DEPARTMENT OF ENVIRONMENTAL PROTECTION
SITE LOCATION OF DEVELOPMENT
38 M.R.S.A. §§ 481-490
PERMIT APPLICATION

Maine Department of Transportation
Trenton – Acadia Gateway Center
Route 3
PIN 16123.00/13332.09

January 2009

SITE LOCATION OF DEVELOPMENT PERMIT APPLICATION ....38 M.R.SA. §§481-490

PLEASE TYPE OR PRINT IN *INK ONLY*

This application is for: (CHECK THE ONE THAT APPLIES)	☐ 20 acre development ☐ Planning Permit ☐ Metallic Mining	☐ Marine Oil Terminal ☐ Structure ☐ Subdivision	☐ Major Amendment ☐ Minor Amendment
1. Name of Applicant:	Maine Department of Transportation	**6. Name of Agent: (if applicable)**	Josh Nichols
2. Applicant's Mailing Address:	16 State House Station Augusta, ME 04333	**7. Agent's Mailing Address:**	16 state House Station Augusta, ME 04333
3. Applicant's Daytime Phone #:	624-3000	**8. Agent's Daytime Phone # :**	592-3107
4. Applicant's Fax #: (if available)	624-3101	**9. Agent's Fax # :**	624-3101
5. Applicant's *e-mail address*: (license will be sent via e-mail)		**10. Agent's *e-mail address* (license will be sent via e-mail**	Joshua.nichols@maine.gov

PROJECT INFORMATION

11. Name of Development:	Acadia Gateway Center						
12. Map and Lot #'s:	Map #: 24	Lot #: 8	**13. Deed Reference #'s:**		Book #: 4913		Page #: 232-234
14. Location of Project City/Town:	Trenton		**15. County:**	Hancock	**16. UTM Northing**		**17. UTM Easting**
18. Brief Description of Project including total parcel size:	This project consists of construction of a bus maintenance facility, welcome center, parking facilities and access road. The entire parcel is 152 acres.						

19. Type of Direct Watershed: (Check all that apply)
- ☐ Lake not most at risk
- ☐ Lake most at risk
- ☐ Lake most at risk, severely blooming
- ☒ River, stream or brook
- ☐ Urban impaired stream
- ☒ Freshwater wetland
- ☐ Coastal wetland
- ☐ Wellhead or public water

19. Name of Waterbody Project Site drains to: Crippens Brook / Jordan River

21. Amount of Developed Area:	Total acres: 19.7	Existing Developed area: 0 acres	New Developed area: 19.7 acres
22. Amount of Impervious Area:	Total acres: **13.8**	Existing Impervious areas 0 acres	New Impervious area: 13.8 acres

23. Development started prior to obtaining a license?: ☐ Yes ☒ No

24. .Development or any portion of the site subject to enforcement action? ☐ Yes ☒ No — **If yes,** name of enforcement staff involved?

25. Common scheme of development?: ☐ Yes ☐ No

26. Title, Right or Interest: ☐ own ☐ lease ☐ purchase option ☐ written agreement

27. Natural Resources Protection Act permit required?: ☒ Yes ☐ No — **If yes:** ☐ PBR ☐ Tier 1 ☐ Tier 2 ☒ Full Permit

28. Existing DEP Permit number (if applicable): N/A

29. Names of DEP staff person(s) present at the pre-application meeting: Jessica Damon, Ken Libbey

30. Does agent have an interest in project? If yes, what is the interest? ☐ Yes ☒ No

CERTIFICATIONS AND SIGNATURES LOCATED ON PAGE 2

IMPORTANT: IF THE SIGNATURE BELOW IS NOT THE APPLICANT'S SIGNATURE, ATTACH LETTER OF AGENT AUTHORIZATION SIGNED BY THE APPLICANT.

By signing below the applicant (or authorized agent), certifies that he or she has read and understood the following :

CERTIFICATIONS / SIGNATURES

"I certify under penalty of law that I have personally examined the information submitted in this document and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the information is true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment. I authorize the Department to enter the property that is the subject of this application, at reasonable hours, including buildings, structures or conveyances on the property, to determine the accuracy of any information provided herein.

Signed: John E. Dority **Title** CHIEF ENGINEER **Date:** FEB 03 2009

Notice of Intent to Comply with Maine Construction General Permit	**With this Site Law application form and my signature, I am filing notice of my intent to carry out work which meets the requirements of the Maine Construction General Permit (MCGP). I have read and will comply with all of the MCGP standards.** **If this form is not being signed by the landowner or lessee of the property, attach documentation showing authorization to sign.** **Signed** John E. Dority **Date:** 02-03-09

NOTE: You must file a MCGP Notice of Termination (Form K) within 20 days of completing permanent stabilization of the project site.

CERTIFICATION

The person responsible for preparing this application and/or attaching pertinent site and design information hereto, by signing below, certifies that the application for development approval is complete and accurate to the best of his/her knowledge.

Signature: Joshua P Nichols

Name (print): **Josh Nichols**

Date: **1/29/09**

Re/Cert/Lic No.: ________
Engineer ________
Geologist ________
Soil Scientist ________
Land Surveyor ________
Site Evaluator ________
Active Member of the Maine Bar ________
Professional Landscape Architect ________
Other - **ENV.Office Team Leader**

"I hereby authorize the DEP to send me an electronically signed decision on the license I am applying for with this application by emailing the decision to the address located on the front page of this application (see #5 for the applicant and #10 for the agent). ***Do not sign if you elect to "opt out" or receive the decision via regular mail.***

Signed (Applicant) John E. Dority **Date:** 02-03-09
and/or
Signed (Agent) Joshua P Nichols **Date:** 1/29/09

FORM B **08/08**

PUBLIC NOTICE:
NOTICE OF INTENT TO FILE

Please take notice that
The Maine Department of Transportation, State House station 16, Augusta, ME 04333

is intending to file a Site Location of Development Act permit application with the Maine Department of Environmental Protection pursuant to the provisions of 38 M.R.S.A. §§ 481 thru 490 on or about:
February 10, 2009

The application is for:
construction of the Acadia Gateway Center

at the following location:
Trenton, Maine

A request for a public hearing or a request that the Board of Environmental Protection assume jurisdiction over this application must be received by the Department in writing, no later than 20 days after the application is found by the Department to be complete and is accepted for processing. A public hearing may or may not be held at the discretion of the Commissioner or Board of Environmental Protection. Public comment on the application will be accepted throughout the processing of the application.

For Federally licensed, permitted, or funded activities in the Coastal Zone, review of this application shall also constitute the State's consistency review in accordance with the Maine Coastal Program pursuant to Section 307 of the federal Coastal Zone Management Act, 16 U.S.C. § 1456. (Delete if not applicable.)

The application will be filed for public inspection at the Department of Environmental Protection's office in *Bangor* during normal working hours. A copy of the application may also be seen at the municipal offices in **Trenton, Maine.**

Written public comments may be sent to the regional office in Bangor where the application is filed for public inspection:

MDEP, Eastern Maine Regional Office, 106 Hogan Road, Bangor, Maine 04401

FORM C **08/08**

PUBLIC NOTICE FILING AND CERTIFICATION

The DEP Rules, Chapter 2, require an applicant to provide public notice for all Site Location projects with the exception of minor revisions and condition compliance applications. In the notice, the applicant must describe the proposed activity and where it is located. **"Abutter"** for the purposes of the notice provision means any person who owns property that is BOTH (1) adjoining and (2) within one mile of the delineated project boundary, including owners of property directly across a public or private right of way.

1. **Newspaper:** You must publish the Notice of Intent to File in a newspaper circulated in the area where the activity is located. The notice must appear in the newspaper within 30 days prior to the filing of the application with the Department. You may use the attached Notice of Intent to File form, or one containing identical information, for newspaper publication and certified mailing.

2. **Abutting Property Owners:** You must send a copy of the Notice of Intent to File by certified mail to the owners of the property abutting the activity. Their names and addresses can be obtained from the town tax maps or local officials. They must receive notice within 30 days prior to the filing of the application with the Department.

3. **Municipal Office:** You must send a copy of the Notice of Intent to File and a **duplicate of the entire application** to the Municipal Office.

ATTACH a list of the names and addresses of the owners of abutting property.

CERTIFICATION

By signing below, the applicant or authorized agent certifies that:

1. A Notice of Intent to File was published in a newspaper circulated in the area where the project site is located within 30 days prior to filing the application;
2. A certified mailing of the Notice of Intent to File was sent to all abutters within 30 days of the filing of the application;
3. A certified mailing of the Notice of Intent to File, and a duplicate copy of the application was sent to the town office of the municipality in which the project is located; and
4. Provided notice of, if required, and held a public informational meeting in accordance with Chapter 2, Rules Concerning the Processing of Applications, Section 14, prior to filing the application. Notice of the meeting was sent by certified mail to abutters and to the town office of the municipality in which the project is located at least ten days prior to the meeting. Notice of the meeting was also published once in a newspaper circulated in the area where the project site is located at least seven days prior to the meeting.

The Public Informational Meeting was held on ____**7/25/08**____________________________.
Date

Approximately __**40**______ members of the public attended the Public Informational Meeting.

Joshua P. Nichols
Signature of Applicant or authorized agent

2/2/09
Date

FORM D 04/06

SUBMISSIONS CHECKLIST

If a provision is not applicable, put "NA"

Section 1. Development description (**EA Sections ES-1 through 1-1, 1-3, 1-5.)**

A. Narrative

__X__ 1. Objectives and details

_____ 2. Existing facilities (with dates of construction)

B. Topographic map

_____ 1. Location of development boundaries

_____ 2. Quadrangle name

C. Construction plan

_____ 1. Outline of construction sequence (major aspects)

2. Dates

D. Drawings

_____ 1. Development facilities

_____ a. Location, function and ground area

_____ b. Length/cross-sections for roads

_____ 2. Site work (nature and extent)

_____ 3. Existing facilities (location, function ground area and floor area)

4. Topography

_____ a. Pre- and post-development (contours 2 ft or less)

_____ b. Previous construction, facilities and lot lines

_X___ **Section 2. Title, right or interest** (copy of document)

Section 3. Financial capacity

_X___ A. Estimated costs (The project will be funded by State and Federal sources).

B. Financing

_____ 1. Letter of commitment to fund

2. Self-financing

_____ a. Annual report

_____ b. Bank statement

3. Other

_____ a. Cash equity commitment

_____ b. Financial plan

_____ c. Letter

_____ 4. Affordable housing information

Section 4. Technical ability (description)

_X___ A. Prior experience (statement)

_X___ B. Personnel (documents)

Section 5. Noise (**EA Sections 3.3.2., and 4.3.2 – 4.3.3.)**

_X___ A. Developments producing a minor noise impact (statement)

_____ 1. Residential developments

_____ 2. Certain non-residential subdivisions

_____ 3. Schools and hospitals

_____ 4. Other developments

_____ a. Type, source and location of noise

_____ b. Uses, zoning and plans

_____ c. Protected locations

_____ d. Minor nature of impact

_____ e. Demonstration

_____ B. Developments producing a major noise impact (full noise study)

_____ 1. Baseline

_____ a. Uses, zoning and plans

_____ b. Protected locations
_____ c. Quiet area
_____ 2. Noise generated by the development
_____ a. Type, source and location of noise
_____ b. Sound levels
_____ c. Control measures
_____ d. Comparison with regulatory limits
_____ e. Comparison with local limits

__X__ **Section 6. Visual quality and scenic character** (**EA Sections 2.4.2, Figures 2.4-7, 2.4-8, 2.4-9)**

_X___ **Section 7. Wildlife and fisheries** (**EA Sections 3.2.4, 4.2.5.)**

_X___ **Section 8. Historic sites** (**EA Section 3.5.3.)**

__X__ **Section 9. Unusual natural areas** (**EA Section 3.2.5.3.)**

_X__ **Section 10. Buffers** (**EA Sections 4.2.4 Most of the property will remain in its natural state. A 25 foot wide vegetated buffer will be maintained along the northern property line.)**
_____ A. Site plan and narrative

Section 11. Soils (**EA Sections 3.2.1.3, 4.2.1.3, Table 3.2.1, map/figures 3.2.2.)**
_X___ A. Soil survey map and report
_____ 1. Soil investigation narrative
__X__ 2. Soil survey map
_____ B. Soil survey intensity level by development type
1.Class A (High Intensity) Soil Survey
2. Class B (High Intensity) Soil Survey
3. Class C (Medium High-Intensity) Soil Survey
4. Class D (Medium Intensity) Soil Survey
C. Geotechnical Investigation
_____ D. Hydric soils mapping

Section 12. Stormwater management (**EA Section 4.2.2.2.)**
__X__ A. Narrative
_____ 1. Development location
_____ 2. Surface water on or abutting the site
_____ 3. Downstream ponds and lakes
_____ 4. General topography
_____ 5. Flooding
_____ 6. Alterations to natural drainage ways
_____ 7. Alterations to land cover
_____ 8. Modeling assumptions
9. Basic standard
_____ 10. Flooding standard
_____ 11. General standard
_____ 12. Parcel size
13. Developed area
14. Disturbed area
15. Impervious area
_X___ B. Maps
_____ 1. U.S.G.S. map with site boundaries
_____ 2. S.C.S. soils map with site boundaries
_X___ C. Drainage Plans (a pre-development plan and a post-development plan)
_____ 1. Contours
_____ 2. Plan elements
_____ 3. Land cover types and boundaries
_____ 4. Soil group boundaries
_____ 5. Stormwater quantity subwatershed boundaries
_____ 6. Stormwater quality subwatershed boundaries
_____ 7. Watershed analysis points

8. Hydrologic flow lines (w/flow types and flow lengths labeled)
9. Runoff storage areas
10. Roads and drives
11. Buildings, parking lots, and other facilities
12. Drainage system layout for storm drains, catch basins, and culverts
13. Natural and man-made open drainage channels
14. Wetlands
15. Flooded areas
16. Benchmark
17. Stormwater detention, retention, and infiltration facilities
18. Stormwater treatment facilities
19. Drainage easements
20. Identify reaches, ponds, and subwatersheds matching stormwater model
21. Buffers

D. Runoff analysis (pre-development and post development)
1. Curve number computations
2. Time of concentration calculations
3. Travel time calculations
4. Peak discharge calculations
5. Reservoir routing calculations

E. Flooding Standard
1. Variance submissions (if applicable)
a. Submissions for discharge to the ocean, great pond, or major river
i. Map
ii. Drainage plan
iii. Drainage system design
iv. Outfall design
v. Easements
b. Insignificant increase
i. Downstream impacts

c. Submissions for discharge to a public stormwater system
i. Letter of permission
ii. Proof of capacity
ii. Outfall analysis and design (pictures)
2. Sizing of storm drains and culverts
3. Stormwater ponds and basins
a. Impoundment sizing calculations
b. Inlet calculations
c. Outlet calculations
d. Emergency spillway calculations
e. Subsurface investigation report
f. Embankment specifications
g. Embankment seepage controls
h. Outlet seepage controls
i. Detail sheet
j. Basin cross sections
k. Basin plan sheet
4. Infiltration systems
a. Well locations map
b. Sand and gravel aquifer map
c. Subsurface investigation report with test pit or boring logs
d. Permeability analysis
e. Infiltration structure design
f. Pollutant generation and transport analysis
g. Monitoring and operations plan
i. Locations of storage points of potential contaminants
ii. Locations of observation wells and infiltration monitoring plan
iii. Groundwater quality monitoring plan
5. Drainage easement declarations.

F. Stormwater quality treatment plan peak discharge calculations
1. Basic stabilization plan

____ a. Ditches, swales, and other open channel stabilization
____ b. Culvert and storm-drain outfall stabilization
____ c. Earthen slope and embankment stabilization
____ d. Disturbed area stabilization
____ e. Gravel roads and drives stabilization

____ 2. General Standard
____ a. Calculations for sizing BMP
____ b. Impervious area calculation
____ c. Developed area calculation
____ d. Summary spreadsheet of calculations

____ 3. Phosphorus control plan
____ a. Calculations for the site's allowable phosphorus export
____ b. Calculations for determining the developed site's phosphorus export
____ c. Calculations for determining any phosphorus compensation fees
____ 4. Offset Credits
____ a. Urban impaired stream
____ Offset credit calculation
____ b. Phosphorus credit determination
____ i. Location map
____ ii. Scaled plan
____ iii. Title and right
____ iv. Demolition plan
____ v. Vegetation plan
____ vi. Offset credit calculation
____ vii. Calculation for the new allowable export
____ 5. Runoff treatment measures
____ a. structural measures
____ i. Design drawings and specifications
____ ii. Design calculations
____ iii. Maintenance plan
____ iv. TSS removal or phosphorus treatment factor determinations
____ v. Stabilization plan
____ b. Vegetated buffers
____ i. Soil survey
____ ii. Buffer plan
____ iii. Turnout and level spreader designs
____ iv. Deed restrictions
____ 6. Control plan for thermal impacts to coldwater fisheries
____ 7. Control plan for other pollutants
____ 8. Engineering inspection of stormwater management facilities

____ G. Maintenance of common facilities or property
____ 1. Components of the maintenance plan
____ A. Maintenance of facilities by owner or operator
____ 1. Site owner or operator (name legally responsible party)
____ 2. Contact person responsible for maintenance
____ 3. Tranfer mechanism
____ 4. List of facilities to be maintained
____ 5. List of inspection and maintenance tasks for each facility
____ 6. Identifications of any deed covenants, easements, or restrictions
____ 7. Sample maintenance log
____ 8. Copies of any third-party maintenance contracts
____ B. Maintenance of facilities by homeowner's association
____ 1. Incorporation documents for the association
____ 2. Membership criteria
____ 3. Association officer responsible for maintenance
____ 4. Establishment of fee assessment for maintenance work
____ 5. Establishment of lien system
____ 6. Reference to department order(s) in association charter
____ 7. Tranfer mechanism from developer to association

____ 8. List of facilities to be maintained
____ 9. Identification of any deed covenants, easements, or restrictions
____ 10. Renewal of covenants and leases
____ 11. List of inspection and maintenance tasks for each facility
____ 12. Sample maintenance log
____ 13. Copies of any third-party maintenance contracts
____ C. Maintenance of facilities by municipality or municipal district
____ 1. Identification of the municipal department or utility district
____ 2. Contact person responsible for maintenance
____ 3. Evidence of acceptance of maintenance responibility
____ 4. Tranfer mechanism from developer
____ 5. List of facilities to be maintained
____ 6. List of inspection and maintenance tasks for each facility
____ 7. Identifications of any deed covenants, easements, or restrictions
____ 8. Sample maintenance log
____ 2. General inspection and maintenance requirements
____ a. Drainage easements
____ b. Ditches, culverts, and catch-basin systems
____ c. Roadways and parking surfaces
____ d. Stormwater detention and retention facilities
____ 1. Embankment inspection and maintenance
____ 2. Outlet inspection and clean-out
____ 3. Spillway maintenance
____ 4. Sediment removal and disposal
____ e. Stormwater infiltration facilities
____ 1. Sediment protection plan
____ 2. Infiltration rehabilitation plan
____ 3. Sediment removal and disposal
____ 4. Groundwater monitoring plan
____ f. Proprietary treatment devices
____ g. Buffers
____ h. Other practices and measures

_X_ **Section 13. Urban Impaired Stream Submissions (The project is not within an Urban Impaired Stream watershed.)**
____ 1. Off-site credits
____ 2. Compensation fees (Urban Impaired Stream/Phosphorus)
____ 3. Development impacts

Section 14. Basic Standards (EA 4.2.1.3 – 4.2.2.)
_X___ A. Narrative
____ 1. Soil types
____ 2. Existing erosion problems
____ 3. Critical areas
____ 4. Protected natural resources
____ 5. Erosion control measures
____ 6. Site stabilization
____ B. Implementation schedule
____ C. Erosion and sediment control plan
____ 1. Pre-development and post-development contours
____ 2. Plan scale and elements
____ 3. Land cover types and boundaries
____ 4. Existing erosion problems
____ 5. Critical areas
____ 6. Protected natural resources
____ 7. Locations (general)
____ 8. Locations of controls
____ 9. Disturbed areas
10. Stabilized construction entrance
____ D. Details and specifications (for both temporary and permanent measures)
____ E. Design calculations
____ F. Stabilization plan

____ 1. Temporary seeding
____ 2. Permanent seeding
____ 3. Sodding
____ 4. Temporary mulching
____ 5. Permanent mulching
____ G. Winter construction plan
____ 1. Dormant seeding
____ 2. Winter mulching
____ H. Third-party inspections
____ 1. Inspector's name, address, and telephone number
____ 2. Inspector's qualifications
____ 3. Inspection schedule
____ 4. Contractor contact
____ 5. Reporting protocol

Section 15. Groundwater (EA Section 3.2.2.1)

_X___ A. Narrative
____ 1. Location and maps
____ 2. Quantity
____ 3. Sources
____ 4. Measures to prevent degradation
____ B. Groundwater protection plan
____ C. Monitoring plan
____ 1. Monitoring points
____ 2. Monitoring frequency
____ 3. Background conditions
____ 4. Monitoring parameters
____ 5. Personnel qualifications
____ 6. Proof of training
____ 7. Equipment and methods
____ 8. Quality assurance/quality control
____ 9. Reporting requirements
____ 10. Remedial action plan
____ D. Monitoring well installation report
____ 1. Well location map
____ 2. Elevation data
____ 3. Well installation data
____ 4. Well construction details
____ 5. Borehole logs
____ 6. Summary of depth measurements
____ 7. Characteristics of subsurface strata
____ 8. Well installation contract
____ 9. Schematic cross-sections
____ 10. Monitoring point summary table
____ 11. Protective casing
____ 12. On-site well identification

Section 16. Water supply

_X___ A. Water supply method
____ 1. Individual wells (evidence of sufficient/healthful supply)
____ a. Support of findings by well drillers
____ b. Support of findings by geologist
____ 2. Common well(s) (reports)
____ a. Hydrogeology report
____ b. Engineering report
____ c. Well installation report
____ d. Long-term safe yield and zone of influence determination
____ e. Public water supply
____ i. Proposed well or wells
____ ii. Existing well or wells

____ iii. Water quality analysis
____ 3. Well construction in shallow-to-bedrock areas
____ 4. Additional information
____ 5. Off-site utility company or public agency
____ 6. Other sources
____ B. Subsurface wastewater disposal systems (locations of systems and wells)
____ C. Total usage (statement re: total anticipated water usage)

Section 17. Wastewater disposal

_X___ A. On-site subsurface wastewater disposal systems (investigation results)
____ 1. Site plan
2. Soil conditions summary table
____ 3. Logs of subsurface explorations
4. Additional test pits, borings or probes
____ a. Soil conditions A
____ b. Soils with Profiles 8 and 9 parent material
____ c. Soil conditions D
____ d. Disposal field length 60 feet or greater
____ 5. 3-bedroom design
____ 6. Larger disposal systems
a. System design details
____ b. Plan view
____ c. Cross sections
____ d. Test pit data
____ e. Mounding analysis
____ B. Nitrate-nitrogen impact assessment
____ 1. When required
____ a. Exempted____
i. Conventional systems meeting certain setbacks
____ ii. Denitrification systems
____ b. Special conditions and other exemptions
____ 2. Assumptions
____ a. Initial concentration
____ b. Background concentration
____ c. Contribution from development
____ d. Mixing and dilution
____ e. Severe-drought scenario
____ f. Wastewater flow to subsurface wastewater disposal fields
____ 3. Assessment report minimum requirements
____ a. Narrative and calculations
____ b. Site plan
____ i. Well locations
____ ii. 10 mg/l and 8 mg/l isocons
____ iii. Groundwater contours and groundwater flow divides
____ c. References
____ 4. Denitrification systems
____ a. Design plans and specifications
____ b. Installation information
____ c. Monitoring plan
____ d. Maintentance
____ e. Backup system
____ D. Municipal facility or utility company letter
____ E. Storage or treatment lagoons

__X_ **Section 18. Solid waste** (list: type, quantity, method of collection and location)
___ A. Commercial solid waste facility (final disposal location)
___ B. Off-site disposal of construction/demolition debris (final disposal location)
C. On-site disposal of woodwaste/land clearing debris
____ 1. Applicability of rules (evidence re: applicability of rules)
2. Burning of wood wastes

____ a. Delineation on site plan
____ b. Plans for handling unburned woodwaste and woodash
____ c. Evidence of capacity to accept waste (approved facility)
____ d. Usage of materials
____ e. Data on mixing ratios and application rates
____ D. Special or Hazardous Waste

Section 19. Flooding **(EA Section 3.2.2.3., and 4.2.2.4.)**

_X___ A. Explanation of flooding impact
____ B. Site plan showing 100-year flood elevation
____ C. Hydrology analysis
___ D. FEMA flood zone map with site boundaries

Section 20. Blasting **(There will be no blasting.)**

____ A. Site Plan or map
____ B. Report
1. Assessment
2. Blasting plan

Section 21. Air emissions (**EA Section 3.3.1, 4.3.1)**

_X___ A. Point and non-point sources identified
____ B. Emission components (point sources)

Section 22. Odors **(**The project consists of a bus maintenance facility, an intermodal facility, and a welcome facility; therefore odors would consist of car emissions and propane bus emissions.)

____ A. Identification of nature/source
____ B. Estimate of areas affected
____ C. Methods of control)

__X__ **Section 23. Water vapor** (narrative) (There will no large scale water vapor emission from the development, such as that resulting from a processing plant or power generating facility. The development consists of a bus maintenance facility and a visitor center.)

_X___ **Section 24. Sunlight** (statement and drawing, if required) (Structures will not block access to direct sunlight for structures utilizing solar energy through active or passive systems. The tallest structure is a 2-story building located mare than 100 feet from the nearest property line.)

Section 25. Notices

_X___ A. Evidence that notice sent
_X__ B. List of abutters for purposes of notice

TABLE OF CONTENTS

SECTION 1 - DEVELOPMENT DESCRIPTION

The proposed Acadia Gateway Center (AGC) is the final piece of a three-phase transportation strategy that was developed in 1999 with the assistance of an interagency team of transportation and Acadia National Park (ANP) managers in an effort to reduce traffic on local roads, primarily Route 3, the primary access route to Mount Desert Island (MDI) and ANP. It was developed within the context of the Maine Strategic Transportation Plan (Explore Maine), which seeks to provide alternative transportation systems that reduce dependency on the private automobile to support Maine's growing tourist industry.

The first phase of the transportation strategy established the Island Explorer bus system operated by Downeast Transportation Inc. (DTI), and developed a transit hub at the Village Green in Bar Harbor, Maine. The Island Explorer initially operated six routes with eight propane-fueled buses during the summer season. Phase II expanded the fleet to 17 buses, extended the season and routes, increased service frequency, and implemented Intelligent Transportation Systems (ITS) technology to provide fleet management and real time traveler information. Since its inception in 1999, the Island Explorer has carried over two million passengers.

The AGC is proposed as Phase III of the strategy, which calls for developing a transportation and welcome center with the goal of orienting visitors to the Acadia region and reducing traffic congestion on Route 3 and in ANP by attracting day visitors and commuters to the Island Explorer transit system and other transportation alternatives. The AGC would also support transit operations by providing a bus maintenance and storage facility. All project goals would be accomplished in a manner that protects and promotes as much as possible the resources associated with the site.

The proposed site is located on privately-owned land located along Route 3, in the town of Trenton, Maine outside of ANP boundaries, approximately two miles north of the Bar Harbor-Hancock County Airport. This site is strategically located to intercept traffic on Route 3 before it gets to MDI.

Proposed Action

The Federal Transit Administration in cooperation with the National Park Service, Maine Department of Transportation, Friends of Acadia, Downeast Transportation Inc., and other partners proposes to construct the Acadia Gateway Center (AGC) in the Town of Trenton, Maine. The proposed Acadia Gateway Center would serve as a welcome Center, public transportation center, and a bus maintenance facility. The purpose of the project would be to reduce traffic congestion on the Route 3 corridor and in the Acadia National Park by attracting visitors and commuters to the Island Explorer Transit System and other transportation alternatives. The project would: 1) provide connections to the Island Explorer and other bus services; 2) provide parking for visitors and commuters; 3) provide administrative, light maintenance, and storage facilities for Downeast Transportation Inc. in support of the Island Explorer Bus System; 4) provide an area to sell National Park Service passes to support the Island Explorer Bus System; 5) orient visitors to the Acadia region.

BK 4913 PGS 232 - 234
INSTR # 2007021830
12/28/2007 at 09:01 AM
HANCOCK COUNTY, ME

WARRANTY DEED
(Maine Statutory Short Form)

KNOW ALL PERSONS BY THESE PRESENTS, that the FRIENDS OF ACADIA, a Maine non-profit corporation, having its principal place of business at Bar Harbor, County of Hancock, and State of Maine, for consideration paid, grants to the STATE OF MAINE, acting by and through its DEPARTMENT OF TRANSPORTATION, its successor and assigns, having its principal place of business at City of Augusta, County of Kennebec, and State of Maine, whose mailing address is 16 State House Station, Augusta, Maine 04333-0016, with **WARRANTY COVENANTS**, the land in Town of Trenton, County of Hancock, State of Maine, described as follows:

A certain lot or parcel of land situated on the westerly side of Route 3 in the Town of Trenton, Hancock County, State of Maine, bounded and described as follows, to wit:

Beginning at a #5 rebar found set in the ground in 1997 at or near the westerly sideline of Route 3 and on the northerly line of a lot of land conveyed to Rene L. Becker and James A. Day from James Lyons in a deed dated March 2, 2004 and recorded in the Hancock County Registry of Deeds, Book 3859, Page 162; thence South 79 degrees 22 minutes 10 seconds West by and along said northerly line of land of Becker and Day, the northerly line of a lot of land conveyed to Norman L. York and Denice Gray-York from said Norman L. York in a deed dated May 28, 2003 and recorded in said Registry, Book 3628, Page 323, the northerly line of a lot of land conveyed to Troy M. Mace and Corry M. Nolan from Norman York in a deed dated April 9, 2007 and recorded in said Registry, Book 4739, Page 71, and the northerly line of a lot of land conveyed to Lawrence Collier from A. B. Marshall in a deed dated November 29, 1958 and recorded in said Registry, Book 830, Page 160, four thousand twenty-five and ninety-one hundredths (4025.91) feet to a #5 rebar found set in the ground in 1997; thence continuing same course (South 79 degrees 22 minutes 10 seconds West) by and along said northerly line of land of Collier, eight hundred twenty-three and eighty-three hundredths (823.83) feet to a one (1) inch iron bolt set in the ground in 1997; thence North 10 degrees 37 minutes 50 seconds West by and along the easterly line of remaining land of Nacoochee Corporation, one thousand three hundred sixty-three and twenty-three hundredths (1363.23) feet to a one (1) inch iron bolt set in the ground in 2007; thence continuing same course (North 10 degrees 37 minutes 50 seconds West) by and along said easterly line of remaining land of Nacoochee Corporation, thirty-three (33) feet, more or less, to the centerline of the Old Turnpike, so called, being the southwesterly corner of a lot of land conveyed to Lewis A. and Joanne Romer from Lewis G. and Jolene F. Romer in a deed dated February, 1993 and recorded in said Registry, Book 2059, Page 290; thence running in an easterly direction by and along said centerline of the Old Turnpike being the southerly line of said land of Romer and the southerly line of a lot of land conveyed to William H. and Ellen W. McElvain from Leslie M. Creamer in a deed dated March 14, 2005 and recorded in said Registry of Deeds, Book 4153, Page 258, four thousand six hundred seven (4607) feet, more or less, to a one (1) inch iron bolt set flush with the ground at or near the aforementioned westerly line of Route 3, being North 79 degrees 11 minutes 10 seconds East four thousand six hundred and twenty-two hundredths (4600.22) feet from the last mentioned bolt and being North 20 degrees 53 minutes 40 seconds West one thousand four hundred and thirty-seven hundredths (1400.37) feet from the rebar at the point of beginning; thence continuing running in an easterly direction by and along said centerline of the Old Turnpike and said southerly line of land of McElvain, thirty-three (33) feet, more or less, to said centerline of Route 3; thence running in a southerly direction by and along said centerline of Route 3, one thousand four hundred four (1404) feet, more or less, to a point which bears North 79 degrees 22 minutes 10 seconds East from the rebar at the point of beginning; thence South 79 degrees 22 minutes 10 seconds West by and along the aforementioned northerly line of land of Becker and Day, thirty-two and five tenths (32.5) feet, more or less, to the rebar at the point of beginning and containing 152 acres, more or less.

The above mentioned bearings are oriented to Grid North, 1803 Maine 2000 East, NAD 1983.

Excepting and reserving herefrom that portion of the above described premises which is situated within the limits of Route 3 and subject to whatever rights third parties may have in the location of the Old Turnpike Road, so-called, and further subject to utility easements of record to New England Telephone and Telegraph Company dated May 25, 1915 and recorded in said Registry of Deeds in Book 517, Page 111, to Shoreline Electric Company dated August 3, 1926 and recorded in said Registry of Deeds in Book 610, Page 321 and to New England Telephone and Telegraph Company dated November 10, 1969 and recorded in said Registry of Deeds in Book 1089, Page 496.

Excepting and reserving to the Grantor herein a right-of-way over said Old Turnpike Road location for access to the land of the rear of the aforesaid premises to be retained by Grantor herein.

The above described being a portion of those premises conveyed to Grantor herein by Nacoochee Corporation dated December 18, 2007 and recorded in said Registry of Deeds in Book 4911, Page 152.

IN WITNESS WHEREOF, it, the said FRIENDS OF ACADIA, has caused this instrument to be signed and sealed in its corporate name by Marla S. O'Byrne, its President, thereunto duly authorized, this 21 day of December, 20 07

WITNESS:

FRIENDS OF ACADIA

By:
Name: Marla S. O'Byrne
Title: President

STATE OF MAINE
Kennebec, ss.

Dec. 27, 2007

Then personally appeared the above named Marla S. O'Byrne, President of said Corporation, as aforesaid, and acknowledged the foregoing instrument to be her free act and deed in her said capacity and the free act and deed of said Corporation.

Before me,

Attorney at Law/~~Notary Public~~
Printed Name: Kenneth M. Cole III

#1

X - D.O.T

SECTION 3 FINANCIAL CAPACITY

The Acadia Gateway Project, Phase One, is funded through a variety of federal and state fund sources for a total of $14,100,000. It is a complex funding package and the agencies involved are committed to the project. Federal funding sources include Federal Highway Administration (FHWA) funding through the Surface Transportation Program (STP) and Federal Transit Administration (FTA) funding through the FTA Discretionary Program (5309) and the Rural Transit Program (5311). In addition, the State of Maine has authorized multiple bonds since 1999 for this project. The National Park Service has committed $1,000,000 for this project. The total project funding package of $14,100,000 breakdown includes:

FTA grant ME-04-0001 $2,339,355
FTA Rural Program $3,364,882
FHWA STP earmark $4,061,810*
State of Maine bonds $3,333,953
National Park Service $1,000,000

*These funds will be transferred to the FTA for execution.
Since the initiation of Master Planning in 2002, MaineDOT, its federal partners and the National Park Service have consistently demonstrated their commitment to this project. MaineDOT has shown its ability to finance programs throughout the state. The MaineDOT will utilize approved bidding processes to ensure the project will be completed within the available funding.

Acadia Gateway Center - Project Team

Firm	Contract Information	Project Role
MaineDOT	Joel Kittredge 16 State House Station Augusta, ME 04333	Project Manager
Allied Engineering, Inc.	160 Veranda Street Portland, ME 04103 T (207) 221-2260 F (207) 221-2266	Project Engineering: Structural, Civil, Electrical, Mechanical,
Fore Solutions	386 Fore St Ste 401, Portland, ME 04101-7408 T (207) 347-5066 F 207-347-6039	LEED Management & Consulting
FGS/CMT	PO Box 2097 Bangor, Maine 04402 T (207) 947-3184 F (207) 990-1194	Geo-Environmental Services
DMJM	7 Hanover Square Suite 1800 New York, NY 10004 T 917.522.2866 F 212.785.3451	Project Architect

COMPANY PROFILE

BACKGROUND

Allied Engineering (AEI) has been providing multi-discipline engineering support to our clients since 1958. Our experience lies in our knowledge and understanding of Structural, Mechanical, Electrical and Technology systems for buildings on both new and/or renovation design projects. Our expertise is best seen in our attention to detail, integrated designs, and our in-house staff coordination of all project disciplines.

OUR PRACTICE

Structural engineering -	Building structure design, roof upgrades, foundations, code compliance analysis.
Mechanical engineering -	HVAC, plumbing, fire protection systems design and analysis.
Electrical engineering -	Supply and distribution, lighting, energy use, controls.
Technology engineering -	Copper and fiber optic structured cabling, telecommunications systems.
Commissioning -	Mechanical and electrical systems commissioning to document functional project completion.

GREEN DESIGN

AEI is proud of our energy efficient, green design skills. We have a strong understanding of green and sustainable design strategies and practices, and corresponding credits in the **LEED**™ Rating System. We have powerful software tools including HAP, Energy-10, and System Analyzer that allows us to perform evaluations of the viability and payback of sustainable strategies including day lighting, heat recovery, extra insulation, and others. We are currently involved with several **LEED**™ registered projects including the Colby College Schair-Swenson-Watson Alumni Center, which utilizes a geothermal heat pump system.

GEOGRAPHIC LOCATION

AEI's office is located Portland, Maine. Our location places us within minutes of the Maine Turnpike, Interstate 95 and the Portland International Jetport, allowing for timely travel to and from our office to meetings and site visits, throughout New England.

INSURANCE

AEI maintains full coverage for a variety of insurance needs at standard levels consistent with good business practices. Standard Insurance Coverage includes: Professional Liability for Errors and Omissions ($1,000,000), General Liability ($1,000,000/incident, $2,000,000 aggregate), Workers Compensation per State of Maine, Vehicle accidents and damage ($1,000,000).

LICENSES

AEI's staff is registered as Professional Engineers in Maine, New York, New Hampshire, Rhode Island, Vermont, Connecticut, Massachusetts, Pennsylvania, Florida, Virginia, North Carolina, and Maryland.

160 Veranda Street
Portland, ME 04103

T 207.221.2260
F 207.221.2266
Web: www.allied-eng.com

PROFESSIONAL CAPABILITIES

Allied Engineering (AEI) philosophy is that a comprehensive design of integrated systems can best be developed by a team which works well together, consistently, and one which is able to communicate freely. For this reason, **AEI** has staff with registered professionals in the following disciplines:

Structural • Mechanical • Electrical • Technology • Environmental
Building Studies • Commissioning • Construction Administration

We have **LEED™** accredited staff that have experience with several **LEED™** registered projects. **Allied Engineering** is proud of our energy efficient, green design skills. We have a strong understanding of sustainable design strategies and practices, and corresponding credits in the **LEED™** Rating System. We have powerful software tools including HAP, Energy-10, and System Analyzer that allows us to perform evaluations of the viability and payback of sustainable strategies including day lighting, heat recovery, extra insulation, and others. We are currently involved with several **LEED™** registered projects including the Colby Alumni & Development Center, which incorporates a geothermal heat pump system.

The following is a list of **AEI's** recent project experience:

- ✓ **Universities and Colleges**
- ✓ **Boiler Replacements**
- ✓ **Churches/Places of Worship**
- ✓ **Correctional Facilities**
- ✓ **Education Projects**
- ✓ **Grocery and Food Stores**
- ✓ **Historical Projects**
- ✓ **Hospitality**
- ✓ **Lodging**
- ✓ **Athletic Facilities**
- ✓ **LEED ™ Consulting**
- ✓ **Commissioning**
- ✓ **Performing Arts & Museums**
- ✓ **HVAC/Indoor Air Quality**
- ✓ **Healthcare Projects**
- ✓ **Municipal Projects**
- ✓ **Revolving Fund Projects**
- ✓ **Sustainable Design**
- ✓ **Technology**
- ✓ **Asbestos/Lead Paint**

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Allied Engineering

Structural Mechanical Electrical Commissioning

WILLIAM P. FAUCHER, P.E., LEED™ AP

Principal in Charge of Structural Engineering

William P. Faucher, P.E. has extensive experience analyzing and designing various structures utilizing a variety of construction techniques and materials including: reinforced masonry, pre-stressed concrete, stone, brick, braced steel and steel with moment connections, engineered wood systems, reinforced cast-in-place concrete, concrete masonry units, and cold-formed metal, both bearing and non-load bearing systems. Mr. Faucher's experience covers building analysis for renovations, seismic stress and wind and snow loading. He remains current with new building technology and techniques so each project is designed with the best options available to meet client needs. Bill is also a **LEED™** (Leadership in Energy and Environmental Design) Accredited Professional.

Work Related Experience

Saco Rehabilitation Center @ Atlantic Heights	University of Maine Art Museum, Bangor, Maine
Central Maine Medical Center, Lewiston, ME – new Marconi CT scanner	Lord Hall – Art Studio and classroom spaces – University of Maine - Orono
York Hospital, York, Maine	Mantor Library – University of Maine - Farmington
University Healthcare, Saco, ME	Mt. Blue Middle School, Farmington, ME
Poland Middle/High School, Poland, ME	UNE Special Collections library Space-Westbrook Campus, Portland, ME

Education, Registration, and Affiliation

University of Maine - B.S. in Civil Engineering Concentration - Structural - 1987
University of Wisconsin, Continuing Education in Foundation Design - 1989
Registered Professional Engineer - ME, NH, MA, NY, MD, RI, FL, CT, VT
Member – Past President (2000-2001) of Structural Engineers Association of Maine
Member - National Council of Examiners for Engineers and Surveyors (NCEES)
Member - Concrete Reinforcing Steel Institute (CRSI)
Member - Construction Specifications Institute (CSI)
Member - American Concrete Institute (ACI); ACI Concrete Flatwork Technician #912153
Member - Associated Constructors of Maine, Inc.
LEED™ (Leadership in Energy and Environmental Design) Accredited Professional

Employment History

1994 - Present	**Allied Engineering.** – Principal in Charge, Structural Engineering
1990 - 1993	Criterium-Mooney Engineers - Director of Engineering
1989 - 1990	Sebago Technics, Inc. - Civil Engineer
1988 - 1989	Power Line Models, Inc. - Consulting Engineer
1987 - 1989	New England Power Service Company - Project Engineer

Allied Engineering

Structural Mechanical Electrical Commissioning

ANTHONY S. DAVIS, P.E., LEED™ AP

Mechanical Engineer / Accredited Commissioning Process Provider

Anthony Davis, P.E., Associate, is a mechanical engineer with experience in the assessment, design, and commissioning of mechanical systems. Tony has completed the VFA Facilities/Infrastructure Certification Program, and has also been trained and certified as an asbestos professional with experience in the survey, design, and construction management of asbestos remediation/removal projects. Tony has attained accreditation from the University of Wisconsin as a Total Building Commissioning Process Provider. He has completed many projects throughout the New England region. Tony is also a **LEED™** (Leadership in Energy and Environmental Design) Accredited Professional.

Work Related Experience

Cumston Hall Add/Reno, Monmouth, Maine
Colby College Alumni/Development Center, Mechanical Systems Commissioning, Waterville, Maine
Hitchner Hall, Aubert Hall, and the Global Sciences Building Commissioning of Mechanical/Electrical Systems, University of Maine, Orono, ME
MDOT, Woodland and Sedgewick, Maine
Maine Neurological Associates, Portland, ME
The Jackson Lab, Bar Harbor, Maine
New Residence Hall Commissioning, University of Maine, Farmington, Maine

Pratt & Whitney, No. Berwick, Maine
Systems Commissioning, Kennebunk Elementary School, Kennebunk, Maine
Maine State Housing Authority, 353 Water Street, LEED Consulting/Systems Commissioning, Augusta, Maine
Kaler & Small Elementary Schools, South Portland, Maine
Eyecare Medical Group, Portland, Maine
Topsham Public Library, Topsham, Maine
USPS Facilities, Maine and New Hampshire
Windham Sand/Salt Building, Windham, ME

Education, Registration, and Affiliation

University of Maine - B.S. in Mechanical Engineering - 1988
Registered Professional Engineer – ME, NH, and MA
VFA Facilities/Infrastructure Certification Program
Hazard Communication Program - 1990 - Maine Labor Group on Health
Lead Abatement Training - 1994 - University of MASS
Registered Asbestos Inspector - ME - AI-0040
Registered Asbestos Design Consultant - ME - DC-0067
Registered Asbestos Management Planner - ME - MP - 0079
Member - American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
Member - Maine Indoor Air Quality Council
Member - National Fire Protection Association (NFPA)
Member – Building Commissioning Association (BCA)
Accredited Total Building Commissioning Process Provider, University of Wisconsin
LEED™ (Leadership in Energy and Environmental Design) Accredited Professional

Employment History

2000 – Present **Allied Engineering** - Mechanical Engineer, Associate
1999 – 2000 **Allied Engineering** - Chief Mechanical Engineer
1988 – 1999 **Allied Engineering** - Mechanical Engineer

Allied Engineering
Structural Mechanical Electrical Commissioning

CATHERINE A. FAUCHER, P.E., LEED™ AP

Principal in Charge of Electrical Engineering

Catherine A. Faucher P.E., Chief Electrical Engineer, in addition to her experience in new construction and renovations for power supply and distribution, lighting and system controls, has been heavily involved in the design of Technology Systems. This specialized area concentrates on the design of data/voice and other lower voltage wiring and components. Ms. Faucher has attended numerous courses and seminars in this field and supervises technical staff with RCDD credentials. Cathy is also a **LEED™** (Leadership in Energy and Environmental Design) Accredited Professional.

Work Related Experience

University Healthcare, Saco, ME
Rumford Hospital, Rumford, ME
St. Mary's Hospital, Lewiston, ME – Renovation of a 7,300-SF Intensive Care Unit
Farnsworth Art Museum, Rockland, ME
Poland Middle/High School, Poland, ME
UNE Library, Westbrook College, Portland, ME

Garland Manufacturing Addition, Saco, ME
U.S. Postal Service, ME and NH
UNE Library, Westbrook College, Portland, ME
National Consular Visa & Passport Processing Centers, Portsmouth, NH

Saddleback Lodge, Rangeley, ME
Berklee College of Music, Boston, MA
Brighton Medical Center, Portland, ME

Cumston Hall Add/Reno, Monmouth, ME
Maine Correctional Center, Windham, ME
Central Maine Medical Center, Lewiston, ME – new Marconi CT scanner
Thomas College Auditorium, Waterville, ME
Portsmouth Naval Shipyard, Kittery, ME
Sentry Commons, Kittery, ME
United Technologies/Pratt & Whitney, South Berwick, ME

Education, Registration, and Affiliation

University of Maine - Orono - B.S. Electrical Engineering - 1987
Registered Professional Electrical Engineer - ME, NH, MA, and RI
Institute of Electric and Electronics (IEEE)
National Association of Electrical Inspectors
Illuminating Engineering Society (IES)
LEED™ (Leadership in Energy and Environmental Design) Accredited Professional

Employment History

1996 – Present **Allied Engineering.** - Principal in Charge of Electrical Engineering
1995 – 1996 TMP Consulting Engineers - Project Engineer
1993 – 1995 SMRT - Electrical Engineer
1988 – 1993 Oak Point Associates - Electrical Engineer
1987 – 1988 Factory Mutual Engineering - Field Engineer

DMJM Harris is a national leader in rail and transit projects. The firm employs nearly 2,000 professional and technical staff and provides a full range of services from the conceptual phases through completion for transit, railroad and intermodal projects. As the flagship transportation company of AECOM Technology Corporation, DMJM Harris was largely responsible for the firm's number one ranking by Engineering News-Record in the fields of transportation and transit and rail projects in- the United States.

DMJM Harris's services include project/program management, planning, funding assistance, liaison with government agencies, conceptual/schematic design, preliminary engineering, final design, construction management, and operations support for transit and rail development projects. The firm also has extensive experience in achieving compliance with national and local environmental statutes including the National Environmental Policy Act (NEPA). DMJM Harris also is a recognized expert in Federal Transit Administration (FTA) requirements and standards and has provided consulting services to the FTA to assist transit agencies in understanding the process for achieving federal funding approval.

The DMJM Harris Team has unsurpassed qualifications in the development, evaluation and implementation of intermodal centers and bus maintenance facilities. We also have significant expertise in transportation planning, master planning, environmental planning, market analysis, architectural and engineering design, public participation, public private partnerships and finance. Our understand how each project element integrates with each other and how to develop these projects within the complex environmental, regulatory, and public stakeholder environments and long-standing relationships with Maine DOT, Acadia National Park, Federal Transit Administration and Federal Highway Administration will be invaluable to the success of this project.

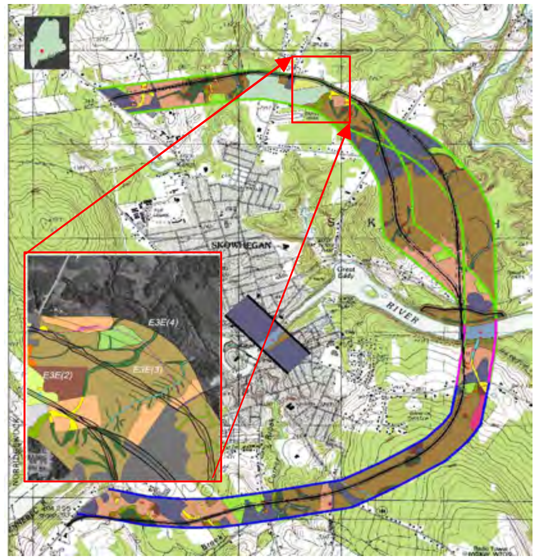
DMJM Harris' services include project/program management, planning, funding assistance, liaison with government agencies, conceptual/schematic design, preliminary engineering, final design, construction management, and operations support for transit and rail development projects. The firm also has extensive experience in achieving compliance with national and local environmental statutes including the National Environmental Policy Act (NEPA) for numerous projects large-scale transit projects such as the WMATA Dulles Corridor Rapid Transit Project and Tren Urbano in San Juan, PR where we achieved a ROD in a record 18-months. DMJM Harris also is a recognized expert in Federal Transit Administration (FTA) requirements and standards and has provided consulting services to the FTA to assist transit agencies in understanding the process for achieving federal funding approval.

Park City Transportation Plan/Intermodal Centers, Park City, UT

DMJM Harris provided planning services for short- and long-range transportation plans for Park City, Utah with a particular focus on the 2002 Winter Olympics, and the **planning and architectural design of an intermodal transportation center** in Park City, Utah. The planning concept entailed an intermodal approach to Park City's transportation system and incorporated four separate transportation centers with differing operational and functional purposes. The primary transportation center developed by DMJM Harris was built in Park City's Historic Old Town, and includes **bus and van platforms,** airline and car rental facilities**, transit supportive retail, a Park City 2002 Winter Olympics Visitor Center,** and the Park City Police Station**.** The facility also includes **transit operations and support spaces,** and a 200-car parking garage.

This facility was designed to sensitively respond to the scale and architectural character of the historic old mining town, and enhance pedestrian connections to the historic Main Street, making the transit facility a focal point within the community. DMJM Harris prepared an **Environmental Assessment (EA)** under **National Environmental Policy Act and FTA regulations,** and our design considerations and analyses resulted in a **Finding of No Significant Impact (FONSI)** designation for the main intermodal hub. This was integral in expediting facility construction and advancing Park City's short- and long-term transportation program needs for the 2002 Winter Olympics.

Skowhegan Transportation Study and Environmental Assessment, Maine Department of Transportation, Skowhegan, ME

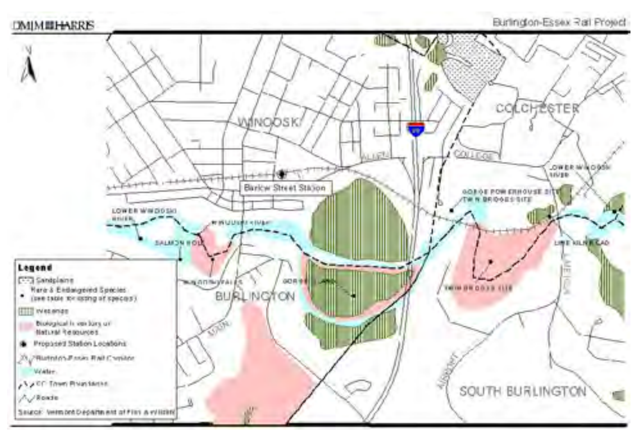


DMJM Harris is providing the alternatives analysis, conceptual design and **Environmental Assessment (EA**) for a new highway segment around downtown Skowhegan, Maine that includes a major river crossing. Downtown Skowhegan is currently the crossroads for Maine State Routes 2 and 201, as well as other major roadways. Significant volumes (including a large number of trucks), and the existing roadway configuration contribute to heavy congestion and unsafe conditions. DMJM Harris evaluated a number of alternatives that would provide an alternative river crossing that connects the major State Routes, but that avoids the restrictive downtown roadway network. This would allow truck and through traffic to navigate through the area safely and efficiently, while providing greater access for downtown traffic. Once a preferred alternative is selected, DMJM Harris will complete an Environmental Assessment in accordance with the **National Environmental Policy Act (NEPA).** Throughout the process DMJM Harris worked closely with a Public Advisory Committee.

Merrimack Valley Regional Transit Authority (MVRTA). Lawrence Transportation Center, Lawrence, MA

DMJM Harris provided MVRTA with comprehensive **master planning**, design, project finance, and construction phase services for the **intermodal Lawrence Transportation Center**, and produced the federal (**NEPA**) and state (MEPA) environmental compliance documents leading to a successful environmental compliance process, with **FTA** serving as the lead federal Agency. Located just south of downtown Lawrence, this project combines a new commuter rail station, a 900-car multi-use park-and-ride garage, a bus terminal, and other transit services, such as paratransit and airport shuttles. DMJM Harris identified the site that best combined transit and economic development benefits, and devised a complex site assembly strategy involving a mill owner and the region's major electric utility. DMJM Harris worked with MVRTA to secure funding from several state and local sources, and to issue a Parking Revenue Bond which completed the finance package. The facility is scheduled to open in late 2005.

Chittenden County MPO/ Vermont Agency of Transportation, Burlington to Essex Rail Project, VT

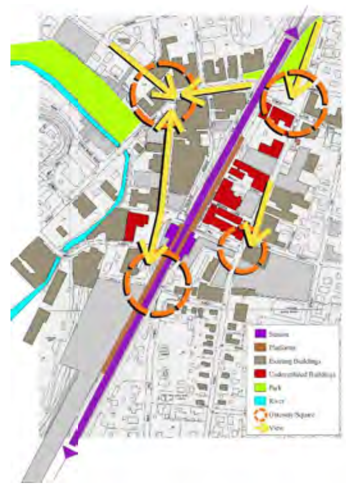


DMJM Harris prepared an **Environmental Assessment (EA)** and provided project development and schematic design for improvements to the eight-mile Winooski Branch freight line to provide for commuter rail service, five new stations and associated feeder bus service. Services included development of alternative track alignments to accommodate freight and passenger operations, while avoiding wetland impacts; and conceptual design and operational analysis of improvements to highway-rail grade crossings to allow development of a "quiet zone" in accordance with Federal Railroad Administration (FRA) waiver requirements. In addition, the project developed stabilization concepts for rehabilitation of an historic 160-year old brick arch railroad tunnel that were approved by the State Historic Preservation Officer. **The EA was**

completed on a fast-track schedule within 5 months, and was granted a FONSI by FTA.

Merrimack Valley Regional Transit Authority (MVRTA), Transit Station at Washington Square, Haverhill, MA –

DMJM Harris is providing Architectural and Site Design services to renovate an existing Transit Station building and improve site layout. The existing station building will be renovated and expanded to include a **new Visitor Center and conference/meeting space, as well as transit operations.** The building is on the National Register of Historic Places, and architectural design will conform to historical considerations. The site layout will be improved to add to the existing bus berth capacity, maintain public parking and provide a pedestrian link to a new waterfront walkway. DMJM Harris was responsible for preparing all **NEPA** and MEPA compliance documents, with **FTA serving as the lead federal agency**.



Greater Attleboro Taunton Regional Transit Authority (GATRA), Attleboro Intermodal Transit Center, Attleboro, MA

DMJM Harris assisted GATRA with a **master plan, conceptual engineering, environmental compliance** and **financial planning** for an **intermodal facility,** consisting of a bus terminal and 760-space parking facility integrated with a four-story mixed use Transit-Oriented Development consisting of ground floor retail with residential units above, located adjacent to an existing MBTA commuter rail station. The project will require MEPA compliance, preparation of an **Environmental Assessment under FTA NEPA guidelines**, and compliance with Section 4(f)/106 due to historic resource impact issues. Work completed to date includes an Expanded Environmental Notification Form that included a traffic impact analysis, and an historic resources assessment survey. DMJM Harris obtained a Phase I MEPA waiver allowing the Urban Renewal Plan to be approved prior to completion of environmental documentation, as well as approval for a Single Environmental Impact Report, thereby reducing the time required to obtain environmental clearances.

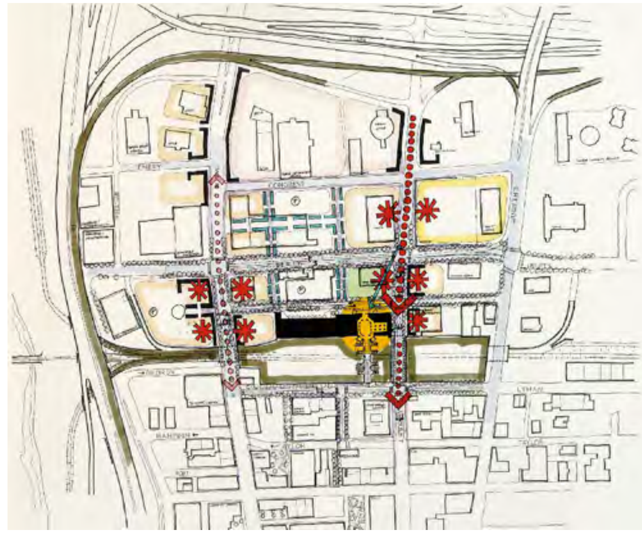
Massachusetts Bay Transit Authority/Amtrak, Route 128 Intermodal Facility, Dedham / Westwood, MA

DMJM Harris was Prime consultant for this new **intermodal** facility located in suburban Boston that was developed as a design, build, operate, and maintain (DBOM) project. The new facility incorporates **intermodal activities and operations, including, bus, commuter rail, and Amtrak functions**. The existing 2,800 sq. ft. station was replaced with a new 27,000 sq. ft., three-level facility with separate waiting areas for MBTA commuter rail and Amtrak passengers, a pedestrian overpass, and new high level platforms with canopies. A new 2,670 car garage was constructed to replace the 803 car surface parking lot. **The project was constructed in phases** to allow the station and high level platforms to be ready for Amtrak's inauguration of high speed Amtrak Acela service.

The project is located within a State designated Area of Critical Environmental Concern, as well as the Zone II of the aquifer for the Dedham-Westwood Water District. The drainage system was designed to address both the quality and quantity of the stormwater runoff to protect these critical resources in compliance with the State's Stormwater Management Policy. An extensive community outreach process was also undertaken to address local concerns about traffic, water quality, and other design issues. A combined Environmental Impact Report/**Environmental Assessment (EA)** was prepared to comply with both the State MEPA and **Federal NEPA** processes, **with a Phase I MEPA waiver and a FONSI granted to allow the station and platform construction to proceed on a fast track schedule.**

Pioneer Valley Transit Authority (PVTA) Union Station Intermodal Redevelopment Project, Springfield, MA

DMJM Harris provided program management; **master planning**; development services; **NEPA** and MEPA compliance; and, architecture and engineering design for the redevelopment of the historic Union Station in Springfield, Massachusetts into an **Intermodal** Center that will accommodate local transit, paratransit, parking and drop-off, and inter-city bus and Amtrak services integrated with private commercial development. We successfully managed the environmental compliance process, by preparing a combined **Environmental Assessment (EA**) / Environmental Impact Report to comply with **NEPA** and MEPA. The project was particularly complex given the need to weigh the transportation alternatives against the historic considerations of this National Register of Historic Places resource and compliance with Section 106 of the National Historic Preservation Act of 1966 and Section 4(f) of the Department of Transportation Act of 1966. **The project was granted a FONSI by the Federal Transit Administration**.



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Henderson Intermodal Transit Hub, Las Vegas, NV

DMJM Harris provided planning, site selection, architectural, site concept design and on **Environmental Assessment (EA)** for a 27-bus intermodal bus transfer station in suburban Las Vegas. The project included a 30,000 square foot bus station, berths for approximately 27 buses, transit supportive retail, administration operations space, gaming, parking for approximately 150 cars, and other transit supportive uses. The project will also include a CNG and diesel fueling station.

Terry Rookard, RA

Vice President/Principal Architect

Education

M.Arch., Ohio State University, Columbus, OH, 1981
BS, Architecture, Ohio State University, Columbus, OH, 1980
Architectural Studies, Boston Architectural Center, Boston, MA, 1976-78
Creative Arts Studies, Ramapo College of New Jersey, Mahwah, NJ, 1973-75

Professional Registrations

Registered Architect, MA, #6012, 1984
Registered Architect, NY, #027541-1, 1999
Registered Architect, MD, #10502, 1996
Registered Architect, NJ, #13631, 1996
Registered Architect, PA, #014887-B, 1996
Registered Architect, UT, #344830301, 1997
Registered Architect, TN, #102857, 2004
Registered Architect, ME, #3308, 2007
NCARB, #33,038

Awards

AIA Medal for General Excellence in Architecture/Urban Design, Ohio State University, 1982
Foundation Scholarship, Architect's Society of Ohio, 1981
Department of Architecture Faculty Prize, Ohio State University, 1981
Department of Architecture Scholarship, Ohio State University, 1980
Clarence Tabor Memorial Scholarship, Architects League of New Jersey, 1979
Urban Design & Planning Award, *Progressive Architecture* magazine, 1986

Experience Summary

Mr. Rookard is an Architect and Project Manager with more than 25 years of professional experience. Terry is a Principal Architect and Vice President with DMJM Harris, and has extensive experience leading, managing and designing aviation and transit facilities. He has lead the efforts for airport and rail passenger terminal planning and design, as well as related security initiatives including passenger screening checkpoints, security assessments, access controls, command and control centers, terminal hardening and in-line baggage screening systems.

Terry has significant experience working in the airport environment, and has been successfully leading a wide range of projects in the aviation business for over fifteen years. Other transportation facilities that Terry has worked included intermodal centers, parking garages, railroad terminals and bus stations.

Terry was the Project Manager and Design Director for Logan Airport's award-winning $146 million In-Line Baggage Screening System. This was a fast-track A/E Design / CM project that accomplished in twelve months what would normally take about 3 years. Terry lead and integrated the efforts of 12 subconsultants and nearly 100 professional staff in order to accomplish this effort on time for the TSA-mandated deadline, and worked in close collaboration with the project CM. This includes the design, integration and construction of over 2.5 miles of automated baggage handling systems to incorporate 100% In-Line baggage screening in 13 separate locations around the airport.

Before joining DMJM Harris, Mr. Rookard was one of the founding principals of Hopkinson & Partners, a design and planning firm focusing on a variety of project types, including airport design and master planning. He was also a Senior Associate with the multi-disciplinary firm of Sasaki Associates, Inc., where he designed and managed large-scale urban design, corporate/commercial, and mixed-use development projects.

Prior to joining Sasaki Associates, Mr. Rookard worked in the Boston office of Skidmore, Owings & Merrill, where he was involved in a wide range of urban design and architectural projects. During this time, he was Project Designer on the comprehensive master plan for Northwest Frontier Province Agricultural University in Pakistan, winner of the prestigious award from *Progressive Architecture* magazine.

Transportation – Airport Projects

Terminal E Baggage Handling Improvements, Logan International Airport, East Boston, MA. Project Director for the improvement of baggage operations at the international terminal at Logan International Airport. The project includes the renovation of the North Baggage Room and the replacement of a single outbound baggage conveyor with two smaller carousels, tag reader and diverter.
Also included is the upgrade of lighting, wall and device guardrail protection, code compliance upgrades and new finishes. West Baggage Room improvements include the addition of a fifth outbound make-up conveyor on the ramp outside the bag room and an additional fifth conveyor feed tying into the existing baggage

system. To protect the new outdoor conveyor, a new building canopy is being constructed to architecturally blend with the existing terminal design. Lighting and radiant heat are being included. Particular challenges of this addition is the routing of new conveyor feeds through existing building mechanical systems and the existing baggage system. (2008)

TOPSC2, Atlantic City International Airport, Atlantic City, NJ. Project Director and planner for a combined Airport Rescue and Fire Fighting facility, State Police substation, airport operations, regional traffic operations and county-wide 911 dispatch center, and an emergency operations center. The ARFF, locate in the west wing, includes the programming and planning of eight apparatus bays, apparatus and firefighting support facilities, living accommodations for 30 firefighters, and operations offices and support. Adjacent to the ARFF, and centrally located in the facility, an airport State Police substation is strategically positioned to provide police access to all areas of airport property quickly. Also collocated with the police substation is airport operations including ground control, access control, a badging office and training facility. Located in a wing east of and adjacent to the State Police is a regional traffic operations center and emergency management facility. The regional traffic operations facility includes a county-wide 911 dispatch center, a large video wall providing live monitoring and situational awareness, ITS, traffic signal ops, and IT network support. Strategically located and sharing a large video wall with traffic ops, a regional emergency operations center is equipped to provide live monitoring and situational awareness to rapidly respond and manage regional emergency situations. (2008)

Logan International Airport, Terminal E Improvements and Airline Relocation, East Boston, MA . Project Director for the planning and design of a terminal expansion and renovation at Logan's Terminal E to accommodate Northwest Airlines outbound operations. The program includes a major terminal expansion of approximately 40,000 SF of new and 60,000 SF of renovated area. The expansion incorporates 5 departure lounges, new retail concessions, a new expanded passenger security checkpoint, a NWA First Class Club and ATO space for air carrier operations. This is a fast-track, multiple bid packages and CM at Risk procurement and implementation process. The estimated total program cost is approximately $13 Million. DMJM Harris is providing full-service A/E as well as Program Management Services to manage the CM at Risk implementation process. (2008 - 2009)

Atlantic City International Airport Terminal Expansion and Renovations, Atlantic City, NJ. . Project Director for the terminal expansion of the Atlantic City International Airport. The expansion will incorporate about 70,000 SF of new space on two levels, including 2 new gates and jetbridges, a mini FIS, expansion of the Bag Claim area, expanded Meeter Greeter area and new retail concessions. DMJM is providing full A/E services including all design disciplines. (2008-2009)

Logan International Airport, Access Controls Upgrade, East Boston, MA . Project Manager for the design of a new Access Control System for all Logan Airport Facilities. The new ACS System includes the planning and design for state-of-the-art upgrades incorporating a new head-end, IP based digital Network Backbone, integrated alarm activated CCTV and video management system, PIN pads and proximity card readers, smart cards and biometric devices at all secured portals throughout the airport. (2005 – 2007)

Terry Rookard

PHL Terminal A East In-Line Bag Screening Concept Design
Philadelphia International Airport, Philadelphia, PA
Technical Director and Lead Architect for the preparation of Planning and Concept Design for PHL Terminal A East. Includes all planning and the development of alternative concepts for new in-line EDS system. (2006 – 2008)

Westfield Development LLC, Terminal C Concessions Development
Logan International Airport, East Boston, MA
Technical Director and Officer in Charge of the design and implementation of Retail Concessions upgrades to Logan Airport's Terminal C. Full A/E services are being provided. (2006 – 2007)

Logan International Airport, Terminal B Architectural Upgrades, East Boston, MA. Officer-In-Charge and Lead Designer for immediate upgrades to the floor finishes in Terminal B, Pier A American Airlines terminal. The project involves the replacement of existing floor finishes with high-end terrazzo in the public circulation areas and new carpet in the departure lounges. (2005 – 2007)

Manchester-Boston Regional Airport, Consolidate Car Rental Facility and Parking Garage Expansion, City of Manchester, Manchester, NH. Officer-In-Charge and Lead Designer for the design and engineering of a new consolidated car rental facility at MHT. The project includes full A/E services for expanding the existing parking garage to accommodate and 3,000 car CONRAC facility. (2006 – 2008)

Manchester-Boston Regional Airport, Parking Blast Analysis, City of Manchester, Manchester, NH. Officer-In-Charge and Technical Director for the evaluation of potential blasts within the three 300' Rule, and the preparation of documents including a BIPP for submission to the TSA in order to gain a waiver for parking within 300 feet of the terminal building. (2007)

FLL Security Systems and Available Technologies
Fort Lauderdale-Hollywood International Airport, Fort Lauderdale, FL
Project Manager and Technical Director for the preparation of an evaluation of technologies available for security systems. Responsible for the evaluation and recommendation of available and emerging technologies for Access Controls, CCTV Systems, Perimeter Intrusion Detection Systems, Video Analytics, Vehicle Entrance Gates. (2006 - 2007)

FLL Airport Security Action Program
Fort Lauderdale-Hollywood International Airport, Fort Lauderdale, FL
Project Manager and Technical Director for the preparation of an airport-wide security master plan. The plan addresses specific security threats and vulnerabilities at the airport. Security systems include Access Controls, PIDS, IP Based CCTV integrated with ACS, Passenger Security Checkpoints, Baggage Systems, Training Programs, and the review and updating of the Airport ASP. (2006 - 2007)

San Juan Seaport 4Ci Command and Control Center, San Juan, Puerto Rico. Project Manager for the design of a new Command, Control, Communication and Coordination (4Ci) Center for the Puerto Rico Ports Authority. This facility is a state of the art Command Center that will house security systems and personnel to control and monitor CCTV and vessel tracking in the Bay of San Juan. (2005 – 2007)

Terry Rookard

Logan International Airport, Terminal Security Enhancement Program, East Boston, MA. Officer-In-Charge and Design Coordinator for immediate security enhancements as a result of the September 11, 2001 terrorist attack and in response to the S.1447 Aviation and Transportation Security Act of Congress. Security upgrades included access controls, terminal hardening and security upgrades, CCTV systems and passenger screening checkpoints. (2001 – 2003)

Luis Munoz Marin International Airport Security Upgrades, San Juan, Puerto Rico. Project Manager and Design Director for security infrastructure upgrades to SJU Terminals A, C and C. Program elements include new and improved access control system incorporating biometrics and badging equipment, re-designed security and employee checkpoints, blast analysis and BIPP, perimeter security including intrusion detection and CCTV, a new C4i control center and CCTV monitoring throughout the terminals. (2004 – 2005)

Luis Munoz Marin International Airport, Terminal Blast Analysis, San Juan, Puerto Rico. Officer-In-Charge and Technical Director for the evaluation of potential blasts within the three 300' Rule, and the preparation of documents including a BIPP for submission to the TSA in order to gain a waiver for parking within 300 feet of the terminal building. (2005)

Bay of San Juan Security Enhancement Program, San Juan, Puerto Rico. Project Manager and design director for planning and design of security systems for the Puerto Rico Ports Authority and US Coast Guard. Project elements included VTS, CCTV surveillance, perimeter security, intrusion detection, biometric-based ACS and new vehicle entrance gates at both the cargo and passenger terminals. (2004 – 2005)

Logan Airport Terminal B American Airlines Passenger Screening Checkpoint, East Boston, MA. Terry was the Officer in Charge and Technical Director for the re-design and construction of a new consolidated passenger screening checkpoint at Logan's Terminal B for American Airlines. The checkpoint included the incorporation of 8 new lanes of passenger screening, incorporating the latest TSA standards as well as pilot programs for puffer machines and a trusted traveler lane. (2005 - 2006)

Logan International Airport Terminal B Pier A North-South Connector and Eagle Hold Room Renovations, East Boston, MA. Officer In Charge and Design Director for renovations to the American Eagle Departure Lounge including, floor and ceiling finishes, a re-located checkpoint and exit lane, toilet rooms and lighting. The project also included the re-configuration of AA's ATO to afford the opportunjity to create a passenger connector on the secure side between American Eagle and the main concourse. (2005 – 2006)

Logan International Airport 100% Baggage Screening, East Boston, MA. Project Manager for design of Logan's 100% Baggage Screening Program. Lead a multidisciplinary team of over 80 architects, engineers and construction specialists. Directed the efforts of 12 subconsultants in order to bring the project from concept to construction in 10 months to meet the Federal 12/31/02 baggage screening deadline. (2001 – 2002)

Fort Lauderdale / Hollywood International Airport, Ft, Lauderdale, FL. Design Director for Concept Design of 100% In-Line Baggage Screening at Ft. Lauderdale Airport's Terminals 1, 2 and 3. Scope of work included planning and concept design of in-line systems resulting in the preparation of a request for a LOI/MOU with the TSA for funding the system. The design incorporated 31 EDS machines in the three terminals, along with all of the required facility modifications to accommodate the TSA's program and support space. (2004)

Luis Munoz Marin International Airport 100% In-Line Baggage Screening, San Juan, Puerto Rico. Officer in Charge and Design Director for the planning and design of in-line baggage screening for the San Juan International Airport. The design includes over 40 in-line automated EDS machines in three terminals and 12 Level 3 xylon diffraction units integrated in-line. (2004)

Logan International Airport, Terminal B Satellite FIS, East Boston, MA. Project Manager and Design Director for a new international and domestic terminal at Logan Airport. The project included all planning and design of a 250,000 square foot passenger terminal on three levels. The program included 22 ticket counter positions, six gates and a Satellite FIS to process 800 passengers per hour for international arrivals. The project was slated to be one of the first LEEDs certified airport terminals in the US, gaining silver status. (2000 – 2003)

Massachusetts Port Authority (Massport), Logan 2000 Modernization Program, Boston - Logan International Airport, Boston, MA. Served as Design Manager and Project Planner/Architect in the planning and design of a people mover system for Boston - Logan International Airport. Participation included the design of seven elevated transit stations at the airport, as well as the guideway alignment and overall configuration and interface with the existing and proposed new terminals and pedestrian bridges at Logan. (1997 - 1999)

Massachusetts Port Authority (Massport), Boston - Logan International Airport ARFF Re-Use Study, East Boston, MA. Served as Project Manager and Project Planner for this study that explored possible alternatives for the re-use and renovation of the old Crash Fire Rescue Building at Boston - Logan International Airport. (1997)

Air Canada Cargo Facility, Logan International Airport, East Boston, MA. Officer in Charge for the design and engineering for the renovations of Air Canada's Air Cargo Processing facility at Logan. (2002)

Air Canada Terminal Renovations, Logan International Airport, East Boston, MA. Project Manager and OIC for the planning and design of Air Canada's relocation to Terminal C. Project included numerous options at Terminal D and ultimately a build-out at Terminal C. (2003)

AirTran Airways Ticket Counters and ATO Renovation, Logan International Airport, East Boston, MA. Officer in Charge for the design and engineering of AirTran's new and renovated terminal operations space at Logan's Terminal E. This project includes new ticket counters and kiosks, ATO space, inbound and outbound bag rooms. (2003)

Massachusetts Port Authority (Massport), Boston - Logan International Airport SW Service Area Master Plan, Boston, MA. Served as Design Manager and Project Planner/Architect for the master planning and preliminary design of a service area, to serve commuters and air cargo at Logan. (1997)

Massachusetts Port Authority (Massport), Boston - Logan International Airport Passenger Service Charrette, Boston, MA. Led week-long study sessions with airport staff to develop concepts to improve passenger service at the airport. (1997)

Terry Rookard

The Port Authority of New York and New Jersey (PANY&NJ), JFK Airport Access Program, People Mover System, JFK International Airport, Jamaica, NY. Served as Senior Planner and Architect in the design of 13 passenger stations for the proposed people mover system linking Manhattan with JFK and LaGuardia airports. (1990 – 1992)

Terminal One Group Association, Terminal One, JFK International Airport, Jamaica, NY. Served as Project Planner and Designer in the planning and design competition for this major new terminal project at JFK. Also responsible for airside planning and gate organization, terminal and concourse layout, and overall plan development. (1998)

Niagara Frontier Transportation Authority (NFTA), Greater Buffalo International Airport, Buffalo, NY. As Project Planner and Designer, prepared master planning and preliminary design for the $250 million reconstruction of the airport terminal. (1996 – 1997)

The Port Authority of New York and New Jersey (PANY&NJ), 1991 JFK Action Program, Jamaica, NY. Served as Project Planner and Designer in the 1991 JFK Action Program at JFK International Airport, and as Project Task Manager for the planning effort. As part of the JFK Redevelopment Program, this planning effort focused on developing a comprehensive program for short- and long-term capital improvements at JFK. Airport elements studied included passenger terminals, airport access and roadway circulation, taxiways and taxi lanes, aircraft parking and hardstands, parking garages, and all other airside, landside, and terminal components. (1991)

The Port Authority of New York and New Jersey (PANY&NJ), LaGuardia Airport Hangars 2/4 Development Concept, Flushing, NY. Served as Project Manager and Planner in the programming and design of alternative aviation uses based on input from the airline carriers, third-party operators, and client representatives. This effort focused on the analysis of redevelopment opportunities on the present Hangar 2/4 site and service cores. (1990)

The Port Authority of New York and New Jersey (PANY&NJ), JFK On-Airport AGT Alignment, Alternatives Analysis: Loop vs. Radial, Jamaica, NY. As Project Planner/Designer, evaluated the advantages and disadvantages of loop vs. radial AGT systems for the CTA at JFK. (1992)

Massachusetts Port Authority (Massport), Boston - Logan International Airport Edge Park Study, Boston, MA. Served as Design Manager and Project Planner/Architect for the planning and design of a buffer park to surround the property for Boston - Logan International Airport. Participation included the conceptual design of several parks at the airport, as well as the coordination with community groups for input into the parks configuration, and interface with the residential and commercial areas surrounding Logan. (1997)

South Jersey Transportation Authority (SJTA), Atlantic City International Airport Terminal Design and Master Plan, Atlantic City, NJ. Performed overall airport master planning and conceptual design for a new/expanded passenger terminal, including the development and evaluation of a wide range of alternatives for short- and long-range expansion of the terminal, airside, and landside facilities. (1997 – 1998)

Terry Rookard

South Jersey Transportation Authority (SJTA), Bader Field Master Plan and Verti-Port Study, Atlantic City, NJ. Served as Project Manager and Planner for the master planning and facility design for the airport, including the development and evaluation of a potential verti-port usage, and study of alternatives for short- and long-range expansion of the terminal and airside and landside facilities. (1997 – 1998)

South Jersey Transportation Authority (SJTA), On-Call A/E Services. Provided planning and design services for a range of studies including the design of a mini-FIS to accommodate international arrivals from Saudi Arabia, parking layouts and a possible new parking structure in front of the existing terminal. (1996)

South Jersey Transportation Authority (SJTA), ACY Terminal Design Documentation. Provided design and engineering services for the completion of the contract documents for the Passenger Terminal Expansion. (1996)

County of Mercer, Trenton-Mercer Airport, Terminal Enhancement Program, Scotch Road, West Trenton, NJ. As Project Manager, responsible for managing conceptual design and architectural services. The project work consists of full aviation planning, programming, conceptual design, environmental analysis, economic feasibility, and architectural and engineering services. Full-service architectural and engineering services include: Terminal Area Plan/Terminal Concept Design for the renovation and expansion of existing terminal; design modifications to existing terminal including interior renovations to Gate 2 departure lounge, refurbishment and installation of a used jetbridge, and the associated vertical circulation elements; preparation of a PCF application to the FAA; Economic Feasibility Study including the following three elements: environmental analyses (not assessment) heading towards a Categorical Exclusion; concept design for a totally new terminal; economic feasibility study comparing the renovation scheme to the new-build scheme, and plans for how to finance project; and, after decision is made to New-Build or Renovate, will implement entire project. (1996 – 1997)

Mercer County Department of Transportation and Infrastructure, Trenton-Mercer Airport Master Plan Study, Trenton, NJ. Participated in the planning and development of an update to the Master Plan for the Trenton-Mercer Airport. Responsible for the planning of the future new passenger terminal, and the associated airside and landside improvements over a 20-year planning horizon. Also responsible for the project's community participation program, and led the County's outreach efforts to solicit input on the project from the public. (1996 – 1997)

Mercer County Department of Transportation and Infrastructure, Trenton-Mercer Airport Terminal Enhancement Program, Trenton, NJ. Project Manager and Lead Architect/Aviation Planner for this multi-faceted terminal improvement program, which entails the planning and design of a new or renovated air carrier passenger terminal at the airport. The project revolves around the development of concepts to convert the existing old terminal into a modern, functional, and efficient air carrier facility meeting today's industry standards. Early planning and design work included the evaluation of a wide range of terminal improvement alternatives, as well as the possibility of constructing a totally new facility. The preferred plan involves the total rebuilding of the existing facility, including the design of all passenger terminal areas, airline and non-airline terminal areas, landside parking, passenger arrival/departure functions, and expanded aircraft apron and operating areas. Final design for this $10 million project will be complete in January 1999, and construction will be complete in the summer of 2000. (1998 – 1999)

Mercer County Department of Transportation and Infrastructure, Trenton-Mercer Airport Short-Term Terminal Renovations, Trenton, NJ. As Project Manager and Architect, responsible for a series of terminal renovations to accommodate the immediate, short-term needs of the facility's commercial air carrier. Terminal improvements included renovations to the passenger waiting area, and the installation of a refurbished passenger loading bridge onto the existing building. (1997 – 1998)

Mercer County Department of Transportation and Infrastructure, Trenton-Mercer Airport PFC Application, Trenton, NJ. As Project Manager and Aviation Planner, responsible for the preparation of the County's application to the FAA to impose and use a Passenger Facility Charge at the airport. Transportation – Parking Garages and Intermodal Centers. (1996 – 1998)

Transportation – Station and Intermodal Projects

Naval Station Roosevelt Roads Master Plan, Puerto Rico Ports Authority, Cieba, PR. Served as Officer In Charge and Lead Designer on the Master Plan for the Reuse of the former Naval Station Roosevelt Roads on the east coast of Puerto Rico. The program revolves around the relocation of the current Ferry Service from Fajardo to Cieba, which serves the islands of Vieques and Culebra.. The Master Plan calls for the re-development of 100 acres of prime and pristine waterfront and includes and new ferry terminal, a ferry maintenance facility, a mixed use development of retail, housing and a hotel, surface and structured parking, and a waterfront promenade, open spaces and infrastructure. The design is centered around the idea of creating a waterfront "village" that uses transportation as a catalyst for development. It incorporates transportation connections to key points within the region, including the former Navy Station Airport which will be incorporated into the plan for the whole site. The project contemplates that this will become a cruise ship home port in the future. (2006 – 2007)

NJ Transit (NJT), Broad Street Commuter Parking Garage, Summit, NJ. Served as Project Designer for this four-level, 600-car, commuter parking deck. This parking structure incorporated an architectural vocabulary that consisted of materials and architectural elements extracted from the local context. This successful project was designed "not to look like a garage, but to look like Summit". Led the design efforts for this project and was responsible for working with the design review committee in Summit. . (1995 – 1996)

Massachusetts Bay Transportation Authority (MBTA)/Amtrak, Route 128 Intermodal Facility, Westwood/Dedham, MA. Project Manager and Design Director for this new intermodal facility located in suburban Boston. The project is being developed as a design, build, operate, and maintain (DBOM) project. The project is composed of a 2,800-car parking garage, an MBTA commuter rail station, an Amtrak high-speed rail station, a pedestrian overpass, and new platforms and passenger facilities. The new facility incorporates intermodal activities and operations, including bus, commuter rail, and Amtrak functions. In addition, the facility accommodates kiss-and-ride, park-and-ride, and short- and long-term parking for commuters and passengers utilizing the future high-speed rail line to New York and Washington. As Prime Consultant, Harris provided complete architectural, project management, structural, environmental planning, community outreach, and civil engineering services, as members of a Design/Build team to Perini Corporation on behalf of the MBTA. (1997 – 1999)

Buffalo Airport Garage, Buffalo, NY. Project Designer/Design Manager for the 900-car garage at Buffalo International Airport. This parking garage was designed as three-levels, to reinforce the image for the new airport. In addition to structured parking, extensive layout and design for over 2,500 cars at grade was developed. (1995 – 1996)

Trenton Stadium Parking Garage, Trenton, NJ. Project Designer and Manager for an 1,100-car garage on four levels adjacent to the Trenton Waterfront Baseball Stadium. This project was part of the implementation of an overall master plan for Trenton's redeveloping historic waterfront area. The garage was planned to be built over existing surface parking lots, and construction techniques were used that built the structure in a horizontal fashion, one bay four stories high each. With this technique, it was possible to minimize disruption to existing parking over the duration of the construction. The garage was designed in a way that echoed the architectural flavor of the adjacent stadium and historic brick warehouse structures. (1996)

Dedham Galleria Garages, Dedham, MA. Project Designer/Planner for this mixed-use project in suburban Boston. It included structured parking for 5,000 cars, which were designed to blend into the natural environment of this heavily wooded hilltop site. (1995)

NJ Transit (NJT), Rutherford Station Commuter Parking Garage, Rutherford, NJ. Responsible for planning and design services for a new 3-level, 520-car garage to respond to increased demand for commuter parking across the street from the historic Rutherford Station. A variety of site planning and massing options were studied for siting a bank headquarters office building, housing, retail, and parking garage to assure a successful solution to urban design issues, traffic access, pedestrian circulation, passenger connections to the train station, and responsiveness to the surrounding community context, including Rutherford's central business district, and an adjacent single-family housing neighborhood. In addition, a transit-oriented day care center with a capacity for approximately 160 children, and pediatric medical offices are being incorporated into the design. Based on the preferred scheme for the development being undertaken by Rutherford Station Square Joint Development, DMJM Harris provided architectural schematic design studies for alternate garage massing, elevation studies, parking layouts, and perspective sketch studies for review at public meetings. As consultant to NJ Transit, DMJM Harris continues to provide environmental planning, architectural design services, and traffic studies on this project. (1999 – 2004)

Massachusetts Port Authority (Massport), Boston - Logan International Airport Consolidated Car Rental and Parking Facility Study, Boston, MA. Served as Project Planner/Architect for the master planning and preliminary design of new car rental areas, parking facilities, shuttle buses and bus routes,and off-airport parking access, to serve commuters at Logan. (1997)

The Keefe Company, Dedham Galleria Garages, Dedham, MA. Project Designer/ Planner for this mixed-use project in suburban Boston. It included structured parking for 5,000 cars, which were designed to blend into the natural environment of this heavily wooded hilltop site. (1995)

Terry Rookard

Post Office Square Parking Garage, Boston, MA. Project Designer and Urban Designer for this 7-level parking structure in the heart of downtown Boston. This 1,400-car garage was designed within a complex atmosphere of public opposition and community participation. (1991)

NJ Transit/Amtrak, New Metropark Station, Iselin, NJ. As Project Manager, responsible for managing the development of a design for the new station. The scope of work for this project is aimed at establishing a definitive design direction for the proposed new station. Design will be completed to a 15% Schematic Design Level for the purpose of soliciting competitive design services for final design. The new station will be designed and built to meet the near-term needs of both NJ TRANSIT and Amtrak. It is also being designed to not preclude the possibility of increased passenger volumes in the future, and to accommodate the possible addition of a passenger bridge spanning the tracks and the construction of a future center platform. (200 – 2002)

Park City Municipal Corporation, Park City Transportation Plan/Intermodal Centers, Park City, UT. Project Director and Principal Architect for the planning of short- and long-range transportation plans, the 2002 Winter Olympics, and the planning and architectural design of four intermodal transportation centers in Park City, Utah. The planning concept entailed a multi-nodal approach to Park City's transportation system and will incorporate four separate transportation centers with differing operational and functional purposes. The primary transportation center will be built in Park City's Historic Old Town, and will include bus and van platforms, airline and car rental facilities, transit supportive retail, a Park City 2002 Winter Olympics Visitor Center, and the Park City Police Station. The facility will also include transit operations, support spaces, and a 200-car parking garage. This facility was designed to sensitively respond to the scale and architectural character of the historic old mining town, and will enhance pedestrian connections to the historic Main Street, making the transit facility a focal point within the community. (1998 – 2000)

Southeastern Pennsylvania Transportation Authority (SEPTA), Chester Transportation Center Master Plan, Chester, PA. Served as Principal Planner and Project Designer for the planning, design, and community participation process for this intermodal center in the heart of downtown Chester, PA. The project included a bus and commuter rail station facility, and incorporates a mix of transit-supportive retail and community uses geared towards enhancing passenger convenience and increasing ridership. The expansion renovations to the existing facilities will transform the station into a focal point within the community, and stimulate economic development within the downtown Central Business District. The project was funded by the FTA as part of its Livable Communities Initiative. The project involved the planning and design of improvements to the station, based upon input from within the community, gathered through a series of community workshops and focus groups. (1999)

Southeastern Pennsylvania Transportation Authority (SEPTA), North Philadelphia Transportation Center, Philadelphia, PA. Served as Project Planner/Designer for the intermodal center, which is focused on functionally, visually, and operationally linking five existing transit nodes together, including bus, rail, and subway elements north of Center City, Philadelphia. Concepts for the Center incorporate improvements to transportation elements such as a bus transfer facility for passengers connecting to the Broad Street Subway, major renovations to the Broad Street Subway Station, and improved passenger amenities and streetscape enhancements to visually and functionally unite the transportation

Timothy vonAschwege, RA

Associate Vice President/Principal Architect

Education
BA, Architecture,
University of Nebraska at Lincoln,
Nebraska
1971

Professional Registrations
Registered Architect, IL, #0010009032,
1976

Experience Summary

Tim vonAschwege has 36 years of experience as a Project Architect and Designer. Since joining DMJM Harris he has participated as a Planner and Designer on several transportation and transit-oriented development, projects, including station design and station area development planning for the "VIVA" Bus Rapid Transit system in York Region, Ontario. His transit design experience also includes the Route 128 Intermodal Center (Westwood, Massachusetts), Metropark Station (Iselin, New Jersey), and the Rutherford, New Jersey, rail station and joint development project. Before joining DMJM Harris, he was a founding partner of Hopkinson & Partners, a design and planning firm focusing on a variety of project types, including airport design and master planning. Previously he was a Senior Associate with Sasaki Associates, Inc., where he was involved in a variety of corporate/commercial, residential, and mixed-use projects. He also spent 10 years with Skidmore, Owings & Merrill, where he was involved in high-rise office and housing projects, as well as hotel and institutional work.

Mr. vonAschwege has experience in a variety of international projects. While living in Iran, he was involved in the design of the 10,000-student Bou Ali Sina University, two new-town housing projects, and design of office, housing and public buildings. He has also worked on other office, hotel interiors, and housing projects in Singapore, Hong Kong, Saipan and Kathmandu.

Detailed Experience

Regional Municipality of York (Ontario), *VIVA* Rapid Transit System. Architectural designer and station planner for a four-corridor rapid transit system in Toronto's fast-growing northern suburbs. Conceived explicitly as a land use/Smart Growth initiative, the system consists of high-end bus rapid transit, with key segments convertible to light rail if future conditions warrant. TOD strategies include joint development, coordinated transit and land use planning, and a development approval process intended to promote TOD and Smart Growth principles along the corridor.

VIVA 2A Operations and Maintenance Facility, York Region, York, Ontario, Canada. Architect and Urban Designer for conceptual plan studies for an Operations and Maintenance Facility at the hub of the York Region's new VIVA rapid transit system. This project includes O&M facilities for Bus Rapid Transit and Light Rail maintenance facilities and storage. A wide range of studies for this very constrained site include a variety of LRT track layouts and yard configurations, employee parking requirements, a major creek restoration and storm water management ponds, and opportunities for Transit Oriented Development. These studies have given priority to BRT and LRT maintenance and storage requirements, including storage for 250 buses and 50 light rail vehicles. Development opportunities for housing, commercial office, retail, and hotel are being explored to take optimal advantage of amenities offered by creek restoration, ponds, and adjacent open space, while the presence of public transit reduces on-site private parking demand.

Timothy vonAschwege

Massachusetts Bay Transportation Authority (MBTA) Silver Line III, Boston, MA. Architectural Discipline Leader for the third phase connecting Phase II, South Station, the South Boston waterfront, and Logan Airport, to the Phase 1 surface routes running from Dudley Square to Downtown. This Phase III work will contain a stacked-tunnel alignment from South Station to the Back Bay with two new stations - the first below Chinatown's Orange-Line station, and the second at Boylston Station connected to the Green-Line. The tunnels will initially accommodate electric low-floor BRT vehicles traveling in dedicated lanes, with possible future conversion to Light Rail Vehicles. Architectural elements consist of the two new underground stations and their connections to the existing subway system, ancillary support spaces, tunnel ventilation rooms, an underground traction-power substation, and associated surface elements – head houses for public access, ventilation structures, emergency egress, streetscape improvements, and landscape design.

Massachusetts Convention Center Authority, Springfield Civic Center, Springfield, MA. Member of program management team, composed of DMJM Harris and Gilbane on behalf of Massachusetts Convention Center Authority, to review technical documents and provide cost control measures during design and construction. Provided extensive detailed review of design drawings and specifications at 95% and 100% completion, and participated in a lengthy budget reconciliation process between designer cost consultants and Gilbane cost estimators to arrive at an agreed upon statement of costs for the facility. Ultimately, this process led to creative cost reduction design measures and value engineering of all building systems and design elements that brought the final revised building construction costs within an acceptable MCCA budget.

Massachusetts Bay Transportation Authority (MBTA)/Amtrak, Route 128 Intermodal Facility, Westwood/Dedham, MA. Architectural Designer for this new intermodal facility located in suburban Boston. The project was developed as a design, build, operate, and maintain (DBOM) project. The project is composed of a 2,800-car parking garage, an MBTA commuter rail station, an Amtrak high-speed rail station, a pedestrian overpass, and new platforms and passenger facilities. The new facility incorporates intermodal activities and operations, including bus, commuter rail, and Amtrak functions. In addition, the facility accommodates kiss-and-ride, park-and-ride, and short- and long-term parking for commuters and passengers utilizing the future high-speed rail line to New York and Washington. As Prime Consultant, DMJM Harris provided complete architectural, project management, structural, environmental planning, community outreach, and civil engineering services, as members of a Design/Build team to Perini Corporation on behalf of the MBTA and Amtrak.

Merrimack Valley Regional Transportation Authority (MRVTA), MVRTA Intermodal Station and Parking Garage, Lawrence, MA. Architectural Designer for a $23 million Parking Garage and Intermodal Center in downtown Lawrence, the project includes the design of a commuter rail station, a parking garage for 900 cars on 5 levels, a bus/intermodal station, police sub-station, transit-supportive retail, a community meeting room, and public green space. Located in an historic mill district, the street facades reflect the surrounding mill architecture while on trackside a contemporary face welcomes travelers to the city. Transit services include commuter rail, regional and local bus service, and airport shuttle buses.

Timothy vonAschwege

Greater Attleboro-Taunton Regional Transit Authority, Intermodal Parking Facility Project, Attleboro, MA. As Project Designer, responsible for directing alternatives design efforts associated with a proposed intermodal parking facility/mixed-use complex designed to address the growing need for bus/commuter rail facilities while supporting downtown revitalization efforts. Project also involves designing upgrades to existing commuter rail parking facilities to increase capacity, efficiency, and access.

NJ Transit/Amtrak, New Metropark Station, Iselin, NJ. As Project Designer, responsible for the development of a conceptual design for the new station. This project established a definitive design direction for the proposed new station. Full design services were provided. The new station was designed and will be built to meet the near-term needs of both NJ TRANSIT and Amtrak. It was also designed to not preclude the possibility of increased passenger volumes in the future, and to accommodate the possible addition of a passenger bridge spanning the tracks and the construction of a future center platform.

NJ Transit (NJT), Rutherford Station Garage and Joint Development, Rutherford, NJ. Provided planning and design services for a new 550-car garage to respond to increased demand for commuter parking across the street from the historic Rutherford Station. A variety of site planning and massing options were studied for siting a bank headquarters office building, housing, retail, and parking garage to assure a successful solution to urban design issues, traffic access, pedestrian circulation, and responsiveness to the surrounding community context, including an adjacent single-family housing neighborhood. Based on the preferred scheme for the development being undertaken by Rutherford Station Square Joint Development, Harris provided architectural schematic design studies for alternate garage massing, elevation studies, parking layouts, and perspective sketch studies for review at public meetings. As consultant to NJ Transit, Harris continues to provide architectural design services and traffic studies on this current project.

Park City Municipal Corporation, Park City Intermodal Centers and Parking Garage, Park City, UT. Project Designer for four intermodal centers and parking facilities in Park City, Utah for the 2002 Winter Olympics. The primary transportation center will be built in Park City's Historic Old Town, and will include bus and van platforms, airline and car rental facilities, transit supportive retail, a Park City 2002 Winter Olympics Visitor Center, and the Park City Police Station. The facility will also include transit operations, support spaces, and a 300-car parking garage on three levels.

NJ Transit (NJT), Broad Street Commuter Parking Garage, Summit, NJ. Participated as one of the Project Designers for this four-level, 600-car commuter parking deck.This parking structure incorporated an architectural vocabulary that consisted of materials and architectural elements extracted from the local setting. This successful project is designed "not to look like a garage, but to look like historic structures in the town of Summit".

Massachusetts Port Authority (Massport), Boston - Logan International Airport Station/ Government Center Transportation Center, Boston, MA. As Project Designer, created a new commuter rail station at Government Center in downtown Boston, linking the station directly with Boston - Logan International Airport via the Massachusetts Bay Transportation Authority's Blue Line. The Transportation Center is conceived as an "Airport Station" and will include program elements for travel- and business-related services aimed at the traveling population.

nodes together. The project incorporated new functions and uses that meet the needs of the community, and encourage increased ridership, including a new passenger service center and a town watch space/mini-police station. (1999)

Massachusetts Port Authority (Massport), Boston - Logan International Airport Station/Government Center Transportation Center, Boston, MA. Served as Project Manager and Project Planner for the development of design concepts to create a new commuter rail station at Government Center in Boston, linking the downtown directly with Boston - Logan International Airport via the MBTA's Blue Line. The Transportation Center is conceived as an "Airport Station" and will include elements for travel- and business-related services aimed at the traveling population. (1997)

Puerto Rico Department of Transportation and Public Works (PRDOT/DPW)/Puerto Rico Highway and Transportation Authority (PRHTA), Tren Urbano Rail System, San Juan, PR. Served as Design and Production Advisor on the new, heavy-rail transit system for the Commonwealth of Puerto Rico. This project includes the planning and preliminary design for the Phase 1 segment of the system, including 16 passenger stations and ten miles of track. Other Architecture, Urban Design, and Planning Projects. (1997)

Port Authority of San Diego, B Street Pier Cruise Ship Terminal and Office Building, San Diego, CA. Participated as Project Manager and Designer on the planning and preliminary design of two cruise ship terminals, a support office, and a ticketing building on San Diego's waterfront Pier B. (1995)

Retina Associates, Retina Opthamology Clinic, Boston, MA. Project Manager and Design Architect for the programming, planning and design of a new 20,000 sq. ft. eye clinic in Boston, Massachusetts. Project elements included waiting areas, exam rooms, emergency rooms, research laboratories and offices. (1994)

Cleveland Clinic, Cleveland Clinic Opthamology Center, Cleveland, Ohio. Project Manager and Design Principal for the design and development of a new 150,000 sq. ft. state-of-the-art eye clinic in Cleveland, Ohio. Activities included the planning, urban design, site design, programming and conceptual design for a new $45 million facility. Project elements included emergency room suites, outpatient clinic, exam rooms, research laboratories, teaching facilities, all support spaces, physician offices and administrative spaces. (1994)

Community Teamwork, Inc., Lowell Head Start Child Development Center, Lowell, MA. Project Manager for the design services of this comprehensive early childhood development center, including light-filled classrooms, gross motor skills play areas, health and teaching units, central kitchen, and administrative spaces. Concern for the children's sense of place informed the design imagery of rooms like houses, corridors like streets, and play areas like village squares. (1995)

Community Teamwork, Inc., Children's Village at the Mill, Lowell, MA. Served as Project Manager for the design and construction administration services for an 8,000-sq.-ft. day-care facility for toddlers and infants, with accessory teaching space, observation booths, and gross motor play areas. Provided construction administration for this facility, including value engineering, shop drawing review, review and approval of payments, change order review, preparation of punch lists and close-out, contractor claims evaluation and avoidance, and preparation of field reports and meeting minutes. (1996)

James G. Duncan, AICP

Vice President/Project Manager

Education

M.C.P., Environmental Planning and Design, University of Rhode Island, Kingston, RI, 1992

B.A., Urban Affairs, University of Rhode Island, Kingston, RI, 1990

Registrations

American Institute of Certified Planners

Presentations

1999, Rhode Island Department of Transportation: Transportation Equity Act for the 21st Century Summary, Providence, RI, March 1999.

1997, National Association of Environmental Professionals: Environmental Justice and Railroad Improvement Projects, Orlando, FL, May 1997.

1996, National Association of State Transportation Officials: Intermodal Efforts Toward Economic Development—Rhode Island Freight Rail Improvement Project, Providence, RI, June 1996.

Experience Summary

Mr. Duncan has 15 years of experience in transportation and environmental planning. During this time, he has served in project management and technical evaluation roles associated with corridor studies, feasibility studies, siting studies, Environmental Impact Statements and Assessments, Major Investment Studies, and design for rail, transit, highway, air, water, and intermodal transportation projects.

Detailed Experience

Maine Department of Transportation, Acadia Gateway Center, Trenton, ME. Project Manager responsible for preparing an alternatives analysis, master plan, conceptual design, business plan and Environmental Assessment for this proposed National Park Service visitors center, transit intermodal center, and bus maintenance, fueling, and storage facility associated with Acadia National Park in Bar Harbor, ME. The project is designed to reduce traffic congestion, increase operating efficiencies for the National Park Service and transit provider, and enhance the visitor's experience to the Park. This project was especially challenging given an expedited schedule and need to balance significant environmental site restrictions with project program needs.

Massachusetts Bay Transportation Authority, North Shore Transportation Improvements Project, Boston, MA. Project Manager responsible for preparing a Major Investment Study and Environmental Impact Statement associated with a project identifying and evaluating potential mobility improvements for the region north of Boston, Massachusetts. Project involves consideration of potential rapid transit, commuter rail, and bus alternatives for expanding the metropolitan transportation system. Project included complex regulatory coordination efforts to address how project rapid transit alternatives traversed sensitive environmental resources, as well as value engineering exercises to better position the project for Federal Transit Administration New Starts funding.

Makkah Western Gateway Project, Millennium Development Corporation, Mecca, Saudi Arabia. Project Manager for a transit feasibility study and conceptual design for a new 4.5 kilometer transportation and development corridor leading to the Haram in the Holy City of Mecca. Responsible for directing the alternatives analysis and conceptual engineering studies to determine mode type, alignment, and station locations for a major new 100,000 resident transportation and development gateway connecting a major interchange outside the City with a new activity center adjacent to the Holy City. Project presented unique demands and required creative solutions to address uncharacteristic peak flow periods and volumes associated with pilgrimage activities.

Greater Attleboro-Taunton Regional Transit Authority, Attleboro Intermodal Transportation Center Project, Attleboro, MA. Project Manager responsible for directing alternatives analysis, master planning, urban redevelopment, design, and public participation efforts associated with a proposed $50 million intermodal parking facility/mixed-use complex. Project was developed to address the growing need for bus/commuter rail facilities while supporting downtown revitalization efforts. Project also involves designing upgrades to existing commuter rail parking facilities to increase capacity, efficiency, and improve accessibility.

James Duncan

Puerto Rico Department of Transportation and Public Works (PRDOT/DPW)/Puerto Rico Highway and Transportation Authority (PRHTA), Tren Urbano Rail System, San Juan, PR. Environmental Planner responsible for technical analysis and document production for an Environmental Impact Statement evaluating a ten-mile, grade-separated, heavy rail system passing through 13 municipalities in the vicinity of San Juan. Also prepared Environmental Assessments for alignment alternatives, and developed construction mitigation documentation to assure contractor compliance with regulatory commitments.

Rhode Island Department of Transportation (RIDOT), Rhode Island Freight Rail Improvement Project, Quonset Point/Davisville to Central Falls, RI. Manager for the Final Environmental Impact Statement (EIS), studying the financial and environmental implications of a proposed $200 million rail project designed to provide for vertical and horizontal clearances necessary to support freight rail movements along a 22-mile section of Amtrak's Northeast Corridor main line in Rhode Island. The project was a critical transportation initiative designed to ensure adequate separation of rail operations between freight carriers and Amtrak's high-speed Acela service in order to preserve adequate service and schedule parameters for both users. Another important element was providing adequate clearance conditions to support the redevelopment of a former navy base as a high volume intermodal cargo port.

Federal Railroad Administration (FRA)/Volpe National Transportation Systems Center (VNTSC), Northeast Corridor Electrification Project, Environmental Impact Statement/Report (EIS/R), New Haven, CT and Boston, MA. Environmental Planner responsible for the preparation of EIS/R technical evaluations for the proposed $1.8 billion Electrification of Amtrak's Northeast Corridor rail line between New Haven, CT and Boston, MA. Also prepared audits of project sites, and managed the geographic information system (GIS) and public participation processes.

Regional Transportation Commission of Clark County, Henderson Intermodal Transit Hub Environmental Assessment, Henderson, NV. Principal Planner responsible for the preparation of an Environmental Assessment (EA) evaluating the potential impacts of the construction and operation of an intermodal bus facility. The 20-bay facility with joint development, fueling, operations, employee, and public-use space, is an integral component of the Commission's program of improving transit service to keep pace with explosive population growth and reduce traffic congestion within the Las Vegas Valley.

Massachusetts Bay Transportation Authority (MBTA), North-South Rail Link, Major Investment Study (MIS)/Environmental Impact Statement (EIS)/Environmental Impact Report (EIR), Boston, MA. Senior Environmental Planner responsible for performing technical evaluations and subconsultant oversight for a MIS/EIS/EIR for a proposed $2 billion, three-mile rail tunnel connecting North and South Stations in Boston.

Park City Municipal Corporation, Park City Transportation Plan/Intermodal Centers, Park City, UT. Senior Environmental Planner responsible for the preparation of an Environmental Assessment evaluating the potential impacts of the construction and operation of an intermodal facility. This facility is part of the City's transportation improvements associated with the 2002 Winter Olympic Games, and includes bus, shuttle, taxi, and pedestrian operations. Also assisted in the development of transportation planning program elements associated with short-term intermodal improvements required for all local Olympic venues, and long-term plans necessary to support projected regional transportation network needs.

Process, hazardous materials remediation program, and Transit Operator Coordination Program.

