Stormwater Management Report

GENERAL DYNAMICS
Electric Boat

South Yard Assembly Building
75 Eastern Point Road

Groton, Connecticut

February 2019

FUSS & O'NEILL

146 Hartford Road
Manchester, CT 06040

Project No. 97570.S30

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1 Executive Summary

General Dynamics Corporation Electric Boat Division (GDEB), the nation's premier manufacturer of submarines for the Unites States Navy, will design and build the Columbia class submarine, the next-generation of ballistic-missile submarines to replace the Ohio class submarines scheduled for retirement starting in 2027. This next generation of submarines will be constructed at the GDEB shipyard facility located at 75 Eastern Point Road in Groton, Connecticut – the submarine capitol of the world.

In order to meet the demand and delivery schedule for this critical national defense asset as required by the United States Navy, GDEB has prepared and implemented a Facility Master Plan (FMP) with an accelerated schedule for design and construction of a new state of the art manufacturing facility on the southern portion of their property. This new facility will allow for construction of the Columbia class submarines while the Virginia class submarines are constructed in the existing facilities.

The proposed manufacturing facility is the South Yard Assembly Building (SYAB). The facility will allow for efficient construction and launching of the new submarines. The SYAB is a 624 ft. x 317 ft. x 160 ft. steel structure that is founded on concrete filled steel tube piles driven as much as 90 ft. to bedrock. The structure projects out over the New London Harbor portion of the Thames River. Bulkheads and piers are located on either side of the structure to allow for docking of transport barges and shuttles delivering materials and modules for the submarines. The SYAB is supported by a utility building adjoining to the east. The utility building will provide new utility services drawing from existing facility utilities and also from public utilities located in Eastern Point Road. A future building is also planned to house module fit-up and testing facilities and also provide trade support related spaces.

GDEB's Facility Master Plan for development includes construction of the following facility improvements:

- SYAB – A new manufacturing building founded on steel piles over the harbor to allow for construction of two Columbia class submarines concurrently.
- Future Building – A future building to be located east of the SYAB for testing of system modules and to provide trade related support spaces.
- Utility Building and Connections – A utility building to house primary utility infrastructure to support the SYAB and the future building. New utility connections for the utility building will come from existing facility utilities as well as public utilities in Eastern Point Road.
- Bulkheads and Piers – Constructed on the north and south sides of the SYAB to allow transport barges and sea shuttles to deliver materials and modules for construction of the submarines.
- Floating Dry Dock – A floating dry dock (FDD) located to the south of the SYAB to move completed submarines from the SYAB into position for launching.
- Submerging Basin – A dredged area adjacent to the FDD that will provide the required draft to submerse and launch the completed submarines.
- Wastewater Pump Station – A wastewater pump station adjacent to the SYAB with sufficient capacity to support ship building and testing activities pumping wastewater up to the Groton Utilities sanitary sewer main located in Eastern Point Road.
- Electrical Receiving Station – An electrical receiving station constructed along Eastern Point Road and fed from the Groton Utilities power distribution network to provide sufficient power to the SYAB and future building.

- Railroad Track Renovations – Renovations to the existing railroad tracks that enter the site from the south utilized to deliver materials and components for construction of the submarines.
- Construction Road – A construction road providing access from Eastern Point Road. The construction road will run along the southern edge of the property and then over a portion of existing railroad tracks to allow for deliveries during construction.
- Stormwater Management – Replacement of existing stormwater management systems and implementation of new stormwater systems designed to remove oils and suspended solids from runoff prior to discharge to the Thames River.

The 74.89 acre property is bounded by Eastern Point Road to the east and residential areas beyond, Thames Street to the north, the Thames River (New London Harbor) to the west, and the Speedway (Buckeye) Terminal petroleum storage facility to the south. The landward project area is approximately 12.8 acres located in the South Yard on the southern portion of the site. A USGS site location map is presented as *Figure 1*.

Fuss & O'Neill evaluated existing (pre-development) and proposed (post-development) hydrologic conditions for the site. This report presents the design calculations for the peak stormwater runoff flow rates leaving the site. This report also discusses proposed water quality improvement measures for the stormwater runoff. Ultimately the proposed site will not have a negative impact on the receiving waters.

A plan was developed to establish erosion and sedimentation controls to stabilize the site during construction and protect receiving water resources adjacent to the development. Silt fence, sediment control socks, catch basin inserts, erosion control mats, and other erosion control devices will be used to ensure proper site stabilization during construction. Once construction has been completed and the site is stabilized, water quality of the stormwater runoff will be improved by the use of accepted Best Management Practices (BMP's) in development. The proposed BMP's have been designed using recommendations from the *2002 Connecticut Guidelines for Erosion and Sediment Control.* These efforts will remove a minimum of 80% of Total Suspended Solids (TSS) that may be present in runoff from the developed site. The design meets the guidelines of the City of Groton and the *Connecticut Stormwater Quality Manual* (CTSWQM). The design also meets the requirements of the Connecticut Department of Energy and Environmental Protection (CTDEEP)'s *General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities*.

2 Existing Conditions

The South Yard of the GDEB facility currently contains a variety of buildings and material storage areas and is mostly paved with bituminous concrete. Stormwater runoff generally flows to the west across the site following the surface topography toward the Thames River. A network of catch basins and storm sewers captures and conveys stormwater runoff and discharges it through a series of five (5) outfall pipes directly to the Thames River. These improvements will be removed or relocated to make room for the SYAB and associated infrastructure.

The elevation of Eastern Point Road is approximately 50 feet higher than the South Yard. The ground surface generally slopes down steeply heading west from the roadway toward the South Yard at the edge of the river. The eastern portion of the South Yard includes a level area formed by a significant cut into the slope and the underlying bedrock. At the base of this rock cut face is a drainage trench (Watercourse

B) that captures stormwater runoff and some groundwater seeping from the rock face. In addition, there are two storm sewers that extend down the rock face and discharge into this drainage trench. The sewers convey stormwater from portions of Eastern Point Road and a 90-acre residential watershed to the east of the road. The discharge this off-site water is recorded in a drainage easement in favor of the State of Connecticut as Eastern Point Road is a State highway (SR 349). The Connecticut Department of Transportation (CTDOT) maintains a hydrodynamic separator located in an easement in GDEB Parking Lot J adjacent to the road to treat the runoff prior to discharge into the drainage trench. At the end of the drainage trench is a concrete headwall with a 30-inch storm sewer to convey the water to the river. During larger storm events the drainage trench can be over loaded with off-site runoff leading to localized flooding in the South Yard.

The existing watershed area was analyzed to evaluate existing hydrologic conditions. There were six (6) existing design points used for this analysis (Design Point DP-28, DP-29, DP-30, DP-33, DP-34E and DP-60). DP-28 (Outfall #28) is a 24" reinforced concrete pipe (RCP) in the northwest corner of the project area that discharges directly to the river. DP-29 (Outfall #29) is a 42" corrugated metal pipe (CMP) also in the northwest corner of the project area that discharges directly to the river. DP-30 (Outfall #30) is a 24" RCP in the middle of the project area that discharges directly to the river. DP-33 (Outfall #33) is a 10" PVC pipe in the southern end of the project area that discharges to the revetment along the river. DP-34E (Outfall #34) is a 30" asphalt coated CMP (ACCMP) at the southern edge of the property that discharges to a small watercourse (Watercourse A) that then discharges to the river. DP-60 represents sheet flow to the river from approximately half the project area. The discharge and design point labels have been modified for the proposed condition to represent the SYAB development. The watershed areas and design points are illustrated in the Existing Watershed Map, Sheet DRA-01, found in *Appendix A*.

According to Natural Resources Conservation Service (NRCS, formerly SCS) mapping, the site is characterized primarily as a mixture of hydrologic Type B (fine sandy loam) and Type D (urban soils). A NRCS soil survey map is presented as *Figure 2*.

The site is located in the Thames River Basin (basin number 3000) and is a sub-watershed of the Thames Major Basin. The project area location relative to the major Connecticut drainage basins is presented as *Figure 3*.

Federal Emergency Management Agency (FEMA) mapping shows the portion of the site lies within the 100-year flood plain, denoted as "Zone AE." A portion of the project area is also located in "Zone VE" indicating an area with wave action greater than three feet. A portion of the relevant FEMA – Flood Insurance Rate Map for New London County, Connecticut (Panel Numbers 09011C0502J and 09011C0504J, Effective Date: August 5, 2013) is presented as *Figure 4*.

3 Proposed Conditions

The existing storm sewers and catch basins within the project area will be replaced with a new network of storm sewers and catch basins designed to capture stormwater runoff from the paved areas. A total of four hydrodynamic separators will be installed to remove oil and suspended solids from the runoff prior to discharge.

Existing sewer outfalls that discharge to the Thames River located within the proposed footprint of the SYAB will be relocated and/or combined into two new outfalls. The northern outfall (Outfall 27A) will be a 30-inch RCP sewer extending through the north bulkhead. This storm sewer will convey runoff from the northern portion of the project area. The end of the sewer pipe will be equipped with a security grate. The southern outfall (Outfall 33A) will be a 60-inch RCP sewer conveying site runoff from the southern portion of the project area as well as flow from the drainage trench. The sewer will extend through the south bulkhead and will also have a security grate.

New bituminous pavement will be installed throughout the project area. The new pavement and base materials will be designed for the heavy loads of equipment within the yard. The majority of the South Yard (the area between the southern property line and Building 132) is currently impervious surfaces (56.5% of the total area). The proposed SYAB landward layout will result in an increase of 88,600 square feet of impervious area (8.5 %) over existing conditions. The increase occurs mostly along the edge of the river where existing vegetated and rocky areas will be replaced by the SYAB.

The storm sewers extending from Eastern Point Road and down the rock face into the drainage trench will be replaced with new piping and supports. A 42-inch high concrete wall will also be installed along the edge of the drainage trench to contain the stormwater during larger storm events and prevent localized flooding in the South Yard. Stormwater runoff impounded behind the wall will be collected with a new series of drains.

A construction road will be installed to allow delivery trucks to access the project area from the south without disrupting other facility operations. The road will extend from Eastern Point Road, run along the southern property line through existing GDEB Parking Lot S, and extend down to the railroad tracks running along the edge of the river. The railroad tracks will remain active, but will be flooded with ballast (crushed stone) to allow trucks to travel north over them and into the South Yard. The portion of road extending from the existing Parking Lot S down to the railroad tracks is currently vegetated land with 8-10 percent slope. The roadway constructed in this area will be paved with bituminous concrete and equipped with two catch basins and a hydrodynamic separator to collect stormwater runoff and treat it before discharging to adjacent Wetland Area A.

The railroad tracks will be renovated following completion of the SYAB including reconstruction of ballast, and replacement of concrete rail ties and underdrains. A new outfall (Outfall 33B) for the underdrains is proposed midway along the new tracks to ensure proper drainage. The new outfall will discharge to the ground surface in the wooded area just west of the tracks.

Fuss & O'Neill evaluated the pre- and post-hydrologic conditions for the site. The proposed site plan has a slight increase in impervious surface which will result in a corresponding increase in peak discharge rates. The increase is not considered significant given site location adjacent to the Thames River and the tidal setting. Subsurface detention to attenuate the slight increase in peak discharge rates is not possible due to the shallow depth to bedrock and the congested industrial tidal setting along the river.

The proposed drainage network has been modified from existing conditions to account for the new SYAB. Four of the design points (outfalls) DP-28 (Outfall #28), DP-29 (Outfall # 29), DP-30 (Outfall #30) and DP-33 (Outfall #33) have been removed as well as the sheet flow discharge (DP-60). These

outfalls have been replaced with two new design points (outfalls) DP-27A (Outfall #27A) and DP-33A (Outfall #33A). Existing design point DP-34P (Outfall #34) will remain in its current condition.

Design point DP-27A (Outfall 27A) is a 30" RCP in the northwest corner of the site that discharges directly to the river. Design point DP-33A (Outfall #33A) is a 60" RCP in the middle of the site that discharges directly to the river. Design point DP-34P (Outfall #34) is a 30" ACCMP at the southern edge of the property that discharges to a small watercourse (Watercourse A) that then discharges to the Thames River.

The evaluated proposed watershed areas are illustrated in the Watershed Area Map, Sheet DRA-02, found in *Appendix A*. Results from modeling of pre- and post-development peak flow rates at the Design Point are shown below. These results are taken from the HydroCAD model of existing and proposed conditions found in *Appendix B*.

EXISTING & PROPOSED WATERSHED RESULTS

Existing Design Point	Storm Event			
	2-Yr	10-Yr	25-Yr	100-Yr
DP-28	6.45	9.74	12.21	17.07
DP-29	54.54	115.74	159.16	249.46
DP-30	2.12	4.83	7.14	12.03
DP-33	1.54	3.40	4.97	8.27
DP-34E	1.34	2.75	3.92	6.34
DP-60	20.32	29.61	36.65	50.57

Proposed Design Point	Storm Event			
	2-Yr	10-Yr	25-Yr	100-Yr
DP-27A	17.30	25.67	32.00	44.50
DP-33A	65.15	119.56	162.01	245.58
DP-34P	1.95	3.52	4.76	7.23

The drainage analyses for the proposed stormwater networks associated with the proposed development improvements were modeled using the 25-year storm event. The model shows that the proposed drainage network will be able to safely convey the storm event. The proposed StormCAD model results and the Site Drainage Plans (sheets SY-C-161 thru SY-C-164), which shows the proposed storm network, are included in *Appendix C*.

4 Construction Stormwater Management and Soil Erosion and Sedimentation Control

A detailed Erosion & Sediment control plan has been prepared for the site. During construction, measures will be taken to reduce erosion and manage sedimentation from disturbed surfaces. The following BMPs will be employed:

- Stormwater collection structures will be fitted with filter fabric inserts to remove sediments from the runoff prior to entering the receiving drainage systems.
- Silt fence and/or erosion control socks will be installed at clearing limits and the down-gradient perimeter of the disturbed portion of the site.
- Silt fence backed by hay bales will be installed around the perimeter of on-site soil stockpiles.
- Construction entrances will be installed at main points of entry to prevent tracking of sediment into local roads.
- Erosion control blankets will be installed on selected disturbed slopes 3(H):1(V) or steeper.

These BMPs will protect adjacent wetlands and downstream stormwater collection systems following construction. E&S control details and narratives for construction periods are provided in the site plans. Temporary Sediment Trap Sizing calculations are included on the Erosion and Sediment Control Plans (separate bound). Erosion and sediment control details and procedures are consistent with the 2002 Guidelines for Soil Erosion and Sedimentation Control (CTDEEP Bulletin 34), and City requirements.

5 Post-Construction Stormwater Management

The quality of stormwater runoff from the site will be improved under proposed conditions. Runoff from paved surfaces will be collected by the stormwater management system and treated prior to leaving the site. The majority of the project area in the South Yard has very shallow bedrock. The shallow bedrock prevents the use of subsurface infiltration to treat stormwater runoff. As a result of the subsurface conditions, the proposed stormwater management system serving the paved areas will rely primarily on secondary treatment techniques including deep catch basin sumps and hydrodynamic separators. Deep sumps in catch basins and hydrodynamic separators will help achieve the removal of 80% of total suspended solids (TSS) from the captured stormwater runoff. The design meets the requirements of the CTDEEP General Permit of the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities and the Connecticut Stormwater Quality Manual (CTSWQM).

The required water quality flowrates (WQF) for the project were calculated in accordance with the 2004 Connecticut Stormwater Quality Manual. The WQF is the peak flowrate associated with the Water Quality Volume (WQV) of the contributing area. The WQV represents the volume of storm water runoff resulting from the first inch of precipitation at the site. A summary of the WQF for the hydrodynamic separators throughout the site is provided in *Appendix D*. The required WQF were calculated based on Section 7.4.2 of the CTSWQM.

To ensure the deep sump catch basins and hydrodynamic separators continue to operate adequately over time, the following maintenance procedures should be followed:

- **Catch Basin Sumps** – Catch basin sumps must be inspected at regular intervals and cleaned when necessary. At a minimum, inspections should be conducted twice per year, once in the spring and again in the fall. More inspections may be required during winter months where heavy sanding operations may lead to rapid sediment accumulation within the structure. Cleaning operations are typically done using a vacuum truck.

- **Hydrodynamic Separators** – The hydrodynamic separators must be inspected at regular intervals and maintained when necessary to ensure optimum performance. At a minimum, inspections should be conducted twice per year; once in the spring and again in the fall. More inspections may be required during winter months where heavy sanding operations may lead to rapid sediment accumulation within the structure. The structure should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when appreciable level of hydrocarbons and trash has accumulated. Cleaning operations are typically done using a vacuum truck.

The remaining impervious surfaces at the site include the roof of the SYAB and utility building, as well as the decks on the north, west and south sides of the building.

Roof Runoff

Stormwater runoff from the roof of the SYAB, which is located mostly over the river, will discharge through two down spouts leading directly through the floor of the building to the river. The downspouts will be located at the southeast and southwest corners of the building footprint. An inspection and sample port will be provided inside the building at each discharge point.

Stormwater runoff from the roof of the utility building will discharge through down spouts and roof leaders to the site's land based stormwater network. The stormwater will then discharge to the river through the southern Outfall 33A.

Deck Runoff

The west deck on the west side of the SYAB will sheet flow directly to the river. The west deck will not be used to store any hazardous materials and will be kept clean to ensure runoff is free of pollutants. The north and south decks will have a series of catch basin inlets at low points that will discharge directly to the river. The deck catch basins will be equipped with treatment units designed to treat the runoff prior to discharge.

6 Methods

The drainage analysis for the proposed development was completed using the HydroCAD Software Solutions computer program. The HydroCAD program runoff method selected for the watershed modeling is based on NRCS TR-20 methods. The methods described in the NRCS TR-55 manual were

followed to calculate the curve number and time of concentration input data for this model. Curve number values were taken from Table 2.2 within the TR-55 manual. Existing and proposed pervious surfaces for the site were modeled using the prescribed curve numbers for grass, gravel, wetlands, and wooded areas in good condition. These values are associated with surfaces over Hydrological Group-'B, C and D' soils per the NRCS TR-55 Drainage Manual. A curve number of 98 was utilized for impervious surfaces.

The drainage analysis for the proposed stormwater management system was completed using Bentley System's StormCAD computer program. Input information for the model was derived using the Rational Formula. Times of concentration for paved areas were assumed to be the minimum allowable time of 5 minutes. Precipitation frequency estimates for storm events were obtained from the NOAA Atlas 14, Volume 10, Version 2 specific to the project site. The StormCAD output indicates that the storm sewer system will have the capacity to convey the 25-year design storm.

7 Summary

Stormwater runoff from the developed site will discharge to the west in similar patterns to existing conditions. Post-construction water quality improvement for the stormwater runoff will be achieved by the use of BMPs designed to remove 80% of Total Suspended Solids that may be present in runoff from the site. The stormwater management design meets the requirements of the Connecticut Stormwater Quality Manual, Connecticut and Federal stormwater regulations, and the requirements of the City of Groton. Based on the results of the foregoing analysis, it is the professional opinion of Fuss & O'Neill that the proposed development will not have an adverse impact on receiving watersheds.

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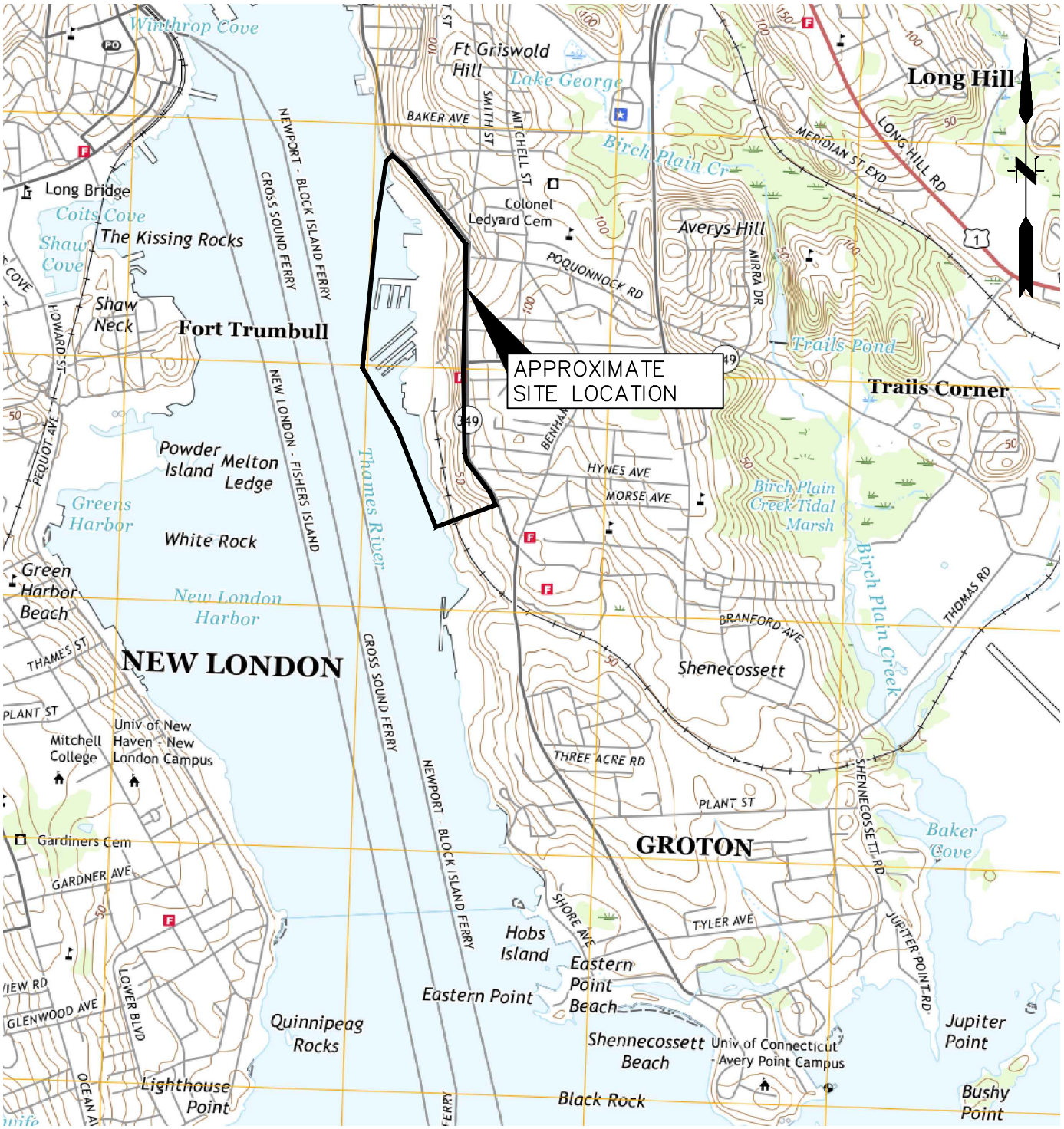
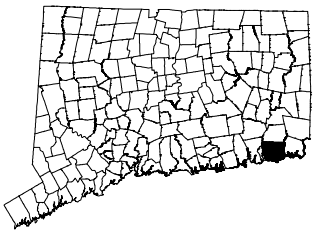
Figure 1

Site Location Map



MAP REFERENCE
THIS MAP WAS PREPARED FROM THE FOLLOWING 7.5 MINUTE USGS MAP:
NEW LONDON, CONNECTICUT–NEW YORK, 2018



SCALE:	
HORZ.:	1" = 2000'
VERT.:	
DATUM:	
HORZ.:	
VERT.:	

0 1000 2000
GRAPHIC SCALE

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ELECTRIC BOAT

SITE LOCATION MAP

75 EASTERN POINT ROAD

GROTON CONNECTICUT

PROJ. No.: 1997570.S30
DATE: JANUARY 2019

FIG. 1

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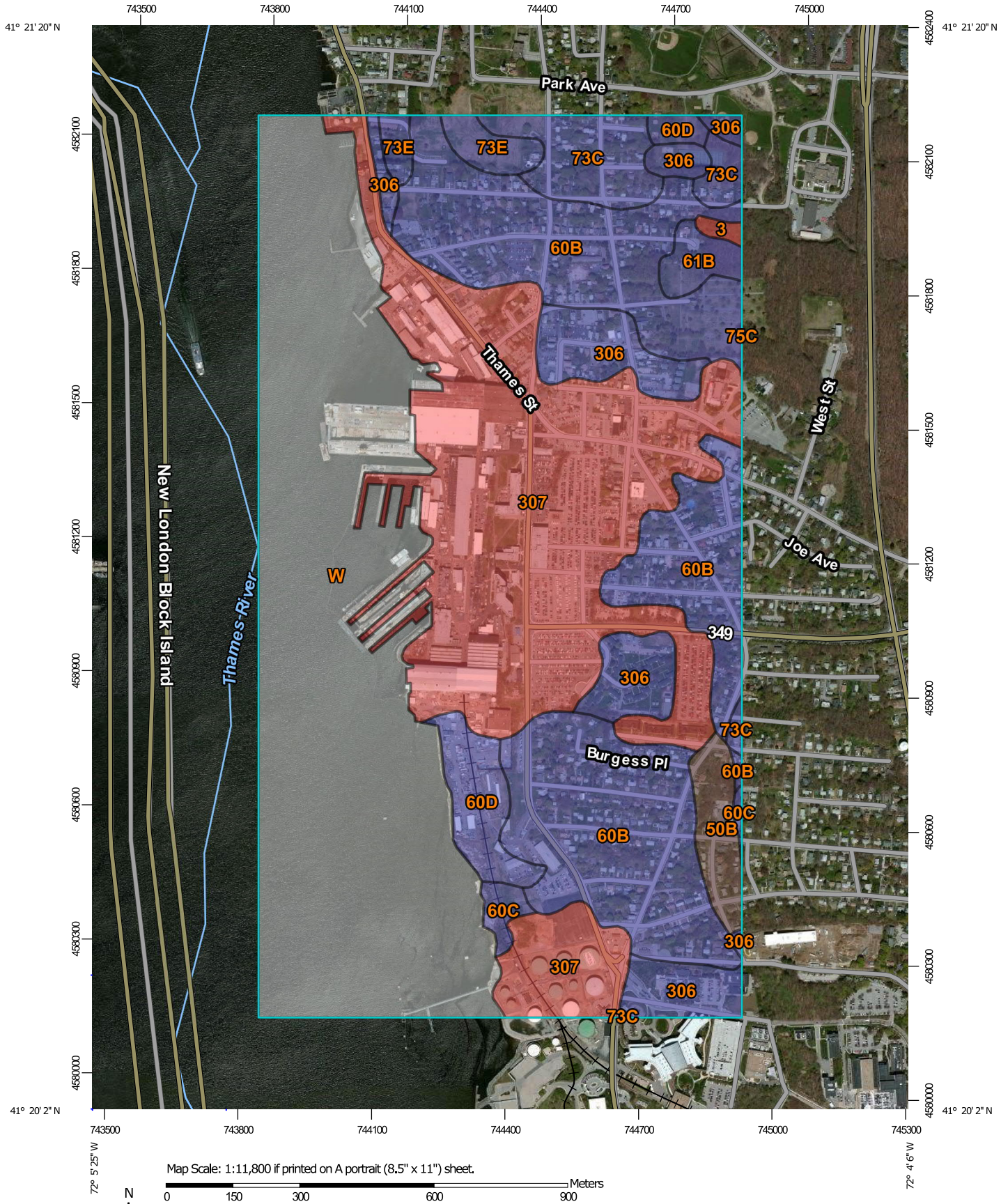
Figure 2

NRCS Web Soil Survey Map

Custom Soil Resource Report
Map—Hydrologic Soil Group



Map Scale: 1:11,800 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 18, Dec 6, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 28, 2011—May 12, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	D	1.1	0.2%
50B	Sutton fine sandy loam, 3 to 8 percent slopes	B/D	8.9	1.6%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	B	121.1	22.3%
60C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes	B	3.2	0.6%
60D	Canton and Charlton soils, 15 to 25 percent slopes	B	13.4	2.5%
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	B	5.0	0.9%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	B	18.2	3.4%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	B	7.0	1.3%
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	D	0.0	0.0%
306	Udorthents-Urban land complex	B	34.2	6.3%
307	Urban land	D	149.3	27.5%
W	Water		181.6	33.4%
Totals for Area of Interest			**543.0**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes,

the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

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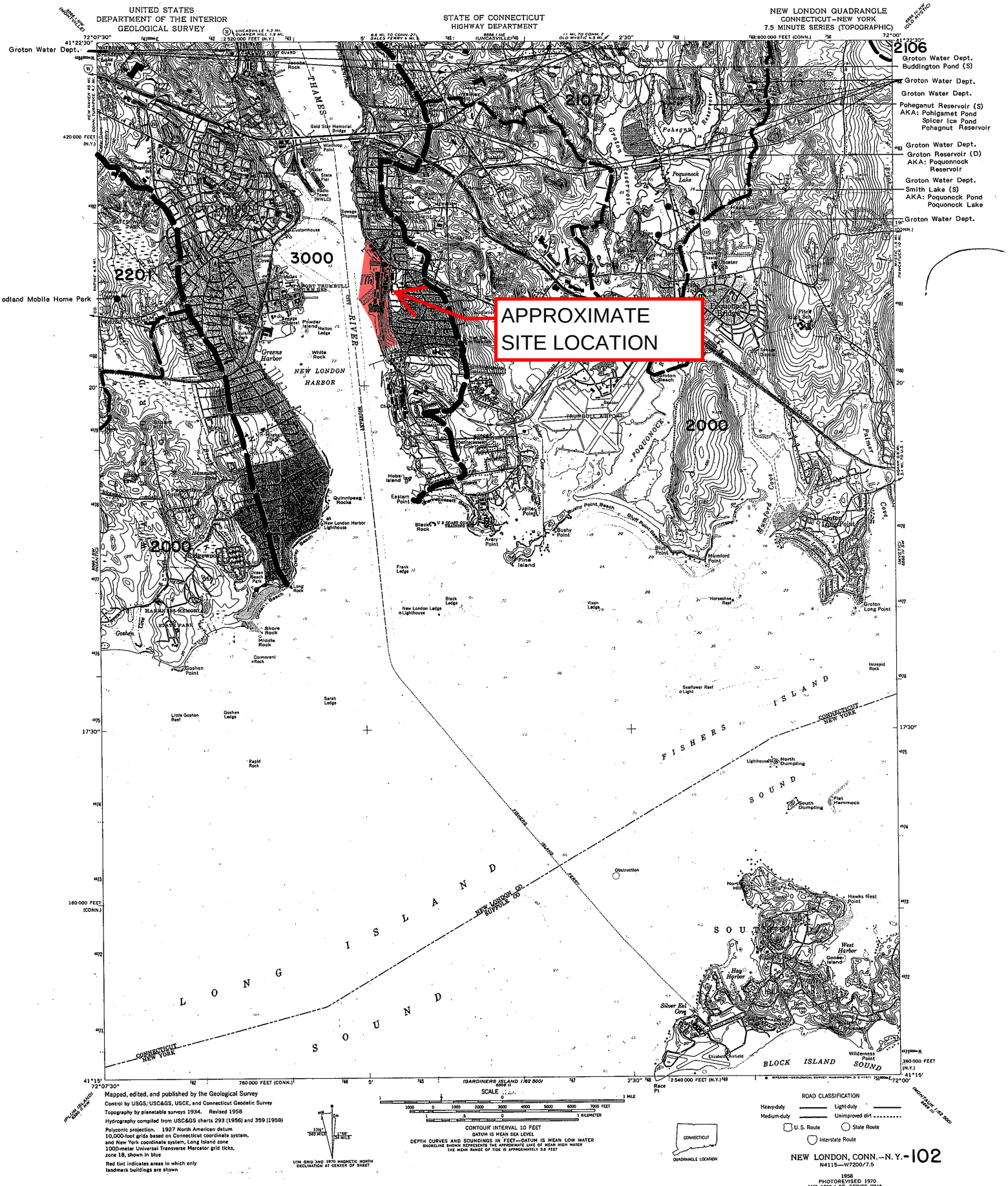
Figure 3

Connecticut Drainage Basin Map



3 Thames Major Basin
30 Thames Main Stem Regional Basin
3000 Thames River

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Figure 4

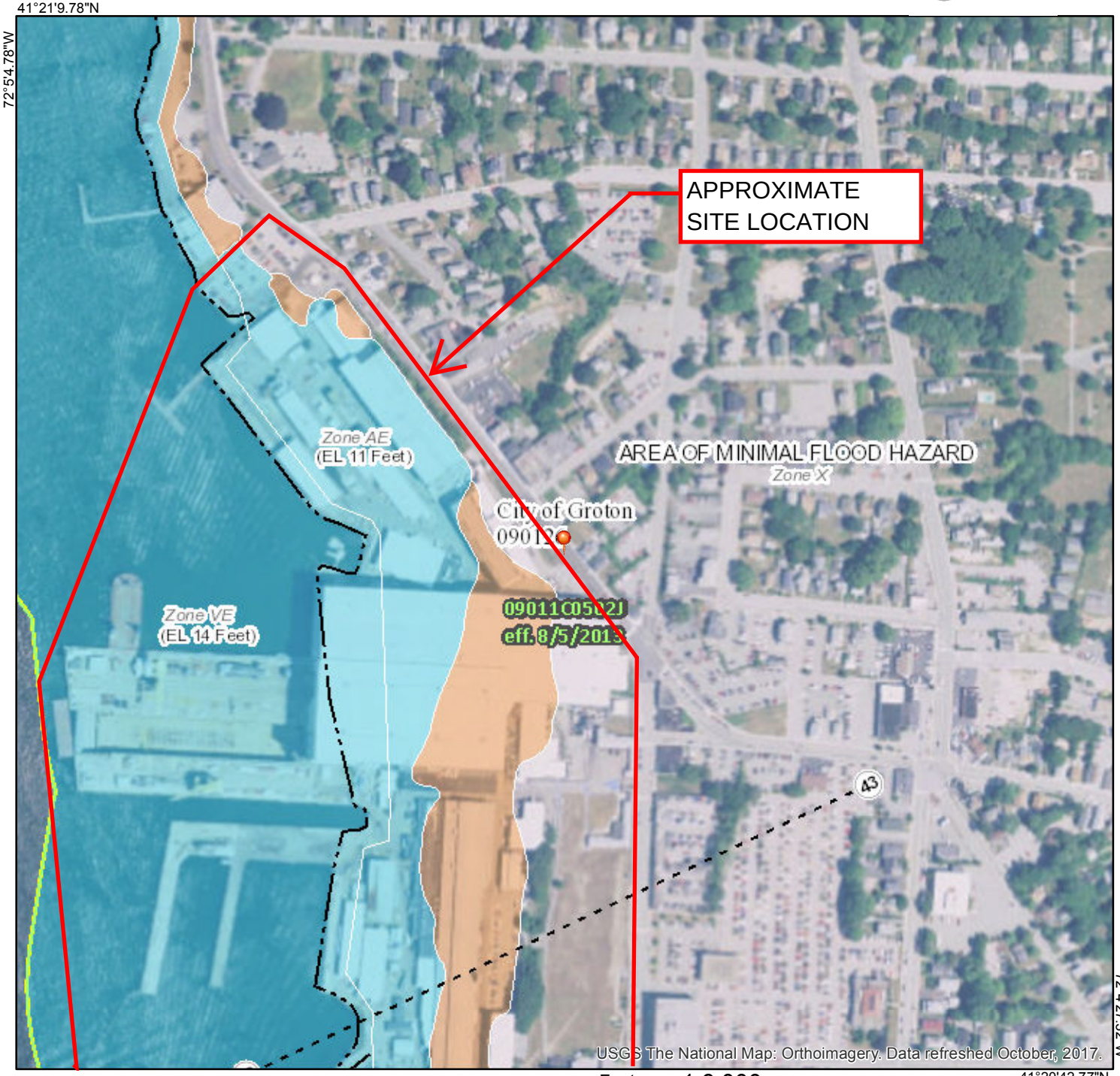
FEMA – Flood Insurance Rate Map

National Flood Hazard Layer FIRMette

FEMA

41°21'9.78"N

72°5'4.78"W



72°4'27.32"W

41°20'42.77"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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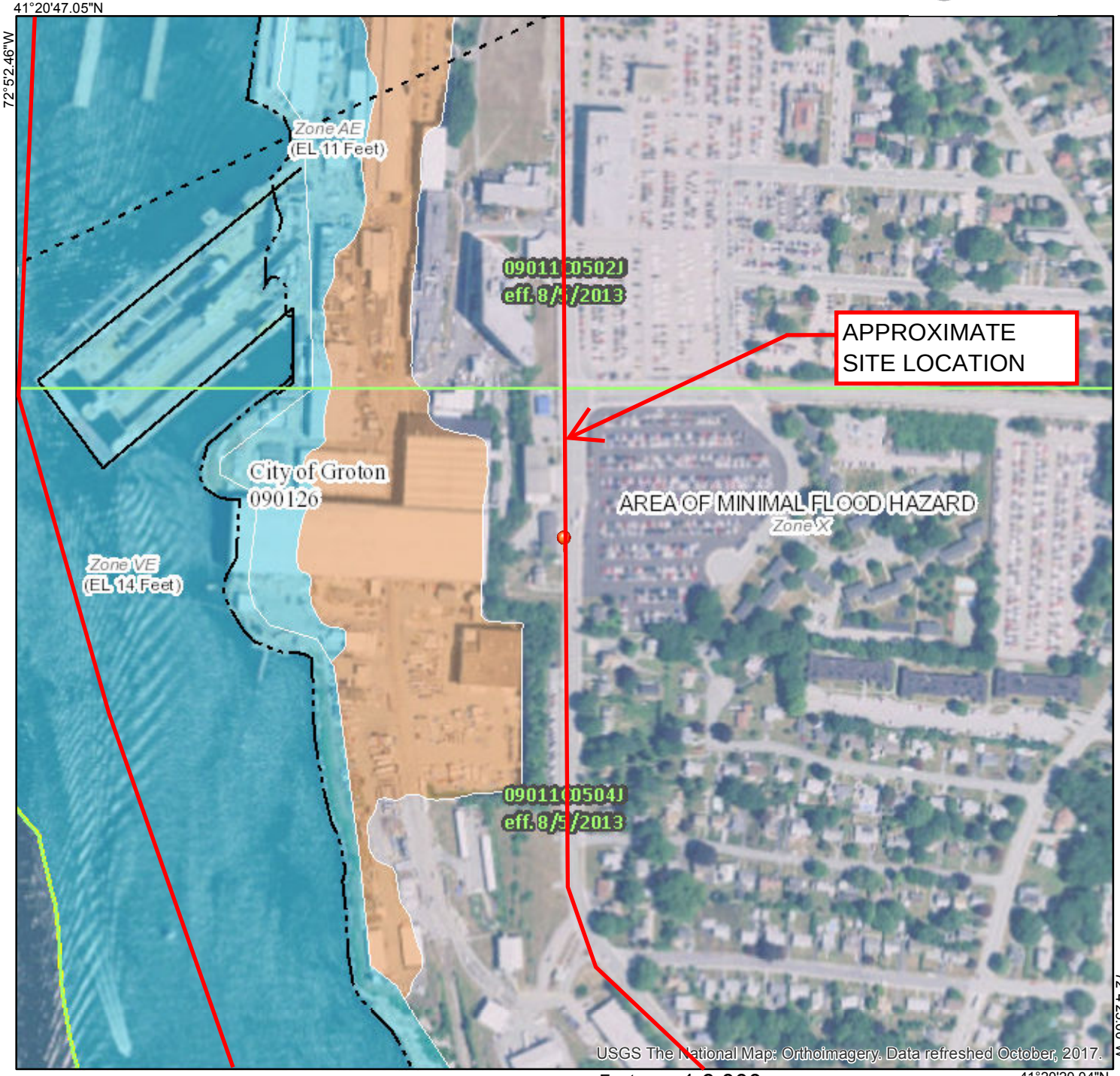
National Flood Hazard Layer FIRMette

FEMA



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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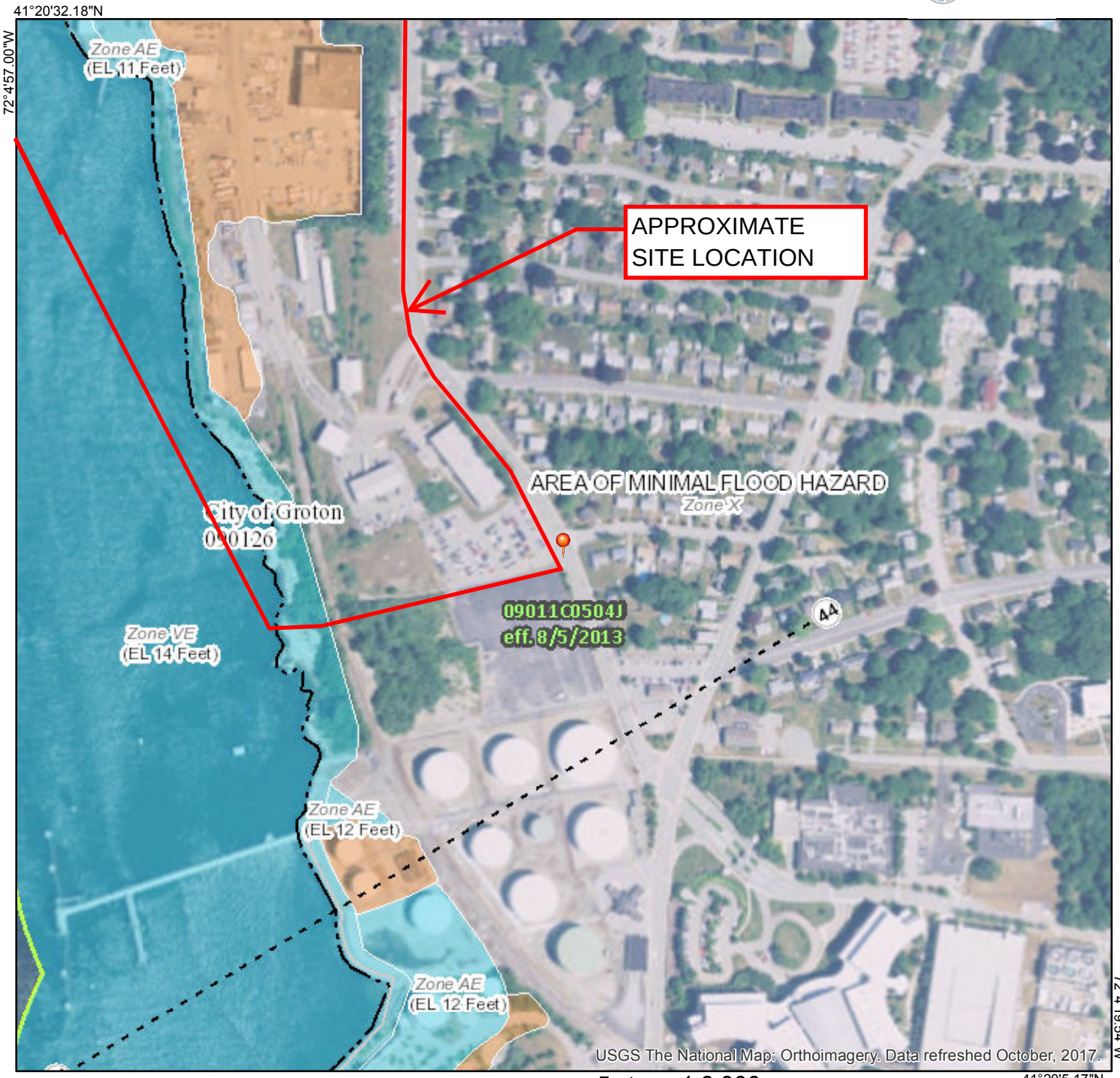
National Flood Hazard Layer FIRMette

FEMA



0 250 500 1,000 1,500 2,000 Feet

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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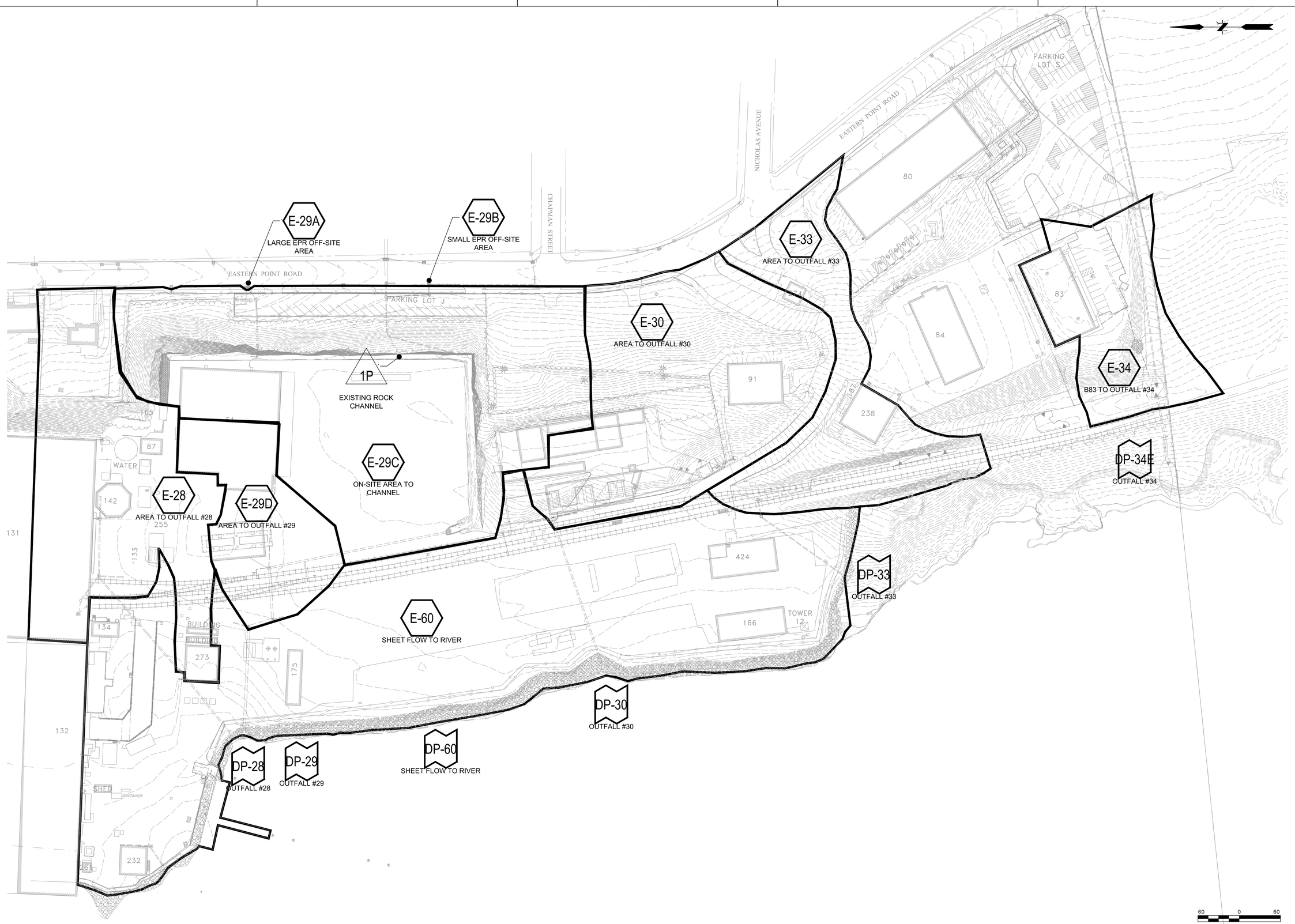
Appendix A

Watershed Drainage Maps – Existing & Proposed Conditions



JACOBS
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DESIGNED BY: KEITH GOODROW
DRAWN BY: KEITH GOODROW
CHECKED BY: JOE DEVINE
SUBMITTED BY: JOHN OSOSKIE
FILE NAME:

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GENERAL DYNAMICS
Electric Boat
South Yard Assembly Building (SYAB)

EXISTING CONDITIONS
WATERSHED DRAINAGE MAP

Date: 13 FEB 2019

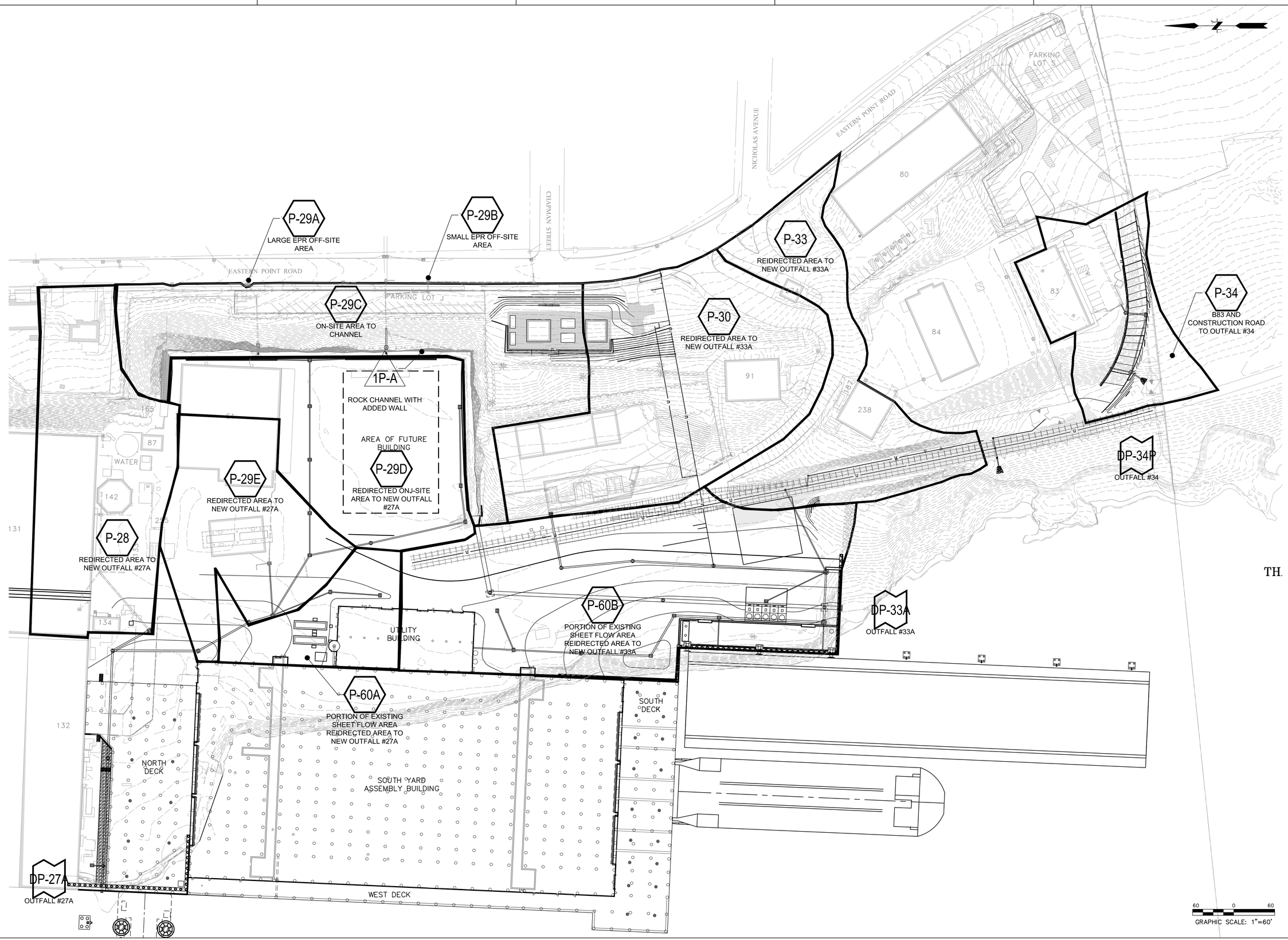
Drawing No.:
DRA-01

SHEET: OF

ISSUED FOR PERMIT

File Path: J:\DWG\P97\97570\S30\Civil\Plan\1997570S30-DRA-01.dwg

PLOT DATE/TIME: 2/12/2019 8:52 AM



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NO.	DATE	BY	APVD

REUSE OF DOCUMENTS:

DESIGNED BY: KEITH GOODROW	ISSUE DATE: 13 FEB 2019
DRAWN BY: KEITH GOODROW	DRAWING CODE:
CHECKED BY: JOE DEVINE	BORDER SIZE: ARCH D 24x36
SUBMITTED BY: JOHN OSOSKIE	
FILE NAME:	

GENERAL DYNAMICS
Electric Boat
South Yard Assembly Building (SYAB)

PROPOSED CONDITIONS
WATERSHED DRAINAGE MAP

Date: 13 FEB 2019

Drawing No.:
DRA-02

SHEET: OF

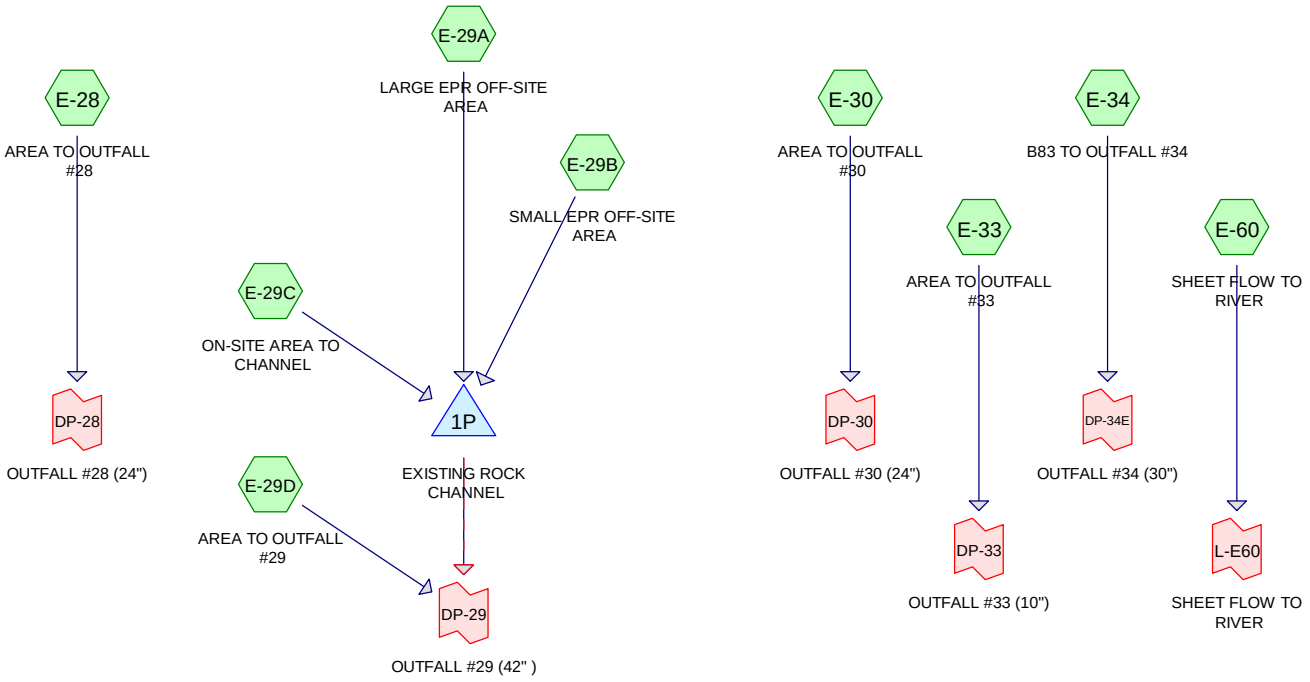
ISSUED FOR PERMIT

File Path: J:\DWG\P97\97570\S30\Civil\Plan\1997570S30-DRA-01.dwg

PLOT DATE/TIME: 2/12/2019 8:52 AM

Appendix B

Watershed Model Analysis – HydroCAD Model Results



Subcat Reach Pond Link

Routing Diagram for SYAB - EX

Prepared by {enter your company name here}, Printed 2/12/2019

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
59.917	75	1/4 acre lots, 38% imp, HSG B (E-29A, E-29B)
4.075	61	>75% Grass cover, Good, HSG B (E-29C, E-30, E-33, E-34)
0.450	80	>75% Grass cover, Good, HSG D (E-28, E-29C)
0.275	85	Gravel roads, HSG B (E-33)
0.657	98	Paved parking, HSG B (E-30)
10.638	98	Unconnected pavement, HSG B (E-29C, E-29D, E-33, E-34, E-60)
1.830	98	Unconnected pavement, HSG D (E-28)
0.806	98	Unconnected roofs, HSG B (E-29C, E-29D, E-34)
14.922	95	Urban commercial, 85% imp, HSG D (E-29A)
0.466	55	Woods, Good, HSG B (E-29C, E-30)
0.494	77	Woods, Good, HSG D (E-28, E-29C)
94.529	**81**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
76.834	HSG B	E-29A, E-29B, E-29C, E-29D, E-30, E-33, E-34, E-60
0.000	HSG C	
17.695	HSG D	E-28, E-29A, E-29C
0.000	Other	
94.529		**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	59.917	0.000	0.000	0.000	59.917	1/4 acre lots, 38% imp	E-29A, E-29B
0.000	4.075	0.000	0.450	0.000	4.525	>75% Grass cover, Good	E-28, E-29C, E-30, E-33, E-34
0.000	0.275	0.000	0.000	0.000	0.275	Gravel roads	E-33
0.000	0.657	0.000	0.000	0.000	0.657	Paved parking	E-30
0.000	10.638	0.000	1.830	0.000	12.468	Unconnected pavement	E-28, E-29C, E-29D, E-33, E-34, E-60
0.000	0.806	0.000	0.000	0.000	0.806	Unconnected roofs	E-29C, E-29D, E-34
0.000	0.000	0.000	14.922	0.000	14.922	Urban commercial, 85% imp	E-29A
0.000	0.466	0.000	0.494	0.000	0.960	Woods, Good	E-28, E-29C, E-30
0.000	**76.834**	**0.000**	**17.695**	**0.000**	**94.529**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P	15.84	15.31	260.0	0.0020	0.013	30.0	0.0	0.0

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-28: AREA TO OUTFALL #28 Runoff Area=99,900 sf 79.78% Impervious Runoff Depth=2.69"
Tc=8.0 min CN=94 Runoff=6.45 cfs 0.514 af

Subcatchment E-29A: LARGE EPR Runoff Area=2,650,000 sf 49.53% Impervious Runoff Depth=1.52"
Tc=41.0 min CN=80 Runoff=52.04 cfs 7.697 af

Subcatchment E-29B: SMALL EPR OFF-SITE Runoff Area=610,000 sf 38.00% Impervious Runoff Depth=1.20"
Tc=21.0 min CN=75 Runoff=12.45 cfs 1.397 af

Subcatchment E-29C: ON-SITE AREA TO Runoff Area=192,200 sf 67.43% Impervious Runoff Depth=2.05"
Tc=9.0 min CN=87 Runoff=9.55 cfs 0.753 af

Subcatchment E-29D: AREA TO OUTFALL #29 Runoff Area=42,500 sf 100.00% Impervious Runoff Depth=3.12"
Tc=5.0 min CN=98 Runoff=3.29 cfs 0.253 af

Subcatchment E-30: AREA TO OUTFALL #30 Runoff Area=112,800 sf 25.35% Impervious Runoff Depth=0.92"
Tc=11.0 min CN=70 Runoff=2.12 cfs 0.198 af

Subcatchment E-33: AREA TO OUTFALL #33 Runoff Area=68,700 sf 25.04% Impervious Runoff Depth=0.97"
Tc=8.0 min UI Adjusted CN=71 Runoff=1.54 cfs 0.127 af

Subcatchment E-34: B83 TO OUTFALL #34 Runoff Area=50,800 sf 36.22% Impervious Runoff Depth=1.14"
Tc=9.0 min CN=74 Runoff=1.34 cfs 0.111 af

Subcatchment E-60: SHEET FLOW TO RIVER Runoff Area=290,800 sf 100.00% Impervious Runoff Depth=3.12"
Tc=8.0 min CN=98 Runoff=20.32 cfs 1.734 af

Pond 1P: EXISTING ROCK CHANNEL Peak Elev=20.03' Storage=68,384 cf Inflow=63.29 cfs 9.846 af
Primary=29.72 cfs 8.987 af Secondary=24.48 cfs 0.796 af Outflow=54.20 cfs 9.783 af

Link DP-28: OUTFALL #28 (24") Inflow=6.45 cfs 0.514 af
Primary=6.45 cfs 0.514 af

Link DP-29: OUTFALL #29 (42") Inflow=54.54 cfs 10.037 af
Primary=54.54 cfs 10.037 af

Link DP-30: OUTFALL #30 (24") Inflow=2.12 cfs 0.198 af
Primary=2.12 cfs 0.198 af

Link DP-33: OUTFALL #33 (10") Inflow=1.54 cfs 0.127 af
Primary=1.54 cfs 0.127 af

Link DP-34E: OUTFALL #34 (30") Inflow=1.34 cfs 0.111 af
Primary=1.34 cfs 0.111 af

Link L-E60: SHEET FLOW TO RIVER Inflow=20.32 cfs 1.734 af
Primary=20.32 cfs 1.734 af

Total Runoff Area = 94.529 ac Runoff Volume = 12.784 af Average Runoff Depth = 1.62"
47.76% Pervious = 45.147 ac 52.24% Impervious = 49.382 ac

Summary for Subcatchment E-28: AREA TO OUTFALL #28

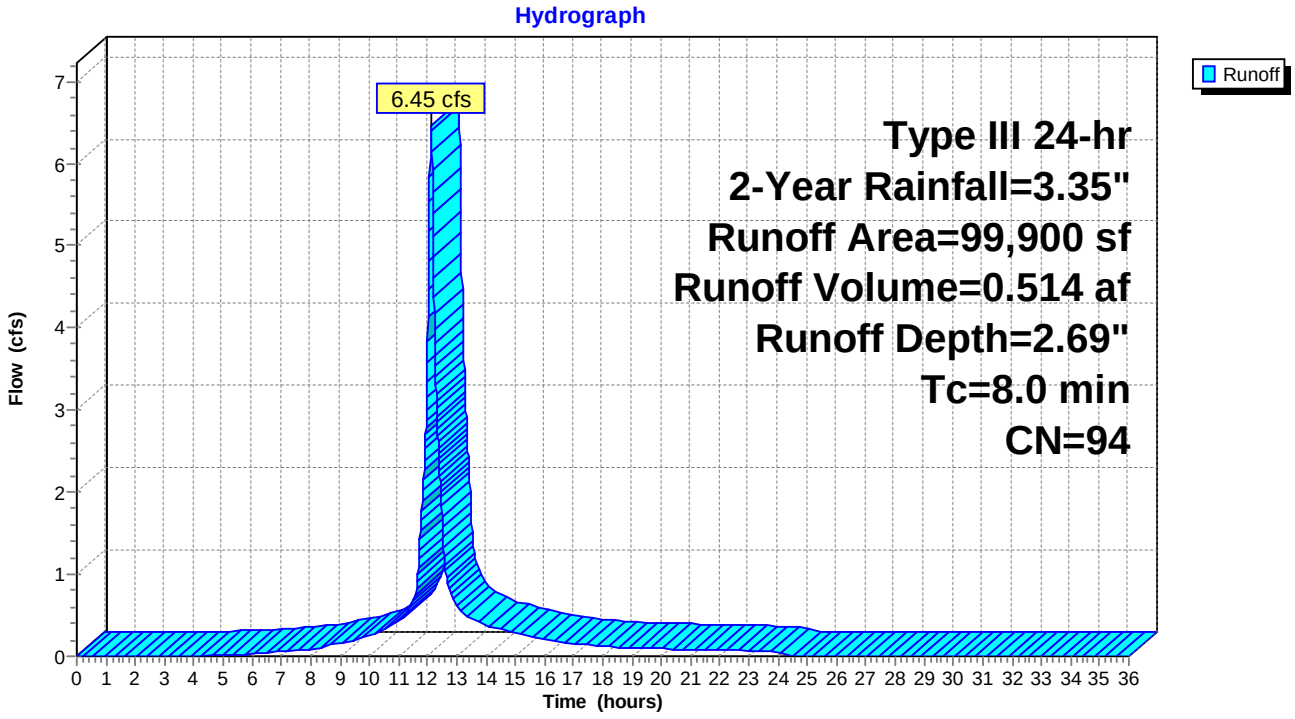
Runoff = 6.45 cfs @ 12.11 hrs, Volume= 0.514 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
14,300	80	>75% Grass cover, Good, HSG D
5,900	77	Woods, Good, HSG D
79,700	98	Unconnected pavement, HSG D
99,900	94	Weighted Average
20,200		20.22% Pervious Area
79,700		79.78% Impervious Area
79,700		100.00% Unconnected

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

Subcatchment E-28: AREA TO OUTFALL #28



Summary for Subcatchment E-29A: LARGE EPR OFF-SITE AREA

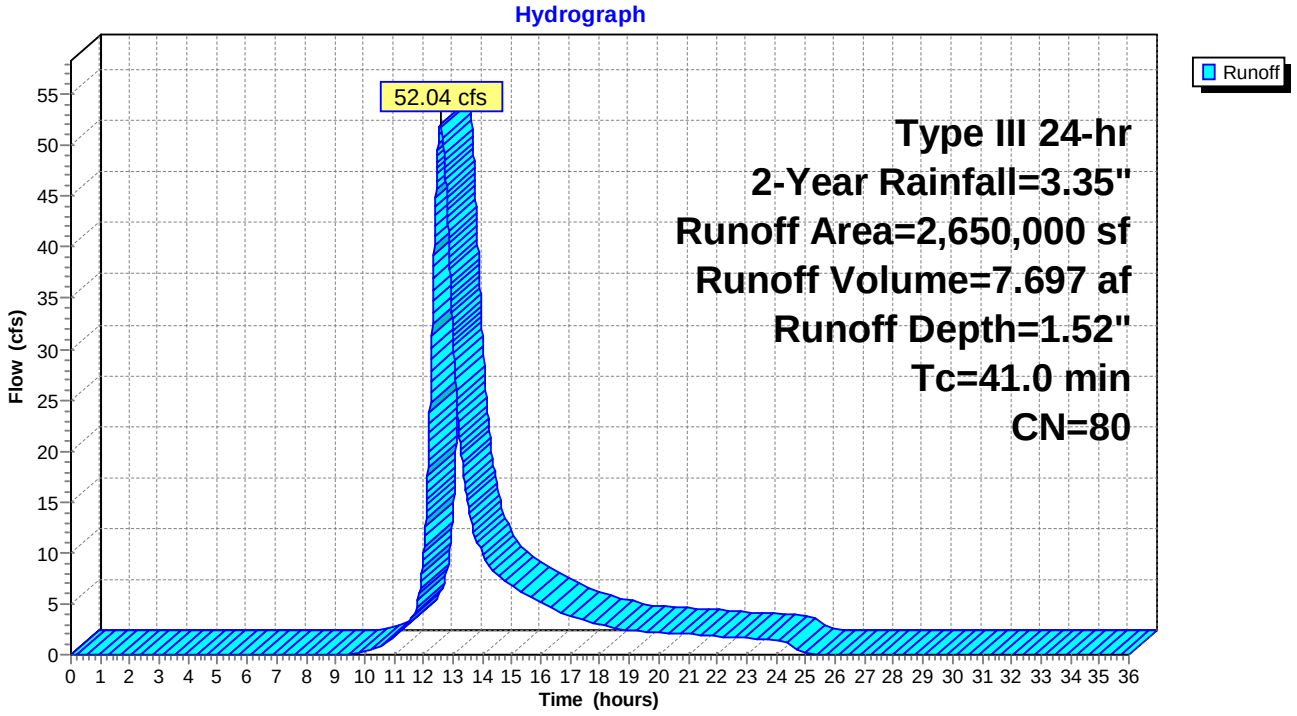
Runoff = 52.04 cfs @ 12.58 hrs, Volume= 7.697 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
2,000,000	75	1/4 acre lots, 38% imp, HSG B
650,000	95	Urban commercial, 85% imp, HSG D
2,650,000	80	Weighted Average
1,337,500		50.47% Pervious Area
1,312,500		49.53% Impervious Area

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

Subcatchment E-29A: LARGE EPR OFF-SITE AREA



Summary for Subcatchment E-29B: SMALL EPR OFF-SITE AREA

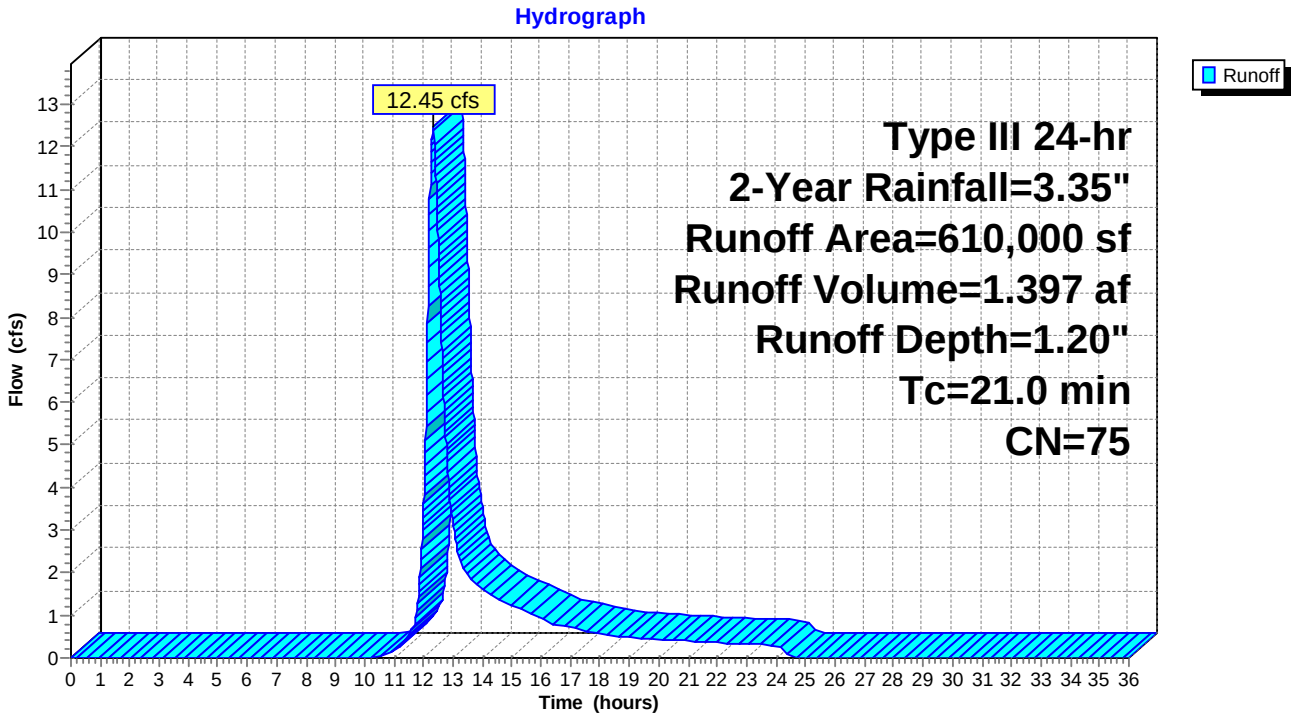
Runoff = 12.45 cfs @ 12.30 hrs, Volume= 1.397 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
610,000	75	1/4 acre lots, 38% imp, HSG B
378,200		62.00% Pervious Area
231,800		38.00% Impervious Area

