STORMWATER MANAGEMENT, GROUNDWATER RECHARGE AND WATER QUALITY ANALYSIS

For

Ashbel Associates, LLC
Proposed Multifamily Residential Units

Greenwood Road & Texas Road
Block 146, Lot 25 & 26
Township of Marlboro
Monmouth County, NJ

Prepared by:

DYNAMIC ENGINEERING

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APPENDIX

I. SITE DESCRIPTION

The project site consists of Block 119, Lot 16, located on the western side of Texas Road in the Township of Marlboro, Monmouth County, New Jersey. Currently, the site is vacant and mostly forested. The subject site is 1,562,410 square feet (35.9 acres). The site is bordered to the north and west by vacant forested land; to the east by a residential use; and the south by a residential use. The project consists of developing the parcel with five (5) multi-family residential dwelling units and one (1) community building, with two hundred and thirty-five (235) total vehicle parking spaces, driveways, landscaping, stormwater management facilities, and other related site improvements and structures. The majority of the developed area will be completed outside wetlands, and wetland buffers of Matawan Creek.

The existing conditions of the tract have been verified by Boundary and Topographic Survey, prepared by Dynamic Survey, LLC, dated 7/30/2020.

II. DESIGN OVERVIEW

This report has been prepared to define and analyze the stormwater drainage conditions that would occur as a result of the development of Block 119, Lot 16 in the Township of Marlboro, Monmouth County, New Jersey. The project includes new stormwater management facilities to address applicable aspects of the Township of Marlboro Stormwater Management rules, NJAC 5:21, and NJAC 7:8.

Based upon the fact that the proposed improvements will result in more than one (1) acre of land disturbance and increase the amount or impervious coverage by more than 0.25 acres, this project is classified as a "major development"; and therefore, has been designed to meet the stormwater runoff quantity, quality and groundwater recharge standards, set forth by the Township of Marlboro Land Use Ordinance, NJAC 5:21, and NJAC 7:8. Accordingly, the following items are addressed within this report:

- Erosion control, groundwater recharge and runoff quantity standards (7:8-5.4)
- Stormwater runoff quality standards (7:8-5.5)
- Calculation of stormwater runoff and groundwater recharge (7:8-5.6)
- Standards for structural stormwater management measures (7:8-5.7)

The scope of the report includes the proposed five (5) multi-family dwelling units, one (1) community clubhouse, basins, driveways, parking areas, landscaping and other related site improvements as shown on the engineering drawings. The proposed site plan has 10.1% impervious lot coverage. The storm systems on site have been designed using this coverage.

A hydrological evaluation is provided for the NJDEP Water Quality, 2, 10, and 100-year storm events utilizing the Urban Hydrology for Small Watersheds TR55 method.

NJAC 7:8-5.4(a)3 states the stormwater quantity impacts can be calculating to meet one the of the following below:

i. Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the 2, 10 and 100-year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;

ii. Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the two, 10 and 100-year storm events and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area;

iii. Design stormwater management measures so that the post-construction peak runoff rates for the two, 10 and 100-year storm events are 50, 75 and 80 percent, respectively, of the pre-construction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed.

Per the above requirements, Study Point 1 (SP 1) will have runoff that will comply with the flow reductions indicated under iii as follows:

2-year:	50% reduction
10-year:	25% reduction
100-year:	20% reduction

This facility will comply with the Stormwater Management Best Management Practices.

It is important to note that the aforementioned flow reduction requirements are only required to be applied to onsite drainage areas within the limit of disturbance to satisfy the Township of Marlboro and NJDEP flow reduction requirements. Therefore, the proposed development satisfies the flow reduction requirements by applying the peak rate reduction requirements only to the onsite area that is to be disturbed.

III. EXISTING DRAINAGE CONDITIONS

The tract has been evaluated with the following drainage sub-watershed areas as depicted on the Existing Conditions Drainage Area Map. Each sub-watershed area has been calculated as a separate point of analysis.

Existing Study Area A: This study area is comprised of mostly wooded vegetation. It is analyzed as an area to be disturbed as a result of the proposed development. Currently, the stormwater runoff in this area, flows from the eastern side of the property to the wetlands located on the western side of the property. Runoff will continue to flow through the wetlands into Matawan Creek, also known as Study Point 1.

Based on the Monmouth County soils survey information, the soil types native to the site include:

MONMOUTH COUNTY SOIL SURVEY INFORMATION		
SOIL TYPE (SYMBOL)	**SOIL TYPE (NAME)**	**HYDROLOGIC SOIL GROUP**
AtsA	Atsion Sand	A/D
EkaAr	Elkton Loam	C/D
KkgB	Klej Loamy Sand	A/D
KkgkB	Klej Loamy Sand, Clayey Substratum	A/D
MakAt	Manahawkin Muck	D
PHG	Pits, Sand, and Gravel	N/A

Per the soil investigation completed by Dynamic Earth, LLC, the soil borings and soil profile pits generally encountered approximately eleven to 14 inches of topsoil at the surface. Beneath the surface cover, natural coastal plain deposits were encountered that generally consisted of sand, loamy sand, sandy clay loam, silt loam, and clay loam with variable amounts of gravel. The natural coastal plain deposits were encountered to refusal (due to continuous wet cave-in) depths ranging between approximately ten feet and 12.0 feet below the ground surface.

Evidence of seasonal high groundwater (based on soil mottling) was encountered within the soil profile pits at depths ranging between approximately 0.9 feet and 4.1 feet below the ground surface. Groundwater was encountered at depths ranging between approximately two feet and 4.1 feet. Groundwater levels are expected to fluctuate seasonally and following significant periods of precipitation. A summary of the seasonal high groundwater levels and permeability test results is presented in the following table:

STORMWATER INVESTIGATION SUMMARY - Greenwood Road							
Location	**Approximate Surface Elevation (Feet)**	**Estimated Seasonal High Groundwater**		**Permeability Test Results**			
		Depth (Feet)	**Elevation (Feet)**	**Field USDA Classification**	**Sample Depth (Inches)**	**Permeability (Inches/Hour)**	
						Replicate A	**Replicate B**
SPP-1	81.0	4.1	76.9	Sandy Clay Loam	53	--	--
SPP-2	84.0	3.8	80.2	Loamy Sand	35	1.7	1.7
				Sandy Clay Loam	50	0.2	< 0.2
SPP-3	71.5	0.9	70.6	Silt Loam	50	--	--
SPP-4	74.5	0.9	73.6	Silt Loam	55	< 0.2	< 0.2

IV. PROPOSED DRAINAGE CONDITIONS

The tract has been evaluated with the following drainage sub-watershed areas as depicted on the Proposed Conditions Drainage Area Map. Each sub-watershed area has been calculated as a separate point of analysis.

Proposed Study Area A: This portion of the site consists of the southern portion of the impervious asphalt drive aisles and parking lot. Stormwater runoff from this area is collected by a series of stormwater inlets which then flow to the proposed above ground detention Basin A. Stormwater runoff discharged from Basin A flows through the stormwater conveyance systems to the wetlands which ultimately flows to Matawan Creek located at Study Point 1.

Proposed Study Area B: This portion of the site consists of dwelling unit building #2 and the southwestern portion of the impervious asphalt drive aisles. Stormwater runoff from this area is collected by a series of roof drains and stormwater inlets that flow to the proposed above ground detention Basins B1 & B2. Stormwater runoff discharged from Basin B2 flows through the stormwater conveyance systems to the wetlands which ultimately flows to Matawan Creek located at Study Point 1.

Proposed Study Area C: This portion of the site consists of dwelling unit buildings # 1, 3, 4, & 5 and the northern portion of the impervious asphalt drive aisles and parking lots. Stormwater runoff from this area is collected by a series of roof drains and stormwater inlets that flow to the proposed above ground detention Basin C. Stormwater runoff discharged from Basin C flows through the stormwater conveyance systems to the wetlands which ultimately flows to Matawan Creek located at Study Point 1.

V. NON-STRUCTURAL STORMWATER MANAGEMENT STRATEGIES

The proposed project has been designed to the maximum extent practicable by incorporating the nonstructural stormwater management strategies set forth in NJAC 7:8-5.3 as follows:

1. **Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment lost:** The proposed impervious surface is minimized wherever possible under the proposed condition, therefore, increasing the water quality benefits on the site. By implementation of the manufactured treatment devices (MTD), the proposed development meets the water quality requirements set forth by NJAC 7:8.
2. **Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces:** The impervious surfaces have been minimized wherever possible. Impervious surfaces have been diverted to multiple structural BMPs capable of providing water quality treatment.
3. **Maximize the protection of natural drainage features and vegetation:** In the proposed condition, there is a 10.1% increase in impervious coverage. The drainage pattern will remain unchanged from pre-developed to post-developed conditions.

4. **Minimize the decrease in the "time of concentration" from pre-construction to post-construction. "Time of concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the drainage area to the point of interest within a watershed:** The decrease in the time of concentration has been minimized by maintaining existing overland flow slopes to the maximum extent practical.
5. **Minimize land disturbance including clearing and grading:** Land disturbance has been minimized where feasible. The site disturbance is limited to the development area.
6. **Minimize soil compaction:** Soil compaction will be minimized in the basins and proposed lawn and landscape areas. Areas for soil restoration and soil compaction testing are shown on the Soil Erosion and Sediment Control Plan.
7. **Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides:** The project proposes low-maintenance trees, shrubs, and ground cover on the site. Refer to the Landscape Plan for plant information.
8. **Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas:** Due to the site constraints, it is not feasible to design a vegetated open-channel conveyance system on this project.
9. **Provide other source controls to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimizes the release of those pollutants into stormwater runoff:** The proposed detention basins will detain the runoff from the site. The site also utilizes manufactured treatment devices to remove pollutants from stormwater.

VI. DESIGN METHODOLOGY

The intention of the proposed stormwater management facilities for this project is to provide applicable, required measures from the Township of Marlboro Land Use Ordinance, NJAC 5:21, and NJAC 7:8. In order to prepare the stormwater calculations for the subject project, an investigation of the property and topography was performed. An on-site review of the tract was performed by Dynamic Engineering Consultants, PC, verifying the existing site conditions and land cover characteristics. Dynamic Survey was contracted to prepare the Boundary and Topographic Survey for the existing site.

Based on our review of the existing site conditions and the Topographic Survey, the Drainage Area Maps for the existing and proposed site conditions as defined within this report were established. A grading plan was developed for the proposed site improvements with consideration to the existing drainage patterns. The plan was then designed to ensure runoff from the proposed development could be directed to stormwater management facilities to the maximum extent practicable in order to address the applicable sections of the Township of Marlboro Stormwater Management rules, NJAC 5:21, and NJAC 7:8.

The detention basins will temporarily store and attenuate stormwater runoff from the site. An outlet control structure for each basin has been implemented to release stormwater runoff at a controlled rate to satisfy the stormwater quantity requirements. Overflow from the basins is routed via the emergency spillways to the downstream Study Point 1.

According to the NJAC 7:8-5.5(a), a TSS removal rate of 80% is required for stormwater runoff generated as a result of a major development. Stormwater runoff generated by the water quality design storm is directed to proposed manufactured treatment devices (MTD) in each basin prior to discharging into the existing wetlands. These MTD's provide 80% removal rate of total suspended solids (TSS).

VII. STORMWATER MANAGEMENT BASIN DESIGN AND RUNOFF QUANTITY STANDARDS

In order to meet the stormwater runoff quantity and water quality requirements set forth in NJAC 7:8, the site design incorporates three (3) manufactured treatment devices and four (4) above ground detention basins. The basins accept stormwater runoff from the proposed parking areas, driveways, and tributary yard areas. The runoff flows over land by sheet flow and is then collected by inlets and transported by the stormwater conveyance systems to the basins.

A summary of the pre and post development flows are shown in the chart below:

Pre-development and Post Development Peak Runoff Results

Summary to POA 'A' to Study Point 1: Wetlands

Design Storm	Existing Runoff Rate from Disturbed Areas (CFS)	Runoff Rate Required Reduction	Maximum Allowable Runoff Rate (CFS)	Proposed Runoff Rate (CFS)
1 Year	0.81	0%	0.81	1.07
2 Year	4.97	50%	2.48	1.51
10 Year	10.66	25%	8.00	2.88
25 Year	14.95	0%	14.95	8.38
100 Year	23.17	20%	18.54	18.38

VIII. GROUNDWATER RECHARGE & WATER QUALITY

As required by NJAC 7:8-5.5, a TSS removal rate of 80% is required for stormwater generated by the water quality design storm as a result of a major development. The design for the subject development meets the obligation for TSS removal by four (4) detention basins, and three (3) water quality manufactured treatment device (MTD).

Stormwater collected from the site is directed into onsite inlets and pipes and directed towards one of the on-site basins. Once collected, the detention basins, temporarily store and attenuate stormwater runoff from the development. The outlet control structures are implemented in each basin to release stormwater runoff at a

controlled rate to satisfy the stormwater quantity and quality requirements. The Post-Development Annual Recharge Deficit has been calculated using the New Jersey Groundwater Recharge Spreadsheet. Per the NJGRS Spreadsheet and soils investigation, the site does not have any recharge deficits.

The stormwater management design for the project satisfies the requirements set forth in NJAC 7:8-5.5(a) by utilizing a Jellyfish MTD certified by the NJDEP to provide a minimum TSS removal rate of 80%. Each Basin has an 80% Water Quality Manhole after each outlet control structure before discharging offsite. As a result, the water quality requirements of the Township of Marlboro Land Use Ordinance and NJAC 7:8 are met. A copy of the NJDEP Certification Letter and sizing requirements for the Jellyfish MTD has been provided within the appendix of this report.

IX. STABILITY ANALYSIS

Per the NJ Soil Erosion Standards, Section 21, "Standard for Off-Site Stability," compliance has been met for the site. The conditions of the NJ SESC Standards Section 21-1 have been satisfied using the point of discharge method with a no well-defined waterway.

a. **Retain pre-developed runoff characteristics. Do not increase the rate of runoff from development.** Discharge rates from the proposed stormwater improvements are equal to or below the flow rates in the existing conditions for the 2- and 10-year 24 hour storm events as shown in the tables below:

b. **Where there is no well-defined channel, no sandy condition, no trees or brush to substantially concentrate the flows and it can be reasonably assumed that the flow will disperse over a broad area. The combinations of slopes and soils in table 21-1 and the following criteria are considered stable for flows of 10cfs or less for a 25 year, 24hr design storm.**

   i. **The maximum discharge rate shall be 10 cfs or less for the twenty-five (25) year storm:** The discharge rate for each stability point is less than 10 cfs for the 25-year storm as shown in the above runoff rate charts.

   ii. **Multiple outlets may be utilized to reduce individual outlet flow rates to levels below the thresholds noted above. Outlets should be spaced no closer than 50 ft horizontally to avoid re-mixing of flows:** One (1) outlet control structure and one (1) emergency spillway is provided for each basin. The outflow pipe from the outlet control structure and emergency spillway are no closer than 50 feet apart.

iii. **Flow over the outlet area shall be less than 0.5 cfs/ft. Designers shall not design excessive widths which will cause flows to concentrate:** Flow over the conduit outlet control structure is less than 0.5 cfs/ft as shown in the chart below:

Conduit Outlet Protection Flow Rate					
Basin #	**2-yr flow (cfs)**	**10-yr flow (cfs)**	**Width of COP (ft.)**	**2-yr velocity (cfs/ft)**	**10-yr velocity (cfs/ft)**
Basin A	0.27	0.38	14	0.02	0.03
Basin B	0.19	0.24	13	0.01	0.02
Basin C	1.06	2.28	24	0.04	0.10

iv. **Conduit outlet protection shall be provided in accordance with that Standard and may include: flat aprons, preformed scour holes, impact basins, stilling wells, plunge pools, etc. Level spreaders are not an acceptable design:** Conduit Outlet Protection (COP) is provided at the outflow pipe of each basin. Calculations for each structure are provided in the appendix of the report.

v. **Topography shows broad uniform outlet area where flows will not concentrate:** Topography is shown on the Grading Plan in the Preliminary and Final Site Plan Set.

vi. **Discharge locations shall contain perennial, erosion resistant vegetation:** Vegetation outside of the discharge points will be unchanged. Existing vegetation is considered to be densely wooded.

vii. **Peak discharge velocities (in the last pipe section) do not exceed 2 fps:** Peak discharge velocities

Discharge Velocity				
Basin #	**2-yr flow (cfs)**	**10-yr flow (cfs)**	**Pipe Diameter (ft)**	**10-yr Velocity (fps)**
Basin A	0.27	0.38	1.25	0.310
Basin B	0.19	0.24	1.25	0.196
Basin C	1.06	2.28	1.5	1.290

viii. **The maximum length of slope below the outlet(s) is 100 feet:** The maximum length of slope below the outlet is 100 ft.

X. CONCLUSION

The proposed overall development has been designed with provisions for the safe and efficient control of stormwater runoff in a manner that will not adversely impact the existing drainage patterns, adjacent roadways, or adjacent parcels. The TSS removal obligations set forth by NJAC 7:8 have been satisfied by utilizing four (4) detention basins, and three (3) water quality manufactured treatment devices to achieve the 80% TSS required removal rate for the development.

With this stated, it is evident that the proposed development will not have a negative impact on the existing drainage pattern, water quality, or groundwater recharge on site or within the vicinity of the subject parcel.

APPENDIX

1. USGS MAP

DYNAMIC
ENGINEERING EARTH SURVEY TRAFFIC

USGS MAP

South Amboy Quad

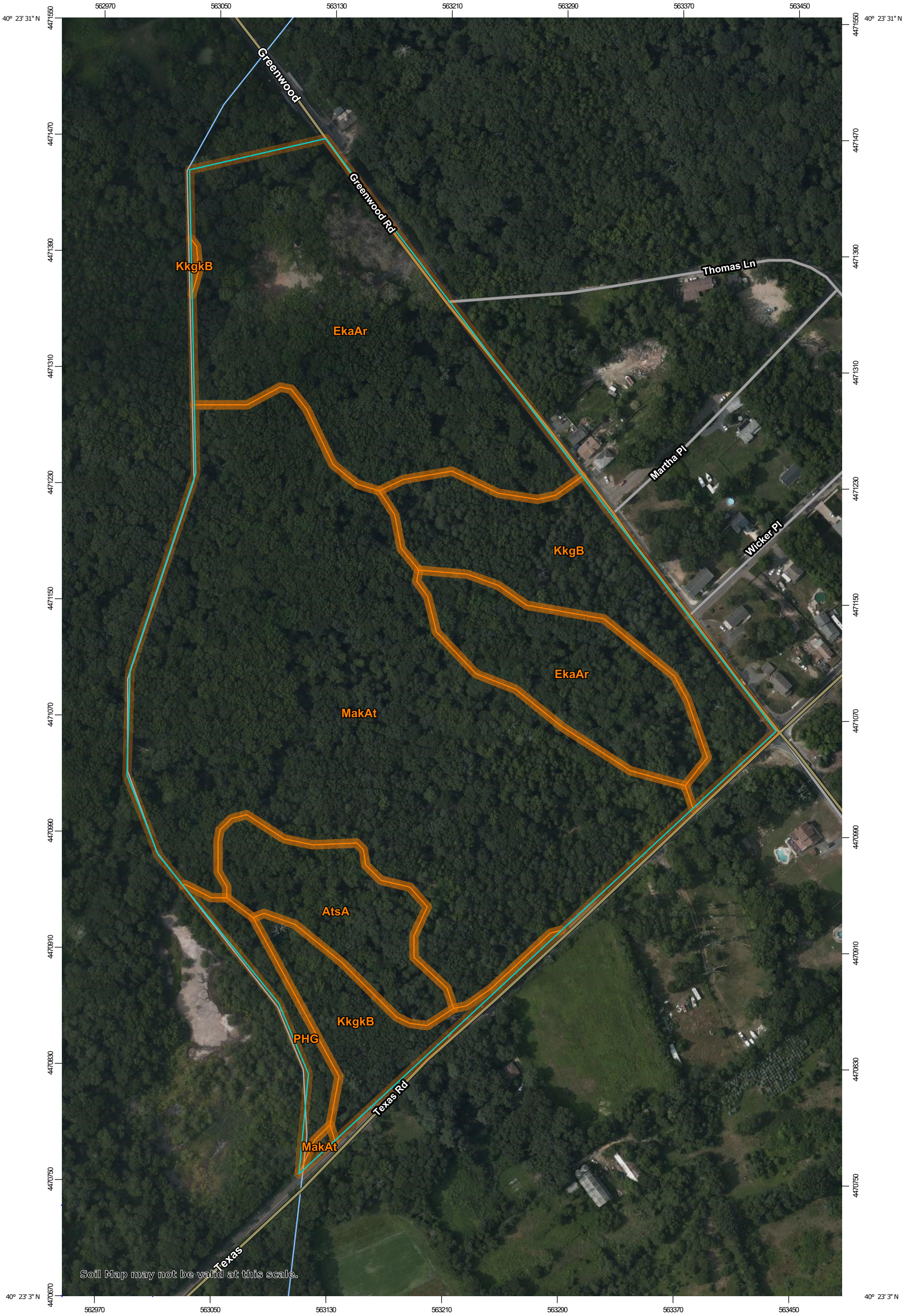
1904 Main Street, Lake Como, NJ 07719 T. 732-974-0198

245 Main Street, Suite 110, Chester, NJ 07930 T. 908-879-9229
8 Robbins Street, Suite 102, Toms River, NJ 08753 T. 732-974-0198
826 Newtown Yardley Rd., Suite 201, Newtown, PA 18940 T. 267-685-0276

100 NE 5th Avenue, Suite B2, Delray Beach, FL 33483 T. 561-921-8570
14521 Old Katy Road, Suite 270, Houston, TX 77079 T. 281-789-6400
714 S. Greenville Avenue, Suite 100, Allen, TX 75002 T. 972-534-2100

2. NRCS SOILS MAPS

Soil Map—Monmouth County, New Jersey
(Ashbel Soils Map)



Map Scale: 1:2,470 if printed on B portrait (11" x 17") sheet.

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

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

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

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

Soil Survey Area: Monmouth County, New Jersey
Survey Area Data: Version 14, Jun 1, 2020

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

Date(s) aerial images were photographed: Jun 29, 2019—Jul 16, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AtsA	Atsion sand, 0 to 2 percent slopes, Northern Coastal Plain	2.6	6.2%
EkaAr	Elkton loam, 0 to 2 percent slopes, rarely flooded	12.6	29.8%
KkgB	Klej loamy sand, 0 to 5 percent slopes	4.4	10.5%
KkgkB	Klej loamy sand, clayey substratum, 0 to 5 percent slopes	1.9	4.6%
MakAt	Manahawkin muck, 0 to 2 percent slopes, frequently flooded	19.7	46.7%
PHG	Pits, sand and gravel	0.9	2.1%
Totals for Area of Interest		**42.2**	**100.0%**

3. RUNOFF CURVE NUMBER (CN) CALCULATIONS- EXISTING

EXISTING DRAINAGE AREA SUMMARY AND AVERAGE CURVE NUMBER(CN) CALCULATIONS

Project: Greenwich Park Residential Development
Job #: 2841-99-001
Location: Greenwood Road & Texas Road, Marlboro, NJ

Computed By: SMM
Checked By: SRC
Date: 1/14/2021

Drainage Area	Impervious Area (acre)	Impervious Area (sf)	Curve Number (CN) Used	HSG A - Wooded Area (acre)	HSG A - Wooded Area (sf)	Curve Number (CN) Used	HSG D - Wooded Area (acre)	HSG D - Wooded Area (sf)	Curve Number (CN) Used	Avg. Perv. Curve Number	Total Pervious Area (acres)	Total Area (acres)	TC (Min.)
Study Area A (Disturbed)	0.00	-	98	0.00	-	30	6.61	287,752	77	77	6.61	6.61	17
Total	**0.00**	**-**		**0.00**	**-**		**6.61**	**287,752**			**6.61**	**6.61**	

Per Monmouth County Soil Survey -	AtsA	HSG	A/D	Soil	Atsion sand
Per Monmouth County Soil Survey -	EkaAR	HSG	C/D	Soil	Elkton Loam
Per Monmouth County Soil Survey -	KkgB	HSG	A/D	Soil	Klej Loamy Sand
Per Monmouth County Soil Survey -	KkgkB	HSG	A/D	Soil	Klej Loamy Sand
Per Monmouth County Soil Survey -	LasC	HSG	A	Soil	Lakewood Sand
Per Monmouth County Soil Survey -	MakAt	HSG	A/D	Soil	Manahawkin Muck
Per Monmouth County Soil Survey -	PHG	HSG	None	Soil	Pits

Description	Runoff Curve Number (CN)	Runoff Curve Number (CN) (HSG	Runoff Curve Number (CN)	Runoff Curve Number (CN)
Impervious Surface	98	98	98	98
Open Space (lawn) (good)	39	61	74	80
Woods (good)	30	55	70	77

4. RUNOFF CURVE NUMBER (CN) CALCULATIONS-PROPOSED

DYNAMIC ENGINEERING

PROPOSED DRAINAGE AREA SUMMARY AND AVERAGE CURVE NUMBER(CN) CALCULATIONS

Project: Greenwich Park Residential Development
Job #: 2841-99-001
Location: Greenwood Road & Texas Road, Hamilton, NJ

Computed By: KSOOK
Checked By: SRC
Date: 1/20/2021

Drainage Area	Impervious Area (acre)	Impervious Area (sf)	Curve Number (CN) Used	HSG D - Open Space Area (acre)	HSG D - Open Space Area (sf)	Curve Number (CN) Used	HSG D - Wooded Area (acre)	HSG D - Wooded Area (sf)	Curve Number (CN) Used	Avg. Perv. Curve Number	Total Pervious Area (acres)	Total Area (acres)	TC (Min.)
Study Area 1 - Basin A	0.16	6,800	98	0.30	13,108	80	0.00	-	77	80	0.30	0.46	10
Study Area 2 - Basin B	0.42	18,436	98	0.67	29,104	80	0.14	6,315	77	79	0.81	1.24	10
Study Area 3 - Basin C	2.96	129,117	98	0.65	28,397	80	0.00	-	77	80	0.65	3.62	10
Study Area 4 - Bypass	1.36	59,042	98	0.00	-	80	0.00	-	77	N/A	0.00	1.36	10
Total	**4.90**	**213,395**		**1.62**	**70,609**		**0.14**	**6,315**			**1.77**	**6.66**	

Per Monmouth County Soil Survey -	AtsA	HSG	A/D	Soil	Atsion sand
Per Monmouth County Soil Survey -	EkaAR	HSG	C/D	Soil	Elkton Loam
Per Monmouth County Soil Survey -	KkgB	HSG	A/D	Soil	Klej Loamy Sand
Per Monmouth County Soil Survey -	KkgkB	HSG	A/D	Soil	Klej Loamy Sand
Per Monmouth County Soil Survey -	LasC	HSG	A	Soil	Lakewood Sand
Per Monmouth County Soil Survey -	MakAt	HSG	A/D	Soil	Manahawkin Muck
Per Monmouth County Soil Survey -	PHG	HSG	None	Soil	Pits

Description	Runoff Curve Number (CN) (HSG A)	Runoff Curve Number (CN) (HSG B)	Runoff Curve Number (CN) (HSG C)	Runoff Curve Number (CN) (HSG D)
Impervious Surface	98	98	98	98
Open Space (lawn) (good)	39	61	74	80
Woods (good)	30	55	70	77

5. EXISTING TIME OF CONCENTRATION (Tc) CALCULATIONS

DYNAMIC ENGINEERING

826 Newtown-Yardley Road, Suite 425, Newtown, PA 18940
(267) 685-0276

Date: 1/15/2021
Project: Greedwich Park
Project No: 2841-99-001

Calculated By: SMM
Checked By: SRC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Existing
Drainage Area: Study Area A

• Sheet Flow:

		AB				
1.	Surface Description	Short Grass, Prairie				
2.	Manning's Roughness Coefficient, n	0.15				
3.	Flow Length, L { total $L \le 100$ ft }	100.0 ft				
4.	Two-Year 24-hour Rainfall, p_2 for . . . Monmouth County	3.38 in	3.38 in	3.38 in		
5.	Land Slope, s (ft/ft)	0.026 ft/ft				
6.	Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.143 hr	+ 0.000 hr	+ 0.000 hr	=	0.143 hr

• Shallow Concentrated Flow:

		BC				
7.	Surface Description	Unpaved				
8.	Flow Length, L	1291.0 ft				
9.	Watercourse Slope, s	0.026 ft/ft				
10.	Average velocity, V { see Figure 3.1)	2.60 ft/s				
11.	Travel Time, $T_t = \frac{L}{3600\,V}$	0.138 hr	+ 0.000 hr	+ 0.000 hr	=	0.138 hr

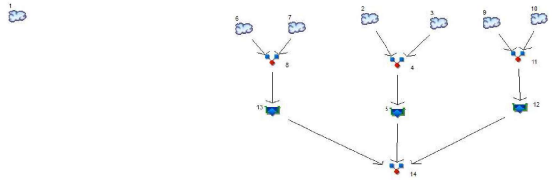
• Channel Flow:

12.	Pipe Diameter, D					
13.	Cross-Sectional Flow Area, A					
14.	Wetted Perimeter, p_w					
15.	Hydraulic Radius, $r = A / p_w$					
16.	Channel Slope, s					
17.	Pipe Material					
18.	Manning's Roughness Coefficient, n					
19.	Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$					
20.	Flow Length, L					
21.	Travel Time, $T_t = \frac{L}{3600\,V}$	0.000 hr	+ 0.000 hr	+ 0.000 hr	=	0.000 hr
22.	Watershed or subarea Time of Concentration, T_c { add T_t in steps 6, 11 and 21 }					0.281 hr
						16.9 min

6. HYDROGRAPH SUMMARY REPORTS – EXISTING & PROPOSED 2 YR., 10 YR., 25 YR. & 100 YR.

Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

Hyd.	Origin	Description
1	SCS Runoff	EXIST. WOODS TO A
2	SCS Runoff	Pervious to Basin B
3	SCS Runoff	Imp to Basin B
4	Combine	Combined to Basin B
5	Reservoir	Basin B Routing
6	SCS Runoff	Pervious to Basin C
7	SCS Runoff	Impervious to Basin C
8	Combine	Combined to Basin C
9	SCS Runoff	Perv to Basin A
10	SCS Runoff	Imp to Basin A
11	Combine	Combined to Basin A
12	Reservoir	Basin A Routing
13	Reservoir	Basin C Routing
14	Combine	Combined to SP1

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	4.969	5	745	33,182	---	-----	----	EXIST. WOODS TO A
2	SCS Runoff	0.809	5	735	4,305	---	-----	----	Pervious to Basin B
3	SCS Runoff	0.830	5	730	4,767	---	-----	----	Imp to Basin B
4	Combine	1.623	5	735	9,072	2, 3	-----	----	Combined to Basin B
5	Reservoir	0.193	5	830	9,062	4	82.49	4,281	Basin B Routing
6	SCS Runoff	0.682	5	735	3,615	---	-----	----	Pervious to Basin C
7	SCS Runoff	5.850	5	730	33,598	---	-----	----	Impervious to Basin C
8	Combine	6.515	5	730	37,213	6, 7	-----	----	Combined to Basin C
9	SCS Runoff	0.315	5	735	1,668	---	-----	----	Perv to Basin A
10	SCS Runoff	0.316	5	730	1,816	---	-----	----	Imp to Basin A
11	Combine	0.625	5	735	3,484	9, 10	-----	----	Combined to Basin A
12	Reservoir	0.270	5	760	3,479	11	82.61	986	Basin A Routing
13	Reservoir	1.063	5	785	37,211	8	75.50	14,973	Basin C Routing
14	Combine	1.508	5	780	49,752	5, 12, 13	-----	----	Combined to SP1

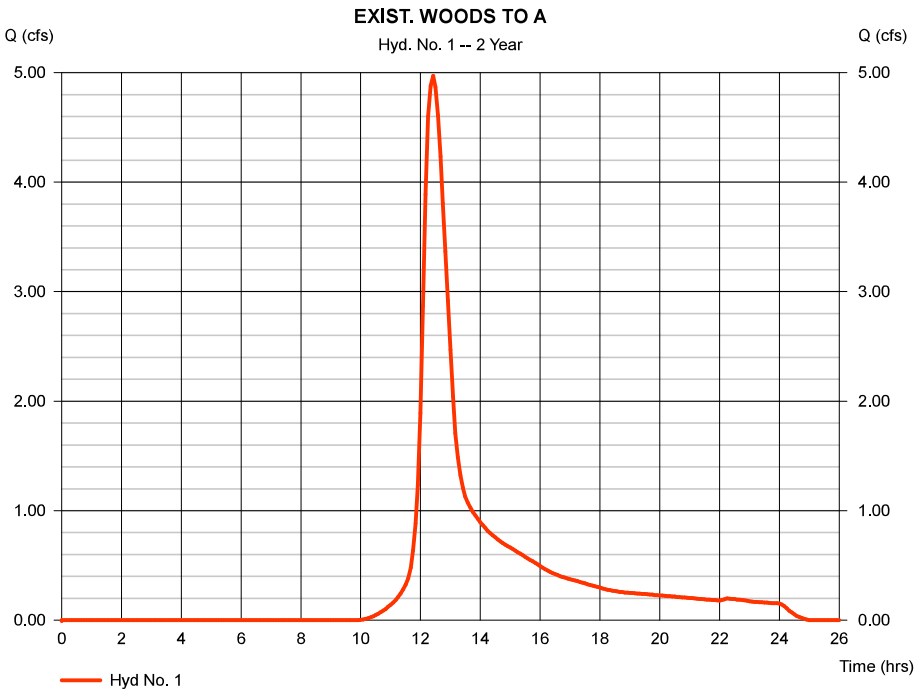
Hydrograph Report

Hyd. No. 1

EXIST. WOODS TO A

Hydrograph type	= SCS Runoff	Peak discharge	= 4.969 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.42 hrs
Time interval	= 5 min	Hyd. volume	= 33,182 cuft
Drainage area	= 6.610 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 16.90 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(2.200 x 77) + (4.400 x 30)] / 6.610



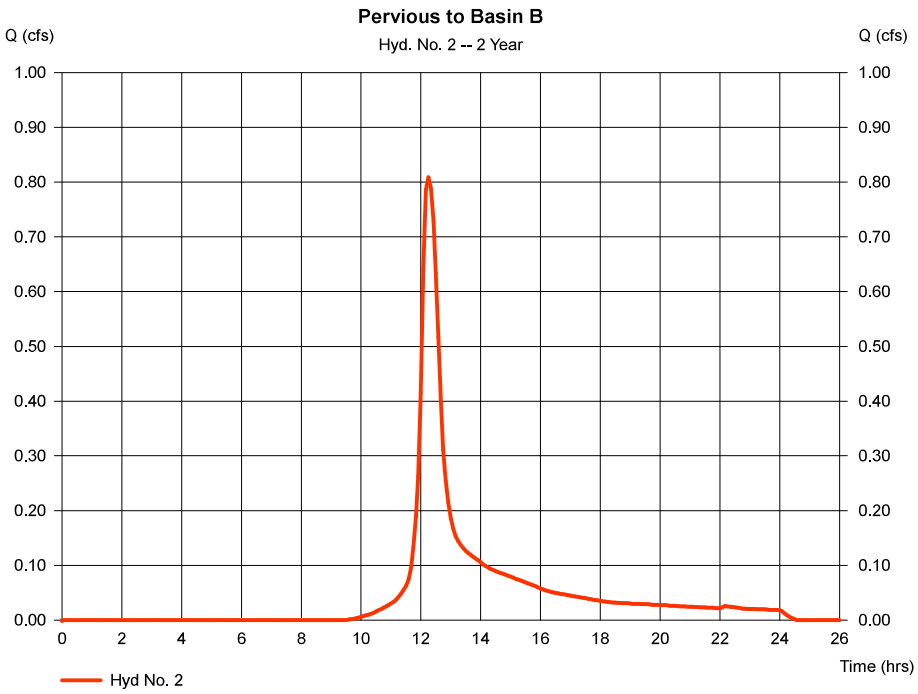
Hydrograph Report

Hyd. No. 2

Pervious to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.809 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 4,305 cuft
Drainage area	= 0.810 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.670 x 80) + (0.140 x 77)] / 0.810

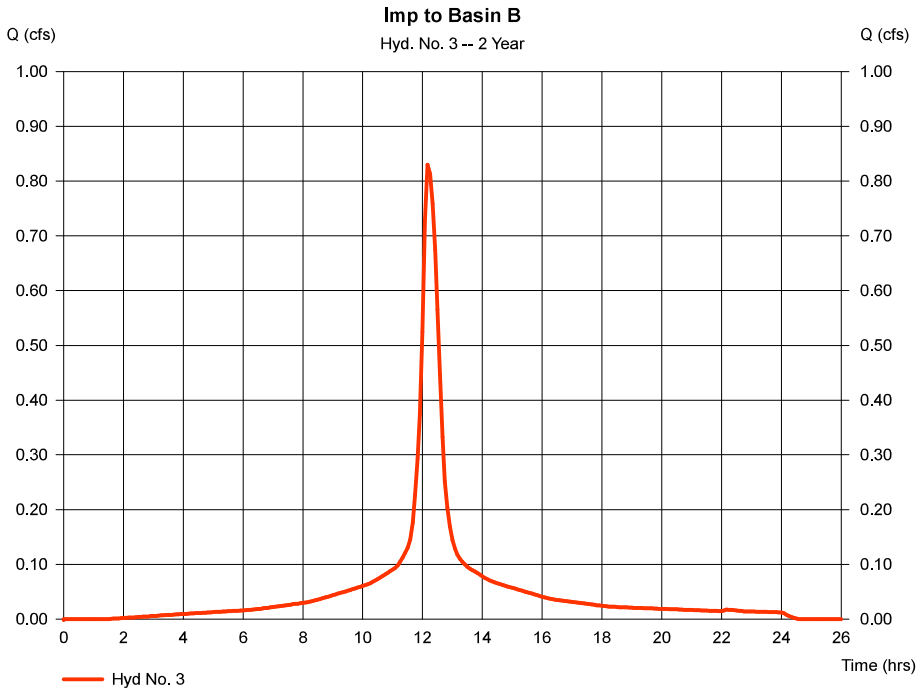


Hydrograph Report

Hyd. No. 3

Imp to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.830 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 4,767 cuft
Drainage area	= 0.420 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

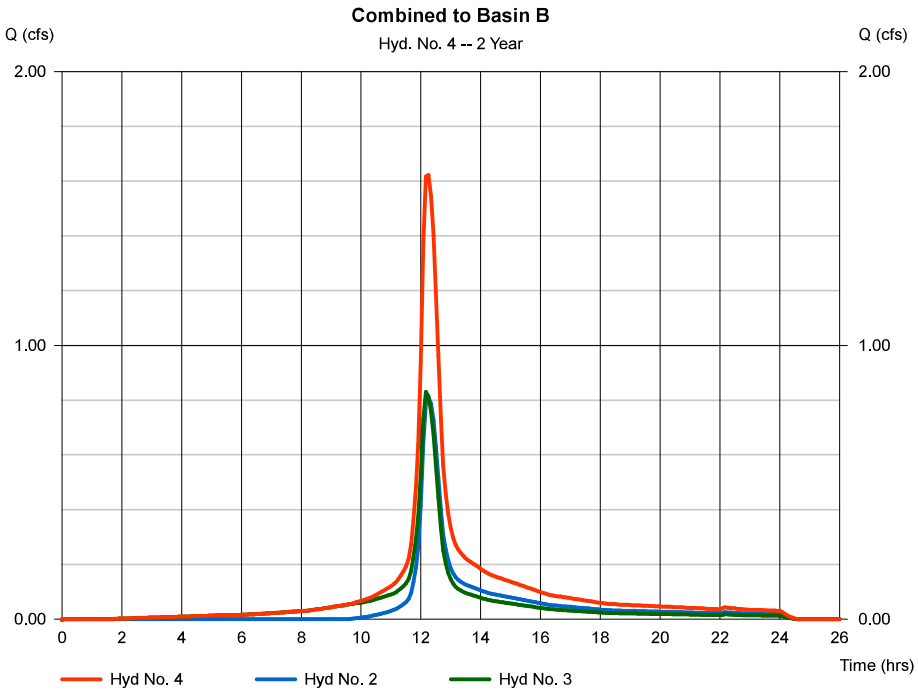


Hydrograph Report

Hyd. No. 4

Combined to Basin B

Hydrograph type	= Combine	Peak discharge	= 1.623 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 9,072 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 1.230 ac



Hydrograph Report

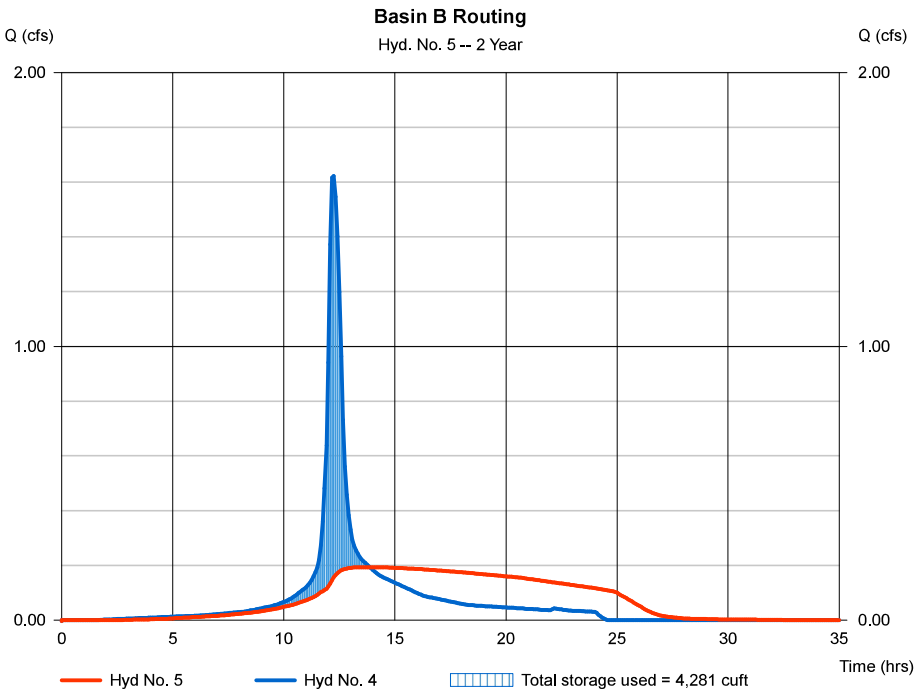
Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Hyd. No. 5

Basin B Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.193 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.83 hrs
Time interval	= 5 min	Hyd. volume	= 9,062 cuft
Inflow hyd. No.	= 4 - Combined to Basin B	Max. Elevation	= 82.49 ft
Reservoir name	= Basin B	Max. Storage	= 4,281 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Pond No. 1 - Basin B

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 81.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	81.00	00	0	0
0.50	81.50	2,042	511	511
1.00	82.00	4,084	1,532	2,042
1.50	82.50	5,007	2,273	4,315
2.00	83.00	5,929	2,734	7,049
2.50	83.50	7,506	3,359	10,408
3.00	84.00	9,083	4,147	14,555
3.50	84.50	10,373	4,864	19,419
4.00	85.00	11,663	5,509	24,928

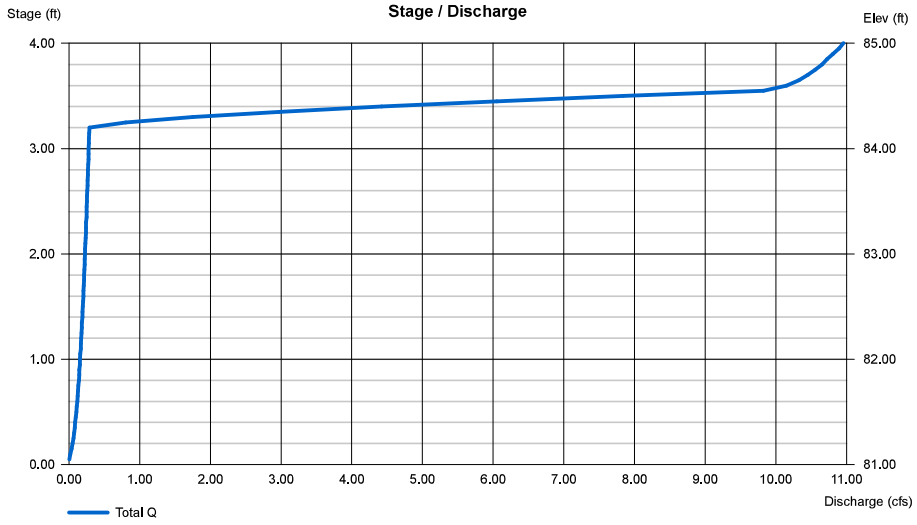
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.50	0.00	0.00
Span (in)	= 15.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 80.90	81.00	0.00	0.00
Length (ft)	= 72.00	0.50	0.00	0.00
Slope (%)	= 2.50	0.50	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	20.00	0.00	0.00
Crest El. (ft)	= 84.20	84.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	Yes	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



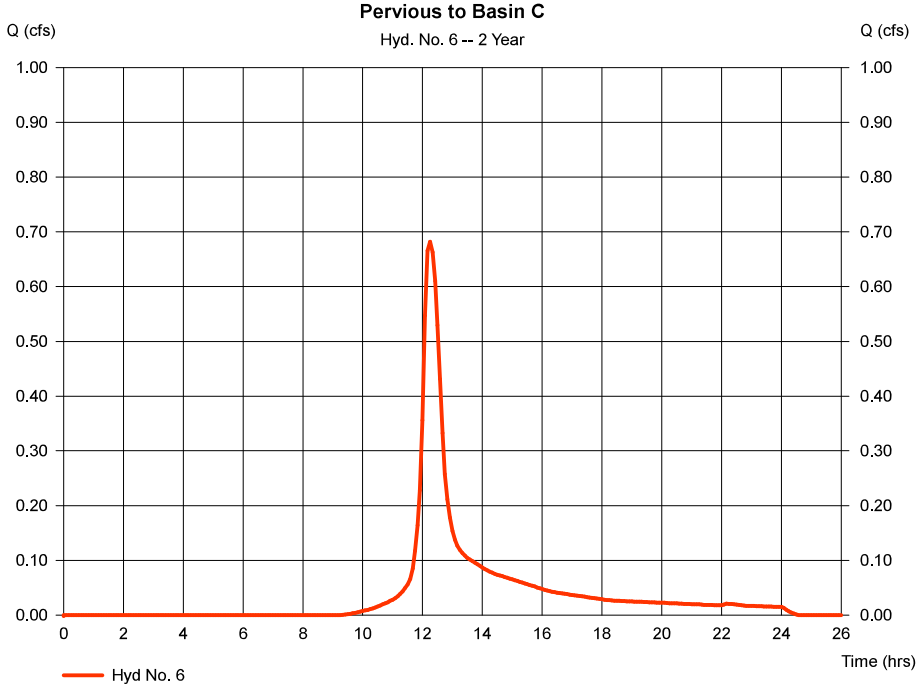
Hydrograph Report

Hyd. No. 6

Pervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 0.682 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 3,615 cuft
Drainage area	= 0.650 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.430 x 39) + (0.220 x 80)] / 0.650

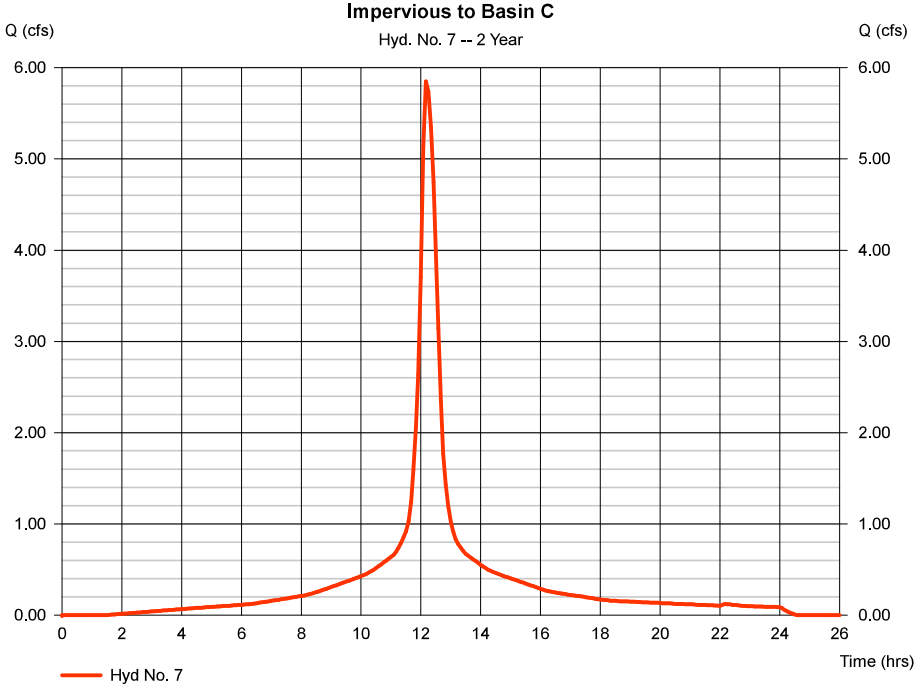


Hydrograph Report

Hyd. No. 7

Impervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 5.850 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 33,598 cuft
Drainage area	= 2.960 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

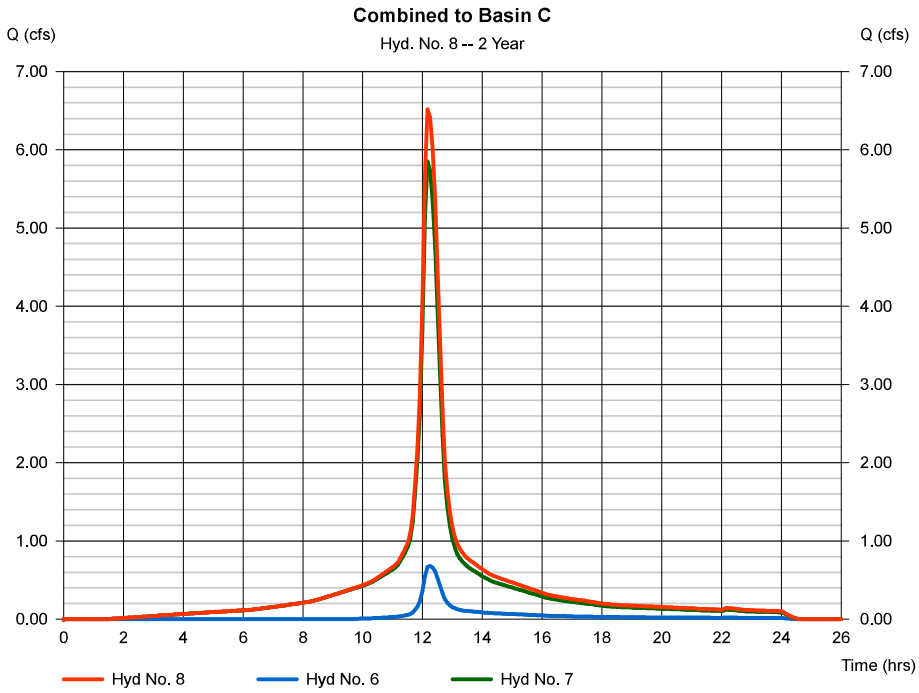


Hydrograph Report

Hyd. No. 8

Combined to Basin C

Hydrograph type	= Combine	Peak discharge	= 6.515 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 37,213 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 3.610 ac



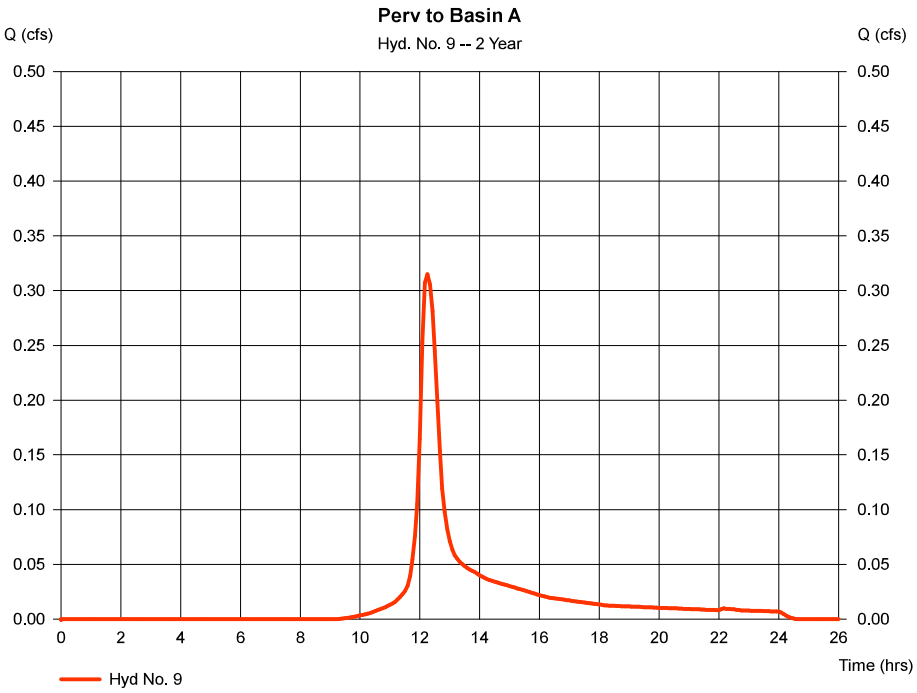
Hydrograph Report

Hyd. No. 9

Perv to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.315 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 1,668 cuft
Drainage area	= 0.300 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.200 x 39) + (0.100 x 80)] / 0.300

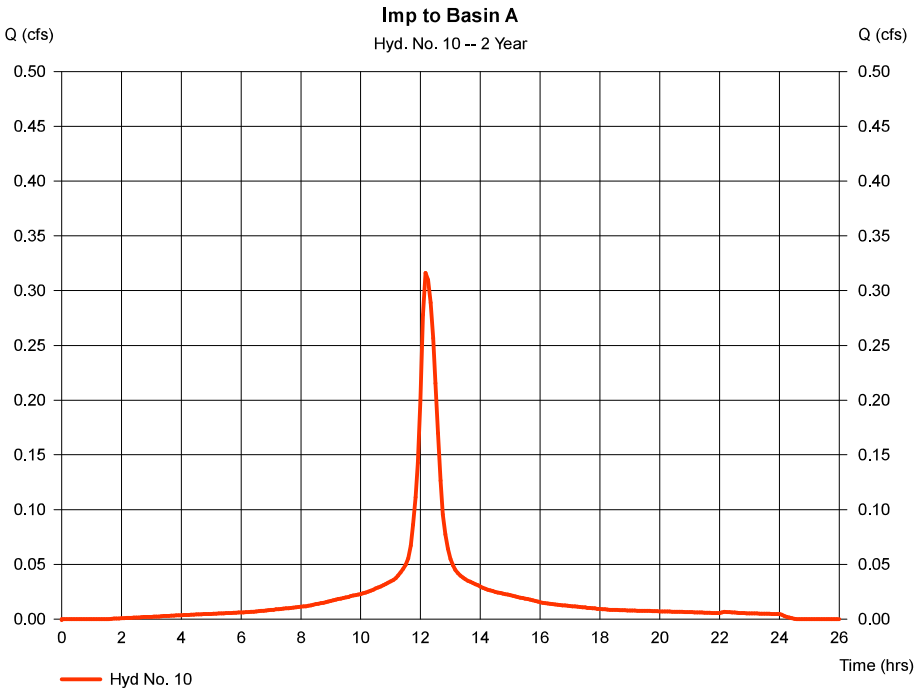


Hydrograph Report

Hyd. No. 10

Imp to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.316 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 1,816 cuft
Drainage area	= 0.160 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

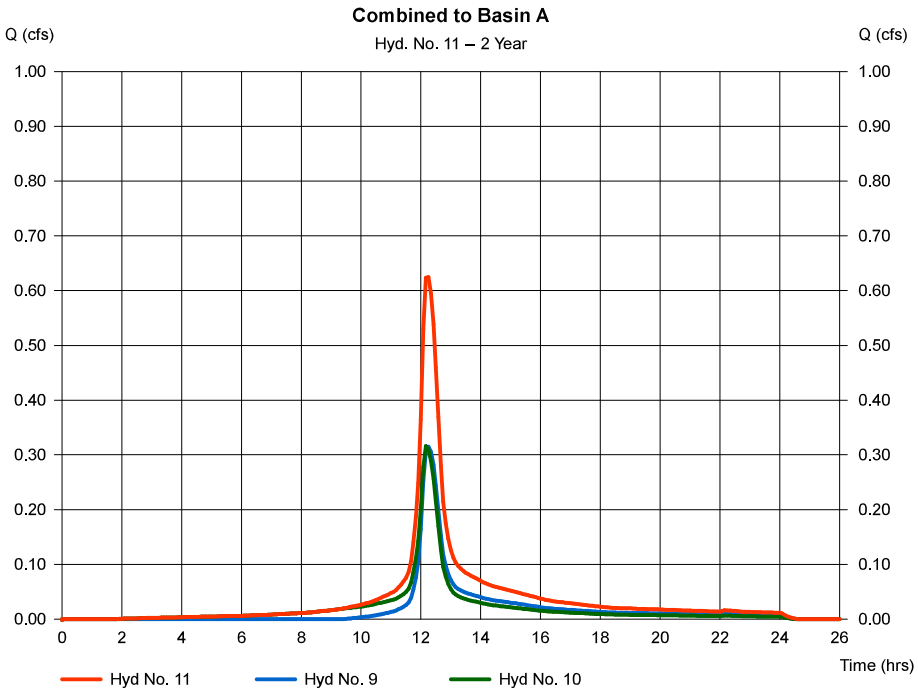


Hydrograph Report

Hyd. No. 11

Combined to Basin A

Hydrograph type	= Combine	Peak discharge	= 0.625 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 3,484 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 0.460 ac



Hydrograph Report

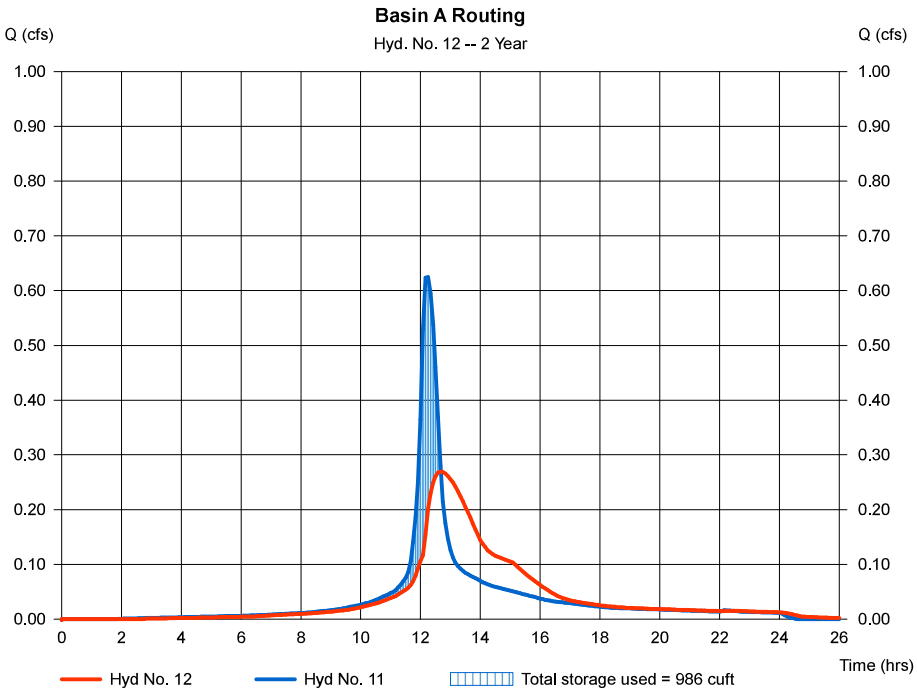
Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Hyd. No. 12