Pioneer Valley Transit Authority (PVTA), Union Station Intermodal Redevelopment Project, Springfield, MA. Manager for a Federally mandated Environmental Assessment (EA) and State mandated Environmental Impact Report (EIR) evaluating a proposed $40 million intermodal project. This project involves identifying the potential environmental and transportation impacts of rehabilitating Springfield's vacant historic railroad station where intercity and local transit would be combined with existing train service and complemented by commercial and retail uses. The project is particularly complex given the need to weigh the transportation alternatives against the historic considerations of this National Register of Historic Places resource in accordance with Section 106 of the National Historic Preservation Act of 1966 and Section 4(f) of the Department of Transportation Act of 1966. Also managed Urban Renewal Plan Amendment

Massachusetts Port Authority (Massport)/Massachusetts Bay Transportation Authority (MBTA), Airport Intermodal Transit Connector Joint Vehicle Maintenance Facility Siting Study, Boston, MA. Senior Planner responsible for the preparation of a siting study identifying and evaluating alternative locations for a $12 million joint-agency bus maintenance facility complex.

Massachusetts Bay Transportation Authority (MBTA), Rehabilitation and Accessibility of Haverhill Station, Haverhill, MA. Senior Planner responsible for the preparation of an Environmental Notification Form (ENF) under 301 CMR 11.00 for the rehabilitation of a commuter rail station, including circulation and parking improvements, as well as station upgrades consistent with the Americans with Disabilities Act and local and national historic preservation guidelines.

Skowhegan Transportation Study, Maine Department of Transportation (MDOT), Skowhegan, Maine. Project Manager for an alternatives analysis, conceptual design, and Environmental Assessment associated with a new crossing over the Kennebec River in Skowhegan, Maine designed to alleviate traffic congestion and improve public safety. Project included identifying and evaluating downtown and circumferential options ranging from one-half to six miles in length designed to improve connectivity, safety, circulation, and create environmental benefits.

City of Concord, Concord 2020 Vision Project, Concord, NH. Project Manager responsible for directing technical evaluations associated with a transportation vision for the City of Concord, New Hampshire. The goal of the project is to identify ways to addresses existing traffic congestion while also planning for future traffic increases in the context of promoting economic development, maintaining access to the downtown, and protecting residential areas.

Massachusetts Highway Department (MassHighway), Conceptual Design and Feasibility Study for a New Route 6 Interchange, Barnstable, MA. Senior Planner responsible for the preparation of a technical feasibility study evaluating alternative interchange configurations designed to reduce traffic congestion and provide strategic access to local industrial development parcels, while limiting impacts to residential areas. Alternatives were analyzed relative to land use, environmental, circulation, and economic criteria.

Tri-Agency of Massachusetts Turnpike Authority (MTA), Boston Transportation Department (BTD), and Boston Redevelopment Authority (BRA), Boston Extension Ramps Feasibility Study, Boston, MA. Senior Planner responsible for the production of a technical feasibility study evaluating alternative ramp configurations to provide strategic access and egress points along sections of the Massachusetts Turnpike in Boston. Alternatives were analyzed relative to design and construction, environmental, urban design, and economic criteria.

Port Authority of Allegheny County, 2020 Vision Study, Pittsburgh, PA. Task Manager responsible for two studies focusing on the introduction of passenger ferry service in and around the Pittsburgh region. The first study evaluated the feasibility of, and identified ridership, physical, operational, and financial elements for a proposed passenger ferry service along the Monongahela River between downtown Pittsburgh and Homestead, PA. The second study identified potential areas for ferry stops within the nine county regional of the 2020 Vision study area along the Monongahela, Allegheny, and Ohio Rivers, and addressed potential solutions to overcoming physical barriers such as the lock and dam systems present along the waterways.

Maine Department of Transportation (MDOT), Office of Passenger Transportation, Three-Year Indefinite Quantity Contract, Marine Highway Waterfront Assessment, Statewide. Project Manager responsible for the preparation of the Marine Highway Waterfront Assessment, evaluating potential siting locations for proposed high-speed ferry service that would provide access to and link multiple tourist destinations and transportation modes along the Maine coast. The proposed project is an integral component of the State's Strategic Passenger Transportation Plan, designed to provide statewide connectivity between modes, promote transit and high occupancy vehicle travel, and reduce traffic congestion on roadways. Duties involved the development and implementation of alternative analysis and screening evaluations leading to final selection, conceptual plan preparation, and estimated costs for intermodal waterfront facilities and connections. Also provided assistance and input regarding the Biennial Transportation Improvement Program related to these items.

Rockland Intermodal Center, Maine Department of Transportation (MDOT), Rockland, Maine. Project Manager for an alternatives analysis, conceptual design, and Environmental Assessment associated with a marine intermodal center designed to support Maine DOT's "Marine Highway" system designed to provide a contiguous water transportation system to assist in diverting travelers from roadways to waterways. The Rockland facility would accommodate large international high-speed ferries, smaller state-wide high-speed ferries, and small cruise ships as well as customs support facilities, parking, and joint development elements.

United States Postal Service, Hovercraft Environmental Assessment, Bethel, AK. Principal Technical Evaluator for an Environmental Assessment evaluating the impacts of a two-year pilot program using hovercraft for mail delivery along the Alaskan river system.

Cranston Planning Department, Comprehensive Master Plan, Cranston, RI. Assistant Planner responsible for performing technical analyses for the City's comprehensive master plan and harbor management plan. These included conducting citywide land use, open space, and marine facility inventories, and performing research and preparing reports to be integrated into the main document. Also, managed the comprehensive plan public survey process and reporting.

Hadrian D. Millon, AICP

Associate Vice President/ Urban Design and Planning

Education
Master of Landscape Architecture
Harvard University Graduate School of Design, Cambridge, MA
1988
B.A., History-Tulane University, New Orleans, LA
1980

Registrations
American Institute of Certified Planners (AICP), #017765

Professional Affiliations
American Planning Association
American Soc. of Landscape Arch.

Experience Summary

Hadrian Millon has 19 years of professional experience in the planning, programming, design, and construction of complex public sector projects specializing in urban design for large-scale transit and transportation projects. Presently a member of the DMJM Harris planning and design team, he is currently involved in a variety of projects including master planning, transportation planning, and corridor design. Prior to joining DMJM Harris, Mr. Millon was the lead landscape architect for Boston's Central Artery/Tunnel Project, the largest urban transportation and infrastructure project in North America. He enjoyed eight years of experience with a state department of transportation where he managed planning, design, and review of landscape and environmental restoration projects. He has extensive experience with transit and transportation planning and design; corridor planning; and sustainable solutions for integrating transportation and land use.

Detailed Experience

Massachusetts Bay Transportation Authority (MBTA), Silver Line Phase III, Boston, MA. Provide pedestrian accessibility, streetscape design, and system-wide design guidelines for $750 million, New Starts, bus rapid transit project involving bus stop canopies, enhanced sidewalks, lighting, signage, and park restoration.

City of New Bedford/Massachusetts Highway Department, Route 18 Access Improvement Project, New Bedford, MA. A three-mile roadway and pedestrian access project conceived to recharacterize Route 18 as an integral part of the city fabric and to reconnect the downtown and the waterfront. Developed project concepts and alternatives analyses for roadways and intersections in response to stakeholder and client input; assisted the Project Team with the development of the long-term Master Plan. Developed final landscape and urban design plans.

Pioneer Valley Transit Authority (PVTA), Union Station Intermodal Redevelopment Project, Springfield, MA. Proposed $60 million intermodal project involving rehabilitation of Springfield's vacant historic railroad station where intercity and local transit will be combined with existing train service and complemented by commercial and retail uses. Developed neighborhood and station-area streetscape design concepts covering lighting, paving, and landscape architecture, rehabilitation concepts for adjacent structures, and participation in neighborhood public processes.

Greater Attleboro-Taunton Regional Transit Authority, Intermodal Facility Project, Attleboro, MA. Proposed intermodal parking facility/mixed-use/residential complex designed to address the growing need for bus/commuter rail facilities while supporting downtown revitalization efforts. Prepared urban design and landscape architectural concepts in support of the master plan.

Maine Department of Transportation (MDOT), Acadia Gateway Center, Master Plan and Environmental Assessment for the Office of Passenger Transportation, Augusta, ME. Master planning and site design services for a facility allowing day visitors and commuters to leave their cars and ride the *Island Explorer* propane-powered transit system through Bar Harbor and Acadia National Park. Master plan includes retail facilities, visitor and information center, parking, bus operations and maintenance facility, offices, and interpretive and nature trail system.

Judson R. Herter, AIA

Project Manager

Education
BA, Architecture
Ohio State University
1969

Registrations
Registered Architect –
Pennsylvania, 1978

Experience Summary

Mr. Herter serves as a Project Manager in the Transit Group. His responsibilities have included management of light rail transit station designs, preparation of maintenance facility studies; bus, rail, and public works maintenance and operational facility programming, flow studies and operations analysis; maintenance equipment selection, specifications, and plans; and architectural designing, detailing, and specification writing.

Mr. Herter has also been responsible for construction coordination and construction management on projects where he was not involved in the design process

Detailed Experience

<u>**Transit Maintenance and Operational Facilities**</u>

Midvale Garage, Philadelphia, Pennsylvania. Southeastern Pennsylvania Transportation Authority. Project Architect including flow studies, operational analysis, programming, building design, shop equipment, shop furnishings, and material handling/ parts storage, technical specifications and estimates.

Bus Maintenance, Vehicle Storage and Administrative Facility, State College, Pennsylvania. *Centre Area Transportation Authority.* Project Manager including site sizing requirements report, programming, directed architectural design and coordinated contact document preparation of all project disciplines.

Bus Maintenance, Vehicle Storage and Administrative Facility, Hartford, Connecticut. *Connecticut Department of Transportation.* Project Architect. Directed architectural design and coordinated contract document preparation of all building disciplines.

Garage Rehabilitation Facilities Study and Development, Pittsburgh, Pennsylvania. *Port Authority of Allegheny County.* Operations Analyst. Conducted needs interviews and compiled existing operations practices for five division garages.

South Hills Bus Garage, Pittsburgh, Pennsylvania. *Port Authority of Allegheny County.* Detailing and specifications writing.

Transit Garage/Office Facility, Raleigh, North Carolina. City of Raleigh. Project Architect including flow studies, architectural design, detailing, and specifications writing.

Bus Facility at University of Massachusetts/Amherst. Pioneer Valley Transit Authority. Maintenance Consultant including flow studies and maintenance equipment specifications.

Bus Maintenance, Vehicle Storage, and Administration Facility, Omaha, Nebraska. Metro Area Transit. Project Architect including programming, flow studies, operations analysis, maintenance equipment selection and specifications; architectural design, detailing and specifications writing

John J. Pesa, AIA, AICP, MBA

Massport Logan Office Center, Boston, MA. Architect for new addition for expansion of computer/data spaces and reconfiguration of office suites. Responsibilities include architectural and interdisciplinary design/engineering coordination.

Massport Logan Airport Access Control Project, Boston, MA. Architect for new computer/telcom-data spaces. Responsibilities include architectural and interdisciplinary design/engineering coordination.

Pittsburg International Airport, Pittsburgh, PA. Architect for new security checkpoint and office design

Prior to DMJM+HARRIS

Woods Hole Oceanographic Institution, Woods Hole, MA., 62,000 GSf, US $34M.design of a Marine Research and Biogeochemistry Research Laboratory Responsibilities include design of laboratories.

University of Florida, Gainsville, FA., 280,000 GSf, US $70M.design of a Cancer and Genetics Research Laboratory. Responsibilities include coordination and design of base building and laboratory design and coordination of all engineering disciplines.

University of Pennsylvania, Philadelphia, PA., 110,000 GSf, US $44M.design of a Life Sciences Research Facility. Responsibilities include coordination and design of base building and laboratory design and coordination of all engineering disciplines.

Project Manager–**The American University in Cairo, New Cairo, Egypt.,** 185,000GSM, US$200M.design of a liberal arts university campus in a newly planned city 30 kilometers east of Cairo. Prime Architect managerial function included: managing component architects, campus and specialty consultants, involving: reviewing contracts, preparing commercial terms, drafting plans for project execution, staffing, subcontracting, quality control, document control, communication, value engineering, setting major control line layout for the campus, designating parcel boundaries/scopes of work/cost models/budgets, prepare all reports for the Prime Architect, and a portion of the campus level technical coordination.

Project Manager/Architect – **InterNAP Collocation Facility, Atlanta, GA.** Responsibilities include leading design team and engineering consultants in the preparation of Contract Documents. Review existing conditions of leased space and coordinate all systems and disciplines. Review contracts and maintain aggressive paced schedule. Prepare and document project standards for future projects.

Project Manager/Architect - **Harvard University Graduate School of Business Administration - Mellon Hall Dormitory Renovation,** $9 million, Rehabilitation/ Restoration project. *Responsibilities*: Chief Designer, Managed all design and engineering disciplines, managed, scheduled, generated, and coordinated entire set of Design and Construction Contract Documents. Construction Administration responsibilities included: reviewing Construction layout, Contract proposals, preparing and documenting change orders, and reviewing Contractor's applications for payment. Maintained less than 1% in Architectural Change Orders.

Project Manager/Architect - **Dechert, Price, and Rhoades Law Offices** - tenant fit-out project. Renovation of office space located in Post Office Square, Boston MA

Project Manager/Architect - **Gillette Corporation** – designer of new corporate entrance and various tenant fit-out projects located in South Boston MA

Engineer - **Shirley Maximum Security Correctional Facility,** $95 million, design-build. *Responsibilities*: Construction administration, reviewing Contract Documents, preparing and documenting change orders, and reviewing subcontractor's applications for payment.

Engineer - **Reebok World Headquarters, Canton, MA,** $90 million, fast track, new construction. Core and shell project. *Responsibilities:* managing and scheduling subcontractors, detailing, coordination, and scheduling the "shell" (structural steel, architectural precast, and curtain-wall elements).

Job Captain - **EMC Corp "Einstein Project".** 700,000 s.f., $100 million, fast track, new construction project involving office space and high-bay manufacturing of computer hardware storage systems.

Job Captain - **Bell Atlantic Regional Systems Facility,** 45,000 s.f. new office building in Marlboro MA.

Job Captain - "**Villages at Hudson"** 125 unit, 55 and older housing development (master planning to Construction Documents) Hudson, Massachusetts.

Downtown 2005 Master plan- generated master-planning strategies synthesizing market analysis,
historical preservation analysis, recreation and open space plans.

Downtown Facade Improvement Project -designer for a facade renovation program.

Research, Development, and Implementation of Steep Slopes Zoning Overlay District Ordinance.

CMI - cash management information authorized operator for HUD's line of Credit Control system.

Project manager for a $5 million new Public Services, Park, Recreation and Forest Facility.
Responsibilities: reviewing architect's submissions of drawings, cost estimates, specifications of systems, materials and equipment. Also reviewed contractor's and schedules, submittals, applications and certificates for payment, and change orders.

Plan reviewer - provided technical analysis and staff support for Zoning Board of Appeals, City Council Special Permits, and the Historical Commission.

Master-plan Design staff member urban planning and design, preservation, and landscape architecture in an urban/historic fabric highlighting and linking canal ways, gate houses, locks, weirs, and mill structures.

John J. Pesa, AIA, AICP, MBA

Senior Architect/Planner

Education

MBA, 2001, Executive Program, Suffolk University, MA, 2001
BA, Roger Williams University, RI,1992
* AIA Accredited

Professional Associations

Registered Architect in the State of Massachusetts. Member of the *American Institute of Architects*.
Certified City Planner, Member of the *American Institute of City Planners* and *American Planning Association*.
Construction Supervisors License (*Unrestricted*) in the State of Massachusetts.
Registered Continuing Education Provider, *American Institute of Architects*

Experience Summary

Experience ranges from a variety of Architectural Design roles to Construction Management, Urban/City Planning/Zoning, to Landscape Architecture/ Civil Layout. Roles range from team leader, designer, contract and quality control reviewer to management and technical and design coordination of consultants as well as preparing and maintaining schedules, work plans, proposals, and budgets. Business Skills include financial modeling, general accounting, marketing, contracts, management and strategic analysis.

Detailed Experience

Seamans Center, Miami Port , FL- State of Florida Department of Transportation - Conceptual Design Architect for new 20,000 s.f. seamans center including: church, restaurant, gift shop, offices, storage and outdoor amenities such as swimming pool, tennis and basketball courts and parking facility.

Acadia Gateway Center, Trenton ME – Maine Department of Transportation – Concept and Schematic Design Architect for new 40,000 s.f. intermodal transportation and visitors center including: visitors center, exhibit space, theater, administrative offices, rest areas and bus station and maintenance facility. Exterior amenities include: plaza , courtyard spaces and a look out tower. Responsibilities include coordinating the building program with the building forms and developing the detailed exterior design character of the project.

Proposed Transit Village Development, Jersey City, New Jersey. Urban Designer/ Architect for a master plan proposal including a mid-density residential development with retail, a commuter rail station and parking structure.

Master Plan for the Maritime Area former Naval Station Roosevelt Roads, Puerto Rico Port Authority, Puerto Rico. Architect/Urban Planner for a maritime waterfront village, ferry operations/ inter modal center, with associated economic development research. Responsibilities include design and managerial functions of this interdisciplinary Master Plan project.

4CI Center (Command, Control, Communication, Coordination and Intelligence Center), Puerto Rico Port Authority, Puerto Rico. Architect for new 4CI Center Command and Control and MIS Data Center. This facility is a state of the art Command Center that houses security and communication systems for personnel to control and monitor CCTV and vessel tracking within the Port of San Juan. Ancillary spaces include conferencing facilities, emergency command center, offices, and personnel facilities. (2005 – 2007)

Massport Logan Terminal B Public Space Expansion, Boston, MA. Design Architect for new addition for retail/concessions and interior design for secure checkpoint, secure corridor, hold room renovation and office reconfiguration. Responsibilities include designing and detailing the exterior and interior of the project.

Logan International Airport Terminal C Concessions Redesign – Westfield Concessions Management. Design Architect for public concessions areas. Responsibilities include design, detailing and interdisciplinary coordination for the 25,000 s.f. project.

SECTION 5 NOISE

Developments producing a minor noise impact – Other developments

Type, Source, and Location Noise

The potential sources of noise at the project site will consist of noise generated during construction of the project and noise resulting from the operation of the facilities.

Construction Noise

Construction of Phase 1 will begin during the Spring of 2009 and be completed in the Summer of 2010. Noise generated during the construction period will consist of that associated with light and heavy machinery and various forms of construction related equipment.

Facility Operations

Noise in the vicinity of the proposed project is currently dominated by the local highway traffic on Route 3. Noise relating to the operation of facilities will consist of vehicular traffic entering and exiting the facility. There will not be an appreciable difference in noise level along Route 3.

Conclusion

Based on the results of the noise analysis presented in the Environmental Assessment (EA), the predicted noise levels from the Acadia Gateway Center are not expected to exceed the FTA noise impact criteria, or the FHWA and MaineDOT traffic noise criteria described in the EA (pages 4-23 through 4-28).


Bird's-Eye View Looking Southeast


View from Entrance Plaza


View from Route 3 Entrance


View of Maintenance Facility Entrance

SECTION 6 VISUAL QUALITY AND SCENIC CHARACTER

MaineDOT Individual Project Commenting Form
STREAM CROSSING AND WILDLIFE REVIEW
PROPOSED BY THE MAINE DEPARTMENT OF TRANSPORTATION

This form provides project-specific information. In accordance with DEP Chapter 305, Permit by Rule, Section 11, and ACOE Programmatic General Permit, constitutes a request for State and Federal fish and wildlife agency comments on that activity. To assure consideration of any comments, respond within two weeks of this request. **Attached you will find a Site Location Map and if available, "Preliminary Site Inventory Form for MaineDOT Passage Policy Compliance"**

For MaineDOT Use Only

MaineDOT Project Development:
☐ **Bridge Project** ☐ **Highway Project** ☒ **Traffic/Multi-Modal Project** ☐ **Maintenance Project**

Project Name: Acadia Gateway Center **PIN or Location: 13332.09 Trenton -Route 3**
Project Description: Construction of bus facilities, visitor center. This will require extensions to the existing box culvert under Route 3 as well as a new crossing (open bottom pipe arch) a few hundred feet upstream for the access road
Project need: New transportation facility
Stream(s) and/or Water body Names: **Crippens Brook**

This project/activity consists of a:
Early Fact Finding, Project Being Developed ☐ ***If this is checked, MaineDOT has not formally kicked this project off. The intent of this consultation is to identify issues early and address them during the design phase of this project. Please skip down to your section.***

New Structure ☒ Replacement in-kind ☐ Replacement with expansion ☐ Slip-line ☐

If a replacement, the existing structure is a: Culvert/Pipe☐ Box☐ Open Bottom Arch☐ Bridge Span ☐

Proposed Structure: Culvert/Pipe☐ Box☐ Open Bottom Arch☒ Bridge Span ☐

Detour across resource required: Yes☐ No☒

Alternate designs considered: No build ☒ Culvert/Pipe ☐ Bridge Span ☐ Box ☐ Open Bottom Arch ☐

Alternate not selected due to: N/A

In-water work will be performed: During Standard In-Water Window (July 15 – Sept 30) ☐
☐ Other
☐ Require ability to drive and remove piles outside the prescribed work window.
☒ Require ability to work in the dry outside prescribed work window (when streambed is dry).
☐ Require to work outside standard in-water work window because: N/A
*Construction specification includes: N/A
N/A
MaineDOT Best Management Practices for Erosion and Sedimentation Control are required construction specifications for all projects.

Additional Project Specific Information:

MaineDOT Contact Information: Josh Nichols (joshua.nichols@maine.gov)
Maine Department of Transportation, Environmental Office
State House Station #16 Augusta, ME 04333

MaineDOT Individual Project Commenting Form
STREAM CROSSING AND WILDLIFE REVIEW
PROPOSED BY THE MAINE DEPARTMENT OF TRANSPORTATION

For Review Agency Use Only

Agency completing review: MDIF&W☐ USFWS☐ DMR☐ ASC☒ NMFS☐

Section A:
Early Fact Finding Information: ***(Please outline species of concern, when in-water work is preferred and other information that may provide useful in the consideration of this project.)***
Species of Concern: None
Preferred In-Water Work Window:
Other information that may be useful:

Section B:
Would you like MaineDOT to coordinate an on-site meeting? Yes☐ No☒

Given that this project will be designed in accordance with MaineDOT's "Waterway and Wildlife Crossing Policy and Design Guide" MaineDOT may complete the design of this project based on any specific recommendations below and proceed to construction: Yes☒ *Proceed to Section C* No☐ *Please complete the remainder of this section.*

Additional information requested:
Plan & details ("Peter paper") ☐
Cross sectional plans ☐
Alternative analysis ☐
Construction methods ☐
Other ☐ Describe:

Special conditions/comments:
No concerns

Section C:
Is this an Essential Habitat for Atlantic Salmon? YES ☐ NO☒
Other Species?_____ YES☐ NO☐
Federal Agencies Only
Will this project require Formal or Informal Section 7 Consultation? NO☐ Informal☐ Formal☐
For what species? _____

Representative ***Norm Dube*** ***Date: 7/8/2008***

Please forward your comments electronically or in hard copy to the contact for this project. Thank you.

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Proposed Structure: Culvert/Pipe☐ Box☐ Open Bottom Arch☒ Bridge Span ☐

Detour across resource required: Yes☐ No☒

Alternate designs considered: No build ☒ Culvert/Pipe ☐ Bridge Span ☐ Box ☐ Open Bottom Arch ☐

Alternate not selected due to: N/A

In-water work will be performed: During Standard In-Water Window (July 15 – Sept 30) ☐
☐ Other
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☒ Require ability to work in the dry outside prescribed work window (when streambed is dry).
☐ Require to work outside standard in-water work window because: N/A
*Construction specification includes: N/A
N/A
MaineDOT Best Management Practices for Erosion and Sedimentation Control are required construction specifications for all projects.

Additional Project Specific Information:

MaineDOT Contact Information: Josh Nichols (joshua.nichols@maine.gov)
Maine Department of Transportation, Environmental Office
State House Station #16 Augusta, ME 04333

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STREAM CROSSING AND WILDLIFE REVIEW
PROPOSED BY THE MAINE DEPARTMENT OF TRANSPORTATION

For Review Agency Use Only

Agency completing review: MDIF&W☐ USFWS☐ DMR☒ ASC☐ NMFS☐

Section A:
Early Fact Finding Information: (Please outline species of concern, when in-water work is preferred and other information that may provide useful in the consideration of this project.)
Species of Concern:
Preferred In-Water Work Window:
Other information that may be useful:

Section B:
Would you like MaineDOT to coordinate an on-site meeting? Yes☐ No☒

Given that this project will be designed in accordance with MaineDOT's "Waterway and Wildlife Crossing Policy and Design Guide" MaineDOT may complete the design of this project based on any specific recommendations below and proceed to construction: Yes☐ *Proceed to Section C* No☐ *Please complete the remainder of this section.*

Additional information requested:
- Plan & details ("Peter paper") ☐
- Cross sectional plans ☐
- Alternative analysis ☐
- Construction methods ☐
- Other ☐ Describe:

Special conditions/comments:
Passage for smelt and eels should be provided.

Section C:
Is this an Essential Habitat for Atlantic Salmon? YES ☐ NO☐
Other Species?**smelt and eels** YES☒ NO☐

Federal Agencies Only
Will this project require Formal or Informal Section 7 Consultation? NO☐ Informal☐ Formal☐
For what species? _____

Representative Brian Swan ***Date: 1/6/2009***

Please forward your comments electronically or in hard copy to the contact for this project. Thank you.

MaineDOT Individual Project Commenting Form
STREAM CROSSING AND WILDLIFE REVIEW
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Proposed Structure: Culvert/Pipe☐ Box☐ Open Bottom Arch☒ Bridge Span ☐

Detour across resource required: Yes☐ No☒

Alternate designs considered: No build ☒ Culvert/Pipe ☐ Bridge Span ☐ Box ☐ Open Bottom Arch ☐

Alternate not selected due to: N/A

In-water work will be performed: During Standard In-Water Window (July 15 – Sept 30) ☐
☐ Other
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☒ Require ability to work in the dry outside prescribed work window (when streambed is dry).
☐ Require to work outside standard in-water work window because: N/A
*Construction specification includes: N/A
N/A
MaineDOT Best Management Practices for Erosion and Sedimentation Control are required construction specifications for all projects.

Additional Project Specific Information:

MaineDOT Contact Information: Josh Nichols (joshua.nichols@maine.gov)
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MaineDOT Individual Project Commenting Form
STREAM CROSSING AND WILDLIFE REVIEW
PROPOSED BY THE MAINE DEPARTMENT OF TRANSPORTATION

For Review Agency Use Only

Agency completing review: MDIF&W☒ USFWS☐ DMR☐ ASC☐ NMFS☐

Section A:
***Early Fact Finding Information**: (Please outline species of concern, when in-water work is preferred and other information that may provide useful in the consideration of this project.)*
Species of Concern: none
Preferred In-Water Work Window: anytime
Other information that may be useful: No brook trout taken in 2 electrofishing sampling trips. Captured only eels.

Section B:
Would you like MaineDOT to coordinate an on-site meeting? Yes☒ No☒

Given that this project will be designed in accordance with MaineDOT's "Waterway and Wildlife Crossing Policy and Design Guide" MaineDOT may complete the design of this project based on any specific recommendations below and proceed to construction: Yes☒ *Proceed to Section C* No☐ *Please complete the remainder of this section.*

Additional information requested:
- Plan & details ("Peter paper") ☐
- Cross sectional plans ☐
- Alternative analysis ☐
- Construction methods ☐
- Other ☐ Describe:

Special conditions/comments:

Section C:
Is this an Essential Habitat for Atlantic Salmon? YES ☐ NO☒
Other Species?_____ YES☐ NO☒

Federal Agencies Only
Will this project require Formal or Informal Section 7 Consultation? NO☐ Informal☐ Formal☐
For what species? _____

Representative Rick Jordan, Inland Fisheries ***Date: 9/24/2008***

Please forward your comments electronically or in hard copy to the contact for this project. Thank you.

105183

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JOHN ELIAS BALDACCI
GOVERNOR

EARLE G. SHETTLEWORTH, JR.
DIRECTOR

April 19, 2006

Gino J.M. Giumarro
Woodlot Alternatives, Inc.
30 Park Drive
Topsham, ME 04086

Project: MHPC #1184-05 - proposed intermodal transportation facility
Town: Trenton, ME

Dear Mr. Giumarro:

In response to your recent request, I have reviewed the information received March 24, 2006 to continue consultation on the above referenced parcel in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended.

Based on the information provided, I have concluded that there are no historic properties [architectural or archaeological] within the subject parcel. No part of the parcel is sensitive for significant prehistoric or historic archaeological sites, and there are no structures on or adjacent to the parcel that are eligible for nomination to the National Register of Historic Places. The proposed undertaking will have no effect upon historic properties.

Please contact Mike Johnson of my staff if we can be of further assistance in this matter.

Sincerely,

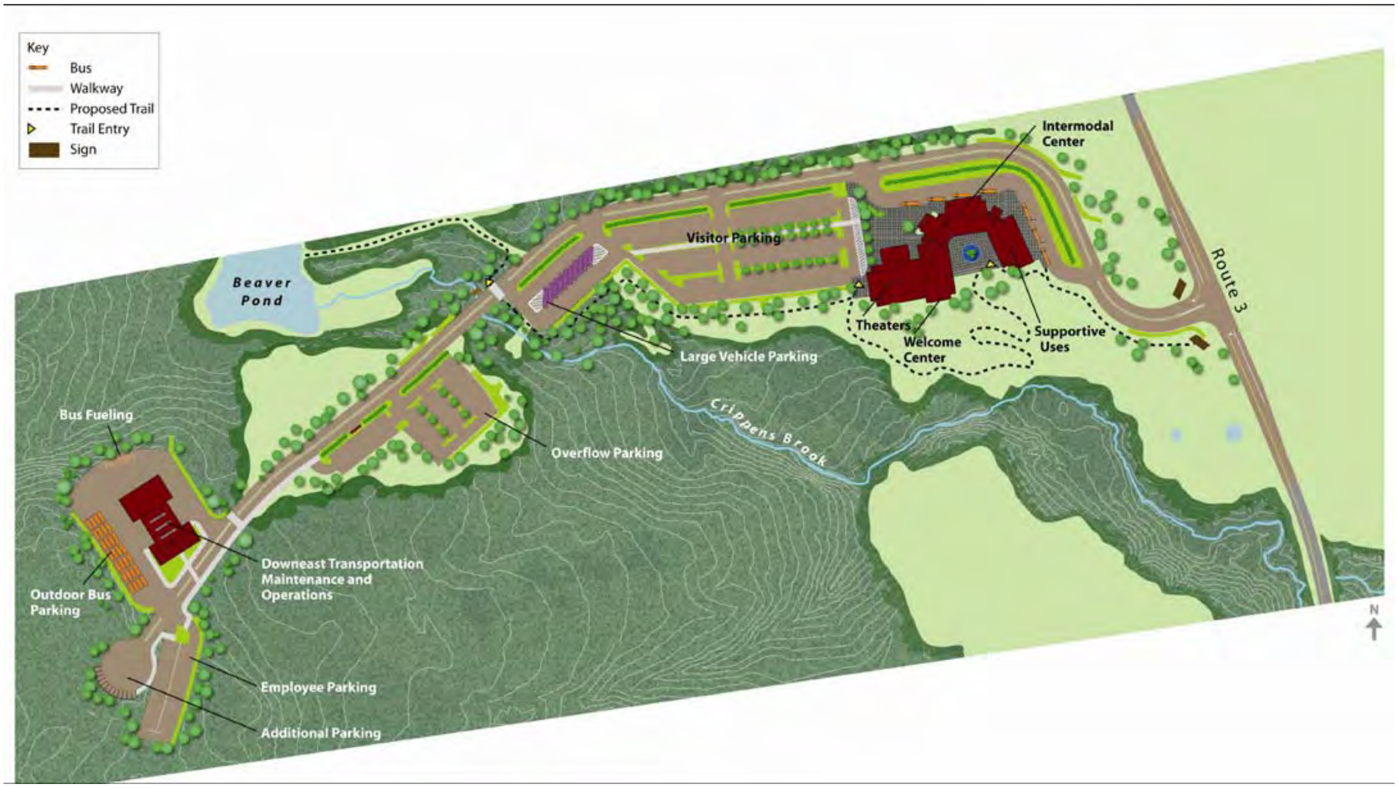
Earle G. Shettleworth, Jr.
State Historic Preservation Officer

SECTION 9 UNUSUAL NATURAL AREAS

There are no unusual natural areas impacted by this project.

SECTION 10 BUFFERS

Initial planting includes tree plantings adjacent to entrance, entrance road, and Phase I parking lot areas, shrub planting is to occur in bioswales and along parking lots and slopes, and is to include seeding of native shrub materials on slopes; bus facility entrance islands are to include native ornamental trees, shrubs, and groundcover shrub planting. Lawn area clearing is to be seeded to include lawn strip for installation of landscape granite blocks as "Rockefeller's Teeth" from the entrance up to Crippens Brook.



SECTION 11 SOILS

Fine-grained glaciomarine deposits dominate the parent material found in level and lowland areas within the project area and the adjacent region. Fine-grained sediments suspended in marine waters were deposited across the region during the marine intrusion that occurred during the last glacial retreat. Soils derived from glacial till are generally present on ridges and knolls throughout the project area and adjacent region.

Various soil types are present within the project area according to the U.S. Department of Agriculture (USDA) *Soil Survey of Hancock County Area, Maine* (USDA 1998) and are presented on the attached Soils Map. The dominant soil associations are described below. Additional soil associations present within the project area are included in the attached table.

The Dixfield-Colonel-Tunbridge Complex with 3 to 8 percent slopes dominates approximately 42 percent of the project area. This soil type consists of glacial till ridges with low relief. This soil type consists of 35 percent deep, moderately well drained Dixfield soils; 25 percent very deep, somewhat poorly drained Colonel soils; 20 percent moderately deep, well drained Tunbridge soils; and 20 percent other soils. Permeability in the Dixfield and Colonel soils is moderate at the surface becoming slow or moderately slow in the substratum. Permeability in the Tunbridge soils is moderate to moderately rapid. A perched high water table is generally 18 to 30 inches below the surface in the Dixfield soils and 12 to 24 inches below the surface in the Colonel soils. Depth to bedrock is between 20 to 40 inches in the Tunbridge soils and greater than 60 inches in the Dixfield and Colonel soils.

The Lamoine-Scantic-Buxton Association dominates approximately 12 percent of the project area. This soil association consists of very deep, nearly level to strongly sloping soils in coastal lowlands and river valleys. This soil association consists of approximately 35 percent somewhat poorly drained Lamoine soils; 30 percent poorly drained Scantic soils; 20 percent moderately drained Buxton soils; and 15 percent other soils. The permeability of these soils is generally moderately or moderately slow at the surface becoming slow to very slow in the substratum. A perched high water table is generally 6 to 18 inches below the surface in the Lamoine and Scantic soils, and 18 to 36 inches below the surface in the Buxton soils. Scantic soils are hydric soils. The Lamoine-Scantic-Buxton Association is considered to be *Farmland of Statewide Importance*.

Lamoine Silt Loam with 3 to 8 percent slopes dominates approximately 7 percent of the project area. This very deep, gently sloping, somewhat poorly drained soil is present on coastal lowlands and river valleys. The permeability of the soil is moderate to moderately slow at the surface becoming very slow in the substratum. Surface runoff is slow and the perched high water table is typically between 6 and 18 inches below the surface. Depth to bedrock is generally between 20 and 40 inches. This soil association is considered *Farmland of Statewide Importance*

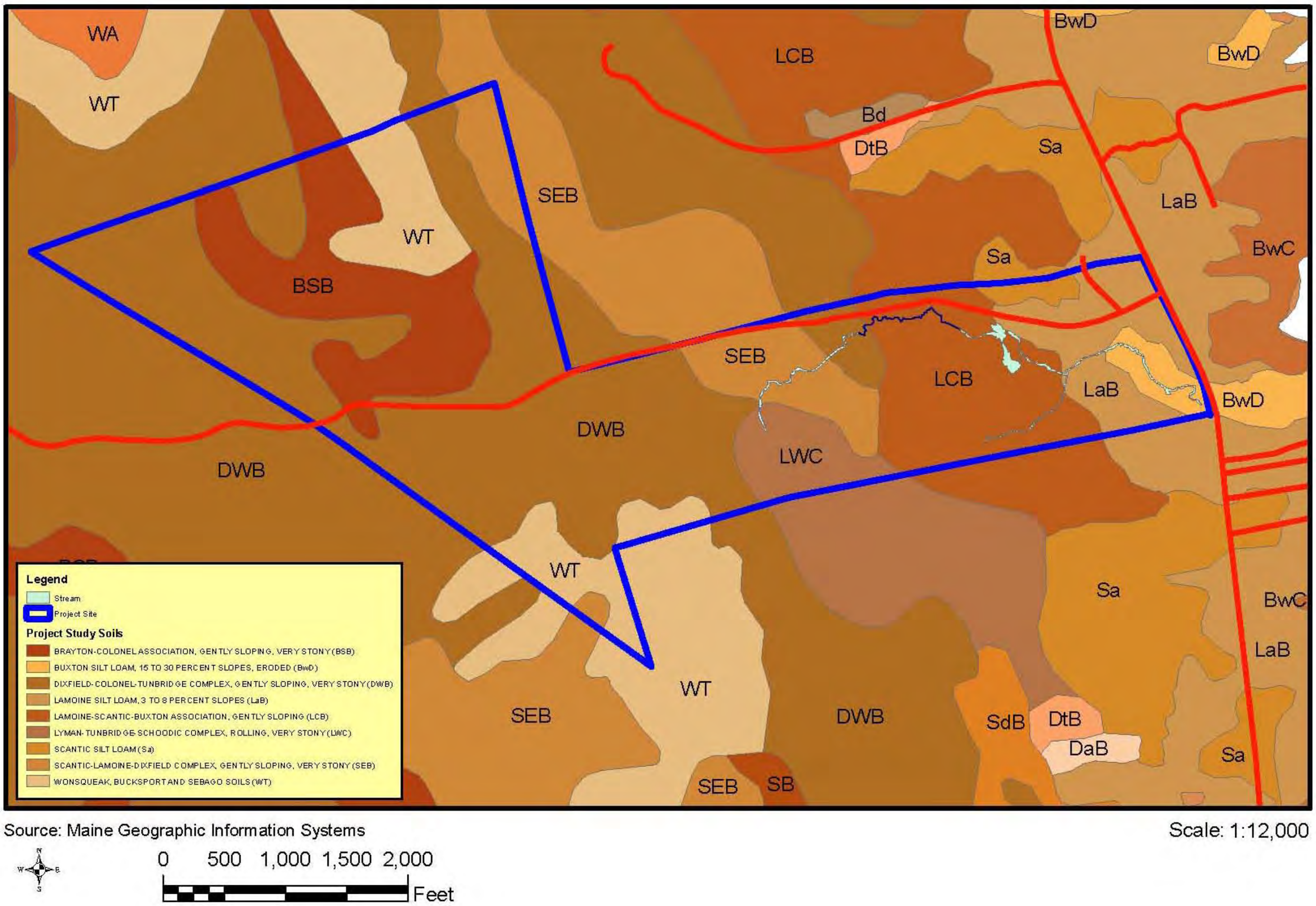
Farmland

Lamoine-Scantic-Buxton and Lamoine Silt Loam soils are designated as *Farmlands of Statewide Importance* by the Natural Resources Conservation Service (NRCS). *Farmlands of Statewide Importance* are considered important at either the state or local level for the production of food, feed, fiber, forage, or oilseed crops. According to the USDA, these soils have the potential to be characterized as Prime Farmland if they are drained (USDA 1998). Prime Farmland is comprised of soils that combine the best physical and chemical "characteristics for producing food, feed, fiber, forage, oilseed and other crops with minimum inputs of fuel, fertilizer, pesticides, and without intolerable soil erosion" (7 USC 4201).

According the *Farmland Protection Policy Act of 1981* [Section 1539-1549, Public Law 97-98, 95 Statute 1341-1344 (7 U.S.C. 4201 et seq.)] federal agencies are required to examine the impacts of any activity that would convert existing or potential farmland to non-agricultural uses. The NRCS is required to rate the relative impacts of projects on prime farmland. The NRCS has published a Farmland Conversion Impact Rating form (form AD-1006) to evaluate and assess the project site. The Land Evaluation element rates the overall soil quality of the farmland. The Site Assessment element measures factors such as percent of project site being farmed, protection provided by state and local government, distance from urban areas, and percent of farmland currently being farmed. Numerical scores are given for each criterion. In general, the higher the score, the more valuable the farmland is to protect. Sites that receive a total score of 160 or greater require further evaluation by the NRCS. Scores of less than 160 do not need further evaluation by the NRCS for the conversion of farmland.

The Crippens Brook parcel received an overall Land Evaluation score of 48, indicating that the soil within the project area has moderate value for agricultural production. The Site Assessment of the project area gave a score of 84. The total score was 132 out of a possible 260 points, indicating that the Crippens Brook parcel should not be considered prime farmland. A copy of the USDA Farmland Conversion Impact Rating form is included in Appendix B. While evidence of drainage attempts (e.g. drainage ditches) are present in the open fields within the project area, much of the drained areas are fragmented by areas with a high water table. The majority of the remaining site soils within the project area remain undrained; therefore these sites should not be considered prime farmland.

SECTION 11 SOILS



Additional Soils Present at Project Area

Soil Series	Percent Abundance	Description	Drainage class	Depth to Bedrock (in.) from Surface	Permeability at Surface	Depth to High Water Table (in.)
Brayton-Colonel Association (BSB)	14%	Very deep, glacial till uplands, gently sloping, 50% Brayton; 30% Colonel; 20% other	Brayton: poorly drained; Colonel: somewhat poorly drained	N/A	Brayton: mod. – mod rapid; Colonel: mod	Brayton: within 12"; Colonel: 12-24"
Buxton Silt Loam (BwD)	2%	Very deep, coastal lowlands; 15-30% slopes, eroded	Moderately well drained	N/A	Mod – mod slow	18-36"
Dixfield-Colonel-Tunbridge Complex (DWB)	42%	Very deep, moderately coarse textured, compact glacial till derived mainly from schist and some gneiss, phyllite, or granite	Dixfield: moderately well drained; Colonel: somewhat poorly drained; Tunbridge: well drained	Dixfield: >60 Colonel: >60 Tunbridge: 20-40	Dixfield: mod; Colonel: mod; Turbridge: mod-mod rapid	Dixfield: 18-30" Colonel: 12-24" Tunbridge: >72"
Lamoine Silt Loam (LaB)	7 %	Very deep, medium textured over moderately fine textured and fine textured material	Lamoine: somewhat poorly drained	Lamoine: >60	Mod-mod slow	Lamoine: 6-18"
Lamoine-Scantic-Buxton Association (LCB)	12%	Very deep, medium textured over moderately fine textured and fine textured material	Lamoine: somewhat poorly drained; Scantic: poorly drained; Buxton: moderately well drained	Lamoine: >60 Scantic: >60 Buxton: >60	Lamoine: mod – mod slow; Scantic: mod – mod slow; Buxton: mod – mod slow	Lamoine: 6-18"; Scantic: <12" Buxton: 18-36"
Lyman-Tunbridge-Schoodic Complex (LWC)	5%	Glacial till ridges, rolling, very stony. 30% Lyman; 25% Tunbridge; 20% Schoodic; 25% other	Lyman: somewhat excessively drained; Tunbridge: well drained; Schoodic: excessively drained	Lyman: 10-20; Tunbridge 20-40; Schoodic: 1-10	Lyman: mod rapid; Tunbridge: mod – mod rapid; Schoodic: rapid	N/A
Scantic Silt Loam (Sa)	1%	Very deep, level, coastal lowlands along streams and rivers; hydric	Poorly drained	N/A	Mod – mod slow	< 12"
Scantic-Lamoine-Dixfield Complex (SEB)	8%	Very deep nearly level to gently sloping, costal lowlands and valleys; very stony. 30% Scantic; 25% Lamoine; 20% Dixfield; 25% other	Scantic: poorly drained, hydric; Lamoine: somewhat poorly drained; Dixfield: moderately well drained	N/A	Scantic: mod – mod slow; Lamoine: mod – mod slow; Dixfield: mod	Scantic: <12"; Lamoine: 6-18"; Dixfield: 18-30"
Wonsqueak, Bucksport, and Sebago Soils (WT)	10%	Very deep, level, glaciomoraine and glaciofluvial deposits, organic soils	Very poorly drained, hydric	N/A	Wonsqueak: mod slow – mod rapid; Bucksport: mod slow-mod rapid; Sebago: mod rapid.	< 12"

Section 12. Stormwater management (Flooding and General standards).

A. Narrative

(Reference figures and tables are at the end of narrative.)

General

This project straddles Crippens Brook and is entirely within its watershed. Total drainage area for Crippens Brook is 1453 acres with a hydrologic flow length of 21,372 feet. This development project is in the lower 20% of the watershed. The project watersheds are predominantly B (3-8%) slopes (USDA Soil Survey) with steeper E (15-80%) slopes adjacent in the lowest reach on the development site. Land covers within the project site are old pasture on the northern side of Crippens Brook and spruce-northern hardwood forest on the southern and south-eastern side of Crippens Brook. Dominant soil types are Lamoine-Scantic-Buxton Association and Lamoine Silt Loam. On site wetlands are predominantly PFO, PSS and RUS. Two beaver flowages are present on Crippens Brook and receive runoff from the project site. The upper reaches of the total watershed have extensive areas of heath and other wetlands that total approximately 30% of the total watershed area. Crippens Brook discharges into Jordan River approximately 1,300 feet downstream of the project site.

Flooding

Crippens Brook is within the Zone X on FIRM for the Town of Trenton, Maine Panel 230299 0005A (Figure 11) and outlets into the Zone AE Jordan River. The only structure downstream and within the floodplain of Crippens Brook before it discharges into the Jordan River is the Rt 3 culvert.

Channel Realignment

There will be a slight realignment to Crippens Brook at the road crossing (STA 30+45). The existing stream bank-full dimensions at this location are; TW = 7.5 ft., D = 1.8 ft., channel grade is 1.2%. The proposed structure will be an 80 foot long aluminum pipe arch on concrete footers. The width of this arch is 9.0 feet, which is 1.2 times the average bank full width of the channel through this reach. The existing bank-full dimensions with a natural bottom shall be reconstruction within the structure to provide aquatic organism passage. The height of the structure will be 4'-8" from the top of the footers. Headwalls shall be constructed upstream and down in order to limit total length of the structure and minimize wetland impacts. Hydraulic calculations for this structure are included in D. Runoff Analysis. It was decided not to reduce this length any further in order to provide a reasonable angle of alignment with the existing downstream channel.

Alterations to Land Cover

Layout of the project was done with the intent to minimize wetland disturbance; additional wetland impacts were then required for water quality/quantity filter strips. Land use cover changes to the project are kept to a minimum. Phase 1 will consist of the access road to the cul-de-sac, the maintenance facility and two parking areas. New cover types will be impervious asphalt and the maintenance building roof. Additional land use changes include landscape plantings on the perimeter and in the esplanades as shown on the plans. Note that all landscape plantings are naturalized. Refer to the general plan sheets for before and after changes. Phase 2 will include two new parking lots and the Visitor's Center. The details of the Phase 2 design have yet to be determined.

New impervious cover areas total; Phase 1 = 7.51 acres, and Phase 2 ≈ 6.25 acres.

Hydrologic Analysis

The NRCS TR20 model within the HydroCAD program was used for pre and post analysis (refer to Figures 1 through 7.) As noted above the proposed development will occur within the lower 20% of the watershed. There are two major upstream watersheds (A and B) that converge at a beaver pond that abuts the developed areas. For the Phase 1 developed area (watershed C) there are four discrete pre and post development subwatersheds that were delineated for discharge to Crippens Brook (Figures 8 and 9.) A fifth sub-watershed that discharges through an existing culvert north of the project entrance was evaluated separately (Figure 10.)

The Phase 2 analysis will occur and be incorporated into analysis at that time. It is anticipated that the bulk of the runoff from Phase II will discharge to the reaches of Crippens Brook adjacent to this development.

For a more detailed discussion of model parameters, analysis and results, refer to Section D - Runoff Analysis.

Water Quality Treatment
Filter strips, (a.k.a. vegetative buffers) are the primary treatment practices utilized for Phase 1 and were designed according to procedures in of the *Maine DEP Chapter 500: Stormwater Management, Appendix F. Vegetative Buffers*. There are five filter strips with constructed stone berm level lip spreaders to evenly distribute flows. These were chosen for their effectiveness and low maintenance costs. Other methods such as biofiltration, infiltration and wet ponds were considered, but dismissed because of soil types, depth to bedrock, and the increase for more extensive wetland impacts from construction.

In order to correctly size these filter strips some on-site wetlands are being utilized in the filter area. These wetlands are counted in the overall project wetland impacts and included in the mitigation plan. Other impervious areas that do not drain to these filter strips meet the Chapter 500 specification for buffers adjacent to the road.

For further discussion on water quality treatment, see Section F. General Standards Submissions.

Development Impacts
Because the development crosses over four separate subwatersheds to Crippens Brook and is located at the lower reaches of the brook, the development will have an indiscernible quantitative stormwater impact on the brook and no impact to the Jordan River. There are two beaver flowages in series with the discharges to the receiving waters. Beaver flowages are typically a source of temperature increases and low dissolved oxygen. The new impervious area from this project will increase temperatures and pollutant load of the direct runoff, but the installation of the vegetative buffers should mitigate these impacts.

B. Maps

Topographic Map; Refer to Figures 1 through 10 as appropriate, as well as the Project Design Sheets

C. Drainage Plans. Pre and Post Development

- Contours and plan elements for pre and post development are shown on the Design Plan Sheets
- Project soil types are shown in Figures 3 and 7 and listed in table 1. These data were taken from MEGIS layer Ssa-s, NRCS Soil Survey for Hancock County, ME.
- Project land use cover is show in Figures 2 and 6 and was taken from MEGIS digital orthoquads.
- Pre and post development subwatersheds with hydraulic flow lines for the project site are shown in Figures 5, 8, 9, and 10.
- All proposed developed land, facilities, and drainage structures are shown on the Design Plan Sheets.
- On-site flooded areas occur within the natural floodplain of Crippens Brook and were not delineated.

D. Runoff Analysis

TR 20 hydrologic model (HydroCAD) was used to model the pre and post hydrology for Phase 1 of this project and the model report within Attachment A. Figures 1-10 and Tables 1-3 depict pertinent site parameters. Phase 2 development will occur in the area shown on the Plan Design Sheets and was not included in the hydrologic calculations at this time. It is anticipated that in order to mitigate the increased runoff from Phase 2 extensive on site detention will be required.

For the Phase 1 analysis, there are two major upstream subwatersheds (A and B) that converge at a beaver pond abutting the developed areas. The proposed Phase 1 development discharges directly to Crippens Brook at four locations and therefore four discrete subwatersheds were determined for pre and post analysis. Level lip spreaders and filter strips were incorporated into the post construction flow paths for both quantitative and qualitative treatment of runoff. Table 2 lists the new impervious areas for each sub-watershed (as well as filter strip dimensions required by Chapter 500.) These Phase 1 pre and post development watersheds and hydrologic flow paths are shown in Figures 5, 8, 9, and 10. Table 3 lists all pre and post sub-watershed areas, and flow slopes, lengths and types used for the Tc routine in HydroCAD.

Professional judgment was employed in estimating cover types and flow parameters for the model. A field investigation was done for the project site, but upstream watershed flow parameters were estimated from office resource information. Care was taken to be consistent from pre to post development in order to best model the changes from the development.

It should be noted that the area where the filter strip in sub-watershed 3 flows is in Hydrologic Soil Group C but, from field investigation and the extent of PFO wetlands throughout this area, HSG D was used for all of the subwatersheds, both pre and post. Because the cover and flow type through this area does not change there is appreciable change from pre to post.

In developing the pre and post analysis for flooding, we considered the effects of in-channel flow of Crippens Brook. Sub-watershed 3 discharges to Crippens Brook above the existing beaver pond which has minimal flood storage and freeboard, and sub-watersheds 1, 2, and 4 all discharge within 880 feet of each other immediately downstream of the beaver pond. We concluded that flow through these reaches would provide insignificant in-reach storage and flow attenuation. In addition, other than the Rt 3 box culvert there are no structures within the floodplain between the project site and the Jordan River. Therefore, it was decided that it was not necessary to accurately describe the flow profile through these reaches of Crippens Brook. Measurements of the channel conveyance parameters and floodplain sections were not taken and a simple rectangular 20 ft. by 4 ft. “dummy” section was entered for each reach and a simple comparison of pre and post peak flows was preformed. The pre and post peak flows are tabulated in table 4.

The first observation from table 4 is the percent change in the subwatersheds (SW). In particular the 38% increase in SW3. These subwatersheds were determined from the point of discharge to the stream and this additional area is added from an area that discharged at a point upstream from SW3. Also note that approximately half of this post development watershed is new impervious. We considered splitting the flows from the maintenance facility to minimize the new impervious but decided not to because; a) the outlet of SW3 is at the outlet of larger SW B and at the beaver pond, the hydraulic impact would be minimized and b) the lower reaches of SW1 and SW2 may be destabilized by this additional water.

There is a calculated increase in flows from 20 to 30 percent in SW1 and SW2 respectively. We contend that this increase is acceptable because of inherent error in hydrologic modeling and as noted in the calculated decrease in total WS peaks other than SW4 all Times to Peak are earlier after development. There is no quantitative increase in peak flow to Crippens Brook.

As a quality check, the USGS Regression Equations were run for the total watershed. Those results are shown in Table 5 and although slightly higher are comparable indicate agreement with the values generated in the HydroCAD model.

The Phase 1 access road from Route 3 to station 25+00 does not discharge to Crippens Brook (except for eastern half of the first 250 feet of the access road (STA 10+00 to 12+50). These watershed parameters are shown in Figures 6, 7, and 10. The runoff discharges to a cross culverts under Route 3 and the diameter of that culvert will remain the same. The new impervious areas in this watershed are also tabulated at the end of table 2. No additional treatment was designed because of the minimal new impervious areas, relatively flat vegetated channel slopes, and no change in the Route 3 cross pipe. The HydroCAD output report is for this project is also in Attachment A.

When Phase 2 is designed the right half of the road up to station 25+00 will be incorporated into the water quality/quantity treatment analysis for Phase 2.

Culvert Design
The 50 year peak flow (510 cfs) was taken from the HydroCAD outputs, which were checked against the Rational and USGS models and used to size the Access Road crossing of Crippens Brook. The FHWA HY-8 hydraulic model was used. A structure was chosen that had the approximate cross sectional area of the Rt 3 culvert (9 x 4.8 arch.) The results found that the proposed design overtopped at approximately the 25 year storm. As a check the Rt 3 structure run with the same 50 year storm. It too overtopped at approximately the 25 year event. Given that the Rt 3 structure has no history of overtopping it was concluded that the hydrologic models over estimated the design storm and choosing the proposed arch size is reasonable. This fact also justifies the decision not to evaluate reach flooding at the outlets of the developed subwatersheds mentioned before.

E. Flooding Standard Submission

Refer to Section D for input parameters and analysis.

F. General Standards Submissions

Table 2 describes impervious area areas treated for subwatersheds shown in Figure 9 and design parameters for each filter strip shown on the Design Plan Sheets. The level lip spreaders for each filter strip will be constructed according to a standard drawing shown included in the Design Plan Typical Drawings and will be identical to the dimensions of figure 5-2 of the *MEDEP BMPS Technical Design Manual (06)*. Road sections that do not drain to the designed filter strips will utilize inslope and adjacent wooded areas for treatment as specified in Appendix F of Chapter 500.

It was decided not to install a structural treatment for the first 1,700 feet of the access road. The northern half drains to a vegetated ditch with a grade of 1.1%, discharging to the cross culvert under Route 3 at STA 170+89 and then to an ephemeral stream and eventually the Jordan River. The southern half of this road section flows through overland flow to Crippens Brook. Once Phase II of the project is designed this runoff will be incorporated into that design component.

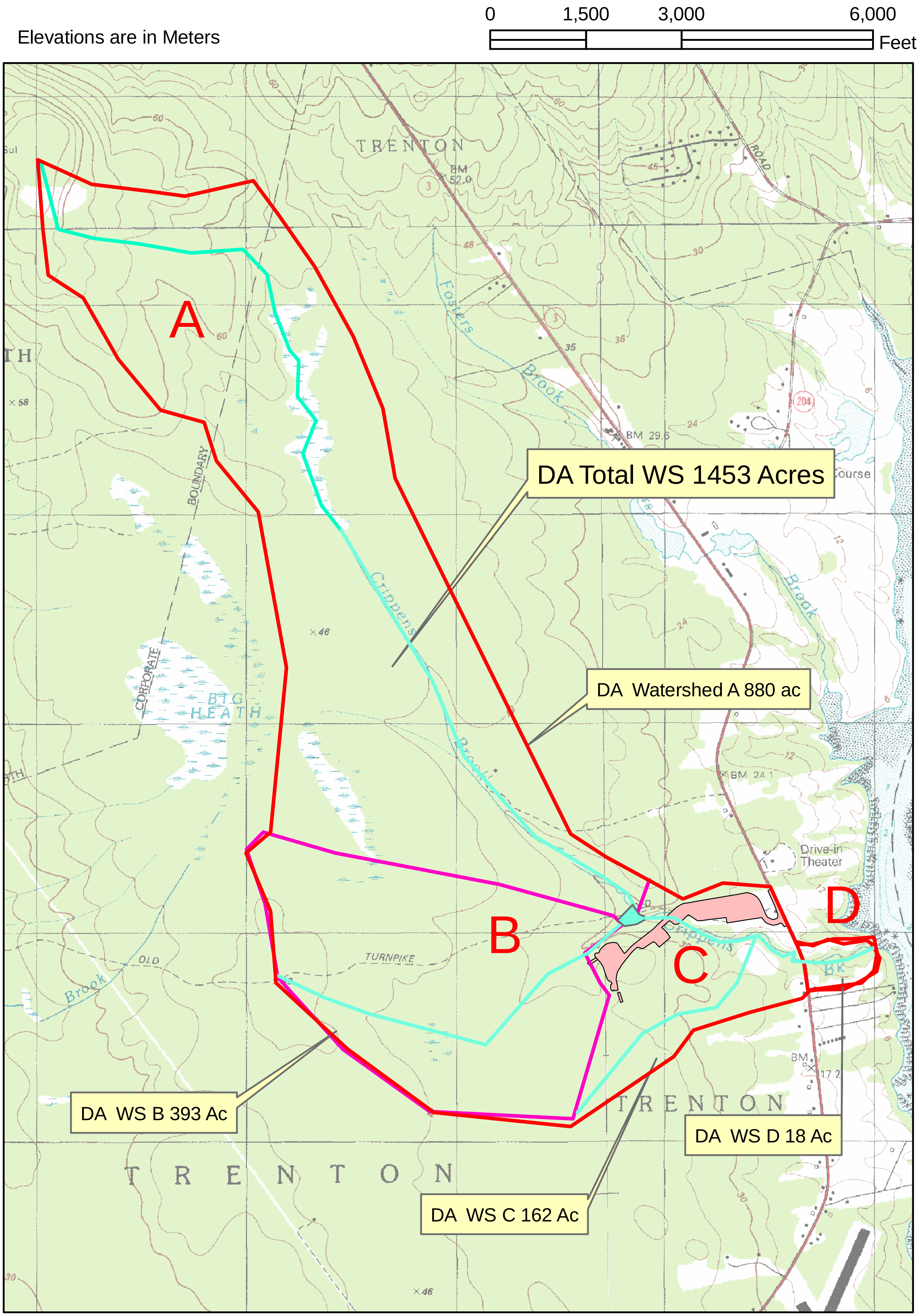
Downeast Transportation Inc. will be responsible for the development and implementation of the facility maintenance plan. MaineDOT will work with them to ensure that permanent stormwater structures (drainage structures, level lip spreaders, and filter strips) maintenance practices will be incorporated into that plan. In addition, street sweeping will be a component of that plan.

Permanent stormwater quantity and quality control practices for Phase 2 are conceptual, but from preliminary investigation there is a high confidence that with the use of Low Impact Development technology, such as a combination of porous pavement, rain gardens and biofiltration practices, an acceptable level of control can be achieved.

G. Maintenance Plan

Once Downeast Transportation Inc. develops their facility maintenance plan in consultation with the MaineDOT, it will be submitted to the MEDEP as an amendment to this permit application.

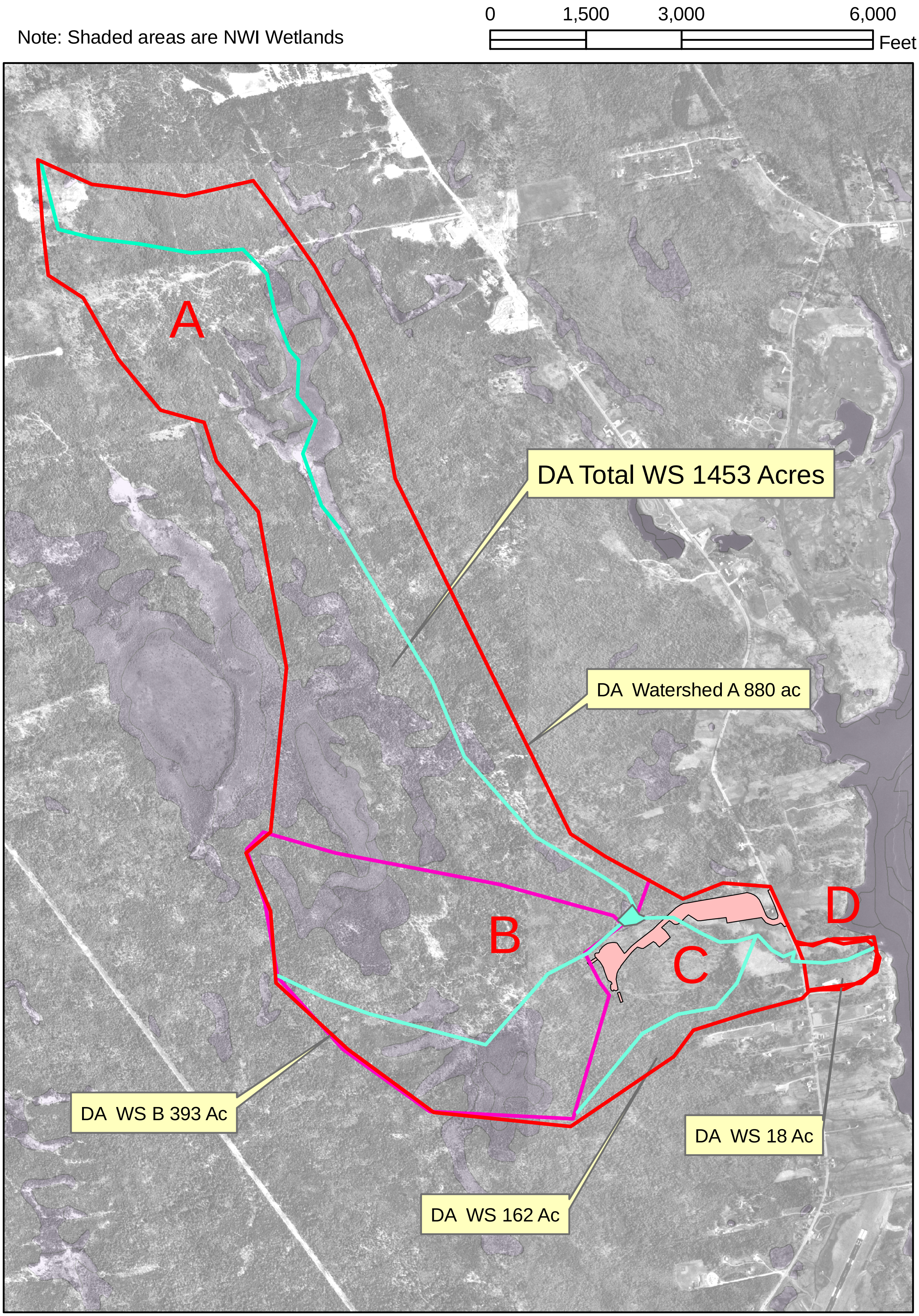
Elevations are in Meters



Acadia Gateway Hydrology - Topography

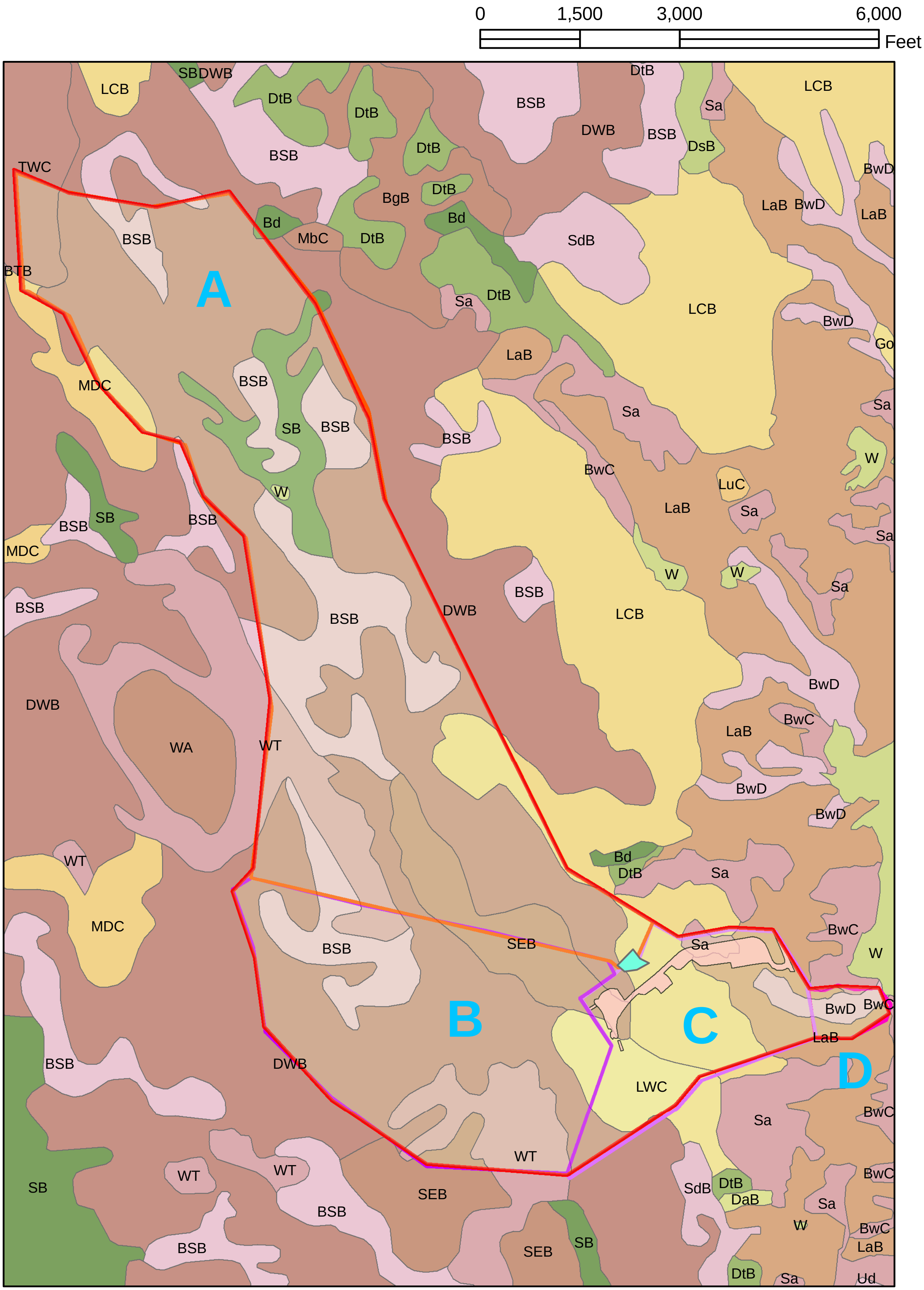
Figure 1.

Note: Shaded areas are NWI Wetlands



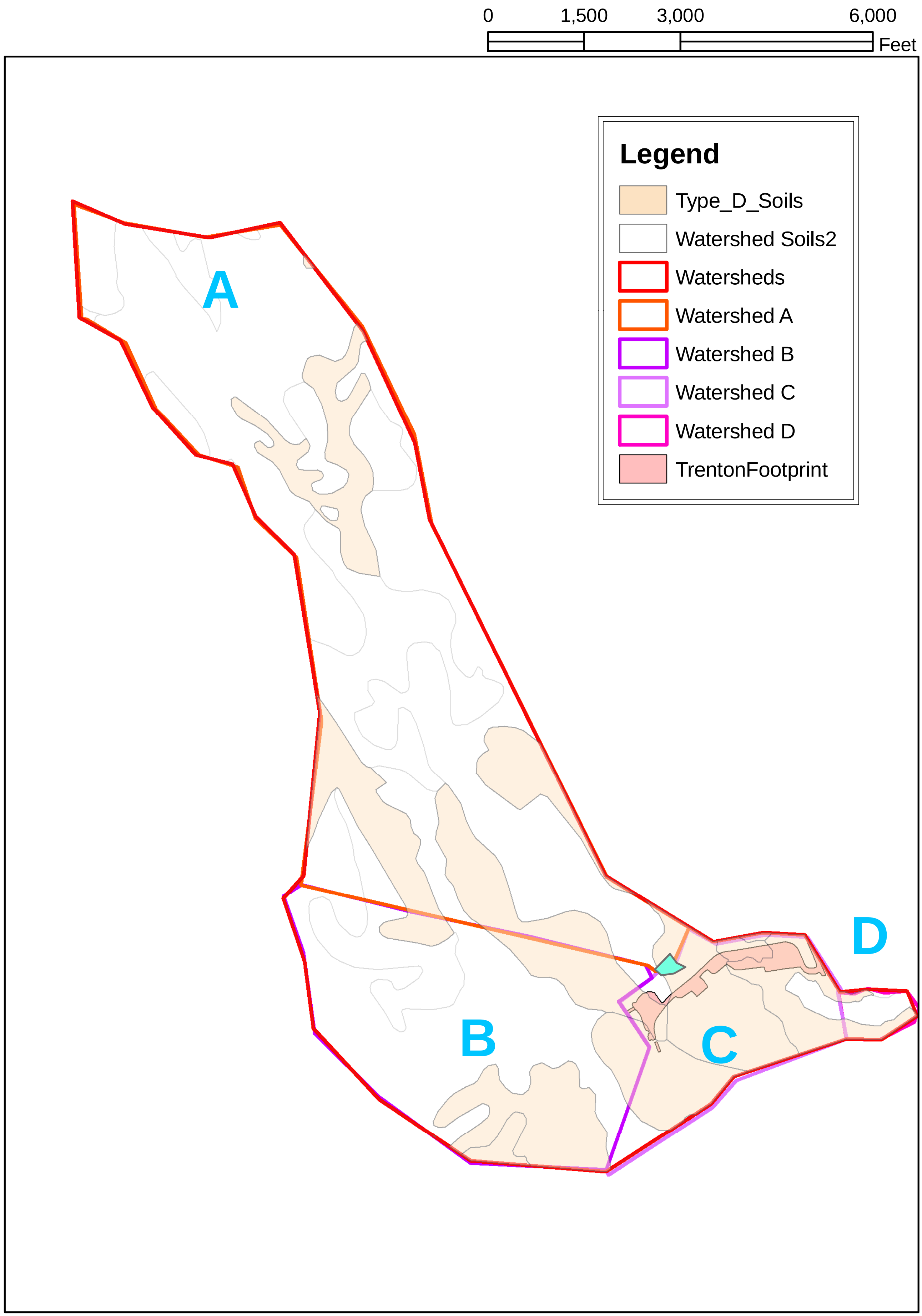
Acadia Gateway Hydrology - Land Use

Figure 2.



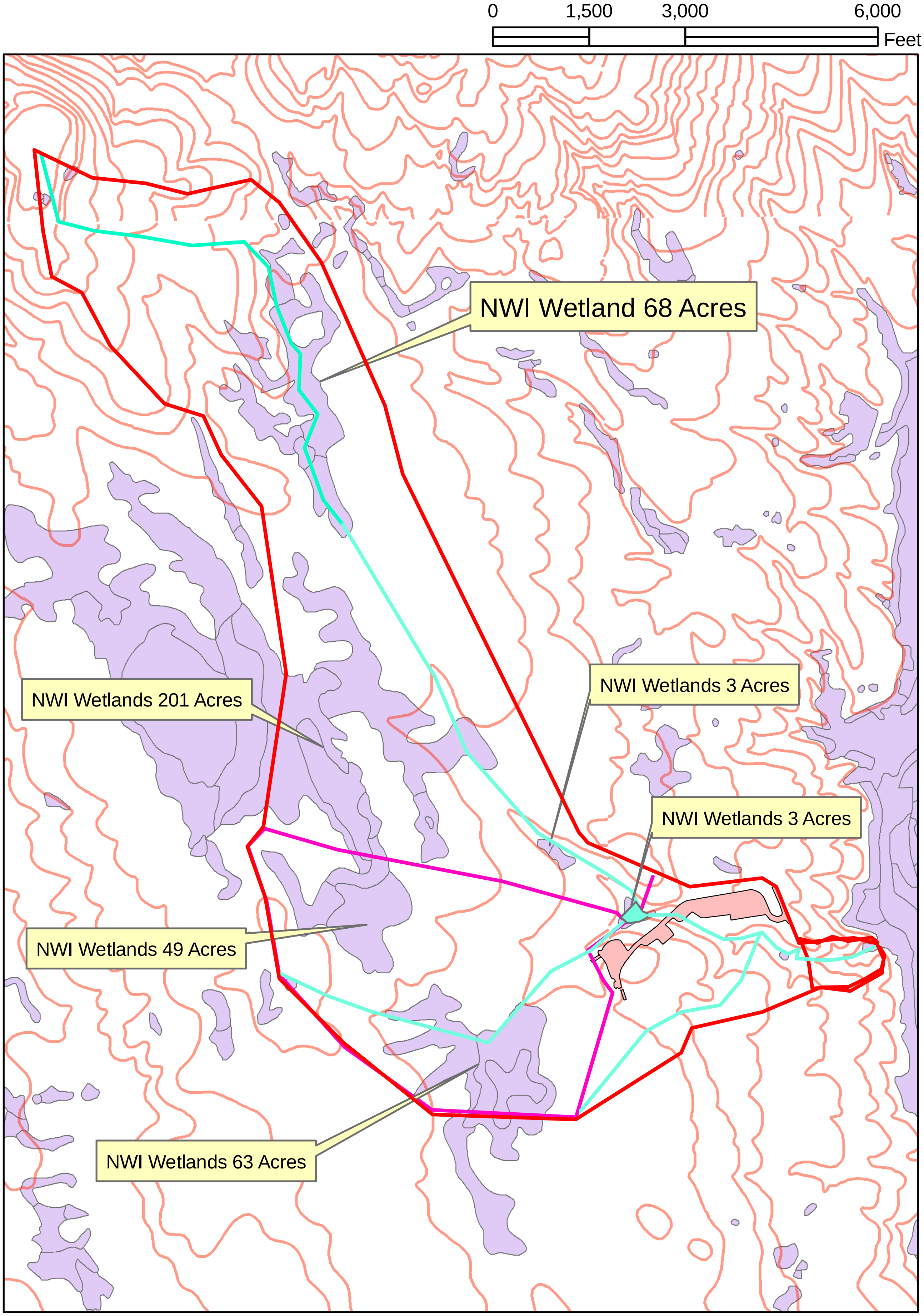
Acadia Gateway Hydrology - Soil Types

Figure 3a.



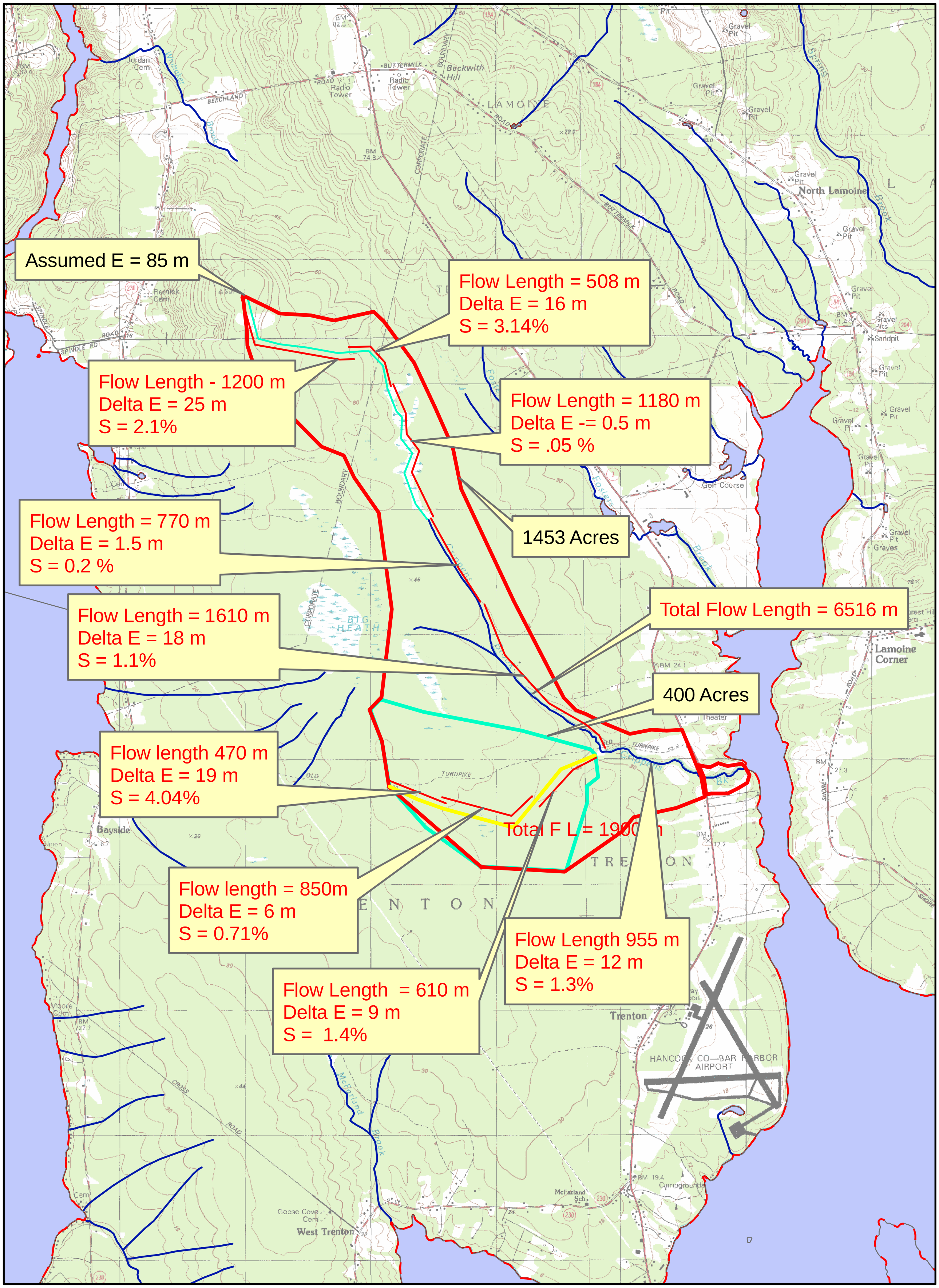
Acadia Gateway Hydrologic Soil Group D

Figure 3b.



Acadia Gateway Hydrology - NWI Wetlands

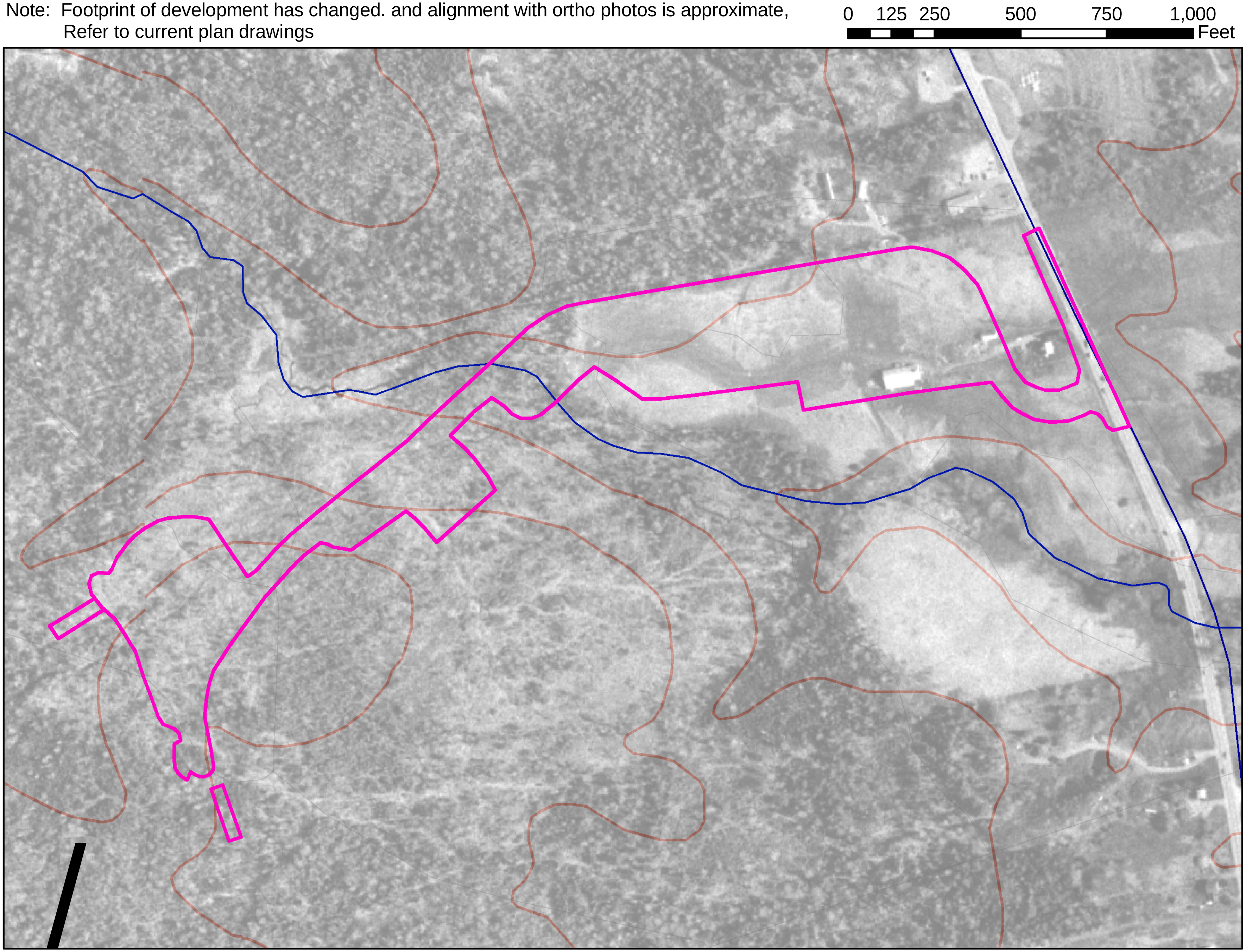
Figure 4.



Acadia Gateway Drainage Areas

Figure 5.

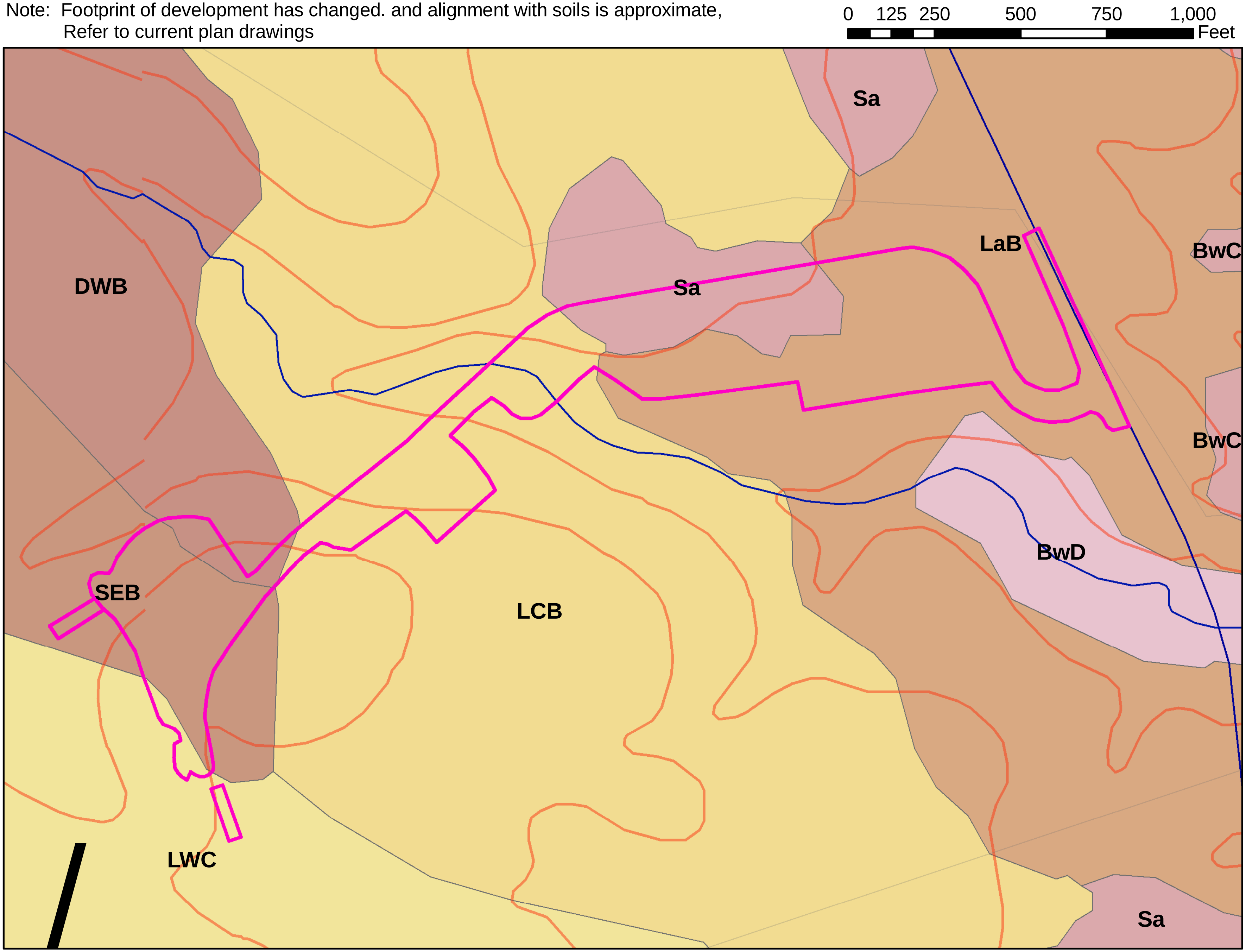
Note: Footprint of development has changed. and alignment with ortho photos is approximate,
Refer to current plan drawings



Acadia Gateway - Project Landuse Cover

Figure 6.

Note: Footprint of development has changed. and alignment with soils is approximate,
Refer to current plan drawings



Acadia Gateway - Project Site Soils

Figure 7.

Figure 3a.

Figure 3b.

Figure 1.

Figure 8b.

Figure 9a.

Sub Watershed 1-4 Post-Development Areas & Flow Lines (Contours)

Figure 9b.

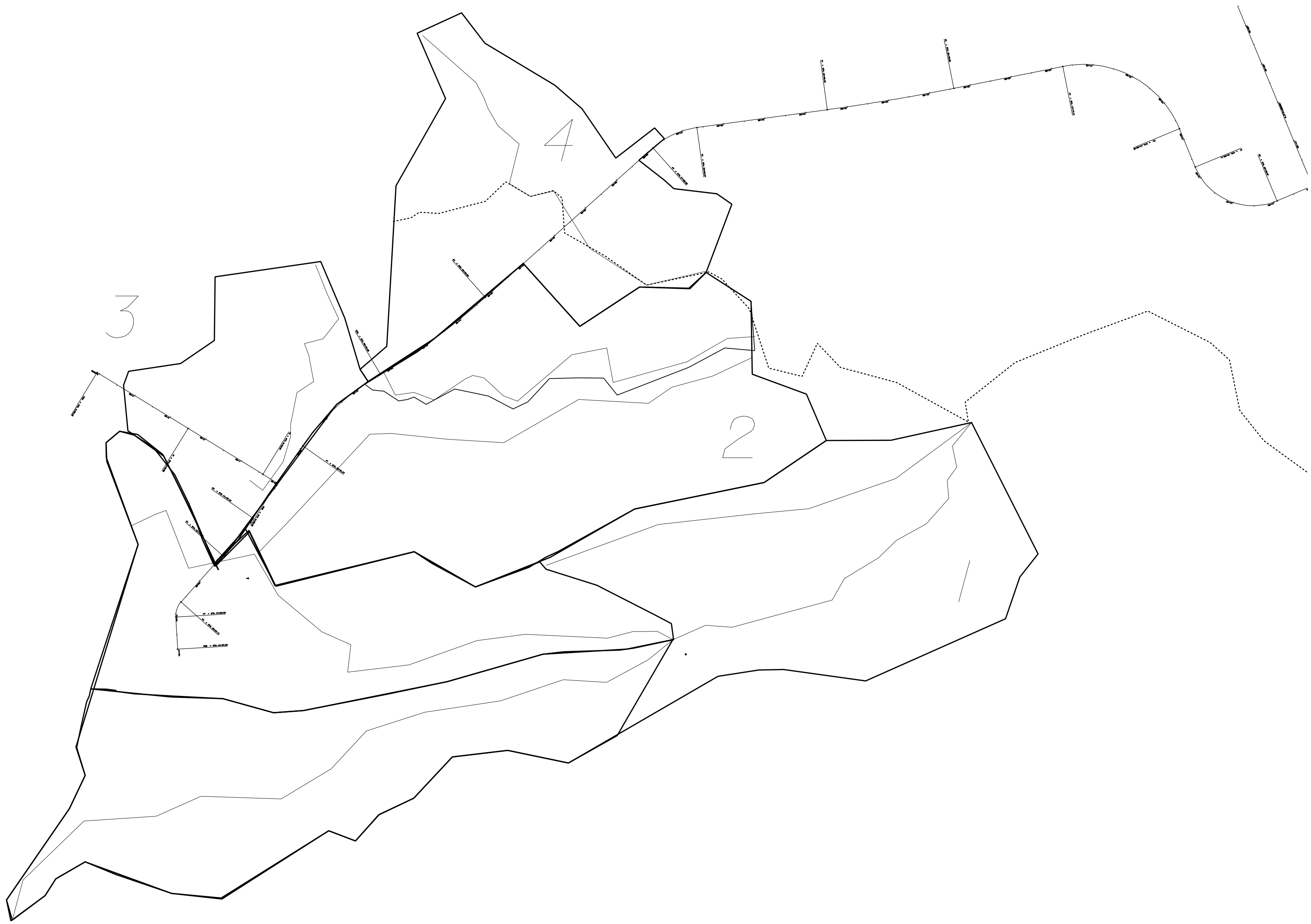


Figure 6.

Sub Watershe

Figure 9b.

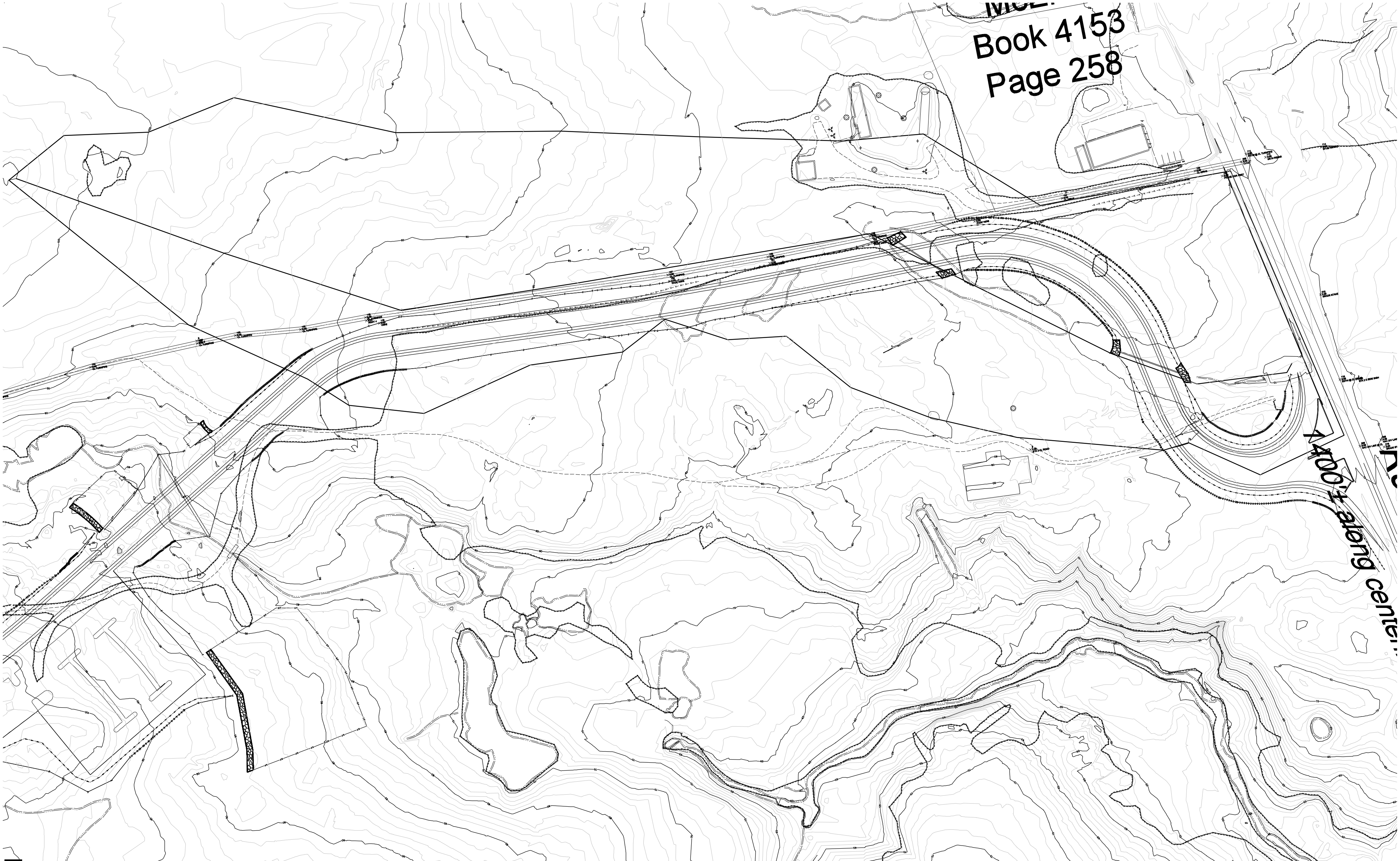


Figure 9a.

Figure 10b.

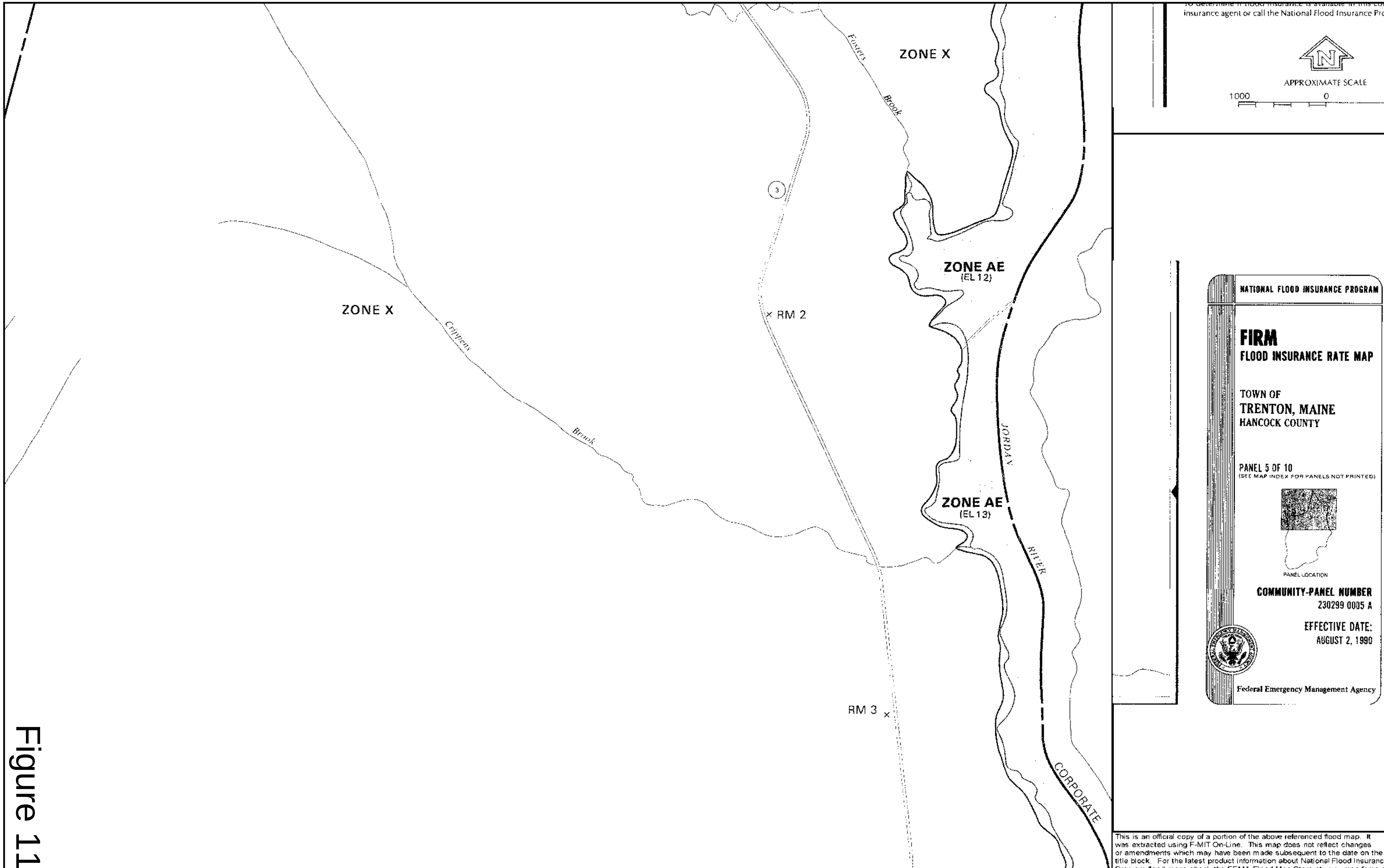

ZONE X
Fosters Brook
ZONE X
Crippens Brook
3
RM 2
ZONE AE
(EL 12)
ZONE AE
(EL 13)
JORDAN RIVER
RM 3
CORPORATE
APPROXIMATE SCALE
1000 0
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
TOWN OF
TRENTON, MAINE
HANCOCK COUNTY
PANEL 5 OF 10
(SEE MAP INDEX FOR PANELS NOT PRINTED)
PANEL LOCATION
COMMUNITY-PANEL NUMBER
230299 0005 A
EFFECTIVE DATE:
AUGUST 2, 1990
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Figure 11

Table 1.

MUSYM	MUNAME	HSG	DRAINAGEDS	HYDRICAP
BSB	BRAYTON-COLONEL ASSOCIATION, GENTLY SLOPING, VERY STONY	C	Poorly drained	Partially hydric
BwD	BUXTON SILT LOAM, 15 TO 30 PERCENT SLOPES, ERODED	C	Moderately well drained	Not hydric
DWB	DIXFIELD-COLONEL-TUNBRIDGE COMPLEX, GENTLY SLOPING, VERY STONY	C	Moderately well drained	Not hydric
DWB	DIXFIELD-COLONEL-TUNBRIDGE COMPLEX, GENTLY SLOPING, VERY STONY	C	Moderately well drained	Not hydric
TWC	TUNBRIDGE-LYMAN-MARLOW COMPLEX, STRONGLY SLOPING	C	Well drained	Not hydric
LWC	LYMAN-TUNBRIDGE-SCHOODIC COMPLEX, ROLLING, VERY STONY	C/D	Somewhat excessively drained	Not hydric
LaB	LAMOINE SILT LOAM, 3 TO 8 PERCENT SLOPES	D	Somewhat poorly drained	Not hydric
LCB	LAMOINE-SCANTIC-BUXTON ASSOCIATION, GENTLY SLOPING	D	Somewhat poorly drained	Partially hydric
Sa	SCANTIC SILT LOAM	D	Poorly drained	All hydric
SB	SCANTIC-BIDDEFORD ASSOCIATION	D	Poorly drained	All hydric
SEB	SCANTIC-LAMOINE-DIXFIELD COMPLEX, GENTLY SLOPING, VERY STONY	D	Poorly drained	Partially hydric
WT	WONSQUEAK, BUCKSPORT AND SEBAGO SOILS	D	Very poorly drained	All hydric

Yellow shading indicates soils in project area

Table 2.

HydroCAD Watershed	Area	Description *	Area (ft^2)	Area (Ac.)	Buffer Contributing Area Total (Ac.)	Buffer Area Hydrologic Soil Group	Buffer Area Slope (ft/ft)	Chapter 500 Berm Lgth/ Ac	Chapter 500 Flow Length	Design Berm Length (ft.)
	Impervious Areas that will drain to Stone Level Lip Spreader and Forested Buffer									
	2	Employee Parking	22,600	0.52						
	1A	Culdesac and Parking	9,720	0.22						
	1B	1/2 Road (42+50 LT - 43+25 LT)	3000	0.07	0.81	D	0.070	150	**150**	**122**
2	6	Overflow Parking	51,123	1.17						
	1D	1/2 Road (33+50 LT-36+50 LT)	4000	0.09	1.27	D	0.049	150	**150**	**190**
3	4	Maintenance Lot**	76,522	1.76						
	5	Maintenance Building Roof	21,081	0.48	2.24	D	0.067	150	**150**	**336**
	Road Sections that drain to ditch turnout buffer strip									
	1F	1/2 Road (27+50 RT - 29+50 RT)	4000	0.09	Treating as a Ditch Turnout Buffer			20	100	20
4					Dimension adjusted to avoid PFO wetland				**80**	**26**
	1E	1/2 Road (31+75 RT - 36+75 RT)	10000	0.23	0.32	D	0.056	150	150	48
					Exceed length for Ditch Turnout Buffer					
4					Revised dimensions to fit site conditions			60	**85**	**60**
	Road Sections that drain to buffers directly connected to road inslope ***									
2	1X	1/2 Road (35+00 LT - 42+50 LT)	15000	0.34						
3	1X	1/2 Road (36+25 RT - 40+00 RT)	7500	0.17						
4	1X	1/2 Road (27+50 LT - 29+50 LT)	4000	0.09						
4******	1X	Road (29+50 - 32+00 LT&RT)	10000	0.23						
*****	1X	1/2 Road (20+50 RT - 30+00 RT)	19000	0.44						
*****	1X	1/2 Road (20+75 LT - 27+50 LT)	13500	0.31						
	Impervious areas that do not require treatment									
******	1X	1/2 Road (10+00 RT - 20+50 RT)	21000	0.48	Road drainage discharges to ephemeral stream through a Rt 3 cross pipe at Station 170+89 and directly to the Jordan River					
******	1X	1/2 Road (14+50 LT - 27+50 RT)	26000	0.60	Road drainage discharges to ephemeral stream through a Rt 3 cross pipe at Station 170+89 and directly to the Jordan River					
******	1X	1/2 Road (10+00 RT - 14+50 RT)	9000	0.21	Road drainage discharges to e Rt 3 road ditch and to Crippens Brook at Rt 3 box culvert					
			Total Acres =	7.51						

*   1/2 Road Width = 12 ft travel lane + 4 ft Bike Lane + 4 ft Gravel Shoulder = 20 Feet
** Portion of road in front of maintneance lot is offset by uncurbed section of lot that drains to inslope filter and not to designed filter strip
*** When Phase 2 is designed, sections that drain to additional impervious areas will be included in those areas for quantity and quality design
**** Does not meet specs. Road section is on approachs and over Crippens Brook Crossing which has and inslopes were minimized for fish passage.
***** Drainage Areas are outside of Phase 1 HydroCAD Model area because landuse changes are insignificant in model. They will be incorporated into Phase II
****** Drainage Areas do not flow to Crippens Brook and are insignificant to quantitative impacts to ehemeral stream outlet under Rt 3 at STA 170+89

2750	2825	20	1500
2825	3200	40	15000
3200	3675	20	9500
			26000

Table 3.

