# STORMWATER MANAGEMENT SYSTEM

**Prepared for the**

**CENTRAL MAINE POWER COMPANY**
**MERRILL ROAD CONVERTER SUBSTATION**

**Location**

**Merrill Road**
**Lewiston, ME 04240**

**Owner**

**Central Maine Power Company**
**83 Edison Drive**
**Augusta, Maine 04336**

**Prepared by**

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**September 2017**

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# 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 Merrill Road in the town of Lewiston in Androscoggin County, Maine and will be named the Merrill Road Converter Substation.

The proposed electrical substation is located within the Lower Androscoggin Watershed. Site runoff flows north to Stetson Brook, and then heads south into the Androscoggin River. The river then flows downstream to Merrymeeting Bay, then southeast to the Kennebec River and discharges into the Atlantic Ocean.

## Merrill Road Converter Substation

The existing conditions and proposed grading plans for the proposed Merrill Road Converter Substation are included with this submission as sheets 1076-003-001 SH 001 General Site Plan Existing Conditions and 1076-003-001 SH 002 General Site Plan Proposed Conditions, respectively. The layout of proposed equipment within the yard is shown on SK-MER-GL Conceptual General Location Plan.

The proposed substation will sit on a 49.5 acre parcel of mostly wooded land that is a mix of somewhat steep terrain and low lying wetlands and includes an existing electric transmission line corridor. The western portion of the site is relatively flat with steeply ascending sloped terrain heading from west to east along the site. The existing transmission line corridor will be the site for a proposed access road to the station. The proposed station pad footprint will be approximately 7.10 acres and will consist of roof top, concrete foundations and pavement impervious and evenly graded 3/4" to 1.5" stone for the remainder of the station pad. The access road will consist of gravel. The station pad site will consist of a total developed area of 10.71 acres, of which, 7.15 acres will be impervious. The access road will include an additional total developed area of 3.69 acres, of which, 1.50 acres will be impervious. The site will be sloped to drain to the north, honoring the existing drainage patterns to the extent practicable. Site and road stormwater runoff will be treated with grassed underdrain soil filters and stormwater detention, while the stoned yard areas are considered to be treated in place.

## Permitting Requirements

The Merrill Road Converter Substation is part of the larger NECEC Project currently being undertaken by CMP. The project is submitted as a whole to the Maine Department of Environmental Protection (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 also be required to meet the Basic, General and Flooding Standards as described in MeDEP Chapter 500. The standards will be met using several erosion and sedimentation control and permanent stormwater management Best Management Practices (BMPs).

# BASIC STANDARDS

The proposed project will disturb more than one acre of land, requiring compliance with the Basic Standards as described in MeDEP Chapter 500 Section 4B. In order to meet the Basic Standards, 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 Merrill Road Converter Substation project are indicated on sheet 1076-003-003 SH 001 & SH 002 Erosion and Sediment Control Plan 1 and 2. Details of the measures proposed are shown on sheet 1076-003-005 SH 004 Site Details 4 and sheet 1076-003-005 SH 005 Site Details 5. Sheet 1076-003-005 SH 006 Site Details 6 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 required 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. 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 Maine DEP 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 1076-003-005 SH 006 Site Details 6 for the Merrill Road Converter Substation.

# GENERAL STANDARDS

The proposed project will result in more than one acre of new impervious area, requiring compliance with the General Standards as described in MeDEP Chapter 500 Section 4C. For the purposes of determining the level of permitting and treatment required, the substation yard is treated as impervious area.

## Stormwater Treatment BMPs

At the Merrill Road Converter Substation, stormwater treatment will be accomplished using two separate treatment measures.

The approach to the station within the existing transmission line right of way will be a gravel access road and will be drained using open conveyance channels. Runoff from the road, up to within 50 feet of the substation, will be treated to meet the requirements under ***Section 4.C (5) (C) - Exceptions from the general standards for Linear portion of a project***. The majority of the gravel access road, vegetated developed areas and the drainage ditch running east and west on the north side of the road, will be treated using a grassed underdrain soil filter with grassed swale and forebay pre-treatment.

The substation yard will be treated in-place via filtration through an 18"-thick layer of gravel below the stone surface. This ***Crushed Stone Substation Surface*** is approved by MeDEP as an adequate treatment for the yard surface for compliance with the General Standards and water quality treatment requirement. Additional paved and rooftop surfaces and additional developed areas around the yard will also be treated in the ***Crushed Stone Substation Surface***. Developed areas outside the substation pad will discharge to open drainage channels around the station pad which will flow to a single ***Underdrained Soil Filter*** where additional detention will be provided. The soil filter/detention basin will discharge through a level spreader to the north of the station. Runoff from the station pad does not require detention and will bypass the soil filter and detention by sheet flowing to the proposed catch basin outside of the soil filter area to the north of the pad. The catch basin will also discharge through a level spreader to the north of the substation. The stormwater treatment measures, and the areas that are treated by each, are depicted on sheet 1076-003-002 SH 004 Post-Development Stormwater Plan.

### *Crushed Stone Substation Surface*

MeDEP has provided yard construction requirements that allow the General Standards requirements to be met for the substation pad, and no further water quality treatment of stormwater from the pad itself is required. The MeDEP letter describing the construction requirements is included with this submission as Appendix B.

The substation surface for each yard is comprised of crushed stone. The crushed stone is supported by 18" of gravel base which acts to filter stormwater runoff as it passes through and into the soil subgrade below. The typical crushed stone surface section is shown in the Substation Yard Sections on sheet 1076-003-005 SH 001 Site Details 1 for the Merrill Road Converter Substation.

In each yard, an additional 2" of crushed stone above the 4" requirement will be provided, creating a 6" layer. The additional storage in the crushed stone layer down slope of the buildings, paved areas and various concrete foundations throughout the yard will allow the crushed stone surface to treat

each of these non-soil areas. Calculations for treatment of runoff from the pad have been provided on sheet 1076-003-002 SH 004 Post-Development Stormwater Plan for the Merrill Road Converter Substation.

### *Grassed Underdrain Soil Filter*

Runoff from the vegetated developed areas as well as the gravel access road will be treated in Grassed Underdrain Soil Filters. Pretreatment will be accomplished by flowing runoff through a vegetated swale and into pre-treatment forebays before entering the filter area.

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 4" perforated pipe within a 12"-thick layer of underdrain material. A detail of the underdrained soil filter is shown on sheet 1076-003-002 SH 002 Stormwater Treatment Plan. Underdrained soil filter sizing calculations are shown in Appendix C.

The hydraulic modeling report for the entire project site, including station and access road, is included with this submission in Appendix C. The report was developed based on USDA TR-55 hydraulic analysis methodology. The report illustrates 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 primary outlet, a broad crested weir constructed in the outlet structure.

### Stormwater Treatment Calculations

In order to meet the General Standards, the proposed project must use MeDEP approved treatment measures to treat no less than 95% of the proposed impervious area and 80% of the proposed developed area at the substation site. At the Merrill Road Converter Substation, 99.33% of impervious area is treated, and 83.75% of the developed area is treated. For the linear portion of the project treatment has been reduced to not less than 75% of impervious access road and no less than 50% of the developed area surrounding the road to within 50' of the substation. At the linear portion of the Merrill Road Converter Substation, 75.10% of impervious area is treated, and 59.89% of developed area is treated. Stormwater treatment calculations for the Merrill Road Converter Substation are shown on sheet 1076-003-002 SH 004 Post-Development Stormwater Plan.

## FLOODING STANDARD

The project is required to meet the MeDEP Chapter 500 Flooding Standard; an increase of over 3 acres of impervious area requires a decrease in peak stormwater runoff as a result of the proposed development. Additionally, management of stormwater to prevent site and road inundation during a 25-year storm event is provided. The site is situated on HSG Type C and 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 1076-003-002 SH 003 and SH 004). The MeDEP letter describing the construction requirements that allow the General Standards requirements to be met for the pad within the ***Crushed Stone Substation Surface*** also prescribes Curve Numbers for use when calculating runoff from the stone section. Pre-Developed Curve Numbers for the project site range from 72 to 77. MeDEP prescribes developed Curve Numbers for the stone station surface of 55 and 60 over HSG Type C and Type D soils respectively. 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 55 and 60 for these areas), post-development peak flows were calculated to be less than or relatively equal to the pre-development peak flows from the substation pad without the need for on-site stormwater attenuation. In order to maintain a post-development peak runoff rate at or below the pre-development peak runoff rate for developed landscaped areas outside the pad however, some level of stormwater detention is required. Additional stormwater storage is provided in the grassed underdrain soil filter. A maximum of 18" of flooding storage depth above the required water quality volume elevations in the grassed underdrain soil filters is proposed. The proposed on-site stormwater detention will provide sufficient capacity to meet the MeDEP Flooding Standard Requirements in Chapter 500 at each analysis point, located at the property line. At each analysis point, stormwater detention or the ***Crushed Stone Substation Surface*** provides enough treatment to decrease post-development 2 -, 10 – and 25 – year design storm peak flows to be lower than pre-development peak flows. See the table below for the pre- and post-development peak flows at each analysis point.

Pre-Developed Peak Flow Rates

| Analysis Point | 2-Year Flow Rate (CFS) | 10-Year Flow Rate (CFS) | 25-Year Flow Rate (CFS) |
|---|---|---|---|
| A | 11.40 | 27.00 | 35.56 |
| B | 4.94 | 11.30 | 14.75 |
| C | 6.00 | 14.87 | 19.86 |
| D | 0.72 | 1.58 | 2.04 |
| E | 3.22 | 7.13 | 9.23 |

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) |
|---|---|---|---|---|---|---|
| A1 | 5.17 | 12.68 | 16.85 | 11.12 | 26.18 | 33.76 |
| A2 | 7.56 | 15.31 | 19.36 | | | |
| A3 | 2.90 | 7.30 | 9.76 | | | |
| B | 3.50 | 7.98 | 10.41 | N/A | | |
| C1 | 5.97 | 14.63 | 19.48 | 5.96 | 14.84 | 19.83 |
| C2 | 2.25 | 4.39 | 5.50 | | | |
| D | 0.56 | 1.24 | 1.61 | N/A | | |
| E | 2.68 | 5.91 | 7.65 | N/A | | |

# CONCLUSION

The NECEC Project will require a Stormwater Management Permit, and will be required to meet the Basic and General Standards and the Flooding Standard as described in MeDEP Chapter 500. The Basic Standards shall be met at the Merrill Road Converter Substation through Erosion and Sedimentation Control, Inspection and Maintenance, and Housekeeping, as described in this narrative and the attached checklists, logs and plans. The General Standards shall be met at the Merrill Road Converter Substation by using Grassed Underdrain Soil Filters and the MeDEP approved crushed

stone substation yard section, as illustrated on the attached stormwater treatment plans. The Flooding Standard shall be met using storage above the water quality volume within the proposed Grassed Underdrain Soil Filters.

# APPENDIX A – BMP INSPECTION & MAINTENANCE CHECKLISTS AND LOGS

# APPENDIX A-1: BMP INSPECTION & MAINTENANCE CHECKLIST

Central Maine Power Company – Merrill Road Converter Substation
Lewiston, 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. |
| 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. |
| 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 – Merrill Road Substation
Lewiston, 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. |
| 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 – Merrill Road Converter Substation
Lewiston, Maine

| **BMP MEASURE**<br>**(Refer to Appendix B-1 & the O&M Plan)** | **Inspector(s):** | | | **Inspection Type:**<br>**Monthly [ ]**<br>**Follow-up [ ]** | **Photos Taken:**<br>**Yes [ ] No [ ]** | **Date:** |
|---|---|---|---|---|---|---|
| **VEGETATED SWALES**<br>**Swale along Gravel Access Road** | **YES*** | **NO** | **INITIALS** | **OBSERVATIONS** | **CORRECTIVE ACTIONS/REPAIR ACTIVITY** | **DATE COMPLETED & BY WHOM**<br>**(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? | | | | | | |
| **Swale along Northwesterly side of yard** | | | | | | |
| 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**<br>**Check Dams in Swale along Gravel Access Road** | | | | | | |
| 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 – Merrill Road Converter Substation
Lewiston, Maine

| **BMP MEASURE**<br>**(Refer to Appendix B-1 & the O&M Plan)** | **Inspector(s):** | | | **Inspection Type:**<br>**Monthly [ ]**<br>**Follow-up [ ]** | **Photos Taken:**<br>**Yes [ ] No [ ]** | **Date:** |
|---|---|---|---|---|---|---|
| **CHECK DAMS (cont.)**<br>**Check Dams in Swale along North, South and East sides of the yard** | **YES*** | **NO** | **INITIALS** | **OBSERVATIONS** | **CORRECTIVE ACTIONS/REPAIR ACTIVITY** | **DATE COMPLETED & BY WHOM**<br>**(Refer to any contractor service logs)** |
| 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? | | | | | | |
| **REVEGETATED AREAS**<br>**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**<br>**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 – Merrill Road Converter Substation
Lewiston, Maine

| **BMP MEASURE**<br>**(Refer to Appendix B-1 & the O&M Plan)** | **Inspector(s):** | | | **Inspection Type:**<br>**Monthly [ ]**<br>**Follow-up [ ]** | **Photos Taken:**<br>**Yes [ ] No [ ]** | **Date:** |
|---|---|---|---|---|---|---|
| **GRASSED UNDERDRAINED SOIL FILTER**<br>**West side of station yard and north of Access Road** | **YES*** | **NO** | **INITIALS** | **OBSERVATIONS** | **CORRECTIVE ACTIONS/REPAIR ACTIVITY** | **DATE COMPLETED & BY WHOM**<br>**(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? | | | | | | |
| **CRUSHED STONE SUBSTATION SURFACE**<br>**Fenced-in area of the Substation and aprons** | | | | | | |
| 1. Is there an accumulation of sand/sediment in crushed stone areas? | | | | | | |

# APPENDIX B – LETTER 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"

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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).

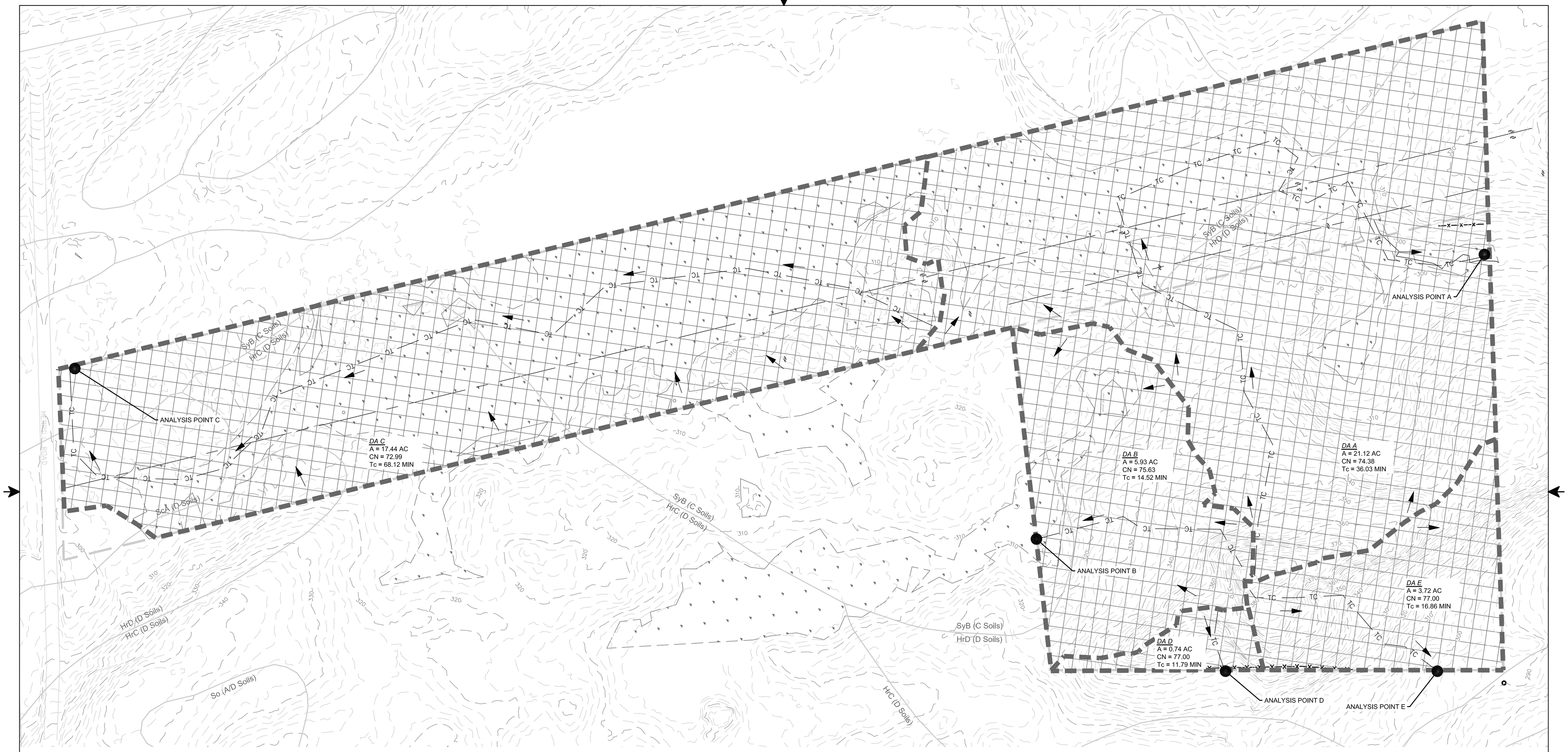
I hope this addresses your request and will make the DEP permitting process more straight forward. If you have further questions, please contact Marianne Hubert at (207) 287-4140.

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

# APPENDIX C – STORMWATER CALCULATIONS




LEGEND

- 750 — EX. MAJOR CONTOUR
- 744 — EX. MINOR CONTOUR
- TC — EX. TIME OF CONCENTRATION
- HrD (D Soils) / HrC (C Soils) — EX. SOIL BOUNDARY
- EX. OVERHEAD UTILITY
- EX. FLOW DIRECTION ARROW
- EX. DRAINAGE BOUNDARY
- EX. PROPERTY BOUNDARY
- EX. WETLAND
- ANALYSIS POINT
- EX. WOODS

| EXISTING CONDITIONS HYDRAULIC SUMMARY | | | |
|---|---|---|---|
| DRAINAGE AREA | 2 - YEAR FLOW RATE (CFS) | 10 - YEAR FLOW RATE (CFS) | 25 - YEAR FLOW RATE (CFS) |
| A | 11.40 | 27.00 | 35.56 |
| B | 4.94 | 11.30 | 14.75 |
| C | 6.00 | 14.87 | 19.86 |
| D | 0.72 | 1.58 | 2.04 |
| E | 3.22 | 7.13 | 9.23 |

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |
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| | | | | | |

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

CMP
IBERDROLA - USA

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
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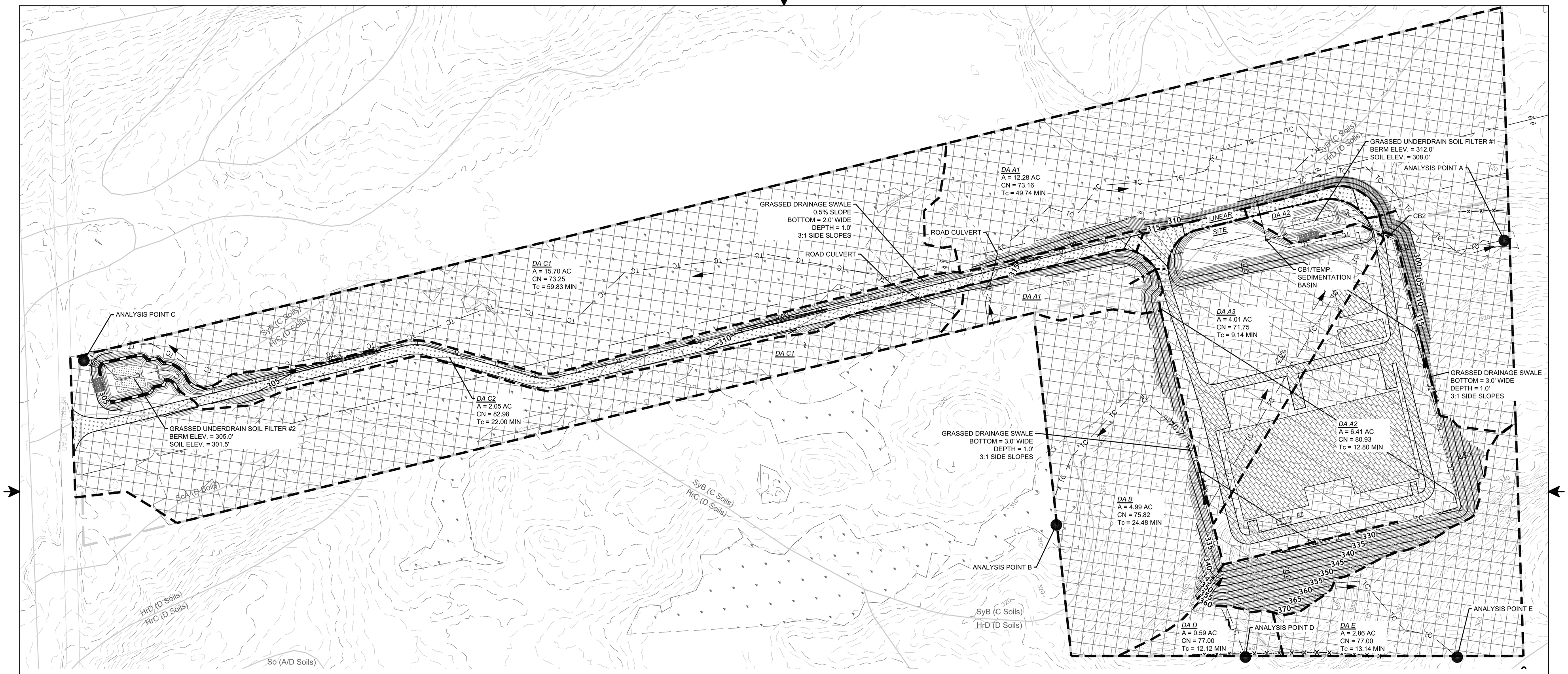
PRE-DEVELOPMENT STORMWATER PLAN

SH 3 OF 4

MERRILL ROAD/1076 LEWISTON, ME

| | | | |
|---|---|---|---|
| DR. | TJG | SCALE: 1" = 100' | FILE: 1076-003-002SH003.DWG |
| CK. | KRV | NO. 1076-003-002 | REV. A |
| APP. | | | |
| DATE: | | | |

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.




LEGEND

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. SOIL BOUNDARY
- EX. OVERHEAD UTILITY
- EX. PROPERTY BOUNDARY
- EX. WETLAND
- EX. WOODS
- PROP. MAJOR CONTOUR
- PROP. MINOR CONTOUR
- PROP. TIME OF CONCENTRATION
- PROP. FLOW DIRECTION ARROW
- PROP. DRAINAGE BOUNDARY
- ANALYSIS POINT
- PROP. CULVERT/PIPING
- PROP. SITE/LINEAR DEMARCATION
- PROP. IMPERVIOUS PAVING/ROOF
- PROP. DEVELOPED GRASS
- PROP. STONE PAD
- PROP. UNDERDRAIN SOIL FILTER
- PROP. GRAVEL 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 ANALYSIS POINT (IF SUBSHEDS PRESENT) | PEAK 10 - YEAR FLOW RATE AT ANALYSIS POINT (IF SUBSHEDS PRESENT) | PEAK 25 - YEAR FLOW RATE AT ANALYSIS POINT (IF SUBSHEDS PRESENT) |
|---|---|---|---|---|---|---|
| A1 | 5.17 | 12.68 | 16.85 | 11.12 | 26.18 | 33.76 |
| A2 | 7.56 | 15.31 | 19.36 | | | |
| A3 | 2.90 | 7.30 | 9.76 | | | |
| B | 3.50 | 7.98 | 10.41 | N/A | N/A | N/A |
| C1 | 5.97 | 14.63 | 19.48 | 5.96 | 14.84 | 19.83 |
| C2 | 2.25 | 4.39 | 5.50 | | | |
| D | 0.56 | 1.24 | 1.61 | N/A | N/A | N/A |
| E | 2.68 | 5.91 | 7.65 | N/A | N/A | N/A |

STORMWATER TREATMENT REQUIREMENTS (% OF TREATED AREA)

| LAND TYPE | STATION | STATION % TREATED | LINEAR | LINEAR % TREATED |
|---|---|---|---|---|
| IMPERVIOUS TOTAL | 7.15 AC | 99.33% | 1.50 AC | 75.10% |
| IMPERVIOUS TREATED | 7.10 AC | | 1.13 AC | |
| DEVELOPED TOTAL* | 10.71 AC | 83.75% | 3.69 AC | 59.89% |
| DEVELOPED TREATED | 8.97 AC | | 2.21 AC | |

*DEVELOPED AREA INCLUDES BOTH IMPERVIOUS AND LANDSCAPED SURFACES

0 200 400 Feet

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

OWNER ENGINEER:

APPROVAL STAMP:

PE Stamp

DRAWING PREPARED BY:

ACCEPTED BY OE:

CMP
IBERDROLA - USA

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

# POST-DEVELOPMENT STORMWATER PLAN

SH 4 OF 4

MERRILL ROAD/1076 LEWISTON, ME

| | | | |
|---|---|---|---|
| DR. | TJG | SCALE: 1" = 100' | FILE: 1076-003-002SH004.DWG |
| CK. | KRV | NO. | REV. |
| APP. | | 1076-003-002 | A |
| DATE: | | | |

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.

| Calculations for Grassed Underdrain Soil Filters | | | | | | |
|---|---|---|---|---|---|---|
| *Based upon MeDEP Stormwater BMPs Chapter 7.1 - Grassed Underdrain Soil Filters | | | | | | |
| Name of Filter | Impervious Catchment (AC) | Pervious Developed Catchment (AC) | Surface Area Required (SF) | [1]Designed Surface Area of Filter (SF) | WQv Required (CF) | [2]WQv Provided (CF) |
| Filter-1 | 0.17 | 1.87 | 1999.404 | 2178 | 3332.34 | 3542 |
| Filter-2 | 0.97 | 1.08 | 3053.556 | 3106 | 5089.26 | 6065 |

[1]Filter-2 consists of two (2) 1553 SF filter beds, totalling 3106 SF of surface area

[2]Filter-1 WQv depth = 1.10', Filter-2 WQv depth = 1.25'

| Calculations for Level Spreaders | | | |
|---|---|---|---|
| *Based Upon MeDEP Storm water BMPs Chapter 8.3 - Level Spreaders | | | |
| Level Spreader # | Peak 10-Year Flow Rate | [1] Calculated Lip Length (LF) | [2] Lip Length Used (LF) |
| 1 | 0.36 | 1.44 | 10 |
| 2 | [3] 2.00 | 8.00 | 10 |
| 3 | 1.84 | 7.36 | 10 |
| 4 | 2.19 | 8.76 | 10 |
| | | | |
| [4] Pipe Outlet Protection from CB-1 | 19.04 | 76.16 | N/A |

[1] Lip Length Based Upon 0.25 LF / CFS

[2] Based Upon Minimum Lip Length of 10 LF

[3] 2 cfs (Approx ¼ of DA B)

[4] Plunge pool designed in accordance with MeDEP Erosion Control BMPs H.2 Pipe Outlet Protection

## 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 ..... Jul 13, 2017 00:00:00
End Analysis On ..... Jul 14, 2017 00:00:00
Start Reporting On ..... Jul 13, 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 | 5 |
| Nodes | 5 |
| *Junctions* | 0 |
| *Outfalls* | 5 |
| *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 | Androscoggin | 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 | 21.12 | 74.38 | 3.00 | 0.93 | 19.60 | 11.40 | 0 00:36:01 |
| B | 5.93 | 75.63 | 3.00 | 1.00 | 5.90 | 4.94 | 0 00:14:31 |
| C | 17.44 | 72.99 | 3.00 | 0.86 | 14.95 | 6.00 | 0 01:08:07 |
| D | 0.74 | 77.00 | 3.00 | 1.07 | 0.79 | 0.72 | 0 00:11:47 |
| E | 3.72 | 77.00 | 3.00 | 1.07 | 3.98 | 3.22 | 0 00:16:51 |

## Node Summary

| Element ID | Element Type | Invert Elevation (ft) |
|---|---|---|
| OUT-A | Outfall | 298.00 |
| OUT-B | Outfall | 310.00 |
| OUT-C | Outfall | 298.00 |
| OUT-D | Outfall | 338.00 |
| OUT-E | Outfall | 298.00 |

# Subbasin Hydrology

## Subbasin : A

### Input Data

Area (ac) ..... 21.12
Weighted Curve Number ..... 74.38
Rain Gage ID ..... Rain Gage-01

### Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 7.92 | C | 70.00 |
| Woods, Good | 13.20 | D | 77.00 |
| Composite Area & Weighted CN | 21.12 | | 74.38 |

### 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 (%) : | 32.75 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.17 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 10.03 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 870 | 1086 | 0.00 |
| Slope (%) : | 5.65 | .76 | 0.00 |
| Surface Type : | Woodland | Grassed waterway | Unpaved |
| Velocity (ft/sec) : | 1.19 | 1.31 | 0.00 |
| Computed Flow Time (min) : | 12.18 | 13.82 | 0.00 |

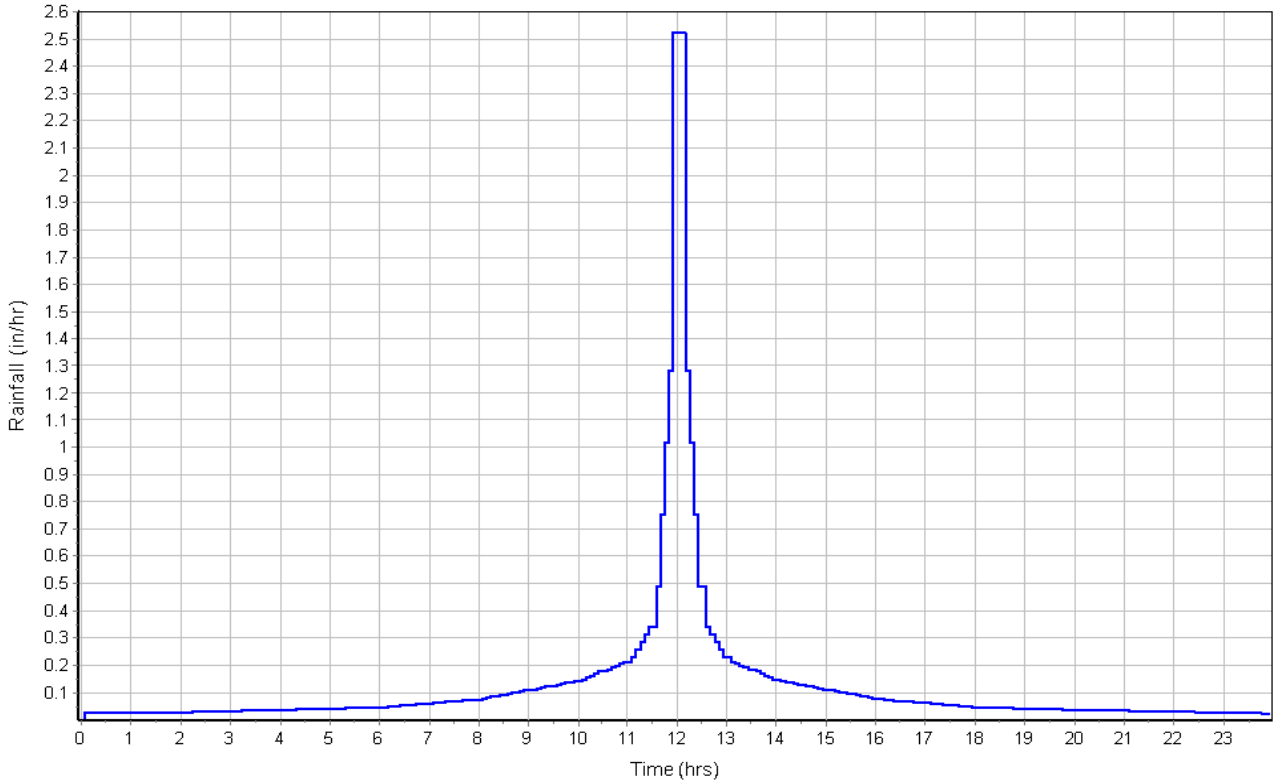
Total TOC (min) .....36.03

## Subbasin Runoff Results

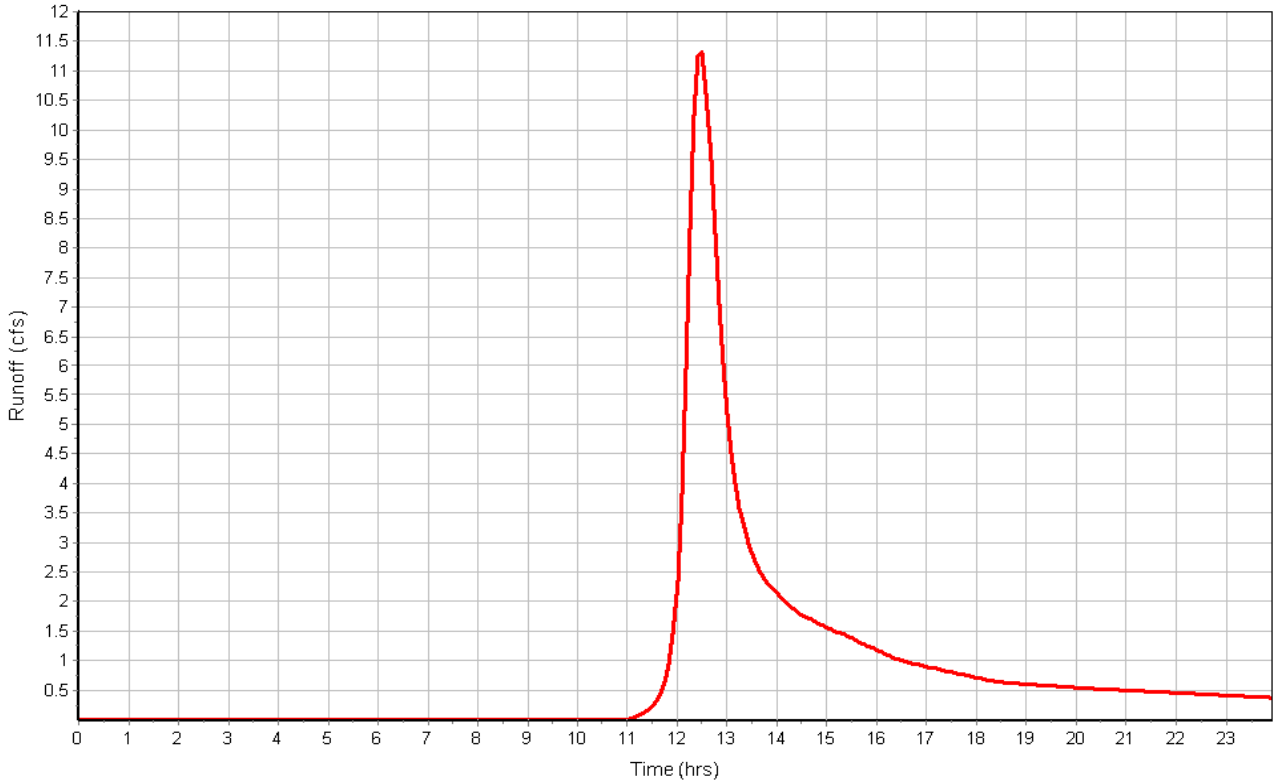
| | |
|---|---|
| Total Rainfall (in) | 3.00 |
| Total Runoff (in) | 0.93 |
| Peak Runoff (cfs) | 11.40 |
| Weighted Curve Number | 74.38 |
| Time of Concentration (days hh:mm:ss) | 0 00:36:02 |

**Subbasin : A**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : B

## Input Data

Area (ac) ..... 5.93
Weighted Curve Number ..... 75.63
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 1.16 | C | 70.00 |
| Woods, Good | 4.77 | D | 77.00 |
| Composite Area & Weighted CN | 5.93 | | 75.63 |

## 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 (%) : | 34 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.17 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 9.88 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 440 | 0.00 | 0.00 |
| Slope (%) : | 10 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.58 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 4.64 | 0.00 | 0.00 |

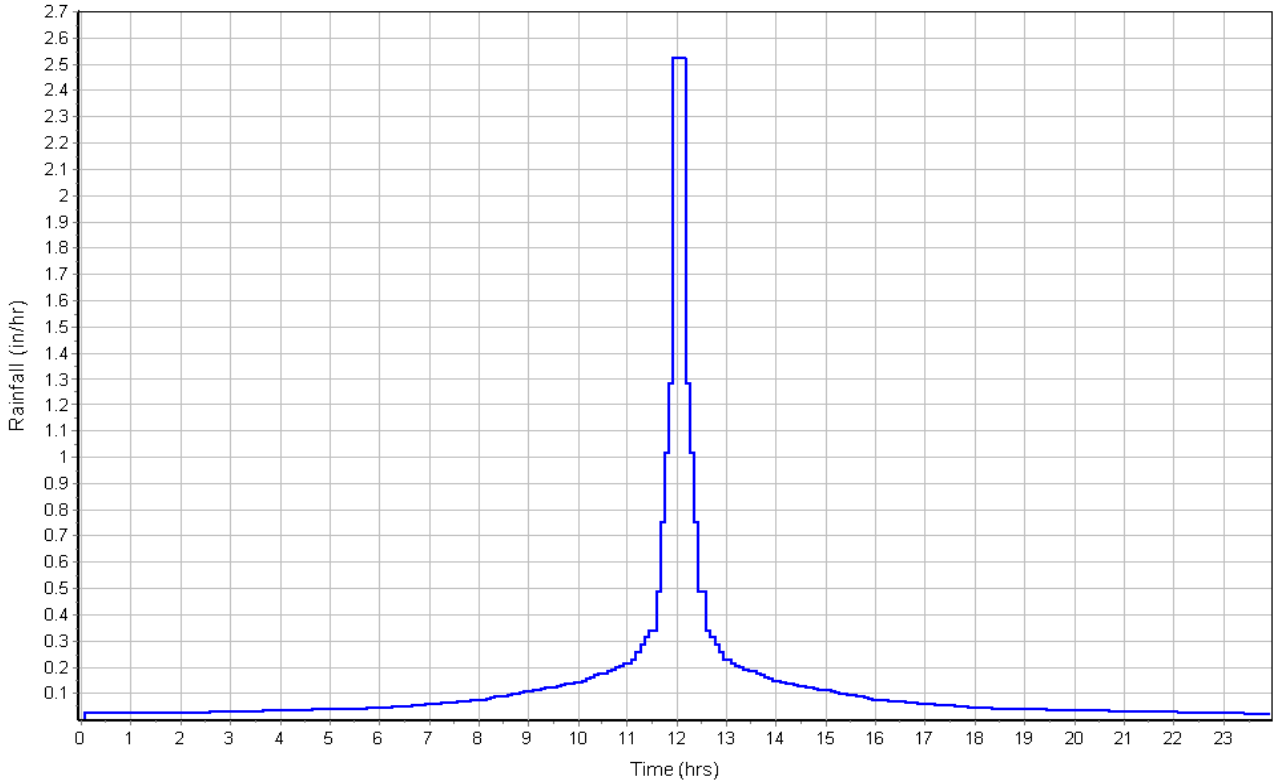
Total TOC (min) .....14.52

## Subbasin Runoff Results

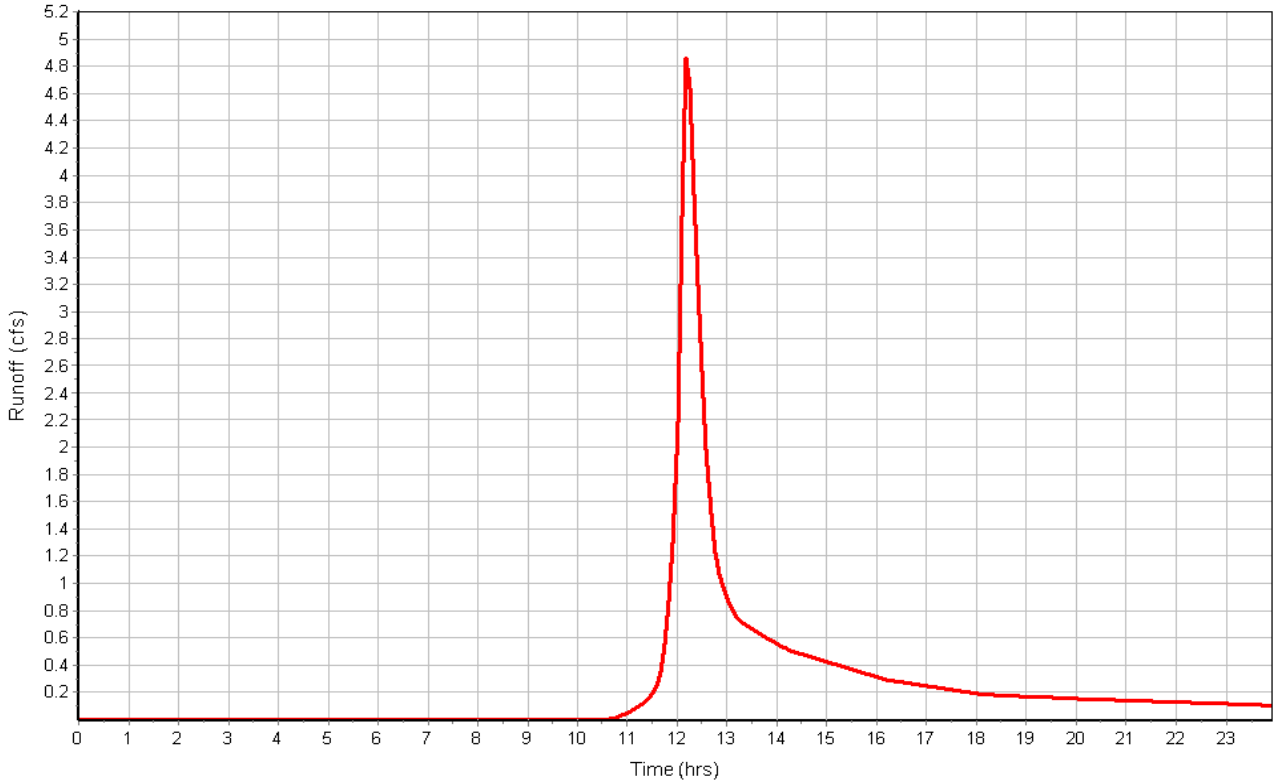
Total Rainfall (in) ..... 3.00
Total Runoff (in) ..... 1.00
Peak Runoff (cfs) ..... 4.94
Weighted Curve Number ..... 75.63
Time of Concentration (days hh:mm:ss) ..... 0 00:14:31

**Subbasin : B**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : C

## Input Data

Area (ac) ..... 17.44
Weighted Curve Number ..... 72.99
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 10.00 | C | 70.00 |
| Woods, Good | 7.44 | D | 77.00 |
| Composite Area & Weighted CN | 17.44 | | 72.99 |

## 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 (%) : | 1.61 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.05 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 33.46 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 2142 | 0.00 | 0.00 |
| Slope (%) : | .47 | 0.00 | 0.00 |
| Surface Type : | Grassed waterway | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.03 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 34.66 | 0.00 | 0.00 |

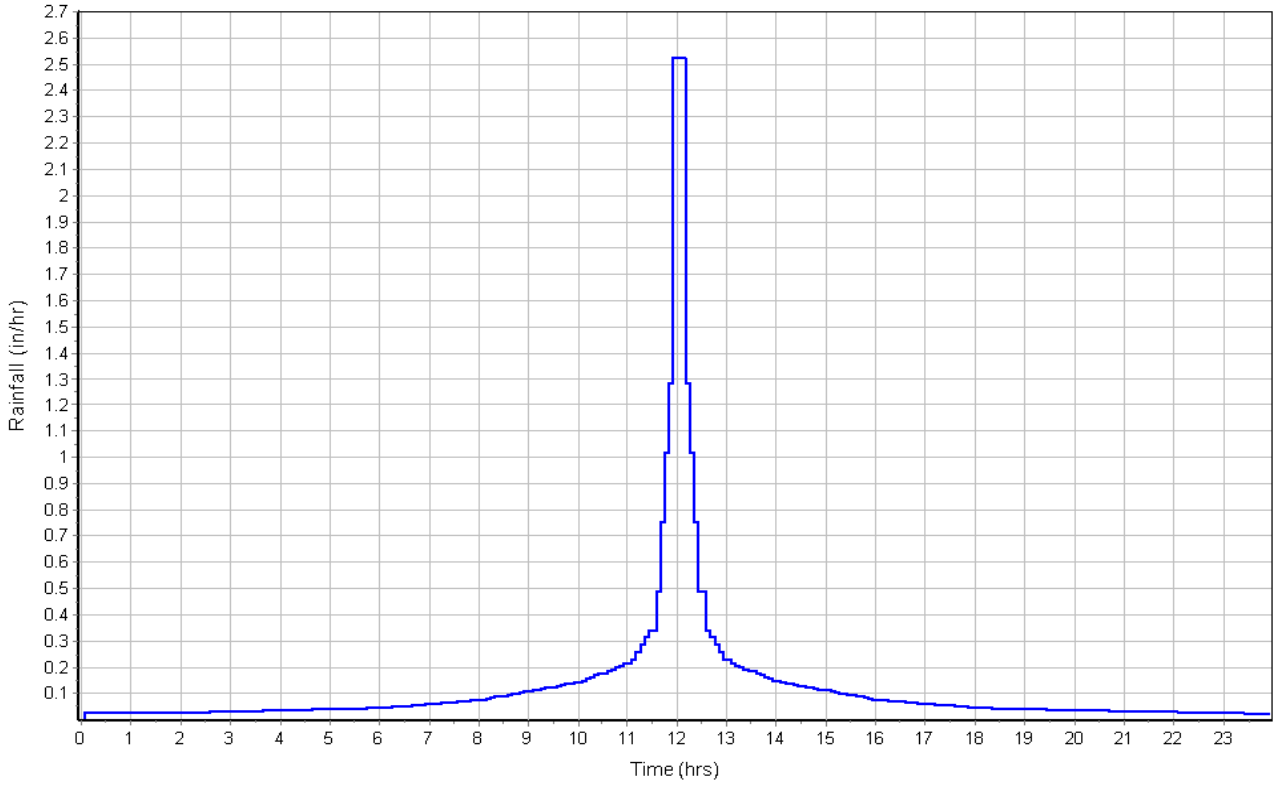
Total TOC (min) .....68.12

## Subbasin Runoff Results

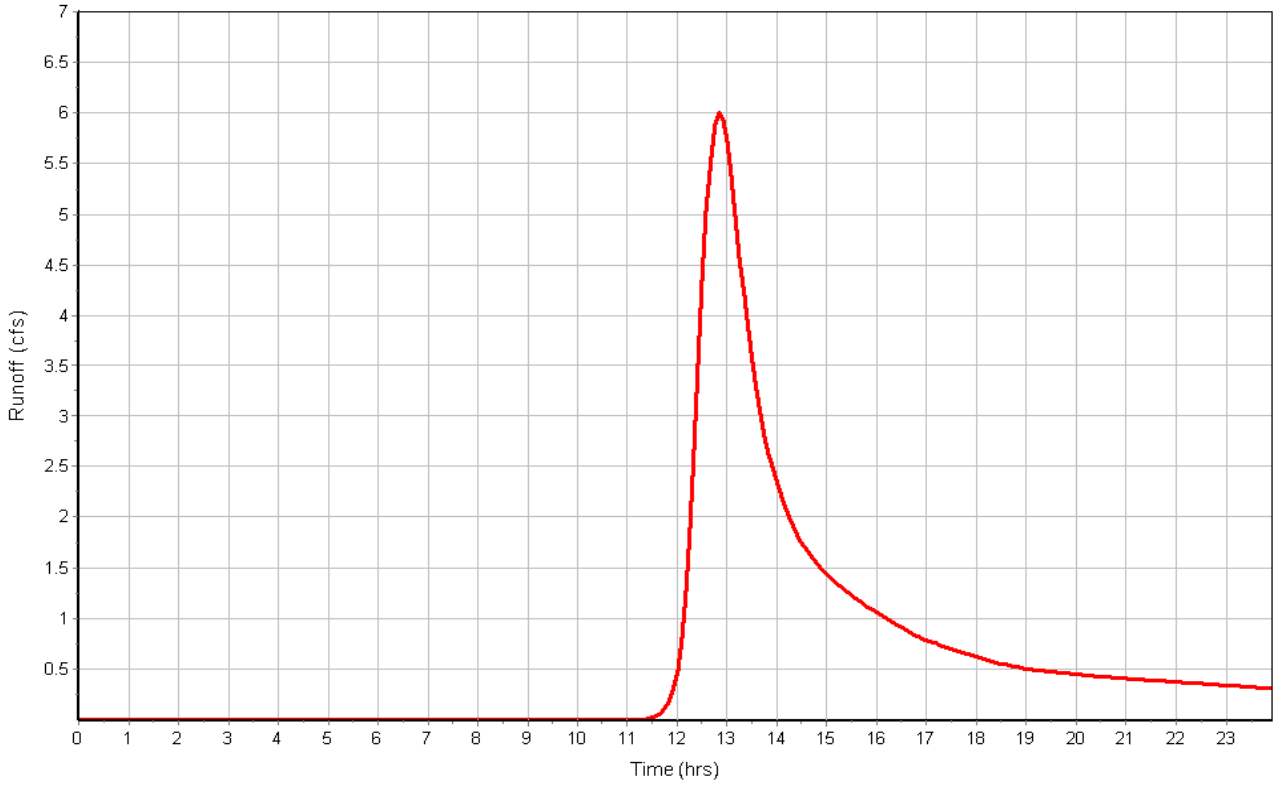
Total Rainfall (in) ..... 3.00
Total Runoff (in) ..... 0.86
Peak Runoff (cfs) ..... 6.00
Weighted Curve Number ..... 72.99
Time of Concentration (days hh:mm:ss) ..... 0 01:08:07

**Subbasin : C**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : D

## Input Data

Area (ac) ..... 0.74
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 | 0.74 | D | 77.00 |
| Composite Area & Weighted CN | 0.74 | | 77.00 |

## 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 (%) : | 23.2 | 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) : | 11.51 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 33 | 0.00 | 0.00 |
| Slope (%) : | 14.75 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.92 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 0.29 | 0.00 | 0.00 |

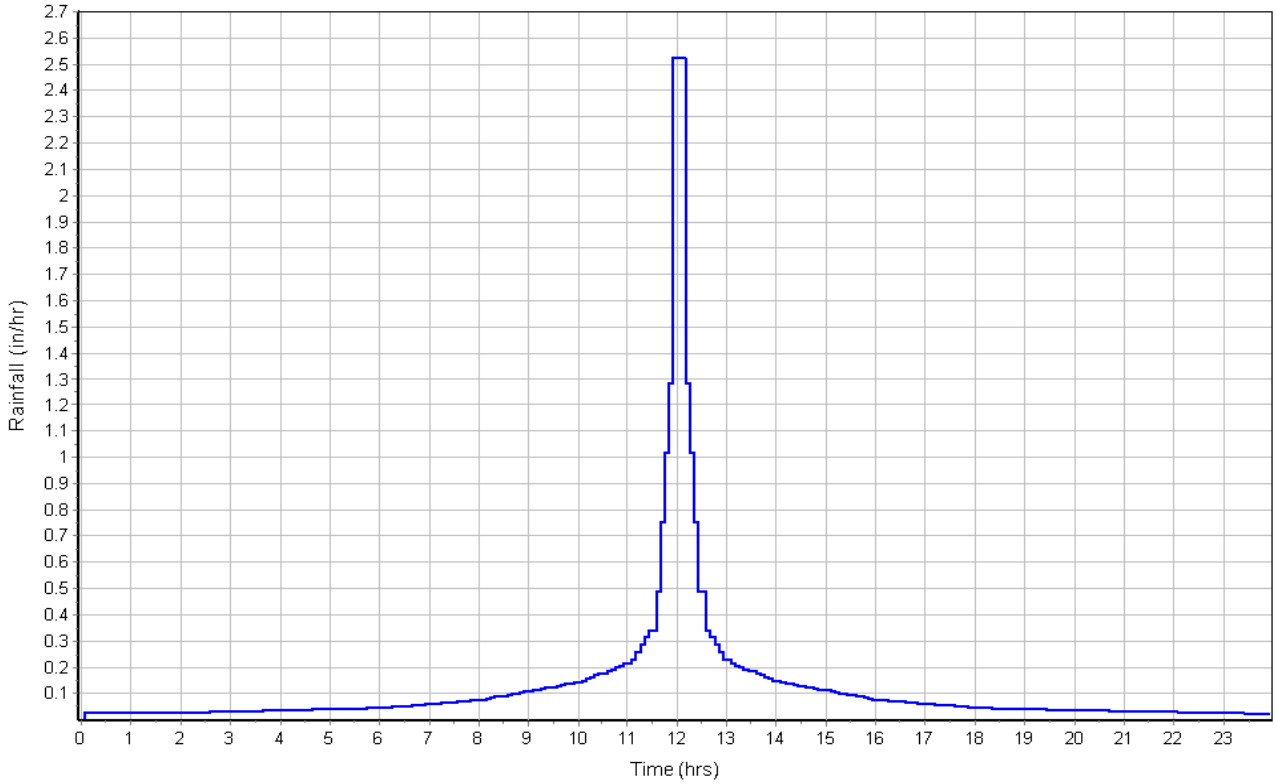
Total TOC (min) .....11.79

## Subbasin Runoff Results

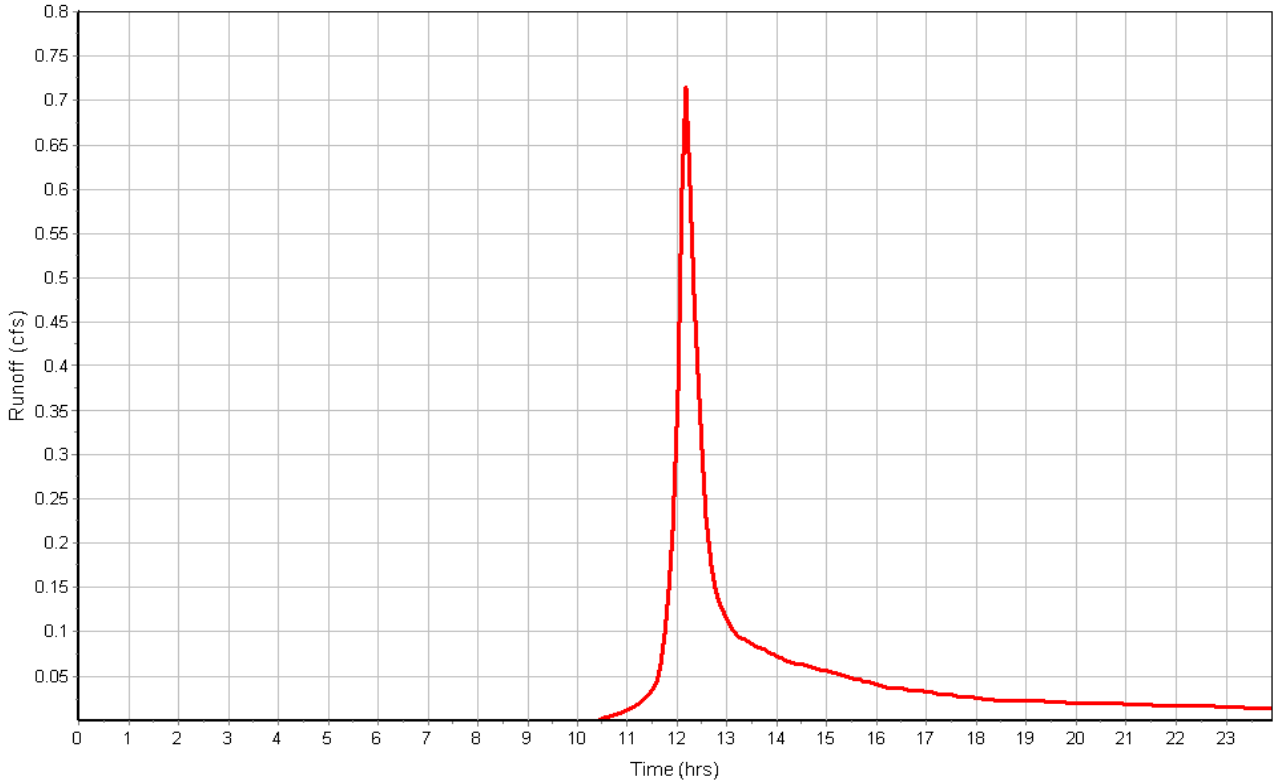
Total Rainfall (in) ..... 3.00
Total Runoff (in) ..... 1.07
Peak Runoff (cfs) ..... 0.72
Weighted Curve Number ..... 77.00
Time of Concentration (days hh:mm:ss) ..... 0 00:11:47

**Subbasin : D**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : E

## Input Data

Area (ac) ..... 3.72
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 | 3.72 | D | 77.00 |
| Composite Area & Weighted CN | 3.72 | | 77.00 |

## 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 (%) : | 14 | 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) : | 14.09 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 375 | 0.00 | 0.00 |
| Slope (%) : | 20.25 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 2.25 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 2.78 | 0.00 | 0.00 |

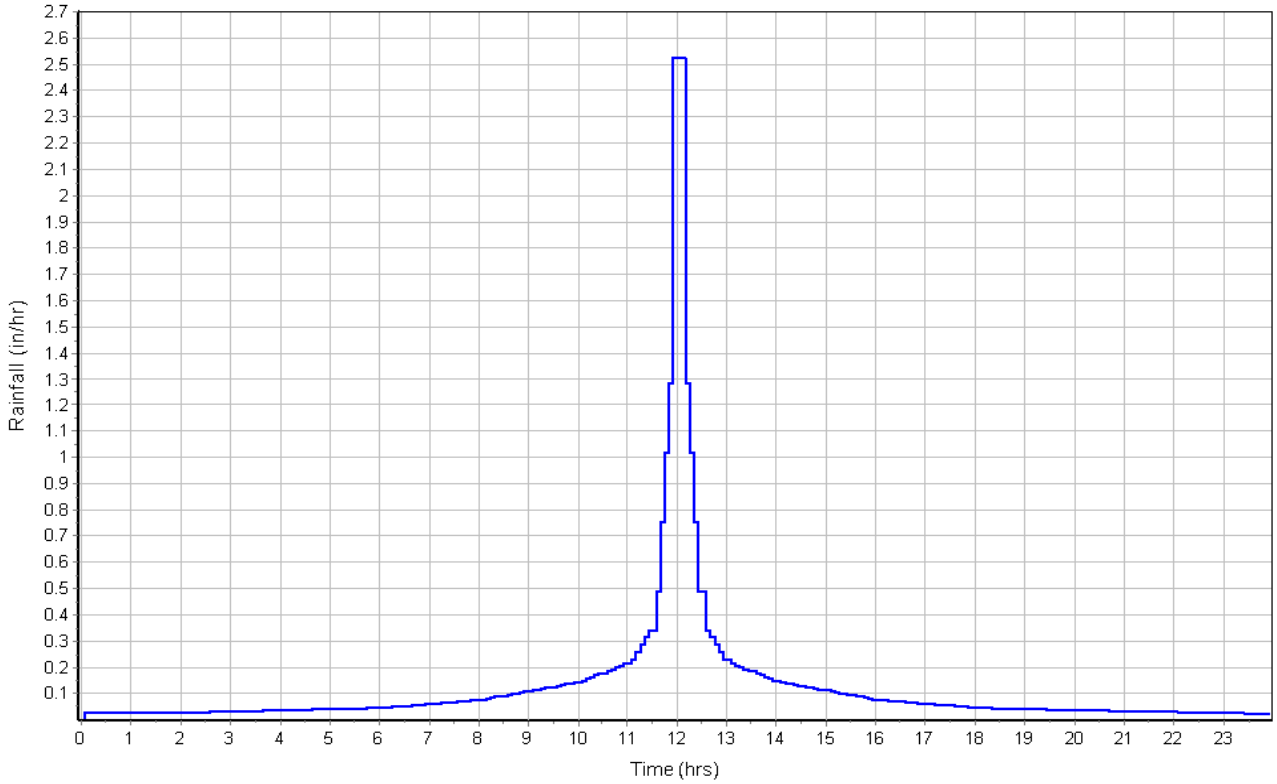
Total TOC (min) .....16.86

## Subbasin Runoff Results

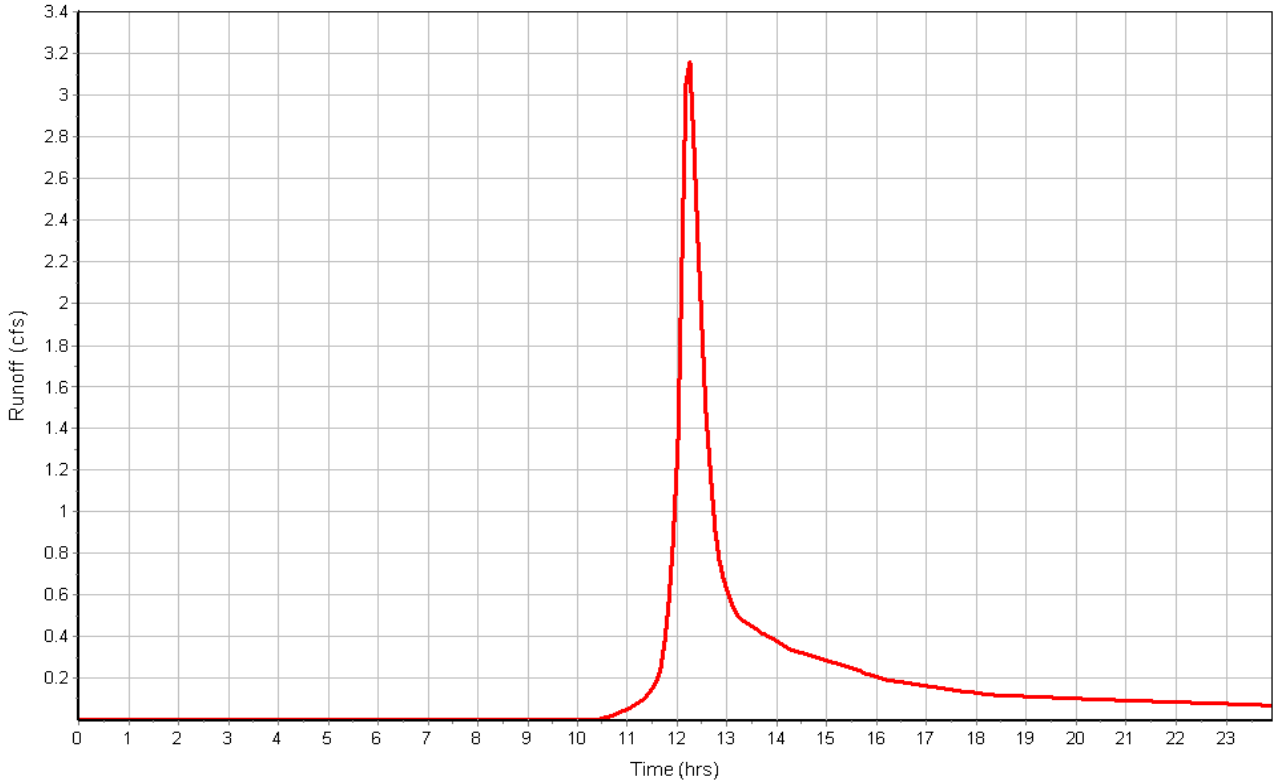
Total Rainfall (in) ..... 3.00
Total Runoff (in) ..... 1.07
Peak Runoff (cfs) ..... 3.22
Weighted Curve Number ..... 77.00
Time of Concentration (days hh:mm:ss) ..... 0 00:16:52

