Attachment I
Revised Fickett Road Substation Stormwater Management Drawings

STORMWATER MANAGEMENT SYSTEM

Prepared for the

CENTRAL MAINE POWER COMPANY
FICKETT ROAD SUBSTATION

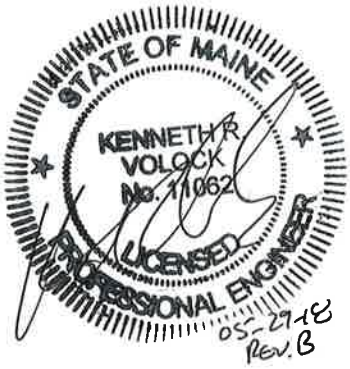
CENTRAL MAINE POWER

Location

Fickett Road
Pownal, ME

Owner

Central Maine Power Company
83 Edison Drive
Augusta, Maine 04336



Prepared by

POWER ENGINEERS

11733 Chesterdale Road
Cincinnati, OH 45246
(513) 326-1500
September 2017
REVISED MAY 2018

TABLE OF CONTENTS

INTRODUCTION

Central Maine Power Company (CMP) is proposing to construct a new electrical substation as part of the New England Clean Energy Connect (NECEC) Project. The new station will be built on Fickett Road in the town of Pownal in Cumberland County, Maine and will be named the Fickett Road Substation.

Runoff from the proposed electrical substation flows south to Runaround Brook, and then heads north into Runaround Pond. Runaround Pond is listed as a Lake Most at Risk from New Development in Maine Department of Environmental Protection (MeDEP) Chapter 502. The pond then discharges to Runaround Brook, then Chandler Brook, heading downstream to Royal River, then southeast where it discharges into the Atlantic Ocean.

Fickett Road Substation

The existing conditions and proposed grading plans for the proposed Fickett Road Substation are included with this submission as sheets 1077-003-001 SH 001 General Site Plan Existing Conditions and 1077-003-001 SH 002 General Site Plan Proposed Conditions, respectively. The layout of proposed equipment within the yard is shown on SK-FICK-GL Conceptual General Location Plan.

The proposed substation will sit on a 19.61 acre parcel of land that is a mix of flat terrain, steep hills, forest, shrubs and low lying wetlands and includes an existing electric transmission line corridor. The proposed station footprint will be approximately 3.75 acres and will consist of roof top and concrete foundation impervious and evenly graded 3/4" to 1.5" stone for the remainder of the station pad. The access roads leading to the station from the north and east will consist of gravel. The project will consist of a total developed area of 4.87 acres, of which, 3.90 acres will be impervious. The site will be sloped to drain to the south, honoring the existing drainage patterns to the extent practicable. Site stormwater runoff will be treated with a grassed underdrain soil filter, while the stoned yard areas are considered to be treated in place.

Permitting Requirements

The Fickett Road Substation is part of the larger NECEC Project currently being undertaken by CMP. The project is submitted as a whole to the MeDEP for permitting purposes.

The project will require a Stormwater Management Permit and a Site Location of Development Permit because more than 3 acres will be stripped or graded and not revegetated within one year, and because the project will occupy more than 20 acres of land. The project will be required to meet the Basic, General, and Flooding Standards as described in MeDEP Chapter 500. As a result of the Fickett Road Substation discharging to Runaround Brook the project is also required to meet the Chapter 500 Phosphorous Standard. The standards will be met using several erosion and sedimentation control and permanent stormwater management Best Management Practices (BMPs).

BASIC STANDARD

The proposed project will disturb more than one acre of land, requiring compliance with the Basic Standard as described in MeDEP Chapter 500 Section 4B. In order to meet the Basic Standard, the proposed project will be required to address the following:

- Erosion and Sedimentation Control
- Inspection and Maintenance
- Housekeeping

Erosion and Sedimentation Control

Exhibit 14-1 of the Site Law Application contains the manual "Central Maine Power Company - Environmental Guidelines for Construction and Maintenance Activities on Transmission Line and Substation Projects". This manual addresses general erosion and sedimentation control measures used in many previous transmission and substation projects and has been reviewed and approved by MeDEP. The manual was developed to be consistent with the Maine Erosion and Sediment Control Practices Field Guide for Contractors, 2015, and MeDEP's Chapter 500.

Specific erosion and sedimentation control BMPs for the Fickett Road Substation project are indicated on sheet 1077-003-004 SH 001 Erosion and Sediment Control Plan. Details of the measures proposed are shown on sheet 1077-003-005 SH 003 Site Details 3 and sheet 1077-003-005 SH 004 Site Details 4. Sheet 1077-003-005 SH 005 Site Details 5 presents a plan for implementing these measures at the site.

Inspection and Maintenance

CMP will ensure that a qualified design engineer inspects the construction site periodically to verify that the stormwater BMPs are constructed in accordance with the plans and specifications shown on the design drawings, and, as needed, during any period when construction activity affecting the stormwater management system occurs, until the site is permanently stabilized. Inspection and Maintenance procedures for the proposed substation are described below. BMP Inspection & Maintenance Checklists and BMP Inspection & Maintenance Logs for each site have been enclosed in Appendix A. The BMP Inspection & Maintenance Checklists outline the inspection frequency/requirements and maintenance/cleanout thresholds for each BMP measure. The enclosed BMP Inspection & Maintenance Logs include specific inspection guidelines for each BMP measure and are the documentation portion of this Plan.

Scheduled Inspections

Prior to completion of construction, CMP shall designate a CMP Supervisor and personnel or a contractor as the Site Inspector for each substation. Inspection requirements for each individual BMP measure are specified on the Inspection & Maintenance Checklists in Appendix A.

- QUARTERLY: Inspections of stormwater conveyance, control and treatment measures at each Site are to be performed on a quarterly basis throughout the year. Inspections during winter months may encounter snow and ice cover, frozen ground, snow embankments, dormant vegetation, etc. In these cases, the inspector must use his/her best judgment

interpreting these inspection and maintenance requirements, in order to meet both the stated objectives and the intent of the Plan. The inspection should prevent problems and plan for maintenance in advance of the spring thaw (removing snow piles if they obstruct drainage paths, repairing any damage from snow plows, frost heaves, etc.).

- FOLLOW-UP: Additional follow-up inspections will be performed, as needed, depending on the results of routine inspections and site conditions, under the direction of the CMP Supervisor.

As-Needed Maintenance

Maintenance is to be performed on an as-needed basis, in accordance with recommendations made by the Site Inspector. Routine maintenance will include the immediate repair of eroded channels or gullies; reseeding or sodding of bare ground; removal of trash, leaves and sediment; and control of vegetation. Maintenance issues associated with specific areas and stormwater facilities at each Site are identified on the Inspection & Maintenance Checklists in Appendix A. Disposal of all sediment, debris, and waste shall be in accordance with Maine Solid Waste Management Rules, Chapter 400.

5-Year Re-Certification

CMP will certify the following to the MeDEP within three months of the expiration of each five-year interval from the date of issuance of the permit:

- All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.

- All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the facilities.

- The erosion and stormwater maintenance plan for the site is being implemented as written, or modifications of the plan have been submitted to and approved by the department, and the maintenance log is being maintained.

Housekeeping

Housekeeping entails the control or elimination of pollution not specifically related to soil erosion such as spill prevention, dust control, litter removal and dewatering. Housekeeping is addressed within the narrative and on sheet 1077-003-005 SH 004 Site Details 4 for the Fickett Road Substation.

PHOSPHORUS STANDARD

The Fickett Road substation discharges to Runaround Pond and will add more than 20,000 square feet of impervious surface within the watershed of a Lake Most at Risk. For this reason the project is required to meet the MeDEP Chapter 500 Phosphorus Standard. In order to meet the Phosphorus Standard, the project needs to reduce the amount of phosphorus released from the site to calculated allowable levels for the parcel. Phosphorus Worksheet 1 was used to calculate the allowable phosphorus load from the parcel, also known as the phosphorous Budget. Following establishment of

the phosphorous Budget, pre-treatment phosphorous loading from the site and loading from the site following implementation of on site BMPs is calculated using Worksheet 2. For the proposed condition, phosphorous Worksheet 2 was used to calculate post-developed phosphorous export loads from the site. Worksheets 1 and 2 can be found in Appendix C.

Stormwater Treatment BMPs

Crushed Stone Substation Surface

MeDEP has provided yard construction requirements that allow for reduced *Export Coefficients* and *Treatment Factors* to be applied to the substation's stone surface for treatment related to meeting the Phosphorous Standard. In email correspondence following MeDEP's 2008 letter MeDEP has indicated that phosphorous loading and phosphorous removal associated with the station pad may be calculating using an *Export Coefficient* of 0.30 and a *Treatment Factor* of 0.10 for the ***Crushed Stone Substation Surface***. The email correspondence can be found in Appendix B.

Grassed Underdrain Soil Filter

Runoff from the vegetated developed area along the west side of the station pad will be treated in a Grassed Underdrain Soil Filter. Pretreatment will be accomplished by flowing runoff through a vegetated swale and into a pre-treatment forebay before entering the filter area. Additionally, areas of the station pad and the rooftop surfaces within the pad will be treated within the Soil Filter following treatment within the crushed stone.

The Grassed Underdrain Soil Filter is comprised of an 18"-thick layer of a silty sand and organic material mix. The underdrain system consists of 6" perforated pipe within a 12"-thick layer of underdrain material. The filter is proposed partially within an existing wetland and within areas believed to have elevated groundwater conditions. An impermeable liner has been incorporated into the filter to allow for proper dewatering and prevent oversaturation of the filter media by groundwater prior to rain events. A detail of the underdrained soil filter is shown on sheet 1077-003-003 SH 001 Stormwater Treatment Plan. Underdrained soil filter sizing calculations are provided in Appendix C.

Stormwater Treatment Calculations

In addition to using the station stone as a BMP, a downstream Soil Filter is proposed to further reduce post developed phosphorous exports from the site by providing primary treatment for developed areas surrounding the pad and by further treating runoff from the stone pad as part of a two-tier treatment train utilizing the ***Crushed Stone Substation Surface*** treatment with a downstream soil filter. For parts of the site (pad, rooftops) utilizing the two-tier treatment train, a calculated Treatment Factor of 0.1 was used.

Export Coefficients for the proposed surfaces were used to calculate pre-treatment loading and *Treatment Factors* for the proposed BMPs were used to calculate load reductions and subsequent post-developed phosphorous export loads. As shown in Worksheet 1, the Budget for the parcel was calculated to be 0.51 pounds per year and as seen in Worksheet 2, a post developed, post treatment phosphorous export load of 0.45 is achieved.

Typical sizing of Soil Filters for adherence to the Phosphorous Standard requires that the filter have capacity to contain the standard water quality volume (BMP_{ST}) which is the volume required for adherence to the General Standard, plus additional volume calculated using a prescribed Treatment Factor. The BMP_{ST} volume plus the additional phosphorous treatment volume requirement constitute the total volume capacity required for BMPs used to meet the Phosphorous Standard and is known as BMP_{TF}. The Fickett Road substation yard is self-treating and does not require additional BMPs for adherence to the General Standard, therefore the soil filter was sized to have capacity for the difference between the BMP_{ST} and BMP_{TF} for areas of the yard plus the full BMP_{TF} for developed landscaped areas outside the yard that are not treated for the general standard within the yard stone. Appendix C contains calculations for sizing the soil filter based on these parameters.

The hydraulic modeling report for the entire project site is also included with this submission in Appendix C. The calculations were developed using USDA TR-55 methodology. The model results in Appendix C illustrate how the site drainage and stormwater management infrastructure will function during the 2 -, 10 - and 25 - year storms. The report also contains the hydrologic calculations for the project. The modeling results were used to confirm that adequate water quality volume (WQV) will be provided below the required 18" depth for the Grassed Underdrain Soil Filter.

FLOODING STANDARD

The project is required to meet the MeDEP Chapter 500 Flooding Standard; the addition of over 3 acres of impervious area requires a decrease in peak stormwater runoff as a result of the proposed development. The site is situated entirely within existing HSG Type D soils. Pre-developed and post-developed Curve Numbers for the project can be found in Appendix C and on the project drainage area maps (Sheets 1077-003-003 SH 002 and SH 003). The MeDEP letter describing the construction requirements that allow the General Standard requirements to be met for the yards within the ***Crushed Stone Substation Surface*** also prescribes allotted Curve Numbers for use when calculating runoff from the stone section. Pre-Developed Curve Numbers for the project site depicted on the drainage area maps indicate existing Curve Numbers ranging from 73 to 77. MeDEP prescribes a developed Curve Number for the stone station surface over HSG Type D soils of 60. As existing drainage patterns have been maintained to the extent practicable, the sizes and times of concentration have not been significantly altered with this project. Due to the decreased Curve Numbers across the stone station pad (CN decreased to 60 for these areas), post-development peak flows were calculated to be less than or relatively equal to the pre-development peak flows without the need for on-site stormwater attenuation. Tables 1 and 2 show the pre- and post-development peak flows at each analysis point. Tables 3 through 5 show the comparisons between the pre-developed and post-developed peak flow rates

Table 1 - Pre-Developed Peak Flow Rates

Analysis Point	2-Year Flow Rate (CFS)	10-Year Flow Rate (CFS)	25-Year Flow Rate (CFS)
A	2.25	5.70	7.51
B	3.98	10.12	13.36
C	0.27	0.66	0.86
D	0.13	0.30	0.38

Table 2 - Post-Developed Peak Flow Rates

Analysis Point	2-Year Flow Rate (CFS)	10-Year Flow Rate (CFS)	25-Year Flow Rate (CFS)	Peak 2-Year Flow Rate at Outfall (If Subsheds Present)	Peak 10-Year Flow Rate at Outfall (If Subsheds Present)	Peak 25-Year Flow Rate at Outfall (If Subsheds Present)
A	2.33	5.71	7.47	N/A	N/A	N/A
B1	1.30	4.05	5.55	2.06	5.73	7.71
B2	1.84	5.14	6.91			
C	0.15	0.37	0.48	N/A	N/A	N/A
D	0.13	0.30	0.38	N/A	N/A	N/A

Table 3 – Flow Rate Comparison, 2-Year

Analysis Point	PRE 2-Year Flow Rate (CFS)	POST 2-Year Flow Rate (CFS)	Change in Peak Flow Rate (CFS)
A	2.25	2.33	0.08
B	3.98	2.06	(1.92)
C	0.27	0.15	(0.12)
D	0.13	0.13	0.00

Table 4 – Flow Rate Comparison, 10-Year

Analysis Point	PRE 10-Year Flow Rate (CFS)	POST 10-Year Flow Rate (CFS)	Change in Peak Flow Rate (CFS)
A	5.70	5.71	0.01
B	10.12	5.73	(4.39)
C	0.66	0.37	(0.29)
D	0.30	0.30	0.00

Table 5 – Flow Rate Comparison, 25-Year

Analysis Point	PRE 25-Year Flow Rate (CFS)	POST 25-Year Flow Rate (CFS)	Change in Peak Flow Rate (CFS)
A	7.51	7.47	(1.04)
B	13.36	7.71	(5.65)
C	0.86	0.48	(0.38)
D	0.38	0.38	0.00

Access Road Culvert Sizing

An approximately 200’ long gravel access drive is proposed extending from Fickett Road to the proposed substation pad. The road will be graded to slope longitudinally downward to a low point between the station pad and Fickett Road and will be graded to have a 2% minimum cross slope to carry stormwater runoff from the road surface. Surface runoff from areas upstream of the new access

drive currently flow within a poorly defined ditch along Fickett Road and will be required to pass beneath the road via a proposed 15" reinforced concrete culvert.

The culvert is expected to serve a drainage area of approximately 0.68 acres having a runoff Curve Number of 75 and with a time of concentration of 5 minutes. The drainage area hydrology was modeled in AutoDesk's Storm and Sanitary Analysis program to develop post-developed peak flow rates to the culvert in the 2-, 10- and 25-year storm events. Hydraulic analysis of the culvert was completed using AutoDesk's Hydraflow Express analysis tool to confirm flow capacity and check for flooding. Hydrologic model outputs including peak flow rates can be found in Appendix C in the *Proposed Conditions Hydraulic/Hydrologic Report*. The *Culvert Report* in Appendix C demonstrates the anticipated performance of the culvert during a 25-year event including flow regime and hydraulic grade line elevations at both upstream and downstream ends.

CONCLUSION

The NECEC Project will require a Stormwater Management Permit, and will be required to meet the Basic, Phosphorous and Flooding Standards as described in MeDEP Chapter 500. The Basic Standard shall be met at the Fickett Road Substation through Erosion and Sedimentation Control, Inspection and Maintenance, and Housekeeping, as described in this narrative and the attached checklists, logs and plans. The Flooding Standards shall be met at the Fickett Road Substation by using the MeDEP approved substation yard stone section, as illustrated on the attached stormwater treatment plans. The proposed culvert beneath the new access drive has been sized to prevent flooding of the road during the 25-year storm event. The Phosphorus Standard shall be met using the MeDEP approved substation yard section and a Grassed Underdrain Soil Filter.

APPENDIX A – BMP INSPECTION & MAINTENANCE CHECKLISTS AND LOGS

APPENDIX A-1: BMP INSPECTION & MAINTENANCE CHECKLIST

Central Maine Power Company – Fickett Road Substation
Pownal, Maine

BMP MEASURE	INSPECTION REQUIREMENTS*	MAINTENANCE/CLEANOUT THRESHOLDS
Vegetated Swales	Inspect swale for accumulated sediment, debris and other obstructions.	Clean as needed and dispose of properly.
	Inspect swales for evidence of erosion, gullies, or slumping of the side slopes.	Repair and re-seed as necessary. Consult engineer if problem persists. Areas of persistent erosion may need to be armored.
	Inspect swales for bare ground/sparse vegetation.	Re-seed as necessary. Soil may need to be scarified if compacted soils are present.
	Monitor vegetative growth.	Mow vegetation in swales to roughly six inches at least once and no more than two times a year. To be performed between June 15th and August 30th. Fertilizer containing phosphorus is prohibited, except when establishing new turf or vegetation on bare soil.
Check Dams	Inspect check dams to ensure the center is lower than the edges.	Repair as necessary.
	Inspect check dams for stone displacement, erosion, concentrated flow or channelization.	Repair any damaged areas. Consult engineer if problem persists.
	Inspect check dams for accumulated sediment, debris or other obstructions.	Clean as needed and dispose of properly. Sediment must be removed before it exceeds one half the original height of the check dam.
Revegetated Areas	Inspect revegetated areas for evidence of erosion, concentrated flow, or channelization.	Repair and re-seed as necessary. Consult engineer if problem persists. Areas of concentrated flow where rills and gullies are present may need to be armored
	Inspect revegetated areas for bare ground/sparse vegetation.	Re-seed as necessary. Soil may need to be scarified if compacted soils are present. Fertilizer containing phosphorus is prohibited, except when establishing new turf or vegetation on bare soil.
Gravel Access Roads	Inspect access road shoulder for accumulated sand/sediment.	Remove sand/sediment as necessary.
	Inspect grade on access road and shoulder to ensure stormwater is not impeded by accumulation of materials or false ditches.	Repair grade as necessary.
	Inspect access road to ensure that there is no rutting, wash-boarding, frost heaves, potholes, or ponding occurring.	Repair by replacing gravel and re-grading as necessary.

*Inspections are to be performed on a monthly basis with additional follow-up inspections and maintenance as needed.

APPENDIX A-1: BMP INSPECTION & MAINTENANCE CHECKLIST

Central Maine Power Company – Fickett Road Substation
Pownal, Maine

BMP MEASURE	INSPECTION REQUIREMENTS*	MAINTENANCE/CLEANOUT THRESHOLDS
Grassed Underdrained Soil Filter	Inspect entering swale, basin and outlet structure for accumulated sediment, debris and other obstructions.	Clean as needed and dispose of properly.
	Inspect filter for evidence of erosion, gullies, or slumping of the side slopes.	Repair and re-seed as necessary. Consult engineer if problem persists. Areas of persistent erosion may need to be armored.
	Inspect filter for bare ground/sparse vegetation.	Re-seed as necessary. Soil may need to be scarified if filter media becomes compacted.
	Monitor vegetative growth.	Mow vegetation in impoundment to roughly six inches at least once and no more than two times a year. To be performed between June 15th and August 30th. Fertilizer containing phosphorus is prohibited, except when establishing new turf or vegetation on bare soil.
	Test Ball Valve operating nuts and open and close for operability.	Replace ball valve if not in good operating condition.
Crushed Stone Substation Surface	Inspect crushed stone areas for accumulated sand/sediment.	Remove sand/sediment as necessary.
	Inspect substation surface to ensure that there is no ponding occurring.	Repair by re-grading as necessary.

*Inspections are to be performed on a monthly basis with additional follow-up inspections and maintenance as needed.

APPENDIX A-2: BMP INSPECTION & MAINTENANCE LOG

Central Maine Power Company – Fickett Road Substation

Pownal, Maine

BMP MEASURE **(Refer to Appendix B-1 & the O&M Plan)**	**Inspector(s):**			**Inspection Type:** **Monthly [ ]** **Follow-up [ ]**	**Photos Taken:** **Yes [ ] No [ ]**	**Date:**
VEGETATED SWALES **Swale along Northwesterly side of yard**	**YES***	**NO**	**INITIALS**	**OBSERVATIONS**	**CORRECTIVE ACTIONS/REPAIR ACTIVITY**	**DATE COMPLETED & BY WHOM** **(Refer to any contractor service logs)**
1. Is there an accumulation of sediment, debris and/or other obstructions?						
2. Is there any evidence of erosion, gullies or slumping of the side slopes?						
3. Are there areas of bare ground or sparse vegetation?						
4. Has vegetation been mowed to a length roughly 6" this year?						
CHECK DAMS **Check Dams in Swales**						
1. Are the edges of the check dams higher than the center?						
2. Is there any evidence of stone displacement, erosion, concentrated flow or channelization?						
3. Is there an accumulation of sediment, debris and/or other obstructions?						

APPENDIX A-2: BMP INSPECTION & MAINTENANCE LOG

Central Maine Power Company – Fickett Road Substation
Pownal, Maine

BMP MEASURE (Refer to Appendix B-1 & the O&M Plan)	Inspector(s):			Inspection Type: Monthly [ ] Follow-up [ ]	Photos Taken: Yes [ ] No [ ]	Date:
	YES*	NO	INITIALS	OBSERVATIONS	CORRECTIVE ACTIONS/REPAIR ACTIVITY	DATE COMPLETED & BY WHOM (Refer to any contractor service logs)
REVEGETATED AREAS						
Revegetated Areas along Access Road						
1. Is there any evidence of erosion, concentrated flow or channelization?						
2. Are there areas of bare ground or sparse vegetation?						
Revegetated Areas on all sides of the station						
1. Is there any evidence of erosion, concentrated flow or channelization?						
2. Are there areas of bare ground or sparse vegetation?						
GRAVEL ACCESS ROADS						
Access Road to Entrance						
1. Is there an accumulation of sand and/or sediment in the road shoulder?						
2. Does the grade across the road section allow stormwater to drain off the roadway?						
3. Are there any signs of rutting, wash-boarding, frost heaves, potholes or ponding?						

APPENDIX A-2: BMP INSPECTION & MAINTENANCE LOG

Central Maine Power Company – Fickett Road Substation
Pownal, Maine

BMP MEASURE **(Refer to Appendix B-1 & the O&M Plan)**	**Inspector(s):**			**Inspection Type:** **Monthly [ ]** **Follow-up [ ]**	**Photos Taken:** **Yes [ ] No [ ]**	**Date:**
GRASSED UNDERDRAINED SOIL FILTER **West side of station yard and north of Access Road**	**YES***	**NO**	**INITIALS**	**OBSERVATIONS**	**CORRECTIVE ACTIONS/REPAIR ACTIVITY**	**DATE COMPLETED & BY WHOM** **(Refer to any contractor service logs)**
1. Is there an accumulation of sand and/or sediment in the swale or basin?						
2. Is there any evidence of erosion, gullies or slumping of the side slopes?						
3. Are there areas of bare ground or sparse vegetation?						
4. Is the ball valve clean and operable?						
CRUSHED STONE SUBSTATION SURFACE **Fenced-in area of the Substation and aprons**						
1. Is there an accumulation of sand/sediment in crushed stone areas?						

APPENDIX B – CORRESPONDENCE FROM MEDEP TO CMP

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JUN 11 2008

JOHN ELIAS BALDACCI
GOVERNOR

DAVID P. LITTELL
COMMISSIONER

June 5, 2008

Roy Koster
Central Maine Power
83 Edison Drive
Augusta, ME 04336

RE: DEP Stormwater Management Regulations and how they apply to Central Maine Power Company Substations and Switchyards

Dear Mr. Koster:

I am writing to provide clarification on how substations and switchyards designed by Central Maine Power Company (CMP) can meet DEP Stormwater Management rules, Chapter 500 and the Site Location of Development Law. This letter supersedes a previous DEP letter on this subject dated February 29, 2008 and is a follow-up to further discussions between CMP and DEP staff.

Based on the report prepared by John Simon of Balance Engineering, dated March 8, 2008, regarding the stormwater runoff coefficient at CMP substations and switchyards, the required gravel fill and surface nature of these structures performs differently than most common construction practices and a modeling variance will be allowed for CMP substations and switchyards as follows:

When Flooding Standard requirements apply to a CMP project, modeling must demonstrate that peak runoff from the substation structure does not exceed predevelopment flow rates at the property line. Because of the permeability plus storage within the gravel fill and roughness of the crushed rock surface, the curve number (CN) specified in John Simon's report (March 2008) may be used for the substation area. As reported, a CN of 55 may be used for substations and switchyards that are built on areas that are mapped as HSG "A", "B", and "C", and a CN of 60 must be used when the area is mapped as HSG "D" for the HydroCAD model. However, all impervious surfaces will have to be added for an averaged curve number.

The General Standards of Chapter 500 (water quality) will be considered as met by the CMP substation/switchyard design specifications as long as the structure includes the typical CMP substation profile overlaying the natural ground surface. The soil layers within the CMP substation profile consist of 4 inches of crushed stone, 50:50 mix of 1.5"

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826
RAY BLDG., HOSPITAL ST.

BANGOR
106 HOGAN ROAD
BANGOR, MAINE 04401
(207) 941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769-2094
(207) 764-0477 FAX: (207) 760-3143

web site: www.maine.gov/dep

and 0.75" diameter stone overlaying 18 inches or more of gravel fill, MDOT 703.06 Type A. Saturation within the granular fill will detain and provide treatment for the one-inch design standard under that requirement. Groundwater can never be any higher than 18 inches below the top of the gravel fill. Other treatment considerations will need to be provided for all impervious structures anticipated on the substation and switchyard and for the roadway.

The Basic Standards of Chapter 500 (erosion and sedimentation control, inspection and maintenance, and housekeeping) will be met by the standard CMP substation and switchyard design specification and erosion control/construction plan as developed by CMP for each Stormwater Management application. These are minimum erosion control measures that will need to be maintained until the site is fully stabilized. However, based on site and weather conditions during construction, additional erosion control measures may be needed.

While there are several ways to approach the design standards discussed above, these must be considered the minimum requirements in meeting the Stormwater Management and Site Location of Development Laws. However, in some situations where the local hydrology and site conditions warrant more resource protection, additional BMPs may be required. Also, the access drive and associated roadside swales are included in the disturbed area for permitting purposes and the treatment of these areas must be addressed separately from the substation or switchyard and be treated with standard practices. The natural hydrology of these areas will need to be maintained and will have to meet all applicable standards as established in Chapter 500 (page 11, Section 5).

I hope this addresses your request and will make the DEP permitting process more straight forward. If you have further questions, please contact Marianne Hubert at (207) 287-4140.

Sincerely,

Don Witherill, Director
Watershed Management Division
Bureau of Land and Water Quality

Cc: Marianne Hubert, PE, DEP program manager
Andy Fisk, DEP L&W Bureau Director
Dan Butler, PE, TRC
Gerry Mirabile, CMP

From: Gungor, Kerem [mailto:Kerem.Gungor@maine.gov]
Sent: Wednesday, August 23, 2017 1:57 PM
To: Volock, Kenny
Subject: RE: CMP Substation Yard Treatment Clarifications

Hi Kenny,

Here are my answers:

Is there a point at which we can no longer consider the concrete and roof area within a substation to be treated through the 4" stone and 18" MDOT Type "A" gravel station yard section?

I took into account the storage volume provided by the underlying 18" gravel layer for Coopers Mill substation minor revision I reviewed. Same approach can be followed for NECEC:

Storage Volume Provided for Treatment (cf) = (Substation Yard Area excluding the impervious surfaces (sf)) x 2 ft x 0.3 (assumed porosity for the substation yard profile)

Storage Volume Required for the Treatment of the Impervious Surfaces (cf) = Impervious surface (i.e. concrete, roof) (sf) x (1/12) (ft) (one-inch storage requirement for the impervious surfaces)

Therefore, one unit area of stone yard can treat up to 7 unit areas of impervious area (I would recommend staying on the conservative side, not going this far). You do not need to provide additional treatment for the roof at Merrill Road substation.

How is the station yard section considered when it comes to phosphorous treatment?
Considering the storage volume and structure of the station yard, I would use the minimum treatment factor, **0.1** as given for the infiltration measures in **Table 4.1** of the Phosphorus Control Manual. For the concrete surfaces and roof, you can use the export factor of **0.5 lb/ac/yr**. For the substation yard, the export factor of **0.3 lb/ac/yr** can be used.
Please let me know if you have any more questions.
Best,

Kerem Gungor, Ph.D., P.E.
Environmental Engineer, Central Maine Region
Bureau of Land Resources | Land Division
Maine Department of Environmental Protection
(207) 446-3915 | kerem.gungor@maine.gov

From: kenny.volock@powereng.com [mailto:kenny.volock@powereng.com]
Sent: Wednesday, August 23, 2017 12:03 PM
To: Gungor, Kerem
Subject: CMP Substation Yard Treatment Clarifications

Kerem,

Thank you for your input regarding stormwater management and erosion control during the NECEC Pre-Application last Thursday. I do have a couple follow-up questions that I would like some clarification on:

Is there a point at which we can no longer consider the concrete and roof area within a substation to be treated through the 4" stone and 18" MDOT Type "A" gravel station yard section?

Since we typically call for 6" of stone, I've always assumed the extra 2" of stone is what provided the additional water quality volume for the roof and concrete areas. Depending on what you use for porosity of the stone (0.3 to 0.4), you would have 0.6" to 0.8" available, enough for 0.6 acres to 0.8 acres of roof/concrete per acre of stone yard. This equates to 37.5% to 44.4% roof/concrete area.

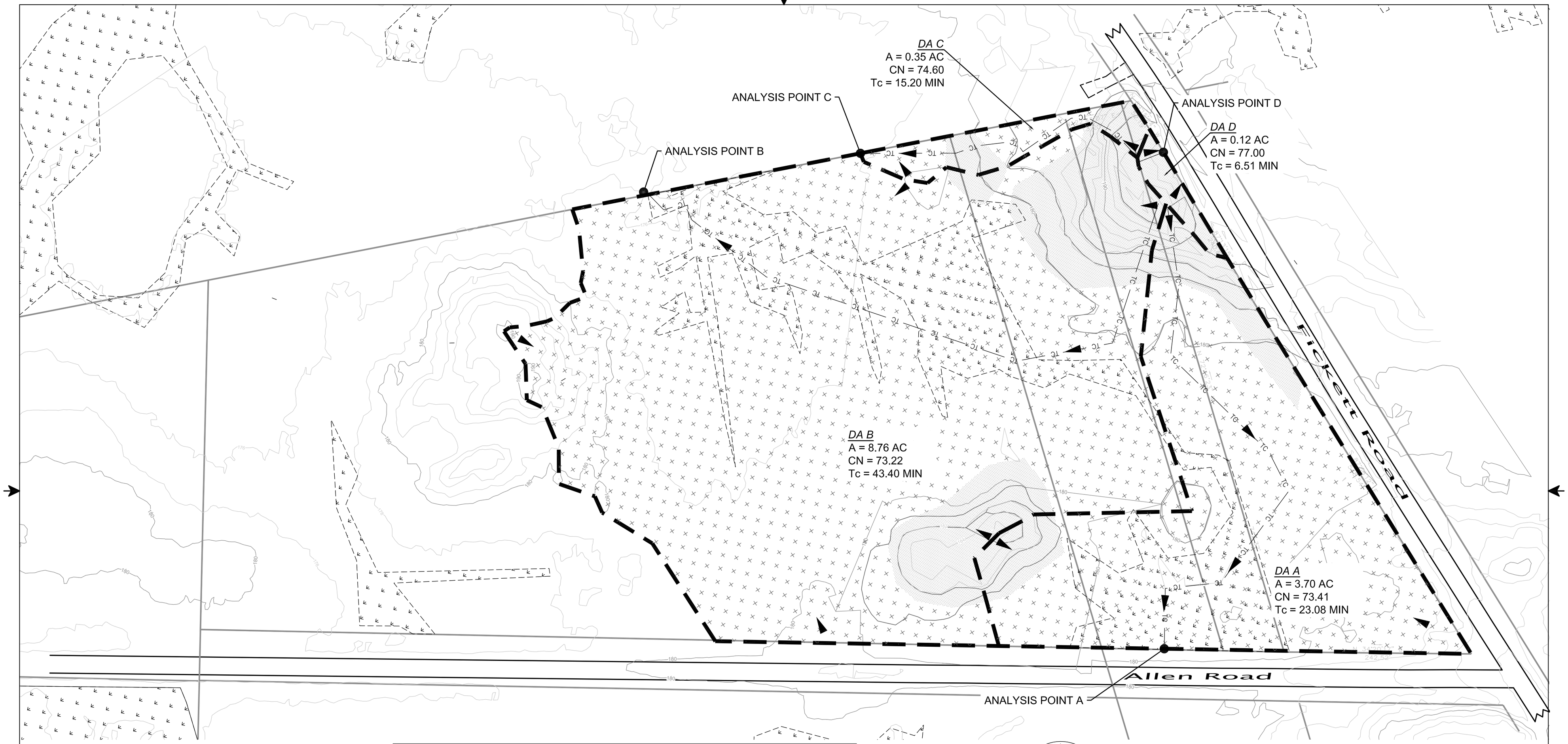
A typical substation yard has only around 2% to 5% roof/concrete area, so it is negligible. However, at Merrill Road, with a very large building, that percentage could approach 30%. I would like to know, prior to submission, if we will be able to consider the runoff from the building roof as treated by the yard, or if we will need to make separate provisions.

How is the station yard section considered when it comes to phosphorous treatment?

The 2008 letter from MeDEP to CMP discusses the Flooding and General Standards, but does not discuss the Phosphorous Standard. Can we assume the yard to have the same base treatment factor of 0.4 as the other BMPs? Or is there some other base treatment factor we should be using?

Any input you could provide in resolving these two outstanding issues would be greatly appreciated.

APPENDIX C – STORMWATER COMPUTATIONS



LEGEND

- 750 — EX. MAJOR CONTOUR
- 744 — EX. MINOR CONTOUR
- TC — EX. TIME OF CONCENTRATION
- EX. SOIL BOUNDARY *
- EX. OVERHEAD UTILITY
- EX. FLOW DIRECTION ARROW
- EX. DRAINAGE BOUNDARY
- EX. PROPERTY BOUNDARY
- EX. WETLAND
- ANALYSIS POINT

* SITE IS ENTIRELY HSG TYPE D SOILS

EX. BRUSH EX. WOODS

EXISTING CONDITIONS HYDRAULIC SUMMARY			
DRAINAGE AREA	2 - YEAR FLOW RATE (CFS)	10 - YEAR FLOW RATE (CFS)	25 - YEAR FLOW RATE (CFS)
A	2.25	5.70	7.51
B	3.98	10.12	13.36
C	0.27	0.66	0.86
D	0.13	0.30	0.38

0 60 120 Feet

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION 05/29/18

REV.	DESCRIPTION	DATE	BY	CK	APP

OWNER ENGINEER:
APPROVAL STAMP:
PE Stamp
DRAWING PREPARED BY:
ACCEPTED BY OE:

IUSA ENGINEERING
CONFIDENTIAL, PROPRIETARY and TRADE SECRET INFORMATION
Property of Iberdrola, USA

CMP IBERDROLA - USA

REV.	DATE	BY	DESCRIPTION	APP.

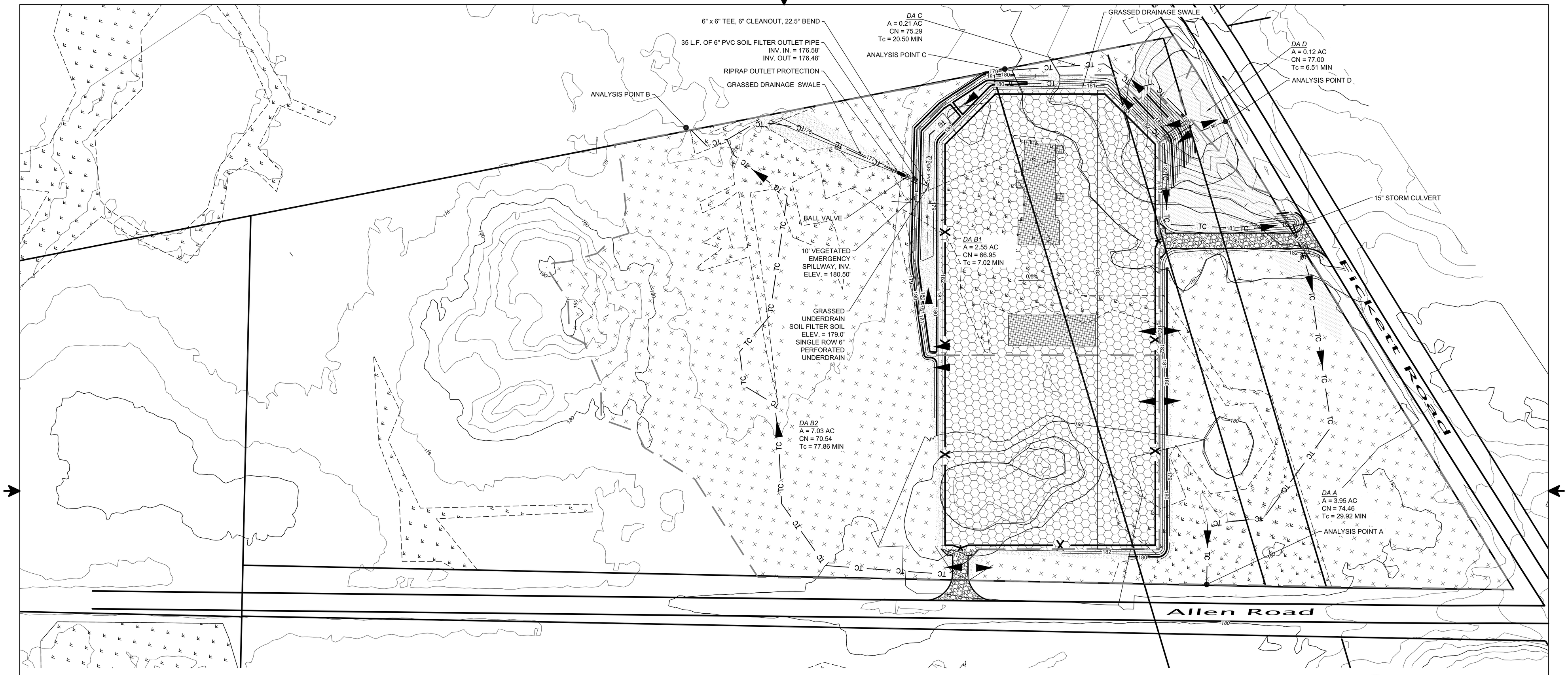
PRE-DEVELOPMENT STORMWATER PLAN

SH 2 OF 3

FICKETT ROAD/1077 POWNAL, ME

DR.	TJG	SCALE: 1" = 60'	FILE: 1077-003-003SH002.DWG
CK.	KRV	NO. 1077-003-003	REV. A
APP.			
DATE:			

CADD Drawing, DO NOT REVISE MANUALLY.
ANSI D



LEGEND

- 750 — EX. MAJOR CONTOUR
- 744 — EX. MINOR CONTOUR
- EX. SOIL BOUNDARY *
- EX. OVERHEAD UTILITY
- EX. PROPERTY BOUNDARY
- EX. WETLAND
- 750 — PROP. MAJOR CONTOUR
- 744 — PROP. MINOR CONTOUR
- TC — PROP. TIME OF CONCENTRATION
- PROP. FLOW DIRECTION ARROW
- PROP. DRAINAGE BOUNDARY
- ANALYSIS POINT
- PROP. CULVERT/PIPING

* SITE IS ENTIRELY HSG TYPE D SOILS

- EX. WOODS
- EX. BRUSH
- PROP. DEVELOPED GRASS/LANDSCAPE
- PROP. IMPERVIOUS SURFACE/ROOF
- PROP. STONE PAD
- PROP. GRAVEL ACCESS ROAD

PROPOSED CONDITIONS HYDRAULIC SUMMARY						
DRAINAGE AREA	2 - YEAR FLOW RATE (CFS)	10 - YEAR FLOW RATE (CFS)	25 - YEAR FLOW RATE (CFS)	PEAK 2 - YEAR FLOW RATE AT OUTFALL (IF SUBSHEDS PRESENT)	PEAK 10 - YEAR FLOW RATE AT OUTFALL (IF SUBSHEDS PRESENT)	PEAK 25 - YEAR FLOW RATE AT OUTFALL (IF SUBSHEDS PRESENT)
A	2.33	5.71	7.47	N/A	N/A	N/A
B1	1.30	4.05	5.55	2.06	5.73	7.71
B2	1.84	5.14	6.91			
C	0.15	0.37	0.48	N/A	N/A	N/A
D	0.13	0.30	0.38	N/A	N/A	N/A

STORMWATER TREATMENT REQUIREMENTS (% OF TREATED AREA)		
LAND TYPE	STATION	STATION % TREATED
IMPERVIOUS TOTAL	3.90 AC	96.15%
IMPERVIOUS TREATED	3.75 AC	
DEVELOPED TOTAL*	4.87 AC	85.83%
DEVELOPED TREATED	4.18 AC	

*DEVELOPED AREA INCLUDES BOTH IMPERVIOUS AND LANDSCAPED SURFACES

STORMWATER TREATMENT FOR PHOSPHOROUS STANDARD	
CONDITION	PHOSPHOROUS EXPORT LOAD (LBS P/YEAR)
PROJECT PHOSPHOROUS BUDGET	0.51
PRE-TREATMENT ALGAL AV. P EXPORT	1.65
POST-TREATMENT ALGAL AV. P EXPORT	0.45

0 120 240 Feet

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION 05/29/18

REV.	DESCRIPTION	DATE	BY	CK	APP
B	MEDEP PERMIT SET COMMENT REVISIONS	05/29/18	TJG	KRV	

OWNER ENGINEER: | APPROVAL STAMP: | PE Stamp

DRAWING PREPARED BY: | ACCEPTED BY OE:

IUSA ENGINEERING
CONFIDENTIAL, PROPRIETARY and TRADE SECRET INFORMATION
Property of Iberdrola, USA

CMP IBERDROLA - USA

REV.	DATE	BY	DESCRIPTION	APP.