PRE

Area	Sq Ft	Acres	Flow Lnth
1	1218660	28.0	2808
2	642388	14.7	1674
3	161378	3.7	981
4	451804	10.4	862
	Tot. Acres	56.8	

POST

New Subs

Area	Sq Ft	Acres	Flow Lnth	Area	Sq Ft	Acres	Flow Lnth	Area	Sq Ft	Acres	Flow Lnth	Area	Sq Ft	Acres	Flow Lnth
1	1325319	30.4	2930	1AS	401703	9.2	1352	1BS	455037	10.4	1833	1CS	468579	10.8	1097
2	630149	14.5	1358	2AS	169886	3.9	1103	2BS	460263	10.6	1501				
3	222944	5.1	1691												
4	363358	8.3	1041												
	Tot. Acres	58.4													

PRE

Area	Flow Lnth	E1	E2	Slope
1	2808			
Sheet	200	132	127	0.025
Shallow	835	127	107	0.024
Chan	496	127	95	0.065
	1277	95	60	0.027
2	1674			
Sheet	200	123	120	0.015
Shallow	912	120	95	0.027
Chan	562	95	75	0.036
3	981			0.000
Sheet	275	123	122	0.004
Shallow	705	122	90	0.045
Chan				
4	862			
Sheet	280	104	100	0.014
Shallow	407	100	79	0.052
Chan	175	79	78	0.006

POST

Area	Flow Lnth	E1	E2	Slope	Comments	Area	Flow Lnth	E1	E2	Slope	Comments	Area	Flow Lnth	E1	E2	Slope
1AS	1591					1BS	1833					1CS	1097			
Sheet	65	122	121	0.015	Woods	Sheet	200	132	127	0.025	Woods	Sheet	150	100	98	0.013
Sheet	177	118	117	0.006	Parking	Shallow	835	127	107	0.024	Woods	shallow	480	98	89	0.019
pipe	161	115	112	0.019	Pipe	Chan	798	127	87	0.050	Woods	shallow	467	89	60	0.062
channel	311	112	109.5	0.008	Stone Ditch											
channel	75	109.5	109	0.007	Level Lip											
sheet	122	109	103	0.049	Filter Strip											
shallow	373	103	97.5	0.015	Woods		1 AB Reach	985	87	60	0.027					
channel	307	97.5	87	0.034	Woods											
2AS	1103			0.000		2BS	1358									
Sheet	145	105	104	0.007	Parking lot	Sheet	200	112	104	0.040	Woods					
Shallow	15	104	102	0.133	Inslope	Shallow	876	104	86	0.021	Woods					
channel	504	102	89	0.026	Ditch	Chan	282	86	75	0.039	Woods					
channel	85	89	88.9	0.001	Level Lip											
sheet	150	88.9	81	0.053	Filter Strip											
shallow	204	81	75	0.029	Woods											
3	613								Imperv in 1AS			Imperv in 2AS				
Sheet	20	130	118	0.600	Roof				0.78	ac		1.27	ac			
Sheet	130	112	111.5	0.004	Parking				Non imperv in 1AS			Non imperv in 2AS				
Sheet	22	111.5	105	0.295	Inslope				8.44	ac		2.63	ac			
Shallow	230	105	99.5	0.024	Woods											
Channel	118	99.5	99	0.004	Level Lip				Imperv in 3S			Imperv in 4S				
Sheet	150	99	90	0.060	Filter Strip				2.24	ac		0.63	ac			
									Non imperv in 3S			Non imperv in 4S				
4	1055								2.88	ac		7.71	ac			
Sheet	250	106	95	0.044	Woods											
Shallow	144	95	86	0.063	Woods											
Chan	591	86	78	0.014	Stream											

Table 4.

	Area (ac.)		%	2 YR		%	10 YR		%	25 YR		%	50 YR		%
	Pre	Post	Change	Pre	Post	Change	Pre	Post	Change	Pre	Post	Change	Pre	Post	Change
SW1	28	30.4	8.57	7.46	9.25	23.99	18.10	22.19	22.60	23.60	28.82	22.12	27.65	33.70	21.88
Time to Peak				13.43	13.26		13.34	13.18		13.32	13.16		13.31	13.15	
SW2	14.7	14.5	-1.36	3.67	5.06	37.87	9.00	11.63	29.22	11.75	14.95	27.23	13.78	17.38	26.12
Time to Peak				13.49	12.89		13.40	12.87		13.39	12.87		13.39	12.87	
SW3	3.7	5.1	37.84	0.95	4.20	342.11	2.30	8.19	256.09	3.00	10.10	236.67	3.51	11.48	227.07
Time to Peak				13.47	12.54		13.44	12.52		13.44	12.52		13.43	12.52	
SW4	10.4	8.3	-20.19	2.60	2.08	-20.00	6.30	4.83	-23.33	8.21	6.40	-22.05	9.62	7.24	-24.74
Time to Peak				13.58	13.71		13.47	13.67		13.46	13.74		13.45	13.67	
Total WS	1335.8	1337.2	0.10	117.08	116.66	-0.36	317.56	314.47	-0.97	427.31	422.82	-1.05	510.04	504.00	-1.18
Time to Peak				14.10	14.10		14.00	14.01		13.98	13.99		13.97	13.98	

Table 4.

Project: Acadia Gateway **PIN:** 13332.09 **Town:** Trenton

Procedures according to MaineDOT Highway Design Guide Chap. 12 Drainage

USGS

Q=b(A)^a*10^(-wW)

A (Acres)	NWI(Acres)
1337	384

A (sqKm)	NWI(sqKm)
5.41	1.55
Percent NWI W =	28.72
	<=27

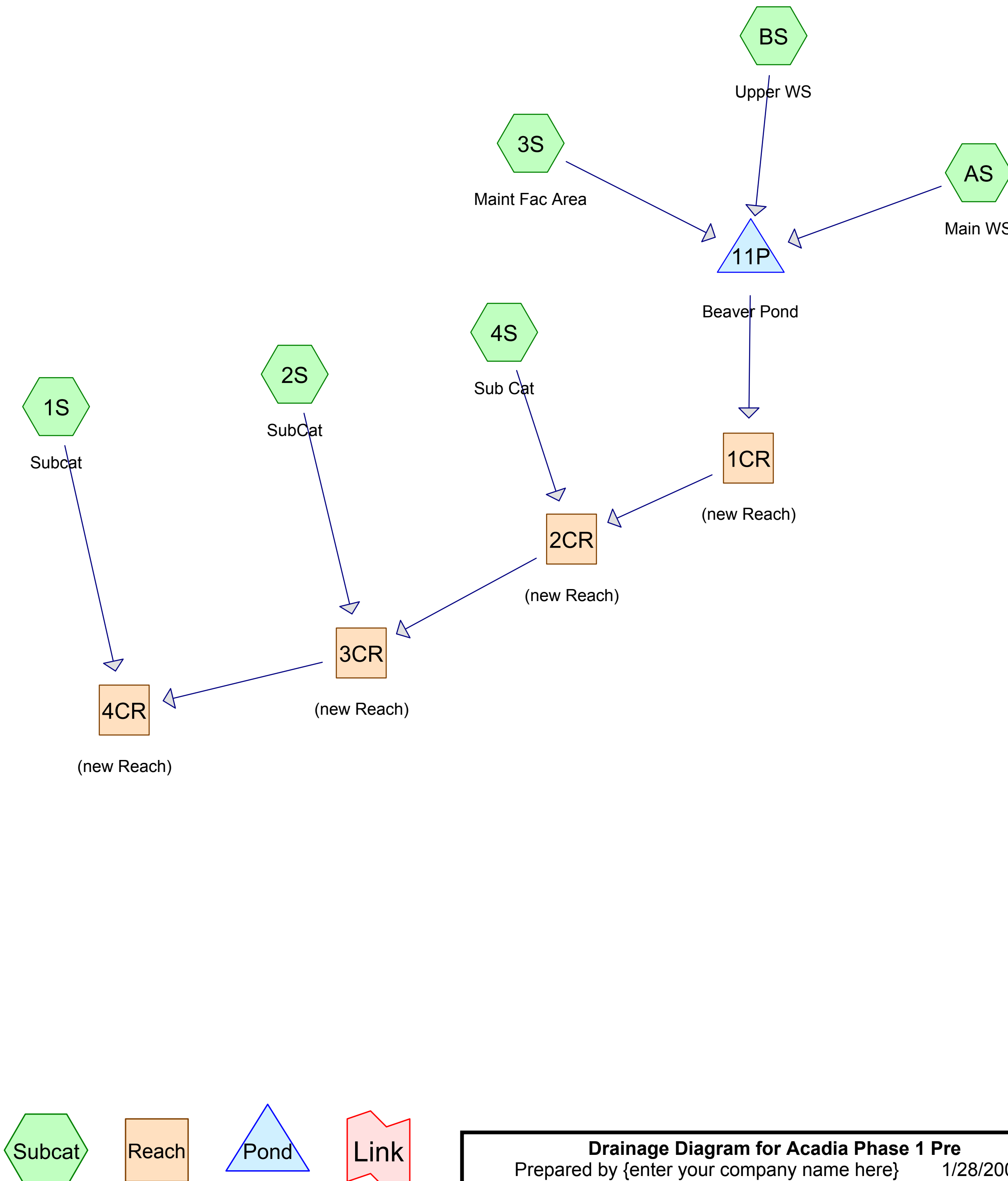
b	a	w	Q(csm)	Q (cfs)	T
1.075	0.848	0.0266	4.50	159	2
1.952	0.820	0.0288	7.79	275	5
2.674	0.806	0.0300	10.43	368	10
3.740	0.790	0.0312	14.20	501	25
4.637	0.780	0.0320	17.31	611	50
5.629	0.771	0.0326	20.69	730	100
8.283	0.754	0.0340	29.58	1044	500

Compare Qs

Q (cfs)	Hydrocad	USGS	T
	318	368	10
	510	611	50
	613	730	100

Appendix A

HydroCAD Model



Drainage Diagram for Acadia Phase 1 Pre
Prepared by {enter your company name here} 1/28/2009
HydroCAD® 7.10 s/n 001495 © 2005 HydroCAD Software Solutions LLC

Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcat Runoff Area=28.000 ac Runoff Depth>0.83"
Flow Length=2,808' Tc=111.1 min CN=77 Runoff=7.46 cfs 1.947 af

Subcatchment 2S: SubCat Runoff Area=14.700 ac Runoff Depth>0.83"
Flow Length=1,638' Tc=119.2 min CN=77 Runoff=3.67 cfs 1.019 af

Subcatchment 3S: Maint Fac Area Runoff Area=3.700 ac Runoff Depth>0.83"
Flow Length=980' Tc=117.7 min CN=77 Runoff=0.95 cfs 0.257 af

Subcatchment 4S: Sub Cat Runoff Area=10.400 ac Runoff Depth>0.83"
Flow Length=862' Tc=121.1 min CN=77 Runoff=2.60 cfs 0.720 af

Subcatchment AS: Main WS Runoff Area=880.000 ac Runoff Depth>0.51"
Flow Length=18,419' Tc=280.1 min CN=71 Runoff=73.73 cfs 37.689 af

Subcatchment BS: Upper WS Runoff Area=399.000 ac Runoff Depth>0.73"
Flow Length=6,330' Tc=125.5 min CN=75 Runoff=82.80 cfs 24.401 af

Reach 1CR: (new Reach) Peak Depth=1.49' Max Vel=3.6 fps Inflow=107.13 cfs 62.347 af
n=0.050 L=923.0' S=0.0103 '/' Capacity=485.68 cfs Outflow=107.07 cfs 61.916 af

Reach 2CR: (new Reach) Peak Depth=1.42' Max Vel=3.8 fps Inflow=109.17 cfs 62.636 af
n=0.050 L=241.0' S=0.0124 '/' Capacity=534.13 cfs Outflow=109.16 cfs 62.529 af

Reach 3CR: (new Reach) Peak Depth=1.17' Max Vel=4.8 fps Inflow=112.05 cfs 63.548 af
n=0.050 L=630.0' S=0.0246 '/' Capacity=750.91 cfs Outflow=112.02 cfs 63.319 af

Reach 4CR: (new Reach) Peak Depth=1.60' Max Vel=3.7 fps Inflow=117.28 cfs 65.266 af
n=0.050 L=1.0' S=0.0100 '/' Capacity=478.73 cfs Outflow=117.28 cfs 65.266 af

Pond 11P: Beaver Pond Inflow=107.13 cfs 62.347 af
Primary=107.13 cfs 62.347 af

Total Runoff Area = 1,335.800 ac Runoff Volume = 66.033 af Average Runoff Depth = 0.59"

Subcatchment 1S: Subcat

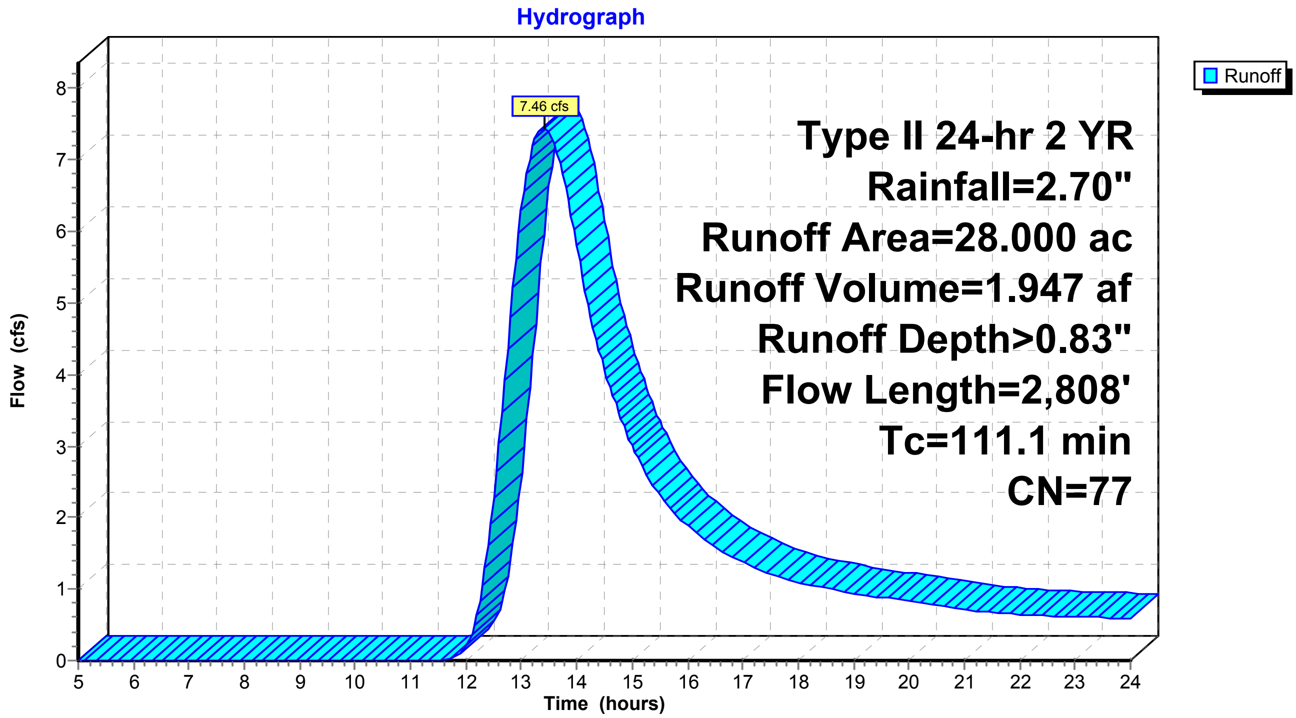
Runoff = 7.46 cfs @ 13.43 hrs, Volume= 1.947 af, Depth> 0.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
28.000	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.8	200	0.0250	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
35.9	835	0.0240	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
2.7	496	0.0650	3.0	1.50	**Channel Flow, First Chan Flow** Area= 0.5 sf Perim= 2.0' r= 0.25' n= 0.050 Mountain streams w/large boulders
7.7	1,277	0.0270	2.8	4.16	**Channel Flow, Lower Chan Flow** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
111.1	2,808	Total			

Subcatchment 1S: Subcat



Subcatchment 2S: SubCat

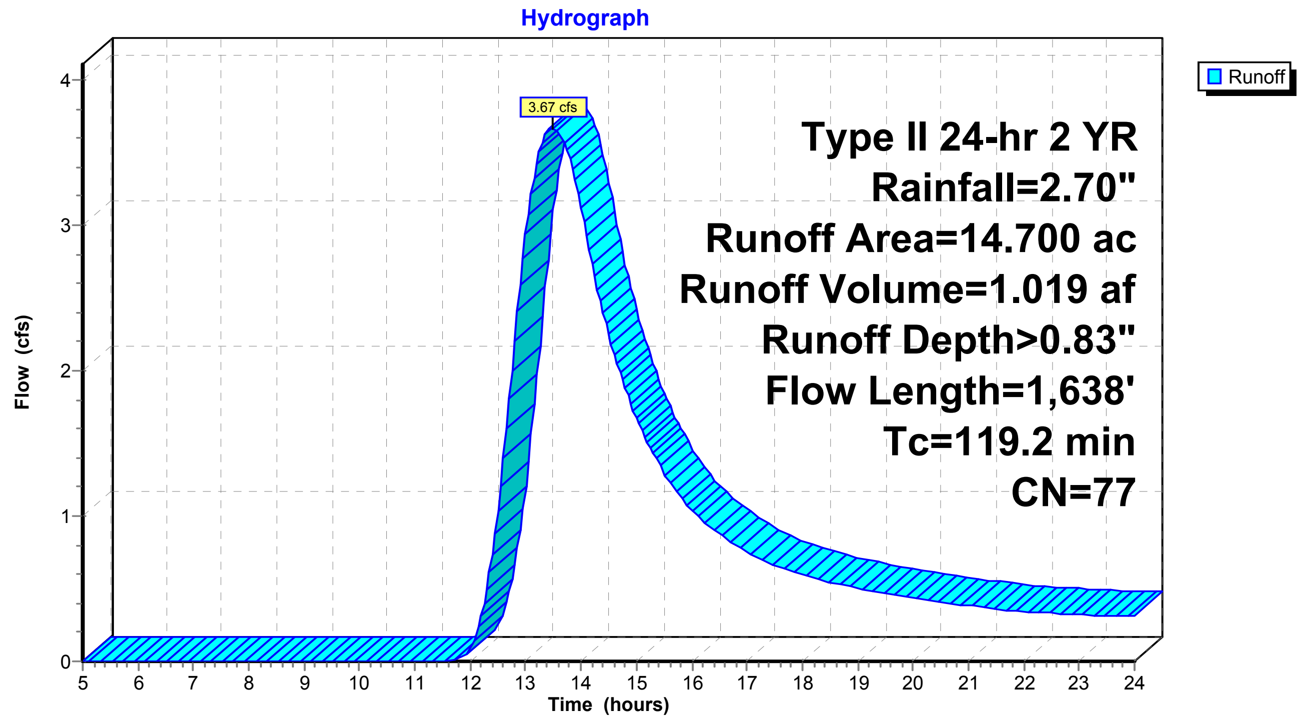
Runoff = 3.67 cfs @ 13.49 hrs, Volume= 1.019 af, Depth> 0.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
14.700	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
79.5	200	0.0150	0.0		**Sheet Flow, 200** Woods: Dense underbrush n= 0.800 P2= 2.70"
37.0	912	0.0270	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
2.7	526	0.0380	3.3	4.94	**Channel Flow, Channel** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
119.2	1,638	Total			

Subcatchment 2S: SubCat



Subcatchment 3S: Maint Fac Area

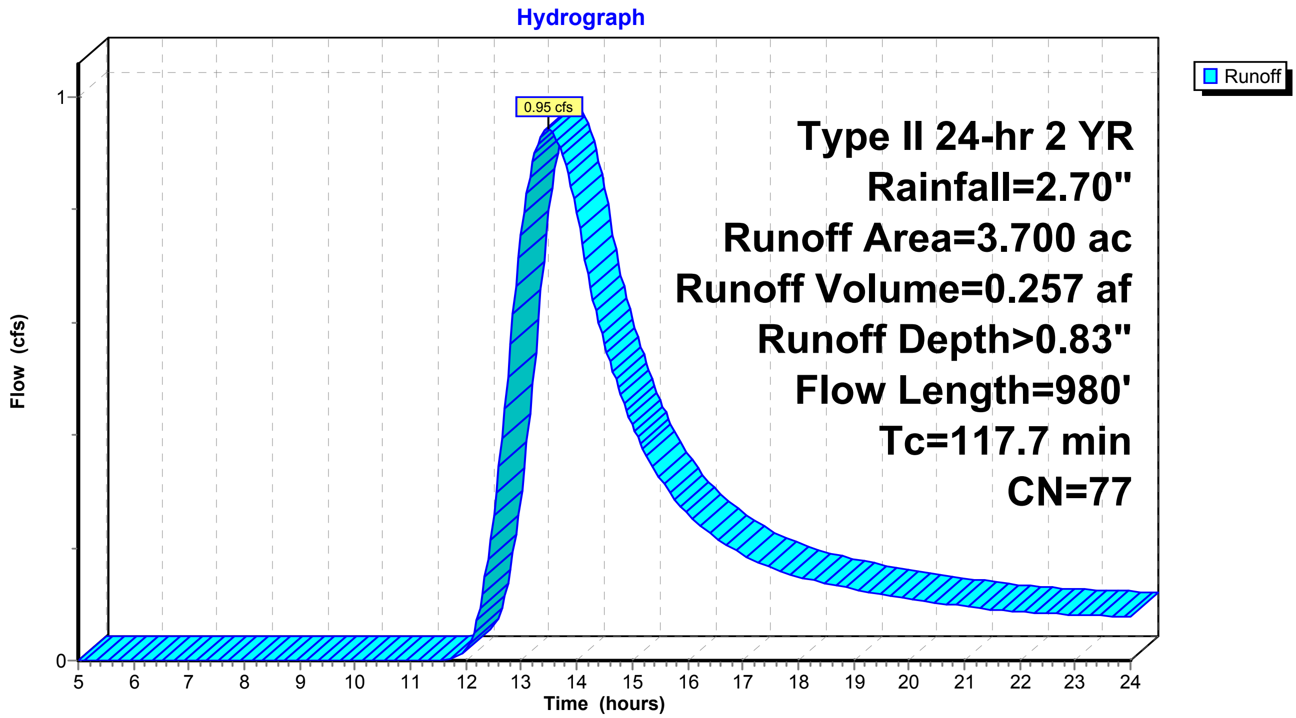
Runoff = 0.95 cfs @ 13.47 hrs, Volume= 0.257 af, Depth> 0.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
3.700	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.4	275	0.0200	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
26.3	705	0.0320	0.4		**Shallow Concentrated Flow, Shallow Concentrated** Forest w/Heavy Litter Kv= 2.5 fps
117.7	980	Total			

Subcatchment 3S: Maint Fac Area



Subcatchment 4S: Sub Cat

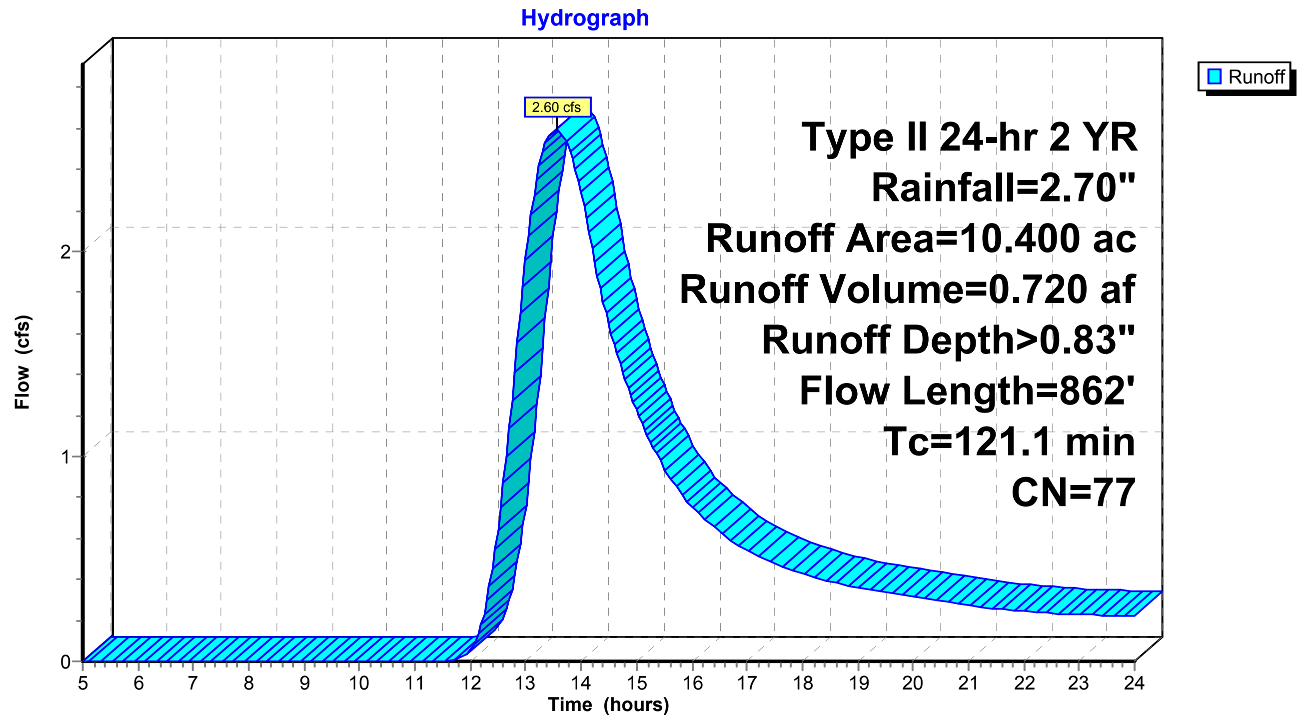
Runoff = 2.60 cfs @ 13.58 hrs, Volume= 0.720 af, Depth> 0.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
10.400	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
107.0	280	0.0140	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
11.9	407	0.0520	0.6		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
2.2	175	0.0060	1.3	1.96	**Channel Flow, Chann Flow** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
121.1	862	Total			

Subcatchment 4S: Sub Cat



Subcatchment AS: Main WS

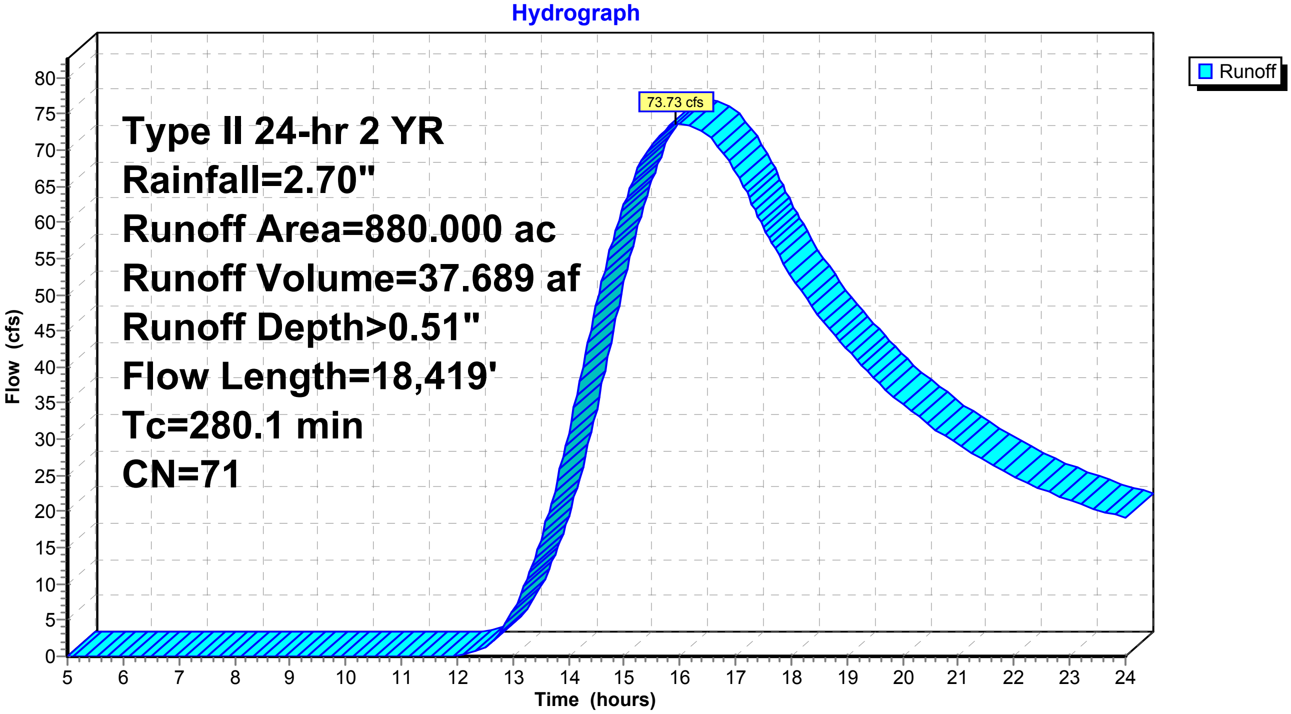
Runoff = 73.73 cfs @ 15.91 hrs, Volume= 37.689 af, Depth> 0.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
151.000	77	Woods, Good, HSG D
46.000	73	Brush, Good, HSG D
683.000	70	Woods, Good, HSG C
880.000	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.9	100	0.0210	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
46.0	1,000	0.0210	0.4		**Shallow Concentrated Flow, Shallow Concen** Forest w/Heavy Litter Kv= 2.5 fps
32.6	4,500	0.0260	2.3	2.30	**Channel Flow, Before Upper Wetland** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.050 Mountain streams w/large boulders
97.4	3,870	0.0050	0.7	1.32	**Channel Flow, Channel Flow in Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.100 Very weedy reaches w/pools
15.9	2,525	0.0200	2.6	5.30	**Channel Flow, Open Channel** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.050 Mountain streams w/large boulders
48.3	6,424	0.0110	2.2	6.65	**Channel Flow, Open Channel** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
280.1	18,419	Total			

Subcatchment AS: Main WS



Subcatchment BS: Upper WS

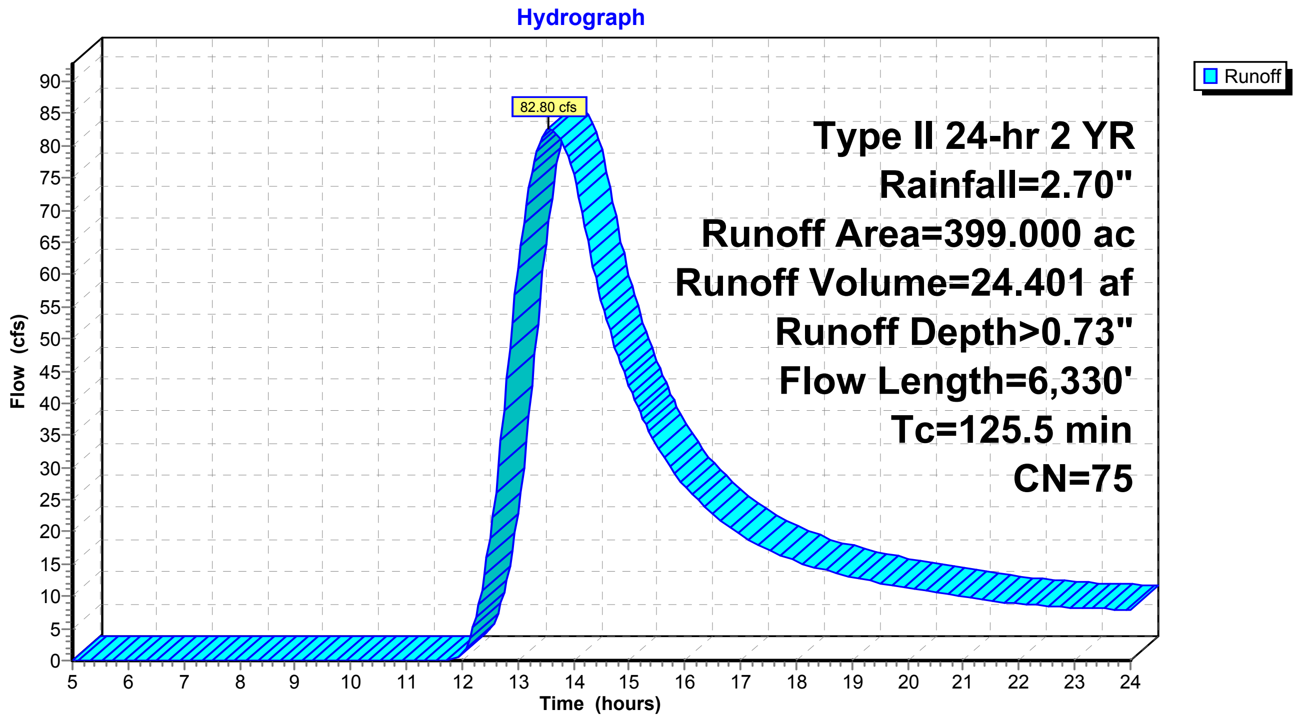
Runoff = 82.80 cfs @ 13.56 hrs, Volume= 24.401 af, Depth> 0.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
245.000	77	Woods, Good, HSG D
31.000	73	Brush, Good, HSG D
123.000	70	Woods, Good, HSG C
399.000	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
33.3	1,000	0.0400	0.5		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
48.1	3,230	0.0070	1.1	2.24	**Channel Flow, Through Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.070 Sluggish weedy reaches w/pools
13.3	2,000	0.0140	2.5	7.50	**Channel Flow, Lower Reach** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
125.5	6,330	Total			

Subcatchment BS: Upper WS



Reach 1CR: (new Reach)

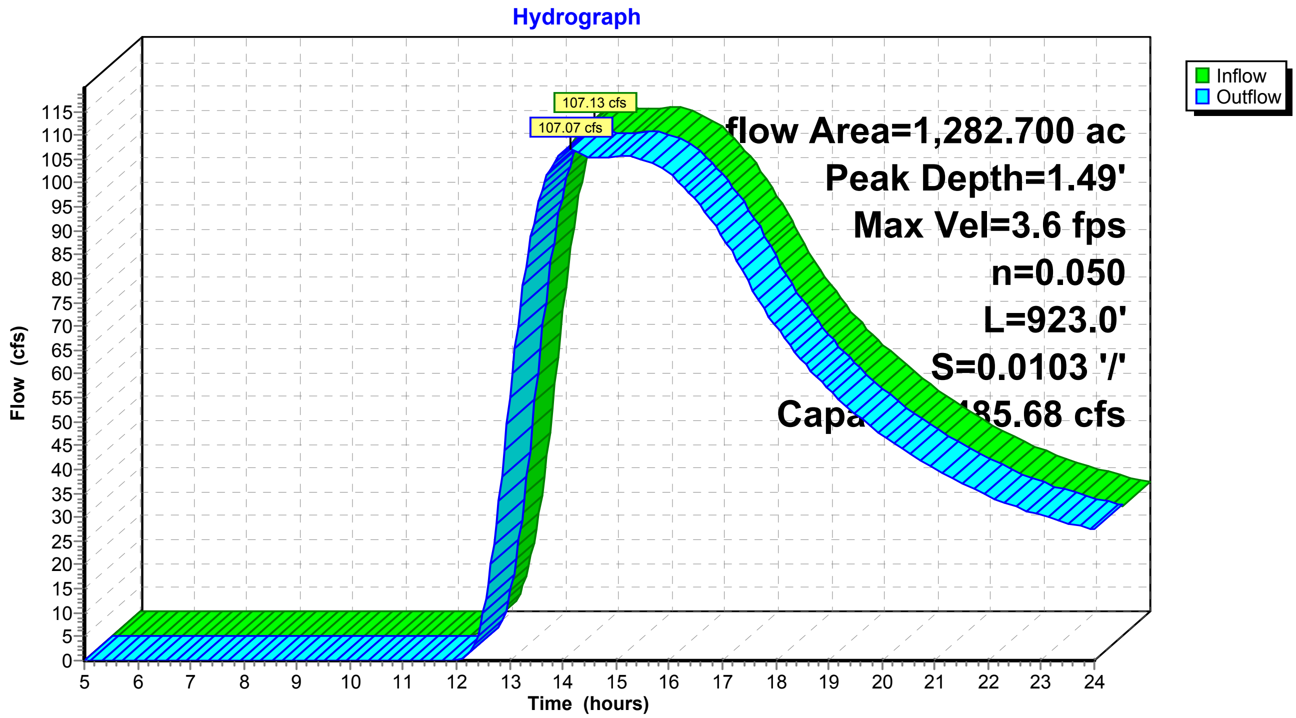
Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

Inflow Area = 1,282.700 ac, Inflow Depth > 0.58" for 2 YR event
Inflow = 107.13 cfs @ 14.06 hrs, Volume= 62.347 af
Outflow = 107.07 cfs @ 14.15 hrs, Volume= 61.916 af, Atten= 0%, Lag= 5.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.6 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 2.7 fps, Avg. Travel Time= 5.7 min

Peak Depth= 1.49' @ 14.09 hrs
Capacity at bank full= 485.68 cfs
Inlet Invert= 87.00', Outlet Invert= 77.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 923.0' Slope= 0.0103 '/'

Reach 1CR: (new Reach)



Reach 2CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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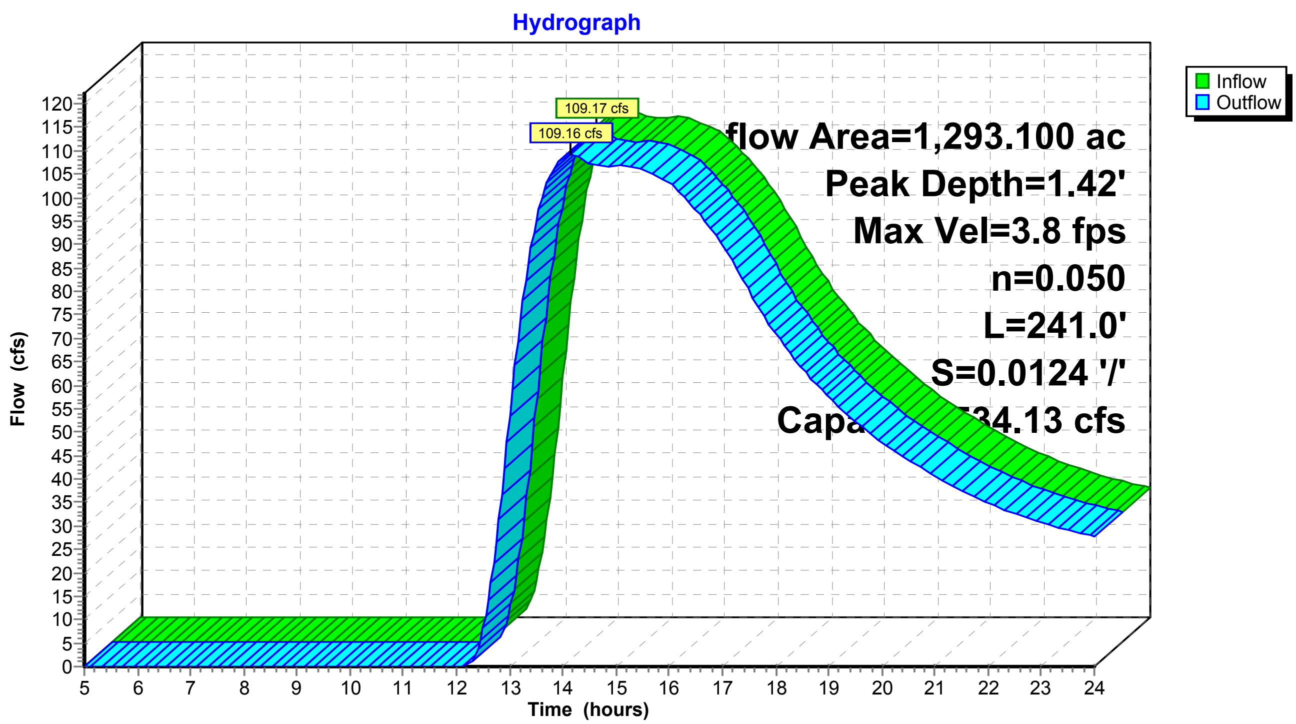
[61] Hint: Submerged 15% of Reach 1CR bottom

Inflow Area = 1,293.100 ac, Inflow Depth > 0.58" for 2 YR event
Inflow = 109.17 cfs @ 14.12 hrs, Volume= 62.636 af
Outflow = 109.16 cfs @ 14.15 hrs, Volume= 62.529 af, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.8 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 2.8 fps, Avg. Travel Time= 1.4 min

Peak Depth= 1.42' @ 14.13 hrs
Capacity at bank full= 534.13 cfs
Inlet Invert= 77.50', Outlet Invert= 74.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 241.0' Slope= 0.0124 '/'

Reach 2CR: (new Reach)



Reach 3CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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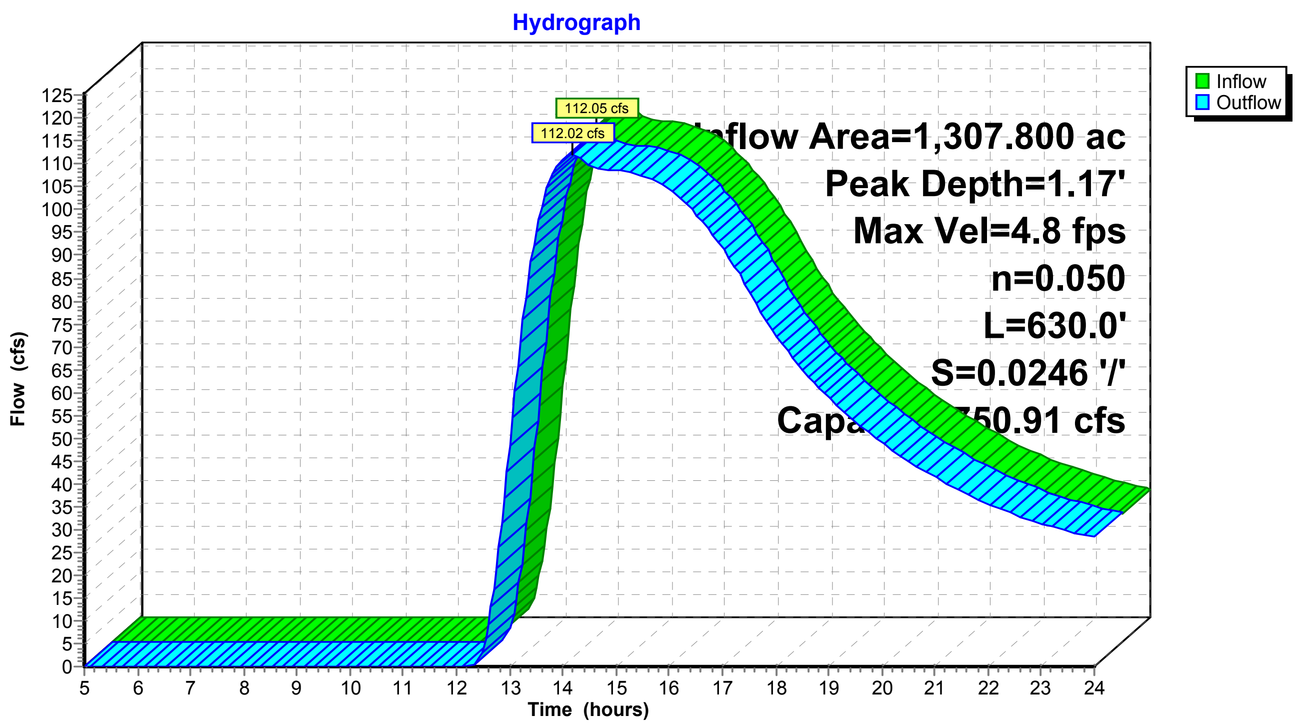
[61] Hint: Submerged 39% of Reach 2CR bottom

Inflow Area = 1,307.800 ac, Inflow Depth > 0.58" for 2 YR event
Inflow = 112.05 cfs @ 14.10 hrs, Volume= 63.548 af
Outflow = 112.02 cfs @ 14.17 hrs, Volume= 63.319 af, Atten= 0%, Lag= 3.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.8 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 3.5 fps, Avg. Travel Time= 3.0 min

Peak Depth= 1.17' @ 14.13 hrs
Capacity at bank full= 750.91 cfs
Inlet Invert= 74.50', Outlet Invert= 59.00'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 630.0' Slope= 0.0246 '/'

Reach 3CR: (new Reach)



Reach 4CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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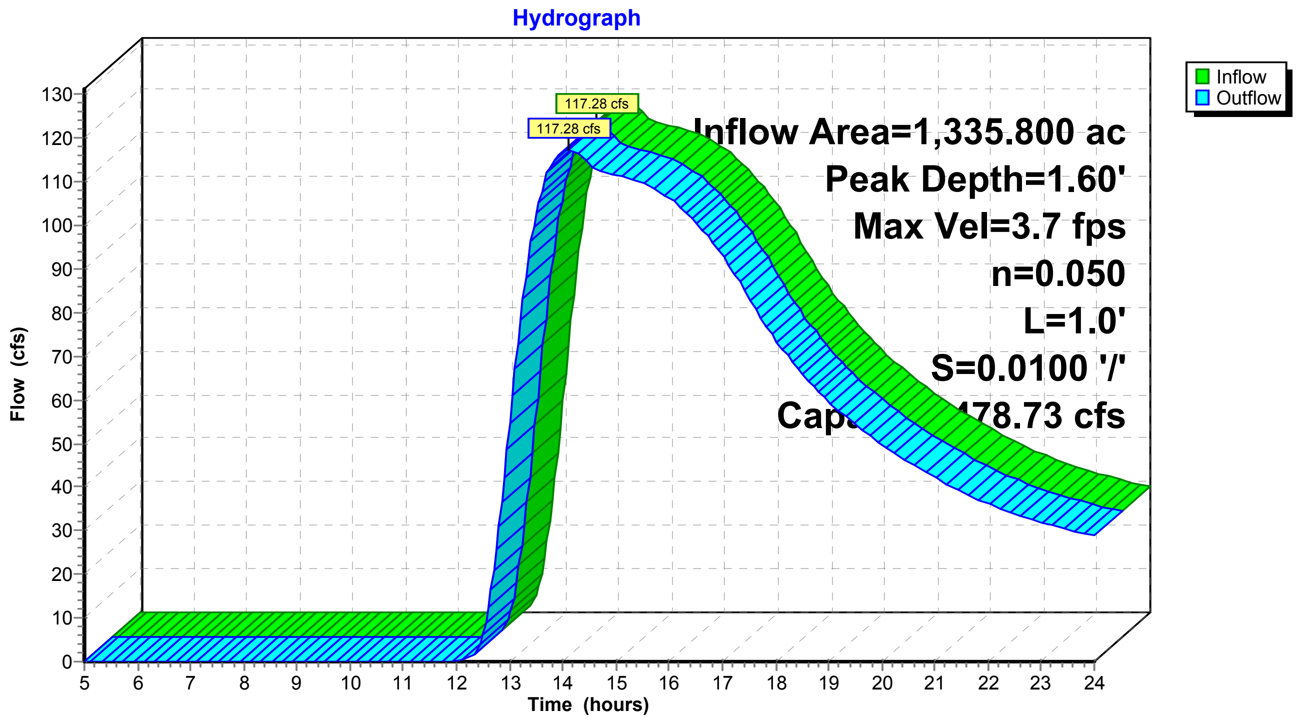
[61] Hint: Submerged 10% of Reach 3CR bottom

Inflow Area = 1,335.800 ac, Inflow Depth > 0.59" for 2 YR event
Inflow = 117.28 cfs @ 14.10 hrs, Volume= 65.266 af
Outflow = 117.28 cfs @ 14.10 hrs, Volume= 65.266 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.6 fps, Avg. Travel Time= 0.0 min

Peak Depth= 1.60' @ 14.10 hrs
Capacity at bank full= 478.73 cfs
Inlet Invert= 59.00', Outlet Invert= 58.99'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 1.0' Slope= 0.0100 '/'

Reach 4CR: (new Reach)



Pond 11P: Beaver Pond

Beaver Pond has minimal storage (observed to be 2 inches on 9/28/08) and therefore shown as without in both pre and post development and no effect on comparative flows.

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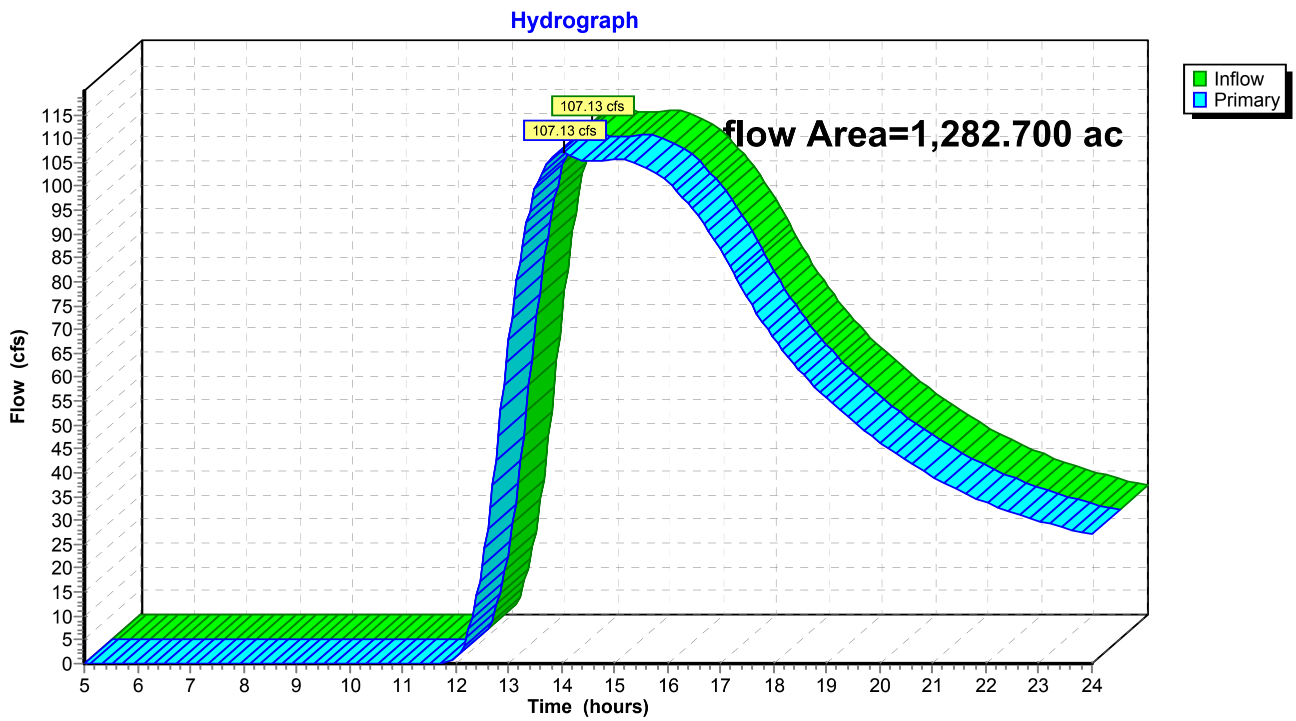
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,282.700 ac, Inflow Depth > 0.58" for 2 YR event
Inflow = 107.13 cfs @ 14.06 hrs, Volume= 62.347 af
Primary = 107.13 cfs @ 14.06 hrs, Volume= 62.347 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs

Pond 11P: Beaver Pond



Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcat Runoff Area=28.000 ac Runoff Depth>1.90"
Flow Length=2,808' Tc=111.1 min CN=77 Runoff=18.10 cfs 4.444 af

Subcatchment 2S: SubCat Runoff Area=14.700 ac Runoff Depth>1.90"
Flow Length=1,638' Tc=119.2 min CN=77 Runoff=9.00 cfs 2.327 af

Subcatchment 3S: Maint Fac Area Runoff Area=3.700 ac Runoff Depth>1.90"
Flow Length=980' Tc=117.7 min CN=77 Runoff=2.30 cfs 0.586 af

Subcatchment 4S: Sub Cat Runoff Area=10.400 ac Runoff Depth>1.90"
Flow Length=862' Tc=121.1 min CN=77 Runoff=6.30 cfs 1.645 af

Subcatchment AS: Main WS Runoff Area=880.000 ac Runoff Depth>1.36"
Flow Length=18,419' Tc=280.1 min CN=71 Runoff=209.02 cfs 100.044 af

Subcatchment BS: Upper WS Runoff Area=399.000 ac Runoff Depth>1.75"
Flow Length=6,330' Tc=125.5 min CN=75 Runoff=215.16 cfs 58.093 af

Reach 1CR: (new Reach) Peak Depth=2.85' Max Vel=5.1 fps Inflow=292.74 cfs 158.723 af
n=0.050 L=923.0' S=0.0103 '/' Capacity=485.68 cfs Outflow=292.59 cfs 158.064 af

Reach 2CR: (new Reach) Peak Depth=2.71' Max Vel=5.5 fps Inflow=297.72 cfs 159.709 af
n=0.050 L=241.0' S=0.0124 '/' Capacity=534.13 cfs Outflow=297.70 cfs 159.546 af

Reach 3CR: (new Reach) Peak Depth=2.20' Max Vel=6.9 fps Inflow=304.71 cfs 161.873 af
n=0.050 L=630.0' S=0.0246 '/' Capacity=750.91 cfs Outflow=304.64 cfs 161.526 af

Reach 4CR: (new Reach) Peak Depth=3.04' Max Vel=5.2 fps Inflow=317.56 cfs 165.970 af
n=0.050 L=1.0' S=0.0100 '/' Capacity=478.73 cfs Outflow=317.56 cfs 165.969 af

Pond 11P: Beaver Pond Inflow=292.74 cfs 158.723 af
Primary=292.74 cfs 158.723 af

Total Runoff Area = 1,335.800 ac Runoff Volume = 167.140 af Average Runoff Depth = 1.50"

Subcatchment 1S: Subcat

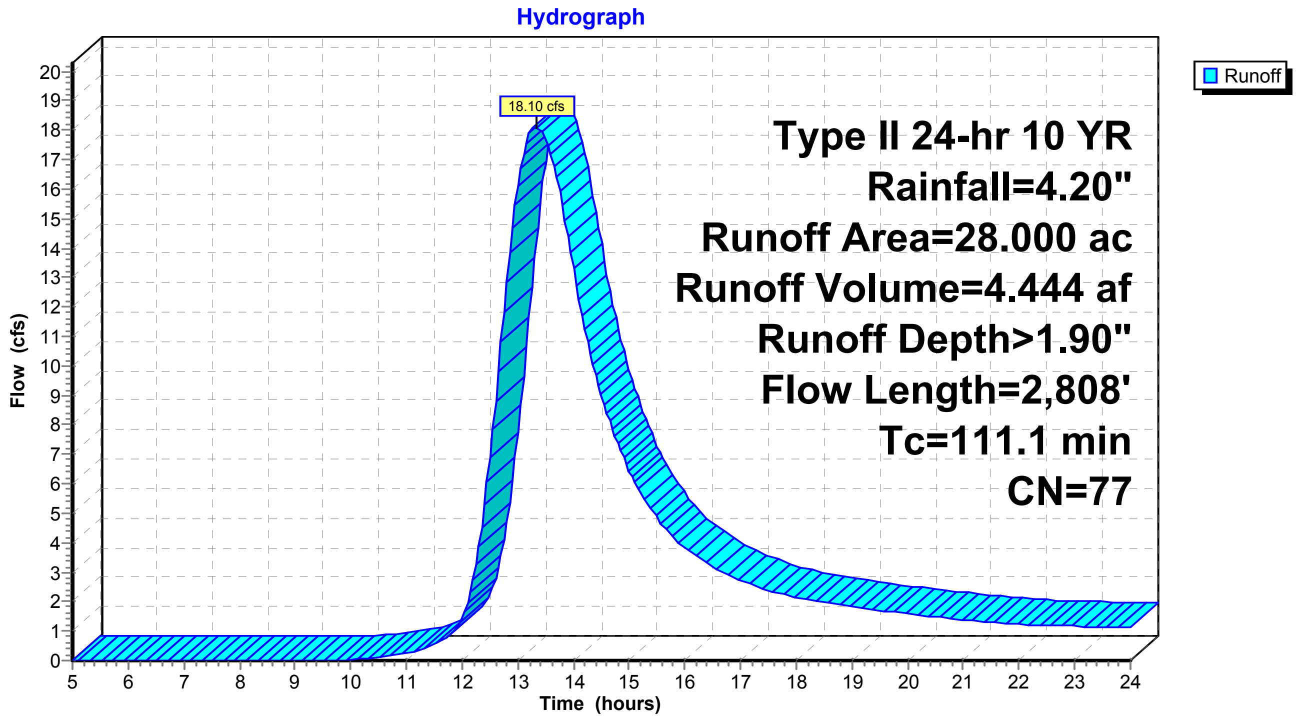
Runoff = 18.10 cfs @ 13.34 hrs, Volume= 4.444 af, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
28.000	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.8	200	0.0250	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
35.9	835	0.0240	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
2.7	496	0.0650	3.0	1.50	**Channel Flow, First Chan Flow** Area= 0.5 sf Perim= 2.0' r= 0.25' n= 0.050 Mountain streams w/large boulders
7.7	1,277	0.0270	2.8	4.16	**Channel Flow, Lower Chan Flow** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
111.1	2,808	Total			

Subcatchment 1S: Subcat



Subcatchment 2S: SubCat

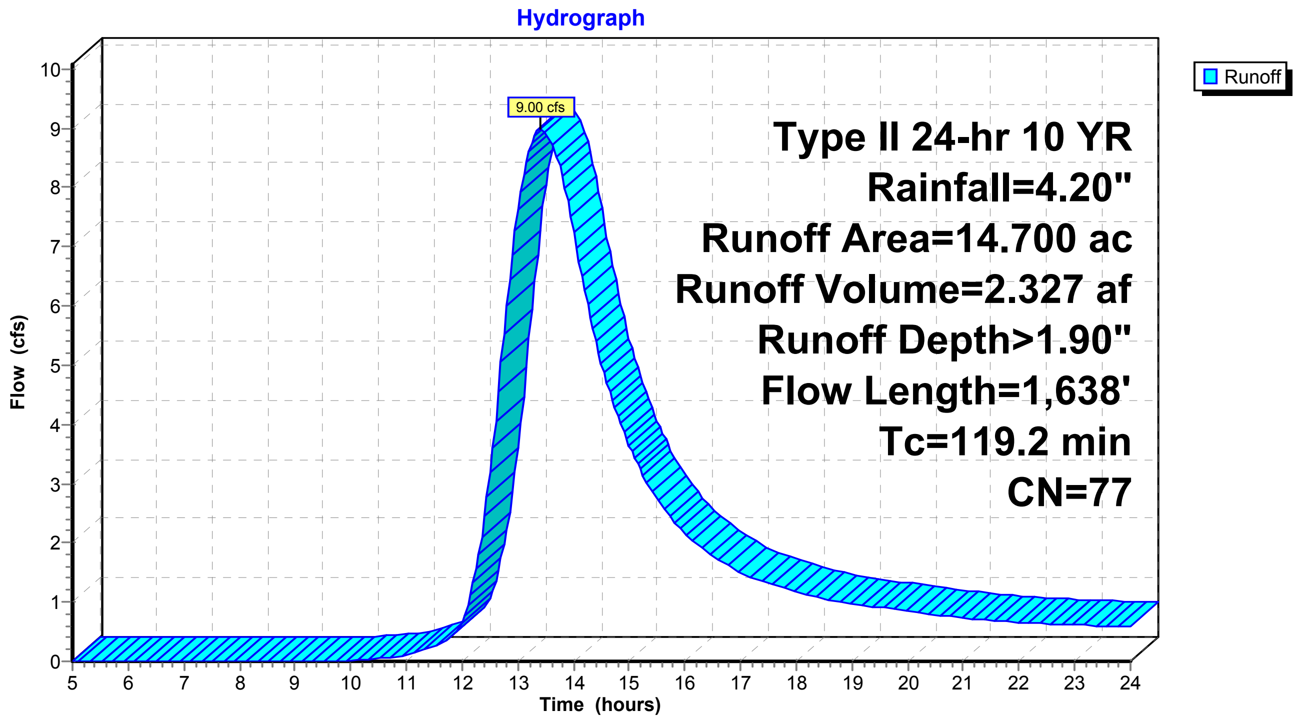
Runoff = 9.00 cfs @ 13.40 hrs, Volume= 2.327 af, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
14.700	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
79.5	200	0.0150	0.0		**Sheet Flow, 200** Woods: Dense underbrush n= 0.800 P2= 2.70"
37.0	912	0.0270	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
2.7	526	0.0380	3.3	4.94	**Channel Flow, Channel** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
119.2	1,638	Total			

Subcatchment 2S: SubCat



Subcatchment 3S: Maint Fac Area

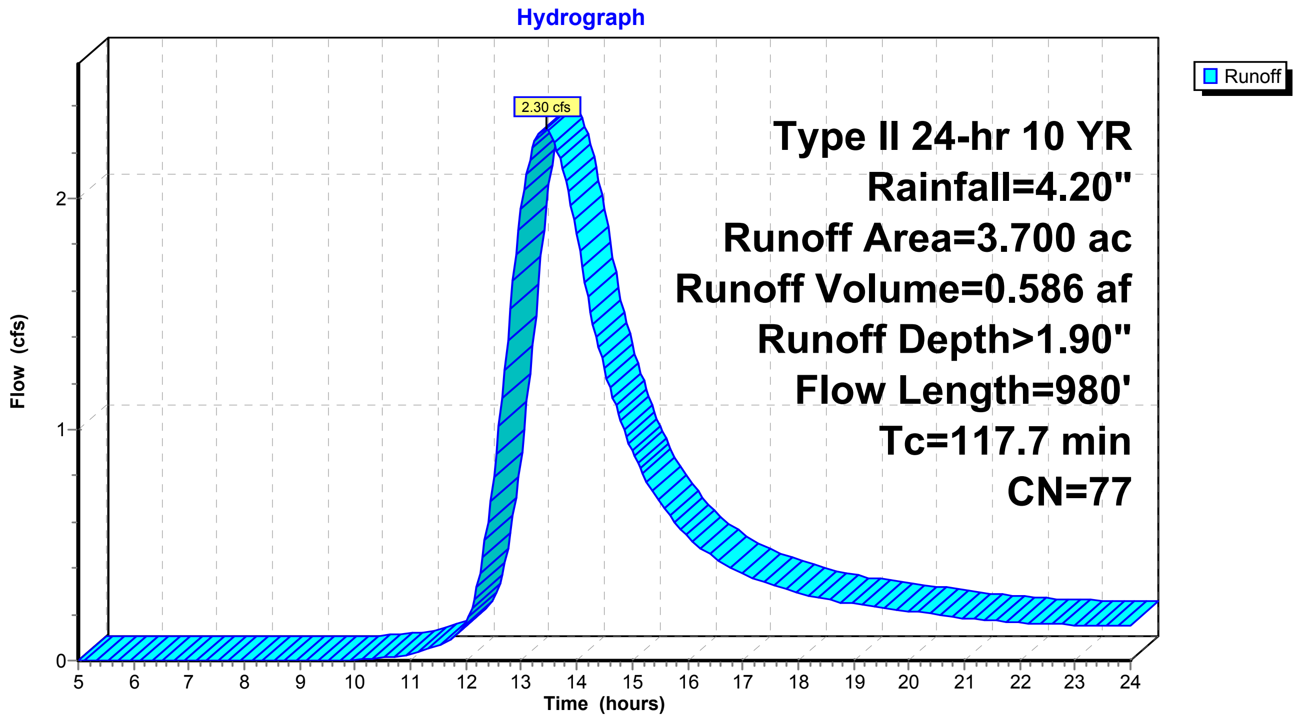
Runoff = 2.30 cfs @ 13.44 hrs, Volume= 0.586 af, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
3.700	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.4	275	0.0200	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
26.3	705	0.0320	0.4		**Shallow Concentrated Flow, Shallow Concentrated** Forest w/Heavy Litter Kv= 2.5 fps
117.7	980	Total			

Subcatchment 3S: Maint Fac Area



Subcatchment 4S: Sub Cat

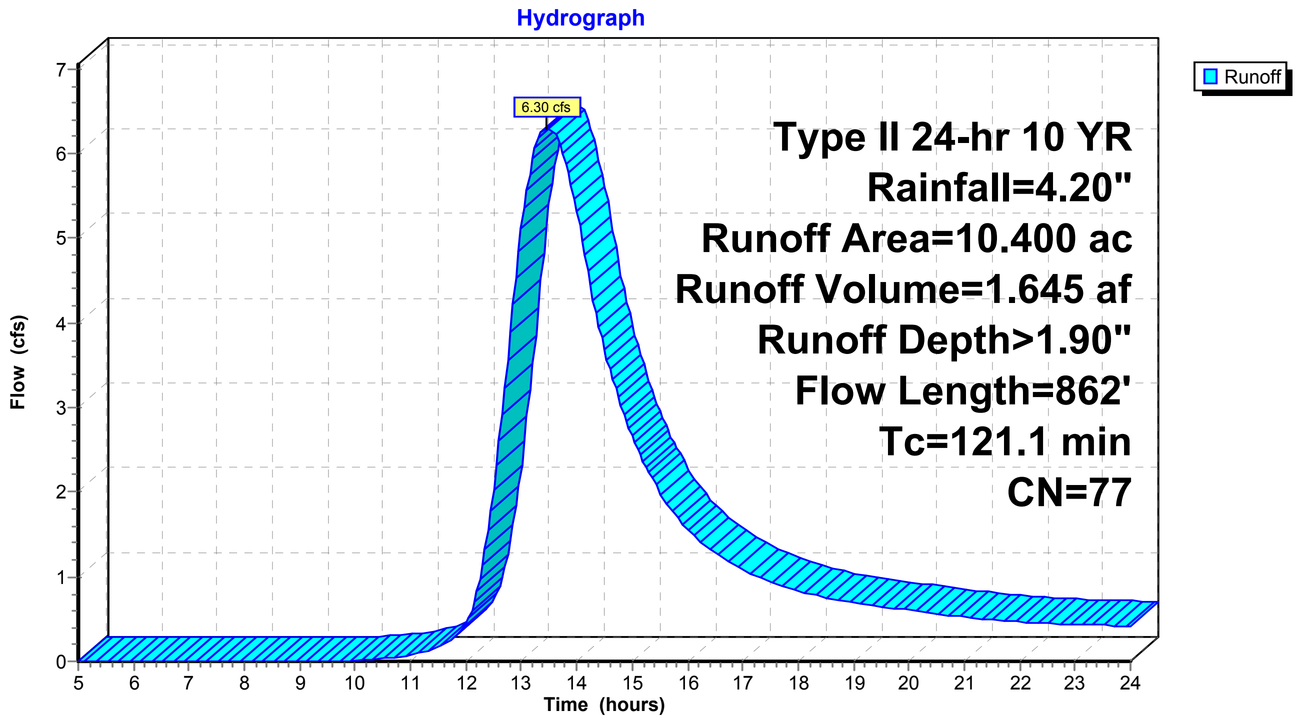
Runoff = 6.30 cfs @ 13.47 hrs, Volume= 1.645 af, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
10.400	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
107.0	280	0.0140	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
11.9	407	0.0520	0.6		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
2.2	175	0.0060	1.3	1.96	**Channel Flow, Chann Flow** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
121.1	862	Total			

Subcatchment 4S: Sub Cat



Subcatchment AS: Main WS

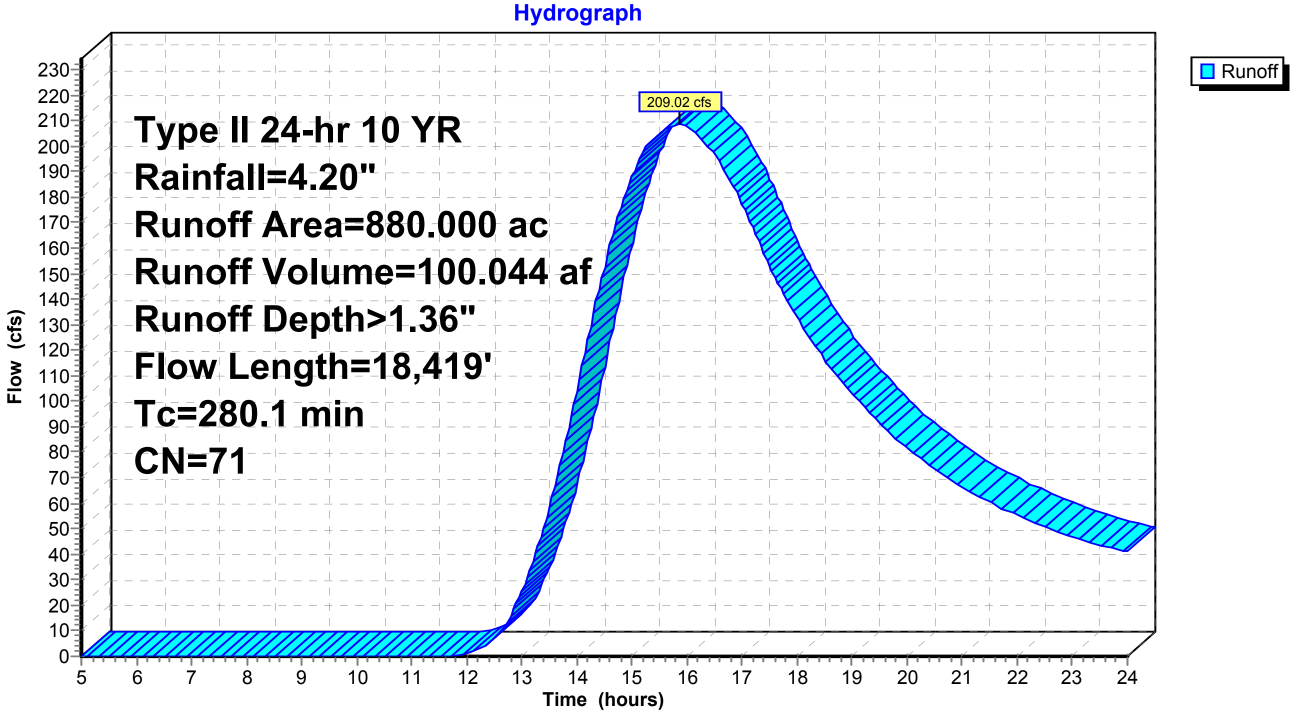
Runoff = 209.02 cfs @ 15.86 hrs, Volume= 100.044 af, Depth> 1.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
151.000	77	Woods, Good, HSG D
46.000	73	Brush, Good, HSG D
683.000	70	Woods, Good, HSG C
880.000	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.9	100	0.0210	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
46.0	1,000	0.0210	0.4		**Shallow Concentrated Flow, Shallow Concen** Forest w/Heavy Litter Kv= 2.5 fps
32.6	4,500	0.0260	2.3	2.30	**Channel Flow, Before Upper Wetland** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.050 Mountain streams w/large boulders
97.4	3,870	0.0050	0.7	1.32	**Channel Flow, Channel Flow in Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.100 Very weedy reaches w/pools
15.9	2,525	0.0200	2.6	5.30	**Channel Flow, Open Channel** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.050 Mountain streams w/large boulders
48.3	6,424	0.0110	2.2	6.65	**Channel Flow, Open Channel** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
280.1	18,419	Total			

Subcatchment AS: Main WS



Subcatchment BS: Upper WS

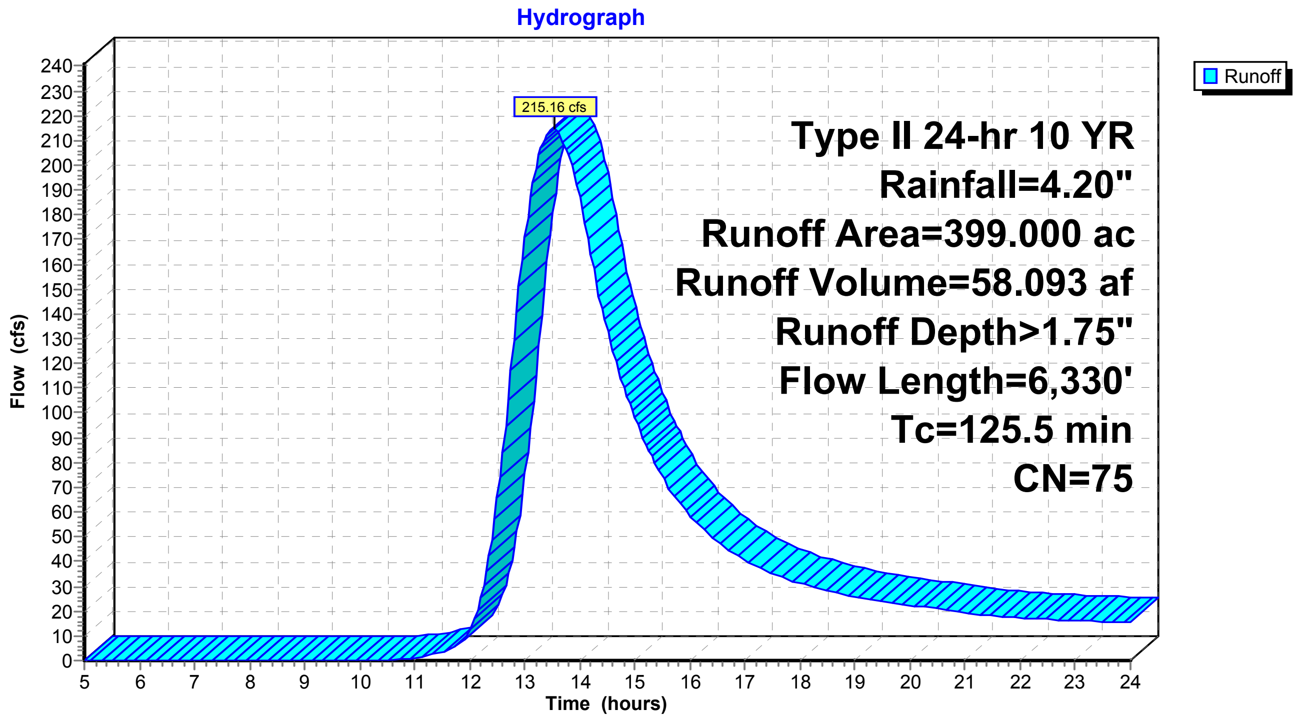
Runoff = 215.16 cfs @ 13.52 hrs, Volume= 58.093 af, Depth> 1.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
245.000	77	Woods, Good, HSG D
31.000	73	Brush, Good, HSG D
123.000	70	Woods, Good, HSG C
399.000	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
33.3	1,000	0.0400	0.5		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
48.1	3,230	0.0070	1.1	2.24	**Channel Flow, Through Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.070 Sluggish weedy reaches w/pools
13.3	2,000	0.0140	2.5	7.50	**Channel Flow, Lower Reach** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
125.5	6,330	Total			

Subcatchment BS: Upper WS



Reach 1CR: (new Reach)

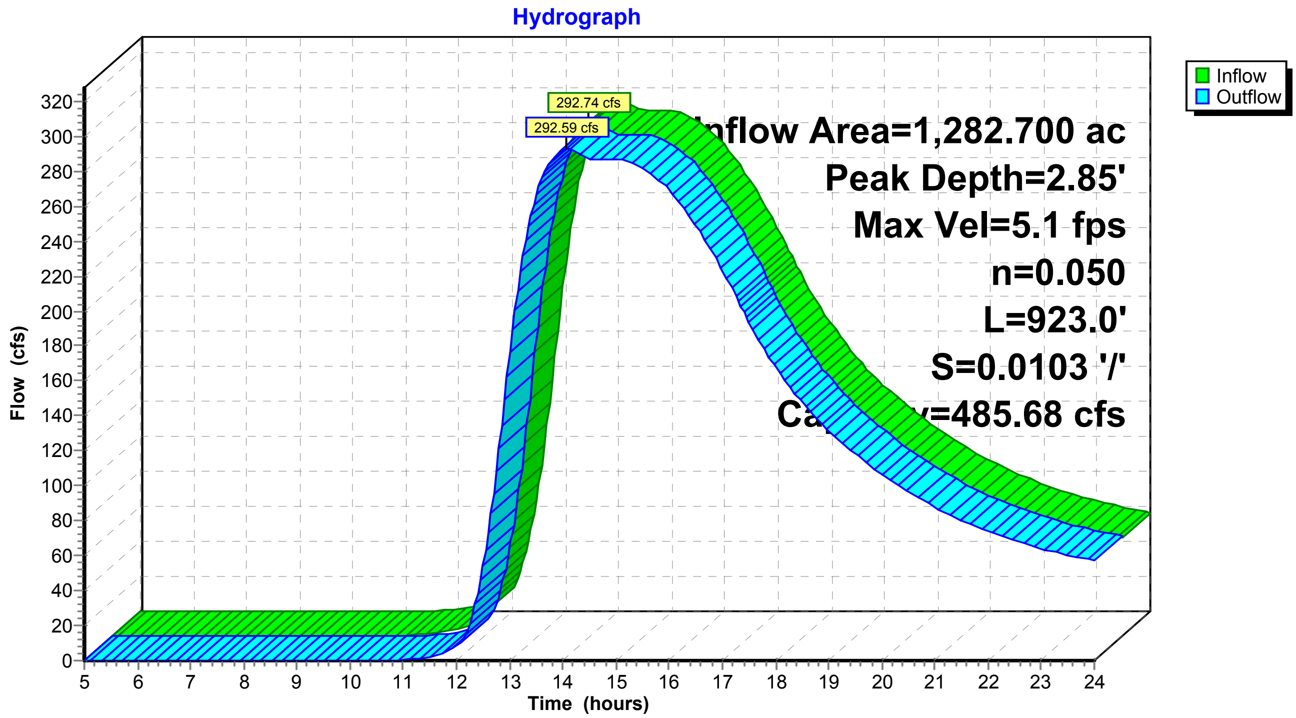
Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

Inflow Area = 1,282.700 ac, Inflow Depth > 1.48" for 10 YR event
Inflow = 292.74 cfs @ 13.96 hrs, Volume= 158.723 af
Outflow = 292.59 cfs @ 14.07 hrs, Volume= 158.064 af, Atten= 0%, Lag= 6.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.1 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 3.4 fps, Avg. Travel Time= 4.6 min

Peak Depth= 2.85' @ 14.02 hrs
Capacity at bank full= 485.68 cfs
Inlet Invert= 87.00', Outlet Invert= 77.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 923.0' Slope= 0.0103 '/'

Reach 1CR: (new Reach)



Reach 2CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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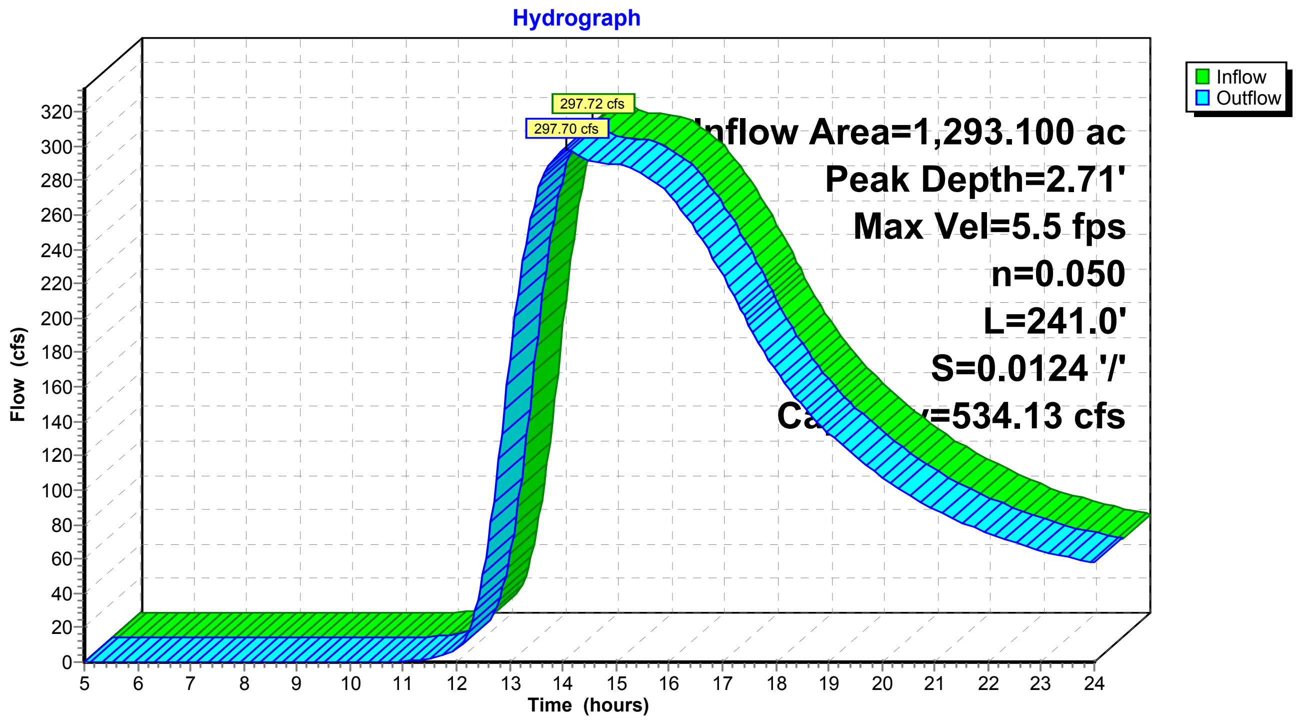
[61] Hint: Submerged 29% of Reach 1CR bottom

Inflow Area = 1,293.100 ac, Inflow Depth > 1.48" for 10 YR event
Inflow = 297.72 cfs @ 14.04 hrs, Volume= 159.709 af
Outflow = 297.70 cfs @ 14.06 hrs, Volume= 159.546 af, Atten= 0%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.5 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 3.5 fps, Avg. Travel Time= 1.1 min

Peak Depth= 2.71' @ 14.05 hrs
Capacity at bank full= 534.13 cfs
Inlet Invert= 77.50', Outlet Invert= 74.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 241.0' Slope= 0.0124 '/'

Reach 2CR: (new Reach)



Reach 3CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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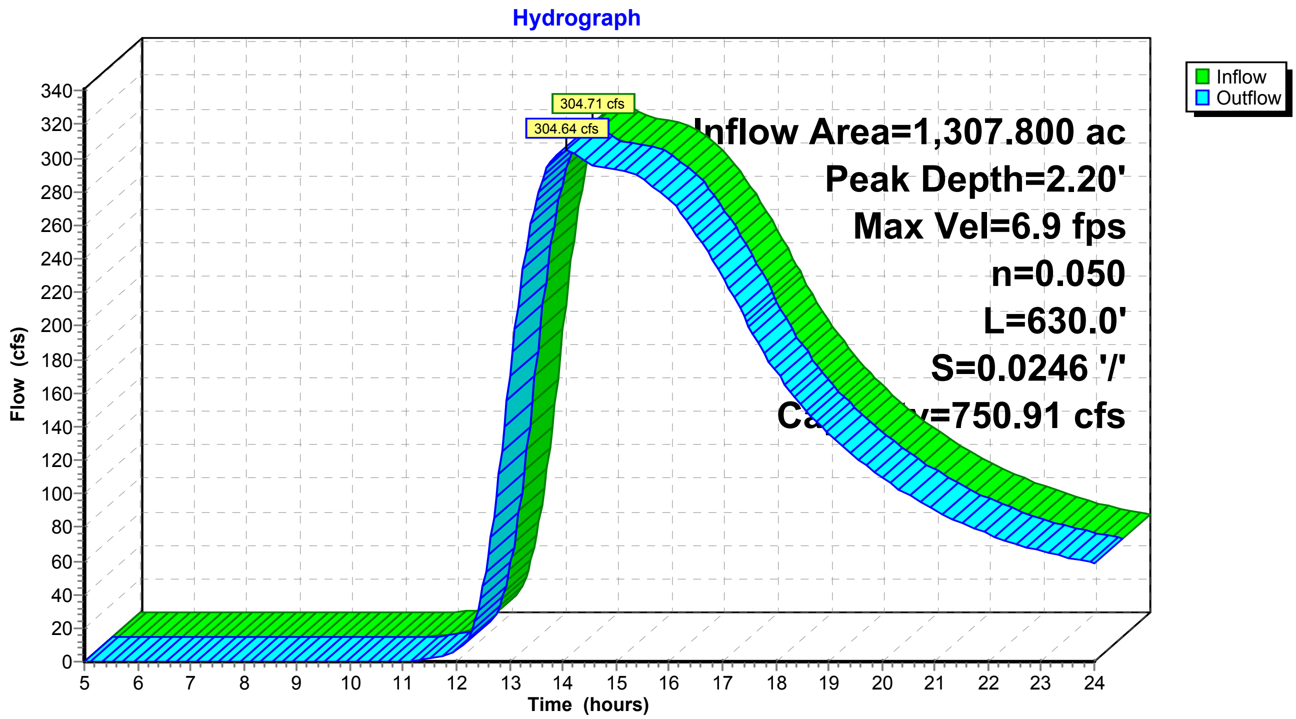
[61] Hint: Submerged 73% of Reach 2CR bottom

Inflow Area = 1,307.800 ac, Inflow Depth > 1.49" for 10 YR event
Inflow = 304.71 cfs @ 14.03 hrs, Volume= 161.873 af
Outflow = 304.64 cfs @ 14.07 hrs, Volume= 161.526 af, Atten= 0%, Lag= 2.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.9 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 4.4 fps, Avg. Travel Time= 2.4 min

Peak Depth= 2.20' @ 14.05 hrs
Capacity at bank full= 750.91 cfs
Inlet Invert= 74.50', Outlet Invert= 59.00'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 630.0' Slope= 0.0246 '/'

Reach 3CR: (new Reach)



Reach 4CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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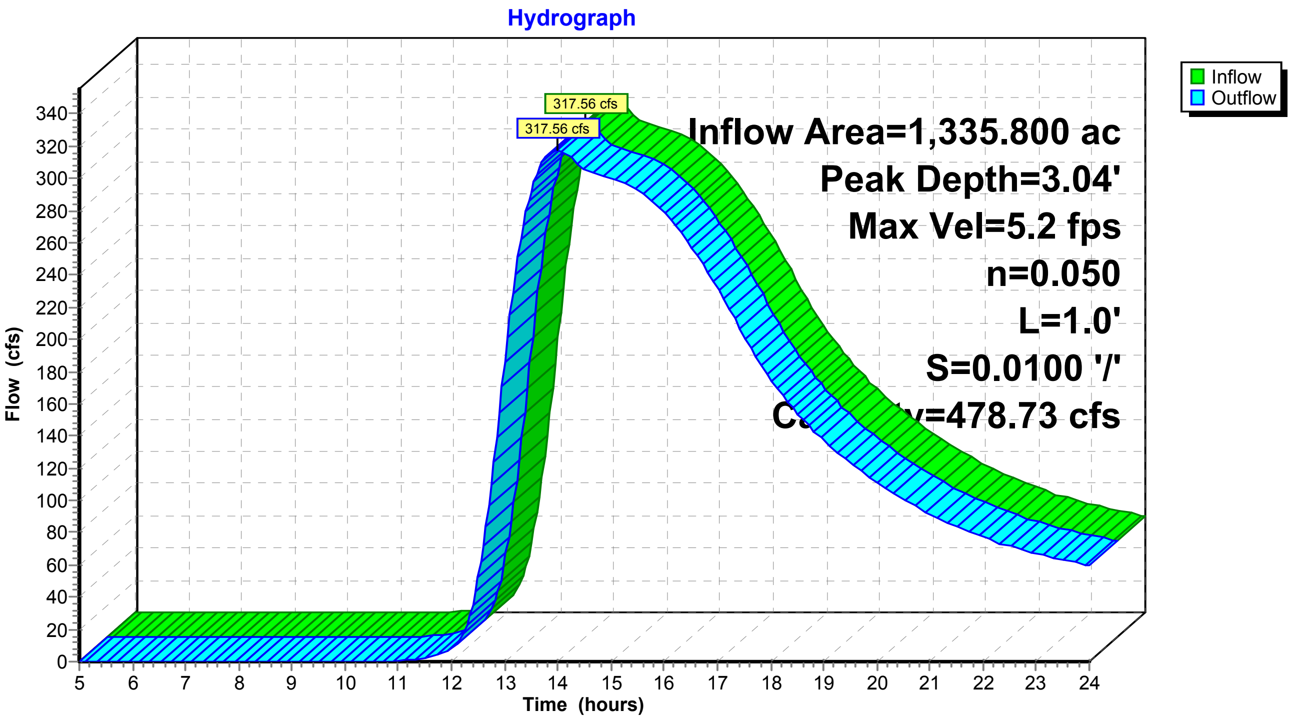
[61] Hint: Submerged 20% of Reach 3CR bottom

Inflow Area = 1,335.800 ac, Inflow Depth > 1.49" for 10 YR event
Inflow = 317.56 cfs @ 14.00 hrs, Volume= 165.970 af
Outflow = 317.56 cfs @ 14.00 hrs, Volume= 165.969 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.2 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.3 fps, Avg. Travel Time= 0.0 min

Peak Depth= 3.04' @ 14.00 hrs
Capacity at bank full= 478.73 cfs
Inlet Invert= 59.00', Outlet Invert= 58.99'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 1.0' Slope= 0.0100 '/'

Reach 4CR: (new Reach)



Pond 11P: Beaver Pond

Beaver Pond has minimal storage (observed to be 2 inches on 9/28/08) and therefore shown as without in both pre and post development and no effect on comparative flows.

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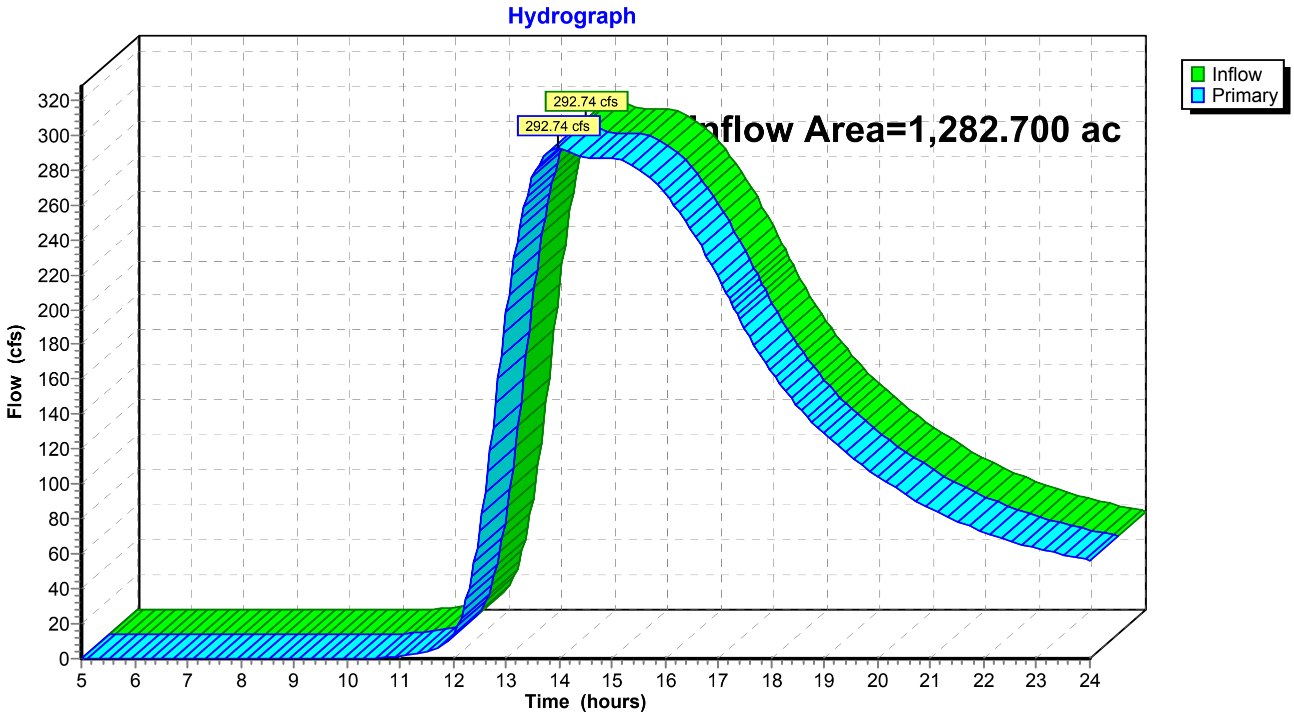
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,282.700 ac, Inflow Depth > 1.48" for 10 YR event
Inflow = 292.74 cfs @ 13.96 hrs, Volume= 158.723 af
Primary = 292.74 cfs @ 13.96 hrs, Volume= 158.723 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs

Pond 11P: Beaver Pond



Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcat Runoff Area=28.000 ac Runoff Depth>2.46"
Flow Length=2,808' Tc=111.1 min CN=77 Runoff=23.60 cfs 5.741 af

Subcatchment 2S: SubCat Runoff Area=14.700 ac Runoff Depth>2.45"
Flow Length=1,638' Tc=119.2 min CN=77 Runoff=11.75 cfs 3.006 af

Subcatchment 3S: Maint Fac Area Runoff Area=3.700 ac Runoff Depth>2.46"
Flow Length=980' Tc=117.7 min CN=77 Runoff=3.00 cfs 0.757 af

Subcatchment 4S: Sub Cat Runoff Area=10.400 ac Runoff Depth>2.45"
Flow Length=862' Tc=121.1 min CN=77 Runoff=8.21 cfs 2.126 af

Subcatchment AS: Main WS Runoff Area=880.000 ac Runoff Depth>1.83"
Flow Length=18,419' Tc=280.1 min CN=71 Runoff=283.54 cfs 134.174 af

Subcatchment BS: Upper WS Runoff Area=399.000 ac Runoff Depth>2.28"
Flow Length=6,330' Tc=125.5 min CN=75 Runoff=284.75 cfs 75.845 af

Reach 1CR: (new Reach) Peak Depth=3.48' Max Vel=5.7 fps Inflow=395.00 cfs 210.775 af
n=0.050 L=923.0' S=0.0103 '/' Capacity=485.68 cfs Outflow=394.80 cfs 210.020 af

Reach 2CR: (new Reach) Peak Depth=3.30' Max Vel=6.1 fps Inflow=401.46 cfs 212.146 af
n=0.050 L=241.0' S=0.0124 '/' Capacity=534.13 cfs Outflow=401.42 cfs 211.959 af

Reach 3CR: (new Reach) Peak Depth=2.68' Max Vel=7.7 fps Inflow=410.54 cfs 214.965 af
n=0.050 L=630.0' S=0.0246 '/' Capacity=750.91 cfs Outflow=410.46 cfs 214.568 af

Reach 4CR: (new Reach) Peak Depth=3.70' Max Vel=5.8 fps Inflow=427.31 cfs 220.309 af
n=0.050 L=1.0' S=0.0100 '/' Capacity=478.73 cfs Outflow=427.31 cfs 220.308 af

Pond 11P: Beaver Pond Inflow=395.00 cfs 210.775 af
Primary=395.00 cfs 210.775 af

Total Runoff Area = 1,335.800 ac Runoff Volume = 221.648 af Average Runoff Depth = 1.99"

Subcatchment 1S: Subcat

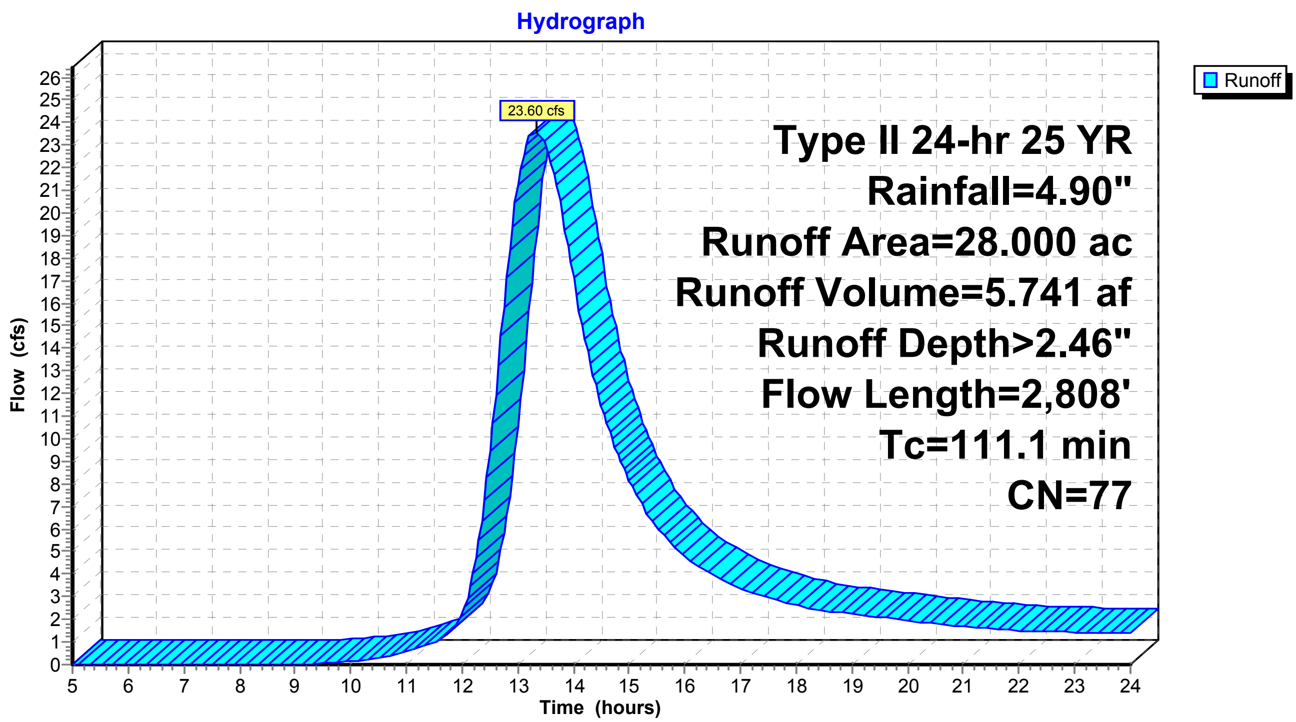
Runoff = 23.60 cfs @ 13.32 hrs, Volume= 5.741 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
28.000	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.8	200	0.0250	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
35.9	835	0.0240	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
2.7	496	0.0650	3.0	1.50	**Channel Flow, First Chan Flow** Area= 0.5 sf Perim= 2.0' r= 0.25' n= 0.050 Mountain streams w/large boulders
7.7	1,277	0.0270	2.8	4.16	**Channel Flow, Lower Chan Flow** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
111.1	2,808	Total			

Subcatchment 1S: Subcat



Subcatchment 2S: SubCat

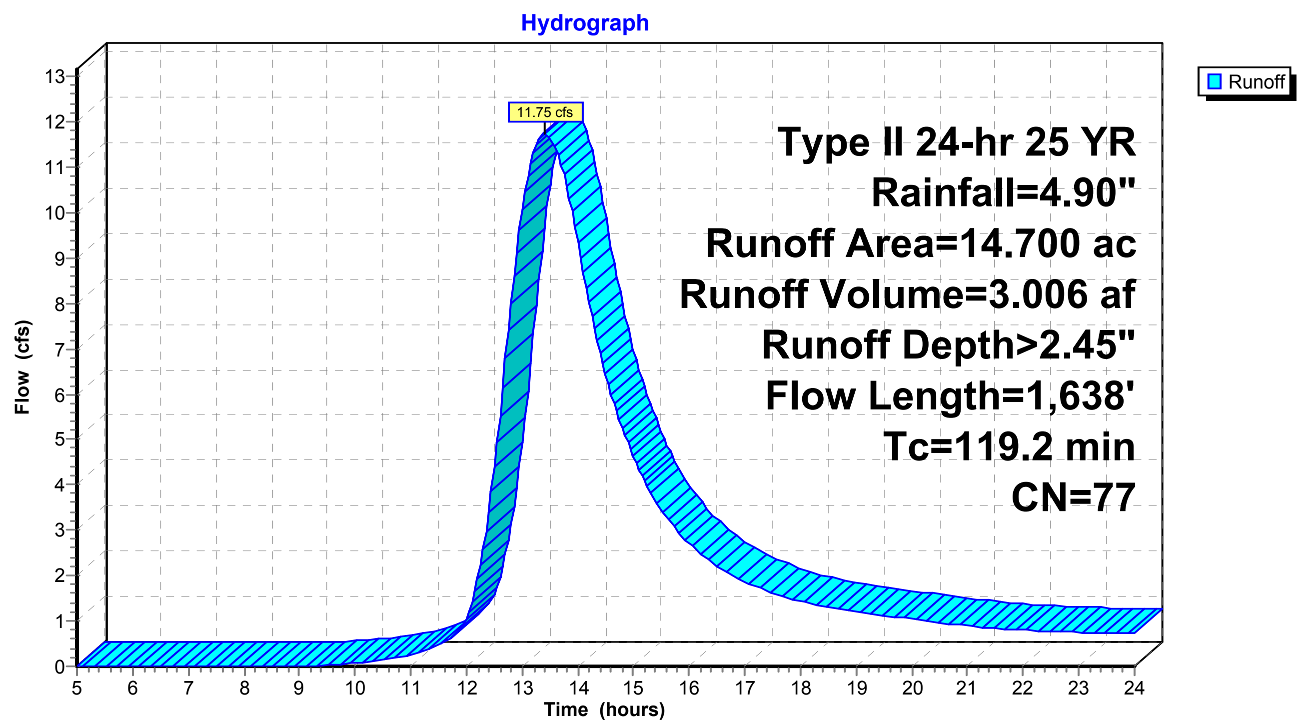
Runoff = 11.75 cfs @ 13.39 hrs, Volume= 3.006 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
14.700	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
79.5	200	0.0150	0.0		**Sheet Flow, 200** Woods: Dense underbrush n= 0.800 P2= 2.70"
37.0	912	0.0270	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
2.7	526	0.0380	3.3	4.94	**Channel Flow, Channel** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
119.2	1,638	Total			

Subcatchment 2S: SubCat



Subcatchment 3S: Maint Fac Area

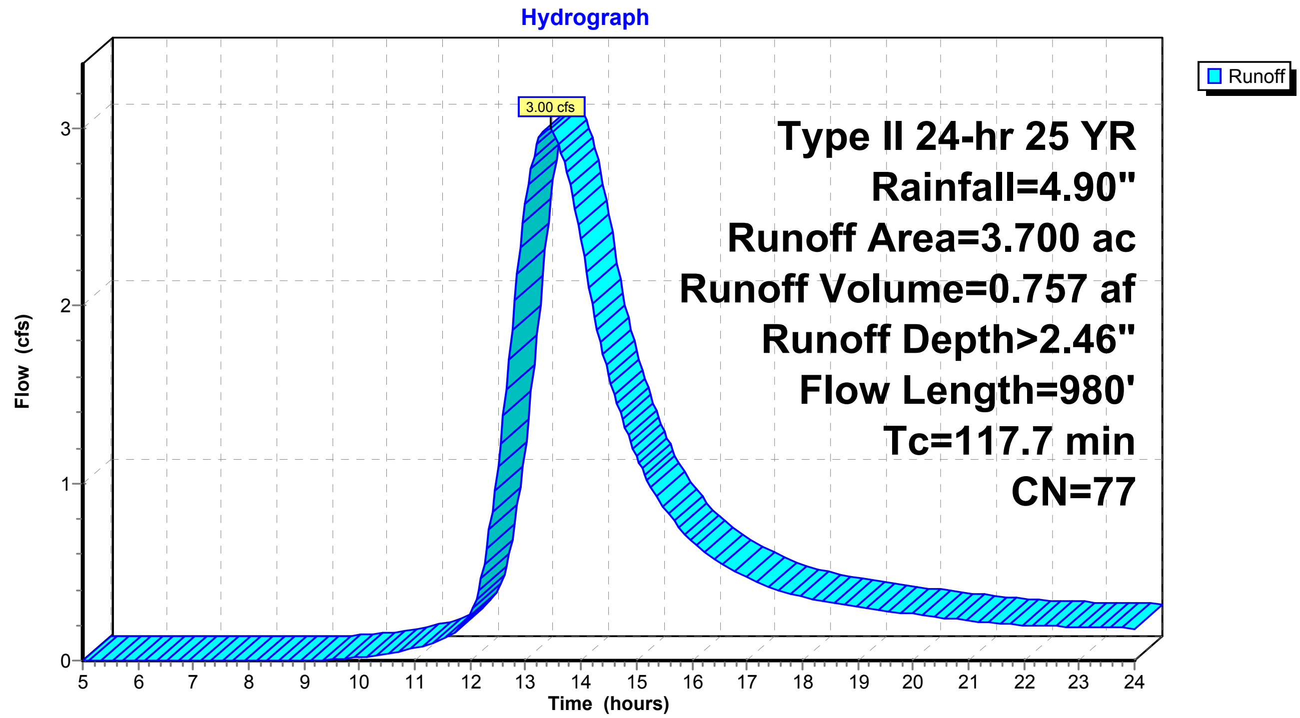
Runoff = 3.00 cfs @ 13.44 hrs, Volume= 0.757 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
3.700	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.4	275	0.0200	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
26.3	705	0.0320	0.4		**Shallow Concentrated Flow, Shallow Concentrated** Forest w/Heavy Litter Kv= 2.5 fps
117.7	980	Total			

Subcatchment 3S: Maint Fac Area



Subcatchment 4S: Sub Cat

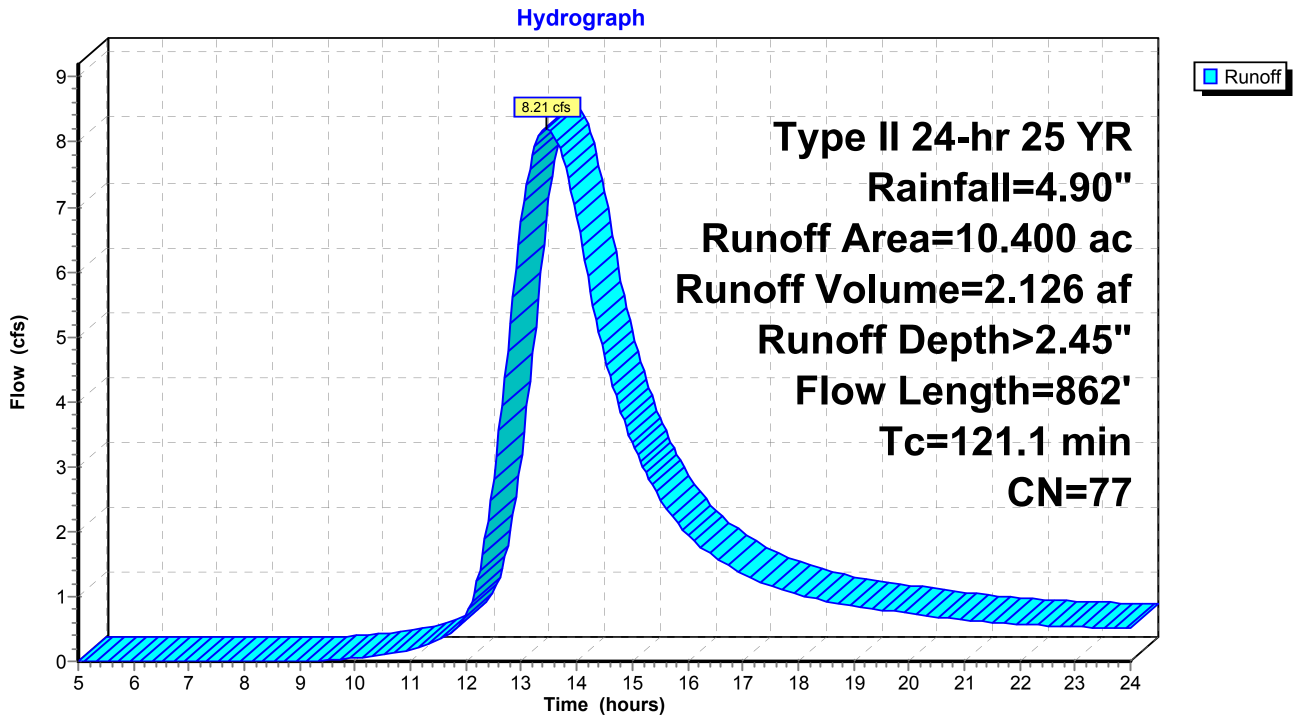
Runoff = 8.21 cfs @ 13.46 hrs, Volume= 2.126 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
10.400	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
107.0	280	0.0140	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
11.9	407	0.0520	0.6		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
2.2	175	0.0060	1.3	1.96	**Channel Flow, Chann Flow** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
121.1	862	Total			

