3752.00
MEARNG PN 230113
Joint Forces Headquarters
Augusta, Kennebec County, Maine

Joint Forces Headquarters

City of Augusta

Development Review

Prepared For: Maine Army National Guard
Attn: Normand Michaud
Bldg #8, Camp Keyes
Augusta, Maine 04333

Prepared By: WBRC Architects-Engineers
44 Central Street
Bangor, Maine 04401
(207) 947-4511
(207) 947-4628
www.wbrcae.com

WBRC ARCHITECTS • ENGINEERS
BANGOR PORTLAND SARASOTA
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Exhibit #1 – Application Form, Authorization Letter

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DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT
JOINT FORCE HEADQUARTERS, MAINE NATIONAL GUARD
33 STATE HOUSE STATION
AUGUSTA, ME 04333-0033

March 29, 2013

To Matt Nazar:
City Center Plaza
16 Cony Street
Augusta, ME 04330

The Department of Defense, Veterans and Emergency Management has retained WBRC Architects/Engineers to prepare requisite local, state, and federal permit applications for the proposed construction of a Joint Force Headquarters and related site improvements on a parcel of land off Civic Center Drive in Augusta, Maine.

WBRC Architects/Engineers and other sub-consultants are authorized to act on the behalf of the Department of Defense, Veterans and Emergency Management in matters related to these permits. Please contact the undersigned @ (207) 626-7887 should you have any questions.

Sincerely,

Normand G. Michaud,
LTC, EN MEARNG
Department of Defense, Veterans and Emergency Management

City of Augusta
Development Review Application
Bureau of Planning, Department of Development Services

Address of Proposed development: Civic Center Drive
Augusta, ME 04333

Zone(s): Planned Development District (Urban Growth Area)

Project Name: Joint Forces Headquarters

Existing Building (sq. ft.): 0 sq. ft.	**Proposed Building (sq. ft.):** 100,791 sq. ft.
Existing Impervious (sq. ft.): 15,681 sq. ft.	**Proposed Impervious (sq. ft.):** 414,626 sq.ft.

Proposed Total Disturbed Area of the Site: ~18.7 acres

Proposed disturbance of greater than one acre requires a Chapter 500, Stormwater Management Permit from the Maine Department of Environmental Protection (DEP).

Owner's Name/Address:	**Applicant's Name/Address:**	**Consultant's Name/Address:**
Maine Army National Guard Bldg #8, Camp Keyes Augusta, ME 04333 Attn: Normand Michaud	Same As Owner	WBRC Architects·Engineers 44 Central Street Bangor, ME 04401 Attn: John Kenney
Phone #: (207) 626-7887	**Phone #:**	**Phone #:** (207) 947-4511
Cell #:	**Cell #:**	**Cell #:**
e-mail: normand.g.michaud.mil@mail.mil	**e-mail:**	**e-mail:** john.kenney@wbrcae.com
Tax Map #: 5 **Lot #:** 13A	**Lot Size (acres):** 43.4 acres **Frontage (Feet):** 550 ft.	**Form for Evidence of Standing** (deed, purchase and sale agreement, other): Deed (attached)

For Staff Use

Fee Calculation: Major Development max fee is $4,000; Minor Development max fee is $1,000

Major Development: $2,000 + (number of sq ft over 25,000 x $0.15) =

Minor Development: $250 + (number of sq ft over 5,000 x $0.15) =

All Development: Number of Abutters x (1oz First Class postage fee + $0.15) =

Total Fee:

Signatures

Applicant: _____ **Date:** _____

Owner: _____ **Date:** _____

Agent: _____ **Date:** 10/24/13

STATE OF MAINE
JOHN S. KENNEY
No. 11670
LICENSED PROFESSIONAL ENGINEER

Checklist. The checklist below must be completed by the applicant. The required material or a written waiver request must be provided.

Information Required on Plan(s) See Augusta Land Use Ordinance for greater detail	**Included**	**Waiver Requested**
a. Name of Site Plan (Sec 4.5.2.1 of the Land Use Ordinance)	x	
b. Owner(s) name and address (4.5.2.2)	x	
c. Deed reference to subject parcel (4.5.2.3)	x	
d. Engineer's name, address, signature and seal (4.5.2.4)	x	
e. Surveyor's name, address, signature and seal (4.5.2.5)	x	
f. Scale, both in graphic and written form (4.5.2.6)	x	
g. Date and Revision box (4.5.2.7)	x	
h. Zoning designation(s) (4.5.2.8)	x	
i. North Arrow (true and magnetic, dated or grid) (4.5.2.9)	x	
j. Ownership, location and present use of abutting land (4.5.2.11)	x	
k. Location map (4.5.2.12)	x	
l. Streets, existing & proposed, with curve data (4.5.2.13 & 4.6.2.5)	x	
m. Drainage and erosion control (4.5.2.14)	x	
n. Utilities, existing and proposed (4.5.2.15)	x	
o. Topography, 2 foot contours (4.5.2.16)	x	
p. Parcel boundaries and dimensions (4.5.2.17)	x	
q. Proposed Use of the property (4.5.2.18)	x	
r. Proposed public or common areas (4.5.2.19)	x	
s. Boundary Survey and associated information (4.5.2.20)	x	
t. Traffic controls, off-street parking and facilities (4.5.2.21)	x	
u. Proposed fire protection plans or needs (4.5.2.22)	x	
v. Landscaping and buffering (4.5.2.23)	x	
w. Outdoor lighting plan (4.5.2.24)	x	
x. Freshwater wetlands (4.4.1.14)	x	
y. River, stream or brook (4.4.1.15)	x	
Information Required in Written Project Narrative See Augusta Land Use Ordinance for greater detail	**Included**	**Waiver Requested**
a. Pollution – Undue water or air pollution (4.4.1.1)	x	
b. Water – Sufficient potable water (4.4.1.2)	x	
c. Municipal Water – is there adequate supply (4.4.1.3)	x	
d. Soil Erosion – unreasonable soil erosion (4.4.1.4)	x	
e. Road congestion and safety (4.4.1.5 & 4.5.2.21)	x	
f. Sewage waste disposal – adequate provisions (4.4.1.6)	x	
g. Solid waste – adequate provisions (4.4.1.7)	x	
h. Aesthetic, cultural, and natural values (4.4.1.8)	x	
i. Conformity with city ordinances and plans (4.4.1.9)	x	
j. Financial and technical ability (4.4.1.10)	x	
k. Surface water, shoreland, outstanding rivers (4.4.1.11)	x	
l. Ground water – negative impact (4.4.1.12)	x	
m. Flood areas (4.4.1.13)	x	
n. Freshwater wetlands – description of impact (4.4.1.14)	x	
o. Stormwater – management plans (4.4.1.16)	x	
p. Access to direct sunlight (4.4.1.17)	x	
q. State Permits – description of requirements (4.4.1.18)	x	
r. Outdoor lighting – description of lighting plans (4.4.1.20)	x	

Additional Information Required in Written Narrative See Augusta Land Use Ordinance for greater detail **Where the items below duplicate the items above, identical responses are permitted and encouraged.**	**Included**	**Waiver Requested**
s. Neighborhood Compatibility – description per ordinance (6.3.4.1)	x	
t. Compliance with Plans and Policies (6.3.4.2)	x	
u. Traffic Pattern, Flow, and Volume analysis (6.3.4.3)	x	
v. Public facilities – Utilities including stormwater (6.3.4.4)	x	
w. Resource protection and the environment (6.3.4.5)	x	
x. Performance Standards (6.3.4.6)	x	
y. Financial and Technical Ability (6.3.4.7)	x	

Application Materials

The application materials that are required for a complete application are listed below:

Paper Copies	**Included**	**Waiver Requested**
10 copies of the application form and narrative	x	
10 copies of the deed, Purchase & Sale agreement, or other document to show standing	x	
3 copies of any stormwater report	x	
2 copies of any traffic report	x	
6 reduced-sized copies of the complete plan set on 11” x 17” size paper	x	
4 full-sized copies of the complete plan set on ANSI D or E size paper	x	
10 copies of a letter authorizing the agent to represent the applicant	x	
Payment in full of application fee (Note: an abutter notification fee will be assessed after the application is determined to be complete. The fee is $0.15 plus the cost of first class postage for each abutter that will be notified as required by the ordinance.)	x	
Electronic Copy	x	
1 CD that includes each of the application documents in Adobe PDF format	x	

For Official Use:

[] $_____ **Application** Fee Paid. Received By (Initials):_____Date:_____

[] $_____ **Abutter** Notification Fee Paid. Received By (Initials):_____Date:_____

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Exhibit #2 – Project Narrative and Compliance with Approval Criteria

Ordinance Section 4.4.1
Ordinance Section 6.3.4
Requested Waivers

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Existing Conditions

The project is located on 43.4 acres of undeveloped area on a site located off of Civic Center Drive. As part of this project, the 43.4 acres will be separated from the existing 165 acre site that is occupied by the Maine Veterans Memorial Cemetery, established in 1970. (See Exhibit#4 for Title Right or Interest) A road runs across the site providing access to the cemetery from Civic Center Drive. The parcel is zoned as the Planned Development District (PD).

Proposed Project

The purpose of the project is to build a 100,791 sq. ft. (59,333 sq. ft. footprint) joint forces headquarters and associated parking, access drives, and loading areas. The facility will be used for government services, which is a conditional use. The existing access road will be relocated so it intersects with Darin Drive. This intersection will be designed by MDOT. The relocated road will eventually connect back into the existing road.