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

Subcatchment E-29B: SMALL EPR OFF-SITE AREA



Summary for Subcatchment E-29C: ON-SITE AREA TO CHANNEL

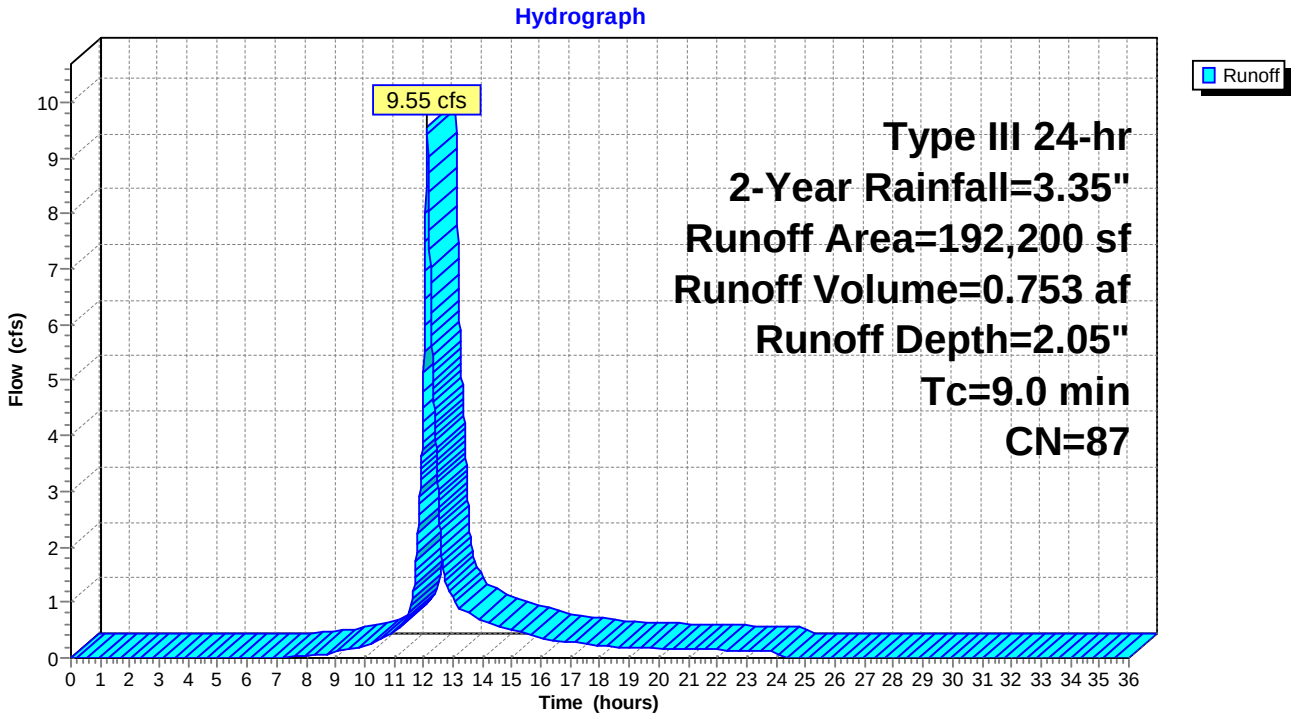
Runoff = 9.55 cfs @ 12.13 hrs, Volume= 0.753 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
108,400	98	Unconnected pavement, HSG B
21,200	98	Unconnected roofs, HSG B
5,300	80	>75% Grass cover, Good, HSG D
15,600	77	Woods, Good, HSG D
26,800	61	>75% Grass cover, Good, HSG B
14,900	55	Woods, Good, HSG B
192,200	87	Weighted Average
62,600		32.57% Pervious Area
129,600		67.43% Impervious Area
129,600		100.00% Unconnected

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

Subcatchment E-29C: ON-SITE AREA TO CHANNEL



Summary for Subcatchment E-29D: AREA TO OUTFALL #29

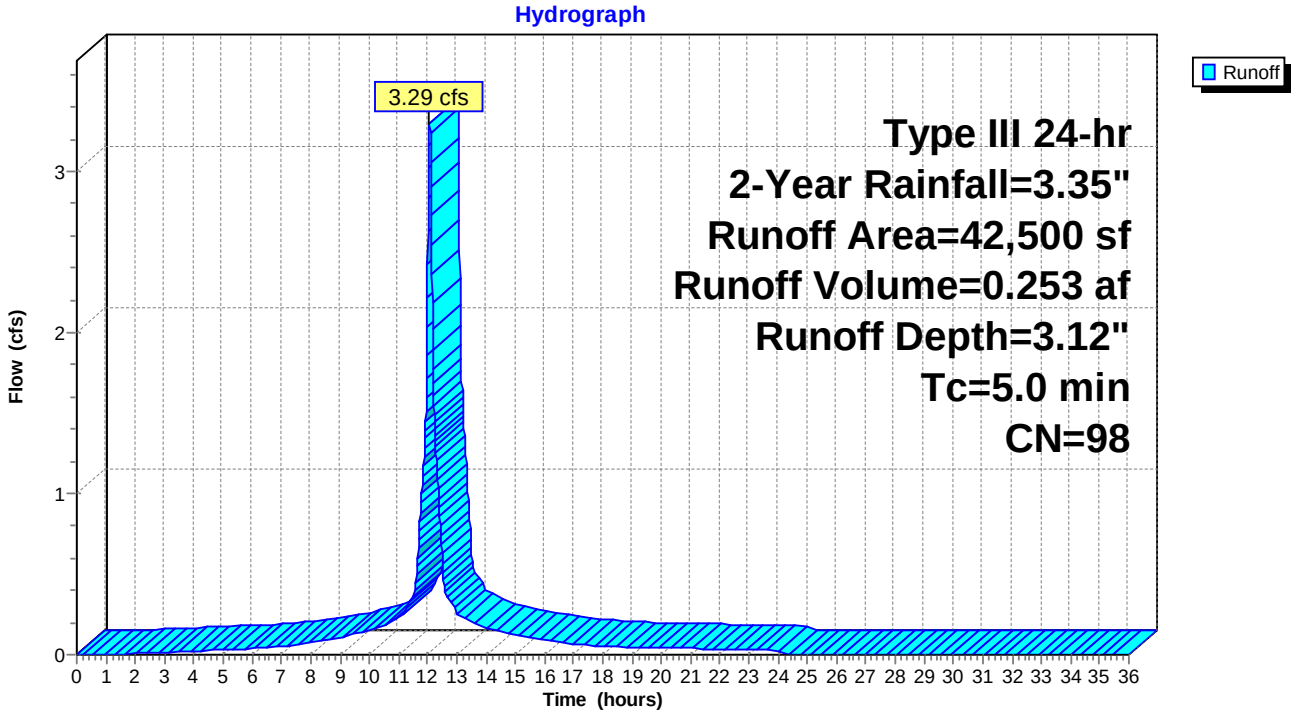
Runoff = 3.29 cfs @ 12.07 hrs, Volume= 0.253 af, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
37,000	98	Unconnected pavement, HSG B
5,500	98	Unconnected roofs, HSG B
42,500	98	Weighted Average
42,500		100.00% Impervious Area
42,500		100.00% Unconnected

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

Subcatchment E-29D: AREA TO OUTFALL #29



Summary for Subcatchment E-30: AREA TO OUTFALL #30

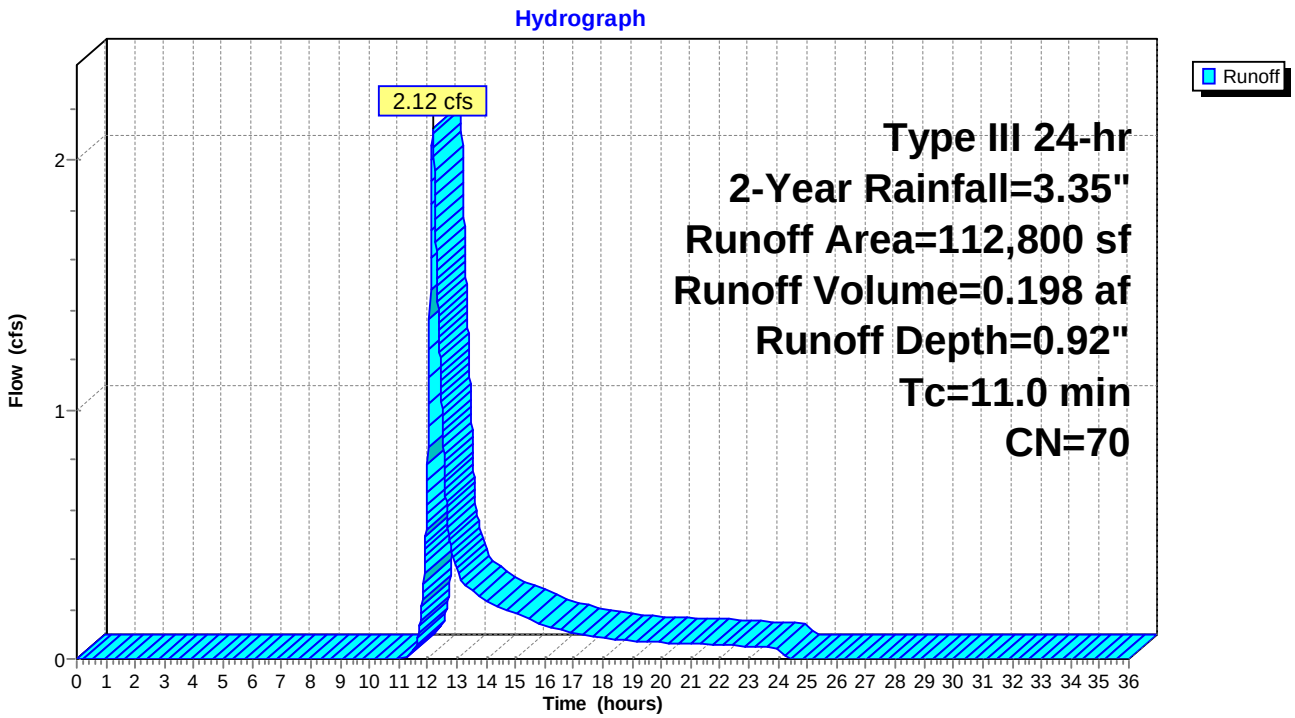
Runoff = 2.12 cfs @ 12.17 hrs, Volume= 0.198 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
78,800	61	>75% Grass cover, Good, HSG B
28,600	98	Paved parking, HSG B
5,400	55	Woods, Good, HSG B
112,800	70	Weighted Average
84,200		74.65% Pervious Area
28,600		25.35% Impervious Area

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

Subcatchment E-30: AREA TO OUTFALL #30



Summary for Subcatchment E-33: AREA TO OUTFALL #33

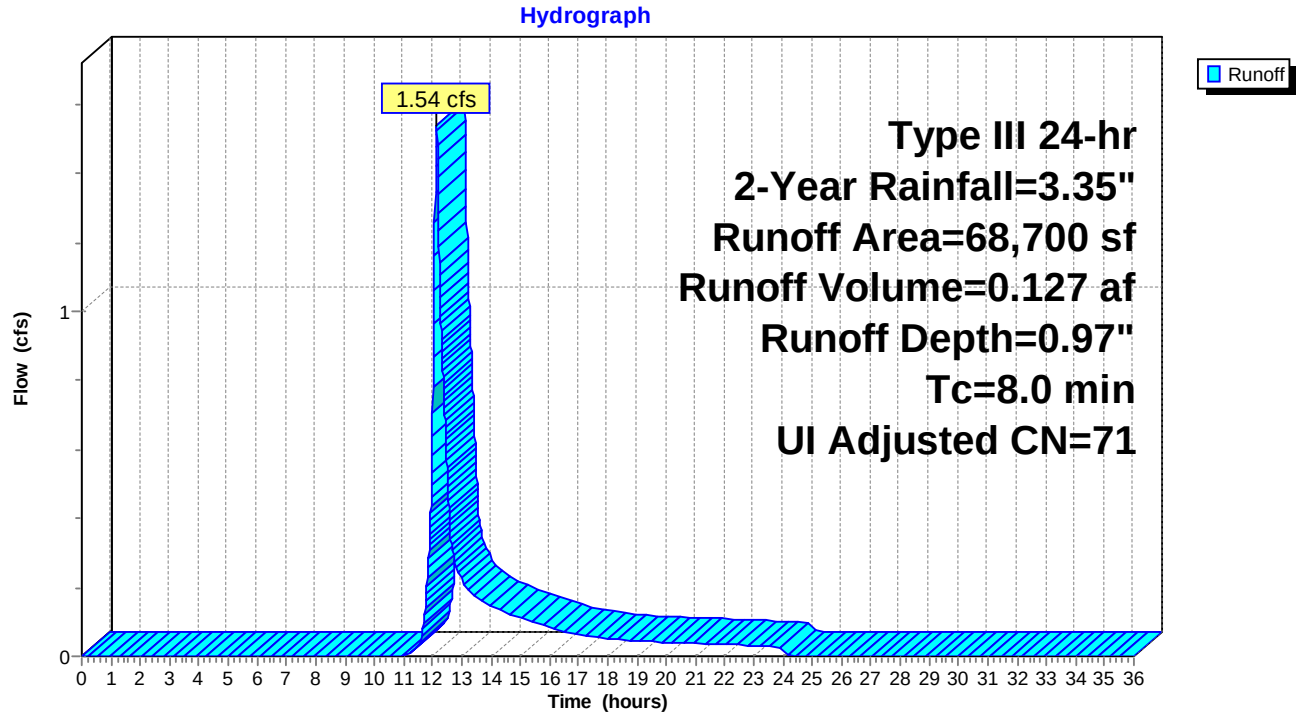
Runoff = 1.54 cfs @ 12.12 hrs, Volume= 0.127 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Adj	Description
39,500	61		>75% Grass cover, Good, HSG B
17,200	98		Unconnected pavement, HSG B
12,000	85		Gravel roads, HSG B
68,700	74	71	Weighted Average, UI Adjusted
51,500			74.96% Pervious Area
17,200			25.04% Impervious Area
17,200			100.00% Unconnected

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

Subcatchment E-33: AREA TO OUTFALL #33



Summary for Subcatchment E-34: B83 TO OUTFALL #34

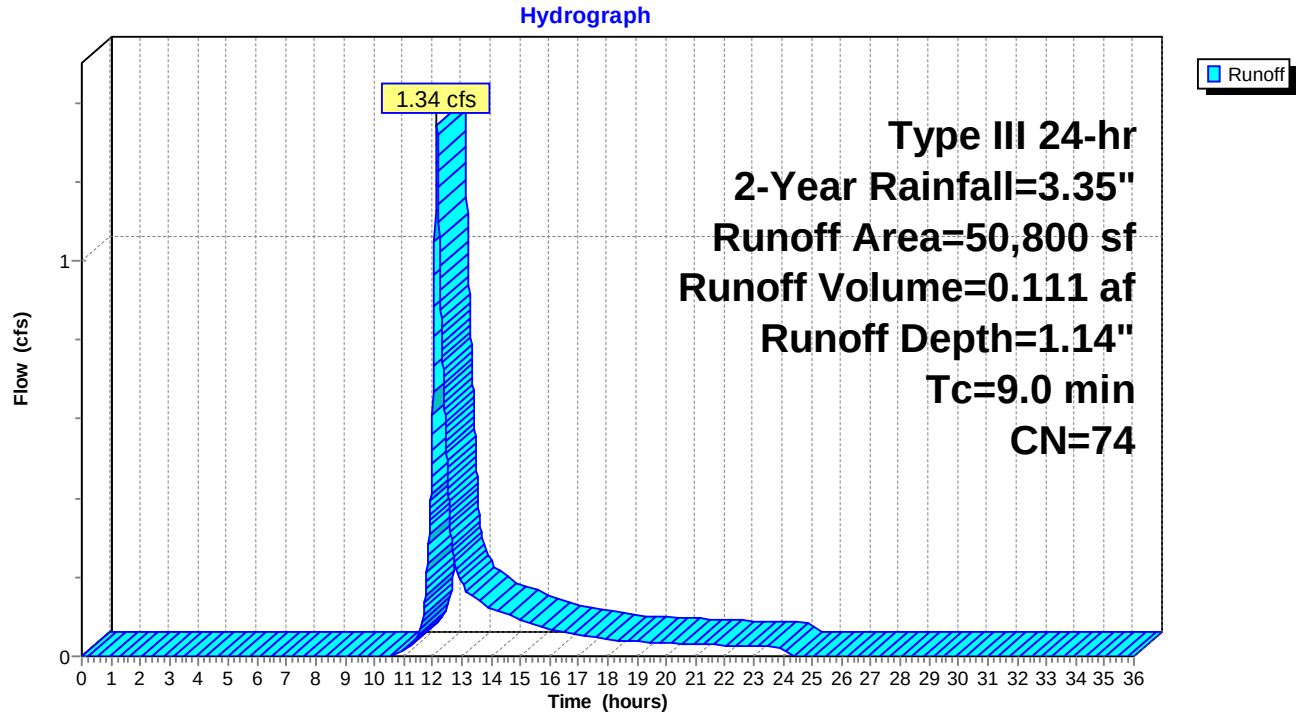
Runoff = 1.34 cfs @ 12.13 hrs, Volume= 0.111 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
10,000	98	Unconnected pavement, HSG B
8,400	98	Unconnected roofs, HSG B
32,400	61	>75% Grass cover, Good, HSG B
50,800	74	Weighted Average
32,400		63.78% Pervious Area
18,400		36.22% Impervious Area
18,400		100.00% Unconnected

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

Subcatchment E-34: B83 TO OUTFALL #34



Summary for Subcatchment E-60: SHEET FLOW TO RIVER

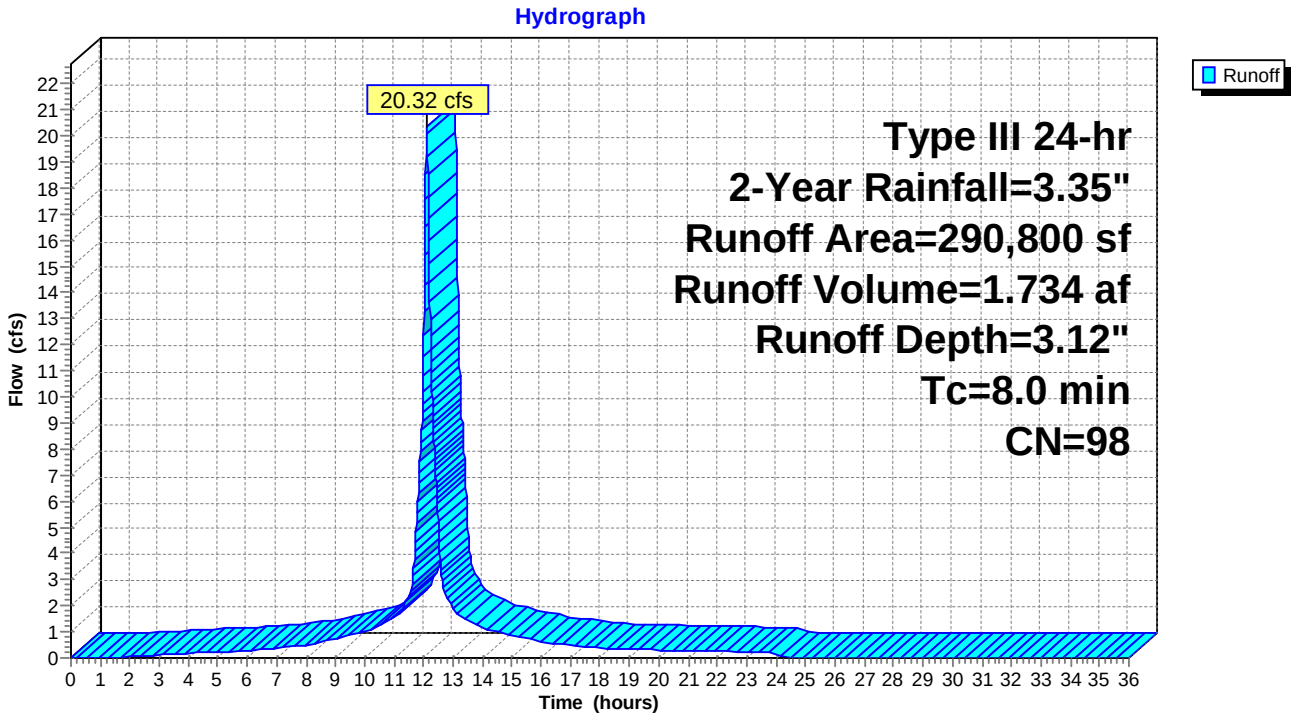
Runoff = 20.32 cfs @ 12.11 hrs, Volume= 1.734 af, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
290,800	98	Unconnected pavement, HSG B
290,800		100.00% Impervious Area
290,800		100.00% Unconnected

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

Subcatchment E-60: SHEET FLOW TO RIVER



Summary for Pond 1P: EXISTING ROCK CHANNEL

Inflow Area = 79.252 ac, 48.49% Impervious, Inflow Depth = 1.49" for 2-Year event
Inflow = 63.29 cfs @ 12.53 hrs, Volume= 9.846 af
Outflow = 54.20 cfs @ 12.74 hrs, Volume= 9.783 af, Atten= 14%, Lag= 12.6 min
Primary = 29.72 cfs @ 12.74 hrs, Volume= 8.987 af
Secondary = 24.48 cfs @ 12.74 hrs, Volume= 0.796 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 20.03' @ 12.74 hrs Surf.Area= 55,940 sf Storage= 68,384 cf

Plug-Flow detention time= 27.9 min calculated for 9.783 af (99% of inflow)
Center-of-Mass det. time= 24.0 min (892.4 - 868.4)

Volume	Invert	Avail.Storage	Storage Description
#1	13.60'	106,375 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

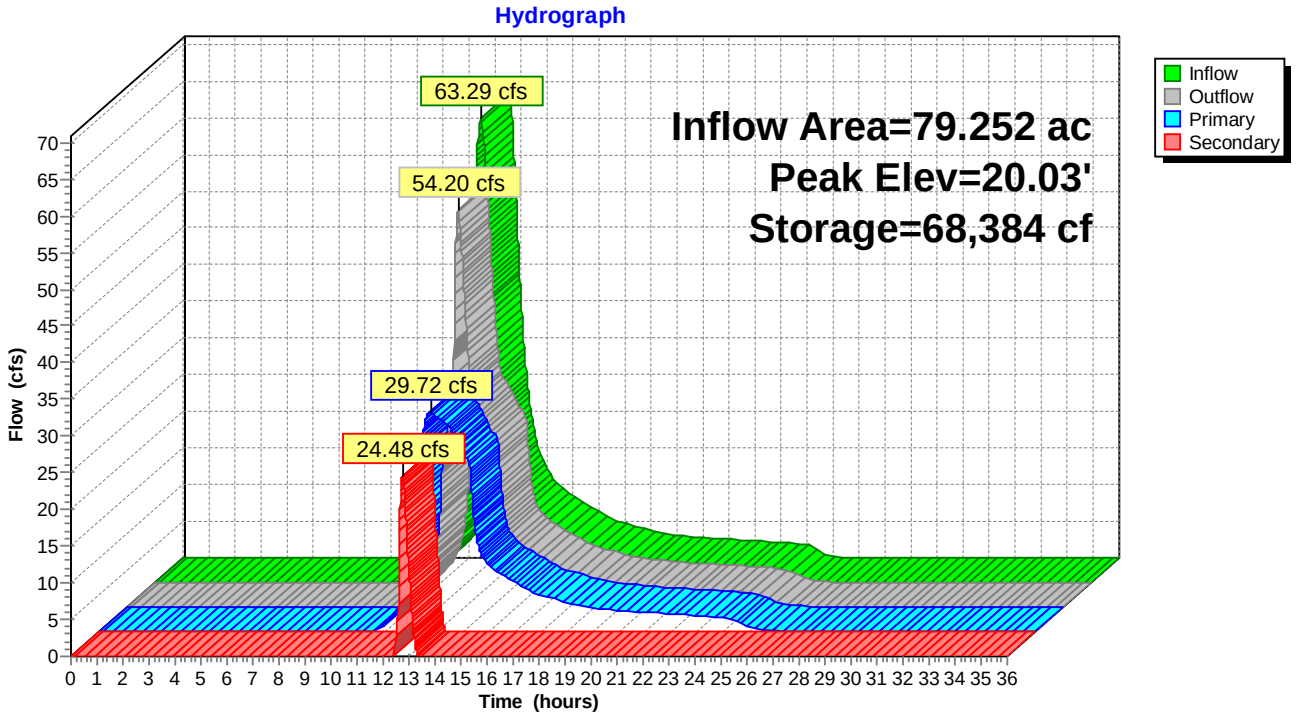
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.60	250	0	0
14.60	1,000	625	625
15.60	2,000	1,500	2,125
16.60	6,000	4,000	6,125
17.60	6,000	6,000	12,125
18.60	6,000	6,000	18,125
19.60	49,000	27,500	45,625
20.10	57,000	26,500	72,125
20.60	80,000	34,250	106,375

Device	Routing	Invert	Outlet Devices
#1	Primary	15.84'	**30.0" Round Ex 30" Culvert** L= 260.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 15.84' / 15.31' S= 0.0020 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Secondary	19.85'	**115.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=29.72 cfs @ 12.74 hrs HW=20.03' TW=4.00' (Fixed TW Elev= 4.00')
↑—**1=Ex 30" Culvert** (Barrel Controls 29.72 cfs @ 6.05 fps)

Secondary OutFlow Max=24.36 cfs @ 12.74 hrs HW=20.03' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 24.36 cfs @ 1.15 fps)

Pond 1P: EXISTING ROCK CHANNEL

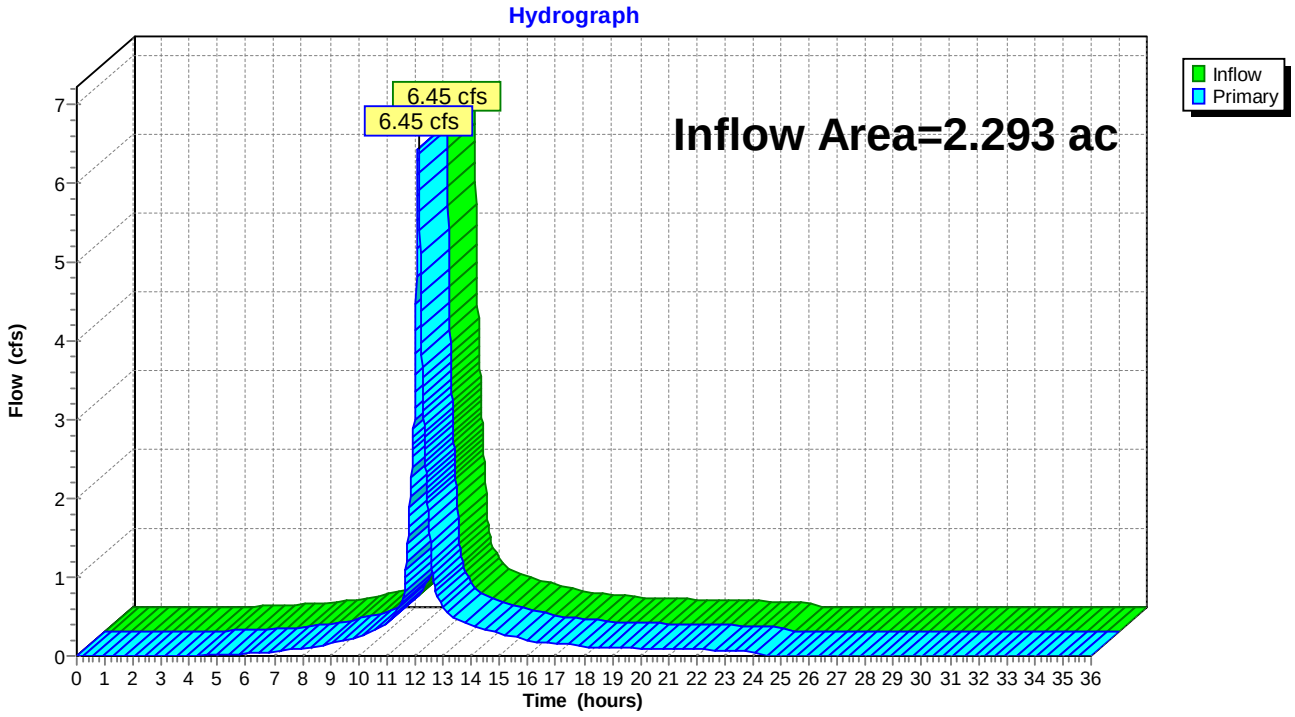


Summary for Link DP-28: OUTFALL #28 (24")

Inflow Area = 2.293 ac, 79.78% Impervious, Inflow Depth = 2.69" for 2-Year event
Inflow = 6.45 cfs @ 12.11 hrs, Volume= 0.514 af
Primary = 6.45 cfs @ 12.11 hrs, Volume= 0.514 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-28: OUTFALL #28 (24")

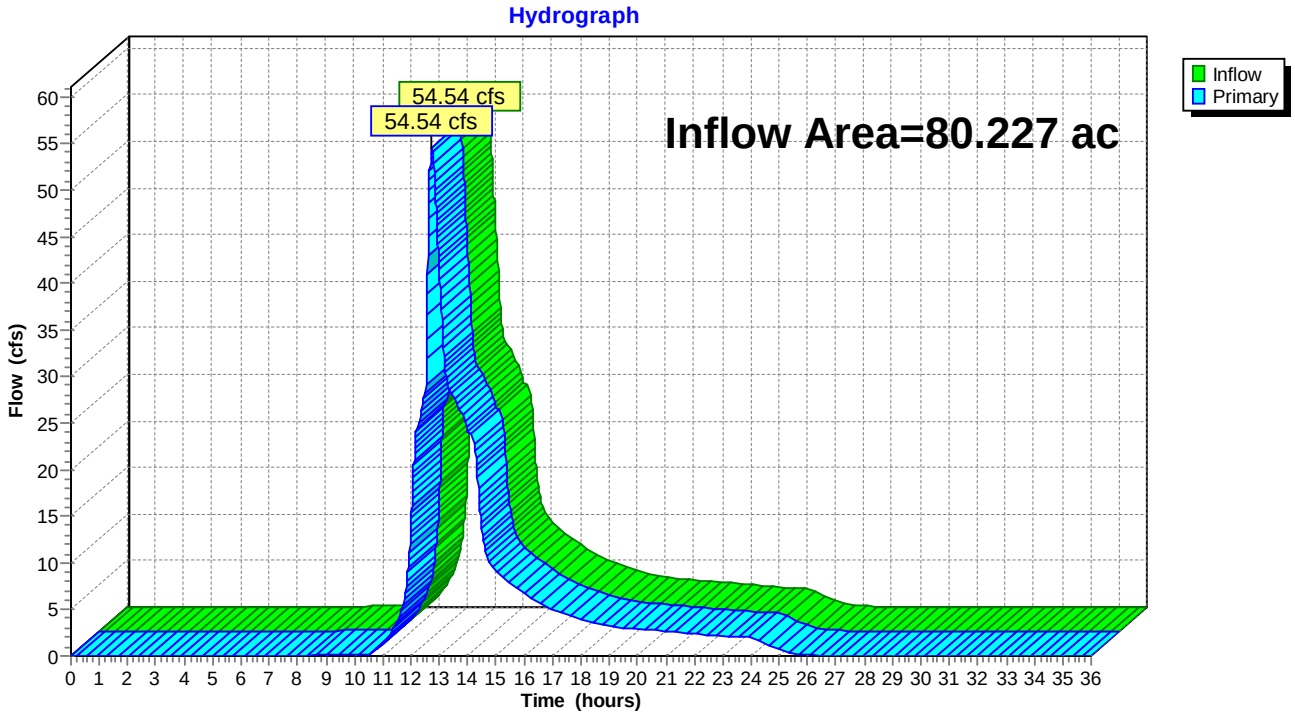


Summary for Link DP-29: OUTFALL #29 (42")

Inflow Area = 80.227 ac, 49.11% Impervious, Inflow Depth = 1.50" for 2-Year event
Inflow = 54.54 cfs @ 12.74 hrs, Volume= 10.037 af
Primary = 54.54 cfs @ 12.74 hrs, Volume= 10.037 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-29: OUTFALL #29 (42")

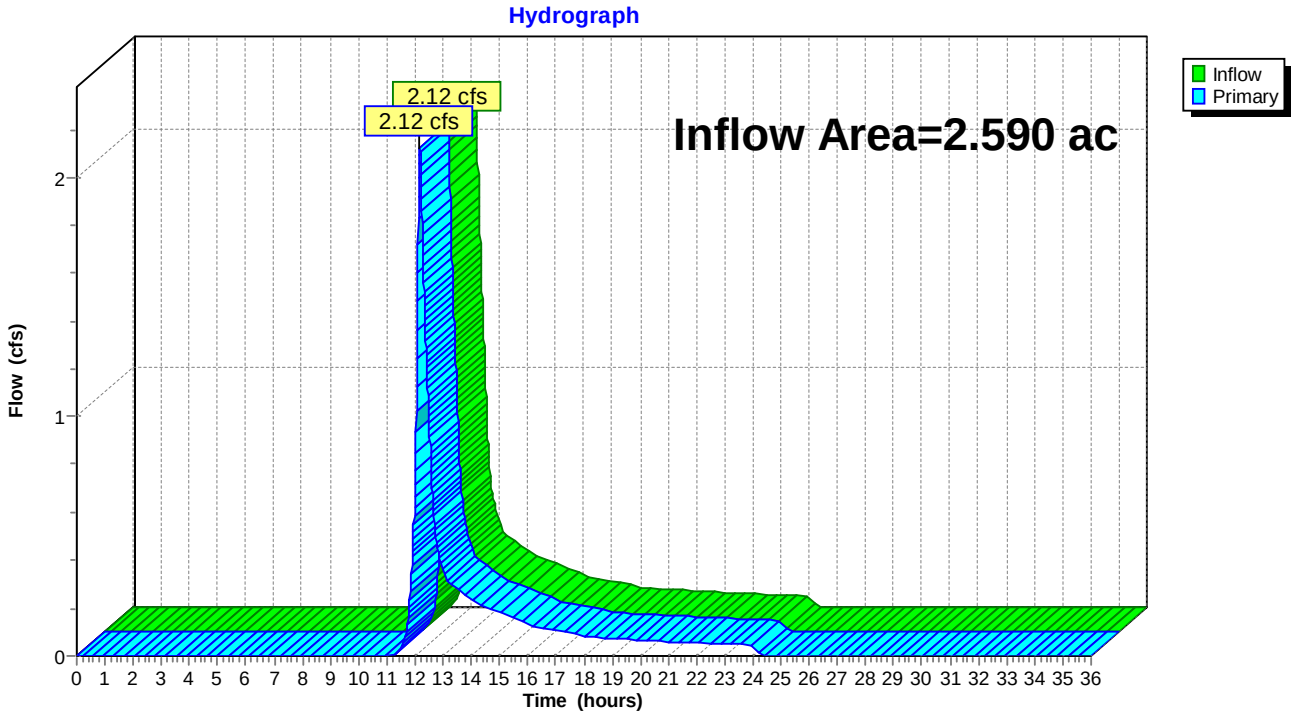


Summary for Link DP-30: OUTFALL #30 (24")

Inflow Area = 2.590 ac, 25.35% Impervious, Inflow Depth = 0.92" for 2-Year event
Inflow = 2.12 cfs @ 12.17 hrs, Volume= 0.198 af
Primary = 2.12 cfs @ 12.17 hrs, Volume= 0.198 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-30: OUTFALL #30 (24")

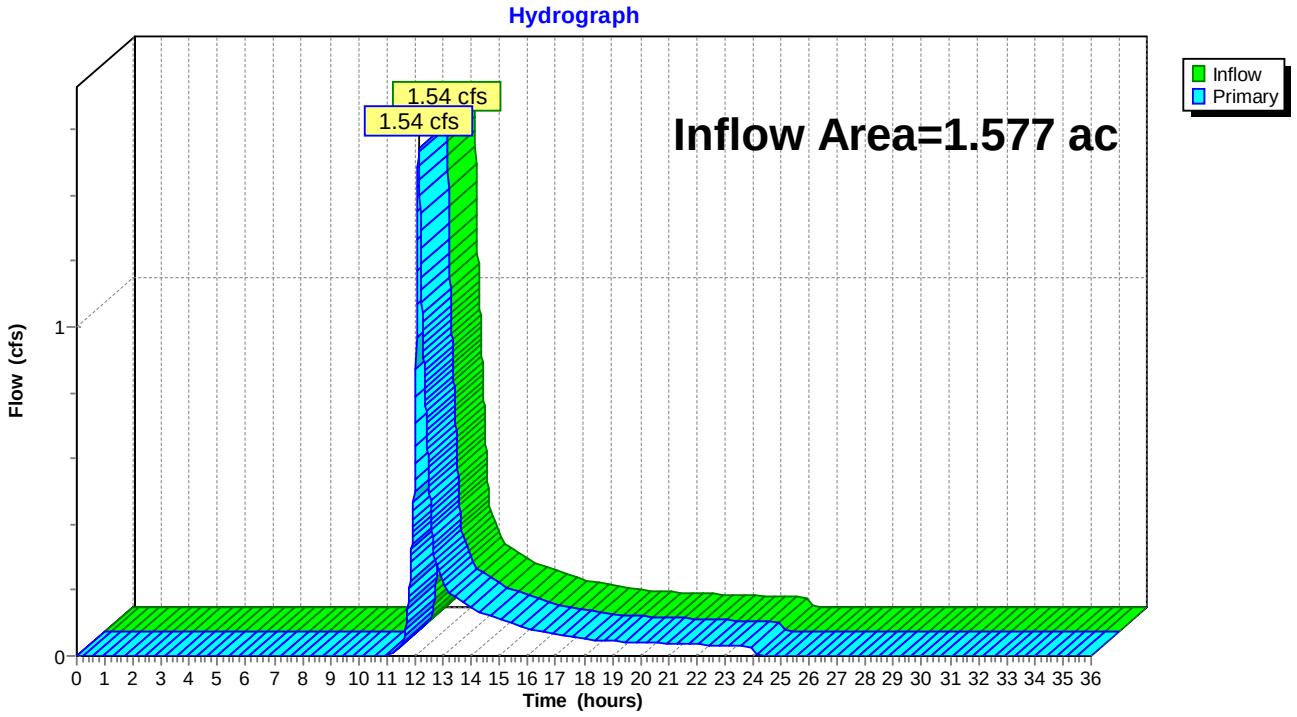


Summary for Link DP-33: OUTFALL #33 (10")

Inflow Area = 1.577 ac, 25.04% Impervious, Inflow Depth = 0.97" for 2-Year event
Inflow = 1.54 cfs @ 12.12 hrs, Volume= 0.127 af
Primary = 1.54 cfs @ 12.12 hrs, Volume= 0.127 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-33: OUTFALL #33 (10")

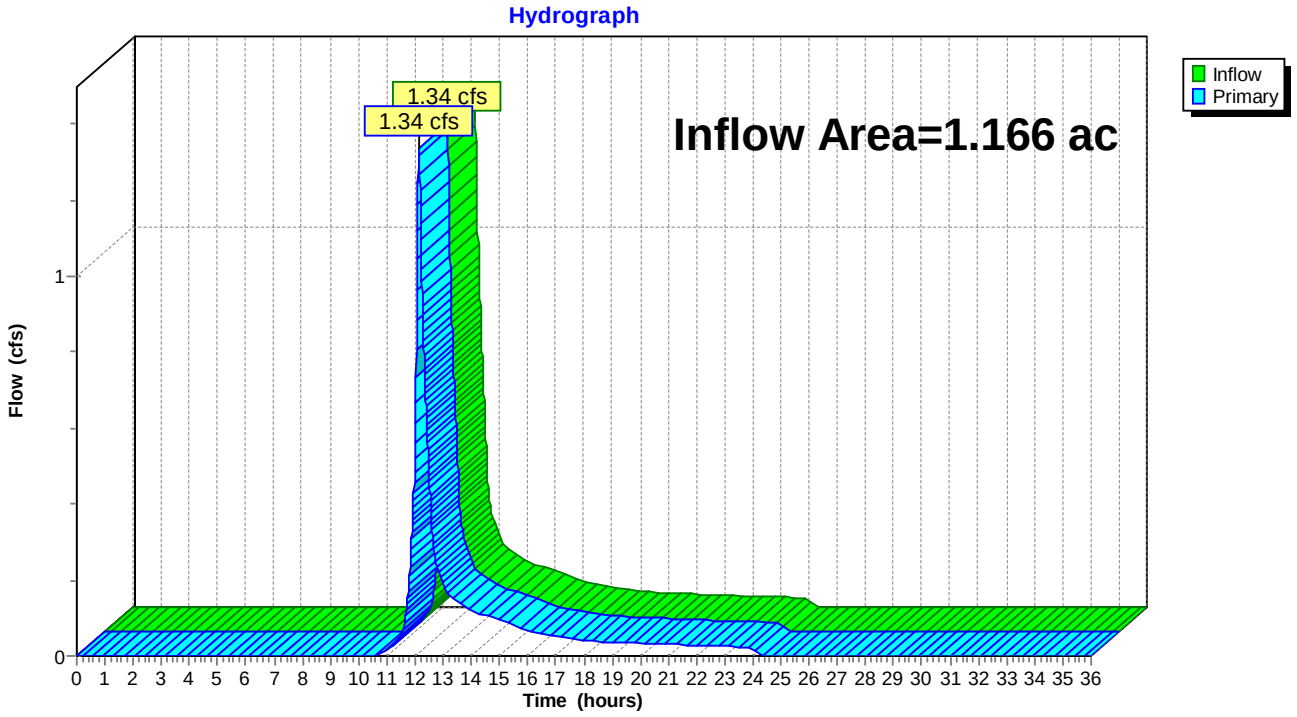


Summary for Link DP-34E: OUTFALL #34 (30")

Inflow Area = 1.166 ac, 36.22% Impervious, Inflow Depth = 1.14" for 2-Year event
Inflow = 1.34 cfs @ 12.13 hrs, Volume= 0.111 af
Primary = 1.34 cfs @ 12.13 hrs, Volume= 0.111 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-34E: OUTFALL #34 (30")

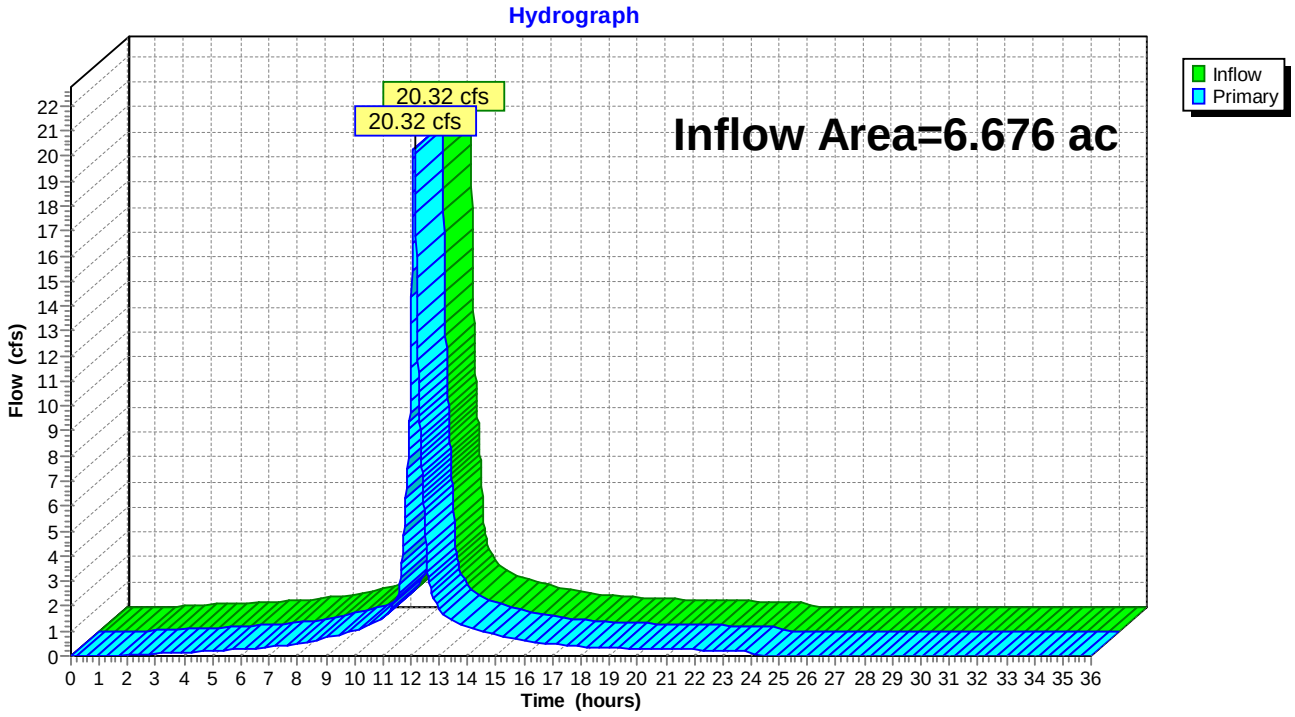


Summary for Link L-E60: SHEET FLOW TO RIVER

Inflow Area = 6.676 ac,100.00% Impervious, Inflow Depth = 3.12" for 2-Year event
Inflow = 20.32 cfs @ 12.11 hrs, Volume= 1.734 af
Primary = 20.32 cfs @ 12.11 hrs, Volume= 1.734 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link L-E60: SHEET FLOW TO RIVER



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-28: AREA TO OUTFALL #28 Runoff Area=99,900 sf 79.78% Impervious Runoff Depth=4.16"
Tc=8.0 min CN=94 Runoff=9.74 cfs 0.795 af

Subcatchment E-29A: LARGE EPR Runoff Area=2,650,000 sf 49.53% Impervious Runoff Depth=2.76"
Tc=41.0 min CN=80 Runoff=95.73 cfs 14.004 af

Subcatchment E-29B: SMALL EPR OFF-SITE Runoff Area=610,000 sf 38.00% Impervious Runoff Depth=2.33"
Tc=21.0 min CN=75 Runoff=25.13 cfs 2.717 af

Subcatchment E-29C: ON-SITE AREA TO Runoff Area=192,200 sf 67.43% Impervious Runoff Depth=3.43"
Tc=9.0 min CN=87 Runoff=15.75 cfs 1.260 af

Subcatchment E-29D: AREA TO OUTFALL #29 Runoff Area=42,500 sf 100.00% Impervious Runoff Depth=4.61"
Tc=5.0 min CN=98 Runoff=4.79 cfs 0.375 af

Subcatchment E-30: AREA TO OUTFALL #30 Runoff Area=112,800 sf 25.35% Impervious Runoff Depth=1.93"
Tc=11.0 min CN=70 Runoff=4.83 cfs 0.416 af

Subcatchment E-33: AREA TO OUTFALL #33 Runoff Area=68,700 sf 25.04% Impervious Runoff Depth=2.00"
Tc=8.0 min UI Adjusted CN=71 Runoff=3.40 cfs 0.263 af

Subcatchment E-34: B83 TO OUTFALL #34 Runoff Area=50,800 sf 36.22% Impervious Runoff Depth=2.25"
Tc=9.0 min CN=74 Runoff=2.75 cfs 0.218 af

Subcatchment E-60: SHEET FLOW TO RIVER Runoff Area=290,800 sf 100.00% Impervious Runoff Depth=4.61"
Tc=8.0 min CN=98 Runoff=29.61 cfs 2.567 af

Pond 1P: EXISTING ROCK CHANNEL Peak Elev=20.27' Storage=82,159 cf Inflow=117.05 cfs 17.981 af
Primary=31.23 cfs 13.245 af Secondary=83.87 cfs 4.673 af Outflow=115.10 cfs 17.918 af

Link DP-28: OUTFALL #28 (24") Inflow=9.74 cfs 0.795 af
Primary=9.74 cfs 0.795 af

Link DP-29: OUTFALL #29 (42") Inflow=115.74 cfs 18.293 af
Primary=115.74 cfs 18.293 af

Link DP-30: OUTFALL #30 (24") Inflow=4.83 cfs 0.416 af
Primary=4.83 cfs 0.416 af

Link DP-33: OUTFALL #33 (10") Inflow=3.40 cfs 0.263 af
Primary=3.40 cfs 0.263 af

Link DP-34E: OUTFALL #34 (30") Inflow=2.75 cfs 0.218 af
Primary=2.75 cfs 0.218 af

Link L-E60: SHEET FLOW TO RIVER Inflow=29.61 cfs 2.567 af
Primary=29.61 cfs 2.567 af

Total Runoff Area = 94.529 ac Runoff Volume = 22.615 af Average Runoff Depth = 2.87"
47.76% Pervious = 45.147 ac 52.24% Impervious = 49.382 ac

Summary for Subcatchment E-28: AREA TO OUTFALL #28

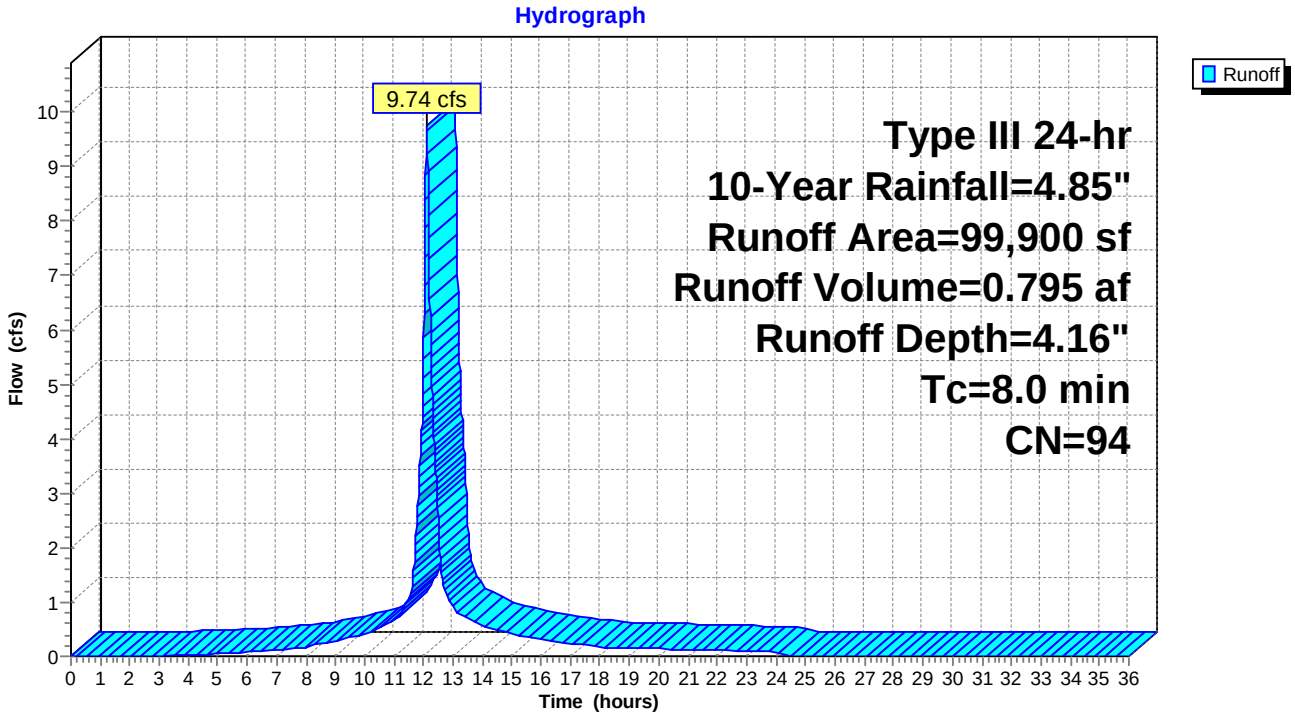
Runoff = 9.74 cfs @ 12.11 hrs, Volume= 0.795 af, Depth= 4.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
14,300	80	>75% Grass cover, Good, HSG D
5,900	77	Woods, Good, HSG D
79,700	98	Unconnected pavement, HSG D
99,900	94	Weighted Average
20,200		20.22% Pervious Area
79,700		79.78% Impervious Area
79,700		100.00% Unconnected

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

Subcatchment E-28: AREA TO OUTFALL #28



Summary for Subcatchment E-29A: LARGE EPR OFF-SITE AREA

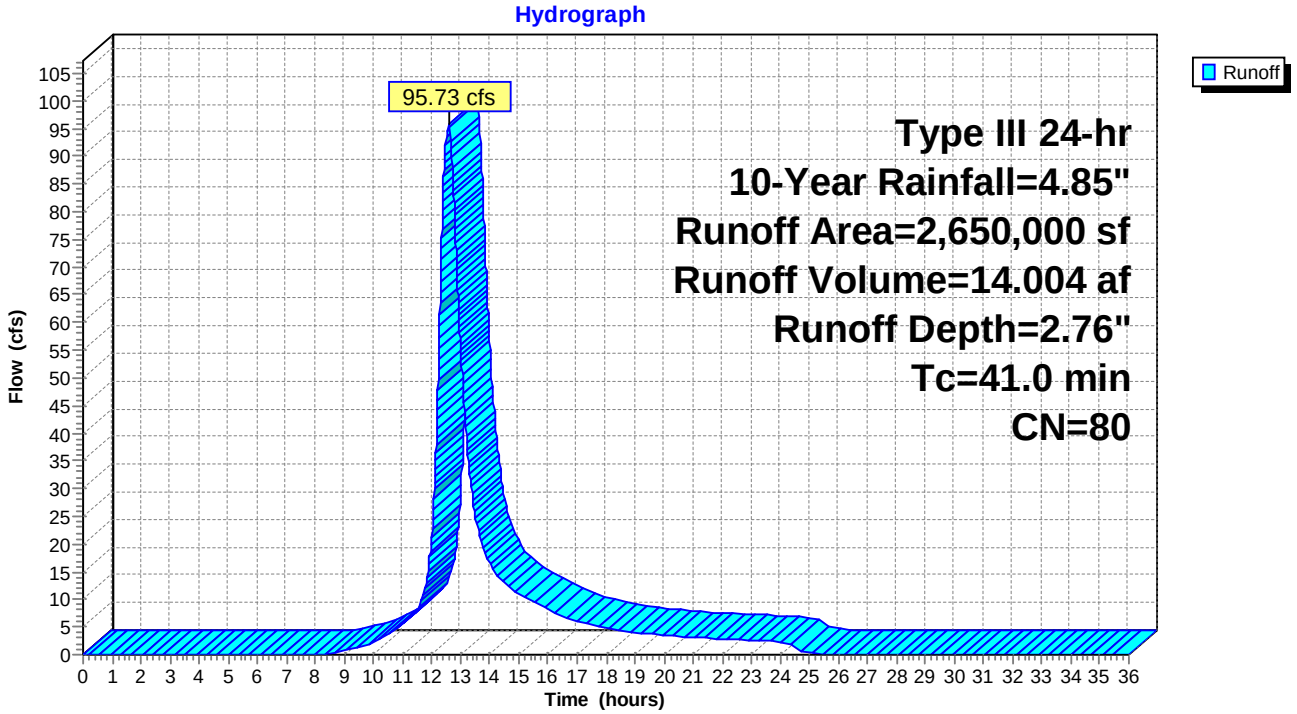
Runoff = 95.73 cfs @ 12.57 hrs, Volume= 14.004 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
2,000,000	75	1/4 acre lots, 38% imp, HSG B
650,000	95	Urban commercial, 85% imp, HSG D
2,650,000	80	Weighted Average
1,337,500		50.47% Pervious Area
1,312,500		49.53% Impervious Area

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

Subcatchment E-29A: LARGE EPR OFF-SITE AREA



Summary for Subcatchment E-29B: SMALL EPR OFF-SITE AREA

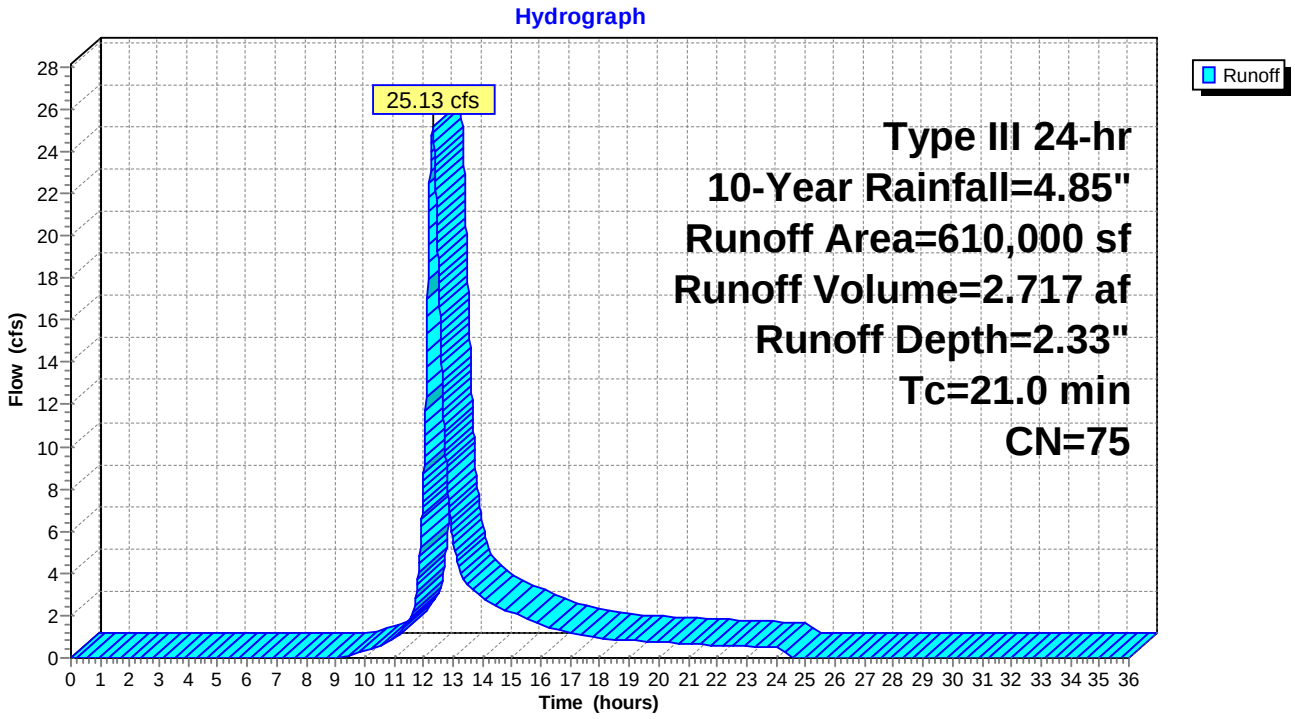
Runoff = 25.13 cfs @ 12.30 hrs, Volume= 2.717 af, Depth= 2.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
610,000	75	1/4 acre lots, 38% imp, HSG B
378,200		62.00% Pervious Area
231,800		38.00% Impervious Area

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

Subcatchment E-29B: SMALL EPR OFF-SITE AREA



Summary for Subcatchment E-29C: ON-SITE AREA TO CHANNEL

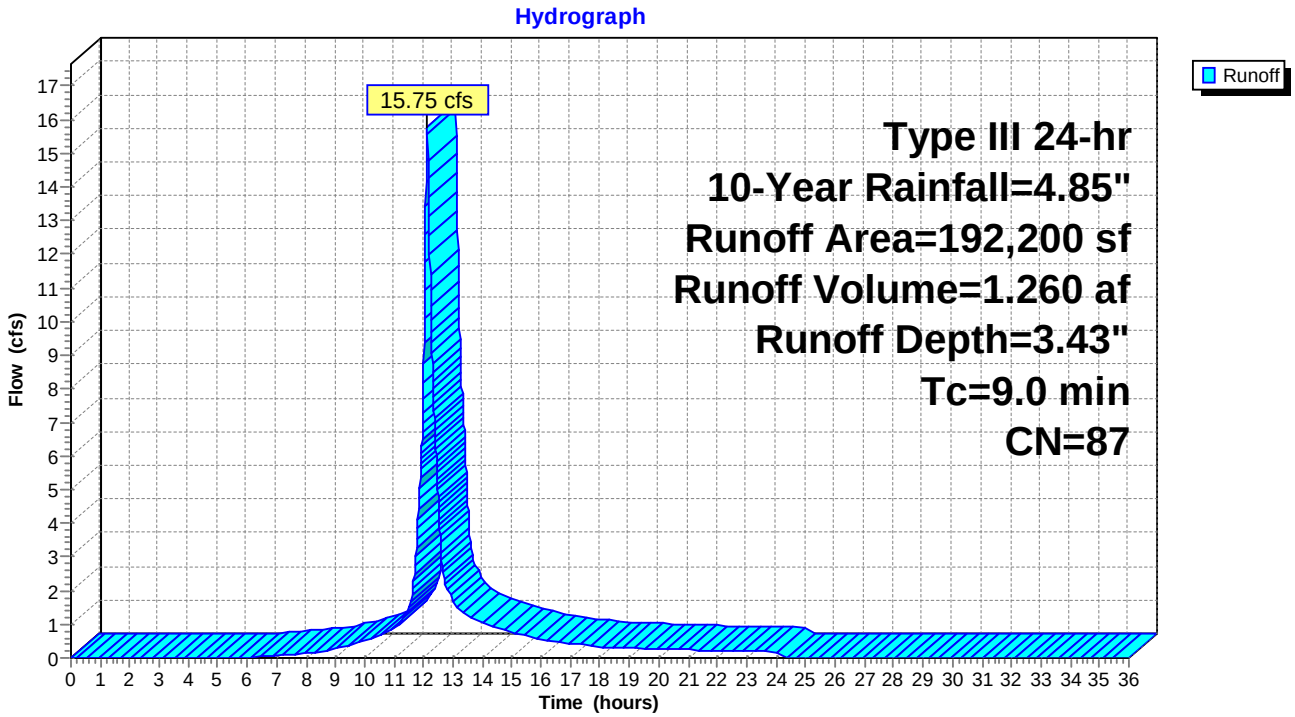
Runoff = 15.75 cfs @ 12.13 hrs, Volume= 1.260 af, Depth= 3.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
108,400	98	Unconnected pavement, HSG B
21,200	98	Unconnected roofs, HSG B
5,300	80	>75% Grass cover, Good, HSG D
15,600	77	Woods, Good, HSG D
26,800	61	>75% Grass cover, Good, HSG B
14,900	55	Woods, Good, HSG B
192,200	87	Weighted Average
62,600		32.57% Pervious Area
129,600		67.43% Impervious Area
129,600		100.00% Unconnected

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

Subcatchment E-29C: ON-SITE AREA TO CHANNEL



Summary for Subcatchment E-29D: AREA TO OUTFALL #29

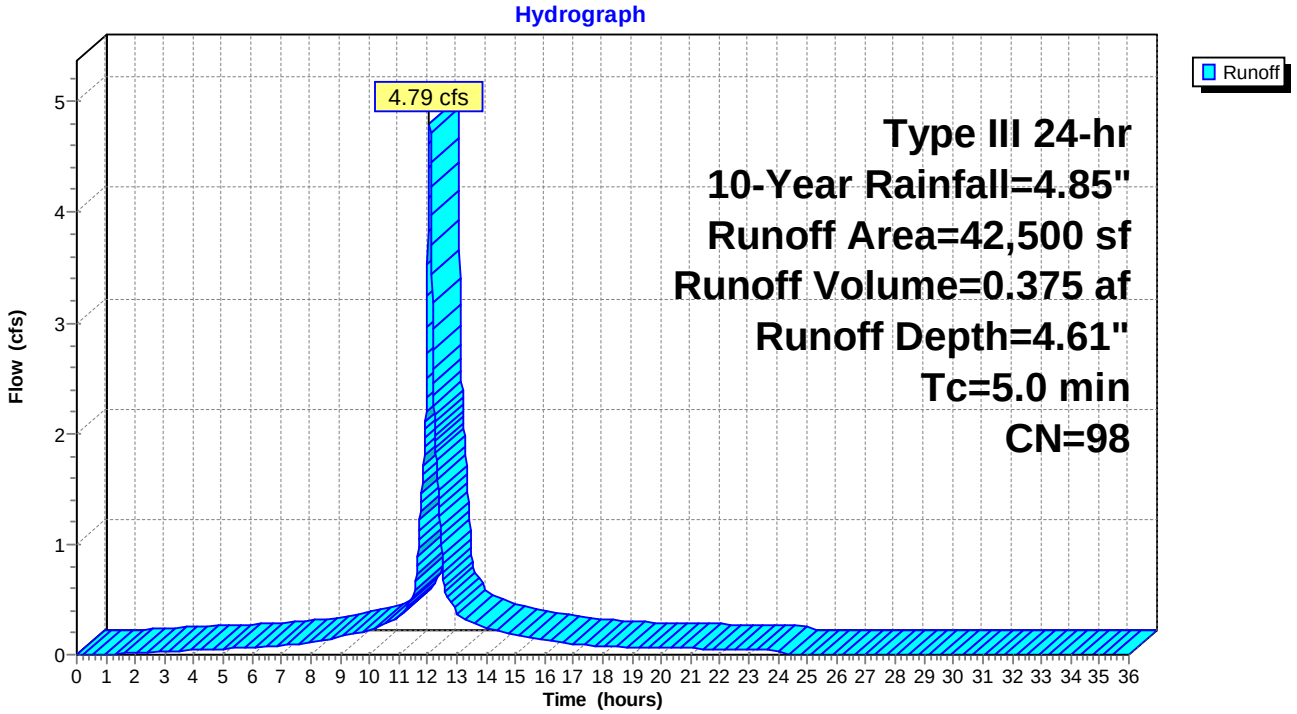
Runoff = 4.79 cfs @ 12.07 hrs, Volume= 0.375 af, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
37,000	98	Unconnected pavement, HSG B
5,500	98	Unconnected roofs, HSG B
42,500	98	Weighted Average
42,500		100.00% Impervious Area
42,500		100.00% Unconnected

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

Subcatchment E-29D: AREA TO OUTFALL #29



Summary for Subcatchment E-30: AREA TO OUTFALL #30

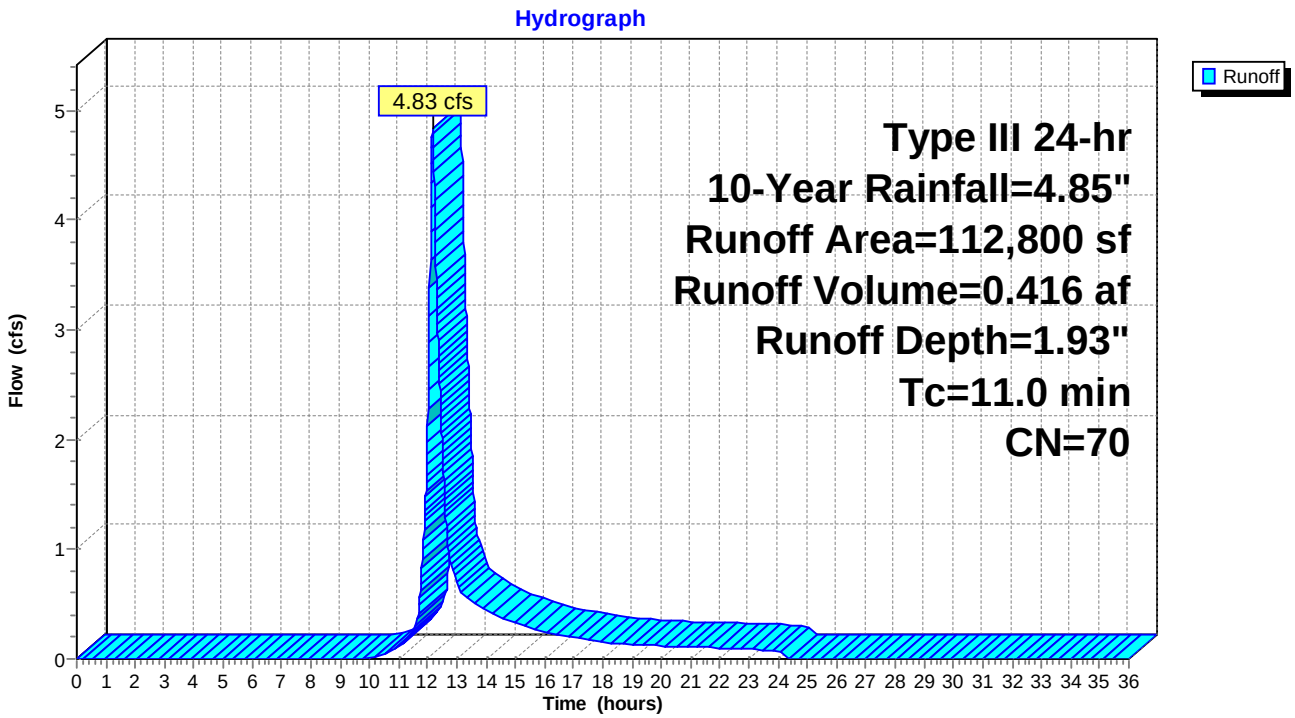
Runoff = 4.83 cfs @ 12.16 hrs, Volume= 0.416 af, Depth= 1.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
78,800	61	>75% Grass cover, Good, HSG B
28,600	98	Paved parking, HSG B
5,400	55	Woods, Good, HSG B
112,800	70	Weighted Average
84,200		74.65% Pervious Area
28,600		25.35% Impervious Area

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

Subcatchment E-30: AREA TO OUTFALL #30



Summary for Subcatchment E-33: AREA TO OUTFALL #33

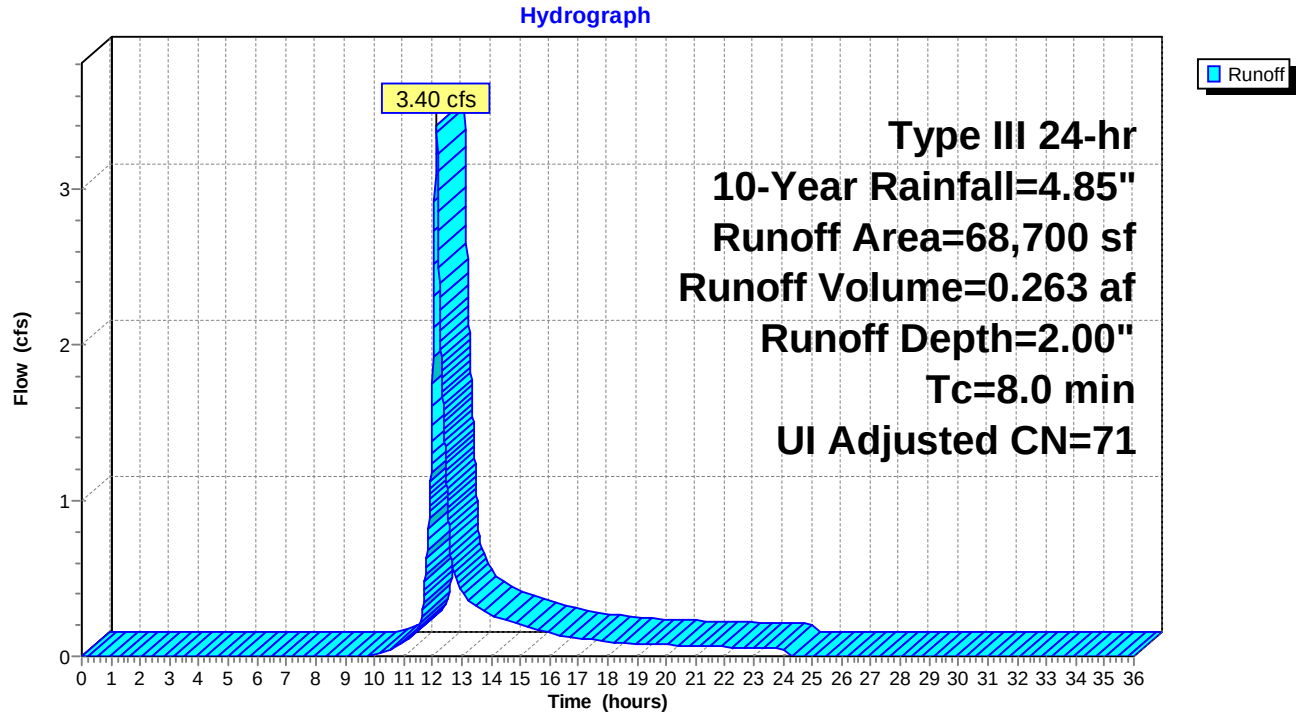
Runoff = 3.40 cfs @ 12.12 hrs, Volume= 0.263 af, Depth= 2.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Adj	Description
39,500	61		>75% Grass cover, Good, HSG B
17,200	98		Unconnected pavement, HSG B
12,000	85		Gravel roads, HSG B
68,700	74	71	Weighted Average, UI Adjusted
51,500			74.96% Pervious Area
17,200			25.04% Impervious Area
17,200			100.00% Unconnected