POST-DEVELOPMENT STORMWATER PLAN

SH 3 OF 3

FICKETT ROAD/1077 POWNAL, ME

DR.	TJG	SCALE: 1" = 60'	FILE: 1077-003-003SH003.DWG
CK.	KRV	NO.	REV.
APP.		1077-003-003	B
DATE:			

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.

Worksheet 1 - PPB calculations

Project Name:	**Fickett Road Substation**			
Lake Watershed:	**Runaround Pond**			
Town: Durham				
Standard Calculations				
Watershed per acre phosphorus budget (Appendix C)		**PAPB**	0.03	lbs P/acre/year
Total acreage of development parcel:		**TA**	19.61	acres
NWI wetland acreage:		**WA**	2.41	acres
Steep slope acreage:		**SA**	0.17	acres
Project acreage: A = TA - (WA+ SA)		**A**	17.03	acres
Project Phosphorus Budget: PPB = P x A		**PPB**	0.51	**lbs P/year**
Small Watershed Adjustment				
If Project Acreage (A) is greater than the threshold acreage for the small watershed threshold (SWT, from pertinent lake and town info in the table in Appendix C), calculate an alternative PPB using the analysis below and use this value if it is less than the the Standard Calculation PPB.				
Small Watershed Threshold (Appendix C):		**SWT**	N/A	acres
Project acreage:		**A**	N/A	acres
Allowable increase in town's share of annual phosphorus load to lake (Appendix C):		**FC**	N/A	lbs P/year
Area available for development (Appendix C):		**AAD**	N/A	acres
Ratio of A to AAD (R=A/AAD)		**R**	N/A	
Project Phosphorus Budget				
If R < 0.5, PPB = [(FC x R)/2] + [FC/4]		**PPB**	N/A	**lbs P/year**
If R> 0.5, PPB = FC x R		**PPB**	N/A	**lbs P/year**

Worksheet 2

Pre-PPE and Post-PPE Calculations

Calculate phosphorus export from development for before and after treatment
Use as many sheets as needed for each development type (commercial, roads, residential lots, etc.)

Project name: Fickett Substation **Development type**: Commercial Sheet # _____

Land Surface Type or Lot #(s) with description	Acres or # of lots	Export Coefficient from Table 3.1 Table 3.2	Pre-treatment Algal Av. P Export (lbs P/year)	Treatment Factor for BMP(s) from Chapter 6	Post-treatment Algal Av. P Export (lbs P/year)	Description of BMPs
Impervious Roofs	0.24	0.5	0.12	0.1	0.01	Stone yard to Soil Filter
Stone Station Pad	1.58	0.3	0.47	0.1	0.05	Stone Yard
Concrete Foundations	0.05	0.5	0.03	0.1	0.00	Stone Yard
Stone Station Pad to Soil Filter	1.88	0.3	0.56	0.1	0.06	Stone yard to Soil Filter
Gravel Road Outside Station	0.15	0.5	0.08	1	0.08	N/A
Landscaped Treated	0.43	0.4	0.17	0.25	0.04	Soil Filter
Landscaped Untreated	0.54	0.4	0.22	1	0.22	N/A
		Total Pre-PPE (lbs P/year)	1.65	**Total PostPPE (lbs P/year)**	0.45	

WORKSHEET 4 - PROJECT PHOSPHORUS EXPORT SUMMARY

Summarizing the project's algal available phosphorus export (PPE)

Project Name: Fickett Road Substation

Project Phosphorus Budget - Worksheet 1	**PPB**	0.51	lbs P/year
Total Pre-Treatment Phosphorus Export - Worksheet 2	**Pre-PPE**	1.65	lbs P/year
Total Post-Treatment Phosphorus Export - Worksheet 2	**Post-PPE**	0.45	lbs P/year
Total Phosphorus Mitigation Credit - Worksheet 3	**TMC**	0.00	lbs P/year
Project Phosphorus Export (Post-PPE - TMC)	**PPE**	0.45	lbs P/year

Is the Project Phosphorus Export ≤ the Project Phosphorus Budget? (PPE≤PPB)

*If **YES**, PPE is less than or equal to PPB and the project meets its phosphorus budget .* *If **NO,** PPE is greater than PPB, more reduction in phosphorus export is required or the payment of a compensation fee may be an option*	YES
The amount of phosphorus that needs further treatment or compensation	lbs P/year

Has Project Phosphorus Export been sufficiently reduced?
Is (Pre-PPE - Post-PPE)/Pre-PPE greater than 0.60?

*If **YES**, in some watersheds the compensation fee is an available option.* *If **NO**, more treatment must be provided. PPE must be further reduced.*	
*The post-treatment phosphorus export must be less than 40% of the pre-treatment export (Post-PPE < 0.4*Pre-PPE)*	%

If the project is located in a watershed that is eligible for a compensation fee (or is a residential subdivision with buffers), a compensation fee may be appropriate as follows:

If Project Export has been reduced by greater than 60% and less than 75%, $25,000 per pound minus $833 per 1% Percent Export	
If Project Export has been reduced by greater than 75%, $12,500 per pound minus $500 per 1% Project Export	

Calculations for Grassed Underdrain Soil Filter							
*Based upon MeDEP Stormwater BMPs Chapter 7.1 - Grassed Underdrain Soil Filters and Phosphorus Control Manual							
Land Type	Area (AC.)	BMP_{ST} = WQv Required, General Standard[1], (CU.FT.)	Treatment Factor (TF)[2]	BMP_{TF} = WQv Required, Phosphorus Standard + General Standard[3], (CU.FT.)	WQv Required[4], BMP_{TF} - BMP_{ST}, (CU.FT.)	Total WQv Required (Impervious and Pervious) (CU.FT.)	WQv Provided[5] @ 18" Depth, (CU.FT.)
Impervious Catchment	2.07	7,514.10	0.25	12,022.56	4,508.46	5,507.44	8,354.00
Pervious Developed Catchment	0.43	624.36	0.25	998.98	998.98		

[1] The General Standard has been met by providing the required BMP_{ST} Water Quality volume within the MeDEP approved station pad stone section.

[2] The Treatment Factor used to upsize the required Stanard Treatment volume in order to meet the Phosphorous Standard.

[3] The Water Quality volume required to meet the General and Phosphorous Standards, calculated using the Maine Storm Water Management Design Manual - Phosphorus Control Manual, Section 4.3: BMP_{TF}=0.4*(BMP_{ST}/TF)

[4] The Water Quality volume required to meet the Phosphorouse Standard for areas where the General Standard has already been met within the MeDEP approved station pad stone section.

[5] Flow rate for ball valve to detain WQv over 36 hour period = 8,354CF * 7.48GAL/CF / (36HR*60MIN/HR) = 29 GPM. Flow rate ranges between 22 - 43 GPM for detention times between 24 - 48 HR.

Orifice Sizing, Ball Valve						
WQv Required (CF)	Detention Time (HR)	Flow Rate (CFS)	Average Head (FT)	Orifice Coefficient	Orifice Area (SF)	Orifice Diameter (IN)[3]
8354	36	0.064459877	1.96	0.614	0.009344372	1.308914774

[3] Equivalent Ball Valve Opening = 1/4 Turn

Culvert Report

Circular Culvert

Invert Elev Dn (ft)	=	180.55
Pipe Length (ft)	=	45.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	181.00
Rise (in)	=	15.0
Shape	=	Circular
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.015
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

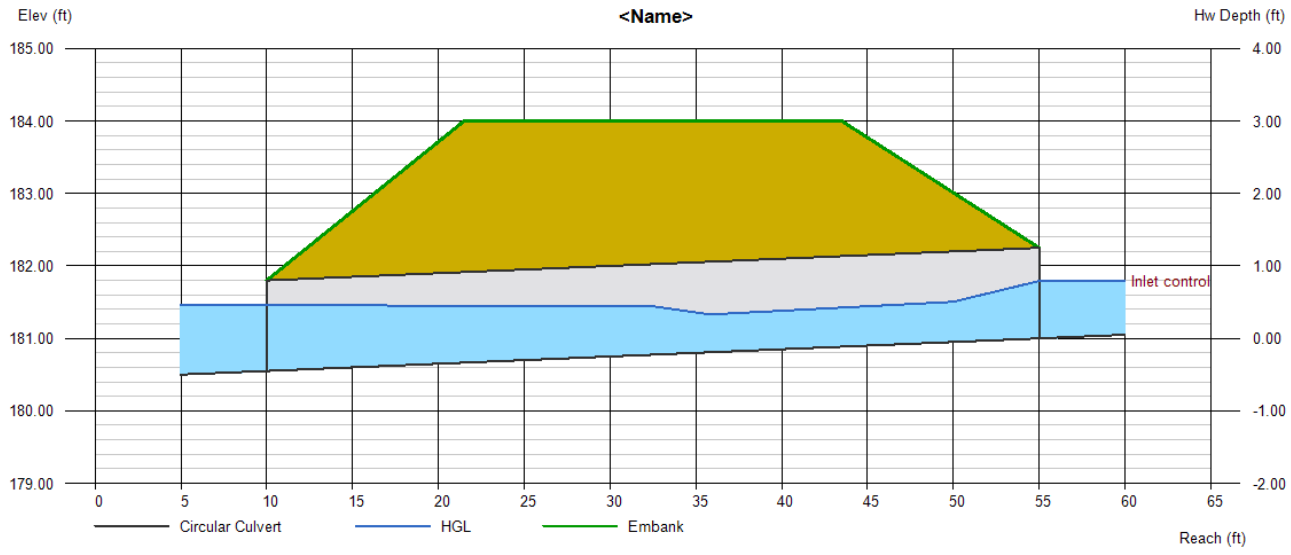
Top Elevation (ft)	=	184.00
Top Width (ft)	=	22.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	2.03
Qmax (cfs)	=	2.03
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	2.03
Qpipe (cfs)	=	2.03
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.12
Veloc Up (ft/s)	=	3.75
HGL Dn (ft)	=	181.46
HGL Up (ft)	=	181.57
Hw Elev (ft)	=	181.79
Hw/D (ft)	=	0.63
Flow Regime	=	Inlet Control



Project Description

File Name ..... Existing Conditions.SPF

Project Options

Flow Units ..... CFS
Elevation Type ..... Elevation
Hydrology Method ..... SCS TR-55
Time of Concentration (TOC) Method ..... SCS TR-55
Link Routing Method ..... Kinematic Wave
Enable Overflow Ponding at Nodes ..... YES
Skip Steady State Analysis Time Periods ..... NO

Analysis Options

Start Analysis On ..... Aug 10, 2017 00:00:00
End Analysis On ..... Aug 11, 2017 00:00:00
Start Reporting On ..... Aug 10, 2017 00:00:00
Antecedent Dry Days ..... 0 days
Runoff (Dry Weather) Time Step ..... 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step ..... 0 00:05:00 days hh:mm:ss
Reporting Time Step ..... 0 00:05:00 days hh:mm:ss
Routing Time Step ..... 30 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	4
Nodes	4
Junctions	0
Outfalls	4
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	0
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-02	Cumulative	inches	Maine	Cumberland (Southeast)	2	3.00	SCS Type III 24-hr

Subbasin Summary

Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
A	3.70	73.41	3.00	0.88	3.25	2.25	0 00:23:04
B	8.76	73.22	3.00	0.87	7.61	3.98	0 00:43:24
C	0.35	74.60	3.00	0.94	0.33	0.27	0 00:15:12
D	0.12	77.00	3.00	1.07	0.13	0.13	0 00:06:30

Subbasin Hydrology

Subbasin : A

Input Data

Area (ac) 3.70
Weighted Curve Number 73.41
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.38	D	77.00
Brush, Good	3.32	D	73.00
Composite Area & Weighted CN	3.70		73.41

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.6	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	14.36	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	13.94	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	625	0.00	0.00
Slope (%) :	.582	0.00	0.00
Surface Type :	Grassed waterway	Unpaved	Unpaved
Velocity (ft/sec) :	1.14	0.00	0.00
Computed Flow Time (min) :	9.14	0.00	0.00

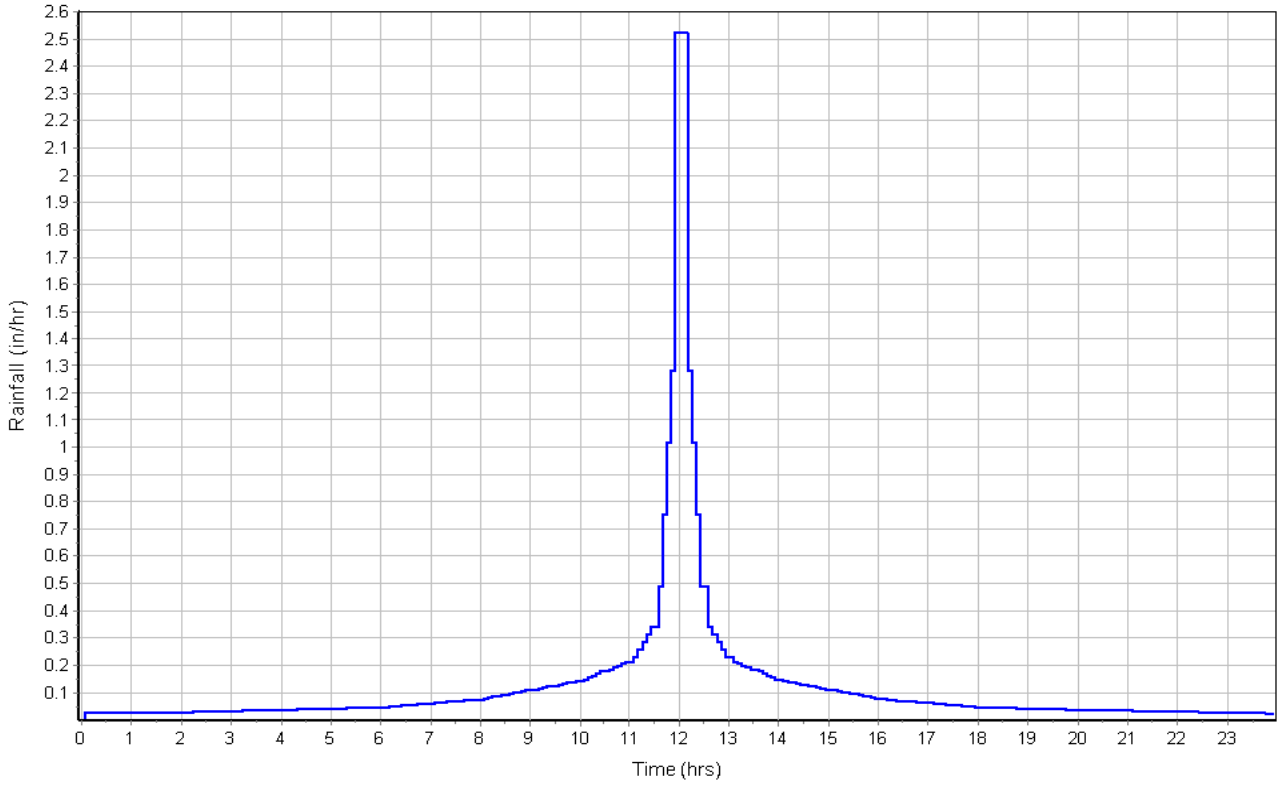
Total TOC (min) 23.08

Subbasin Runoff Results

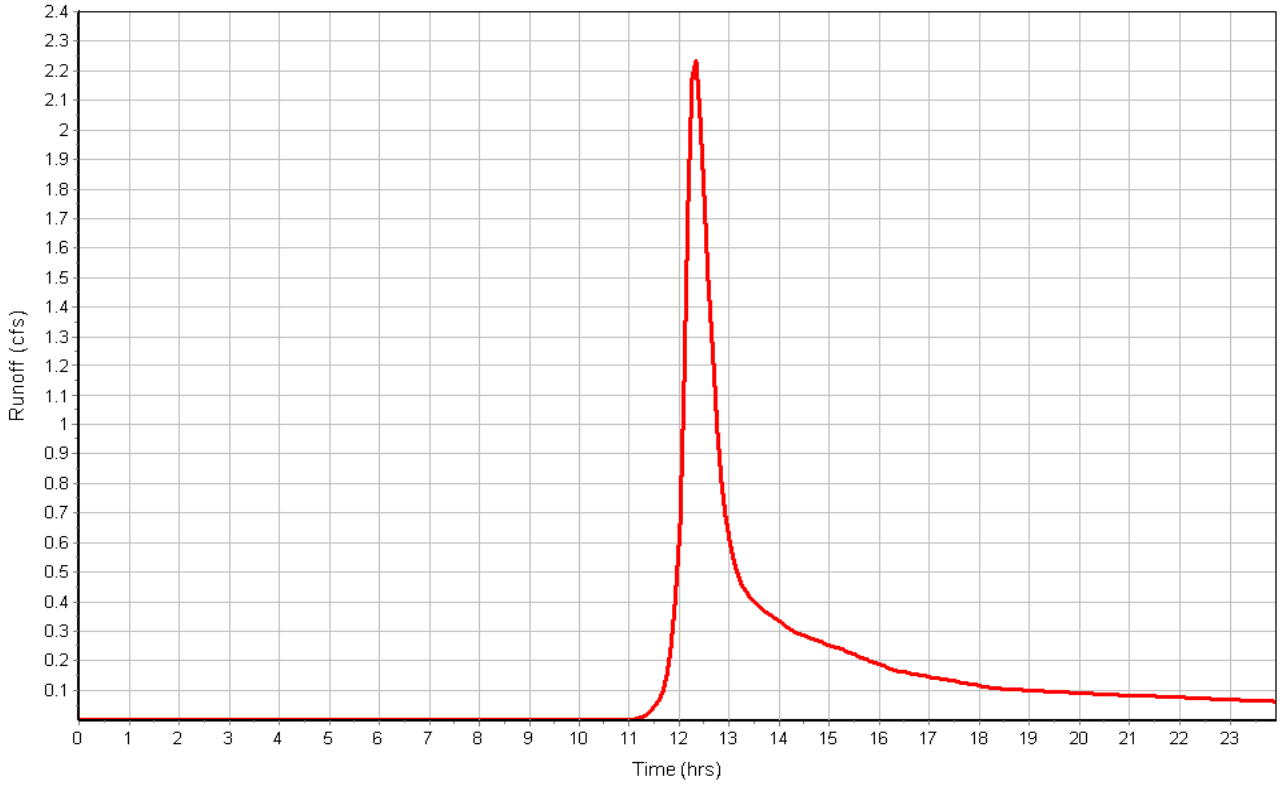
Total Rainfall (in)	3.00
Total Runoff (in)	0.88
Peak Runoff (cfs)	2.25
Weighted Curve Number	73.41
Time of Concentration (days hh:mm:ss)	0 00:23:05

Subbasin : A

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : B

Input Data

Area (ac) 8.76
Weighted Curve Number 73.22
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Brush, Good	8.27	D	73.00
Woods, Good	0.49	D	77.00
Composite Area & Weighted CN	8.76		73.22

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.6	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	4.25	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.07	0.00	0.00
Computed Flow Time (min) :	22.69	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	758	0.00	0.00
Slope (%) :	.758	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.61	0.00	0.00
Computed Flow Time (min) :	20.71	0.00	0.00

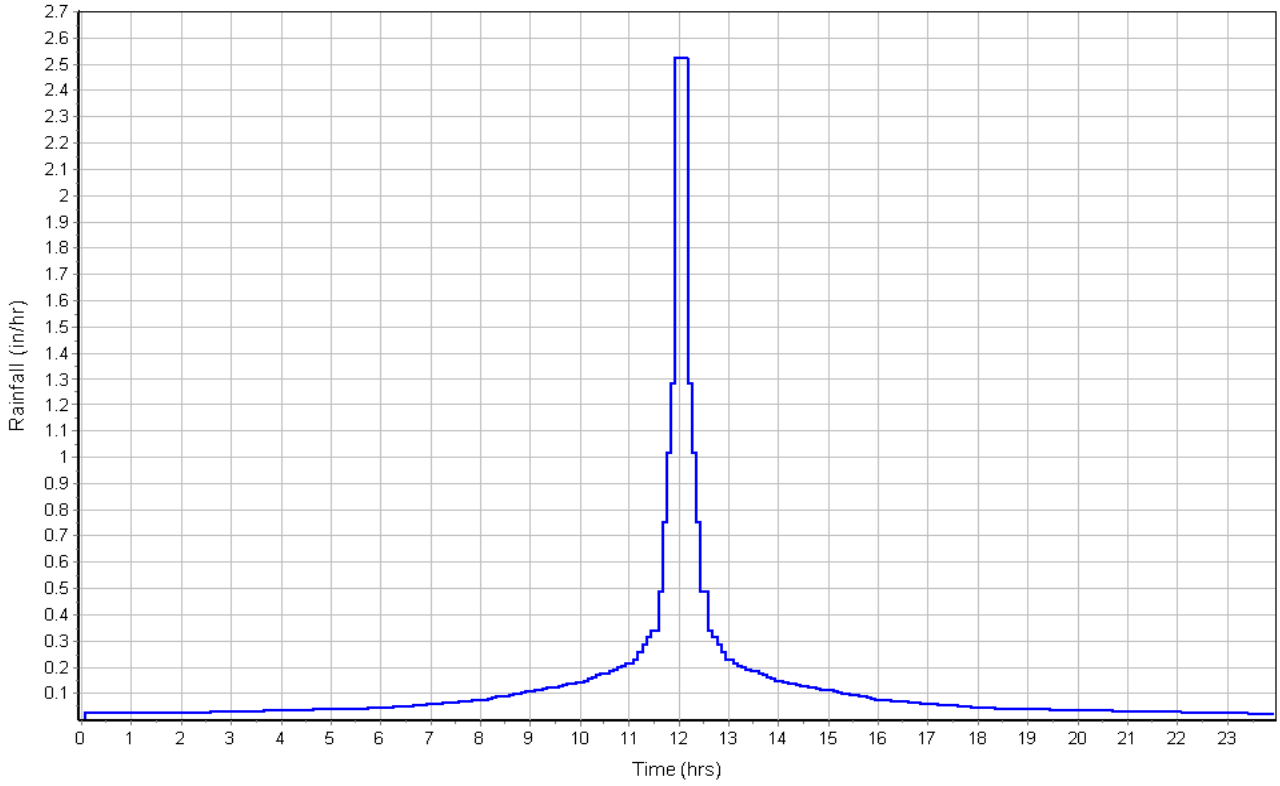
Total TOC (min) 43.40

Subbasin Runoff Results

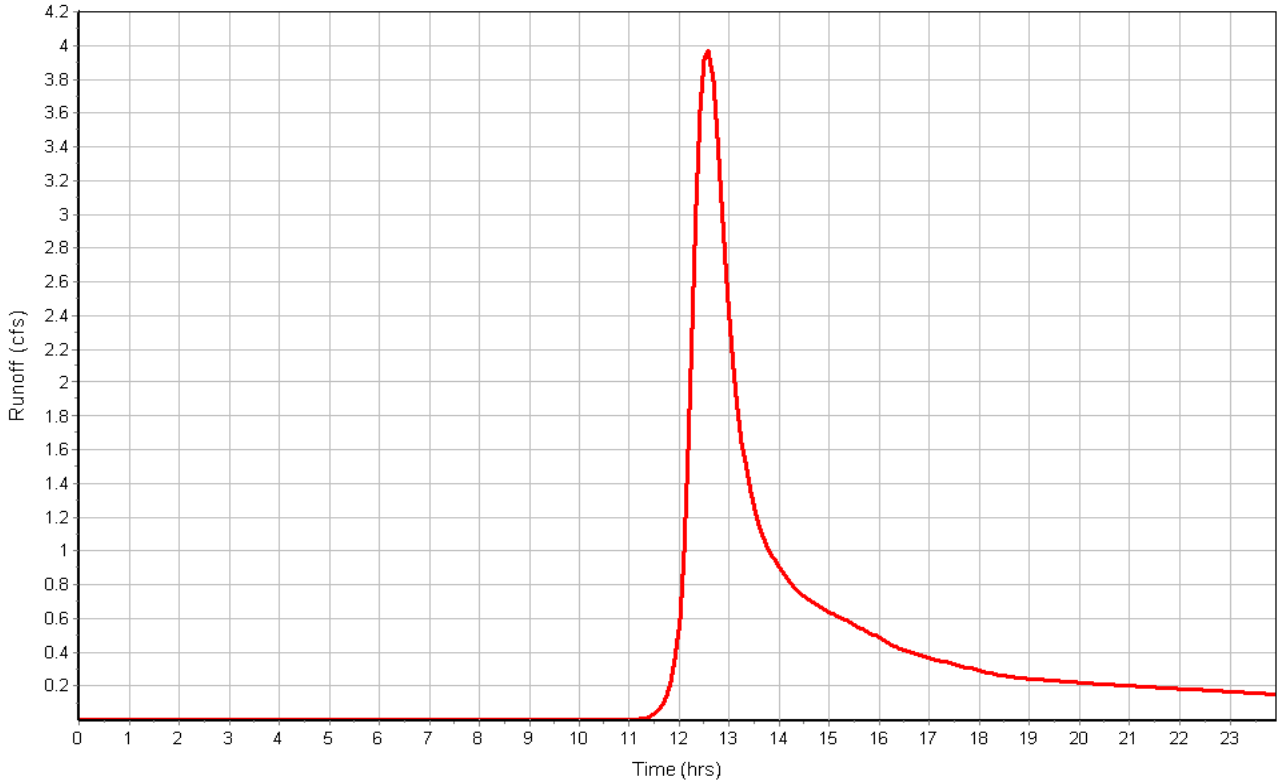
Total Rainfall (in) 3.00
Total Runoff (in) 0.87
Peak Runoff (cfs) 3.98
Weighted Curve Number 73.22
Time of Concentration (days hh:mm:ss) 0 00:43:24

Subbasin : B

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : C

Input Data

Area (ac) 0.35
Weighted Curve Number 74.60
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.03	D	77.00
Woods, Good	0.04	D	77.00
Brush, Good	0.08	D	73.00
Brush, Good	0.13	D	73.00
Woods, Good	0.07	D	77.00
Composite Area & Weighted CN	0.35		74.60

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	87	0.00	0.00
Slope (%) :	10.35	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.14	0.00	0.00
Computed Flow Time (min) :	10.28	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	313	0.00	0.00
Slope (%) :	2.3	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.06	0.00	0.00
Computed Flow Time (min) :	4.92	0.00	0.00

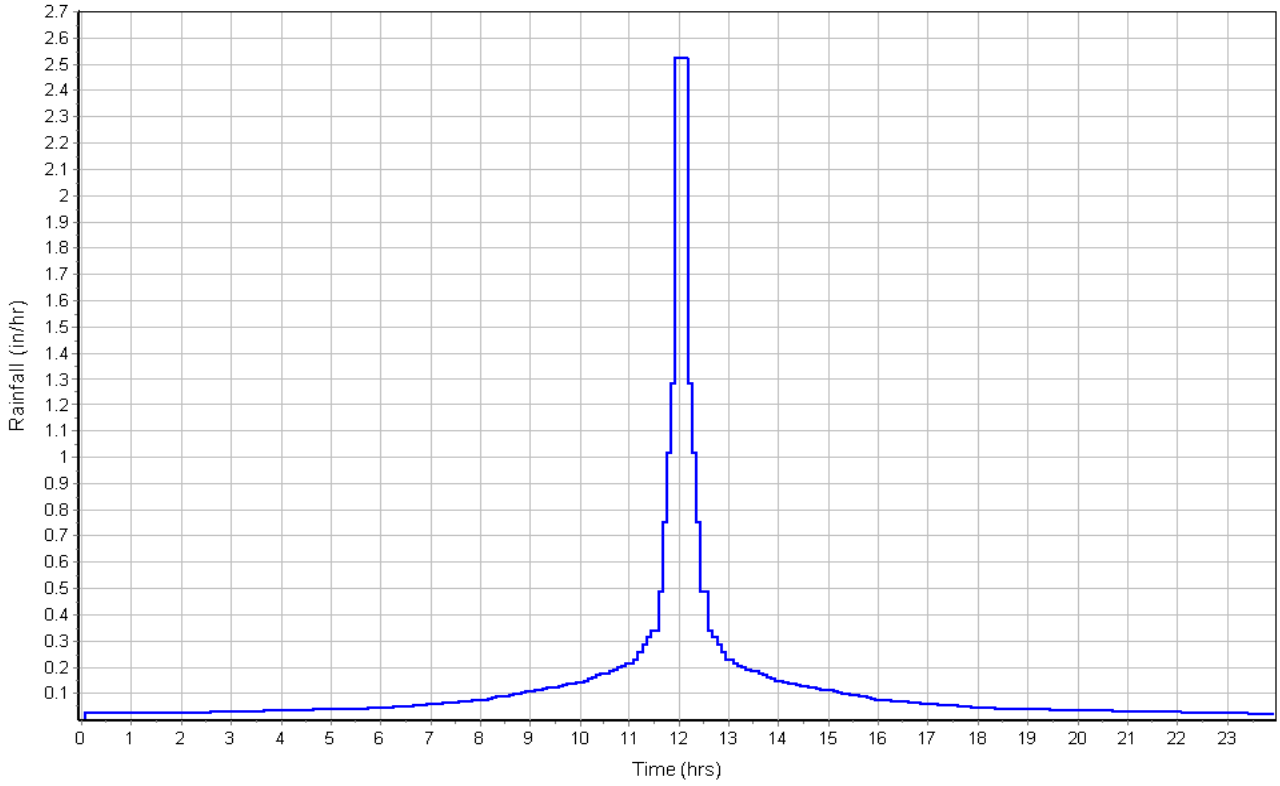
Total TOC (min) 15.20

Subbasin Runoff Results

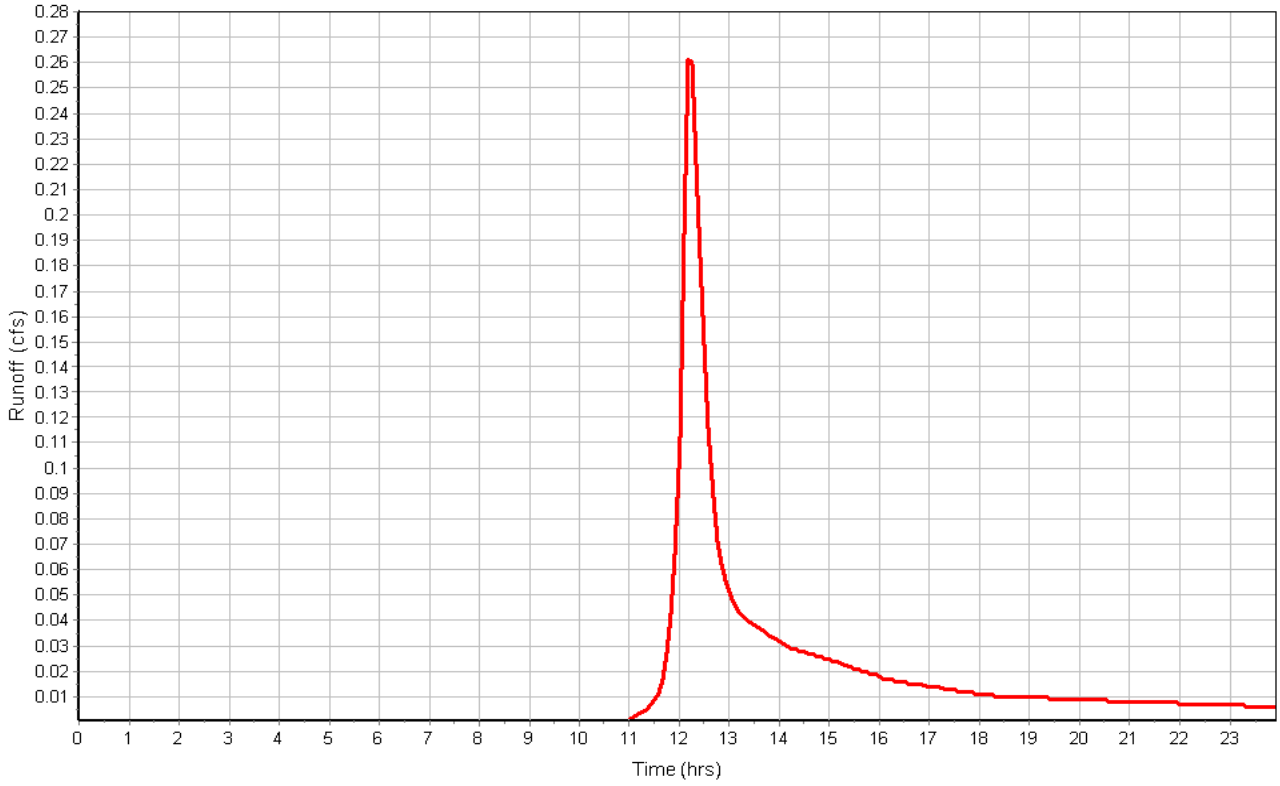
Total Rainfall (in) 3.00
Total Runoff (in) 0.94
Peak Runoff (cfs) 0.27
Weighted Curve Number 74.60
Time of Concentration (days hh:mm:ss) 0 00:15:12

Subbasin : C

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : D

Input Data

Area (ac) 0.12
Weighted Curve Number 77.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.12	D	77.00
Composite Area & Weighted CN	0.12		77.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	36	0.00	0.00
Slope (%) :	5.55	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.09	0.00	0.00
Computed Flow Time (min) :	6.51	0.00	0.00

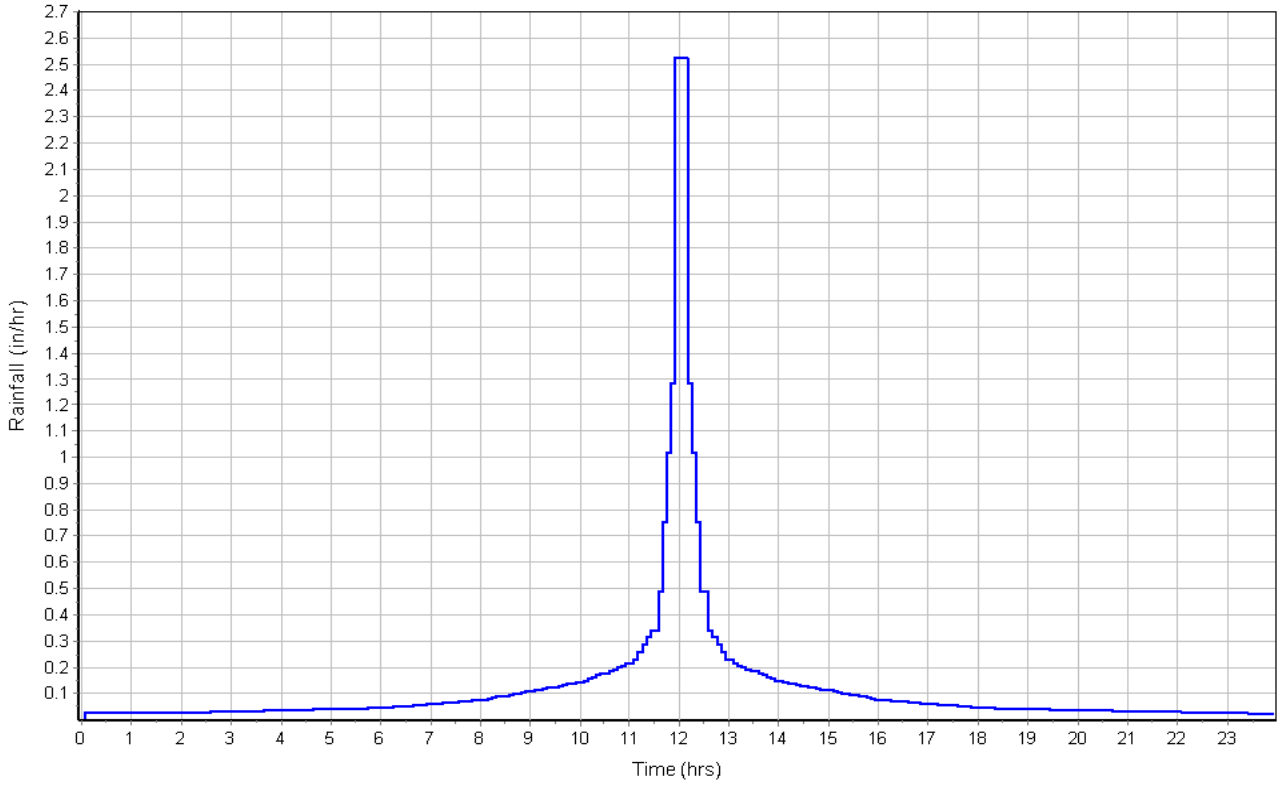
Total TOC (min) 6.51

Subbasin Runoff Results

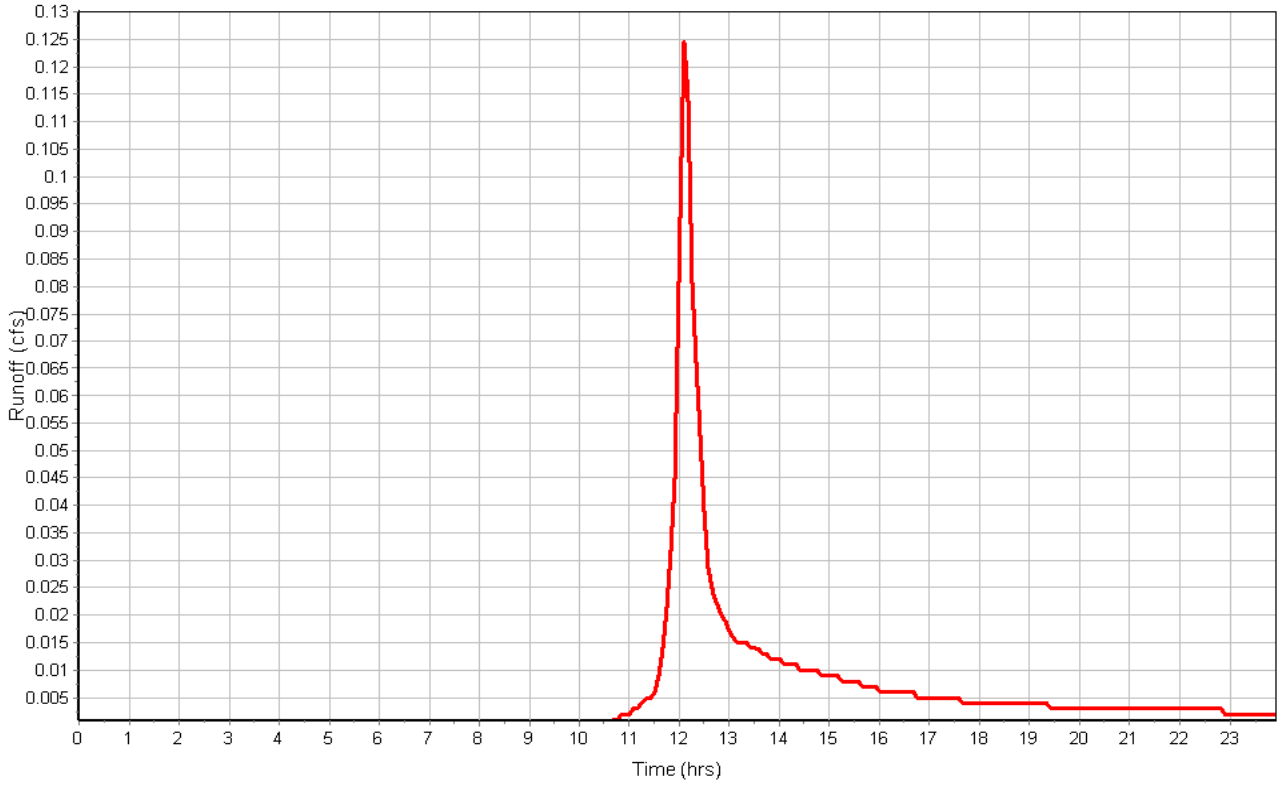
Total Rainfall (in) 3.00
Total Runoff (in) 1.07
Peak Runoff (cfs) 0.13
Weighted Curve Number 77.00
Time of Concentration (days hh:mm:ss) 0 00:06:31