**Subbasin : E**

## 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 ..... Jul 13, 2017 00:00:00
End Analysis On ..... Jul 14, 2017 00:00:00
Start Reporting On ..... Jul 13, 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 | 5 |
| Nodes | 5 |
| *Junctions* | 0 |
| *Outfalls* | 5 |
| *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 | Androscoggin | 10 | 4.60 | 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 | 21.12 | 74.38 | 4.60 | 2.08 | 43.93 | 27.00 | 0 00:36:01 |
| B | 5.93 | 75.63 | 4.60 | 2.18 | 12.93 | 11.30 | 0 00:14:31 |
| C | 17.44 | 72.99 | 4.60 | 1.97 | 34.37 | 14.87 | 0 01:08:07 |
| D | 0.74 | 77.00 | 4.60 | 2.29 | 1.70 | 1.58 | 0 00:11:47 |
| E | 3.72 | 77.00 | 4.60 | 2.29 | 8.53 | 7.13 | 0 00:16:51 |

## Node Summary

| Element ID | Element Type | Invert Elevation (ft) |
|---|---|---|
| OUT-A | Outfall | 298.00 |
| OUT-B | Outfall | 310.00 |
| OUT-C | Outfall | 298.00 |
| OUT-D | Outfall | 338.00 |
| OUT-E | Outfall | 298.00 |

# Subbasin Hydrology

## Subbasin : A

### Input Data

Area (ac) ..... 21.12
Weighted Curve Number ..... 74.38
Rain Gage ID ..... Rain Gage-01

### Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 7.92 | C | 70.00 |
| Woods, Good | 13.20 | D | 77.00 |
| Composite Area & Weighted CN | 21.12 | | 74.38 |

### 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 (%) : | 32.75 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.17 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 10.03 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 870 | 1086 | 0.00 |
| Slope (%) : | 5.65 | .76 | 0.00 |
| Surface Type : | Woodland | Grassed waterway | Unpaved |
| Velocity (ft/sec) : | 1.19 | 1.31 | 0.00 |
| Computed Flow Time (min) : | 12.18 | 13.82 | 0.00 |

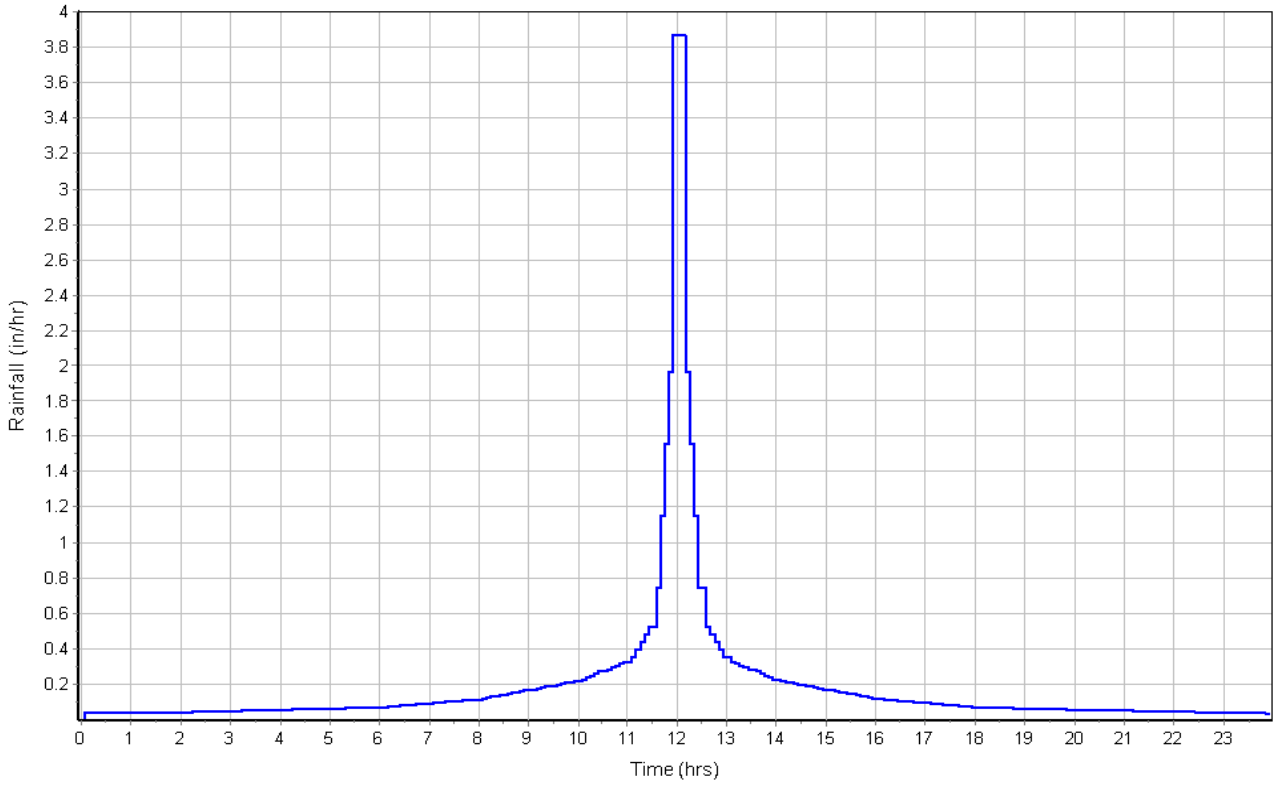
Total TOC (min) .....36.03

## Subbasin Runoff Results

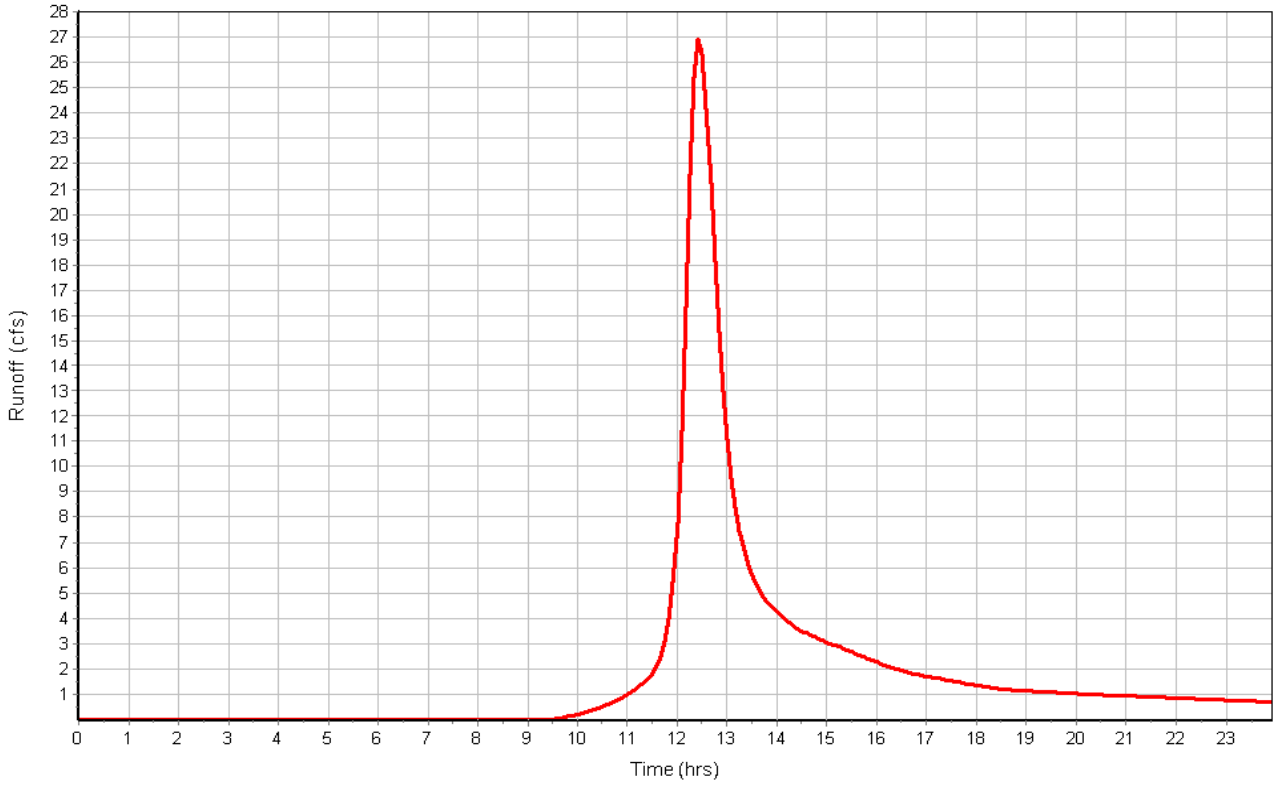
| | |
|---|---|
| Total Rainfall (in) | 4.60 |
| Total Runoff (in) | 2.08 |
| Peak Runoff (cfs) | 27.00 |
| Weighted Curve Number | 74.38 |
| Time of Concentration (days hh:mm:ss) | 0 00:36:02 |

**Subbasin : A**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : B

## Input Data

Area (ac) ..... 5.93
Weighted Curve Number ..... 75.63
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 1.16 | C | 70.00 |
| Woods, Good | 4.77 | D | 77.00 |
| Composite Area & Weighted CN | 5.93 | | 75.63 |

## 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 (%) : | 34 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.17 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 9.88 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 440 | 0.00 | 0.00 |
| Slope (%) : | 10 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.58 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 4.64 | 0.00 | 0.00 |

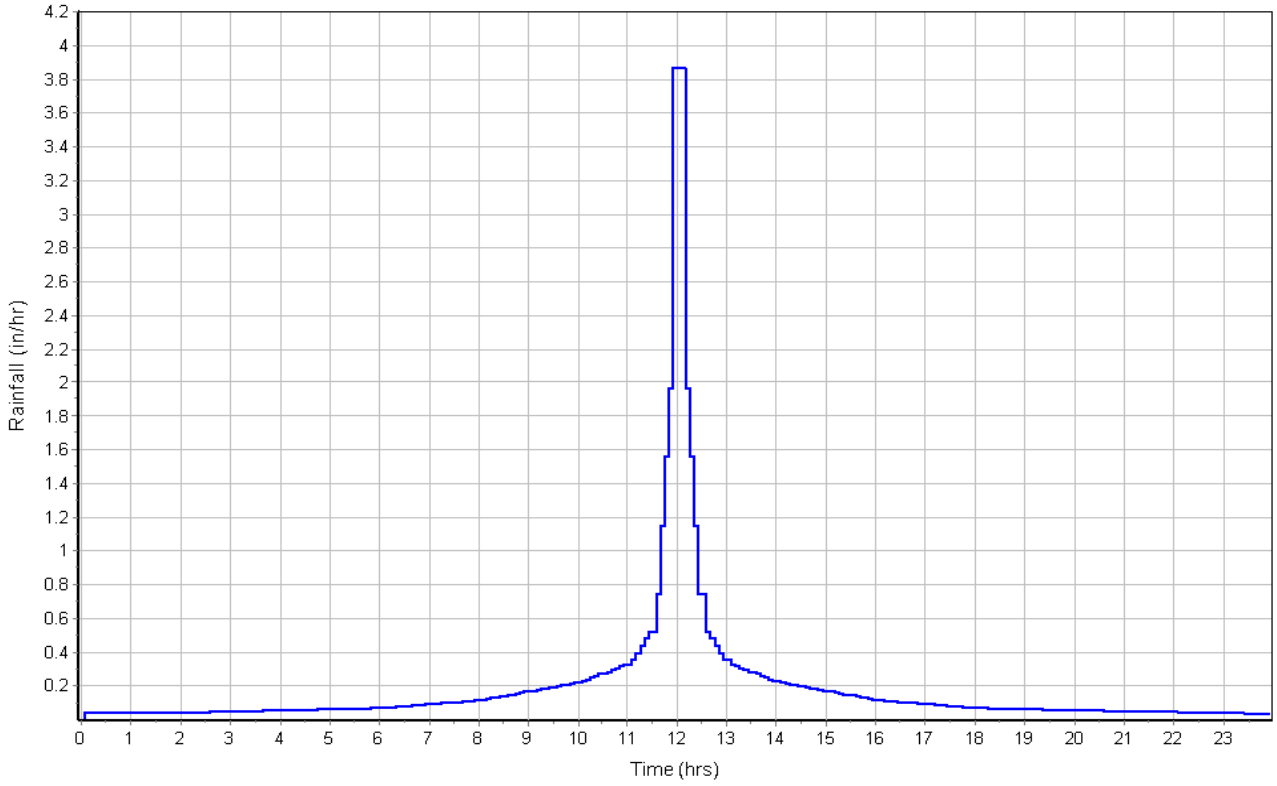
Total TOC (min) .....14.52

## Subbasin Runoff Results

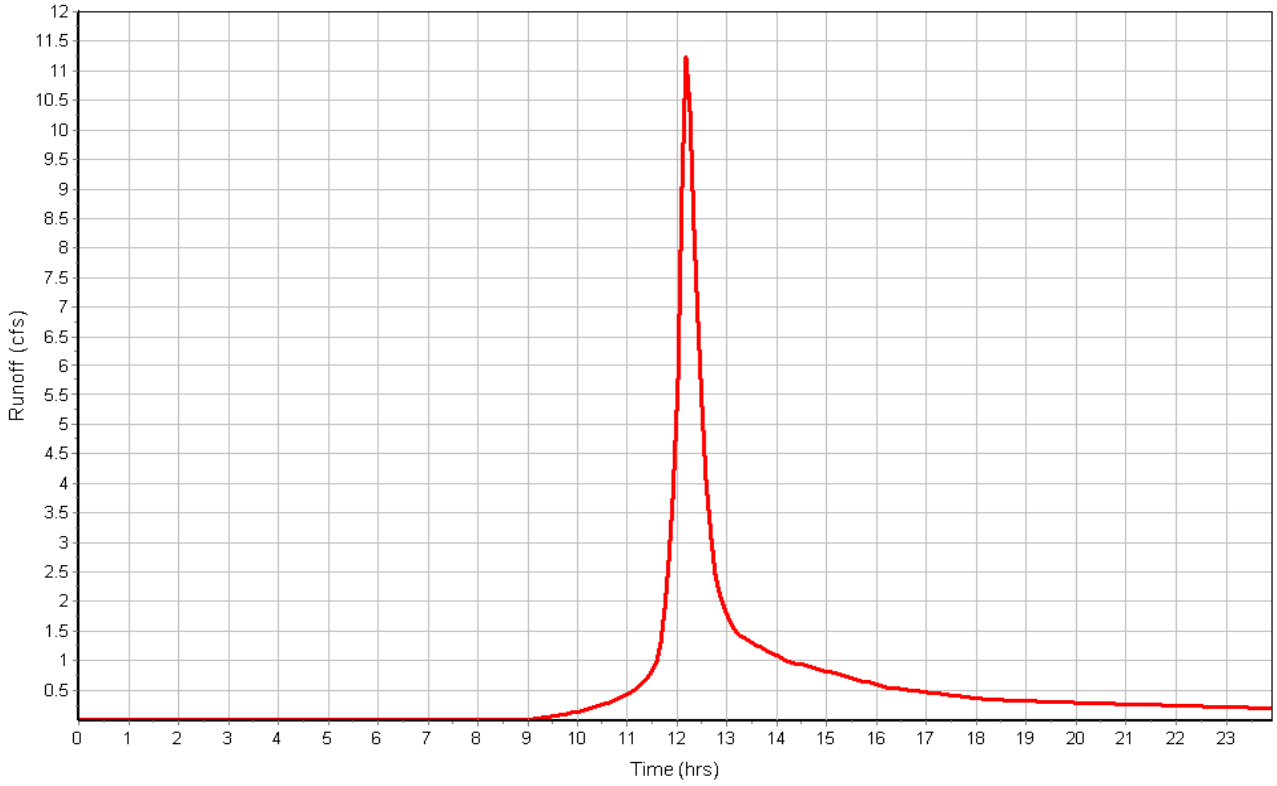
Total Rainfall (in) ..... 4.60
Total Runoff (in) ..... 2.18
Peak Runoff (cfs) ..... 11.30
Weighted Curve Number ..... 75.63
Time of Concentration (days hh:mm:ss) ..... 0 00:14:31

**Subbasin : B**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : C

## Input Data

Area (ac) ..... 17.44
Weighted Curve Number ..... 72.99
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 10.00 | C | 70.00 |
| Woods, Good | 7.44 | D | 77.00 |
| Composite Area & Weighted CN | 17.44 | | 72.99 |

## 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 (%) : | 1.61 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.05 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 33.46 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 2142 | 0.00 | 0.00 |
| Slope (%) : | .47 | 0.00 | 0.00 |
| Surface Type : | Grassed waterway | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.03 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 34.66 | 0.00 | 0.00 |

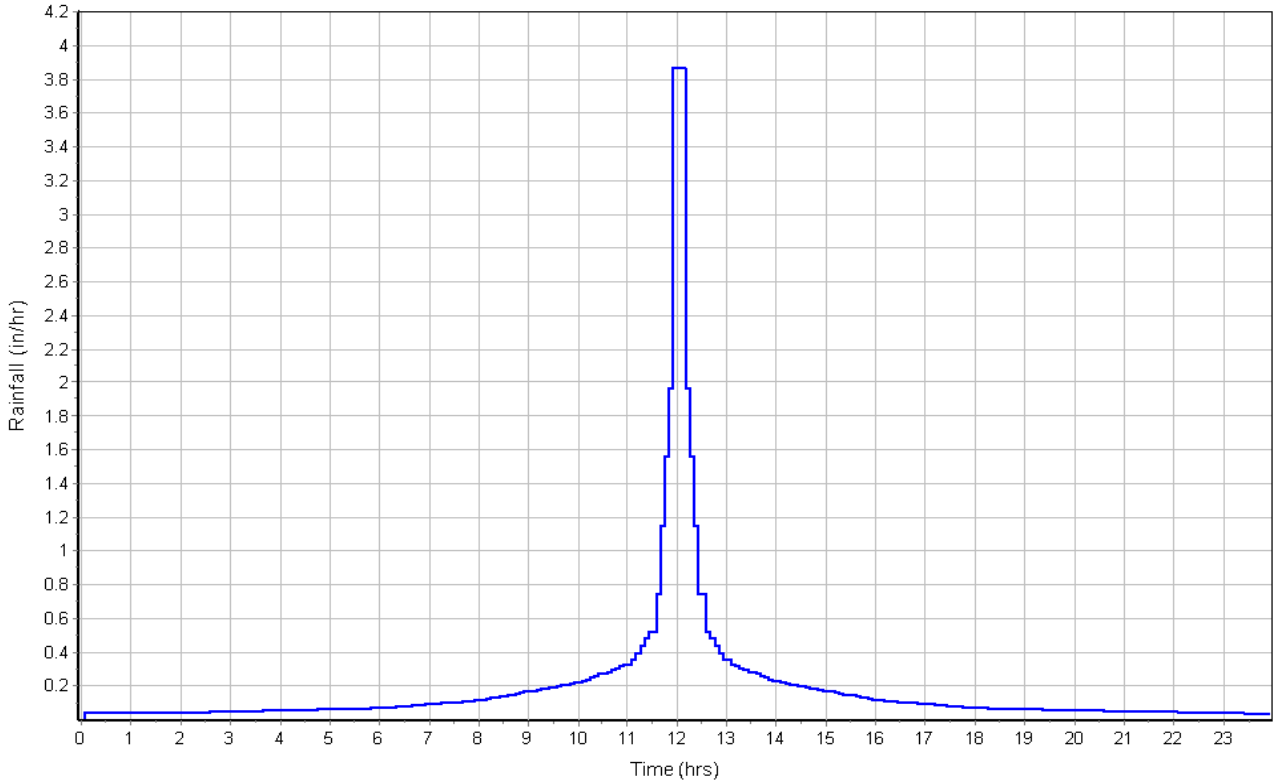
Total TOC (min) .....68.12

## Subbasin Runoff Results

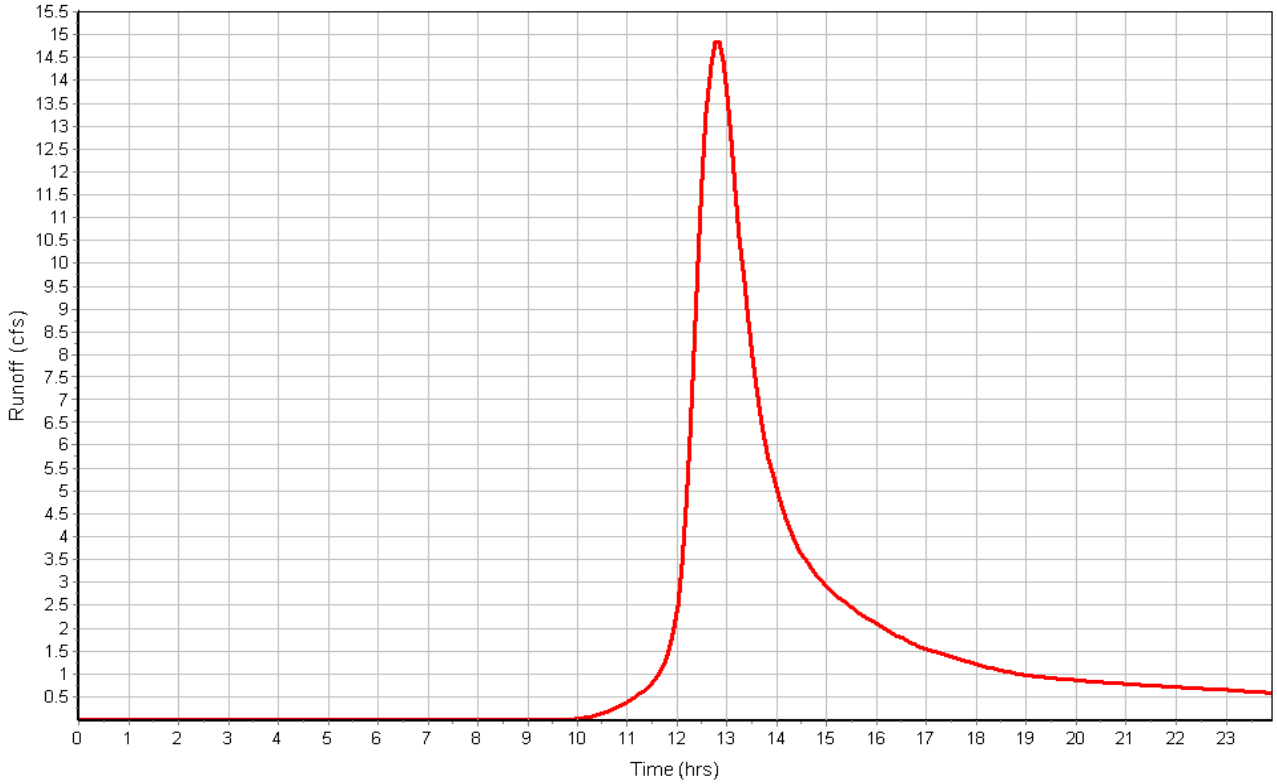
Total Rainfall (in) ..... 4.60
Total Runoff (in) ..... 1.97
Peak Runoff (cfs) ..... 14.87
Weighted Curve Number ..... 72.99
Time of Concentration (days hh:mm:ss) ..... 0 01:08:07

**Subbasin : C**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : D

## Input Data

Area (ac) ..... 0.74
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 | 0.74 | D | 77.00 |
| Composite Area & Weighted CN | 0.74 | | 77.00 |

## 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 (%) : | 23.2 | 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) : | 11.51 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 33 | 0.00 | 0.00 |
| Slope (%) : | 14.75 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.92 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 0.29 | 0.00 | 0.00 |

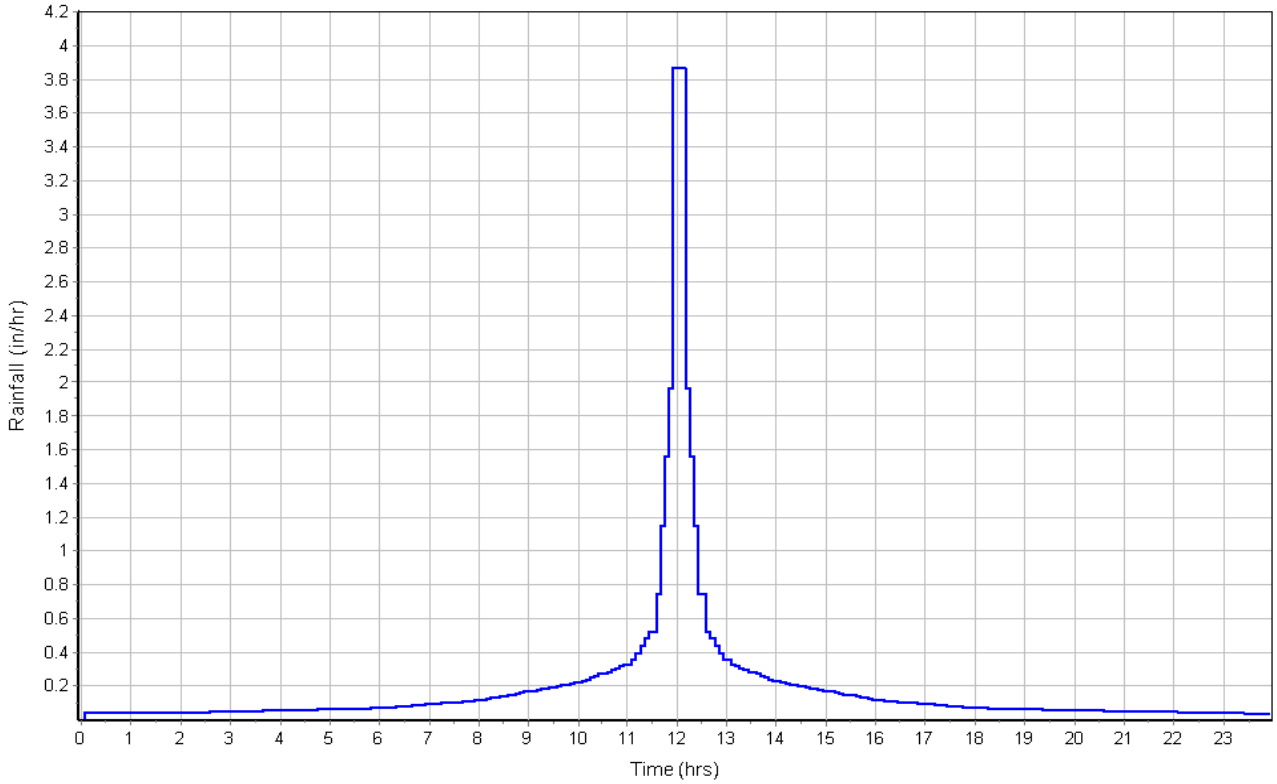
Total TOC (min) .....11.79

## Subbasin Runoff Results

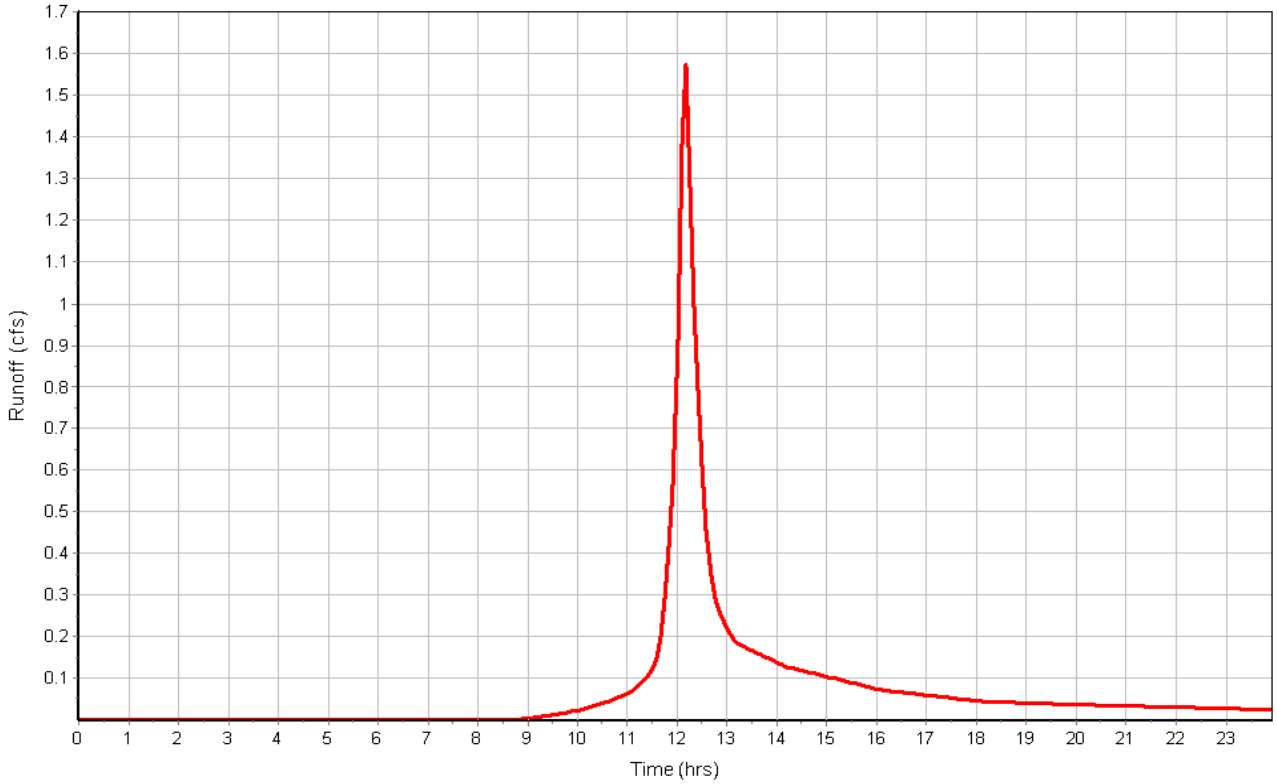
Total Rainfall (in) ..... 4.60
Total Runoff (in) ..... 2.29
Peak Runoff (cfs) ..... 1.58
Weighted Curve Number ..... 77.00
Time of Concentration (days hh:mm:ss) ..... 0 00:11:47

**Subbasin : D**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : E

## Input Data

Area (ac) ..... 3.72
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 | 3.72 | D | 77.00 |
| Composite Area & Weighted CN | 3.72 | | 77.00 |

## 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 (%) : | 14 | 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) : | 14.09 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 375 | 0.00 | 0.00 |
| Slope (%) : | 20.25 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 2.25 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 2.78 | 0.00 | 0.00 |

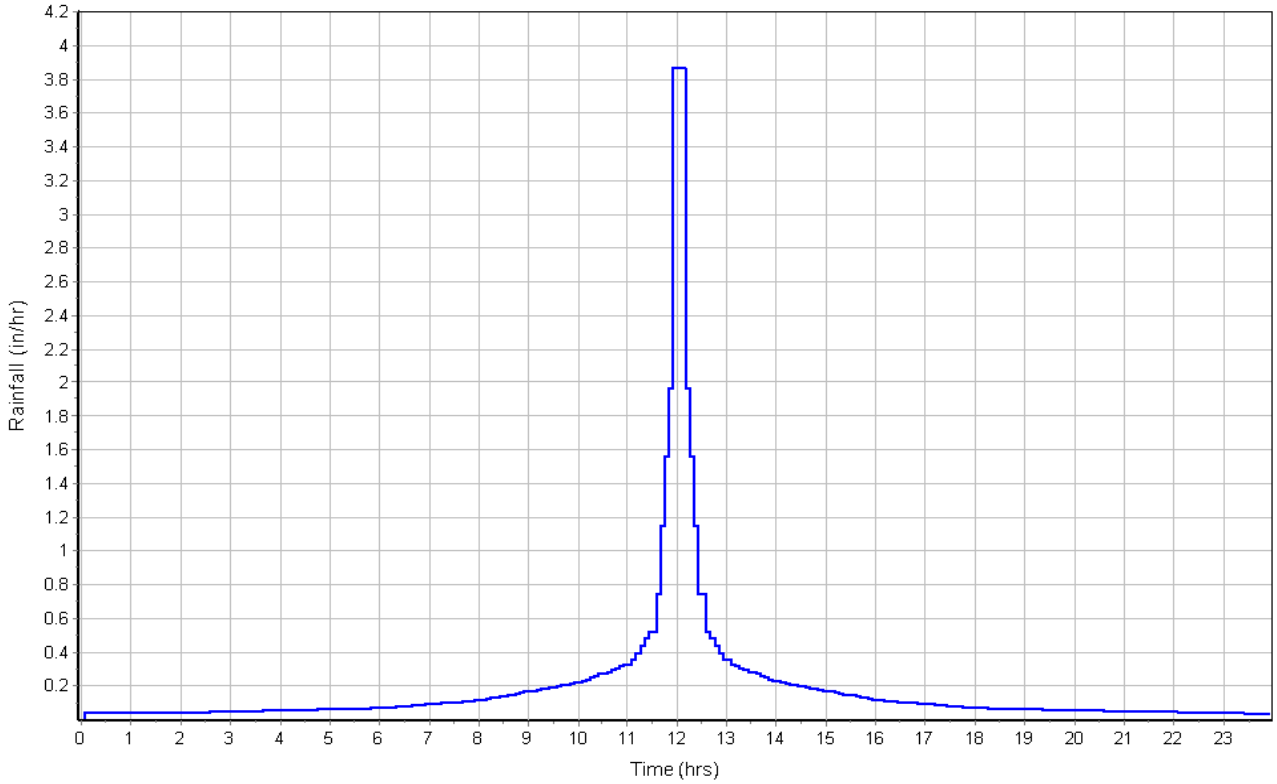
Total TOC (min) .....16.86

## Subbasin Runoff Results

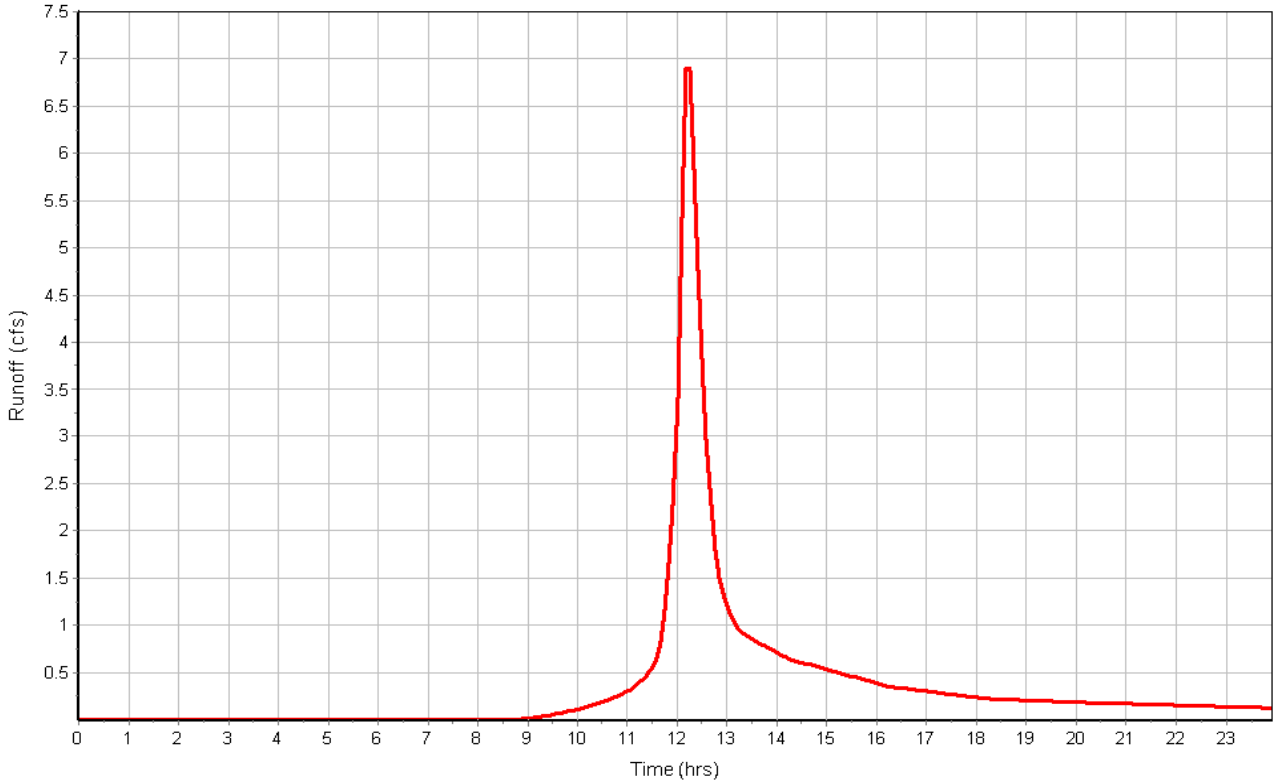
Total Rainfall (in) ..... 4.60
Total Runoff (in) ..... 2.29
Peak Runoff (cfs) ..... 7.13
Weighted Curve Number ..... 77.00
Time of Concentration (days hh:mm:ss) ..... 0 00:16:52

**Subbasin : E**

## 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 ..... Jul 13, 2017 00:00:00
End Analysis On ..... Jul 14, 2017 00:00:00
Start Reporting On ..... Jul 13, 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 | 5 |
| Nodes | 5 |
| *Junctions* | 0 |
| *Outfalls* | 5 |
| *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 | Androscoggin | 25 | 5.40 | 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 | 21.12 | 74.38 | 5.40 | 2.72 | 57.47 | 35.56 | 0 00:36:01 |
| B | 5.93 | 75.63 | 5.40 | 2.84 | 16.81 | 14.75 | 0 00:14:31 |
| C | 17.44 | 72.99 | 5.40 | 2.60 | 45.29 | 19.86 | 0 01:08:07 |
| D | 0.74 | 77.00 | 5.40 | 2.96 | 2.19 | 2.04 | 0 00:11:47 |
| E | 3.72 | 77.00 | 5.40 | 2.96 | 11.01 | 9.23 | 0 00:16:51 |

## Node Summary

| Element ID | Element Type | Invert Elevation (ft) |
|---|---|---|
| OUT-A | Outfall | 298.00 |
| OUT-B | Outfall | 310.00 |
| OUT-C | Outfall | 298.00 |
| OUT-D | Outfall | 338.00 |
| OUT-E | Outfall | 298.00 |

# Subbasin Hydrology

## Subbasin : A

### Input Data

Area (ac) ..... 21.12
Weighted Curve Number ..... 74.38
Rain Gage ID ..... Rain Gage-01

### Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 7.92 | C | 70.00 |
| Woods, Good | 13.20 | D | 77.00 |
| Composite Area & Weighted CN | 21.12 | | 74.38 |

### 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 (%) : | 32.75 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.17 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 10.03 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 870 | 1086 | 0.00 |
| Slope (%) : | 5.65 | .76 | 0.00 |
| Surface Type : | Woodland | Grassed waterway | Unpaved |
| Velocity (ft/sec) : | 1.19 | 1.31 | 0.00 |
| Computed Flow Time (min) : | 12.18 | 13.82 | 0.00 |

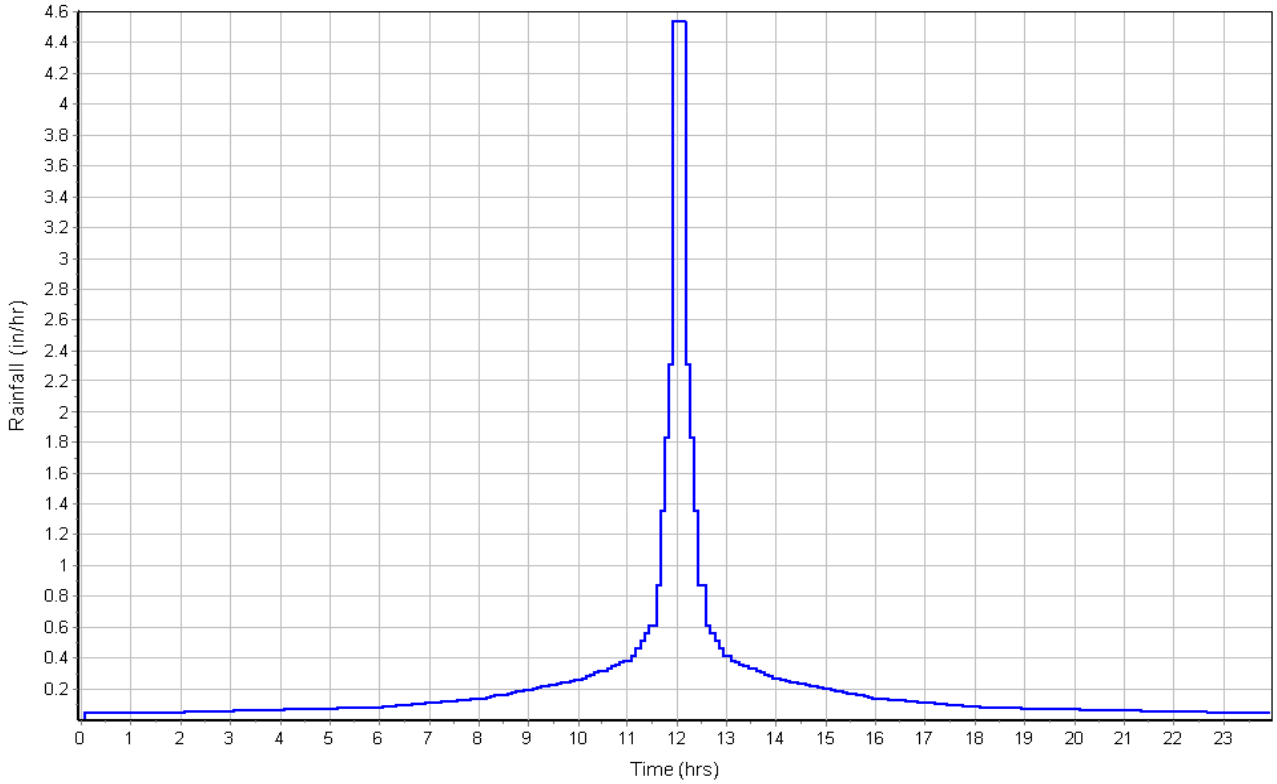
Total TOC (min) .....36.03

## Subbasin Runoff Results

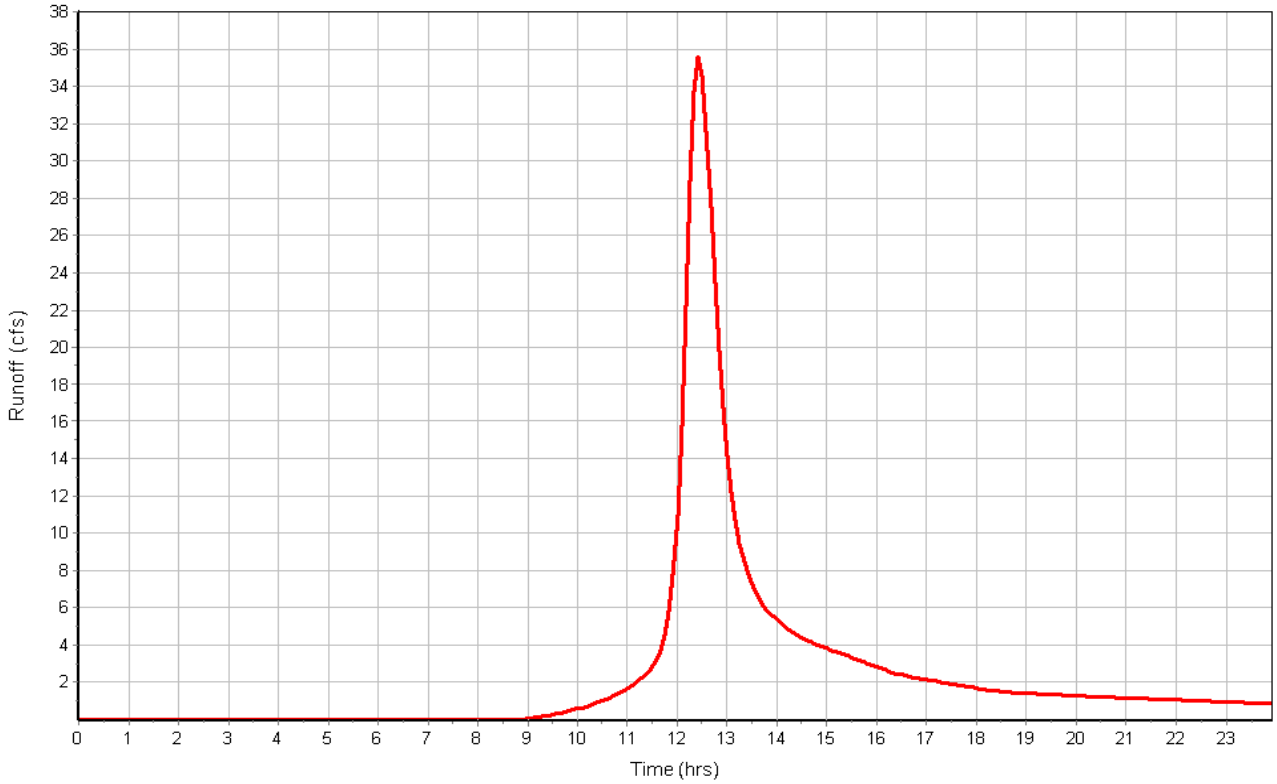
| | |
|---|---|
| Total Rainfall (in) | 5.40 |
| Total Runoff (in) | 2.72 |
| Peak Runoff (cfs) | 35.56 |
| Weighted Curve Number | 74.38 |
| Time of Concentration (days hh:mm:ss) | 0 00:36:02 |

**Subbasin : A**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : B

## Input Data

Area (ac) ..... 5.93
Weighted Curve Number ..... 75.63
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 1.16 | C | 70.00 |
| Woods, Good | 4.77 | D | 77.00 |
| Composite Area & Weighted CN | 5.93 | | 75.63 |

## 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 (%) : | 34 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.17 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 9.88 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 440 | 0.00 | 0.00 |
| Slope (%) : | 10 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.58 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 4.64 | 0.00 | 0.00 |

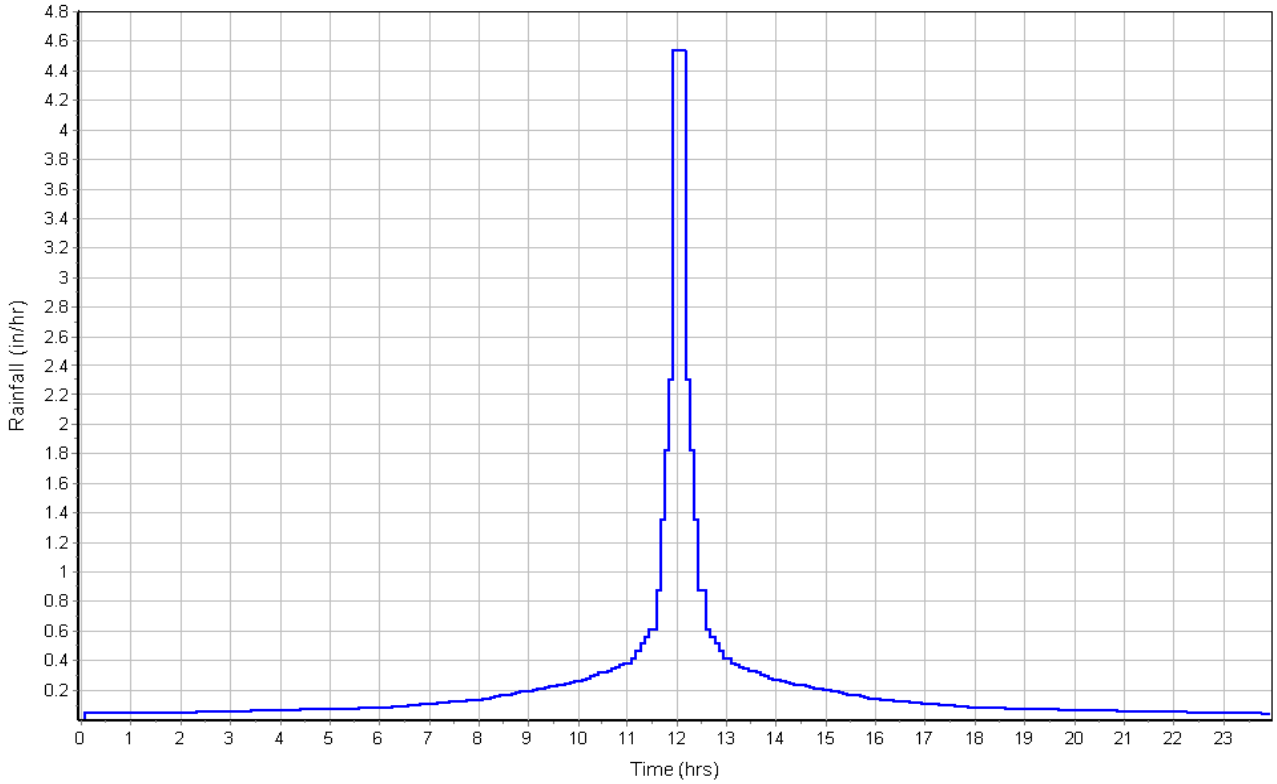
Total TOC (min) .....14.52

## Subbasin Runoff Results

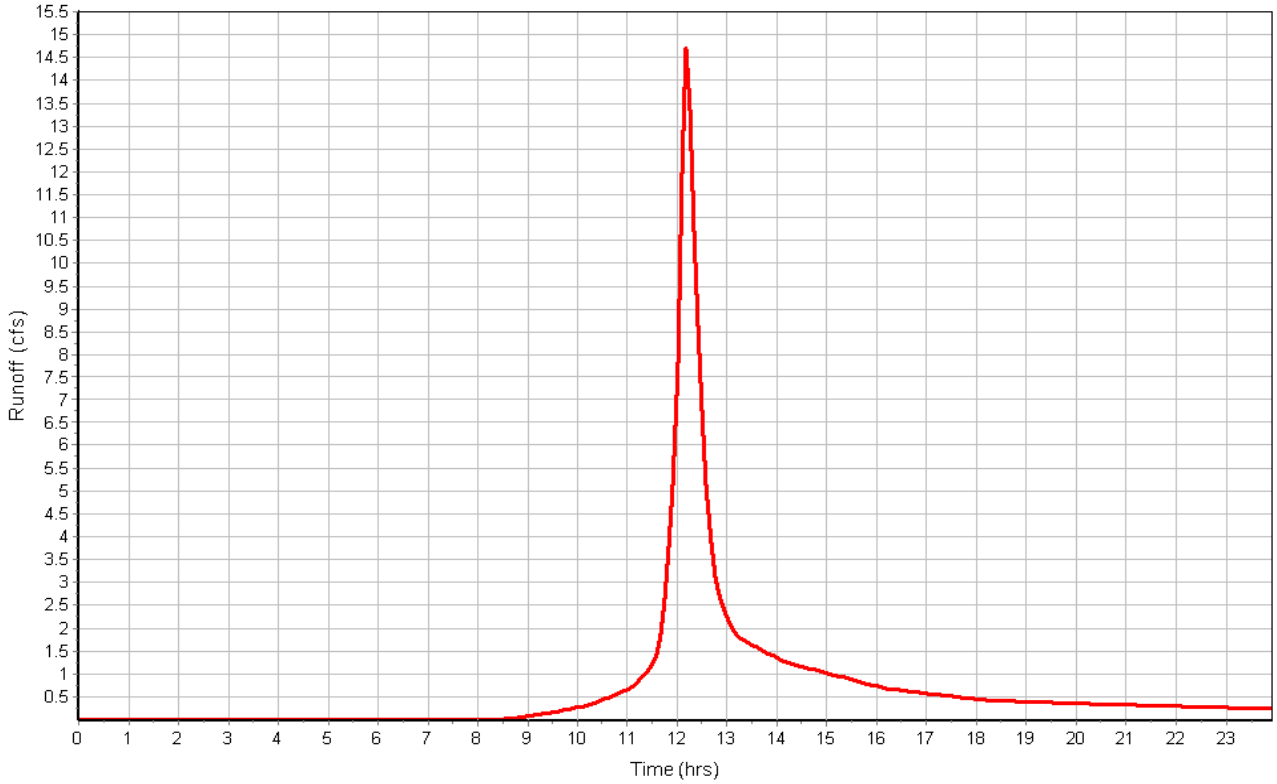
Total Rainfall (in) ..... 5.40
Total Runoff (in) ..... 2.84
Peak Runoff (cfs) ..... 14.75
Weighted Curve Number ..... 75.63
Time of Concentration (days hh:mm:ss) ..... 0 00:14:31

**Subbasin : B**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : C

## Input Data

Area (ac) ..... 17.44
Weighted Curve Number ..... 72.99
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 10.00 | C | 70.00 |
| Woods, Good | 7.44 | D | 77.00 |
| Composite Area & Weighted CN | 17.44 | | 72.99 |

## 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 (%) : | 1.61 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.05 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 33.46 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 2142 | 0.00 | 0.00 |
| Slope (%) : | .47 | 0.00 | 0.00 |
| Surface Type : | Grassed waterway | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.03 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 34.66 | 0.00 | 0.00 |

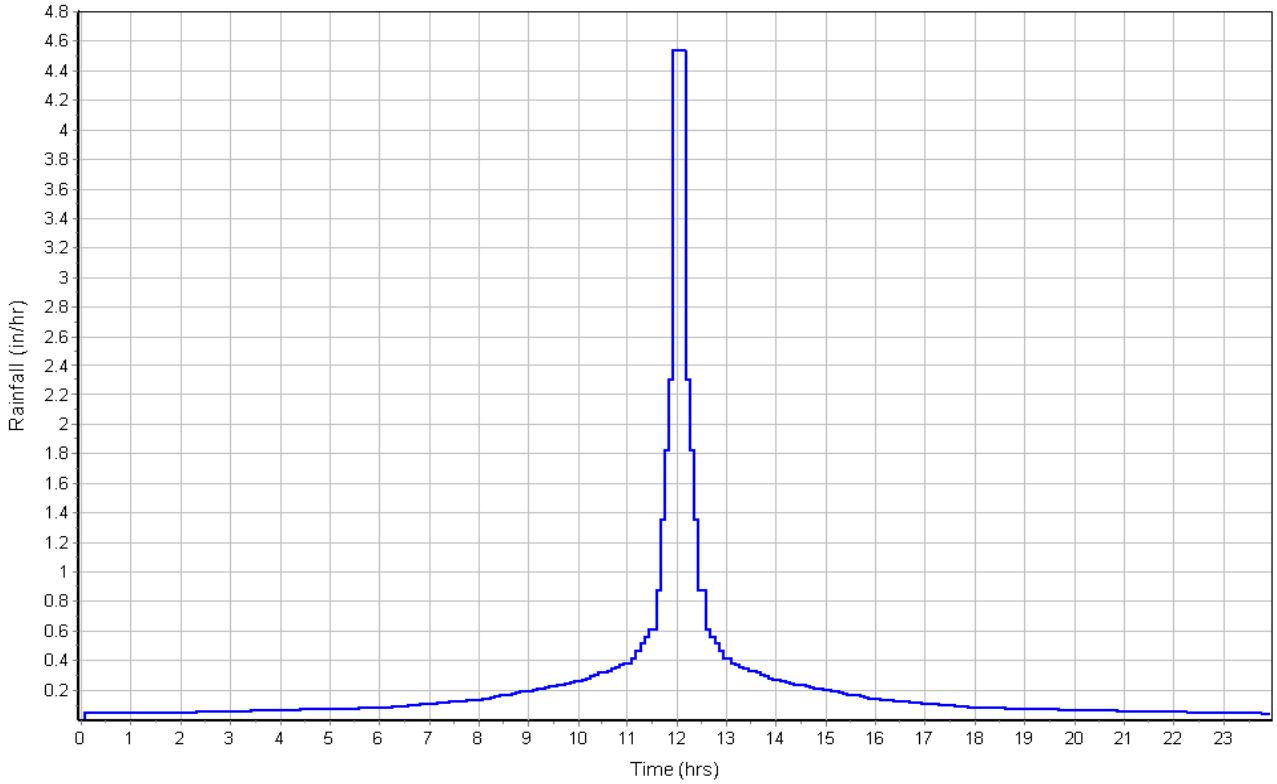
Total TOC (min) .....68.12

## Subbasin Runoff Results

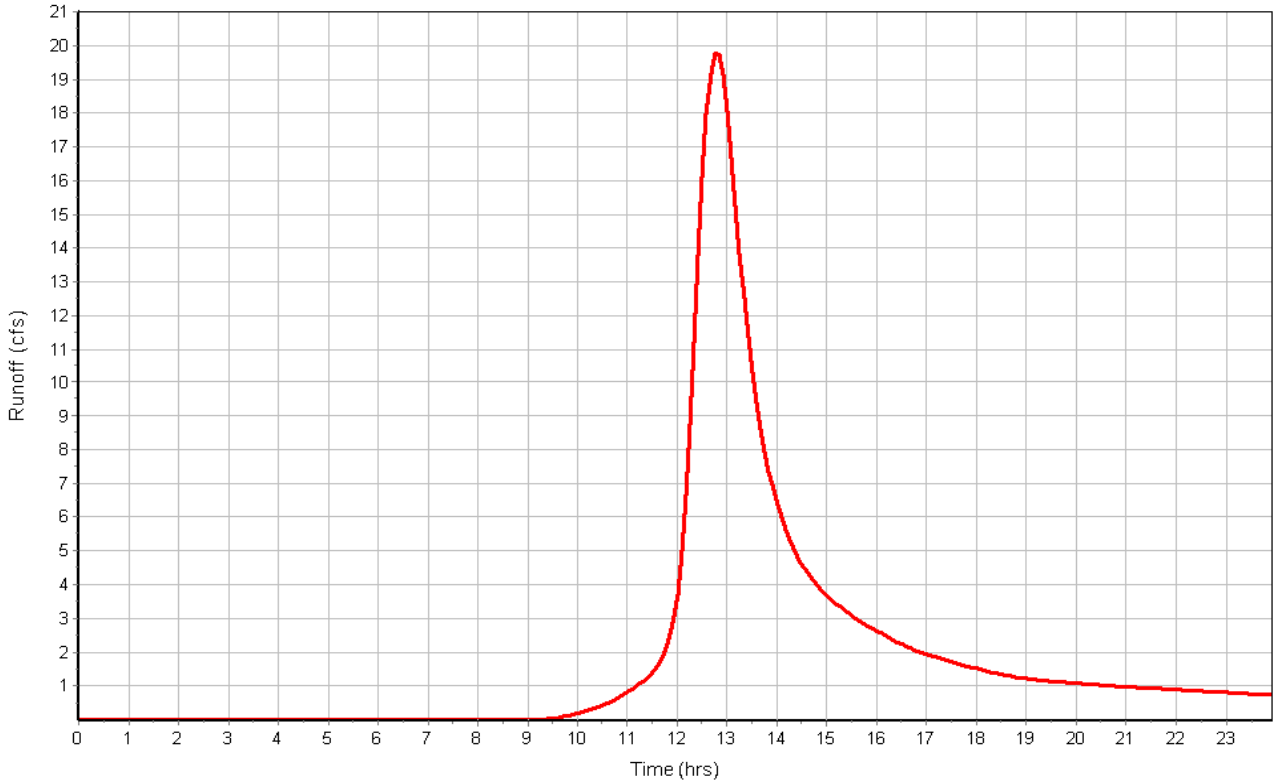
Total Rainfall (in) ..... 5.40
Total Runoff (in) ..... 2.60
Peak Runoff (cfs) ..... 19.86
Weighted Curve Number ..... 72.99
Time of Concentration (days hh:mm:ss) ..... 0 01:08:07

**Subbasin : C**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : D

## Input Data

Area (ac) ..... 0.74
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 | 0.74 | D | 77.00 |
| Composite Area & Weighted CN | 0.74 | | 77.00 |

## 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 (%) : | 23.2 | 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) : | 11.51 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 33 | 0.00 | 0.00 |
| Slope (%) : | 14.75 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.92 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 0.29 | 0.00 | 0.00 |