Subcatchment 4S: Sub Cat



Subcatchment AS: Main WS

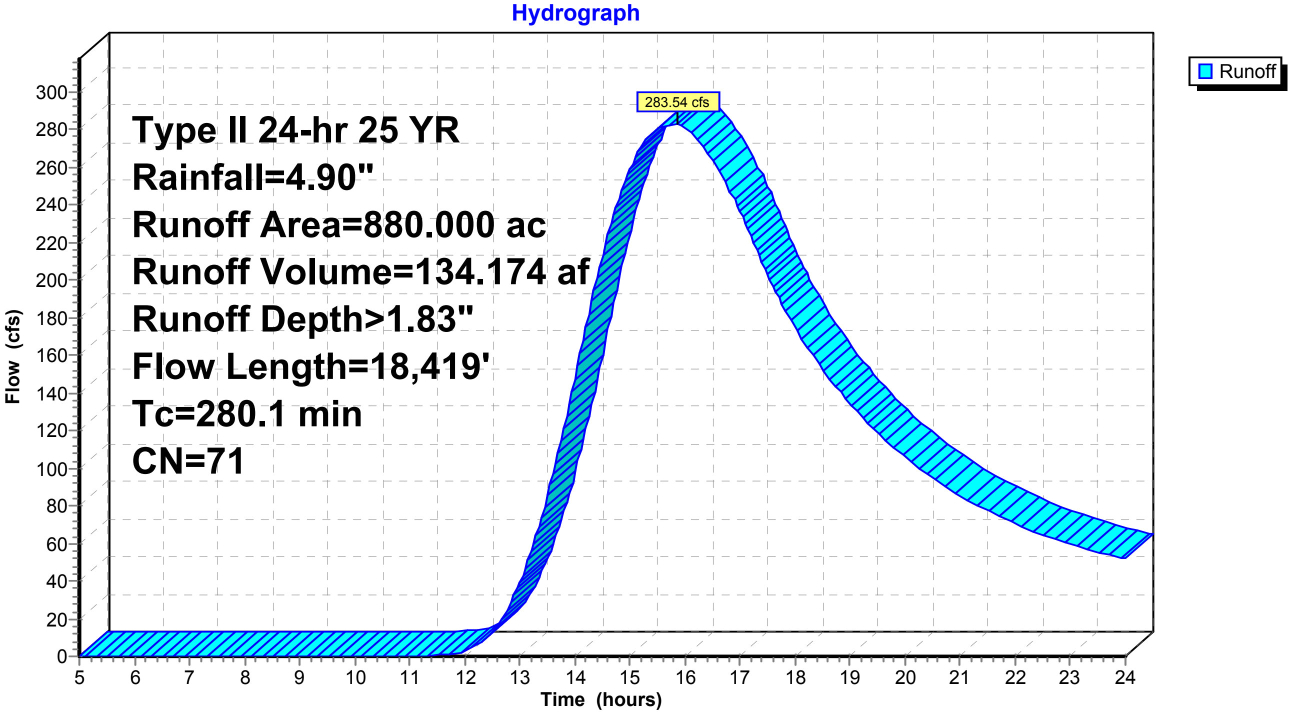
Runoff = 283.54 cfs @ 15.85 hrs, Volume= 134.174 af, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
151.000	77	Woods, Good, HSG D
46.000	73	Brush, Good, HSG D
683.000	70	Woods, Good, HSG C
880.000	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.9	100	0.0210	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
46.0	1,000	0.0210	0.4		**Shallow Concentrated Flow, Shallow Concen** Forest w/Heavy Litter Kv= 2.5 fps
32.6	4,500	0.0260	2.3	2.30	**Channel Flow, Before Upper Wetland** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.050 Mountain streams w/large boulders
97.4	3,870	0.0050	0.7	1.32	**Channel Flow, Channel Flow in Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.100 Very weedy reaches w/pools
15.9	2,525	0.0200	2.6	5.30	**Channel Flow, Open Channel** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.050 Mountain streams w/large boulders
48.3	6,424	0.0110	2.2	6.65	**Channel Flow, Open Channel** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
280.1	18,419	Total			

Subcatchment AS: Main WS



Subcatchment BS: Upper WS

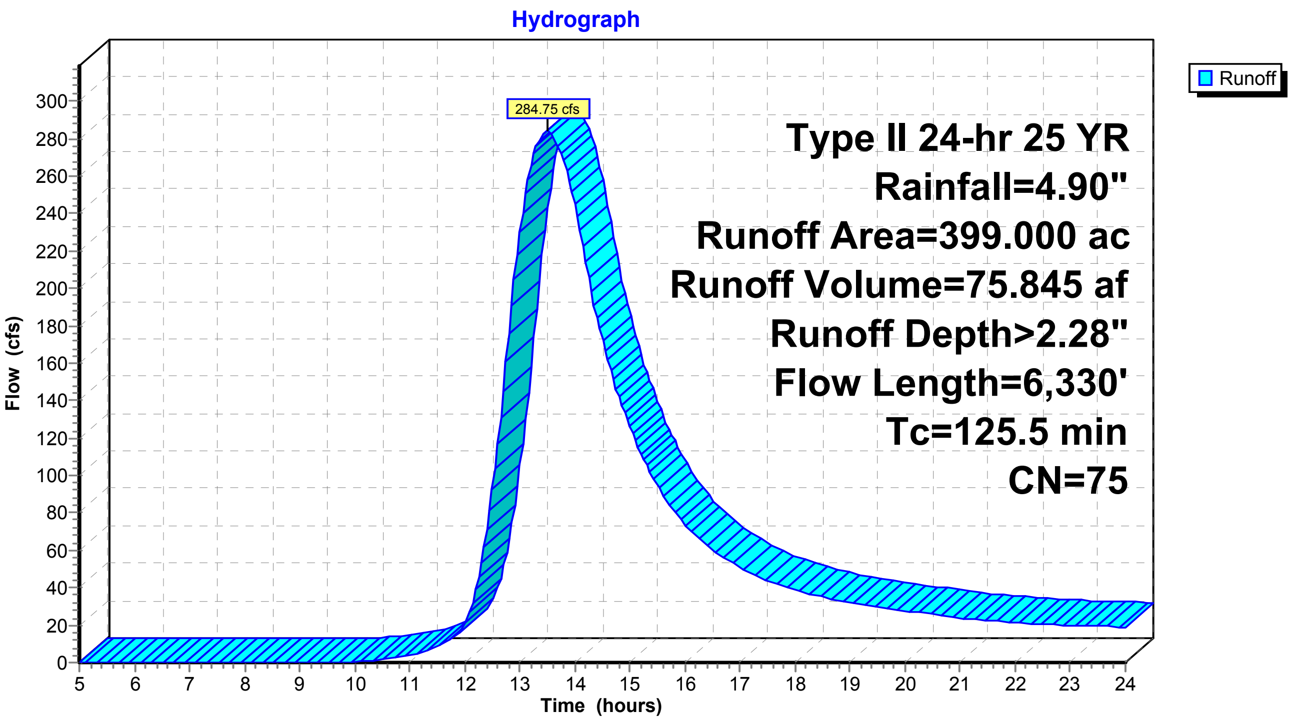
Runoff = 284.75 cfs @ 13.51 hrs, Volume= 75.845 af, Depth> 2.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
245.000	77	Woods, Good, HSG D
31.000	73	Brush, Good, HSG D
123.000	70	Woods, Good, HSG C
399.000	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
33.3	1,000	0.0400	0.5		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
48.1	3,230	0.0070	1.1	2.24	**Channel Flow, Through Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.070 Sluggish weedy reaches w/pools
13.3	2,000	0.0140	2.5	7.50	**Channel Flow, Lower Reach** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
125.5	6,330	Total			

Subcatchment BS: Upper WS



Reach 1CR: (new Reach)

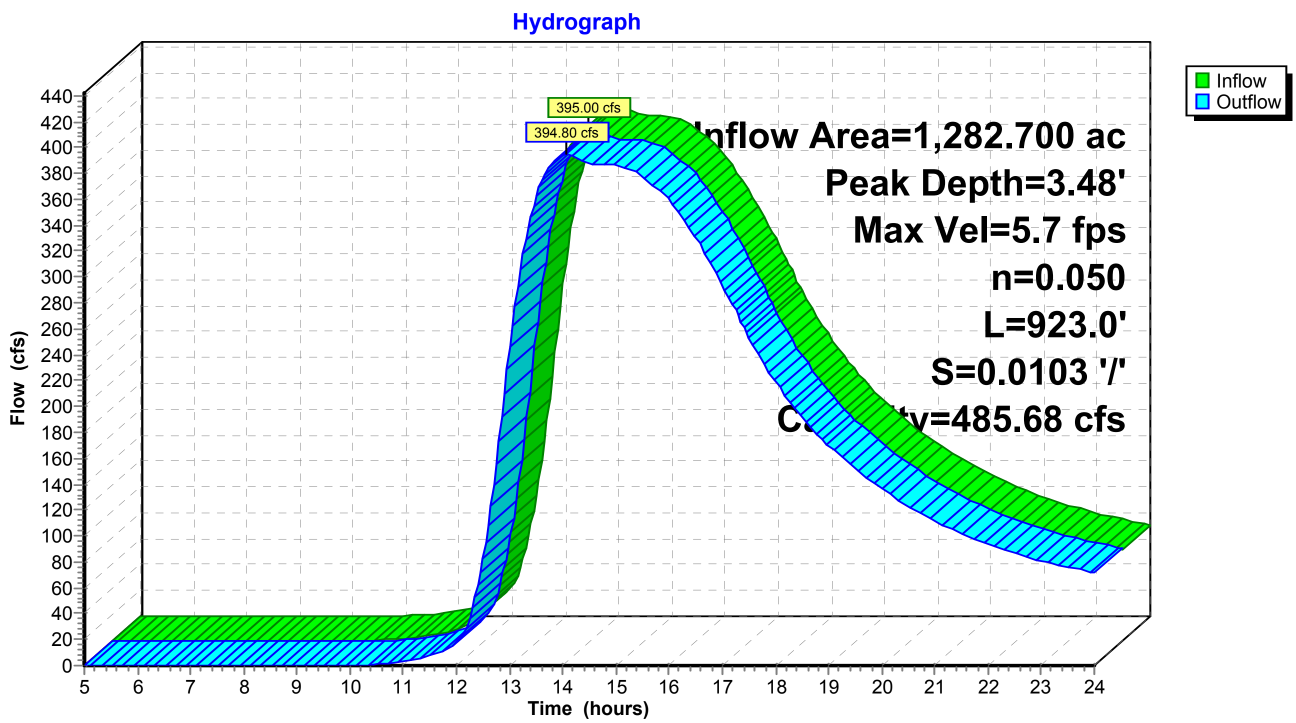
Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

Inflow Area = 1,282.700 ac, Inflow Depth > 1.97" for 25 YR event
Inflow = 395.00 cfs @ 13.96 hrs, Volume= 210.775 af
Outflow = 394.80 cfs @ 14.06 hrs, Volume= 210.020 af, Atten= 0%, Lag= 5.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.7 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 3.6 fps, Avg. Travel Time= 4.3 min

Peak Depth= 3.48' @ 14.01 hrs
Capacity at bank full= 485.68 cfs
Inlet Invert= 87.00', Outlet Invert= 77.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 923.0' Slope= 0.0103 '/'

Reach 1CR: (new Reach)



Reach 2CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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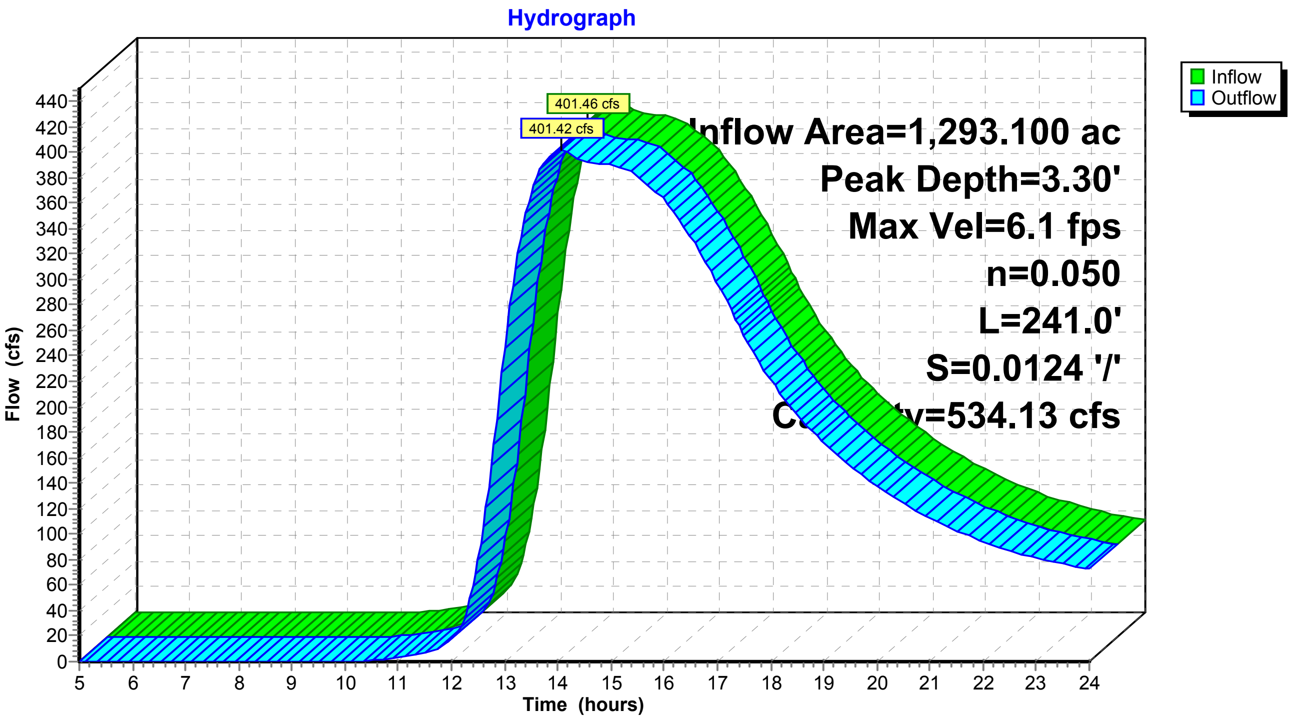
[61] Hint: Submerged 35% of Reach 1CR bottom

Inflow Area = 1,293.100 ac, Inflow Depth > 1.97" for 25 YR event
Inflow = 401.46 cfs @ 14.03 hrs, Volume= 212.146 af
Outflow = 401.42 cfs @ 14.05 hrs, Volume= 211.959 af, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.1 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 3.8 fps, Avg. Travel Time= 1.1 min

Peak Depth= 3.30' @ 14.04 hrs
Capacity at bank full= 534.13 cfs
Inlet Invert= 77.50', Outlet Invert= 74.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 241.0' Slope= 0.0124 '/'

Reach 2CR: (new Reach)



Reach 3CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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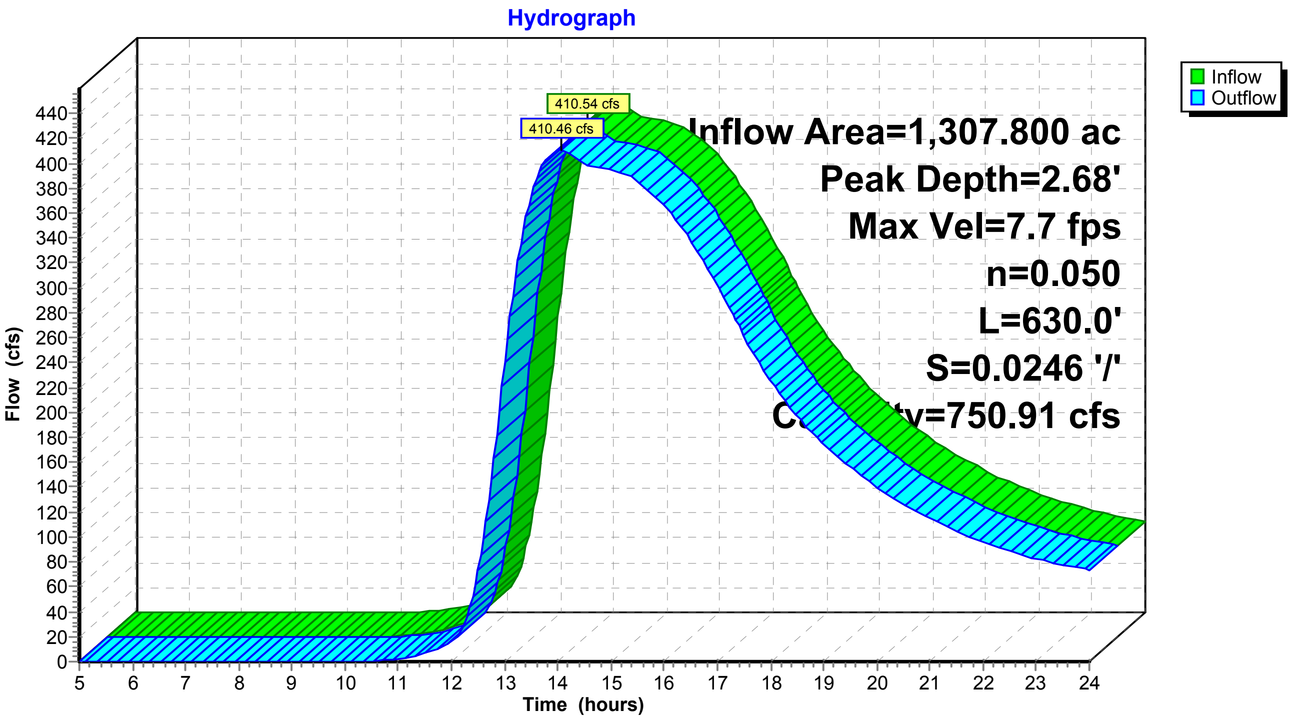
[61] Hint: Submerged 89% of Reach 2CR bottom

Inflow Area = 1,307.800 ac, Inflow Depth > 1.97" for 25 YR event
Inflow = 410.54 cfs @ 14.02 hrs, Volume= 214.965 af
Outflow = 410.46 cfs @ 14.05 hrs, Volume= 214.568 af, Atten= 0%, Lag= 2.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.7 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 4.7 fps, Avg. Travel Time= 2.2 min

Peak Depth= 2.68' @ 14.03 hrs
Capacity at bank full= 750.91 cfs
Inlet Invert= 74.50', Outlet Invert= 59.00'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 630.0' Slope= 0.0246 '/'

Reach 3CR: (new Reach)



Reach 4CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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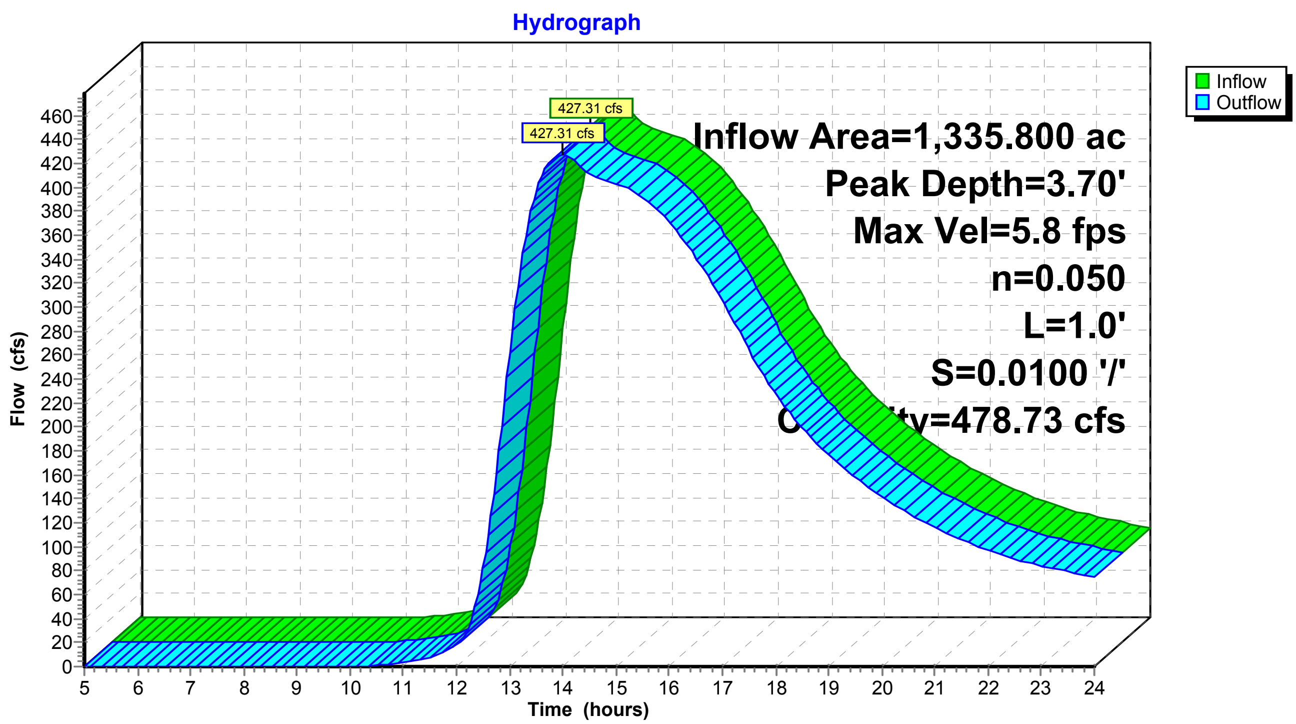
[61] Hint: Submerged 24% of Reach 3CR bottom

Inflow Area = 1,335.800 ac, Inflow Depth > 1.98" for 25 YR event
Inflow = 427.31 cfs @ 13.98 hrs, Volume= 220.309 af
Outflow = 427.31 cfs @ 13.98 hrs, Volume= 220.308 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.8 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.5 fps, Avg. Travel Time= 0.0 min

Peak Depth= 3.70' @ 13.98 hrs
Capacity at bank full= 478.73 cfs
Inlet Invert= 59.00', Outlet Invert= 58.99'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 1.0' Slope= 0.0100 '/'

Reach 4CR: (new Reach)



Pond 11P: Beaver Pond

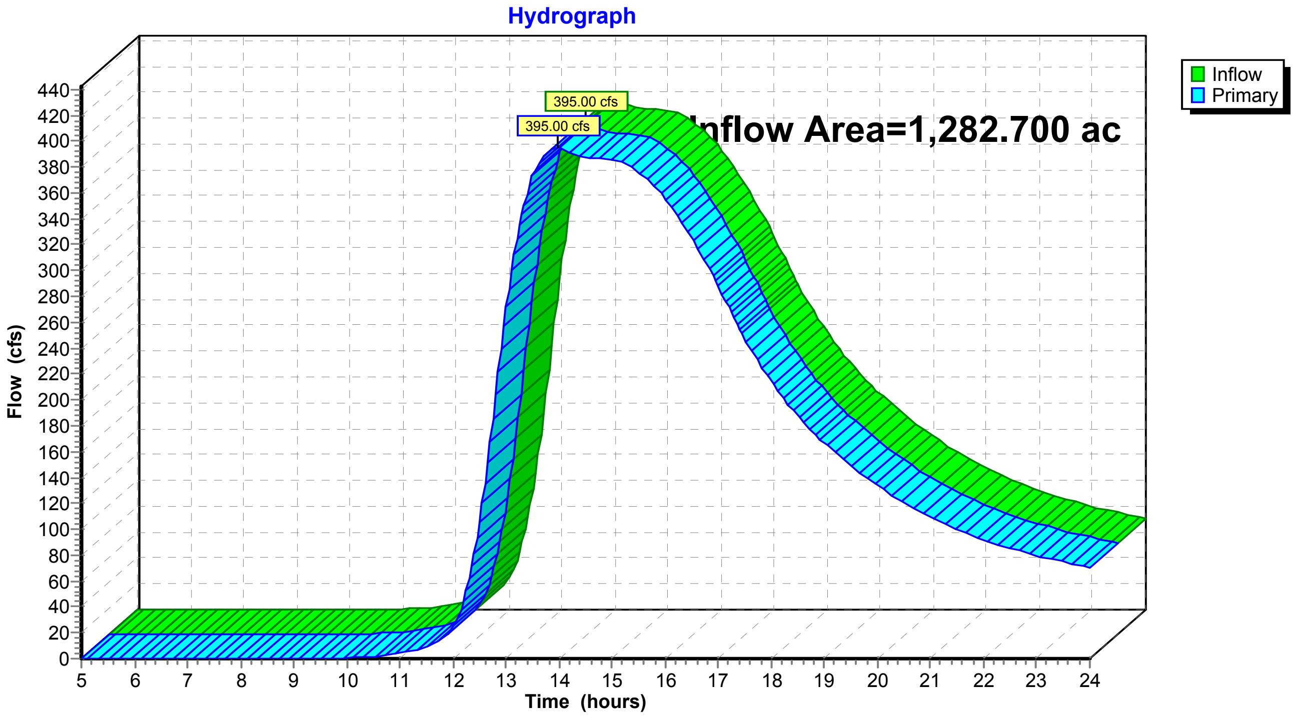
Beaver Pond has minimal storage (observed to be 2 inches on 9/28/08) and therefore shown as without in both pre and post development and no effect on comparative flows.

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,282.700 ac, Inflow Depth > 1.97" for 25 YR event
Inflow = 395.00 cfs @ 13.96 hrs, Volume= 210.775 af
Primary = 395.00 cfs @ 13.96 hrs, Volume= 210.775 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs

Pond 11P: Beaver Pond



Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcat Runoff Area=28.000 ac Runoff Depth>2.87"
Flow Length=2,808' Tc=111.1 min CN=77 Runoff=27.65 cfs 6.700 af

Subcatchment 2S: SubCat Runoff Area=14.700 ac Runoff Depth>2.86"
Flow Length=1,638' Tc=119.2 min CN=77 Runoff=13.78 cfs 3.509 af

Subcatchment 3S: Maint Fac Area Runoff Area=3.700 ac Runoff Depth>2.87"
Flow Length=980' Tc=117.7 min CN=77 Runoff=3.51 cfs 0.884 af

Subcatchment 4S: Sub Cat Runoff Area=10.400 ac Runoff Depth>2.86"
Flow Length=862' Tc=121.1 min CN=77 Runoff=9.62 cfs 2.481 af

Subcatchment AS: Main WS Runoff Area=880.000 ac Runoff Depth>2.18"
Flow Length=18,419' Tc=280.1 min CN=71 Runoff=339.58 cfs 159.916 af

Subcatchment BS: Upper WS Runoff Area=399.000 ac Runoff Depth>2.68"
Flow Length=6,330' Tc=125.5 min CN=75 Runoff=336.28 cfs 89.052 af

Reach 1CR: (new Reach) Peak Depth=3.92' Max Vel=6.0 fps Inflow=472.18 cfs 249.852 af
n=0.050 L=923.0' S=0.0103 '/' Capacity=485.68 cfs Outflow=471.93 cfs 249.031 af

Reach 2CR: (new Reach) Peak Depth=3.72' Max Vel=6.4 fps Inflow=479.75 cfs 251.512 af
n=0.050 L=241.0' S=0.0124 '/' Capacity=534.13 cfs Outflow=479.68 cfs 251.309 af

Reach 3CR: (new Reach) Peak Depth=3.01' Max Vel=8.2 fps Inflow=490.35 cfs 254.817 af
n=0.050 L=630.0' S=0.0246 '/' Capacity=750.91 cfs Outflow=490.25 cfs 254.387 af

Reach 4CR: (new Reach) Peak Depth=4.18' Max Vel=6.1 fps Inflow=510.04 cfs 261.087 af
n=0.050 L=1.0' S=0.0100 '/' Capacity=478.73 cfs Outflow=510.04 cfs 261.086 af

Pond 11P: Beaver Pond Inflow=472.18 cfs 249.852 af
Primary=472.18 cfs 249.852 af

Total Runoff Area = 1,335.800 ac Runoff Volume = 262.542 af Average Runoff Depth = 2.36"

Subcatchment 1S: Subcat

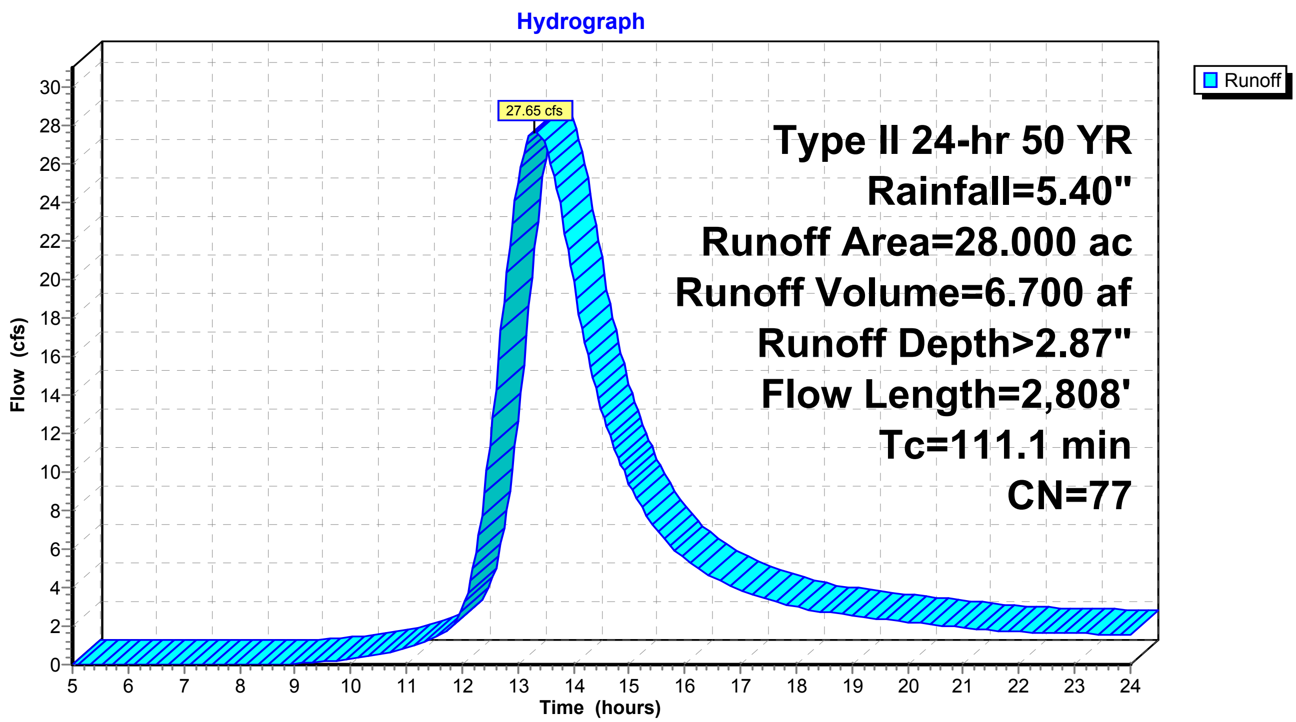
Runoff = 27.65 cfs @ 13.31 hrs, Volume= 6.700 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
28.000	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.8	200	0.0250	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
35.9	835	0.0240	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
2.7	496	0.0650	3.0	1.50	**Channel Flow, First Chan Flow** Area= 0.5 sf Perim= 2.0' r= 0.25' n= 0.050 Mountain streams w/large boulders
7.7	1,277	0.0270	2.8	4.16	**Channel Flow, Lower Chan Flow** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
111.1	2,808	Total			

Subcatchment 1S: Subcat



Subcatchment 2S: SubCat

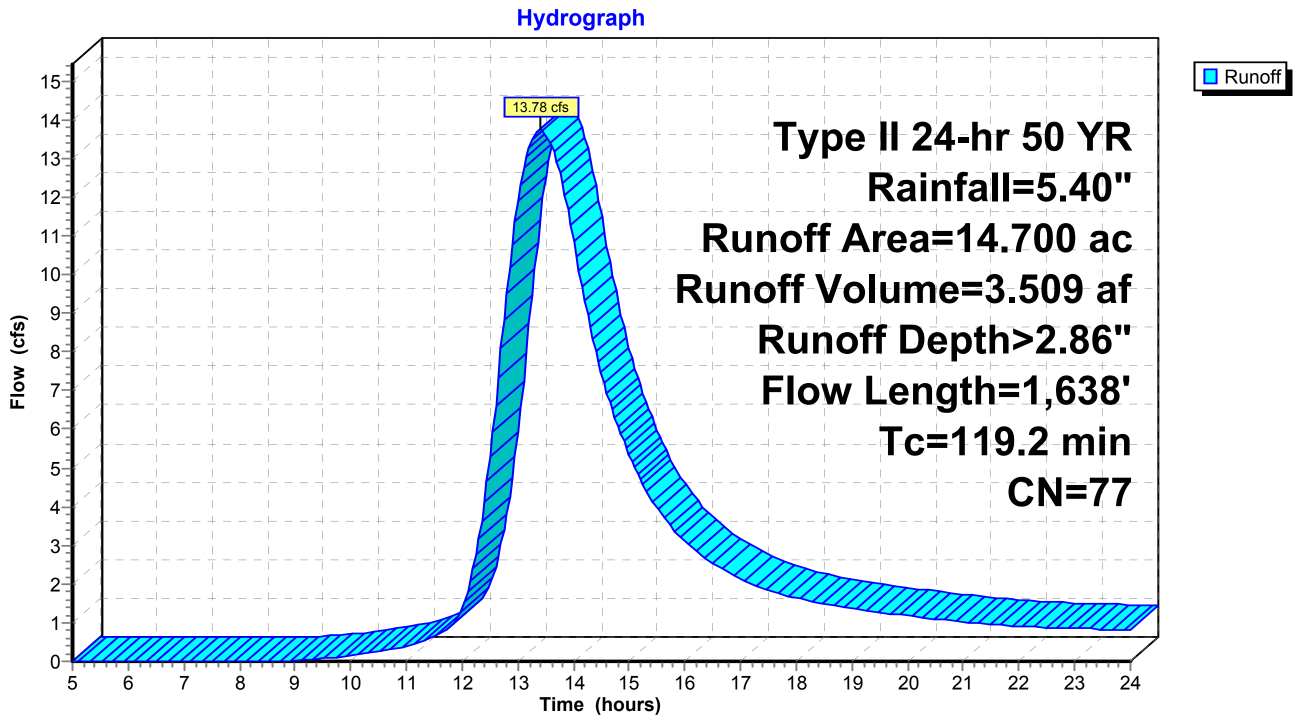
Runoff = 13.78 cfs @ 13.39 hrs, Volume= 3.509 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
14.700	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
79.5	200	0.0150	0.0		**Sheet Flow, 200** Woods: Dense underbrush n= 0.800 P2= 2.70"
37.0	912	0.0270	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
2.7	526	0.0380	3.3	4.94	**Channel Flow, Channel** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
119.2	1,638	Total			

Subcatchment 2S: SubCat



Subcatchment 3S: Maint Fac Area

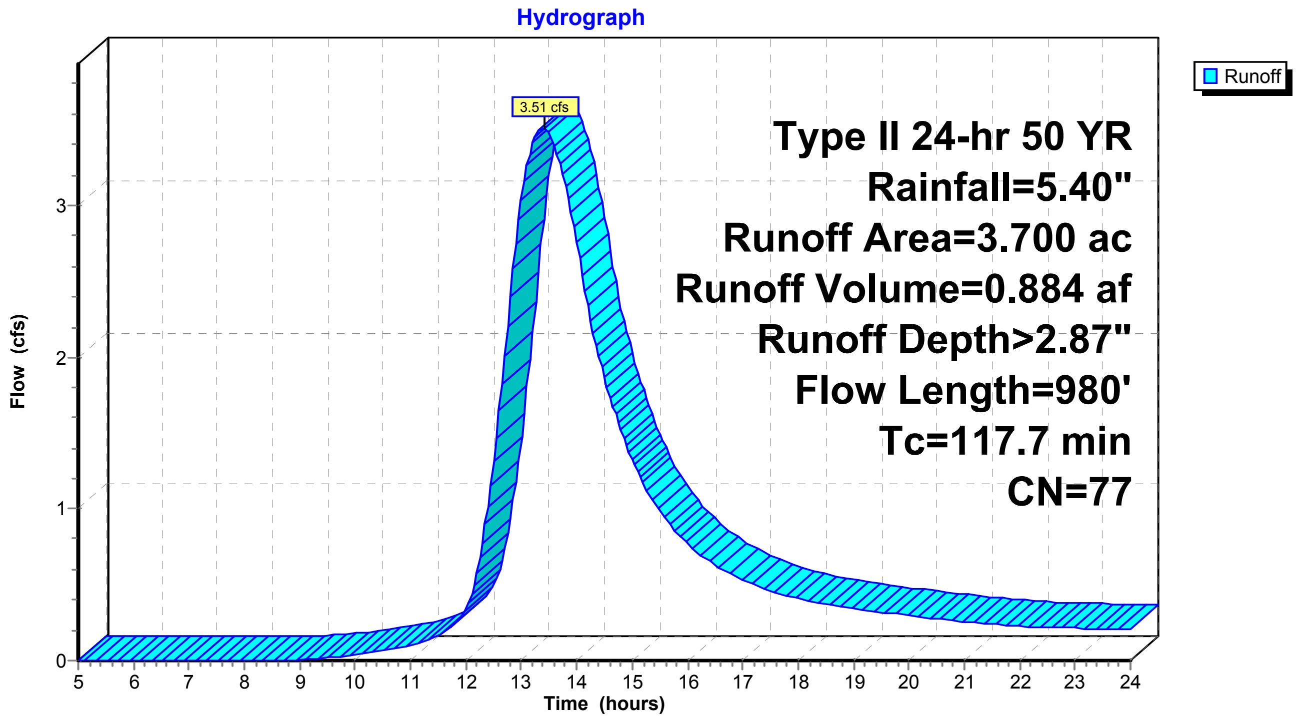
Runoff = 3.51 cfs @ 13.43 hrs, Volume= 0.884 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
3.700	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.4	275	0.0200	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
26.3	705	0.0320	0.4		**Shallow Concentrated Flow, Shallow Concentrated** Forest w/Heavy Litter Kv= 2.5 fps
117.7	980	Total			

Subcatchment 3S: Maint Fac Area



Subcatchment 4S: Sub Cat

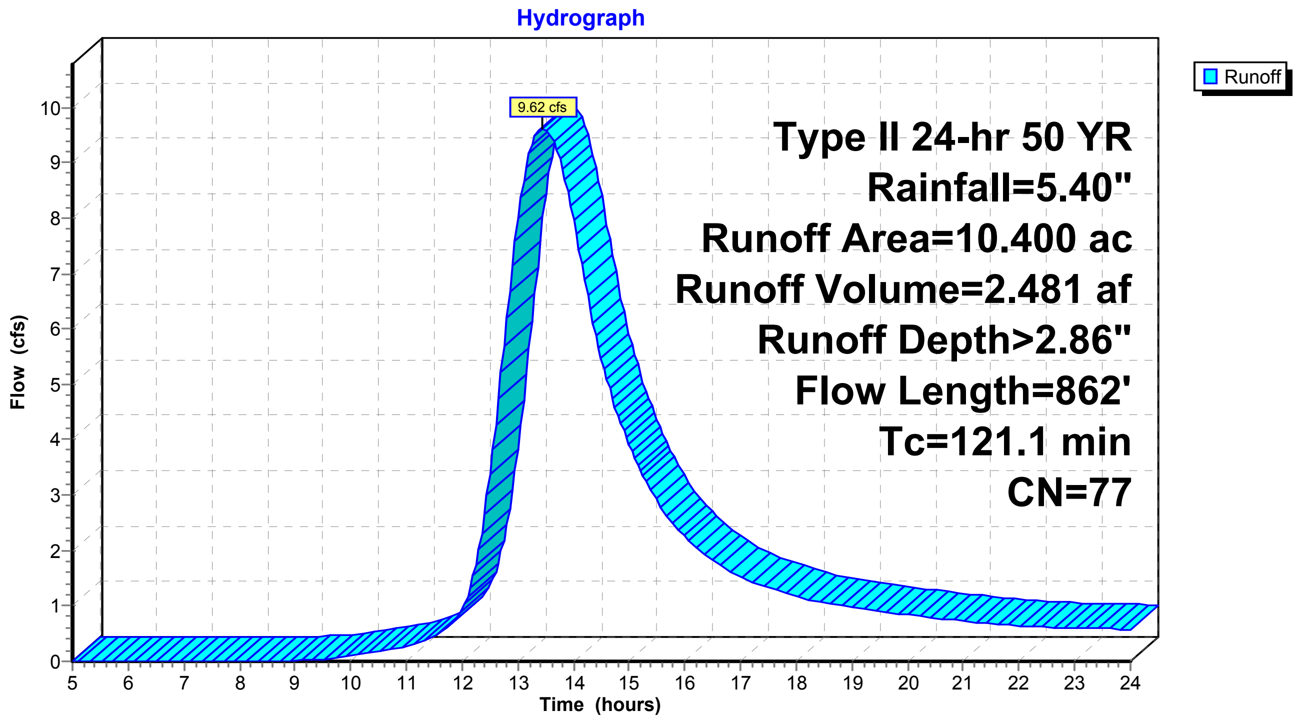
Runoff = 9.62 cfs @ 13.45 hrs, Volume= 2.481 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
10.400	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
107.0	280	0.0140	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
11.9	407	0.0520	0.6		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
2.2	175	0.0060	1.3	1.96	**Channel Flow, Chann Flow** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
121.1	862	Total			

Subcatchment 4S: Sub Cat



Subcatchment AS: Main WS

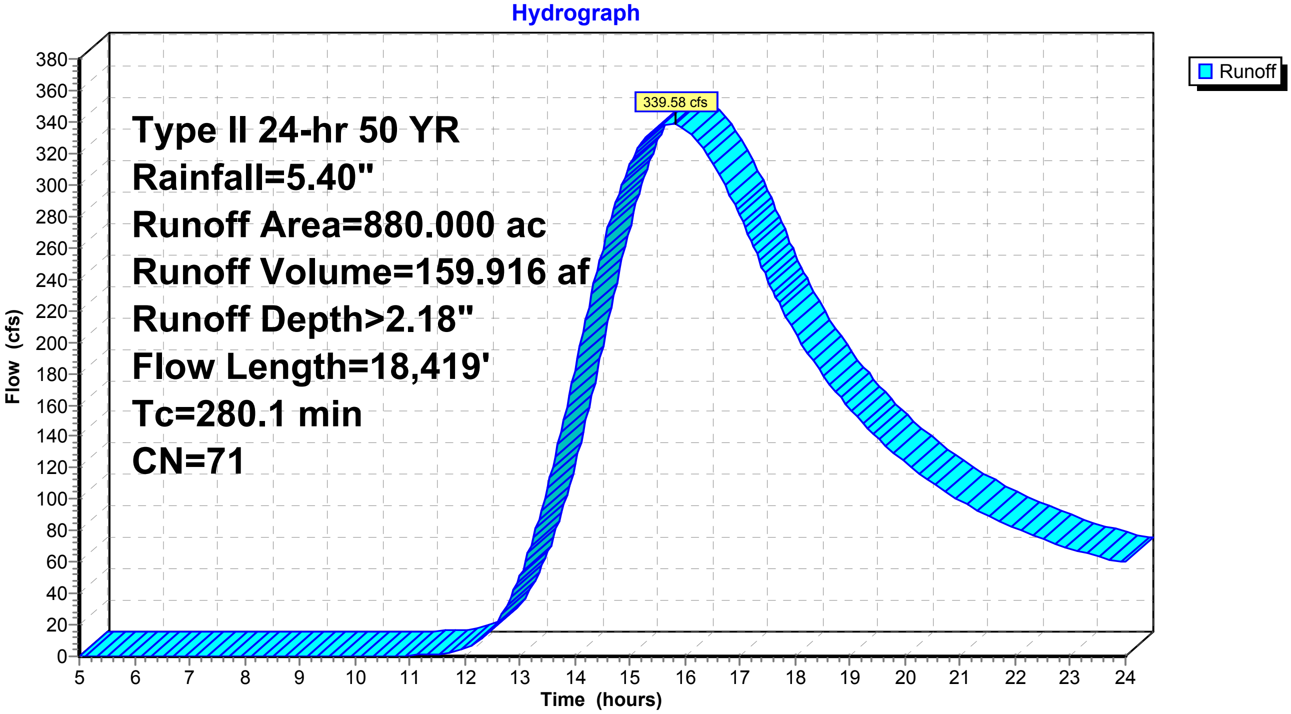
Runoff = 339.58 cfs @ 15.84 hrs, Volume= 159.916 af, Depth> 2.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
151.000	77	Woods, Good, HSG D
46.000	73	Brush, Good, HSG D
683.000	70	Woods, Good, HSG C
880.000	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.9	100	0.0210	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
46.0	1,000	0.0210	0.4		**Shallow Concentrated Flow, Shallow Concen** Forest w/Heavy Litter Kv= 2.5 fps
32.6	4,500	0.0260	2.3	2.30	**Channel Flow, Before Upper Wetland** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.050 Mountain streams w/large boulders
97.4	3,870	0.0050	0.7	1.32	**Channel Flow, Channel Flow in Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.100 Very weedy reaches w/pools
15.9	2,525	0.0200	2.6	5.30	**Channel Flow, Open Channel** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.050 Mountain streams w/large boulders
48.3	6,424	0.0110	2.2	6.65	**Channel Flow, Open Channel** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
280.1	18,419	Total			

Subcatchment AS: Main WS



Subcatchment BS: Upper WS

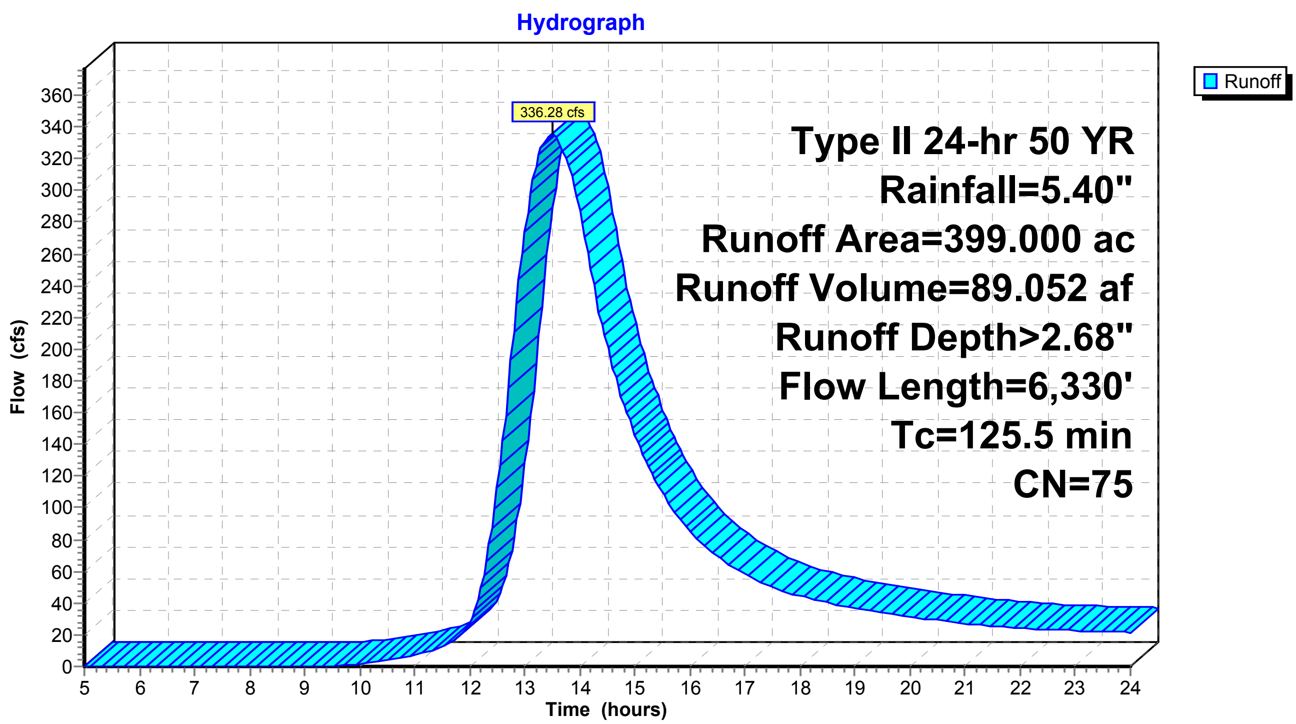
Runoff = 336.28 cfs @ 13.51 hrs, Volume= 89.052 af, Depth> 2.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
245.000	77	Woods, Good, HSG D
31.000	73	Brush, Good, HSG D
123.000	70	Woods, Good, HSG C
399.000	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
33.3	1,000	0.0400	0.5		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
48.1	3,230	0.0070	1.1	2.24	**Channel Flow, Through Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.070 Sluggish weedy reaches w/pools
13.3	2,000	0.0140	2.5	7.50	**Channel Flow, Lower Reach** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
125.5	6,330	Total			

Subcatchment BS: Upper WS



Reach 1CR: (new Reach)

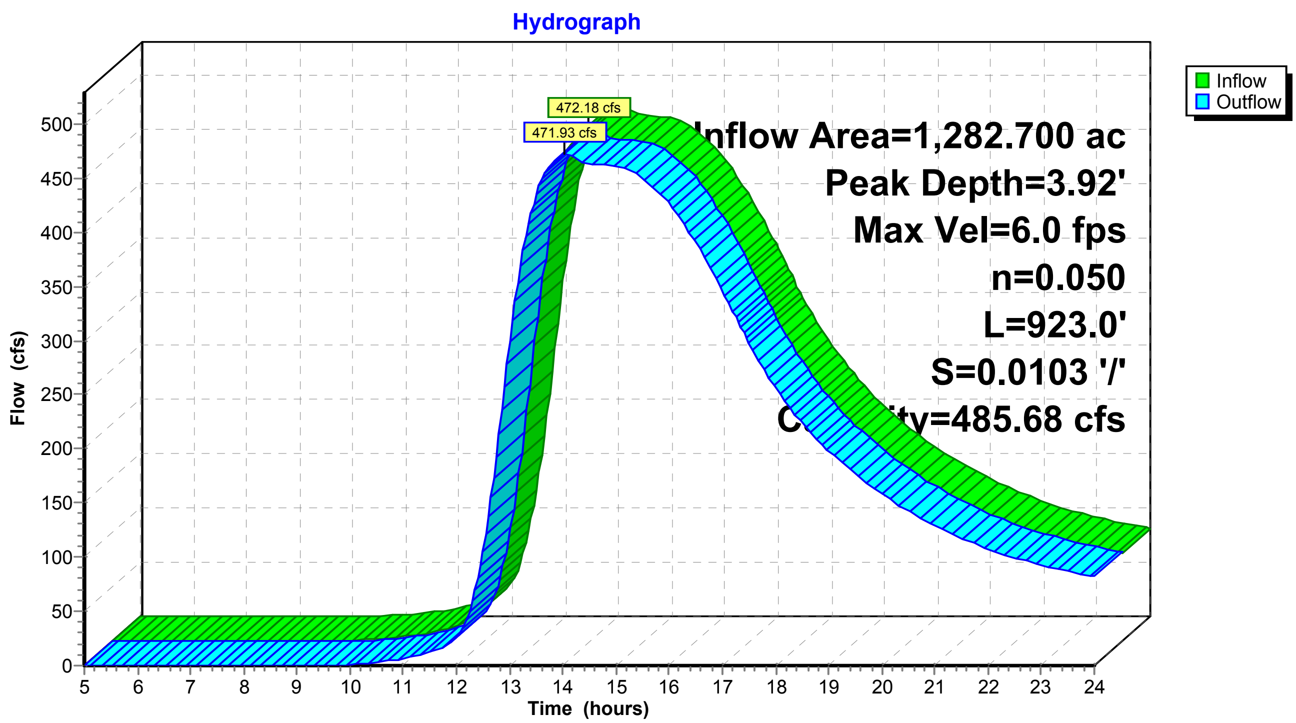
Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

Inflow Area = 1,282.700 ac, Inflow Depth > 2.34" for 50 YR event
Inflow = 472.18 cfs @ 13.96 hrs, Volume= 249.852 af
Outflow = 471.93 cfs @ 14.05 hrs, Volume= 249.031 af, Atten= 0%, Lag= 5.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.0 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 3.7 fps, Avg. Travel Time= 4.1 min

Peak Depth= 3.92' @ 14.00 hrs
Capacity at bank full= 485.68 cfs
Inlet Invert= 87.00', Outlet Invert= 77.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 923.0' Slope= 0.0103 '/'

Reach 1CR: (new Reach)



Reach 2CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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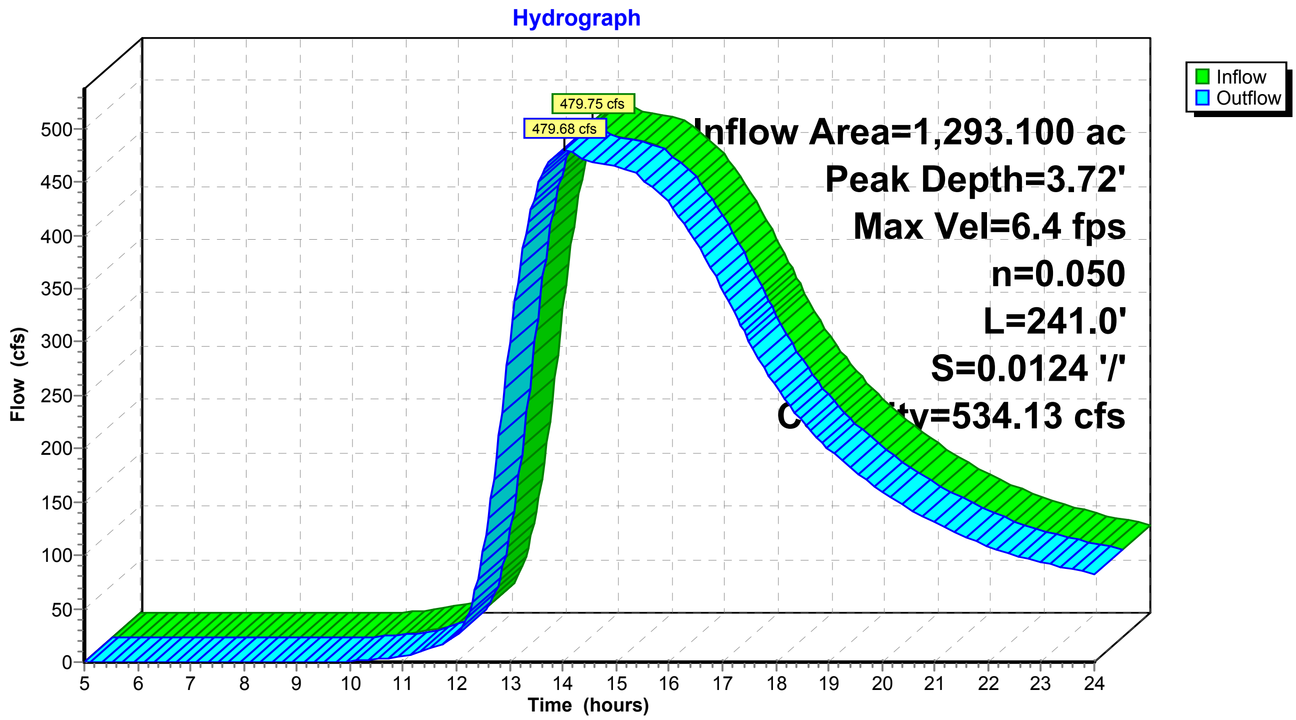
[61] Hint: Submerged 39% of Reach 1CR bottom

Inflow Area = 1,293.100 ac, Inflow Depth > 2.33" for 50 YR event
Inflow = 479.75 cfs @ 14.02 hrs, Volume= 251.512 af
Outflow = 479.68 cfs @ 14.04 hrs, Volume= 251.309 af, Atten= 0%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.4 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 3.9 fps, Avg. Travel Time= 1.0 min

Peak Depth= 3.72' @ 14.03 hrs
Capacity at bank full= 534.13 cfs
Inlet Invert= 77.50', Outlet Invert= 74.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 241.0' Slope= 0.0124 '/'

Reach 2CR: (new Reach)



Reach 3CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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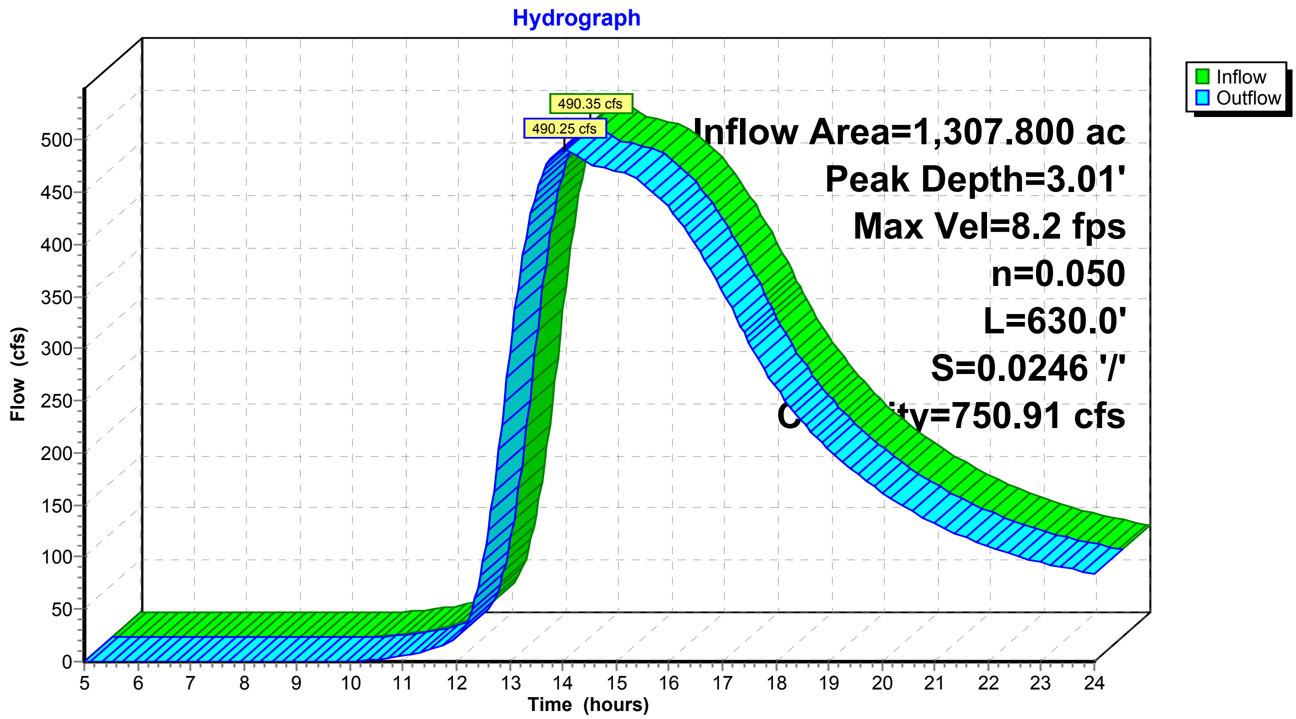
[61] Hint: Submerged 100% of Reach 2CR bottom

Inflow Area = 1,307.800 ac, Inflow Depth > 2.34" for 50 YR event
Inflow = 490.35 cfs @ 14.01 hrs, Volume= 254.817 af
Outflow = 490.25 cfs @ 14.04 hrs, Volume= 254.387 af, Atten= 0%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.2 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 4.9 fps, Avg. Travel Time= 2.1 min

Peak Depth= 3.01' @ 14.02 hrs
Capacity at bank full= 750.91 cfs
Inlet Invert= 74.50', Outlet Invert= 59.00'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 630.0' Slope= 0.0246 '/'

Reach 3CR: (new Reach)



Reach 4CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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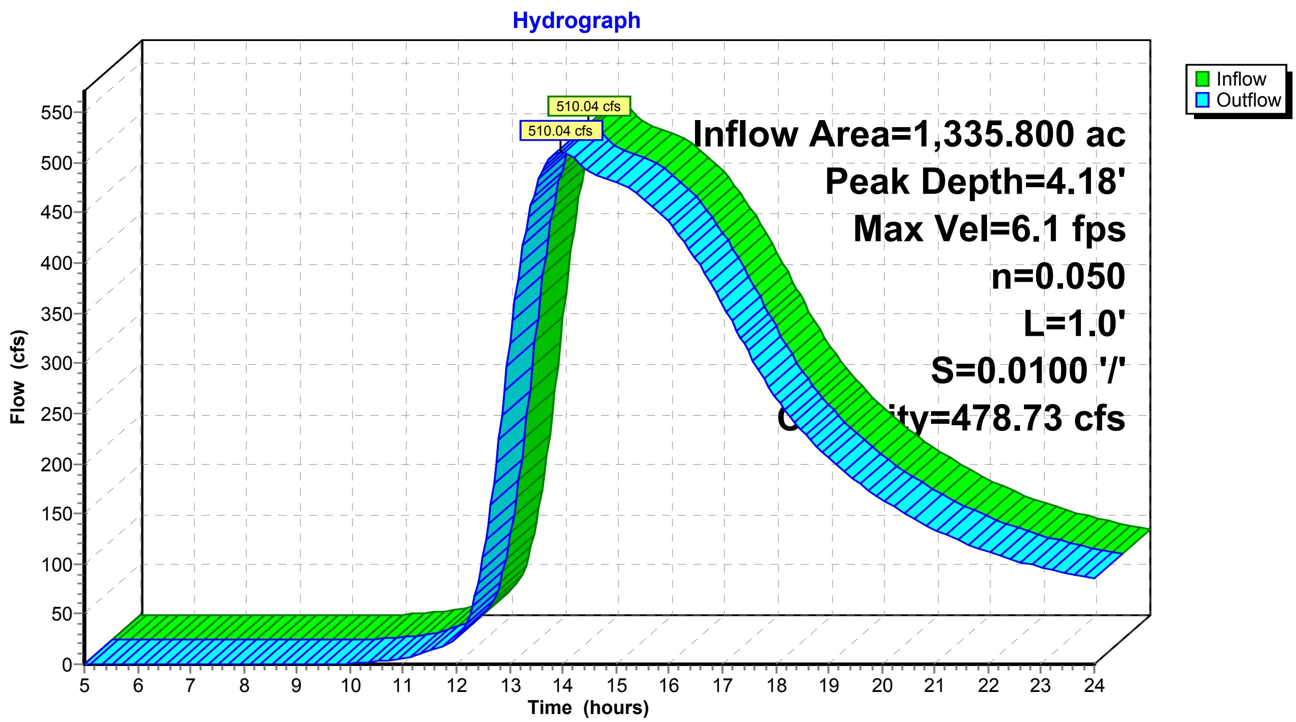
[91] Warning: Storage range exceeded by 0.18'
[55] Hint: Peak inflow is 107% of Manning's capacity
[61] Hint: Submerged 27% of Reach 3CR bottom

Inflow Area = 1,335.800 ac, Inflow Depth > 2.35" for 50 YR event
Inflow = 510.04 cfs @ 13.97 hrs, Volume= 261.087 af
Outflow = 510.04 cfs @ 13.97 hrs, Volume= 261.086 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.1 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.7 fps, Avg. Travel Time= 0.0 min

Peak Depth= 4.18' @ 13.97 hrs
Capacity at bank full= 478.73 cfs
Inlet Invert= 59.00', Outlet Invert= 58.99'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 1.0' Slope= 0.0100 '/'

Reach 4CR: (new Reach)



Pond 11P: Beaver Pond

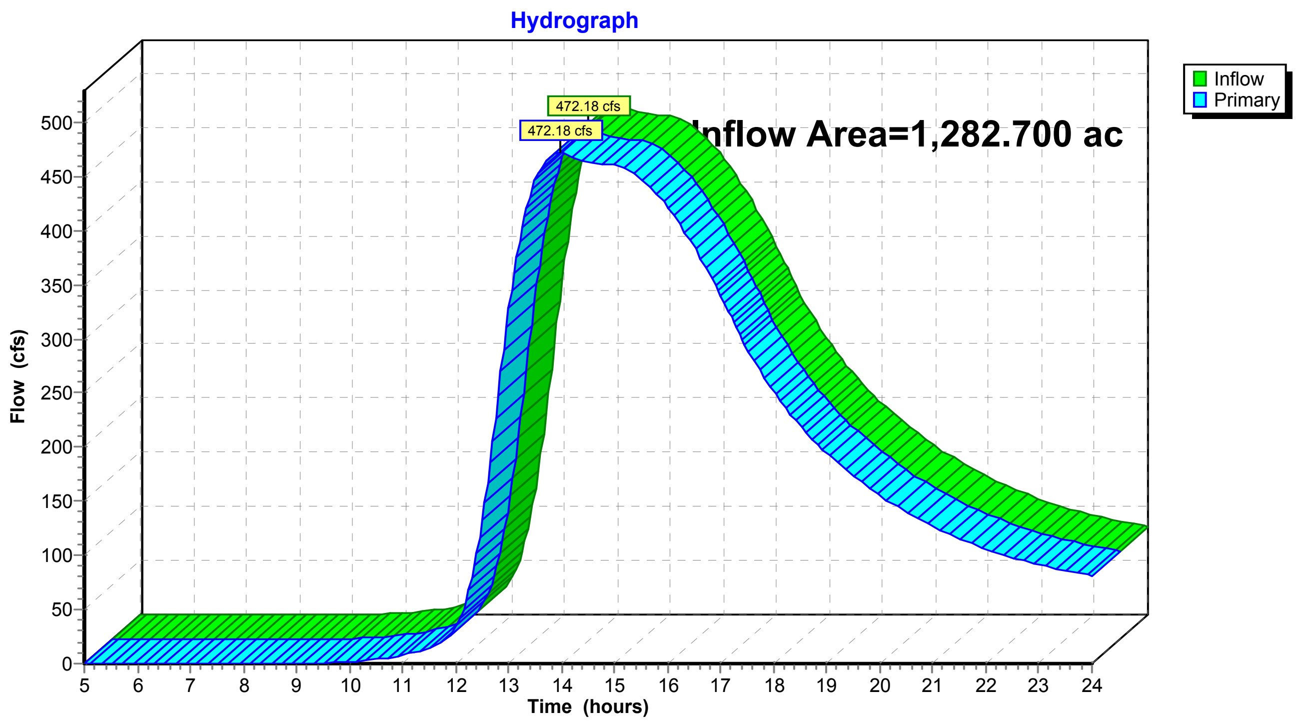
Beaver Pond has minimal storage (observed to be 2 inches on 9/28/08) and therefore shown as without in both pre and post development and no effect on comparative flows.

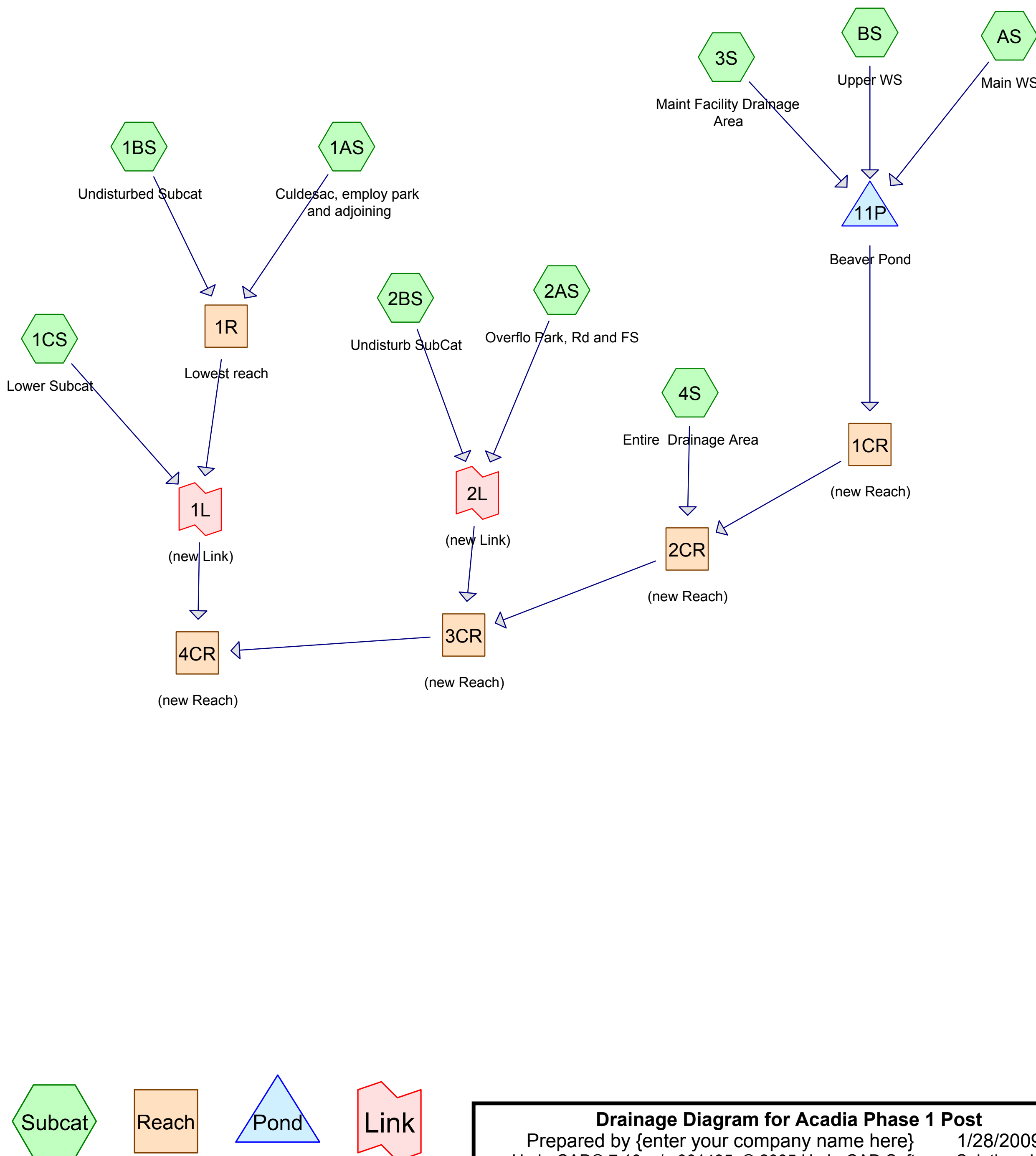
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,282.700 ac, Inflow Depth > 2.34" for 50 YR event
Inflow = 472.18 cfs @ 13.96 hrs, Volume= 249.852 af
Primary = 472.18 cfs @ 13.96 hrs, Volume= 249.852 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs

Pond 11P: Beaver Pond





Drainage Diagram for Acadia Phase 1 Post
Prepared by {enter your company name here} 1/28/2009
HydroCAD® 7.10 s/n 001495 © 2005 HydroCAD Software Solutions LLC

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1AS: Culdesac, employ park and adjoining Runoff Area=9.180 ac Runoff Depth>0.85"
Flow Length=1,573' Tc=79.0 min CN=79 Runoff=3.65 cfs 0.652 af

Subcatchment 1BS: Undisturbed Subcat Runoff Area=10.400 ac Runoff Depth>0.74"
Flow Length=1,833' Tc=104.2 min CN=77 Runoff=2.92 cfs 0.644 af

Subcatchment 1CS: Lower Subcat Runoff Area=10.800 ac Runoff Depth>0.74"
Flow Length=1,097' Tc=102.6 min CN=77 Runoff=3.05 cfs 0.669 af

Subcatchment 2AS: Overflo Park, Rd and FS Runoff Area=3.900 ac Runoff Depth>1.14"
Flow Length=1,103' Tc=61.0 min CN=84 Runoff=2.57 cfs 0.371 af

Subcatchment 2BS: Undisturb SubCat Runoff Area=10.600 ac Runoff Depth>0.75"
Flow Length=1,358' Tc=95.4 min CN=77 Runoff=3.16 cfs 0.660 af

Subcatchment 3S: Maint Facility Drainage Area Runoff Area=5.100 ac Runoff Depth>1.28"
Flow Length=670' Tc=52.5 min CN=86 Runoff=4.20 cfs 0.542 af

Subcatchment 4S: Entire Drainage Area Runoff Area=8.240 ac Runoff Depth>0.82"
Flow Length=835' Tc=141.4 min CN=79 Runoff=2.08 cfs 0.564 af

Subcatchment AS: Main WS Runoff Area=880.000 ac Runoff Depth>0.40"
Flow Length=18,419' Tc=280.1 min CN=71 Runoff=73.73 cfs 29.259 af

Subcatchment BS: Upper WS Runoff Area=399.000 ac Runoff Depth>0.64"
Flow Length=6,330' Tc=125.5 min CN=75 Runoff=82.80 cfs 21.399 af

Reach 1CR: (new Reach) Peak Depth=1.49' Max Vel=3.6 fps Inflow=107.04 cfs 51.200 af
n=0.050 L=923.0' S=0.0103 '/' Capacity=485.68 cfs Outflow=106.98 cfs 50.547 af

Reach 1R: Lowest reach Peak Depth=0.57' Max Vel=2.5 fps Inflow=6.27 cfs 1.296 af
n=0.050 L=985.0' S=0.0274 '/' Capacity=20.66 cfs Outflow=6.21 cfs 1.281 af

Reach 2CR: (new Reach) Peak Depth=1.42' Max Vel=3.8 fps Inflow=108.93 cfs 51.111 af
n=0.050 L=241.0' S=0.0124 '/' Capacity=534.13 cfs Outflow=108.91 cfs 50.948 af

Reach 3CR: (new Reach) Peak Depth=1.16' Max Vel=4.8 fps Inflow=111.13 cfs 51.979 af
n=0.050 L=630.0' S=0.0246 '/' Capacity=750.91 cfs Outflow=111.11 cfs 51.632 af

Reach 4CR: (new Reach) Peak Depth=1.59' Max Vel=3.7 fps Inflow=116.66 cfs 53.582 af
n=0.050 L=1.0' S=0.0100 '/' Capacity=478.73 cfs Outflow=116.66 cfs 53.581 af

Pond 11P: Beaver Pond Inflow=107.04 cfs 51.200 af
Primary=107.04 cfs 51.200 af

Link 1L: (new Link)
Inflow=9.25 cfs 1.950 af
Primary=9.25 cfs 1.950 af

Link 2L: (new Link)
Inflow=5.06 cfs 1.031 af
Primary=5.06 cfs 1.031 af

Total Runoff Area = 1,337.220 ac Runoff Volume = 54.761 af Average Runoff Depth = 0.49"

Subcatchment 1AS: Culdesac, employ park and adjoining

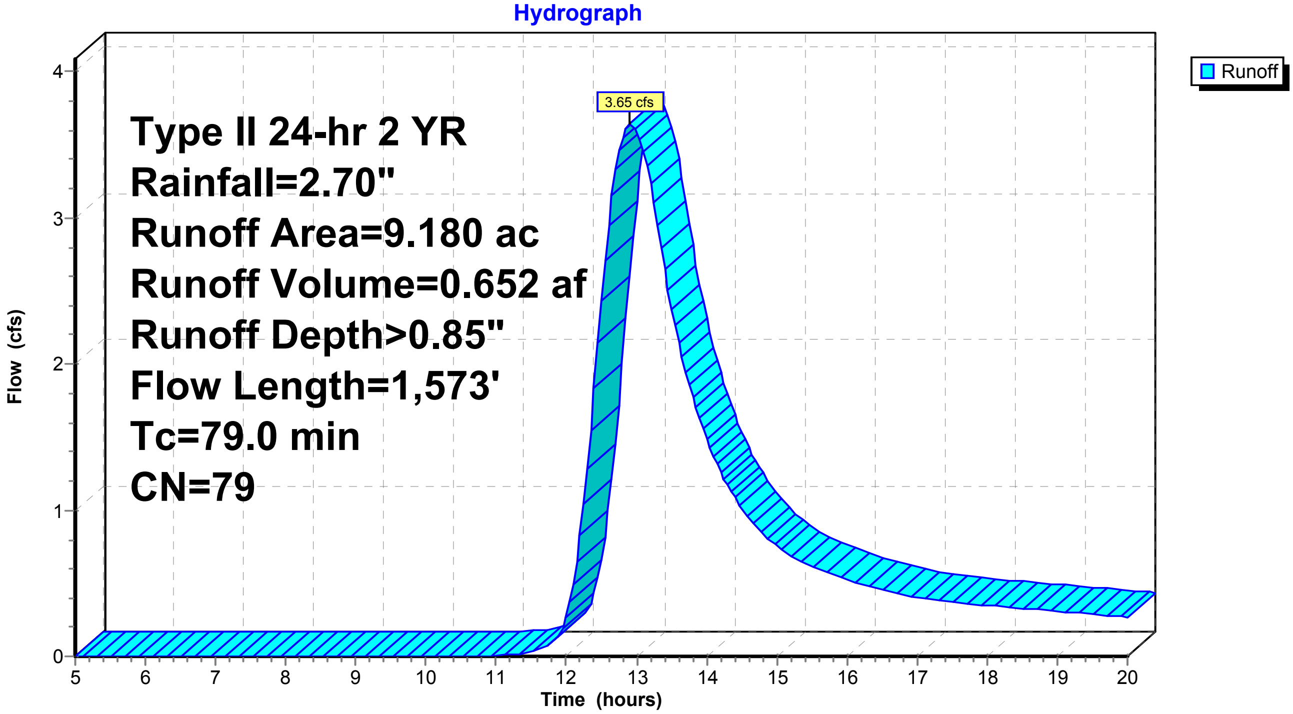
Runoff = 3.65 cfs @ 12.91 hrs, Volume= 0.652 af, Depth> 0.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
0.780	98	Paved parking & roofs
8.400	77	Woods, Good, HSG D
9.180	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	65	0.0150	0.1		**Sheet Flow, From slope** Woods: Light underbrush n= 0.400 P2= 2.70"
3.4	177	0.0060	0.9		**Sheet Flow, Through parking lot** Smooth surfaces n= 0.011 P2= 2.70"
0.3	161	0.0190	9.4	11.58	**Circular Channel (pipe), Pipe flow** Diam= 15.0" Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.010 PVC, smooth interior
1.6	311	0.0080	3.2	9.73	**Channel Flow, Channel to Level Lip T6xD0.75** Area= 3.0 sf Perim= 6.3' r= 0.48' n= 0.025 Rubble masonry, cemented
0.9	75	0.0010	1.3	6.02	**Channel Flow, Level Lip Spreader** Area= 4.5 sf Perim= 7.5' r= 0.60' n= 0.025 Rubble masonry, cemented
33.3	122	0.0490	0.1		**Sheet Flow, Filter Strip** Woods: Dense underbrush n= 0.800 P2= 2.70"
19.3	355	0.0150	0.3		**Shallow Concentrated Flow, Shallow** Forest w/Heavy Litter Kv= 2.5 fps
1.6	307	0.0340	3.1	4.67	**Channel Flow,** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
79.0	1,573	Total			

Subcatchment 1AS: Culdesac, employ park and adjoining



Subcatchment 1BS: Undisturbed Subcat

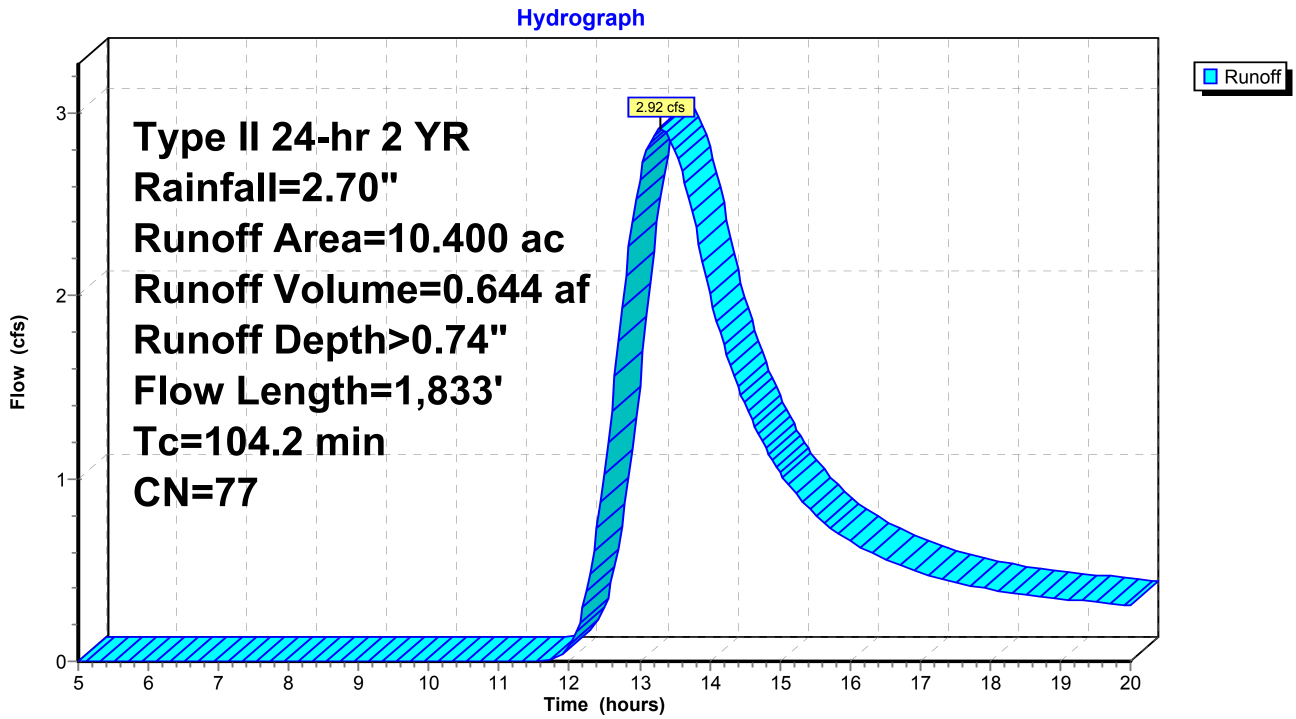
Runoff = 2.92 cfs @ 13.30 hrs, Volume= 0.644 af, Depth> 0.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
10.400	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.8	200	0.0250	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
35.9	835	0.0240	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
3.5	798	0.0510	3.8	5.72	**Channel Flow, First Chan Flow** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
104.2	1,833	Total			

Subcatchment 1BS: Undisturbed Subcat



Subcatchment 1CS: Lower Subcat

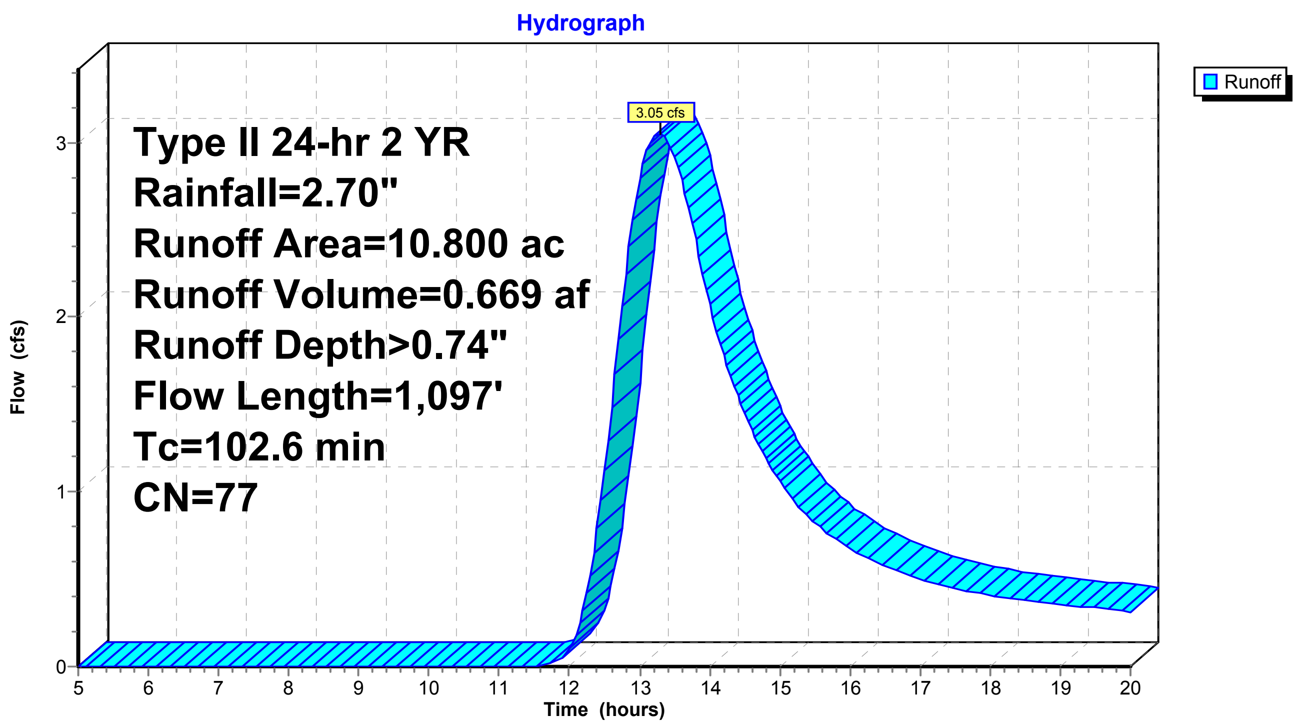
Runoff = 3.05 cfs @ 13.30 hrs, Volume= 0.669 af, Depth> 0.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
10.800	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.9	150	0.0130	0.0		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
23.2	480	0.0190	0.3		**Shallow Concentrated Flow, Shallow** Forest w/Heavy Litter Kv= 2.5 fps
12.5	467	0.0620	0.6		**Shallow Concentrated Flow, Shallow two** Forest w/Heavy Litter Kv= 2.5 fps
102.6	1,097	Total			

Subcatchment 1CS: Lower Subcat



Subcatchment 2AS: Overflo Park, Rd and FS

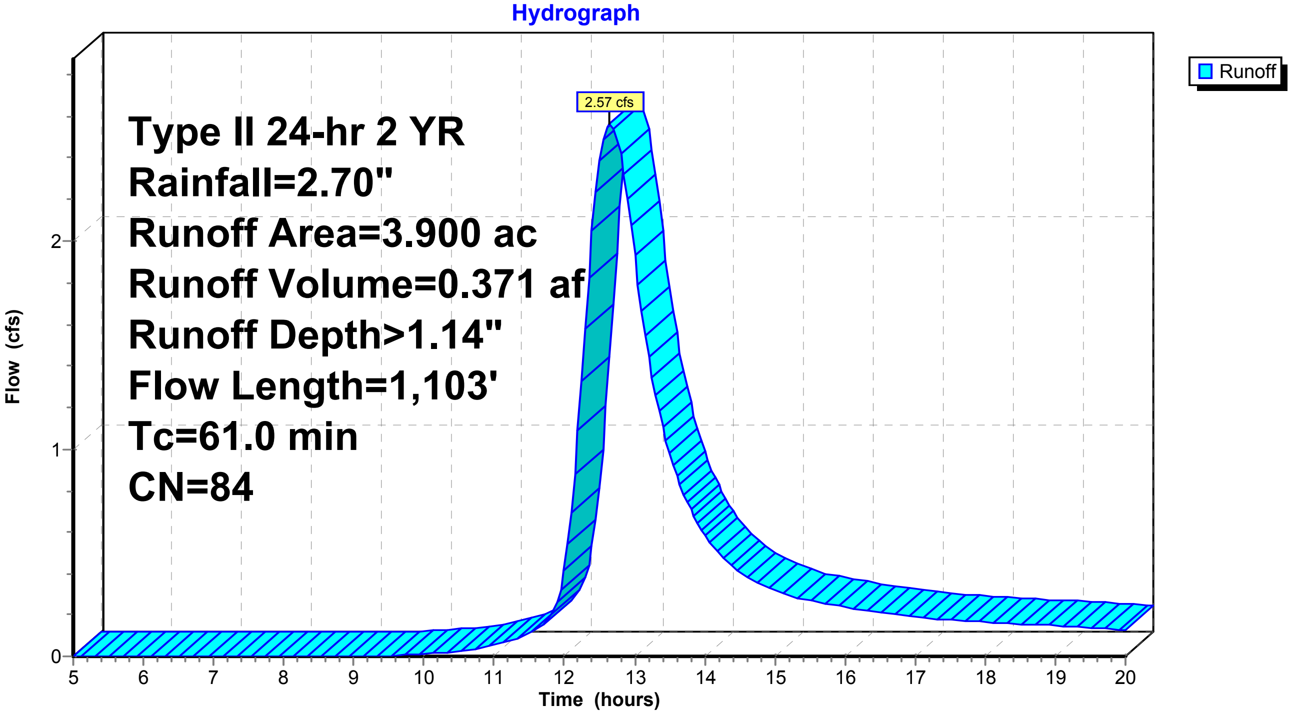
Runoff = 2.57 cfs @ 12.65 hrs, Volume= 0.371 af, Depth> 1.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
1.270	98	Paved parking & roofs
2.630	77	Woods, Good, HSG D
3.900	84	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	145	0.0070	0.9		**Sheet Flow, Road through Parking Lot** Smooth surfaces n= 0.011 P2= 2.70"
0.0	15	0.1130	5.4		**Shallow Concentrated Flow, Down bank** Unpaved Kv= 16.1 fps
11.1	504	0.0260	0.8	3.01	**Channel Flow, Ditch at toe slope** Area= 4.0 sf Perim= 6.1' r= 0.66' n= 0.240 Sheet flow over Dense Grass
1.1	85	0.0010	1.3	6.02	**Channel Flow, In Level Lip** Area= 4.5 sf Perim= 7.5' r= 0.60' n= 0.025 Rubble masonry, cemented
38.1	150	0.0530	0.1		**Sheet Flow, Filter Strip** Woods: Dense underbrush n= 0.800 P2= 2.70"
8.0	204	0.0290	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
61.0	1,103	Total			

Subcatchment 2AS: Overflo Park, Rd and FS



Subcatchment 2BS: Undisturb SubCat

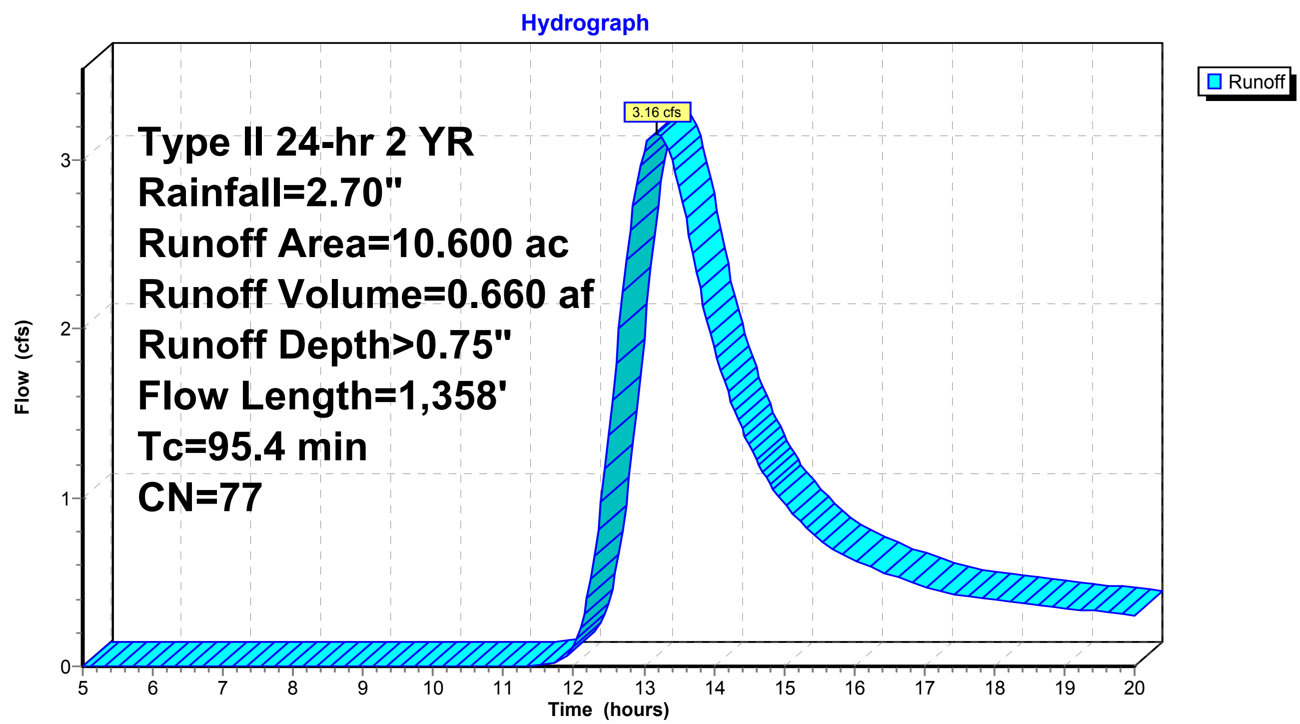
Runoff = 3.16 cfs @ 13.18 hrs, Volume= 0.660 af, Depth> 0.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
10.600	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.7	200	0.0400	0.1		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
40.3	876	0.0210	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
1.4	282	0.0390	3.3	5.00	**Channel Flow, Channel** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
95.4	1,358	Total			

Subcatchment 2BS: Undisturb SubCat



Subcatchment 3S: Maint Facility Drainage Area

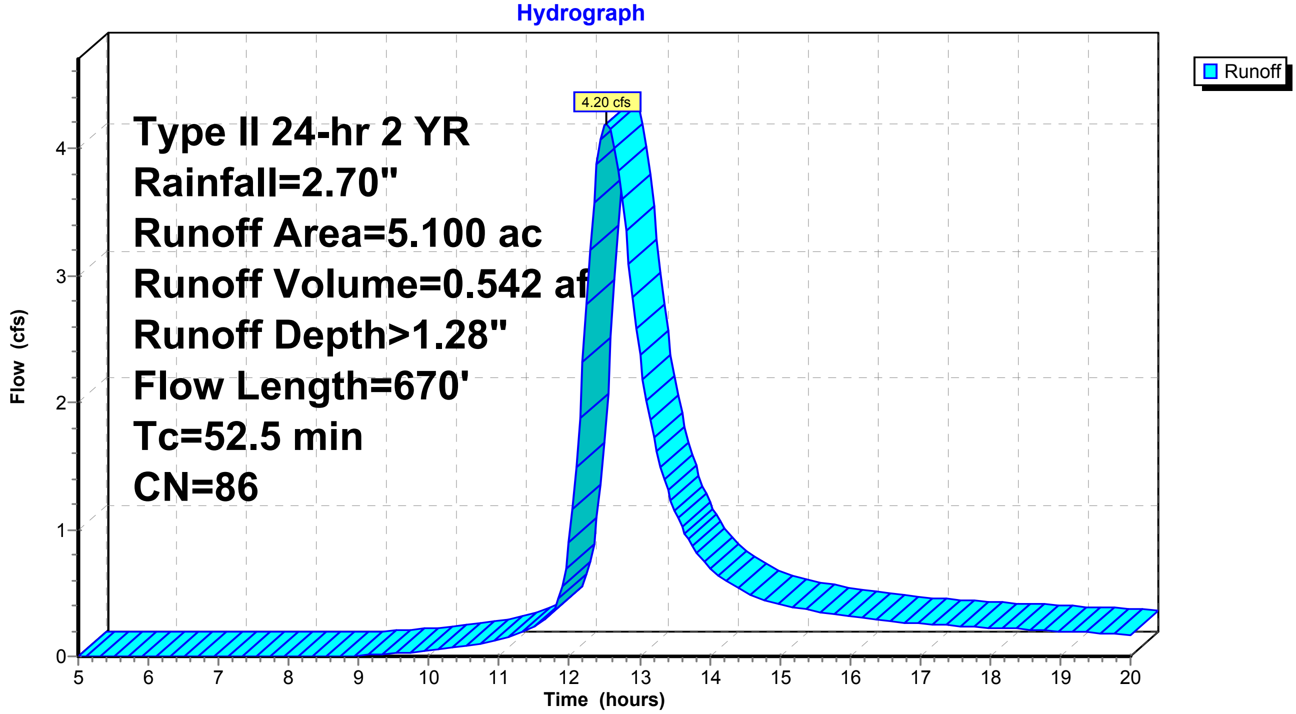
Runoff = 4.20 cfs @ 12.54 hrs, Volume= 0.542 af, Depth> 1.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
2.240	98	Paved parking & roofs
2.860	77	Woods, Good, HSG D
5.100	86	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.6000	3.6		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 2.70"
3.1	130	0.0040	0.7		**Sheet Flow, Through Parking lot** Smooth surfaces n= 0.011 P2= 2.70"
1.6	22	0.2950	0.2		**Sheet Flow, Over inslope** Grass: Dense n= 0.240 P2= 2.70"
9.9	230	0.0240	0.4		**Shallow Concentrated Flow, Overland (w/ treatment) to Filter str** Forest w/Heavy Litter Kv= 2.5 fps
1.5	118	0.0010	1.3	6.02	**Channel Flow, In Level Lip** Area= 4.5 sf Perim= 7.5' r= 0.60' n= 0.025 Rubble masonry, cemented
36.3	150	0.0600	0.1		**Sheet Flow, Through Filter Strip** Woods: Dense underbrush n= 0.800 P2= 2.70"
52.5	670	Total			

Subcatchment 3S: Maint Facility Drainage Area



Subcatchment 4S: Entire Drainage Area

Channel flow section is for existing stream which differs from artificial sections used for each reach. See notes associated with the reach sections.