Parking areas will be buffered by existing vegetation that surrounds the site. Due to strict setbacks put in place by MEARNG a large area of existing vegetation will remain in-tact. Landscaped buffers are proposed in areas lacking sufficient buffering. See Exhibit #10 for more information on buffers.

Stormwater will be captured through catch basins and run into treatment devices. Stormwater will be treated for both quantity and quality by a either a wet pond, or vegetated soil filters. See Exhibit #8 for more information.

The following are the performance standards and review criteria from the City of Augusta Land Use Ordinance. A narrative (in bold) is provided to show how each standard was considered and met.

Ordinance Section 4.4.1 – Criteria for Reviewing the Preapplication

(1) Pollution: The proposed subdivision will not result in undue water or air pollution. In making this determination, consideration shall be given to:

- **The project is not a subdivision. The project is equivalent to an office building and is not expected to produce any unreasonable adverse effect on air or water quality.**

a. The elevation of the land above sea level and its relation to the floodplains;

- **The property is approximately 250 feet above sea level. The project site is located just beyond the Stone Brook floodplain.**

b. The nature of soils and subsoils and their ability to adequately support waste disposal;

- **The project will connect into the municipal sewer system.**

c. The slope of the land and its effect on effluents;

- **The project will connect into the municipal sewer system through means of a force main. See CU### – Site Utility Plan sheets for more information.**

d. The availability of streams for disposal of effluents;

- **The project will connect into the municipal sewer system.**

e. The applicable state and local health and water resource rules and regulations;

- **The project will connect into the municipal sewer systems in accordance with the Greater Augusta Utility District standards.**

(2) Sufficient water: The proposed subdivision has sufficient water available for the reasonably foreseeable needs of the subdivision;

- **The project will connect into the public water system. The building will be supplied from a new 8" service line that will connect into a 16" main in Civic Center Drive. The building will have sprinklers installed and a new hydrant will be located near the building. See CU###-Site Utility Plan sheets for more information. The location of the water line has been reviewed by the Greater Augusta Utility District.**

(3) Municipal water supply: The proposed subdivision will not cause an unreasonable burden on an existing water supply, if one is to be used;

- **A letter from the Greater Augusta Utility district is enclosed in Exhibit #12 stating they have an adequate water supply to meet the demand of the building.**

(4) Soil erosion: The proposed subdivision will not cause unreasonable soil erosion or a reduction in the land's capacity to hold water so that a dangerous or unhealthy condition results;

- **Erosion and sediment control best management practices will be used during and after construction. See Exhibit #7 for the attached Erosion and Sediment Control Plan. NRCS Soils maps are also included in Exhibit #6**

(5) Highway or public road congestion: The proposed subdivision will not cause unreasonable highway or public road congestion or unsafe conditions with respect to the use of the highways or public roads existing or proposed;

- **The current entrance to the parcel will be realigned with Darin Drive due to the increase in traffic along the access road. MDOT is designing the relocation of the access road to provide a safe signalized intersection. See Exhibit #9 for more information on traffic.**

(6) Sewage waste disposal: The proposed subdivision will provide adequate sewage waste disposal.

- **A letter from the Greater Augusta Utility district is enclosed in Exhibit #12 stating they have adequate capacity to meet the demand of the new project.**

(7) Municipal solid waste and sewage waste disposal: The proposed subdivision will not cause an unreasonable burden on the municipality's ability to dispose of solid waste and sewage, if municipal services are to be utilized.

- **A letter from Pine Tree Waste is enclosed in Exhibit #12 stating they are willing to accept the construction waste and municipal solid waste generated as a result of this project and have adequate capacity to do so. This letter is not a contract but more of statement of capabilities.**

(8) Aesthetic, cultural and natural values: The proposed subdivision will not have an undue adverse effect on the scenic or natural beauty of the area, aesthetics, historic sites, significant wildlife habitat identified by the Maine Department of Inland Fisheries and Wildlife or the City of Augusta, or rare and irreplaceable natural areas or any public rights for physical or visual access to the shoreline;

- **Letters from the Maine Historic Preservation Commission, Maine Department of Inland Fisheries and Wildlife, and Maine Natural Areas Program are included in Exhibit #12. The project will incorporate up to date architectural design as to make the project aesthetically pleasing and have no adverse effect on the scenic or natural beauty of the area.**

(9) Conformity with city ordinances and plans: The proposed subdivision conforms with a duly adopted subdivision regulation or ordinance, comprehensive plan, development, plan or land use plan.

- **The project is not a subdivision. The proposed use is a Conditional Use, requiring Planning Board review and a public hearing. Performance zoning was also considered during the design process.**

(10) Financial and technical capacity: The subdivider has adequate financial and technical ability to develop the project in a manner consistent with state and local performance, environmental and technical standards;

- **The applicant has previous experience in construction projects. The project is federally funded and a statement of financial capacity has been included in Exhibit #4.**

- **The design team has extensive experience in designing and obtaining local, state, and federal permits. Examples of previous projects done by WBRC Architects · Engineers and their consultants are included in Exhibit #5.**

(11) Surface waters; outstanding river segments: Whenever situated entirely or partially within the watershed of any pond or lake or within two hundred fifty (250) feet of any wetland, great pond or river as defined in Title 38, Chapter 3, subchapter I, Article 2-B, the proposed subdivision will not adversely affect the quality of that body of water or unreasonably affect the shoreline of that body of water:

- **The project is not a subdivision. The parcel is located within 250 feet of a wetland. A Tier 3 NRPA permit will be filed with the US Army Corps of Engineers in order to deal with wetland mitigation. Stormwater will be treated with best management practices as to not affect the quality of water in these wetlands and nearby Stone Brook.**

(12) Ground water: The proposed subdivision will not, alone or in conjunction with existing activities, adversely affect the quality or quantity of ground water;

- **The project will not adversely affect the quality of the groundwater. Stormwater will be treated with best management practices as to not adversely affect the quality of water.**

(13) Flood areas: Based on the Federal Emergency Management Agency's Flood Boundary and Floodway Maps and Flood Insurance Rate Maps, and information presented by the applicant, whether the subdivision, or any part of it, is in a flood-prone area. If the subdivision, or any part of it, is in such an area, the subdivider shall determine the 100-year flood elevation and flood hazard boundaries within the subdivision. The proposed subdivision plan must include a condition of plat approval requiring that principal structures in the subdivision will be constructed with their lowest floor, including the basement, at least one (1) foot above the 100-year flood elevation;

- **The project is not located within a floodplain. See Exhibit #11 for a FEMA flood map.**

(14) Freshwater wetlands: All freshwater wetlands within the proposed subdivision have been identified on any maps submitted as part of the application, regardless of the size of these wetlands. Any mapping of freshwater wetlands may be done with the help of the Kennebec County Soil and Water Conservation District.

- **Wetlands and vernal pools were located in an Environmental Assessment done by CES Inc. The locations of wetlands and vernal pools have been shown on attached plans. A Tier 3 NRPA permit will be filed with the US Army Corps of Engineers to deal with the wetland and vernal pool mitigation.**

(15) River, stream or brook: Any river, stream or brook within or abutting the proposed subdivision has been identified on any maps submitted as part of the application. For purposes of this section, "river, stream or brook" has the same meaning as in Title 38, M.R.S.A. Section 480-B, Subsection 9 (also defined in this ordinance);

- **Stone Brook is located on the project parcel. See CP### - Site Layout Plan sheets for more information on location of Stone Brook with relation to project.**

(16) Stormwater: The proposed subdivision will provide for adequate stormwater management.

- **Due to the increase in impervious area on the site, stormwater will be a factor. Stormwater will be treated for both quantity and quality with treatment devices from Maine Stormwater Best Management Practices Manual. A wet pond will be located to the southeast of the new building. This wet pond will capture a large portion of the stormwater from the new impervious area (both building and parking). It will retain the water as well as treat it. Areas along the new access drive will be treated by soil filters. See Exhibit #8 for more information on stormwater management.**

(17) Access to direct sunlight: The Planning Board may, to protect and ensure access to direct sunlight for solar energy systems, prohibit, restrict or control development. The subdivider shall, on request of the Planning Board or staff, submit development plans which include either one (1) or a combination of the following:

(a) Restrictive covenants;
(b) Height restrictions;
(c) Increased setback requirements.

- **The proposed project will not block access to sunlight. The project was designed in accordance with height and setback requirements for the Planned Development District.**

(18) Title 38 M.R.S.A. as amended, Section 484, Standards for Development; Chapter 371, Definition of Terms used in the Site Location of Development Law and Regulations; Chapter 373, Financial Capacity Standard; Chapter 374, Traffic Movement Standard; Chapter 375, No Adverse Environmental Effect Standard; Chapter 376, Soil Types Standard; and Chapter 377, Review of Roads, shall apply to review of major developments.

- **A Site Location of Development Act (SLODA) major amendment will be filed with Maine DEP as part of this project. The project parcel was previously located on the same lot as the Maine Veterans Memorial Cemetery which had a previously approved SLODA permit. A copy of the major amendment application will be sent to the City of Augusta as required.**

(19) Spaghetti-lots prohibited. If any lots in the proposed subdivision have shore frontage on a river, stream, brook, great pond or coastal wetland as these features are defined in Title 38, Section 480-B, none of the lots created within the subdivision have a lot depth to shore frontage ratio greater than five (5) to one (1).

- **No spaghetti lots are proposed as part of this project.**

(20) All outdoor lighting shall be of a design and construction that prevents light trespass beyond the boundaries of the property on which it is located.