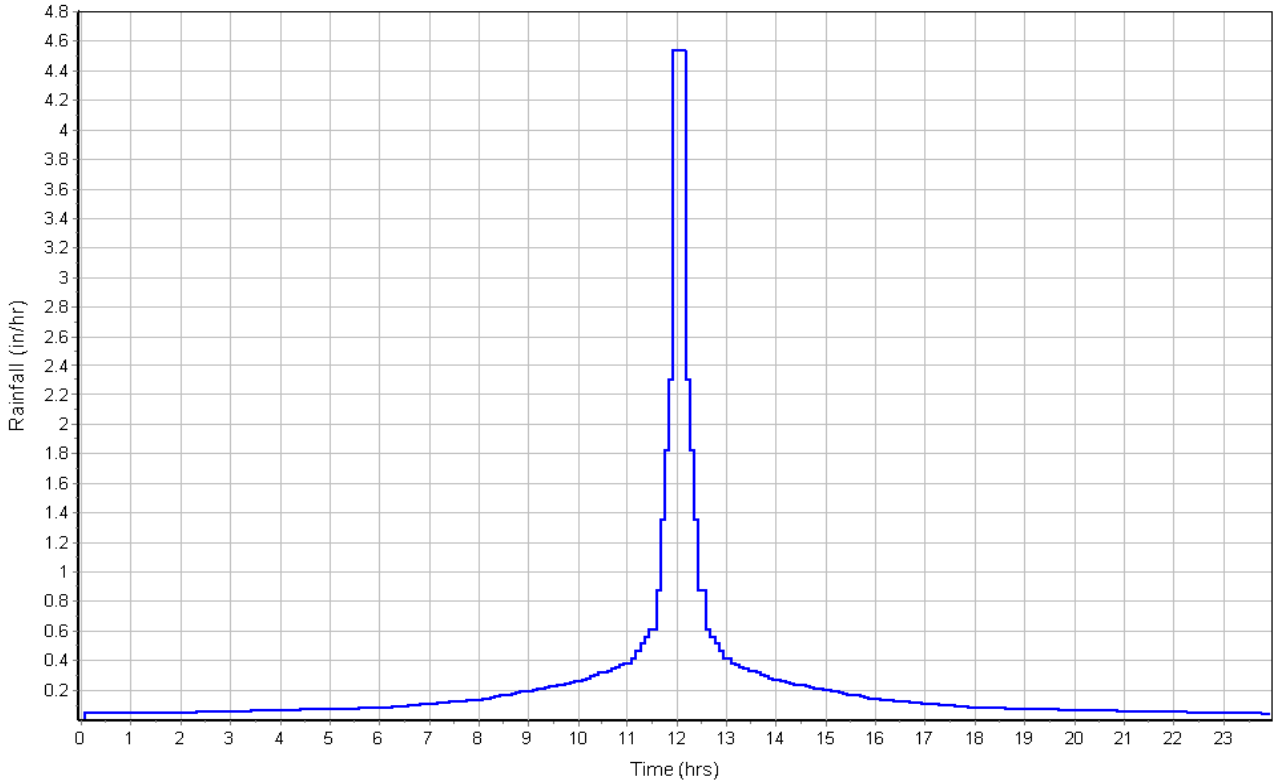
Total TOC (min) .....11.79

## Subbasin Runoff Results

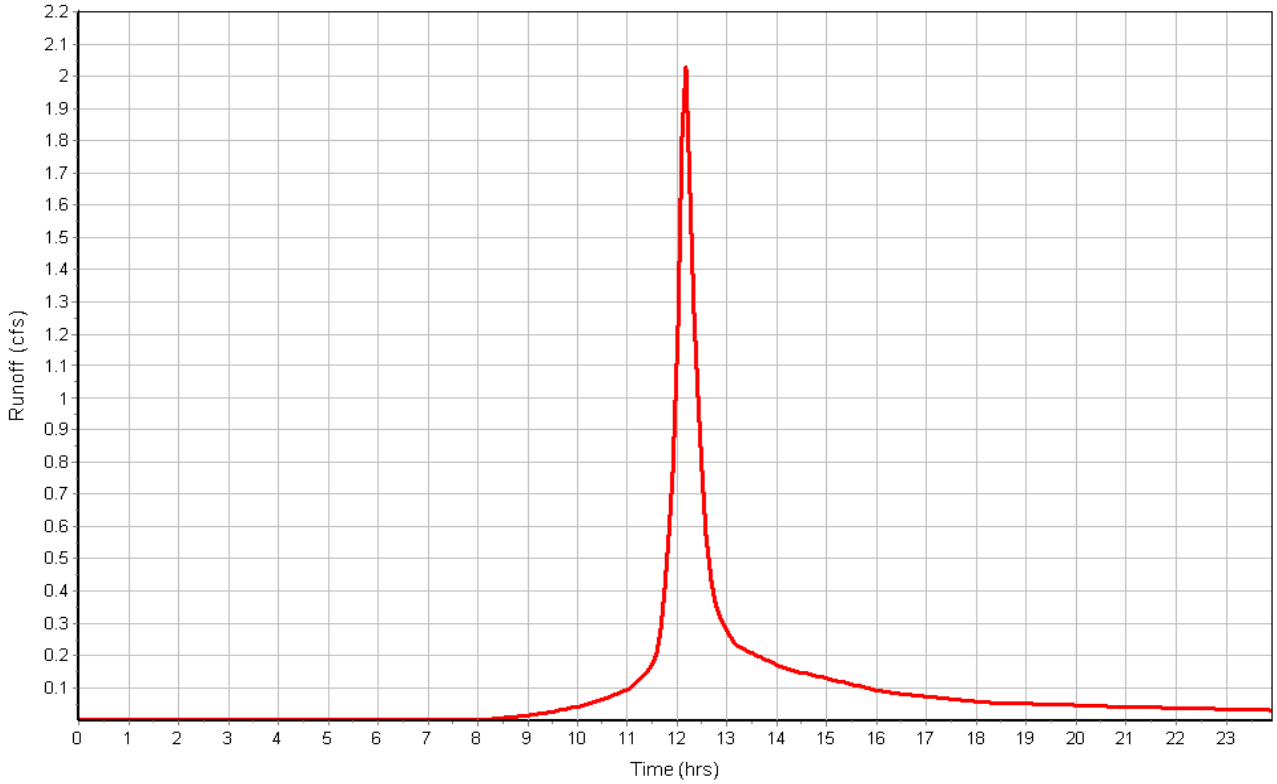
Total Rainfall (in) ..... 5.40
Total Runoff (in) ..... 2.96
Peak Runoff (cfs) ..... 2.04
Weighted Curve Number ..... 77.00
Time of Concentration (days hh:mm:ss) ..... 0 00:11:47

**Subbasin : D**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : E

## Input Data

Area (ac) ..... 3.72
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 | 3.72 | D | 77.00 |
| Composite Area & Weighted CN | 3.72 | | 77.00 |

## 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 (%) : | 14 | 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) : | 14.09 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 375 | 0.00 | 0.00 |
| Slope (%) : | 20.25 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 2.25 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 2.78 | 0.00 | 0.00 |

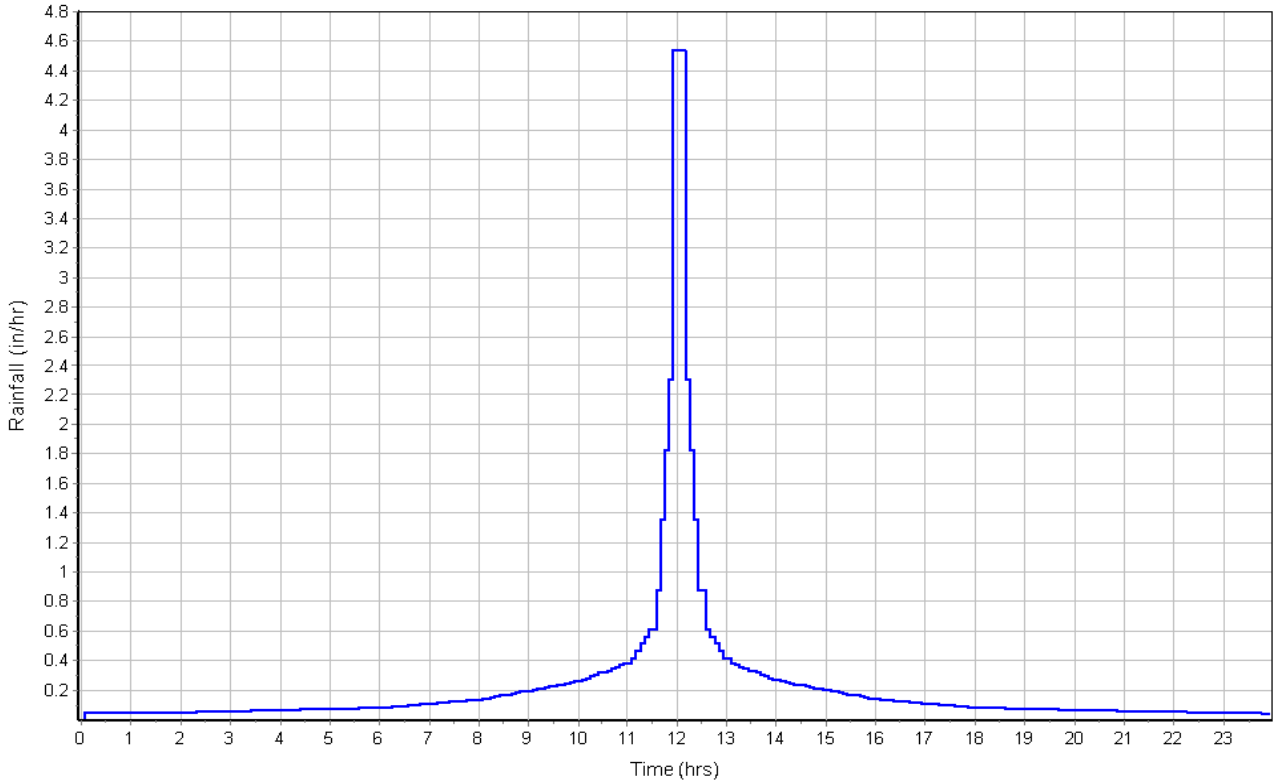
Total TOC (min) .....16.86

## Subbasin Runoff Results

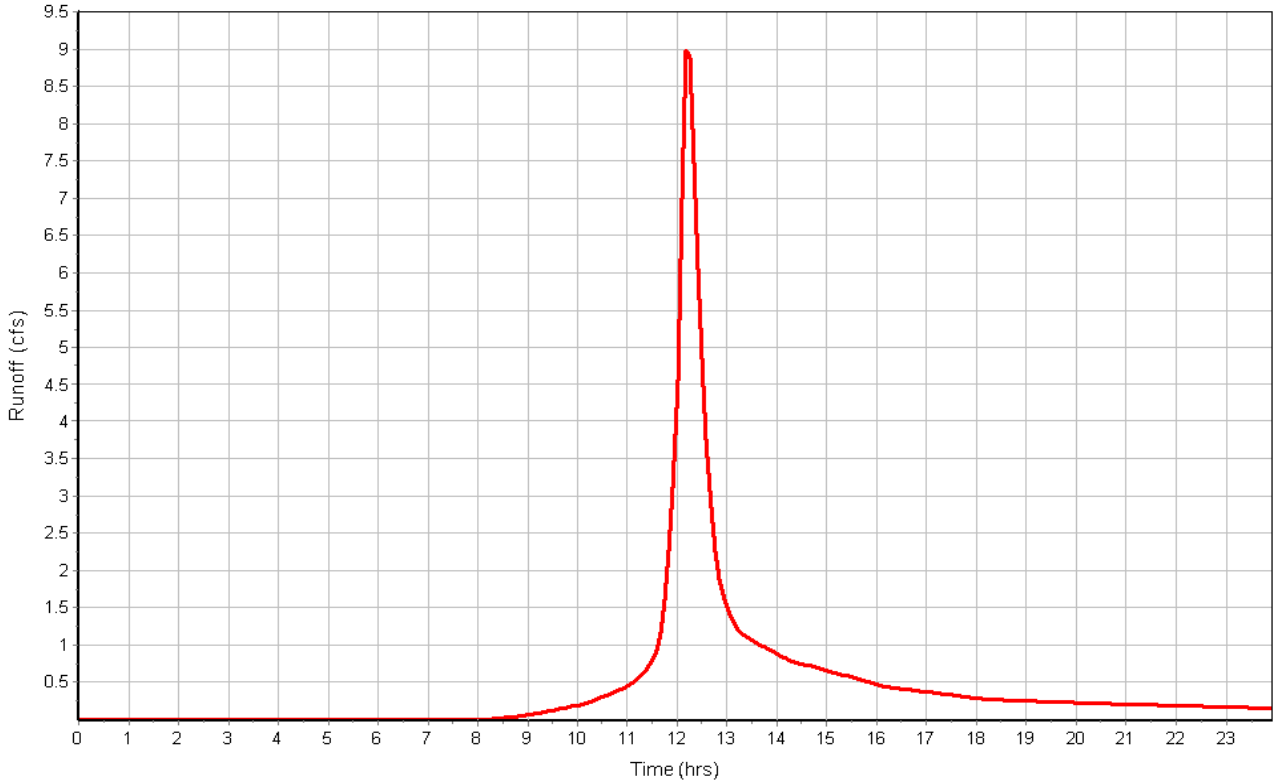
Total Rainfall (in) ..... 5.40
Total Runoff (in) ..... 2.96
Peak Runoff (cfs) ..... 9.23
Weighted Curve Number ..... 77.00
Time of Concentration (days hh:mm:ss) ..... 0 00:16:52

**Subbasin : E**

## Rainfall Intensity Graph




## Runoff Hydrograph



## Project Description

File Name ..... Proposed 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 ..... Jul 13, 2017 00:00:00
End Analysis On ..... Jul 14, 2017 00:00:00
Start Reporting On ..... Jul 13, 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 | 8 |
| Nodes | 11 |
| *Junctions* | 4 |
| *Outfalls* | 5 |
| *Flow Diversions* | 0 |
| *Inlets* | 0 |
| *Storage Nodes* | 2 |
| Links | 8 |
| *Channels* | 0 |
| *Pipes* | 4 |
| *Pumps* | 0 |
| *Orifices* | 2 |
| *Weirs* | 2 |
| *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 | Androscoggin | 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) |
|---|---|---|---|---|---|---|---|
| A1 | 12.28 | 73.16 | 3.00 | 0.87 | 10.62 | 5.17 | 0 00:49:44 |
| A2 | 6.41 | 80.93 | 3.00 | 1.31 | 8.39 | 7.56 | 0 00:12:48 |
| A3 | 4.01 | 71.75 | 3.00 | 0.80 | 3.19 | 2.90 | 0 00:09:08 |
| B | 4.99 | 75.82 | 3.00 | 1.01 | 5.01 | 3.50 | 0 00:24:28 |
| C1 | 15.70 | 73.25 | 3.00 | 0.87 | 13.66 | 5.97 | 0 00:59:49 |
| C2 | 2.05 | 82.98 | 3.00 | 1.45 | 2.96 | 2.25 | 0 00:22:00 |
| D | 0.59 | 77.00 | 3.00 | 1.07 | 0.63 | 0.56 | 0 00:12:07 |
| E | 2.86 | 77.00 | 3.00 | 1.07 | 3.06 | 2.68 | 0 00:13:08 |

## Node Summary

| Element ID | Element Type | Invert Elevation (ft) | Peak Inflow (cfs) |
|---|---|---|---|
| CB1 | Junction | 305.30 | 7.89 |
| CB2 | Junction | 312.00 | 7.55 |
| OUTLET-STR-A2 | Junction | 305.60 | 5.87 |
| OUTLET-STR-C2 | Junction | 299.00 | 0.06 |
| OUT-A | Outfall | 298.00 | 11.12 |
| OUT-B | Outfall | 310.00 | 3.48 |
| OUT-C | Outfall | 298.00 | 5.96 |
| OUT-D | Outfall | 338.00 | 0.56 |
| OUT-E | Outfall | 298.00 | 2.66 |
| FILTER-A2 | Storage Node | 308.00 | 7.51 |
| FILTER-C2 | Storage Node | 301.50 | 2.24 |

# 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) |
| CULV-A2-1 | Pipe | CB2 | FILTER-A2 | 104.00 | 312.00 | 310.00 | 1.9200 | 24.000 | 0.0150 | 7.51 | 27.19 | 7.41 | 0.72 |
| CULV-A2-2 | Pipe | OUTLET-STR-A2 | CB1 | 43.00 | 305.60 | 305.30 | 0.7000 | 24.000 | 0.0150 | 5.87 | 16.38 | 4.78 | 0.82 |
| CULV-A3 | Pipe | CB1 | OUT-A | 98.00 | 305.30 | 305.00 | 0.3100 | 36.000 | 0.0150 | 7.89 | 31.98 | 3.75 | 1.01 |
| CULV-C2 | Pipe | OUTLET-STR-C2 | OUT-C | 40.00 | 299.00 | 298.00 | 2.5000 | 15.000 | 0.0150 | 0.06 | 8.85 | 2.06 | 0.07 |
| ORIF-A2 | Orifice | FILTER-A2 | OUTLET-STR-A2 | | 308.00 | 305.60 | | 15.000 | | 5.87 | | | |
| ORIF-C2 | Orifice | FILTER-C2 | OUTLET-STR-C2 | | 301.50 | 299.00 | | 4.500 | | 0.06 | | | |
| WEIR-A2 | Weir | FILTER-A2 | OUTLET-STR-A2 | | 308.00 | 305.60 | | | | 0.00 | | | |
| WEIR-C2 | Weir | FILTER-C2 | OUT-C | | 301.50 | 298.00 | | | | 0.00 | | | |

# Subbasin Hydrology

## Subbasin : A1

### Input Data

Area (ac) ..... 12.28
Weighted Curve Number ..... 73.16
Rain Gage ID ..... Rain Gage-01

### Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 4.58 | D | 77.00 |
| > 75% grass cover, Good | 0.68 | C | 74.00 |
| Woods, Good | 6.62 | C | 70.00 |
| > 75% grass cover, Good | 0.40 | D | 80.00 |
| Composite Area & Weighted CN | 12.28 | | 73.16 |

### 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 (%) : | 2 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.05 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 30.68 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 1510 | 0.00 | 0.00 |
| Slope (%) : | .78 | 0.00 | 0.00 |
| Surface Type : | Grassed waterway | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.32 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 19.07 | 0.00 | 0.00 |

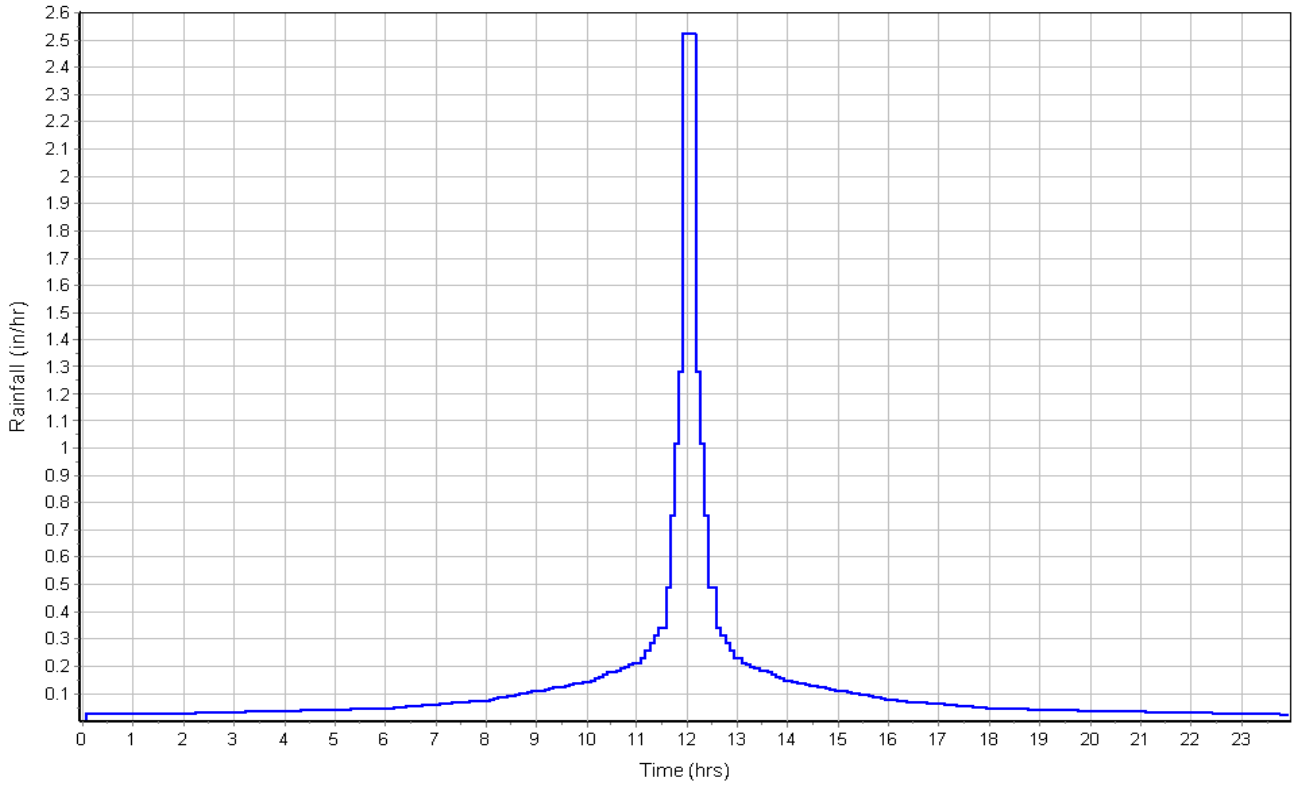
Total TOC (min) .....49.74

## Subbasin Runoff Results

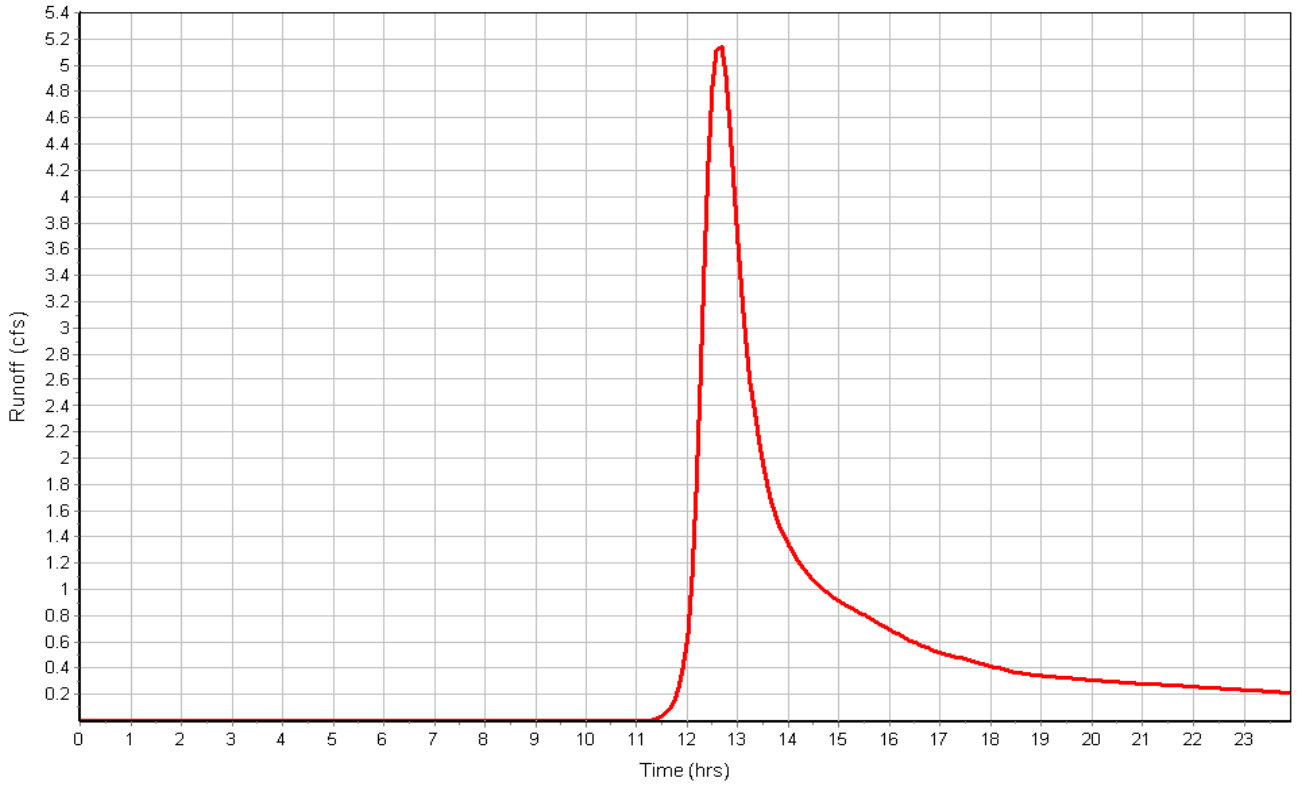
| | |
|---|---|
| Total Rainfall (in) | 3.00 |
| Total Runoff (in) | 0.87 |
| Peak Runoff (cfs) | 5.17 |
| Weighted Curve Number | 73.16 |
| Time of Concentration (days hh:mm:ss) | 0 00:49:44 |

**Subbasin : A1**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : A2

## Input Data

Area (ac) ..... 6.41
Weighted Curve Number ..... 80.93
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 0.13 | D | 77.00 |
| Roofs | 1.68 | D | 98.00 |
| > 75% grass cover, Good | 1.87 | D | 80.00 |
| Stone_Pad | 1.89 | D | 60.00 |
| Gravel roads | 0.17 | D | 91.00 |
| Pavement | 0.67 | D | 98.00 |
| Composite Area & Weighted CN | 6.41 | | 80.93 |

## Time of Concentration

| Sheet Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .4 | 0.00 | 0.00 |
| Flow Length (ft) : | 85 | 0.00 | 0.00 |
| Slope (%) : | 33.33 | 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) : | 6.32 | 0.00 | 0.00 |

| Channel Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .04 | 0.00 | 0.00 |
| Flow Length (ft) : | 1138 | 0.00 | 0.00 |
| Channel Slope (%) : | 1.4 | 0.00 | 0.00 |
| Cross Section Area (ft²) : | 4.398 | 0.00 | 0.00 |
| Wetted Perimeter (ft) : | 8.12 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 2.93 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 6.48 | 0.00 | 0.00 |

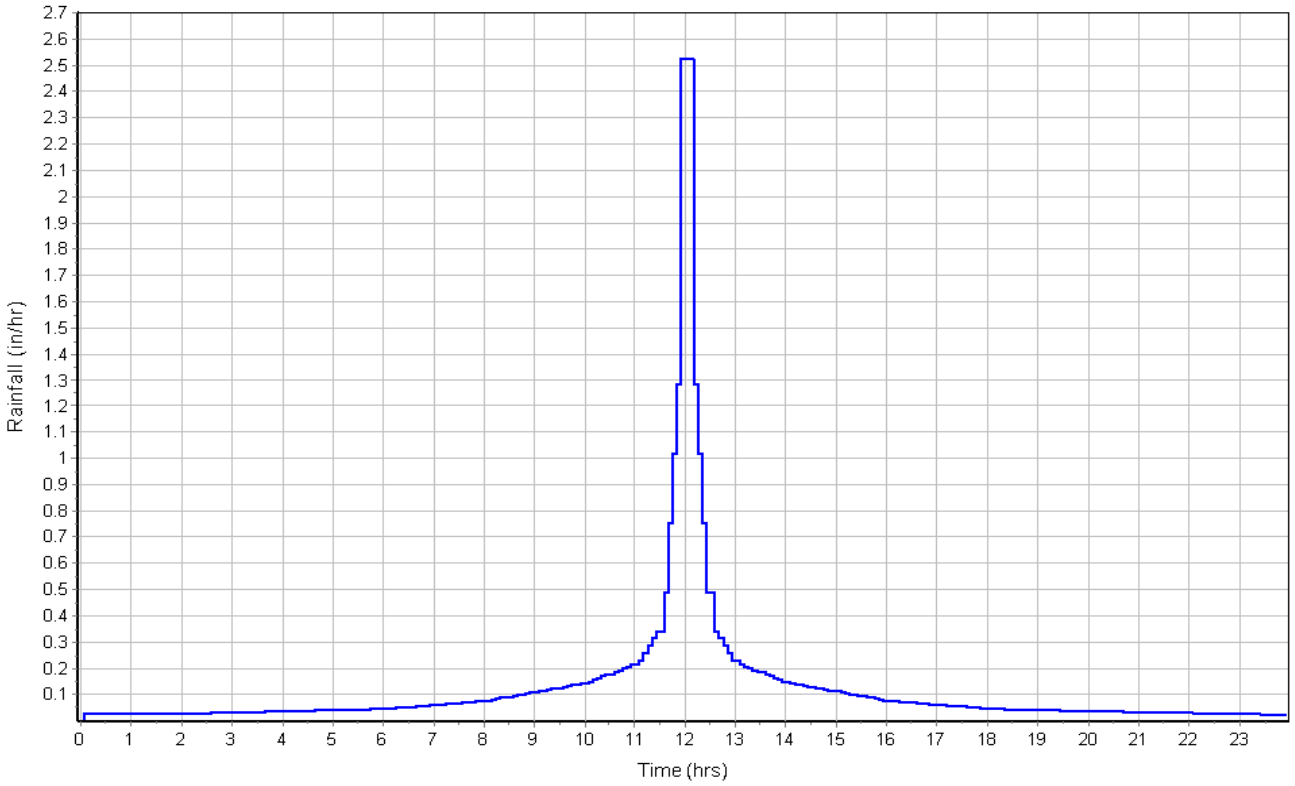
Total TOC (min) .....12.80

## Subbasin Runoff Results

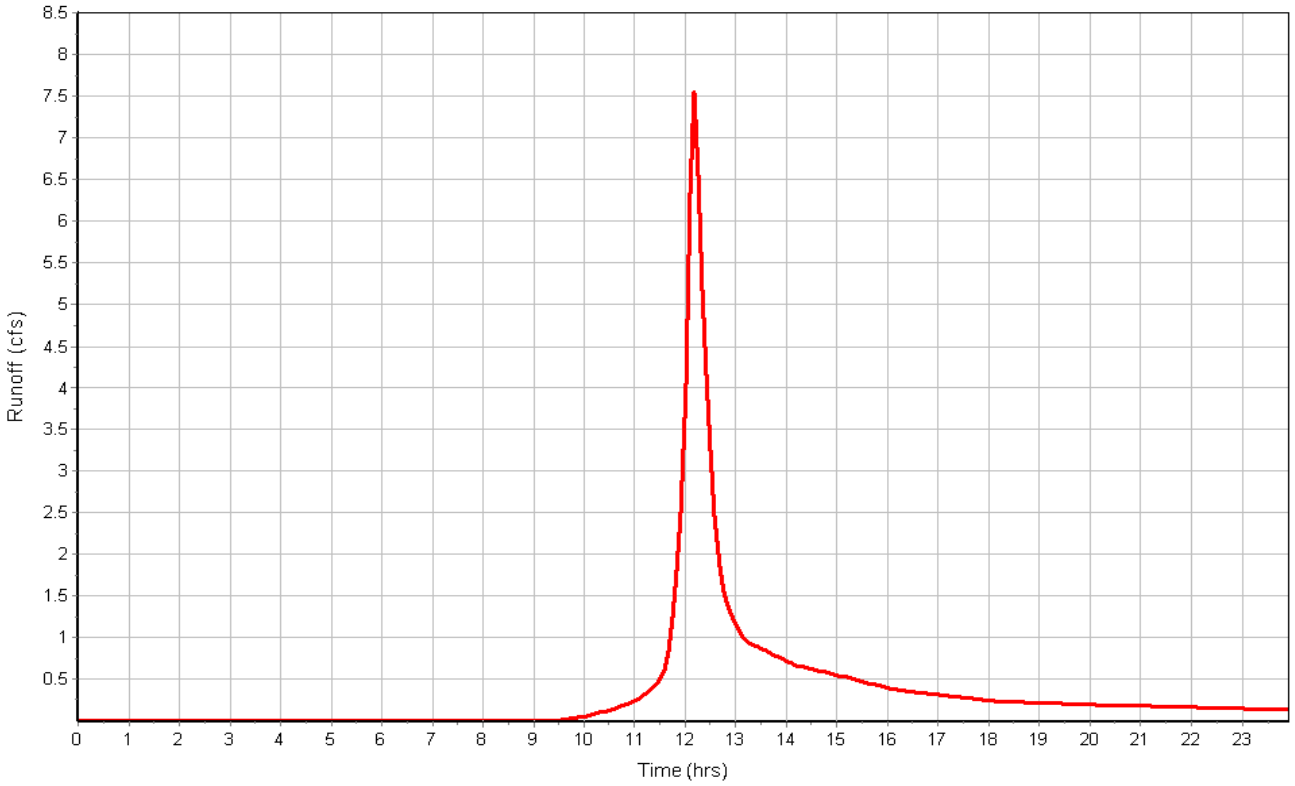
Total Rainfall (in) ..... 3.00
Total Runoff (in) ..... 1.31
Peak Runoff (cfs) ..... 7.56
Weighted Curve Number ..... 80.93
Time of Concentration (days hh:mm:ss) ..... 0 00:12:48

**Subbasin : A2**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : A3

## Input Data

Area (ac) ..... 4.01
Weighted Curve Number ..... 71.75
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| > 75% grass cover, Good | 0.75 | D | 80.00 |
| > 75% grass cover, Good | 0.14 | C | 74.00 |
| Stone_Pad | 2.28 | D | 60.00 |
| Roofs | 0.19 | D | 98.00 |
| Gravel roads | 0.25 | D | 91.00 |
| Pavement | 0.35 | D | 98.00 |
| Foundations | 0.05 | D | 98.00 |
| Composite Area & Weighted CN | 4.01 | | 71.75 |

## Time of Concentration

| Sheet Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .01 | 0.00 | 0.00 |
| Flow Length (ft) : | 100 | 0.00 | 0.00 |
| Slope (%) : | 2 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 1.44 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 1.16 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 548 | 25 | 200 |
| Slope (%) : | 2 | 33.33 | 1.5 |
| Surface Type : | Unpaved | rass pastu | rass pasture |
| Velocity (ft/sec) : | 2.28 | 4.04 | 0.86 |
| Computed Flow Time (min) : | 4.01 | 0.10 | 3.88 |

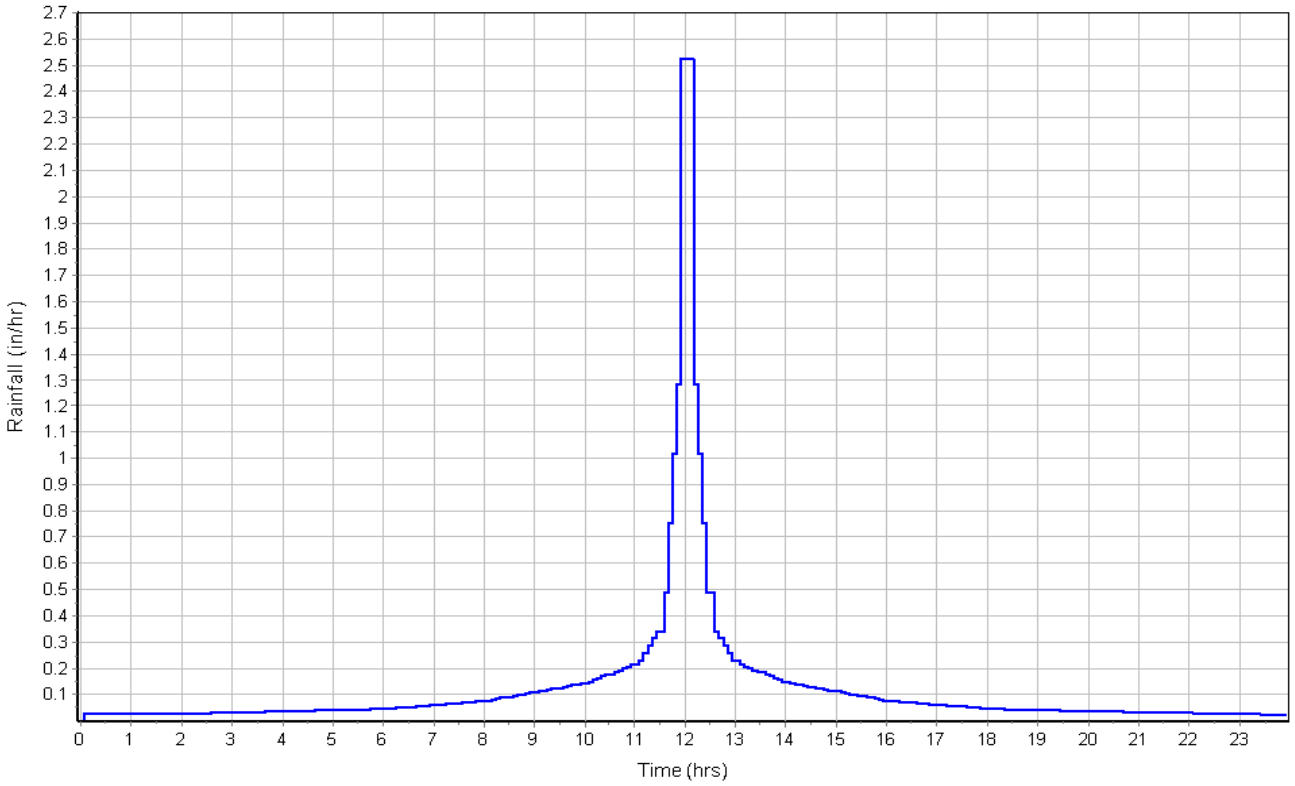
Total TOC (min) .....9.14

## Subbasin Runoff Results

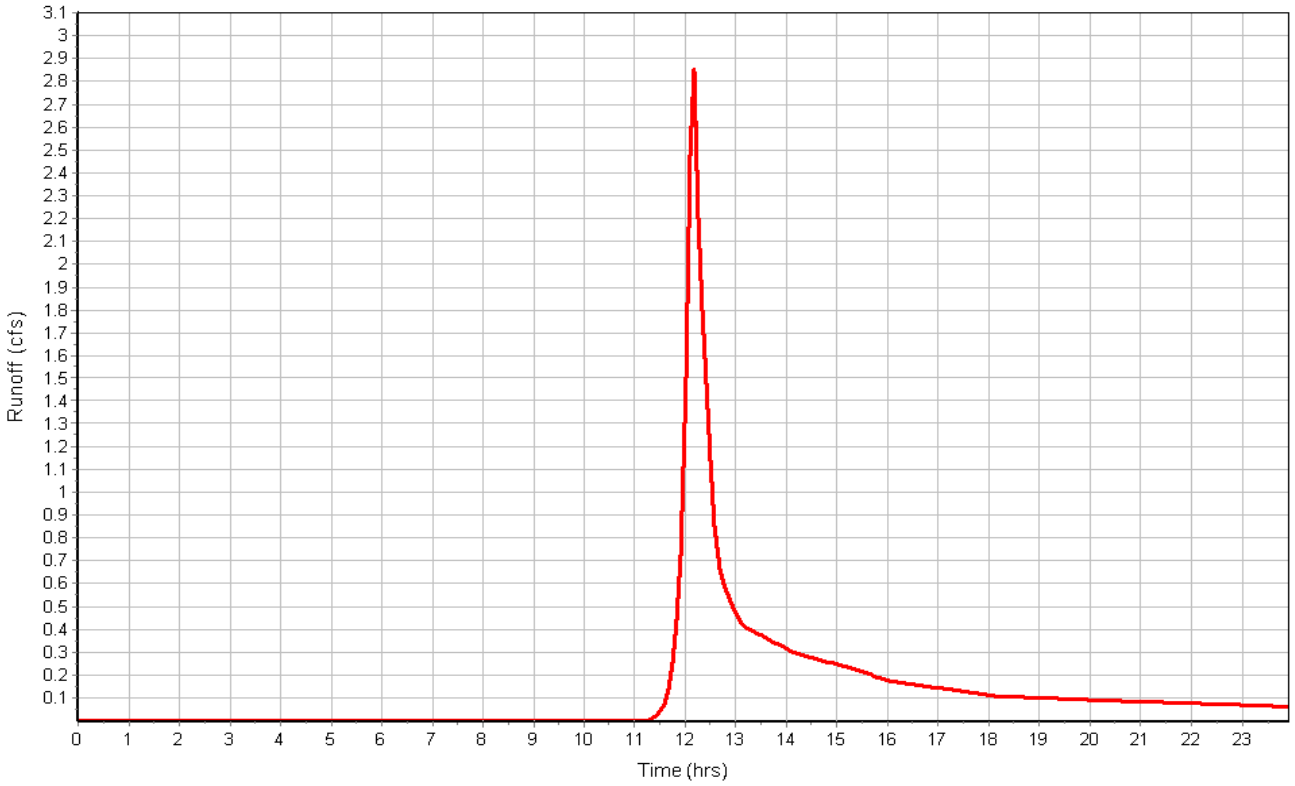
Total Rainfall (in) ..... 3.00
Total Runoff (in) ..... 0.80
Peak Runoff (cfs) ..... 2.90
Weighted Curve Number ..... 71.75
Time of Concentration (days hh:mm:ss) ..... 0 00:09:08

**Subbasin : A3**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : B

## Input Data

Area (ac) ..... 4.99
Weighted Curve Number ..... 75.82
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 1.05 | C | 70.00 |
| Woods, Good | 3.45 | D | 77.00 |
| > 75% grass cover, Good | 0.49 | D | 80.00 |
| Composite Area & Weighted CN | 4.99 | | 75.82 |

## Time of Concentration

| Sheet Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .4 | 0.00 | 0.00 |
| Flow Length (ft) : | 90 | 0.00 | 0.00 |
| Slope (%) : | 33.33 | 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) : | 6.62 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 368 | 0.00 | 0.00 |
| Slope (%) : | 1.63 | 0.00 | 0.00 |
| Surface Type : | Grassed waterway | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.92 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 3.19 | 0.00 | 0.00 |

| Channel Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .3 | .3 | 0.00 |
| Flow Length (ft) : | 272 | 85 | 0.00 |
| Channel Slope (%) : | 1.4 | 16.7 | 0.00 |
| Cross Section Area ($ft^2$) : | 3.287 | 1.367 | 0.00 |
| Wetted Perimeter (ft) : | 7.17 | 5.15 | 0.00 |
| Velocity (ft/sec) : | 0.35 | 0.84 | 0.00 |
| Computed Flow Time (min) : | 12.97 | 1.69 | 0.00 |

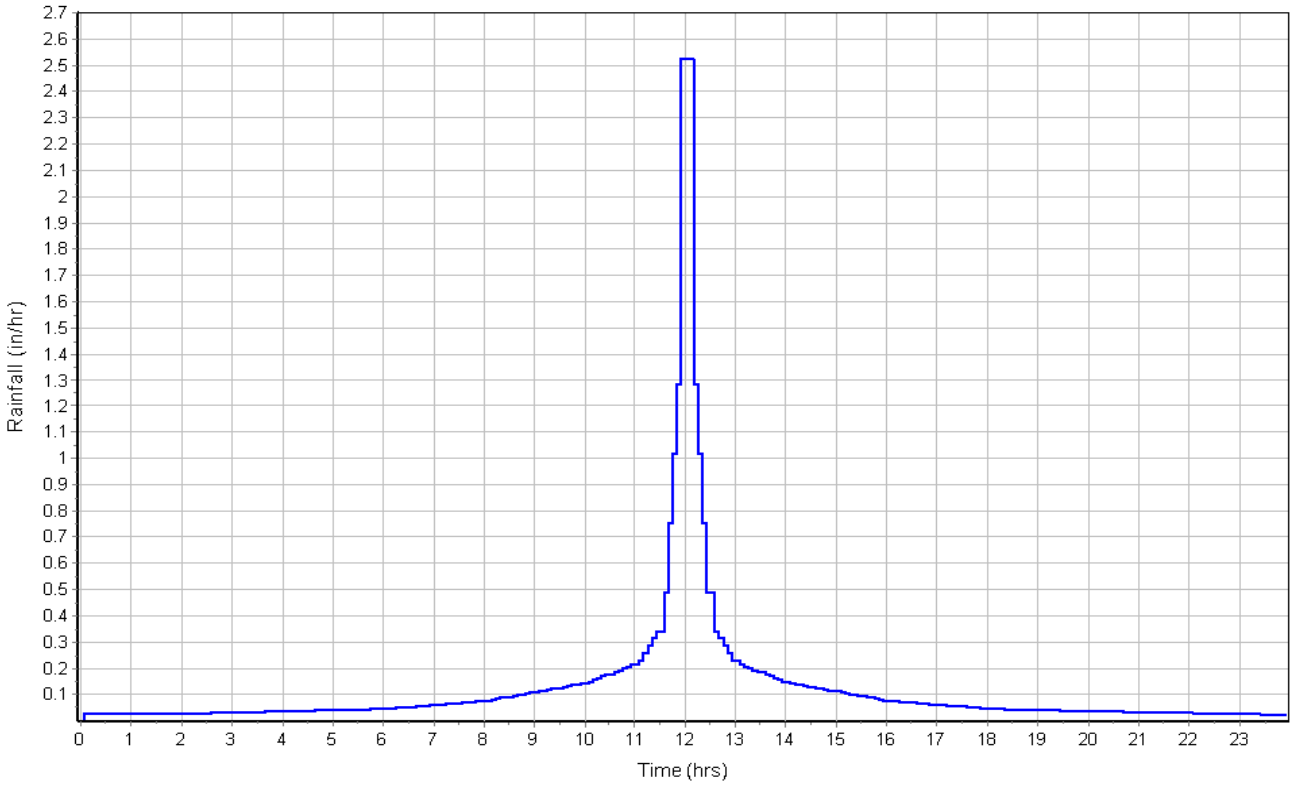
Total TOC (min) .....24.48

## Subbasin Runoff Results

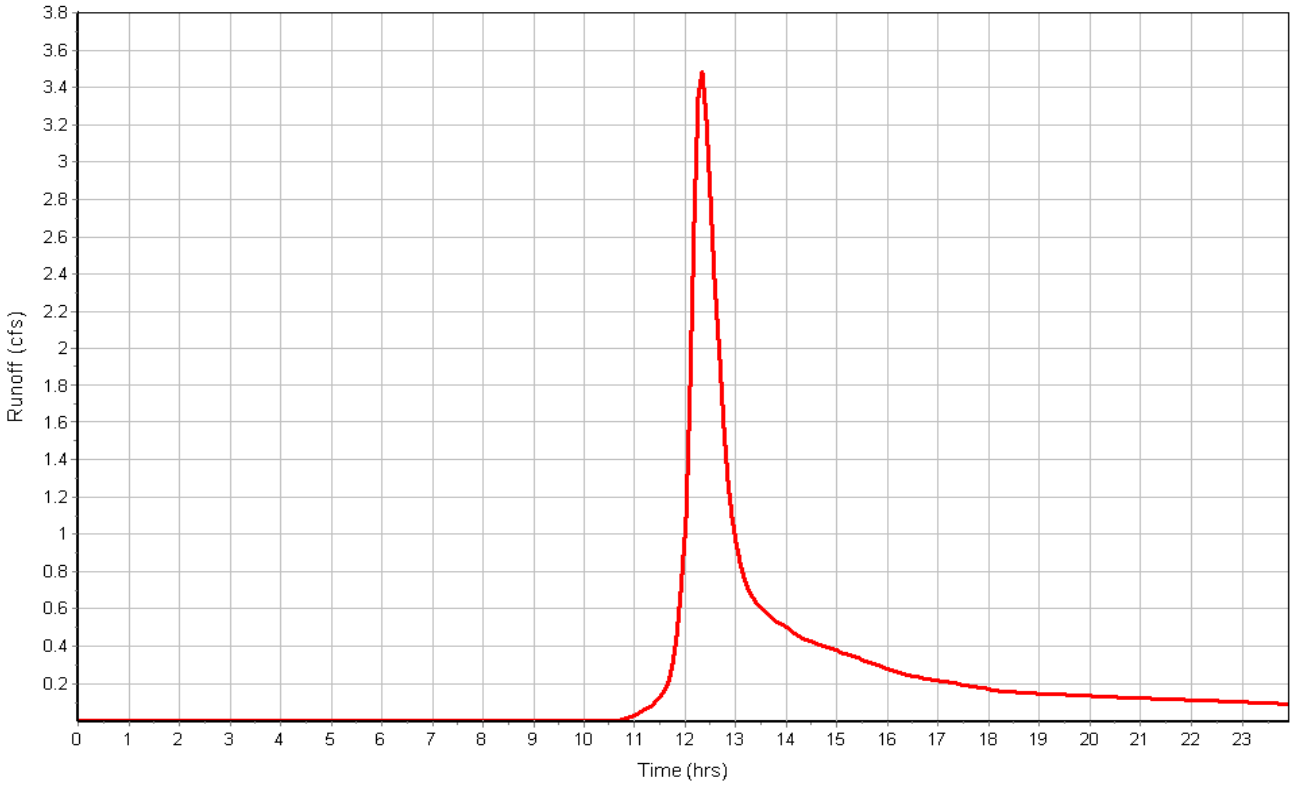
Total Rainfall (in) ..... 3.00
Total Runoff (in) ..... 1.01
Peak Runoff (cfs) ..... 3.50
Weighted Curve Number ..... 75.82
Time of Concentration (days hh:mm:ss) ..... 0 00:24:29

**Subbasin : B**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : C1

## Input Data

Area (ac) ..... 15.70
Weighted Curve Number ..... 73.25
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Gravel roads | 0.17 | D | 91.00 |
| > 75% grass cover, Good | 0.04 | D | 80.00 |
| Woods, Good | 8.63 | C | 70.00 |
| Woods, Good | 6.55 | D | 77.00 |
| > 75% grass cover, Good | 0.31 | C | 74.00 |
| Composite Area & Weighted CN | 15.70 | | 73.25 |

## 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 (%) : | 2 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.05 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 30.68 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 1907 | 0.00 | 0.00 |
| Slope (%) : | .524 | 0.00 | 0.00 |
| Surface Type : | Grassed waterway | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.09 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 29.16 | 0.00 | 0.00 |

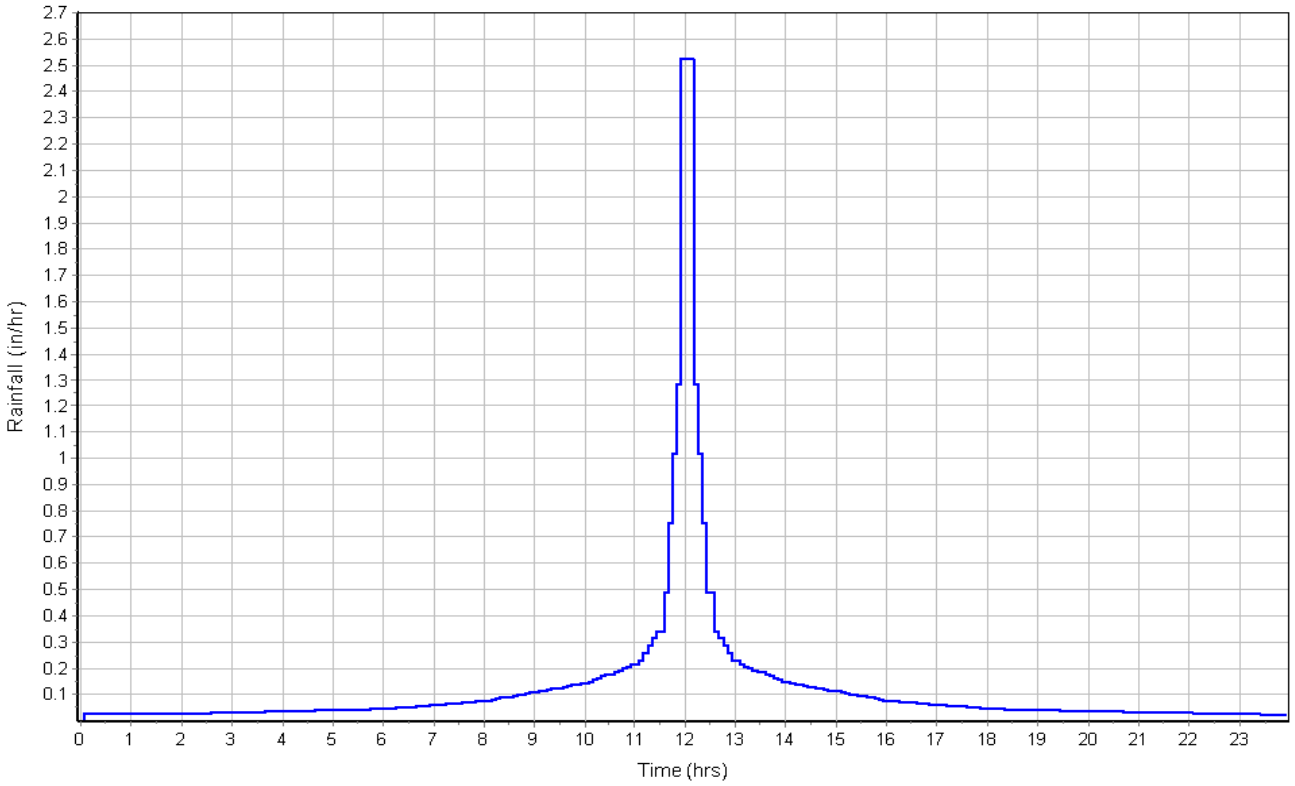
Total TOC (min) .....59.83

## Subbasin Runoff Results

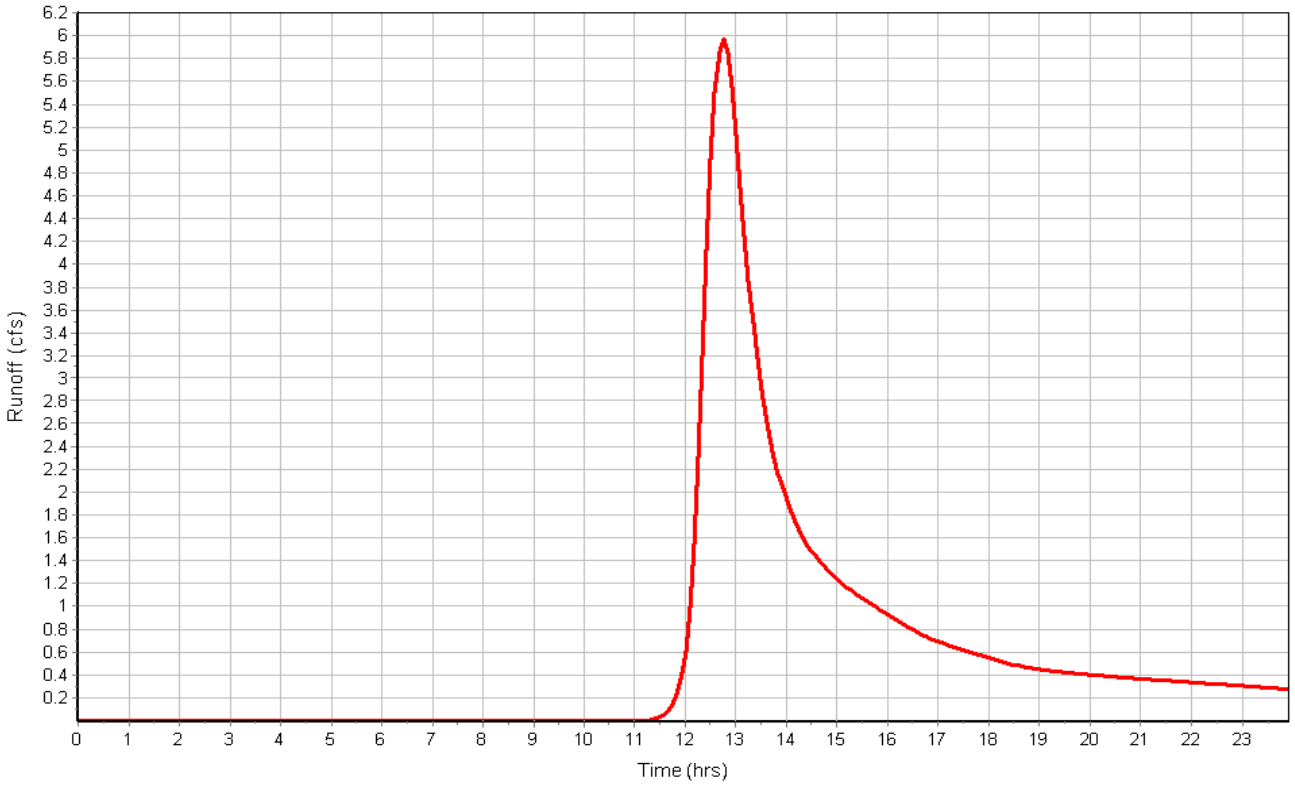
Total Rainfall (in) ..... 3.00
Total Runoff (in) ..... 0.87
Peak Runoff (cfs) ..... 5.97
Weighted Curve Number ..... 73.25
Time of Concentration (days hh:mm:ss) ..... 0 00:59:50

**Subbasin : C1**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : C2

## Input Data

Area (ac) ..... 2.05
Weighted Curve Number ..... 82.98
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| > 75% grass cover, Good | 0.32 | D | 80.00 |
| > 75% grass cover, Good | 0.76 | C | 74.00 |
| Gravel roads | 0.97 | D | 91.00 |
| Composite Area & Weighted CN | 2.05 | | 82.98 |

## Time of Concentration

| Sheet Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .01 | 0.00 | 0.00 |
| Flow Length (ft) : | 60 | 0.00 | 0.00 |
| Slope (%) : | 2 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 1.30 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 0.77 | 0.00 | 0.00 |

| Channel Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .03 | 0.00 | 0.00 |
| Flow Length (ft) : | 2256 | 0.00 | 0.00 |
| Channel Slope (%) : | .5 | 0.00 | 0.00 |
| Cross Section Area ($ft^2$) : | 2.475 | 0.00 | 0.00 |
| Wetted Perimeter (ft) : | 6.91 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 1.77 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 21.23 | 0.00 | 0.00 |

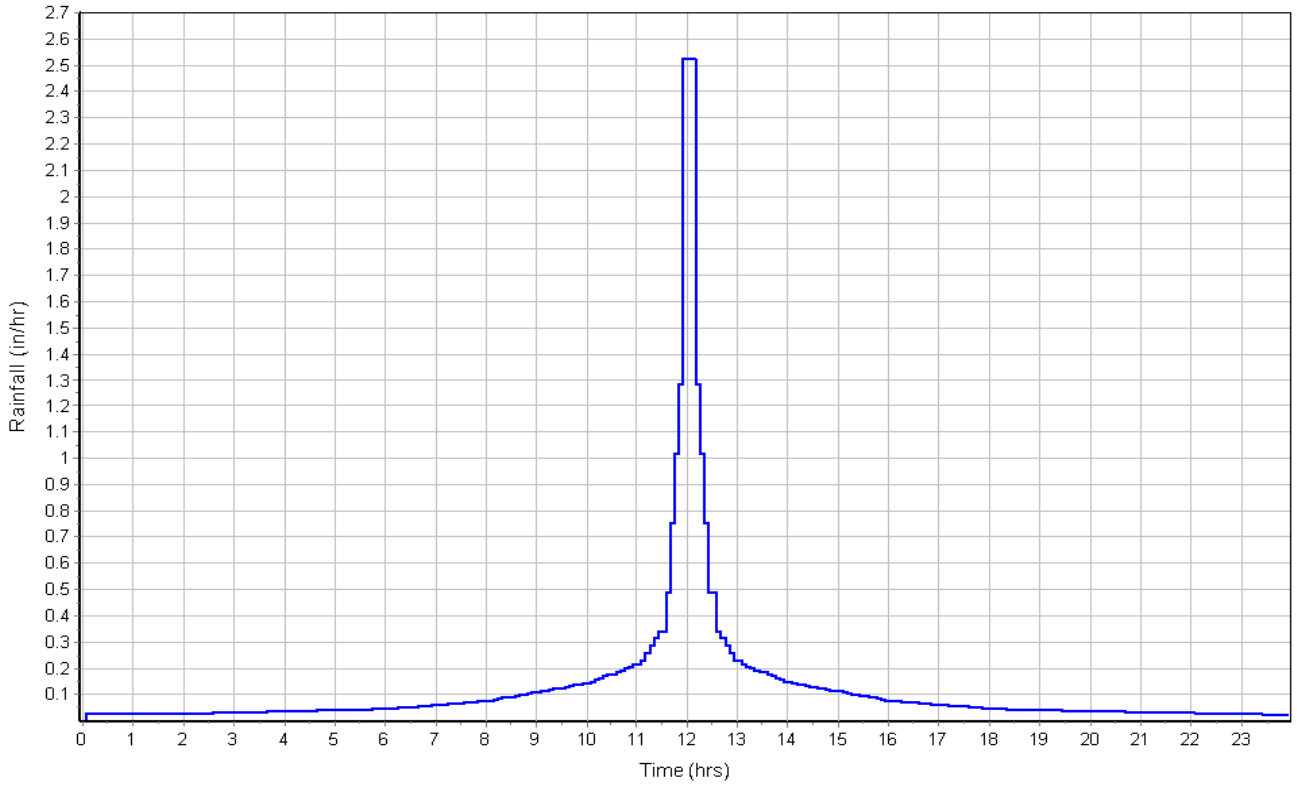
Total TOC (min) .....22.00

## Subbasin Runoff Results

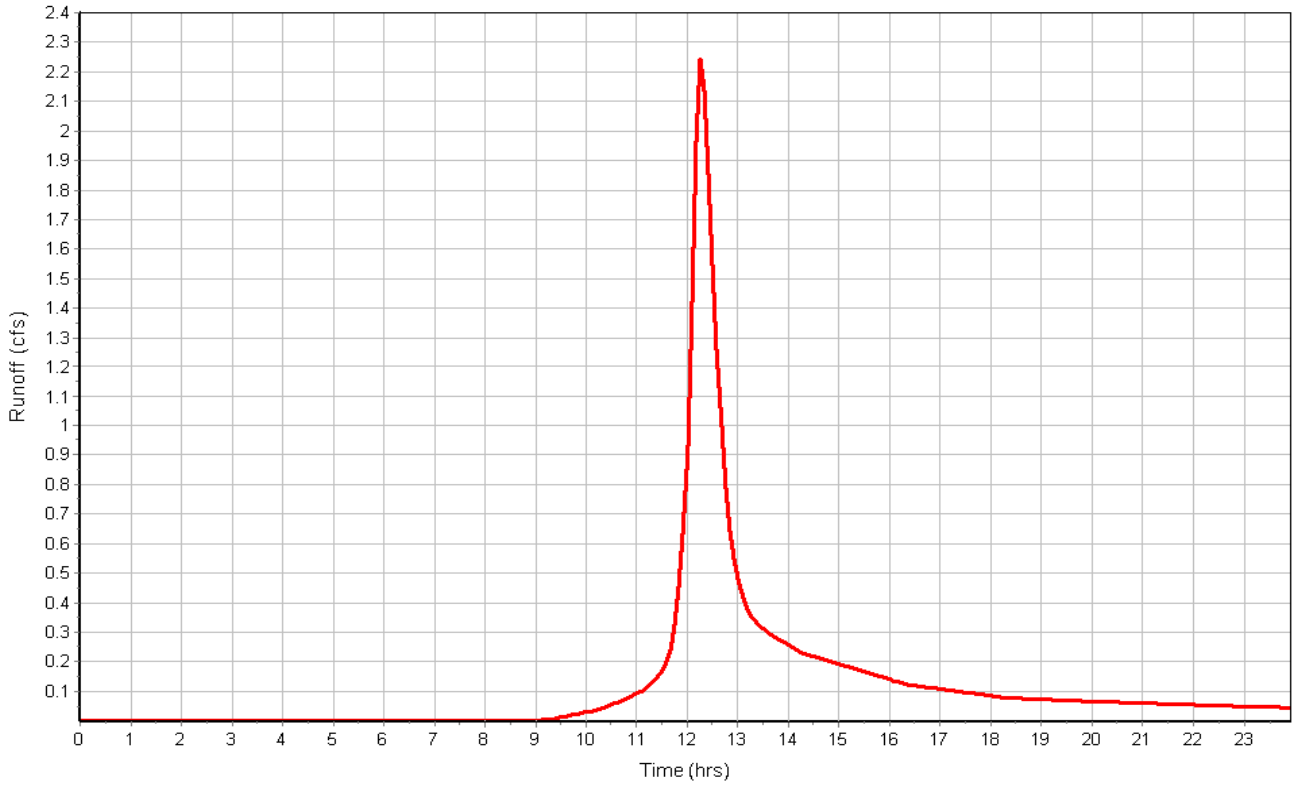
Total Rainfall (in) ..... 3.00
Total Runoff (in) ..... 1.45
Peak Runoff (cfs) ..... 2.25
Weighted Curve Number ..... 82.98
Time of Concentration (days hh:mm:ss) ..... 0 00:22:00