Subbasin : D

Rainfall Intensity Graph



Runoff Hydrograph



Project Description

File Name ..... Existing Conditions.SPF

Project Options

Flow Units ..... CFS
Elevation Type ..... Elevation
Hydrology Method ..... SCS TR-55
Time of Concentration (TOC) Method ..... SCS TR-55
Link Routing Method ..... Kinematic Wave
Enable Overflow Ponding at Nodes ..... YES
Skip Steady State Analysis Time Periods ..... NO

Analysis Options

Start Analysis On ..... Aug 10, 2017 00:00:00
End Analysis On ..... Aug 11, 2017 00:00:00
Start Reporting On ..... Aug 10, 2017 00:00:00
Antecedent Dry Days ..... 0 days
Runoff (Dry Weather) Time Step ..... 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step ..... 0 00:05:00 days hh:mm:ss
Reporting Time Step ..... 0 00:05:00 days hh:mm:ss
Routing Time Step ..... 30 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	4
Nodes	4
Junctions	0
Outfalls	4
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	0
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-10	Cumulative	inches	Maine	Cumberland (Southeast)	10	4.70	SCS Type III 24-hr

Subbasin Summary

Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
A	3.70	73.41	4.70	2.08	7.70	5.70	0 00:23:04
B	8.76	73.22	4.70	2.07	18.10	10.12	0 00:43:24
C	0.35	74.60	4.70	2.18	0.76	0.66	0 00:15:12
D	0.12	77.00	4.70	2.37	0.28	0.30	0 00:06:30

Subbasin Hydrology

Subbasin : A

Input Data

Area (ac) 3.70
Weighted Curve Number 73.41
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.38	D	77.00
Brush, Good	3.32	D	73.00
Composite Area & Weighted CN	3.70		73.41

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.6	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	14.36	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	13.94	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	625	0.00	0.00
Slope (%) :	.582	0.00	0.00
Surface Type :	Grassed waterway	Unpaved	Unpaved
Velocity (ft/sec) :	1.14	0.00	0.00
Computed Flow Time (min) :	9.14	0.00	0.00

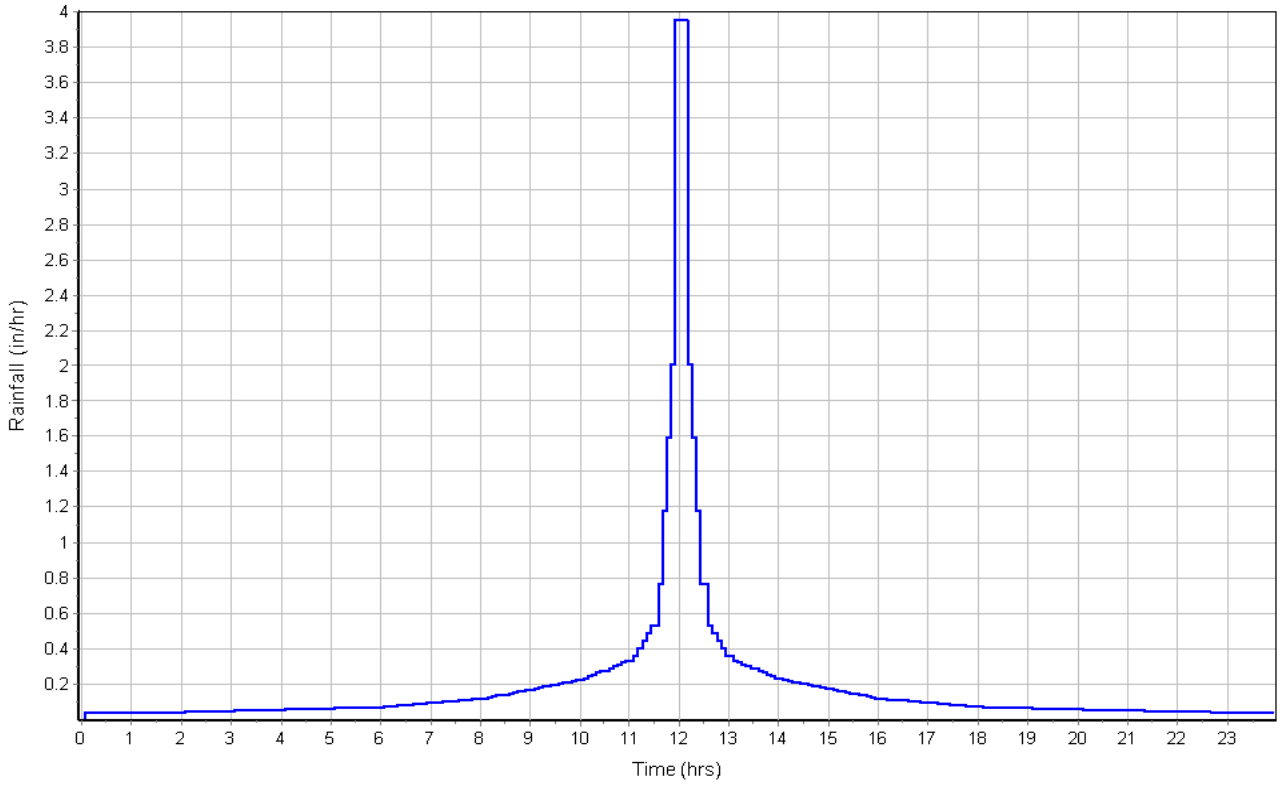
Total TOC (min) 23.08

Subbasin Runoff Results

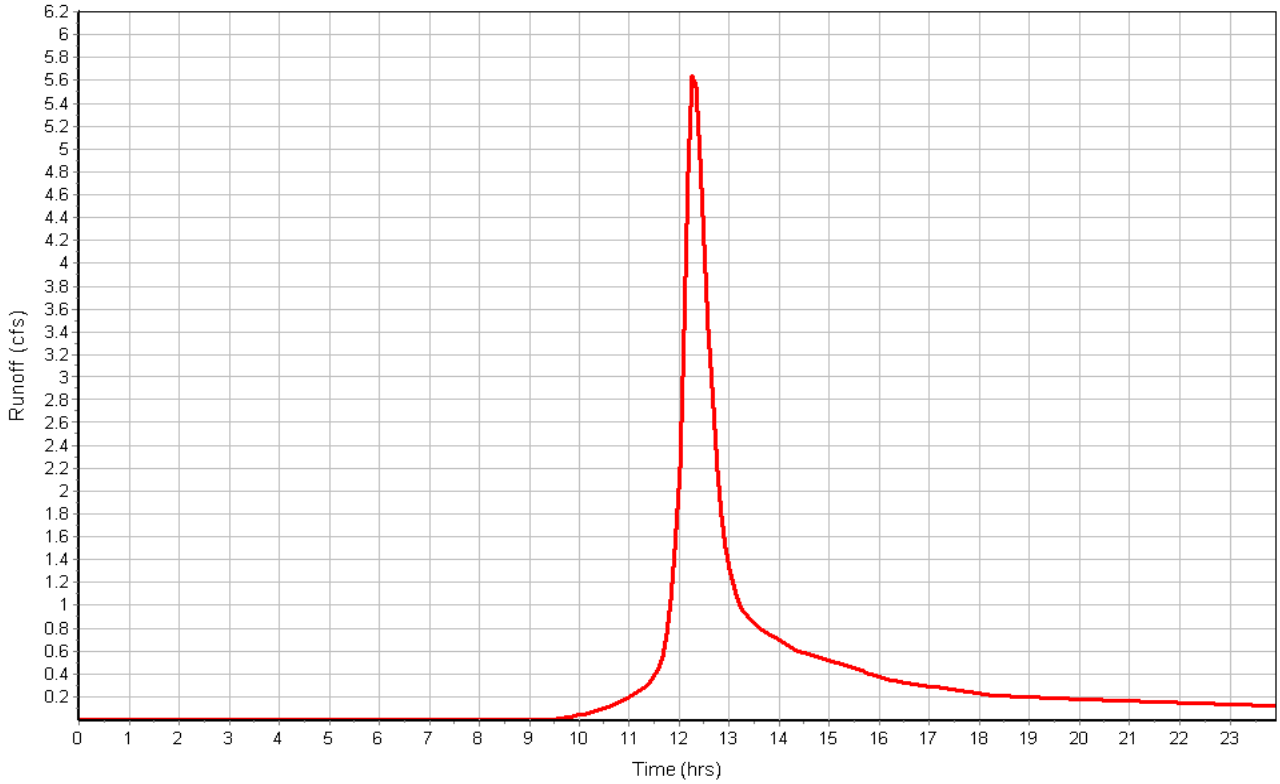
Total Rainfall (in)	4.70
Total Runoff (in)	2.08
Peak Runoff (cfs)	5.70
Weighted Curve Number	73.41
Time of Concentration (days hh:mm:ss)	0 00:23:05

Subbasin : A

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : B

Input Data

Area (ac) 8.76
Weighted Curve Number 73.22
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Brush, Good	8.27	D	73.00
Woods, Good	0.49	D	77.00
Composite Area & Weighted CN	8.76		73.22

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.6	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	4.25	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.07	0.00	0.00
Computed Flow Time (min) :	22.69	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	758	0.00	0.00
Slope (%) :	.758	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.61	0.00	0.00
Computed Flow Time (min) :	20.71	0.00	0.00

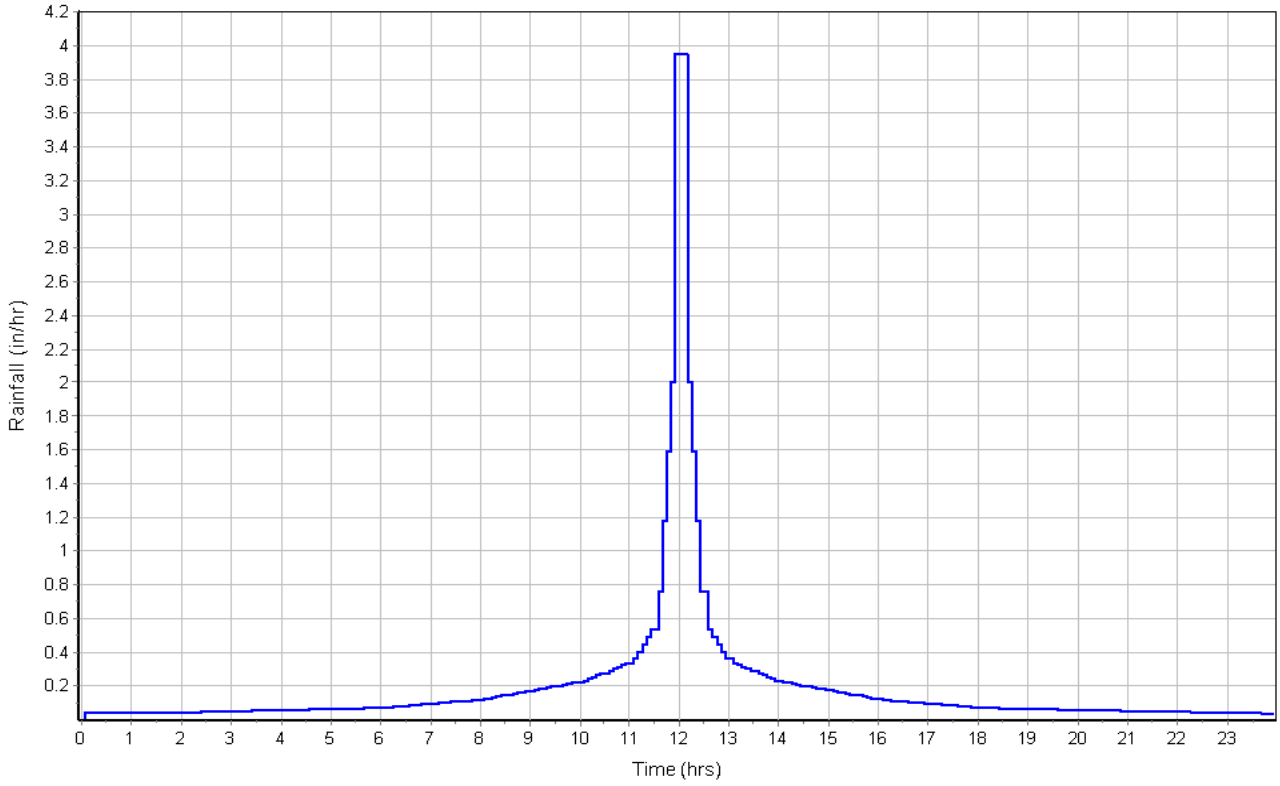
Total TOC (min) 43.40

Subbasin Runoff Results

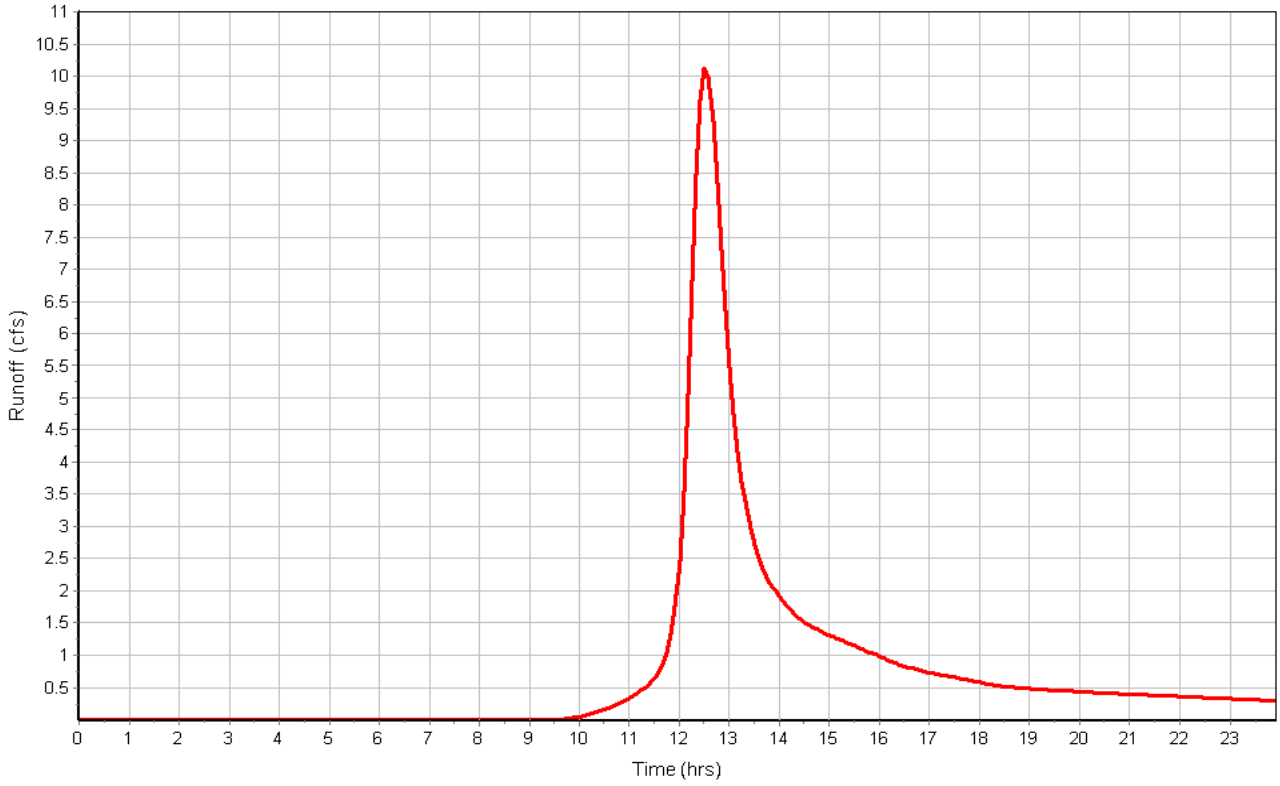
Total Rainfall (in) 4.70
Total Runoff (in) 2.07
Peak Runoff (cfs) 10.12
Weighted Curve Number 73.22
Time of Concentration (days hh:mm:ss) 0 00:43:24

Subbasin : B

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : C

Input Data

Area (ac) 0.35
Weighted Curve Number 74.60
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.03	D	77.00
Woods, Good	0.04	D	77.00
Brush, Good	0.08	D	73.00
Brush, Good	0.13	D	73.00
Woods, Good	0.07	D	77.00
Composite Area & Weighted CN	0.35		74.60

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	87	0.00	0.00
Slope (%) :	10.35	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.14	0.00	0.00
Computed Flow Time (min) :	10.28	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	313	0.00	0.00
Slope (%) :	2.3	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.06	0.00	0.00
Computed Flow Time (min) :	4.92	0.00	0.00

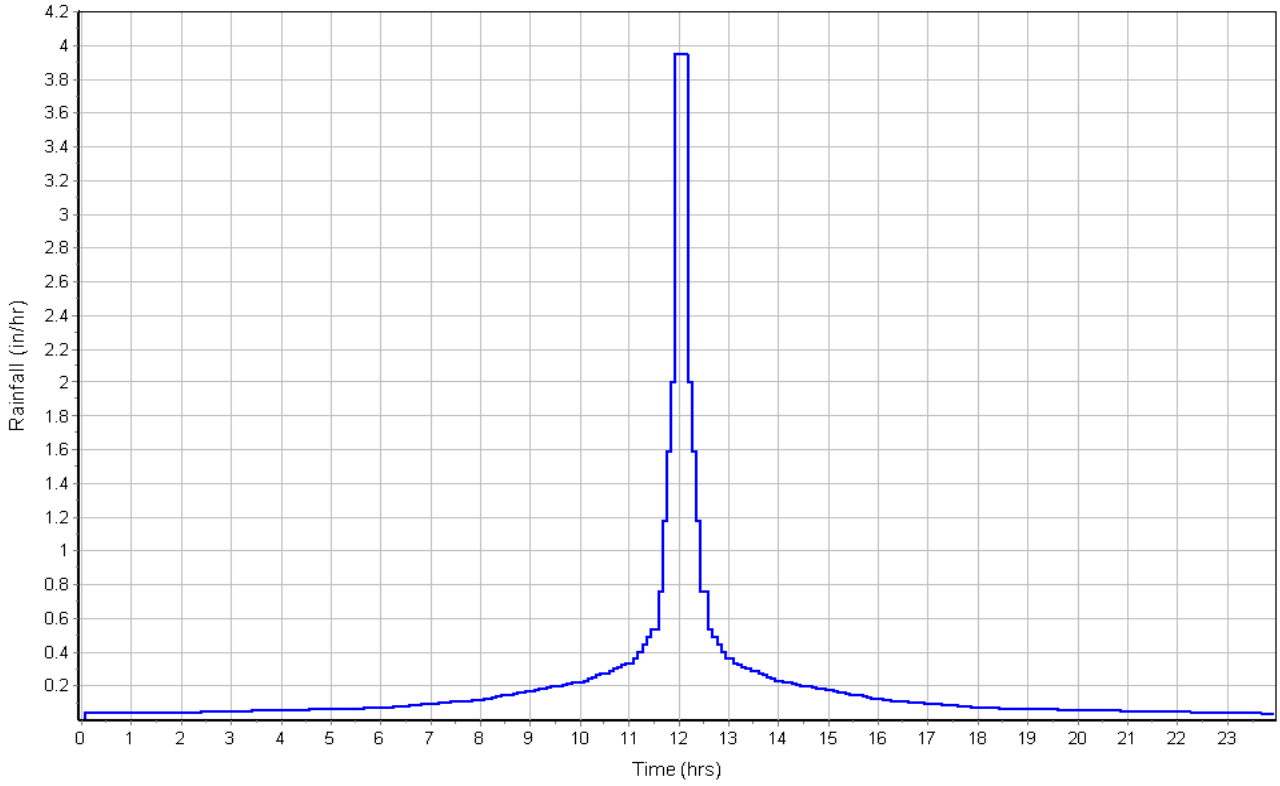
Total TOC (min) 15.20

Subbasin Runoff Results

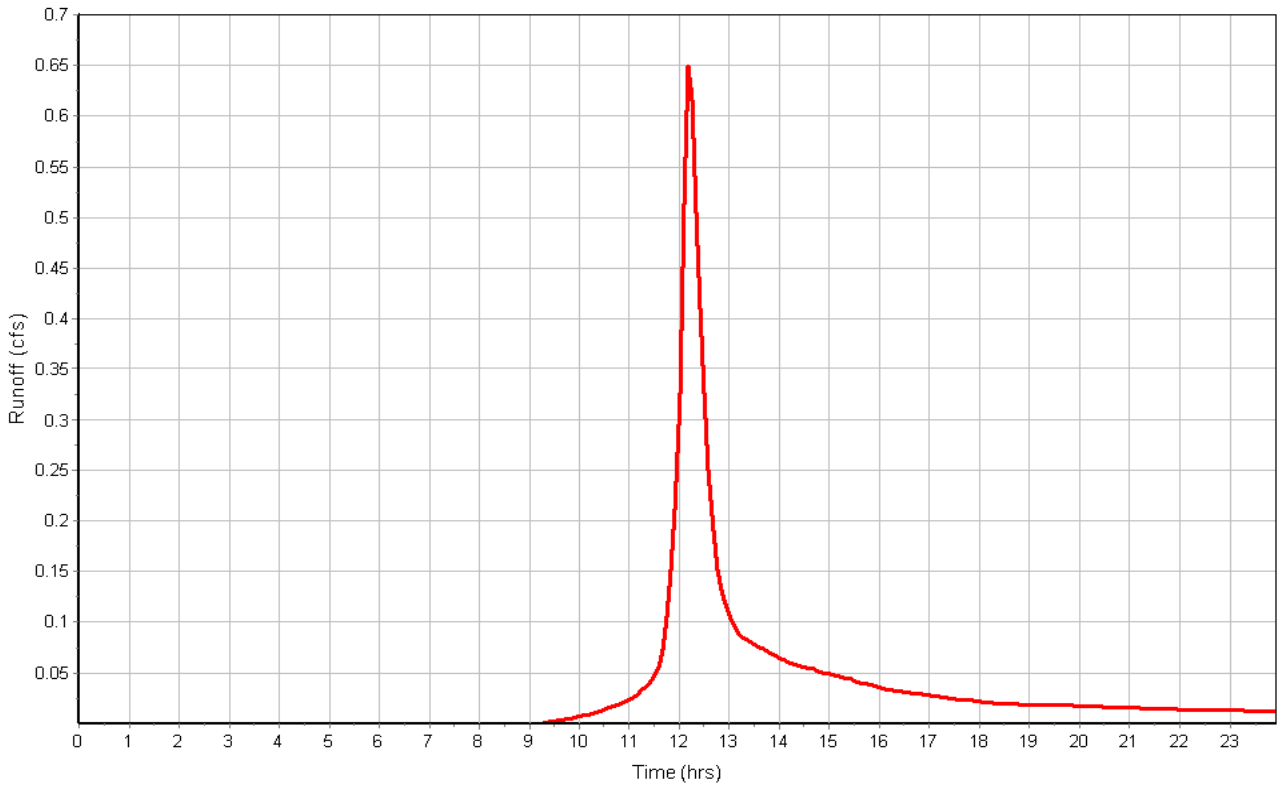
Total Rainfall (in) 4.70
Total Runoff (in) 2.18
Peak Runoff (cfs) 0.66
Weighted Curve Number 74.60
Time of Concentration (days hh:mm:ss) 0 00:15:12

Subbasin : C

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : D

Input Data

Area (ac) 0.12
Weighted Curve Number 77.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.12	D	77.00
Composite Area & Weighted CN	0.12		77.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	36	0.00	0.00
Slope (%) :	5.55	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.09	0.00	0.00
Computed Flow Time (min) :	6.51	0.00	0.00

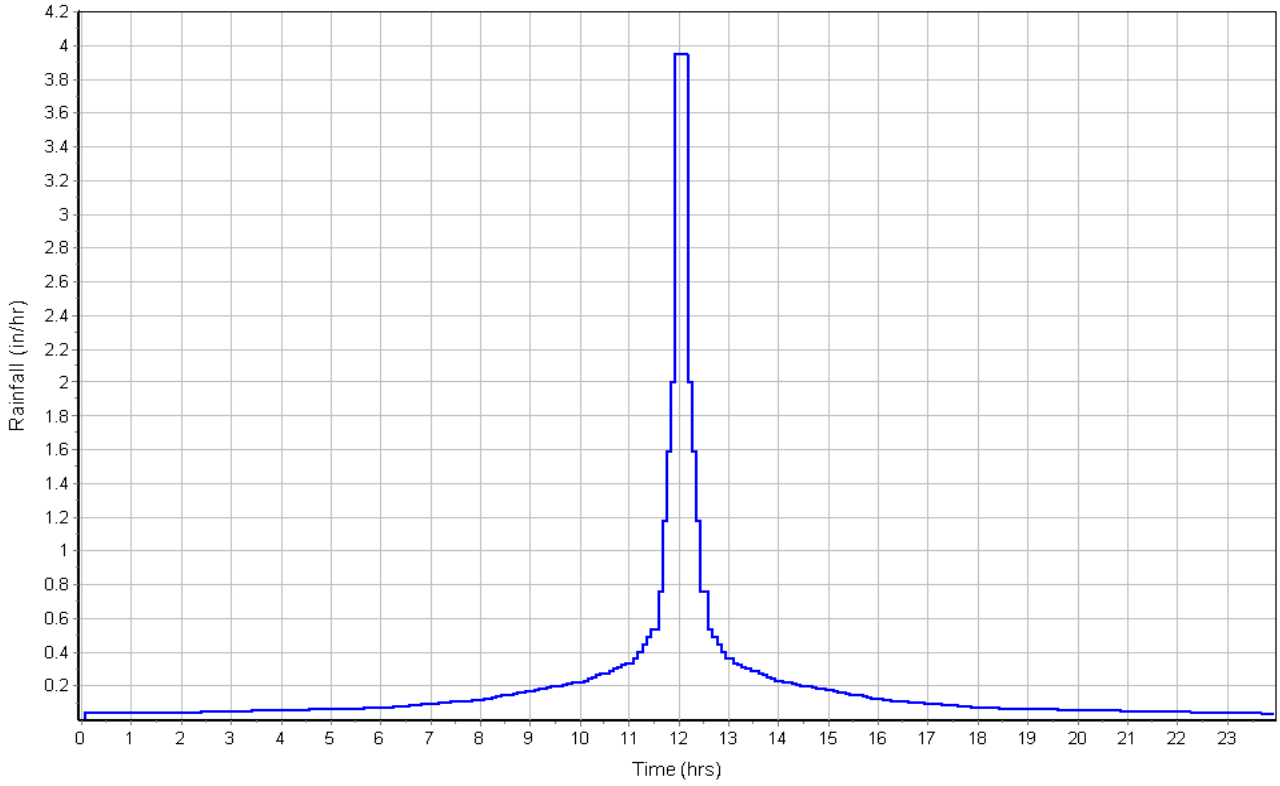
Total TOC (min) 6.51

Subbasin Runoff Results

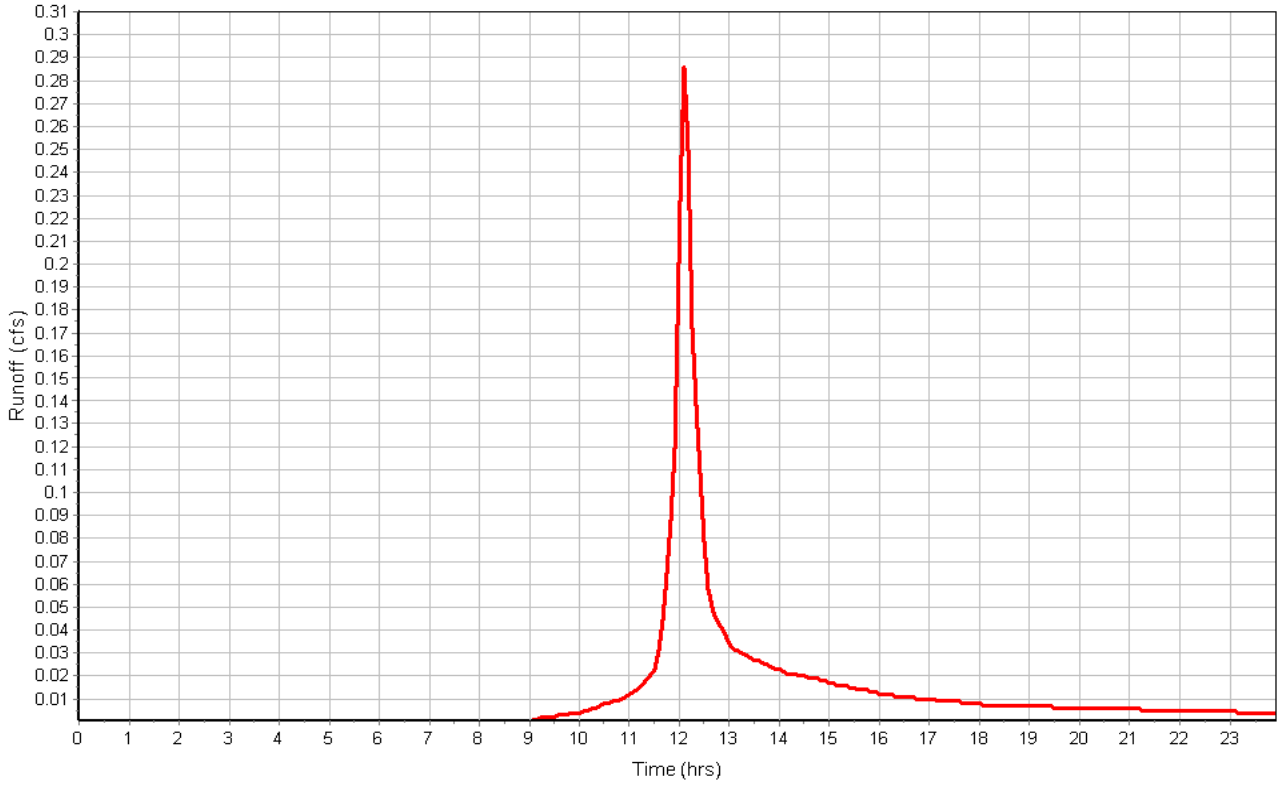
Total Rainfall (in) 4.70
Total Runoff (in) 2.37
Peak Runoff (cfs) 0.30
Weighted Curve Number 77.00
Time of Concentration (days hh:mm:ss) 0 00:06:31

Subbasin : D

Rainfall Intensity Graph



Runoff Hydrograph



Project Description

File Name ..... Existing Conditions.SPF

Project Options

Flow Units ..... CFS
Elevation Type ..... Elevation
Hydrology Method ..... SCS TR-55
Time of Concentration (TOC) Method ..... SCS TR-55
Link Routing Method ..... Kinematic Wave
Enable Overflow Ponding at Nodes ..... YES
Skip Steady State Analysis Time Periods ..... NO

Analysis Options

Start Analysis On ..... Aug 10, 2017 00:00:00
End Analysis On ..... Aug 11, 2017 00:00:00
Start Reporting On ..... Aug 10, 2017 00:00:00
Antecedent Dry Days ..... 0 days
Runoff (Dry Weather) Time Step ..... 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step ..... 0 00:05:00 days hh:mm:ss
Reporting Time Step ..... 0 00:05:00 days hh:mm:ss
Routing Time Step ..... 30 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	4
Nodes	4
Junctions	0
Outfalls	4
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	0
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-25	Cumulative	inches	Maine	Cumberland (Southeast)	25	5.50	SCS Type III 24-hr

Subbasin Summary

Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
A	3.70	73.41	5.50	2.72	10.05	7.51	0 00:23:04
B	8.76	73.22	5.50	2.70	23.65	13.36	0 00:43:24
C	0.35	74.60	5.50	2.82	0.99	0.86	0 00:15:12
D	0.12	77.00	5.50	3.04	0.37	0.38	0 00:06:30

Subbasin Hydrology

Subbasin : A

Input Data

Area (ac) 3.70
Weighted Curve Number 73.41
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.38	D	77.00
Brush, Good	3.32	D	73.00
Composite Area & Weighted CN	3.70		73.41

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.6	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	14.36	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	13.94	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	625	0.00	0.00
Slope (%) :	.582	0.00	0.00
Surface Type :	Grassed waterway	Unpaved	Unpaved
Velocity (ft/sec) :	1.14	0.00	0.00
Computed Flow Time (min) :	9.14	0.00	0.00

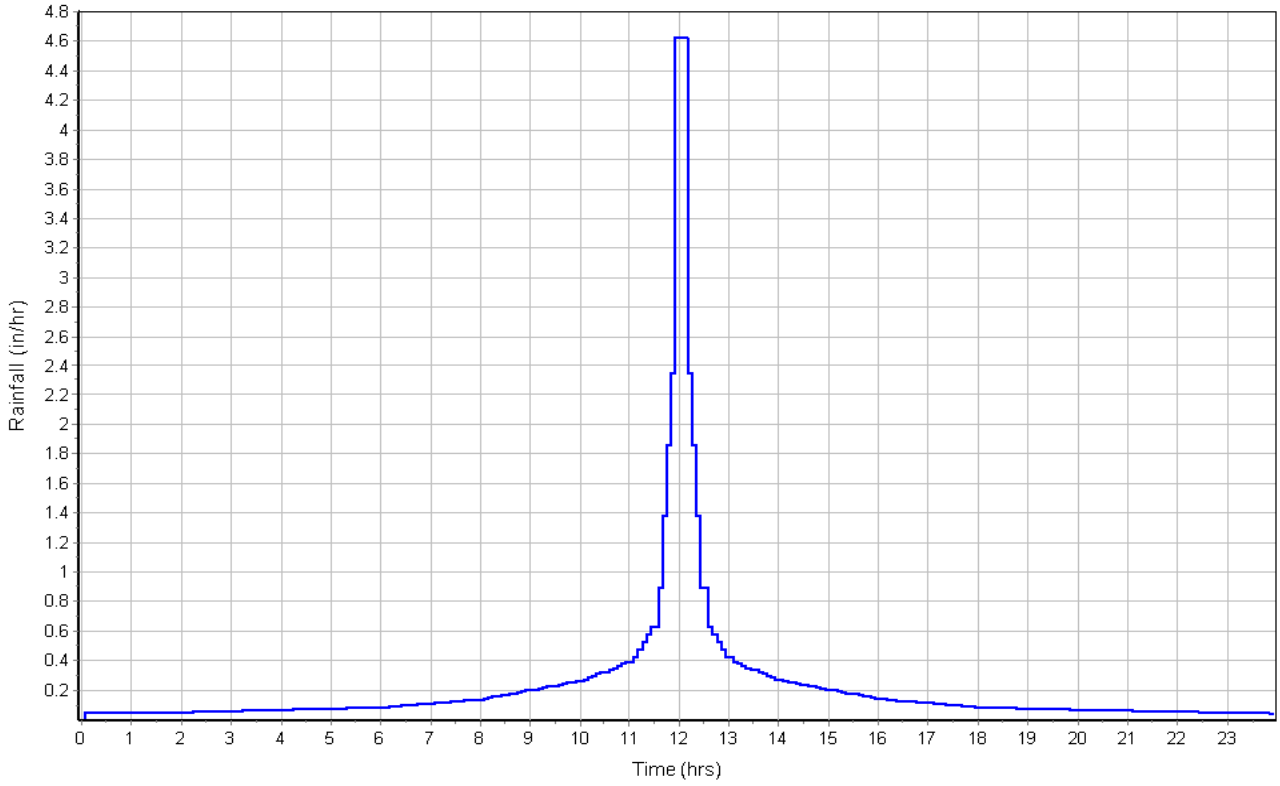
Total TOC (min) 23.08

Subbasin Runoff Results

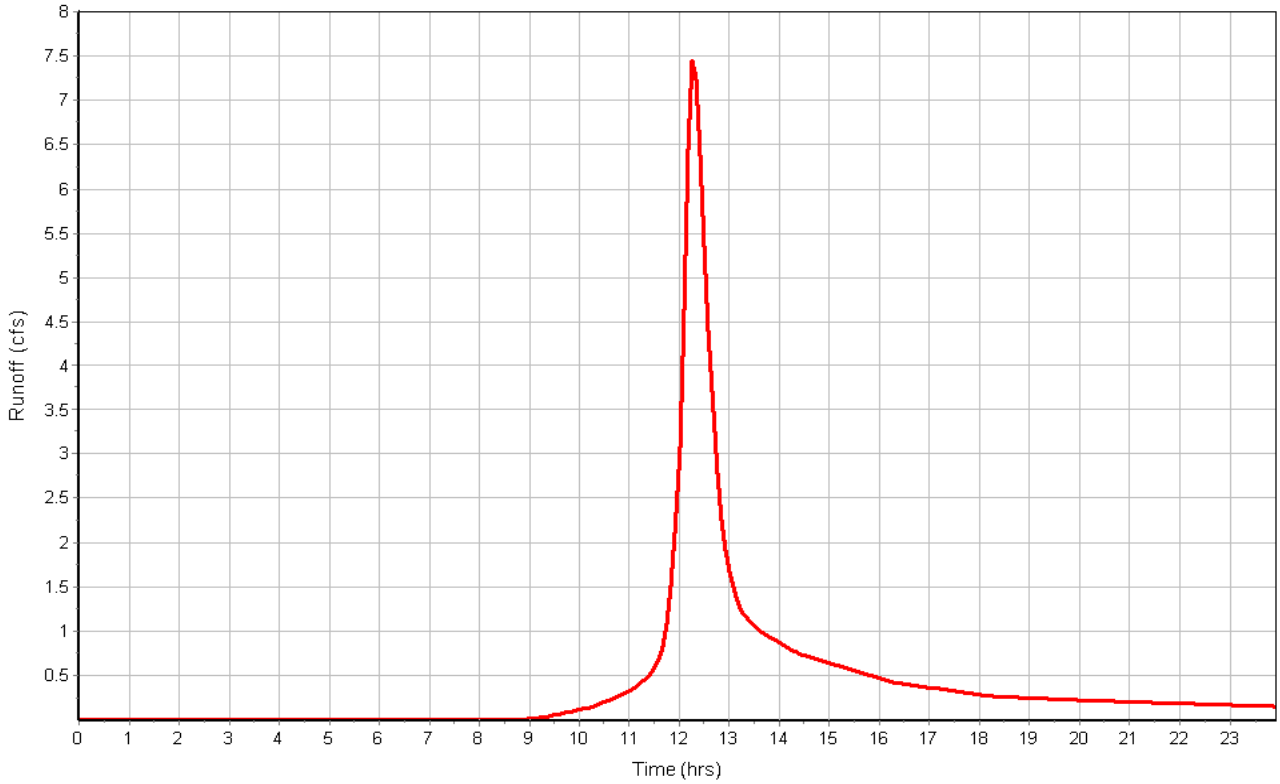
Total Rainfall (in)	5.50
Total Runoff (in)	2.72
Peak Runoff (cfs)	7.51
Weighted Curve Number	73.41
Time of Concentration (days hh:mm:ss)	0 00:23:05

Subbasin : A

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : B

Input Data

Area (ac) 8.76
Weighted Curve Number 73.22
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Brush, Good	8.27	D	73.00
Woods, Good	0.49	D	77.00
Composite Area & Weighted CN	8.76		73.22

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.6	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	4.25	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.07	0.00	0.00
Computed Flow Time (min) :	22.69	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	758	0.00	0.00
Slope (%) :	.758	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.61	0.00	0.00
Computed Flow Time (min) :	20.71	0.00	0.00