- **All lighting will be full cutoff fixtures and motion sensor activated. See ES###- Site Electrical Plan sheets for more information on lighting. See Exhibit #10 for site lighting cut sheets.**

Ordinance Section 6.3.4 – Site Plan Review Criteria Applicable to Conditional Uses

(1) NEIGHBORHOOD COMPATIBILITY

- **The project will incorporate up to date architectural design as to make the project aesthetically pleasing and have no adverse effect on the scenic or natural beauty of the area. It follows all dimensional standards set forth in the Augusta Land Use Ordinance. The elements of the site plan are designed to maximize the privacy of the neighboring residents while limiting wetland impact. This project will not cause any safety concerns in the neighboring area or have a detrimental effect on the value of nearby properties.**

(2) PLANS AND POLICIES:

- **The approval process will confirm the project's compliance with the 1988 Growth Management Plan**

(3) TRAFFIC PATTERN, FLOW AND VOLUME:

- **The current entrance to the parcel will be realigned with Darin Drive due to the increase in traffic along the access road. MDOT is designing the relocation of the access road to provide a safe signalized intersection.**
- **The entrance and parking areas of the project have been designed to allow easy access for emergency vehicles. The parking system allows smooth and convenient movements and satisfies the parking capacity and loading requirements. See Exhibit #9 for more information on traffic and parking requirements.**

(4) PUBLIC FACILITIES:

- **The project will connect to municipal utility services which have adequate capacity. See Exhibit #8 for more information on stormwater management.**

(5) RESOURCE PROTECTION AND ENVIRONMENT:

- **A Tier 3 NRPA permit will be filed with US Army Corps of Engineers to deal with the mitigation of wetlands on the site. Wetland and vernal pool impact were highly considered when making design decisions. All new impervious area will be treated with stormwater best management practices as to minimize the environmental impact of the project. The project will meet air and water quality standards for both state DEP and federal EPA. All state and federal permits will be filed before any construction begins.**

(6) PERFORMANCE STANDARDS:

- **The project complies with performance and dimensional standards in the Augusta ordinance. As the project is equivalent to an office building, glare, and heat are not expected to be issues. Due to a 207' standoff setback a lot of existing trees and vegetation will remain between Civic Center Drive/access road and the building. Areas that don't have adequate buffering will receive additional landscaping.**
- **The proposed Joint Forces Headquarters facility is functionally equivalent to an office building. As such, noise typical of an office building (e.g. air handling units, vehicles in parking lots, etc.) will be generated. There will be two (2) diesel-**

powered generators on-site that will be used for electrical back-up purposes. These generators will be tested periodically. A helicopter landing area is designated on-site for emergency purposes only. The proposed landing area is located 110 feet from the nearest property line, 325 feet from the nearest structure and is buffered by at least 100 feet of existing forest.

(7) FINANCIAL AND TECHNICAL ABILITY:

- **Both the applicant and consultant have prior experience in construction projects. The applicant has shown the there are sufficient funds to complete this project. See attached Exhibit #5 for technical ability sections and Exhibit #4 for financial capacity sections.**

Requested Waivers

The following is a list of requested waivers for this project. They are all requirements within the Ordinance Section 5.1.14.2.

1. Based on the building's square footage and use, 303 parking spaces are required by the ordinance. Funding, however, is provided for only 287 parking spaces, which the applicant deems sufficient. The applicant understands that the Planning Board can reduce the number of required parking spaces by up to 50%. The applicant would like to request a waiver to reduce the number of required parking spaces.

2. The applicant is proposing eight (8) handicap-accessible spaces, which is one more than the seven (7) spaces required by the Americans with Disabilities Act. The ordinance requires 4% of all parking to be handicap-accessible, which would require twelve (12) spaces. The applicant would like to request a waiver to reduce the number of required handicap-accessible parking spaces.

3. The applicant would like to request a waiver to reduce the aisle width from 26 feet to 24 feet to reduce the amount of wetland impact. The applicant has found that a 24 foot wide aisle width will be sufficient for their needs. Lionel Cayer (City Engineer) indicated this reduction would be acceptable.

4. The applicant would like to request a waiver regarding interior islands within the parking lot. Ordinance section 5.1.1.3.g.ii states that parking lots are to be broken up into a maximum of 70 spaces by raised island buffers with plantings. Due to operational and maintenance concerns, the applicant would like to provide striped island areas in lieu of islands with raised curbing and plantings. The striping will be 4" wide painted white striping spaced 12" on center (See layout plans for more information). Although the parking lot will be open to the general public for certain events, its primary usage will be to provide parking for employees and members of the Maine National Guard. The applicant believes that the proposed striped islands will be effective in separating pedestrian and vehicular circulation areas and in breaking up the larger parking lot into areas of 70 parking spaces or fewer. The striped islands will lessen the burden from an operational and maintenance standpoint and will allow for efficient snow removal. If the Planning Board finds that striped islands are not an acceptable substitute for raised islands, then the applicant would like to request a waiver to substitute 1" raised concrete islands in lieu of raised island buffers with plantings.

Ordinance Section 3.7 – Site Capacity Analysis

Site capacity analysis is required in the Planned Development district when utilizing the performance zoning process. The following document goes through the step-by-step process for site capacity analysis.

The results from the site capacity analysis show a **maximum floor area** of **22.4 acres**, and a **maximum impervious surface** of **28.4 acres**.

The proposed project has a **floor area** of **2.31 acres,** and an **impervious area** of **9.52 acres.**

Table 3.7.1-A	
	Gross site area as determined by actual on-site survey within last 5 years.
43.4	acres
	Subtract land constituting land within rights-of-ways of existing roads and/or access easements.
1.5	acres
41.9	acres (running total)
	Subtract land which is not contiguous: (1 and 2) *1. A separate parcel which does not abut, adjoin, or share common boundaries with the rest of the development*
0	acres
41.9	acres (running total)
	2. Land which is cut off from the main parcel by a road, railroad existing land uses, or major stream, such that common use is hindered or that the land unavailable for building purposes.
0.0	acres
41.9	acres (running total)
	Whenever both nonresidential and residential uses are proposed:
0.0	acres
41.9	acres (running total)
	Subtract any land that consists of floodplain, wetland, lake or pond; associated lands zoned Resource Protection.
6.4	acres
35.5	acres (running total)
	Base Site Area
35.5	acres (total)

Table 3.7.3	
	BASE SITE AREA equals NET BUILDABLE SITE AREA
35.5	acres
	Take NET BUILDABLE SITE AREA
35.5	acres
	Multiply by FLOOR AREA FACTOR
0.63	FAR
	Equals MAXIMUM FLOOR AREA
22.4	acres
	Take NET BUILDABLE SITE AREA
35.5	acres
	Multiply by IMPERVIOUS SURFACE RATIO
0.8	ISR
	Equals MAXIMUM IMPERVIOUS SURFACE
28.4	acres

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Joint Forces Headquarters
Augusta, Kennebec County, Maine

Exhibit #3 – Location, Zoning, and Tax Map

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Bldg #8, Camp Keyes
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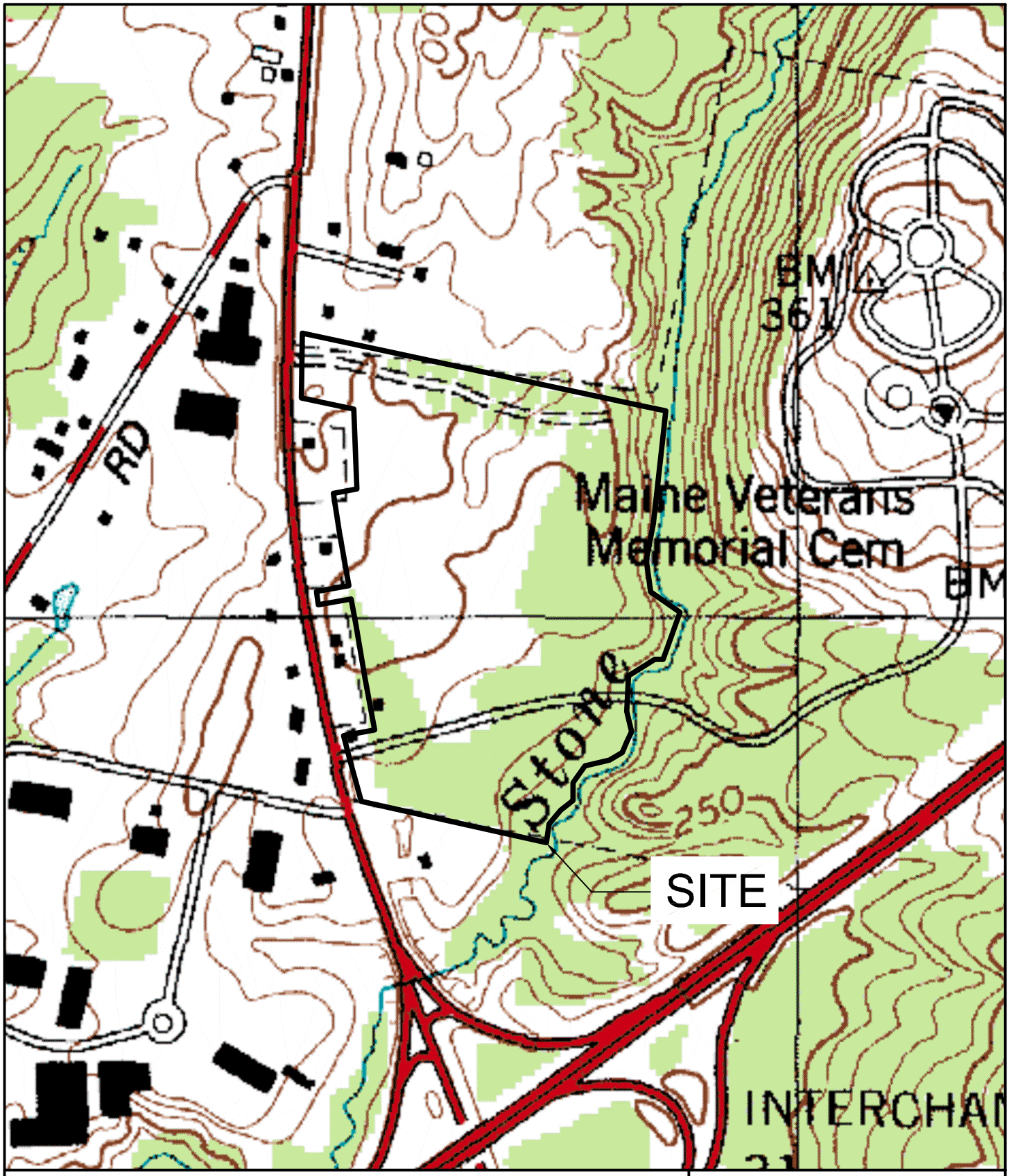
BANGOR PORTLAND SARASOTA
www.wbrcae.com