**Subbasin : C2**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : D

## Input Data

Area (ac) ..... 0.59
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 | 0.59 | D | 77.00 |
| Composite Area & Weighted CN | 0.59 | | 77.00 |

## 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 (%) : | 21 | 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) : | 11.98 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 16 | 0.00 | 0.00 |
| Slope (%) : | 14.5 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.90 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 0.14 | 0.00 | 0.00 |

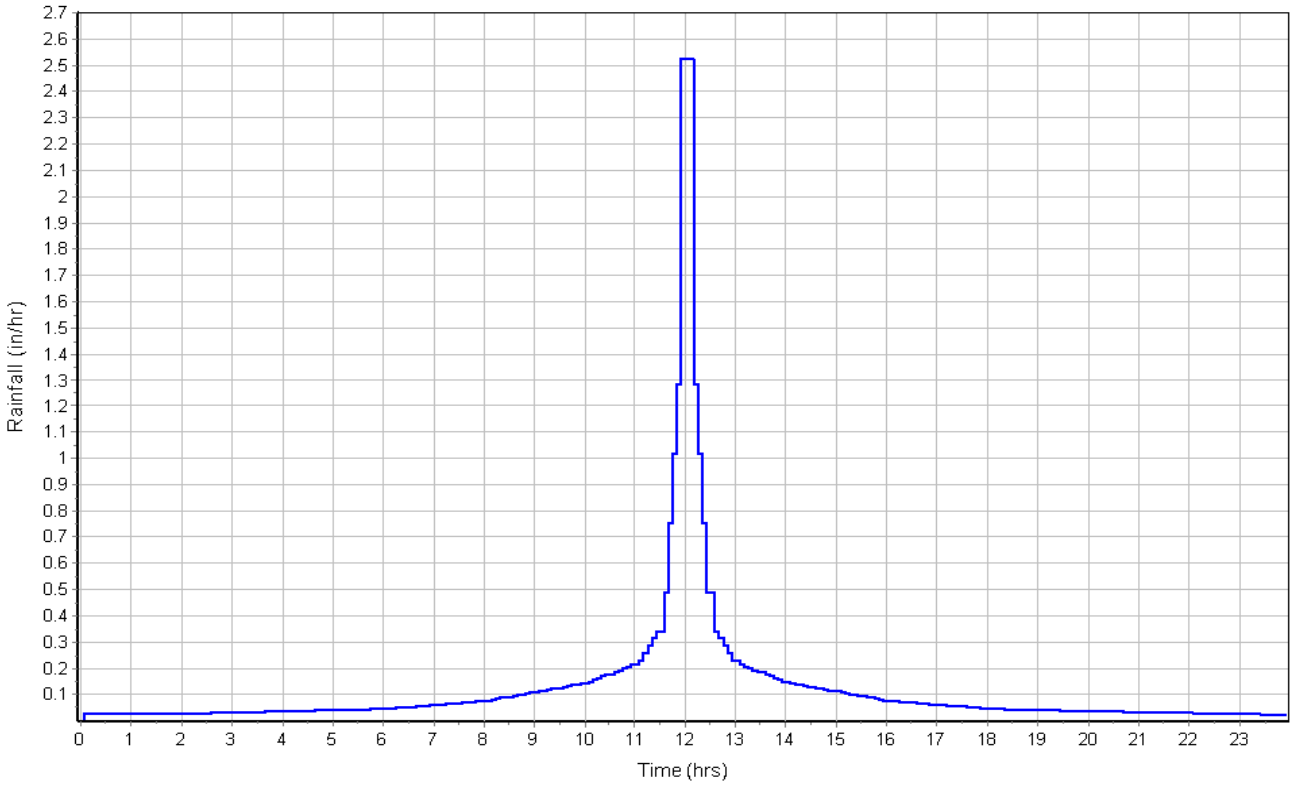
Total TOC (min) .....12.12

## Subbasin Runoff Results

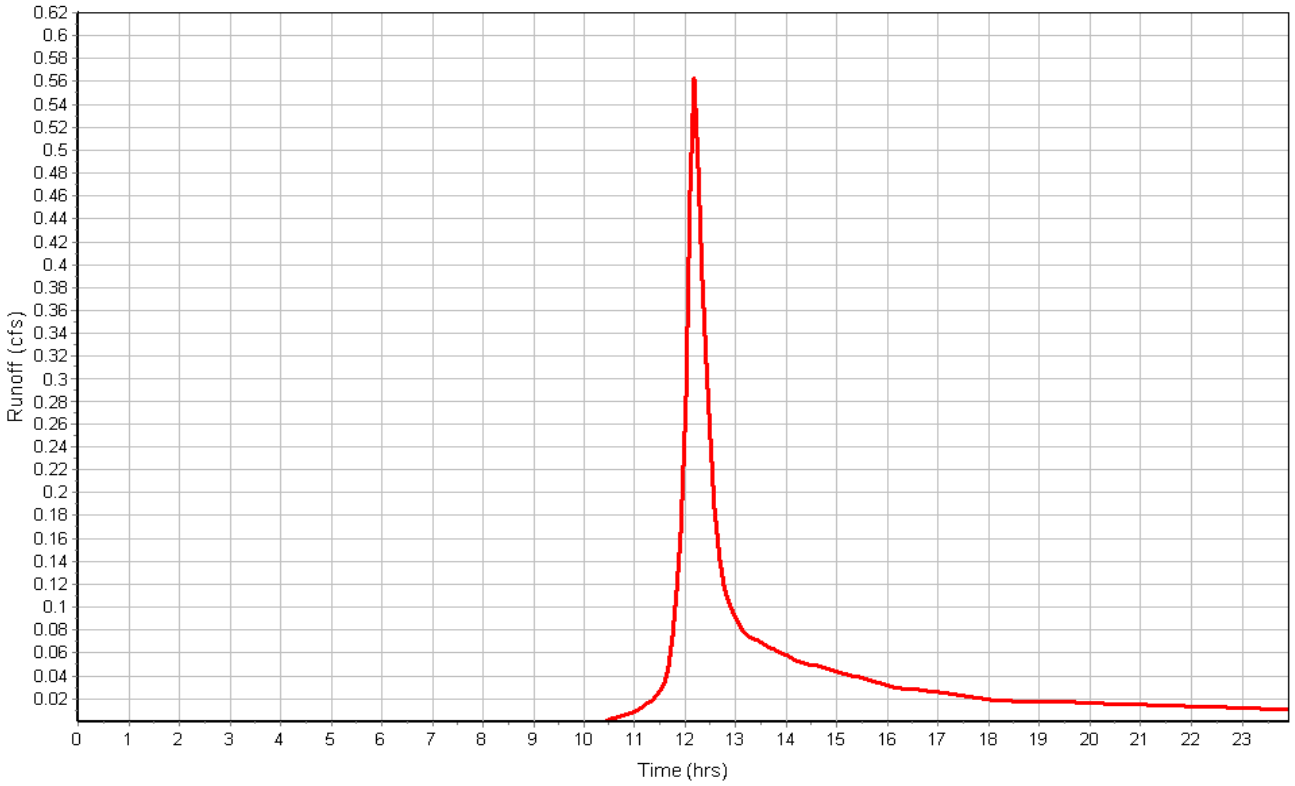
Total Rainfall (in) ..... 3.00
Total Runoff (in) ..... 1.07
Peak Runoff (cfs) ..... 0.56
Weighted Curve Number ..... 77.00
Time of Concentration (days hh:mm:ss) ..... 0 00:12:07

**Subbasin : D**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : E

## Input Data

Area (ac) ..... 2.86
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 | 2.86 | D | 77.00 |
| Composite Area & Weighted CN | 2.86 | | 77.00 |

## 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 (%) : | 24 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.15 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 11.35 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 227 | 0.00 | 0.00 |
| Slope (%) : | 18 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 2.12 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 1.78 | 0.00 | 0.00 |

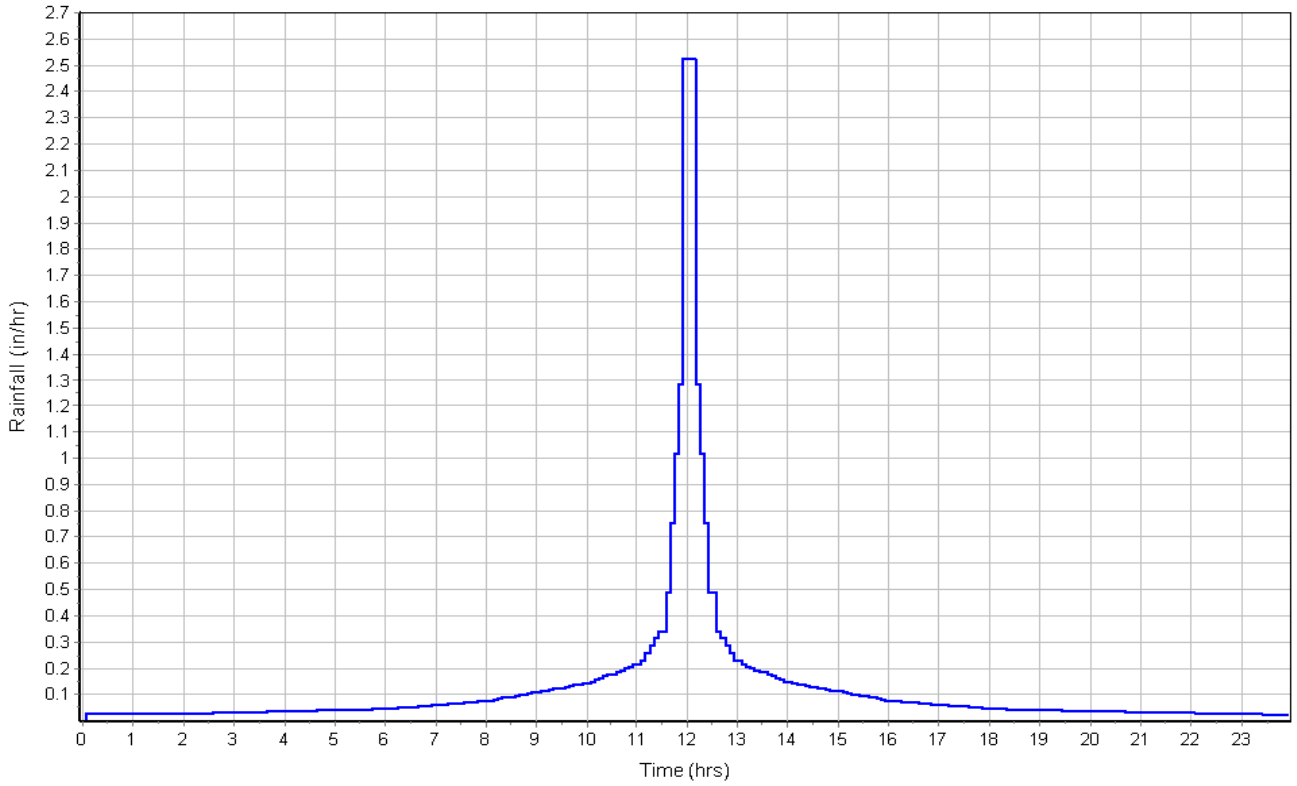
Total TOC (min) .....13.14

## Subbasin Runoff Results

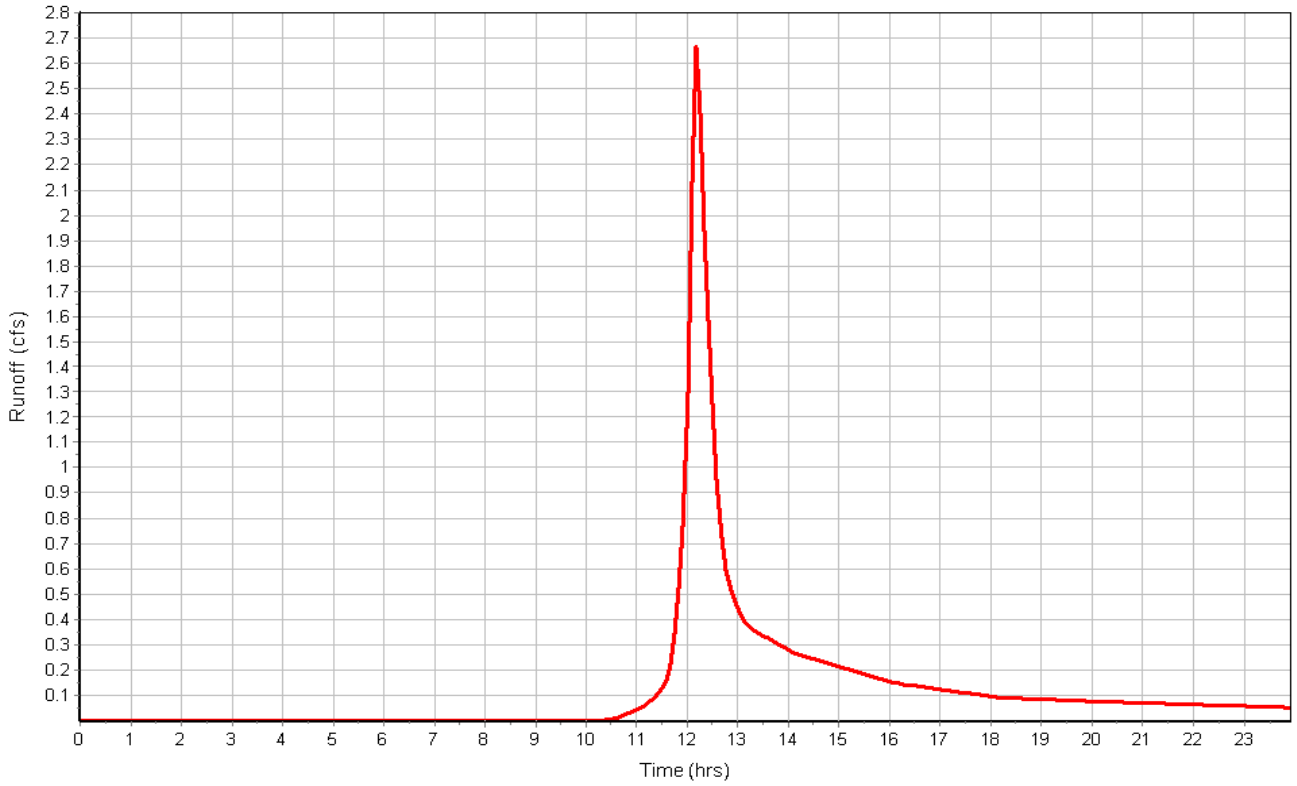
Total Rainfall (in) ..... 3.00
Total Runoff (in) ..... 1.07
Peak Runoff (cfs) ..... 2.68
Weighted Curve Number ..... 77.00
Time of Concentration (days hh:mm:ss) ..... 0 00:13:08

**Subbasin : E**

## Rainfall Intensity Graph




## Runoff Hydrograph



## Junction Input

| Element ID | Invert Elevation (ft) | Ground/Rim (Max) Elevation (ft) |
|---|---|---|
| CB1 | 305.30 | 309.50 |
| CB2 | 312.00 | 316.00 |
| OUTLET-STR-A2 | 305.60 | 312.00 |
| OUTLET-STR-C2 | 299.00 | 305.00 |

## 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) |
| CB1 | 7.89 | 306.32 | 1.02 | 3.18 | 305.45 | 0 12:21 |
| CB2 | 7.55 | 312.72 | 0.72 | 3.28 | 312.10 | 0 12:15 |
| OUTLET-STR-A2 | 5.87 | 306.43 | 0.83 | 5.57 | 305.71 | 0 12:23 |
| OUTLET-STR-C2 | 0.06 | 299.07 | 0.07 | 5.93 | 299.02 | 0 21:01 |

## 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 |
|---|---|---|---|---|---|---|---|---|
| CULV-A2-1 | 104.00 | 312.00 | 310.00 | 1.9200 | CIRCULAR | 24.000 | 24.000 | 0.0150 |
| CULV-A2-2 | 43.00 | 305.60 | 305.30 | 0.7000 | CIRCULAR | 24.000 | 24.000 | 0.0150 |
| CULV-A3 | 98.00 | 305.30 | 305.00 | 0.3100 | CIRCULAR | 36.000 | 36.000 | 0.0150 |
| CULV-C2 | 40.00 | 299.00 | 298.00 | 2.5000 | 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) |
| CULV-A2-1 | 7.51 | 0 12:15 | 27.19 | 7.41 | 0.72 |
| CULV-A2-2 | 5.87 | 0 12:23 | 16.38 | 4.78 | 0.82 |
| CULV-A3 | 7.89 | 0 12:21 | 31.98 | 3.75 | 1.01 |
| CULV-C2 | 0.06 | 0 21:01 | 8.85 | 2.06 | 0.07 |

# Storage Nodes

## Storage Node : FILTER-A2

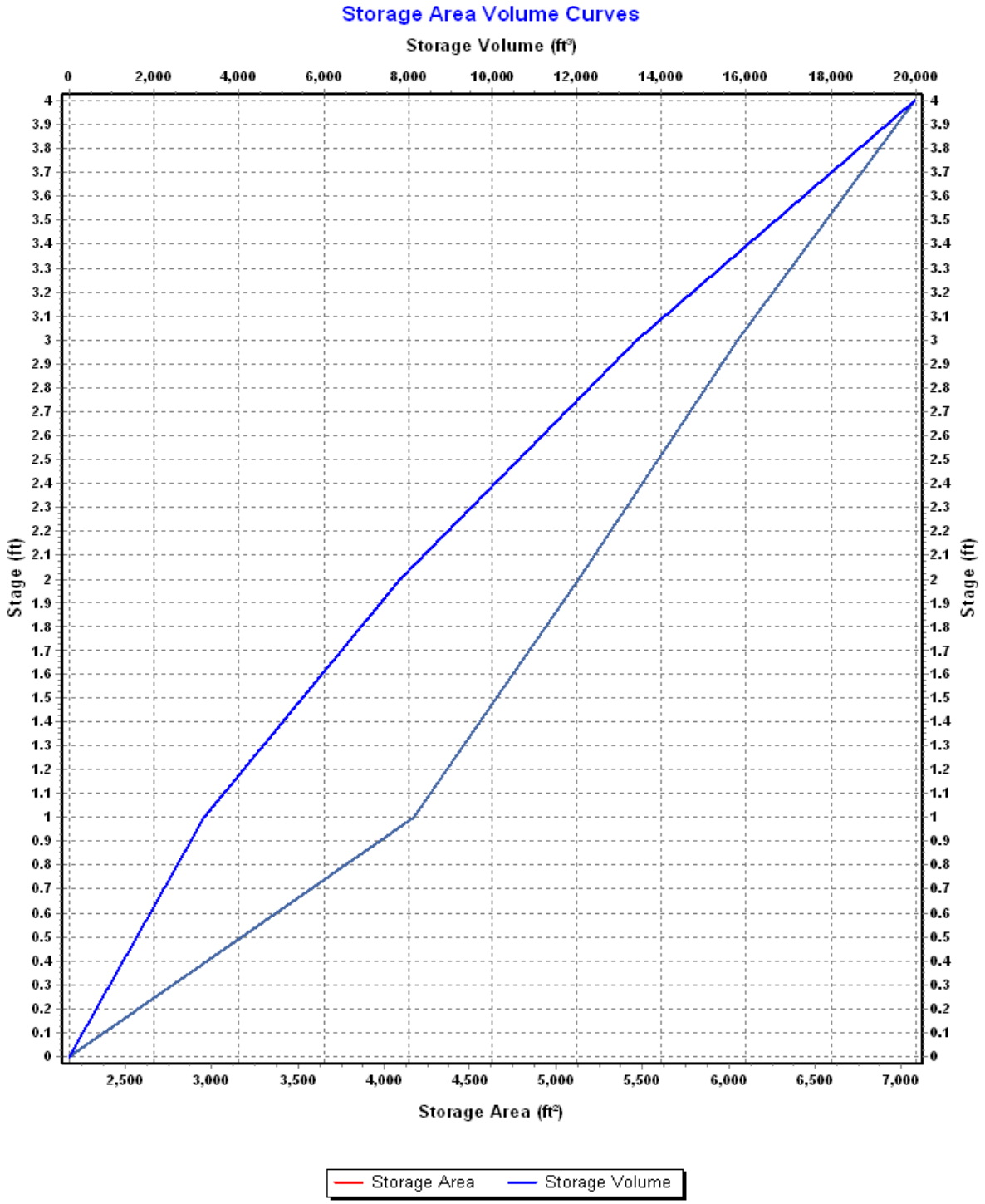
### Input Data

| | |
|---|---|
| Invert Elevation (ft) | 308.00 |
| Max (Rim) Elevation (ft) | 312.00 |
| Max (Rim) Offset (ft) | 4.00 |
| Initial Water Elevation (ft) | 308.00 |
| Initial Water Depth (ft) | 0.00 |
| Ponded Area (ft²) | 0.00 |
| Evaporation Loss | 0.00 |

### Storage Area Volume Curves

Storage Curve : Storage-05

| Stage (ft) | Storage Area (ft²) | Storage Volume (ft³) |
|---|---|---|
| 0 | 2178 | 0.000 |
| 1 | 4172 | 3175.00 |
| 2 | 5127 | 7824.50 |
| 3 | 6050 | 13413.00 |
| 4 | 7075 | 19975.50 |


Storage Area Volume Curves
Storage Volume (ft³)
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
Stage (ft)
Stage (ft)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1
2.2
2.3
2.4
2.5
2.6
2.7
2.8
2.9
3
3.1
3.2
3.3
3.4
3.5
3.6
3.7
3.8
3.9
4
2,500
3,000
3,500
4,000
4,500
5,000
5,500
6,000
6,500
7,000
Storage Area (ft²)
Storage Area
Storage Volume

# Storage Node : FILTER-A2 (continued)

## Outflow Weirs

| Element ID | Weir Type | Crest Elevation (ft) | Length (ft) | Weir Total Height (ft) | Discharge Coefficient |
|---|---|---|---|---|---|
| WEIR-A2 | Trapezoidal | 310.70 | 40.00 | 1.32 | 3.10 |

## Outflow Orifices

| Element ID | Orifice Type | Orifice Shape | Circular Orifice Diameter (in) | Rectangular Orifice Height (in) | Rectangular Orifice Width (in) | Orifice Invert Elevation (ft) | Orifice Coefficient |
|---|---|---|---|---|---|---|---|
| ORIF-A2 | Side | Rectangular | | 15.00 | 32.00 | 309.10 | 0.63 |

## Output Summary Results

| | |
|---|---|
| Peak Inflow (cfs) | 7.51 |
| Peak Lateral Inflow (cfs) | 0.00 |
| Peak Outflow (cfs) | 5.87 |
| Peak Exfiltration Flow Rate (cfm) | 0.00 |
| Max HGL Elevation Attained (ft) | 309.83 |
| Max HGL Depth Attained (ft) | 1.83 |
| Average HGL Elevation Attained (ft) | 308.64 |
| Average HGL Depth Attained (ft) | 0.64 |
| Time of Max HGL Occurrence (days hh:mm) | 0 12:23 |
| Total Exfiltration Volume (1000-ft³) | 0.000 |
| Total Flooded Volume (ac-in) | 0 |
| Total Time Flooded (min) | 0 |
| Total Retention Time (sec) | 0.00 |

# Storage Node : FILTER-C2

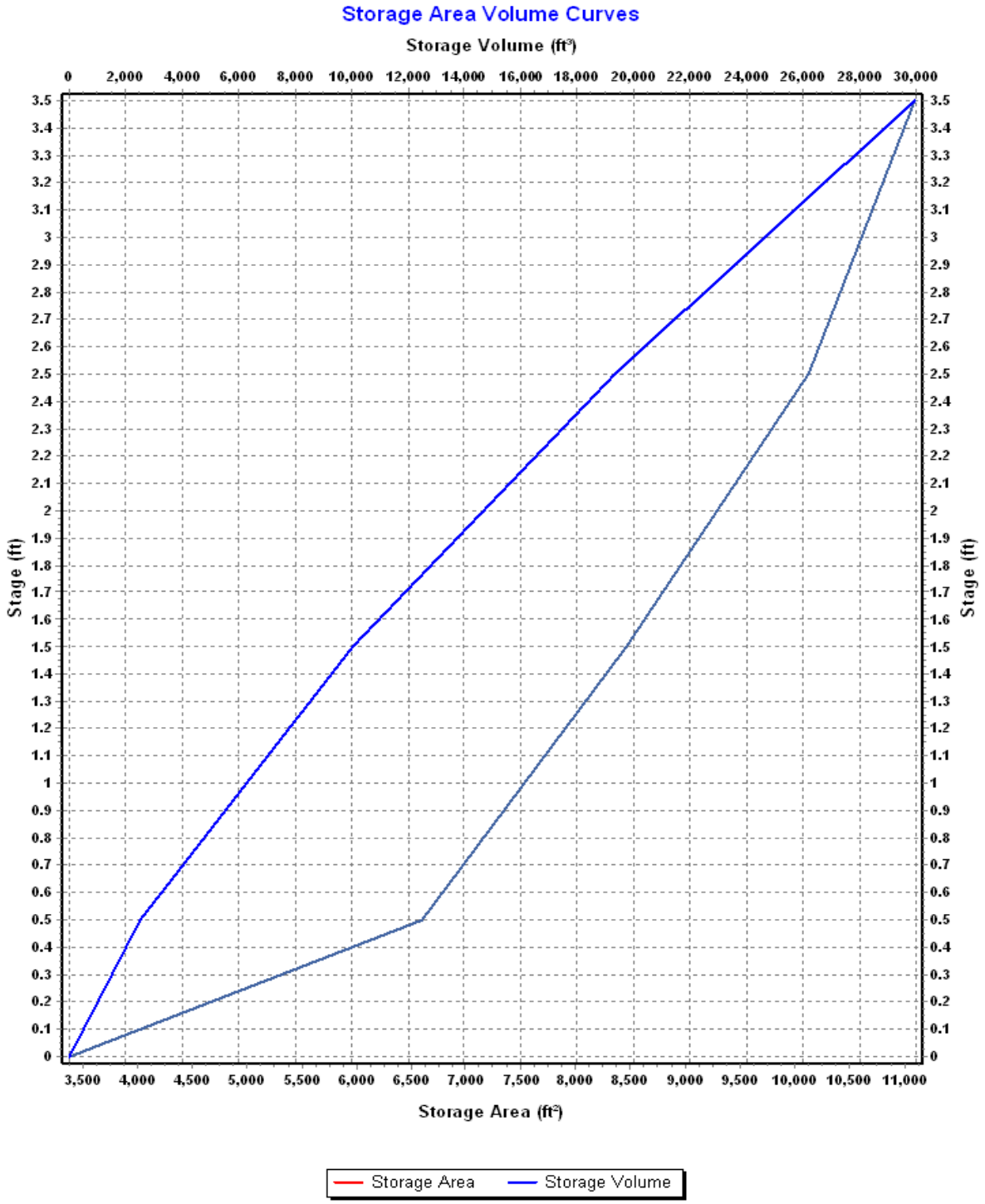
## Input Data

Invert Elevation (ft) ..... 301.50
Max (Rim) Elevation (ft) ..... 305.00
Max (Rim) Offset (ft) ..... 3.50
Initial Water Elevation (ft) ..... 301.50
Initial Water Depth (ft) ..... 0.00
Ponded Area (ft²) ..... 0.00
Evaporation Loss ..... 0.00

## Storage Area Volume Curves

Storage Curve : Storage-07

| Stage (ft) | Storage Area (ft²) | Storage Volume (ft³) |
|---|---|---|
| 0 | 3380 | 0.000 |
| .5 | 6601 | 2495.25 |
| 1.5 | 8462 | 10026.75 |
| 2.5 | 10125 | 19320.25 |
| 3.5 | 11092 | 29928.75 |


Storage Area Volume Curves
Storage Volume (ft³)
0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000 22,000 24,000 26,000 28,000 30,000
Stage (ft)
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3 3.1 3.2 3.3 3.4 3.5
Storage Area (ft²)
3,500 4,000 4,500 5,000 5,500 6,000 6,500 7,000 7,500 8,000 8,500 9,000 9,500 10,000 10,500 11,000
Storage Area
Storage Volume

## Storage Node : FILTER-C2 (continued)

### Outflow Weirs

| Element ID | Weir Type | Crest Elevation (ft) | Length (ft) | Weir Total Height (ft) | Discharge Coefficient |
|---|---|---|---|---|---|
| WEIR-C2 | Trapezoidal | 303.80 | 30.00 | 1.20 | 3.10 |

### Outflow Orifices

| Element ID | Orifice Type | Orifice Shape | Circular Orifice Diameter (in) | Rectangular Orifice Height (in) | Rectangular Orifice Width (in) | Orifice Invert Elevation (ft) | Orifice Coefficient |
|---|---|---|---|---|---|---|---|
| ORIF-C2 | Side | CIRCULAR | 4.50 | | | 302.75 | 0.61 |

### Output Summary Results

| | |
|---|---|
| Peak Inflow (cfs) | 2.24 |
| Peak Lateral Inflow (cfs) | 2.24 |
| Peak Outflow (cfs) | 0.06 |
| Peak Exfiltration Flow Rate (cfm) | 0.00 |
| Max HGL Elevation Attained (ft) | 302.90 |
| Max HGL Depth Attained (ft) | 1.4 |
| Average HGL Elevation Attained (ft) | 302.15 |
| Average HGL Depth Attained (ft) | 0.65 |
| Time of Max HGL Occurrence (days hh:mm) | 0 21:01 |
| Total Exfiltration Volume (1000-ft³) | 0.000 |
| Total Flooded Volume (ac-in) | 0 |
| Total Time Flooded (min) | 0 |
| Total Retention Time (sec) | 0.00 |

## Project Description

File Name ..... Proposed 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 ..... Jul 13, 2017 00:00:00
End Analysis On ..... Jul 14, 2017 00:00:00
Start Reporting On ..... Jul 13, 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 | 8 |
| Nodes | 11 |
| *Junctions* | 4 |
| *Outfalls* | 5 |
| *Flow Diversions* | 0 |
| *Inlets* | 0 |
| *Storage Nodes* | 2 |
| Links | 8 |
| *Channels* | 0 |
| *Pipes* | 4 |
| *Pumps* | 0 |
| *Orifices* | 2 |
| *Weirs* | 2 |
| *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 | Androscoggin | 10 | 4.60 | 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) |
|---|---|---|---|---|---|---|---|
| A1 | 12.28 | 73.16 | 4.60 | 1.98 | 24.36 | 12.68 | 0 00:49:44 |
| A2 | 6.41 | 80.93 | 4.60 | 2.63 | 16.85 | 15.31 | 0 00:12:48 |
| A3 | 4.01 | 71.75 | 4.60 | 1.88 | 7.52 | 7.30 | 0 00:09:08 |
| B | 4.99 | 75.82 | 4.60 | 2.20 | 10.95 | 7.98 | 0 00:24:28 |
| C1 | 15.70 | 73.25 | 4.60 | 1.99 | 31.26 | 14.63 | 0 00:59:49 |
| C2 | 2.05 | 82.98 | 4.60 | 2.81 | 5.77 | 4.39 | 0 00:22:00 |
| D | 0.59 | 77.00 | 4.60 | 2.29 | 1.35 | 1.24 | 0 00:12:07 |
| E | 2.86 | 77.00 | 4.60 | 2.29 | 6.56 | 5.91 | 0 00:13:08 |

## Node Summary

| Element ID | Element Type | Invert Elevation (ft) | Peak Inflow (cfs) |
|---|---|---|---|
| CB1 | Junction | 305.30 | 19.04 |
| CB2 | Junction | 312.00 | 15.30 |
| OUTLET-STR-A2 | Junction | 305.60 | 13.15 |
| OUTLET-STR-C2 | Junction | 299.00 | 0.36 |
| OUT-A | Outfall | 298.00 | 26.18 |
| OUT-B | Outfall | 310.00 | 7.87 |
| OUT-C | Outfall | 298.00 | 14.84 |
| OUT-D | Outfall | 338.00 | 1.24 |
| OUT-E | Outfall | 298.00 | 5.91 |
| FILTER-A2 | Storage Node | 308.00 | 15.24 |
| FILTER-C2 | Storage Node | 301.50 | 4.39 |

# 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) |
| CULV-A2-1 | Pipe | CB2 | FILTER-A2 | 104.00 | 312.00 | 310.00 | 1.9200 | 24.000 | 0.0150 | 15.24 | 27.19 | 8.90 | 1.07 |
| CULV-A2-2 | Pipe | OUTLET-STR-A2 | CB1 | 43.00 | 305.60 | 305.30 | 0.7000 | 24.000 | 0.0150 | 13.15 | 16.38 | 5.79 | 1.36 |
| CULV-A3 | Pipe | CB1 | OUT-A | 98.00 | 305.30 | 305.00 | 0.3100 | 36.000 | 0.0150 | 19.04 | 31.98 | 4.72 | 1.65 |
| CULV-C2 | Pipe | OUTLET-STR-C2 | OUT-C | 40.00 | 299.00 | 298.00 | 2.5000 | 15.000 | 0.0150 | 0.36 | 8.85 | 3.53 | 0.17 |
| ORIF-A2 | Orifice | FILTER-A2 | OUTLET-STR-A2 | | 308.00 | 305.60 | | 15.000 | | 13.15 | | | |
| ORIF-C2 | Orifice | FILTER-C2 | OUTLET-STR-C2 | | 301.50 | 299.00 | | 4.500 | | 0.36 | | | |
| WEIR-A2 | Weir | FILTER-A2 | OUTLET-STR-A2 | | 308.00 | 305.60 | | | | 0.00 | | | |
| WEIR-C2 | Weir | FILTER-C2 | OUT-C | | 301.50 | 298.00 | | | | 0.00 | | | |

# Subbasin Hydrology

## Subbasin : A1

### Input Data

Area (ac) ..... 12.28
Weighted Curve Number ..... 73.16
Rain Gage ID ..... Rain Gage-01

### Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 4.58 | D | 77.00 |
| > 75% grass cover, Good | 0.68 | C | 74.00 |
| Woods, Good | 6.62 | C | 70.00 |
| > 75% grass cover, Good | 0.40 | D | 80.00 |
| Composite Area & Weighted CN | 12.28 | | 73.16 |

### 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 (%) : | 2 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.05 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 30.68 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 1510 | 0.00 | 0.00 |
| Slope (%) : | .78 | 0.00 | 0.00 |
| Surface Type : | Grassed waterway | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.32 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 19.07 | 0.00 | 0.00 |

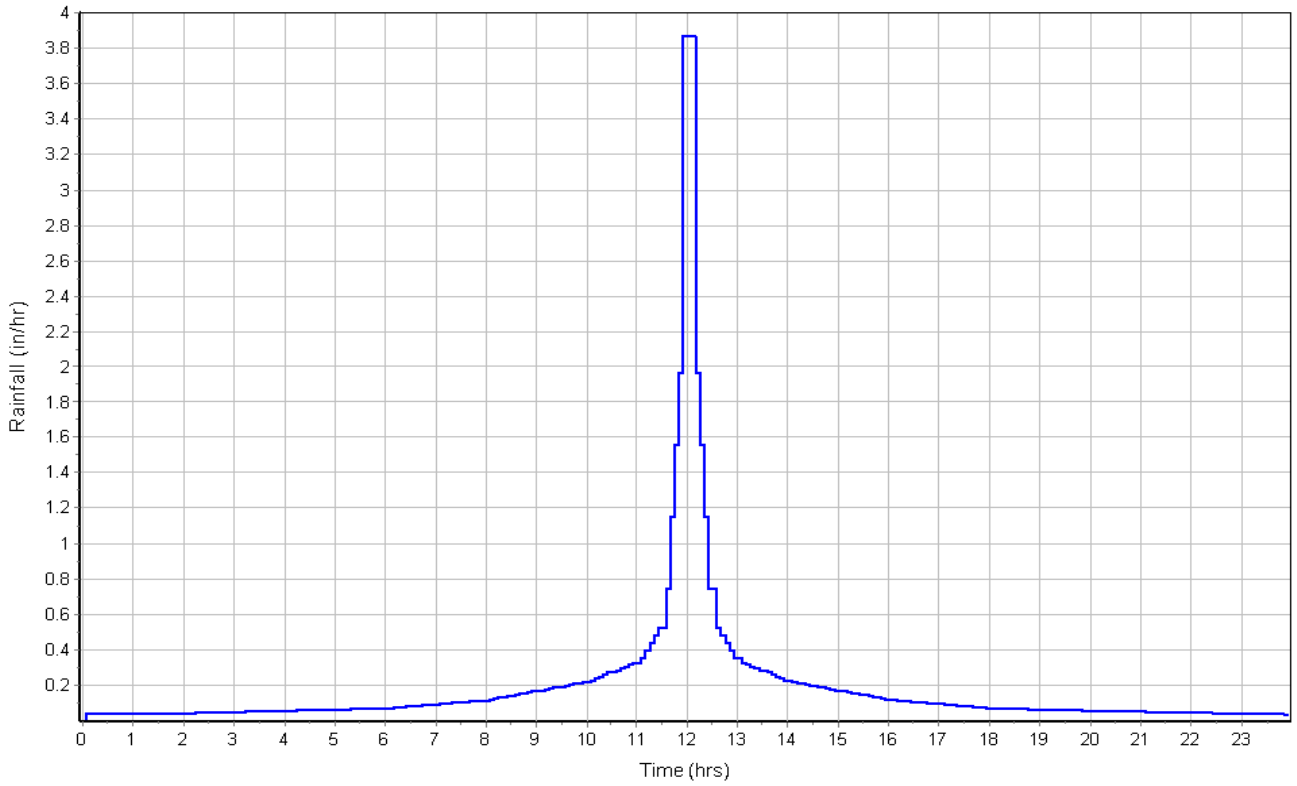
Total TOC (min) .....49.74

## Subbasin Runoff Results

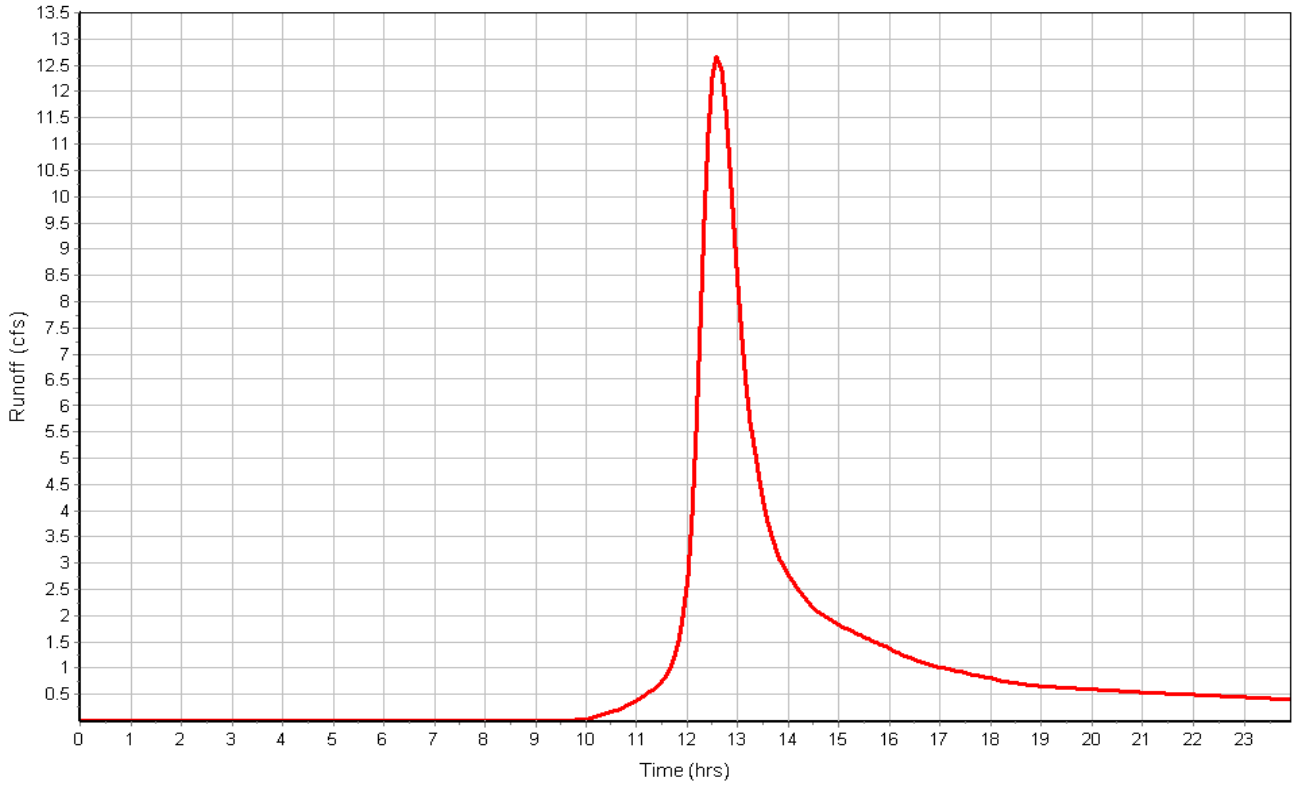
| | |
|---|---|
| Total Rainfall (in) | 4.60 |
| Total Runoff (in) | 1.98 |
| Peak Runoff (cfs) | 12.68 |
| Weighted Curve Number | 73.16 |
| Time of Concentration (days hh:mm:ss) | 0 00:49:44 |

**Subbasin : A1**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : A2

## Input Data

Area (ac) ..... 6.41
Weighted Curve Number ..... 80.93
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 0.13 | D | 77.00 |
| Roofs | 1.68 | D | 98.00 |
| > 75% grass cover, Good | 1.87 | D | 80.00 |
| Stone_Pad | 1.89 | D | 60.00 |
| Gravel roads | 0.17 | D | 91.00 |
| Pavement | 0.67 | D | 98.00 |
| Composite Area & Weighted CN | 6.41 | | 80.93 |

## Time of Concentration

| Sheet Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .4 | 0.00 | 0.00 |
| Flow Length (ft) : | 85 | 0.00 | 0.00 |
| Slope (%) : | 33.33 | 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) : | 6.32 | 0.00 | 0.00 |

| Channel Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .04 | 0.00 | 0.00 |
| Flow Length (ft) : | 1138 | 0.00 | 0.00 |
| Channel Slope (%) : | 1.4 | 0.00 | 0.00 |
| Cross Section Area (ft²) : | 4.398 | 0.00 | 0.00 |
| Wetted Perimeter (ft) : | 8.12 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 2.93 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 6.48 | 0.00 | 0.00 |

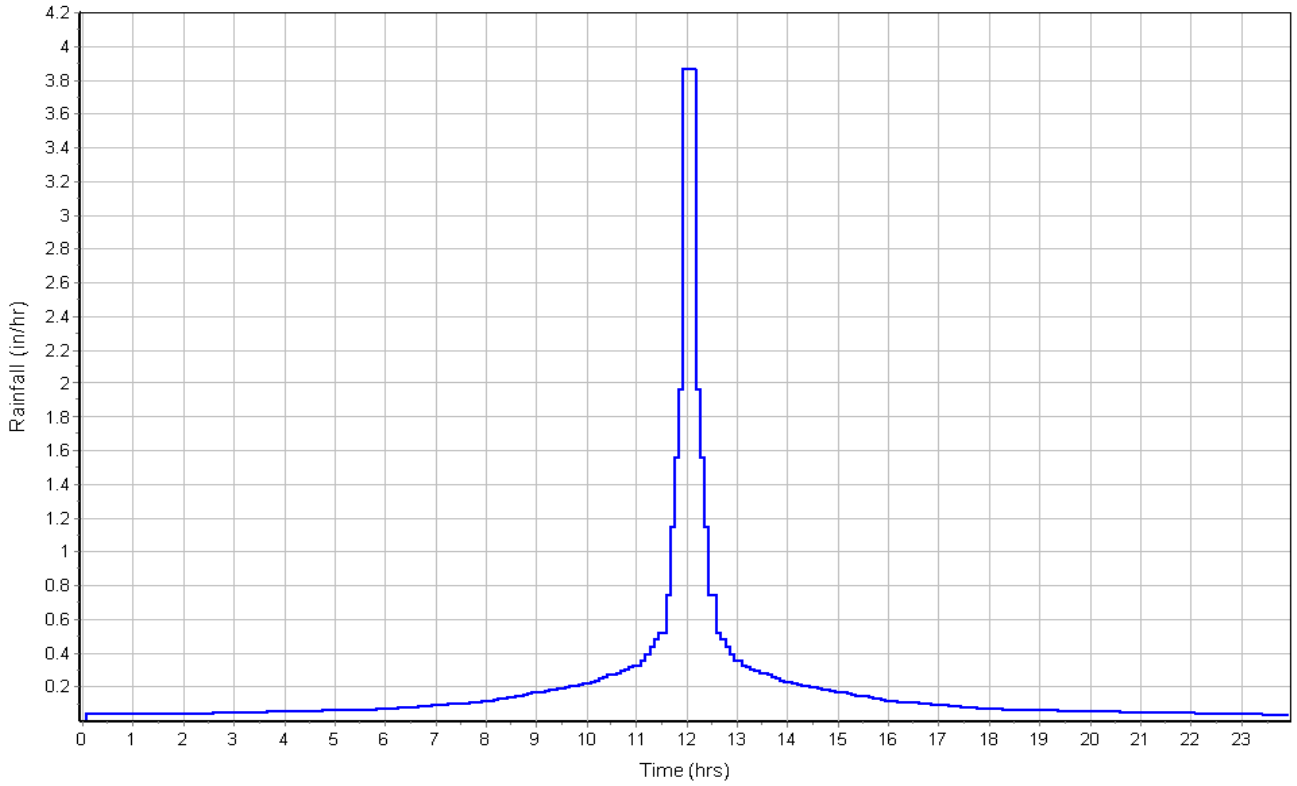
Total TOC (min) .....12.80

## Subbasin Runoff Results

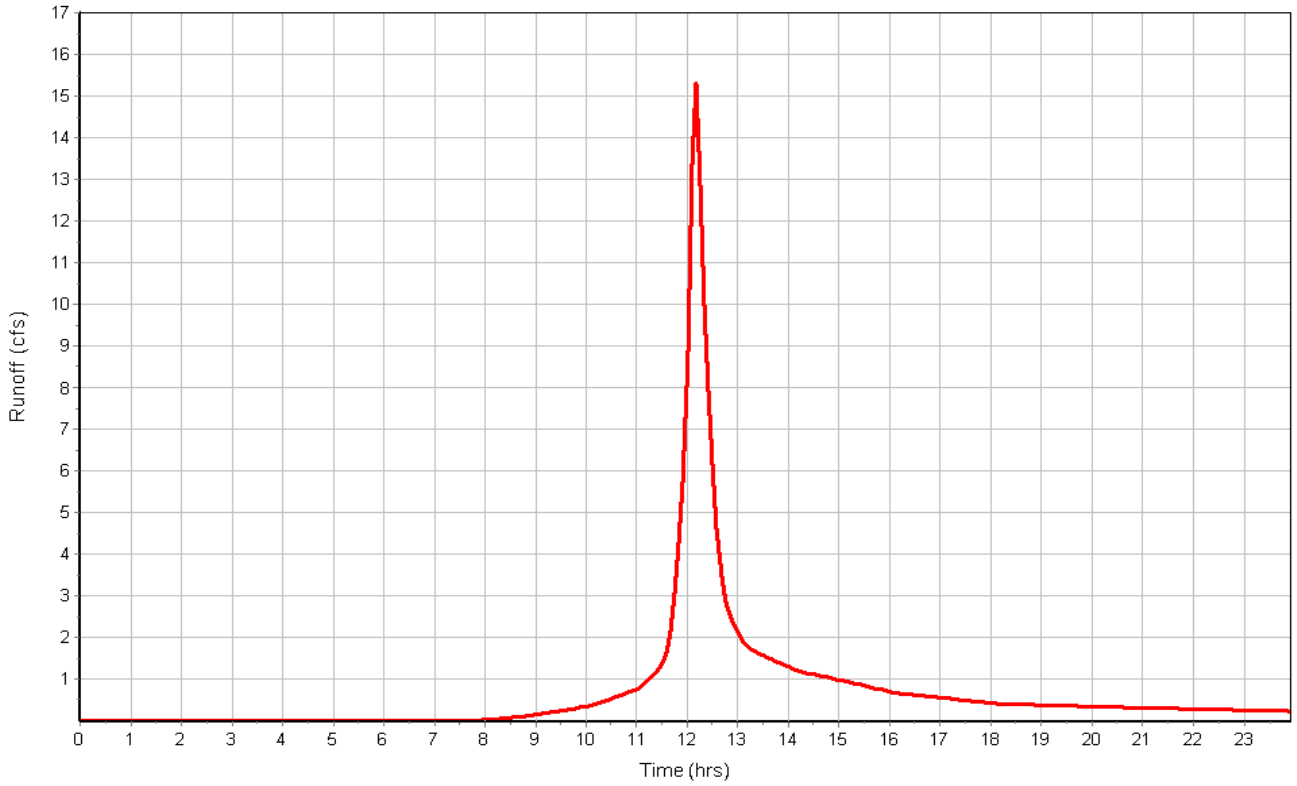
Total Rainfall (in) ..... 4.60
Total Runoff (in) ..... 2.63
Peak Runoff (cfs) ..... 15.31
Weighted Curve Number ..... 80.93
Time of Concentration (days hh:mm:ss) ..... 0 00:12:48

**Subbasin : A2**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : A3

## Input Data

Area (ac) ..... 4.01
Weighted Curve Number ..... 71.75
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| > 75% grass cover, Good | 0.75 | D | 80.00 |
| > 75% grass cover, Good | 0.14 | C | 74.00 |
| Stone_Pad | 2.28 | D | 60.00 |
| Roofs | 0.19 | D | 98.00 |
| Gravel roads | 0.25 | D | 91.00 |
| Pavement | 0.35 | D | 98.00 |
| Foundations | 0.05 | D | 98.00 |
| Composite Area & Weighted CN | 4.01 | | 71.75 |

## Time of Concentration

| Sheet Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .01 | 0.00 | 0.00 |
| Flow Length (ft) : | 100 | 0.00 | 0.00 |
| Slope (%) : | 2 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 1.44 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 1.16 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 548 | 25 | 200 |
| Slope (%) : | 2 | 33.33 | 1.5 |
| Surface Type : | Unpaved | rass pastu | rass pasture |
| Velocity (ft/sec) : | 2.28 | 4.04 | 0.86 |
| Computed Flow Time (min) : | 4.01 | 0.10 | 3.88 |

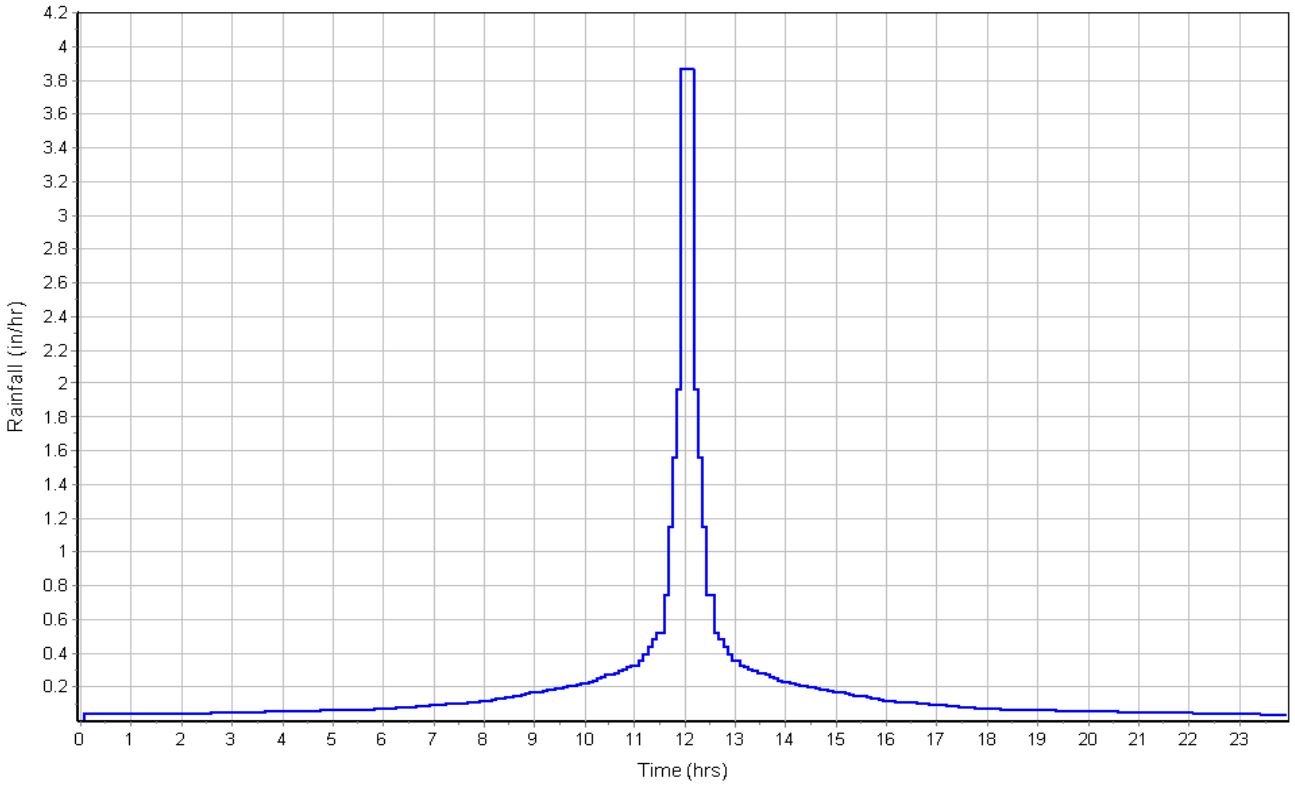
Total TOC (min) .....9.14

## Subbasin Runoff Results

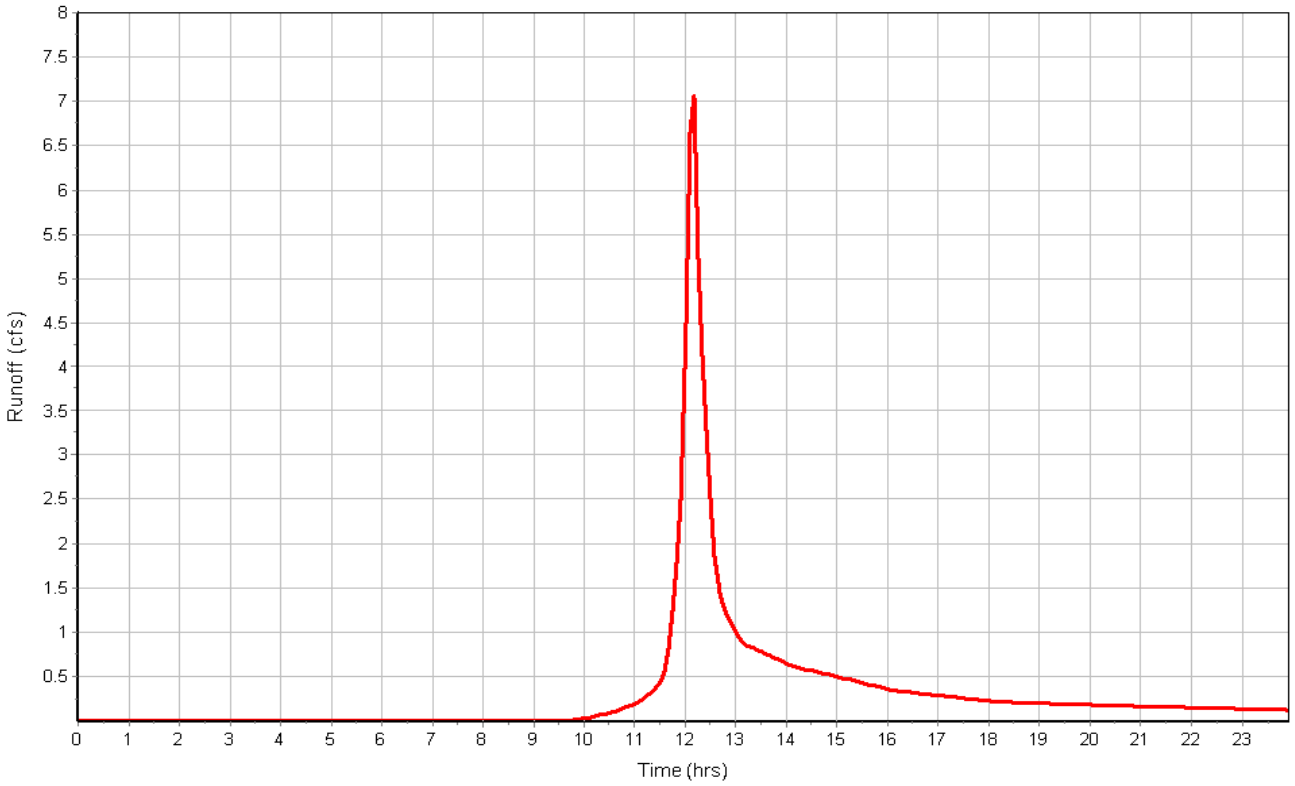
Total Rainfall (in) ..... 4.60
Total Runoff (in) ..... 1.88
Peak Runoff (cfs) ..... 7.30
Weighted Curve Number ..... 71.75
Time of Concentration (days hh:mm:ss) ..... 0 00:09:08

**Subbasin : A3**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : B

## Input Data

Area (ac) ..... 4.99
Weighted Curve Number ..... 75.82
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 1.05 | C | 70.00 |
| Woods, Good | 3.45 | D | 77.00 |
| > 75% grass cover, Good | 0.49 | D | 80.00 |
| Composite Area & Weighted CN | 4.99 | | 75.82 |

## Time of Concentration

| Sheet Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .4 | 0.00 | 0.00 |
| Flow Length (ft) : | 90 | 0.00 | 0.00 |
| Slope (%) : | 33.33 | 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) : | 6.62 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 368 | 0.00 | 0.00 |
| Slope (%) : | 1.63 | 0.00 | 0.00 |
| Surface Type : | Grassed waterway | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.92 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 3.19 | 0.00 | 0.00 |

| Channel Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .3 | .3 | 0.00 |
| Flow Length (ft) : | 272 | 85 | 0.00 |
| Channel Slope (%) : | 1.4 | 16.7 | 0.00 |
| Cross Section Area ($ft^2$) : | 3.287 | 1.367 | 0.00 |
| Wetted Perimeter (ft) : | 7.17 | 5.15 | 0.00 |
| Velocity (ft/sec) : | 0.35 | 0.84 | 0.00 |
| Computed Flow Time (min) : | 12.97 | 1.69 | 0.00 |