Basin A Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.270 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.67 hrs
Time interval	= 5 min	Hyd. volume	= 3,479 cuft
Inflow hyd. No.	= 11 - Combined to Basin A	Max. Elevation	= 82.61 ft
Reservoir name	= Basin A	Max. Storage	= 986 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Pond No. 3 - Basin A

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 81.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	81.50	00	0	0
0.50	82.00	979	245	245
1.00	82.50	1,314	573	818
1.50	83.00	1,649	741	1,559
2.00	83.50	2,088	934	2,493
2.50	84.00	2,526	1,154	3,647
3.00	84.50	3,026	1,388	5,035

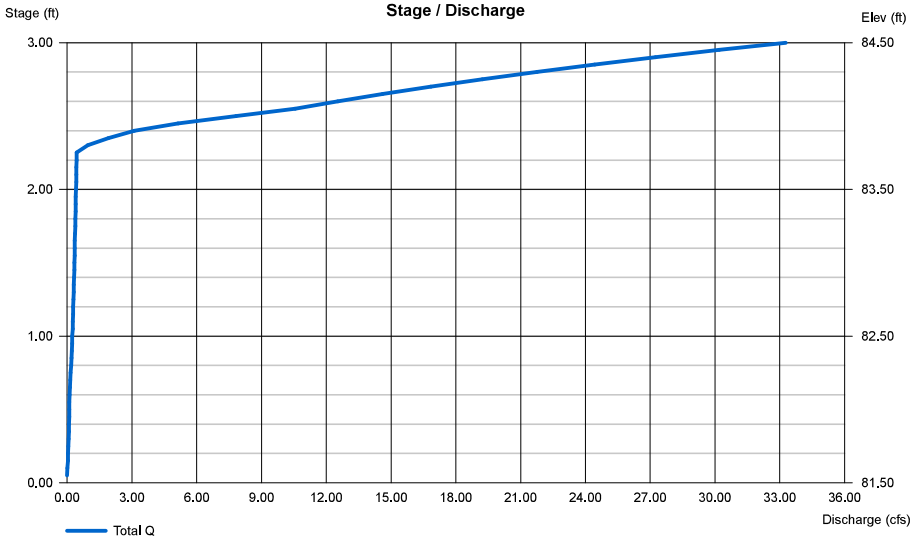
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.50	2.50	0.00
Span (in)	= 15.00	2.50	2.50	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 81.40	81.50	82.10	0.00
Length (ft)	= 45.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	20.00	0.00	0.00
Crest El. (ft)	= 83.75	83.90	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

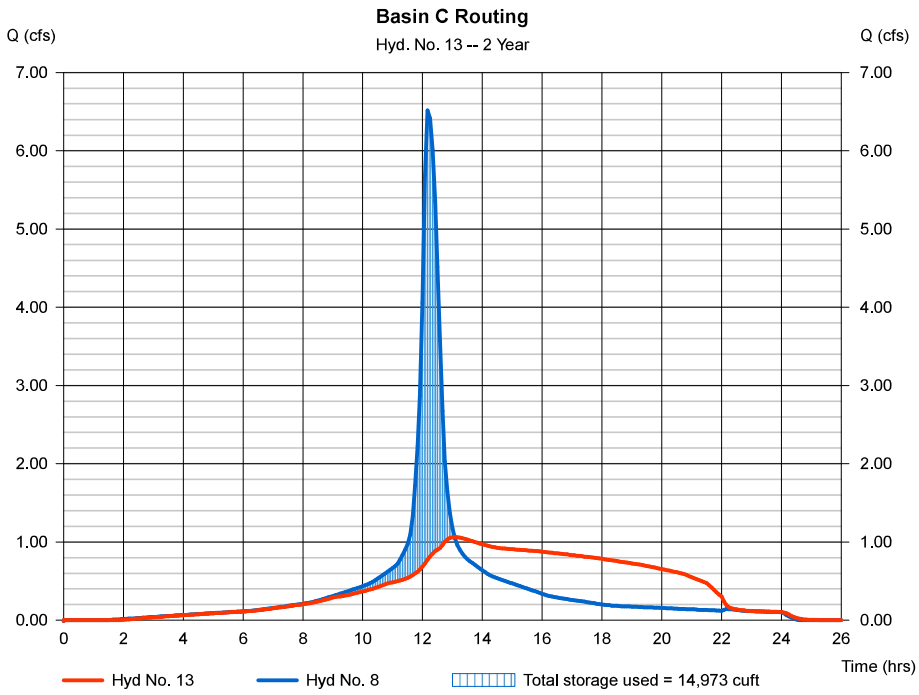
Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Hyd. No. 13

Basin C Routing

Hydrograph type	= Reservoir	Peak discharge	= 1.063 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.08 hrs
Time interval	= 5 min	Hyd. volume	= 37,211 cuft
Inflow hyd. No.	= 8 - Combined to Basin C	Max. Elevation	= 75.50 ft
Reservoir name	= Basin C	Max. Storage	= 14,973 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Pond No. 2 - Basin C

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 72.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	72.00	00	0	0
0.50	72.50	641	160	160
1.00	73.00	1,282	481	641
1.50	73.50	3,407	1,172	1,813
2.00	74.00	5,531	2,235	4,048
2.50	74.50	6,781	3,078	7,126
3.00	75.00	8,030	3,703	10,829
3.50	75.50	8,715	4,186	15,015
4.00	76.00	9,400	4,529	19,544
4.50	76.50	10,075	4,869	24,412
5.00	77.00	10,749	5,206	29,618
5.50	77.50	11,413	5,541	35,159

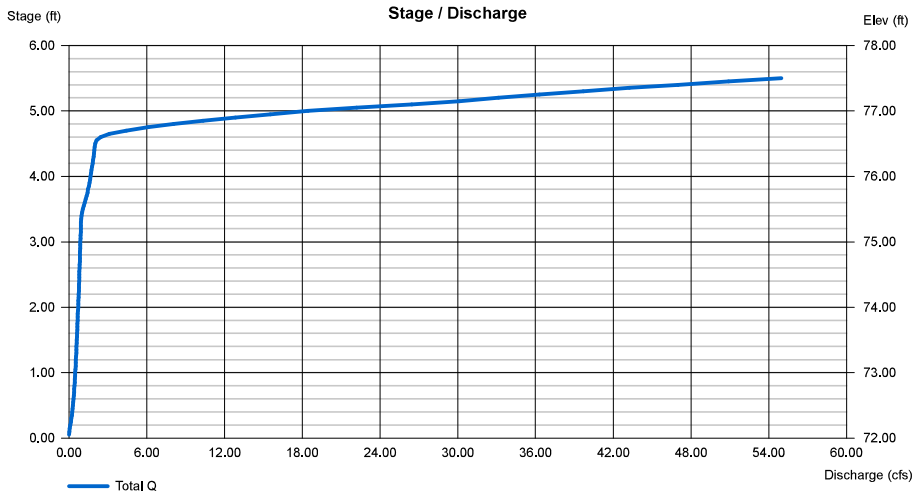
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	4.50	6.00	0.00
Span (in)	= 18.00	4.50	6.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 71.90	72.00	75.29	0.00
Length (ft)	= 42.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	20.00	5.00	0.00
Crest El. (ft)	= 76.62	76.99	76.52	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	Rect	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

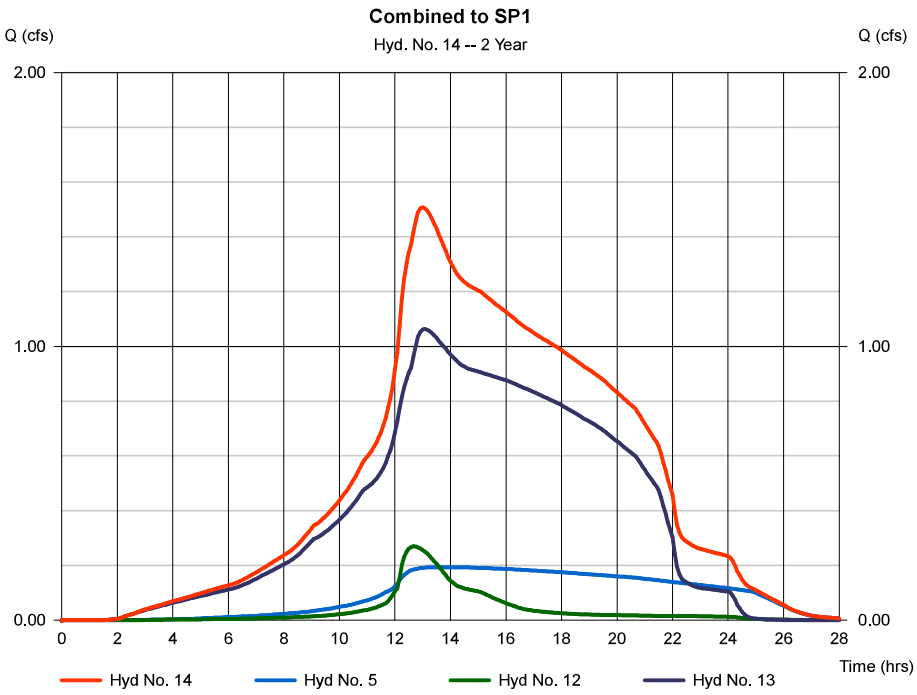


Hydrograph Report

Hyd. No. 14

Combined to SP1

Hydrograph type	= Combine	Peak discharge	= 1.508 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.00 hrs
Time interval	= 5 min	Hyd. volume	= 49,752 cuft
Inflow hyds.	= 5, 12, 13	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	10.66	5	745	69,641	---	-----	---	EXIST. WOODS TO A
2	SCS Runoff	1.670	5	735	8,767	---	-----	---	Pervious to Basin B
3	SCS Runoff	1.295	5	730	7,564	---	-----	---	Imp to Basin B
4	Combine	2.950	5	730	16,331	2, 3	-----	---	Combined to Basin B
5	Reservoir	0.241	5	890	16,320	4	83.28	8,911	Basin B Routing
6	SCS Runoff	1.382	5	735	7,255	---	-----	---	Pervious to Basin C
7	SCS Runoff	9.125	5	730	53,307	---	-----	---	Impervious to Basin C
8	Combine	10.50	5	730	60,562	6, 7	-----	---	Combined to Basin C
9	SCS Runoff	0.638	5	735	3,349	---	-----	---	Perv to Basin A
10	SCS Runoff	0.493	5	730	2,881	---	-----	---	Imp to Basin A
11	Combine	1.127	5	730	6,230	9, 10	-----	---	Combined to Basin A
12	Reservoir	0.377	5	765	6,225	11	83.24	2,011	Basin A Routing
13	Reservoir	2.275	5	775	60,560	8	76.58	25,179	Basin C Routing
14	Combine	2.883	5	775	83,106	5, 12, 13	-----	---	Combined to SP1

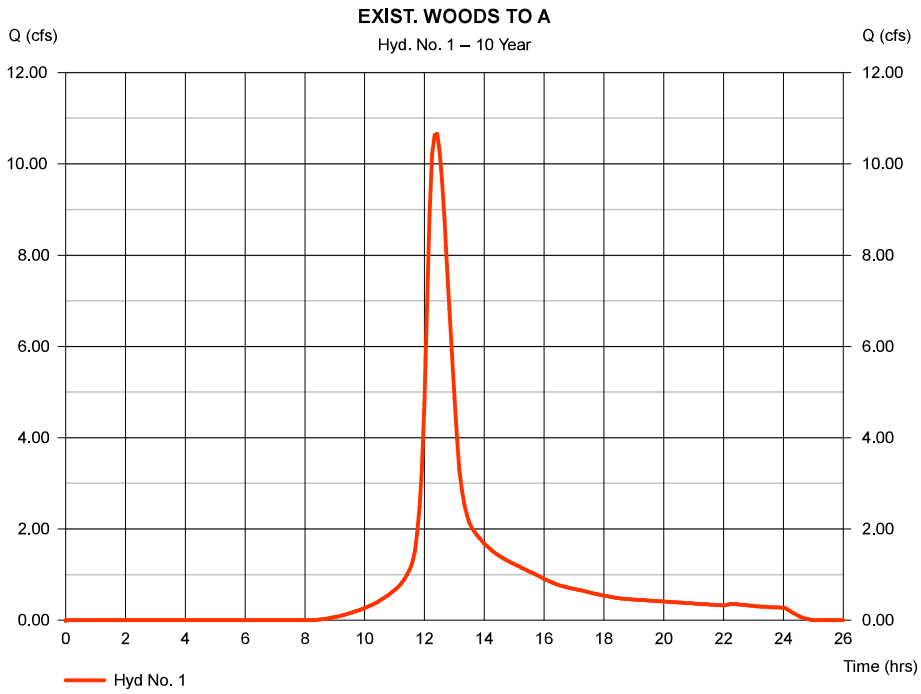
Hydrograph Report

Hyd. No. 1

EXIST. WOODS TO A

Hydrograph type	= SCS Runoff	Peak discharge	= 10.66 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.42 hrs
Time interval	= 5 min	Hyd. volume	= 69,641 cuft
Drainage area	= 6.610 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 16.90 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(2.200 x 77) + (4.400 x 30)] / 6.610



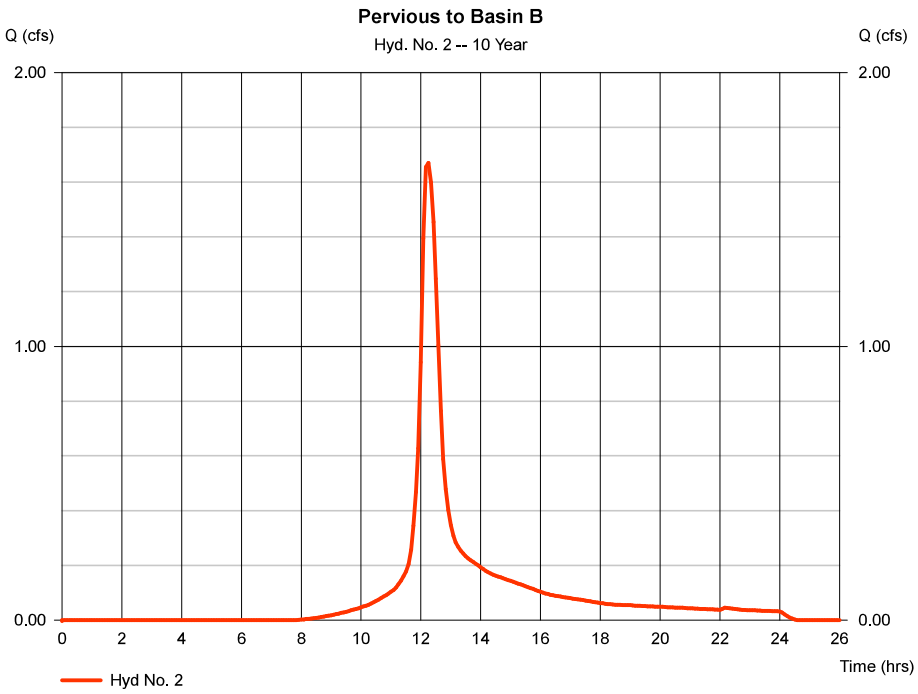
Hydrograph Report

Hyd. No. 2

Pervious to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.670 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 8,767 cuft
Drainage area	= 0.810 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.670 x 80) + (0.140 x 77)] / 0.810

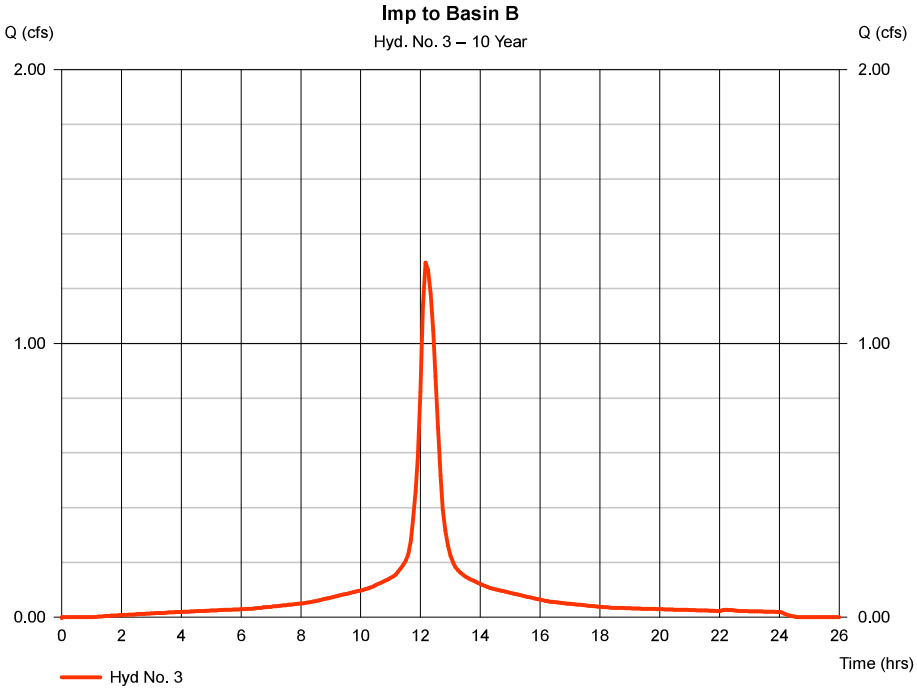


Hydrograph Report

Hyd. No. 3

Imp to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.295 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 7,564 cuft
Drainage area	= 0.420 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

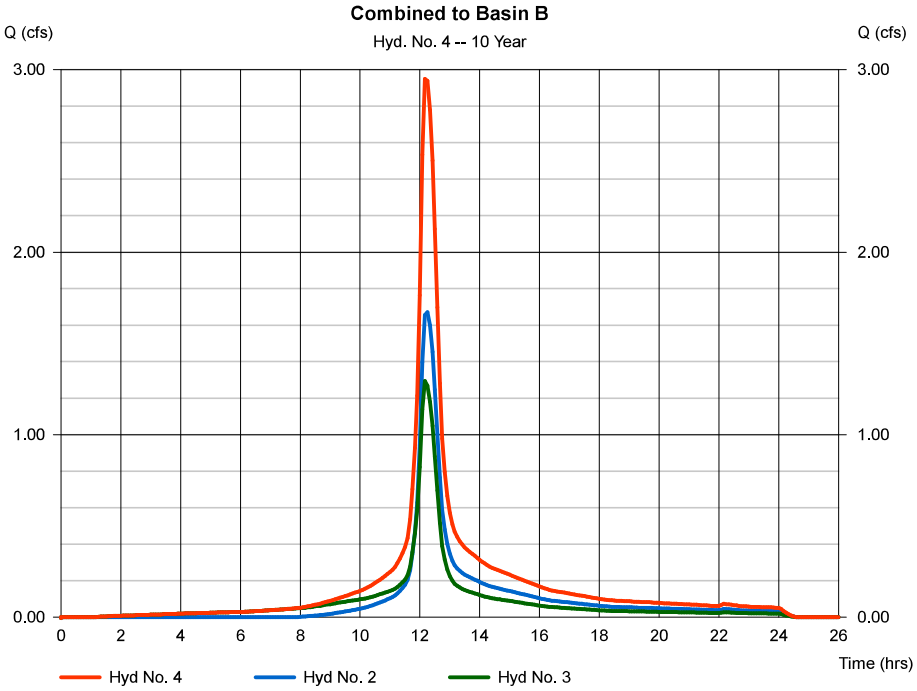


Hydrograph Report

Hyd. No. 4

Combined to Basin B

Hydrograph type	= Combine	Peak discharge	= 2.950 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 16,331 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 1.230 ac



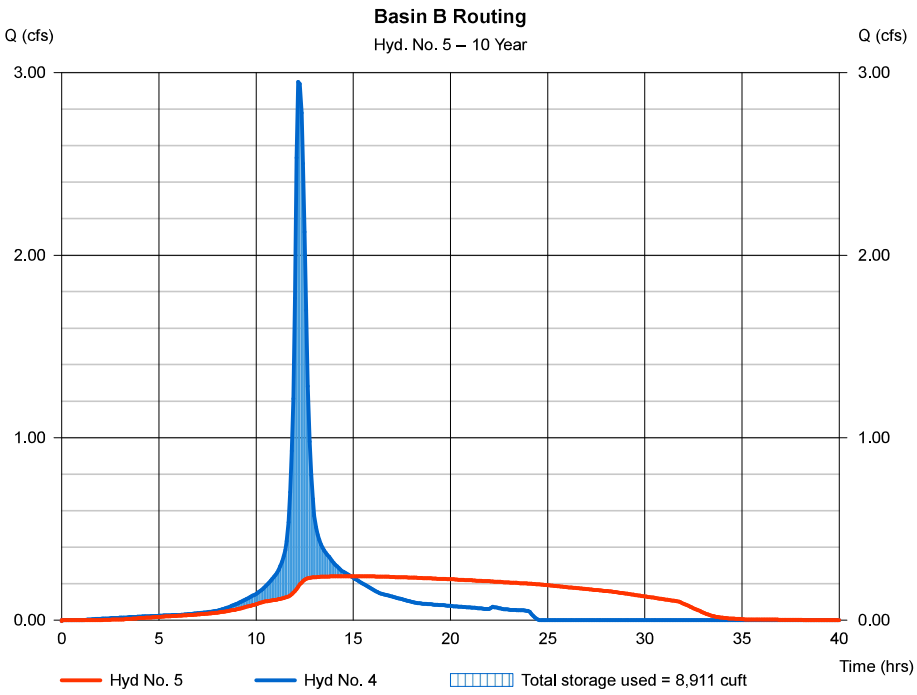
Hydrograph Report

Hyd. No. 5

Basin B Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.241 cfs
Storm frequency	= 10 yrs	Time to peak	= 14.83 hrs
Time interval	= 5 min	Hyd. volume	= 16,320 cuft
Inflow hyd. No.	= 4 - Combined to Basin B	Max. Elevation	= 83.28 ft
Reservoir name	= Basin B	Max. Storage	= 8,911 cuft

Storage Indication method used.



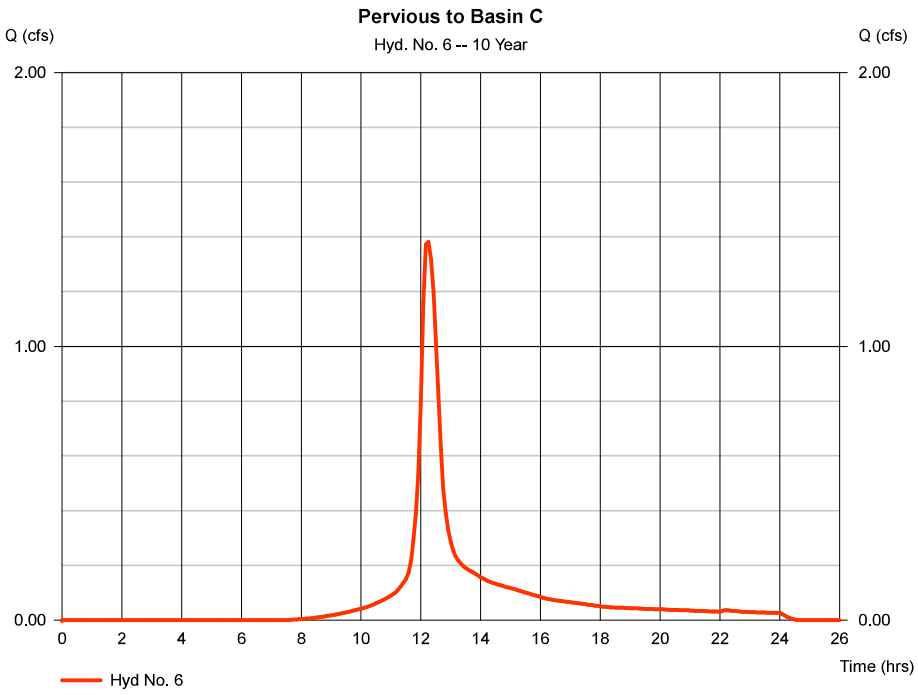
Hydrograph Report

Hyd. No. 6

Pervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 1.382 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 7,255 cuft
Drainage area	= 0.650 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.430 x 39) + (0.220 x 80)] / 0.650

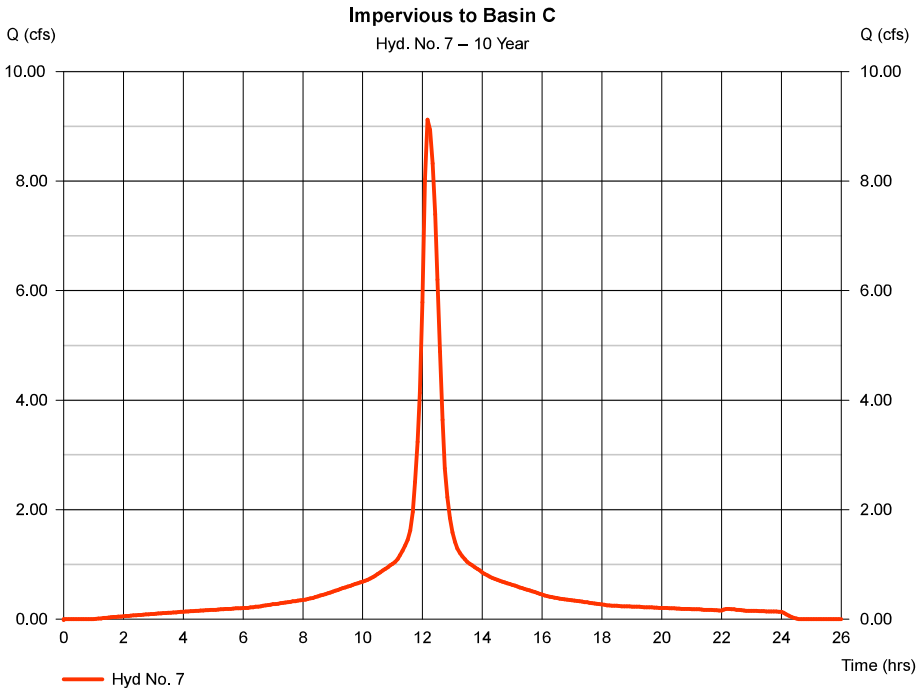


Hydrograph Report

Hyd. No. 7

Impervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 9.125 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 53,307 cuft
Drainage area	= 2.960 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

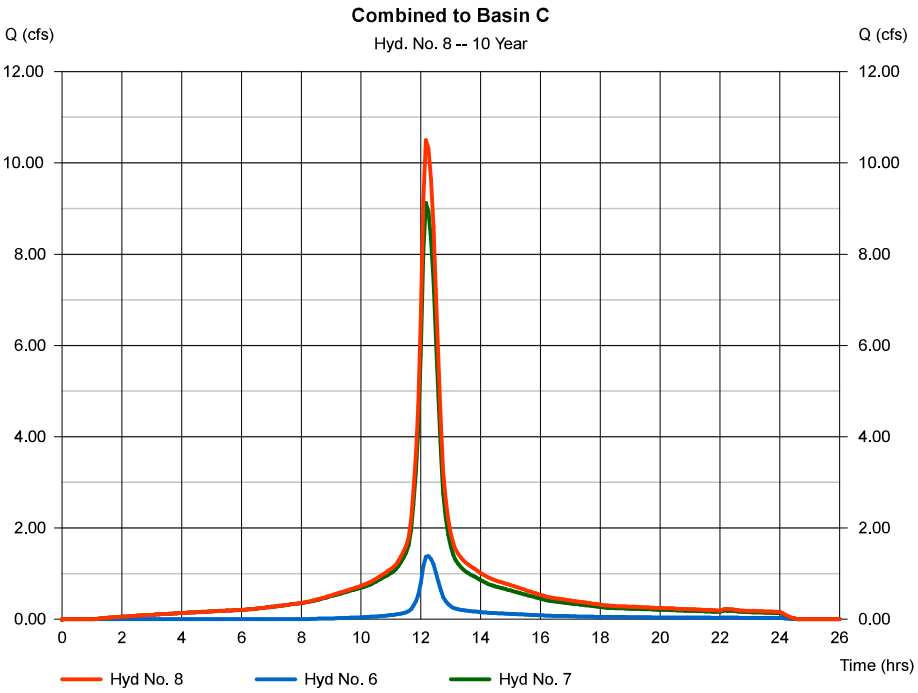


Hydrograph Report

Hyd. No. 8

Combined to Basin C

Hydrograph type	= Combine	Peak discharge	= 10.50 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 60,562 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 3.610 ac



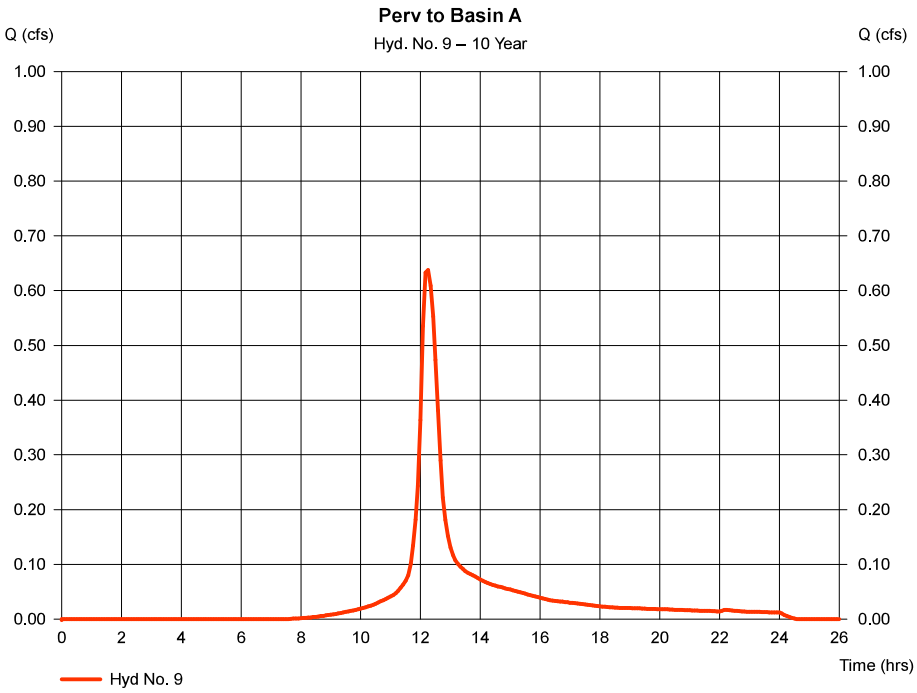
Hydrograph Report

Hyd. No. 9

Perv to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.638 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 3,349 cuft
Drainage area	= 0.300 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.200 x 39) + (0.100 x 80)] / 0.300

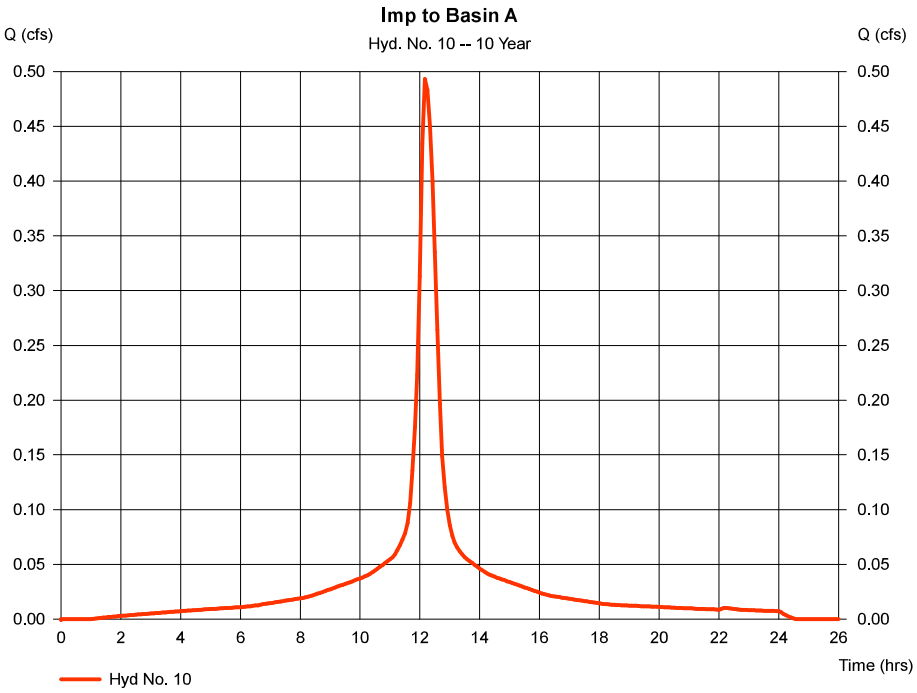


Hydrograph Report

Hyd. No. 10

Imp to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.493 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 2,881 cuft
Drainage area	= 0.160 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

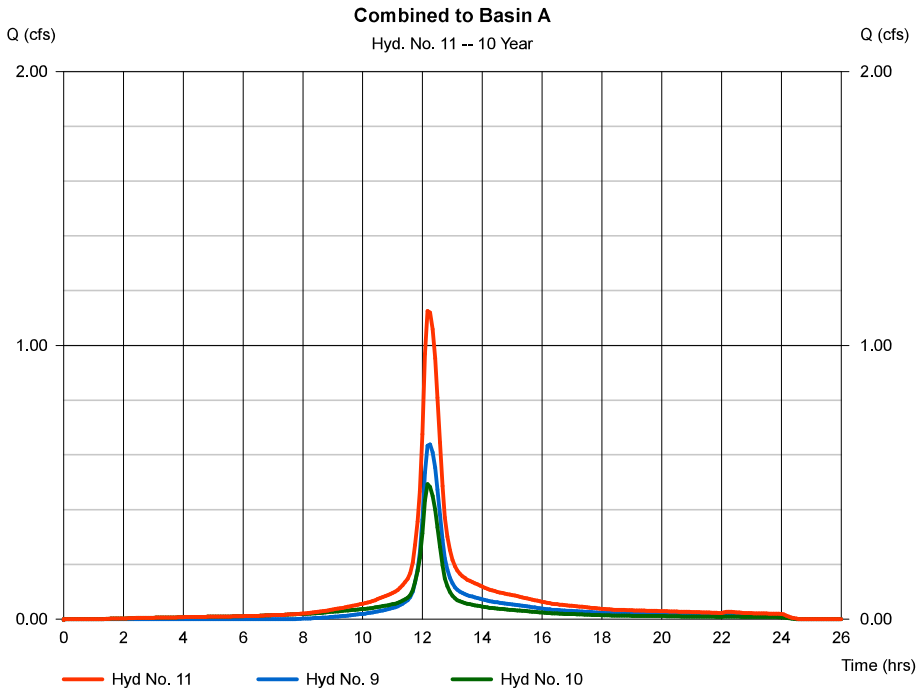


Hydrograph Report

Hyd. No. 11

Combined to Basin A

Hydrograph type	= Combine	Peak discharge	= 1.127 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 6,230 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 0.460 ac



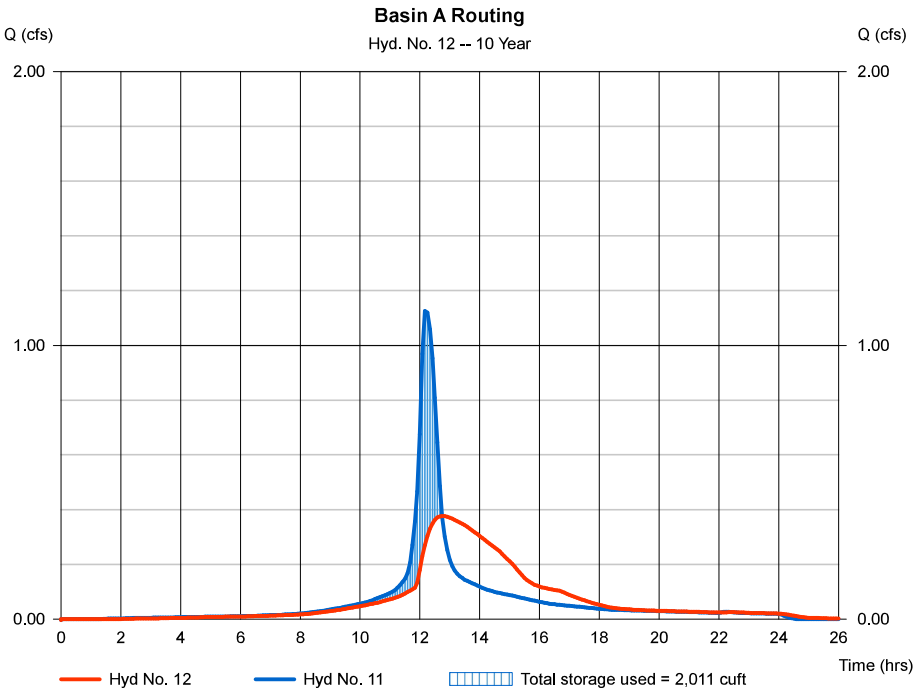
Hydrograph Report

Hyd. No. 12

Basin A Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.377 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.75 hrs
Time interval	= 5 min	Hyd. volume	= 6,225 cuft
Inflow hyd. No.	= 11 - Combined to Basin A	Max. Elevation	= 83.24 ft
Reservoir name	= Basin A	Max. Storage	= 2,011 cuft

Storage Indication method used.



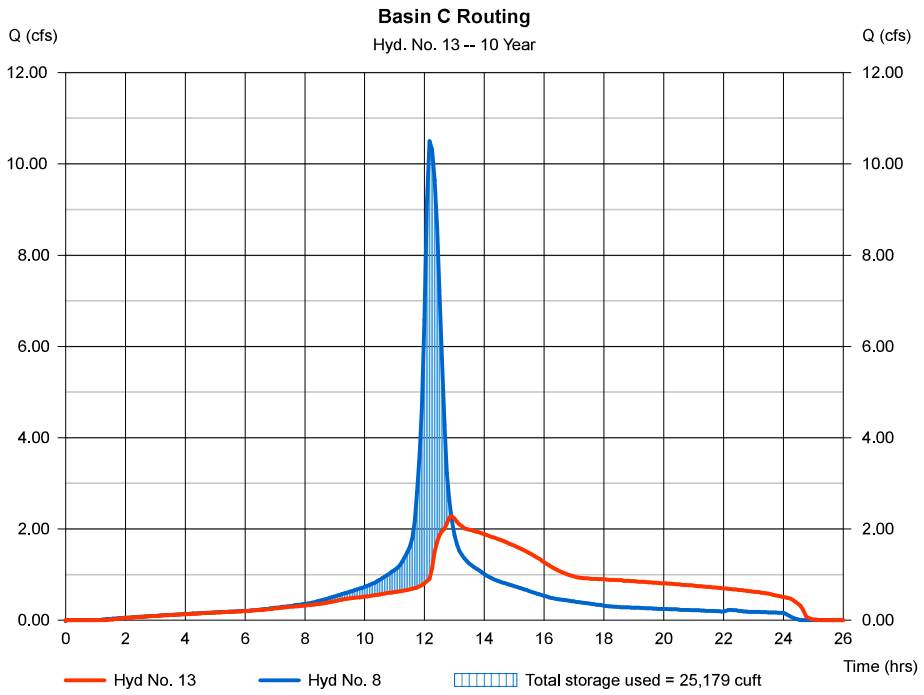
Hydrograph Report

Hyd. No. 13

Basin C Routing

Hydrograph type	= Reservoir	Peak discharge	= 2.275 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.92 hrs
Time interval	= 5 min	Hyd. volume	= 60,560 cuft
Inflow hyd. No.	= 8 - Combined to Basin C	Max. Elevation	= 76.58 ft
Reservoir name	= Basin C	Max. Storage	= 25,179 cuft

Storage Indication method used.

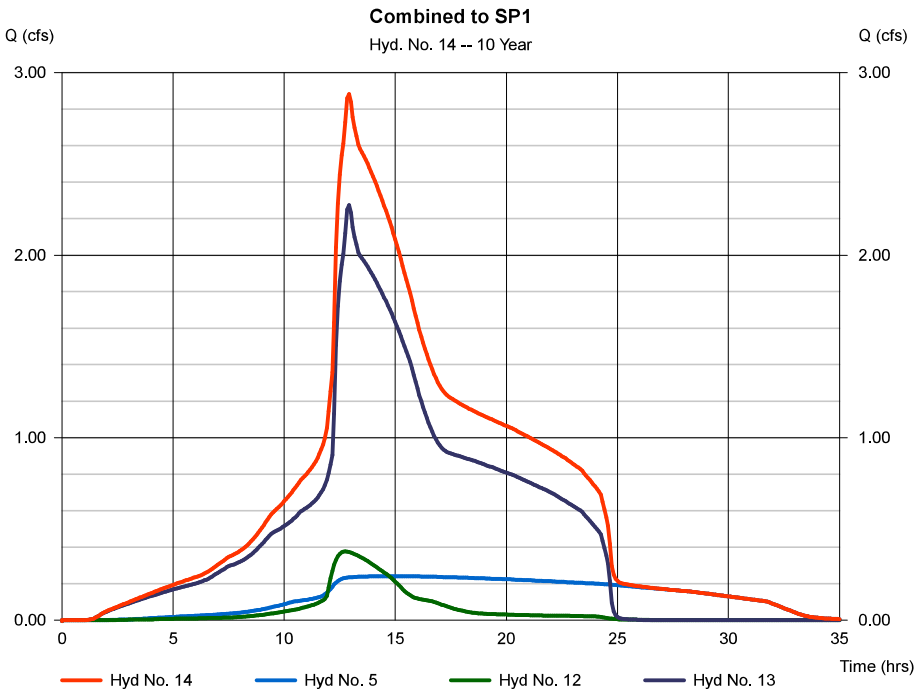


Hydrograph Report

Hyd. No. 14

Combined to SP1

Hydrograph type	= Combine	Peak discharge	= 2.883 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.92 hrs
Time interval	= 5 min	Hyd. volume	= 83,106 cuft
Inflow hyds.	= 5, 12, 13	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	14.95	5	740	97,564	---	---	---	EXIST. WOODS TO A
2	SCS Runoff	2.305	5	735	12,144	---	---	---	Pervious to Basin B
3	SCS Runoff	1.620	5	730	9,531	---	---	---	Imp to Basin B
4	Combine	3.921	5	730	21,675	2, 3	---	---	Combined to Basin B
5	Reservoir	0.266	5	925	21,664	4	83.77	12,644	Basin B Routing
6	SCS Runoff	1.893	5	735	9,994	---	---	---	Pervious to Basin C
7	SCS Runoff	11.42	5	730	67,171	---	---	---	Impervious to Basin C
8	Combine	13.31	5	730	77,165	6, 7	---	---	Combined to Basin C
9	SCS Runoff	0.874	5	735	4,613	---	---	---	Perv to Basin A
10	SCS Runoff	0.617	5	730	3,631	---	---	---	Imp to Basin A
11	Combine	1.491	5	730	8,244	9, 10	---	---	Combined to Basin A
12	Reservoir	0.432	5	770	8,239	11	83.66	2,845	Basin A Routing
13	Reservoir	8.383	5	750	77,163	8	76.82	27,608	Basin C Routing
14	Combine	9.042	5	750	107,066	5, 12, 13	---	---	Combined to SP1

Hydrograph Report

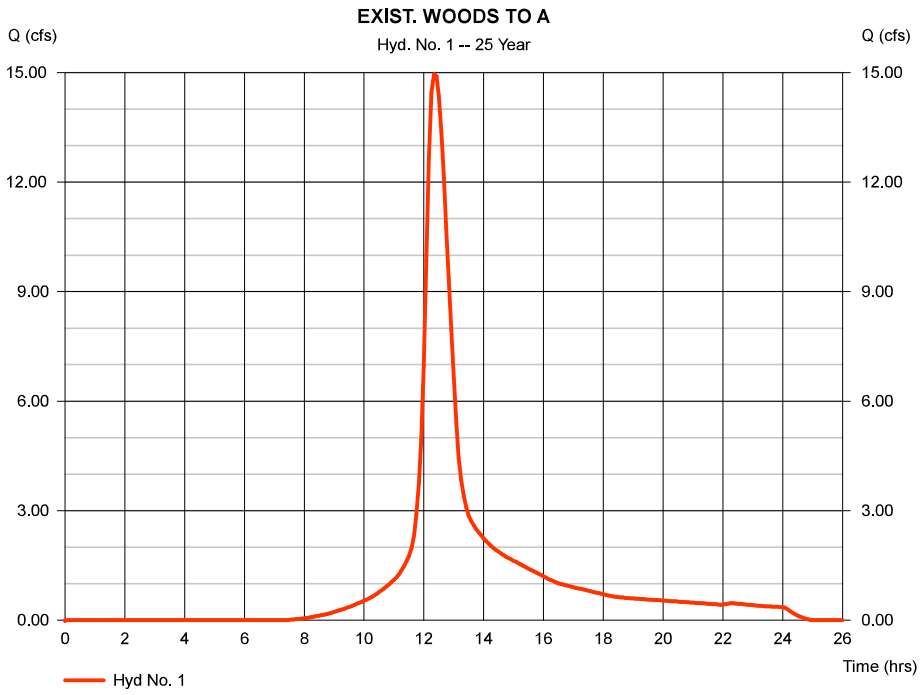
Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Hyd. No. 1

EXIST. WOODS TO A

Hydrograph type	= SCS Runoff	Peak discharge	= 14.95 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.33 hrs
Time interval	= 5 min	Hyd. volume	= 97,564 cuft
Drainage area	= 6.610 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 16.90 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(2.200 x 77) + (4.400 x 30)] / 6.610



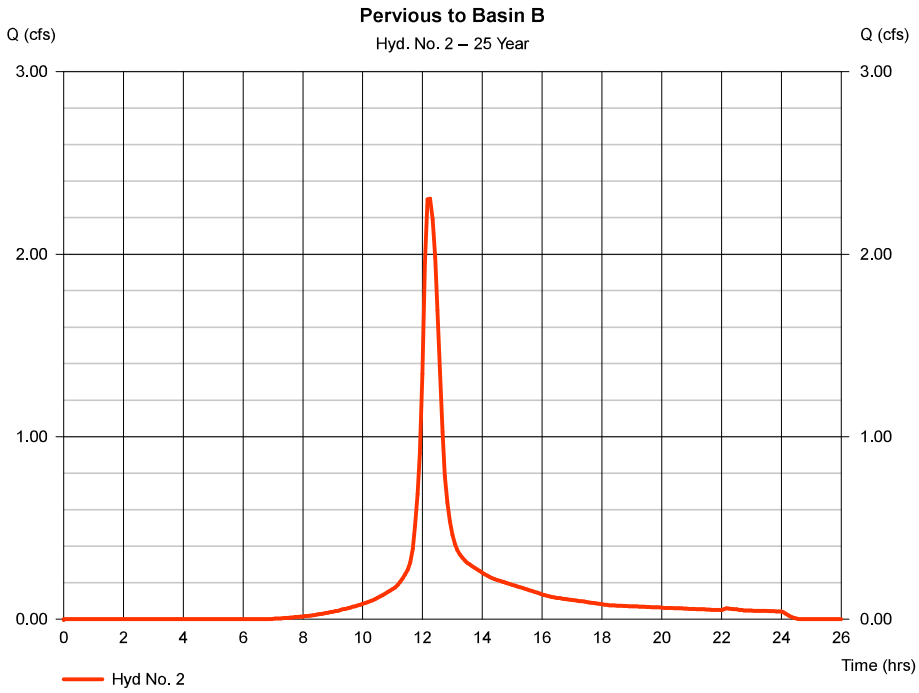
Hydrograph Report

Hyd. No. 2

Pervious to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 2.305 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 12,144 cuft
Drainage area	= 0.810 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.670 x 80) + (0.140 x 77)] / 0.810

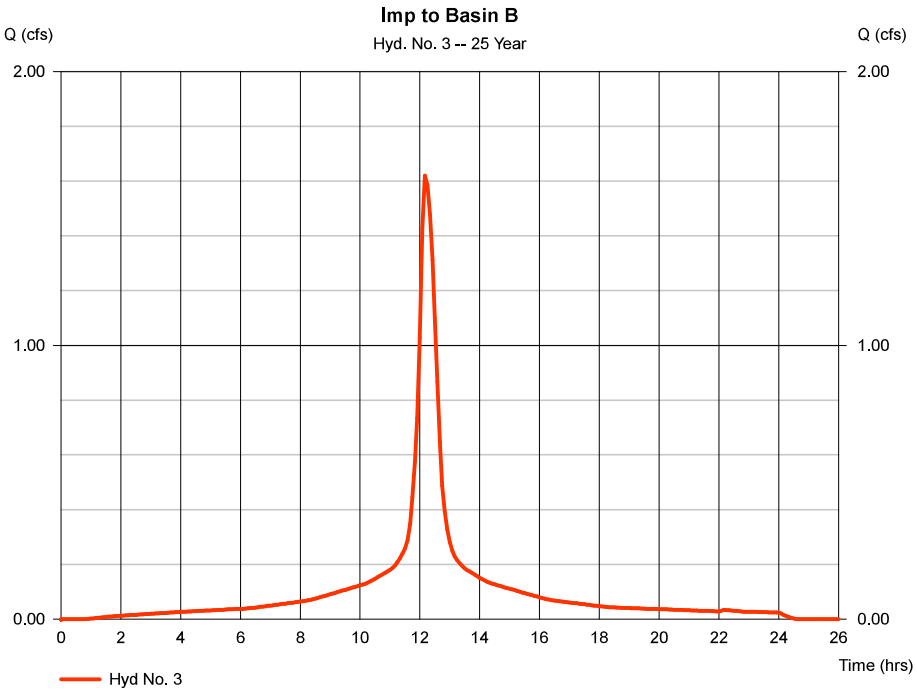


Hydrograph Report

Hyd. No. 3

Imp to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.620 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 9,531 cuft
Drainage area	= 0.420 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

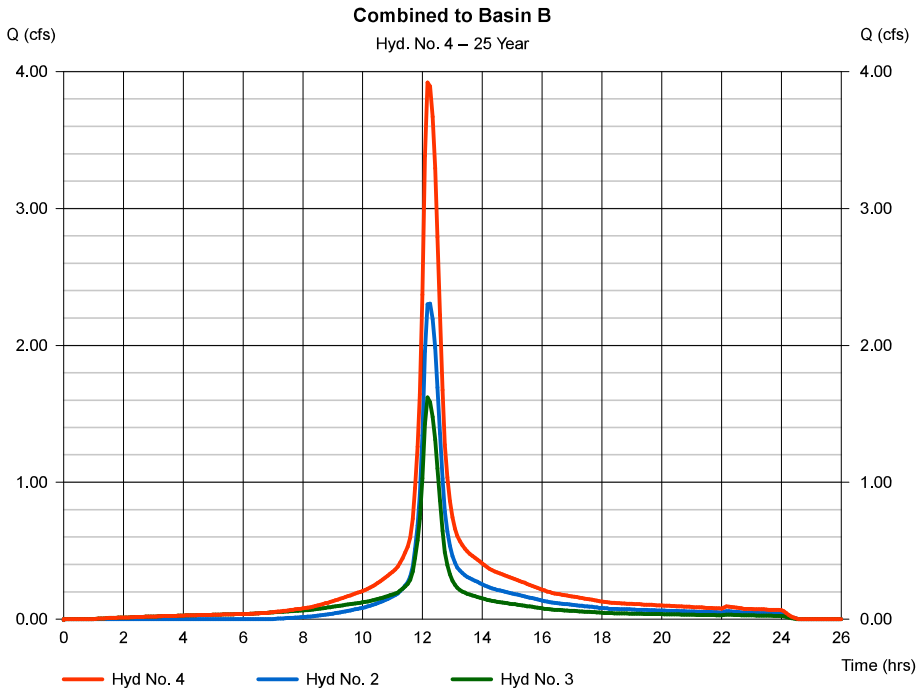


Hydrograph Report

Hyd. No. 4

Combined to Basin B

Hydrograph type	= Combine	Peak discharge	= 3.921 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 21,675 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 1.230 ac



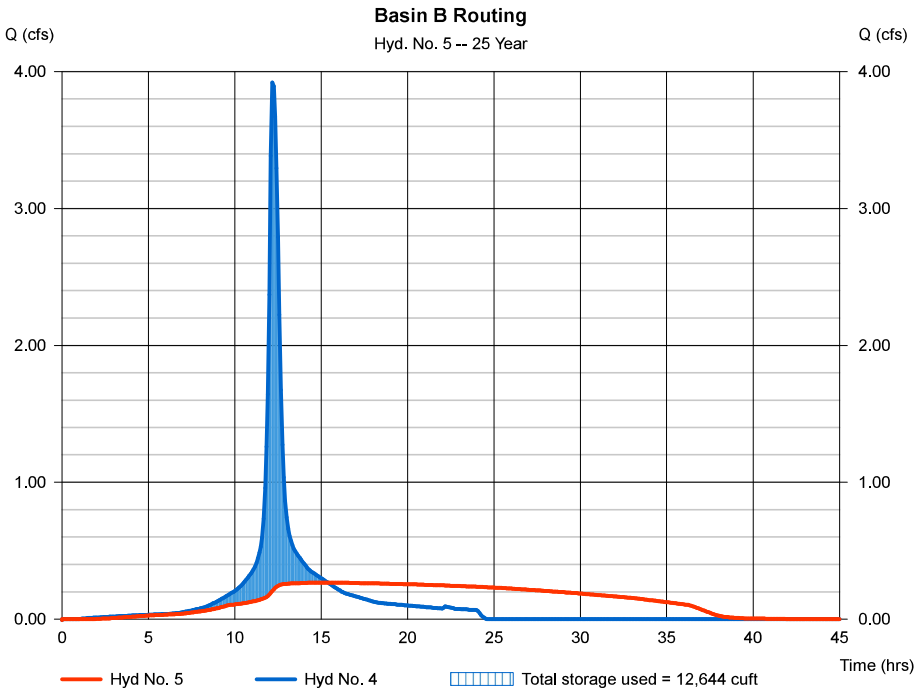
Hydrograph Report

Hyd. No. 5

Basin B Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.266 cfs
Storm frequency	= 25 yrs	Time to peak	= 15.42 hrs
Time interval	= 5 min	Hyd. volume	= 21,664 cuft
Inflow hyd. No.	= 4 - Combined to Basin B	Max. Elevation	= 83.77 ft
Reservoir name	= Basin B	Max. Storage	= 12,644 cuft

Storage Indication method used.