WBRC
ARCHITECTS · ENGINEERS

BANGOR, MAINE
207-947-4511

SARASOTA, FLORIDA
941-373-1583

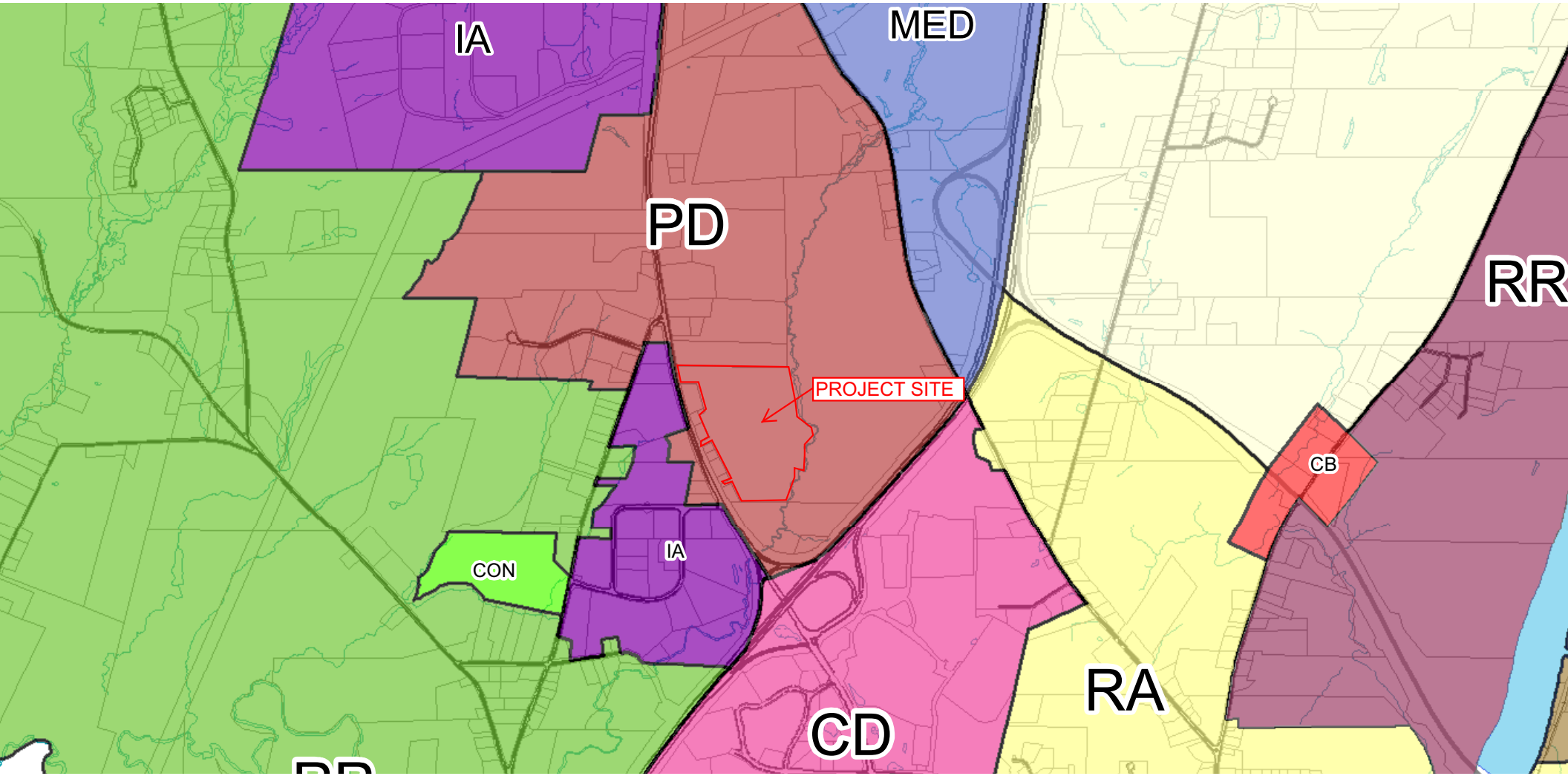
WWW.WBRCAE.COM

SCALE:	1"=500'
WBRC CAD FILE:	375200-LM101
PROJECT No.	3752.00
JOB CAP/DRAW:	CHP
PM:	MLW
CHECKED BY:	ARB
DATE:	11/1/12
SHEET No.	LM101

PROJECT: JOINT FORCES HEADQUARTERS

SHEET TITLE: SITE LOCATION MAP

© COPYRIGHT 2005 WBRC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PROJECT SITE
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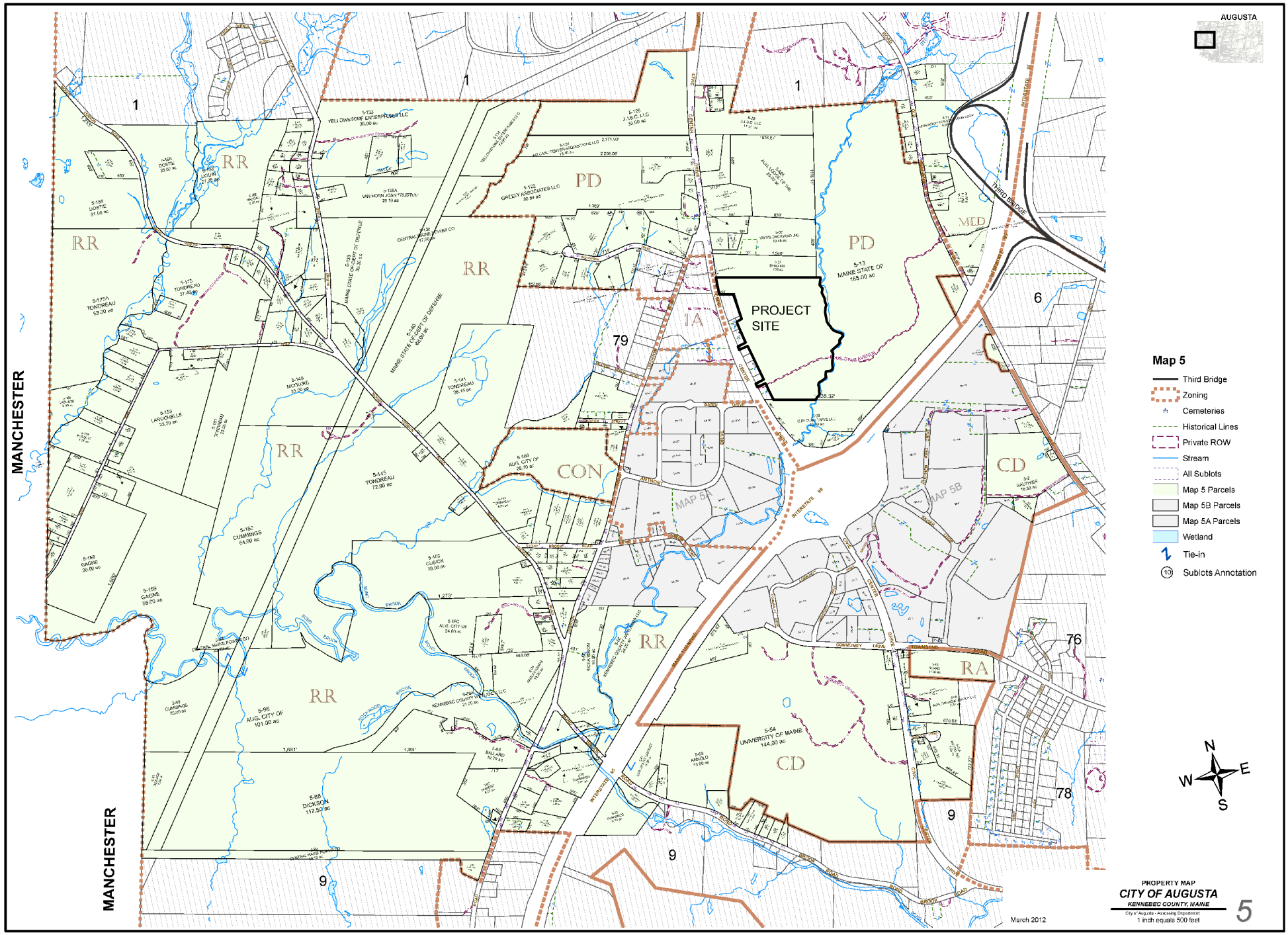
CON
RA
CD