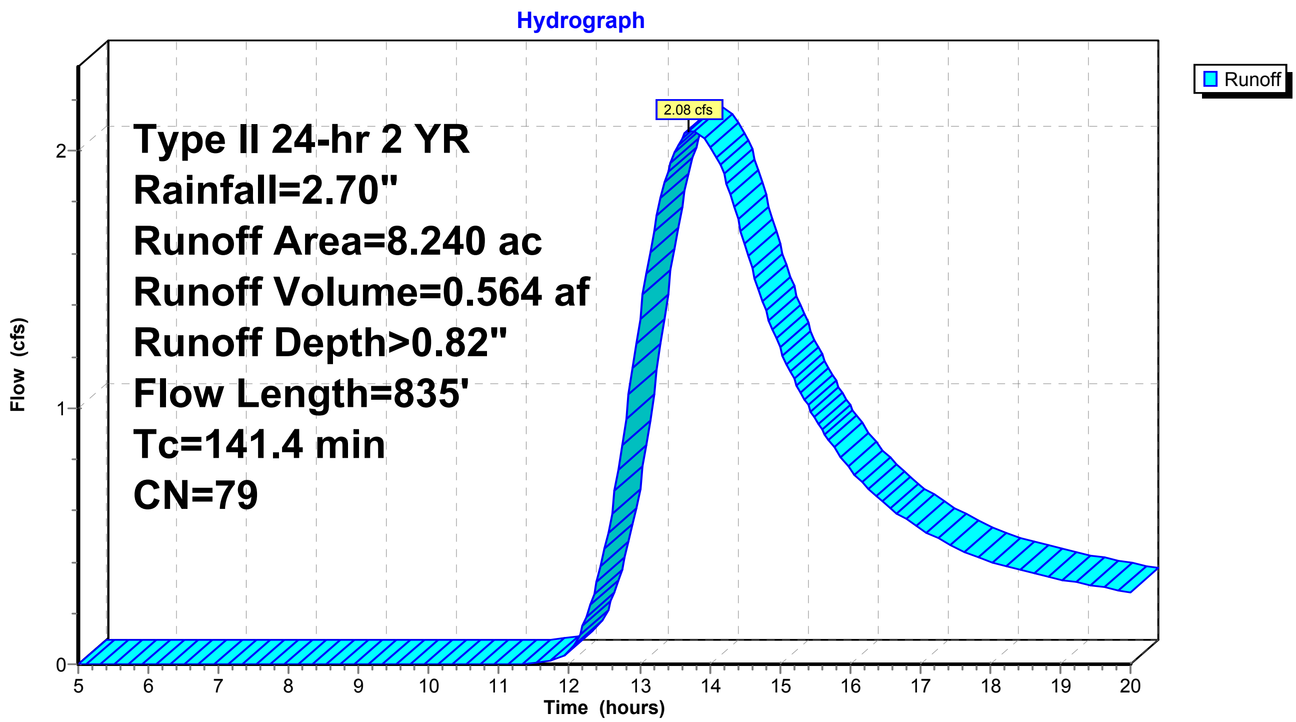
Runoff = 2.08 cfs @ 13.71 hrs, Volume= 0.564 af, Depth> 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
0.630	98	Paved parking & roofs
7.610	77	Woods, Good, HSG D
8.240	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
134.9	100	0.0010	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
3.8	144	0.0630	0.6		**Shallow Concentrated Flow, Shallow** Forest w/Heavy Litter Kv= 2.5 fps
2.7	591	0.0140	3.7	41.73	**Channel Flow, Stream/Culvert/Stream** Area= 11.3 sf Perim= 10.5' r= 1.08' n= 0.050 Mountain streams w/large boulders
141.4	835	Total			

Subcatchment 4S: Entire Drainage Area



Subcatchment AS: Main WS

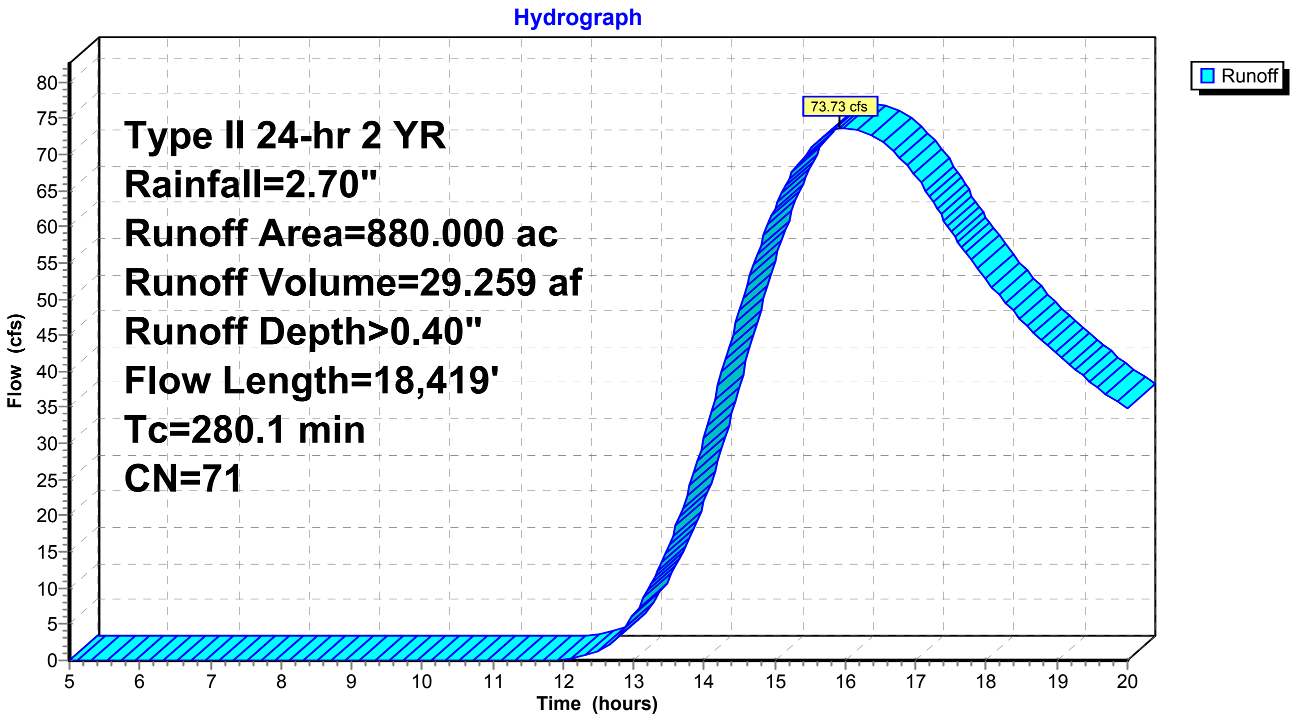
Runoff = 73.73 cfs @ 15.91 hrs, Volume= 29.259 af, Depth> 0.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
151.000	77	Woods, Good, HSG D
46.000	73	Brush, Good, HSG D
683.000	70	Woods, Good, HSG C
880.000	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.9	100	0.0210	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
46.0	1,000	0.0210	0.4		**Shallow Concentrated Flow, Shallow Concen** Forest w/Heavy Litter Kv= 2.5 fps
32.6	4,500	0.0260	2.3	2.30	**Channel Flow, Before Upper Wetland** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.050 Mountain streams w/large boulders
97.4	3,870	0.0050	0.7	1.32	**Channel Flow, Channel Flow in Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.100 Very weedy reaches w/pools
15.9	2,525	0.0200	2.6	5.30	**Channel Flow, Open Channel** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.050 Mountain streams w/large boulders
48.3	6,424	0.0110	2.2	6.65	**Channel Flow, Open Channel** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
280.1	18,419	Total			

Subcatchment AS: Main WS



Subcatchment BS: Upper WS

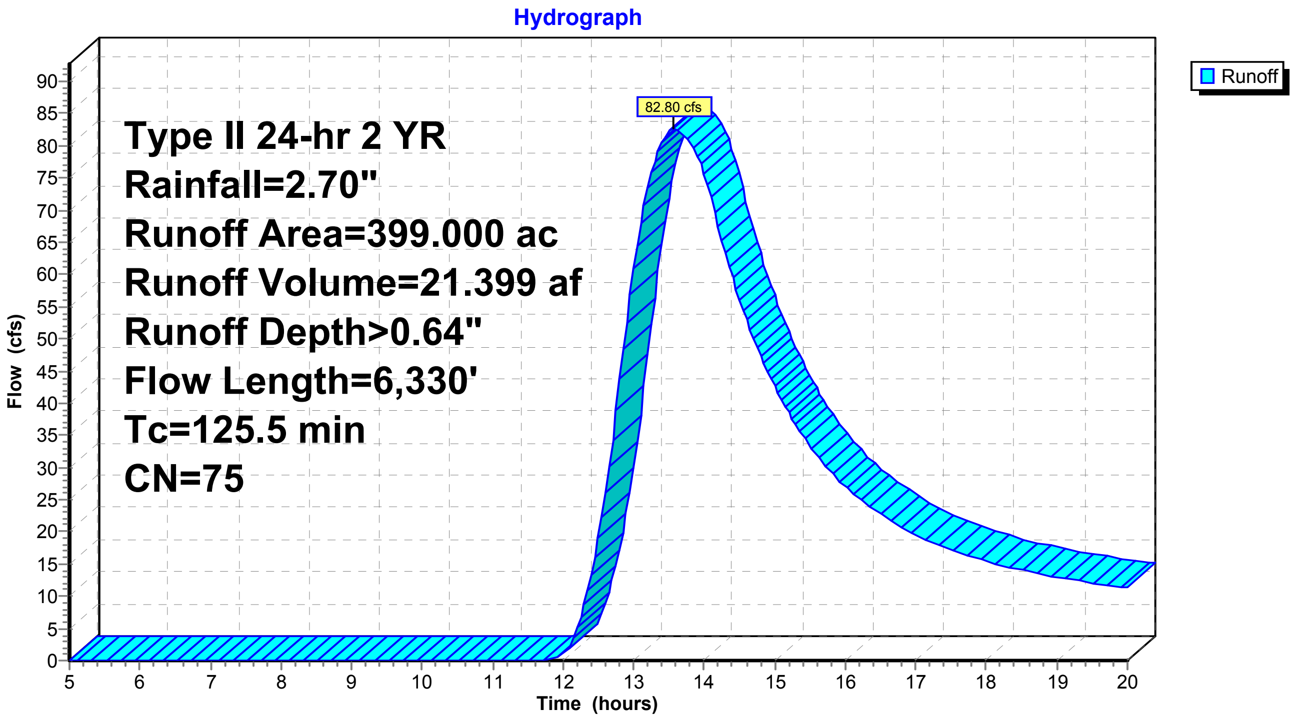
Runoff = 82.80 cfs @ 13.56 hrs, Volume= 21.399 af, Depth> 0.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
245.000	77	Woods, Good, HSG D
31.000	73	Brush, Good, HSG D
123.000	70	Woods, Good, HSG C
399.000	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
33.3	1,000	0.0400	0.5		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
48.1	3,230	0.0070	1.1	2.24	**Channel Flow, Through Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.070 Sluggish weedy reaches w/pools
13.3	2,000	0.0140	2.5	7.50	**Channel Flow, Lower Reach** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
125.5	6,330	Total			

Subcatchment BS: Upper WS



Reach 1CR: (new Reach)

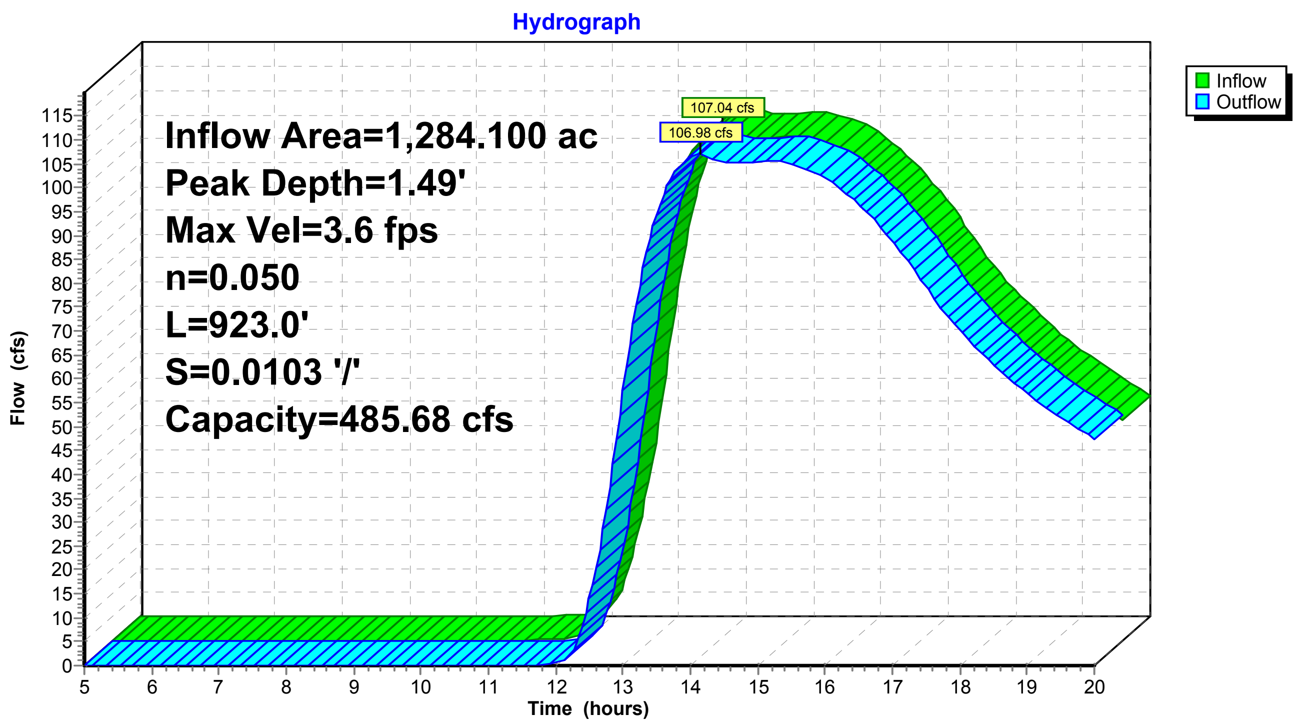
Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

Inflow Area = 1,284.100 ac, Inflow Depth > 0.48" for 2 YR event
Inflow = 107.04 cfs @ 14.06 hrs, Volume= 51.200 af
Outflow = 106.98 cfs @ 14.15 hrs, Volume= 50.547 af, Atten= 0%, Lag= 5.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.6 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 2.2 fps, Avg. Travel Time= 6.9 min

Peak Depth= 1.49' @ 14.09 hrs
Capacity at bank full= 485.68 cfs
Inlet Invert= 87.00', Outlet Invert= 77.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 923.0' Slope= 0.0103 '/'

Reach 1CR: (new Reach)



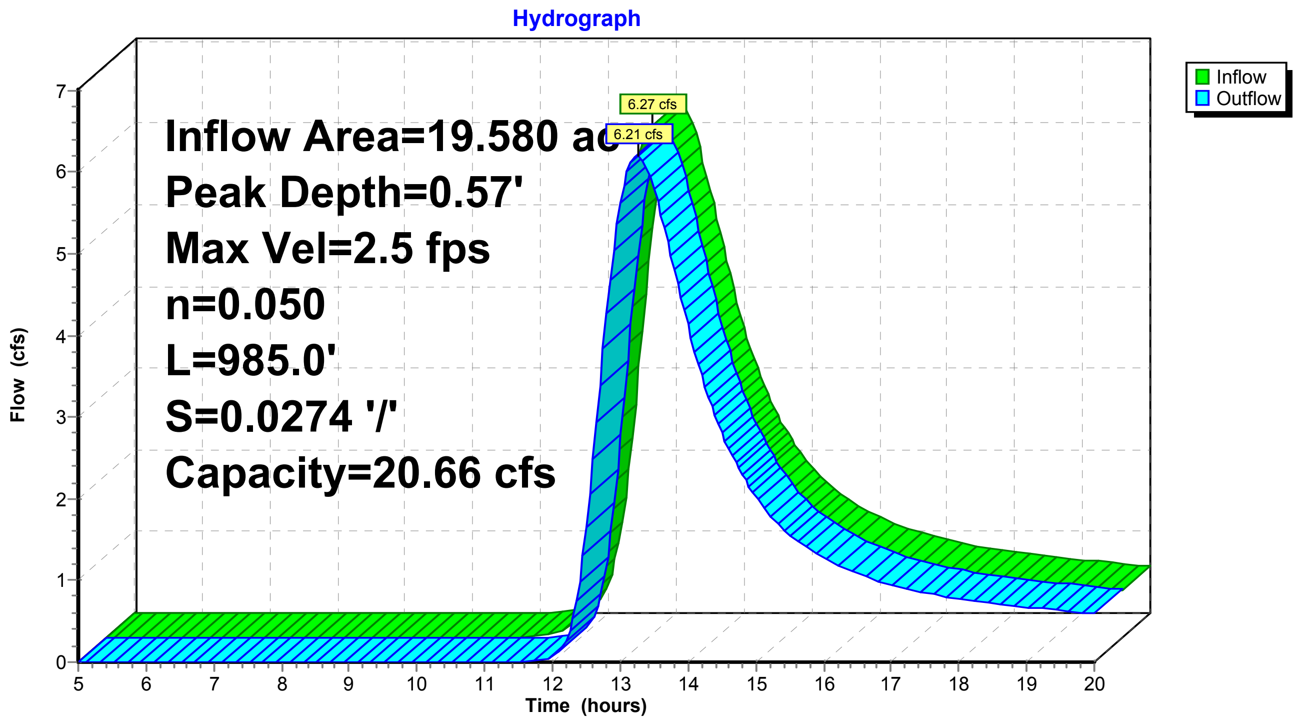
Reach 1R: Lowest reach

Inflow Area = 19.580 ac, Inflow Depth > 0.79" for 2 YR event
Inflow = 6.27 cfs @ 13.07 hrs, Volume= 1.296 af
Outflow = 6.21 cfs @ 13.25 hrs, Volume= 1.281 af, Atten= 1%, Lag= 11.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.5 fps, Min. Travel Time= 6.5 min
Avg. Velocity = 1.5 fps, Avg. Travel Time= 10.8 min

Peak Depth= 0.57' @ 13.14 hrs
Capacity at bank full= 20.66 cfs
Inlet Invert= 87.00', Outlet Invert= 60.00'
2.00' x 1.00' deep channel, n= 0.050 Mountain streams w/large boulders
Side Slope Z-value= 4.0 '/' Top Width= 10.00'
Length= 985.0' Slope= 0.0274 '/'

Reach 1R: Lowest reach



Reach 2CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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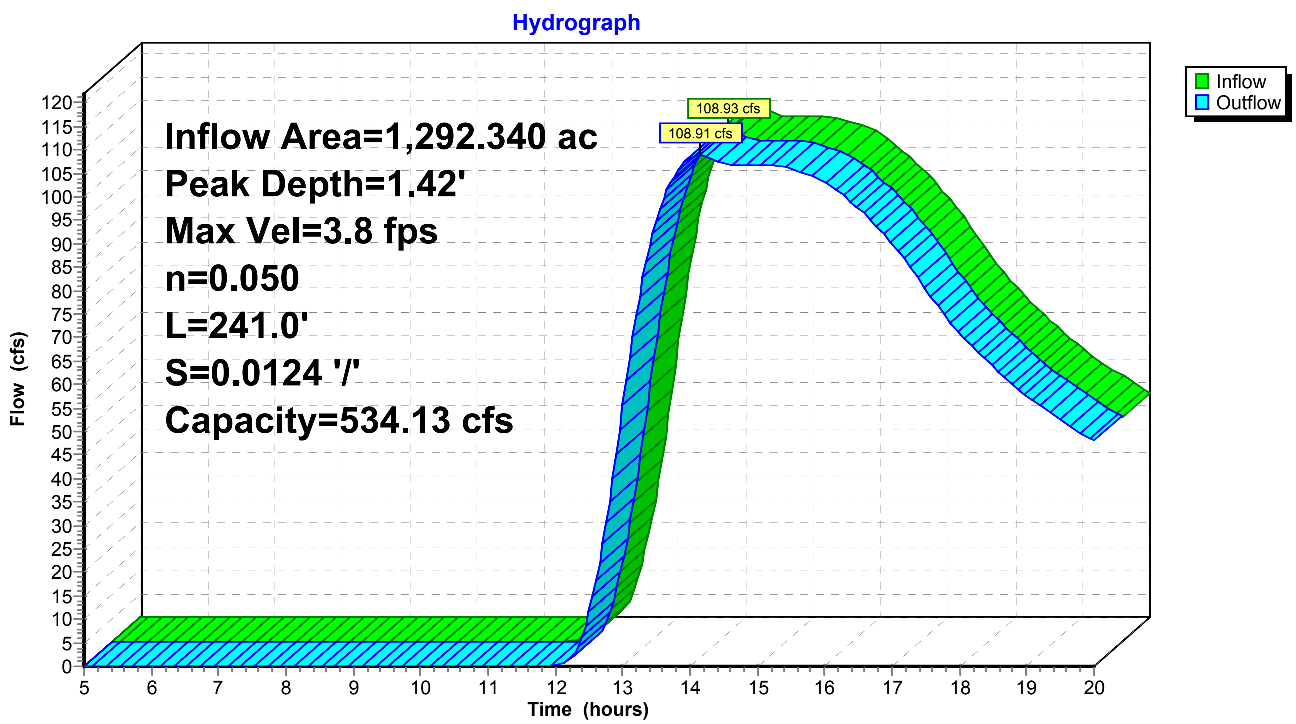
[61] Hint: Submerged 15% of Reach 1CR bottom

Inflow Area = 1,292.340 ac, Inflow Depth > 0.47" for 2 YR event
Inflow = 108.93 cfs @ 14.14 hrs, Volume= 51.111 af
Outflow = 108.91 cfs @ 14.16 hrs, Volume= 50.948 af, Atten= 0%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.8 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 2.4 fps, Avg. Travel Time= 1.7 min

Peak Depth= 1.42' @ 14.14 hrs
Capacity at bank full= 534.13 cfs
Inlet Invert= 77.50', Outlet Invert= 74.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 241.0' Slope= 0.0124 '/'

Reach 2CR: (new Reach)



Reach 3CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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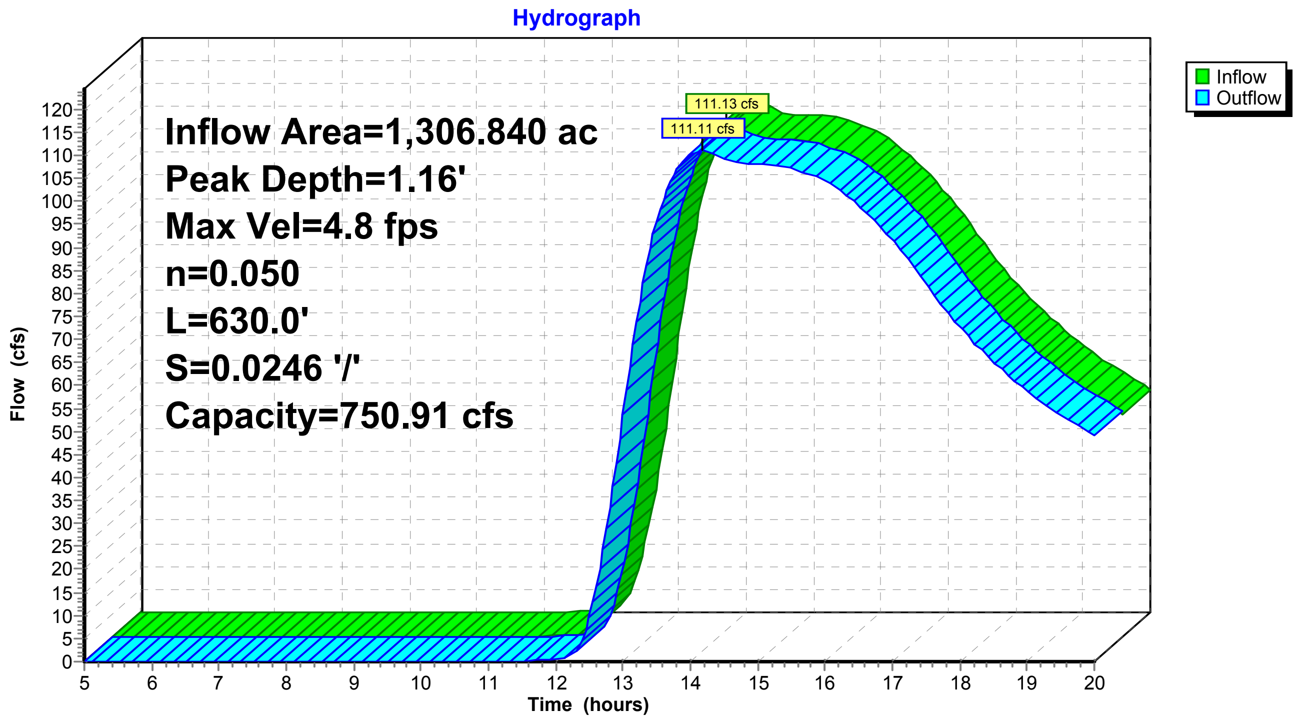
[61] Hint: Submerged 39% of Reach 2CR bottom

Inflow Area = 1,306.840 ac, Inflow Depth > 0.48" for 2 YR event
Inflow = 111.13 cfs @ 14.12 hrs, Volume= 51.979 af
Outflow = 111.11 cfs @ 14.18 hrs, Volume= 51.632 af, Atten= 0%, Lag= 3.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.8 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 3.0 fps, Avg. Travel Time= 3.4 min

Peak Depth= 1.16' @ 14.15 hrs
Capacity at bank full= 750.91 cfs
Inlet Invert= 74.50', Outlet Invert= 59.00'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 630.0' Slope= 0.0246 '/'

Reach 3CR: (new Reach)



Reach 4CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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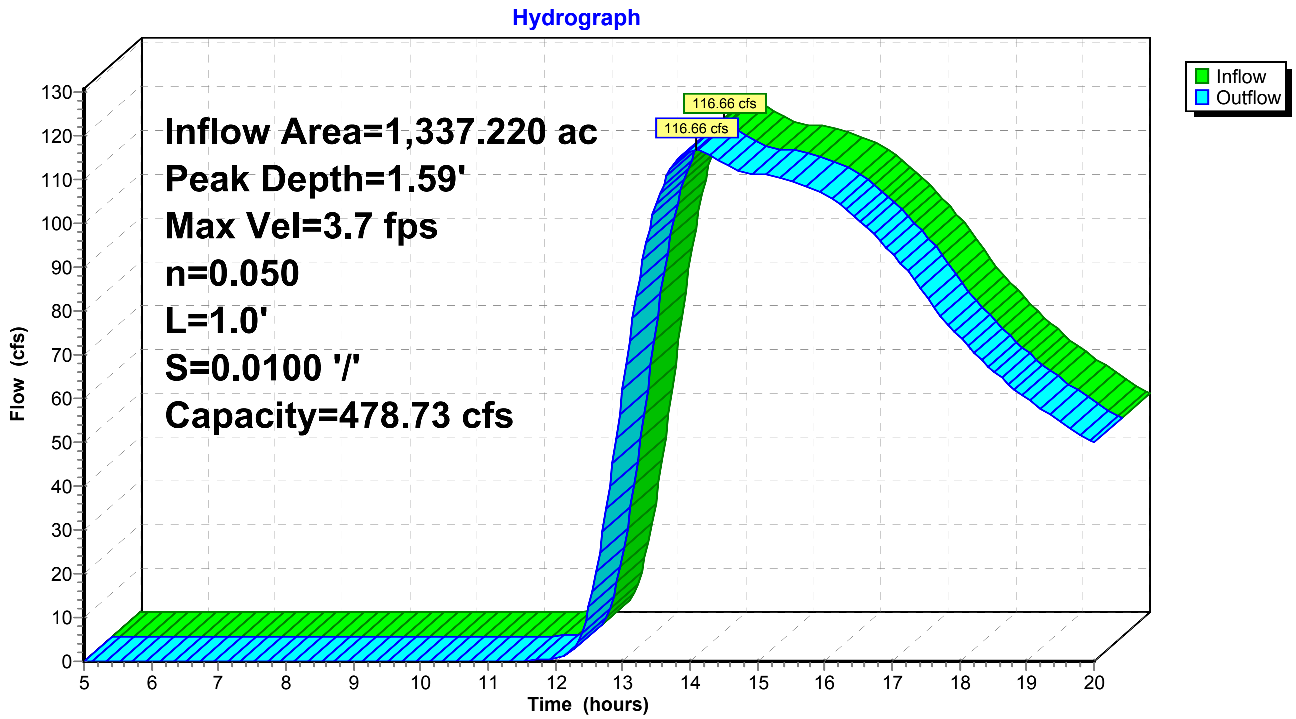
[61] Hint: Submerged 10% of Reach 3CR bottom

Inflow Area = 1,337.220 ac, Inflow Depth > 0.48" for 2 YR event
Inflow = 116.66 cfs @ 14.10 hrs, Volume= 53.582 af
Outflow = 116.66 cfs @ 14.10 hrs, Volume= 53.581 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.3 fps, Avg. Travel Time= 0.0 min

Peak Depth= 1.59' @ 14.10 hrs
Capacity at bank full= 478.73 cfs
Inlet Invert= 59.00', Outlet Invert= 58.99'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 1.0' Slope= 0.0100 '/'

Reach 4CR: (new Reach)



Pond 11P: Beaver Pond

Beaver Pond has minimal storage (observed to be 2 inches on 9/28/08) and therefore shown as without in both pre and post development and no effect on comparative flows.

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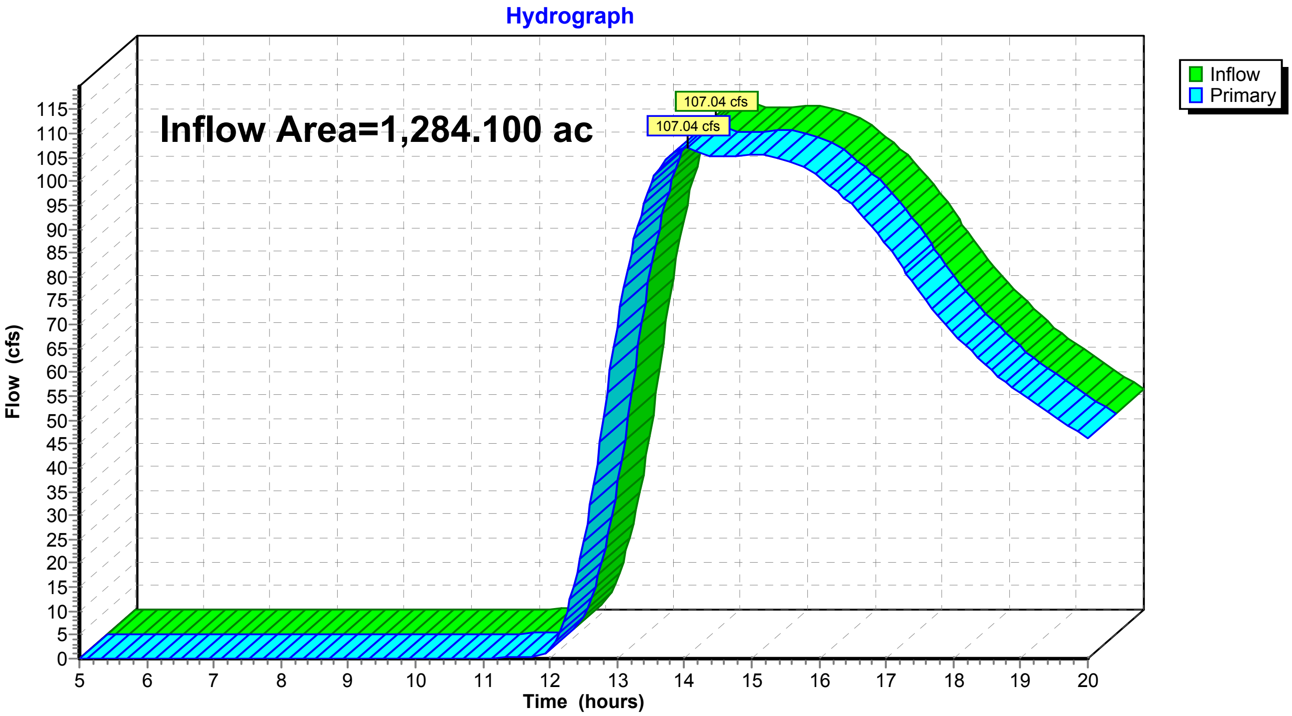
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,284.100 ac, Inflow Depth > 0.48" for 2 YR event
Inflow = 107.04 cfs @ 14.06 hrs, Volume= 51.200 af
Primary = 107.04 cfs @ 14.06 hrs, Volume= 51.200 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 11P: Beaver Pond

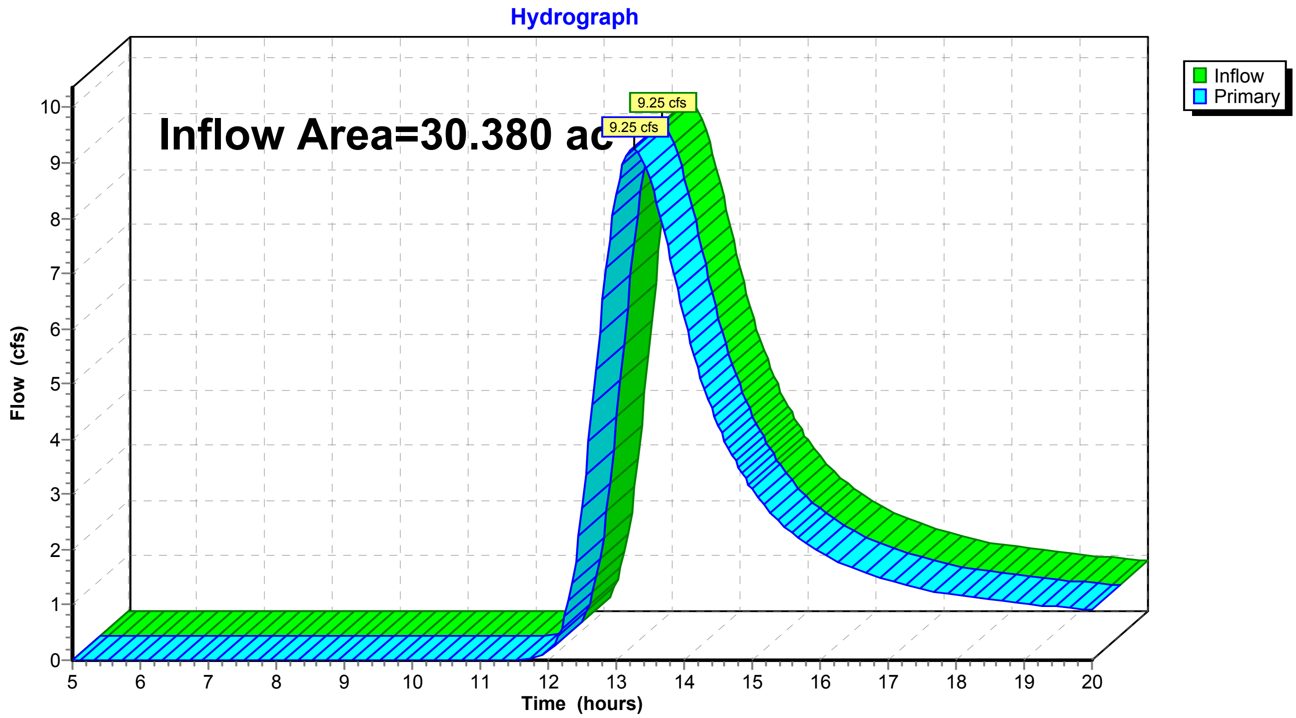


Link 1L: (new Link)

Inflow Area = 30.380 ac, Inflow Depth > 0.77" for 2 YR event
Inflow = 9.25 cfs @ 13.26 hrs, Volume= 1.950 af
Primary = 9.25 cfs @ 13.26 hrs, Volume= 1.950 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: (new Link)

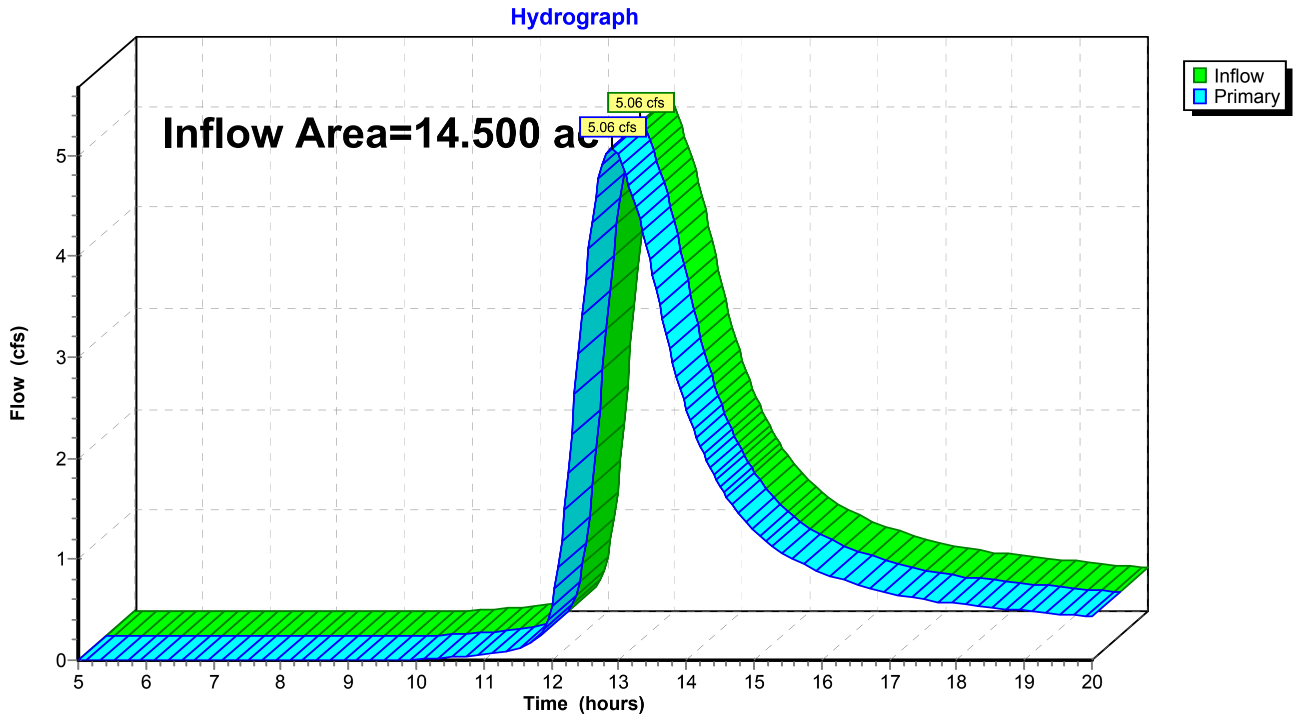


Link 2L: (new Link)

Inflow Area = 14.500 ac, Inflow Depth > 0.85" for 2 YR event
Inflow = 5.06 cfs @ 12.89 hrs, Volume= 1.031 af
Primary = 5.06 cfs @ 12.89 hrs, Volume= 1.031 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: (new Link)



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1AS: Culdesac, employ park and adjoining Runoff Area=9.180 ac Runoff Depth>1.90"
Flow Length=1,573' Tc=79.0 min CN=79 Runoff=8.42 cfs 1.455 af

Subcatchment 1BS: Undisturbed Subcat Runoff Area=10.400 ac Runoff Depth>1.73"
Flow Length=1,833' Tc=104.2 min CN=77 Runoff=7.09 cfs 1.500 af

Subcatchment 1CS: Lower Subcat Runoff Area=10.800 ac Runoff Depth>1.73"
Flow Length=1,097' Tc=102.6 min CN=77 Runoff=7.42 cfs 1.559 af

Subcatchment 2AS: Overflo Park, Rd and FS Runoff Area=3.900 ac Runoff Depth>2.32"
Flow Length=1,103' Tc=61.0 min CN=84 Runoff=5.25 cfs 0.754 af

Subcatchment 2BS: Undisturb SubCat Runoff Area=10.600 ac Runoff Depth>1.74"
Flow Length=1,358' Tc=95.4 min CN=77 Runoff=7.69 cfs 1.536 af

Subcatchment 3S: Maint Facility Drainage Area Runoff Area=5.100 ac Runoff Depth>2.50"
Flow Length=670' Tc=52.5 min CN=86 Runoff=8.19 cfs 1.064 af

Subcatchment 4S: Entire Drainage Area Runoff Area=8.240 ac Runoff Depth>1.84"
Flow Length=835' Tc=141.4 min CN=79 Runoff=4.83 cfs 1.265 af

Subcatchment AS: Main WS Runoff Area=880.000 ac Runoff Depth>1.11"
Flow Length=18,419' Tc=280.1 min CN=71 Runoff=209.02 cfs 81.203 af

Subcatchment BS: Upper WS Runoff Area=399.000 ac Runoff Depth>1.57"
Flow Length=6,330' Tc=125.5 min CN=75 Runoff=215.16 cfs 52.198 af

Reach 1CR: (new Reach) Peak Depth=2.85' Max Vel=5.1 fps Inflow=292.14 cfs 134.464 af
n=0.050 L=923.0' S=0.0103 '/' Capacity=485.68 cfs Outflow=292.00 cfs 133.405 af

Reach 1R: Lowest reach Peak Depth=0.86' Max Vel=3.2 fps Inflow=14.86 cfs 2.955 af
n=0.050 L=985.0' S=0.0274 '/' Capacity=20.66 cfs Outflow=14.78 cfs 2.931 af

Reach 2CR: (new Reach) Peak Depth=2.70' Max Vel=5.5 fps Inflow=296.51 cfs 134.670 af
n=0.050 L=241.0' S=0.0124 '/' Capacity=534.13 cfs Outflow=296.46 cfs 134.407 af

Reach 3CR: (new Reach) Peak Depth=2.19' Max Vel=6.9 fps Inflow=301.54 cfs 136.697 af
n=0.050 L=630.0' S=0.0246 '/' Capacity=750.91 cfs Outflow=301.47 cfs 136.139 af

Reach 4CR: (new Reach) Peak Depth=3.02' Max Vel=5.2 fps Inflow=314.47 cfs 140.629 af
n=0.050 L=1.0' S=0.0100 '/' Capacity=478.73 cfs Outflow=314.47 cfs 140.628 af

Pond 11P: Beaver Pond Inflow=292.14 cfs 134.464 af
Primary=292.14 cfs 134.464 af

Link 1L: (new Link) Inflow=22.19 cfs 4.490 af
Primary=22.19 cfs 4.490 af

Link 2L: (new Link) Inflow=11.63 cfs 2.290 af
Primary=11.63 cfs 2.290 af

Total Runoff Area = 1,337.220 ac Runoff Volume = 142.533 af Average Runoff Depth = 1.28"

Subcatchment 1AS: Culdesac, employ park and adjoining

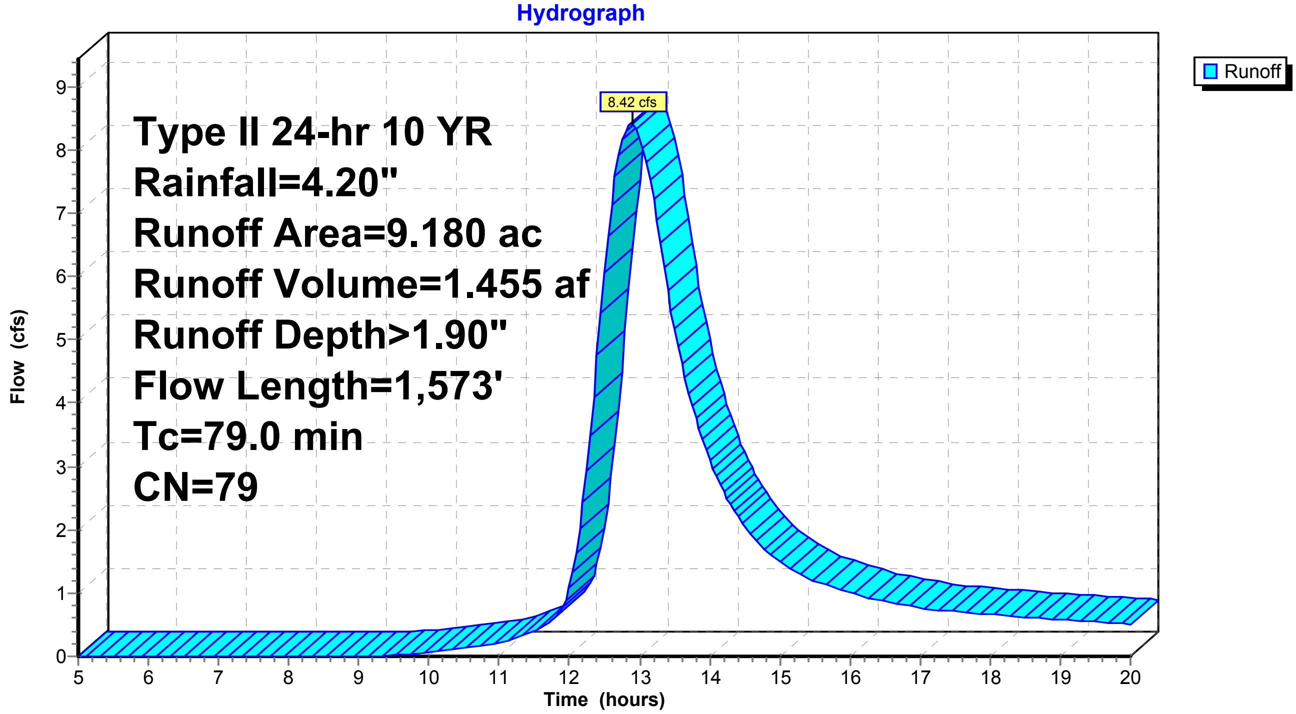
Runoff = 8.42 cfs @ 12.89 hrs, Volume= 1.455 af, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
0.780	98	Paved parking & roofs
8.400	77	Woods, Good, HSG D
9.180	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	65	0.0150	0.1		**Sheet Flow, From slope** Woods: Light underbrush n= 0.400 P2= 2.70"
3.4	177	0.0060	0.9		**Sheet Flow, Through parking lot** Smooth surfaces n= 0.011 P2= 2.70"
0.3	161	0.0190	9.4	11.58	**Circular Channel (pipe), Pipe flow** Diam= 15.0" Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.010 PVC, smooth interior
1.6	311	0.0080	3.2	9.73	**Channel Flow, Channel to Level Lip T6xD0.75** Area= 3.0 sf Perim= 6.3' r= 0.48' n= 0.025 Rubble masonry, cemented
0.9	75	0.0010	1.3	6.02	**Channel Flow, Level Lip Spreader** Area= 4.5 sf Perim= 7.5' r= 0.60' n= 0.025 Rubble masonry, cemented
33.3	122	0.0490	0.1		**Sheet Flow, Filter Strip** Woods: Dense underbrush n= 0.800 P2= 2.70"
19.3	355	0.0150	0.3		**Shallow Concentrated Flow, Shallow** Forest w/Heavy Litter Kv= 2.5 fps
1.6	307	0.0340	3.1	4.67	**Channel Flow,** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
79.0	1,573	Total			

Subcatchment 1AS: Culdesac, employ park and adjoining



Subcatchment 1BS: Undisturbed Subcat

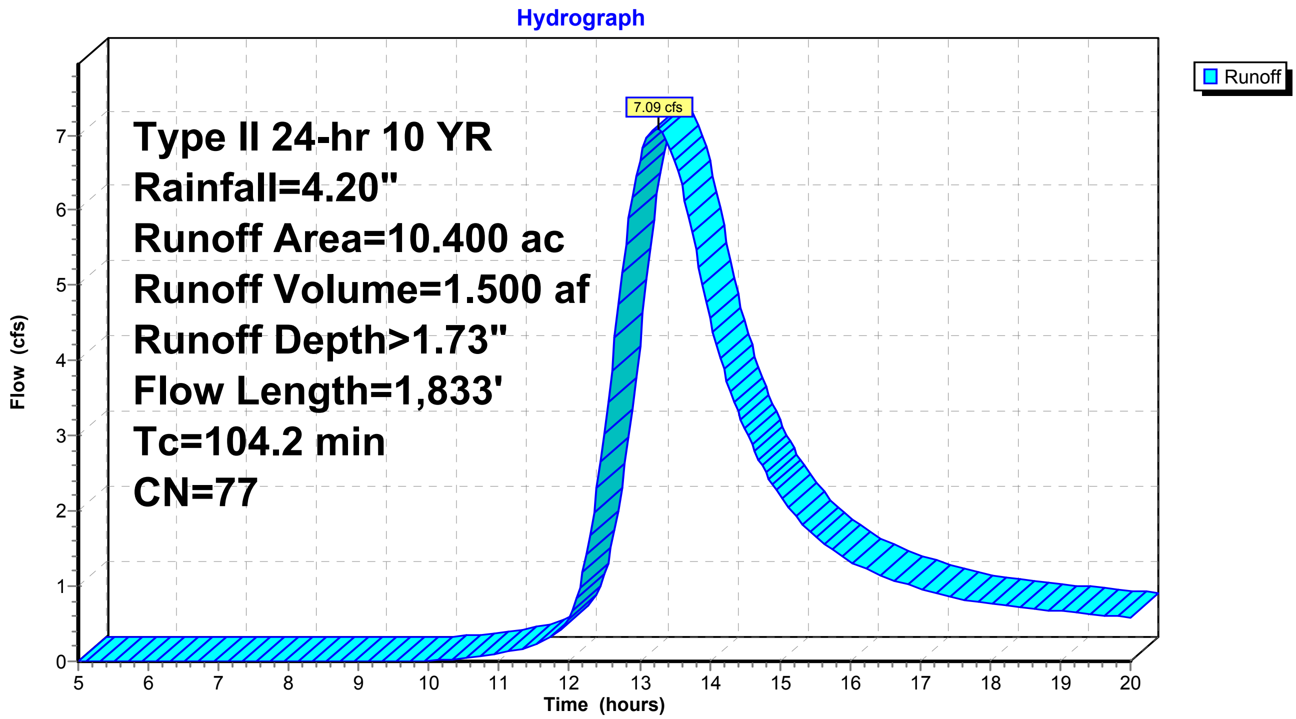
Runoff = 7.09 cfs @ 13.28 hrs, Volume= 1.500 af, Depth> 1.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
10.400	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.8	200	0.0250	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
35.9	835	0.0240	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
3.5	798	0.0510	3.8	5.72	**Channel Flow, First Chan Flow** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
104.2	1,833	Total			

Subcatchment 1BS: Undisturbed Subcat



Subcatchment 1CS: Lower Subcat

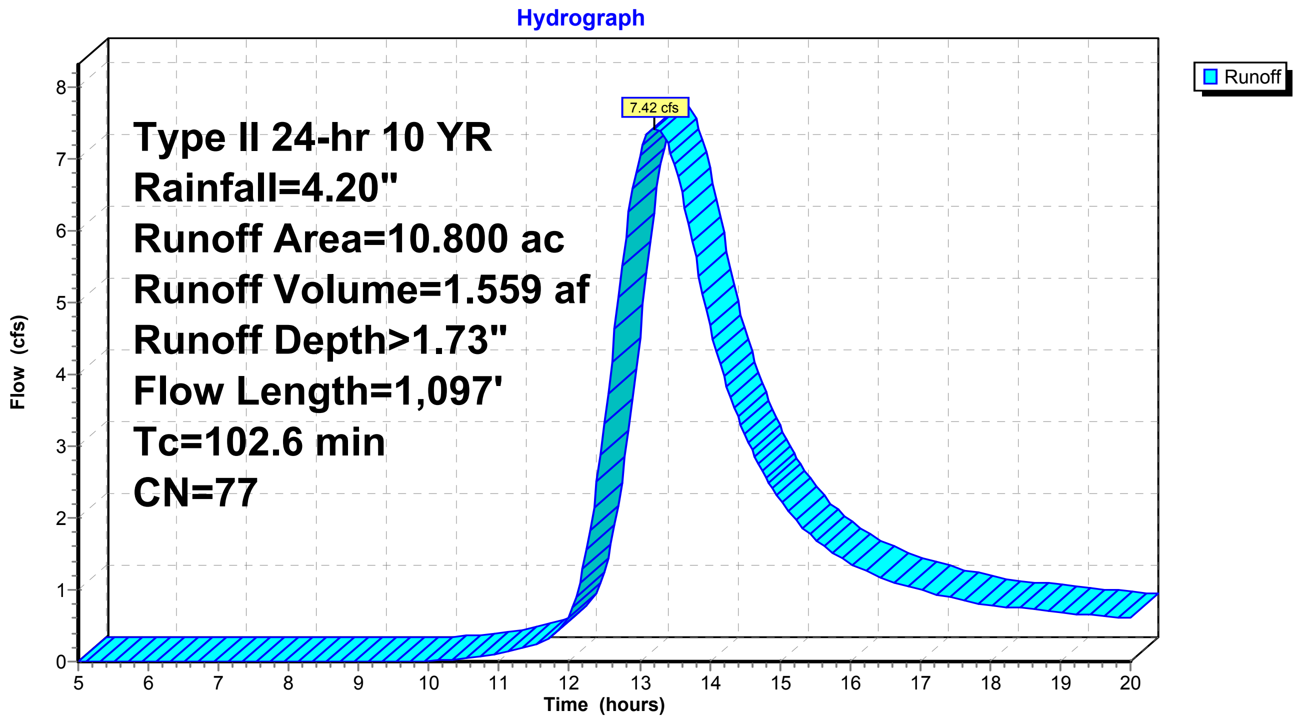
Runoff = 7.42 cfs @ 13.22 hrs, Volume= 1.559 af, Depth> 1.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
10.800	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.9	150	0.0130	0.0		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
23.2	480	0.0190	0.3		**Shallow Concentrated Flow, Shallow** Forest w/Heavy Litter Kv= 2.5 fps
12.5	467	0.0620	0.6		**Shallow Concentrated Flow, Shallow two** Forest w/Heavy Litter Kv= 2.5 fps
102.6	1,097	Total			

Subcatchment 1CS: Lower Subcat



Subcatchment 2AS: Overflo Park, Rd and FS

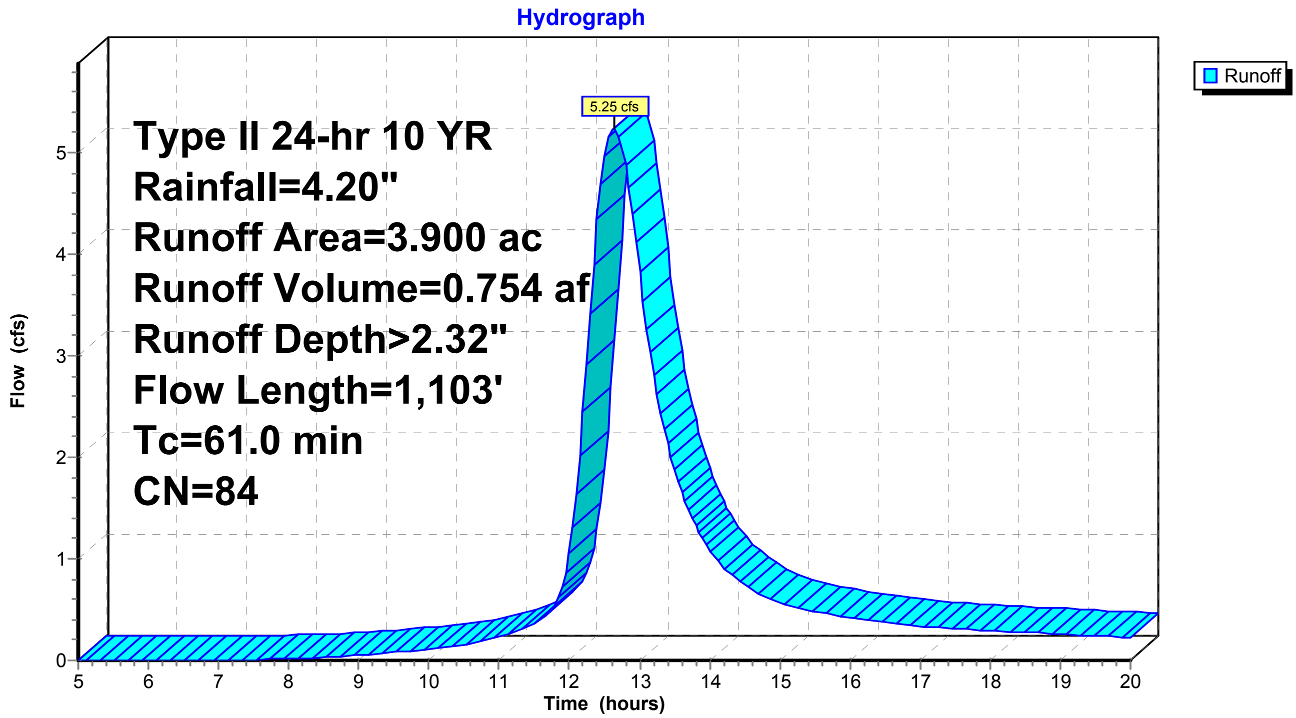
Runoff = 5.25 cfs @ 12.64 hrs, Volume= 0.754 af, Depth> 2.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
1.270	98	Paved parking & roofs
2.630	77	Woods, Good, HSG D
3.900	84	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	145	0.0070	0.9		**Sheet Flow, Road through Parking Lot** Smooth surfaces n= 0.011 P2= 2.70"
0.0	15	0.1130	5.4		**Shallow Concentrated Flow, Down bank** Unpaved Kv= 16.1 fps
11.1	504	0.0260	0.8	3.01	**Channel Flow, Ditch at toe slope** Area= 4.0 sf Perim= 6.1' r= 0.66' n= 0.240 Sheet flow over Dense Grass
1.1	85	0.0010	1.3	6.02	**Channel Flow, In Level Lip** Area= 4.5 sf Perim= 7.5' r= 0.60' n= 0.025 Rubble masonry, cemented
38.1	150	0.0530	0.1		**Sheet Flow, Filter Strip** Woods: Dense underbrush n= 0.800 P2= 2.70"
8.0	204	0.0290	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
61.0	1,103	Total			

Subcatchment 2AS: Overflo Park, Rd and FS



Subcatchment 2BS: Undisturb SubCat

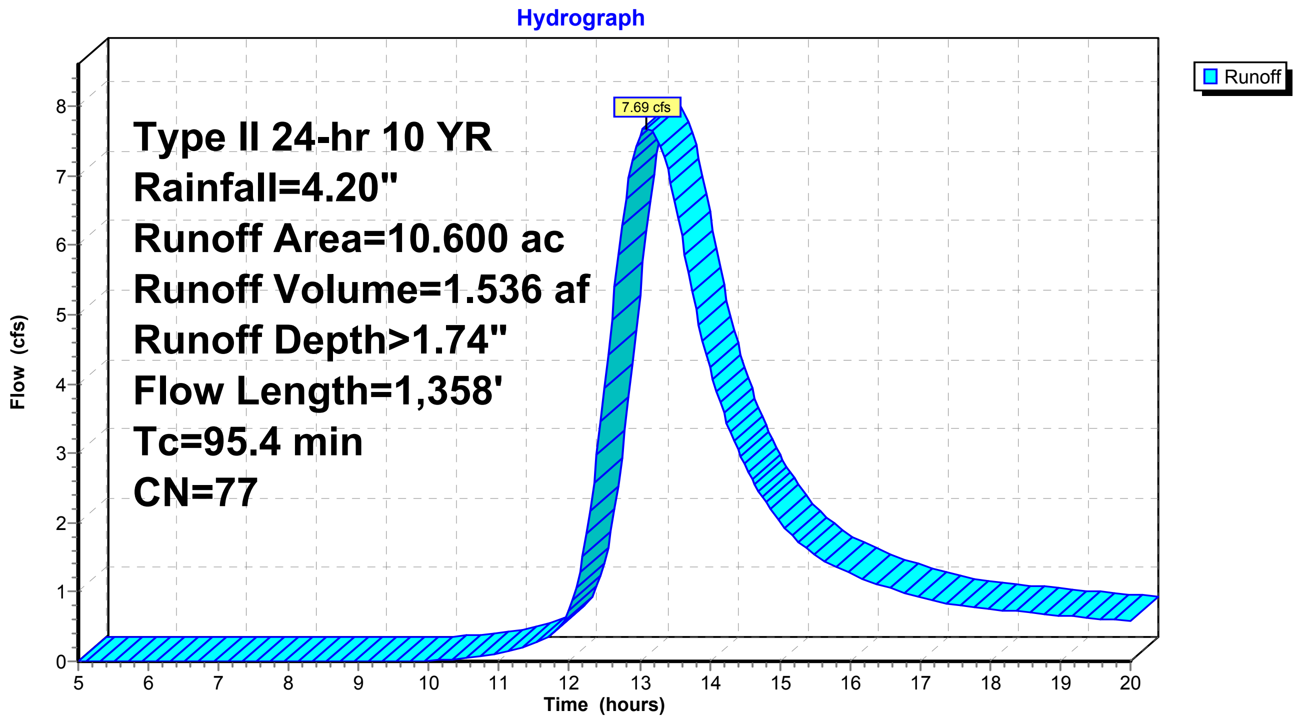
Runoff = 7.69 cfs @ 13.11 hrs, Volume= 1.536 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
10.600	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.7	200	0.0400	0.1		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
40.3	876	0.0210	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
1.4	282	0.0390	3.3	5.00	**Channel Flow, Channel** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
95.4	1,358	Total			

Subcatchment 2BS: Undisturb SubCat



Subcatchment 3S: Maint Facility Drainage Area

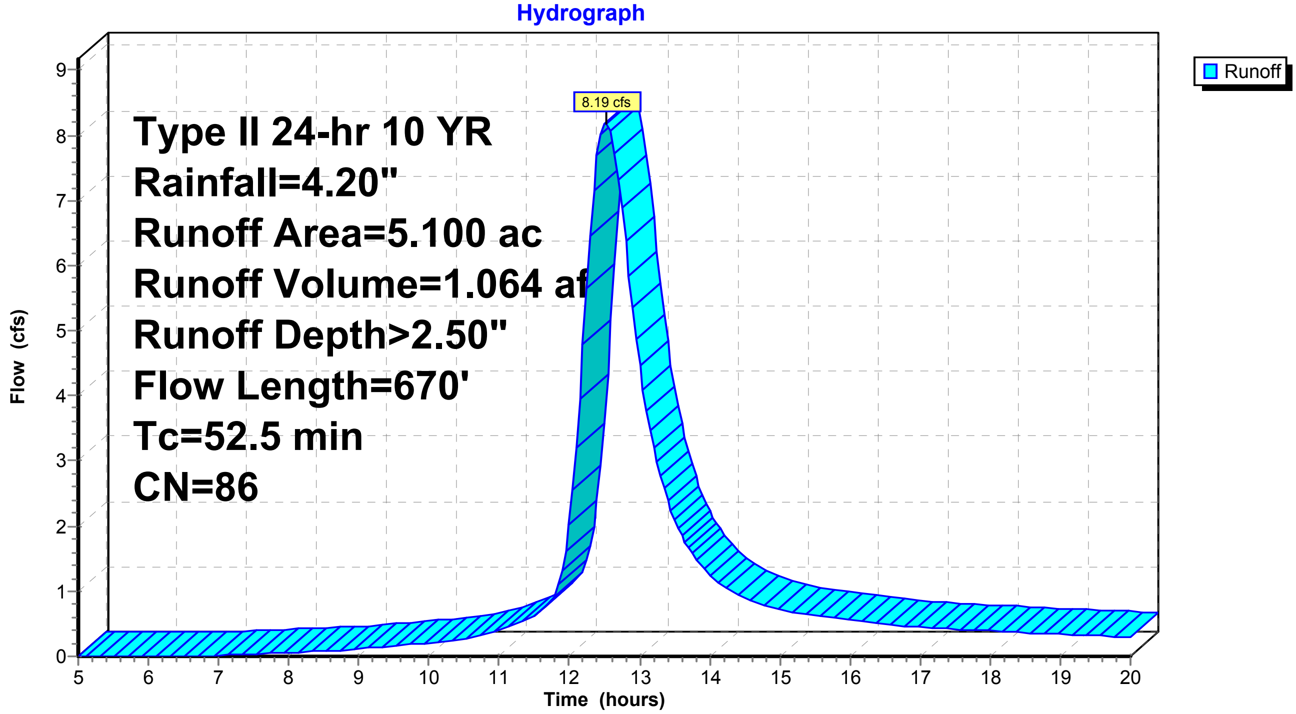
Runoff = 8.19 cfs @ 12.52 hrs, Volume= 1.064 af, Depth> 2.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
2.240	98	Paved parking & roofs
2.860	77	Woods, Good, HSG D
5.100	86	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.6000	3.6		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 2.70"
3.1	130	0.0040	0.7		**Sheet Flow, Through Parking lot** Smooth surfaces n= 0.011 P2= 2.70"
1.6	22	0.2950	0.2		**Sheet Flow, Over inslope** Grass: Dense n= 0.240 P2= 2.70"
9.9	230	0.0240	0.4		**Shallow Concentrated Flow, Overland (w/ treatment) to Filter str** Forest w/Heavy Litter Kv= 2.5 fps
1.5	118	0.0010	1.3	6.02	**Channel Flow, In Level Lip** Area= 4.5 sf Perim= 7.5' r= 0.60' n= 0.025 Rubble masonry, cemented
36.3	150	0.0600	0.1		**Sheet Flow, Through Filter Strip** Woods: Dense underbrush n= 0.800 P2= 2.70"
52.5	670	Total			

Subcatchment 3S: Maint Facility Drainage Area



Subcatchment 4S: Entire Drainage Area

Channel flow section is for existing stream which differs from artificial sections used for each reach. See notes associated with the reach sections.

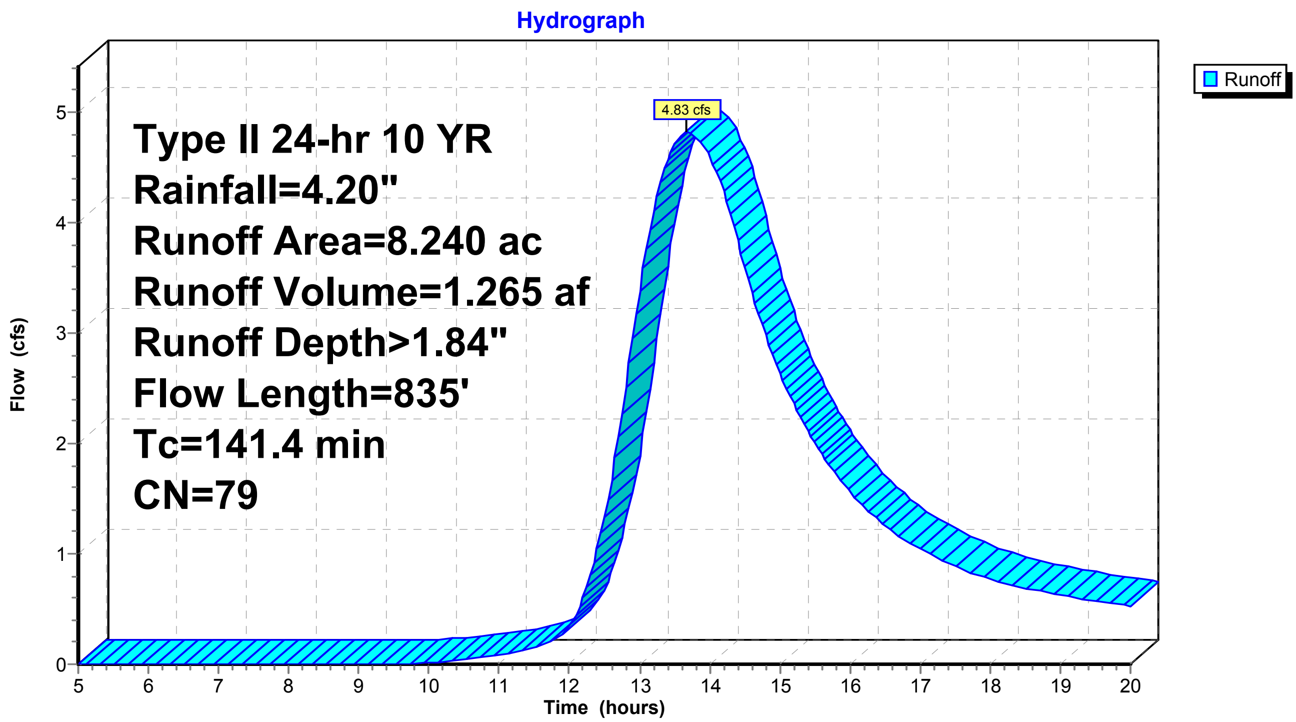
Runoff = 4.83 cfs @ 13.67 hrs, Volume= 1.265 af, Depth> 1.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
0.630	98	Paved parking & roofs
7.610	77	Woods, Good, HSG D
8.240	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
134.9	100	0.0010	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
3.8	144	0.0630	0.6		**Shallow Concentrated Flow, Shallow** Forest w/Heavy Litter Kv= 2.5 fps
2.7	591	0.0140	3.7	41.73	**Channel Flow, Stream/Culvert/Stream** Area= 11.3 sf Perim= 10.5' r= 1.08' n= 0.050 Mountain streams w/large boulders
141.4	835	Total			

Subcatchment 4S: Entire Drainage Area



Subcatchment AS: Main WS

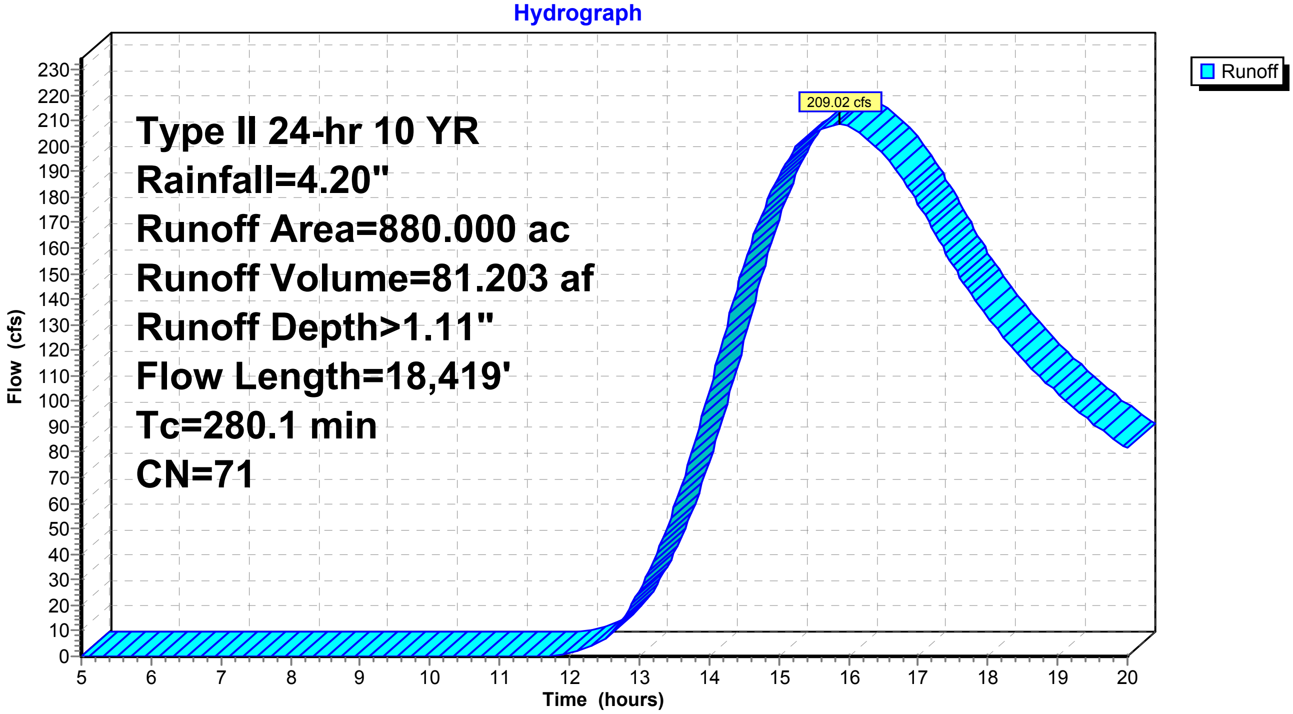
Runoff = 209.02 cfs @ 15.86 hrs, Volume= 81.203 af, Depth> 1.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
151.000	77	Woods, Good, HSG D
46.000	73	Brush, Good, HSG D
683.000	70	Woods, Good, HSG C
880.000	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.9	100	0.0210	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
46.0	1,000	0.0210	0.4		**Shallow Concentrated Flow, Shallow Concen** Forest w/Heavy Litter Kv= 2.5 fps
32.6	4,500	0.0260	2.3	2.30	**Channel Flow, Before Upper Wetland** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.050 Mountain streams w/large boulders
97.4	3,870	0.0050	0.7	1.32	**Channel Flow, Channel Flow in Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.100 Very weedy reaches w/pools
15.9	2,525	0.0200	2.6	5.30	**Channel Flow, Open Channel** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.050 Mountain streams w/large boulders
48.3	6,424	0.0110	2.2	6.65	**Channel Flow, Open Channel** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
280.1	18,419	Total			

Subcatchment AS: Main WS



Subcatchment BS: Upper WS

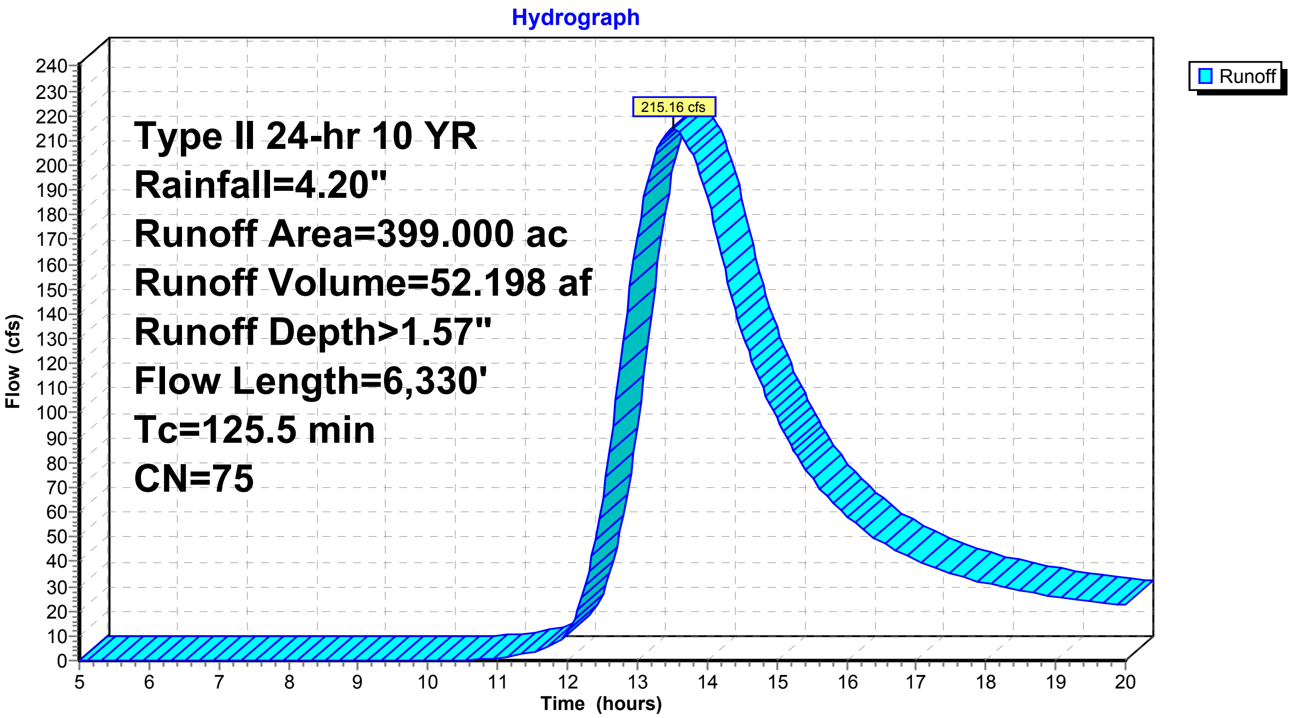
Runoff = 215.16 cfs @ 13.52 hrs, Volume= 52.198 af, Depth> 1.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
245.000	77	Woods, Good, HSG D
31.000	73	Brush, Good, HSG D
123.000	70	Woods, Good, HSG C
399.000	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
33.3	1,000	0.0400	0.5		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
48.1	3,230	0.0070	1.1	2.24	**Channel Flow, Through Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.070 Sluggish weedy reaches w/pools
13.3	2,000	0.0140	2.5	7.50	**Channel Flow, Lower Reach** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
125.5	6,330	Total			

Subcatchment BS: Upper WS



Reach 1CR: (new Reach)

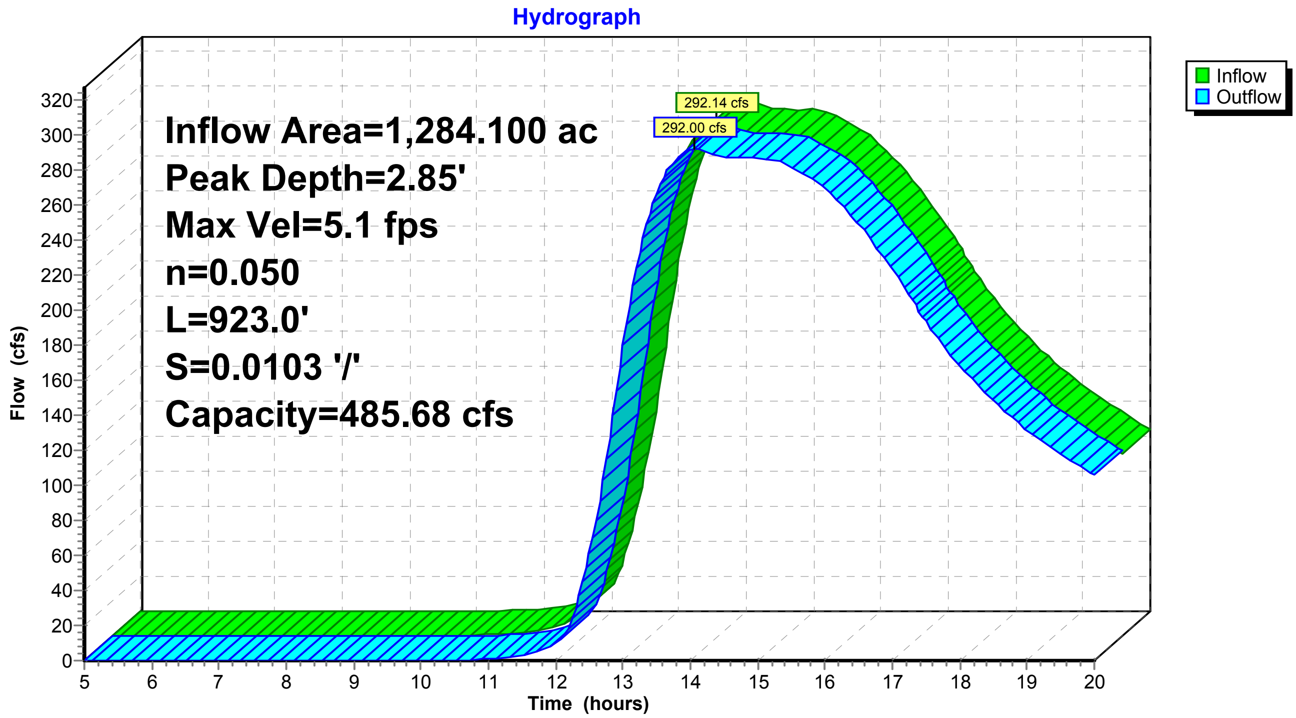
Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

Inflow Area = 1,284.100 ac, Inflow Depth > 1.26" for 10 YR event
Inflow = 292.14 cfs @ 13.96 hrs, Volume= 134.464 af
Outflow = 292.00 cfs @ 14.07 hrs, Volume= 133.405 af, Atten= 0%, Lag= 6.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.1 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 2.8 fps, Avg. Travel Time= 5.6 min

Peak Depth= 2.85' @ 14.02 hrs
Capacity at bank full= 485.68 cfs
Inlet Invert= 87.00', Outlet Invert= 77.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 923.0' Slope= 0.0103 '/'

Reach 1CR: (new Reach)



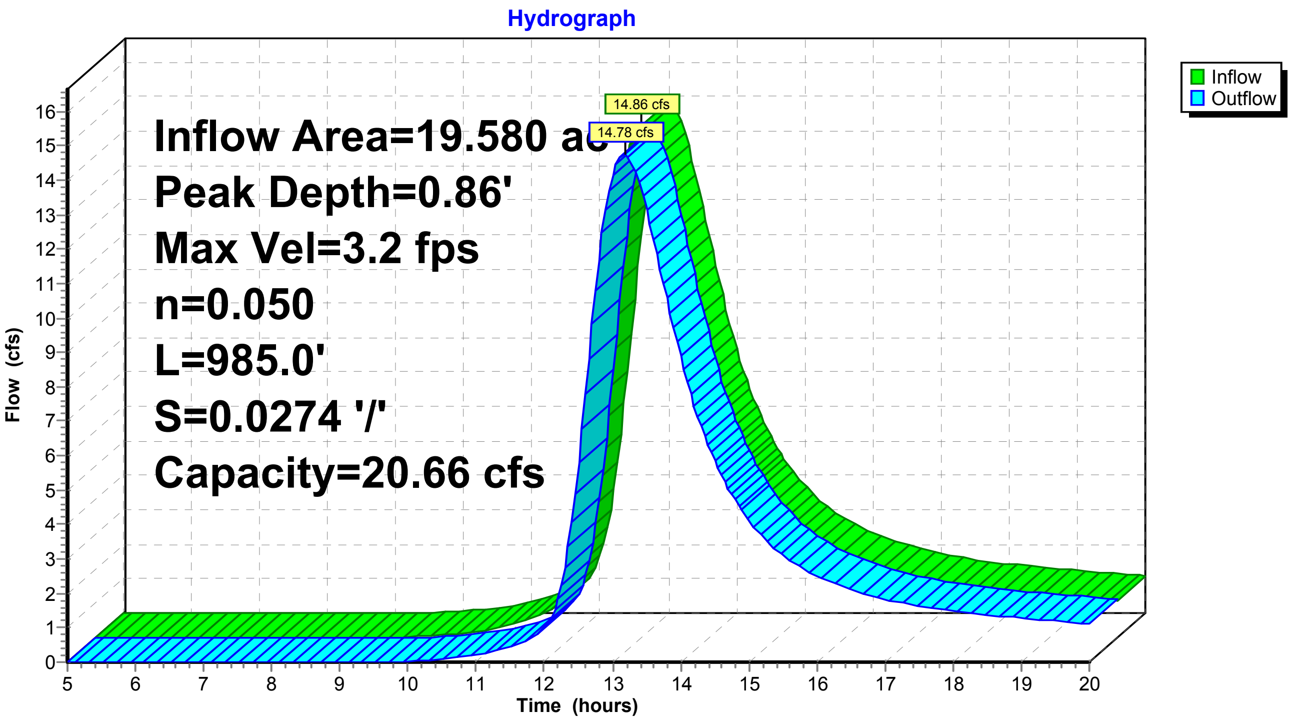
Reach 1R: Lowest reach

Inflow Area = 19.580 ac, Inflow Depth > 1.81" for 10 YR event
Inflow = 14.86 cfs @ 13.02 hrs, Volume= 2.955 af
Outflow = 14.78 cfs @ 13.18 hrs, Volume= 2.931 af, Atten= 1%, Lag= 9.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.2 fps, Min. Travel Time= 5.2 min
Avg. Velocity = 1.7 fps, Avg. Travel Time= 9.6 min

Peak Depth= 0.86' @ 13.09 hrs
Capacity at bank full= 20.66 cfs
Inlet Invert= 87.00', Outlet Invert= 60.00'
2.00' x 1.00' deep channel, n= 0.050 Mountain streams w/large boulders
Side Slope Z-value= 4.0 '/' Top Width= 10.00'
Length= 985.0' Slope= 0.0274 '/'

Reach 1R: Lowest reach



Reach 2CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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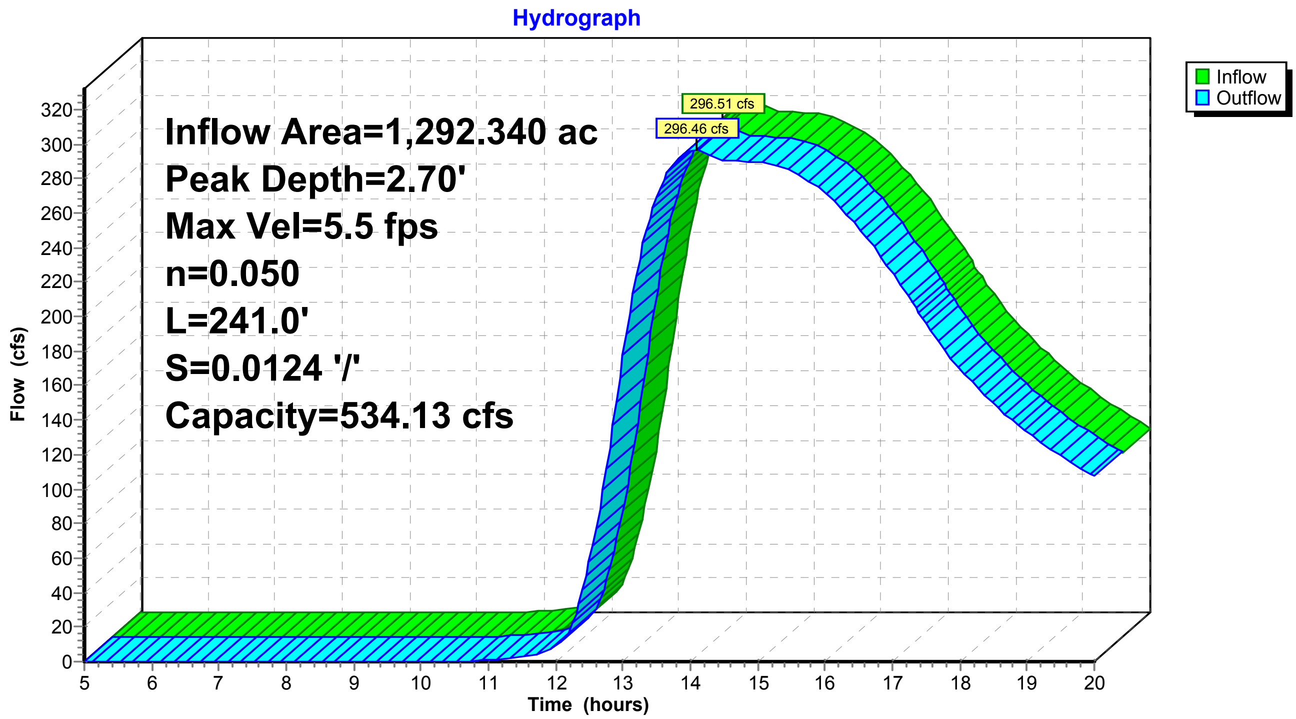
[61] Hint: Submerged 28% of Reach 1CR bottom

Inflow Area = 1,292.340 ac, Inflow Depth > 1.25" for 10 YR event
Inflow = 296.51 cfs @ 14.06 hrs, Volume= 134.670 af
Outflow = 296.46 cfs @ 14.08 hrs, Volume= 134.407 af, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.5 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 3.0 fps, Avg. Travel Time= 1.4 min

Peak Depth= 2.70' @ 14.06 hrs
Capacity at bank full= 534.13 cfs
Inlet Invert= 77.50', Outlet Invert= 74.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 241.0' Slope= 0.0124 '/'

Reach 2CR: (new Reach)



Reach 3CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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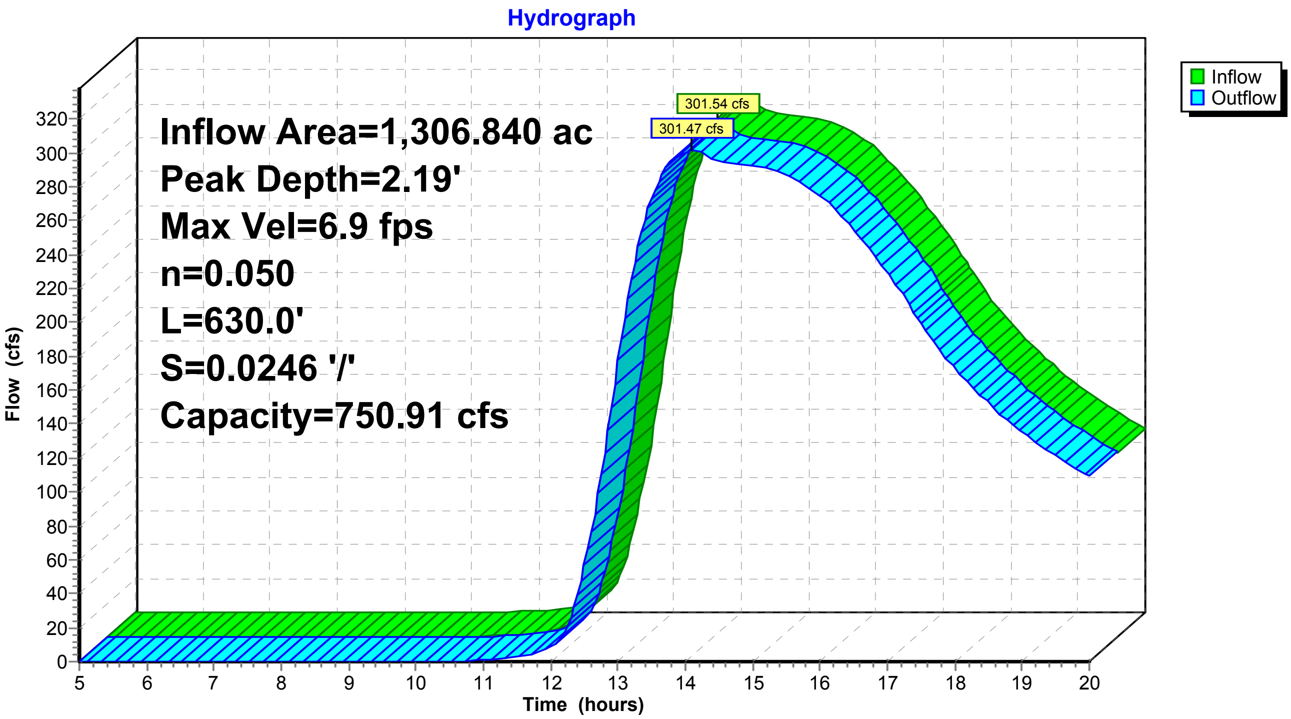
[61] Hint: Submerged 73% of Reach 2CR bottom

Inflow Area = 1,306.840 ac, Inflow Depth > 1.26" for 10 YR event
Inflow = 301.54 cfs @ 14.05 hrs, Volume= 136.697 af
Outflow = 301.47 cfs @ 14.09 hrs, Volume= 136.139 af, Atten= 0%, Lag= 2.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.9 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 3.8 fps, Avg. Travel Time= 2.8 min

Peak Depth= 2.19' @ 14.06 hrs
Capacity at bank full= 750.91 cfs
Inlet Invert= 74.50', Outlet Invert= 59.00'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 630.0' Slope= 0.0246 '/'

Reach 3CR: (new Reach)



Reach 4CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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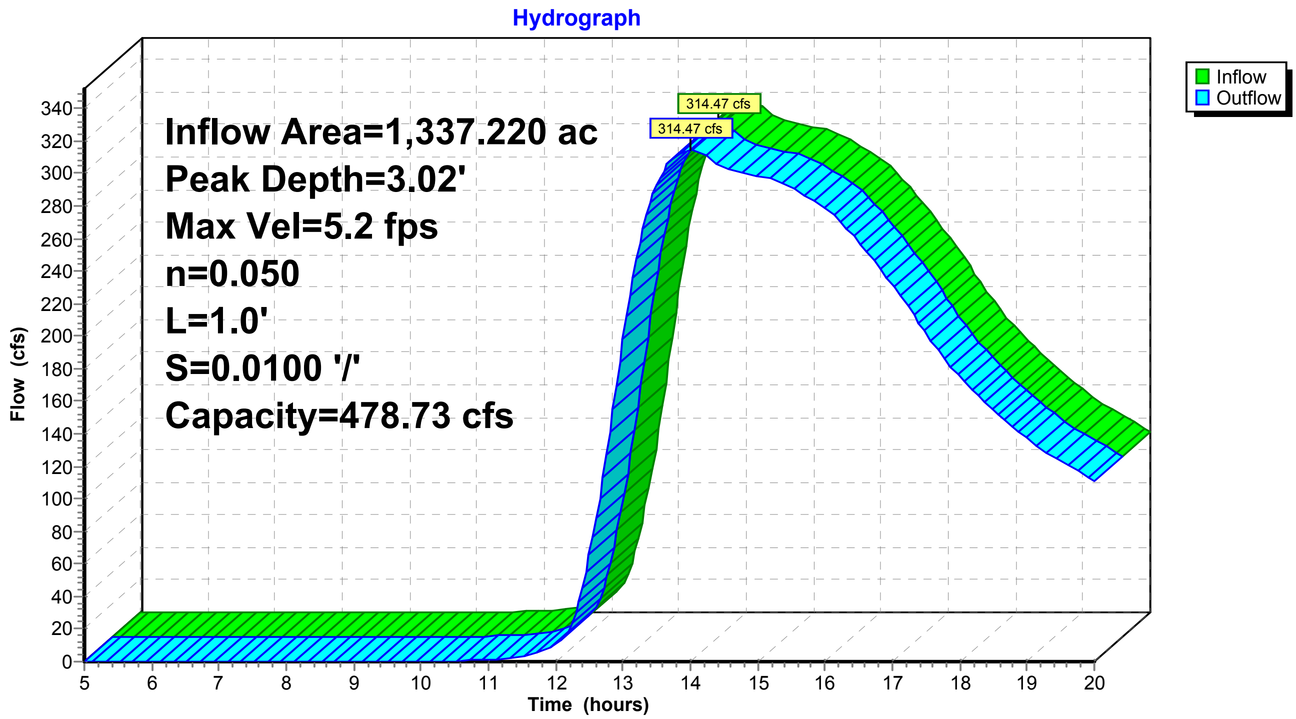
[61] Hint: Submerged 19% of Reach 3CR bottom

Inflow Area = 1,337.220 ac, Inflow Depth > 1.26" for 10 YR event
Inflow = 314.47 cfs @ 14.01 hrs, Volume= 140.629 af
Outflow = 314.47 cfs @ 14.01 hrs, Volume= 140.628 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.2 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.8 fps, Avg. Travel Time= 0.0 min

Peak Depth= 3.02' @ 14.01 hrs
Capacity at bank full= 478.73 cfs
Inlet Invert= 59.00', Outlet Invert= 58.99'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 1.0' Slope= 0.0100 '/'

Reach 4CR: (new Reach)



Pond 11P: Beaver Pond

Beaver Pond has minimal storage (observed to be 2 inches on 9/28/08) and therefore shown as without in both pre and post development and no effect on comparative flows.

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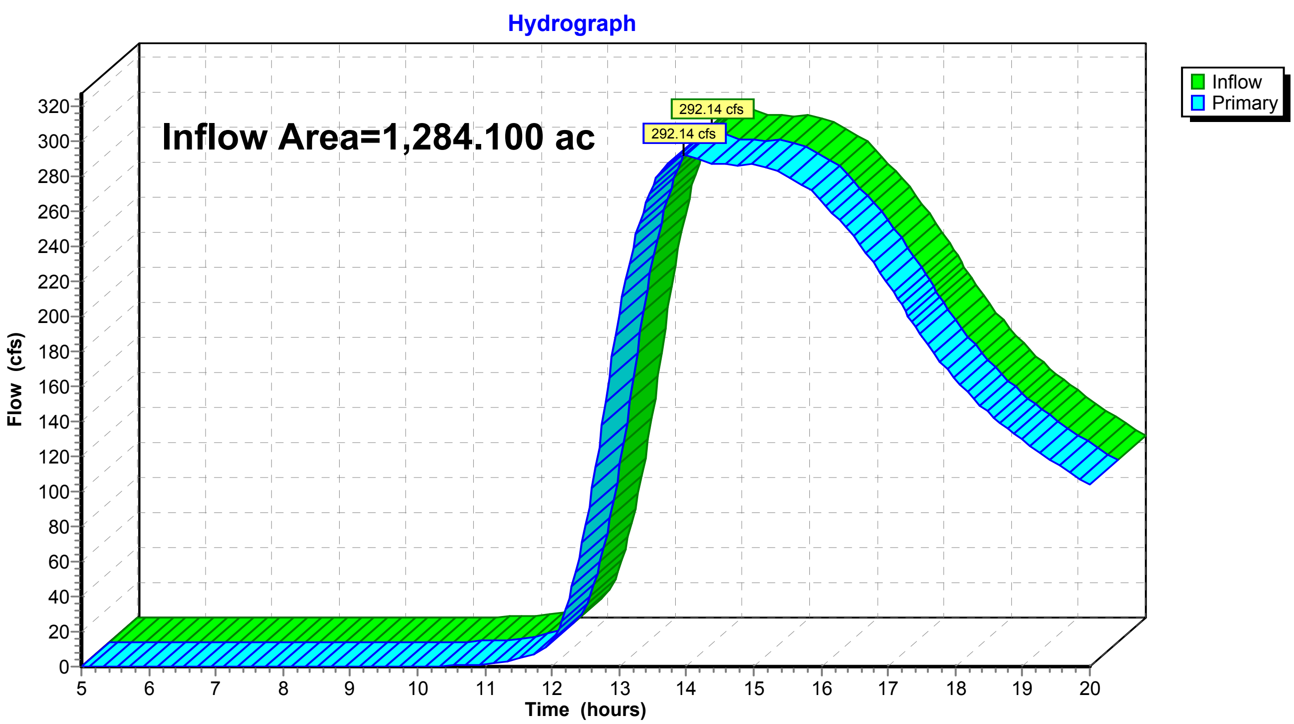
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,284.100 ac, Inflow Depth > 1.26" for 10 YR event
Inflow = 292.14 cfs @ 13.96 hrs, Volume= 134.464 af
Primary = 292.14 cfs @ 13.96 hrs, Volume= 134.464 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 11P: Beaver Pond

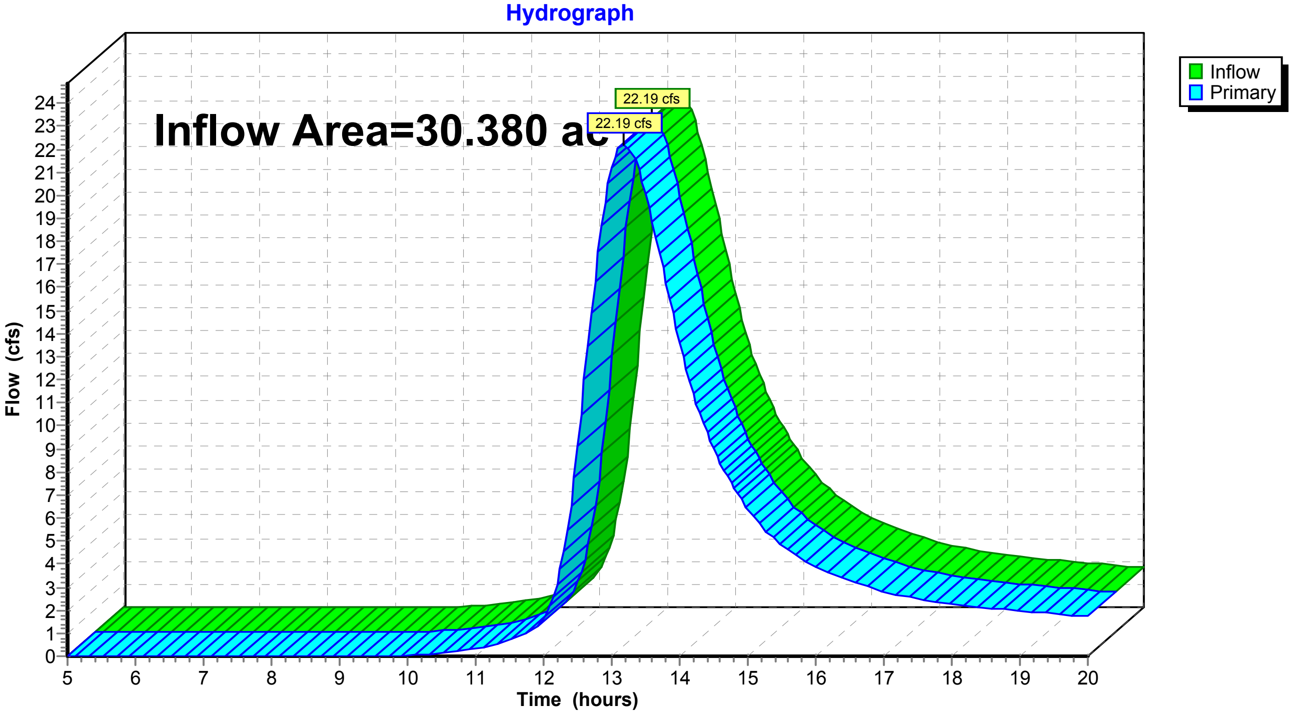


Link 1L: (new Link)

Inflow Area = 30.380 ac, Inflow Depth > 1.77" for 10 YR event
Inflow = 22.19 cfs @ 13.18 hrs, Volume= 4.490 af
Primary = 22.19 cfs @ 13.18 hrs, Volume= 4.490 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: (new Link)

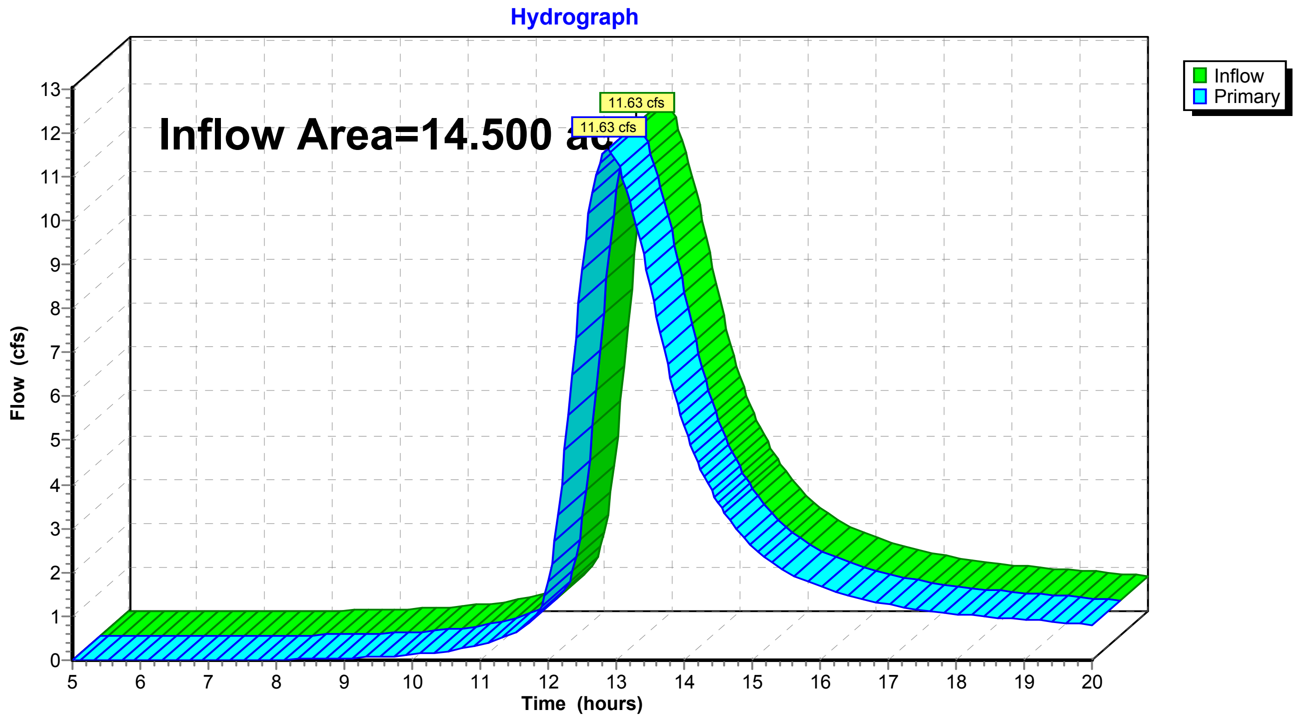


Link 2L: (new Link)

Inflow Area = 14.500 ac, Inflow Depth > 1.90" for 10 YR event
Inflow = 11.63 cfs @ 12.87 hrs, Volume= 2.290 af
Primary = 11.63 cfs @ 12.87 hrs, Volume= 2.290 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: (new Link)



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1AS: Culdesac, employ park and adjoining Runoff Area=9.180 ac Runoff Depth>2.44"
Flow Length=1,573' Tc=79.0 min CN=79 Runoff=10.83 cfs 1.868 af

Subcatchment 1BS: Undisturbed Subcat Runoff Area=10.400 ac Runoff Depth>2.25"
Flow Length=1,833' Tc=104.2 min CN=77 Runoff=9.24 cfs 1.947 af

Subcatchment 1CS: Lower Subcat Runoff Area=10.800 ac Runoff Depth>2.25"
Flow Length=1,097' Tc=102.6 min CN=77 Runoff=9.67 cfs 2.024 af

Subcatchment 2AS: Overflo Park, Rd and FS Runoff Area=3.900 ac Runoff Depth>2.91"
Flow Length=1,103' Tc=61.0 min CN=84 Runoff=6.55 cfs 0.945 af

Subcatchment 2BS: Undisturb SubCat Runoff Area=10.600 ac Runoff Depth>2.26"
Flow Length=1,358' Tc=95.4 min CN=77 Runoff=10.05 cfs 1.993 af

Subcatchment 3S: Maint Facility Drainage Area Runoff Area=5.100 ac Runoff Depth>3.10"
Flow Length=670' Tc=52.5 min CN=86 Runoff=10.10 cfs 1.320 af

Subcatchment 4S: Entire Drainage Area Runoff Area=8.240 ac Runoff Depth>2.37"
Flow Length=835' Tc=141.4 min CN=79 Runoff=6.22 cfs 1.627 af

Subcatchment AS: Main WS Runoff Area=880.000 ac Runoff Depth>1.50"
Flow Length=18,419' Tc=280.1 min CN=71 Runoff=283.54 cfs 110.092 af

Subcatchment BS: Upper WS Runoff Area=399.000 ac Runoff Depth>2.06"
Flow Length=6,330' Tc=125.5 min CN=75 Runoff=284.75 cfs 68.567 af

Reach 1CR: (new Reach) Peak Depth=3.47' Max Vel=5.7 fps Inflow=394.13 cfs 179.978 af
n=0.050 L=923.0' S=0.0103 '/' Capacity=485.68 cfs Outflow=393.94 cfs 178.744 af

Reach 1R: Lowest reach Peak Depth=0.97' Max Vel=3.4 fps Inflow=19.25 cfs 3.816 af
n=0.050 L=985.0' S=0.0274 '/' Capacity=20.66 cfs Outflow=19.16 cfs 3.788 af

Reach 2CR: (new Reach) Peak Depth=3.29' Max Vel=6.1 fps Inflow=399.73 cfs 180.371 af
n=0.050 L=241.0' S=0.0124 '/' Capacity=534.13 cfs Outflow=399.70 cfs 180.065 af

Reach 3CR: (new Reach) Peak Depth=2.66' Max Vel=7.6 fps Inflow=406.15 cfs 183.003 af
n=0.050 L=630.0' S=0.0246 '/' Capacity=750.91 cfs Outflow=406.07 cfs 182.355 af

Reach 4CR: (new Reach) Peak Depth=3.68' Max Vel=5.7 fps Inflow=422.82 cfs 188.167 af
n=0.050 L=1.0' S=0.0100 '/' Capacity=478.73 cfs Outflow=422.82 cfs 188.165 af

Pond 11P: Beaver Pond Inflow=394.13 cfs 179.978 af
Primary=394.13 cfs 179.978 af

Link 1L: (new Link)

Inflow=28.82 cfs 5.812 af
Primary=28.82 cfs 5.812 af

Link 2L: (new Link)

Inflow=14.95 cfs 2.938 af
Primary=14.95 cfs 2.938 af

Total Runoff Area = 1,337.220 ac Runoff Volume = 190.382 af Average Runoff Depth = 1.71"

Subcatchment 1AS: Culdesac, employ park and adjoining

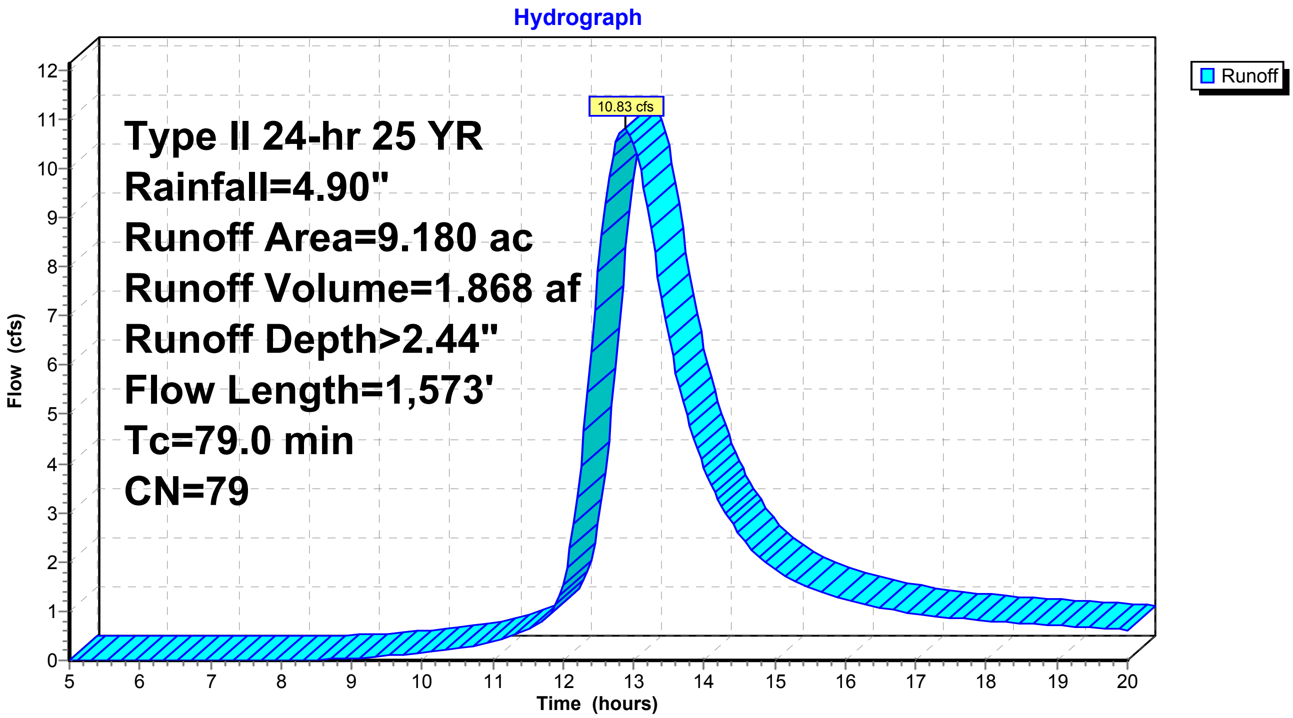
Runoff = 10.83 cfs @ 12.88 hrs, Volume= 1.868 af, Depth> 2.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
0.780	98	Paved parking & roofs
8.400	77	Woods, Good, HSG D
9.180	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	65	0.0150	0.1		**Sheet Flow, From slope** Woods: Light underbrush n= 0.400 P2= 2.70"
3.4	177	0.0060	0.9		**Sheet Flow, Through parking lot** Smooth surfaces n= 0.011 P2= 2.70"
0.3	161	0.0190	9.4	11.58	**Circular Channel (pipe), Pipe flow** Diam= 15.0" Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.010 PVC, smooth interior
1.6	311	0.0080	3.2	9.73	**Channel Flow, Channel to Level Lip T6xD0.75** Area= 3.0 sf Perim= 6.3' r= 0.48' n= 0.025 Rubble masonry, cemented
0.9	75	0.0010	1.3	6.02	**Channel Flow, Level Lip Spreader** Area= 4.5 sf Perim= 7.5' r= 0.60' n= 0.025 Rubble masonry, cemented
33.3	122	0.0490	0.1		**Sheet Flow, Filter Strip** Woods: Dense underbrush n= 0.800 P2= 2.70"
19.3	355	0.0150	0.3		**Shallow Concentrated Flow, Shallow** Forest w/Heavy Litter Kv= 2.5 fps
1.6	307	0.0340	3.1	4.67	**Channel Flow,** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
79.0	1,573	Total			

Subcatchment 1AS: Culdesac, employ park and adjoining



Subcatchment 1BS: Undisturbed Subcat

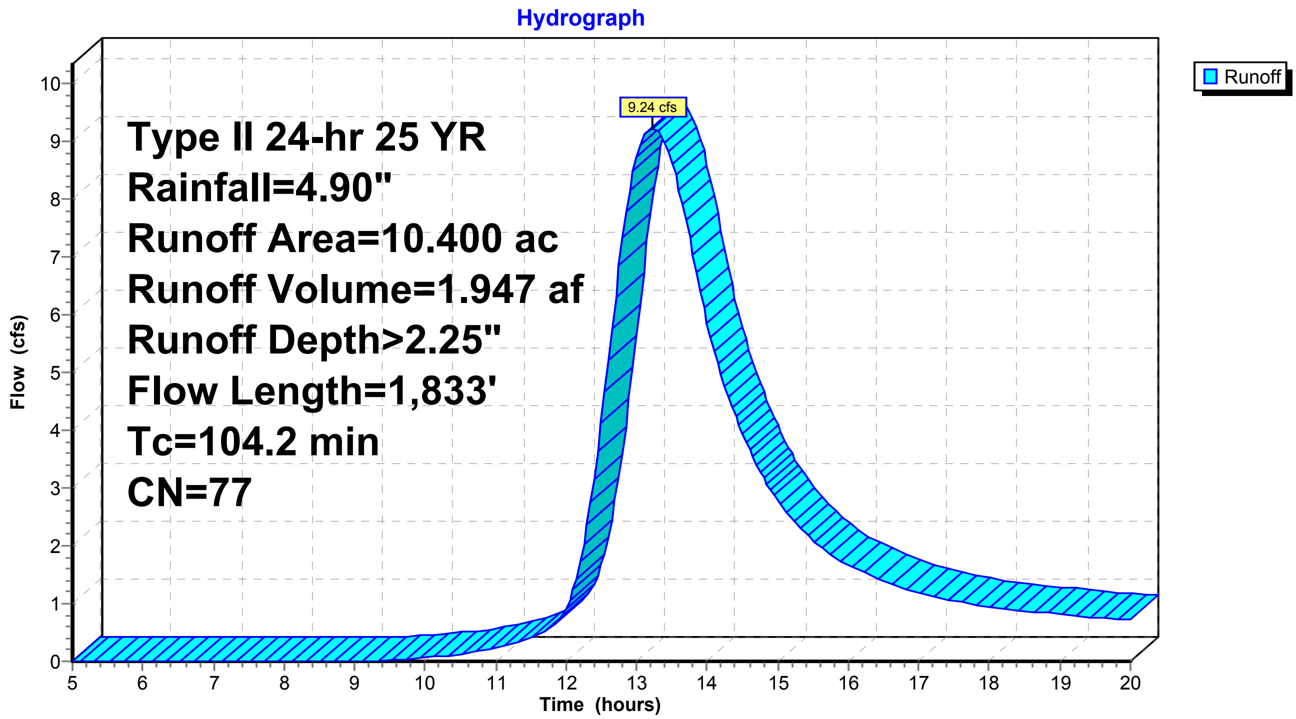
Runoff = 9.24 cfs @ 13.22 hrs, Volume= 1.947 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
10.400	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.8	200	0.0250	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
35.9	835	0.0240	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
3.5	798	0.0510	3.8	5.72	**Channel Flow, First Chan Flow** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
104.2	1,833	Total			