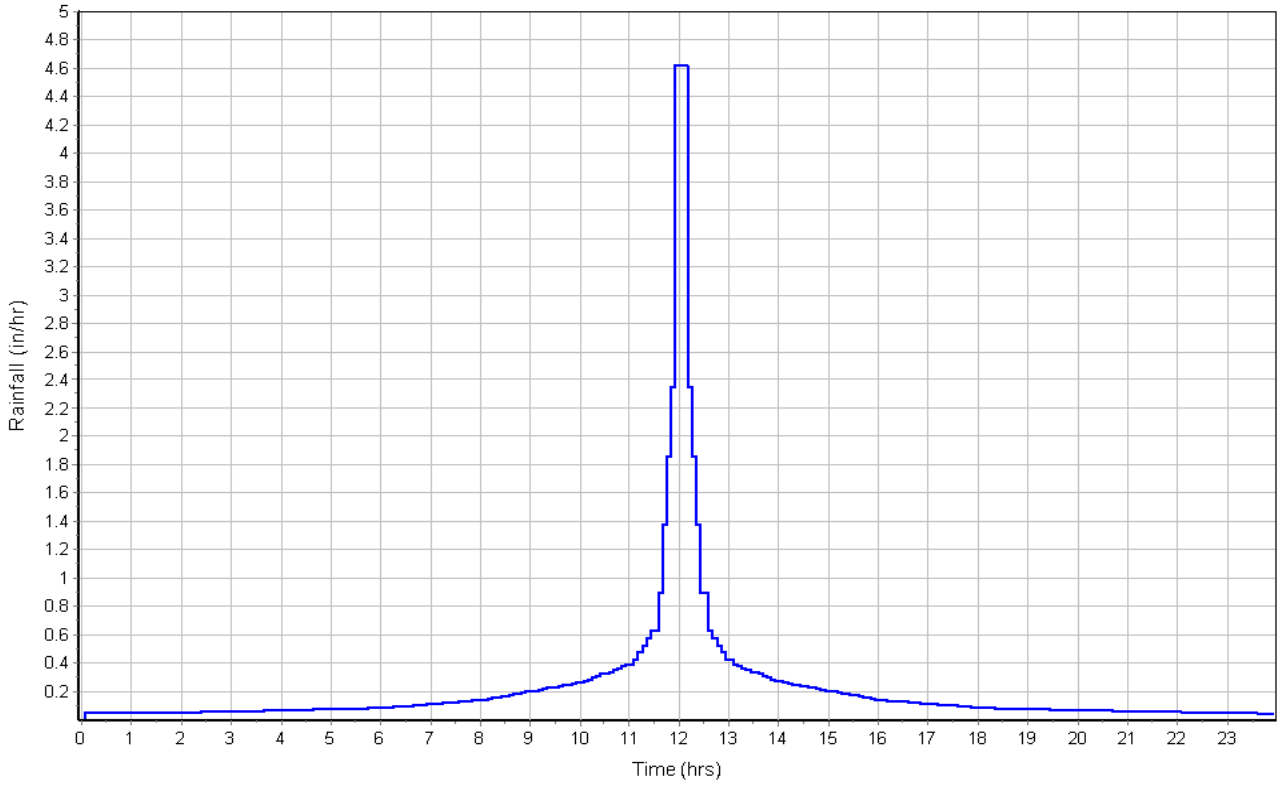
Total TOC (min) 43.40

Subbasin Runoff Results

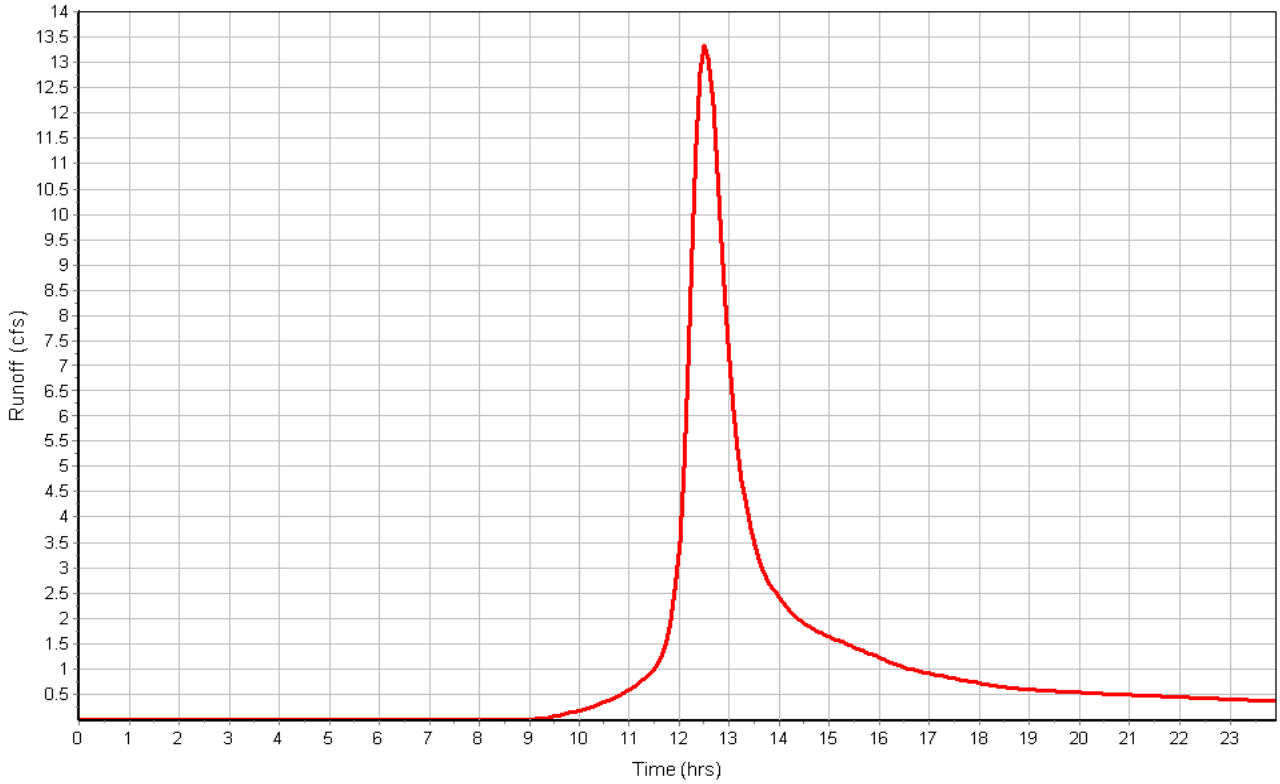
Total Rainfall (in) 5.50
Total Runoff (in) 2.70
Peak Runoff (cfs) 13.36
Weighted Curve Number 73.22
Time of Concentration (days hh:mm:ss) 0 00:43:24

Subbasin : B

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : C

Input Data

Area (ac) 0.35
Weighted Curve Number 74.60
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.03	D	77.00
Woods, Good	0.04	D	77.00
Brush, Good	0.08	D	73.00
Brush, Good	0.13	D	73.00
Woods, Good	0.07	D	77.00
Composite Area & Weighted CN	0.35		74.60

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	87	0.00	0.00
Slope (%) :	10.35	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.14	0.00	0.00
Computed Flow Time (min) :	10.28	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	313	0.00	0.00
Slope (%) :	2.3	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.06	0.00	0.00
Computed Flow Time (min) :	4.92	0.00	0.00

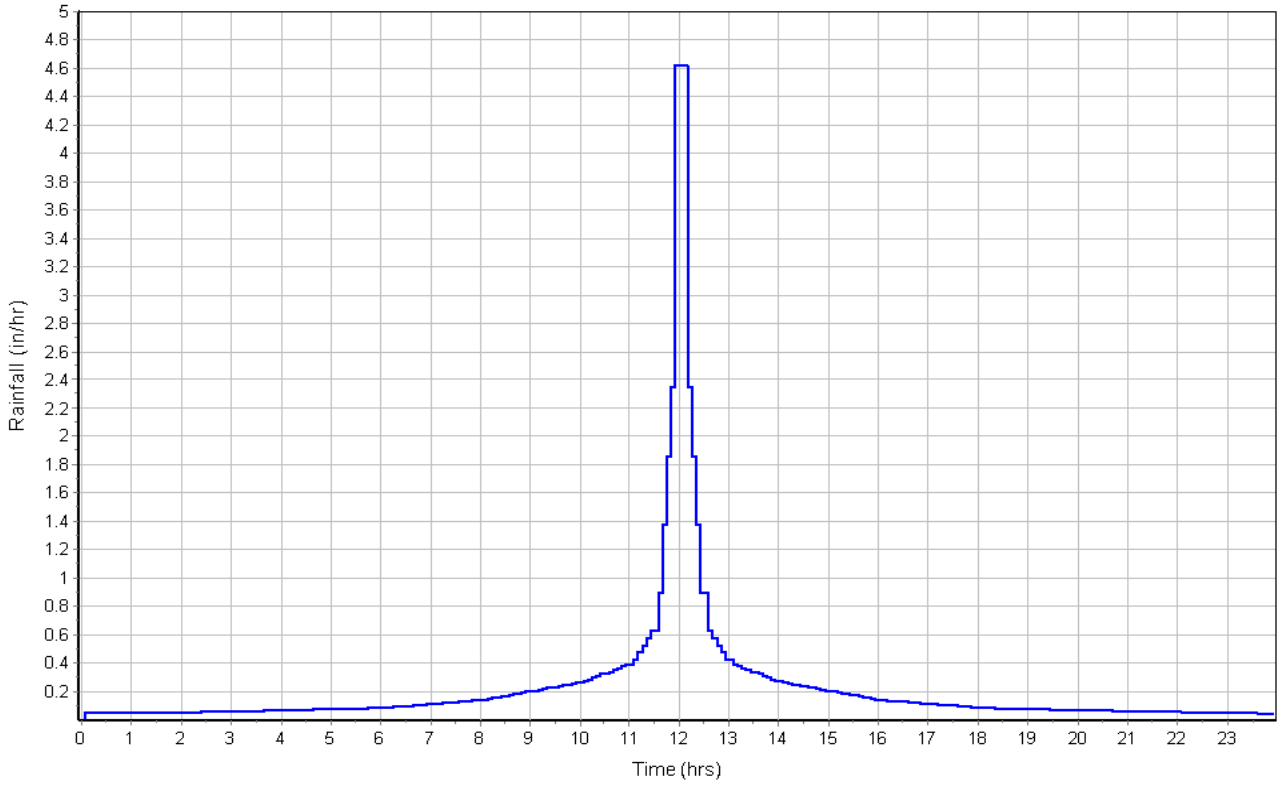
Total TOC (min) 15.20

Subbasin Runoff Results

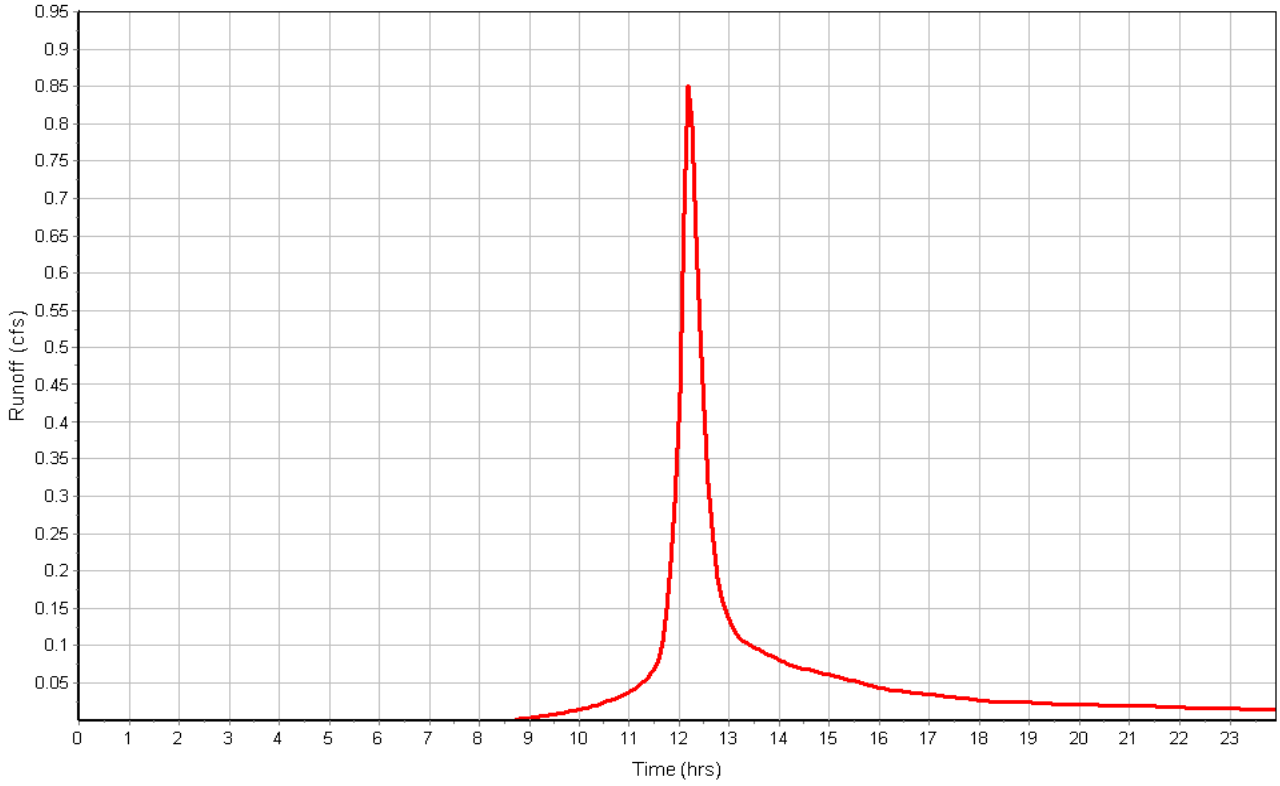
Total Rainfall (in) 5.50
Total Runoff (in) 2.82
Peak Runoff (cfs) 0.86
Weighted Curve Number 74.60
Time of Concentration (days hh:mm:ss) 0 00:15:12

Subbasin : C

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : D

Input Data

Area (ac) 0.12
Weighted Curve Number 77.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.12	D	77.00
Composite Area & Weighted CN	0.12		77.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	36	0.00	0.00
Slope (%) :	5.55	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.09	0.00	0.00
Computed Flow Time (min) :	6.51	0.00	0.00

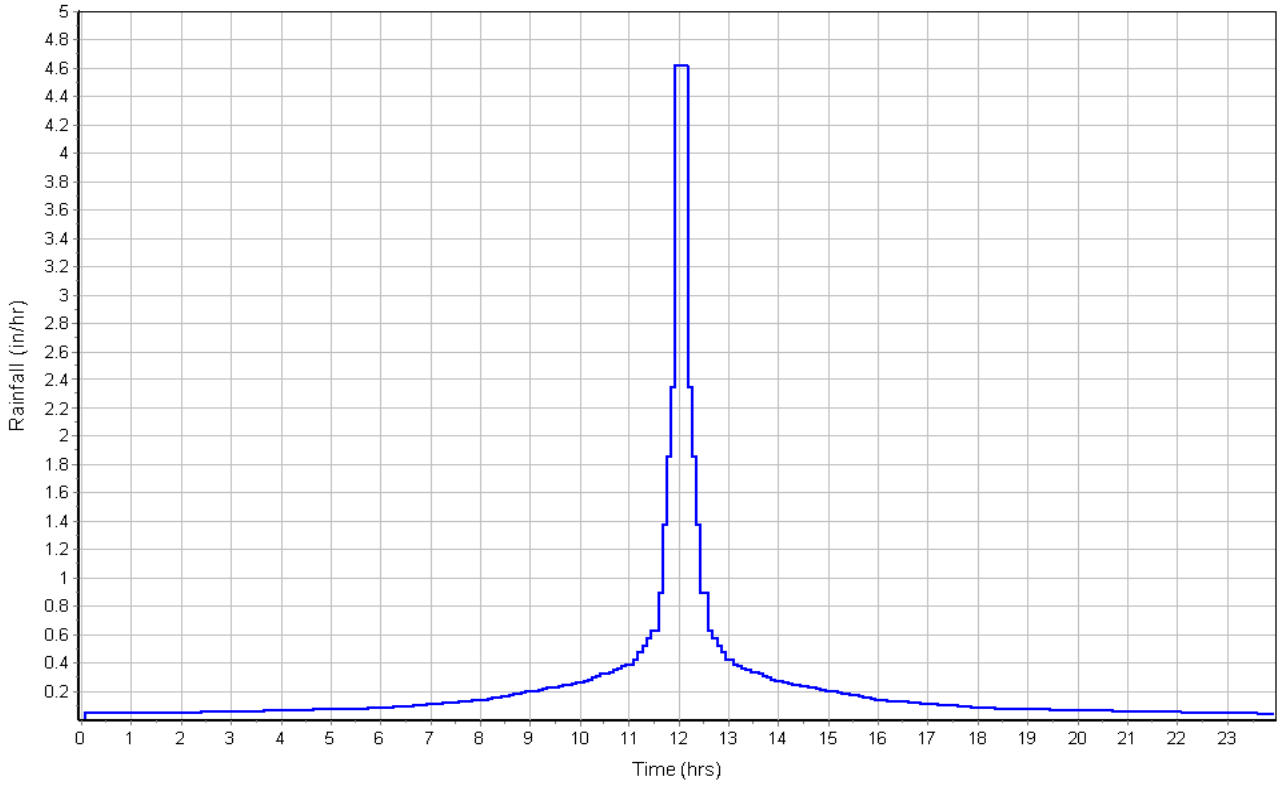
Total TOC (min) 6.51

Subbasin Runoff Results

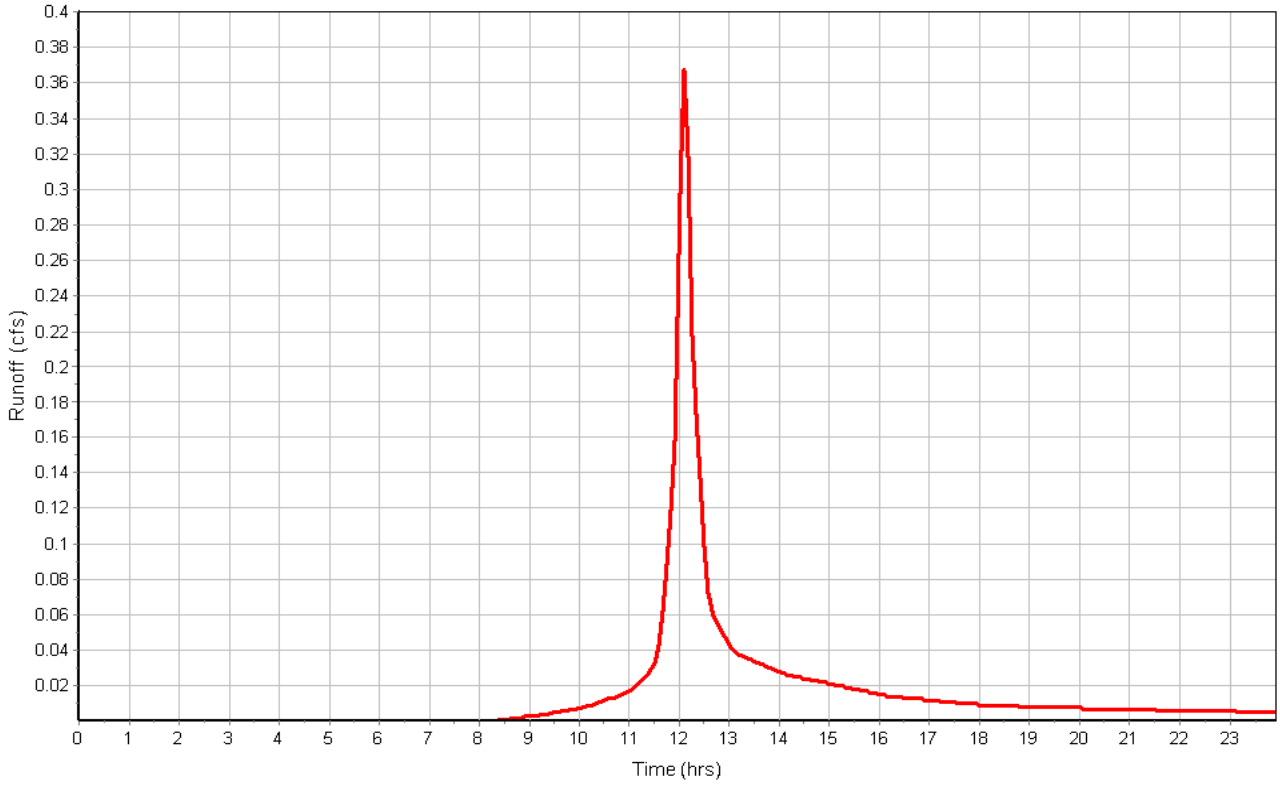
Total Rainfall (in) 5.50
Total Runoff (in) 3.04
Peak Runoff (cfs) 0.38
Weighted Curve Number 77.00
Time of Concentration (days hh:mm:ss) 0 00:06:31

Subbasin : D

Rainfall Intensity Graph



Runoff Hydrograph



Project Description

File Name ..... Proposed Conditions_SMT.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Aug 15, 2017	00:00:00
End Analysis On	Aug 17, 2017	00:00:00
Start Reporting On	Aug 15, 2017	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	6
Nodes	7
Junctions	2
Outfalls	5
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	2
Channels	0
Pipes	2
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-02	Cumulative	inches	Maine	Cumberland (Southeast)	2	3.00	SCS Type III 24-hr

Subbasin Summary

Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
A	3.95	74.46	3.00	0.93	3.68	2.33	0 00:29:55
B-1	2.55	66.95	3.00	0.58	1.49	1.30	0 00:07:01
B-2	7.03	70.54	3.00	0.74	5.20	1.84	0 01:17:51
C	0.21	75.29	3.00	0.98	0.20	0.15	0 00:20:30
CulvertDrainageArea	0.68	75.00	3.00	0.96	0.65	0.67	0 00:05:00
D	0.12	77.00	3.00	1.07	0.13	0.13	0 00:06:30

Node Summary

Element ID	Element Type	Invert Elevation (ft)	Peak Inflow (cfs)
CulvertInlet	Junction	181.00	0.64
Out_B1andB2	Junction	176.00	2.06
CulvertOutlet	Outfall	180.35	0.64
OUT-A	Outfall	180.00	2.31
OUT-B	Outfall	176.00	2.06
OUT-C	Outfall	178.00	0.15
OUT-D	Outfall	190.82	0.12

Link Summary

Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow Velocity	Peak Flow Depth
				(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)	(ft/sec)	(ft)
Direct_to_OutB	Pipe	Out_B1andB2	OUT-B	1715.96	0.00	0.00	0.0000	0.000	0.0150	2.06	0.00	0.00	0.00
Link-03	Pipe	CulvertInlet	CulvertOutlet	45.00	181.00	180.55	1.0000	15.000	0.0150	0.64	5.60	3.04	0.29

Subbasin Hydrology

Subbasin : A

Input Data

Area (ac) 3.95
Weighted Curve Number 74.46
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.33	D	77.00
Gravel roads	0.10	D	91.00
> 75% grass cover, Good	0.38	D	80.00
Brush, Good	3.14	D	73.00
Composite Area & Weighted CN	3.95		74.46

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	45	0.00	0.00
Slope (%) :	50	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.23	0.00	0.00
Computed Flow Time (min) :	3.23	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	264	574	0.00
Slope (%) :	.76	.35	0.00
Surface Type :	Grassed waterway	Grass pasture	Unpaved
Velocity (ft/sec) :	1.31	0.41	0.00
Computed Flow Time (min) :	3.36	23.33	0.00

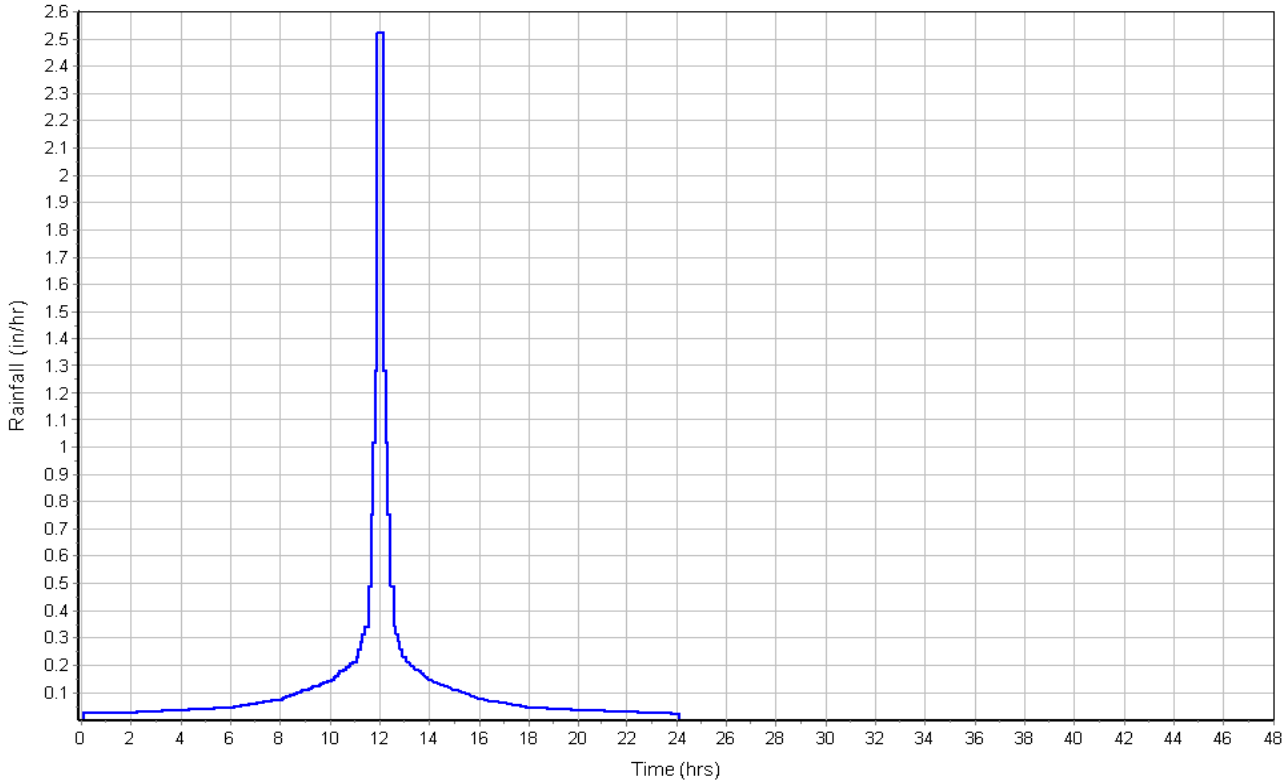
Total TOC (min) 29.92

Subbasin Runoff Results

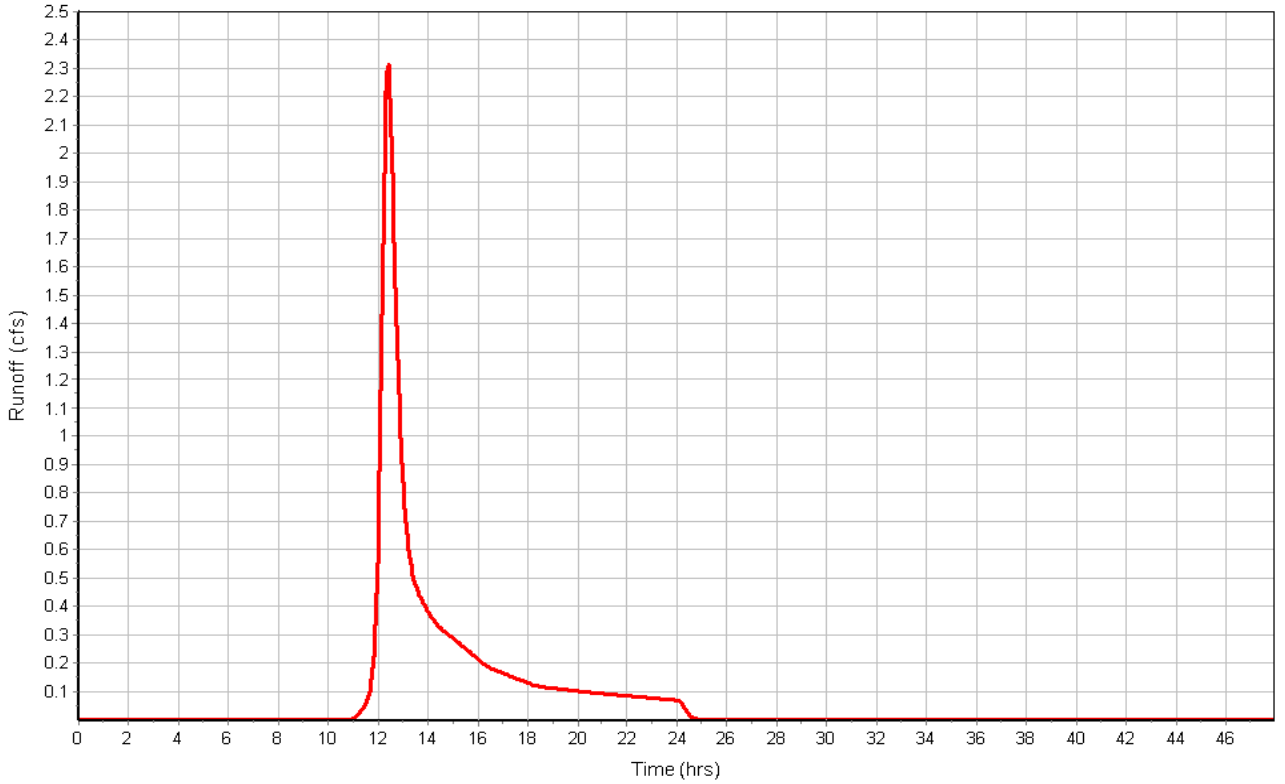
Total Rainfall (in)	3.00
Total Runoff (in)	0.93
Peak Runoff (cfs)	2.33
Weighted Curve Number	74.46
Time of Concentration (days hh:mm:ss)	0 00:29:55

Subbasin : A

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : B-1

Input Data

Area (ac) 2.55
Weighted Curve Number 66.95
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Gravel-Pad	1.88	D	60.00
Rooftops	0.24	D	98.00
> 75% grass cover, Good	0.43	D	80.00
Composite Area & Weighted CN	2.55		66.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	38	0.00	0.00
Slope (%) :	50	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.22	0.00	0.00
Computed Flow Time (min) :	2.82	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	385	0.00	0.00
Slope (%) :	1.04	0.00	0.00
Surface Type :	Grassed waterway	Grass pasture	rass pasture
Velocity (ft/sec) :	1.53	0.00	0.00
Computed Flow Time (min) :	4.19	0.00	0.00

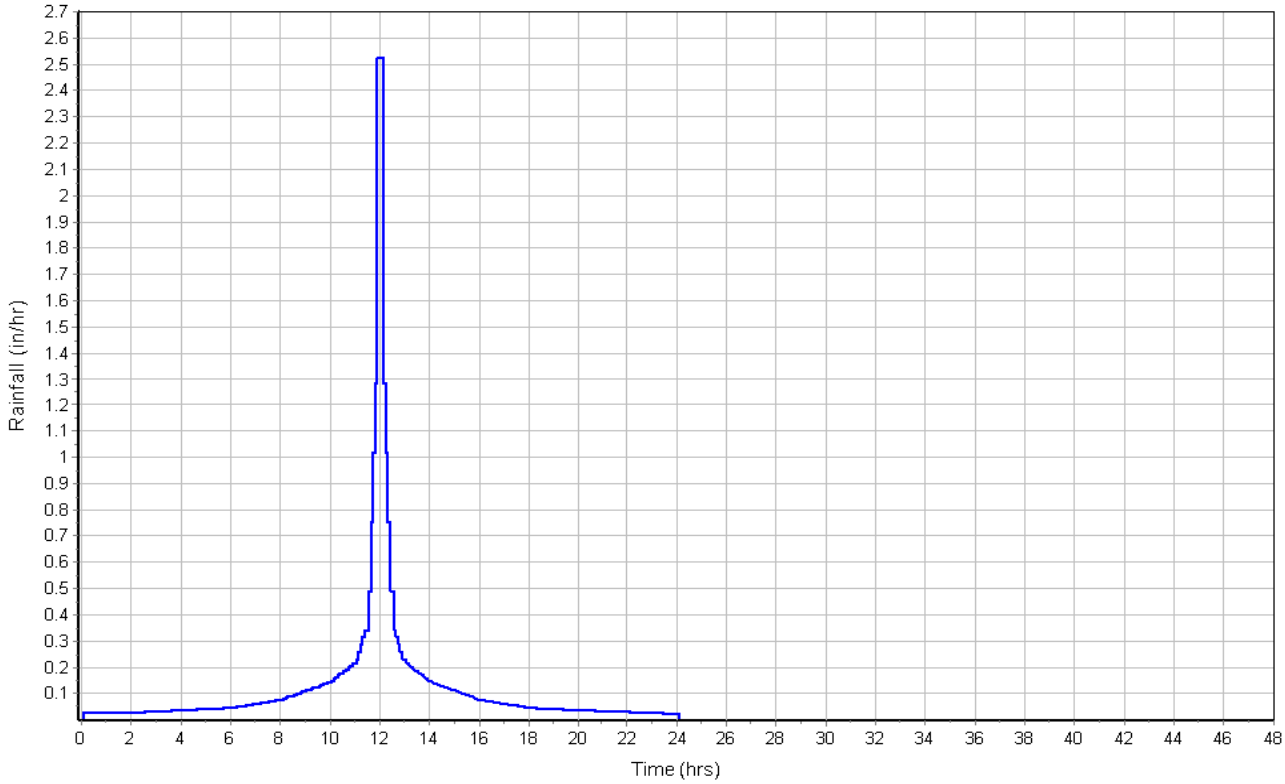
Total TOC (min) 7.02

Subbasin Runoff Results

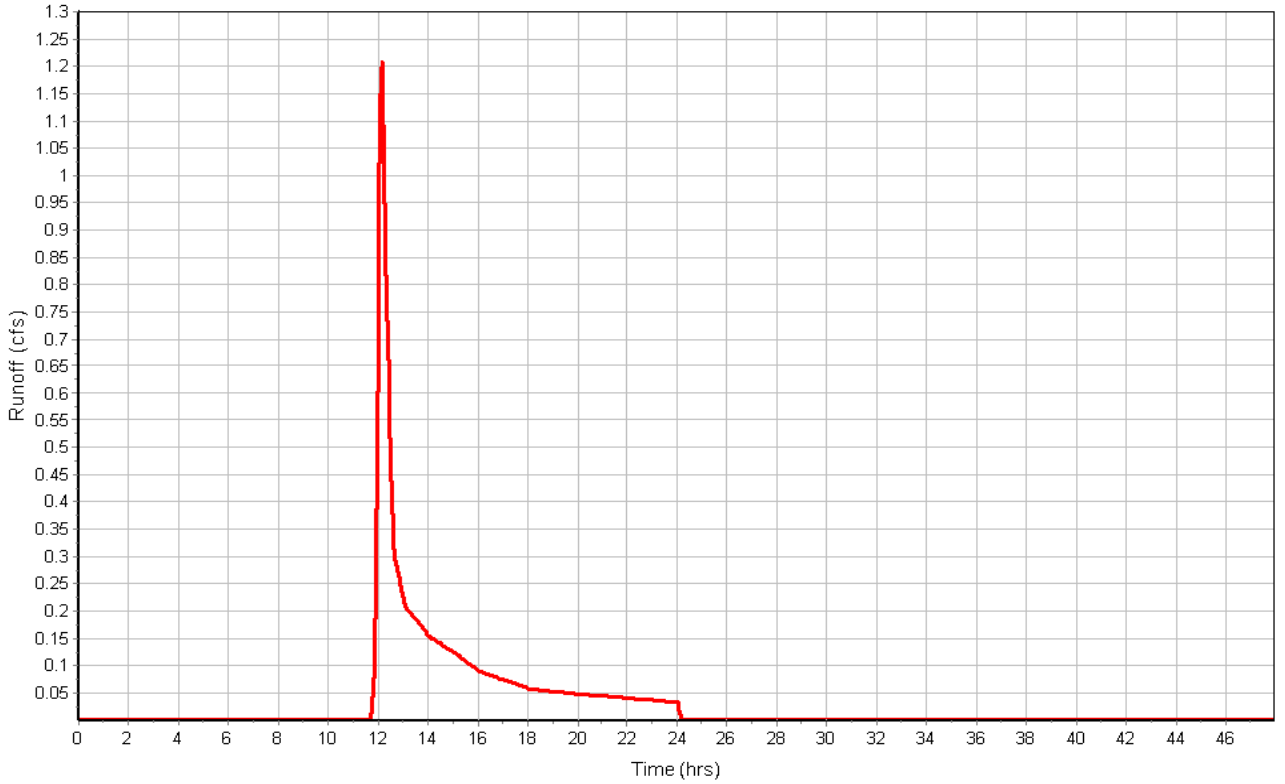
Total Rainfall (in) 3.00
Total Runoff (in) 0.58
Peak Runoff (cfs) 1.30
Weighted Curve Number 66.95
Time of Concentration (days hh:mm:ss) 0 00:07:01

Subbasin : B-1

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : B-2

Input Data

Area (ac) 7.03
Weighted Curve Number 70.54
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Brush, Good	5.19	D	73.00
Gravel roads	0.05	D	91.00
> 75% grass cover, Good	0.16	D	80.00
Gravel_Pad	1.58	D	60.00
ConcreteFoundations	0.05	D	98.00
Composite Area & Weighted CN	7.03		70.54

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	.25	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.03	0.00	0.00
Computed Flow Time (min) :	50.95	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	791	0.00	0.00
Slope (%) :	.5	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.49	0.00	0.00
Computed Flow Time (min) :	26.90	0.00	0.00

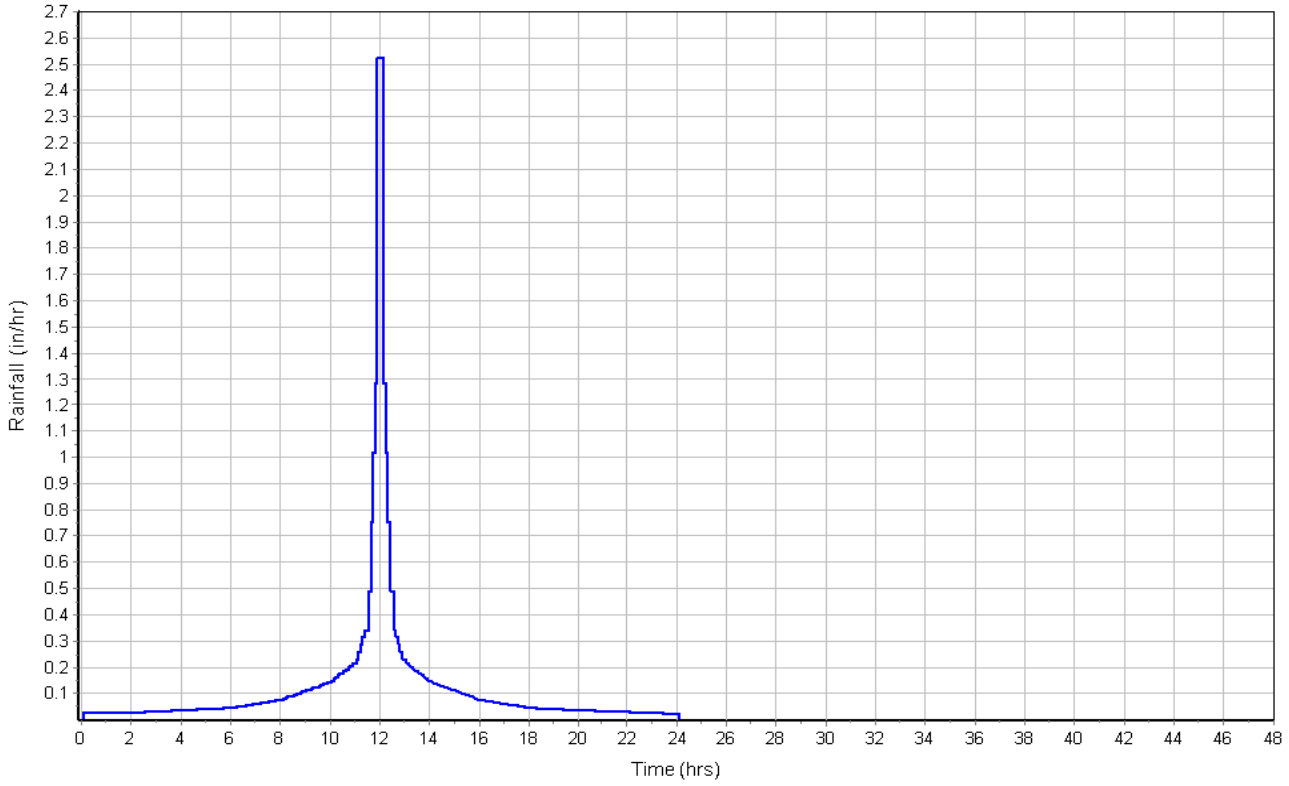
Total TOC (min) 77.86

Subbasin Runoff Results

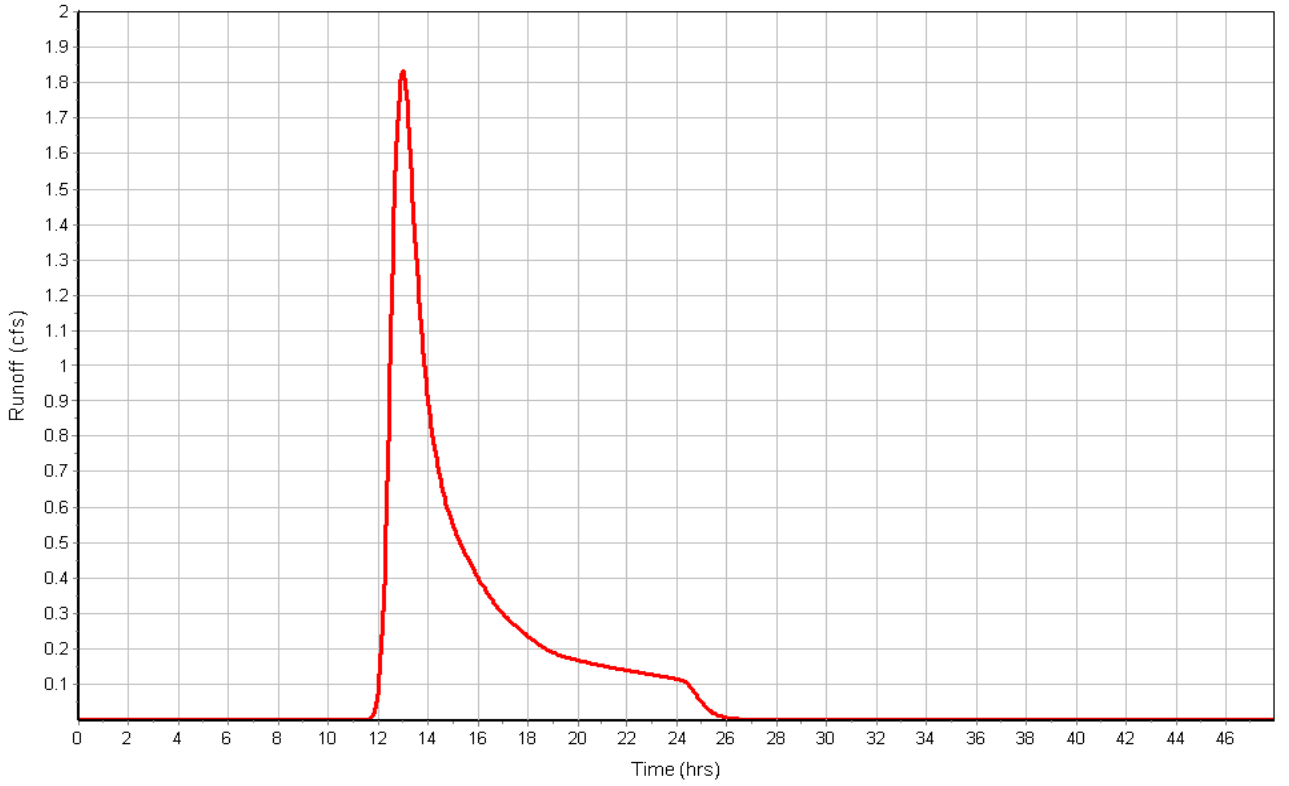
Total Rainfall (in) 3.00
Total Runoff (in) 0.74
Peak Runoff (cfs) 1.84
Weighted Curve Number 70.54
Time of Concentration (days hh:mm:ss) 0 01:17:52