AUGUSTA
MANCHESTER
MANCHESTER
PROJECT SITE
RR
PD
IA
CON
MD
CD
RA
MAP 5A
MAP 5B
THIRD BRIDGE
INTERSTATE 95
5-13 MAINE STATE OF 165.00 ac
5-54 UNIVERSITY OF MAINE 144.00 ac
5-86 AUG. CITY OF 101.00 ac
5-85 DICKSON 117.50 ac
5-145 TONDREAU 72.90 ac
5-149 MORGURE 33.00 ac
5-153 CUMMINGS 64.00 ac
5-159 GAGNE 55.00 ac
5-158 GAGNE 30.00 ac
5-153 LARCHELLE 33.70 ac
5-175 TONDREAU 53.20 ac
5-184 LOSTIE 51.00 ac
5-156 LOSTIE 29.50 ac
5-172 TONDREAU 37.40 ac
5-141 TONDREAU 36.15 ac
5-139 MAINE STATE OF DEPT OF DEFENSE 36.30 ac
5-140 MAINE STATE OF DEPT OF DEFENSE 60.00 ac
5-133 YELLOWSTONE ENTERPRISES LLC 95.00 ac
5-132 GREELY ASSOCIATES LLC 36.94 ac
5-126 J.J.S.C. LLC 30.00 ac
5-2 SAUVIER 19.33 ac
5-102 AUG. CITY OF 28.70 ac
5-103 CUSICK 18.00 ac
5-90 AUG. CITY OF 24.00 ac
5-68 BALLARD 6.70 ac
5-69 BALLARD 6.70 ac
5-49 CUMMINGS 23.05 ac
5-53 HAROLD 13.00 ac
1
6
9
76
78
79
N
E
S
W
Map 5
Third Bridge
Zoning
Cemeteries
Historical Lines
Private ROW
Stream
All Sublots
Map 5 Parcels
Map 5B Parcels
Map 5A Parcels
Wetland
Tie-in
Sublots Annotation
PROPERTY MAP
CITY OF AUGUSTA
KENNEBEC COUNTY, MAINE
City of Augusta - Assessing Department
1 inch equals 500 feet
March 2012
5

3752.00
MEARNG PN 230113
Joint Forces Headquarters
Augusta, Kennebec County, Maine

Exhibit #4 – Right/Title/Interest and Financial Capacity

Prepared For: Maine Army National Guard
Attn: Normand Michaud
Bldg #8, Camp Keyes
Augusta, Maine 04333

Prepared By: WBRC Architects-Engineers
44 Central Street
Bangor, Maine 04401
(207) 947-4511
(207) 947-4628
www.wbrcae.com

WBRC ARCHITECTS • ENGINEERS
BANGOR PORTLAND SARASOTA
www.wbrcae.com

Doc # 2013019489
Book 11464 Page 0295

NO TRANSFER
TAX PAID

QUITCLAIM DEED

KNOW ALL MEN BY THESE PRESENTS, that State of Maine, Department of Defense, Veterans and Emergency Management, Bureau of Veteran Services, by and through its Commissioner pursuant to 37-B M.R.S.A. § 3(1)(D)(11) grant to State of Maine, Department of Defense, Military Bureau, its heirs and assigns, to its own use in fee simple forever, 3

A certain lot or parcel of land situated on the easterly side of Civic Center Drive, so called, in the City of Augusta, County of Kennebec, State of Maine and being more particularly described as follows:

Beginning at a 5/8" iron rebar with identification cap #2157 set on the easterly side of Civic Center Drive on the southwesterly corner of the parcel of land Ruth E. Babcock received by deed dated August 29, 1977 and recorded in the Kennebec County Registry of Deeds, Book 2039, Page 124. Said point also being located S 02º-19'-51"W, a distance of 238.35 feet from granite highway monument found. Thence S 78º-34'-37" E along the land of said Babcock, a distance of 1311.49 feet to a ¾" iron rod found. Thence S 78º-34'-37" E along the land of said Babcock and the remaining land of the grantor, a distance of 105 feet more or less to a point in the thread of Stone Brook. Thence in a general southerly direction along the thread of said Stone Brook and the remaining land of the grantor a distance of 1282 feet more or less to a point on the northeasterly terminus of a 60 foot wide right of way as described below. A straight line between said iron rod found and said point being S 00º-28'-35" E, a distance of 1097.47 feet. Thence S 17º-08'-35" W along the thread of said Stone Brook and the remaining land of the grantor, a distance of 60.05 feet to a point on the southeasterly terminus of said right of way. Thence in a general southerly direction along the thread of said Stone Brook and the remaining land of the grantor, a distance of 718 feet more or less to a point. Thence N 78º-04'-30" W along the land Giri Civic Drive, LLC received by deed dated July 15, 2008 as recorded in said Registry of Deeds, Book 9803, Page 289, a distance of 96 feet more or less to a ¾" iron rebar with identification cap #1059 found. A straight line between said point on the southeasterly right of way terminus and said iron rebar being S 42º-47'-47" W, a distance of 637.20 feet.Thence N 78º-04'-30" W along the land of said Giri Civic Drive, LLC, a distance of 615.57 feet to a point on the easterly side of said Civic Center Drive. Said point being located S 78º-04'-30" E, a distance of 1.84 feet from a 5/8" iron rebar with identification cap #66 found. Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 143.29 feet to a point on the southwesterly terminus of said right of way. A straight line between said last two points being N 16º-05'-34" W, a distance of 143.28 feet. Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 60.01 feet to a point on the northwesterly terminus of said right of way. A straight line between said last two points being N 15º-04'-03" W, a distance of 60.01 feet. Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 52.30 feet to a point. A straight line between said last two points being N 14º-30'-03" W, a distance of 52.30 feet. Said point being located N 79º-15'-38" E, a distance of

Received Kennebec SS.
08/01/2013 12:45PM
Pages 3 Attest:
BEVERLY BUSTIN-HATHEWAY
REGISTER OF DEEDS

0.61 feet from a 2" iron pipe found. Thence N 79º-15'-38" E along the land Carl J. Vander Putten received by deed dated September 15, 1989 as recorded in said Registry of Deeds, Book 3616, Page 184, a distance of 118.00 feet to a 1 ¾" iron pipe found. Thence N 11º-12'-11" W along the land Said Vander Putten received by deed dated September 15, 1989 as recorded in said Registry of Deeds, Book 3616, Page 184 and the land Gerald R. Duplessis received by deed dated June 7, 2000 as recorded in said Registry of Deeds, Book 6220, Page 339, a distance of 200.21 feet to a 1" iron pipe found. Thence N 10º-23'-26" W along the land of said Duplessis, a distance of 99.18 feet to a 1" iron pipe found. Thence N 10º-44'-40" W along the land Marcel E. Veilleux and Nancy D. Thompson received by deed dated April 24, 2009 as recorded in said Registry of Deeds, Book 10338, Page 222, a distance of 100.15 feet to a 1" iron pipe found. Thence N 10º-38'-06" W along the land George E. Poulin and Therese Poulin received by deed dated March 26, 1965 as recorded in said Registry of Deeds, Book 1372, Page 95, a distance of 99.94 feet to a 1 ¾" iron pipe found. Thence S 79º-14'-44" W along the land of said Poulin, a distance of 125.68 feet to a point. Said point being located S 79º-14'-44" W, a distance of 0.38 feet from a 1 ½" iron pipe found. Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 50.10 feet to a point. A straight line between said last two points being N 08º-56'-38" W, a distance of 50.10 feet. Said point being located S 79º-14'-31" W, a distance of 0.25 feet from a 1" iron pipe found. Thence N 79º-14'-31" E along the land Emilien J. Doyon and Fernande Doyon received by deed dated April 13, 1977 as recorded in said Registry of Deeds, Book 1988, Page 333, a distance of 124.06 feet to a 1 ¾" iron pipe found. Thence N 10º-31'-48" W along the land of said Doyon, a distance of 200.18 feet to a 1 ¾" iron pipe found. Thence N 09º-59'-11" W along the land Luke M. Bolduc received by deed dated April 24, 2006 as recorded in said Registry of Deeds, Book 8921, Page 101, a distance of 151.04 feet to a ½" iron rebar found. Thence N 77º-41'-43" E along the land Clemente L. Gaboury and Susan Dostie, trustees of the Donald J. Gaboury Living Trust received by deed dated October 17, 1998 as recorded in said Registry of Deeds, Book 5763, Page 234, a distance of 90.34 feet to a 1 ¾" iron pipe found. Thence N 02º-49'-45" W along the land of said Donald J. Gaboury Living Trust, a distance of 299.58 feet to a 1 ¾" iron pipe found. Thence N 78º-34'-37" W along the land of said Donald J. Gaboury Living Trust, a distance of 200.25 feet to a point on said Civic Center Drive. Said point being located N 78º-34'-37" W, a distance of 0.17 feet from a 1 ¾" iron pipe found. Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 243.27 feet to the point of beginning. A straight line between said last point and said point of beginning being N 00º-05'-55" W, a distance of 243.25 feet. The parcel described above contains 43.4 acres more or less. The above described parcel is subject to a 60 foot wide right of way for all purposes including but not limited to roadway construction, maintenance and improvement for ingress and egress by vehicles and foot with maintenance rights, utility rights and the right to convey these rights to others. Said right of way is described as follows: Beginning at a point on the easterly side of Civic Center Drive. Said point being located S 14º-30'-03" E, a distance of 52.30 feet from a point located on the southwesterly corner of the land Carl J. Vander Putten received by deed dated September 15, 1989 as recorded in the Kennebec County Registry of Deeds, Book 3616, Page 184.Thence N 75º-46'-08" E, a distance of 830.71 feet to a point. Thence in a Easterly direction following a curve concave to the south having a radius of 600.00 feet, a distance of 306.31 feet to a point in the thread of