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

Subcatchment E-33: AREA TO OUTFALL #33



Summary for Subcatchment E-34: B83 TO OUTFALL #34

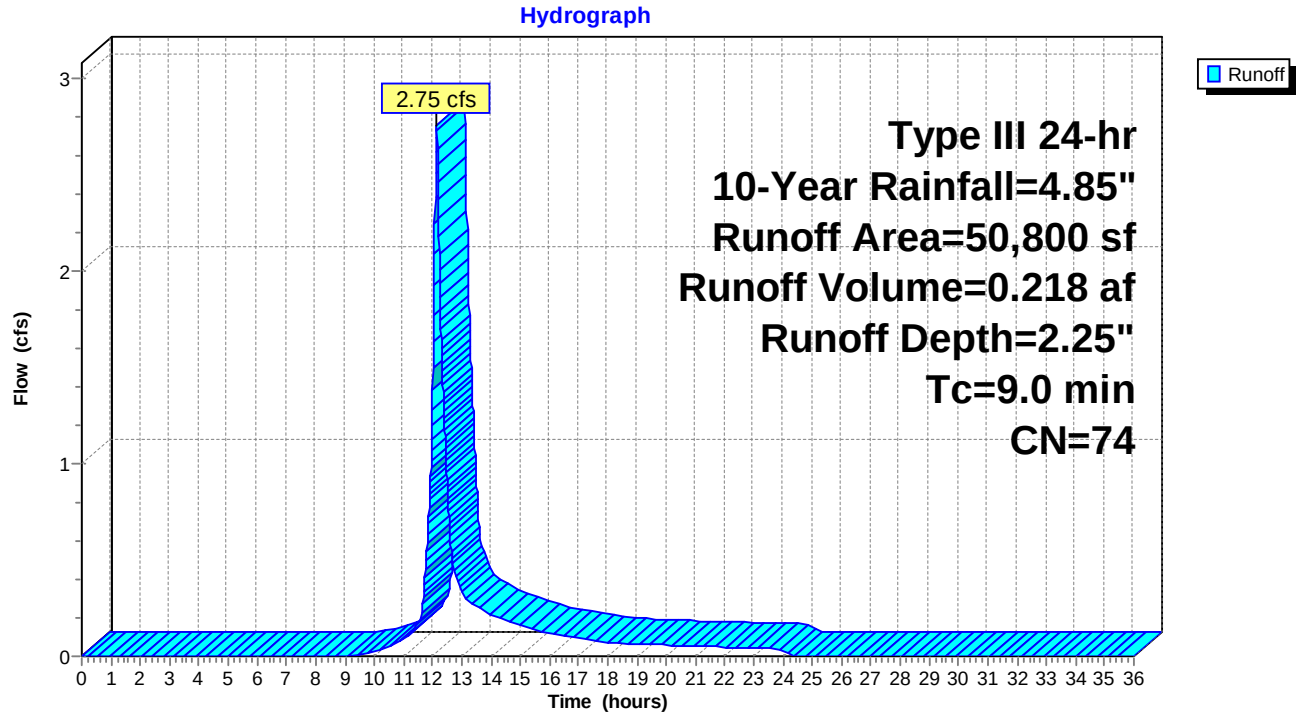
Runoff = 2.75 cfs @ 12.13 hrs, Volume= 0.218 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
10,000	98	Unconnected pavement, HSG B
8,400	98	Unconnected roofs, HSG B
32,400	61	>75% Grass cover, Good, HSG B
50,800	74	Weighted Average
32,400		63.78% Pervious Area
18,400		36.22% Impervious Area
18,400		100.00% Unconnected

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

Subcatchment E-34: B83 TO OUTFALL #34



Summary for Subcatchment E-60: SHEET FLOW TO RIVER

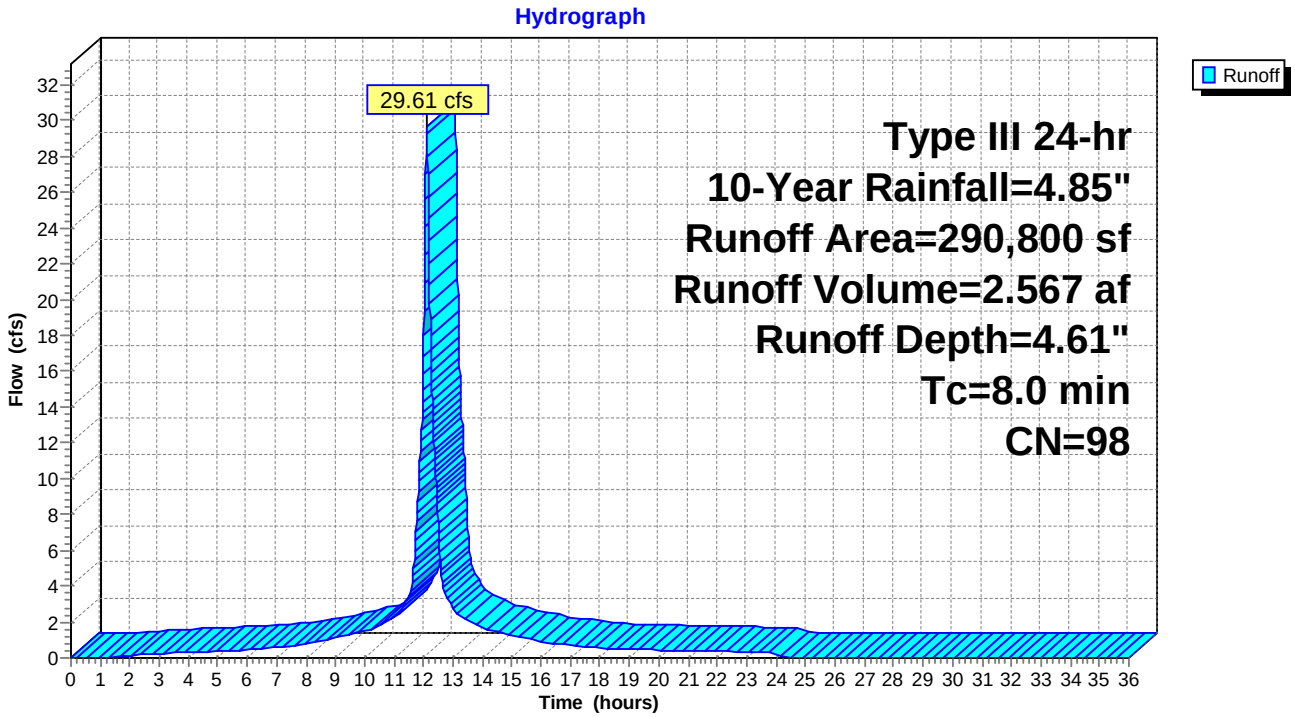
Runoff = 29.61 cfs @ 12.11 hrs, Volume= 2.567 af, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
290,800	98	Unconnected pavement, HSG B
290,800		100.00% Impervious Area
290,800		100.00% Unconnected

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

Subcatchment E-60: SHEET FLOW TO RIVER



Summary for Pond 1P: EXISTING ROCK CHANNEL

Inflow Area = 79.252 ac, 48.49% Impervious, Inflow Depth = 2.72" for 10-Year event
Inflow = 117.05 cfs @ 12.52 hrs, Volume= 17.981 af
Outflow = 115.10 cfs @ 12.57 hrs, Volume= 17.918 af, Atten= 2%, Lag= 3.0 min
Primary = 31.23 cfs @ 12.57 hrs, Volume= 13.245 af
Secondary = 83.87 cfs @ 12.57 hrs, Volume= 4.673 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 20.27' @ 12.57 hrs Surf.Area= 64,592 sf Storage= 82,159 cf

Plug-Flow detention time= 21.7 min calculated for 17.913 af (100% of inflow)
Center-of-Mass det. time= 19.7 min (870.9 - 851.2)

Volume	Invert	Avail.Storage	Storage Description
#1	13.60'	106,375 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

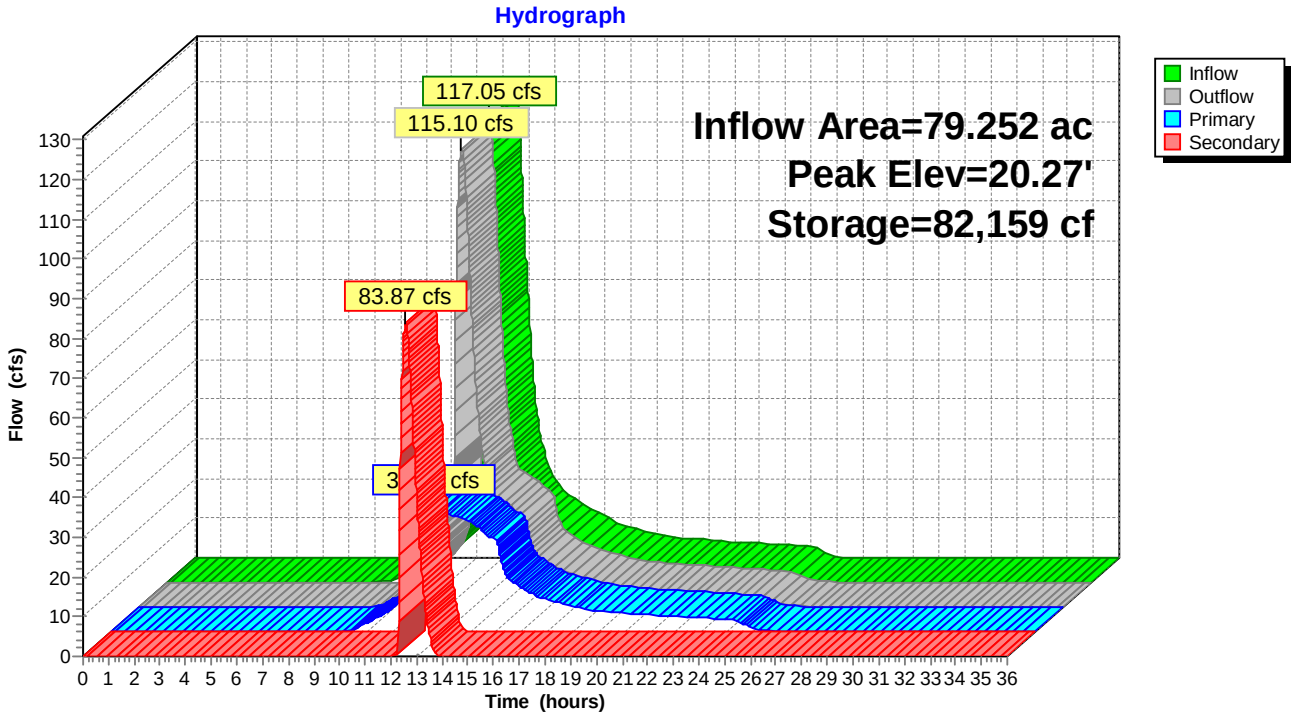
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.60	250	0	0
14.60	1,000	625	625
15.60	2,000	1,500	2,125
16.60	6,000	4,000	6,125
17.60	6,000	6,000	12,125
18.60	6,000	6,000	18,125
19.60	49,000	27,500	45,625
20.10	57,000	26,500	72,125
20.60	80,000	34,250	106,375

Device	Routing	Invert	Outlet Devices
#1	Primary	15.84'	**30.0" Round Ex 30" Culvert** L= 260.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 15.84' / 15.31' S= 0.0020 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Secondary	19.85'	**115.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=31.23 cfs @ 12.57 hrs HW=20.27' TW=4.00' (Fixed TW Elev= 4.00')
↑—**1=Ex 30" Culvert** (Barrel Controls 31.23 cfs @ 6.36 fps)

Secondary OutFlow Max=83.70 cfs @ 12.57 hrs HW=20.27' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 83.70 cfs @ 1.75 fps)

Pond 1P: EXISTING ROCK CHANNEL

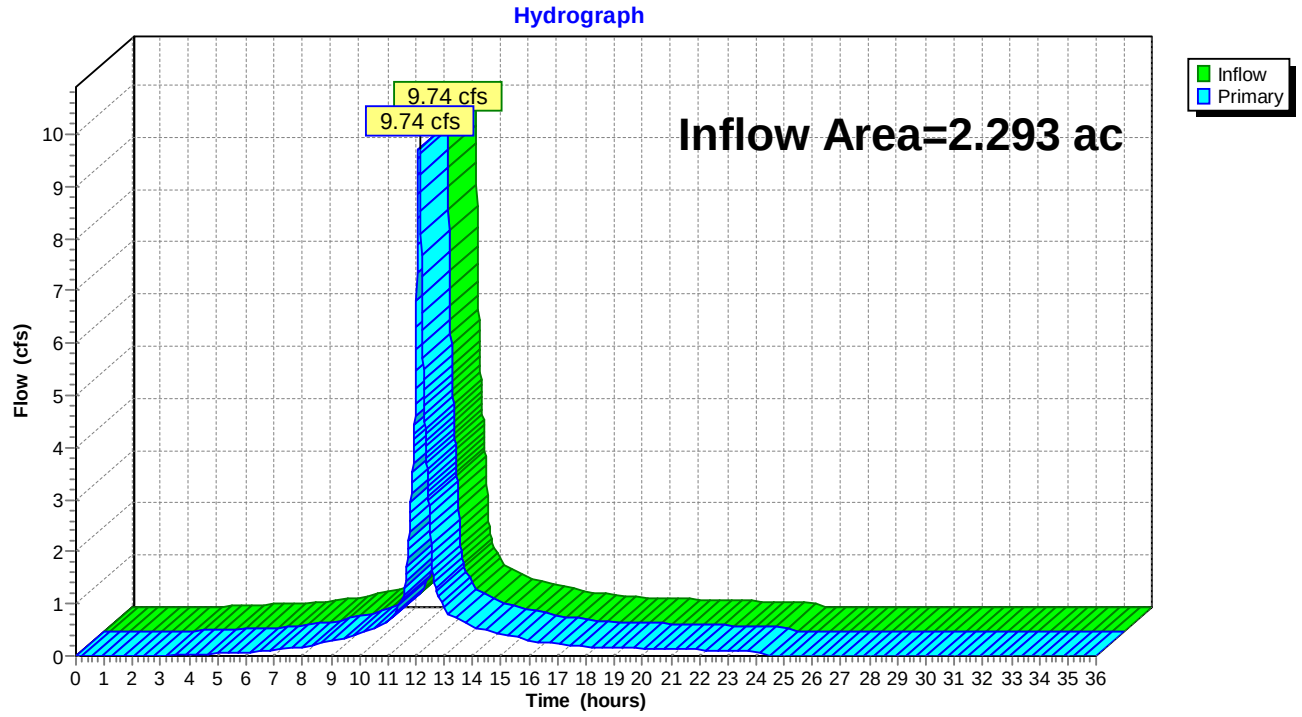


Summary for Link DP-28: OUTFALL #28 (24")

Inflow Area = 2.293 ac, 79.78% Impervious, Inflow Depth = 4.16" for 10-Year event
Inflow = 9.74 cfs @ 12.11 hrs, Volume= 0.795 af
Primary = 9.74 cfs @ 12.11 hrs, Volume= 0.795 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-28: OUTFALL #28 (24")

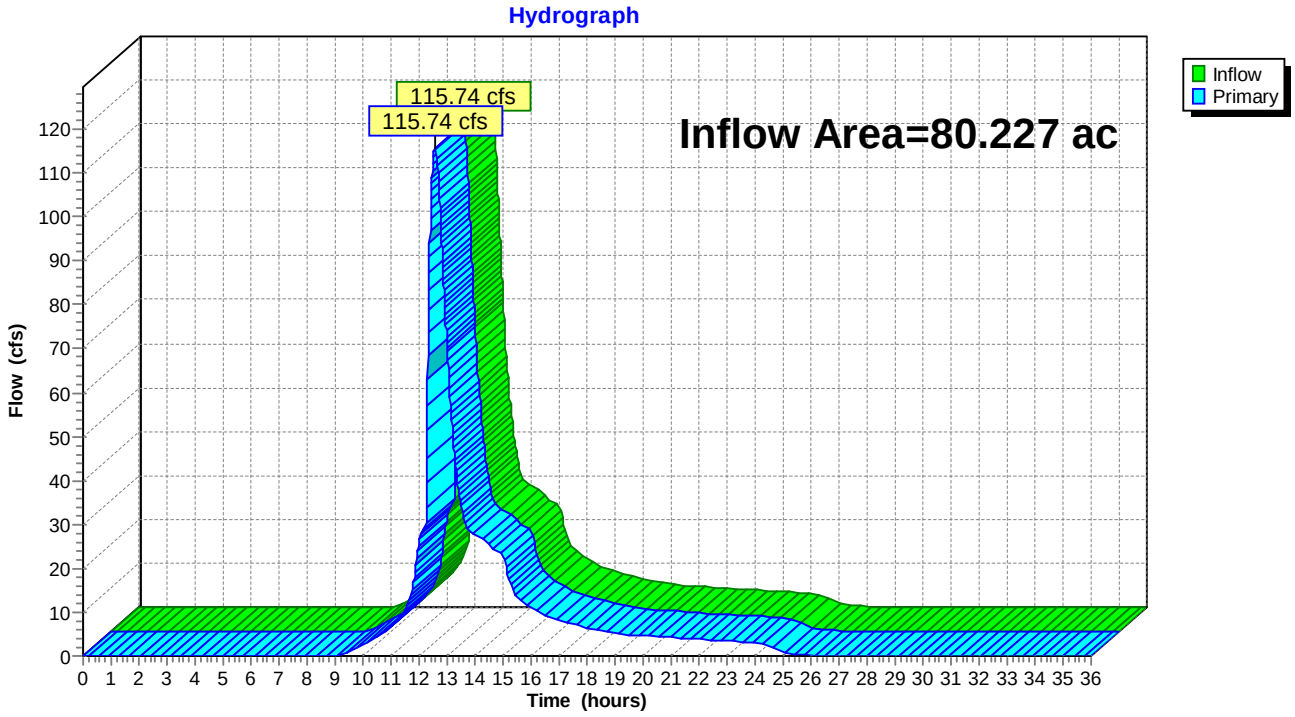


Summary for Link DP-29: OUTFALL #29 (42")

Inflow Area = 80.227 ac, 49.11% Impervious, Inflow Depth = 2.74" for 10-Year event
Inflow = 115.74 cfs @ 12.57 hrs, Volume= 18.293 af
Primary = 115.74 cfs @ 12.57 hrs, Volume= 18.293 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-29: OUTFALL #29 (42")

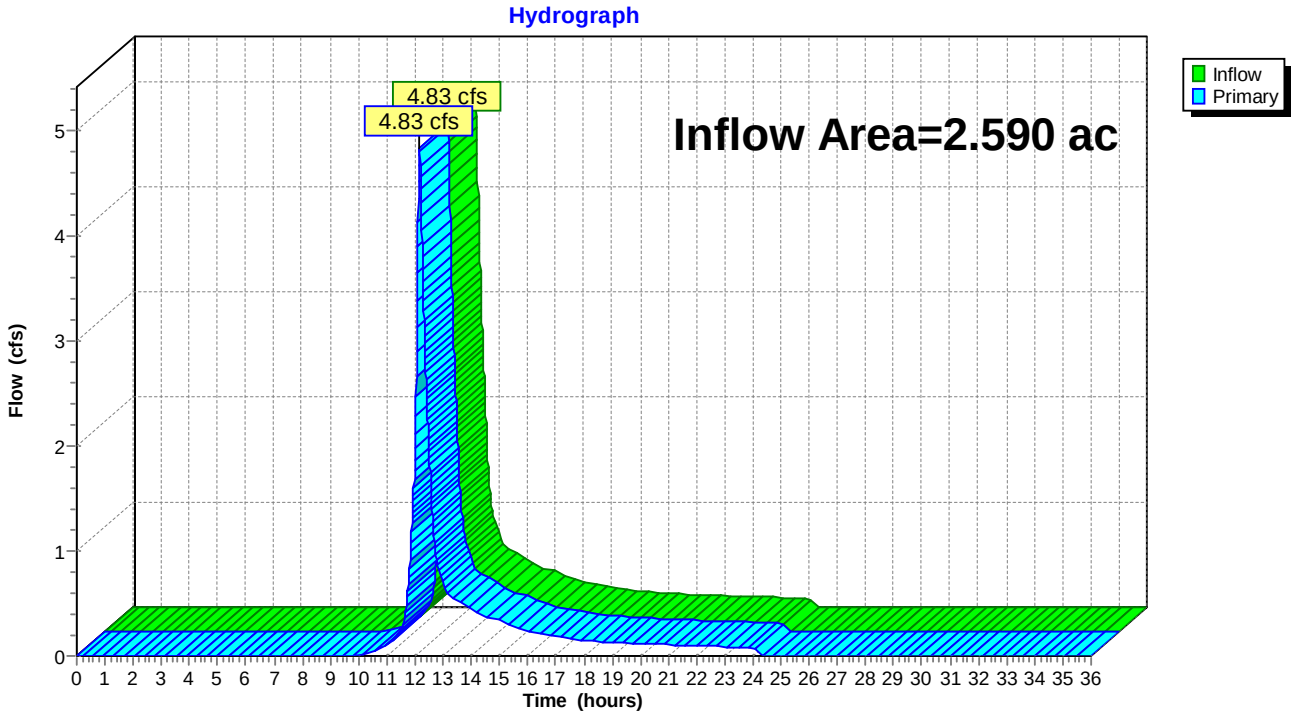


Summary for Link DP-30: OUTFALL #30 (24")

Inflow Area = 2.590 ac, 25.35% Impervious, Inflow Depth = 1.93" for 10-Year event
Inflow = 4.83 cfs @ 12.16 hrs, Volume= 0.416 af
Primary = 4.83 cfs @ 12.16 hrs, Volume= 0.416 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-30: OUTFALL #30 (24")

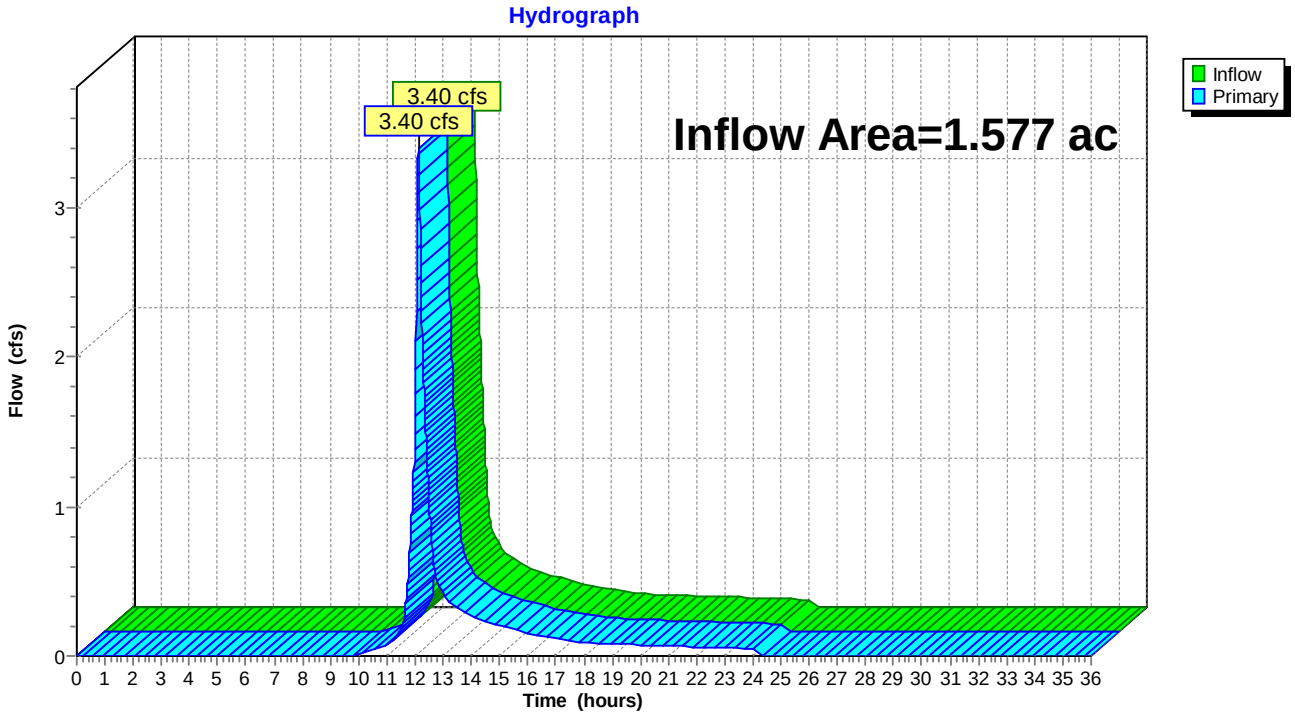


Summary for Link DP-33: OUTFALL #33 (10")

Inflow Area = 1.577 ac, 25.04% Impervious, Inflow Depth = 2.00" for 10-Year event
Inflow = 3.40 cfs @ 12.12 hrs, Volume= 0.263 af
Primary = 3.40 cfs @ 12.12 hrs, Volume= 0.263 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-33: OUTFALL #33 (10")

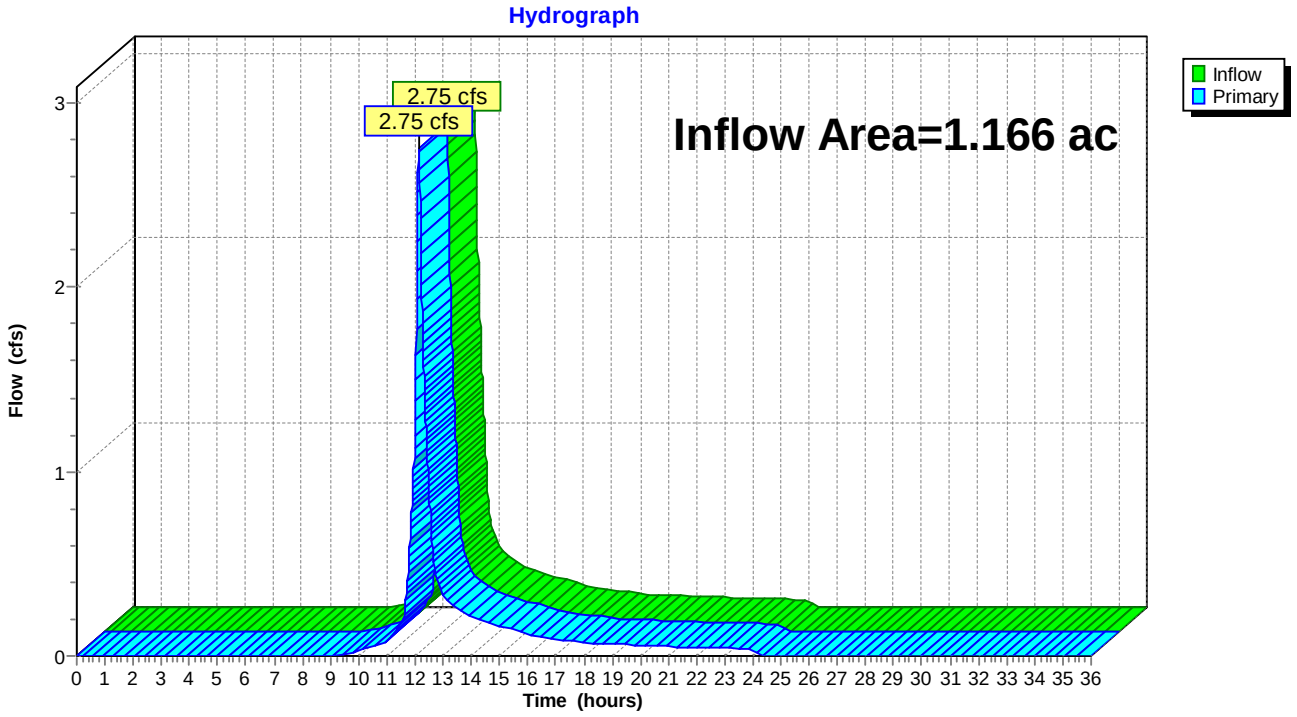


Summary for Link DP-34E: OUTFALL #34 (30")

Inflow Area = 1.166 ac, 36.22% Impervious, Inflow Depth = 2.25" for 10-Year event
Inflow = 2.75 cfs @ 12.13 hrs, Volume= 0.218 af
Primary = 2.75 cfs @ 12.13 hrs, Volume= 0.218 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-34E: OUTFALL #34 (30")

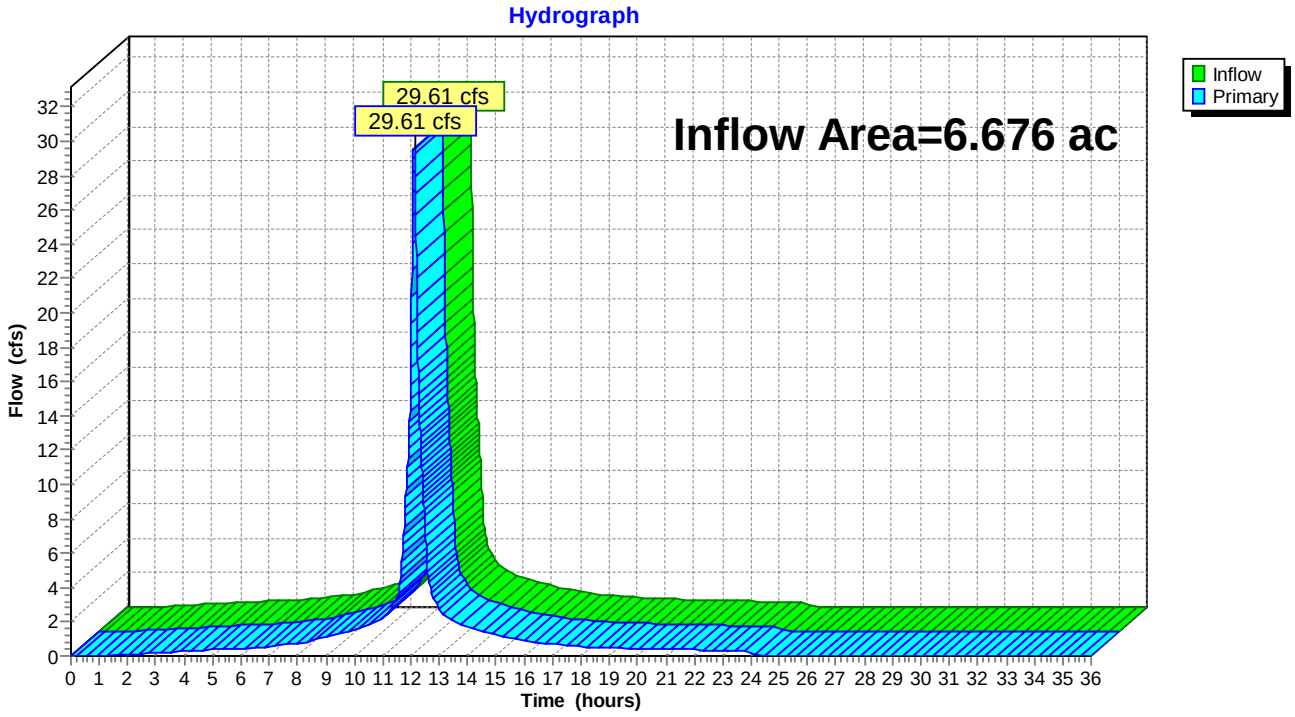


Summary for Link L-E60: SHEET FLOW TO RIVER

Inflow Area = 6.676 ac,100.00% Impervious, Inflow Depth = 4.61" for 10-Year event
Inflow = 29.61 cfs @ 12.11 hrs, Volume= 2.567 af
Primary = 29.61 cfs @ 12.11 hrs, Volume= 2.567 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link L-E60: SHEET FLOW TO RIVER



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-28: AREA TO OUTFALL #28 Runoff Area=99,900 sf 79.78% Impervious Runoff Depth=5.29"
Tc=8.0 min CN=94 Runoff=12.21 cfs 1.010 af

Subcatchment E-29A: LARGE EPR Runoff Area=2,650,000 sf 49.53% Impervious Runoff Depth=3.77"
Tc=41.0 min CN=80 Runoff=130.42 cfs 19.124 af

Subcatchment E-29B: SMALL EPR OFF-SITE Runoff Area=610,000 sf 38.00% Impervious Runoff Depth=3.27"
Tc=21.0 min CN=75 Runoff=35.52 cfs 3.820 af

Subcatchment E-29C: ON-SITE AREA TO Runoff Area=192,200 sf 67.43% Impervious Runoff Depth=4.51"
Tc=9.0 min CN=87 Runoff=20.48 cfs 1.657 af

Subcatchment E-29D: AREA TO OUTFALL #29 Runoff Area=42,500 sf 100.00% Impervious Runoff Depth=5.75"
Tc=5.0 min CN=98 Runoff=5.93 cfs 0.468 af

Subcatchment E-30: AREA TO OUTFALL #30 Runoff Area=112,800 sf 25.35% Impervious Runoff Depth=2.80"
Tc=11.0 min CN=70 Runoff=7.14 cfs 0.604 af

Subcatchment E-33: AREA TO OUTFALL #33 Runoff Area=68,700 sf 25.04% Impervious Runoff Depth=2.89"
Tc=8.0 min UI Adjusted CN=71 Runoff=4.97 cfs 0.380 af

Subcatchment E-34: B83 TO OUTFALL #34 Runoff Area=50,800 sf 36.22% Impervious Runoff Depth=3.18"
Tc=9.0 min CN=74 Runoff=3.92 cfs 0.309 af

Subcatchment E-60: SHEET FLOW TO RIVER Runoff Area=290,800 sf 100.00% Impervious Runoff Depth=5.75"
Tc=8.0 min CN=98 Runoff=36.65 cfs 3.200 af

Pond 1P: EXISTING ROCK CHANNEL Peak Elev=20.39' Storage=90,814 cf Inflow=159.99 cfs 24.601 af
Primary=32.03 cfs 16.261 af Secondary=126.26 cfs 8.277 af Outflow=158.29 cfs 24.538 af

Link DP-28: OUTFALL #28 (24") Inflow=12.21 cfs 1.010 af
Primary=12.21 cfs 1.010 af

Link DP-29: OUTFALL #29 (42") Inflow=159.16 cfs 25.006 af
Primary=159.16 cfs 25.006 af

Link DP-30: OUTFALL #30 (24") Inflow=7.14 cfs 0.604 af
Primary=7.14 cfs 0.604 af

Link DP-33: OUTFALL #33 (10") Inflow=4.97 cfs 0.380 af
Primary=4.97 cfs 0.380 af

Link DP-34E: OUTFALL #34 (30") Inflow=3.92 cfs 0.309 af
Primary=3.92 cfs 0.309 af

Link L-E60: SHEET FLOW TO RIVER Inflow=36.65 cfs 3.200 af
Primary=36.65 cfs 3.200 af

Total Runoff Area = 94.529 ac Runoff Volume = 30.572 af Average Runoff Depth = 3.88"
47.76% Pervious = 45.147 ac 52.24% Impervious = 49.382 ac

Summary for Subcatchment E-28: AREA TO OUTFALL #28

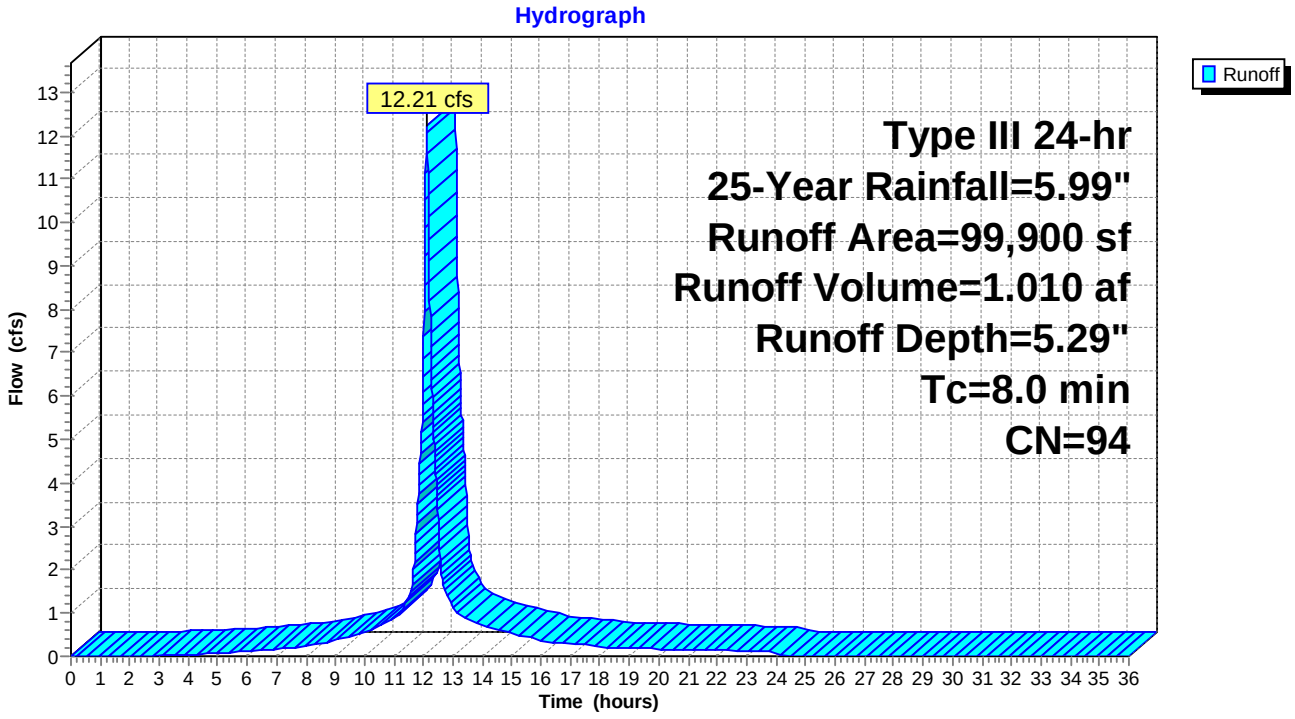
Runoff = 12.21 cfs @ 12.11 hrs, Volume= 1.010 af, Depth= 5.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
14,300	80	>75% Grass cover, Good, HSG D
5,900	77	Woods, Good, HSG D
79,700	98	Unconnected pavement, HSG D
99,900	94	Weighted Average
20,200		20.22% Pervious Area
79,700		79.78% Impervious Area
79,700		100.00% Unconnected

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

Subcatchment E-28: AREA TO OUTFALL #28



Summary for Subcatchment E-29A: LARGE EPR OFF-SITE AREA

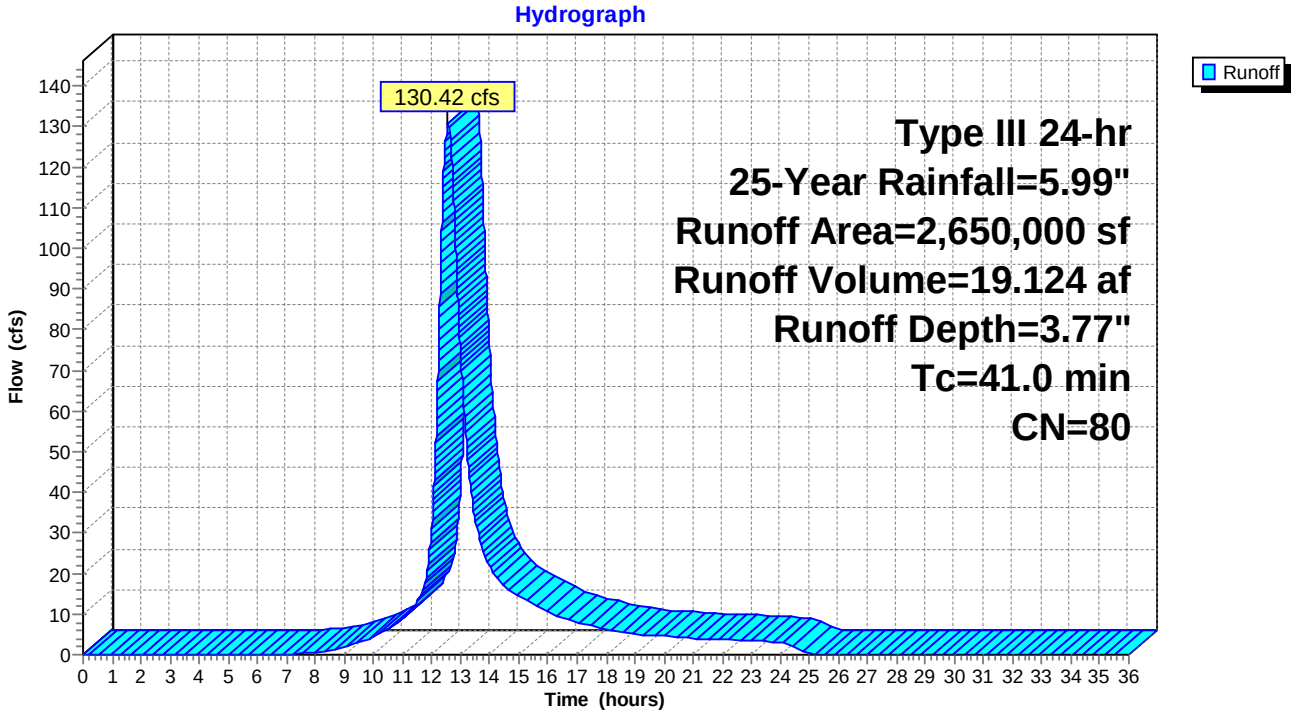
Runoff = 130.42 cfs @ 12.54 hrs, Volume= 19.124 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
2,000,000	75	1/4 acre lots, 38% imp, HSG B
650,000	95	Urban commercial, 85% imp, HSG D
2,650,000	80	Weighted Average
1,337,500		50.47% Pervious Area
1,312,500		49.53% Impervious Area

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

Subcatchment E-29A: LARGE EPR OFF-SITE AREA



Summary for Subcatchment E-29B: SMALL EPR OFF-SITE AREA

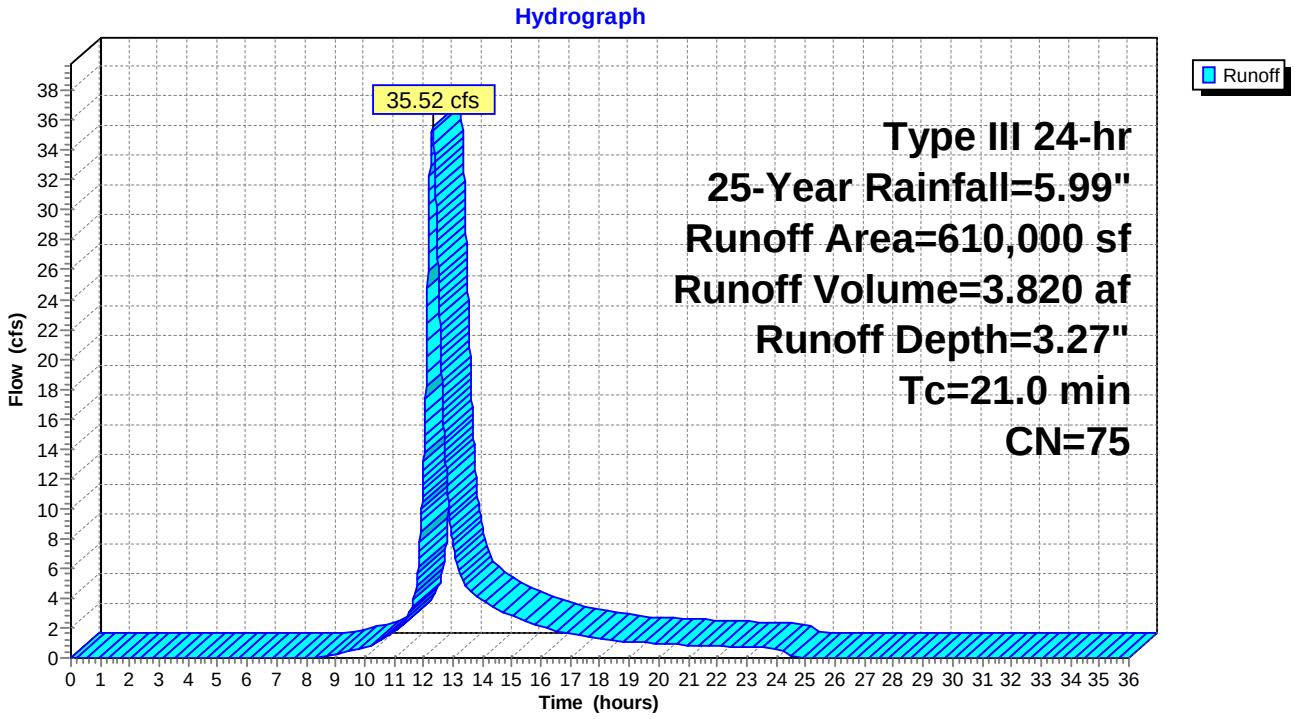
Runoff = 35.52 cfs @ 12.29 hrs, Volume= 3.820 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
610,000	75	1/4 acre lots, 38% imp, HSG B
378,200		62.00% Pervious Area
231,800		38.00% Impervious Area

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

Subcatchment E-29B: SMALL EPR OFF-SITE AREA



Summary for Subcatchment E-29C: ON-SITE AREA TO CHANNEL

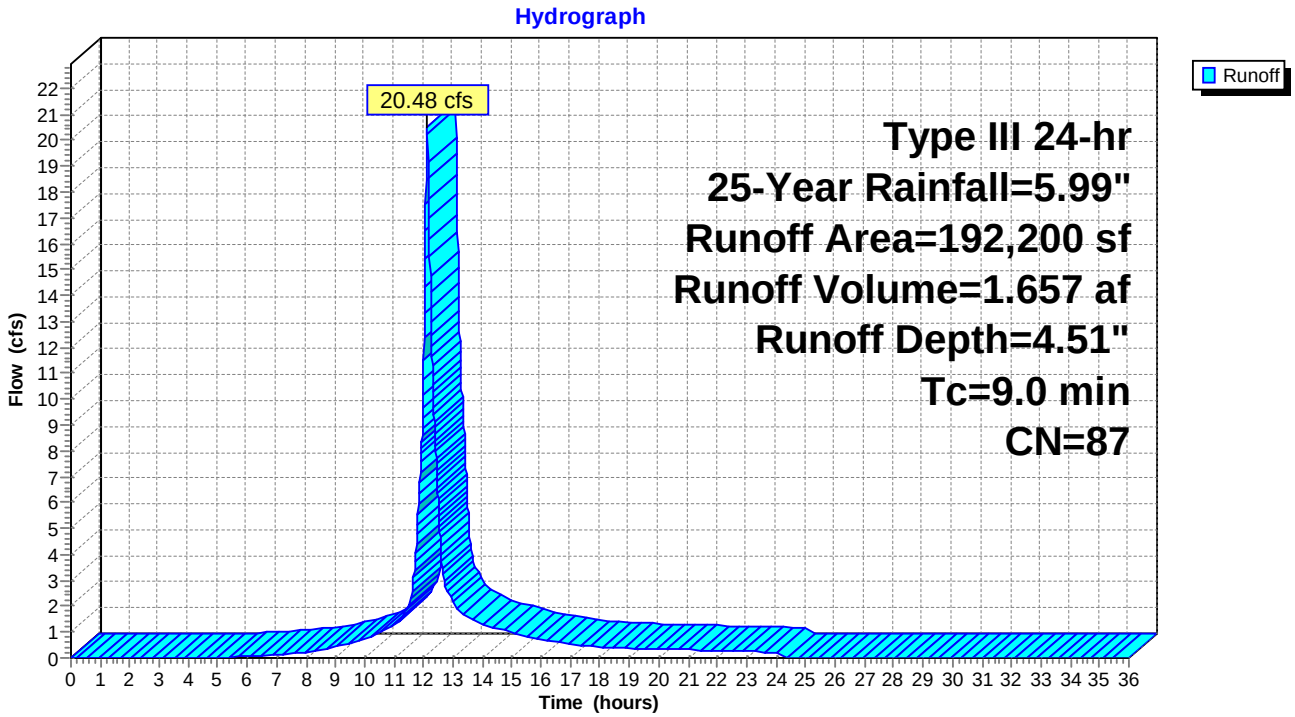
Runoff = 20.48 cfs @ 12.12 hrs, Volume= 1.657 af, Depth= 4.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
108,400	98	Unconnected pavement, HSG B
21,200	98	Unconnected roofs, HSG B
5,300	80	>75% Grass cover, Good, HSG D
15,600	77	Woods, Good, HSG D
26,800	61	>75% Grass cover, Good, HSG B
14,900	55	Woods, Good, HSG B
192,200	87	Weighted Average
62,600		32.57% Pervious Area
129,600		67.43% Impervious Area
129,600		100.00% Unconnected

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

Subcatchment E-29C: ON-SITE AREA TO CHANNEL



Summary for Subcatchment E-29D: AREA TO OUTFALL #29

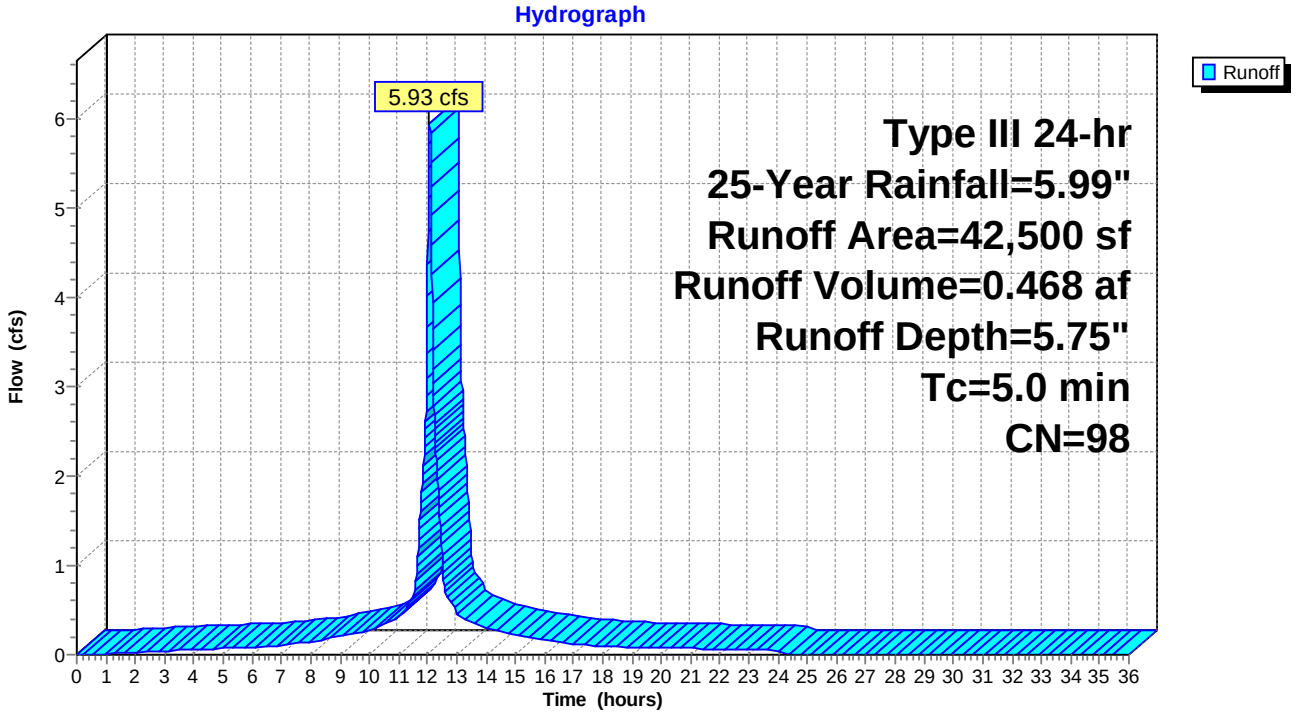
Runoff = 5.93 cfs @ 12.07 hrs, Volume= 0.468 af, Depth= 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
37,000	98	Unconnected pavement, HSG B
5,500	98	Unconnected roofs, HSG B
42,500	98	Weighted Average
42,500		100.00% Impervious Area
42,500		100.00% Unconnected

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

Subcatchment E-29D: AREA TO OUTFALL #29



Summary for Subcatchment E-30: AREA TO OUTFALL #30

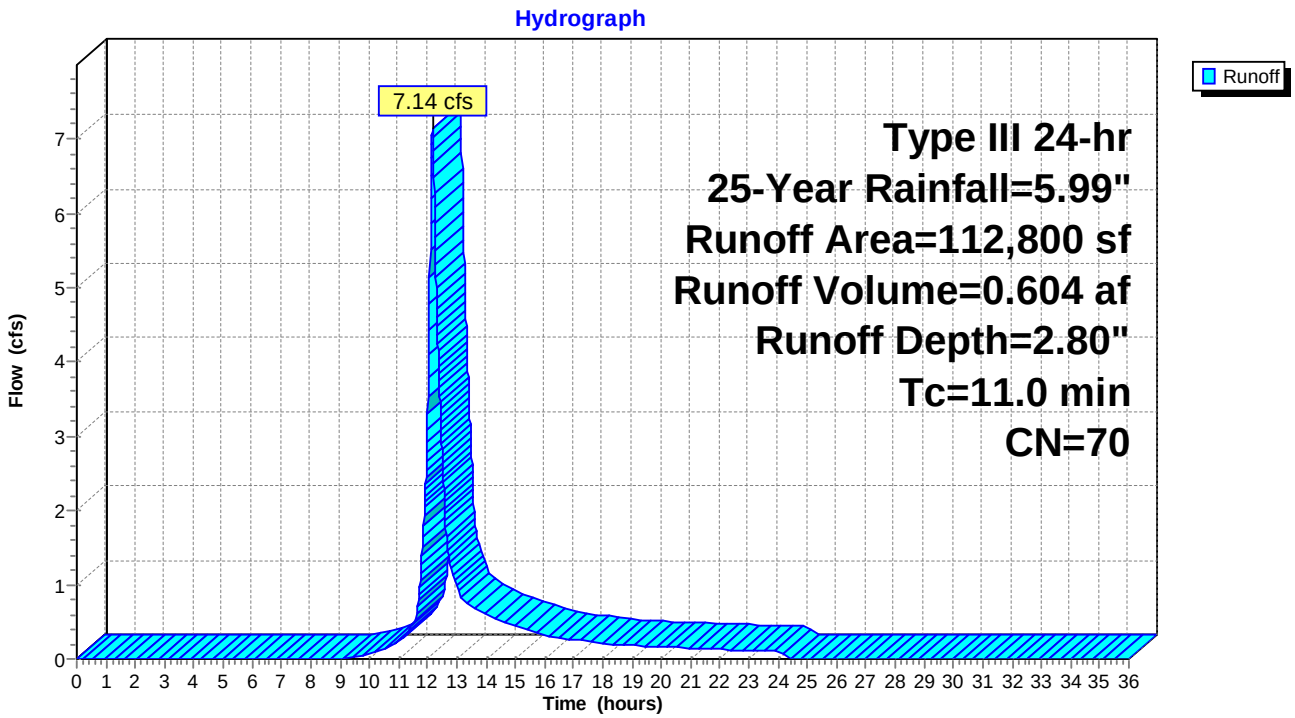
Runoff = 7.14 cfs @ 12.16 hrs, Volume= 0.604 af, Depth= 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
78,800	61	>75% Grass cover, Good, HSG B
28,600	98	Paved parking, HSG B
5,400	55	Woods, Good, HSG B
112,800	70	Weighted Average
84,200		74.65% Pervious Area
28,600		25.35% Impervious Area

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

Subcatchment E-30: AREA TO OUTFALL #30



Summary for Subcatchment E-33: AREA TO OUTFALL #33

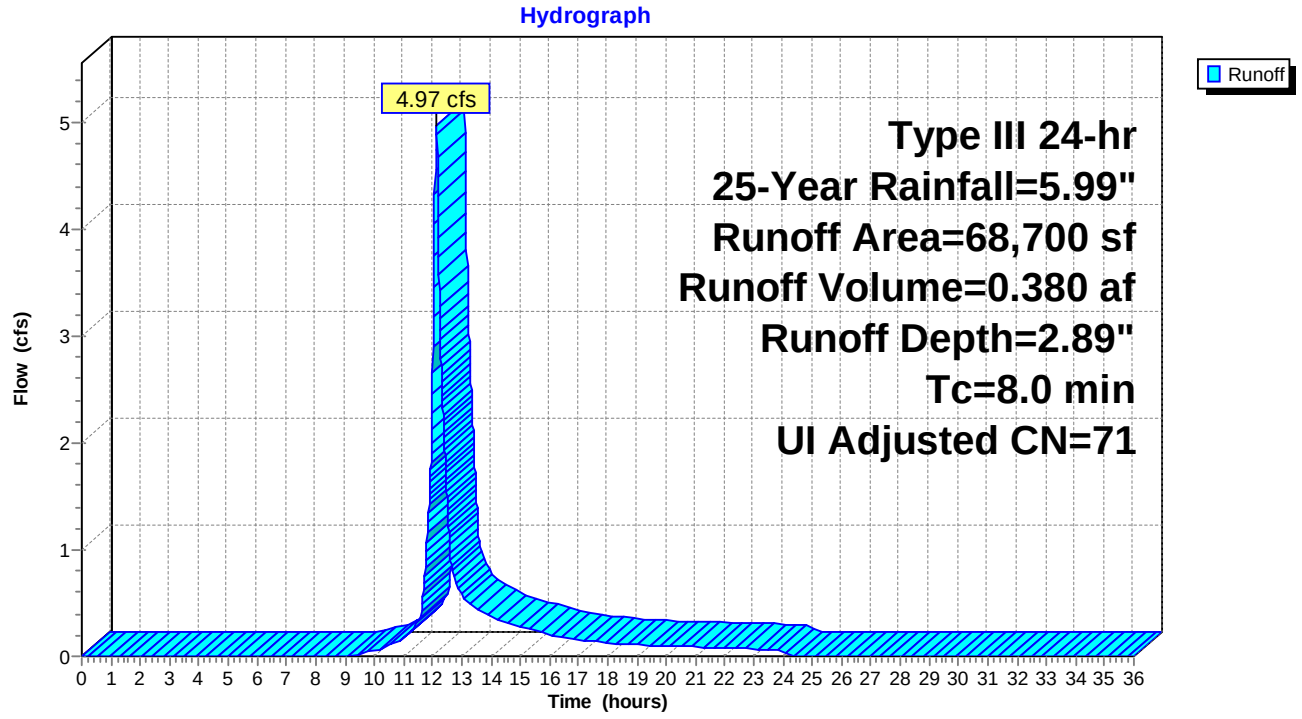
Runoff = 4.97 cfs @ 12.12 hrs, Volume= 0.380 af, Depth= 2.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Adj	Description
39,500	61		>75% Grass cover, Good, HSG B
17,200	98		Unconnected pavement, HSG B
12,000	85		Gravel roads, HSG B
68,700	74	71	Weighted Average, UI Adjusted
51,500			74.96% Pervious Area
17,200			25.04% Impervious Area
17,200			100.00% Unconnected

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

Subcatchment E-33: AREA TO OUTFALL #33



Summary for Subcatchment E-34: B83 TO OUTFALL #34

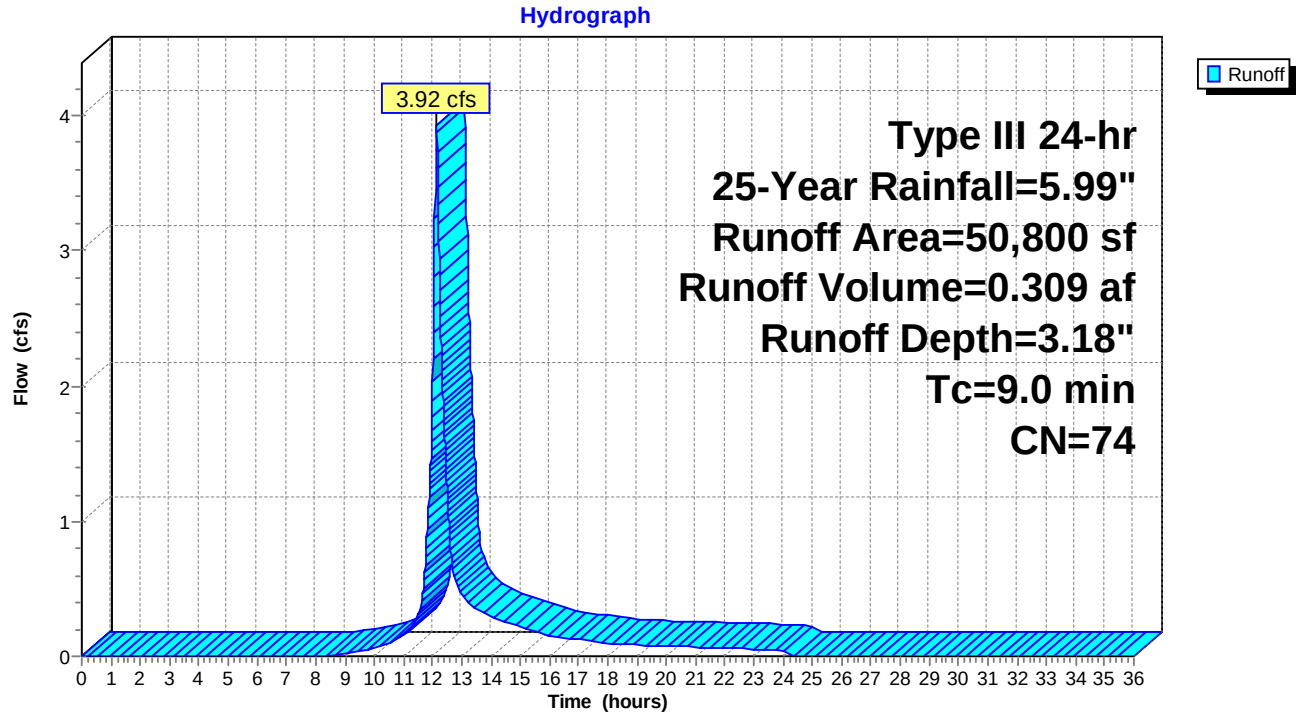
Runoff = 3.92 cfs @ 12.13 hrs, Volume= 0.309 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
10,000	98	Unconnected pavement, HSG B
8,400	98	Unconnected roofs, HSG B
32,400	61	>75% Grass cover, Good, HSG B
50,800	74	Weighted Average
32,400		63.78% Pervious Area
18,400		36.22% Impervious Area
18,400		100.00% Unconnected

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

Subcatchment E-34: B83 TO OUTFALL #34



Summary for Subcatchment E-60: SHEET FLOW TO RIVER

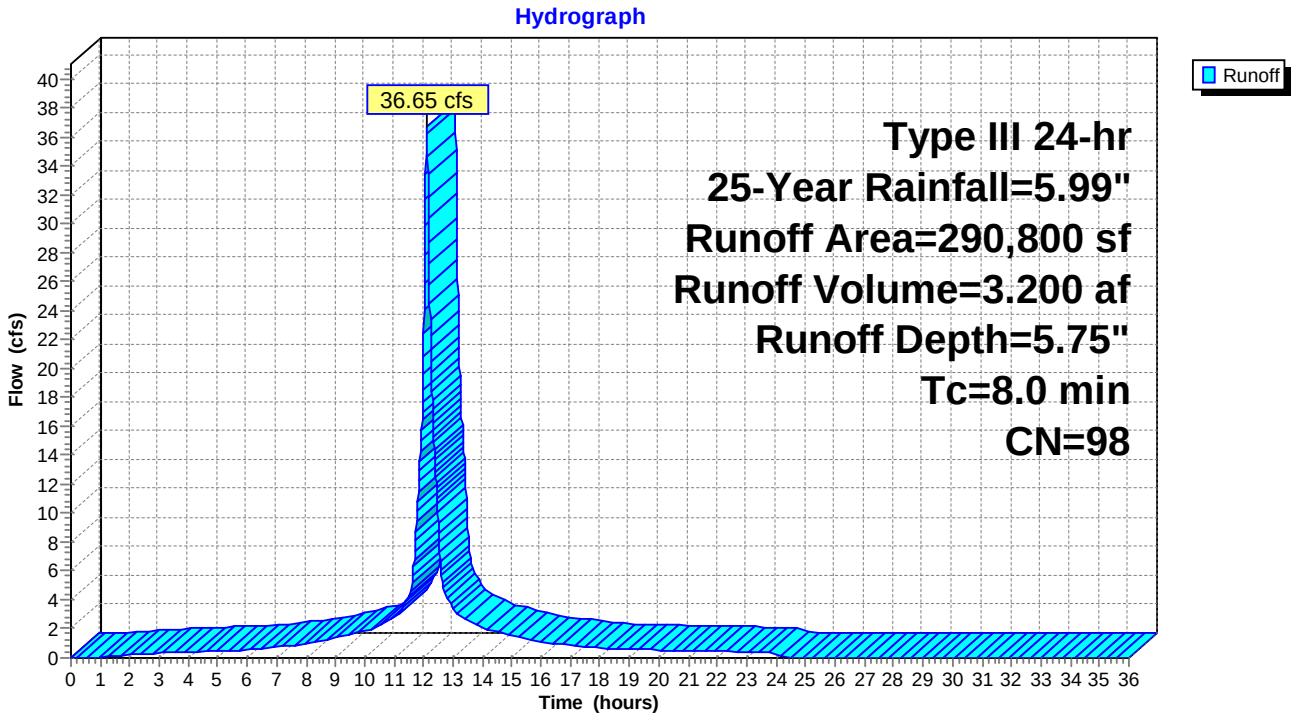
Runoff = 36.65 cfs @ 12.11 hrs, Volume= 3.200 af, Depth= 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
290,800	98	Unconnected pavement, HSG B
290,800		100.00% Impervious Area
290,800		100.00% Unconnected

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

Subcatchment E-60: SHEET FLOW TO RIVER



Summary for Pond 1P: EXISTING ROCK CHANNEL

Inflow Area = 79.252 ac, 48.49% Impervious, Inflow Depth = 3.73" for 25-Year event
Inflow = 159.99 cfs @ 12.49 hrs, Volume= 24.601 af
Outflow = 158.29 cfs @ 12.55 hrs, Volume= 24.538 af, Atten= 1%, Lag= 3.5 min
Primary = 32.03 cfs @ 12.55 hrs, Volume= 16.261 af
Secondary = 126.26 cfs @ 12.55 hrs, Volume= 8.277 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 20.39' @ 12.55 hrs Surf.Area= 70,487 sf Storage= 90,814 cf

Plug-Flow detention time= 19.5 min calculated for 24.538 af (100% of inflow)
Center-of-Mass det. time= 17.8 min (860.2 - 842.4)

Volume	Invert	Avail.Storage	Storage Description
#1	13.60'	106,375 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

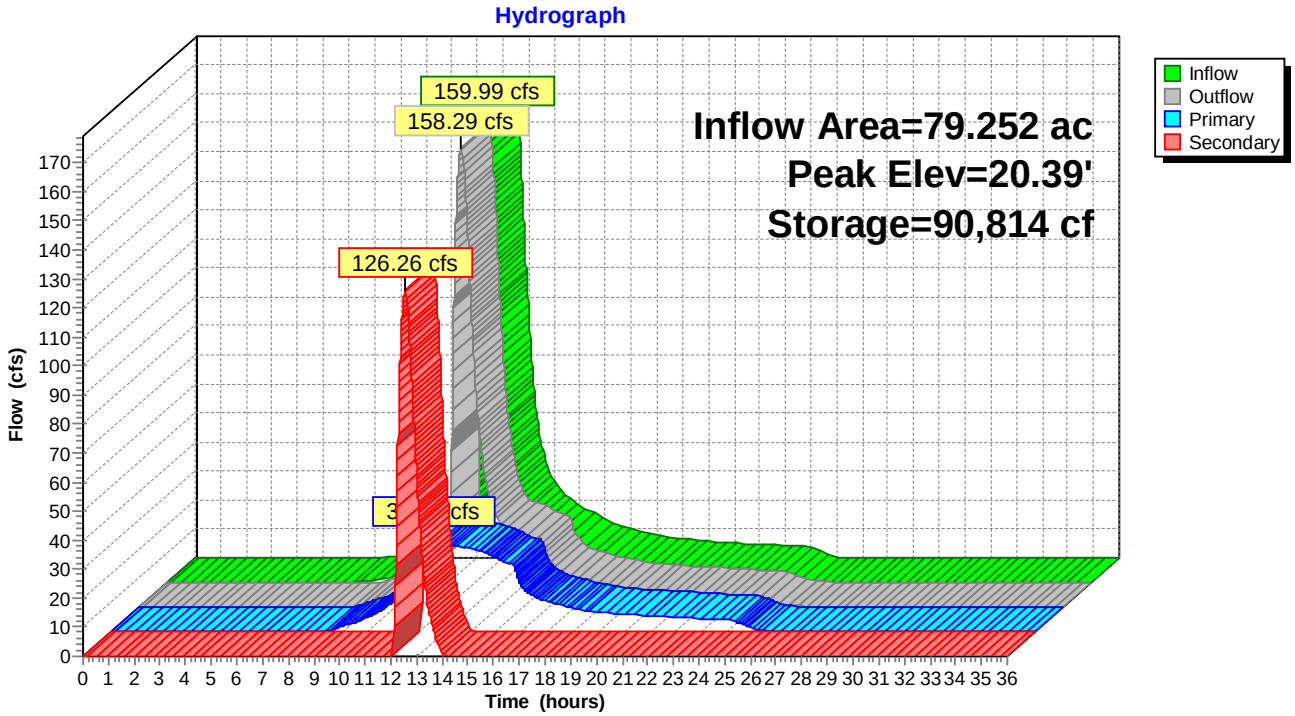
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.60	250	0	0
14.60	1,000	625	625
15.60	2,000	1,500	2,125
16.60	6,000	4,000	6,125
17.60	6,000	6,000	12,125
18.60	6,000	6,000	18,125
19.60	49,000	27,500	45,625
20.10	57,000	26,500	72,125
20.60	80,000	34,250	106,375

Device	Routing	Invert	Outlet Devices
#1	Primary	15.84'	**30.0" Round Ex 30" Culvert** L= 260.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 15.84' / 15.31' S= 0.0020 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Secondary	19.85'	**115.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=32.03 cfs @ 12.55 hrs HW=20.39' TW=4.00' (Fixed TW Elev= 4.00')
↑—**1=Ex 30" Culvert** (Barrel Controls 32.03 cfs @ 6.53 fps)

Secondary OutFlow Max=126.21 cfs @ 12.55 hrs HW=20.39' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 126.21 cfs @ 2.02 fps)

Pond 1P: EXISTING ROCK CHANNEL

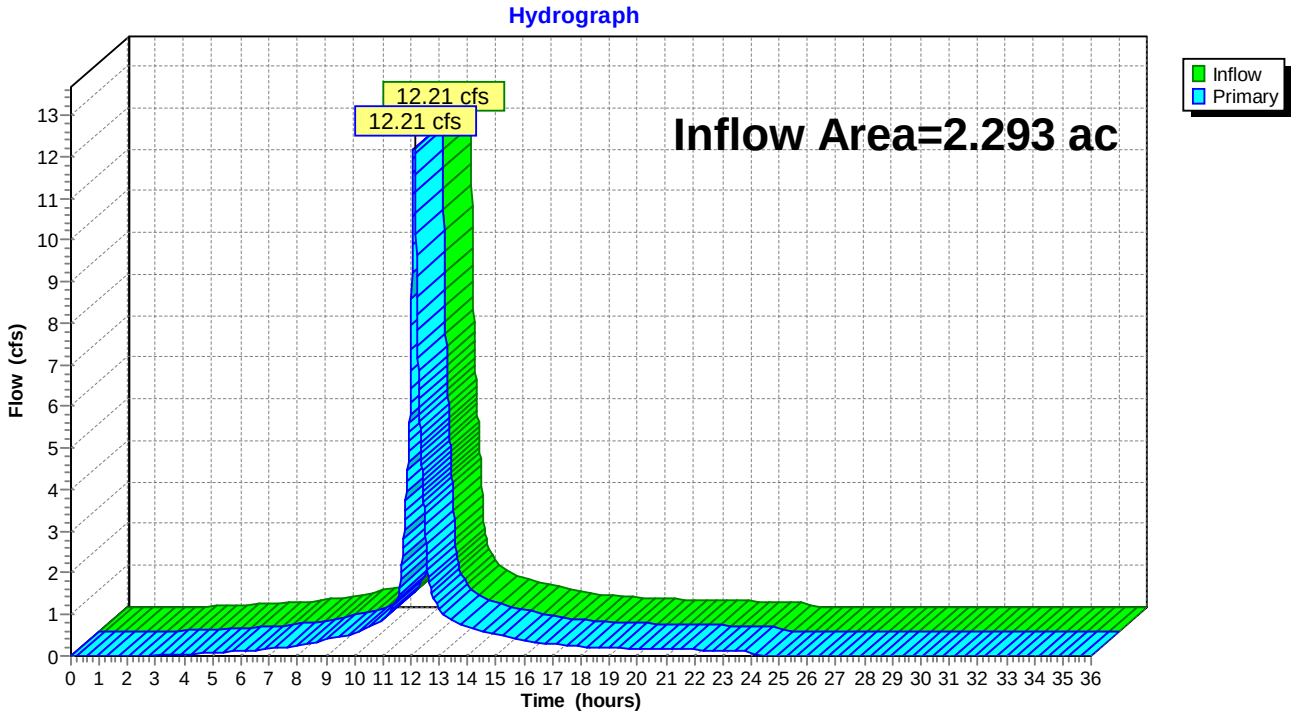


Summary for Link DP-28: OUTFALL #28 (24")

Inflow Area = 2.293 ac, 79.78% Impervious, Inflow Depth = 5.29" for 25-Year event
Inflow = 12.21 cfs @ 12.11 hrs, Volume= 1.010 af
Primary = 12.21 cfs @ 12.11 hrs, Volume= 1.010 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-28: OUTFALL #28 (24")

