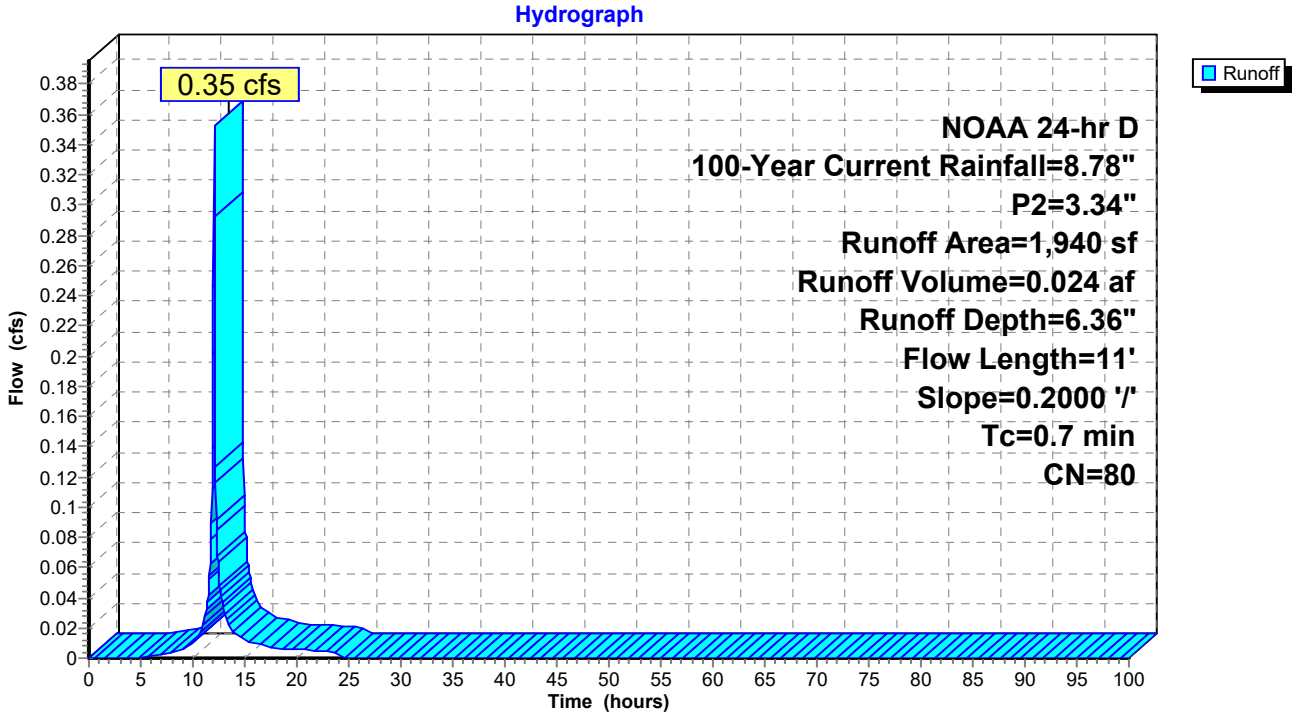
Runoff = 0.35 cfs @ 12.06 hrs, Volume= 0.024 af, Depth= 6.36"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

Area (sf)	CN	Description
1,940	80	>75% Grass cover, Good, HSG D
1,940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	11	0.2000	0.28		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"

Subcatchment P1B-P: PDA 1B-P



Summary for Subcatchment P2A-I: PDA 2A-I

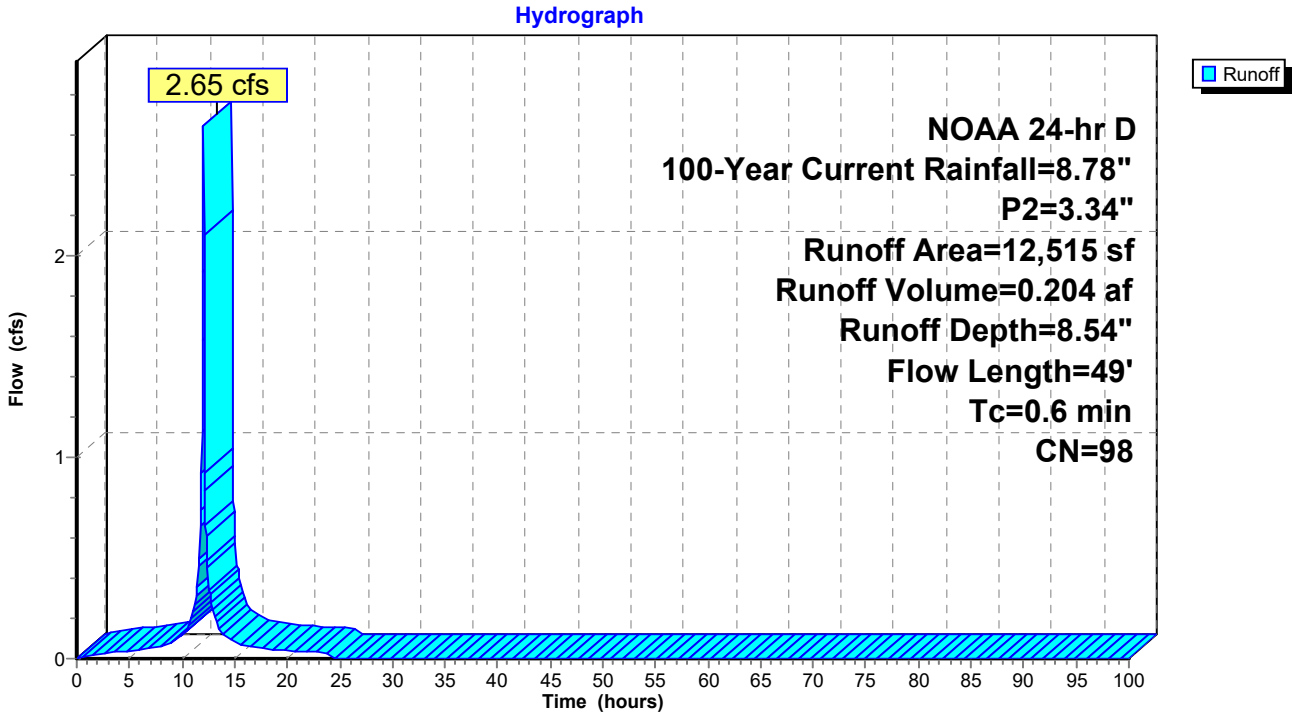
Runoff = 2.65 cfs @ 12.05 hrs, Volume= 0.204 af, Depth= 8.54"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

	Area (sf)	CN	Description
*	11,539	98	MVS Paved parking, HSG D
	976	98	Paved parking, HSG D
	12,515	98	Weighted Average
	12,515		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	30	0.0330	1.35		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
0.2	19	0.0105	2.08		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.6	49	Total			

Subcatchment P2A-I: PDA 2A-I



Summary for Subcatchment P2A-P: PDA 2A-P

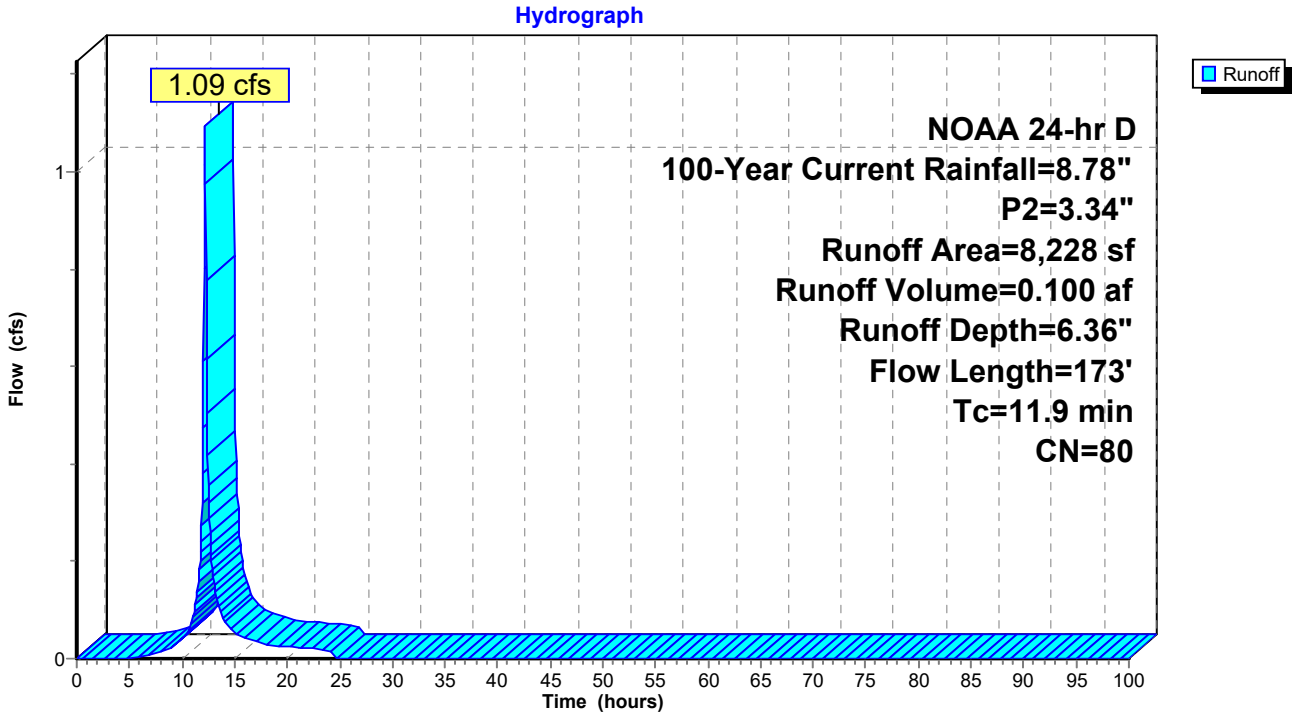
Runoff = 1.09 cfs @ 12.19 hrs, Volume= 0.100 af, Depth= 6.36"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

Area (sf)	CN	Description
8,228	80	>75% Grass cover, Good, HSG D
8,228		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	60	0.0080	0.11		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"
2.6	96	0.0080	0.63		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
11.9	173	Total			

Subcatchment P2A-P: PDA 2A-P



Summary for Subcatchment P2B-I: PDA 2B-I

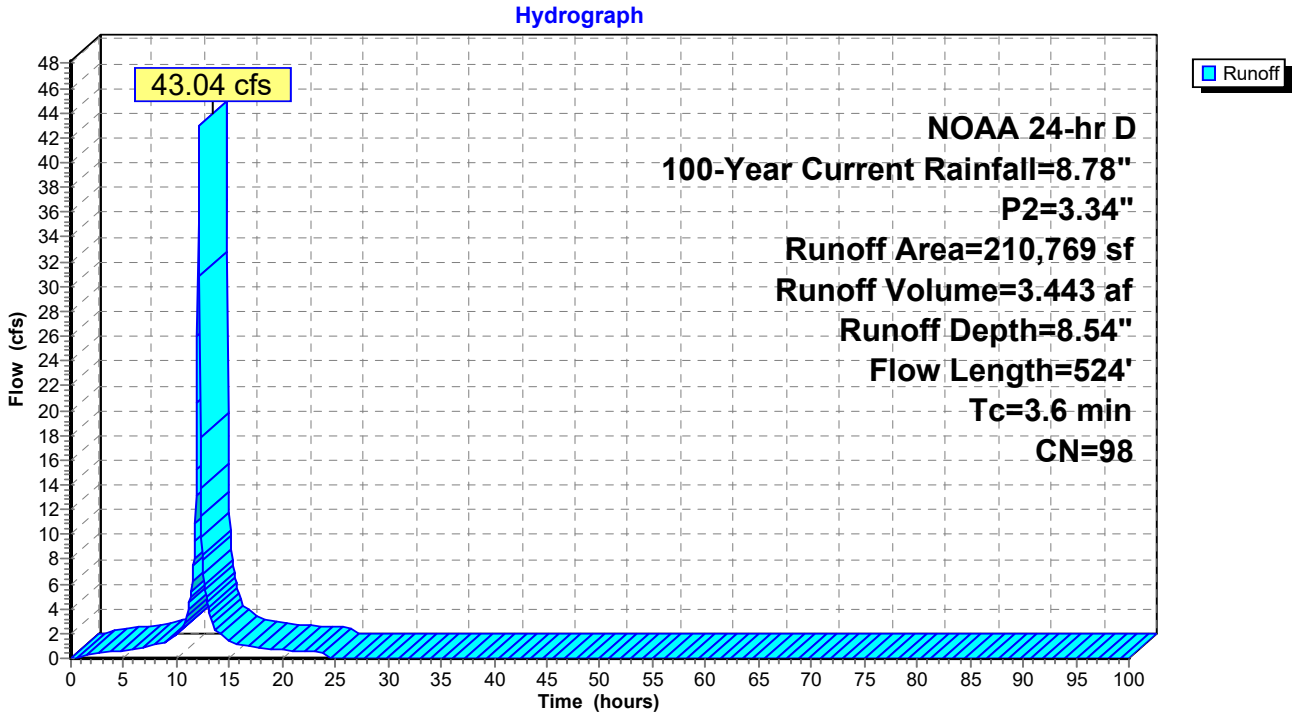
Runoff = 43.04 cfs @ 12.09 hrs, Volume= 3.443 af, Depth= 8.54"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

	Area (sf)	CN	Description
*	170,269	98	MVS Paved parking, HSG D
	40,500	98	Roofs, HSG D
	210,769	98	Weighted Average
	210,769		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0136	1.20		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
1.1	155	0.0136	2.37		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.2	51	0.0050	3.79	3.79	**Pipe Channel, CD** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.6	139	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	79	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
3.6	524	Total			

Subcatchment P2B-I: PDA 2B-I



Summary for Subcatchment P2B-P: PDA 2B-P

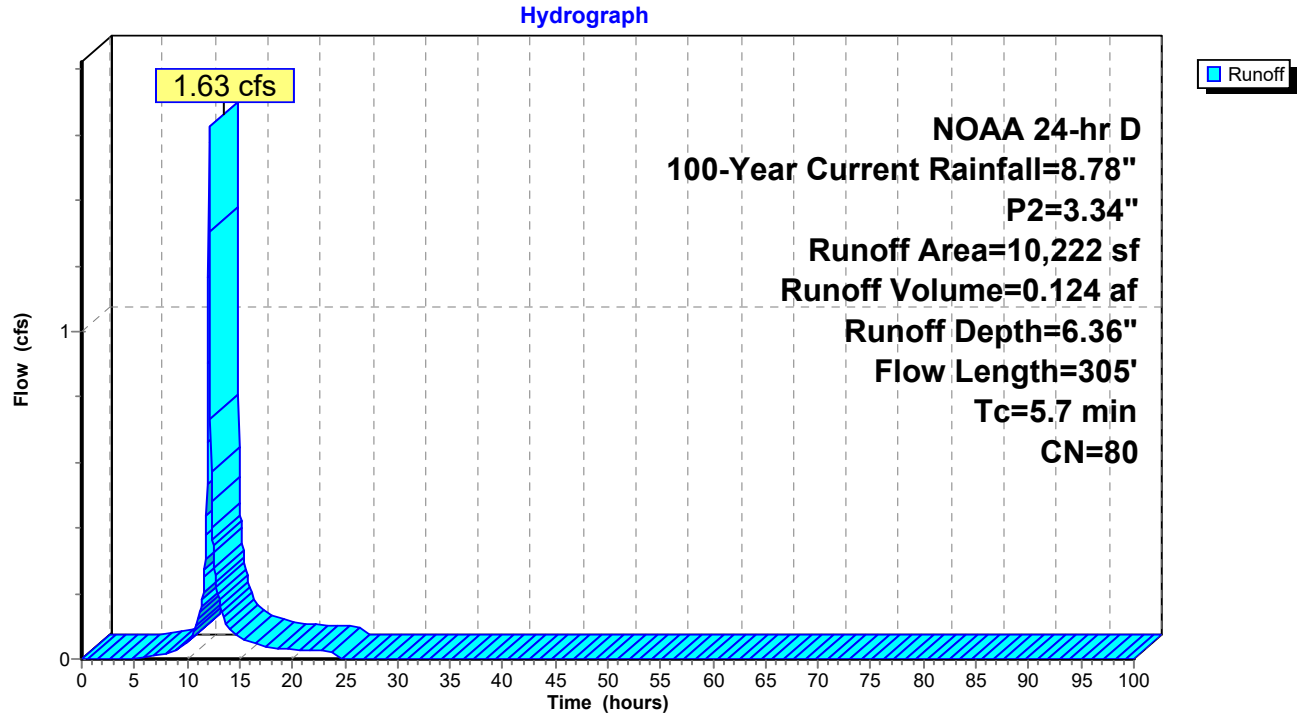
Runoff = 1.63 cfs @ 12.12 hrs, Volume= 0.124 af, Depth= 6.36"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

Area (sf)	CN	Description
10,222	80	>75% Grass cover, Good, HSG D
10,222		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	45	0.0250	0.16		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"
0.2	56	0.0050	3.79	3.79	**Pipe Channel, BC** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.4	98	0.0030	3.85	6.80	**Pipe Channel, CD** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.5	106	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
5.7	305	Total			

Subcatchment P2B-P: PDA 2B-P



Summary for Subcatchment P2C-I: PDA 2C-I

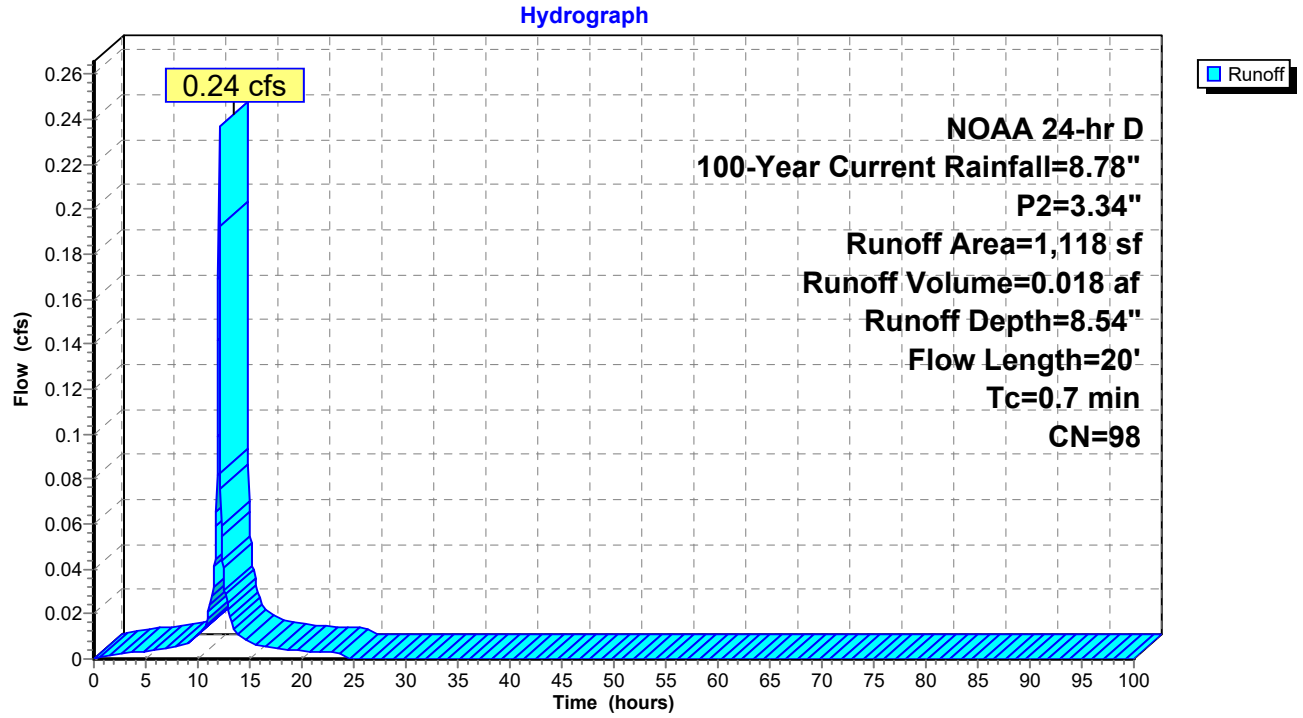
Runoff = 0.24 cfs @ 12.06 hrs, Volume= 0.018 af, Depth= 8.54"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

Area (sf)	CN	Description
1,118	98	Paved parking, HSG D
1,118		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	10	0.0150	0.79		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.34"
0.5	10	0.3000	0.32		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.34"
0.7	20	Total			

Subcatchment P2C-I: PDA 2C-I



Summary for Subcatchment P2C-P: PDA 2C-P

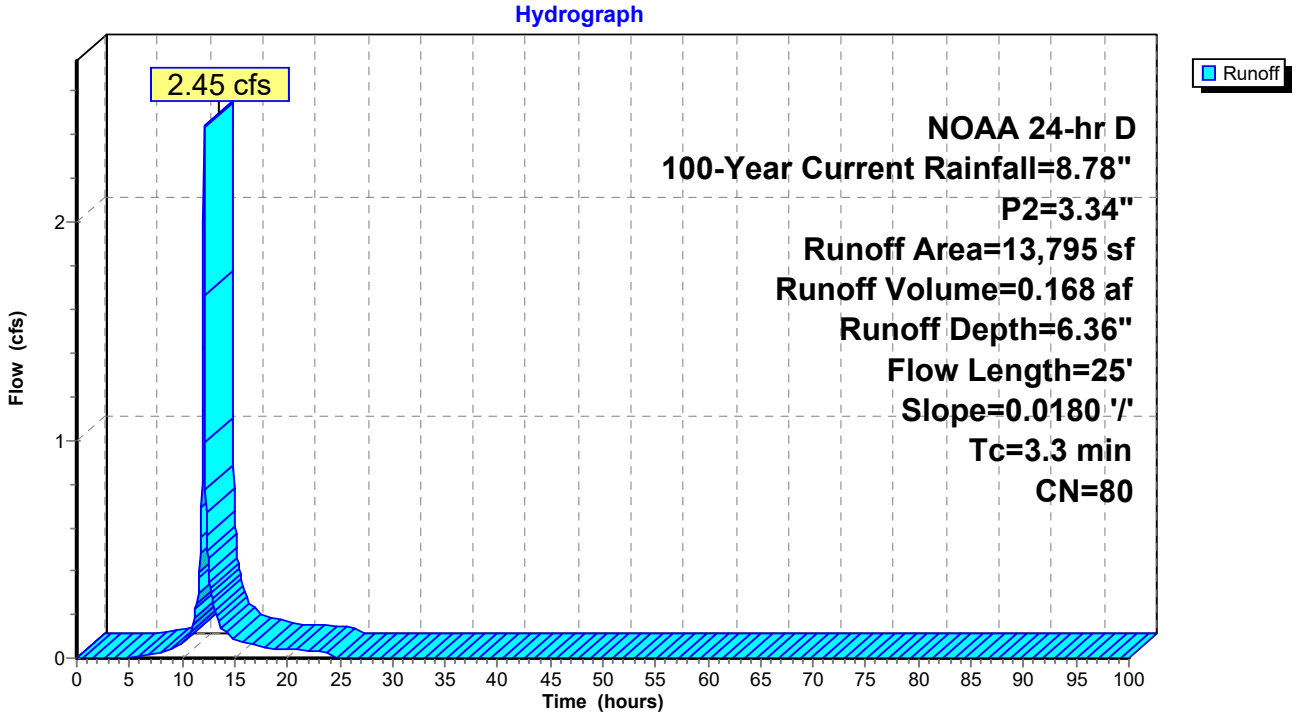
Runoff = 2.45 cfs @ 12.09 hrs, Volume= 0.168 af, Depth= 6.36"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Current Rainfall=8.78", P2=3.34"

Area (sf)	CN	Description
13,795	80	>75% Grass cover, Good, HSG D
13,795		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	25	0.0180	0.13		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.34"

Subcatchment P2C-P: PDA 2C-P



Summary for Pond B1: UG IB

Inflow Area = 5.549 ac, 92.37% Impervious, Inflow Depth = 8.37" for 100-Year Current event
Inflow = 45.01 cfs @ 12.10 hrs, Volume= 3.872 af
Outflow = 5.64 cfs @ 12.82 hrs, Volume= 3.872 af, Atten= 87%, Lag= 43.2 min
Primary = 5.64 cfs @ 12.82 hrs, Volume= 3.872 af
Routed to Link P POA-2 : POA-2 PDA

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 3.72' @ 12.82 hrs Surf.Area= 38,229 sf Storage= 86,101 cf

Plug-Flow detention time= 532.7 min calculated for 3.870 af (100% of inflow)
Center-of-Mass det. time= 533.3 min (1,284.5 - 751.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1.05'	48 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	1.20'	102,602 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 114,639 cf Overall x 89.5% Voids
		102,650 cf	Total Available Storage

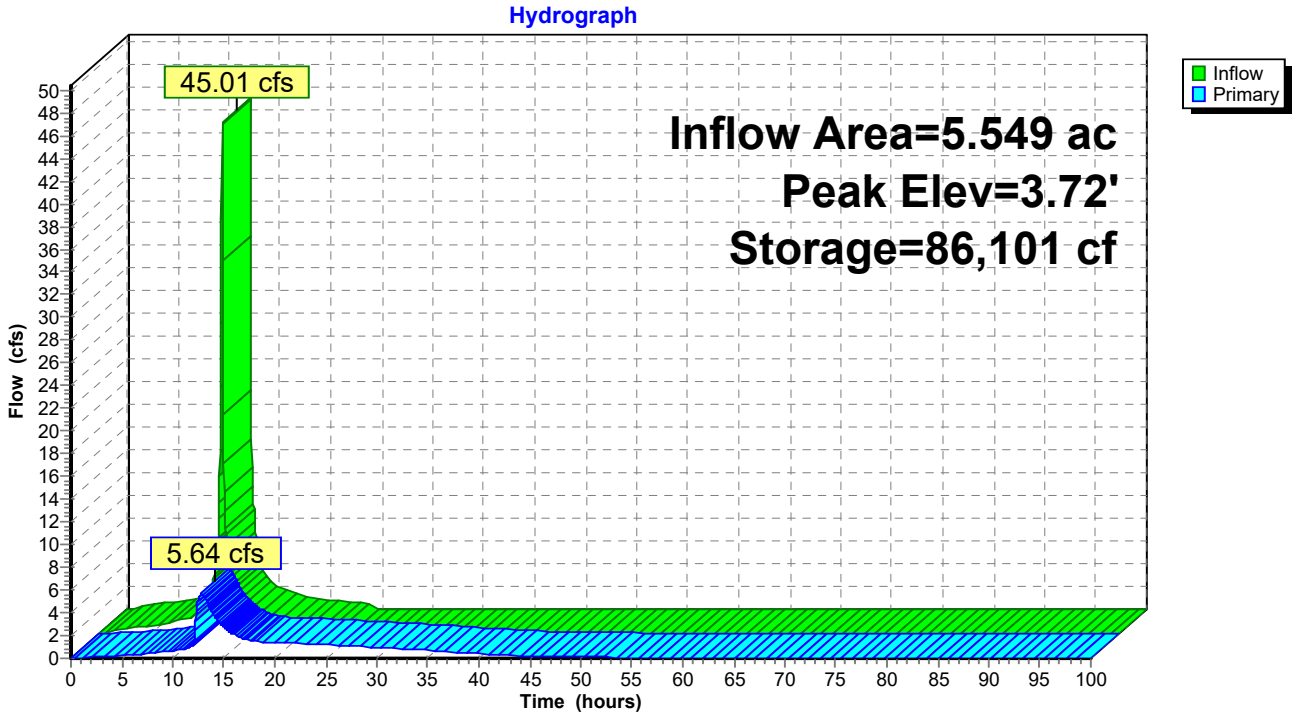
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.05	16	0	0
4.05	16	48	48

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.20	38,213	0	0
4.20	38,213	114,639	114,639

Device	Routing	Invert	Outlet Devices
#1	Primary	1.05'	**24.0" Round Culvert** L= 119.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 1.05' / 0.64' S= 0.0034 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	1.05'	**6.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	3.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=5.63 cfs @ 12.82 hrs HW=3.72' (Free Discharge)
└**1=Culvert** (Passes 5.63 cfs of 16.02 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 1.57 cfs @ 7.47 fps)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 4.07 cfs @ 2.23 fps)

Pond B1: UG IB


Hydrograph
45.01 cfs
5.64 cfs
Inflow Area=5.549 ac
Peak Elev=3.72'
Storage=86,101 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Summary for Pond PP1: PP-A

Inflow Area = 0.476 ac, 60.33% Impervious, Inflow Depth = 7.68" for 100-Year Current event
Inflow = 3.29 cfs @ 12.06 hrs, Volume= 0.305 af
Outflow = 0.63 cfs @ 12.59 hrs, Volume= 0.305 af, Atten= 81%, Lag= 31.6 min
Primary = 0.63 cfs @ 12.59 hrs, Volume= 0.305 af
Routed to Pond B1 : UG IB

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 5.23' @ 12.59 hrs Surf.Area= 10,028 sf Storage= 4,934 cf

Plug-Flow detention time= 111.1 min calculated for 0.304 af (100% of inflow)
Center-of-Mass det. time= 111.1 min (871.7 - 760.7)

Volume	Invert	Avail.Storage	Storage Description
#1	4.00'	7,129 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 17,821 cf Overall x 40.0% Voids
#2	3.90'	30 cf	**Outlet Structure Storage (Prismatic)** Listed below (Recalc)
		7,159 cf	Total Available Storage

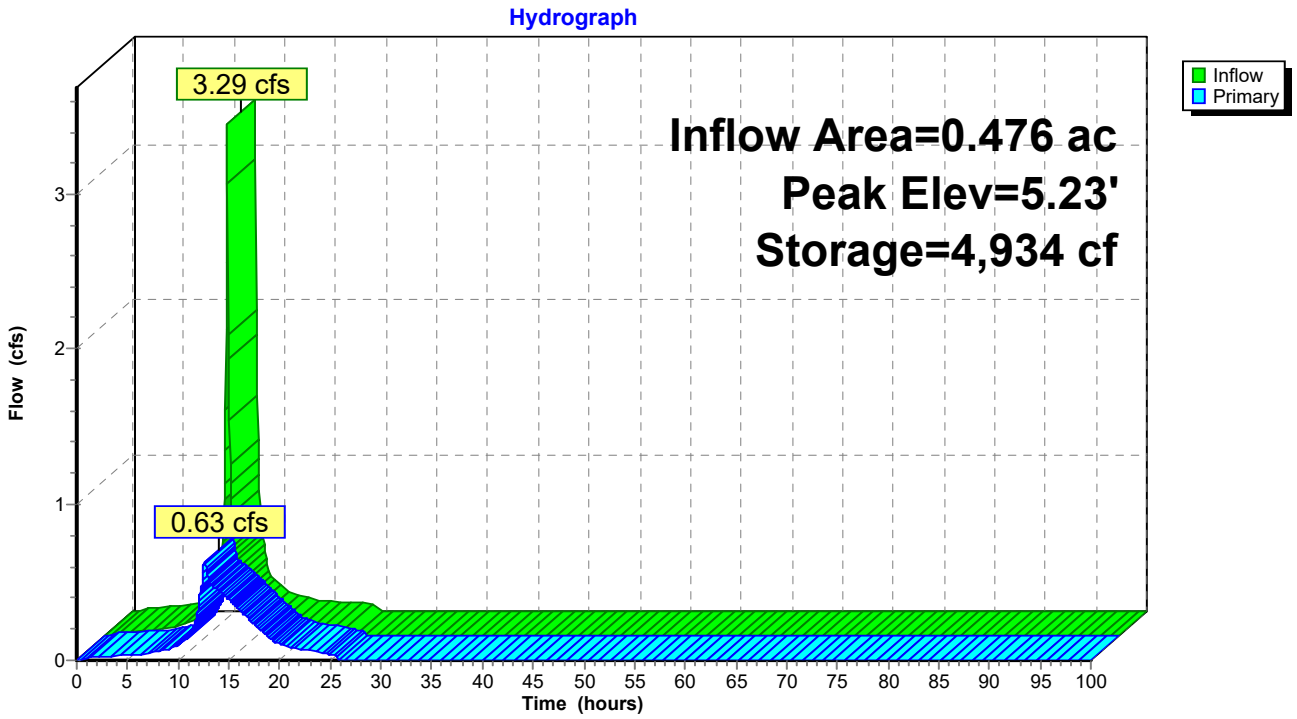
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.00	10,012	0	0
5.00	10,012	10,012	10,012
5.78	10,012	7,809	17,821

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
3.90	16	0	0
5.78	16	30	30

Device	Routing	Invert	Outlet Devices
#1	Primary	3.67'	**24.0" Round Culvert** L= 58.0' Ke= 0.200 Inlet / Outlet Invert= 3.67' / 3.38' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	3.90'	**4.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	5.18'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.63 cfs @ 12.59 hrs HW=5.23' (Free Discharge)
└**1=Culvert** (Passes 0.63 cfs of 9.78 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 0.50 cfs @ 5.17 fps)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.13 cfs @ 0.71 fps)

Pond PP1: PP-A

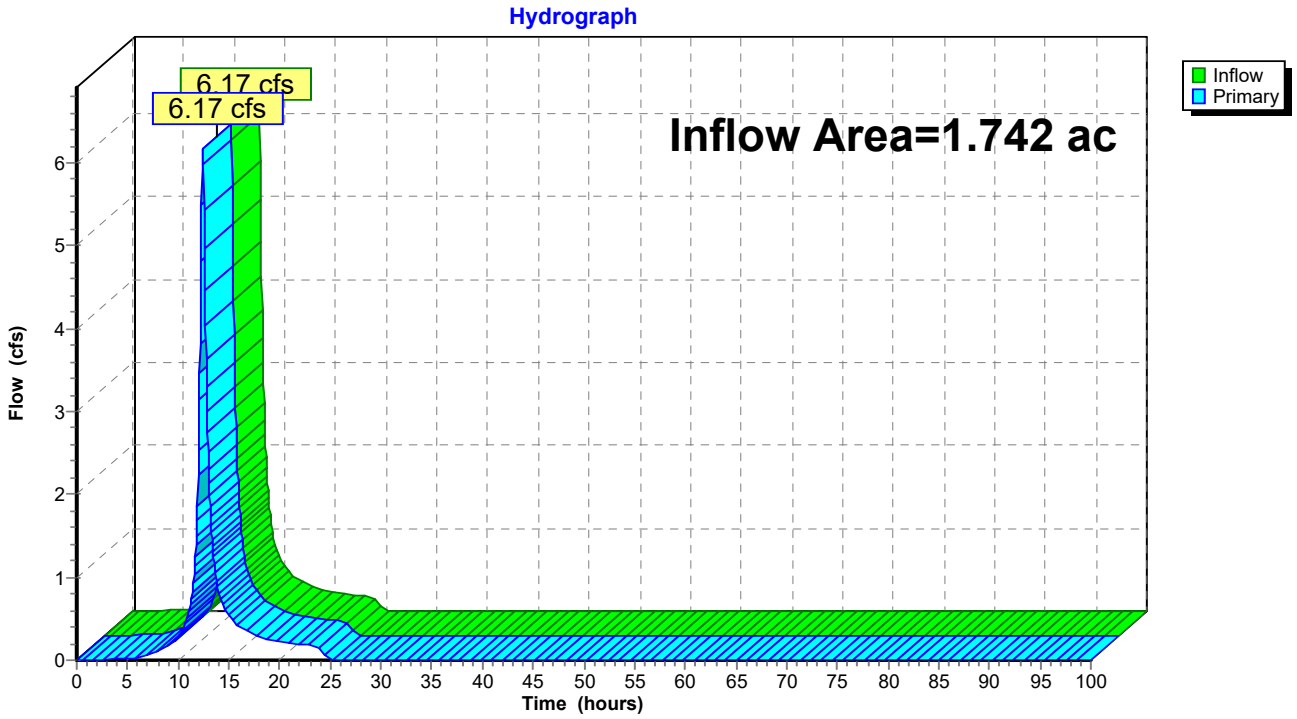

Hydrograph
3.29 cfs
0.63 cfs
Inflow Area=0.476 ac
Peak Elev=5.23'
Storage=4,934 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
3
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Summary for Link E POA-1: POA-1 EDA

Inflow Area = 1.742 ac, 6.23% Impervious, Inflow Depth = 6.15" for 100-Year Current event
Inflow = 6.17 cfs @ 12.42 hrs, Volume= 0.893 af
Primary = 6.17 cfs @ 12.42 hrs, Volume= 0.893 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-1: POA-1 EDA

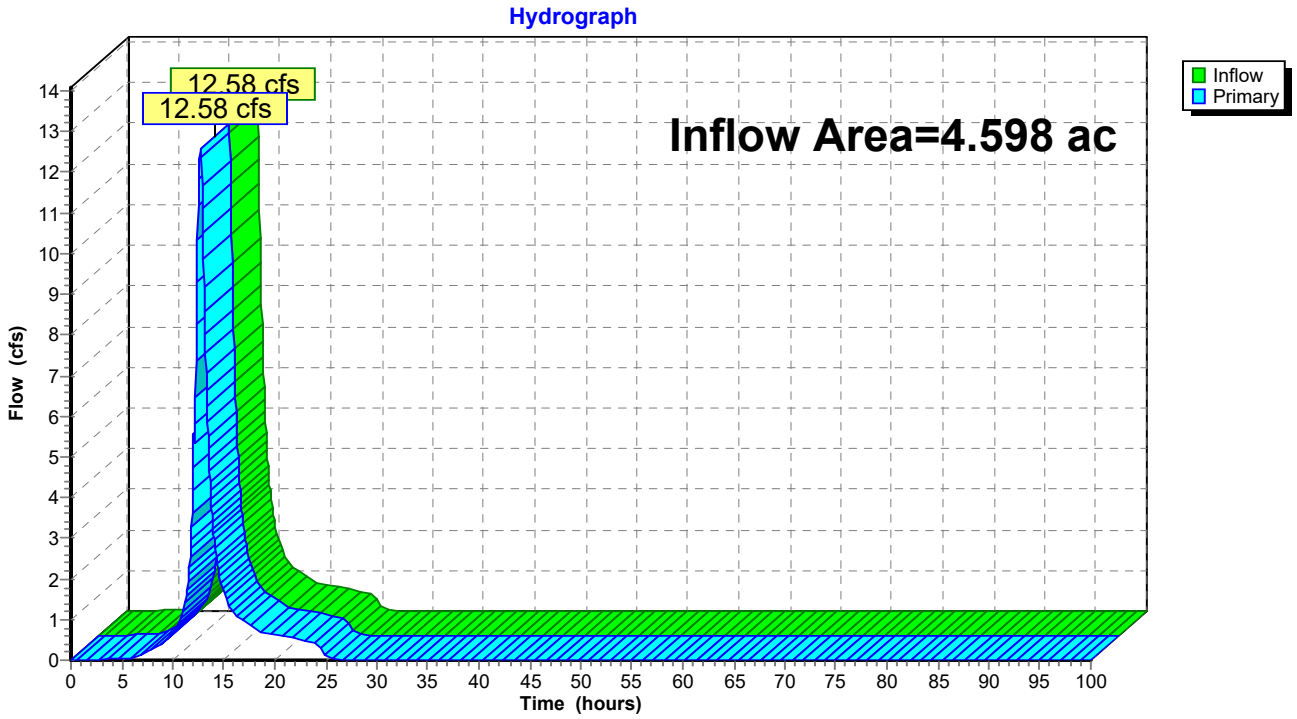


Summary for Link E POA-2: POA-2 EDA

Inflow Area = 4.598 ac, 4.74% Impervious, Inflow Depth = 6.23" for 100-Year Current event
Inflow = 12.58 cfs @ 12.68 hrs, Volume= 2.388 af
Primary = 12.58 cfs @ 12.68 hrs, Volume= 2.388 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-2: POA-2 EDA

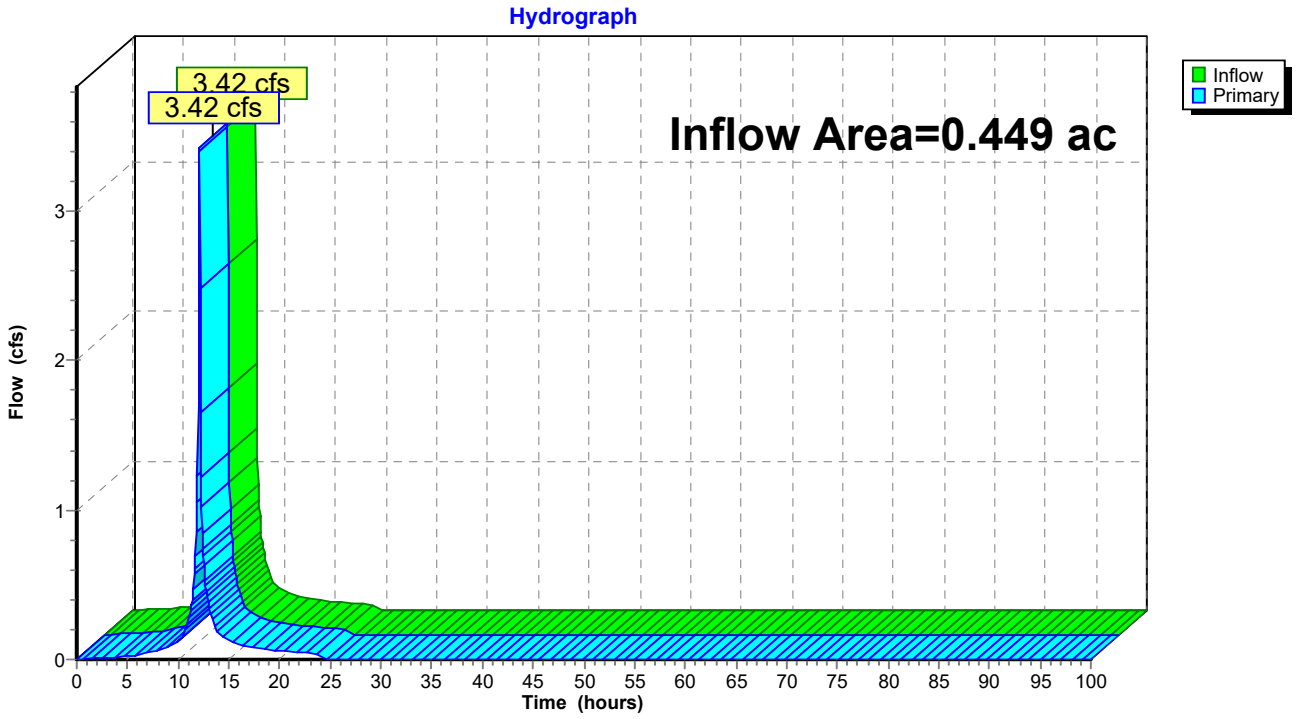


Summary for Link P POA-1: POA-1 PDA

Inflow Area = 0.449 ac, 32.97% Impervious, Inflow Depth = 7.08" for 100-Year Current event
Inflow = 3.42 cfs @ 12.09 hrs, Volume= 0.265 af
Primary = 3.42 cfs @ 12.09 hrs, Volume= 0.265 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-1: POA-1 PDA

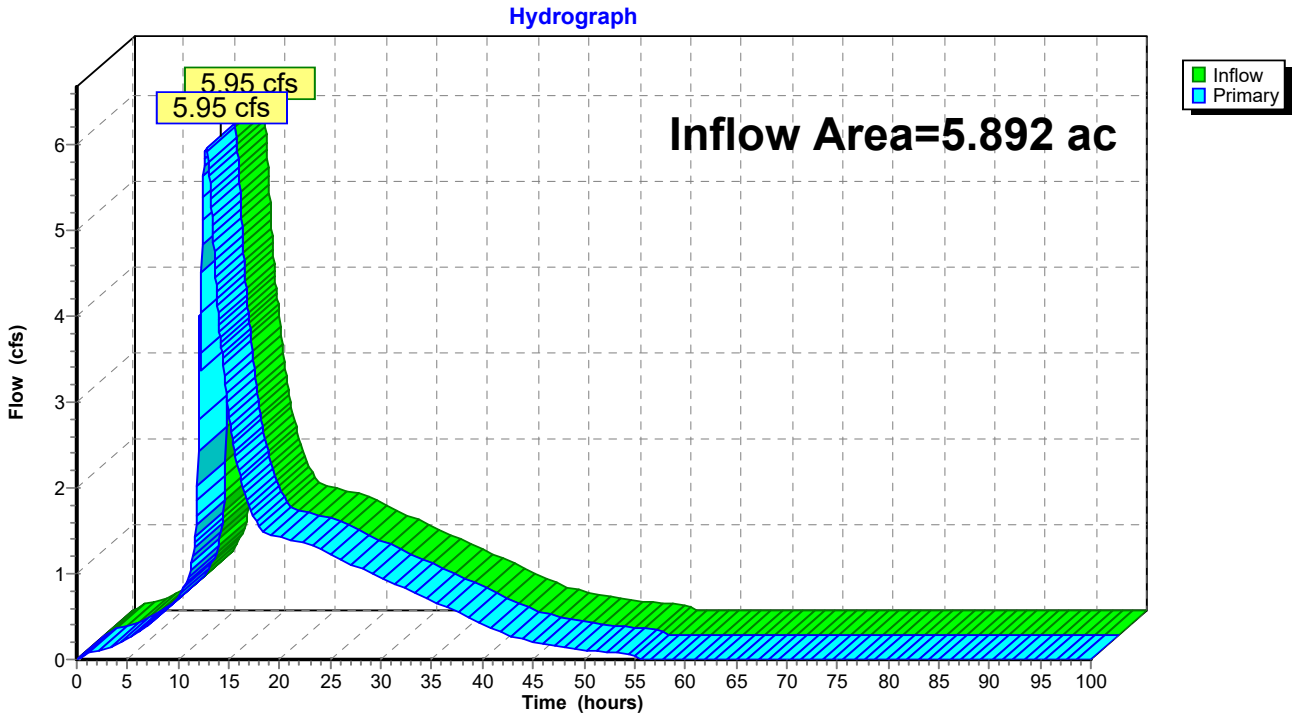


Summary for Link P POA-2: POA-2 PDA

Inflow Area = 5.892 ac, 87.44% Impervious, Inflow Depth = 8.27" for 100-Year Current event
Inflow = 5.95 cfs @ 12.78 hrs, Volume= 4.058 af
Primary = 5.95 cfs @ 12.78 hrs, Volume= 4.058 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

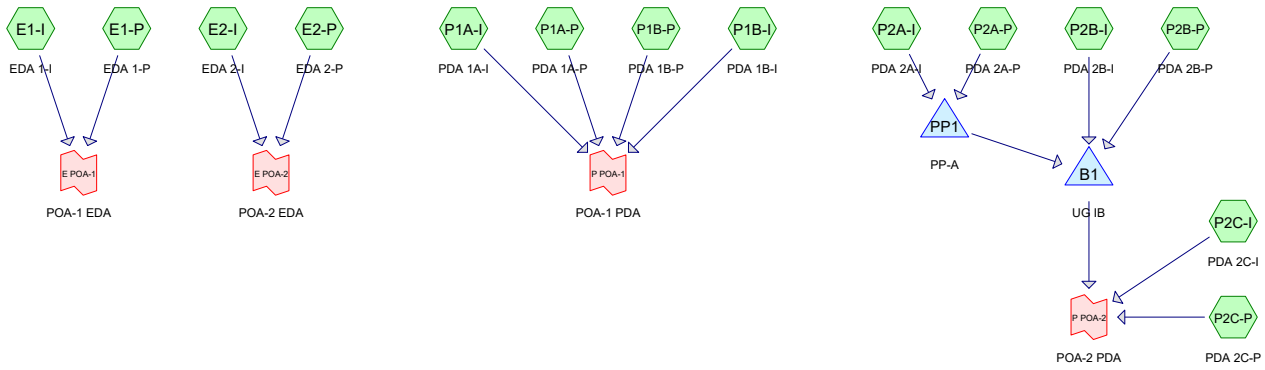
Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-2: POA-2 PDA



B. PRE- vs. POST-DEVELOPMENT HYDROGRAPHS - Future Adjusted Precipitation Depths

- **2-Year Storm Event**
- **10-Year Storm Event**
- **100-Year Storm Event**



Subcat Reach Pond Link

Routing Diagram for Pre vs Post 0d

Prepared by Bohler Engineering, PC, Printed 10/16/2025

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC	P2 (inches)
1	2-Year- Future	NOAA 24-hr	D	Default	24.00	1	3.97	2	3.97
2	10-Year Future	NOAA 24-hr	D	Default	24.00	1	6.16	2	3.97
3	100-Year Future	NOAA 24-hr	D	Default	24.00	1	11.34	2	3.97

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.022	80	>75% Grass cover, Good, HSG D (E1-P, E2-P, P1A-P, P1B-P, P2A-P, P2B-P, P2C-P)
4.629	98	MVS Paved parking, HSG D (E1-I, E2-I, P1B-I, P2A-I, P2B-I)
0.068	98	Paved parking, HSG D (E1-I, P1A-I, P1B-I, P2A-I, P2C-I)
0.930	98	Roofs, HSG D (P2B-I)
4.032	77	Woods, Good, HSG D (E1-P, E2-P)
12.681	**87**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
12.681	HSG D	E1-I, E1-P, E2-I, E2-P, P1A-I, P1A-P, P1B-I, P1B-P, P2A-I, P2A-P, P2B-I, P2B-P, P2C-I, P2C-P
0.000	Other	
12.681		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	3.022	0.000	3.022	>75% Grass cover, Good	E1-P, E2-P, P1A-P, P1B-P, P2A-P, P2B-P, P2C-P
0.000	0.000	0.000	4.629	0.000	4.629	MVS Paved parking	E1-I, E2-I, P1B-I, P2A-I, P2B-I
0.000	0.000	0.000	0.068	0.000	0.068	Paved parking	E1-I, P1A-I, P1B-I, P2A-I, P2C-I
0.000	0.000	0.000	0.930	0.000	0.930	Roofs	P2B-I
0.000	0.000	0.000	4.032	0.000	4.032	Woods, Good	E1-P, E2-P
0.000	**0.000**	**0.000**	**12.681**	**0.000**	**12.681**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	P2B-I	0.00	0.00	51.0	0.0050	0.011	12.0	12.0	0.0	
2	P2B-I	0.00	0.00	139.0	0.0030	0.011	0.0	18.0	0.0	
3	P2B-I	0.00	0.00	79.0	0.0030	0.011	0.0	18.0	0.0	
4	P2B-P	0.00	0.00	56.0	0.0050	0.011	12.0	12.0	0.0	
5	P2B-P	0.00	0.00	98.0	0.0030	0.011	0.0	18.0	0.0	
6	P2B-P	0.00	0.00	106.0	0.0030	0.011	0.0	18.0	0.0	
7	B1	1.05	0.64	119.0	0.0034	0.013	0.0	24.0	0.0	
8	PP1	3.67	3.38	58.0	0.0050	0.011	0.0	24.0	0.0	

Time span=0.00-100.00 hrs, dt=0.05 hrs, 2001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentE1-I: EDA 1-I Runoff Area=4,731 sf 100.00% Impervious Runoff Depth=3.74"
Flow Length=135' Tc=1.2 min CN=98 Runoff=0.45 cfs 0.034 af

SubcatchmentE1-P: EDA 1-P Runoff Area=71,171 sf 0.00% Impervious Runoff Depth=1.79"
Flow Length=181' Slope=0.0100 '/' Tc=28.1 min CN=77 Runoff=1.86 cfs 0.244 af

SubcatchmentE2-I: EDA 2-I Runoff Area=9,500 sf 100.00% Impervious Runoff Depth=3.74"
Flow Length=29' Slope=0.0300 '/' Tc=0.3 min CN=98 Runoff=0.90 cfs 0.068 af

SubcatchmentE2-P: EDA 2-P Runoff Area=190,784 sf 0.00% Impervious Runoff Depth=1.86"
Flow Length=431' Slope=0.0050 '/' Tc=48.4 min CN=78 Runoff=3.88 cfs 0.680 af

SubcatchmentP1A-I: PDA 1A-I Runoff Area=791 sf 100.00% Impervious Runoff Depth=3.74"
Flow Length=48' Tc=2.7 min CN=98 Runoff=0.08 cfs 0.006 af

SubcatchmentP1A-P: PDA 1A-P Runoff Area=11,157 sf 0.00% Impervious Runoff Depth=2.02"
Flow Length=58' Tc=4.8 min CN=80 Runoff=0.61 cfs 0.043 af

SubcatchmentP1B-I: PDA 1B-I Runoff Area=5,651 sf 100.00% Impervious Runoff Depth=3.74"
Flow Length=193' Tc=2.0 min CN=98 Runoff=0.55 cfs 0.040 af

SubcatchmentP1B-P: PDA 1B-P Runoff Area=1,940 sf 0.00% Impervious Runoff Depth=2.02"
Flow Length=11' Slope=0.2000 '/' Tc=0.6 min CN=80 Runoff=0.12 cfs 0.007 af

SubcatchmentP2A-I: PDA 2A-I Runoff Area=12,515 sf 100.00% Impervious Runoff Depth=3.74"
Flow Length=49' Tc=0.5 min CN=98 Runoff=1.19 cfs 0.089 af

SubcatchmentP2A-P: PDA 2A-P Runoff Area=8,228 sf 0.00% Impervious Runoff Depth=2.02"
Flow Length=173' Tc=11.1 min CN=80 Runoff=0.36 cfs 0.032 af

SubcatchmentP2B-I: PDA 2B-I Runoff Area=210,769 sf 100.00% Impervious Runoff Depth=3.74"
Flow Length=524' Tc=3.5 min CN=98 Runoff=19.41 cfs 1.506 af

SubcatchmentP2B-P: PDA 2B-P Runoff Area=10,222 sf 0.00% Impervious Runoff Depth=2.02"
Flow Length=305' Tc=5.3 min CN=80 Runoff=0.55 cfs 0.039 af

SubcatchmentP2C-I: PDA 2C-I Runoff Area=1,118 sf 100.00% Impervious Runoff Depth=3.74"
Flow Length=20' Tc=0.7 min CN=98 Runoff=0.11 cfs 0.008 af

SubcatchmentP2C-P: PDA 2C-P Runoff Area=13,795 sf 0.00% Impervious Runoff Depth=2.02"
Flow Length=25' Slope=0.0180 '/' Tc=3.0 min CN=80 Runoff=0.82 cfs 0.053 af

Pond B1: UG IB Peak Elev=2.41' Storage=41,252 cf Inflow=20.16 cfs 1.667 af
Outflow=1.06 cfs 1.667 af

Pond PP1: PP-A Peak Elev=4.43' Storage=1,747 cf Inflow=1.39 cfs 0.121 af
Outflow=0.28 cfs 0.121 af

Link E POA-1: POA-1 EDA Inflow=1.94 cfs 0.277 af
Primary=1.94 cfs 0.277 af

Link E POA-2: POA-2 EDA Inflow=3.98 cfs 0.748 af
Primary=3.98 cfs 0.748 af

Link P POA-1: POA-1 PDA Inflow=1.30 cfs 0.097 af
Primary=1.30 cfs 0.097 af

Link P POA-2: POA-2 PDA Inflow=1.74 cfs 1.728 af
Primary=1.74 cfs 1.728 af

Total Runoff Area = 12.681 ac Runoff Volume = 2.850 af Average Runoff Depth = 2.70"
55.63% Pervious = 7.055 ac 44.37% Impervious = 5.626 ac

Summary for Subcatchment E1-I: EDA 1-I

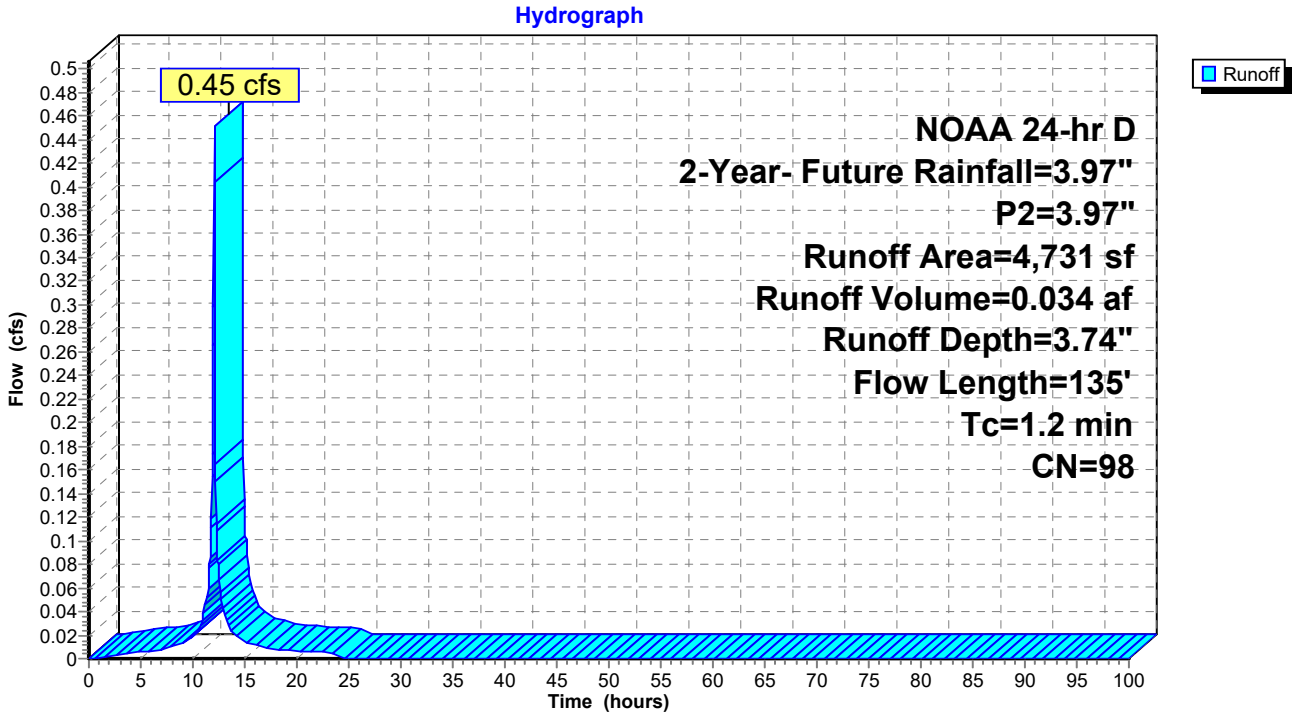
Runoff = 0.45 cfs @ 12.06 hrs, Volume= 0.034 af, Depth= 3.74"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

	Area (sf)	CN	Description
*	4,701	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	4,731	98	Weighted Average
	4,731		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	25	0.0340	1.44		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
0.9	110	0.0100	2.03		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
1.2	135	Total			

Subcatchment E1-I: EDA 1-I



Summary for Subcatchment E1-P: EDA 1-P

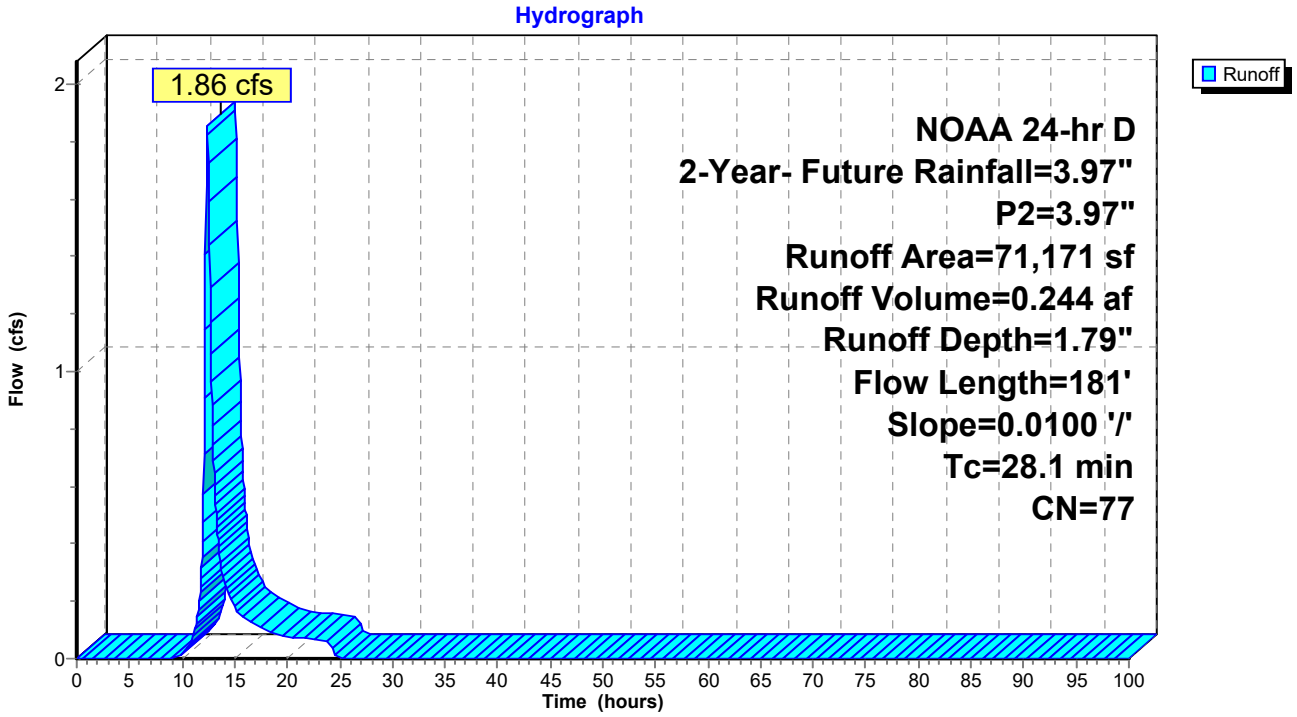
Runoff = 1.86 cfs @ 12.41 hrs, Volume= 0.244 af, Depth= 1.79"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

Area (sf)	CN	Description
8,810	80	>75% Grass cover, Good, HSG D
62,361	77	Woods, Good, HSG D
71,171	77	Weighted Average
71,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.4	100	0.0100	0.07		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.97"
2.7	81	0.0100	0.50		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
28.1	181	Total			

Subcatchment E1-P: EDA 1-P



Summary for Subcatchment E2-I: EDA 2-I

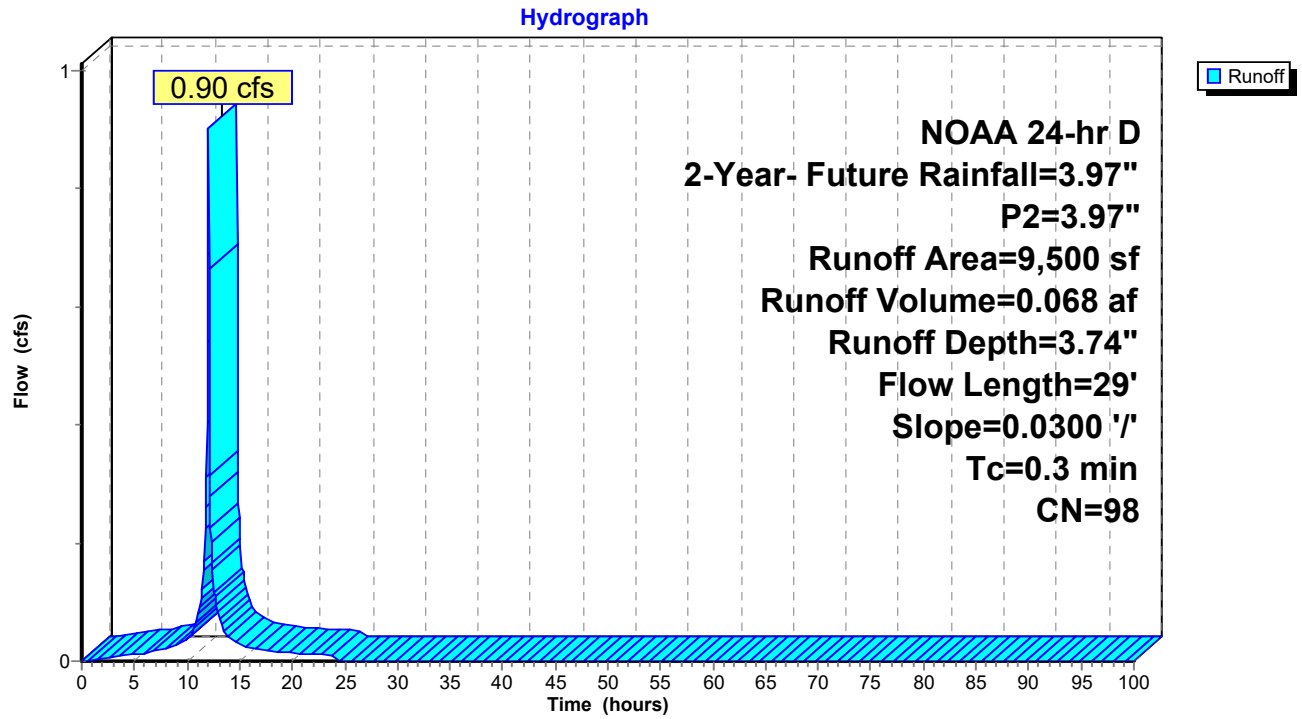
Runoff = 0.90 cfs @ 12.05 hrs, Volume= 0.068 af, Depth= 3.74"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

	Area (sf)	CN	Description
*	9,500	98	MVS Paved parking, HSG D
	9,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	29	0.0300	1.41		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"

Subcatchment E2-I: EDA 2-I



Summary for Subcatchment E2-P: EDA 2-P

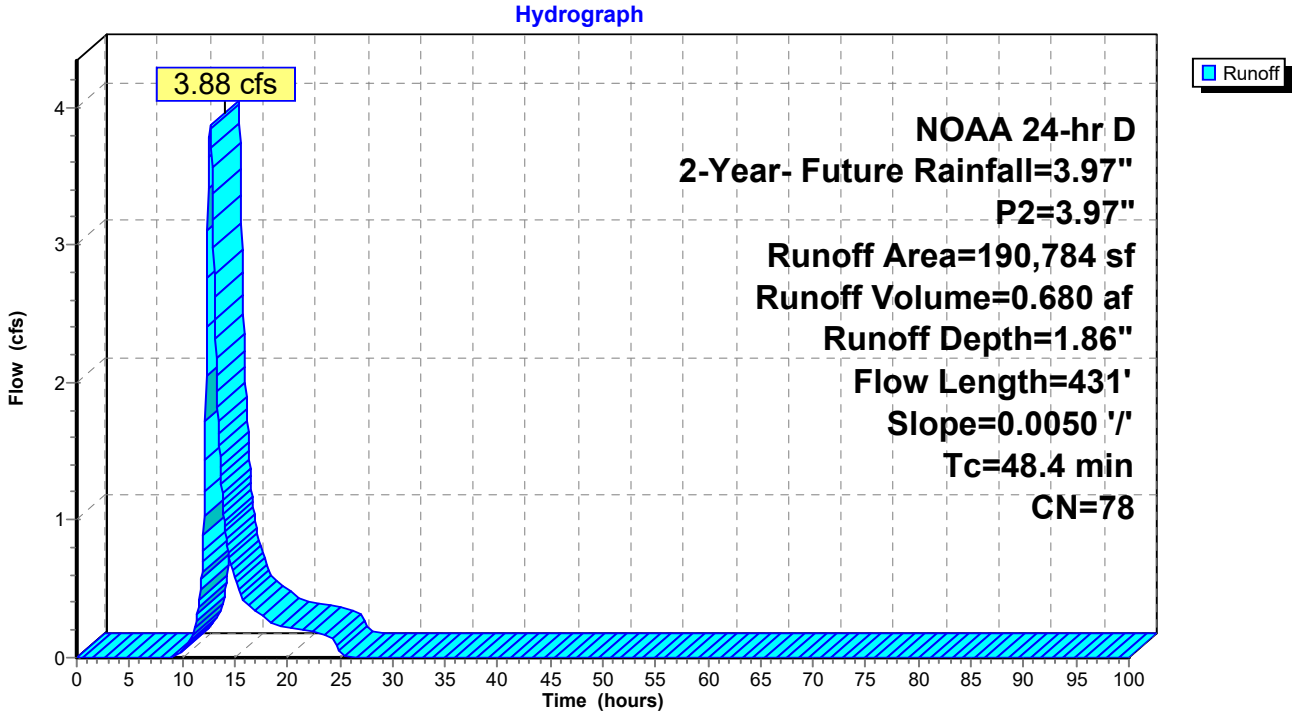
Runoff = 3.88 cfs @ 12.67 hrs, Volume= 0.680 af, Depth= 1.86"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

Area (sf)	CN	Description
77,501	80	>75% Grass cover, Good, HSG D
113,283	77	Woods, Good, HSG D
190,784	78	Weighted Average
190,784		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.6	100	0.0050	0.05		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.97"
12.9	274	0.0050	0.35		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
1.9	57	0.0050	0.49		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
48.4	431	Total			