Stone Brook at the remaining land of the grantor. A straight line between the last two points being S 89º-36'-21" E, a distance of 303.00 feet. Thence S 17º-08'-35" W along the thread of said Stone Brook and the remaining land of the grantor, a distance of 60.05 feet to a point. Thence in a Westerly direction following a curve concave to the south having a radius of 540.00 feet, a distance of 273.45 feet to a point. A straight line between the last two points being N 89º-43'-26" W, a distance of 270.54 feet. Thence S 75º-46'-08" W, a distance of 829.83 feet to a point on the easterly side of said Civic Center Drive. Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 60.01 feet to the point of beginning. A straight line between said last point and said point of beginning being N 15º-04'-03" W, a distance of 60.01 feet. Bearings referenced are based on True North, NAD 83 West Zone. Meaning and intending convey a portion of the land the State of Maine received by deed dated September 28, 1973 as recorded in the Kennebec County Registry of Deeds, Book 1688, Page 295, by deed dated February 09, 1973 as recorded in the Kennebec County Registry of Deeds, Book 1614, Page 220 and by deed dated June 30, 1969 as recorded in the Kennebec County Registry of Deeds, Book 1498, Page 64. Reference is made to a Boundary Survey of a proposed lot division for the Department of Defense, Dated 01-18-2012, by Morin Land Surveying, Plan No. 459, File No. AU102K.

TO HAVE AND TO HOLD the aforgranted and bargained premises with all the privileges and appurtenances thereof, to the said State of Maine, Department of Defense, Veterans and Emergency Management, acting by and through its Commissioner, to its own use in fee simple forever.

IN WITNESS WHEREOF, the Said State of Maine, Department of Defense, Veterans and Emergency Management, as Grantor, have hereunto set its hand and seal this 26th day of July in the year of 2013.

James D. Campbell
Brigadier General
The Adjutant General, MENG

STATE OF MAINE

Kennebec, ss. July 26, 2013

Personally appeared the above named James D. Campbell, and acknowledged the foregoing instrument to be his free act and deed.

Before me,

Name: Peter S. Black, Maine Bar No. 8843

~~Notary Public~~/Attorney at Law

My Commission Expires: Indefinite

Appendix F
Certificate of Title

STATE OF MAINE PROJECT TITLE: JOINT FORCE HEADQUARTERS

LOCATION OF SITE: Maine Veterans Memorial Cemetery, Off Civic Center Drive, Augusta

I hereby certify that the State of Maine is possessed of fee simple title in the hereinafter described real property, as evidenced by deed from Donald J. Gaboury et al to the State of Maine, dated September 28, 1973, and recorded in Book 1688, Page 295, by deed from Frederick L. Turner to the State of Maine, dated February 9, 1973, and recorded in Book 1614, Page 220, and by deed from Dostie Bros., Inc. to the State of Maine, dated June 30, 1969, and recorded in Book 1498, Page 64, official records of the County of Kennebec; that such title or interest in said real property is free of restrictions to National Guard or Reserve use for construction, administration and training, or to U.S. Government use in time of war or national emergency, and is good, valid, and sufficient, and subject to no liens or encumbrances save and except the following: none.

I further certify that the interest of the State of Maine in and to said real property is adequate to justify the expenditure of public funds of the State of Maine in the improvement thereof for Army National Guard purposes and subject to the limitations set forth in Title 10, U.S.C., Chapter 1803, as amended, and that the intended use of said lands and improvements by the Maine Army National Guard is in compliance with all applicable statutes, local laws, and ordinances.

A complete legal description of the property is attached hereto as Attachment A.

Being the lands referred to in Military Construction Cooperative Agreement No. W912JD-12-2-2001 between the United States and the State of Maine for the construction of a Joint Force Headquarters facility at the above named site.

5/2/12
(Date)

Phyllis Gardiner, Assistant Attorney General
Attorney General (or Legal Representative)

Attachment A

718 Cross Hill Road
Vassalboro, Maine 04989
Telephone: (207) 923-3443
Fax: (207) 923-3648

Morin Land Surveying

Date: February 13, 2012

File #: AU102K

Plan #: 459

Grantor: State of Maine

Deed Reference: Book 1688, Page 295, 09-28-1973
Book 1614, Page 220, 02-09-1973
Book 1498, Page 64, 06-30-1969

Location: Civic Center Drive, Augusta

Purpose: Proposed Conveyance 43.4 Acres +/-

EXHIBIT "A"

A certain lot or parcel of land situated on the easterly side of Civic Center Drive, so called, in the City of Augusta, County of Kennebec, State of Maine and being more particularly described as follows:

Beginning at a 5/8" iron rebar with identification cap #2157 set on the easterly side of Civic Center Drive on the southwesterly corner of the parcel of land Ruth E. Babcock received by deed dated August 29, 1977 and recorded in the Kennebec County Registry of Deeds, Book 2039, Page 124. Said point also being located S 02°-19'-51"W, a distance of 238.35 feet from granite highway monument found.

Thence S 78°-34'-37" E along the land of said Babcock, a distance of 1311.49 feet to a ¾" iron rod found.

Thence S 78°-34'-37" E along the land of said Babcock and the remaining land of the grantor, a distance of 105 feet more or less to a point in the thread of Stone Brook.

Thence in a general southerly direction along the thread of said Stone Brook and the remaining land of the grantor a distance of 1282 feet more or less to a point on the northeasterly terminus of a 60 foot wide right of way as described below. A straight line between said iron rod found and said point being S 00°-28'-35" E, a distance of 1097.47 feet.

Thence S 17°-08'-35" W along the thread of said Stone Brook and the remaining land of the grantor, a distance of 60.05 feet to a point on the southeasterly terminus of said right of way.

Thence in a general southerly direction along the thread of said Stone Brook and the remaining land of the grantor, a distance of 718 feet more or less to a point.

Thence N 78°-04'-30" W along the land Giri Civic Drive, LLC received by deed dated July 15, 2008 as recorded in said Registry of Deeds, Book 9803, Page 289, a distance of 96 feet more or less to a ¾" iron rebar with identification cap #1059 found. A straight line between said point on the southeasterly right of way terminus and said iron rebar being S 42°-47'-47" W, a distance of 637.20 feet.

Thence N 78°-04'-30" W along the land of said Giri Civic Drive, LLC, a distance of 615.57 feet to a point on the easterly side of said Civic Center Drive. Said point being located S 78°-04'-30" E, a distance of 1.84 feet from a 5/8" iron rebar with identification cap #66 found.

Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 143.29 feet to a point on the southwesterly terminus of said right of way. A straight line between said last two points being N 16°-05'-34" W, a distance of 143.28 feet.

Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 60.01 feet to a point on the northwesterly terminus of said right of way. A straight line between said last two points being N 15°-04'-03" W, a distance of 60.01 feet.

Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 52.30 feet to a point. A straight line between said last two points being N 14°-30'-03" W, a distance of 52.30 feet. Said point being located N 79°-15'-38" E, a distance of 0.61 feet from a 2" iron pipe found.

Thence N 79°-15'-38" E along the land Carl J. Vander Putten received by deed dated September 15, 1989 as recorded in said Registry of Deeds, Book 3616, Page 184, a distance of 118.00 feet to a 1 ¾" iron pipe found.

Thence N 11°-12'-11" W along the land Said Vander Putten received by deed dated September 15, 1989 as recorded in said Registry of Deeds, Book 3616, Page 184 and the land Gerald R. Duplessis received by deed dated June 7, 2000 as recorded in said Registry of Deeds, Book 6220, Page 339, a distance of 200.21 feet to a 1" iron pipe found.

Thence N 10°-23'-26" W along the land of said Duplessis, a distance of 99.18 feet to a 1" iron pipe found.

Thence N 10°-44'-40" W along the land Marcel E. Veilleux and Nancy D. Thompson received by deed dated April 24, 2009 as recorded in said Registry of Deeds, Book 10338, Page 222, a distance of 100.15 feet to a 1" iron pipe found.

Thence N 10°-38'-06" W along the land George E. Poulin and Therese Poulin received by deed dated March 26, 1965 as recorded in said Registry of Deeds, Book 1372, Page 95, a distance of 99.94 feet to a 1 ¾" iron pipe found.

Thence S 79°-14'-44" W along the land of said Poulin, a distance of 125.68 feet to a point. Said point being located S 79°-14'-44" W, a distance of 0.38 feet from a 1 ½" iron pipe found.

Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 50.10 feet to a point. A straight line between said last two points being N 08°-56'-38" W, a distance of 50.10 feet. Said point being located S 79°-14'-31" W, a distance of 0.25 feet from a 1" iron pipe found.

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Thence N 10°-31'-48" W along the land of said Doyon, a distance of 200.18 feet to a 1 ¾" iron pipe found.

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Thence N 77°-41'-43" E along the land Clemente L. Gaboury and Susan Dostie, trustees of the Donald J. Gaboury Living Trust received by deed dated October 17, 1998 as recorded in said Registry of Deeds, Book 5763, Page 234, a distance of 90.34 feet to a 1 ¾" iron pipe found.

Thence N 02°-49'-45" W along the land of said Donald J. Gaboury Living Trust, a distance of 299.58 feet to a 1 ¾" iron pipe found.

Thence N 78°-34'-37" W along the land of said Donald J. Gaboury Living Trust, a distance of 200.25 feet to a point on said Civic Center Drive. Said point being located N 78°-34'-37" W, a distance of 0.17 feet from a 1 ¾" iron pipe found.

Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 243.27 feet to the point of beginning. A straight line between said last point and said point of beginning being N 00°-05'-55" W, a distance of 243.25 feet.

The parcel described above contains 43.4 acres more or less.

The above described parcel is subject to a 60 foot wide right of way for all purposes including but not limited to roadway construction, maintenance and improvement for ingress and egress by vehicles and foot with maintenance rights, utility rights and the right to convey these rights to others. Said right of way is described as follows:

Beginning at a point on the easterly side of Civic Center Drive. Said point being located S 14°-30'-03" E, a distance of 52.30 feet from a point located on the southwesterly corner of the land Carl J. Vander Putten received by deed dated September 15, 1989 as recorded in the Kennebec County Registry of Deeds, Book 3616, Page 184.

Thence N 75°-46'-08" E, a distance of 830.71 feet to a point.

Thence in a Easterly direction following a curve concave to the south having a radius of 600.00 feet, a distance of 306.31 feet to a point in the thread of Stone Brook at the remaining land of the grantor. A straight line between the last two points being S 89°-36'-21" E, a distance of 303.00 feet.

Thence S 17°-08'-35" W along the thread of said Stone Brook and the remaining land of the grantor, a distance of 60.05 feet to a point.

Thence in a Westerly direction following a curve concave to the south having a radius of 540.00 feet, a distance of 273.45 feet to a point. A straight line between the last two points being N 89°-43'-26" W, a distance of 270.54 feet.

Thence S 75°-46'-08" W, a distance of 829.83 feet to a point on the easterly side of said Civic Center Drive.

Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 60.01 feet to the point of beginning. A straight line between said last point and said point of beginning being N 15°-04'-03" W, a distance of 60.01 feet.

Bearings referenced are based on True North, NAD 83 West Zone.

Meaning and intending convey a portion of the land the State of Maine received by deed dated September 28, 1973 as recorded in the Kennebec County Registry of Deeds, Book 1688, Page 295, by deed dated February 09, 1973 as recorded in the Kennebec County Registry of Deeds, Book 1614, Page 220 and by deed dated June 30, 1969 as recorded in the Kennebec County Registry of Deeds, Book 1498, Page 64.

Reference is made to a Boundary Survey of a proposed lot division for the Department of Defense, Dated 01-18-2012, by Morin Land Surveying, Plan No. 459, File No. AU102K.

NATIONAL GUARD BUREAU
UNITED STATES PROPERTY & FISCAL OFFICER FOR MAINE
CAMP KEYES, BLDG. 39
32 STATEHOUSE STATION
AUGUSTA, MAINE 04333-0032

REPLY TO ATTENTION

USPFO 7 December 2012

MEMORANDUM FOR RECORD

SUBJECT: Fiscal Responsibility for Construction of a Joint Forces Headquarters, Maine National Guard, Augusta, Maine

1. As the United States Property and Fiscal Officer (USPFO) for the Maine National Guard, I represent the Federal Government in all matters with respect to all property and the overall receipt, management, and allocation of all federal funds issued to the Maine National Guard.

2. I am responsible to authenticate the requirements, certify the authority, and authorize the expenditure of funds to perform planned construction of Maine National Guard facilities.

3. Therefore, I am able to certify that the Maine National Guard has been authorized and funded to construct a Joint Forces Headquarters on State lands in Augusta, Maine (project number 230113).

4. Questions may be directed to the undersigned at (207) 430-5634, or by email at donald.o.lagace.mil@mail.mil.

DONALD O. LAGACE, JR.
Colonel, NGB
USPFO for Maine

CF:
Maine Department of
Environmental Protection

3752.00
MEARNG PN 230113
Joint Forces Headquarters
Augusta, Kennebec County, Maine

Exhibit #5 – Technical Ability

Prepared For: Maine Army National Guard
Attn: Normand Michaud
Bldg #8, Camp Keyes
Augusta, Maine 04333

Prepared By: WBRC Architects-Engineers
44 Central Street
Bangor, Maine 04401
(207) 947-4511
(207) 947-4628
www.wbrcae.com

WBRC ARCHITECTS • ENGINEERS
BANGOR PORTLAND SARASOTA
www.wbrcae.com

WBRC ARCHITECTS / ENGINEERS

Firm Description

A. Office Background:

WBRC Architects / Engineers is a full service architectural/engineering firm. The office has been in continuous operation since 1902.

Presently, the staff consists of over sixty (60) people of which there are thirteen (13) Registered Architects, thirteen (13) Registered Professional Engineers, one (1) Landscape Architect, two (2) Registered Interior Designers, and numerous qualified technical support staff across all disciplines.

B. History and Organization:

The firm of WBRC Architects / Engineers has provided services in architecture and engineering since 1902. Established in that year by C. Parker Crowell and Lancaster, the firm has evolved over the years with the following name changes: Crowell, Lancaster, Higgins; Crowell, Lancaster, Higgins and Webster; Higgins, Webster and Lloyd; Higgins, Webster and Partners; Webster, Baldwin, Rohman, Day; Webster/Baldwin/Rohman/Day/Czarniecki, P.A., and in 1989 the firm's name was changed to WBRC Architects / Engineers.

C. Services:

WBRC Architects / Engineers is a service-oriented business, which caters to the needs of our clients. We actively involve our clients in the design and construction decision-making process. We provide complete state of the art services including programming, permitting, schematic design, design development, construction documents, bid evaluation, construction supervision, post construction evaluation and a full range of supplemental services.

D. General Experience:

Our office has extensive experience in the areas of feasibility studies, energy retrofit architecture, interior architecture, urban streetscape design, urban planning, environmental planning and permitting, historic preservation, and rehabilitation and renovation. Representative project types include commercial buildings, community service facilities, municipal buildings, schools, offices, colleges, medical facilities, churches and housing.

E. Project permitting and regulatory submittal and review experience:

HOLLYWOOD SLOTS GAMING FACILITY/ BANGOR HISTORIC TRACK, Bangor, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps, MDOT)

$90.0M development consisting of a 9-acre footprint gaming facility and attached 150 room hotel and 1,500 space parking garage situated adjacent to the Penobscot River. Offsite mitigation of stormwater included over $1.0M in stormwater interceptors and attenuation basins on adjacent city-owned Bass Park property, home of Bangor Historic Track. The permitting efforts included the treatment of all post-1975 development on Bass Park, including 16 acres of impervious area and 9 acres of non-impervious area.

Project required extensive demolition and removals of existing built retail neighborhood, elimination and rerouting of I-395 off-ramp, and onsite development of walks, plantings, and site amenities consistent with City's waterfront park.

HAMPDEN ACADEMY, Hampden, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps, MDOT)

$52.0 M, 170,000 square feet, planned high school to replace the historical Hampden Academy which had fallen into disrepair. The project is located on a parcel adjacent to three other Hampden schools, in both the Reeds Brook watershed and the Souadabscook Stream watershed. A careful site selection process included consideration of ecological impacts. The owner chose the site with the least amount of wetlands, no potential vernal pools, and in the area of significant existing development.

BREWER PK-8 SCHOOL, Brewer, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps, MDOT)

$39.0M, 156,000 square feet, consolidated PK-8 school with associated site improvements, and an 8-lane track facility. Project achieved both stormwater quality and quantity requirements using only Low-Impact Development BMPs. The mitigation requirement for the alteration of 20,000 square feet of wetland was waived due to the fact that the project was a redevelopment of an existing site and all available site space was used to avoid impacting any wetlands on additional properties. The project design avoided impact within 25 feet of an intermittent stream on the property.

PENINSULA ELEMENTARY SCHOOL, Gouldsboro, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps, MDOT)

$12M, 41,000 square foot K-8 school on a 21-acre parcel in the village of Prospect Harbor. The site design included several LID methods in order to effectively treat the quality and quantity of stormwater runoff. The site design was able to achieve a Tier II wetland alteration permit despite the existence of several acres of wetland on the site. WBRC worked closely with the Army Corps of Engineers and US Department of Fish and Wildlife to permit the impact of vernal pools. The vernal pools will be monitored annually to assess the condition of the wildlife.

ORCHARD TRAILS HOUSING, Orono, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps, MDOT)

$24.0M, 144 unit, 576 bed housing project adjacent to the University of Maine at Orono Campus. Project required extensive pre-design planning for 60 acre parcel to develop a 20 acre development in avoidance of onsite freshwater wetlands and mapped vernal pools.

HERMON MIDDLE SCHOOL, Hermon, Maine
(Stormwater, NRPA/ Army Corps, MDOT)

For this repeat client, the Hermon School Department, WBRC was hired on the basis of their vast experience in the educational sector and know-how in terms of renovation and new construction. WBRC provided full A/E services including architecture, civil, structural, mechanical, electrical, plumbing, interior design and landscaping for 14,000 SF of New Construction and 28,000 SF of Renovation scope. WBRC provided schematic design, design development, construction documents, bidding and construction administration services. The project was implemented on time, in the proper quality and within budget. WBRC also provided additional cost saving services by assisting the Owner with direct procurement of large ticket vendor items such as lockers, bleachers & furniture. Total Construction Cost: $4.9 Million.

The schools are located in a phosphorus-impacted watershed, necessitating careful design to avoid non-point source pollution. The school was able to share many facilities with the High School, resulting in a reduction of impervious area.

HERMON TENNIS FACILITY, Hermon, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps)

Construction of tennis facility on parcel adjacent to Hermon High School.