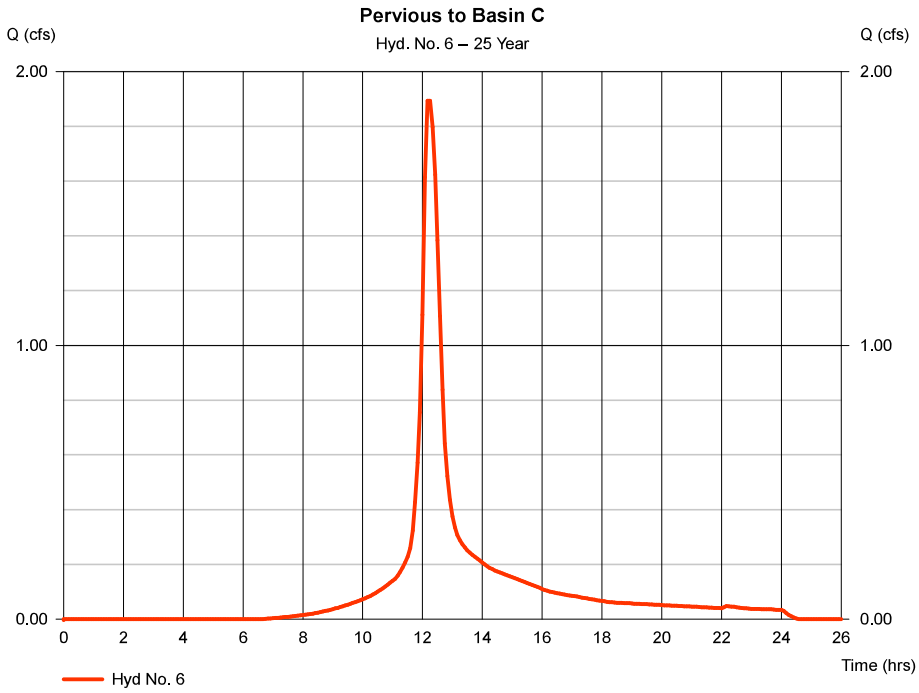
Hydrograph Report

Hyd. No. 6

Pervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 1.893 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 9,994 cuft
Drainage area	= 0.650 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.430 x 39) + (0.220 x 80)] / 0.650

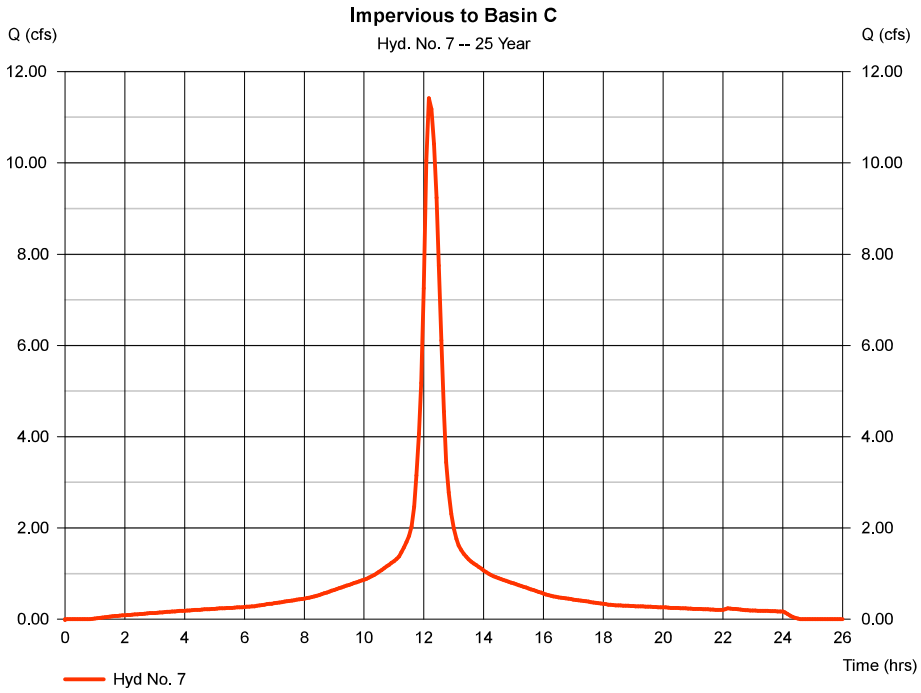


Hydrograph Report

Hyd. No. 7

Impervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 11.42 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 67,171 cuft
Drainage area	= 2.960 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

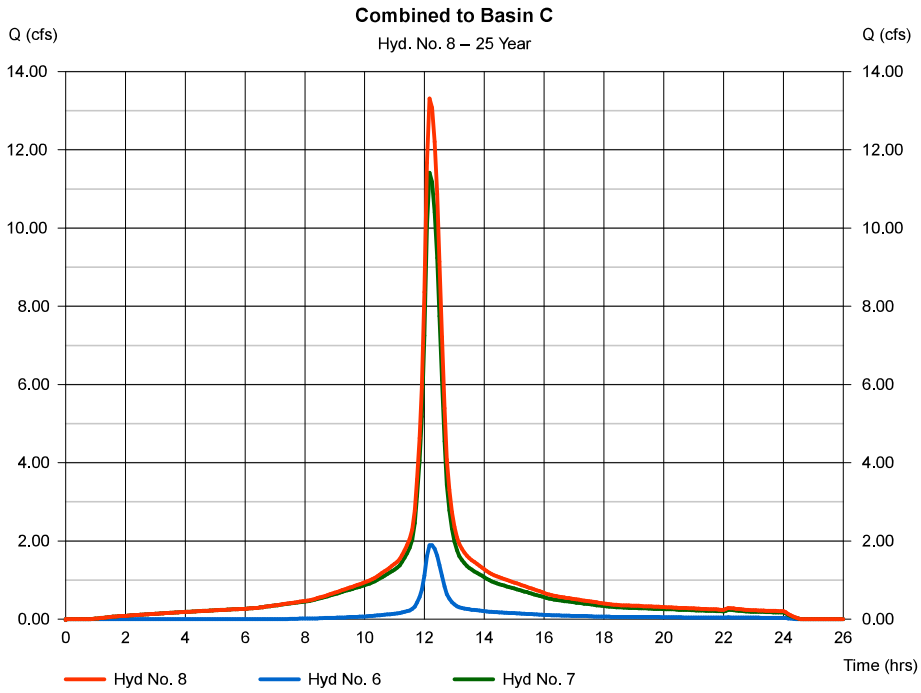


Hydrograph Report

Hyd. No. 8

Combined to Basin C

Hydrograph type	= Combine	Peak discharge	= 13.31 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 77,165 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 3.610 ac



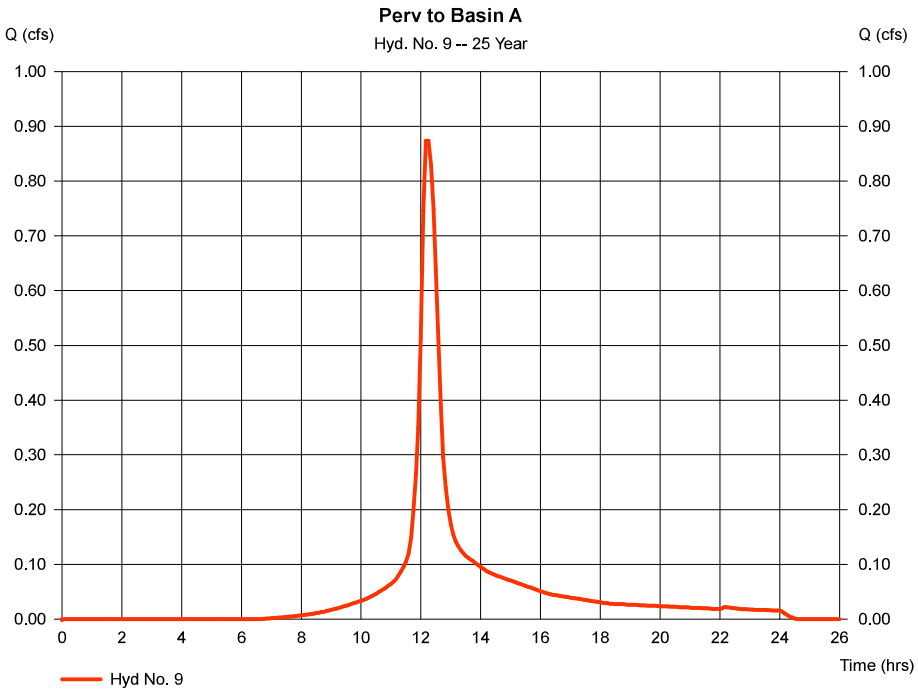
Hydrograph Report

Hyd. No. 9

Perv to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.874 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 4,613 cuft
Drainage area	= 0.300 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.200 x 39) + (0.100 x 80)] / 0.300

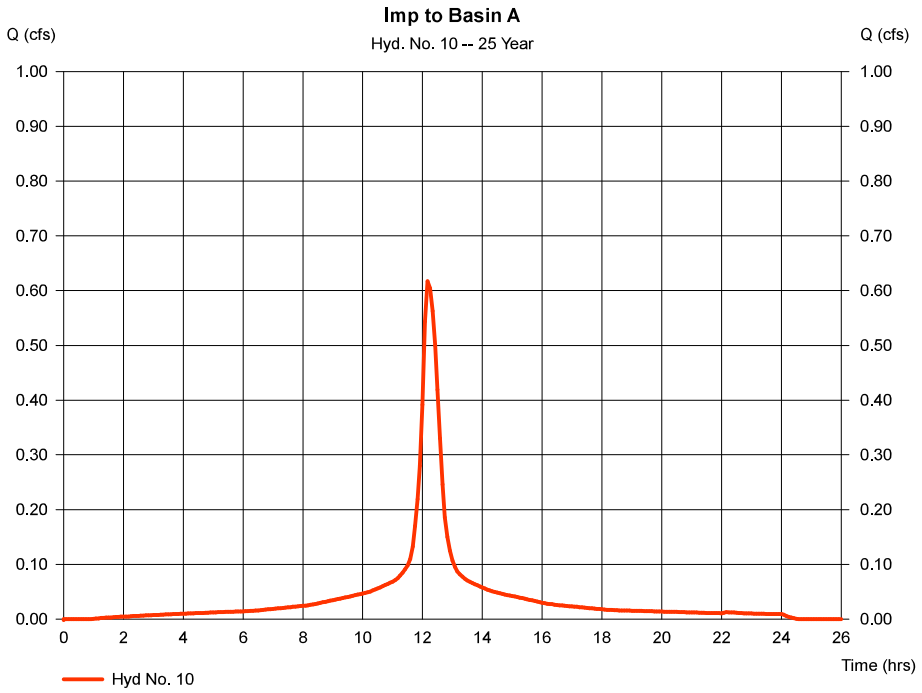


Hydrograph Report

Hyd. No. 10

Imp to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.617 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 3,631 cuft
Drainage area	= 0.160 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

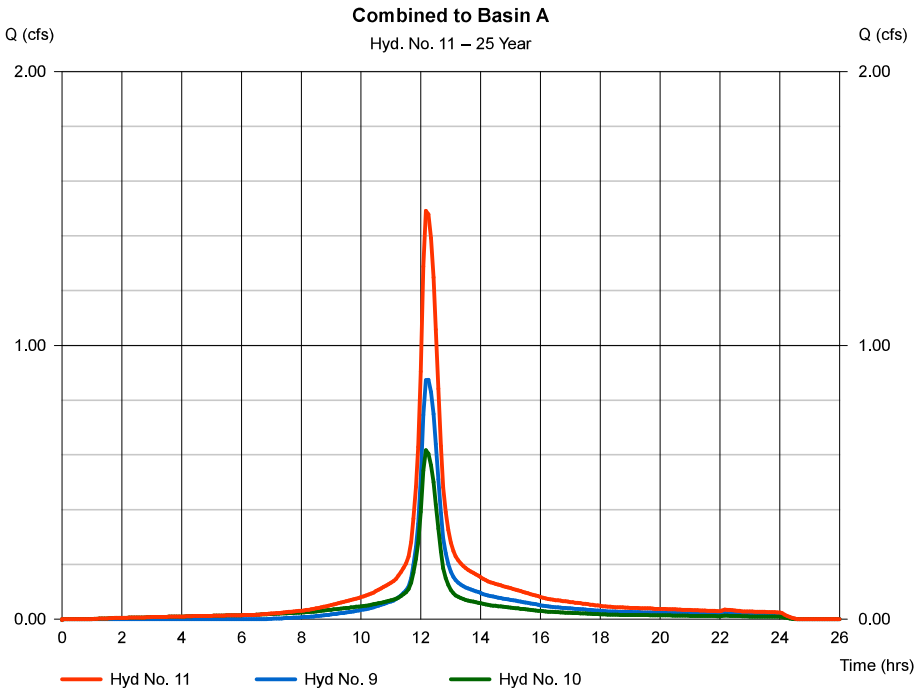


Hydrograph Report

Hyd. No. 11

Combined to Basin A

Hydrograph type	= Combine	Peak discharge	= 1.491 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 8,244 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 0.460 ac



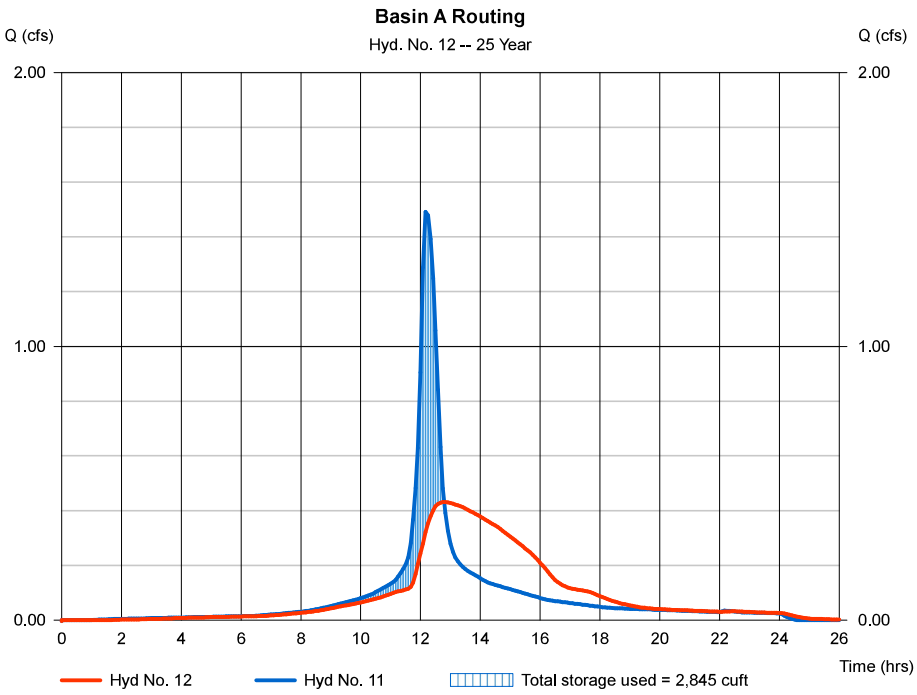
Hydrograph Report

Hyd. No. 12

Basin A Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.432 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.83 hrs
Time interval	= 5 min	Hyd. volume	= 8,239 cuft
Inflow hyd. No.	= 11 - Combined to Basin A	Max. Elevation	= 83.66 ft
Reservoir name	= Basin A	Max. Storage	= 2,845 cuft

Storage Indication method used.



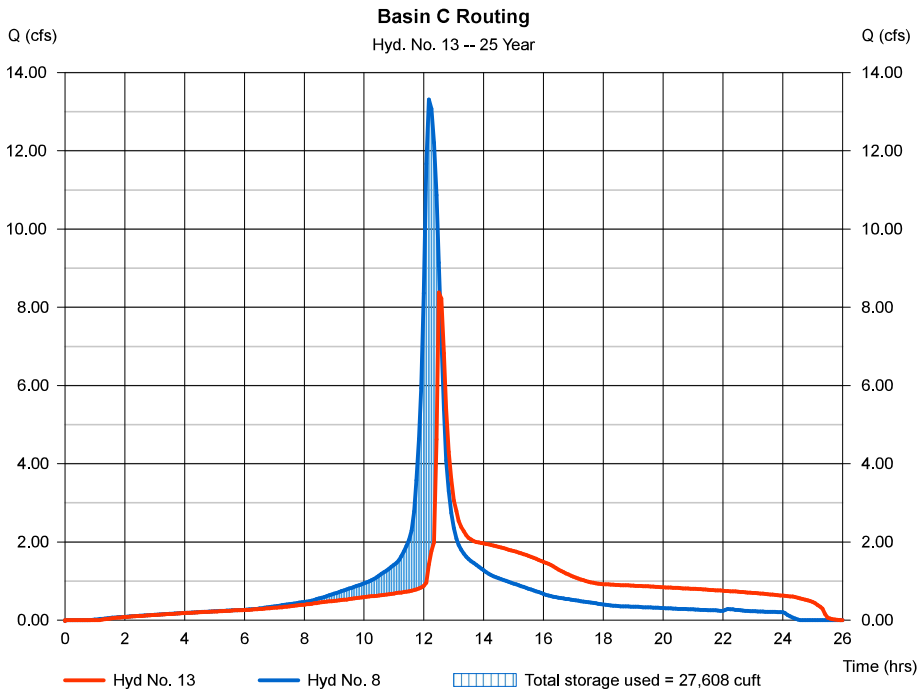
Hydrograph Report

Hyd. No. 13

Basin C Routing

Hydrograph type	= Reservoir	Peak discharge	= 8.383 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.50 hrs
Time interval	= 5 min	Hyd. volume	= 77,163 cuft
Inflow hyd. No.	= 8 - Combined to Basin C	Max. Elevation	= 76.82 ft
Reservoir name	= Basin C	Max. Storage	= 27,608 cuft

Storage Indication method used.

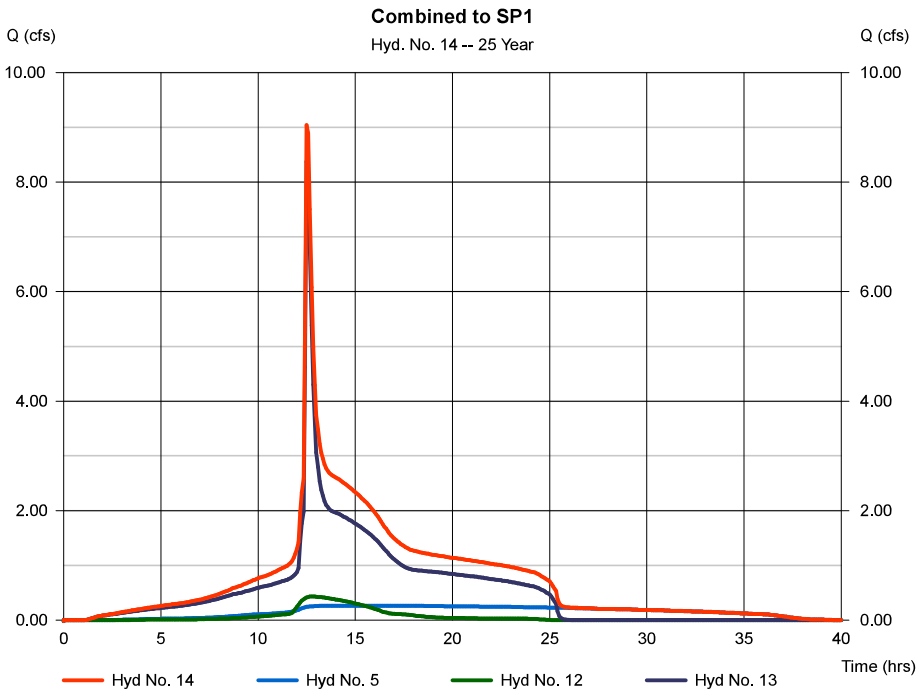


Hydrograph Report

Hyd. No. 14

Combined to SP1

Hydrograph type	= Combine	Peak discharge	= 9.042 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.50 hrs
Time interval	= 5 min	Hyd. volume	= 107,066 cuft
Inflow hyds.	= 5, 12, 13	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	23.17	5	740	151,891	---	-----	---	EXIST. WOODS TO A
2	SCS Runoff	3.518	5	730	18,666	---	-----	---	Pervious to Basin B
3	SCS Runoff	2.222	5	730	13,180	---	-----	---	Imp to Basin B
4	Combine	5.740	5	730	31,845	2, 3	-----	---	Combined to Basin B
5	Reservoir	1.089	5	780	31,835	4	84.27	17,134	Basin B Routing
6	SCS Runoff	2.871	5	730	15,266	---	-----	---	Pervious to Basin C
7	SCS Runoff	15.66	5	730	92,884	---	-----	---	Impervious to Basin C
8	Combine	18.53	5	730	108,150	6, 7	-----	---	Combined to Basin C
9	SCS Runoff	1.325	5	730	7,046	---	-----	---	Perv to Basin A
10	SCS Runoff	0.847	5	730	5,021	---	-----	---	Imp to Basin A
11	Combine	2.172	5	730	12,067	9, 10	-----	---	Combined to Basin A
12	Reservoir	1.967	5	745	12,062	11	83.86	3,306	Basin A Routing
13	Reservoir	17.31	5	740	108,148	8	76.99	29,415	Basin C Routing
14	Combine	18.38	5	740	152,045	5, 12, 13	-----	---	Combined to SP1

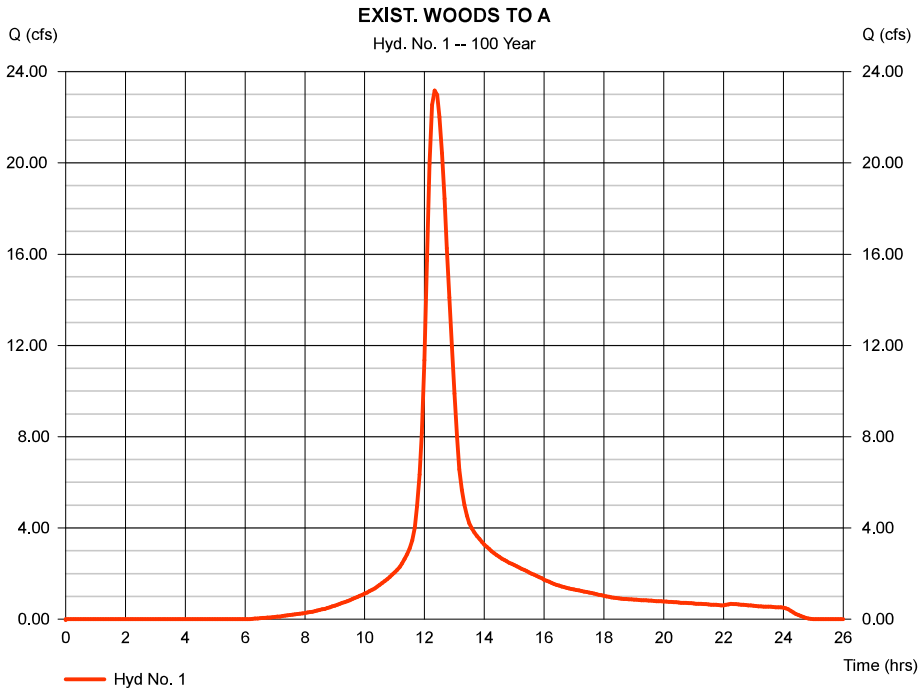
Hydrograph Report

Hyd. No. 1

EXIST. WOODS TO A

Hydrograph type	= SCS Runoff	Peak discharge	= 23.17 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.33 hrs
Time interval	= 5 min	Hyd. volume	= 151,891 cuft
Drainage area	= 6.610 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 16.90 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(2.200 x 77) + (4.400 x 30)] / 6.610



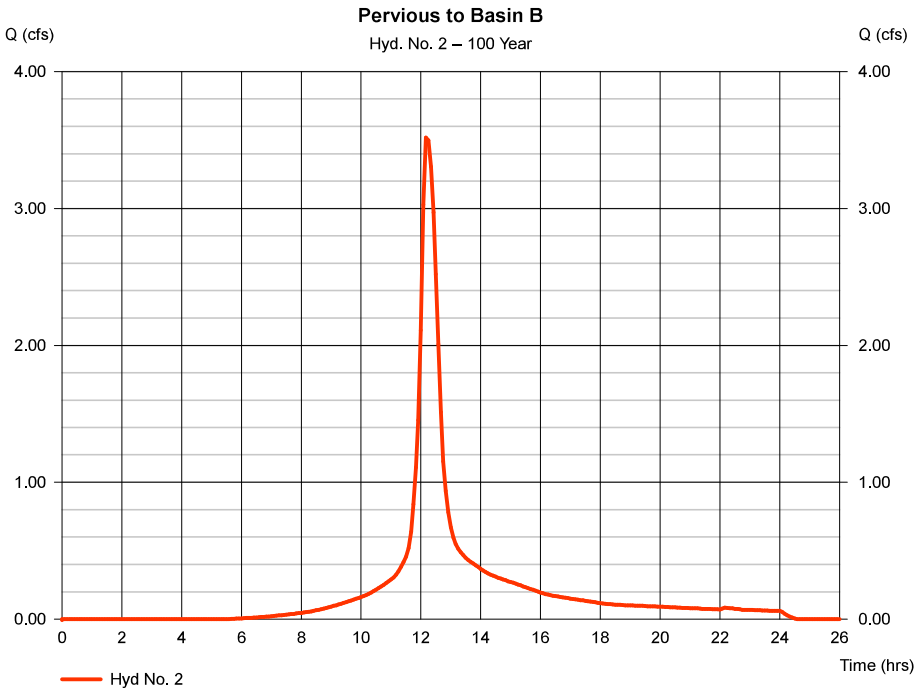
Hydrograph Report

Hyd. No. 2

Pervious to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 3.518 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 18,666 cuft
Drainage area	= 0.810 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.670 x 80) + (0.140 x 77)] / 0.810

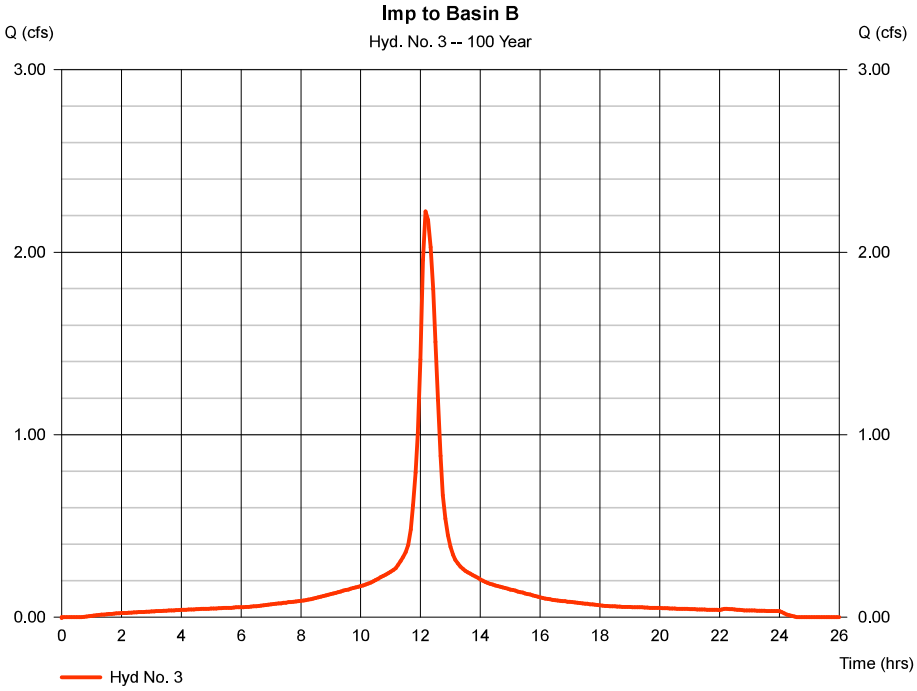


Hydrograph Report

Hyd. No. 3

Imp to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 2.222 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 13,180 cuft
Drainage area	= 0.420 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

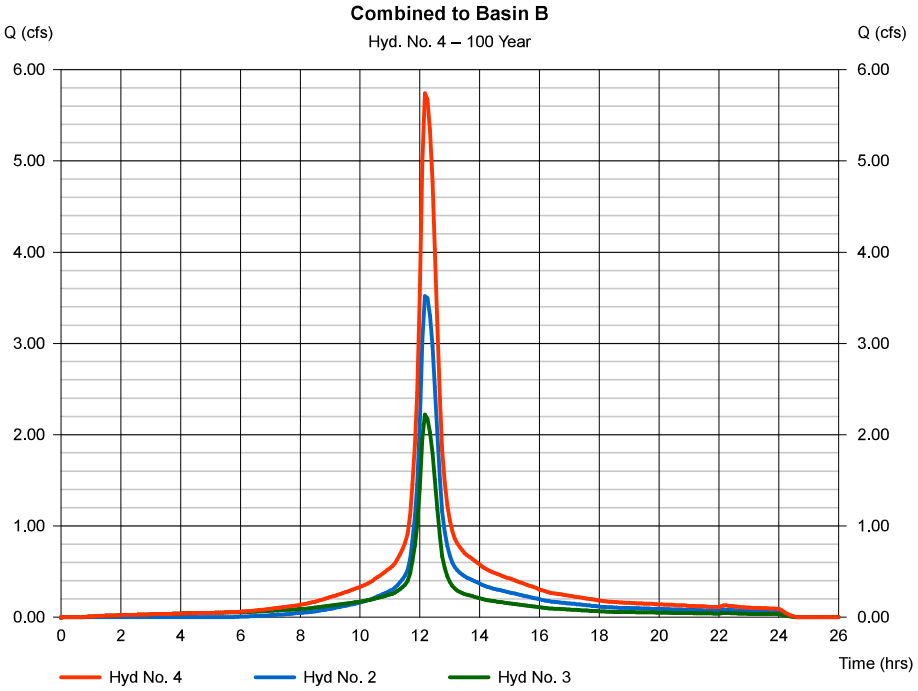


Hydrograph Report

Hyd. No. 4

Combined to Basin B

Hydrograph type	= Combine	Peak discharge	= 5.740 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 31,845 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 1.230 ac



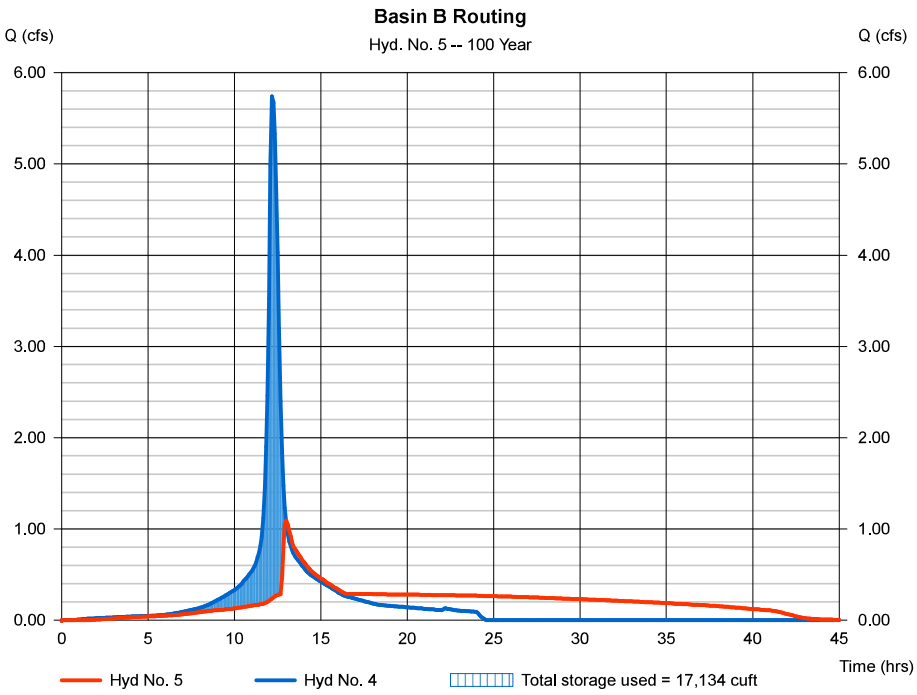
Hydrograph Report

Hyd. No. 5

Basin B Routing

Hydrograph type	= Reservoir	Peak discharge	= 1.089 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.00 hrs
Time interval	= 5 min	Hyd. volume	= 31,835 cuft
Inflow hyd. No.	= 4 - Combined to Basin B	Max. Elevation	= 84.27 ft
Reservoir name	= Basin B	Max. Storage	= 17,134 cuft

Storage Indication method used.



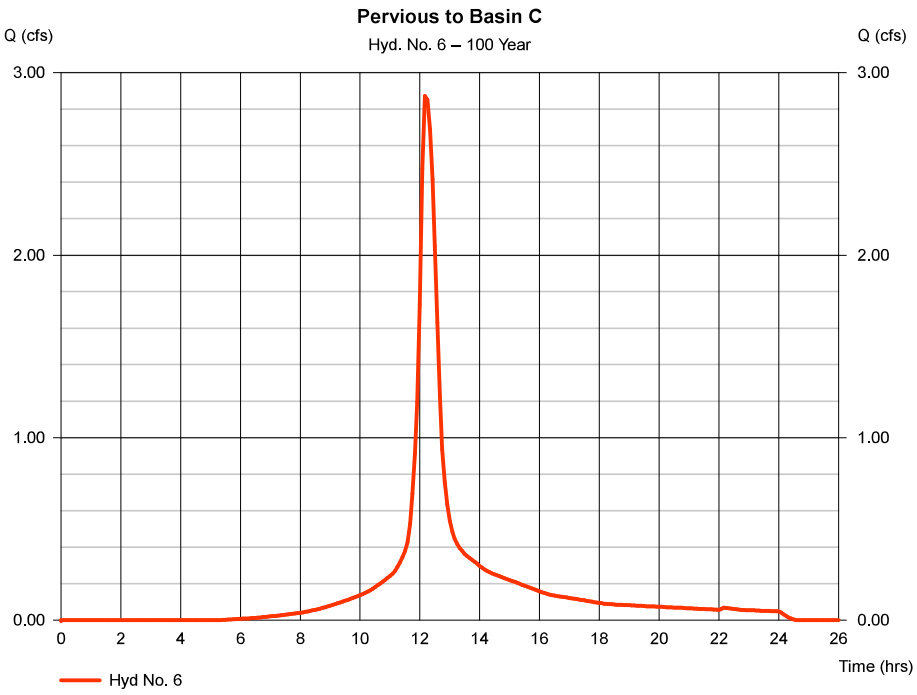
Hydrograph Report

Hyd. No. 6

Pervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 2.871 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 15,266 cuft
Drainage area	= 0.650 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.430 x 39) + (0.220 x 80)] / 0.650

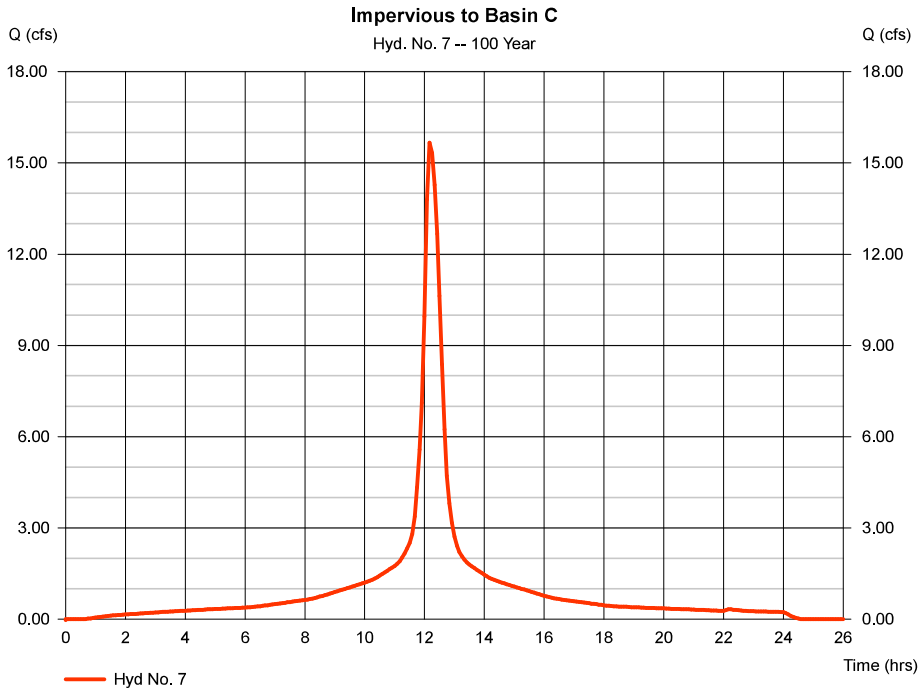


Hydrograph Report

Hyd. No. 7

Impervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 15.66 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 92,884 cuft
Drainage area	= 2.960 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

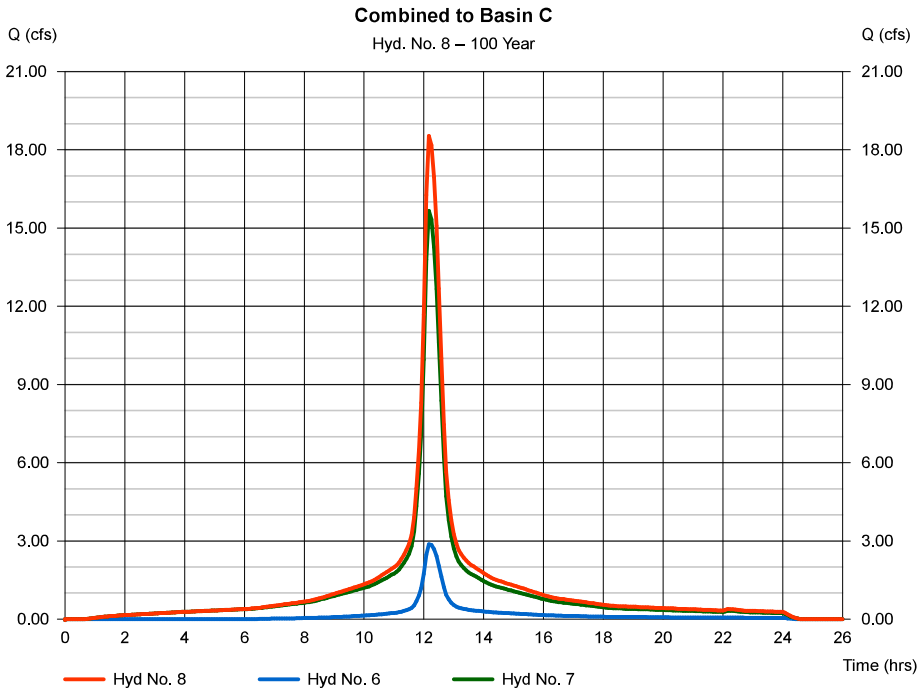


Hydrograph Report

Hyd. No. 8

Combined to Basin C

Hydrograph type	= Combine	Peak discharge	= 18.53 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 108,150 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 3.610 ac



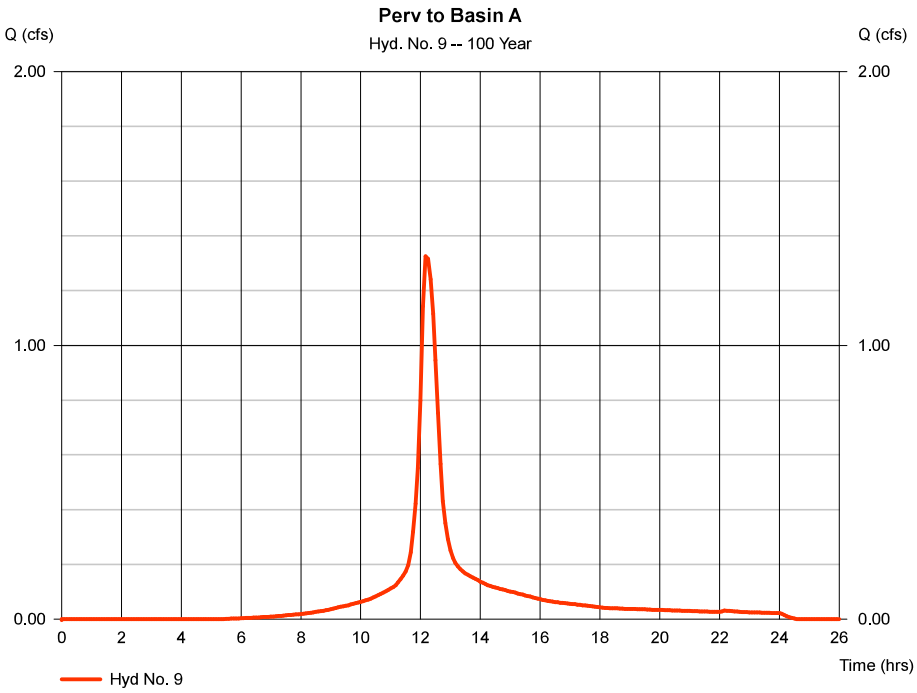
Hydrograph Report

Hyd. No. 9

Perv to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.325 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 7,046 cuft
Drainage area	= 0.300 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.200 x 39) + (0.100 x 80)] / 0.300

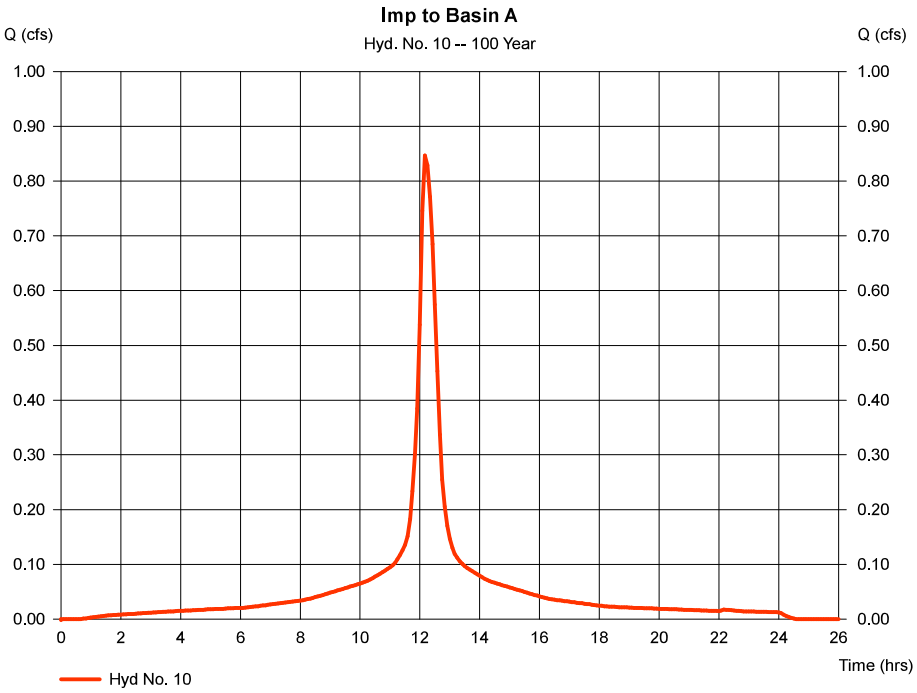


Hydrograph Report

Hyd. No. 10

Imp to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.847 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 5,021 cuft
Drainage area	= 0.160 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

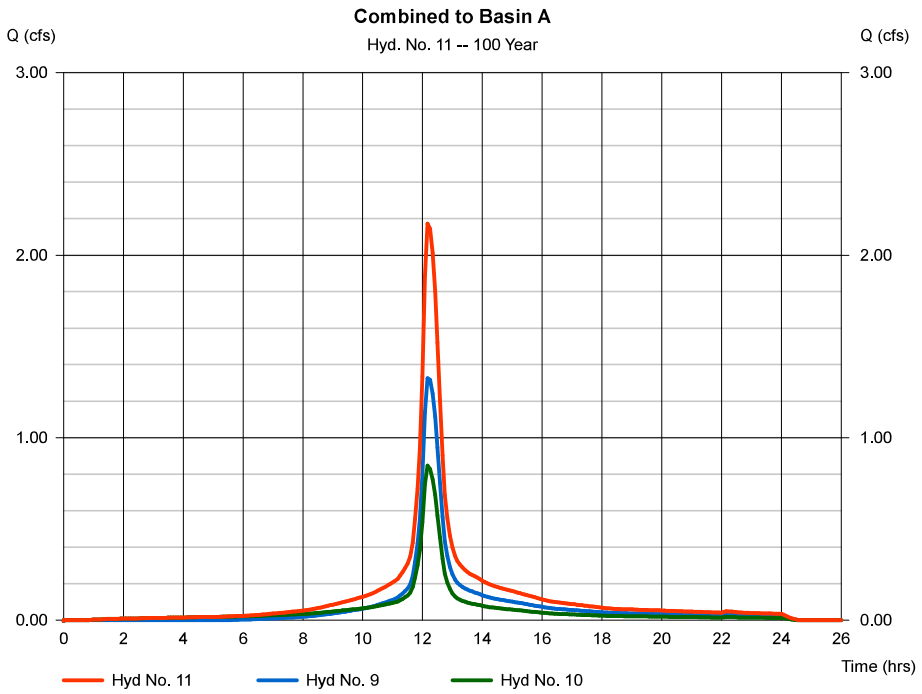


Hydrograph Report

Hyd. No. 11

Combined to Basin A

Hydrograph type	= Combine	Peak discharge	= 2.172 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 12,067 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 0.460 ac



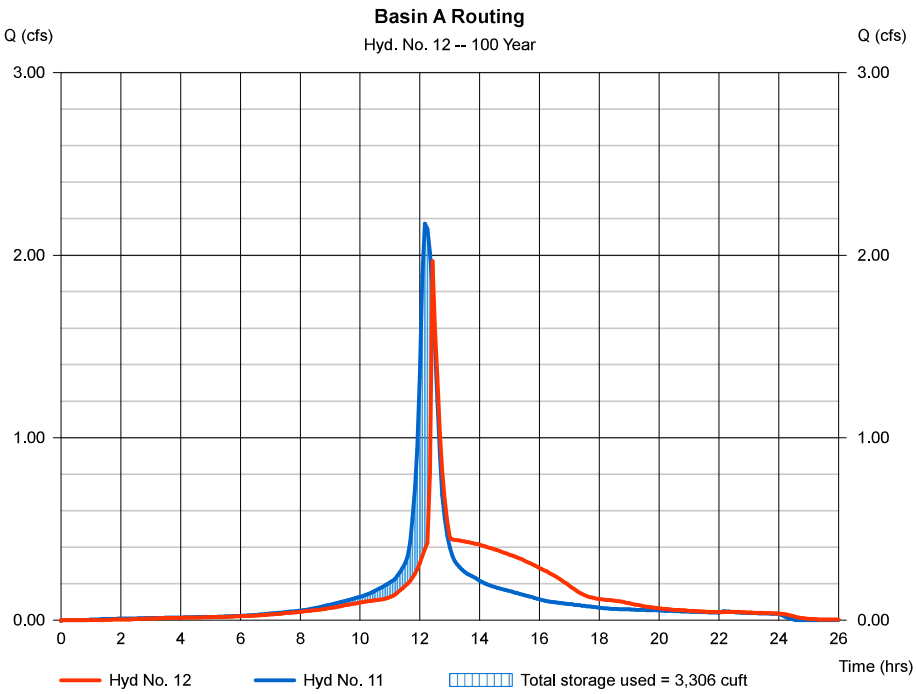
Hydrograph Report

Hyd. No. 12

Basin A Routing

Hydrograph type	= Reservoir	Peak discharge	= 1.967 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.42 hrs
Time interval	= 5 min	Hyd. volume	= 12,062 cuft
Inflow hyd. No.	= 11 - Combined to Basin A	Max. Elevation	= 83.86 ft
Reservoir name	= Basin A	Max. Storage	= 3,306 cuft

Storage Indication method used.



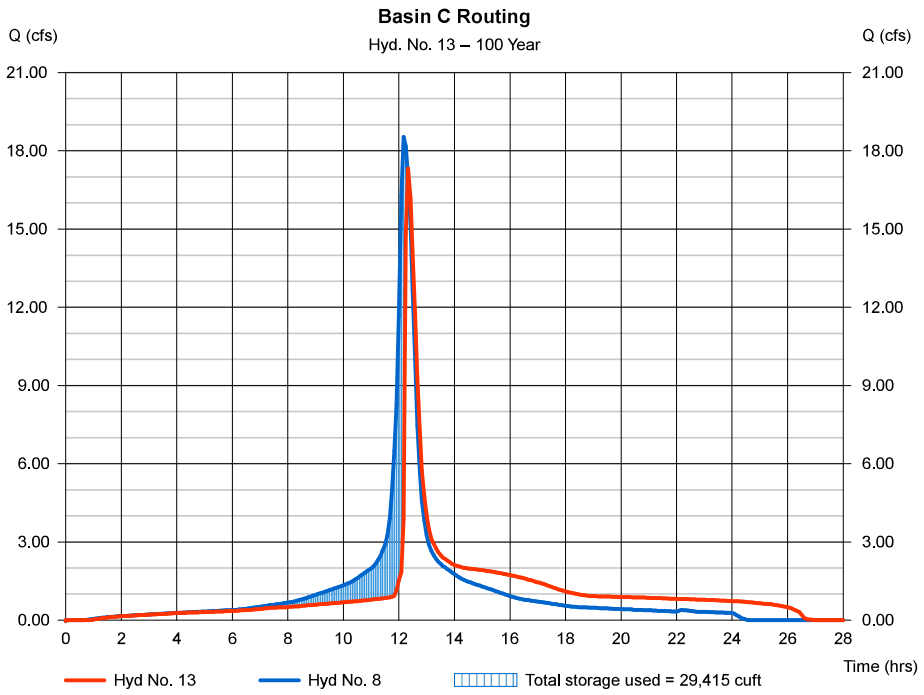
Hydrograph Report

Hyd. No. 13

Basin C Routing

Hydrograph type	= Reservoir	Peak discharge	= 17.31 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.33 hrs
Time interval	= 5 min	Hyd. volume	= 108,148 cuft
Inflow hyd. No.	= 8 - Combined to Basin C	Max. Elevation	= 76.99 ft
Reservoir name	= Basin C	Max. Storage	= 29,415 cuft

Storage Indication method used.

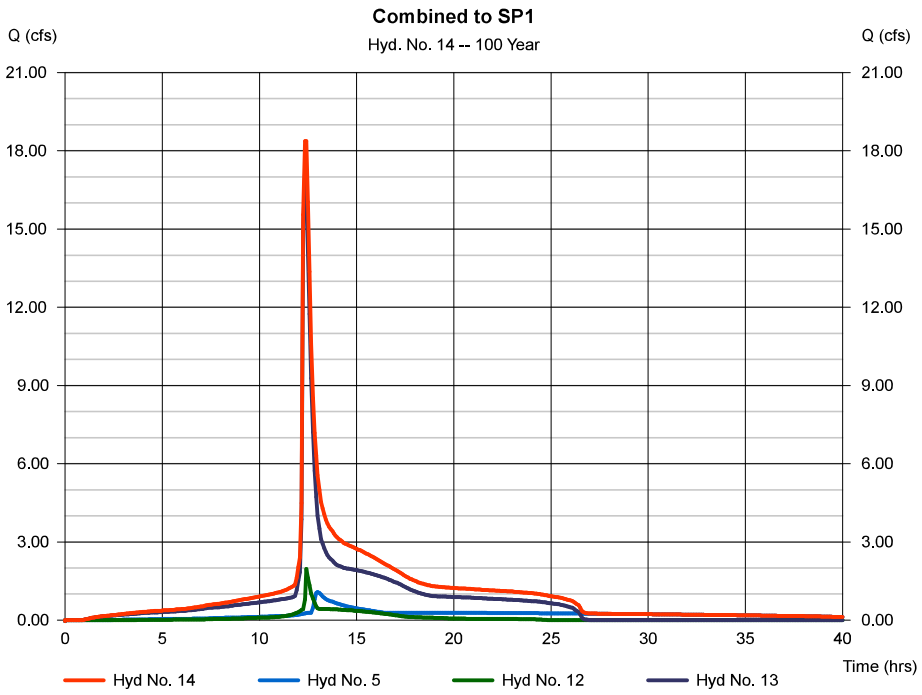


Hydrograph Report

Hyd. No. 14

Combined to SP1

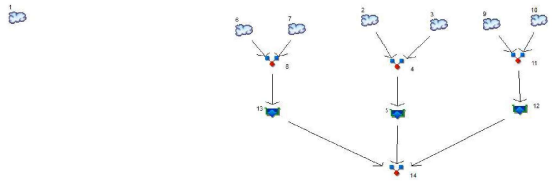
Hydrograph type	= Combine	Peak discharge	= 18.38 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.33 hrs
Time interval	= 5 min	Hyd. volume	= 152,045 cuft
Inflow hyds.	= 5, 12, 13	Contrib. drain. area	= 0.000 ac



7. HYDROGRAPH SUMMARY REPORTS – WATER QUALITY STORM

Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

Hyd.	Origin	Description
1	SCS Runoff	EXIST. WOODS TO A
2	SCS Runoff	Pervious to Basin B
3	SCS Runoff	Imp to Basin B
4	Combine	Combined to Basin B
5	Reservoir	Basin B Routing
6	SCS Runoff	Pervious to Basin C
7	SCS Runoff	Impervious to Basin C
8	Combine	Combined to Basin C
9	SCS Runoff	Perv to Basin A
10	SCS Runoff	Imp to Basin A
11	Combine	Combined to Basin A
12	Reservoir	Basin A Routing
13	Reservoir	Basin C Routing
14	Combine	Combined to SP1

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.805	5	100	2,887	---	-----	---	EXIST. WOODS TO A
2	SCS Runoff	0.155	5	80	437	---	-----	---	Pervious to Basin B
3	SCS Runoff	0.680	5	70	1,567	---	-----	---	Imp to Basin B
4	Combine	0.804	5	75	2,004	2, 3	-----	---	Combined to Basin B
5	Reservoir	0.138	5	120	1,994	4	81.81	1,466	Basin B Routing
6	SCS Runoff	0.142	5	80	392	---	-----	---	Pervious to Basin C
7	SCS Runoff	4.793	5	70	11,042	---	-----	---	Impervious to Basin C
8	Combine	4.899	5	70	11,434	6, 7	-----	---	Combined to Basin C
9	SCS Runoff	0.065	5	80	181	---	-----	---	Perv to Basin A
10	SCS Runoff	0.259	5	70	597	---	-----	---	Imp to Basin A
11	Combine	0.313	5	75	778	9, 10	-----	---	Combined to Basin A
12	Reservoir	0.123	5	100	773	11	82.14	399	Basin A Routing
13	Reservoir	0.809	5	115	11,431	8	74.61	7,932	Basin C Routing
14	Combine	1.066	5	110	14,198	5, 12, 13	-----	---	Combined to SP1

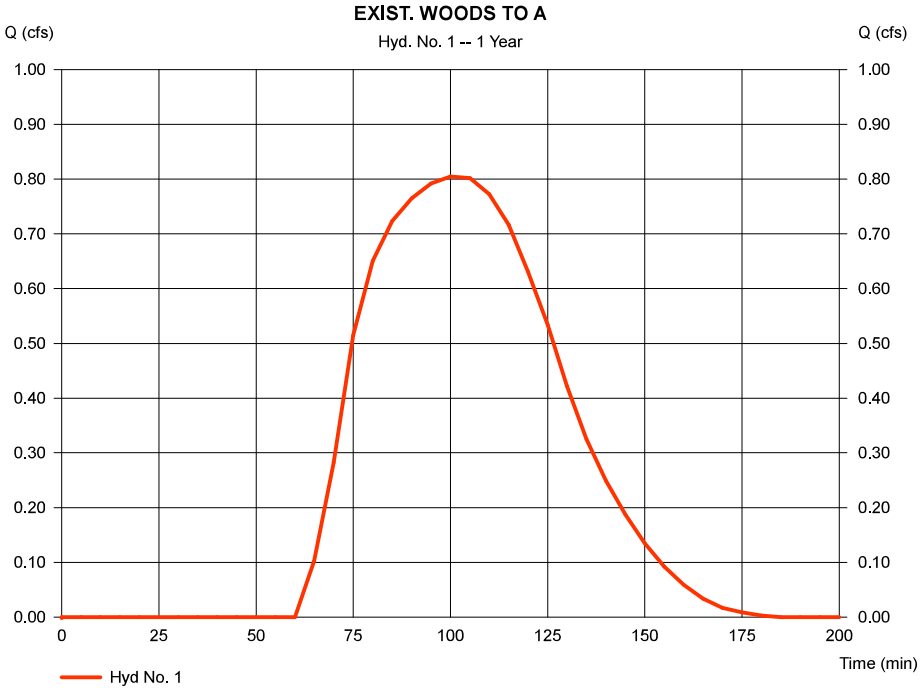
Hydrograph Report

Hyd. No. 1

EXIST. WOODS TO A

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.805 cfs
Storm frequency	=	1 yrs	Time to peak	=	100 min
Time interval	=	5 min	Hyd. volume	=	2,887 cuft
Drainage area	=	6.610 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	16.90 min
Total precip.	=	1.25 in	Distribution	=	Custom
Storm duration	=	Water Quality Storm.cds	Shape factor	=	285

* Composite (Area/CN) = [(2.200 x 77) + (4.400 x 30)] / 6.610



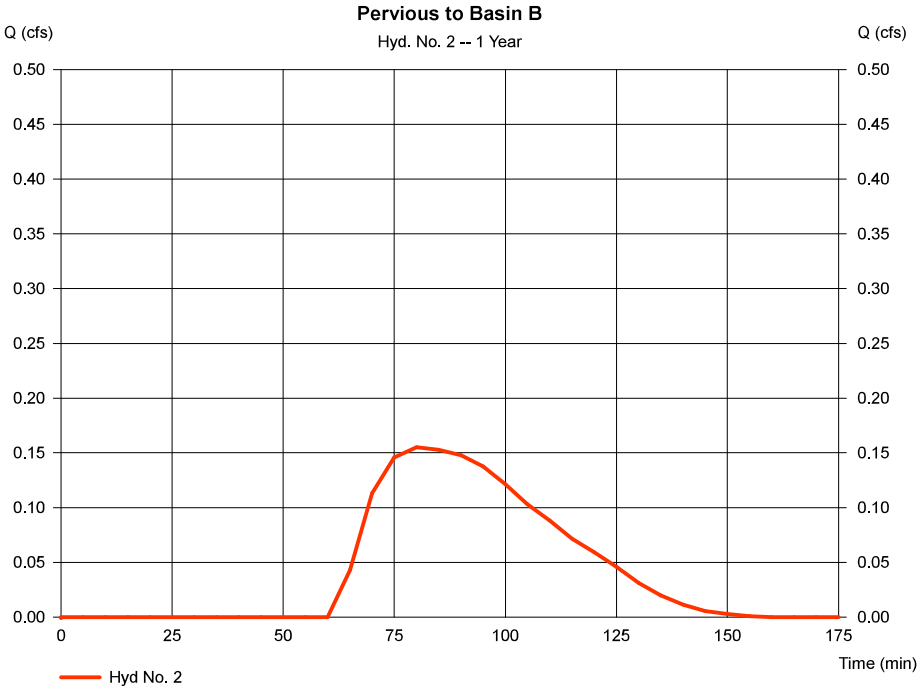
Hydrograph Report

Hyd. No. 2

Pervious to Basin B

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.155 cfs
Storm frequency	=	1 yrs	Time to peak	=	80 min
Time interval	=	5 min	Hyd. volume	=	437 cuft
Drainage area	=	0.810 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	10.00 min
Total precip.	=	1.25 in	Distribution	=	Custom
Storm duration	=	Water Quality Storm.cds	Shape factor	=	285

* Composite (Area/CN) = [(0.670 x 80) + (0.140 x 77)] / 0.810

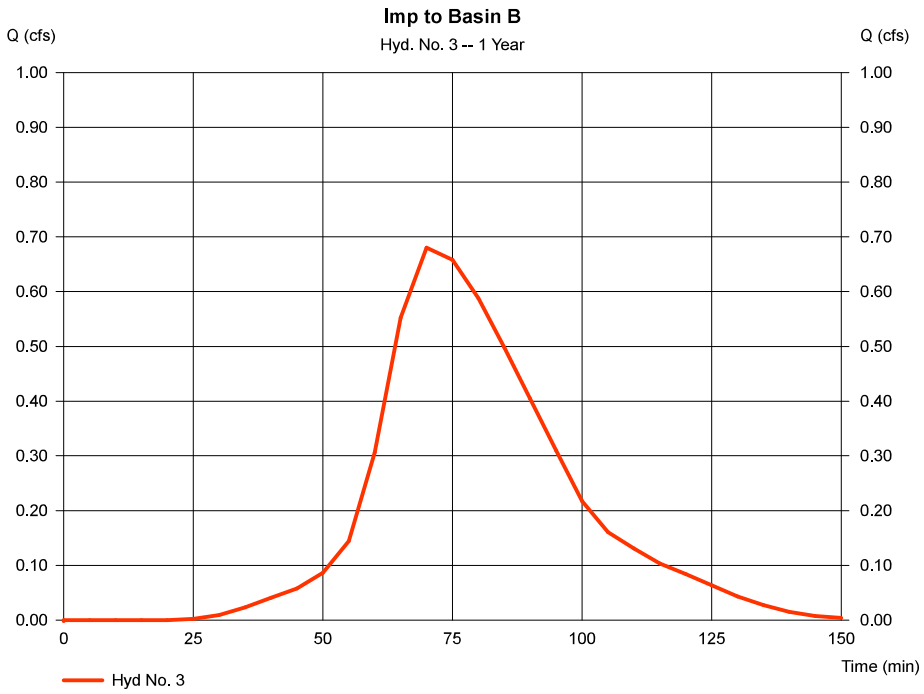


Hydrograph Report

Hyd. No. 3

Imp to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.680 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 1,567 cuft
Drainage area	= 0.420 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 285