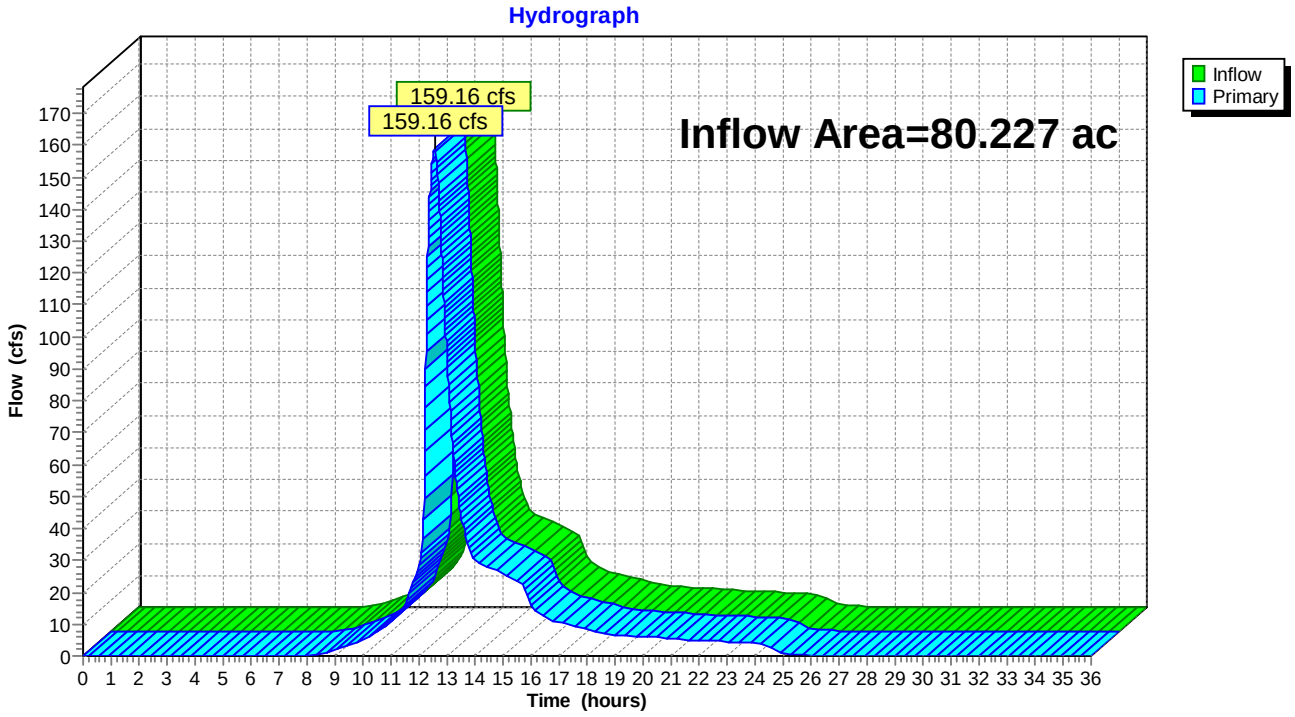


Summary for Link DP-29: OUTFALL #29 (42")

Inflow Area = 80.227 ac, 49.11% Impervious, Inflow Depth = 3.74" for 25-Year event
Inflow = 159.16 cfs @ 12.55 hrs, Volume= 25.006 af
Primary = 159.16 cfs @ 12.55 hrs, Volume= 25.006 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-29: OUTFALL #29 (42")

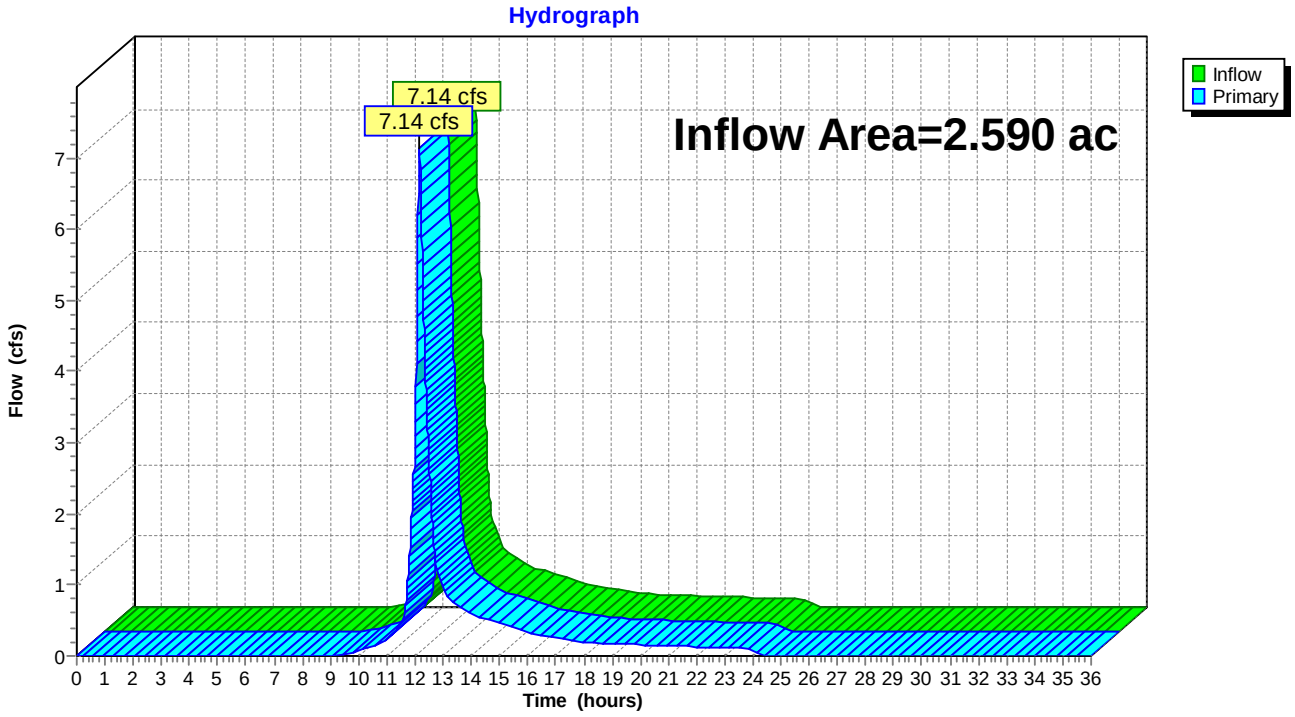


Summary for Link DP-30: OUTFALL #30 (24")

Inflow Area = 2.590 ac, 25.35% Impervious, Inflow Depth = 2.80" for 25-Year event
Inflow = 7.14 cfs @ 12.16 hrs, Volume= 0.604 af
Primary = 7.14 cfs @ 12.16 hrs, Volume= 0.604 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-30: OUTFALL #30 (24")

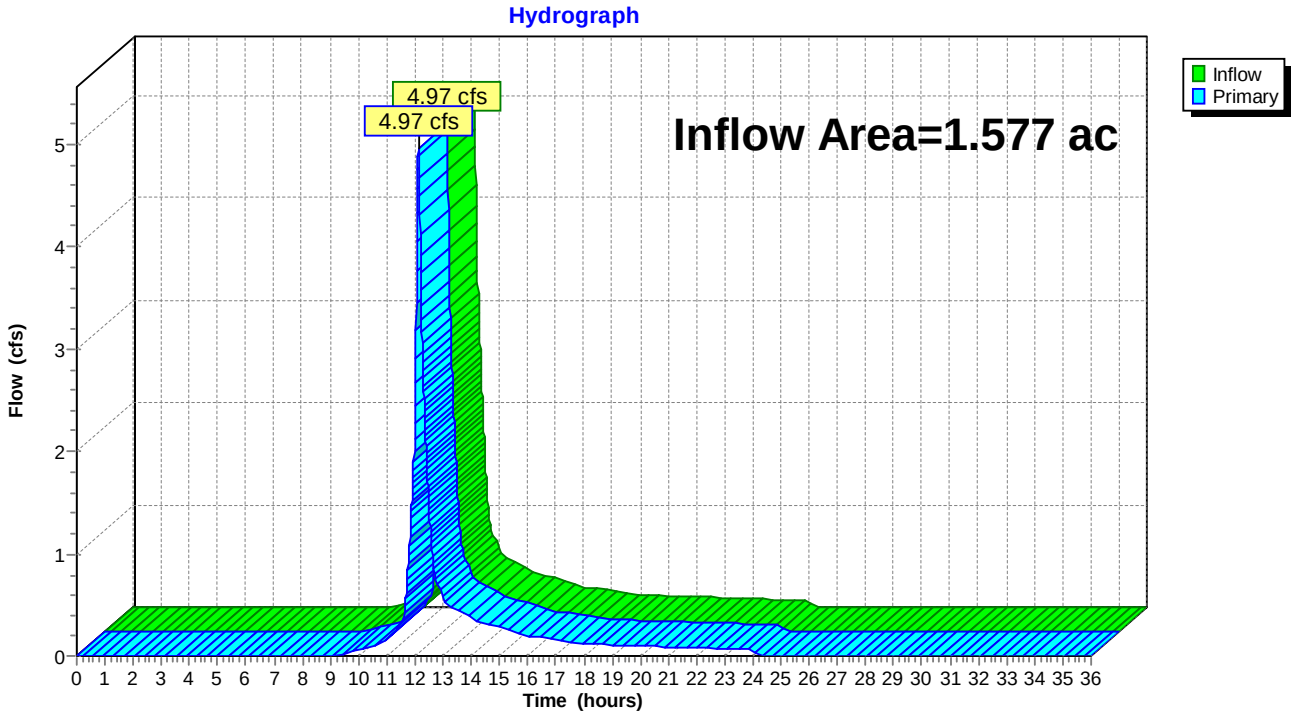


Summary for Link DP-33: OUTFALL #33 (10")

Inflow Area = 1.577 ac, 25.04% Impervious, Inflow Depth = 2.89" for 25-Year event
Inflow = 4.97 cfs @ 12.12 hrs, Volume= 0.380 af
Primary = 4.97 cfs @ 12.12 hrs, Volume= 0.380 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-33: OUTFALL #33 (10")

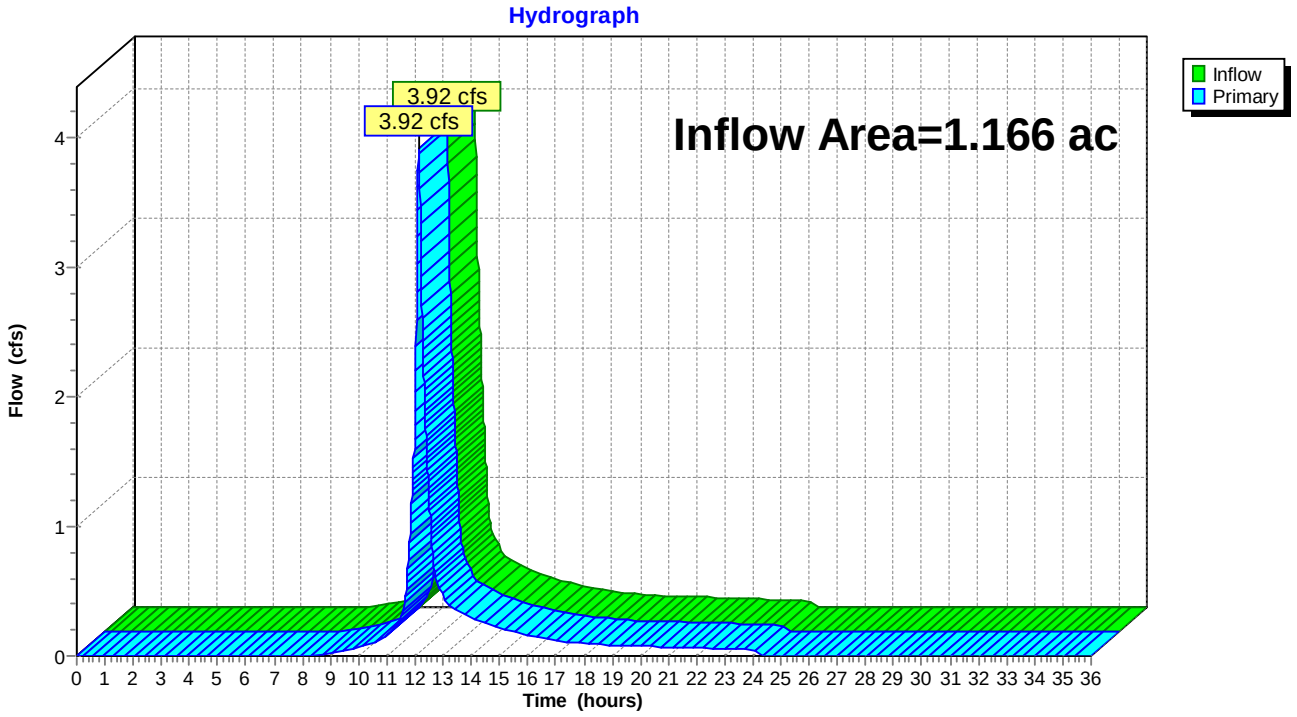


Summary for Link DP-34E: OUTFALL #34 (30")

Inflow Area = 1.166 ac, 36.22% Impervious, Inflow Depth = 3.18" for 25-Year event
Inflow = 3.92 cfs @ 12.13 hrs, Volume= 0.309 af
Primary = 3.92 cfs @ 12.13 hrs, Volume= 0.309 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-34E: OUTFALL #34 (30")

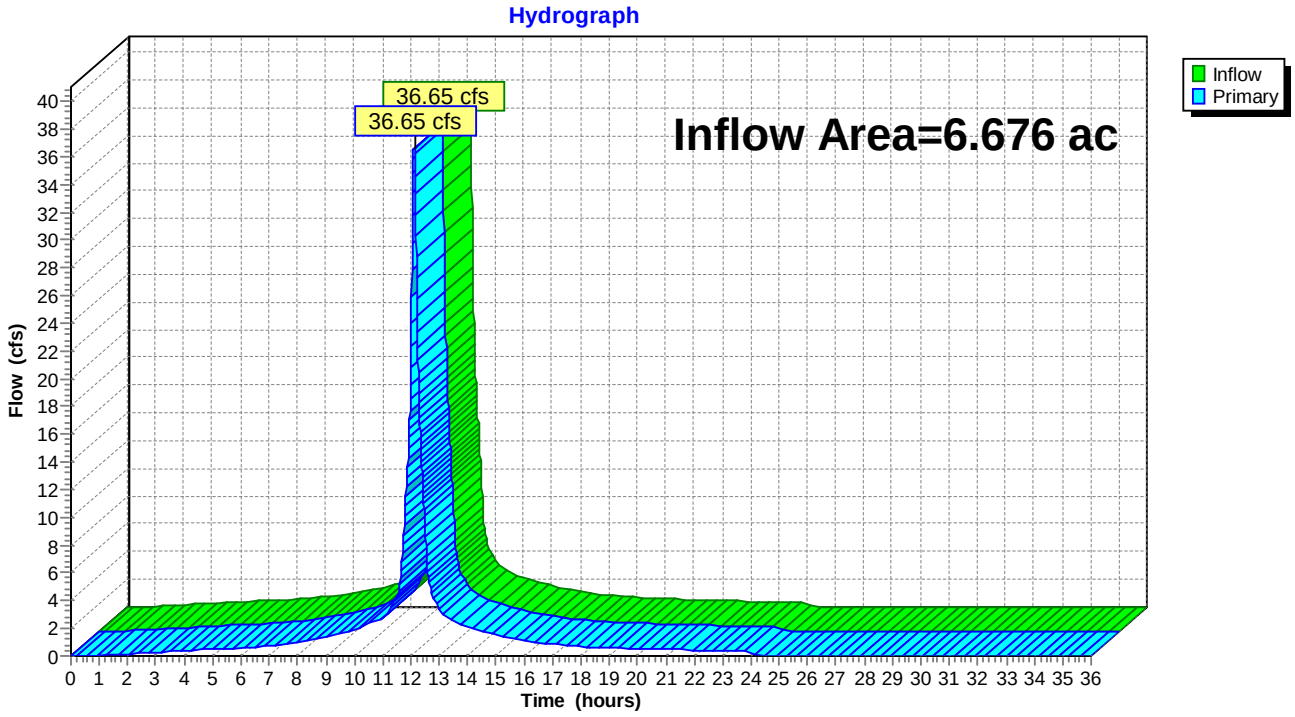


Summary for Link L-E60: SHEET FLOW TO RIVER

Inflow Area = 6.676 ac,100.00% Impervious, Inflow Depth = 5.75" for 25-Year event
Inflow = 36.65 cfs @ 12.11 hrs, Volume= 3.200 af
Primary = 36.65 cfs @ 12.11 hrs, Volume= 3.200 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link L-E60: SHEET FLOW TO RIVER



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-28: AREA TO OUTFALL #28 Runoff Area=99,900 sf 79.78% Impervious Runoff Depth=7.53"
Tc=8.0 min CN=94 Runoff=17.07 cfs 1.439 af

Subcatchment E-29A: LARGE EPR Runoff Area=2,650,000 sf 49.53% Impervious Runoff Depth=5.86"
Tc=41.0 min CN=80 Runoff=200.94 cfs 29.707 af

Subcatchment E-29B: SMALL EPR OFF-SITE Runoff Area=610,000 sf 38.00% Impervious Runoff Depth=5.27"
Tc=21.0 min CN=75 Runoff=57.00 cfs 6.147 af

Subcatchment E-29C: ON-SITE AREA TO Runoff Area=192,200 sf 67.43% Impervious Runoff Depth=6.69"
Tc=9.0 min CN=87 Runoff=29.80 cfs 2.461 af

Subcatchment E-29D: AREA TO OUTFALL #29 Runoff Area=42,500 sf 100.00% Impervious Runoff Depth=8.01"
Tc=5.0 min CN=98 Runoff=8.19 cfs 0.651 af

Subcatchment E-30: AREA TO OUTFALL #30 Runoff Area=112,800 sf 25.35% Impervious Runoff Depth=4.68"
Tc=11.0 min CN=70 Runoff=12.03 cfs 1.010 af

Subcatchment E-33: AREA TO OUTFALL #33 Runoff Area=68,700 sf 25.04% Impervious Runoff Depth=4.80"
Tc=8.0 min UI Adjusted CN=71 Runoff=8.27 cfs 0.630 af

Subcatchment E-34: B83 TO OUTFALL #34 Runoff Area=50,800 sf 36.22% Impervious Runoff Depth=5.15"
Tc=9.0 min CN=74 Runoff=6.34 cfs 0.500 af

Subcatchment E-60: SHEET FLOW TO RIVER Runoff Area=290,800 sf 100.00% Impervious Runoff Depth=8.01"
Tc=8.0 min CN=98 Runoff=50.57 cfs 4.456 af

Pond 1P: EXISTING ROCK CHANNEL Peak Elev=20.61' Storage=106,375 cf Inflow=247.21 cfs 38.315 af
Primary=33.34 cfs 21.690 af Secondary=214.68 cfs 16.562 af Outflow=248.02 cfs 38.252 af

Link DP-28: OUTFALL #28 (24") Inflow=17.07 cfs 1.439 af
Primary=17.07 cfs 1.439 af

Link DP-29: OUTFALL #29 (42") Inflow=249.46 cfs 38.903 af
Primary=249.46 cfs 38.903 af

Link DP-30: OUTFALL #30 (24") Inflow=12.03 cfs 1.010 af
Primary=12.03 cfs 1.010 af

Link DP-33: OUTFALL #33 (10") Inflow=8.27 cfs 0.630 af
Primary=8.27 cfs 0.630 af

Link DP-34E: OUTFALL #34 (30") Inflow=6.34 cfs 0.500 af
Primary=6.34 cfs 0.500 af

Link L-E60: SHEET FLOW TO RIVER Inflow=50.57 cfs 4.456 af
Primary=50.57 cfs 4.456 af

Total Runoff Area = 94.529 ac Runoff Volume = 47.003 af Average Runoff Depth = 5.97"
47.76% Pervious = 45.147 ac 52.24% Impervious = 49.382 ac

Summary for Subcatchment E-28: AREA TO OUTFALL #28

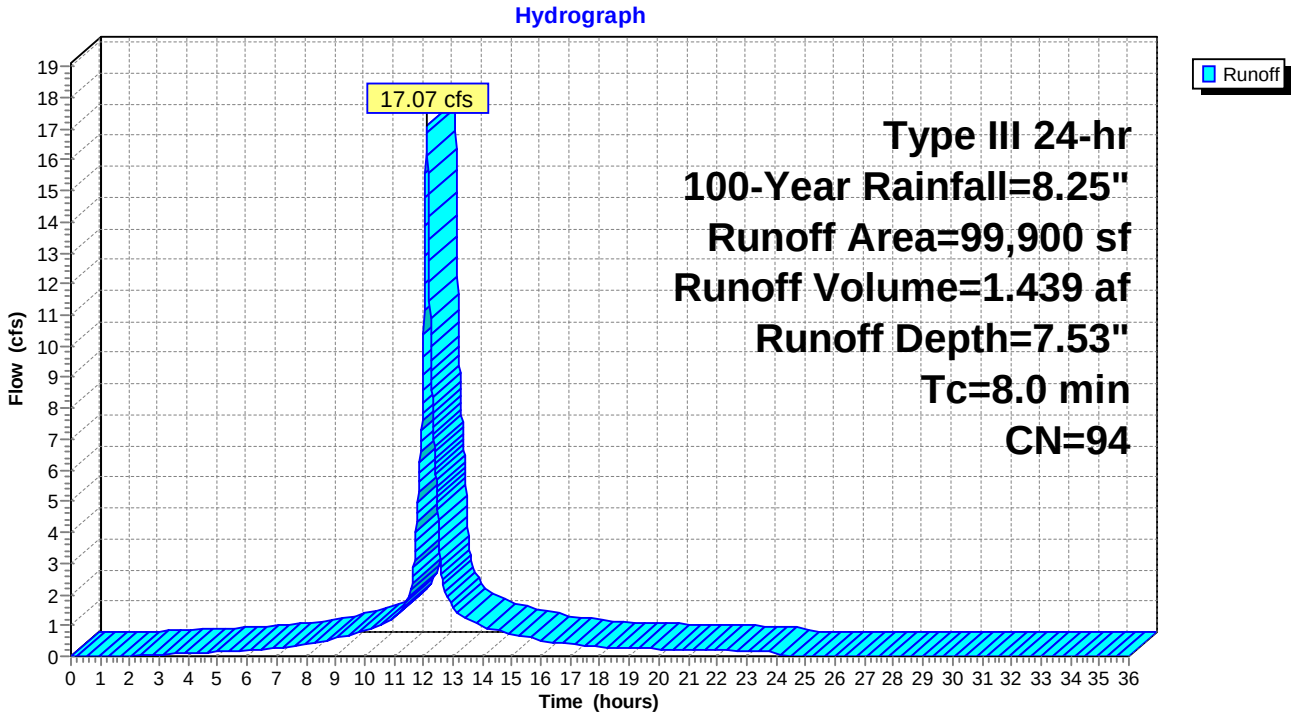
Runoff = 17.07 cfs @ 12.11 hrs, Volume= 1.439 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
14,300	80	>75% Grass cover, Good, HSG D
5,900	77	Woods, Good, HSG D
79,700	98	Unconnected pavement, HSG D
99,900	94	Weighted Average
20,200		20.22% Pervious Area
79,700		79.78% Impervious Area
79,700		100.00% Unconnected

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

Subcatchment E-28: AREA TO OUTFALL #28



Summary for Subcatchment E-29A: LARGE EPR OFF-SITE AREA

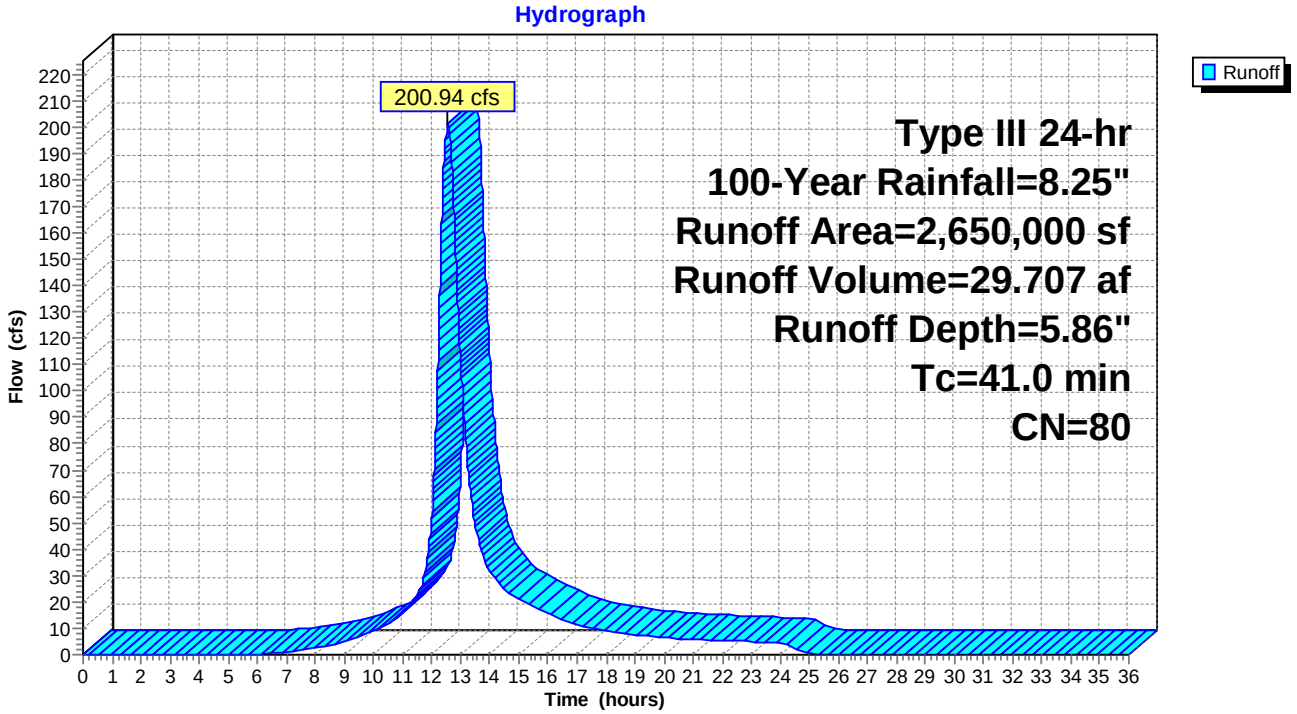
Runoff = 200.94 cfs @ 12.53 hrs, Volume= 29.707 af, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
2,000,000	75	1/4 acre lots, 38% imp, HSG B
650,000	95	Urban commercial, 85% imp, HSG D
2,650,000	80	Weighted Average
1,337,500		50.47% Pervious Area
1,312,500		49.53% Impervious Area

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

Subcatchment E-29A: LARGE EPR OFF-SITE AREA



Summary for Subcatchment E-29B: SMALL EPR OFF-SITE AREA

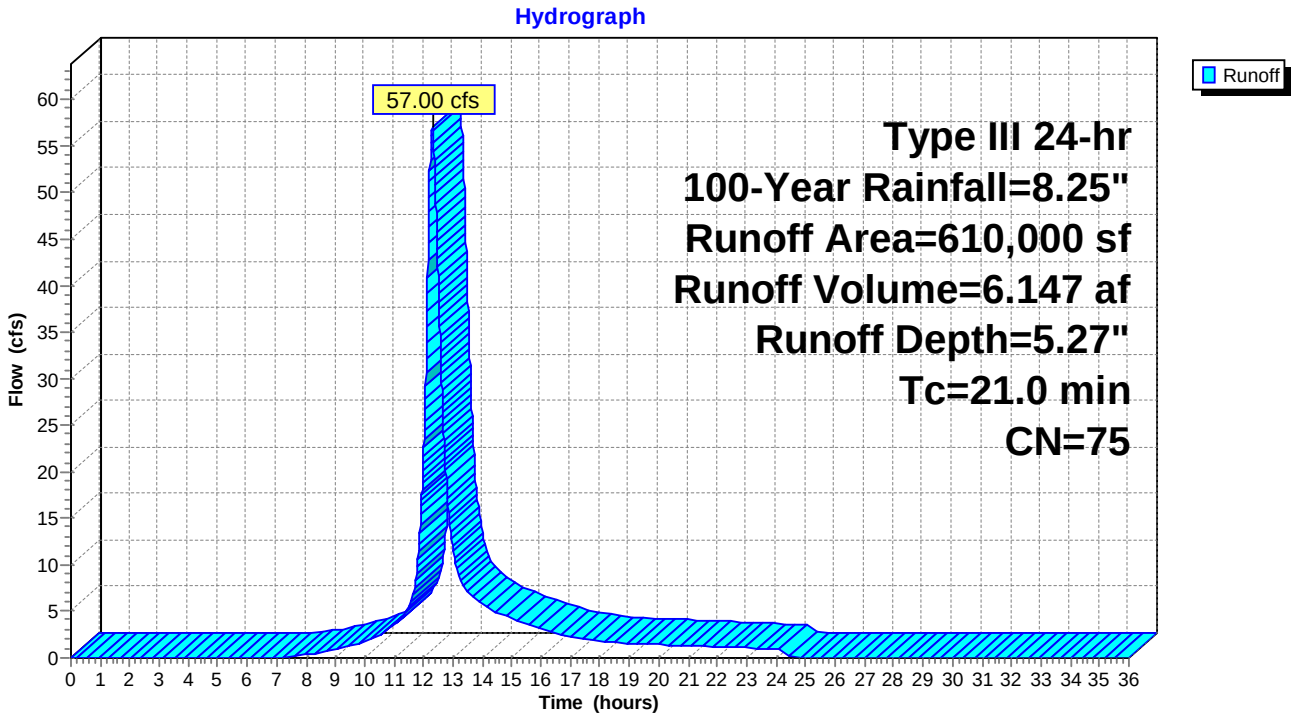
Runoff = 57.00 cfs @ 12.29 hrs, Volume= 6.147 af, Depth= 5.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
610,000	75	1/4 acre lots, 38% imp, HSG B
378,200		62.00% Pervious Area
231,800		38.00% Impervious Area

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

Subcatchment E-29B: SMALL EPR OFF-SITE AREA



Summary for Subcatchment E-29C: ON-SITE AREA TO CHANNEL

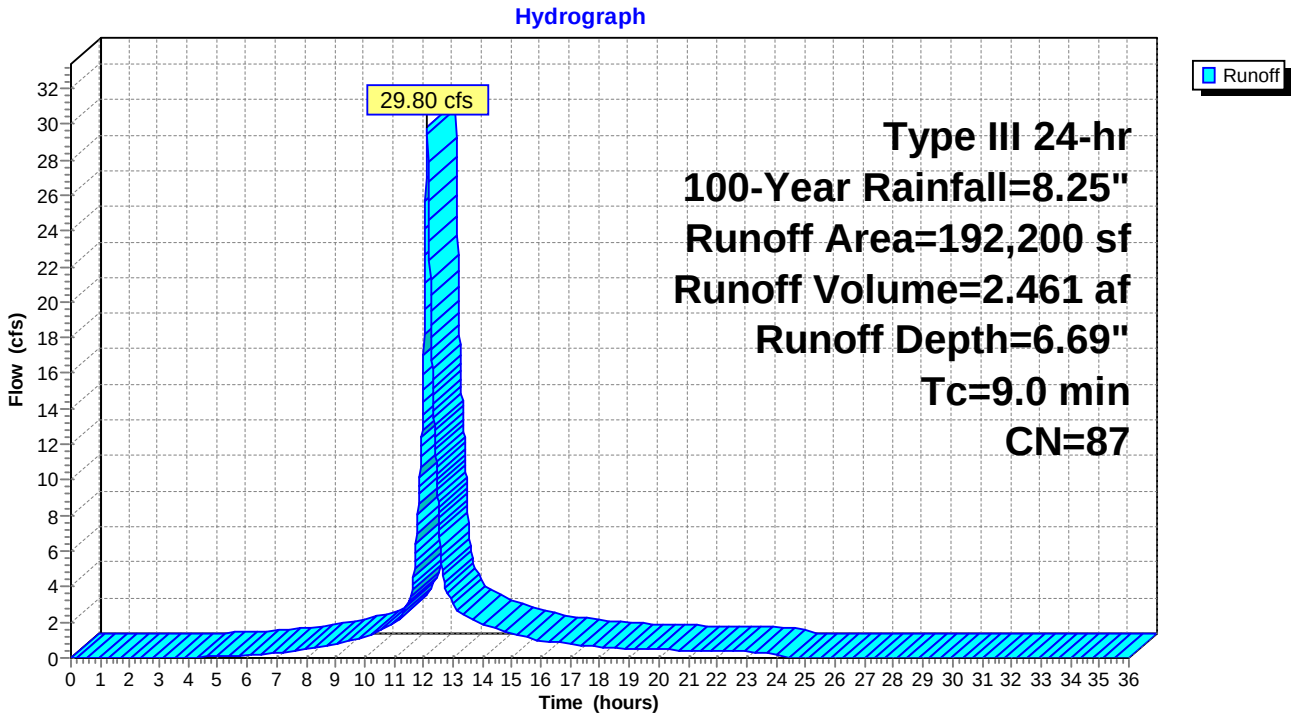
Runoff = 29.80 cfs @ 12.12 hrs, Volume= 2.461 af, Depth= 6.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
108,400	98	Unconnected pavement, HSG B
21,200	98	Unconnected roofs, HSG B
5,300	80	>75% Grass cover, Good, HSG D
15,600	77	Woods, Good, HSG D
26,800	61	>75% Grass cover, Good, HSG B
14,900	55	Woods, Good, HSG B
192,200	87	Weighted Average
62,600		32.57% Pervious Area
129,600		67.43% Impervious Area
129,600		100.00% Unconnected

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

Subcatchment E-29C: ON-SITE AREA TO CHANNEL



Summary for Subcatchment E-29D: AREA TO OUTFALL #29

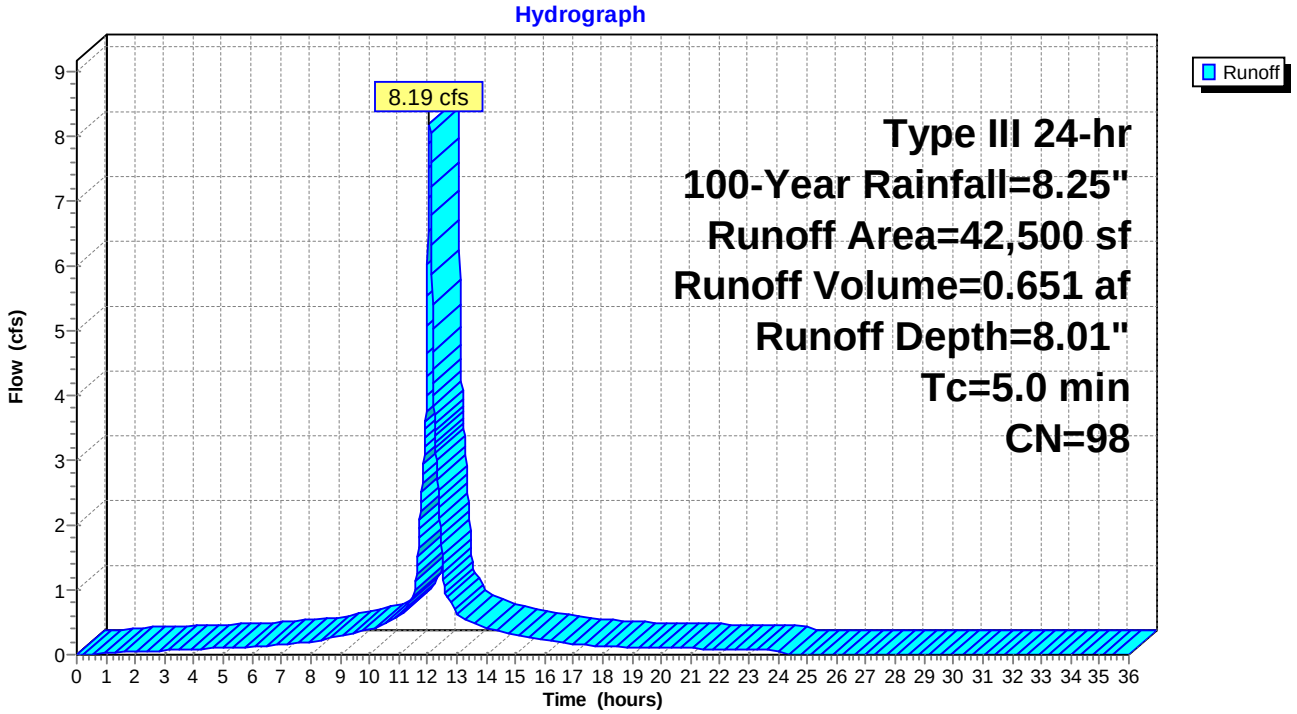
Runoff = 8.19 cfs @ 12.07 hrs, Volume= 0.651 af, Depth= 8.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
37,000	98	Unconnected pavement, HSG B
5,500	98	Unconnected roofs, HSG B
42,500	98	Weighted Average
42,500		100.00% Impervious Area
42,500		100.00% Unconnected

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

Subcatchment E-29D: AREA TO OUTFALL #29



Summary for Subcatchment E-30: AREA TO OUTFALL #30

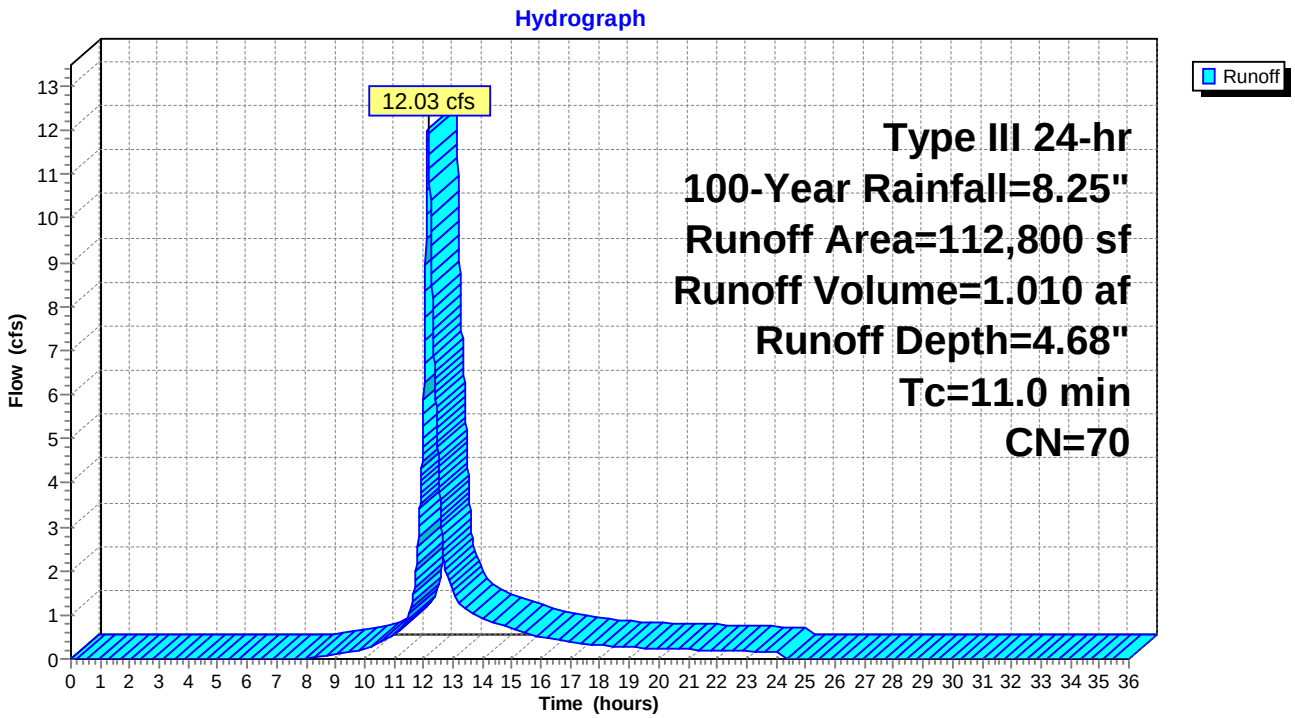
Runoff = 12.03 cfs @ 12.15 hrs, Volume= 1.010 af, Depth= 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
78,800	61	>75% Grass cover, Good, HSG B
28,600	98	Paved parking, HSG B
5,400	55	Woods, Good, HSG B
112,800	70	Weighted Average
84,200		74.65% Pervious Area
28,600		25.35% Impervious Area

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

Subcatchment E-30: AREA TO OUTFALL #30



Summary for Subcatchment E-33: AREA TO OUTFALL #33

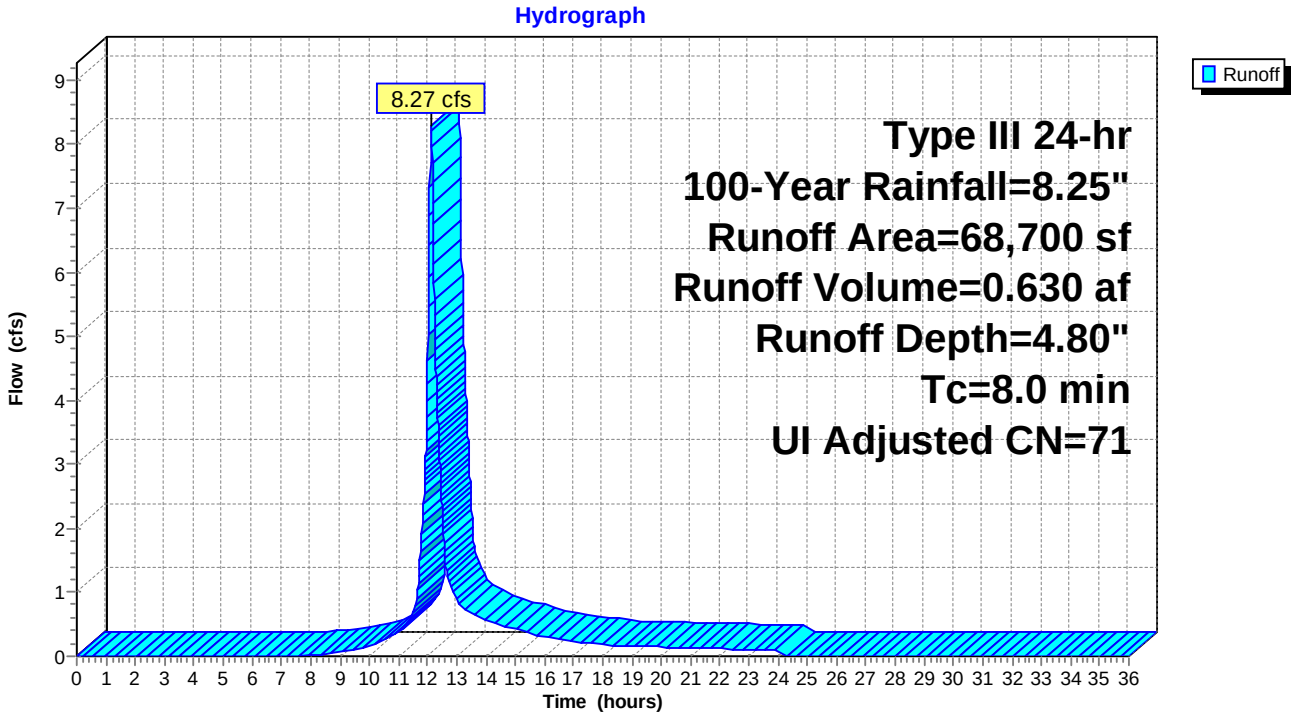
Runoff = 8.27 cfs @ 12.11 hrs, Volume= 0.630 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Adj	Description
39,500	61		>75% Grass cover, Good, HSG B
17,200	98		Unconnected pavement, HSG B
12,000	85		Gravel roads, HSG B
68,700	74	71	Weighted Average, UI Adjusted
51,500			74.96% Pervious Area
17,200			25.04% Impervious Area
17,200			100.00% Unconnected

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

Subcatchment E-33: AREA TO OUTFALL #33



Summary for Subcatchment E-34: B83 TO OUTFALL #34

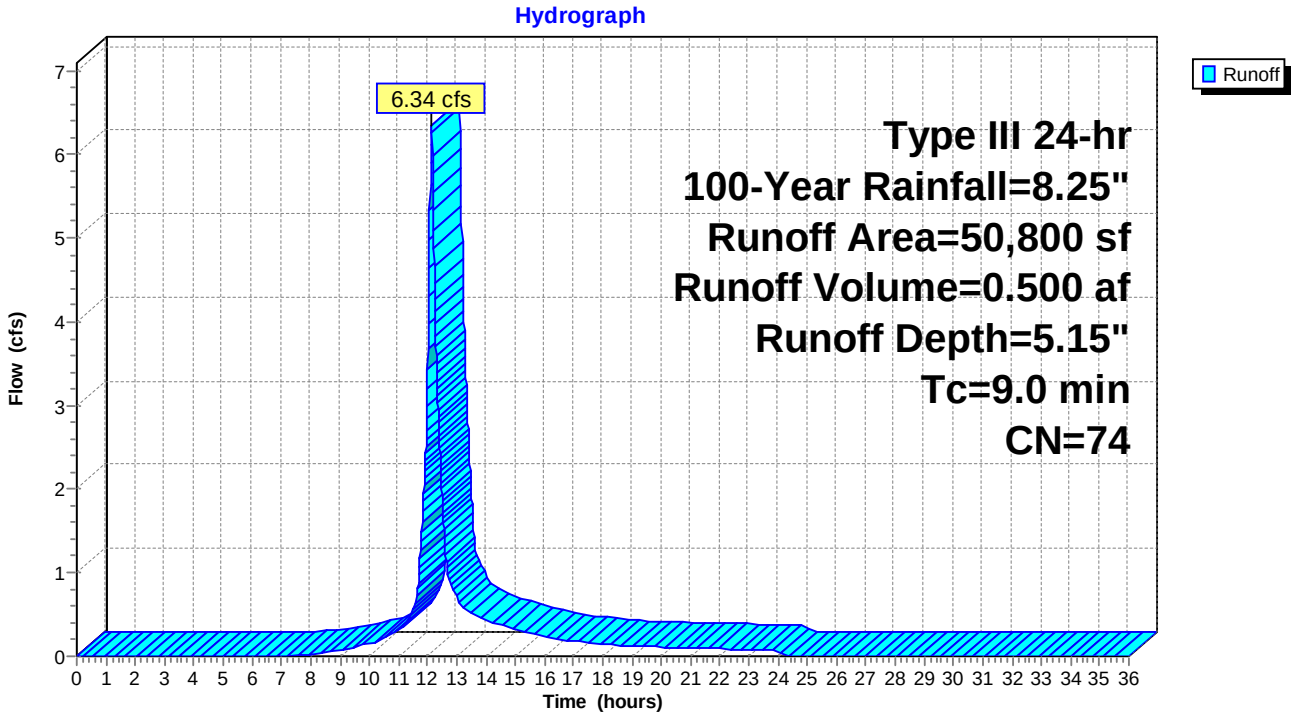
Runoff = 6.34 cfs @ 12.13 hrs, Volume= 0.500 af, Depth= 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
10,000	98	Unconnected pavement, HSG B
8,400	98	Unconnected roofs, HSG B
32,400	61	>75% Grass cover, Good, HSG B
50,800	74	Weighted Average
32,400		63.78% Pervious Area
18,400		36.22% Impervious Area
18,400		100.00% Unconnected

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

Subcatchment E-34: B83 TO OUTFALL #34



Summary for Subcatchment E-60: SHEET FLOW TO RIVER

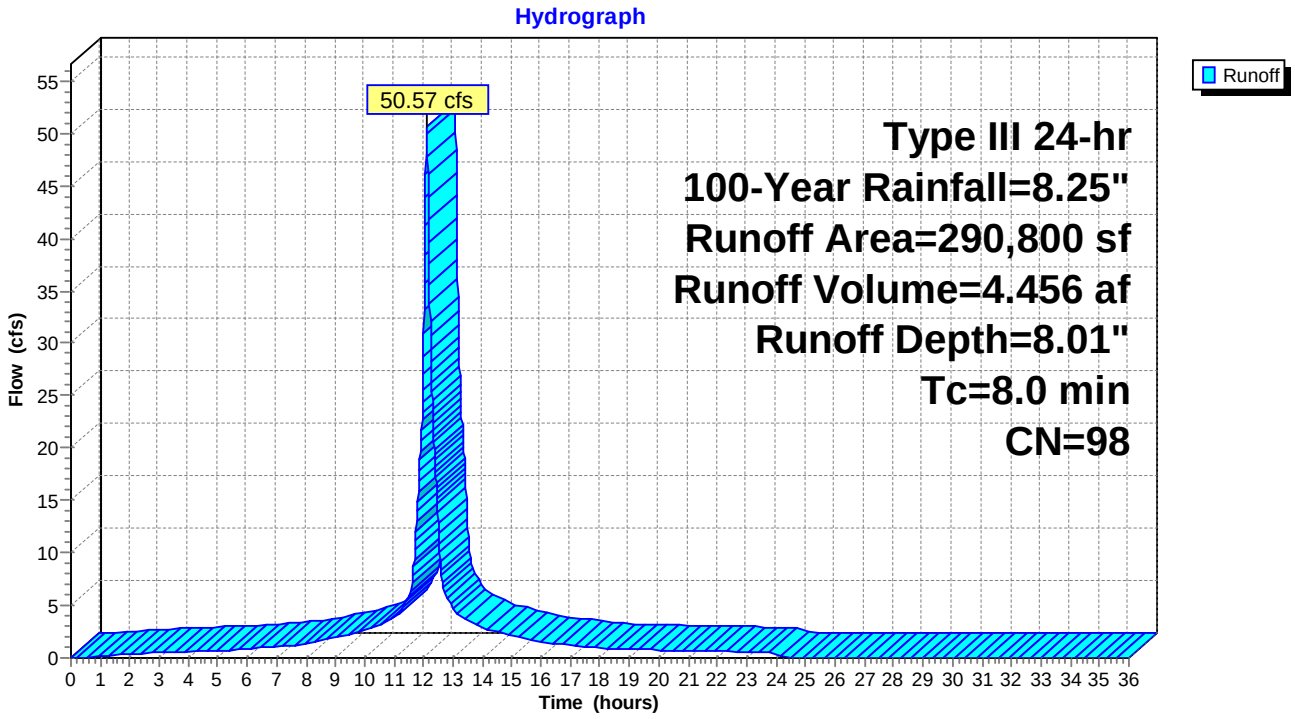
Runoff = 50.57 cfs @ 12.11 hrs, Volume= 4.456 af, Depth= 8.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
290,800	98	Unconnected pavement, HSG B
290,800		100.00% Impervious Area
290,800		100.00% Unconnected

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

Subcatchment E-60: SHEET FLOW TO RIVER



Summary for Pond 1P: EXISTING ROCK CHANNEL

Inflow Area = 79.252 ac, 48.49% Impervious, Inflow Depth = 5.80" for 100-Year event
Inflow = 247.21 cfs @ 12.48 hrs, Volume= 38.315 af
Outflow = 248.02 cfs @ 12.51 hrs, Volume= 38.252 af, Atten= 0%, Lag= 1.7 min
Primary = 33.34 cfs @ 12.51 hrs, Volume= 21.690 af
Secondary = 214.68 cfs @ 12.51 hrs, Volume= 16.562 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 20.61' @ 12.51 hrs Surf.Area= 80,000 sf Storage= 106,375 cf

Plug-Flow detention time= 16.9 min calculated for 38.252 af (100% of inflow)
Center-of-Mass det. time= 15.8 min (845.7 - 830.0)

Volume	Invert	Avail.Storage	Storage Description
#1	13.60'	106,375 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

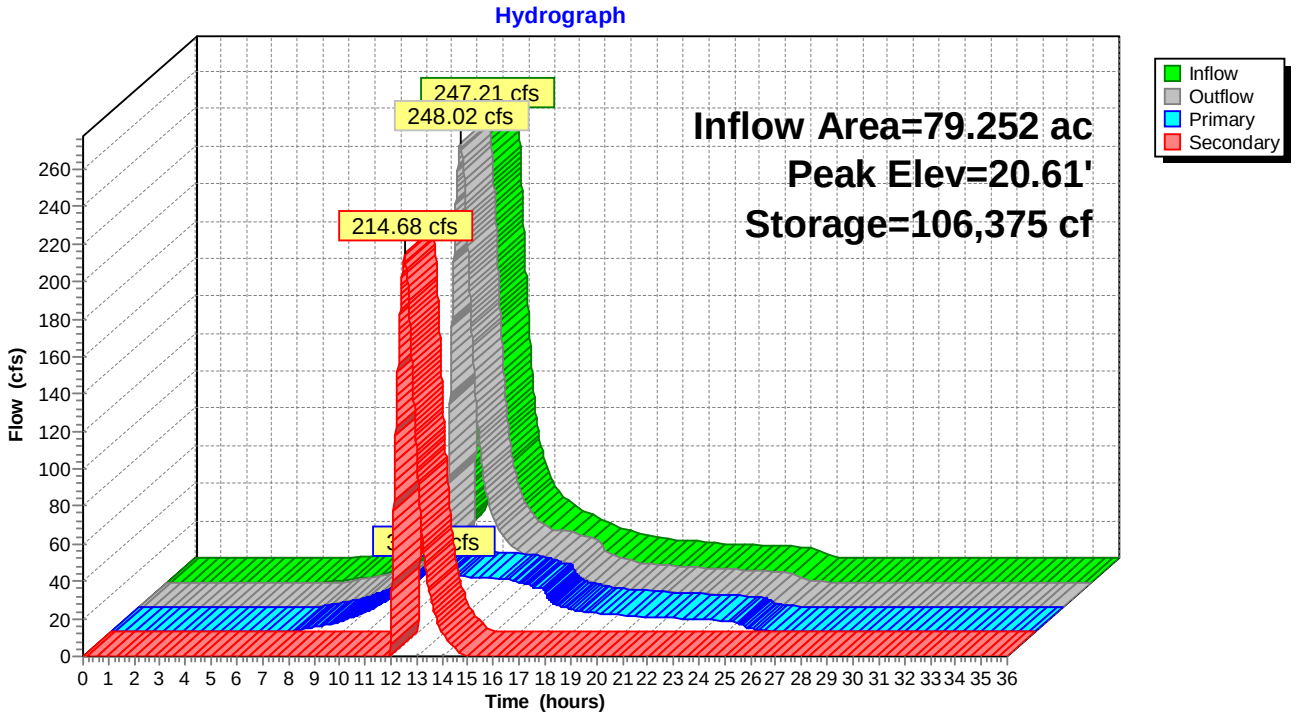
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.60	250	0	0
14.60	1,000	625	625
15.60	2,000	1,500	2,125
16.60	6,000	4,000	6,125
17.60	6,000	6,000	12,125
18.60	6,000	6,000	18,125
19.60	49,000	27,500	45,625
20.10	57,000	26,500	72,125
20.60	80,000	34,250	106,375

Device	Routing	Invert	Outlet Devices
#1	Primary	15.84'	**30.0" Round Ex 30" Culvert** L= 260.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 15.84' / 15.31' S= 0.0020 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Secondary	19.85'	**115.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=33.33 cfs @ 12.51 hrs HW=20.61' TW=4.00' (Fixed TW Elev= 4.00')
↑—**1=Ex 30" Culvert** (Barrel Controls 33.33 cfs @ 6.79 fps)

Secondary OutFlow Max=214.39 cfs @ 12.51 hrs HW=20.61' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 214.39 cfs @ 2.46 fps)

Pond 1P: EXISTING ROCK CHANNEL

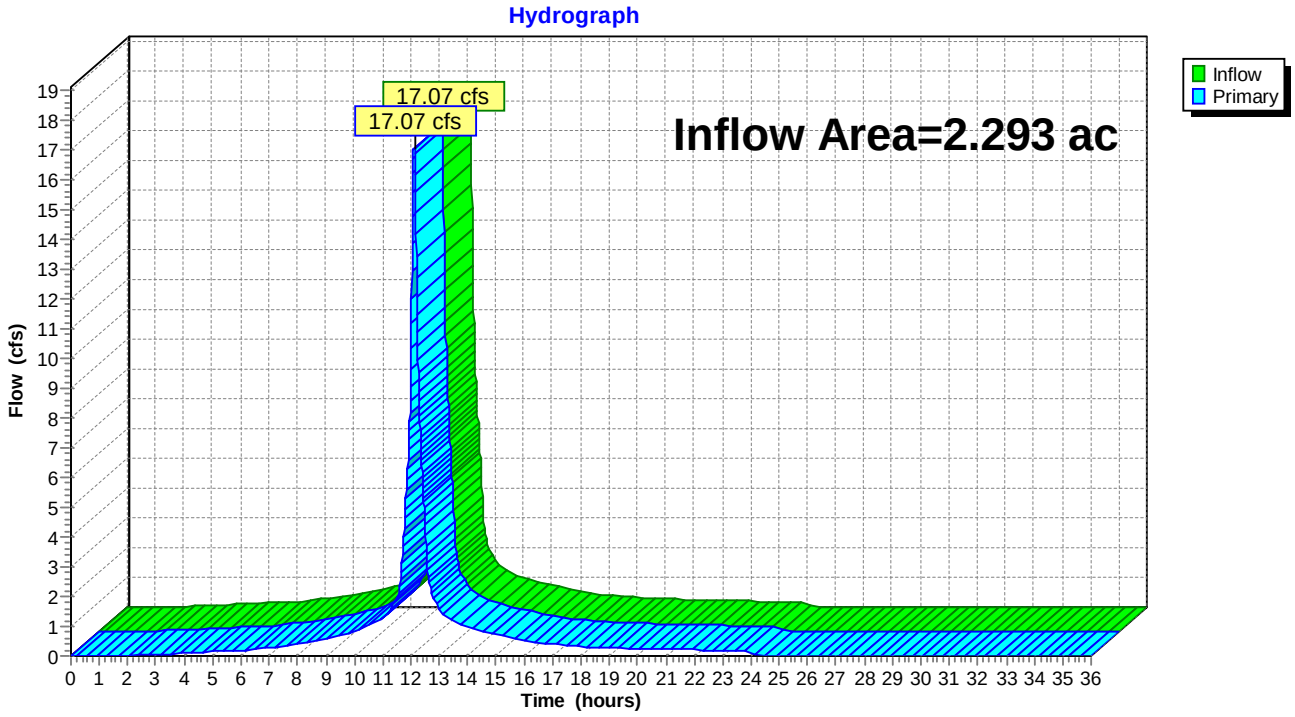


Summary for Link DP-28: OUTFALL #28 (24")

Inflow Area = 2.293 ac, 79.78% Impervious, Inflow Depth = 7.53" for 100-Year event
Inflow = 17.07 cfs @ 12.11 hrs, Volume= 1.439 af
Primary = 17.07 cfs @ 12.11 hrs, Volume= 1.439 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-28: OUTFALL #28 (24")

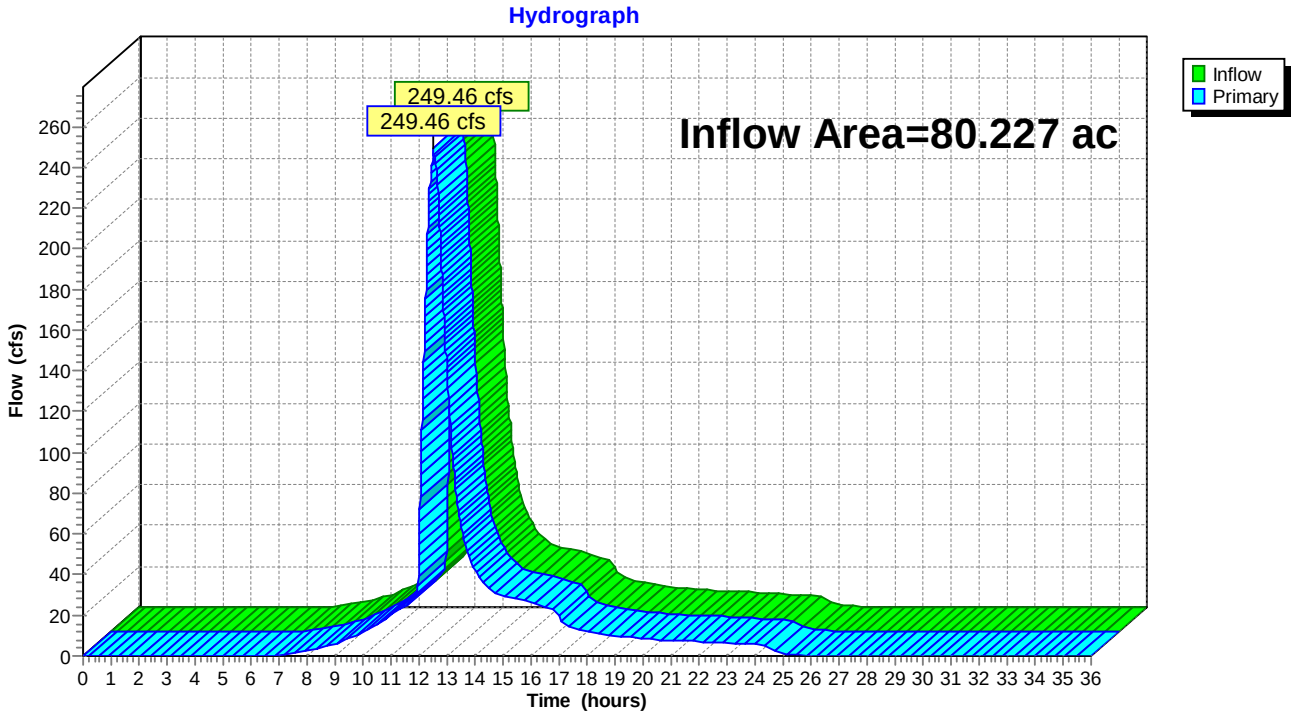


Summary for Link DP-29: OUTFALL #29 (42")

Inflow Area = 80.227 ac, 49.11% Impervious, Inflow Depth = 5.82" for 100-Year event
Inflow = 249.46 cfs @ 12.51 hrs, Volume= 38.903 af
Primary = 249.46 cfs @ 12.51 hrs, Volume= 38.903 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-29: OUTFALL #29 (42")

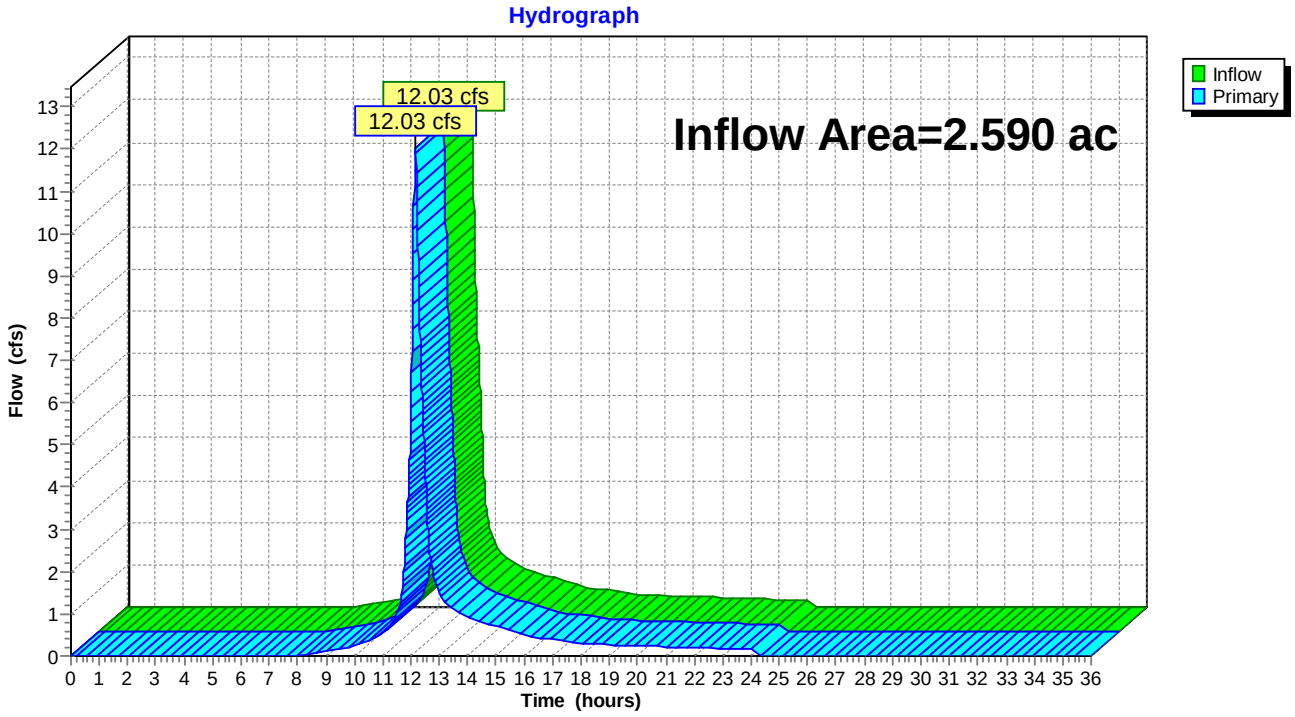


Summary for Link DP-30: OUTFALL #30 (24")

Inflow Area = 2.590 ac, 25.35% Impervious, Inflow Depth = 4.68" for 100-Year event
Inflow = 12.03 cfs @ 12.15 hrs, Volume= 1.010 af
Primary = 12.03 cfs @ 12.15 hrs, Volume= 1.010 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-30: OUTFALL #30 (24")

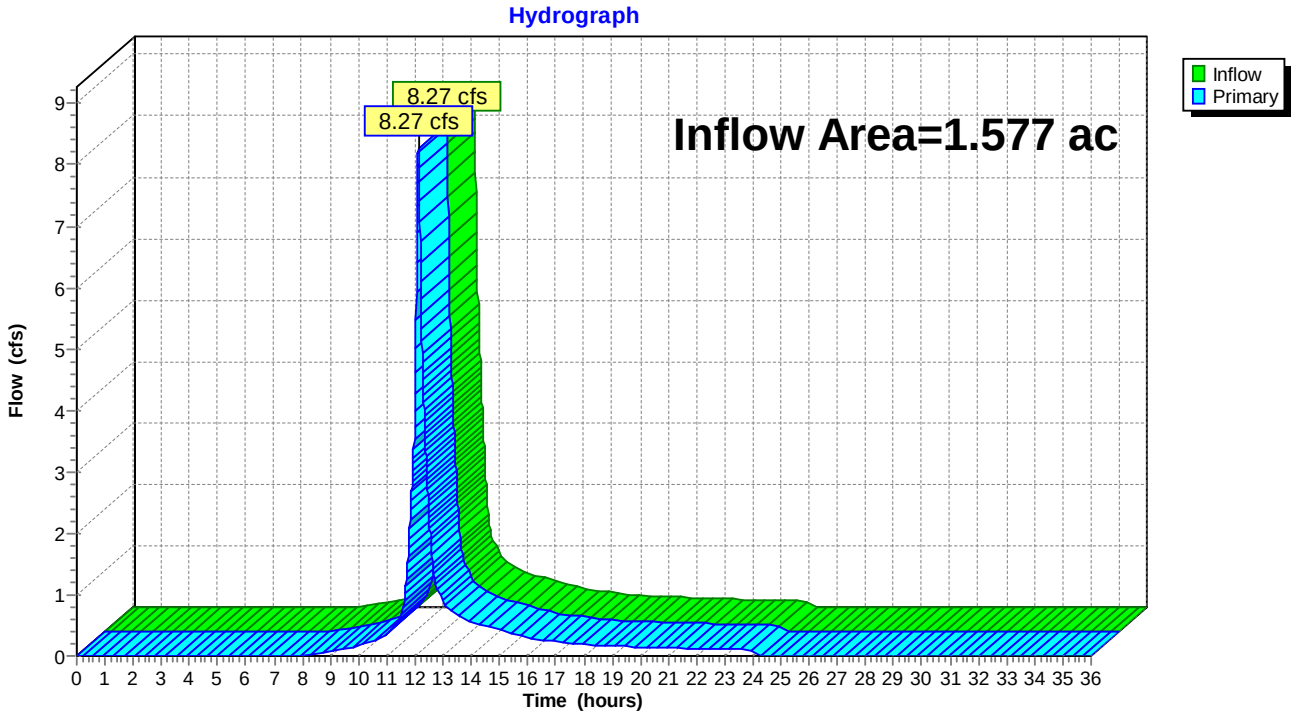


Summary for Link DP-33: OUTFALL #33 (10")

Inflow Area = 1.577 ac, 25.04% Impervious, Inflow Depth = 4.80" for 100-Year event
Inflow = 8.27 cfs @ 12.11 hrs, Volume= 0.630 af
Primary = 8.27 cfs @ 12.11 hrs, Volume= 0.630 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-33: OUTFALL #33 (10")

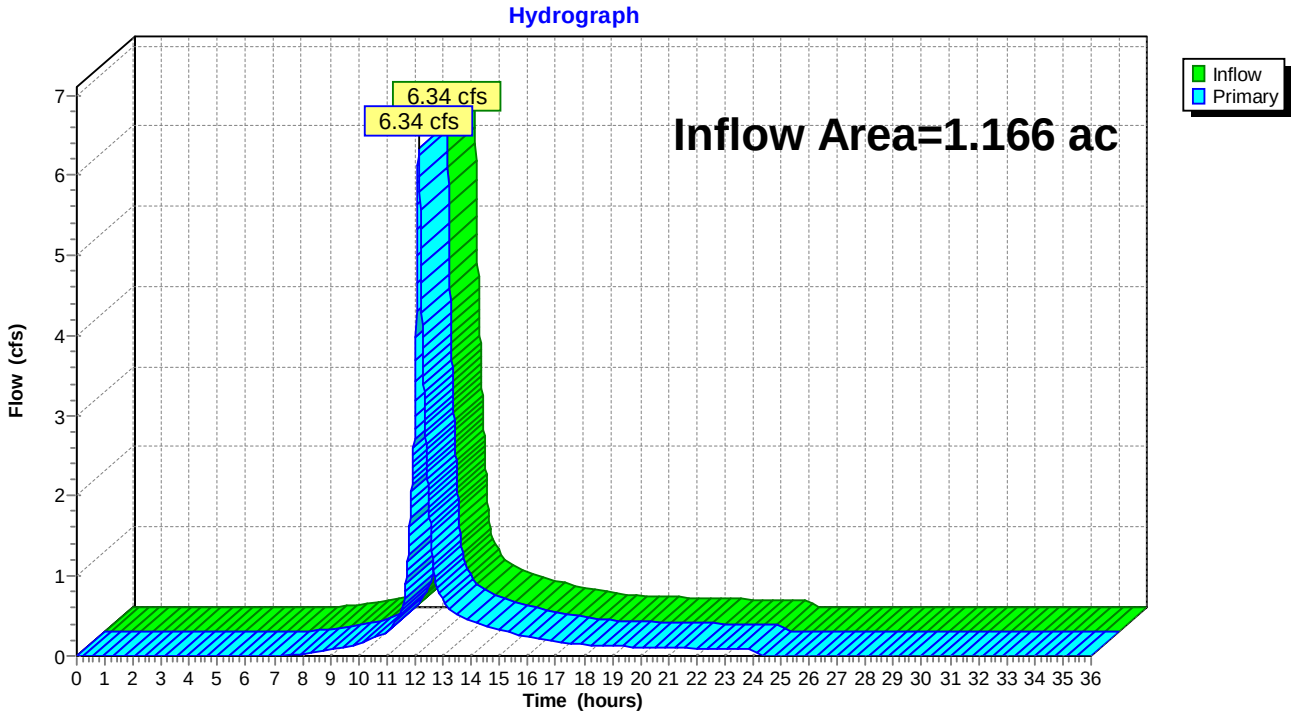


Summary for Link DP-34E: OUTFALL #34 (30")

Inflow Area = 1.166 ac, 36.22% Impervious, Inflow Depth = 5.15" for 100-Year event
Inflow = 6.34 cfs @ 12.13 hrs, Volume= 0.500 af
Primary = 6.34 cfs @ 12.13 hrs, Volume= 0.500 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-34E: OUTFALL #34 (30")