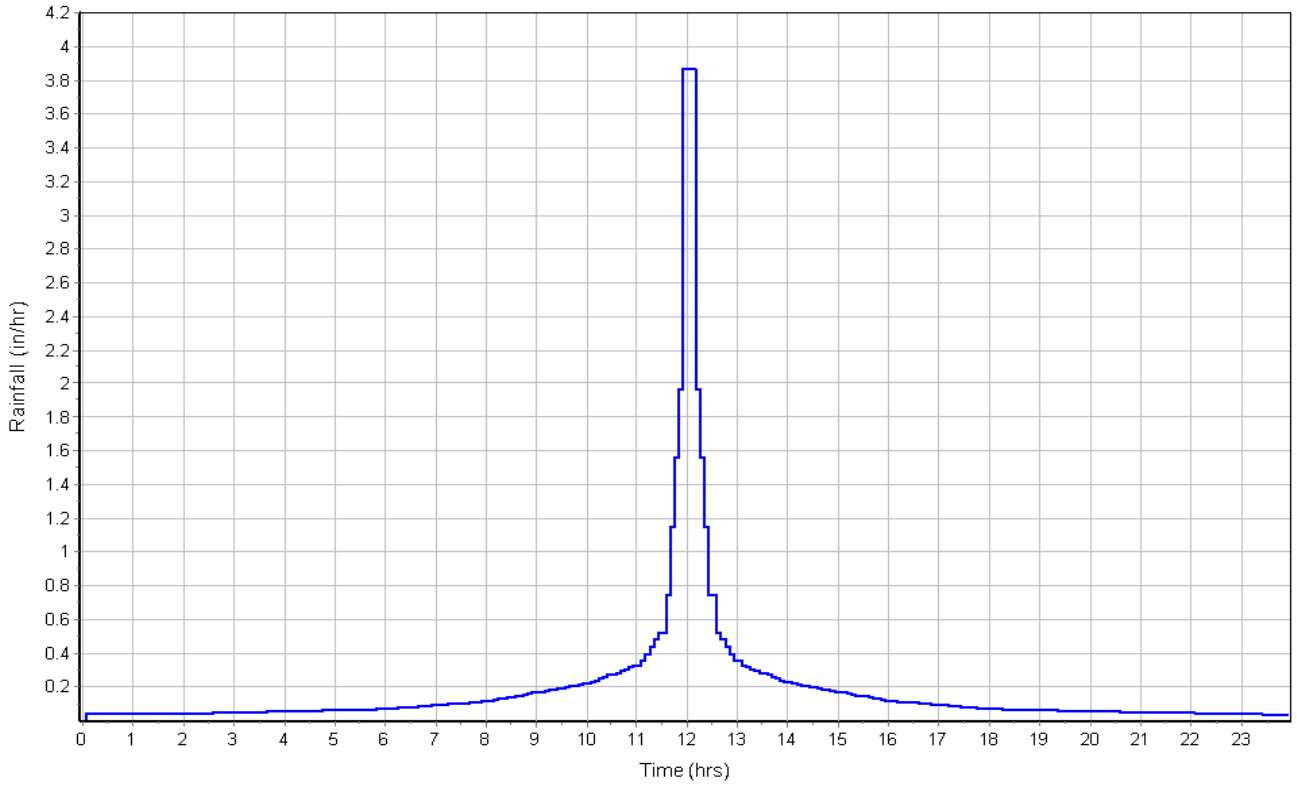
Total TOC (min) .....24.48

## Subbasin Runoff Results

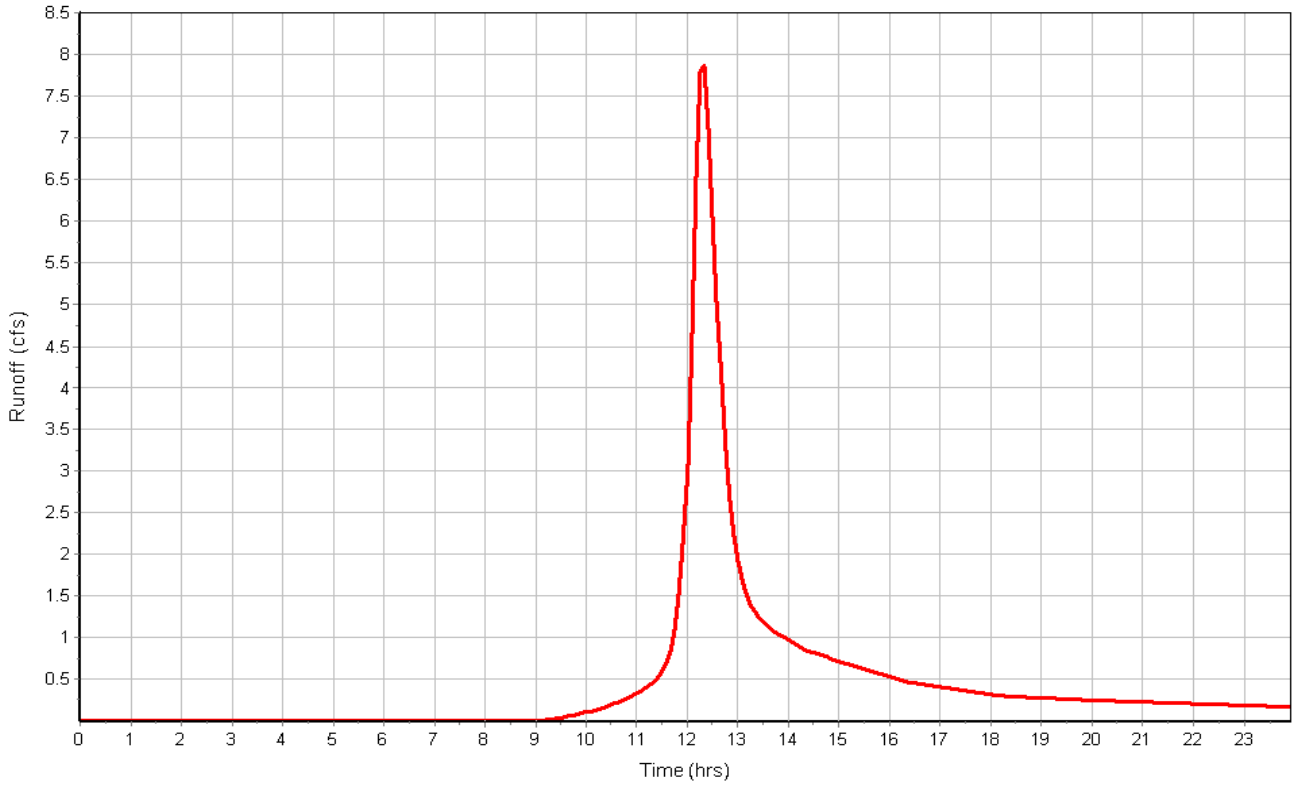
Total Rainfall (in) ..... 4.60
Total Runoff (in) ..... 2.20
Peak Runoff (cfs) ..... 7.98
Weighted Curve Number ..... 75.82
Time of Concentration (days hh:mm:ss) ..... 0 00:24:29

**Subbasin : B**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : C1

## Input Data

Area (ac) ..... 15.70
Weighted Curve Number ..... 73.25
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Gravel roads | 0.17 | D | 91.00 |
| > 75% grass cover, Good | 0.04 | D | 80.00 |
| Woods, Good | 8.63 | C | 70.00 |
| Woods, Good | 6.55 | D | 77.00 |
| > 75% grass cover, Good | 0.31 | C | 74.00 |
| Composite Area & Weighted CN | 15.70 | | 73.25 |

## 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 (%) : | 2 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.05 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 30.68 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 1907 | 0.00 | 0.00 |
| Slope (%) : | .524 | 0.00 | 0.00 |
| Surface Type : | Grassed waterway | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.09 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 29.16 | 0.00 | 0.00 |

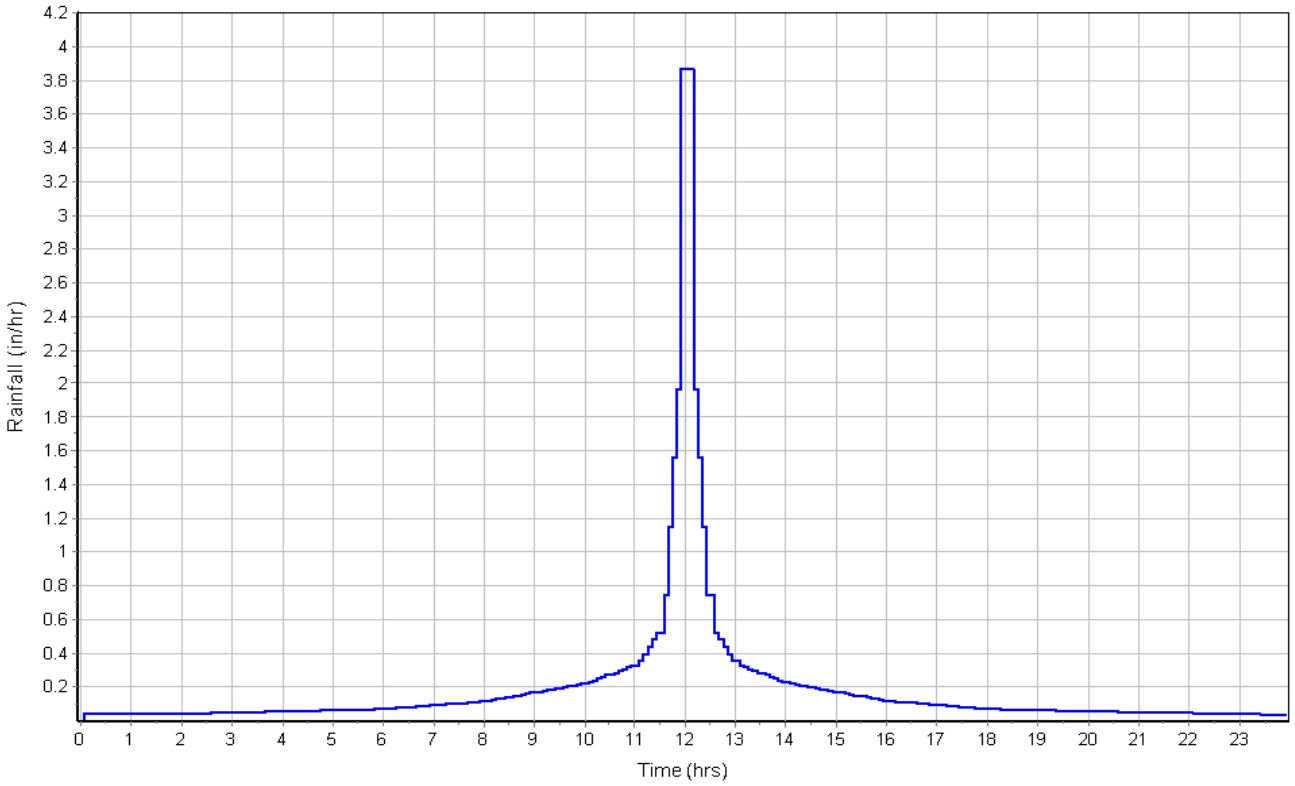
Total TOC (min) .....59.83

## Subbasin Runoff Results

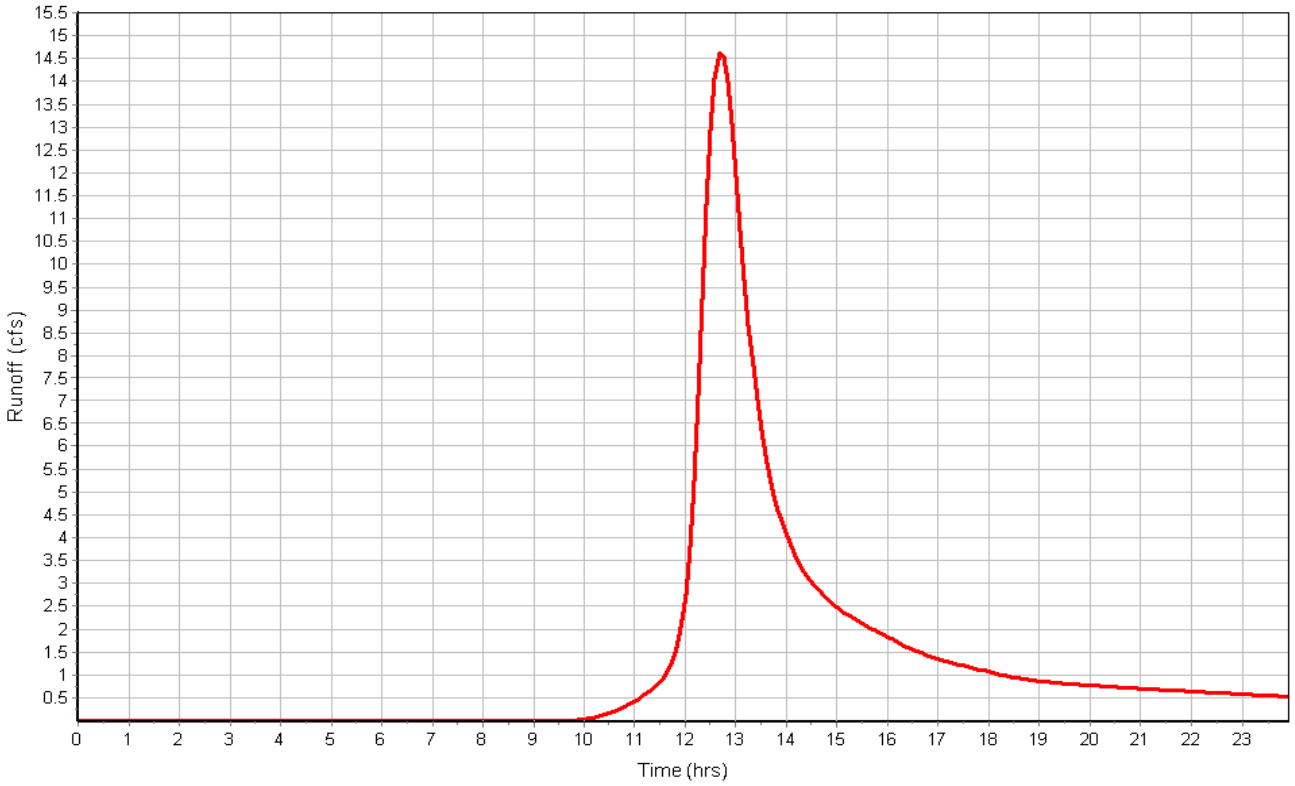
Total Rainfall (in) ..... 4.60
Total Runoff (in) ..... 1.99
Peak Runoff (cfs) ..... 14.63
Weighted Curve Number ..... 73.25
Time of Concentration (days hh:mm:ss) ..... 0 00:59:50

**Subbasin : C1**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : C2

## Input Data

Area (ac) ..... 2.05
Weighted Curve Number ..... 82.98
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| > 75% grass cover, Good | 0.32 | D | 80.00 |
| > 75% grass cover, Good | 0.76 | C | 74.00 |
| Gravel roads | 0.97 | D | 91.00 |
| Composite Area & Weighted CN | 2.05 | | 82.98 |

## Time of Concentration

| Sheet Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .01 | 0.00 | 0.00 |
| Flow Length (ft) : | 60 | 0.00 | 0.00 |
| Slope (%) : | 2 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 1.30 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 0.77 | 0.00 | 0.00 |

| Channel Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .03 | 0.00 | 0.00 |
| Flow Length (ft) : | 2256 | 0.00 | 0.00 |
| Channel Slope (%) : | .5 | 0.00 | 0.00 |
| Cross Section Area ($ft^2$) : | 2.475 | 0.00 | 0.00 |
| Wetted Perimeter (ft) : | 6.91 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 1.77 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 21.23 | 0.00 | 0.00 |

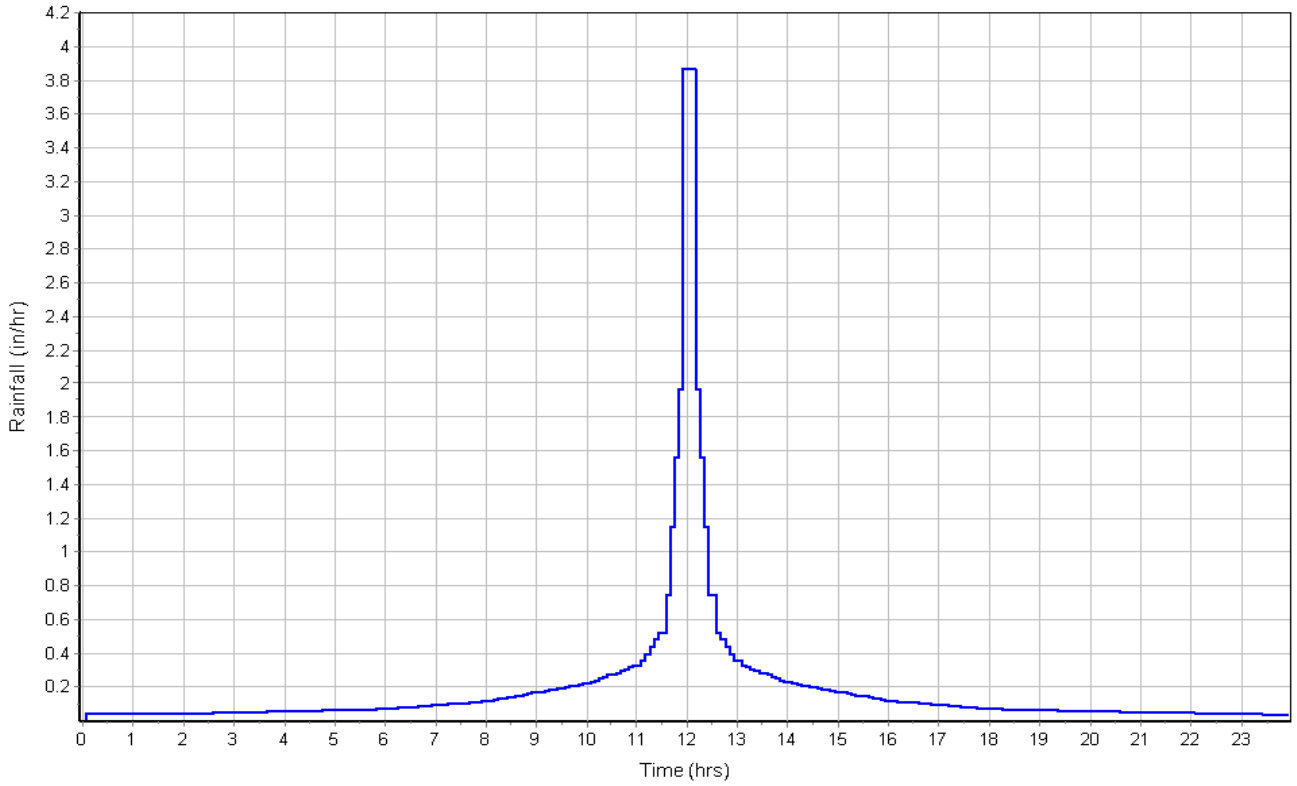
Total TOC (min) .....22.00

## Subbasin Runoff Results

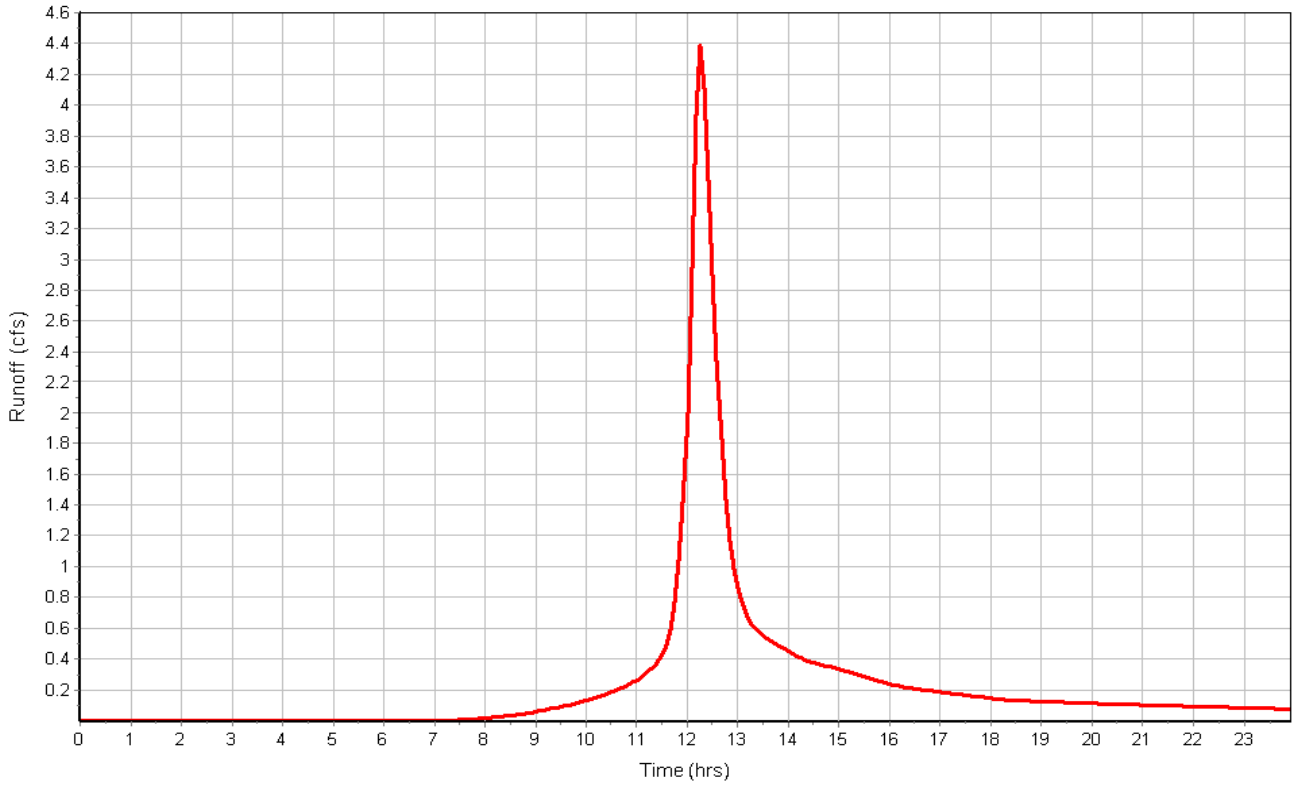
Total Rainfall (in) ..... 4.60
Total Runoff (in) ..... 2.81
Peak Runoff (cfs) ..... 4.39
Weighted Curve Number ..... 82.98
Time of Concentration (days hh:mm:ss) ..... 0 00:22:00

**Subbasin : C2**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : D

## Input Data

Area (ac) ..... 0.59
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 | 0.59 | D | 77.00 |
| Composite Area & Weighted CN | 0.59 | | 77.00 |

## 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 (%) : | 21 | 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) : | 11.98 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 16 | 0.00 | 0.00 |
| Slope (%) : | 14.5 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.90 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 0.14 | 0.00 | 0.00 |

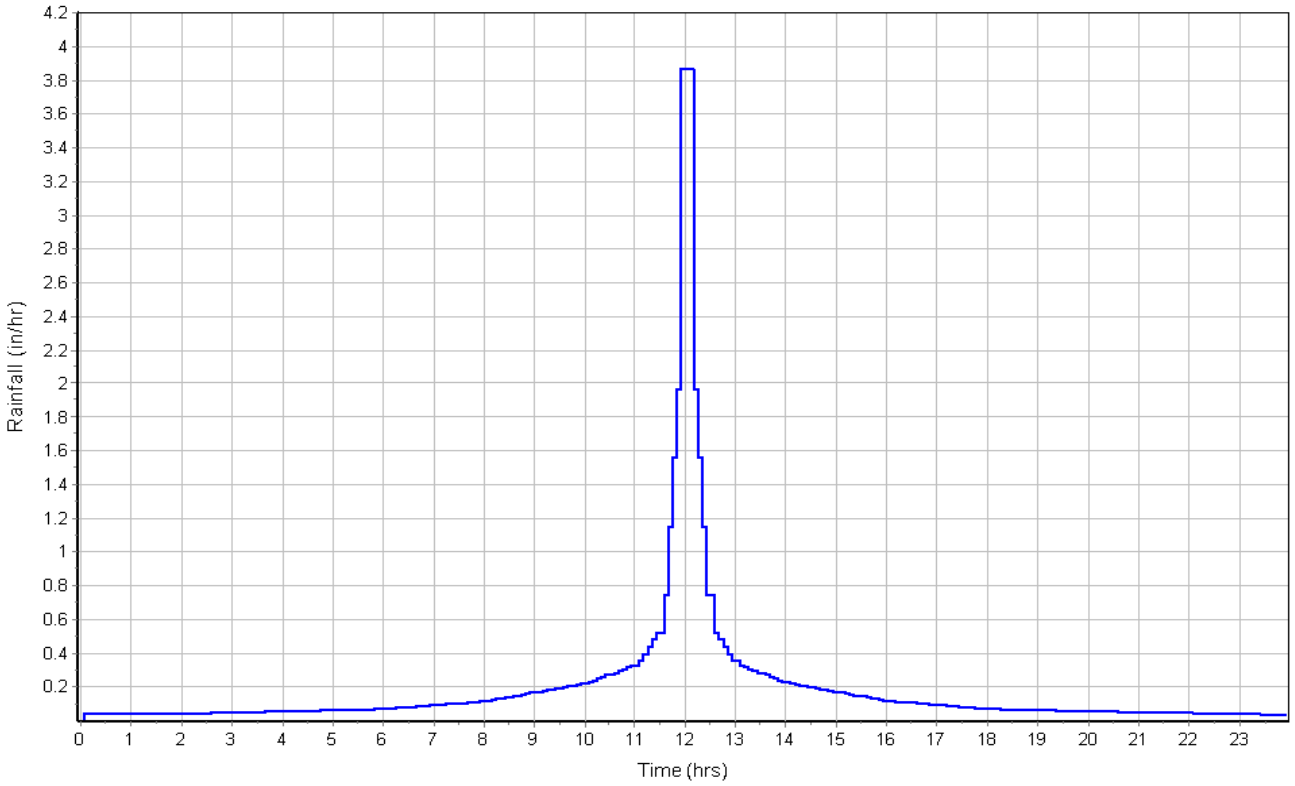
Total TOC (min) .....12.12

## Subbasin Runoff Results

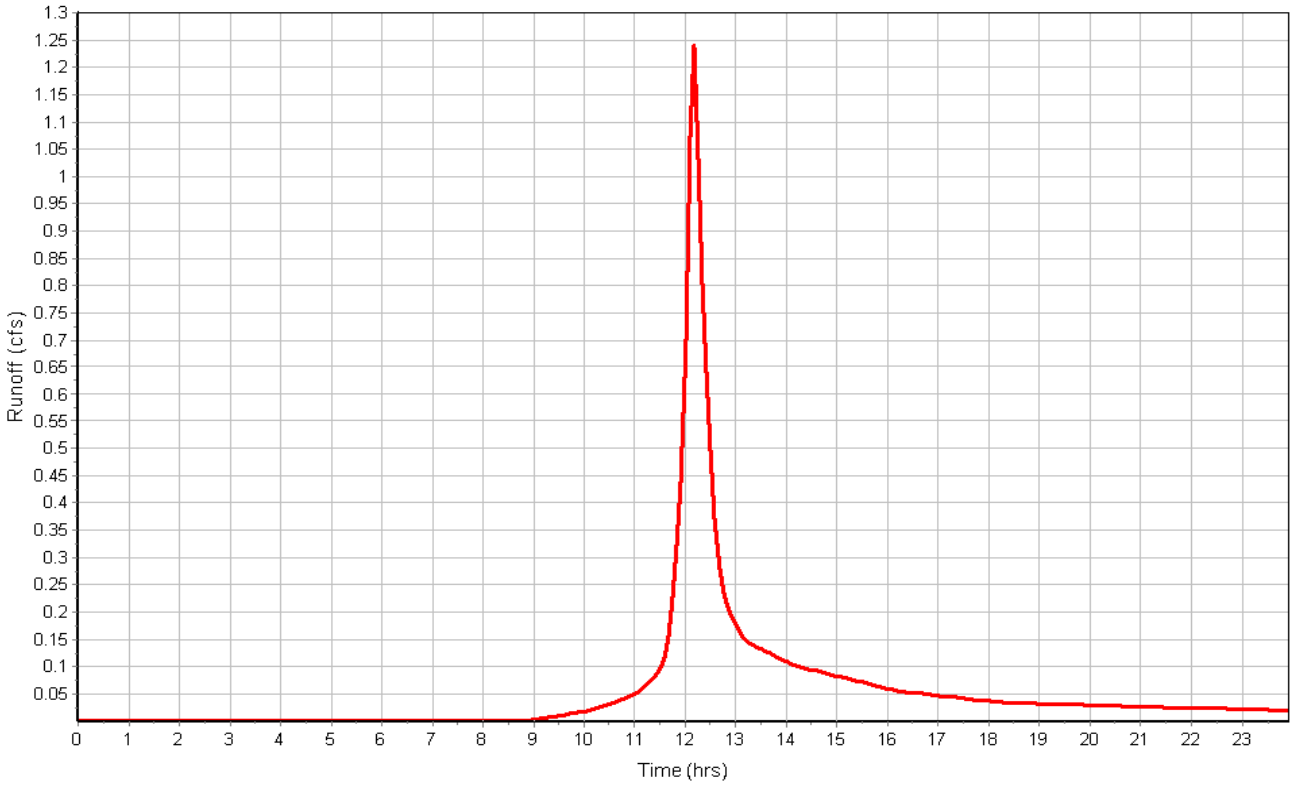
Total Rainfall (in) ..... 4.60
Total Runoff (in) ..... 2.29
Peak Runoff (cfs) ..... 1.24
Weighted Curve Number ..... 77.00
Time of Concentration (days hh:mm:ss) ..... 0 00:12:07

**Subbasin : D**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : E

## Input Data

Area (ac) ..... 2.86
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 | 2.86 | D | 77.00 |
| Composite Area & Weighted CN | 2.86 | | 77.00 |

## 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 (%) : | 24 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.15 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 11.35 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 227 | 0.00 | 0.00 |
| Slope (%) : | 18 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 2.12 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 1.78 | 0.00 | 0.00 |

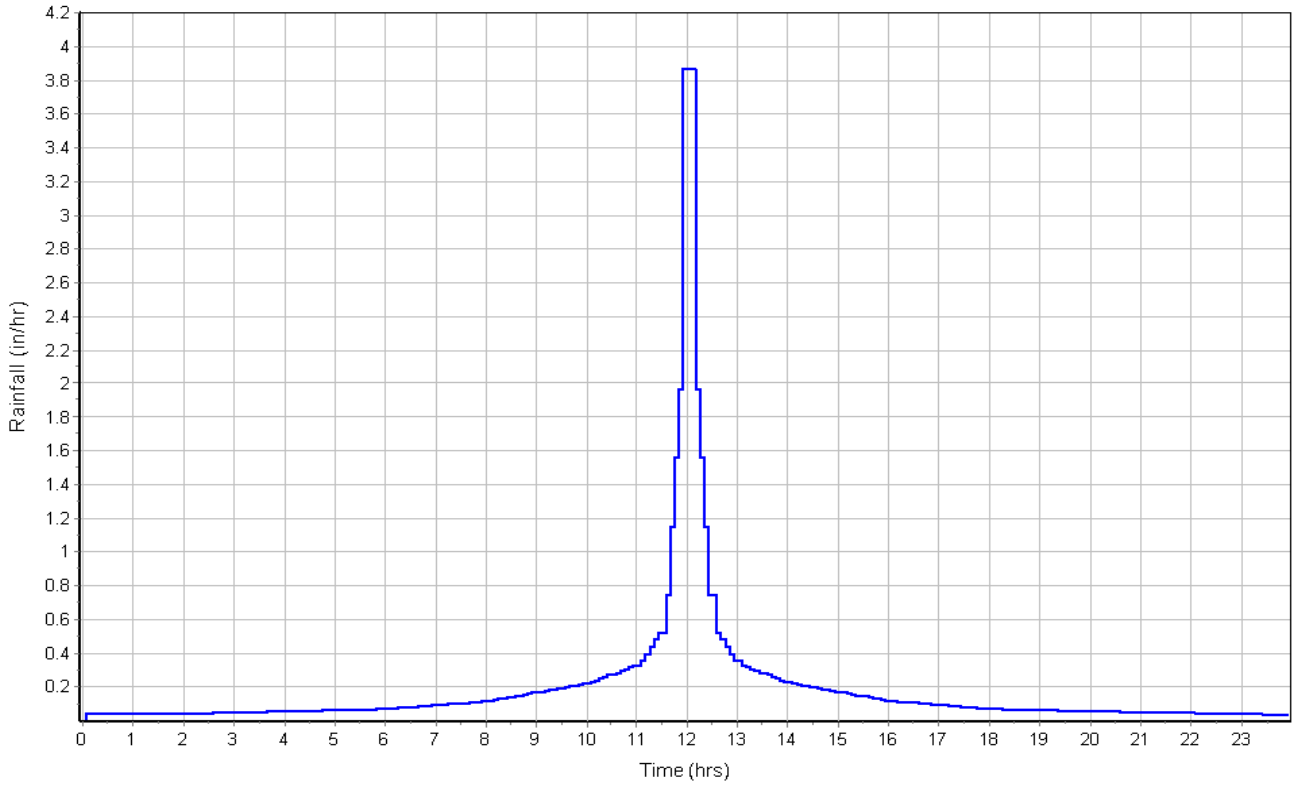
Total TOC (min) .....13.14

## Subbasin Runoff Results

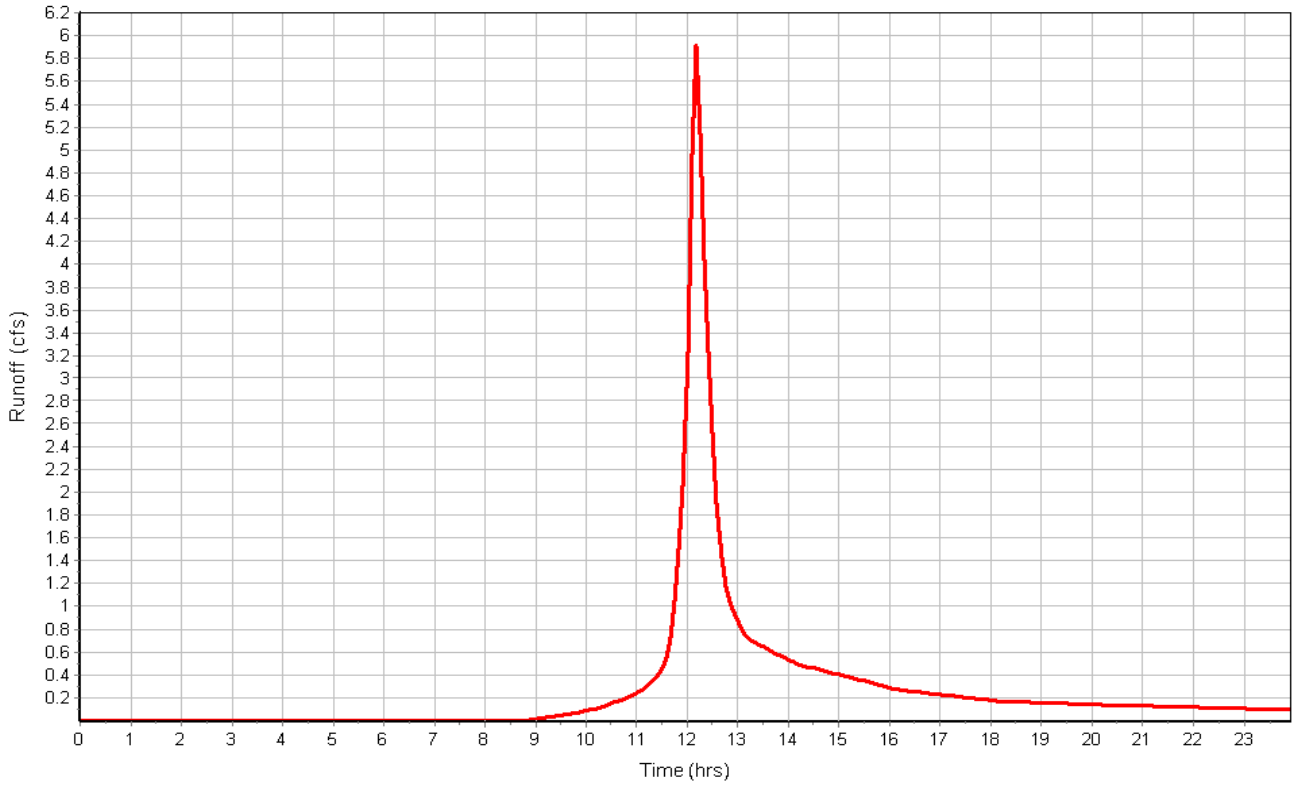
Total Rainfall (in) ..... 4.60
Total Runoff (in) ..... 2.29
Peak Runoff (cfs) ..... 5.91
Weighted Curve Number ..... 77.00
Time of Concentration (days hh:mm:ss) ..... 0 00:13:08

**Subbasin : E**

## Rainfall Intensity Graph




## Runoff Hydrograph



## Junction Input

| Element ID | Invert Elevation (ft) | Ground/Rim (Max) Elevation (ft) |
|---|---|---|
| CB1 | 305.30 | 309.50 |
| CB2 | 312.00 | 316.00 |
| OUTLET-STR-A2 | 305.60 | 312.00 |
| OUTLET-STR-C2 | 299.00 | 305.00 |

## 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) |
| CB1 | 19.04 | 306.97 | 1.67 | 2.53 | 305.53 | 0 12:16 |
| CB2 | 15.30 | 313.07 | 1.07 | 2.93 | 312.15 | 0 12:15 |
| OUTLET-STR-A2 | 13.15 | 306.96 | 1.36 | 5.04 | 305.77 | 0 12:20 |
| OUTLET-STR-C2 | 0.36 | 299.17 | 0.17 | 5.83 | 299.07 | 0 14:50 |

## 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 |
|---|---|---|---|---|---|---|---|---|
| CULV-A2-1 | 104.00 | 312.00 | 310.00 | 1.9200 | CIRCULAR | 24.000 | 24.000 | 0.0150 |
| CULV-A2-2 | 43.00 | 305.60 | 305.30 | 0.7000 | CIRCULAR | 24.000 | 24.000 | 0.0150 |
| CULV-A3 | 98.00 | 305.30 | 305.00 | 0.3100 | CIRCULAR | 36.000 | 36.000 | 0.0150 |
| CULV-C2 | 40.00 | 299.00 | 298.00 | 2.5000 | 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) |
| CULV-A2-1 | 15.24 | 0 12:15 | 27.19 | 8.90 | 1.07 |
| CULV-A2-2 | 13.15 | 0 12:20 | 16.38 | 5.79 | 1.36 |
| CULV-A3 | 19.04 | 0 12:17 | 31.98 | 4.72 | 1.65 |
| CULV-C2 | 0.36 | 0 14:50 | 8.85 | 3.53 | 0.17 |

# Storage Nodes

## Storage Node : FILTER-A2

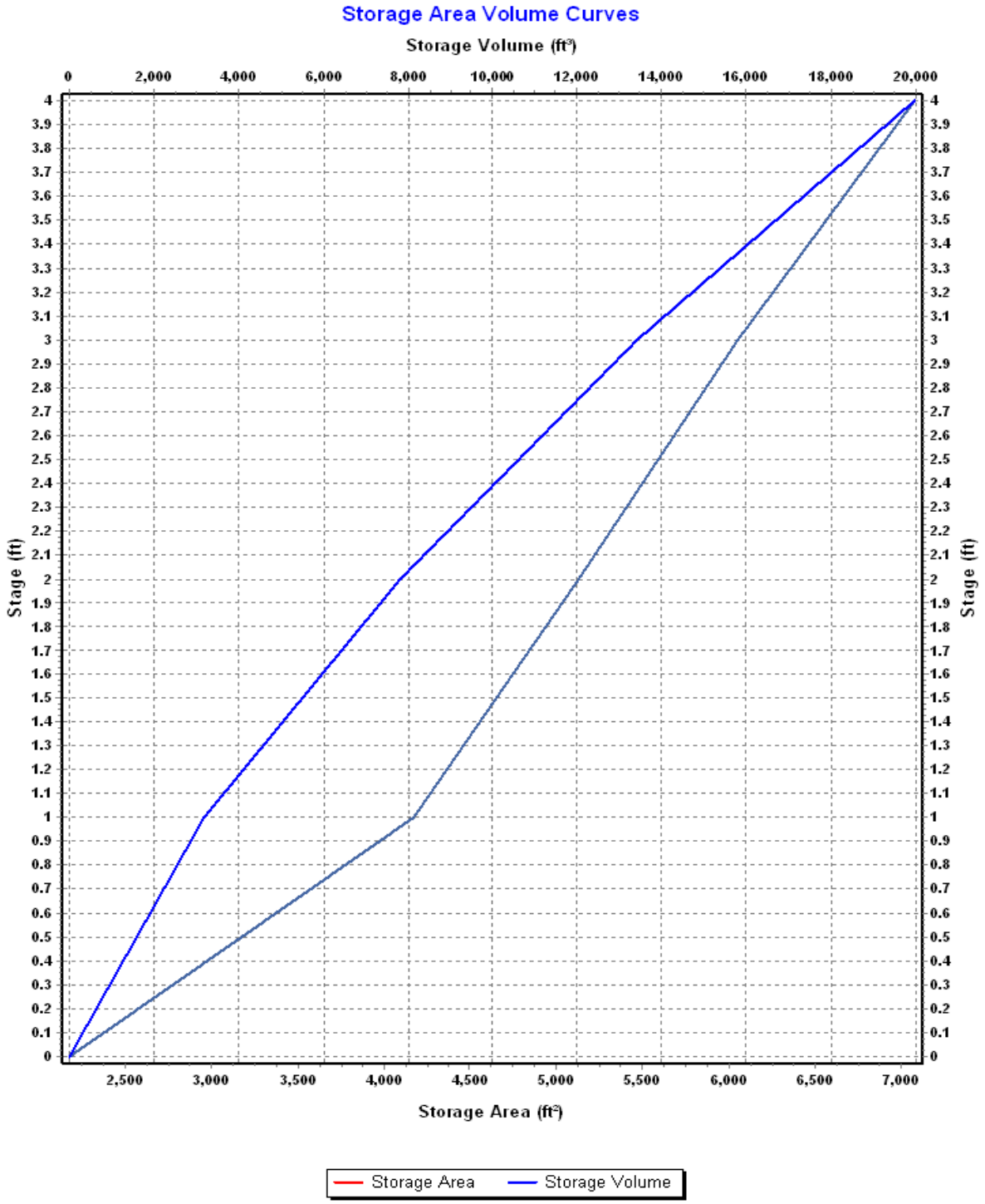
### Input Data

| | |
|---|---|
| Invert Elevation (ft) | 308.00 |
| Max (Rim) Elevation (ft) | 312.00 |
| Max (Rim) Offset (ft) | 4.00 |
| Initial Water Elevation (ft) | 308.00 |
| Initial Water Depth (ft) | 0.00 |
| Ponded Area (ft²) | 0.00 |
| Evaporation Loss | 0.00 |

### Storage Area Volume Curves

Storage Curve : Storage-05

| Stage (ft) | Storage Area (ft²) | Storage Volume (ft³) |
|---|---|---|
| 0 | 2178 | 0.000 |
| 1 | 4172 | 3175.00 |
| 2 | 5127 | 7824.50 |
| 3 | 6050 | 13413.00 |
| 4 | 7075 | 19975.50 |


Storage Area Volume Curves
Storage Volume (ft³)
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
Stage (ft)
Storage Area (ft²)
2,500
3,000
3,500
4,000
4,500
5,000
5,500
6,000
6,500
7,000
Storage Area
Storage Volume

## Storage Node : FILTER-A2 (continued)

### Outflow Weirs

| Element ID | Weir Type | Crest Elevation (ft) | Length (ft) | Weir Total Height (ft) | Discharge Coefficient |
|---|---|---|---|---|---|
| WEIR-A2 | Trapezoidal | 310.70 | 40.00 | 1.32 | 3.10 |

### Outflow Orifices

| Element ID | Orifice Type | Orifice Shape | Circular Orifice Diameter (in) | Rectangular Orifice Height (in) | Rectangular Orifice Width (in) | Orifice Invert Elevation (ft) | Orifice Coefficient |
|---|---|---|---|---|---|---|---|
| ORIF-A2 | Side | Rectangular | | 15.00 | 32.00 | 309.10 | 0.63 |

### Output Summary Results

| | |
|---|---|
| Peak Inflow (cfs) | 15.24 |
| Peak Lateral Inflow (cfs) | 0.00 |
| Peak Outflow (cfs) | 13.15 |
| Peak Exfiltration Flow Rate (cfm) | 0.00 |
| Max HGL Elevation Attained (ft) | 310.34 |
| Max HGL Depth Attained (ft) | 2.34 |
| Average HGL Elevation Attained (ft) | 308.75 |
| Average HGL Depth Attained (ft) | 0.75 |
| Time of Max HGL Occurrence (days hh:mm) | 0 12:20 |
| Total Exfiltration Volume (1000-ft³) | 0.000 |
| Total Flooded Volume (ac-in) | 0 |
| Total Time Flooded (min) | 0 |
| Total Retention Time (sec) | 0.00 |

# Storage Node : FILTER-C2

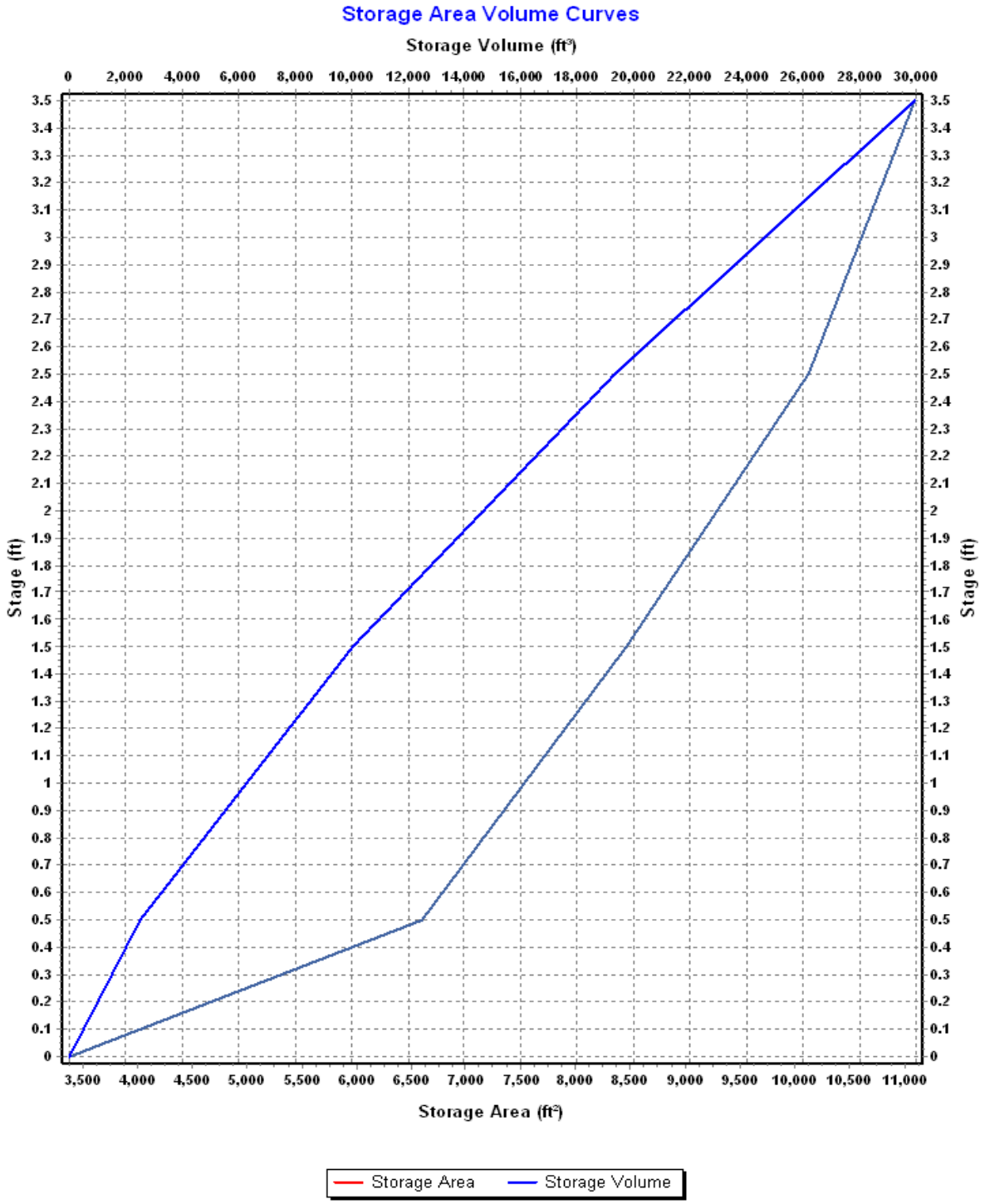
## Input Data

Invert Elevation (ft) ..... 301.50
Max (Rim) Elevation (ft) ..... 305.00
Max (Rim) Offset (ft) ..... 3.50
Initial Water Elevation (ft) ..... 301.50
Initial Water Depth (ft) ..... 0.00
Ponded Area (ft²) ..... 0.00
Evaporation Loss ..... 0.00

## Storage Area Volume Curves

Storage Curve : Storage-07

| Stage (ft) | Storage Area (ft²) | Storage Volume (ft³) |
|---|---|---|
| 0 | 3380 | 0.000 |
| .5 | 6601 | 2495.25 |
| 1.5 | 8462 | 10026.75 |
| 2.5 | 10125 | 19320.25 |
| 3.5 | 11092 | 29928.75 |


Storage Area Volume Curves
Storage Volume (ft³)
0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000 22,000 24,000 26,000 28,000 30,000
Stage (ft)
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3 3.1 3.2 3.3 3.4 3.5
Storage Area (ft²)
3,500 4,000 4,500 5,000 5,500 6,000 6,500 7,000 7,500 8,000 8,500 9,000 9,500 10,000 10,500 11,000
Storage Area
Storage Volume

## Storage Node : FILTER-C2 (continued)

### Outflow Weirs

| Element ID | Weir Type | Crest Elevation (ft) | Length (ft) | Weir Total Height (ft) | Discharge Coefficient |
|---|---|---|---|---|---|
| WEIR-C2 | Trapezoidal | 303.80 | 30.00 | 1.20 | 3.10 |

### Outflow Orifices

| Element ID | Orifice Type | Orifice Shape | Circular Orifice Diameter (in) | Rectangular Orifice Height (in) | Rectangular Orifice Width (in) | Orifice Invert Elevation (ft) | Orifice Coefficient |
|---|---|---|---|---|---|---|---|
| ORIF-C2 | Side | CIRCULAR | 4.50 | | | 302.75 | 0.61 |

### Output Summary Results

| | |
|---|---|
| Peak Inflow (cfs) | 4.39 |
| Peak Lateral Inflow (cfs) | 4.39 |
| Peak Outflow (cfs) | 0.36 |
| Peak Exfiltration Flow Rate (cfm) | 0.00 |
| Max HGL Elevation Attained (ft) | 303.37 |
| Max HGL Depth Attained (ft) | 1.87 |
| Average HGL Elevation Attained (ft) | 302.36 |
| Average HGL Depth Attained (ft) | 0.86 |
| Time of Max HGL Occurrence (days hh:mm) | 0 14:50 |
| Total Exfiltration Volume (1000-ft³) | 0.000 |
| Total Flooded Volume (ac-in) | 0 |
| Total Time Flooded (min) | 0 |
| Total Retention Time (sec) | 0.00 |

## Project Description

File Name ..... Proposed 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 ..... Jul 13, 2017 00:00:00
End Analysis On ..... Jul 14, 2017 00:00:00
Start Reporting On ..... Jul 13, 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 | 8 |
| Nodes | 11 |
| *Junctions* | 4 |
| *Outfalls* | 5 |
| *Flow Diversions* | 0 |
| *Inlets* | 0 |
| *Storage Nodes* | 2 |
| Links | 8 |
| *Channels* | 0 |
| *Pipes* | 4 |
| *Pumps* | 0 |
| *Orifices* | 2 |
| *Weirs* | 2 |
| *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 | Androscoggin | 25 | 5.40 | 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) |
|---|---|---|---|---|---|---|---|
| A1 | 12.28 | 73.16 | 5.40 | 2.61 | 32.08 | 16.85 | 0 00:49:44 |
| A2 | 6.41 | 80.93 | 5.40 | 3.34 | 21.38 | 19.36 | 0 00:12:48 |
| A3 | 4.01 | 71.75 | 5.40 | 2.49 | 9.98 | 9.76 | 0 00:09:08 |
| B | 4.99 | 75.82 | 5.40 | 2.85 | 14.23 | 10.41 | 0 00:24:28 |
| C1 | 15.70 | 73.25 | 5.40 | 2.62 | 41.13 | 19.48 | 0 00:59:49 |
| C2 | 2.05 | 82.98 | 5.40 | 3.54 | 7.25 | 5.50 | 0 00:22:00 |
| D | 0.59 | 77.00 | 5.40 | 2.96 | 1.75 | 1.61 | 0 00:12:07 |
| E | 2.86 | 77.00 | 5.40 | 2.96 | 8.47 | 7.65 | 0 00:13:08 |

## Node Summary

| Element ID | Element Type | Invert Elevation (ft) | Peak Inflow (cfs) |
|---|---|---|---|
| CB1 | Junction | 305.30 | 23.99 |
| CB2 | Junction | 312.00 | 19.33 |
| OUTLET-STR-A2 | Junction | 305.60 | 15.86 |
| OUTLET-STR-C2 | Junction | 299.00 | 0.48 |
| OUT-A | Outfall | 298.00 | 33.76 |
| OUT-B | Outfall | 310.00 | 10.23 |
| OUT-C | Outfall | 298.00 | 19.83 |
| OUT-D | Outfall | 338.00 | 1.60 |
| OUT-E | Outfall | 298.00 | 7.64 |
| FILTER-A2 | Storage Node | 308.00 | 19.23 |
| FILTER-C2 | Storage Node | 301.50 | 5.49 |

# 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) |
| CULV-A2-1 | Pipe | CB2 | FILTER-A2 | 104.00 | 312.00 | 310.00 | 1.9200 | 24.000 | 0.0150 | 19.23 | 27.19 | 9.40 | 1.24 |
| CULV-A2-2 | Pipe | OUTLET-STR-A2 | CB1 | 43.00 | 305.60 | 305.30 | 0.7000 | 24.000 | 0.0150 | 15.86 | 16.38 | 5.94 | 1.58 |
| CULV-A3 | Pipe | CB1 | OUT-A | 98.00 | 305.30 | 305.00 | 0.3100 | 36.000 | 0.0150 | 23.99 | 31.98 | 4.97 | 1.93 |
| CULV-C2 | Pipe | OUTLET-STR-C2 | OUT-C | 40.00 | 299.00 | 298.00 | 2.5000 | 15.000 | 0.0150 | 0.48 | 8.85 | 3.84 | 0.20 |
| ORIF-A2 | Orifice | FILTER-A2 | OUTLET-STR-A2 | | 308.00 | 305.60 | | 15.000 | | 15.86 | | | |
| ORIF-C2 | Orifice | FILTER-C2 | OUTLET-STR-C2 | | 301.50 | 299.00 | | 4.500 | | 0.48 | | | |
| WEIR-A2 | Weir | FILTER-A2 | OUTLET-STR-A2 | | 308.00 | 305.60 | | | | 0.00 | | | |
| WEIR-C2 | Weir | FILTER-C2 | OUT-C | | 301.50 | 298.00 | | | | 0.00 | | | |

# Subbasin Hydrology

## Subbasin : A1

### Input Data

Area (ac) ..... 12.28
Weighted Curve Number ..... 73.16
Rain Gage ID ..... Rain Gage-01

### Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 4.58 | D | 77.00 |
| > 75% grass cover, Good | 0.68 | C | 74.00 |
| Woods, Good | 6.62 | C | 70.00 |
| > 75% grass cover, Good | 0.40 | D | 80.00 |
| Composite Area & Weighted CN | 12.28 | | 73.16 |

### 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 (%) : | 2 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.05 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 30.68 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 1510 | 0.00 | 0.00 |
| Slope (%) : | .78 | 0.00 | 0.00 |
| Surface Type : | Grassed waterway | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.32 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 19.07 | 0.00 | 0.00 |

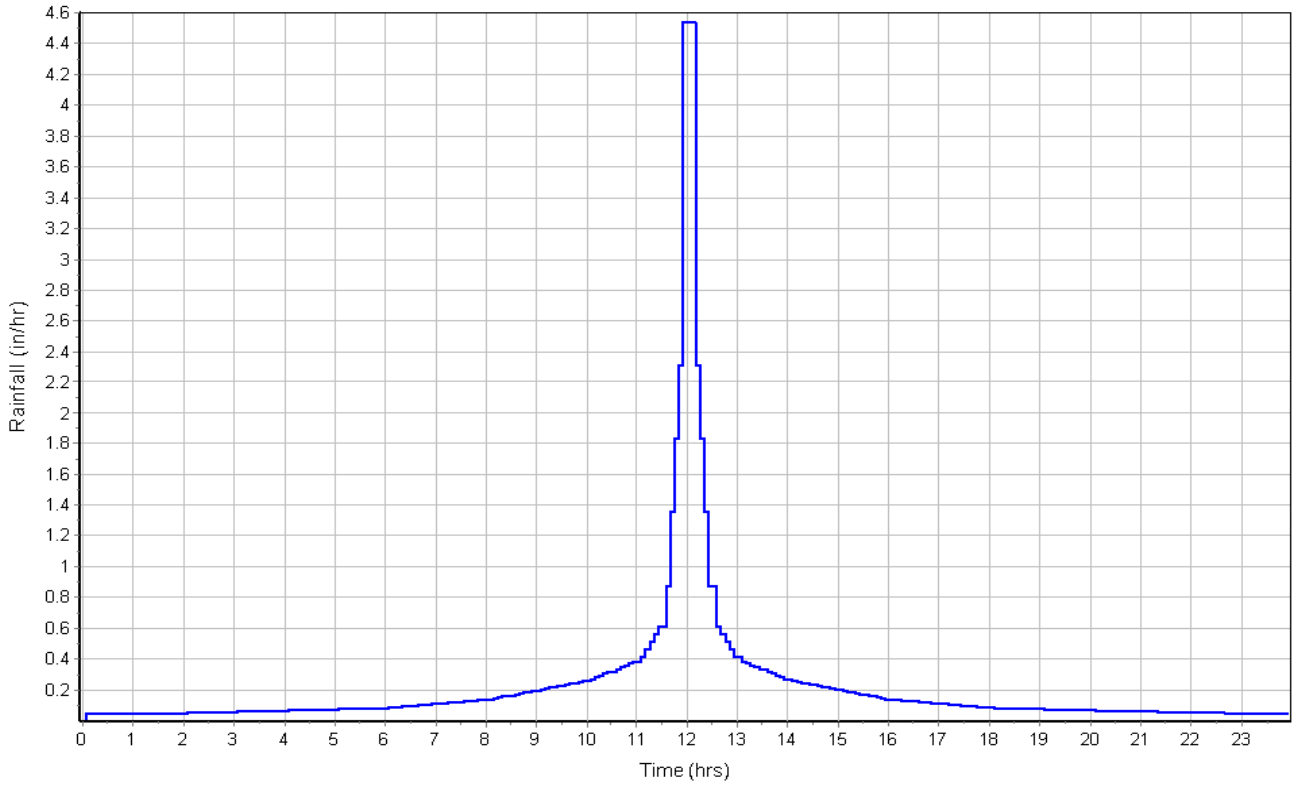
Total TOC (min) .....49.74

## Subbasin Runoff Results

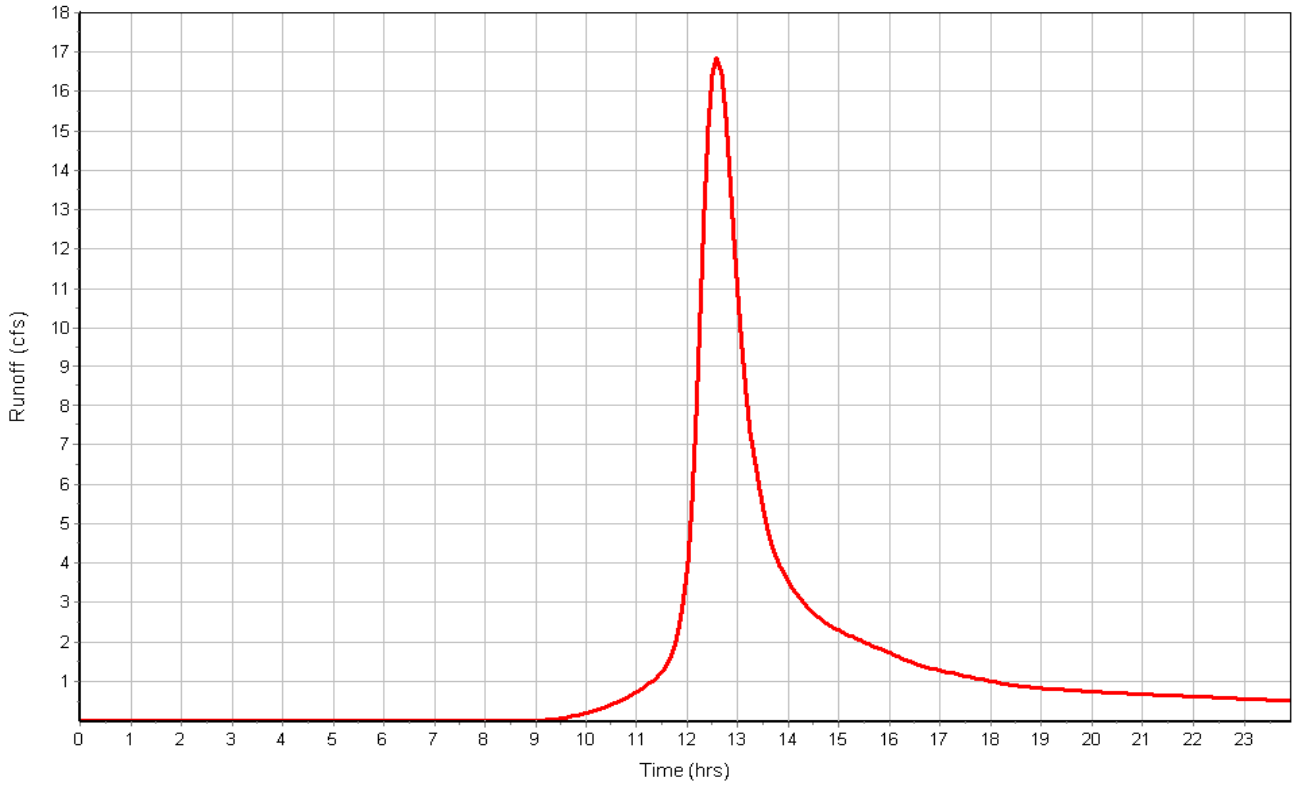
| | |
|---|---|
| Total Rainfall (in) | 5.40 |
| Total Runoff (in) | 2.61 |
| Peak Runoff (cfs) | 16.85 |
| Weighted Curve Number | 73.16 |
| Time of Concentration (days hh:mm:ss) | 0 00:49:44 |