Subbasin : B-2

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : C

Input Data

Area (ac) 0.21
Weighted Curve Number 75.29
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.12	D	77.00
Brush, Good	0.09	D	73.00
Composite Area & Weighted CN	0.21		75.29

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.6	0.00	0.00
Flow Length (ft) :	80	0.00	0.00
Slope (%) :	4.31	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.07	0.00	0.00
Computed Flow Time (min) :	18.88	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	182	0.00	0.00
Slope (%) :	7.1	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.87	0.00	0.00
Computed Flow Time (min) :	1.62	0.00	0.00

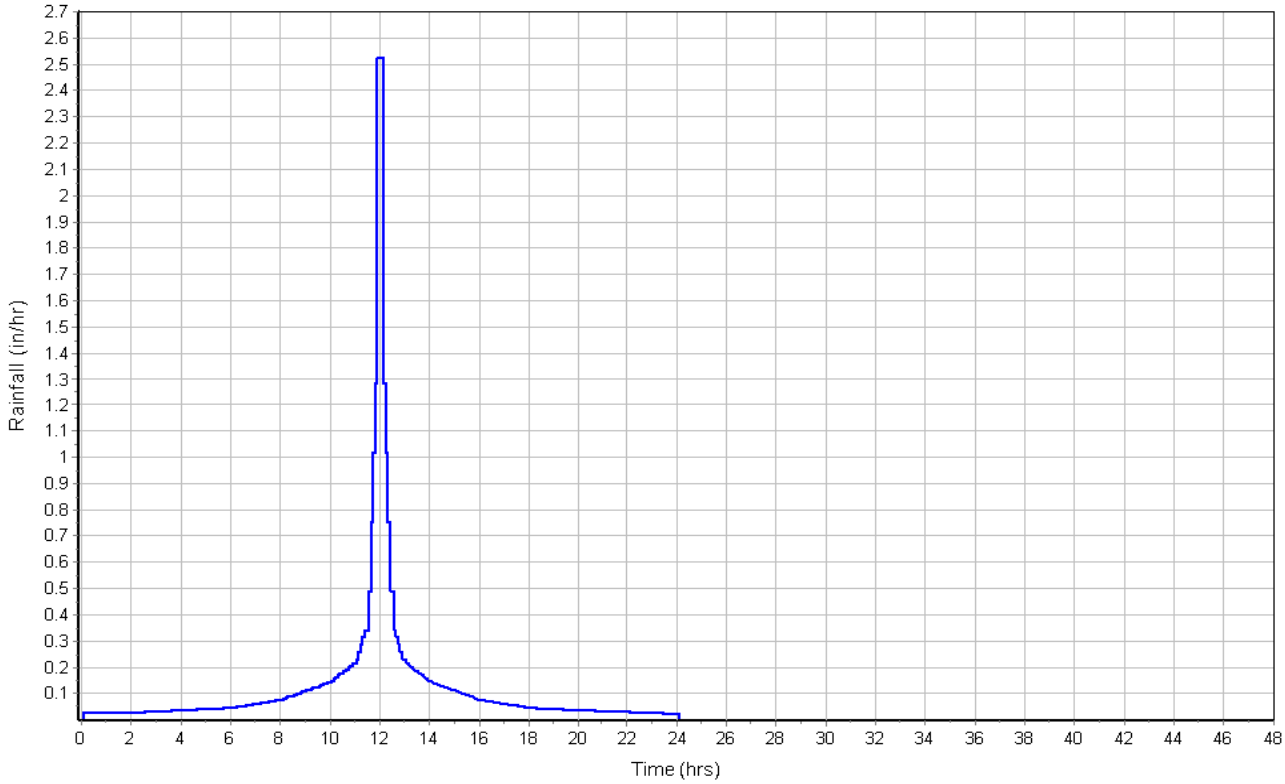
Total TOC (min) 20.50

Subbasin Runoff Results

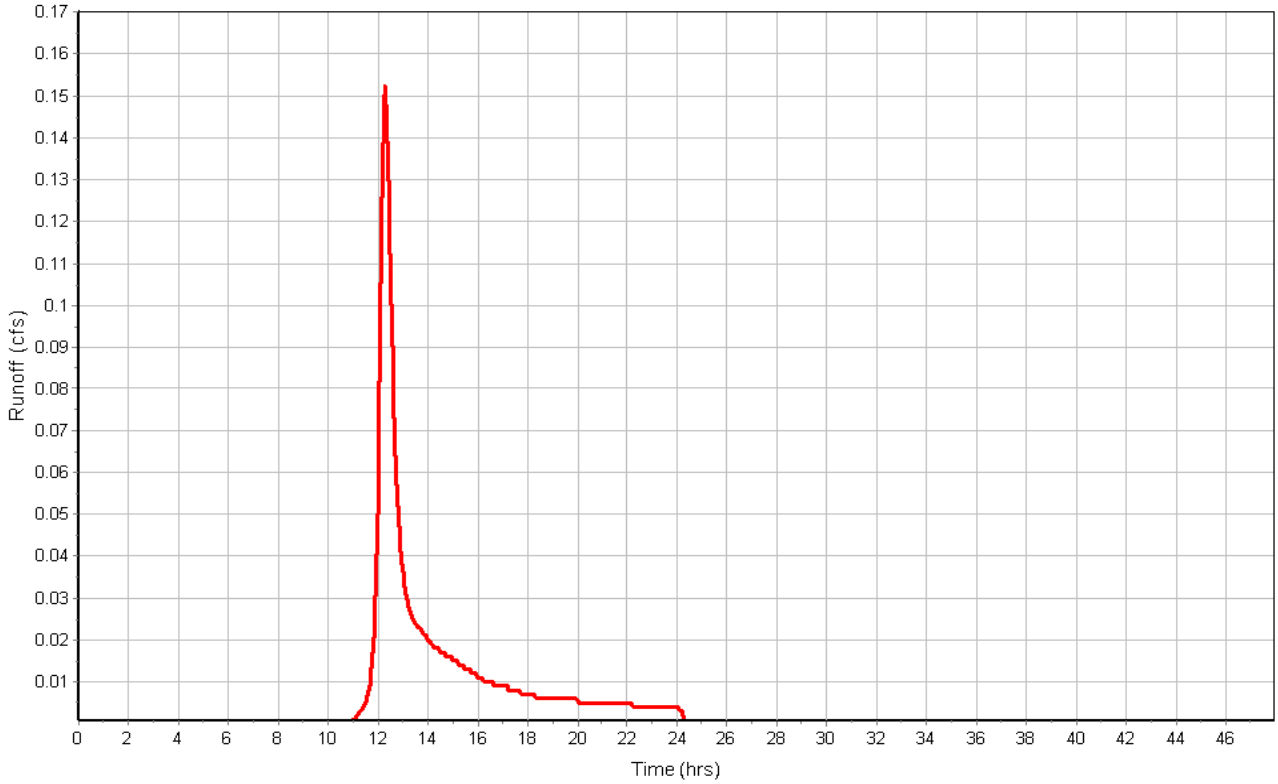
Total Rainfall (in) 3.00
Total Runoff (in) 0.98
Peak Runoff (cfs) 0.15
Weighted Curve Number 75.29
Time of Concentration (days hh:mm:ss) 0 00:20:30

Subbasin : C

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CulvertDrainageArea

Input Data

Area (ac) 0.68
Weighted Curve Number 75.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.68	-	75.00
Composite Area & Weighted CN	0.68		75.00

Time of Concentration

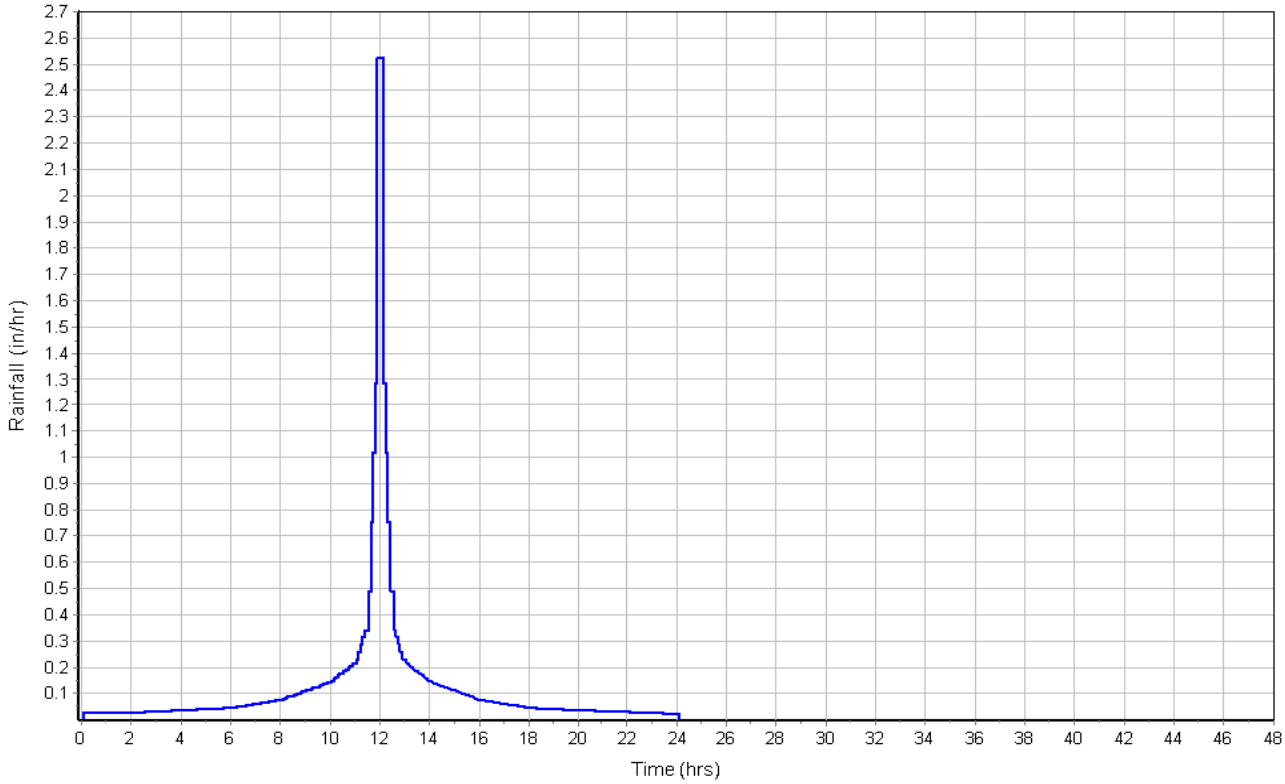
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

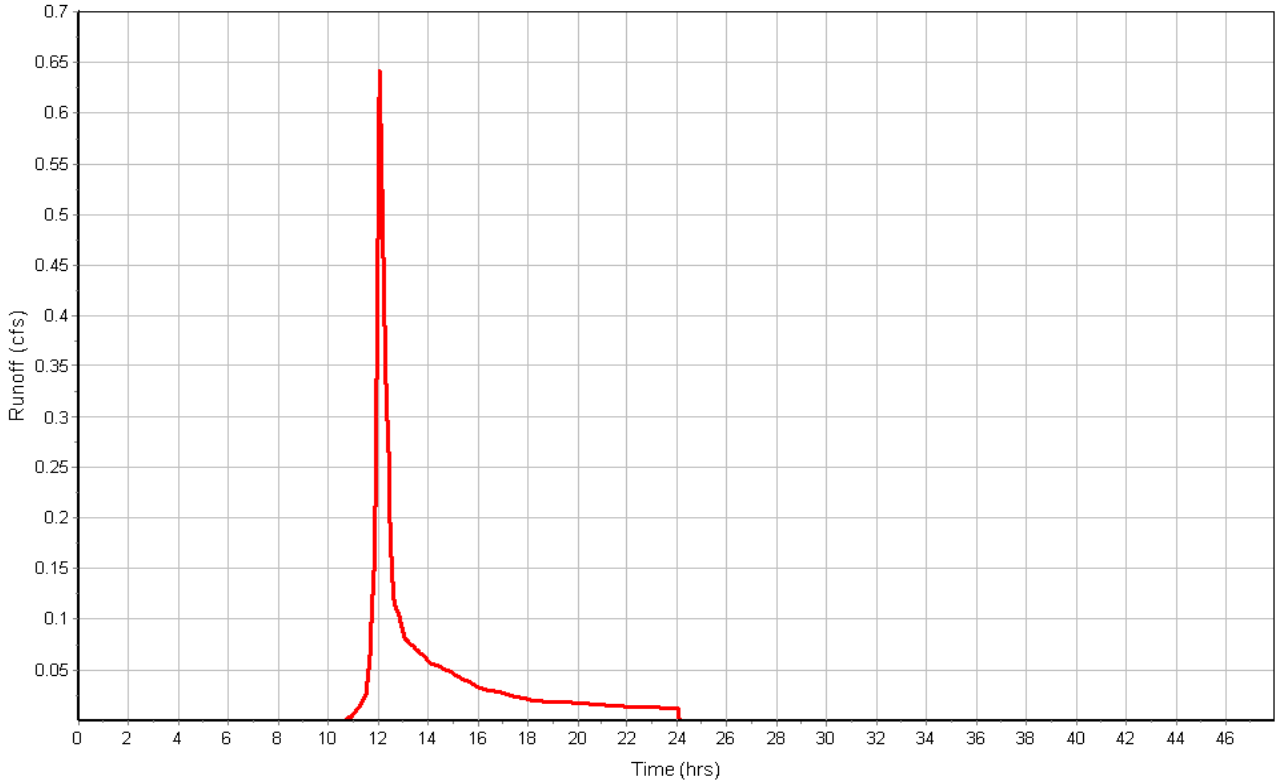
Total Rainfall (in) 3.00
Total Runoff (in) 0.96
Peak Runoff (cfs) 0.67
Weighted Curve Number 75.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : CulvertDrainageArea

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : D

Input Data

Area (ac) 0.12
Weighted Curve Number 77.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.12	D	77.00
Composite Area & Weighted CN	0.12		77.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	36	0.00	0.00
Slope (%) :	5.55	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.09	0.00	0.00
Computed Flow Time (min) :	6.51	0.00	0.00

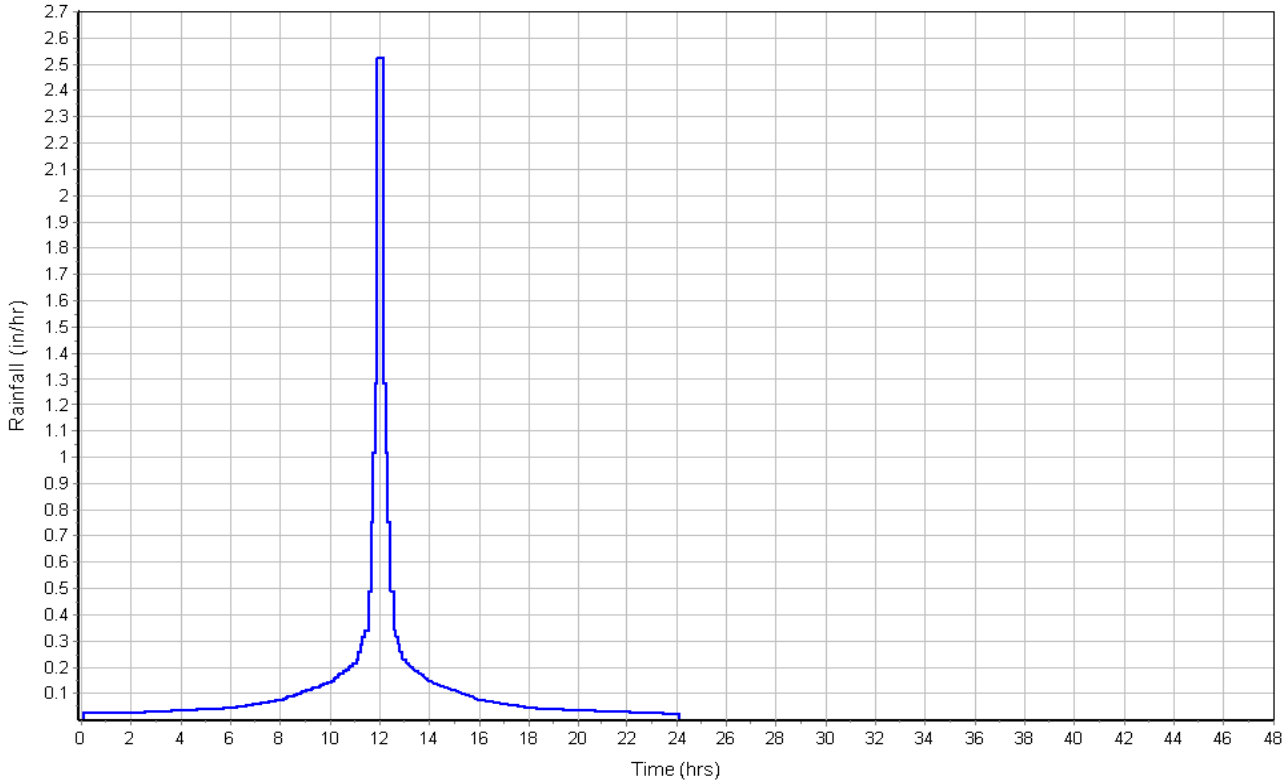
Total TOC (min) 6.51

Subbasin Runoff Results

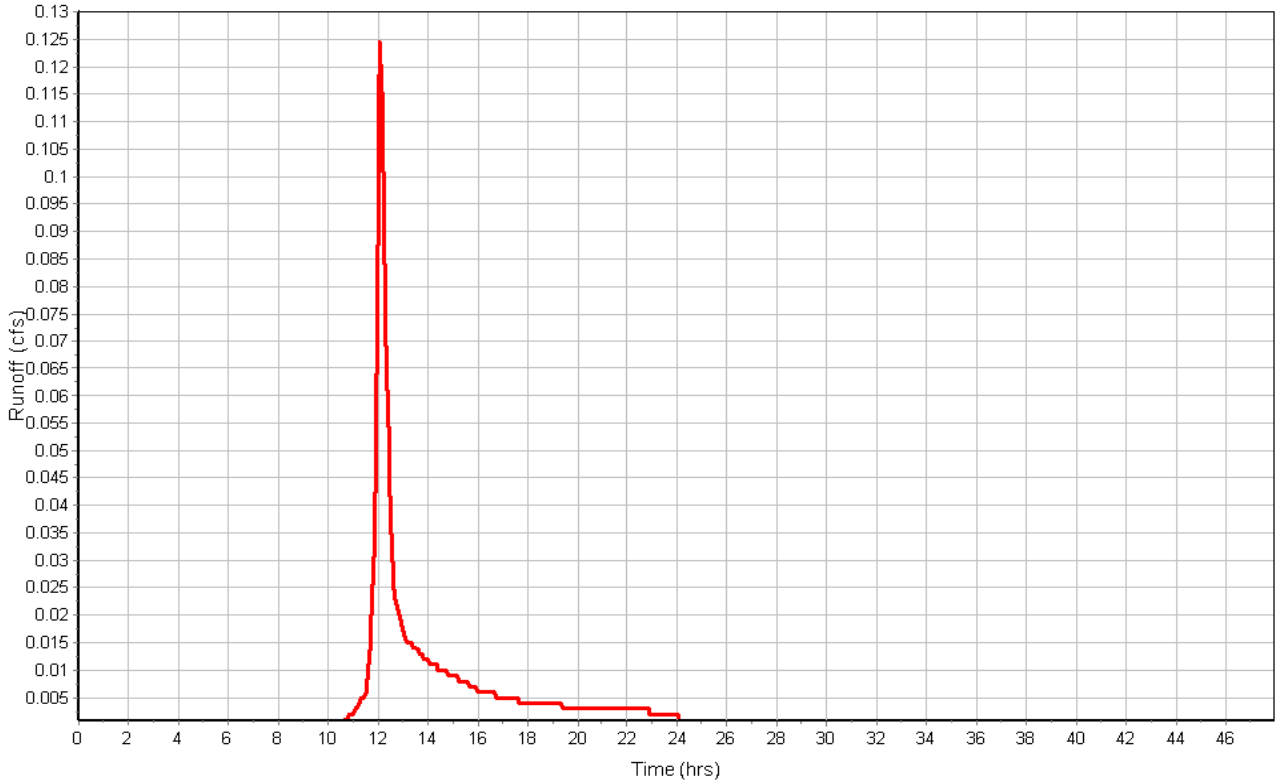
Total Rainfall (in) 3.00
Total Runoff (in) 1.07
Peak Runoff (cfs) 0.13
Weighted Curve Number 77.00
Time of Concentration (days hh:mm:ss) 0 00:06:31

Subbasin : D

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)
CulvertInlet	181.00	184.00
Out_B1andB2	176.00	6.00

Junction Results

Element ID	Peak Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Time of Max HGL Occurrence
	(cfs)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)
CulvertInlet	0.64	181.29	0.29	2.71	181.02	0 12:10
Out_B1andB2	2.06	176.00	0.00	0.00	176.00	0 00:00

Pipe Input

Element ID	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness
Direct_to_OutB	1715.96	0.00	0.00	0.0000	Dummy	0.000	0.000	0.0150
Link-03	45.00	181.00	180.55	1.0000	CIRCULAR	15.000	15.000	0.0150

Pipe Results

Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow Velocity	Peak Flow Depth
	(cfs)	(days hh:mm)	(cfs)	(ft/sec)	(ft)
Direct_to_OutB	2.06	0 13:00	0.00	0.00	0.00
Link-03	0.64	0 12:10	5.60	3.04	0.29

Project Description

File Name ..... Proposed Conditions_SMT.SPF

Project Options

Flow Units ..... CFS
Elevation Type ..... Elevation
Hydrology Method ..... SCS TR-55
Time of Concentration (TOC) Method ..... SCS TR-55
Link Routing Method ..... Kinematic Wave
Enable Overflow Ponding at Nodes ..... YES
Skip Steady State Analysis Time Periods ..... NO

Analysis Options

Start Analysis On ..... Aug 15, 2017 00:00:00
End Analysis On ..... Aug 17, 2017 00:00:00
Start Reporting On ..... Aug 15, 2017 00:00:00
Antecedent Dry Days ..... 0 days
Runoff (Dry Weather) Time Step ..... 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step ..... 0 00:05:00 days hh:mm:ss
Reporting Time Step ..... 0 00:05:00 days hh:mm:ss
Routing Time Step ..... 30 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	6
Nodes	7
Junctions	2
Outfalls	5
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	2
Channels	0
Pipes	2
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-10	Cumulative	inches	Maine	Cumberland (Southeast)	10	4.70	SCS Type III 24-hr

Subbasin Summary

Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
A	3.95	74.46	4.70	2.16	8.55	5.71	0 00:29:55
B-1	2.55	66.95	4.70	1.59	4.06	4.05	0 00:07:01
B-2	7.03	70.54	4.70	1.86	13.05	5.14	0 01:17:51
C	0.21	75.29	4.70	2.23	0.47	0.37	0 00:20:30
CulvertDrainageArea	0.68	75.00	4.70	2.21	1.50	1.58	0 00:05:00
D	0.12	77.00	4.70	2.37	0.28	0.30	0 00:06:30

Node Summary

Element ID	Element Type	Invert Elevation (ft)	Peak Inflow (cfs)
CulvertInlet	Junction	181.00	1.54
Out_B1andB2	Junction	176.00	5.73
CulvertOutlet	Outfall	180.35	1.53
OUT-A	Outfall	180.00	5.67
OUT-B	Outfall	176.00	5.73
OUT-C	Outfall	178.00	0.37
OUT-D	Outfall	190.82	0.29

Link Summary

Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow Velocity	Peak Flow Depth
				(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)	(ft/sec)	(ft)
Direct_to_OutB	Pipe	Out_B1andB2	OUT-B	1715.96	0.00	0.00	0.0000	0.000	0.0150	5.73	0.00	0.00	0.00
Link-03	Pipe	CulvertInlet	CulvertOutlet	45.00	181.00	180.55	1.0000	15.000	0.0150	1.53	5.60	3.89	0.45

Subbasin Hydrology

Subbasin : A

Input Data

Area (ac) 3.95
Weighted Curve Number 74.46
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.33	D	77.00
Gravel roads	0.10	D	91.00
> 75% grass cover, Good	0.38	D	80.00
Brush, Good	3.14	D	73.00
Composite Area & Weighted CN	3.95		74.46

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	45	0.00	0.00
Slope (%) :	50	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.23	0.00	0.00
Computed Flow Time (min) :	3.23	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	264	574	0.00
Slope (%) :	.76	.35	0.00
Surface Type :	Grassed waterway	Grass pasture	Unpaved
Velocity (ft/sec) :	1.31	0.41	0.00
Computed Flow Time (min) :	3.36	23.33	0.00

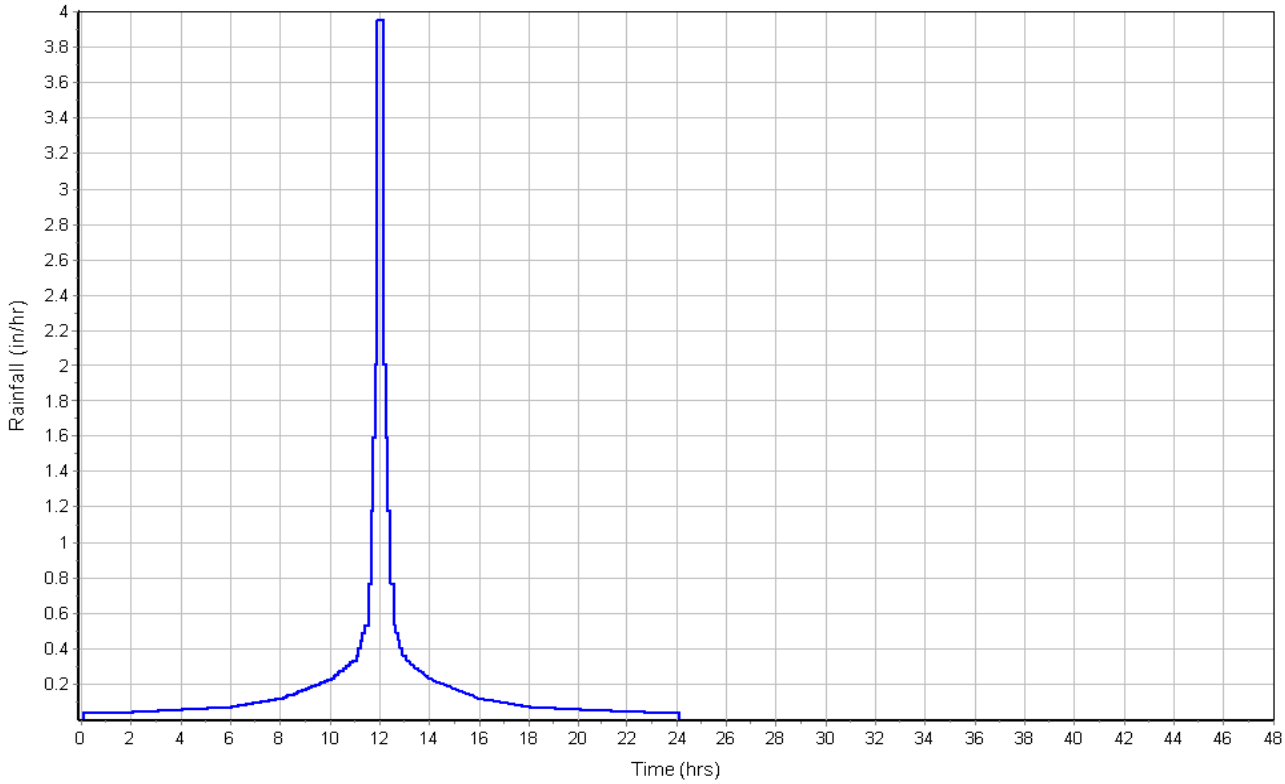
Total TOC (min) 29.92

Subbasin Runoff Results

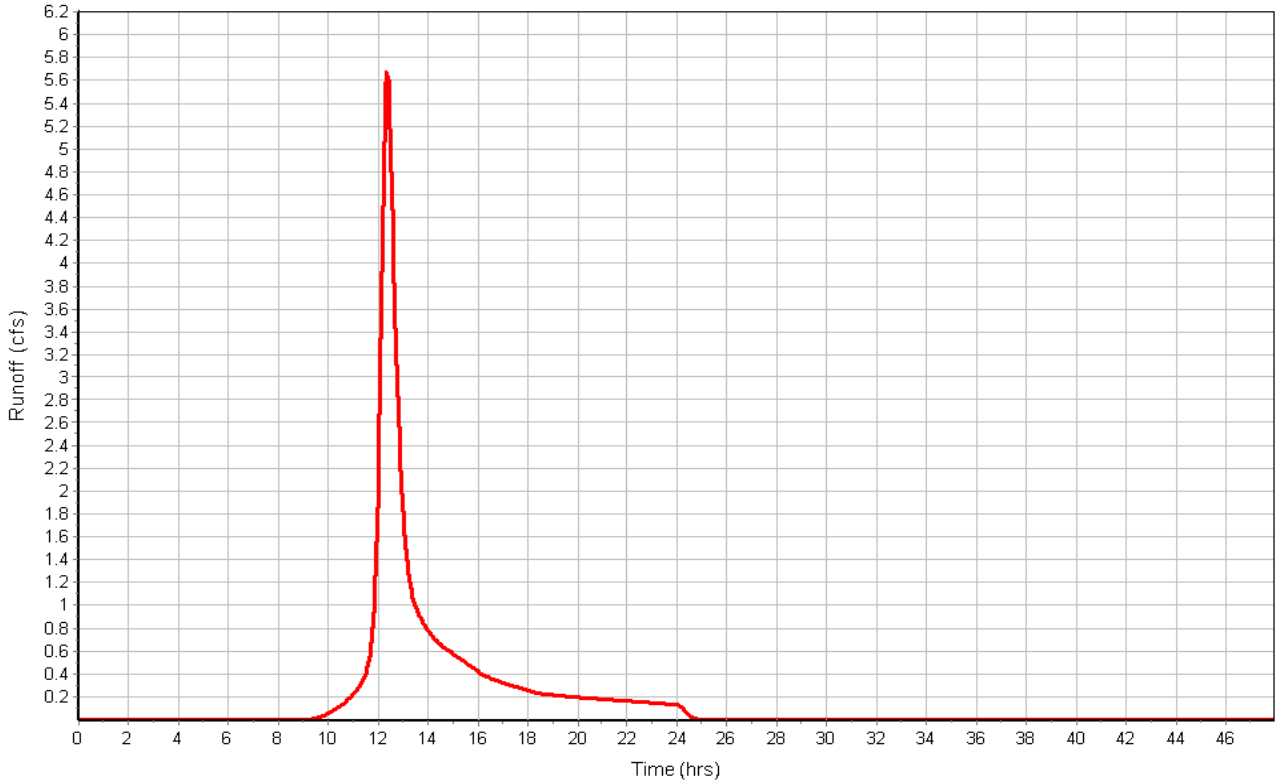
Total Rainfall (in)	4.70
Total Runoff (in)	2.16
Peak Runoff (cfs)	5.71
Weighted Curve Number	74.46
Time of Concentration (days hh:mm:ss)	0 00:29:55

Subbasin : A

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : B-1

Input Data

Area (ac) 2.55
Weighted Curve Number 66.95
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Gravel-Pad	1.88	D	60.00
Rooftops	0.24	D	98.00
> 75% grass cover, Good	0.43	D	80.00
Composite Area & Weighted CN	2.55		66.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	38	0.00	0.00
Slope (%) :	50	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.22	0.00	0.00
Computed Flow Time (min) :	2.82	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	385	0.00	0.00
Slope (%) :	1.04	0.00	0.00
Surface Type :	Grassed waterway	Grass pasture	rass pasture
Velocity (ft/sec) :	1.53	0.00	0.00
Computed Flow Time (min) :	4.19	0.00	0.00

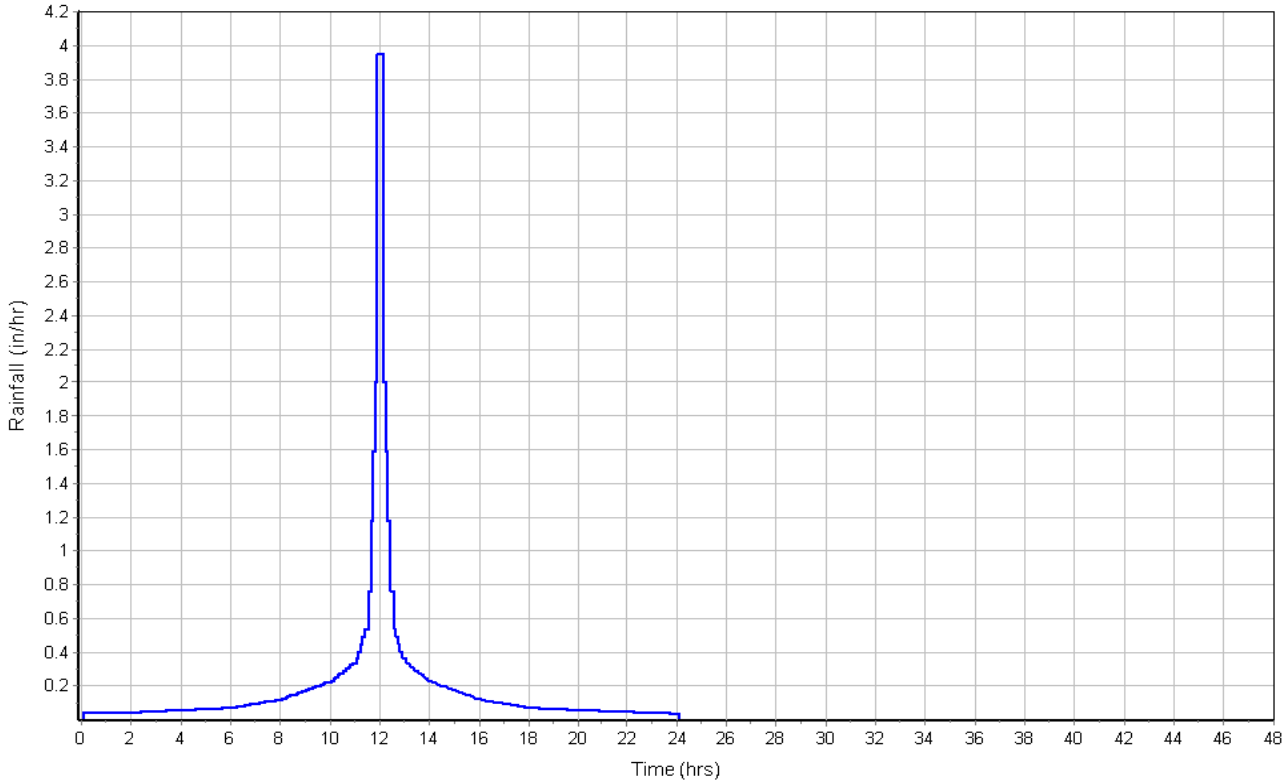
Total TOC (min) 7.02

Subbasin Runoff Results

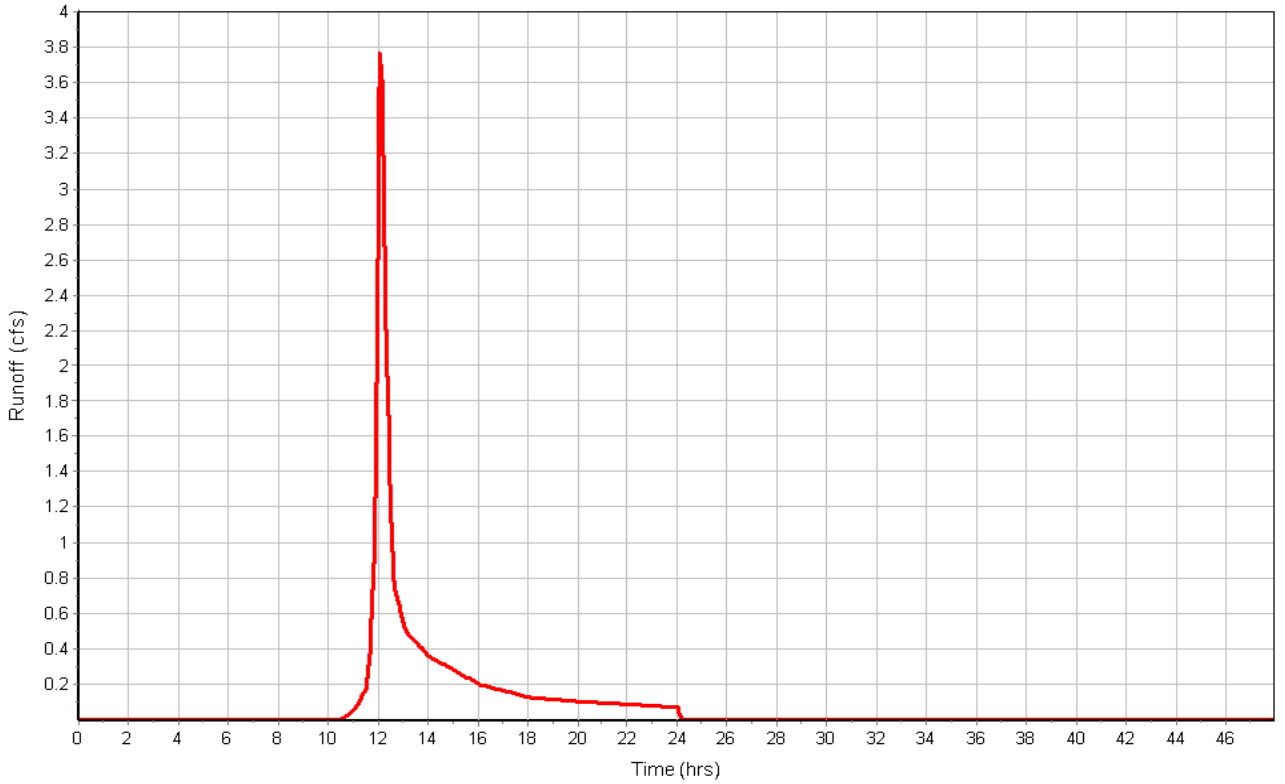
Total Rainfall (in) 4.70
Total Runoff (in) 1.59
Peak Runoff (cfs) 4.05
Weighted Curve Number 66.95
Time of Concentration (days hh:mm:ss) 0 00:07:01

Subbasin : B-1

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : B-2

Input Data

Area (ac) 7.03
Weighted Curve Number 70.54
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Brush, Good	5.19	D	73.00
Gravel roads	0.05	D	91.00
> 75% grass cover, Good	0.16	D	80.00
Gravel_Pad	1.58	D	60.00
ConcreteFoundations	0.05	D	98.00
Composite Area & Weighted CN	7.03		70.54

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	.25	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.03	0.00	0.00
Computed Flow Time (min) :	50.95	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	791	0.00	0.00
Slope (%) :	.5	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.49	0.00	0.00
Computed Flow Time (min) :	26.90	0.00	0.00