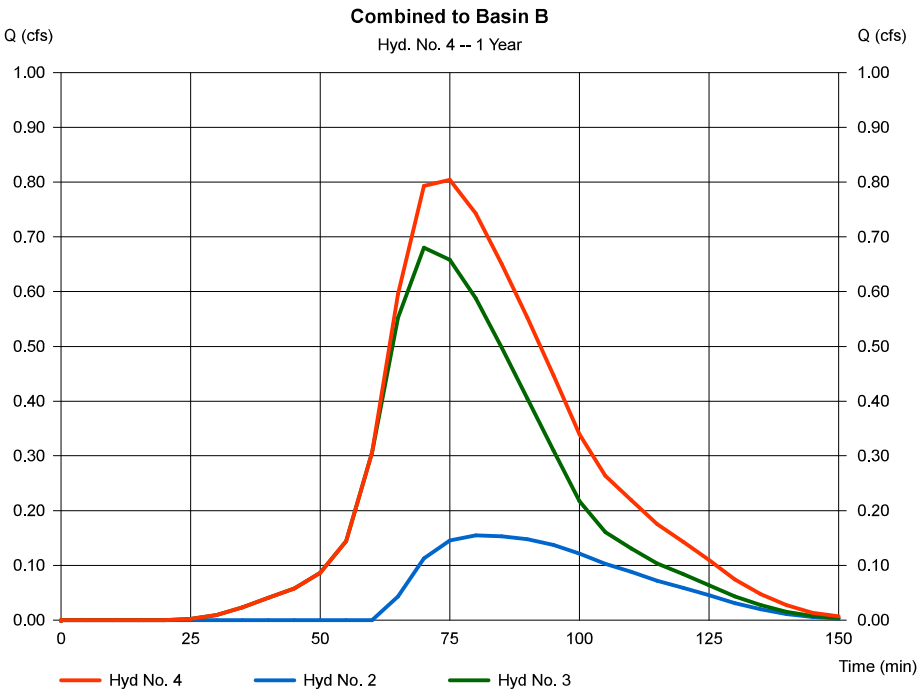


Hydrograph Report

Hyd. No. 4

Combined to Basin B

Hydrograph type	= Combine	Peak discharge	= 0.804 cfs
Storm frequency	= 1 yrs	Time to peak	= 75 min
Time interval	= 5 min	Hyd. volume	= 2,004 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 1.230 ac



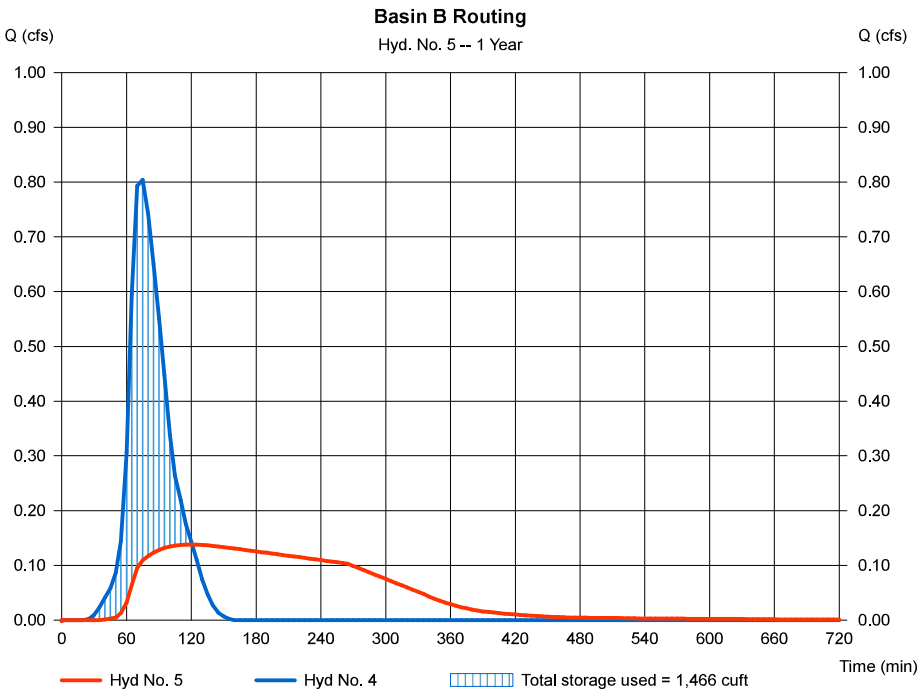
Hydrograph Report

Hyd. No. 5

Basin B Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.138 cfs
Storm frequency	= 1 yrs	Time to peak	= 120 min
Time interval	= 5 min	Hyd. volume	= 1,994 cuft
Inflow hyd. No.	= 4 - Combined to Basin B	Max. Elevation	= 81.81 ft
Reservoir name	= Basin B	Max. Storage	= 1,466 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Basin B

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 81.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	81.00	00	0	0
0.50	81.50	2,042	511	511
1.00	82.00	4,084	1,532	2,042
1.50	82.50	5,007	2,273	4,315
2.00	83.00	5,929	2,734	7,049
2.50	83.50	7,506	3,359	10,408
3.00	84.00	9,083	4,147	14,555
3.50	84.50	10,373	4,864	19,419
4.00	85.00	11,663	5,509	24,928

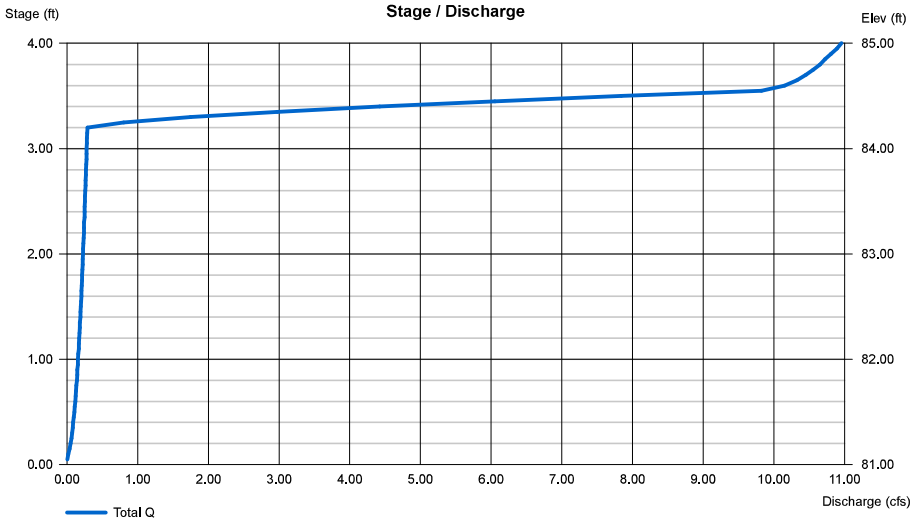
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.50	0.00	0.00
Span (in)	= 15.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 80.90	81.00	0.00	0.00
Length (ft)	= 72.00	0.50	0.00	0.00
Slope (%)	= 2.50	0.50	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	20.00	0.00	0.00
Crest El. (ft)	= 84.20	84.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	Yes	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



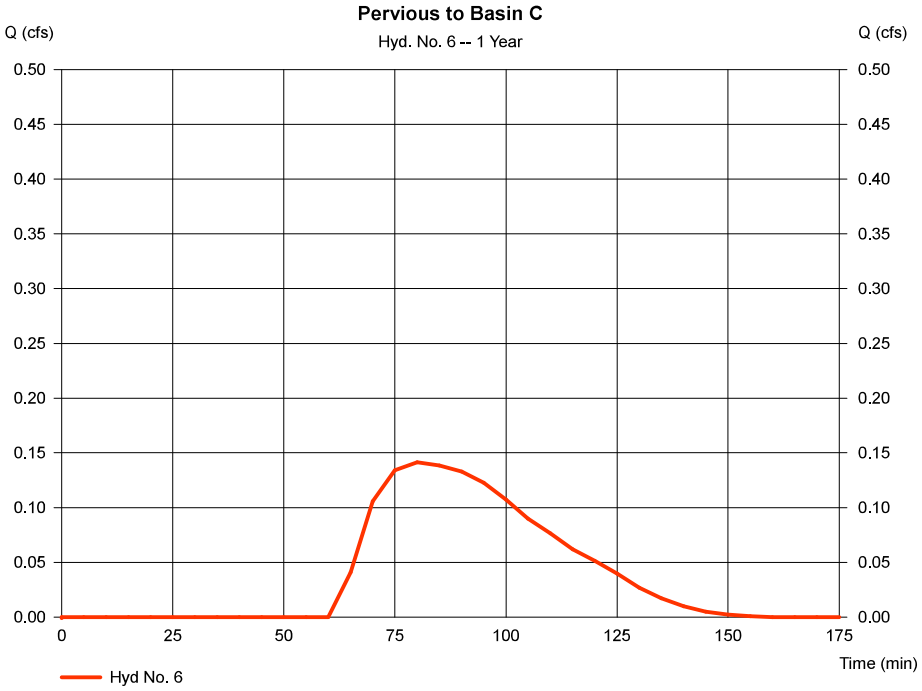
Hydrograph Report

Hyd. No. 6

Pervious to Basin C

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.142 cfs
Storm frequency	=	1 yrs	Time to peak	=	80 min
Time interval	=	5 min	Hyd. volume	=	392 cuft
Drainage area	=	0.650 ac	Curve number	=	80*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	10.00 min
Total precip.	=	1.25 in	Distribution	=	Custom
Storm duration	=	Water Quality Storm.cds	Shape factor	=	285

* Composite (Area/CN) = [(0.430 x 39) + (0.220 x 80)] / 0.650

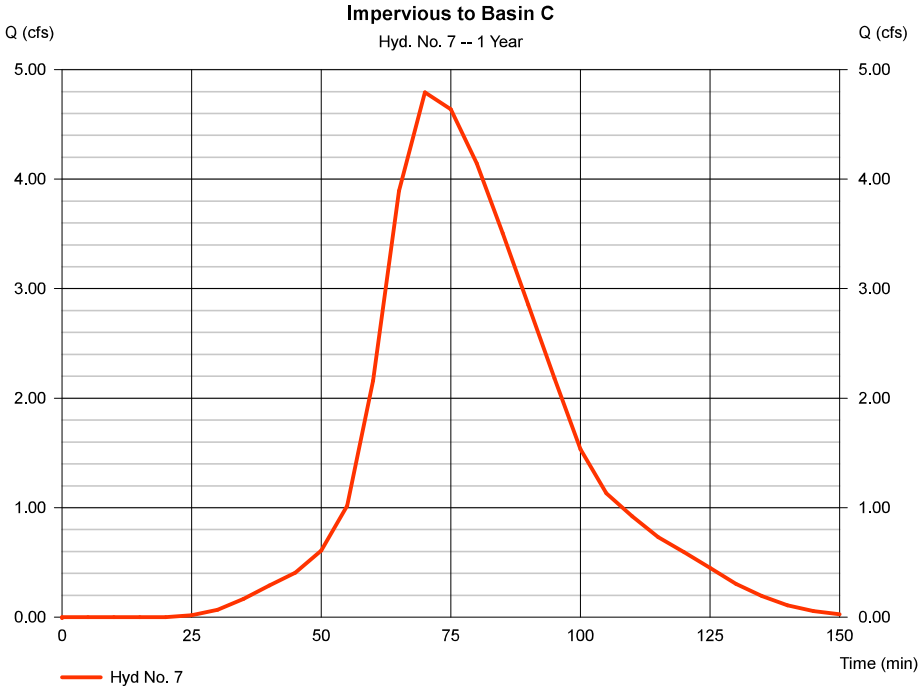


Hydrograph Report

Hyd. No. 7

Impervious to Basin C

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.793 cfs
Storm frequency	=	1 yrs	Time to peak	=	70 min
Time interval	=	5 min	Hyd. volume	=	11,042 cuft
Drainage area	=	2.960 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	10.00 min
Total precip.	=	1.25 in	Distribution	=	Custom
Storm duration	=	Water Quality Storm.cds	Shape factor	=	285

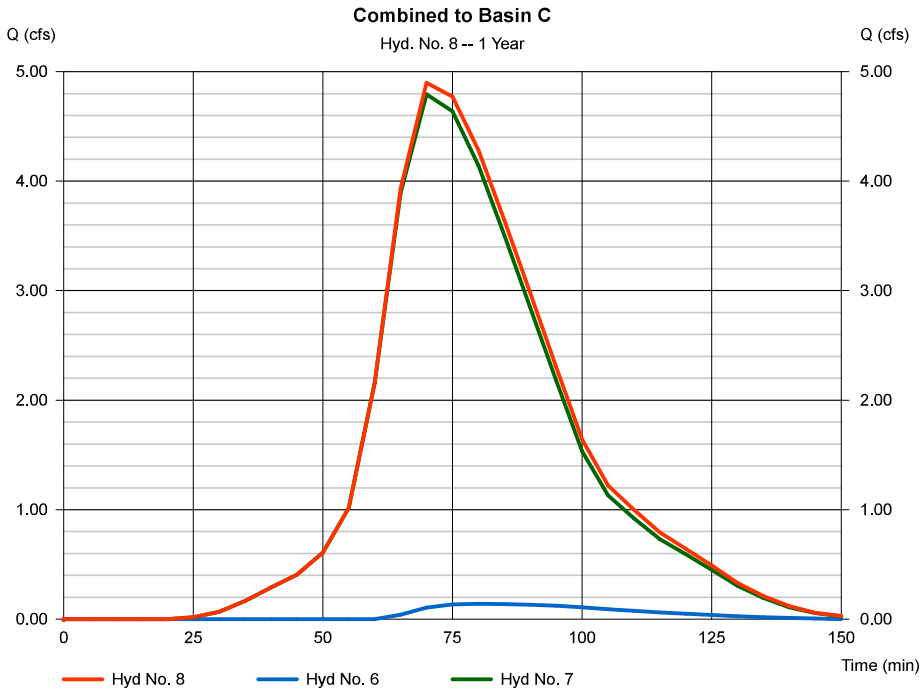


Hydrograph Report

Hyd. No. 8

Combined to Basin C

Hydrograph type	= Combine	Peak discharge	= 4.899 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 11,434 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 3.610 ac



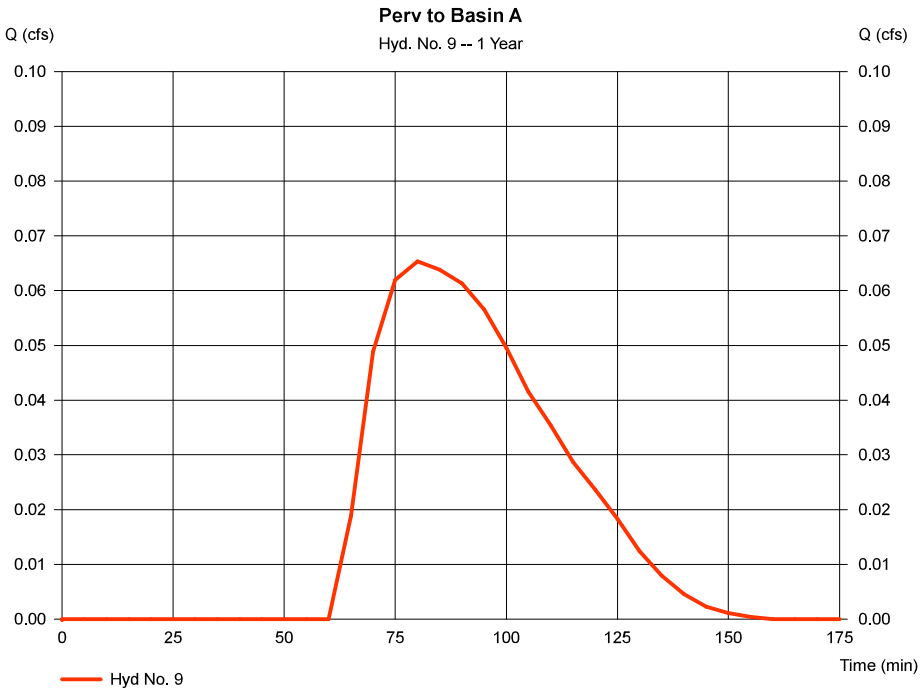
Hydrograph Report

Hyd. No. 9

Perv to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.065 cfs
Storm frequency	= 1 yrs	Time to peak	= 80 min
Time interval	= 5 min	Hyd. volume	= 181 cuft
Drainage area	= 0.300 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 285

* Composite (Area/CN) = [(0.200 x 39) + (0.100 x 80)] / 0.300

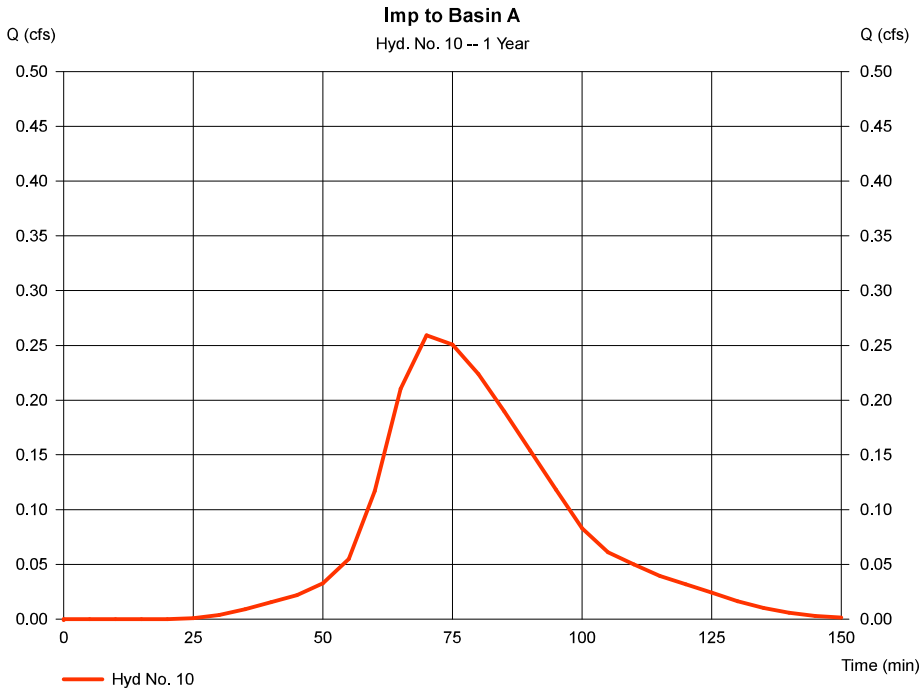


Hydrograph Report

Hyd. No. 10

Imp to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.259 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 597 cuft
Drainage area	= 0.160 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 285

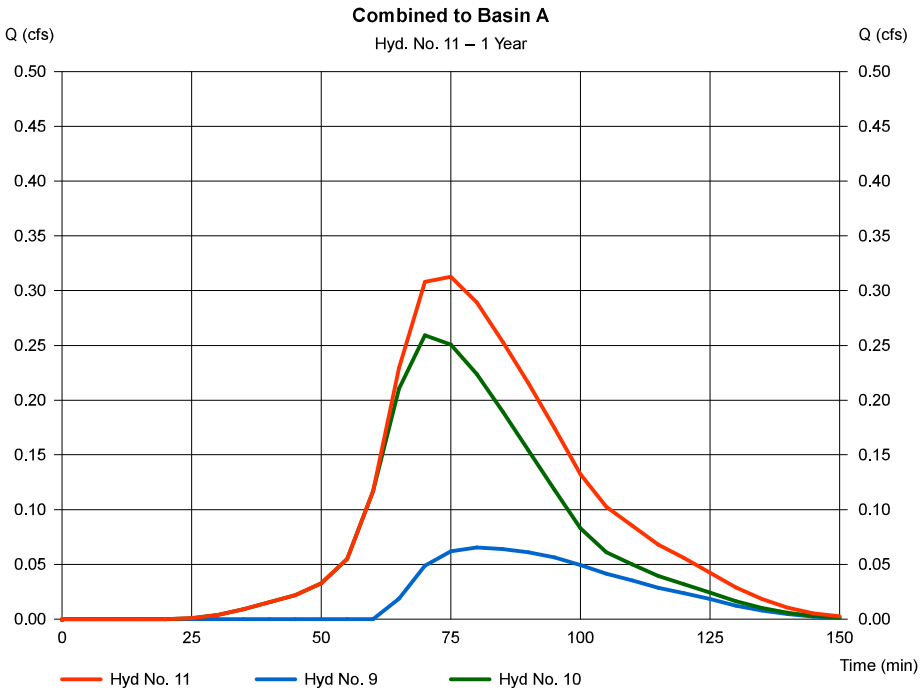


Hydrograph Report

Hyd. No. 11

Combined to Basin A

Hydrograph type	= Combine	Peak discharge	= 0.313 cfs
Storm frequency	= 1 yrs	Time to peak	= 75 min
Time interval	= 5 min	Hyd. volume	= 778 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 0.460 ac



Hydrograph Report

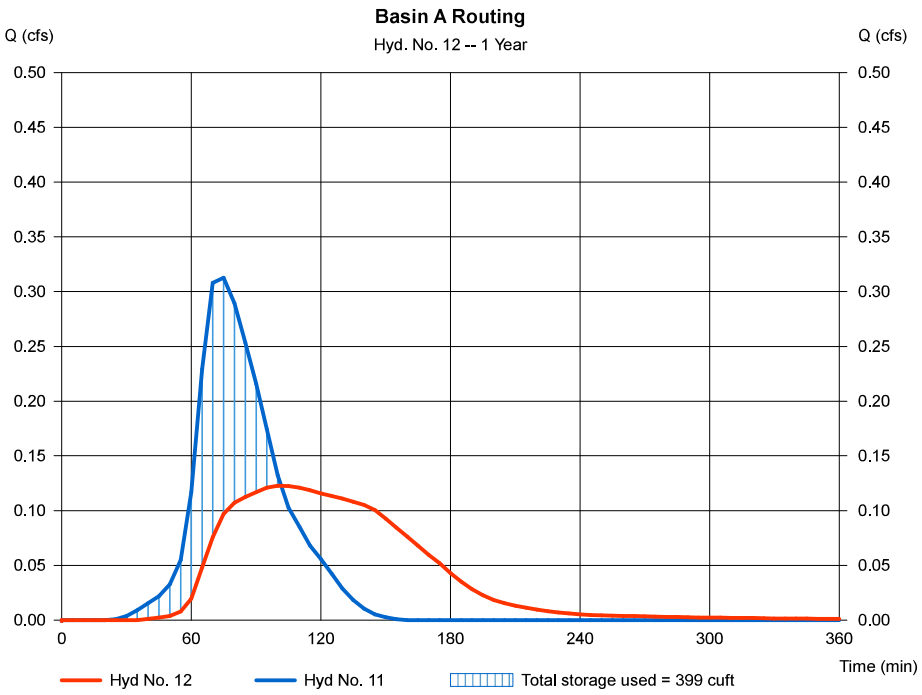
Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Hyd. No. 12

Basin A Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.123 cfs
Storm frequency	= 1 yrs	Time to peak	= 100 min
Time interval	= 5 min	Hyd. volume	= 773 cuft
Inflow hyd. No.	= 11 - Combined to Basin A	Max. Elevation	= 82.14 ft
Reservoir name	= Basin A	Max. Storage	= 399 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Pond No. 3 - Basin A

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 81.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	81.50	00	0	0
0.50	82.00	979	245	245
1.00	82.50	1,314	573	818
1.50	83.00	1,649	741	1,559
2.00	83.50	2,088	934	2,493
2.50	84.00	2,526	1,154	3,647
3.00	84.50	3,026	1,388	5,035

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.50	2.50	0.00
Span (in)	= 15.00	2.50	2.50	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 81.40	81.50	82.10	0.00
Length (ft)	= 45.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

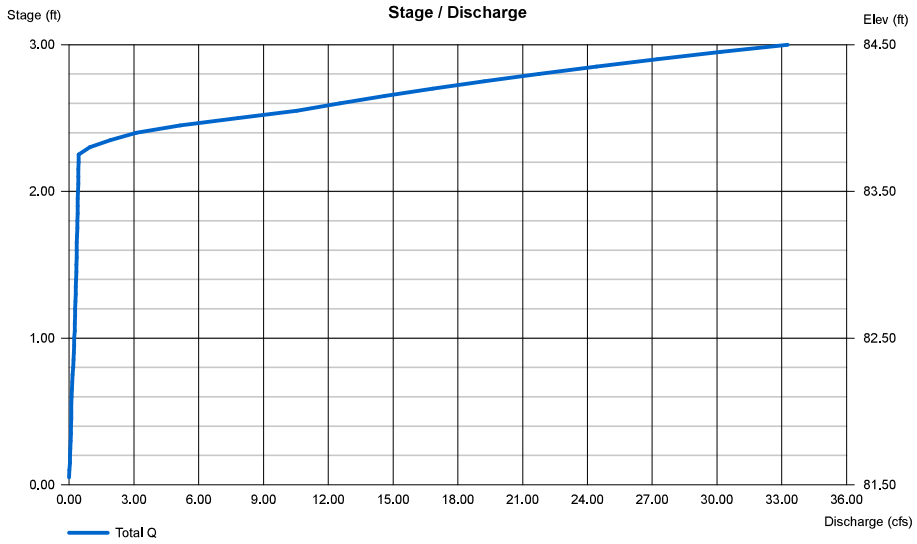
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	20.00	0.00	0.00
Crest El. (ft)	= 83.75	83.90	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

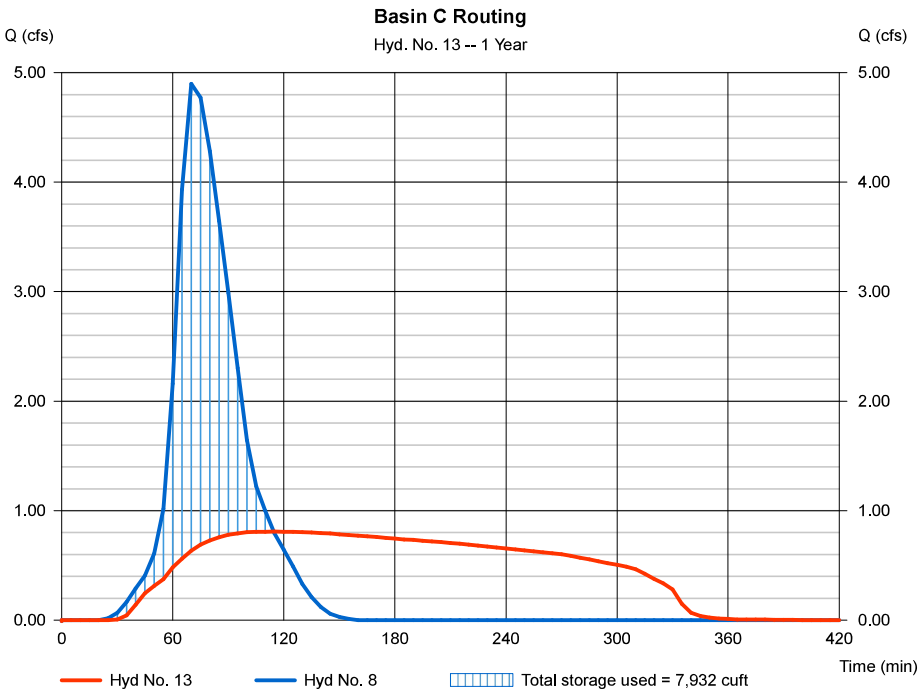
Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Hyd. No. 13

Basin C Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.809 cfs
Storm frequency	= 1 yrs	Time to peak	= 115 min
Time interval	= 5 min	Hyd. volume	= 11,431 cuft
Inflow hyd. No.	= 8 - Combined to Basin C	Max. Elevation	= 74.61 ft
Reservoir name	= Basin C	Max. Storage	= 7,932 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Pond No. 2 - Basin C

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 72.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	72.00	00	0	0
0.50	72.50	641	160	160
1.00	73.00	1,282	481	641
1.50	73.50	3,407	1,172	1,813
2.00	74.00	5,531	2,235	4,048
2.50	74.50	6,781	3,078	7,126
3.00	75.00	8,030	3,703	10,829
3.50	75.50	8,715	4,186	15,015
4.00	76.00	9,400	4,529	19,544
4.50	76.50	10,075	4,869	24,412
5.00	77.00	10,749	5,206	29,618
5.50	77.50	11,413	5,541	35,159

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	4.50	6.00	0.00
Span (in)	= 18.00	4.50	6.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 71.90	72.00	75.29	0.00
Length (ft)	= 42.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

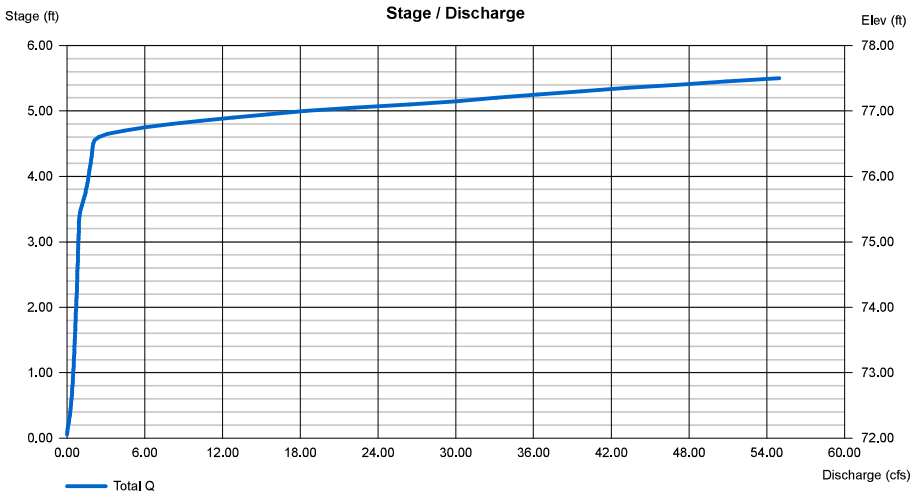
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	20.00	5.00	0.00
Crest El. (ft)	= 76.62	76.99	76.52	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	Rect	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

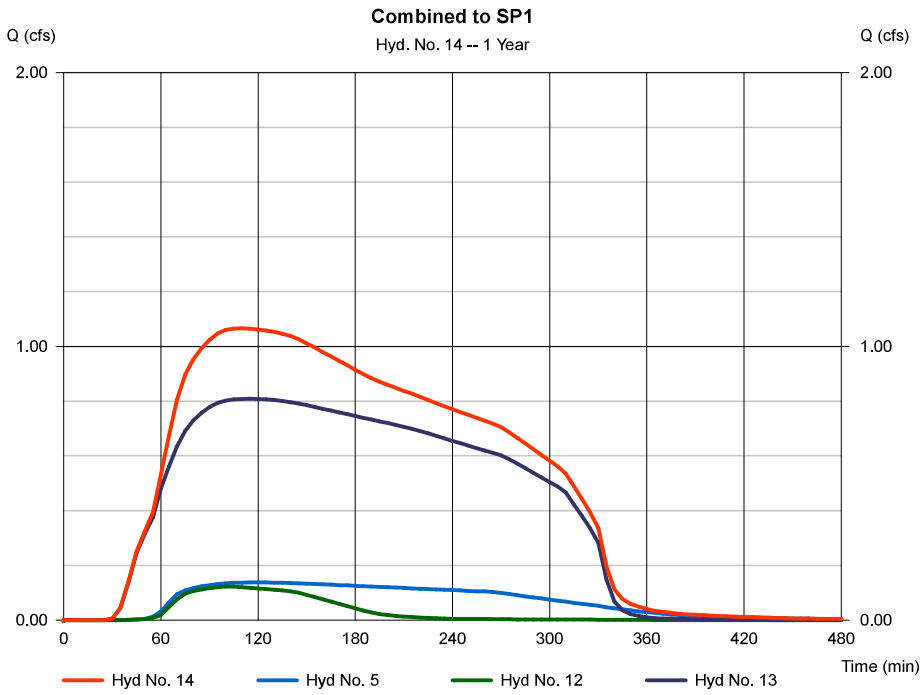


Hydrograph Report

Hyd. No. 14

Combined to SP1

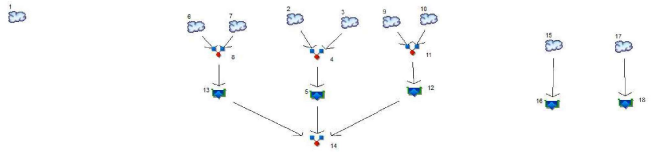
Hydrograph type	= Combine	Peak discharge	= 1.066 cfs
Storm frequency	= 1 yrs	Time to peak	= 110 min
Time interval	= 5 min	Hyd. volume	= 14,198 cuft
Inflow hyds.	= 5, 12, 13	Contrib. drain. area	= 0.000 ac



8. HYDROGRAPH SUMMARY REPORTS – EMERGENCY SPILLWAY

Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

Hyd.	Origin	Description
1	SCS Runoff	EXIST. WOODS TO A
2	SCS Runoff	Pervious to Basin B
3	SCS Runoff	Imp to Basin B
4	Combine	Combined to Basin B
5	Reservoir	Basin B Routing
6	SCS Runoff	Pervious to Basin C
7	SCS Runoff	Impervious to Basin C
8	Combine	Combined to Basin C
9	SCS Runoff	Perv to Basin A
10	SCS Runoff	Imp to Basin A
11	Combine	Combined to Basin A
12	Reservoir	Basin A Routing
13	Reservoir	Basin C Routing
14	Combine	Combined to SP1
15	SCS Runoff	150% Basin C
16	Reservoir	150% Basin C Routing
17	SCS Runoff	150% Basin B
18	Reservoir	150% Basin B Routing

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	23.17	5	740	151,891	---	-----	---	EXIST. WOODS TO A
2	SCS Runoff	3.518	5	730	18,666	---	-----	---	Pervious to Basin B
3	SCS Runoff	2.222	5	730	13,180	---	-----	---	Imp to Basin B
4	Combine	5.740	5	730	31,845	2, 3	-----	---	Combined to Basin B
5	Reservoir	2.743	5	760	15,344	4	84.36	17,971	Basin B Routing
6	SCS Runoff	2.871	5	730	15,266	---	-----	---	Pervious to Basin C
7	SCS Runoff	15.66	5	730	92,884	---	-----	---	Impervious to Basin C
8	Combine	18.53	5	730	108,150	6, 7	-----	---	Combined to Basin C
9	SCS Runoff	1.325	5	730	7,046	---	-----	---	Perv to Basin A
10	SCS Runoff	0.847	5	730	5,021	---	-----	---	Imp to Basin A
11	Combine	2.172	5	730	12,067	9, 10	-----	---	Combined to Basin A
12	Reservoir	2.172	5	735	8,997	11	83.88	3,366	Basin A Routing
13	Reservoir	18.44	5	735	82,695	8	77.09	30,533	Basin C Routing
14	Combine	20.61	5	735	107,035	5, 12, 13	-----	---	Combined to SP1
15	SCS Runoff	30.58	2	730	164,902	---	-----	---	150% Basin C
16	Reservoir	30.12	2	732	139,446	15	77.20	31,842	150% Basin C Routing
17	SCS Runoff	8.625	5	730	51,149	---	-----	---	150% Basin B
18	Reservoir	8.145	5	740	34,648	17	84.52	19,543	150% Basin B Routing

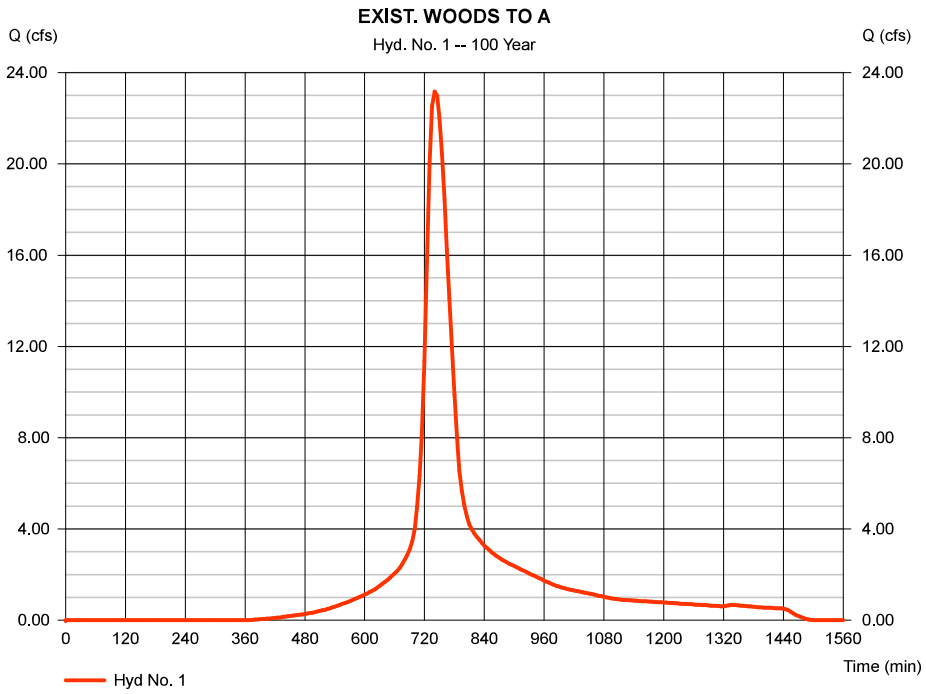
Hydrograph Report

Hyd. No. 1

EXIST. WOODS TO A

Hydrograph type	= SCS Runoff	Peak discharge	= 23.17 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 151,891 cuft
Drainage area	= 6.610 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 16.90 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(2.200 x 77) + (4.400 x 30)] / 6.610



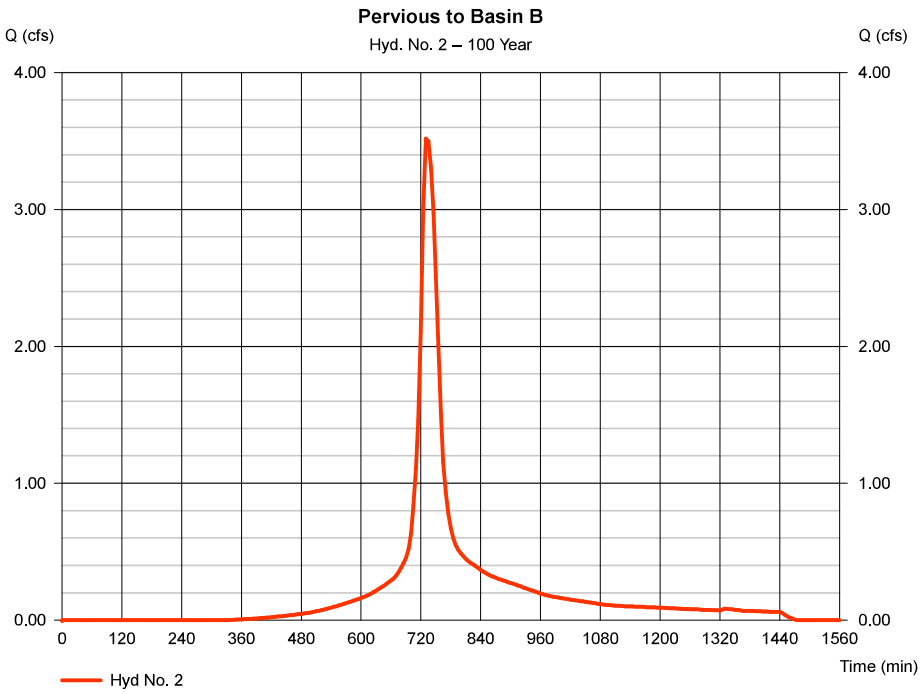
Hydrograph Report

Hyd. No. 2

Pervious to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 3.518 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 18,666 cuft
Drainage area	= 0.810 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.670 x 80) + (0.140 x 77)] / 0.810

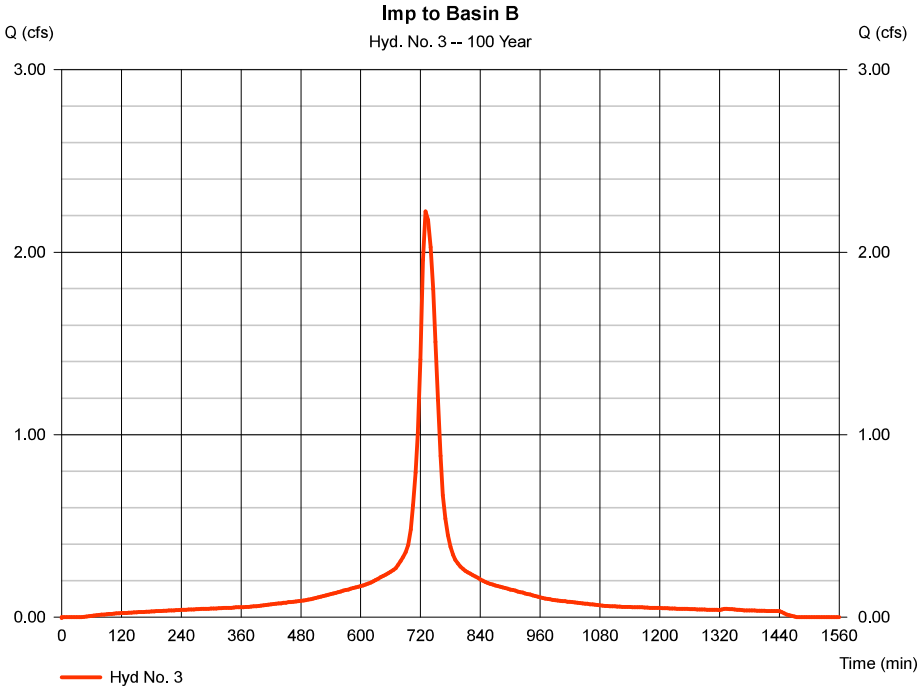


Hydrograph Report

Hyd. No. 3

Imp to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 2.222 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 13,180 cuft
Drainage area	= 0.420 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

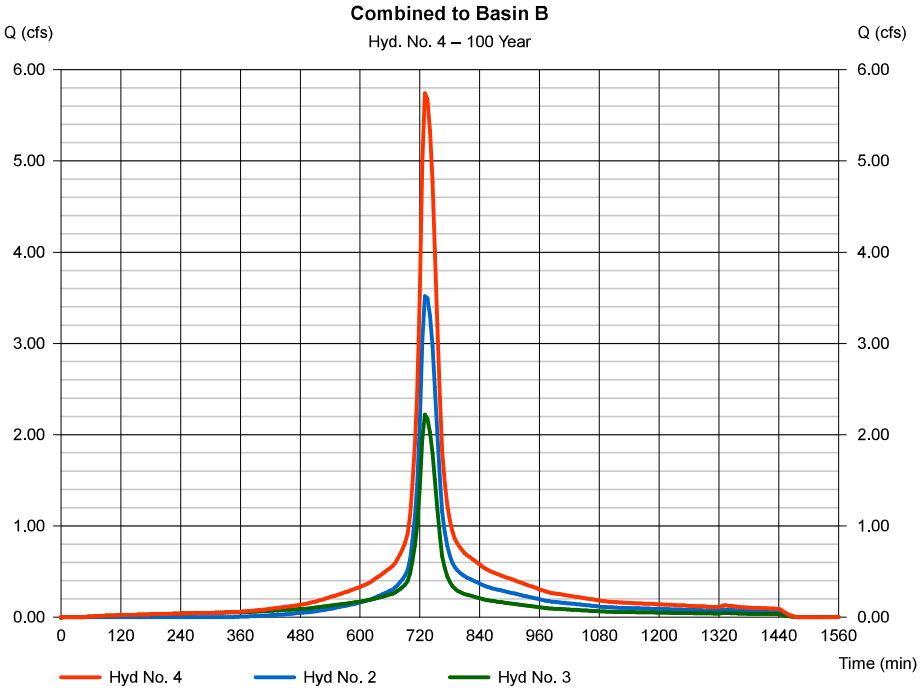


Hydrograph Report

Hyd. No. 4

Combined to Basin B

Hydrograph type	= Combine	Peak discharge	= 5.740 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 31,845 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 1.230 ac



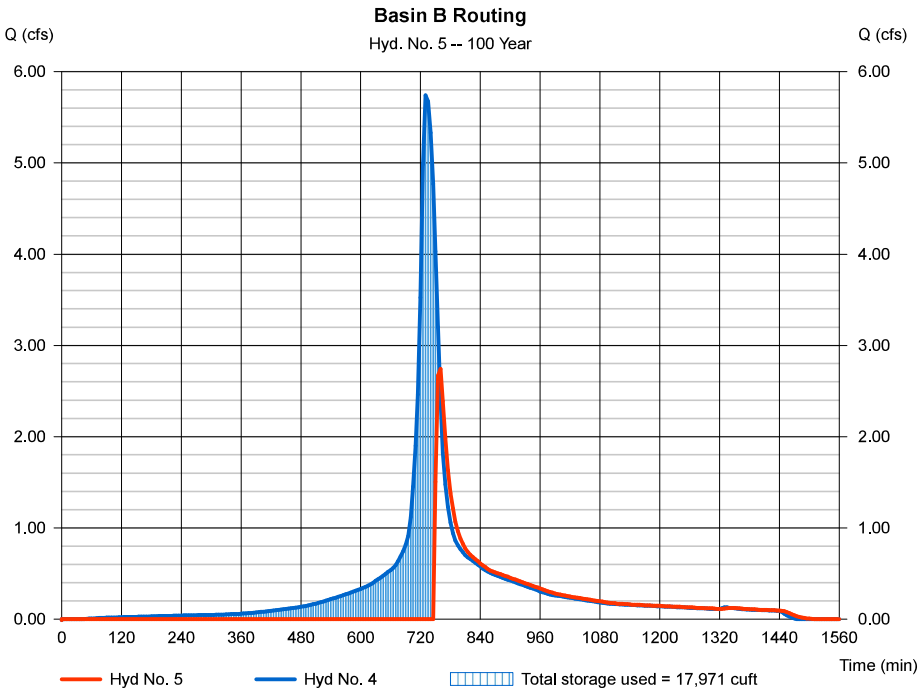
Hydrograph Report

Hyd. No. 5

Basin B Routing

Hydrograph type	= Reservoir	Peak discharge	= 2.743 cfs
Storm frequency	= 100 yrs	Time to peak	= 760 min
Time interval	= 5 min	Hyd. volume	= 15,344 cuft
Inflow hyd. No.	= 4 - Combined to Basin B	Max. Elevation	= 84.36 ft
Reservoir name	= Basin B	Max. Storage	= 17,971 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Basin B

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 81.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	81.00	00	0	0
0.50	81.50	2,042	511	511
1.00	82.00	4,084	1,532	2,042
1.50	82.50	5,007	2,273	4,315
2.00	83.00	5,929	2,734	7,049
2.50	83.50	7,506	3,359	10,408
3.00	84.00	9,083	4,147	14,555
3.50	84.50	10,373	4,864	19,419
4.00	85.00	11,663	5,509	24,928

Culvert / Orifice Structures

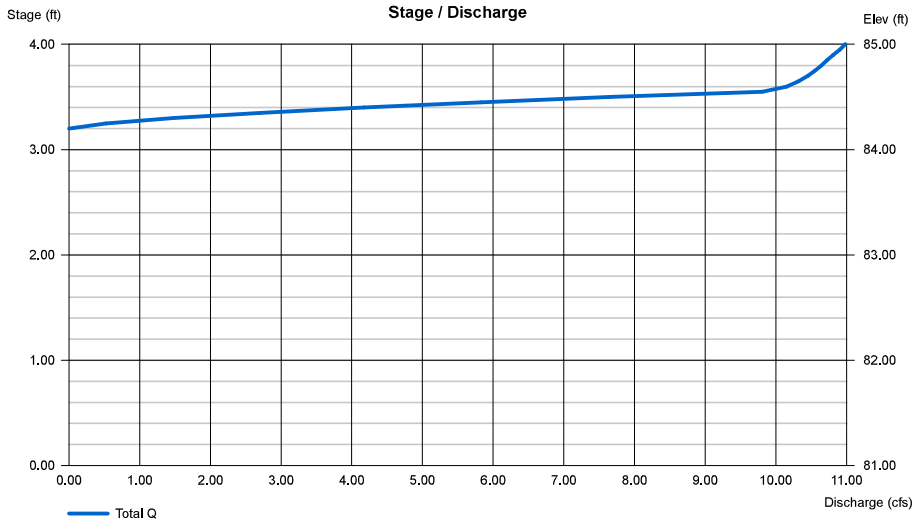
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	Inactive	0.00	0.00
Span (in)	= 15.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 80.90	81.00	0.00	0.00
Length (ft)	= 72.00	0.50	0.00	0.00
Slope (%)	= 2.50	0.50	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	20.00	0.00	0.00
Crest El. (ft)	= 84.20	84.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



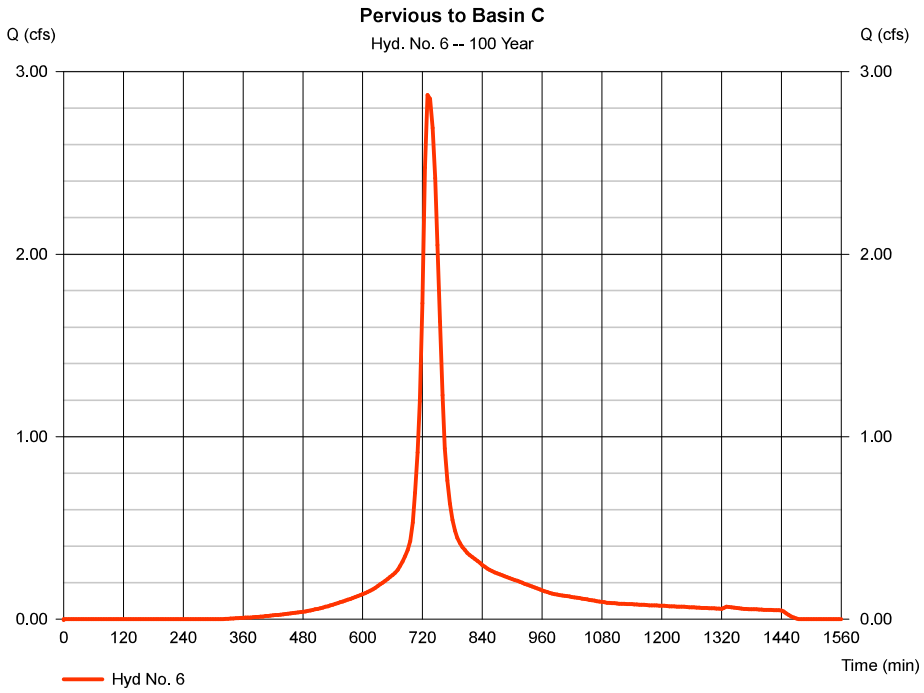
Hydrograph Report

Hyd. No. 6

Pervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 2.871 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 15,266 cuft
Drainage area	= 0.650 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.430 x 39) + (0.220 x 80)] / 0.650

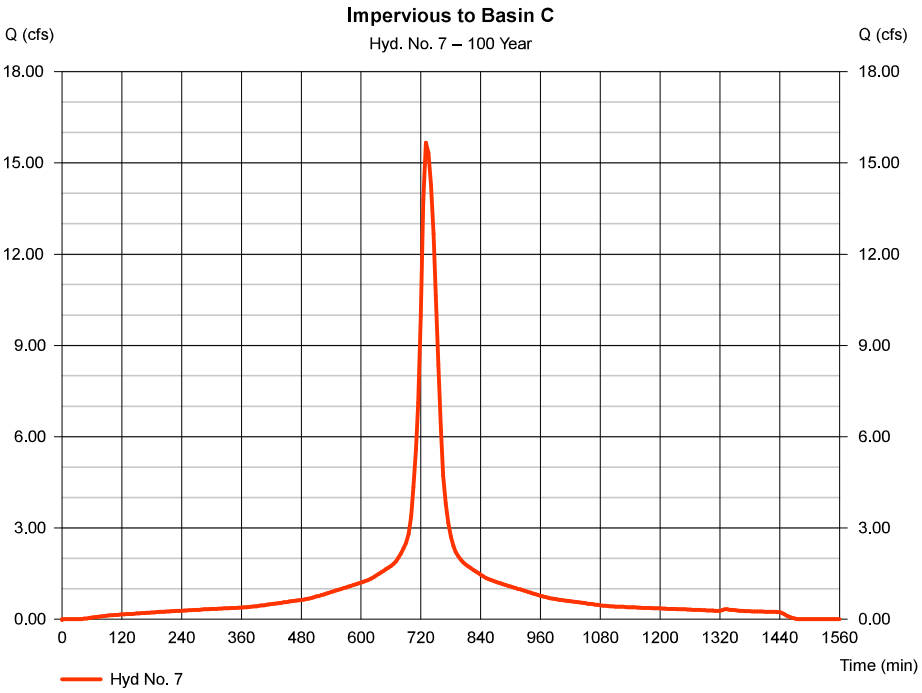


Hydrograph Report

Hyd. No. 7

Impervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 15.66 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 92,884 cuft
Drainage area	= 2.960 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

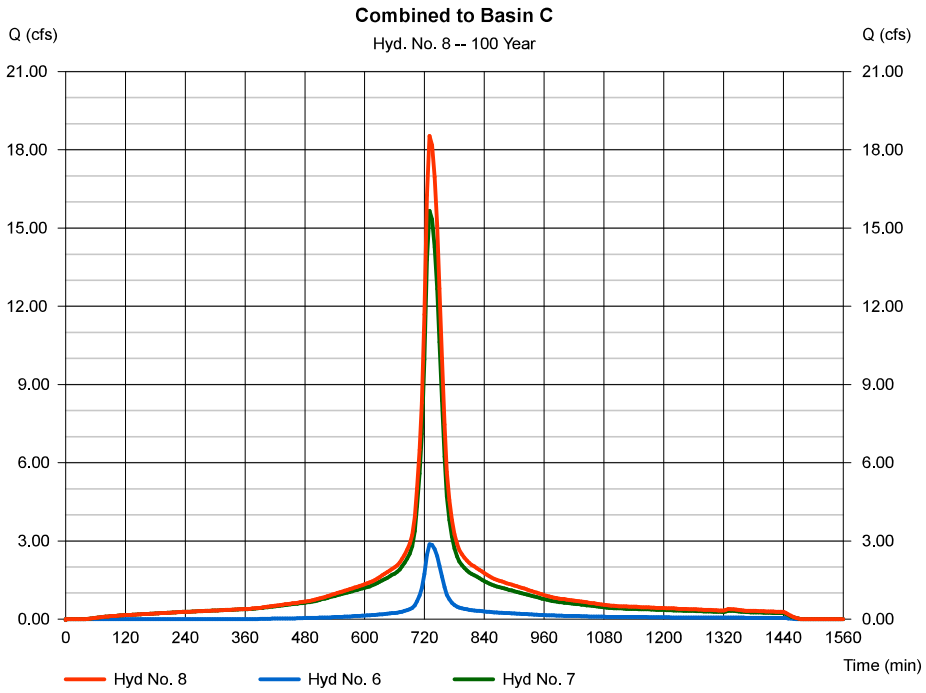


Hydrograph Report

Hyd. No. 8

Combined to Basin C

Hydrograph type	= Combine	Peak discharge	= 18.53 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 108,150 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 3.610 ac



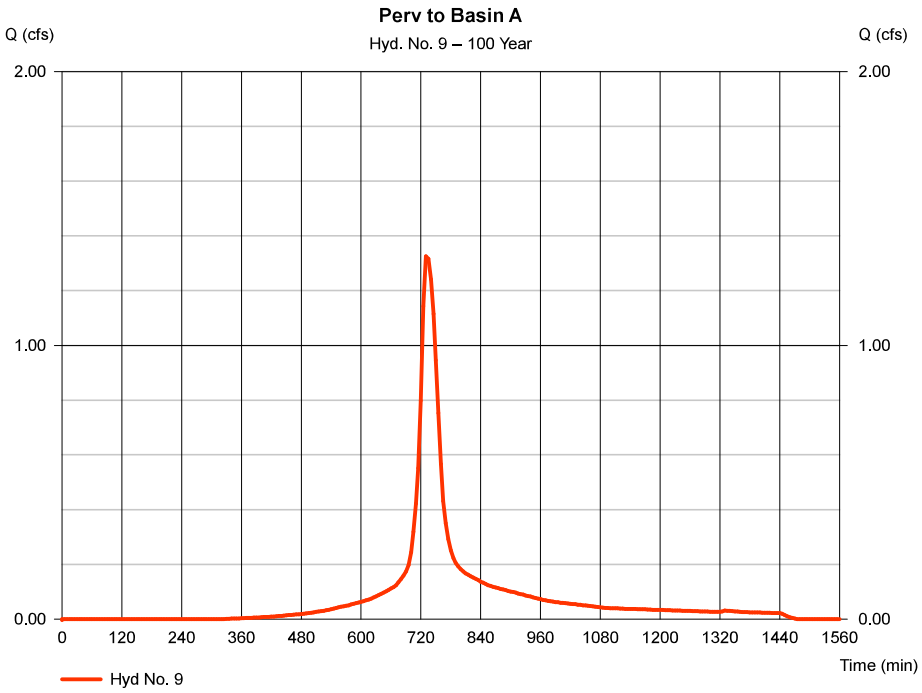
Hydrograph Report

Hyd. No. 9

Perv to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.325 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 7,046 cuft
Drainage area	= 0.300 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.200 x 39) + (0.100 x 80)] / 0.300

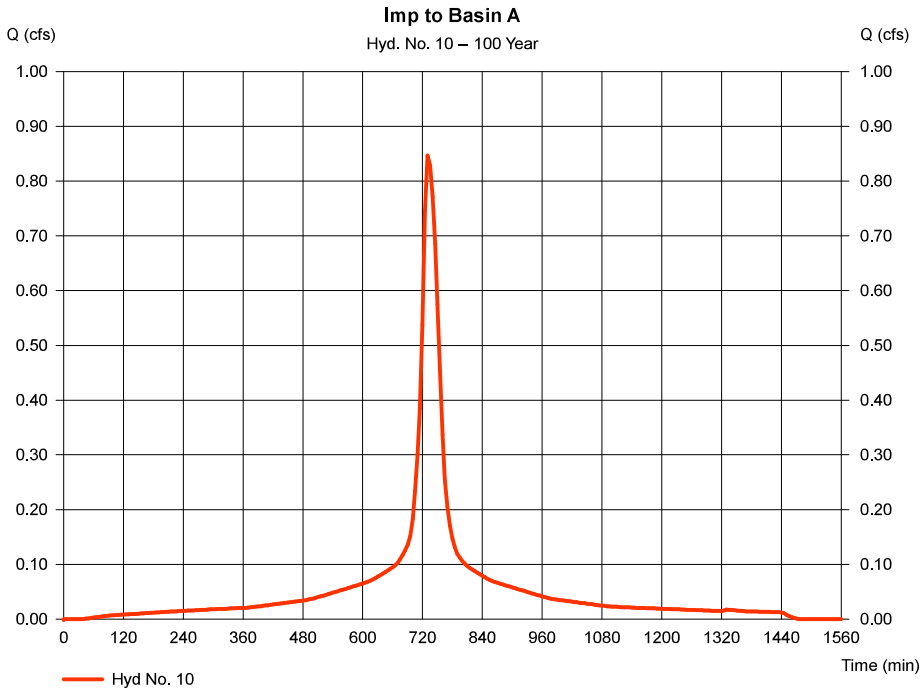


Hydrograph Report

Hyd. No. 10

Imp to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.847 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 5,021 cuft
Drainage area	= 0.160 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

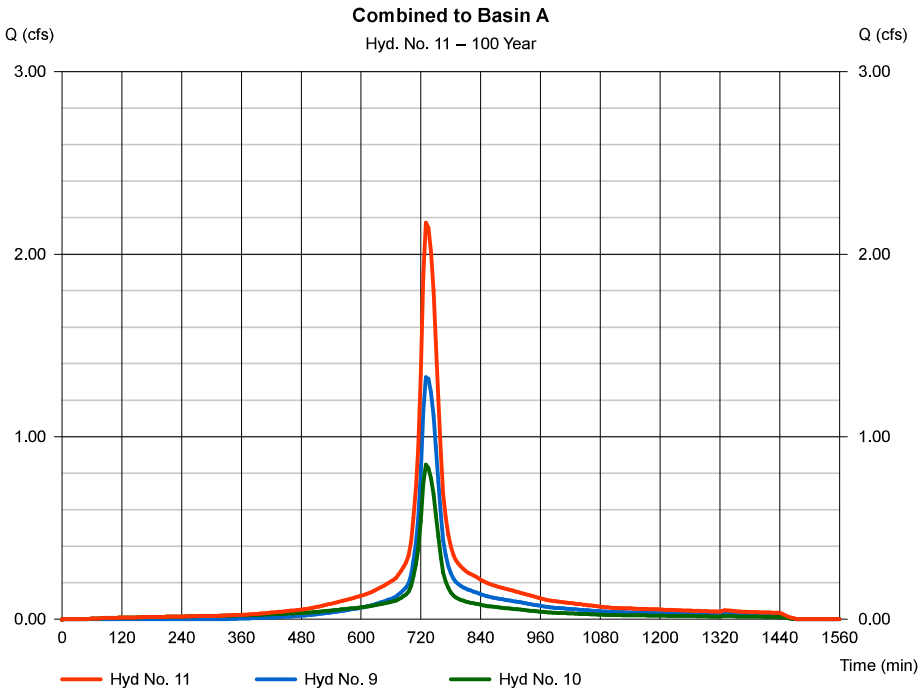


Hydrograph Report

Hyd. No. 11

Combined to Basin A

Hydrograph type	= Combine	Peak discharge	= 2.172 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 12,067 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 0.460 ac



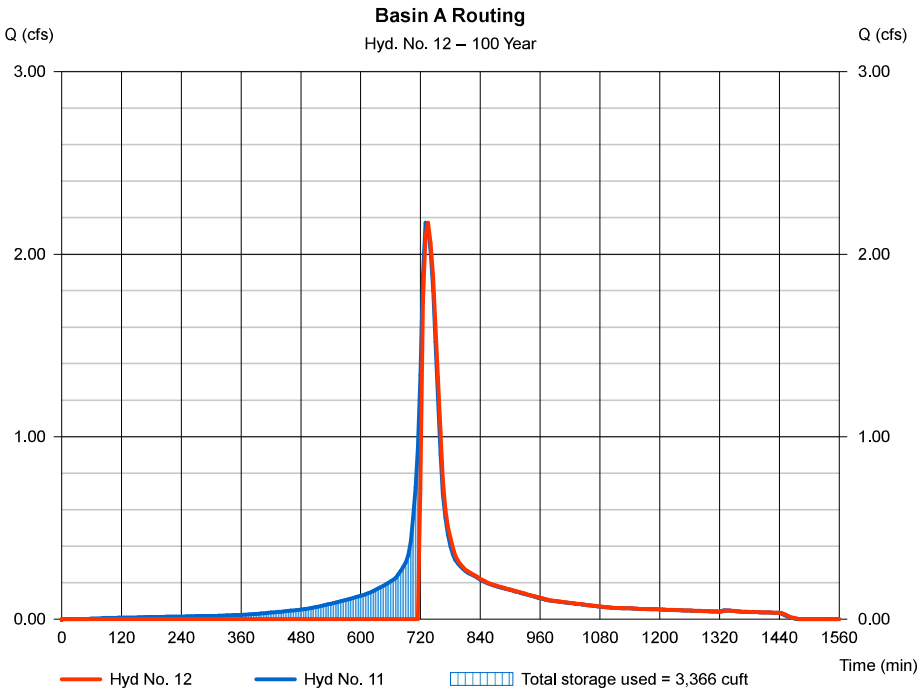
Hydrograph Report

Hyd. No. 12

Basin A Routing

Hydrograph type	= Reservoir	Peak discharge	= 2.172 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 8,997 cuft
Inflow hyd. No.	= 11 - Combined to Basin A	Max. Elevation	= 83.88 ft
Reservoir name	= Basin A	Max. Storage	= 3,366 cuft

Storage Indication method used.