**Subbasin : A1**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : A2

## Input Data

Area (ac) ..... 6.41
Weighted Curve Number ..... 80.93
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 0.13 | D | 77.00 |
| Roofs | 1.68 | D | 98.00 |
| > 75% grass cover, Good | 1.87 | D | 80.00 |
| Stone_Pad | 1.89 | D | 60.00 |
| Gravel roads | 0.17 | D | 91.00 |
| Pavement | 0.67 | D | 98.00 |
| Composite Area & Weighted CN | 6.41 | | 80.93 |

## Time of Concentration

| Sheet Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .4 | 0.00 | 0.00 |
| Flow Length (ft) : | 85 | 0.00 | 0.00 |
| Slope (%) : | 33.33 | 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) : | 6.32 | 0.00 | 0.00 |

| Channel Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .04 | 0.00 | 0.00 |
| Flow Length (ft) : | 1138 | 0.00 | 0.00 |
| Channel Slope (%) : | 1.4 | 0.00 | 0.00 |
| Cross Section Area (ft²) : | 4.398 | 0.00 | 0.00 |
| Wetted Perimeter (ft) : | 8.12 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 2.93 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 6.48 | 0.00 | 0.00 |

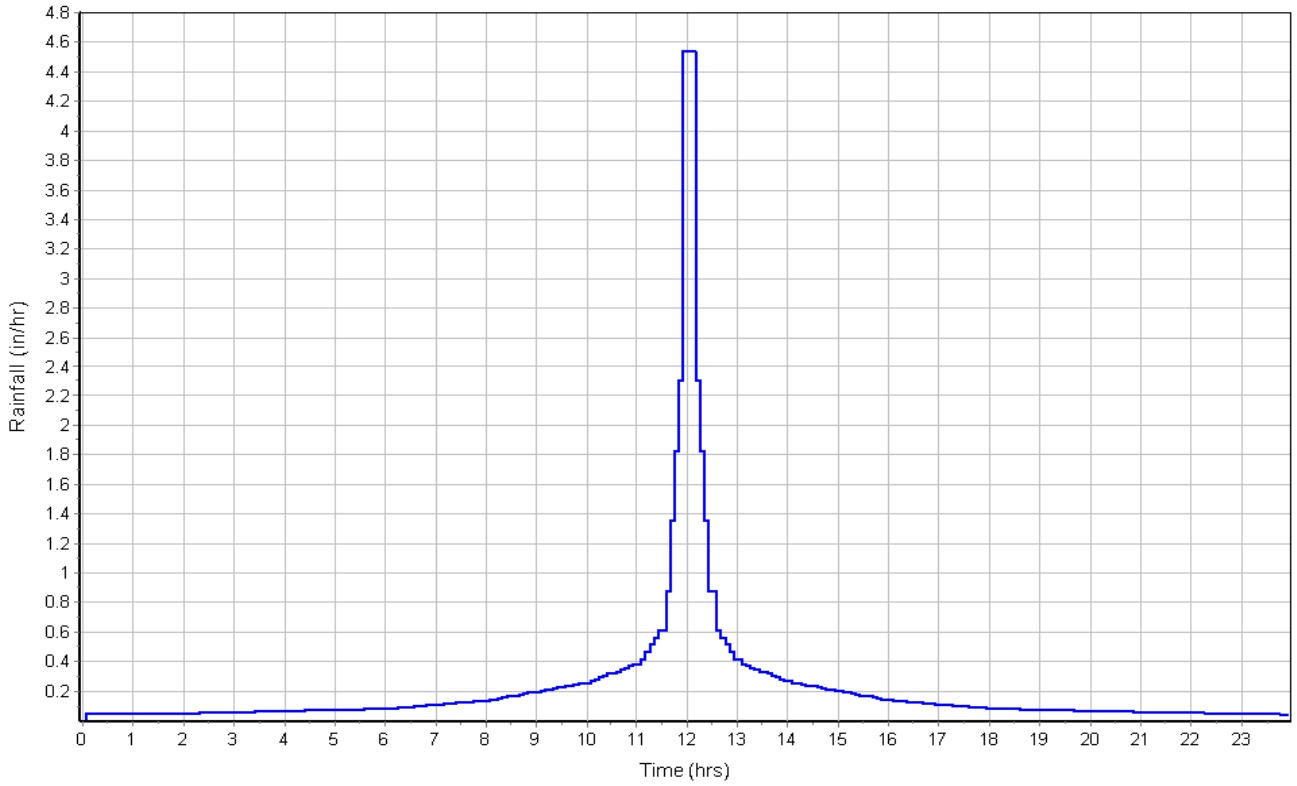
Total TOC (min) .....12.80

## Subbasin Runoff Results

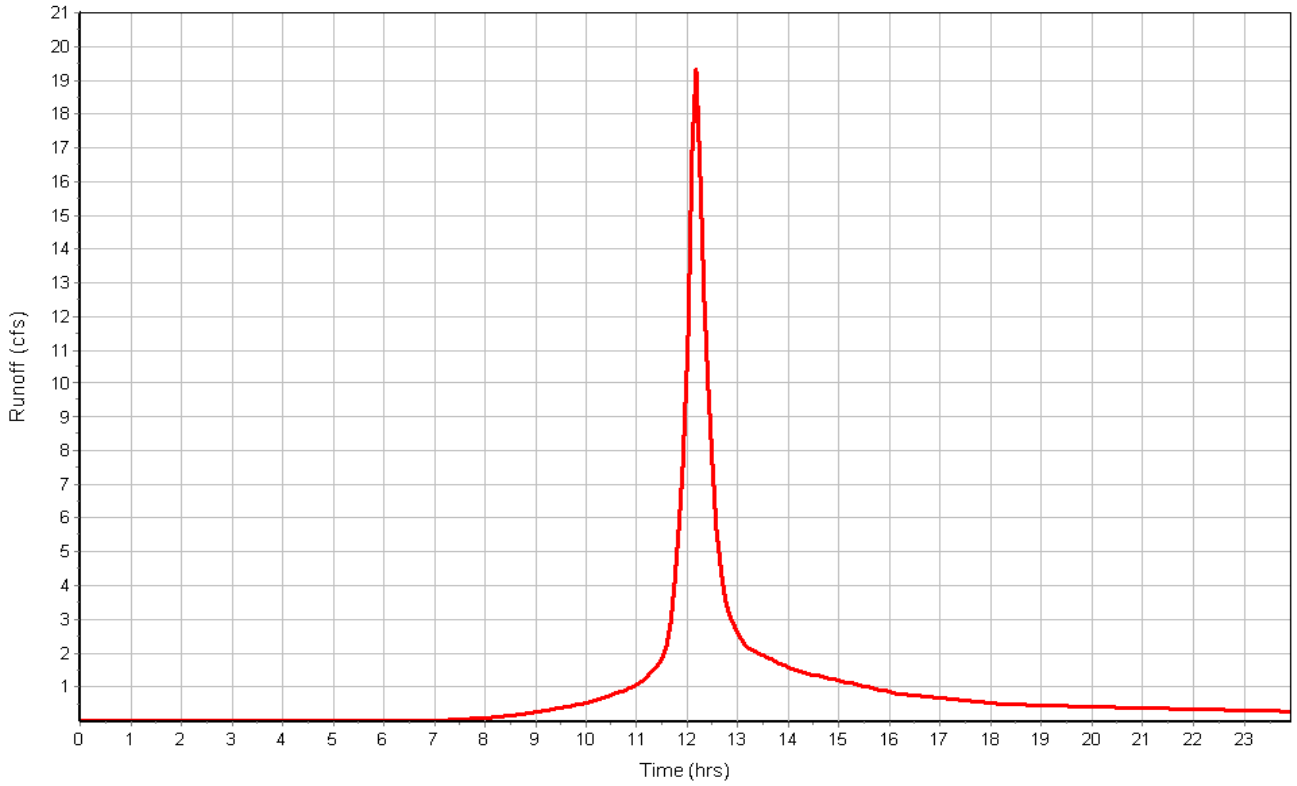
Total Rainfall (in) ..... 5.40
Total Runoff (in) ..... 3.34
Peak Runoff (cfs) ..... 19.36
Weighted Curve Number ..... 80.93
Time of Concentration (days hh:mm:ss) ..... 0 00:12:48

**Subbasin : A2**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : A3

## Input Data

Area (ac) ..... 4.01
Weighted Curve Number ..... 71.75
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| > 75% grass cover, Good | 0.75 | D | 80.00 |
| > 75% grass cover, Good | 0.14 | C | 74.00 |
| Stone_Pad | 2.28 | D | 60.00 |
| Roofs | 0.19 | D | 98.00 |
| Gravel roads | 0.25 | D | 91.00 |
| Pavement | 0.35 | D | 98.00 |
| Foundations | 0.05 | D | 98.00 |
| Composite Area & Weighted CN | 4.01 | | 71.75 |

## Time of Concentration

| Sheet Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .01 | 0.00 | 0.00 |
| Flow Length (ft) : | 100 | 0.00 | 0.00 |
| Slope (%) : | 2 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 1.44 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 1.16 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 548 | 25 | 200 |
| Slope (%) : | 2 | 33.33 | 1.5 |
| Surface Type : | Unpaved | rass pastu | rass pasture |
| Velocity (ft/sec) : | 2.28 | 4.04 | 0.86 |
| Computed Flow Time (min) : | 4.01 | 0.10 | 3.88 |

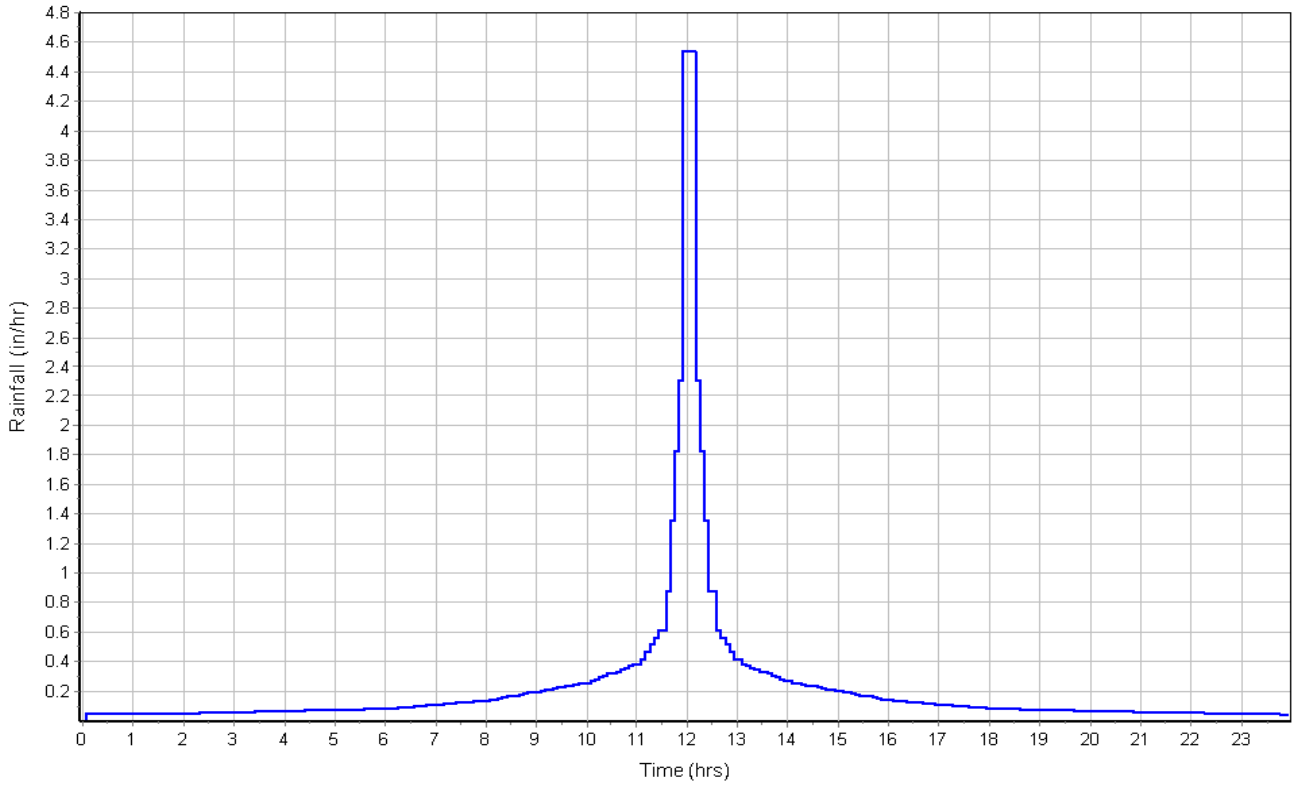
Total TOC (min) .....9.14

## Subbasin Runoff Results

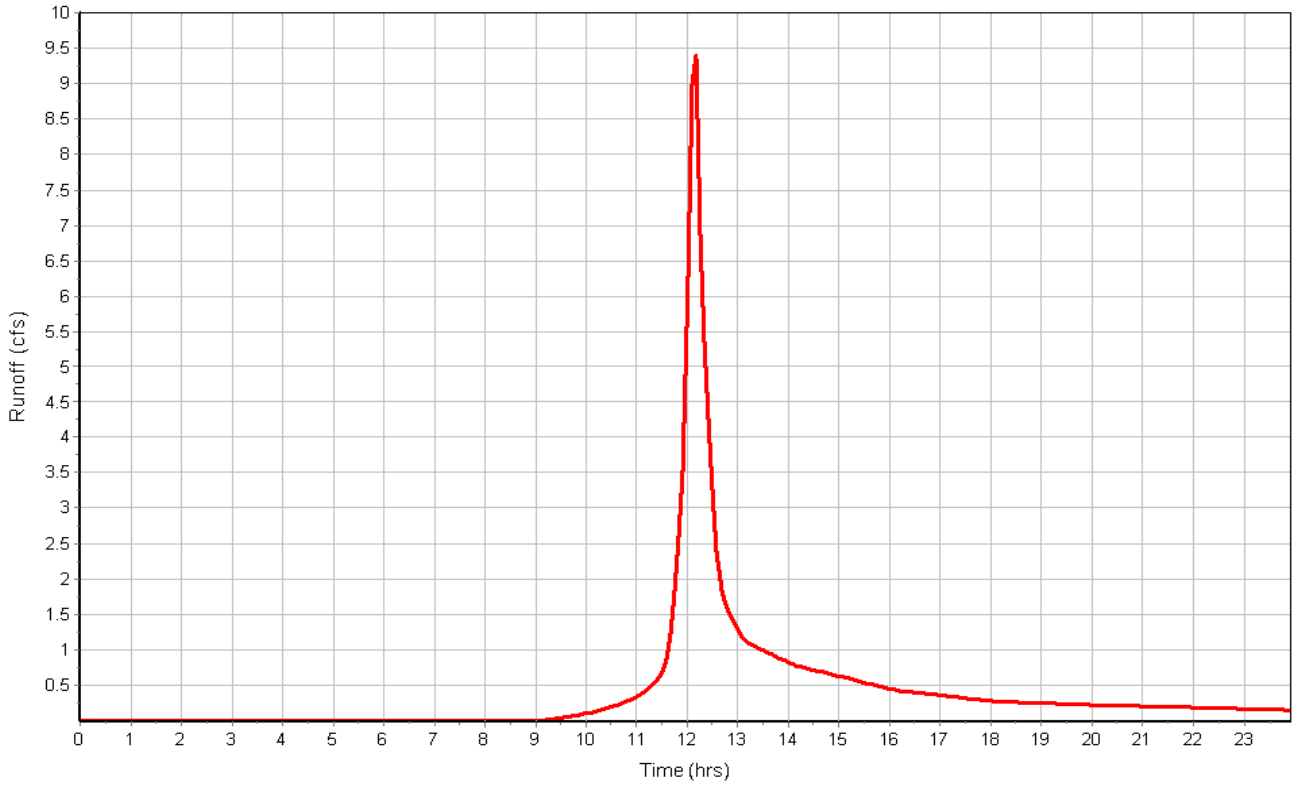
Total Rainfall (in) ..... 5.40
Total Runoff (in) ..... 2.49
Peak Runoff (cfs) ..... 9.76
Weighted Curve Number ..... 71.75
Time of Concentration (days hh:mm:ss) ..... 0 00:09:08

**Subbasin : A3**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : B

## Input Data

Area (ac) ..... 4.99
Weighted Curve Number ..... 75.82
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Woods, Good | 1.05 | C | 70.00 |
| Woods, Good | 3.45 | D | 77.00 |
| > 75% grass cover, Good | 0.49 | D | 80.00 |
| Composite Area & Weighted CN | 4.99 | | 75.82 |

## Time of Concentration

| Sheet Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .4 | 0.00 | 0.00 |
| Flow Length (ft) : | 90 | 0.00 | 0.00 |
| Slope (%) : | 33.33 | 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) : | 6.62 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 368 | 0.00 | 0.00 |
| Slope (%) : | 1.63 | 0.00 | 0.00 |
| Surface Type : | Grassed waterway | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.92 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 3.19 | 0.00 | 0.00 |

| Channel Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .3 | .3 | 0.00 |
| Flow Length (ft) : | 272 | 85 | 0.00 |
| Channel Slope (%) : | 1.4 | 16.7 | 0.00 |
| Cross Section Area ($ft^2$) : | 3.287 | 1.367 | 0.00 |
| Wetted Perimeter (ft) : | 7.17 | 5.15 | 0.00 |
| Velocity (ft/sec) : | 0.35 | 0.84 | 0.00 |
| Computed Flow Time (min) : | 12.97 | 1.69 | 0.00 |

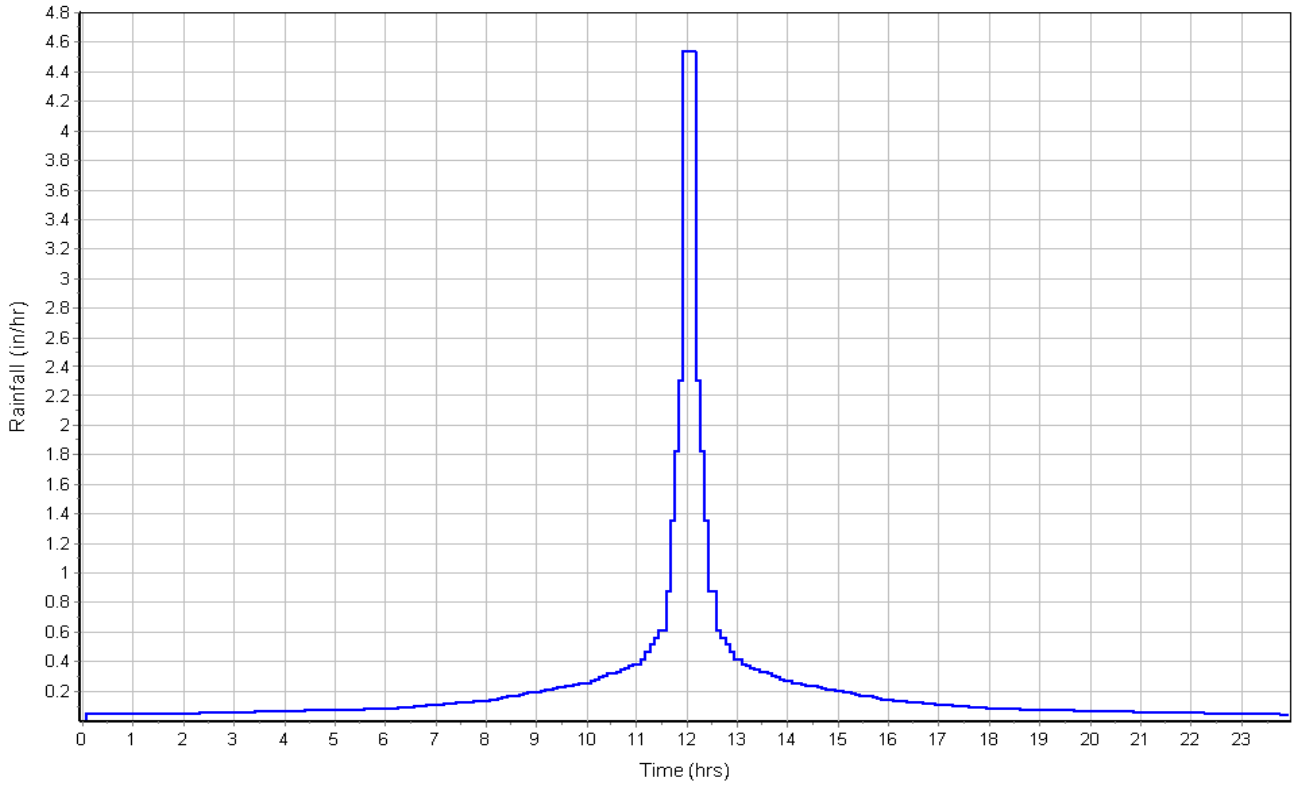
Total TOC (min) .....24.48

## Subbasin Runoff Results

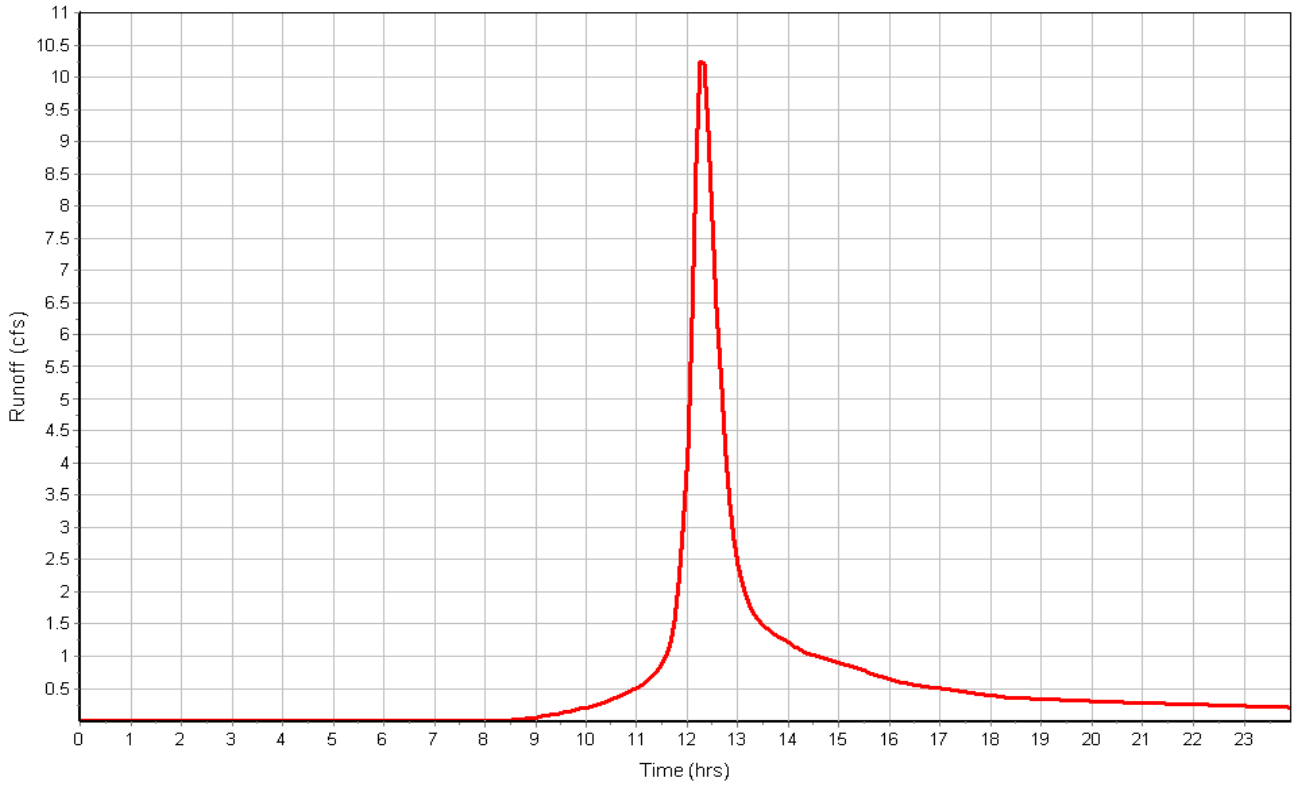
Total Rainfall (in) ..... 5.40
Total Runoff (in) ..... 2.85
Peak Runoff (cfs) ..... 10.41
Weighted Curve Number ..... 75.82
Time of Concentration (days hh:mm:ss) ..... 0 00:24:29

**Subbasin : B**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : C1

## Input Data

Area (ac) ..... 15.70
Weighted Curve Number ..... 73.25
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| Gravel roads | 0.17 | D | 91.00 |
| > 75% grass cover, Good | 0.04 | D | 80.00 |
| Woods, Good | 8.63 | C | 70.00 |
| Woods, Good | 6.55 | D | 77.00 |
| > 75% grass cover, Good | 0.31 | C | 74.00 |
| Composite Area & Weighted CN | 15.70 | | 73.25 |

## 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 (%) : | 2 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.05 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 30.68 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 1907 | 0.00 | 0.00 |
| Slope (%) : | .524 | 0.00 | 0.00 |
| Surface Type : | Grassed waterway | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.09 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 29.16 | 0.00 | 0.00 |

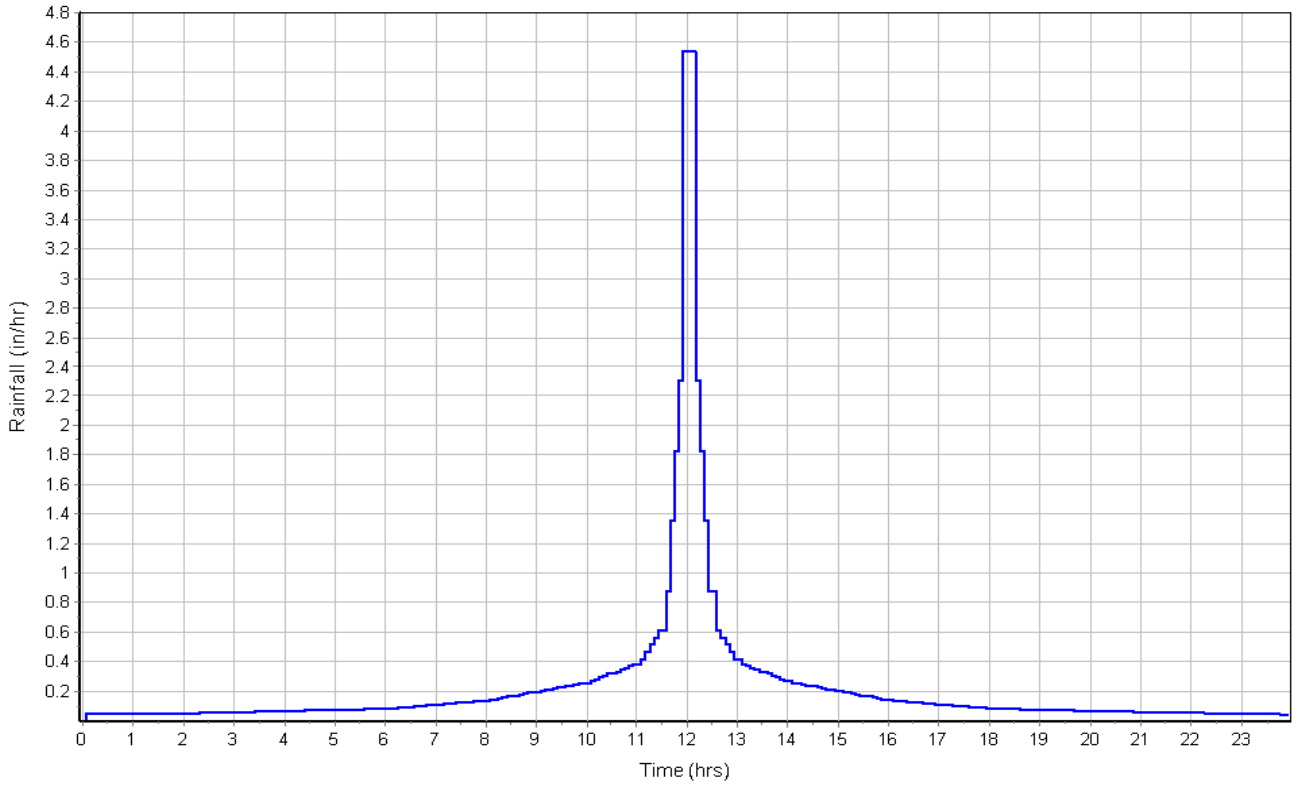
Total TOC (min) .....59.83

## Subbasin Runoff Results

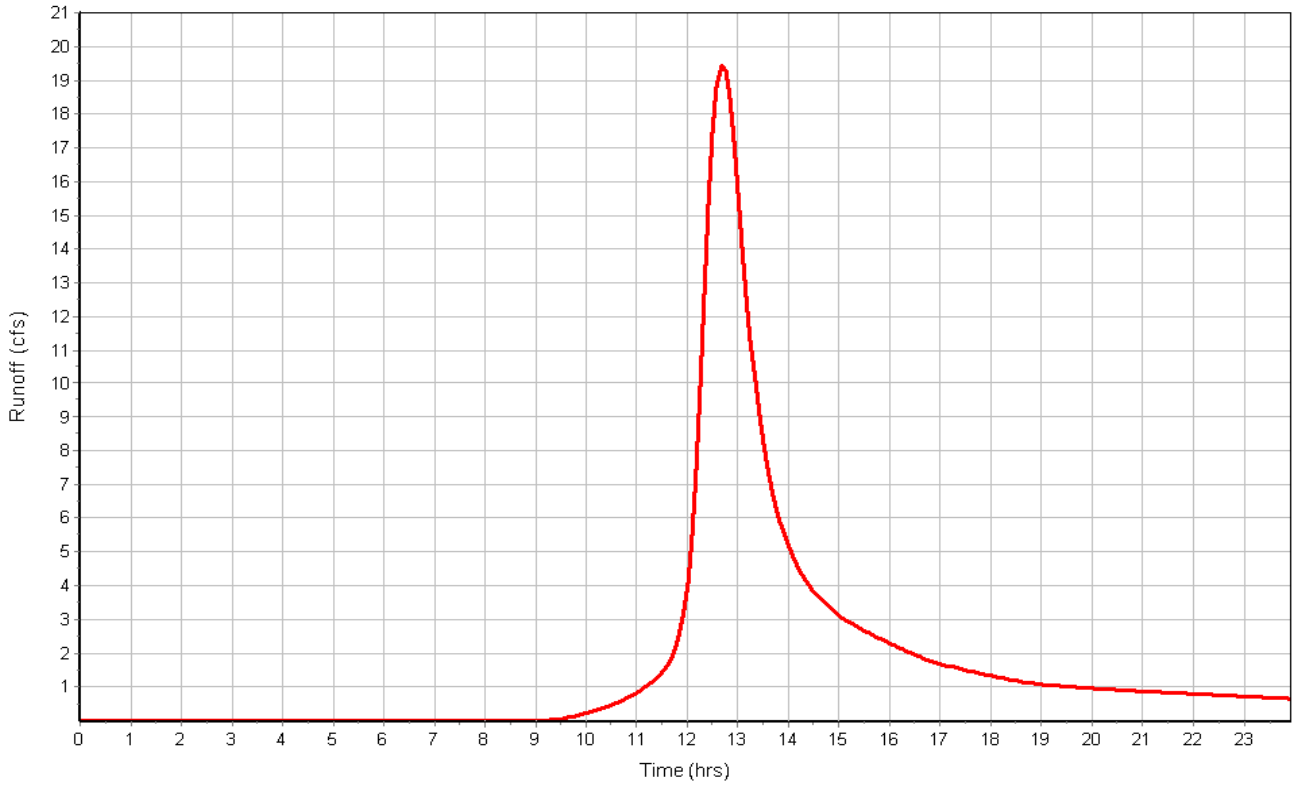
Total Rainfall (in) ..... 5.40
Total Runoff (in) ..... 2.62
Peak Runoff (cfs) ..... 19.48
Weighted Curve Number ..... 73.25
Time of Concentration (days hh:mm:ss) ..... 0 00:59:50

**Subbasin : C1**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : C2

## Input Data

Area (ac) ..... 2.05
Weighted Curve Number ..... 82.98
Rain Gage ID ..... Rain Gage-01

## Composite Curve Number

| Soil/Surface Description | Area (acres) | Soil Group | Curve Number |
|---|---|---|---|
| > 75% grass cover, Good | 0.32 | D | 80.00 |
| > 75% grass cover, Good | 0.76 | C | 74.00 |
| Gravel roads | 0.97 | D | 91.00 |
| Composite Area & Weighted CN | 2.05 | | 82.98 |

## Time of Concentration

| Sheet Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .01 | 0.00 | 0.00 |
| Flow Length (ft) : | 60 | 0.00 | 0.00 |
| Slope (%) : | 2 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 1.30 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 0.77 | 0.00 | 0.00 |

| Channel Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Manning's Roughness : | .03 | 0.00 | 0.00 |
| Flow Length (ft) : | 2256 | 0.00 | 0.00 |
| Channel Slope (%) : | .5 | 0.00 | 0.00 |
| Cross Section Area ($ft^2$) : | 2.475 | 0.00 | 0.00 |
| Wetted Perimeter (ft) : | 6.91 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 1.77 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 21.23 | 0.00 | 0.00 |

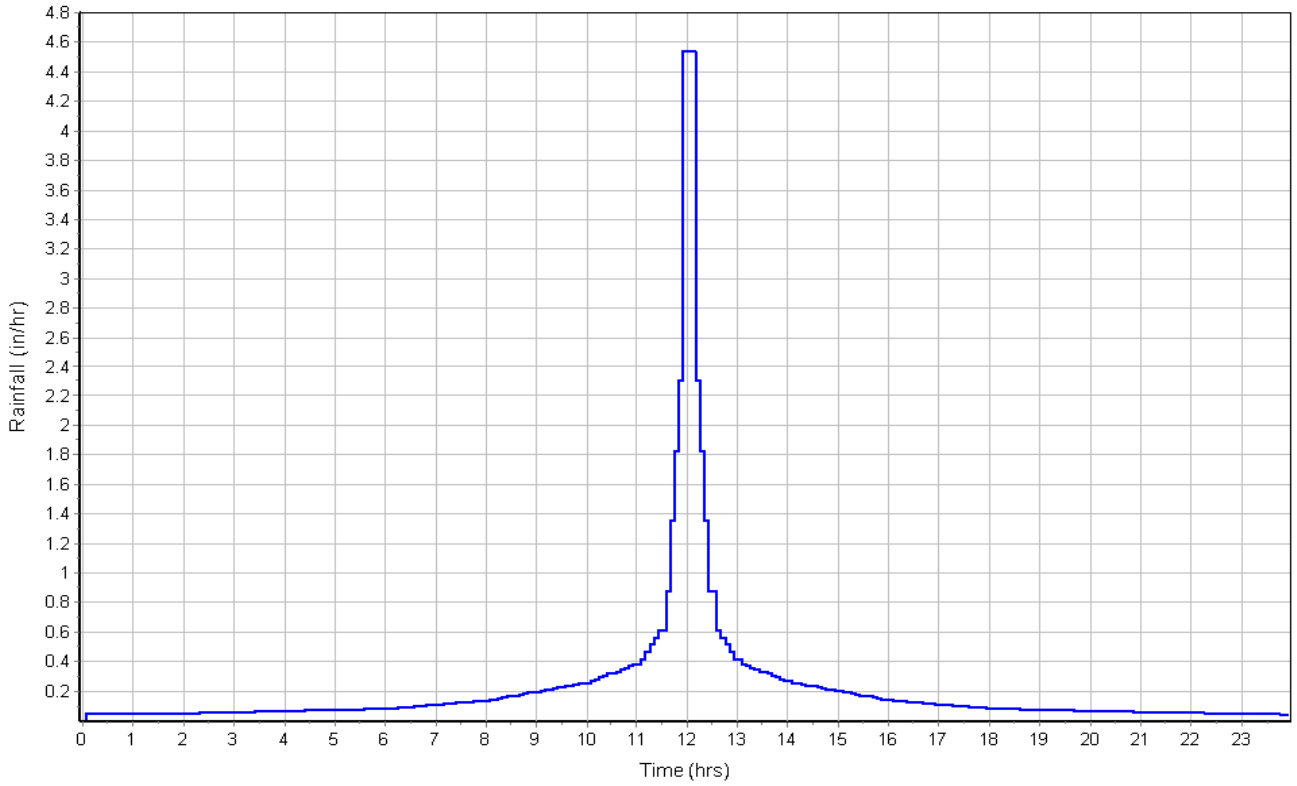
Total TOC (min) .....22.00

## Subbasin Runoff Results

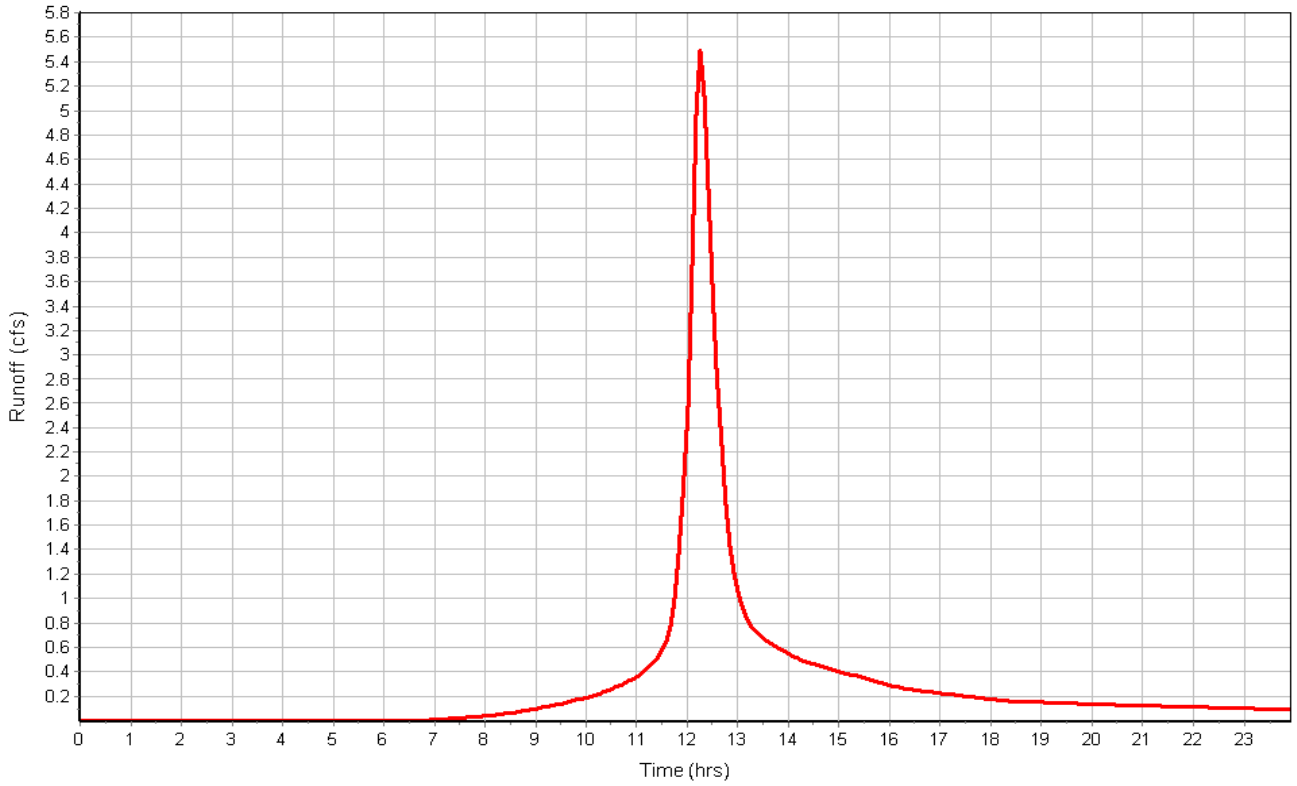
Total Rainfall (in) ..... 5.40
Total Runoff (in) ..... 3.54
Peak Runoff (cfs) ..... 5.50
Weighted Curve Number ..... 82.98
Time of Concentration (days hh:mm:ss) ..... 0 00:22:00

**Subbasin : C2**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : D

## Input Data

Area (ac) ..... 0.59
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 | 0.59 | D | 77.00 |
| Composite Area & Weighted CN | 0.59 | | 77.00 |

## 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 (%) : | 21 | 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) : | 11.98 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 16 | 0.00 | 0.00 |
| Slope (%) : | 14.5 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 1.90 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 0.14 | 0.00 | 0.00 |

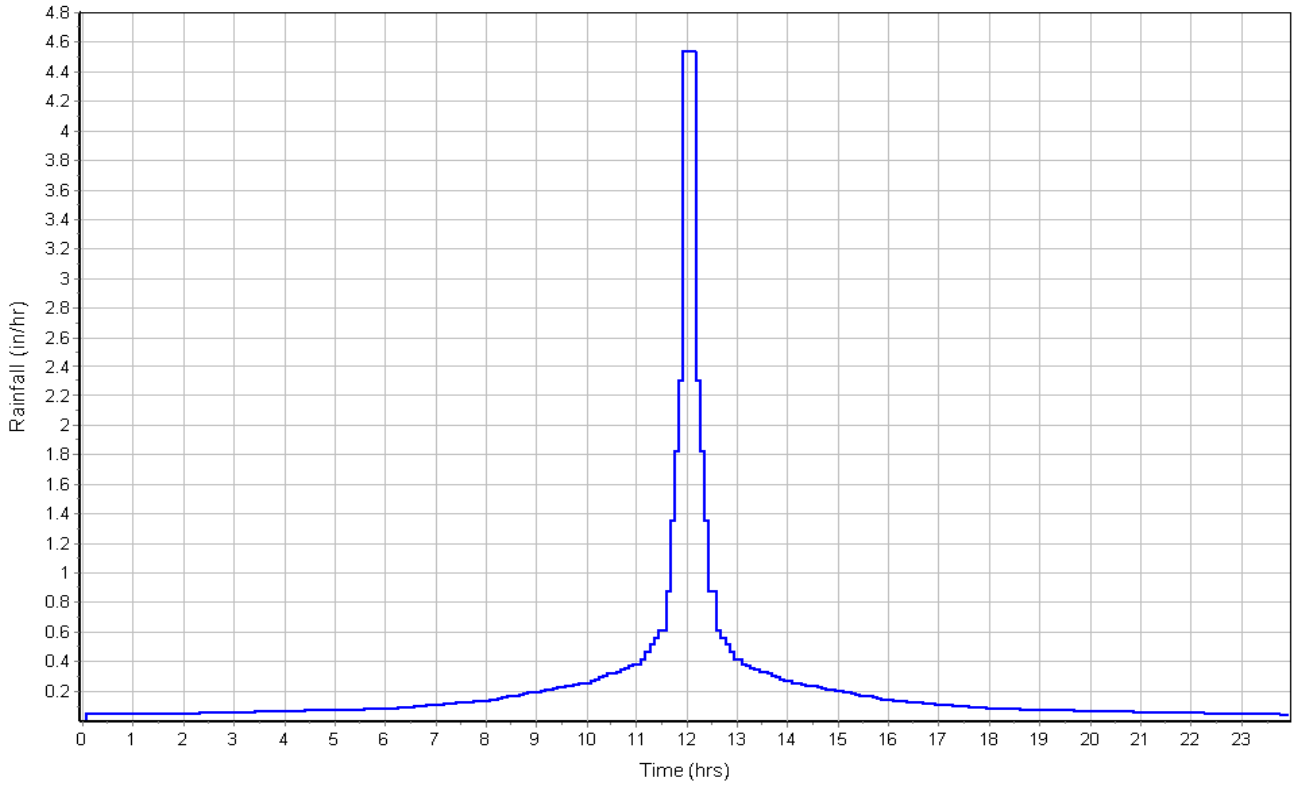
Total TOC (min) .....12.12

## Subbasin Runoff Results

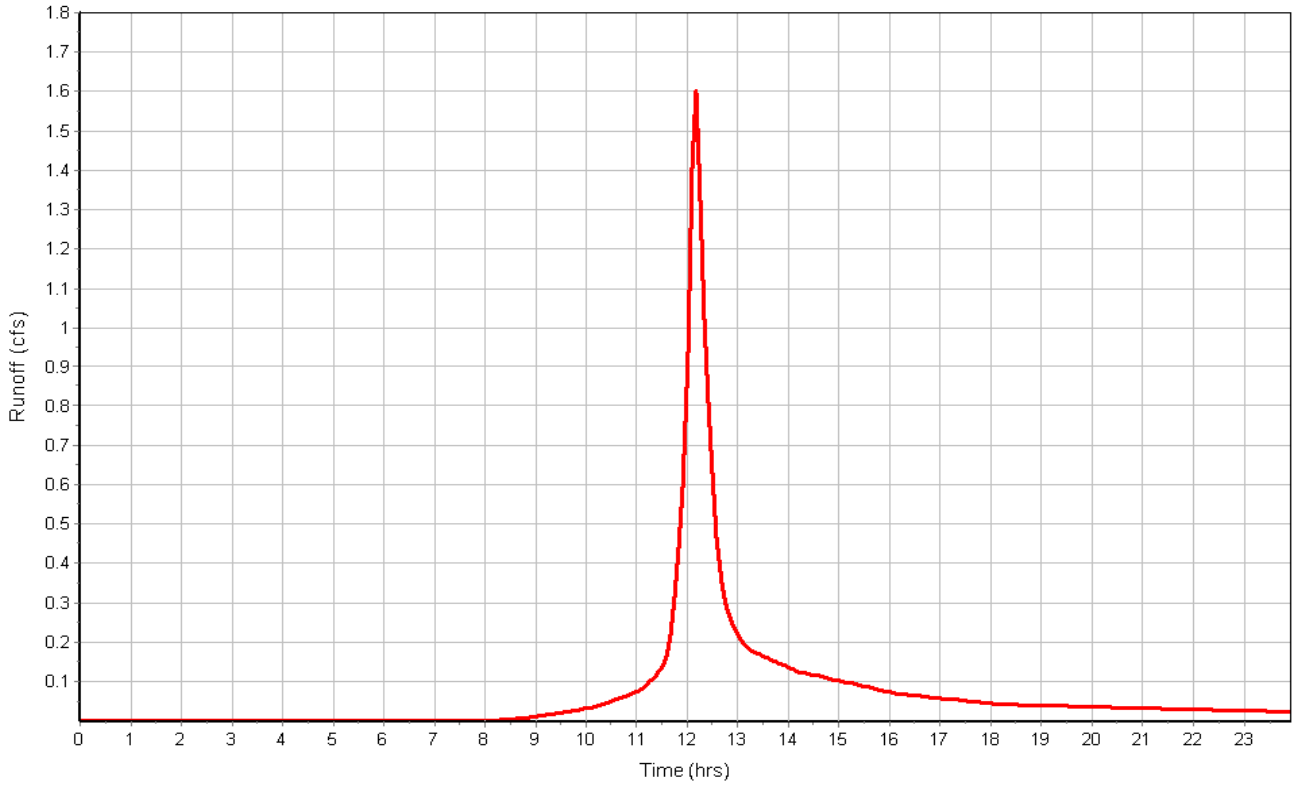
Total Rainfall (in) ..... 5.40
Total Runoff (in) ..... 2.96
Peak Runoff (cfs) ..... 1.61
Weighted Curve Number ..... 77.00
Time of Concentration (days hh:mm:ss) ..... 0 00:12:07

**Subbasin : D**

## Rainfall Intensity Graph




## Runoff Hydrograph



# Subbasin : E

## Input Data

Area (ac) ..... 2.86
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 | 2.86 | D | 77.00 |
| Composite Area & Weighted CN | 2.86 | | 77.00 |

## 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 (%) : | 24 | 0.00 | 0.00 |
| 2 yr, 24 hr Rainfall (in) : | 3.00 | 0.00 | 0.00 |
| Velocity (ft/sec) : | 0.15 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 11.35 | 0.00 | 0.00 |

| Shallow Concentrated Flow Computations | Subarea A | Subarea B | Subarea C |
|---|---|---|---|
| Flow Length (ft) : | 227 | 0.00 | 0.00 |
| Slope (%) : | 18 | 0.00 | 0.00 |
| Surface Type : | Woodland | Unpaved | Unpaved |
| Velocity (ft/sec) : | 2.12 | 0.00 | 0.00 |
| Computed Flow Time (min) : | 1.78 | 0.00 | 0.00 |

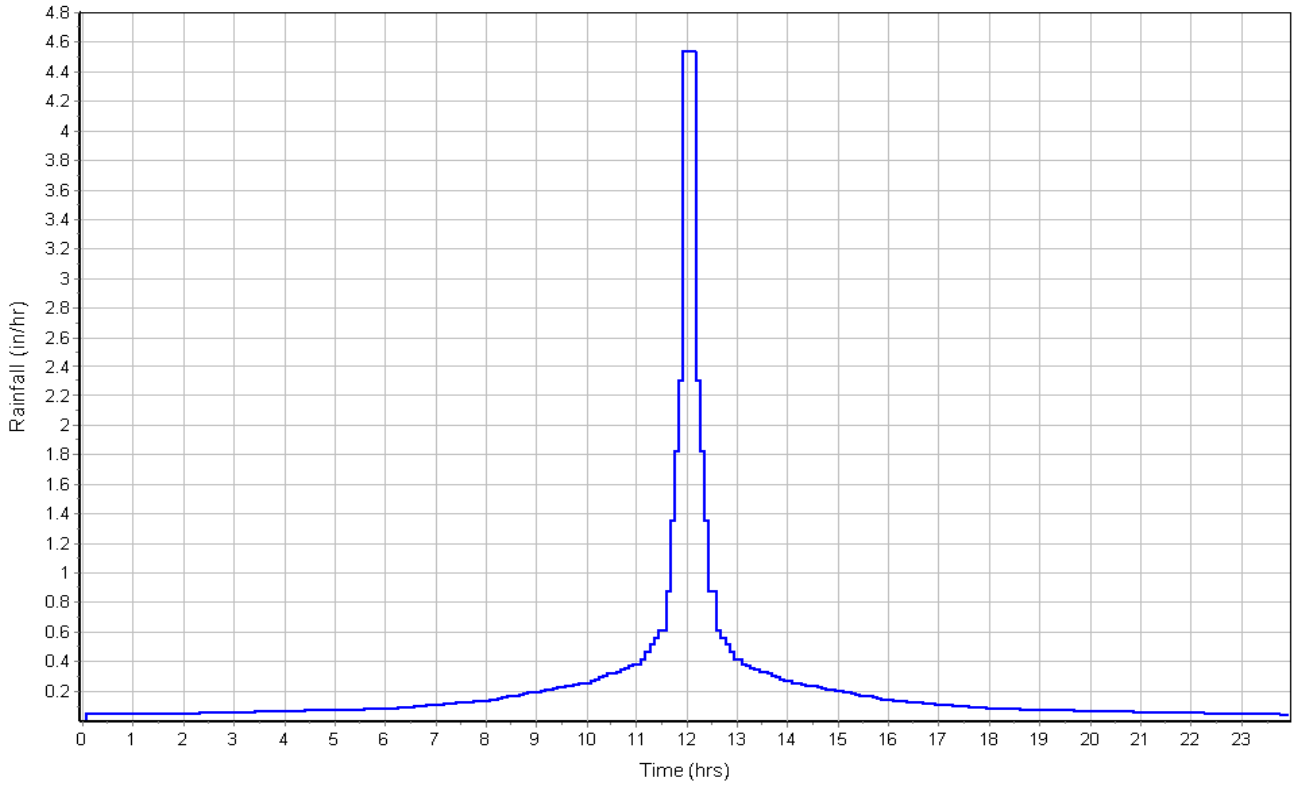
Total TOC (min) .....13.14

## Subbasin Runoff Results

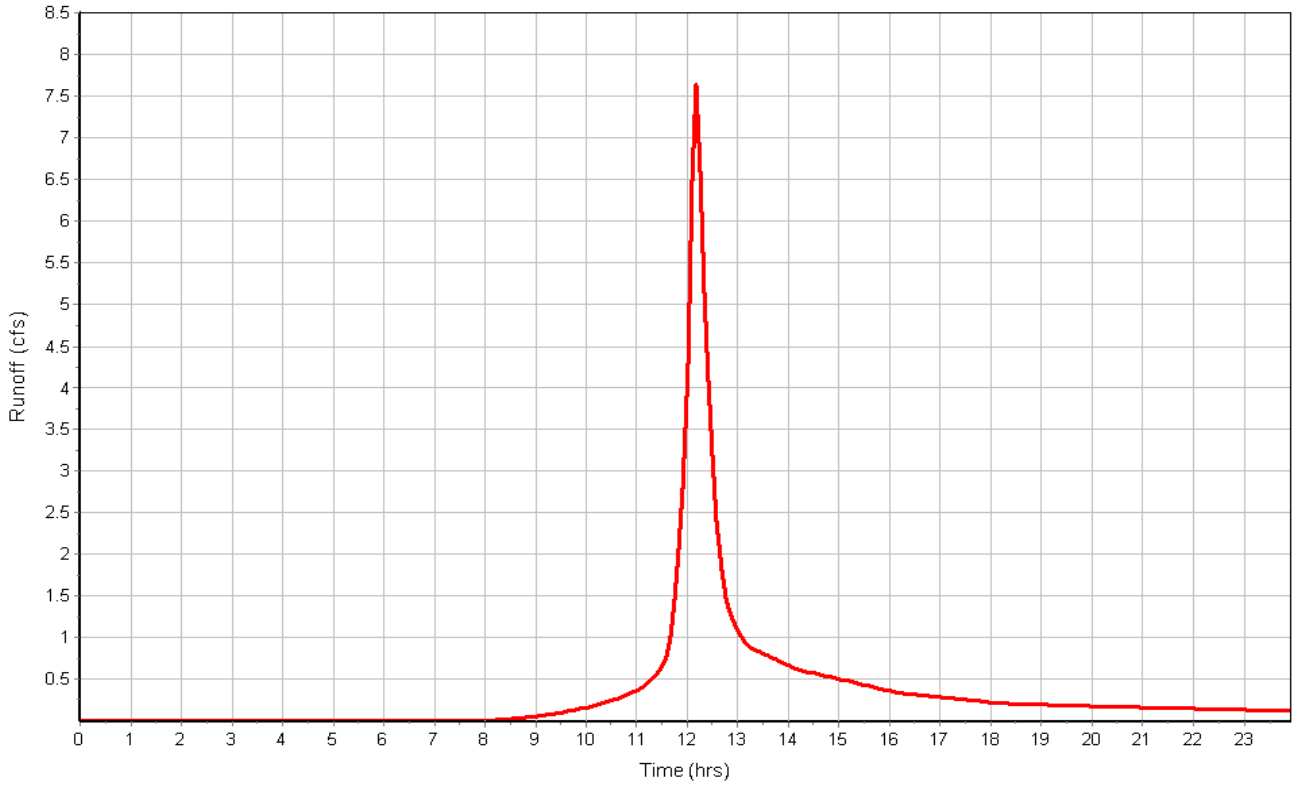
Total Rainfall (in) ..... 5.40
Total Runoff (in) ..... 2.96
Peak Runoff (cfs) ..... 7.65
Weighted Curve Number ..... 77.00
Time of Concentration (days hh:mm:ss) ..... 0 00:13:08

**Subbasin : E**

## Rainfall Intensity Graph




## Runoff Hydrograph



## Junction Input

| Element ID | Invert Elevation (ft) | Ground/Rim (Max) Elevation (ft) |
|---|---|---|
| CB1 | 305.30 | 309.50 |
| CB2 | 312.00 | 316.00 |
| OUTLET-STR-A2 | 305.60 | 312.00 |
| OUTLET-STR-C2 | 299.00 | 305.00 |

## 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) |
| CB1 | 23.99 | 307.24 | 1.94 | 2.26 | 305.56 | 0 12:15 |
| CB2 | 19.33 | 313.25 | 1.25 | 2.75 | 312.17 | 0 12:15 |
| OUTLET-STR-A2 | 15.86 | 307.19 | 1.59 | 4.81 | 305.80 | 0 12:21 |
| OUTLET-STR-C2 | 0.48 | 299.20 | 0.20 | 5.80 | 299.08 | 0 14:28 |

## 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 |
|---|---|---|---|---|---|---|---|---|
| CULV-A2-1 | 104.00 | 312.00 | 310.00 | 1.9200 | CIRCULAR | 24.000 | 24.000 | 0.0150 |
| CULV-A2-2 | 43.00 | 305.60 | 305.30 | 0.7000 | CIRCULAR | 24.000 | 24.000 | 0.0150 |
| CULV-A3 | 98.00 | 305.30 | 305.00 | 0.3100 | CIRCULAR | 36.000 | 36.000 | 0.0150 |
| CULV-C2 | 40.00 | 299.00 | 298.00 | 2.5000 | 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) |
| CULV-A2-1 | 19.23 | 0 12:15 | 27.19 | 9.40 | 1.24 |
| CULV-A2-2 | 15.86 | 0 12:21 | 16.38 | 5.94 | 1.58 |
| CULV-A3 | 23.99 | 0 12:15 | 31.98 | 4.97 | 1.93 |
| CULV-C2 | 0.48 | 0 14:28 | 8.85 | 3.84 | 0.20 |

# Storage Nodes

## Storage Node : FILTER-A2

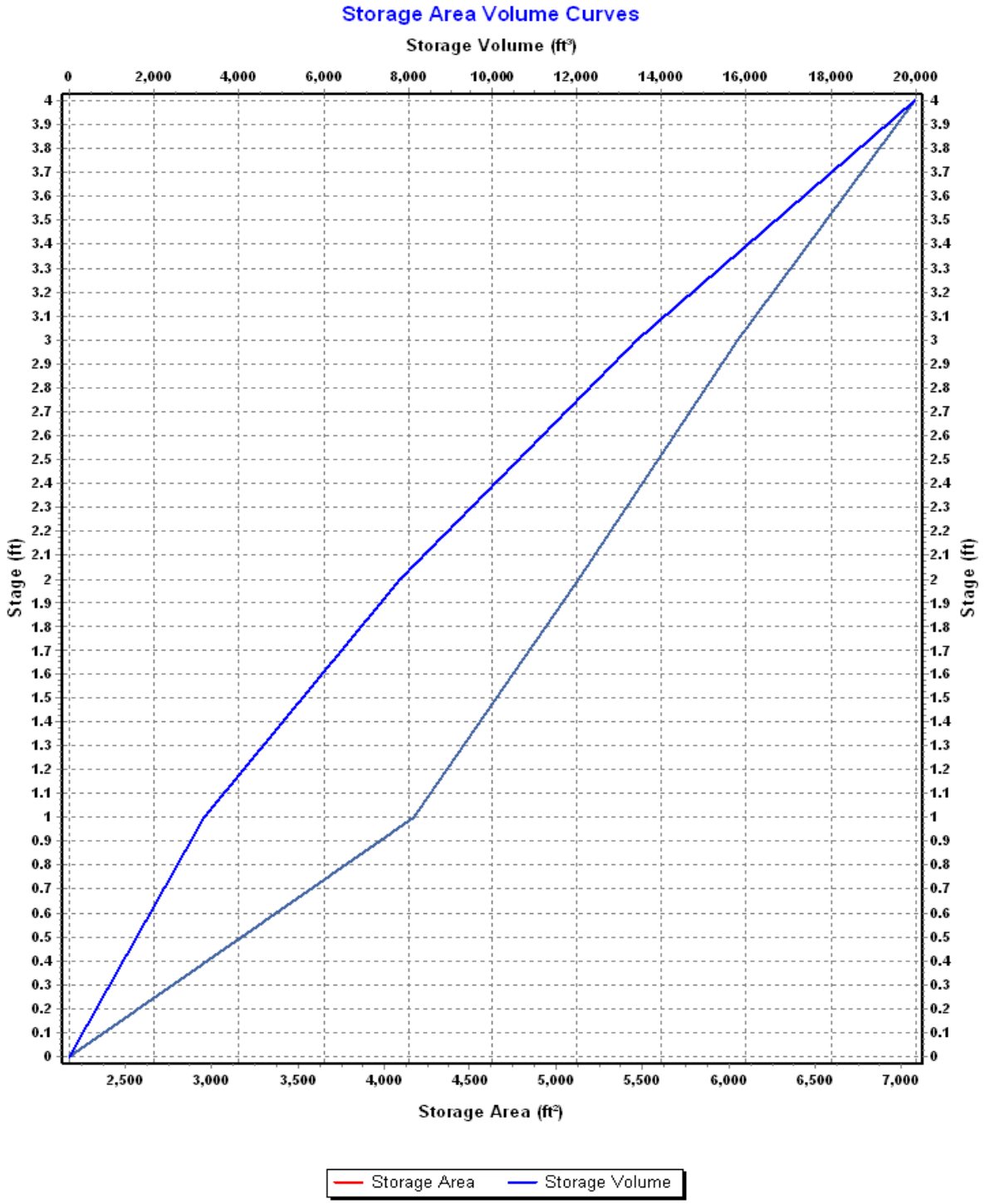
### Input Data

| | |
|---|---|
| Invert Elevation (ft) | 308.00 |
| Max (Rim) Elevation (ft) | 312.00 |
| Max (Rim) Offset (ft) | 4.00 |
| Initial Water Elevation (ft) | 308.00 |
| Initial Water Depth (ft) | 0.00 |
| Ponded Area (ft²) | 0.00 |
| Evaporation Loss | 0.00 |