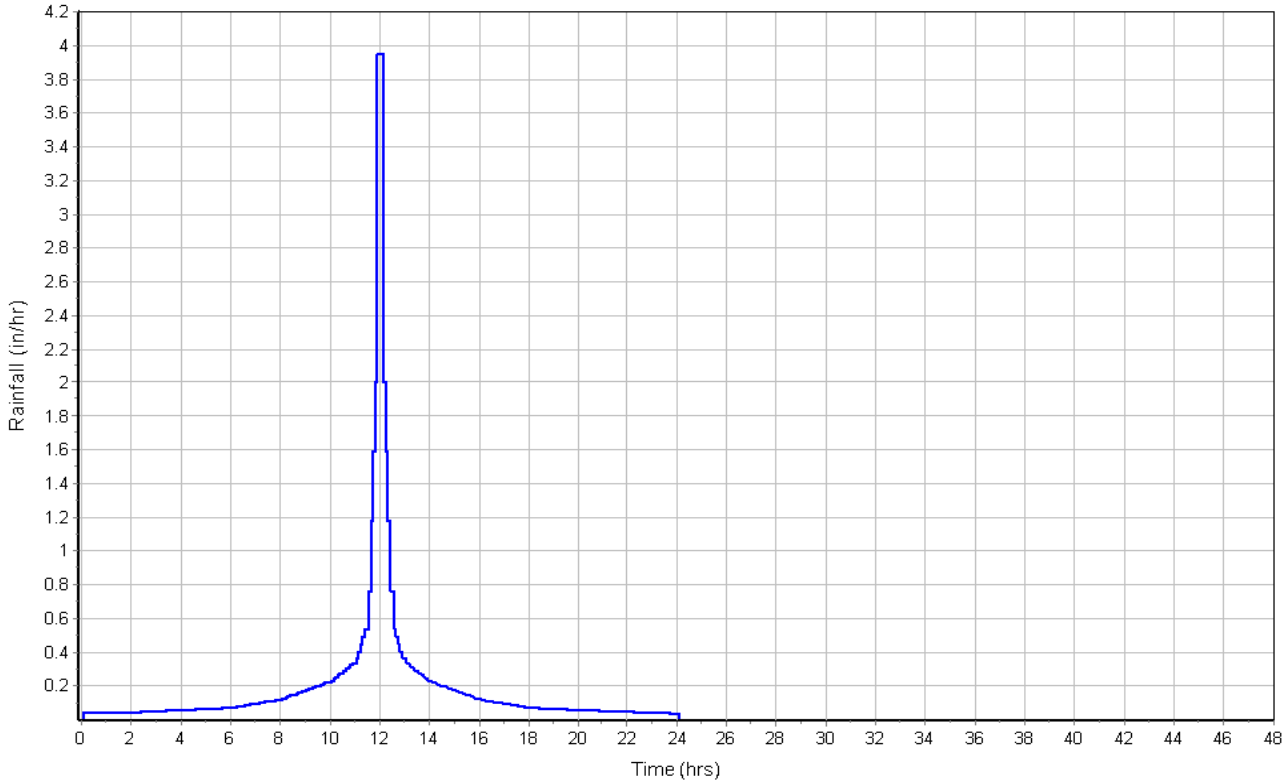
Total TOC (min) 77.86

Subbasin Runoff Results

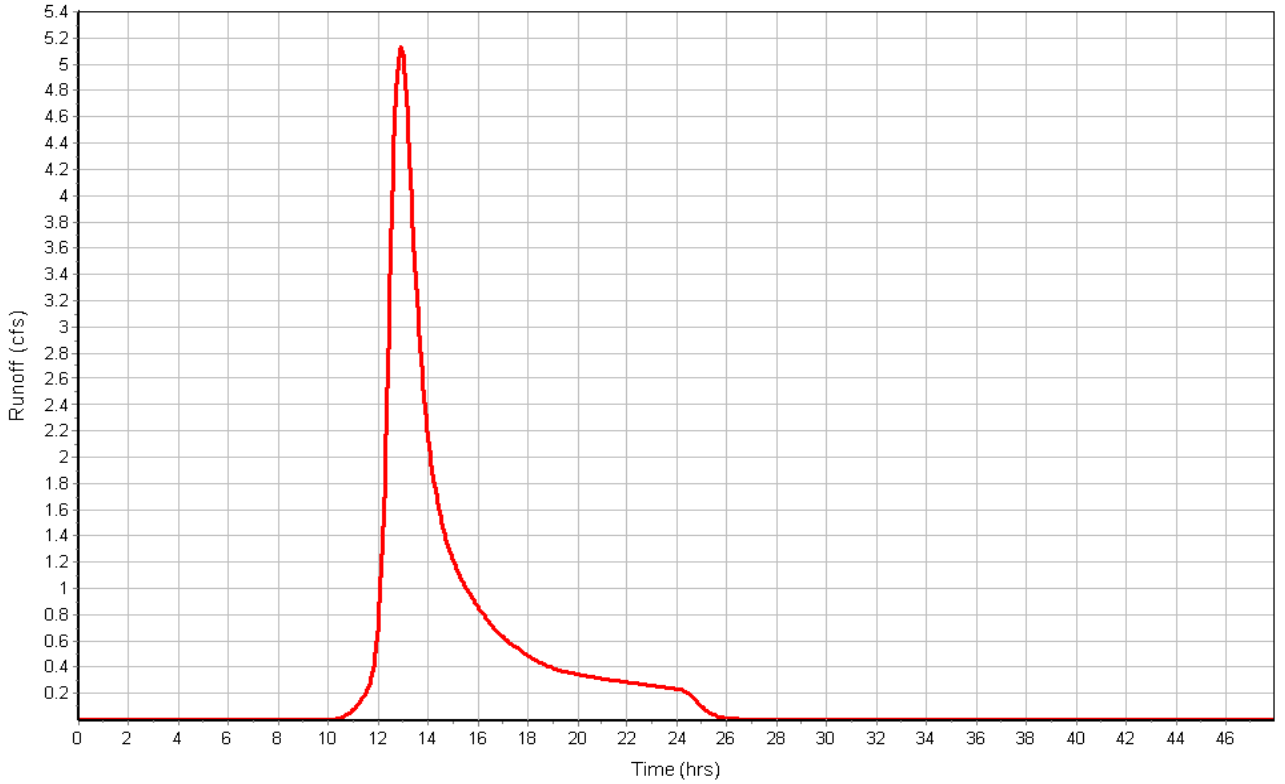
Total Rainfall (in) 4.70
Total Runoff (in) 1.86
Peak Runoff (cfs) 5.14
Weighted Curve Number 70.54
Time of Concentration (days hh:mm:ss) 0 01:17:52

Subbasin : B-2

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : C

Input Data

Area (ac) 0.21
Weighted Curve Number 75.29
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.12	D	77.00
Brush, Good	0.09	D	73.00
Composite Area & Weighted CN	0.21		75.29

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.6	0.00	0.00
Flow Length (ft) :	80	0.00	0.00
Slope (%) :	4.31	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.07	0.00	0.00
Computed Flow Time (min) :	18.88	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	182	0.00	0.00
Slope (%) :	7.1	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.87	0.00	0.00
Computed Flow Time (min) :	1.62	0.00	0.00

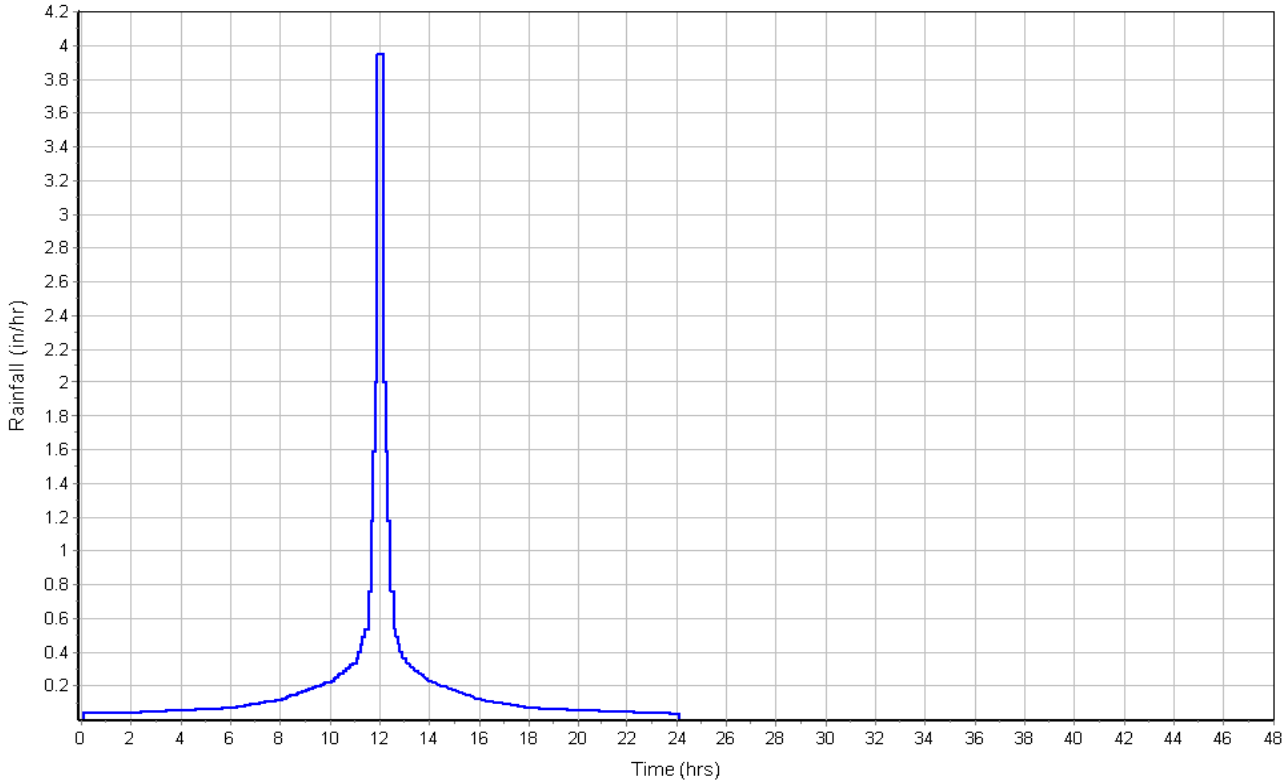
Total TOC (min) 20.50

Subbasin Runoff Results

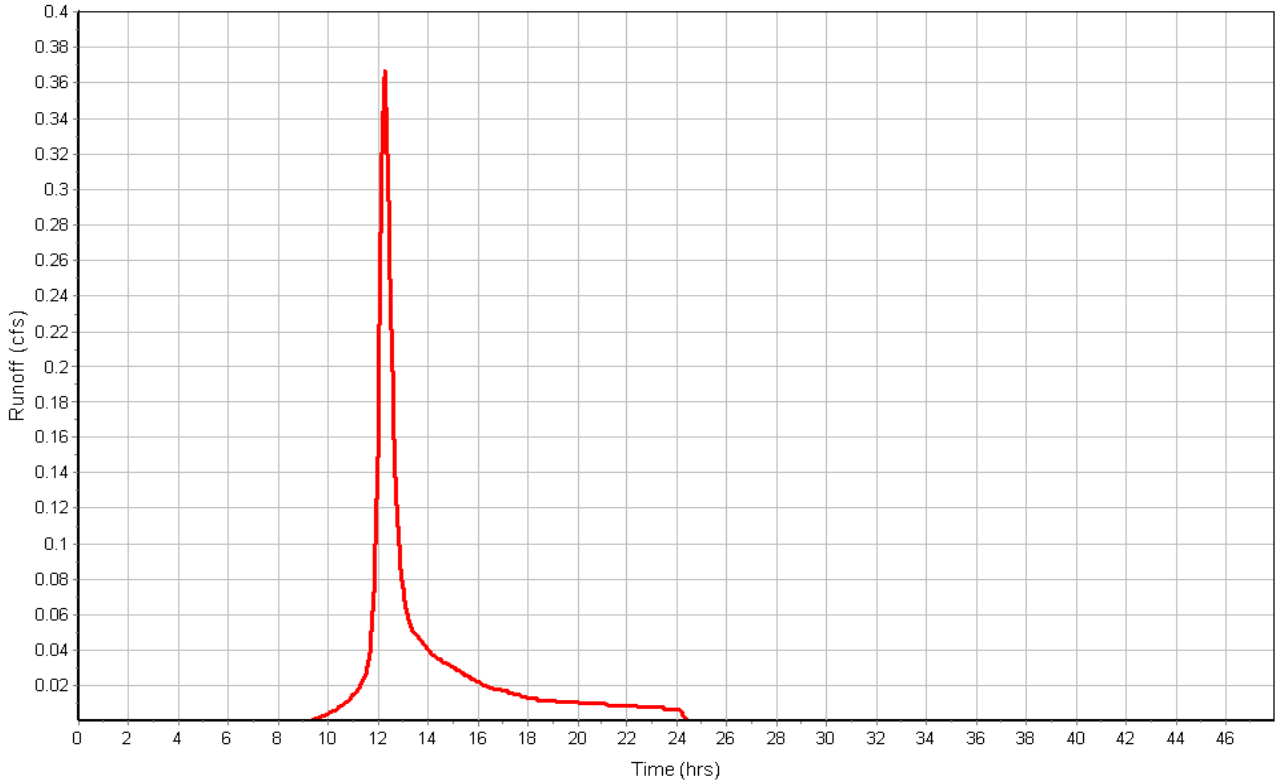
Total Rainfall (in) 4.70
Total Runoff (in) 2.23
Peak Runoff (cfs) 0.37
Weighted Curve Number 75.29
Time of Concentration (days hh:mm:ss) 0 00:20:30

Subbasin : C

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CulvertDrainageArea

Input Data

Area (ac) 0.68
Weighted Curve Number 75.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.68	-	75.00
Composite Area & Weighted CN	0.68		75.00

Time of Concentration

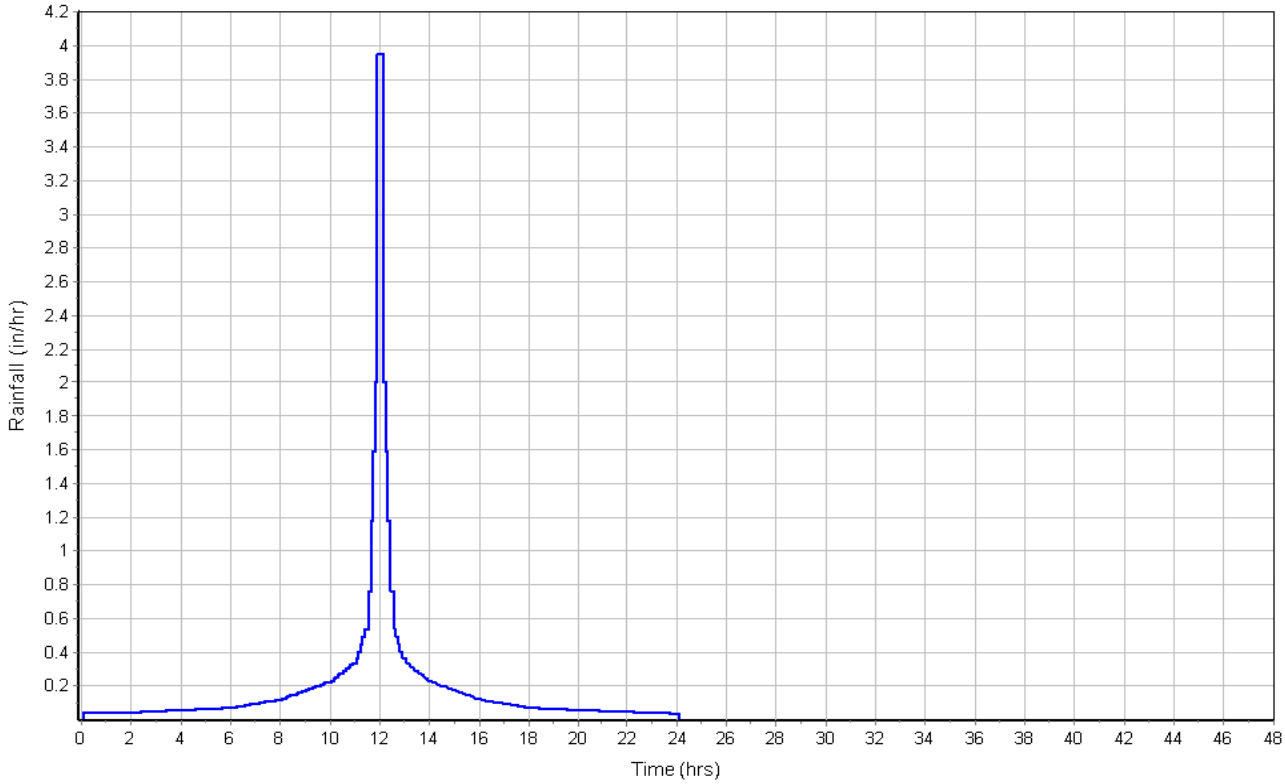
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

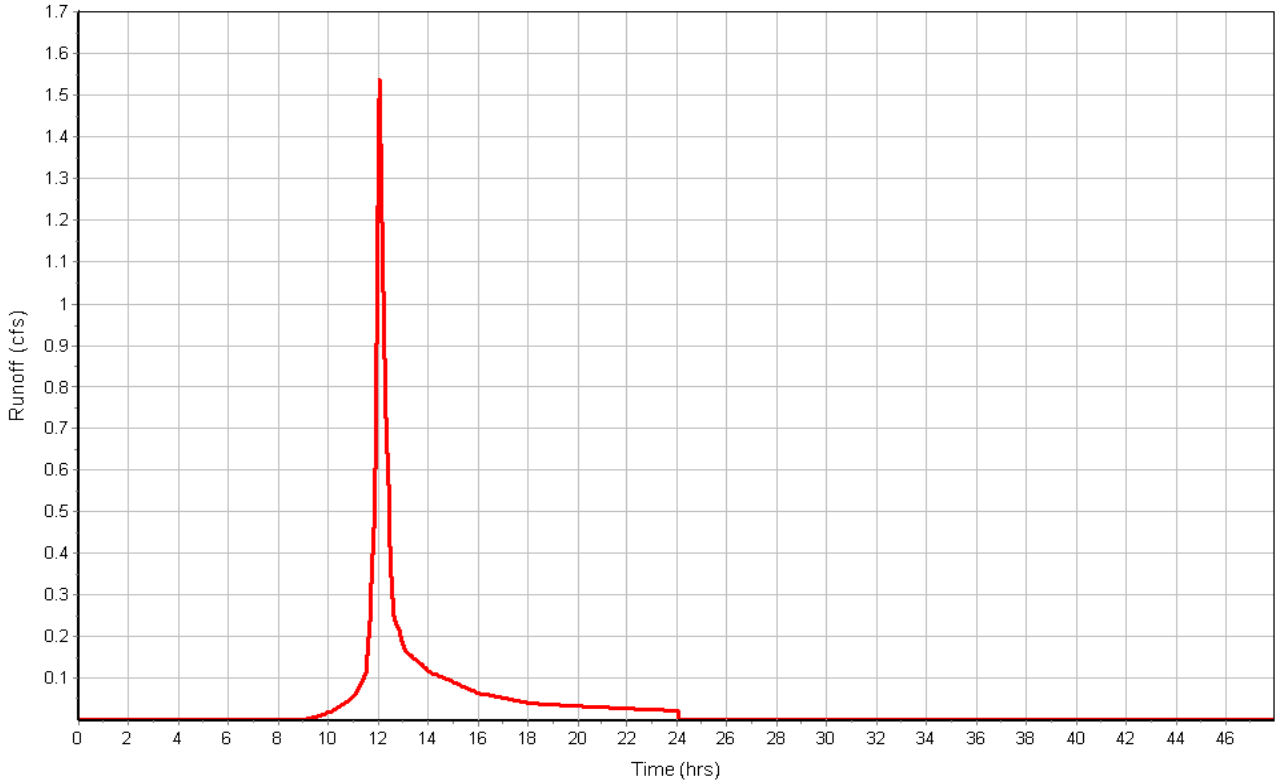
Total Rainfall (in) 4.70
Total Runoff (in) 2.21
Peak Runoff (cfs) 1.58
Weighted Curve Number 75.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : CulvertDrainageArea

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : D

Input Data

Area (ac) 0.12
Weighted Curve Number 77.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.12	D	77.00
Composite Area & Weighted CN	0.12		77.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	36	0.00	0.00
Slope (%) :	5.55	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.09	0.00	0.00
Computed Flow Time (min) :	6.51	0.00	0.00

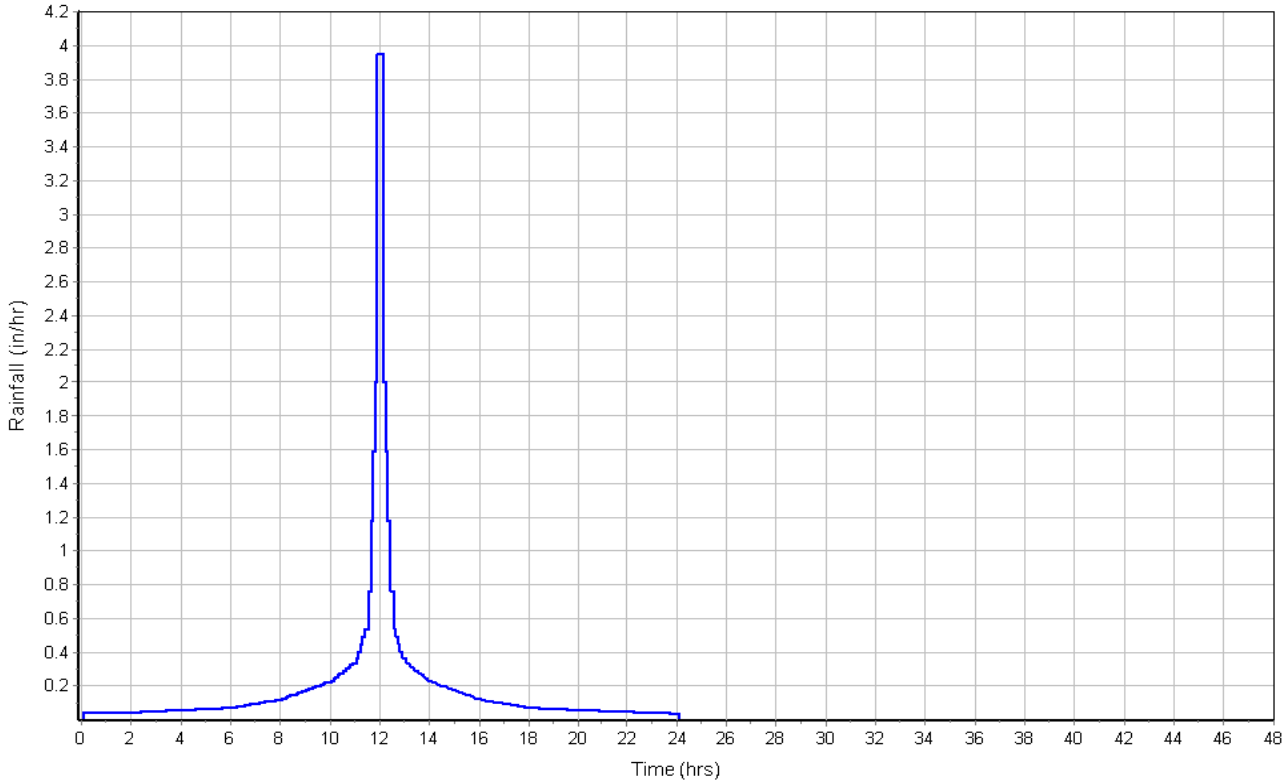
Total TOC (min) 6.51

Subbasin Runoff Results

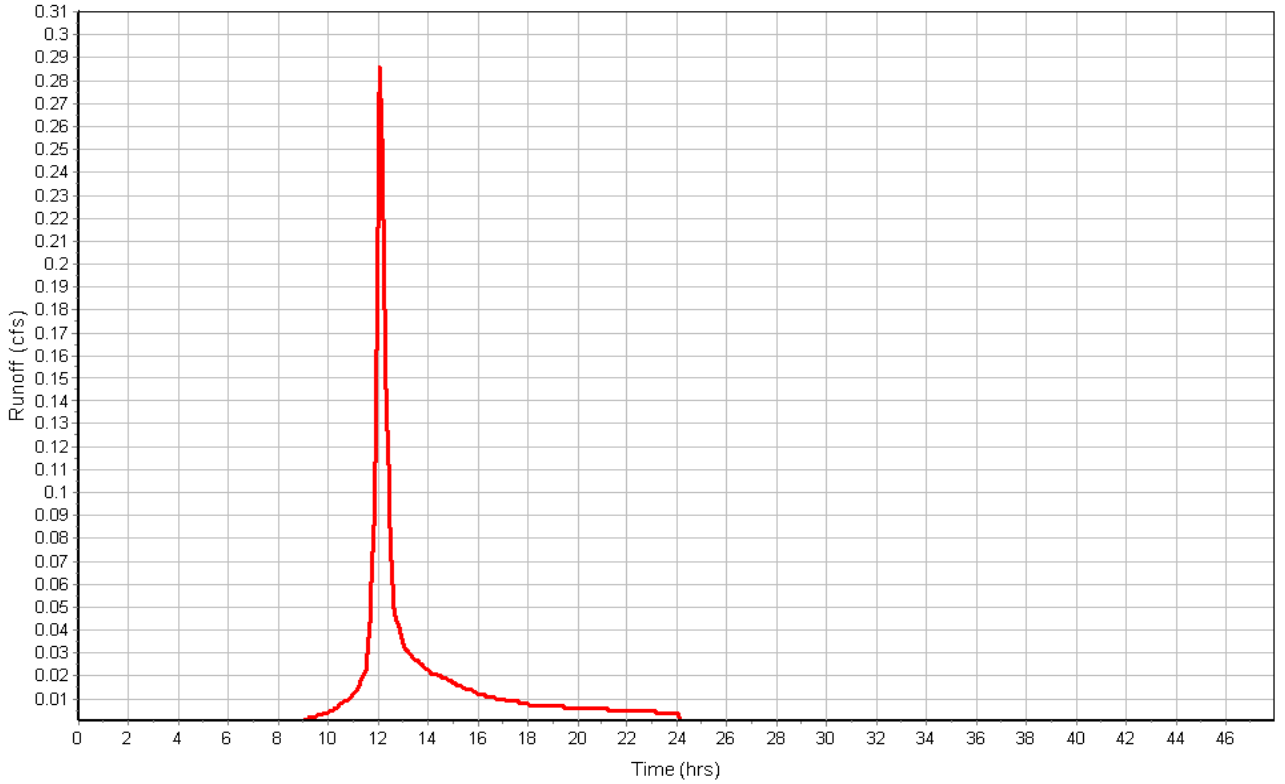
Total Rainfall (in) 4.70
Total Runoff (in) 2.37
Peak Runoff (cfs) 0.30
Weighted Curve Number 77.00
Time of Concentration (days hh:mm:ss) 0 00:06:31

Subbasin : D

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)
CulvertInlet	181.00	184.00
Out_B1andB2	176.00	6.00

Junction Results

Element ID	Peak Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Time of Max HGL Occurrence
	(cfs)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)
CulvertInlet	1.54	181.45	0.45	2.55	181.03	0 12:10
Out_B1andB2	5.73	176.00	0.00	0.00	176.00	0 00:00

Pipe Input

Element ID	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness
Direct_to_OutB	1715.96	0.00	0.00	0.0000	Dummy	0.000	0.000	0.0150
Link-03	45.00	181.00	180.55	1.0000	CIRCULAR	15.000	15.000	0.0150

Pipe Results

Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow Velocity	Peak Flow Depth
	(cfs)	(days hh:mm)	(cfs)	(ft/sec)	(ft)
Direct_to_OutB	5.73	0 13:00	0.00	0.00	0.00
Link-03	1.53	0 12:10	5.60	3.89	0.45

Project Description

File Name ..... Proposed Conditions_SMT.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Aug 15, 2017	00:00:00
End Analysis On	Aug 17, 2017	00:00:00
Start Reporting On	Aug 15, 2017	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	6
Nodes	7
Junctions	2
Outfalls	5
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	2
Channels	0
Pipes	2
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-25	Cumulative	inches	Maine	Cumberland (Southeast)	25	5.50	SCS Type III 24-hr

Subbasin Summary

Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
A	3.95	74.46	5.50	2.81	11.10	7.47	0 00:29:55
B-1	2.55	66.95	5.50	2.16	5.50	5.55	0 00:07:01
B-2	7.03	70.54	5.50	2.46	17.30	6.91	0 01:17:51
C	0.21	75.29	5.50	2.89	0.61	0.48	0 00:20:30
CulvertDrainageArea	0.68	75.00	5.50	2.86	1.94	2.03	0 00:05:00
D	0.12	77.00	5.50	3.04	0.37	0.38	0 00:06:30

Node Summary

Element ID	Element Type	Invert Elevation (ft)	Peak Inflow (cfs)
CulvertInlet	Junction	181.00	1.99
Out_B1andB2	Junction	176.00	7.71
CulvertOutlet	Outfall	180.35	1.98
OUT-A	Outfall	180.00	7.44
OUT-B	Outfall	176.00	7.71
OUT-C	Outfall	178.00	0.48
OUT-D	Outfall	190.82	0.37

Link Summary

Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow Velocity	Peak Flow Depth
				(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)	(ft/sec)	(ft)
Direct_to_OutB	Pipe	Out_B1andB2	OUT-B	1715.96	0.00	0.00	0.0000	0.000	0.0150	7.71	0.00	0.00	0.00
Link-03	Pipe	CulvertInlet	CulvertOutlet	45.00	181.00	180.55	1.0000	15.000	0.0150	1.98	5.60	4.17	0.51

Subbasin Hydrology

Subbasin : A

Input Data

Area (ac) 3.95
Weighted Curve Number 74.46
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.33	D	77.00
Gravel roads	0.10	D	91.00
> 75% grass cover, Good	0.38	D	80.00
Brush, Good	3.14	D	73.00
Composite Area & Weighted CN	3.95		74.46

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	45	0.00	0.00
Slope (%) :	50	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.23	0.00	0.00
Computed Flow Time (min) :	3.23	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	264	574	0.00
Slope (%) :	.76	.35	0.00
Surface Type :	Grassed waterway	Grass pasture	Unpaved
Velocity (ft/sec) :	1.31	0.41	0.00
Computed Flow Time (min) :	3.36	23.33	0.00

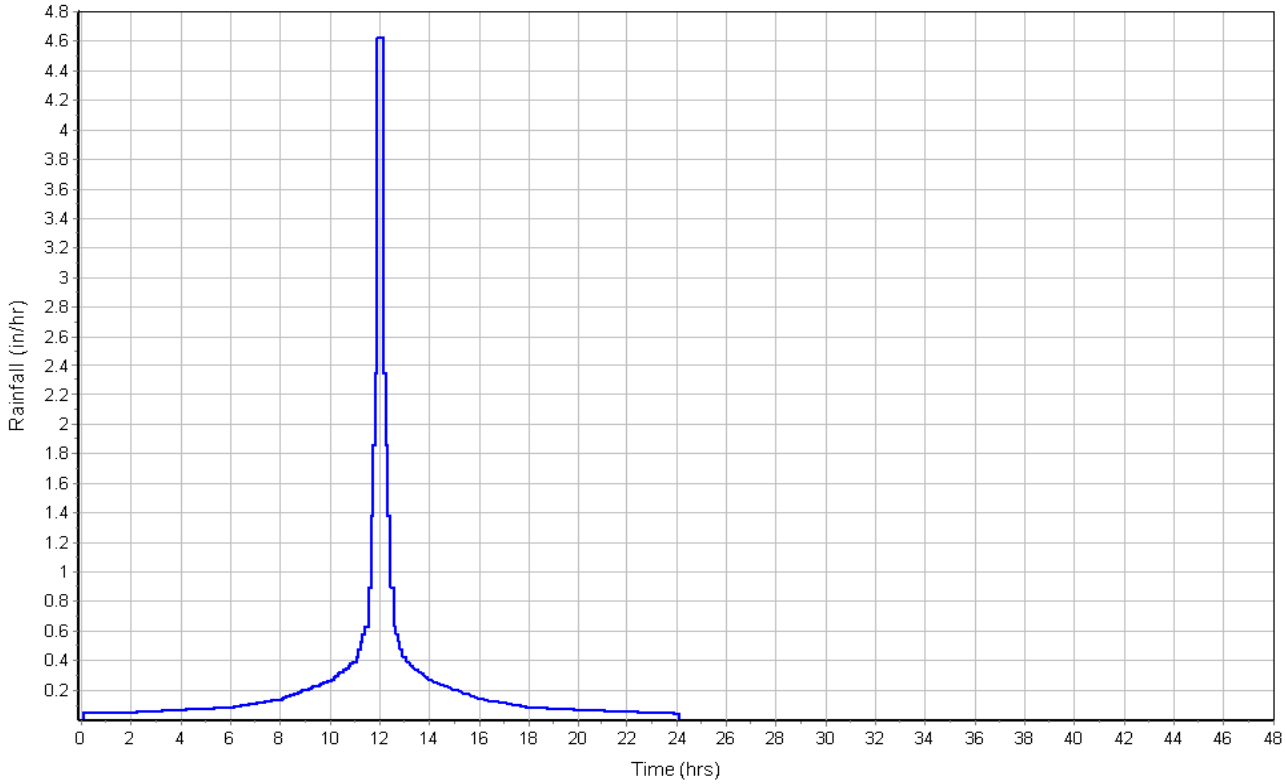
Total TOC (min) 29.92

Subbasin Runoff Results

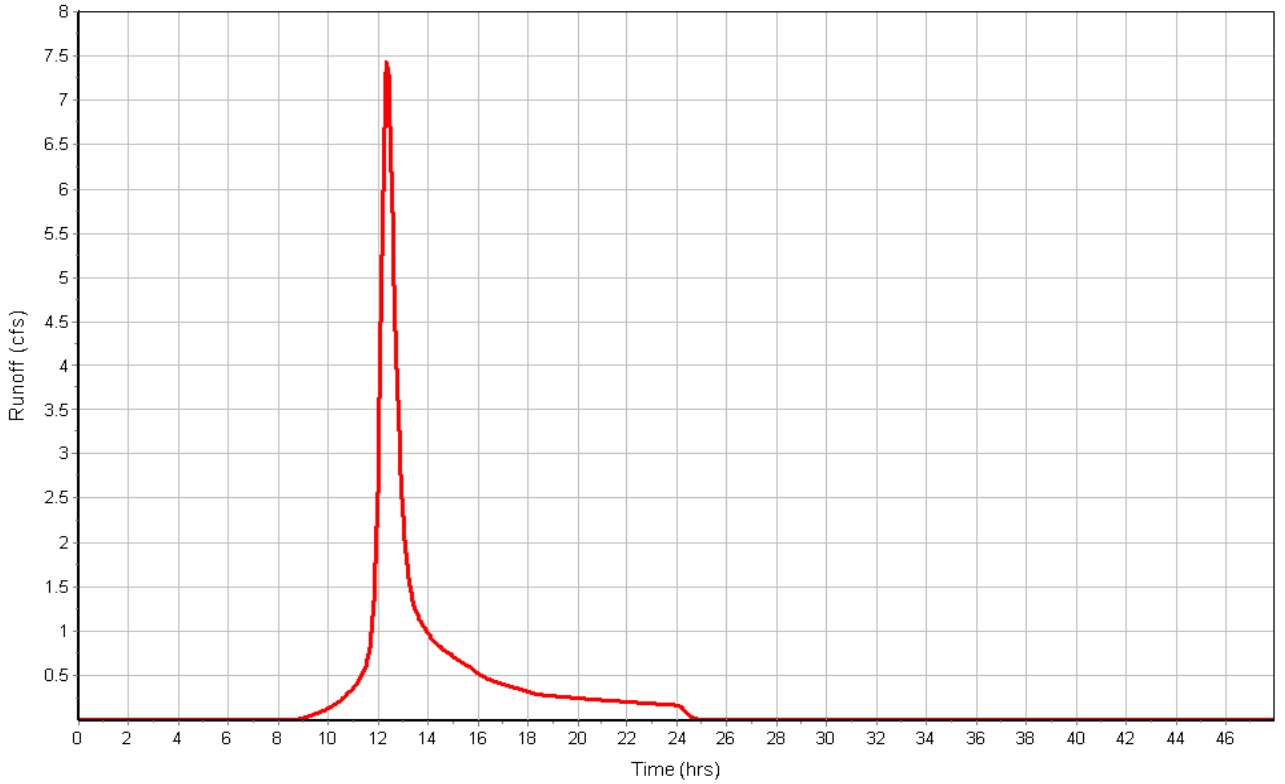
Total Rainfall (in)	5.50
Total Runoff (in)	2.81
Peak Runoff (cfs)	7.47
Weighted Curve Number	74.46
Time of Concentration (days hh:mm:ss)	0 00:29:55

Subbasin : A

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : B-1

Input Data

Area (ac) 2.55
Weighted Curve Number 66.95
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Gravel-Pad	1.88	D	60.00
Rooftops	0.24	D	98.00
> 75% grass cover, Good	0.43	D	80.00
Composite Area & Weighted CN	2.55		66.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	38	0.00	0.00
Slope (%) :	50	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.22	0.00	0.00
Computed Flow Time (min) :	2.82	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	385	0.00	0.00
Slope (%) :	1.04	0.00	0.00
Surface Type :	Grassed waterway	Grass pasture	rass pasture
Velocity (ft/sec) :	1.53	0.00	0.00
Computed Flow Time (min) :	4.19	0.00	0.00

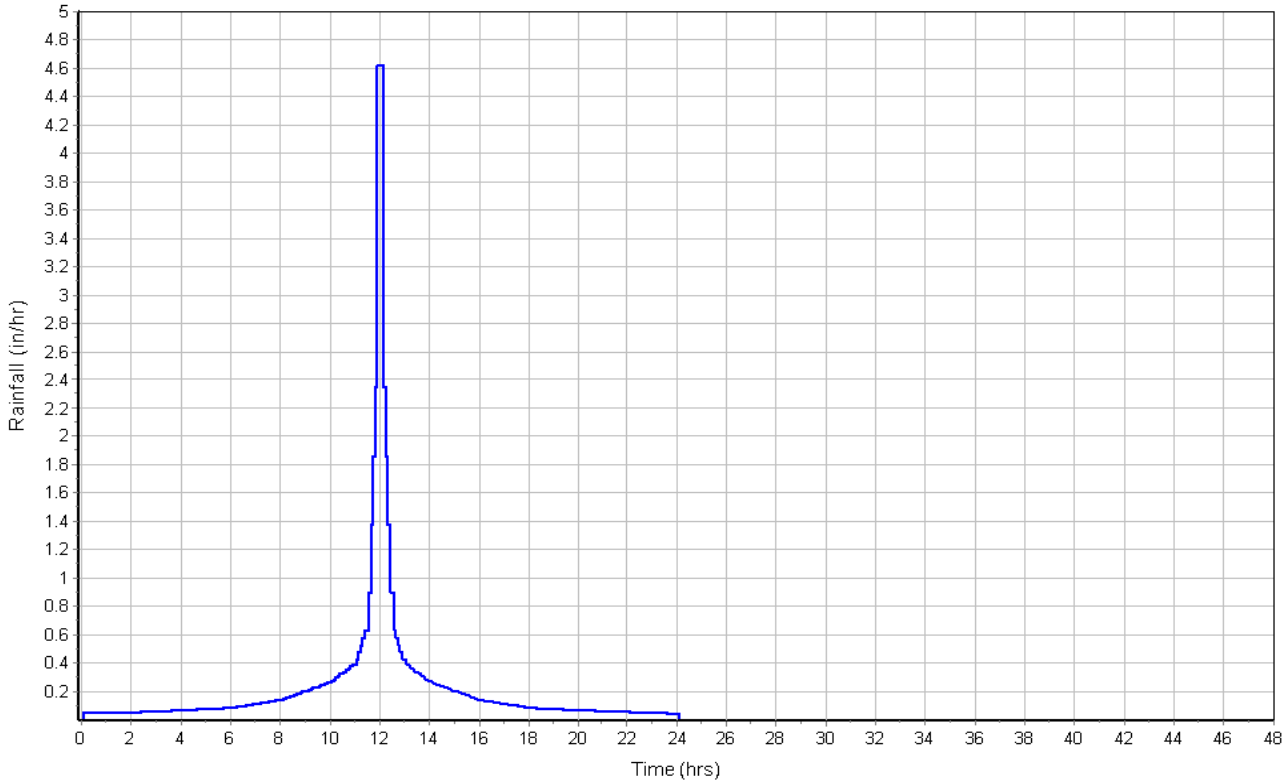
Total TOC (min) 7.02

Subbasin Runoff Results

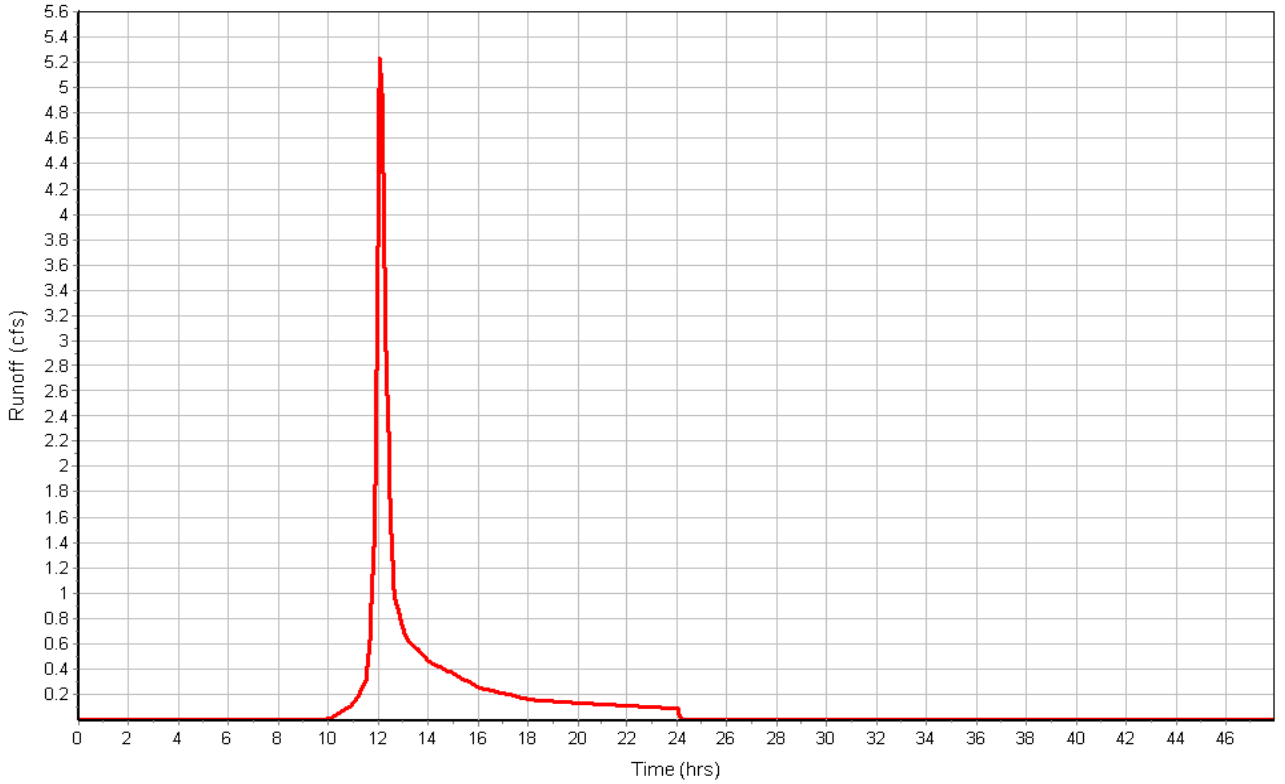
Total Rainfall (in) 5.50
Total Runoff (in) 2.16
Peak Runoff (cfs) 5.55
Weighted Curve Number 66.95
Time of Concentration (days hh:mm:ss) 0 00:07:01