Subcatchment E2-P: EDA 2-P



Summary for Subcatchment P1A-I: PDA 1A-I

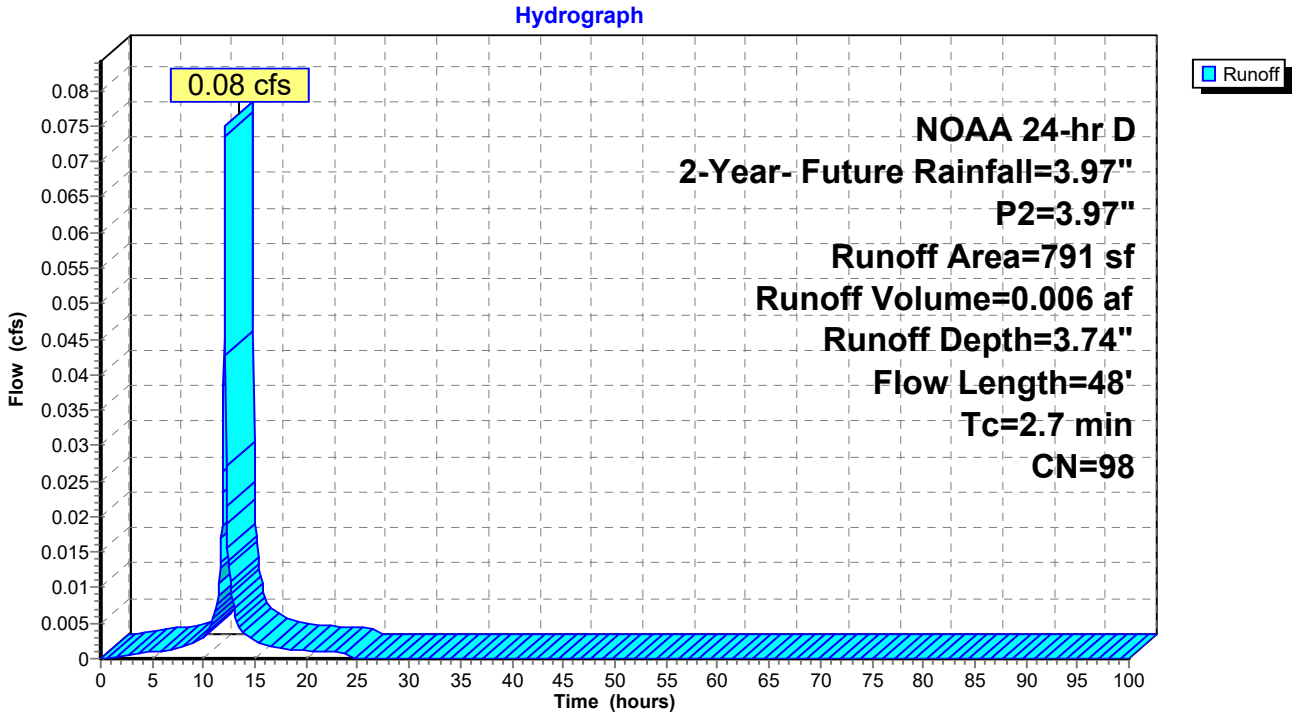
Runoff = 0.08 cfs @ 12.09 hrs, Volume= 0.006 af, Depth= 3.74"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

Area (sf)	CN	Description
791	98	Paved parking, HSG D
791		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	12	0.0175	0.95		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
1.2	14	0.0550	0.19		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.97"
1.3	22	0.1140	0.28		**Sheet Flow, CD** Grass: Short n= 0.150 P2= 3.97"
2.7	48	Total			

Subcatchment P1A-I: PDA 1A-I



Summary for Subcatchment P1A-P: PDA 1A-P

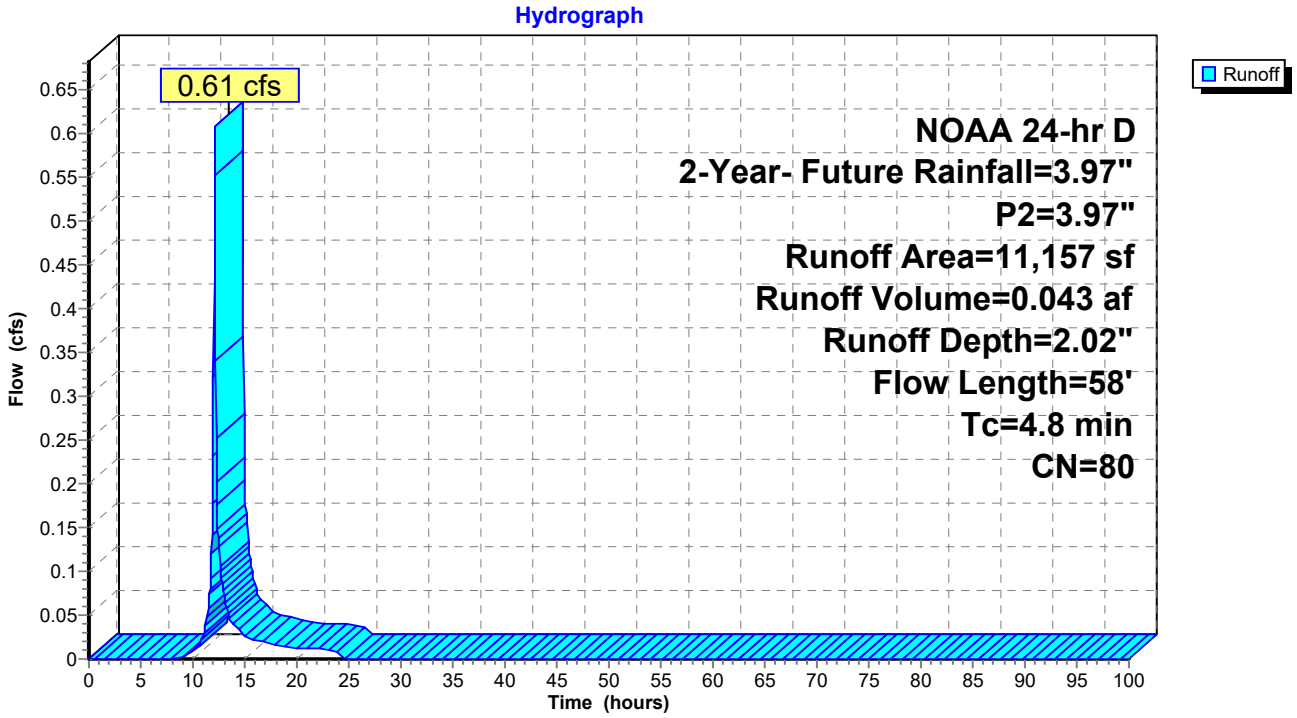
Runoff = 0.61 cfs @ 12.11 hrs, Volume= 0.043 af, Depth= 2.02"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

Area (sf)	CN	Description
11,157	80	>75% Grass cover, Good, HSG D
11,157		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	33	0.0300	0.18		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"
1.7	25	0.0800	0.25		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.97"
4.8	58	Total			

Subcatchment P1A-P: PDA 1A-P



Summary for Subcatchment P1B-I: PDA 1B-I

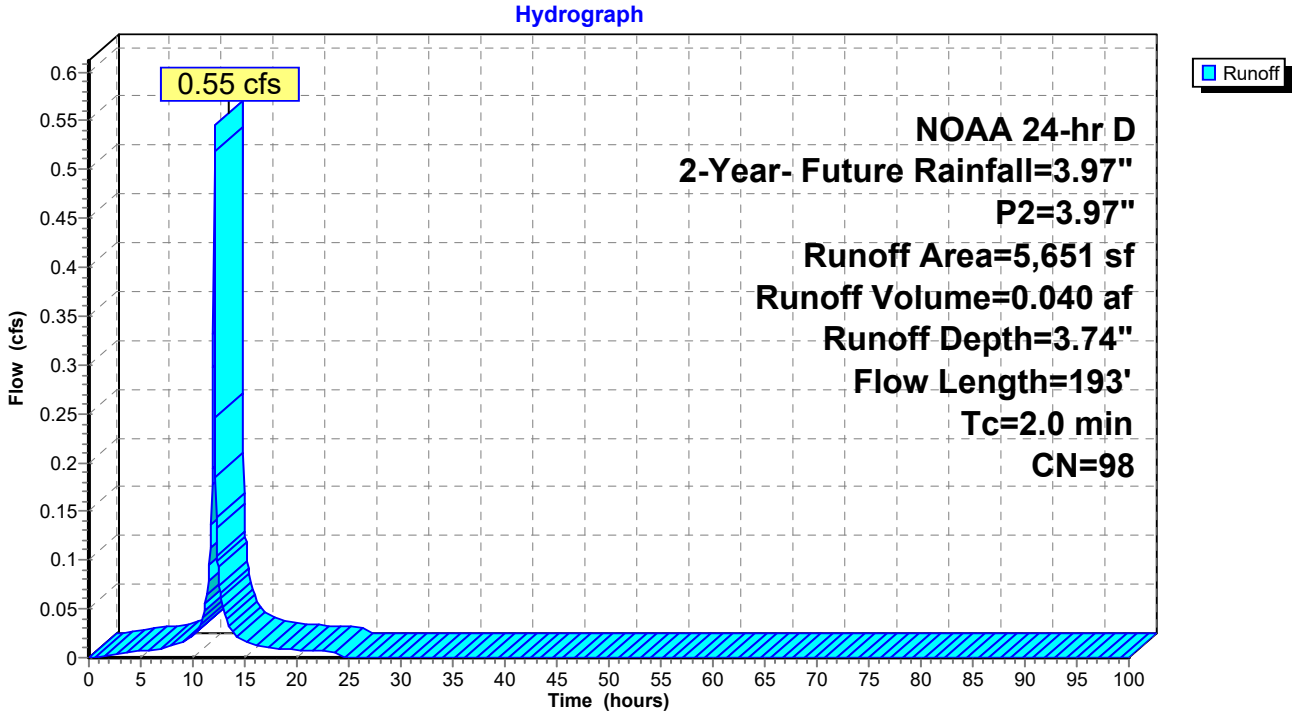
Runoff = 0.55 cfs @ 12.08 hrs, Volume= 0.040 af, Depth= 3.74"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

	Area (sf)	CN	Description
*	5,621	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	5,651	98	Weighted Average
	5,651		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	84	0.0209	1.51		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
0.3	16	0.0130	0.89		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.97"
0.8	93	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
2.0	193	Total			

Subcatchment P1B-I: PDA 1B-I



Summary for Subcatchment P1B-P: PDA 1B-P

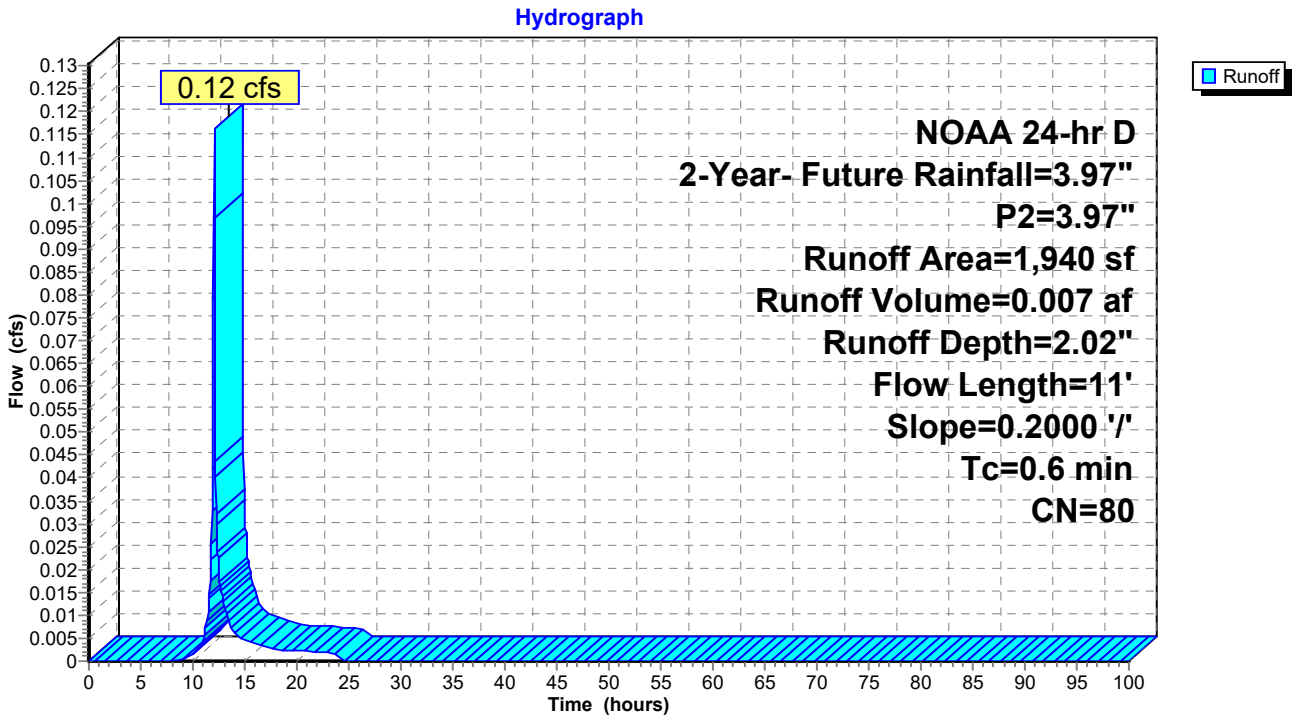
Runoff = 0.12 cfs @ 12.06 hrs, Volume= 0.007 af, Depth= 2.02"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

Area (sf)	CN	Description
1,940	80	>75% Grass cover, Good, HSG D
1,940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	11	0.2000	0.31		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"

Subcatchment P1B-P: PDA 1B-P



Summary for Subcatchment P2A-I: PDA 2A-I

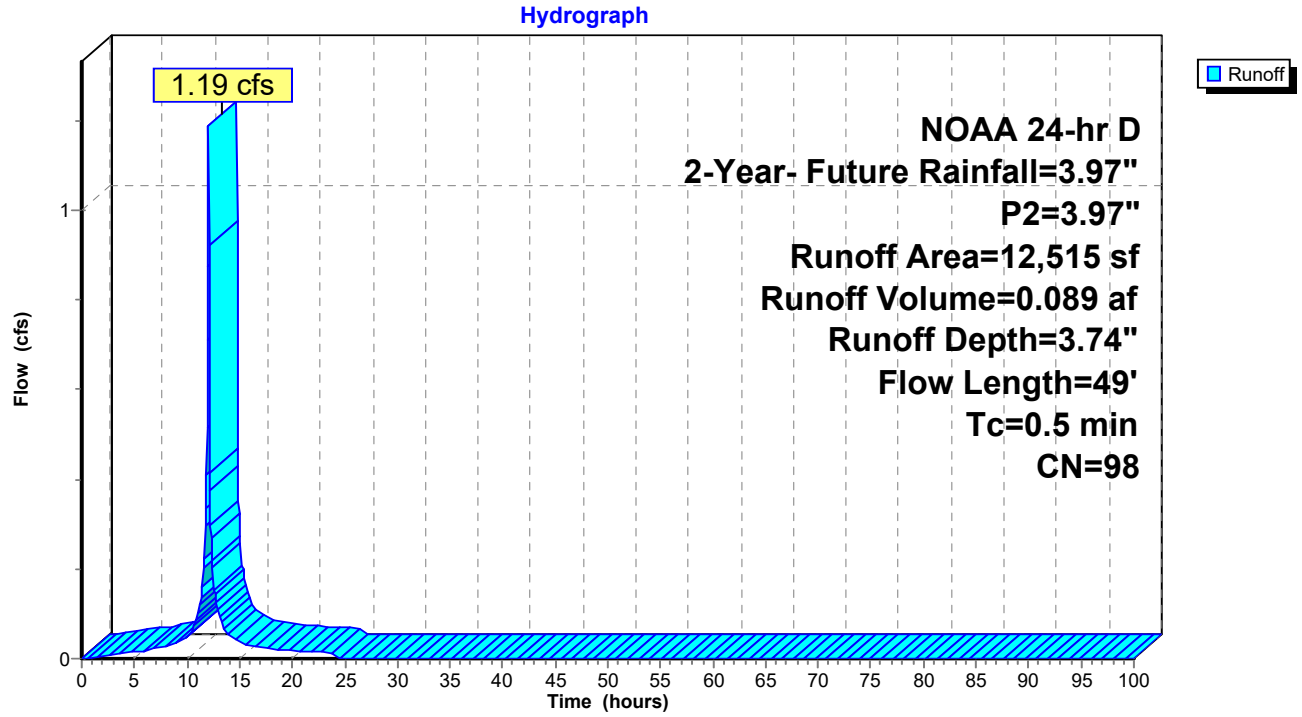
Runoff = 1.19 cfs @ 12.05 hrs, Volume= 0.089 af, Depth= 3.74"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

	Area (sf)	CN	Description
*	11,539	98	MVS Paved parking, HSG D
	976	98	Paved parking, HSG D
	12,515	98	Weighted Average
	12,515		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	30	0.0330	1.47		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
0.2	19	0.0105	2.08		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.5	49	Total			

Subcatchment P2A-I: PDA 2A-I



Summary for Subcatchment P2A-P: PDA 2A-P

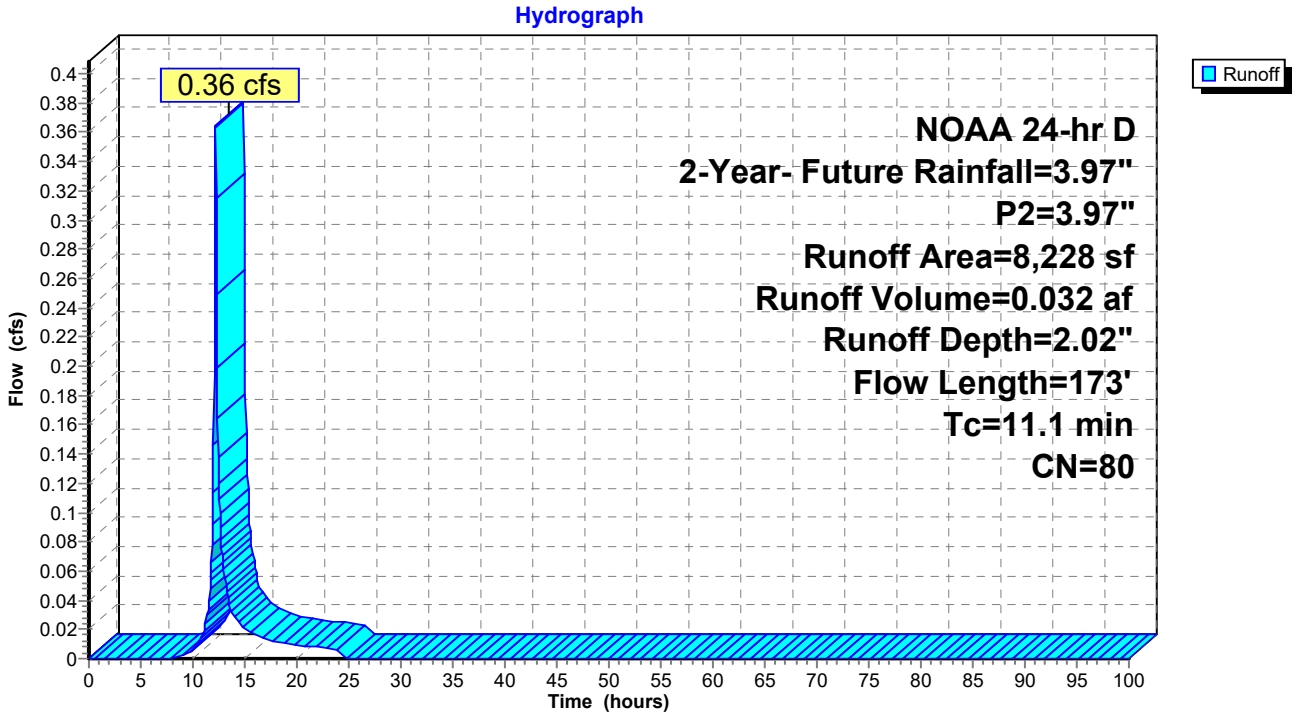
Runoff = 0.36 cfs @ 12.19 hrs, Volume= 0.032 af, Depth= 2.02"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

Area (sf)	CN	Description
8,228	80	>75% Grass cover, Good, HSG D
8,228		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	60	0.0080	0.12		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"
2.6	96	0.0080	0.63		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
11.1	173	Total			

Subcatchment P2A-P: PDA 2A-P



Summary for Subcatchment P2B-I: PDA 2B-I

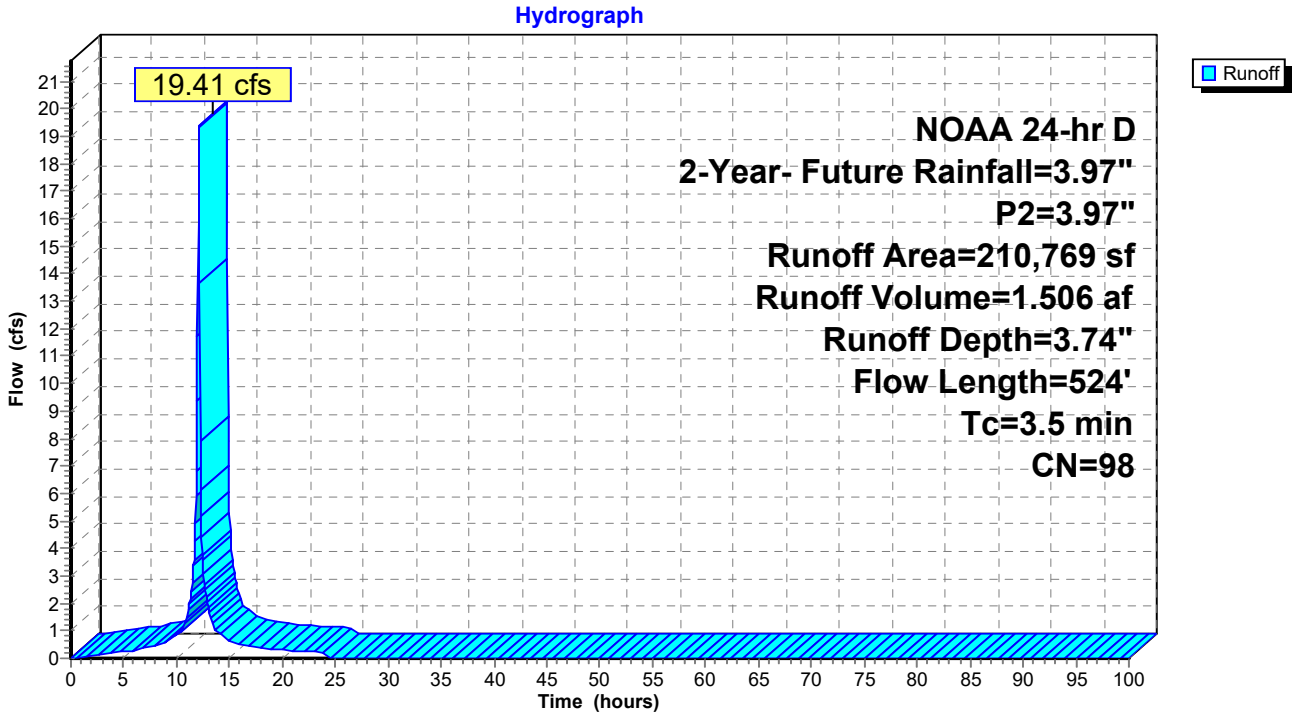
Runoff = 19.41 cfs @ 12.09 hrs, Volume= 1.506 af, Depth= 3.74"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

	Area (sf)	CN	Description
*	170,269	98	MVS Paved parking, HSG D
	40,500	98	Roofs, HSG D
	210,769	98	Weighted Average
	210,769		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0136	1.31		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
1.1	155	0.0136	2.37		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.2	51	0.0050	3.79	3.79	**Pipe Channel, CD** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.6	139	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	79	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
3.5	524	Total			

Subcatchment P2B-I: PDA 2B-I



Summary for Subcatchment P2B-P: PDA 2B-P

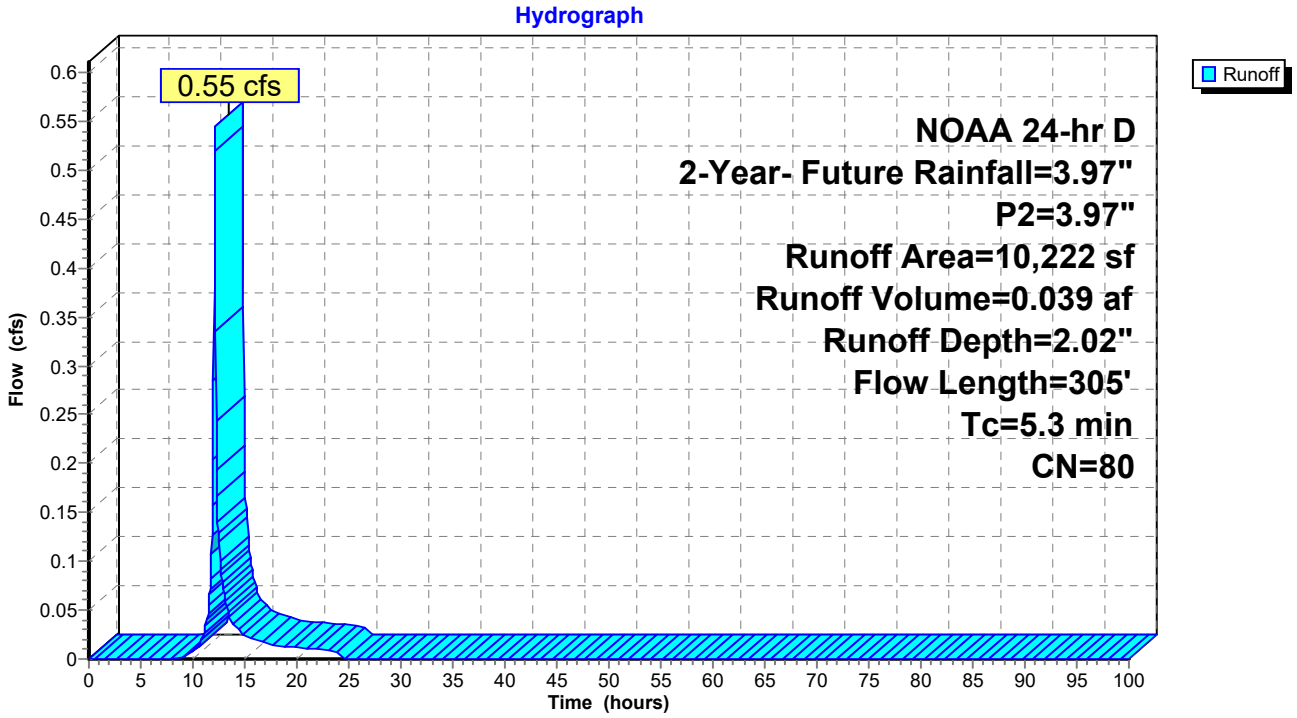
Runoff = 0.55 cfs @ 12.12 hrs, Volume= 0.039 af, Depth= 2.02"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

Area (sf)	CN	Description
10,222	80	>75% Grass cover, Good, HSG D
10,222		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	45	0.0250	0.18		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"
0.2	56	0.0050	3.79	3.79	**Pipe Channel, BC** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.4	98	0.0030	3.85	6.80	**Pipe Channel, CD** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.5	106	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
5.3	305	Total			

Subcatchment P2B-P: PDA 2B-P



Summary for Subcatchment P2C-I: PDA 2C-I

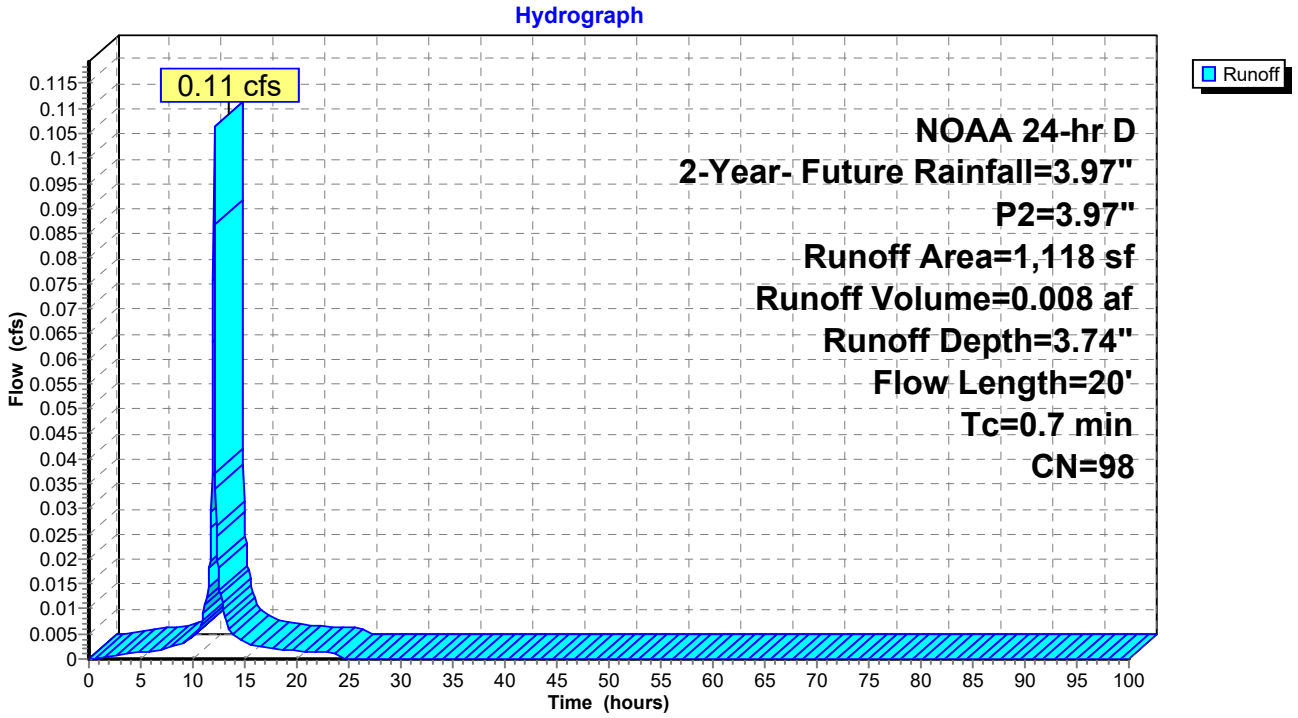
Runoff = 0.11 cfs @ 12.06 hrs, Volume= 0.008 af, Depth= 3.74"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

Area (sf)	CN	Description
1,118	98	Paved parking, HSG D
1,118		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	10	0.0150	0.86		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
0.5	10	0.3000	0.35		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.97"
0.7	20	Total			

Subcatchment P2C-I: PDA 2C-I



Summary for Subcatchment P2C-P: PDA 2C-P

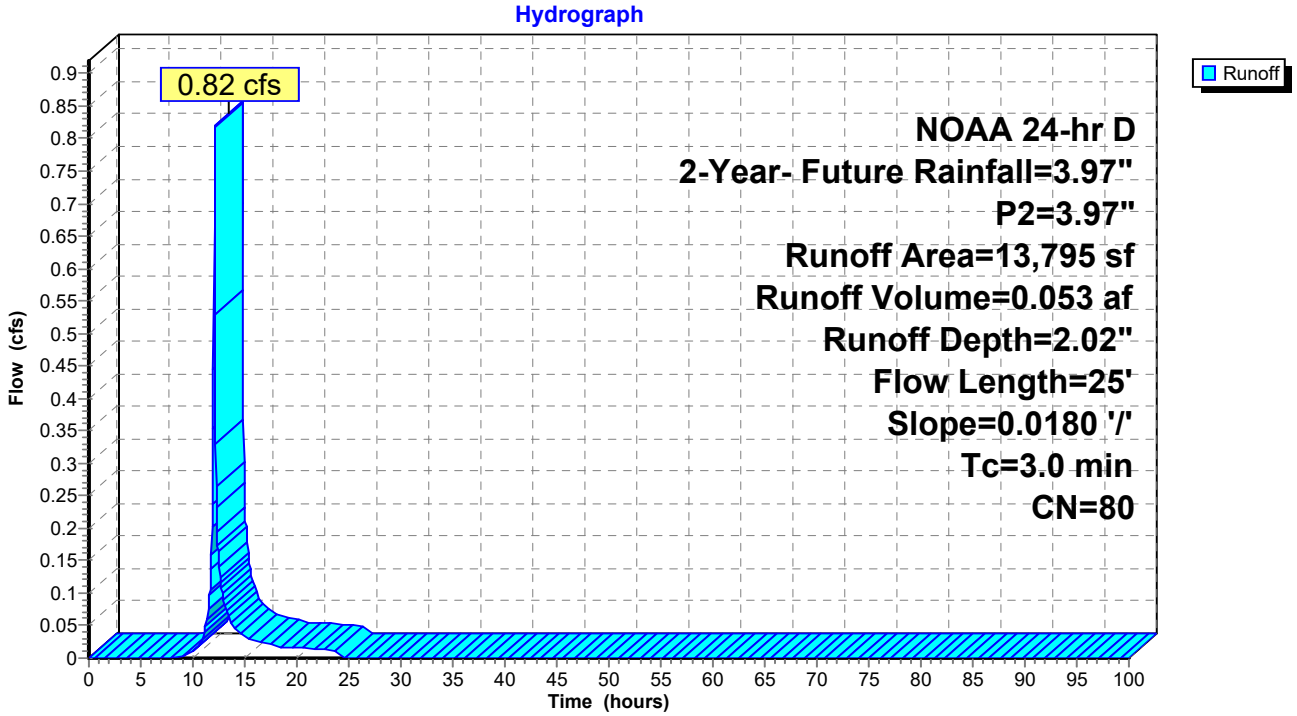
Runoff = 0.82 cfs @ 12.09 hrs, Volume= 0.053 af, Depth= 2.02"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year- Future Rainfall=3.97", P2=3.97"

Area (sf)	CN	Description
13,795	80	>75% Grass cover, Good, HSG D
13,795		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	25	0.0180	0.14		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"

Subcatchment P2C-P: PDA 2C-P



Summary for Pond B1: UG IB

Inflow Area = 5.549 ac, 92.37% Impervious, Inflow Depth = 3.60" for 2-Year- Future event
Inflow = 20.16 cfs @ 12.09 hrs, Volume= 1.667 af
Outflow = 1.06 cfs @ 14.34 hrs, Volume= 1.667 af, Atten= 95%, Lag= 134.5 min
Primary = 1.06 cfs @ 14.34 hrs, Volume= 1.667 af
Routed to Link P POA-2 : POA-2 PDA

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 2.41' @ 14.34 hrs Surf.Area= 38,229 sf Storage= 41,252 cf

Plug-Flow detention time= 506.2 min calculated for 1.667 af (100% of inflow)
Center-of-Mass det. time= 506.3 min (1,266.7 - 760.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1.05'	48 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	1.20'	102,602 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 114,639 cf Overall x 89.5% Voids
		102,650 cf	Total Available Storage

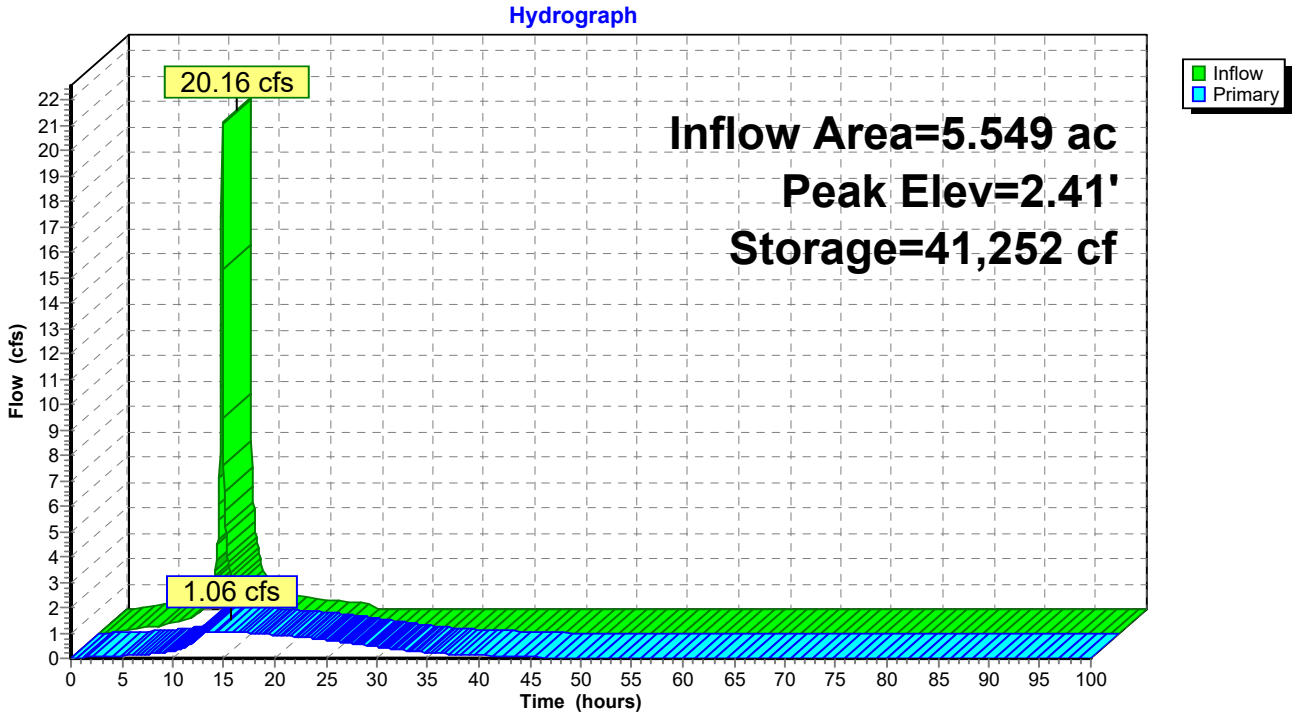
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.05	16	0	0
4.05	16	48	48

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.20	38,213	0	0
4.20	38,213	114,639	114,639

Device	Routing	Invert	Outlet Devices
#1	Primary	1.05'	**24.0" Round Culvert** L= 119.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 1.05' / 0.64' S= 0.0034 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	1.05'	**6.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	3.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.06 cfs @ 14.34 hrs HW=2.41' (Free Discharge)
└**1=Culvert** (Passes 1.06 cfs of 6.83 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 1.06 cfs @ 5.04 fps)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B1: UG IB


Hydrograph
20.16 cfs
1.06 cfs
Inflow Area=5.549 ac
Peak Elev=2.41'
Storage=41,252 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Summary for Pond PP1: PP-A

Inflow Area = 0.476 ac, 60.33% Impervious, Inflow Depth = 3.05" for 2-Year- Future event
Inflow = 1.39 cfs @ 12.06 hrs, Volume= 0.121 af
Outflow = 0.28 cfs @ 12.54 hrs, Volume= 0.121 af, Atten= 80%, Lag= 28.9 min
Primary = 0.28 cfs @ 12.54 hrs, Volume= 0.121 af
Routed to Pond B1 : UG IB

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 4.43' @ 12.54 hrs Surf.Area= 10,028 sf Storage= 1,747 cf

Plug-Flow detention time= 72.8 min calculated for 0.121 af (100% of inflow)
Center-of-Mass det. time= 72.8 min (847.2 - 774.4)

Volume	Invert	Avail.Storage	Storage Description
#1	4.00'	7,129 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 17,821 cf Overall x 40.0% Voids
#2	3.90'	30 cf	**Outlet Structure Storage (Prismatic)** Listed below (Recalc)
		7,159 cf	Total Available Storage

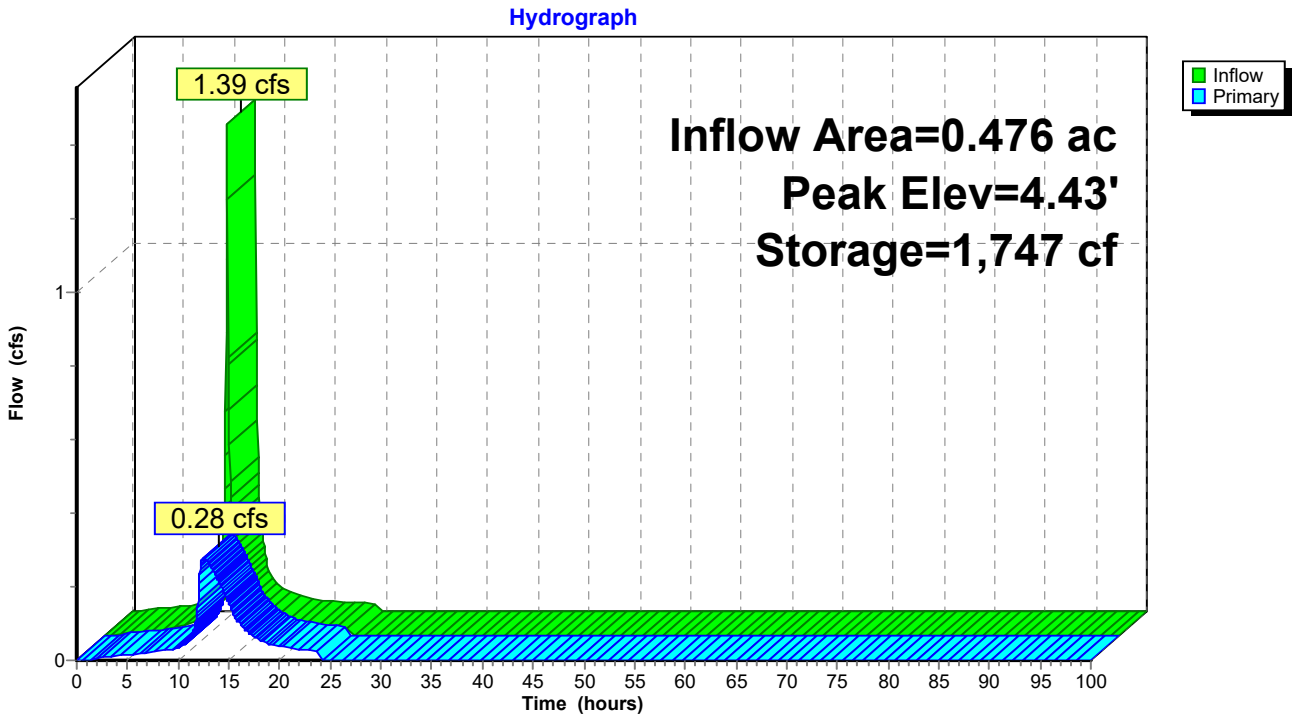
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.00	10,012	0	0
5.00	10,012	10,012	10,012
5.78	10,012	7,809	17,821

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
3.90	16	0	0
5.78	16	30	30

Device	Routing	Invert	Outlet Devices
#1	Primary	3.67'	**24.0" Round Culvert** L= 58.0' Ke= 0.200 Inlet / Outlet Invert= 3.67' / 3.38' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	3.90'	**4.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	5.18'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.28 cfs @ 12.54 hrs HW=4.43' (Free Discharge)
↑└**1=Culvert** (Passes 0.28 cfs of 2.85 cfs potential flow)
↑└**2=Orifice/Grate** (Orifice Controls 0.28 cfs @ 2.89 fps)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PP1: PP-A

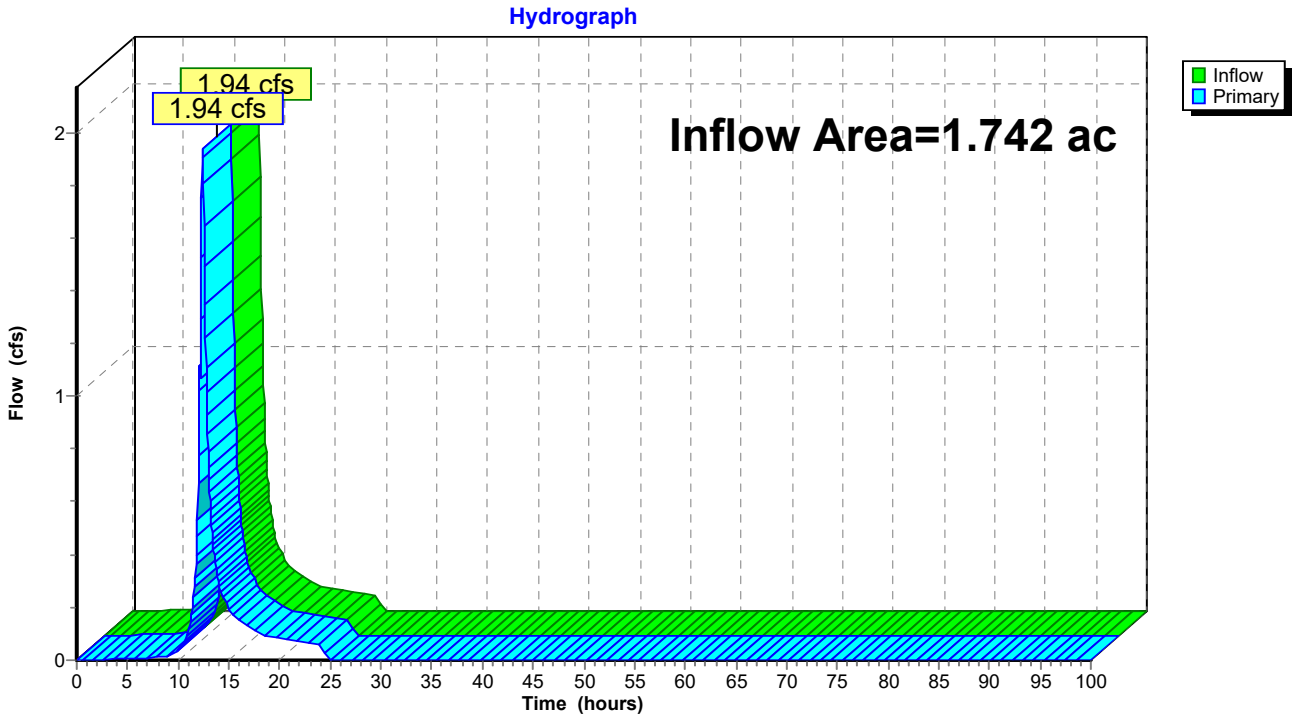

Hydrograph
1.39 cfs
0.28 cfs
Inflow Area=0.476 ac
Peak Elev=4.43'
Storage=1,747 cf
Inflow
Primary
Flow (cfs)
0
1
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
Time (hours)

Summary for Link E POA-1: POA-1 EDA

Inflow Area = 1.742 ac, 6.23% Impervious, Inflow Depth = 1.91" for 2-Year- Future event
Inflow = 1.94 cfs @ 12.41 hrs, Volume= 0.277 af
Primary = 1.94 cfs @ 12.41 hrs, Volume= 0.277 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-1: POA-1 EDA

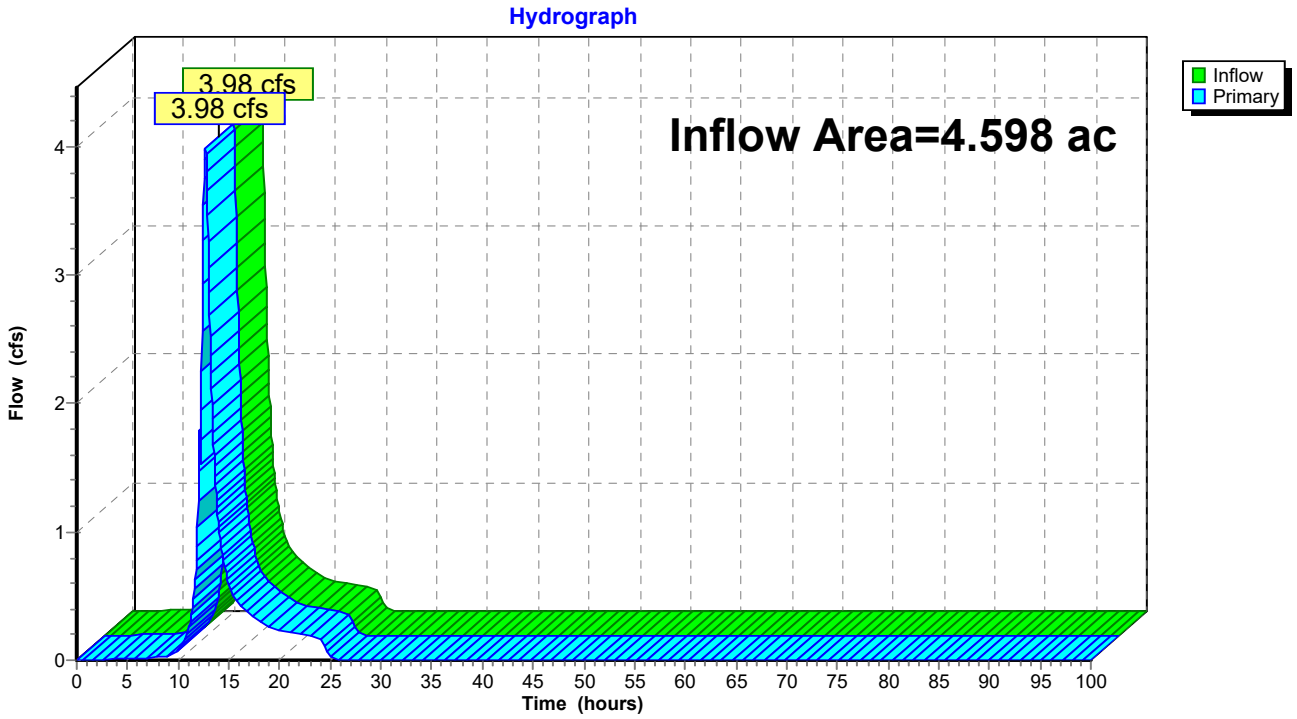


Summary for Link E POA-2: POA-2 EDA

Inflow Area = 4.598 ac, 4.74% Impervious, Inflow Depth = 1.95" for 2-Year- Future event
Inflow = 3.98 cfs @ 12.67 hrs, Volume= 0.748 af
Primary = 3.98 cfs @ 12.67 hrs, Volume= 0.748 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-2: POA-2 EDA

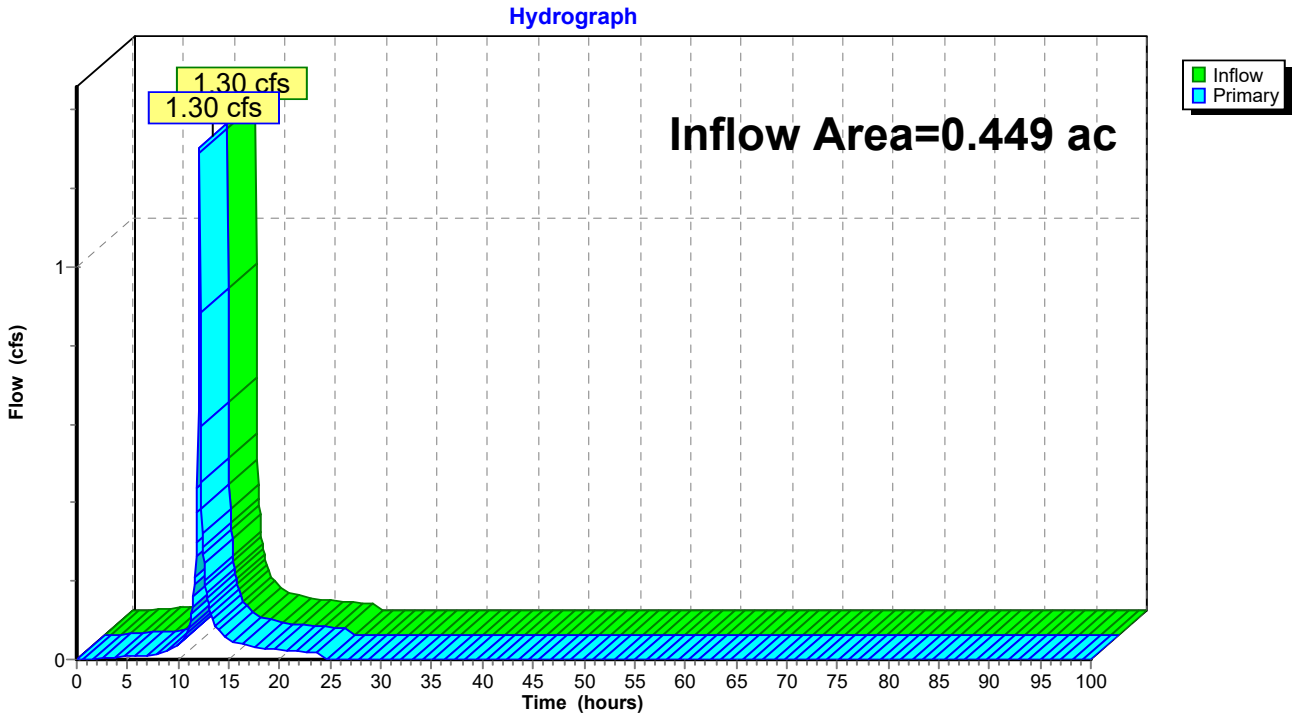


Summary for Link P POA-1: POA-1 PDA

Inflow Area = 0.449 ac, 32.97% Impervious, Inflow Depth = 2.58" for 2-Year- Future event
Inflow = 1.30 cfs @ 12.09 hrs, Volume= 0.097 af
Primary = 1.30 cfs @ 12.09 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-1: POA-1 PDA

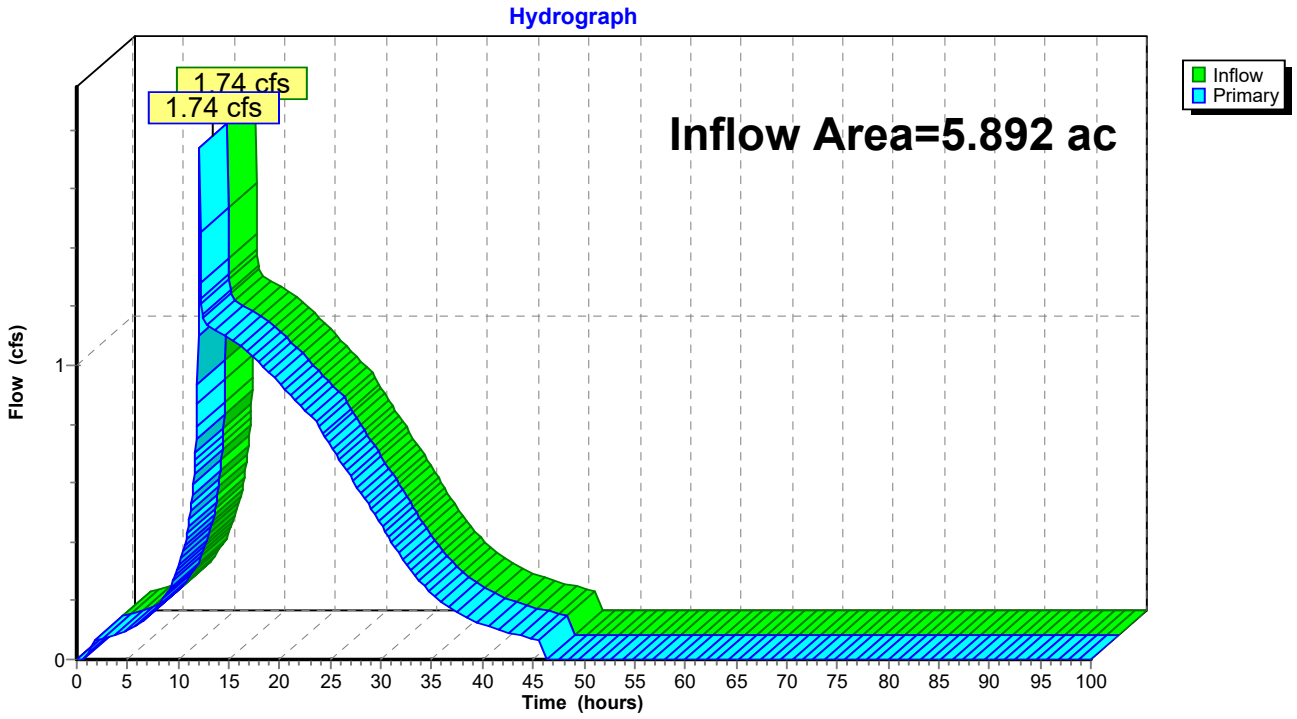


Summary for Link P POA-2: POA-2 PDA

Inflow Area = 5.892 ac, 87.44% Impervious, Inflow Depth = 3.52" for 2-Year- Future event
Inflow = 1.74 cfs @ 12.10 hrs, Volume= 1.728 af
Primary = 1.74 cfs @ 12.10 hrs, Volume= 1.728 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-2: POA-2 PDA



Time span=0.00-100.00 hrs, dt=0.05 hrs, 2001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentE1-I: EDA 1-I Runoff Area=4,731 sf 100.00% Impervious Runoff Depth=5.92"
Flow Length=135' Tc=1.2 min CN=98 Runoff=0.70 cfs 0.054 af

SubcatchmentE1-P: EDA 1-P Runoff Area=71,171 sf 0.00% Impervious Runoff Depth=3.62"
Flow Length=181' Slope=0.0100 '/' Tc=28.1 min CN=77 Runoff=3.80 cfs 0.493 af

SubcatchmentE2-I: EDA 2-I Runoff Area=9,500 sf 100.00% Impervious Runoff Depth=5.92"
Flow Length=29' Slope=0.0300 '/' Tc=0.3 min CN=98 Runoff=1.41 cfs 0.108 af

SubcatchmentE2-P: EDA 2-P Runoff Area=190,784 sf 0.00% Impervious Runoff Depth=3.72"
Flow Length=431' Slope=0.0050 '/' Tc=48.4 min CN=78 Runoff=7.82 cfs 1.358 af

SubcatchmentP1A-I: PDA 1A-I Runoff Area=791 sf 100.00% Impervious Runoff Depth=5.92"
Flow Length=48' Tc=2.7 min CN=98 Runoff=0.12 cfs 0.009 af

SubcatchmentP1A-P: PDA 1A-P Runoff Area=11,157 sf 0.00% Impervious Runoff Depth=3.93"
Flow Length=58' Tc=4.8 min CN=80 Runoff=1.17 cfs 0.084 af

SubcatchmentP1B-I: PDA 1B-I Runoff Area=5,651 sf 100.00% Impervious Runoff Depth=5.92"
Flow Length=193' Tc=2.0 min CN=98 Runoff=0.85 cfs 0.064 af

SubcatchmentP1B-P: PDA 1B-P Runoff Area=1,940 sf 0.00% Impervious Runoff Depth=3.93"
Flow Length=11' Slope=0.2000 '/' Tc=0.6 min CN=80 Runoff=0.22 cfs 0.015 af

SubcatchmentP2A-I: PDA 2A-I Runoff Area=12,515 sf 100.00% Impervious Runoff Depth=5.92"
Flow Length=49' Tc=0.5 min CN=98 Runoff=1.86 cfs 0.142 af

SubcatchmentP2A-P: PDA 2A-P Runoff Area=8,228 sf 0.00% Impervious Runoff Depth=3.93"
Flow Length=173' Tc=11.1 min CN=80 Runoff=0.70 cfs 0.062 af

SubcatchmentP2B-I: PDA 2B-I Runoff Area=210,769 sf 100.00% Impervious Runoff Depth=5.92"
Flow Length=524' Tc=3.5 min CN=98 Runoff=30.26 cfs 2.388 af

SubcatchmentP2B-P: PDA 2B-P Runoff Area=10,222 sf 0.00% Impervious Runoff Depth=3.93"
Flow Length=305' Tc=5.3 min CN=80 Runoff=1.05 cfs 0.077 af

SubcatchmentP2C-I: PDA 2C-I Runoff Area=1,118 sf 100.00% Impervious Runoff Depth=5.92"
Flow Length=20' Tc=0.7 min CN=98 Runoff=0.17 cfs 0.013 af

SubcatchmentP2C-P: PDA 2C-P Runoff Area=13,795 sf 0.00% Impervious Runoff Depth=3.93"
Flow Length=25' Slope=0.0180 '/' Tc=3.0 min CN=80 Runoff=1.57 cfs 0.104 af

Pond B1: UG IB Peak Elev=3.21' Storage=68,917 cf Inflow=31.59 cfs 2.668 af
Outflow=1.39 cfs 2.668 af

Pond PP1: PP-A Peak Elev=4.79' Storage=3,175 cf Inflow=2.26 cfs 0.204 af
Outflow=0.39 cfs 0.204 af

Link E POA-1: POA-1 EDA Inflow=3.92 cfs 0.546 af
Primary=3.92 cfs 0.546 af

Link E POA-2: POA-2 EDA Inflow=7.98 cfs 1.466 af
Primary=7.98 cfs 1.466 af

Link P POA-1: POA-1 PDA Inflow=2.28 cfs 0.171 af
Primary=2.28 cfs 0.171 af

Link P POA-2: POA-2 PDA Inflow=2.80 cfs 2.784 af
Primary=2.80 cfs 2.784 af

Total Runoff Area = 12.681 ac Runoff Volume = 4.968 af Average Runoff Depth = 4.70"
55.63% Pervious = 7.055 ac 44.37% Impervious = 5.626 ac

Summary for Subcatchment E1-I: EDA 1-I

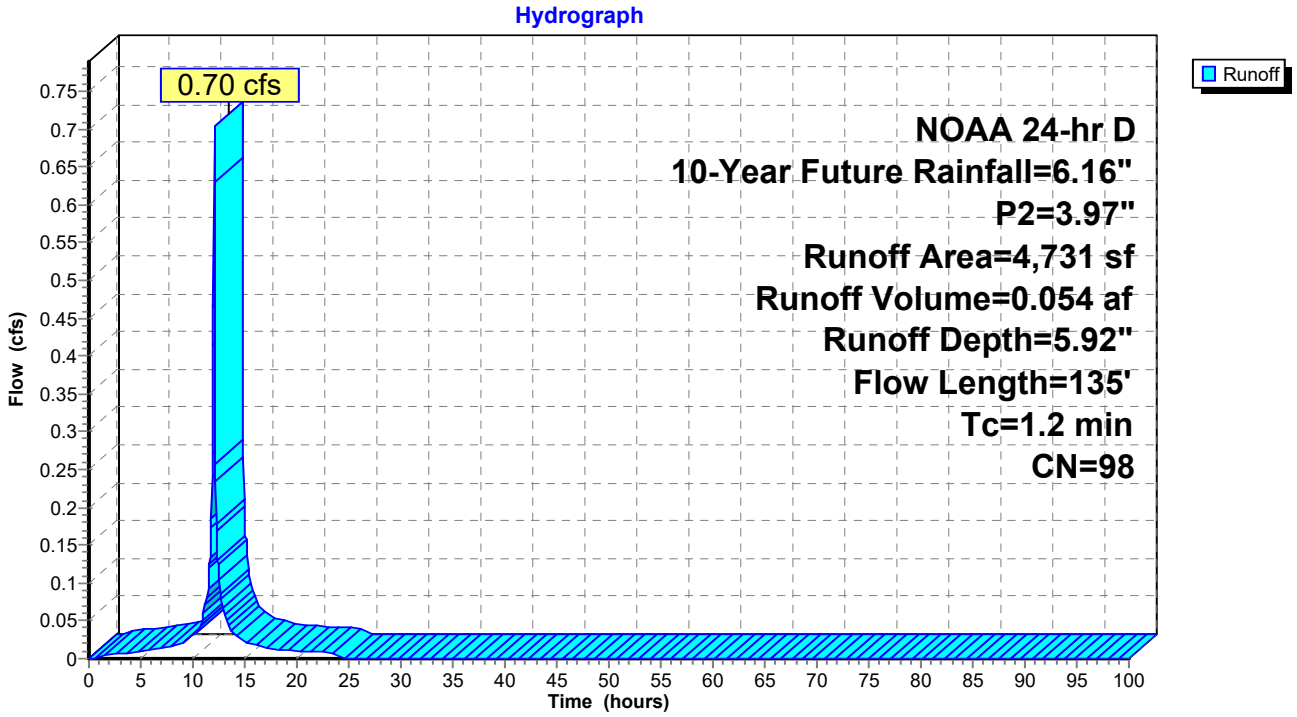
Runoff = 0.70 cfs @ 12.06 hrs, Volume= 0.054 af, Depth= 5.92"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

	Area (sf)	CN	Description
*	4,701	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	4,731	98	Weighted Average
	4,731		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	25	0.0340	1.44		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
0.9	110	0.0100	2.03		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
1.2	135	Total			

Subcatchment E1-I: EDA 1-I



Summary for Subcatchment E1-P: EDA 1-P

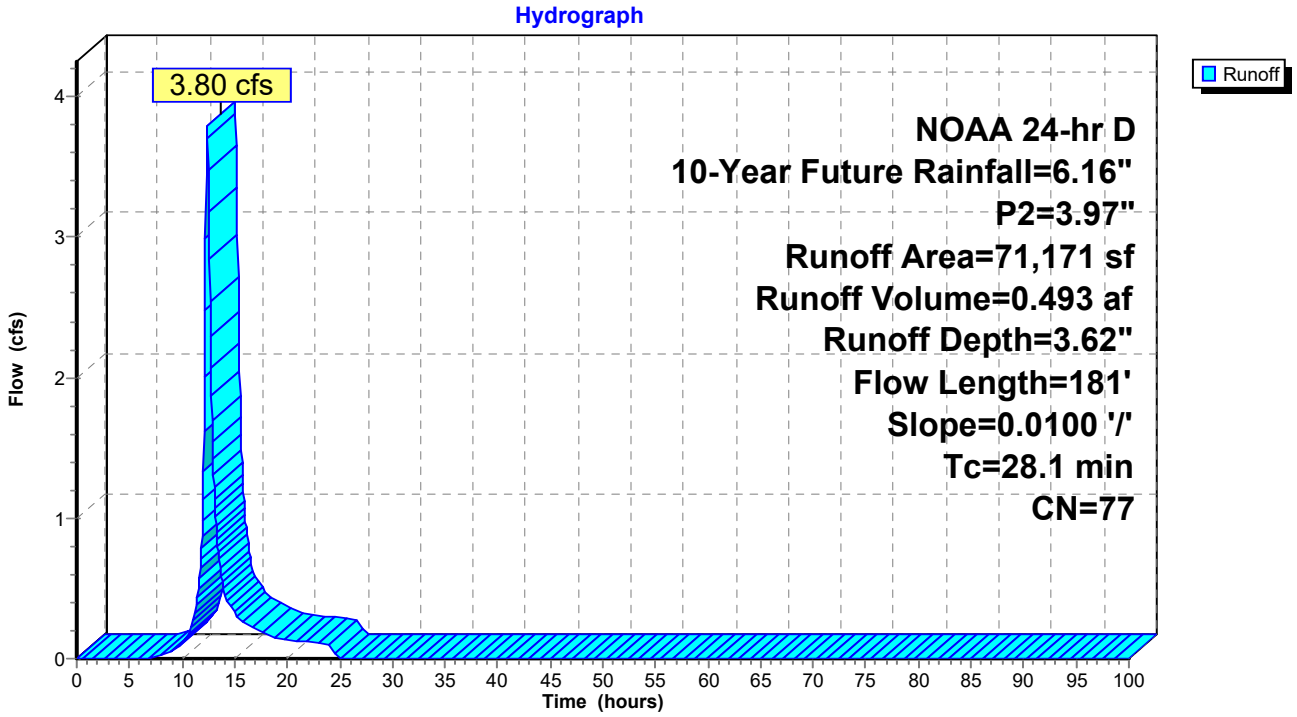
Runoff = 3.80 cfs @ 12.40 hrs, Volume= 0.493 af, Depth= 3.62"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

Area (sf)	CN	Description
8,810	80	>75% Grass cover, Good, HSG D
62,361	77	Woods, Good, HSG D
71,171	77	Weighted Average
71,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.4	100	0.0100	0.07		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.97"
2.7	81	0.0100	0.50		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
28.1	181	Total			

Subcatchment E1-P: EDA 1-P



Summary for Subcatchment E2-I: EDA 2-I

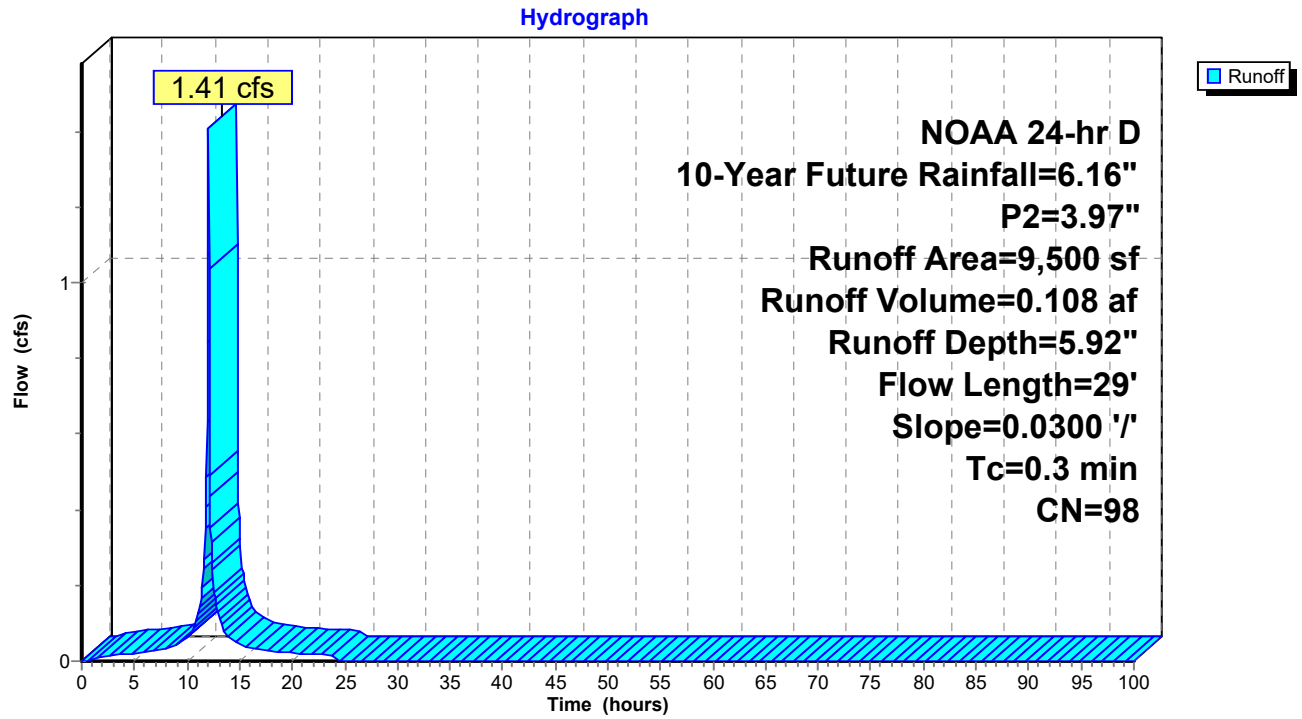
Runoff = 1.41 cfs @ 12.05 hrs, Volume= 0.108 af, Depth= 5.92"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