Pond Report

Pond No. 3 - Basin A

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 81.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	81.50	00	0	0
0.50	82.00	979	245	245
1.00	82.50	1,314	573	818
1.50	83.00	1,649	741	1,559
2.00	83.50	2,088	934	2,493
2.50	84.00	2,526	1,154	3,647
3.00	84.50	3,026	1,388	5,035

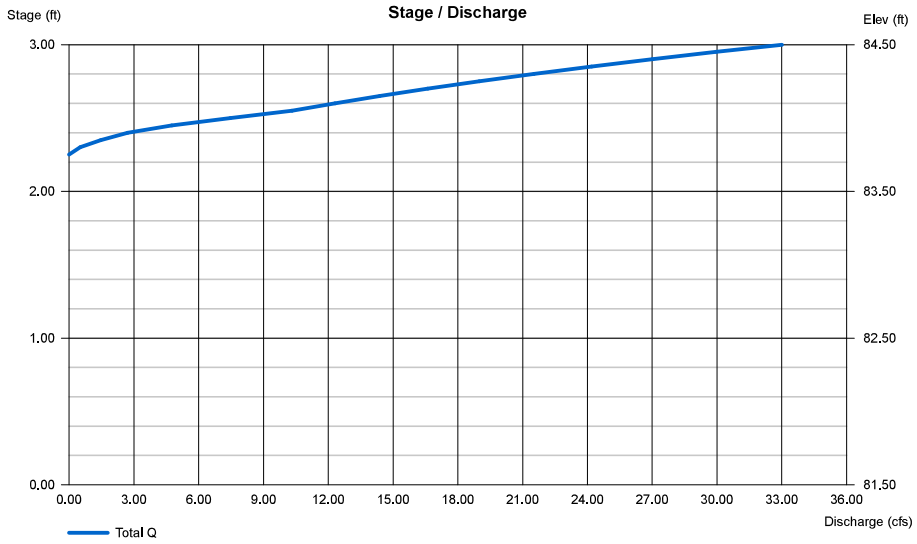
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	Inactive	Inactive	0.00
Span (in)	= 15.00	2.50	2.50	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 81.40	81.50	82.10	0.00
Length (ft)	= 45.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	20.00	0.00	0.00
Crest El. (ft)	= 83.75	83.90	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

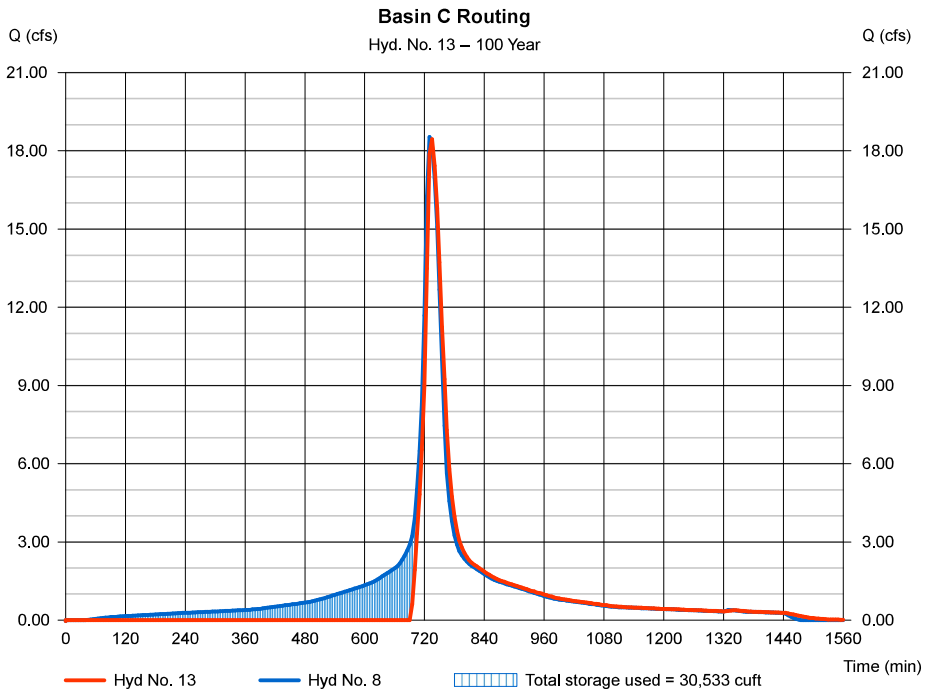
Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Hyd. No. 13

Basin C Routing

Hydrograph type	= Reservoir	Peak discharge	= 18.44 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 82,695 cuft
Inflow hyd. No.	= 8 - Combined to Basin C	Max. Elevation	= 77.09 ft
Reservoir name	= Basin C	Max. Storage	= 30,533 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Pond No. 2 - Basin C

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 72.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	72.00	00	0	0
0.50	72.50	641	160	160
1.00	73.00	1,282	481	641
1.50	73.50	3,407	1,172	1,813
2.00	74.00	5,531	2,235	4,048
2.50	74.50	6,781	3,078	7,126
3.00	75.00	8,030	3,703	10,829
3.50	75.50	8,715	4,186	15,015
4.00	76.00	9,400	4,529	19,544
4.50	76.50	10,075	4,869	24,412
5.00	77.00	10,749	5,206	29,618
5.50	77.50	11,413	5,541	35,159

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	Inactive	Inactive	0.00
Span (in)	= 18.00	4.50	6.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 71.90	72.00	75.29	0.00
Length (ft)	= 42.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

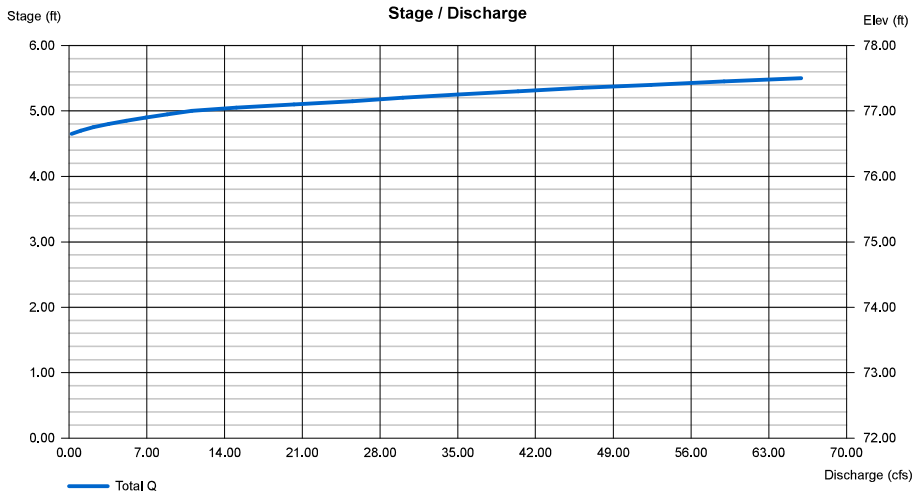
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	50.00	Inactive	0.00
Crest El. (ft)	= 76.62	76.99	76.52	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	Rect	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

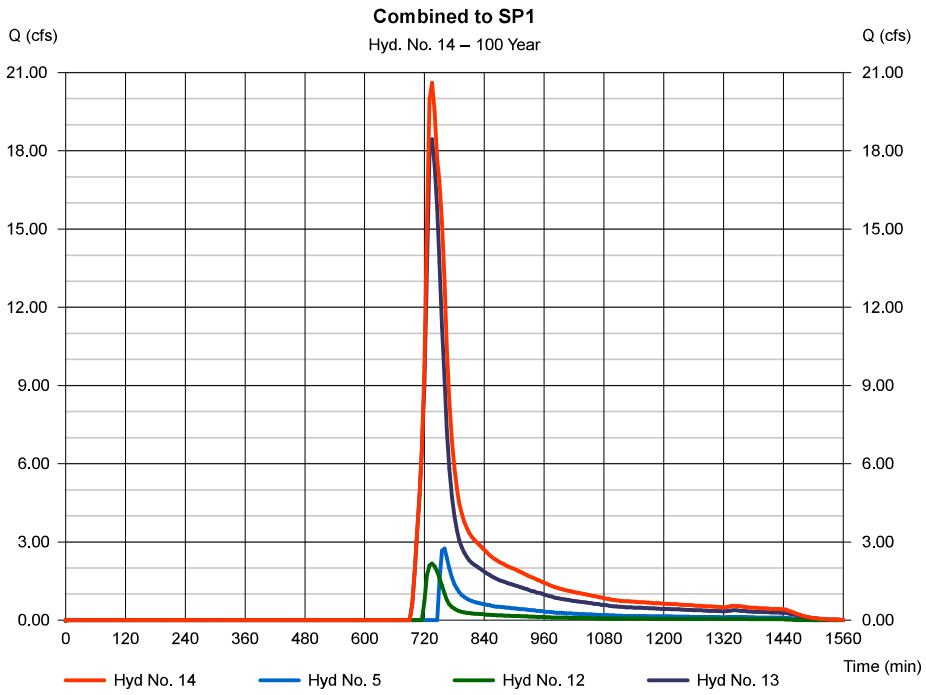


Hydrograph Report

Hyd. No. 14

Combined to SP1

Hydrograph type	= Combine	Peak discharge	= 20.61 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 107,035 cuft
Inflow hyds.	= 5, 12, 13	Contrib. drain. area	= 0.000 ac

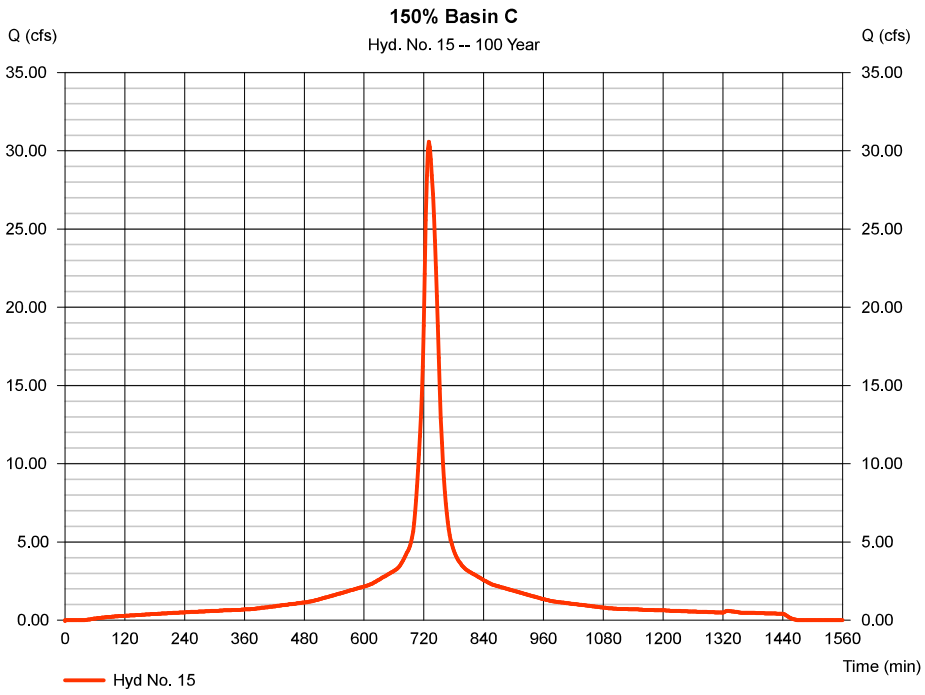


Hydrograph Report

Hyd. No. 15

150% Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 30.58 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 164,902 cuft
Drainage area	= 5.255 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285



Hydrograph Report

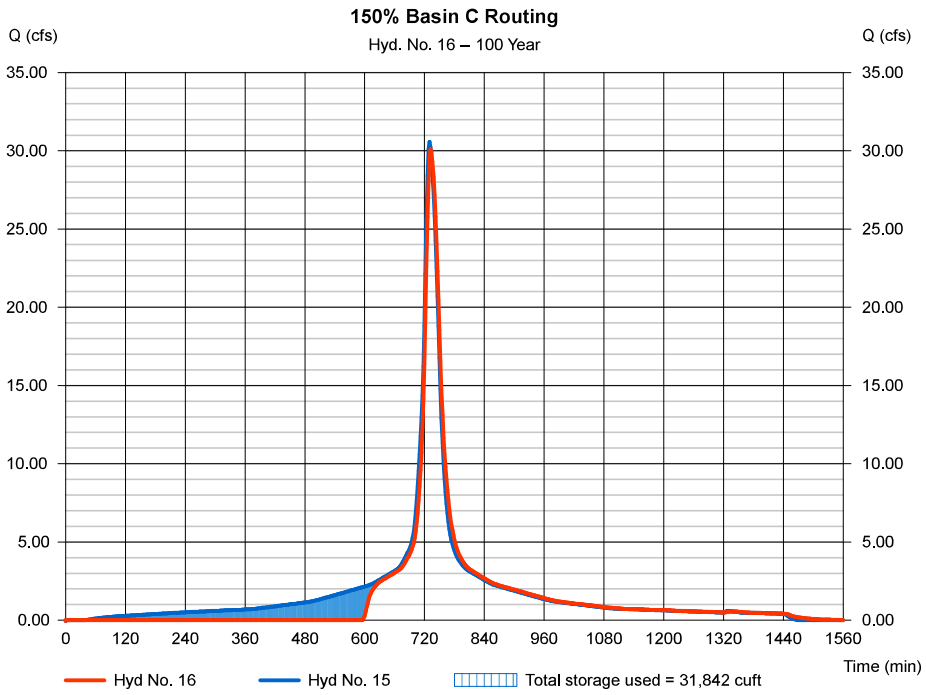
Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Hyd. No. 16

150% Basin C Routing

Hydrograph type	= Reservoir	Peak discharge	= 30.12 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 139,446 cuft
Inflow hyd. No.	= 15 - 150% Basin C	Max. Elevation	= 77.20 ft
Reservoir name	= Basin C	Max. Storage	= 31,842 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Pond No. 2 - Basin C

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 72.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	72.00	00	0	0
0.50	72.50	641	160	160
1.00	73.00	1,282	481	641
1.50	73.50	3,407	1,172	1,813
2.00	74.00	5,531	2,235	4,048
2.50	74.50	6,781	3,078	7,126
3.00	75.00	8,030	3,703	10,829
3.50	75.50	8,715	4,186	15,015
4.00	76.00	9,400	4,529	19,544
4.50	76.50	10,075	4,869	24,412
5.00	77.00	10,749	5,206	29,618
5.50	77.50	11,413	5,541	35,159

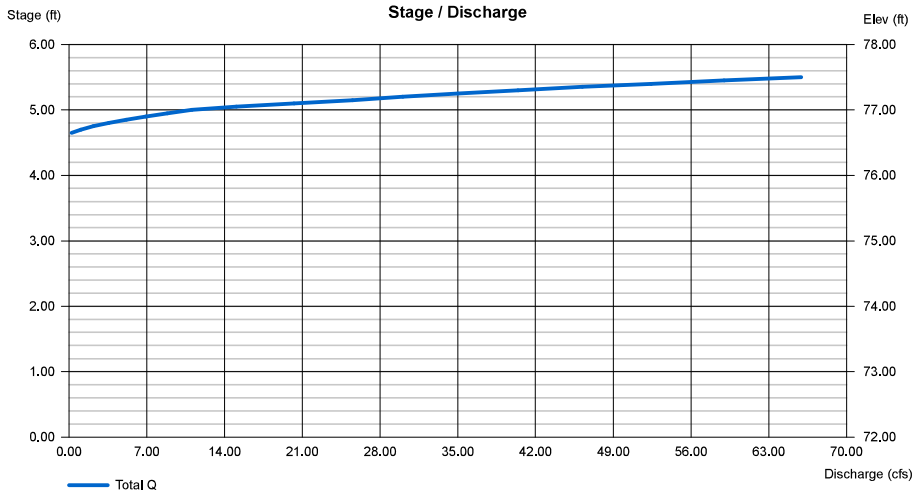
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	Inactive	Inactive	0.00
Span (in)	= 18.00	4.50	6.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 71.90	72.00	75.29	0.00
Length (ft)	= 42.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	50.00	Inactive	0.00
Crest El. (ft)	= 76.62	76.99	76.52	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	Rect	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

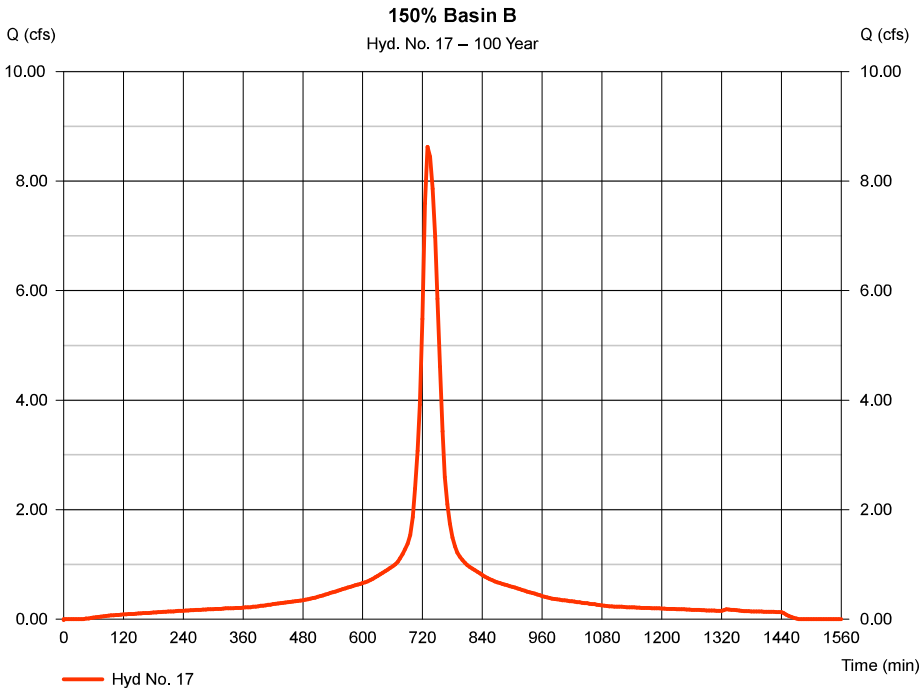


Hydrograph Report

Hyd. No. 17

150% Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 8.625 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 51,149 cuft
Drainage area	= 1.630 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285



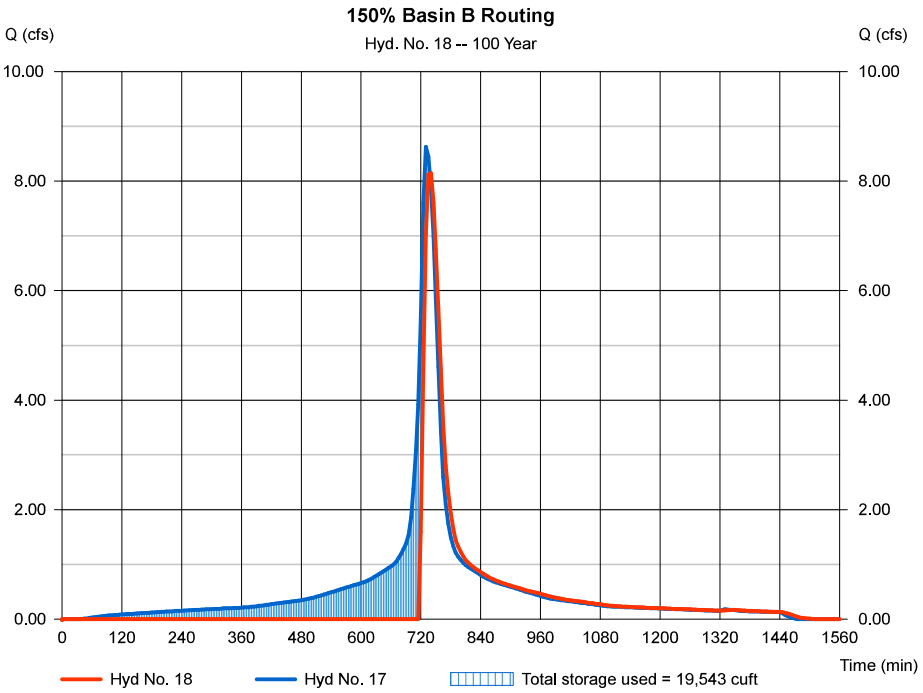
Hydrograph Report

Hyd. No. 18

150% Basin B Routing

Hydrograph type	= Reservoir	Peak discharge	= 8.145 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 34,648 cuft
Inflow hyd. No.	= 17 - 150% Basin B	Max. Elevation	= 84.52 ft
Reservoir name	= Basin B	Max. Storage	= 19,543 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Pond No. 1 - Basin B

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 81.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	81.00	00	0	0
0.50	81.50	2,042	511	511
1.00	82.00	4,084	1,532	2,042
1.50	82.50	5,007	2,273	4,315
2.00	83.00	5,929	2,734	7,049
2.50	83.50	7,506	3,359	10,408
3.00	84.00	9,083	4,147	14,555
3.50	84.50	10,373	4,864	19,419
4.00	85.00	11,663	5,509	24,928

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	Inactive	0.00	0.00
Span (in)	= 15.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 80.90	81.00	0.00	0.00
Length (ft)	= 72.00	0.50	0.00	0.00
Slope (%)	= 2.50	0.50	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

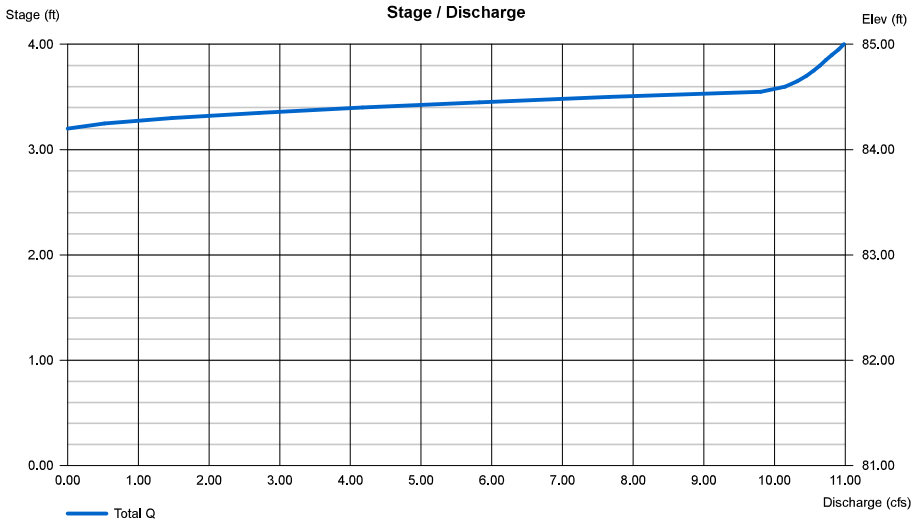
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	20.00	0.00	0.00
Crest El. (ft)	= 84.20	84.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

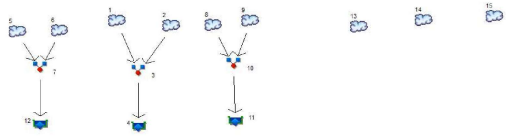
Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



9. HYDROGRAPH SUMMARY REPORTS – STABILITY ANALYSIS

Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

Hyd.	Origin	Description
1	SCS Runoff	Pervious to Basin B
2	SCS Runoff	Imp to Basin B
3	Combine	Combined to Basin B
4	Reservoir	Basin B Routing
5	SCS Runoff	Pervious to Basin C
6	SCS Runoff	Impervious to Basin C
7	Combine	Combined to Basin C
8	SCS Runoff	Perv to Basin A
9	SCS Runoff	Imp to Basin A
10	Combine	Combined to Basin A
11	Reservoir	Basin A Routing
12	Reservoir	Basin C Routing
13	SCS Runoff	EXISTING STABILITY POINT A
14	SCS Runoff	EXISTING STABILITY POINT B
15	SCS Runoff	EXISTING STABILITY POINT C

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.809	5	735	4,305	---	-----	---	Pervious to Basin B
2	SCS Runoff	0.830	5	730	4,767	---	-----	---	Imp to Basin B
3	Combine	1.623	5	735	9,072	1, 2	-----	---	Combined to Basin B
4	Reservoir	0.193	5	830	9,062	3	82.49	4,281	Basin B Routing
5	SCS Runoff	0.682	5	735	3,615	---	-----	---	Pervious to Basin C
6	SCS Runoff	5.850	5	730	33,598	---	-----	---	Impervious to Basin C
7	Combine	6.515	5	730	37,213	5, 6	-----	---	Combined to Basin C
8	SCS Runoff	0.315	5	735	1,668	---	-----	---	Perv to Basin A
9	SCS Runoff	0.316	5	730	1,816	---	-----	---	Imp to Basin A
10	Combine	0.625	5	735	3,484	8, 9	-----	---	Combined to Basin A
11	Reservoir	0.270	5	760	3,479	10	82.61	986	Basin A Routing
12	Reservoir	1.063	5	785	37,211	7	75.50	14,973	Basin C Routing
13	SCS Runoff	0.558	5	735	3,001	---	-----	---	EXISTING STABILITY POINT A
14	SCS Runoff	0.216	5	735	1,162	---	-----	---	EXISTING STABILITY POINT B
15	SCS Runoff	1.061	5	735	5,712	---	-----	---	EXISTING STABILITY POINT C

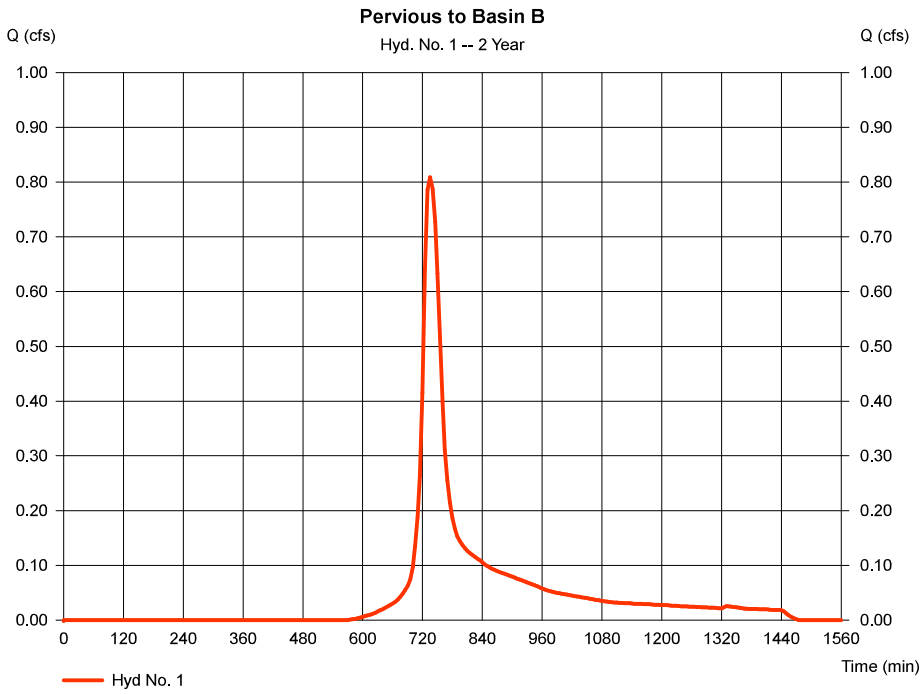
Hydrograph Report

Hyd. No. 1

Pervious to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.809 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 4,305 cuft
Drainage area	= 0.810 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.670 x 80) + (0.140 x 77)] / 0.810

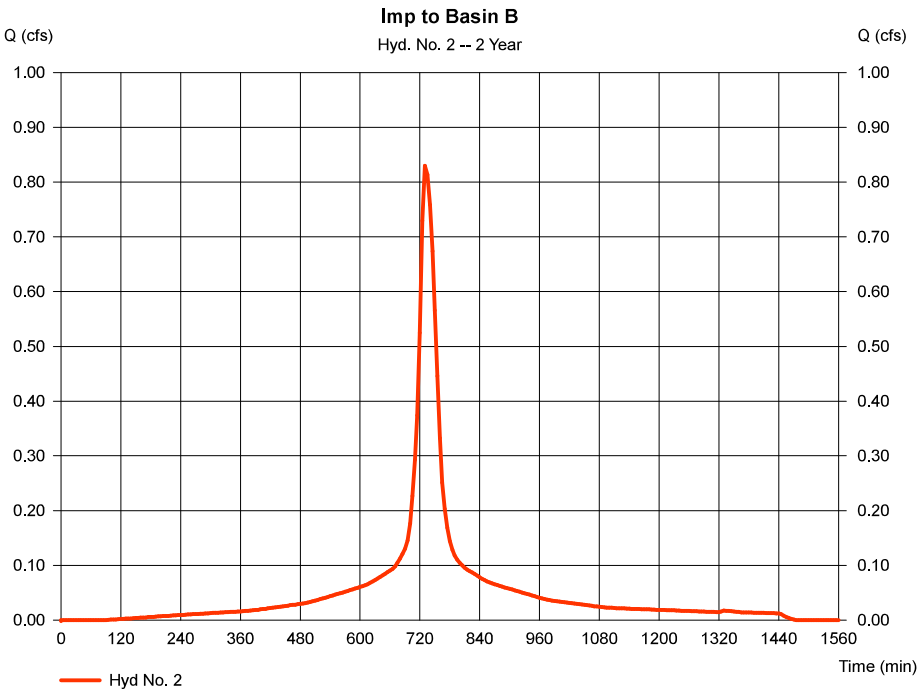


Hydrograph Report

Hyd. No. 2

Imp to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.830 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 4,767 cuft
Drainage area	= 0.420 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

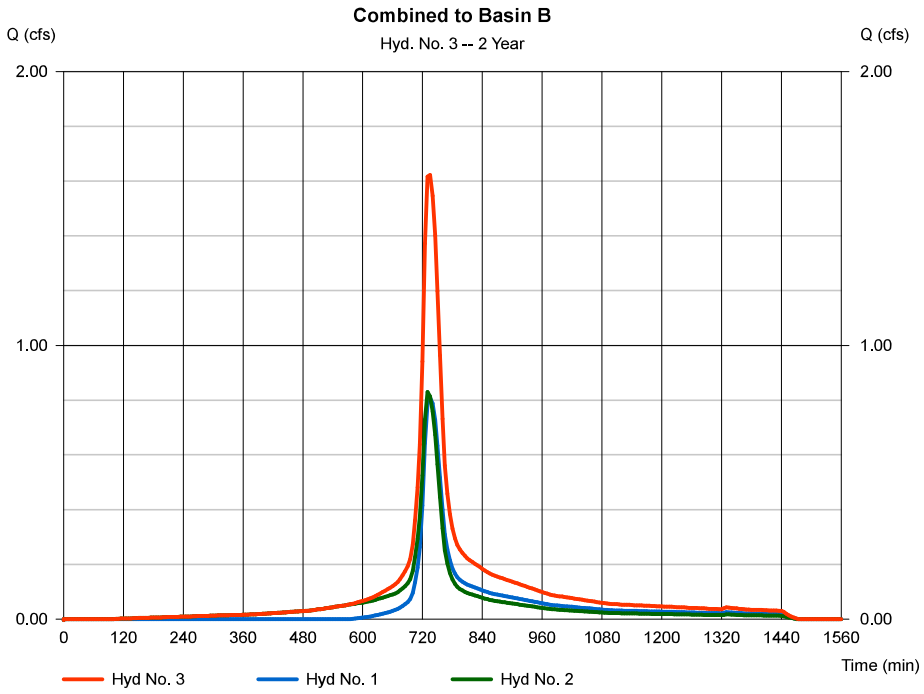


Hydrograph Report

Hyd. No. 3

Combined to Basin B

Hydrograph type	= Combine	Peak discharge	= 1.623 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 9,072 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.230 ac



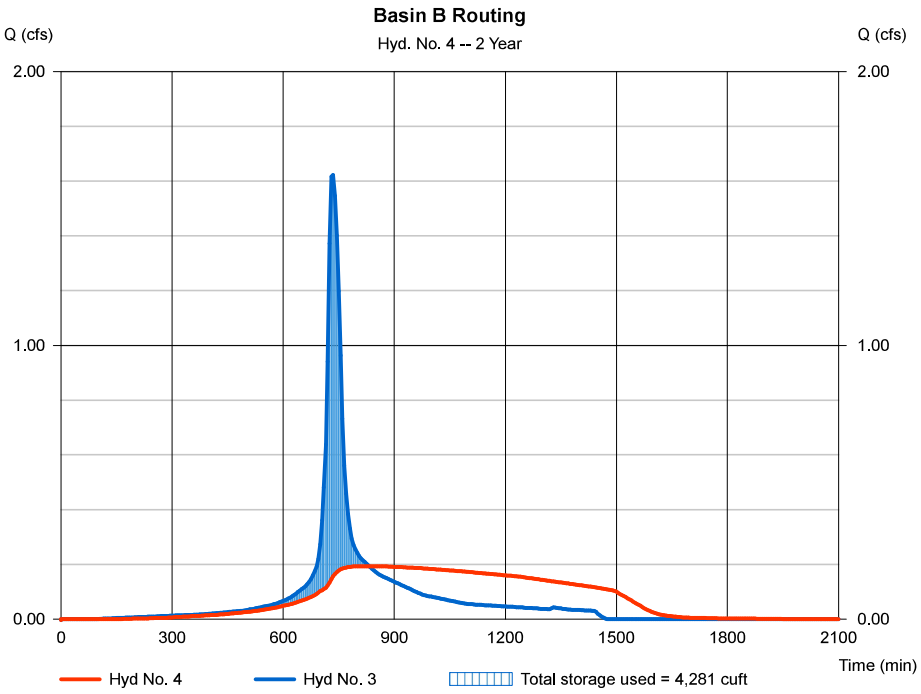
Hydrograph Report

Hyd. No. 4

Basin B Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.193 cfs
Storm frequency	= 2 yrs	Time to peak	= 830 min
Time interval	= 5 min	Hyd. volume	= 9,062 cuft
Inflow hyd. No.	= 3 - Combined to Basin B	Max. Elevation	= 82.49 ft
Reservoir name	= Basin B	Max. Storage	= 4,281 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Pond No. 1 - Basin B

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 81.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	81.00	00	0	0
0.50	81.50	2,042	511	511
1.00	82.00	4,084	1,532	2,042
1.50	82.50	5,007	2,273	4,315
2.00	83.00	5,929	2,734	7,049
2.50	83.50	7,506	3,359	10,408
3.00	84.00	9,083	4,147	14,555
3.50	84.50	10,373	4,864	19,419
4.00	85.00	11,663	5,509	24,928

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.50	0.00	0.00
Span (in)	= 15.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 80.90	81.00	0.00	0.00
Length (ft)	= 72.00	0.50	0.00	0.00
Slope (%)	= 2.50	0.50	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

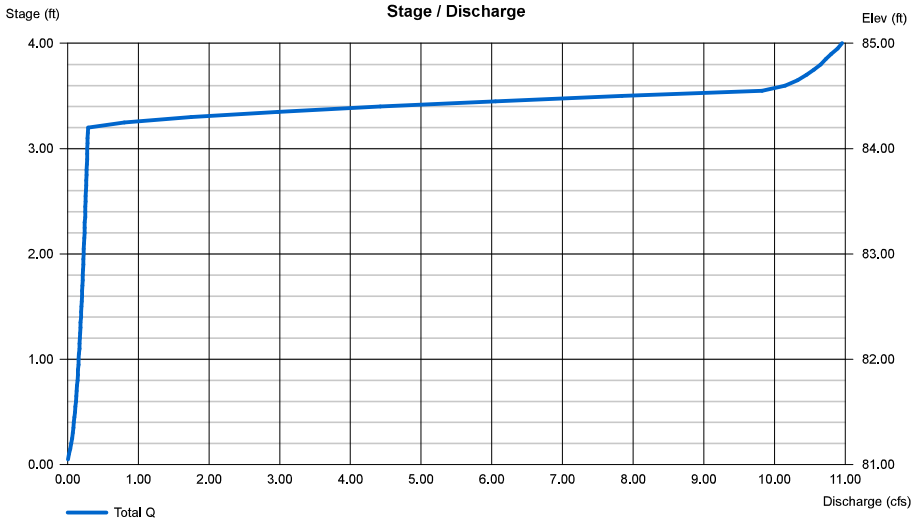
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	20.00	0.00	0.00
Crest El. (ft)	= 84.20	84.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

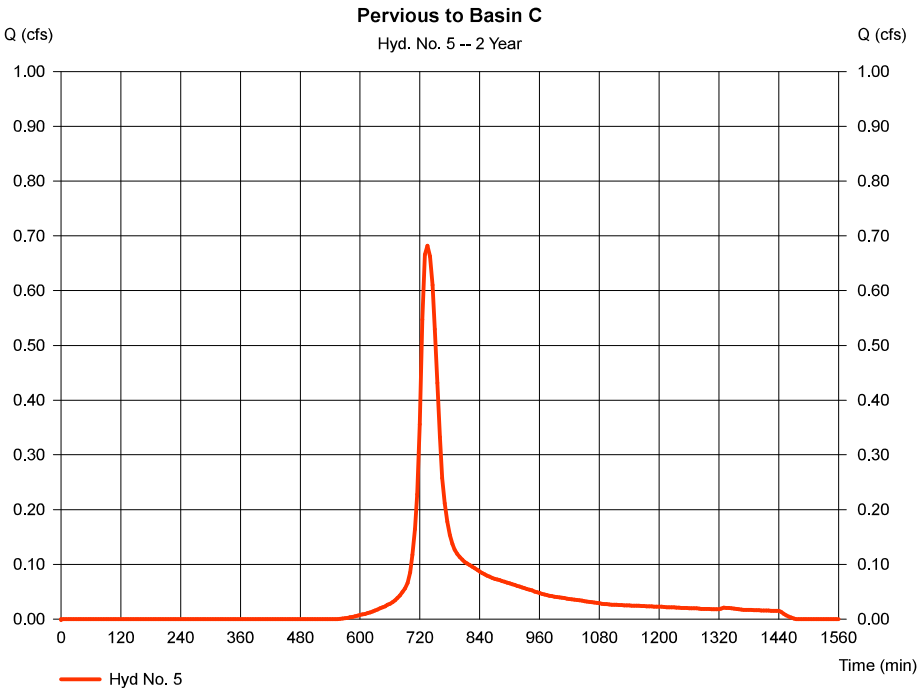
Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Hyd. No. 5

Pervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 0.682 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 3,615 cuft
Drainage area	= 0.650 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.430 x 39) + (0.220 x 80)] / 0.650

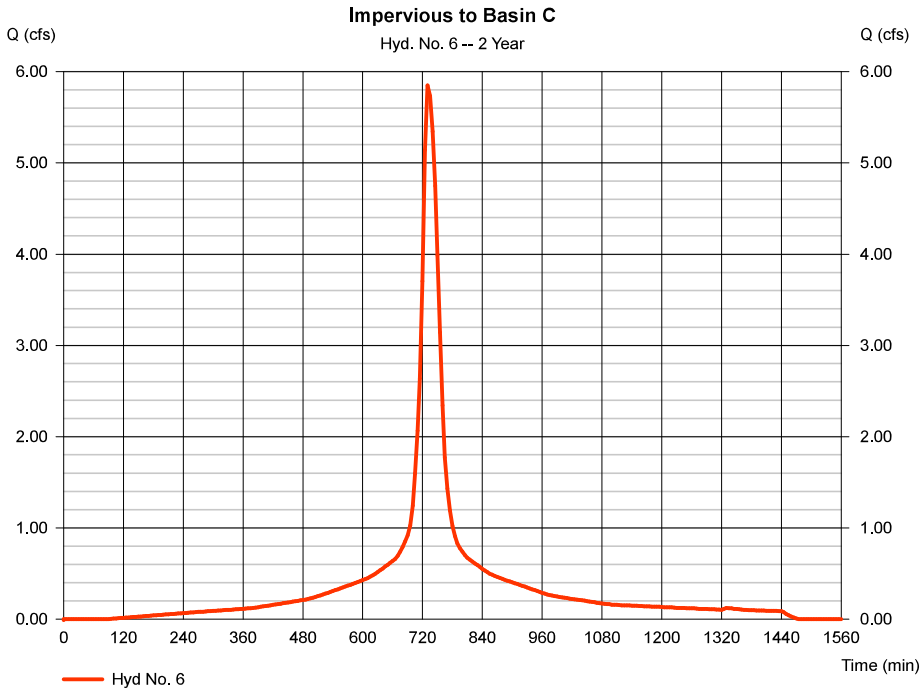


Hydrograph Report

Hyd. No. 6

Impervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 5.850 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 33,598 cuft
Drainage area	= 2.960 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

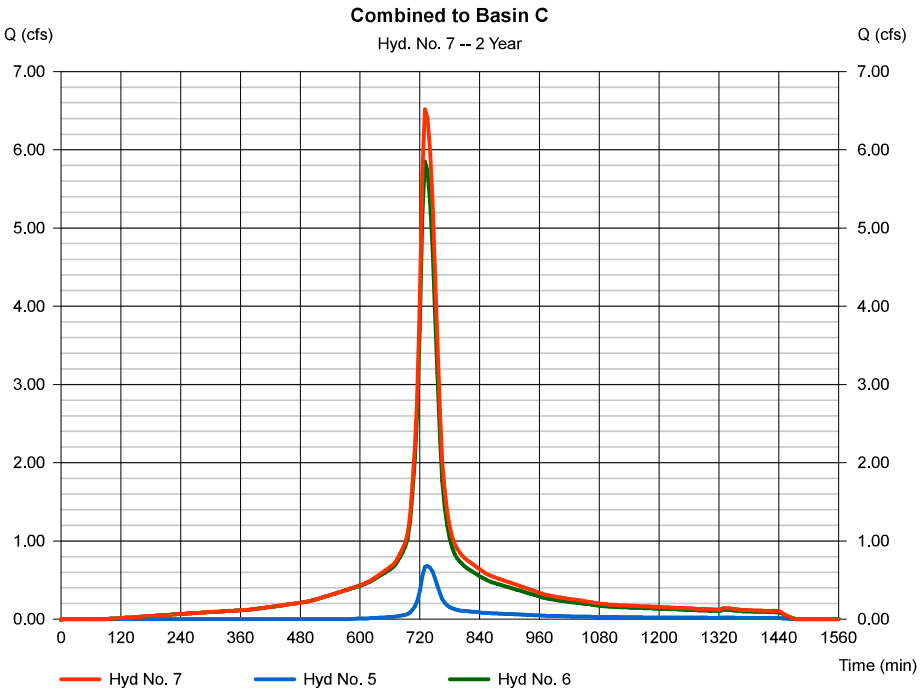


Hydrograph Report

Hyd. No. 7

Combined to Basin C

Hydrograph type	= Combine	Peak discharge	= 6.515 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 37,213 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 3.610 ac



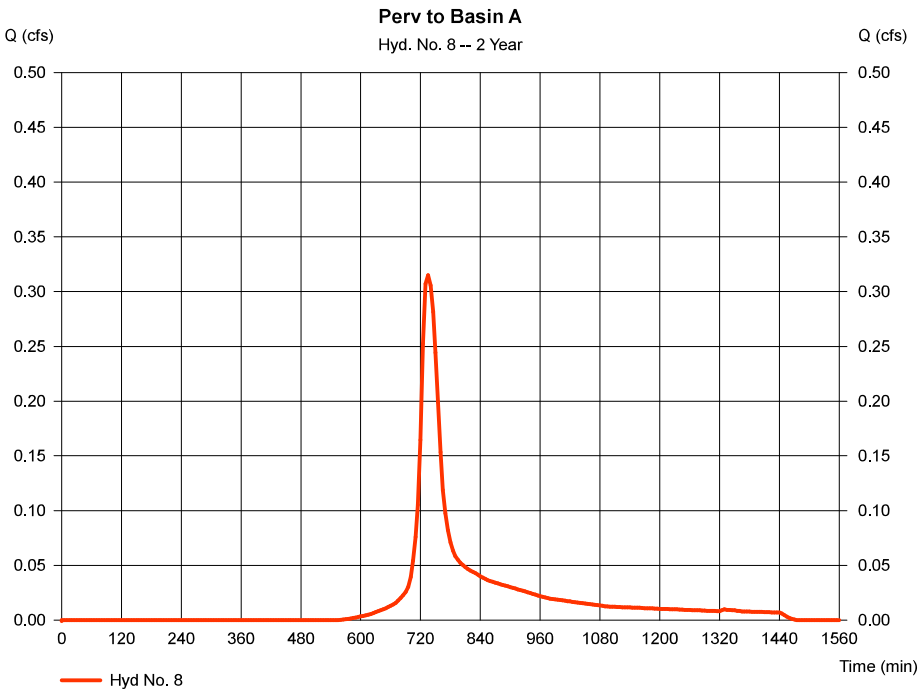
Hydrograph Report

Hyd. No. 8

Perv to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.315 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 1,668 cuft
Drainage area	= 0.300 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.200 x 39) + (0.100 x 80)] / 0.300

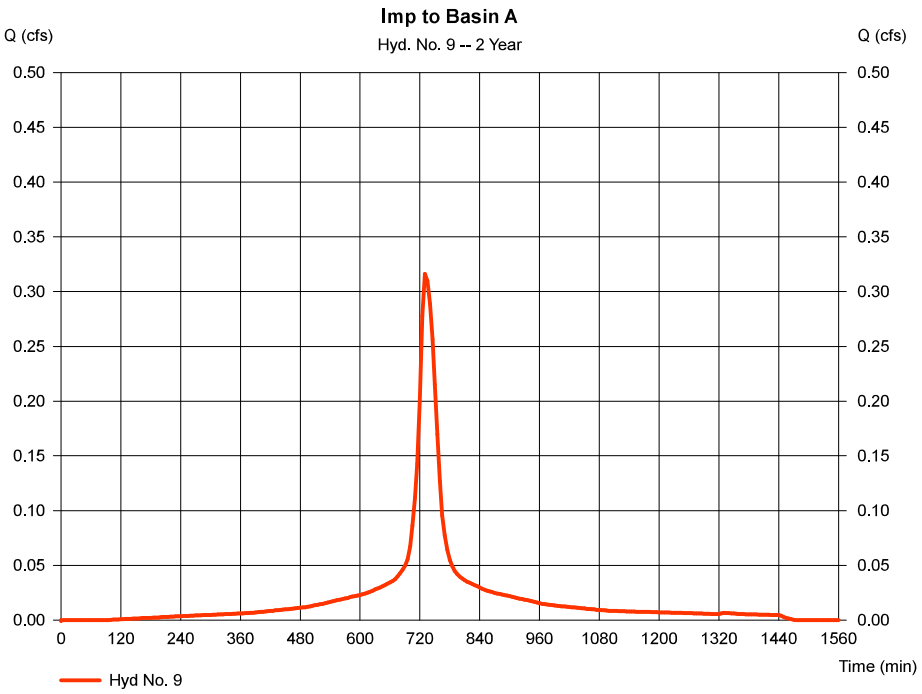


Hydrograph Report

Hyd. No. 9

Imp to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.316 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,816 cuft
Drainage area	= 0.160 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

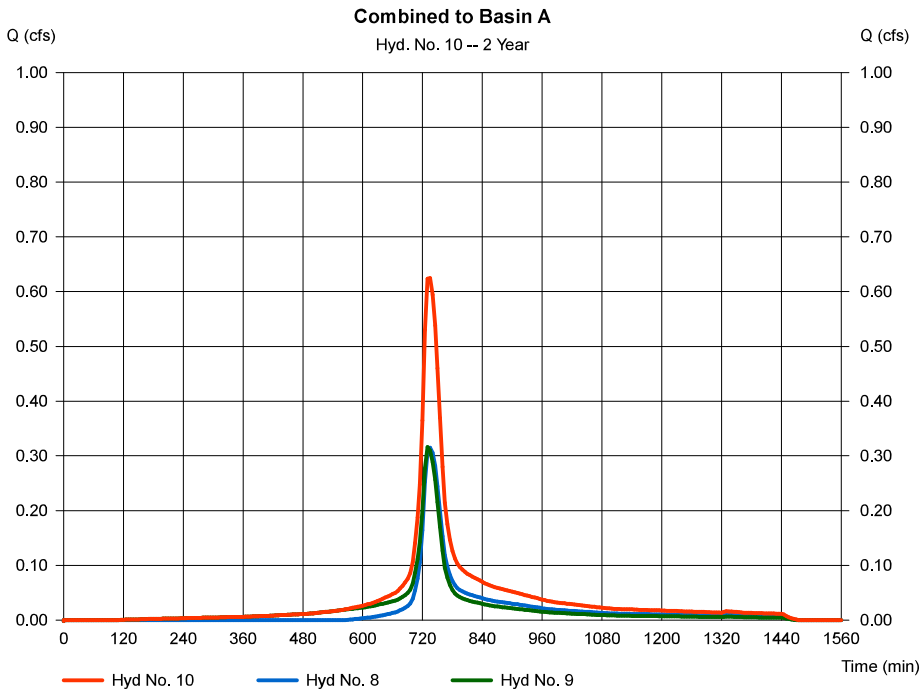


Hydrograph Report

Hyd. No. 10

Combined to Basin A

Hydrograph type	= Combine	Peak discharge	= 0.625 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 3,484 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 0.460 ac



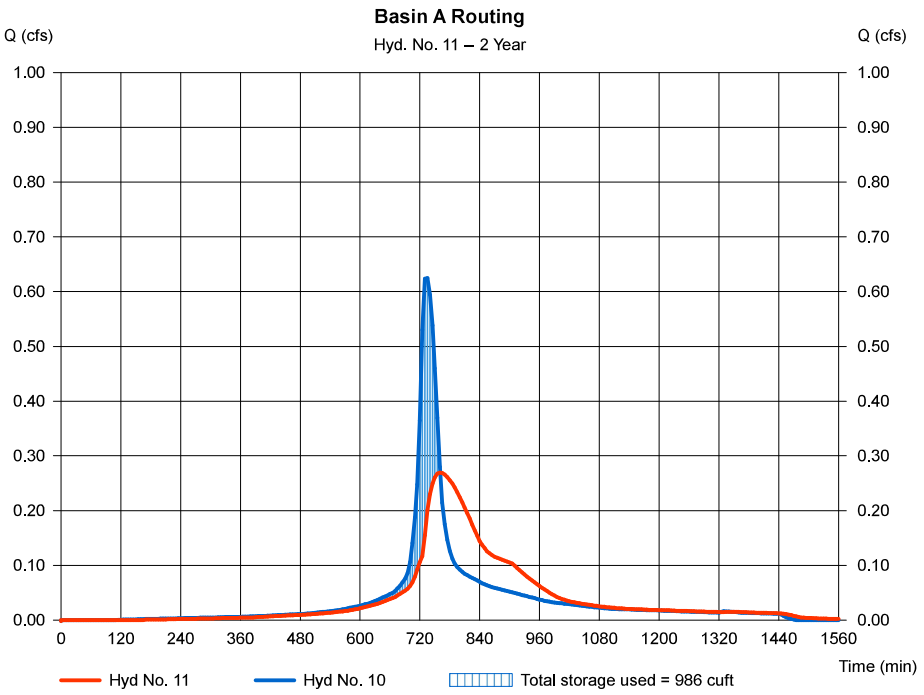
Hydrograph Report

Hyd. No. 11

Basin A Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.270 cfs
Storm frequency	= 2 yrs	Time to peak	= 760 min
Time interval	= 5 min	Hyd. volume	= 3,479 cuft
Inflow hyd. No.	= 10 - Combined to Basin A	Max. Elevation	= 82.61 ft
Reservoir name	= Basin A	Max. Storage	= 986 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Pond No. 3 - Basin A

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 81.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	81.50	00	0	0
0.50	82.00	979	245	245
1.00	82.50	1,314	573	818
1.50	83.00	1,649	741	1,559
2.00	83.50	2,088	934	2,493
2.50	84.00	2,526	1,154	3,647
3.00	84.50	3,026	1,388	5,035

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.50	2.50	0.00
Span (in)	= 15.00	2.50	2.50	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 81.40	81.50	82.10	0.00
Length (ft)	= 45.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

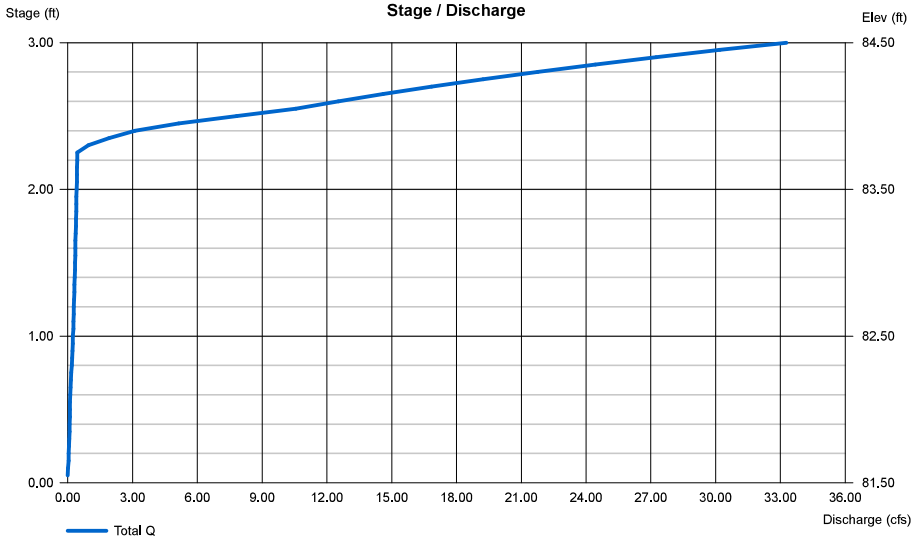
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	20.00	0.00	0.00
Crest El. (ft)	= 83.75	83.90	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

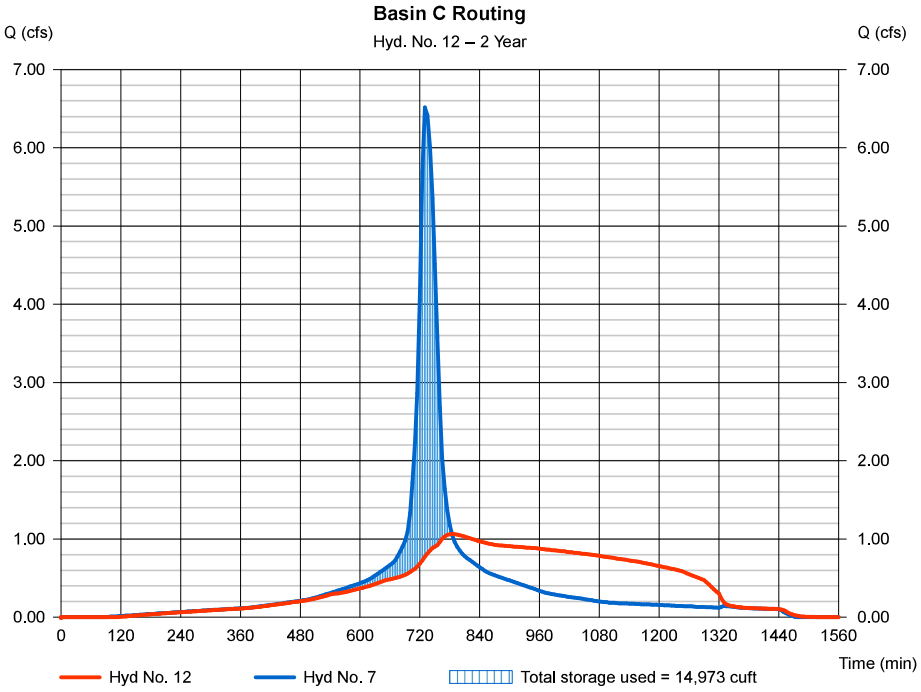
Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Hyd. No. 12