### Storage Area Volume Curves

Storage Curve : Storage-05

| Stage (ft) | Storage Area (ft²) | Storage Volume (ft³) |
|---|---|---|
| 0 | 2178 | 0.000 |
| 1 | 4172 | 3175.00 |
| 2 | 5127 | 7824.50 |
| 3 | 6050 | 13413.00 |
| 4 | 7075 | 19975.50 |


Storage Area Volume Curves
Storage Volume (ft³)
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
Stage (ft)
Stage (ft)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1
2.2
2.3
2.4
2.5
2.6
2.7
2.8
2.9
3
3.1
3.2
3.3
3.4
3.5
3.6
3.7
3.8
3.9
4
2,500
3,000
3,500
4,000
4,500
5,000
5,500
6,000
6,500
7,000
Storage Area (ft²)
Storage Area
Storage Volume

## Storage Node : FILTER-A2 (continued)

### Outflow Weirs

| Element ID | Weir Type | Crest Elevation (ft) | Length (ft) | Weir Total Height (ft) | Discharge Coefficient |
|---|---|---|---|---|---|
| WEIR-A2 | Trapezoidal | 310.70 | 40.00 | 1.32 | 3.10 |

### Outflow Orifices

| Element ID | Orifice Type | Orifice Shape | Circular Orifice Diameter (in) | Rectangular Orifice Height (in) | Rectangular Orifice Width (in) | Orifice Invert Elevation (ft) | Orifice Coefficient |
|---|---|---|---|---|---|---|---|
| ORIF-A2 | Side | Rectangular | | 15.00 | 32.00 | 309.10 | 0.63 |

### Output Summary Results

| | |
|---|---|
| Peak Inflow (cfs) | 19.23 |
| Peak Lateral Inflow (cfs) | 0.00 |
| Peak Outflow (cfs) | 15.86 |
| Peak Exfiltration Flow Rate (cfm) | 0.00 |
| Max HGL Elevation Attained (ft) | 310.62 |
| Max HGL Depth Attained (ft) | 2.62 |
| Average HGL Elevation Attained (ft) | 308.80 |
| Average HGL Depth Attained (ft) | 0.8 |
| Time of Max HGL Occurrence (days hh:mm) | 0 12:21 |
| Total Exfiltration Volume (1000-ft³) | 0.000 |
| Total Flooded Volume (ac-in) | 0 |
| Total Time Flooded (min) | 0 |
| Total Retention Time (sec) | 0.00 |

# Storage Node : FILTER-C2

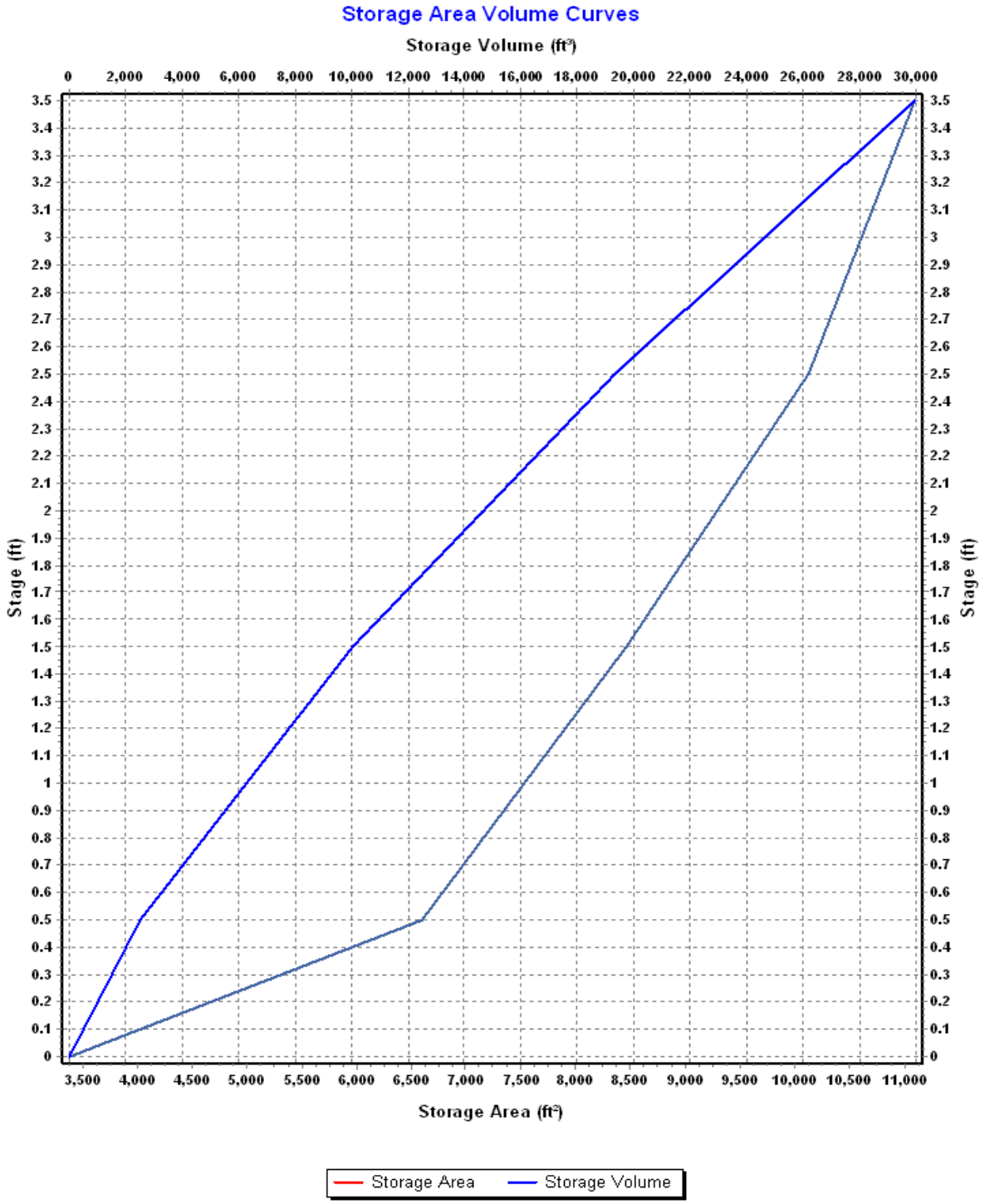
## Input Data

Invert Elevation (ft) ..... 301.50
Max (Rim) Elevation (ft) ..... 305.00
Max (Rim) Offset (ft) ..... 3.50
Initial Water Elevation (ft) ..... 301.50
Initial Water Depth (ft) ..... 0.00
Ponded Area (ft²) ..... 0.00
Evaporation Loss ..... 0.00

## Storage Area Volume Curves

Storage Curve : Storage-07

| Stage (ft) | Storage Area (ft²) | Storage Volume (ft³) |
|---|---|---|
| 0 | 3380 | 0.000 |
| .5 | 6601 | 2495.25 |
| 1.5 | 8462 | 10026.75 |
| 2.5 | 10125 | 19320.25 |
| 3.5 | 11092 | 29928.75 |


Storage Area Volume Curves
Storage Volume (ft³)
0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000 22,000 24,000 26,000 28,000 30,000
Stage (ft)
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3 3.1 3.2 3.3 3.4 3.5
Storage Area (ft²)
3,500 4,000 4,500 5,000 5,500 6,000 6,500 7,000 7,500 8,000 8,500 9,000 9,500 10,000 10,500 11,000
Storage Area
Storage Volume

## Storage Node : FILTER-C2 (continued)

### Outflow Weirs

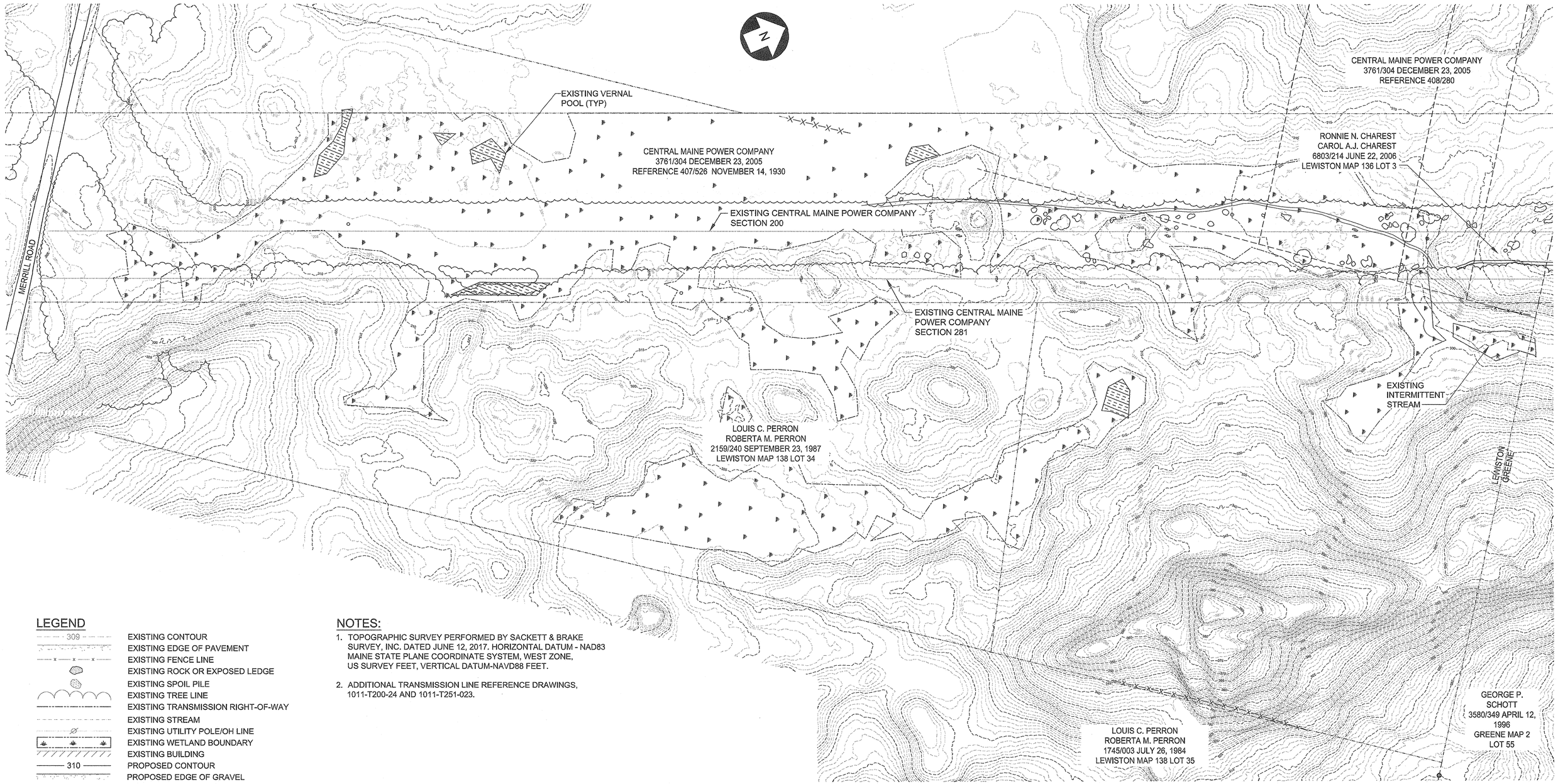
| Element ID | Weir Type | Crest Elevation (ft) | Length (ft) | Weir Total Height (ft) | Discharge Coefficient |
|---|---|---|---|---|---|
| WEIR-C2 | Trapezoidal | 303.80 | 30.00 | 1.20 | 3.10 |

### Outflow Orifices

| Element ID | Orifice Type | Orifice Shape | Circular Orifice Diameter (in) | Rectangular Orifice Height (in) | Rectangular Orifice Width (in) | Orifice Invert Elevation (ft) | Orifice Coefficient |
|---|---|---|---|---|---|---|---|
| ORIF-C2 | Side | CIRCULAR | 4.50 | | | 302.75 | 0.61 |

### Output Summary Results

| | |
|---|---|
| Peak Inflow (cfs) | 5.49 |
| Peak Lateral Inflow (cfs) | 5.49 |
| Peak Outflow (cfs) | 0.48 |
| Peak Exfiltration Flow Rate (cfm) | 0.00 |
| Max HGL Elevation Attained (ft) | 303.70 |
| Max HGL Depth Attained (ft) | 2.2 |
| Average HGL Elevation Attained (ft) | 302.49 |
| Average HGL Depth Attained (ft) | 0.99 |
| Time of Max HGL Occurrence (days hh:mm) | 0 14:28 |
| Total Exfiltration Volume (1000-ft³) | 0.000 |
| Total Flooded Volume (ac-in) | 0 |
| Total Time Flooded (min) | 0 |
| Total Retention Time (sec) | 0.00 |




## LEGEND

- 309 — EXISTING CONTOUR
- EXISTING EDGE OF PAVEMENT
- x x x — EXISTING FENCE LINE
- EXISTING ROCK OR EXPOSED LEDGE
- EXISTING SPOIL PILE
- EXISTING TREE LINE
- EXISTING TRANSMISSION RIGHT-OF-WAY
- EXISTING STREAM
- EXISTING UTILITY POLE/OH LINE
- EXISTING WETLAND BOUNDARY
- EXISTING BUILDING
- 310 — PROPOSED CONTOUR
- PROPOSED EDGE OF GRAVEL
- x x x — PROPOSED FENCE LINE
- PROPOSED EDGE GRAVEL YARD SURFACE
- LP-XX — PROPOSED SITE LAYOUT POINT
- PROPOSED TREE LINE
- SF SF SF — PROPOSED SILT FENCE
- PROPERTY LINE
- PROPOSED CHECK DAM

## NOTES:

1. TOPOGRAPHIC SURVEY PERFORMED BY SACKETT & BRAKE SURVEY, INC. DATED JUNE 12, 2017. HORIZONTAL DATUM - NAD83 MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, US SURVEY FEET, VERTICAL DATUM-NAVD88 FEET.
2. ADDITIONAL TRANSMISSION LINE REFERENCE DRAWINGS, 1011-T200-24 AND 1011-T251-023.

## GENERAL SITE PLAN
SCALE: 1"= 100'

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

100 0 100 200 FT
SCALE: 1"= 100'

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

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

PE Stamp: STATE OF MAINE — KENNETH R. VOLOCK No. 11082 — LICENSED PROFESSIONAL ENGINEER — 09/08/2017 — ISSUED FOR PERMITTING

CMP IBERDROLA - USA

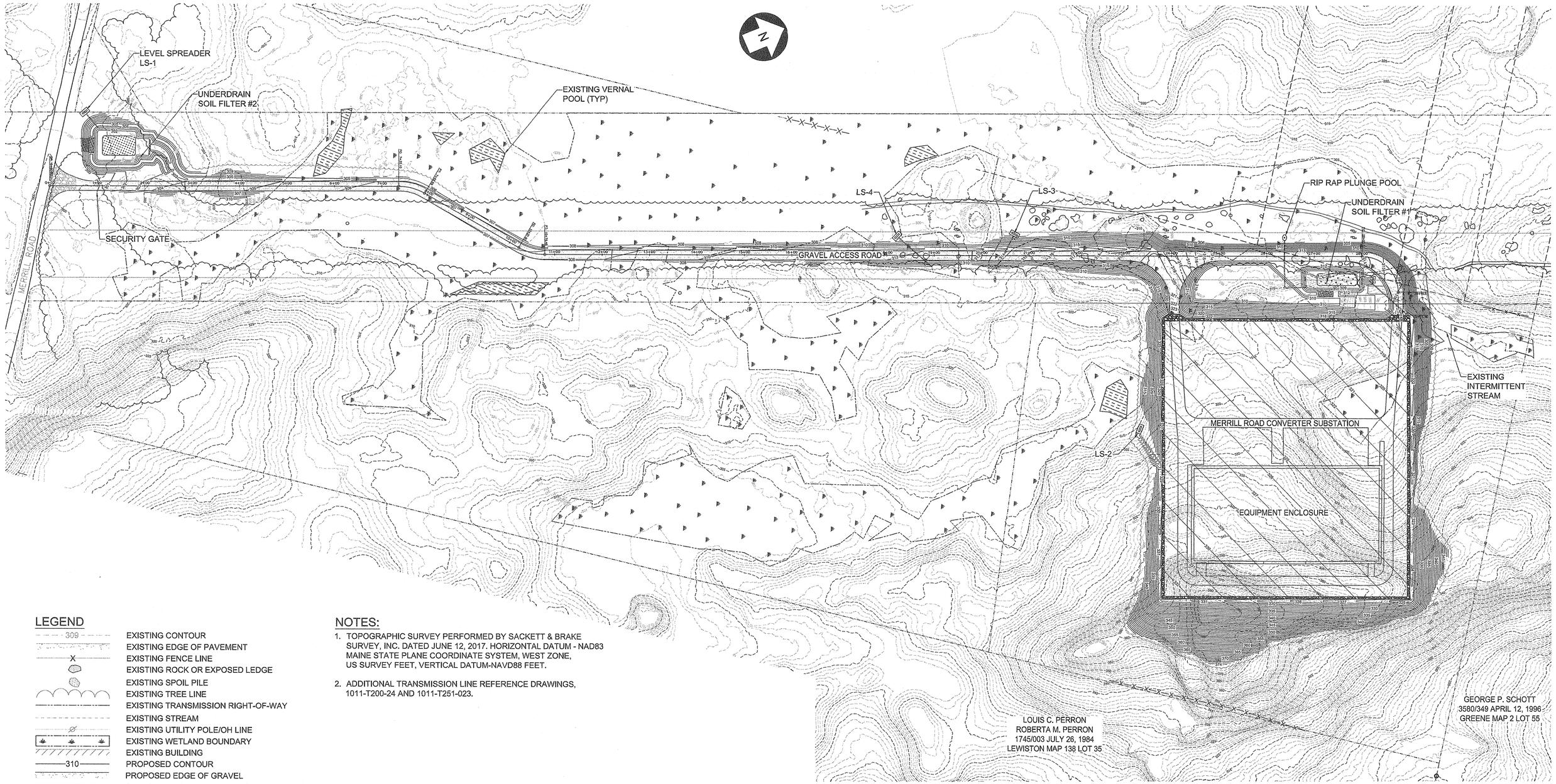
| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

GENERAL SITE PLAN
EXISTING CONDITIONS
SH 1 OF 2

MERRILL ROAD/1076 LEWISTON, ME

| DR. | EVD | SCALE: 1"=100' | FILE: 1076-003-001SH001.DWG |
|---|---|---|---|
| CK. | KRV | NO. | REV. |
| APP. | | 1076-003-001 | A |
| DATE: | | | |

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.




## LEGEND

- EXISTING CONTOUR (309)
- EXISTING EDGE OF PAVEMENT
- EXISTING FENCE LINE
- EXISTING ROCK OR EXPOSED LEDGE
- EXISTING SPOIL PILE
- EXISTING TREE LINE
- EXISTING TRANSMISSION RIGHT-OF-WAY
- EXISTING STREAM
- EXISTING UTILITY POLE/OH LINE
- EXISTING WETLAND BOUNDARY
- EXISTING BUILDING
- PROPOSED CONTOUR (310)
- PROPOSED EDGE OF GRAVEL
- PROPOSED STABILIZED CONSTRUCTION EXIT
- PROPOSED FENCE LINE
- PROPOSED EDGE GRAVEL YARD SURFACE
- PROPOSED SITE LAYOUT POINT (LP-XX)
- PROPOSED TREE LINE
- PROPOSED SILT FENCE
- PROPERTY LINE
- PROPOSED CHECK DAM

## NOTES:

1. TOPOGRAPHIC SURVEY PERFORMED BY SACKETT & BRAKE SURVEY, INC. DATED JUNE 12, 2017. HORIZONTAL DATUM - NAD83 MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, US SURVEY FEET, VERTICAL DATUM-NAVD88 FEET.
2. ADDITIONAL TRANSMISSION LINE REFERENCE DRAWINGS, 1011-T200-24 AND 1011-T251-023.

## GENERAL SITE PLAN
SCALE: 1"= 100'

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

100 0 100 200 FT
SCALE: 1"= 100'

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

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

PE Stamp: STATE OF MAINE · KENNETH R. VOLOCK No. 11082 · LICENSED PROFESSIONAL ENGINEER

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

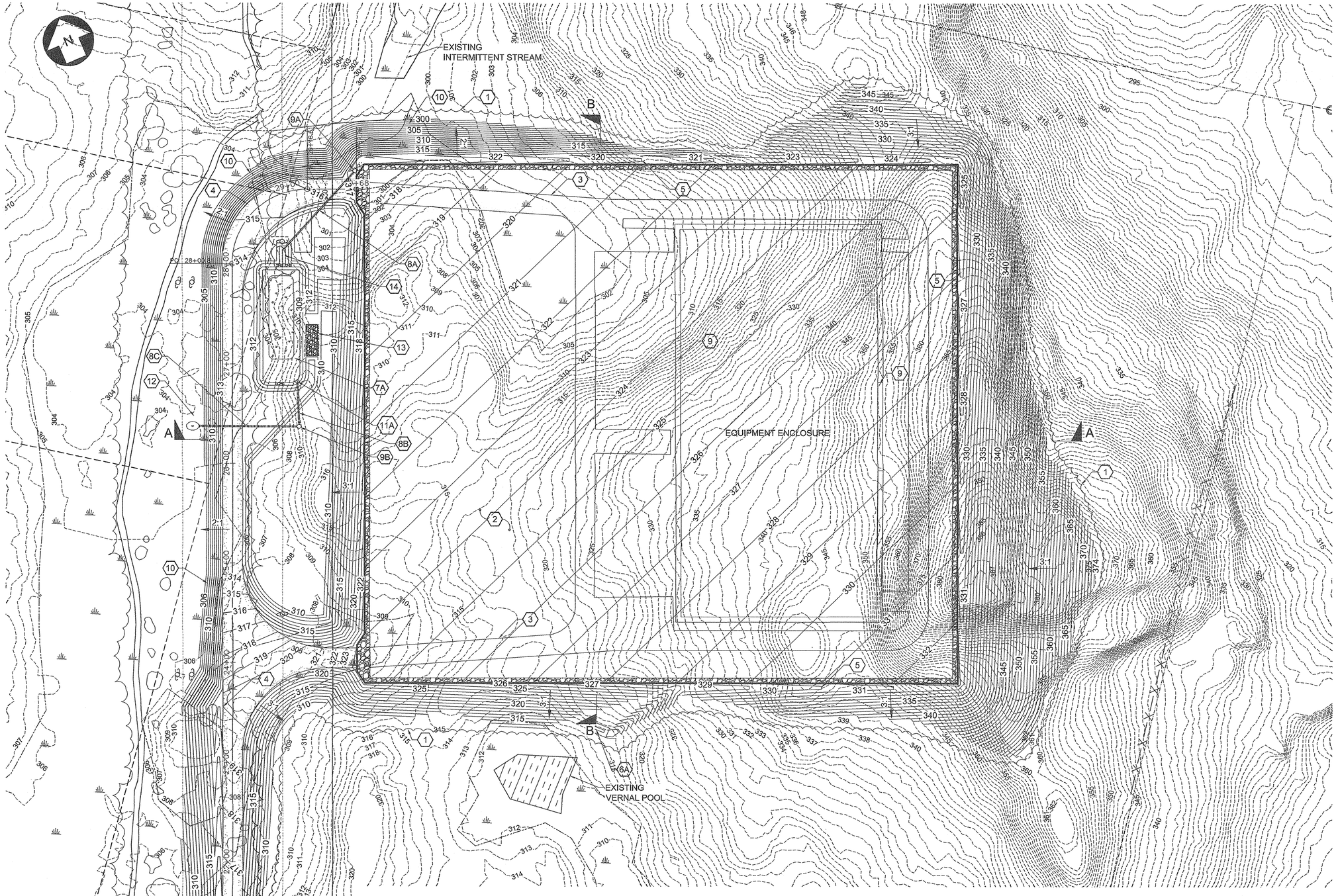
CMP IBERDROLA - USA

# GENERAL SITE PLAN PROPOSED CONDITIONS
SH 2 OF 2

MERRILL ROAD/1076 — LEWISTON, ME

| | | | |
|---|---|---|---|
| DR. | EVD | SCALE: 1"=100' | FILE: 1076-003-001SH002.DWG |
| CK. | KRV | NO. 1076-003-001 | REV. A |
| APP. | | | |
| DATE: | | | |

ANSI D CADD Drawing. DO NOT REVISE MANUALLY.




## LEGEND

- EXISTING CONTOUR (309)
- EXISTING EDGE OF PAVEMENT
- EXISTING FENCE LINE
- EXISTING ROCK OR EXPOSED LEDGE
- EXISTING SPOIL PILE
- EXISTING TREE LINE
- EXISTING TRANSMISSION RIGHT-OF-WAY
- EXISTING STREAM
- EXISTING UTILITY POLE/OH LINE
- EXISTING WETLAND BOUNDARY
- EXISTING BUILDING
- PROPOSED CONTOUR (310)
- PROPOSED EDGE OF GRAVEL
- PROPOSED GRAVEL ACCESS RAMP
- PROPOSED FENCE LINE
- PROPOSED STABILIZED CONSTRUCTION EXIT
- PROPOSED SITE LAYOUT POINT (LP-XX)
- PROPOSED TREE LINE
- PROPOSED SILT FENCE
- PROPERTY LINE
- PROPOSED CHECK DAM
- PROPOSED EDGE OF PAVEMENT

## NOTES:

1. TOPOGRAPHIC SURVEY PERFORMED BY SACKETT & BRAKE SURVEY, INC. DATED JUNE 12, 2017. HORIZONTAL DATUM - NAD83 MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, US SURVEY FEET, VERTICAL DATUM-NAVD88 FEET.
2. ADDITIONAL TRANSMISSION LINE REFERENCE DRAWINGS, 1011-T200-24 AND 1011-T251-023.

## WORK NOTES

1. PROPOSED TREE LINE.
2. SUBSTATION YARD - SEE SECTION A-A & B-B, DWG 1076-003-005 SHEET 1.
3. PAVED VEHICULAR CIRCULATION ROUTES - SEE DETAIL, DWG 1076-003-005 SHEET 1.
4. GRAVEL ACCESS ROAD - SEE DETAIL, DWG 1076-003-005 SHEET 1.
5. VEGETATED DRAINAGE SWALE - SEE DETAIL, DWG 1076-003-005 SHEET 1.
6A. LEVEL SPREADER LS-2 - SEE DETAIL, DWG 1076-003-005 SHEET 2.
7A. GRASSED UNDERDRAIN SOIL FILTER #1 - SEE DETAIL, DWG 1076-003-002 SHEET 2.
8A. 24" CULVERT PIPE- INV IN = 312.0', INV OUT = 310.0'
6B. 24" CULVERT PIPE- INV IN = 305.60', INV OUT = 305.30'
8C. 36" CULVERT PIPE-INV IN = 305.30', INV OUT = 305.00'
9A. CATCH BASIN, CB-2 - RIM ELEV. = 316.0', SEE DETAIL DWG 1076-003-002 SHEET 2.
9B. CATCH BASIN/SEDIMENT BASIN OUTLET STRUCTURE, CB-1 - SEE DETAIL DWG 1076-003-002 SHEET 2.
10. ALL SLOPES GREATER THAN 3 TO 1 SHALL RECEIVE EROSION CONTROL BLANKET - SEE DETAIL DWG 1076-003-005 SHEET 4.
11A. SOIL FILTER OUTLET STRUCTURE #1 - SEE DETAIL, DWG. 1076-003-002 SHEET 2.
12. RIP RAP PLUNGE POOL - SEE DETAIL, DWG. 1076-003-005 SHEET 2.
13. EMERGENCY SPILLWAY - SEE DETAIL, DWG. 1076-003-002 SHEET 2.
14. STONE FOREBAY - SEE DETAIL, DWG. 1076-003-002 SHEET 2.

50 0 50 100 FT
SCALE: 1"= 50'

## GRADING PLAN
SCALE: 1"= 50'

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

OWNER ENGINEER:

APPROVAL STAMP:

DRAWING PREPARED BY:

ACCEPTED BY OE:

PE Stamp: STATE OF MAINE — KENNETH R. VOLOCK No. 11082 — LICENSED PROFESSIONAL ENGINEER — 09/11/2017 — ISSUED FOR PERMITTING

CMP — IBERDROLA - USA

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

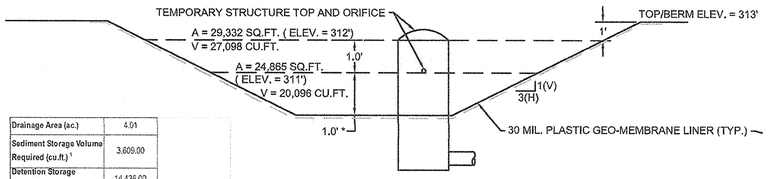
GRADING PLAN

SH 1 OF 4

MERRILL ROAD/1076 — LEWISTON, ME

| DR. | EVD | SCALE: 1"=50' | FILE: 1076-003-002SH001.DWG |
|---|---|---|---|
| CK. | KRV | NO. | REV. |
| APP. | | 1076-003-002 | A |
| DATE: | | | |

ANSI D — CADD Drawing. DO NOT REVISE MANUALLY.




| | |
|---|---|
| Drainage Area (ac.) | 4.91 |
| Sediment Storage Volume Required (cu.ft.) [1] | 3,609.00 |
| Detention Storage Volume Required (cu.ft.) [1] | 14,436.00 |
| Sediment Storage Provided (cu.ft.) | 20,095.00 |
| Detention Storage Provided (cu.ft.) | 27,098.50 |
| Storm Event | 10-year/24-hr/Type II |
| $V_{runoff}$ (in.) | 1.88 |
| $Q_{inflow}$ (cfs) | 7.30 |
| $Q_{outlet}$/DA (cfs/ac.) | 1.62 |
| $Q_o/Q_i$ [2] | 0.0250 |
| Max. $Q_{outlet}$ (cfs) | 0.18 |
| Orifice Diameter (in.) | 2.00 |
| Qoutflow Achieved (cfs) | 0.16 |

1. NRCS Conservation Practice Standard Code 350 - Sediment Basin

2. Maine Erosion and Sediment Control BMPs (10/2016) Ch. 2 - Sediment Basins, Graph C.1

| ELEVATION | AREA (SQ.FT) | INCR. VOLUME (CU.FT.) | TOTAL VOLUME (CU.FT.) |
|---|---|---|---|
| 310.00 | 15,327.00 | | |
| 311.00 | 24,865.00 | 20,095.00 | 20,096.00 |
| 312.00 | 29,332.00 | 27,098.50 | 47,194.50 |

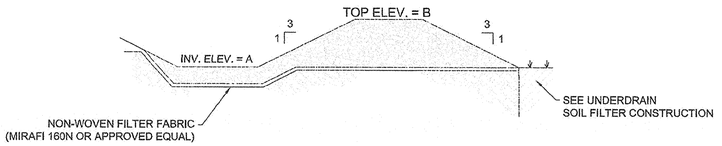
**SEDIMENT BASIN SCHEMATIC**
NTS

***NOTES:***

***CONVERT THE SEDIMENT BASIN TO A GRADED DEPRESSION WITH CATCH BASIN TOP AT GRADE BY LOWERING THE GRATE TOP FOLLOWING FINAL STABILIZATION***

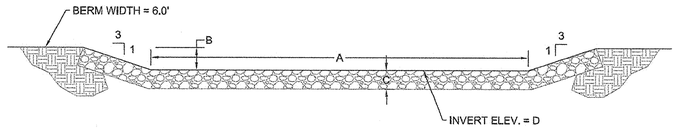
***GRADE SEDIMENT BASIN AND SURROUNDING AREA TO FINISHED PLAN GRADES UP TO ELEVATION 312' (MIN.) PRIOR TO UPSTREAM DISTURBANCES***

**** 1' OF STORAGE ASSUMED. ACTUAL PERMANENT GRATE ELEVATION = 309.5'***




STONE FOREBAY
NTS

| STONE FOREBAY ELEVATIONS | | |
|---|---|---|
| UNDERDRAIN FILTER NUMBER | A | B |
| SOIL FILTER #1 | 310.0 | 310.5 |
| SOIL FILTER #2 | 302.0 | 302.5 |




EMERGENCY SPILLWAY
NTS

| EMERGENCY SPILLWAY GEOMETRY | | | | | | |
|---|---|---|---|---|---|---|
| UNDERDRAIN FILTER NUMBER | A | B | C | D | RIP RAP D50 | 25-YR WATER ELEV. |
| SOIL FILTER #1 | 40' | 1.30' | 18" | 310.70 | 9" | 310.98 |
| SOIL FILTER #2 | 30' | 1.20' | 12" | 303.80 | 6" | 303.84 |

**FILTER NOTES:**

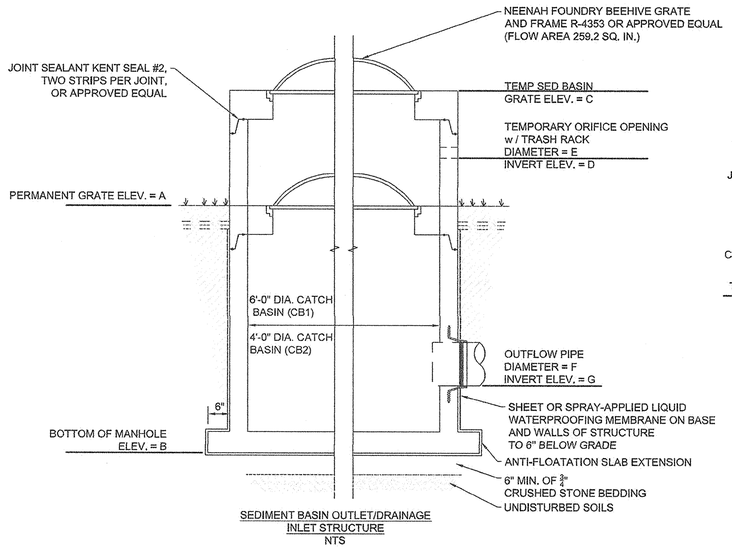
1. UNDERDRAIN PIPES SHALL BE SCH. 40 PVC. ENDS OF UNDERDRAIN PIPING SHALL BE PLUGGED WITH PIPE FITTINGS. PIPE JOINTS SHALL BE FULLY GLUED.
2. COMPACT EMBANKMENT MATERIAL TO 93% OF MAXIMUM DENSITY AS DETERMINED BY ASTM D1557.
3. FILTER BED & SIDE SLOPES SHALL BE SEEDED USING "NEW ENGLAND CONSERVATION/WILDLIFE MIX" FROM NEW ENGLAND WETLAND PLANTS, INC.OF AMHERST, MA. OR APPROVED EQUAL (APPLICATION RATE 25#/ACRE).
4. 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 |

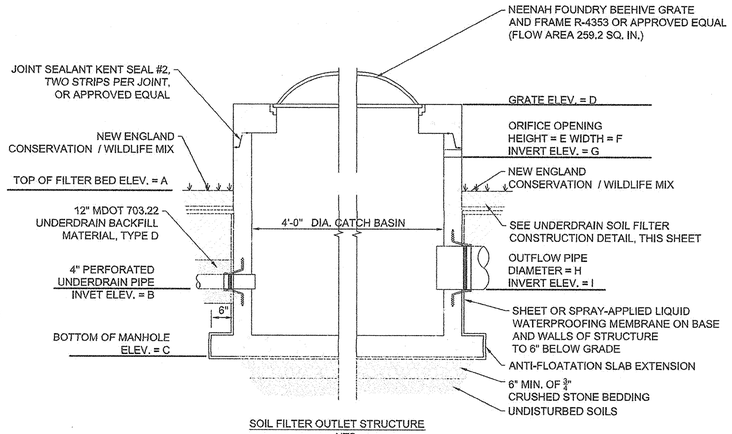
5. FILTER MEDIA MATERIALS:
   5.1. FILTER TOPSOIL LAYER: A 6-INCH LAYER OF LOAMY TOPSOIL SUCH AS USDA SANDY LOAM TOPSOIL WITH 5-8% HUMIFIED ORGANIC MATTER. SCREENED TOPSOIL FROM THE SITE MAY BE APPROPRIATE BUT SHALL BE TESTED FOR ORGANIC CONTENT. ORGANIC MATTER (SUCH AS SUPERHUMUS OR EQUIVALENT) MAY BE ADDED IF NECESSARY, PROVIDED THAT THE RESULTING TEXTURE IS SUITABLE. SEE EROSION CONTROL DETAILS FOR EROSION CONTROL BLANKET INSTALLATION REQUIREMENTS.
   5.2. FILTER SAND LAYER: A 12-INCH LAYER OF LOAMY COARSE SAND.

**FILTER CONSTRUCTION INSPECTION AND TESTING NOTES:**

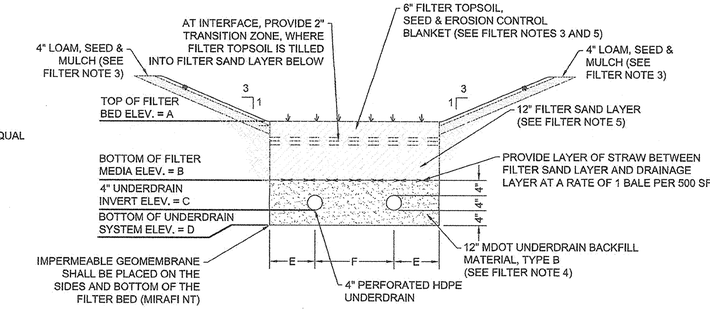
1. INSPECTION OF THE FILTER BASIN SHALL BE PROVIDED FOR EACH PHASE OF CONSTRUCTION BY THE DESIGN ENGINEER WITH REQUIRED REPORTING TO THE MAINE DEP.
2. AT A MINIMUM INSPECTIONS WILL OCCUR:
   2.1. AFTER PRELIMINARY CONSTRUCTION OF THE FILTER GRADES AND ONCE THE UNDERDRAIN PIPES ARE INSTALLED BUT NOT BACKFILLED;
   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 DETERMINED 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.




SEDIMENT BASIN OUTLET/DRAINAGE INLET STRUCTURE
NTS




SOIL FILTER OUTLET STRUCTURE
NTS




GRASSED UNDERDRAIN SOIL FILTER CONSTRUCTION DETAILS
NTS

| GRASSED UNDERDRAIN SOIL FILTER ELEVATIONS/GEOMETRY | | | | | | |
|---|---|---|---|---|---|---|
| UNDERDRAIN FILTER NUMBER | A | B | C | D | E | F |
| SOIL FILTER #1 | 308.00 | 306.33 | 305.66 | 305.33 | 7.00 | 11.00 |
| SOIL FILTER #2 | 301.50 | 299.83 | 299.16 | 298.83 | 7.00 | 11.00 |

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

| SEDIMENT BASIN OUTLET / CATCH BASIN STRUCTURE ELEVATIONS/GEOMETRY | | | | | | | |
|---|---|---|---|---|---|---|---|
| STRUCTURE | A | B | C | D | E | F | G |
| CB 1 | 309.50 | 304.85 | 312.00 | 311.00 | 2" | 24" | 305.35 |
| CB 2 | 316.00 | 311.50 | N/A | N/A | N/A | 24" | 312.00 |

| SOIL FILTER OUTLET STRUCTURE ELEVATIONS/GEOMETRY | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| UNDERDRAIN FILTER NUMBER | A | B | C | D | E | F | G | H | I |
| SOIL FILTER #1 | 308.00 | 305.66 | 304.83 | 312.00 | 15" | 32" | 309.10 | 24" | 305.60 |
| SOIL FILTER #2 | 301.50 | 299.16 | 298.32 | 305.00 | 4.5" | 4.5" | 302.75 | 15" | 299.00 |

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

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

PE Stamp
STATE OF MAINE
KENNETH R. VOLDOCK
No. 11082
LICENSED
PROFESSIONAL ENGINEER
OCT 2017
ISSUED FOR PERMITTING

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

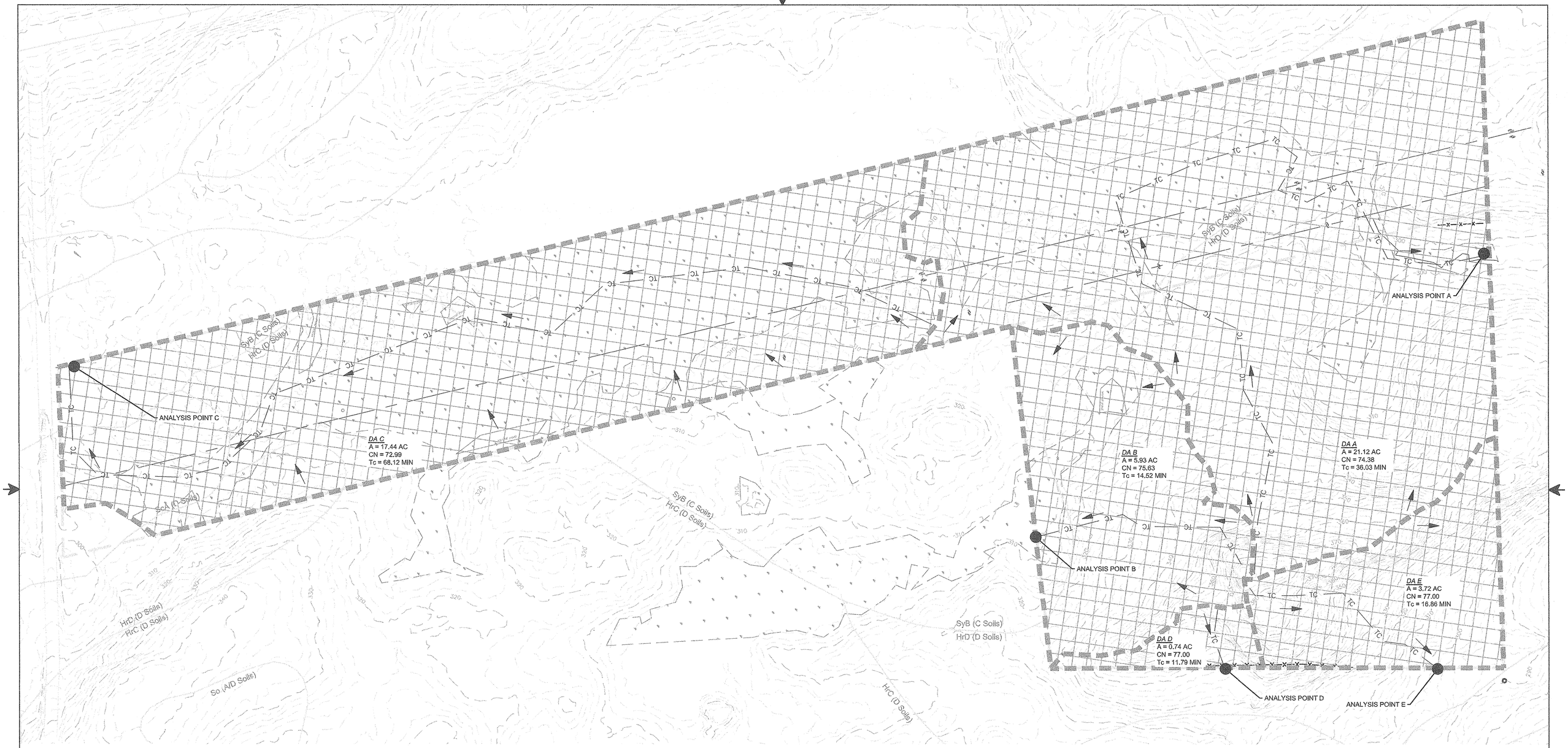
CMP
IBERDROLA - USA

STORMWATER TREATMENT PLAN

SH 2 OF 4

MERRILL ROAD/1076 LEWISTON, ME

| DR. | TJG | SCALE: N/A | FILE: 1076-003-002SH002.DWG |
|---|---|---|---|
| CK. | KRV | NO. | REV. |
| APP. | | 1076-003-002 | A |
| DATE: | | | |




**LEGEND**

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. TIME OF CONCENTRATION
- EX. SOIL BOUNDARY
- EX. OVERHEAD UTILITY
- EX. FLOW DIRECTION ARROW
- EX. DRAINAGE BOUNDARY
- EX. PROPERTY BOUNDARY
- EX. WETLAND
- ANALYSIS POINT
- EX. WOODS

| EXISTING CONDITIONS HYDRAULIC SUMMARY | | | |
|---|---|---|---|
| DRAINAGE AREA | 2 - YEAR FLOW RATE (CFS) | 10 - YEAR FLOW RATE (CFS) | 25 - YEAR FLOW RATE (CFS) |
| A | 11.40 | 27.00 | 35.56 |
| B | 4.94 | 11.30 | 14.75 |
| C | 6.00 | 14.87 | 19.86 |
| D | 0.72 | 1.58 | 2.04 |
| E | 3.22 | 7.13 | 9.23 |

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

OWNER ENGINEER:

APPROVAL STAMP:

DRAWING PREPARED BY:

ACCEPTED BY OE:

PE Stamp

STATE OF MAINE
KENNETH R. VOLOCK
No. 11052
LICENSED
PROFESSIONAL ENGINEER
09-08-2017

CMP
IBERDROLA - USA

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

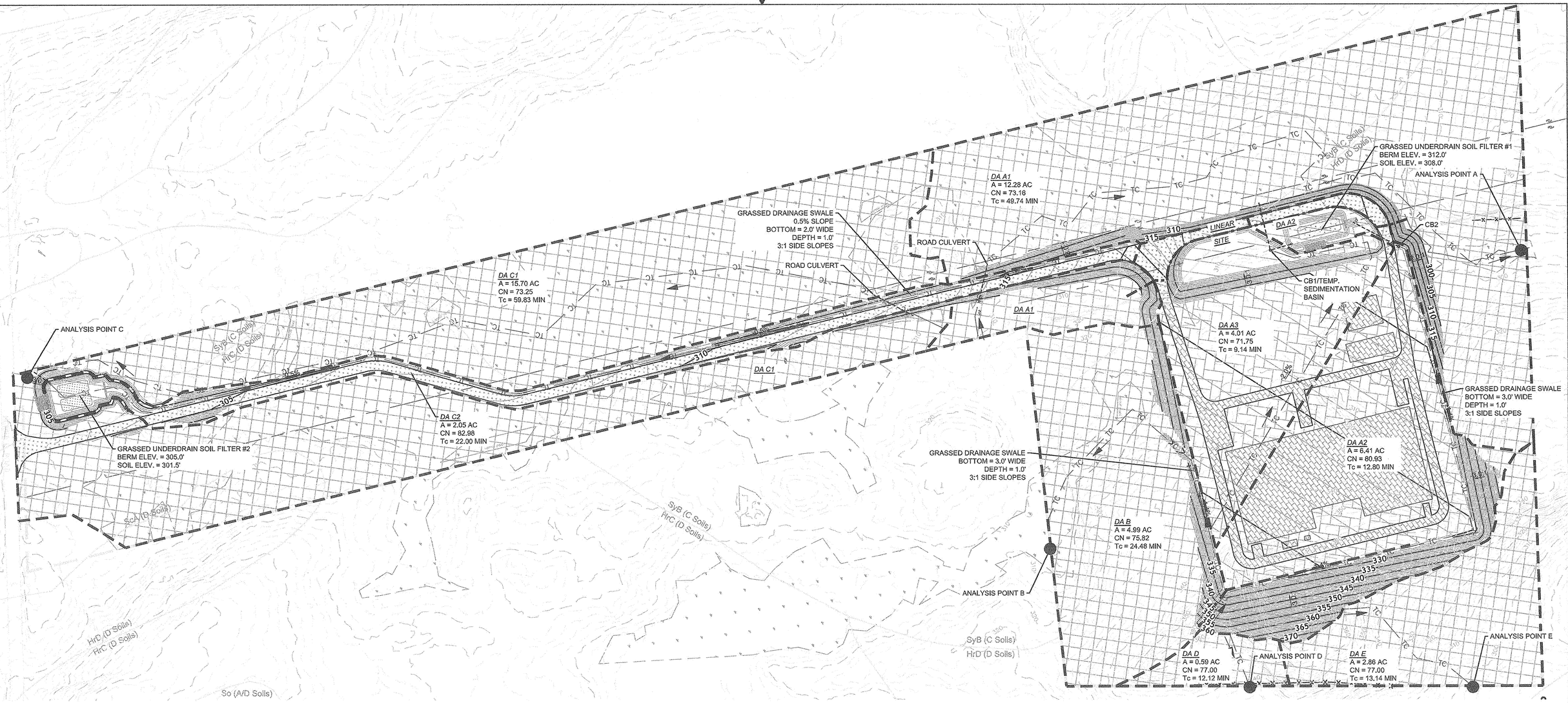
# PRE-DEVELOPMENT STORMWATER PLAN

SH 3 OF 4

MERRILL ROAD/1076 — LEWISTON, ME

| DR. | TJG | SCALE: 1" = 100' | FILE: 1076-003-002SH003.DWG |
|---|---|---|---|
| CK. | KRV | NO. | REV. |
| APP. | | 1076-003-002 | A |
| DATE: | | | |

ANSI D CADD Drawing, DO NOT REVISE MANUALLY




LEGEND

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. SOIL BOUNDARY
- EX. OVERHEAD UTILITY
- EX. PROPERTY BOUNDARY
- EX. WETLAND
- EX. WOODS
- PROP. DEVELOPED GRASS
- PROP. UNDERDRAIN SOIL FILTER
- PROP. MAJOR CONTOUR
- PROP. MINOR CONTOUR
- PROP. TIME OF CONCENTRATION
- PROP. FLOW DIRECTION ARROW
- PROP. DRAINAGE BOUNDARY
- ANALYSIS POINT
- PROP. CULVERT/PIPING
- PROP. SITE/LINEAR DEMARCATION
- PROP. IMPERVIOUS PAVING/ROOF
- PROP. STONE PAD
- PROP. GRAVEL 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 ANALYSIS POINT (IF SUBSHEDS PRESENT) | PEAK 10 - YEAR FLOW RATE AT ANALYSIS POINT (IF SUBSHEDS PRESENT) | PEAK 25 - YEAR FLOW RATE AT ANALYSIS POINT (IF SUBSHEDS PRESENT) |
|---|---|---|---|---|---|---|
| A1 | 5.17 | 12.68 | 16.85 | 11.12 | 26.18 | 33.76 |
| A2 | 7.56 | 15.31 | 19.36 | | | |
| A3 | 2.90 | 7.30 | 9.76 | | | |
| B | 3.50 | 7.98 | 10.41 | N/A | N/A | N/A |
| C1 | 5.97 | 14.63 | 19.48 | 5.96 | 14.84 | 19.83 |
| C2 | 2.25 | 4.39 | 5.50 | | | |
| D | 0.56 | 1.24 | 1.61 | N/A | N/A | N/A |
| E | 2.68 | 5.91 | 7.65 | N/A | N/A | N/A |

STORMWATER TREATMENT REQUIREMENTS (% OF TREATED AREA)

| LAND TYPE | STATION | STATION % TREATED | LINEAR | LINEAR % TREATED |
|---|---|---|---|---|
| IMPERVIOUS TOTAL | 7.15 AC | 99.33% | 1.50 AC | 75.10% |
| IMPERVIOUS TREATED | 7.10 AC | | 1.13 AC | |
| DEVELOPED TOTAL* | 10.71 AC | 83.75% | 3.69 AC | 59.89% |
| DEVELOPED TREATED | 8.97 AC | | 2.21 AC | |

*DEVELOPED AREA INCLUDES BOTH IMPERVIOUS AND LANDSCAPED SURFACES

0 200 400 Feet

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

OWNER ENGINEER:

APPROVAL STAMP:

DRAWING PREPARED BY:

ACCEPTED BY OE:

PE Stamp: STATE OF MAINE, KENNETH R. VOLOCK, No. 11082, LICENSED PROFESSIONAL ENGINEER, 07-28-2017

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

CMP IBERDROLA - USA

# POST-DEVELOPMENT STORMWATER PLAN

SH 4 OF 4

MERRILL ROAD/1076 LEWISTON, ME

| | | | |
|---|---|---|---|
| DR. | TJG | SCALE: 1" = 100' | FILE: 1076-003-002SH004.DWG |
| CK. | KRV | NO. | REV. |
| APP. | | 1076-003-002 | A |
| DATE: | | | |

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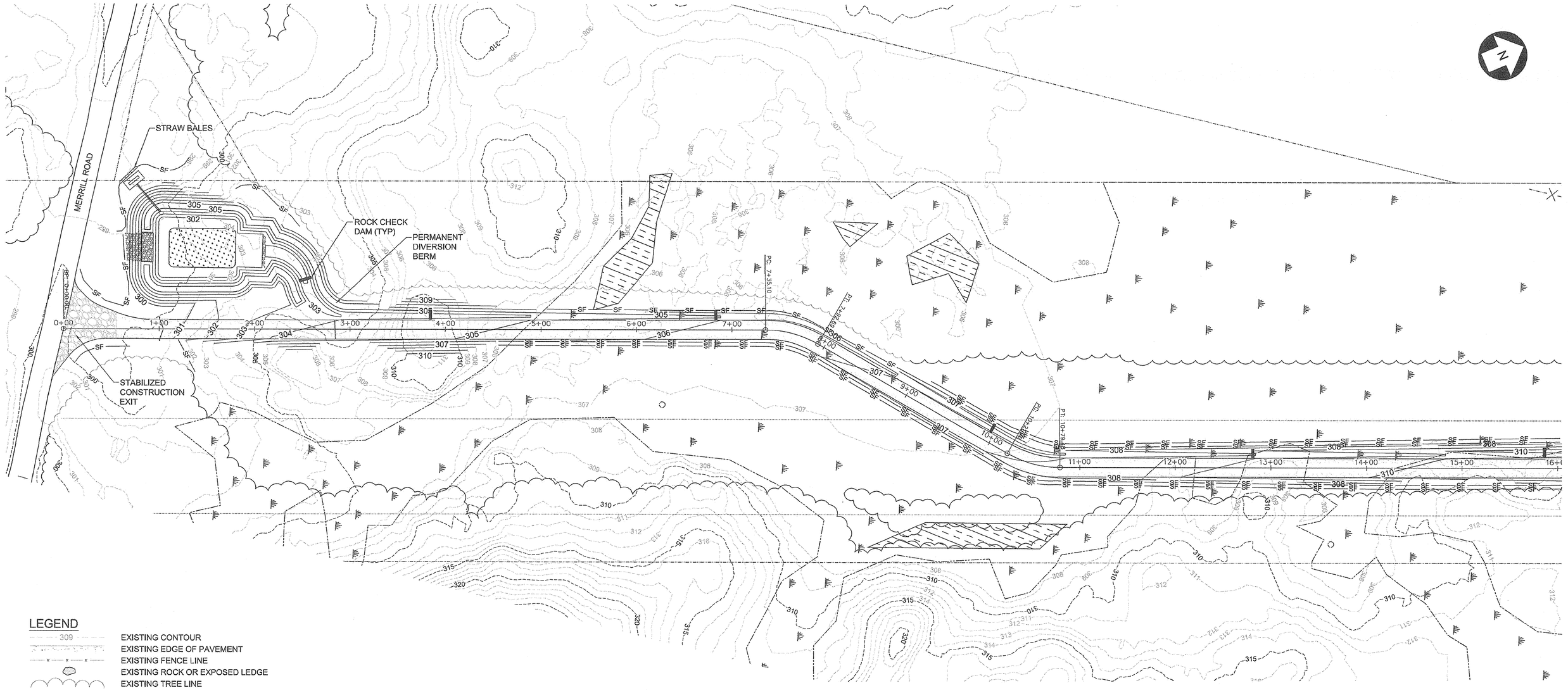
CADD Drawing, DO NOT REVISE MANUALLY




## LEGEND

- 309 — EXISTING CONTOUR
- EXISTING EDGE OF PAVEMENT
- EXISTING FENCE LINE
- EXISTING ROCK OR EXPOSED LEDGE
- EXISTING TREE LINE
- EXISTING TRANSMISSION RIGHT-OF-WAY
- EXISTING STREAM
- EXISTING UTILITY POLE/OH LINE
- EXISTING WETLAND BOUNDARY
- EXISTING BUILDING
- 310 — PROPOSED CONTOUR
- PROPOSED EDGE OF GRAVEL
- PROPOSED STABILIZED CONSTRUCTION EXIT
- PROPOSED FENCE LINE
- PROPOSED EDGE GRAVEL YARD SURFACE
- LP-XX — PROPOSED SITE LAYOUT POINT
- PROPOSED TREE LINE
- PROPOSED SILT FENCE
- PROPERTY LINE
- PROPOSED CHECK DAM

## EROSION AND SEDIMENT CONTROL PLAN 1

SCALE: 1"= 50'

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

50 0 50 100 FT
SCALE: 1"= 50'

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

OWNER ENGINEER:

APPROVAL STAMP:

DRAWING PREPARED BY:

ACCEPTED BY OE:

PE Stamp

STATE OF MAINE
KENNETH R. VOLOCK
No. 11062
LICENSED
PROFESSIONAL ENGINEER
09-08-2017
ISSUED FOR PERMITTING

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

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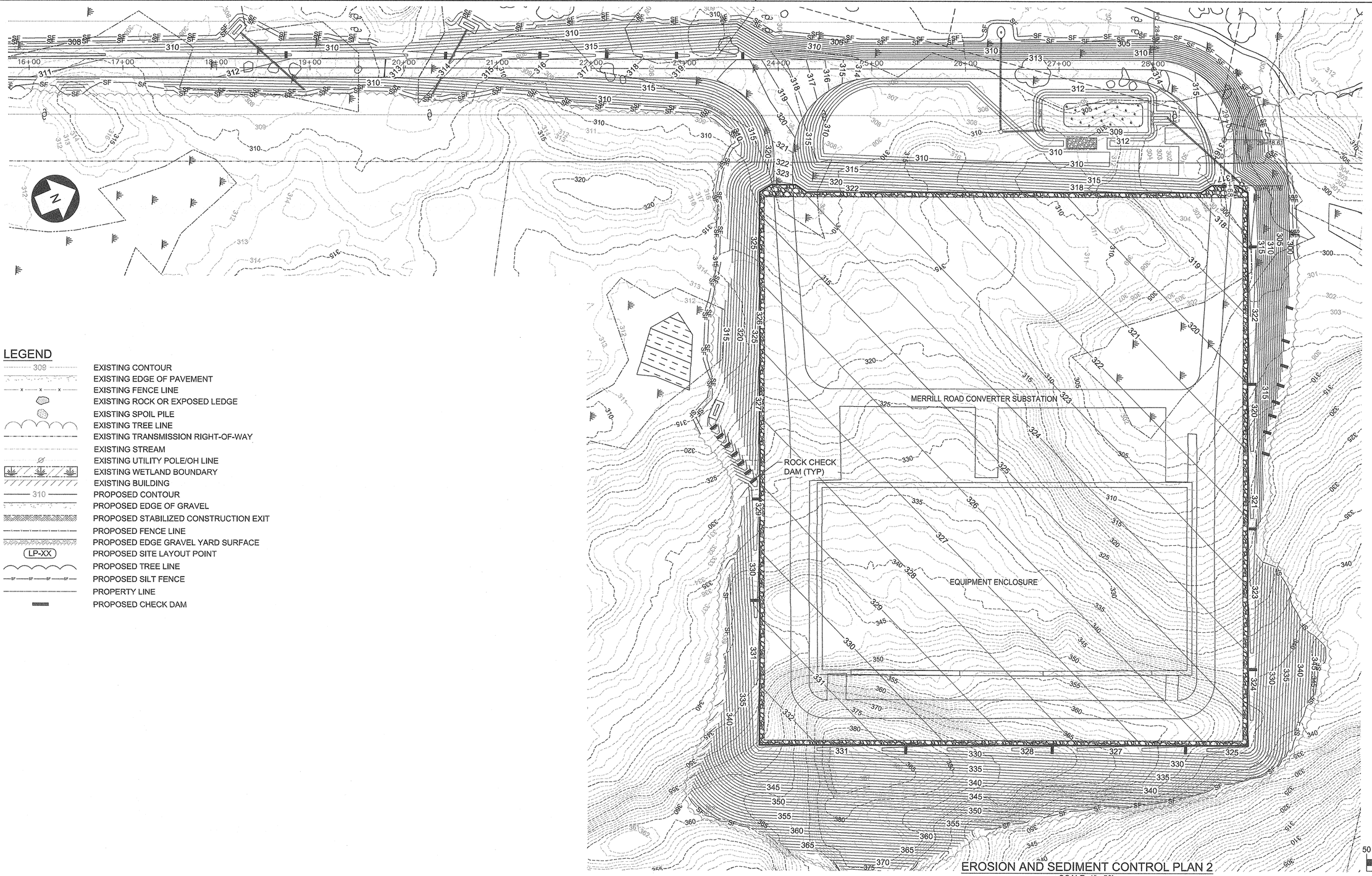
EROSION AND SEDIMENT CONTROL PLAN 1

SH 1 OF 2

MERRILL ROAD/1076 LEWISTON, ME

| DR. | EVD | SCALE: | FILE: 1076-003-003SH001.DWG |
|---|---|---|---|
| CK. | KRV | NO. | REV. |
| APP. | | 1076-003-003 | A |
| DATE: | | | |

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.