	Area (sf)	CN	Description
*	9,500	98	MVS Paved parking, HSG D
	9,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	29	0.0300	1.41		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"

Subcatchment E2-I: EDA 2-I



Summary for Subcatchment E2-P: EDA 2-P

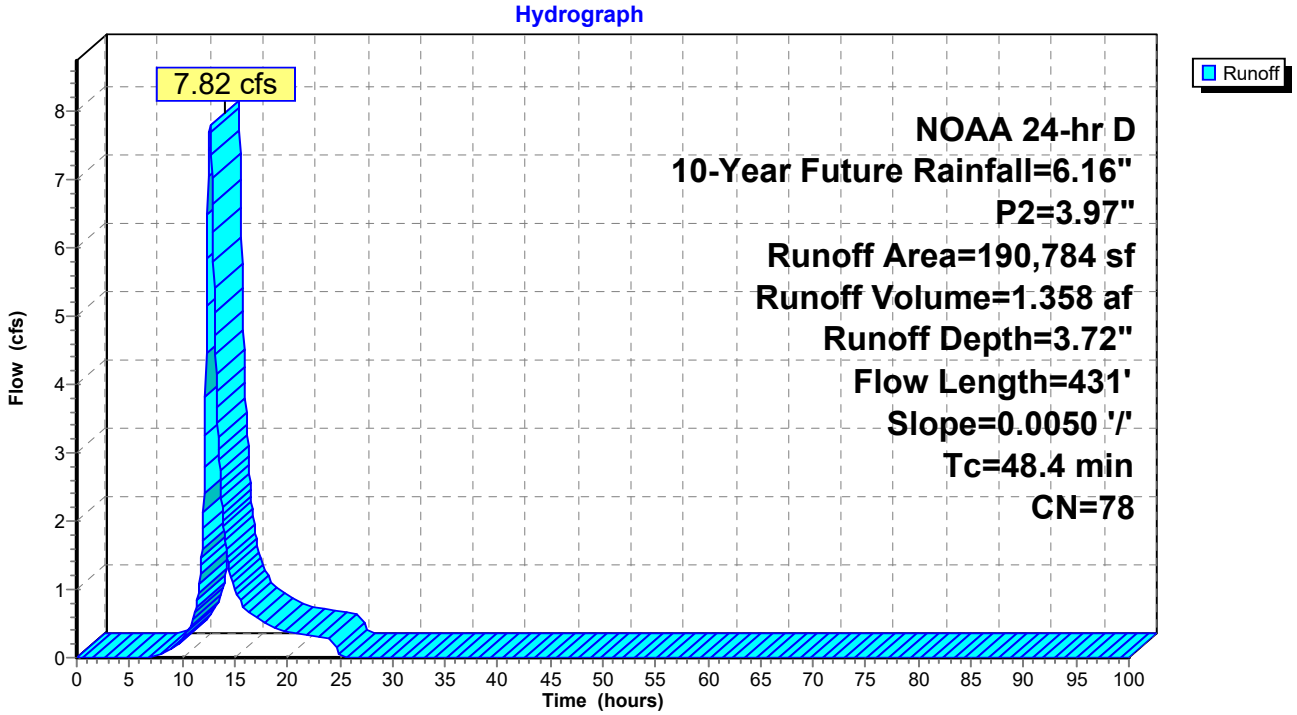
Runoff = 7.82 cfs @ 12.66 hrs, Volume= 1.358 af, Depth= 3.72"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

Area (sf)	CN	Description
77,501	80	>75% Grass cover, Good, HSG D
113,283	77	Woods, Good, HSG D
190,784	78	Weighted Average
190,784		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.6	100	0.0050	0.05		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.97"
12.9	274	0.0050	0.35		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
1.9	57	0.0050	0.49		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
48.4	431	Total			

Subcatchment E2-P: EDA 2-P



Summary for Subcatchment P1A-I: PDA 1A-I

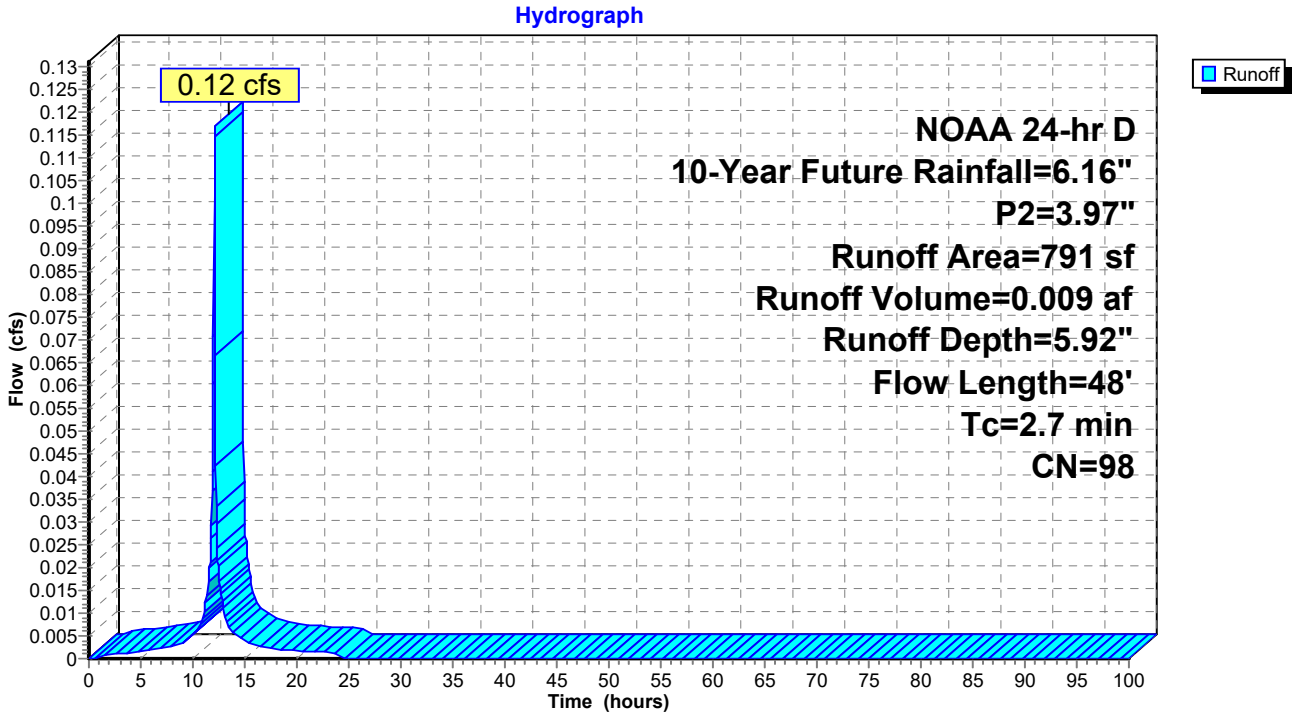
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 5.92"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

Area (sf)	CN	Description
791	98	Paved parking, HSG D
791		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	12	0.0175	0.95		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
1.2	14	0.0550	0.19		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.97"
1.3	22	0.1140	0.28		**Sheet Flow, CD** Grass: Short n= 0.150 P2= 3.97"
2.7	48	Total			

Subcatchment P1A-I: PDA 1A-I



Summary for Subcatchment P1A-P: PDA 1A-P

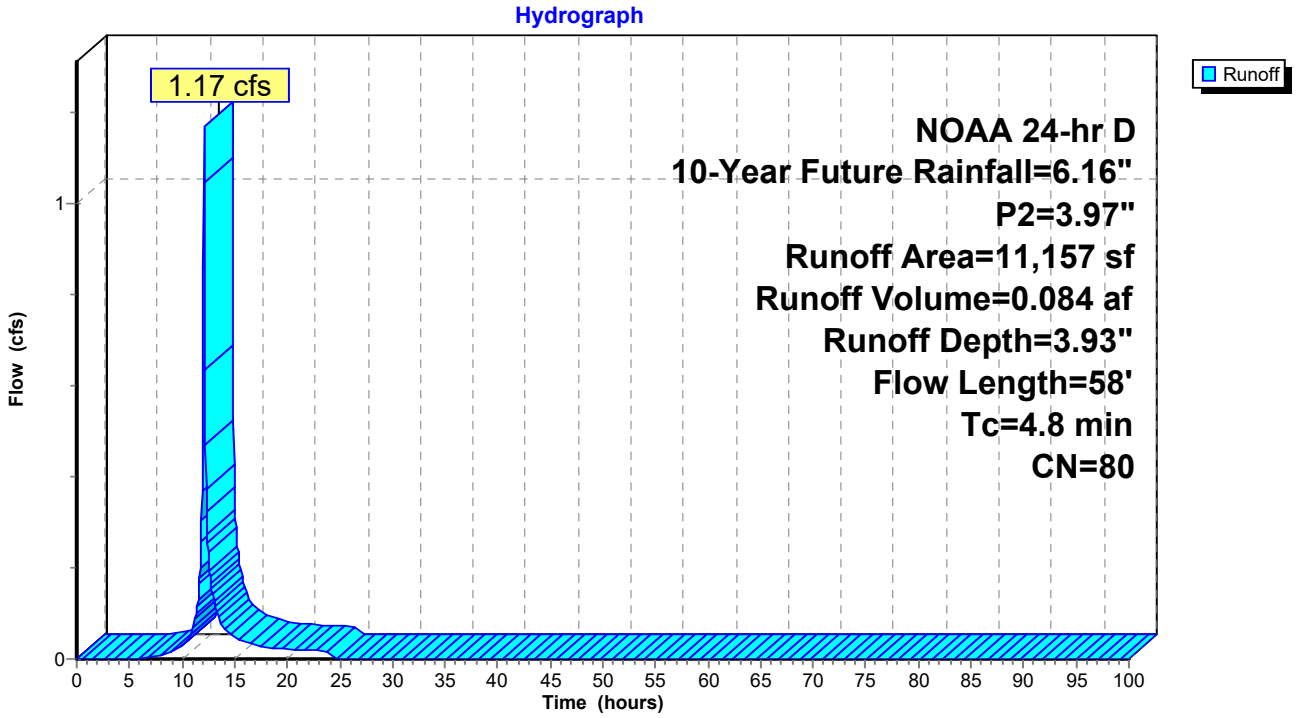
Runoff = 1.17 cfs @ 12.11 hrs, Volume= 0.084 af, Depth= 3.93"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

Area (sf)	CN	Description
11,157	80	>75% Grass cover, Good, HSG D
11,157		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	33	0.0300	0.18		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"
1.7	25	0.0800	0.25		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.97"
4.8	58	Total			

Subcatchment P1A-P: PDA 1A-P



Summary for Subcatchment P1B-I: PDA 1B-I

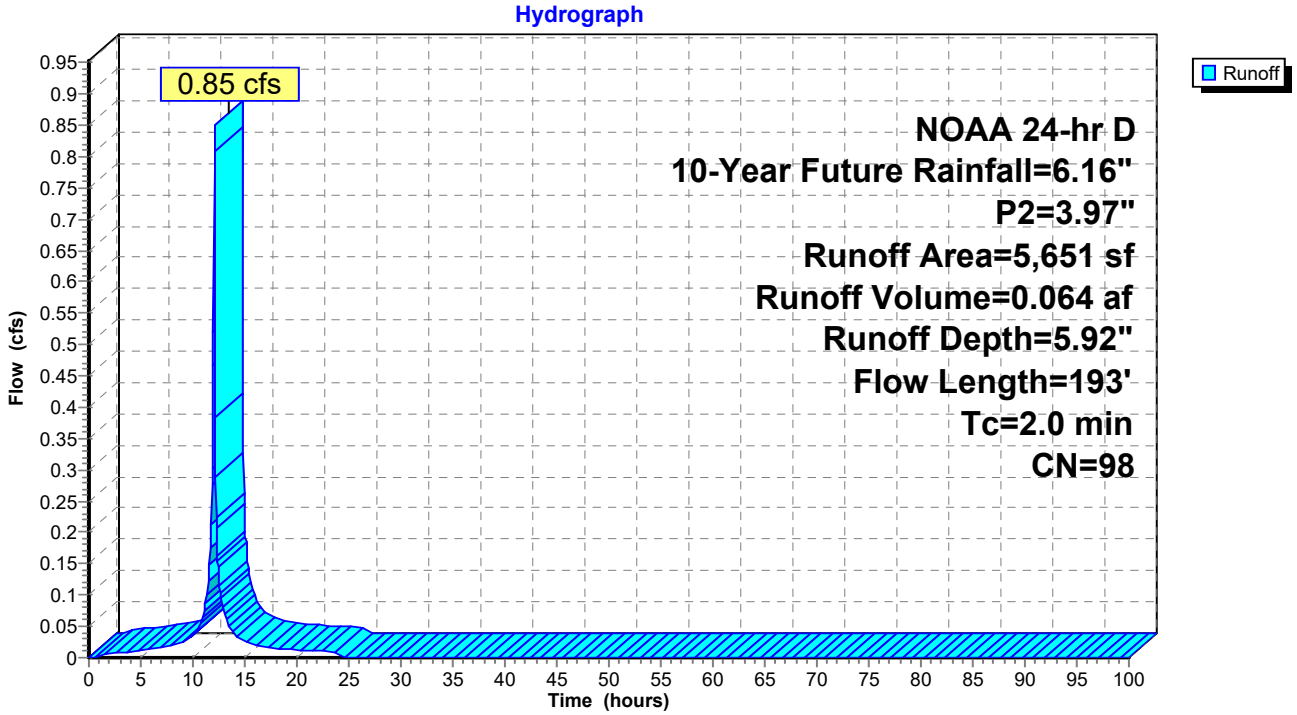
Runoff = 0.85 cfs @ 12.08 hrs, Volume= 0.064 af, Depth= 5.92"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

	Area (sf)	CN	Description
*	5,621	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	5,651	98	Weighted Average
	5,651		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	84	0.0209	1.51		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
0.3	16	0.0130	0.89		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.97"
0.8	93	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
2.0	193	Total			

Subcatchment P1B-I: PDA 1B-I



Summary for Subcatchment P1B-P: PDA 1B-P

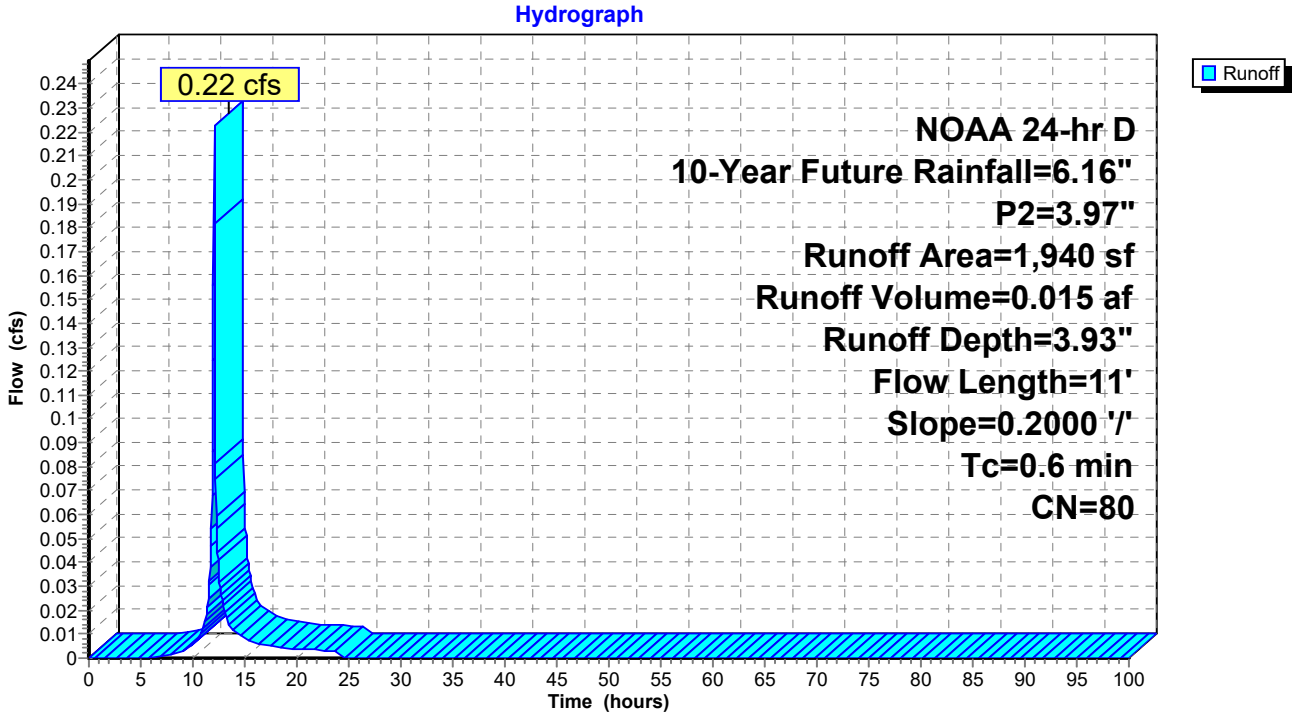
Runoff = 0.22 cfs @ 12.06 hrs, Volume= 0.015 af, Depth= 3.93"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

Area (sf)	CN	Description
1,940	80	>75% Grass cover, Good, HSG D
1,940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	11	0.2000	0.31		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"

Subcatchment P1B-P: PDA 1B-P



Summary for Subcatchment P2A-I: PDA 2A-I

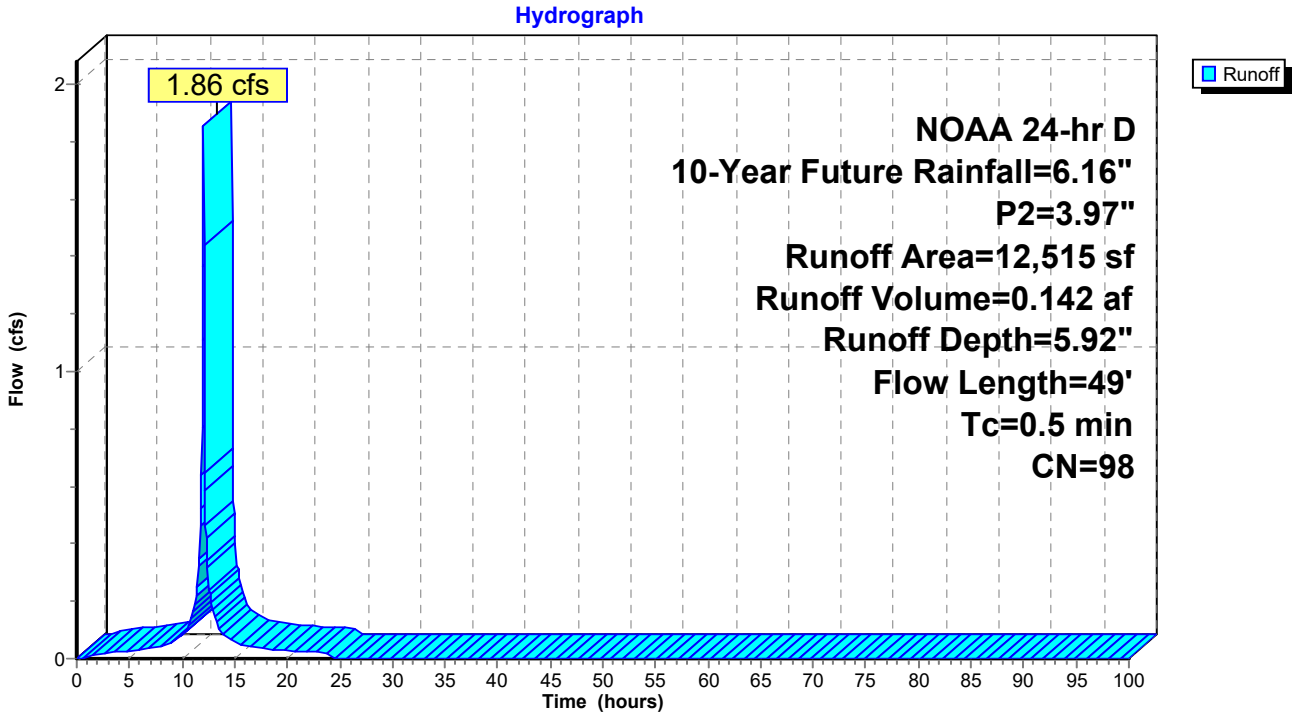
Runoff = 1.86 cfs @ 12.05 hrs, Volume= 0.142 af, Depth= 5.92"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

	Area (sf)	CN	Description
*	11,539	98	MVS Paved parking, HSG D
	976	98	Paved parking, HSG D
	12,515	98	Weighted Average
	12,515		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	30	0.0330	1.47		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
0.2	19	0.0105	2.08		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.5	49	Total			

Subcatchment P2A-I: PDA 2A-I



Summary for Subcatchment P2A-P: PDA 2A-P

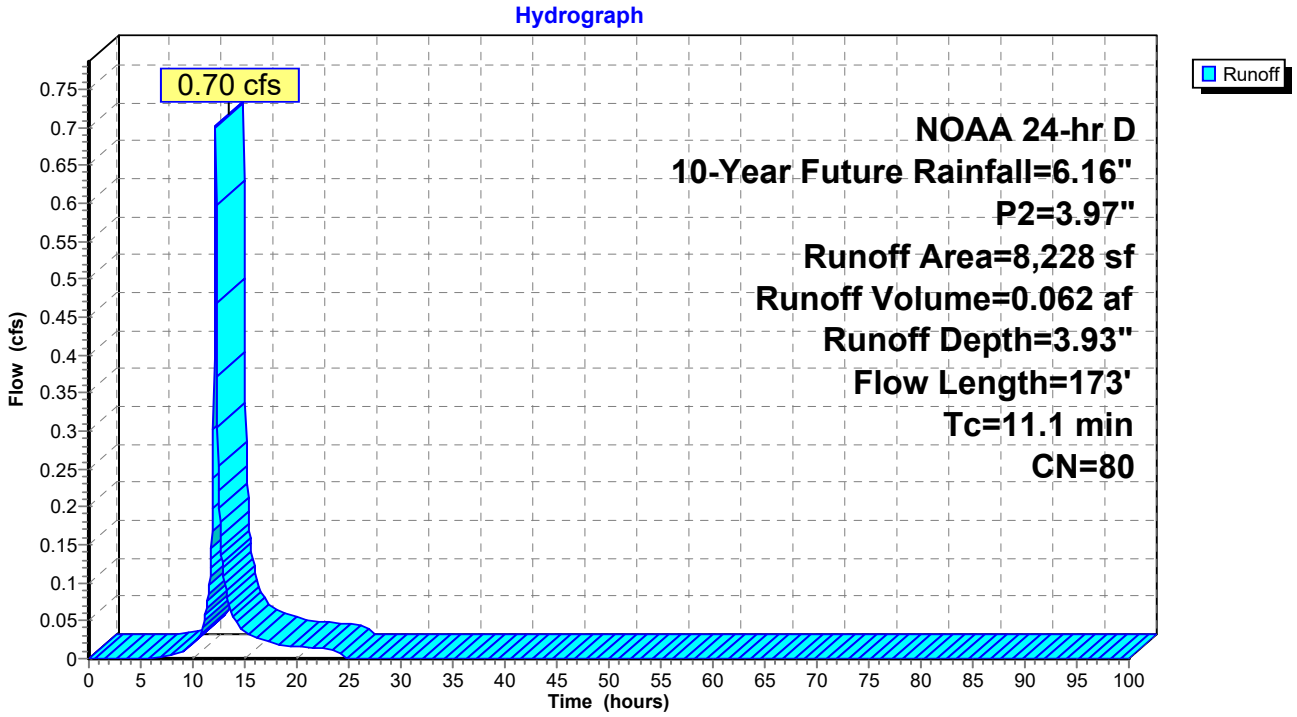
Runoff = 0.70 cfs @ 12.19 hrs, Volume= 0.062 af, Depth= 3.93"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

Area (sf)	CN	Description
8,228	80	>75% Grass cover, Good, HSG D
8,228		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	60	0.0080	0.12		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"
2.6	96	0.0080	0.63		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
11.1	173	Total			

Subcatchment P2A-P: PDA 2A-P



Summary for Subcatchment P2B-I: PDA 2B-I

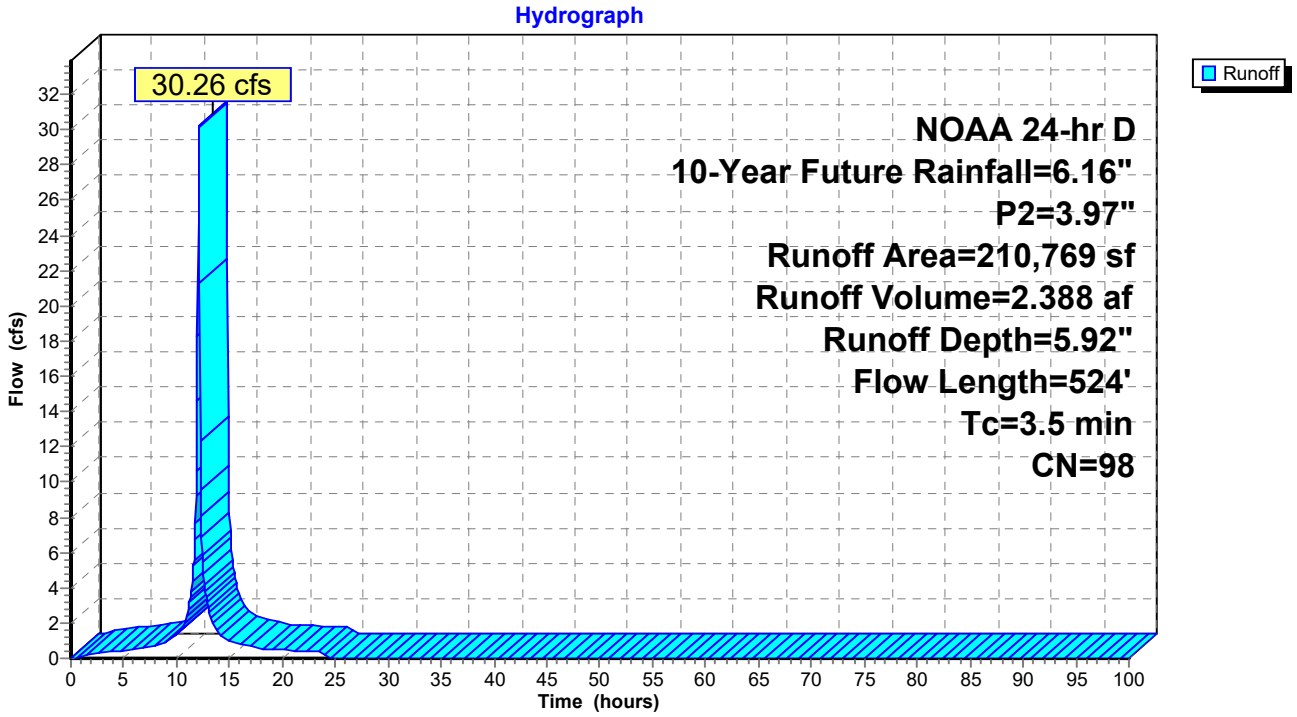
Runoff = 30.26 cfs @ 12.09 hrs, Volume= 2.388 af, Depth= 5.92"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

	Area (sf)	CN	Description
*	170,269	98	MVS Paved parking, HSG D
	40,500	98	Roofs, HSG D
	210,769	98	Weighted Average
	210,769		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0136	1.31		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
1.1	155	0.0136	2.37		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.2	51	0.0050	3.79	3.79	**Pipe Channel, CD** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.6	139	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	79	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
3.5	524	Total			

Subcatchment P2B-I: PDA 2B-I



Summary for Subcatchment P2B-P: PDA 2B-P

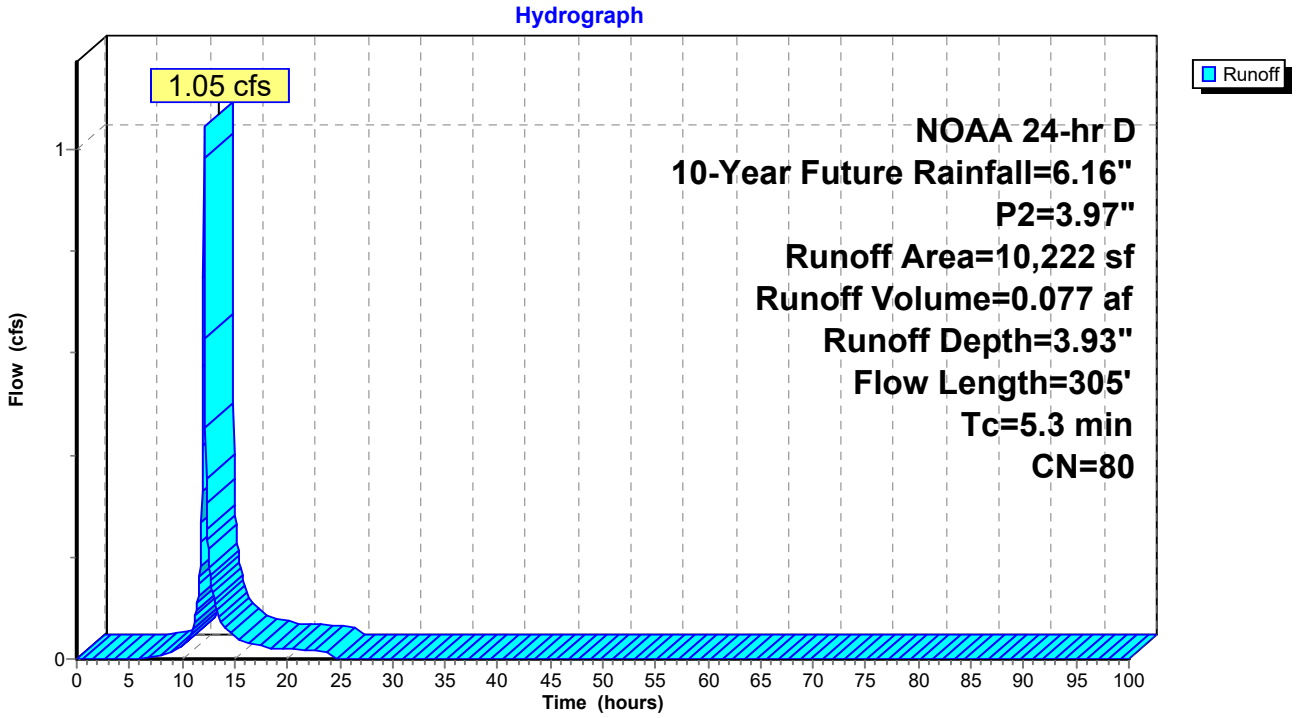
Runoff = 1.05 cfs @ 12.12 hrs, Volume= 0.077 af, Depth= 3.93"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

Area (sf)	CN	Description
10,222	80	>75% Grass cover, Good, HSG D
10,222		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	45	0.0250	0.18		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"
0.2	56	0.0050	3.79	3.79	**Pipe Channel, BC** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.4	98	0.0030	3.85	6.80	**Pipe Channel, CD** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.5	106	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
5.3	305	Total			

Subcatchment P2B-P: PDA 2B-P



Summary for Subcatchment P2C-I: PDA 2C-I

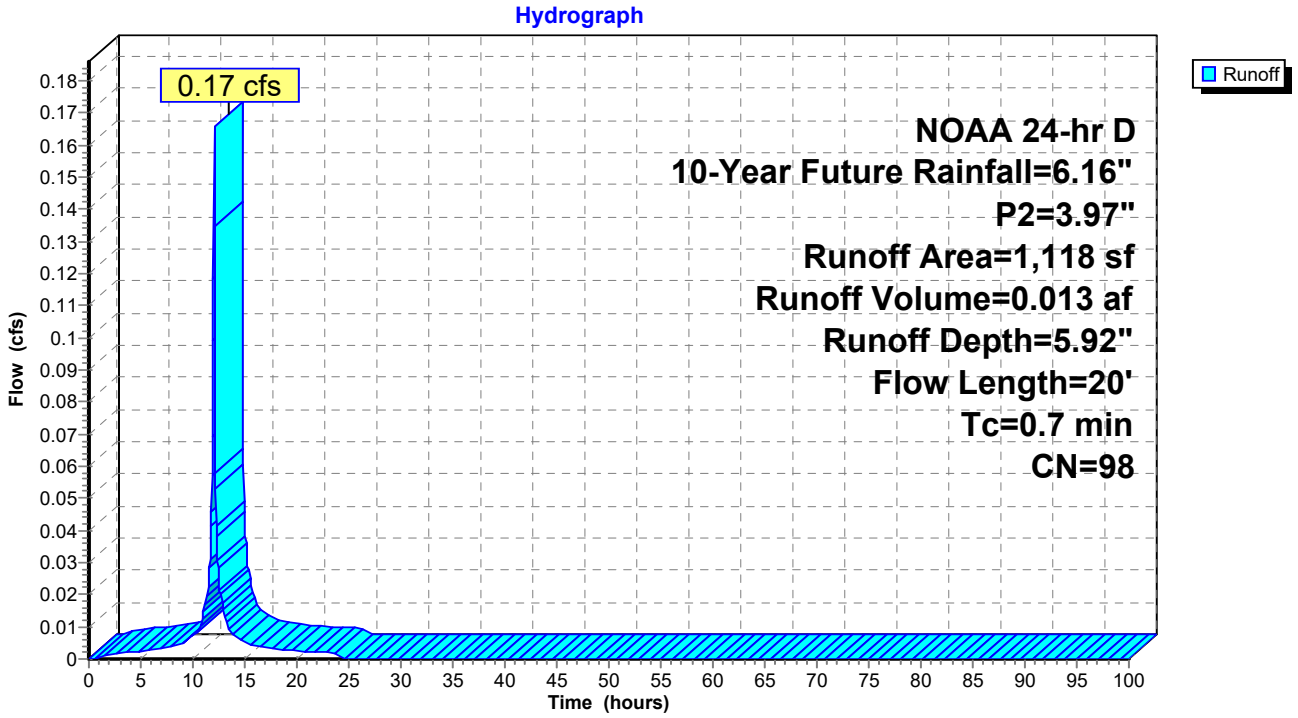
Runoff = 0.17 cfs @ 12.06 hrs, Volume= 0.013 af, Depth= 5.92"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

Area (sf)	CN	Description
1,118	98	Paved parking, HSG D
1,118		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	10	0.0150	0.86		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
0.5	10	0.3000	0.35		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.97"
0.7	20	Total			

Subcatchment P2C-I: PDA 2C-I



Summary for Subcatchment P2C-P: PDA 2C-P

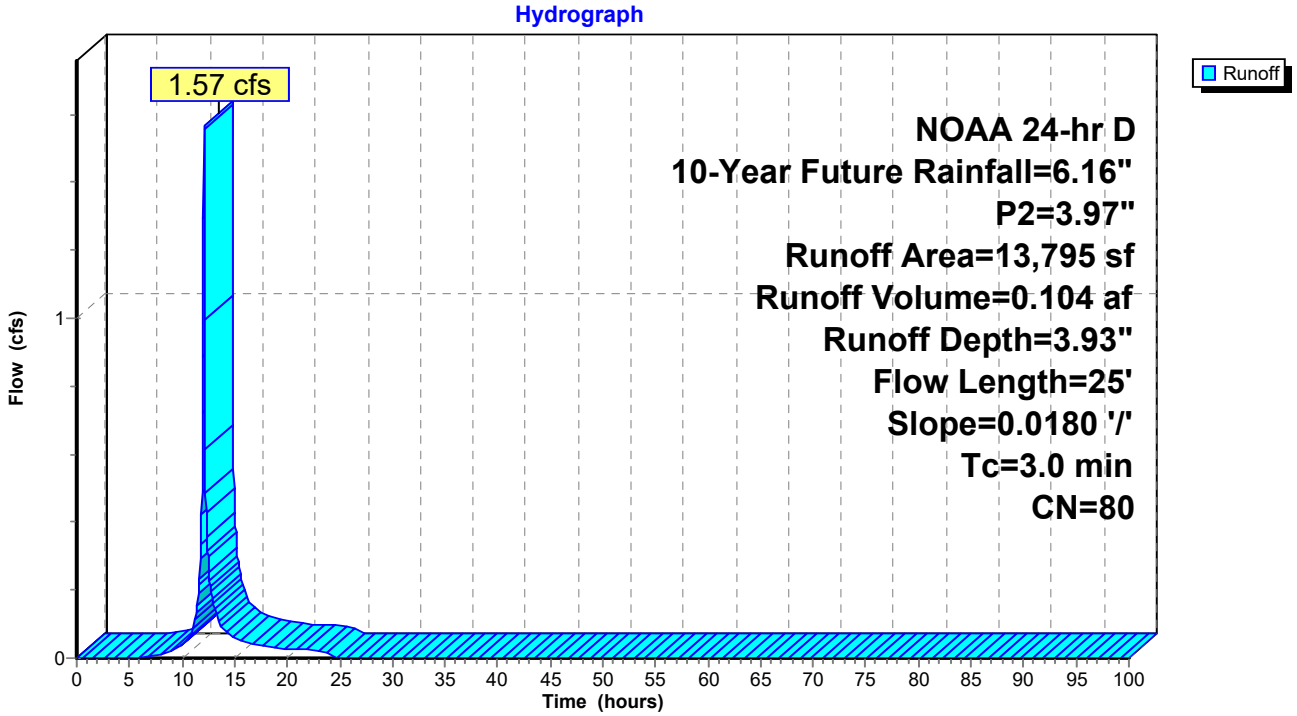
Runoff = 1.57 cfs @ 12.09 hrs, Volume= 0.104 af, Depth= 3.93"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Future Rainfall=6.16", P2=3.97"

Area (sf)	CN	Description
13,795	80	>75% Grass cover, Good, HSG D
13,795		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	25	0.0180	0.14		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"

Subcatchment P2C-P: PDA 2C-P



Summary for Pond B1: UG IB

Inflow Area = 5.549 ac, 92.37% Impervious, Inflow Depth = 5.77" for 10-Year Future event
Inflow = 31.59 cfs @ 12.09 hrs, Volume= 2.668 af
Outflow = 1.39 cfs @ 14.83 hrs, Volume= 2.668 af, Atten= 96%, Lag= 163.9 min
Primary = 1.39 cfs @ 14.83 hrs, Volume= 2.668 af
Routed to Link P POA-2 : POA-2 PDA

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 3.21' @ 14.83 hrs Surf.Area= 38,229 sf Storage= 68,917 cf

Plug-Flow detention time= 626.1 min calculated for 2.667 af (100% of inflow)
Center-of-Mass det. time= 626.7 min (1,381.3 - 754.6)

Volume	Invert	Avail.Storage	Storage Description
#1	1.05'	48 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	1.20'	102,602 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 114,639 cf Overall x 89.5% Voids
		102,650 cf	Total Available Storage

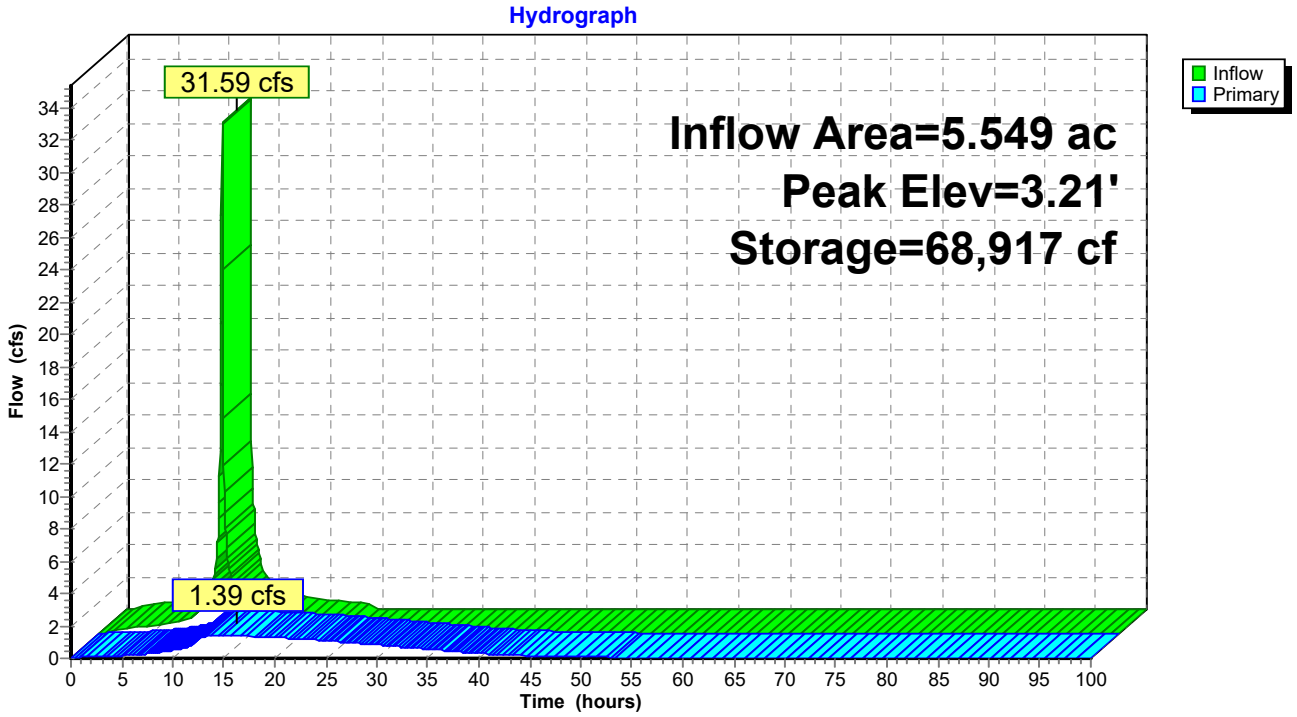
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.05	16	0	0
4.05	16	48	48

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.20	38,213	0	0
4.20	38,213	114,639	114,639

Device	Routing	Invert	Outlet Devices
#1	Primary	1.05'	**24.0" Round Culvert** L= 119.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 1.05' / 0.64' S= 0.0034 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	1.05'	**6.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	3.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.39 cfs @ 14.83 hrs HW=3.21' (Free Discharge)
└**1=Culvert** (Passes 1.39 cfs of 13.97 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 1.39 cfs @ 6.65 fps)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B1: UG IB


Hydrograph
31.59 cfs
1.39 cfs
Inflow Area=5.549 ac
Peak Elev=3.21'
Storage=68,917 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100

Summary for Pond PP1: PP-A

Inflow Area = 0.476 ac, 60.33% Impervious, Inflow Depth = 5.13" for 10-Year Future event
Inflow = 2.26 cfs @ 12.06 hrs, Volume= 0.204 af
Outflow = 0.39 cfs @ 12.64 hrs, Volume= 0.204 af, Atten= 83%, Lag= 34.8 min
Primary = 0.39 cfs @ 12.64 hrs, Volume= 0.204 af
Routed to Pond B1 : UG IB

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 4.79' @ 12.64 hrs Surf.Area= 10,028 sf Storage= 3,175 cf

Plug-Flow detention time= 93.6 min calculated for 0.203 af (100% of inflow)
Center-of-Mass det. time= 93.6 min (860.1 - 766.5)

Volume	Invert	Avail.Storage	Storage Description
#1	4.00'	7,129 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 17,821 cf Overall x 40.0% Voids
#2	3.90'	30 cf	**Outlet Structure Storage (Prismatic)** Listed below (Recalc)
		7,159 cf	Total Available Storage

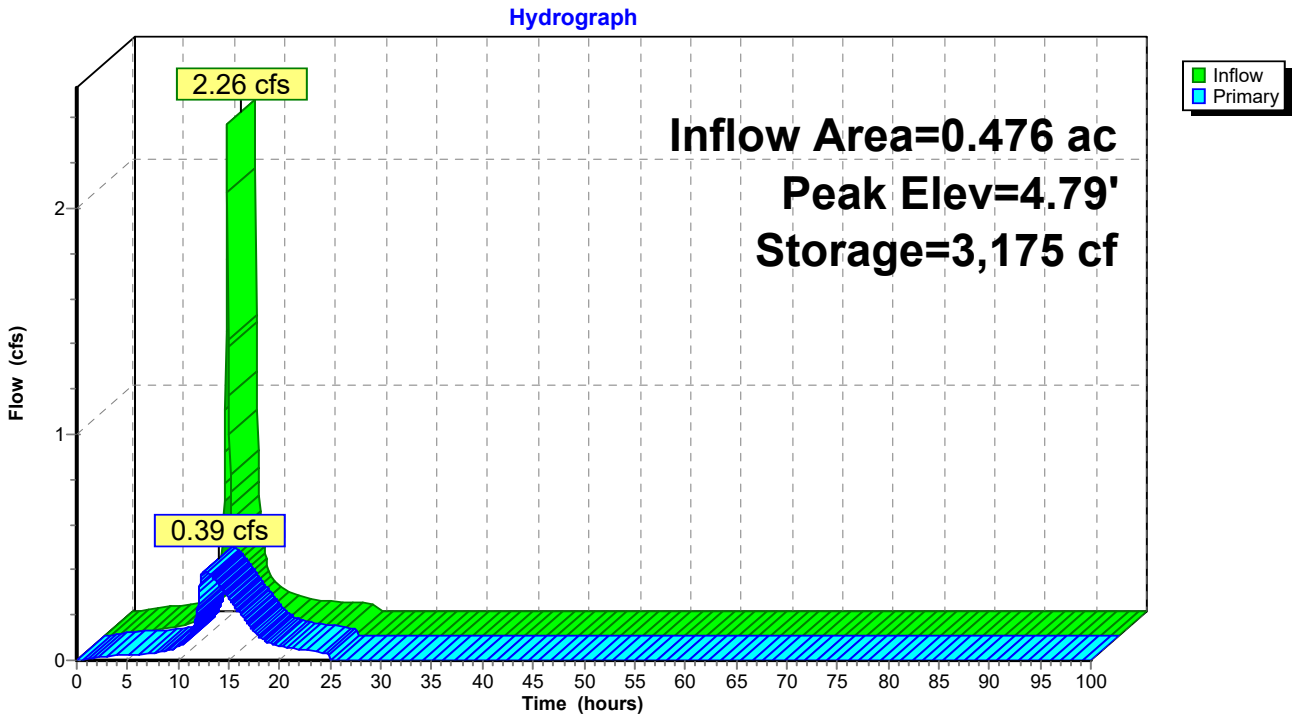
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.00	10,012	0	0
5.00	10,012	10,012	10,012
5.78	10,012	7,809	17,821

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
3.90	16	0	0
5.78	16	30	30

Device	Routing	Invert	Outlet Devices
#1	Primary	3.67'	**24.0" Round Culvert** L= 58.0' Ke= 0.200 Inlet / Outlet Invert= 3.67' / 3.38' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	3.90'	**4.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	5.18'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.39 cfs @ 12.64 hrs HW=4.79' (Free Discharge)
└**1=Culvert** (Passes 0.39 cfs of 5.64 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 0.39 cfs @ 4.07 fps)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PP1: PP-A

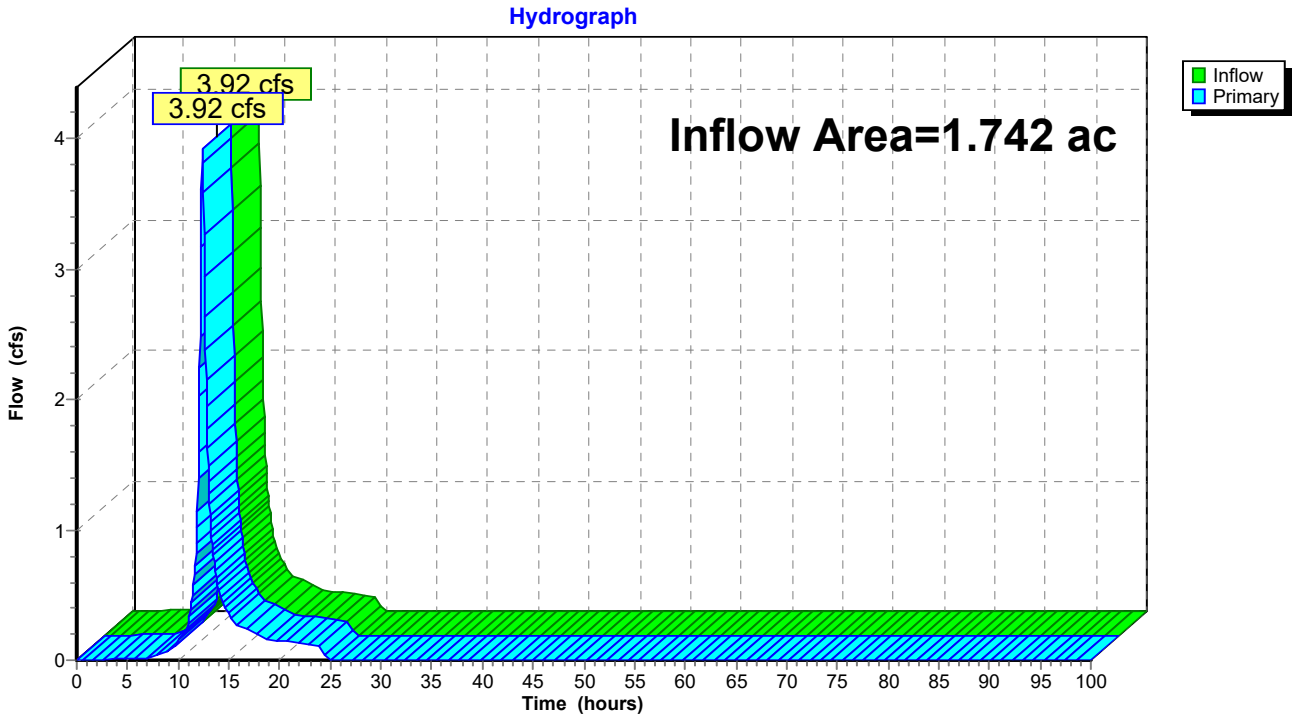

Hydrograph
2.26 cfs
0.39 cfs
Inflow Area=0.476 ac
Peak Elev=4.79'
Storage=3,175 cf
Inflow
Primary
Flow (cfs)
0
1
2
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
Time (hours)

Summary for Link E POA-1: POA-1 EDA

Inflow Area = 1.742 ac, 6.23% Impervious, Inflow Depth = 3.76" for 10-Year Future event
Inflow = 3.92 cfs @ 12.40 hrs, Volume= 0.546 af
Primary = 3.92 cfs @ 12.40 hrs, Volume= 0.546 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-1: POA-1 EDA

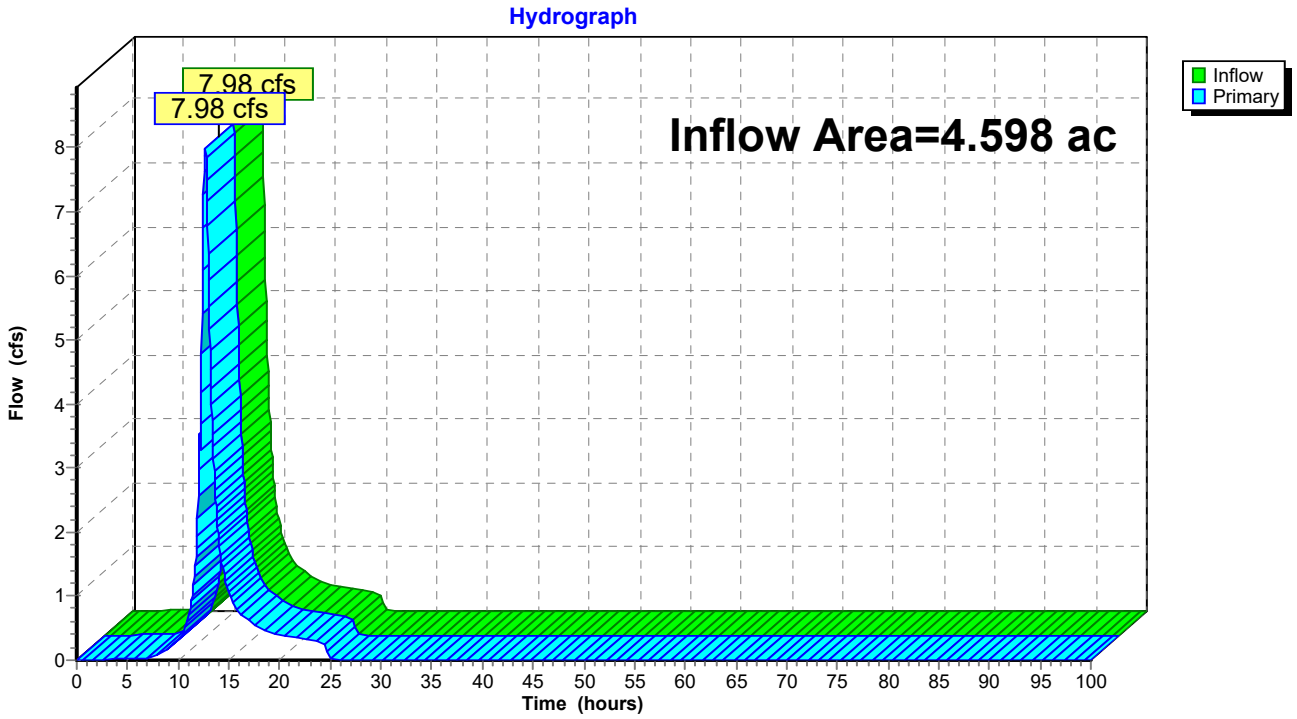


Summary for Link E POA-2: POA-2 EDA

Inflow Area = 4.598 ac, 4.74% Impervious, Inflow Depth = 3.83" for 10-Year Future event
Inflow = 7.98 cfs @ 12.66 hrs, Volume= 1.466 af
Primary = 7.98 cfs @ 12.66 hrs, Volume= 1.466 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-2: POA-2 EDA

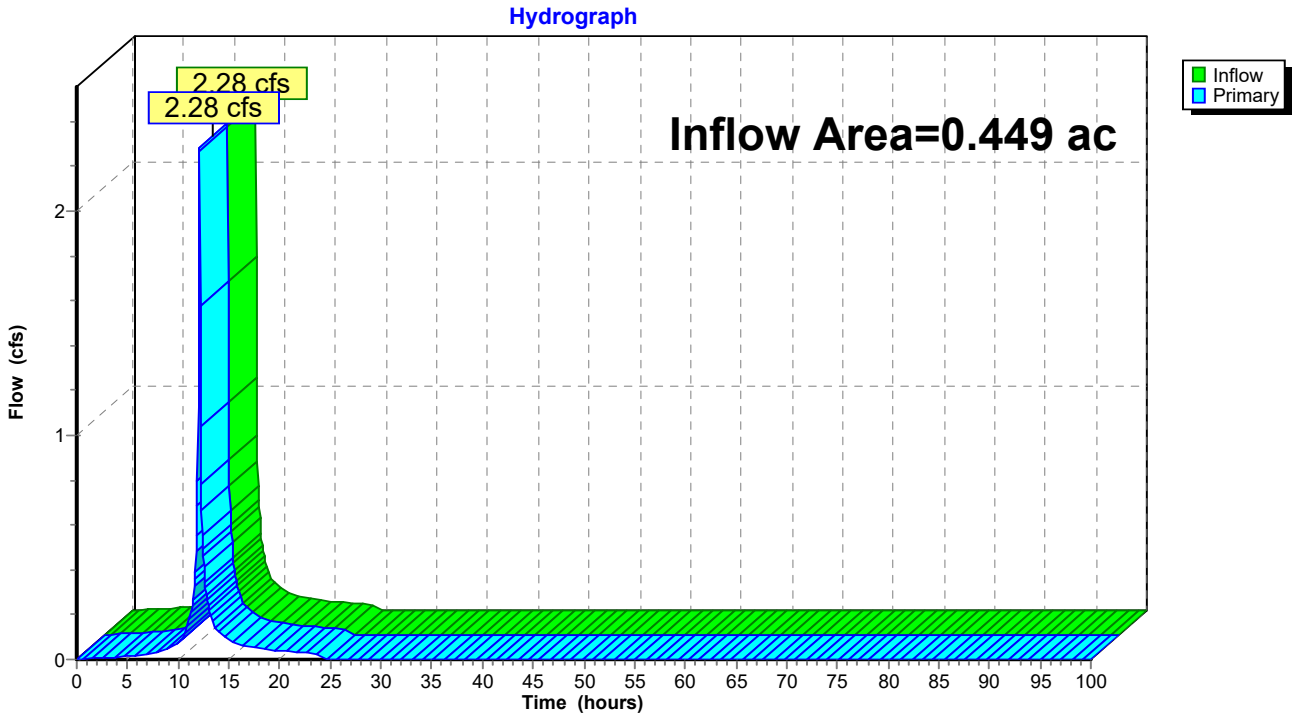


Summary for Link P POA-1: POA-1 PDA

Inflow Area = 0.449 ac, 32.97% Impervious, Inflow Depth = 4.58" for 10-Year Future event
Inflow = 2.28 cfs @ 12.09 hrs, Volume= 0.171 af
Primary = 2.28 cfs @ 12.09 hrs, Volume= 0.171 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-1: POA-1 PDA

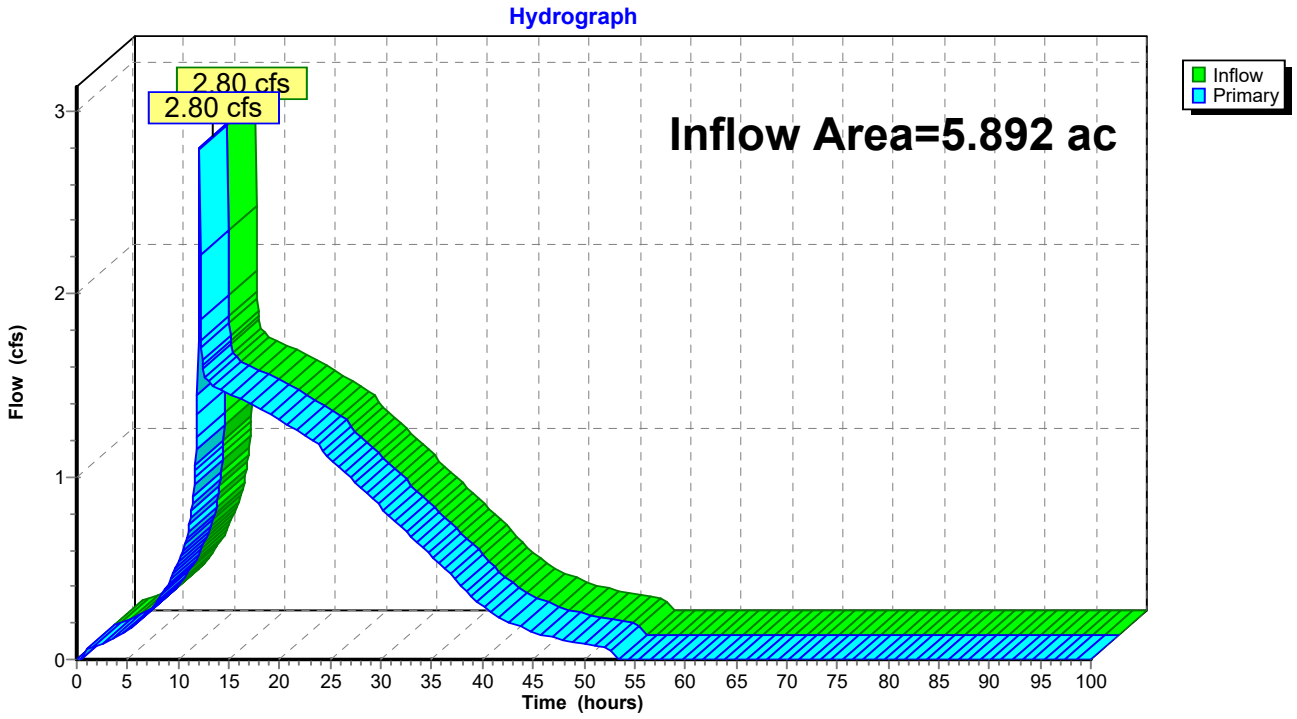


Summary for Link P POA-2: POA-2 PDA

Inflow Area = 5.892 ac, 87.44% Impervious, Inflow Depth = 5.67" for 10-Year Future event
Inflow = 2.80 cfs @ 12.09 hrs, Volume= 2.784 af
Primary = 2.80 cfs @ 12.09 hrs, Volume= 2.784 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-2: POA-2 PDA



Time span=0.00-100.00 hrs, dt=0.05 hrs, 2001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentE1-I: EDA 1-I Runoff Area=4,731 sf 100.00% Impervious Runoff Depth=11.10"
Flow Length=135' Tc=1.2 min CN=98 Runoff=1.30 cfs 0.100 af

SubcatchmentE1-P: EDA 1-P Runoff Area=71,171 sf 0.00% Impervious Runoff Depth=8.41"
Flow Length=181' Slope=0.0100 '/' Tc=28.1 min CN=77 Runoff=8.62 cfs 1.144 af

SubcatchmentE2-I: EDA 2-I Runoff Area=9,500 sf 100.00% Impervious Runoff Depth=11.10"
Flow Length=29' Slope=0.0300 '/' Tc=0.3 min CN=98 Runoff=2.60 cfs 0.202 af

SubcatchmentE2-P: EDA 2-P Runoff Area=190,784 sf 0.00% Impervious Runoff Depth=8.54"
Flow Length=431' Slope=0.0050 '/' Tc=48.4 min CN=78 Runoff=17.58 cfs 3.117 af

SubcatchmentP1A-I: PDA 1A-I Runoff Area=791 sf 100.00% Impervious Runoff Depth=11.10"
Flow Length=48' Tc=2.7 min CN=98 Runoff=0.22 cfs 0.017 af

SubcatchmentP1A-P: PDA 1A-P Runoff Area=11,157 sf 0.00% Impervious Runoff Depth=8.81"
Flow Length=58' Tc=4.8 min CN=80 Runoff=2.52 cfs 0.188 af

SubcatchmentP1B-I: PDA 1B-I Runoff Area=5,651 sf 100.00% Impervious Runoff Depth=11.10"
Flow Length=193' Tc=2.0 min CN=98 Runoff=1.57 cfs 0.120 af

SubcatchmentP1B-P: PDA 1B-P Runoff Area=1,940 sf 0.00% Impervious Runoff Depth=8.81"
Flow Length=11' Slope=0.2000 '/' Tc=0.6 min CN=80 Runoff=0.48 cfs 0.033 af

SubcatchmentP2A-I: PDA 2A-I Runoff Area=12,515 sf 100.00% Impervious Runoff Depth=11.10"
Flow Length=49' Tc=0.5 min CN=98 Runoff=3.43 cfs 0.266 af

SubcatchmentP2A-P: PDA 2A-P Runoff Area=8,228 sf 0.00% Impervious Runoff Depth=8.81"
Flow Length=173' Tc=11.1 min CN=80 Runoff=1.52 cfs 0.139 af

SubcatchmentP2B-I: PDA 2B-I Runoff Area=210,769 sf 100.00% Impervious Runoff Depth=11.10"
Flow Length=524' Tc=3.5 min CN=98 Runoff=55.85 cfs 4.475 af

SubcatchmentP2B-P: PDA 2B-P Runoff Area=10,222 sf 0.00% Impervious Runoff Depth=8.81"
Flow Length=305' Tc=5.3 min CN=80 Runoff=2.26 cfs 0.172 af

SubcatchmentP2C-I: PDA 2C-I Runoff Area=1,118 sf 100.00% Impervious Runoff Depth=11.10"
Flow Length=20' Tc=0.7 min CN=98 Runoff=0.31 cfs 0.024 af

SubcatchmentP2C-P: PDA 2C-P Runoff Area=13,795 sf 0.00% Impervious Runoff Depth=8.81"
Flow Length=25' Slope=0.0180 '/' Tc=3.0 min CN=80 Runoff=3.37 cfs 0.232 af

Pond B1: UG IB Peak Elev=4.20' Storage=102,503 cf Inflow=58.54 cfs 5.052 af
Outflow=13.18 cfs 5.052 af

Pond PP1: PP-A Peak Elev=5.40' Storage=5,634 cf Inflow=4.34 cfs 0.404 af
Outflow=1.88 cfs 0.404 af

Link E POA-1: POA-1 EDA Inflow=8.86 cfs 1.245 af
Primary=8.86 cfs 1.245 af

Link E POA-2: POA-2 EDA Inflow=17.89 cfs 3.319 af
Primary=17.89 cfs 3.319 af

Link P POA-1: POA-1 PDA Inflow=4.63 cfs 0.357 af
Primary=4.63 cfs 0.357 af

Link P POA-2: POA-2 PDA Inflow=13.90 cfs 5.308 af
Primary=13.90 cfs 5.308 af

Total Runoff Area = 12.681 ac Runoff Volume = 10.229 af Average Runoff Depth = 9.68"
55.63% Pervious = 7.055 ac 44.37% Impervious = 5.626 ac

Summary for Subcatchment E1-I: EDA 1-I

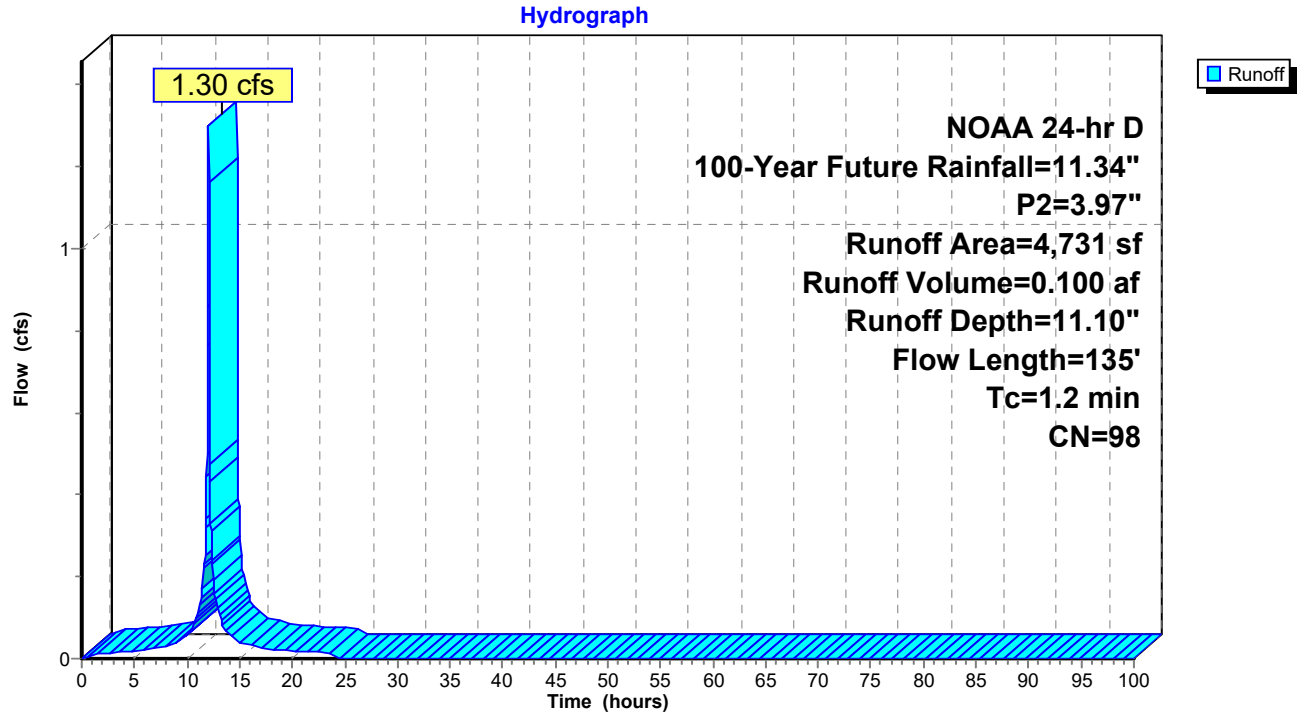
Runoff = 1.30 cfs @ 12.06 hrs, Volume= 0.100 af, Depth=11.10"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

	Area (sf)	CN	Description
*	4,701	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	4,731	98	Weighted Average
	4,731		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	25	0.0340	1.44		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
0.9	110	0.0100	2.03		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
1.2	135	Total			