Subbasin : B-1

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : B-2

Input Data

Area (ac) 7.03
Weighted Curve Number 70.54
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Brush, Good	5.19	D	73.00
Gravel roads	0.05	D	91.00
> 75% grass cover, Good	0.16	D	80.00
Gravel_Pad	1.58	D	60.00
ConcreteFoundations	0.05	D	98.00
Composite Area & Weighted CN	7.03		70.54

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	.25	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.03	0.00	0.00
Computed Flow Time (min) :	50.95	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	791	0.00	0.00
Slope (%) :	.5	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.49	0.00	0.00
Computed Flow Time (min) :	26.90	0.00	0.00

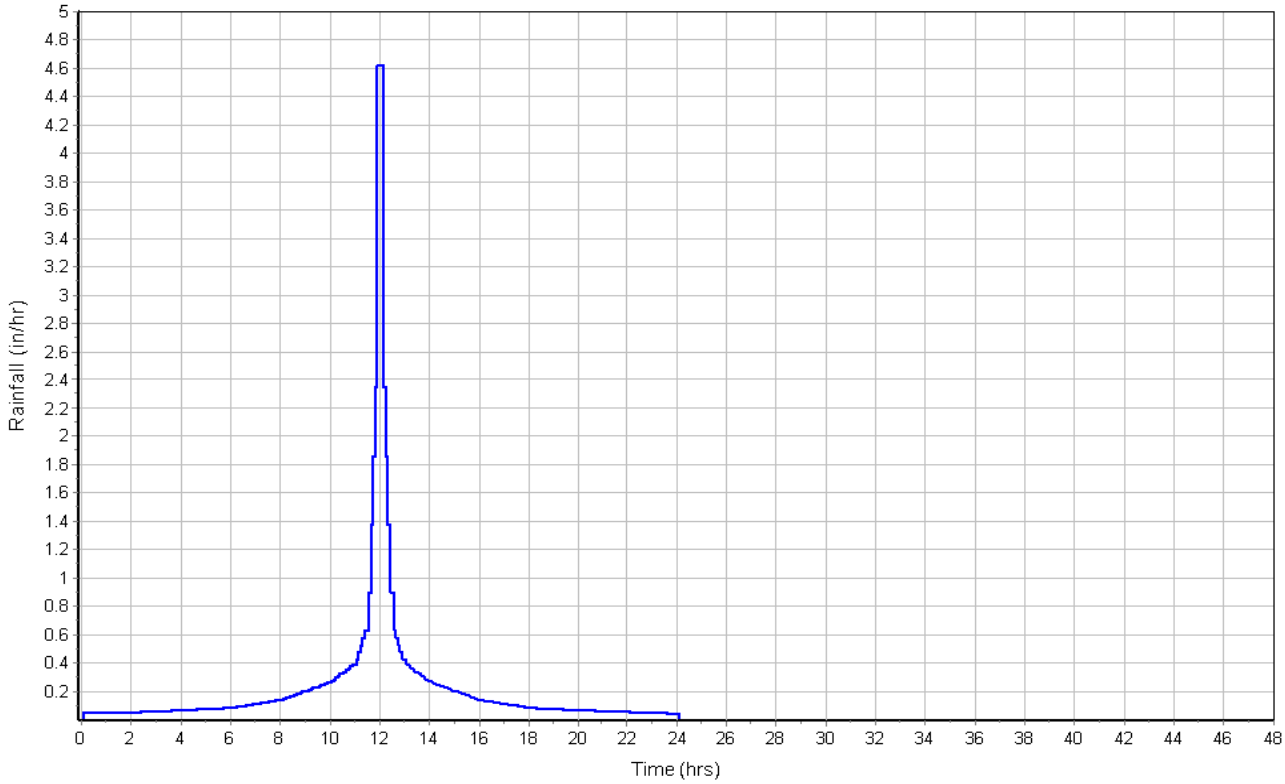
Total TOC (min) 77.86

Subbasin Runoff Results

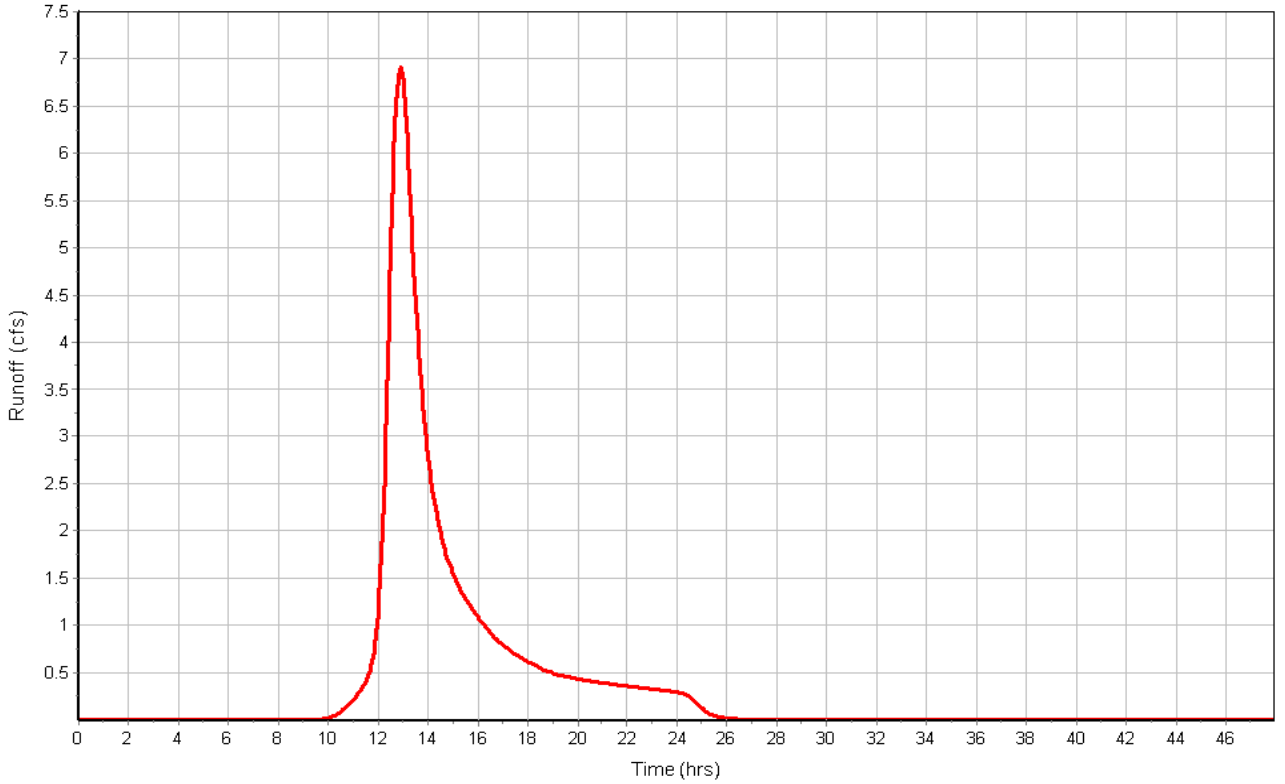
Total Rainfall (in) 5.50
Total Runoff (in) 2.46
Peak Runoff (cfs) 6.91
Weighted Curve Number 70.54
Time of Concentration (days hh:mm:ss) 0 01:17:52

Subbasin : B-2

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : C

Input Data

Area (ac) 0.21
Weighted Curve Number 75.29
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.12	D	77.00
Brush, Good	0.09	D	73.00
Composite Area & Weighted CN	0.21		75.29

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.6	0.00	0.00
Flow Length (ft) :	80	0.00	0.00
Slope (%) :	4.31	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.07	0.00	0.00
Computed Flow Time (min) :	18.88	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	182	0.00	0.00
Slope (%) :	7.1	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.87	0.00	0.00
Computed Flow Time (min) :	1.62	0.00	0.00

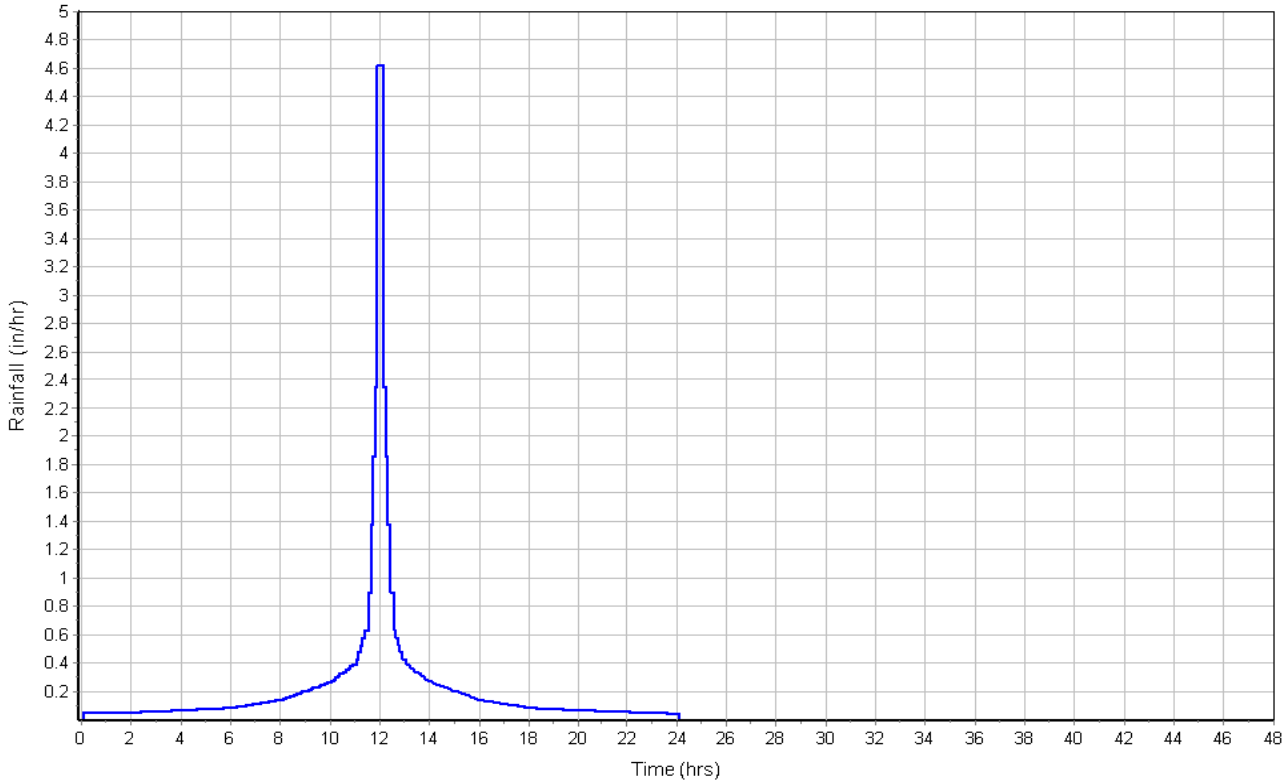
Total TOC (min) 20.50

Subbasin Runoff Results

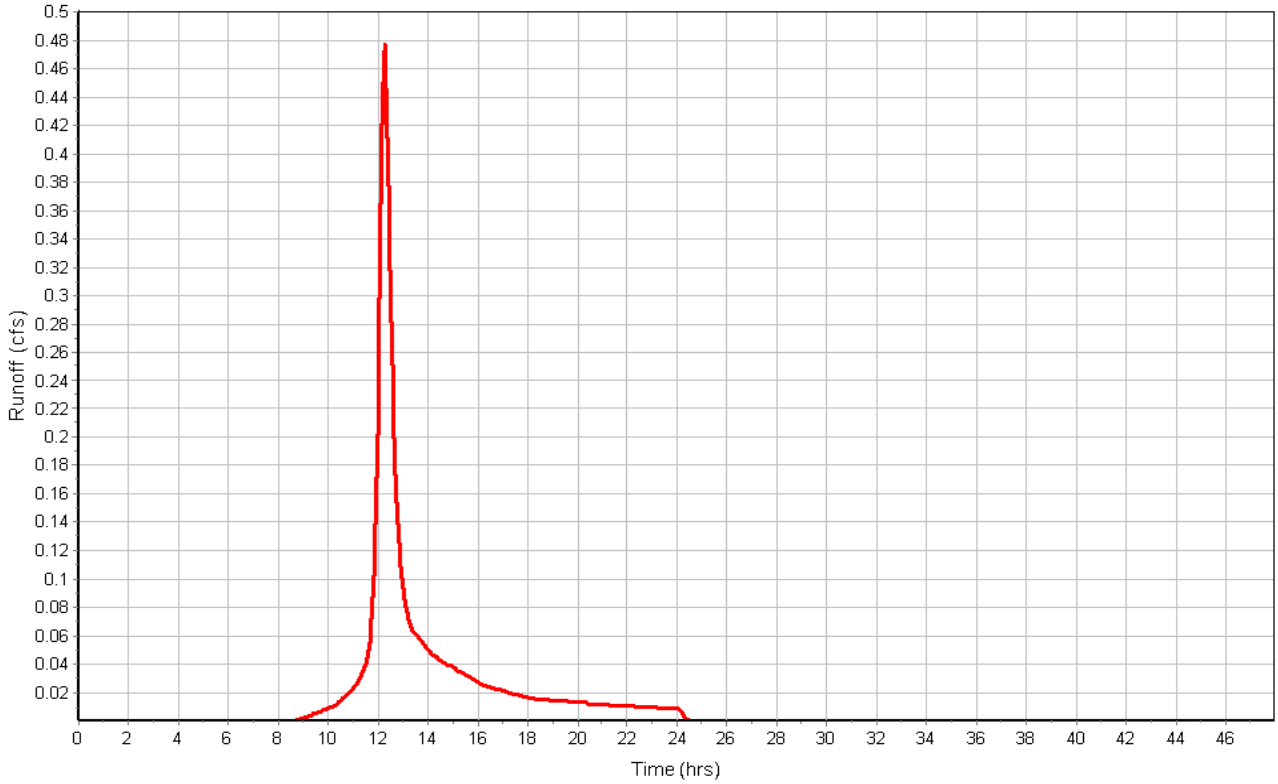
Total Rainfall (in) 5.50
Total Runoff (in) 2.89
Peak Runoff (cfs) 0.48
Weighted Curve Number 75.29
Time of Concentration (days hh:mm:ss) 0 00:20:30

Subbasin : C

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CulvertDrainageArea

Input Data

Area (ac) 0.68
Weighted Curve Number 75.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.68	-	75.00
Composite Area & Weighted CN	0.68		75.00

Time of Concentration

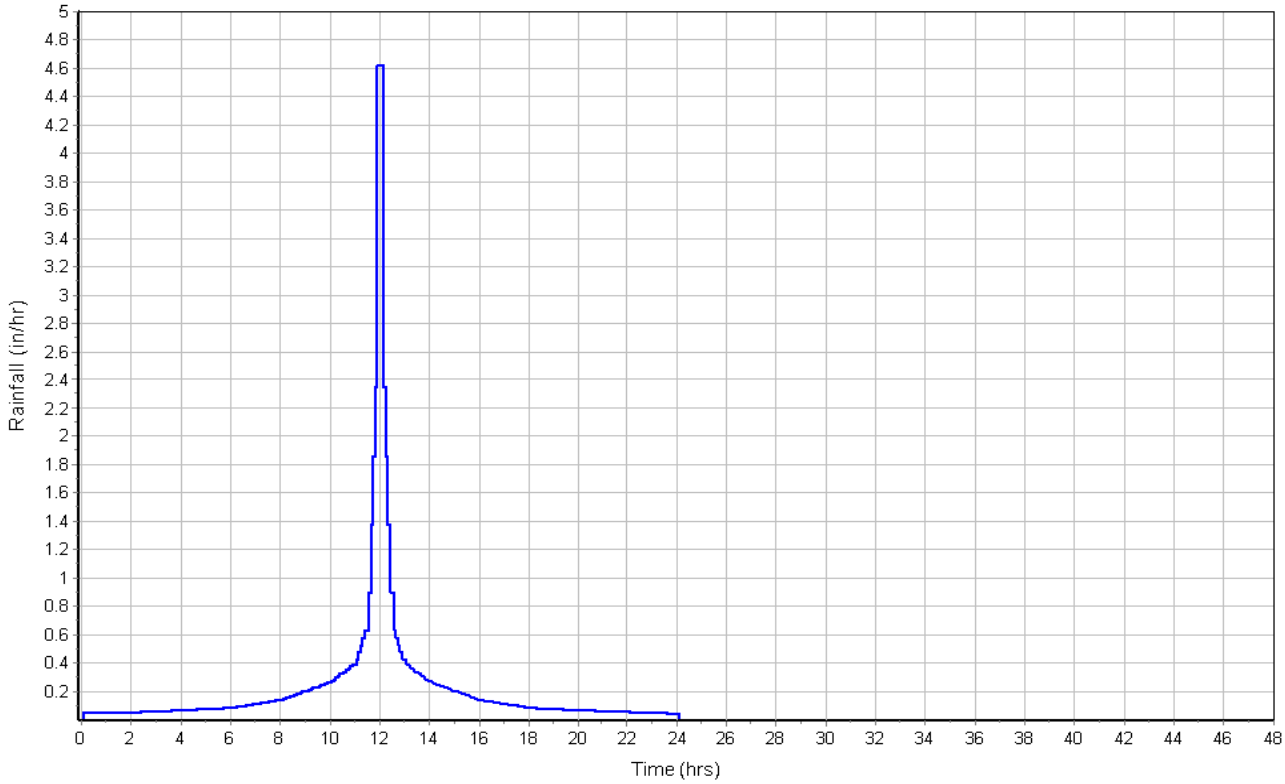
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

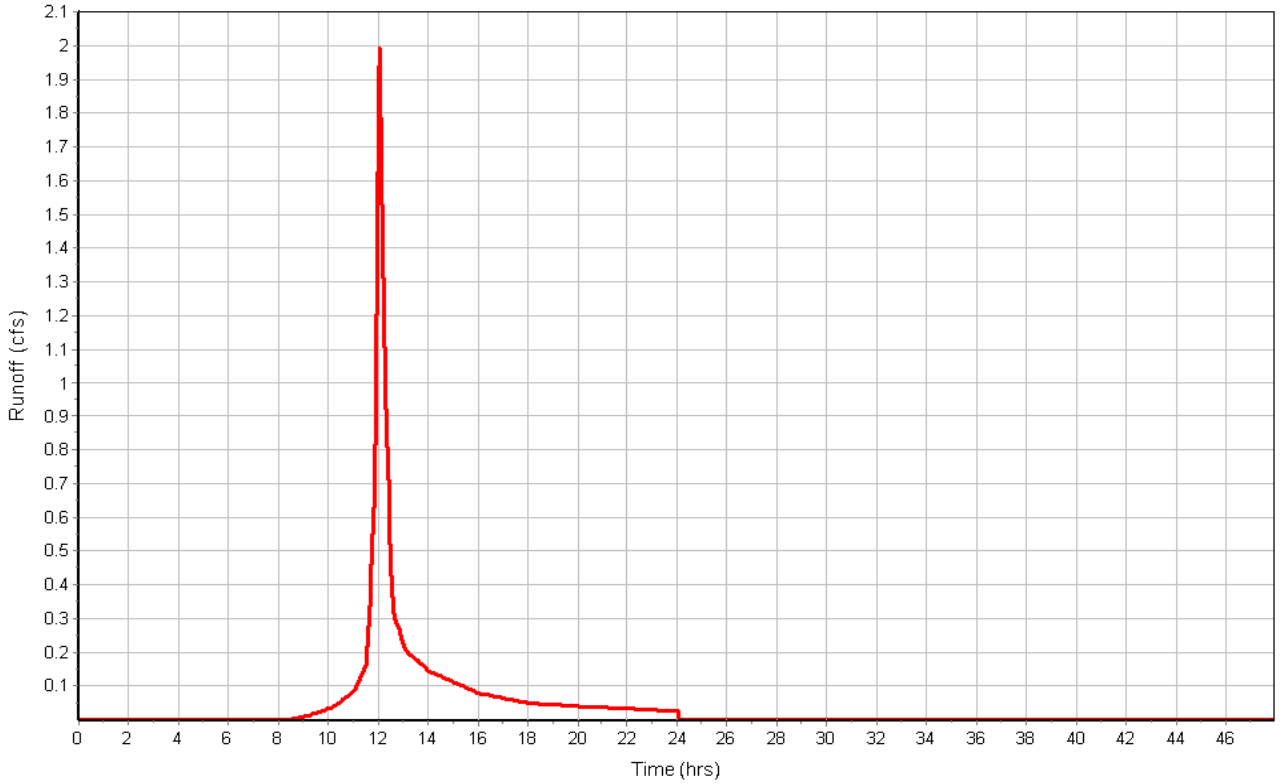
Total Rainfall (in) 5.50
Total Runoff (in) 2.86
Peak Runoff (cfs) 2.03
Weighted Curve Number 75.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : CulvertDrainageArea

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : D

Input Data

Area (ac) 0.12
Weighted Curve Number 77.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	0.12	D	77.00
Composite Area & Weighted CN	0.12		77.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.4	0.00	0.00
Flow Length (ft) :	36	0.00	0.00
Slope (%) :	5.55	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.00	0.00	0.00
Velocity (ft/sec) :	0.09	0.00	0.00
Computed Flow Time (min) :	6.51	0.00	0.00

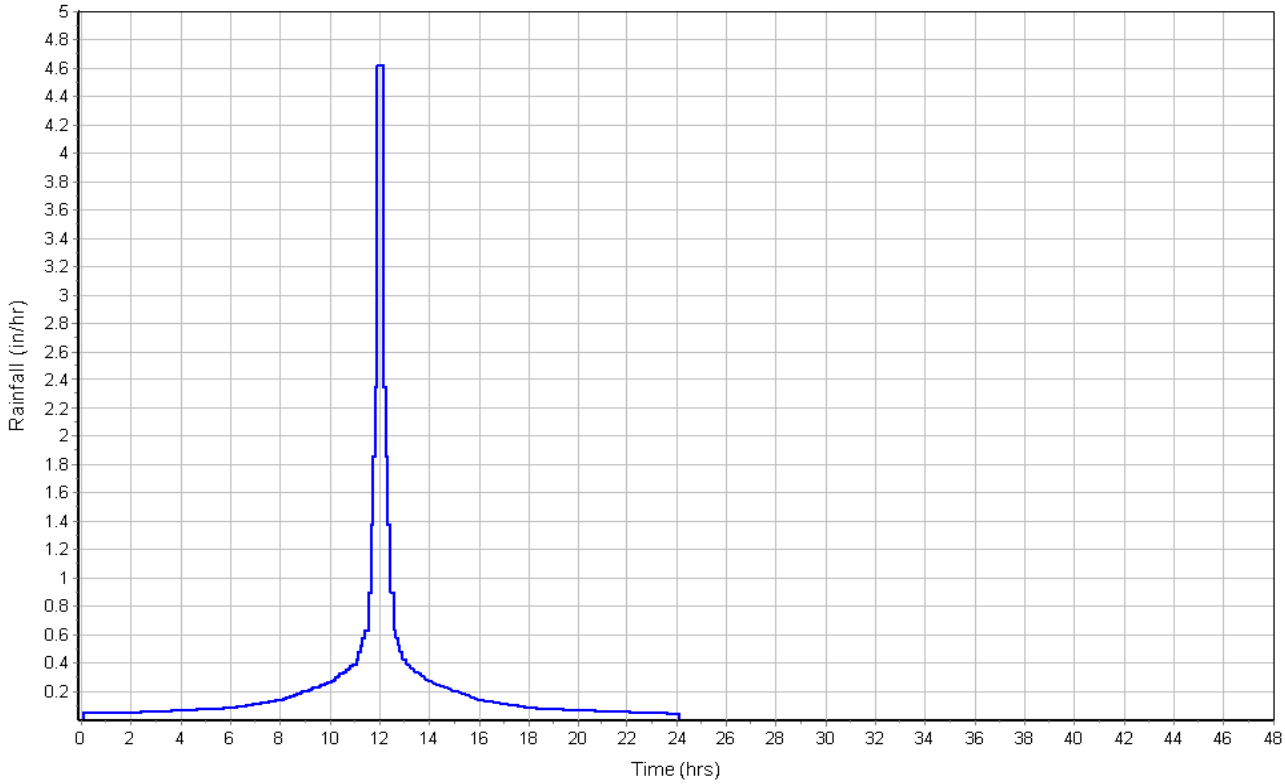
Total TOC (min) 6.51

Subbasin Runoff Results

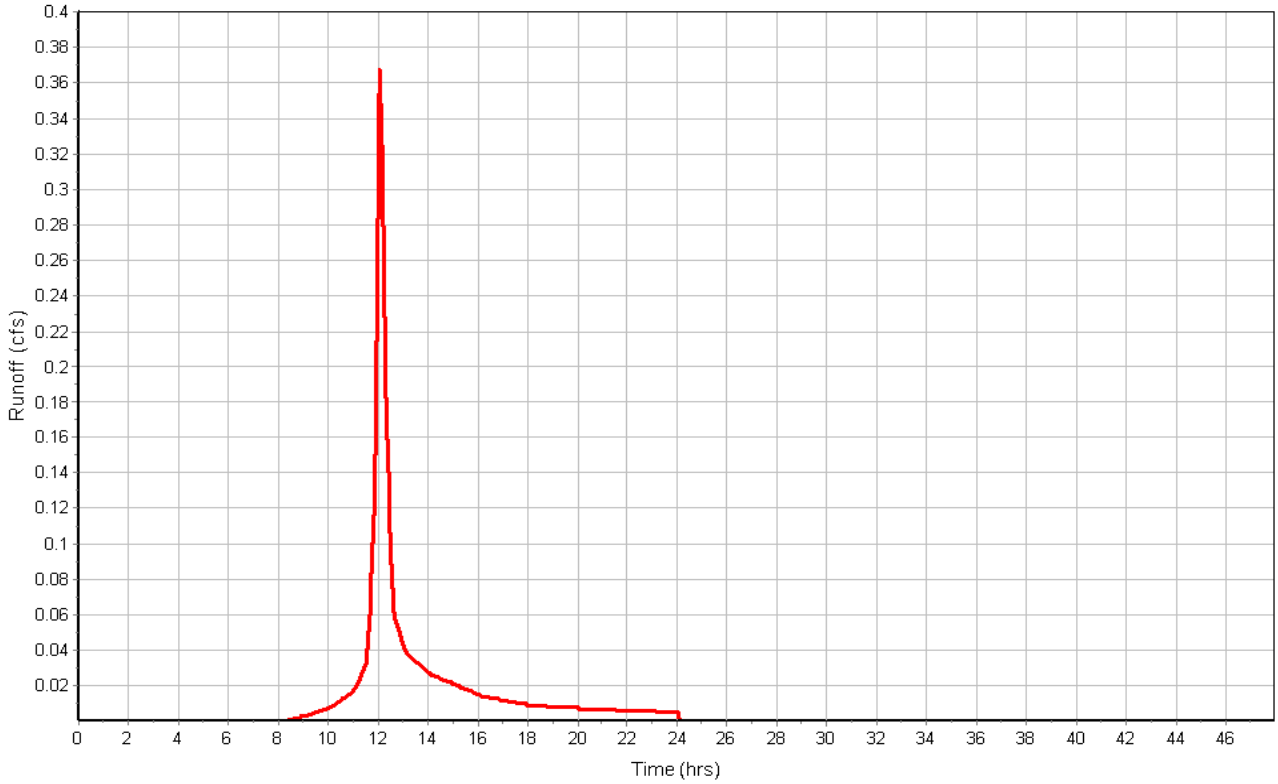
Total Rainfall (in) 5.50
Total Runoff (in) 3.04
Peak Runoff (cfs) 0.38
Weighted Curve Number 77.00
Time of Concentration (days hh:mm:ss) 0 00:06:31

Subbasin : D

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)
CulvertInlet	181.00	184.00
Out_B1andB2	176.00	6.00

Junction Results

Element ID	Peak Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Time of Max HGL Occurrence
	(cfs)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)
CulvertInlet	1.99	181.52	0.52	2.48	181.04	0 12:10
Out_B1andB2	7.71	176.00	0.00	0.00	176.00	0 00:00

Pipe Input

Element ID	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness
Direct_to_OutB	1715.96	0.00	0.00	0.0000	Dummy	0.000	0.000	0.0150
Link-03	45.00	181.00	180.55	1.0000	CIRCULAR	15.000	15.000	0.0150

Pipe Results

Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow Velocity	Peak Flow Depth
	(cfs)	(days hh:mm)	(cfs)	(ft/sec)	(ft)
Direct_to_OutB	7.71	0 12:55	0.00	0.00	0.00
Link-03	1.98	0 12:10	5.60	4.17	0.51

FILTER NOTES:

1. UNDERDRAIN PIPES SHALL BE SCH. 40 PVC. ENDS OF UNDERDRAIN PIPING SHALL BE PLUGGED WITH PIPE FITTINGS. PIPE JOINTS SHALL BE FULLY GLUED.
2. SOIL FILTER OUTLET PIPE SHALL HAVE 6" DIA. BALL VALVE, WITH 22 - 43 GPM FLOW RATE CAPACITY.
3. COMPACT EMBANKMENT MATERIAL TO 93% OF MAXIMUM DENSITY AS DETERMINED BY ASTM D1557.
4. FILTER BED & SIDE SLOPES SHALL BE SEEDED USING "NEW ENGLAND CONSERVATION/WILDLIFE MIX" FROM NEW ENGLAND WETLAND PLANTS, INC.OF AMHERST, MA. OR APPROVED EQUAL (APPLICATION RATE 25#/ACRE).
5. MDOT 703.22 UNDERDRAIN BACKFILL MATERIAL, TYPE B SPECIFICATIONS.

SIEVE	BY WEIGHT
1	90 - 100
1 / 2	75 - 100
#4	50 - 100
#20	15 - 80
#50	0 - 15
#200	0 - 5

6. FILTER MEDIA MATERIALS:

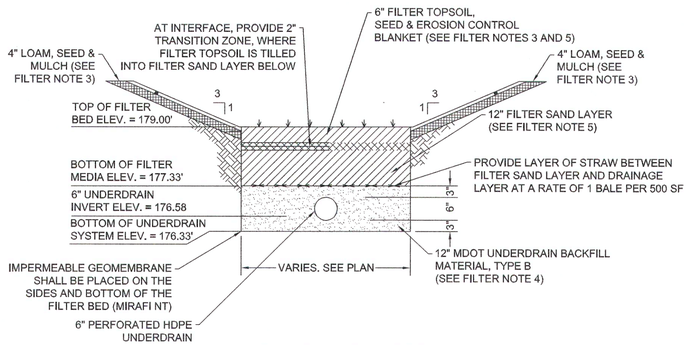
6.1. FILTER TOPSOIL LAYER: A 6-INCH LAYER OF LOAMY TOPSOIL SUCH AS USDA SANDY LOAM TOPSOIL WITH 5-8% HUMIFIED ORGANIC MATTER. SCREENED TOPSOIL FROM THE SITE MAY BE APPROPRIATE BUT SHALL BE TESTED FOR ORGANIC CONTENT. ORGANIC MATTER (SUCH AS SUPERHUMUS OR EQUIVALENT) MAY BE ADDED IF NECESSARY, PROVIDED THAT THE RESULTING TEXTURE IS SUITABLE. SEE EROSION CONTROL DETAILS FOR EROSION CONTROL BLANKET INSTALLATION REQUIREMENTS.

6.2. FILTER SAND LAYER: A 12-INCH LAYER OF LOAMY COARSE SAND PER MAINE DEP STORMWATER BEST MANAGEMENT PRACTICES TABLE 7.1.3.

SIEVE	BY WEIGHT
#10	85-100
#20	70-100
#60	15-40
#200	8-15
#200 (CLAY SIZE)	<2.0

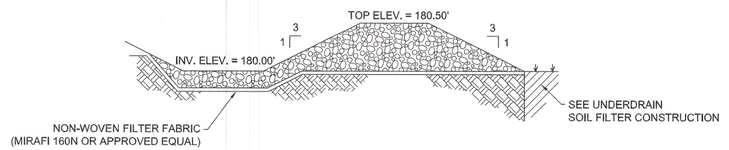
FILTER CONSTRUCTION INSPECTION AND TESTING NOTES:

1. INSPECTION OF THE FILTER BASIN SHALL BE PROVIDED FOR EACH PHASE OF CONSTRUCTION BY THE DESIGN ENGINEER WITH REQUIRED REPORTING TO THE MAINE DEP.
2. AT A MINIMUM INSPECTIONS WILL OCCUR:
   2.1. AFTER PRELIMINARY CONSTRUCTION OF THE FILTER GRADES AND ONCE THE UNDERDRAIN PIPES ARE INSTALLED BUT NOT BACKFILLED;
   2.2. AFTER THE DRAINAGE LAYER IS CONSTRUCTED AND PRIOR TO THE INSTALLATION OF THE FILTER SAND LAYER;
   2.3. AFTER FILTER SAND LAYER IS CONSTRUCTED AND PRIOR TO THE INSTALLATION OF THE FILTER TOPSOIL LAYER;
   2.4. AFTER THE FILTER TOPSOIL LAYER HAS BEEN INSTALLED AND SEEDED; AND
   2.5. AFTER ONE YEAR TO INSPECT HEALTH OF THE VEGETATION AND MAKE CORRECTIONS.
3. THE CONTRACTOR SHALL PROVIDE SUBMITTALS FOR EACH COMPONENT OF THE FILTER MEDIA, IDENTIFYING THE SOURCE.
4. ALL MATERIAL USED FOR THE CONSTRUCTION OF THE FILTER BASIN WILL BE APPROVED BY THE DESIGN ENGINEER, AFTER TESTS BY A CERTIFIED LABORATORY SHOW THAT THEY ARE PASSING MAINE DEP SPECIFICATIONS.
5. THE CONTRACTOR SHALL SUBMIT SAMPLES OF EACH TYPE OF MATERIAL TO BE USED FOR THE MIXED FILTER MEDIA AND SAMPLES OF THE UNDERDRAIN BEDDING MATERIAL. SAMPLES MUST BE A COMPOSITE OF THREE DIFFERENT LOCATIONS (GRABS) FROM THE STOCKPILE OR PIT FACE. SAMPLE SIZE REQUIRED WILL BE DETERMINED BY THE TESTING LABORATORY.
6. THE CONTRACTOR SHALL PERFORM, OR HAVE PERFORMED, A SIEVE ANALYSIS CONFORMING TO ASTM C138 ON EACH TYPE OF THE SAMPLE MATERIAL. ALL MATERIALS SHALL HAVE A CLAY CONTENT OF LESS THAN 2% AS DETERMNED BY HYDROMETER GRAIN SIZE ANALYSIS.
7. THE CONTRACTOR SHALL PERFORM, OR HAVE PERFORMED, A PERMEABILITY TEST ON THE SOIL FILTER MEDIA MATERIALS CONFORMING TO ASTM D2434 WITH THE MIXTURE COMPACTED TO 90 - 92% OF MAXIMUM DRY DENSITY BASED ON ASTM D698.

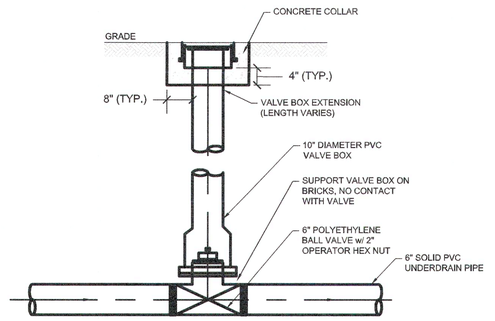


GRASSED UNDERDRAIN SOIL FILTER CONSTRUCTION DETAILS
NTS

NOTE:
FILTER CROSS SECTION IS SHOWN FOR GRAPHICAL PURPOSES ONLY - NOT TRUE SCALE.