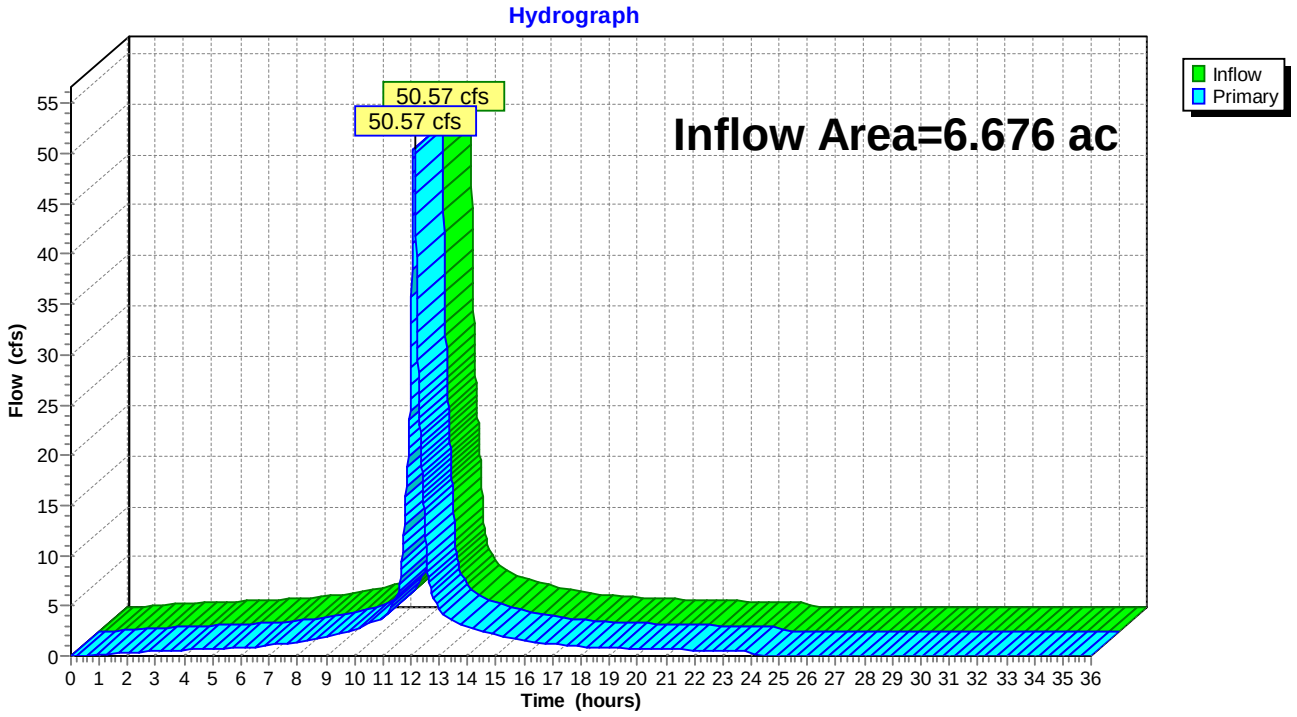


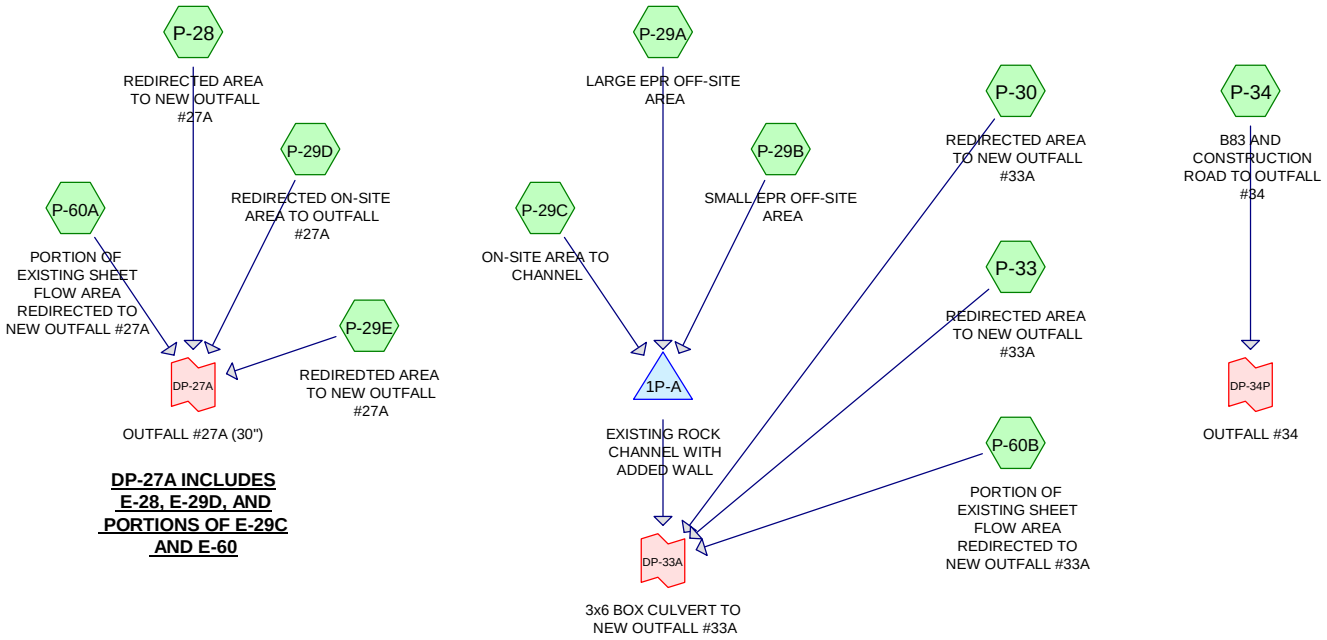
Summary for Link L-E60: SHEET FLOW TO RIVER

Inflow Area = 6.676 ac,100.00% Impervious, Inflow Depth = 8.01" for 100-Year event
Inflow = 50.57 cfs @ 12.11 hrs, Volume= 4.456 af
Primary = 50.57 cfs @ 12.11 hrs, Volume= 4.456 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link L-E60: SHEET FLOW TO RIVER





Subcat Reach Pond Link

Routing Diagram for SYAB - PR

Prepared by {enter your company name here}, Printed 2/12/2019

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
59.917	75	1/4 acre lots, 38% imp, HSG B (P-29A, P-29B)
3.884	61	>75% Grass cover, Good, HSG B (P-29C, P-30, P-33, P-34)
0.576	80	>75% Grass cover, Good, HSG D (P-28, P-29C)
0.448	85	Gravel roads, HSG B (P-29C, P-33)
0.859	98	Paved parking, HSG B (P-30, P-34)
7.050	98	Unconnected pavement, HSG B (P-29C, P-29D, P-29E, P-33, P-34, P-60B)
2.107	98	Unconnected pavement, HSG D (P-28, P-60A)
1.258	98	Unconnected roofs, HSG B (P-29C, P-29D, P-29E, P-34)
14.922	95	Urban commercial, 85% imp, HSG D (P-29A)
0.466	55	Woods, Good, HSG B (P-29C, P-30)
0.494	77	Woods, Good, HSG D (P-28, P-29C)
91.981	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
73.882	HSG B	P-29A, P-29B, P-29C, P-29D, P-29E, P-30, P-33, P-34, P-60B
0.000	HSG C	
18.099	HSG D	P-28, P-29A, P-29C, P-60A
0.000	Other	
91.981		**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	59.917	0.000	0.000	0.000	59.917	1/4 acre lots, 38% imp	P-29A, P-29B
0.000	3.884	0.000	0.576	0.000	4.461	>75% Grass cover, Good	P-28, P-29C, P-30, P-33, P-34
0.000	0.448	0.000	0.000	0.000	0.448	Gravel roads	P-29C, P-33
0.000	0.859	0.000	0.000	0.000	0.859	Paved parking	P-30, P-34
0.000	7.050	0.000	2.107	0.000	9.157	Unconnected pavement	P-28, P-29C, P-29D, P-29E, P-33, P-34, P-60A, P-60B
0.000	1.258	0.000	0.000	0.000	1.258	Unconnected roofs	P-29C, P-29D, P-29E, P-34
0.000	0.000	0.000	14.922	0.000	14.922	Urban commercial, 85% imp	P-29A
0.000	0.466	0.000	0.494	0.000	0.960	Woods, Good	P-28, P-29C, P-30
0.000	**73.882**	**0.000**	**18.099**	**0.000**	**91.981**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P-A	13.60	12.30	80.0	0.0162	0.013	72.0	36.0	0.0

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-28: REDIRECTED AREA TO Runoff Area=86,600 sf 70.32% Impervious Runoff Depth=2.49"
Tc=8.0 min CN=92 Runoff=5.29 cfs 0.413 af

Subcatchment P-29A: LARGE EPR Runoff Area=2,650,000 sf 49.53% Impervious Runoff Depth=1.52"
Tc=41.0 min CN=80 Runoff=52.04 cfs 7.697 af

Subcatchment P-29B: SMALL EPR OFF-SITE Runoff Area=610,000 sf 38.00% Impervious Runoff Depth=1.20"
Tc=21.0 min CN=75 Runoff=12.45 cfs 1.397 af

Subcatchment P-29C: ON-SITE AREA TO Runoff Area=101,600 sf 38.39% Impervious Runoff Depth=1.52"
Tc=9.0 min CN=80 Runoff=3.71 cfs 0.295 af

Subcatchment P-29D: REDIRECTED ON-SITE Runoff Area=84,200 sf 100.00% Impervious Runoff Depth=3.12"
Tc=9.0 min CN=98 Runoff=5.70 cfs 0.502 af

Subcatchment P-29E: REDIREDTED AREA TO Runoff Area=60,200 sf 100.00% Impervious Runoff Depth=3.12"
Tc=5.0 min CN=98 Runoff=4.66 cfs 0.359 af

Subcatchment P-30: REDIRECTED AREA TO Runoff Area=120,800 sf 23.68% Impervious Runoff Depth=0.87"
Tc=11.0 min CN=69 Runoff=2.11 cfs 0.200 af

Subcatchment P-33: REDIRECTED AREA TO Runoff Area=68,700 sf 25.04% Impervious Runoff Depth=0.97"
Tc=8.0 min UI Adjusted CN=71 Runoff=1.54 cfs 0.127 af

Subcatchment P-34: B83 AND Runoff Area=50,800 sf 53.54% Impervious Runoff Depth=1.59"
Tc=9.0 min CN=81 Runoff=1.95 cfs 0.154 af

Subcatchment P-60A: PORTION OF EXISTING Runoff Area=30,900 sf 100.00% Impervious Runoff Depth=3.12"
Tc=8.0 min CN=98 Runoff=2.16 cfs 0.184 af

Subcatchment P-60B: PORTION OF Runoff Area=142,900 sf 100.00% Impervious Runoff Depth=3.12"
Tc=8.0 min CN=98 Runoff=9.99 cfs 0.852 af

Pond 1P-A: EXISTING ROCK CHANNEL WITH Peak Elev=15.77' Storage=2,525 cf Inflow=61.79 cfs 9.388 af
72.0" x 36.0" Box Culvert n=0.013 L=80.0' S=0.0162 '/' Outflow=61.62 cfs 9.388 af

Link DP-27A: OUTFALL #27A (30") Inflow=17.30 cfs 1.458 af
Primary=17.30 cfs 1.458 af

Link DP-33A: 3x6 BOX CULVERT TO NEW OUTFALL #33A Inflow=65.15 cfs 10.568 af
Primary=65.15 cfs 10.568 af

Link DP-34P: OUTFALL #34 Inflow=1.95 cfs 0.154 af
Primary=1.95 cfs 0.154 af

Total Runoff Area = 91.981 ac Runoff Volume = 12.181 af Average Runoff Depth = 1.59"
49.20% Pervious = 45.255 ac 50.80% Impervious = 46.726 ac

Summary for Subcatchment P-28: REDIRECTED AREA TO NEW OUTFALL #27A

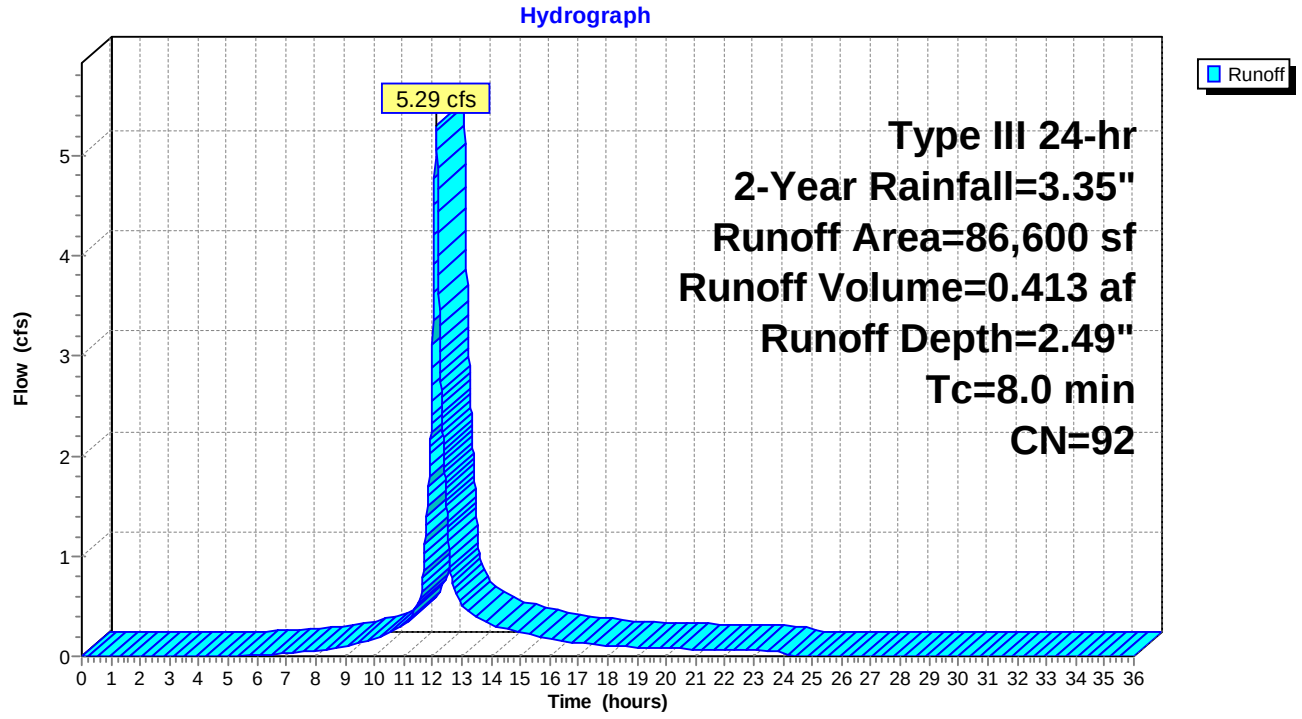
Runoff = 5.29 cfs @ 12.11 hrs, Volume= 0.413 af, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
19,800	80	>75% Grass cover, Good, HSG D
5,900	77	Woods, Good, HSG D
60,900	98	Unconnected pavement, HSG D
86,600	92	Weighted Average
25,700		29.68% Pervious Area
60,900		70.32% Impervious Area
60,900		100.00% Unconnected

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

Subcatchment P-28: REDIRECTED AREA TO NEW OUTFALL #27A



Summary for Subcatchment P-29A: LARGE EPR OFF-SITE AREA

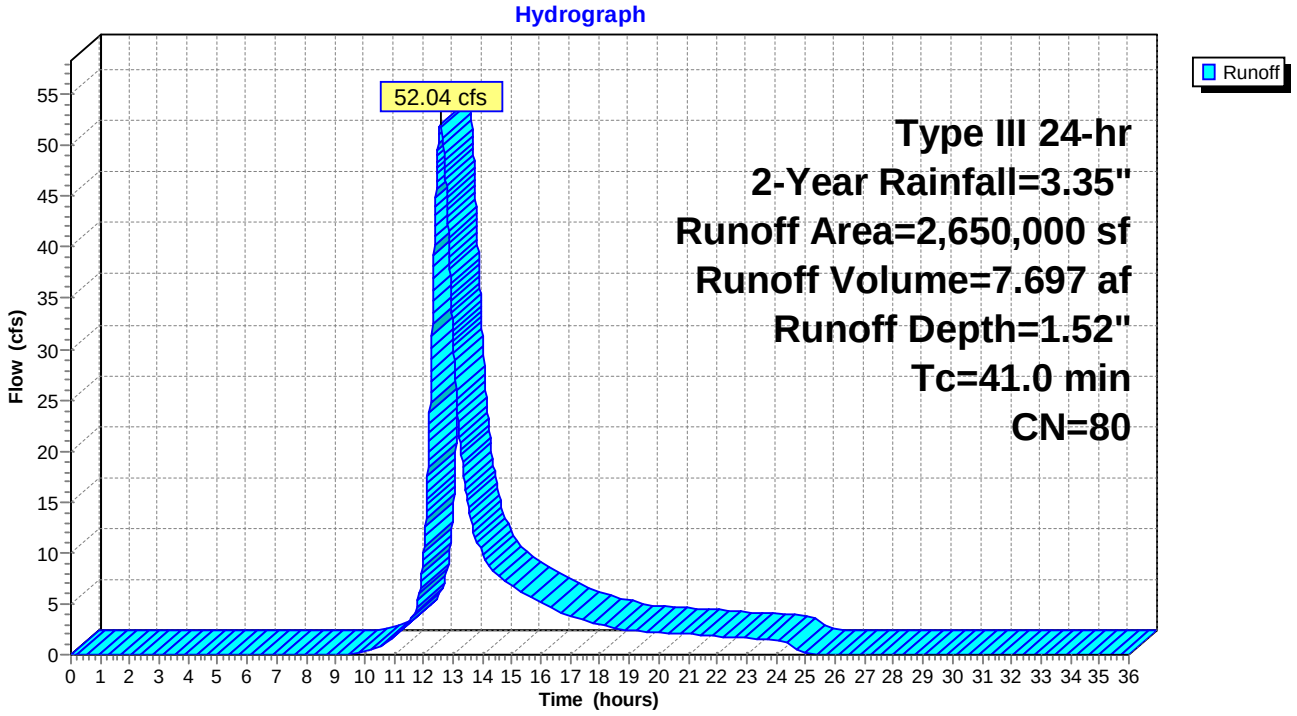
Runoff = 52.04 cfs @ 12.58 hrs, Volume= 7.697 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
2,000,000	75	1/4 acre lots, 38% imp, HSG B
650,000	95	Urban commercial, 85% imp, HSG D
2,650,000	80	Weighted Average
1,337,500		50.47% Pervious Area
1,312,500		49.53% Impervious Area

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

Subcatchment P-29A: LARGE EPR OFF-SITE AREA



Summary for Subcatchment P-29B: SMALL EPR OFF-SITE AREA

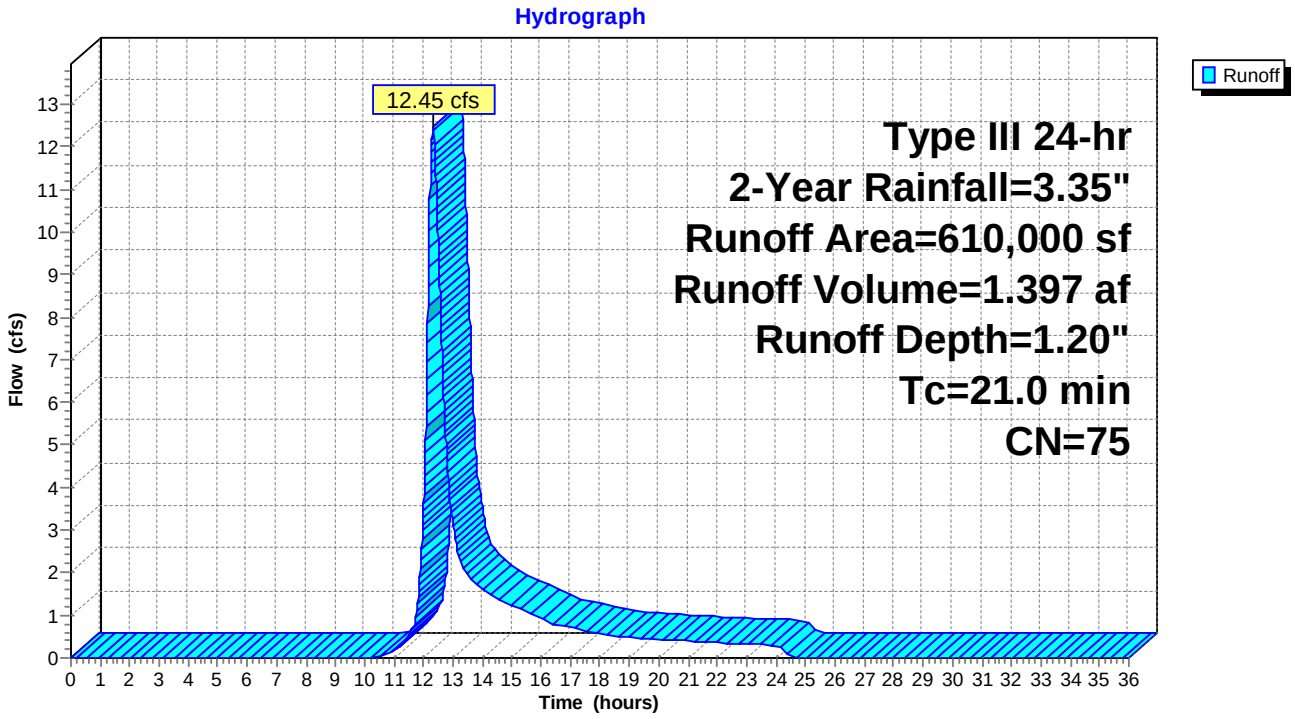
Runoff = 12.45 cfs @ 12.30 hrs, Volume= 1.397 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
610,000	75	1/4 acre lots, 38% imp, HSG B
378,200		62.00% Pervious Area
231,800		38.00% Impervious Area

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

Subcatchment P-29B: SMALL EPR OFF-SITE AREA



Summary for Subcatchment P-29C: ON-SITE AREA TO CHANNEL

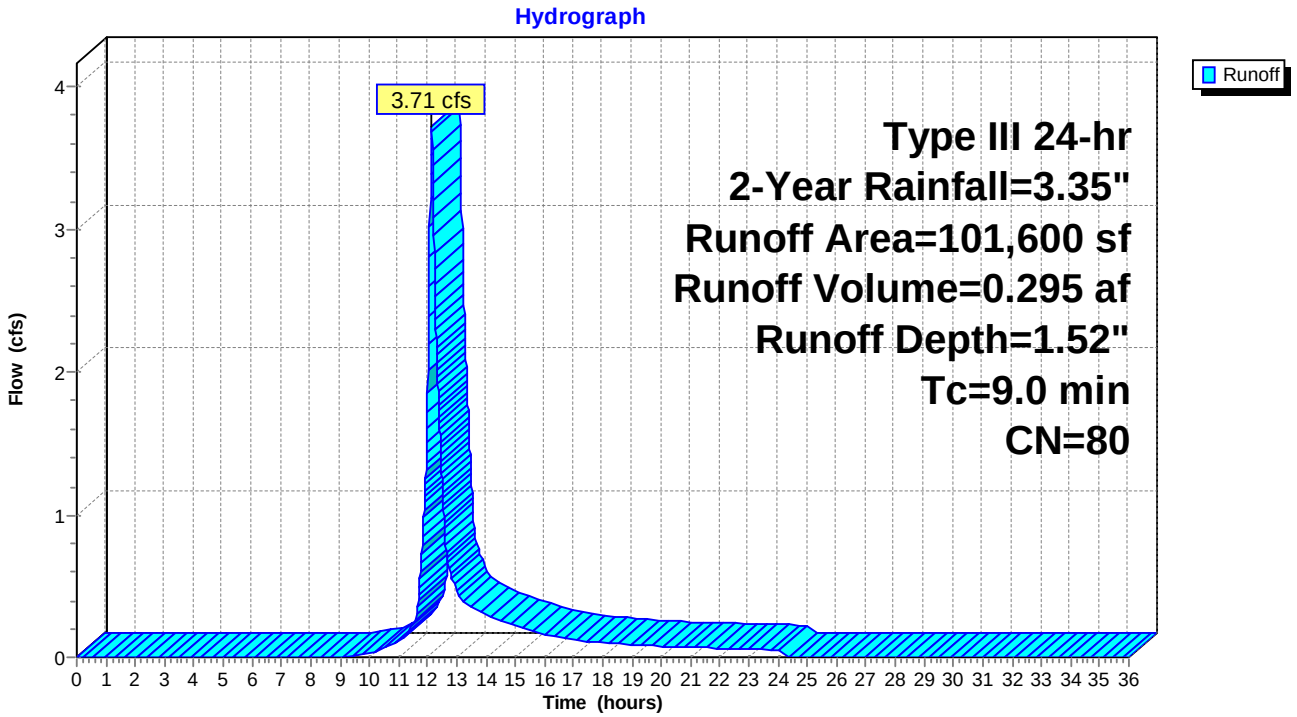
Runoff = 3.71 cfs @ 12.13 hrs, Volume= 0.295 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
19,300	98	Unconnected pavement, HSG B
19,700	98	Unconnected roofs, HSG B
5,300	80	>75% Grass cover, Good, HSG D
15,600	77	Woods, Good, HSG D
19,300	61	>75% Grass cover, Good, HSG B
14,900	55	Woods, Good, HSG B
7,500	85	Gravel roads, HSG B
101,600	80	Weighted Average
62,600		61.61% Pervious Area
39,000		38.39% Impervious Area
39,000		100.00% Unconnected

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

Subcatchment P-29C: ON-SITE AREA TO CHANNEL



Summary for Subcatchment P-29D: REDIRECTED ON-SITE AREA TO OUTFALL #27A

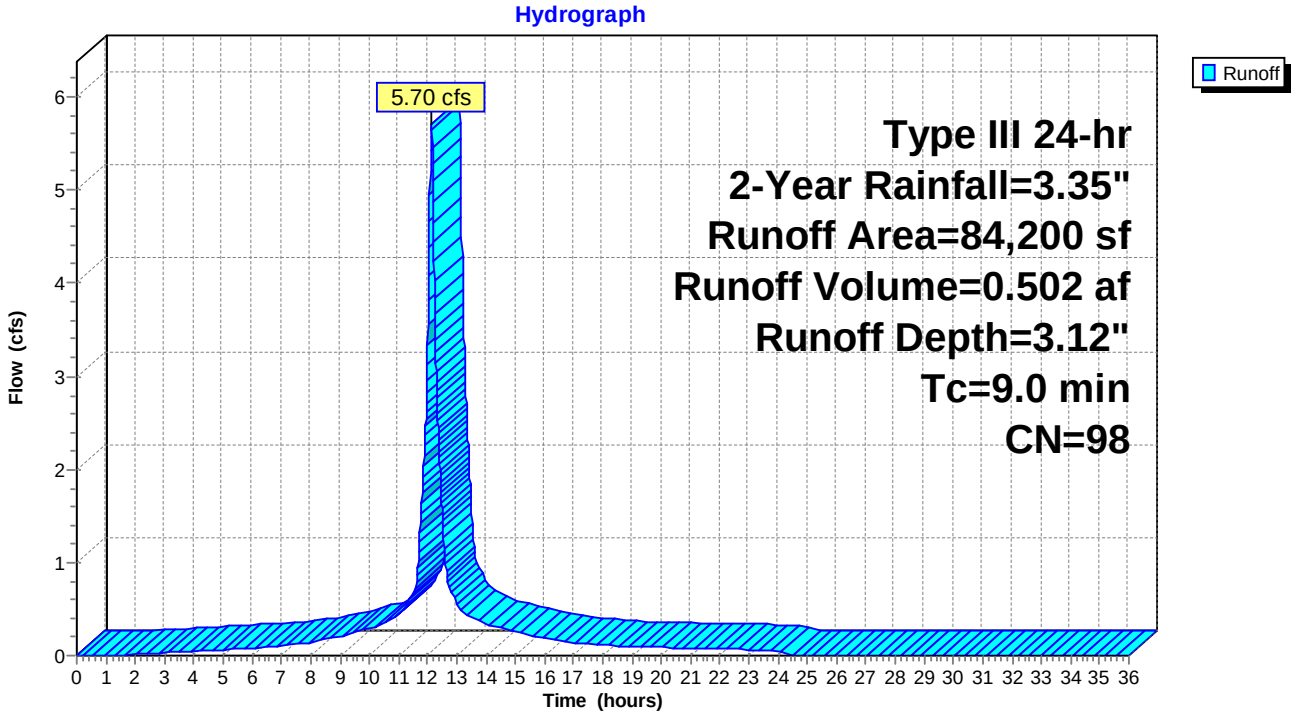
Runoff = 5.70 cfs @ 12.12 hrs, Volume= 0.502 af, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
63,000	98	Unconnected pavement, HSG B
21,200	98	Unconnected roofs, HSG B
0	80	>75% Grass cover, Good, HSG D
0	77	Woods, Good, HSG D
0	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
84,200	98	Weighted Average
84,200		100.00% Impervious Area
84,200		100.00% Unconnected

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

Subcatchment P-29D: REDIRECTED ON-SITE AREA TO OUTFALL #27A



Summary for Subcatchment P-29E: REDIREDTED AREA TO NEW OUTFALL #27A

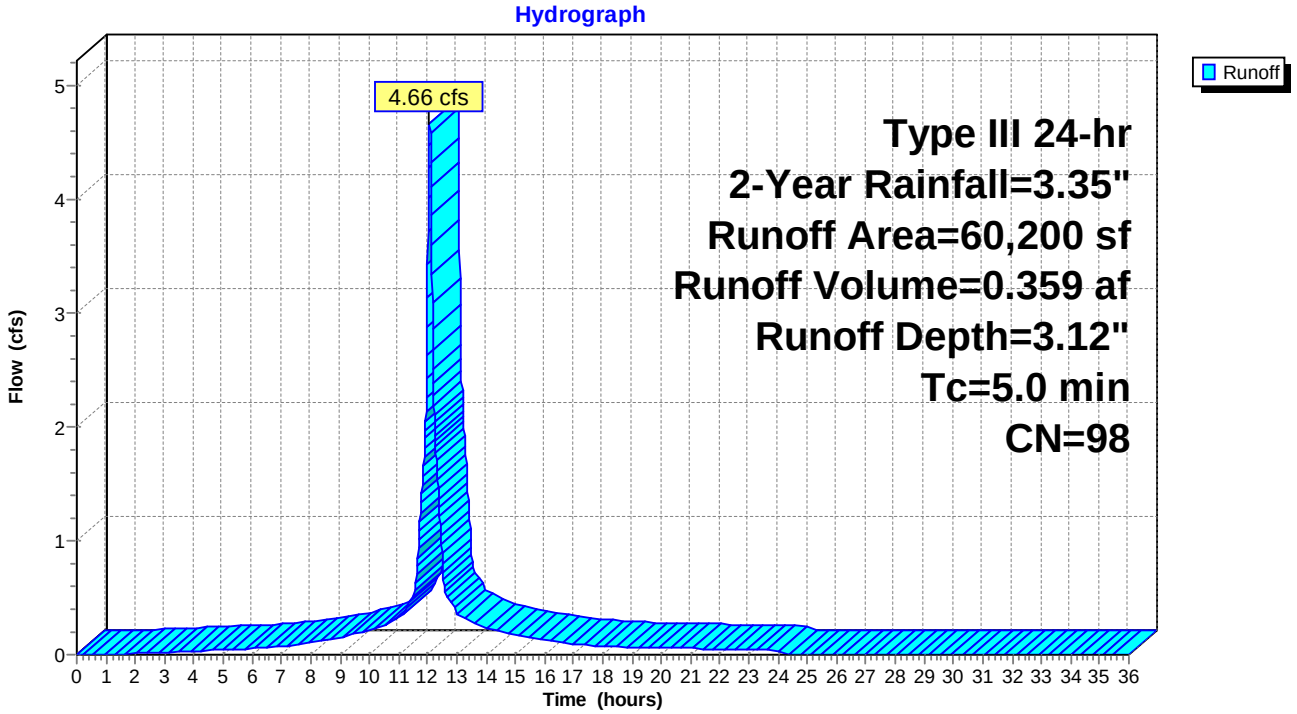
Runoff = 4.66 cfs @ 12.07 hrs, Volume= 0.359 af, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
54,700	98	Unconnected pavement, HSG B
5,500	98	Unconnected roofs, HSG B
60,200	98	Weighted Average
60,200		100.00% Impervious Area
60,200		100.00% Unconnected

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

Subcatchment P-29E: REDIREDTED AREA TO NEW OUTFALL #27A



Summary for Subcatchment P-30: REDIRECTED AREA TO NEW OUTFALL #33A

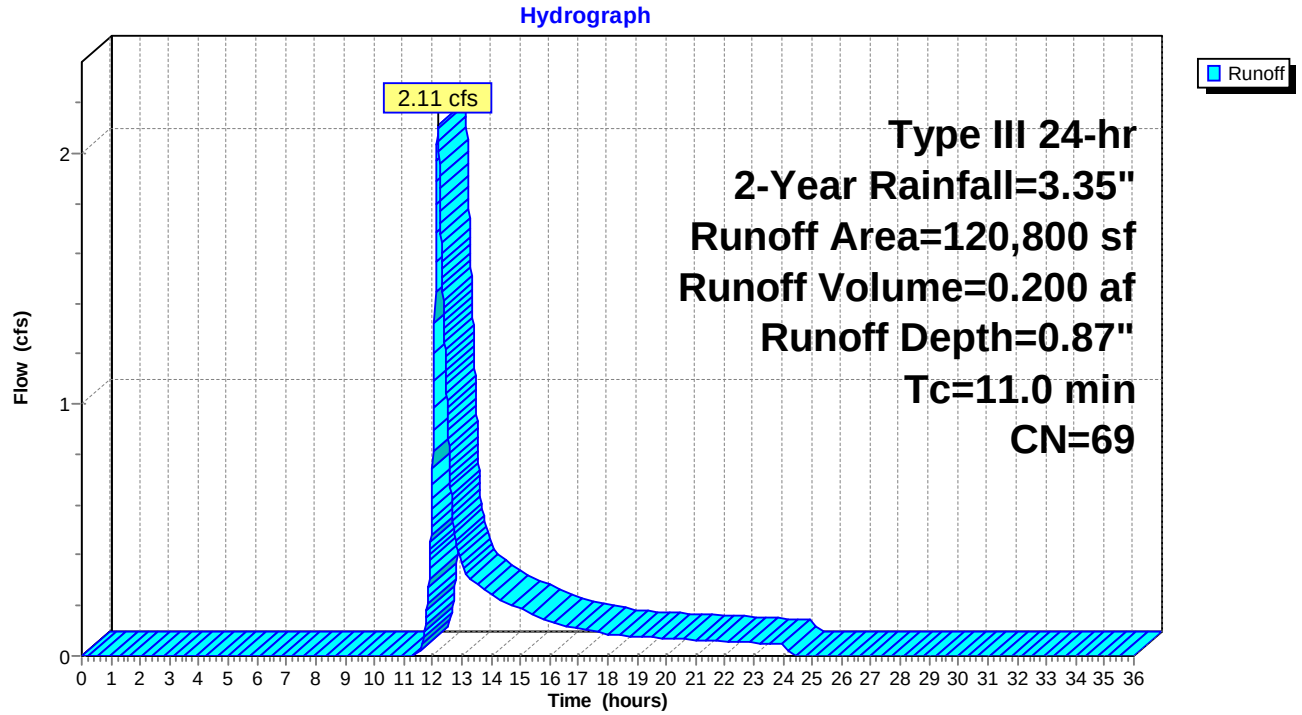
Runoff = 2.11 cfs @ 12.17 hrs, Volume= 0.200 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
86,800	61	>75% Grass cover, Good, HSG B
28,600	98	Paved parking, HSG B
5,400	55	Woods, Good, HSG B
120,800	69	Weighted Average
92,200		76.32% Pervious Area
28,600		23.68% Impervious Area

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

Subcatchment P-30: REDIRECTED AREA TO NEW OUTFALL #33A



Summary for Subcatchment P-33: REDIRECTED AREA TO NEW OUTFALL #33A

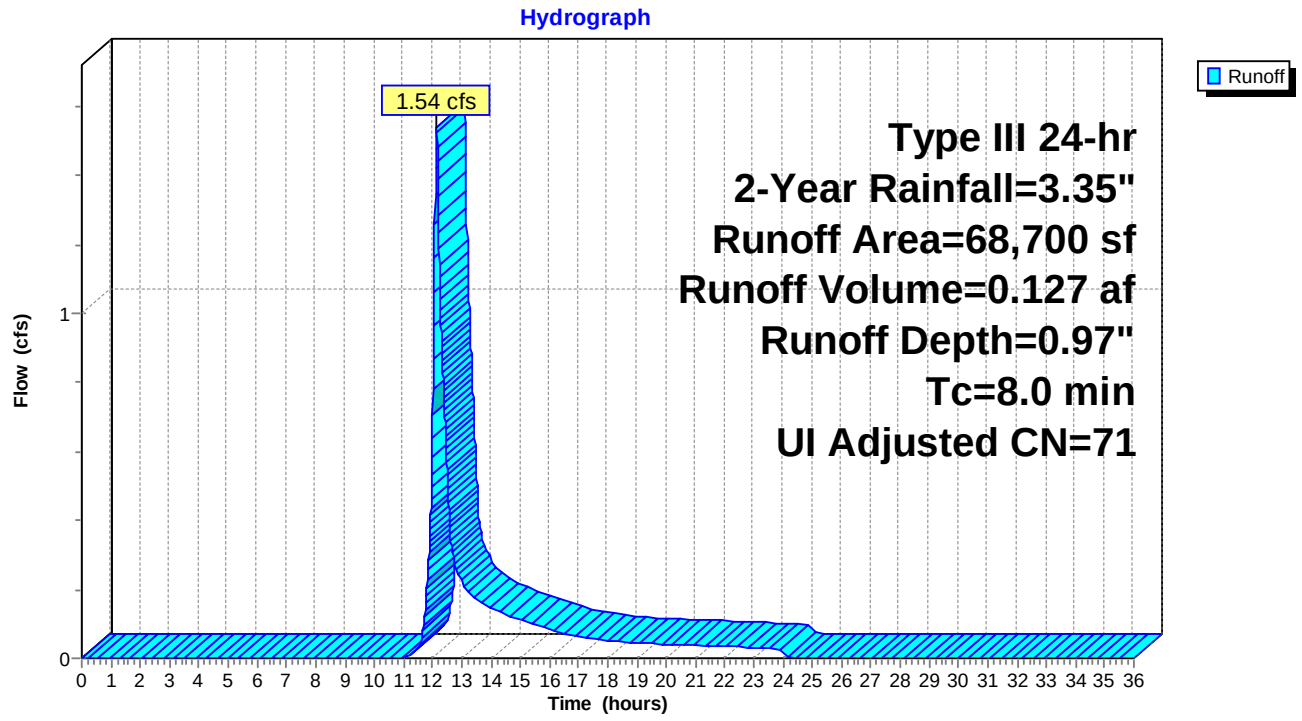
Runoff = 1.54 cfs @ 12.12 hrs, Volume= 0.127 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Adj	Description
39,500	61		>75% Grass cover, Good, HSG B
17,200	98		Unconnected pavement, HSG B
12,000	85		Gravel roads, HSG B
68,700	74	71	Weighted Average, UI Adjusted
51,500			74.96% Pervious Area
17,200			25.04% Impervious Area
17,200			100.00% Unconnected

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

Subcatchment P-33: REDIRECTED AREA TO NEW OUTFALL #33A



Summary for Subcatchment P-34: B83 AND CONSTRUCTION ROAD TO OUTFALL #34

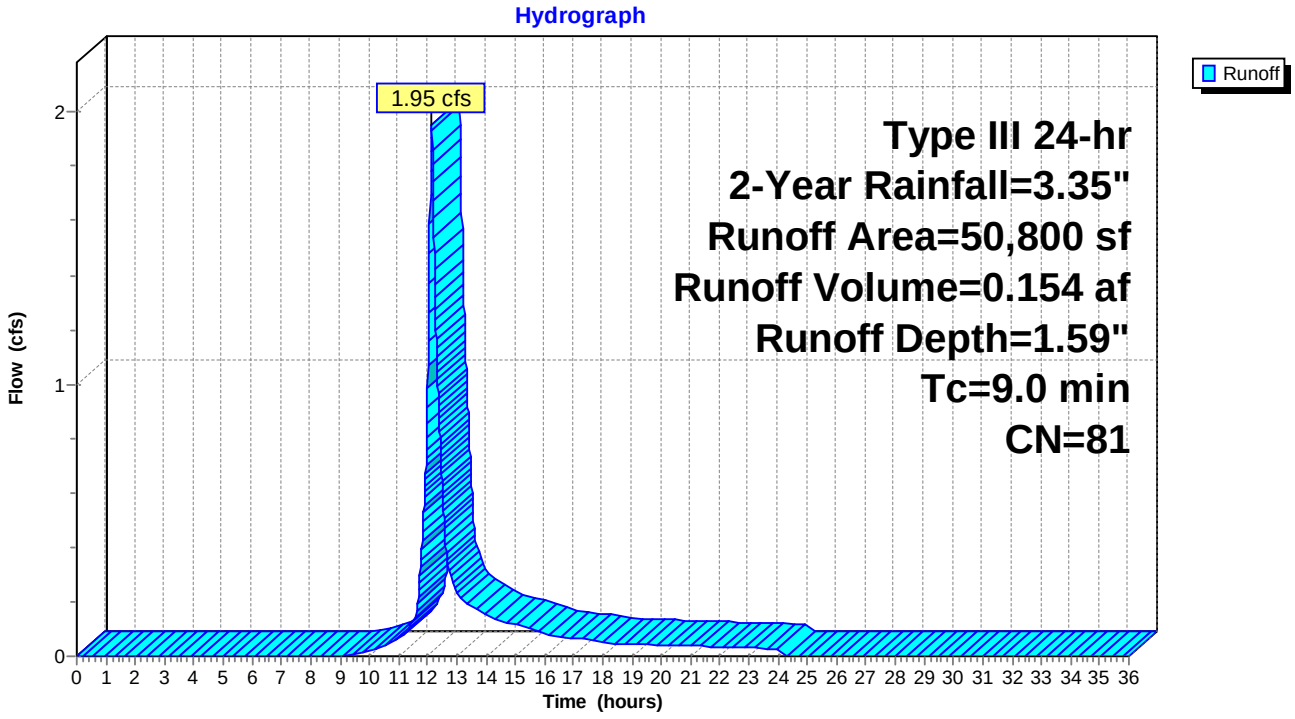
Runoff = 1.95 cfs @ 12.13 hrs, Volume= 0.154 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
10,000	98	Unconnected pavement, HSG B
8,400	98	Unconnected roofs, HSG B
8,800	98	Paved parking, HSG B
23,600	61	>75% Grass cover, Good, HSG B
50,800	81	Weighted Average
23,600		46.46% Pervious Area
27,200		53.54% Impervious Area
18,400		67.65% Unconnected

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

Subcatchment P-34: B83 AND CONSTRUCTION ROAD TO OUTFALL #34



mary for Subcatchment P-60A: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL

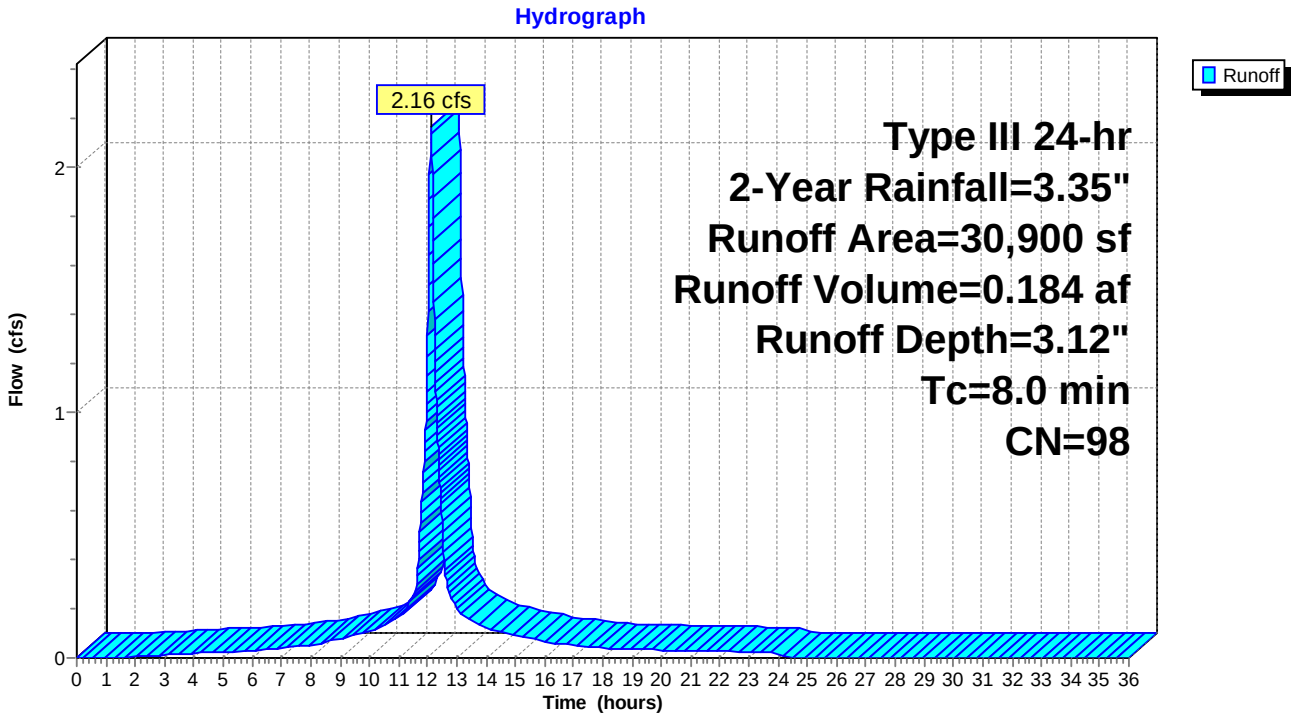
Runoff = 2.16 cfs @ 12.11 hrs, Volume= 0.184 af, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
30,900	98	Unconnected pavement, HSG D
30,900		100.00% Impervious Area
30,900		100.00% Unconnected

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

Subcatchment P-60A: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL #27A



mary for Subcatchment P-60B: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL

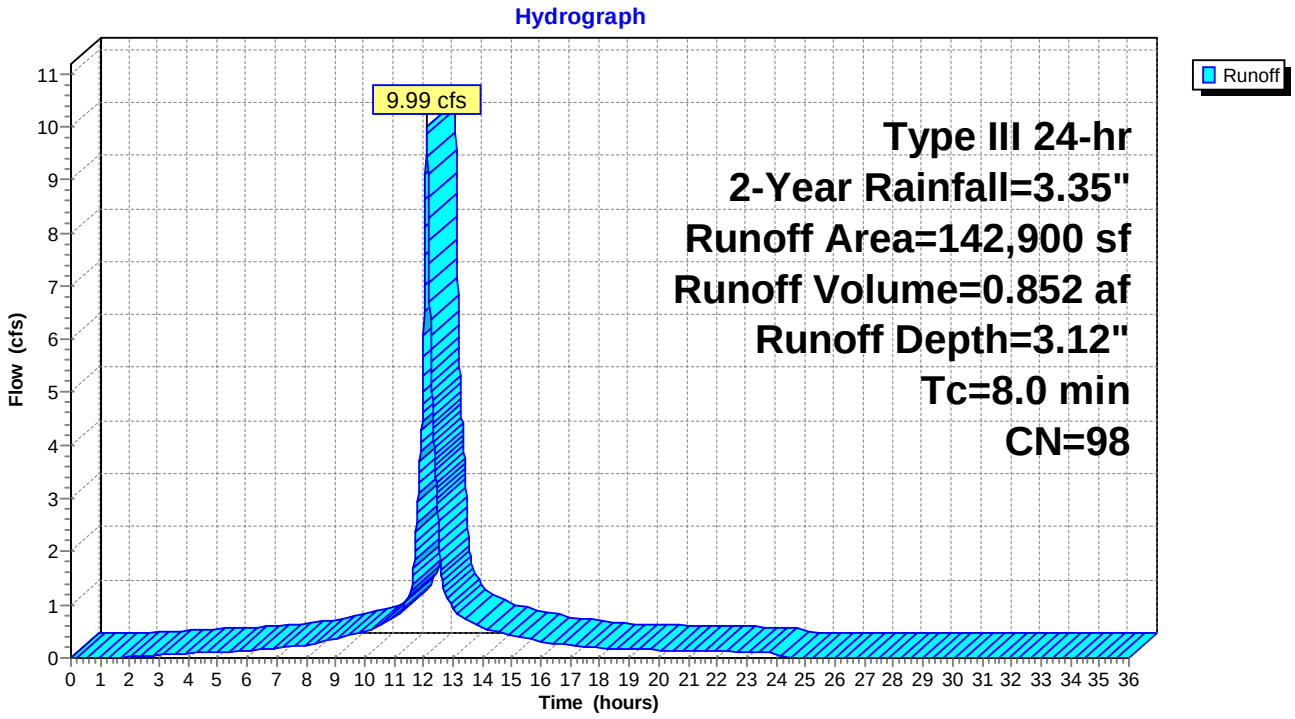
Runoff = 9.99 cfs @ 12.11 hrs, Volume= 0.852 af, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
142,900	98	Unconnected pavement, HSG B
142,900		100.00% Impervious Area
142,900		100.00% Unconnected

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

Subcatchment P-60B: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL #33A



Summary for Pond 1P-A: EXISTING ROCK CHANNEL WITH ADDED WALL

Inflow Area = 77.172 ac, 47.10% Impervious, Inflow Depth = 1.46" for 2-Year event
Inflow = 61.79 cfs @ 12.53 hrs, Volume= 9.388 af
Outflow = 61.62 cfs @ 12.55 hrs, Volume= 9.388 af, Atten= 0%, Lag= 0.9 min
Primary = 61.62 cfs @ 12.55 hrs, Volume= 9.388 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 15.77' @ 12.55 hrs Surf.Area= 2,684 sf Storage= 2,525 cf

Plug-Flow detention time= 0.6 min calculated for 9.388 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (872.1 - 871.5)

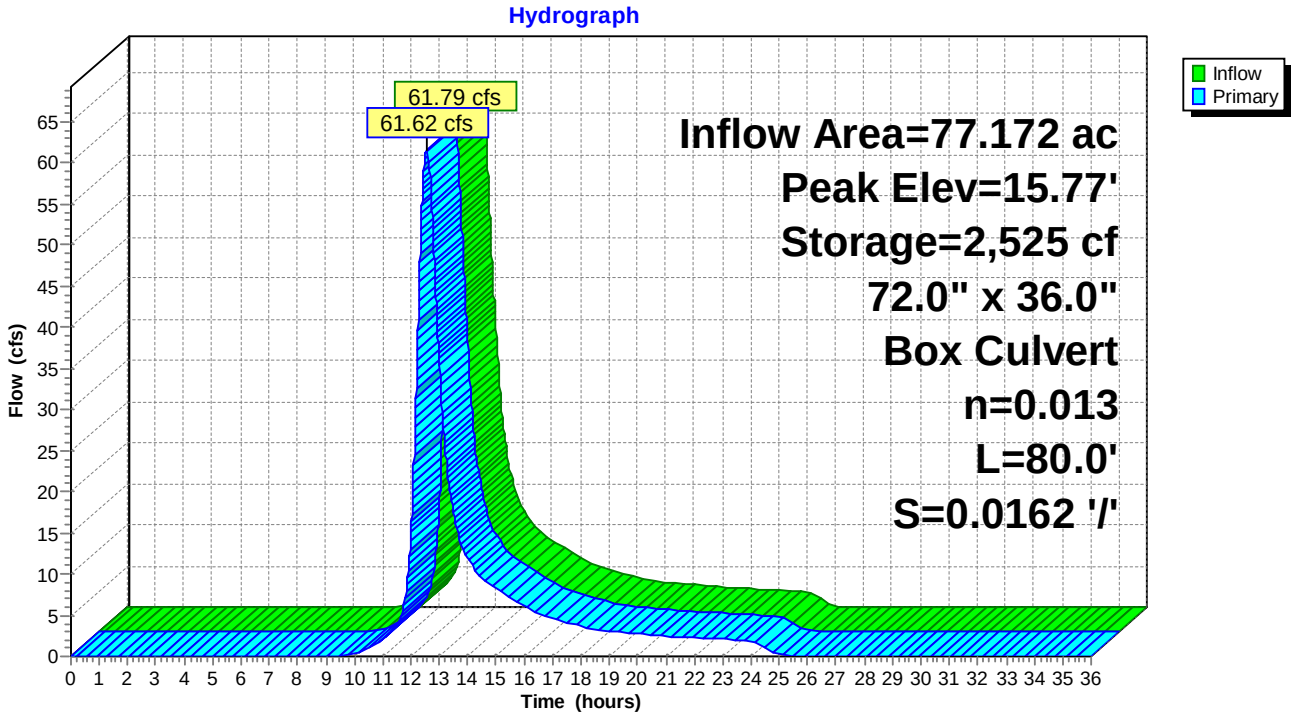
Volume	Invert	Avail.Storage	Storage Description
#1	13.60'	48,125 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.60	250	0	0
14.60	1,000	625	625
15.60	2,000	1,500	2,125
16.60	6,000	4,000	6,125
17.60	6,000	6,000	12,125
18.60	6,000	6,000	18,125
19.60	6,000	6,000	24,125
20.60	6,000	6,000	30,125
21.60	6,000	6,000	36,125
22.60	6,000	6,000	42,125
23.60	6,000	6,000	48,125

Device	Routing	Invert	Outlet Devices
#1	Primary	13.60'	**72.0" W x 36.0" H Box 3x6 Box Culvert** L= 80.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 13.60' / 12.30' S= 0.0162 '/' Cc= 0.900 n= 0.013, Flow Area= 18.00 sf

Primary OutFlow Max=61.60 cfs @ 12.55 hrs HW=15.77' TW=4.00' (Fixed TW Elev= 4.00')
↑—**1=3x6 Box Culvert** (Inlet Controls 61.60 cfs @ 4.73 fps)

Pond 1P-A: EXISTING ROCK CHANNEL WITH ADDED WALL

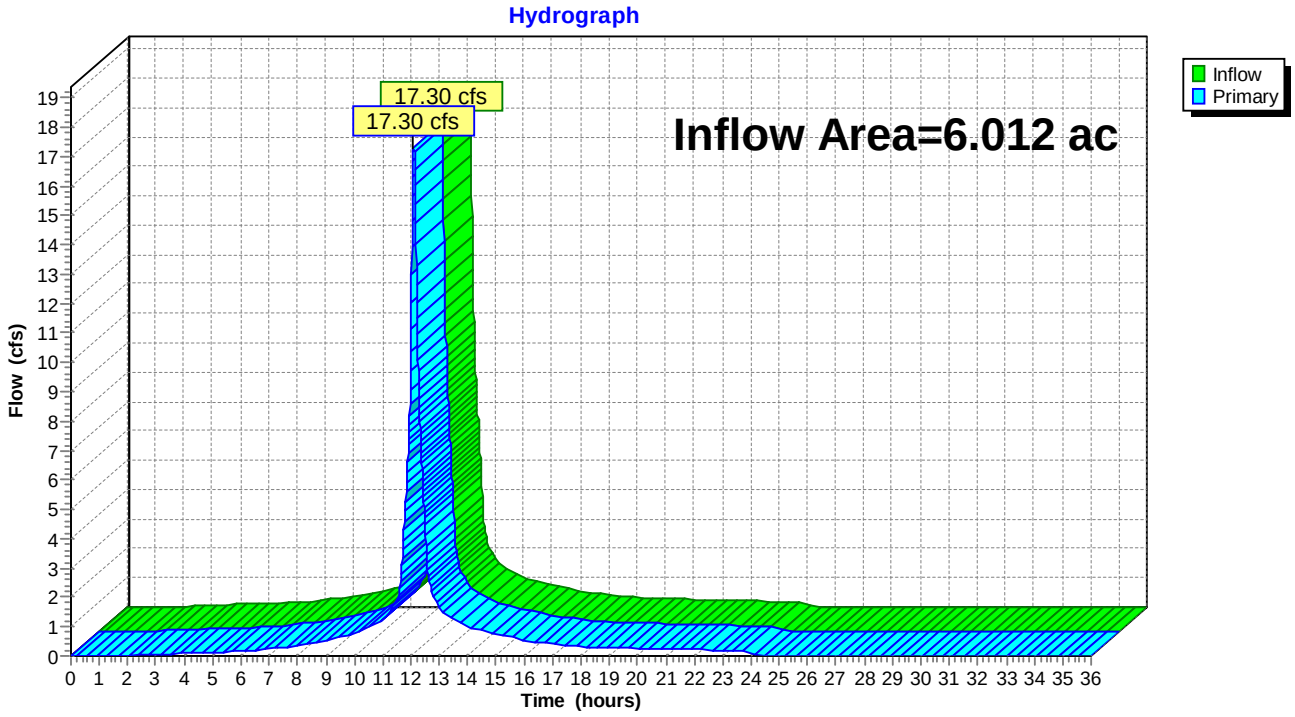


Summary for Link DP-27A: OUTFALL #27A (30")

Inflow Area = 6.012 ac, 90.19% Impervious, Inflow Depth = 2.91" for 2-Year event
Inflow = 17.30 cfs @ 12.10 hrs, Volume= 1.458 af
Primary = 17.30 cfs @ 12.10 hrs, Volume= 1.458 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-27A: OUTFALL #27A (30")

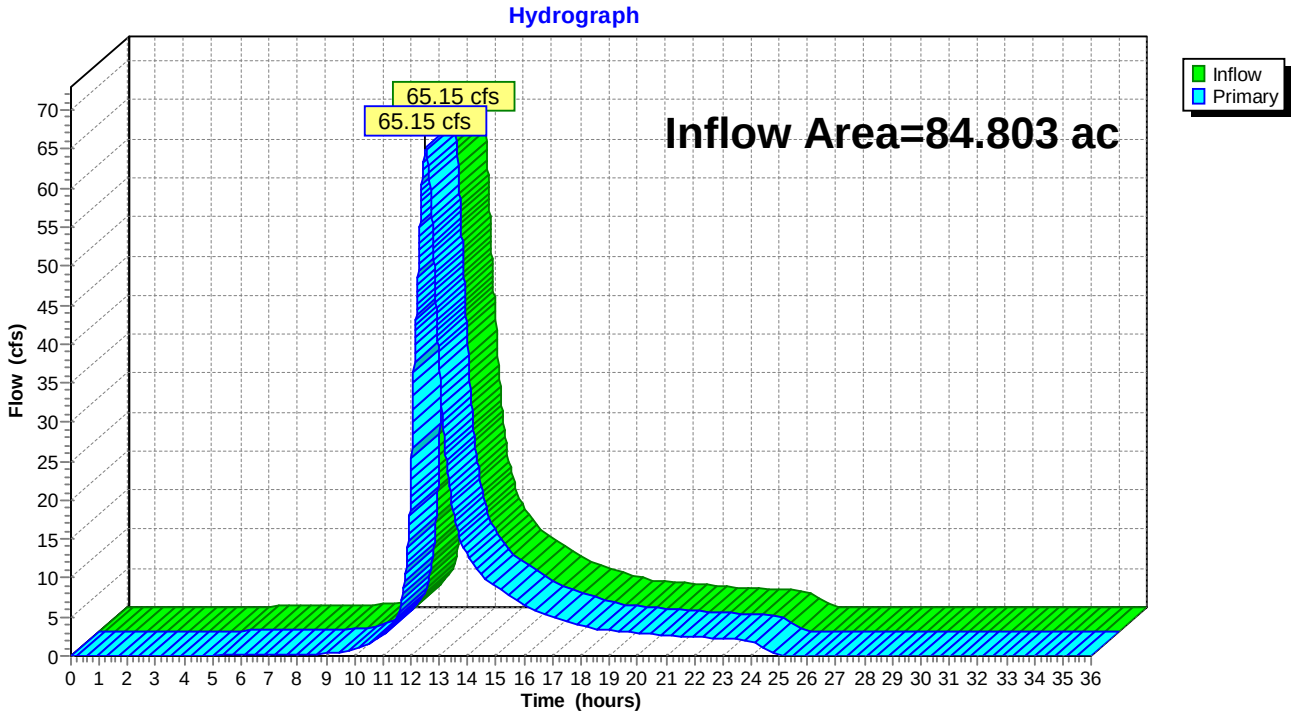


Summary for Link DP-33A: 3x6 BOX CULVERT TO NEW OUTFALL #33A

Inflow Area = 84.803 ac, 47.97% Impervious, Inflow Depth = 1.50" for 2-Year event
Inflow = 65.15 cfs @ 12.53 hrs, Volume= 10.568 af
Primary = 65.15 cfs @ 12.53 hrs, Volume= 10.568 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-33A: 3x6 BOX CULVERT TO NEW OUTFALL #33A

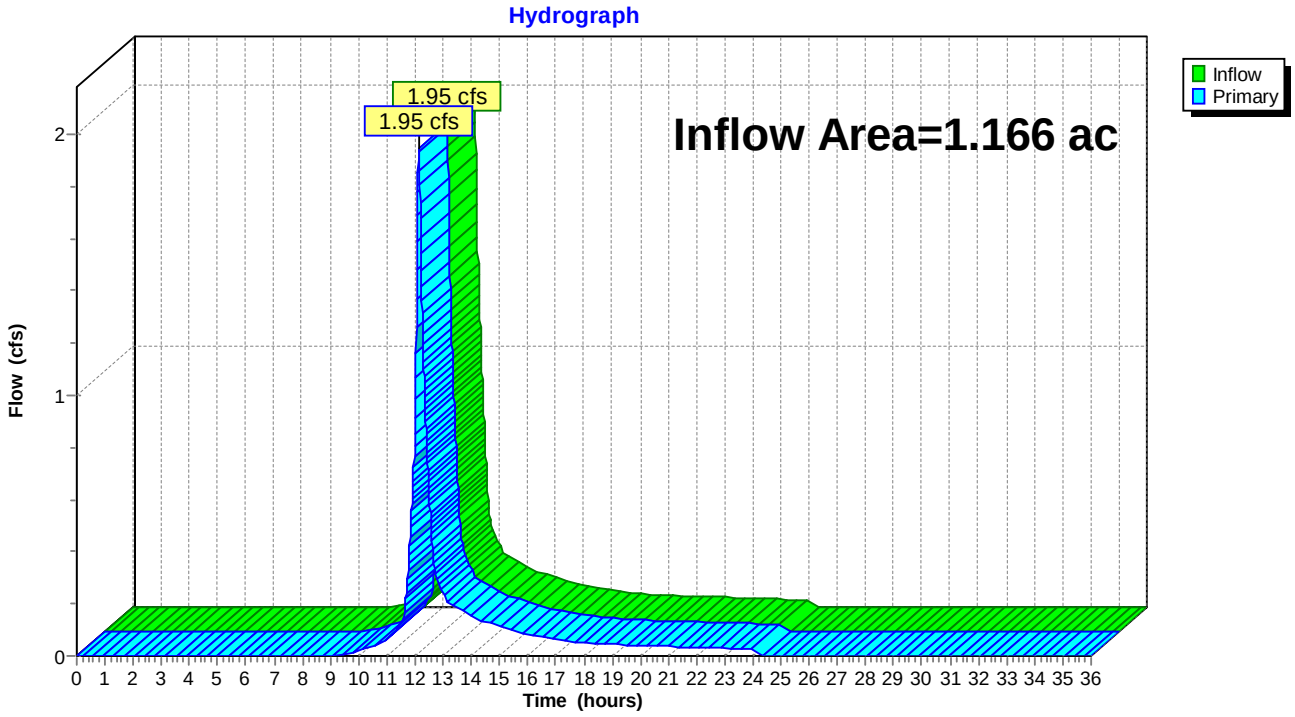


Summary for Link DP-34P: OUTFALL #34

Inflow Area = 1.166 ac, 53.54% Impervious, Inflow Depth = 1.59" for 2-Year event
Inflow = 1.95 cfs @ 12.13 hrs, Volume= 0.154 af
Primary = 1.95 cfs @ 12.13 hrs, Volume= 0.154 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-34P: OUTFALL #34



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-28: REDIRECTED AREA TO Runoff Area=86,600 sf 70.32% Impervious Runoff Depth=3.94"
Tc=8.0 min CN=92 Runoff=8.17 cfs 0.653 af

Subcatchment P-29A: LARGE EPR Runoff Area=2,650,000 sf 49.53% Impervious Runoff Depth=2.76"
Tc=41.0 min CN=80 Runoff=95.73 cfs 14.004 af

Subcatchment P-29B: SMALL EPR OFF-SITE Runoff Area=610,000 sf 38.00% Impervious Runoff Depth=2.33"
Tc=21.0 min CN=75 Runoff=25.13 cfs 2.717 af

Subcatchment P-29C: ON-SITE AREA TO Runoff Area=101,600 sf 38.39% Impervious Runoff Depth=2.76"
Tc=9.0 min CN=80 Runoff=6.82 cfs 0.537 af

Subcatchment P-29D: REDIRECTED ON-SITE Runoff Area=84,200 sf 100.00% Impervious Runoff Depth=4.61"
Tc=9.0 min CN=98 Runoff=8.30 cfs 0.743 af

Subcatchment P-29E: REDIREDTED AREA TO Runoff Area=60,200 sf 100.00% Impervious Runoff Depth=4.61"
Tc=5.0 min CN=98 Runoff=6.79 cfs 0.531 af

Subcatchment P-30: REDIRECTED AREA TO Runoff Area=120,800 sf 23.68% Impervious Runoff Depth=1.85"
Tc=11.0 min CN=69 Runoff=4.94 cfs 0.427 af

Subcatchment P-33: REDIRECTED AREA TO Runoff Area=68,700 sf 25.04% Impervious Runoff Depth=2.00"
Tc=8.0 min UI Adjusted CN=71 Runoff=3.40 cfs 0.263 af

Subcatchment P-34: B83 AND Runoff Area=50,800 sf 53.54% Impervious Runoff Depth=2.85"
Tc=9.0 min CN=81 Runoff=3.52 cfs 0.277 af

Subcatchment P-60A: PORTION OF EXISTING Runoff Area=30,900 sf 100.00% Impervious Runoff Depth=4.61"
Tc=8.0 min CN=98 Runoff=3.15 cfs 0.273 af

Subcatchment P-60B: PORTION OF Runoff Area=142,900 sf 100.00% Impervious Runoff Depth=4.61"
Tc=8.0 min CN=98 Runoff=14.55 cfs 1.261 af

Pond 1P-A: EXISTING ROCK CHANNEL WITH Peak Elev=16.94' Storage=8,178 cf Inflow=114.79 cfs 17.258 af
72.0" x 36.0" Box Culvert n=0.013 L=80.0' S=0.0162 '/' Outflow=113.80 cfs 17.258 af

Link DP-27A: OUTFALL #27A (30") Inflow=25.67 cfs 2.200 af
Primary=25.67 cfs 2.200 af

Link DP-33A: 3x6 BOX CULVERT TO NEW OUTFALL #33A Inflow=119.56 cfs 19.210 af
Primary=119.56 cfs 19.210 af

Link DP-34P: OUTFALL #34 Inflow=3.52 cfs 0.277 af
Primary=3.52 cfs 0.277 af

Total Runoff Area = 91.981 ac Runoff Volume = 21.688 af Average Runoff Depth = 2.83"
49.20% Pervious = 45.255 ac 50.80% Impervious = 46.726 ac

Summary for Subcatchment P-28: REDIRECTED AREA TO NEW OUTFALL #27A

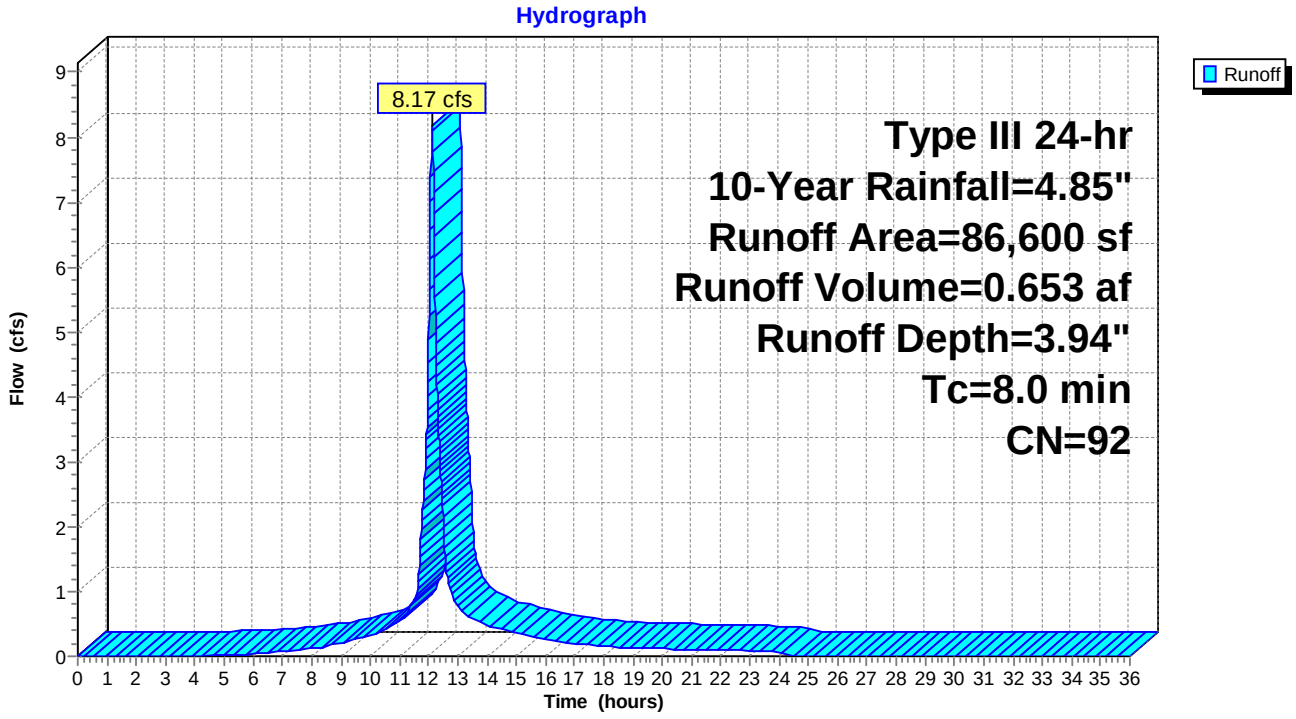
Runoff = 8.17 cfs @ 12.11 hrs, Volume= 0.653 af, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
19,800	80	>75% Grass cover, Good, HSG D
5,900	77	Woods, Good, HSG D
60,900	98	Unconnected pavement, HSG D
86,600	92	Weighted Average
25,700		29.68% Pervious Area
60,900		70.32% Impervious Area
60,900		100.00% Unconnected

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

Subcatchment P-28: REDIRECTED AREA TO NEW OUTFALL #27A



Summary for Subcatchment P-29A: LARGE EPR OFF-SITE AREA

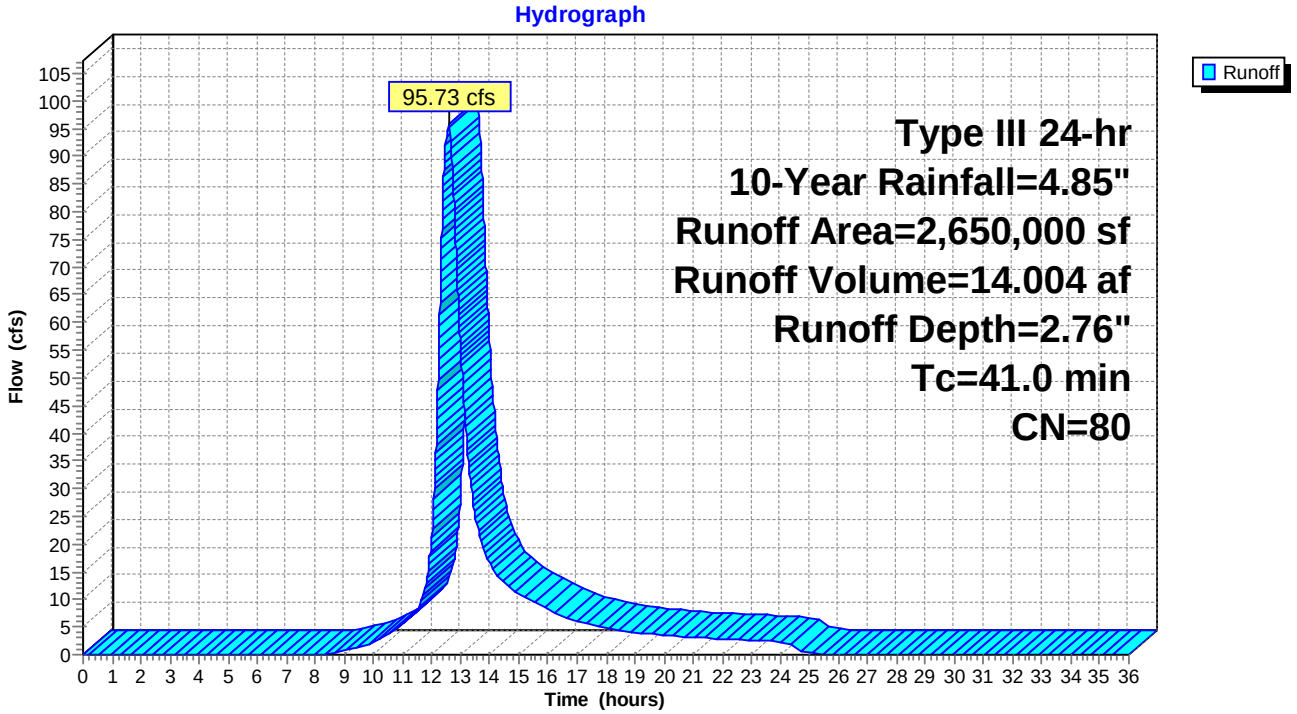
Runoff = 95.73 cfs @ 12.57 hrs, Volume= 14.004 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
2,000,000	75	1/4 acre lots, 38% imp, HSG B
650,000	95	Urban commercial, 85% imp, HSG D
2,650,000	80	Weighted Average
1,337,500		50.47% Pervious Area
1,312,500		49.53% Impervious Area