Subcatchment E1-I: EDA 1-I



Summary for Subcatchment E1-P: EDA 1-P

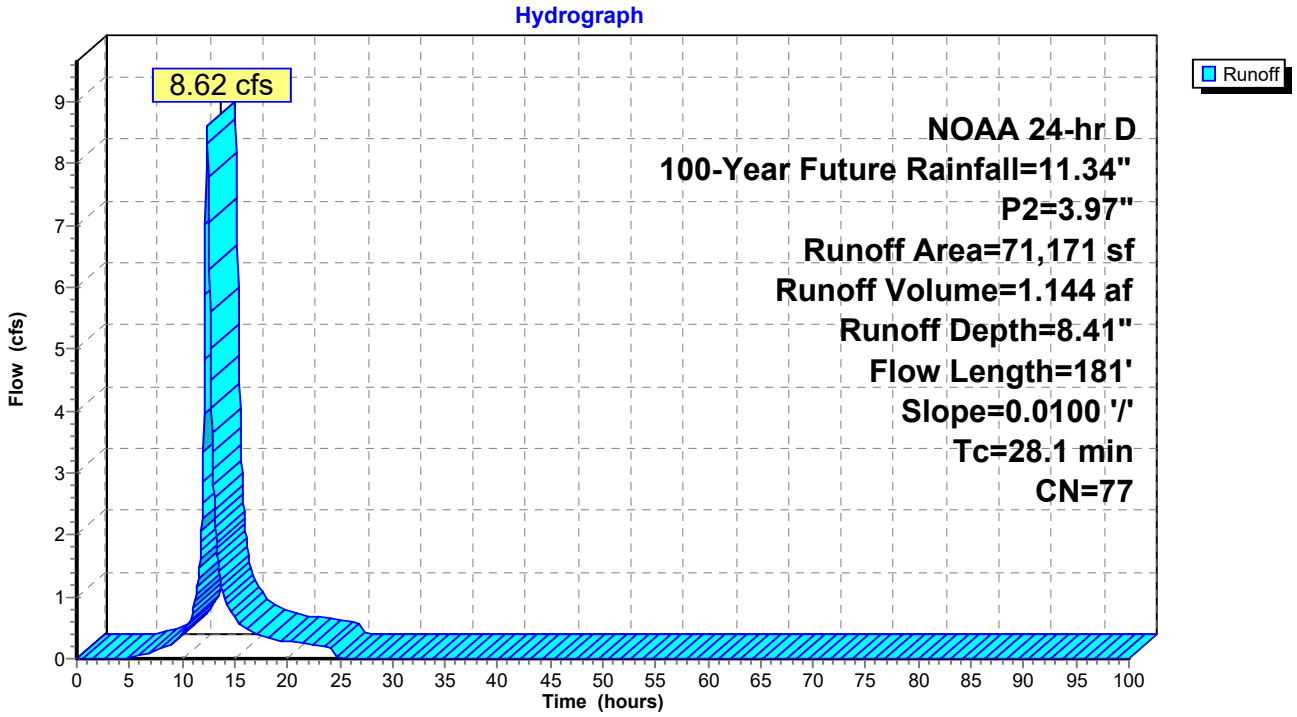
Runoff = 8.62 cfs @ 12.39 hrs, Volume= 1.144 af, Depth= 8.41"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

Area (sf)	CN	Description
8,810	80	>75% Grass cover, Good, HSG D
62,361	77	Woods, Good, HSG D
71,171	77	Weighted Average
71,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.4	100	0.0100	0.07		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.97"
2.7	81	0.0100	0.50		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
28.1	181	Total			

Subcatchment E1-P: EDA 1-P



Summary for Subcatchment E2-I: EDA 2-I

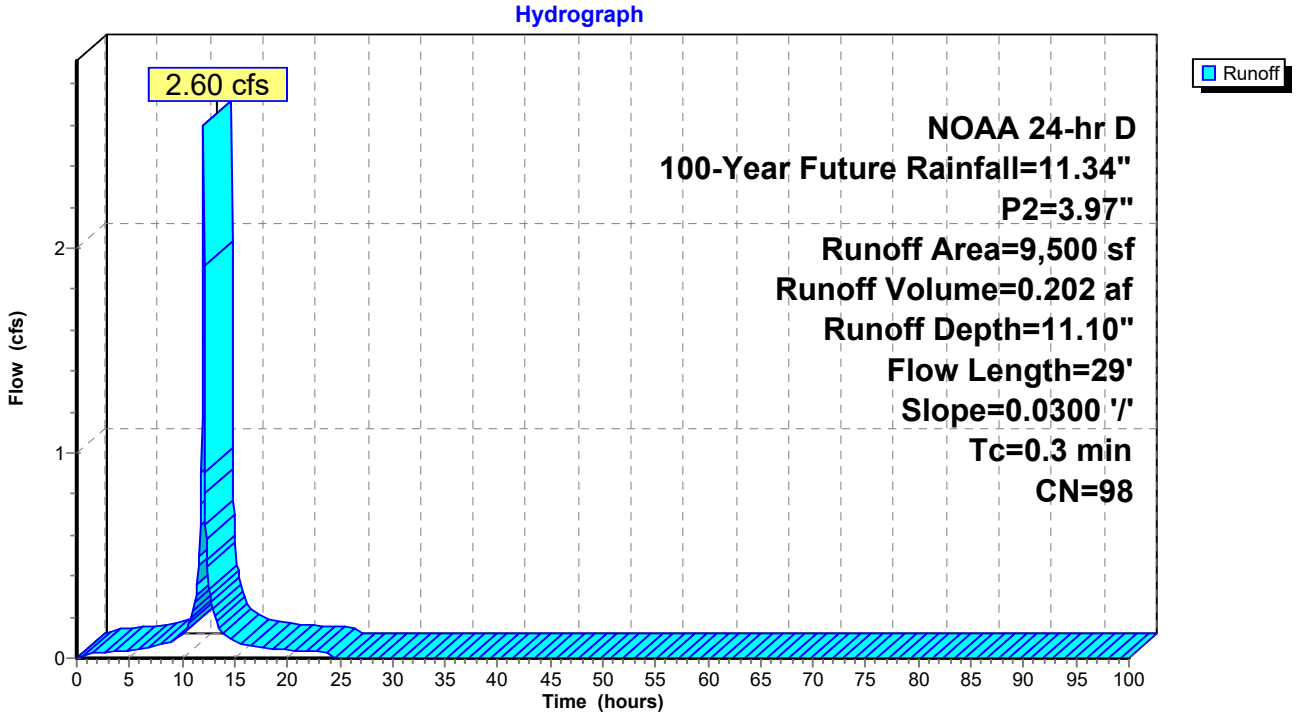
Runoff = 2.60 cfs @ 12.05 hrs, Volume= 0.202 af, Depth=11.10"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

	Area (sf)	CN	Description
*	9,500	98	MVS Paved parking, HSG D
	9,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	29	0.0300	1.41		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"

Subcatchment E2-I: EDA 2-I



Summary for Subcatchment E2-P: EDA 2-P

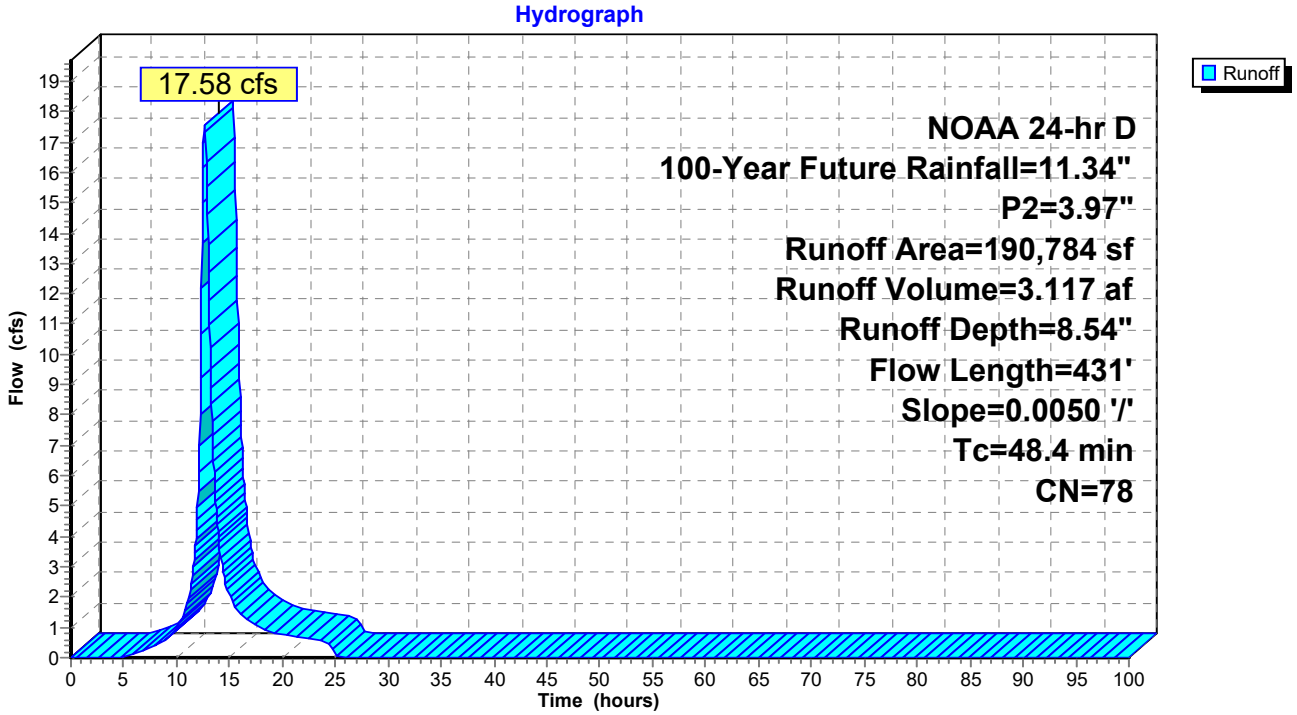
Runoff = 17.58 cfs @ 12.65 hrs, Volume= 3.117 af, Depth= 8.54"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

Area (sf)	CN	Description
77,501	80	>75% Grass cover, Good, HSG D
113,283	77	Woods, Good, HSG D
190,784	78	Weighted Average
190,784		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.6	100	0.0050	0.05		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.97"
12.9	274	0.0050	0.35		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
1.9	57	0.0050	0.49		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
48.4	431	Total			

Subcatchment E2-P: EDA 2-P



Summary for Subcatchment P1A-I: PDA 1A-I

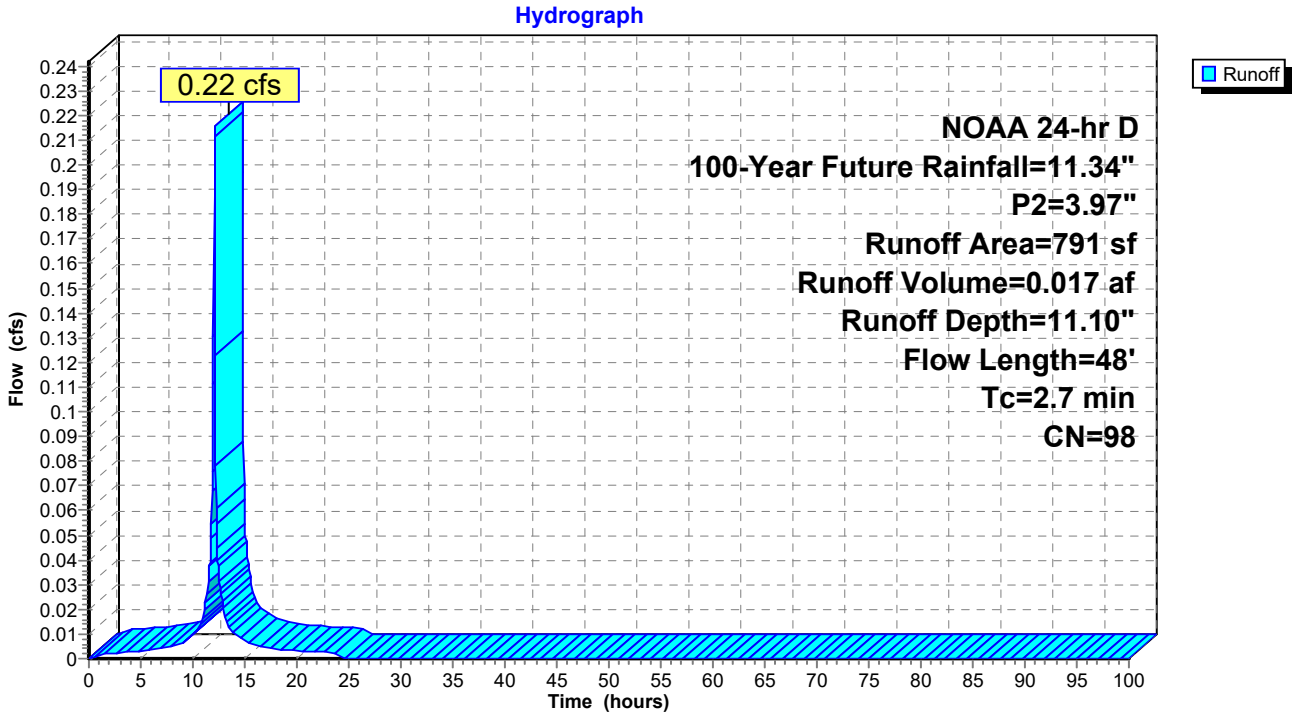
Runoff = 0.22 cfs @ 12.09 hrs, Volume= 0.017 af, Depth=11.10"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

Area (sf)	CN	Description
791	98	Paved parking, HSG D
791		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	12	0.0175	0.95		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
1.2	14	0.0550	0.19		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.97"
1.3	22	0.1140	0.28		**Sheet Flow, CD** Grass: Short n= 0.150 P2= 3.97"
2.7	48	Total			

Subcatchment P1A-I: PDA 1A-I



Summary for Subcatchment P1A-P: PDA 1A-P

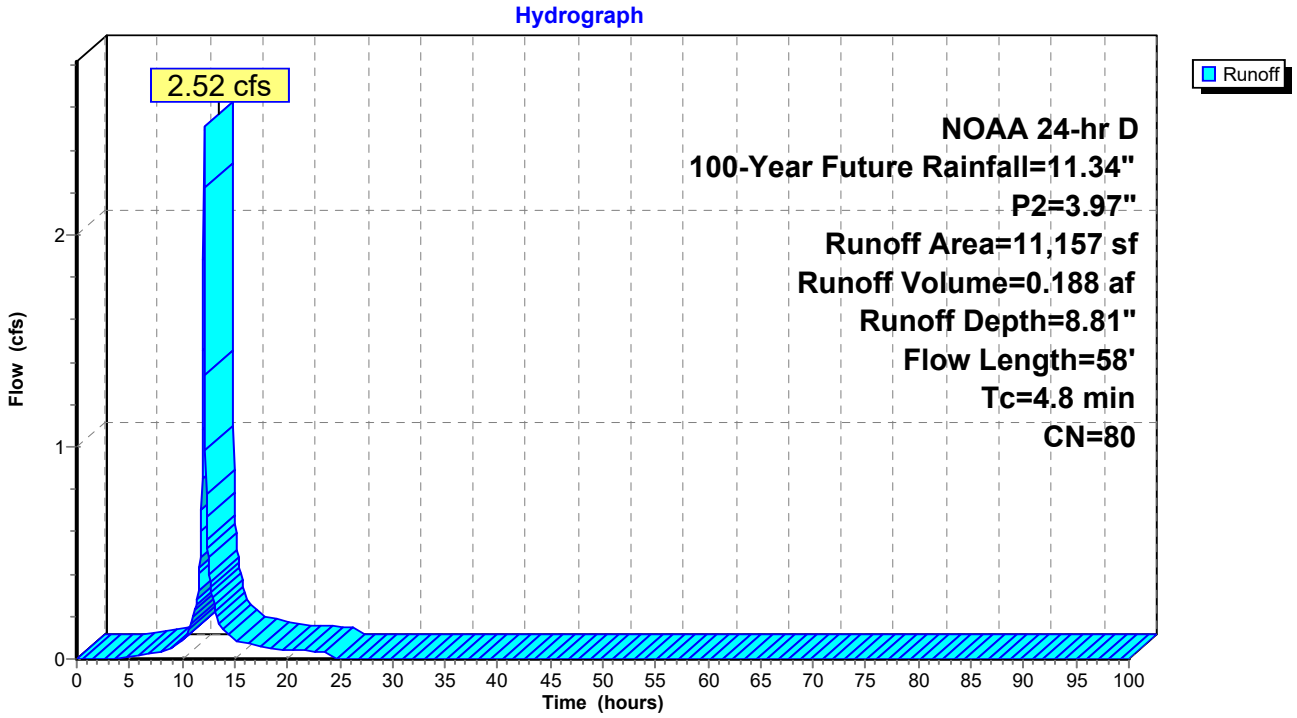
Runoff = 2.52 cfs @ 12.11 hrs, Volume= 0.188 af, Depth= 8.81"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

Area (sf)	CN	Description
11,157	80	>75% Grass cover, Good, HSG D
11,157		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	33	0.0300	0.18		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"
1.7	25	0.0800	0.25		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.97"
4.8	58	Total			

Subcatchment P1A-P: PDA 1A-P



Summary for Subcatchment P1B-I: PDA 1B-I

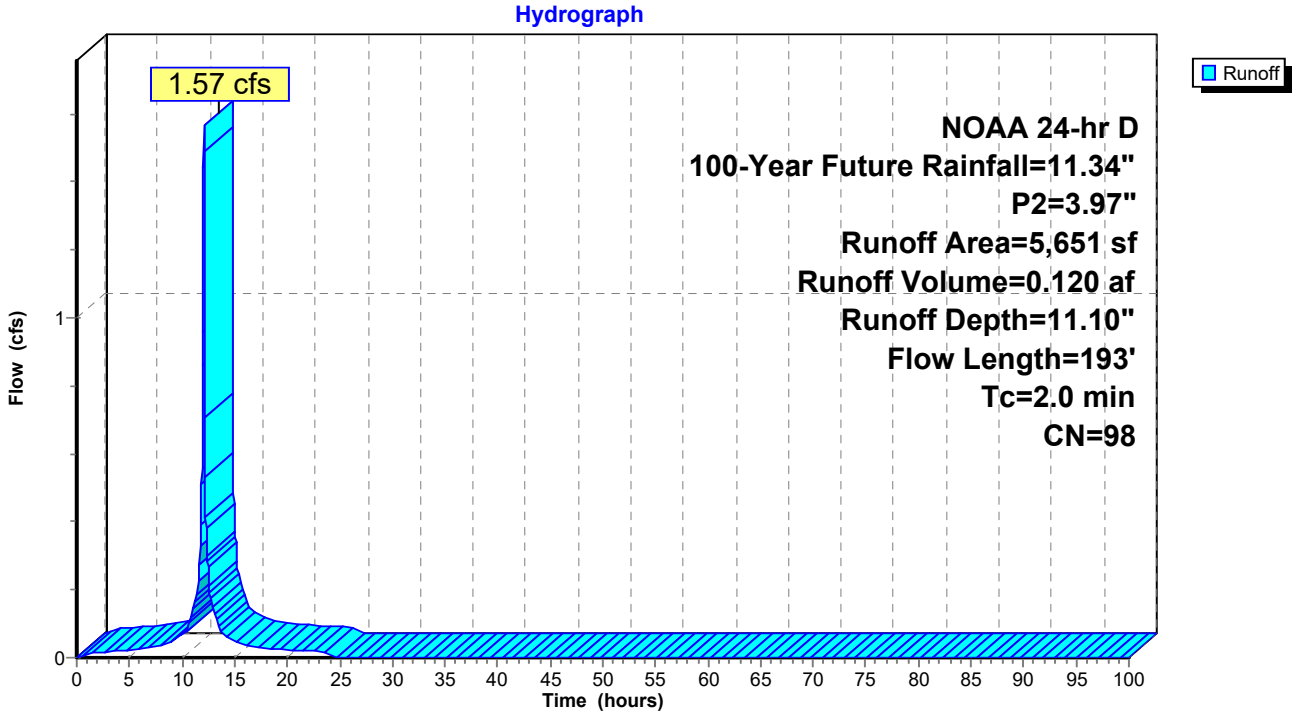
Runoff = 1.57 cfs @ 12.08 hrs, Volume= 0.120 af, Depth=11.10"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

	Area (sf)	CN	Description
*	5,621	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	5,651	98	Weighted Average
	5,651		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	84	0.0209	1.51		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
0.3	16	0.0130	0.89		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.97"
0.8	93	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
2.0	193	Total			

Subcatchment P1B-I: PDA 1B-I



Summary for Subcatchment P1B-P: PDA 1B-P

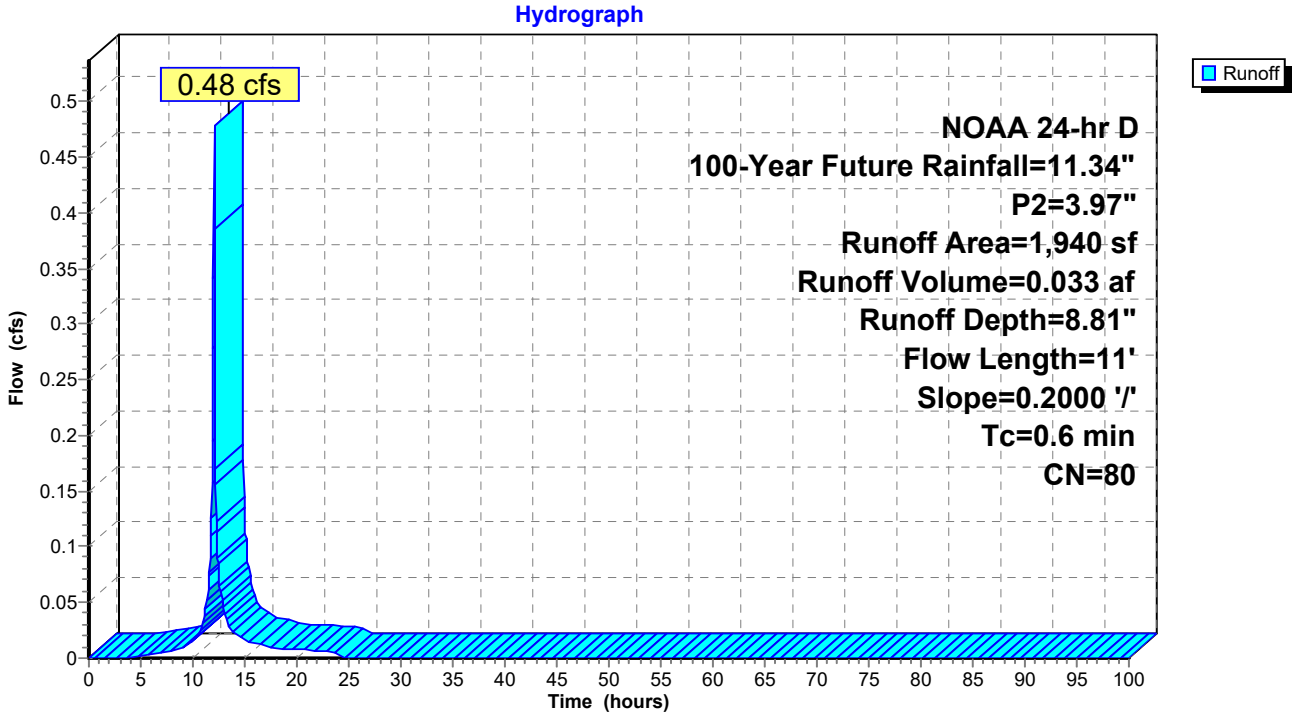
Runoff = 0.48 cfs @ 12.05 hrs, Volume= 0.033 af, Depth= 8.81"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

Area (sf)	CN	Description
1,940	80	>75% Grass cover, Good, HSG D
1,940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	11	0.2000	0.31		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"

Subcatchment P1B-P: PDA 1B-P



Summary for Subcatchment P2A-I: PDA 2A-I

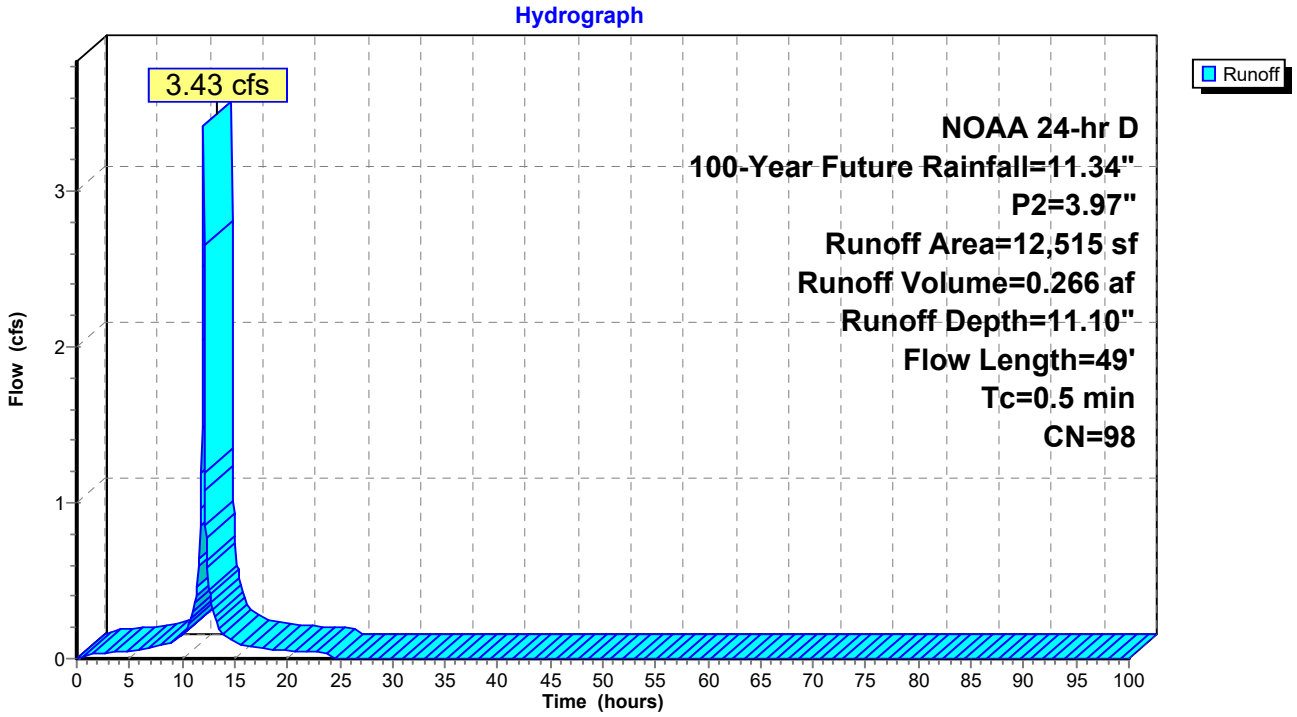
Runoff = 3.43 cfs @ 12.05 hrs, Volume= 0.266 af, Depth=11.10"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

	Area (sf)	CN	Description
*	11,539	98	MVS Paved parking, HSG D
	976	98	Paved parking, HSG D
	12,515	98	Weighted Average
	12,515		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	30	0.0330	1.47		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
0.2	19	0.0105	2.08		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.5	49	Total			

Subcatchment P2A-I: PDA 2A-I



Summary for Subcatchment P2A-P: PDA 2A-P

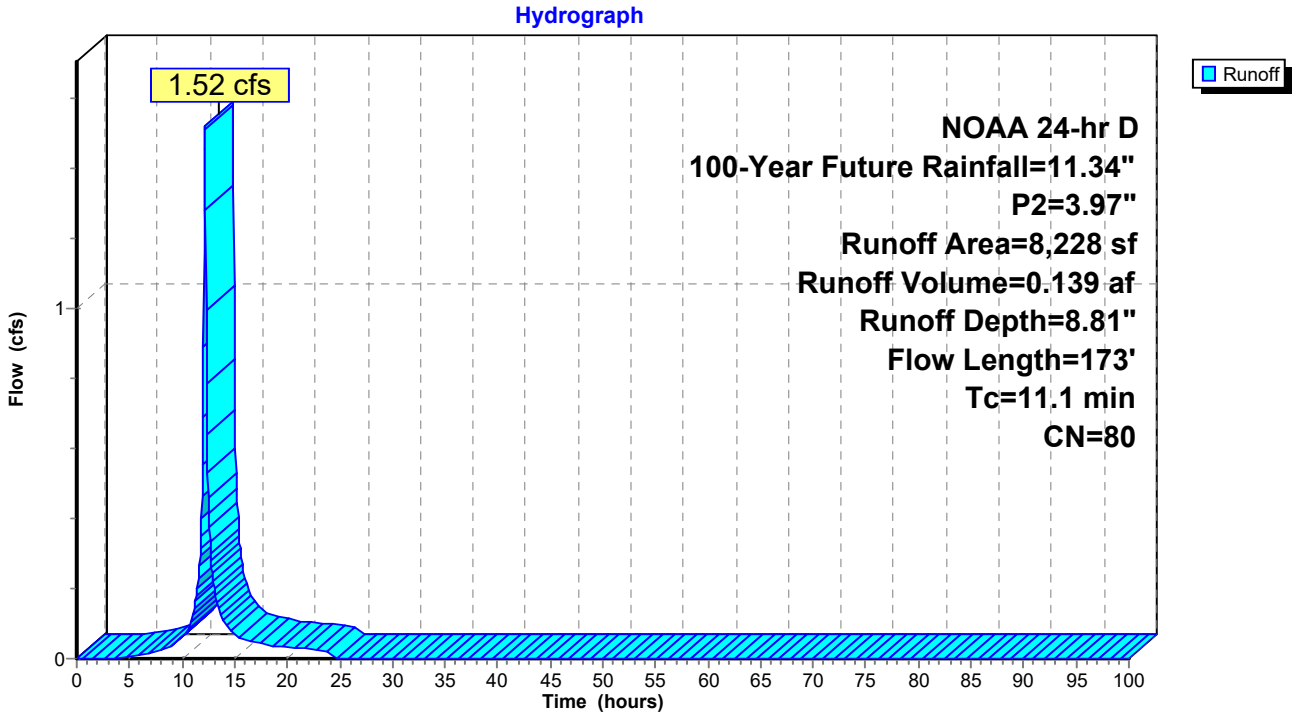
Runoff = 1.52 cfs @ 12.18 hrs, Volume= 0.139 af, Depth= 8.81"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

Area (sf)	CN	Description
8,228	80	>75% Grass cover, Good, HSG D
8,228		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	60	0.0080	0.12		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"
2.6	96	0.0080	0.63		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
11.1	173	Total			

Subcatchment P2A-P: PDA 2A-P



Summary for Subcatchment P2B-I: PDA 2B-I

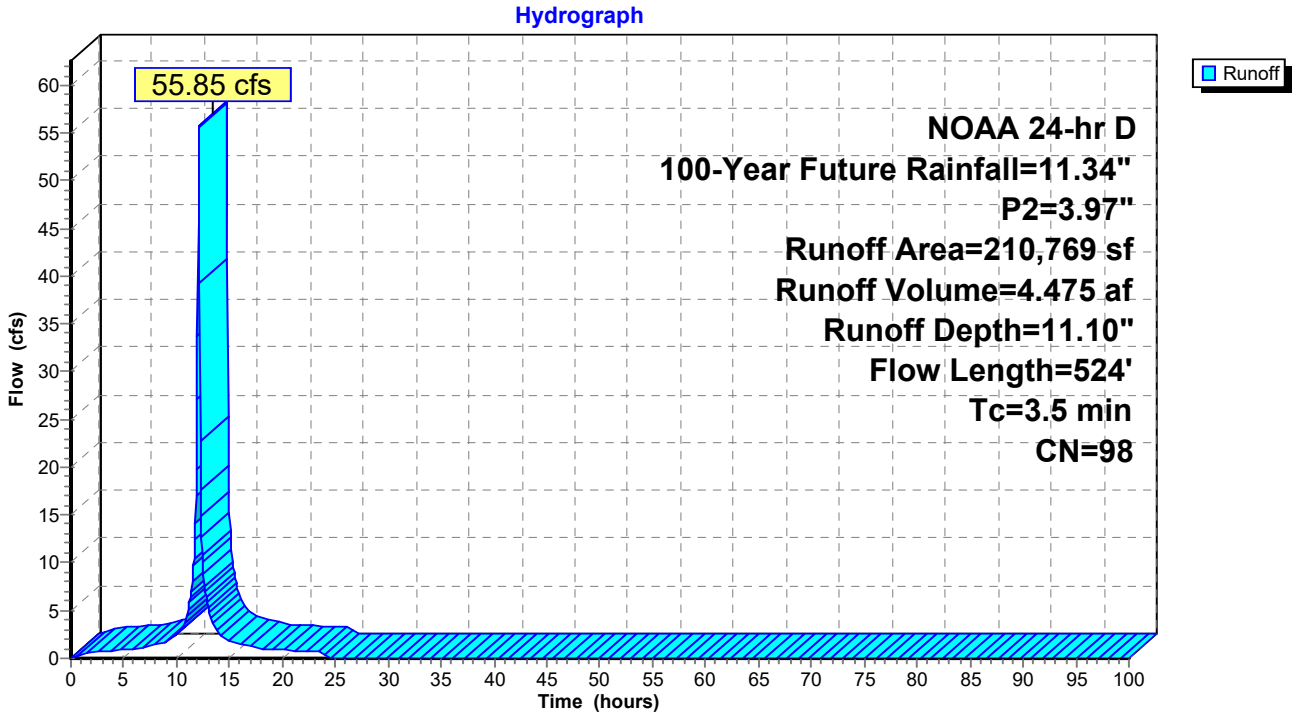
Runoff = 55.85 cfs @ 12.09 hrs, Volume= 4.475 af, Depth=11.10"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

	Area (sf)	CN	Description
*	170,269	98	MVS Paved parking, HSG D
	40,500	98	Roofs, HSG D
	210,769	98	Weighted Average
	210,769		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0136	1.31		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
1.1	155	0.0136	2.37		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.2	51	0.0050	3.79	3.79	**Pipe Channel, CD** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.6	139	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	79	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
3.5	524	Total			

Subcatchment P2B-I: PDA 2B-I



Summary for Subcatchment P2B-P: PDA 2B-P

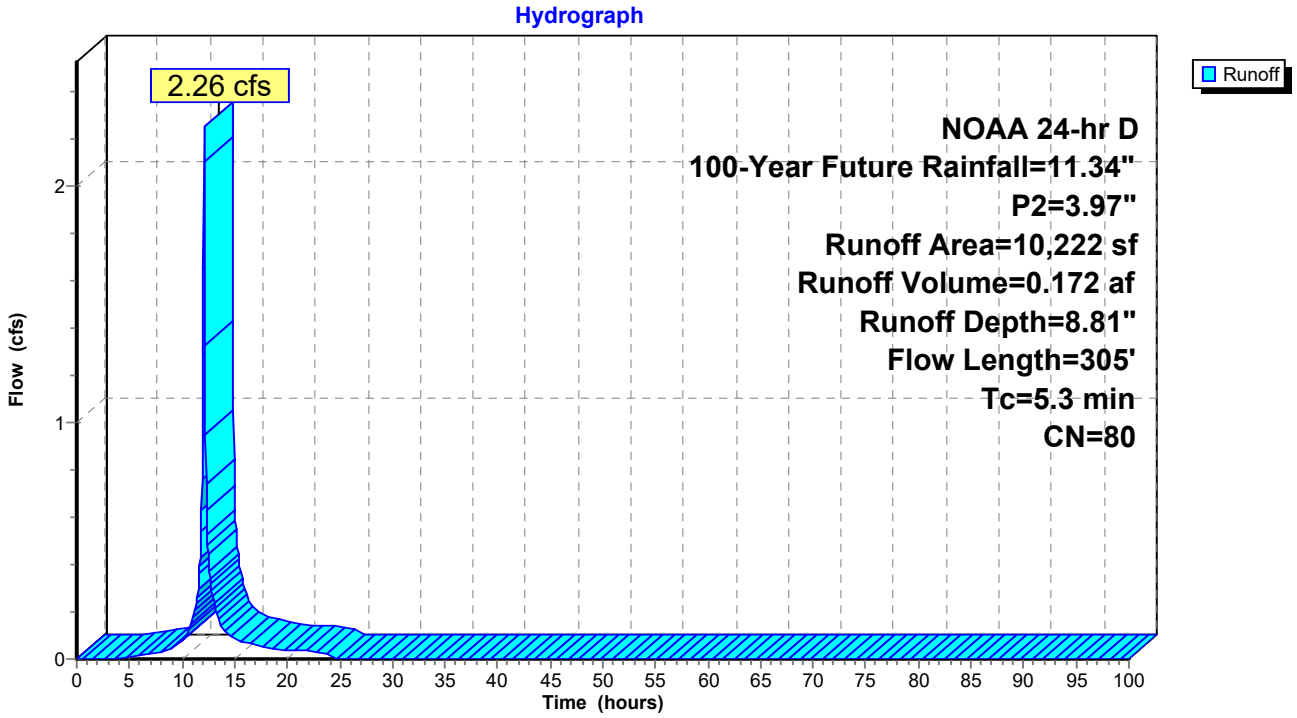
Runoff = 2.26 cfs @ 12.12 hrs, Volume= 0.172 af, Depth= 8.81"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

Area (sf)	CN	Description
10,222	80	>75% Grass cover, Good, HSG D
10,222		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	45	0.0250	0.18		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"
0.2	56	0.0050	3.79	3.79	**Pipe Channel, BC** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.4	98	0.0030	3.85	6.80	**Pipe Channel, CD** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.5	106	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
5.3	305	Total			

Subcatchment P2B-P: PDA 2B-P



Summary for Subcatchment P2C-I: PDA 2C-I

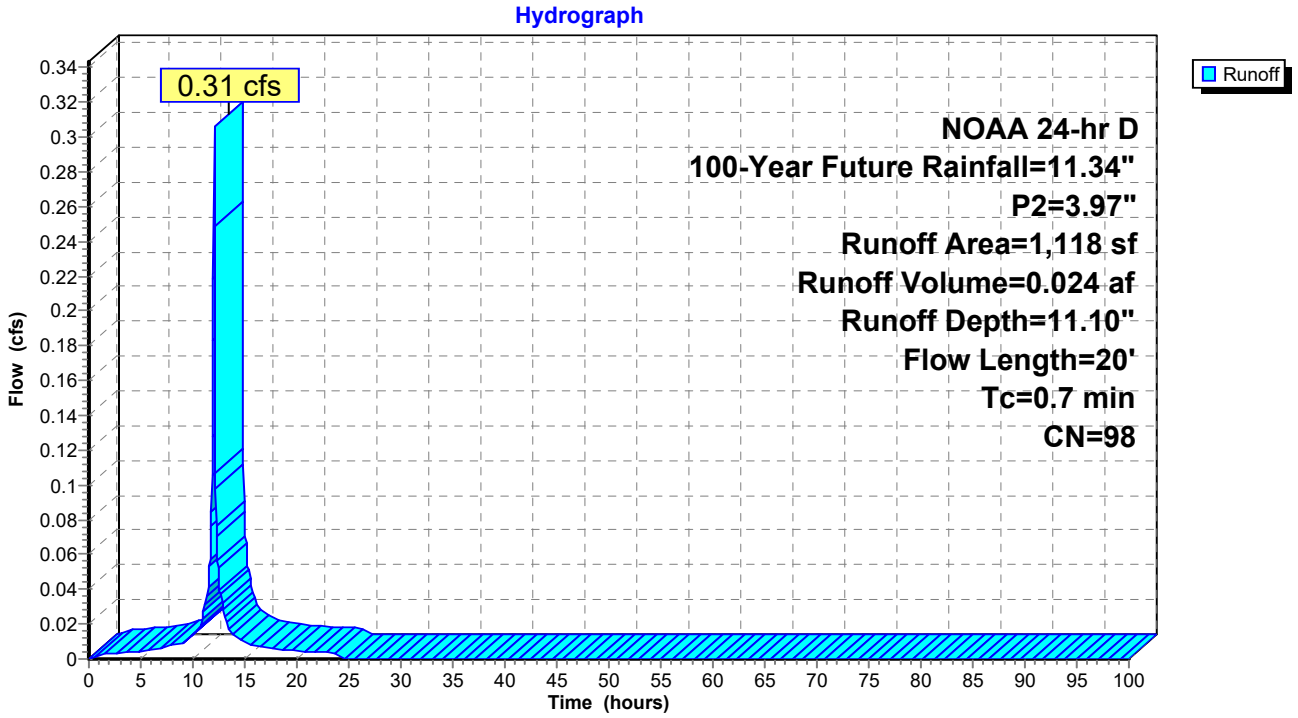
Runoff = 0.31 cfs @ 12.06 hrs, Volume= 0.024 af, Depth=11.10"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

Area (sf)	CN	Description
1,118	98	Paved parking, HSG D
1,118		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	10	0.0150	0.86		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.97"
0.5	10	0.3000	0.35		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.97"
0.7	20	Total			

Subcatchment P2C-I: PDA 2C-I



Summary for Subcatchment P2C-P: PDA 2C-P

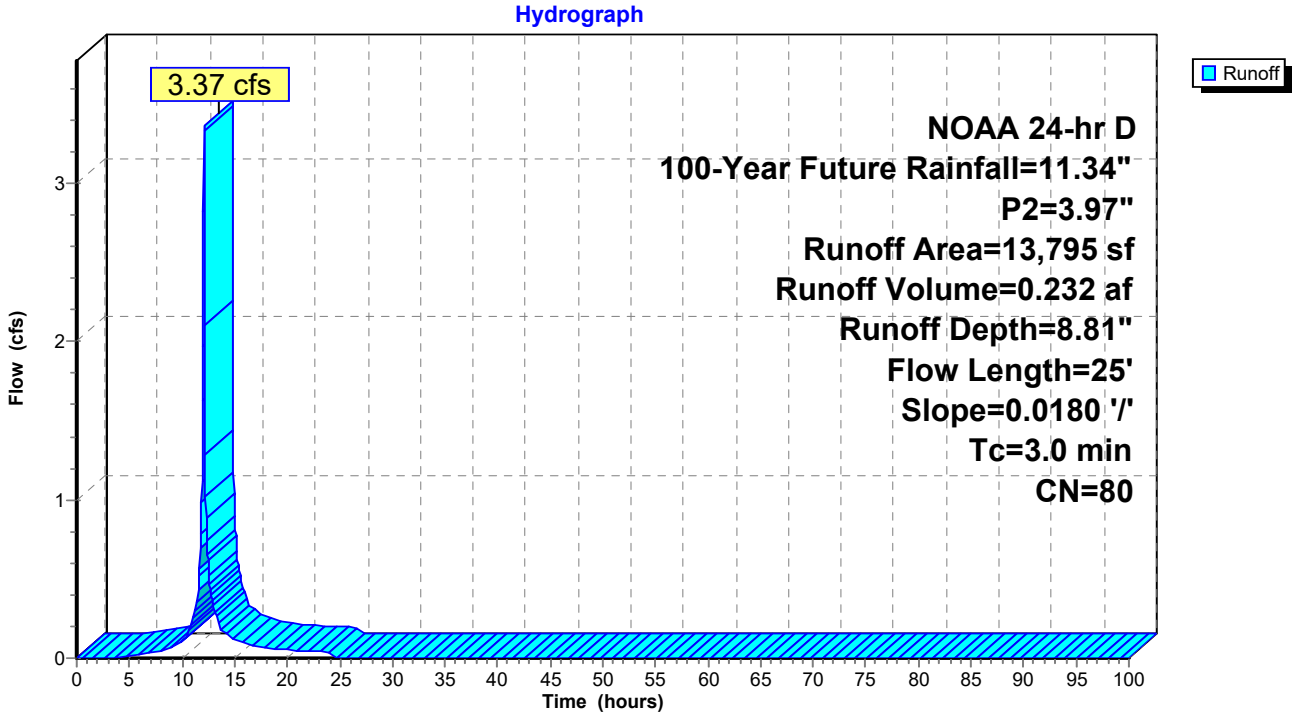
Runoff = 3.37 cfs @ 12.09 hrs, Volume= 0.232 af, Depth= 8.81"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Future Rainfall=11.34", P2=3.97"

Area (sf)	CN	Description
13,795	80	>75% Grass cover, Good, HSG D
13,795		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	25	0.0180	0.14		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.97"

Subcatchment P2C-P: PDA 2C-P



Summary for Pond B1: UG IB

Inflow Area = 5.549 ac, 92.37% Impervious, Inflow Depth = 10.92" for 100-Year Future event
Inflow = 58.54 cfs @ 12.09 hrs, Volume= 5.052 af
Outflow = 13.18 cfs @ 12.41 hrs, Volume= 5.052 af, Atten= 77%, Lag= 18.7 min
Primary = 13.18 cfs @ 12.41 hrs, Volume= 5.052 af
Routed to Link P POA-2 : POA-2 PDA

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 4.20' @ 12.41 hrs Surf.Area= 38,229 sf Storage= 102,503 cf

Plug-Flow detention time= 452.1 min calculated for 5.049 af (100% of inflow)
Center-of-Mass det. time= 452.8 min (1,200.2 - 747.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1.05'	48 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	1.20'	102,602 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 114,639 cf Overall x 89.5% Voids
		102,650 cf	Total Available Storage

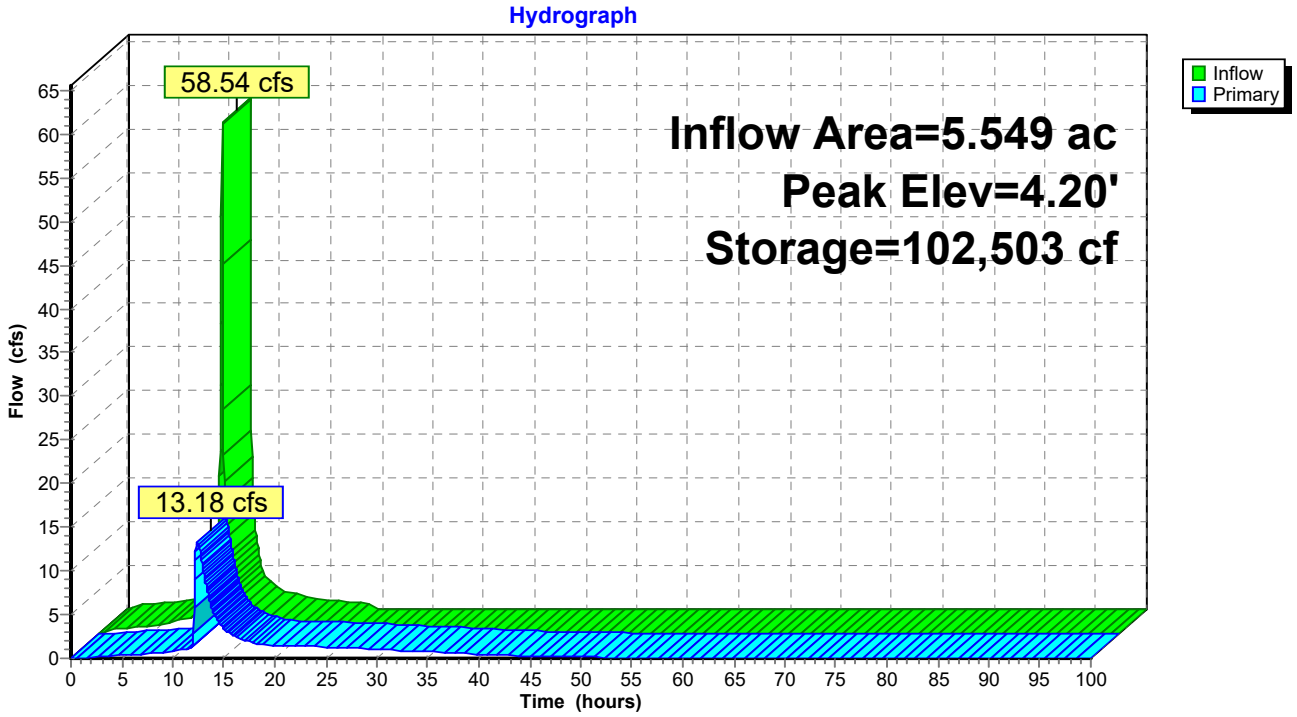
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.05	16	0	0
4.05	16	48	48

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.20	38,213	0	0
4.20	38,213	114,639	114,639

Device	Routing	Invert	Outlet Devices
#1	Primary	1.05'	**24.0" Round Culvert** L= 119.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 1.05' / 0.64' S= 0.0034 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	1.05'	**6.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	3.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=13.17 cfs @ 12.41 hrs HW=4.20' (Free Discharge)
└**1=Culvert** (Passes 13.17 cfs of 19.19 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 1.72 cfs @ 8.18 fps)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 11.45 cfs @ 3.18 fps)

Pond B1: UG IB


Hydrograph
58.54 cfs
13.18 cfs
Inflow Area=5.549 ac
Peak Elev=4.20'
Storage=102,503 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100

Summary for Pond PP1: PP-A

Inflow Area = 0.476 ac, 60.33% Impervious, Inflow Depth = 10.19" for 100-Year Future event
Inflow = 4.34 cfs @ 12.06 hrs, Volume= 0.404 af
Outflow = 1.88 cfs @ 12.29 hrs, Volume= 0.404 af, Atten= 57%, Lag= 13.9 min
Primary = 1.88 cfs @ 12.29 hrs, Volume= 0.404 af
Routed to Pond B1 : UG IB

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 5.40' @ 12.29 hrs Surf.Area= 10,028 sf Storage= 5,634 cf

Plug-Flow detention time= 101.4 min calculated for 0.404 af (100% of inflow)
Center-of-Mass det. time= 101.4 min (857.5 - 756.1)

Volume	Invert	Avail.Storage	Storage Description
#1	4.00'	7,129 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 17,821 cf Overall x 40.0% Voids
#2	3.90'	30 cf	**Outlet Structure Storage (Prismatic)** Listed below (Recalc)
		7,159 cf	Total Available Storage

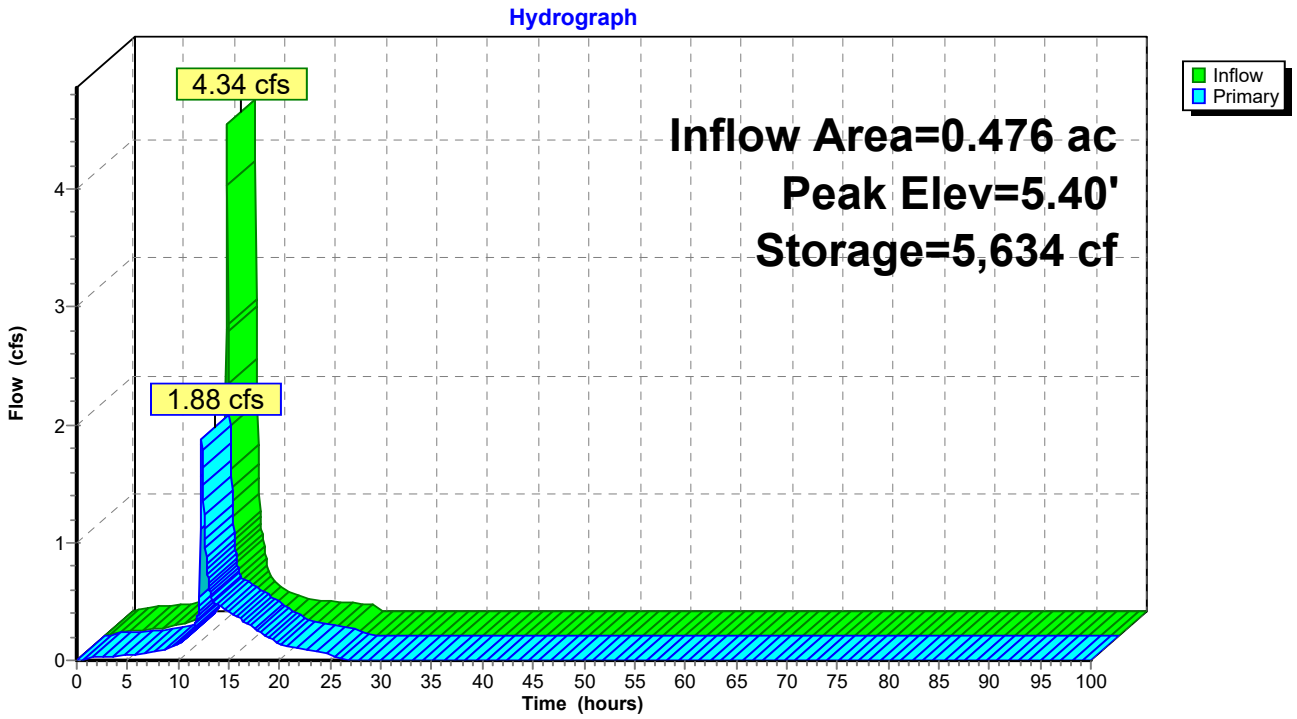
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.00	10,012	0	0
5.00	10,012	10,012	10,012
5.78	10,012	7,809	17,821

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
3.90	16	0	0
5.78	16	30	30

Device	Routing	Invert	Outlet Devices
#1	Primary	3.67'	**24.0" Round Culvert** L= 58.0' Ke= 0.200 Inlet / Outlet Invert= 3.67' / 3.38' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	3.90'	**4.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	5.18'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.86 cfs @ 12.29 hrs HW=5.40' (Free Discharge)
└**1=Culvert** (Passes 1.86 cfs of 11.52 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.53 cfs @ 5.54 fps)
  └**3=Sharp-Crested Rectangular Weir** (Weir Controls 1.33 cfs @ 1.53 fps)

Pond PP1: PP-A

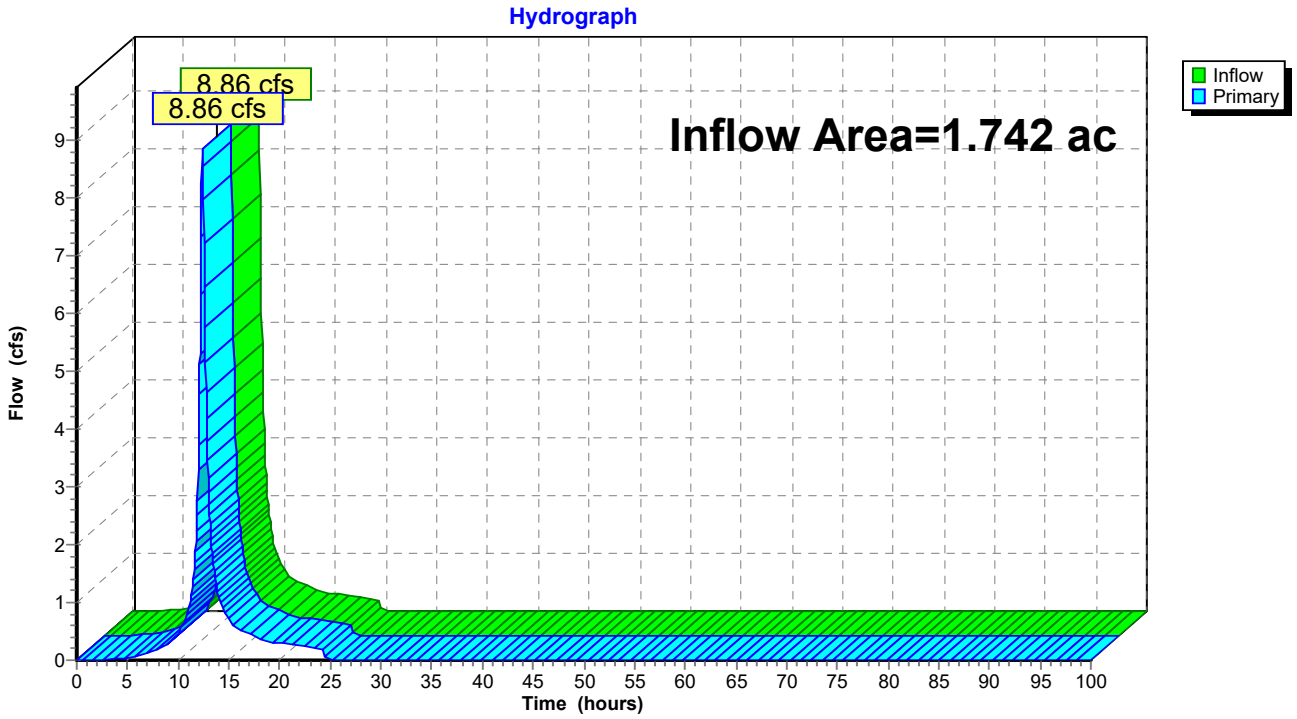

Hydrograph
4.34 cfs
1.88 cfs
Inflow Area=0.476 ac
Peak Elev=5.40'
Storage=5,634 cf
Inflow
Primary
Flow (cfs)
0
1
2
3
4
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
Time (hours)

Summary for Link E POA-1: POA-1 EDA

Inflow Area = 1.742 ac, 6.23% Impervious, Inflow Depth = 8.57" for 100-Year Future event
Inflow = 8.86 cfs @ 12.39 hrs, Volume= 1.245 af
Primary = 8.86 cfs @ 12.39 hrs, Volume= 1.245 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-1: POA-1 EDA

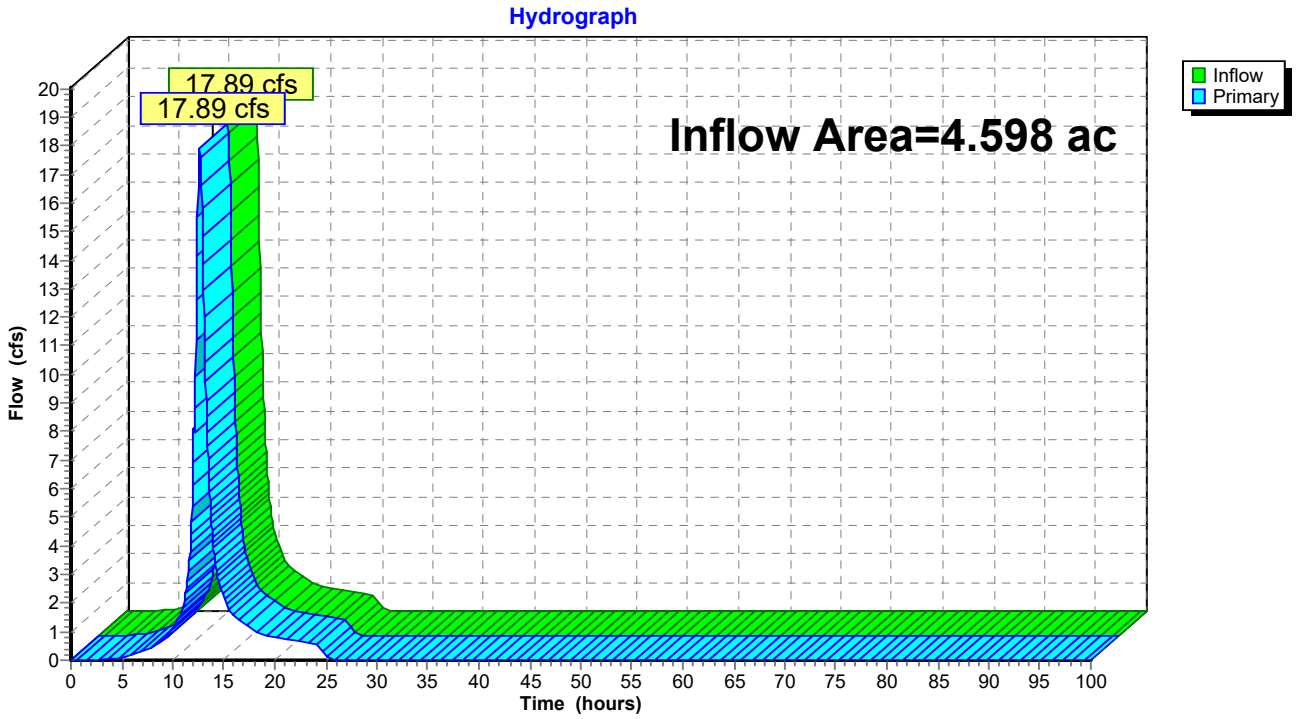


Summary for Link E POA-2: POA-2 EDA

Inflow Area = 4.598 ac, 4.74% Impervious, Inflow Depth = 8.66" for 100-Year Future event
Inflow = 17.89 cfs @ 12.64 hrs, Volume= 3.319 af
Primary = 17.89 cfs @ 12.64 hrs, Volume= 3.319 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-2: POA-2 EDA

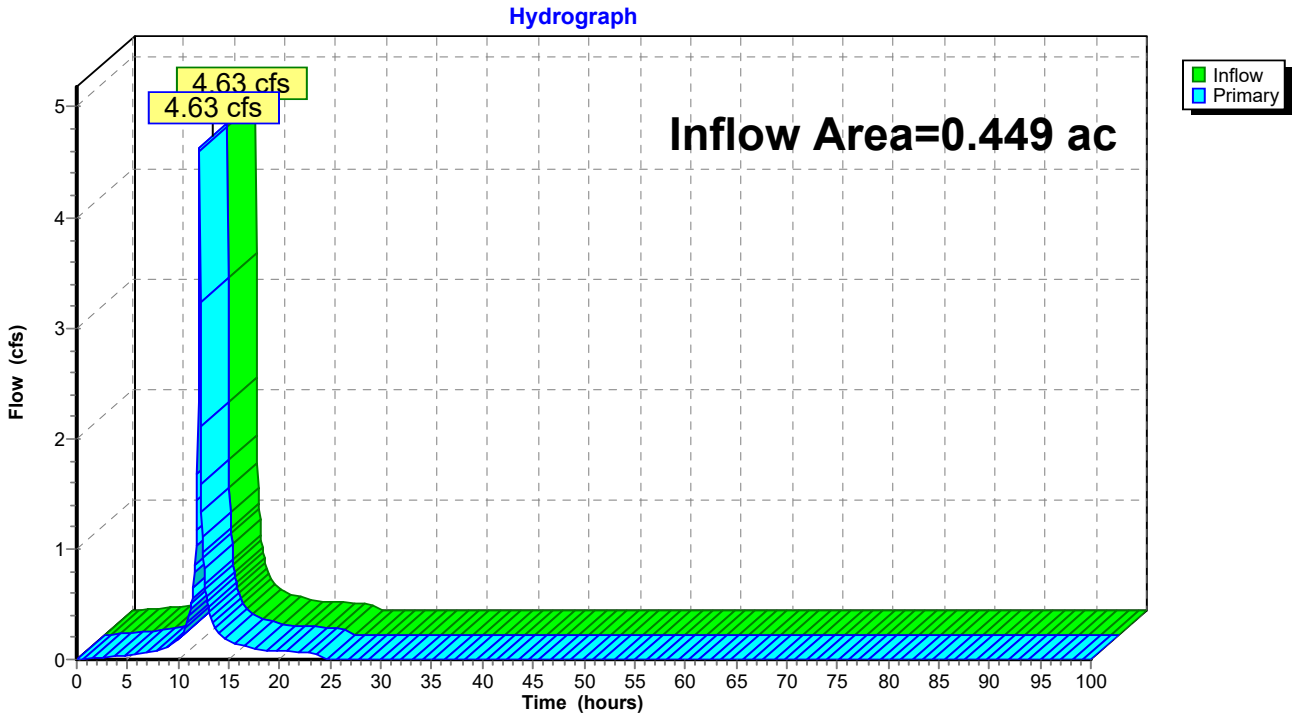


Summary for Link P POA-1: POA-1 PDA

Inflow Area = 0.449 ac, 32.97% Impervious, Inflow Depth = 9.56" for 100-Year Future event
Inflow = 4.63 cfs @ 12.09 hrs, Volume= 0.357 af
Primary = 4.63 cfs @ 12.09 hrs, Volume= 0.357 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-1: POA-1 PDA

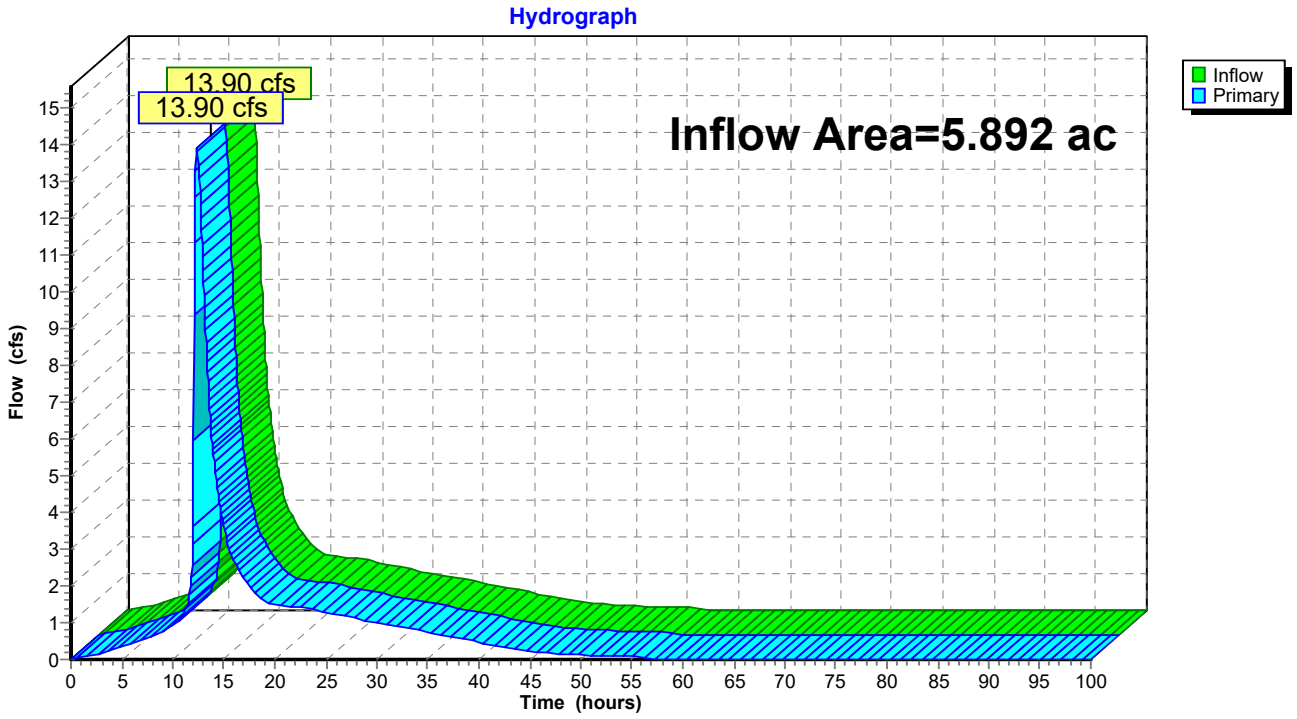


Summary for Link P POA-2: POA-2 PDA

Inflow Area = 5.892 ac, 87.44% Impervious, Inflow Depth = 10.81" for 100-Year Future event
Inflow = 13.90 cfs @ 12.37 hrs, Volume= 5.308 af
Primary = 13.90 cfs @ 12.37 hrs, Volume= 5.308 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-2: POA-2 PDA



C. WATER QUALITY

- **Water Quality Storm Hydrograph**
- **Water Quality Unit Flows**

Summary for Subcatchment E1-I: EDA 1-I

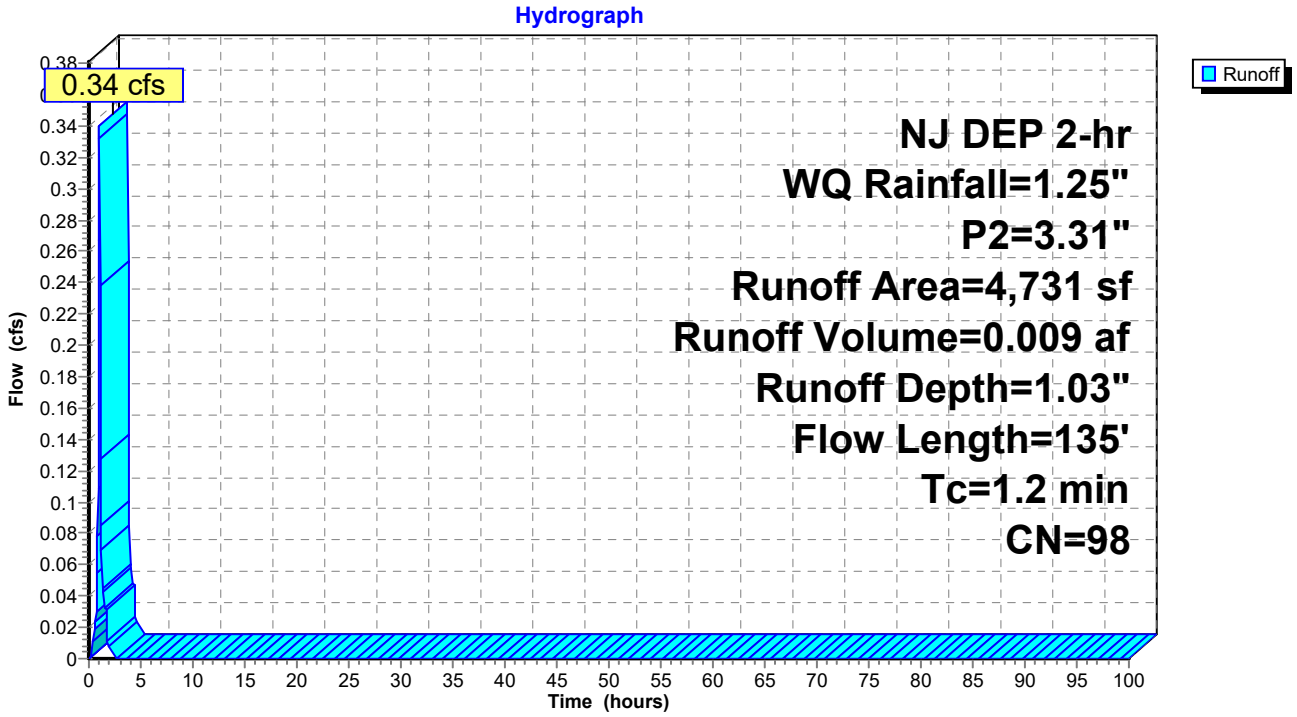
Runoff = 0.34 cfs @ 1.03 hrs, Volume= 0.009 af, Depth= 1.03"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

	Area (sf)	CN	Description
*	4,701	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	4,731	98	Weighted Average
	4,731		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	25	0.0340	1.31		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.31"
0.9	110	0.0100	2.03		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
1.2	135	Total			