Subcatchment 1BS: Undisturbed Subcat



Subcatchment 1CS: Lower Subcat

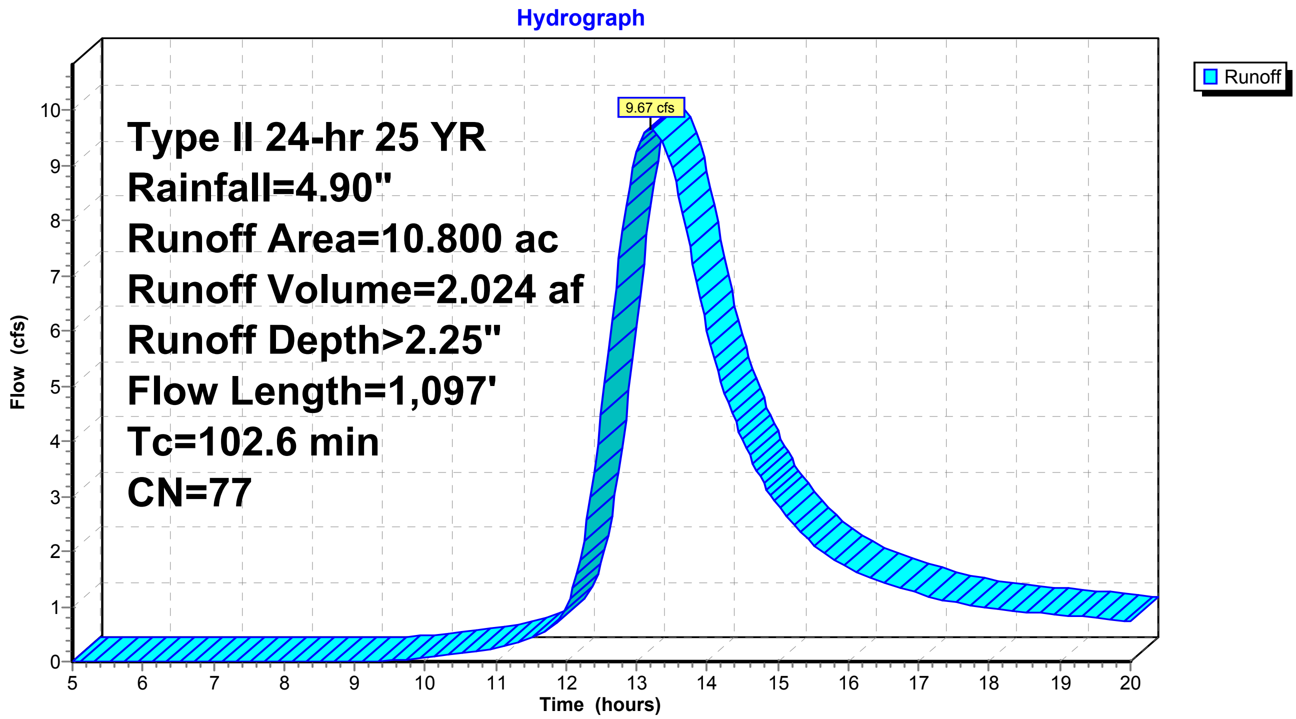
Runoff = 9.67 cfs @ 13.20 hrs, Volume= 2.024 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
10.800	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.9	150	0.0130	0.0		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
23.2	480	0.0190	0.3		**Shallow Concentrated Flow, Shallow** Forest w/Heavy Litter Kv= 2.5 fps
12.5	467	0.0620	0.6		**Shallow Concentrated Flow, Shallow two** Forest w/Heavy Litter Kv= 2.5 fps
102.6	1,097	Total			

Subcatchment 1CS: Lower Subcat



Subcatchment 2AS: Overflo Park, Rd and FS

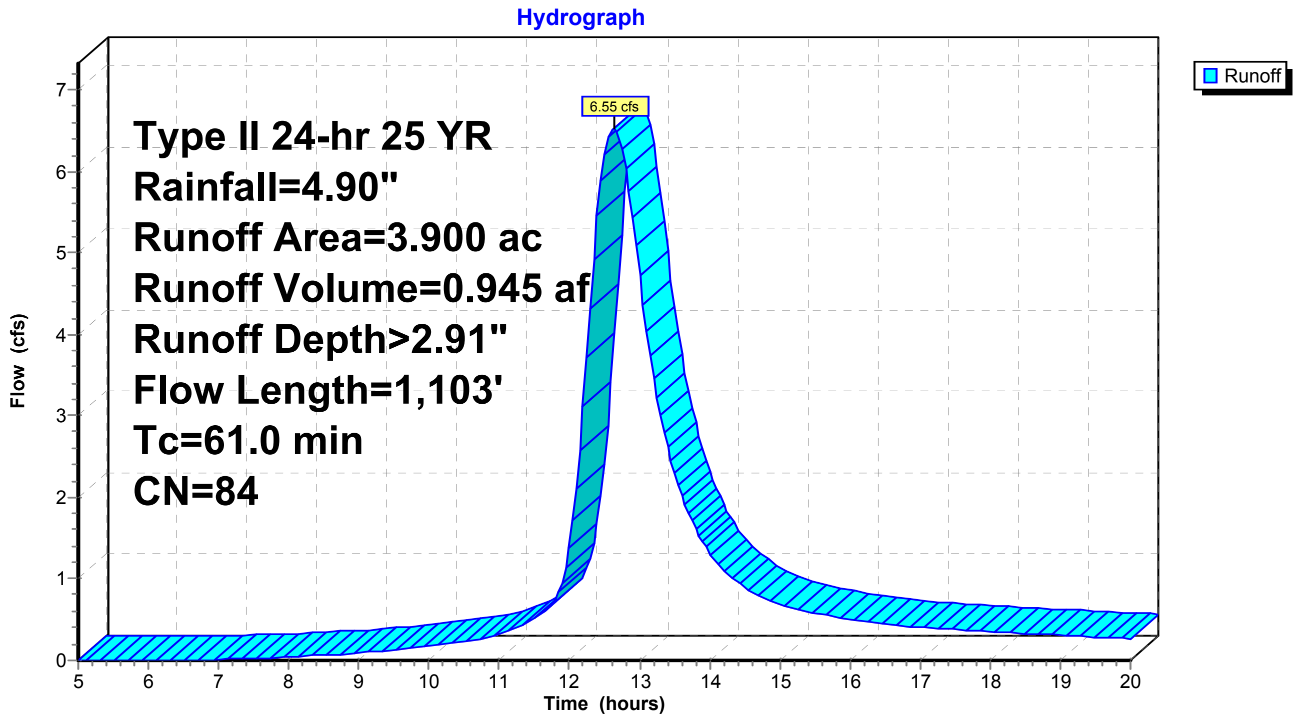
Runoff = 6.55 cfs @ 12.63 hrs, Volume= 0.945 af, Depth> 2.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
1.270	98	Paved parking & roofs
2.630	77	Woods, Good, HSG D
3.900	84	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	145	0.0070	0.9		**Sheet Flow, Road through Parking Lot** Smooth surfaces n= 0.011 P2= 2.70"
0.0	15	0.1130	5.4		**Shallow Concentrated Flow, Down bank** Unpaved Kv= 16.1 fps
11.1	504	0.0260	0.8	3.01	**Channel Flow, Ditch at toe slope** Area= 4.0 sf Perim= 6.1' r= 0.66' n= 0.240 Sheet flow over Dense Grass
1.1	85	0.0010	1.3	6.02	**Channel Flow, In Level Lip** Area= 4.5 sf Perim= 7.5' r= 0.60' n= 0.025 Rubble masonry, cemented
38.1	150	0.0530	0.1		**Sheet Flow, Filter Strip** Woods: Dense underbrush n= 0.800 P2= 2.70"
8.0	204	0.0290	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
61.0	1,103	Total			

Subcatchment 2AS: Overflo Park, Rd and FS



Subcatchment 2BS: Undisturb SubCat

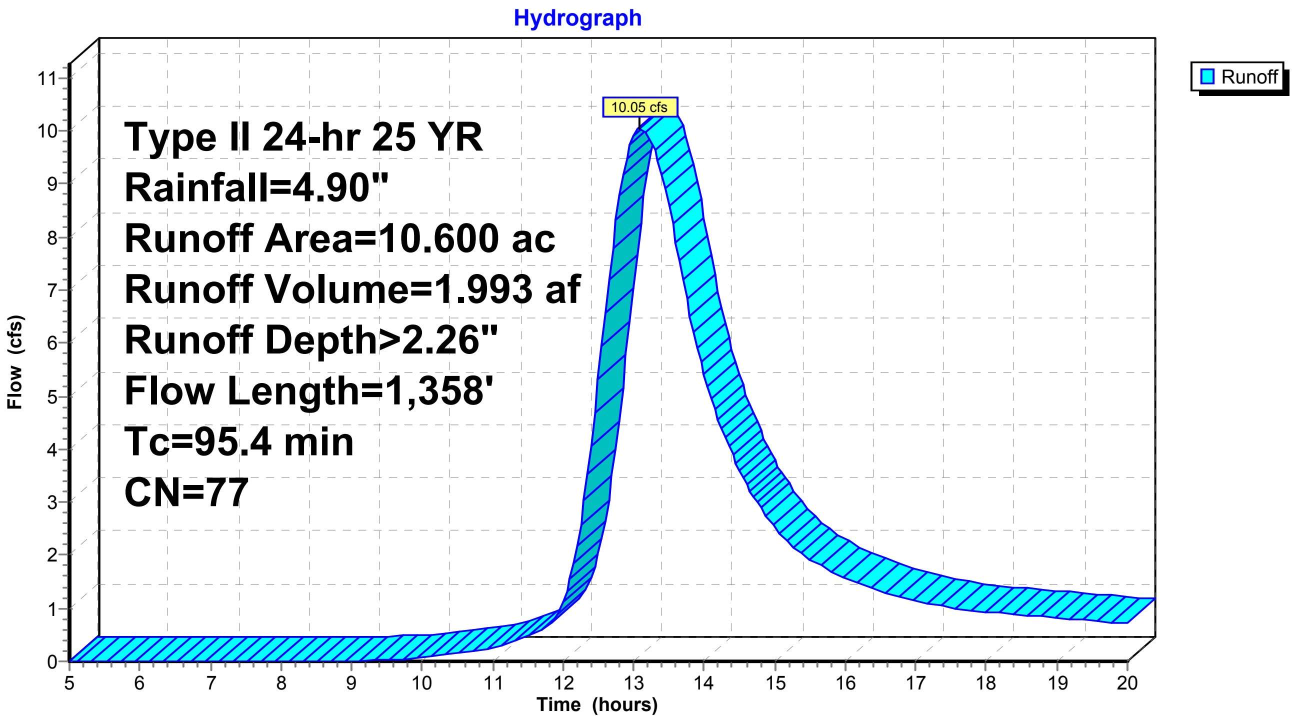
Runoff = 10.05 cfs @ 13.07 hrs, Volume= 1.993 af, Depth> 2.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
10.600	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.7	200	0.0400	0.1		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
40.3	876	0.0210	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
1.4	282	0.0390	3.3	5.00	**Channel Flow, Channel** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
95.4	1,358	Total			

Subcatchment 2BS: Undisturb SubCat



Subcatchment 3S: Maint Facility Drainage Area

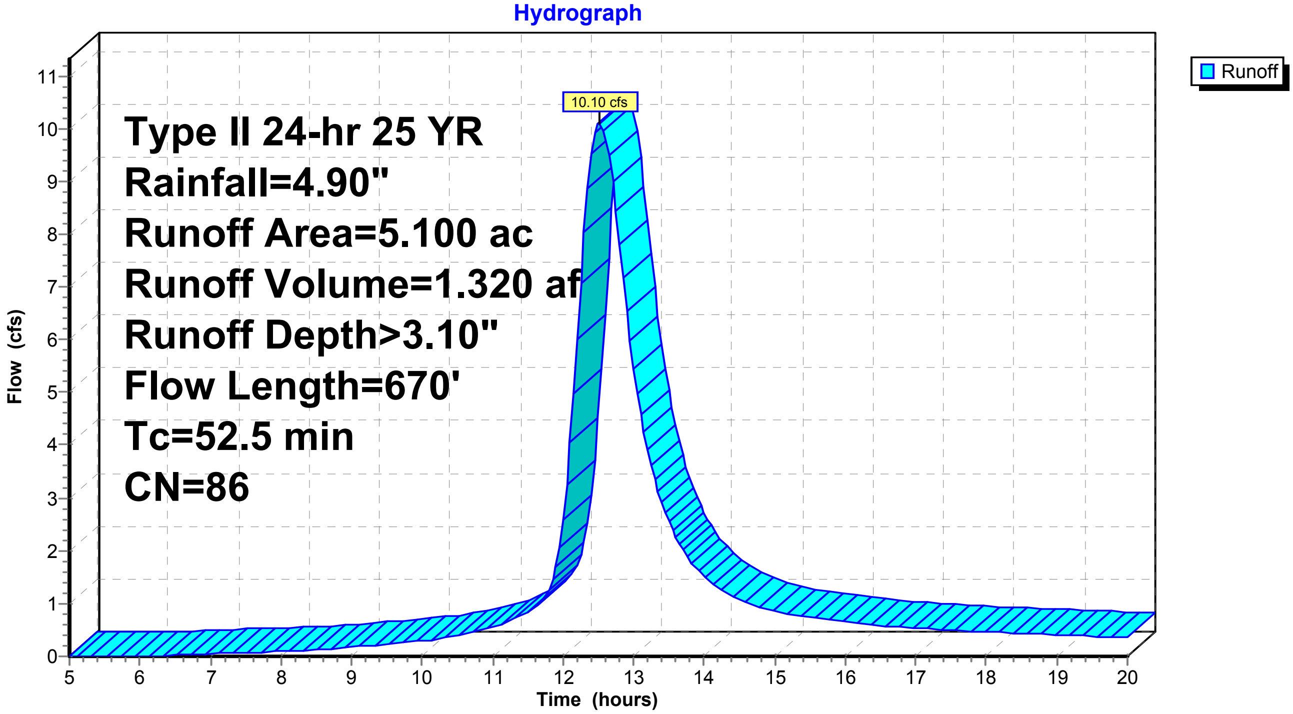
Runoff = 10.10 cfs @ 12.52 hrs, Volume= 1.320 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
2.240	98	Paved parking & roofs
2.860	77	Woods, Good, HSG D
5.100	86	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.6000	3.6		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 2.70"
3.1	130	0.0040	0.7		**Sheet Flow, Through Parking lot** Smooth surfaces n= 0.011 P2= 2.70"
1.6	22	0.2950	0.2		**Sheet Flow, Over inslope** Grass: Dense n= 0.240 P2= 2.70"
9.9	230	0.0240	0.4		**Shallow Concentrated Flow, Overland (w/ treatment) to Filter str** Forest w/Heavy Litter Kv= 2.5 fps
1.5	118	0.0010	1.3	6.02	**Channel Flow, In Level Lip** Area= 4.5 sf Perim= 7.5' r= 0.60' n= 0.025 Rubble masonry, cemented
36.3	150	0.0600	0.1		**Sheet Flow, Through Filter Strip** Woods: Dense underbrush n= 0.800 P2= 2.70"
52.5	670	Total			

Subcatchment 3S: Maint Facility Drainage Area



Subcatchment 4S: Entire Drainage Area

Channel flow section is for existing stream which differs from artificial sections used for each reach. See notes associated with the reach sections.

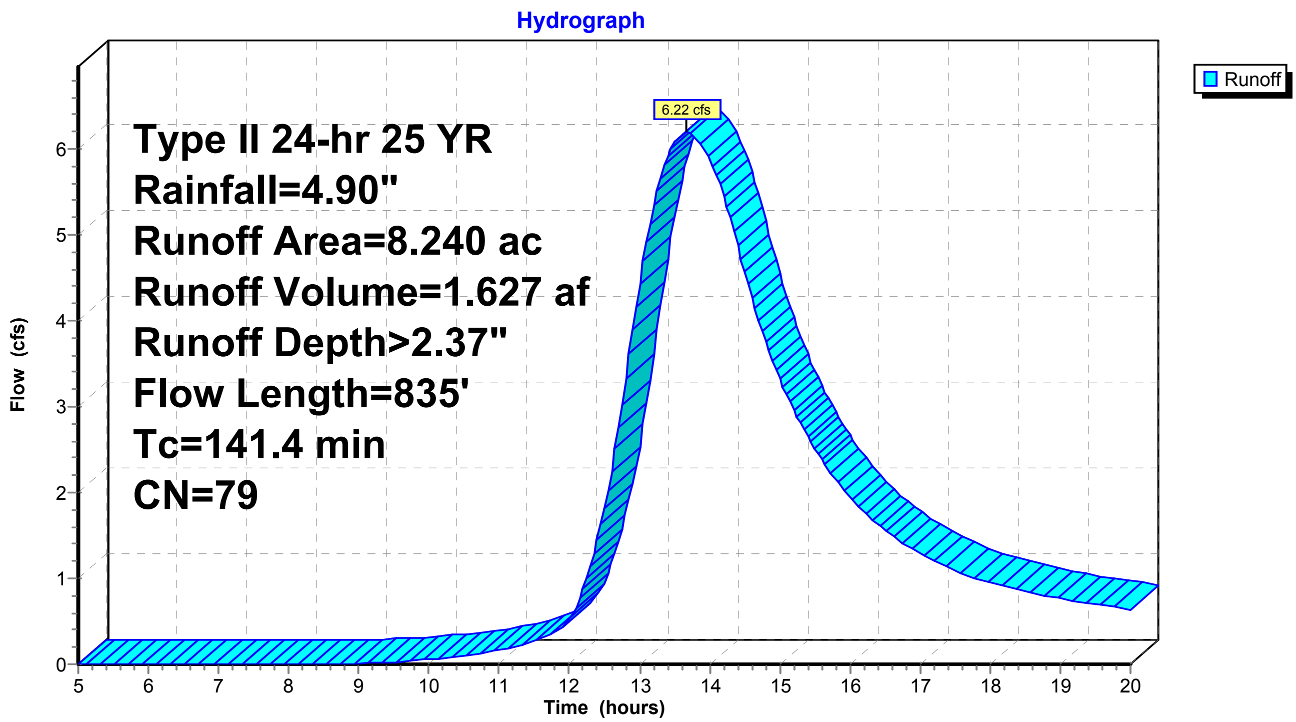
Runoff = 6.22 cfs @ 13.67 hrs, Volume= 1.627 af, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
0.630	98	Paved parking & roofs
7.610	77	Woods, Good, HSG D
8.240	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
134.9	100	0.0010	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
3.8	144	0.0630	0.6		**Shallow Concentrated Flow, Shallow** Forest w/Heavy Litter Kv= 2.5 fps
2.7	591	0.0140	3.7	41.73	**Channel Flow, Stream/Culvert/Stream** Area= 11.3 sf Perim= 10.5' r= 1.08' n= 0.050 Mountain streams w/large boulders
141.4	835	Total			

Subcatchment 4S: Entire Drainage Area



Subcatchment AS: Main WS

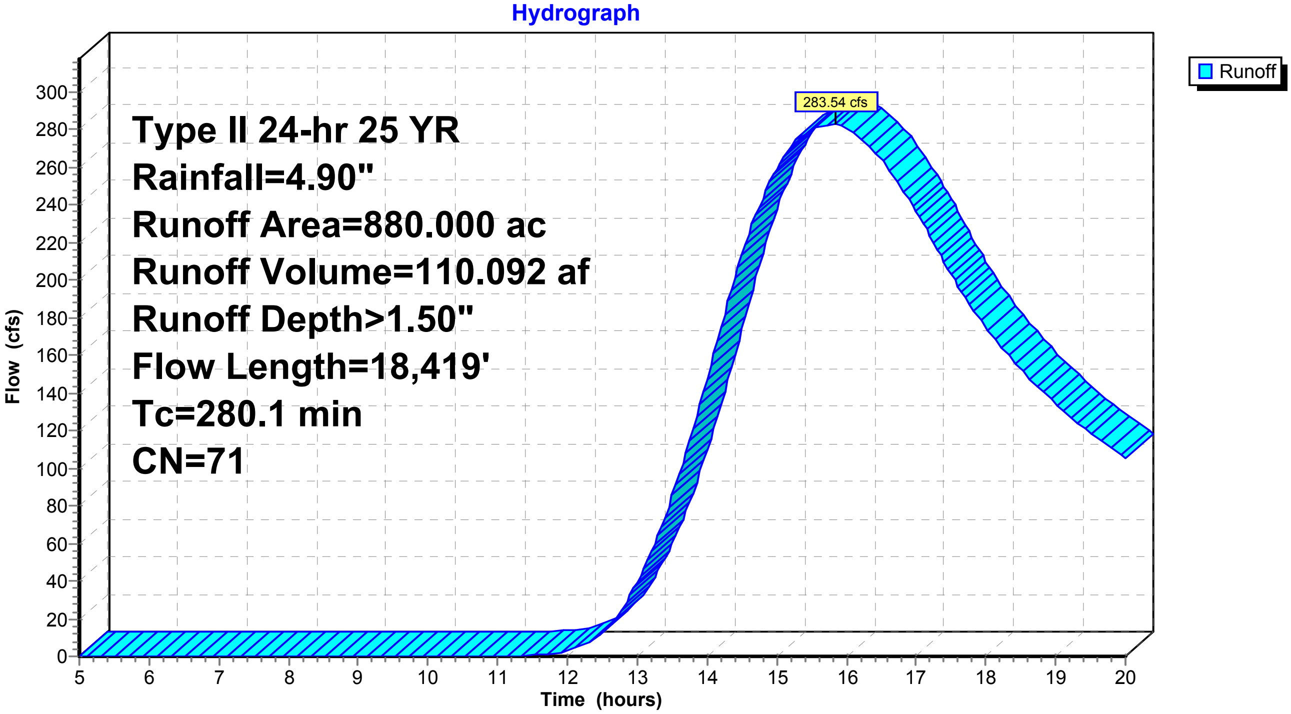
Runoff = 283.54 cfs @ 15.85 hrs, Volume= 110.092 af, Depth> 1.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
151.000	77	Woods, Good, HSG D
46.000	73	Brush, Good, HSG D
683.000	70	Woods, Good, HSG C
880.000	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.9	100	0.0210	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
46.0	1,000	0.0210	0.4		**Shallow Concentrated Flow, Shallow Concen** Forest w/Heavy Litter Kv= 2.5 fps
32.6	4,500	0.0260	2.3	2.30	**Channel Flow, Before Upper Wetland** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.050 Mountain streams w/large boulders
97.4	3,870	0.0050	0.7	1.32	**Channel Flow, Channel Flow in Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.100 Very weedy reaches w/pools
15.9	2,525	0.0200	2.6	5.30	**Channel Flow, Open Channel** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.050 Mountain streams w/large boulders
48.3	6,424	0.0110	2.2	6.65	**Channel Flow, Open Channel** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
280.1	18,419	Total			

Subcatchment AS: Main WS



Subcatchment BS: Upper WS

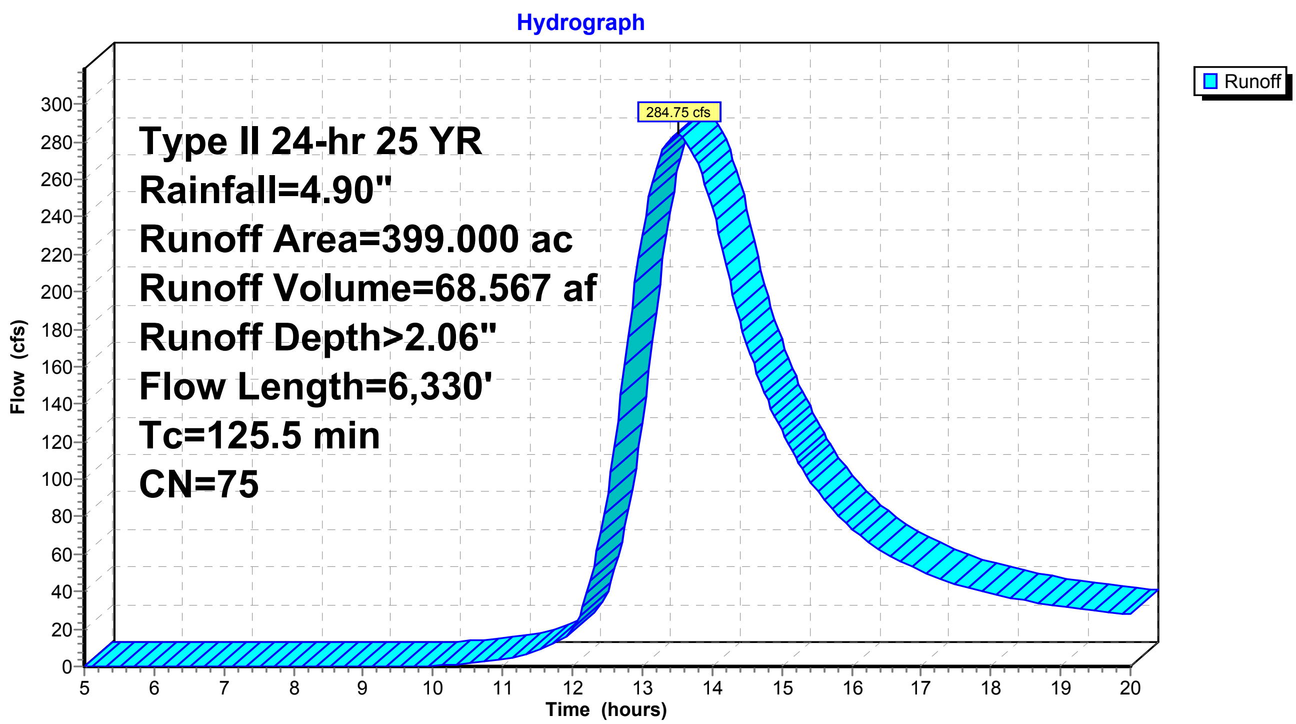
Runoff = 284.75 cfs @ 13.51 hrs, Volume= 68.567 af, Depth> 2.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
245.000	77	Woods, Good, HSG D
31.000	73	Brush, Good, HSG D
123.000	70	Woods, Good, HSG C
399.000	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
33.3	1,000	0.0400	0.5		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
48.1	3,230	0.0070	1.1	2.24	**Channel Flow, Through Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.070 Sluggish weedy reaches w/pools
13.3	2,000	0.0140	2.5	7.50	**Channel Flow, Lower Reach** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
125.5	6,330	Total			

Subcatchment BS: Upper WS



Reach 1CR: (new Reach)

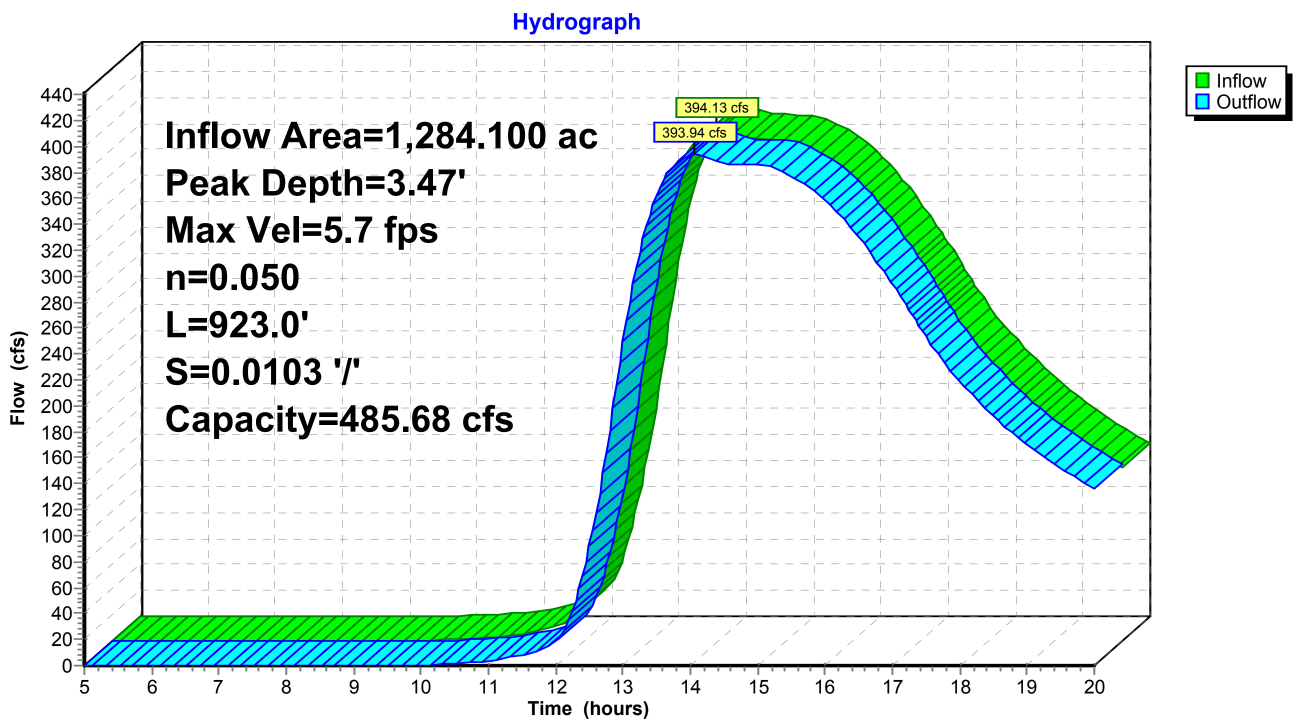
Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

Inflow Area = 1,284.100 ac, Inflow Depth > 1.68" for 25 YR event
Inflow = 394.13 cfs @ 13.96 hrs, Volume= 179.978 af
Outflow = 393.94 cfs @ 14.06 hrs, Volume= 178.744 af, Atten= 0%, Lag= 5.8 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.7 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 3.0 fps, Avg. Travel Time= 5.2 min

Peak Depth= 3.47' @ 14.01 hrs
Capacity at bank full= 485.68 cfs
Inlet Invert= 87.00', Outlet Invert= 77.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 923.0' Slope= 0.0103 '/'

Reach 1CR: (new Reach)



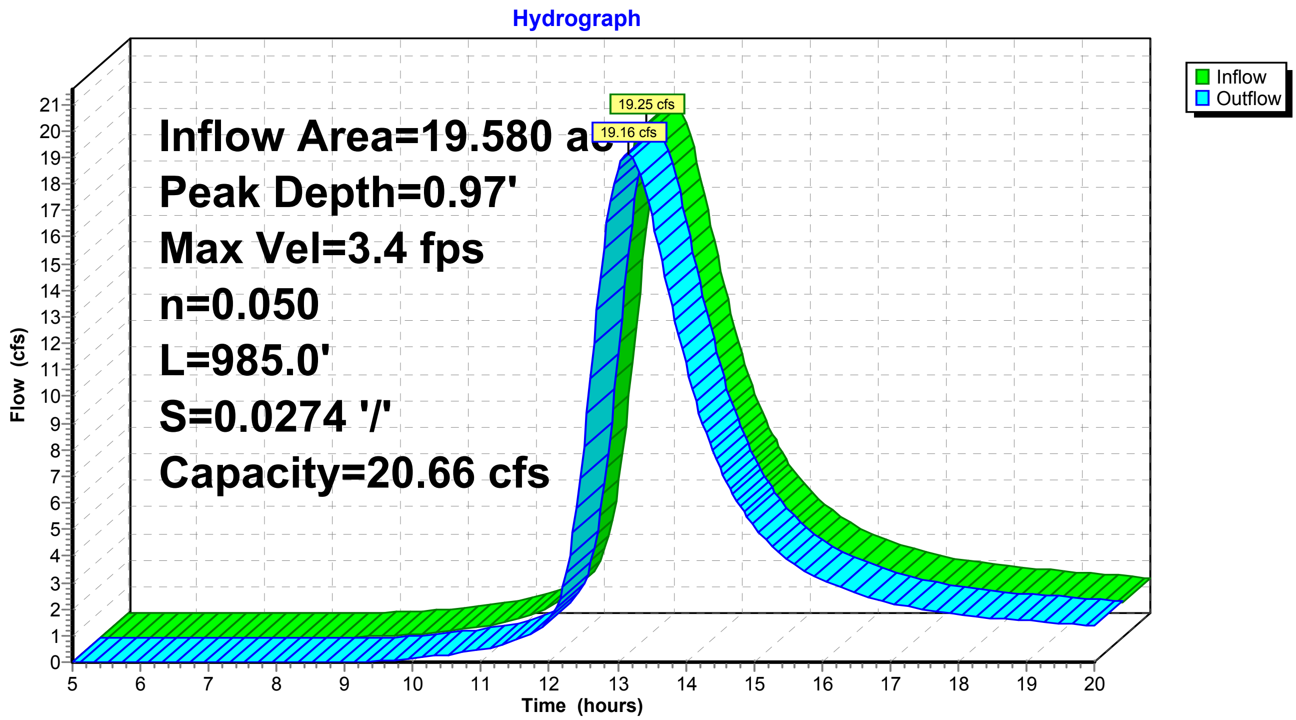
Reach 1R: Lowest reach

Inflow Area = 19.580 ac, Inflow Depth > 2.34" for 25 YR event
Inflow = 19.25 cfs @ 13.01 hrs, Volume= 3.816 af
Outflow = 19.16 cfs @ 13.16 hrs, Volume= 3.788 af, Atten= 1%, Lag= 8.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.4 fps, Min. Travel Time= 4.9 min
Avg. Velocity = 1.8 fps, Avg. Travel Time= 9.3 min

Peak Depth= 0.97' @ 13.08 hrs
Capacity at bank full= 20.66 cfs
Inlet Invert= 87.00', Outlet Invert= 60.00'
2.00' x 1.00' deep channel, n= 0.050 Mountain streams w/large boulders
Side Slope Z-value= 4.0 '/' Top Width= 10.00'
Length= 985.0' Slope= 0.0274 '/'

Reach 1R: Lowest reach



Reach 2CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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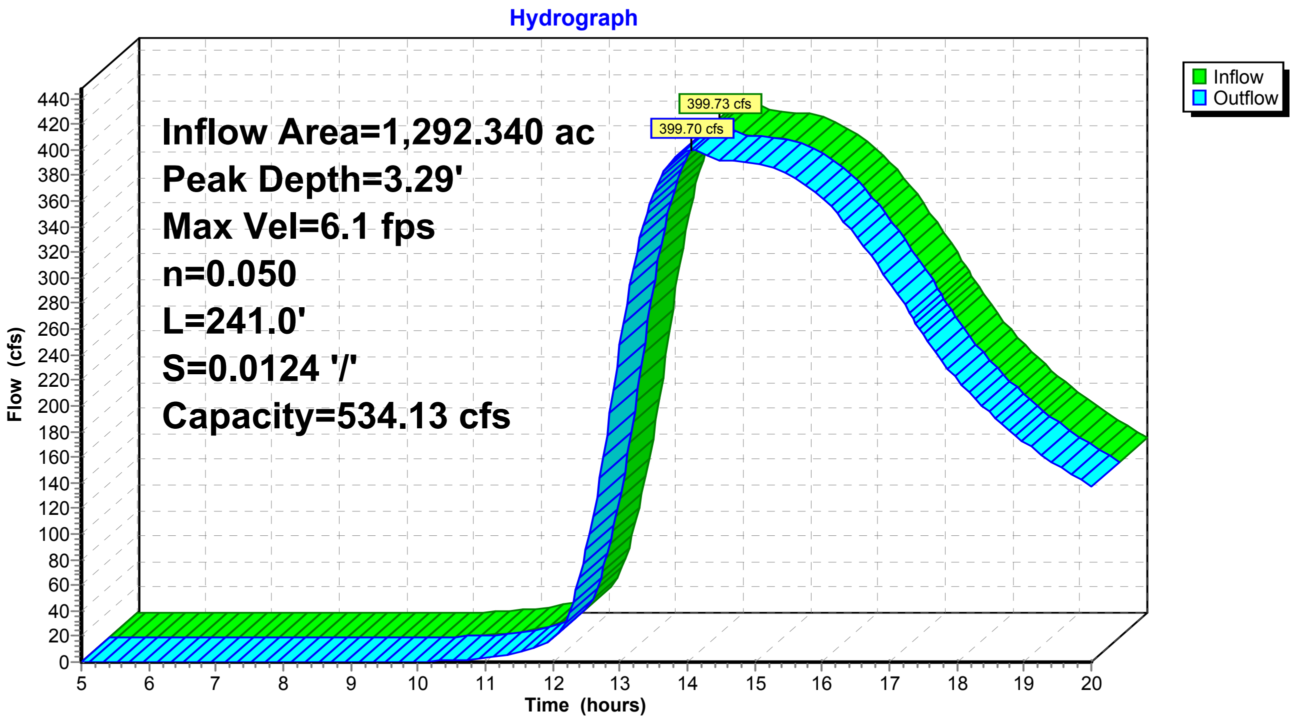
[61] Hint: Submerged 35% of Reach 1CR bottom

Inflow Area = 1,292.340 ac, Inflow Depth > 1.67" for 25 YR event
Inflow = 399.73 cfs @ 14.05 hrs, Volume= 180.371 af
Outflow = 399.70 cfs @ 14.07 hrs, Volume= 180.065 af, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.1 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 3.2 fps, Avg. Travel Time= 1.3 min

Peak Depth= 3.29' @ 14.05 hrs
Capacity at bank full= 534.13 cfs
Inlet Invert= 77.50', Outlet Invert= 74.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 241.0' Slope= 0.0124 '/'

Reach 2CR: (new Reach)



Reach 3CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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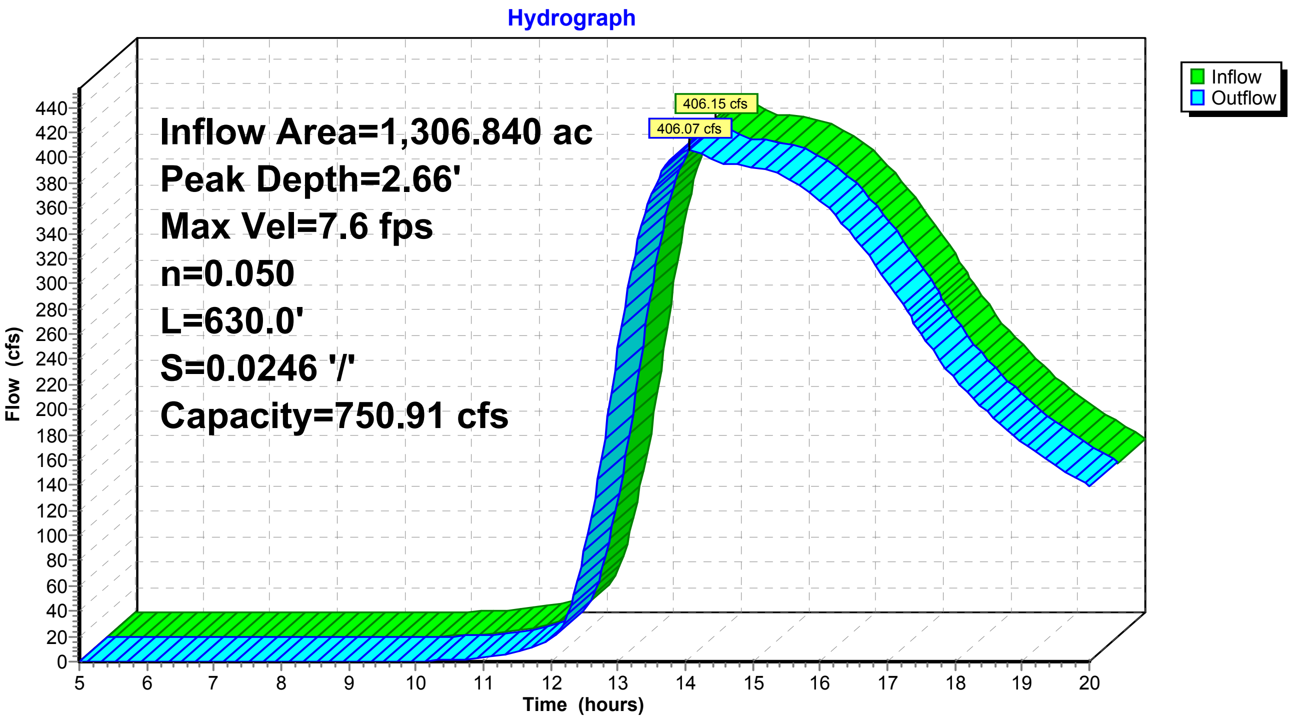
[61] Hint: Submerged 89% of Reach 2CR bottom

Inflow Area = 1,306.840 ac, Inflow Depth > 1.68" for 25 YR event
Inflow = 406.15 cfs @ 14.04 hrs, Volume= 183.003 af
Outflow = 406.07 cfs @ 14.07 hrs, Volume= 182.355 af, Atten= 0%, Lag= 2.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.6 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 4.0 fps, Avg. Travel Time= 2.6 min

Peak Depth= 2.66' @ 14.05 hrs
Capacity at bank full= 750.91 cfs
Inlet Invert= 74.50', Outlet Invert= 59.00'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 630.0' Slope= 0.0246 '/'

Reach 3CR: (new Reach)



Reach 4CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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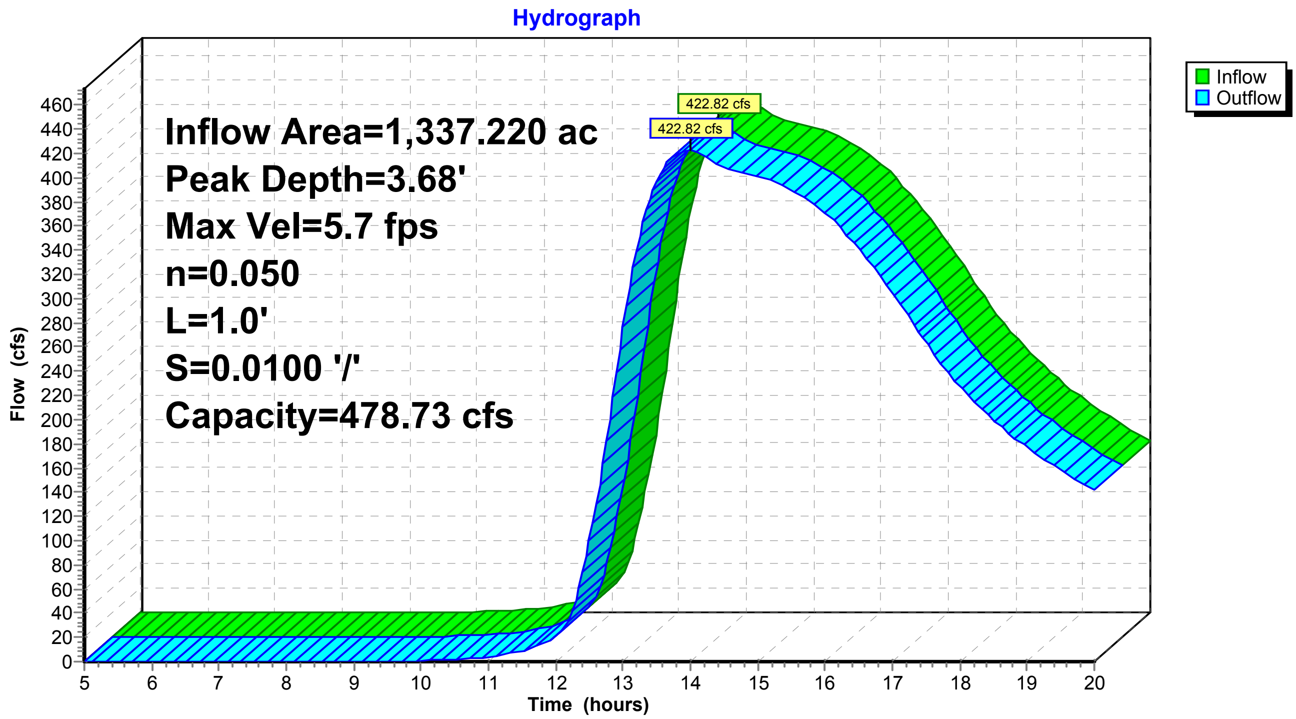
[61] Hint: Submerged 24% of Reach 3CR bottom

Inflow Area = 1,337.220 ac, Inflow Depth > 1.69" for 25 YR event
Inflow = 422.82 cfs @ 13.99 hrs, Volume= 188.167 af
Outflow = 422.82 cfs @ 13.99 hrs, Volume= 188.165 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.7 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.0 fps, Avg. Travel Time= 0.0 min

Peak Depth= 3.68' @ 13.99 hrs
Capacity at bank full= 478.73 cfs
Inlet Invert= 59.00', Outlet Invert= 58.99'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 1.0' Slope= 0.0100 '/'

Reach 4CR: (new Reach)



Pond 11P: Beaver Pond

Beaver Pond has minimal storage (observed to be 2 inches on 9/28/08) and therefore shown as without in both pre and post development and no effect on comparative flows.

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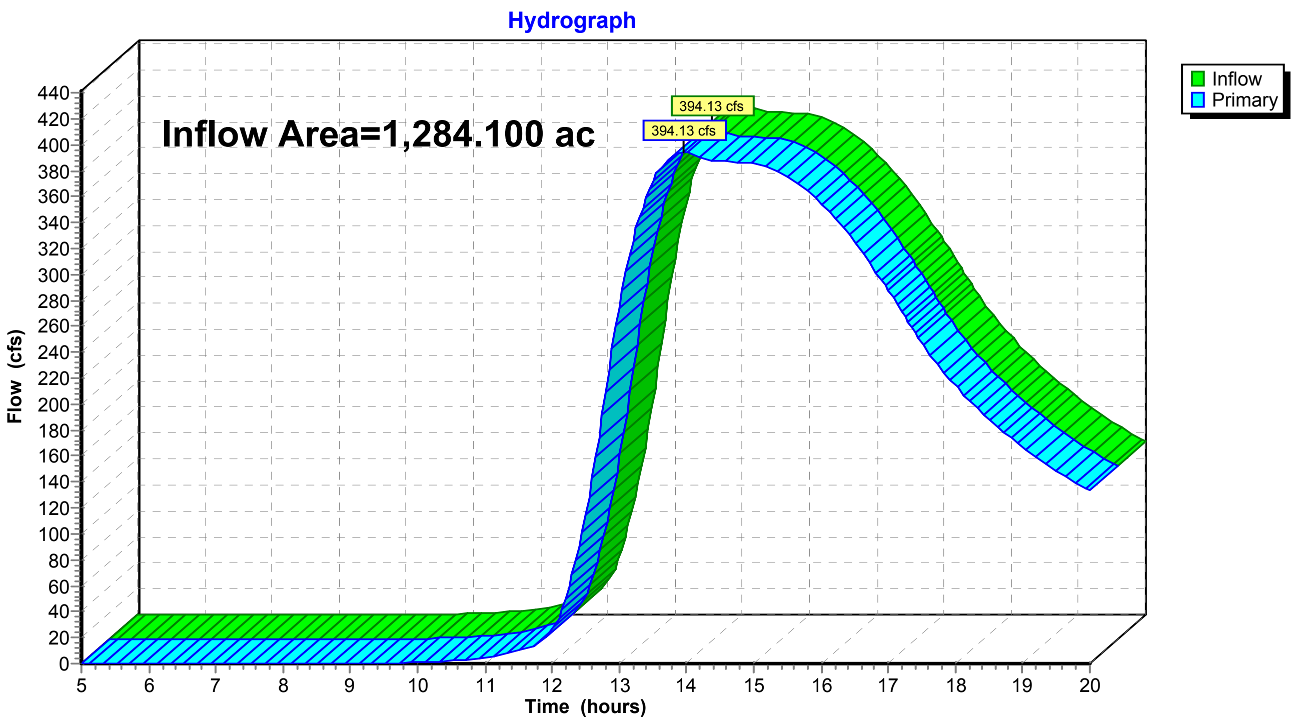
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,284.100 ac, Inflow Depth > 1.68" for 25 YR event
Inflow = 394.13 cfs @ 13.96 hrs, Volume= 179.978 af
Primary = 394.13 cfs @ 13.96 hrs, Volume= 179.978 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 11P: Beaver Pond

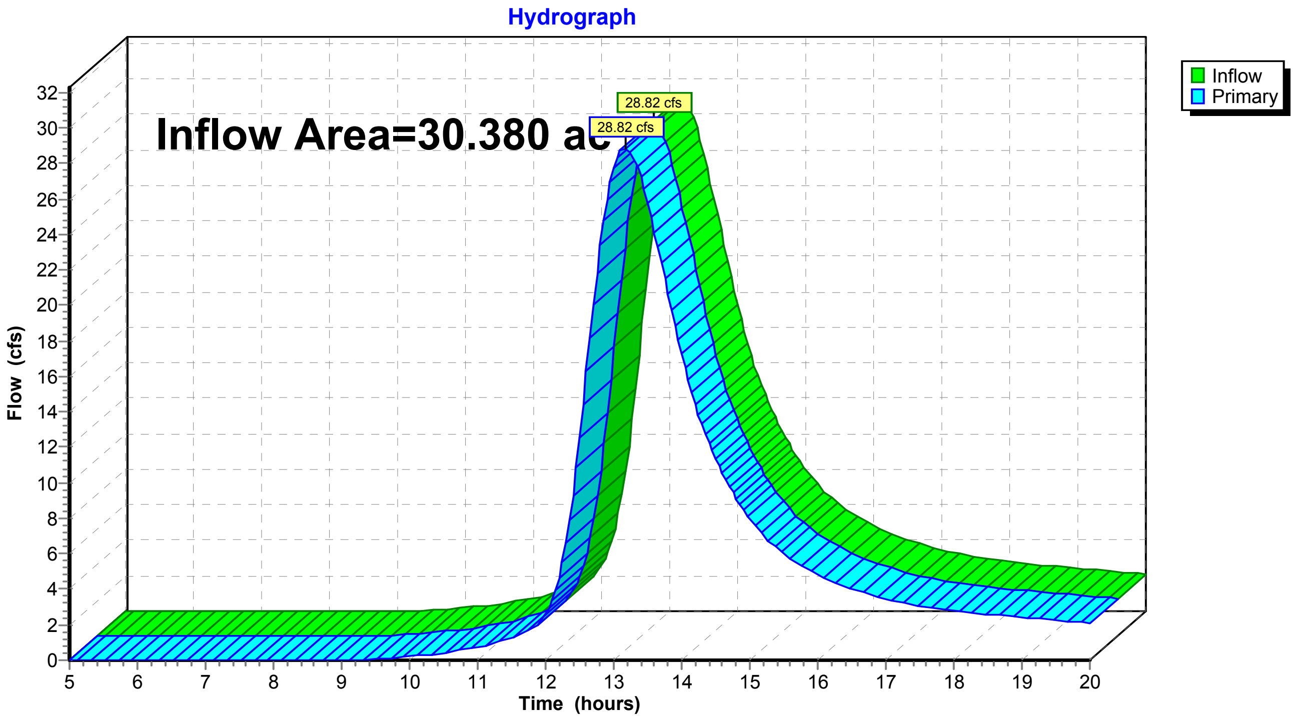


Link 1L: (new Link)

Inflow Area = 30.380 ac, Inflow Depth > 2.30" for 25 YR event
Inflow = 28.82 cfs @ 13.16 hrs, Volume= 5.812 af
Primary = 28.82 cfs @ 13.16 hrs, Volume= 5.812 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: (new Link)

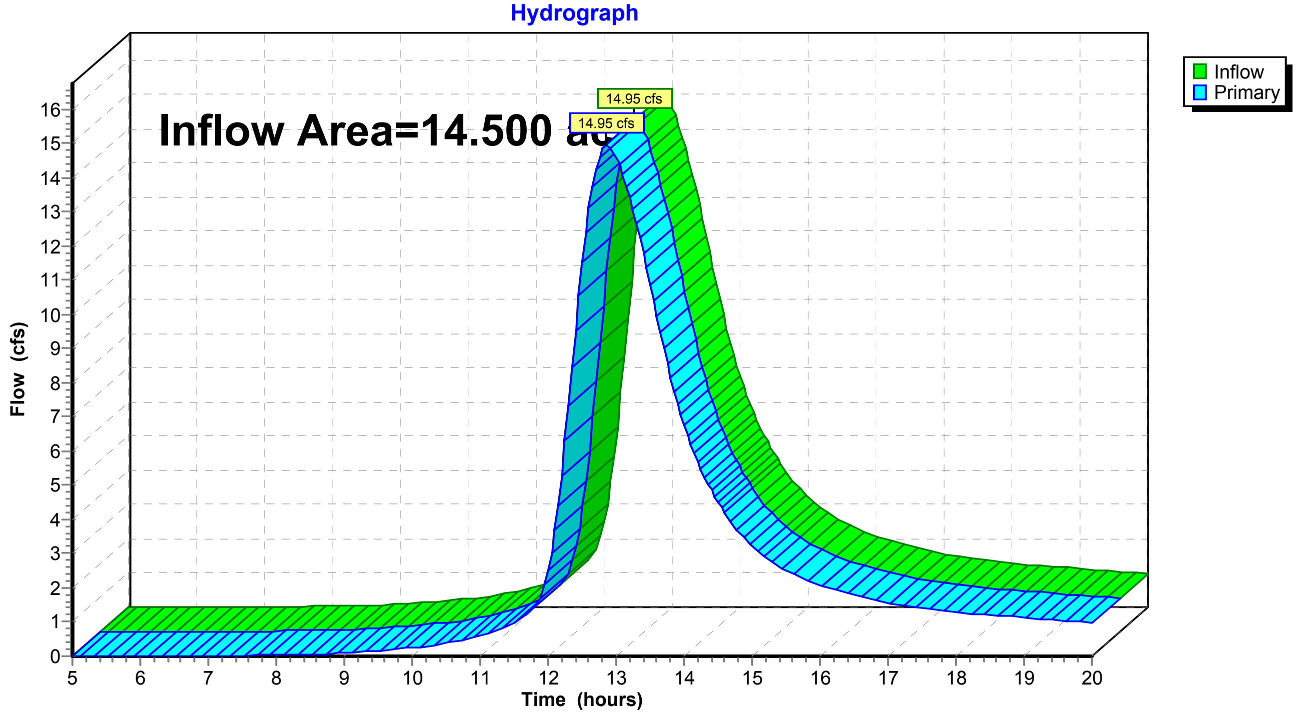


Link 2L: (new Link)

Inflow Area = 14.500 ac, Inflow Depth > 2.43" for 25 YR event
Inflow = 14.95 cfs @ 12.87 hrs, Volume= 2.938 af
Primary = 14.95 cfs @ 12.87 hrs, Volume= 2.938 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: (new Link)



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1AS: Culdesac, employ park and adjoining Runoff Area=9.180 ac Runoff Depth>2.84"
Flow Length=1,573' Tc=79.0 min CN=79 Runoff=12.59 cfs 2.173 af

Subcatchment 1BS: Undisturbed Subcat Runoff Area=10.400 ac Runoff Depth>2.63"
Flow Length=1,833' Tc=104.2 min CN=77 Runoff=10.82 cfs 2.279 af

Subcatchment 1CS: Lower Subcat Runoff Area=10.800 ac Runoff Depth>2.63"
Flow Length=1,097' Tc=102.6 min CN=77 Runoff=11.34 cfs 2.369 af

Subcatchment 2AS: Overflo Park, Rd and FS Runoff Area=3.900 ac Runoff Depth>3.33"
Flow Length=1,103' Tc=61.0 min CN=84 Runoff=7.48 cfs 1.084 af

Subcatchment 2BS: Undisturb SubCat Runoff Area=10.600 ac Runoff Depth>2.64"
Flow Length=1,358' Tc=95.4 min CN=77 Runoff=11.78 cfs 2.333 af

Subcatchment 3S: Maint Facility Drainage Area Runoff Area=5.100 ac Runoff Depth>3.54"
Flow Length=670' Tc=52.5 min CN=86 Runoff=11.48 cfs 1.505 af

Subcatchment 4S: Entire Drainage Area Runoff Area=8.240 ac Runoff Depth>2.76"
Flow Length=835' Tc=141.4 min CN=79 Runoff=7.24 cfs 1.894 af

Subcatchment AS: Main WS Runoff Area=880.000 ac Runoff Depth>1.80"
Flow Length=18,419' Tc=280.1 min CN=71 Runoff=339.58 cfs 132.010 af

Subcatchment BS: Upper WS Runoff Area=399.000 ac Runoff Depth>2.43"
Flow Length=6,330' Tc=125.5 min CN=75 Runoff=336.28 cfs 80.783 af

Reach 1CR: (new Reach) Peak Depth=3.92' Max Vel=6.0 fps Inflow=471.10 cfs 214.298 af
n=0.050 L=923.0' S=0.0103 '/' Capacity=485.68 cfs Outflow=470.86 cfs 212.944 af

Reach 1R: Lowest reach Peak Depth=1.04' Max Vel=3.5 fps Inflow=22.48 cfs 4.452 af
n=0.050 L=985.0' S=0.0274 '/' Capacity=20.66 cfs Outflow=22.37 cfs 4.422 af

Reach 2CR: (new Reach) Peak Depth=3.71' Max Vel=6.4 fps Inflow=477.59 cfs 214.838 af
n=0.050 L=241.0' S=0.0124 '/' Capacity=534.13 cfs Outflow=477.56 cfs 214.503 af

Reach 3CR: (new Reach) Peak Depth=2.99' Max Vel=8.1 fps Inflow=485.04 cfs 217.919 af
n=0.050 L=630.0' S=0.0246 '/' Capacity=750.91 cfs Outflow=484.95 cfs 217.210 af

Reach 4CR: (new Reach) Peak Depth=4.15' Max Vel=6.1 fps Inflow=504.46 cfs 224.001 af
n=0.050 L=1.0' S=0.0100 '/' Capacity=478.73 cfs Outflow=504.46 cfs 223.999 af

Pond 11P: Beaver Pond Inflow=471.10 cfs 214.298 af
Primary=471.10 cfs 214.298 af

Link 1L: (new Link)

Inflow=33.70 cfs 6.791 af
Primary=33.70 cfs 6.791 af

Link 2L: (new Link)

Inflow=17.38 cfs 3.416 af
Primary=17.38 cfs 3.416 af

Total Runoff Area = 1,337.220 ac Runoff Volume = 226.430 af Average Runoff Depth = 2.03"

Subcatchment 1AS: Culdesac, employ park and adjoining

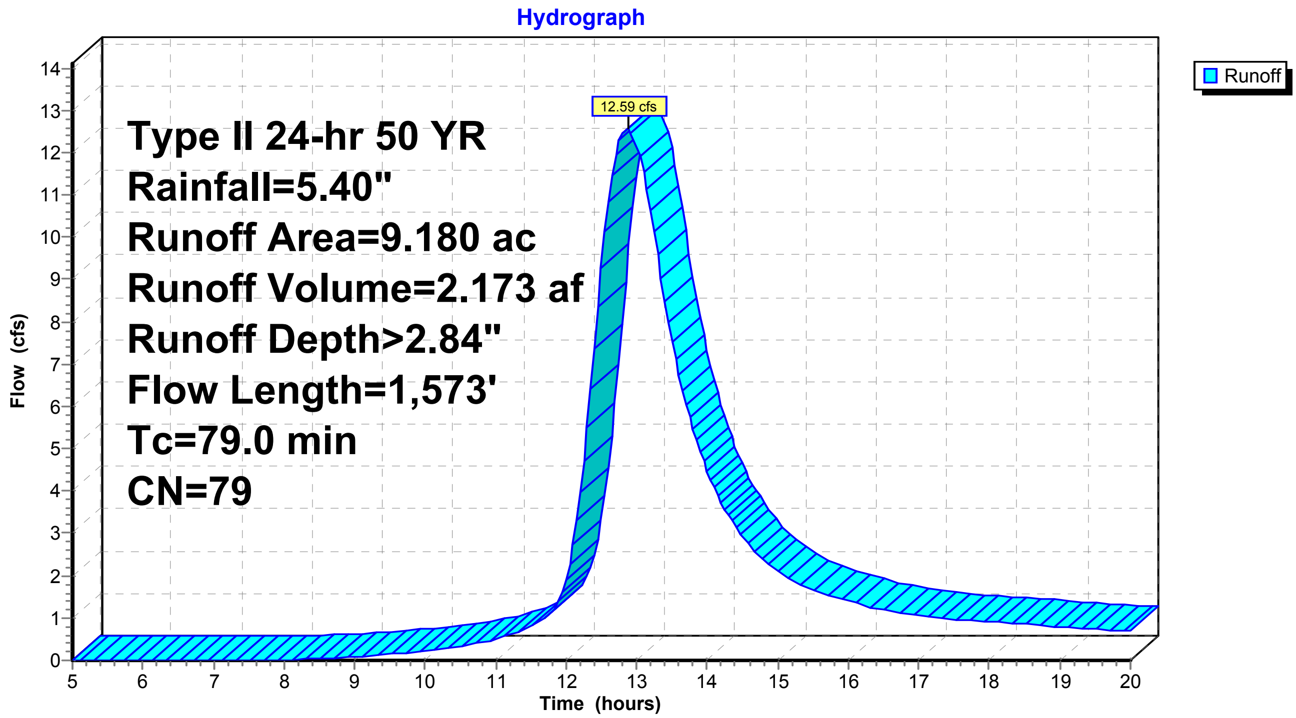
Runoff = 12.59 cfs @ 12.88 hrs, Volume= 2.173 af, Depth> 2.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
0.780	98	Paved parking & roofs
8.400	77	Woods, Good, HSG D
9.180	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	65	0.0150	0.1		**Sheet Flow, From slope** Woods: Light underbrush n= 0.400 P2= 2.70"
3.4	177	0.0060	0.9		**Sheet Flow, Through parking lot** Smooth surfaces n= 0.011 P2= 2.70"
0.3	161	0.0190	9.4	11.58	**Circular Channel (pipe), Pipe flow** Diam= 15.0" Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.010 PVC, smooth interior
1.6	311	0.0080	3.2	9.73	**Channel Flow, Channel to Level Lip T6xD0.75** Area= 3.0 sf Perim= 6.3' r= 0.48' n= 0.025 Rubble masonry, cemented
0.9	75	0.0010	1.3	6.02	**Channel Flow, Level Lip Spreader** Area= 4.5 sf Perim= 7.5' r= 0.60' n= 0.025 Rubble masonry, cemented
33.3	122	0.0490	0.1		**Sheet Flow, Filter Strip** Woods: Dense underbrush n= 0.800 P2= 2.70"
19.3	355	0.0150	0.3		**Shallow Concentrated Flow, Shallow** Forest w/Heavy Litter Kv= 2.5 fps
1.6	307	0.0340	3.1	4.67	**Channel Flow,** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
79.0	1,573	Total			

Subcatchment 1AS: Culdesac, employ park and adjoining



Subcatchment 1BS: Undisturbed Subcat

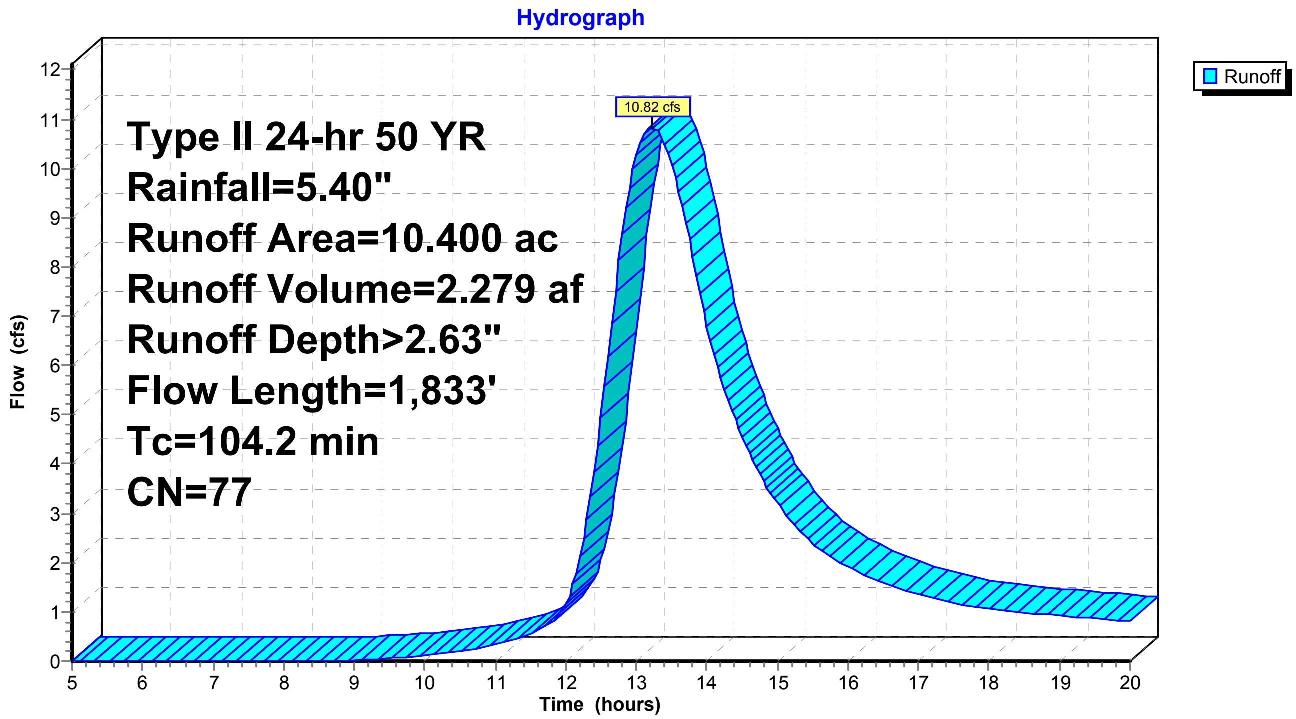
Runoff = 10.82 cfs @ 13.22 hrs, Volume= 2.279 af, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
10.400	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.8	200	0.0250	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
35.9	835	0.0240	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
3.5	798	0.0510	3.8	5.72	**Channel Flow, First Chan Flow** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
104.2	1,833	Total			

Subcatchment 1BS: Undisturbed Subcat



Subcatchment 1CS: Lower Subcat

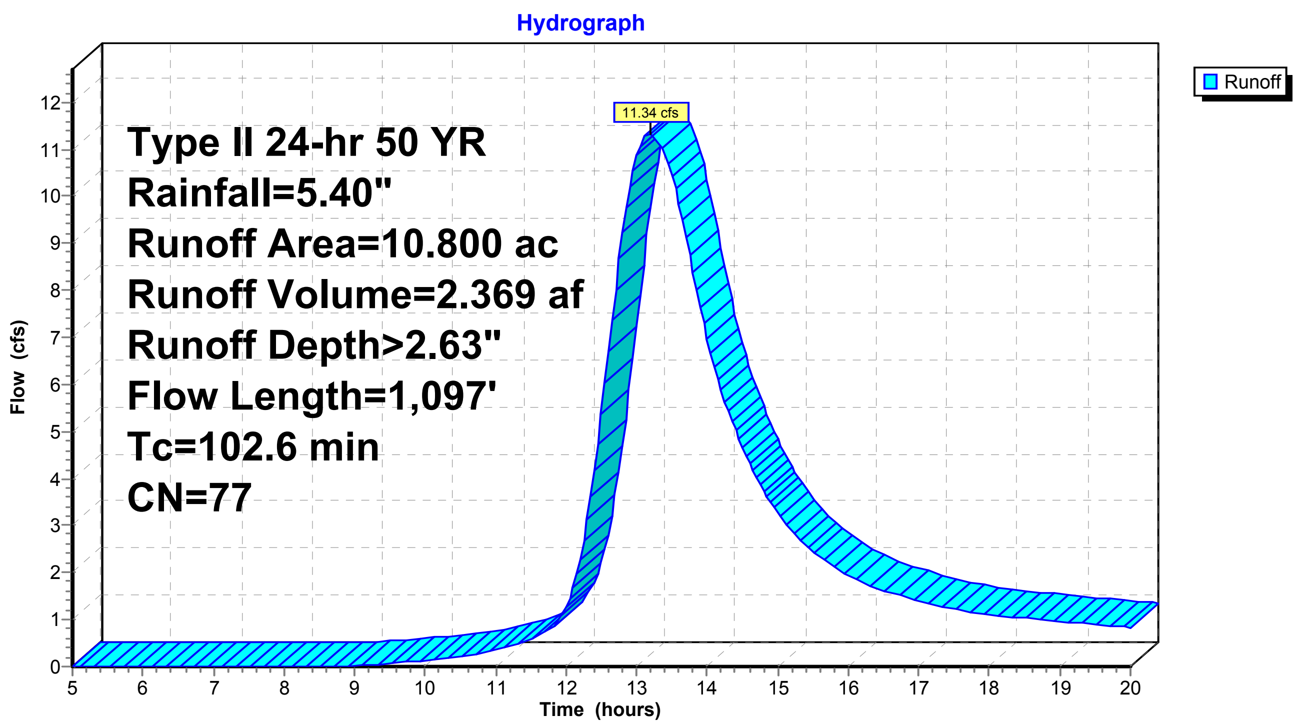
Runoff = 11.34 cfs @ 13.18 hrs, Volume= 2.369 af, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
10.800	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.9	150	0.0130	0.0		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
23.2	480	0.0190	0.3		**Shallow Concentrated Flow, Shallow** Forest w/Heavy Litter Kv= 2.5 fps
12.5	467	0.0620	0.6		**Shallow Concentrated Flow, Shallow two** Forest w/Heavy Litter Kv= 2.5 fps
102.6	1,097	Total			

Subcatchment 1CS: Lower Subcat



Subcatchment 2AS: Overflo Park, Rd and FS

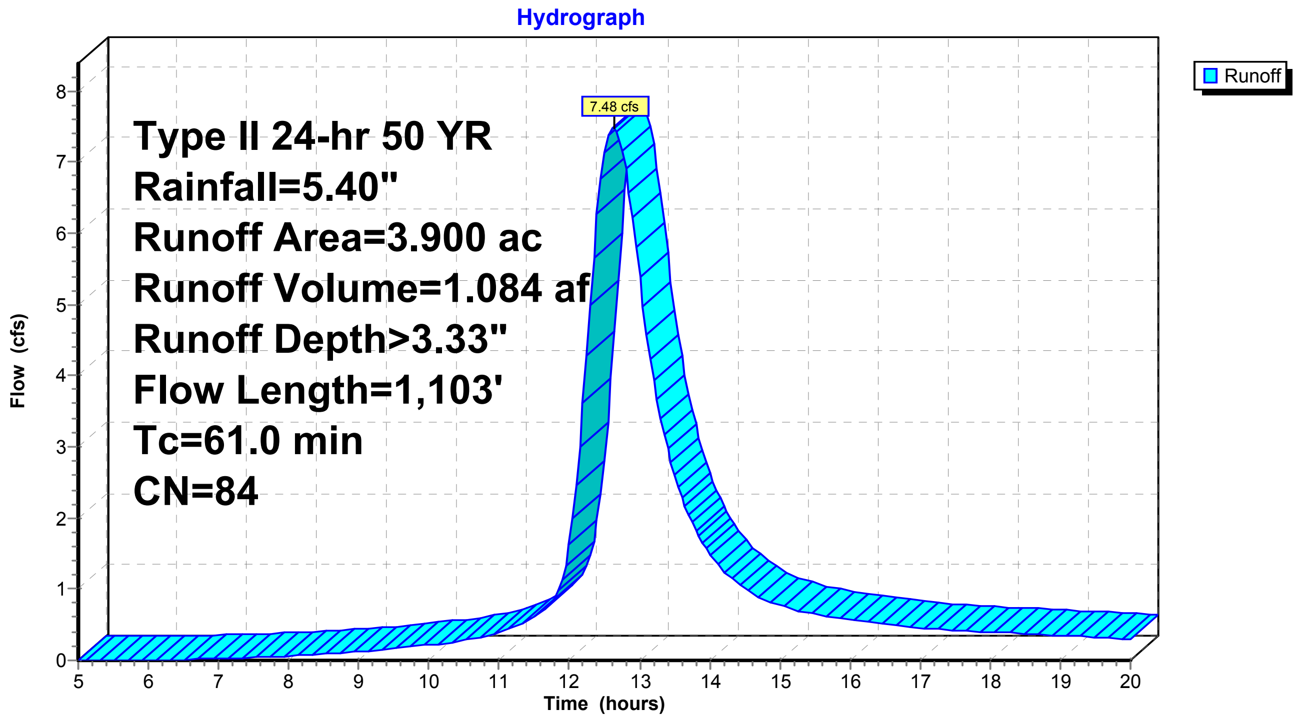
Runoff = 7.48 cfs @ 12.63 hrs, Volume= 1.084 af, Depth> 3.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
1.270	98	Paved parking & roofs
2.630	77	Woods, Good, HSG D
3.900	84	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	145	0.0070	0.9		**Sheet Flow, Road through Parking Lot** Smooth surfaces n= 0.011 P2= 2.70"
0.0	15	0.1130	5.4		**Shallow Concentrated Flow, Down bank** Unpaved Kv= 16.1 fps
11.1	504	0.0260	0.8	3.01	**Channel Flow, Ditch at toe slope** Area= 4.0 sf Perim= 6.1' r= 0.66' n= 0.240 Sheet flow over Dense Grass
1.1	85	0.0010	1.3	6.02	**Channel Flow, In Level Lip** Area= 4.5 sf Perim= 7.5' r= 0.60' n= 0.025 Rubble masonry, cemented
38.1	150	0.0530	0.1		**Sheet Flow, Filter Strip** Woods: Dense underbrush n= 0.800 P2= 2.70"
8.0	204	0.0290	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
61.0	1,103	Total			

Subcatchment 2AS: Overflo Park, Rd and FS



Subcatchment 2BS: Undisturb SubCat

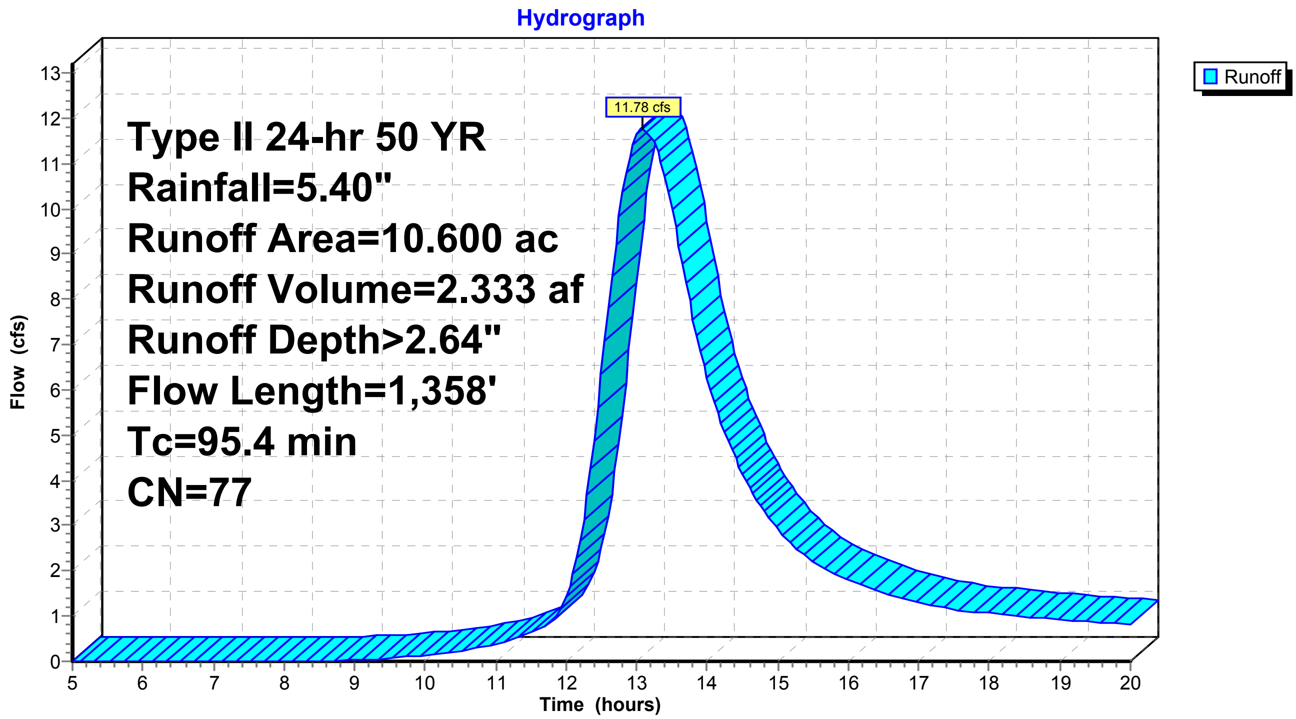
Runoff = 11.78 cfs @ 13.07 hrs, Volume= 2.333 af, Depth> 2.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
10.600	77	Woods, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.7	200	0.0400	0.1		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
40.3	876	0.0210	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
1.4	282	0.0390	3.3	5.00	**Channel Flow, Channel** Area= 1.5 sf Perim= 3.5' r= 0.43' n= 0.050 Mountain streams w/large boulders
95.4	1,358	Total			

Subcatchment 2BS: Undisturb SubCat



Subcatchment 3S: Maint Facility Drainage Area

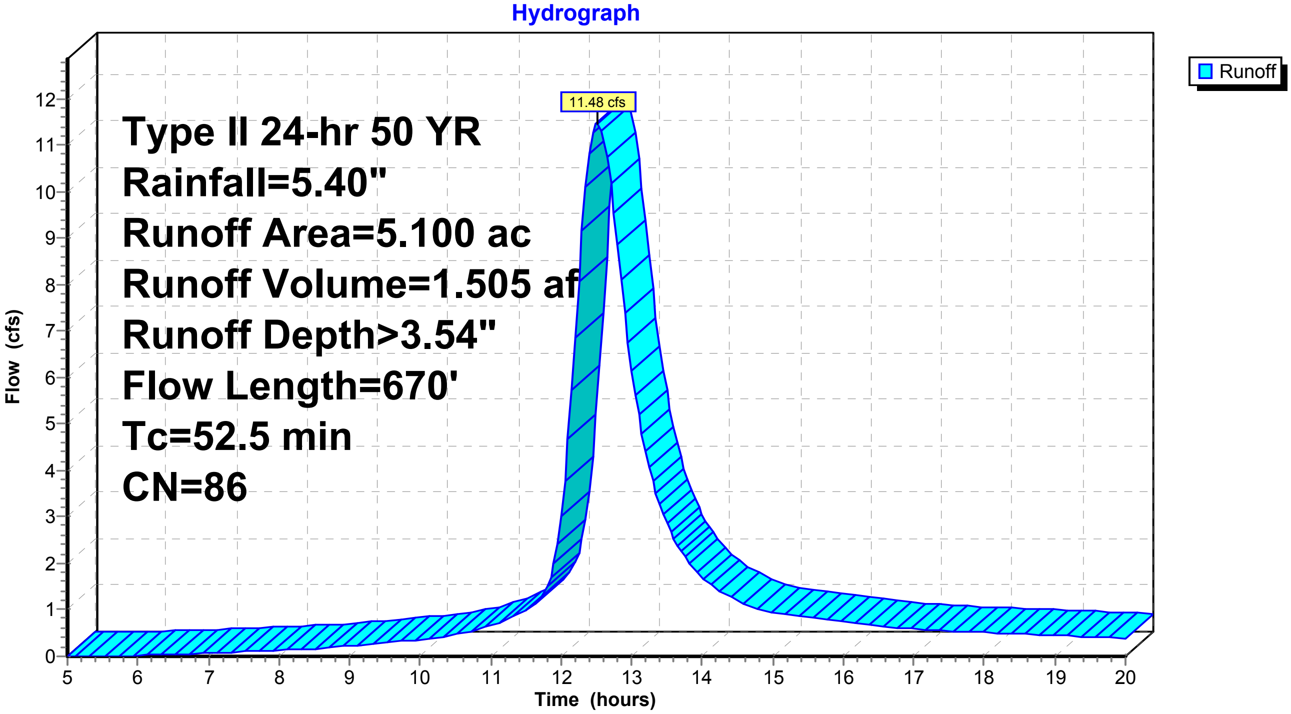
Runoff = 11.48 cfs @ 12.52 hrs, Volume= 1.505 af, Depth> 3.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
2.240	98	Paved parking & roofs
2.860	77	Woods, Good, HSG D
5.100	86	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.6000	3.6		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 2.70"
3.1	130	0.0040	0.7		**Sheet Flow, Through Parking lot** Smooth surfaces n= 0.011 P2= 2.70"
1.6	22	0.2950	0.2		**Sheet Flow, Over inslope** Grass: Dense n= 0.240 P2= 2.70"
9.9	230	0.0240	0.4		**Shallow Concentrated Flow, Overland (w/ treatment) to Filter str** Forest w/Heavy Litter Kv= 2.5 fps
1.5	118	0.0010	1.3	6.02	**Channel Flow, In Level Lip** Area= 4.5 sf Perim= 7.5' r= 0.60' n= 0.025 Rubble masonry, cemented
36.3	150	0.0600	0.1		**Sheet Flow, Through Filter Strip** Woods: Dense underbrush n= 0.800 P2= 2.70"
52.5	670	Total			

Subcatchment 3S: Maint Facility Drainage Area



Subcatchment 4S: Entire Drainage Area

Channel flow section is for existing stream which differs from artificial sections used for each reach. See notes associated with the reach sections.

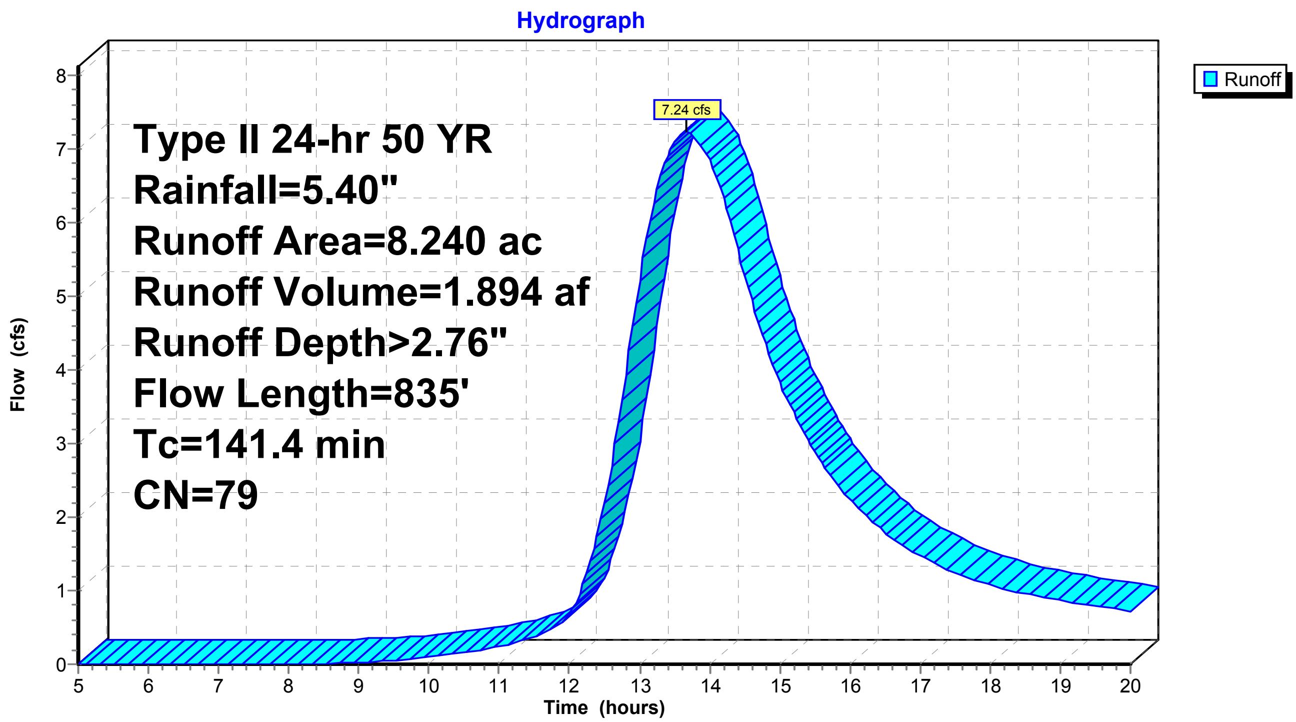
Runoff = 7.24 cfs @ 13.67 hrs, Volume= 1.894 af, Depth> 2.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
0.630	98	Paved parking & roofs
7.610	77	Woods, Good, HSG D
8.240	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
134.9	100	0.0010	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
3.8	144	0.0630	0.6		**Shallow Concentrated Flow, Shallow** Forest w/Heavy Litter Kv= 2.5 fps
2.7	591	0.0140	3.7	41.73	**Channel Flow, Stream/Culvert/Stream** Area= 11.3 sf Perim= 10.5' r= 1.08' n= 0.050 Mountain streams w/large boulders
141.4	835	Total			

Subcatchment 4S: Entire Drainage Area



Subcatchment AS: Main WS

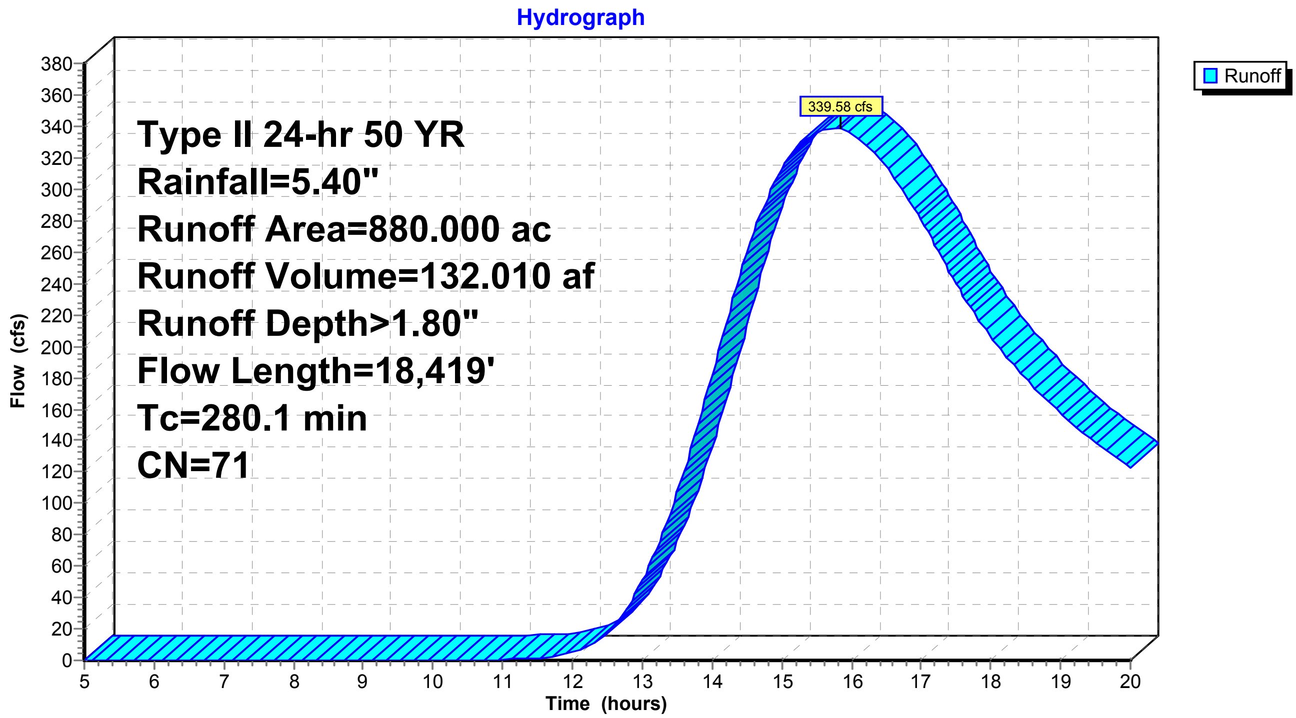
Runoff = 339.58 cfs @ 15.84 hrs, Volume= 132.010 af, Depth> 1.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
151.000	77	Woods, Good, HSG D
46.000	73	Brush, Good, HSG D
683.000	70	Woods, Good, HSG C
880.000	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.9	100	0.0210	0.0		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
46.0	1,000	0.0210	0.4		**Shallow Concentrated Flow, Shallow Concen** Forest w/Heavy Litter Kv= 2.5 fps
32.6	4,500	0.0260	2.3	2.30	**Channel Flow, Before Upper Wetland** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.050 Mountain streams w/large boulders
97.4	3,870	0.0050	0.7	1.32	**Channel Flow, Channel Flow in Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.100 Very weedy reaches w/pools
15.9	2,525	0.0200	2.6	5.30	**Channel Flow, Open Channel** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.050 Mountain streams w/large boulders
48.3	6,424	0.0110	2.2	6.65	**Channel Flow, Open Channel** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
280.1	18,419	Total			

Subcatchment AS: Main WS



Subcatchment BS: Upper WS

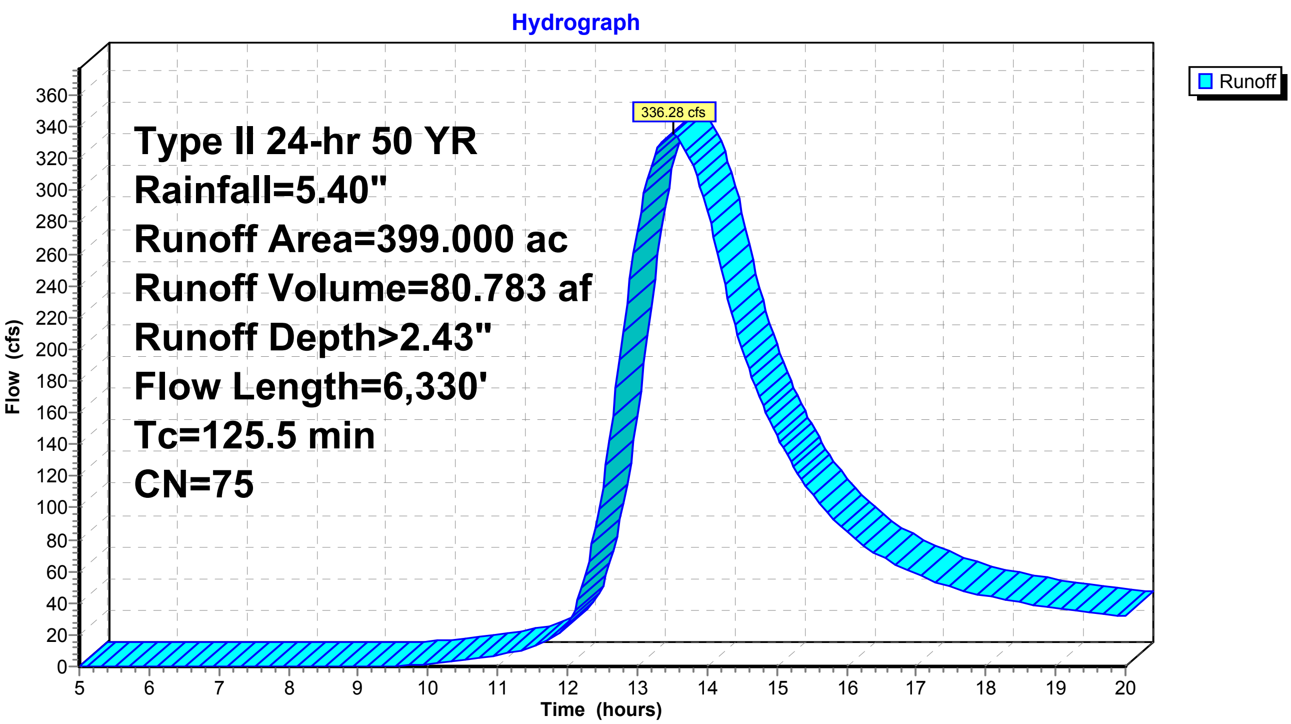
Runoff = 336.28 cfs @ 13.51 hrs, Volume= 80.783 af, Depth> 2.43"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
245.000	77	Woods, Good, HSG D
31.000	73	Brush, Good, HSG D
123.000	70	Woods, Good, HSG C
399.000	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.1		**Sheet Flow, Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 2.70"
33.3	1,000	0.0400	0.5		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
48.1	3,230	0.0070	1.1	2.24	**Channel Flow, Through Wetland** Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.070 Sluggish weedy reaches w/pools
13.3	2,000	0.0140	2.5	7.50	**Channel Flow, Lower Reach** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.050 Mountain streams w/large boulders
125.5	6,330	Total			

Subcatchment BS: Upper WS



Reach 1CR: (new Reach)

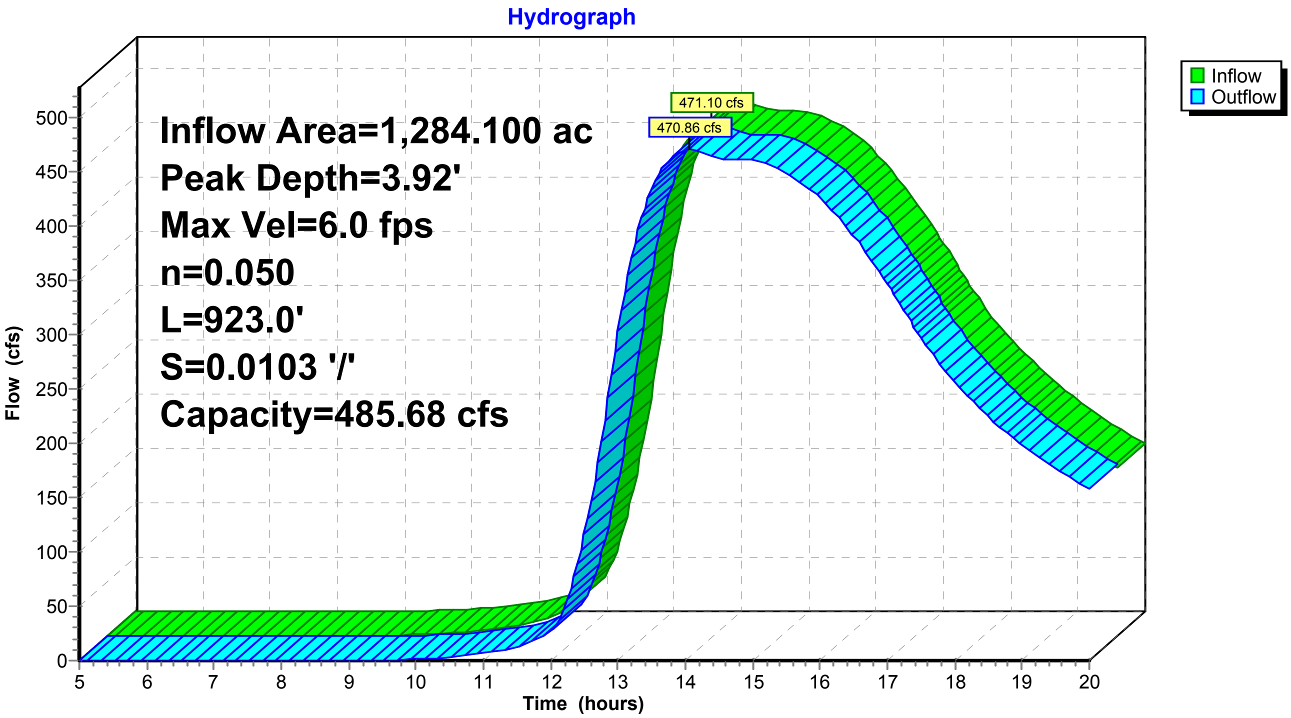
Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

Inflow Area = 1,284.100 ac, Inflow Depth > 2.00" for 50 YR event
Inflow = 471.10 cfs @ 13.96 hrs, Volume= 214.298 af
Outflow = 470.86 cfs @ 14.05 hrs, Volume= 212.944 af, Atten= 0%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.0 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 3.1 fps, Avg. Travel Time= 5.0 min

Peak Depth= 3.92' @ 14.01 hrs
Capacity at bank full= 485.68 cfs
Inlet Invert= 87.00', Outlet Invert= 77.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 923.0' Slope= 0.0103 '/'

Reach 1CR: (new Reach)



Reach 1R: Lowest reach

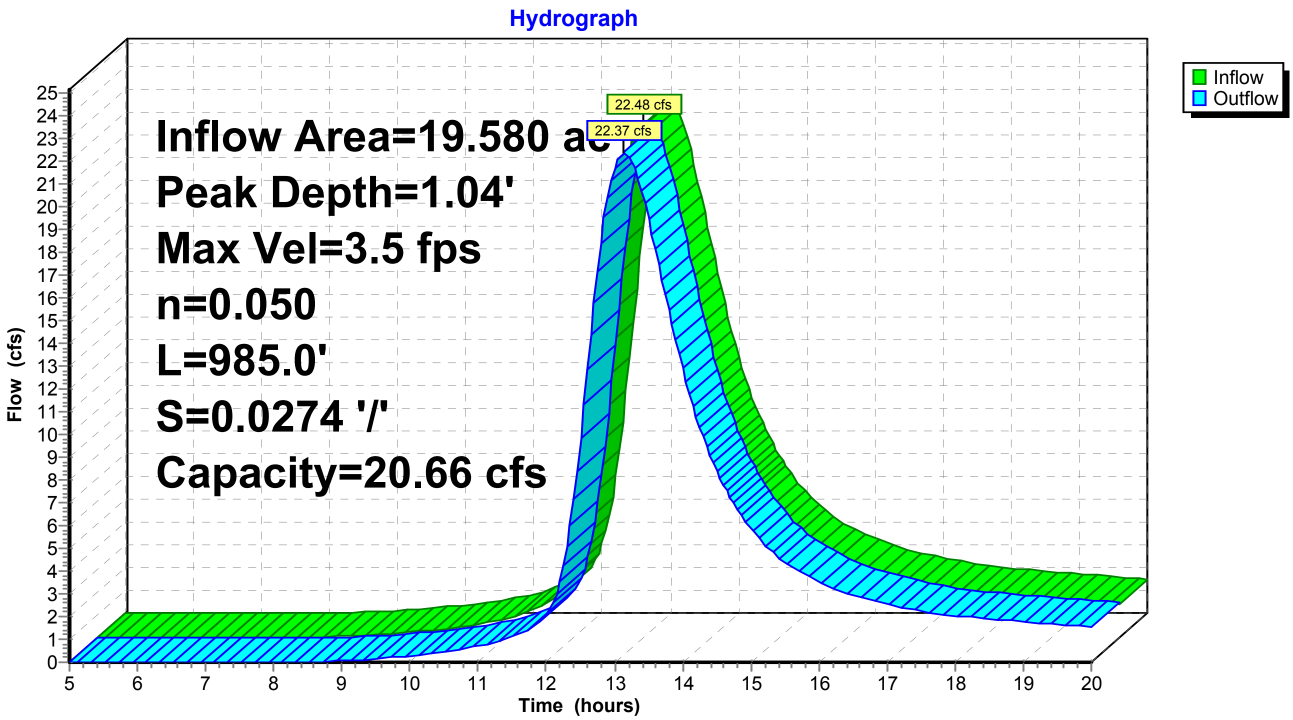
[91] Warning: Storage range exceeded by 0.04'
[55] Hint: Peak inflow is 109% of Manning's capacity

Inflow Area = 19.580 ac, Inflow Depth > 2.73" for 50 YR event
Inflow = 22.48 cfs @ 13.00 hrs, Volume= 4.452 af
Outflow = 22.37 cfs @ 13.15 hrs, Volume= 4.422 af, Atten= 0%, Lag= 8.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.5 fps, Min. Travel Time= 4.7 min
Avg. Velocity = 1.8 fps, Avg. Travel Time= 9.0 min

Peak Depth= 1.04' @ 13.07 hrs
Capacity at bank full= 20.66 cfs
Inlet Invert= 87.00', Outlet Invert= 60.00'
2.00' x 1.00' deep channel, n= 0.050 Mountain streams w/large boulders
Side Slope Z-value= 4.0 '/' Top Width= 10.00'
Length= 985.0' Slope= 0.0274 '/'

Reach 1R: Lowest reach



Reach 2CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

---

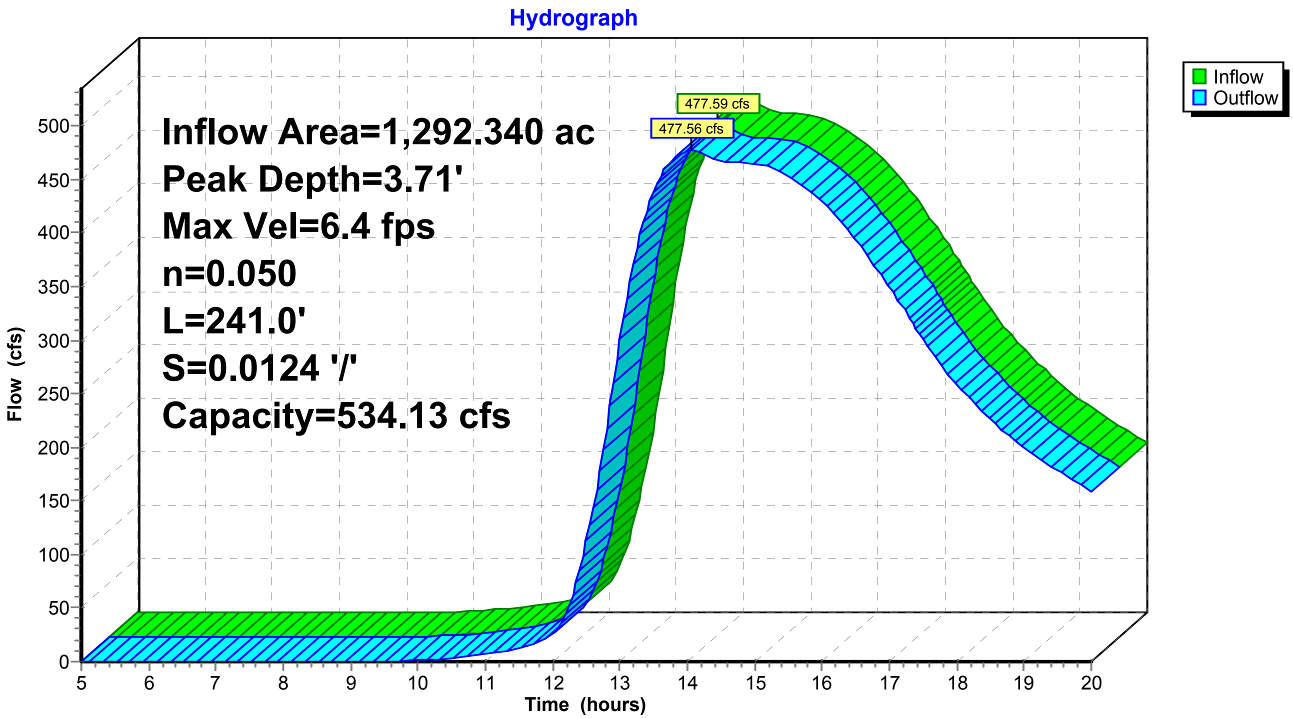
[61] Hint: Submerged 39% of Reach 1CR bottom

Inflow Area = 1,292.340 ac, Inflow Depth > 1.99" for 50 YR event
Inflow = 477.59 cfs @ 14.04 hrs, Volume= 214.838 af
Outflow = 477.56 cfs @ 14.06 hrs, Volume= 214.503 af, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.4 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 3.3 fps, Avg. Travel Time= 1.2 min

Peak Depth= 3.71' @ 14.05 hrs
Capacity at bank full= 534.13 cfs
Inlet Invert= 77.50', Outlet Invert= 74.50'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 241.0' Slope= 0.0124 '/'

Reach 2CR: (new Reach)



Reach 3CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

---

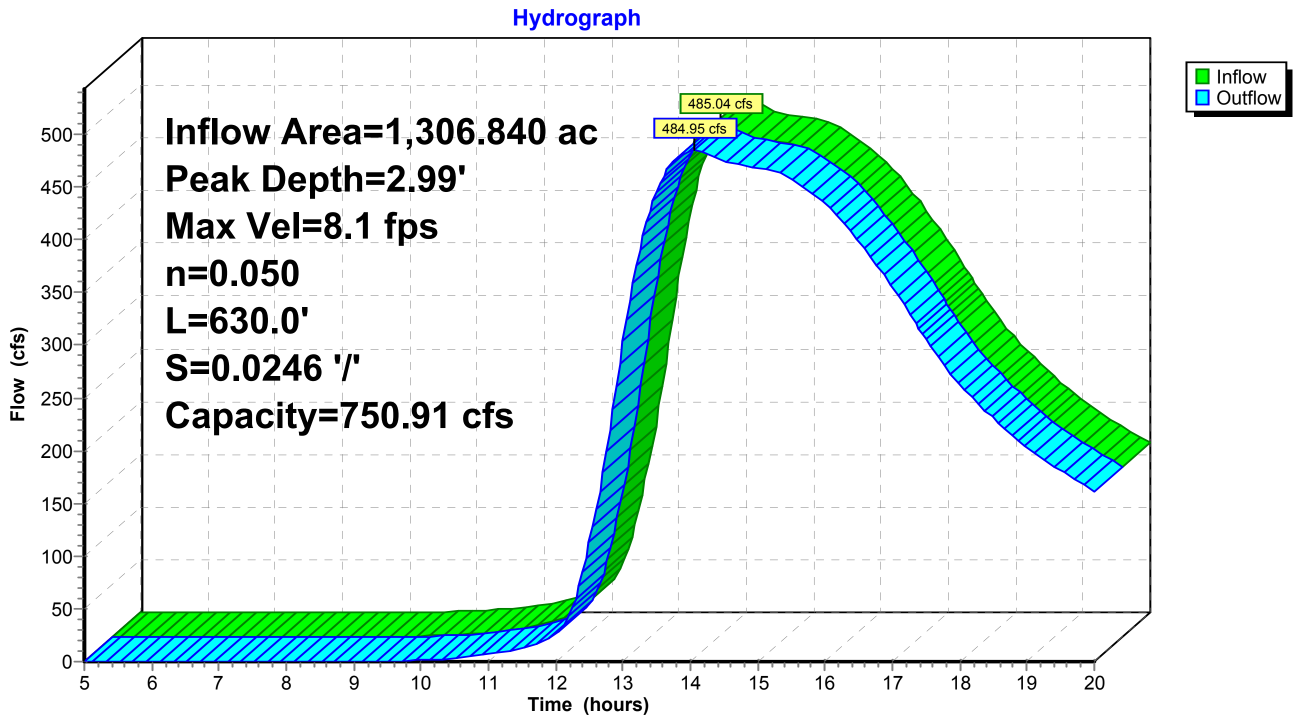
[61] Hint: Submerged 100% of Reach 2CR bottom

Inflow Area = 1,306.840 ac, Inflow Depth > 2.00" for 50 YR event
Inflow = 485.04 cfs @ 14.03 hrs, Volume= 217.919 af
Outflow = 484.95 cfs @ 14.06 hrs, Volume= 217.210 af, Atten= 0%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.1 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 4.2 fps, Avg. Travel Time= 2.5 min

Peak Depth= 2.99' @ 14.04 hrs
Capacity at bank full= 750.91 cfs
Inlet Invert= 74.50', Outlet Invert= 59.00'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 630.0' Slope= 0.0246 '/'

Reach 3CR: (new Reach)



Reach 4CR: (new Reach)

Cross section is assumed to be rectangular and is used consistently throughout with cross sectional dimensions 20'x4'. Channel grades are taken from contours. Justification for same section is, lack of field data for natural sections and for a comparative analysis of pre vs post and because of the short reach lengths, it does not matter what the reach sections are.