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

Subcatchment P-29A: LARGE EPR OFF-SITE AREA



Summary for Subcatchment P-29B: SMALL EPR OFF-SITE AREA

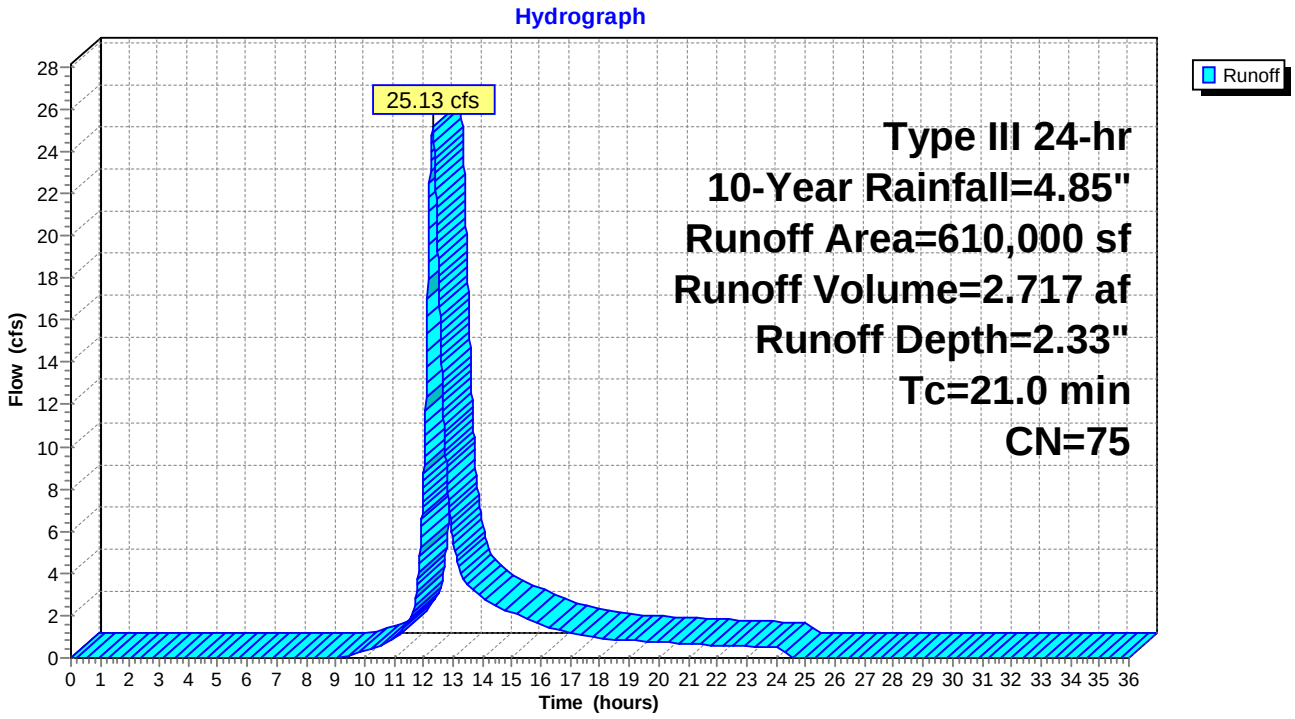
Runoff = 25.13 cfs @ 12.30 hrs, Volume= 2.717 af, Depth= 2.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
610,000	75	1/4 acre lots, 38% imp, HSG B
378,200		62.00% Pervious Area
231,800		38.00% Impervious Area

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

Subcatchment P-29B: SMALL EPR OFF-SITE AREA



Summary for Subcatchment P-29C: ON-SITE AREA TO CHANNEL

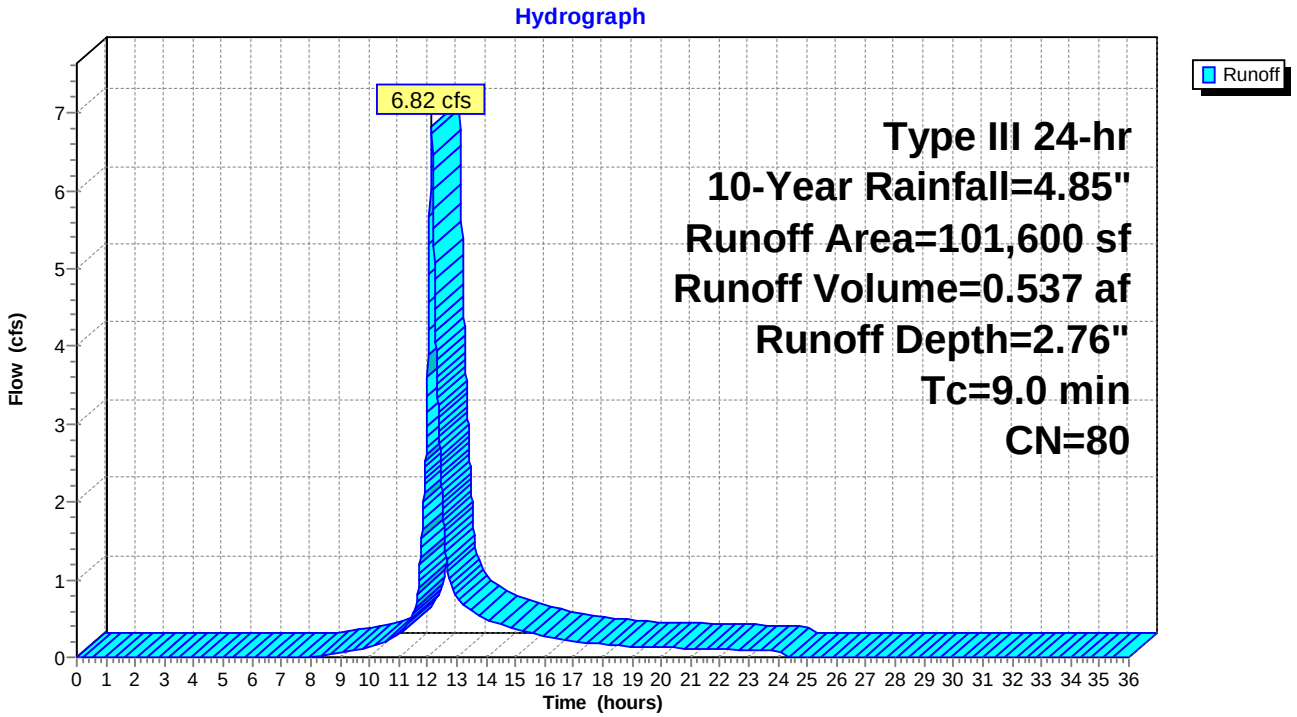
Runoff = 6.82 cfs @ 12.13 hrs, Volume= 0.537 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
19,300	98	Unconnected pavement, HSG B
19,700	98	Unconnected roofs, HSG B
5,300	80	>75% Grass cover, Good, HSG D
15,600	77	Woods, Good, HSG D
19,300	61	>75% Grass cover, Good, HSG B
14,900	55	Woods, Good, HSG B
7,500	85	Gravel roads, HSG B
101,600	80	Weighted Average
62,600		61.61% Pervious Area
39,000		38.39% Impervious Area
39,000		100.00% Unconnected

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

Subcatchment P-29C: ON-SITE AREA TO CHANNEL



Summary for Subcatchment P-29D: REDIRECTED ON-SITE AREA TO OUTFALL #27A

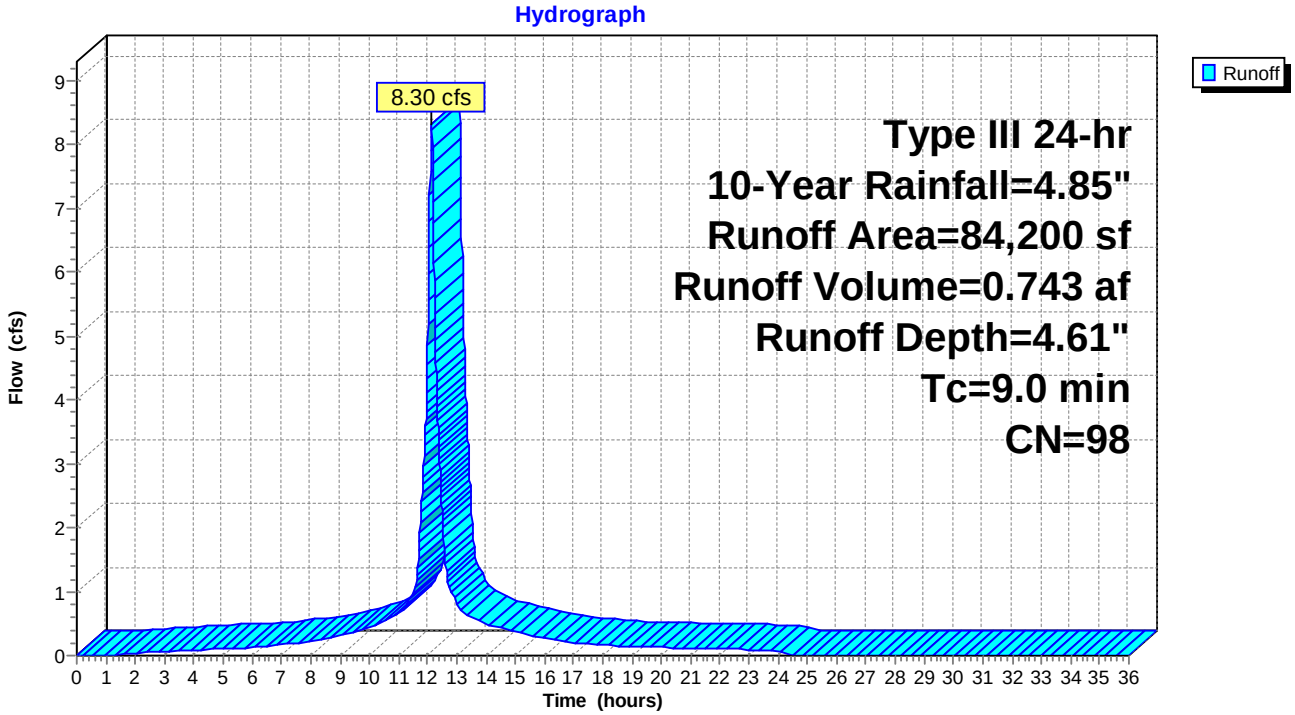
Runoff = 8.30 cfs @ 12.12 hrs, Volume= 0.743 af, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
63,000	98	Unconnected pavement, HSG B
21,200	98	Unconnected roofs, HSG B
0	80	>75% Grass cover, Good, HSG D
0	77	Woods, Good, HSG D
0	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
84,200	98	Weighted Average
84,200		100.00% Impervious Area
84,200		100.00% Unconnected

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

Subcatchment P-29D: REDIRECTED ON-SITE AREA TO OUTFALL #27A



Summary for Subcatchment P-29E: REDIREDTED AREA TO NEW OUTFALL #27A

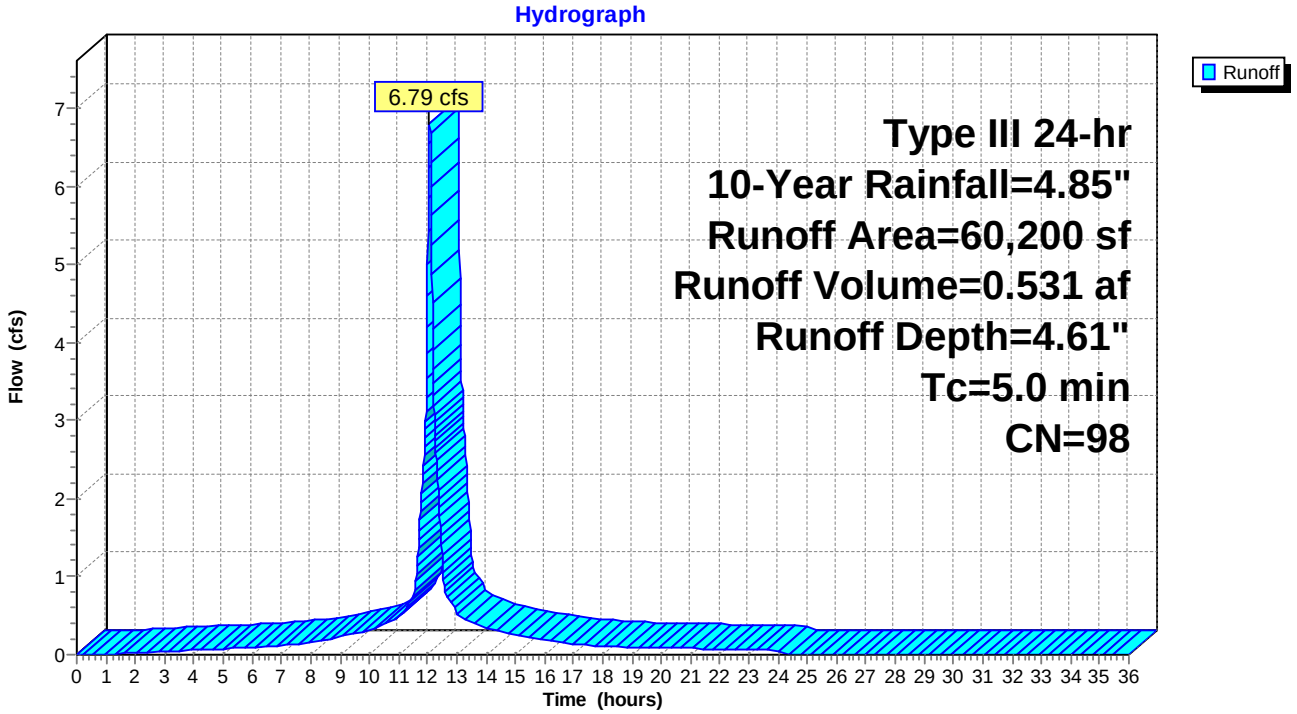
Runoff = 6.79 cfs @ 12.07 hrs, Volume= 0.531 af, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
54,700	98	Unconnected pavement, HSG B
5,500	98	Unconnected roofs, HSG B
60,200	98	Weighted Average
60,200		100.00% Impervious Area
60,200		100.00% Unconnected

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

Subcatchment P-29E: REDIREDTED AREA TO NEW OUTFALL #27A



Summary for Subcatchment P-30: REDIRECTED AREA TO NEW OUTFALL #33A

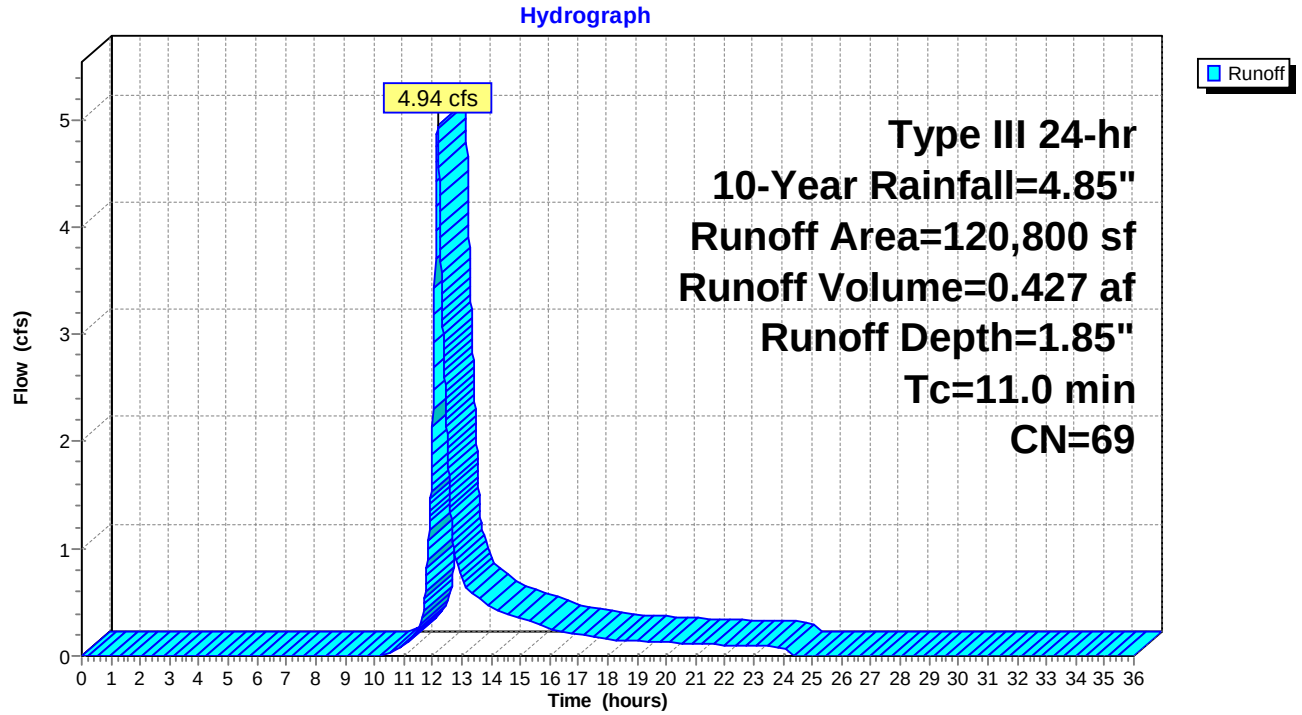
Runoff = 4.94 cfs @ 12.16 hrs, Volume= 0.427 af, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
86,800	61	>75% Grass cover, Good, HSG B
28,600	98	Paved parking, HSG B
5,400	55	Woods, Good, HSG B
120,800	69	Weighted Average
92,200		76.32% Pervious Area
28,600		23.68% Impervious Area

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

Subcatchment P-30: REDIRECTED AREA TO NEW OUTFALL #33A



Summary for Subcatchment P-33: REDIRECTED AREA TO NEW OUTFALL #33A

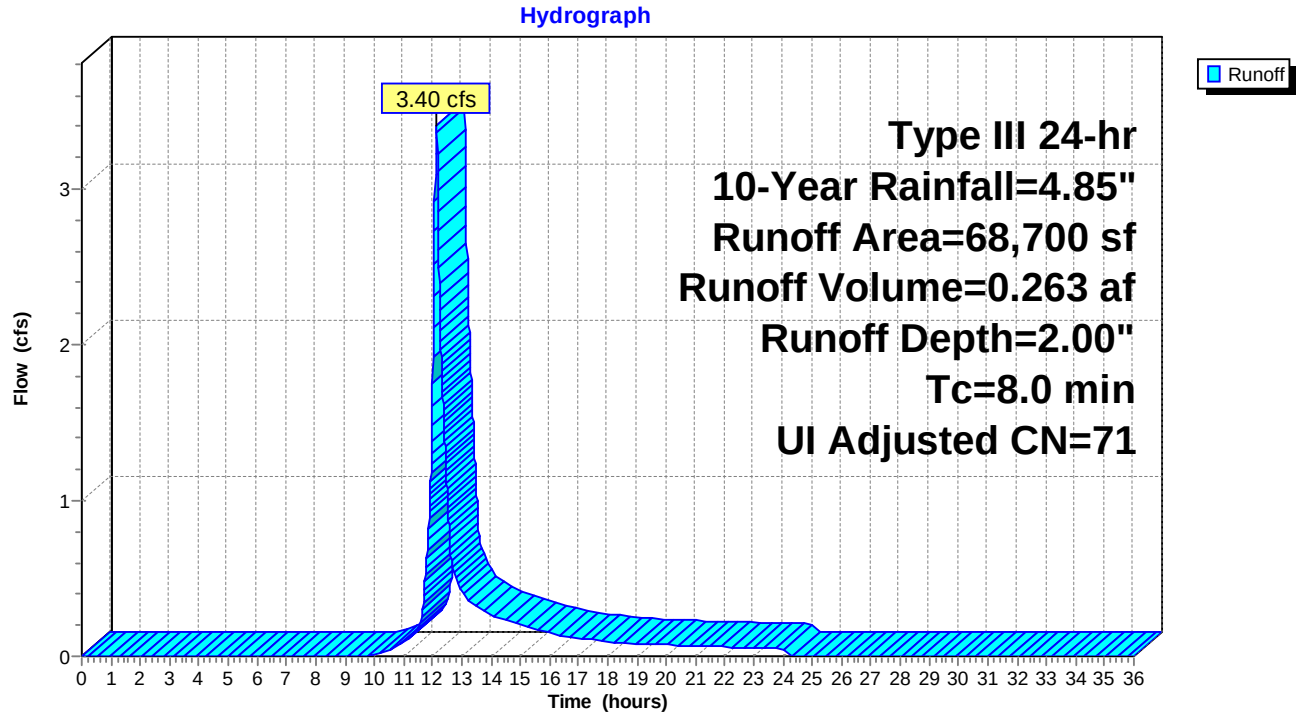
Runoff = 3.40 cfs @ 12.12 hrs, Volume= 0.263 af, Depth= 2.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Adj	Description
39,500	61		>75% Grass cover, Good, HSG B
17,200	98		Unconnected pavement, HSG B
12,000	85		Gravel roads, HSG B
68,700	74	71	Weighted Average, UI Adjusted
51,500			74.96% Pervious Area
17,200			25.04% Impervious Area
17,200			100.00% Unconnected

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

Subcatchment P-33: REDIRECTED AREA TO NEW OUTFALL #33A



Summary for Subcatchment P-34: B83 AND CONSTRUCTION ROAD TO OUTFALL #34

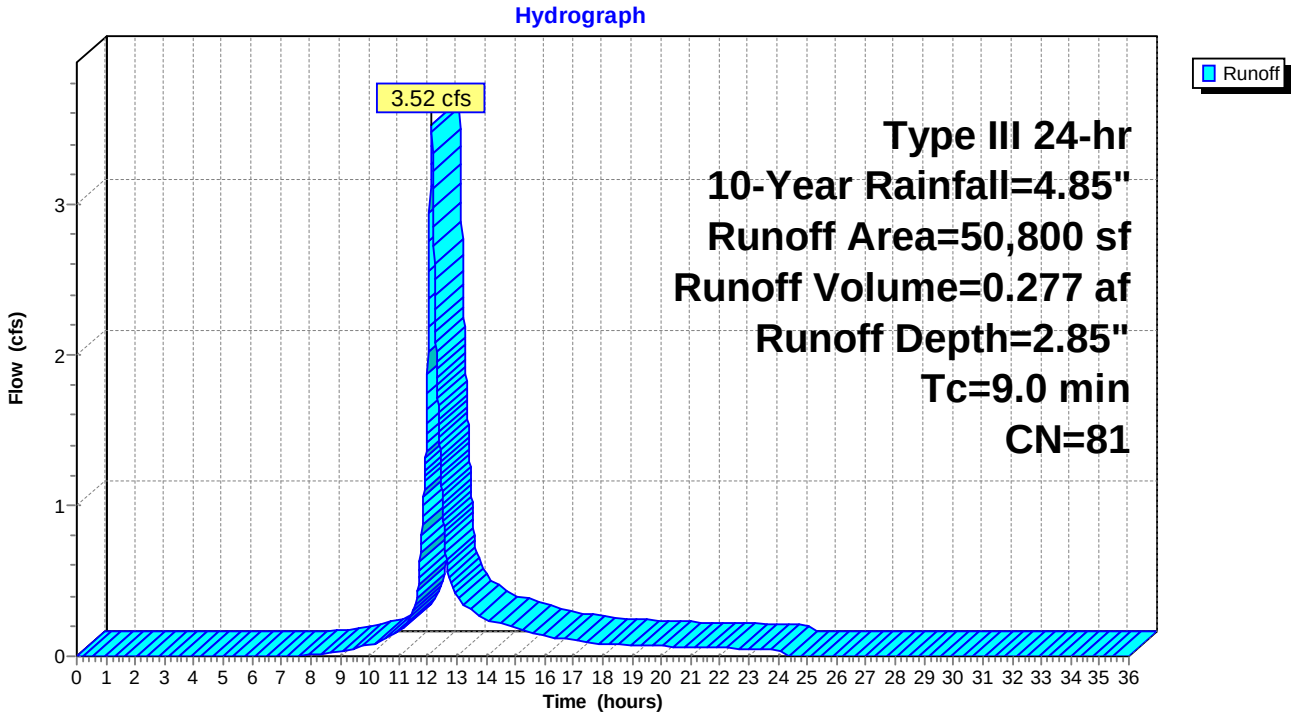
Runoff = 3.52 cfs @ 12.13 hrs, Volume= 0.277 af, Depth= 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
10,000	98	Unconnected pavement, HSG B
8,400	98	Unconnected roofs, HSG B
8,800	98	Paved parking, HSG B
23,600	61	>75% Grass cover, Good, HSG B
50,800	81	Weighted Average
23,600		46.46% Pervious Area
27,200		53.54% Impervious Area
18,400		67.65% Unconnected

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

Subcatchment P-34: B83 AND CONSTRUCTION ROAD TO OUTFALL #34



mary for Subcatchment P-60A: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL

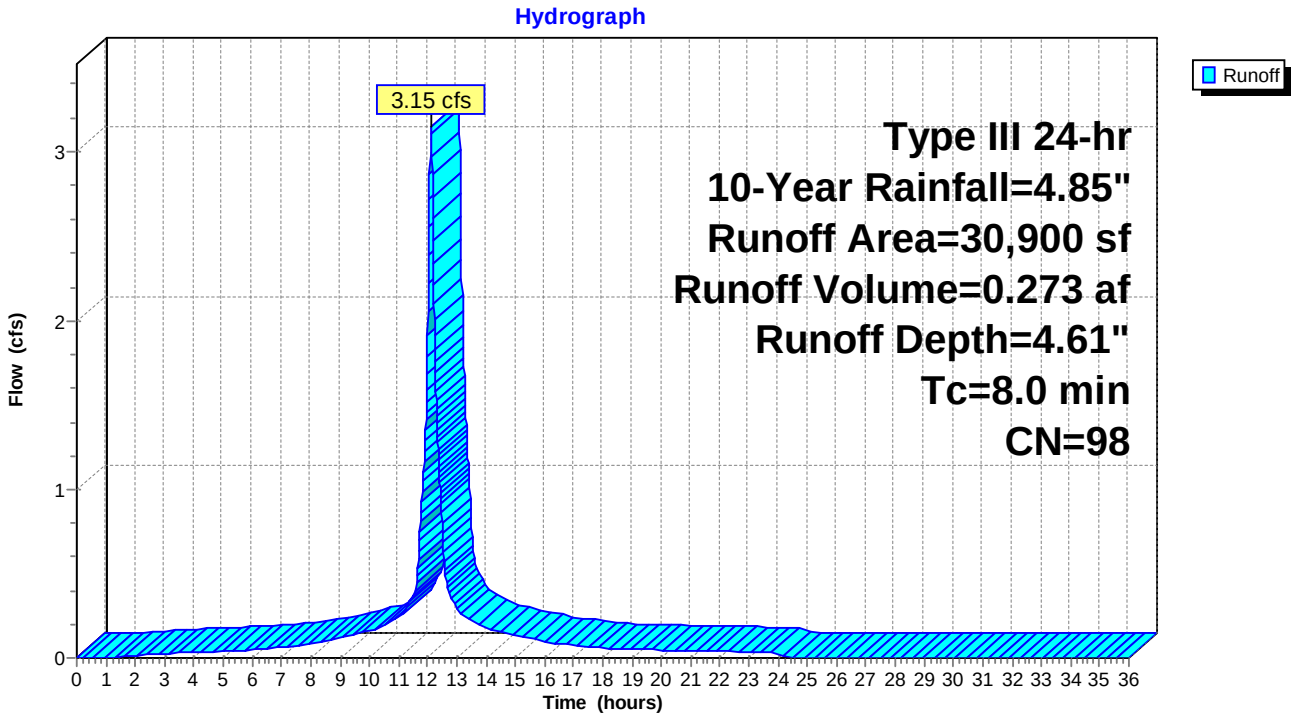
Runoff = 3.15 cfs @ 12.11 hrs, Volume= 0.273 af, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
30,900	98	Unconnected pavement, HSG D
30,900		100.00% Impervious Area
30,900		100.00% Unconnected

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

Subcatchment P-60A: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL #27A



mary for Subcatchment P-60B: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL

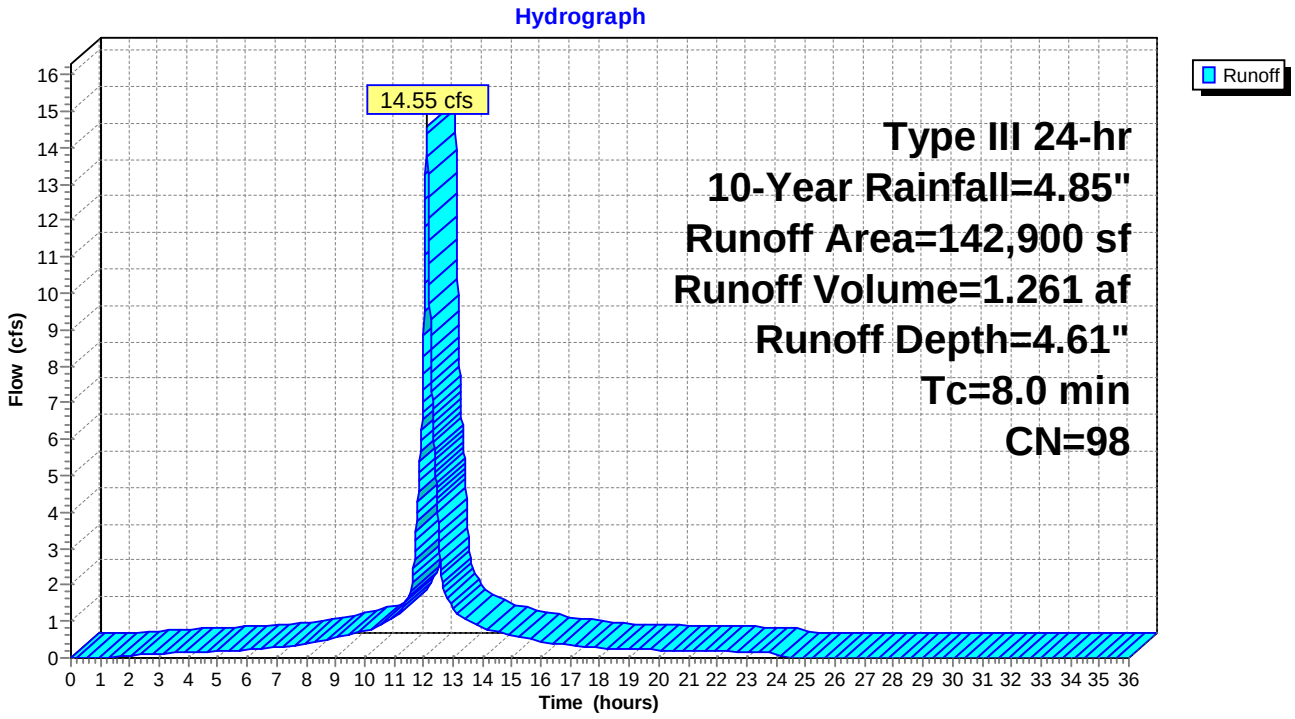
Runoff = 14.55 cfs @ 12.11 hrs, Volume= 1.261 af, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.85"

Area (sf)	CN	Description
142,900	98	Unconnected pavement, HSG B
142,900		100.00% Impervious Area
142,900		100.00% Unconnected

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

Subcatchment P-60B: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL #33A



Summary for Pond 1P-A: EXISTING ROCK CHANNEL WITH ADDED WALL

Inflow Area = 77.172 ac, 47.10% Impervious, Inflow Depth = 2.68" for 10-Year event
Inflow = 114.79 cfs @ 12.53 hrs, Volume= 17.258 af
Outflow = 113.80 cfs @ 12.55 hrs, Volume= 17.258 af, Atten= 1%, Lag= 1.7 min
Primary = 113.80 cfs @ 12.55 hrs, Volume= 17.258 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 16.94' @ 12.55 hrs Surf.Area= 6,000 sf Storage= 8,178 cf

Plug-Flow detention time= 0.7 min calculated for 17.253 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (854.5 - 853.8)

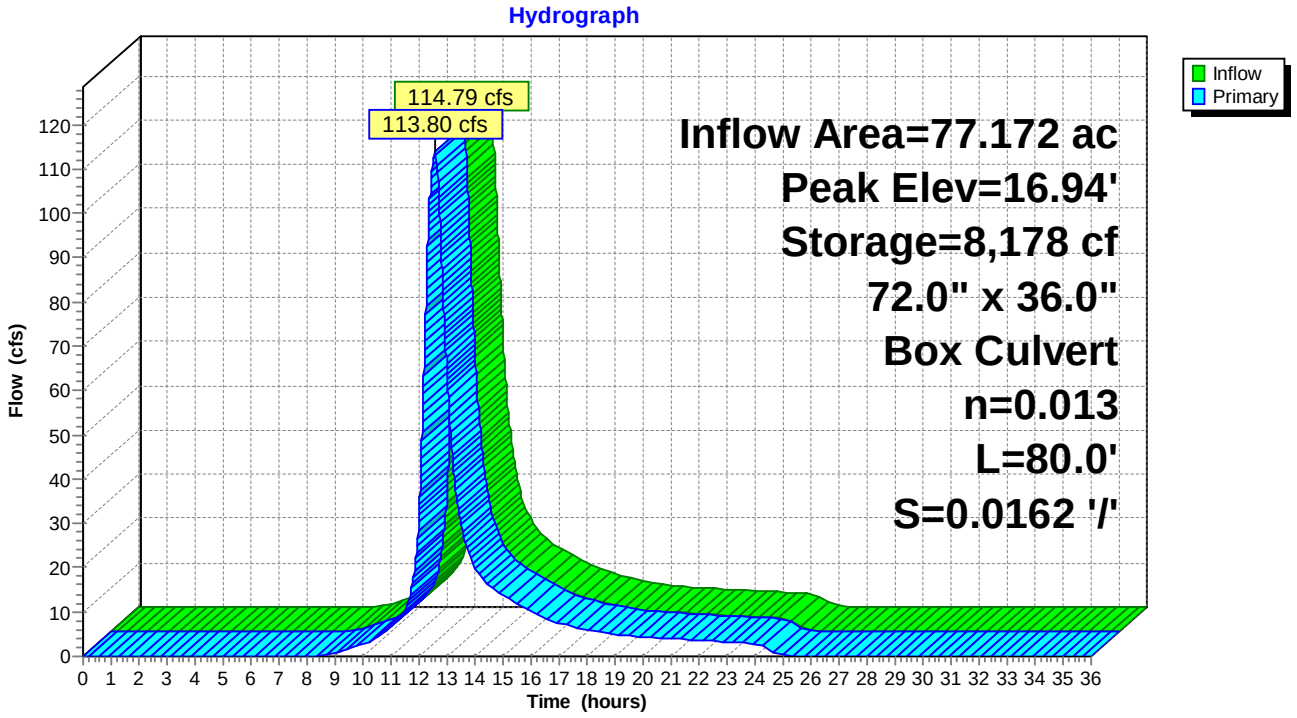
Volume	Invert	Avail.Storage	Storage Description
#1	13.60'	48,125 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.60	250	0	0
14.60	1,000	625	625
15.60	2,000	1,500	2,125
16.60	6,000	4,000	6,125
17.60	6,000	6,000	12,125
18.60	6,000	6,000	18,125
19.60	6,000	6,000	24,125
20.60	6,000	6,000	30,125
21.60	6,000	6,000	36,125
22.60	6,000	6,000	42,125
23.60	6,000	6,000	48,125

Device	Routing	Invert	Outlet Devices
#1	Primary	13.60'	**72.0" W x 36.0" H Box 3x6 Box Culvert** L= 80.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 13.60' / 12.30' S= 0.0162 '/' Cc= 0.900 n= 0.013, Flow Area= 18.00 sf

Primary OutFlow Max=113.81 cfs @ 12.55 hrs HW=16.94' TW=4.00' (Fixed TW Elev= 4.00')
↑—**1=3x6 Box Culvert** (Inlet Controls 113.81 cfs @ 6.32 fps)

Pond 1P-A: EXISTING ROCK CHANNEL WITH ADDED WALL

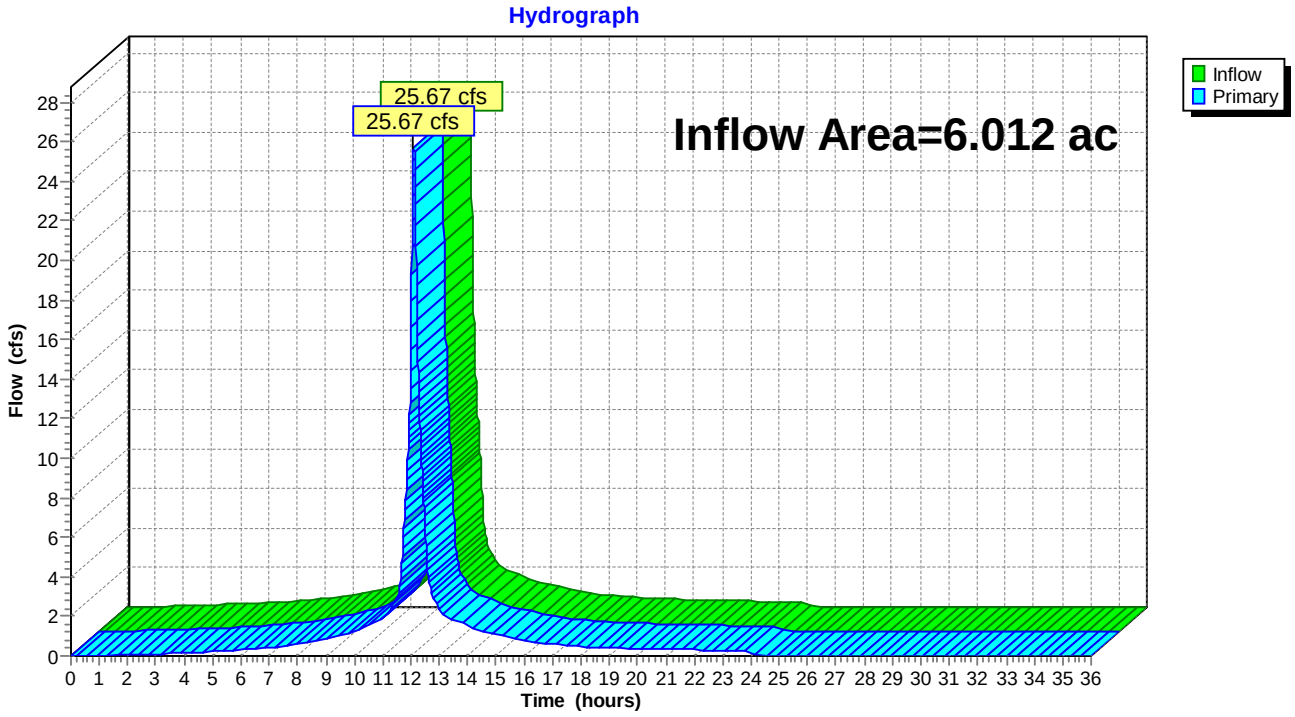


Summary for Link DP-27A: OUTFALL #27A (30")

Inflow Area = 6.012 ac, 90.19% Impervious, Inflow Depth = 4.39" for 10-Year event
Inflow = 25.67 cfs @ 12.10 hrs, Volume= 2.200 af
Primary = 25.67 cfs @ 12.10 hrs, Volume= 2.200 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-27A: OUTFALL #27A (30")

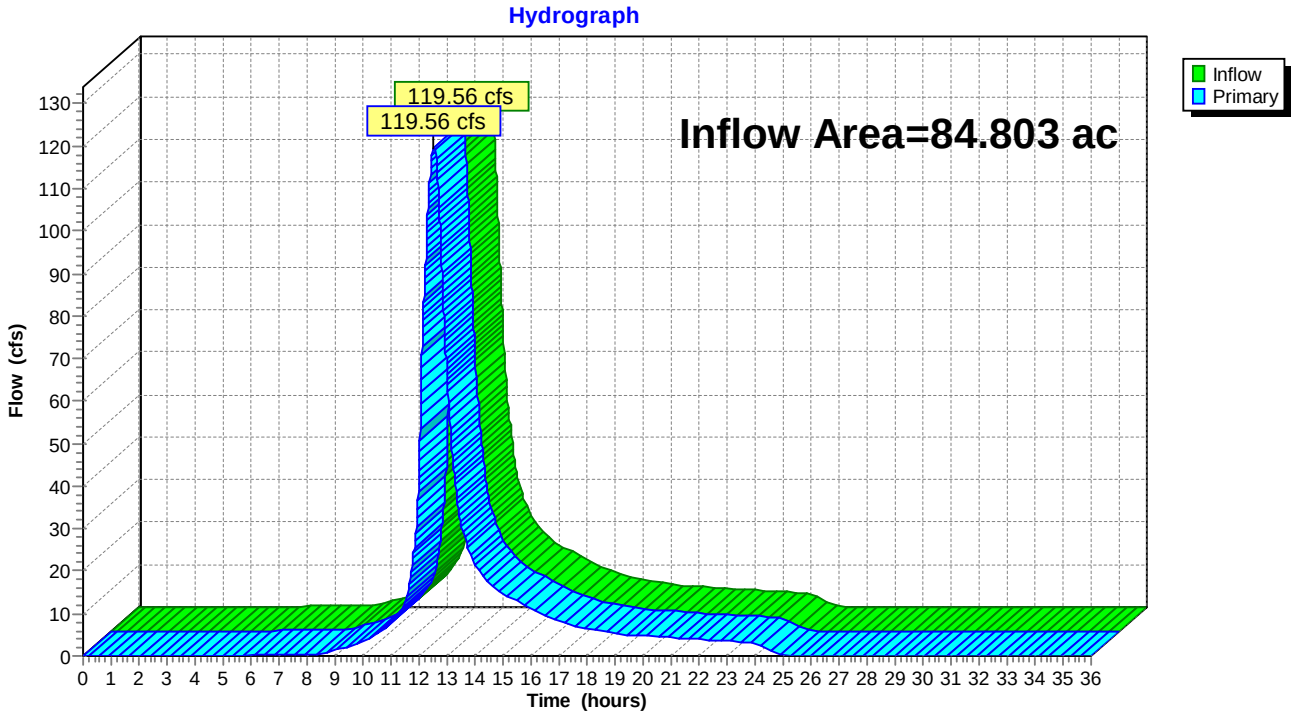


Summary for Link DP-33A: 3x6 BOX CULVERT TO NEW OUTFALL #33A

Inflow Area = 84.803 ac, 47.97% Impervious, Inflow Depth = 2.72" for 10-Year event
Inflow = 119.56 cfs @ 12.53 hrs, Volume= 19.210 af
Primary = 119.56 cfs @ 12.53 hrs, Volume= 19.210 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-33A: 3x6 BOX CULVERT TO NEW OUTFALL #33A

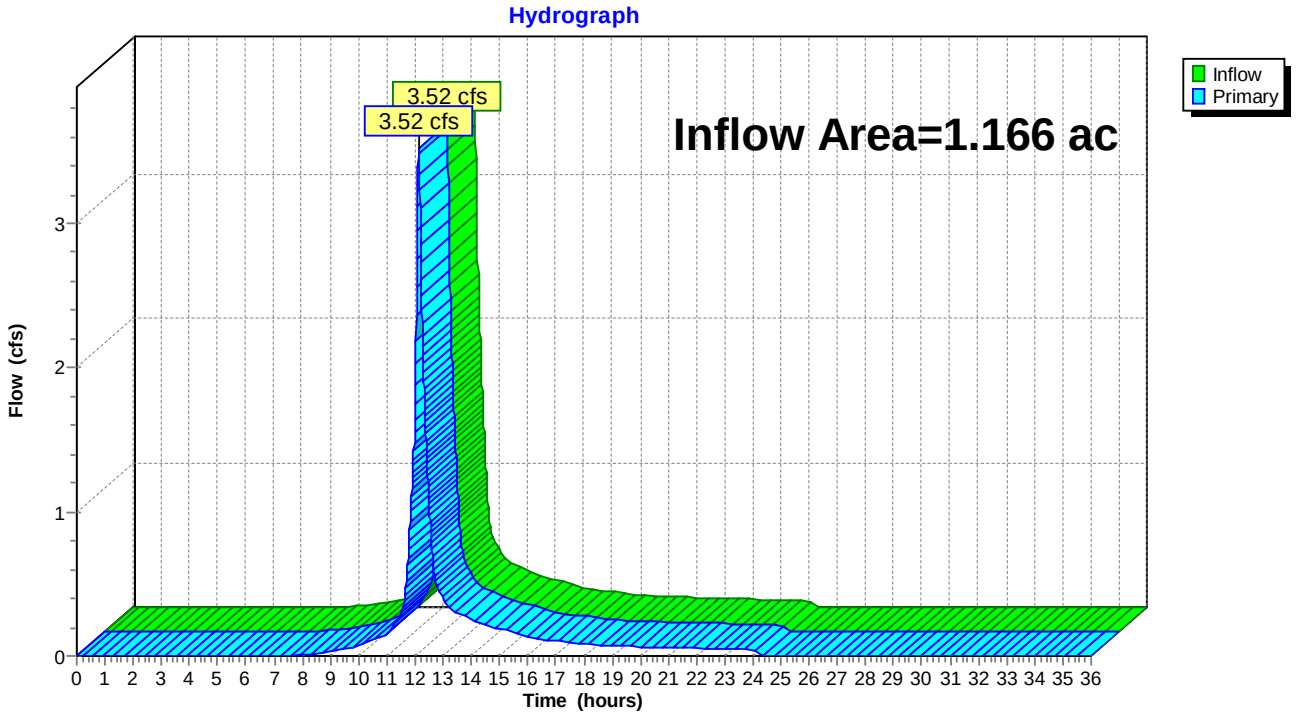


Summary for Link DP-34P: OUTFALL #34

Inflow Area = 1.166 ac, 53.54% Impervious, Inflow Depth = 2.85" for 10-Year event
Inflow = 3.52 cfs @ 12.13 hrs, Volume= 0.277 af
Primary = 3.52 cfs @ 12.13 hrs, Volume= 0.277 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-34P: OUTFALL #34



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-28: REDIRECTED AREA TO Runoff Area=86,600 sf 70.32% Impervious Runoff Depth=5.06"
Tc=8.0 min CN=92 Runoff=10.33 cfs 0.838 af

Subcatchment P-29A: LARGE EPR Runoff Area=2,650,000 sf 49.53% Impervious Runoff Depth=3.77"
Tc=41.0 min CN=80 Runoff=130.42 cfs 19.124 af

Subcatchment P-29B: SMALL EPR OFF-SITE Runoff Area=610,000 sf 38.00% Impervious Runoff Depth=3.27"
Tc=21.0 min CN=75 Runoff=35.52 cfs 3.820 af

Subcatchment P-29C: ON-SITE AREA TO Runoff Area=101,600 sf 38.39% Impervious Runoff Depth=3.77"
Tc=9.0 min CN=80 Runoff=9.28 cfs 0.733 af

Subcatchment P-29D: REDIRECTED ON-SITE Runoff Area=84,200 sf 100.00% Impervious Runoff Depth=5.75"
Tc=9.0 min CN=98 Runoff=10.27 cfs 0.927 af

Subcatchment P-29E: REDIREDTED AREA TO Runoff Area=60,200 sf 100.00% Impervious Runoff Depth=5.75"
Tc=5.0 min CN=98 Runoff=8.40 cfs 0.662 af

Subcatchment P-30: REDIRECTED AREA TO Runoff Area=120,800 sf 23.68% Impervious Runoff Depth=2.70"
Tc=11.0 min CN=69 Runoff=7.37 cfs 0.625 af

Subcatchment P-33: REDIRECTED AREA TO Runoff Area=68,700 sf 25.04% Impervious Runoff Depth=2.89"
Tc=8.0 min UI Adjusted CN=71 Runoff=4.97 cfs 0.380 af

Subcatchment P-34: B83 AND Runoff Area=50,800 sf 53.54% Impervious Runoff Depth=3.87"
Tc=9.0 min CN=81 Runoff=4.76 cfs 0.377 af

Subcatchment P-60A: PORTION OF EXISTING Runoff Area=30,900 sf 100.00% Impervious Runoff Depth=5.75"
Tc=8.0 min CN=98 Runoff=3.89 cfs 0.340 af

Subcatchment P-60B: PORTION OF Runoff Area=142,900 sf 100.00% Impervious Runoff Depth=5.75"
Tc=8.0 min CN=98 Runoff=18.01 cfs 1.572 af

Pond 1P-A: EXISTING ROCK CHANNEL Peak Elev=18.35' Storage=16,598 cf Inflow=156.99 cfs 23.677 af
72.0" x 36.0" Box Culvert n=0.013 L=80.0' S=0.0162 '/' Outflow=154.68 cfs 23.677 af

Link DP-27A: OUTFALL #27A (30") Inflow=32.00 cfs 2.767 af
Primary=32.00 cfs 2.767 af

Link DP-33A: 3x6 BOX CULVERT TO NEW OUTFALL #33A Inflow=162.01 cfs 26.255 af
Primary=162.01 cfs 26.255 af

Link DP-34P: OUTFALL #34 Inflow=4.76 cfs 0.377 af
Primary=4.76 cfs 0.377 af

Total Runoff Area = 91.981 ac Runoff Volume = 29.398 af Average Runoff Depth = 3.84"
49.20% Pervious = 45.255 ac 50.80% Impervious = 46.726 ac

Summary for Subcatchment P-28: REDIRECTED AREA TO NEW OUTFALL #27A

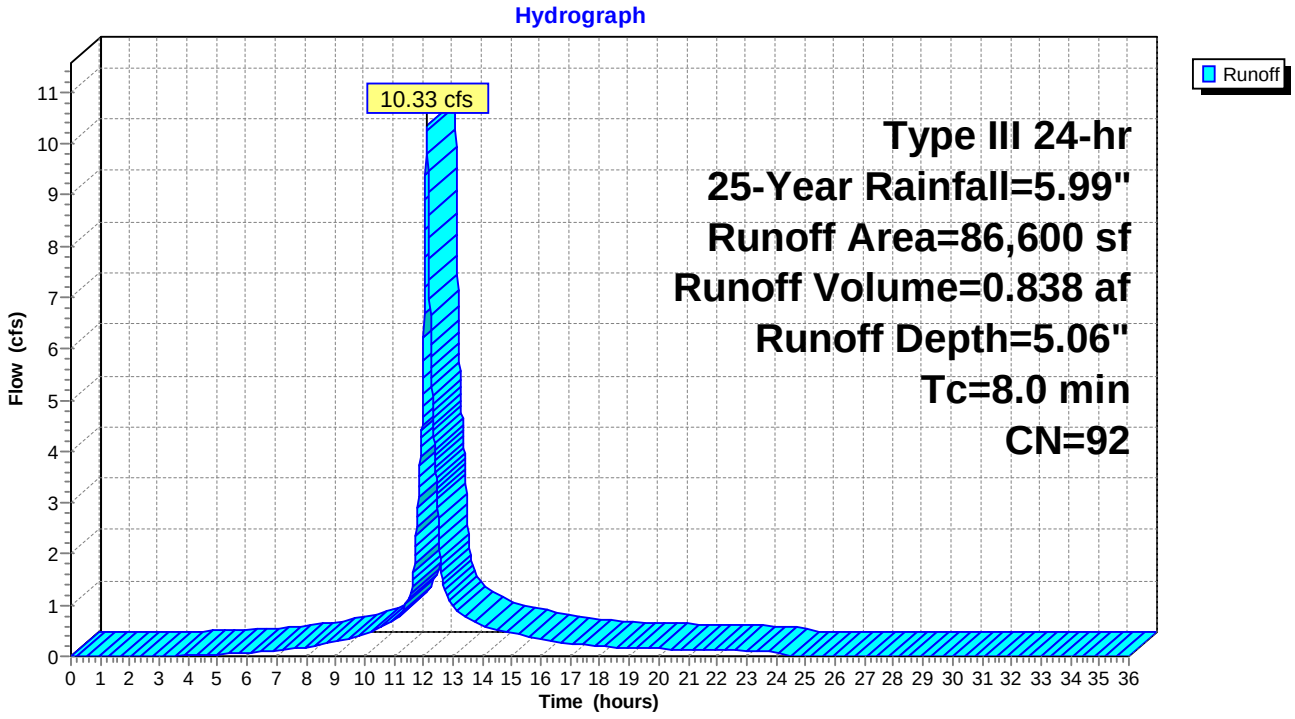
Runoff = 10.33 cfs @ 12.11 hrs, Volume= 0.838 af, Depth= 5.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
19,800	80	>75% Grass cover, Good, HSG D
5,900	77	Woods, Good, HSG D
60,900	98	Unconnected pavement, HSG D
86,600	92	Weighted Average
25,700		29.68% Pervious Area
60,900		70.32% Impervious Area
60,900		100.00% Unconnected

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

Subcatchment P-28: REDIRECTED AREA TO NEW OUTFALL #27A



Summary for Subcatchment P-29A: LARGE EPR OFF-SITE AREA

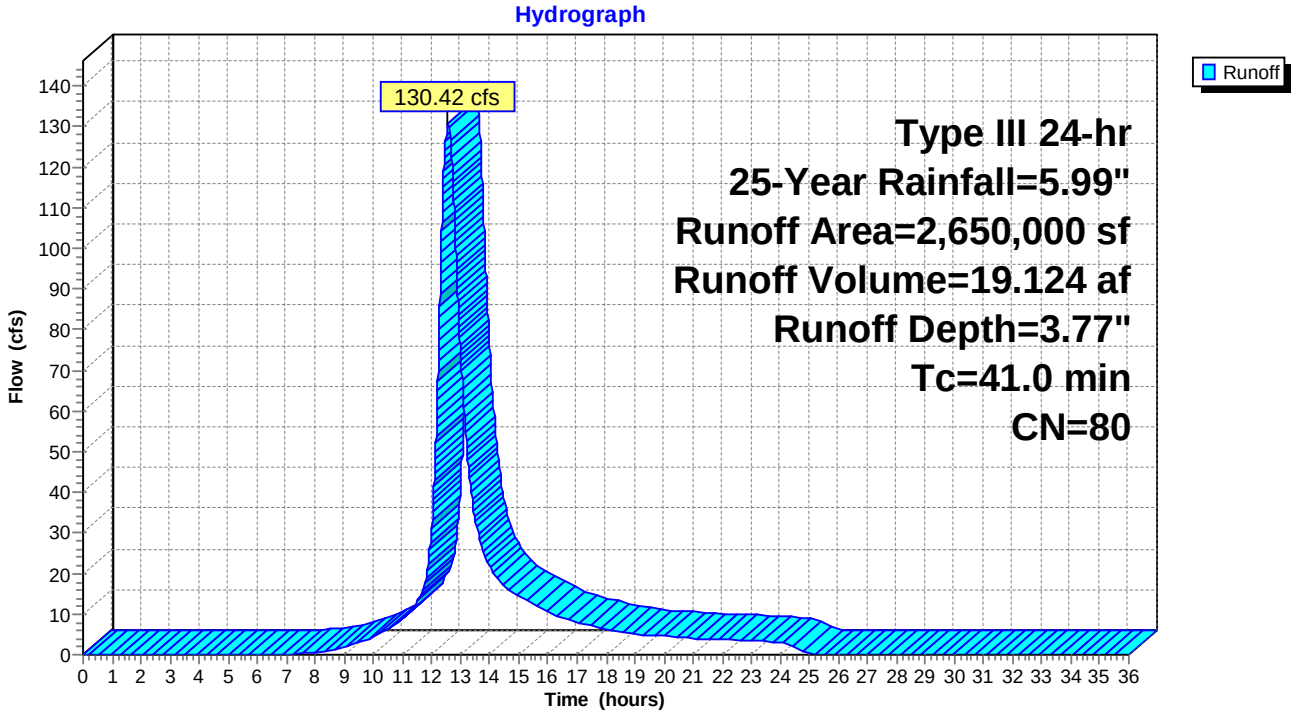
Runoff = 130.42 cfs @ 12.54 hrs, Volume= 19.124 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
2,000,000	75	1/4 acre lots, 38% imp, HSG B
650,000	95	Urban commercial, 85% imp, HSG D
2,650,000	80	Weighted Average
1,337,500		50.47% Pervious Area
1,312,500		49.53% Impervious Area

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

Subcatchment P-29A: LARGE EPR OFF-SITE AREA



Summary for Subcatchment P-29B: SMALL EPR OFF-SITE AREA

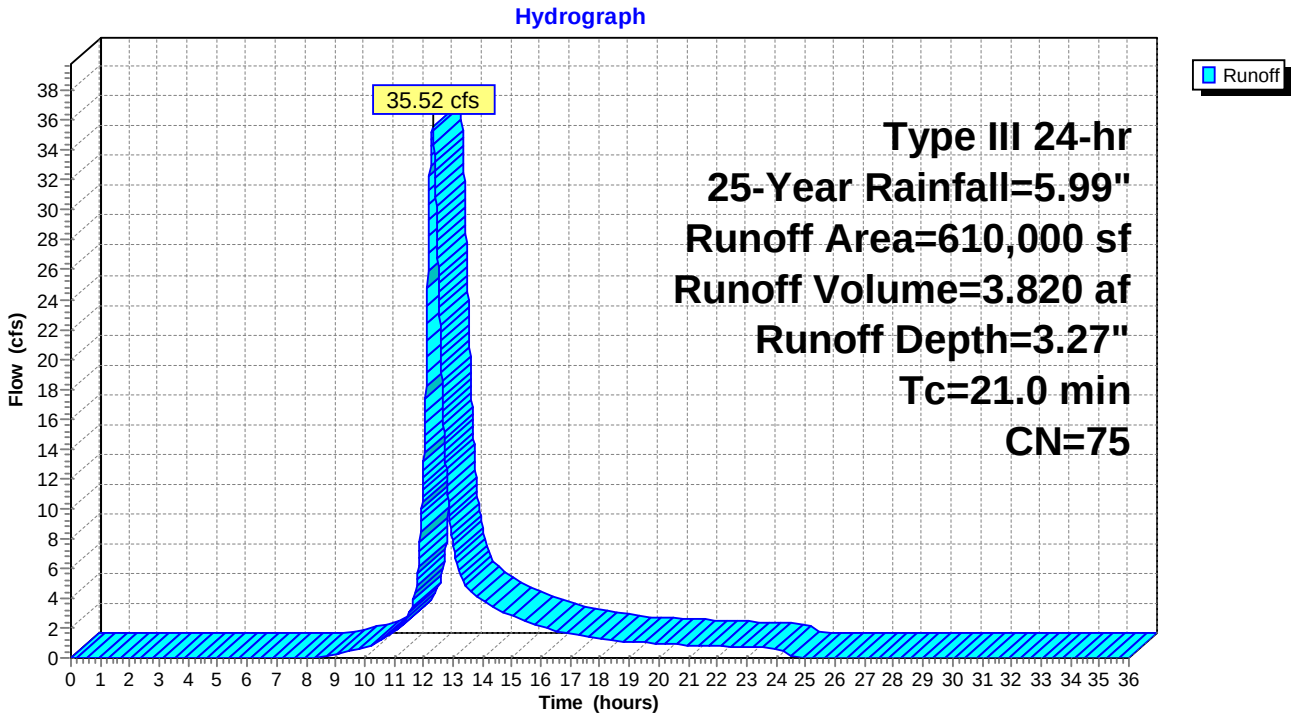
Runoff = 35.52 cfs @ 12.29 hrs, Volume= 3.820 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
610,000	75	1/4 acre lots, 38% imp, HSG B
378,200		62.00% Pervious Area
231,800		38.00% Impervious Area

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

Subcatchment P-29B: SMALL EPR OFF-SITE AREA



Summary for Subcatchment P-29C: ON-SITE AREA TO CHANNEL

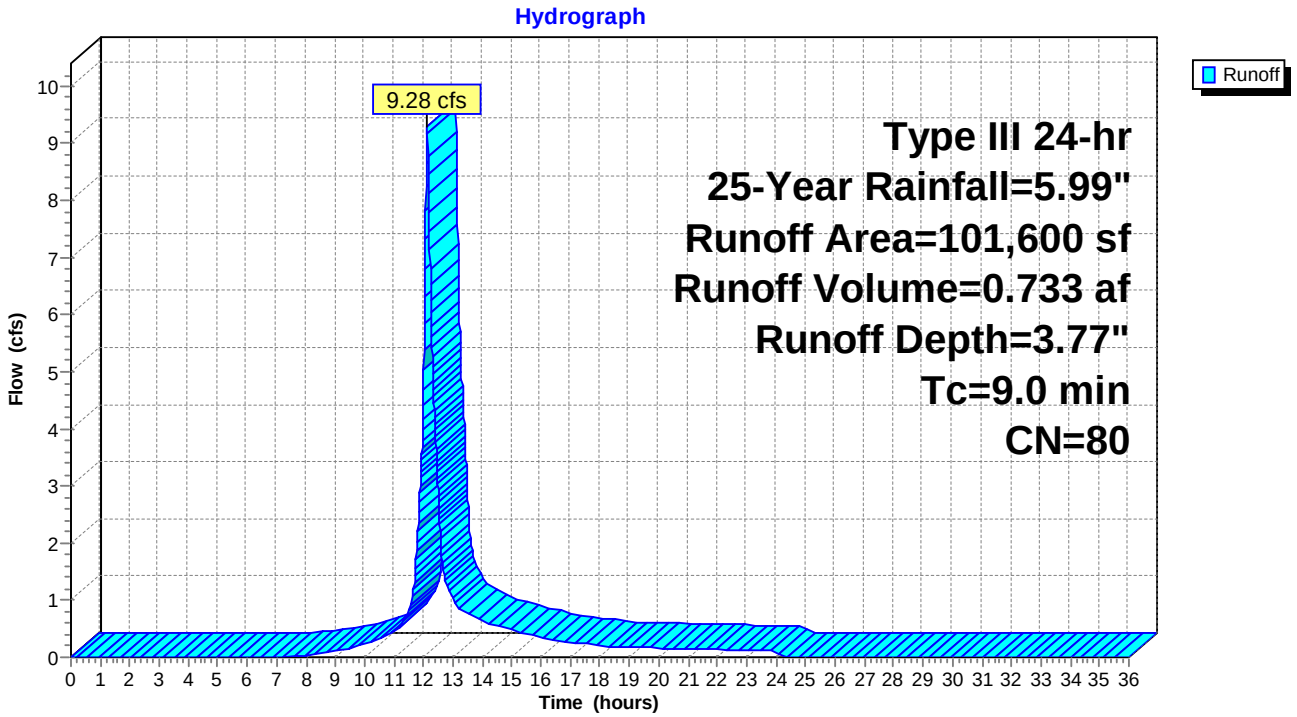
Runoff = 9.28 cfs @ 12.13 hrs, Volume= 0.733 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
19,300	98	Unconnected pavement, HSG B
19,700	98	Unconnected roofs, HSG B
5,300	80	>75% Grass cover, Good, HSG D
15,600	77	Woods, Good, HSG D
19,300	61	>75% Grass cover, Good, HSG B
14,900	55	Woods, Good, HSG B
7,500	85	Gravel roads, HSG B
101,600	80	Weighted Average
62,600		61.61% Pervious Area
39,000		38.39% Impervious Area
39,000		100.00% Unconnected

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

Subcatchment P-29C: ON-SITE AREA TO CHANNEL



Summary for Subcatchment P-29D: REDIRECTED ON-SITE AREA TO OUTFALL #27A

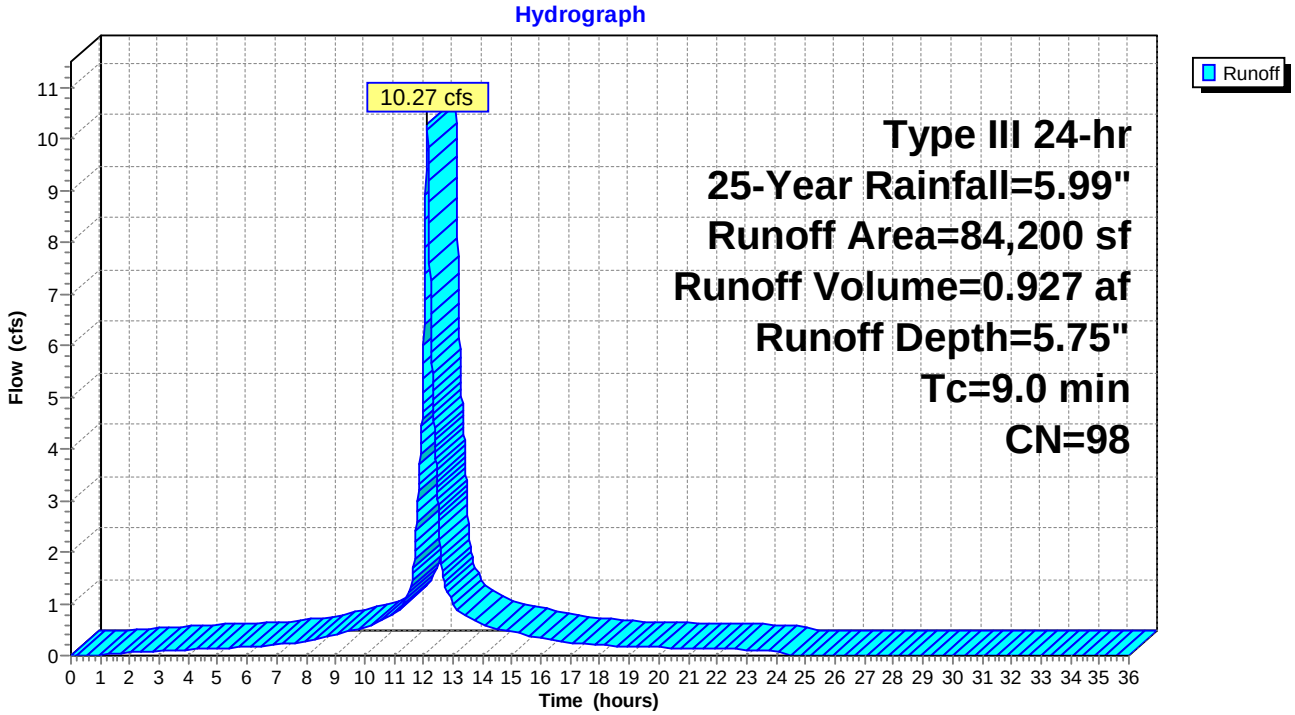
Runoff = 10.27 cfs @ 12.12 hrs, Volume= 0.927 af, Depth= 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
63,000	98	Unconnected pavement, HSG B
21,200	98	Unconnected roofs, HSG B
0	80	>75% Grass cover, Good, HSG D
0	77	Woods, Good, HSG D
0	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
84,200	98	Weighted Average
84,200		100.00% Impervious Area
84,200		100.00% Unconnected

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

Subcatchment P-29D: REDIRECTED ON-SITE AREA TO OUTFALL #27A



Summary for Subcatchment P-29E: REDIREDTED AREA TO NEW OUTFALL #27A

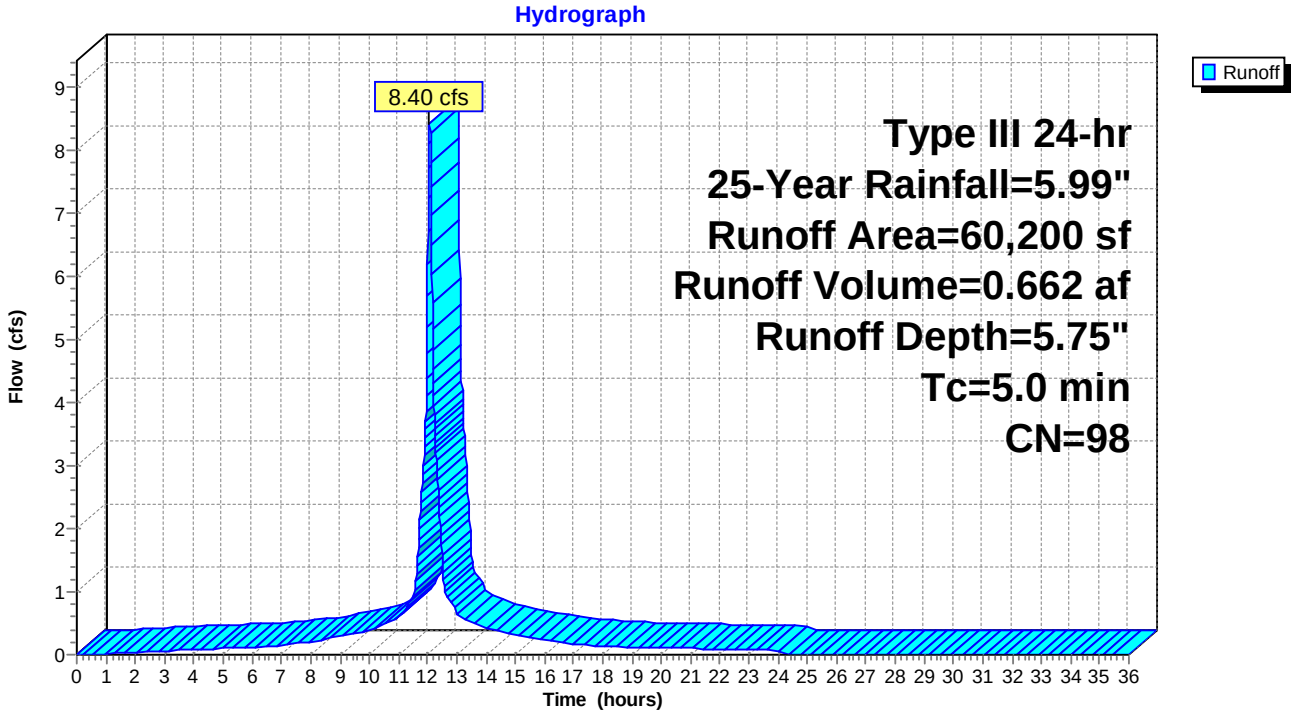
Runoff = 8.40 cfs @ 12.07 hrs, Volume= 0.662 af, Depth= 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
54,700	98	Unconnected pavement, HSG B
5,500	98	Unconnected roofs, HSG B
60,200	98	Weighted Average
60,200		100.00% Impervious Area
60,200		100.00% Unconnected