Subcatchment E1-I: EDA 1-I



Summary for Subcatchment E1-P: EDA 1-P

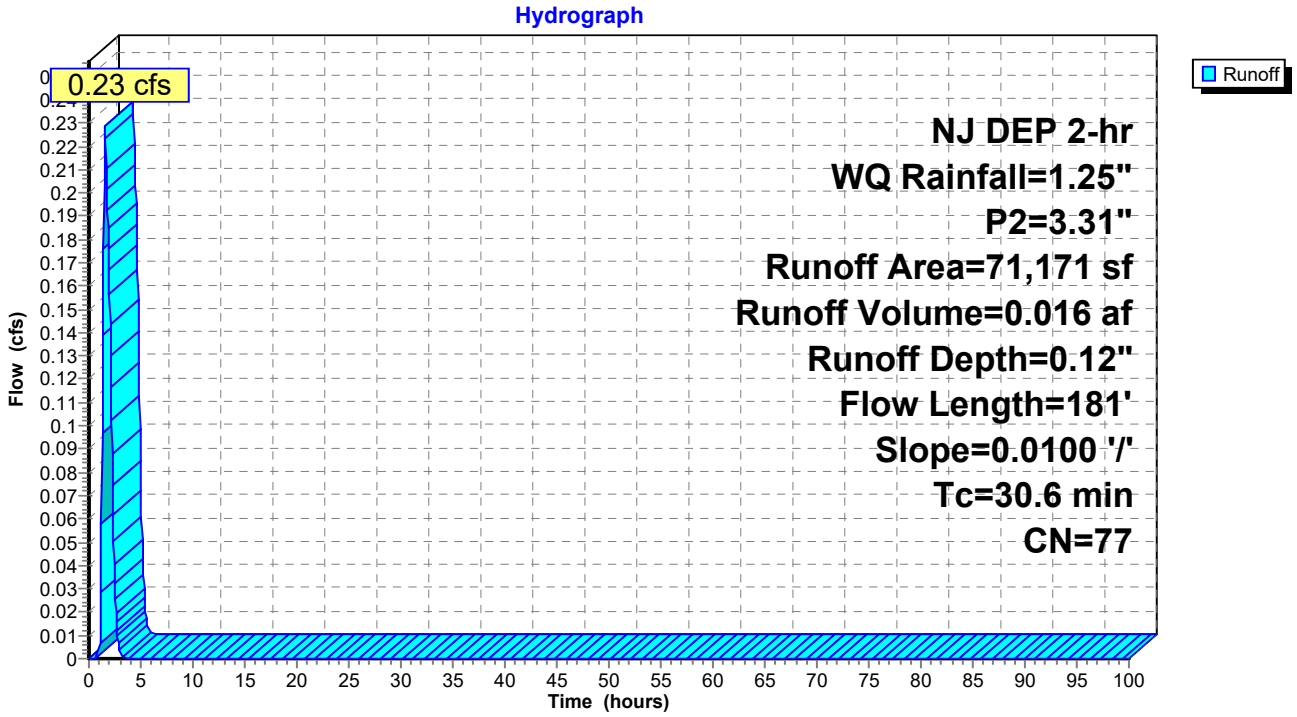
Runoff = 0.23 cfs @ 1.57 hrs, Volume= 0.016 af, Depth= 0.12"
Routed to Link E POA-1 : POA-1 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

Area (sf)	CN	Description
8,810	80	>75% Grass cover, Good, HSG D
62,361	77	Woods, Good, HSG D
71,171	77	Weighted Average
71,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	100	0.0100	0.06		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.31"
2.7	81	0.0100	0.50		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
30.6	181	Total			

Subcatchment E1-P: EDA 1-P



Summary for Subcatchment E2-I: EDA 2-I

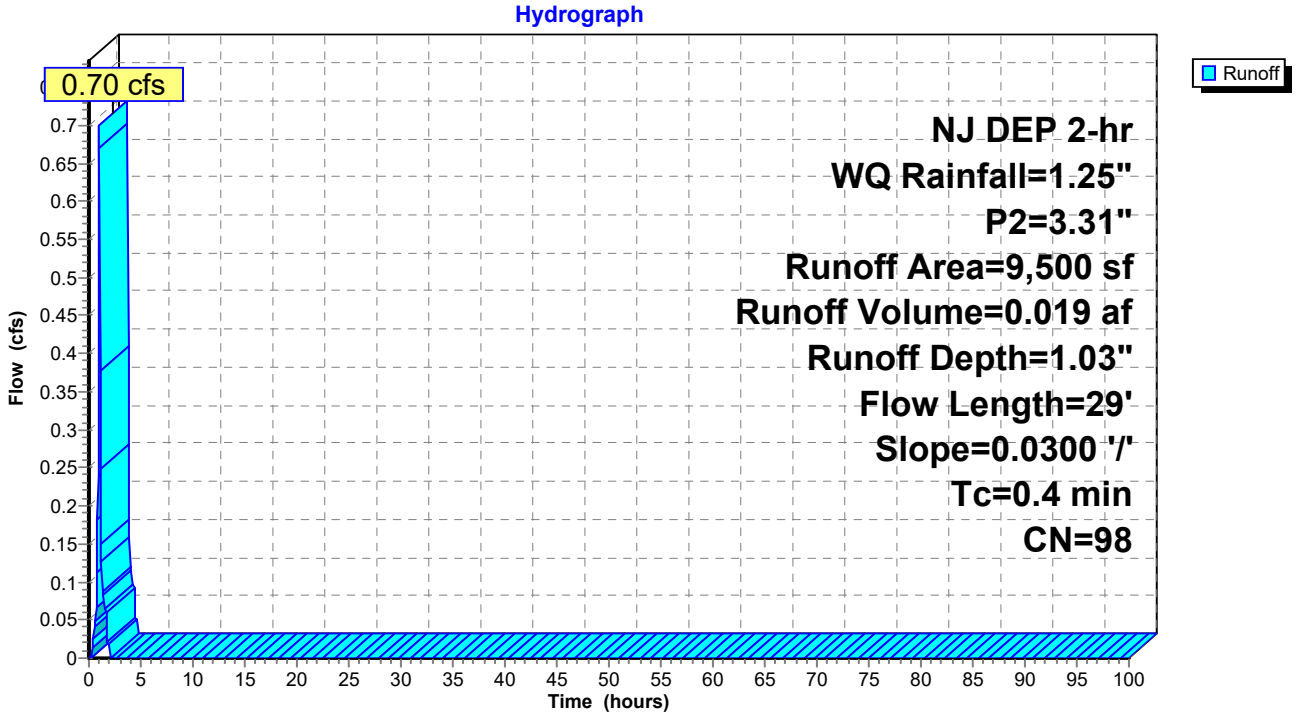
Runoff = 0.70 cfs @ 1.03 hrs, Volume= 0.019 af, Depth= 1.03"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

	Area (sf)	CN	Description
*	9,500	98	MVS Paved parking, HSG D
	9,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	29	0.0300	1.28		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.31"

Subcatchment E2-I: EDA 2-I



Summary for Subcatchment E2-P: EDA 2-P

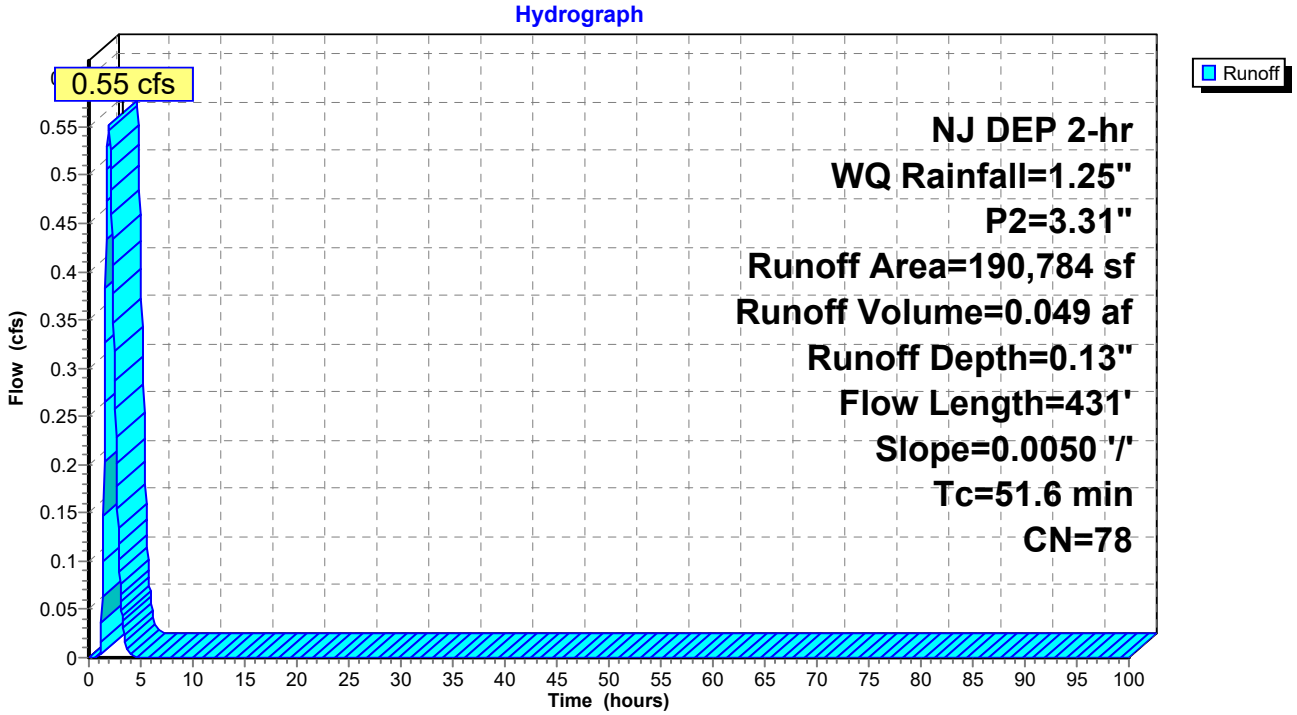
Runoff = 0.55 cfs @ 1.92 hrs, Volume= 0.049 af, Depth= 0.13"
Routed to Link E POA-2 : POA-2 EDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

Area (sf)	CN	Description
77,501	80	>75% Grass cover, Good, HSG D
113,283	77	Woods, Good, HSG D
190,784	78	Weighted Average
190,784		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.8	100	0.0050	0.05		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.31"
12.9	274	0.0050	0.35		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
1.9	57	0.0050	0.49		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
51.6	431	Total			

Subcatchment E2-P: EDA 2-P



Summary for Subcatchment P1A-I: PDA 1A-I

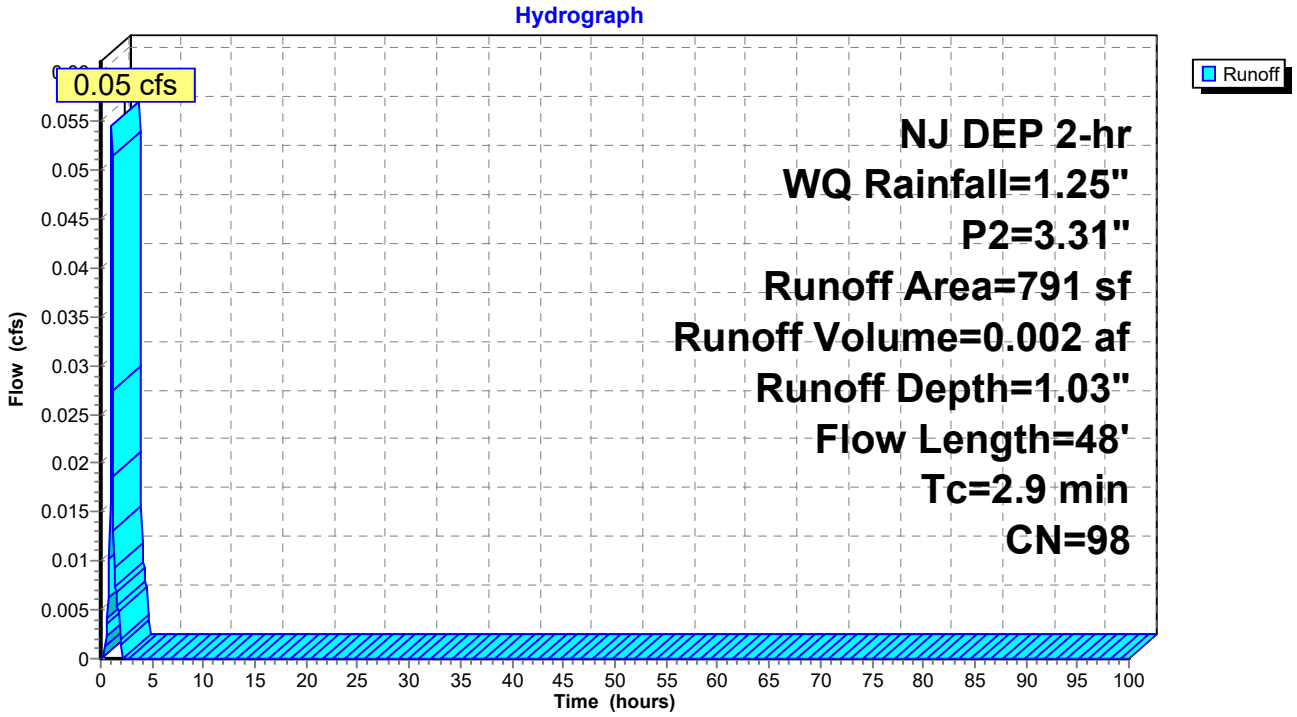
Runoff = 0.05 cfs @ 1.05 hrs, Volume= 0.002 af, Depth= 1.03"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

Area (sf)	CN	Description
791	98	Paved parking, HSG D
791		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	12	0.0175	0.87		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.31"
1.3	14	0.0550	0.17		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.31"
1.4	22	0.1140	0.26		**Sheet Flow, CD** Grass: Short n= 0.150 P2= 3.31"
2.9	48	Total			

Subcatchment P1A-I: PDA 1A-I



Summary for Subcatchment P1A-P: PDA 1A-P

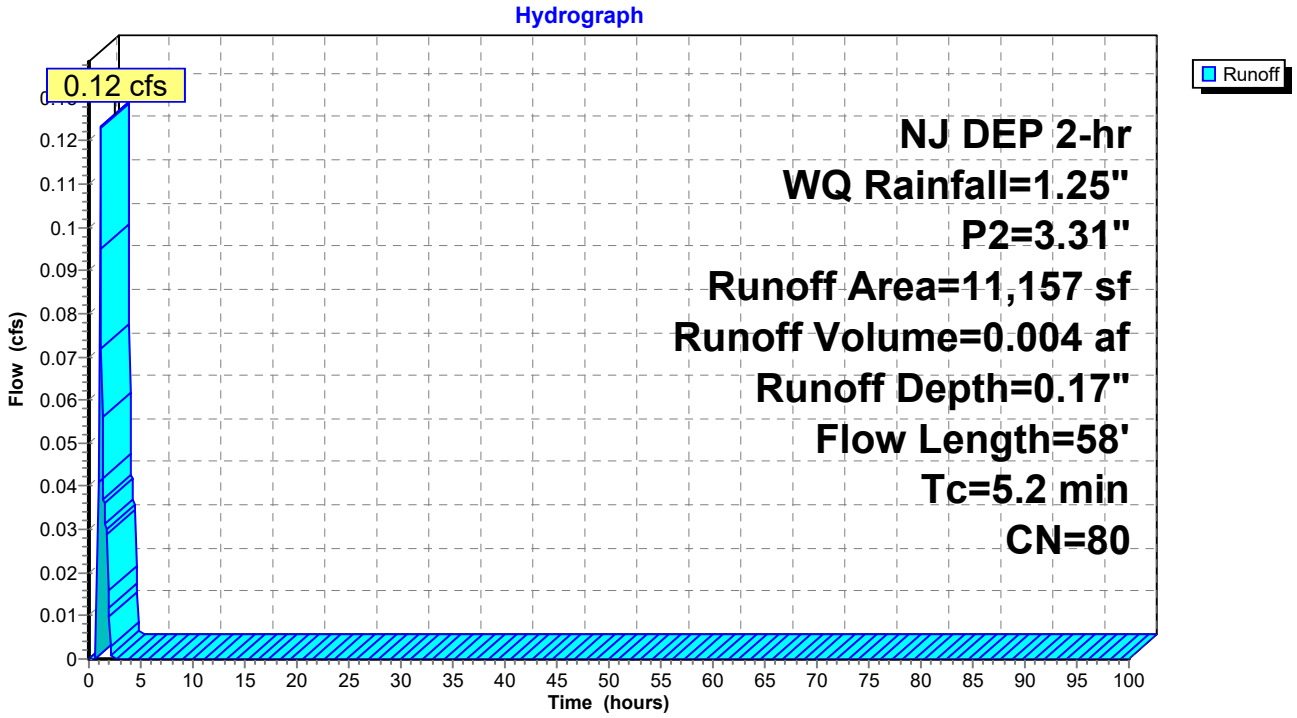
Runoff = 0.12 cfs @ 1.14 hrs, Volume= 0.004 af, Depth= 0.17"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

Area (sf)	CN	Description
11,157	80	>75% Grass cover, Good, HSG D
11,157		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	33	0.0300	0.16		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.31"
1.8	25	0.0800	0.23		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.31"
5.2	58	Total			

Subcatchment P1A-P: PDA 1A-P



Summary for Subcatchment P1B-I: PDA 1B-I

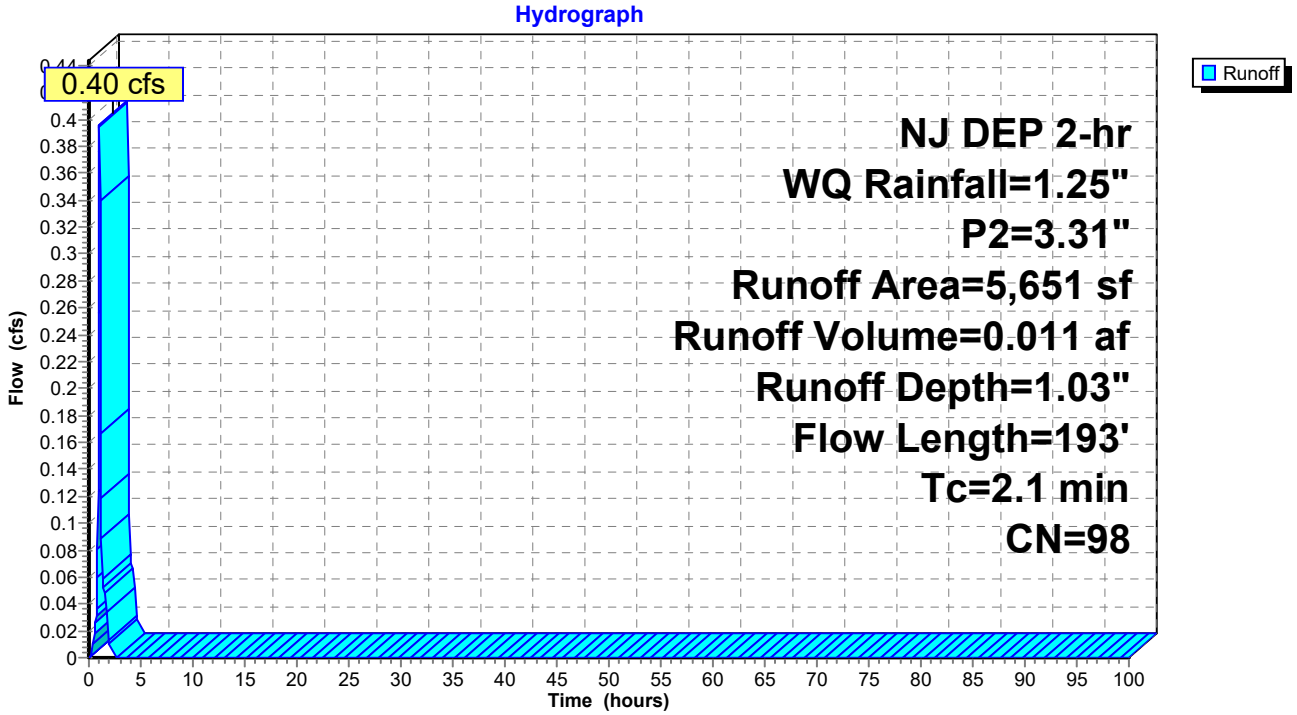
Runoff = 0.40 cfs @ 1.04 hrs, Volume= 0.011 af, Depth= 1.03"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

	Area (sf)	CN	Description
*	5,621	98	MVS Paved parking, HSG D
	30	98	Paved parking, HSG D
	5,651	98	Weighted Average
	5,651		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	84	0.0209	1.38		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.31"
0.3	16	0.0130	0.82		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.31"
0.8	93	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
2.1	193	Total			

Subcatchment P1B-I: PDA 1B-I



Summary for Subcatchment P1B-P: PDA 1B-P

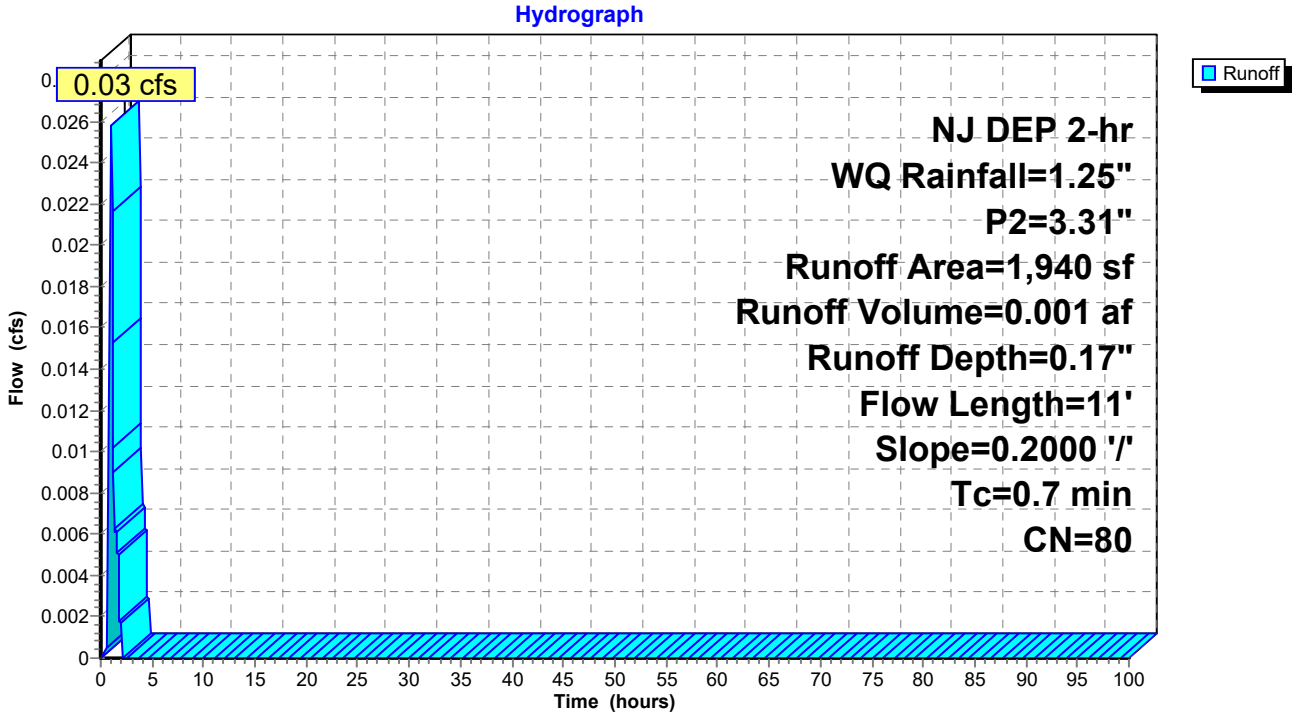
Runoff = 0.03 cfs @ 1.07 hrs, Volume= 0.001 af, Depth= 0.17"
Routed to Link P POA-1 : POA-1 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

Area (sf)	CN	Description
1,940	80	>75% Grass cover, Good, HSG D
1,940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	11	0.2000	0.28		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.31"

Subcatchment P1B-P: PDA 1B-P



Summary for Subcatchment P2A-I: PDA 2A-I

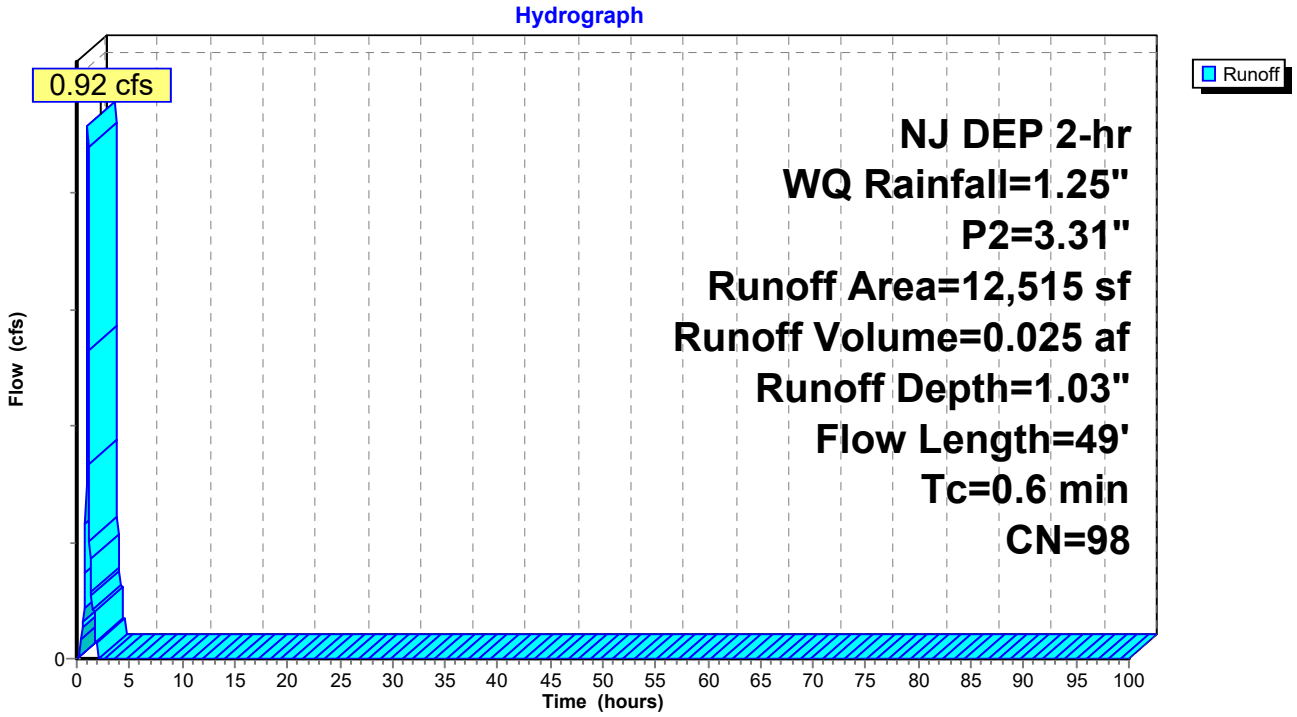
Runoff = 0.92 cfs @ 1.03 hrs, Volume= 0.025 af, Depth= 1.03"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

	Area (sf)	CN	Description
*	11,539	98	MVS Paved parking, HSG D
	976	98	Paved parking, HSG D
	12,515	98	Weighted Average
	12,515		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	30	0.0330	1.34		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.31"
0.2	19	0.0105	2.08		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.6	49	Total			

Subcatchment P2A-I: PDA 2A-I



Summary for Subcatchment P2A-P: PDA 2A-P

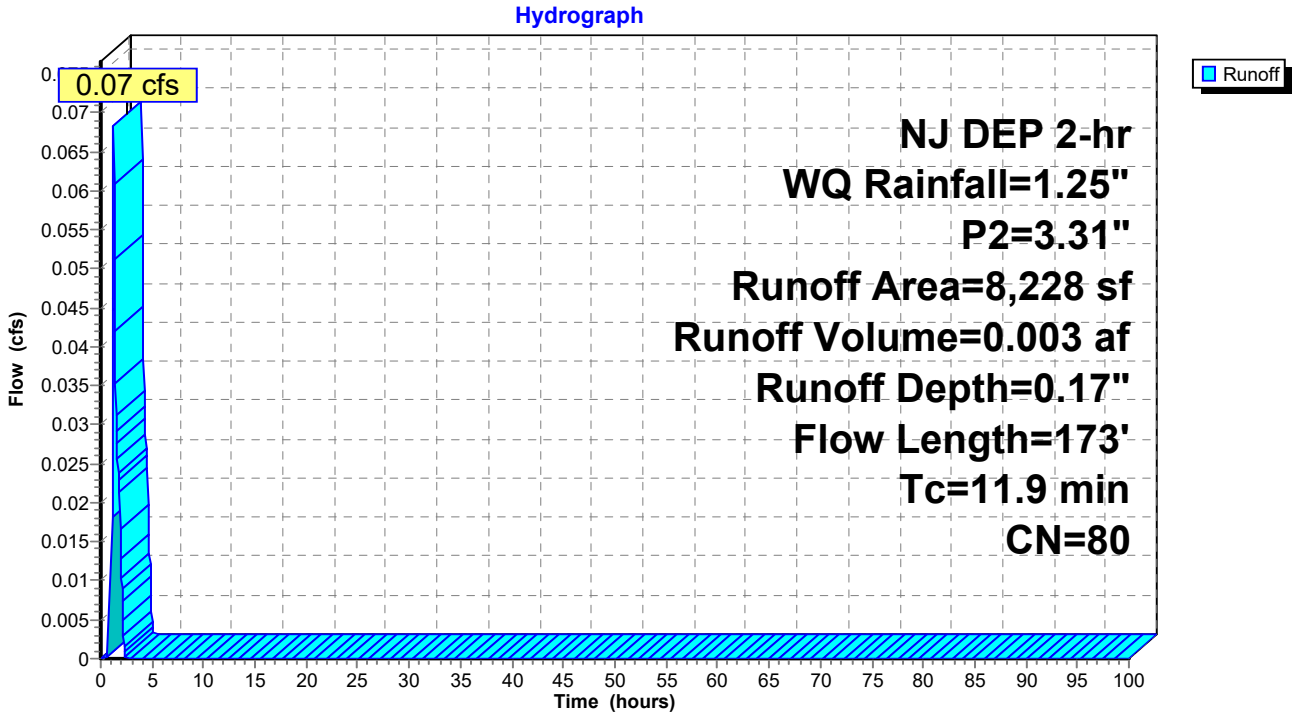
Runoff = 0.07 cfs @ 1.24 hrs, Volume= 0.003 af, Depth= 0.17"
Routed to Pond PP1 : PP-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

Area (sf)	CN	Description
8,228	80	>75% Grass cover, Good, HSG D
8,228		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	60	0.0080	0.11		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.31"
2.6	96	0.0080	0.63		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0100	2.03		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
11.9	173	Total			

Subcatchment P2A-P: PDA 2A-P



Summary for Subcatchment P2B-I: PDA 2B-I

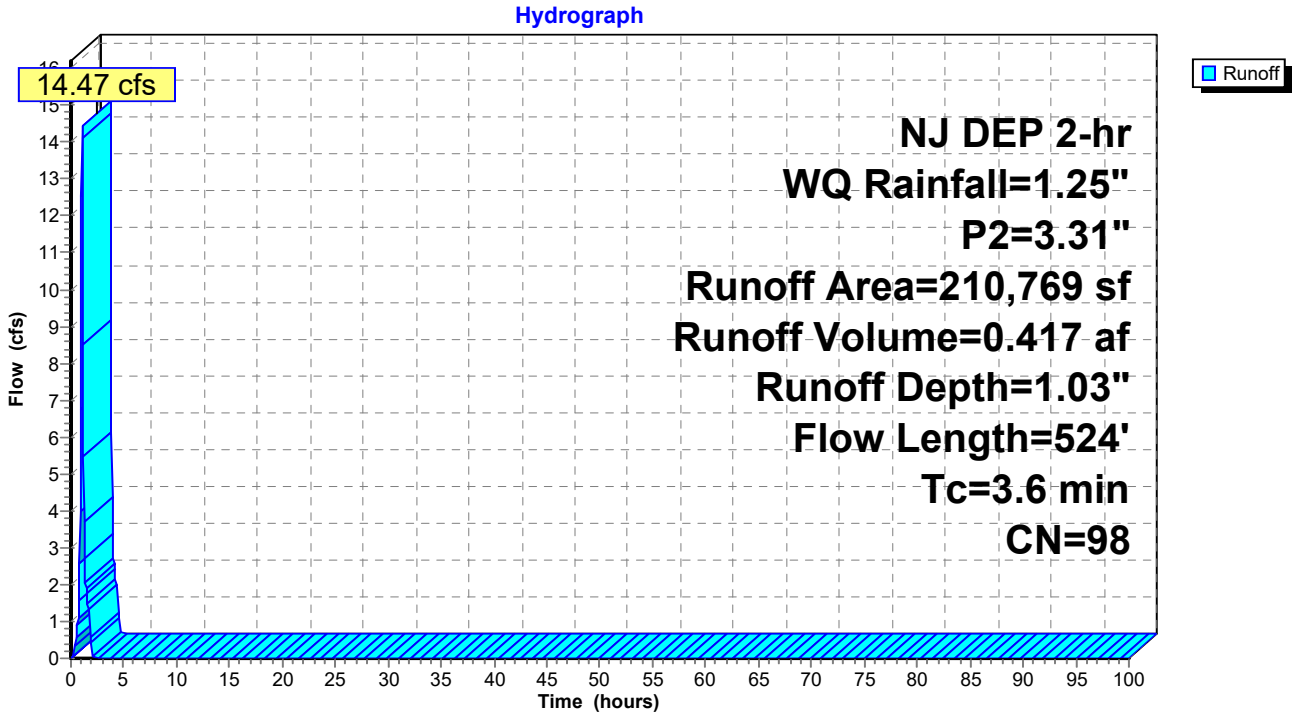
Runoff = 14.47 cfs @ 1.07 hrs, Volume= 0.417 af, Depth= 1.03"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

	Area (sf)	CN	Description
*	170,269	98	MVS Paved parking, HSG D
	40,500	98	Roofs, HSG D
	210,769	98	Weighted Average
	210,769		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0136	1.20		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.31"
1.1	155	0.0136	2.37		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.2	51	0.0050	3.79	3.79	**Pipe Channel, CD** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.6	139	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	79	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
3.6	524	Total			

Subcatchment P2B-I: PDA 2B-I



Summary for Subcatchment P2B-P: PDA 2B-P

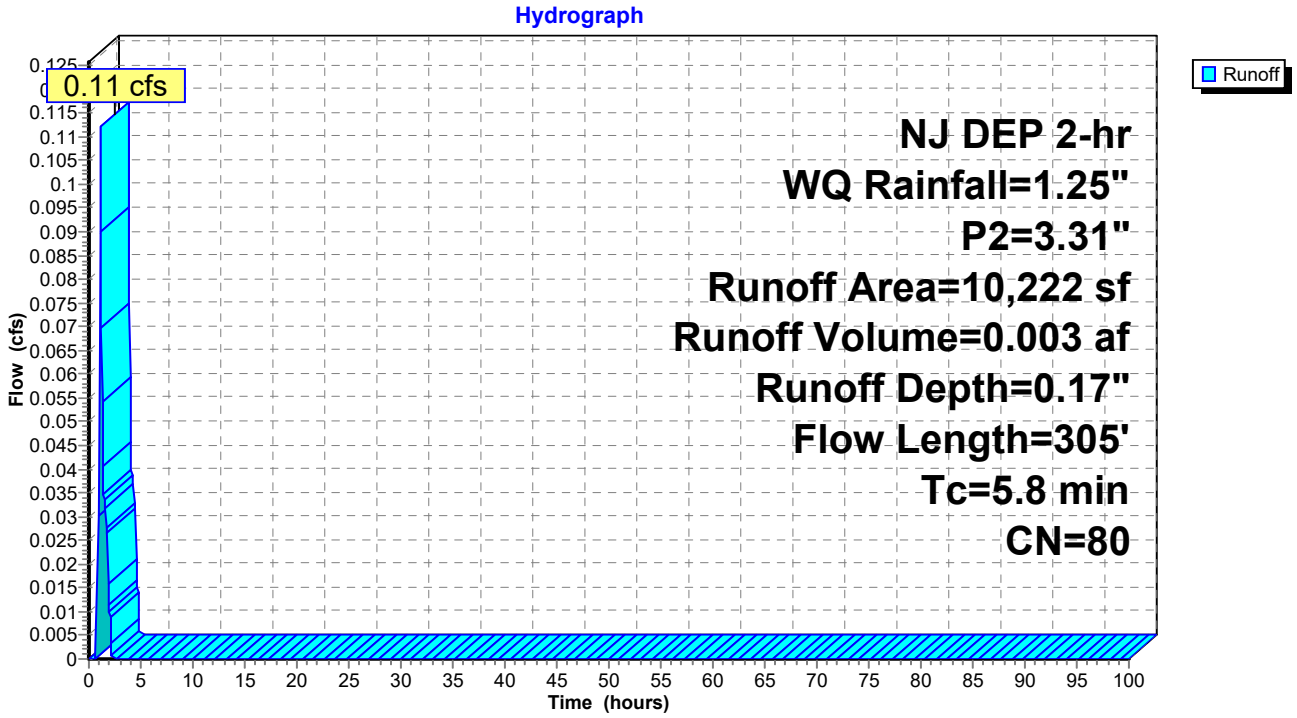
Runoff = 0.11 cfs @ 1.15 hrs, Volume= 0.003 af, Depth= 0.17"
Routed to Pond B1 : UG IB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

Area (sf)	CN	Description
10,222	80	>75% Grass cover, Good, HSG D
10,222		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	45	0.0250	0.16		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.31"
0.2	56	0.0050	3.79	3.79	**Pipe Channel, BC** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.4	98	0.0030	3.85	6.80	**Pipe Channel, CD** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.5	106	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
5.8	305	Total			

Subcatchment P2B-P: PDA 2B-P



Summary for Subcatchment P2C-I: PDA 2C-I

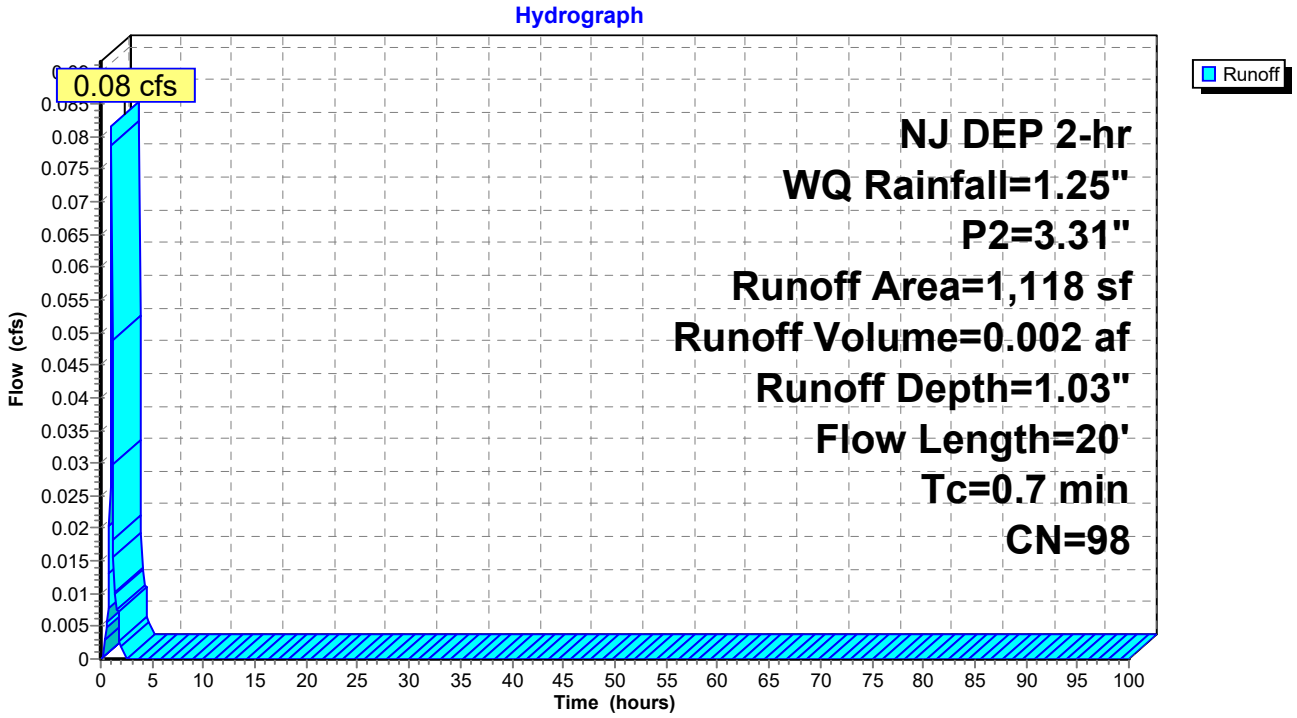
Runoff = 0.08 cfs @ 1.03 hrs, Volume= 0.002 af, Depth= 1.03"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

Area (sf)	CN	Description
1,118	98	Paved parking, HSG D
1,118		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	10	0.0150	0.79		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.31"
0.5	10	0.3000	0.32		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.31"
0.7	20	Total			

Subcatchment P2C-I: PDA 2C-I



Summary for Subcatchment P2C-P: PDA 2C-P

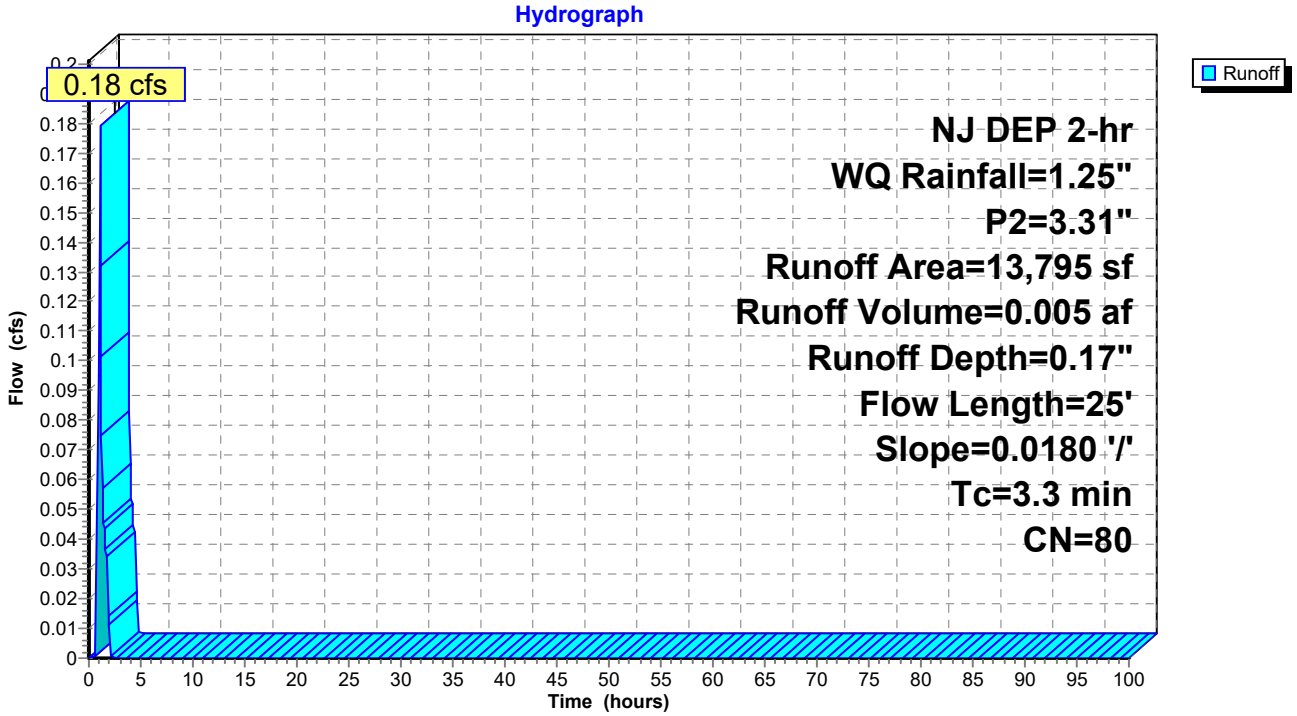
Runoff = 0.18 cfs @ 1.11 hrs, Volume= 0.005 af, Depth= 0.17"
Routed to Link P POA-2 : POA-2 PDA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

Area (sf)	CN	Description
13,795	80	>75% Grass cover, Good, HSG D
13,795		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	25	0.0180	0.13		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.31"

Subcatchment P2C-P: PDA 2C-P



Summary for Pond B1: UG IB

Inflow Area = 5.549 ac, 92.37% Impervious, Inflow Depth = 0.97" for WQ event
Inflow = 14.63 cfs @ 1.07 hrs, Volume= 0.448 af
Outflow = 0.62 cfs @ 1.95 hrs, Volume= 0.448 af, Atten= 96%, Lag= 52.7 min
Primary = 0.62 cfs @ 1.95 hrs, Volume= 0.448 af
Routed to Link P POA-2 : POA-2 PDA

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 1.68' @ 1.95 hrs Surf.Area= 38,229 sf Storage= 16,574 cf

Plug-Flow detention time= 365.0 min calculated for 0.448 af (100% of inflow)
Center-of-Mass det. time= 365.3 min (437.8 - 72.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1.05'	48 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	1.20'	102,602 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 114,639 cf Overall x 89.5% Voids
		102,650 cf	Total Available Storage

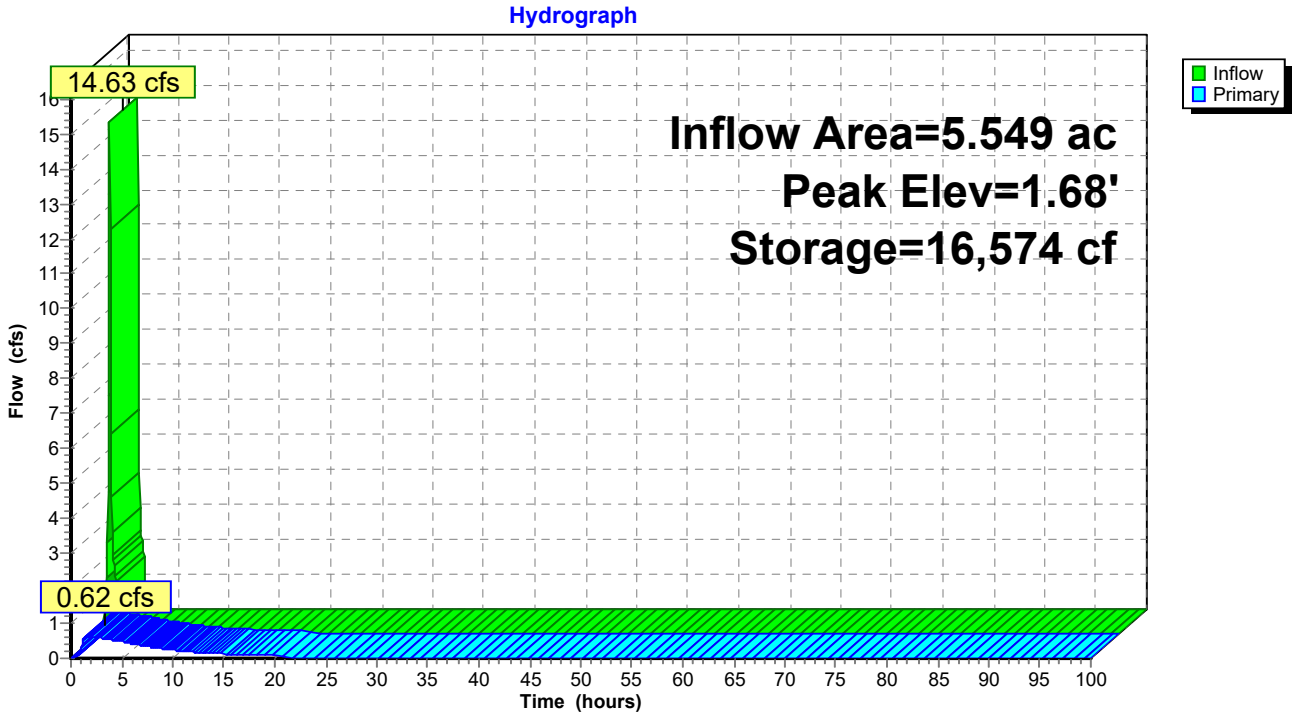
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.05	16	0	0
4.05	16	48	48

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.20	38,213	0	0
4.20	38,213	114,639	114,639

Device	Routing	Invert	Outlet Devices
#1	Primary	1.05'	**24.0" Round Culvert** L= 119.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 1.05' / 0.64' S= 0.0034 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	1.05'	**6.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	3.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.62 cfs @ 1.95 hrs HW=1.68' (Free Discharge)
↑└**1=Culvert** (Passes 0.62 cfs of 1.65 cfs potential flow)
↑ ├**2=Orifice/Grate** (Orifice Controls 0.62 cfs @ 2.95 fps)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B1: UG IB


Hydrograph
14.63 cfs
0.62 cfs
Inflow Area=5.549 ac
Peak Elev=1.68'
Storage=16,574 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Summary for Pond PP1: PP-A

Inflow Area = 0.476 ac, 60.33% Impervious, Inflow Depth = 0.69" for WQ event
Inflow = 0.92 cfs @ 1.03 hrs, Volume= 0.027 af
Outflow = 0.15 cfs @ 1.43 hrs, Volume= 0.027 af, Atten= 84%, Lag= 24.1 min
Primary = 0.15 cfs @ 1.43 hrs, Volume= 0.027 af
Routed to Pond B1 : UG IB

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 4.18' @ 1.43 hrs Surf.Area= 10,028 sf Storage= 730 cf

Plug-Flow detention time= 69.6 min calculated for 0.027 af (100% of inflow)
Center-of-Mass det. time= 69.7 min (137.2 - 67.6)

Volume	Invert	Avail.Storage	Storage Description
#1	4.00'	7,129 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 17,821 cf Overall x 40.0% Voids
#2	3.90'	30 cf	**Outlet Structure Storage (Prismatic)** Listed below (Recalc)
		7,159 cf	Total Available Storage

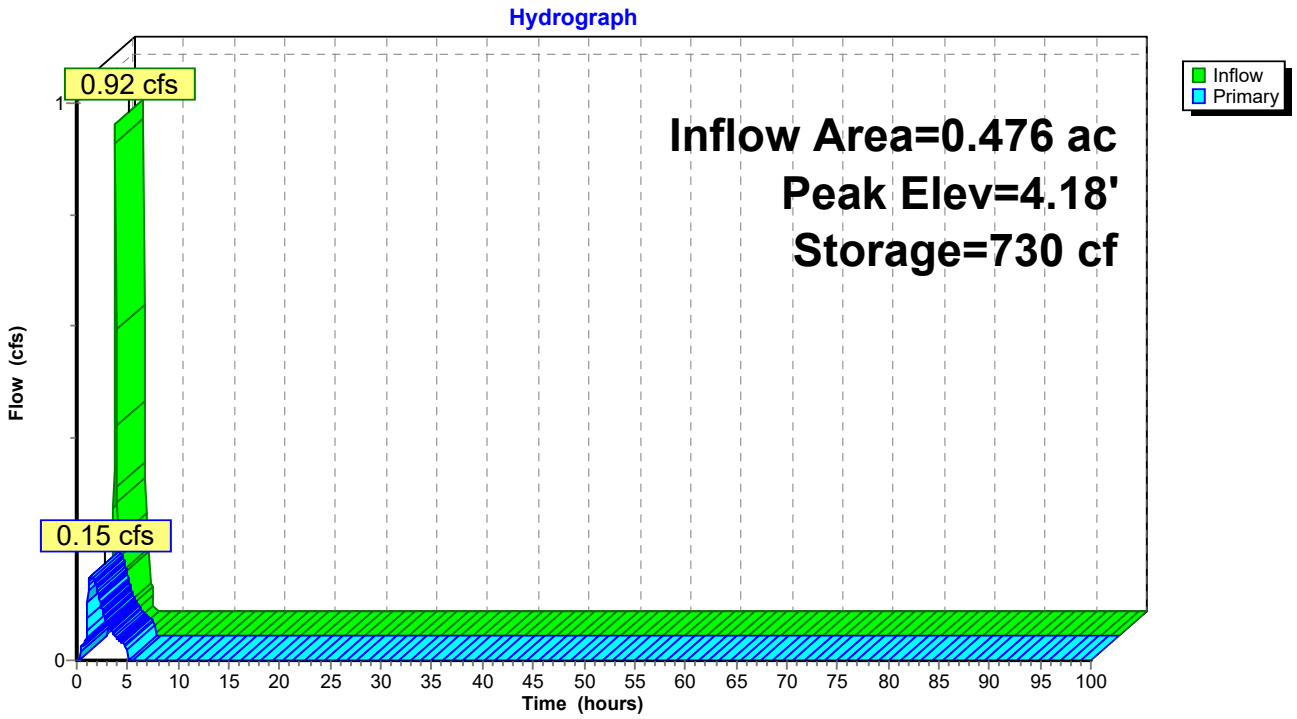
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.00	10,012	0	0
5.00	10,012	10,012	10,012
5.78	10,012	7,809	17,821

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
3.90	16	0	0
5.78	16	30	30

Device	Routing	Invert	Outlet Devices
#1	Primary	3.67'	**24.0" Round Culvert** L= 58.0' Ke= 0.200 Inlet / Outlet Invert= 3.67' / 3.38' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	3.90'	**4.2" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	5.18'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.15 cfs @ 1.43 hrs HW=4.18' (Free Discharge)
└**1=Culvert** (Passes 0.15 cfs of 1.34 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 0.15 cfs @ 1.80 fps)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PP1: PP-A

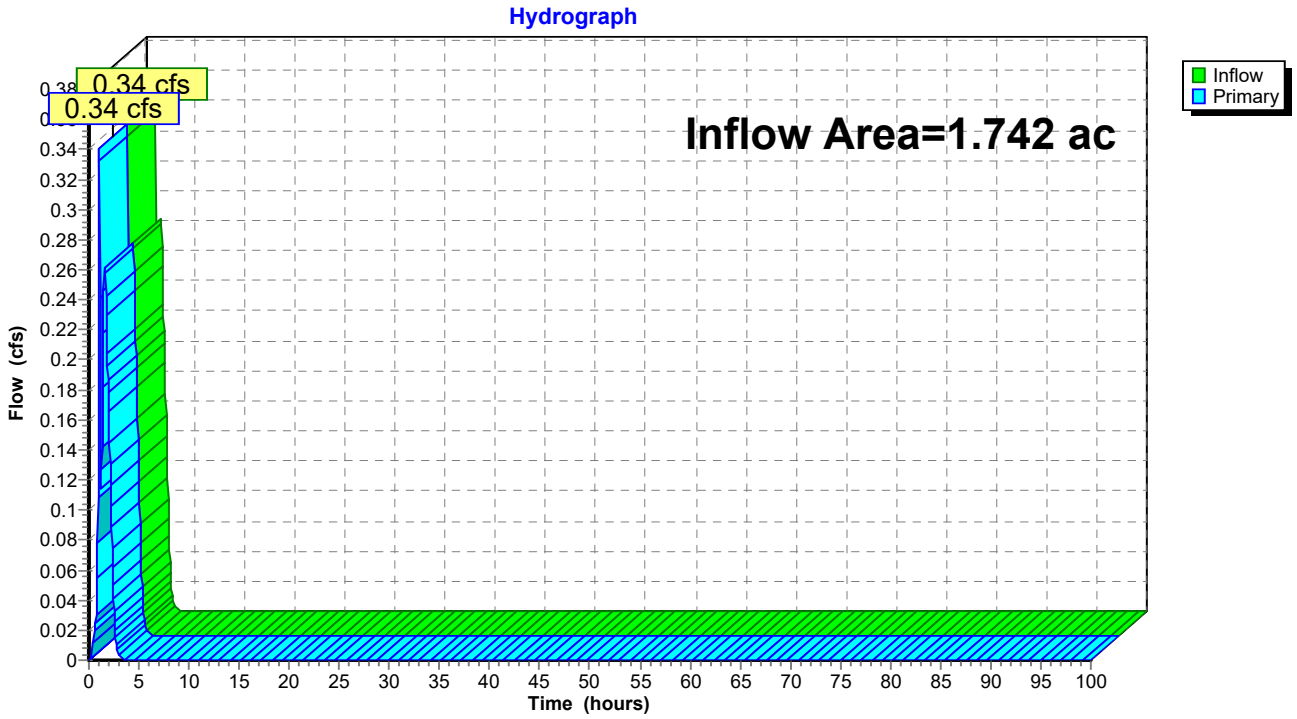

Hydrograph
0.92 cfs
0.15 cfs
Inflow Area=0.476 ac
Peak Elev=4.18'
Storage=730 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Summary for Link E POA-1: POA-1 EDA

Inflow Area = 1.742 ac, 6.23% Impervious, Inflow Depth = 0.17" for WQ event
Inflow = 0.34 cfs @ 1.03 hrs, Volume= 0.025 af
Primary = 0.34 cfs @ 1.03 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-1: POA-1 EDA

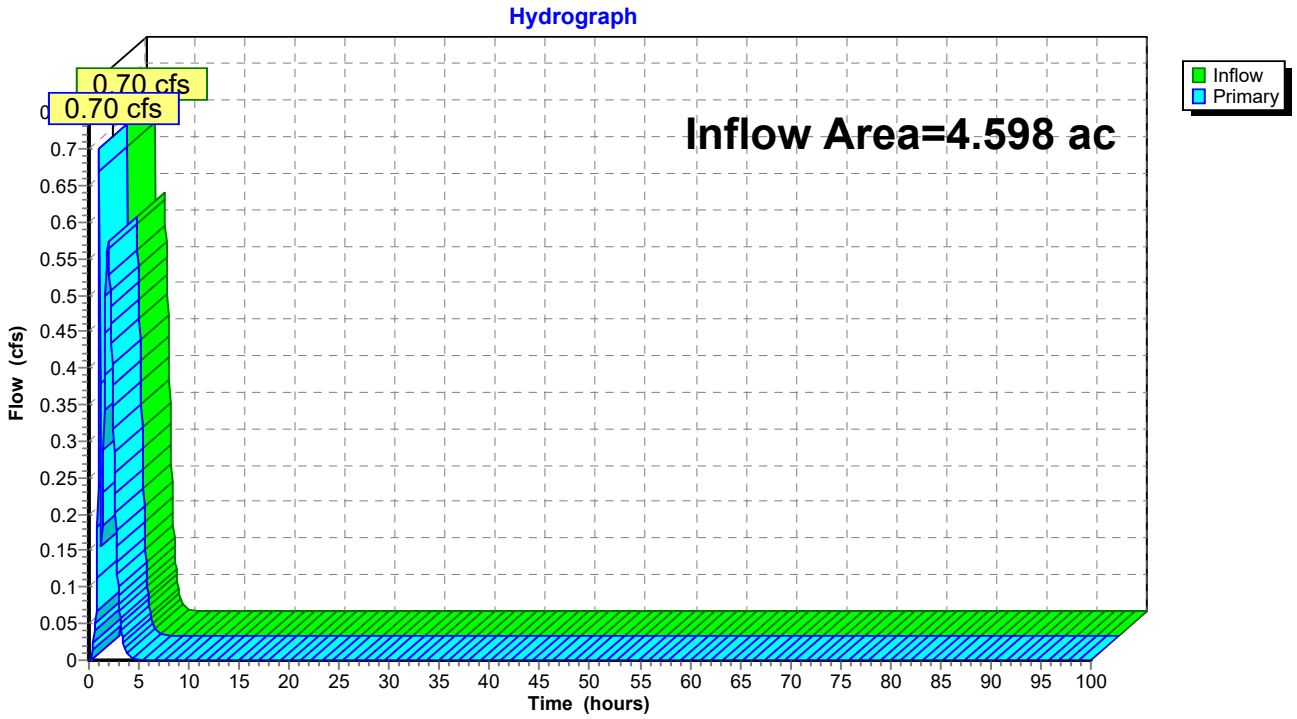


Summary for Link E POA-2: POA-2 EDA

Inflow Area = 4.598 ac, 4.74% Impervious, Inflow Depth = 0.18" for WQ event
Inflow = 0.70 cfs @ 1.03 hrs, Volume= 0.068 af
Primary = 0.70 cfs @ 1.03 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-2: POA-2 EDA

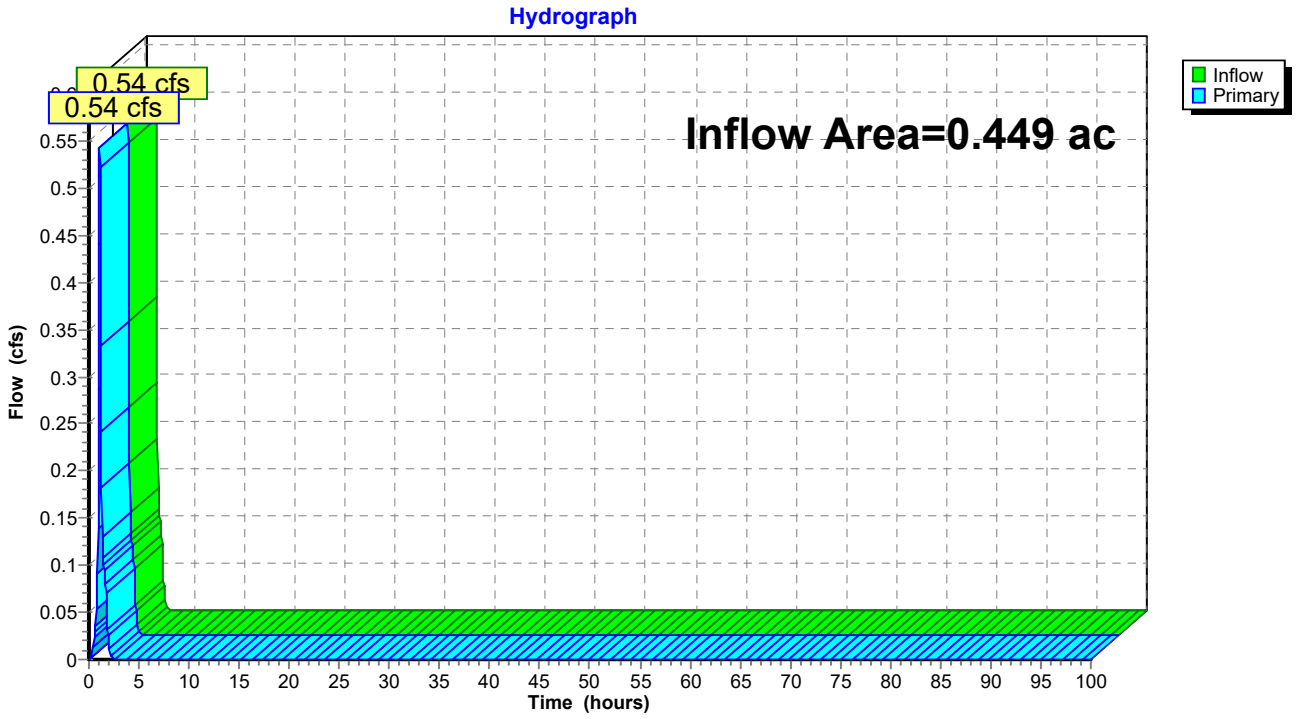


Summary for Link P POA-1: POA-1 PDA

Inflow Area = 0.449 ac, 32.97% Impervious, Inflow Depth = 0.46" for WQ event
Inflow = 0.54 cfs @ 1.08 hrs, Volume= 0.017 af
Primary = 0.54 cfs @ 1.08 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-1: POA-1 PDA

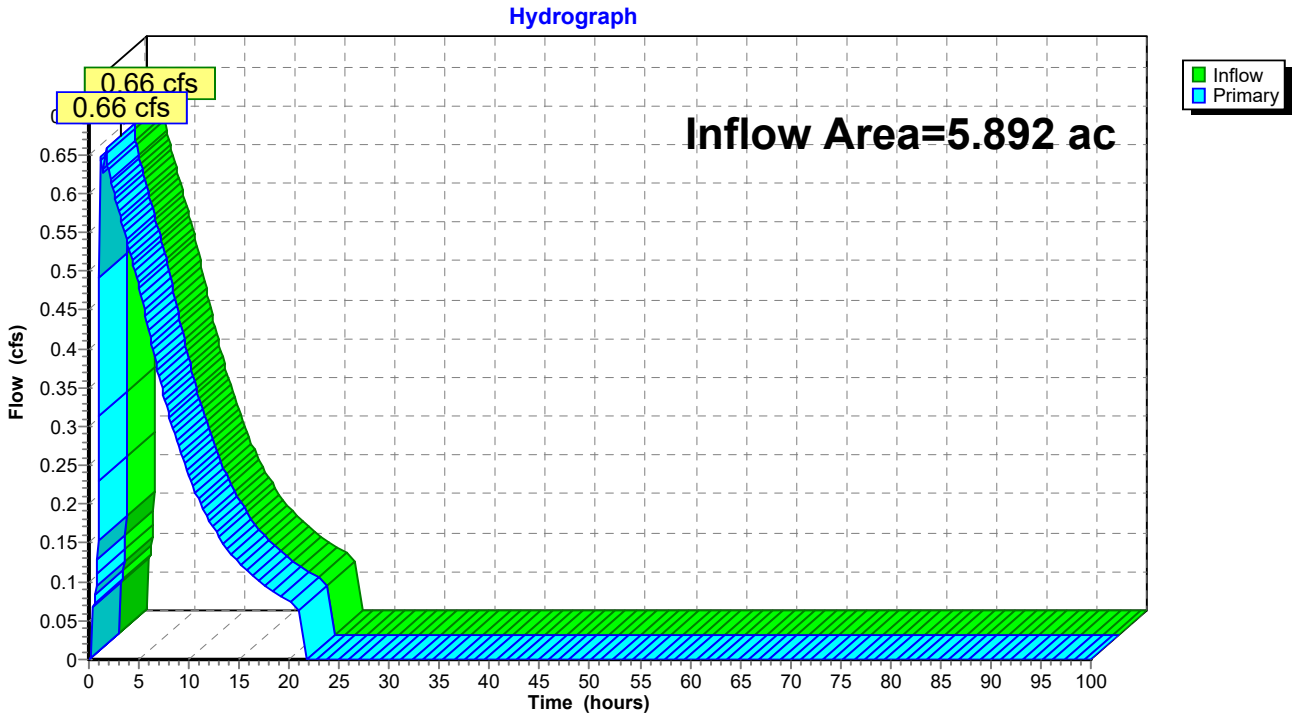


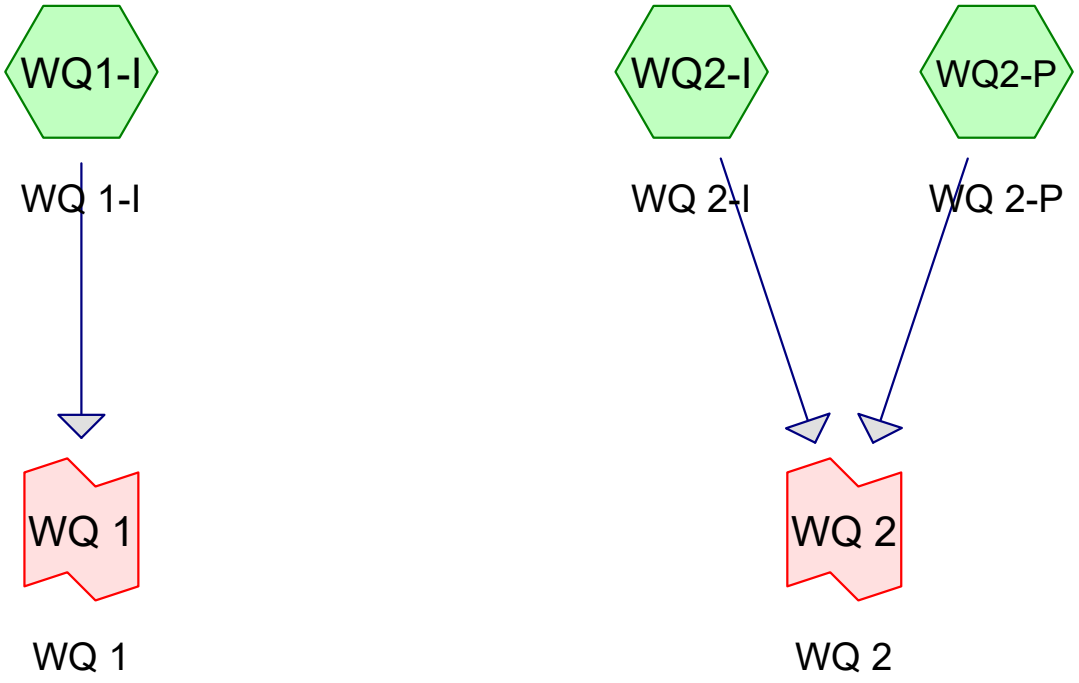
Summary for Link P POA-2: POA-2 PDA

Inflow Area = 5.892 ac, 87.44% Impervious, Inflow Depth = 0.93" for WQ event
Inflow = 0.66 cfs @ 1.73 hrs, Volume= 0.455 af
Primary = 0.66 cfs @ 1.73 hrs, Volume= 0.455 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-2: POA-2 PDA





Subcat Reach Pond Link

Routing Diagram for WQ 0d
Prepared by Bohler Engineering, PC, Printed 10/16/2025
HydroCAD® 10.20-7a s/n 03478 © 2025 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.235	80	>75% Grass cover, Good, HSG D (WQ2-P)
3.909	98	MVS Paved parking, HSG D (WQ1-I, WQ2-I)