Basin C Routing

Hydrograph type	= Reservoir	Peak discharge	= 1.063 cfs
Storm frequency	= 2 yrs	Time to peak	= 785 min
Time interval	= 5 min	Hyd. volume	= 37,211 cuft
Inflow hyd. No.	= 7 - Combined to Basin C	Max. Elevation	= 75.50 ft
Reservoir name	= Basin C	Max. Storage	= 14,973 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Pond No. 2 - Basin C

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 72.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	72.00	00	0	0
0.50	72.50	641	160	160
1.00	73.00	1,282	481	641
1.50	73.50	3,407	1,172	1,813
2.00	74.00	5,531	2,235	4,048
2.50	74.50	6,781	3,078	7,126
3.00	75.00	8,030	3,703	10,829
3.50	75.50	8,715	4,186	15,015
4.00	76.00	9,400	4,529	19,544
4.50	76.50	10,075	4,869	24,412
5.00	77.00	10,749	5,206	29,618
5.50	77.50	11,413	5,541	35,159

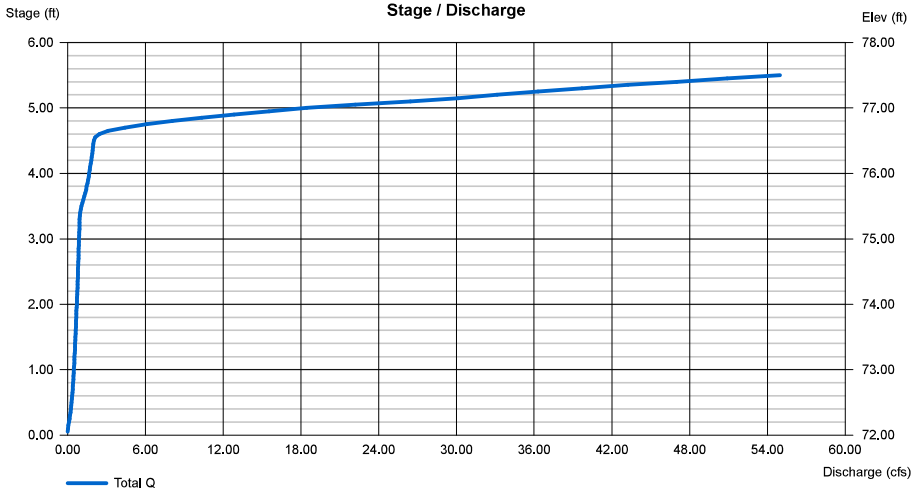
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	4.50	6.00	0.00
Span (in)	= 18.00	4.50	6.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 71.90	72.00	75.29	0.00
Length (ft)	= 42.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	20.00	5.00	0.00
Crest El. (ft)	= 76.62	76.99	76.52	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	Rect	—
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



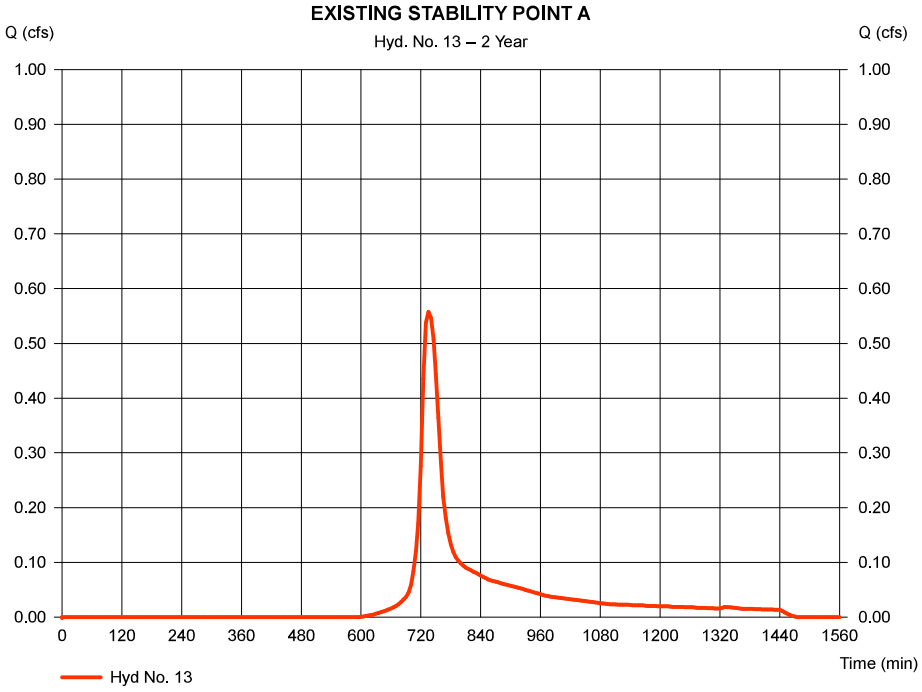
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Hyd. No. 13

EXISTING STABILITY POINT A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.558 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 3,001 cuft
Drainage area	= 0.620 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

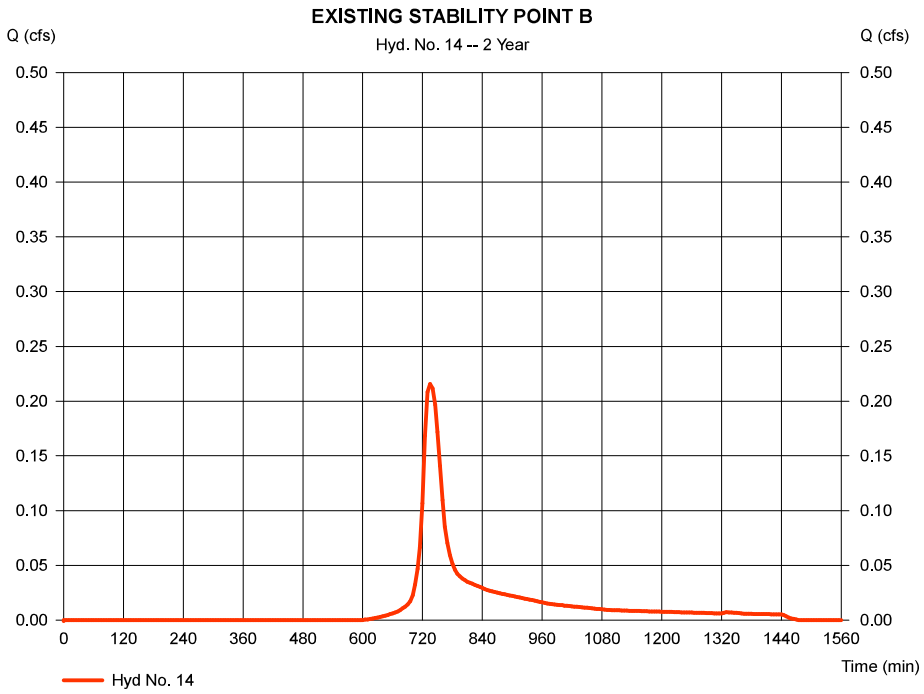


Hydrograph Report

Hyd. No. 14

EXISTING STABILITY POINT B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.216 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 1,162 cuft
Drainage area	= 0.240 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

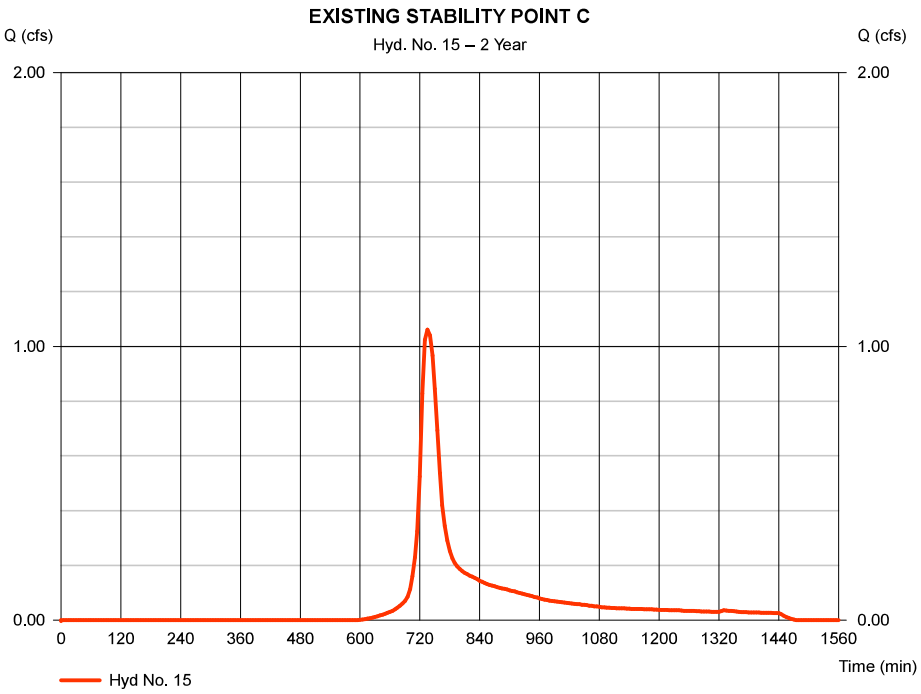


Hydrograph Report

Hyd. No. 15

EXISTING STABILITY POINT C

Hydrograph type	= SCS Runoff	Peak discharge	= 1.061 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 5,712 cuft
Drainage area	= 1.180 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	1.670	5	735	8,767	--	----	----	Pervious to Basin B
2	SCS Runoff	1.295	5	730	7,564	--	----	----	Imp to Basin B
3	Combine	2.950	5	730	16,331	1, 2	----	----	Combined to Basin B
4	Reservoir	0.241	5	890	16,320	3	83.28	8,911	Basin B Routing
5	SCS Runoff	1.382	5	735	7,255	--	----	----	Pervious to Basin C
6	SCS Runoff	9.125	5	730	53,307	--	----	----	Impervious to Basin C
7	Combine	10.50	5	730	60,562	5, 6	----	----	Combined to Basin C
8	SCS Runoff	0.638	5	735	3,349	--	----	----	Perv to Basin A
9	SCS Runoff	0.493	5	730	2,881	--	----	----	Imp to Basin A
10	Combine	1.127	5	730	6,230	8, 9	----	----	Combined to Basin A
11	Reservoir	0.377	5	765	6,225	10	83.24	2,011	Basin A Routing
12	Reservoir	2.275	5	775	60,560	7	76.58	25,179	Basin C Routing
13	SCS Runoff	1.200	5	735	6,299	--	----	----	EXISTING STABILITY POINT A
14	SCS Runoff	0.464	5	735	2,438	--	----	----	EXISTING STABILITY POINT B
15	SCS Runoff	2.283	5	735	11,988	--	----	----	EXISTING STABILITY POINT C

Hydrograph Report

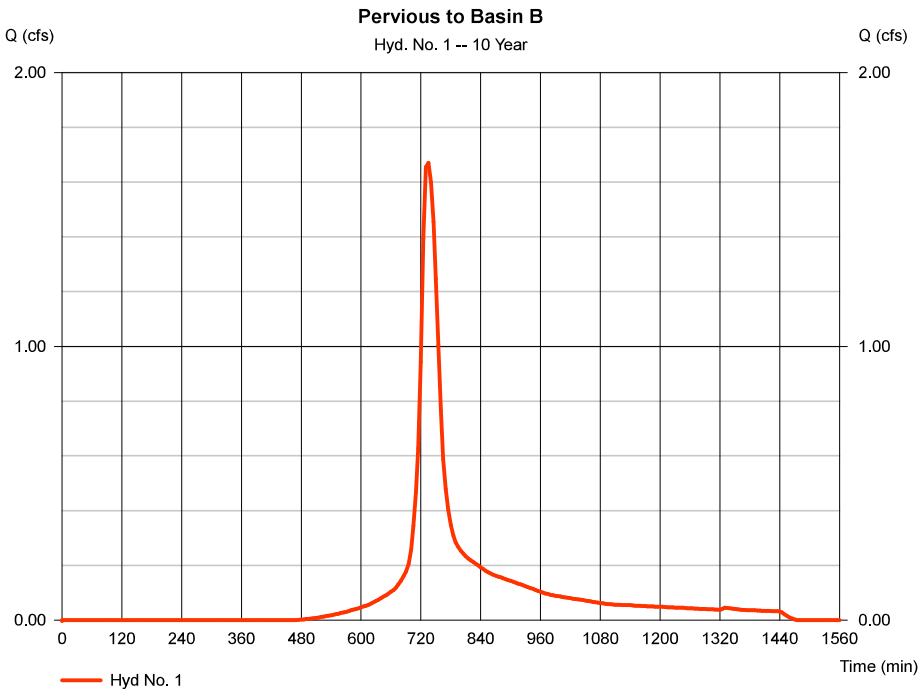
Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Hyd. No. 1

Pervious to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.670 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 8,767 cuft
Drainage area	= 0.810 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.670 x 80) + (0.140 x 77)] / 0.810

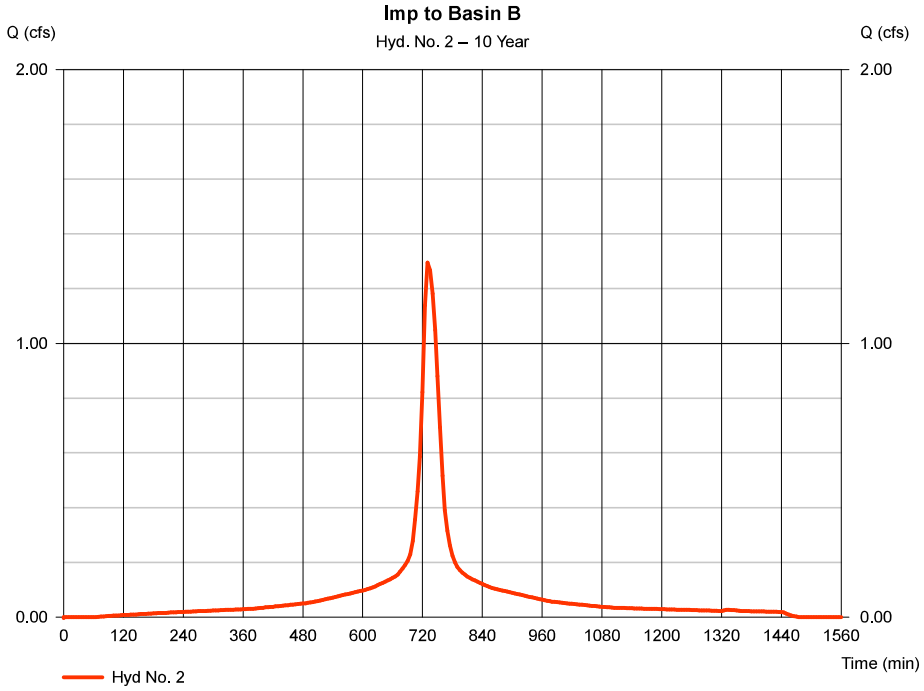


Hydrograph Report

Hyd. No. 2

Imp to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.295 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 7,564 cuft
Drainage area	= 0.420 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

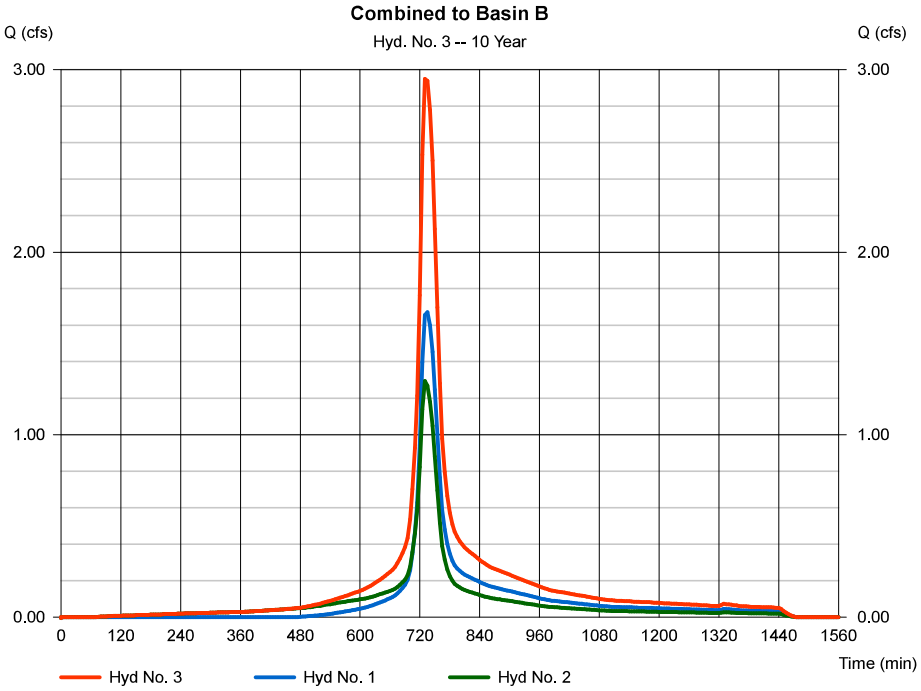


Hydrograph Report

Hyd. No. 3

Combined to Basin B

Hydrograph type	= Combine	Peak discharge	= 2.950 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 16,331 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.230 ac



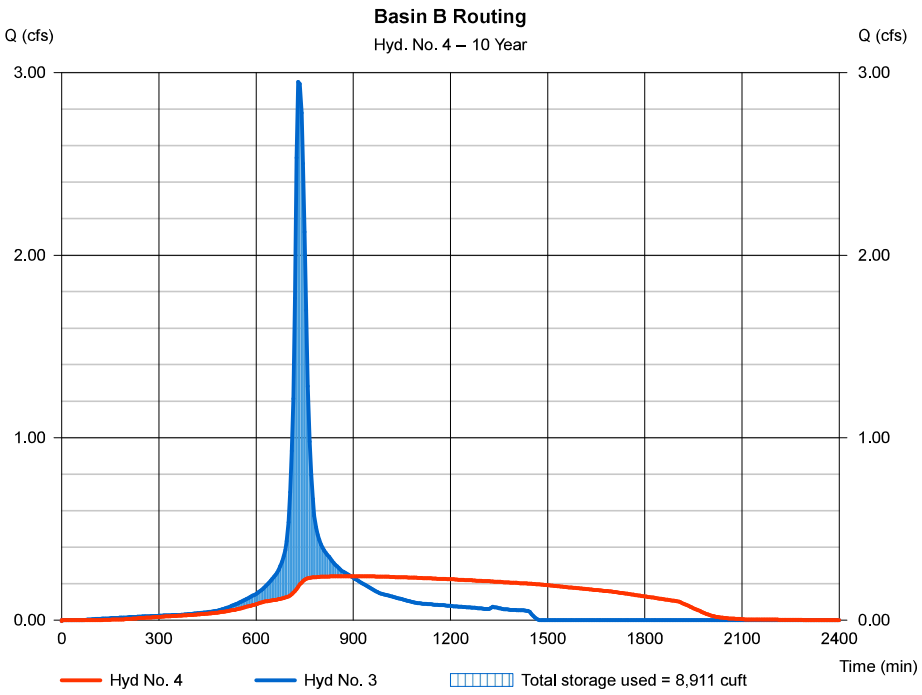
Hydrograph Report

Hyd. No. 4

Basin B Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.241 cfs
Storm frequency	= 10 yrs	Time to peak	= 890 min
Time interval	= 5 min	Hyd. volume	= 16,320 cuft
Inflow hyd. No.	= 3 - Combined to Basin B	Max. Elevation	= 83.28 ft
Reservoir name	= Basin B	Max. Storage	= 8,911 cuft

Storage Indication method used.



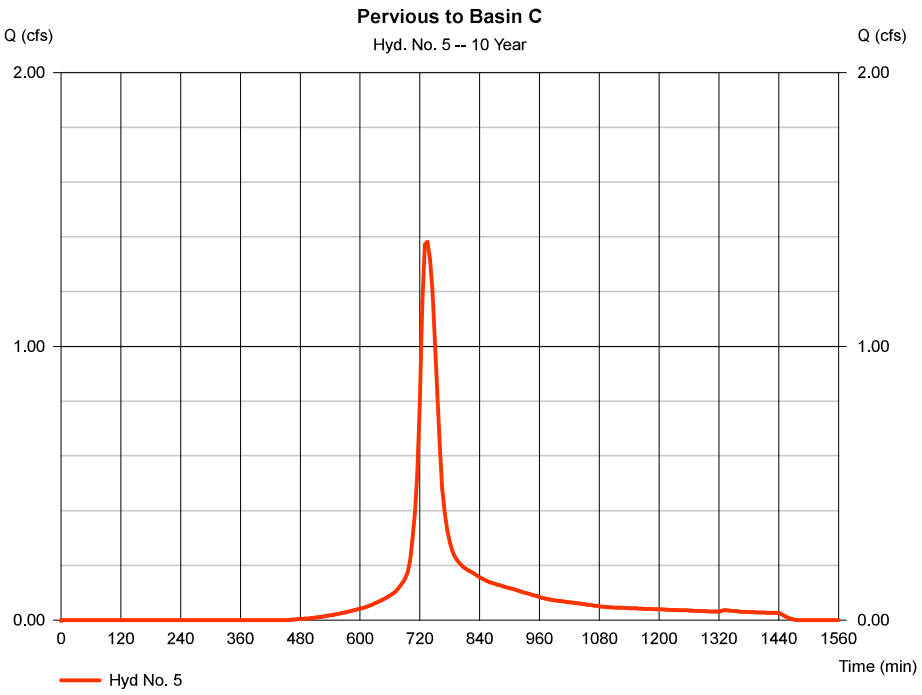
Hydrograph Report

Hyd. No. 5

Pervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 1.382 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 7,255 cuft
Drainage area	= 0.650 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.430 x 39) + (0.220 x 80)] / 0.650

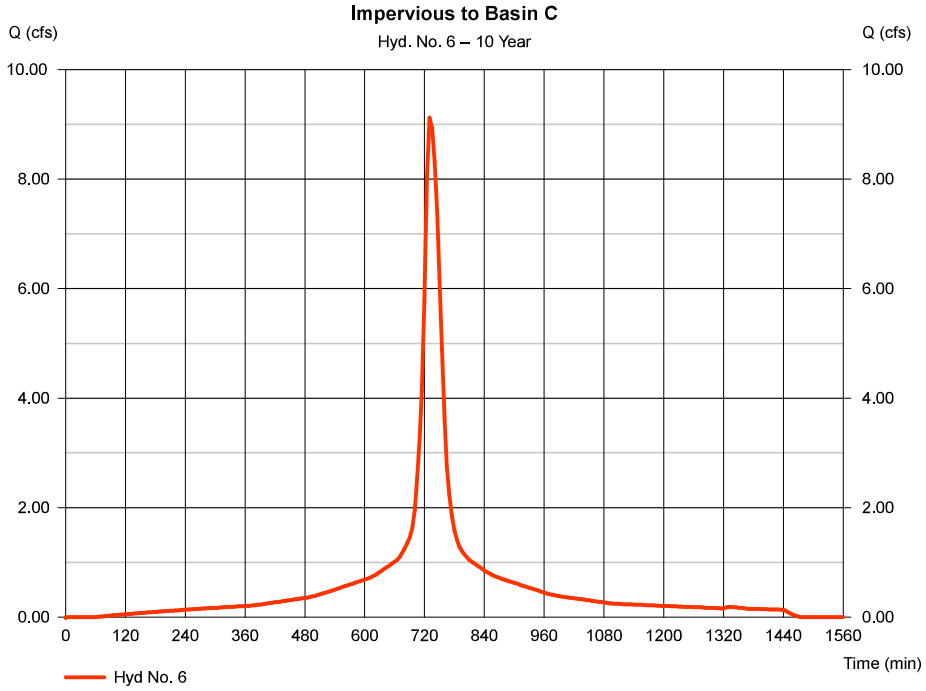


Hydrograph Report

Hyd. No. 6

Impervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 9.125 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 53,307 cuft
Drainage area	= 2.960 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

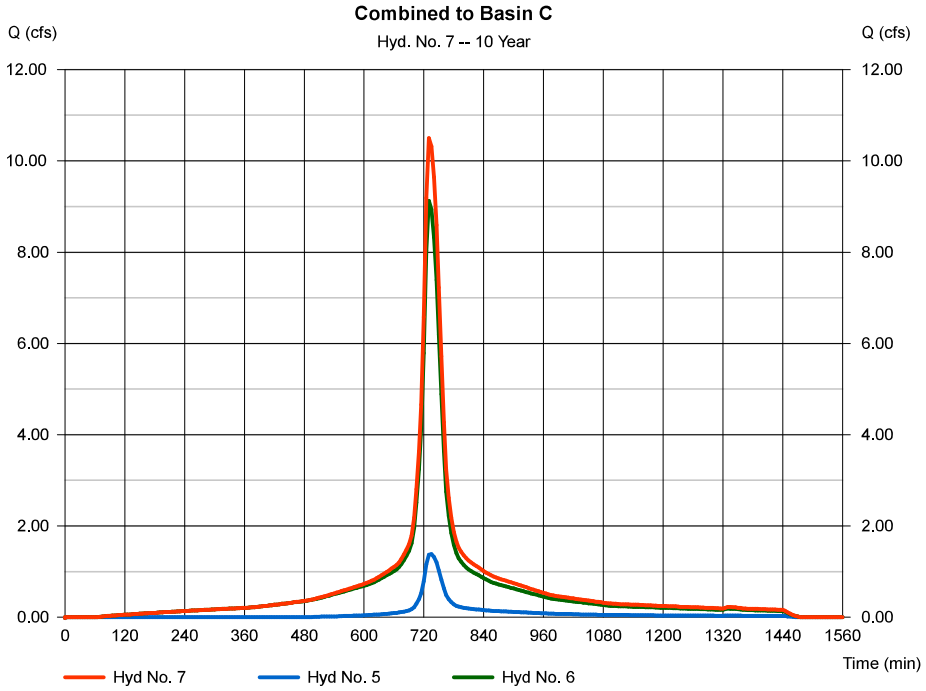


Hydrograph Report

Hyd. No. 7

Combined to Basin C

Hydrograph type	= Combine	Peak discharge	= 10.50 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 60,562 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 3.610 ac



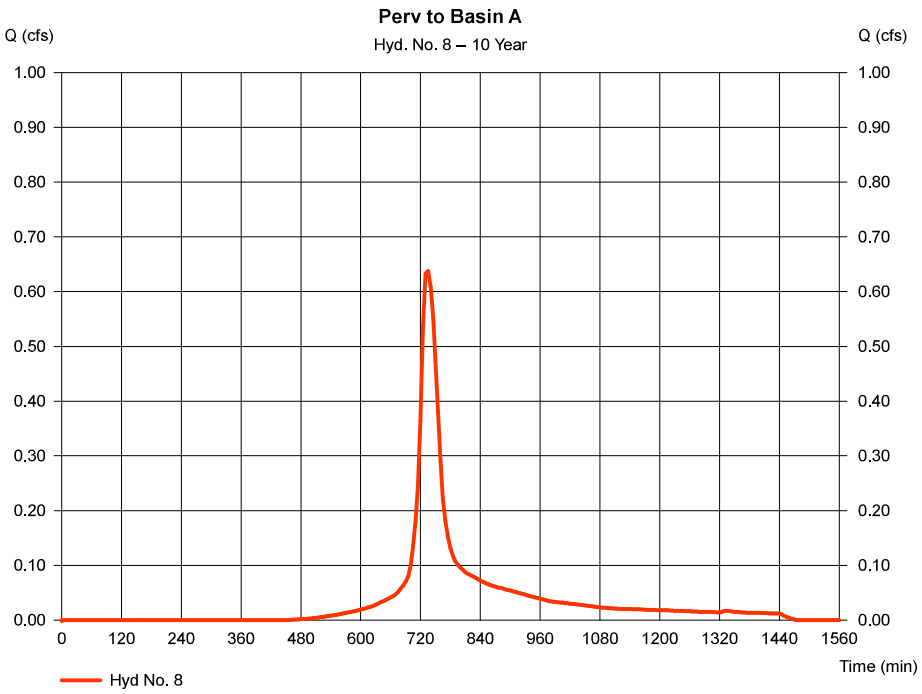
Hydrograph Report

Hyd. No. 8

Perv to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.638 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 3,349 cuft
Drainage area	= 0.300 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.200 x 39) + (0.100 x 80)] / 0.300

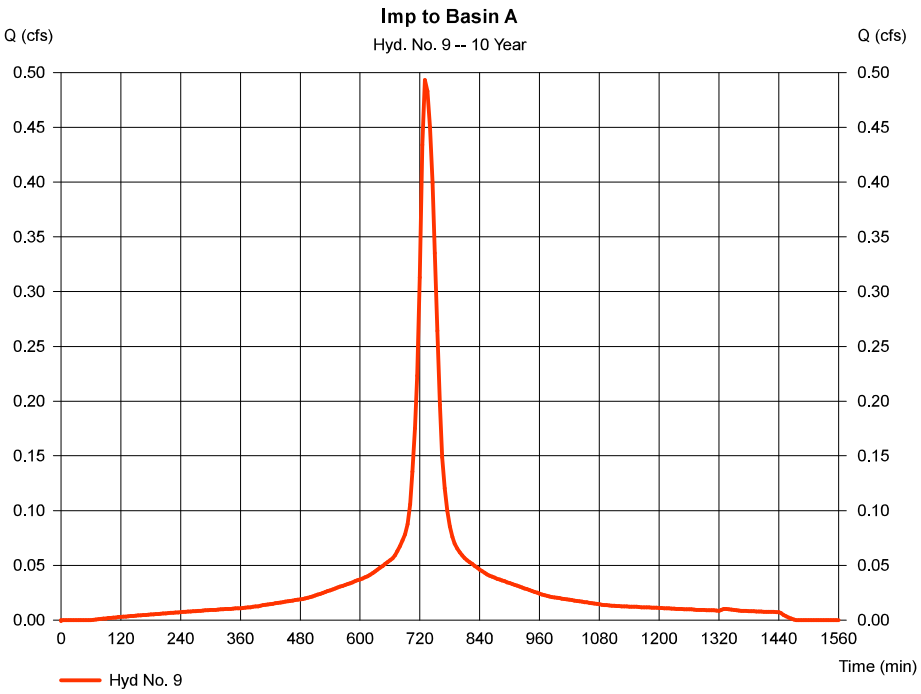


Hydrograph Report

Hyd. No. 9

Imp to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.493 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 2,881 cuft
Drainage area	= 0.160 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

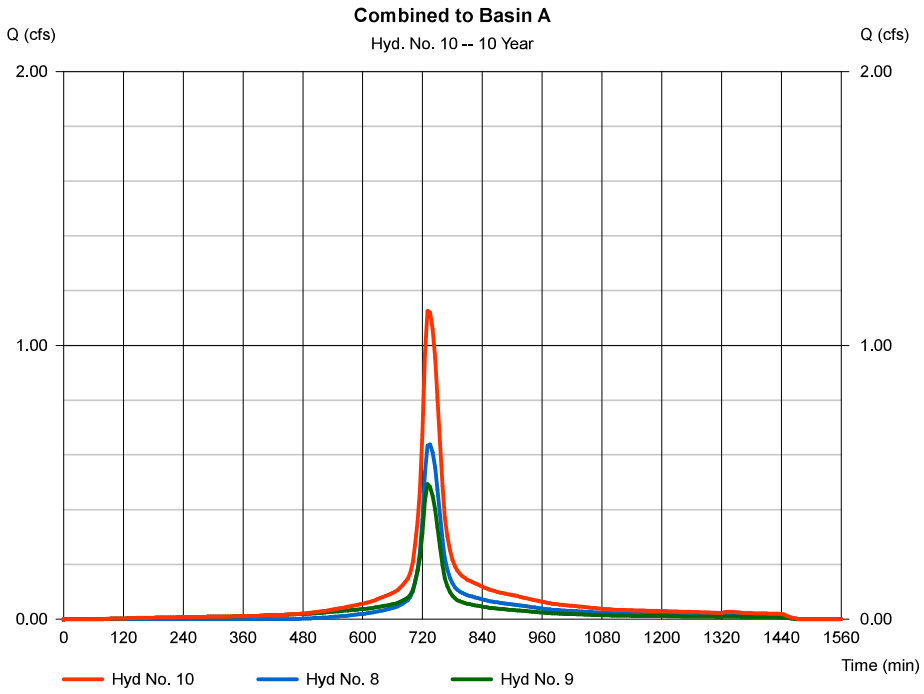


Hydrograph Report

Hyd. No. 10

Combined to Basin A

Hydrograph type	= Combine	Peak discharge	= 1.127 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 6,230 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 0.460 ac



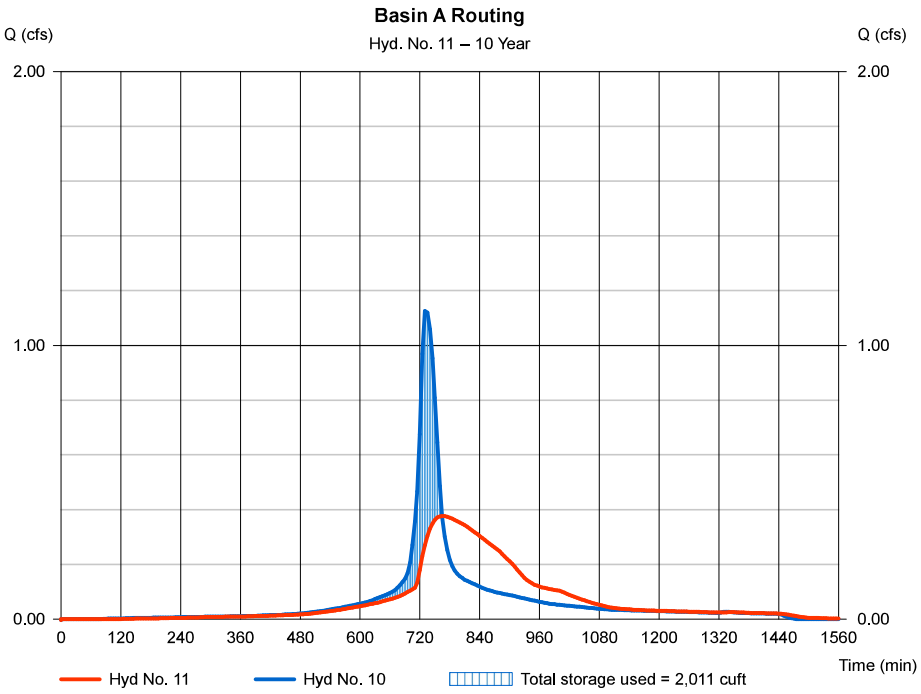
Hydrograph Report

Hyd. No. 11

Basin A Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.377 cfs
Storm frequency	= 10 yrs	Time to peak	= 765 min
Time interval	= 5 min	Hyd. volume	= 6,225 cuft
Inflow hyd. No.	= 10 - Combined to Basin A	Max. Elevation	= 83.24 ft
Reservoir name	= Basin A	Max. Storage	= 2,011 cuft

Storage Indication method used.



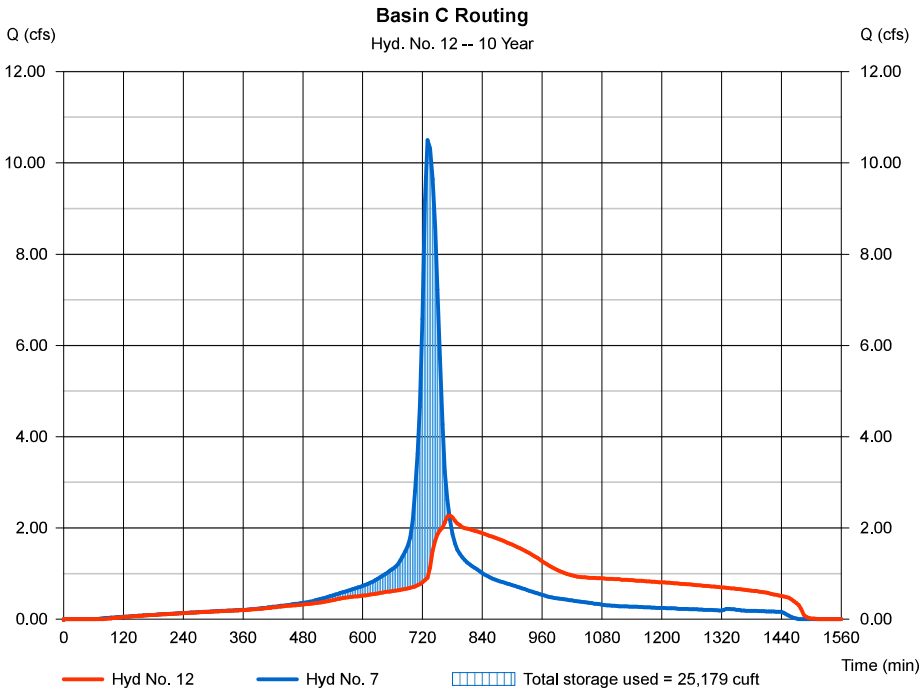
Hydrograph Report

Hyd. No. 12

Basin C Routing

Hydrograph type	= Reservoir	Peak discharge	= 2.275 cfs
Storm frequency	= 10 yrs	Time to peak	= 775 min
Time interval	= 5 min	Hyd. volume	= 60,560 cuft
Inflow hyd. No.	= 7 - Combined to Basin C	Max. Elevation	= 76.58 ft
Reservoir name	= Basin C	Max. Storage	= 25,179 cuft

Storage Indication method used.

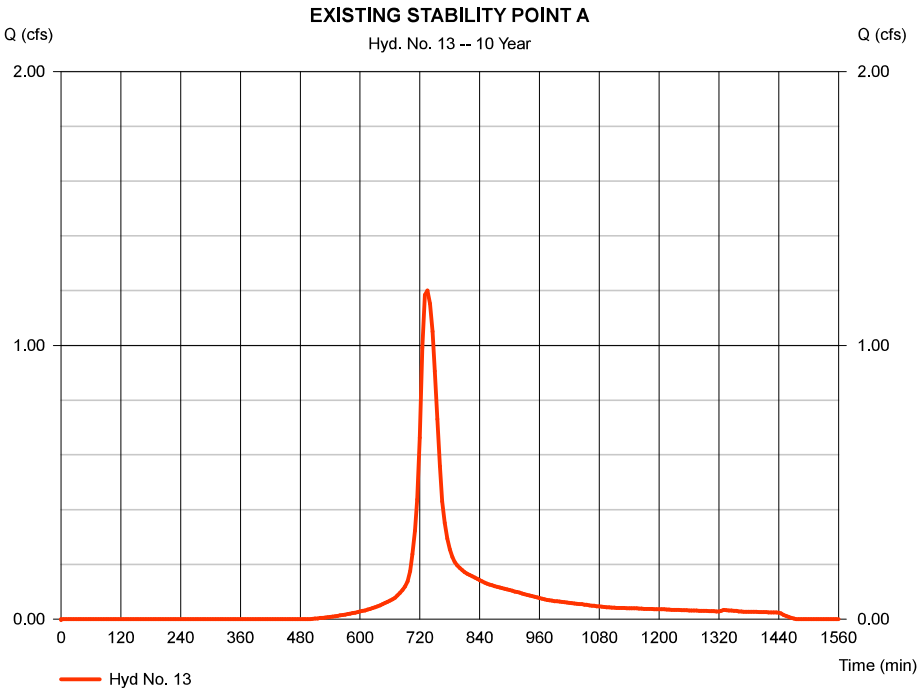


Hydrograph Report

Hyd. No. 13

EXISTING STABILITY POINT A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.200 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 6,299 cuft
Drainage area	= 0.620 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

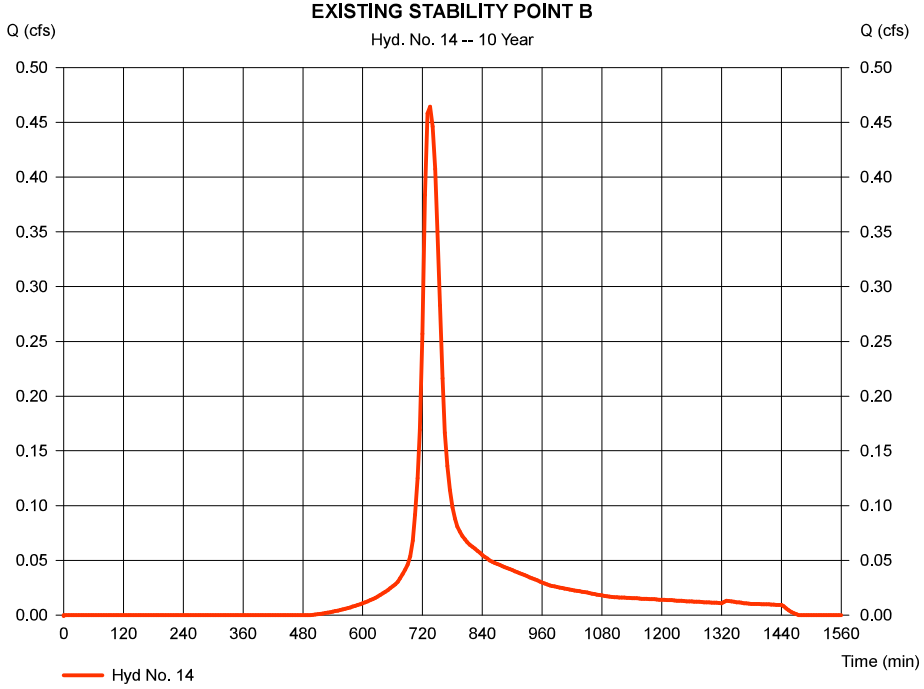


Hydrograph Report

Hyd. No. 14

EXISTING STABILITY POINT B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.464 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 2,438 cuft
Drainage area	= 0.240 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

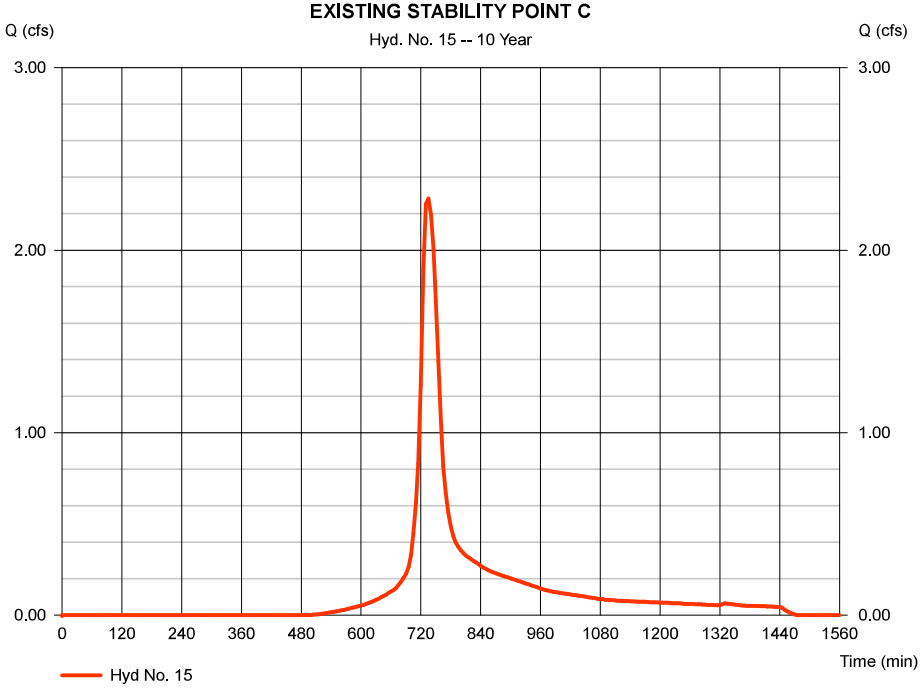


Hydrograph Report

Hyd. No. 15

EXISTING STABILITY POINT C

Hydrograph type	= SCS Runoff	Peak discharge	= 2.283 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 11,988 cuft
Drainage area	= 1.180 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	2.305	5	735	12,144	--	----	----	Pervious to Basin B
2	SCS Runoff	1.620	5	730	9,531	--	----	----	Imp to Basin B
3	Combine	3.921	5	730	21,675	1, 2	----	----	Combined to Basin B
4	Reservoir	0.266	5	925	21,664	3	83.77	12,644	Basin B Routing
5	SCS Runoff	1.893	5	735	9,994	--	----	----	Pervious to Basin C
6	SCS Runoff	11.42	5	730	67,171	--	----	----	Impervious to Basin C
7	Combine	13.31	5	730	77,165	5, 6	----	----	Combined to Basin C
8	SCS Runoff	0.874	5	735	4,613	--	----	----	Perv to Basin A
9	SCS Runoff	0.617	5	730	3,631	--	----	----	Imp to Basin A
10	Combine	1.491	5	730	8,244	8, 9	----	----	Combined to Basin A
11	Reservoir	0.432	5	770	8,239	10	83.66	2,845	Basin A Routing
12	Reservoir	8.383	5	750	77,163	7	76.82	27,608	Basin C Routing
13	SCS Runoff	1.679	5	735	8,824	--	----	----	EXISTING STABILITY POINT A
14	SCS Runoff	0.650	5	735	3,416	--	----	----	EXISTING STABILITY POINT B
15	SCS Runoff	3.196	5	735	16,795	--	----	----	EXISTING STABILITY POINT C

Hydrograph Report

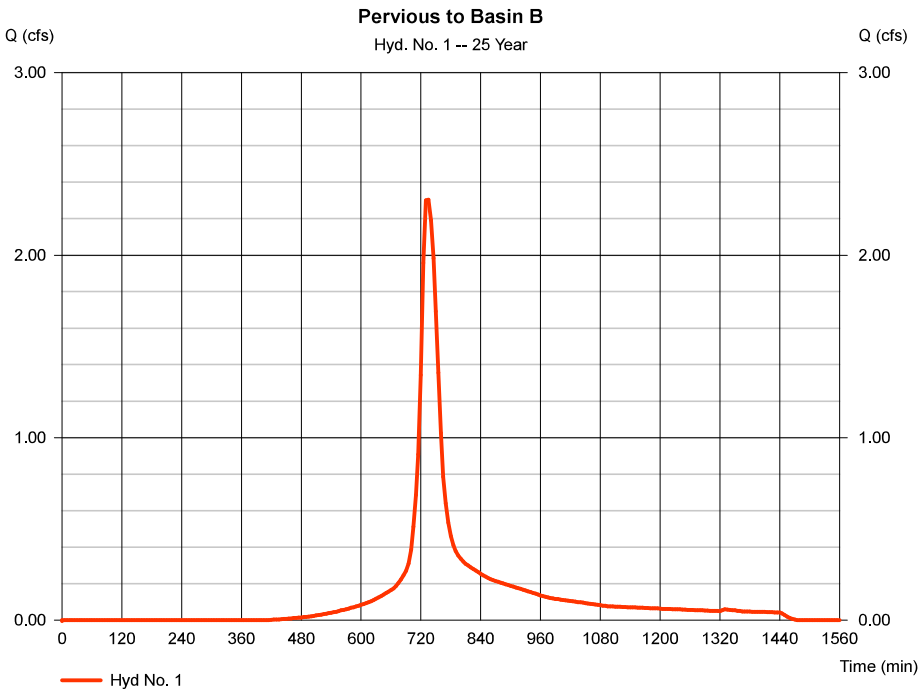
Hydraflow Hydrographs by Intelisolve v9.1 — Wednesday, Jan 20, 2021

Hyd. No. 1

Pervious to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 2.305 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 12,144 cuft
Drainage area	= 0.810 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.670 x 80) + (0.140 x 77)] / 0.810

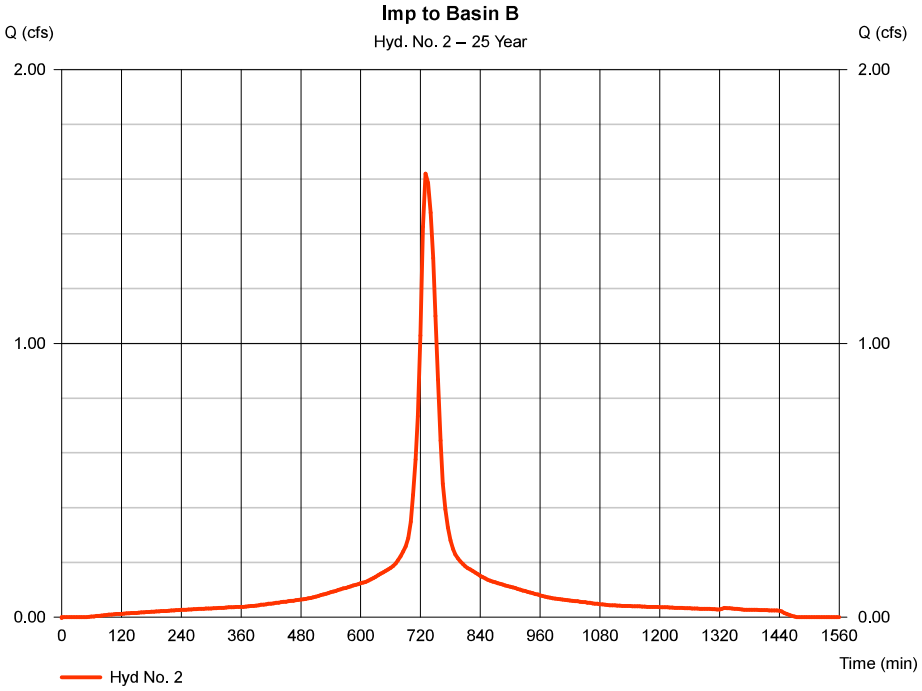


Hydrograph Report

Hyd. No. 2

Imp to Basin B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.620 cfs
Storm frequency	= 25 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 9,531 cuft
Drainage area	= 0.420 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

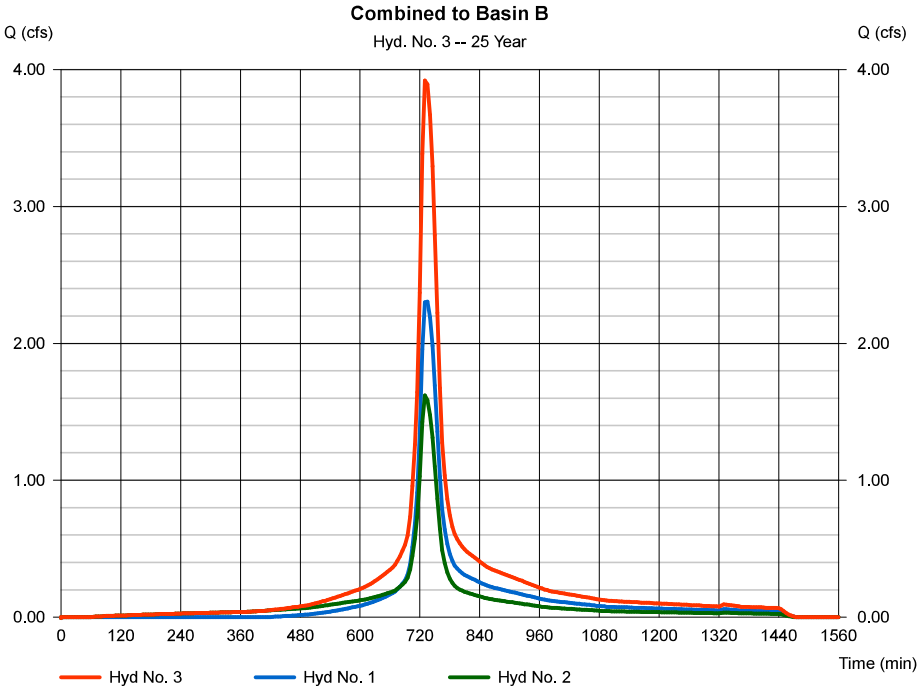


Hydrograph Report

Hyd. No. 3

Combined to Basin B

Hydrograph type	= Combine	Peak discharge	= 3.921 cfs
Storm frequency	= 25 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 21,675 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.230 ac



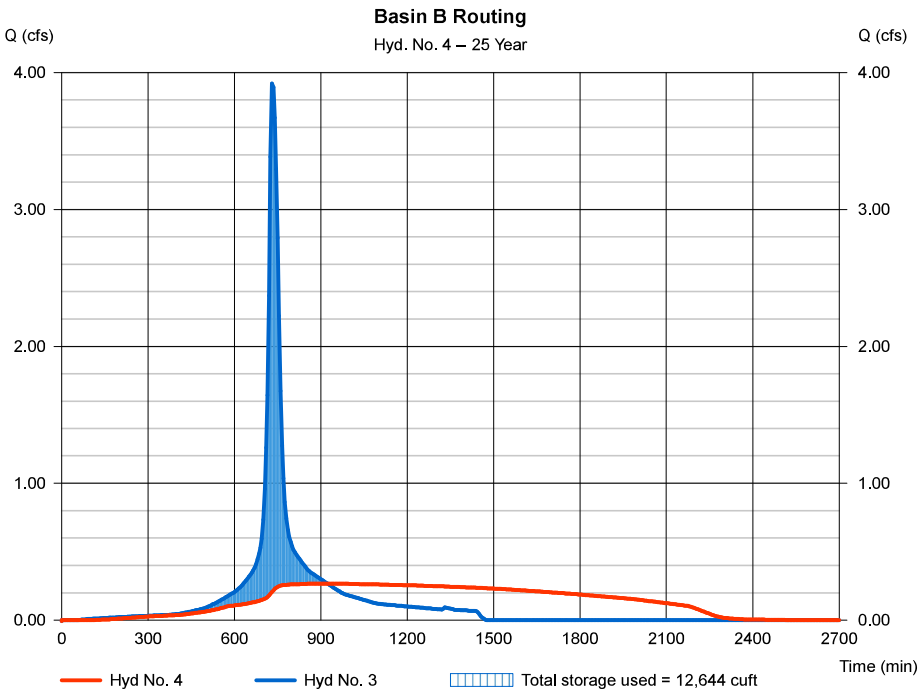
Hydrograph Report

Hyd. No. 4

Basin B Routing

Hydrograph type	=	Reservoir	Peak discharge	=	0.266 cfs
Storm frequency	=	25 yrs	Time to peak	=	925 min
Time interval	=	5 min	Hyd. volume	=	21,664 cuft
Inflow hyd. No.	=	3 - Combined to Basin B	Max. Elevation	=	83.77 ft
Reservoir name	=	Basin B	Max. Storage	=	12,644 cuft

Storage Indication method used.