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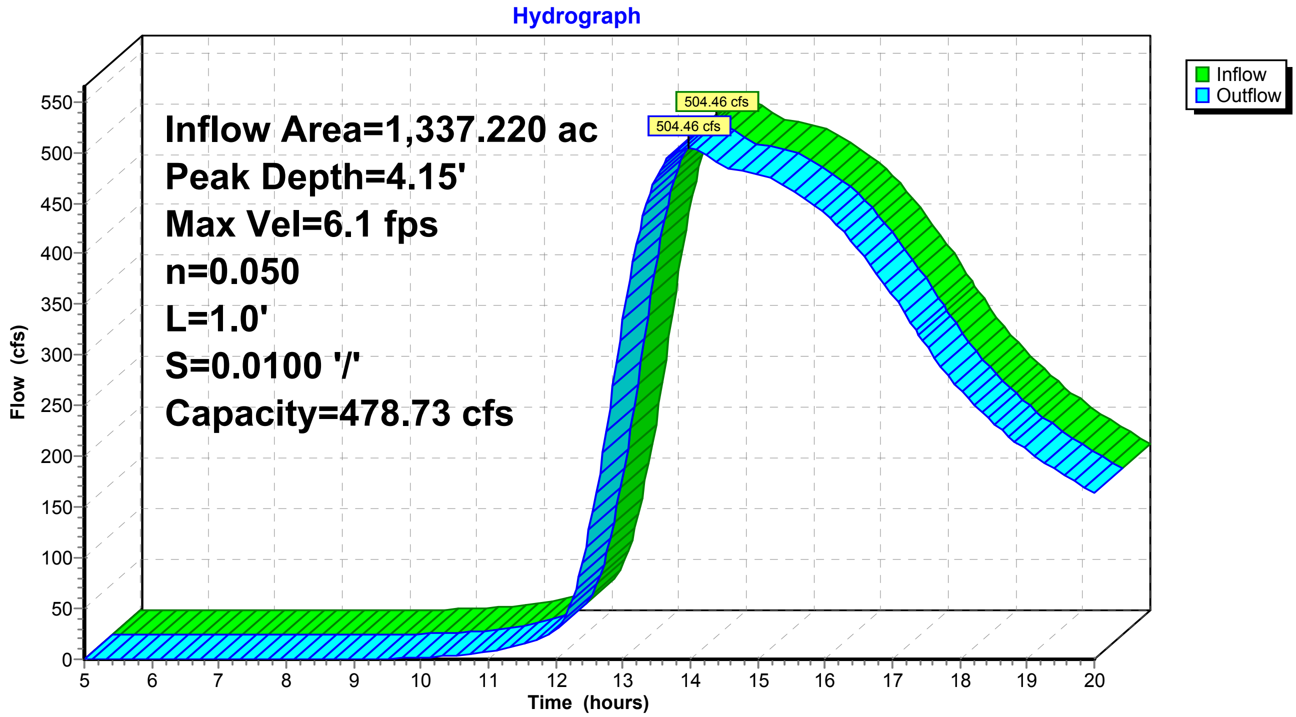
[91] Warning: Storage range exceeded by 0.15'
[55] Hint: Peak inflow is 105% of Manning's capacity
[61] Hint: Submerged 27% of Reach 3CR bottom

Inflow Area = 1,337.220 ac, Inflow Depth > 2.01" for 50 YR event
Inflow = 504.46 cfs @ 13.98 hrs, Volume= 224.001 af
Outflow = 504.46 cfs @ 13.98 hrs, Volume= 223.999 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.1 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.2 fps, Avg. Travel Time= 0.0 min

Peak Depth= 4.15' @ 13.98 hrs
Capacity at bank full= 478.73 cfs
Inlet Invert= 59.00', Outlet Invert= 58.99'
20.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Length= 1.0' Slope= 0.0100 '/'

Reach 4CR: (new Reach)



Pond 11P: Beaver Pond

Beaver Pond has minimal storage (observed to be 2 inches on 9/28/08) and therefore shown as without in both pre and post development and no effect on comparative flows.

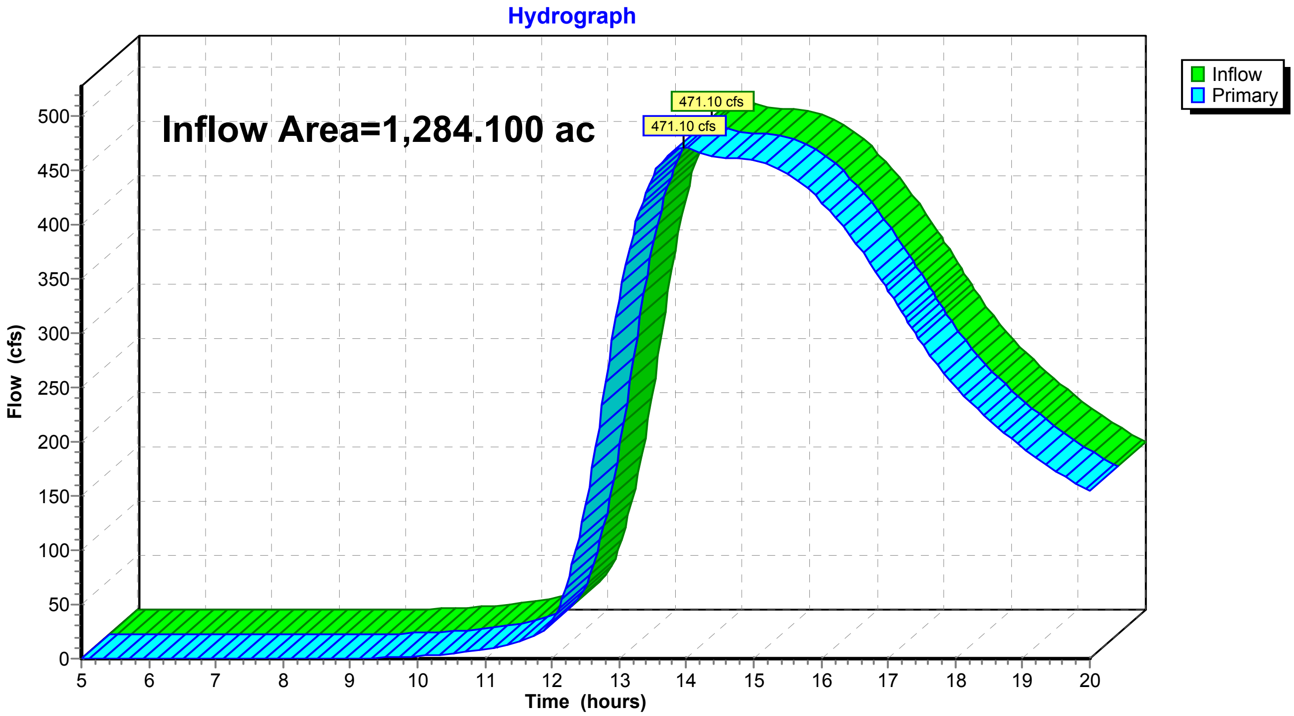
---

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,284.100 ac, Inflow Depth > 2.00" for 50 YR event
Inflow = 471.10 cfs @ 13.96 hrs, Volume= 214.298 af
Primary = 471.10 cfs @ 13.96 hrs, Volume= 214.298 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 11P: Beaver Pond

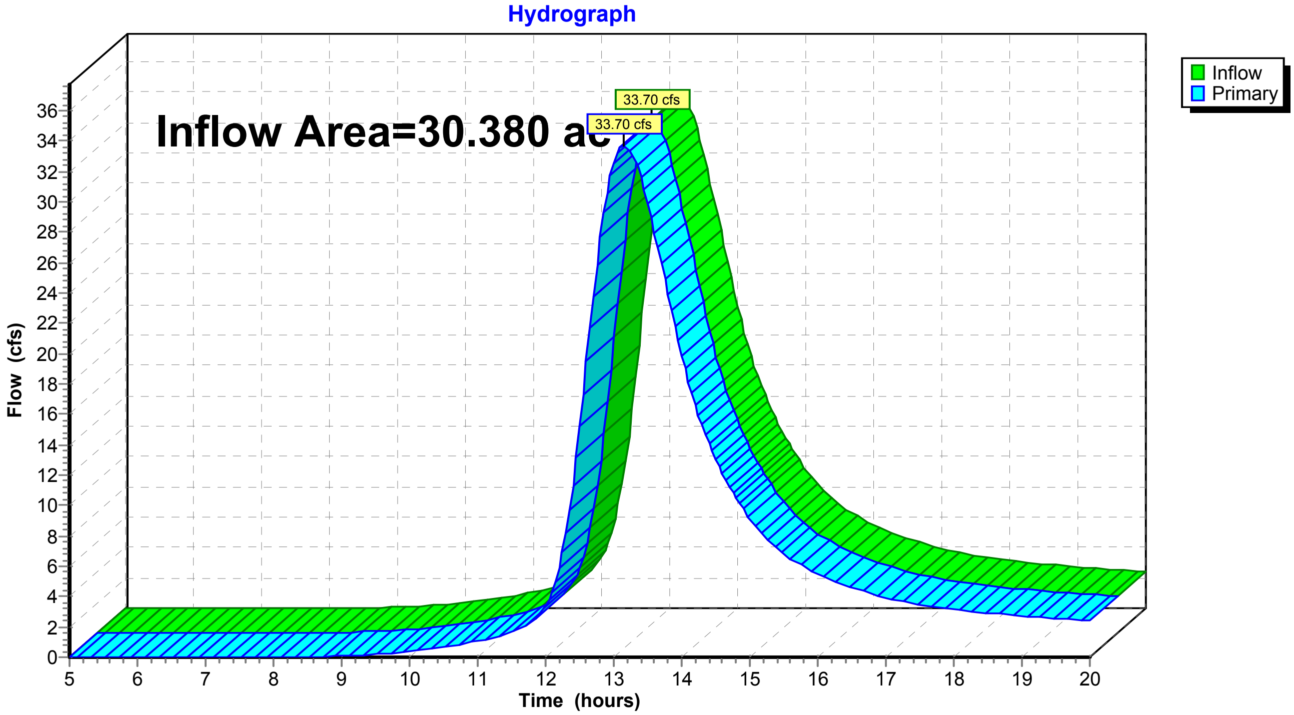


Link 1L: (new Link)

Inflow Area = 30.380 ac, Inflow Depth > 2.68" for 50 YR event
Inflow = 33.70 cfs @ 13.15 hrs, Volume= 6.791 af
Primary = 33.70 cfs @ 13.15 hrs, Volume= 6.791 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: (new Link)

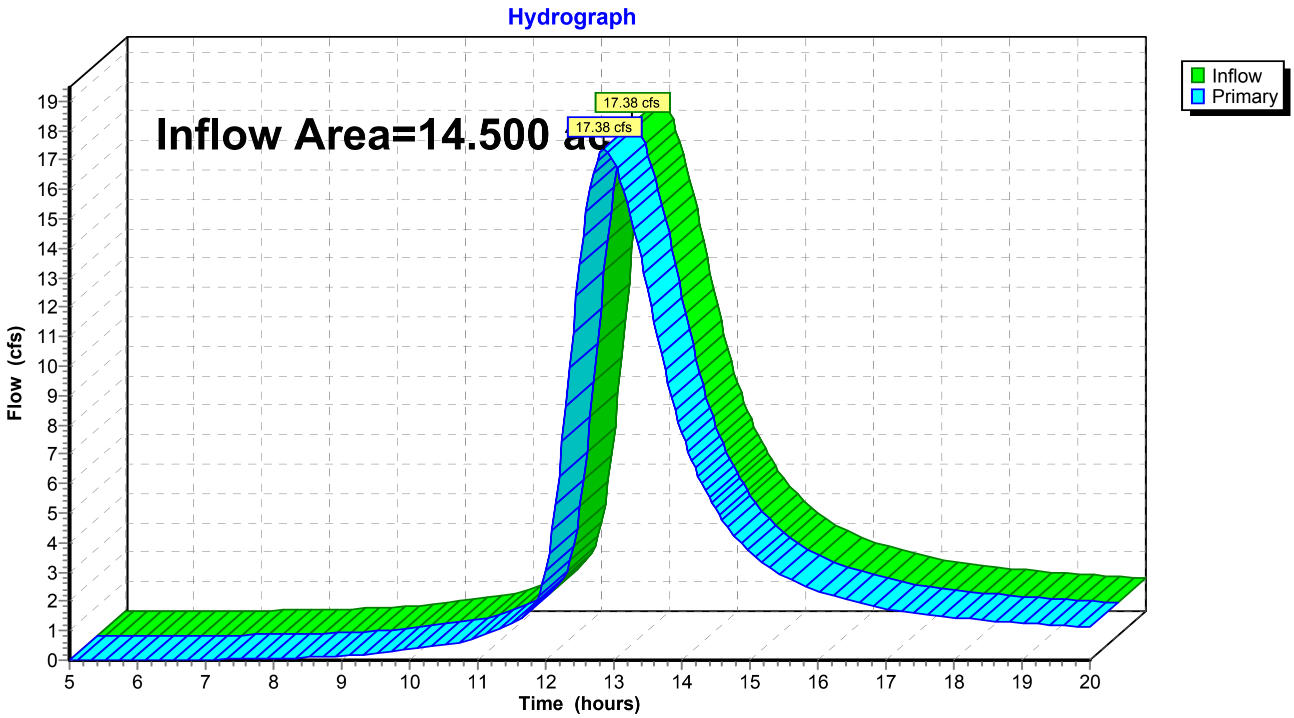


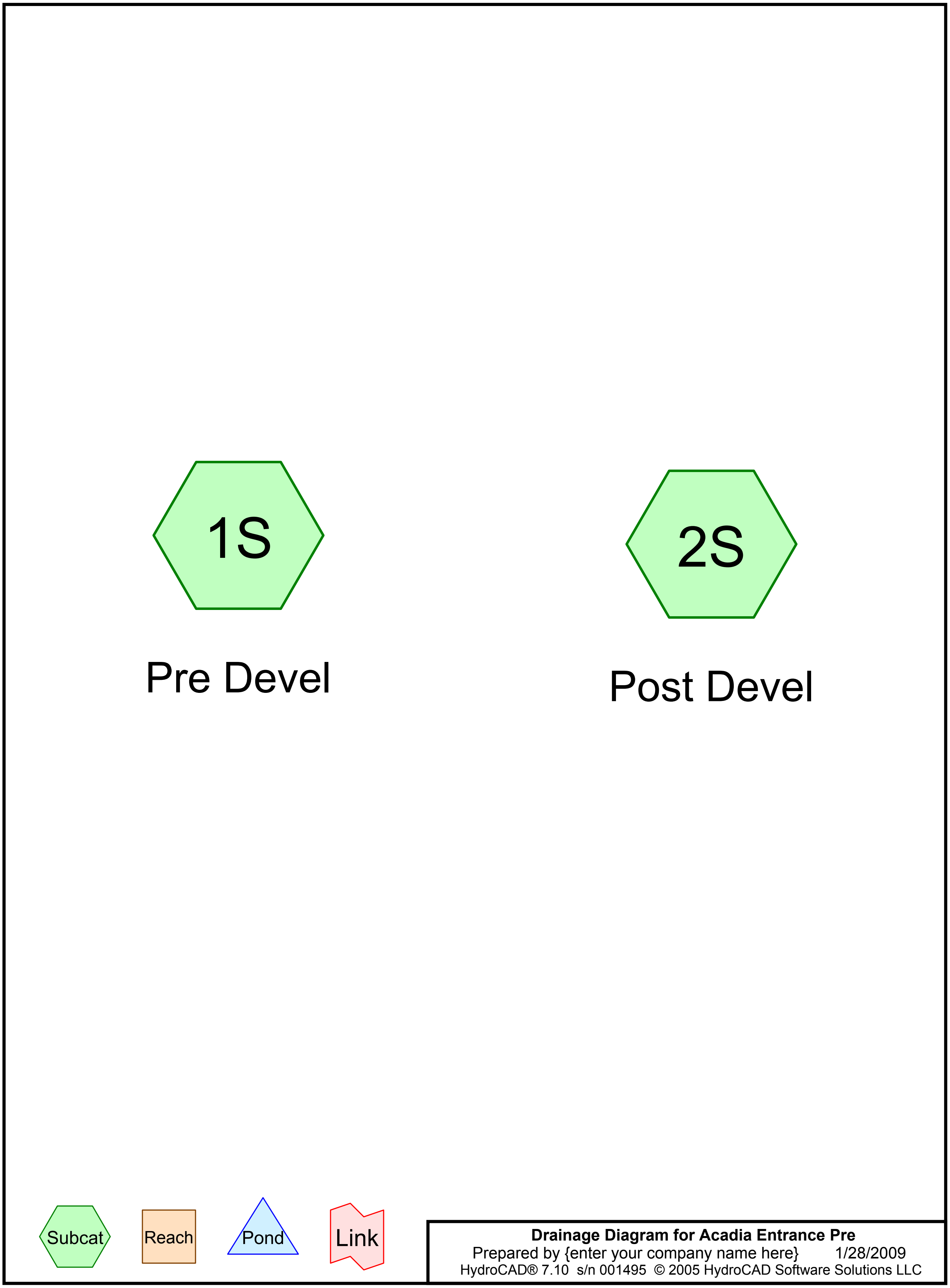
Link 2L: (new Link)

Inflow Area = 14.500 ac, Inflow Depth > 2.83" for 50 YR event
Inflow = 17.38 cfs @ 12.87 hrs, Volume= 3.416 af
Primary = 17.38 cfs @ 12.87 hrs, Volume= 3.416 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: (new Link)




1S
Pre Devel
2S
Post Devel
Subcat
Reach
Pond
Link
Drainage Diagram for Acadia Entrance Pre
Prepared by {enter your company name here} 1/28/2009
HydroCAD® 7.10 s/n 001495 © 2005 HydroCAD Software Solutions LLC

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre Devel Runoff Area=15.100 ac Runoff Depth>0.79"
Flow Length=1,996' Tc=109.5 min CN=78 Runoff=4.33 cfs 0.992 af

Subcatchment 2S: Post Devel Runoff Area=15.400 ac Runoff Depth>0.85"
Flow Length=1,970' Tc=85.7 min CN=79 Runoff=5.77 cfs 1.090 af

Total Runoff Area = 30.500 ac Runoff Volume = 2.082 af Average Runoff Depth = 0.82"

Subcatchment 1S: Pre Devel

Road ditch dimensions - parabolic, T = 6' D = .5'

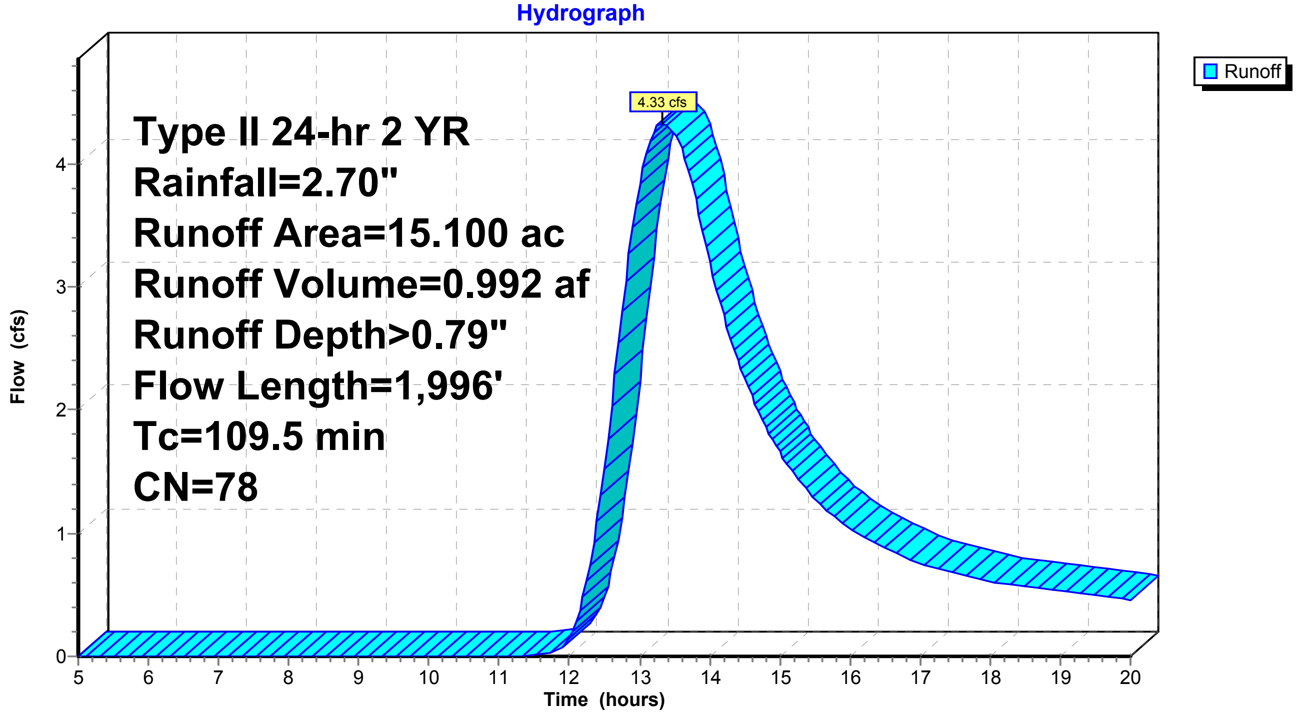
Runoff = 4.33 cfs @ 13.32 hrs, Volume= 0.992 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
8.100	78	Meadow, non-grazed, HSG D
7.000	77	Woods, Good, HSG D
15.100	78	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.1		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
45.4	1,000	0.0216	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
5.8	596	0.0111	1.7	3.41	**Channel Flow, shallow channel through wetlands** Area= 2.0 sf Perim= 8.5' r= 0.24' n= 0.035 Earth, dense weeds
1.6	200	0.0111	2.1	4.25	**Channel Flow, last run before rt 3culvert** Area= 2.0 sf Perim= 6.1' r= 0.33' n= 0.035 Earth, dense weeds
109.5	1,996	Total			

Subcatchment 1S: Pre Devel



Subcatchment 2S: Post Devel

Road ditch dimensions - parabolic, T = 6' D = .5'

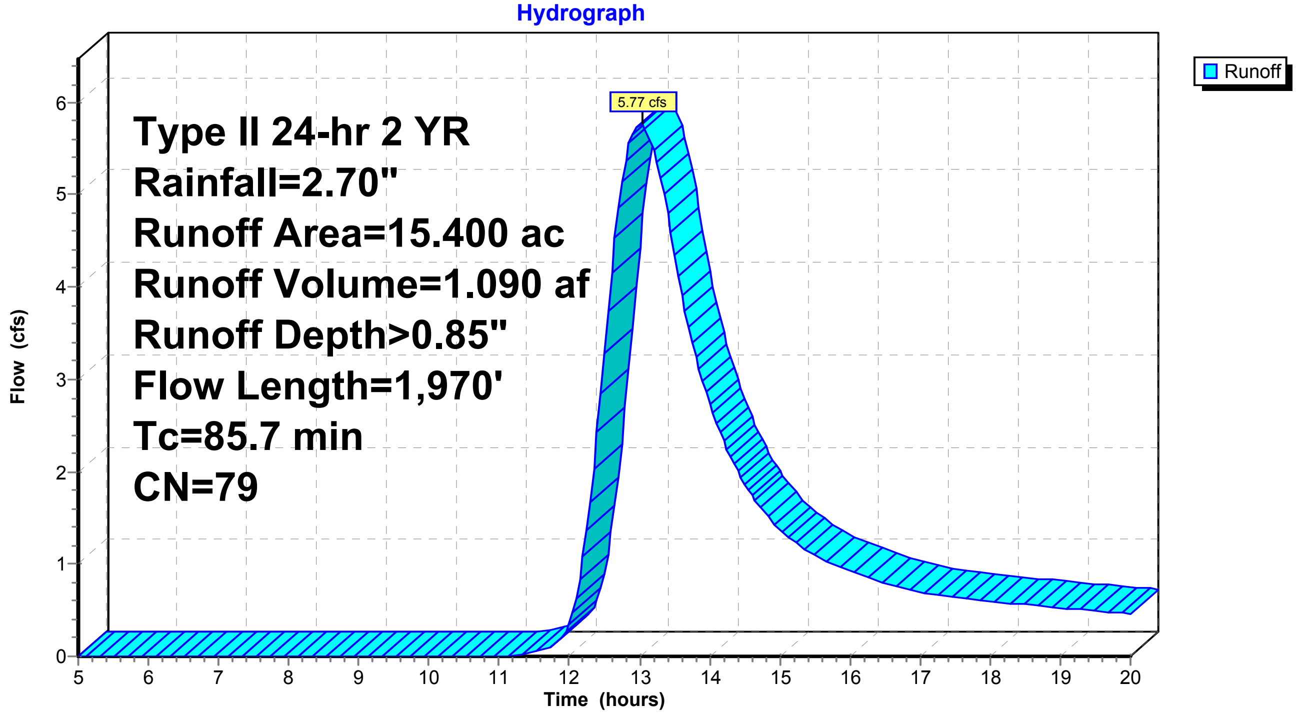
Runoff = 5.77 cfs @ 13.03 hrs, Volume= 1.090 af, Depth> 0.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YR Rainfall=2.70"

Area (ac)	CN	Description
7.400	78	Meadow, non-grazed, HSG D
7.000	77	Woods, Good, HSG D
1.000	98	Paved roads w/curbs & sewers
15.400	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.1		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
21.0	462	0.0216	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
7.6	1,128	0.0111	2.5	4.96	**Channel Flow, road ditch** Area= 2.0 sf Perim= 6.1' r= 0.33' n= 0.030 Straight, grassed, maintained
0.4	180	0.0500	8.4	26.30	**Circular Channel (pipe), Both pipes under Access Road** Diam= 24.0" Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
85.7	1,970	Total			

Subcatchment 2S: Post Devel



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre Devel Runoff Area=15.100 ac Runoff Depth>1.80"
Flow Length=1,996' Tc=109.5 min CN=78 Runoff=10.33 cfs 2.264 af

Subcatchment 2S: Post Devel Runoff Area=15.400 ac Runoff Depth>1.90"
Flow Length=1,970' Tc=85.7 min CN=79 Runoff=13.27 cfs 2.433 af

Total Runoff Area = 30.500 ac Runoff Volume = 4.697 af Average Runoff Depth = 1.85"

Subcatchment 1S: Pre Devel

Road ditch dimensions - parabolic, T = 6' D = .5'

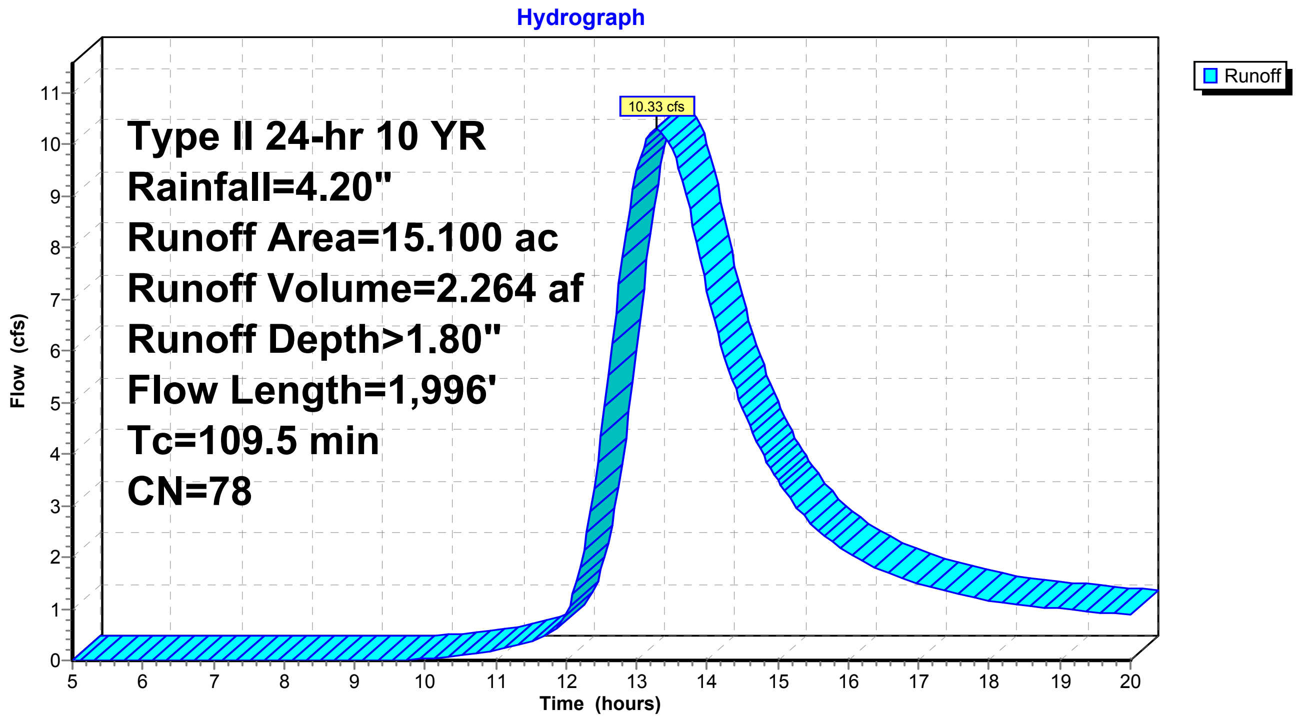
Runoff = 10.33 cfs @ 13.27 hrs, Volume= 2.264 af, Depth> 1.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
8.100	78	Meadow, non-grazed, HSG D
7.000	77	Woods, Good, HSG D
15.100	78	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.1		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
45.4	1,000	0.0216	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
5.8	596	0.0111	1.7	3.41	**Channel Flow, shallow channel through wetlands** Area= 2.0 sf Perim= 8.5' r= 0.24' n= 0.035 Earth, dense weeds
1.6	200	0.0111	2.1	4.25	**Channel Flow, last run before rt 3culvert** Area= 2.0 sf Perim= 6.1' r= 0.33' n= 0.035 Earth, dense weeds
109.5	1,996	Total			

Subcatchment 1S: Pre Devel



Subcatchment 2S: Post Devel

Road ditch dimensions - parabolic, T = 6' D = .5'

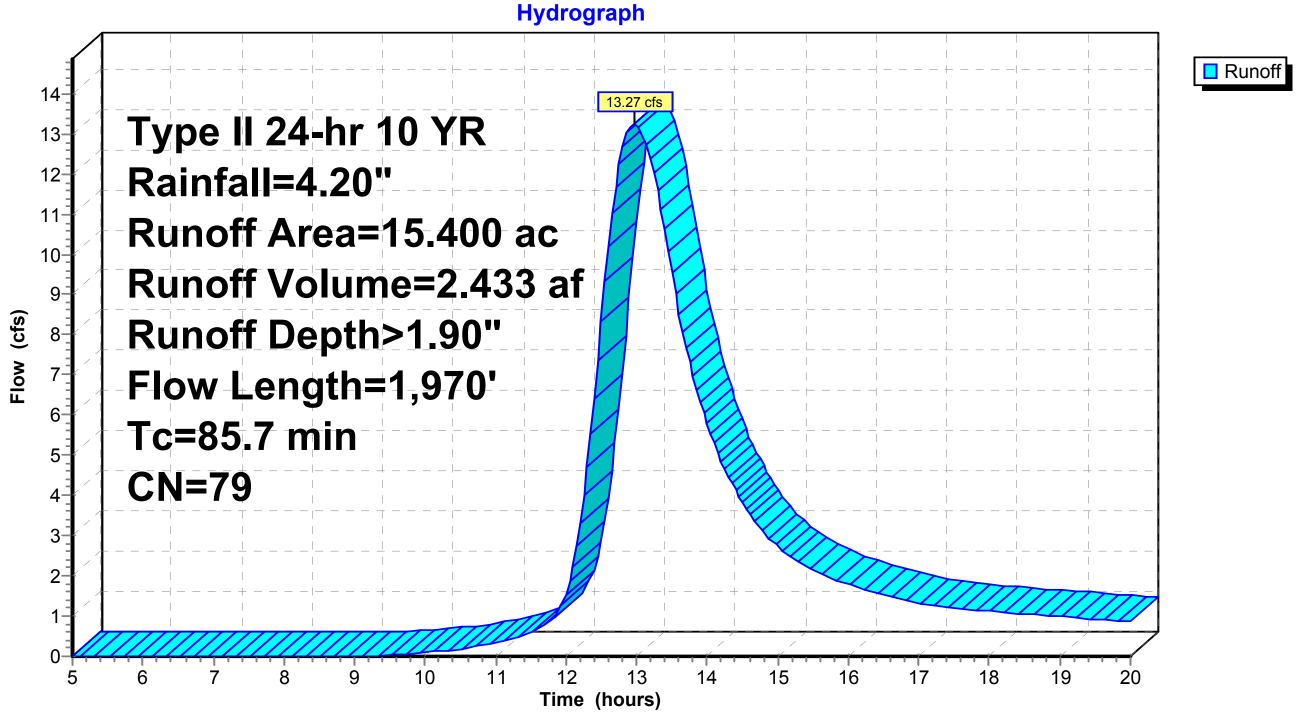
Runoff = 13.27 cfs @ 12.98 hrs, Volume= 2.433 af, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YR Rainfall=4.20"

Area (ac)	CN	Description
7.400	78	Meadow, non-grazed, HSG D
7.000	77	Woods, Good, HSG D
1.000	98	Paved roads w/curbs & sewers
15.400	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.1		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
21.0	462	0.0216	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
7.6	1,128	0.0111	2.5	4.96	**Channel Flow, road ditch** Area= 2.0 sf Perim= 6.1' r= 0.33' n= 0.030 Straight, grassed, maintained
0.4	180	0.0500	8.4	26.30	**Circular Channel (pipe), Both pipes under Access Road** Diam= 24.0" Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
85.7	1,970	Total			

Subcatchment 2S: Post Devel



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre Devel Runoff Area=15.100 ac Runoff Depth>2.32"
Flow Length=1,996' Tc=109.5 min CN=78 Runoff=13.39 cfs 2.924 af

Subcatchment 2S: Post Devel Runoff Area=15.400 ac Runoff Depth>2.43"
Flow Length=1,970' Tc=85.7 min CN=79 Runoff=17.07 cfs 3.125 af

Total Runoff Area = 30.500 ac Runoff Volume = 6.049 af Average Runoff Depth = 2.38"

Subcatchment 1S: Pre Devel

Road ditch dimensions - parabolic, T = 6' D = .5'

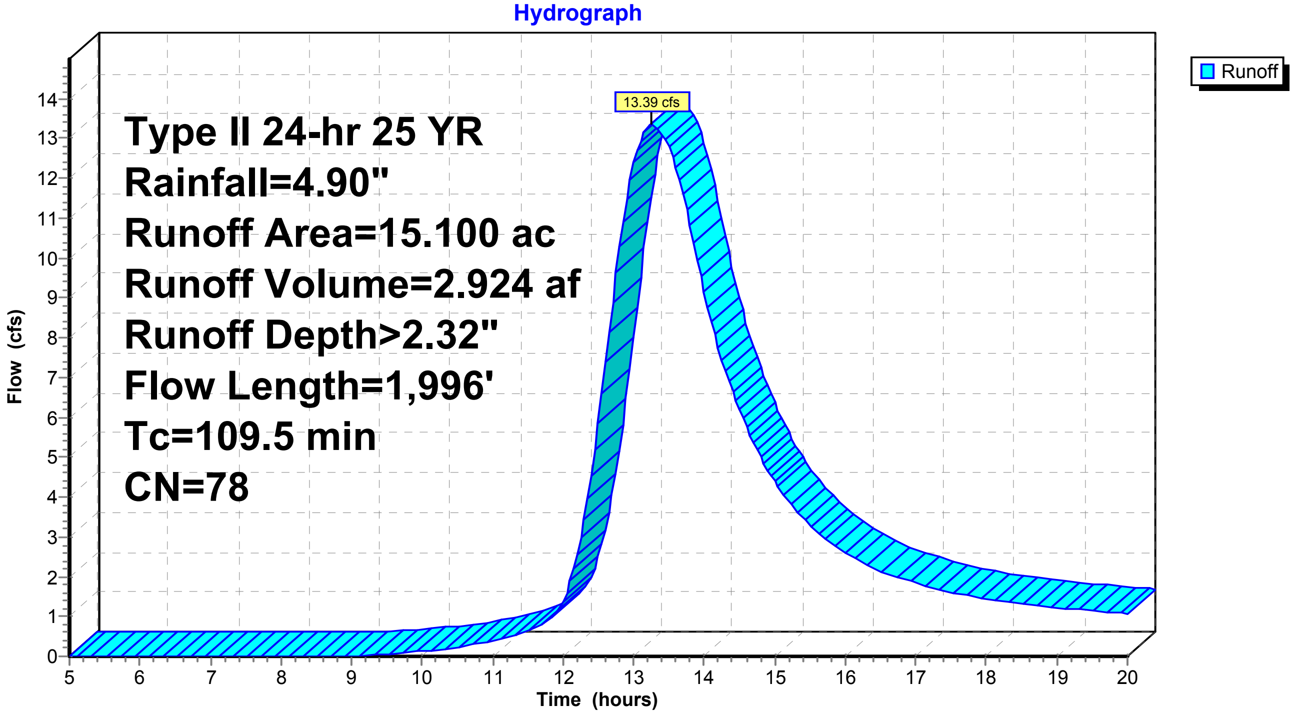
Runoff = 13.39 cfs @ 13.26 hrs, Volume= 2.924 af, Depth> 2.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
8.100	78	Meadow, non-grazed, HSG D
7.000	77	Woods, Good, HSG D
15.100	78	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.1		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
45.4	1,000	0.0216	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
5.8	596	0.0111	1.7	3.41	**Channel Flow, shallow channel through wetlands** Area= 2.0 sf Perim= 8.5' r= 0.24' n= 0.035 Earth, dense weeds
1.6	200	0.0111	2.1	4.25	**Channel Flow, last run before rt 3culvert** Area= 2.0 sf Perim= 6.1' r= 0.33' n= 0.035 Earth, dense weeds
109.5	1,996	Total			

Subcatchment 1S: Pre Devel



Subcatchment 2S: Post Devel

Road ditch dimensions - parabolic, T = 6' D = .5'

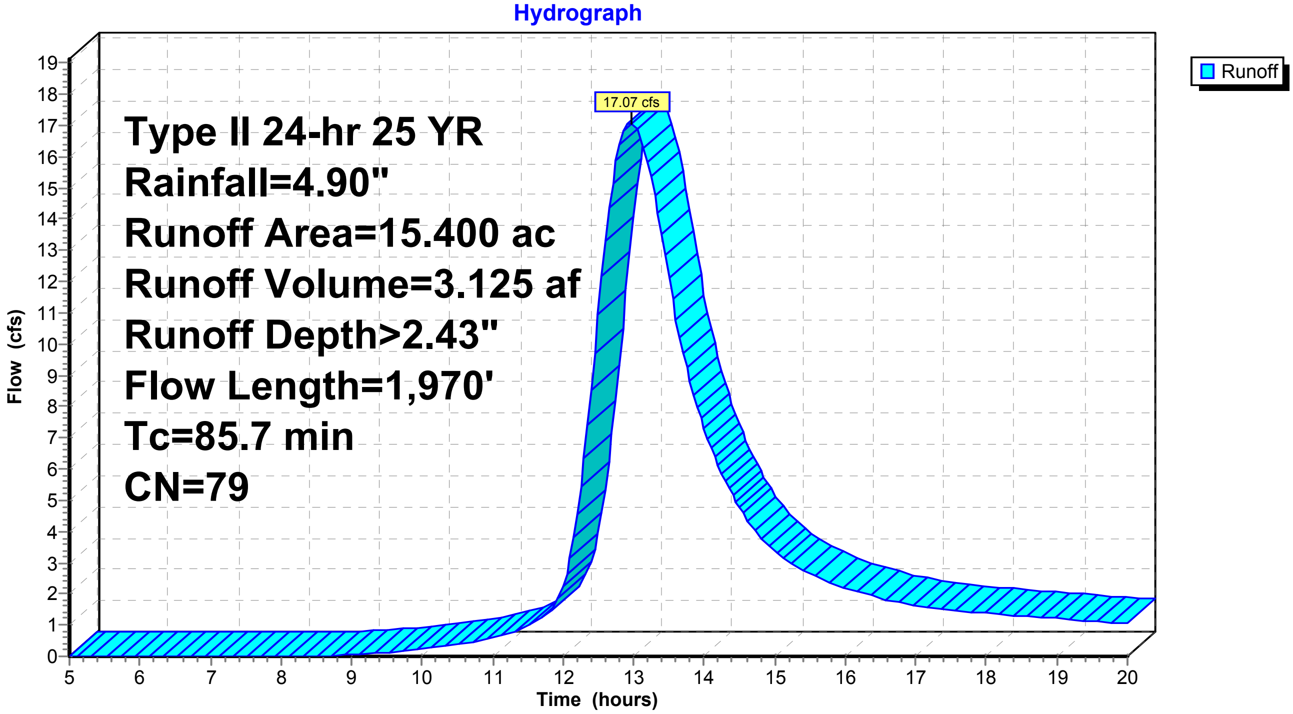
Runoff = 17.07 cfs @ 12.97 hrs, Volume= 3.125 af, Depth> 2.43"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YR Rainfall=4.90"

Area (ac)	CN	Description
7.400	78	Meadow, non-grazed, HSG D
7.000	77	Woods, Good, HSG D
1.000	98	Paved roads w/curbs & sewers
15.400	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.1		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
21.0	462	0.0216	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
7.6	1,128	0.0111	2.5	4.96	**Channel Flow, road ditch** Area= 2.0 sf Perim= 6.1' r= 0.33' n= 0.030 Straight, grassed, maintained
0.4	180	0.0500	8.4	26.30	**Circular Channel (pipe), Both pipes under Access Road** Diam= 24.0" Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
85.7	1,970	Total			

Subcatchment 2S: Post Devel



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre Devel Runoff Area=15.100 ac Runoff Depth>2.71"
Flow Length=1,996' Tc=109.5 min CN=78 Runoff=15.63 cfs 3.413 af

Subcatchment 2S: Post Devel Runoff Area=15.400 ac Runoff Depth>2.83"
Flow Length=1,970' Tc=85.7 min CN=79 Runoff=19.86 cfs 3.635 af

Total Runoff Area = 30.500 ac Runoff Volume = 7.048 af Average Runoff Depth = 2.77"

Subcatchment 1S: Pre Devel

Road ditch dimensions - parabolic, T = 6' D = .5'

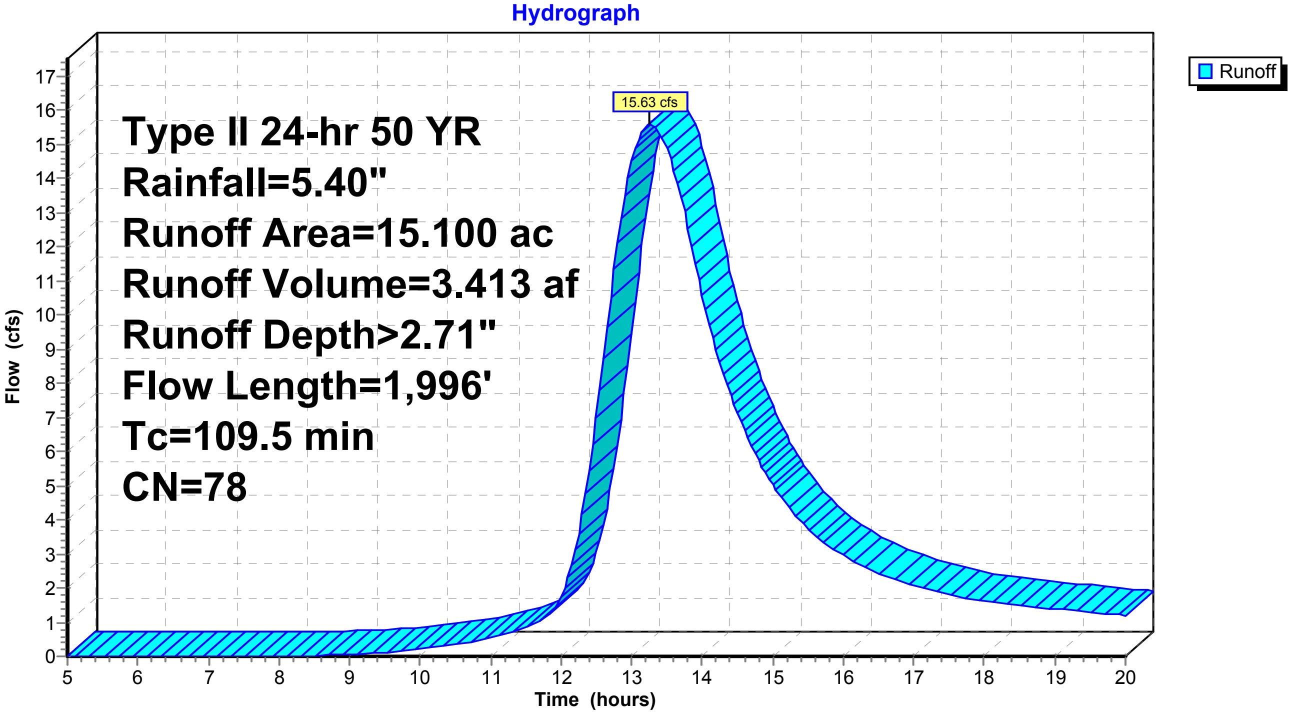
Runoff = 15.63 cfs @ 13.26 hrs, Volume= 3.413 af, Depth> 2.71"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
8.100	78	Meadow, non-grazed, HSG D
7.000	77	Woods, Good, HSG D
15.100	78	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.1		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
45.4	1,000	0.0216	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
5.8	596	0.0111	1.7	3.41	**Channel Flow, shallow channel through wetlands** Area= 2.0 sf Perim= 8.5' r= 0.24' n= 0.035 Earth, dense weeds
1.6	200	0.0111	2.1	4.25	**Channel Flow, last run before rt 3culvert** Area= 2.0 sf Perim= 6.1' r= 0.33' n= 0.035 Earth, dense weeds
109.5	1,996	Total			

Subcatchment 1S: Pre Devel



Subcatchment 2S: Post Devel

Road ditch dimensions - parabolic, T = 6' D = .5'

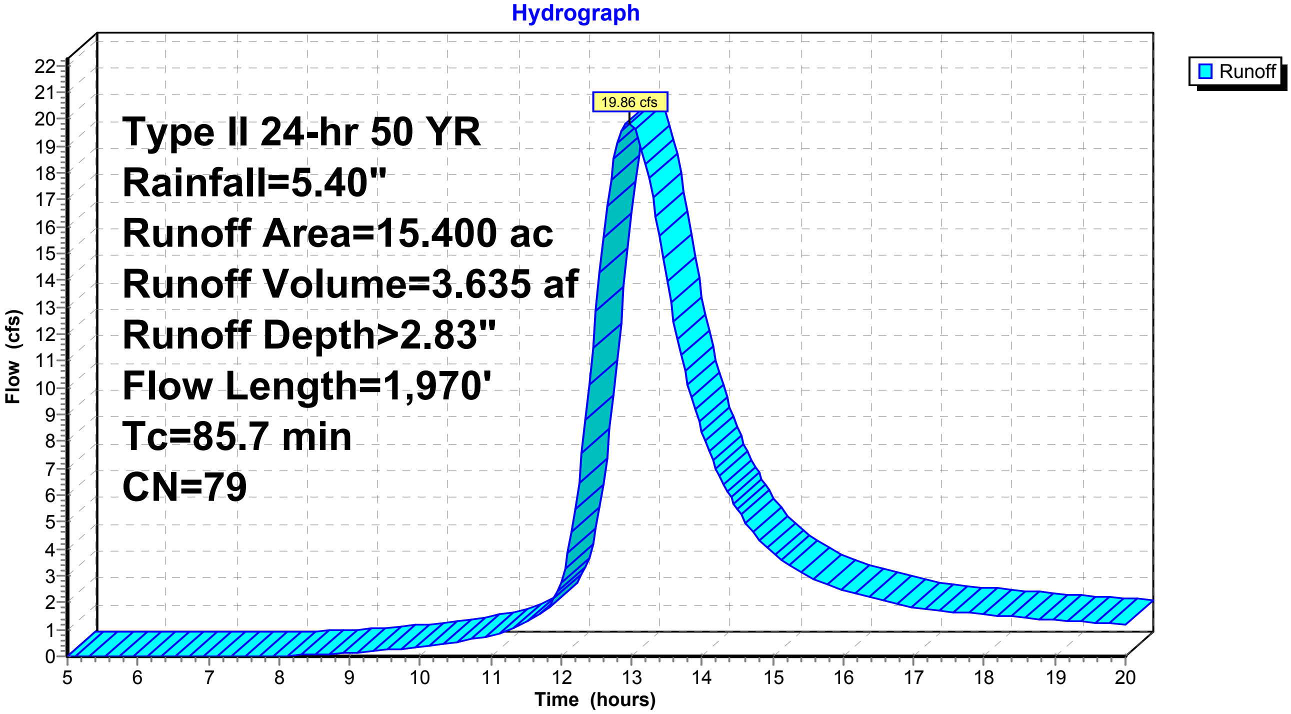
Runoff = 19.86 cfs @ 12.96 hrs, Volume= 3.635 af, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50 YR Rainfall=5.40"

Area (ac)	CN	Description
7.400	78	Meadow, non-grazed, HSG D
7.000	77	Woods, Good, HSG D
1.000	98	Paved roads w/curbs & sewers
15.400	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.1		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 2.70"
21.0	462	0.0216	0.4		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
7.6	1,128	0.0111	2.5	4.96	**Channel Flow, road ditch** Area= 2.0 sf Perim= 6.1' r= 0.33' n= 0.030 Straight, grassed, maintained
0.4	180	0.0500	8.4	26.30	**Circular Channel (pipe), Both pipes under Access Road** Diam= 24.0" Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
85.7	1,970	Total			

Subcatchment 2S: Post Devel



SECTION 13 URBAN IMPAIRED STREAM SUBMISSION

There are no urban impaired streams impacted as a part of this project.

Section 14 Basic Standards Submission

The MaineDOT does not prepare designs for temporary erosion and sedimentation control measures. Temporary erosion and sedimentation control during construction is the responsibility of the prime contractor for the project as described in the construction Standard Specification 656 – *Temporary Soil Erosion and Water Pollution Control* (attached) and the MaineDOT Best Management Practices for Erosion and Sedimentation Control, February 2008, (BMP Manual) available through the MaineDOT webpage. These procedures have been sanctioned since 1997 by the Maine Department of Environmental Protection in a Stormwater Memorandum of Agreement (revised 2007).

The 656 specification requires the contractor to prepare, submit, and receive approval of a Soil Erosion and Water Pollution Control Plan (SEWPCP) and to properly implement it. The standards used for development of the SEWPCP must be in accordance with all applicable laws, rules, regulations, permit requirements and conditions, this specification, all other contractual provisions, and the BMP Manual. Successful implementation and compliance with the 656 is required for completion of the project contract. If the contractor fails to prepare, submit, or seek approval of a SEWPCP or fails to properly implement its approved SEWPCP, then the Department will take action to remedy deficiencies at the contractor's expense, up to and including suspension of work until the deficiency is remedied. In addition, if regulatory enforcement occurs, the contractor is responsible for all damages.

There are two key factors for successful implementing this specification. By having the contractor write the plan, they take ownership and respond to the variable site conditions that are inevitable in construction, resulting in a more effective and meaningful implementation of BMPs. In addition, there is an assigned member of the MaineDOT Surface Water Quality Unit (SWQU) who assists the MaineDOT Project Resident throughout the construction schedule, reviewing and approving the SEWPCP, providing regular field inspections for compliance with the SEWPCP until final site stabilization is achieved, and providing valued technical advice to the contractor in their plan implementation.

The SWQU member coordinates with the Department's Coordination and Permit Division regarding state and federal resource agency concerns and needs.

The MaineDOT shall provide a copy of the contractors SEWPCP to the DEP once it is approved and, if requested, will provide regular status reports throughout the construction process.

SECTION 15 GROUNDWATER

15.1 NARRATIVE

The groundwater in the vicinity of the proposed project is used by both commercial and private individuals. Based on work by others, the ground water is obtained from bedrock wells. According to work by Maine Department of Human Health Services (DHHS) and the Maine Geological Survey (MGS), the nearest public water supply is approximately 0.8 mile away and puts this outside the required 250 foot public water supply radius. The Maine Geological Survey (MGS) Sand and Gravel Map shows that the project site is not located on such and aquifer. A sand and Gravel Aquifer is located to the west of the project. The surficial geology of the project site reportedly consists of marine clays of the Penobscot Formation which support the conclusion the site is not over a sand and gravel aquifer. The bedrock is mapped as the Ellsworth Schist with granite just to the south of the project site (See figures 15.1, 15.2 and 15.3).

Anticipated quantity of water to be used is discussed in Section 16. Work by MGS in the area shows bedrock wells in the vicinity of the project generally produce 10-25 gallons/minute. The work also shows that the average depth of the bedrock wells ranges from 250 to 300 feet below ground surface (BGS). Reports from DHHS on water quality of facilities in the area of the project suggest no quality issues resulting from salt water intrusion. These reports also suggest no petroleum or hazardous waste contamination in the wells of facilities closest to the project area. There have been no reported issues involving land subsidence due to the pumping of ground water in the area.

Based on the environmental assessment (EA), no gasoline or diesel underground storage tanks (USTs) or above ground storage tanks (ASTs) will be stored on site and that propane will be used to fuel the buses. Minor maintainence (lube oil/motor oil/transmission fluid) will be performed at the site. The anticipated amounts of petroleum products, both new and used, to be stored at the facility at any one time are reported to be less than 1320 gallons. The petroleum products will be stored in areas constructed to minimize discharge to the environment. Maintainence will take place in garage areas also constructed to minimize release to the environment. Best management practices will be followed to minimize release of petroleum products to the ground water.

Bus washing operations will be a recycle system constructed to minimize discharge to the surface and ground water. An oil/water separator will be installed to handle any petroleum washed off during the washing operations.

Pesticide/salt application will follow BMPs to minimize discharge to the groundwater.

The septic system and leach filed will be designed to properly handle anticipated waste loads to minimize impact to the ground water. The septic system is discussed in further detail in section 17.

15.2 MONITORING PLAN

The above information to date, suggests no anticipated adverse effect to the ground water is expected. No monitoring plan is anticipated.

15.3 CONCLUSION

Based on current information, the proposed project meets no adverse environmental effect standard of the Site Law (no unreasonable adverse effect on surface water quality, groundwater quality or groundwater quantity).

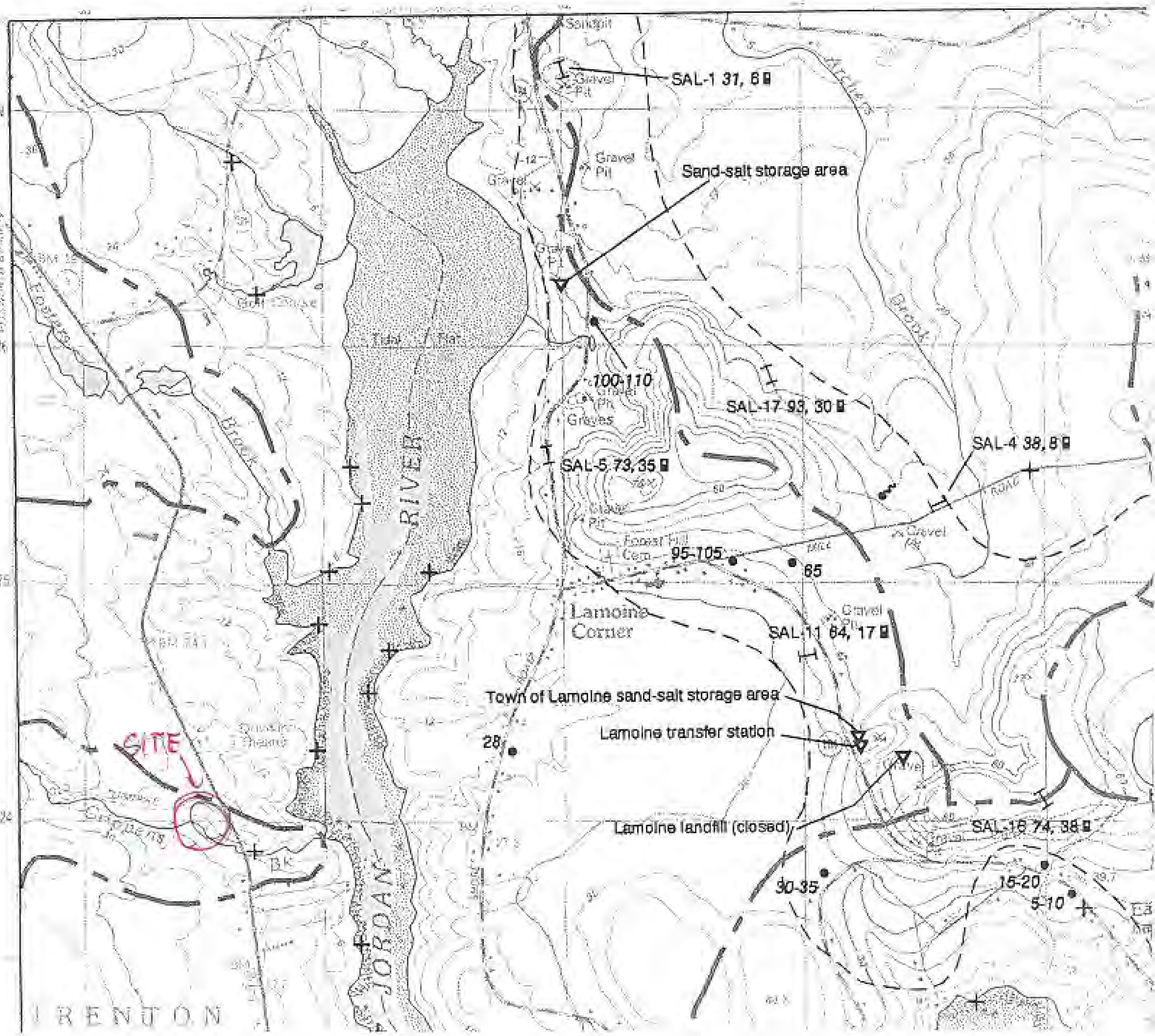


FIGURE 15.1 MGS SAND AND GRAVEL AQUIFER MAP

SOURCE: OPEN FILE NO 07-41 2007

Salsbury Cove Quadrangle, ME

Maine Geological Survey

Figure 15.2 MGS SURFICIAL MAP

QP = GLACIAL MARINE DEPOSITS - PRESUMPSCOT FORMATION. SILT/SAND/CLAY FROM MELTWATER DEPOSITED ON OCEAN FLOOR.

SOURCE: SURFICIAL GEOLOGY OF MOUNT DESERT ISLAND QUAD, MAINE MAINE GEOLOGICAL SURVEY 1974.

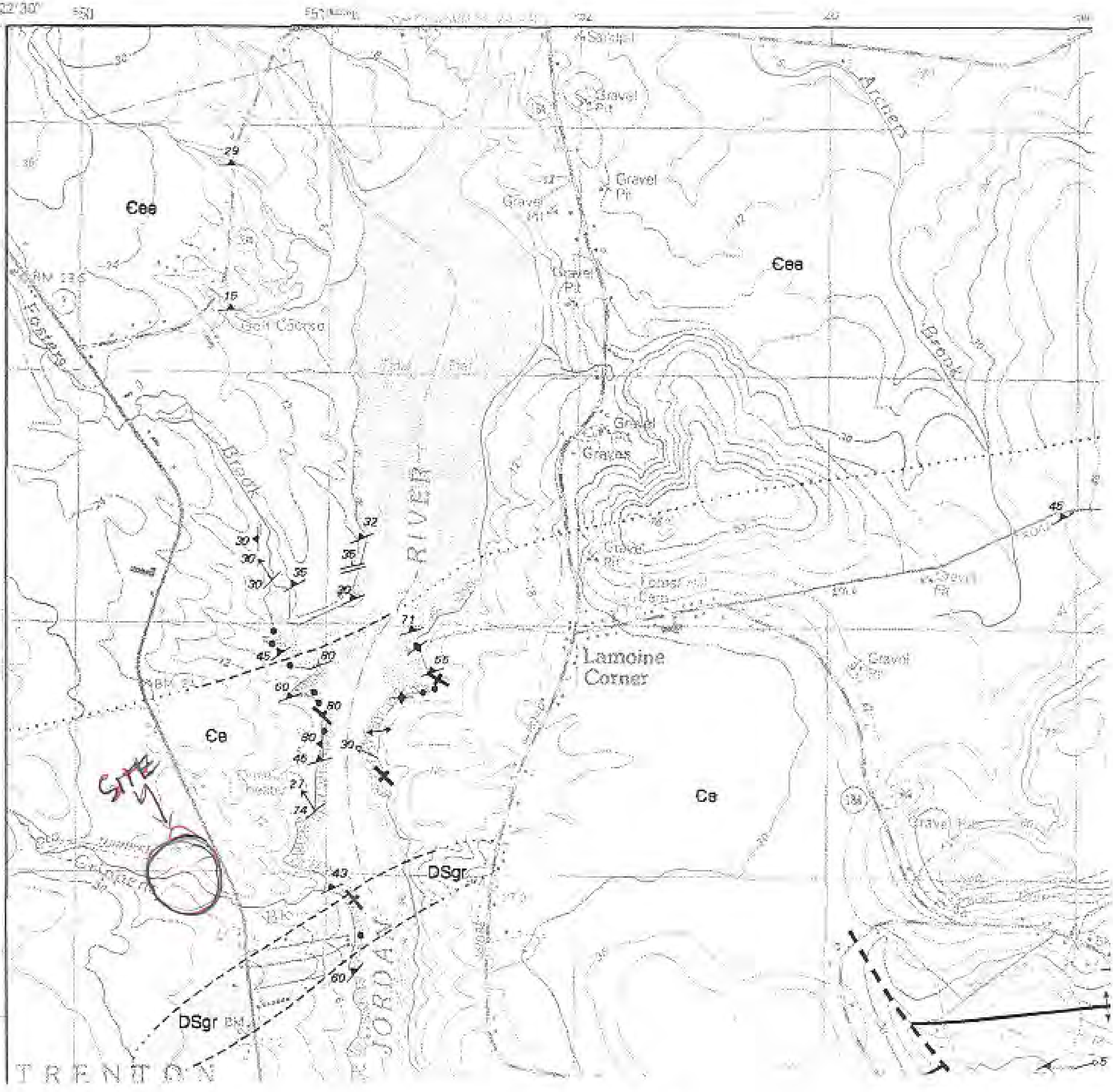


FIGURE 15.3 MGS BEDROCK MAP

Єe = ELSWORTH SCHIST = QUARTZ/FELDSPAR/MUSCOVITE/CHLORITE SCHIST.

DSgr = GRANITE

SOURCE: SALSBURY COVE QUAD, MAINE
OPEN FILE NO 03-91 2003
MAINE GEOLOGICAL SURVEY

Domestic Water Supply Narrative
Acadia Gateway Center
Trenton, Maine

Allied Project #07-010

January 7, 2009

STATE OF MAINE
ANTHONY S.
DAVIS
No. 8834
LICENSED
PROFESSIONAL ENGINEER

Prepared by:

Allied Engineering
Structural Mechanical Electrical Commissioning

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SECTION 16 WATER SUPPLY

1.0 General

The Acadia Gateway Facility is proposed for construction in several phases, with Phase I, the Bus Maintenance Facility, scheduled for construction initiation in the Summer of 2009.

The second phase of construction will be an Intermodal Center. The Intermodal Center will house space for regional tourism activities and include public restroom and information areas. This will serve as the northern portion of the National Park Service Welcome Center.

The southern portions of the National Park Service Welcome Center will be constructed under Phases III and IV. Phase III will incorporate office space for the Downeast Transportation service and Phase IV will provide a public theatre.

2.0 Summary of Proposed Domestic Water Supply

The facility will incorporate two independent wells, each located on the project site (refer to preliminary site plan, attached). The well for the maintenance garage will serve 36 employees with no public use requirements. The anticipated daily consumption will total 1,200 gallons per day with a peak fixture loading of 111 gallons per minute. Given the anticipated well yield of 25 gpm, a submersible well pump, sized to match the yield, will be specified. A storage tank with booster pump will be specified within the facility to provide a buffer in meeting the peak facility demand. A chlorination system will be specified under a bid alternate, to be incorporated should testing reveal the need for treatment, in providing drinking water per State of Maine standards.

A second well will be specified with the Phase II facility. This well, again, will be located in close proximity to the proposed facility. The well will incorporate a submersible pump sized to approximate the well yield. This well will serve 4,000 visitor's per day and 50 employees (based upon entire facility-Phases II through IV). As such, the well will be a public water supply. Water usage is estimated at 3,900 gallons per day, with a peak fixture loading of 150 gallons per minute. Again, a storage tank and booster pump will be specified, sized to meet the facility demand, based upon all Phases of construction being completed. A system of water treatment will be specified as a bid alternate.

3.0 Hydrogeologic Data (From PDR Report)

The groundwater in the vicinity of the proposed project is used by both commercial and private individuals. Based on work by others, the ground water is obtained from bedrock wells. According to work by Maine Department of Human Health Services (DHHS) and the Maine Geological Survey (MGS), the nearest public water supply is approximately 0.1 mile away and puts this outside the required 250 foot public water supply radius. The Maine Geological Survey (MGS) Sand and Gravel Map shows that the project site is not located on such and aquifer. A sand and Gravel Aquifer is located to the west of the project. The surficial geology of the project site reportedly consists of marine clays of the Penobscot Formation which support the conclusion the site is not over a sand and gravel aquifer. The bedrock is mapped as the Ellsworth Schist with granite just to the south of the project site.

Work by MGS in the area shows bedrock wells in the vicinity of the project generally produce 10-25 gallons/minute. The work also shows that the average depth of the bedrock wells ranges from 250 to 300 feet below ground surface (BGS). Reports from DHHS on water quality of facilities in the area of the project suggest no quality issues resulting from salt water intrusion. These reports also suggest no petroleum or hazardous waste contamination in

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the wells of facilities closest to the project area. There have been no reported issues involving land subsidence due to the pumping of ground water in the area.

Based on the environmental assessment (EA), no gasoline or diesel underground storage tanks (UST's) above ground storage tanks (AST's) will be stored on site and that propane will be used to fuel the buses. Minor maintenance (lube oil/motor oil/transmission fluid) will be performed at the site. The anticipated amounts of petroleum products, both new and used, to be stored at the facility at any one time are reported to be less than 1320 gallons. The petroleum products will be stored in areas constructed to minimize discharge to the environment. Maintenance will take place in garage areas also constructed to minimize release to the environment. Best management practices will be followed to minimize release of petroleum products to the ground water.

Bus washing operations will be a recycle system constructed to minimize discharge to the surface and ground water. An oil/water separator will be installed to handle any petroleum washed off during the washing operations.

Pesticide/salt application will follow BMP's to minimize discharge to the groundwater.

The septic system and leach filed will be designed to properly handle anticipated waste loads to minimize impact to the ground water. The design and final location of the septic system is still being finalized.

The above information suggests no anticipated adverse effect to the ground water is expected. No monitoring plan is anticipated.

Based on current information, the proposed project meets no adverse environmental effect standard of the Site Law (no unreasonable adverse effect on surface water quality, groundwater quality or groundwater quantity).

4.0 Specifications and System Layout

The wells and associated domestic water distribution and treatment systems are proposed for completion during the construction of each of the respective facilities and will be included in the construction documents, to be furnished and installed by the successful bidder.

As such, the well is not pre-existing, and no actual data for the proposed systems yet exists. With that said, please refer to Appendix C of this report for the well and pump specification proposed for the maintenance facility and Appendix D for a detail of the proposed water service entrance to serve the facility. Along those lines, the well will be tested at the time of construction, upon successful completion of its drilling. Water treatment and capacity will be finalized at that time, based upon actual findings.

5.0 Closing

This preliminary report is offered to outline the general design parameters for the domestic water system at the Acadia Gateway Center. This report is intended to provide data to support the requirements of Section 16 of the Site Law Permit Application. Should further discussion and information be required, please do not hesitate to contact Allied Engineering, Inc.

APPENDIX A

Water Consumption Spreadsheets

DATE: **4/21/2008**
BY: **ASD**

PROJECT NAME: **Acadia Gateway**

DOMESTIC WATER LOAD-VISITOR'S CENTER-DAILY SANITARY LOAD

FIXTURE TYPE	TYPE OF SUPPLY CONTROL	VISITORS		EMPLOYEES		FLOW RATE(GPF)	DURATION (FLUSH)	SEWAGE GENERATION (GPD)
		DAILY USES-MALE	DAILY USES-FEMALE	DAILY USES-MALE	DAILY USES-FEMALE			
WATER CLOSET	FLUSH VALVE	667	2000	25	75	1.6	1 FLUSH	4427.2
WATER CLOSET	LOW FLOW FLUSH VALVE	667	2000	25	75	1.1	1 FLUSH	3043.7
URINAL	1" FLUSH VALVE	1333	0	50	0	1	1 FLUSH	1383
URINAL	LOW FLOW	1333	0	50	0	0.125	1 FLUSH	172.875
							DAILY TOTAL-CONVENTIONAL FIXTURES	5810.2
							DAILY TOTAL-LOW FLOW FIXTURES	3216.575

FIXTURE TYPE	TYPE OF SUPPLY CONTROL	VISITORS		EMPLOYEES		FLOW RATE(GPM)	DURATION (SEC)	SEWAGE GENERATION (GPD)
		DAILY USES-MALE	DAILY USES-FEMALE	DAILY USES-MALE	DAILY USES-FEMALE			
CONVENTIONAL LAVATORY	FAUCET	2000	2000	75	75	2.2	15	2282.5
LOW FLOW LAVATORY	FAUCET	2000	2000	75	75	0.5	15	518.75
SERVICE SINK	FAUCET	0	0	10	10	2.5	15	12.5
KITCHEN SINK	FAUCET	0	0	25	25	2.2	15	27.5
LOW FLOW KITCHEN SINK	FAUCET	0	0	25	25	0.5	15	6.25
WATER COOLER	VALVE	2000	2000	50	50	0.13	10	88.83
							DAILY TOTAL-CONVENTIONAL FIXTURES	2411.33
							DAILY TOTAL-LOW FLOW FIXTURES	681.33

ASSUMPTIONS:
1. 50 EMPLOYEES, 4000 VISITORS PER DAY
2. HALF OF EMPLOYEES AND VISITORS ARE FEMALE, HALF ARE MALE

DAILY TOTAL COMPARISON:

DHHS CALCULATION: 50 EMPLOYEES * 15 GALLONS/EMPLOYEE/DAY = 750 GPD + (4000 VISITORS * 6 gpd) =**24,750 GPD**
ACTUAL FIXTURE LOAD-CONVENTIONAL FIXTURES: 5810.2 +2411.33 = **8221.53 GPD**
ACTUAL FIXTURE LOAD-LOW FLOW FIXTURES: 3216.58 + 681.33 = **3897.91 GPD**

DATE: **4/21/2008**
BY: **ASD**

PROJECT NAME: **Acadia Gateway**

DOMESTIC WATER LOAD-BUS GARAGE-DAILY SANITARY LOAD

FIXTURE TYPE	TYPE OF SUPPLY CONTROL	DAILY USES-MALE	DAILY USES-FEMALE	FLOW RATE(GPF)	DURATION (FLUSH)	SEWAGE GENERATION (GPD)
WATER CLOSET	FLUSH VALVE	18	54	1.6	1 FLUSH	115.2
WATER CLOSET	LOW FLOW FLUSH VALVE	18	54	1.1	1 FLUSH	79.2
URINAL	1" FLUSH VALVE	36	0	1	1 FLUSH	36
URINAL	LOW FLOW	36	0	0.125	1 FLUSH	4.5
					DAILY TOTAL-CONVENTIONAL FIXTURES	151.2
					DAILY TOTAL-LOW FLOW FIXTURES	83.7

FIXTURE TYPE	TYPE OF SUPPLY CONTROL	DAILY USES-MALE	DAILY USES-FEMALE	FLOW RATE(GPM)	DURATION (SEC)	SEWAGE GENERATION (GPD)
LAVATORY	FAUCET	18	18	2.2	15	19.8
LOW FLOW LAVATORY	FAUCET	18	18	0.5	15	4.5
SHOWER HEAD	MIXING VALVE	6	6	2.5	300	150
LOW FLOW SHOWER HEAD	MIXING VALVE	6	6	1.8	300	108
SERVICE SINK	FAUCET	3	3	2.5	15	3.75
KITCHEN SINK	FAUCET	9	9	2.2	15	9.9
LOW FLOW KITCHEN SINK	FAUCET	9	9	0.5	15	2.25
WATER COOLER	VALVE	18	18	0.13	10	0.78
EMERGENCY EYE WASH	VALVE	1	1	3	1	0.1
					DAILY TOTAL-CONVENTIONAL FIXTURES	184.33
			DAILY TOTAL-LOW FLOW FIXTURES			119.38

FIXTURE TYPE	TYPE OF SUPPLY CONTROL	TOTAL MAKE-UP FLOW (GAL/BUS)	CARRY-OFF (GAL/BUS)	WASTE FLOW (GAL/BUS)	WASH FREQUENCY(BUS/DAY)	SEWAGE GENERATION (GPD)
BUS WASH	RINSE NOZZLES	40	20	20	50	1000
					DAILY TOTAL	1000

ASSUMPTIONS:
1. 36 EMPLOYEES, NO VISITORS
2. HALF OF EMPLOYEES ARE FEMALE, HALF ARE MALE

DAILY TOTAL COMPARISON:

DHHS CALCULATION: 36 EMPLOYEES * 15 GALLONS/EMPLOYEE/DAY = 540 GPD + 1000 (BUS WASH) =**1540 GPD**
ACTUAL FIXTURE LOAD-CONVENTIONAL FIXTURES: 151.2 +184.33 + 1000 = **1335.53 GPD**
ACTUAL FIXTURE LOAD-LOW FLOW FIXTURES: 83.7 +119.38 + 1000 = **1203.08 GPD**

APPENDIX B

Peak Fixture Load Spreadsheets

DATE: **4/21/2008**
BY: **ASD**

PROJECT NAME: Acadia Gateway-Bus Garage

DOMESTIC WATER LOAD-PEAK GPM

FIXTURE TYPE	TYPE OF SUPPLY CONTROL	FIXTURE UNIT VALUE	QUANTITY	COLD WATER	HOT WATER	TOTAL (CW & HW)
WATER CLOSET	FLUSH VALVE	10	10	165	--	165
URINAL	WATERLESS	0	3	0	--	0
LAVATORY	FAUCET	1	11	8.25	8.25	11
SHOWER HEAD	MIXING VALVE	2	3	4.5	4.5	6
KITCHEN SINK	FAUCET	1.5	1	1.125	1.125	1.5
MOP BASIN	FAUCET	3	2	4.5	4.5	6
WATER COOLER	VALVE	1	2	2	--	2
HOSE BIB	VALVE	2.5	6	11.25	11.25	15
			TOTAL FIXTURE UNITS:	196.625	29.625	206.5
			CONVERT TO GPM=>	92	41	95

BUS WASH MAKEUP:	13	GPM
EMERGENCY EYEWASH	3	GPM
TOTAL CONTINUOUS DEMAND=>	16	GPM
COLD WATER DEMAND=>	108	GPM
HOT WATER DEMAND=>	41	GPM
TOTAL WATER DEMAND=>	111	GPM

DATE: **4/21/2008**
BY: **ASD**

PROJECT NAME: Acadia Gateway-Bus Garage

DOMESTIC WATER LOAD-PEAK GPM

FIXTURE TYPE	TYPE OF SUPPLY CONTROL	FIXTURE UNIT VALUE	QUANTITY	COLD WATER	HOT WATER	TOTAL (CW & HW)
WATER CLOSET	FLUSH VALVE	10	38	445	--	445
URINAL	WATERLESS	0	10	0	--	0
LAVATORY	FAUCET	1	14	10.5	10.5	14
KITCHEN SINK	FAUCET	1.5	4	4.5	4.5	6
MOP BASIN	FAUCET	3	8	18	18	24
WATER COOLER	VALVE	0.75	8	6	--	6
HOSE BIB	VALVE	2.5	12	22.5	22.5	30
			TOTAL FIXTURE UNITS:	506.5	55.5	525
			CONVERT TO GPM=>	143	54	146

BOILER MAKEUP:	3	GPM
TOTAL CONTINUOUS DEMAND=>	3	GPM
COLD WATER DEMAND=>	146	GPM
HOT WATER DEMAND=>	54	GPM
TOTAL WATER DEMAND=>	149	GPM

APPENDIX C

Well and Pump Specification-Maintenance Facility

SECTION 332100 - WATER SUPPLY WELLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. If the Contractor discovers any ambiguity, error, omission, conflict, or discrepancy, General Conditions Section 101.3.6 Priority of Conflicting Contract Documents shall control.

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
2. State of Maine Department of Transportation, “Standard Specifications,” Revision December 2002, and any revisions thereto, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Reverse-rotary drilled water supply wells.
2. Submersible well pumps.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. PA: Polyamide (nylon) plastic.

C. PE: Polyethylene plastic.

D. PP: Polypropylene plastic.

E. PVC: Polyvinyl chloride plastic.

1.4 PERFORMANCE REQUIREMENTS

A. Minimum Tested Water Supply Well Performance Capacity: 25 gpm.

1.5 ALLOWANCES

A. Allowance amounts and quantities are specified in Division 01 Section "Allowances."

1. Water Supply Well Depth Allowance: Install complete and functional well to 300 foot depth as indicated in Division 01 Section "Allowances." If water supply well depths vary from quantities in the allowance, the Contract Sum will be adjusted according to unit prices listed in "Unit Prices" Article. Include the following in the Contract Amount:
2. Labor for water supply well installation.
3. Furnishing and installing casing materials, grout, well screen, and packing materials in required diameter to comply with minimum performance requirements specified in the Section Text.

4. Furnishing and installing well pump.

B. Water supply wells and well pumps are covered by cash allowance. Allowance includes labor and materials.

1.6 UNIT PRICES

A. Unit-Price Amounts: As stipulated in the Form of Agreement.

B. Measurement and Payment Procedures: Specified in Division 01 Section "Unit Prices."

C. Measurement Units for Water Supply Wells, Casings, and Grout: Per linear foot (meter) of well depth.

1.7 SUBMITTALS

A. Product Data: Submit certified performance curves and rated capacities of selected well pumps and furnished specialties and accessories for each type and size of well pump indicated.

B. Shop Drawings: Show layout and connections for well pumps.

1. Wiring Diagrams: Power, signal, and control wiring.
2. Setting Drawings: Include templates and directions for installing foundation bolts, anchor bolts, and other anchorages.
3. Project Record Documents: Record the following data for each water supply well:

   a. Casings: Material, diameter, thickness, weight per foot (meter) of length, and depth below grade.
   b. Screen: Material, construction, diameter, and opening size.
   c. Pumping Test: Static water level, maximum safe yield, and drawdown at maximum yield.
   d. Log: Formation log indicating strata encountered.
   e. Alignment: Certification that well is aligned and plumb within specified tolerances.

C. Field quality-control reports, including the following:

1. Substrata formations.
2. Water-bearing formations.
3. Water levels.
4. Laboratory water analysis.
5. Well-screen analysis.
6. Performance test data.

D. Operation and Maintenance Data: For each well pump to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Well Driller Qualifications: An experienced water supply well driller licensed in the jurisdiction where Project is located.

B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with AWWA A100 for water supply wells.

1.9 PROJECT CONDITIONS

A. Well Drilling Water: Provide temporary water and piping for drilling purposes. Provide necessary piping for water supply.

PART 2 - PRODUCTS

2.1 WELL CASINGS

A. Steel Casing: AWWA C200, single ply, steel pipe with threaded ends and threaded couplings for threaded joints.

B. Pitless Adapter: Fitting, of shape required to fit onto casing, with waterproof seals.

C. Pitless Unit: Factory-assembled equipment that includes pitless adapter.

D. Well Seals: Casing cap, with holes for piping and cables, that fits into top of casing and is removable, waterproof, and vermin proof.

2.2 GROUT

A. Cement: ASTM C 150, Type II.

B. Aggregates: ASTM C 33, fine and coarse grades.

C. Water: Potable.

2.3 WATER WELL SCREENS

A. Screen Material: Fabricated of ASTM A 666, Type 304 stainless steel, welded; with continuous-slot, V-shaped openings that widen inwardly.

1. Screen Couplings: Butt-type, stainless-steel coupling rings.
2. Screen Fittings: Screen, with necessary fittings, closes bottom and makes tight seal between top of screen and well casing.
3. Maximum Entering Velocity: 0.1 fps (0.03 m/s).

2.4 PACK MATERIALS

A. Coarse, uniformly graded filter sand, maximum 1/8 inch (3 mm) in diameter.

B. Fine gravel, maximum 1/4 inch (6 mm) in diameter.

2.5 SUBMERSIBLE WELL PUMPS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. Aermotor Pumps, Inc.
2. American Turbine Pump Co.
3. Crane Pumps and Systems; Deming Pumps.
4. Grundfos.
5. ITT Industries; Goulds Pumps.
6. Jacuzzi, Inc.; Jacuzzi Brothers.
7. Johnston Pump Company.
8. McDonald, A. Y. Mfg. Co.
9. Pentair Pump Group; Layne/Verti-Line.
10. Pentair Pump Group; Myers, F. E.
11. Reda Productions Services; Schlumberger Limited.
12. Sta-Rite Industries, Inc.; Water Systems Group.
13. Sterling Fluid Systems (USA) Inc.; Peerless Pump.
14. USFilter/EMU Products.
15. Weber Industries, Inc.

D. Description: Submersible, vertical-turbine well pump complying with HI 2.1-2.2 and HI 2.3; with the following features:

1. Impeller Material: Stainless steel.
2. Motor: Capable of continuous operation under water, with protected submersible power cable.
3. Column Pipe: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with threaded ends and cast-iron or steel threaded couplings.
4. Discharge Piping: ASTM D 2239, SIDR Numbers 5.3, 7, or 9 PE pipe; made with PE compound number required to give pressure rating not less than 160 psig (1100 kPa). Include NSF listing mark "NSF pw."

    a. Insert Fittings for PE Pipe: ASTM D 2609, made of PA, PP, or PVC with serrated, male insert ends matching inside of pipe. Include bands or crimp rings.

E. Capacities and Characteristics:

1. Capacity: 25 gpm.
2. Discharge Head: 150 **psig.**
3. Discharge Size: 2”**.**
4. Speed: 3450 rpm.
5. Motor Horsepower: 3 hp.
6. Lift: 250 ft**.**
7. Pressure Rating: 300 **psig.**
8. Volts: 480 V.
9. Phases: 3.
10. Hertz: 60.
11. Full-Load Amperes:
12. Minimum Circuit Ampacity:
13. Maximum Overcurrent Protection:

2.6 MOTORS

A. General requirements for motors are specified in Division 22 Section "Common Motor Requirements for Plumbing Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 26 Sections.

PART 3 - EXECUTION

3.1 PREPARATION

A. Pilot-Hole Data: Review pilot-hole test analysis furnished by Owner.

B. Neighborhood Well Data: Review operating and test analyses.

3.2 INSTALLATION

A. Construct well using reverse-rotary drilling method.

B. Take samples of substrata formation at 10-foot (3-m) intervals and at changes in formation throughout entire depth of each water supply well. Carefully preserve samples on-site in glass jars properly labeled for identification.

C. Excavate for mud pit or provide aboveground structure, acceptable to authorities having jurisdiction, to allow settlement of cuttings and circulation of drill fluids back to well without discharging to on-site waterways.

D. Enlarge pilot hole and install permanent casing, screen, and grout. Install first section of casing with hardened steel driving shoe of an OD slightly larger than casing couplings if threaded couplings are used.

E. Set casing and liners round, plumb, and true to line.

F. Join casing pipe as follows:

1. Ream ends of pipe and remove burrs.
2. Remove scale, slag, dirt, and debris from inside and outside casing before installation.
3. Cut bevel in ends of casing pipe and make threaded joints.
4. Clean and make solvent-cemented joints.

G. Mix grout in proportions of 1 cu. ft. (0.03 cu. m) or a 94-lb (42.6-kg) sack of cement with 5 to 6 gal. (19 to 23 L) of water. Bentonite clay may be added in amounts of 3 to 5 lb/cu. ft. (1.4 to 2.3 kg/0.03 cu. m) for a 94-lb (42.6-kg) sack of cement. If bentonite clay is added, water may be increased to 6.5 gal./cu. ft. (25 L/0.03 cu. m) of cement.

H. Place grout continuously, from bottom to top surface, to ensure filling of annular space in one operation. Do not perform other operations in well within 72 hours after grouting of casing. When quick-setting cement is used, this period may be reduced to 24 hours.

I. Provide permanent casing with temporary well cap. Install with top of casing 36 inches (910 mm) above finished grade.

J. Develop wells to maximum yield per foot (meter) of drawdown.

1. Extract maximum practical quantity of sand, drill fluid, and other fine materials from water-bearing formation.
2. Avoid settlement and disturbance of strata above water-bearing formation.
3. Do not disturb sealing around well casings.
4. Continue developing wells until water contains no more than 2 ppm of sand by weight when pumped at maximum testing rate.

K. Install submersible well pumps according to HI 2.1-2.4 and provide access for periodic maintenance.

1. Before lowering permanent pump into well, lower a dummy pump that is slightly longer and wider than permanent pump to determine that permanent pump can be installed. Correct alignment problems.
2. Before lowering permanent pump into well, start pump to verify correct rotation.
3. Securely tighten discharge piping joints.
4. Locate line-shaft well pump near well bottom; locate motor above grade. Install driver plate to correctly align motor and pump.
5. Connect motor to submersible pump and locate near well bottom.

   a. Connect power cable while connection points are dry and undamaged.
   b. Do not damage power cable during installation; use cable clamps that do not have sharp edges.
   c. Install water-sealed surface plate that will support pump and piping.

3.3 CONNECTIONS

A. Piping installation requirements are specified in Division 22 Section "Facility Water Distribution Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

1. Connect piping between well pump and water piping.
2. Connect water distribution system in trench to well pipe at pitless adapter.

B. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Test Preparation: Clean water supply wells of foreign substances. Swab casings using alkalis, if necessary, to remove foreign substances.

B. Perform tests and inspections and prepare test reports.

C. Tests and Inspections:

1. Plumbness and Alignment Testing: Comply with AWWA A100.
2. Furnish samples of water-bearing formation to testing laboratory and well-screen manufacturer for mechanical sieve analysis.

3. Prepare reports on static level of ground water, level of water for various pumping rates, and depth to water-bearing strata.
4. Performance Test Preparation: Start well pump and adjust controls and pressure setting. Replace damaged and malfunctioning controls and equipment.
5. Performance Testing: Conduct final pumping tests after wells have been constructed, cleaned, and tested for plumbness and alignment.

   a. Arrange to conduct tests, with seven days' advance notice, after test pump and auxiliary equipment have been installed. Note water-level elevations referred to for each assigned datum in wells.
   b. Provide discharge piping to conduct water to locations where disposal will not create a nuisance or endanger adjacent property. Comply with requirements of authorities having jurisdiction.
   c. Provide and maintain equipment of adequate size and type for measuring flow of water, such as weir box, orifice, or water meter.
   d. Measure elevation to water level in wells.
   e. Perform two bailer or air-ejection tests to determine expected yield. Test at depths with sufficient quantity of water to satisfy desired yields.
   f. Test Pump: Variable capacity test pump with capacity equal to maximum expected yields at pressure equal to drawdown in wells, plus losses in pump columns and discharge pipes.
   g. Start and adjust test pumps and equipment to required pumping rates.
   h. Record readings of water levels in wells and pumping rates at 30-minute maximum intervals throughout 24-hour minimum period.
   i. Record maximum yields when drawdown is 60 inches (1500 mm) above top of suction screens after designated times.
   j. Operate pumping units continuously for eight hours after maximum drawdown is reached.
   k. Record returning water levels in wells and plot curves of well recovery rates.
   l. Remove sand, stones, and other foreign materials that may become deposited in wells after completing final tests.

D. Water Analysis Testing:

1. Engage a qualified testing agency to make bacteriological, physical, and chemical analyses of water from each finished well and report the results. Make analyses according to requirements of authorities having jurisdiction.

3.5 CLEANING

A. Disinfect water supply wells according to AWWA A100 and AWWA C654 before testing well pumps.

B. Follow water supply well disinfection procedures required by authorities having jurisdiction before testing well pumps.

3.6 PROTECTION

A. Water Quality Protection: Prevent well contamination, including undesirable physical and chemical characteristics.

B. Ensure that mud pit will not leak or overflow into streams or wetlands. When well is accepted, remove mud and solids in mud pit from Project site and restore site to finished grade.

C. Provide casings, seals, sterilizing agents, and other materials to eliminate contamination; shut off contaminated water.

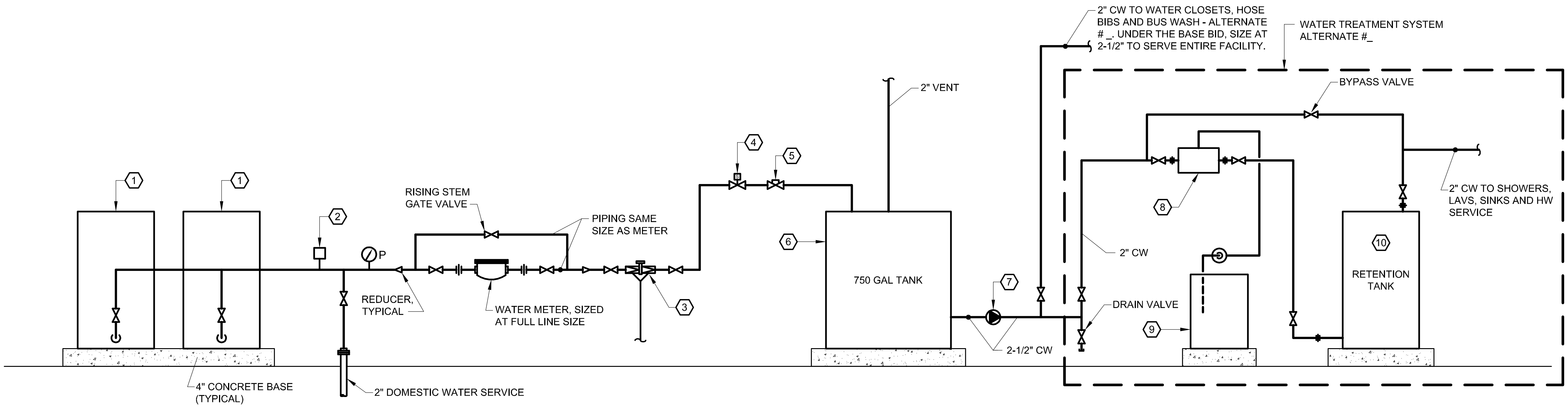
D. Exercise care to prevent breakdown or collapse of strata overlaying that from which water is to be drawn.

E. Protect water supply wells to prevent tampering and introducing foreign matter. Retain temporary well cap until installation is complete.

END OF SECTION 332100

APPENDIX D

Domestic Water Service Entrance Schematic-Maintenance Facility



KEY NOTES:

1. WELL-X-TROL MODEL No. WX-251 62 gal. CAPACITY, 34 gal. MINIMUM ACCEPTANCE VOLUME
2. PRESSURE SWITCH, ON AT 20 psi, OFF AT 30 psi.
3. 2" RPZ TYPE BACKFLOW PREVENTER WATTS MODEL No. 909QT OR EQUAL
4. SOLENOID VALVE SHALL BE PIPE LINE SIZE, BRASS, EQUAL TO ASCO 8210 SERIES, NORMALLY CLOSED, 24v OR 120v ACTUATOR IS ACCEPTABLE. VALVE SHALL BE CONTROLLED VIA COMPACT RELAY CONTROLLER SUBMITTED WITH "WELL BOOSTER PUMP & TANK" SUBMITTAL.
5. CALIBRATED BALANCE VALVE SET AT 25 gpm
6. 750 GALLON VERTICAL POLY TANK EQUAL TO AMERICAN TANK COMPANY MODEL No. 00 85-045. TANK SHALL BE LISTED AND APPROVED FOR POTABLE USE. INSULATE TANK PER SPECIFICATION.
7. BASE MOUNTED BOOSTER VARIABLE SPEED PUMP.
8. STATIC MIXER (CARDONNA ASSOCIATES)
9. 15gal. CHEMICAL SOLUTION TANK (BY CARDONNA ASSOCIATES OR EQUAL
10. 80gal. RETENTION TANK (CARDONNA ASSOCIATES)

GENERAL NOTES:

1. COORDINATE TANK LOCATION TO FACILITATE SERVICE CLEARANCE FOR ALL EQUIPMENT.
2. STORAGE TANK SHALL INCLUDE FACTORY MOUNTED LEVEL CONTROL SYSTEM WITH CONTROL PANEL AND ALARMING TO OPEN SOLENOID VALVE UPON DROP IN WATER LEVEL AND CLOSE VALVE UPON SENSING FULL TANK. LEVEL CONTROL SHALL ALL NECESSARY RELAYS AND DEVICES REQUIRED TO PROVIDE COMPLETE LEVEL CONTROL.

Allied Engineering
Structural Mechanical Electrical Commissioning
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Portland, Maine 04103
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F: 207.221.2266
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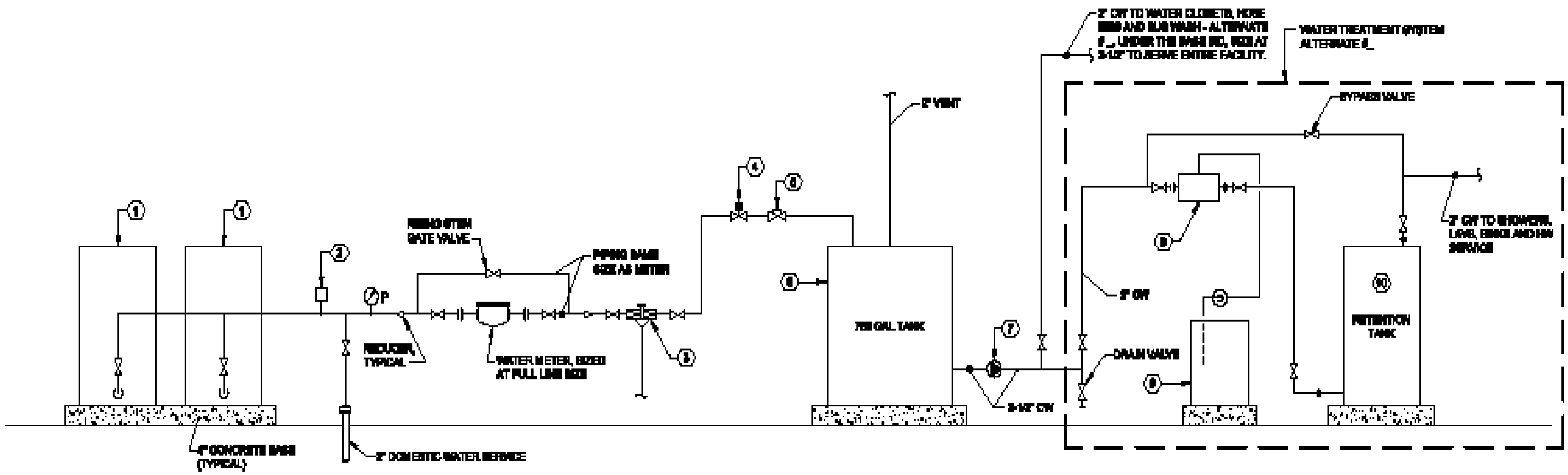
WATER ENTRANCE DETAIL

ACADIA GATEWAY FACILITY
BUS MAINTENANCE FACILITY

Scale: NONE	Date: 1/7/2009	Project No: 07010	Cad File: 07010P

SKP-1



KEY NOTES:

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2. PRESSURE SWITCH, ON AT 20 psi, OFF AT 30 psi.
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4. SOLENOID VALVE SHALL BE PIPE LINE SIZE, BRASS, EQUAL TO ASCO 8210 SERIES, NORMALLY CLOSED, 24v OR 120v ACTUATOR IS ACCEPTABLE. VALVE SHALL BE CONTROLLED VIA COMPACT RELAY CONTROLLER SUBMITTED WITH "WELL BOOSTER PUMP & TANK" SUBMITTAL.
5. CALIBRATED BALANCE VALVE SET AT 25 gpm
6. 750 GALLON VERTICAL POLY TANK EQUAL TO AMERICAN TANK COMPANY MODEL No. 00 85-045. TANK SHALL BE LISTED AND APPROVED FOR POTABLE USE. INSULATE TANK PER SPECIFICATION.
7. BASE MOUNTED BOOSTER VARIABLE SPEED PUMP.
8. STATIC MIXER (CARDONNA ASSOCIATES)
9. 15gal. CHEMICAL SOLUTION TANK (BY CARDONNA ASSOCIATES OR EQUAL
10. 60gal. RETENTION TANK (CARDONNA ASSOCIATES)

GENERAL NOTES:

1. COORDINATE TANK LOCATION TO FACILITATE SERVICE CLEARANCE FOR ALL EQUIPMENT.
2. STORAGE TANK SHALL INCLUDE FACTORY MOUNTED LEVEL CONTROL SYSTEM WITH CONTROL PANEL AND ALARMING TO OPEN SOLENOID VALVE UPON DROP IN WATER LEVEL AND CLOSE VALVE UPON SENSING FULL TANK. LEVEL CONTROL SHALL ALL NECESSARY RELAYS AND DEVICES REQUIRED TO PROVIDE COMPLETE LEVEL CONTROL.

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160 Veranda Street
Portland, Maine 04103

WATER ENTRANCE DETAIL

ACADIA GATEWAY FACILITY
BUS MAINTENANCE FACILITY

Scale: NONE | Date: 1/7/2009 | Project No: 07010 | Cad File: 07010P

SKP-1

APPENDIX E

Site Part Plan

Filename:- Date:- Division:- Username:-

MAINE DEPARTMENT OF TRANSPORTATION	PROJECT	INFORMATION		STATE OF MAINE DEPARTMENT OF TRANSPORTATION
ACADIA GATEWAY FACILITY	PROGRAM	-		
BUS MAINTENANCE FACILITY	PROJECT MANAGER	WPF	SIGNATURE	DATE
WELL LOCATIONS OPTIONS	DESIGNER	-		
	CONSULTANT	ALLIED ENGINEERING	P.E. NUMBER	
	PROJECT RESIDENT	-		FED PIN NO.
	CONTRACTOR	-	DATE 60% REVIEW - 05 JANUARY 2009 NOT FOR CONSTRUCTION	
	PROJECT COMPLETION DATE	-		PIN NO: 013332.06

SHEET NUMBER

OF

FGS/CMT

Fessenden Geo-Environmental Services
Construction Materials Testing

1.0 General

A nitrate-nitrogen analysis for the Acadia Gateway Facility in Trenton, Maine has been conducted. The analysis was done for the two separate facilities that are to be constructed on the property - a Bus Maintenance Facility located at the back of the property and the Visitor Center located at the front of the site. The leachfield areas for both facilities are located toward the back of the property.

On 05/29/08 and on 12/15/08, Mr. Paul Corey, a Licensed Soil Scientist and Site Evaluator, conducted the site evaluation for the wastewater disposal for the Facility. The purpose of the work was to identify areas suitable for subsurface wastewater disposal and design disposal areas for the proposed facilities   Mr. Corey designed the two leachfield systems based on the site conditions, subsurface findings, and using an effluent flow of 3725 gallons per day for the Visitor Center and an effluent flow of 1200 gallons per day (gpm) for the Bus Maintenance Facility. Allied Engineering provided the design flow estimates. FGS/CMT assisted Mr. Corey during the field exploration to identify the geologic/hydrogeologic characteristics of the site and soils, as well as locating the subsurface explorations.

2.0 Findings

The locations of the two systems and exploration logs detailing the subsurface conditions encountered are attached in this document in Appendix A. According to the logs the soils at the Bus Maintenance disposal site are gravelly silt loams-Soil Class/Condition 1AIII/ B,C &D. At the Visitor Center site the soil are fine sandy loam classified as Soil Class/Condition 2 AIII/B. The limiting factor at both disposal field locations was bedrock, which was 24 inches or less. Geologically in the uplands areas west of Crippens Brook, and at the disposal sites, the soils are granular glacial till that are flanked by glacial marine sediments consisting of silty clay with high groundwater and low permeability that support wetlands in many areas. FGS/CMT conducted two in-situ permeability tests at the disposal field for the Visitor Center in order to estimate the hydraulic conductivity of the soil, the average was calculated to be 8.1E-5 centimeters per second. This information is provided in Appendix A.

3.0 Nitrate-Nitrogen Analysis

The nitrate-nitrogen (NO3) calculations are based on Maine Department of Environmental Protection guidelines that include: 40 mg/L NO3 in wastewater effluent, 0.5 mg/L NO3 in precipitation, 2.0 mg/L for NO3 in background groundwater, a recharge rate of 21% and 60% of annual precipitation for drought conditions. The precipitation amount was determined by the United States Geological Survey to be about 55 inches annually for the Ellsworth/Bar Harbor area.

The plume width was determined by summing the total length and two sides of each system, and a mixing depth of 10 feet was used in the calculations. The permeability of the soils established by the NRCS has mapped the site soils in the area as Lyman/Tunbridge, which has an average saturated hydraulic conductivity of 2.29 x 10-3 centimeters per second, however to be conservative a rate of 8.1 x 10-5 centimeters per second, which we calculated during field testing, is significantly slower than the NRCS data. The method used to calculate the NO3 concentrations was a mass-balance dilution model. This model and method of calculation has been reviewed and approved by the Maine Department of Environmental Protection on numerous projects.

As shown on disposal field site drawings, the flow path from each of the proposed leachfield system locations flows down slope from topographic highs to topographic lows and enter into wetlands within the property. Since organic matter in the wetlands will dilute the plumes from the leachfields that flow into the wetlands, the nitrate-nitrogen concentrations will be reduced to acceptable levels through the process of denitrification – a chemical process where the organics reduce the nitrate concentration by about 75% to 90% (Robertson & Cherry 1995). The wetlands produce a constant supply of organic matter, and therefore, the nitrates from the leachfields will likely not have a significant impact on the environment or the groundwater in the future. The leachfield plumes are not anticipated to reach any property lines and will diluted by precipitation and mixing with groundwater as well as through denitrification.

For this project, a mass balance mathematical model developed by Dr. John Tewhey. This model and method of calculation has been reviewed and approved by the Maine Department of Environmental Protection for numerous similar projects. As shown in Table 1 below through the process of dilution and denitrification the nitrate-nitrogen concentrations, even under drought conditions (60% of average precipitation), are reduced to less than 10 milligrams/Liter (mg/L).