Summary for Subcatchment WQ1-I: WQ 1-I

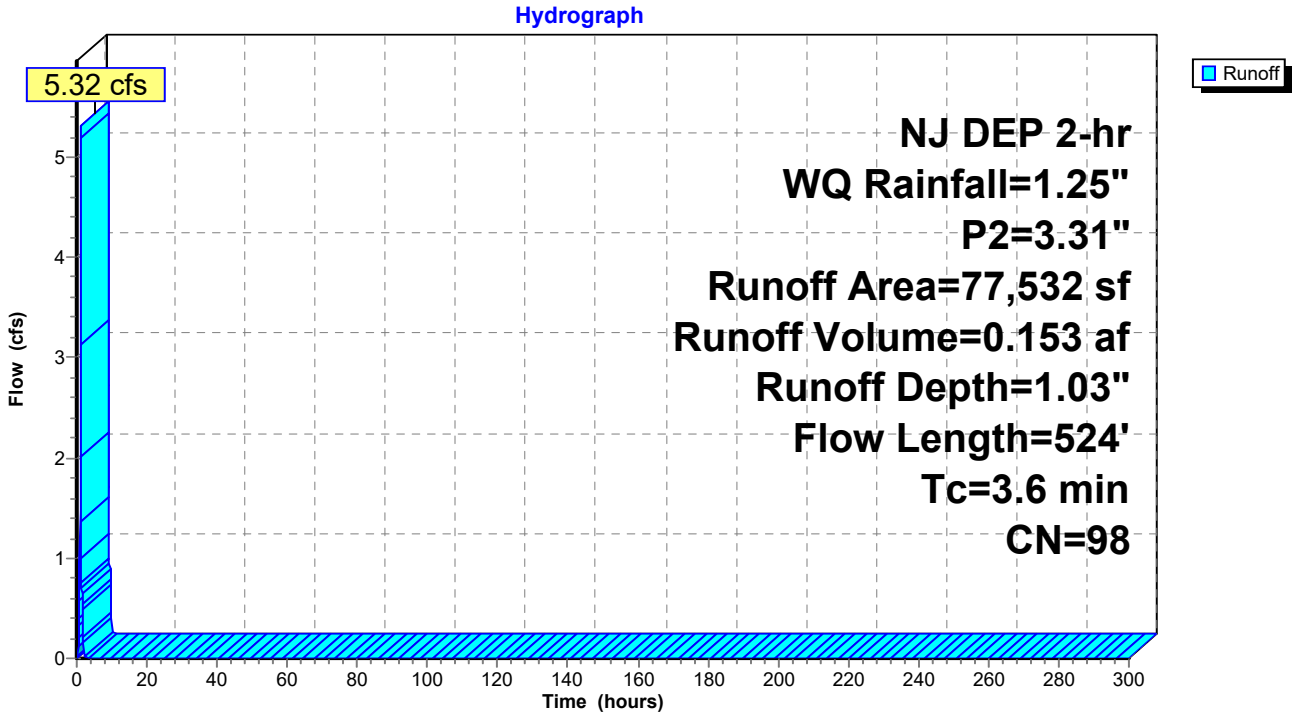
Runoff = 5.32 cfs @ 1.07 hrs, Volume= 0.153 af, Depth= 1.03"
Routed to Link WQ 1 : WQ 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

	Area (sf)	CN	Description
*	77,532	98	MVS Paved parking, HSG D
	77,532		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0136	1.20		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.31"
1.1	155	0.0136	2.37		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.2	51	0.0050	3.79	3.79	**Pipe Channel, CD** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.6	139	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	79	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
3.6	524	Total			

Subcatchment WQ1-I: WQ 1-I



Summary for Subcatchment WQ2-I: WQ 2-I

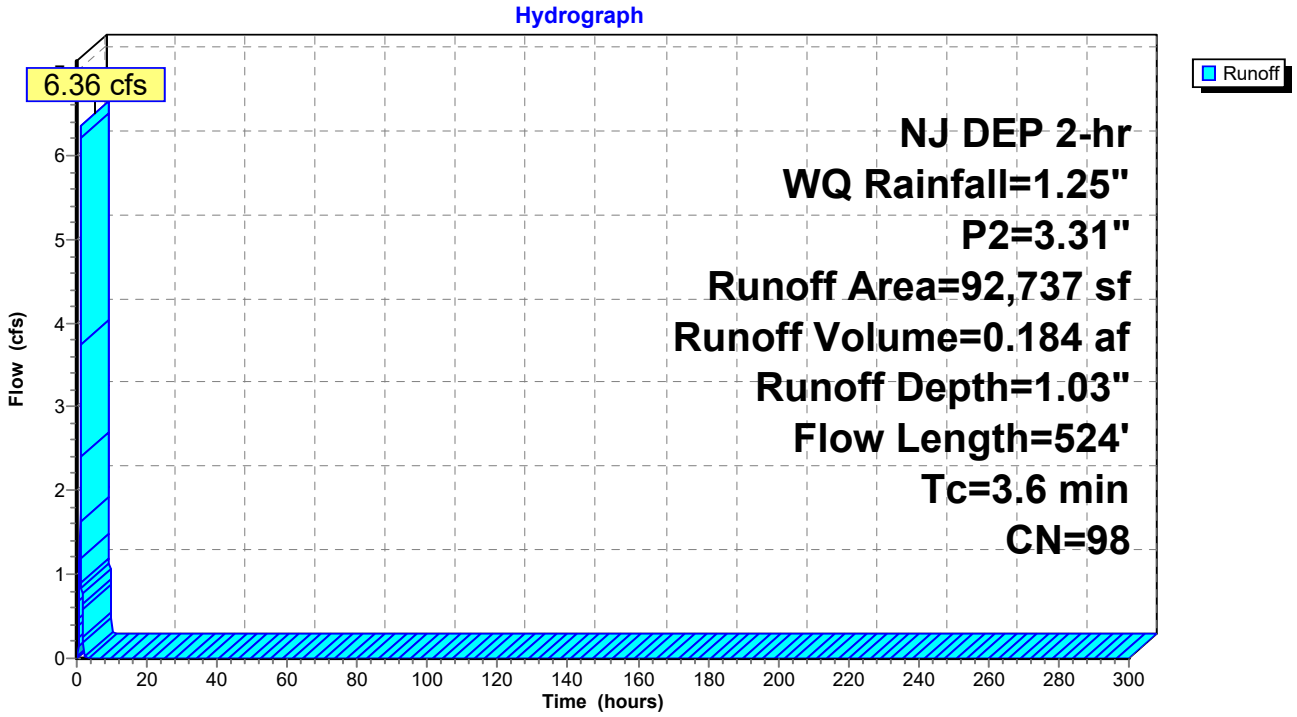
Runoff = 6.36 cfs @ 1.07 hrs, Volume= 0.184 af, Depth= 1.03"
Routed to Link WQ 2 : WQ 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

	Area (sf)	CN	Description
*	92,737	98	MVS Paved parking, HSG D
	92,737		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0136	1.20		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 3.31"
1.1	155	0.0136	2.37		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.2	51	0.0050	3.79	3.79	**Pipe Channel, CD** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.6	139	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	79	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
3.6	524	Total			

Subcatchment WQ2-I: WQ 2-I



Summary for Subcatchment WQ2-P: WQ 2-P

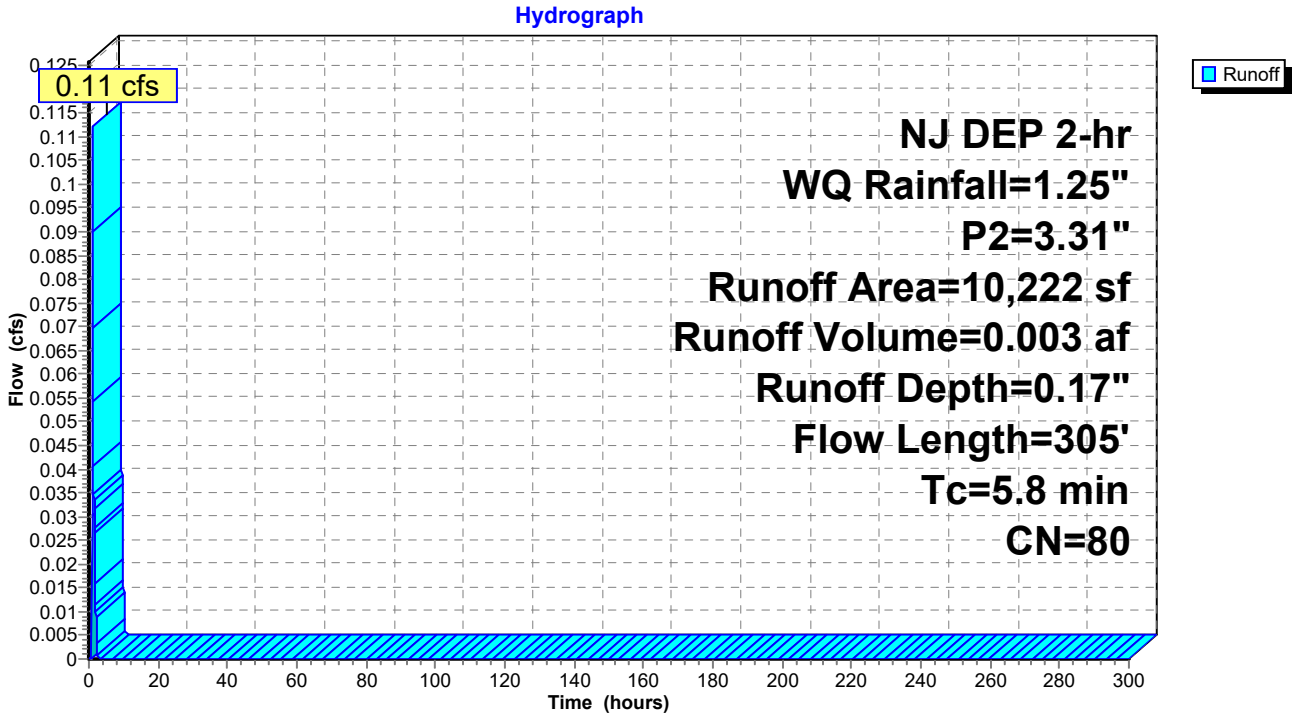
Runoff = 0.11 cfs @ 1.15 hrs, Volume= 0.003 af, Depth= 0.17"
Routed to Link WQ 2 : WQ 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25", P2=3.31"

Area (sf)	CN	Description
10,222	80	>75% Grass cover, Good, HSG D
10,222		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	45	0.0250	0.16		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.31"
0.2	56	0.0050	3.79	3.79	**Pipe Channel, BC** 12.0" x 12.0" Box Area= 1.0 sf Perim= 4.0' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.4	98	0.0030	3.85	6.80	**Pipe Channel, CD** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.5	106	0.0030	3.85	6.80	**Pipe Channel, DE** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
5.8	305	Total			

Subcatchment WQ2-P: WQ 2-P

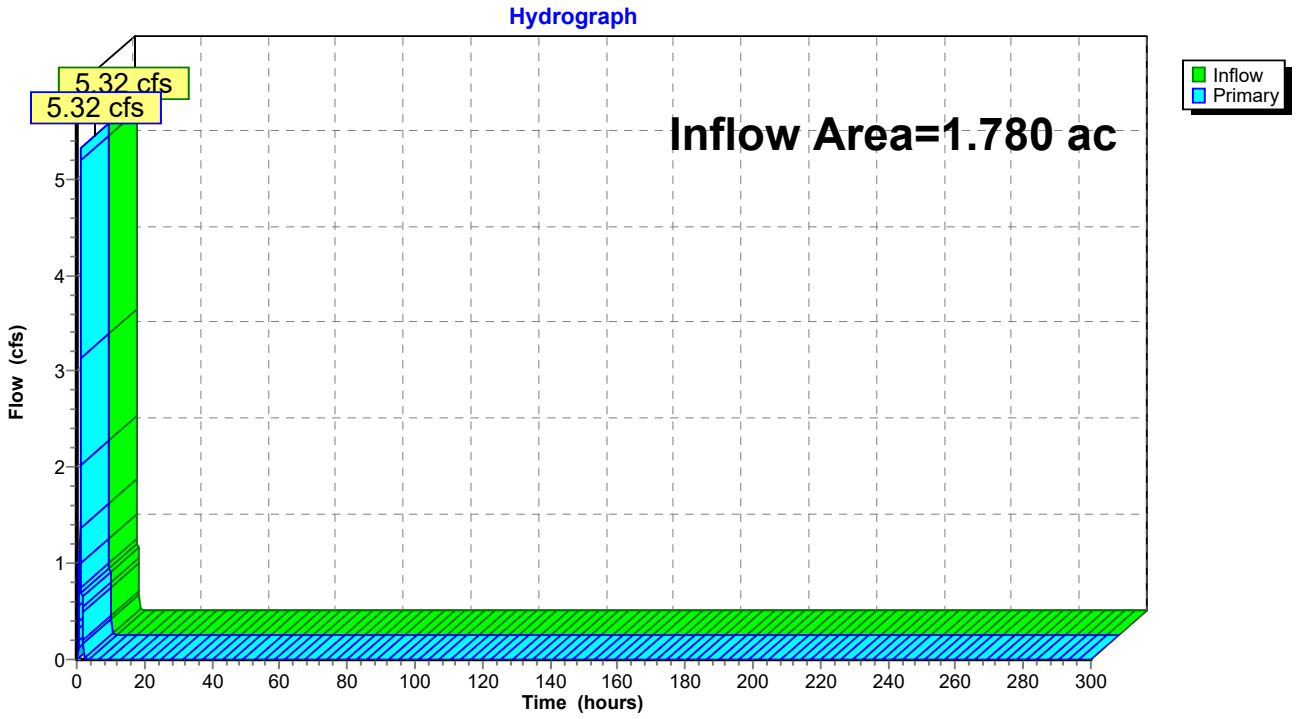


Summary for Link WQ 1: WQ 1

Inflow Area = 1.780 ac,100.00% Impervious, Inflow Depth = 1.03" for WQ event
Inflow = 5.32 cfs @ 1.07 hrs, Volume= 0.153 af
Primary = 5.32 cfs @ 1.07 hrs, Volume= 0.153 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-300.00 hrs, dt= 0.05 hrs

Link WQ 1: WQ 1

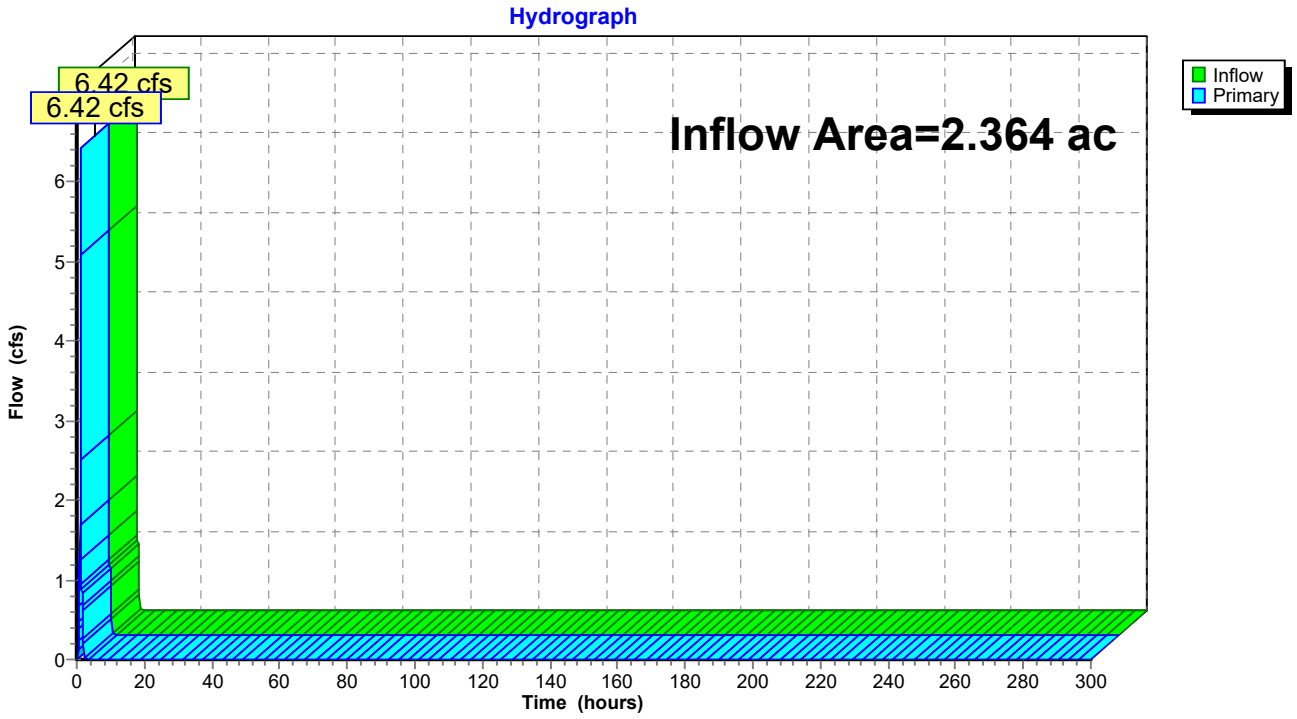


Summary for Link WQ 2: WQ 2

Inflow Area = 2.364 ac, 90.07% Impervious, Inflow Depth = 0.95" for WQ event
Inflow = 6.42 cfs @ 1.07 hrs, Volume= 0.187 af
Primary = 6.42 cfs @ 1.07 hrs, Volume= 0.187 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-300.00 hrs, dt= 0.05 hrs

Link WQ 2: WQ 2



D. DESIGN CALCULATIONS

- **Basin Drain Time**
- **Emergency Spillway**
- **Groundwater Recharge Worksheet**
- **Off-site Stability**
- **West Riser Ditch Pump Station Analysis**

Hydrograph for Pond B1: UG IB

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	1.05	0.00
0.25	0.00	0	1.05	0.00
0.50	0.09	5	1.20	0.07
0.75	0.24	95	1.20	0.07
1.00	0.34	294	1.21	0.07
1.25	0.43	572	1.22	0.08
1.50	0.49	906	1.23	0.09
1.75	0.54	1,282	1.24	0.10
2.00	0.58	1,691	1.25	0.11
2.25	0.62	2,125	1.26	0.13
2.50	0.66	2,580	1.28	0.14
2.75	0.69	3,051	1.29	0.16
3.00	0.71	3,533	1.30	0.18
3.25	0.74	4,025	1.32	0.19
3.50	0.77	4,525	1.33	0.21
3.75	0.80	5,031	1.35	0.23
4.00	0.82	5,541	1.36	0.25
4.25	0.84	6,055	1.38	0.27
4.50	0.87	6,572	1.39	0.29
4.75	0.89	7,089	1.41	0.31
5.00	0.91	7,609	1.42	0.34
5.25	0.94	8,129	1.44	0.36
5.50	0.96	8,651	1.45	0.38
5.75	0.98	9,171	1.47	0.40
6.00	1.00	9,693	1.48	0.42
6.25	1.07	10,236	1.50	0.44
6.50	1.13	10,821	1.52	0.46
6.75	1.20	11,446	1.53	0.48
7.00	1.27	12,116	1.55	0.50
7.25	1.34	12,831	1.57	0.52
7.50	1.41	13,592	1.60	0.54
7.75	1.48	14,395	1.62	0.56
8.00	1.56	15,243	1.65	0.59
8.25	1.62	16,135	1.67	0.61
8.50	1.69	17,071	1.70	0.63
8.75	1.77	18,051	1.73	0.65
9.00	1.84	19,074	1.76	0.68
9.25	2.07	20,212	1.79	0.70
9.50	2.30	21,537	1.83	0.73
9.75	2.54	23,049	1.87	0.76
10.00	2.78	24,749	1.92	0.79
10.25	3.03	26,635	1.98	0.83
10.50	3.27	28,708	2.04	0.86
10.75	4.11	31,228	2.11	0.91
11.00	4.95	34,468	2.21	0.96
11.25	6.45	38,701	2.33	1.02
11.50	7.95	44,217	2.49	1.10
11.75	13.19	52,615	2.74	1.21
12.00	**35.46**	70,667	3.27	1.44
12.25	**20.39**	**100,607**	**4.14**	**12.20**
12.50	11.84	**102,223**	**4.19**	**13.03**
12.75	7.79	99,366	4.10	11.57

Hydrograph for Pond B1: UG IB (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
13.00	6.12	95,958	4.00	9.90
13.25	4.88	92,629	3.91	8.37
13.50	4.00	89,684	3.82	7.08
13.75	3.50	87,112	3.75	6.03
14.00	3.27	85,096	3.69	5.25
14.25	3.02	83,475	3.64	4.66
14.50	2.79	82,114	3.60	4.19
14.75	2.54	80,924	3.56	3.79
15.00	2.30	79,846	3.53	3.45
15.25	2.15	78,861	3.50	3.16
15.50	2.07	78,033	3.48	2.92
15.75	2.00	77,326	3.46	2.73
16.00	1.92	76,706	3.44	2.56
16.25	1.84	76,152	3.43	2.42
16.50	1.76	75,645	3.41	2.30
16.75	1.68	75,171	3.40	2.19
17.00	1.60	74,721	3.38	2.09
17.25	1.52	74,286	3.37	2.00
17.50	1.44	73,859	3.36	1.91
17.75	1.36	73,438	3.35	1.83
18.00	1.29	73,016	3.33	1.76
18.25	1.23	72,596	3.32	1.68
18.50	1.20	72,206	3.31	1.62
18.75	1.17	71,837	3.30	1.57
19.00	1.15	71,488	3.29	1.52
19.25	1.12	71,152	3.28	1.49
19.50	1.09	70,818	3.27	1.46
19.75	1.06	70,486	3.26	1.43
20.00	1.03	70,154	3.25	1.41
20.25	1.01	69,808	3.24	1.40
20.50	0.98	69,442	3.23	1.40
20.75	0.96	69,059	3.22	1.40
21.00	0.94	68,659	3.21	1.39
21.25	0.92	68,242	3.19	1.39
21.50	0.89	67,811	3.18	1.38
21.75	0.87	67,365	3.17	1.38
22.00	0.86	66,907	3.16	1.37
22.25	0.84	66,435	3.14	1.37
22.50	0.82	65,949	3.13	1.36
22.75	0.80	65,452	3.11	1.36
23.00	0.78	64,944	3.10	1.35
23.25	0.76	64,423	3.08	1.34
23.50	0.74	63,890	3.07	1.34
23.75	0.72	63,348	3.05	1.33
24.00	0.70	62,794	3.04	1.33
24.25	0.06	61,793	3.01	1.32
24.50	0.05	60,668	2.97	1.30
24.75	0.05	59,547	2.94	1.29
25.00	0.04	58,433	2.91	1.28
25.25	0.04	57,325	2.88	1.26
25.50	0.03	56,225	2.84	1.25
25.75	0.03	55,133	2.81	1.24

Hydrograph for Pond B1: UG IB (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
26.00	0.03	54,049	2.78	1.22
26.25	0.00	52,969	2.75	1.21
26.50	0.00	51,885	2.72	1.20
26.75	0.00	50,813	2.68	1.18
27.00	0.00	49,753	2.65	1.17
27.25	0.00	48,705	2.62	1.16
27.50	0.00	47,669	2.59	1.14
27.75	0.00	46,646	2.56	1.13
28.00	0.00	45,634	2.53	1.12
28.25	0.00	44,634	2.50	1.10
28.50	0.00	43,647	2.48	1.09
28.75	0.00	42,671	2.45	1.08
29.00	0.00	41,708	2.42	1.06
29.25	0.00	40,756	2.39	1.05
29.50	0.00	39,817	2.36	1.04
29.75	0.00	38,890	2.34	1.02
30.00	0.00	37,974	2.31	1.01
30.25	0.00	37,071	2.28	1.00
30.50	0.00	36,180	2.26	0.98
30.75	0.00	35,301	2.23	0.97
31.00	0.00	34,434	2.21	0.96
31.25	0.00	33,579	2.18	0.94
31.50	0.00	32,737	2.16	0.93
31.75	0.00	31,906	2.13	0.92
32.00	0.00	31,087	2.11	0.90
32.25	0.00	30,280	2.08	0.89
32.50	0.00	29,486	2.06	0.88
32.75	0.00	28,703	2.04	0.86
33.00	0.00	27,933	2.02	0.85
33.25	0.00	27,175	1.99	0.84
33.50	0.00	26,428	1.97	0.82
33.75	0.00	25,694	1.95	0.81
34.00	0.00	24,972	1.93	0.80
34.25	0.00	24,262	1.91	0.78
34.50	0.00	23,564	1.89	0.77
34.75	0.00	22,878	1.87	0.76
35.00	0.00	22,204	1.85	0.74
35.25	0.00	21,542	1.83	0.73
35.50	0.00	20,892	1.81	0.72
35.75	0.00	20,254	1.79	0.70
36.00	0.00	19,628	1.77	0.69
36.25	0.00	19,015	1.76	0.68
36.50	0.00	18,413	1.74	0.66
36.75	0.00	17,824	1.72	0.65
37.00	0.00	17,246	1.70	0.63
37.25	0.00	16,681	1.69	0.62
37.50	0.00	16,128	1.67	0.61
37.75	0.00	15,586	1.66	0.59
38.00	0.00	15,057	1.64	0.58
38.25	0.00	14,540	1.62	0.57
38.50	0.00	14,035	1.61	0.55
38.75	0.00	13,542	1.60	0.54

Hydrograph for Pond B1: UG IB (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
39.00	0.00	13,061	1.58	0.53
39.25	0.00	12,592	1.57	0.52
39.50	0.00	12,133	1.55	0.50
39.75	0.00	11,685	1.54	0.49
40.00	0.00	11,250	1.53	0.48
40.25	0.00	10,827	1.52	0.46
40.50	0.00	10,417	1.50	0.45
40.75	0.00	10,021	1.49	0.43
41.00	0.00	9,638	1.48	0.42
41.25	0.00	9,268	1.47	0.40
41.50	0.00	8,911	1.46	0.39
41.75	0.00	8,567	1.45	0.38
42.00	0.00	8,235	1.44	0.36
42.25	0.00	7,916	1.43	0.35
42.50	0.00	7,608	1.42	0.34
42.75	0.00	7,311	1.41	0.32
43.00	0.00	7,025	1.41	0.31
43.25	0.00	6,749	1.40	0.30
43.50	0.00	6,484	1.39	0.29
43.75	0.00	6,228	1.38	0.28
44.00	0.00	5,981	1.37	0.27
44.25	0.00	5,743	1.37	0.26
44.50	0.00	5,513	1.36	0.25
44.75	0.00	5,292	1.35	0.24
45.00	0.00	5,078	1.35	0.23
45.25	0.00	4,871	1.34	0.23
45.50	0.00	4,672	1.34	0.22
45.75	0.00	4,480	1.33	0.21
46.00	0.00	4,294	1.33	0.20
46.25	0.00	4,114	1.32	0.20
46.50	0.00	3,940	1.32	0.19
46.75	0.00	3,771	1.31	0.18
47.00	0.00	3,608	1.31	0.18
47.25	0.00	3,451	1.30	0.17
47.50	0.00	3,298	1.30	0.17
47.75	0.00	3,150	1.29	0.16
48.00	0.00	3,007	1.29	0.16
48.25	0.00	2,868	1.28	0.15
48.50	0.00	2,733	1.28	0.15
48.75	0.00	2,603	1.28	0.14
49.00	0.00	2,476	1.27	0.14
49.25	0.00	2,353	1.27	0.13
49.50	0.00	2,234	1.27	0.13
49.75	0.00	2,118	1.26	0.13
50.00	0.00	2,005	1.26	0.12
50.25	0.00	1,895	1.26	0.12
50.50	0.00	1,788	1.25	0.12
50.75	0.00	1,685	1.25	0.11
51.00	0.00	1,584	1.25	0.11
51.25	0.00	1,486	1.24	0.11
51.50	0.00	1,390	1.24	0.10
51.75	0.00	1,298	1.24	0.10

Hydrograph for Pond B1: UG IB (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
52.00	0.00	1,207	1.24	0.10
52.25	0.00	1,119	1.23	0.10
52.50	0.00	1,033	1.23	0.09
52.75	0.00	949	1.23	0.09
53.00	0.00	867	1.23	0.09
53.25	0.00	787	1.22	0.09
53.50	0.00	709	1.22	0.09
53.75	0.00	633	1.22	0.08
54.00	0.00	559	1.22	0.08
54.25	0.00	487	1.21	0.08
54.50	0.00	416	1.21	0.08
54.75	0.00	348	1.21	0.08
55.00	0.00	280	1.21	0.07
55.25	0.00	215	1.21	0.07
55.50	0.00	151	1.20	0.07
55.75	0.00	88	1.20	0.07
56.00	0.00	27	1.20	0.07
56.25	0.00	0	1.05	0.00
56.50	0.00	0	1.05	0.00
56.75	0.00	0	1.05	0.00
57.00	0.00	0	1.05	0.00
57.25	0.00	0	1.05	0.00
57.50	0.00	0	1.05	0.00
57.75	0.00	0	1.05	0.00
58.00	0.00	0	1.05	0.00
58.25	0.00	0	1.05	0.00
58.50	0.00	0	1.05	0.00
58.75	0.00	0	1.05	0.00
59.00	0.00	0	1.05	0.00
59.25	0.00	0	1.05	0.00
59.50	0.00	0	1.05	0.00
59.75	0.00	0	1.05	0.00
60.00	0.00	0	1.05	0.00
60.25	0.00	0	1.05	0.00
60.50	0.00	0	1.05	0.00
60.75	0.00	0	1.05	0.00
61.00	0.00	0	1.05	0.00
61.25	0.00	0	1.05	0.00
61.50	0.00	0	1.05	0.00
61.75	0.00	0	1.05	0.00
62.00	0.00	0	1.05	0.00
62.25	0.00	0	1.05	0.00
62.50	0.00	0	1.05	0.00
62.75	0.00	0	1.05	0.00
63.00	0.00	0	1.05	0.00
63.25	0.00	0	1.05	0.00
63.50	0.00	0	1.05	0.00
63.75	0.00	0	1.05	0.00
64.00	0.00	0	1.05	0.00
64.25	0.00	0	1.05	0.00
64.50	0.00	0	1.05	0.00
64.75	0.00	0	1.05	0.00

Hydrograph for Pond PP1: PP-A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	3.90	0.00
0.25	0.00	0	3.90	0.00
0.50	0.01	1	3.95	0.01
0.75	0.01	1	3.97	0.01
1.00	0.02	1	3.99	0.02
1.25	0.02	2	4.00	0.02
1.50	0.03	3	4.00	0.02
1.75	0.03	8	4.00	0.03
2.00	0.03	14	4.00	0.03
2.25	0.04	21	4.00	0.03
2.50	0.04	30	4.01	0.03
2.75	0.04	39	4.01	0.03
3.00	0.04	49	4.01	0.03
3.25	0.04	59	4.01	0.03
3.50	0.04	69	4.02	0.03
3.75	0.05	79	4.02	0.03
4.00	0.05	90	4.02	0.04
4.25	0.05	102	4.02	0.04
4.50	0.05	114	4.03	0.04
4.75	0.06	127	4.03	0.04
5.00	0.06	140	4.03	0.04
5.25	0.06	154	4.04	0.04
5.50	0.06	167	4.04	0.05
5.75	0.06	181	4.04	0.05
6.00	0.07	195	4.05	0.05
6.25	0.07	210	4.05	0.05
6.50	0.08	228	4.06	0.06
6.75	0.08	248	4.06	0.06
7.00	0.09	270	4.07	0.06
7.25	0.09	294	4.07	0.07
7.50	0.10	319	4.08	0.07
7.75	0.11	345	4.09	0.08
8.00	0.11	373	4.09	0.08
8.25	0.12	401	4.10	0.09
8.50	0.12	431	4.11	0.09
8.75	0.13	461	4.11	0.10
9.00	0.14	491	4.12	0.10
9.25	0.16	528	4.13	0.11
9.50	0.18	574	4.14	0.12
9.75	0.20	630	4.16	0.13
10.00	0.22	693	4.17	0.14
10.25	0.24	763	4.19	0.16
10.50	0.26	839	4.21	0.17
10.75	0.33	945	4.23	0.19
11.00	0.41	1,098	4.27	0.21
11.25	0.53	1,320	4.33	0.23
11.50	0.70	1,635	4.41	0.27
11.75	1.17	2,179	4.54	0.32
12.00	**3.22**	3,593	4.89	0.42
12.25	**2.14**	**5,614**	**5.40**	**1.83**
12.50	1.00	**5,392**	**5.34**	**1.36**
12.75	0.65	5,120	5.27	0.88

Hydrograph for Pond PP1: PP-A (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
13.00	0.51	4,960	5.23	0.66
13.25	0.40	4,835	5.20	0.54
13.50	0.33	4,712	5.17	0.49
13.75	0.28	4,549	5.13	0.48
14.00	0.26	4,369	5.09	0.47
14.25	0.24	4,178	5.04	0.45
14.50	0.22	3,979	4.99	0.44
14.75	0.20	3,772	4.94	0.43
15.00	0.18	3,558	4.88	0.42
15.25	0.16	3,340	4.83	0.40
15.50	0.16	3,127	4.78	0.39
15.75	0.15	2,922	4.73	0.37
16.00	0.14	2,725	4.68	0.36
16.25	0.14	2,535	4.63	0.35
16.50	0.13	2,352	4.58	0.33
16.75	0.13	2,178	4.54	0.32
17.00	0.12	2,011	4.50	0.30
17.25	0.11	1,851	4.46	0.29
17.50	0.11	1,699	4.42	0.27
17.75	0.10	1,555	4.39	0.26
18.00	0.10	1,419	4.35	0.24
18.25	0.09	1,291	4.32	0.23
18.50	0.09	1,174	4.29	0.22
18.75	0.09	1,068	4.27	0.20
19.00	0.09	972	4.24	0.19
19.25	0.09	886	4.22	0.18
19.50	0.09	810	4.20	0.16
19.75	0.08	744	4.18	0.15
20.00	0.08	687	4.17	0.14
20.25	0.08	638	4.16	0.13
20.50	0.08	596	4.15	0.12
20.75	0.08	559	4.14	0.12
21.00	0.08	527	4.13	0.11
21.25	0.08	499	4.12	0.10
21.50	0.07	474	4.12	0.10
21.75	0.07	452	4.11	0.10
22.00	0.07	432	4.11	0.09
22.25	0.07	414	4.10	0.09
22.50	0.07	397	4.10	0.09
22.75	0.07	382	4.09	0.08
23.00	0.06	368	4.09	0.08
23.25	0.06	355	4.09	0.08
23.50	0.06	342	4.08	0.08
23.75	0.06	330	4.08	0.07
24.00	0.05	318	4.08	0.07
24.25	0.00	272	4.07	0.06
24.50	0.00	220	4.05	0.05
24.75	0.00	174	4.04	0.05
25.00	0.00	134	4.03	0.04
25.25	0.00	99	4.02	0.04
25.50	0.00	68	4.02	0.03
25.75	0.00	40	4.01	0.03

Hydrograph for Pond PP1: PP-A (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
26.00	0.00	15	4.00	0.03
26.25	0.00	0	3.90	0.00
26.50	0.00	0	3.90	0.00
26.75	0.00	0	3.90	0.00
27.00	0.00	0	3.90	0.00
27.25	0.00	0	3.90	0.00
27.50	0.00	0	3.90	0.00
27.75	0.00	0	3.90	0.00
28.00	0.00	0	3.90	0.00
28.25	0.00	0	3.90	0.00
28.50	0.00	0	3.90	0.00
28.75	0.00	0	3.90	0.00
29.00	0.00	0	3.90	0.00
29.25	0.00	0	3.90	0.00
29.50	0.00	0	3.90	0.00
29.75	0.00	0	3.90	0.00
30.00	0.00	0	3.90	0.00
30.25	0.00	0	3.90	0.00
30.50	0.00	0	3.90	0.00
30.75	0.00	0	3.90	0.00
31.00	0.00	0	3.90	0.00
31.25	0.00	0	3.90	0.00
31.50	0.00	0	3.90	0.00
31.75	0.00	0	3.90	0.00
32.00	0.00	0	3.90	0.00
32.25	0.00	0	3.90	0.00
32.50	0.00	0	3.90	0.00
32.75	0.00	0	3.90	0.00
33.00	0.00	0	3.90	0.00
33.25	0.00	0	3.90	0.00
33.50	0.00	0	3.90	0.00
33.75	0.00	0	3.90	0.00
34.00	0.00	0	3.90	0.00
34.25	0.00	0	3.90	0.00
34.50	0.00	0	3.90	0.00
34.75	0.00	0	3.90	0.00
35.00	0.00	0	3.90	0.00
35.25	0.00	0	3.90	0.00
35.50	0.00	0	3.90	0.00
35.75	0.00	0	3.90	0.00
36.00	0.00	0	3.90	0.00
36.25	0.00	0	3.90	0.00
36.50	0.00	0	3.90	0.00
36.75	0.00	0	3.90	0.00
37.00	0.00	0	3.90	0.00
37.25	0.00	0	3.90	0.00
37.50	0.00	0	3.90	0.00
37.75	0.00	0	3.90	0.00
38.00	0.00	0	3.90	0.00
38.25	0.00	0	3.90	0.00
38.50	0.00	0	3.90	0.00
38.75	0.00	0	3.90	0.00

Summary for Pond 3P: PP-A

Inflow Area = 0.476 ac, 60.33% Impervious, Inflow Depth = 10.19" for 100-Year Future event
Inflow = 4.34 cfs @ 12.06 hrs, Volume= 0.404 af
Outflow = 6.68 cfs @ 12.05 hrs, Volume= 0.245 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 6.68 cfs @ 12.05 hrs, Volume= 0.245 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 6.86' @ 12.07 hrs Surf.Area= 10,028 sf Storage= 7,159 cf

Plug-Flow detention time= 235.3 min calculated for 0.245 af (61% of inflow)
Center-of-Mass det. time= 113.6 min (869.7 - 756.1)

Volume	Invert	Avail.Storage	Storage Description
#1	4.00'	7,129 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 17,821 cf Overall x 40.0% Voids
#2	3.90'	30 cf	**Outlet Structure Storage (Prismatic)** Listed below (Recalc)
		7,159 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.00	10,012	0	0
5.00	10,012	10,012	10,012
5.78	10,012	7,809	17,821

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
3.90	16	0	0
5.78	16	30	30

Device	Routing	Invert	Outlet Devices
#1	Primary	3.67'	**24.0" Round Culvert X 0.00** L= 58.0' Ke= 0.200 Inlet / Outlet Invert= 3.67' / 3.38' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	3.90'	**4.2" Vert. Orifice/Grate X 0.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	5.18'	**4.0' long Sharp-Crested Rectangular Weir X 0.00** 2 End Contraction(s)
#4	Secondary	6.45'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=3.90' (Free Discharge)
↑1=**Culvert** (Controls 0.00 cfs)
↑2=**Orifice/Grate** (Controls 0.00 cfs)
3=**Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=6.26 cfs @ 12.05 hrs HW=6.78' (Free Discharge)
↑4=**Orifice/Grate** (Weir Controls 6.26 cfs @ 1.89 fps)

In an emergency condition when the outlet structure fails, stormwater will rise out of the lowest inlet (A-60) and flow through the grass area.

Summary for Pond B1: UG IB

Inflow Area = 5.549 ac, 92.37% Impervious, Inflow Depth = 10.92" for 100-Year Future event
Inflow = 58.54 cfs @ 12.09 hrs, Volume= 5.052 af
Outflow = 58.94 cfs @ 12.12 hrs, Volume= 2.703 af, Atten= 0%, Lag= 1.4 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link P POA-2 : POA-2 PDA
Secondary = 58.94 cfs @ 12.12 hrs, Volume= 2.703 af
Routed to Link P POA-2 : POA-2 PDA

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 6.97' @ 12.12 hrs Surf.Area= 38,229 sf Storage= 102,650 cf

Plug-Flow detention time= 289.0 min calculated for 2.701 af (53% of inflow)
Center-of-Mass det. time= 143.8 min (891.3 - 747.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1.05'	48 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	1.20'	102,602 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 114,639 cf Overall x 89.5% Voids
		102,650 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.05	16	0	0
4.05	16	48	48

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.20	38,213	0	0
4.20	38,213	114,639	114,639

Device	Routing	Invert	Outlet Devices
#1	Primary	1.05'	**24.0" Round Culvert X 0.00** L= 119.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 1.05' / 0.64' S= 0.0034 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	1.05'	**6.2" Vert. Orifice/Grate X 0.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	3.25'	**4.0' long Sharp-Crested Rectangular Weir X 0.00** 2 End Contraction(s)
#4	Secondary	6.32'	**24.0" x 480.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1.05' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=51.43 cfs @ 12.12 hrs HW=6.65' (Free Discharge)
└**4=Orifice/Grate** (Weir Controls 51.43 cfs @ 1.87 fps)

In an emergency condition when the outlet structure fails, stormwater will rise out of the lowest trench drain (elevation 6.32) and flow through the wetland area.

New Jersey Groundwater Recharge Spreadsheet Version 2.0 November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
BERGEN CO., TETERBORO BORO	43.2	1.40

Project Name:	**Signature Aviation USA, LLC**
Description:	**East Side Ramp Expansion**
Analysis Date:	**10/14/25**

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	4.03	Woods	Udorthents	0.0	-
2	1.98	Open space	Udorthents	0.0	-
3	0.33	Impervious areas	Udorthents	0.0	-
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
Total =	6.3			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				0.0	-

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	5.3	Impervious areas	Udorthents	0.0	-
2	1.04	Open space	Udorthents	0.0	-
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
Total =	6.3			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				0.0	-

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	230,868
Post-Development Annual Recharge Deficit=	***0***	(cubic feet)	

Recharge Efficiency Parameters Calculations (area averages)

RWC=	#N/A	(in)	DRWC=	#N/A	(in)
ERWC =	#N/A	(in)	EDRWC=	#N/A	(in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

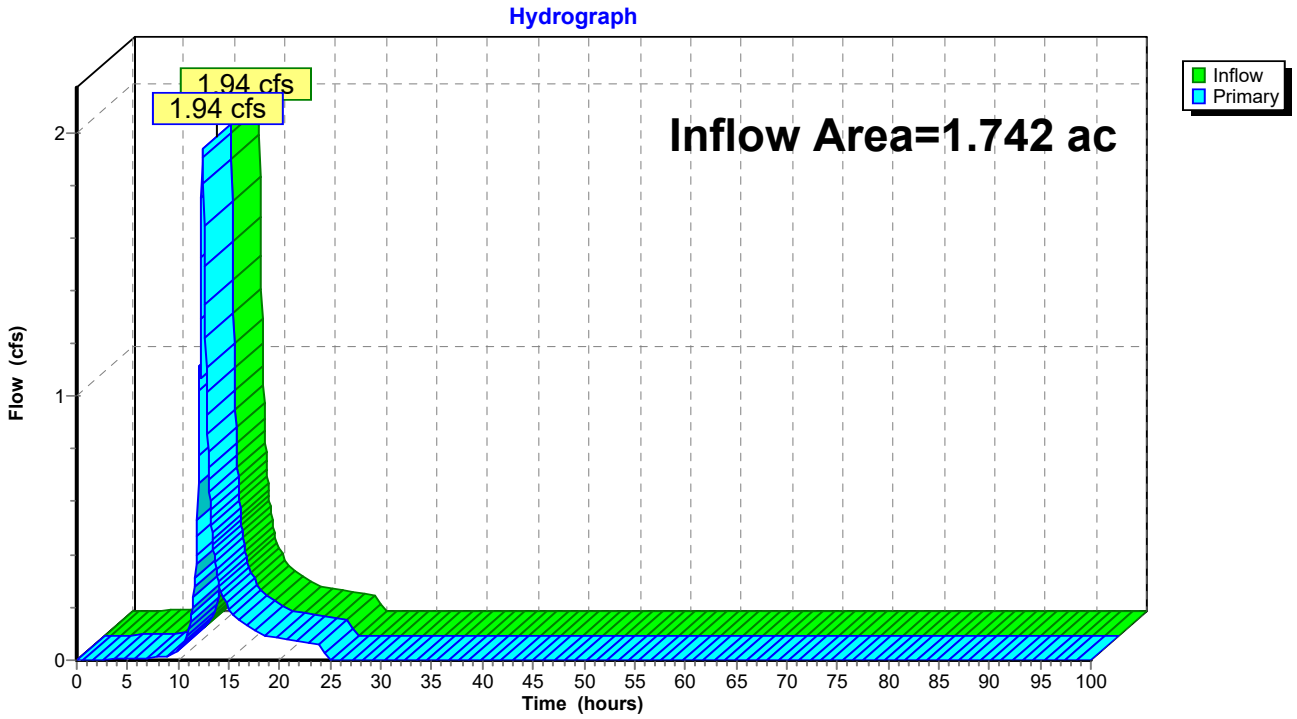
For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Summary for Link E POA-1: POA-1 EDA

Inflow Area = 1.742 ac, 6.23% Impervious, Inflow Depth = 1.91" for 2-Year- Future event
Inflow = 1.94 cfs @ 12.41 hrs, Volume= 0.277 af
Primary = 1.94 cfs @ 12.41 hrs, Volume= 0.277 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-1: POA-1 EDA

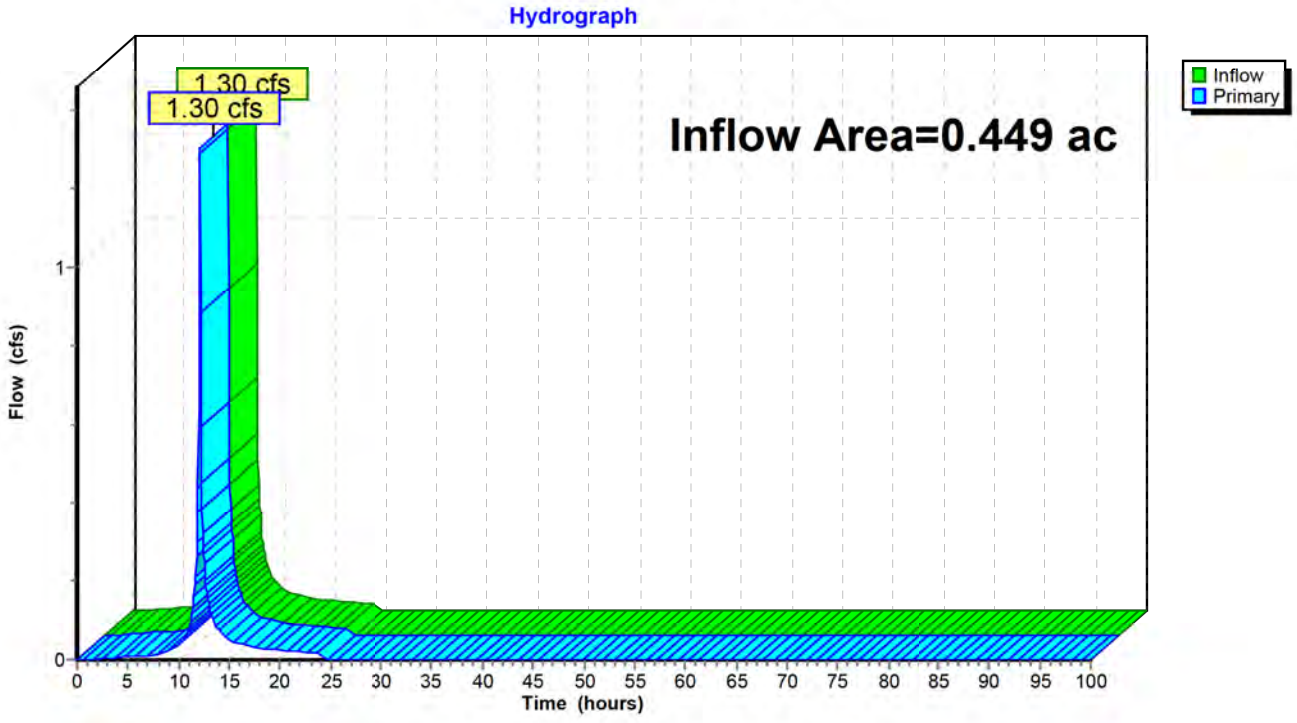


Summary for Link P POA-1: POA-1 PDA

Inflow Area = 0.449 ac, 32.97% Impervious, Inflow Depth = 2.58" for 2-Year- Future event
Inflow = 1.30 cfs @ 12.09 hrs, Volume= 0.097 af
Primary = 1.30 cfs @ 12.09 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-1: POA-1 PDA



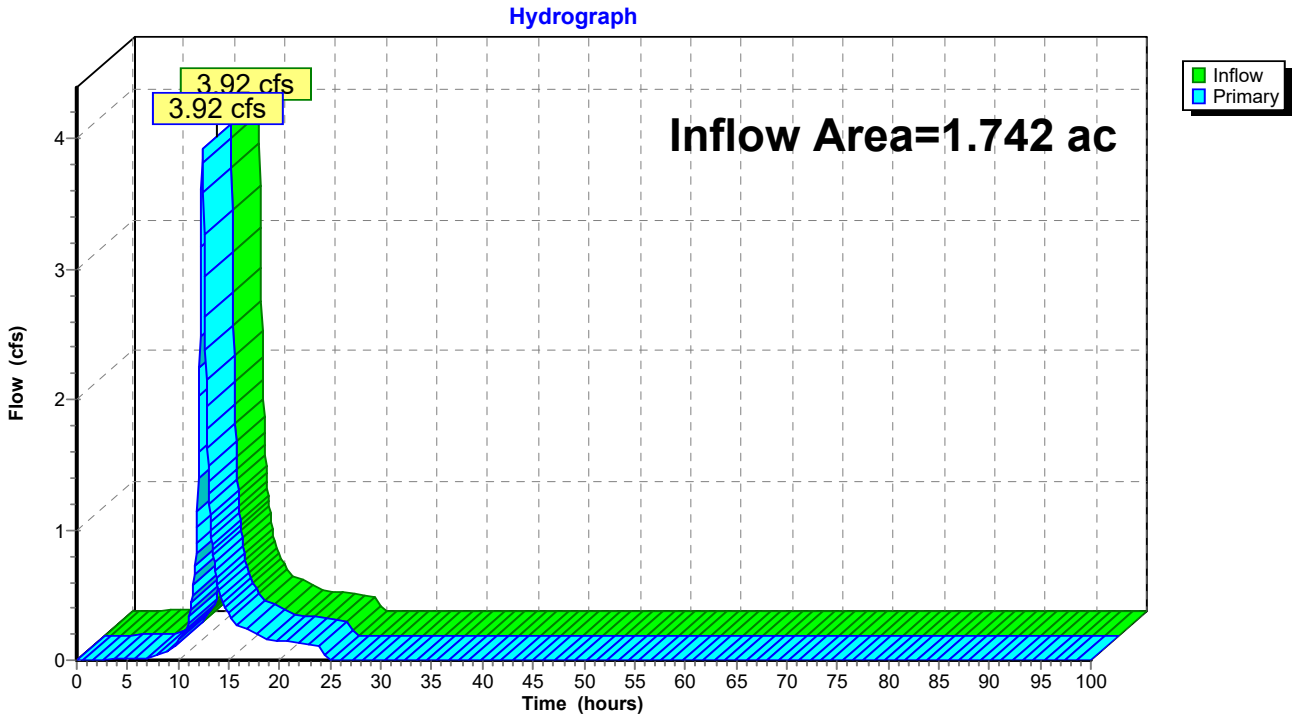
Off-site stability has been met by decreasing the amount of runoff from existing conditions

Summary for Link E POA-1: POA-1 EDA

Inflow Area = 1.742 ac, 6.23% Impervious, Inflow Depth = 3.76" for 10-Year Future event
Inflow = 3.92 cfs @ 12.40 hrs, Volume= 0.546 af
Primary = 3.92 cfs @ 12.40 hrs, Volume= 0.546 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-1: POA-1 EDA

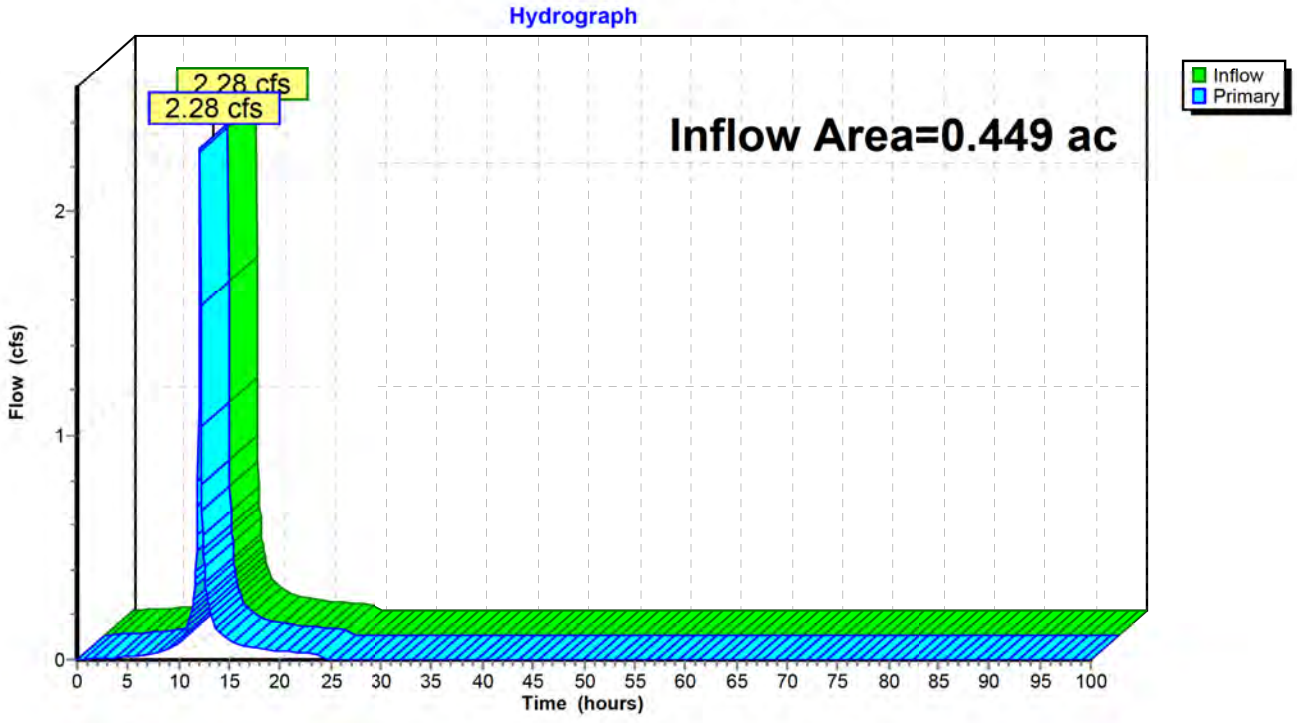


Summary for Link P POA-1: POA-1 PDA

Inflow Area = 0.449 ac, 32.97% Impervious, Inflow Depth = 4.58" for 10-Year Future event
Inflow = 2.28 cfs @ 12.09 hrs, Volume= 0.171 af
Primary = 2.28 cfs @ 12.09 hrs, Volume= 0.171 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-1: POA-1 PDA



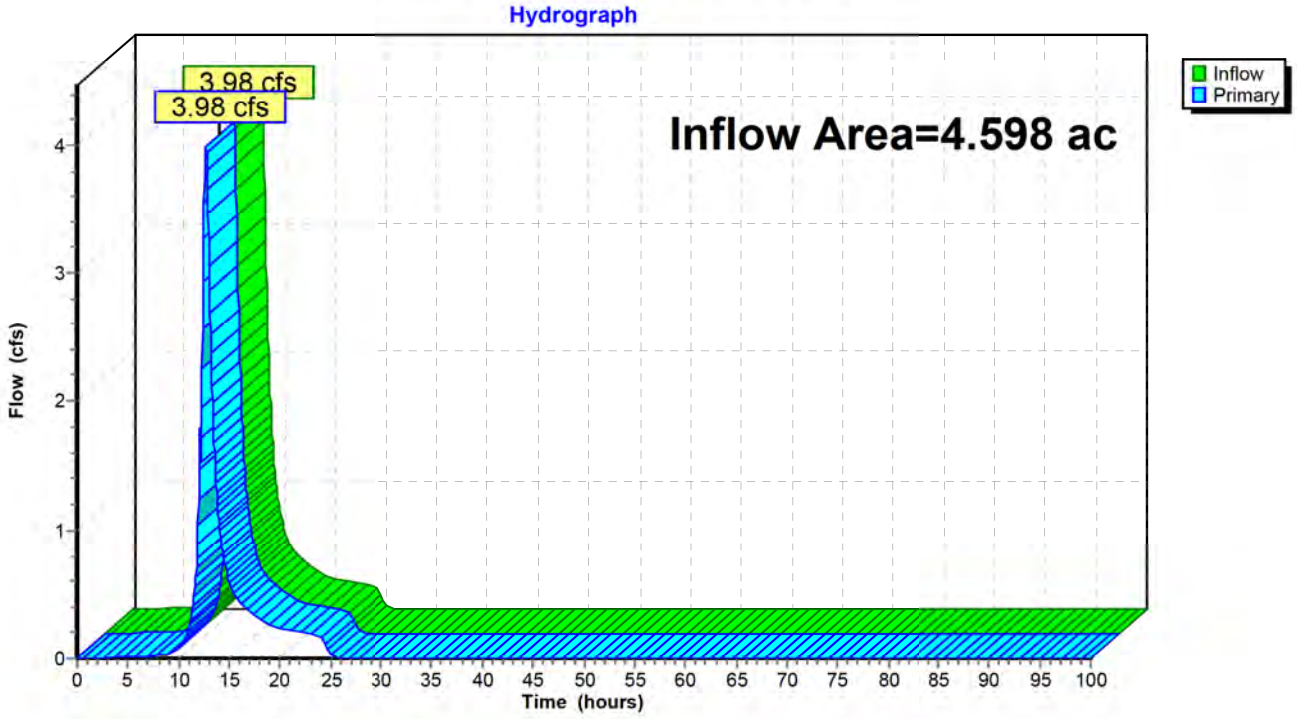
Off-site stability has been met by decreasing the amount of runoff from existing conditions

Summary for Link E POA-2: POA-2 EDA

Inflow Area = 4.598 ac, 4.74% Impervious, Inflow Depth = 1.95" for 2-Year- Future event
Inflow = 3.98 cfs @ 12.67 hrs, Volume= 0.748 af
Primary = 3.98 cfs @ 12.67 hrs, Volume= 0.748 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-2: POA-2 EDA

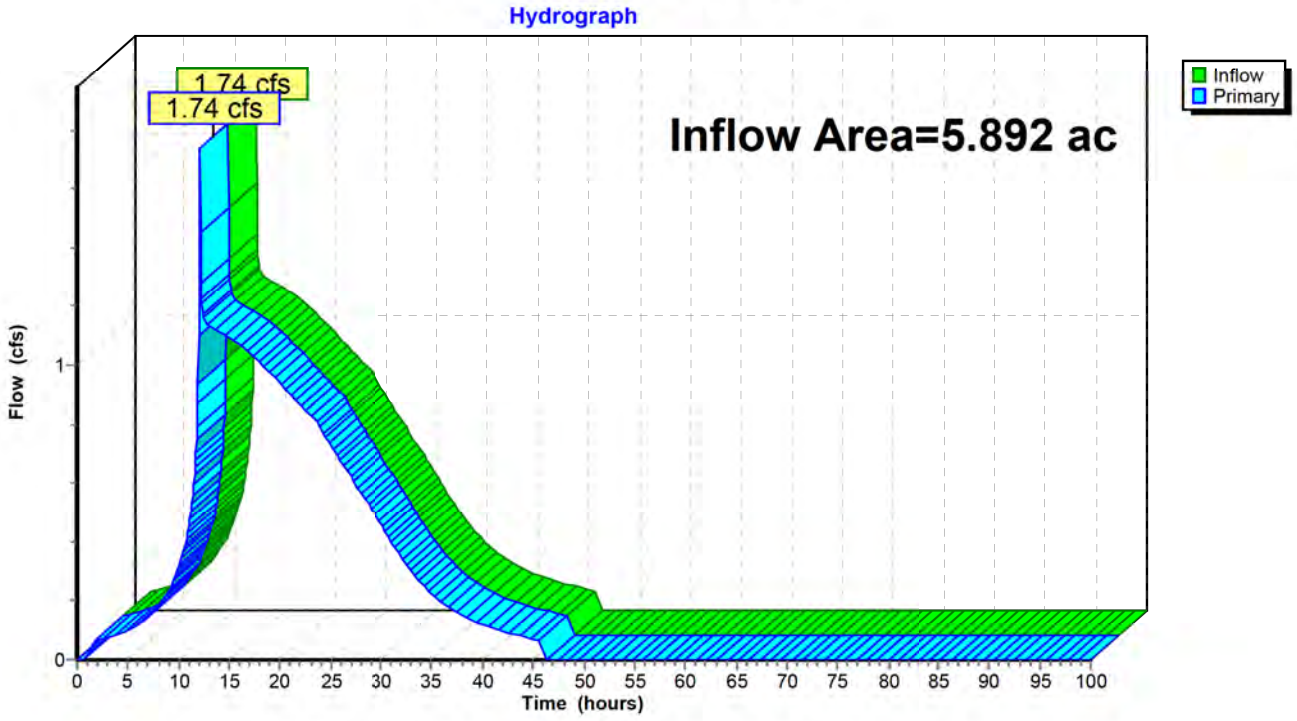


Summary for Link P POA-2: POA-2 PDA

Inflow Area = 5.892 ac, 87.44% Impervious, Inflow Depth = 3.52" for 2-Year- Future event
Inflow = 1.74 cfs @ 12.10 hrs, Volume= 1.728 af
Primary = 1.74 cfs @ 12.10 hrs, Volume= 1.728 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-2: POA-2 PDA



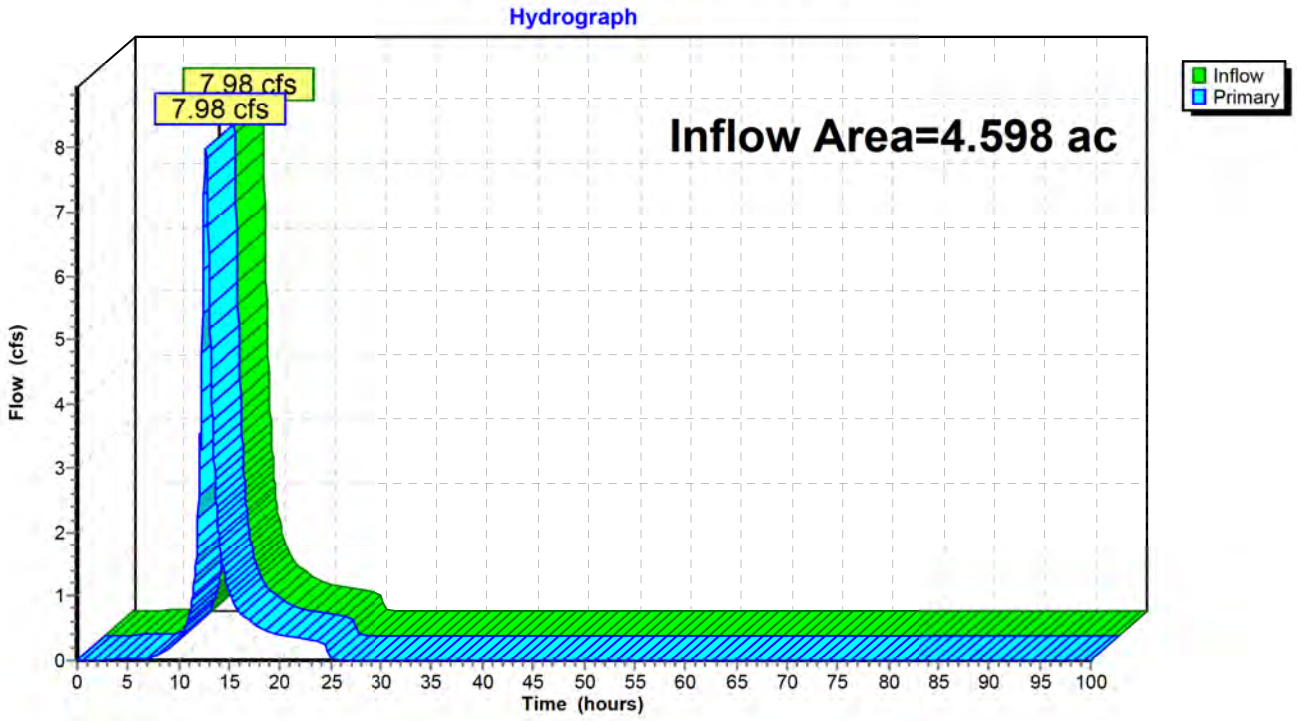
Off-site stability has been met by decreasing the amount of runoff from existing conditions. POA #2 discharges to an existing stormwater conveyance network. The rate of runoff at the discharge point has been decreased

Summary for Link E POA-2: POA-2 EDA

Inflow Area = 4.598 ac, 4.74% Impervious, Inflow Depth = 3.83" for 10-Year Future event
Inflow = 7.98 cfs @ 12.66 hrs, Volume= 1.466 af
Primary = 7.98 cfs @ 12.66 hrs, Volume= 1.466 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link E POA-2: POA-2 EDA

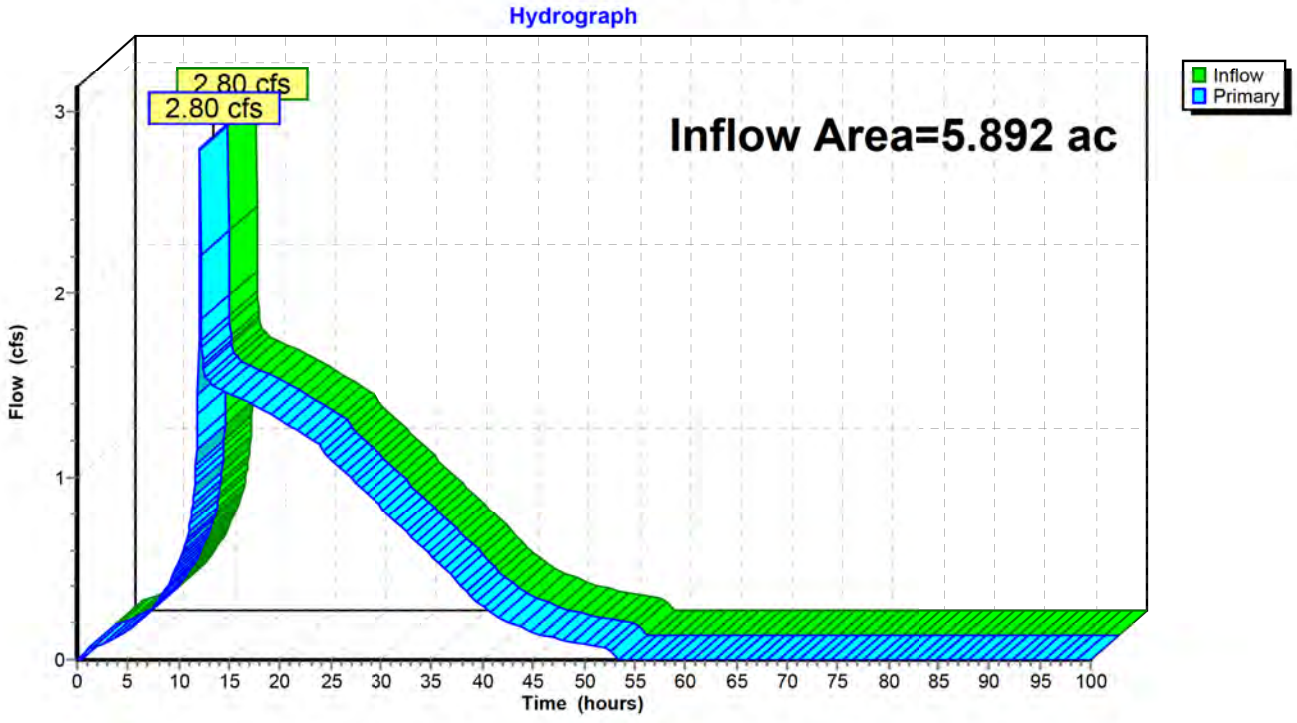


Summary for Link P POA-2: POA-2 PDA

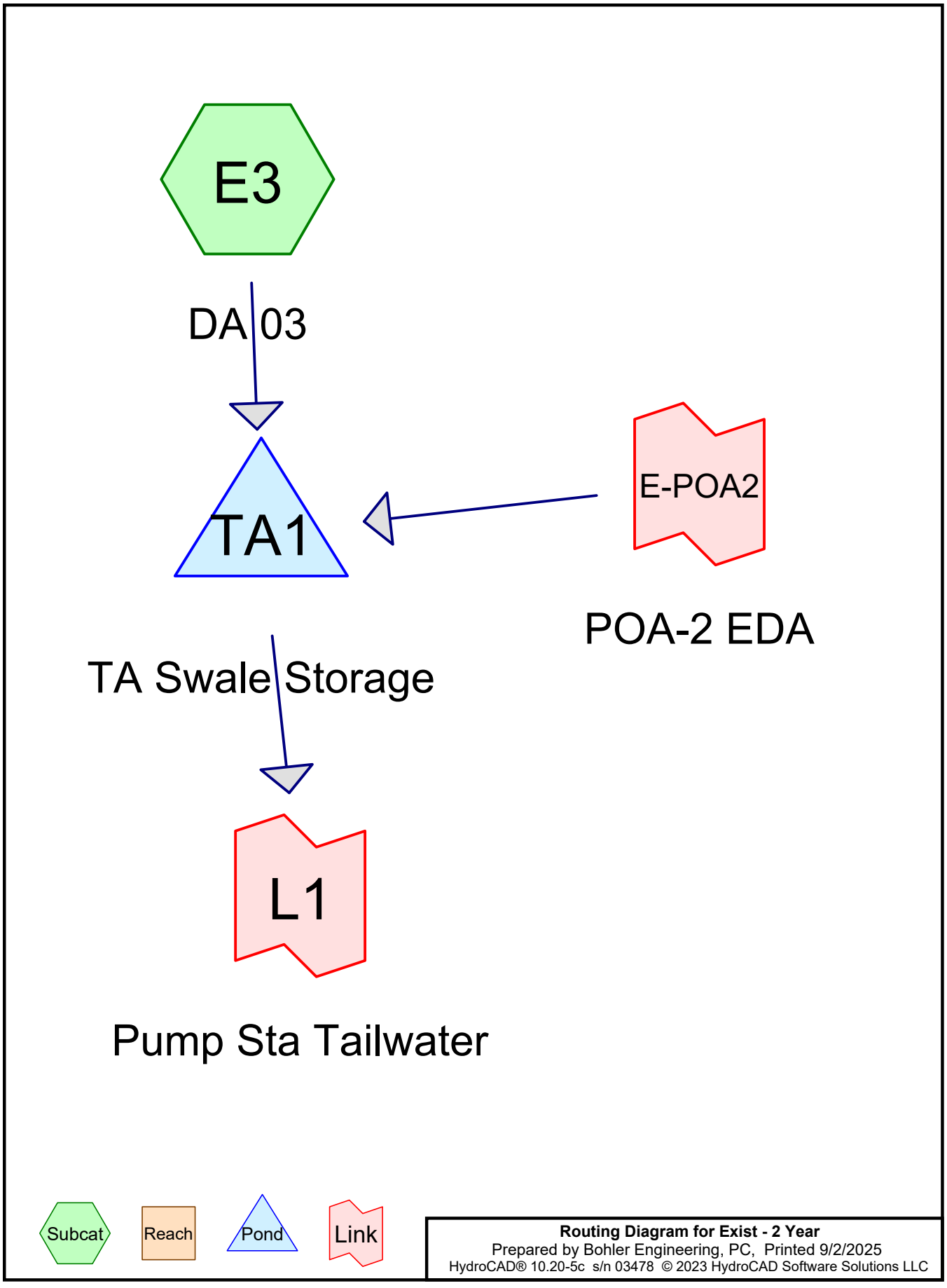
Inflow Area = 5.892 ac, 87.44% Impervious, Inflow Depth = 5.67" for 10-Year Future event
Inflow = 2.80 cfs @ 12.09 hrs, Volume= 2.784 af
Primary = 2.80 cfs @ 12.09 hrs, Volume= 2.784 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node TA1