## LEGEND

- EXISTING CONTOUR
- EXISTING EDGE OF PAVEMENT
- EXISTING FENCE LINE
- EXISTING ROCK OR EXPOSED LEDGE
- EXISTING SPOIL PILE
- EXISTING TREE LINE
- EXISTING TRANSMISSION RIGHT-OF-WAY
- EXISTING STREAM
- EXISTING UTILITY POLE/OH LINE
- EXISTING WETLAND BOUNDARY
- EXISTING BUILDING
- PROPOSED CONTOUR
- PROPOSED EDGE OF GRAVEL
- PROPOSED STABILIZED CONSTRUCTION EXIT
- PROPOSED FENCE LINE
- PROPOSED EDGE GRAVEL YARD SURFACE
- LP-XX — PROPOSED SITE LAYOUT POINT
- PROPOSED TREE LINE
- PROPOSED SILT FENCE
- PROPERTY LINE
- PROPOSED CHECK DAM

# EROSION AND SEDIMENT CONTROL PLAN 2

SCALE: 1"= 50'

50 0 50 100 FT

SCALE: 1"= 50'

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

OWNER ENGINEER:

APPROVAL STAMP:

DRAWING PREPARED BY:

ACCEPTED BY OE:

PE Stamp

STATE OF MAINE
KENNETH R. YOLOSK
No. 11082
LICENSED
PROFESSIONAL ENGINEER
09-08-2017
ISSUED FOR PERMITTING

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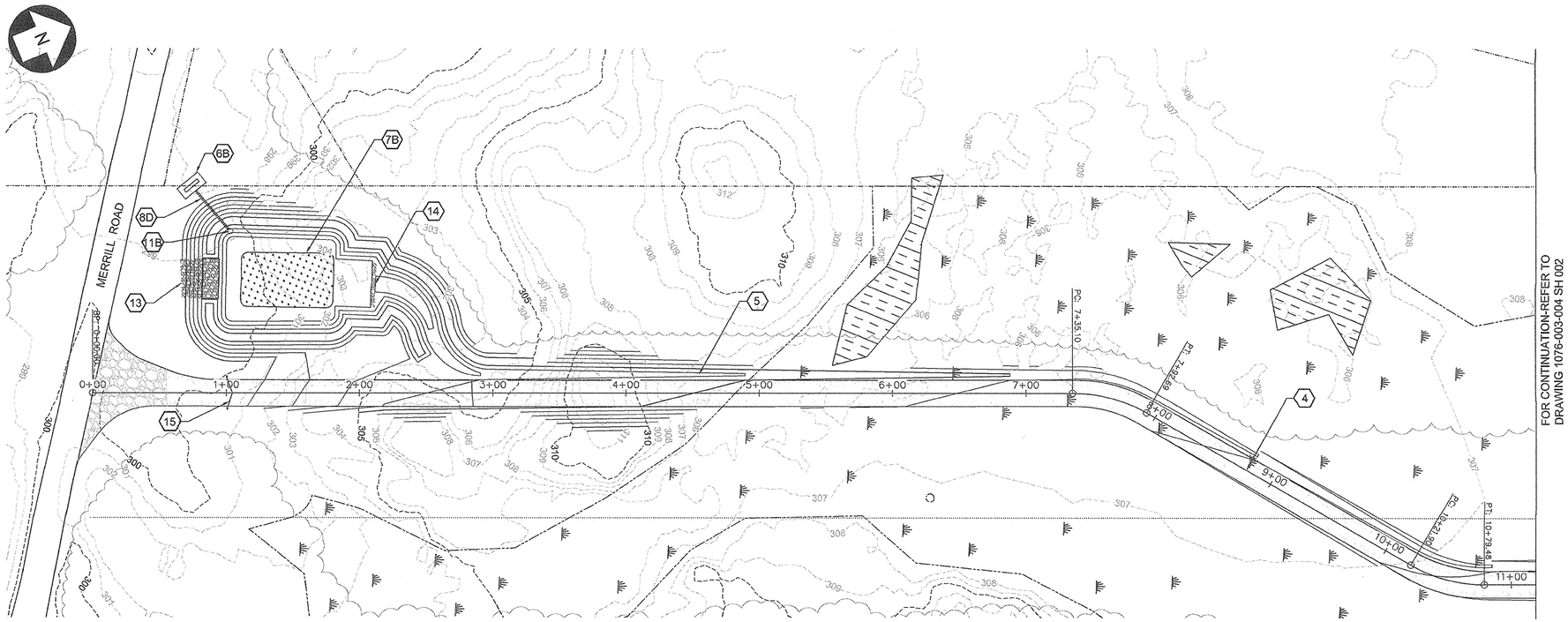
| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

EROSION AND SEDIMENT CONTROL PLAN 2
SH 2 OF 2

MERRILL ROAD/1076 LEWISTON , ME

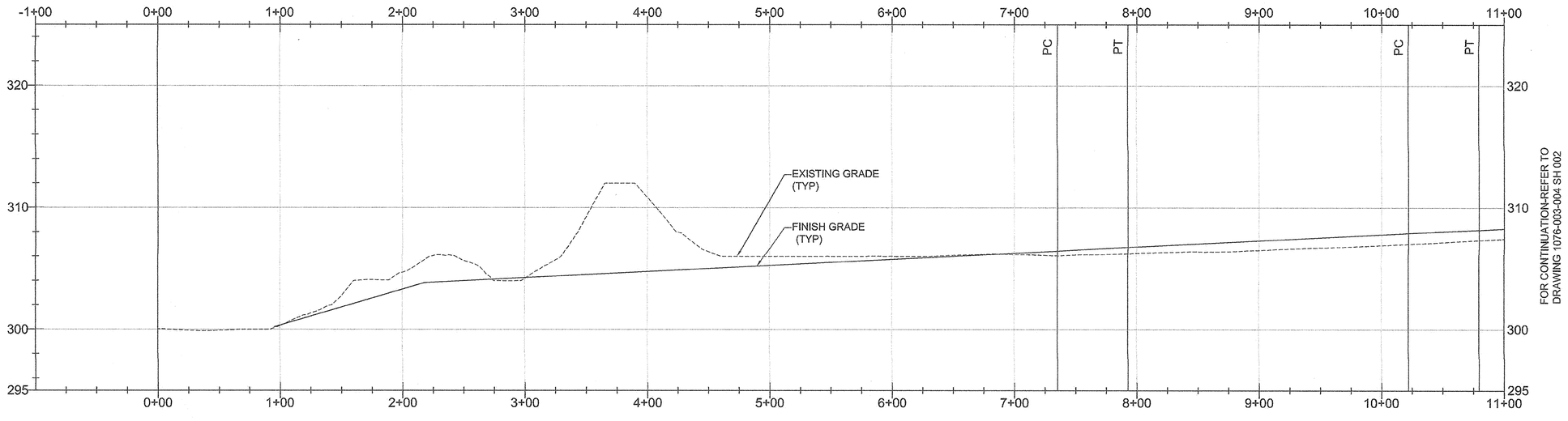
| | | | |
|---|---|---|---|
| DR. EVD | SCALE: 1"=100' | FILE: 1076-003-003SH002.DWG | |
| CK. KRV | NO. | | REV. |
| APP. | | 1076-003-003 | A |
| DATE: | | | |

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.




## ROAD PLAN STATION 0+00 TO 11+00

SCALE: 1"= 50'




## ROAD PROFILE STATION 0+00 TO 11+00

SCALE HORIZ: 1"= 50'
VERT: 1"= 5'

## LEGEND

- EXISTING CONTOUR (198)
- EXISTING EDGE OF PAVEMENT
- EXISTING FENCE LINE
- EXISTING ROCK OR EXPOSED LEDGE
- EXISTING SPOIL PILE
- EXISTING TREE LINE
- EXISTING TRANSMISSION RIGHT-OF-WAY
- EXISTING STREAM
- EXISTING UTILITY POLE/OH LINE
- EXISTING WETLAND BOUNDARY
- EXISTING BUILDING
- PROPOSED CONTOUR (310)
- PROPOSED EDGE OF GRAVEL
- PROPOSED GRAVEL ACCESS RAMP
- PROPOSED FENCE LINE
- PROPOSED STABILIZED CONSTRUCTION EXIT
- PROPOSED SITE LAYOUT POINT (LP-XX)
- PROPOSED TREE LINE
- PROPOSED SILT FENCE
- PROPERTY LINE
- PROPOSED CHECK DAM
- LIMIT OF CONSTRUCTION
- LIMIT OF FOUNDATION CONSTRUCTION
- PROPOSED GRAVEL BASE DRAINAGE BLANKET

## NOTES:

1. TOPOGRAPHIC SURVEY PERFORMED BY SACKETT & BRAKE SURVEY, INC. DATED JUNE 12, 2017. HORIZONTAL DATUM - NAD83 MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, US SURVEY FEET, VERTICAL DATUM-NAVD88 FEET.
2. ADDITIONAL TRANSMISSION LINE REFERENCE DRAWINGS, 1011-T200-24 AND 1011-T251-023.

## WORK NOTES

(4) GRAVEL ACCESS ROAD - SEE DETAIL, DWG 1076-003-005 SHEET 1.
(5) VEGETATED DRAINAGE SWALE - SEE DETAIL, DWG 1076-003-005 SHEET 1.
(6B) LEVEL SPREADER LS-1 - SEE DETAIL, DWG 1076-003-005 SHEET 2.
(7B) GRASSED UNDERDRAIN SOIL FILTER #2 - SEE DETAIL, DWG 1076-003-002 SHEET 2.
(8D) 15" CULVERT PIPE - INV. IN = 299.0', INV. OUT = 298.0'
(11B) SOIL FILTER OUTLET STRUCTURE #2 - SEE DETAIL, DWG. 1076-003-002 SHEET 2.
(13) EMERGENCY SPILLWAY - SEE DETAIL, DWG. 1076-003-002 SHEET 2.
(14) STONE FOREBAY - SEE DETAIL, DWG. 1076-003-002 SHEET 2.
(15) SECURITY GATE - SEE DETAIL, 1076-003-005 SHEET 3.

50 0 50 100 FT
SCALE: 1"= 50'

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

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

PE Stamp: STATE OF MAINE — KENNETH R. HOLDEN — No. 11032 — LICENSED PROFESSIONAL ENGINEER — ISSUED FOR PERMITTING 9-8-2017

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

CMP IBERDROLA - USA

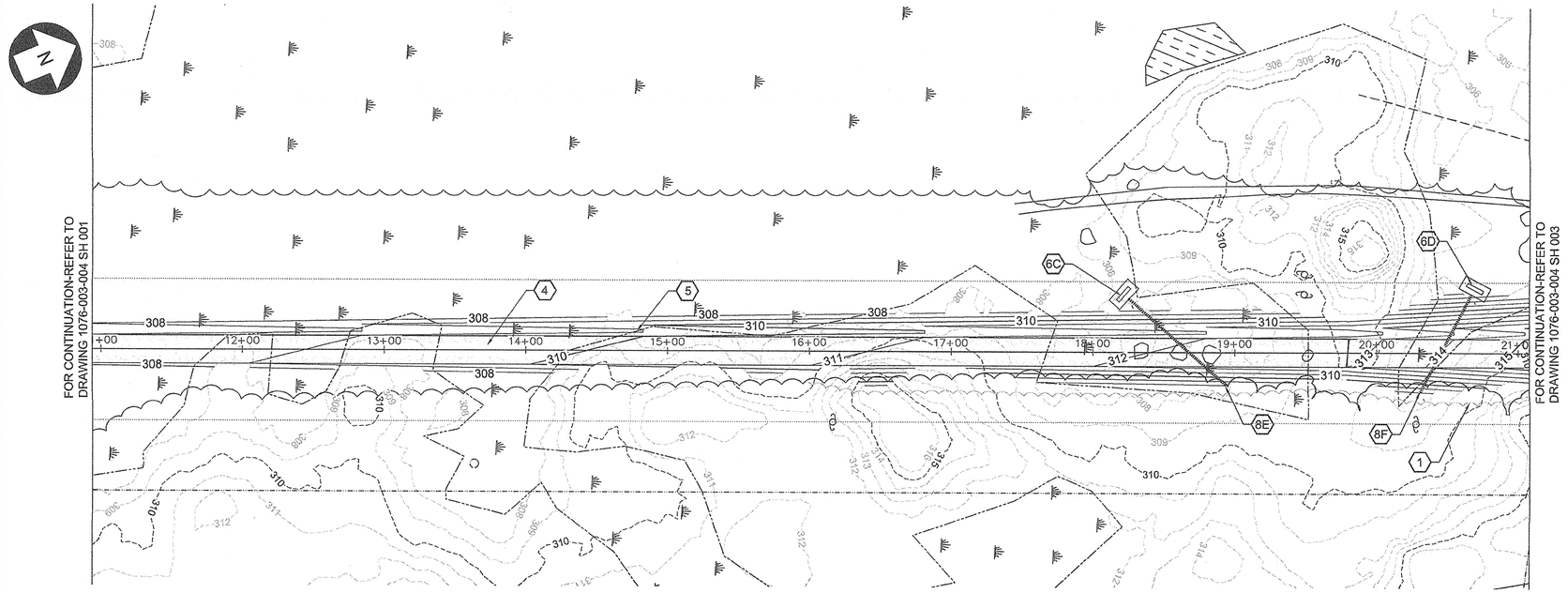
# ROAD PLAN AND PROFILE 1

SH 1 OF 3

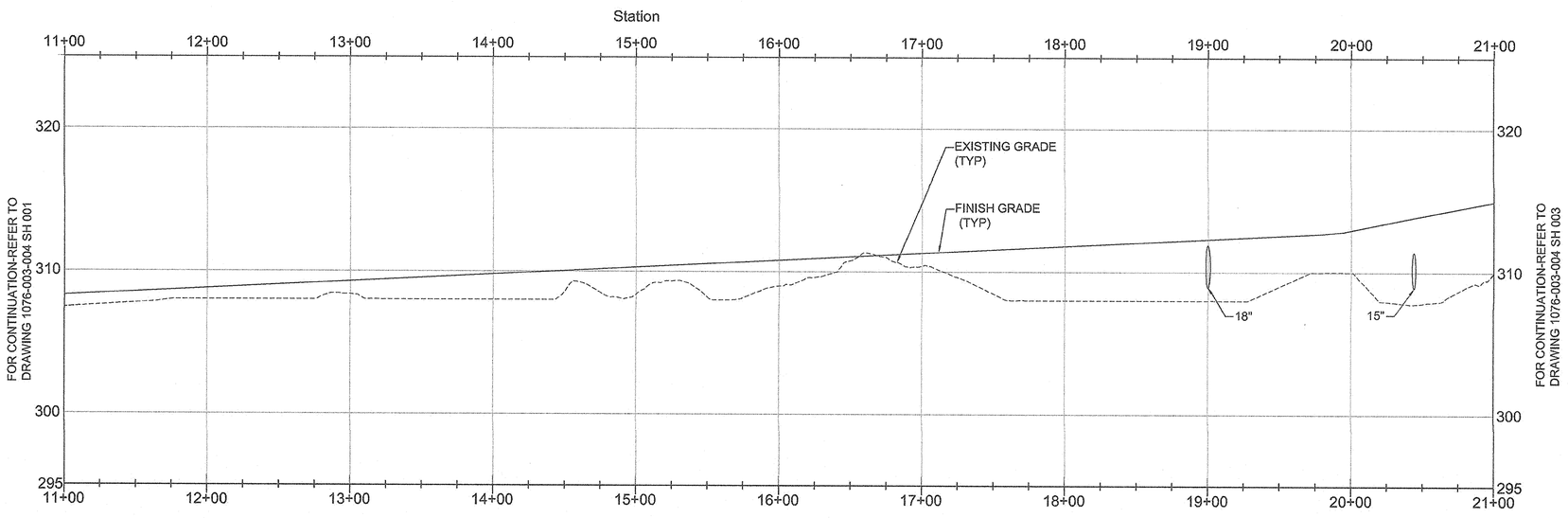
MERRILL ROAD/1076 — LEWISTON, ME

| DR. | EVD | SCALE: 1"=50' | FILE: 1076-003-004SH001.DWG |
|---|---|---|---|
| CK. | KRV | NO. | REV. |
| APP. | | 1076-003-004 | A |
| DATE: | | | |

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.




ROAD PLAN STATION 11+00 TO 21+00
SCALE: 1"= 50'




ROAD PROFILE STATION 11+00 TO 21+00
SCALE HORIZ: 1"= 50'
VERT: 1"= 5'

## LEGEND

| | |
|---|---|
| 309 | EXISTING CONTOUR |
| | EXISTING EDGE OF PAVEMENT |
| | EXISTING FENCE LINE |
| | EXISTING ROCK OR EXPOSED LEDGE |
| | EXISTING SPOIL PILE |
| | EXISTING TREE LINE |
| | EXISTING TRANSMISSION RIGHT-OF-WAY |
| | EXISTING STREAM |
| | EXISTING UTILITY POLE/OH LINE |
| | EXISTING WETLAND BOUNDARY |
| | EXISTING BUILDING |
| 310 | PROPOSED CONTOUR |
| | PROPOSED EDGE OF GRAVEL |
| | PROPOSED GRAVEL ACCESS RAMP |
| | PROPOSED FENCE LINE |
| | PROPOSED STABILIZED CONSTRUCTION EXIT |
| LP-XX | PROPOSED SITE LAYOUT POINT |
| | PROPOSED TREE LINE |
| | PROPOSED SILT FENCE |
| | PROPERTY LINE |
| | PROPOSED CHECK DAM |

## NOTES:

1. TOPOGRAPHIC SURVEY PERFORMED BY SACKETT & BRAKE SURVEY, INC. DATED JUNE 12, 2017. HORIZONTAL DATUM - NAD83 MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, US SURVEY FEET, VERTICAL DATUM-NAVD88 FEET.
2. ADDITIONAL TRANSMISSION LINE REFERENCE DRAWINGS, 1011-T200-24 AND 1011-T251-023.

## WORK NOTES

1. PROPOSED TREELINE
4. GRAVEL ACCESS ROAD - SEE DETAIL, DWG 1076-003-005 SHEET 1.
5. VEGETATED DRAINAGE SWALE - SEE DETAIL, DWG 1076-003-005 SHEET 1.
6C. LEVEL SPREADER LS-4 - SEE DETAIL, DWG 1076-003-005 SHEET 2.
6D. LEVEL SPREADER LS-3 - SEE DETAIL, DWG 1076-003-005 SHEET 2.
8E. 18" CULVERT PIPE - INV. IN = 308.0', INV. OUT = 307.75'
8F. 15" CULVERT PIPE - INV. IN = 307.0', INV. OUT = 306.25'

50 0 50 100 FT
SCALE: 1"= 50'

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION
09/08/17

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|

OWNER ENGINEER:
APPROVAL STAMP:
DRAWING PREPARED BY:
ACCEPTED BY OE:
PE Stamp
STATE OF MAINE
KENNETH W. VOLOCK
No. 11062
LICENSED
PROFESSIONAL ENGINEER
09-08-2017
ISSUED FOR PERMITTING

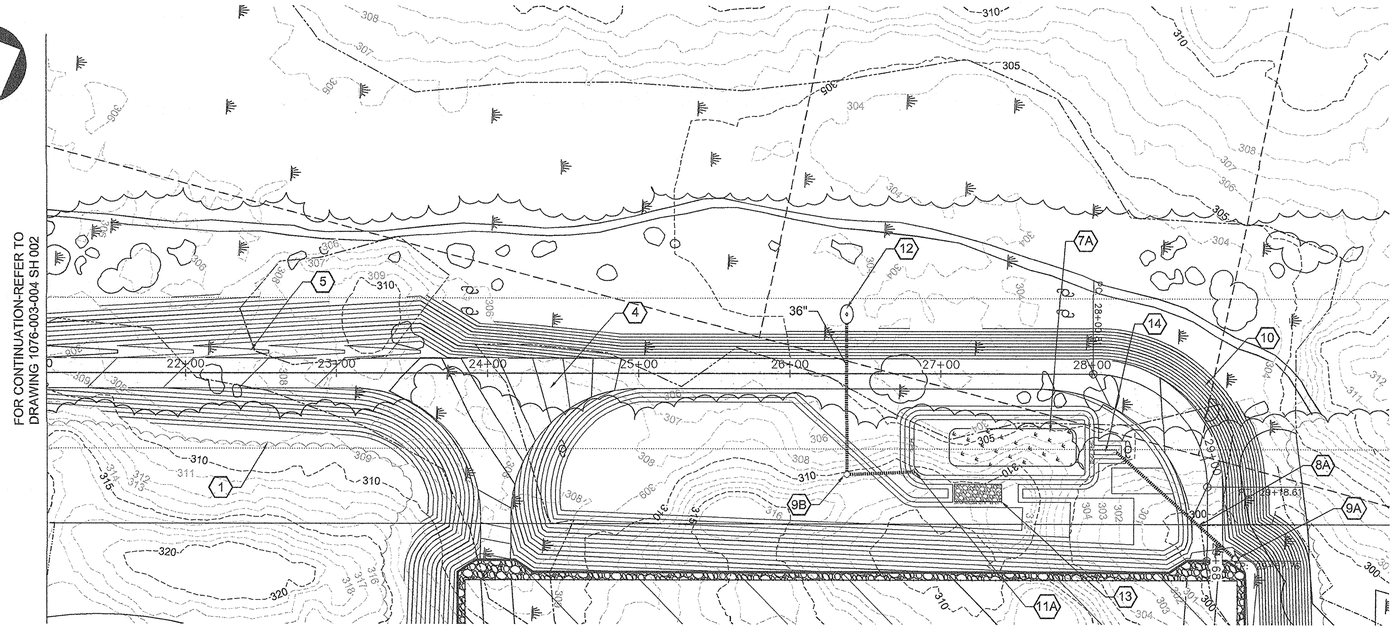
CMP
IBERDROLA - USA

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|

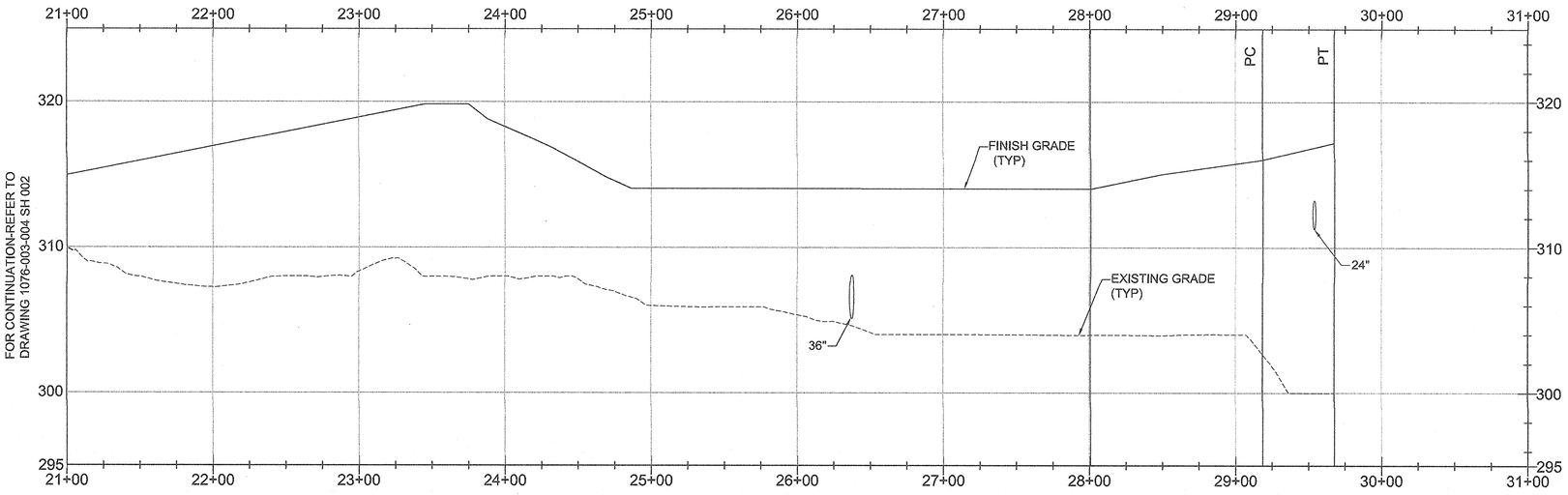
ROAD PLAN AND PROFILE 2
SH 2 OF 3
MERRILL ROAD/1076 LEWISTON, ME

| | | | |
|---|---|---|---|
| DR. EVD | SCALE: 1"=50' | FILE: 1076-003-004SH002.DWG | |
| CK. KRV | NO. | | REV. |
| APP. | | 1076-003-004 | A |
| DATE: | | | |

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.




ROAD PLAN STATION 21+00 TO 29+67.76
SCALE: 1"= 50'




ROAD PROFILE STATION 21+00 TO 29+67.76
SCALE HORIZ: 1"= 50'
VERT: 1"= 5'

## LEGEND

- EXISTING CONTOUR (309)
- EXISTING EDGE OF PAVEMENT
- EXISTING FENCE LINE
- EXISTING ROCK OR EXPOSED LEDGE
- EXISTING SPOIL PILE
- EXISTING TREE LINE
- EXISTING TRANSMISSION RIGHT-OF-WAY
- EXISTING STREAM
- EXISTING UTILITY POLE/OH LINE
- EXISTING WETLAND BOUNDARY
- EXISTING BUILDING
- PROPOSED CONTOUR (310)
- PROPOSED EDGE OF GRAVEL
- PROPOSED GRAVEL ACCESS RAMP
- PROPOSED FENCE LINE
- PROPOSED STABILIZED CONSTRUCTION EXIT
- PROPOSED SITE LAYOUT POINT (LP-XX)
- PROPOSED TREE LINE
- PROPOSED SILT FENCE
- PROPERTY LINE
- PROPOSED CHECK DAM

## NOTES:

1. TOPOGRAPHIC SURVEY PERFORMED BY SACKETT & BRAKE SURVEY, INC. DATED JUNE 12, 2017. HORIZONTAL DATUM - NAD83 MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, US SURVEY FEET, VERTICAL DATUM-NAVD88 FEET.
2. ADDITIONAL TRANSMISSION LINE REFERENCE DRAWINGS, 1011-T200-24 AND 1011-T251-023.

## WORK NOTES

1. PROPOSED TREE LINE.
4. GRAVEL ACCESS ROAD - SEE DETAIL, DWG 1076-003-005 SHEET 1.
5. VEGETATED DRAINAGE SWALE - SEE DETAIL, DWG 1076-003-005 SHEET 1.
7A. GRASSED UNDERDRAIN SOIL FILTER #1 - SEE DETAIL, DWG 1076-003-002 SHEET 2.
8A. 24" CULVERT PIPE- INV IN = 312.0', INV OUT = 310.0'
8B. 24" CULVERT PIPE- INV IN = 305.60', INV OUT = 305.30'
8C. 36" CULVERT PIPE-INV IN = 305.30', INV OUT = 305.00'
9A. CATCH BASIN, CB-2 - RIM ELEV. = 316.0', SEE DETAIL DWG 1076-003-002 SHEET 2.
9B. CATCH BASIN/SEDIMENT BASIN OUTLET STRUCTURE, CB-1 - SEE DETAIL DWG 1076-003-002 SHEET 2.
10. ALL SLOPES GREATER THAN 3 TO 1 SHALL RECEIVE EROSION CONTROL BLANKET - SEE DETAIL DWG 1076-003-005 SHEET 4.
11A. SOIL FILTER OUTLET STRUCTURE #1 - SEE DETAIL, DWG. 1076-003-002 SHEET 2.
12. RIP RAP PLUNGE POOL - SEE DETAIL, DWG. 1076-003-005 SHEET 2.
13. EMERGENCY SPILLWAY - SEE DETAIL, DWG. 1076-003-002 SHEET 2.
14. STONE FOREBAY - SEE DETAIL, DWG. 1076-003-002 SHEET 2.

50 0 50 100 FT
SCALE: 1"= 50'

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/0817**

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

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

PE Stamp: STATE OF MAINE — KENNETH R. VOLOCK No. 11022 — LICENSED PROFESSIONAL ENGINEER — Issued for Permitting

CMP IBERDROLA - USA

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

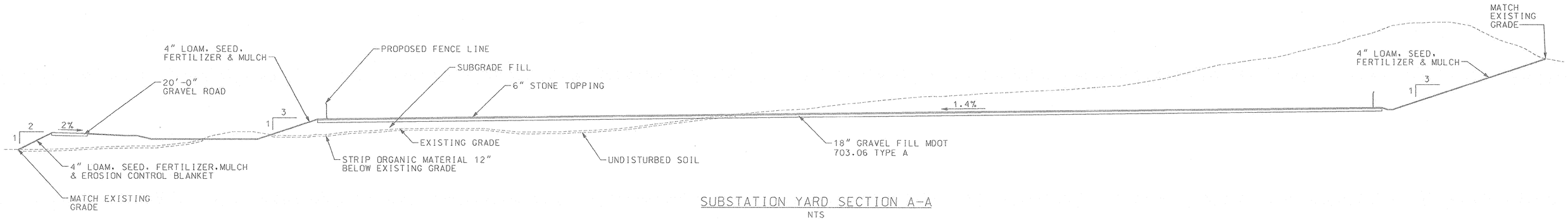
# ROAD PLAN AND PROFILE 3

SH 3 OF 3

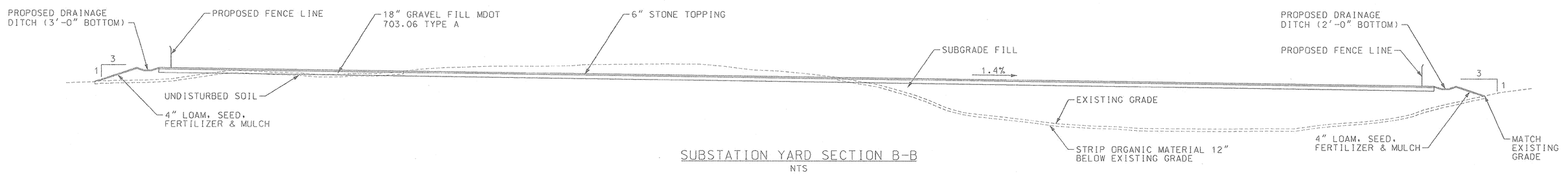
MERRILL ROAD/1076 — LEWISTON, ME

| DR. | EVD | SCALE: | FILE: 1076-003-004SH003.DWG |
|---|---|---|---|
| CK. | KRV | NO. | REV. |
| APP. | | 1076-003-004 | A |
| DATE: | | | |

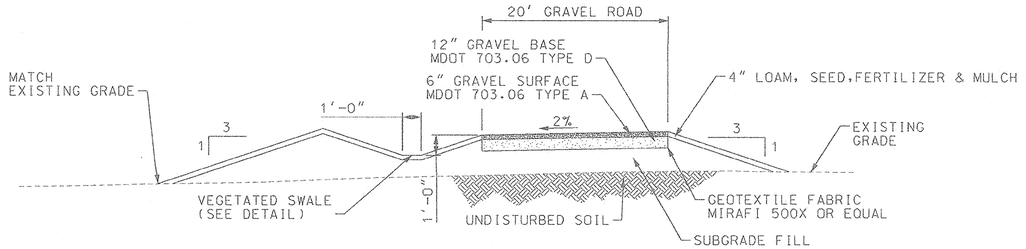
ANSI D CADD Drawing, DO NOT REVISE MANUALLY.



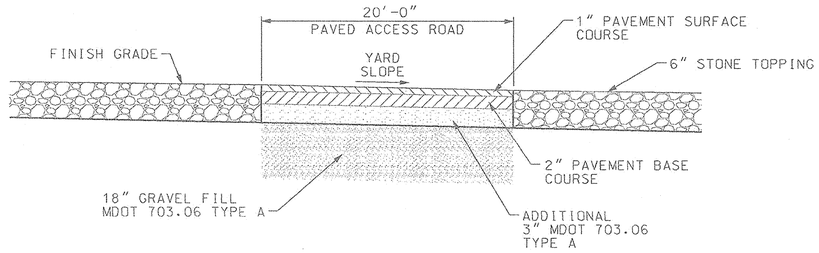

SUBSTATION YARD SECTION A-A
NTS




SUBSTATION YARD SECTION B-B
NTS




TYPICAL GRAVEL ACCESS ROAD SECTION
NTS




TYPICAL PAVED ROADWAY SECTION
NTS

NOTES:

1. FILL SLOPES SHALL BE CONSTRUCTED AS LEVEL BENCHES WHICH ARE OVERBUILT TO FACILITATE COMPACTION. THE FINAL SLOPE FACE SHALL BE CONSTRUCTED BY CUTTING BACK INTO THE COMPACTED CORE.

2. WHERE GREATER THAN 4'-0" OF FILL IS REQUIRED, SUBSTATION YARD SHALL BE FILLED TO 4'-0" BELOW GRADES SHOWN ON THE GRADING PLAN WITH SUBGRADE FILL. FROM 4'-0" BELOW TO GRADE, FILL SHALL BE GRAVEL BORROW.

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

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

PE Stamp: STATE OF MAINE KENNETH R. VOLLOCK No. 11082 LICENSED PROFESSIONAL ENGINEER
04-08-2017
ISSUED for PERMITTING

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

CMP
IBERDROLA - USA

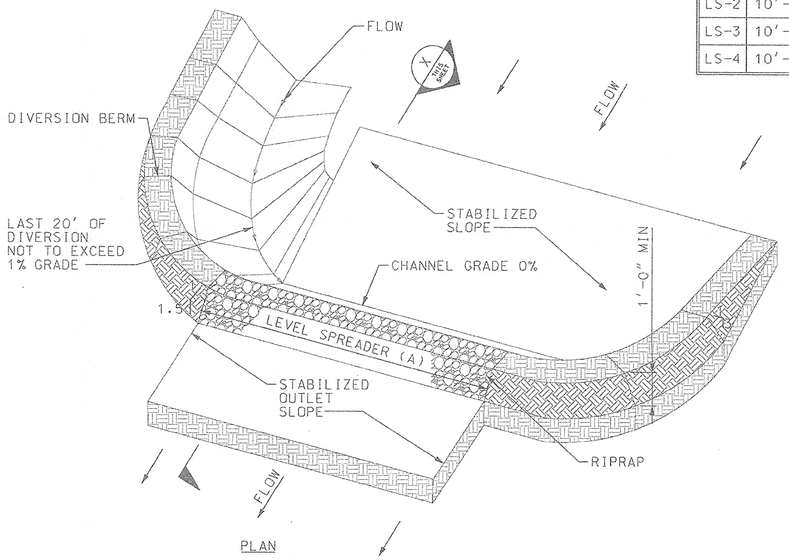
SITE DETAILS 1

SH 1 OF 6

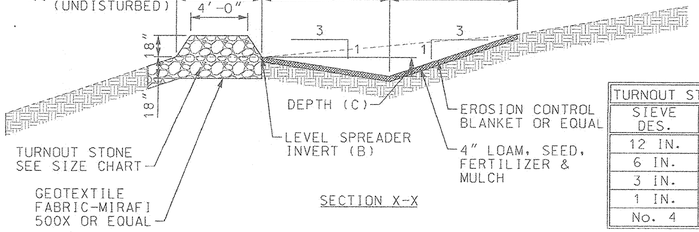
MERRILL ROAD/1076 LEWISTON, ME

| DR. | EVD | SCALE: AS NOTED | FILE: 1076-003-005SH001.DWG |
|---|---|---|---|
| CK. | KRV | NO. | REV. |
| APP. | . | 1076-003-005 | A |
| DATE: | . | | |

| LEVEL SPREADER CHART | | | |
|---|---|---|---|
| ID | LENGTH (A) | INVERT (B) | DEPTH (C) |
| LS-1 | 10'-0" | 298.00' | 1'-0" |
| LS-2 | 10'-0" | 315.00' | 1'-0" |
| LS-3 | 10'-0" | 306.25' | 1'-0" |
| LS-4 | 10'-0" | 307.75' | 1'-0" |



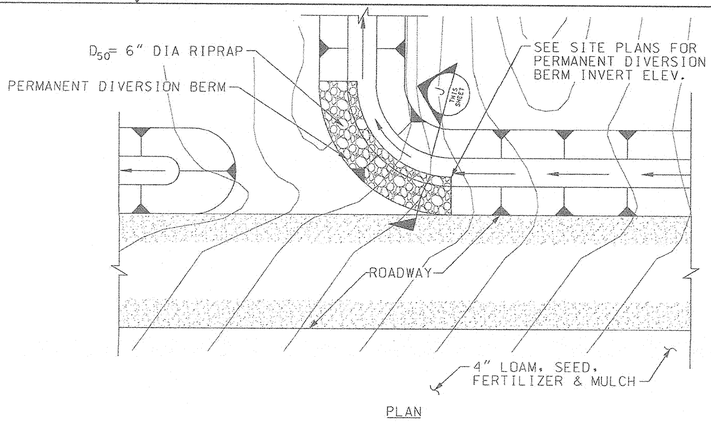

PLAN



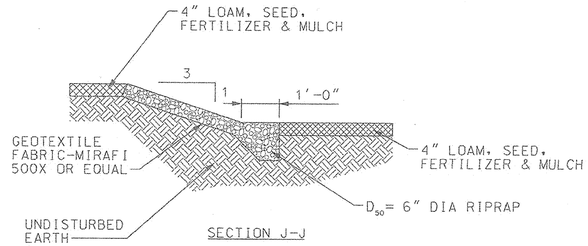

SECTION X-X

| TURNOUT STONE SIZE | |
|---|---|
| SIEVE DES. | % PASSING BY WEIGHT |
| 12 IN. | 100 |
| 6 IN. | 84-100 |
| 3 IN. | 68-83 |
| 1 IN. | 42-55 |
| No. 4 | 8-12 |

## LEVEL SPREADER DETAIL
NTS

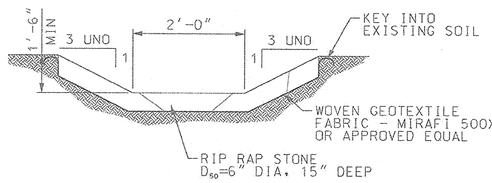



PLAN

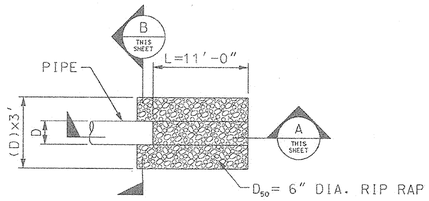



SECTION J-J

## PERMANENT DIVERSION BERM DETAIL
NTS




## TYPICAL RIPRAP DRAINAGE SWALE
NTS

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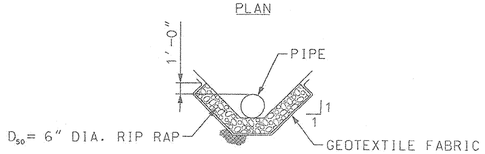
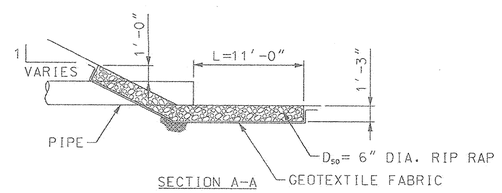
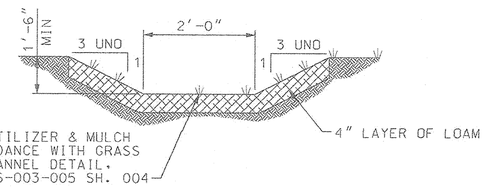



SECTION B-B

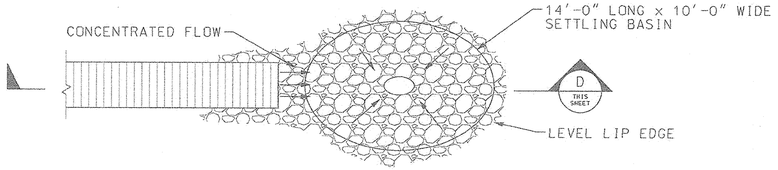



SECTION A-A

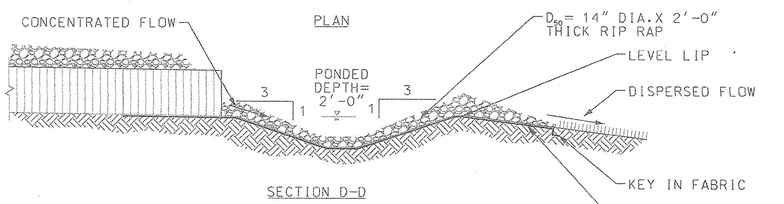
## CULVERT INLET/OUTLET PROTECTION
NOT TO SCALE




## TYPICAL VEGETATED DRAINAGE SWALE
NTS

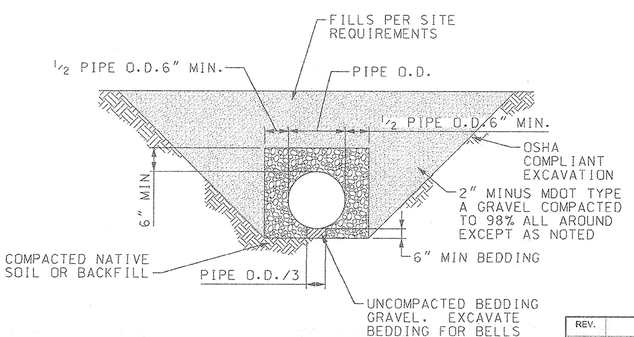



PLAN




SECTION D-D

## RIP RAP PLUNGE POOL DETAIL
NOT TO SCALE




## TYPICAL CULVERT SECTION
NOT TO SCALE

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

OWNER ENGINEER:

APPROVAL STAMP:

DRAWING PREPARED BY:

ACCEPTED BY OE:

PE Stamp: STATE OF MAINE — KENNETH R. VOLOK — No. 11082 — LICENSED PROFESSIONAL ENGINEER — 09-8-2017 — ISSUED for Permitting

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

CMP
IBERDROLA - USA

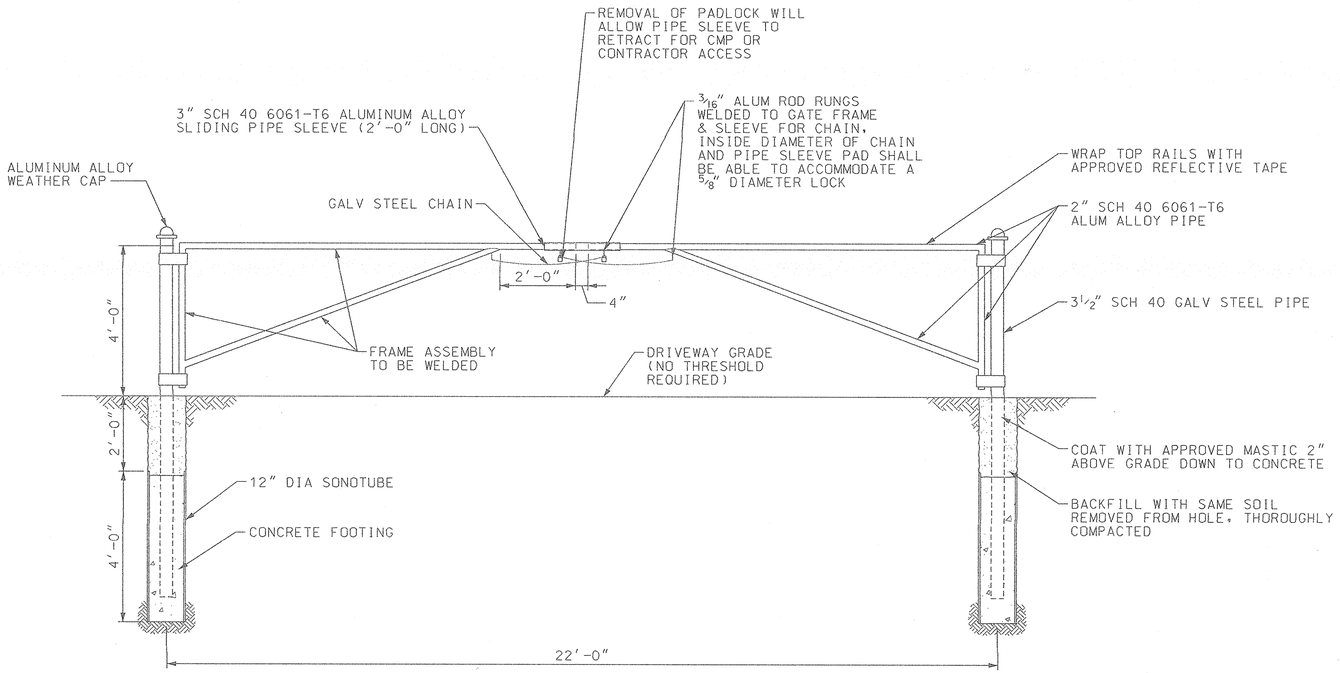
SITE DETAILS 2

SH 2 OF 6

MERRILL ROAD/1076 LEWISTON, ME

| | | | |
|---|---|---|---|
| DR. | EVD | SCALE: AS NOTED | FILE: 1076-003-005SH002.DWG |
| CK. | KRV | NO. | REV. |
| APP. | | 1076-003-005 | A |
| DATE: | | | |

ANSI D CADD Drawing, DO NOT REVISE MANUALLY.




## SECURITY GATE DETAIL

SCALE: 1/2" = 1'-0"

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

OWNER ENGINEER:

APPROVAL STAMP:

DRAWING PREPARED BY:

ACCEPTED BY OE:

PE Stamp

STATE OF MAINE
KENNETH R. WOLOCK
No. 11052
LICENSED
PROFESSIONAL ENGINEER

9.8.17
ISSUED for Permitting

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

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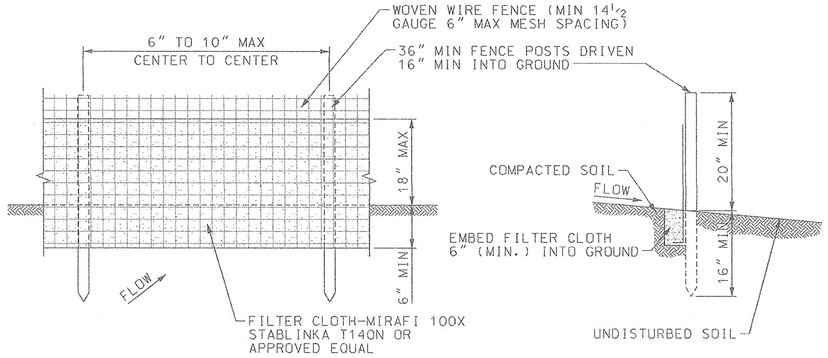
SITE DETAILS 3

SH 3 OF 6

MERRILL ROAD/1076 LEWISTON , ME

| DR. | EVD | SCALE: AS NOTED | FILE: 1076-003-005 SH 003.DWG | |
|---|---|---|---|---|
| CK. | KRV | NO. | | REV. |
| APP. | | | 1076-003-005 | A |
| DATE: | | | | |

ANSI D CADD Drawing, DO NOT REVISE MANUALLY



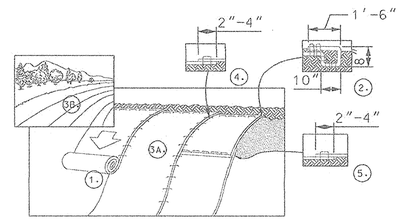

ELEVATION

SECTION

1. WOVEN WIRE FENCE TO BE FASTENED TO FENCE POSTS WITH WIRE TIES OR STAPLES.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MIDSECTION.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY 6" AND FOLDED.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN BUILD-UP REACHES 1/3 THE HEIGHT OF THE FENCE.

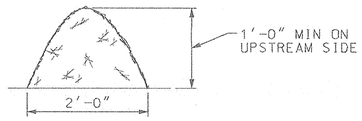
| | |
|---|---|
| POSTS: | STEEL "T" OR "U" TYPE OR 2" HARDWOOD. |
| FENCE: | WOVEN WIRE. 14½ GA 6" MAX MESH OPENING. |
| FILTER CLOTH: | FILTER X, MIRAFI 100X.STABLINKA T140N OR APPROVED EQUAL. |
| PREFABRICATED UNIT: | ENVIROFENCE OR APPROVED EQUAL |

## SILT FENCE DETAILS
NTS




1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN A 8" DEEP X 10" WIDE TRENCH WITH APPROXIMATELY 18" OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN THE SLOPE SIDE WALL OF THE TRENCH AND TWO ROWS OF STAPLES STAGGERED 6" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 18" PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH TWO ROWS OF STAPLES/STAKES SPACED APPROXIMATELY 4" APART STAGGERED WITH STAPLES 6" O.C. ACROSS THE WIDTH OF THE BLANKET.
3. ROLL THE BLANKETS (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING OPTIONAL DOT SYSTEM, STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2"-4" OVERLAP DEPENDING ON BLANKET TYPE. TO ENSURE PROPER SEAM ALIGNMENT, PLACE THE EDGE OF THE OVERLAPPING BLANKET (BLANKET BEING INSTALLED ON TOP) EVEN WITH THE COLORED SEAM STITCH ON THE PREVIOUSLY INSTALLED BLANKET.
5. CONSECUTIVE BLANKETS SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 2"-4" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30cm) APART ACROSS ENTIRE BLANKET WIDTH.
6. BLANKET SHALL EXTEND 3'-0" MIN BEYOND TOE OF SLOPE. STAPLE 12" APART ALONG TERMINATION.

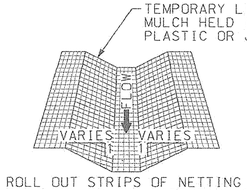
## EROSION CONTROL BLANKET INSTALLATION
NTS



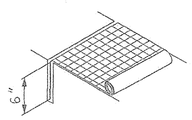

EROSION CONTROL SOIL/BARK MIX: SHALL CONSIST OF SHREDDED BARK, STUMP GRINDINGS, COMPOSTED BARK OR FLUME GRIT AND BARK, STUMP GRINDINGS, COMPOSTED BARK OR FLUME GRIT AND FRAGMENTED WOOD GENERATED FROM WATER-FLUME LOG HANDLING SYSTEMS. THE MIX SHALL CONFORM TO THE FOLLOWING:

1. pH - 5.0 TO 8.0.
2. SCREEN SIZE: 6" - 100% PASSING
   ¾" - 70% TO 85% PASSING
   MIX SHALL NOT CONTAIN LARGE PORTIONS OF SILTS, CLAYS OR FINE SANDS
3. ORGANIC MATERIAL 20% - 100% (DRY WEIGHT BASIS) ORGANIC PORTION MUST BE FIBROUS AND ELONGATED
4. SOLUBLE SALTS SHALL BE LESS THAN 4.0 mmhos/cm

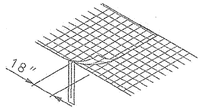
## EROSION CONTROL BERM
NTS




ROLL OUT STRIPS OF NETTING PARALLEL TO THE DIRECTION OF FLOW



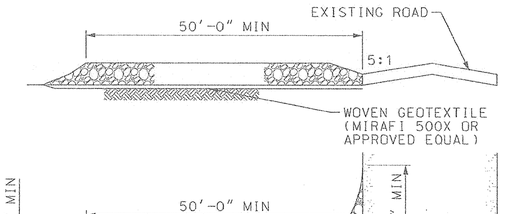

ANCHOR NETTING IN A 6" TRENCH




JOIN STRIPS BY ANCHORING AND OVERLAPPING

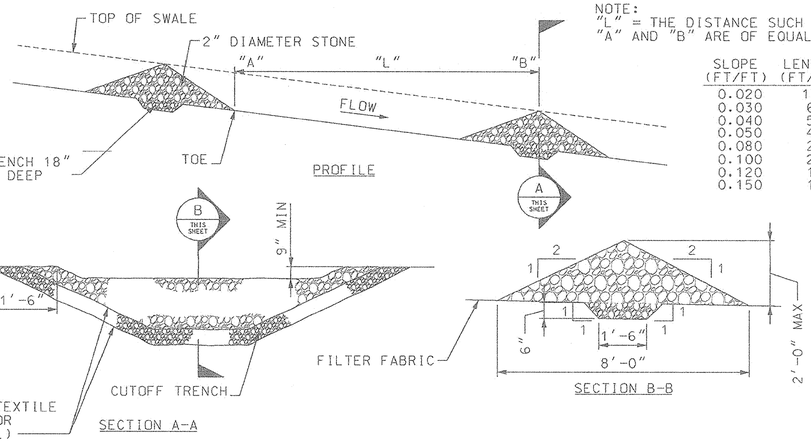
1. EXCAVATE THE CHANNEL AND SHAPE IT TO AN EVEN CROSS-SECTION AS SHOWN. WHEN STAKING INDICATE A 0.2' OVERCUT AROUND THE CHANNEL PERIMETER FOR SILTING AND BULKING.
2. GRADE SOIL AWAY FROM CHANNEL SO THAT SURFACE WATER MAY ENTER FREELY.
3. APPLY LIME, FERTILIZER AND SEED TO THE CHANNEL AND ADJOINING AREAS IN ACCORDANCE WITH THE EROSION CONTROL PLAN.
4. SPREAD HAY OR STRAW MULCH AT THE RATE OF 100LB/1000 SF.
5. HOLD MULCH IN PLACE IMMEDIATELY AFTER SPREADING WITH A PLASTIC NETTING INSTALLED AS SHOWN.
6. START LAYING THE NET FROM THE TOP OF THE UPSTREAM END OF THE CHANNEL AND UNROLL IT DOWN GRADE. DO NOT STRETCH THE NETTING.
7. BURY THE UP SLOPE END AND STAPLE THE NET EVERY 12" ACROSS THE TOP END, EVERY 3 FT AROUND THE EDGES AND ACROSS THE NET SO THAT THE STRAW IS HELD CLOSELY AGAINST THE SOIL. HOWEVER, DO NOT STRETCH THE NETTING WHEN STAPLING.
8. NETTING STRIPS SHOULD BE JOINED TOGETHER ALONG THE SIDES WITH A 3" OVERLAP AND STAPLED TOGETHER.
9. TO JOIN ENDS OF STRIPS, INSERT A NEW ROLL OF NET IN A TRENCH AS WITH THE UP SLOPE END AND OVERLAP IT 18" WITH THE PREVIOUSLY LAID UPPER ROLL. TURN UNDER 6" OF THE 18" OVERLAP AND STAPLE EVERY 12" ACROSS THE END.

## GRASS LINED CHANNEL
NTS




1. STONE SIZE - USE 2" STONE.
2. LENGTH - NOT LESS THAN 50 FEET.
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MIN. BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. WOVEN GEOTEXTILE - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING THE STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE EXIT SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.

## STABILIZED CONSTRUCTION EXIT
NTS




NOTE:
"L" = THE DISTANCE SUCH THAT POINTS "A" AND "B" ARE OF EQUAL ELEVATION

| SLOPE (FT/FT) | LENGTH (FT/FT) |
|---|---|
| 0.020 | 100 |
| 0.030 | 66 |
| 0.040 | 50 |
| 0.050 | 40 |
| 0.080 | 25 |
| 0.100 | 20 |
| 0.120 | 17 |
| 0.150 | 13 |

NOTE:
INSTALL WHERE INDICATED ON SITE GRADING PLAN AND AS NEEDED BY SPACING REQUIREMENTS.

## CHECK DAM DETAIL
NTS

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

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

PE Stamp: STATE OF MAINE · KENNETH G. VOLOCK · No. 11082 · LICENSED PROFESSIONAL ENGINEER · 09-08-2017 · ISSUED for Permitting

CMP
IBERDROLA - USA

| REV. | DATE | BY | DESCRIPTION | APP. |
|---|---|---|---|---|
| | | | | |

SITE DETAILS 4

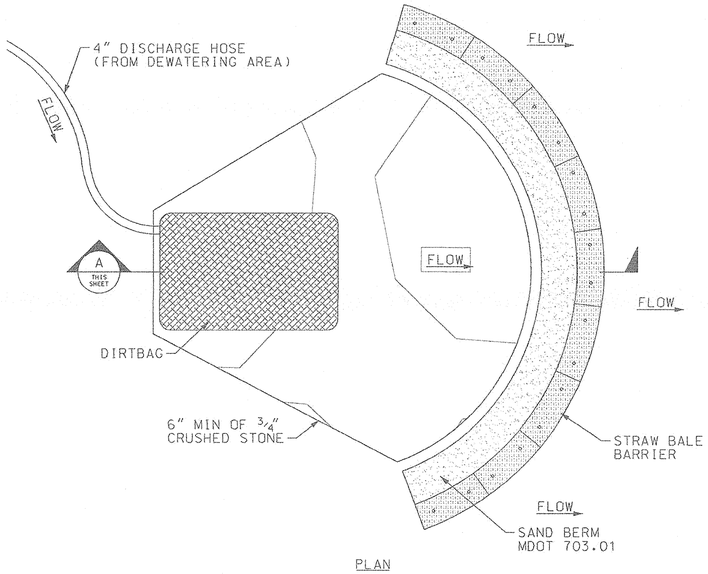
SH 4 OF 6

MERRILL ROAD/1076 LEWISTON, ME

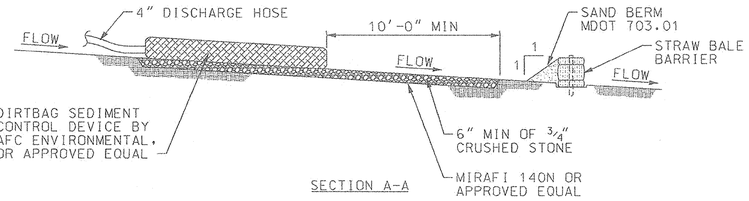
| | | | |
|---|---|---|---|
| DR. | EVD | SCALE: AS NOTED | FILE: 1076-003-005SH004.DWG |
| CK. | KRV | NO. | REV. |
| APP. | | 1076-003-005 | A |
| DATE: | | | |

ANSI D

CADD Drawing. DO NOT REVISE MANUALLY.

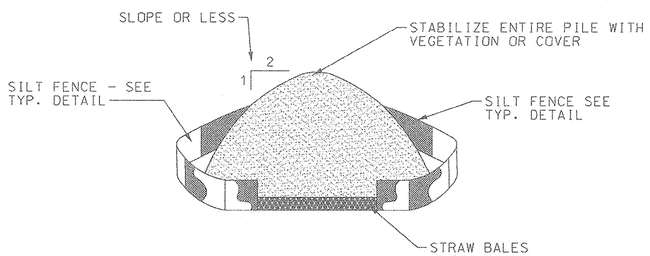



PLAN




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.

**ISSUED FOR PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

| REV. | DESCRIPTION | DATE | BY | CK | APP |
|---|---|---|---|---|---|
| | | | | | |

OWNER ENGINEER:

APPROVAL STAMP:

DRAWING PREPARED BY:

ACCEPTED BY OE:

PE Stamp

STATE OF MAINE
KENNETH R. VOLOCK
No. 11032
LICENSED
PROFESSIONAL ENGINEER
09-08-2017
ISSUED FOR PERMITTING

| REV. | DATE | BY | DESCRIPTION | APP. |
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CMP
IBERDROLA - USA

SITE DETAILS

SH 5 OF 6

MERRILL ROAD/1076 LEWISTON, ME

| DR. | EVD | SCALE: AS NOTED | FILE: 1076-003-005SH005.DWG |
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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. INSTALL THE SEDIMENT BASIN CONTROL STRUCTURE AND OUTLET PIPING AND GRADE THE SEDIMENT BASIN AND SURROUNDING AREA TO PROPOSED PLAN GRADES UP TO ELEVATION 312' SUCH THAT RUNOFF FROM UPSTREAM DISTURBANCES MAY FLOW INTO THE BASIN.
7. 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.
8. 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.
9. INSTALL PROPERLY SPACED STONE CHECK DAMS IN ANY SECTION OF DITCH WITHIN 24 HOURS OF FORMING, SHAPING OR ROUGH GRADING THAT SECTION OF DITCH.
10. 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.
11. 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 THE APPROVED PERMANENT STABILIZATION MEASURES FOR SLOPES. STABILIZE ANY SECTION OF DITCH BROUGHT TO FINAL GRADE WITHIN 24 HOURS USING THE APPROVED PERMANENT STABILIZATION MEASURES FOR DITCHES.
12. 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.
13. 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.
14. 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.
15. INSPECT AND REPAIR EROSION CONTROL MEASURES DAILY IN AREAS OF ACTIVE CONSTRUCTION; OTHERWISE WEEKLY AND AFTER RAINFALL OF 1/2" OR GREATER WITHIN A 24-HOUR PERIOD. REMOVE ACCUMULATED SEDIMENT WHEN IT REACHES 1/3 THE HEIGHT OF THE BARRIER.
16. MONITOR PUBLIC ROADS FOR SIGNS OF TRACKING OR SPILLING OF SPOIL MATERIAL AND CLEAN UP AS NEEDED.
17. COMPLETE FINAL GRADING AND STABILIZATION OF EARTHEN STRUCTURES SUCH AS DIVERSION BERMS, DITCH TURNOUTS AND SWALES THAT WILL CONTROL RUNOFF. LOWER THE TEMPORARY SEDIMENT BASIN INLET GRATE TOP TO THE FINAL PROPOSED PLAN ELEVATION.
18. FINISH GRADE AND REPLACE TOPSOIL OR LOAM IN DISTURBED AREAS. SEED AND MULCH DISTURBED AREAS WITHIN 6 DAYS OF FINAL GRADING.
19. 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.
20. 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<br>WOOD FIBER MULCH | 2 TONS/ACRES<br>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<br>WOOD FIBER MULCH | 2 TONS/ACRES<br>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<br>WOOD FIBER MULCH | 3 TONS/ACRES<br>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<br>OR PAPER MULCH<br>OR WOOD FIBER MULCH | 2 TONS/ACRES<br>1500 LB./ACRES[4]<br>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<br>OR PAPER MULCH<br>OR WOOD FIBER MULCH | 2 TONS/ACRES<br>1500 LB./ACRES[4]<br>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<br>CREEPING RED FESCUE<br>TALL FESCUE<br>BIRDSFOOT TREFOIL | 4<br>40<br>40<br>16 |
| WOOD CHIP APPLICATION SEED MIX | CREEPING RED FESCUE<br>REDTOP<br>TALL FESCUE<br>CROWNVETCH | 20<br>4<br>30<br>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 PERMITTING**
**NOT FOR CONSTRUCTION**
**09/08/17**

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

PE Stamp: STATE OF MAINE — KENNETH R. VOLLICK — No. 11032 — LICENSED PROFESSIONAL ENGINEER — 09-08-2017 — ISSUED FOR PERMITTING

CMP
IBERDROLA - USA

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SITE DETAILS

SH 6 OF 6

MERRILL ROAD/1076 — LEWISTON, ME

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| DR. | EVD | SCALE: NONE | FILE: 1076-003-005SSH006.DWG |
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