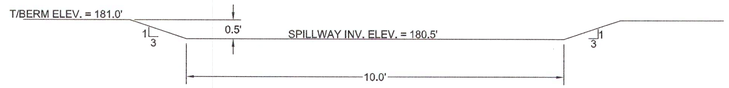
STONE FOREBAY
NTS



NOTES:

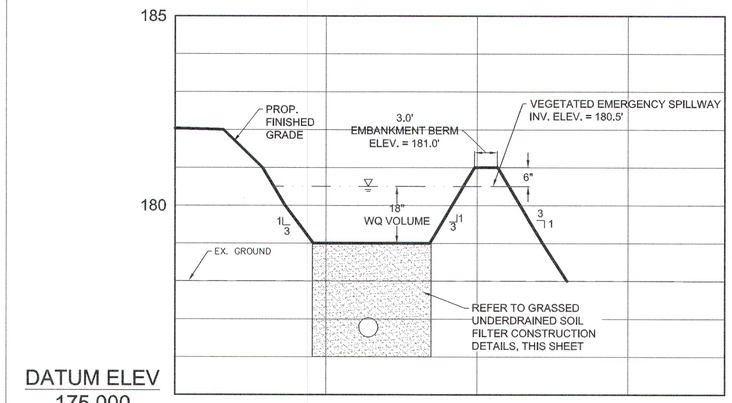
1. INSTALL THE BALL VALVE DURING THE INITIAL PIPE INSTALLATION IN THE FULLY-OPEN POSITION
2. FOLLOWING INITIAL RAIN EVENT THAT PRODUCE OBSERVED OUTFLOW, CLOSE VALVE TO ALLOW AN OUTLFOW OF BETWEEN 22-43 GPM FOR A DEWATERING TIME OF 24-48 HOURS
3. TURN VALVE 1/2 TO 3/4 CLOSED TO ACHIEVE THE REQUIRED MAXIMUM FLOW RATE

6" SOIL FILTER UNDERDRAIN BALL VALVE
NTS



QPEAK, 25-YEAR = 5.55 CFS
VPEAK, 25-YEAR = 1.64 FPS
WEIR LENGTH = 10'
WEIR HEIGHT = 0.5'
FLOW DEPTH, 25-YEAR = 0.31'

UNDERDRAINED SOIL FILTER EMERGENCY SPILLWAY
NTS



DATUM ELEV
175.000

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION 05/29/18

REV.	DESCRIPTION	DATE	BY	CK	APP
B	MEDEP PERMIT SET COMMENT REVISIONS	05/29/18	TJG	KRV	

OWNER ENGINEER:
APPROVAL STAMP:
DRAWING PREPARED BY:
ACCEPTED BY OE:

PE Stamp
STATE OF MAINE
KENNETH R. VOLOCK
No. 11063
LICENSED
PROFESSIONAL ENGINEER
05-29-18
Rev. 7/2

IUSA ENGINEERING
CONFIDENTIAL, PROPRIETARY and TRADE SECRET INFORMATION
Property of Iberdrola, USA

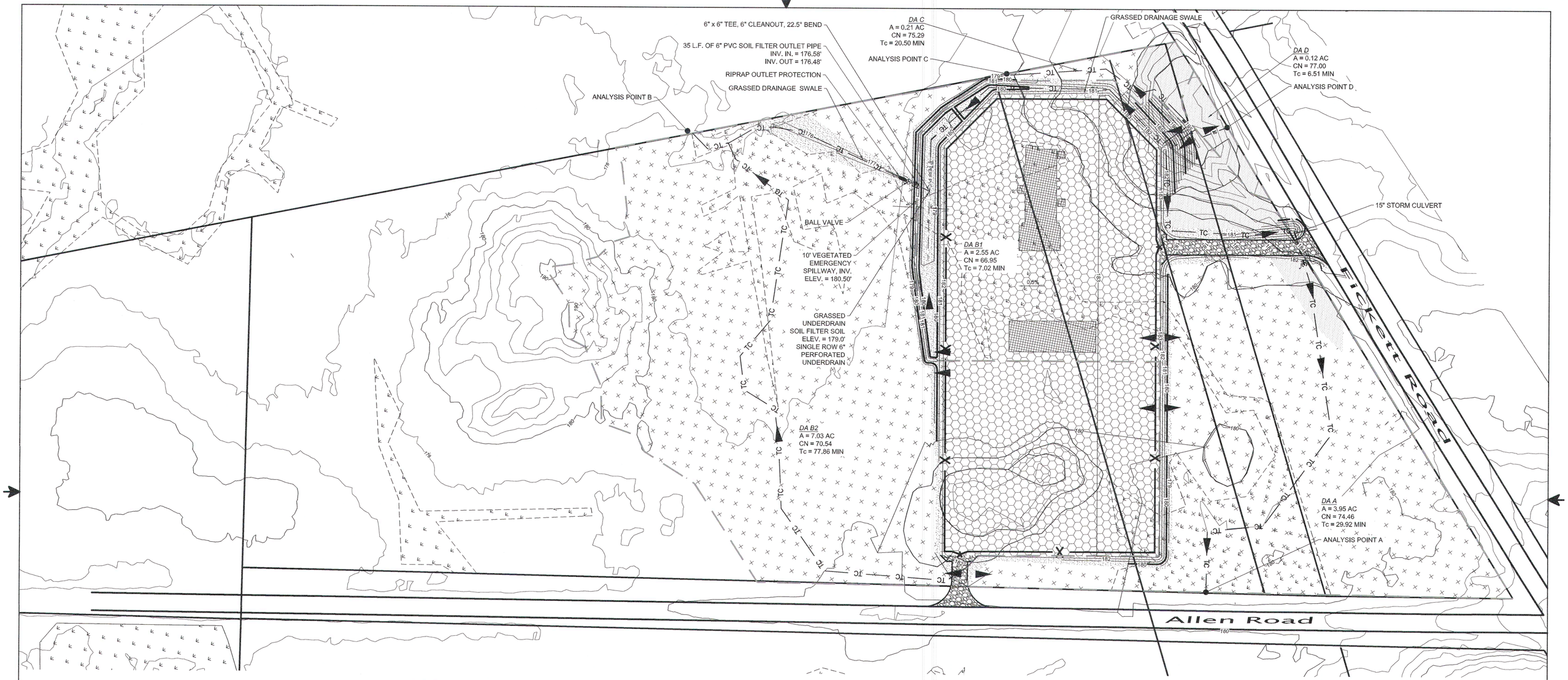
CMP
IBERDROLA - USA

REV.	DATE	BY	DESCRIPTION	APP.

STORMWATER TREATMENT PLAN
SH 1 OF 3
FICKETT ROAD/1077 POWNAL, ME

DR.	TJG	SCALE: N/A	FILE: 1077-003-003SH001.DWG
CK.	KRV	NO.	REV.
APP.		1077-003-003	B
DATE:			

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.



LEGEND

- EX. MAJOR CONTOUR (750)
- EX. MINOR CONTOUR (744)
- EX. SOIL BOUNDARY *
- EX. OVERHEAD UTILITY
- EX. PROPERTY BOUNDARY
- EX. WETLAND
- PROP. MAJOR CONTOUR (750)
- PROP. MINOR CONTOUR (744)
- PROP. TIME OF CONCENTRATION (TC)
- PROP. FLOW DIRECTION ARROW
- PROP. DRAINAGE BOUNDARY
- ANALYSIS POINT
- PROP. CULVERT/PIPING

* SITE IS ENTIRELY HSG TYPE D SOILS

- EX. WOODS
- EX. BRUSH
- PROP. DEVELOPED GRASS/LANDSCAPE
- PROP. IMPERVIOUS SURFACE/ROOF
- PROP. STONE PAD
- PROP. GRAVEL ACCESS ROAD

PROPOSED CONDITIONS HYDRAULIC SUMMARY						
DRAINAGE AREA	2 - YEAR FLOW RATE (CFS)	10 - YEAR FLOW RATE (CFS)	25 - YEAR FLOW RATE (CFS)	PEAK 2 - YEAR FLOW RATE AT OUTFALL (IF SUBSHEDS PRESENT)	PEAK 10 - YEAR FLOW RATE AT OUTFALL (IF SUBSHEDS PRESENT)	PEAK 25 - YEAR FLOW RATE AT OUTFALL (IF SUBSHEDS PRESENT)
A	2.33	5.71	7.47	N/A	N/A	N/A
B1	1.30	4.05	5.55	2.06	5.73	7.71
B2	1.84	5.14	6.91			
C	0.15	0.37	0.48	N/A	N/A	N/A
D	0.13	0.30	0.38	N/A	N/A	N/A

STORMWATER TREATMENT REQUIREMENTS (% OF TREATED AREA)		
LAND TYPE	STATION	STATION % TREATED
IMPERVIOUS TOTAL	3.90 AC	96.15%
IMPERVIOUS TREATED	3.75 AC	
DEVELOPED TOTAL*	4.87 AC	85.83%
DEVELOPED TREATED	4.18 AC	

*DEVELOPED AREA INCLUDES BOTH IMPERVIOUS AND LANDSCAPED SURFACES

STORMWATER TREATMENT FOR PHOSPHOROUS STANDARD	
CONDITION	PHOSPHOROUS EXPORT LOAD (LBS P/YEAR)
PROJECT PHOSPHOROUS BUDGET	0.51
PRE-TREATMENT ALGAL AV. P EXPORT	1.65
POST-TREATMENT ALGAL AV. P EXPORT	0.45

0 120 240 Feet

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION 05/29/18

REV.	DESCRIPTION	DATE	BY	CK	APP
B	MEDEP PERMIT SET COMMENT REVISIONS	05/29/18	TJG	KRV	

OWNER ENGINEER:
APPROVAL STAMP:
DRAWING PREPARED BY:
ACCEPTED BY OE:

PE Stamp: STATE OF MAINE — KENNETH R. WOLDCK — No. 11054 — LICENSED PROFESSIONAL ENGINEER — 05-29-18 — Rev. B

IUSA ENGINEERING
CONFIDENTIAL, PROPRIETARY and TRADE SECRET INFORMATION
Property of Iberdrola, USA

CMP IBERDROLA - USA

REV.	DATE	BY	DESCRIPTION	APP.

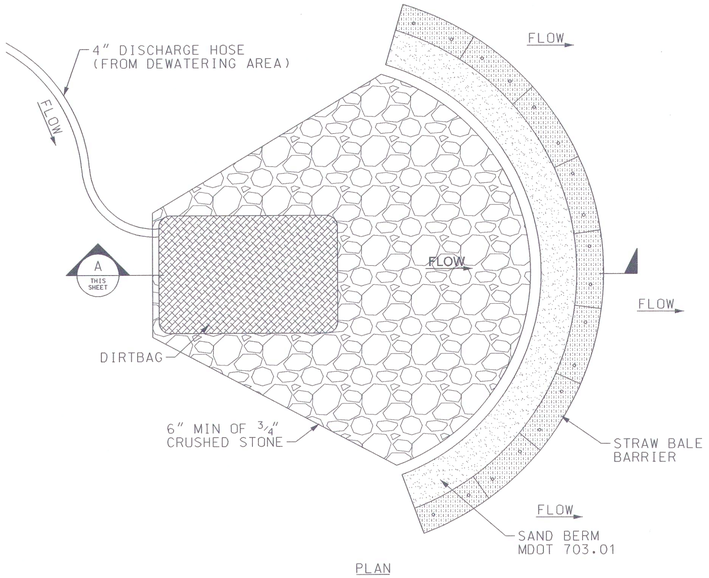
POST-DEVELOPMENT STORMWATER PLAN

SH 3 OF 3

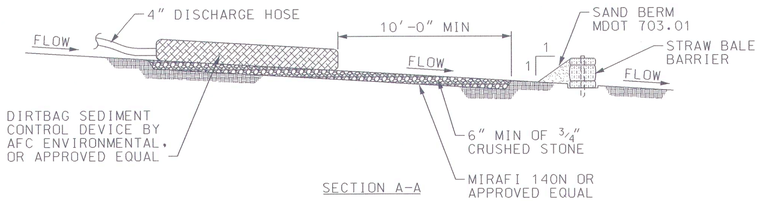
FICKETT ROAD/1077 — POWNAL, ME

DR.	TJG	SCALE: 1" = 60'	FILE: 1077-003-003SH003.DWG
CK.	KRV	NO.	REV.
APP.		1077-003-003	B
DATE:			

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.

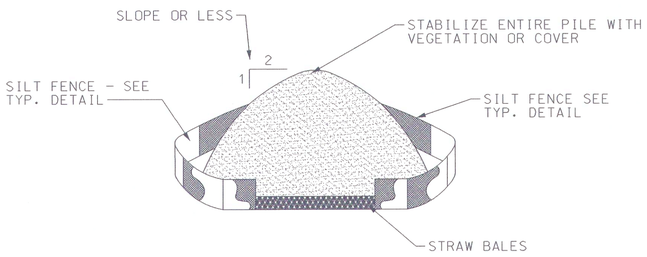


PLAN



SECTION A-A

DEWATERING SYSTEM DETAIL
NTS



INSTALLATION NOTES:

1. AREA CHOSEN FOR STOCKPILING OPERATIONS SHALL BE DRY AND STABLE.
2. MAXIMUM SLOPE OF STOCKPILE SHALL BE 2H:1V.
3. UPON COMPLETION OF SOIL STOCKPILING, EACH PILE SHALL BE SURROUNDED WITH EITHER SILT FENCING OR STRAW BALES, THEN STABILIZED WITH VEGETATION OR COVERED.

TYPICAL TOPSOIL STOCKPILE
NTS

DEWATERING NOTES:

1. THE CONTRACTOR SHALL INSTALL, MAINTAIN, AND OPERATE ALL CHANNELS, SUMPS, AND ALL OTHER TEMPORARY DIVERSION AND PROTECTIVE WORKS NEEDED TO DIVERT STREAM FLOW AND OTHER SURFACE WATER THROUGH OR AROUND THE CONSTRUCTION SITE. CONTROL OF SURFACE WATER SHALL BE CONTINUOUS DURING THE PERIOD THAT DAMAGE TO CONSTRUCTION WORK COULD OCCUR.
2. OPEN EXCAVATIONS SHALL BE DEWATERED AND KEPT FREE OF STANDING WATER AND MUDDY CONDITIONS AS NECESSARY FOR THE PROPER EXECUTION OF THE WORK. THE CONTRACTOR SHALL FURNISH, INSTALL, OPERATE, AND MAINTAIN ALL DRAINS, SUMPS AND ALL OTHER EQUIPMENT REQUIRED TO PROPERLY DEWATER THE SITE. DEWATERING SYSTEMS THAT CAUSE A LOSS OF SOIL FINES FROM THE FOUNDATION AREAS WILL NOT BE PERMITTED.
3. INSTALL DIVERSION DITCHES OR BERMS IF NECESSARY TO MINIMIZE THE AMOUNT OF CLEAN STORMWATER RUNOFF ALLOWED INTO THE EXCAVATED AREA.
4. REMOVAL OF WATER FROM THE CONSTRUCTION SITE SHALL BE ACCOMPLISHED SO THAT EROSION AND THE TRANSPORTING OF SEDIMENT AND OTHER POLLUTANTS ARE MINIMIZED.
5. DISCHARGE DEWATERING EFFLUENT TO AREAS AS INDICATED ON THE SITE GRADING PLAN. DISCHARGE SHALL BE IN SHEET FLOW.
6. DEWATERING IN PERIODS OF INTENSE, HEAVY RAIN, WHEN THE INFILTRATIVE CAPACITY OF THE SOIL IS EXCEEDED, SHALL BE AVOIDED.
7. FLOW TO THE SEDIMENT REMOVAL STRUCTURE MAY NOT EXCEED THE STRUCTURE'S CAPACITY TO SETTLE AND FILTER FLOW OR THE STRUCTURE'S VOLUME CAPACITY.
8. WHEN TEMPORARY WORKS ARE NO LONGER NEEDED, THE CONTRACTOR SHALL REMOVE AND RETURN THE AREA TO A CONDITION SIMILAR TO THAT WHICH EXISTED BEFORE CONSTRUCTION. AREAS WHERE TEMPORARY WORKS WERE LOCATED SHALL BE GRADED FOR SIGHTLY APPEARANCE WITH NO OBSTRUCTION TO NATURAL SURFACE WATER FLOWS OR THE PROPER FUNCTIONING AND ACCESS TO THE WORKS OF IMPROVEMENT INSTALLED. THE CONTRACTOR SHALL EXERCISE EXTREME CARE DURING THE REMOVAL STAGES TO MINIMIZE THE LOSS OF SOIL SEDIMENT AND DEBRIS THAT WAS TRAPPED DURING CONSTRUCTION.

HOUSEKEEPING PLAN:
(MAINE DEP CHAPTER 500, APPENDIX C)

1. SPILL PREVENTION. CONTROLS MUST BE USED TO PREVENT POLLUTANTS FROM CONSTRUCTION AND WASTE MATERIALS STORED ON SITE TO ENTER STORMWATER, WHICH INCLUDES STORAGE PRACTICES TO MINIMIZE EXPOSURE OF THE MATERIALS TO STORMWATER. THE SITE CONTRACTOR OR OPERATOR MUST DEVELOP, AND IMPLEMENT AS NECESSARY, APPROPRIATE SPILL PREVENTION, CONTAINMENT, AND RESPONSE PLANNING MEASURES. ANY SPILL OR RELEASE OF TOXIC OR HAZARDOUS SUBSTANCES MUST BE REPORTED TO THE MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION (MDEP). FOR OIL SPILLS, CALL 1-800-482-0777 WHICH IS AVAILABLE 24 HOURS A DAY. FOR SPILLS OF TOXIC OR HAZARDOUS MATERIAL, CALL 1-800-452-4664 WHICH IS AVAILABLE 24 HOURS A DAY. FOR MORE INFORMATION, VISIT THE MDEP'S WEBSITE AT: http://www.maine.gov/dep/spills/emergspillresp/
2. GROUNDWATER PROTECTION. DURING CONSTRUCTION, LIQUID PETROLEUM PRODUCTS AND OTHER HAZARDOUS MATERIALS WITH THE POTENTIAL TO CONTAMINATE GROUNDWATER MAY NOT BE STORED OR HANDLED IN AREAS OF THE SITE DRAINING TO AN INFILTRATION AREA. AN "INFILTRATION AREA" IS ANY AREA OF THE SITE THAT BY DESIGN OR AS A RESULT OF SOILS, TOPOGRAPHY AND OTHER RELEVANT FACTORS ACCUMULATES RUNOFF THAT INFILTRATES INTO THE SOIL. DIKES, BERMS, SUMPS, AND OTHER FORMS OF SECONDARY CONTAINMENT THAT PREVENT DISCHARGE TO GROUNDWATER MAY BE USED TO ISOLATE PORTIONS OF THE SITE FOR THE PURPOSES OF STORAGE AND HANDLING OF THESE MATERIALS. ANY PROJECT PROPOSING INFILTRATION OF STORMWATER MUST PROVIDE ADEQUATE PRE-TREATMENT OF STORMWATER PRIOR TO DISCHARGE OF STORMWATER TO THE INFILTRATION AREA, OR PROVIDE FOR TREATMENT WITHIN THE INFILTRATION AREA, IN ORDER TO PREVENT THE ACCUMULATION OF FINES, REDUCTION IN INFILTRATION RATE, AND CONSEQUENT FLOODING AND DESTABILIZATION.

   LACK OF APPROPRIATE POLLUTANT REMOVAL BEST MANAGEMENT PRACTICES (BMPS) MAY RESULT IN VIOLATIONS OF THE GROUNDWATER QUALITY STANDARD ESTABLISHED BY 38 M.R.S.A. SECTION 465-C(1).
3. FUGITIVE SEDIMENT AND DUST. ACTIONS MUST BE TAKEN TO ENSURE THAT ACTIVITIES DO NOT RESULT IN NOTICEABLE EROSION OF SOILS OR FUGITIVE DUST EMISSIONS DURING OR AFTER CONSTRUCTION. OIL MAY NOT BE USED FOR DUST CONTROL, BUT OTHER WATER ADDITIVES MAY BE CONSIDERED AS NEEDED. A STABILIZED CONSTRUCTION ENTRANCE (SCE) SHOULD BE INCLUDED TO MINIMIZE TRACKING OF MUD AND SEDIMENT. IF OFF-SITE TRACKING OCCURS, PUBLIC ROADS SHOULD BE SWEPT IMMEDIATELY AND NO LESS THAN ONCE A WEEK AND PRIOR TO SIGNIFICANT STORM EVENTS. OPERATIONS DURING DRY MONTHS, THAT EXPERIENCE FUGITIVE DUST PROBLEMS, SHOULD WET DOWN UNPAVED ACCESS ROADS ONCE A WEEK OR MORE FREQUENTLY AS NEEDED WITH A WATER ADDITIVE TO SUPPRESS FUGITIVE SEDIMENT AND DUST.

   DEWATERING A STREAM WITHOUT A PERMIT FROM THE MDEP MAY VIOLATE STATE WATER QUALITY STANDARDS AND THE NATURAL RESOURCES PROTECTION ACT.

HOUSEKEEPING PLAN (CONT):

4. DEBRIS AND OTHER MATERIALS. MINIMIZE THE EXPOSURE OF CONSTRUCTION DEBRIS, BUILDING AND LANDSCAPING MATERIALS, TRASH, FERTILIZERS, PESTICIDES, HERBICIDES, DETERGENTS, SANITARY WASTE AND OTHER MATERIALS TO PRECIPITATION AND STORMWATER RUNOFF. THESE MATERIALS MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE.

   TO PREVENT THESE MATERIALS FROM BECOMING A SOURCE OF POLLUTANTS, CONSTRUCTION AND POST-CONSTRUCTION ACTIVITIES RELATED TO A PROJECT MAY BE REQUIRED TO COMPLY WITH APPLICABLE PROVISION OF RULES RELATED TO SOLID, UNIVERSAL, AND HAZARDOUS WASTE, INCLUDING, BUT NOT LIMITED TO, THE MAINE SOLID WASTE AND HAZARDOUS WASTE MANAGEMENT RULES; MAINE HAZARDOUS WASTE MANAGEMENT RULES; MAINE OIL CONVEYANCE AND STORAGE RULES; AND MAINE PESTICIDE REQUIREMENTS.
5. EXCAVATION DE-WATERING. EXCAVATION DE-WATERING IS THE REMOVAL OF WATER FROM TRENCHES, FOUNDATIONS, COFFER DAMS, PONDS, AND OTHER AREAS WITHIN THE CONSTRUCTION AREA THAT RETAIN WATER AFTER EXCAVATION. IN MOST CASES THE COLLECTED WATER IS HEAVILY SILTED AND HINDERS CORRECT AND SAFE CONSTRUCTION PRACTICES. THE COLLECTED WATER REMOVED FROM THE PONDED AREA, EITHER THROUGH GRAVITY OR PUMPING, MUST BE SPREAD THROUGH NATURAL WOODED BUFFERS OR REMOVED TO AREAS THAT ARE SPECIFICALLY DESIGNED TO COLLECT THE MAXIMUM AMOUNT OF SEDIMENT POSSIBLE, LIKE A COFFERDAM SEDIMENTATION BASIN. AVOID ALLOWING THE WATER TO FLOW OVER DISTURBED AREAS OF THE SITE. EQUIVALENT MEASURES MAY BE TAKEN IF APPROVED BY THE MDEP.
6. AUTHORIZED NON-STORMWATER DISCHARGES. IDENTIFY AND PREVENT CONTAMINATION BY NON-STORMWATER DISCHARGES. WHERE ALLOWED NON-STORMWATER DISCHARGES EXIST, THEY MUST BE IDENTIFIED AND STEPS SHOULD BE TAKEN TO ENSURE THE IMPLEMENTATION OF APPROPRIATE POLLUTION PREVENTION MEASURES FOR THE NON-STORMWATER COMPONENT(S) OF THE DISCHARGE. AUTHORIZED NON-STORMWATER DISCHARGES ARE:

   (A) DISCHARGES FROM FIREFIGHTING ACTIVITY;
   (B) FIRE HYDRANT FLUSHINGS;
   (C) VEHICLE WASHWATER IF DETERGENTS ARE NOTUSED AND WASHING IS LIMITED TO THE EXTERIOR OF VEHICLES (ENGINE, UNDERCARRIAGE AND TRANSMISSION WASHING IS PROHIBITED);
   (D) DUST CONTROL RUNOFF IN ACCORDANCE WITH PERMIT CONDITIONS AND PARAGRAPH 3 ABOVE;
   (E) ROUTINE EXTERNAL BUILDING WASHDOWN, NOT INCLUDING SURFACE PAINT REMOVAL, THAT DOES NOT INVOLVE DETERGENTS;
   (F) PAVEMENT WASHWATER (WHERE SPILLS/LEAKS OF TOXIC OR HAZARDOUS MATERIALS HAVE NOT OCCURRED, UNLESS ALL SPILLED MATERIAL HAD BEEN REMOVED) IF DETERGENTS ARE NOT USED;
   (G) UNCONTAMINATED AIR CONDITIONING OR COMPRESSOR CONDENSATE;
   (H) UNCONTAMINATED GROUNDWATER OR SPRING WATER;
   (I) FOUNDATION OR FOOTER DRAIN-WATER WHERE FLOWS ARE NOT CONTAMINATED;
   (J) UNCONTAMINATED EXCAVATION DEWATERING (SEE REQUIREMENTS IN PARAGRAPH 5 ABOVE);
   (K) POTABLE WATER SOURCES INCLUDING WATERLINE FLUSHINGS; AND LANDSCAPE IRRIGATION.
7. UNAUTHORIZED NON-STORMWATER DISCHARGES. THE MDEP'S APPROVAL UNDER THIS CHAPTER DOES NOT AUTHORIZE A DISCHARGE THAT IS MIXED WITH A SOURCE OF NONSTORMWATER, OTHER THAN THOSE DISCHARGES IN COMPLIANCE WITH PARAGRAPH 6 ABOVE. SPECIFICALLY, THE MDEP'S APPROVAL DOES NOT AUTHORIZE DISCHARGES OF THE FOLLOWING:

   (A) WASTEWATER FROM THE WASHOUT OR CLEANOUT OF CONCRETE, STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS OR OTHER CONSTRUCTION MATERIALS;
   (B) FUELS, OILS OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE;
   (C) SOAPS, SOLVENTS, OR DETERGENTS USED IN VEHICLE AND EQUIPMENT WASHING; AND
   (D) TOXIC OR HAZARDOUS SUBSTANCES FROM A SPILL OR OTHER RELEASE.

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION 05/29/18

REV.	DESCRIPTION	DATE	BY	CK	APP
B	MEDEP PERMIT SET COMMENT REVISIONS	05/29/18	EVD	KRV	

OWNER ENGINEER:
APPROVAL STAMP:
DRAWING PREPARED BY:
ACCEPTED BY OE:

PE Stamp
STATE OF MAINE
KENNETH R. VOLOCK
No. 11082
LICENSED
PROFESSIONAL ENGINEER
05-29-18
Rev. B

IUSA ENGINEERING
CONFIDENTIAL, PROPRIETARY and TRADE SECRET INFORMATION
Property of Iberdrola, USA

CMP
IBERDROLA - USA

REV.	DATE	BY	DESCRIPTION	APP.

SITE DETAILS 4

SH 4 OF 5

FICKETT ROAD/1077 POWNAL, ME

DR.	EVD	SCALE: AS NOTED	FILE: 1077-003-005SH005.DWG
CK.	KRV	NO.	REV.
APP.		1077-003-005	B
DATE:			

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.

CONSTRUCTION SEQUENCE:

1. ESTABLISH CONSTRUCTION WORKSPACE LIMITS; IDENTIFY AND MARK SENSITIVE RESOURCES.
2. PERFORM ALL WORK IN ACCORDANCE WITH MAINE EROSION AND SEDIMENT CONTROL PRACTICES FIELD GUIDE FOR CONTRACTORS (2015).
3. PRIOR TO USAGE, CONSTRUCT AND STABILIZE THE CONSTRUCTION ENTRANCE ON THE EXISTING PERMANENT ACCESS ROAD WITH A STONE PAD, MUD RACK, OR OTHER MATERIALS USED TO REDUCE THE TRACKING OR FLOWING OF SEDIMENT OFF THE SITE AND MAINTAIN UNTIL PAVING IS COMPLETED.
4. CLEAR TIMBER AND BRUSH; DO NOT GRUB UNTIL JUST PRIOR TO PRELIMINARY GRADING AND ESTABLISHMENT AND STABILIZATION OF TEMPORARY OR PERMANENT DRAINAGE COURSES.
5. INSTALL AND MAINTAIN SEDIMENT BARRIERS SUCH AS SILT FENCING AND/OR OTHER EROSION CONTROL BARRIERS ALONG THE DOWNHILL LIMIT OF WORK, AS SHOWN ON THE DRAWINGS. SEDIMENT BARRIER LOCATIONS MAY BE ADJUSTED IN THE FIELD BASED ON SITE CONDITIONS AS DETERMINED BY THE ENGINEERING INSPECTOR. WHERE SILT FENCE CANNOT BE TOED-IN PROPERLY DUE TO TREE ROOTS, ROCKS OR FROZEN GROUND, HAY BALES OR AN EROSION CONTROL MIX BERM MAY BE SUBSTITUTED. SILT FENCING WILL BE INSTALLED AFTER CLEARING BUT PRIOR TO GRUBBING AND GRADING ACTIVITIES. ANY EROSION ISSUES DEVELOPED DURING CLEARING WILL BE TEMPORARILY STABILIZED AS NECESSARY.
6. STABILIZE PERMANENT ACCESS ROAD SURFACE, PARKING AREAS AND EQUIPMENT STORAGE AND LAYDOWN AREAS WITH MATTING, CRUSHED STONE OR GRAVEL SUBBASE AS NECESSARY TO MINIMIZE RUTTING AND AVOID PONDING.
7. CONCURRENT WITH INITIATION OF SITE GRADING, CONSTRUCT AND STABILIZE TEMPORARY DRAINAGE SWALES, DIVERSION BERMS, CHECK DAMS, AND CULVERTS WITH TEMPORARY INLET AND OUTLET STRUCTURES TO MINIMIZE SEDIMENT IN SITE RUNOFF DURING THE CONSTRUCTION OF THE ROADWAY. DEWATER IN ACCORDANCE WITH DEWATERING NOTES BELOW.
8. INSTALL PROPERLY SPACED STONE CHECK DAMS IN ANY SECTION OF DITCH WITHIN 24 HOURS OF FORMING, SHAPING OR ROUGH GRADING THAT SECTION OF DITCH.
9. MINIMIZE THE AMOUNT OF DISTURBANCE AT ANY ONE TIME BY STAGING CONSTRUCTION AS MUCH AS PRACTICAL FOR EFFICIENT CONSTRUCTION OF THE FACILITY. NATURAL VEGETATIVE BUFFERS OR STRIPS SHOULD BE LEFT IN PLACE WHERE FEASIBLE TO AID IN SEDIMENT RETENTION AND REDUCE EROSION POTENTIAL.
10. STABILIZE ANY NEWLY GRADED SLOPE GREATER THAN EIGHT PERCENT AND ANY SECTION OF NEWLY CONSTRUCTED DITCH USING ANCHORED EROSION CONTROL BLANKETS OR OTHER APPROVED MULCHING TECHNIQUES WITHIN 24 HOURS. STABILIZE ANY SLOPE EXCEEDING EIGHT PERCENT AND BROUGHT TO FINAL GRADE WITHIN 24 HOURS USING ANCHORED EROSION CONTROL BLANKETS OR EROSION CONTROL MIX APPLIED IN ACCORDANCE WITH MAINE EROSION AND SEDIMENT PRACTICES FIELD GUIDE FOR CONTRACTORS (2015). STABILIZE ANY SECTION OF DITCH BROUGHT TO FINAL GRADE WITHIN 24 HOURS USING THE APPROVED PERMANENT STABILIZATION MEASURES FOR DITCHES.
11. DUST CONTROL METHODS WILL BE EMPLOYED AFTER GRADING AND PRIOR TO FINAL STABILIZATION TO PREVENT THE BLOWING AND MOVEMENT OF DUST THROUGH THE APPLICATION OF WATER AND/OR CALCIUM CHLORIDE TO REDUCE WIND EROSION. REPETITIVE TREATMENT WILL BE APPLIED AS NEEDED TO ACCOMPLISH CONTROL.
12. APPLY TEMPORARY SEED AND MULCH TO ANY EXPOSED AREAS WHERE ACTIVITY IS NOT ANTICIPATED FOR 30 DAYS OR MORE, OR WHERE ACTIVITY HAS NOT OCCURRED WITHIN 30 DAYS. TEMPORARILY MULCH ANY EXPOSED AREAS WHERE ACTIVITY IS NOT ANTICIPATED OR HAS NOT OCCURRED IN 7 DAYS.
13. REMOVE EXCESS SPOILS FROM SITE THAT WILL NOT BE USED FOR THE FINAL DESIGN AND STABILIZATION. STOCKPILED SOILS THAT REMAIN IN PLACE FOR 48 HOURS OR MORE WILL BE CONTAINED WITH SEDIMENT BARRIERS SUCH AS SILT FENCE, HAY BALES OR EQUIVALENT. THE SEDIMENT BARRIERS SHALL BE ADEQUATELY LOCATED AND REINFORCED TO HANDLE A SIGNIFICANT RAIN EVENT AND THE POTENTIAL SLUMPING OF THE PILE. BETWEEN MAY 1 AND OCTOBER 15, APPLY TEMPORARY SEED AND MULCH TO A STOCKPILE THAT IS NOT EXPECTED TO BE DISTURBED WITHIN 30 DAYS. APPLY ANCHORED MULCH DAILY, AS NEEDED, DURING WINTER CONSTRUCTION.
14. INSPECT AND REPAIR EROSION CONTROL MEASURES DAILY IN AREAS OF ACTIVE CONSTRUCTION; OTHERWISE WEEKLY AND AFTER RAINFALL OF $\frac{1}{2}$" OR GREATER WITHIN A 24-HOUR PERIOD. REMOVE ACCUMULATED SEDIMENT WHEN IT REACHES 1/3 THE HEIGHT OF THE BARRIER.
15. MONITOR PUBLIC ROADS FOR SIGNS OF TRACKING OR SPILLING OF SPOIL MATERIAL AND CLEAN UP AS NEEDED.
16. COMPLETE FINAL GRADING AND STABILIZATION OF EARTHEN STRUCTURES SUCH AS DIVERSION BERMS, DITCH TURNOUTS AND SWALES THAT WILL CONTROL RUNOFF.
17. FINISH GRADE AND REPLACE TOPSOIL OR LOAM IN DISTURBED AREAS. SEED AND MULCH DISTURBED AREAS WITHIN 6 DAYS OF FINAL GRADING.
18. MAINTAIN ALL TEMPORARY EROSION CONTROLS AND SEDIMENT BARRIERS UNTIL VEGETATION HAS BEEN ESTABLISHED OVER 85-90% OF THE AREA TO BE RE-VEGETATED. RESEED SPARSELY VEGETATED AREAS.
19. REMOVE ALL TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES ONCE THE SITE IS PERMANENTLY STABILIZED.

FERTILIZER AND LIMESTONE REQUIREMENTS:

IN GENERAL, FERTILIZER AND LIME APPLICATION RATES WILL FOLLOW THE GUIDELINES IDENTIFIED BELOW UNLESS SITE SPECIFIC SOIL TESTS IDENTIFY THE NEED FOR ALTERNATIVE FERTILIZER/LIME APPLICATION RATES. FERTILIZER WILL BE APPLIED TO UPLAND AREAS PRIOR TO SEEDING AT A RATE OF 800 POUNDS PER ACRE USING 10-20-20 OR EQUIVALENT. GROUND LIMESTONE (EQUIVALENT TO 50 PERCENT CALCIUM PLUS MAGNESIUM OXIDE) WILL BE APPLIED AT A RATE OF 3 TONS PER ACRE. AN EQUIVALENT MIXTURE OF FERTILIZER AND LIME MAY BE APPLIED USING THE HYDROSEEDING METHOD. NO LIME OR FERTILIZER WILL BE APPLIED TO WETLANDS.

MULCH AND SEEDING SPECIFICATIONS

SUMMARY OF TEMPORARY AND PERMANENT MULCH APPLICATION REQUIREMENTS

CONDITION	TIMING	MULCH TYPE[1,2]	APPLICATION RATES
TEMPORARY			
	IF NO ACTIVITY IN EXPOSED AREAS FOR 7 DAYS, OR PRIOR TO A STORM EVENT	STRAW MULCH OR WOOD FIBER MULCH	2 TONS/ACRES 2000 LB./ACRES
ALL DISTRIBUTED AREAS OF THE CONSTRUCTION WORKSPACE	APPLY MULCH TO ALL EXPOSED AREAS IF NO ACTIVITY OCCURS WITHIN 30 DAYS. APPLY MULCH AND TEMPORARY SEEDING SOONER WHEN IT CAN BE ANTICIPATED THAT ACTIVITY IS NOT GOING TO OCCUR WITHIN 30 DAYS.	STRAW MULCH OR WOOD FIBER MULCH	2 TONS/ACRES 2000 LB./ACRES[3]
ALL WORK AREAS EXPOSED ARE TO BE MULCHED DAILY EACH TIME SOIL IS DISTURBED	OCTOBER 15 - MAY 1	STRAW MULCH OR WOOD FIBER MULCH	3 TONS/ACRES 2000 LB./ACRES
PERMANENT			
ON ALL EXPOSED AREAS AFTER SEEDING TO STABILIZE THE SOIL SURFACE	PERMANENT GRASS AND/OR LEGUME SEEDING COVERED BY HAY OR STRAW MULCH ON ALL AREAS THAT HAVE BEEN RESTORED TO FINAL GRADE. THIS DOES NOT APPLY TO AREAS STABILIZED BY OTHER MEANS SUCH AS JUTE MATTING OR PERMANENT EROSION CONTROL MIX.	CRIMPED STRAW MULCH OR PAPER MULCH OR WOOD FIBER MULCH	2 TONS/ACRES 1500 LB./ACRES[4] 2000 LB./ACRES
WOOD CHIP APPLICATION AREAS	PERMANENT GRASS AND/OR LEGUME SEEDING COVERED BY HAY OR STRAW MULCH ON ALL AREAS THAT HAVE BEEN RESTORED TO FINAL GRADE. THIS DOES NOT APPLY TO AREAS STABILIZED BY OTHER MEANS SUCH AS JUTE MATTING OR PERMANENT EROSION CONTROL MIX.	CRIMPED STRAW MULCH OR PAPER MULCH OR WOOD FIBER MULCH	2 TONS/ACRES 1500 LB./ACRES[4] 2000 LB./ACRES

NOTES:
1. STRAW AND HAY MULCH MAY BE USED INTERCHANGEABLY, EXCEPT IN WETLAND AREAS WHERE STRAW MULCH WILL BE REQUIRED.
2. DOUBLE RATE OF WOOD FIBER MULCH WHEN USED IN CRITICAL AREAS.
3. STRAW, HAY, OR HYDROMULCH (WOOD FIBER OR PAPER MULCH AS APPROPRIATE) WILL PROVIDE 90 PERCENT GROUND COVERAGE
4. PAPER MULCH IS ACCEPTABLE FOR USE DURING THE GROWING SEASON. ON SLOPES GREATER THAN 30 PERCENT AND IN AREAS WHERE VEGETATION HAS NOT ESTABLISHED WELL, ADDITIONAL HAY MULCH WILL BE ADDED AS A WINTERIZING MEASURE.

SEED MIX SPECIFICATIONS

SEED MIX NAME	SEED MIX COMPONENTS	LB./ACRE[1]
TEMPORARY SEED MIX	ANNUAL RYEGRASS	40
PERMANENT UPLAND SEED MIX	REDTOP CREEPING RED FESCUE TALL FESCUE BIRDSFOOT TREFOIL	4 40 40 16
WOOD CHIP APPLICATION SEED MIX	CREEPING RED FESCUE REDTOP TALL FESCUE CROWNVETCH	20 4 30 30
WETLAND SEED MIX	ANNUAL RYEGRASS	40
SUPPLEMENTAL WINTER SEED MIX[2]	WINTER RYEGRASS	120

NOTES:
1. INCREASE SEEDING RATES 10% WHEN HYDROSEEDING
2. WINTER RYE WILL BE ADDED TO PERMANENT UPLAND MIX AT A RATE OF 120 LB./ACRE BETWEEN OCTOBER 15 AND MAY 1

MULCH ANCHORING REQUIREMENTS

ON SLOPES GREATER THAN 3 PER CENT, HAY OR STRAW MULCH WILL BE FIRMLY ANCHORED INTO THE SOIL UTILIZING ONE OF THE FOLLOWING METHODS:
- -CRIMPING WITH A STRAIGHT OR NOTCHED MULCH CRIMPING TOOL (FARM DISCS WILL NOT BE ALLOWED);
- -TRACK WALKING WITH DEEP-CLEATED EQUIPMENT OPERATING UP AND DOWN THE SLOPE (MULCH CRIMPED PERPENDICULAR TO THE SLOPE) ON SLOPES LESS THAN 25 PERCENT;
- -APPLICATION OF MULCH NETTING;
- -APPLICATION OF 500 LB./ACRE OF WOOD FIBER MULCH OVER STRAW/HAY MULCH; AND
- -COMMERCIALLY AVAILABLE TACKIFIERS (EXCEPT WITHIN 100 FEET OF WATERBODIES OR WETLANDS).

SUMMARY OF SEEDING REQUIREMENTS

CONDITION	TIMING[1,2]	SEED MIX
TEMPORARY SEEDING[3]	TEMPORARY SEED BETWEEN MAY 1 AND OCTOBER 15 ONLY. DISTURBED AREAS OR SPOIL STOCKPILES WILL BE SEEDED IMMEDIATELY IF FURTHER DISTURBANCE IS NOT EXPECTED FOR 30 DAYS OR MORE.	ANNUAL RYEGRASS
PERMANENT SEEDING[3,4]		
UPLAND PORTIONS OF THE CONSTRUCTION AREA	DISTURBED AREA WILL BE SEEDED WITHIN 6 DAYS OF FINAL GRADING.	PERMANENT UPLAND MIX
SLOPES GREATER THAN 3:1	DISTURBED AREA WILL BE SEEDED IMMEDIATELY AFTER SEEDBED PREPARATION.	PERMANENT UPLAND MIX
WETLANDS	DISTURBED WETLANDS WILL BE SEEDED WITHIN 6 DAYS OF FINAL GRADING.	ANNUAL RYEGRASS
WOOD CHIP APPLICATION AREAS	DISTURBED AREA WILL BE SEEDED WITHIN 6 DAYS OF FINAL GRADING.	WOODCHIP APPLICATION SEED MIX
WINTER DORMANT SEEDING	DORMANT SEED BETWEEN OCTOBER 15 AND MAY 1 ONLY. NO SEEDING WILL OCCUR IF SNOW DEPTHS EXCEED 1 INCH.	PERMANENT UPLAND MIX PLUS WINTER RYEGRASS

NOTES:
1. WEATHER CONDITIONS PERMITTING.
2. AREAS THAT DO NOT SUCCESSFULLY REVEGETATE WITHIN APPROPRIATE PERIOD OF TIME WILL BE RESEEDED AS NECESSARY.
3. LOOSEN COMPACTED SOIL TO A MINIMUM DEPTH OF 4 INCHES.
4. TOP DRESS WITH 6 INCHES LOAM, AS NEEDED.

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION 05/29/18

REV.	DESCRIPTION	DATE	BY	CK	APP
B	MEDEP PERMIT SET COMMENT REVISIONS	05/29/18	EVD	KRV	

OWNER ENGINEER:
APPROVAL STAMP:
DRAWING PREPARED BY:
ACCEPTED BY OE:

PE Stamp: STATE OF MAINE — KENNETH R. WOLOCK — NO. 14082 — LICENSED PROFESSIONAL ENGINEER — 05.29.18 Rev. 2

IUSA ENGINEERING
CONFIDENTIAL, PROPRIETARY and TRADE SECRET INFORMATION
Property of Iberdrola, USA

CMP
IBERDROLA - USA

REV.	DATE	BY	DESCRIPTION	APP.

SITE DETAILS 5

SH 5 OF 5

FICKETT ROAD/1077 — POWNAL, ME

DR.	EVD	SCALE: NONE	FILE: 1077-003-005SH006.DWG	
CK.	KRV	NO.		REV.
APP.			1077-003-005	B
DATE:				

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.