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

Subcatchment P-29E: REDIREDTED AREA TO NEW OUTFALL #27A



Summary for Subcatchment P-30: REDIRECTED AREA TO NEW OUTFALL #33A

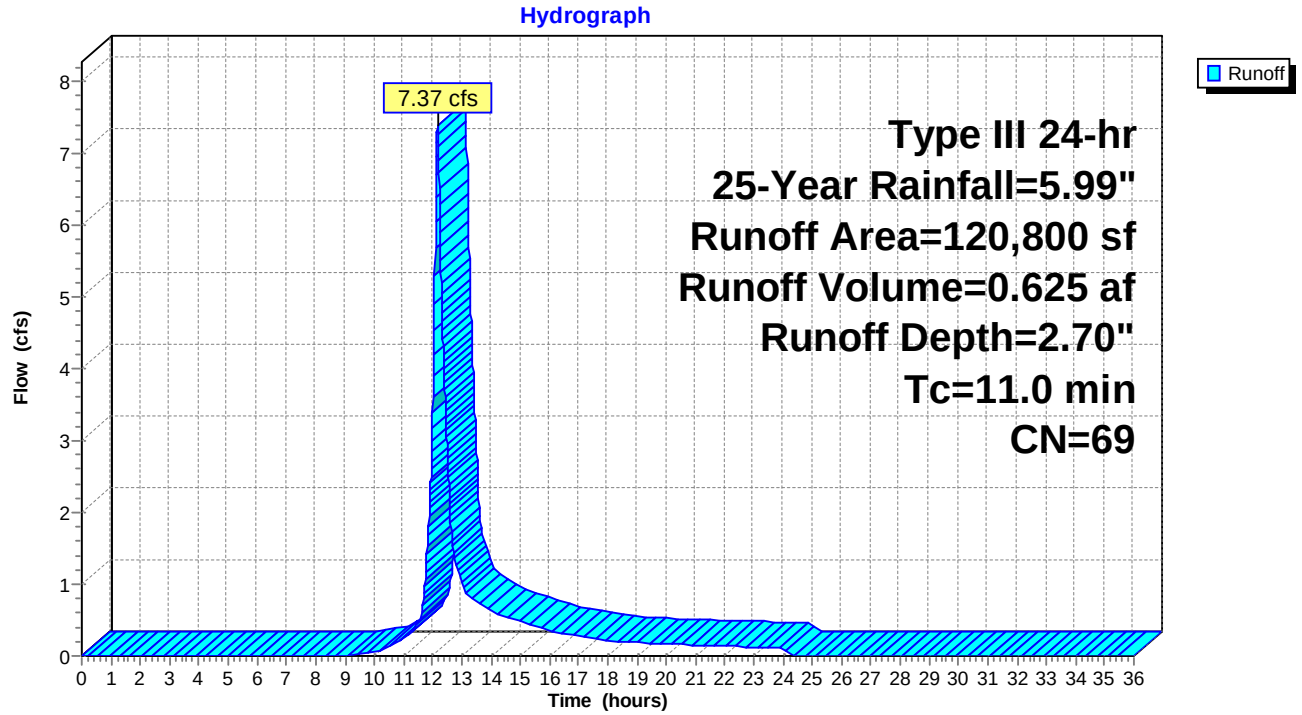
Runoff = 7.37 cfs @ 12.16 hrs, Volume= 0.625 af, Depth= 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
86,800	61	>75% Grass cover, Good, HSG B
28,600	98	Paved parking, HSG B
5,400	55	Woods, Good, HSG B
120,800	69	Weighted Average
92,200		76.32% Pervious Area
28,600		23.68% Impervious Area

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

Subcatchment P-30: REDIRECTED AREA TO NEW OUTFALL #33A



Summary for Subcatchment P-33: REDIRECTED AREA TO NEW OUTFALL #33A

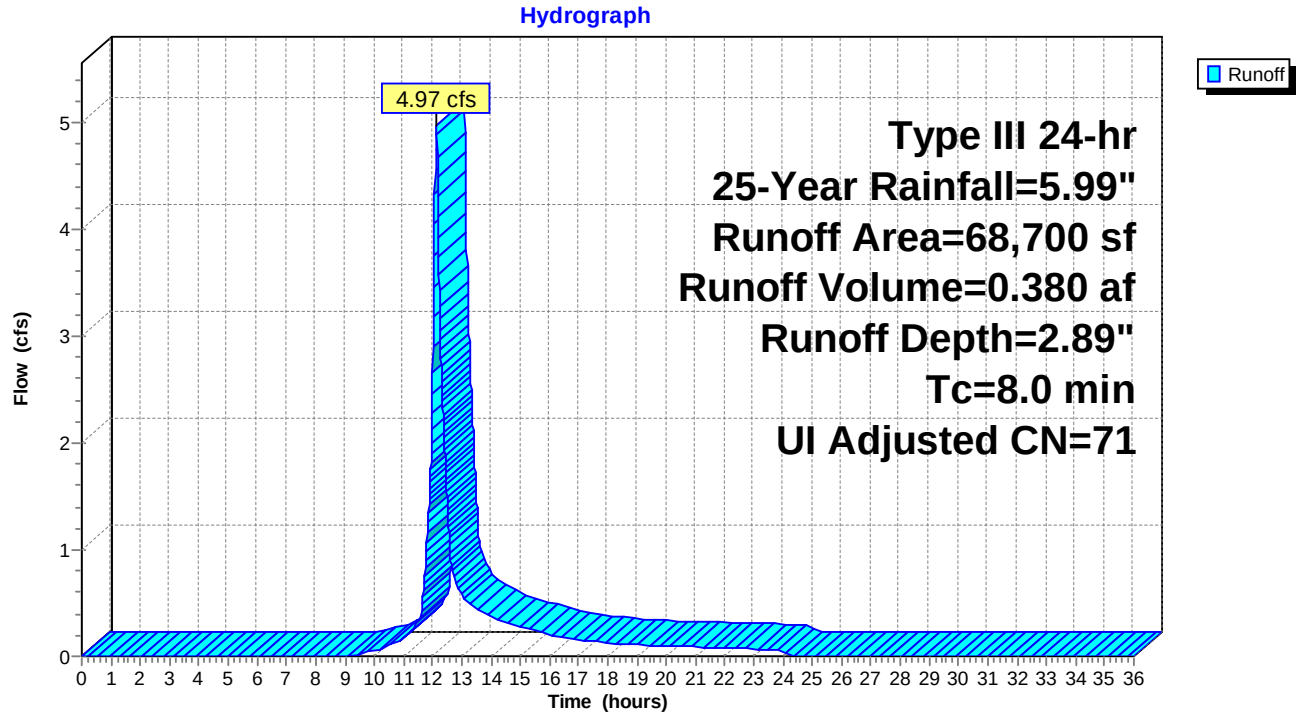
Runoff = 4.97 cfs @ 12.12 hrs, Volume= 0.380 af, Depth= 2.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Adj	Description
39,500	61		>75% Grass cover, Good, HSG B
17,200	98		Unconnected pavement, HSG B
12,000	85		Gravel roads, HSG B
68,700	74	71	Weighted Average, UI Adjusted
51,500			74.96% Pervious Area
17,200			25.04% Impervious Area
17,200			100.00% Unconnected

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

Subcatchment P-33: REDIRECTED AREA TO NEW OUTFALL #33A



Summary for Subcatchment P-34: B83 AND CONSTRUCTION ROAD TO OUTFALL #34

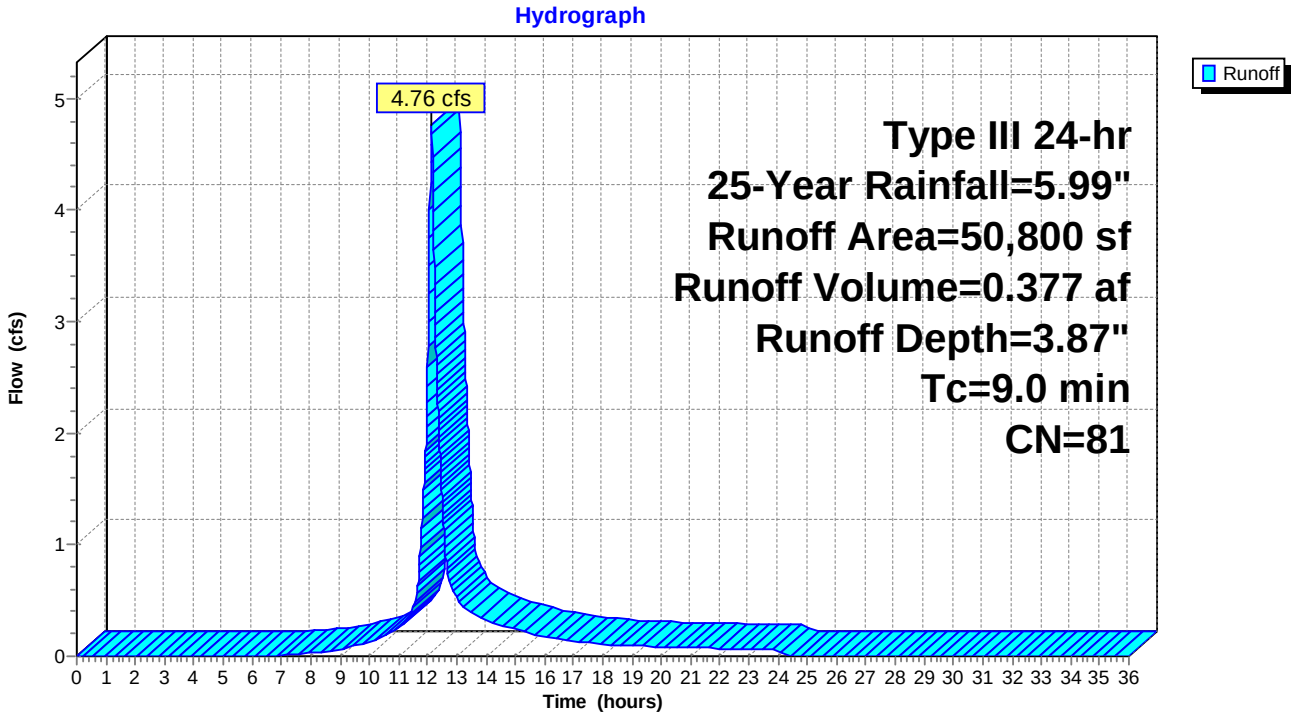
Runoff = 4.76 cfs @ 12.13 hrs, Volume= 0.377 af, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
10,000	98	Unconnected pavement, HSG B
8,400	98	Unconnected roofs, HSG B
8,800	98	Paved parking, HSG B
23,600	61	>75% Grass cover, Good, HSG B
50,800	81	Weighted Average
23,600		46.46% Pervious Area
27,200		53.54% Impervious Area
18,400		67.65% Unconnected

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

Subcatchment P-34: B83 AND CONSTRUCTION ROAD TO OUTFALL #34



mary for Subcatchment P-60A: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL

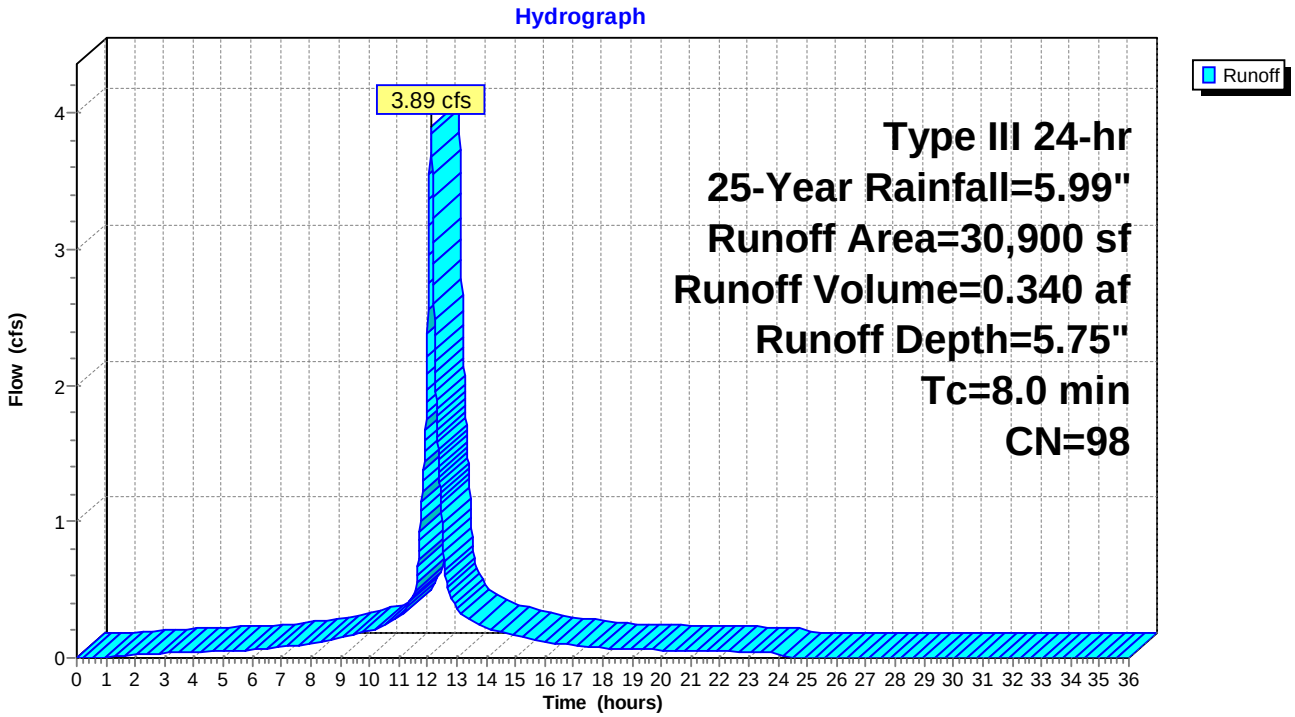
Runoff = 3.89 cfs @ 12.11 hrs, Volume= 0.340 af, Depth= 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
30,900	98	Unconnected pavement, HSG D
30,900		100.00% Impervious Area
30,900		100.00% Unconnected

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

Subcatchment P-60A: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL #27A



mary for Subcatchment P-60B: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL

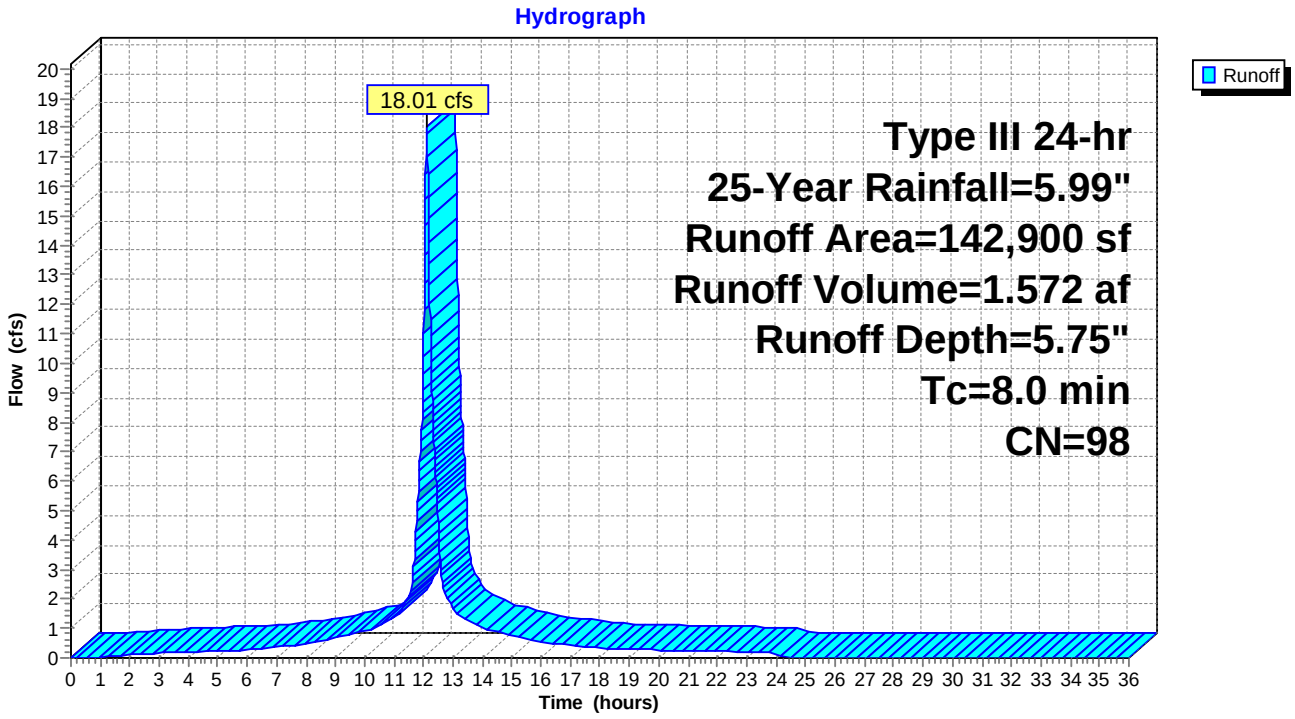
Runoff = 18.01 cfs @ 12.11 hrs, Volume= 1.572 af, Depth= 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
142,900	98	Unconnected pavement, HSG B
142,900		100.00% Impervious Area
142,900		100.00% Unconnected

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

Subcatchment P-60B: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL #33A



Summary for Pond 1P-A: EXISTING ROCK CHANNEL WITH ADDED WALL

Inflow Area = 77.172 ac, 47.10% Impervious, Inflow Depth = 3.68" for 25-Year event
Inflow = 156.99 cfs @ 12.52 hrs, Volume= 23.677 af
Outflow = 154.68 cfs @ 12.56 hrs, Volume= 23.677 af, Atten= 1%, Lag= 2.7 min
Primary = 154.68 cfs @ 12.56 hrs, Volume= 23.677 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 18.35' @ 12.56 hrs Surf.Area= 6,000 sf Storage= 16,598 cf

Plug-Flow detention time= 0.9 min calculated for 23.671 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (845.6 - 844.7)

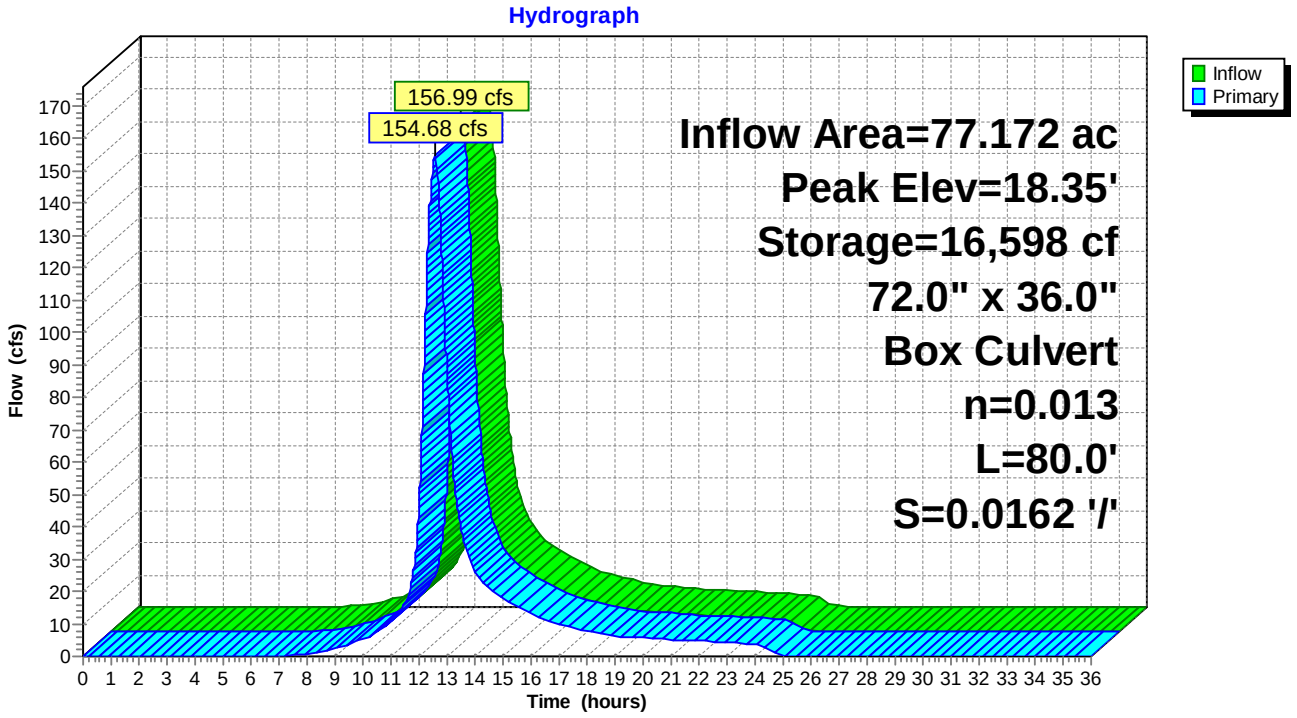
Volume	Invert	Avail.Storage	Storage Description
#1	13.60'	48,125 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.60	250	0	0
14.60	1,000	625	625
15.60	2,000	1,500	2,125
16.60	6,000	4,000	6,125
17.60	6,000	6,000	12,125
18.60	6,000	6,000	18,125
19.60	6,000	6,000	24,125
20.60	6,000	6,000	30,125
21.60	6,000	6,000	36,125
22.60	6,000	6,000	42,125
23.60	6,000	6,000	48,125

Device	Routing	Invert	Outlet Devices
#1	Primary	13.60'	**72.0" W x 36.0" H Box 3x6 Box Culvert** L= 80.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 13.60' / 12.30' S= 0.0162 '/' Cc= 0.900 n= 0.013, Flow Area= 18.00 sf

Primary OutFlow Max=154.67 cfs @ 12.56 hrs HW=18.34' TW=4.00' (Fixed TW Elev= 4.00')
↑—**1=3x6 Box Culvert** (Inlet Controls 154.67 cfs @ 8.59 fps)

Pond 1P-A: EXISTING ROCK CHANNEL WITH ADDED WALL

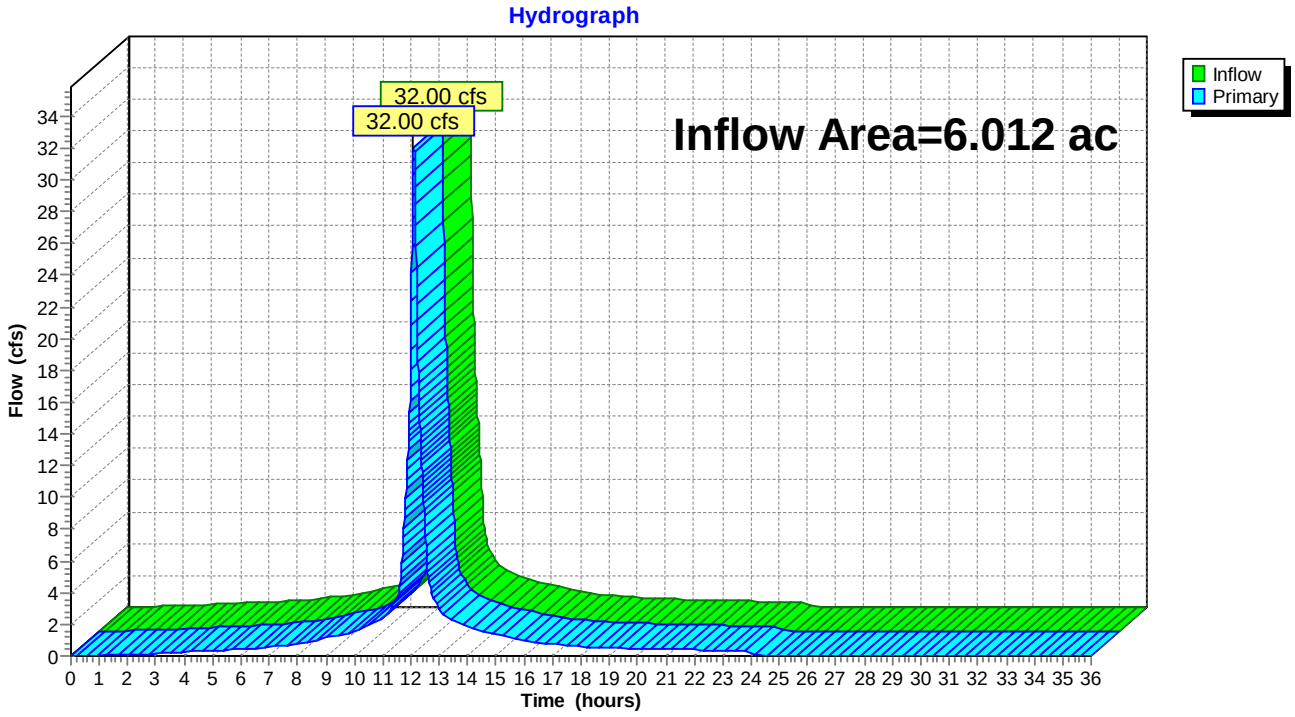


Summary for Link DP-27A: OUTFALL #27A (30")

Inflow Area = 6.012 ac, 90.19% Impervious, Inflow Depth = 5.52" for 25-Year event
Inflow = 32.00 cfs @ 12.10 hrs, Volume= 2.767 af
Primary = 32.00 cfs @ 12.10 hrs, Volume= 2.767 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-27A: OUTFALL #27A (30")

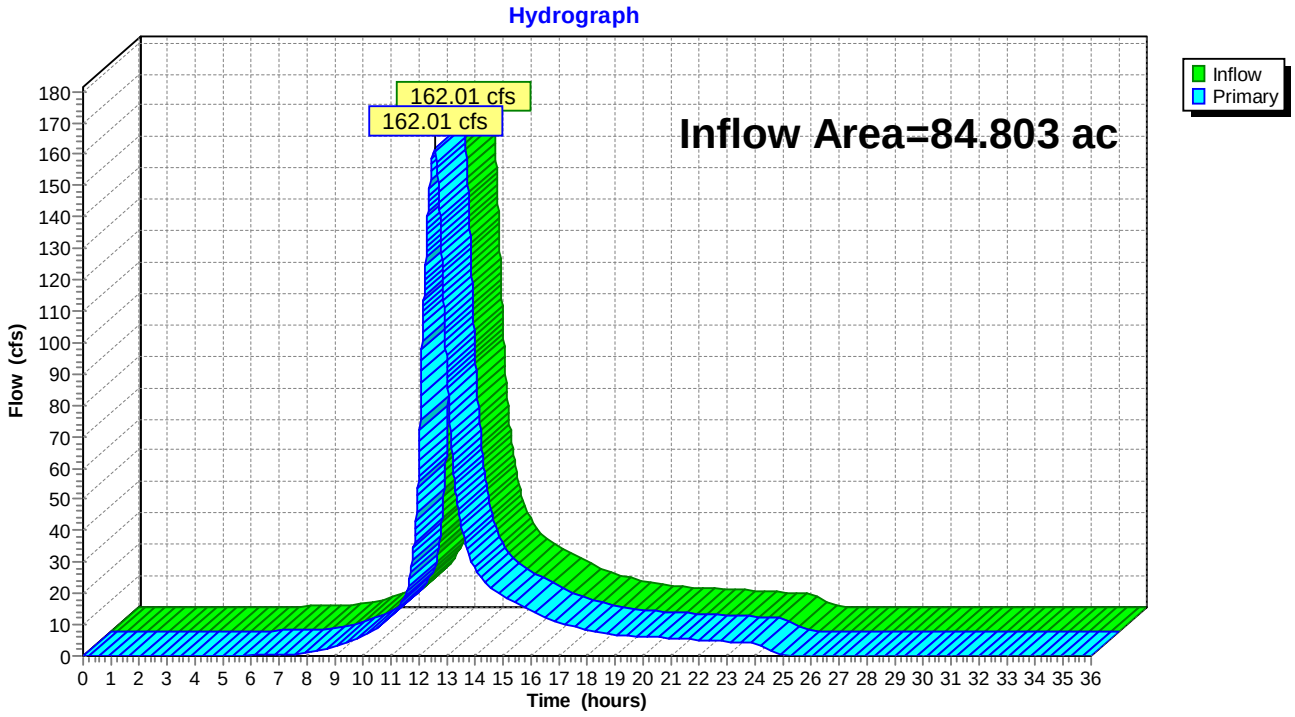


Summary for Link DP-33A: 3x6 BOX CULVERT TO NEW OUTFALL #33A

Inflow Area = 84.803 ac, 47.97% Impervious, Inflow Depth = 3.72" for 25-Year event
Inflow = 162.01 cfs @ 12.54 hrs, Volume= 26.255 af
Primary = 162.01 cfs @ 12.54 hrs, Volume= 26.255 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-33A: 3x6 BOX CULVERT TO NEW OUTFALL #33A

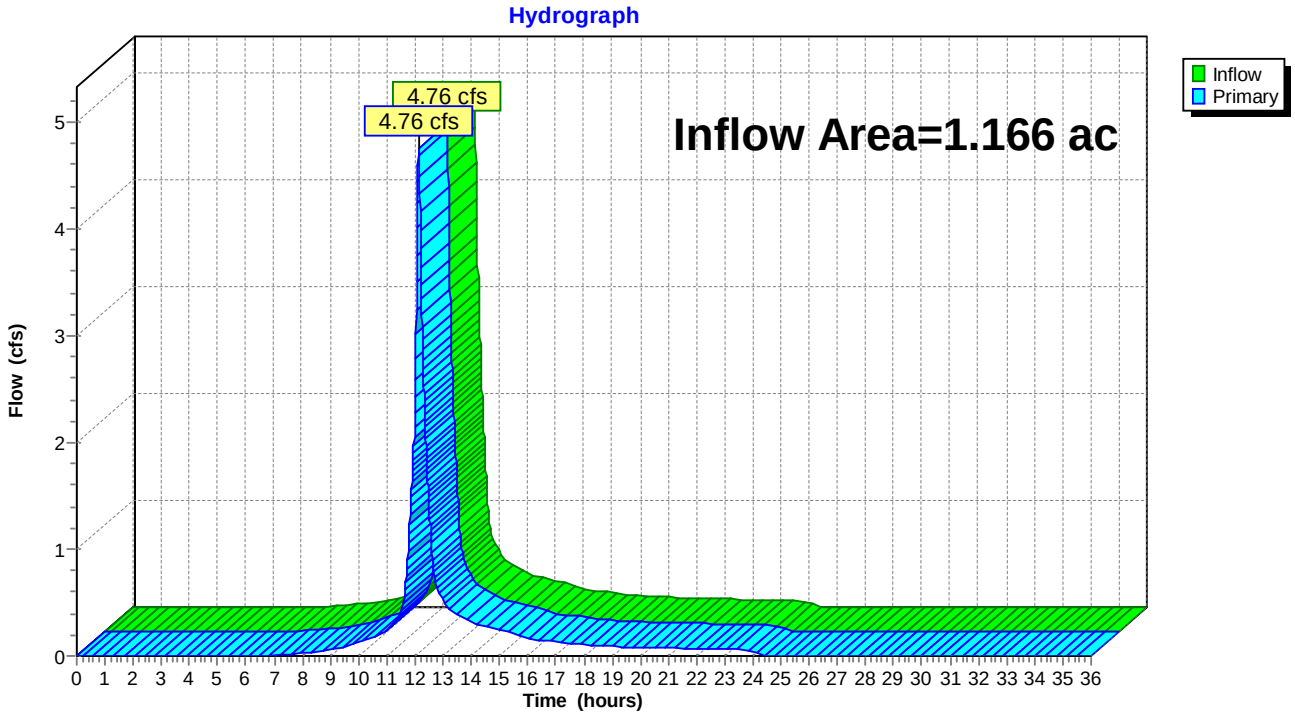


Summary for Link DP-34P: OUTFALL #34

Inflow Area = 1.166 ac, 53.54% Impervious, Inflow Depth = 3.87" for 25-Year event
Inflow = 4.76 cfs @ 12.13 hrs, Volume= 0.377 af
Primary = 4.76 cfs @ 12.13 hrs, Volume= 0.377 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-34P: OUTFALL #34



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-28: REDIRECTED AREA TO Runoff Area=86,600 sf 70.32% Impervious Runoff Depth=7.29"
Tc=8.0 min CN=92 Runoff=14.59 cfs 1.208 af

Subcatchment P-29A: LARGE EPR Runoff Area=2,650,000 sf 49.53% Impervious Runoff Depth=5.86"
Tc=41.0 min CN=80 Runoff=200.94 cfs 29.707 af

Subcatchment P-29B: SMALL EPR OFF-SITE Runoff Area=610,000 sf 38.00% Impervious Runoff Depth=5.27"
Tc=21.0 min CN=75 Runoff=57.00 cfs 6.147 af

Subcatchment P-29C: ON-SITE AREA TO Runoff Area=101,600 sf 38.39% Impervious Runoff Depth=5.86"
Tc=9.0 min CN=80 Runoff=14.23 cfs 1.139 af

Subcatchment P-29D: REDIRECTED ON-SITE Runoff Area=84,200 sf 100.00% Impervious Runoff Depth=8.01"
Tc=9.0 min CN=98 Runoff=14.17 cfs 1.290 af

Subcatchment P-29E: REDIREDTED AREA TO Runoff Area=60,200 sf 100.00% Impervious Runoff Depth=8.01"
Tc=5.0 min CN=98 Runoff=11.60 cfs 0.922 af

Subcatchment P-30: REDIRECTED AREA TO Runoff Area=120,800 sf 23.68% Impervious Runoff Depth=4.56"
Tc=11.0 min CN=69 Runoff=12.56 cfs 1.054 af

Subcatchment P-33: REDIRECTED AREA TO Runoff Area=68,700 sf 25.04% Impervious Runoff Depth=4.80"
Tc=8.0 min UI Adjusted CN=71 Runoff=8.27 cfs 0.630 af

Subcatchment P-34: B83 AND Runoff Area=50,800 sf 53.54% Impervious Runoff Depth=5.98"
Tc=9.0 min CN=81 Runoff=7.23 cfs 0.581 af

Subcatchment P-60A: PORTION OF EXISTING Runoff Area=30,900 sf 100.00% Impervious Runoff Depth=8.01"
Tc=8.0 min CN=98 Runoff=5.37 cfs 0.474 af

Subcatchment P-60B: PORTION OF Runoff Area=142,900 sf 100.00% Impervious Runoff Depth=8.01"
Tc=8.0 min CN=98 Runoff=24.85 cfs 2.190 af

Pond 1P-A: EXISTING ROCK CHANNEL Peak Elev=22.51' Storage=41,564 cf Inflow=242.65 cfs 36.993 af
72.0" x 36.0" Box Culvert n=0.013 L=80.0' S=0.0162 '/' Outflow=235.46 cfs 36.993 af

Link DP-27A: OUTFALL #27A (30") Inflow=44.50 cfs 3.894 af
Primary=44.50 cfs 3.894 af

Link DP-33A: 3x6 BOX CULVERT TO NEW OUTFALL #33A Inflow=245.58 cfs 40.868 af
Primary=245.58 cfs 40.868 af

Link DP-34P: OUTFALL #34 Inflow=7.23 cfs 0.581 af
Primary=7.23 cfs 0.581 af

Total Runoff Area = 91.981 ac Runoff Volume = 45.343 af Average Runoff Depth = 5.92"
49.20% Pervious = 45.255 ac 50.80% Impervious = 46.726 ac

Summary for Subcatchment P-28: REDIRECTED AREA TO NEW OUTFALL #27A

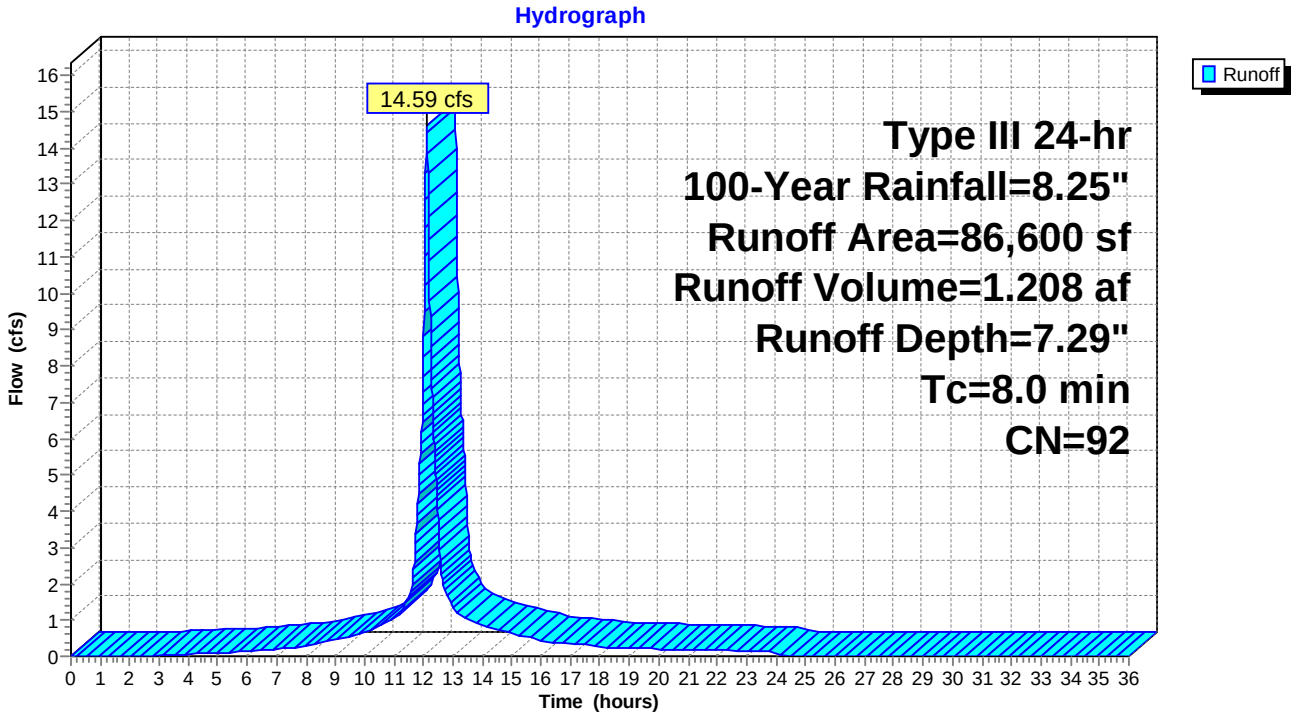
Runoff = 14.59 cfs @ 12.11 hrs, Volume= 1.208 af, Depth= 7.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
19,800	80	>75% Grass cover, Good, HSG D
5,900	77	Woods, Good, HSG D
60,900	98	Unconnected pavement, HSG D
86,600	92	Weighted Average
25,700		29.68% Pervious Area
60,900		70.32% Impervious Area
60,900		100.00% Unconnected

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

Subcatchment P-28: REDIRECTED AREA TO NEW OUTFALL #27A



Summary for Subcatchment P-29A: LARGE EPR OFF-SITE AREA

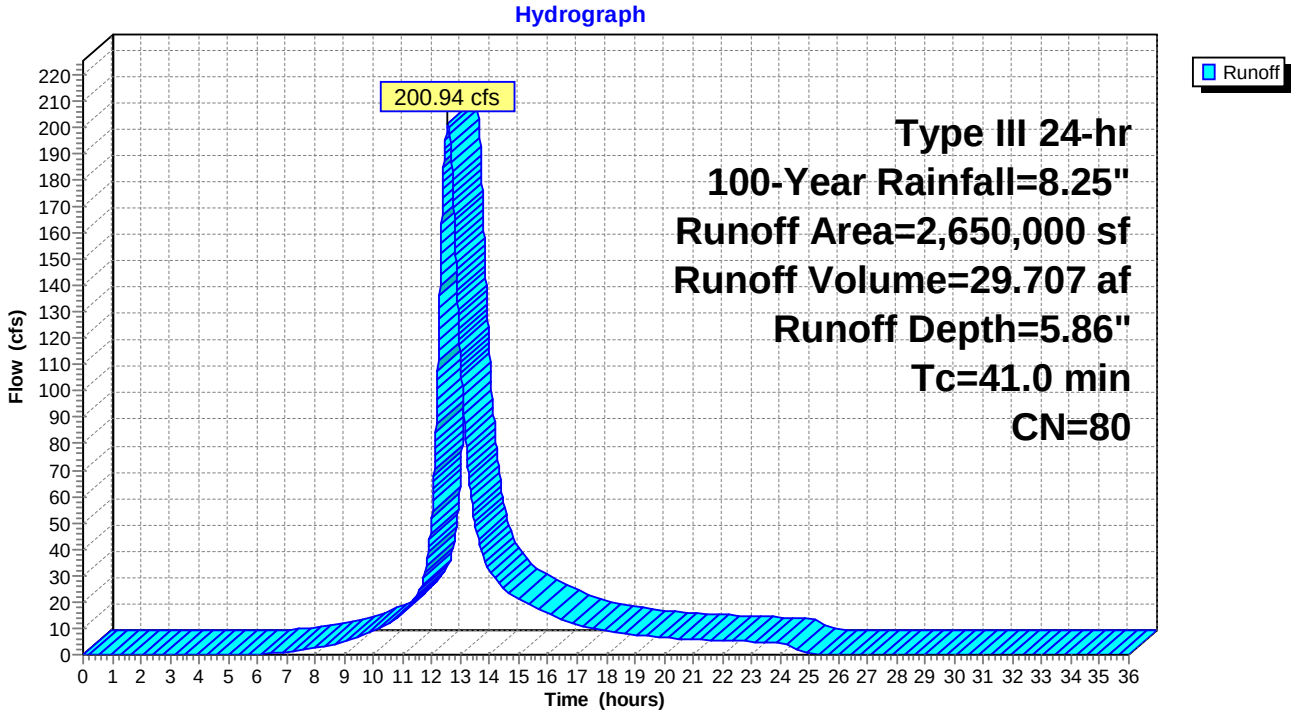
Runoff = 200.94 cfs @ 12.53 hrs, Volume= 29.707 af, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
2,000,000	75	1/4 acre lots, 38% imp, HSG B
650,000	95	Urban commercial, 85% imp, HSG D
2,650,000	80	Weighted Average
1,337,500		50.47% Pervious Area
1,312,500		49.53% Impervious Area

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

Subcatchment P-29A: LARGE EPR OFF-SITE AREA



Summary for Subcatchment P-29B: SMALL EPR OFF-SITE AREA

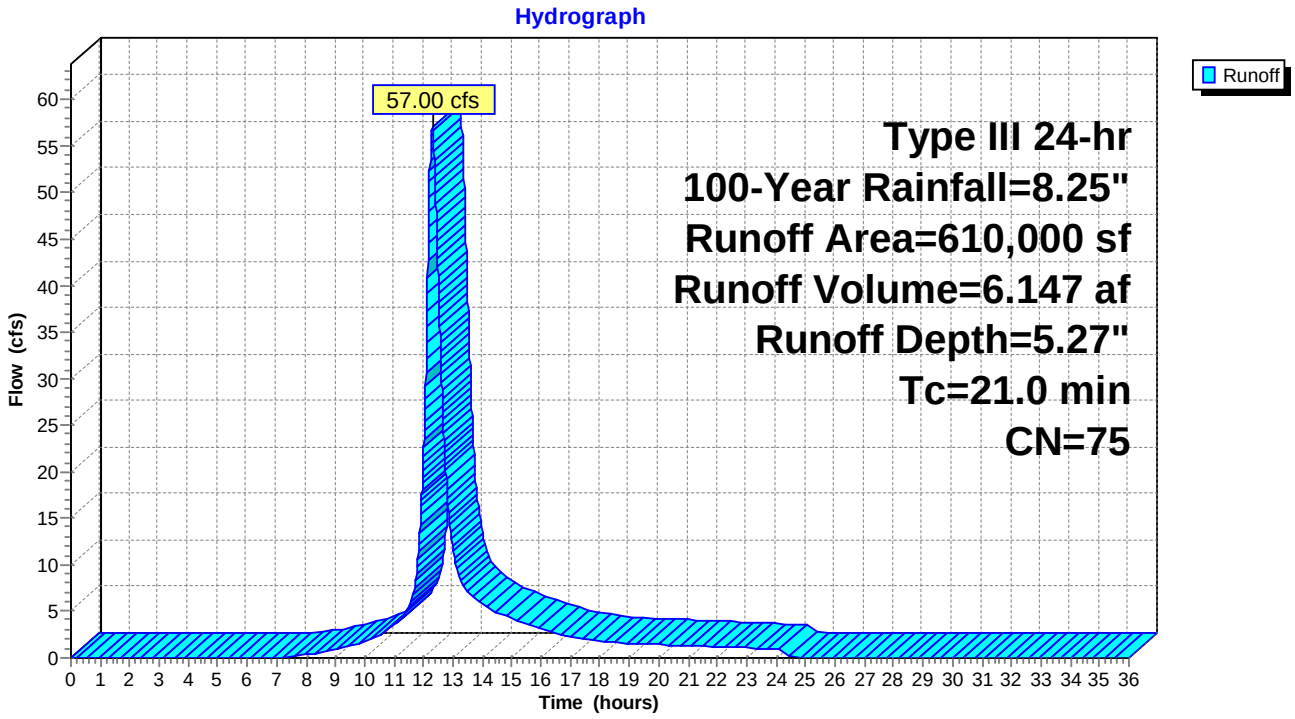
Runoff = 57.00 cfs @ 12.29 hrs, Volume= 6.147 af, Depth= 5.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
610,000	75	1/4 acre lots, 38% imp, HSG B
378,200		62.00% Pervious Area
231,800		38.00% Impervious Area

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

Subcatchment P-29B: SMALL EPR OFF-SITE AREA



Summary for Subcatchment P-29C: ON-SITE AREA TO CHANNEL

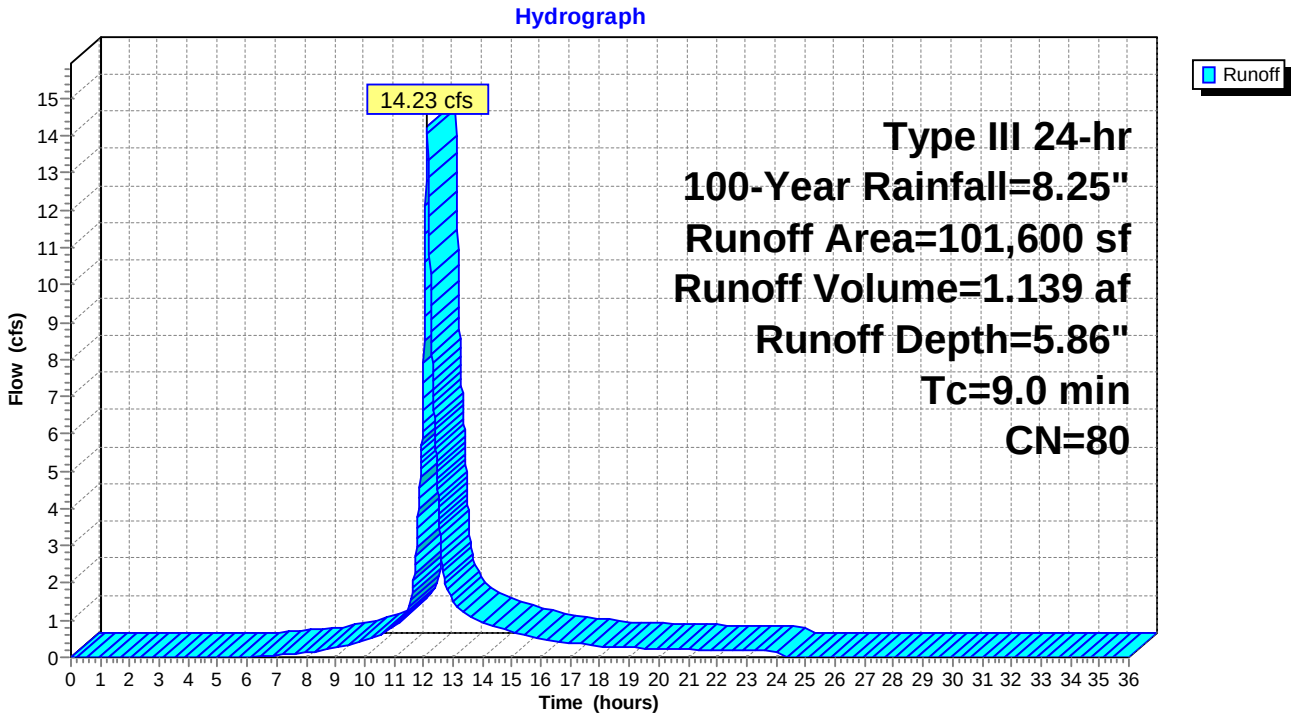
Runoff = 14.23 cfs @ 12.13 hrs, Volume= 1.139 af, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
19,300	98	Unconnected pavement, HSG B
19,700	98	Unconnected roofs, HSG B
5,300	80	>75% Grass cover, Good, HSG D
15,600	77	Woods, Good, HSG D
19,300	61	>75% Grass cover, Good, HSG B
14,900	55	Woods, Good, HSG B
7,500	85	Gravel roads, HSG B
101,600	80	Weighted Average
62,600		61.61% Pervious Area
39,000		38.39% Impervious Area
39,000		100.00% Unconnected

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

Subcatchment P-29C: ON-SITE AREA TO CHANNEL



Summary for Subcatchment P-29D: REDIRECTED ON-SITE AREA TO OUTFALL #27A

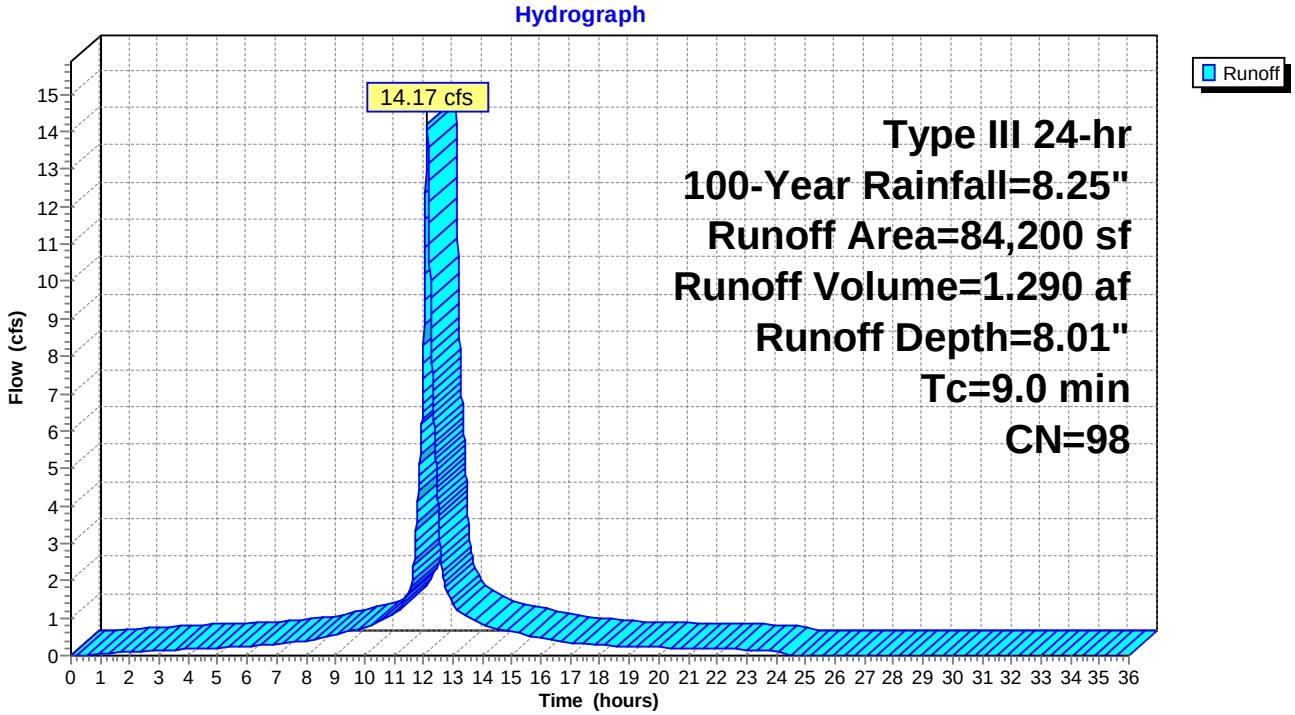
Runoff = 14.17 cfs @ 12.12 hrs, Volume= 1.290 af, Depth= 8.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
63,000	98	Unconnected pavement, HSG B
21,200	98	Unconnected roofs, HSG B
0	80	>75% Grass cover, Good, HSG D
0	77	Woods, Good, HSG D
0	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
84,200	98	Weighted Average
84,200		100.00% Impervious Area
84,200		100.00% Unconnected

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

Subcatchment P-29D: REDIRECTED ON-SITE AREA TO OUTFALL #27A



Summary for Subcatchment P-29E: REDIREDTED AREA TO NEW OUTFALL #27A

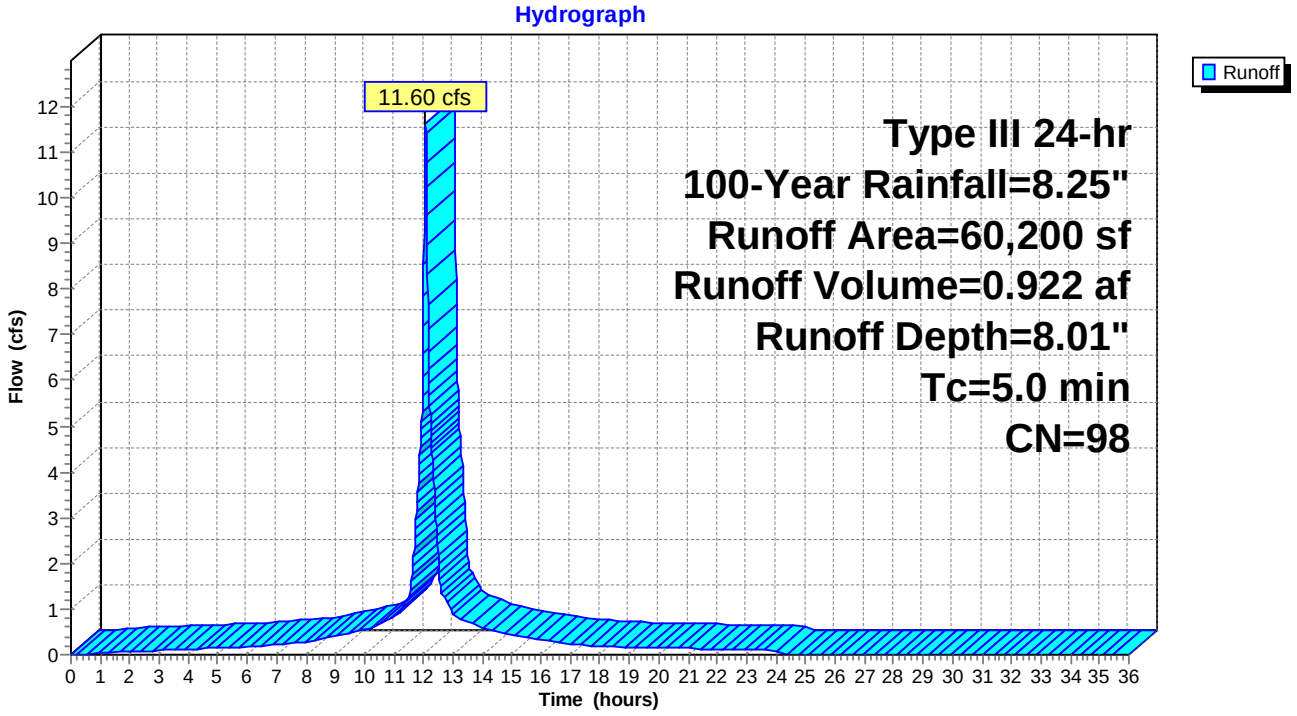
Runoff = 11.60 cfs @ 12.07 hrs, Volume= 0.922 af, Depth= 8.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
54,700	98	Unconnected pavement, HSG B
5,500	98	Unconnected roofs, HSG B
60,200	98	Weighted Average
60,200		100.00% Impervious Area
60,200		100.00% Unconnected

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

Subcatchment P-29E: REDIREDTED AREA TO NEW OUTFALL #27A



Summary for Subcatchment P-30: REDIRECTED AREA TO NEW OUTFALL #33A

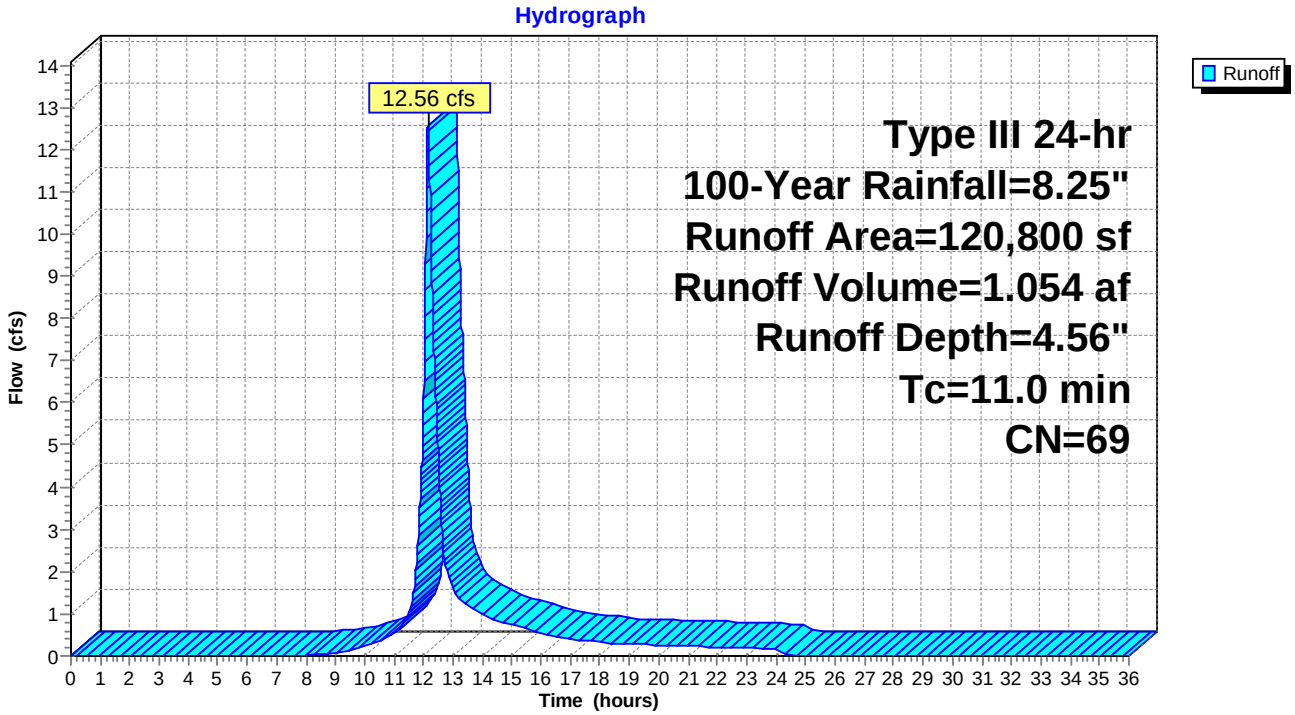
Runoff = 12.56 cfs @ 12.15 hrs, Volume= 1.054 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
86,800	61	>75% Grass cover, Good, HSG B
28,600	98	Paved parking, HSG B
5,400	55	Woods, Good, HSG B
120,800	69	Weighted Average
92,200		76.32% Pervious Area
28,600		23.68% Impervious Area

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

Subcatchment P-30: REDIRECTED AREA TO NEW OUTFALL #33A



Summary for Subcatchment P-33: REDIRECTED AREA TO NEW OUTFALL #33A

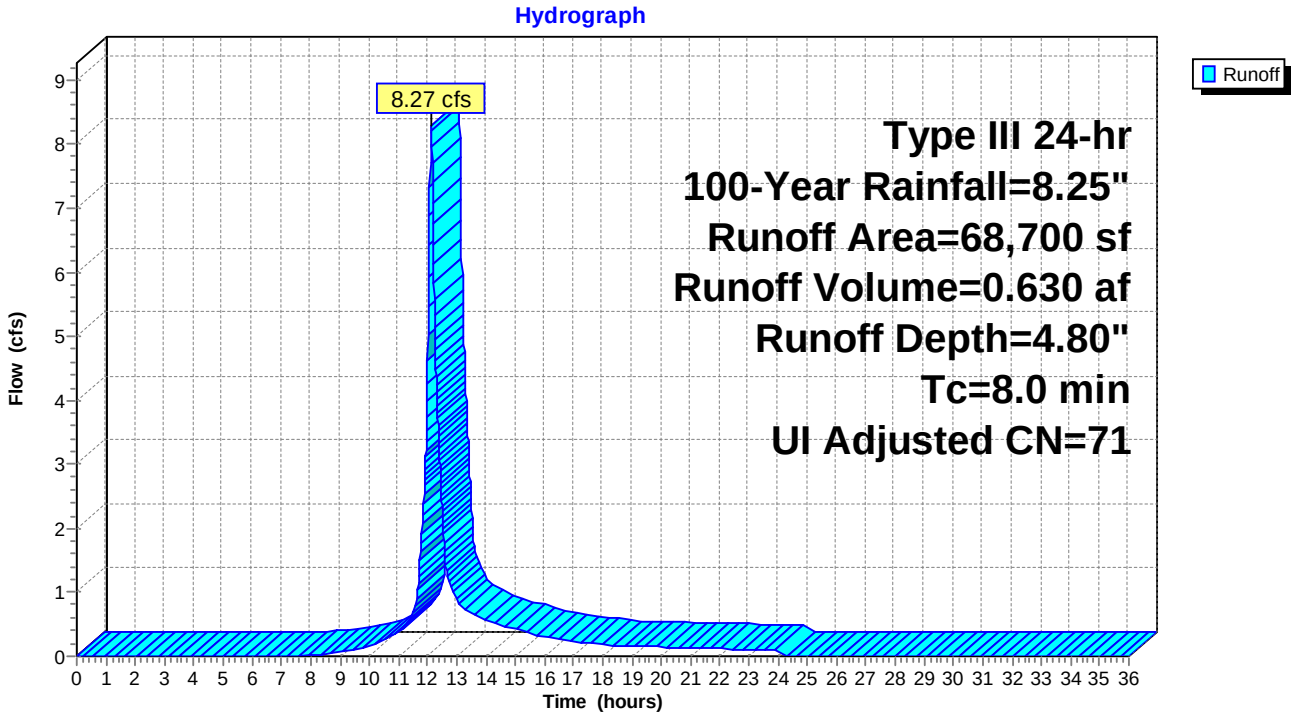
Runoff = 8.27 cfs @ 12.11 hrs, Volume= 0.630 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Adj	Description
39,500	61		>75% Grass cover, Good, HSG B
17,200	98		Unconnected pavement, HSG B
12,000	85		Gravel roads, HSG B
68,700	74	71	Weighted Average, UI Adjusted
51,500			74.96% Pervious Area
17,200			25.04% Impervious Area
17,200			100.00% Unconnected

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

Subcatchment P-33: REDIRECTED AREA TO NEW OUTFALL #33A



Summary for Subcatchment P-34: B83 AND CONSTRUCTION ROAD TO OUTFALL #34

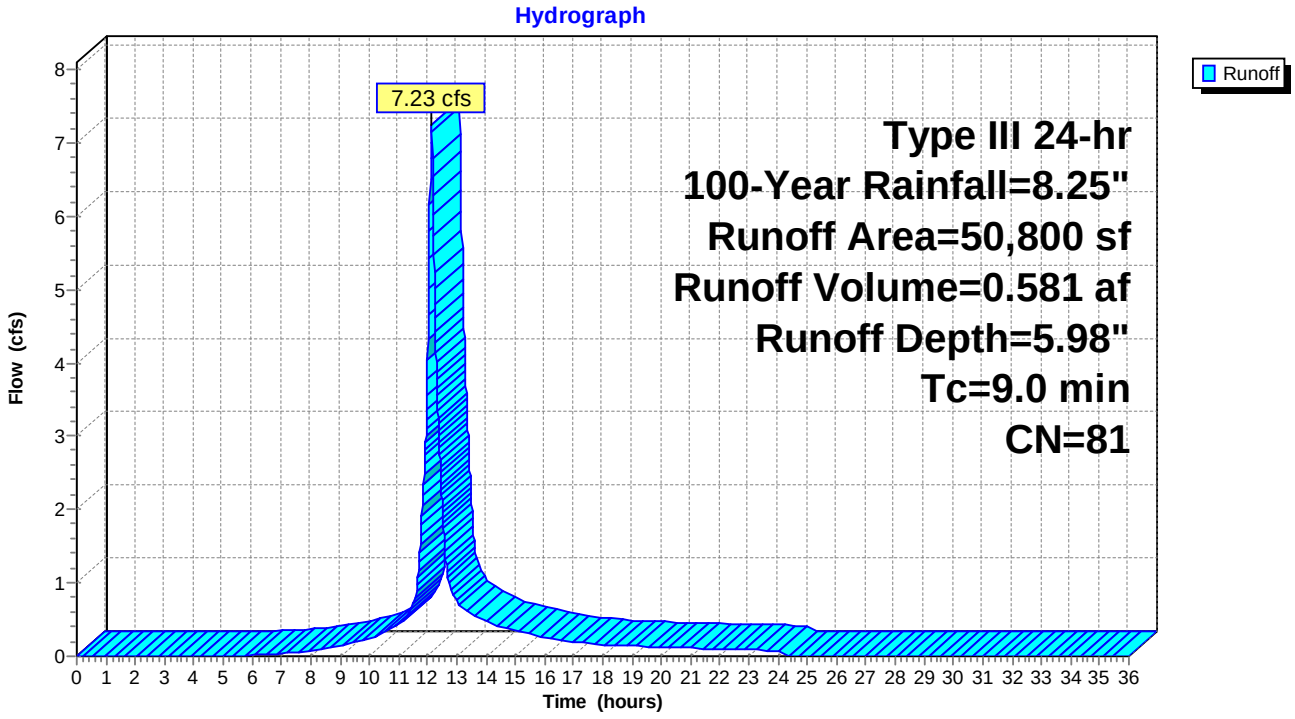
Runoff = 7.23 cfs @ 12.12 hrs, Volume= 0.581 af, Depth= 5.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
10,000	98	Unconnected pavement, HSG B
8,400	98	Unconnected roofs, HSG B
8,800	98	Paved parking, HSG B
23,600	61	>75% Grass cover, Good, HSG B
50,800	81	Weighted Average
23,600		46.46% Pervious Area
27,200		53.54% Impervious Area
18,400		67.65% Unconnected

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

Subcatchment P-34: B83 AND CONSTRUCTION ROAD TO OUTFALL #34



mary for Subcatchment P-60A: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL

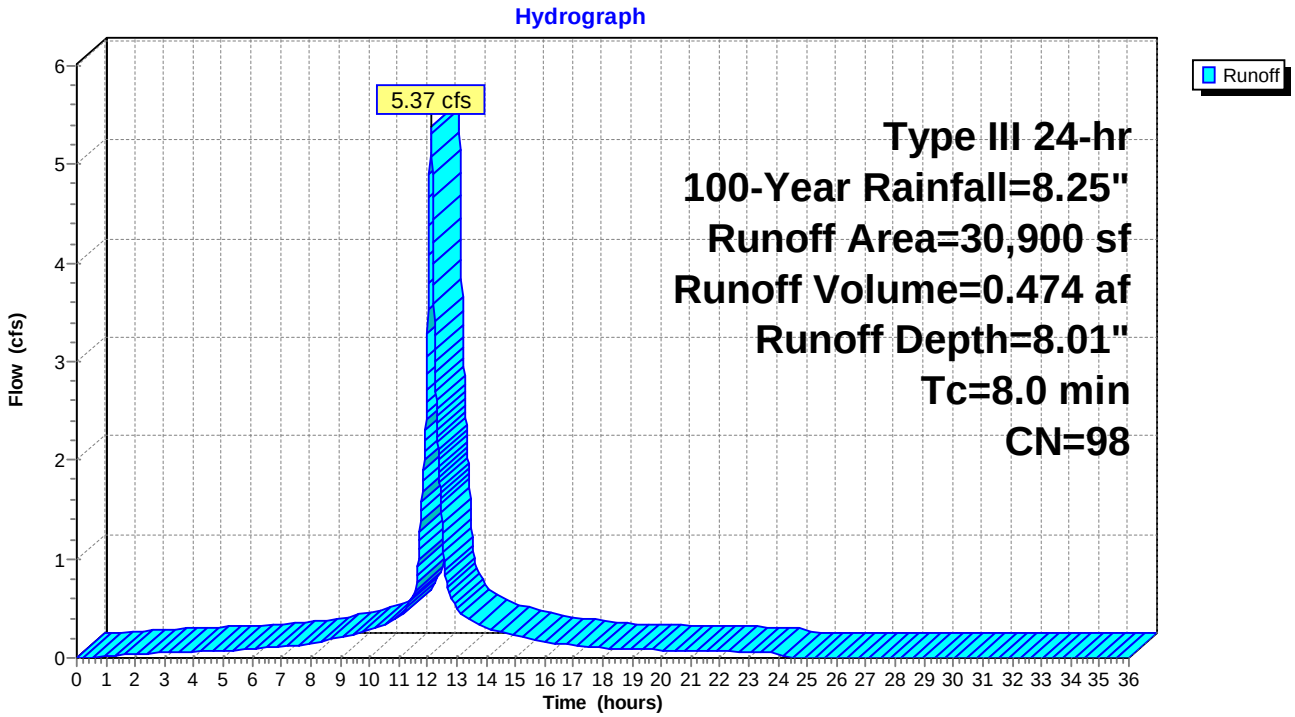
Runoff = 5.37 cfs @ 12.11 hrs, Volume= 0.474 af, Depth= 8.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
30,900	98	Unconnected pavement, HSG D
30,900		100.00% Impervious Area
30,900		100.00% Unconnected

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

Subcatchment P-60A: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL #27A



mary for Subcatchment P-60B: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL

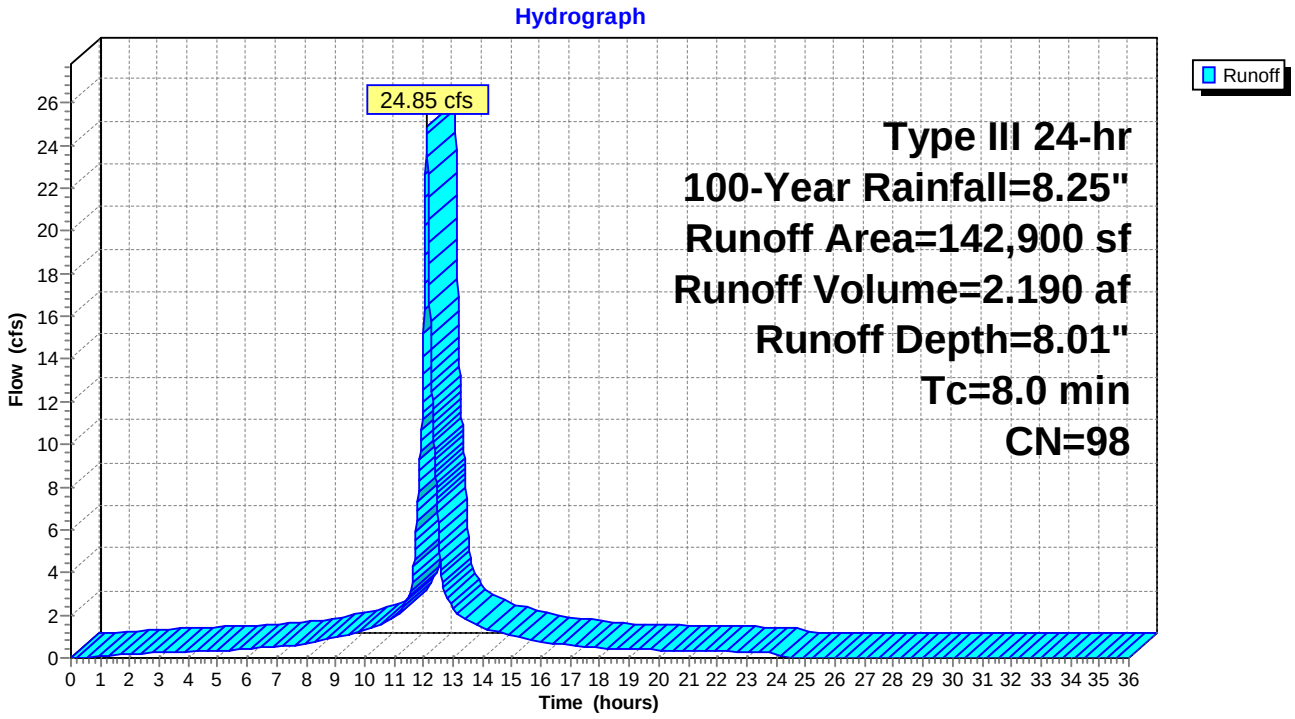
Runoff = 24.85 cfs @ 12.11 hrs, Volume= 2.190 af, Depth= 8.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.25"

Area (sf)	CN	Description
142,900	98	Unconnected pavement, HSG B
142,900		100.00% Impervious Area
142,900		100.00% Unconnected

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

Subcatchment P-60B: PORTION OF EXISTING SHEET FLOW AREA REDIRECTED TO NEW OUTFALL #33A



Summary for Pond 1P-A: EXISTING ROCK CHANNEL WITH ADDED WALL

Inflow Area = 77.172 ac, 47.10% Impervious, Inflow Depth = 5.75" for 100-Year event
Inflow = 242.65 cfs @ 12.49 hrs, Volume= 36.993 af
Outflow = 235.46 cfs @ 12.58 hrs, Volume= 36.993 af, Atten= 3%, Lag= 5.7 min
Primary = 235.46 cfs @ 12.58 hrs, Volume= 36.993 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 22.51' @ 12.58 hrs Surf.Area= 6,000 sf Storage= 41,564 cf

Plug-Flow detention time= 1.3 min calculated for 36.983 af (100% of inflow)
Center-of-Mass det. time= 1.3 min (833.4 - 832.1)