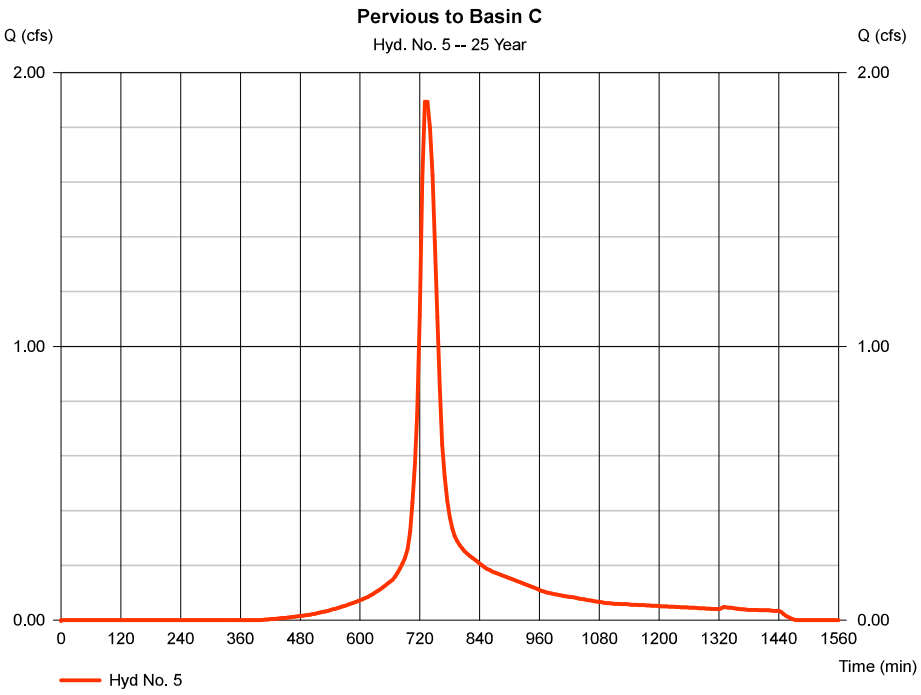
Hydrograph Report

Hyd. No. 5

Pervious to Basin C

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.893 cfs
Storm frequency	=	25 yrs	Time to peak	=	735 min
Time interval	=	5 min	Hyd. volume	=	9,994 cuft
Drainage area	=	0.650 ac	Curve number	=	80*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	10.00 min
Total precip.	=	6.53 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	285

* Composite (Area/CN) = [(0.430 x 39) + (0.220 x 80)] / 0.650

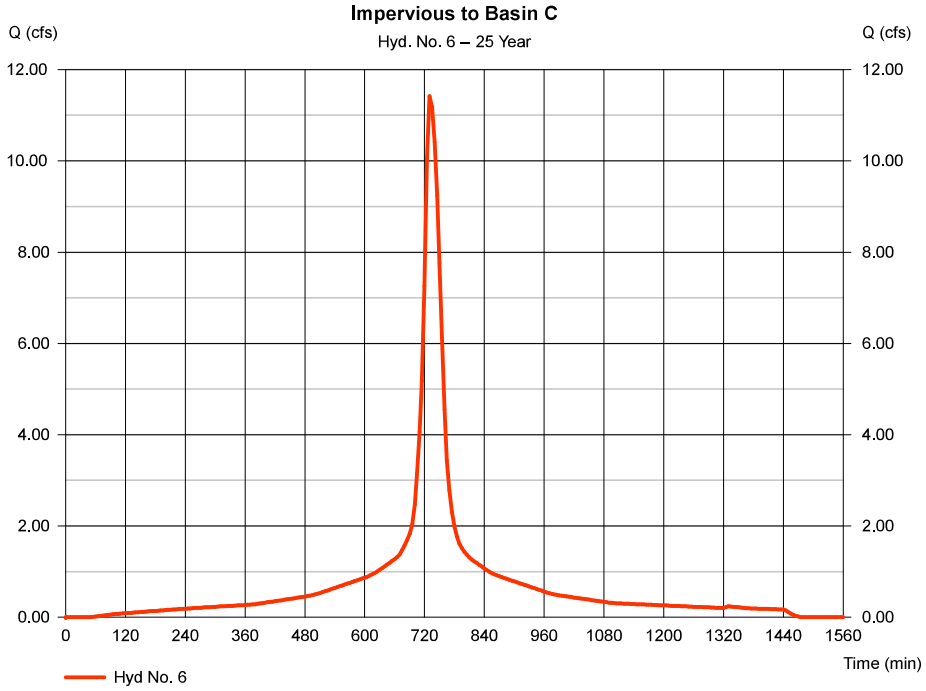


Hydrograph Report

Hyd. No. 6

Impervious to Basin C

Hydrograph type	= SCS Runoff	Peak discharge	= 11.42 cfs
Storm frequency	= 25 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 67,171 cuft
Drainage area	= 2.960 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

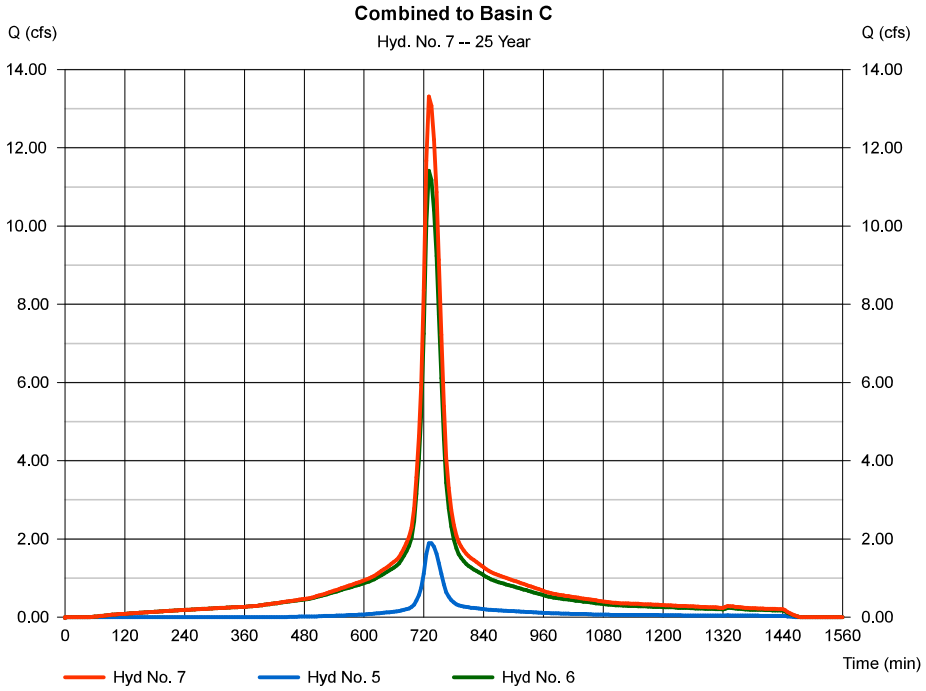


Hydrograph Report

Hyd. No. 7

Combined to Basin C

Hydrograph type	= Combine	Peak discharge	= 13.31 cfs
Storm frequency	= 25 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 77,165 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 3.610 ac



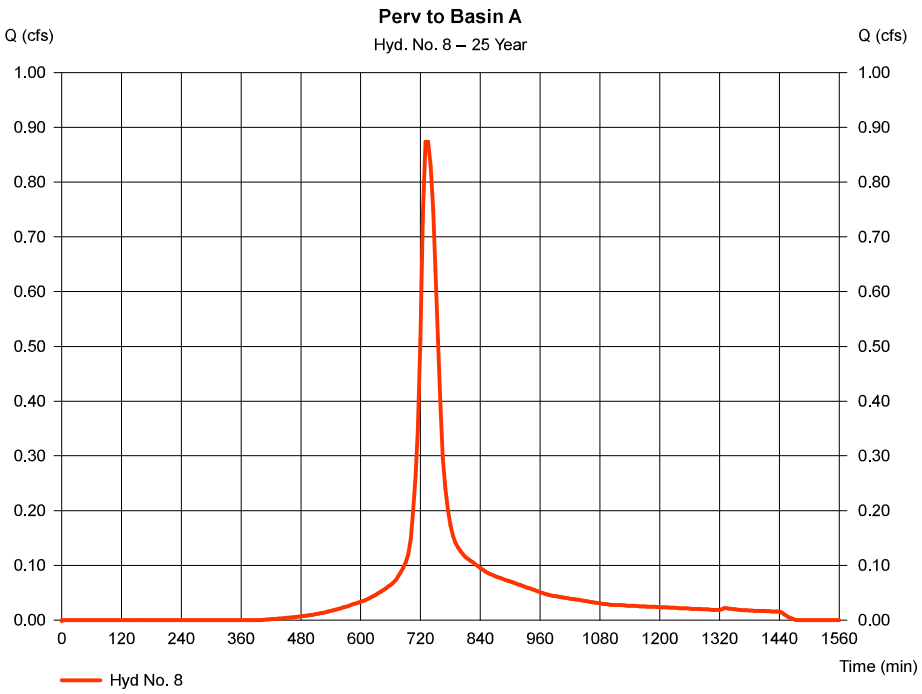
Hydrograph Report

Hyd. No. 8

Perv to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.874 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 4,613 cuft
Drainage area	= 0.300 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

* Composite (Area/CN) = [(0.200 x 39) + (0.100 x 80)] / 0.300

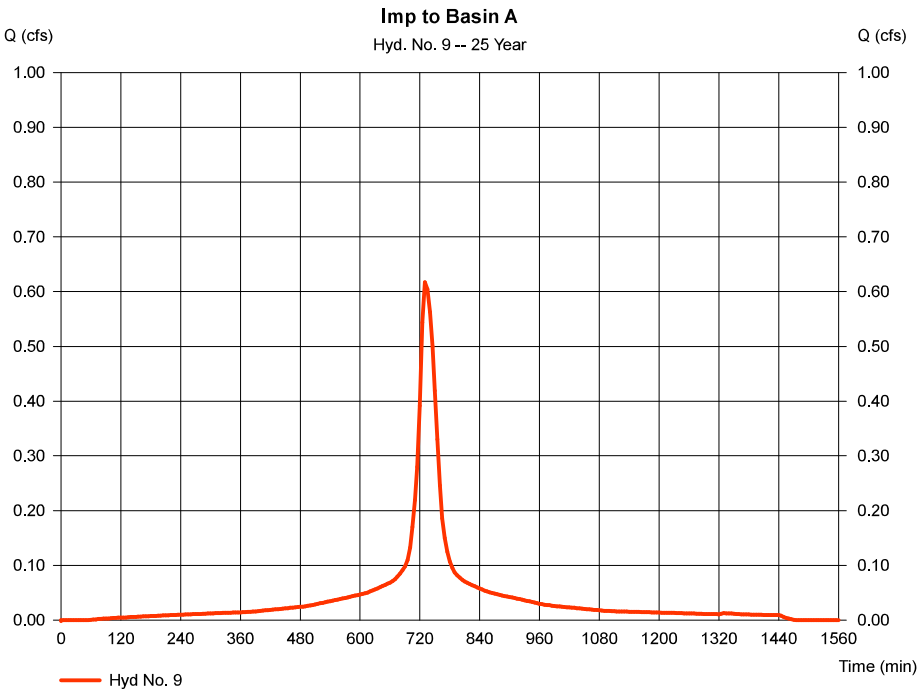


Hydrograph Report

Hyd. No. 9

Imp to Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.617 cfs
Storm frequency	= 25 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 3,631 cuft
Drainage area	= 0.160 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

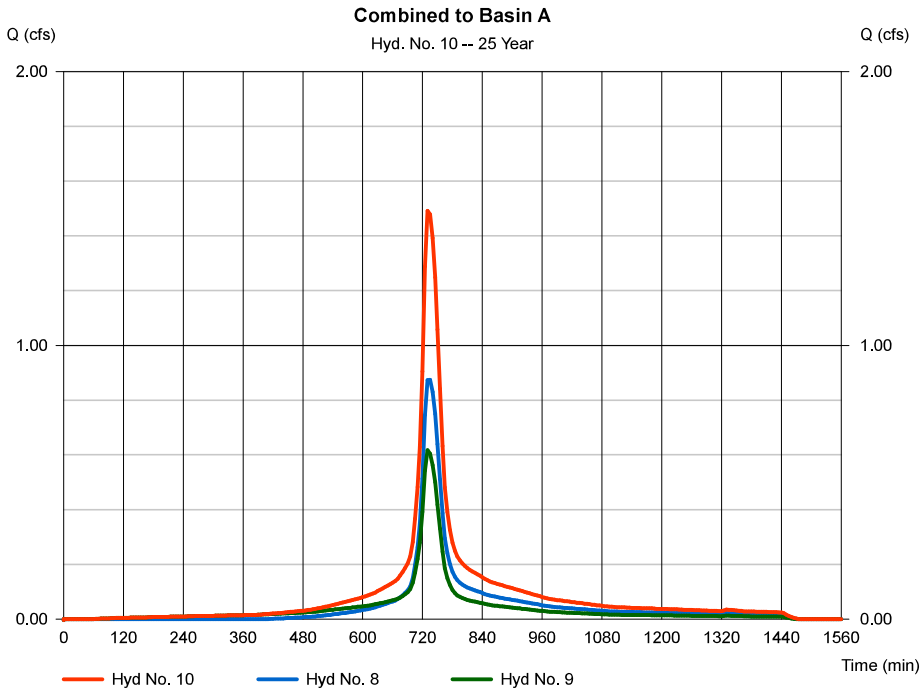


Hydrograph Report

Hyd. No. 10

Combined to Basin A

Hydrograph type	= Combine	Peak discharge	= 1.491 cfs
Storm frequency	= 25 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 8,244 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 0.460 ac



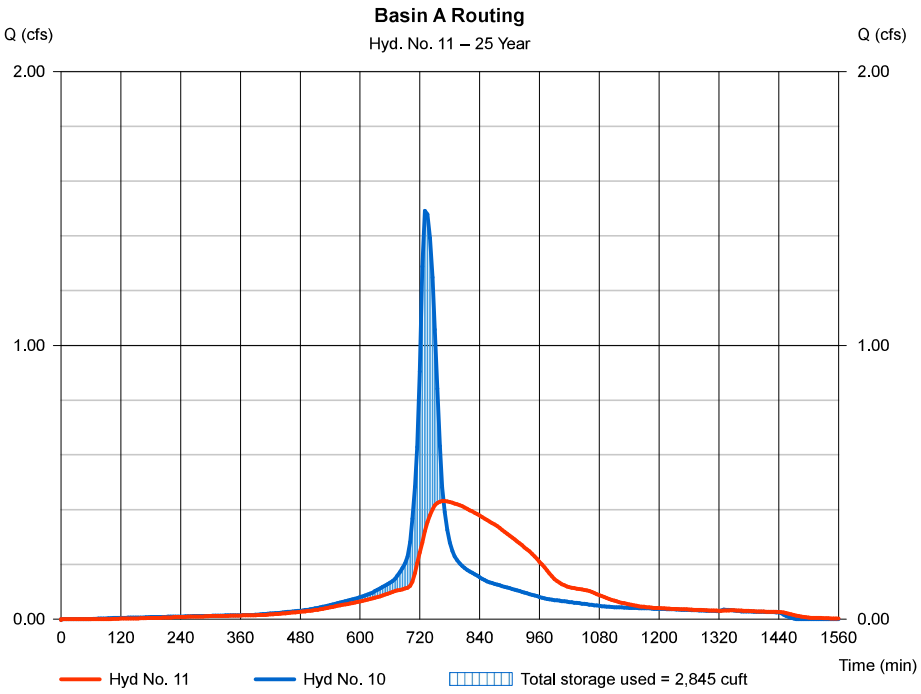
Hydrograph Report

Hyd. No. 11

Basin A Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.432 cfs
Storm frequency	= 25 yrs	Time to peak	= 770 min
Time interval	= 5 min	Hyd. volume	= 8,239 cuft
Inflow hyd. No.	= 10 - Combined to Basin A	Max. Elevation	= 83.66 ft
Reservoir name	= Basin A	Max. Storage	= 2,845 cuft

Storage Indication method used.



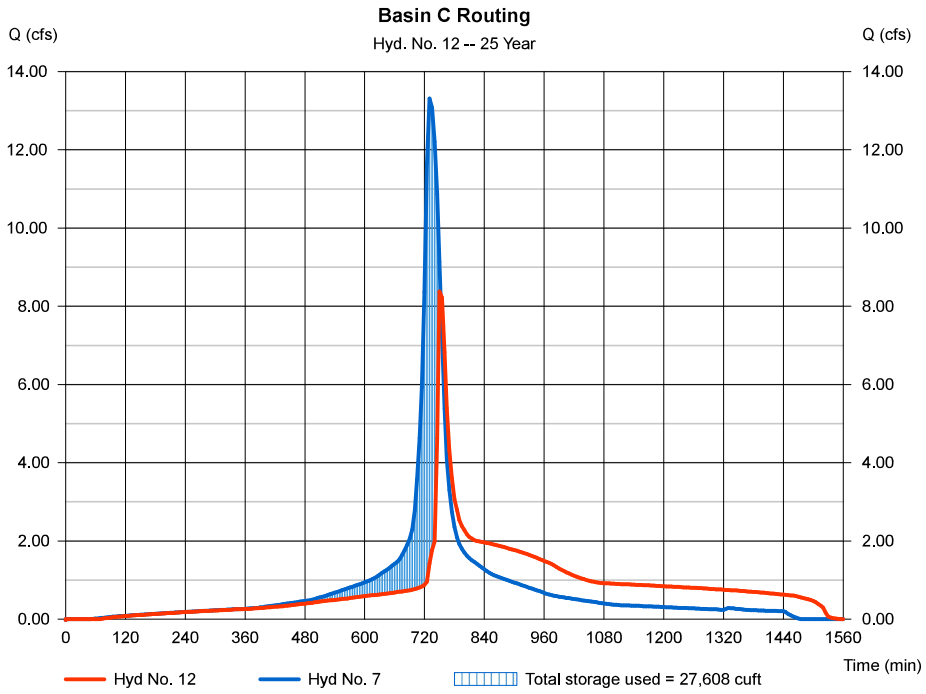
Hydrograph Report

Hyd. No. 12

Basin C Routing

Hydrograph type	=	Reservoir	Peak discharge	=	8.383 cfs
Storm frequency	=	25 yrs	Time to peak	=	750 min
Time interval	=	5 min	Hyd. volume	=	77,163 cuft
Inflow hyd. No.	=	7 - Combined to Basin C	Max. Elevation	=	76.82 ft
Reservoir name	=	Basin C	Max. Storage	=	27,608 cuft

Storage Indication method used.

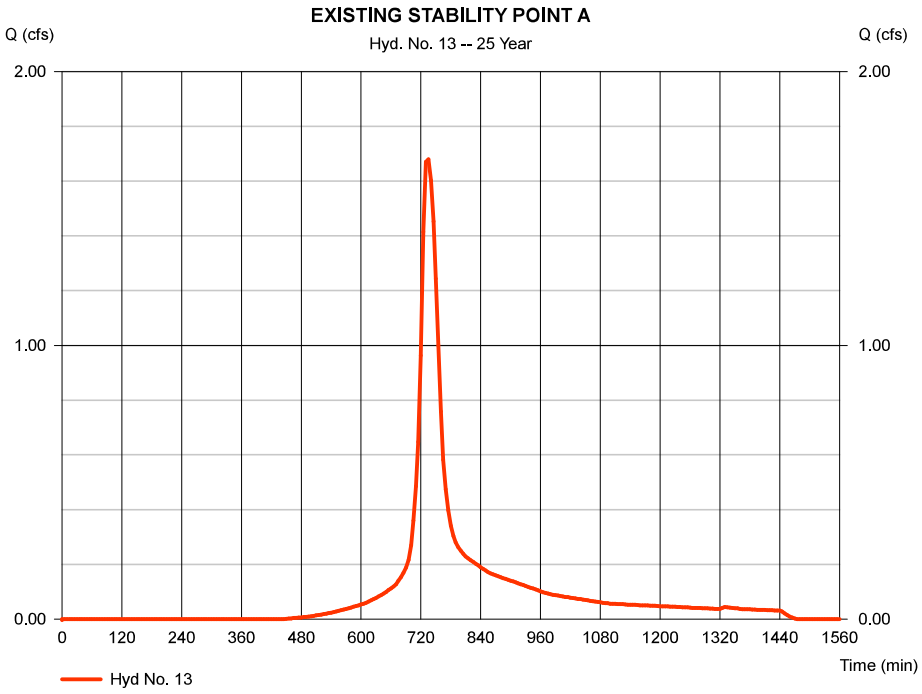


Hydrograph Report

Hyd. No. 13

EXISTING STABILITY POINT A

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.679 cfs
Storm frequency	=	25 yrs	Time to peak	=	735 min
Time interval	=	5 min	Hyd. volume	=	8,824 cuft
Drainage area	=	0.620 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	10.00 min
Total precip.	=	6.53 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	285

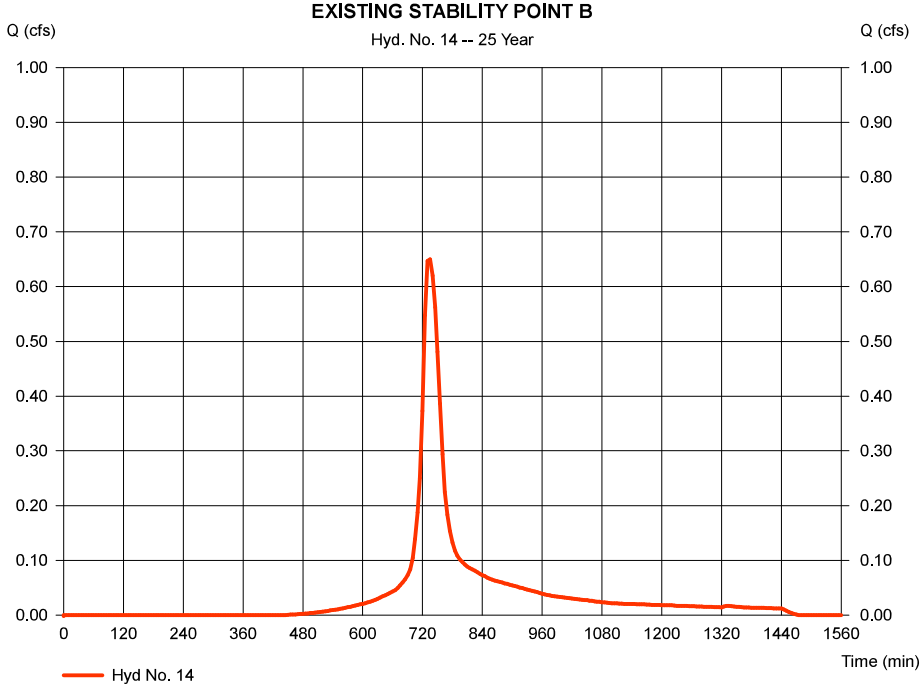


Hydrograph Report

Hyd. No. 14

EXISTING STABILITY POINT B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.650 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 3,416 cuft
Drainage area	= 0.240 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285

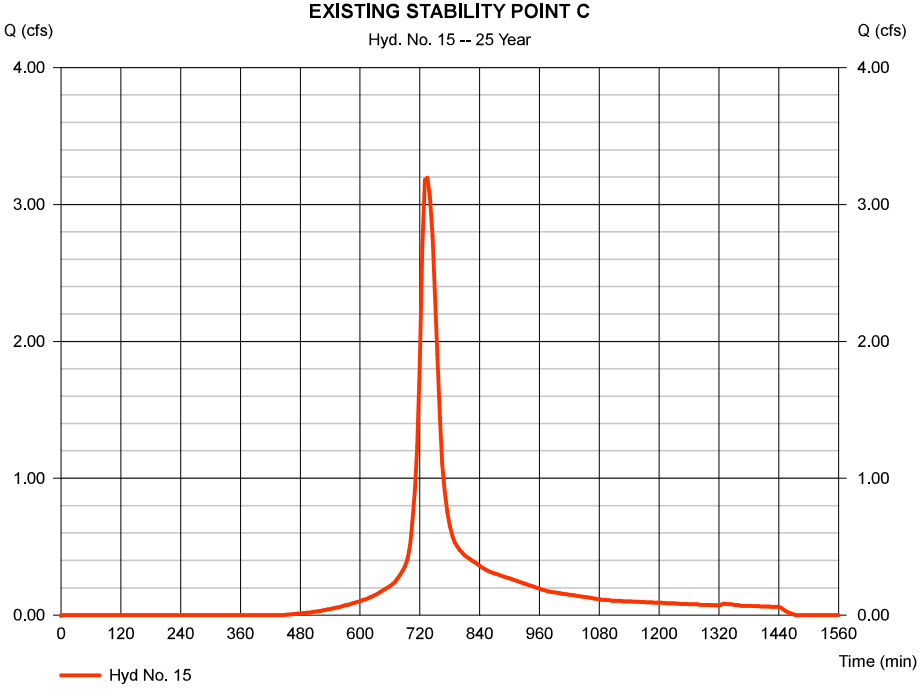


Hydrograph Report

Hyd. No. 15

EXISTING STABILITY POINT C

Hydrograph type	= SCS Runoff	Peak discharge	= 3.196 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 16,795 cuft
Drainage area	= 1.180 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.53 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 285



10. STORMWATER COLLECTION CALCULATION (PIPE SIZING)

DYNAMIC ENGINEERING

Stormwater Collection System Calculations

Project: Greenwich Park
Job #: 2841-99-001
Location: Texas Rd & Greenwood Rd, Marlboro, NJ
Design Storm: 25 YR

Computed By: KSOOK
Checked By: SRC
Date: 1/18/2021

NOTES:
1) Design method used is Rational Method
2) Refer to Weighted Runoff Coefficient table for calculation of incremental areas and C values

PIPE SECTION		SUBCATCHMENT AREA	INCREMENTAL		CUMULATIVE	TIME OF CONCENTRATION			I	PEAK RUNOFF		PIPING INPUT			PIPING DATA		
FROM	TO	Area (Acres)	"C"	A x C Ac	A x C (acres)	Tc to Inlet (min)	Tc in Pipe (min.)	Final Tc (min)	(In/Hr)	Q to Inlet (CFS)	Q cum. for Pipe (CFS)	Dia. (In)	Length (Ft)	Man. "n"	Slope (ft/ft)	Pipe Capacity (cfs)	Pipe Velocity (fps)
209	MH207	0.14	0.28	0.04	0.04	10.00	0.28	10.00	6.80	0.27	0.27	15	74.0	0.011	0.0050	5.40	4.40
307	HW306	0.15	0.93	0.14	0.14	10.00	0.05	10.00	6.80	0.95	0.95	15	18.0	0.011	0.0098	7.55	6.16
113	112	0.32	0.85	0.27	0.27	10.00	0.11	10.00	6.80	1.84	1.84	15	42.0	0.011	0.0100	7.63	6.22
112	111	0.19	0.89	0.17	0.44	10.00	0.51	10.11	6.80	1.16	2.99	15	232.0	0.011	0.0150	9.35	7.62
111	110	0.72	0.88	0.63	1.07	10.00	0.25	10.62	6.68	4.21	7.15	15	129.0	0.011	0.0190	10.52	8.58
110	MH109	0.75	0.84	0.63	1.70	10.00	0.18	10.87	6.68	4.21	11.36	18	76.0	0.011	0.0100	12.41	7.03
MH109	MH108	0.00	0.00	0.00	1.70	10.00	0.10	11.05	6.56	0.00	11.15	18	43.0	0.011	0.0100	12.41	7.03
MH107	HW106	0.00	0.00	0.00	2.19	10.00	0.06	11.40	6.56	0.00	14.37	24	21.0	0.011	0.0050	18.90	6.02
MH207	HW206	0.00	0.00	0.00	0.04	10.00	0.16	10.28	6.80	0.00	0.27	15	58.0	0.011	0.0100	7.63	6.22

11.INLET AREA SUMMARY

DYNAMIC ENGINEERING

Inlet Area Summary and Average Coefficient (C) Calculations

Project: Greenwich Park
Job #: 2841-99-001
Location: Texas Rd & Greenwood Rd, Marlboro NJ

Computed By: KSOOK
Checked By: SRC
Date: 1/18/2021

Drainage Area	Impervious Area (sf)	Coefficient (C) Used	Open Space/Woods Area for Soil Group B (SF)	Coefficient (C) Used	Average Coefficient (C) Used	Total Area (SF)	Total Area (acres)
209	4258	0.95	1860	0.35	0.77	6118	0.14
114	33166	0.95	3545	0.35	0.89	36711	0.84
110	26707	0.95	6095	0.35	0.84	32802	0.75
111	27383	0.95	3833	0.35	0.88	31216	0.72
112	7467	0.95	873	0.35	0.89	8340	0.19
113	11858	0.95	2271	0.35	0.85	14129	0.32
307	6465	0.95	249	0.35	0.93	6714	0.15
Totals	117305		18726			136031	3.1

12. NJGRS Spreadsheets

New Jersey Groundwater Recharge Spreadsheet Version 2.0 November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
MONMOUTH CO., MARLBORO TWP	44.9	1.44

Project Name:	**Ashbel Associates, LLC**
Description:	**120 Unit Residential Layout**
Analysis Date:	**08/01/20**

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	2.71	Woods	Atsion	0.0	-
2	7.55	Woods	Elkton	0.0	-
3	5.82	Woods	Klej	13.7	290,144
4	18.54	Woods	Manahawkin	0.0	-
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	34.6			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				2.3	290,144

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.04	Open space	Atsion	0.0	-
2	2.67	Woods	Atsion	0.0	-
3	7.55	Woods	Elkton	0.0	-
4	5.82	Woods	Klej	13.7	290,144
5	12.56	Woods	Manahawkin	0.0	-
6	3.7	Impervious areas	Manahawkin	0.0	-
7	2.28	Open space	Manahawkin	0.0	-
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	34.6			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				2.3	290,144

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	161,172
Post-Development Annual Recharge Deficit=	***0***	(cubic feet)	

Recharge Efficiency Parameters Calculations (area averages)

RWC=	1.48	(in)	DRWC=	1.48	(in)
ERWC =	0.41	(in)	EDRWC=	0.41	(in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

13. RIP-RAP CALCULATIONS

DYNAMIC ENGINEERING

245 Main Street, Suite 110, Chester, NJ 07930
(908) 879-9229

Date: 1/20/2021
Project: Hyde Park
Project No: 2841-99-001

Calculated By: KS
Checked By: SRC

Conduit Outlet Protection Calculations

Rip Rap Pad # 1

Design Parameters:

Design Storm Flow for 25 Year, Q	0.43	cfs
Vertical Dimension of Outlet Pipe, D_o	15	in
Horizontal Dimension of Outlet Pipe, W_o	15	in
Tailwater Depth, TW[1]	0.25	ft

Apron Dimension Calculations:

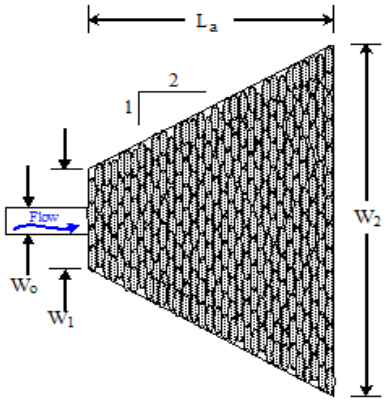
Unit Dicharge, $q = Q/D_o$ = 0.35 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

Apron Length, $L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o$ = 9.31 ft or L_a = **10 ft**

Width, $W_1 = 3W_o$ = 3.75 ft or W_1 = **4 ft**

Width, $W_2 = 3W_o + L_a$ = 13.06 ft or W_2 = **14 ft**

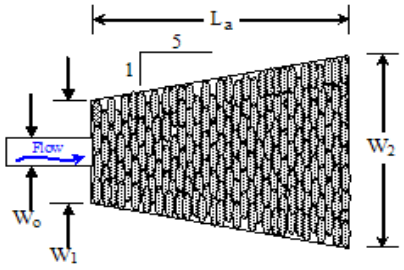


- **Case II: $TW \geq 1/2\ D_o$**

Apron Length, $L_a = \frac{3q}{D_o^{1/2}}$ = L_a =

Width, $W_1 = 3W_o$ = W_1 =

Width, $W_2 = 3W_o + 0.4L_a$ = W_2 =



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 0.23 in d_{50} = **6 in**

Notes:

1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

DYNAMIC ENGINEERING

245 Main Street, Suite 110, Chester, NJ 07930
(908) 879-9229

Date: 1/20/2021
Project: Hyde Park
Project No: 2841-99-001

Calculated By: KS
Checked By: SRC

Conduit Outlet Protection Calculations

Rip Rap Pad # 2

Design Parameters:

Design Storm Flow for 25 Year, Q	0.95	cfs
Vertical Dimension of Outlet Pipe, D_o	15	in
Horizontal Dimension of Outlet Pipe, W_o	15	in
Tailwater Depth, TW[1]	1.11	ft

Apron Dimension Calculations:

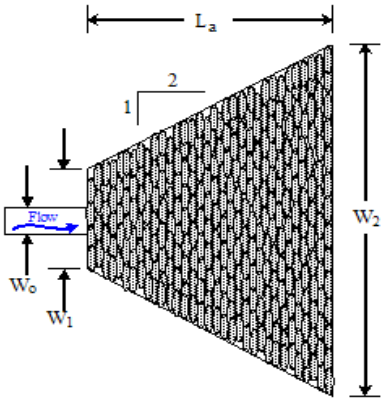
Unit Dicharge, $q = Q/D_o$ = 0.76 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

  Apron Length, $L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o$ = L_a =

  Width, $W_1 = 3W_o$ = W_1 =

  Width, $W_2 = 3W_o + L_a$ = W_2 =

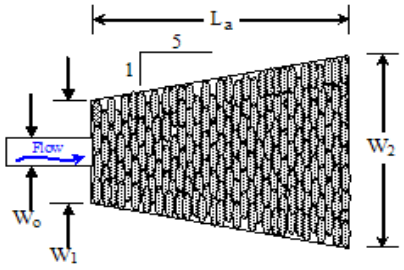


- **Case II: $TW \geq 1/2\ D_o$**

  Apron Length, $L_a = \frac{3q}{D_o^{1/2}}$ = 2.04 ft or L_a = **6 ft**

  Width, $W_1 = 3W_o$ = 3.75 ft or W_1 = **4 ft**

  Width, $W_2 = 3W_o + 0.4L_a$ = 4.57 ft or W_2 = **6 ft**



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 0.15 in d_{50} = **6 in**

Notes:

1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

DYNAMIC ENGINEERING

245 Main Street, Suite 110, Chester, NJ 07930
(908) 879-9229

Date: 1/20/2021
Project: Hyde Park
Project No: 2841-99-001

Calculated By: KS
Checked By: SRC

Conduit Outlet Protection Calculations

Rip Rap Pad # 3

Design Parameters:

Design Storm Flow for 25 Year, Q	0.27	cfs
Vertical Dimension of Outlet Pipe, D_o	15	in
Horizontal Dimension of Outlet Pipe, W_o	15	in
Tailwater Depth, TW[1]	0.41	ft

Apron Dimension Calculations:

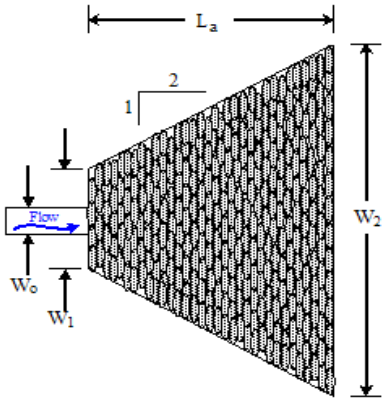
Unit Dicharge, $q = Q/D_o$ = 0.22 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

Apron Length, $L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o$ = 9.1 ft or **L_a = 10 ft**

Width, $W_1 = 3W_o$ = 3.75 ft or **W_1 = 4 ft**

Width, $W_2 = 3W_o + L_a$ = 12.85 ft or **W_2 = 13 ft**

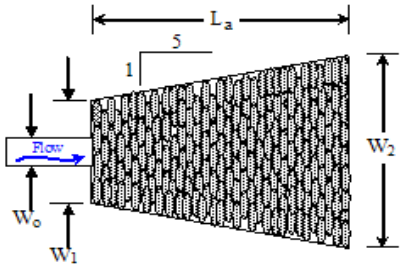


- **Case II: $TW \geq 1/2\ D_o$**

Apron Length, $L_a = \frac{3q}{D_o^{1/2}}$ = **L_a =**

Width, $W_1 = 3W_o$ = **W_1 =**

Width, $W_2 = 3W_o + 0.4L_a$ = **W_2 =**



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 0.08 in **d_{50} = 6 in**

Notes:

1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

DYNAMIC ENGINEERING

245 Main Street, Suite 110, Chester, NJ 07930
(908) 879-9229

Date: 1/20/2021
Project: Hyde Park
Project No: 2841-99-001

Calculated By: KS
Checked By: SRC

Conduit Outlet Protection Calculations

Rip Rap Pad # 4

Design Parameters:

Design Storm Flow for 25 Year, Q	0.27	cfs
Vertical Dimension of Outlet Pipe, D_o	15	in
Horizontal Dimension of Outlet Pipe, W_o	15	in
Tailwater Depth, TW[1]	0.99	ft

Apron Dimension Calculations:

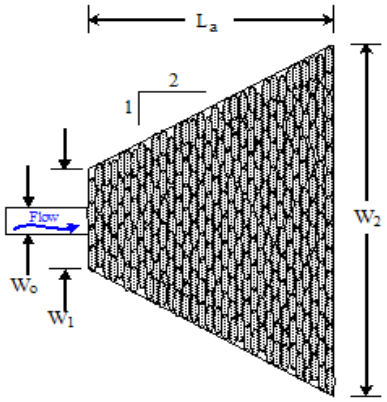
Unit Dicharge, $q = Q/D_o$ = 0.22 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

Apron Length, $L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o$ = L_a =

Width, $W_1 = 3W_o$ = W_1 =

Width, $W_2 = 3W_o + L_a$ = W_2 =

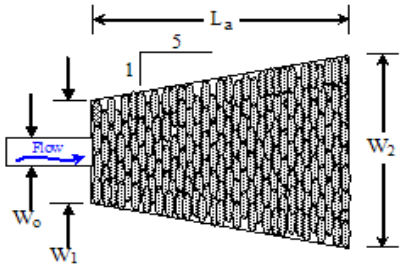


- **Case II: $TW \geq 1/2\ D_o$**

Apron Length, $L_a = \frac{3q}{D_o^{1/2}}$ = .58 ft or L_a = **6 ft**

Width, $W_1 = 3W_o$ = 3.75 ft or W_1 = **4 ft**

Width, $W_2 = 3W_o + 0.4L_a$ = 3.98 ft or W_2 = **6 ft**



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 0.03 in d_{50} = **6 in**

Notes:

1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

DYNAMIC ENGINEERING

245 Main Street, Suite 110, Chester, NJ 07930
(908) 879-9229

Date: 1/20/2021
Project: Hyde Park
Project No: 2841-99-001

Calculated By: KS
Checked By: SRC

Conduit Outlet Protection Calculations

Rip Rap Pad # 5

Design Parameters:

Design Storm Flow for 25 Year, Q	0.27	cfs
Vertical Dimension of Outlet Pipe, D_o	15	in
Horizontal Dimension of Outlet Pipe, W_o	15	in
Tailwater Depth, TW[1]	0.25	ft

Apron Dimension Calculations:

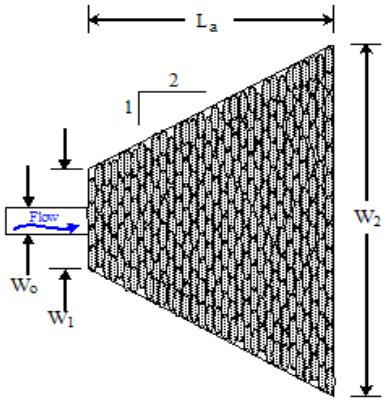
Unit Dicharge, $q = Q/D_o$ = 0.22 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

Apron Length, $L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o$ = 9.1 ft or **L_a = 10 ft**

Width, $W_1 = 3W_o$ = 3.75 ft or **W_1 = 4 ft**

Width, $W_2 = 3W_o + L_a$ = 12.85 ft or **W_2 = 13 ft**

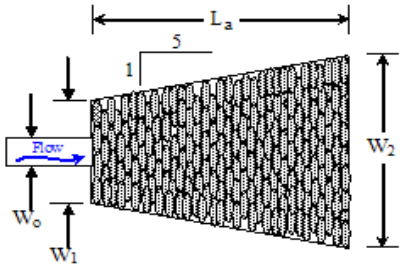


- **Case II: $TW \geq 1/2\ D_o$**

Apron Length, $L_a = \frac{3q}{D_o^{1/2}}$ = **L_a =**

Width, $W_1 = 3W_o$ = **W_1 =**

Width, $W_2 = 3W_o + 0.4L_a$ = **W_2 =**



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 0.13 in **d_{50} = 6 in**

Notes:

1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

DYNAMIC ENGINEERING

245 Main Street, Suite 110, Chester, NJ 07930
(908) 879-9229

Date: 1/20/2021
Project: Hyde Park
Project No: 2841-99-001

Calculated By: KS
Checked By: SRC

Conduit Outlet Protection Calculations

Rip Rap Pad # 6

Design Parameters:

Design Storm Flow for 25 Year, Q	14.37	cfs
Vertical Dimension of Outlet Pipe, D_o	24	in
Horizontal Dimension of Outlet Pipe, W_o	24	in
Tailwater Depth, TW[1]	3.06	ft

Apron Dimension Calculations:

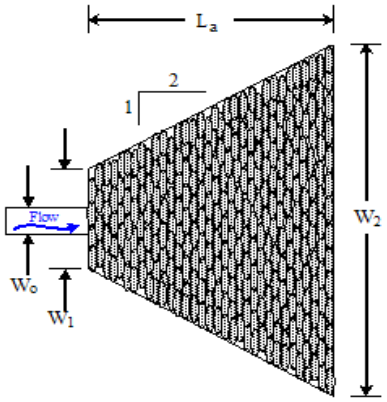
Unit Dicharge, $q = Q/D_o$ = 7.19 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

Apron Length, $L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o$ = **L_a =**

Width, $W_1 = 3W_o$ = **W_1 =**

Width, $W_2 = 3W_o + L_a$ = **W_2 =**

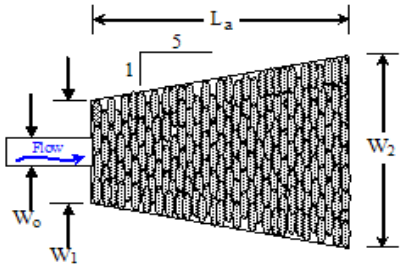


- **Case II: $TW \geq 1/2\ D_o$**

Apron Length, $L_a = \frac{3q}{D_o^{1/2}}$ = 15.24 ft or **L_a = 16 ft**

Width, $W_1 = 3W_o$ = 6. ft or **W_1 = 6 ft**

Width, $W_2 = 3W_o + 0.4L_a$ = 12.1 ft or **W_2 = 13 ft**



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 1.08 in **d_{50} = 6 in**

Notes:

1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

DYNAMIC ENGINEERING

245 Main Street, Suite 110, Chester, NJ 07930
(908) 879-9229

Date: 1/20/2021
Project: Hyde Park
Project No: 2841-99-001

Calculated By: KS
Checked By: SRC

Conduit Outlet Protection Calculations

Rip Rap Pad # 7

Design Parameters:

Design Storm Flow for 25 Year, Q	8.38	cfs
Vertical Dimension of Outlet Pipe, D_o	18	in
Horizontal Dimension of Outlet Pipe, W_o	18	in
Tailwater Depth, TW[1]	0.30	ft

Apron Dimension Calculations:

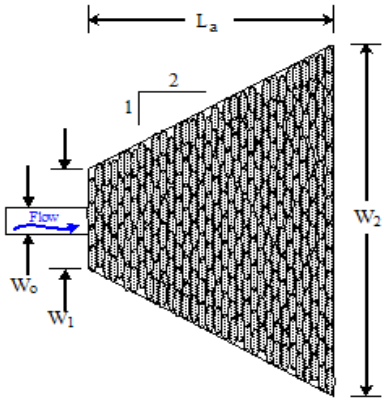
Unit Dicharge, $q = Q/D_o$ = 5.59 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

Apron Length, $L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o$ = 18.71 ft or **L_a = 19 ft**

Width, $W_1 = 3W_o$ = 4.5 ft or **W_1 = 5 ft**

Width, $W_2 = 3W_o + L_a$ = 23.21 ft or **W_2 = 24 ft**

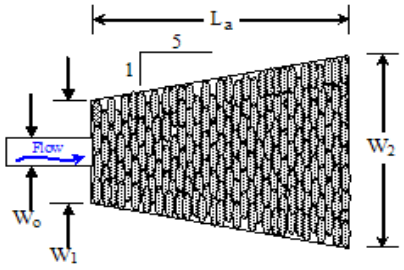


- **Case II: $TW \geq 1/2\ D_o$**

Apron Length, $L_a = \frac{3q}{D_o^{1/2}}$ = **L_a =**

Width, $W_1 = 3W_o$ = **W_1 =**

Width, $W_2 = 3W_o + 0.4L_a$ = **W_2 =**



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 7.89 in **d_{50} = 8 in**

Notes:

1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

DYNAMIC ENGINEERING

245 Main Street, Suite 110, Chester, NJ 07930
(908) 879-9229

Date: 1/20/2021
Project: Hyde Park
Project No: 2841-99-001

Calculated By: KS
Checked By: SRC

Conduit Outlet Protection Calculations

Rip Rap Pad # 8

Design Parameters:

Design Storm Flow for 25 Year, Q	0.82	cfs
Vertical Dimension of Outlet Pipe, D_o	8	in
Horizontal Dimension of Outlet Pipe, W_o	8	in
Tailwater Depth, TW[1]	0.25	ft

Apron Dimension Calculations:

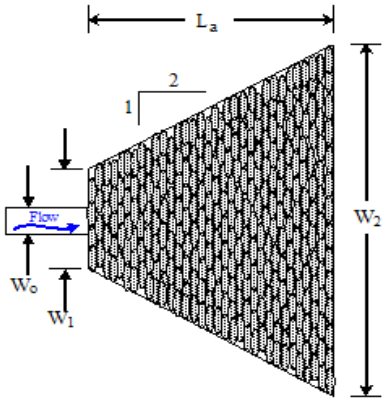
Unit Dicharge, $q = Q/D_o$ = 1.23 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

Apron Length, $L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o$ = 7.38 ft or **L_a = 8 ft**

Width, $W_1 = 3W_o$ = 2. ft or **W_1 = 2 ft**

Width, $W_2 = 3W_o + L_a$ = 9.38 ft or **W_2 = 10 ft**

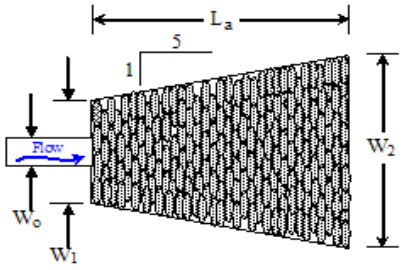


- **Case II: $TW \geq 1/2\ D_o$**

Apron Length, $L_a = \frac{3q}{D_o^{1/2}}$ = **L_a =**

Width, $W_1 = 3W_o$ = **W_1 =**

Width, $W_2 = 3W_o + 0.4L_a$ = **W_2 =**



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 1.26 in **d_{50} = 6 in**

Notes:

1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

14. CLASS IV DAM CALCULATIONS

DYNAMIC ENGINEERING

Class IV Dam Calculations

Project: Ashbel Associates, LLC
Job #: 2841-99-001
Location: Greenwood Road & Texas Road, Marlboro, NJ
Date: 1/20/2021

Calculated by: SMM
Checked By: SRC

Basin	Basin Bottom Elevation	Outlet Elevation	Emergency Spillway Elevation	Outlet Pipe Elevation	Dam Height (ft)	100-yr Elevation	100-yr Inflow (cfs)	100-yr Plug Elev.	150% 100-yr Plug (cfs)	150% 100-yr Elevation	TOB Elev.	Freeboard (ft.)
A	81.50	81.40	83.90	80.92	2.98	83.86	2.17	83.88	N/A	-	84.90	1.00
B	81.00	80.90	84.50	79.10	5.40	84.27	5.74	84.36	8.61	84.52	85.52	1.02
C	72.00	71.90	76.99	71.47	5.52	76.99	18.53	77.12	27.80	77.35	78.35	1.36

15. JELLYFISH MTD DETAIL AND NJDEP CERTIFICATION

DRAWING NOT TO BE USED FOR CONSTRUCTION

GENERAL NOTES:
1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. JELLYFISH STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE JELLYFISH SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR PROJECT BID DATE OR AS DIRECTED BY THE ENGINEER OF RECORD.

JELLYFISH STRUCTURE & DESIGN NOTES:
1. 762 MM Ø (30") MAINTENANCE ACCESS WALL TO BE USED FOR CLEANOUT AND ACCESS BELOW CARTRIDGE DECK.
2. CASTINGS OR DOORS OF THE JELLYFISH MANHOLE STRUCTURE TO EXTEND TO DESIGN FINISH GRADE. DEPTHS IN EXCESS OF 3.65 M (12') MAY REQUIRE THE DESIGN AND INSTALLATION OF INTERMEDIATE SAFETY GRATES OR OTHER STRUCTURAL ELEMENTS.
3. CASTINGS AND GRADE RINGS, OR DOORS AND DOOR RISERS, OR BOTH, SHALL BE GROUTED FOR WATERTIGHTNESS.
   STRUCTURE SHALL MEET AASHTO HS-20, ASSUMING EARTH COVER OF 0' - 3', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 LOAD RATING AND BE CAST WITH THE IMBRIUM LOGO.
4. ALL STRUCTURAL SECTIONS AND PARTS TO MEET OR EXCEED ASTM C-478, ASTM C-443, AND ASTM D-4097 CORRESPONDING TO AASHTO SPECIFICATIONS, AND ANY OTHER SITE OR LOCAL STANDARDS.
5. CONCRETE RISER SECTIONS FROM BOTTOM TO TOP WILL BE ADDED AS REQUIRED INCLUDING TRANSITION PIECES TO SMALLER DIAMETER RISERS FOR SURFACE ACCESSES WHERE WARRANTED BY SERVICING DEPTH.
6. IF MINIMUM DEPTH FROM TOP OF CARTRIDGE DECK TO BOTTOM OF STRUCTURAL TOP SLAB CANNOT BE ACHIEVED DUE TO PIPING INVERT ELEVATIONS OR OTHER SITE CONSTRAINTS. ALTERNATIVE HATCH CONFIGURATIONS MAY BE AVAILABLE. HATCH DOORS SHOULD BE SIZED TO PROVIDE FULL ACCESS ABOVE THE CARTRIDGES TO ACCOMMODATE MAINTENANCE.
7. STEPS TO BE APPROXIMATELY 330 MM (13") APART AND DIMENSIONS MUST MEET LOCAL STANDARDS. STEPS MUST BE INSTALLED AFTER CARTRIDGE DECK IS IN PLACE.
8. CONFIGURATION OF INLET AND OUTLET PIPE CAN VARY TO MEET SITE'S NEEDS.
9. IT IS THE RESPONSIBILITY OF OTHERS TO PROPERLY PROTECT THE TREATMENT DEVICE, AND KEEP THE DEVICE OFFLINE DURING CONSTRUCTION. FILTER CARTRIDGES SHALL NOT BE INSTALLED UNTIL THE PROJECT SITE IS CLEAN AND FREE OF DEBRIS, BY OTHERS. THE PROJECT SITE INCLUDES ANY SURFACE THAT CONTRIBUTES STORM DRAINAGE TO THE TREATMENT DEVICE. CARTRIDGES SHALL BE FURNISHED NEW, AT THE TIME OF FINAL ACCEPTANCE.
10. THIS DRAWING MUST BE VIEWED IN CONJUNCTION WITH THE STANDARD JELLYFISH SPECIFICATION, AND STORMWATER QUALITY FILTER TREATMENT JELLYFISH DOCUMENTS.

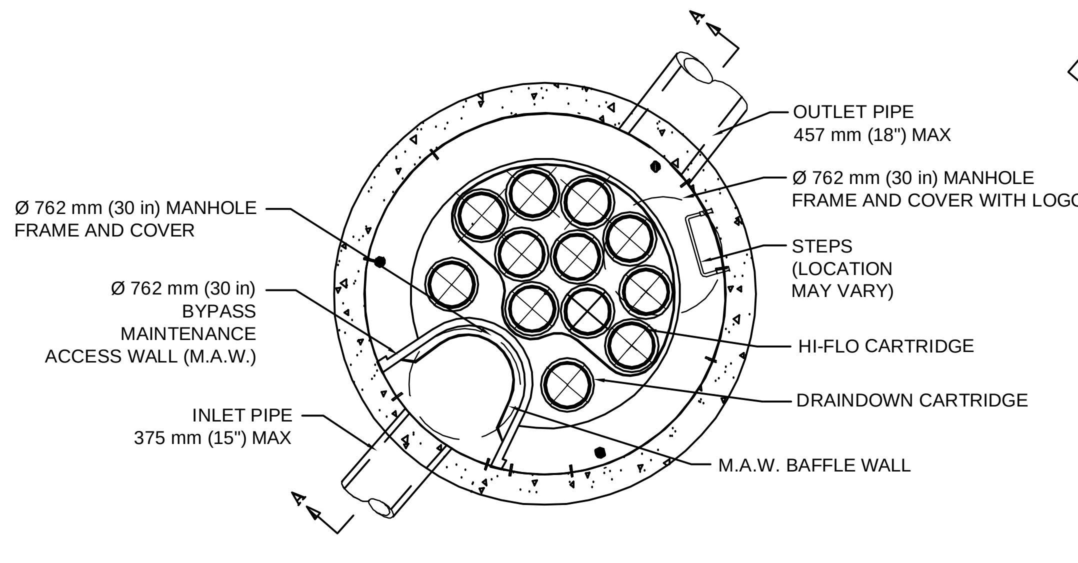
PEAK DIVERSION JELLYFISH DESIGN NOTES:
1. STRUCTURE SHALL MEET AASHTO HS-20 OR PER APPROVING JURISDICTION REQUIREMENTS; WHICHEVER IS MORE STRINGENT, ASSUMING EARTH COVER OF 0' - 3', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 LOAD RATING AND BE CAST WITH THE IMBRIUM LOGO.
2. STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.
3. INLET HGL NOT TO EXCEED 6" BELOW THE TOP OF THE M.A.W. DURING THE PEAK DESIGN STORM, OR 10-YEAR STORM (WHICHEVER IS GREATER).
4. INLET PIPE INVERT ELEVATION VARIES FROM 1" TO 6" MAXIMUM ABOVE THE OUTLET PIPE INVERT.
5. OUTLET PIPE INVERT IS EQUAL TO THE CARTRIDGE DECK ELEVATION.
6. THE OUTLET PIPE DIAMETER FOR NEW INSTALLATIONS IS TO BE ONE PIPE SIZE LARGER THAN THE INLET PIPE AT EQUAL OR GREATER SLOPE.
7. THE DIFFERENCE IN THE INLET AND OUTLET PIPE ELEVATIONS FOR RETROFIT INSTALLATIONS TO EXISTING STORM DRAIN PIPES SHALL BE EQUAL TO THE SLOPE OVER THE DIAMETER OF THE MANHOLE; NOT THE EXCEED 6" IN VERTICAL DIFFERENTIAL BETWEEN INLET AND OUTLET PIPES.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. CARTRIDGE INSTALLATION, BY IMBRIUM, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE JELLYFISH UNIT IS CLEAN AND FREE OF DEBRIS. CONTACT IMBRIUM TO COORDINATE CARTRIDGE INSTALLATION WITH SITE STABILIZATION.

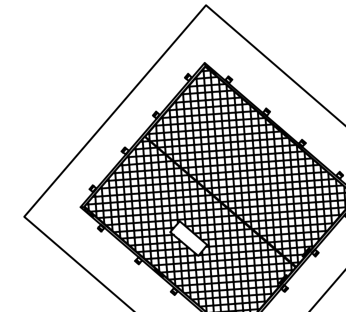
PEAK DIVERSION JELLYFISH RECOMMENDED PIPE DIAMETERS

MODEL DIAMETER (m)	MINIMUM ANGLE INLET/OUTLET PIPES	MINIMUM INLET PIPE DIAMETER (mm)	MAXIMUM INLET PIPE DIAMETER (mm)
1.2	62	150	300
1.8	59	200	300
2.4	52	250	375
3.0	48	300	450
3.6	40	300	450
CONTACT IMBRIUM SYSTEMS FOR ALTERNATE PIPE DIAMETERS			

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL JELLYFISH FILTER REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE.

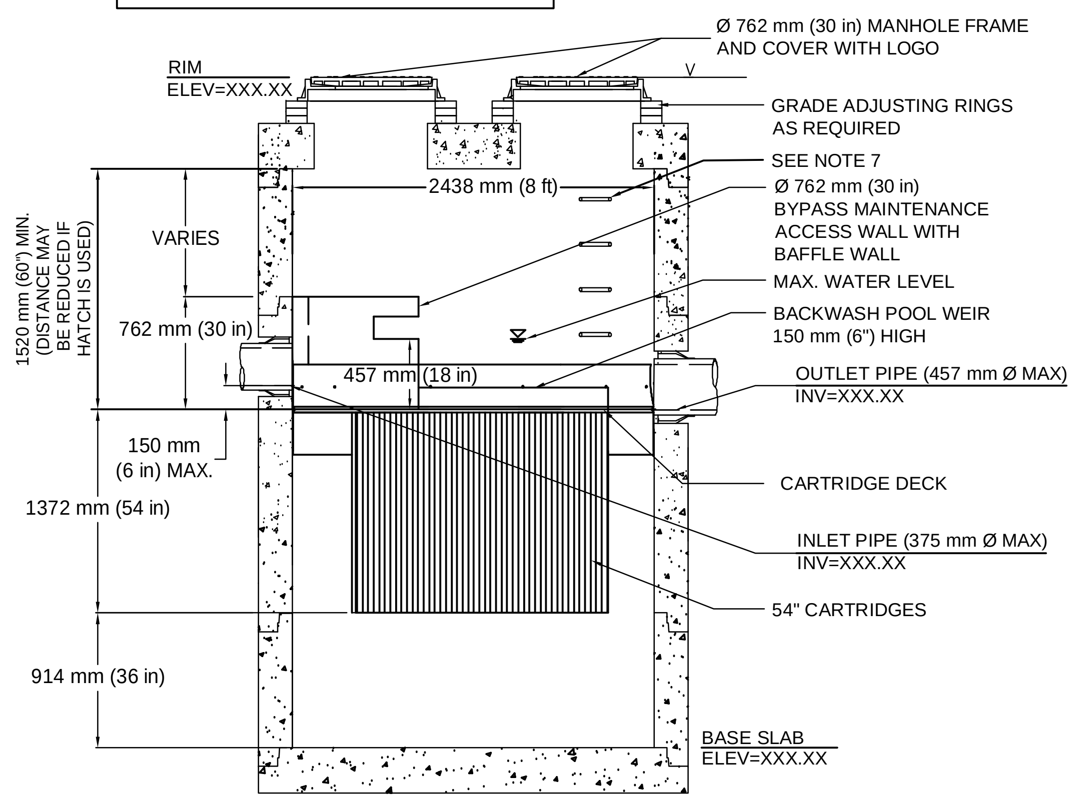


JF8 (PEAK DIVERSION) PLAN VIEW



1829 mm x 1829 mm (72 in. x 72 in.)
OPTIONAL HATCH

XXX.XX INFORMATION TO BE SUPPLIED BY ENGINEER OF RECORD



JELLYFISH CROSS SECTION A-A

JELLYFISH DESIGN NOTES

JELLYFISH TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. THE STANDARD MANHOLE STYLE IS SHOWN. Ø2438 mm (96") MANHOLE JELLYFISH PEAK TREATMENT CAPACITY IS 55.5 L/s (1.96 CFS), AND MAXIMUM BYPASS CAPACITY IS 141.6 L/s (5.00 CFS). IF THE SITE CONDITIONS EXCEED TOTAL CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED. TREATMENT FLOW RATE IS BASED ON 457 MM (18") OF HEAD PRESSURE.

CARTRIDGE SELECTION				
CARTRIDGE DEPTH	54"	40"	27"	15"
OUTLET INVERT TO STRUCTURE BASE SLAB	90"	76"	63"	51"
FLOW RATE HIGH-FLO / DRAINDOWN (L/s) (per cart)	5.09 / 2.55	3.68 / 1.84	2.55 / 1.27	1.41 / 0.71
SEDIMENT CAPACITY HIGH-FLO / DRAINDOWN (kg) (per cart)	57 / 28	42 / 21	28 / 14	16 / 8
MAX. CARTS HIGH-FLO/DRAINDOWN	10 / 2			
MAX. BYPASS (L/s)	141.6			
MAX. SEDIMENT CAPACITY (kg)	626	462	308	176
MAX. TREATMENT (L/s)	55.5	41.6	27.7	15.3
MAX. TREATMENT AND BYPASS (L/s) (TOTAL CAPACITY)	197.1	183.2	169.3	156.9

SITE SPECIFIC DATA REQUIREMENTS

JELLYFISH MODEL	*
STRUCTURE ID	*
WATER QUALITY FLOW RATE (L/s)	*
BYPASS FLOW RATE (L/s)	*
PEAK FLOW RATE (L/s)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
# OF CARTRIDGES REQUIRED (HF / DD)	*
CARTRIDGE SIZE (inches)	*
MAX BYPASS DESIGN CAPACITY (L/s)	141.6

PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

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MARK	DATE	REVISION DESCRIPTION	BY
0	4/15/2015	INTIAL RELEASE	BSF
#	#	#	#
#	#	#	#
#	#	#	#
#	#	#	#

Jellyfish®
JF8 PEAK DIVERSION
Scale = 1:50

www.imbriumsystems.com info@imbriumsystems.com

imbrium®
407 FAIRVIEW DRIVE, WHITBY, ON L1N 3A9
TF 800-565-4801 CA 416-960-9900 INTL +1-416-960-9900
Jellyfish® Filter
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING AUS NO. 2008288749, U.S.A. NO. US 8,287,726, US 8,221,618, US 8,123,935, CA 2,689,482, CA 2, 694,542, KR 10-1287588, NZ 583461, NZ 604227, ZA 2010/01068; OTHER INTERNATIONAL PATENTS PENDING

DATE: ######
DESIGNED: BW | DRAWN: BSF
CHECKED: BW | APPROVED: SP
PROJECT #: ######
SHEET: 1 OF 2

I:\IMBRIUM\PRODUCTS\JELLYFISH FILTER\40 DRAWINGS & DETAILS\STANDARD DETAILS\JELLYFISH FILTER - PEAK DIVERSION MANHOLE\JELLYFISH FILTER JF8 - PEAK DIVERSION.DWG 4/15/2019 9:40 AM

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

May 14, 2012

Joel Garbon
Product Manager
7564 Standish Place
Suite 112
Rockville, MD 20855

Re: Final Certification
Jellyfish® Filter by Imbrium Systems

Expiration Date: December 1, 2016
TSS Removal Rate: 80%

Dear Mr. Garbon:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Imbrium Systems. has requested a Final Certification for the Jellyfish® Filter.