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link P POA-2: POA-2 PDA



Off-site stability has been met by decreasing the amount of runoff from existing conditions. POA #2 discharges to an existing stormwater conveyance network. The rate of runoff at the discharge point has been decreased



Routing Diagram for Exist - 2 Year
Prepared by Bohler Engineering, PC, Printed 9/2/2025
HydroCAD® 10.20-5c s/n 03478 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment E3: DA 03

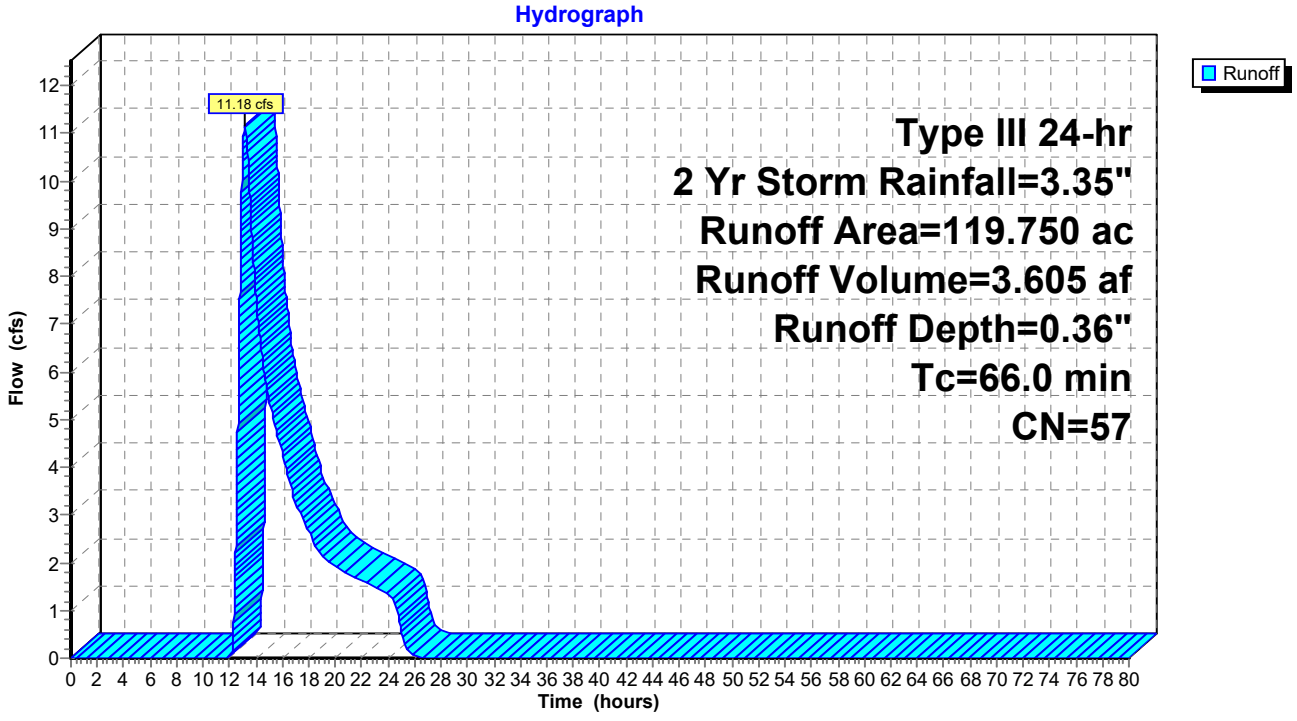
Runoff = 11.18 cfs @ 13.19 hrs, Volume= 3.605 af, Depth= 0.36"
Routed to Pond TA1 : TA Swale Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr Storm Rainfall=3.35"

	Area (ac)	CN	Description
*	88.210	43	Pervious cover, Good, HSG D
	31.540	98	Paved parking, HSG D
	119.750	57	Weighted Average
	88.210		73.66% Pervious Area
	31.540		26.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0					**Direct Entry, HEC I Lag**

Subcatchment E3: DA 03



Summary for Pond TA1: TA Swale Storage

Inflow Area = 124.348 ac, 25.54% Impervious, Inflow Depth = 0.46" for 2 Yr Storm event
Inflow = 14.31 cfs @ 13.13 hrs, Volume= 4.741 af
Outflow = 11.92 cfs @ 13.59 hrs, Volume= 4.741 af, Atten= 17%, Lag= 27.5 min
Primary = 11.92 cfs @ 13.59 hrs, Volume= 4.741 af
Routed to Link L1 : Pump Sta Tailwater

Routing by Sim-Route method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Peak Elev= 1.77' @ 17.01 hrs Surf.Area= 56,267 sf Storage= 40,708 cf

Plug-Flow detention time= 62.1 min calculated for 4.741 af (100% of inflow)
Center-of-Mass det. time= 62.0 min (1,010.5 - 948.5)

Volume	Invert	Avail.Storage	Storage Description
#1	-0.75'	3,758,901 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-0.75	0	0	0
0.00	1,800	675	675
1.00	19,705	10,753	11,428
2.00	67,137	43,421	54,849
3.00	353,035	210,086	264,935
4.00	1,571,910	962,473	1,227,407
5.00	3,491,078	2,531,494	3,758,901

Device	Routing	Invert	Outlet Devices
#1	Primary	-0.75'	**30.0" Round Culvert** L= 547.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= -0.75' / -1.95' S= 0.0022 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf

OUTLET INVERT

Primary OutFlow Max=11.92 cfs @ 13.59 hrs HW=1.12' TW=-0.78' (Dynamic Tailwater)
↳**1=Culvert** (Barrel Controls 11.92 cfs @ 4.19 fps)

OUTLET CONTROLS - NOT TAILWATER

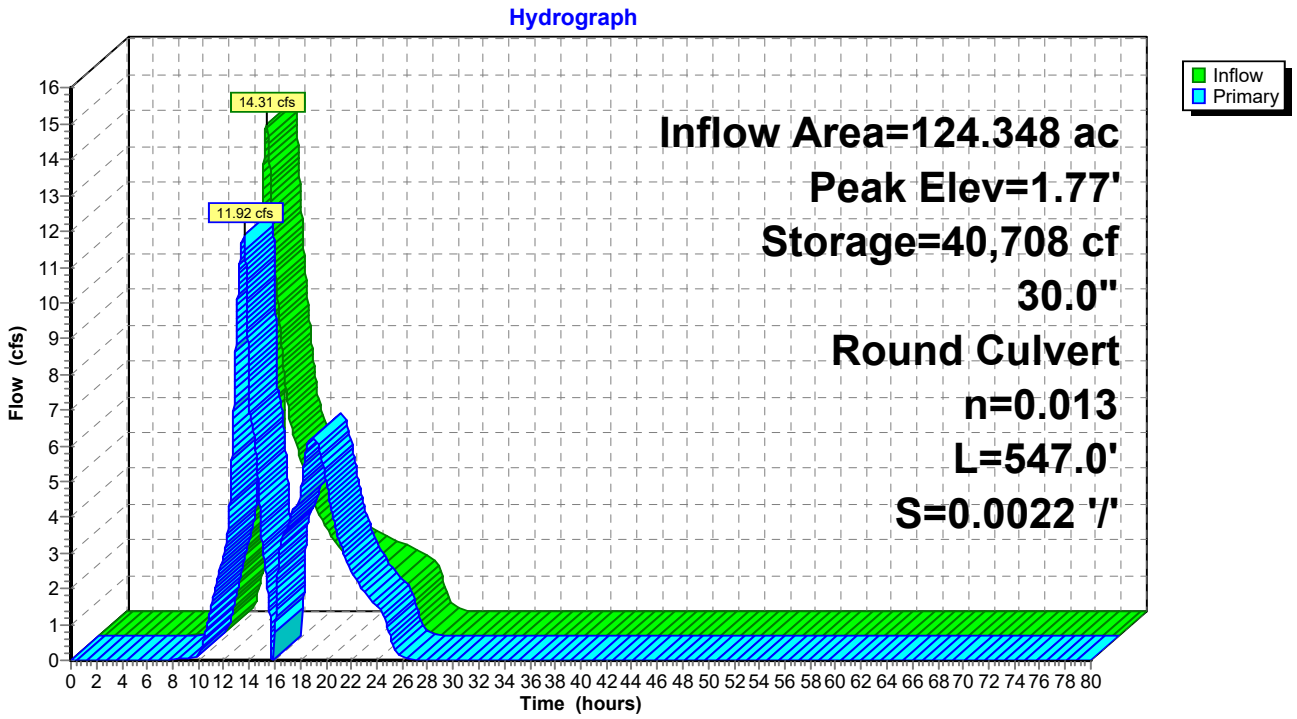
PEAK TAILWATER AT OUTLET

HEADWATER AT PEAK FLOW

ALTHOUGH THE TAILWATER ELEVATION IS ABOVE THE OUTLET INVERT, THE TAILWATER IS WELL BELOW THE HEADWATER ELEVATION.
1.9 FT OF HEAD IS PROVIDED TO PUSH FLOW THROUGH THE OUTLET. THEREFORE, BARREL CONTROLS AND TAILWATER DOES NOT CONTROL FLOW.

FLOW IS CONTROLLED BY POND STORAGE AND CULVERT CAPACITY, NOT DOWNSTREAM CONDITIONS.
THEREFORE, NO TAILWATER-INDUCED BACKUP IS CONFIRMED

Pond TA1: TA Swale Storage



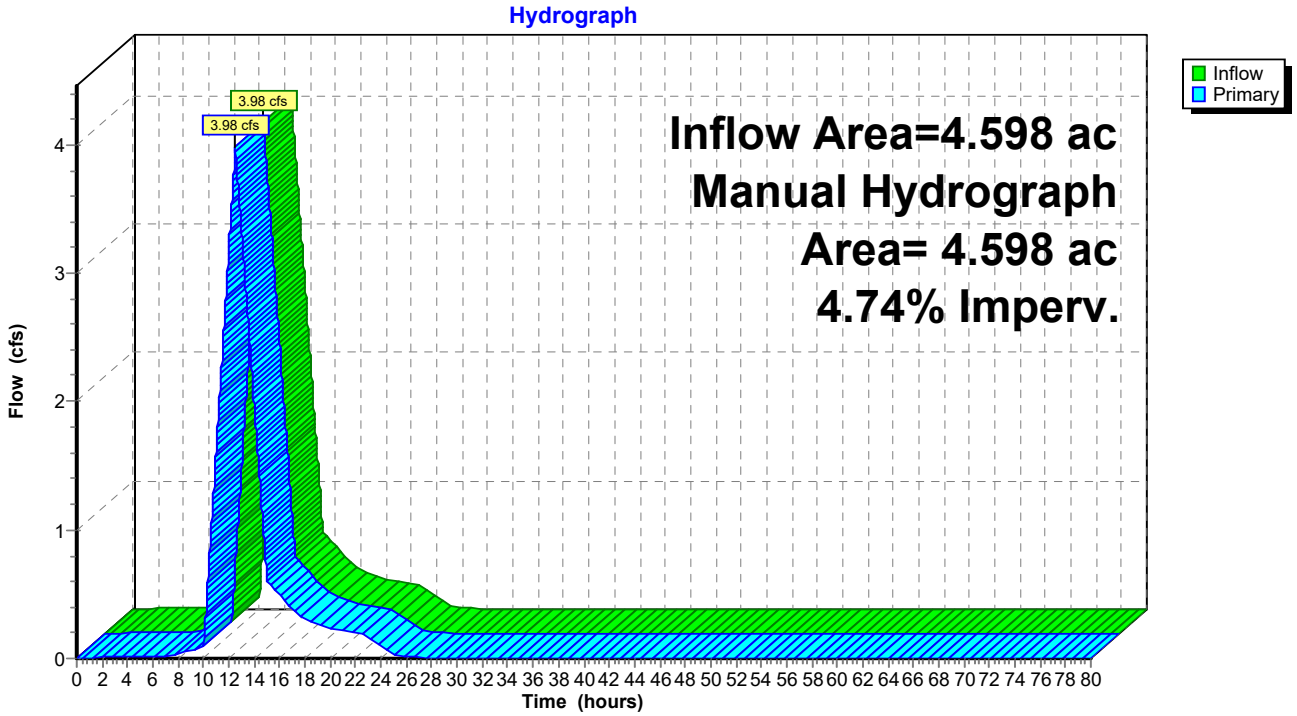
Summary for Link E-POA2: POA-2 EDA

Inflow Area = 4.598 ac, 4.74% Impervious, Inflow Depth = 2.97" for 2 Yr Storm event
Inflow = 3.98 cfs @ 12.50 hrs, Volume= 1.136 af
Primary = 3.98 cfs @ 12.51 hrs, Volume= 1.136 af, Atten= 0%, Lag= 0.6 min
Routed to Pond TA1 : TA Swale Storage

Primary outflow = Inflow, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

2 Yr Storm 12 Point manual hydrograph, To= 0.00 hrs, dt= 2.50 hrs, Area= 4.598 ac, 4.74% Imp., cfs =
0.00 0.01 0.01 0.02 0.09 3.98 0.60 0.33 0.23 0.20
0.03 0.00

Link E-POA2: POA-2 EDA



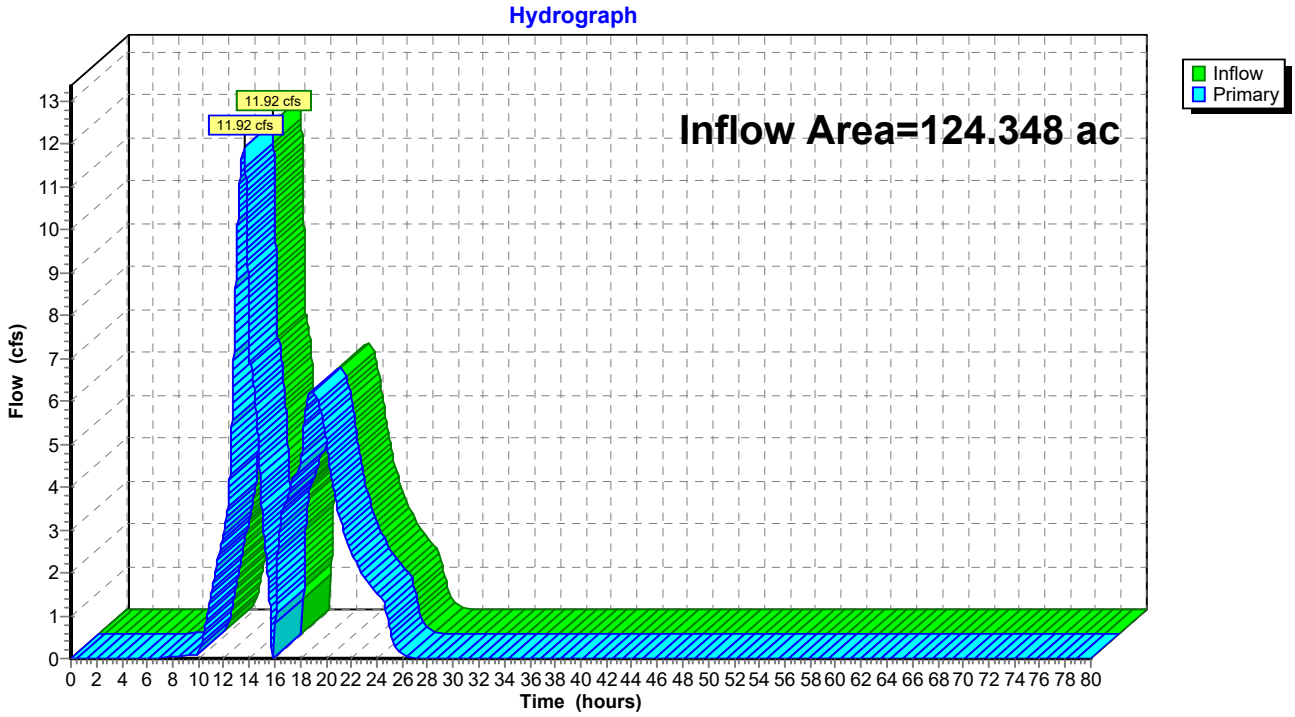
Summary for Link L1: Pump Sta Tailwater

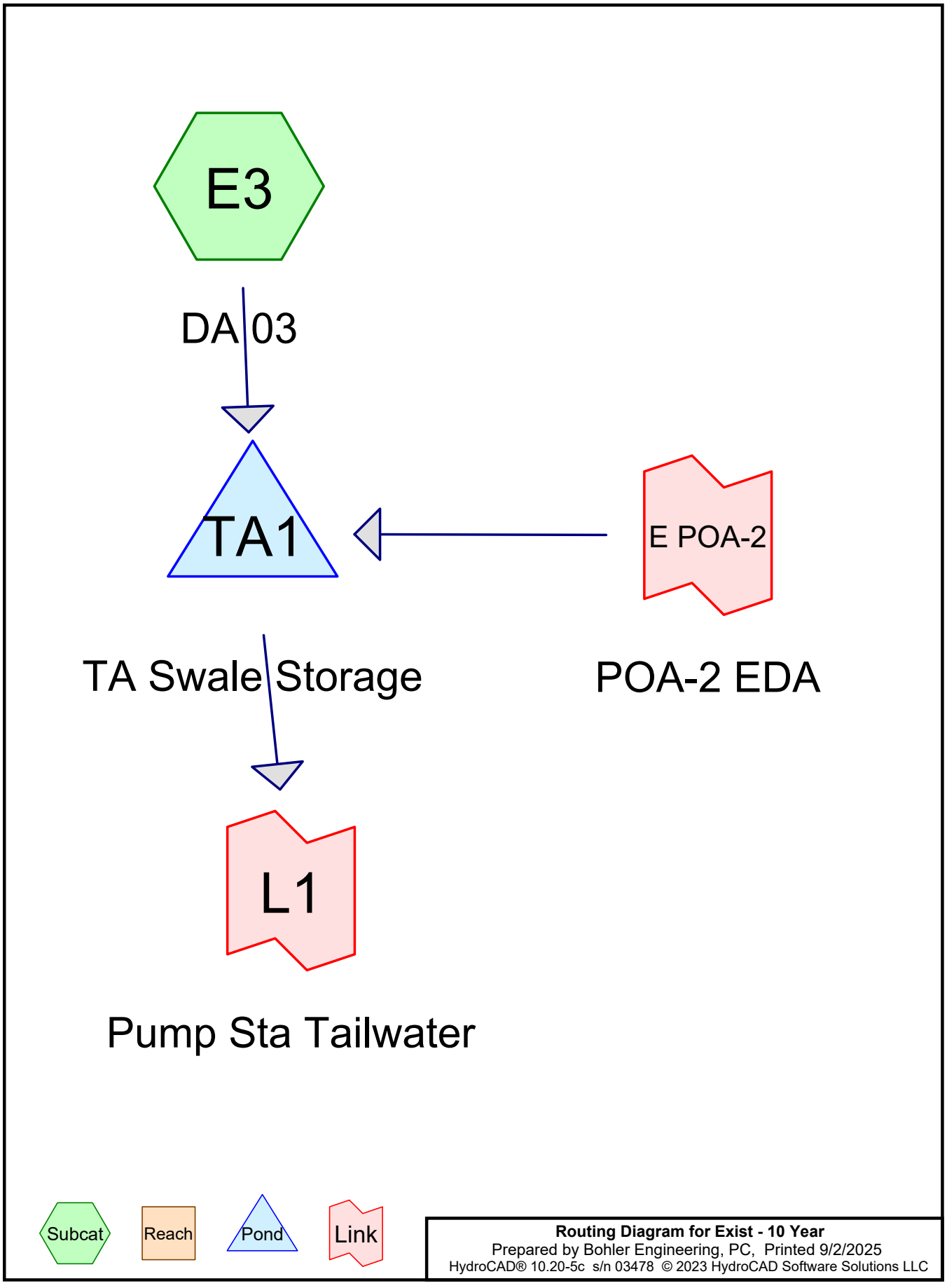
Inflow Area = 124.348 ac, 25.54% Impervious, Inflow Depth = 0.46" for 2 Yr Storm event
Inflow = 11.92 cfs @ 13.59 hrs, Volume= 4.741 af
Primary = 11.92 cfs @ 13.60 hrs, Volume= 4.741 af, Atten= 0%, Lag= 0.6 min
Routed to nonexistent node E-POA ALL FLOW LEAVING THE POND PASSES THROUGH TAILWATER NODE UNCHANGED (NOT DETAINING OR REDUCING)
Primary outflow = Inflow, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

28 Point manual elevation table, To= 0.00 hrs, dt= 1.00 hrs, feet =

-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08
-2.08	-2.08	-2.08	-1.18	-2.80	0.63	1.30	1.70	1.70
1.61	1.20	0.79	0.38	-0.03	-0.44	-0.85	-1.26	-1.67
-2.08								

Link L1: Pump Sta Tailwater





Routing Diagram for Exist - 10 Year
Prepared by Bohler Engineering, PC, Printed 9/2/2025
HydroCAD® 10.20-5c s/n 03478 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment E3: DA 03

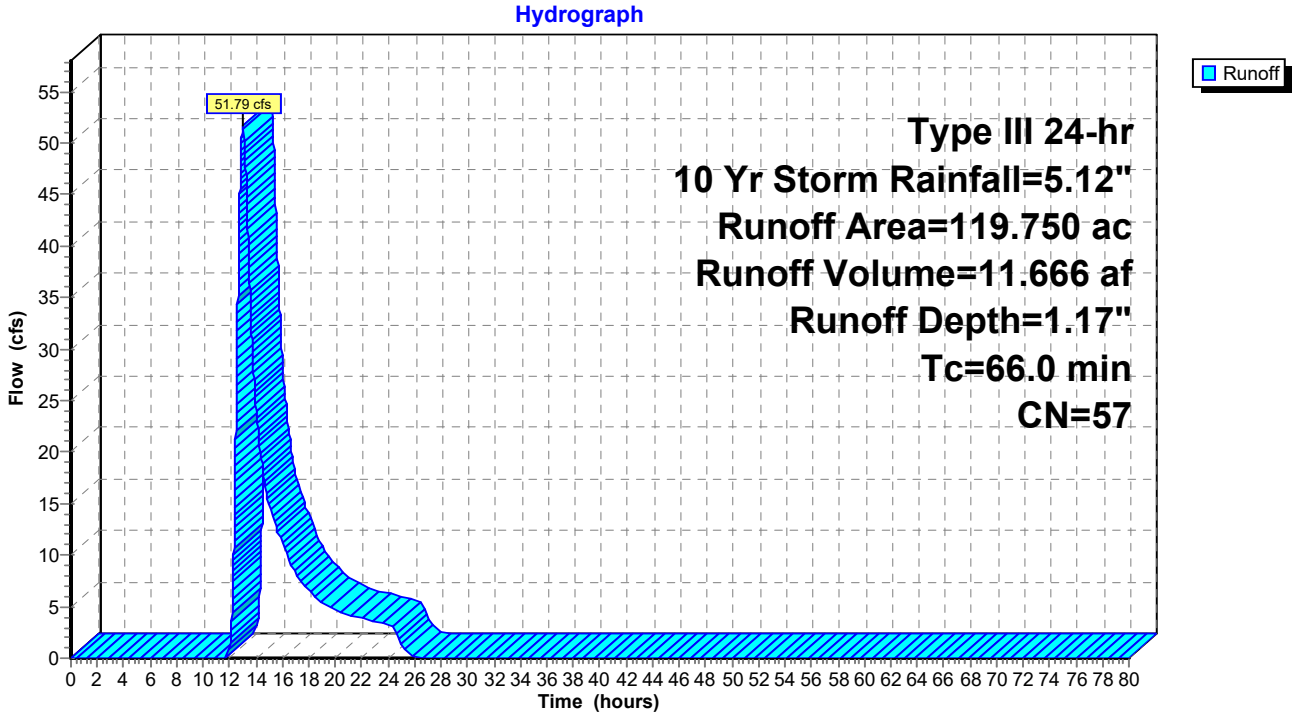
Runoff = 51.79 cfs @ 12.98 hrs, Volume= 11.666 af, Depth= 1.17"
Routed to Pond TA1 : TA Swale Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr Storm Rainfall=5.12"

	Area (ac)	CN	Description
*	88.210	43	Pervious cover, Good, HSG D
	31.540	98	Paved parking, HSG D
	119.750	57	Weighted Average
	88.210		73.66% Pervious Area
	31.540		26.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0					**Direct Entry, HEC I Lag**

Subcatchment E3: DA 03



Summary for Pond TA1: TA Swale Storage

Inflow Area = 124.348 ac, 25.54% Impervious, Inflow Depth = 1.34" for 10 Yr Storm event
Inflow = 58.46 cfs @ 12.98 hrs, Volume= 13.904 af
Outflow = 22.84 cfs @ 13.38 hrs, Volume= 13.903 af, Atten= 61%, Lag= 24.0 min
Primary = 22.84 cfs @ 13.38 hrs, Volume= 13.903 af
Routed to Link L1 : Pump Sta Tailwater

Routing by Sim-Route method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Peak Elev= 2.63' @ 14.63 hrs Surf.Area= 246,540 sf Storage= 153,266 cf

Plug-Flow detention time= 88.6 min calculated for 13.903 af (100% of inflow)
Center-of-Mass det. time= 88.6 min (1,007.3 - 918.7)

Volume	Invert	Avail.Storage	Storage Description
#1	-0.75'	3,758,901 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-0.75	0	0	0
0.00	1,800	675	675
1.00	19,705	10,753	11,428
2.00	67,137	43,421	54,849
3.00	353,035	210,086	264,935
4.00	1,571,910	962,473	1,227,407
5.00	3,491,078	2,531,494	3,758,901

Device	Routing	Invert	Outlet Devices
#1	Primary	-0.75'	**30.0" Round Culvert** L= 547.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= -0.75' / -1.95' S= 0.0022 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf

OUTLET INVERT

Primary OutFlow Max=22.84 cfs @ 13.38 hrs HW=2.46' TW=-1.49' (Dynamic Tailwater)
↳**1=Culvert** (Barrel Controls 22.84 cfs @ 4.71 fps)

OUTLET CONTROLS - NOT TAILWATER

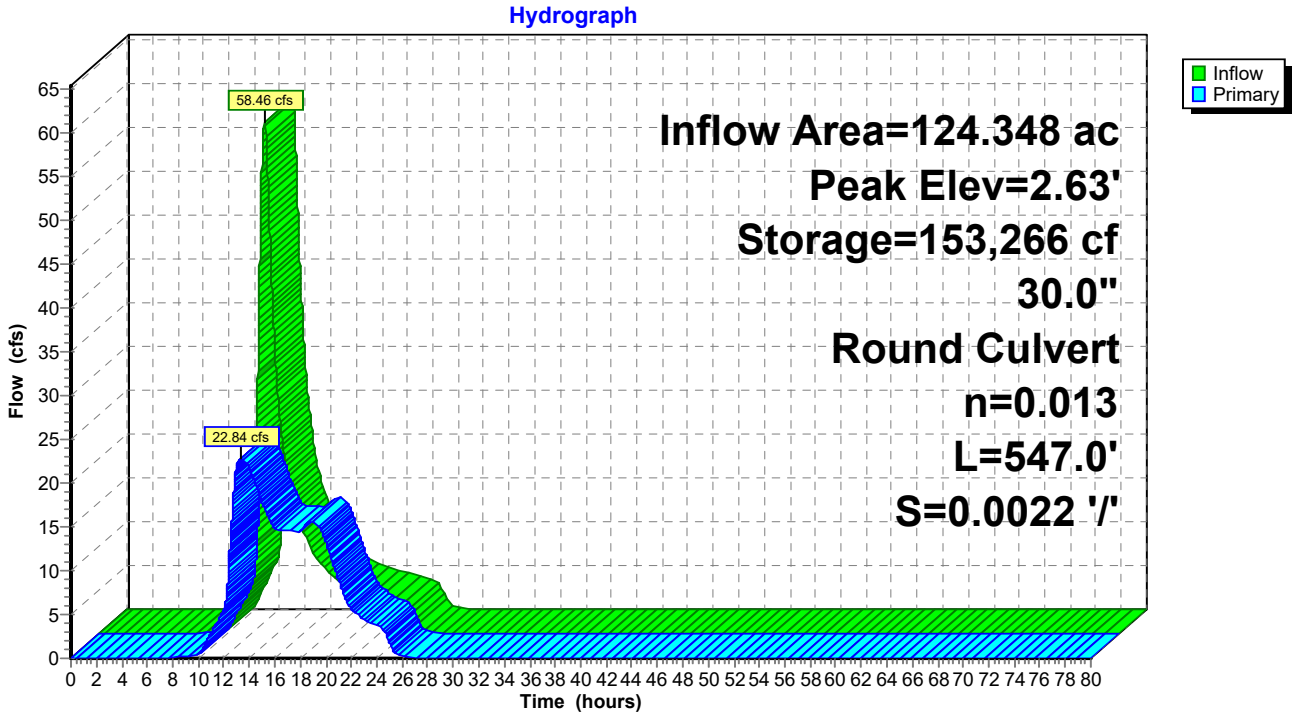
PEAK TAILWATER AT OUTLET

HEADWATER AT PEAK FLOW

ALTHOUGH THE TAILWATER ELEVATION IS ABOVE THE OUTLET INVERT, THE TAILWATER IS WELL BELOW THE HEADWATER ELEVATION.
3.95 FT OF HEAD IS PROVIDED TO PUSH FLOW THROUGH THE OUTLET. THEREFORE, BARREL CONTROLS AND TAILWATER DOES NOT CONTROL FLOW.

FLOW IS CONTROLLED BY POND STORAGE AND CULVERT CAPACITY, NOT DOWNSTREAM CONDITIONS.
THEREFORE, NO TAILWATER-INDUCED BACKUP IS CONFIRMED

Pond TA1: TA Swale Storage



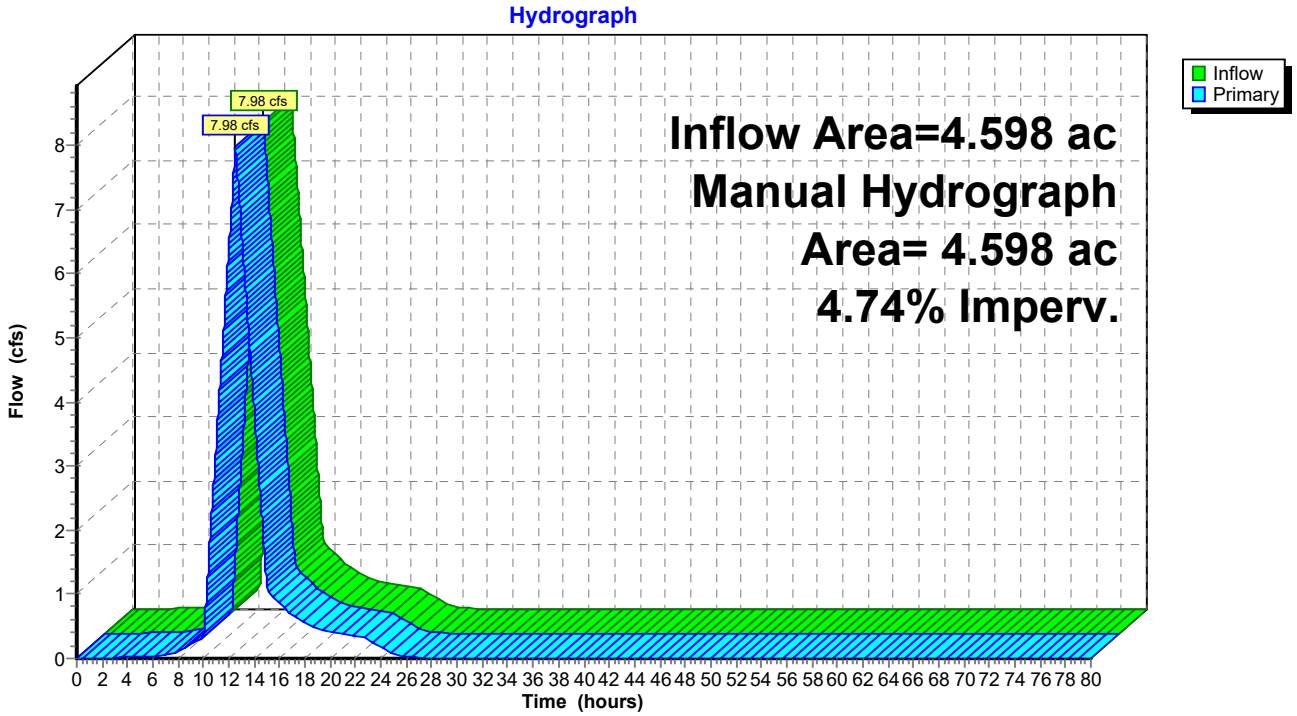
Summary for Link E POA-2: POA-2 EDA

Inflow Area = 4.598 ac, 4.74% Impervious, Inflow Depth = 5.84" for 10 Yr Storm event
Inflow = 7.98 cfs @ 12.50 hrs, Volume= 2.238 af
Primary = 7.98 cfs @ 12.51 hrs, Volume= 2.238 af, Atten= 0%, Lag= 0.6 min
Routed to Pond TA1 : TA Swale Storage

Primary outflow = Inflow, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

10 Yr Storm 12 Point manual hydrograph, To= 0.00 hrs, dt= 2.50 hrs, Area= 4.598 ac, 4.74% Imp., cfs =
0.00 0.01 0.02 0.05 0.33 7.98 1.06 0.58 0.41 0.34
0.05 0.00

Link E POA-2: POA-2 EDA



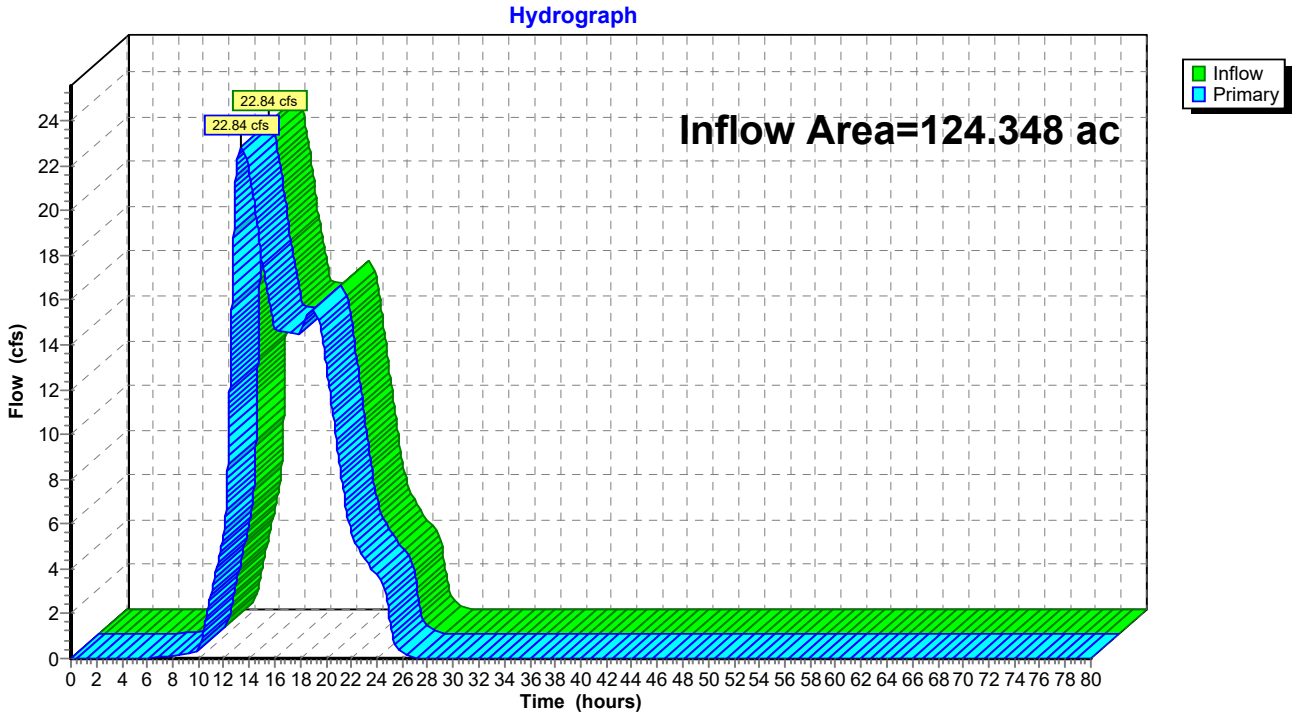
Summary for Link L1: Pump Sta Tailwater

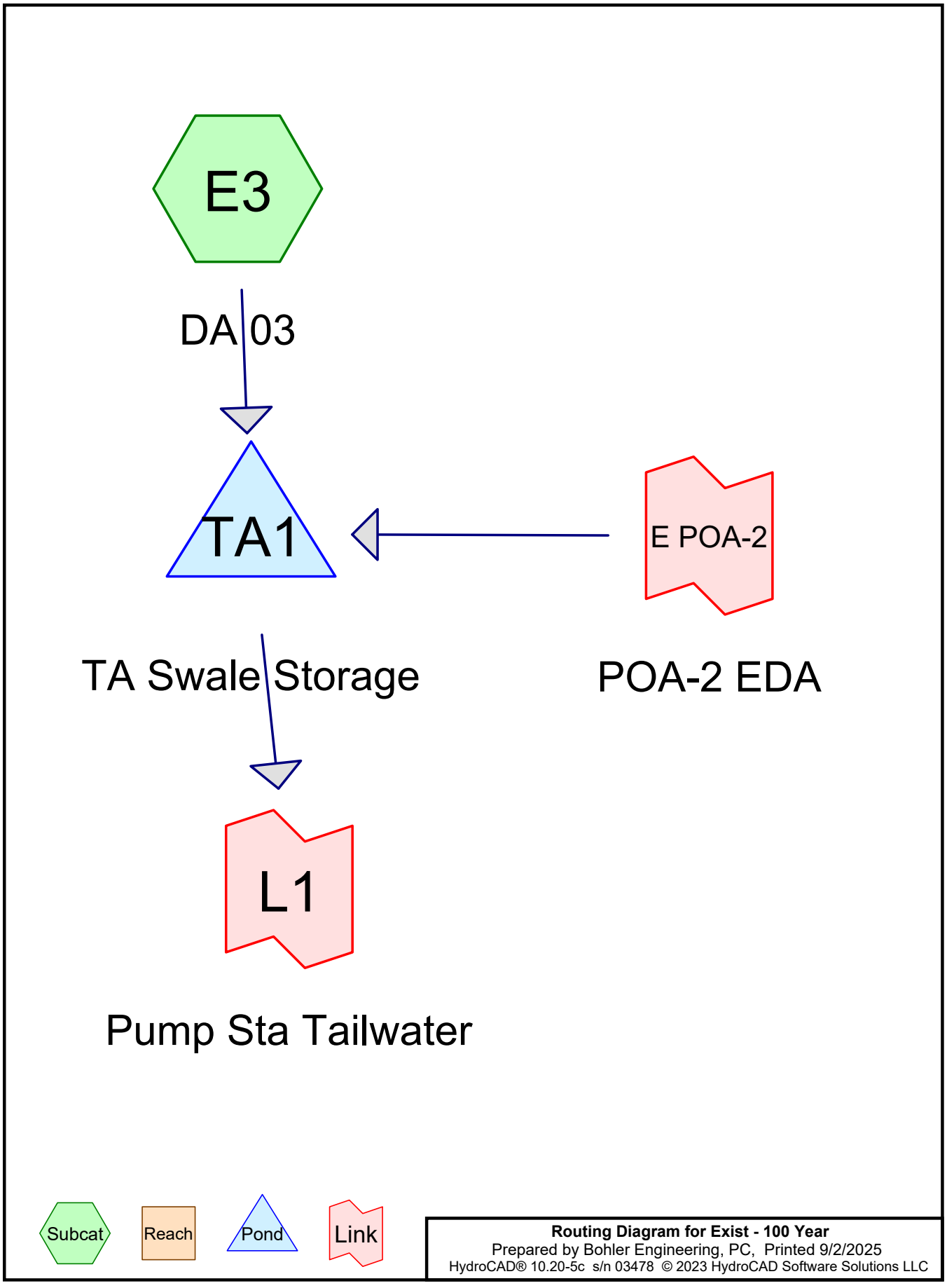
Inflow Area = 124.348 ac, 25.54% Impervious, Inflow Depth = 1.34" for 10 Yr Storm event
Inflow = 22.84 cfs @ 13.38 hrs, Volume= 13.903 af
Primary = 22.84 cfs @ 13.39 hrs, Volume= 13.903 af, Atten= 0%, Lag= 0.6 min
Routed to nonexistent node E-POA ALL FLOW LEAVING THE POND PASSES THROUGH TAILWATER NODE UNCHANGED (NOT DETAINING OR REDUCING)
Primary outflow = Inflow, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

28 Point manual elevation table, To= 0.00 hrs, dt= 1.00 hrs, feet =

-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08
-2.08	-2.08	-2.08	-1.18	-2.80	0.63	1.30	1.70	1.70
1.61	1.20	0.79	0.38	-0.03	-0.44	-0.85	-1.26	-1.67
-2.08								

Link L1: Pump Sta Tailwater





Routing Diagram for Exist - 100 Year
Prepared by Bohler Engineering, PC, Printed 9/2/2025
HydroCAD® 10.20-5c s/n 03478 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment E3: DA 03

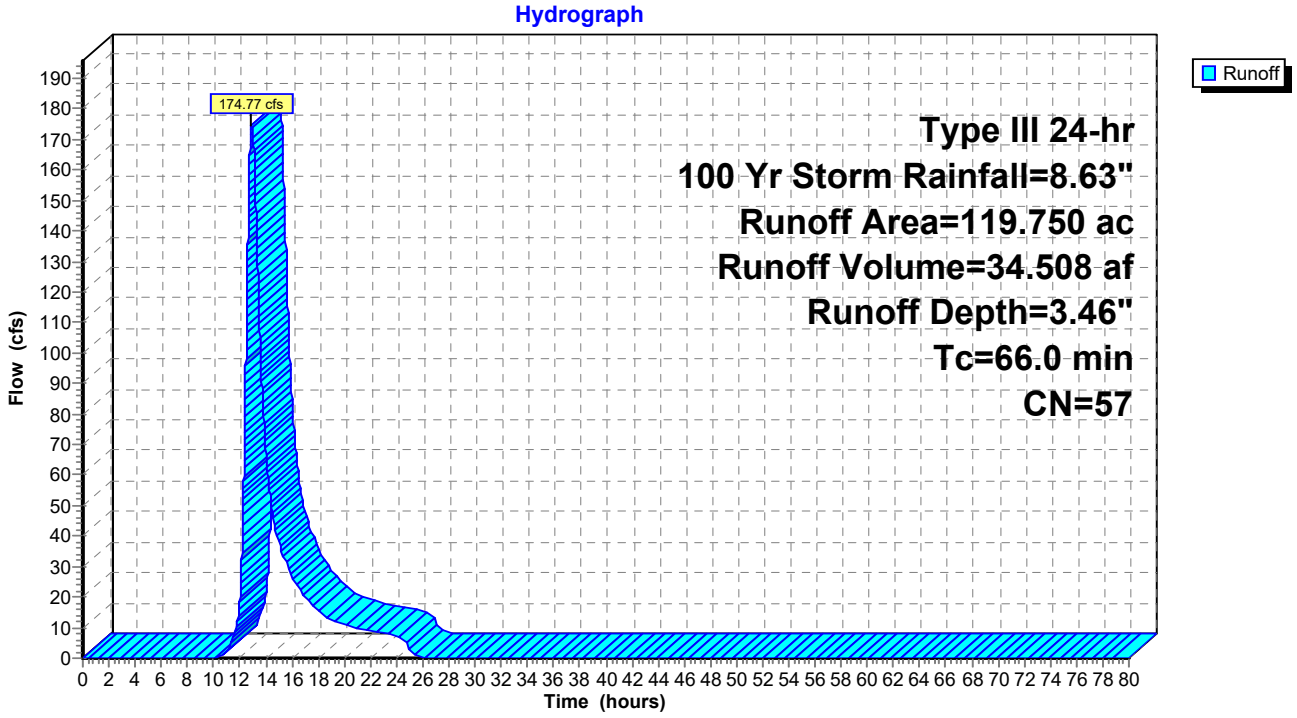
Runoff = 174.77 cfs @ 12.91 hrs, Volume= 34.508 af, Depth= 3.46"
Routed to Pond TA1 : TA Swale Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr Storm Rainfall=8.63"

	Area (ac)	CN	Description
*	88.210	43	Pervious cover, Good, HSG D
	31.540	98	Paved parking, HSG D
	119.750	57	Weighted Average
	88.210		73.66% Pervious Area
	31.540		26.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0					**Direct Entry, HEC I Lag**

Subcatchment E3: DA 03



Summary for Pond TA1: TA Swale Storage

Inflow Area = 124.348 ac, 25.54% Impervious, Inflow Depth = 3.82" for 100 Yr Storm event
Inflow = 190.14 cfs @ 12.91 hrs, Volume= 39.547 af
Outflow = 27.16 cfs @ 20.60 hrs, Volume= 39.532 af, Atten= 86%, Lag= 461.5 min
Primary = 27.16 cfs @ 20.60 hrs, Volume= 39.532 af
Routed to Link L1 : Pump Sta Tailwater

Routing by Sim-Route method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Peak Elev= 3.77' @ 16.85 hrs Surf.Area= 1,291,498 sf Storage= 898,032 cf

Plug-Flow detention time= 369.9 min calculated for 39.532 af (100% of inflow)
Center-of-Mass det. time= 369.7 min (1,260.5 - 890.9)

Volume	Invert	Avail.Storage	Storage Description
#1	-0.75'	3,758,901 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-0.75	0	0	0
0.00	1,800	675	675
1.00	19,705	10,753	11,428
2.00	67,137	43,421	54,849
3.00	353,035	210,086	264,935
4.00	1,571,910	962,473	1,227,407
5.00	3,491,078	2,531,494	3,758,901

Device	Routing	Invert	Outlet Devices
#1	Primary	-0.75'	**30.0" Round Culvert** L= 547.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= -0.75' / -1.95' S= 0.0022 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf

Primary OutFlow Max=27.16 cfs @ 20.60 hrs HW=3.67' TW=0.54' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 27.16 cfs @ 5.53 fps)

OUTLET INVERT

PEAK TAILWATER AT OUTLET

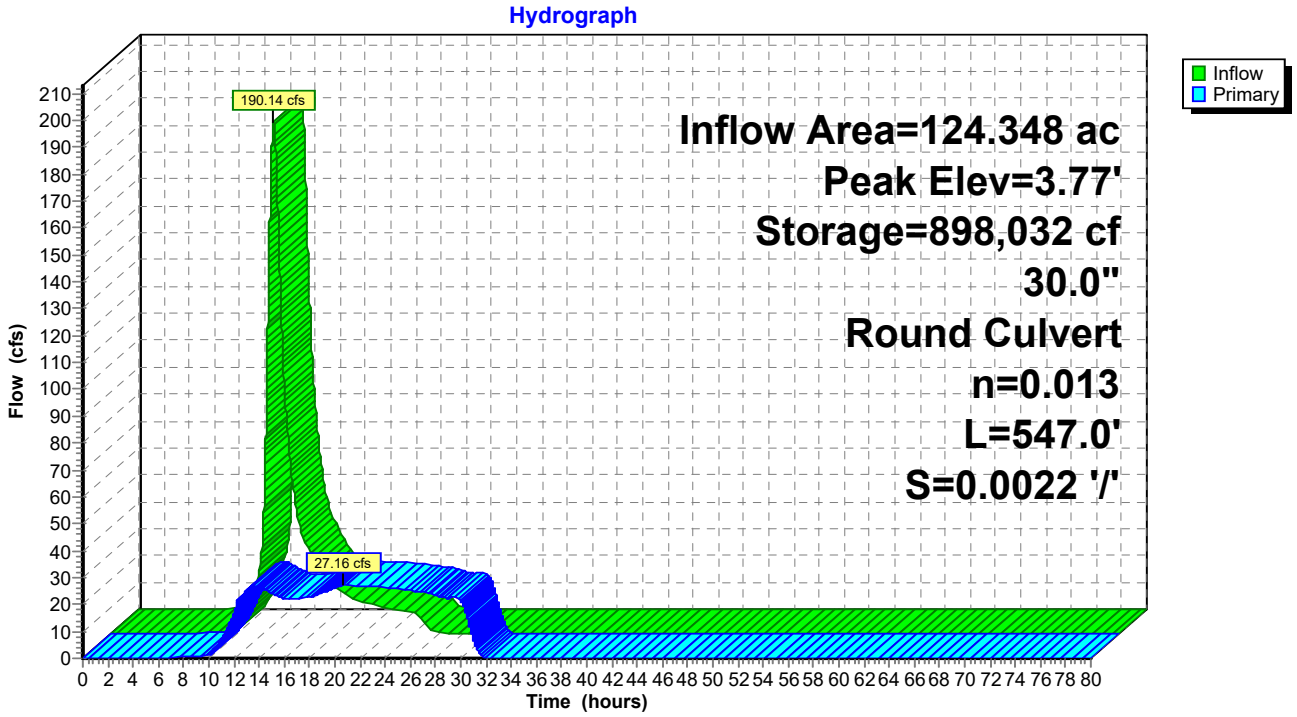
HEADWATER AT PEAK FLOW

OUTLET CONTROLS - NOT TAILWATER

ALTHOUGH THE TAILWATER ELEVATION IS ABOVE THE OUTLET INVERT, THE TAILWATER IS WELL BELOW THE HEADWATER ELEVATION.
3.13 FT OF HEAD IS PROVIDED TO PUSH FLOW THROUGH THE OUTLET. THEREFORE, BARREL CONTROLS AND TAILWATER DOES NOT CONTROL FLOW.

FLOW IS CONTROLLED BY POND STORAGE AND CULVERT CAPACITY, NOT DOWNSTREAM CONDITIONS.
THEREFORE, NO TAILWATER-INDUCED BACKUP IS CONFIRMED

Pond TA1: TA Swale Storage



Summary for Link E POA-2: POA-2 EDA

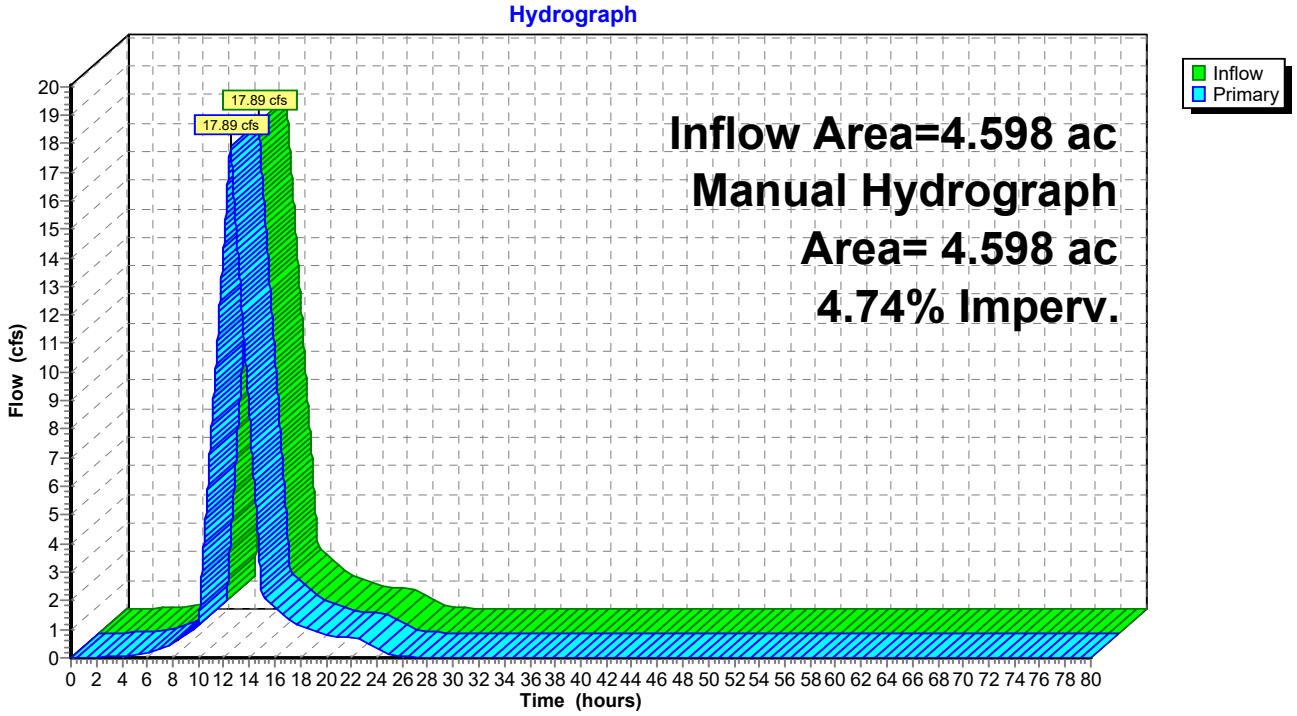
Inflow Area = 4.598 ac, 4.74% Impervious, Inflow Depth = 13.15" for 100 Yr Storm event
Inflow = 17.89 cfs @ 12.50 hrs, Volume= 5.039 af
Primary = 17.89 cfs @ 12.51 hrs, Volume= 5.039 af, Atten= 0%, Lag= 0.6 min
Routed to Pond TA1 : TA Swale Storage

Primary outflow = Inflow, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

100 Yr Storm 30 Point manual hydrograph, To= 0.00 hrs, dt= 2.50 hrs, Area= 4.598 ac, 4.74% Imp., cfs =

0.00	0.03	0.08	0.39	1.10	17.89	2.16	1.16	0.81	0.67
0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Link E POA-2: POA-2 EDA



Summary for Link L1: Pump Sta Tailwater

Inflow Area = 124.348 ac, 25.54% Impervious, Inflow Depth = 3.81" for 100 Yr Storm event
Inflow = 27.16 cfs @ 20.60 hrs, Volume= 39.532 af
Primary = 27.16 cfs @ 20.61 hrs, Volume= 39.532 af, Atten= 0%, Lag= 0.6 min
Routed to nonexistent node E-POA

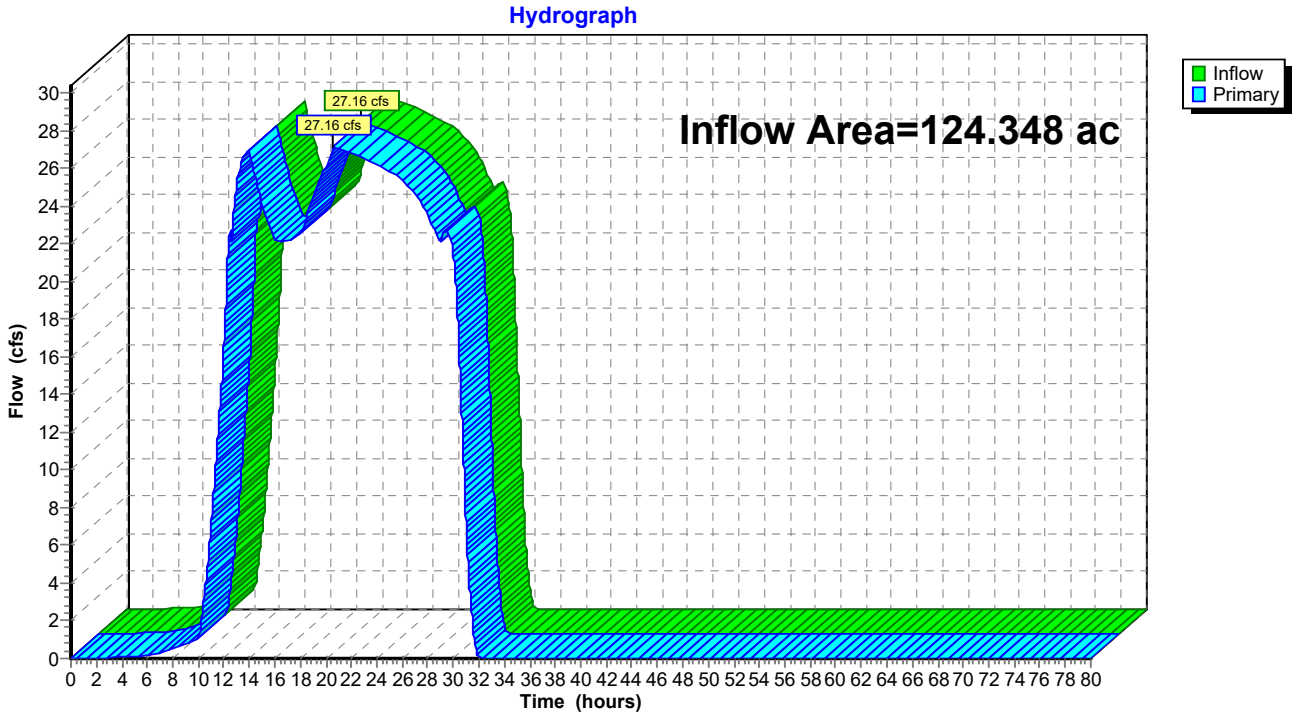
ALL FLOW LEAVING THE POND PASSES THROUGH TAILWATER NODE UNCHANGED (NOT DETAINING OR REDUCING)

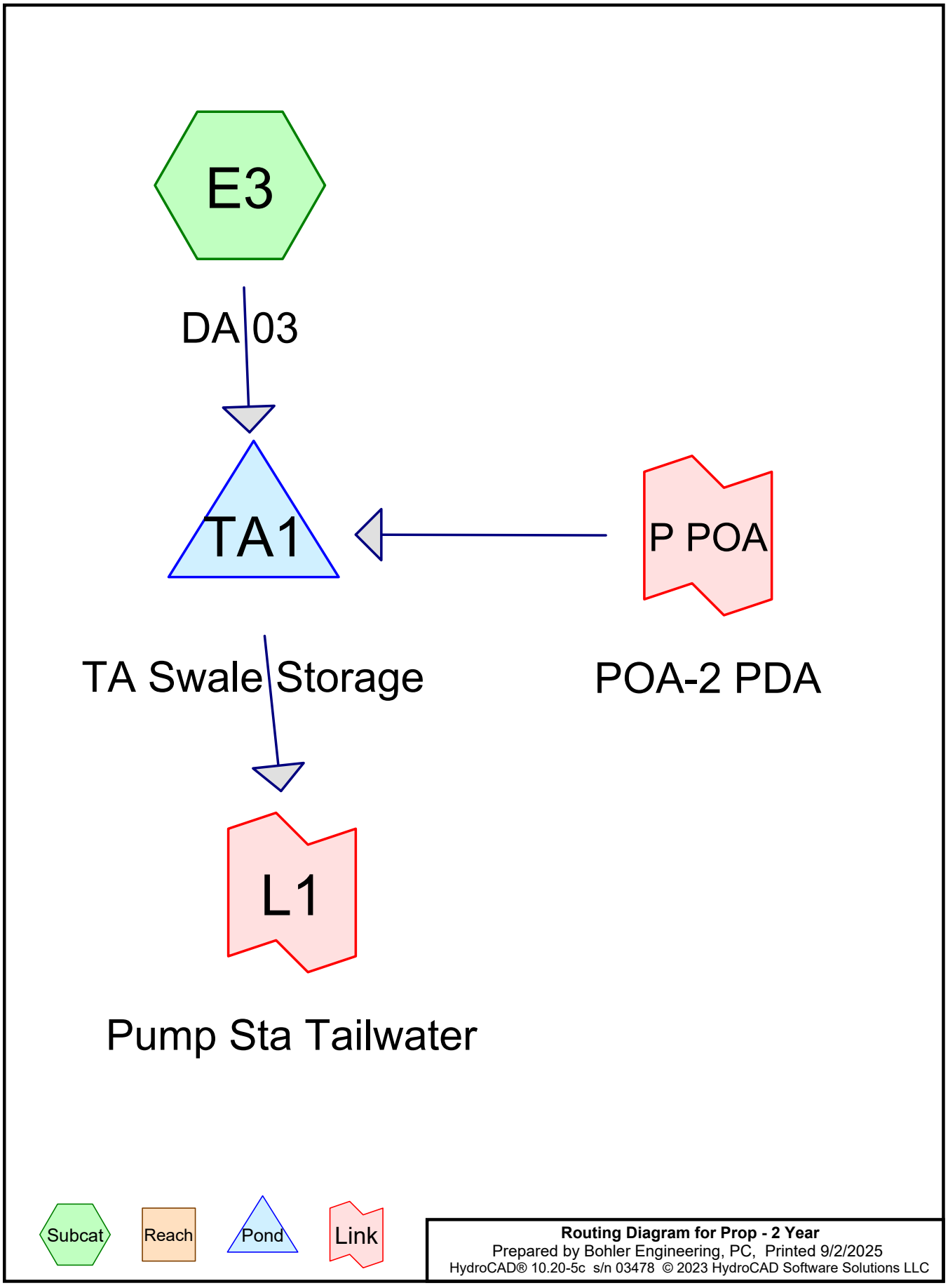
Primary outflow = Inflow, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

28 Point manual elevation table, To= 0.00 hrs, dt= 1.00 hrs, feet =

-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08
-2.08	-2.08	-2.08	-1.18	-2.80	0.63	1.30	1.70	1.70
1.61	1.20	0.79	0.38	-0.03	-0.44	-0.85	-1.26	-1.67
-2.08								

Link L1: Pump Sta Tailwater





Routing Diagram for Prop - 2 Year
Prepared by Bohler Engineering, PC, Printed 9/2/2025
HydroCAD® 10.20-5c s/n 03478 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment E3: DA 03

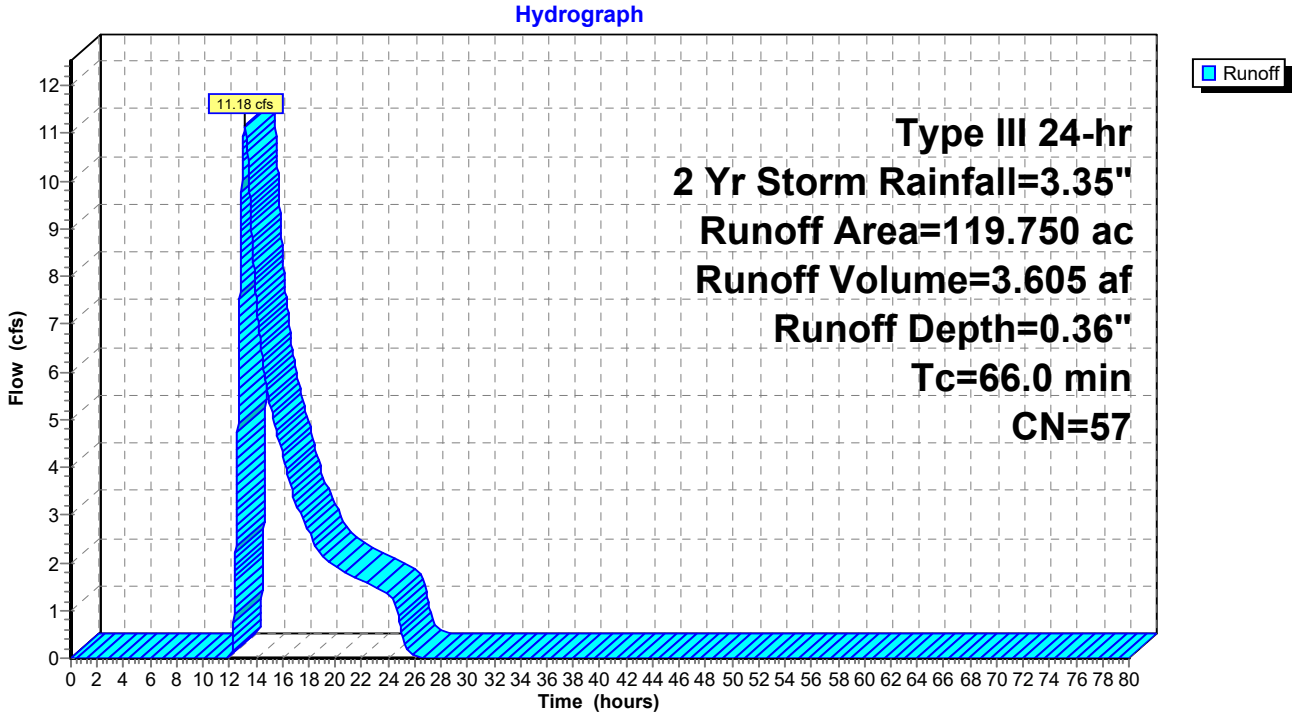
Runoff = 11.18 cfs @ 13.19 hrs, Volume= 3.605 af, Depth= 0.36"
Routed to Pond TA1 : TA Swale Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr Storm Rainfall=3.35"

	Area (ac)	CN	Description
*	88.210	43	Pervious cover, Good, HSG D
	31.540	98	Paved parking, HSG D
	119.750	57	Weighted Average
	88.210		73.66% Pervious Area
	31.540		26.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0					**Direct Entry, HEC I Lag**

Subcatchment E3: DA 03



Summary for Pond TA1: TA Swale Storage

Inflow Area = 125.657 ac, 29.20% Impervious, Inflow Depth = 0.52" for 2 Yr Storm event
Inflow = 12.74 cfs @ 13.13 hrs, Volume= 5.472 af
Outflow = 10.78 cfs @ 13.60 hrs, Volume= 5.457 af, Atten= 15%, Lag= 28.2 min
Primary = 10.78 cfs @ 13.60 hrs, Volume= 5.457 af
Routed to Link L1 : Pump Sta Tailwater

Routing by Sim-Route method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Peak Elev= 1.79' @ 17.06 hrs Surf.Area= 57,205 sf Storage= 41,830 cf

Plug-Flow detention time= 58.6 min calculated for 5.456 af (100% of inflow)
Center-of-Mass det. time= 53.9 min (1,119.2 - 1,065.3)

Volume	Invert	Avail.Storage	Storage Description
#1	-0.75'	3,758,901 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-0.75	0	0	0
0.00	1,800	675	675
1.00	19,705	10,753	11,428
2.00	67,137	43,421	54,849
3.00	353,035	210,086	264,935
4.00	1,571,910	962,473	1,227,407
5.00	3,491,078	2,531,494	3,758,901

Device	Routing	Invert	Outlet Devices
#1	Primary	-0.75'	**30.0" Round Culvert** L= 547.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= -0.75' / -1.95' S= 0.0022 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf

OUTLET INVERT

Primary OutFlow Max=10.78 cfs @ 13.60 hrs HW=1.01' TW=-0.74' (Dynamic Tailwater)
1=Culvert (Barrel Controls 10.78 cfs @ 4.09 fps)

OUTLET CONTROLS - NOT TAILWATER

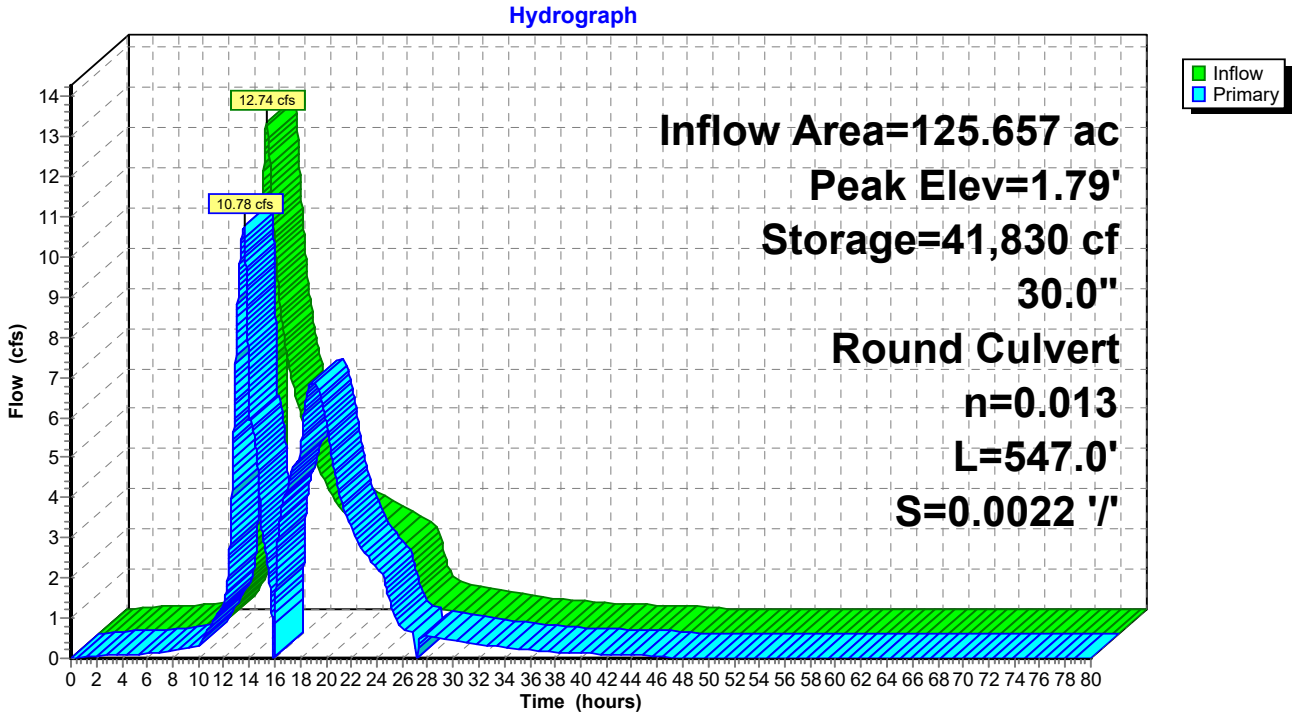
PEAK TAILWATER AT OUTLET

HEADWATER AT PEAK FLOW

ALTHOUGH THE TAILWATER ELEVATION IS ABOVE THE OUTLET INVERT, THE TAILWATER IS WELL BELOW THE HEADWATER ELEVATION.
1.75 FT OF HEAD IS PROVIDED TO PUSH FLOW THROUGH THE OUTLET. THEREFORE, BARREL CONTROLS AND TAILWATER DOES NOT CONTROL FLOW.