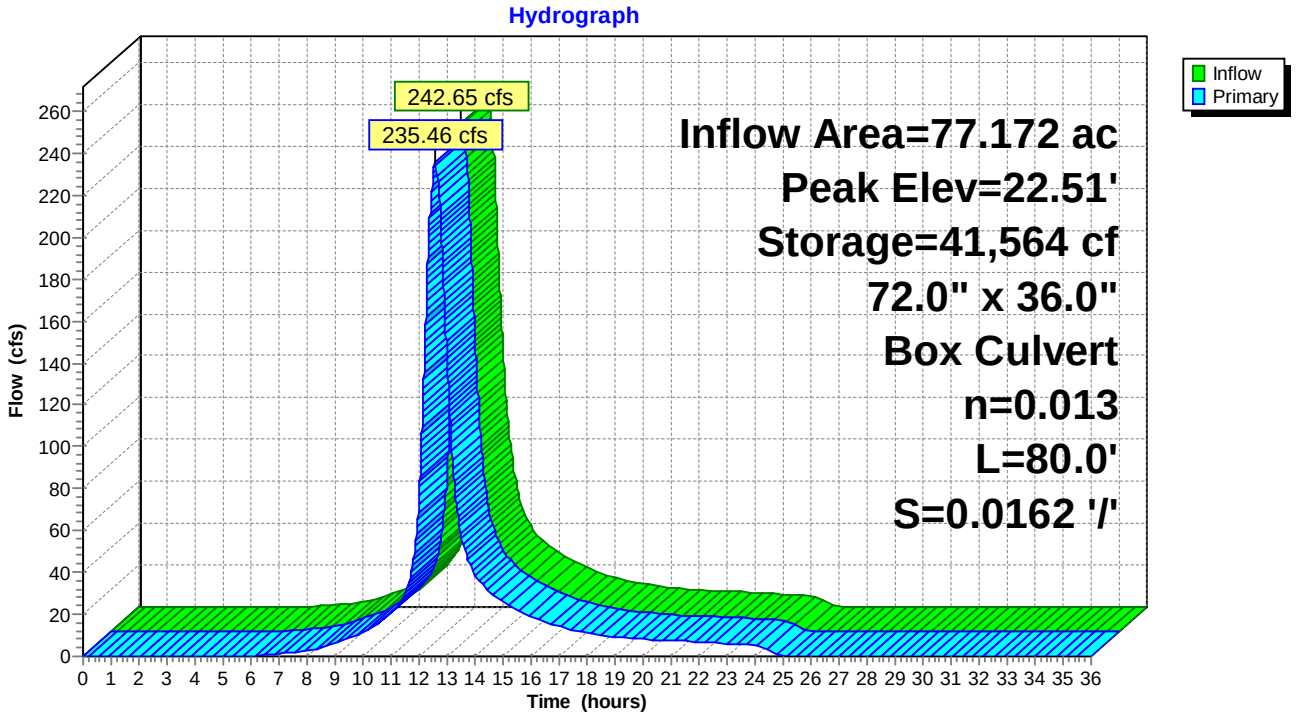
Volume	Invert	Avail.Storage	Storage Description
#1	13.60'	48,125 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.60	250	0	0
14.60	1,000	625	625
15.60	2,000	1,500	2,125
16.60	6,000	4,000	6,125
17.60	6,000	6,000	12,125
18.60	6,000	6,000	18,125
19.60	6,000	6,000	24,125
20.60	6,000	6,000	30,125
21.60	6,000	6,000	36,125
22.60	6,000	6,000	42,125
23.60	6,000	6,000	48,125

Device	Routing	Invert	Outlet Devices
#1	Primary	13.60'	**72.0" W x 36.0" H Box 3x6 Box Culvert** L= 80.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 13.60' / 12.30' S= 0.0162 '/' Cc= 0.900 n= 0.013, Flow Area= 18.00 sf

Primary OutFlow Max=235.45 cfs @ 12.58 hrs HW=22.51' TW=4.00' (Fixed TW Elev= 4.00')
↑—**1=3x6 Box Culvert** (Inlet Controls 235.45 cfs @ 13.08 fps)

Pond 1P-A: EXISTING ROCK CHANNEL WITH ADDED WALL

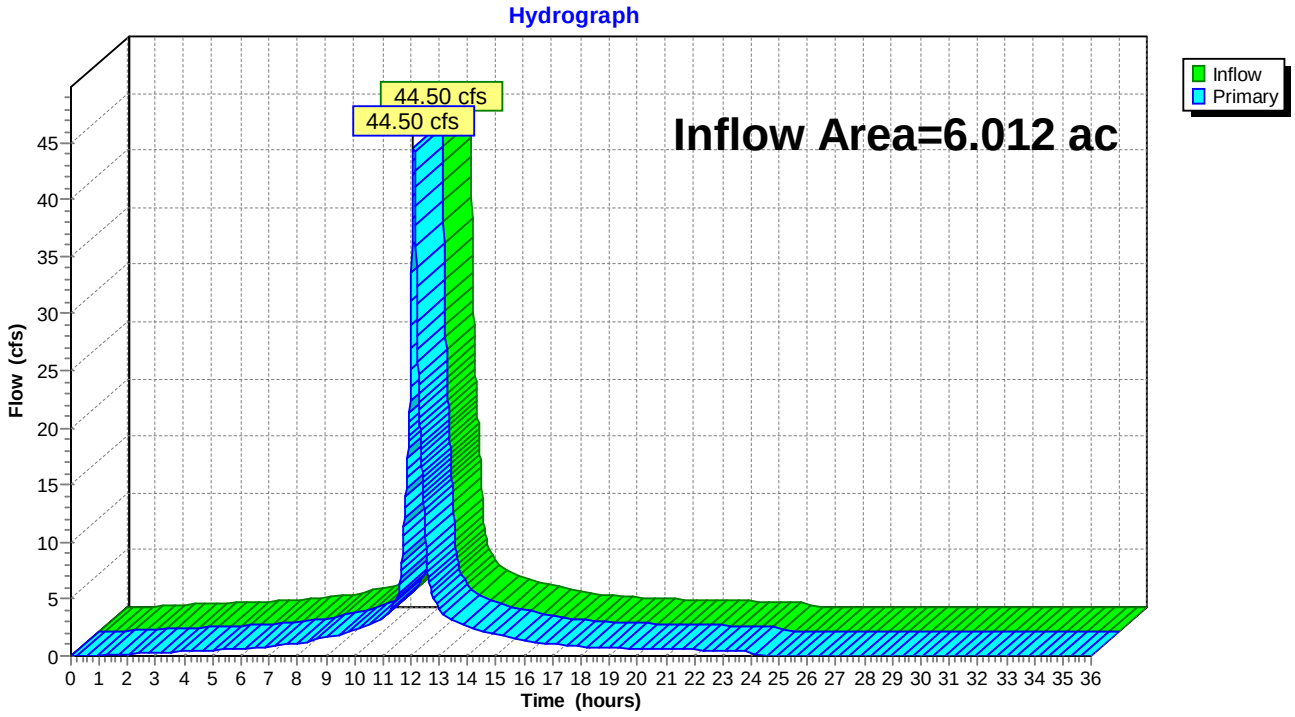


Summary for Link DP-27A: OUTFALL #27A (30")

Inflow Area = 6.012 ac, 90.19% Impervious, Inflow Depth = 7.77" for 100-Year event
Inflow = 44.50 cfs @ 12.10 hrs, Volume= 3.894 af
Primary = 44.50 cfs @ 12.10 hrs, Volume= 3.894 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-27A: OUTFALL #27A (30")

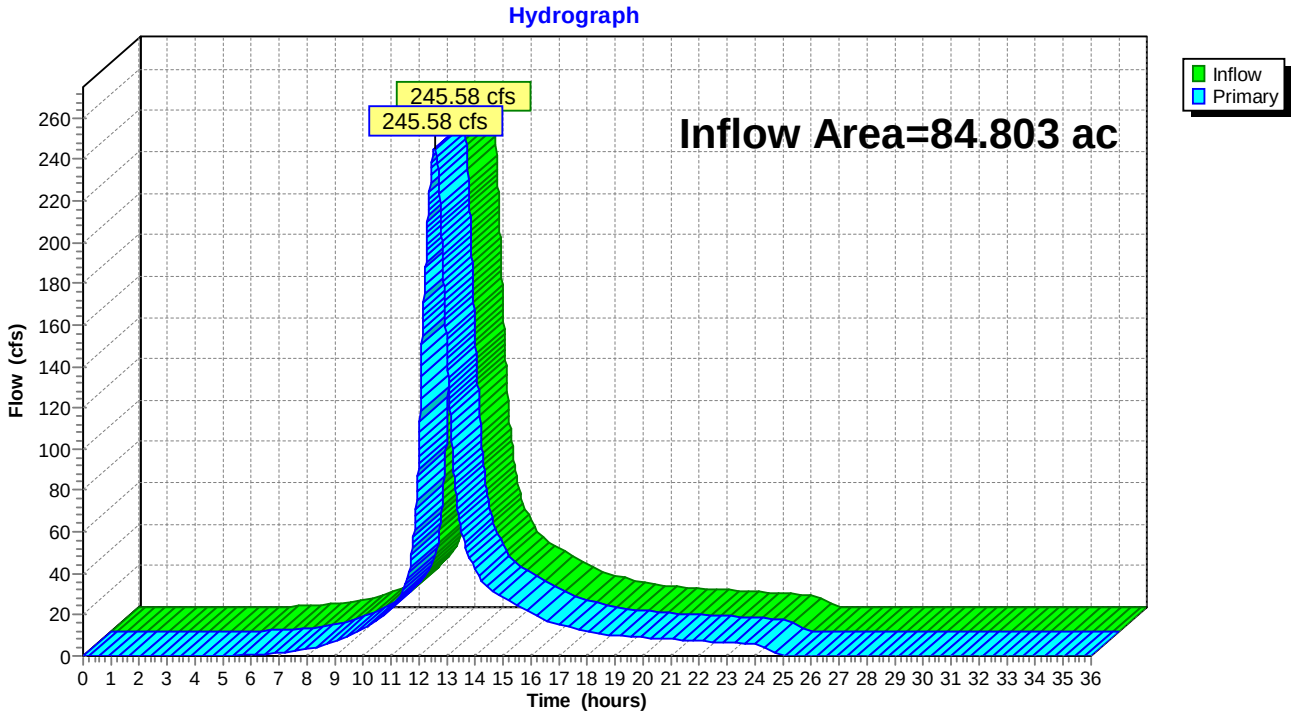


Summary for Link DP-33A: 3x6 BOX CULVERT TO NEW OUTFALL #33A

Inflow Area = 84.803 ac, 47.97% Impervious, Inflow Depth = 5.78" for 100-Year event
Inflow = 245.58 cfs @ 12.55 hrs, Volume= 40.868 af
Primary = 245.58 cfs @ 12.55 hrs, Volume= 40.868 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-33A: 3x6 BOX CULVERT TO NEW OUTFALL #33A

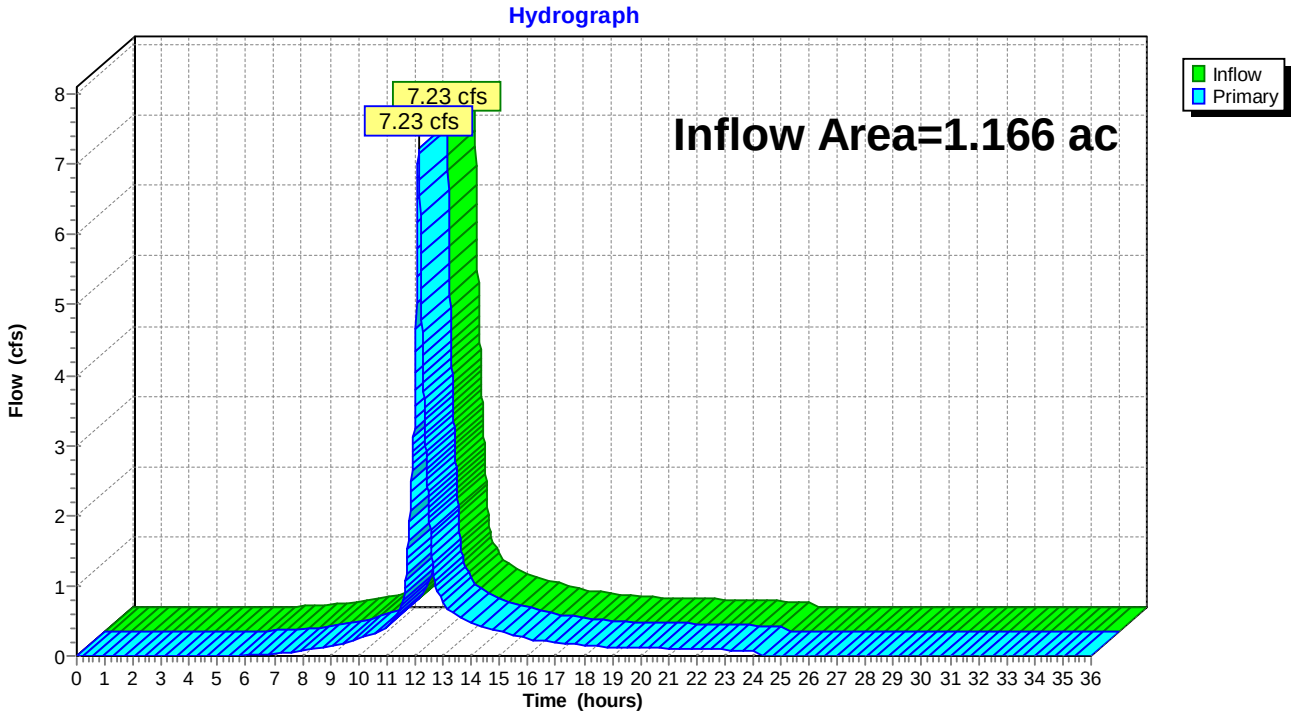


Summary for Link DP-34P: OUTFALL #34

Inflow Area = 1.166 ac, 53.54% Impervious, Inflow Depth = 5.98" for 100-Year event
Inflow = 7.23 cfs @ 12.12 hrs, Volume= 0.581 af
Primary = 7.23 cfs @ 12.12 hrs, Volume= 0.581 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-34P: OUTFALL #34



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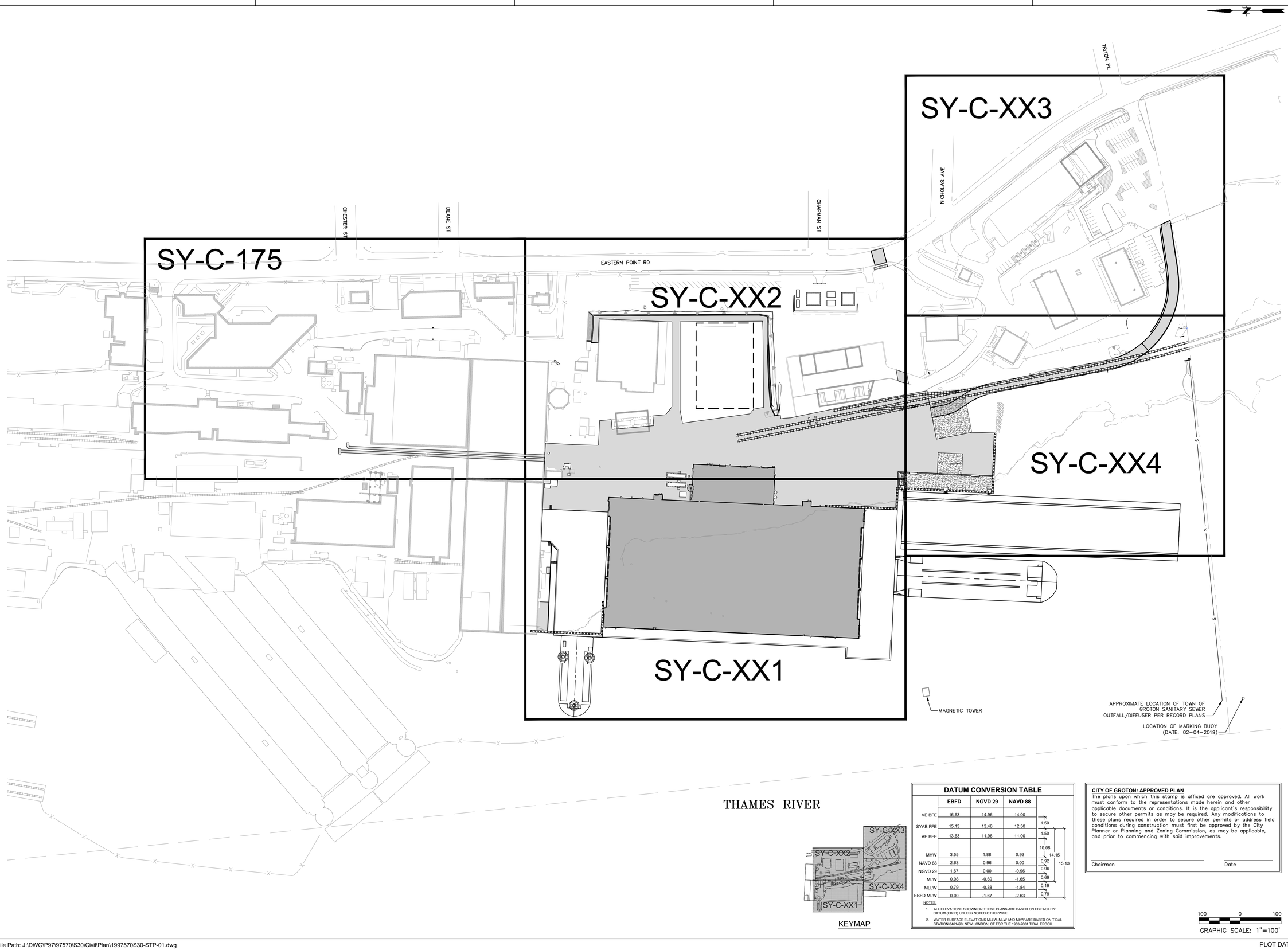
Appendix C

Storm Drainage Network Model:
Site Drainage Plans (SY-C-100, SY-C-161 to SY-C-164)
Proposed Storm Network Modeling Results



KEYMAP

DATUM CONVERSION TABLE

	EBFD	NGVD 29	NAVD 88
VE BFE	16.63	14.96	14.00
SYAB FFE	15.13	13.46	12.50
AE BFE	13.63	11.96	11.00
MHW	3.55	1.88	0.92
NAVD 88	2.63	0.96	0.00
NGVD 29	1.67	0.00	-0.96
MLW	0.98	-0.69	-1.65
MLLW	0.79	-0.88	-1.84
EBFD MLW	0.00	-1.67	-2.63

1.50 / 1.50 / 10.08 / 14.15 / 15.13 / 0.92 / 0.96 / 0.69 / 0.19 / 0.79

NOTES:
1. ALL ELEVATIONS SHOWN ON THESE PLANS ARE BASED ON EB FACILITY DATUM (EBFD) UNLESS NOTED OTHERWISE.
2. WATER SURFACE ELEVATIONS MLLW, MLW AND MHW ARE BASED ON TIDAL STATION 8461490, NEW LONDON, CT FOR THE 1983-2001 TIDAL EPOCH.

CITY OF GROTON: APPROVED PLAN

The plans upon which this stamp is affixed are approved. All work must conform to the representations made herein and other applicable documents or conditions. It is the applicant's responsibility to secure other permits as may be required. Any modifications to these plans required in order to secure other permits or address field conditions during construction must first be approved by the City Planner or Planning and Zoning Commission, as may be applicable, and prior to commencing with said improvements.

Chairman _____ Date _____

100 0 100
GRAPHIC SCALE: 1"=100'

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REGISTRATION NUMBER:

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NO.	DATE	BY	APVD

ISSUE DATE: 13 FEB 2019
DRAWING CODE:
BORDER SIZE: ARCH D 24x36

DESIGNED BY: KEITH GOODROW
DRAWN BY: KEITH GOODROW
CHECKED BY: JOE DEVINE
SUBMITTED BY: JOHN OSOSKIE
FILE NAME:

GENERAL DYNAMICS
Electric Boat
South Yard Assembly Building (SYAB)
SITE LAYOUT KEY PLAN

Date: 13 FEB 2019
Drawing No.:
SY-C-100
SHEET: OF

ISSUED FOR PERMIT

File Path: J:\DWG\P97\97570\S30\Civil\Plan\1997570S30-STP-01.dwg
PLOT DATE/TIME: 2/11/2019 4:51 PM

1 2 3 4 5

D C B A

FORCE MAIN TO EASTERN POINT ROAD (SEE SITE UTILITY PLAN)
EXISTING FFE=18.13

TYPE "C-L" CB 27A-5
T.F.=16.50
24" RCP INV (NE IN)=9.60
24" RCP INV (NW OUT)=9.60

HEAVY-DUTY CB 27A-8
T.F.=17.80
12" RCP INV (S IN)=12.80
15" RCP INV (E IN)=14.00
18" RCP INV (SE IN)=11.30
24" RCP INV (N OUT)=10.80
33' - 24" RCP @ 1.2%

12" RCP INV (N OUT)=14.70

100' - 18" RCP @ 1.2%

STMH 33A-3 (11'x8'x8' VAULT)
T.F.=19.40
BOX CULVERT INV (E IN)=12.30
60" RCP INV (S OUT)=10.00

HEAVY-DUTY CB 27A-10
T.F.=18.90
12" RCP INV (N OUT)=15.50

70' - 12" RCP @ 0.7%

HEAVY-DUTY CB 27A-7
T.F.=17.10
24" RCP INV (S IN)=10.40
8" HDPE INV (N IN)=15.26
24" RCP INV (NW OUT)=10.40

88' - 12" RCP @ 2.2%

CONNECT EXISTING 8" STORM PIPE TO STMH

82' - 24" RCP @ 1.0%

122' - 30" RCP @ 1.1%

58' - 24" RCP @ 2.3%

TOP PAD EL.=19.4

GENERATOR

GENERATOR

UTILITY BUILDING
FFE=19.33
(EBFD)

ROOF LEADER (INV.=14.3)

STMH 27A-4
T.F.=16.10
24" RCP INV (SE IN)=8.30
30" RCP INV (S IN)=7.80
30" RCP INV (W OUT)=7.80

154' - 30" RCP @ 0.7%

HEAVY-DUTY CB 27A-6
T.F.=15.50
24" RCP INV (SE IN)=9.60
30" RCP INV (N OUT)=9.10

STMH 33A-7
T.F.=19.40
24" RCP INV (E IN)=13.80
24" RCP INV (S OUT)=13.80

STMH 33A-2
T.F.=16.80
60" RCP INV (N IN)=8.00
60" RCP INV (S OUT)=8.00

245' - 60" RCP @ 0.8%

HEAVY-DUTY CB 33A-16
T.F.=18.70
15" RCP INV (SW OUT)=15.00

58' - 15" RCP @ 7.8%

HEAVY-DUTY CB 33A-12
T.F.=15.80
24" RCP INV (NW IN)=8.20
30" RCP INV (S OUT)=7.70

62' - 30" RCP @ 0.8%

56' - 18" RCP @ 1.3%

95' - 18" RCP @ 2.3%

99' - 24" RCP @ 2.2%

HEAVY-DUTY CB 33A-15
T.F.=18.20
15" RCP INV (NE IN)=10.50
18" RCP INV (N IN)=13.60
18" RCP INV (S OUT)=13.60

HEAVY-DUTY CB 33A-14
T.F.=16.50
18" RCP INV (N IN)=11.40
24" RCP INV (S OUT)=10.90

APPROXIMATE LOCATION OF INTERNAL ROOF LEADER DRAIN PIPE

DECK INLET WITH TREATMENT UNIT

STMH 27A-3
T.F.=14.50
30" RCP INV (E IN)=6.80
30" RCP INV (W OUT)=6.80

154' - 30" RCP @ 0.5%

UTILITY TUNNEL
FFE=3.63 (EBFD)

SOUTH YARD
ASSEMBLY BUILDING
FFE=15.13 (EBFD)

TYPE "C-L" CB 27A-2
T.F.=9.90
12" RCP INV (S OUT)=6.50

12' - 12" RCP @ 3.3%

STMH 27A-1
HYDRODYNAMIC SEPARATOR 27A
T.F.=14.00
30" RCP INV (E IN)=6.00
12" RCP INV (N IN)=6.10
30" RCP INV (W OUT)=6.00

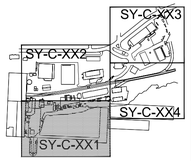
37' - 30" RCP @ 0.5%

CONCRETE CULVERT GRILL AT OUTFALLS (TYP.)

OUTFALL 27A
INV=5.80

THAMES RIVER

KEYMAP



DATUM CONVERSION TABLE

	EBFD	NGVD 29	NAVD 88
VE BFE	16.63	14.96	14.00
SYAB FFE	15.13	13.46	12.50
AE BFE	13.63	11.96	11.00
MHW	3.55	1.88	0.92
NAVD 88	2.63	0.96	0.00
NGVD 29	1.67	0.00	-0.96
MLW	0.98	-0.69	-1.65
MLLW	0.79	-0.88	-1.84
EBFD MLW	0.00	-1.67	-2.63

1.50 · 1.50 · 10.08 · 14.15 · 15.13 · 0.92 · 0.96 · 0.69 · 0.19 · 0.79

NOTES:
1. ALL ELEVATIONS SHOWN ON THESE PLANS ARE BASED ON EB FACILITY DATUM (EBFD) UNLESS NOTED OTHERWISE.
2. WATER SURFACE ELEVATIONS MLLW, MLW AND MHW ARE BASED ON TIDAL STATION 8461490, NEW LONDON, CT FOR THE 1983-2001 TIDAL EPOCH.

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Chairman _____ Date _____

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GRAPHIC SCALE: 1"=30' (30 0 30)

JACOBS
100 Great Meadow Road, Suite 707
Wethersfield, CT 06109

FUSS & O'NEILL
146 HARTFORD ROAD
MANCHESTER, CONNECTICUT 06040
860.646.2469
www.fando.com

REGISTRATION NUMBER:

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ATTACHMENT OF THIS SEAL TO THIS DOCUMENT IS MADE ONLY FOR THE PURPOSE OF AUTHENTICATING THIS DOCUMENT. RESPONSIBILITY FOR ALL OTHER DOCUMENTS RELATING TO THIS PROJECT IS DISCLAIMED

NO.	DATE	BY	APVD

DESIGNED BY: KEITH GOODROW
DRAWN BY: KEITH GOODROW
CHECKED BY: JOE DEVINE
SUBMITTED BY: JOHN OSOSKIE
FILE NAME:
ISSUE DATE: 13 FEB 2019
DRAWING CODE:
BORDER SIZE: ARCH D 24X36

GENERAL DYNAMICS
GD Electric Boat
South Yard Assembly Building (SYAB)
SITE DRAINAGE PLAN

Date: 13 FEB 2019

Drawing No.:
SY-C-161

SHEET: OF

ISSUED FOR PERMIT

File Path: J:\DWG\P97\97570\S30\Civil\Plan\1997570S30-GRD-01.dwg

PLOT DATE/TIME: 2/11/2019 9:25 AM

DATUM CONVERSION TABLE

	EBFD	NGVD 29	NAVD 88	
VE BFE	16.63	14.96	14.00	1.50
SYAB FFE	15.13	13.46	12.50	1.50
AE BFE	13.63	11.96	11.00	10.08
MHW	3.55	1.88	0.92	14.15
NAVD 88	2.63	0.96	0.00	0.92
NGVD 29	1.67	0.00	-0.96	0.96
MLW	0.98	-0.69	-1.65	0.69
MLLW	0.79	-0.88	-1.84	0.19
EBFD MLW	0.00	-1.67	-2.63	0.79

15.13

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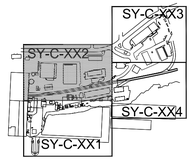
KEYMAP



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Chairman _____ Date _____

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30 0 30
GRAPHIC SCALE: 1"=30'

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NO.	DATE	BY	APVD

ISSUE DATE: 13 FEB 2019
DRAWING CODE:
BORDER SIZE: ARCH D 24X36

DESIGNED BY: KEITH GOODROW
DRAWN BY: KEITH GOODROW
CHECKED BY: JOE DEVINE
SUBMITTED BY: JOHN OSOSKIE
FILE NAME:

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GENERAL DYNAMICS
Electric Boat
South Yard Assembly Building (SYAB)
SITE DRAINAGE PLAN

Date: 13 FEB 2019

Drawing No.:
SY-C-162

SHEET: OF:

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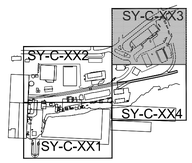

KEYMAP

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NGVD 29	1.67	0.00	-0.96	0.96
MLW	0.98	-0.69	-1.65	0.69
MLLW	0.79	-0.88	-1.84	0.19
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15.13

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30 0 30

GRAPHIC SCALE: 1"=30'

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ISSUE DATE: 13 FEB 2019
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BORDER SIZE: ARCH D 24X36

DESIGNED BY: KEITH GOODROW
DRAWN BY: KEITH GOODROW
CHECKED BY: JOE DEVINE
SUBMITTED BY: JOHN OSOSKIE
FILE NAME:

GENERAL DYNAMICS
Electric Boat
South Yard Assembly Building (SYAB)
SITE DRAINAGE PLAN

Date: 13 FEB 2019

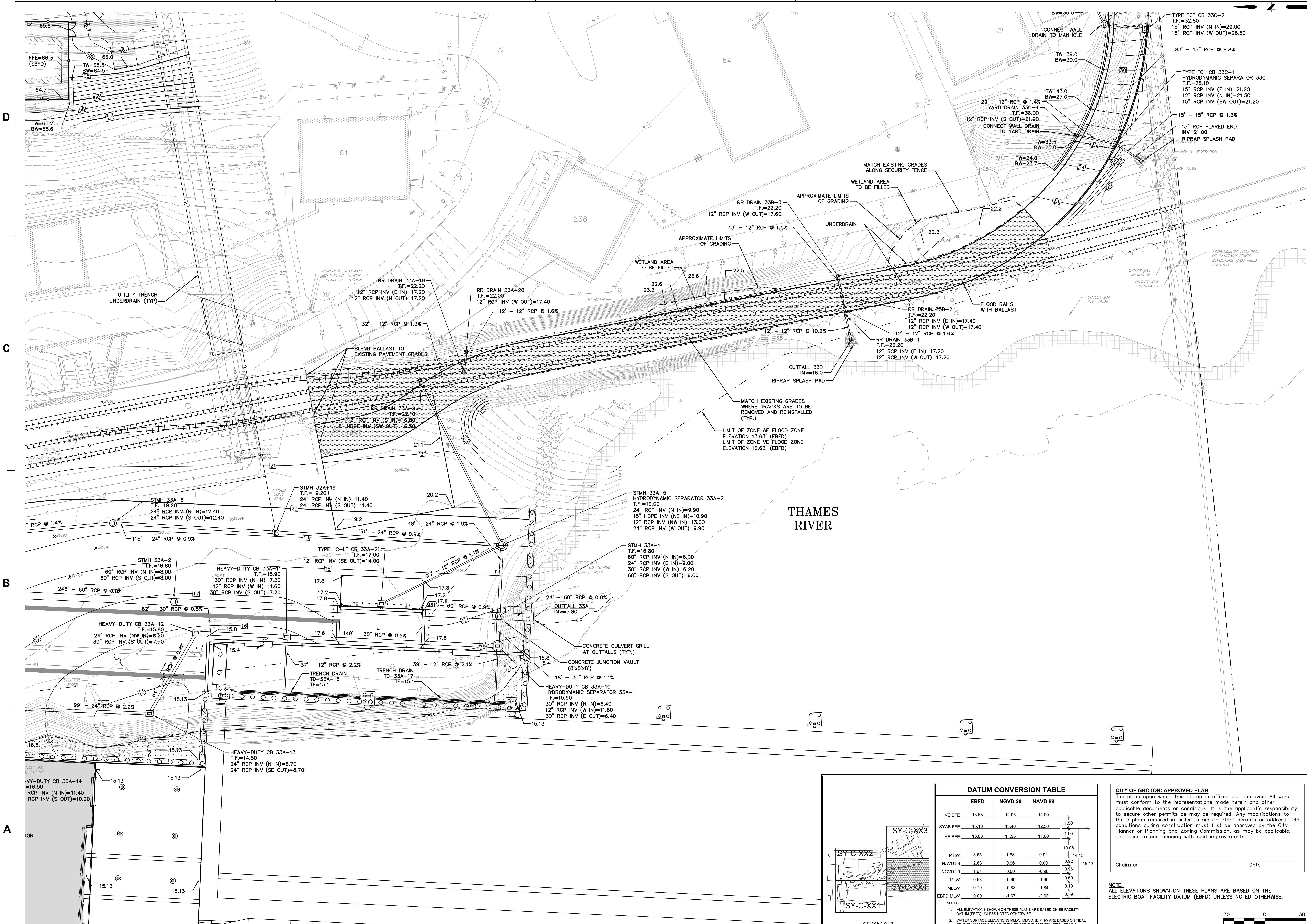
Drawing No.:
SY-C-163

SHEET: OF

ISSUED FOR PERMIT

File Path: J:\DWG\P97\97570\S30\Civil\Plan\1997570S30-GRD-01.dwg

PLOT DATE/TIME: 2/11/2019 9:25 AM



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1.50 1.50 10.08 14.15 15.13 0.92 0.96 0.69 0.19 0.79

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FILE NAME:

GD GENERAL DYNAMICS
Electric Boat
South Yard Assembly Building (SYAB)

SITE DRAINAGE PLAN

Date: 13 FEB 2019

Drawing No.:
SY-C-164

SHEET.: OF

ISSUED FOR PERMIT

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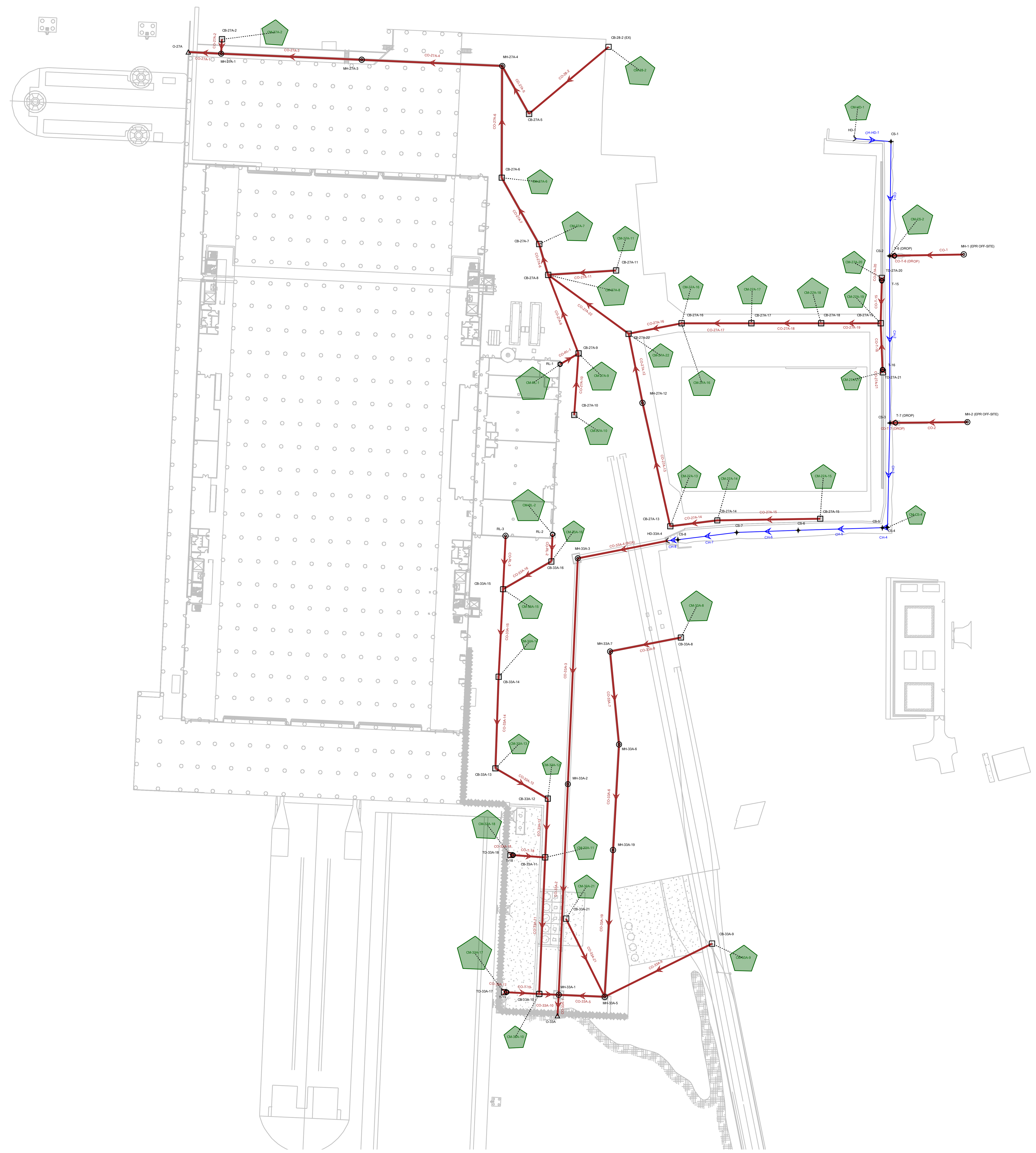
PLOT DATE/TIME: 2/11/2019 9:25 AM

Scenario: 25-Year



Conduit FlexTable: Combined Pipe/Node Report

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (%)	Diameter (in)	System Intensity (in/h)	System CA (ft²)	System Rational Flow (cfs)	Capacity (Full Flow) (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Elevation Ground (Start) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Stop) (ft)
CO-33A-4 (BOX)	HD-33A-4	13.60	MH-33A-3	12.30	103.2	1.26		5.51	108,300	13.82	230.88	14.60	16.60	19.90	14.53	19.40
CO-1	MH-1 (EPR OFF-SITE)	71.10	T-6 (DROP)	61.60	77.6	12.24	24.0	8.66	0	0.00	79.14	31.83	78.77	75.41	63.60	63.60
CO-T-6 (DROP)	T-6 (DROP)	61.60	CS-2	16.49	5.5	825.42	24.0	11.17	0	0.00	649.91	149.90	63.60	63.60	22.64	23.30
CO-2	MH-2 (EPR OFF-SITE)	63.80	T-7 (DROP)	60.80	80.6	3.72	24.0	8.66	0	0.00	43.64	20.69	69.45	70.64	62.79	60.80
CO-T-7 (DROP)	T-7 (DROP)	60.80	CS-3	16.80	6.2	712.08	24.0	11.16	0	0.00	603.64	125.57	62.79	60.80	22.22	23.30
CO-33A-1	MH-33A-1	6.00	O-33A	5.80	23.5	0.85	60.0	5.29	335,328	41.08	240.09	13.82	10.15	16.80	9.72	14.60
CO-33A-9	CB-33A-9	16.50	MH-33A-5	10.90	134.2	4.17	15.0	6.13	31,320	4.44	14.30	10.27	17.35	22.10	11.38	19.00
CO-33A-5	MH-33A-5	9.90	MH-33A-1	9.00	51.7	1.74	24.0	5.32	110,658	13.62	32.34	9.85	11.23	19.00	9.96	16.80
CO-33A-8	CB-33A-8	16.96	MH-33A-7	13.80	81.0	3.90	24.0	5.60	71,148	9.22	44.68	11.20	18.04	21.60	14.42	19.40
CO-33A-7	MH-33A-7	13.80	MH-33A-6	12.40	104.7	1.34	24.0	5.57	71,148	9.17	26.15	7.59	14.88	19.40	13.22	19.20
CO-33A-14	CB-33A-14	10.90	CB-33A-13	8.70	102.6	2.14	24.0	8.43	26,108	5.09	33.12	9.78	12.17	16.50	11.70	14.80
CO-33A-13	CB-33A-13	8.70	CB-33A-12	8.20	67.8	0.74	24.0	8.34	75,888	14.65	19.42	6.99	11.70	14.80	11.06	15.80
CO-33A-12	CB-33A-12	7.70	CB-33A-11	7.20	65.9	0.76	30.0	8.26	80,190	15.33	35.74	4.61	11.06	15.80	10.86	15.90
CO-33A-11	CB-33A-11	7.20	CB-33A-10	6.40	153.3	0.52	30.0	8.14	97,470	18.36	29.63	5.23	10.86	15.90	10.26	15.90
CO-33A-10	CB-33A-10	6.40	MH-33A-1	6.20	21.8	0.92	30.0	7.89	116,370	21.26	39.25	5.82	10.26	15.90	10.15	16.80
CO-33A-3	MH-33A-3	10.00	MH-33A-2	8.00	253.4	0.79	60.0	5.48	108,300	13.74	231.37	13.01	13.83	19.40	11.32	16.80
CO-33A-2	MH-33A-2	8.00	MH-33A-1	6.00	236.4	0.85	60.0	5.40	108,300	13.52	239.52	13.37	11.83	16.80	10.15	16.80
CO-27A-15	CB-27A-15	15.10	CB-27A-14	14.40	115.4	0.61	15.0	8.66	4,140	0.83	5.03	3.03	15.46	18.10	14.74	18.50
CO-27A-14	CB-27A-14	14.10	CB-27A-13	13.80	53.2	0.56	18.0	8.34	6,930	1.34	7.89	3.32	14.53	18.50	14.42	19.60
CO-27A-13	CB-27A-13	13.80	MH-27A-12	13.00	141.8	0.56	18.0	8.20	13,950	2.65	7.89	4.02	14.42	19.60	13.75	20.10
CO-27A-16	CB-27A-16	15.00	CB-27A-22	14.60	60.5	0.66	15.0	7.50	40,298	6.99	5.25	5.70	16.46	19.70	15.66	19.70
CO-27A-4	MH-27A-4	7.80	MH-27A-3	6.80	157.7	0.63	30.0	5.52	227,338	29.06	32.66	7.52	9.64	16.10	8.80	14.50
CO-27A-11	CB-27A-11	15.23	CB-27A-8	14.00	76.3	1.61	15.0	8.66	9,230	1.85	8.20	5.39	15.77	19.02	14.40	17.80
CO-27A-5	CB-27A-5	9.60	MH-27A-4	8.30	61.6	2.11	18.0	5.55	65,608	8.43	15.26	8.85	10.72	16.50	9.64	16.10
CO-27A-7	CB-27A-7	10.40	CB-27A-6	9.60	85.4	0.94	24.0	7.24	116,834	19.56	21.89	7.88	11.99	16.70	11.07	15.60
CO-27A-6	CB-27A-6	9.10	MH-27A-4	7.80	125.3	1.04	30.0	7.14	161,730	26.74	41.78	9.03	10.86	15.60	9.64	16.10
CO-27A-6	CB-27A-8	10.80	CB-27A-7	10.40	36.0	1.11	24.0	7.27	106,056	17.85	23.86	8.33	12.32	17.80	11.99	16.70
CO-27A-3	MH-27A-3	6.80	MH-27A-1	6.00	157.7	0.51	30.0	5.43	227,338	28.57	29.21	6.78	8.80	14.50	7.94	14.00
CO-27A-1	MH-27A-1	6.00	O-27A	5.80	36.9	0.54	30.0	5.33	234,808	28.96	30.20	7.01	7.94	14.00	7.64	12.60
CO-27A-9	CB-27A-9	14.70	CB-27A-8	12.80	94.5	2.01	15.0	8.50	18,045	3.55	9.16	6.99	15.46	19.00	13.34	17.80
CO-28-2	CB-28-2 (EX)	13.70	CB-27A-5	9.60	116.6	3.52	18.0	5.60	65,608	8.50	19.70	10.73	14.83	18.78	10.29	16.50
CO-RL-1	RL-1	15.30	CB-27A-9	15.00	24.0	1.25	12.0	8.66	7,470	1.50	3.98	4.71	15.82	19.30	15.43	19.00
CO-RL-2	RL-2	15.30	CB-33A-16	15.00	30.5	0.98	12.0	8.66	9,000	1.80	3.53	4.52	15.87	19.30	15.67	18.70
CO-27A-17	CB-27A-17	15.40	CB-27A-16	15.00	78.2	0.51	15.0	7.68	25,621	4.55	4.62	3.71	16.85	19.70	16.46	19.70
CO-27A-19	CB-27A-19	16.20	CB-27A-18	15.85	66.9	0.52	15.0	8.03	17,730	3.29	4.67	4.12	17.25	19.70	17.12	19.60
CO-27A-18	CB-27A-18	15.85	CB-27A-17	15.40	78.3	0.57	15.0	7.89	20,810	3.80	4.90	3.10	17.12	19.60	16.85	19.70
CO-27A-10	CB-27A-10	15.50	CB-27A-9	15.00	69.1	0.72	12.0	8.66	6,103	1.22	3.03	3.65	15.97	19.00	15.44	19.00
CO-27A-2	CB-27A-2	6.50	MH-27A-1	6.00	16.2	3.08	12.0	8.66	7,470	1.50	6.25	1.91	7.97	9.90	7.94	14.00
CO-33A-16	CB-33A-16	15.00	CB-33A-15	13.90	62.5	1.76	15.0	8.60	13,974	2.78	8.57	6.24	15.67	18.70	14.84	18.20
CO-33A-15	CB-33A-15	13.60	CB-33A-14	11.40	98.4	2.24	18.0	8.52	15,820	3.12	15.71	9.50	14.84	18.20	12.29	16.50
CO-27A-20	TD-27A-20	19.00	T-15	18.30	3.1	22.49	12.0	8.66	10,350	2.07	18.30	15.45	19.61	19.70	18.65	19.70
CO-T-15	T-15	17.00	CB-27A-19	16.50	47.7	1.05	12.0	8.66	10,350	2.07	3.65	4.79	17.61	19.70	17.25	19.70
CO-27A-21	TD-27A-21	19.00	T-16	18.30	2.9	23.80	12.0	8.15	3,960	0.75	18.83	11.66	19.36	19.70	18.48	19.70
CO-T-16	T-16	17.00	CB-27A-19	16.50	52.0	0.96	12.0	8.15	3,960	0.75	3.49	3.54	17.36	19.70	17.25	19.70
CO-RL-3	RL-3	14.30	CB-33A-15	13.60	59.8	1.17	18.0	8.66	0	0.00	11.36	6.83	15.35	19.33	14.84	18.20
CO-33A-18	TD-33A-18	14.40	T-18	12.40	2.9	68.42	12.0	8.66	4,500	0.90	31.92	17.85	14.80	15.10	12.56	15.10
CO-T-18	T-18	12.40	CB-33A-11	11.60	36.1	2.22	12.0	8.66	4,500	0.90	5.31	5.04	12.80	15.10	11.88	15.90
CO-33A-17	TD-33A-17	14.40	T-19	12.40	3.0	67.10	12.0	8.66	4,500	0.90	31.62	17.72	14.80	15.10	12.56	15.10

Conduit FlexTable: Combined Pipe/Node Report

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (%)	Diameter (in)	System Intensity (in/h)	System CA (ft²)	System Rational Flow (cfs)	Capacity (Full Flow) (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Elevation Ground (Start) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Stop) (ft)
CO-T-19	T-19	12.40	CB-33A-10	11.60	36.6	2.18	12.0	8.66	4,500	0.90	5.27	5.01	12.80	15.10	11.88	15.90
CO-27A-12	MH-27A-12	13.00	CB-27A-22	12.45	79.0	0.70	18.0	7.91	13,950	2.55	8.77	4.30	13.75	20.10	13.76	19.70
CO-27A-22	CB-27A-22	12.45	CB-27A-8	11.30	111.9	1.03	18.0	7.41	65,148	11.17	10.65	6.83	13.76	19.70	12.58	17.80
CO-33A-6	MH-33A-6	12.40	MH-33A-19	11.40	118.5	0.84	24.0	5.51	71,148	9.07	20.78	6.39	13.48	19.20	12.32	19.20
CO-33A-19	MH-33A-19	11.40	MH-33A-5	9.90	164.9	0.91	24.0	5.43	71,148	8.94	21.58	6.55	12.47	19.20	11.23	19.00
CO-33A-21	CB-33A-21	14.00	MH-33A-5	13.00	97.8	1.02	12.0	8.66	8,190	1.64	3.60	4.48	14.54	17.50	13.47	19.00

FlexTable: Conduit Table

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (%)	Diameter (in)	System Intensity (in/h)	System CA (ft²)	System Rational Flow (cfs)	Flow (cfs)	Capacity (Full Flow) (cfs)	Velocity (ft/s)	Flow / Capacity (Design) (%)	Hydraulic Grade Line (In) (ft)	Elevation Ground (Start) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Stop) (ft)
CO-33A-4 (BOX)	HD-33A-4	13.60	MH-33A-3	12.30	103.2	1.26		5.51	108,300	13.82	178.82	230.88	14.60	77.4	16.60	19.90	14.53	19.40
CO-1	MH-1 (EPR OFF-SITE)	71.10	T-6 (DROP)	61.60	77.6	12.24	24.0	8.66	0	0.00	100.00	79.14	31.83	126.4	78.77	75.41	63.60	63.60
CO-T-6 (DROP)	T-6 (DROP)	61.60	CS-2	16.49	5.5	825.42	24.0	11.17	0	0.00	100.00	649.91	149.90	15.4	63.60	63.60	22.64	23.30
CO-2	MH-2 (EPR OFF-SITE)	63.80	T-7 (DROP)	60.80	80.6	3.72	24.0	8.66	0	0.00	65.00	43.64	20.69	148.9	69.45	70.64	62.79	60.80
CO-T-7 (DROP)	T-7 (DROP)	60.80	CS-3	16.80	6.2	712.08	24.0	11.16	0	0.00	65.00	603.64	125.57	10.8	62.79	60.80	22.22	23.30
CO-33A-1	MH-33A-1	6.00	O-33A	5.80	23.5	0.85	60.0	5.29	335,328	41.08	213.38	240.09	13.82	88.9	10.15	16.80	9.72	14.60
CO-33A-9	CB-33A-9	16.50	MH-33A-5	10.90	134.2	4.17	15.0	6.13	31,320	4.44	4.44	14.30	10.27	31.1	17.35	22.10	11.38	19.00
CO-33A-5	MH-33A-5	9.90	MH-33A-1	9.00	51.7	1.74	24.0	5.32	110,658	13.62	13.62	32.34	9.85	42.1	11.23	19.00	9.96	16.80
CO-33A-8	CB-33A-8	16.96	MH-33A-7	13.80	81.0	3.90	24.0	5.60	71,148	9.22	9.22	44.68	11.20	20.6	18.04	21.60	14.42	19.40
CO-33A-7	MH-33A-7	13.80	MH-33A-6	12.40	104.7	1.34	24.0	5.57	71,148	9.17	9.17	26.15	7.59	35.1	14.88	19.40	13.22	19.20
CO-33A-14	CB-33A-14	10.90	CB-33A-13	8.70	102.6	2.14	24.0	8.43	26,108	5.09	12.39	33.12	9.78	37.4	12.17	16.50	11.70	14.80
CO-33A-13	CB-33A-13	8.70	CB-33A-12	8.20	67.8	0.74	24.0	8.34	75,888	14.65	21.95	19.42	6.99	113.0	11.70	14.80	11.06	15.80
CO-33A-12	CB-33A-12	7.70	CB-33A-11	7.20	65.9	0.76	30.0	8.26	80,190	15.33	22.63	35.74	4.61	63.3	11.06	15.80	10.86	15.90
CO-33A-11	CB-33A-11	7.20	CB-33A-10	6.40	153.3	0.52	30.0	8.14	97,470	18.36	25.66	29.63	5.23	86.6	10.86	15.90	10.26	15.90
CO-33A-10	CB-33A-10	6.40	MH-33A-1	6.20	21.8	0.92	30.0	7.89	116,370	21.26	28.56	39.25	5.82	72.7	10.26	15.90	10.15	16.80
CO-33A-3	MH-33A-3	10.00	MH-33A-2	8.00	253.4	0.79	60.0	5.48	108,300	13.74	178.74	231.37	13.01	77.3	13.83	19.40	11.32	16.80
CO-33A-2	MH-33A-2	8.00	MH-33A-1	6.00	236.4	0.85	60.0	5.40	108,300	13.52	178.52	239.52	13.37	74.5	11.83	16.80	10.15	16.80
CO-27A-15	CB-27A-15	15.10	CB-27A-14	14.40	115.4	0.61	15.0	8.66	4,140	0.83	0.83	5.03	3.03	16.5	15.46	18.10	14.74	18.50
CO-27A-14	CB-27A-14	14.10	CB-27A-13	13.80	53.2	0.56	18.0	8.34	6,930	1.34	1.34	7.89	3.32	16.9	14.53	18.50	14.42	19.60
CO-27A-13	CB-27A-13	13.80	MH-27A-12	13.00	141.8	0.56	18.0	8.20	13,950	2.65	2.65	7.89	4.02	33.6	14.42	19.60	13.75	20.10
CO-27A-16	CB-27A-16	15.00	CB-27A-22	14.60	60.5	0.66	15.0	7.50	40,298	6.99	6.99	5.25	5.70	133.1	16.46	19.70	15.66	19.70
CO-27A-4	MH-27A-4	7.80	MH-27A-3	6.80	157.7	0.63	30.0	5.52	227,338	29.06	29.06	32.66	7.52	89.0	9.64	16.10	8.80	14.50
CO-27A-11	CB-27A-11	15.23	CB-27A-8	14.00	76.3	1.61	15.0	8.66	9,230	1.85	1.85	8.20	5.39	22.6	15.77	19.02	14.40	17.80
CO-27A-5	CB-27A-5	9.60	MH-27A-4	8.30	61.6	2.11	18.0	5.55	65,608	8.43	8.43	15.26	8.85	55.3	10.72	16.50	9.64	16.10
CO-27A-7	CB-27A-7	10.40	CB-27A-6	9.60	85.4	0.94	24.0	7.24	116,834	19.56	19.56	21.89	7.88	89.4	11.99	16.70	11.07	15.60
CO-27A-6	CB-27A-6	9.10	MH-27A-4	7.80	125.3	1.04	30.0	7.14	161,730	26.74	26.74	41.78	9.03	64.0	10.86	15.60	9.64	16.10
CO-27A-6	CB-27A-8	10.80	CB-27A-7	10.40	36.0	1.11	24.0	7.27	106,056	17.85	17.85	23.86	8.33	74.8	12.32	17.80	11.99	16.70
CO-27A-3	MH-27A-3	6.80	MH-27A-1	6.00	157.7	0.51	30.0	5.43	227,338	28.57	28.57	29.21	6.78	97.8	8.80	14.50	7.94	14.00
CO-27A-1	MH-27A-1	6.00	O-27A	5.80	36.9	0.54	30.0	5.33	234,808	28.96	28.96	30.20	7.01	95.9	7.94	14.00	7.64	12.60
CO-27A-9	CB-27A-9	14.70	CB-27A-8	12.80	94.5	2.01	15.0	8.50	18,045	3.55	3.55	9.16	6.99	38.7	15.46	19.00	13.34	17.80
CO-28-2	CB-28-2 (EX)	13.70	CB-27A-5	9.60	116.6	3.52	18.0	5.60	65,608	8.50	8.50	19.70	10.73	43.2	14.83	18.78	10.29	16.50
CO-RL-1	RL-1	15.30	CB-27A-9	15.00	24.0	1.25	12.0	8.66	7,470	1.50	1.50	3.98	4.71	37.6	15.82	19.30	15.43	19.00
CO-RL-2	RL-2	15.30	CB-33A-16	15.00	30.5	0.98	12.0	8.66	9,000	1.80	1.80	3.53	4.52	51.0	15.87	19.30	15.67	18.70
CO-27A-17	CB-27A-17	15.40	CB-27A-16	15.00	78.2	0.51	15.0	7.68	25,621	4.55	4.55	4.62	3.71	98.6	16.85	19.70	16.46	19.70
CO-27A-19	CB-27A-19	16.20	CB-27A-18	15.85	66.9	0.52	15.0	8.03	17,730	3.29	3.29	4.67	4.12	70.5	17.25	19.70	17.12	19.60
CO-27A-18	CB-27A-18	15.85	CB-27A-17	15.40	78.3	0.57	15.0	7.89	20,810	3.80	3.80	4.90	3.10	77.6	17.12	19.60	16.85	19.70
CO-27A-10	CB-27A-10	15.50	CB-27A-9	15.00	69.1	0.72	12.0	8.66	6,103	1.22	1.22	3.03	3.65	40.4	15.97	19.00	15.44	19.00
CO-27A-2	CB-27A-2	6.50	MH-27A-1	6.00	16.2	3.08	12.0	8.66	7,470	1.50	1.50	6.25	1.91	23.9	7.97	9.90	7.94	14.00
CO-33A-16	CB-33A-16	15.00	CB-33A-15	13.90	62.5	1.76	15.0	8.60	13,974	2.78	2.78	8.57	6.24	32.5	15.67	18.70	14.84	18.20
CO-33A-15	CB-33A-15	13.60	CB-33A-14	11.40	98.4	2.24	18.0	8.52	15,820	3.12	10.42	15.71	9.50	66.3	14.84	18.20	12.29	16.50
CO-27A-20	TD-27A-20	19.00	T-15	18.30	3.1	22.49	12.0	8.66	10,350	2.07	2.07	18.30	15.45	11.3	19.61	19.70	18.65	19.70
CO-T-15	T-15	17.00	CB-27A-19	16.50	47.7	1.05	12.0	8.66	10,350	2.07	2.07	3.65	4.79	56.8	17.61	19.70	17.25	19.70
CO-27A-21	TD-27A-21	19.00	T-16	18.30	2.9	23.80	12.0	8.15	3,960	0.75	0.75	18.83	11.66	4.0	19.36	19.70	18.48	19.70
CO-T-16	T-16	17.00	CB-27A-19	16.50	52.0	0.96	12.0	8.15	3,960	0.75	0.75	3.49	3.54	21.4	17.36	19.70	17.25	19.70
CO-RL-3	RL-3	14.30	CB-33A-15	13.60	59.8	1.17	18.0	8.66	0	0.00	7.30	11.36	6.83	64.3	15.35	19.33	14.84	18.20
CO-33A-18	TD-33A-18	14.40	T-18	12.40	2.9	68.42	12.0	8.66	4,500	0.90	0.90	31.92	17.85	2.8	14.80	15.10	12.56	15.10
CO-T-18	T-18	12.40	CB-33A-11	11.60	36.1	2.22	12.0	8.66	4,500	0.90	0.90	5.31	5.04	17.0	12.80	15.10	11.88	15.90
CO-33A-17	TD-33A-17	14.40	T-19	12.40	3.0	67.10	12.0	8.66	4,500	0.90	0.90	31.62	17.72	2.9	14.80	15.10	12.56	15.10

FlexTable: Conduit Table

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (%)	Diameter (in)	System Intensity (in/h)	System CA (ft²)	System Rational Flow (cfs)	Flow (cfs)	Capacity (Full Flow) (cfs)	Velocity (ft/s)	Flow / Capacity (Design) (%)	Hydraulic Grade Line (In) (ft)	Elevation Ground (Start) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Stop) (ft)
CO-T-19	T-19	12.40	CB-33A-10	11.60	36.6	2.18	12.0	8.66	4,500	0.90	0.90	5.27	5.01	17.1	12.80	15.10	11.88	15.90
CO-27A-12	MH-27A-12	13.00	CB-27A-22	12.45	79.0	0.70	18.0	7.91	13,950	2.55	2.55	8.77	4.30	29.1	13.75	20.10	13.76	19.70
CO-27A-22	CB-27A-22	12.45	CB-27A-8	11.30	111.9	1.03	18.0	7.41	65,148	11.17	11.17	10.65	6.83	104.9	13.76	19.70	12.58	17.80
CO-33A-6	MH-33A-6	12.40	MH-33A-19	11.40	118.5	0.84	24.0	5.51	71,148	9.07	9.07	20.78	6.39	43.7	13.48	19.20	12.32	19.20
CO-33A-19	MH-33A-19	11.40	MH-33A-5	9.90	164.9	0.91	24.0	5.43	71,148	8.94	8.94	21.58	6.55	41.4	12.47	19.20	11.23	19.00
CO-33A-21	CB-33A-21	14.00	MH-33A-5	13.00	97.8	1.02	12.0	8.66	8,190	1.64	1.64	3.60	4.48	45.6	14.54	17.50	13.47	19.00

FlexTable: Catch Basin Table

Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Downstream Conduit	Local Rational Flow (cfs)	Capture Efficiency (Calculated) (%)	Carryover Rational Flow (cfs)	Flow (Captured) (cfs)	Bypassed Rational Flow (cfs)	Hydraulic Grade Line (In) (ft)	Flow (Total Out) (cfs)	Depth (Gutter) (in)	Spread / Top Width (ft)
CB-27A-10	19.00	19.00	15.50	CO-27A-10	2.27	53.8	0.00	1.22	1.05	15.97	1.22	1.8	7.5
CB-27A-11	19.02	19.02	15.23	CO-27A-11	4.08	45.4	0.00	1.85	2.23	15.77	1.85	2.2	9.3
CB-27A-13	19.60	19.60	13.80	CO-27A-13	1.41	100.0	0.00	1.41	0.00	14.42	2.65	2.4	10.1
CB-27A-14	18.50	18.50	14.10	CO-27A-14	0.56	100.0	0.00	0.56	0.00	14.53	1.34	1.4	6.0
CB-27A-15	18.10	18.10	15.10	CO-27A-15	0.83	100.0	0.00	0.83	0.00	15.46	0.83	1.8	7.5
CB-27A-16	19.70	19.70	15.00	CO-27A-16	6.69	37.8	0.63	2.77	4.56	16.46	6.99	2.8	11.6
CB-27A-17	19.70	19.70	15.40	CO-27A-17	1.35	58.9	0.28	0.96	0.67	16.85	4.55	1.6	6.6
CB-27A-18	19.60	19.60	15.85	CO-27A-18	0.90	68.4	0.00	0.62	0.28	17.12	3.80	1.3	5.3
CB-27A-19	19.70	19.70	16.20	CO-27A-19	0.69	100.0	0.00	0.69	0.00	17.25	3.29	1.6	6.7
CB-27A-2	9.90	9.90	6.50	CO-27A-2	1.50	100.0	0.00	1.50	0.00	7.97	1.50	2.5	10.5
CB-27A-22	19.70	19.70	12.45	CO-27A-22	0.34	42.2	4.84	2.18	3.00	13.76	11.17	2.4	10.2
CB-27A-5	16.50	16.50	9.60	CO-27A-5	0.00	100.0	0.00	0.00	0.00	10.72	8.43	0.0	0.0
CB-27A-6	15.60	15.60	9.10	CO-27A-6	6.06	100.0	2.94	9.00	0.00	10.86	26.74	7.7	31.9
CB-27A-7	16.70	16.70	10.40	CO-27A-7	0.65	42.4	4.45	2.16	2.94	11.99	19.56	2.4	10.1
CB-27A-8	17.80	17.80	10.80	CO-27A-6	1.37	38.1	5.81	2.73	4.45	12.32	17.85	2.8	11.5
CB-27A-9	19.00	19.00	14.70	CO-27A-9	0.43	60.5	1.05	0.90	0.59	15.46	3.55	1.5	6.4
CB-28-2 (EX)	18.78	18.78	13.70	CO-28-2	8.50	100.0	0.00	8.50	0.00	14.83	8.50	7.4	30.8
CB-33A-10	15.90	15.90	6.40	CO-33A-10	2.89	100.0	0.00	2.89	0.00	10.26	28.56	3.7	15.6
CB-33A-11	15.90	15.90	7.20	CO-33A-11	2.56	100.0	0.00	2.56	0.00	10.86	25.66	3.5	14.5
CB-33A-12	15.80	15.80	7.70	CO-33A-12	1.41	61.3	0.00	0.86	0.54	11.06	22.63	1.5	6.3
CB-33A-13	14.80	14.80	8.70	CO-33A-13	6.73	100.0	3.25	9.98	0.00	11.70	21.95	7.9	33.1
CB-33A-14	16.50	16.50	10.90	CO-33A-14	3.95	43.3	0.82	2.06	2.70	12.17	12.39	2.4	9.9
CB-33A-15	18.20	18.20	13.60	CO-33A-15	0.47	78.9	0.00	0.37	0.10	14.84	10.42	1.0	4.1
CB-33A-16	18.70	18.70	15.00	CO-33A-16	1.71	58.2	0.00	1.00	0.72	15.67	2.78	1.6	6.7
CB-33A-21	17.50	17.50	14.00	CO-33A-21	1.64	100.0	0.00	1.64	0.00	14.54	1.64	2.7	11.1
CB-33A-8	21.60	21.60	16.96	CO-33A-8	9.22	100.0	0.00	9.22	0.00	18.04	9.22	7.8	32.4
CB-33A-9	22.10	22.10	16.50	CO-33A-9	4.44	100.0	0.00	4.44	0.00	17.35	4.44	4.9	20.4
TD-27A-20	19.70	19.70	19.00	CO-27A-20	2.07	100.0	0.00	2.07	0.00	19.61	2.07	0.4	1.7
TD-27A-21	19.70	19.70	19.00	CO-27A-21	0.75	100.0	0.00	0.75	0.00	19.36	0.75	0.2	0.9
TD-33A-17	15.10	15.10	14.40	CO-33A-17	0.90	100.0	0.00	0.90	0.00	14.80	0.90	6.1	25.5
TD-33A-18	15.10	15.10	14.40	CO-33A-18	0.90	100.0	0.00	0.90	0.00	14.80	0.90	6.1	25.5

FlexTable: Manhole Table

Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Known) (cfs)	Flow (Total Out) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
MH-1 (EPR OFF-SITE)	75.41	75.41	71.10	100.00	100.00	75.41	75.41
MH-2 (EPR OFF-SITE)	70.64	70.64	63.80	65.00	65.00	69.45	69.45
MH-27A-1	14.00	14.00	6.00	0.00	28.96	7.94	7.94
MH-27A-12	20.10	20.10	13.00	0.00	2.55	13.75	13.75
MH-27A-3	14.50	14.50	6.80	0.00	28.57	8.80	8.80
MH-27A-4	16.10	16.10	7.80	0.00	29.06	9.64	9.64
MH-33A-1	16.80	16.80	6.00	0.00	213.38	10.15	10.15
MH-33A-19	19.20	19.20	11.40	0.00	8.94	12.47	12.47
MH-33A-2	16.80	16.80	8.00	0.00	178.52	11.83	11.83
MH-33A-3	19.40	19.40	10.00	0.00	178.74	13.83	13.83
MH-33A-5	19.00	19.00	9.90	0.00	13.62	11.23	11.23
MH-33A-6	19.20	19.20	12.40	0.00	9.07	13.48	13.48
MH-33A-7	19.40	19.40	13.80	0.00	9.17	14.88	14.88
RL-3	19.33	19.33	14.30	7.30	7.30	15.35	15.35

FlexTable: Catchment Table

Label	Outflow Element	Area (User Defined) (ft²)	Runoff Coefficient (Rational)	Catchment CA (ft²)	Time of Concentration (min)	Catchment Intensity (in/h)	Catchment Rational Flow (cfs)
CM-33A-14	CB-33A-14	21,900	0.90	19,710	5.0	8.66	3.95
CM-33A-13	CB-33A-13	37,300	0.90	33,570	5.0	8.66	6.73
CM-33A-12	CB-33A-12	7,800	0.90	7,020	5.0	8.66	1.41
CM-33A-11	CB-33A-11	14,200	0.90	12,780	5.0	8.66	2.56
CM-33A-9	CB-33A-9	58,000	0.54	31,320	10.0	6.13	4.44
CM-33A-8	CB-33A-8	121,000	0.59	71,148	12.0	5.60	9.22
CM-33A-16	CB-33A-16	9,500	0.90	8,550	5.0	8.66	1.71
CM-33A-10	CB-33A-10	16,000	0.90	14,400	5.0	8.66	2.89
CM-27A-20	TD-27A-20	11,500	0.90	10,350	5.0	8.66	2.07
CM-27A-15	CB-27A-15	4,600	0.90	4,140	5.0	8.66	0.83
CM-27A-14	CB-27A-14	3,100	0.90	2,790	5.0	8.66	0.56
CM-27A-13	CB-27A-13	7,800	0.90	7,020	5.0	8.66	1.41
CM-27A-11	CB-27A-11	22,600	0.90	20,340	5.0	8.66	4.08
CM-RL-1	RL-1	8,300	0.90	7,470	5.0	8.66	1.50
CM-27A-8	CB-27A-8	7,600	0.90	6,840	5.0	8.66	1.37
CM-27A-6	CB-27A-6	33,600	0.90	30,240	5.0	8.66	6.06
CM-28-2	CB-28-2 (EX)	86,100	0.76	65,608	12.0	5.60	8.50
CM-27A-9	CB-27A-9	2,400	0.90	2,160	5.0	8.66	0.43
CM-27A-16	CB-27A-16	28,900	0.90	26,010	6.0	8.15	4.91
CM-27A-7	CB-27A-7	3,600	0.90	3,240	5.0	8.66	0.65
CM-RL-2	RL-2	10,000	0.90	9,000	5.0	8.66	1.80
CM-HD-1	HD-1	43,000	0.54	23,220	8.0	7.14	3.84
CM-CS-2	CS-2	31,000	0.36	11,160	7.0	7.65	1.98
CM-CS-4	CS-4	112,000	0.66	73,920	8.0	7.14	12.22
CM-27A-18	CB-27A-18	5,000	0.90	4,500	5.0	8.66	0.90
CM-27A-17	CB-27A-17	7,500	0.90	6,750	5.0	8.66	1.35
CM-27A-16	CB-27A-16	10,500	0.90	9,450	5.0	8.66	1.89
CM-27A-10	CB-27A-10	12,600	0.90	11,340	5.0	8.66	2.27
CM-33A-18	TD-33A-18	5,000	0.90	4,500	5.0	8.66	0.90
CM-33A-17	TD-33A-17	5,000	0.90	4,500	5.0	8.66	0.90
CM-27A-2	CB-27A-2	8,300	0.90	7,470	5.0	8.66	1.50
CM-27A-21	TD-27A-21	4,400	0.90	3,960	6.0	8.15	0.75
CM-27A-19	CB-27A-19	3,800	0.90	3,420	0.5	8.66	0.69
CM-27A-22	CB-27A-22	1,900	0.90	1,710	5.0	8.66	0.34
CM-33A-15	CB-33A-15	2,600	0.90	2,340	5.0	8.66	0.47
CM-33A-21	CB-33A-21	9,100	0.90	8,190	5.0	8.66	1.64

Appendix D

Water Quality Calculations

Water Quality Flow Calculations

Project: EB- South Yard Assembly Building By: KPG Date: 2/13/2019
Location: 75 Eastern Point Road, Groton, CT

Basin or Watershed Area	MH 27A-1	MH 33A-5	CB 33A-10	CB 33C-1
Area, Am	6.29 ac	4.32 ac	2.97 ac	0.37 ac
	0.00983 mi^2	0.00675 mi^2	0.00464 mi^2	0.00058 mi^2
Water Quality Volume, WQV	16,791 cf	5,619 cf	10,242 cf	1,996 cf
Runoff, Q[1]	0.74 in.	0.36 in.	0.95 in.	1.49 in.
Rainfall, P[2]	1.0 in.	1.0 in.	1.0 in.	1.0 in.
CN[3]	97	91	98	98
Tc	13.0 min.	7.0 min.	13.0 min.	6.0 min.
Rainfall Distribution	III type	III type	III type	III type
Initial Abstraction, Ia[4]	0.062 in.	0.198 in.	0.041 in.	0.041 in.
Ia/P	0.062	0.198	0.041	0.041
Unit Peak Discharge, qu[5]	650 csm/in.	620 csm/in.	650 csm/in.	680 csm/in.
Water Quality Flow, WQF[6]	**4.70 cfs**	**1.50 cfs**	**2.87 cfs**	**0.58 cfs**
CDS Unit	**CDS3030-6**	**CDS2020-5**	**CDS2025-5**	**CDS2015-4**

[1] Q=WQV / Am / 5280 / 5280 * 12

[2] First inch of rainfall, 90% of average annual storm events, 2004 Connecticut Stormwater Quality Manual

[3] $CN=1000/[10+5P+10Q-10(Q^2+1.25QP)^{1/2}]$; Estimated Curve Number from Appendix B-1 of 2004 Connecticut Stormwater Quality Manual

[4] Derived from Table 4-1 from NRCS TR-55 Urban Hydrology for Small Watersheds

[5] Derived from Exhibit 4-III from NRCS TR-55 Urban Hydrology for Small Watersheds

[6] WQF = qp = qu*Am*Q; Equation 4-1 from NRCS TR-55 Urban Hydrology for Small Watersheds

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