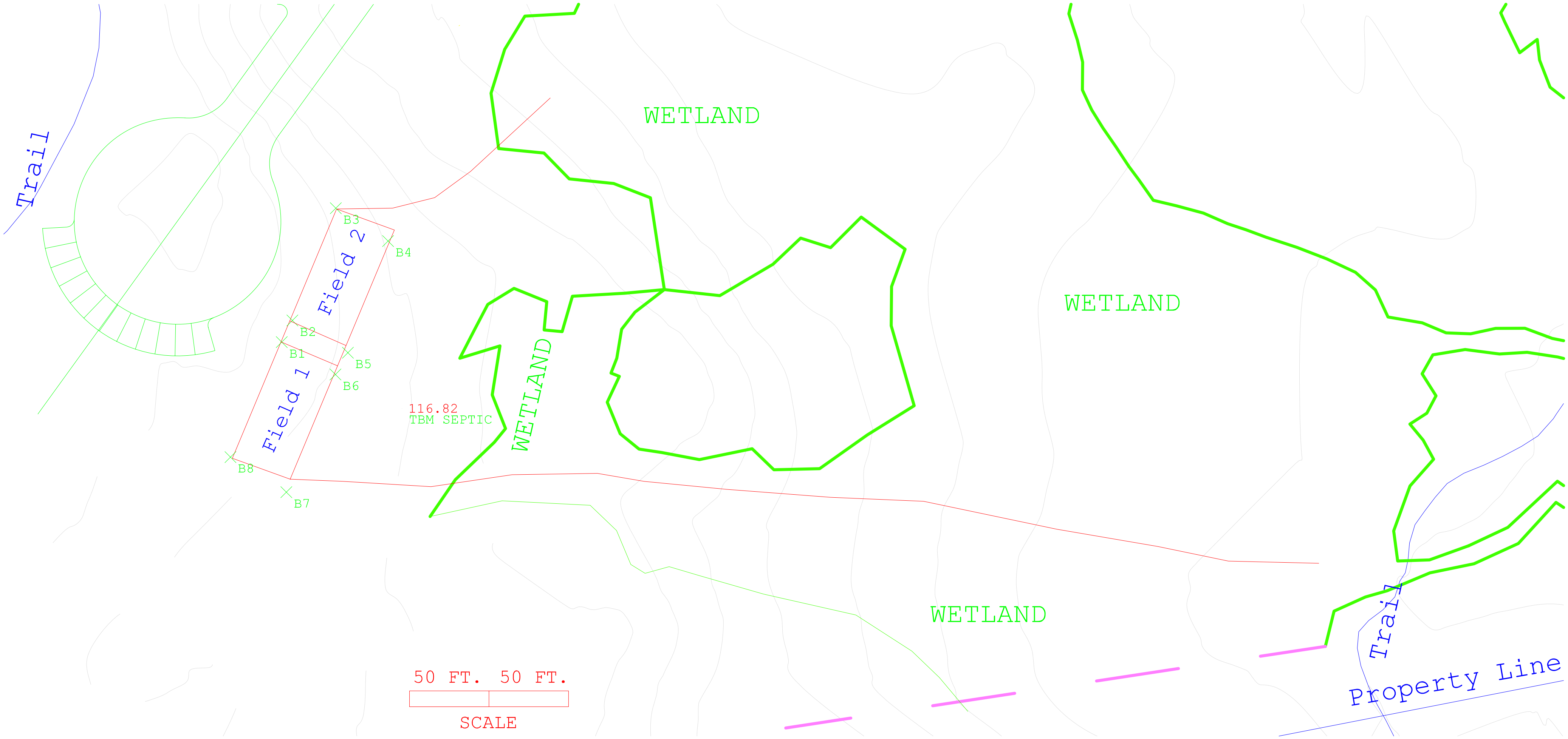
Table 1 - Summary - Nitrate-Nitrogen Calculations Under Drought Conditions

	Nitrate Calculation (ppm)			Nitrate Calculation (ppm)
Visitor Center	8.5		Bus Maintenance	7.7

The nitrate-nitrogen calculation for each system is provided in the following table and the data sheets are provided in Appendix A.

4.0 Summary

In summary, based on the calculations, the proposed leachfield systems should not adversely affect the groundwater and the concentrations within the wetlands on the property and at the property lines will be less than 10 mg/L, even under drought conditions.


Trail
Field 2
Field 1
B1
B2
B3
B4
B5
B6
B7
B8
116.82
TBM SEPTIC
WETLAND
WETLAND
WETLAND
WETLAND
50 FT. 50 FT.
SCALE
Trail
Property Line

FGS/CMT Inc.

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Construction Materials Testing

Acadia Gateway Facility

Trenton, Maine

January 8, 2009
Bus Maintenance Facility
- plume flows into a wetland
Drought Conditions
(60% of Normal)

FLUX CALCULATION

$k := 8.1 \cdot 10^{-5}$ cm/sec - Average Permeability

$w := 138$ Ft. -Plume width

$i := .08$ Gradient (average slope)

$d := 10$ Ft. -Mixing depth with groundwater

Conversion Formula

$$c := \frac{1}{2.54} \cdot \frac{3600}{1} \cdot \frac{24}{1} \cdot \frac{7.48}{1} \cdot \frac{1}{12}$$

Flux Formula

$$F := k \cdot w \cdot i \cdot d \cdot c$$

F=FLUX $F = 189.607$ gal/day

NITRATE CALCULATION

$CE := 40.0$ mg/l conc. effluent

$CP := 0.5$ mg/l conc. precipation

$CB := 2$ mg/l background

$E := 1200$ Gal/day -Effluent

$D := 110$ Ft. -Distance to wetland

$W := 138$ Ft. -Plume width

$I := .21$ % Infiltration

Precipitation

$$P := p \cdot I \cdot \frac{1}{12} \cdot \frac{1}{365} \cdot \frac{7.48}{1} \cdot D \cdot W$$

$p := 55 \cdot .6$ Inches/Year

$P = 179.652$ Gal/day

P = Precipitation 55"/yr

Nitrate Formula

$$NN := \frac{F \cdot CB + E \cdot CE + P \cdot CP}{F + E + P}$$

$NN = 30.887$ mg/l NN = Nitrate-Nitrogen

$TNN := NN \cdot (1 - 0.75)$ $TNN = 7.722$ Total Nitrate-Nitrogen

TNN = Total Nitrate-Nitrogen after denitrification due to organic uptake of nitrate in wetland. About 75% of nitrate is denitrified as found in "In Situ Denitrification of Septic-System Nitrate Using Reactive Porous Media Barriers: Field Trials" by W.D. Robertson and J.A. Cherry, Vol. 33, No.1, Groundwater, Jan-Feb 1995.

FGS/CMT Inc.

Fessenden Geo-Environmental Services
Construction Materials Testing

Acadia Gateway Facility

Trenton, Maine

January 8, 2009
Visitor Center System
- plume flows into a wetland
Drought Conditions
(60% of Normal)

FLUX CALCULATION

$k := 8.1 \cdot 10^{-5}$ cm/sec - Average Permeability

$w := 245$ Ft. -Plume width

$i := .06$ Gradient (average slope)

$d := 10$ Ft. -Mixing depth with groundwater

Conversion Formula

$$c := \frac{1}{2.54} \cdot \frac{3600}{1} \cdot \frac{24}{1} \cdot \frac{7.48}{1} \cdot \frac{1}{12}$$

Flux Formula

$$F := k \cdot w \cdot i \cdot d \cdot c$$

F=FLUX $F = 252.466$ gal/day

NITRATE CALCULATION

$CE := 40.0$ mg/l conc. effluent

$CP := 0.5$ mg/l conc. precipation

$CB := 2$ mg/l background

$E := 3725$ Gal/day -Effluent

$D := 150$ Ft. -Distance in wetland

$W := 245$ Ft. -Plume width

$I := .21$ % Infiltration

Precipitation

$$P := p \cdot I \cdot \frac{1}{12} \cdot \frac{1}{365} \cdot \frac{7.48}{1} \cdot D \cdot W$$

$p := 55 \cdot .6$ Inches/Year

$P = 434.929$ Gal/day

P = Precipitation 55"/yr

Nitrate Formula

$$NN := \frac{F \cdot CB + E \cdot CE + P \cdot CP}{F + E + P}$$

$NN = 33.932$ mg/l NN = Nitrate-Nitrogen

$TNN := NN \cdot (1 - 0.75)$

$TNN = 8.483$ Total Nitrate-Nitrogen

TNN = Total Nitrate-Nitrogen after denitrification due to organic uptake of nitrate in wetland. About 75% of nitrate is denitrified as found in "In Situ Denitrification of Septic-System Nitrate Using Reactive Porous Media Barriers: Field Trials" by W.D. Robertson and J.A. Cherry, Vol. 33, No.1, Groundwater, Jan-Feb 1995.

SECTION 17 WASTEWATER DISPOSAL

A wastewater disposal and groundwater mounding analysis was conducted for the engineered septic system proposed for the Visitor's Center (VC), and a wastewater disposal analysis for the Bus Maintenance (BM) facility at the proposed Acadia Gateway Facility project in Trenton, Maine. The purpose of this work was to identify areas suitable for subsurface wastewater disposal and design disposal areas for the proposed facilities. The field investigations were conducted on 05/29/08 and on 12/15/08.

Design flow volumes, as determined by Allied Engineering, indicate that the Visitor Center portion of the project will generate 3275 gallons per day of wastewater, and that 1200 gallons per day will be generated by the Bus Maintenance facility. During the investigations, two separate areas suitable for subsurface wastewater disposal for these two portions of the project were identified.

Visitor Center Facility

The area chosen for the proposed Visitor Center's subsurface wastewater disposal system is suitable according to the Maine Subsurface Wastewater Disposal Rules (Rules). Hand-dug test pits and borings completed in this area, and the two disposal system layouts are shown in Appendix A. The locations were established with a Trimble GeoExplorer GPS receiver with sub-meter accuracy.

Based on the subsurface soil conditions found at the site by Mr. Paul Corey, a Maine Licensed Site Evaluator and Licensed Soil Scientist, the suitable area for the leachfield system for the Visitors Center is located on the southerly side of the cul-de-sac southwest of the proposed bus facility.

The proposed visitor center as designed would require a disposal area consisting of 266 Eljen In-Drain units. The system is separated into two sections to provide for uniform flow of effluent. Each section would encompass an area of approximately 39' by 76' and be constructed with 133 Eljen In-Drain units. The two adjacent fields are separated by about 15 feet.

The soils were classified as Soil Profile 2 Condition AIII/B, composed of a fine sandy loam. The soils are mapped by the Natural Resource Conservation Service (NRCS) as Tunbridge –Lyman Schoodic complex and geologically the soil is a granular glacial till. The limiting factor at the site was bedrock, which ranged from 18-inches to 24-inches below the forest duff layer. The bedrock in the area is the Ellsworth schist, which is a metamorphosed pelite and sandstone. Ground water mottles were not observed in the subsurface explorations. Attached in Appendix A are the soil profile description logs that describe the soils we examined at the test pits and boring locations. Also attached is a soil conditions summary table for these explorations.

As shown Appendix A, the NRCS has mapped the site soils in the area as Lyman/Tunbridge,which has an average saturated hydraulic conductivity of 2.29 x 10-3 centimeters per second, which is about 6.5 feet per day. To determine actual site conditions, falling-head permeability tests were conducted in an open-borehole at the two septic field locations. The average permeability measured was 8.1 x 10-5 centimeters per second or about 0.23 feet per day, which is significantly slower than the NRCS data.

Since the wastewater disposal system for the Visitor Center is over 2000 gpd, the Maine Department of Human Services (Maine Center of Disease Control and Prevention, Division of Environmental Health) requires a mounding analysis of the proposed system design and site hydraulics to show that there is an adequate vertical separation between the bottom of the disposal field and any mounded water table. Therefore, for the Visitor Center leachfields, a mounding solution developed by Hantush (1967) was used for our analysis of the groundwater table mounding. To be conservative in the assessment, a hydraulic conductivity of 8.1E-5 cm/sec, a specific yield of 0.15 and since the groundwater table is in the bedrock, a saturated thickness of 100 feet were used as parameters in the model. Using the areas and loading rate for the leachfields, a recharge rate of about 0.63 gpd per day was calculated. A simulation time of 75 days, mid June through August, was used, the peak tourism season in Maine.

As can be seen on the groundwater data sheet in Appendix A. after 75-days and using conservative parameters, the groundwater mound is predicted to rise only about 3.3 feet at the center of the leachfield. Since the groundwater table is likely near the bedrock surface, the bottom of the leachfields have been raised 3.3 feet to accommodate the predicted groundwater mound and therefore will not adversely effect the functioning of the system.

Based on the design flow estimate provided, the visitor center will require approximately 6000 gallons of septic tank capacity. It is understood that the visitor center will have two restroom facilities to serve the public: one in the lobby/reception building and one in the theatre building. It is assumed that these two areas will be used approximately equally. It is therefore recommended that each building be served by two septic tanks placed in series. The first septic tank would have a capacity of 2000 gallons followed by a 1000-gallon septic tank. The septic tank locations will be determined when additional facility design information becomes available.

The septic tanks will drain by gravity to a pump station to be located north of the Theater restroom septic tanks. It is anticipated a 2.5" forcemain using a 1 HP septic tank effluent pump will be used. The pumping rate will be 43+/- gem resulting in a velocity of 2.8+/- fps. Since the system is effluent only and there is no fear of solids settling, this velocity appears adequate. The pump station will be dual pumps in a 5-foot precast wetwell and it is anticipated that the pumps will run 7 minutes every few hours on average, more often during peak usage times. Preliminary specifications and drawings are attached in Appendix C.

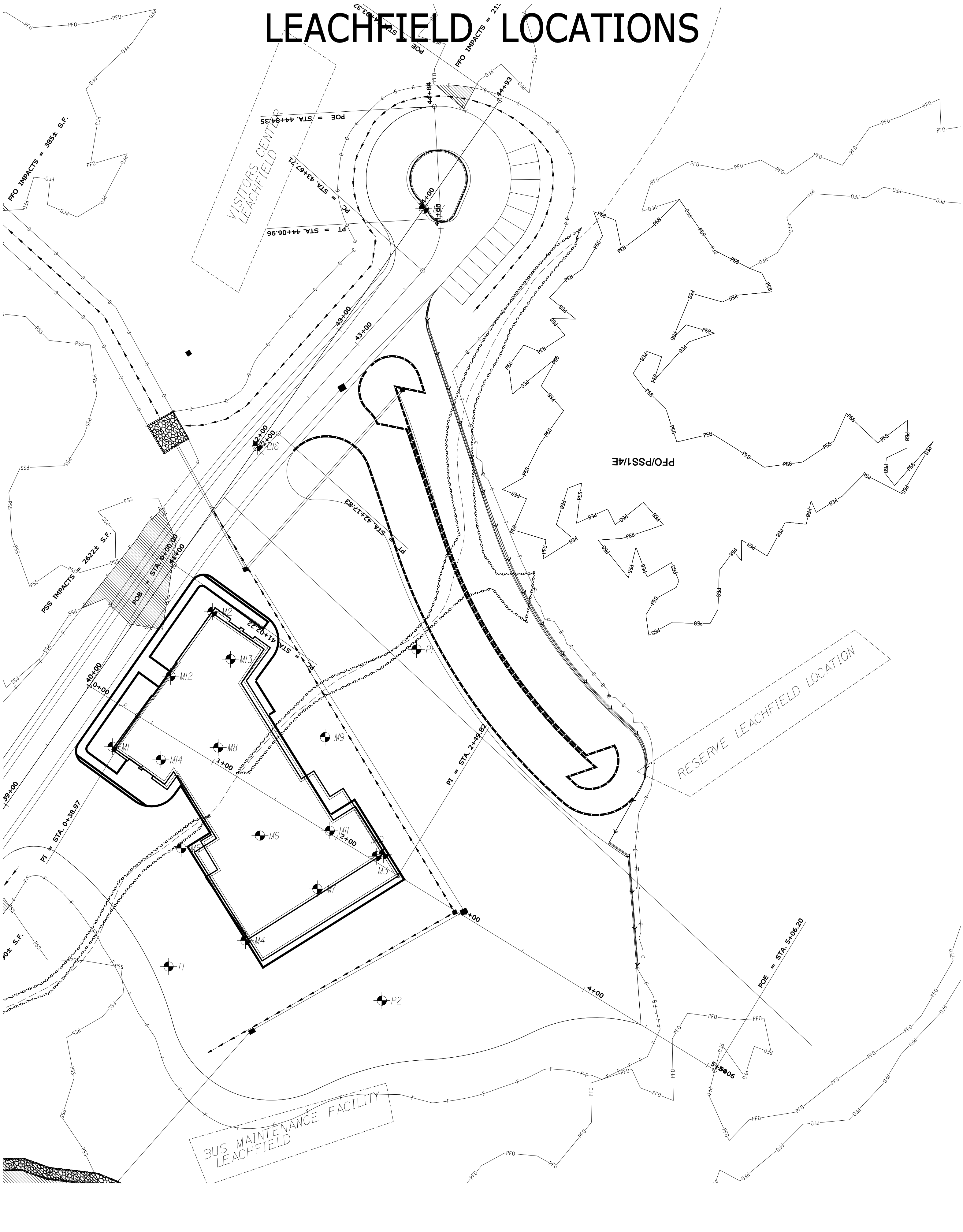
Bus Maintenance Facility

The area chosen for the proposed bus maintenance facility is suitable for subsurface wastewater disposal according to the Maine Subsurface Wastewater Disposal Rules (Rules). The suitable area is shown on the site plan. Test pits completed in this area are shown on the site plan. The test pits were located using a sub-meter GPS receiver.

The proposed bus maintenance facility as designed would require a disposal area consisting of 108 Eljen In-Drain units. The system would encompass an area of approximately 33 feet by 72 feet. Attached in Appendix B are the soil profile descriptions that describe the soils we examined from hand dug test pits. Also attached is a soil conditions summary table for these explorations as well as preliminary design and layout of the leachfield.

This facility will require approximately 2000 gallons of septic tank capacity. It is recommended that the facility be served by two 1000-gallon septic tanks in series. The septic tank locations will on the east side of the building and the exact location be determined once further survey information becomes available.

LEACHFIELD LOCATIONS



APPENDIX A

Visitor Center Wastewater Disposal Information

Disposal Field Layout Details
Exploration Logs
Hydraulic Conductivity Data
Mounding Calculations

FORM E

SOIL CONDITIONS SUMMARY TABLE

for SUBSURFACE INVESTIGATIONS at DEP SITE LOCATION PROJECTS

Project Name: Acadia Gateway Center	DEP Project #:
Applicant Name: Maine Department of Transportation	Consultant Name: Paul B. Corey
Project Location *(municipality)*: Trenton	Type of Investigation: Site Evaluation

Lot No.	Exploration Symbol *(alph/num)*	✓ or ✗ if at SSWD field	• soil profile/condition *(S.E.)* • soil series name *(C.S.S.)* • geologic unit *(C.G.)* *(as appropriate to the investigation)*	Depths to *(check one)*: X inches cm — Mottling	Bedrock	Restrictive Layer	Ground Surface Slope *(%)*
	TP 201	x	2 AIII/B	N.O.*	24	N.O.*	3-8
	TP 202	x	2 AIII/B	N.O.	22	N.O.	3-8
	TP 203	x	2 AIII/B	N.O.	24	N.O.	3-8
	TP 204	x	2 AIII/B	N.O.	20	N.O.	3-8
	B 201	x	2 AIII/B	N.O.	22	N.O.	3-8
	B 202	x	2 AIII/B	N.O.	22	N.O.	3-8
	B 203	x	2 AIII/B	N.O.	18	N.O.	3-8
	B 204	x	2 AIII/B	N.O.	21	N.O.	3-8
	B 205	x	2 AIII/B	N.O.	24	N.O.	3-8
	B 206	x	2 AIII/B	N.O.	20	N.O.	3-8
	B 207	x	2 AIII/B	N.O.	21	N.O.	3-8
	B 208	x	2 AIII/B	N.O.	20	N.O.	3-8
	TP 19	x	1 AIII/D	12	16	12	3-8
	TP 20	x	1 AIII/C	15	19	15	3-8
	TP 21	x	1 AIII/B	N.O.	15	N.O.	3-8
	TP 22	x	1 AIII/C	15	20	15	3-8

Professional Endorsements *(as applicable)*

S.E.	signature:	Date: 12/31/08	affix professional seal
	name printed/typed PAUL B. COREY	Lic. #: 265	
C.S.S.	signature:	Date: 12/31/08	
	name printed/typed PAUL B. COREY	Cert. #: 330	
C.G.	signature:	Date:	
	name printed/typed:	Cert. #:	

* N.O. = NONE OBSERVED

FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

for subsurface investigations at DEP Site Location Projects

Project Name:	Applicant Name:	Project Location (municipality):
ACADIA GATEWAY CENTER	MAINE DOT	TRENTON

Soil Description and Classification

Exploration Symbol: TP 19 ■ Test Pit ☐ Boring

3" Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"–6"	GRAVELLY		BROWN	
6"–12"	SILT	FRIABLE	DK. YELL. BRN.	NONE
12"–18"	LOAM	FIRM	LT. OLIVE BRN.	COMMON PROM.
24"				
30"				
36"				
42"				
48"				
54"				
60"				
66"	REFUSAL @ 16" IN DEPTH : APPARENT BEDROCK			

	Soil Class.	Slope %	Limiting factor	
S.E.	1 AIII/D Prof/Cond	3-8	16"	☐ ground water ☐ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			☐ hydric ■ non-hydric

Soil Description and Classification

Exploration Symbol: TP 20 ■ Test Pit ☐ Boring

2" Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"–6"	GRAVELLY		BROWN	
6"–12"	SILT	FRIABLE	DK. YELL. BRN.	NONE
12"–18"	LOAM	FIRM	LT. OLIVE BRN.	COMMON PROM.
24"				
30"				
36"				
42"				
48"				
54"				
60"				
66"	REFUSAL @ 19" IN DEPTH : APPARENT BEDROCK			

	Soil Class.	Slope %	Limiting factor	
S.E.	1 AIII/C Prof/Cond	3-8	19"	☐ ground water ☐ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			☐ hydric ■ non-hydric

Soil Description and Classification

Exploration Symbol: TP 21 ■ Test Pit ☐ Boring

2" Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"–6"	GRAVELLY		BROWN	
6"–12"	SILT LOAM	FRIABLE	DK. YELL. BRN.	NONE
12"–18"			LT. OLIVE BRN.	
24"				
30"				
36"				
42"				
48"				
54"				
60"				
66"	REFUSAL @ 15" IN DEPTH : APPARENT BEDROCK			

	Soil Class.	Slope %	Limiting factor	
S.E.	1 AIII/B Prof/Cond	3-8	15"	☐ ground water ☐ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			☐ hydric ■ non-hydric

Soil Description and Classification

Exploration Symbol: TP 22 ■ Test Pit ☐ Boring

_____ Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"–6"	GRAVELLY		BROWN	
6"–12"	SILT	FRIABLE	DK. YELL. BRN.	NONE
12"–18"	LOAM	FIRM	LT. OLIVE BRN.	COMMON PROM.
24"				
30"				
36"				
42"				
48"				
54"				
60"				
66"	REFUSAL @ 20" IN DEPTH : APPARENT BEDROCK			

	Soil Class.	Slope %	Limiting factor	
S.E.	1 AIII/C Prof/Cond	3-8	20"	☐ ground water ☐ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			☐ hydric ■ non-hydric

Professional Endorsements *(as applicable)*

S.E.	signature:	[signature]	Date:	05/29/08
	name:	Paul B. Corey	Lic. # :	265
C.S.S.	signature:		Date:	
	name:		Lic. # :	

affix professional seal

FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

for subsurface investigations at DEP Site Location Projects

Project Name:	Applicant Name:	Project Location (municipality):
ACADIA GATEWAY CENTER	MAINE DOT	TRENTON

Soil Description and Classification

Exploration Symbol: TP 201 ■ Test Pit □ Boring

_3"_ Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"				
6"	FINE		GRAY	
12"	SANDY	FRIABLE	STRONG BRN.	NONE
18"	LOAM		DK. YELL. BRN.	
24"			LT. OLIVE BRN.	
30"				
36"				
42"				
48"				
54"				
60"				
66"	REFUSAL @ 24" IN DEPTH : APPARENT BEDROCK			

	Soil Class.	Slope %	Limiting factor	
S.E.	2 AIII/B Prof/Cond	3-8	24"	□ ground water □ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			□ hydric ■ non-hydric

Soil Description and Classification

Exploration Symbol: TP 202 ■ Test Pit □ Boring

_3"_ Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"				
6"	FINE		BROWN	
12"	SANDY	FRIABLE	STRONG BRN.	NONE
18"	LOAM		DK. YELL. BRN.	
24"			LT. OLIVE BRN.	
30"				
36"				
42"				
48"				
54"				
60"				
66"	REFUSAL @ 22" IN DEPTH : APPARENT BEDROCK			

	Soil Class.	Slope %	Limiting factor	
S.E.	2 AIII/B Prof/Cond	3-8	22"	□ ground water □ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			□ hydric ■ non-hydric

Soil Description and Classification

Exploration Symbol: TP 203 ■ Test Pit □ Boring

_3"_ Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"				
6"	FINE		BROWN	
12"	SANDY	FRIABLE	STRONG BRN.	NONE
18"	LOAM		DK. YELL. BRN.	
24"			LT. OLIVE BRN.	
30"				
36"				
42"				
48"				
54"				
60"				
66"	REFUSAL @ 24" IN DEPTH : APPARENT BEDROCK			

	Soil Class.	Slope %	Limiting factor	
S.E.	2 AIII/B Prof/Cond	3-8	24"	□ ground water □ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			□ hydric ■ non-hydric

Soil Description and Classification

Exploration Symbol: TP 204 ■ Test Pit □ Boring

_2"_ Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"				
6"	FINE		BROWN	
12"	SANDY	FRIABLE	DK. YELL. BRN.	NONE
18"	LOAM		LT. OLIVE BRN.	
24"				
30"				
36"				
42"				
48"				
54"				
60"				
66"	REFUSAL @ 20" IN DEPTH : APPARENT BEDROCK			

	Soil Class.	Slope %	Limiting factor	
S.E.	2 AIII/B Prof/Cond	3-8	20"	□ ground water □ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			□ hydric ■ non-hydric

Professional Endorsements *(as applicable)*

S.E.	signature:		Date:	12/15/08
	name:	Paul B. Corey	Lic. #:	265
C.S.S.	signature:		Date:	
	name:		Lic. #:	

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FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

for subsurface investigations at DEP Site Location Projects

Project Name:	Applicant Name:	Project Location (municipality):
ACADIA GATEWAY CENTER	MAINE DOT	TRENTON

Soil Description and Classification

Exploration Symbol: B 201 ☐ Test Pit ■ Boring

3" Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"–6"	FINE SANDY LOAM	FRIABLE	BROWN	NONE
6"–18"			DK. YELL. BRN.	
18"–22"			LT. OLIVE BRN.	

REFUSAL @ 22" IN DEPTH : APPARENT BEDROCK

	Soil Class.	Slope %	Limiting factor	
S.E.	2 AIII/B Prof/Cond	3-8	22"	☐ ground water ☐ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			☐ hydric ■ non-hydric

Soil Description and Classification

Exploration Symbol: B 202 ☐ Test Pit ■ Boring

1" Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"–6"	FINE SANDY LOAM	FRIABLE	BROWN	NONE
6"–18"			DK. YELL. BRN.	
18"–22"			LT. OLIVE BRN.	

REFUSAL @ 22" IN DEPTH : APPARENT BEDROCK

	Soil Class.	Slope %	Limiting factor	
S.E.	2 AIII/B Prof/Cond	3-8	22"	☐ ground water ☐ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			☐ hydric ■ non-hydric

Soil Description and Classification

Exploration Symbol: B 203 ☐ Test Pit ■ Boring

1" Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"–3"	FINE SANDY LOAM	FRIABLE	GR. BROWN	NONE
3"–12"			STRONG BRN.	
12"–18"			DK. YELL. BRN.	

REFUSAL @ 18" IN DEPTH : APPARENT BEDROCK

	Soil Class.	Slope %	Limiting factor	
S.E.	2 AIII/B Prof/Cond	3-8	18"	☐ ground water ☐ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			☐ hydric ■ non-hydric

Soil Description and Classification

Exploration Symbol: B 204 ☐ Test Pit ■ Boring

1" Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"–6"	FINE SANDY LOAM	FRIABLE	BROWN	NONE
6"–21"			DK. YELL. BRN.	

REFUSAL @ 21" IN DEPTH : APPARENT BEDROCK

	Soil Class.	Slope %	Limiting factor	
S.E.	2 AIII/B Prof/Cond	3-8	21"	☐ ground water ☐ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			☐ hydric ☐ non-hydric

Professional Endorsements *(as applicable)*

S.E.	signature:	[signature]	Date:	12/15/08
	name:	Paul B. Corey	Lic. #:	265
C.S.S.	signature:		Date:	
	name:		Lic. #:	

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FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

for subsurface investigations at DEP Site Location Projects

Project Name:	Applicant Name:	Project Location (municipality):
ACADIA GATEWAY CENTER	MAINE DOT	TRENTON

Soil Description and Classification

Exploration Symbol: B 205 □ Test Pit ■ Boring

_3"_ Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"	FINE		BROWN	
6"	SANDY	FRIABLE	STRONG BRN.	NONE
12"	LOAM		DK. YELL. BRN.	
18"			LT. OLIVE BRN.	
24"				
30"				
36"				
42"				
48"				
54"				
60"				
66"	REFUSAL @ 24" IN DEPTH : APPARENT BEDROCK			

	Soil Class.	Slope %	Limiting factor	
S.E.	2 AIII/B Prof/Cond	3-8	24"	□ ground water □ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			□ hydric ■ non-hydric

Soil Description and Classification

Exploration Symbol: B 206 □ Test Pit ■ Boring

_2"_ Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"	FINE		BROWN	
6"	SANDY	FRIABLE	STRONG BRN.	NONE
12"	LOAM		DK. YELL. BRN.	
18"				
24"				
30"				
36"				
42"				
48"				
54"				
60"				
66"	REFUSAL @ 20" IN DEPTH : APPARENT BEDROCK			

	Soil Class.	Slope %	Limiting factor	
S.E.	2 AIII/B Prof/Cond	3-8	20"	□ ground water □ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			□ hydric ■ non-hydric

Soil Description and Classification

Exploration Symbol: B 207 □ Test Pit ■ Boring

_1"_ Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"	FINE		BROWN	
6"	SANDY	FRIABLE	STRONG BRN.	NONE
12"	LOAM		DK. YELL. BRN.	
18"				
24"				
30"				
36"				
42"				
48"				
54"				
60"				
66"	REFUSAL @ 21" IN DEPTH : APPARENT BEDROCK			

	Soil Class.	Slope %	Limiting factor	
S.E.	2 AIII/B Prof/Cond	3-8	21"	□ ground water □ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			□ hydric ■ non-hydric

Soil Description and Classification

Exploration Symbol: B 208 □ Test Pit ■ Boring

_2"_ Depth of Organic Horizon Above Mineral Soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0"	FINE		BROWN	
6"	SANDY	FRIABLE	STRONG BRN.	NONE
12"	LOAM		DK. YELL. BRN.	
18"				
24"				
30"				
36"				
42"				
48"				
54"				
60"				
66"	REFUSAL @ 20" IN DEPTH : APPARENT BEDROCK			

	Soil Class.	Slope %	Limiting factor	
S.E.	2 AIII/B Prof/Cond	3-8	20"	□ ground water □ restrictive layer ■ bedrock
C.S.S.	Soil Series / phase name:			□ hydric □ non-hydric

Professional Endorsements *(as applicable)*

S.E.	signature:	[signature]	Date:	12/15/08
	name:	Paul B. Corey	Lic. #:	265
C.S.S.	signature:		Date:	
	name:		Lic. #:	

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USDA United States Department of Agriculture
Natural Resources Conservation Service

Web Soil Survey

Search

Properties and Qualities Ratings

Open All | Close All

Soil Chemical Properties

Soil Erosion Factors

Soil Physical Properties

- Available Water Capacity
- Available Water Supply, 0 to 100 cm
- Available Water Supply, 0 to 150 cm
- Available Water Supply, 0 to 25 cm
- Available Water Supply, 0 to 50 cm
- Bulk Density, 15 Bar
- Bulk Density, One-Tenth Bar
- Bulk Density, One-Third Bar
- Linear Extensibility
- Liquid Limit
- Organic Matter
- Percent Clay
- Percent Sand
- Percent Silt
- Plasticity Index
- Saturated Hydraulic Conductivity (Ksat)
- Saturated Hydraulic Conductivity (Ksat), Standard Classes

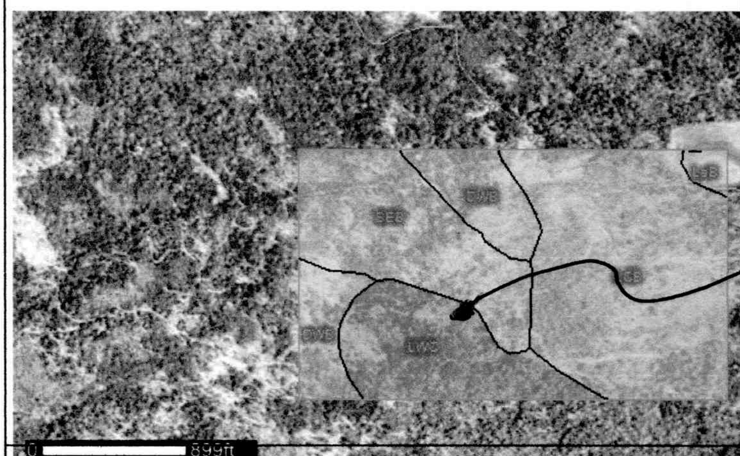
View Description | View Rating

View Options

Map ☑
Table ☑
Description of Rating ☑
Rating Options ☐

Map — Saturated Hydraulic Conductivity (Ksat), Standard Classes

Scale (not to scale)



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

Tables — Saturated Hydraulic Conductivity (Ksat), Standard Classes — Summary By Map Unit

Summary by Map Unit — Hancock County Area, Maine

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
DWB	Dixfield-Colonel-Tunbridge complex, gently sloping, very stony	7.5793	13.0	14.0%
LaB	Lamoine silt loam, 3 to 8 percent slopes	2.2466	1.4	1.5%
LCB	Lamoine-Scantic-Buxton association, gently sloping	2.2466	40.1	43.2%
LWC	Lyman-Tunbridge-Schoodic complex, rolling, very stony	22.9053	16.4	17.7%
Sa	Scantic silt loam	3.4152	0.0	0.0%
SEB	Scantic-Lamoine-Dixfield complex, gently sloping, very stony	4.3655	21.8	23.6%
Totals for Area of Interest			**92.7**	**100.0%**

Description — Saturated Hydraulic Conductivity (Ksat), Standard Classes

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is

Permeability Test

Falling Head

Acadia Visitor's Center

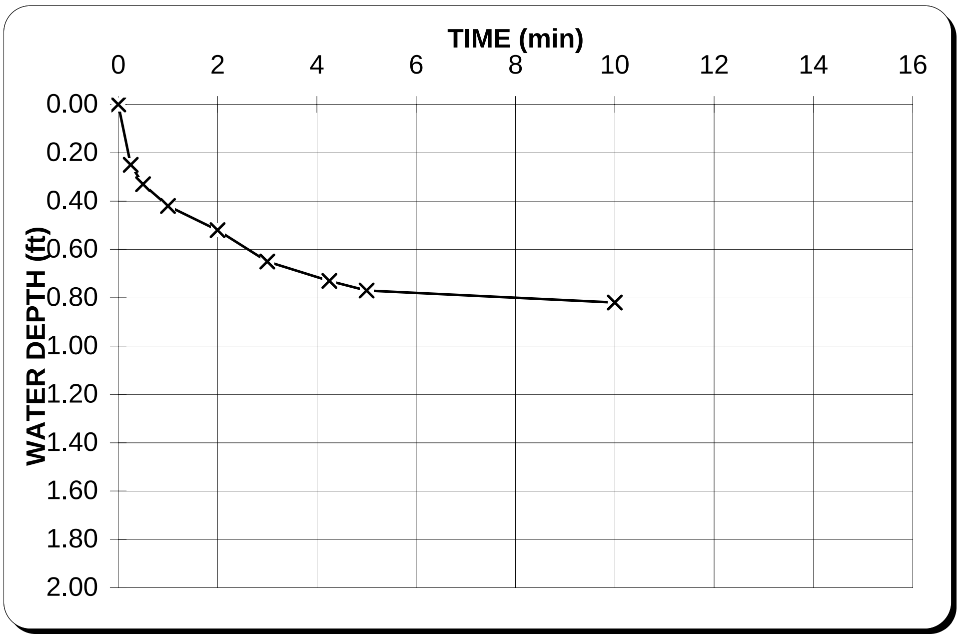
Field 1

Soil

	Actual		Converted Value	
STANDPIPE DIAMETER (d)	1.00	in	2.54	cm
HOLE DIAMETER (D)	1.00	in	2.54	cm
INTAKE LENGTH (L)	2.00	ft	60.96	cm
INITIAL PIEZ. HEAD (H_1)	1.55	ft	47.24	cm
FINAL PIEZ. HEAD (H_2)	0.73	ft	22.25	cm
TIME (t)	10.00	min	600.00	sec
TRANS. RATIO (m)	Assume =1		1.00	

PERMEABILITY **6.43E-05 cm/sec**

Source: Lambe & Whitman
Case G mL/D>4



Permeability Test

Falling Head

Acadia Visitor's Center

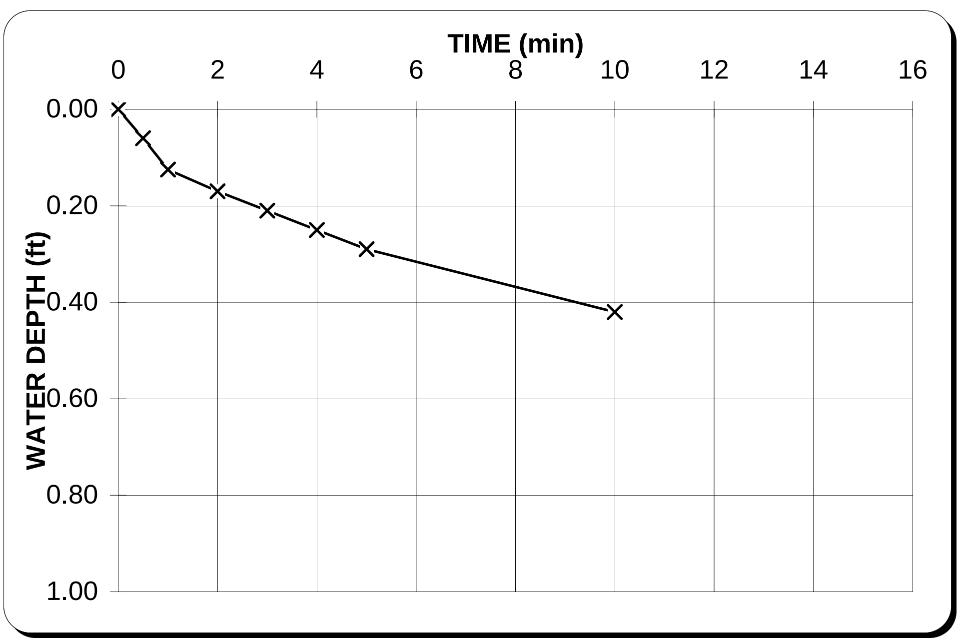
Field 2

Soil

	Actual		Converted Value	
STANDPIPE DIAMETER (d)	1.00	in	2.54	cm
HOLE DIAMETER (D)	1.00	in	2.54	cm
INTAKE LENGTH (L)	2.30	ft	70.10	cm
INITIAL PIEZ. HEAD (H_1)	1.50	ft	45.72	cm
FINAL PIEZ. HEAD (H_2)	0.42	ft	12.80	cm
TIME (t)	10.00	min	600.00	sec
TRANS. RATIO (m)	Assume =1		1.00	

PERMEABILITY **9.79E-05 cm/sec**

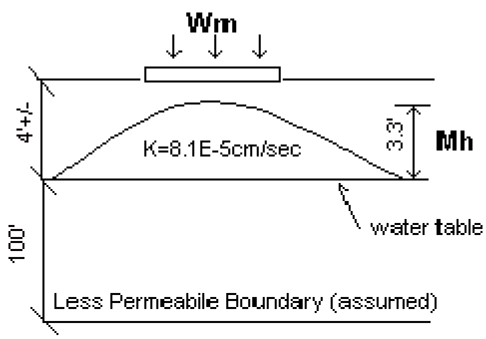
Source: Lambe & Whitman
Case G mL/D>4



FGS/CMT

Fessenden Geo-Environmental Services
Construction Materials Testing

Acadia Visitor's Center - Ground Water Mounding



Wm = Infiltration rate(gal/day/ft^2)-3725gpd
1863 gpd per field
w = width of system (ft) 39 feet
L = length of system (ft) 76 feet
T = transmissivity = K x B (gal/day/ft)
K = hydraulic conductivity (cm/sec)
B = aquifer thickness (ft) 100 feet
t = time since start of recharge (75 days)
Sy = specific yield of aquifer (assumed)
C = Conversion (cm/sec to gal/day/sq.ft)
X,Y = coordinates of observation point
bm = (1/2) w
am = (1/2) L
δ = (alpha1&2, beta1&2), from Tables
Mh = **Mound height** (ft)

$w := 39$ $\quad Wm := 0.628$ $\quad X := 0$ $\quad K := .000081$

$L := 76$ $\quad t := 75$ $\quad Y := 0$ $\quad B := 100$ $\quad C := 21204.6221$

$T := K\cdot C\cdot B$ $\quad T = 171.757$

$Sy := .15$

$$bm := \left(\frac{1}{2}\right)\cdot w \qquad am := \left(\frac{1}{2}\right)\cdot L$$

$$\alpha 1 := 1.37\cdot(bm + X)\cdot\sqrt{\left(\frac{Sy}{T\cdot t}\right)} \qquad \alpha 2 := 1.37\cdot(bm - X)\cdot\sqrt{\left(\frac{Sy}{T\cdot t}\right)}$$

$\alpha 1 = 0.091$ $\qquad \alpha 2 = 0.091$

$$\beta 1 := 1.37\cdot(am + Y)\cdot\sqrt{\left(\frac{Sy}{T\cdot t}\right)} \qquad \beta 2 := 1.37\cdot(am - Y)\cdot\sqrt{\left(\frac{Sy}{T\cdot t}\right)}$$

$\beta 1 = 0.178$ $\qquad \beta 2 = 0.178$

$\delta := 0.0791$ Estimated from Error Function Tables

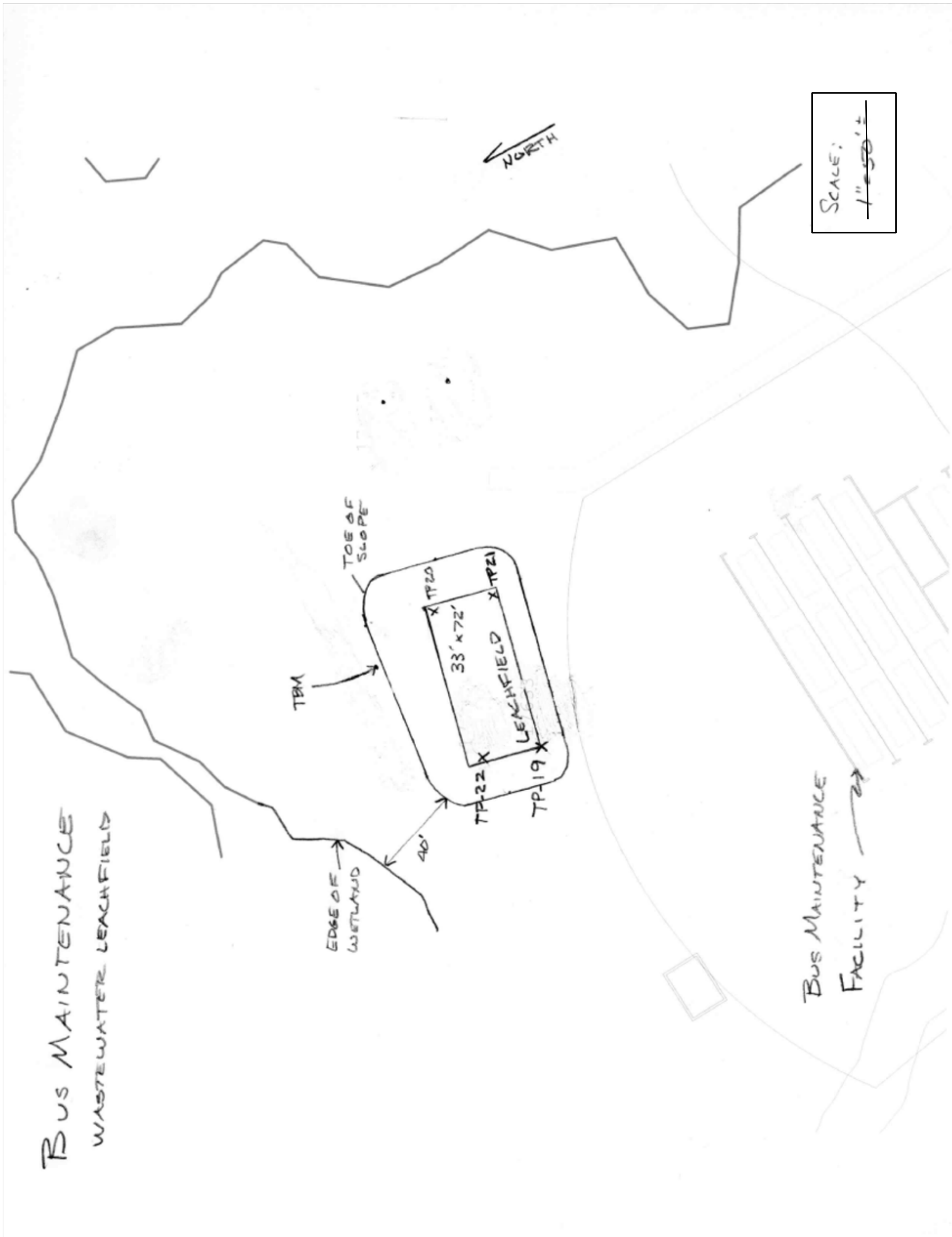
$$Mh := (4\cdot\delta)\cdot\frac{Wm\cdot t}{30\cdot Sy}$$ $Mh = 3.312$ Rise in mound

Hantush method as found in "Canter, L.W., and Knox, R.C., 1985, Septic Tank System Effects on Ground Water Quality"

APPENDIX B

Bus Mainentance Wastewater Disposal Information

Disposal Field Layout Details
Exploration Logs



Date: 01/07/09 Drawn By: AAF
File: Acadia Checked By: AAF
Sheet Number:

Acadia Gateway Facility
Trenton, Maine

Bus Maintenance - Leachfield Plan
Exploration Location & Layout

Fessenden Geo-Environmental Services
Construction Materials Testing
PO Box 2097, 136 Maine Avenue
Bangor, Maine 04401
tel. (207) 947-3184 1-877-CMT-TEST
fax. (207) 990 - 1194

FGS/CMT inc.

APPENDIX C

Visitor Center Wastewater Disposal Preliminary Specifications and Plans

Section
Sanitary Sewage Conveyance Systems

PART I - GENERAL

1.01 SECTION INCLUDES

A. Sanitary Gravity Sewer Piping.

B. Sanitary Sewer Force Main Piping.

C. Service Laterals.

D. Fittings.

E. Testing

1.02 RELATED SECTIONS

A. Reserved

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. D3034, Type PSM Poly (Vinyl Chloride) (PVC) Sewer, Pipe and Fittings.
2. D3212, Joints for Drain and Sewer Pipes Using Flexible Elastometric Seals.
3. D2241-84, Poly (Vinyl Chloride) (PVC) Pressure-rated Pipe (SDR Series)
4. C478-78Precast Reinforced Concrete Manhole Sections.
5. C443-78Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
6. F794-88Poly (Vinyl Chloride) (PVC) Ribbed Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
7. F679-83Poly (Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings.
8. C923-84Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.

B. American Water Works Association (AWWA)

1. C900-81 Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water.

C. Uni-Bell PVC Pipe Association

1. Uni-B-4-82
2. Uni-B-7-82
3. Uni-B-6-85
4. Uni-B-9-87

D. American National Standards Institute (ANSI)

1. A21.10-77 Gray-Iron and Ductile-Iron Fittings, 3-inch through 48-inch for Water and Other Liquids.

1.04 SUBMITTALS

A. Shop drawings including piping layouts and schedules shall include dimensioning, fittings, types and locations of valves and appurtenances, joint details, methods and location of supports, anchorage, gasket material, grade of material, and all other pertinent technical information for all items to be furnished.

B. Prior to each shipment of pipe, certified test reports that the pipe for this Contract was manufactured and tested in accordance with applicable ASTM and/or AWWA standards specified herein shall be submitted.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver products on manufacturers' original skids, or in original unopened protective packaging.

B. Store materials to prevent physical damage and deformation. Pipe shall be adequately supported underneath to prevent sagging. Damaged material shall be removed from the project. PVC items shall be protected from direct sunlight by covering if material is to be left outdoors for more than 60 days prior to installation.

C. Protect material during transportation and installation to avoid physical damage. Any material that has received a blow or that has a showing crack shall be rejected from use inn the project.

D. In handling the items, use special devices and methods as required to achieve the results specified herein. No uncushioned devices shall be used in handling the items.

1.06 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01700.

B. Accurately record location of pipe runs, connections, manholes, and invert elevations.

PART 2 - PRODUCTS

2.01 MANUFACTURERS: SANITARY SEWER PIPE MATERIALS

1. PVC Pipe: John Mansville (J-M)

2. Substitutions - Under provisions of Section 01600.

2.02 SANITARY SEWER PIPE MATERIALS

A. Polyvinyl Chloride (PVC) Non-pressure Sewer Pipe, ASTM D3034

1. Class: SDR 35
2. Joints: ASTM D 3212, Flexible Elastomeric Seals or as shown on Drawings. All joints shall be an integral part of the bell.

B. Polyvinyl Chloride (PVC) Pressure Pipe For Use As Force Main

1. Pipe: J-M Manufacturing Company, Inc. or equal. Pipe shall be SDR 32.5 ASTM 2241, and be U.L. and Factory Mutual approved.

2.03 PIPE ACCESSORIES

A. Fittings for PVC Non-Pressure Pipe: Same material as pipe, molded or formed to suit pipe size and end design, in required "Tee", bends, wyes, elbows, cleanouts, reducers/enlargers, traps, and other configurations required. All fittings shall have bell and spigot push-on joints.

B. Fittings for PVC Pressure Pipe: Ductile Iron, Mechanical Joint (MJ) ANSI A21.10. All fittings shall be restrained by Model 1300 Uni-Flange restraining system as manufactured by Nappco, Inc., or equal.

PART 3 - EXECUTION

3.01 PIPE INSTALLATION

A. Gravity Sewer

1. Beginning at a point approved by the Engineer, all pipe shall be laid without break upgrade from structure to structure with the bell end of the pipe upstream. All pipe shall be laid on stable bedding with joints closely and accurately fitting true to line and grade. Joints and joint materials shall conform to recommendations of the pipe manufacturer. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16-in per foot of length.

2. Place pipe on minimum 6 inch deep bedding in accordance with the requirements of Section 02223.

3. Install bedding to mid-pipe diameter and manually "chink" the bedding around the haunches of the pipe to provide lateral support. Do not mechanically compact crushed stone over flexible pipe. Bedding shall extend from the sides of the pipe to the undisturbed trench wall outside the trench box level with the top of the pipe. Once “chinked”, bedding shall be placed to a depth of 4” over the pipe.

4. Place excavated material or select granular backfill as directed by Engineer over the pipe as backfill. Materials shall be placed in maximum 12 inch lifts and compacted per requirements of Section 02223.

5. Increase compaction of each successive lift. Refer to Section 02223 for compaction requirement. Do not displace or damage pipe when compacting. Compunction equipment shall not be used directly over the pipe until a sufficient depth of material is placed to prevent damage to the pipe. Compaction over the pipe area until that point shall be accomplished with alternative equipment.

6. Install no length of pipe until the previous length has been backfilled and secured.

7. Continue placing backfill material until the aggregate subbase level is reached.

8. Pipes shall be protected at all times against impact shocks and free falls and any damaged pipe shall be removed and replaced. As soon as possible after joints are made, sufficient bedding material shall be placed and tamped around and over the pipe to protect it from injury and to prevent movement from line and grade.

9. At the end of each day's work, all open pipe ends shall be adequately capped to the satisfaction of the Engineer, to prevent the entry of water, rodents, debris or soils into the new sewer lines.

10. The Contractor shall, at all times during construction, provide and maintain ample means and devices, including standby units, with which to promptly remove and properly dispose of water or seepage entering trenches and excavations. Trenches and excavations shall remain sufficiently dry for the proper construction of the

sewer and pipe appurtenances until backfill material is placed and compacted. The Engineer shall determine if the trench is sufficiently dry for sewer construction to progress.

11. All joints shall be made in a dry trench and in accordance with manufacturers recommendations and in accordance with the best practices for class of pipe laid. The bells and spigots of the pipe or couplings shall be wiped clean with a dry cloth before making the joint.

12. Ends of pipe shall be stopped and protected when laying of pipe is interrupted.

13. All water pumped and drained from the work shall be disposed of in a suitable manner without undue interference with other work or damage to adjacent property. Suitable temporary channels shall be provided for water that may flow along or across the site of the work. IN NO CASE SHALL DRAINAGE BE THROUGH THE PIPES BEING INSTALLED.

14. The Contractor may choose any method he wishes to handle any groundwater or seepage flow subject to the provisions herein, but he shall assume all responsibility for the adequacy of the methods, and all the materials and equipment employed. He shall furnish all materials and equipment and shall do all incidental work and excavation required for proper installation of drainage devices used.

15. No construction shall be undertaken until, in the opinion of the Engineer, adequate drainage for the work at hand is assured. Drainage methods or materials which allow appreciable amounts of fine material to be pumped from the soil supporting the structure or pipe, shall be deemed as unsatisfactory and shall be corrected immediately.

16. No temporary connection to the sewer will be made without first receiving approval and supervision of the Engineer.

17. PVC pipe shall not be used when sheeting is being installed or when pipe subgrade is unconsolidated or soft clay. Ductile iron pipe shall be substituted at no additional cost to the owner.

18. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of the pipe to be used with a bell shall be beveled to conform to the manufactured spigot end.

19. The Owner or Owners representative may examine each bell and spigot end to determine whether any performed joint has been damaged prior to installation. Any pipe having defective joint surfaces shall be rejected, marked as such, and removed from the site.

20. When moveable trench bracing, such as trench boxes, moveable sheeting, shoring or plates, are used to support the sides of the trench, care shall be taken in placing or moving the supports to avoid disturbing the new pipe. Bracing shall not extend below the top of the pipe. As bracing is removed, pipe bedding shall be placed in

any voids created and the backfill shall be recompacted to provide uniform support for, them pipe.

B. Force Main

1. Requirements for the installation of gravity sewer pipe are applicable to forcemain pipe.

3. Install bedding material over the top of the pipe for a minimum of four inches. Compact bedding material in accordance with Contract Documents.

   Back up bends exceeding 20 degrees or combinations thereof with Concrete Thrust Blocks as shown on Contract Drawings and in details. Concrete for thrust blocks shall be 3000# concrete conforming to the specifications stated in Section 03300: Cast-In-Place Concrete. In addition, concrete shall be poured against undisturbed trench sides. Backfill around thrust blocks shall be thoroughly compacted as stipulated in Contract Documents.

3.02 WYE BRANCHES, CHIMNEYS AND STUBS

A. All fittings shall be furnished by the same manufacturer as the pipe.

B. Wye branches shall be furnished and installed and capped and/or connected as shown on the Drawings or in locations as specified by the Owner or Engineer. Each wye branch shall be provided with a PVC end cap and shall be backed with a piece of wood (2x4) that extends to a point 3 feet below the finished ground surface.

C. PVC chimneys shall be installed according to the detail on the drawings at locations to be determined by the Owner or Engineer. Concrete shall be as specified in Division 3. NO backfill shall be placed over concrete within 16 hours of placing.

D. Ample time shall be given to the Engineer to obtain the exact location of each wye branch and chimney prior to bacfilling. Wye branches or chimneys which are covered before the Engineer has obtained a location shall be exposed, at no additional expense, so that measurements can be obtained.

E. PVC manhole drops shall be installed as shown on the Drawings. Concrete for encasements shall be 3500 psi as specified. No backfill shall be placed over this concrete within 16 hours or placing.

F. Pipe stubs for manhole connections shall not exceed 3.5 feet in length unless otherwise directed.

3.4 SERVICE CONNECTIONS

A. Service connections shall be installed at a minimum slope of 2 percent unless otherwise permitted by the Engineer.

B. Pipe laying standards of gravity sewer main shall apply to service connections.

3.05 TOLERANCES

A. The Contractor will supply all labor, materials, and equipment necessary to assist the Engineer in inspection of pipe, fittings, and manhole connections. The Contractor will examine the pipe for defects, weak structural components, and deviations beyond allowable tolerances that would adversely affect the execution and quality of the work. The Contractor will remove all rejected materials from the job site. Backfilling of pipe will begin only after the Engineer certifies that the pipe installation is in conformance with the installation requirements of these Specifications.

B. The pipe will be installed to the lines and grades shown on the Contract Drawings. The allowable tolerance on pipe elevation at any given station will be 0.02 feet. The allowable horizontal tolerance will be 0.03 feet. The installation of all sewer pipe shall conform to the requirements for EXCAVATION, BEDDING, BACKFILLING, AND SURFACE RESTORATION as set forth in these specifications.

3.06 PIPE LEAKAGE TESTING

A. GENERAL

1. All new sewer lines shall be tested after backfilling and shall meet a water infiltration limit of 100 gal/day/inch/mile. Compliance with this limit shall be inferred by air exfiltration testing of all newly installed sewer pipe.

2. The primary means of testing leakage in sewers shall be by low pressure air test after installation and capping or plugging of house service fittings and leads; and after completing backfill of the gravity sewer trench. The test shall be performed using the below listed equipment according to stated procedures and under the supervision of the inspecting Engineer. Test shall be conducted at the Contractor's expense.

3. Equipment used shall meet the following minimum requirements:

    1. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be installed.

    (b) Pneumatic plugs shall resist interna-1 test pressures without requiring external bracing or blocking.

    (c) All air used shall pass through a single control panel.

    (d) Three (3) individual hoses shall be used for the following connections:

        (1) From control panel to pneumatic plugs for inflation.
        (2) From control panel to sealed line for introducing the **low** pressure air.
        (3) From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

4. All pneumatic plugs shall be seal tested before being used in the actual test installation. One (1) length of pipe shall be laid on the ground and sealed at both ends with pneumatic plugs to be checked. Air shall be introduced into the plugs to 30 psig. The sealed pipe shall be pressurized to 5 psig. The plugs shall hold against this pressure without movement of the plugs out of the pipe.

5. After a manhole to manhole reach of pipe has been backfilled and cleaned, and service connections capped or suitably plugged with mechanical type plugs and the pneumatic plugs are checked by the above procedure, the plugs shall be placed in the line at each manhole and inflated to 30 psig. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psig greater than the average back pressure of any groundwater that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize.

6. After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be termed "acceptable", if the time required in minutes (for the pressure to decrease from 3.5 to 2.5 psig greater than the average back pressure of any groundwater that may be over the pipe) shall not be less than the time shown for the given diameters in the following table:

Table 1
Time of Pressure Drop* vs. Pipe Diameter/Length

Length of Line(ft)	**4”**	**6”**	**8”**	**10”**	**12”**	**15”**	**18”**	**21”**	**24”**
25	4*	10	18	28	40	62	89	121	158
50	9	20	35	55	79	124	178	243	317
75	13	30	53	83	119	186	267	354	467
100	18	40	70	110	158	248	356	485	634
125	22	50	88	138	198	309	446	595	680
150	26	59	106	165	238	371	510		
175	31	69	123	193	277	425			
200	35	79	141	220	317				
225	40	89	158	248	340				
250	44	99	176	275					
275	48	109	194	283					
300	53	119	211						
350	62	139	227						
400	70	158							
450	79	170							
500	88								
550	97								
600	106								
650	113	170	227	283	340	425	510	595	680

*In seconds for pressure drop from 3-k to 2-k psig.

7. In areas where groundwater is known to exist, the Contractor shall install a one-half inch diameter capped pipe nipple, approximately 1011 long, through the manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the Line Acceptance Test, the groundwater level shall be determined by removing the pipe cap blowing air through the pipe nipple into the ground so as to

clear it, and then connecting a clear plastic tube to the nipple. The hose shall be held vertically and a measurement of the height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. For example, if the height of water is 11@ feet, then the added pressure will be 5 psig, and the 2.5 psig increased to 7.5 psig. The allowable drop of one pound and the timing remain the same.

8. Should the pipe as laid fail to meet these requirements, the Contractor shall perform the necessary work at his expense to meet these requirements.

9. The Contractor shall provide as required the proper plugs,weirs, and other equipment required to perform all tests. Testing of each section of sewer installed shall include the portions of service connections that are to be installed under the Contract. The Contractor shall also provide and utilize, if necessary, equipment to bypass flow around the section being tested and to maintain service to those services temporarily disconnected and capped or plugged for testing.

10. Each day's work may be tested. The Engineer may order pipe laying stopped if testing procedures and results are not acceptable.

11. Leakage in pressure piping shall not exceed 15 gallons in 24 hours per mile of pipe per inch diameter when tested by water pressure at 1.5 times the working pressure of the pipe, but not less than 50 psi. Contractor shall furnish all testing equipment for making such tests. Pressure pipelines shall be tested in accordance with AWWA C600.

12. Should the pipe fail the pressure test, repairs to the pipe are to be made at the expense of the contractor.

13. All testing shall be done in the presence of the Owner or their representative.

3.07 DEFLECTION TESTING FOR GRAVITY SEWER

A. Deflection Testing. After the pipe has been laid and backfilled, all pipe shall be tested for deflection in the presence of the Engineer. This test shall consist of pulling a mandrel (Go-No-Go Device) through the pipe. The maximum deflection allowable shall not exceed 5% of the pipe's internal diameter for final inspection. The Contractor shall conduct the test and shall furnish all necessary test equipment and labor. All pipe sections failing the test shall be removed and replaced at the Contractor's expense.

3.08 LIGHT TEST

1. After the trench has been backfilled and compacted as specified in Section 02223, a light test shall be made between manholes to check alignment and grade for displacement of pipe. The completed pipeline shall be such that a true circle of light can be seen from one manhole to the next. If alignment or grade is other than specified and displacement of pipe is found, the Contractor shall remedy such defects at his own expense.

SECTION

PACKAGE CONCRETE PUMP STATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pump station concrete wet well
B. Pumps
C. Controls
D. Piping
E. Accessories

1.2 RELATED SECTIONS

A. Section 02730 - Sanitary Sewer Systems
B. Section 02222 - Excavation
C. Section 02223 - Backfilling

1.3 SUBMITTALS

A. Manufacturer's Literature: Supply copies of descriptive literature, installation instructions, initial operation instructions, and operating and maintenance instructions.

B. Certificates: Supply copies of manufacturer's certification that supplied products comply with Specification requirements.

C. Shop Drawings: Supply information including dimension drawings, control details, electrical schematic diagrams, pump curves, motor data, painting, etc.

1.4 SPARE PARTS

A. Provide for each pump:

1. Spare mechanical seal.
2. 2. Set of spare gaskets.

1.5 GUARANTEE

A. Contractor's one (1) year guarantee will cover and include:

1. Faulty or inadequate design.

2. Improper assembly or erection.

3. Defective workmanship and materials.

4. Leakage, breakage, or other failure.

B. Material and Workmanship:

1. The pump manufacturer shall warrant equipment supplied to be of quality construction, free of defects in material and workmanship. The written warranty shall indicate specific parts and labor covered, on a prorated basis for a period of 5 years or 10,000 hours from date of shipment for permanent municipal installations.

2. It is not intended that the manufacturer assume liability for consequential damages or contingent liabilities arising out o the failure of any product or parts thereof to operate properly, however caused; whether by or resulting from, or arising out of, defects in design or manufacture, delays in delivery, replacements or otherwise.

C. Effective Date:

1. The warranty shall become effective upon the acceptance by the purchaser or the purchaser's authorized agent, or sixty (60) days after installation, or ninety (90) days after shipment, whichever occurs first.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide the number of automatic pumping stations shown on the plans complete with all required equipment in a precast reinforced concrete shell and adjacent valve vault.

1. Provide all required equipment pre-installed, including but not limited to; two (2) electric motor drive, septic tank effluent pumps with slide away couplings, internal piping, central control panel with circuit breakers in all weather NEMA enclosure for internal mounting, motor starters and automatic pumping level controls, and all internal wiring.

2. Standardization: Except as specified herein, all pumping stations for this project will be by the same manufacturer and will be of similar layout, construction, and operating characteristics.

D. Manufacturer's Experience: Ten (10) years in the production of prefabricated concrete pumping stations.

2.2 PUMP CHAMBER

A. Chamber shall be of precast concrete vertical sections having nominal inside diameters as shown on the plans.

B. All precast concrete shall have a minimum compressive strength of 4,000 psi @ 28 days, comply with ASTM C 478.

C. Steps or rungs shall be of copolymer polypropylene plastic coated steel or forged aluminum and shall meet all applicable safety standards.

D. Joints between sections shall be fitted with annular rubber gaskets meeting ASTM C 443 or butyl rubber joint sealant.

E. Exterior concrete surfaces below grade shall be damp proofed with an approved material such as Bitumastic Super Service Black as made by Koppers Company or approved equal.

2.03 AUXILLARY EQUIPMENT

A. Access Hatch: 2'-6" x 4'-6" for 300#/s.f. unless otherwise specified on project plans.

B. Piping: All valves and fittings shall be 125# flanged cast iron to 24" outside of wet well walls. Plug valves to be iron bodies bronze mounted with non-rising stem. Check valves to be iron bodies bronze mounted.

C. PVC, Schedule 80 vent piping.

2.04 PUMPS

A. Operating Conditions:

1. Myers P102, 1 hp, 3450 rpm, 38 gpm at 80.2 feet total dynamic head.

B. Hydraulic Components and Solids Handling:

1. The pump shall be designed to handle septic tank effluent and be capable of passing 3/4 inch spherical solids. The pump shall be capable of handling liquids with temperatures to 140°F intermittent and shall be capable of running dry without damage to the seals or bearings.

2. All pump openings and passages shall be of adequate size to pass 3/4" diameter spheres (minimum) and any trash or stringy material which can pass through an average house collection system.

3. The pump impeller shall be of the single vane enclosed type. The impeller shall be constructed of an engineered thermoplastic. A stainless steel wear ring shall be molded into the neck of the thermoplastic impeller to provide a sealing surface. A replaceable Buna-N sealing cup shall effect a seal between the volute and impeller in order to maintain high efficiency and prevent recirculation. The impeller shall be threaded onto the 416 stainless steel pump/motor shaft.

4. The motor shall be protected by two (2) rotary shaft seals mounted in tandem with an oil filled chamber separating the seals. The seals shall have carbon and ceramic seal faces diamond lapped to a tolerance of one light band. Metal parts and springs for seals shall be 300 series stainless steel. Two optional electrical sensing probes shall be mounted in the seal chamber to detect any water leakage past the lower seal. The sensing probes shall be connected to a red warning light in the control panel. The warning light shall serve to indicate a seal leak and shall not stop the pump.

5. All other major pump components such as stator housing, seal housing, and bearing brackets must be of structural grade steel or gray iron - Class 30. All external surfaces coming into contact with sewage shall be protected by a coal tar based epoxy coating of 8 mils minimum thickness. All exposed fasteners and lock washers shall be of 300 stainless steel.

6. The motor power cord shall be 14-3 SJOW/SJOWA or SOOW. The cable jacket shall be sealed at the motor entrance by means of a rubber compression washer and compression nut. A heat shrink tube filled with epoxy shall seal the outer cable jacket and the individual leads to prevent water from entering the motor housing.

C. Electrical Power Available

1. The electrical power to be furnished to the site will be 240 volts +/- 10%, 1-phase, 60 hertz, 4 wire.

2. Motor Description

1. The pump motor shall be of the submersible type.

2. Single phase motors shall be of the permanent split capacitor type with no relays or starting switches.

3. Stator winding shall be of the open type with Class B insulation rated for 130°C maximum operating temperature. The winding housing will be filled with clean dielectric oil to lubricate bearings, seals, and transfer heat from the windings to the outer shell.

4. The motor assembly shall be of the standard frame design and shall be secured in place by four threaded fasteners allowing for easy field serviceability. The motor shall be capable of operating over the full range of the performance curve without overloading the motor and causing any objectionable noise or vibration. The motor shall have two bearings to support the rotor; an upper ball bearing to accommodate radial loads and a lower ball bearing to take thrust and radial loads. Ball bearings

shall be designed for a B-10 life of 50,000 hours. A heat sensor thermostat and overload shall be attached to the top end of the motor windings and shall be wired in series with the windings to stop the motor if the motor winding temperature reaches 266°F. The overload thermostat shall reset automatically when the motor cools to a safe operating temperature.

D. Watertight Integrity:

1. All static seals at water tight mating surfaces shall be of nitrite "O" ring type. Use of auxiliary sealing compounds shall not be required. The power and control cables shall enter the motor through a terminal housing. The entrance shall be sealed with a rubber grommet and clamp set which when compressed longitudinally causes a radial water tight seal. The clamp set shall prevent all slippage and rotation of cable while engaged, yet may be easily removed and reused during routine maintenance. Any other cable entrance design requiring use of epoxies, silicones, or similar caulking materials shall be considered unacceptable.

2. The pump and electrical cables shall be capable of continuous submergence without loss of waterproof integrity to a depth of 65 feet.

3. The water tight integrity of the motor housing and shaft seal shall be tested during manufacture by pressurizing the motor cavity and submerging in water with motor operating. A separate performance test shall also be conducted on each fully assembled pump to verify published head/capacity and power input.

2.05 AUTOMATIC DISCHARGE CONNECTION

A. Description:

1. Each pump shall be furnished with a submersible discharge connection system to permit removal and installation of the pump without the necessity of an operator entering the wet well. The design must insure an automatic and firm connection of the pump to the discharge piping when lowered into place: Myers SRA-150 lift-out rail systems

2. Each lift-out system shall consist of a cast iron discharge base, cast iron pump carrier and sealing plate, steel pump guide plate, and cast iron elbow. All exposed nuts, bolts, and fasteners shall be 300 series stainless steel.

3. Discharge elbow shall be 1½” x 2” and shall be integral to the base assembly. The base shall be coated with coal tar epoxy for corrosion resistance. The manufacturer shall provide all necessary drawings to insure proper installation and alignment of baseplate within the sump.

4. A sealing plate shall be threaded to the pump. A simple downward sliding motion of the pump and guide plate on the guide rails shall cause the unit to be automatically connected and sealed to the base. The open face of the sealing plate shall have dovetailed groove machined into the face to hold a sealing “O” ring. The “O” ring shall provide a leakproof seal at all operating pressures.

5. Two rail pipes shall be used to guide the pump from the surface to the discharge base connection. The guide rails shall be ¾” Schedule 40 stainless steel pipe. The weight of the pump shall bear solely on the discharge base and not on the guide rails. Rail systems which require the pump to be supported by legs which might interfere with the flow of solids into the pump suction will not be considered equal. The guide rails shall be firmly attached to the access hatch frame.

6. An adequate length of stainless steel lifting chain shall be supplied for removing

2.06 ELECTRICAL CONTROL COMPONENTS

A. Controls:

1. The pump control panel shall be manufactured by a UL panel builder and the assembly shall bear a serialized UL label for "Enclosed Industrial Control Panels". Listing for open style industrial control panels or an assembly of listed or recognized components shall not be acceptable.

2. Panel Enclosure:

    a. The electrical control equipment shall be mounted within a Nema 3R steel, dead front type control enclosure. The enclosure door shall be hinged and sealed with a neoprene gasket. It shall include a removable steel back panel on which control components shall be mounted. Back panel shall be secured to enclosure with collar studs. Operator controls shall be mounted on a steel inner swing panel. The control panel shall be equipped with vapor emission type corrosion inhibitors. Enclosure shall be suitable for wall .

2.07 MOTOR BRANCH COMPONENTS

A. Component Mounting:

1. All motor branch circuits shall be of the highest industrial quality, securely fastened to a removable sub-plate with screws and lockwashers. The sub-plate shall be tapped to accept all mounting screws. Self-tapping screws shall not be used to mount any component. All operating controls and instruments shall be securely mounted and shall be clearly labeled to indicate function.

B. Main Connections:

1. A main terminal block and ground bar shall be furnished for field connection of the electrical supply. The connections shall be designed to accept copper conductors of sufficient size to serve the pump station loads. The main terminal block shall be mounted to allow incoming wire bending space in accordance with Article 373 of the National Electrical Code (NEC).

C. Circuit Breakers and Operating Mechanisms:

1. A properly sized heavy-duty air circuit breaker shall be furnished for each pump motor, and shall have a symmetrical RMS interrupting rating of amperes at volts. The manufacturer shall seal all circuit breakers after calibration to prevent tampering. A padlocking operating mechanism shall be installed on each motor circuit breaker. Operator handles for the mechanisms shall be located on the inner door, with interlocks which permit the inner door to be opened only when circuit breakers are in the "OFF" position.

2.08 OTHER CONTROL COMPONENTS

A. Control Circuit:

1. The control circuit shall be protected by a normal duty thermal-magnetic air circuit breaker, which shall be connected in such a manner as to allow control power to be disconnected from all control circuits.

B. Pump Mode Selection:

1. Pump mode selector switches shall be connected to permit manual start and manual stop for each pump individually, and to select automatic operation of each pump under control of the liquid level control system. Manual operation shall override the liquid level control system. Selector switches shall be heavy duty, oil-tight design, with contacts rated NEMA A300 minimum.

C. Alternator Relay:

1. Pump alternator relay contacts shall operate after pump shutdown.

D. Pump Run Indicators:

1. Control panel shall be equipped with one oil-tight pilot light for each pump motor. Light shall be wired in parallel with the related pump motor starter to indicate that the motor is on or should be running. Run lights shall be equipped with lamps providing a minimum of 15,000 hours.

E. Elapsed Time Indicators:

1. Six digit elapsed time indicators (non-reset type) shall be connected to each motor starter to indicate the total running time of each pump in "hours" and "tenth of hours".

F. Sequence Selector Switch:

1. A switch shall be provided to permit the station operator to select automatic alternation of the pumps, to select pump number one to be the lead pump for each pumping cycle or to select pump number two to be the lead pump for each pumping cycle. Selector switch shall be heavy duty, oil-tight design, with contacts rated NEMA A300 minimum.

G. Receptacle

1. A duplex ground fault indicating utility receptacle providing 115 VAC, 60 Hertz, single phase current, shall be mounted through the inner swing panel of the control enclosure. Receptacle circuit shall be protected by a 15 ampere thermal-magnetic circuit breaker.

H. Pump Start Delay

1. The control circuit for one of the pumps shall be equipped with a time delay to prevent simultaneous motor starts following a power outage. The time delay shall be a solid state fixed 5 second on-delay device.

I. Wiring:

1. The control panel, as furnished by the manufacturer, shall be completely wired. The contractor shall field connect the power feeder lines to the main terminal block, final connections to the remote alarm devices, and the connections between the pump and the pump motor control. All wiring, workmanship, and schematic wiring diagrams shall be in compliance with applicable standards and specifications set forth by the National Electric Code (NEC).

2. All user serviceable wiring shall be type MTW or THW, 600 volts, and shall be color coded as follows:

a. Line and Load Circuits, AC or DC power...…………………………Black
b. AC Control Circuit Less Than Line Voltage………………………..Red
c. DC Control Circuit .... ………Blue
d. Interlock Control Circuit, from External Source……………………..Yellow
e. Equipment Grounding Conductor... ……….Green
f. Current Carrying Ground .... ……….White
g. Hot With Circuit Breaker Open…………………………………….Orange

J. Wire Identification and Sizing:

1. Control circuit wiring inside the panel, with the exception of internal wiring of individual components, shall be of 14 gauge minimum, type MTW or THW, 600 volts. Power wiring shall be 12 gauge minimum or higher based on NEC requirements.

1. The ampacity of motor branch conductors and other power conductors shall not exceed the temperature rating of the connecting terminals. Wires shall be clearly numbered at each end in accordance with the electrical diagrams. All wires on the sub-plate shall be bundled and tied.

K. Wire Bundles:

1. Wires connected to components mounted on the enclosure door shall be bundled and tied in accordance with good commercial practice. Bundles shall be made flexible at the hinged side of the enclosure. Adequate length and flex shall be provided to allow the door to swing to its full open position without undue stress or abrasion on the wire or insulation. Bundles shall be held in place on each side of the hinge by mechanical fastening devices.

L. Low Water Alarm

1. The liquid level controller shall be equipped with a solid state output relay to alert maintenance personnel to a low liquid level in the wet well. In the event that the wet well liquid level reaches a present low water alarm, the low water output relay shall energize a magnetic switch. The magnetic switch shall complete a 115 volt AC circuit for an external alarm device. An indicator, visible on the front of the control panel, shall indicate that a low wet well level condition exists. The magnetic switch shall maintain the alarm signal until the cause of the low wet well has been corrected. A low liquid level condition shall disable both pump motors. When the wet well rises above the low level point, both pump motors shall be automatically enabled. Once the cause for the low wet well level has been corrected, the alarm circuit shall automatically reset.

2.09 CONDUIT

A. Conduit requirements:

1. All conduit and fittings shall be UL listed.

2. Liquid tight flexible metal conduit shall be constructed of smooth, flexible galvanized steel core with smooth abrasion resistant, liquid tight, polyvinyl chloride cover.

3. Conduit shall be supported in accordance with articles 346, 347, and 350 of the National Electric Code.

4. Conduit shall be sized according to the National Electric Code.

B. Grounding:

1. The pump control manufacturer shall provide a common ground bar mounted on the enclosure back plate. The mounting surface of the ground bar shall have any paint removed before making final connections.

2. The contractor shall make the field connections to the main ground lug and each pump motor in accordance with the National Electric Code.

C. Equipment Marking:

1. A permanent corrosion resistant name plate(s) shall be attached to the control and include the following information:

   a. Equipment serial number
   b. Supply voltage, phase and frequency
   c.Current rating of the minimum main conductor
   d. Electrical wiring diagram number
   e. Motor horsepower and full load current
   f. Motor overload heater element
   g. Motor circuit breaker trip current rating
   h.- Name and location of equipment manufacturer

2. Control components shall be permanently marked using the same identification shown on the electrical diagram. Identification label shall be mounted adjacent to the device.

3. Switches, indicators, and instruments shall be plainly marked to indicate function, position, etc. Marking shall be mounted adjacent to and above the device.

2.10 LIQUID LEVEL CONTROL

Pump control shall be via flat switchs and shall be supplied by the contractor.

PART 3 - EXECUTION

3.1 FACTORY TESTING

A. Operational Test:

1. The pumps, motors and controls will each be given an independent operational test in accordance with the standards of the Hydraulic Institute. Recordings of the test shall constitute the correct performance of the equipment at the design head, capacity, and rated speed and horsepower as specified herein.

2. Upon request from the engineer, the engineer or his representative shall be invited to witness the operational test at the manufacturer's facility or other location designated by the manufacturer.

B. Support Literature:

1. The submersible pump manufacturer shall be required to deliver copies of support literature to the engineer for the pump and all related equipment specified herein.

2. Installation Instructions:

   a. Installation of pumping units shall be done in accordance with written instructions provided by the manufacturer.

3. Operation and Maintenance Instructions:

a. The submersible pump manufacturer shall supply a complete set of comprehensive written instructions to enable an operator to properly operate and maintain the equipment supplied. Content of the instructions shall assume the operator is familiar with pumps, motors, piping and valves but that he has not previously operated and/or maintained the exact equipment supplied.

b. The instructions shall be prepared as a system manual applicable solely to the pump equipment and related devices supplied by the manufacturer, as specified herein. Instructions for any equipment for which the manufacturer has not supplied, but has made mounting or other provisions, shall be provided by others.

c. The instructions shall include, but not be limited to, the following:

1) Descriptions of, and operating instructions for, each major component of the complete pump package as supplied.
2) Instructions on operation of the pump in all intended modes of operation and pump control
3) Instruction for all adjustments which must be performed at initial startup of pump equipment, adjustments required after the replacement of liquid level control system components, and adjustments as required in the course of preventative maintenance as specified by the manufacturer.
4) Service instructions for major components not manufactured by the pump package manufacturer, but supplied by him in accordance with the specifications. In such case, the literature supplied by the actual manufacturer shall be incorporated as an appendices.
5) Electrical schematic diagram of the pump and control package prepared in accordance with NMTBA and JIC standards. Schematics shall illustrate, to the extent of authorized repair, pump motor branch, control and alarm system circuits, and interconnections among these circuits. Wire numbers shall be shown on the schematic. Schematic diagrams for individual components, not normally repairable by the station operator, need not be included and details for such parts shall not be substituted for an overall system schematic. Partial schematics, block diagrams, and simplified schematics shall not be provided in lieu of an overall system diagram.
6) Layout drawing of the pump package as supplied, prepared in accordance with good commercial practice, showing the location of all submersible pumps, base plates and guide rail assemblies.

4. Operation and maintenance instructions which are limited to a collection of component manufacturer's literature without overall pump station continuity shall not be acceptable.

5. Operation and maintenance instructions shall be specific to the equipment supplied in accordance with these specifications. Instruction manuals applicable to many different configurations of pump stations, and which require the operator to selectively read portions of the manual shall not be acceptable.

3.2 INSTALLATION

A. Install the package pumping station in complete compliance with the manufacturer's instructions and as shown on the drawings.

B. All internal piping shall be painted silver gray in conformance with Ten State Standards.

3.3 START-UP AND TESTING

A. Before backfilling, the pump tank shall be filled with clean water to test for leaks. All tanks shall be watertight. Twenty-four hours after filling, the Engineer shall inspect the pump tank for leakage and certify that the tank is watertight. A tank that is not watertight shall be rejected and either removed or repaired. Air testing of tank is an acceptable alternate to water testing.

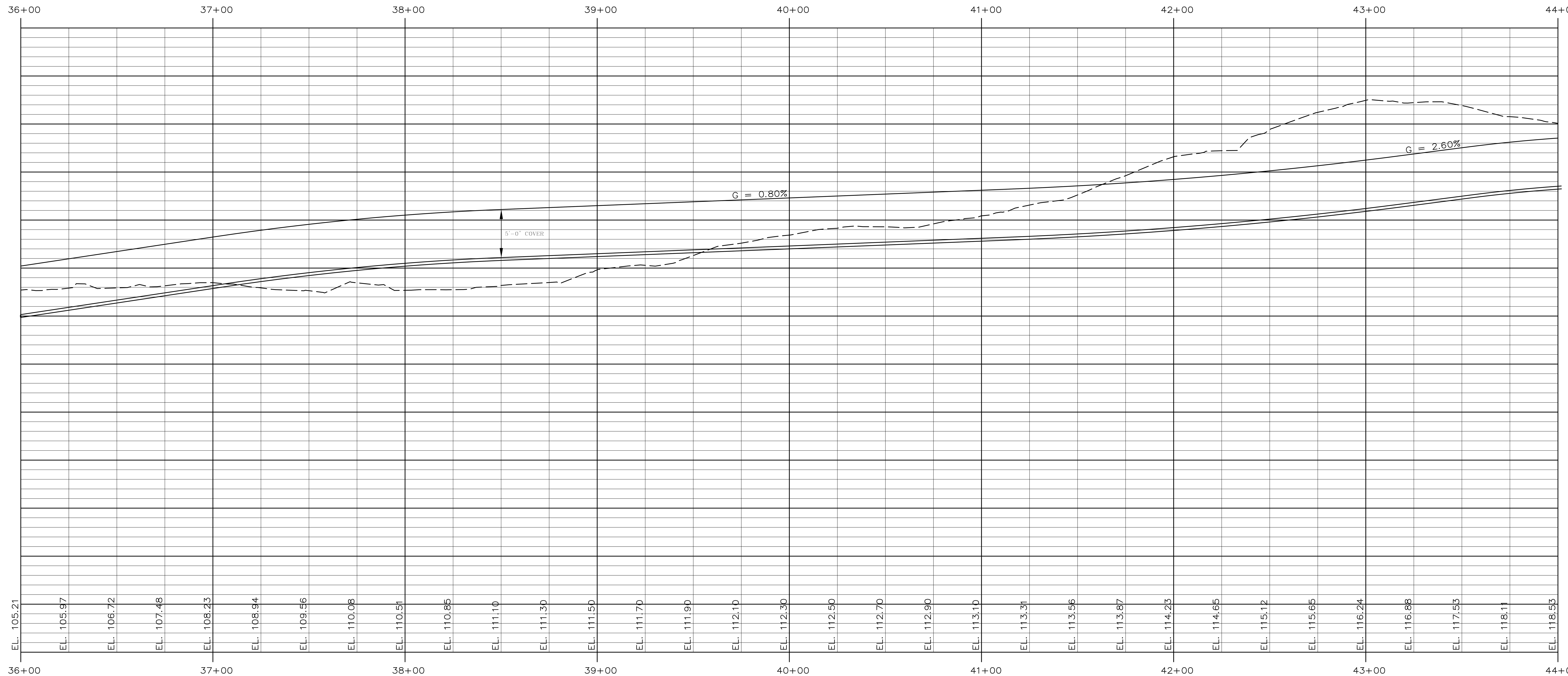
B. Provide the services of a factory-trained representative for a maximum of one day for each station to assist in start-up and testing and to instruct the operator's personnel about the operation and maintenance of the equipment.

C. Before operation:

1. Assure piping is clear of debris which might clog pump.
2. Vent air from pump and piping.
3. Check lubrication.
4. Check for correct operation of check valve.
5. Check for correct rotation.
6. Check alignment.

D. During operation:

1. Check vibration isolation.
2. Check for high bearing temperature.
3. Check for high mechanical seal temperatures.
4. Check for motor overload.
5. Measure flow, head, horsepower.



1/6/09: ISSUED FOR 60% REVIEW

ACADIA GATEWAY CENTER
SEWAGE PUMP STATION AND FORCEMAIN
TRENTON, MAINE

for
FESSENDEN GEOENVIRONMENTAL

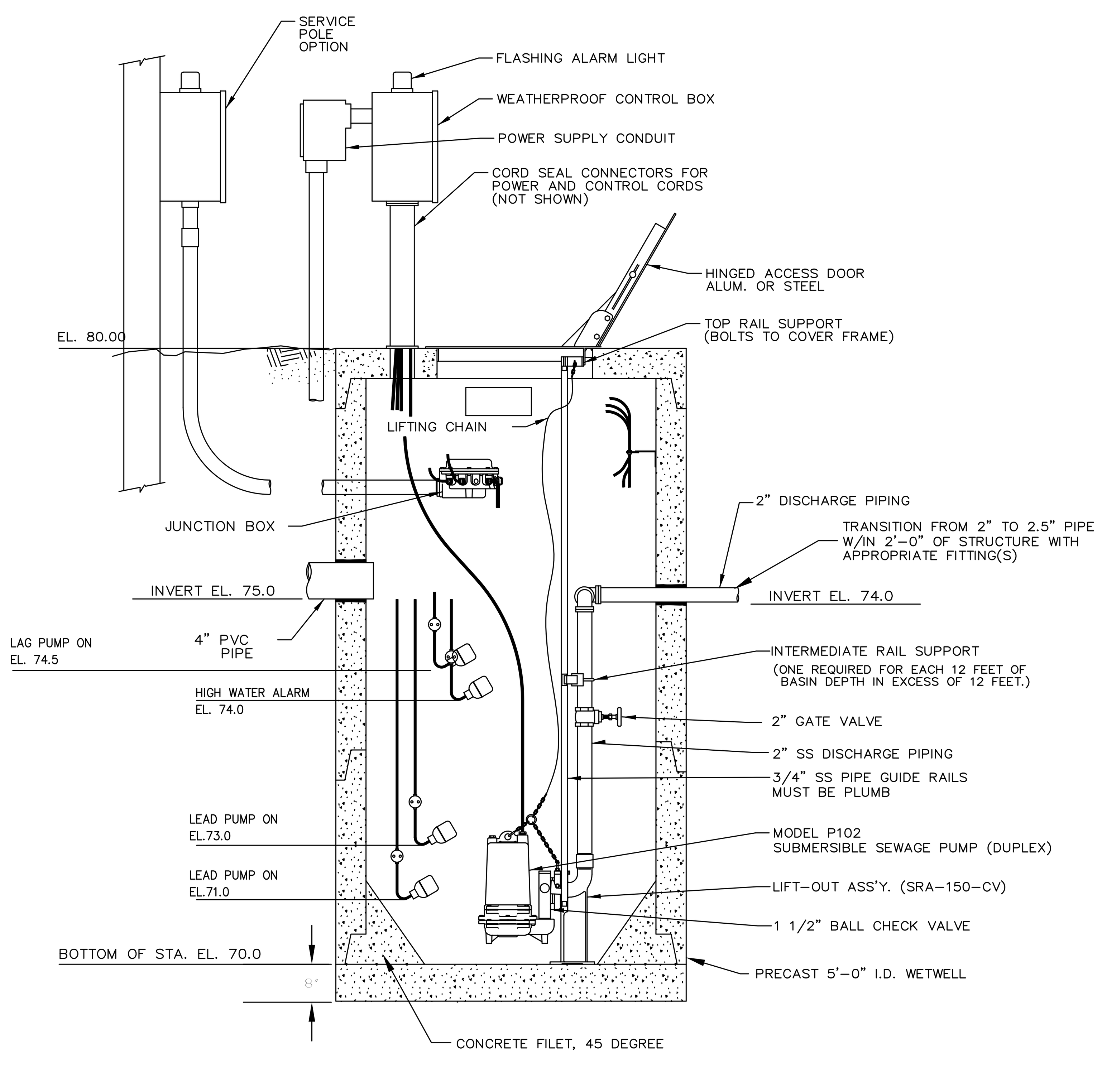
PLAN / PROFILE STA. 36+00 to STA. 44+00

Project #:20810
Scale: 1"=25'
Date: 6/08
Designed by: MM
Drawn by: MM

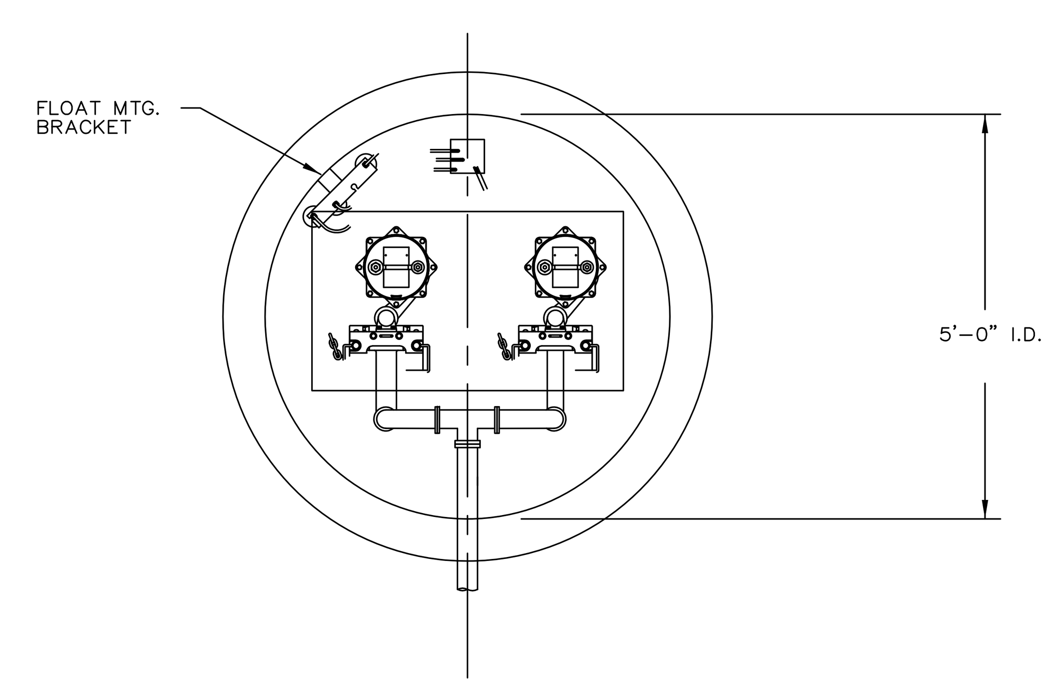
MA

Millett Associates
Civil/Environmental Engineering
38 Homstead Lane
Hermon, Maine 04401
(207) 848-2734

Sheet 2 of

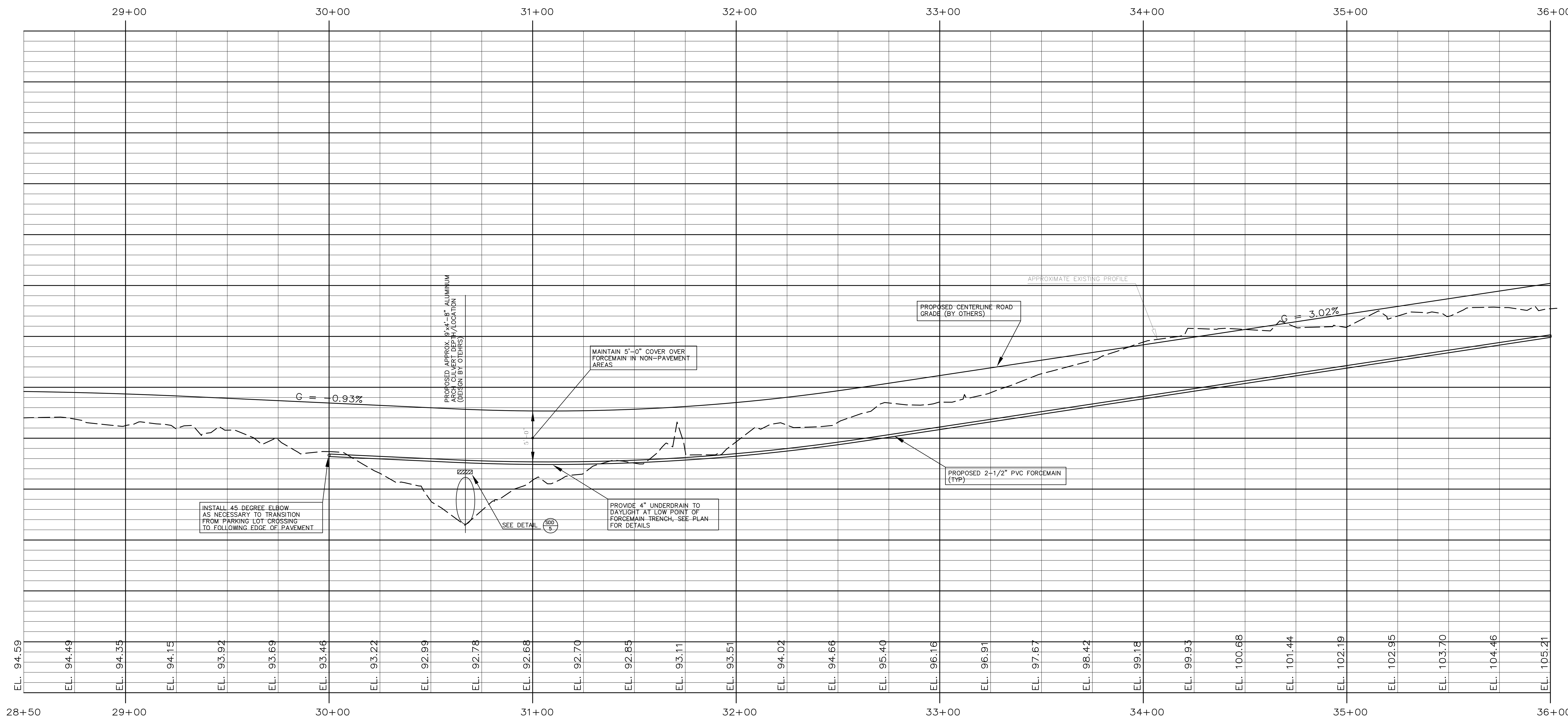


PSD 1 PROFILE



PSD 2 TOP VIEW

1/6/09: ISSUED FOR 60% REVIEW	
ACADIA GATEWAY CENTER TRENTON, MAINE for the FESSENDEN GEOENVIRONMENTAL SERVICES PUMP STATION DETAILS (PSD)	Project #: 20901 Scale: AS INDICATED Date: 1/09 Designed by: MM Drawn by: MM
MA Millett Associates Civil/Environmental Engineering 38 Hamsted Lane Hermon, Maine 04401 (207) 848-2734	Sheet 4 of 4



NOTES:

1. ROAD PROFILE IS TAKEN FROM PLANS PROVIDED BY OTHERS. SEE ROADWAY PROFILE FOR PROPOSED CURVATURE INFORMATION.

2. PROPOSED FORCEMAIN SHALL BE PVC SDR 32.5, 2.5" NOMINAL SIZE.

1/6/09: ISSUED FOR 60% REVIEW

ACADIA GATEWAY CENTER
SEWAGE PUMP STATION AND FORCEMAIN
TRENTON, MAINE

for
FESSENDEN GEOENVIRONMENTAL

PLAN / PROFILE STA. 30+00 to STA. 36+00

Project #: 20901
Scale: 1"=25'
Date: 1/09
Designed by: MM
Drawn by: MM

MA Millett Associates
Civil/Environmental Engineering
38 Homsted Lane
Hermon, Maine 04401
(207) 848-2734

Sheet 1 of

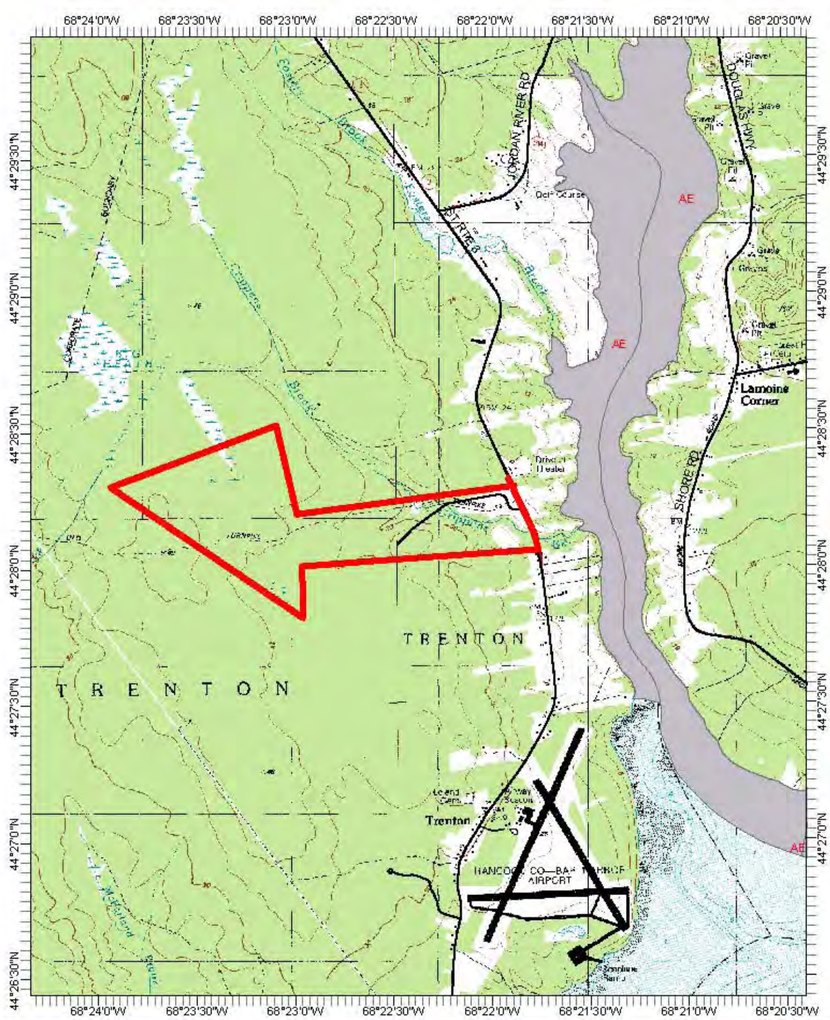
SECTION 18 SOLID WASTE

An estimated total of 100 cubic yards of stumps and grubbing will occur within the footprint of the project. The quantity of food, paper, etc generated by construction personnel is unknown since the project has not been awarded to a contractor; however the contractor will be responsible for maintaining the project site and a MaineDOT Resident Engineer will oversee the contractor’s work and the project. The location for disposal of stumps and grubbing material will be reviewed and approved by the Maine DOT resident engineer, prior to the disposal of any material. Disposal of solid waste will be the contractor’s responsibility. All debris is to become the property of the contractor and will be disposed of in accordance with the Maine Solid Waste Law, Title 38 M.R.S.A.§1301 et. Seq. per Supplemental Specification 656 “Temporary Soil Erosion and Water Pollution Control” of the contract with MaineDOT.

SECTION 19 FLOODING

The Federal Emergency Management Agency (FEMA) is responsible for assisting with floodplain management. Floodplains are defined as "lowland and relatively flat areas adjoining inland and coastal waters including, at a minimum, that area subject to a one percent or greater chance of flooding in any given year" (44 CFR 9.4). All federal projects that could potentially impact floodplains are required to evaluate the impacts according to the provisions set forth in Executive Order 11988, *Floodplain Management*, dated May 24, 1977, and to "avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative" (Executive Order 11988).

The AGC project area is not located within areas subject to flooding from a 100-year flood event according to the Flood Insurance Rate Maps published by the FEMA. Areas adjacent to Crippens Brook may experience minor flooding as a result of severe storm activity or local drainage problems.



Acadia Gateway with Site Boundaries
FEMA Flood Zone Map

SECTION 20 BLASTING

No blasting is anticipated for this project. No blasting plan is provided. If blasting is necessary, a blasting plan will be prepared in accordance with the State of Maine Department of Transportation Standard Specifications 105.2.6 Use of Explosives.

SECTION 21 AIR EMISSIONS

The air quality analysis conducted for the Environmental Assessment demonstrates that although VOC (volatile organic compound) emissions would just barely increase in the project opening year 2009, emissions would decrease in the year 2012. Given the relatively small size of increase in emissions in the year 2009 and the ultimate reduction in emissions in 2012, this project is not expected to result in adverse air quality impacts for the region. Therefore, this project would result in a negligible effect in the short term and a minor long term beneficial impact due to the transfer of private vehicles to transit.

SECTION 22 ODORS

Minimal odors will be generated by the project either during construction or operation of the facility. Odors during construction will include organic odors from earth moving and petroleum odors from construction equipment and other vehicles used during construction. The project consists of a bus maintenance facility, an inter-modal facility and a visitor's welcome facility; therefore, odors post construction would consist of car emissions and propane bus emissions.

SECTION 23 WATER VAPOR

There will be no large scale water vapor emission from the Acadia Gateway Center facility, such as that resulting from a processing plant or power generating facility.

SECTION 24 SUNLIGHT

This project will not block access to sunlight on adjacent properties utilizing solar energy through active or passive systems. The tallest structure will be a 2-story structure more than 100 feet from the nearest property line.

Property Owner Name And Address List

Date : 09/29/2008

NO PROPERTY OWNERS : 20

PIN : 013332.09

TOWN : Trenton

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
LAURIE ROMER LAWRENCE J. ROMER 593 BAR HARBOR RD TRENTON, ME 04605	Yes	1	27		9	16

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
LAURIE ROMER LAWRENCE J. ROMER 593 BAR HARBOR RD TRENTON, ME 04605	Yes	2	27		3	17

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
EDWIN O. BUSSEY 846 CLEARY ROAD WEST PALM BEACH, FL 33413	Yes	3	28		3-3	14

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
ROBERT DAVIS (ET AL) SEAWALL ROAD SOUTHWEST HBR, ME 04679	Yes	3	28		3-3	14

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
VERNON A. JOHNSON 403 MINTURN ROAD SWANS ISLAND, ME 04685	Yes	3	28		3-3	14

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
SANDRA J. SAUNDERS 617-2 BAR HARBOR RD TRENTON, ME 04605	Yes	4	27		1	1

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
JILL C. WARREN PETER MAYO P.O. BOX 1101 ELLSWORTH, ME 04605	Yes	5	28 28		3-1 3-2	3

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
ELLEN W. MCELVAIN WILLIAM H. MCELVAIN 852 BAR HARBOR RD TRENTON, ME 04605	Yes	7	23		3	4

PIN : 013332.09

TOWN : Trenton

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
STATE OF MAINE SHS #76 AUGUSTA, ME 04333	Yes	8	24		10	

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
NACOOCHEE CORP. C/O JOHN SMITHGALL 4470 CHAMBLEE DUNWOOD SUITE 290 ATLANTA, GA 30338	Yes	9	24		11-1	5

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
NOYES DEVELOPMENT, LLC 688 BAR HARBOR ROAD TRENTON, ME 04605	Yes	10	24		11-2	6

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
COMMERCIAL COASTAL MAINE, LLC 511 BAR HARBOR ROAD TRENTON, ME 04605	Yes	11	24		11-1A	7

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
ARTHUR A. DOLE 53 RIVERFIELD ROAD TRENTON, ME 04605	Yes	12	24		12	8

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
JAMES A. DAY 72 NEEDLES EYE ROAD LAMOINE, ME 04605	Yes	13	24		9	9

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
RENE L. BECKER 386 PARTRIDGE COVE ROAD LAMOINE, ME 04605	Yes	13	24		9	9

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
OLSON BIERMAN PROPERTIES, INC. 58 HEATHER LANE HANCOCK, ME 04640	Yes	14	24		13	10

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
LEWIS & JOANN ROMER LEWIS & JOANN ROMER 24 ROMERS LANE TRENTON, ME 04605	Yes		27		1-1	2

PIN : 013332.09

TOWN : Trenton

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
GARY W. STANLEY KATHLEEN STANLEY 298 SHONE ROAD LAMOINE, ME 04605	Yes		24		14	11

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
BETSY MEISTER PETER LAZAS 727 BAR HARBOR ROAD TRENTON, ME 04605	Yes		24		8	12

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
MARY FOREST VICTOR FOREST 726 BAR HARBOR ROAD TRENTON, ME 04605	Yes		24		15	13

PROPERTY OWNER	POR REQUIRED	PARCEL #	TAX MAP	BLOCK	LOT	POR #
FINLAY MATHESON TRUST 3898 SHIPPING AVE MIAMI, FL 33146	Yes		27		2	15

FORM B 08/08

PUBLIC NOTICE:
NOTICE OF INTENT TO FILE

Please take notice that

The Maine Department of Transportation, State House station 16, Augusta, ME 04333

is intending to file a Site Location of Development Act permit application with the Maine Department of Environmental Protection pursuant to the provisions of 38 M.R.S.A. §§ 481 thru 490 on or about:
February 10, 2009

The application is for:
Construction of the Acadia Gateway Center

at the following location:
Trenton, Maine

A request for a public hearing or a request that the Board of Environmental Protection assume jurisdiction over this application must be received by the Department in writing, no later than 20 days after the application is found by the Department to be complete and is accepted for processing. A public hearing may or may not be held at the discretion of the Commissioner or Board of Environmental Protection. Public comment on the application will be accepted throughout the processing of the application.

The application will be filed for public inspection at the Department of Environmental Protection's office in ***Bangor*** during normal working hours. A copy of the application may also be seen at the municipal offices in **Trenton, Maine.**

Written public comments may be sent to the regional office in Bangor where the application is filed for public inspection:

MDEP, Eastern Maine Regional Office, 106 Hogan Road, Bangor, Maine 04401