FLOW IS CONTROLLED BY POND STORAGE AND CULVERT CAPACITY, NOT DOWNSTREAM CONDITIONS.
THEREFORE, NO TAILWATER-INDUCED BACKUP IS CONFIRMED

Pond TA1: TA Swale Storage



Summary for Link L1: Pump Sta Tailwater

Inflow Area = 125.657 ac, 29.20% Impervious, Inflow Depth = 0.52" for 2 Yr Storm event
Inflow = 10.78 cfs @ 13.60 hrs, Volume= 5.457 af
Primary = 10.78 cfs @ 13.61 hrs, Volume= 5.457 af, Atten= 0%, Lag= 0.6 min
Routed to nonexistent node E-POA

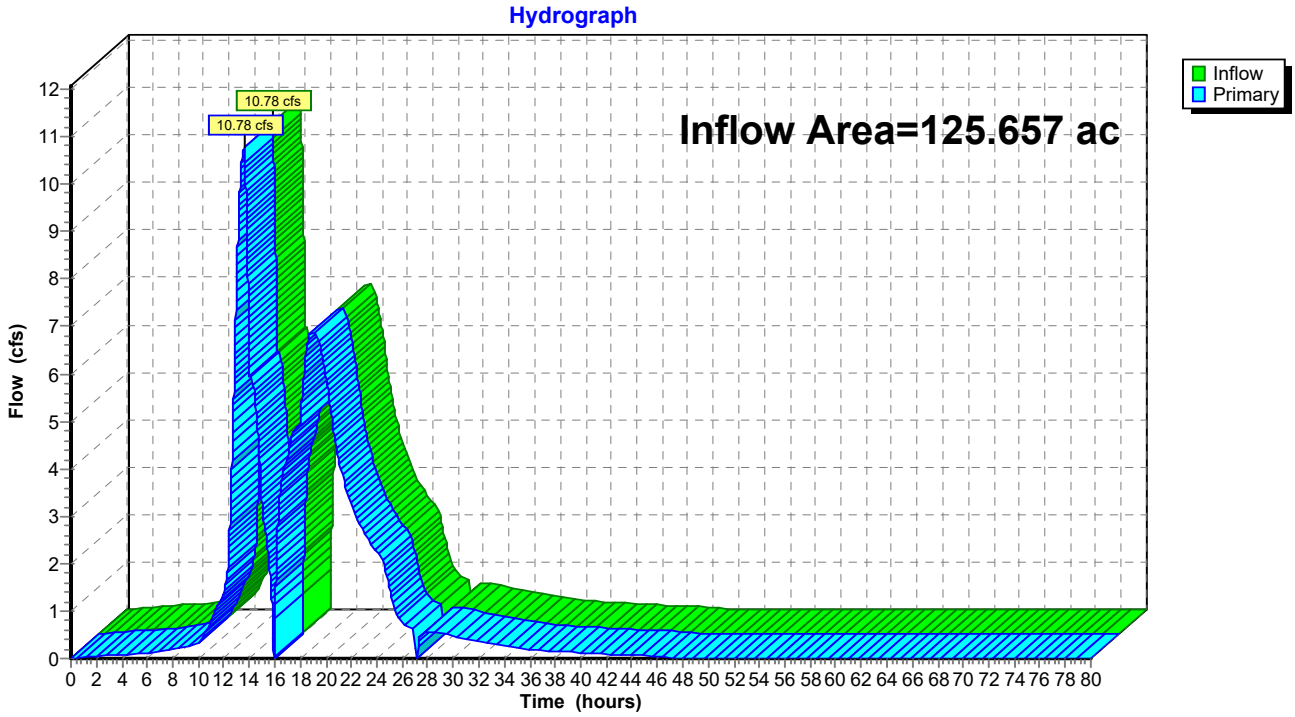
ALL FLOW LEAVING THE POND PASSES THROUGH TAILWATER NODE UNCHANGED (NOT DETAINING OR REDUCING)

Primary outflow = Inflow, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

28 Point manual elevation table, To= 0.00 hrs, dt= 1.00 hrs, feet =

-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08
-2.08	-2.08	-2.08	-1.18	-2.80	0.63	1.30	1.70	1.70
1.61	1.20	0.79	0.38	-0.03	-0.44	-0.85	-1.26	-1.67
-2.08								

Link L1: Pump Sta Tailwater



Summary for Link P POA: POA-2 PDA

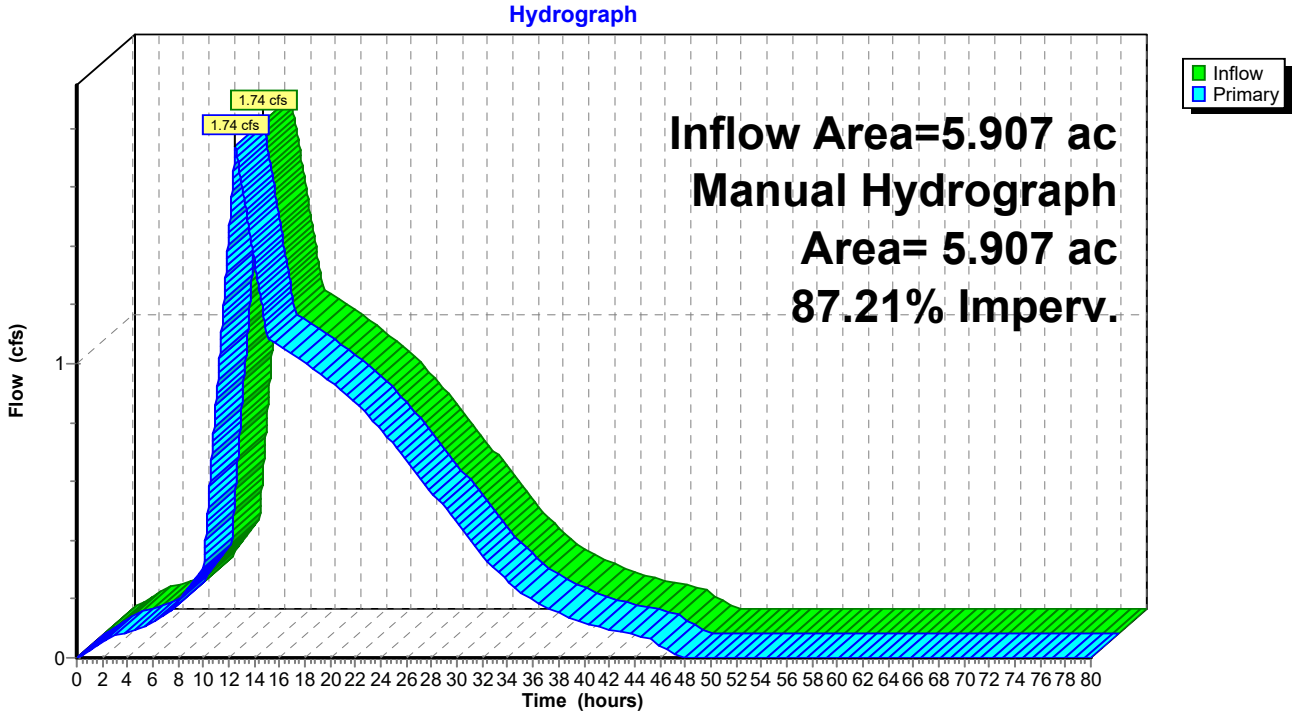
Inflow Area = 5.907 ac, 87.21% Impervious, Inflow Depth = 3.79" for 2 Yr Storm event
Inflow = 1.74 cfs @ 12.50 hrs, Volume= 1.868 af
Primary = 1.74 cfs @ 12.51 hrs, Volume= 1.868 af, Atten= 0%, Lag= 0.6 min
Routed to Pond TA1 : TA Swale Storage

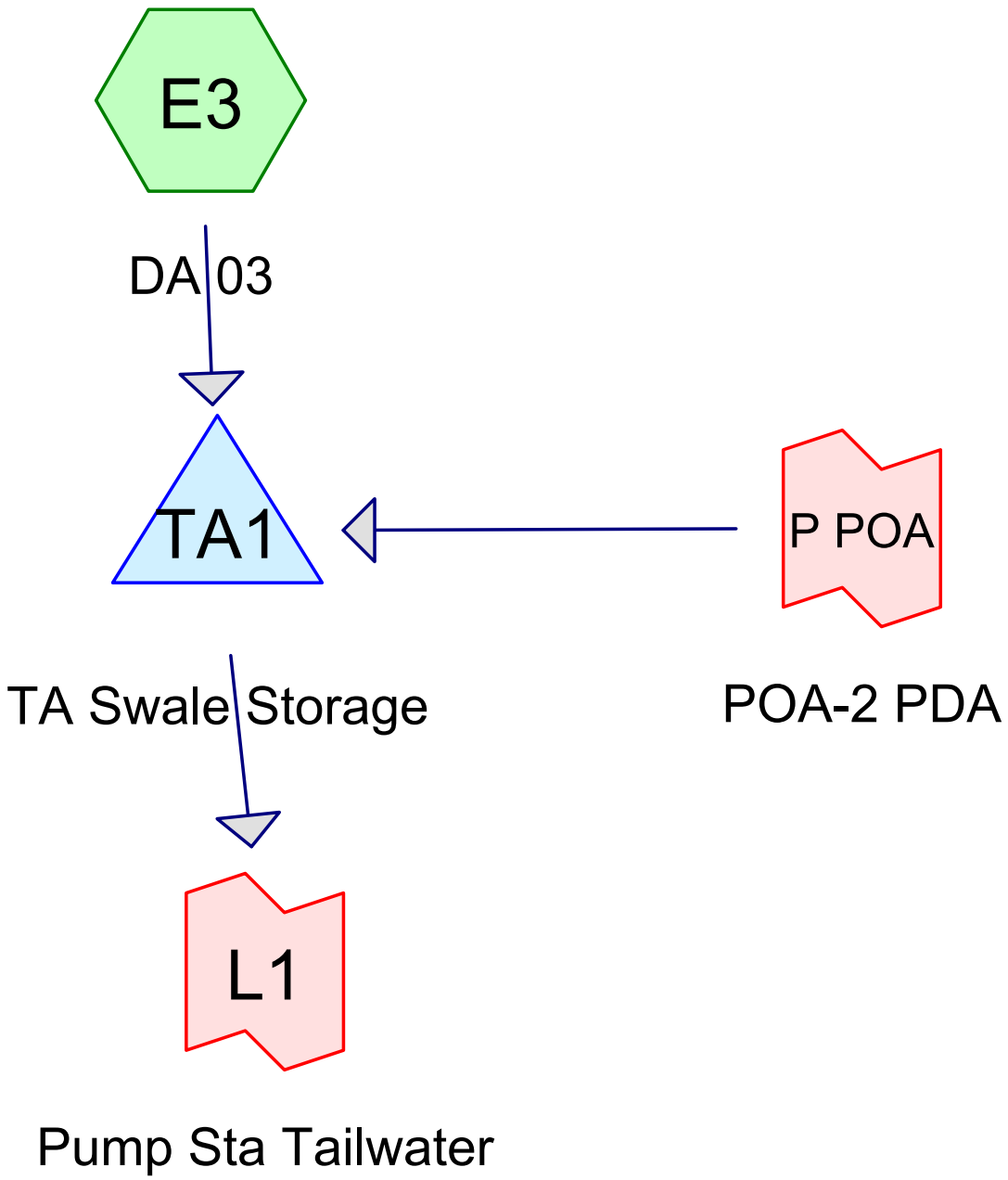
Primary outflow = Inflow, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

2 Yr Storm 27 Point manual hydrograph, To= 0.00 hrs, dt= 2.50 hrs, Area= 5.907 ac, 87.21% Imp., cfs =

0.00	0.07	0.10	0.16	0.31	1.74	1.09	1.02	0.94	0.85
0.73	0.59	0.46	0.32	0.22	0.16	0.12	0.09	0.07	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00			

Link P POA: POA-2 PDA





Subcat Reach Pond Link

Routing Diagram for Prop - 10 Year
Prepared by Bohler Engineering, PC, Printed 9/2/2025
HydroCAD® 10.20-5c s/n 03478 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment E3: DA 03

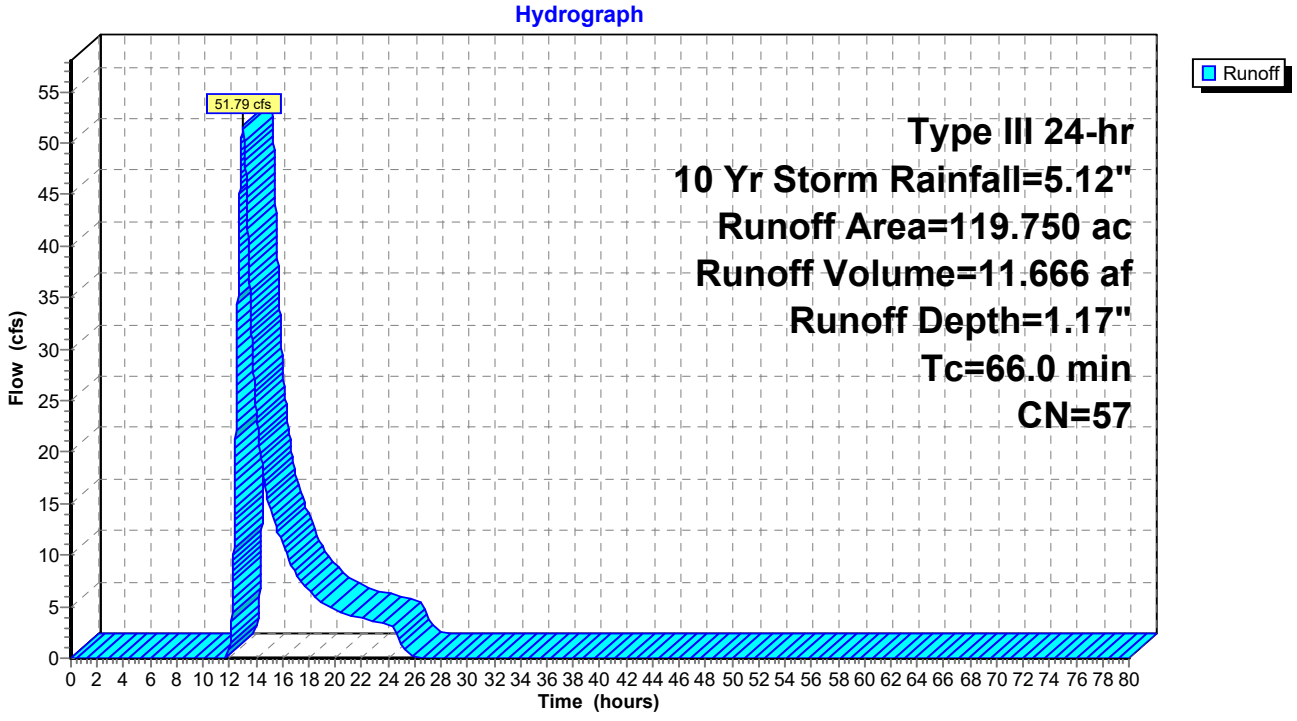
Runoff = 51.79 cfs @ 12.98 hrs, Volume= 11.666 af, Depth= 1.17"
Routed to Pond TA1 : TA Swale Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr Storm Rainfall=5.12"

	Area (ac)	CN	Description
*	88.210	43	Pervious cover, Good, HSG D
	31.540	98	Paved parking, HSG D
	119.750	57	Weighted Average
	88.210		73.66% Pervious Area
	31.540		26.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0					**Direct Entry, HEC I Lag**

Subcatchment E3: DA 03



Summary for Pond TA1: TA Swale Storage

Inflow Area = 125.657 ac, 29.20% Impervious, Inflow Depth = 1.41" for 10 Yr Storm event
Inflow = 54.34 cfs @ 12.98 hrs, Volume= 14.726 af
Outflow = 22.84 cfs @ 13.65 hrs, Volume= 14.711 af, Atten= 58%, Lag= 40.2 min
Primary = 22.84 cfs @ 13.65 hrs, Volume= 14.711 af
Routed to Link L1 : Pump Sta Tailwater

Routing by Sim-Route method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Peak Elev= 2.52' @ 14.51 hrs Surf.Area= 215,351 sf Storage= 128,071 cf

Plug-Flow detention time= 74.4 min calculated for 14.709 af (100% of inflow)
Center-of-Mass det. time= 72.1 min (1,087.9 - 1,015.8)

Volume	Invert	Avail.Storage	Storage Description
#1	-0.75'	3,758,901 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-0.75	0	0	0
0.00	1,800	675	675
1.00	19,705	10,753	11,428
2.00	67,137	43,421	54,849
3.00	353,035	210,086	264,935
4.00	1,571,910	962,473	1,227,407
5.00	3,491,078	2,531,494	3,758,901

Device	Routing	Invert	Outlet Devices
#1	Primary	-0.75'	**30.0" Round Culvert** L= 547.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= -0.75' / -1.95' S= 0.0022 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf

OUTLET INVERT

Primary OutFlow Max=22.84 cfs @ 13.65 hrs HW=2.46' TW=-0.56' (Dynamic Tailwater)
↳**1=Culvert** (Barrel Controls 22.84 cfs @ 4.71 fps)

OUTLET CONTROLS - NOT TAILWATER

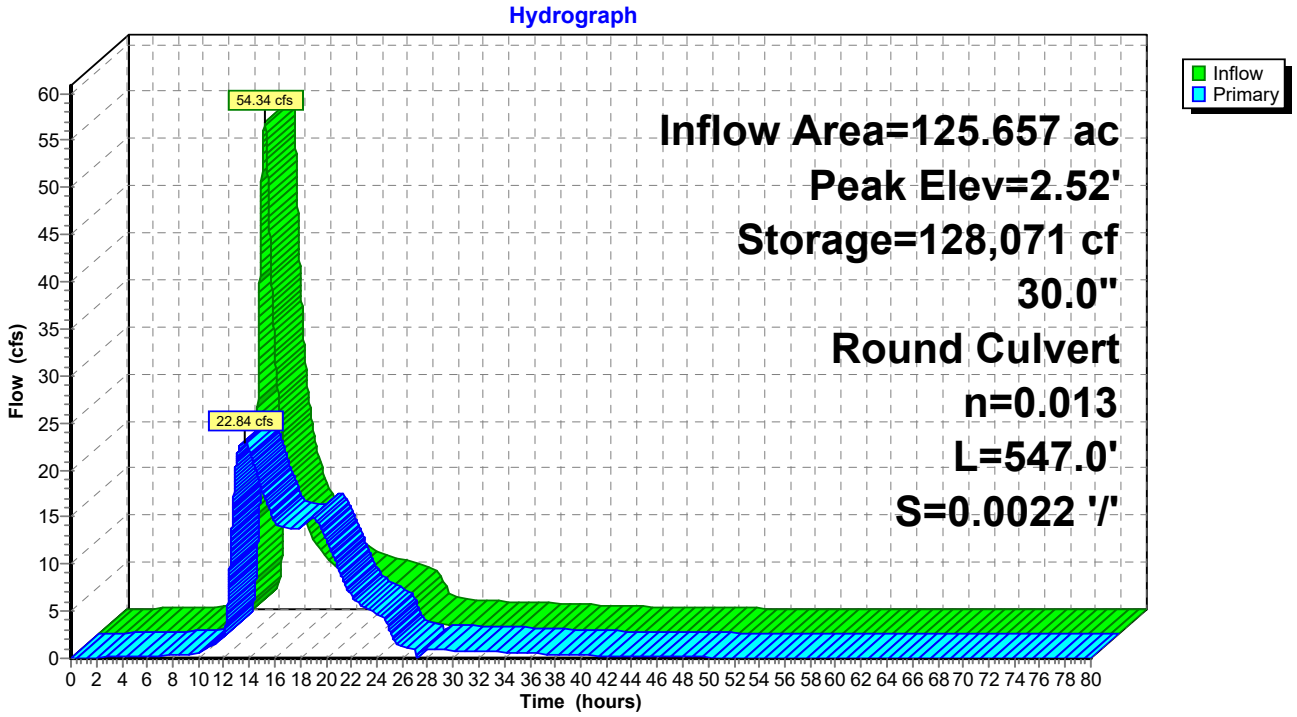
PEAK TAILWATER AT OUTLET

HEADWATER AT PEAK FLOW

ALTHOUGH THE TAILWATER ELEVATION IS ABOVE THE OUTLET INVERT, THE TAILWATER IS WELL BELOW THE HEADWATER ELEVATION.
THEREFORE, OVER 3FT OF HEAD IS PROVIDED TO PUSH FLOW THROUGH THE OUTLET. BARREL CONTROLS AND TAILWATER DOES NOT CONTROL FLOW.

FLOW IS CONTROLLED BY POND STORAGE AND CULVERT CAPACITY, NOT DOWNSTREAM CONDITIONS.
THEREFORE, NO TAILWATER-INDUCED BACKUP IS CONFIRMED

Pond TA1: TA Swale Storage



Summary for Link L1: Pump Sta Tailwater

Inflow Area = 125.657 ac, 29.20% Impervious, Inflow Depth = 1.40" for 10 Yr Storm event
Inflow = 22.84 cfs @ 13.65 hrs, Volume= 14.711 af
Primary = 22.84 cfs @ 13.66 hrs, Volume= 14.711 af, Atten= 0%, Lag= 0.6 min
Routed to nonexistent node E-POA

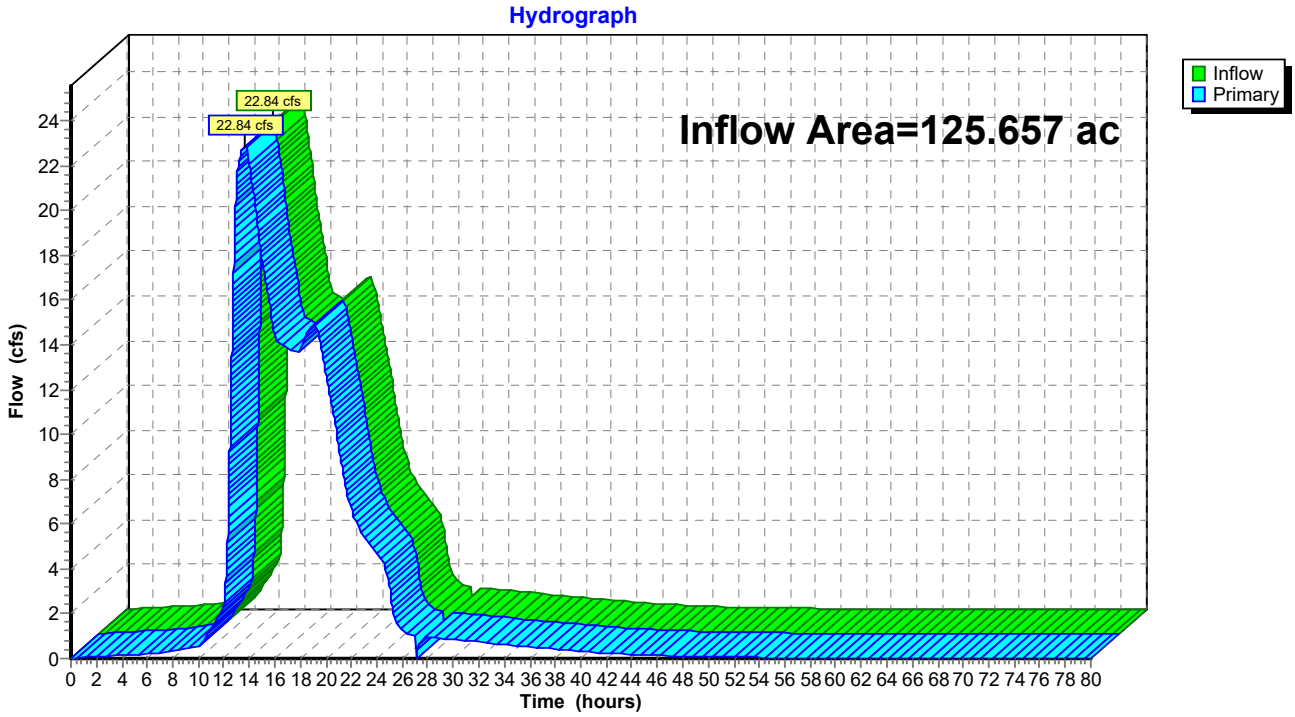
TAILWATER DOES NOT REDUCE OR DELAY FLOW

Primary outflow = Inflow, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

28 Point manual elevation table, To= 0.00 hrs, dt= 1.00 hrs, feet =

-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08
-2.08	-2.08	-2.08	-1.18	-2.80	0.63	1.30	1.70	1.70
1.61	1.20	0.79	0.38	-0.03	-0.44	-0.85	-1.26	-1.67
-2.08								

Link L1: Pump Sta Tailwater



Summary for Link P POA: POA-2 PDA

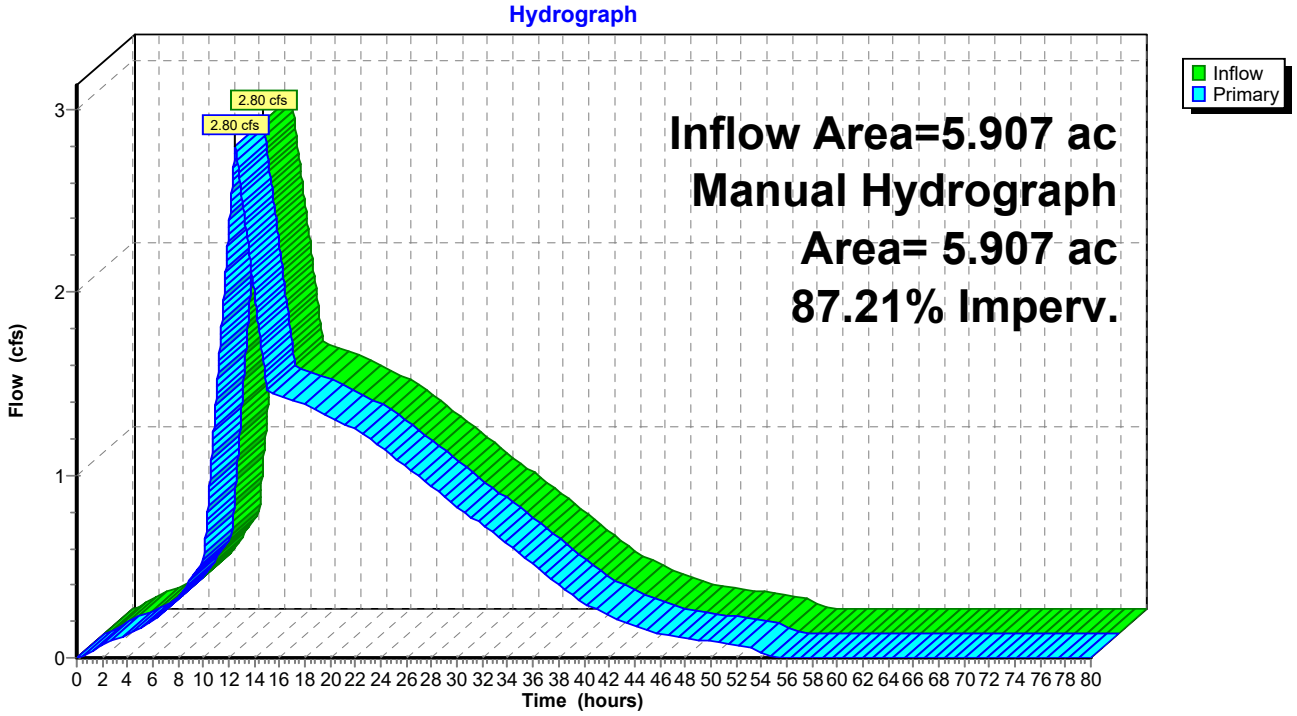
Inflow Area = 5.907 ac, 87.21% Impervious, Inflow Depth = 6.22" for 10 Yr Storm event
Inflow = 2.80 cfs @ 12.50 hrs, Volume= 3.060 af
Primary = 2.80 cfs @ 12.51 hrs, Volume= 3.060 af, Atten= 0%, Lag= 0.6 min
Routed to Pond TA1 : TA Swale Storage

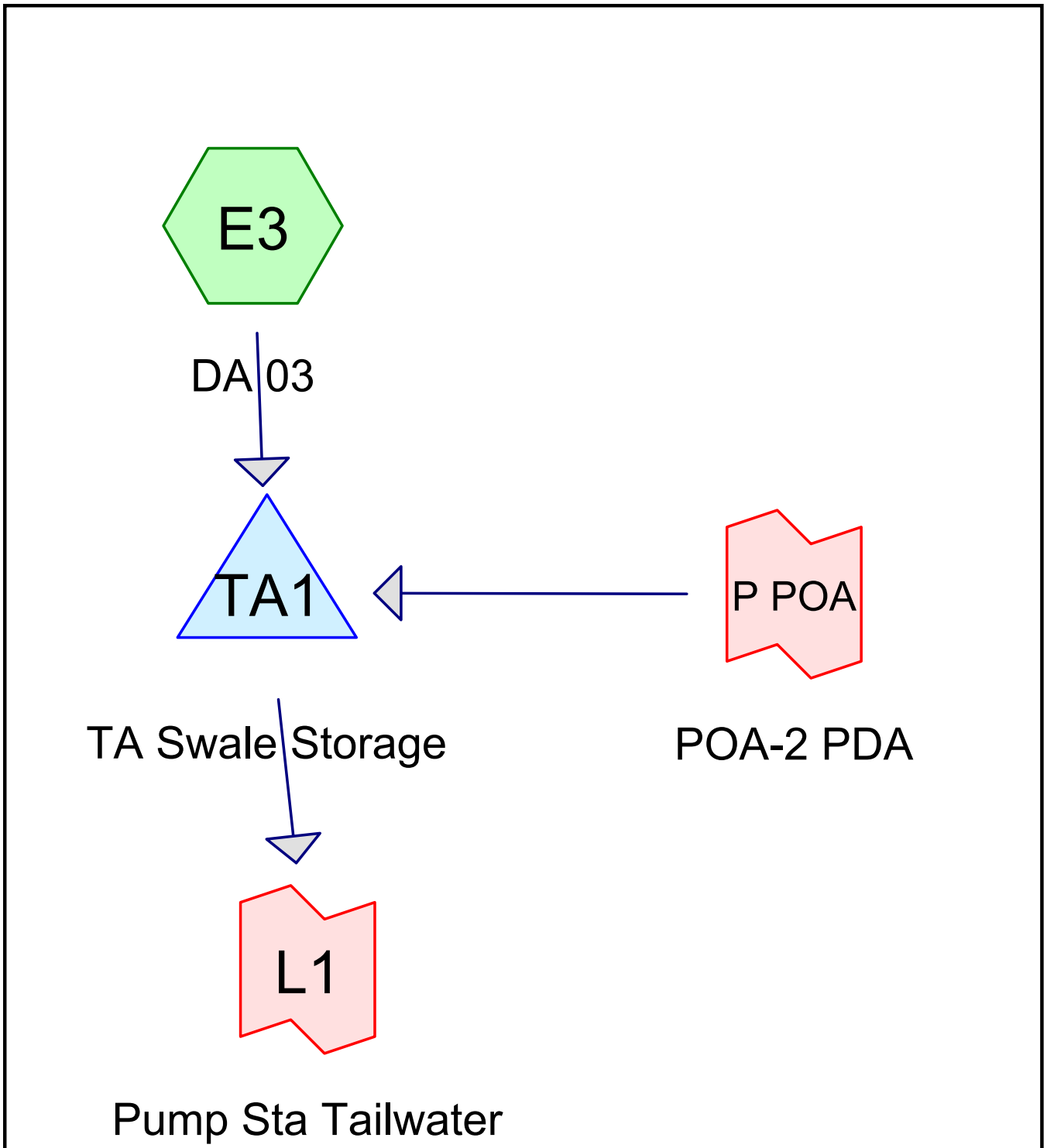
Primary outflow = Inflow, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

10 Yr Storm 27 Point manual hydrograph, To= 0.00 hrs, dt= 2.50 hrs, Area= 5.907 ac, 87.21% Imp., cfs =

0.00	0.09	0.16	0.29	0.53	2.80	1.46	1.40	1.32	1.23
1.10	0.97	0.83	0.70	0.57	0.43	0.30	0.21	0.15	0.11
0.09	0.07	0.00	0.00	0.00	0.00	0.00			

Link P POA: POA-2 PDA





Routing Diagram for Prop - 100 Year
Prepared by Bohler Engineering, PC, Printed 9/2/2025
HydroCAD® 10.20-5c s/n 03478 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment E3: DA 03

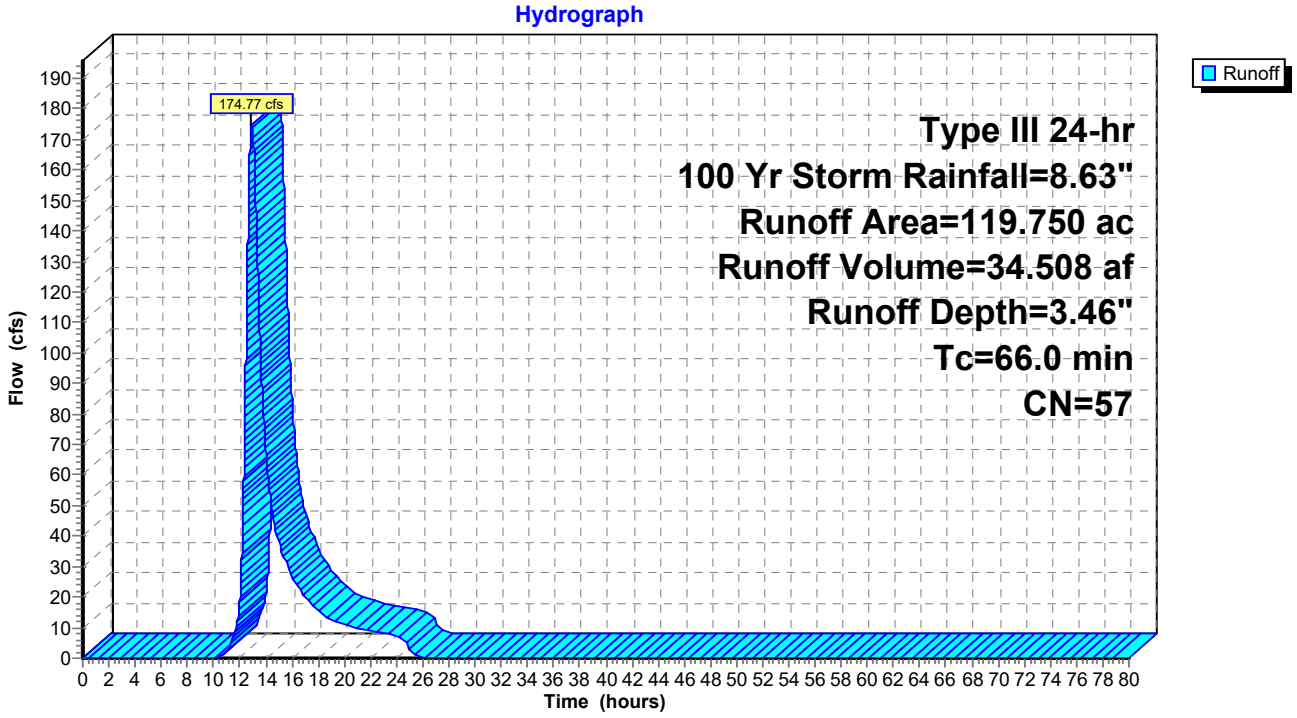
Runoff = 174.77 cfs @ 12.91 hrs, Volume= 34.508 af, Depth= 3.46"
Routed to Pond TA1 : TA Swale Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr Storm Rainfall=8.63"

	Area (ac)	CN	Description
*	88.210	43	Pervious cover, Good, HSG D
	31.540	98	Paved parking, HSG D
	119.750	57	Weighted Average
	88.210		73.66% Pervious Area
	31.540		26.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.0					**Direct Entry, HEC I Lag**

Subcatchment E3: DA 03



Summary for Pond TA1: TA Swale Storage

Inflow Area = 125.657 ac, 29.20% Impervious, Inflow Depth = 3.92" for 100 Yr Storm event
Inflow = 187.10 cfs @ 12.91 hrs, Volume= 41.043 af
Outflow = 27.15 cfs @ 20.60 hrs, Volume= 41.028 af, Atten= 85%, Lag= 461.5 min
Primary = 27.15 cfs @ 20.60 hrs, Volume= 41.028 af
Routed to Link L1 : Pump Sta Tailwater

Routing by Sim-Route method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Peak Elev= 3.76' @ 17.01 hrs Surf.Area= 1,280,107 sf Storage= 886,015 cf

Plug-Flow detention time= 358.6 min calculated for 41.028 af (100% of inflow)
Center-of-Mass det. time= 357.7 min (1,292.8 - 935.1)

Volume	Invert	Avail.Storage	Storage Description
#1	-0.75'	3,758,901 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-0.75	0	0	0
0.00	1,800	675	675
1.00	19,705	10,753	11,428
2.00	67,137	43,421	54,849
3.00	353,035	210,086	264,935
4.00	1,571,910	962,473	1,227,407
5.00	3,491,078	2,531,494	3,758,901

OUTLET INVERT

Device	Routing	Invert	Outlet Devices
#1	Primary	-0.75'	**30.0" Round Culvert** L= 547.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= -0.75' / -1.95' S= 0.0022 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf

Primary OutFlow Max=27.15 cfs @ 20.60 hrs HW=3.67' TW=0.54' (Dynamic Tailwater)
↳**1=Culvert** (Barrel Controls 27.15 cfs @ 5.53 fps)

OUTLET CONTROLS - NOT TAILWATER

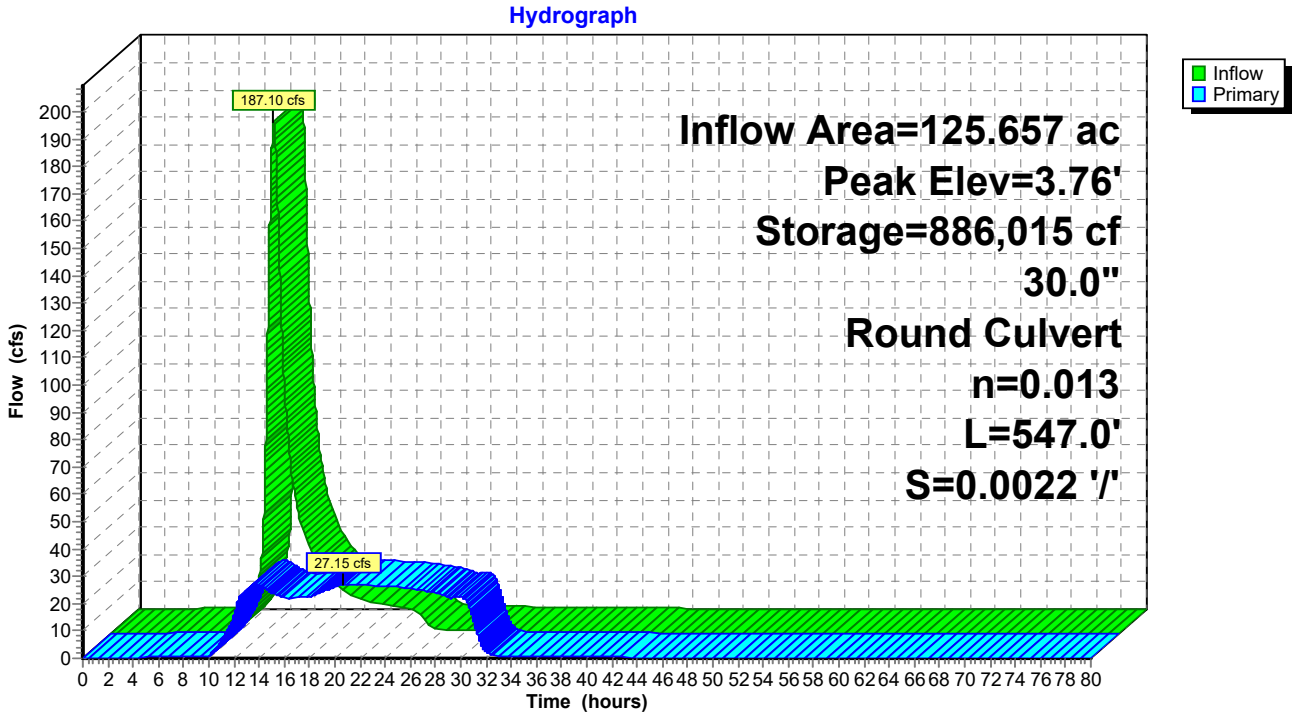
PEAK TAILWATER AT OUTLET

HEADWATER AT PEAK FLOW

ALTHOUGH THE TAILWATER ELEVATION IS ABOVE THE OUTLET INVERT, THE TAILWATER IS WELL BELOW THE HEADWATER ELEVATION.
3.13 FT OF HEAD IS PROVIDED TO PUSH FLOW THROUGH THE OUTLET. THEREFORE, BARREL CONTROLS AND TAILWATER DOES NOT CONTROL FLOW.

FLOW IS CONTROLLED BY POND STORAGE AND CULVERT CAPACITY, NOT DOWNSTREAM CONDITIONS.
THEREFORE, NO TAILWATER-INDUCED BACKUP IS CONFIRMED

Pond TA1: TA Swale Storage



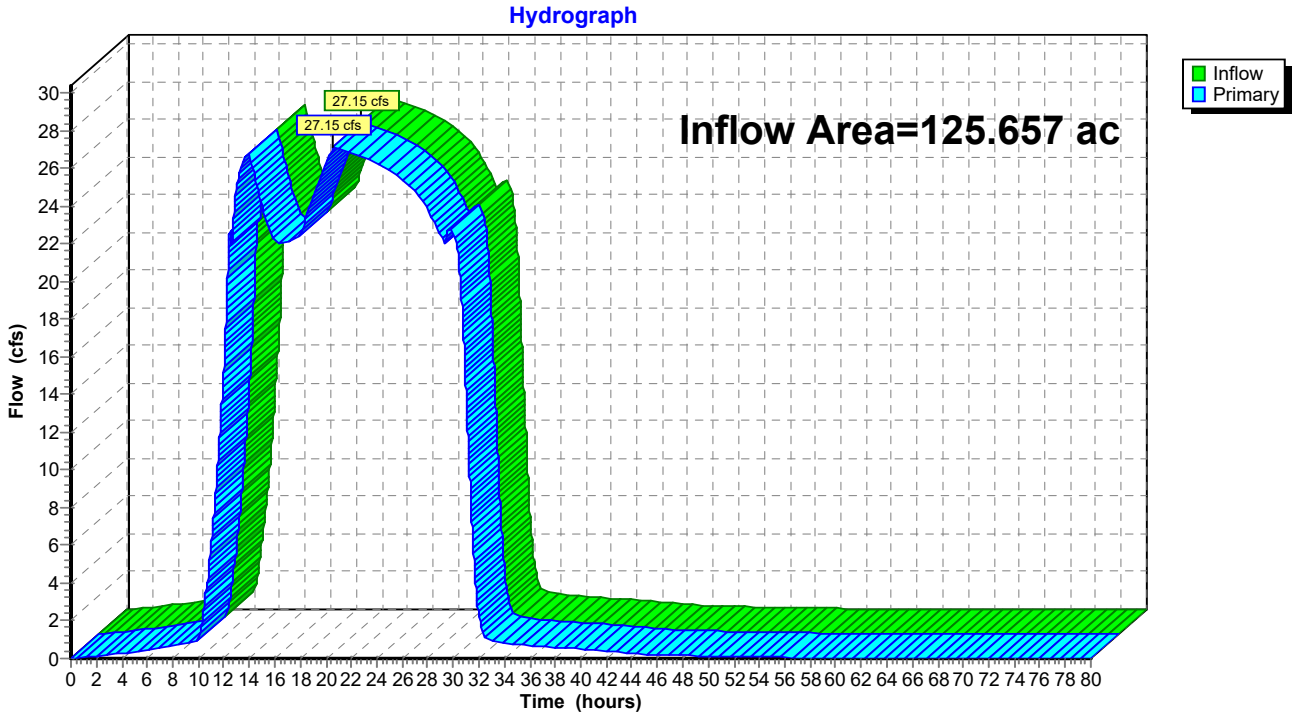
Summary for Link L1: Pump Sta Tailwater

Inflow Area = 125.657 ac, 29.20% Impervious, Inflow Depth = 3.92" for 100 Yr Storm event
Inflow = 27.15 cfs @ 20.60 hrs, Volume= 41.028 af
Primary = 27.15 cfs @ 20.61 hrs, Volume= 41.028 af, Atten= 0%, Lag= 0.6 min
Routed to nonexistent node E-POA ALL FLOW LEAVING THE POND PASSES THROUGH TAILWATER NODE UNCHANGED (NOT DETAINING OR REDUCING)
Primary outflow = Inflow, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

28 Point manual elevation table, To= 0.00 hrs, dt= 1.00 hrs, feet =

-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08	-2.08
-2.08	-2.08	-2.08	-1.18	-2.80	0.63	1.30	1.70	1.70
1.61	1.20	0.79	0.38	-0.03	-0.44	-0.85	-1.26	-1.67
-2.08								

Link L1: Pump Sta Tailwater



Summary for Link P POA: POA-2 PDA

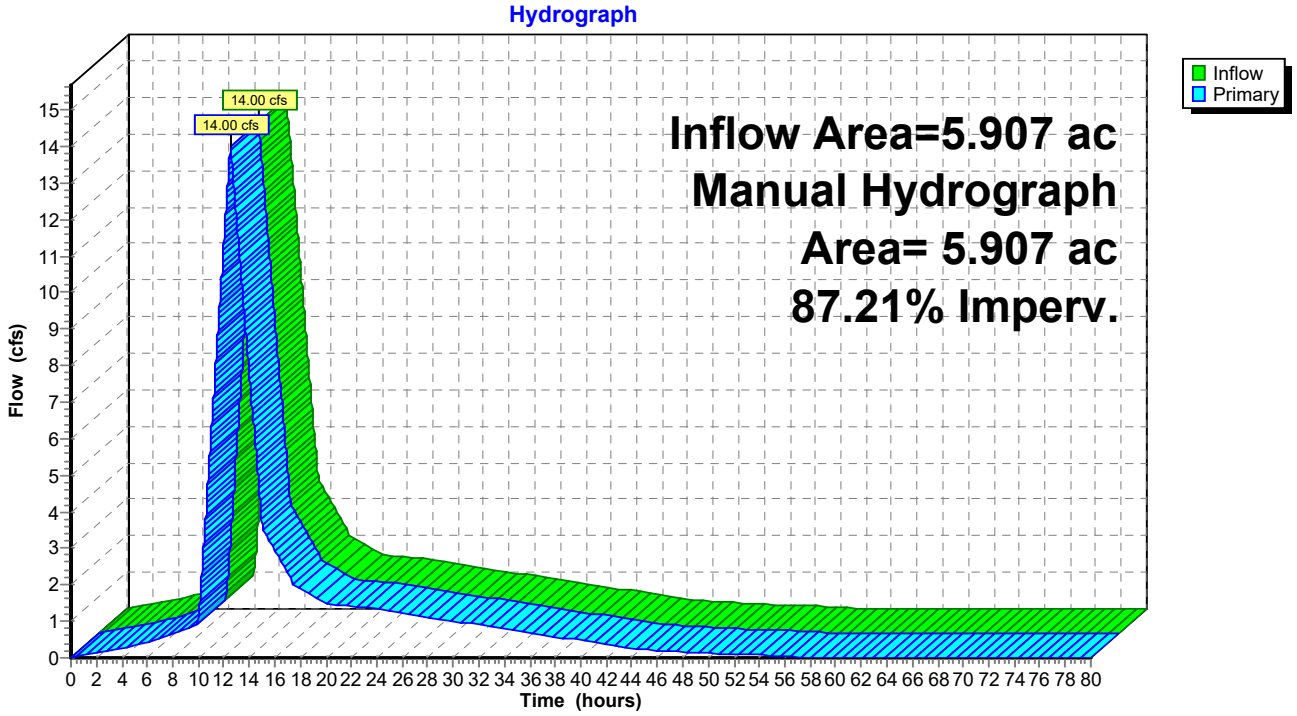
Inflow Area = 5.907 ac, 87.21% Impervious, Inflow Depth = 13.28" for 100 Yr Storm event
Inflow = 14.00 cfs @ 12.50 hrs, Volume= 6.535 af
Primary = 14.00 cfs @ 12.51 hrs, Volume= 6.535 af, Atten= 0%, Lag= 0.6 min
Routed to Pond TA1 : TA Swale Storage

Primary outflow = Inflow, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

100 Yr Storm 25 Point manual hydrograph, To= 0.00 hrs, dt= 2.50 hrs, Area= 5.907 ac, 87.21% Imp., cfs =

0.00	0.15	0.35	0.59	0.92	14.00	3.58	1.99	1.47	1.41
1.28	1.15	1.01	0.88	0.74	0.61	0.48	0.34	0.23	0.17
0.12	0.09	0.07	0.00	0.00					

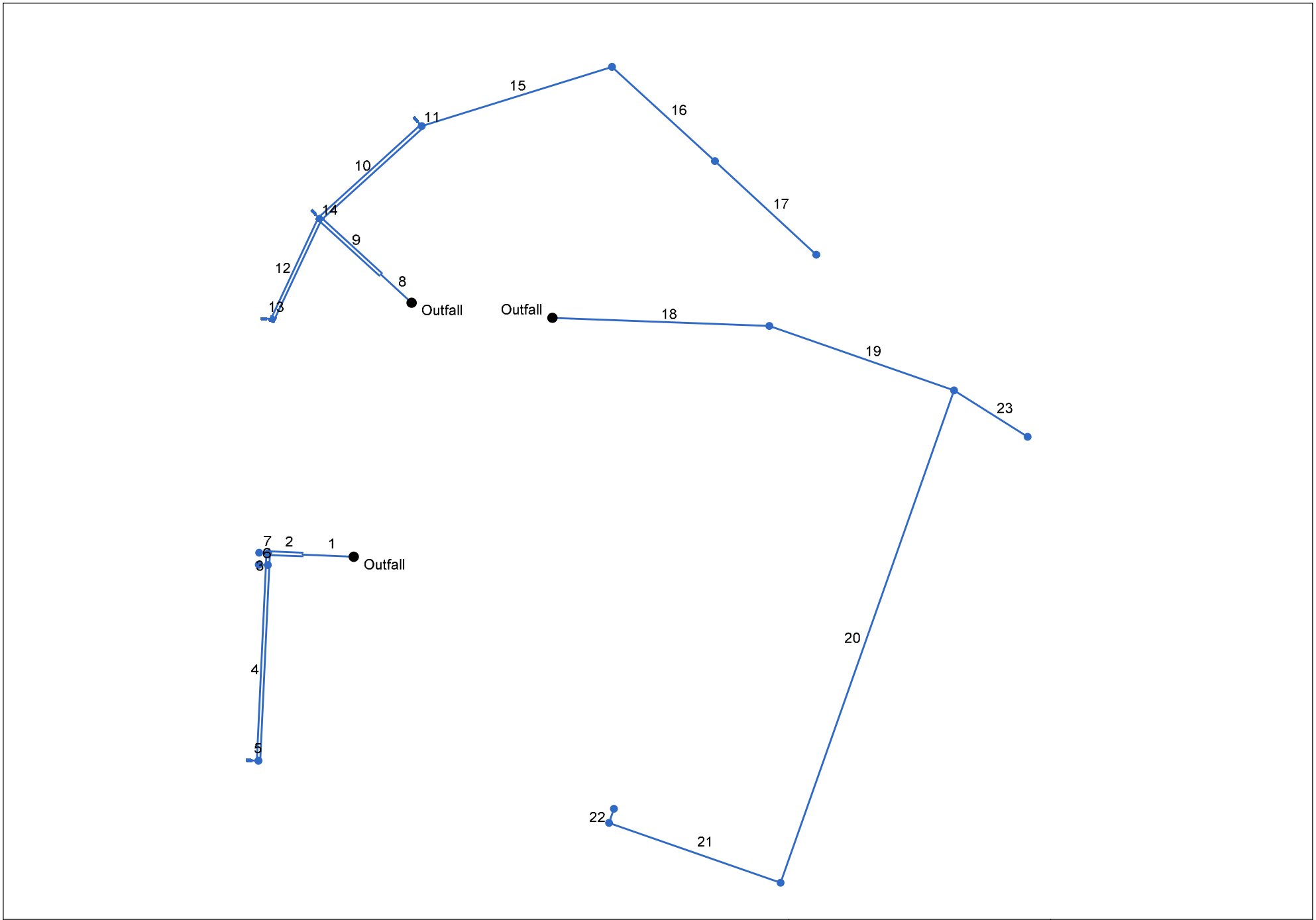
Link P POA: POA-2 PDA



E. CONVEYANCE CALCULATIONS

- **Pipe Sizing**

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: Pipe Sizing.stm	Number of lines: 23	Date: 11/11/2025

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	34.000	0.00	1.74	0.00	0.00	1.71	10.0	12.6	5.9	10.14	12.27	3.23	24	0.29	1.20	1.30	3.21	3.27	7.98	7.25	A-70
2	1	23.000	0.00	1.74	0.00	0.00	1.71	10.0	12.5	6.0	10.18	11.59	3.70	18(2b)	0.30	3.30	3.37	4.39	4.46	7.25	6.95	A-90
3	2	8.000	0.00	1.24	0.00	0.00	1.22	10.0	12.4	6.0	7.27	12.86	2.25	18(2b)	0.38	3.37	3.40	4.67	4.68	6.95	6.94	A-60
4	3	131.000	0.00	0.42	0.00	0.00	0.41	10.0	10.0	6.5	2.66	11.31	0.93	18(2b)	0.29	3.40	3.78	4.76	4.78	6.94	6.73	A-30
5	4	6.000	0.42	0.42	0.98	0.41	0.41	10.0	10.0	6.5	2.66	6.06	2.11	18	0.33	3.78	3.80	4.79	4.80	6.73	6.65	A-20
6	3	6.000	0.82	0.82	0.98	0.80	0.80	10.0	10.0	6.5	5.20	13.56	3.96	18	1.67	3.40	3.50	4.76	4.38	6.94	6.84	A-50
7	2	6.000	0.50	0.50	0.98	0.49	0.49	10.0	10.0	6.5	3.17	12.13	3.04	18	1.33	3.40	3.48	4.67	4.16	6.95	6.85	A-100
8	End	28.000	0.00	2.42	0.00	0.00	2.30	10.0	15.0	5.5	12.70	12.09	4.04	24	0.29	1.20	1.28	3.21	3.28	7.78	7.18	B-50
9	8	55.000	0.00	2.42	0.00	0.00	2.30	10.0	14.7	5.6	12.79	11.68	3.62	18(2b)	0.31	3.28	3.45	4.78	4.95	7.18	6.45	B-40
10	9	92.000	0.00	1.09	0.00	0.00	1.04	10.0	13.8	5.7	5.98	11.59	1.69	18(2b)	0.30	3.45	3.73	5.15	5.23	6.45	6.60	B-90
11	10	6.000	0.59	0.59	0.94	0.55	0.55	10.0	10.0	6.5	3.59	6.06	2.03	18	0.33	3.73	3.75	5.27	5.28	6.60	6.50	B-100
12	9	74.000	0.00	0.73	0.00	0.00	0.70	10.0	10.0	6.5	4.53	11.45	1.28	18(2b)	0.30	3.45	3.67	5.15	5.17	6.45	6.40	B-30
13	12	6.000	0.73	0.73	0.96	0.70	0.70	10.0	10.0	6.5	4.53	6.06	2.56	18	0.33	3.67	3.69	5.19	5.21	6.40	6.32	B-20
14	9	6.000	0.60	0.60	0.92	0.55	0.55	10.0	10.0	6.5	3.57	6.06	2.02	18	0.33	3.45	3.47	5.15	5.16	6.45	6.35	B-70
15	10	132.800	0.13	0.50	0.98	0.13	0.49	10.0	12.6	5.9	2.91	5.76	1.76	18	0.30	3.73	4.13	5.27	5.36	6.60	7.10	B-120
16	15	93.000	0.23	0.37	0.98	0.23	0.36	10.0	11.7	6.1	2.22	5.76	1.51	18	0.30	4.13	4.41	5.43	5.47	7.10	7.44	B-130
17	16	92.000	0.14	0.14	0.98	0.14	0.14	10.0	10.0	6.5	0.89	5.79	0.78	18	0.30	4.41	4.69	5.49	5.50	7.44	7.99	B-140
18	End	144.600	0.00	0.93	0.00	0.00	0.84	10.0	13.4	5.8	6.73	15.96	2.14	24	0.50	2.00	2.72	6.05	6.18	8.94	9.78	C-20
19	18	130.341	0.00	0.93	0.00	0.00	0.84	10.0	12.4	6.0	6.88	16.09	2.19	24	0.51	2.72	3.38	6.20	6.32	9.78	8.30	C-30
20	19	348.980	0.00	0.93	0.00	0.00	0.84	10.0	10.5	6.4	5.32	5.76	3.01	18	0.30	3.38	4.43	6.40	7.29	8.30	8.00	C-40
21	20	121.050	0.00	0.93	0.00	0.00	0.84	10.0	10.0	6.5	5.40	4.58	4.40	15	0.50	4.53	5.14	7.44	8.28	8.00	9.91	C-50
22	21	9.981	0.93	0.93	0.90	0.84	0.84	10.0	10.0	6.5	5.41	4.57	4.41	15	0.50	5.24	5.29	8.59	8.66	9.91	10.05	C-60

Project File: Pipe Sizing.stm

Number of lines: 23

Run Date: 11/11/2025

NOTES:Intensity = 182.59 / (Inlet time + 19.10) ^ 0.99; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	19	58.016	0.00	0.00	0.00	0.00	0.00	10.0	10.0	0.0	1.88	15.99	0.60	24	0.50	3.38	3.67	6.40	6.40	8.30	7.82	E-10A

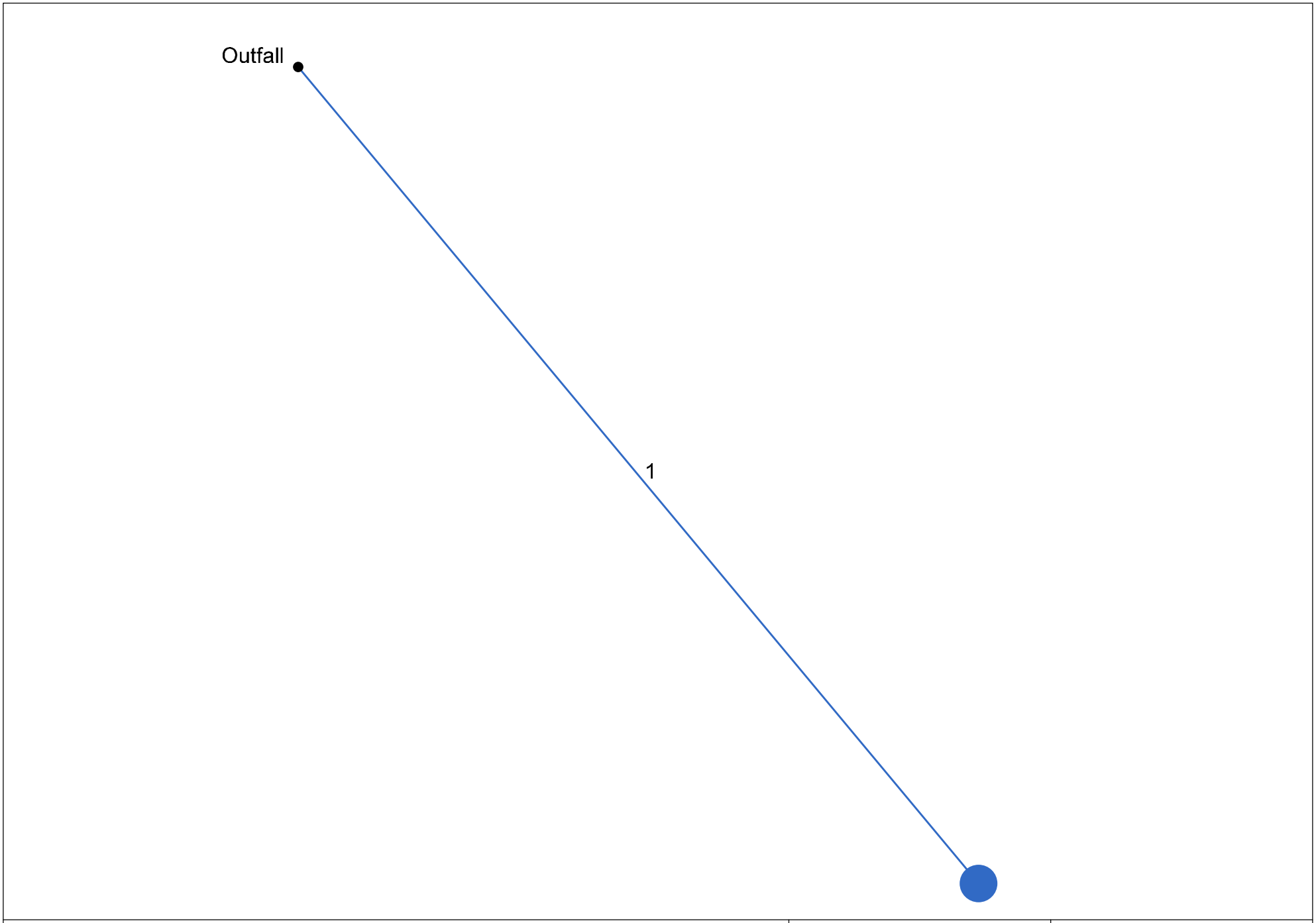
Project File: Pipe Sizing.stm

Number of lines: 23

Run Date: 11/11/2025

NOTES:Intensity = 182.59 / (Inlet time + 19.10) ^ 0.99; Return period =Yrs. 25 ; c = cir e = ellip b = box

Discharge Pipe



Project File: Discharge Pipe.stm	Number of lines: 1	Date: 10/16/2025

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	118.898	0.00	0.00	0.00	0.00	0.00	10.0	10.0	0.0	13.18	14.39	5.53	24	0.34	0.64	1.05	1.95	2.61	7.06	7.33	

Discharge Pipe | Number of lines: 1 | Run Date: 10/16/2025

NOTES:Intensity = 182.59 / (Inlet time + 19.10) ^ 0.99; Return period =Yrs. 25 ; c = cir e = ellip b = box

BOHLER
125 Half Mile Road, Suite 207, Red Bank, NJ 07701
(732) 825-6800

Date: 10/14/2025
Project: Signature East
Project No: NJC240059.00

Calculated By: CTC
Checked By: BE

Manning's Equation

Design Parameters:

Pipe Diameter, D	8	in
Pipe Material	HDPE	
Slope, s	0.10	%
Flow Depth, y	FULL	

Calculations:

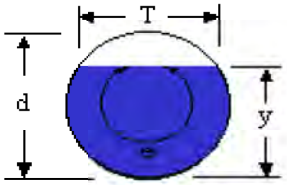
Cross-Sectional Area, $A = D^2/8\,[\theta - \sin(\theta)]$ =	0.35	ft^2
Manning's Coefficient, n	0.011	
Hydraulic Radius, R	0.17	ft
Angle, θ =	6.28	radians
Wetted Perimeter, $P = \theta D/2$	2.09	ft
Flow Depth, y	0.67	ft
Flow Top Width, $T = 2[y(D-y)]^{1/2}$	0.00	ft
Gravity Constant, g	32.174	ft/s^2
Froude Number, F	0.00	
	Subcritical Flow	

- **Flow & Velocity:**

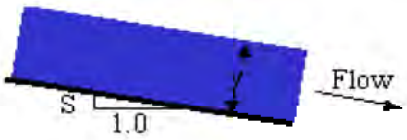
Flow, $Q_o = \dfrac{1.486 \cdot R^{2/3} s^{1/2} A}{n}$ = **0.45 cfs** / **0.29 MGD**

Velocity, $V = Q/A$ = **1.29 fps**

Cross-Section of Culvert



Cut-away Side View



$$Q = VA \qquad V = \frac{k}{n} R^{2/3} S^{1/2} \qquad R = \frac{A}{P} \qquad A = \frac{d^2}{8}\left(\theta - \sin(\theta)\right)$$

$$P = \frac{\theta d}{2} \qquad y = \frac{d}{2}\left[1 - \cos\left(\frac{\theta}{2}\right)\right] \qquad T = 2\sqrt{y(d-y)} \qquad F = V\sqrt{\frac{T}{gA\cos(Tan^{-1}S)}}$$

PIPE SIZING
WQ Inflow (based on Rational Method ~ Q = CIA)

Q = [0.98x(0.625 in/hr)x(0.073 ac)] + [0.95x(0.625 in/hr)x(0.067 ac)] + [0.91x(0.625 in/hr)x(0.159 ac)] = 0.18 CFS

Capacity to Convey Design Storm
0.45 CFS > 0.18 CFS, OK

BOHLER
125 Half Mile Road, Suite 207, Red Bank, NJ 07701
(732) 825-6800

Date: 8/28/2025
Project: Signature East
Project No: NJC240059.00

Calculated By: CTC
Checked By: BE

Manning's Equation

Design Parameters:

Pipe Diameter, D	15	in
Pipe Material	HDPE	
Slope, s	0.10	%
Flow Depth, y	FULL	

Calculations:

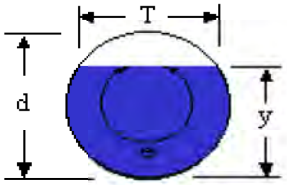
Cross-Sectional Area, $A = D^2/8\,[\theta - \sin(\theta)]$ =	1.23	ft^2
Manning's Coefficient, n	0.011	
Hydraulic Radius, R	0.31	ft
Angle, θ =	6.28	radians
Wetted Perimeter, $P = \theta D/2$	3.93	ft
Flow Depth, y	1.25	ft
Flow Top Width, $T = 2[y(D-y)]^{1/2}$	0.00	ft
Gravity Constant, g	32.174	ft/s^2
Froude Number, F	0.00	
	Subcritical Flow	

- **Flow & Velocity:**

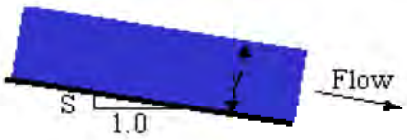
Flow, $Q_o = \dfrac{1.486 \cdot R^{2/3} s^{1/2} A}{n}$ . . . . . **2.41 cfs**
1.56 MGD

Velocity, $V = Q/A$ . . . . . **1.97 fps**

Cross-Section of Culvert



Cut-away Side View



$$Q = VA \qquad V = \frac{k}{n} R^{2/3} S^{1/2} \qquad R = \frac{A}{P} \qquad A = \frac{d^2}{8}\left(\theta - \sin(\theta)\right)$$

$$P = \frac{\theta d}{2} \qquad y = \frac{d}{2}\left[1 - \cos\left(\frac{\theta}{2}\right)\right] \qquad T = 2\sqrt{y(d-y)} \qquad F = V\sqrt{\frac{T}{gA\cos(Tan^{-1}S)}}$$

PIPE SIZING
100-yr Future Outflow (based on HydroCAD Model)

Q = 1.88 CFS

Capacity to Convey Design Storm
2.41 CFS > 1.88 CFS, OK