This project falls under the "Transition for Manufactured Treatment Devices July 15, 2011". The Jellyfish Filter by Imbrium Systems qualified for Category C. Manufactured Treatment Devices Seeking Final Certifications - In Process which are MTDs that have commenced field testing on or before August 1, 2011.

NJDEP received the required information from signed statement sby the NJCAT Technical Director and the manufacturer listing the indicating that the requirements of the 2009 NJDEP Field Testing Protocols have been met or exceeded. NJDEP also received a signed statement from the third party testing entity, University of Florida, indicating that the testing requirements have been met or exceeded. The NJCAT letter also includes a recommended certification TSS removal rate and the required maintenance plan.

The NJDEP certifies the use of the Jellyfish Filter by Imbrium Systems at TSS removal rate of 80%, subject to the following conditions:

1. The Jellyfish Filter is designed according to the NJ Water Quality Design Storm in N.J.A.C. 7:8-5.5.
2. The peak inflow of the water quality design storm is limited to the following:

For each hi-flow cartridge, the maximum inflow is 1.48 gpm and a maximum inflow drainage area is 0.012 impervious acres, for each inch of cartridge length.

For each draindown cartridge, the maximum inflow 0.74 gpm and the maximum inflow drainage area is 0.006 impervious acres for each inch of cartridge length.

Example: For a 54-inch hi-flo cartridge length, the maximum inflow is 80 gpm and the maximum inflow drainage area is 0.65 impervious acres.

Maximum treatment flow rates for typical Jellyfish Filter models are provided in Table 1.

Maximum treatment flow rates and maximum inflow drainage areas for various cartridge lengths are provided in Table 2.

3. The bottom of the Jellyfish tentacles is a minimum of 2 feet above the bottom of the vault. The sedimentation area in the vault shall be a minimum of 4 ft^2 per cartridge.
4. The Jellyfish Filter is certified as an off-line system only.
5. The Jellyfish Filter cannot be used in series with a settling chamber (such as a hydrodynamic separator) or a media filter (such as a sand filter), to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.
6. The maintenance plan for sites using this device shall incorporate, at a minimum, the maintenance requirements for the Jellyfish Filter shown in Appendix A below.

In addition to the attached, any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8, must include a detailed maintenance plan. The detailed maintenance plan must include all of the items identified in Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance of the New Jersey Stormwater Best Management Manual.

NJDEP anticipates proposing further adjustments to this process through the readoption of the Stormwater Management Rules. Additional information regarding the implementation of the Stormwater Management Rules, N.J.A.C. 7:8, are available at www.njstormwater.org. If you have any questions regarding the above information, please contact Ms. Sandra Blick of my office at (609) 633-7021.

Sincerely,

Ed Frankel, P.P., Section Chief
Bureau of Nonpoint Pollution Control

C: Chron File
Richard Magee, NJCAT
Mark Pedersen, DLUR
Elizabeth Dragon, BNPC

Table 1
Maximum Treatment Flow Rates for
Standard (54" Cartridge Length) Jellyfish® Filter Models

Manhole Diameter (ft)	Model No.	Hi-Flo Cartridges (54" Length)	Draindown Cartridges (54" Length)	Maximum Treatment Flow Rate (gpm / cfs)
Catch Basin		varies	varies	varies
4	JF4-2-1	2	1	200 / 0.45
6	JF6-3-1	3	1	280 / 0.62
	JF6-4-1	4	1	360 / 0.80
	JF6-5-1	5	1	440 / 0.98
	JF6-6-1	6	1	520 / 1.16
8	JF8-6-2	6	2	560 / 1.25
	JF8-7-2	7	2	640 / 1.43
	JF8-8-2	8	2	720 / 1.60
	JF8-9-2	9	2	800 / 1.78
	JF8-10-2	10	2	880 / 1.96
10 [1]	JF10-11-3	11	3	1000 / 2.23
	JF10-12-3	12	3	1080 / 2.41
	JF10-13-3	13	3	1160 / 2.58
	JF10-14-3	14	3	1240 / 2.76
	JF10-15-3	15	3	1320 / 2.94
	JF10-16-3	16	3	1400 / 3.12
12 [2]	JF12-17-4	17	4	1520 / 3.39
	JF12-18-4	18	4	1600 / 3.57
	JF12-19-4	19	4	1680 / 3.74
	JF12-20-4	20	4	1760 / 3.92
	JF12-21-4	21	4	1840 / 4.10
	JF12-22-4	22	4	1920 / 4.28
	JF12-23-4	23	4	2000 / 4.46
	JF12-24-4	24	4	2080 / 4.63
Vault		varies	varies	varies

[1] The MTFR for a 10-ft diameter unit occurs with Model JF10-16-3. Since this leaves 4 unoccupied cartridge receptacles in the 10-ft diameter deck, the design engineer has the option to add up to 4 additional cartridges to increase the sediment capacity of the system, however may not increase the MTFR above that of the JF10-16-3.

[2] The MTFR for a 12-ft diameter unit occurs with Model JF12-24-4. Since this leaves 4 unoccupied cartridge receptacles in the 12-ft diameter deck, the design engineer has the option to add up to 4 additional cartridges to increase the sediment capacity of the system, however may not increase the MTFR above that of the JF12-24-4.

Table 2
Maximum Treatment Flow Rate and
Maximum Inflow Drainage Area
for Various Jellyfish® Cartridge Lengths

Cartridge Length (inches)	Maximum Treatment Flow Rate (gpm)	Maximum Inflow Drainage Area (impervious acres)
15	Hi-Flo 22 Draindown 11	Hi-Flo 0.18 Draindown 0.09
27	Hi-Flo 40 Draindown 20	Hi-Flo 0.32 Draindown 0.16
40	Hi-Flo 60 Draindown 30	Hi-Flo 0.48 Draindown 0.24
54	Hi-Flo 80 Draindown 40	Hi-Flo 0.65 Draindown 0.32

Appendix A

Imbrium Systems Jellyfish® Filter
Inspection and Maintenance Information

Jellyfish® Filter Inspection and Maintenance
Regular inspection and maintenance are proven, cost-effective ways to maximize water resource protection for all stormwater pollution control practices, and are required to insure proper functioning of the Jellyfish Filter. Inspection of the Jellyfish Filter is easily performed from the surface, while proper maintenance requires a combination of procedures conducted from the surface and with worker entry into the structure. The Jellyfish Filter's patented technology has no moving parts, keeping the process simple.

Please refer to the following information and guidelines before conducting inspection and maintenance activities.

When is inspection needed?

- Post-construction inspection is required prior to putting the Jellyfish Filter into service.
- A minimum of two inspections are required during the first year of operation to accurately assess the sediment and floatable pollutant accumulation, and to ensure that the automatic backwash feature is functioning properly.
- Inspection frequency in subsequent years is based on the maintenance plan developed in the first year.
- Inspections must also be performed immediately after an oil, fuel or other chemical spill.

When is maintenance service needed?

- For optimum performance, the unit must be cleaned out once the sediment depth reaches 12 inches of accumulation. Generally, the minimum cleaning frequency is once annually, although the frequency can be based on historical inspection results.
- Filter cartridges must be cleaned and re-commissioned, or replaced, every 12 months or when the automatic backwash feature no longer functions, whichever occurs first. The automatic backwash function will be disabled if the filter cartridges become saturated with sediment. This saturated condition is indicated if the backwash pool contains more than 3 inches depth of water after 12 or more hours of dry weather have elapsed since the most recent rainfall/runoff event.
- The unit must be cleaned out immediately after an oil, fuel or chemical spill.

What conditions can compromise the Jellyfish Filter's performance?

- If sediment accumulates beyond 12 inches in depth, filter cartridge life and sediment removal efficiency may be reduced.
- If filter cartridges become saturated with sediment, the system may not provide filtration treatment at the designed water quality flow rate, and unfiltered water may bypass the filter cartridges.
- If an oil spill(s) exceeds the oil capacity of the system, subsequent spills may not be captured and may cause fouling of the filter cartridges.
- If debris clogs the inlet of the system, removal efficiency of sediment, hydrocarbons, and gross pollutants may be reduced.
- If a downstream blockage occurs, a backwater condition may occur in the system and removal efficiency of sediment, hydrocarbons, and gross pollutants may be reduced.

What training is required?

The Jellyfish Filter is inspected and maintained by professional vacuum cleaning service providers with experience in the maintenance of underground tanks, sewers and catch basins. Since some of the maintenance procedures require manned entry into the Jellyfish structure, only professional maintenance service providers trained in confined space entry procedures should enter the vessel. Service provider companies typically have personnel who are trained and certified in confined space entry procedures according to local, state, and federal standards.

For typical inspection and maintenance activities, no specific supplemental training is required for the Jellyfish Filter. Information provided in this document or the Jellyfish Filter Owner's Manual contains sufficient guidance to maintain the system properly.

What equipment is typically required for inspection?

- Manhole access cover lifting tool
- Oil dipstick or sampling tool
- Sediment probe
- Flashlight
- Camera
- Data log
- Safety cones and caution tape
- Hard hat, safety shoes, safety glasses, and chemical-resistant gloves

How is the Jellyfish Filter inspected?

- The Jellyfish filter system can be inspected from the surface through the standard surface manhole access cover or custom doors.
- Sediment and oil depth inspections are performed with a sediment probe and oil dipstick. Sediment and oil depth are measured through the maintenance access wall.
- Visual inspection for floatable pollutant accumulation such as litter and hydrocarbons is also performed by shining a flashlight into the maintenance access wall.
- Visual inspection of the backwash pool (6-inch high kidney-shaped or oval-shaped

weir) should also be performed to check for standing water in the pool. If at least 12 hours of dry weather have elapsed since the most recent rainfall/runoff event and the backwash pool contains more than 3 inches of water, this condition indicates that the filter cartridges are saturated with sediment and should be cleaned or replaced.
- Inspections also involve a visual inspection of the internal components of the system for obvious damage.

What equipment is typically required for maintenance?

- Vacuum truck equipped with water hose and jet nozzle
- Small pump and tubing for oil removal, if necessary
- Manhole access cover lifting tool
- Oil dipstick or sampling tool
- Sediment probe
- Flashlight
- Camera
- Data log
- Safety cones and caution tape
- Hard hats, safety shoes, safety glasses, chemical-resistant gloves, and hearing protection for service providers
- Gas analyzer, respiratory gear, and safety harness for specially trained personnel if confined space entry is required
- Replacement cartridges are required if manual cleaning and re-commissioning of existing cartridges is not possible or adequate to restore proper system function.
- Jellyfish Cartridge Backflush Pipe

How is the Jellyfish Filter maintained?

- The Jellyfish Filter can be maintained through the standard surface manhole access cover. All access covers should be removed to provide additional light and ventilation. If custom doors were installed instead of frames and covers, open all doors.
- If the filter cartridges are to be manually backflushed (see procedure below), perform the manual backflush service prior to vacuum removal of sediment, floatable, and water (i.e. perform the manual backflush with the lower chamber full of water).
- Insert the oil dipstick or sampling tool into the maintenance access wall. If oil is present, pump off the oil layer into separate containment using a small pump and tubing. Some maintenance service providers may elect to use the vacuum hose if the oil amount is small.
- Maintenance cleaning of accumulated floatable litter and sediment is performed with a vacuum hose inserted through the maintenance access wall.
- Using the vacuum hose, decant the water from the lower chamber to the sanitary sewer, if permitted by the local regulating authority, or into a separate containment tank.
- Remove the sediment from the bottom of the unit using the vacuum hose.
- For larger Jellyfish Filters, (8-ft, 10-ft, 12-ft diameter), complete sediment removal

may be facilitated by inserting a garden hose sprayer through a hole in the cartridge deck where a blank cartridge lid (no orifice in the cartridge lid) or filter cartridge has been removed. Use the garden hose sprayer to break up sediment on the bottom of vessel that is farthest from the maintenance access wall, being careful not to cut or otherwise damage the filter tentacle membranes with excessive water pressure. (Note: Use of a garden hose sprayer is recommended. Do not use a high pressure jet sprayer or power washer, as excessive water pressure may damage the filter tentacle membranes.) Rinse the loosened sediment toward the maintenance access wall for easy vacuum removal.

- To access the cartridge deck for manual cleaning or replacement of filter cartridges, descend the ladder that is built into structure's sidewall, observing all precautions for safe and proper confined space entry. Note that the cartridge deck may be slippery. Care should be taken to avoid stepping directly onto the backwash pool weir, as damage may result.
- A manual backflush of the cartridges is recommended to remove a high percentage of accumulated sediment from the filtration tentacles, restore flow capacity, and extend the service life of the cartridges. A Jellyfish Cartridge Backflush Pipe (12-inch diameter x 40-inch length aluminum pipe with flapper valve) may be purchased from Imbrium Systems that allows each cartridge to be selectively backwashed using water that is supplied from either (a) the previously decanted water stored in a vactor truck compartment; (b) clean water from a separate water truck delivered to the site; or (c) water from a nearby fire hydrant or other clean water source. NOTE: Manual backflushing of the cartridges is best performed with the lower chamber full of water (i.e. prior to vacuuming out the sediment, floatables, and water). This ensures that a uniform backflush pressure is applied across all of the filter media surface area.
- **Manual backflush procedure**: Twist the threaded cartridge lid on the cartridge receptacle counter-clockwise to remove the lid and expose the cartridge head. (**NOTE: Do not step directly onto an exposed cartridge head when a cartridge lid is removed, as excessive downward force may damage the cartridge receptacle and result in injury if the cartridge head is forced through the receptacle and into the lower chamber.**) Place the Jellyfish Cartridge Backflush Pipe over the cartridge receptacle such that the gasket on the bottom of the Backflush Pipe is seated on the rim of the cartridge receptacle. Fill the Backflush Pipe with water (approximately 16 gallons). Pull the cord to open the flapper valve and backflush the water through the cartridge. Refill the Pipe and backflush a second time. The full Pipe contents should drain down to the top of the open flapper valve (30 inches from the top of the Pipe) within approximately 15 seconds to remove a high percentage of accumulated sediment and restore the flow capacity of the cartridge. Remove the Pipe and re-install the lid hand-tight. For the most thorough backflushing, backflush the Draindown Cartridge(s) first, followed by the Hi-Flo Cartridges, then finish with a final single backflush on the Draindown Cartridge(s). (NOTE: The Hi-Flo Cartridges are those cartridges within the kidney-shaped 6-inch high backwash pool weir. The Draindown Cartridges are those cartridges outside the backwash pool weir. See the diagram below for reference.) When backflushing a cartridge, it is important to keep the lids in place on all other cartridges both as a safety precaution and so that water displaced from the lower chamber during backflushing is properly filtered when discharged to the top of the cartridge deck.

- **Optional manual rinsing procedure**: If manual backwashing using the Jellyfish Cartridge Backflush Pipe is ineffective in restoring adequate cartridge flow capacity, cartridges may be removed, manually rinsed, and re-commissioned. With the threaded cartridge lid removed, slowly and carefully remove the cartridge from the receptacle using the lifting loops in the cartridge head. (NOTE: Should a snag occur, do not force the cartridge upward as this may result in damage to the tentacles. Instead, gently rotate the cartridge with a slight sideways motion to clear the snag and remove the cartridge.) Remove the cartridge from the vessel, as rinsing is best performed outside the vessel. Immediately replace the lid on the exposed receptacle/hole as a safety precaution. Using a garden hose sprayer, direct the water spray at an angle across the tentacle membrane surface, starting at the top of the tentacle and working downward. For most effective rinsing, remove each tentacle from the cartridge head plate by unscrewing the attachment nut, and perform a 360 degree rinse of each tentacle. Re-attach the rinsed tentacles to the head plate and re-commission the cleaned cartridge. If manual rinsing cannot be performed, or if inspection upon rinsing indicates damage to the tentacles, provisions must be made to replace the spent or damaged tentacles with new tentacles. Contact Imbrium Systems to order replacement tentacles.
- New cartridges are lightweight (less than 20 pounds), and can be easily lowered down to a worker on the cartridge deck. Care should be taken not to bend or otherwise damage the tentacles during the handling and installation procedures.
- For maximum safety, it is recommended that each cartridge be removed and replaced one at a time, such that there is never more than one cartridge receptacle/hole exposed.
- After vacuuming out sediment, floatables, and water, re-fill the lower chamber with water where required by the local jurisdiction.

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What is required for proper disposal?

- Disposal requirements for recovered pollutants and spent filter cartridges may vary depending on local guidelines. In most areas the sediment and spent filter cartridges, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste.

What about oil spills?

- Petroleum-based pollutants captured by the Jellyfish Filter (oil/chemical/fuel spills) should be removed and disposed of by a licensed waste management company.
- Although the Jellyfish Filter captures virtually all free oil, a sheen at the outlet **does not** mean the unit isn't working. A rainbow or sheen can be visible at oil concentrations of less than 10 mg/L (ppm).

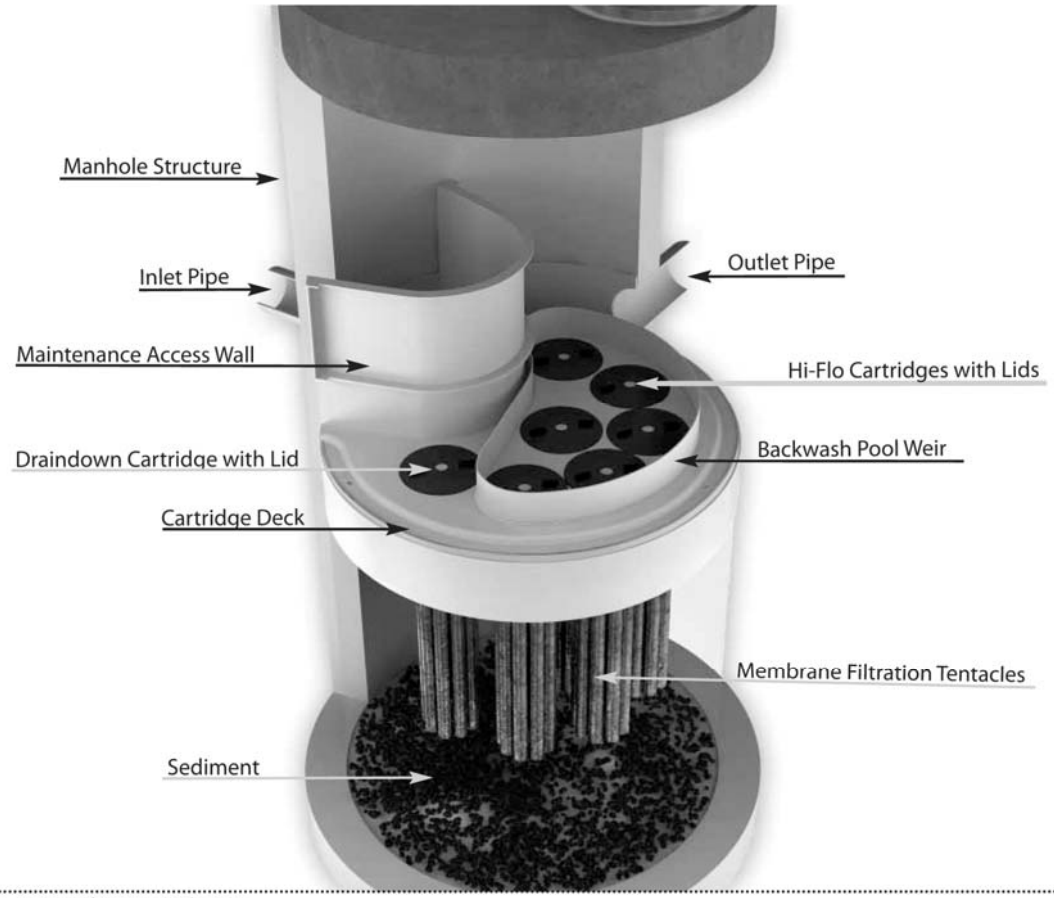
What factors affect the costs involved with inspection/maintenance?

- Inspection and maintenance costs are based on unit size, cartridge count, sediment/oil/hazardous material loads, transportation distances, tipping fees, disposal requirements and other local regulations. Maintenance costs are anticipated to be substantially lower in instances where dirty cartridges are manually cleaned and re-commissioned rather than replaced with new cartridges.

Below is a cut-away schematic of the Jellyfish Filter with key components identified (6-ft diameter manhole configuration is depicted).

FIGURE 1

Jellyfish Filter and Components

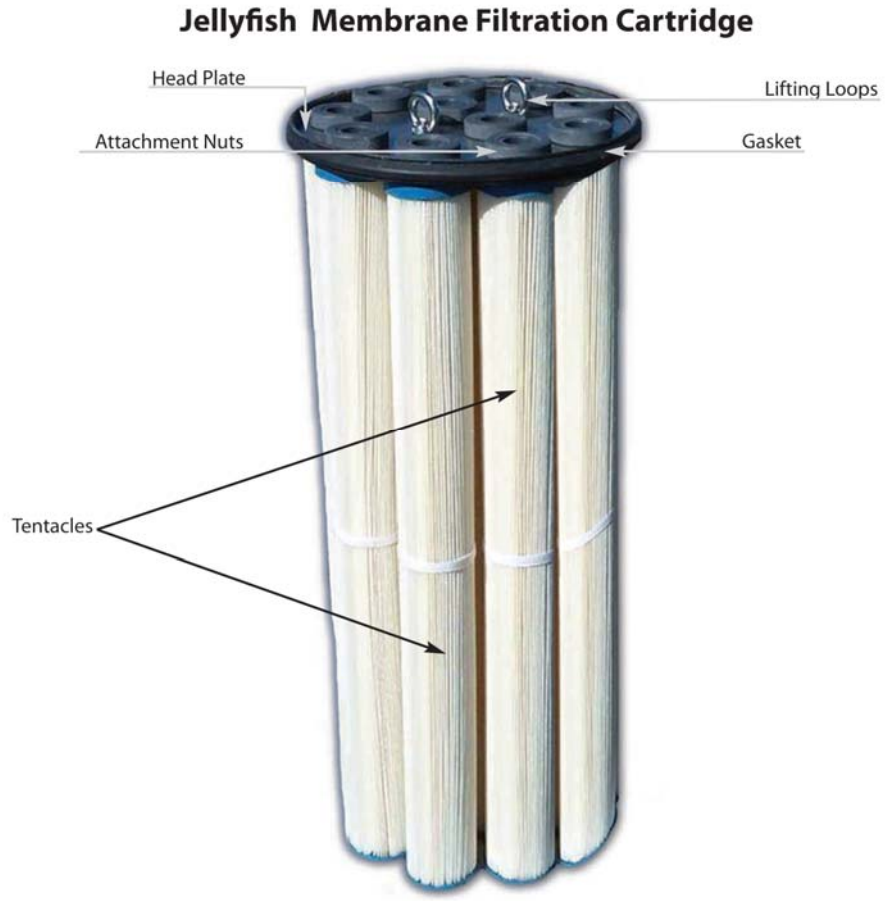


Note: Separator Skirt Not Shown

The Jellyfish Filter has no moving parts to wear out and therefore maintenance activities are generally focused on pollutant removal and filter cartridge service.

Below is a schematic of a Jellyfish Filter membrane filtration cartridge. The extraordinarily high surface area of the membrane filtration tentacles provides superior flow and sediment capacity as well as low head loss. Tentacles can be easily removed from the head plate and replaced.

FIGURE 2



The depth of sediment and oil can be measured from the surface by using a sediment probe or dipstick tube equipped with a ball check valve and inserted through the Jellyfish Filter's maintenance access wall. The large opening in the maintenance access wall provides convenient access for inspection and vacuum removal of water and pollutants.

A maintenance worker stationed on the surface uses a vacuum hose to evacuate water, sediment, and debris from the system.

The benefits of regular inspection and maintenance are many – from ensuring maximum operation efficiency, to keeping maintenance costs low, to the continued protection of natural waterways – and provide the key to the Jellyfish Filter's long and effective service life.

Ordering Replacement Parts

Jellyfish filter cartridges, replacement tentacles, cartridge lids, Jellyfish Cartridge Backflush Pipes (for manual backflushing), and other system components can be ordered by contacting:

Imbrium Systems Corporation
1-888-279-8826
www.imbriumsystems.com

(revised 3-28-12)

JELLYFISH® FILTER - SPECIFICATIONS

GENERAL

A. WORK INCLUDED: SPECIFIES REQUIREMENTS FOR CONSTRUCTION AND PERFORMANCE OF AN UNDERGROUND STORMWATER QUALITY, MEMBRANE FILTRATION, AND TREATMENT DEVICE THAT REMOVES POLLUTANTS FROM STORMWATER RUNOFF THROUGH THE UNIT OPERATIONS OF SEDIMENTATION, FLOATATION, AND MEMBRANE FILTRATION.

B. REFERENCE STANDARDS:

ASTM C 891:	SPECIFICATION FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES
ASTM C 478:	SPECIFICATION FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS
ASTM C 990:	SPECIFICATION FOR JOINTS FOR CONCRETE MANHOLES USING PREFORMED FLEXIBLE JOINT SEALANTS
ASTM D 4101:	SPECIFICATION FOR COPOLYMER STEPS CONSTRUCTION

C. SHOP DRAWINGS: SHOP DRAWINGS FOR THE STRUCTURE AND PERFORMANCE ARE TO BE SUBMITTED WITH EACH ORDER TO THE CONTRACTOR. CONTRACTOR SHALL FORWARD SHOP DRAWING SUBMITTAL TO THE CONSULTING ENGINEER FOR APPROVAL. SHOP DRAWINGS ARE TO DETAIL THE STRUCTURE PRECAST CONCRETE AND CALL OUT OR NOTE THE FIBERGLASS (FRP) INTERNALS/COMPONENTS.

D. PRODUCT SUBSTITUTIONS: NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD. SUBMISSIONS FOR SUBSTITUTIONS REQUIRE REVIEW AND APPROVAL BY THE ENGINEER OF RECORD, FOR HYDRAULIC PERFORMANCE, IMPACT TO PROJECT DESIGNS, EQUIVALENT TREATMENT PERFORMANCE, AND ANY REQUIRED PROJECT PLAN AND REPORT (HYDROLOGY/HYDRAULIC, WATER QUALITY, STORMWATER POLLUTION) MODIFICATIONS THAT WOULD BE REQUIRED BY THE APPROVING JURISDICTIONS/AGENCIES. CONTRACTOR TO COORDINATE WITH THE ENGINEER OF RECORD ANY APPLICABLE MODIFICATIONS TO THE PROJECT ESTIMATES OF COST, BONDING AMOUNT DETERMINATIONS, PLAN CHECK FEES FOR CHANGES TO APPROVED DOCUMENTS, AND/OR ANY OTHER REGULATORY REQUIREMENTS RESULTING FROM THE PRODUCT SUBSTITUTION.

E. HANDLING AND STORAGE: PREVENT DAMAGE TO MATERIALS DURING STORAGE AND HANDLING.

PRODUCTS

A. THE DEVICE SHALL BE A CYLINDRICAL OR RECTANGULAR, ALL CONCRETE STRUCTURE (INCLUDING RISERS), CONSTRUCTED FROM PRECAST CONCRETE RISER AND SLAB COMPONENTS OR MONOLITHIC PRECAST STRUCTURE(S), INSTALLED TO CONFORM TO ASTM C 891 AND TO ANY REQUIRED STATE HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS; WHICHEVER IS MORE STRINGENT. THE DEVICE SHALL BE WATERTIGHT.

B. THE CYLINDRICAL CONCRETE DEVICE SHALL INCLUDE A FIBERGLASS CARTRIDGE DECK INSERT. THE RECTANGULAR CONCRETE DEVICE SHALL INCLUDE A COATED ALUMINUM INSERT. IN EITHER INSTANCE, THE INSERT SHALL BE BOLTED AND SEALED WATERTIGHT INSIDE THE PRECAST CONCRETE CHAMBER. THE INSERT SHALL SERVE AS: (A) A HORIZONTAL DIVIDER BETWEEN THE LOWER TREATMENT ZONE AND THE UPPER TREATED EFFLUENT ZONE; (B) A DECK FOR ATTACHMENT OF FILTER CARTRIDGES SUCH THAT THE MEMBRANE FILTER ELEMENTS OF EACH CARTRIDGE EXTEND INTO THE LOWER TREATMENT ZONE; (C) A PLATFORM FOR MAINTENANCE WORKERS TO SERVICE THE FILTER CARTRIDGES (MAXIMUM MANNED WEIGHT = 450 POUNDS); (D) A CONDUIT FOR CONVEYANCE OF TREATED WATER TO THE EFFLUENT PIPE.

C. MEMBRANE FILTER CARTRIDGES SHALL BE COMPRISED OF REUSABLE CYLINDRICAL MEMBRANE FILTER ELEMENTS CONNECTED TO A PERFORATED HEAD PLATE. THE NUMBER OF MEMBRANE FILTER ELEMENTS PER CARTRIDGE SHALL BE A MINIMUM OF ELEVEN 2.75-INCH (70-MM) OR GREATER DIAMETER ELEMENTS. THE LENGTH OF EACH FILTER ELEMENT SHALL BE A MINIMUM 15 INCHES (381 MM). EACH CARTRIDGE SHALL BE FITTED INTO THE CARTRIDGE DECK BY INSERTION INTO A CARTRIDGE RECEPTACLE THAT IS PERMANENTLY MOUNTED INTO THE CARTRIDGE DECK. EACH CARTRIDGE SHALL BE SECURED BY A CARTRIDGE LID THAT IS THREADED ONTO THE RECEPTACLE, OR SIMILAR MECHANISM TO SECURE THE CARTRIDGE INTO THE DECK. THE MAXIMUM TREATMENT FLOW RATE OF A FILTER CARTRIDGE SHALL BE CONTROLLED BY AN ORIFICE IN THE CARTRIDGE LID, OR ON THE INDIVIDUAL CARTRIDGE ITSELF, AND BASED ON A DESIGN FLUX RATE (SURFACE LOADING RATE) DETERMINED BY THE MAXIMUM TREATMENT FLOW RATE PER UNIT OF FILTRATION MEMBRANE SURFACE AREA. THE MAXIMUM FLUX RATE SHALL BE 0.21 GPM/FT2 (0.142 LPS/M2). EACH MEMBRANE FILTER CARTRIDGE SHALL ALLOW FOR MANUAL INSTALLATION AND REMOVAL.

D. ALL FILTER CARTRIDGES AND MEMBRANES SHALL BE REUSABLE AND ALLOW FOR THE USE OF FILTRATION MEMBRANE RINSING PROCEDURES TO RESTORE FLOW CAPACITY AND SEDIMENT CAPACITY; EXTENDING CARTRIDGE SERVICE LIFE.

E. ACCESS SHALL HAVE A MINIMUM CLEAR HEIGHT OF 60" OVER ALL OF THE FILTER CARTRIDGES, OR BE ACCESSIBLE BY A HATCH OR OTHER MECHANISM THAT PROVIDES MINIMUM 60" VERTICAL CLEAR SPACE OVER ALL OF THE FILTER CARTRIDGES. FILTER CARTRIDGES SHALL BE ABLE TO BE LIFTED STRAIGHT VERTICALLY OUT OF THE RECEPTACLES AND DECK FOR THE ENTIRE LENGTH OF THE CARTRIDGE.

F. THE DEVICE SHALL INCLUDE A MINIMUM 24 INCHES (610 MM) OF SUMP BELOW THE BOTTOM OF THE CARTRIDGES FOR SEDIMENT ACCUMULATION, UNLESS OTHERWISE SPECIFIED BY THE DESIGN ENGINEER. DEPTHS LESS THAN 24" MAY HAVE AN IMPACT ON THE TOTAL PERFORMANCE AND/OR LONGEVITY BETWEEN CARTRIDGE MAINTENANCE/REPLACEMENT OF THE DEVICE.

G. ALL PRECAST CONCRETE COMPONENTS SHALL BE MANUFACTURED TO A MINIMUM LIVE LOAD OF HS-20 TRUCK LOADING OR GREATER BASED ON LOCAL REGULATORY SPECIFICATIONS, UNLESS OTHERWISE MODIFIED OR SPECIFIED BY THE DESIGN ENGINEER, AND SHALL BE WATERTIGHT.

H. GASKETS AND/OR SEALANTS TO PROVIDE WATER TIGHT SEAL BETWEEN CONCRETE JOINTS. JOINTS SHALL BE SEALED WITH PREFORMED JOINT SEALING COMPOUND CONFORMING TO ASTM C 990.

I. FRAME AND COVERS MUST BE MANUFACTURED FROM CAST-IRON OR OTHER COMPOSITE MATERIAL TESTED TO WITHSTAND H-20 OR GREATER DESIGN LOADS, AND AS APPROVED BY THE LOCAL REGULATORY BODY. FRAMES AND COVERS MUST BE EMBOSSED WITH THE NAME OF THE DEVICE MANUFACTURER OR THE DEVICE BRAND NAME.

J. DOOR AND HATCHES, IF PROVIDED SHALL MEET DESIGNATED LOADING REQUIREMENTS OR AT A MINIMUM FOR INCIDENTAL VEHICULAR TRAFFIC.

K. ALL CONCRETE COMPONENTS SHALL BE MANUFACTURED ACCORDING TO LOCAL SPECIFICATIONS AND SHALL MEET THE REQUIREMENTS OF ASTM C 478.

L. THE FIBERGLASS PORTION OF THE FILTER DEVICE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE FOLLOWING STANDARD: ASTM D-4097: CONTACT MOLDED GLASS FIBER REINFORCED CHEMICAL RESISTANT TANKS.

M. STEPS SHALL BE CONSTRUCTED ACCORDING TO ASTM D4101 OF COPOLYMER POLYPROPYLENE, AND BE DRIVEN INTO PREFORMED OR PRE-DRILLED HOLES AFTER THE CONCRETE HAS CURED, INSTALLED TO CONFORM TO APPLICABLE SECTIONS OF STATE, PROVINCIAL AND MUNICIPAL BUILDING CODES, HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS FOR THE CONSTRUCTION OF SUCH DEVICES.

N. ALL PRECAST CONCRETE SECTIONS SHALL BE INSPECTED TO ENSURE THAT DIMENSIONS, APPEARANCE AND QUALITY OF THE PRODUCT MEET LOCAL MUNICIPAL SPECIFICATIONS AND ASTM C 478.

PERFORMANCE

A. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL FUNCTION TO REMOVE POLLUTANTS BY THE FOLLOWING UNIT TREATMENT PROCESSES; SEDIMENTATION, FLOATATION, AND MEMBRANE FILTRATION.

B. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL REMOVE OIL, DEBRIS, TRASH, COARSE AND FINE PARTICULATES, PARTICULATE-BOUND POLLUTANTS, METALS AND NUTRIENTS FROM STORMWATER DURING RUNOFF EVENTS.

C. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL TYPICALLY UTILIZE AN EXTERNAL BYPASS TO DIVERT EXCESSIVE FLOWS. INTERNAL BYPASS SYSTEMS SHALL BE EQUIPPED WITH A FLOATABLES BAFFLE, AND MUST PASS WATER OVER THE CARTRIDGE DECK, AND AVOID PASSAGE THROUGH THE SUMP AND/OR CARTRIDGE FILTRATION ZONE.

D. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL TREAT 100% OF THE REQUIRED WATER QUALITY TREATMENT FLOW BASED ON A MAXIMUM TREATMENT FLUX RATE (SURFACE LOADING RATE) ACROSS THE MEMBRANE FILTER CARTRIDGES NOT TO EXCEED 0.21 GPM/FT2 (0.142 LPS/M2).

E. AT A MINIMUM, THE STORMWATER QUALITY FILTER DEVICE SHALL HAVE BEEN FIELD TESTED AND VERIFIED WITH A MINIMUM 25 QUALIFYING STORM EVENTS AND FIELD MONITORING CONDUCTED ACCORDING TO THE TARP TIER II OR TAPE FIELD TEST PROTOCOL, AND HAVE RECEIVED NJCAT VERIFICATION.

F. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TSS REMOVAL EFFICIENCY OF 85% AND A MINIMUM MEDIAN SSC REMOVAL EFFICIENCY OF 95%.

G. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED THE ABILITY TO CAPTURE FINE PARTICLES AS INDICATED BY A MINIMUM MEDIAN REMOVAL EFFICIENCY OF 75% FOR THE PARTICLE FRACTION LESS THAN 25 MICRONS, AN EFFLUENT D50 OF 15 MICRONS OR LOWER FOR ALL MONITORED STORM EVENTS, AND AN EFFLUENT TURBIDITY OF 15 NTUS OR LOWER.

H. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TOTAL PHOSPHORUS REMOVAL OF 55%, AND A MINIMUM MEDIAN TOTAL NITROGEN REMOVAL OF 50%.

I. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TOTAL ZINC REMOVAL OF 50%, AND A MINIMUM MEDIAN TOTAL COPPER REMOVAL OF 75%.

INSPECTION AND MAINTENANCE

A. DURABILITY OF MEMBRANES ARE SUBJECT TO GOOD HANDLING PRACTICES DURING INSPECTION AND MAINTENANCE (REMOVAL, RINSING, AND REINSERTION) EVENTS, AND SITE SPECIFIC CONDITIONS THAT MAY HAVE HEAVIER OR LIGHTER LOADING ONTO THE CARTRIDGES, AND POLLUTANT VARIABILITY THAT MAY IMPACT THE MEMBRANE STRUCTURAL INTEGRITY. MEMBRANE MAINTENANCE AND REPLACEMENT SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

B. INSPECTION WHICH INCLUDES TRASH AND FLOATABLES COLLECTION, SEDIMENT DEPTH DETERMINATION, AND VISIBLE DETERMINATION OF BACKWASH POOL DEPTH SHALL BE EASILY CONDUCTED FROM GRADE (OUTSIDE THE STRUCTURE).

C. MANUAL RINSING OF THE REUSABLE FILTER CARTRIDGES SHALL PROMOTE RESTORATION OF THE FLOW CAPACITY AND SEDIMENT CAPACITY OF THE FILTER CARTRIDGES, EXTENDING CARTRIDGE SERVICE LIFE.

D. SEDIMENT REMOVAL FROM THE FILTER TREATMENT DEVICE SHALL BE ABLE TO BE CONDUCTED USING A STANDARD MAINTENANCE TRUCK AND VACUUM APPARATUS, AND A MINIMUM ONE POINT OF ENTRY TO THE SUMP THAT IS UNOBSTRUCTED BY FILTER CARTRIDGES.

E. MAINTENANCE ACCESS SHALL HAVE A MINIMUM CLEAR HEIGHT OF 60" OVER ALL OF THE FILTER CARTRIDGES, OR BE ACCESSIBLE BY A HATCH OR OTHER MECHANISM THAT PROVIDES MINIMUM 60" VERTICAL CLEAR SPACE OVER ALL OF THE FILTER CARTRIDGES. FILTER CARTRIDGES SHALL BE ABLE TO BE LIFTED STRAIGHT VERTICALLY OUT OF THE RECEPTACLES AND DECK FOR THE ENTIRE LENGTH OF THE CARTRIDGE.

F. FILTER CARTRIDGES SHALL BE ABLE TO BE MAINTAINED WITHOUT THE USE OF ADDITIONAL LIFTING EQUIPMENT.

EXECUTION

A. THE INSTALLATION OF A WATERTIGHT PRECAST CONCRETE DEVICE SHOULD CONFORM TO ASTM C 891 AND TO ANY STATE HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS FOR THE CONSTRUCTION OF MANHOLES, WHICHEVER IS MORE STRINGENT. SELECTED SECTIONS OF A GENERAL SPECIFICATION THAT ARE APPLICABLE ARE SUMMARIZED BELOW.

B. THE WATERTIGHT PRECAST CONCRETE DEVICE IS INSTALLED IN SECTIONS IN THE FOLLOWING SEQUENCE:
- AGGREGATE BASE
- BASE SLAB
- TREATMENT CHAMBER AND CARTRIDGE DECK RISER SECTION(S)
- BYPASS SECTION
- CONNECT INLET AND OUTLET PIPES
- CONCRETE RISER SECTION(S) AND/OR TRANSITION SLAB (IF REQUIRED)
- MAINTENANCE RISER SECTION(S) (IF REQUIRED)
- FRAME AND ACCESS COVER

C. INLET AND OUTLET PIPES SHOULD BE SECURELY SET INTO THE DEVICE USING APPROVED PIPE SEALS (FLEXIBLE BOOT CONNECTIONS, WHERE APPLICABLE) SO THAT THE STRUCTURE IS WATERTIGHT, AND SUCH THAT ANY PIPE INTRUSION INTO THE DEVICE DOES NOT IMPACT THE DEVICE FUNCTIONALITY.

D. ADJUSTMENT UNITS (E.G. GRADE RINGS) SHOULD BE INSTALLED TO SET THE FRAME AND COVER AT THE REQUIRED ELEVATION. THE ADJUSTMENT UNITS SHOULD BE LAID IN A FULL BED OF MORTAR WITH SUCCESSIVE UNITS BEING JOINED USING SEALANT RECOMMENDED BY THE MANUFACTURER. FRAMES FOR THE COVER SHOULD BE SET IN A FULL BED OF MORTAR AT THE ELEVATION SPECIFIED.

E. IN SOME INSTANCES THE MAINTENANCE ACCESS WALL, IF PROVIDED, SHALL REQUIRE AN EXTENSION ATTACHMENT AND SEALING TO THE PRECAST WALL AND CARTRIDGE DECK AT THE JOB SITE, RATHER THAN AT THE PRECAST FACILITY. IN THIS INSTANCE, INSTALLATION OF THESE COMPONENTS SHALL BE PERFORMED ACCORDING TO INSTRUCTIONS PROVIDED BY THE MANUFACTURER.

F. FILTER CARTRIDGES SHALL BE INSTALLED IN THE CARTRIDGE DECK AFTER THE CONSTRUCTION SITE IS FULLY STABILIZED AND IN ACCORDANCE WITH THE MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. CONTRACTOR TO CONTACT THE MANUFACTURER TO SCHEDULE CARTRIDGE DELIVERY AND REVIEW PROCEDURES/REQUIREMENTS TO BE COMPLETED TO THE DEVICE PRIOR TO INSTALLATION OF THE CARTRIDGES AND ACTIVATION OF THE SYSTEM.

G. MANUFACTURER SHALL COORDINATE DELIVERY OF FILTER CARTRIDGES AND OTHER INTERNAL COMPONENTS WITH CONTRACTOR. FILTER CARTRIDGES SHALL BE DELIVERED AND INSTALLED COMPLETE AFTER SITE IS STABILIZED AND UNIT IS READY TO ACCEPT CARTRIDGES. UNIT IS READY TO ACCEPT CARTRIDGES AFTER IS HAS BEEN CLEANED OUT AND ANY STANDING WATER, DEBRIS, AND OTHER MATERIALS HAVE BEEN REMOVED. CONTRACTOR SHALL TAKE APPROPRIATE ACTION TO PROTECT THE FILTER CARTRIDGE RECEPTACLES AND FILTER CARTRIDGES FROM DAMAGE DURING CONSTRUCTION, AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND GUIDANCE. FOR SYSTEMS WITH CARTRIDGES INSTALLED PRIOR TO FULL SITE STABILIZATION AND PRIOR TO SYSTEM ACTIVATION, THE CONTRACTOR CAN PLUG INLET AND OUTLET PIPES TO PREVENT STORMWATER AND OTHER INFLUENT FROM ENTERING THE DEVICE. PLUGS MUST BE REMOVED DURING THE ACTIVATION PROCESS.

H. THE MANUFACTURER SHALL PROVIDE AN OWNER'S MANUAL UPON REQUEST.

I. AFTER CONSTRUCTION AND INSTALLATION, AND DURING OPERATION, THE DEVICE SHALL BE INSPECTED AND CLEANED AS NECESSARY BASED ON THE MANUFACTURER'S RECOMMENDED INSPECTION AND MAINTENANCE GUIDELINES AND THE LOCAL REGULATORY AGENCY/BODY.

J. WHEN REPLACEMENT MEMBRANE FILTER ELEMENTS AND/OR OTHER PARTS ARE REQUIRED, ONLY MEMBRANE FILTER ELEMENTS AND PARTS APPROVED BY THE MANUFACTURER FOR USE WITH THE STORMWATER QUALITY FILTER DEVICE SHALL BE INSTALLED.

END OF SECTION

I:\IMBRIUM\PRODUCTS\JELLYFISH FILTER\40 DRAWINGS & DETAILS\STANDARD DETAILS\JELLYFISH FILTER - PEAK DIVERSION MANHOLE\JELLYFISH FILTER JF8 - PEAK DIVERSION.DWG 4/15/2019 9:41 AM

MARK	DATE	REVISION DESCRIPTION	BY
0	4/15/2015	INTIAL RELEASE	BSF
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CHECKED: BW	APPROVED: SP
PROJECT #: #####	
SHEET: 2 OF 2	

16. RUNOFF RATE REDUCTIONS

DYNAMIC ENGINEERING

Runoff Rate Reduction Performance

Project: Ashbel Associates, LLC
Job #: 2841-99-001
Location: Greenwood Road & Texas Road, Marlboro, NJ
Date: 1/20/2021

Combined Flows to Study Point 1

Design Storm	Existing Runoff Rate from Disturbed Areas (CFS)	Runoff Rate Required Reduction	Maximum Allowable Runoff Rate (CFS)	Proposed Runoff Rate (CFS)
1 Year	0.81	0%	0.81	1.07
2 Year	4.97	50%	2.48	1.51
10 Year	10.66	25%	8.00	2.88
25 Year	14.95	0%	14.95	8.38
100 Year	23.17	20%	18.54	18.38

Stability Point A

Design Storm	Existing Runoff Rate from Disturbed Areas (CFS)	Runoff Rate Required Reduction	Maximum Allowable Runoff Rate (CFS)	Proposed Runoff Rate (CFS)
2 Year	0.56	0%	0.56	0.27
10 Year	1.20	0%	1.20	0.38
25 Year	1.68	0%	N/A	0.43

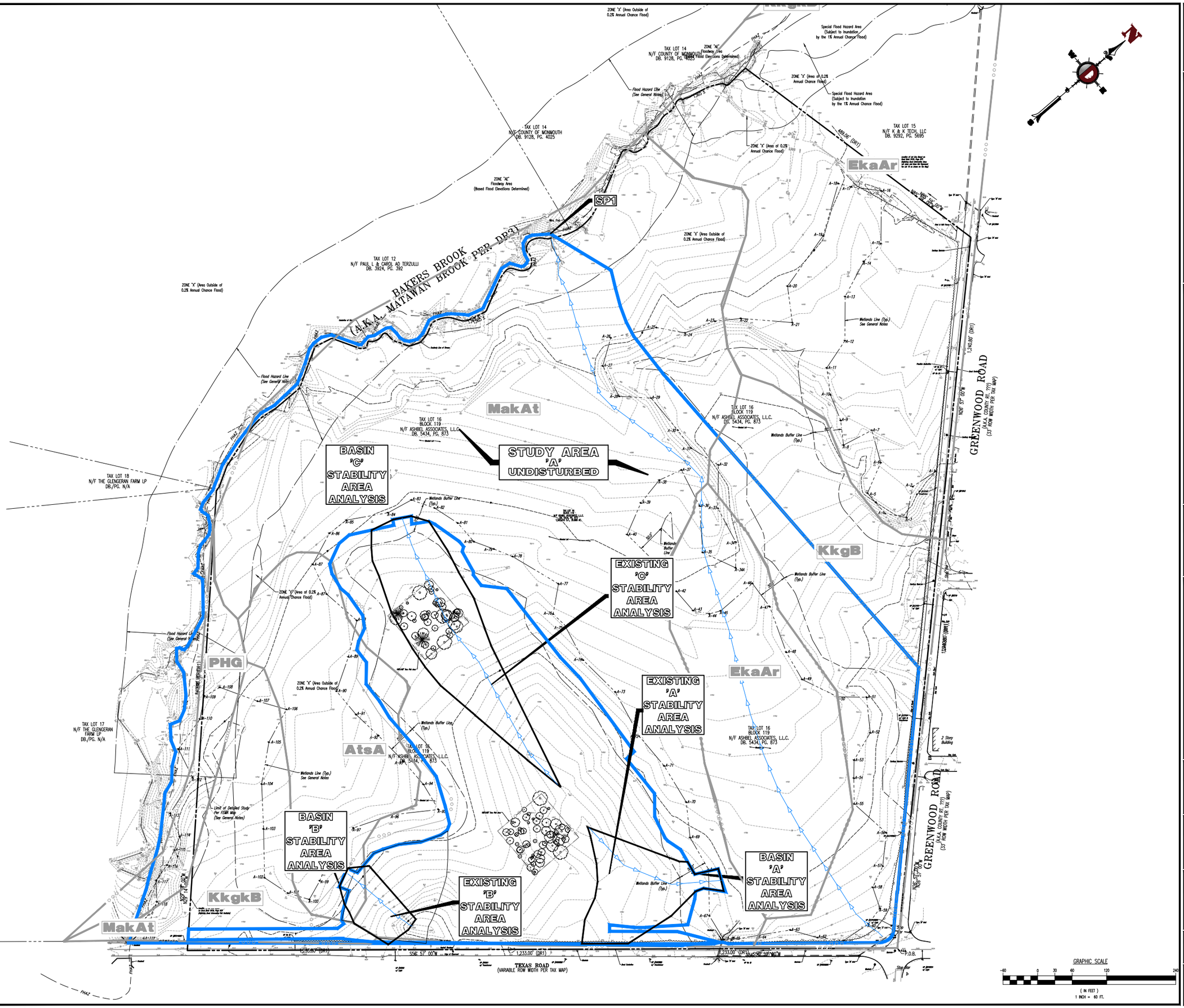
Stability Point B

Design Storm	Existing Runoff Rate from Disturbed Areas (CFS)	Runoff Rate Required Reduction	Maximum Allowable Runoff Rate (CFS)	Proposed Runoff Rate (CFS)
2 Year	0.15	0%	0.15	0.19
10 Year	0.29	0%	0.29	0.24
25 Year	0.41	0%	N/A	0.27

Stability Point C

Design Storm	Existing Runoff Rate from Disturbed Areas (CFS)	Runoff Rate Required Reduction	Maximum Allowable Runoff Rate (CFS)	Proposed Runoff Rate (CFS)
2 Year	1.06	0%	1.06	1.06
10 Year	2.28	0%	2.28	2.28
25 Year	3.20	0%	N/A	8.38

17. DRAINAGE AREA MAPS



DYNAMIC ENGINEERING

BY	REV.	DATE	COMMENTS

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DESIGN BY: LZ | DRAWN BY: SMM | CHECKED BY: SRC | APPROVED BY: —

PROJECT: ASHBEL ASSOCIATES, LLC
GREENWICH RESIDENTIAL DEVELOPMENT
BLOCK 119, LOT 16
EAST SIDE OF GREENWOOD ROAD
TOWNSHIP OF MARLBORO,
MONMOUTH COUNTY, NEW JERSEY

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STEVEN R. CATTANI
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 40014

BRETT W. SKAPINETZ
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 41985

TITLE: EXISTING DRAINAGE AREA MAP

SCALE: 1"=60' | DATE: 01/20/21
PROJECT No: 2841-99-001
SHEET No: 1 OF 3 | Rev. #: 0

Plotted: 01/20/21 – 3:39 PM, By: etolmon
File: P:\DESPC PROJECTS\2841 Pollu Associates, LLC\99-001 Marlboro\Ashbel\Dwg\DA Maps\D2841990010XDA0.dwg, ----> 01 EXISTING DRAINAGE AREA MAP

N

ZONE "AE"
Floodway Area
(Based Flood Elevations Determined)

SP1

ZONE "X" (Area Outside of 0.2% Annual Chance Flood)

BAKERS BROOK
(A.K.A. MATAWAN BROOK - FWD DB3)

Flood Hazard Line
(See General Note)

Wetlands Line (Typ.)
See General Notes

GREENWOOD ROAD
(66' ROW WIDTH PER TAX MAP)

MakAt

ZONE "X" (Area Outside of 0.2% Annual Chance Flood)

STUDY AREA C

5 PROPOSED 3 STORY 24 UNIT BUILDING
FF= 81.50

4 PROPOSED 3 STORY 24 UNIT BUILDING
FF= 81.00

PROP. CLUB HOUSE
FF= 81.00

PROP. SHED

3 PROPOSED 3 STORY 24 UNIT BUILDING
FF= 83.40

2 PROPOSED 3 STORY 24 UNIT BUILDING
FF= 86.00

1 PROPOSED 3 STORY 24 UNIT BUILDING
FF= 85.60

PROPOSED 1,000 SF BASEMENT MAINTENANCE ROOM

KkgB

EkaAr

PHG

AtsA

KkgkB

MakAt

STUDY AREA B

STUDY AREA A

Limit of Detailed Study Per FEMA Map
(See General Notes)

ZONE "X" (Area of 0.2% Annual Chance Flood)

SANCUT LINE (TYP.)

TEXAS ROAD
(VARIABLE ROW WIDTH PER TAX MAP)

P.O.B.

GRAPHIC SCALE
-50 0 25 50 100 200
(IN FEET)
1 INCH = 50 FT.

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REV.	DATE	COMMENTS	BY

DESIGNED BY: SRC
DRAWN BY: LZ
CHECKED BY: SMM
CHECKED BY: —

PROJECT: ASHBEL ASSOCIATES, LLC
GREENWICH RESIDENTIAL DEVELOPMENT
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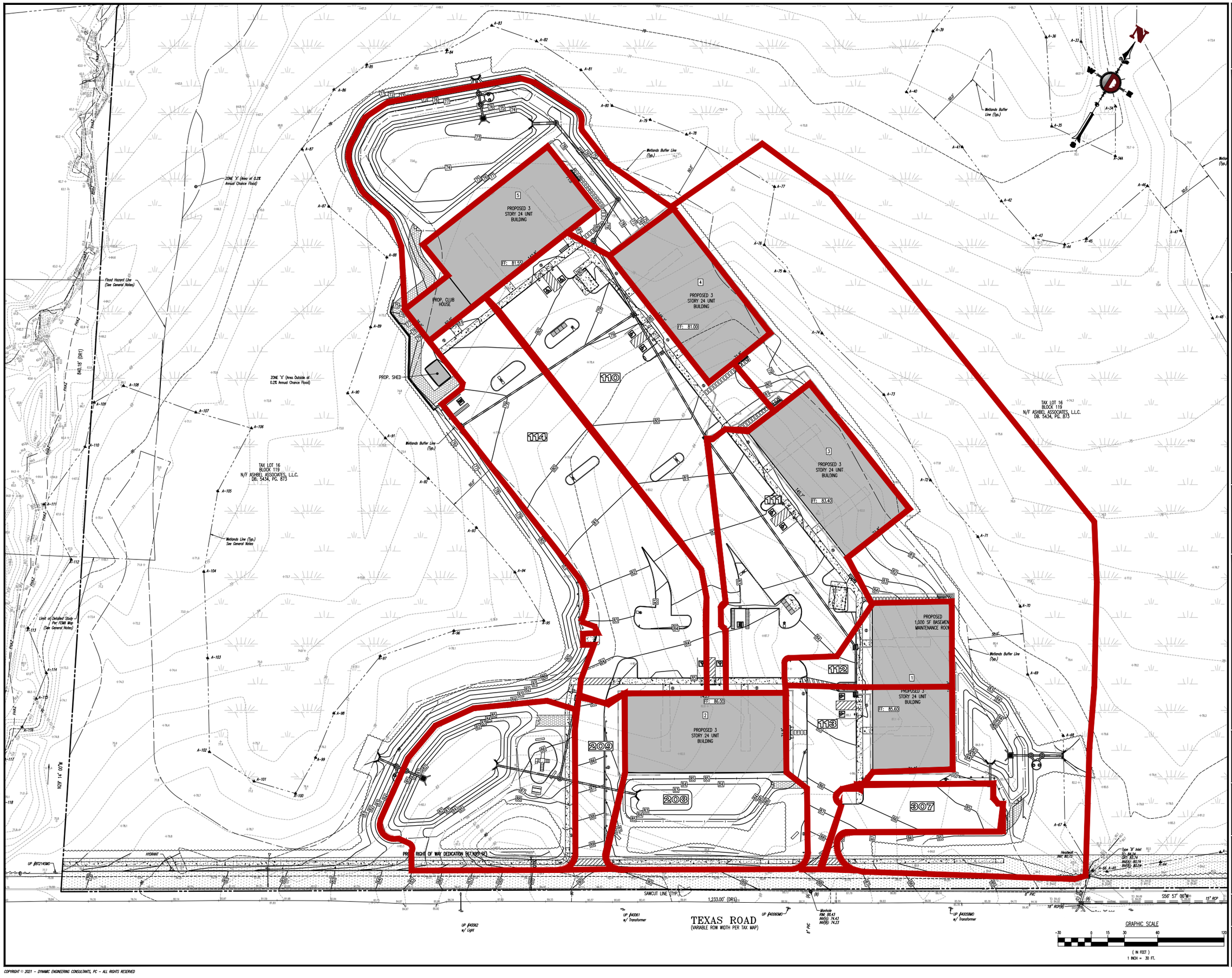
TITLE: PROPOSED DRAINAGE AREA MAP

SCALE: (H) 1"=50'
(V)
DATE: 01/20/21
PROJECT No: 2841-99-001

SHEET No: 2 OF 3
Rev. #: 0

Plotted: 01/20/21 – 3:35 PM By: sfortnon
File: P:\2021PC PROJECTS\2841 Pollio Associates, LLC\99-001 Marlboro\Ashbel\Dwg\DA Maps\D2841990010PDAMD.dwg, ---> 02 PROPOSED DRAINAGE AREA MAP



Plotted: 01/20/21 - 3:35 PM, By: eliotmon
File: P:\DEPC PROJECTS\2841 Pollio Associates, LLC\99-001 Marlboro\Ashbel\Dwg\DA Maps\02841990011AMO.dwg, ---> 03 INLET AREA MAP

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PROJECT: ASHBEL ASSOCIATES, LLC
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BLOCK 119, LOT 16
ROUTE 520 & GREENWOOD ROAD
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BRETT W. SKAPINETZ
PROFESSIONAL ENGINEER
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TITLE:
INLET AREA MAP

SCALE: 1" = 30'
DATE: 01/20/21
PROJECT No: 2841-99-001

SHEET No: 3 OF 3
Rev. #: 0