MAINE MARITIME ACADEMY, Castine, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps, MDOT)

WBRC prepared a Site Location of Development permit for all post-1975 development on the campus, and continues to provide permit modifications for additional campus improvements. Recent projects include an addition to the Student Union, parking upgrades, master planning, and aesthetic improvements to the main quad. All designs must result in zero net increase in peak flows due to overloaded existing stormwater systems.

PENJAJAWOC WATERSHED BMP RETROFIT DESIGN, Bangor, Maine
(Stormwater, BMP retrofit/ LID)

Assisted the MDEP and City of Bangor to identify stormwater BMP retrofits within an urban-impaired stream. Hydrology modeling of a 5,500 acre watershed and nearly 4 miles of stream channel. Developed "case studies" and predicted positive impact to stream water quality for three (3) distinctly unique BMP retrofit approaches.

MDI BIOLOGICAL LABORATORY, Salisbury Cove, Maine
(Stormwater PBR, LEED)

15,000 SF, 3.5-story, structural steel frame laboratory building on shallow spread footings. The project is located on ecologically-sensitive Mount Desert Island. A LEED approach to site design was used, including minimization of site disturbance, minimal impervious areas, shading, and stormwater reduction methods. Currently seeking LEED Platinum certification.

PRESQUE ISLE MIDDLE SCHOOL, Presque Isle, Maine
(Stormwater, MDOT)

Aging facilities and declining enrollments necessitated consolidation of Presque Isle's two middle schools. The school's new exterior façade and south facing building addition adds a new library and a 465-seat performing arts center.

Discussions with administrators and teachers were key to this project's success. The renovations give an old building a new look. The floor plan gives teachers more opportunity for collaboration and public facilities that can be used by the entire community.

KENNEBEC VALLEY YMCA, Augusta, Maine
(Site Location of Development, MDOT)

Faced with a 100+ year old, multi-leveled facility, landlocked in downtown without parking, ball fields, room for expansion, and a dwindling membership; the Kennebec Valley YMCA realized it needed to build new to survive. The city of Augusta made available a 6-acre parcel in the Capital District. WBRC was tasked with developing concept designs, selecting a construction manager and prepping exhibits for this successful $10M fund-raising campaign.

ADVANCED ENGINEERED WOOD COMPOSITES LABORATORY, Orono, Maine
(Site Location of Development Modification, LEED)

The Advanced Engineered Wood Composites Center Office Expansion, located at the University of Maine, is a 6,880 square foot addition dedicated to research, education and economic development focused on the material science and structural application of hybrid composites. The facility is constructed of many different manufactured wood structural component types, representing the latest in wood engineering technology. The Office Expansion provides additional space for the Centers growing population of Graduate Students, Research Engineers, Visiting Faculty and Staff. The project is LEED certified. Construction was completed in May of 2005 by The Sheridan Corporation.

BELFAST ELEMENTARY SCHOOLS, Belfast, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps)

$7.9 million Captain Albert W. Stevens Elementary School (Belfast Elementary School) consists of a 2-story 54,514 SF project designed for 330 students. It replaces three older, smaller schools. The school district was able to purchase 16 acres adjacent to the district's existing eight-acre site and next to its expanding residential neighborhoods. By avoiding nearby wetlands, a curving drive and islands of existing vegetation were created en route to the new school site. Bus drop-off, parent drop-off, teacher parking, and visitor parking are all separate but close to the school's main supervised entrance. The entrance is a two-story element with a covered walkway and battened walls. The floor plan is a unique cross shape with two-story classroom wings making up two legs of the cross. Grades K through 1 are located on the first floor, and grades 2 through 5 are on the second floor. A two-story volume library space connects the classroom wings. The other two arms of the cross include the gymnasium and cafeteria, separated by a stage that doubles as a music room. The center of the cross is a two-story lobby entrance with a central stair that bridges to the upper classrooms.

WINTHROP HIGH SCHOOL, Winthrop, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps, MDOT)

WBRC faced a number of challenges in designing a new high school to share a hilltop campus with the existing middle school built in the 1960s. A new access road for the site situated on a hill overlooking the town was built. The unique building design successfully incorporates architectural details that reflect the town's heritage of manufacturing and agriculture. This new campus integrates technology, recreational activities and services.

The building includes a performing arts center, broadcast studio, publication center, project room and ITV/ATM technology, along with team sports and lifelong learning facilities for the community.

Located in the watershed of Lake Cobbosseecontee, a lake which experiences water quality problems due to excess phosphorus, mostly due to non-point source pollution in the surrounding watershed. WBRC worked closely with the Cobbossee Watershed District to appropriately lessen the impact of the development.

EASTERN MAINE COMMUNITY COLLEGE, Bangor, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps, MDOT)

WBRC prepared a Site Location of Development permit for all post-1975 development on the campus, and continues to provide permit modifications for additional campus improvements. Recent projects include additions to Katahdin Hall, parking improvements, and improvements to the main quad. The site is located in a DEP-designated Urban Impaired Stream watershed (Penjajawoc).

The addition to Katahdin Hall was a $3.1M, 40,000 SF renovation/addition that transformed a 1960's dormitory building into a dynamic Campus Center for the college. WBRC updated the campus master plan and were involved in all aspects of A/E professional services on the project. Featured spaces include: Student Services Center, Library, Cafeteria/Kitchen, Early Childhood Ed. Training, Conference and Faculty Offices.

Other projects include the EMCC Campus-wide master planning, master permitting (SLODA, NRPA, and Local) for 10-year build out of local community college campus. Project included development of a new main entrance boulevard, new student quad, 550 space satellite parking area, reconfigured access and pedestrian routes, and stormwater management planning for development of additional buildings and impervious area. WBRC designed several LID measures to effectively improve water quality in the Penjajawoc Stream.

HAMPDEN BUSINESS & COMMERCE PARK, Hampden, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps, MDOT)

The Hampden Business and Commerce Park is a 135 acre project being developed by the Town of Hampden. The configuration of this multi-phased park will favor a core of shops and open space, with a "Main Street appeal of carefully sited "signature" building clusters, adjoining pedestrian plazas, and purposefully laid out sidewalk and recreational trail elements. Rear “traditional businesses” having low employee counts include: inter-modal and freight processing, manufacturing, compounding, processing, treatment or warehousing of goods and products, wholesale distribution, and wholesale sales.

A public transit stop has been incorporated into the core of this transit-oriented development, well situated within a ten minute or less walking distance anywhere from within the park.
The preservation of view corridors within the park through a “clustering” or “coving” approach permits combining of lots into larger parcels (10+ acres) without jeopardizing the appearance of the site.

WBRC was retained to provide Master Planning, Master Permitting, Master Architectural Guidelines, Design-Development and Construction services.

SEARSPORT MIDDLE-HIGH SCHOOL, Searsport, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps)

WBRC worked with MSAD #56 to restore the school’s accreditation through a series of cost-effective upgrades to the existing school. The new addition at the front façade gave a brand new look to the entire school, complementary to the rich architectural heritage of Searsport. The cafeteria, designed with tiered seating areas is transformed into a performing arts center by the removal of tables, extending the use and value of the structure. The result is a highly functional attractive facility that serves both educational and community needs.

DIRIGO PINES, Orono, Maine
(Site Location of Development Modification, Stormwater, NRPA/ Army Corps)

Site design and permitting for the addition of several duplex units to the Dirigo Pines Retirement Community. The site design included a modification of the existing detention pond as well as the addition of several LID measures such as bioretention filters and level spreaders. WBRC worked closely with the Orono Land Trust to preserve existing trail continuity.

CROSSWINDS ASSISTED LIVING, Fort Kent, Maine
(Stormwater)

Due Diligence for master permitting and design of a 60 acre parcel to include assisted living, nursing home, hotel, duplexes, and apartments in Fort Kent, Maine.

CAMPUS CREST "THE GROVE", Orono, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps)

planned construction of several student housing units in an area of existing multi-family buildings. The site design included several stormwater treatment measures including detention ponds as well as several LID measures such as bioretention filters and level spreaders. WBRC managed a land swap deal between the owner and the Orono Land Trust to preserve a more valuable parcel of land, and to develop a parcel of lower ecological value.

PENOBSCOT BAY MEDICAL CENTER, Rockport, Maine
(Site Location of Development, NRPA/ Army Corps)

Ongoing consulting relationship for several permits relevant to additional development on the site.

HUSSON COLLEGE, Bangor, Maine
(Site Location of Development, Stormwater/ LID, NRPA/Army Corps, MDOT)

Permitting for multiple campus improvements on a 200+ acre campus including: Husson Commons, Furman Student Center, multiple athletic facilities, and a new performing arts center/ administration building entitled the "Meeting House", and associated parking lots.

BANGOR PARKADE, Bangor, Maine
(Site Location of Development, Stormwater, NRPA/ Army Corps, MDOT)

Permitting for a ground-up $24M, 25 acre, 175,000 g.s.f. mixed-use retail development on Stillwater Avenue in Bangor. Project included acquisition and set-aside of nearly 18 acres of open space, including a 150' wide landscaped corridor between an abutting residential neighborhood.

APPLE TREE ACRES, Belfast, Maine
(Site Location of Development, NRPA/Army Corps, Stormwater, DHHS, MDOT)

Planned $16M, 260 acre, 147 lot planned unit residential subdivision (PUD) consisting of 4 phases of clustered village type development surrounding common green areas, with a 109 acre land trust bequest. All utilities were developed onsite (sanitary, water

supply, stormwater treatment). Housing units and lot development were pre-permitted.

CROSBY MANOR ESTATES, Belfast, Maine
(Site Location of Development - Delegated Municipal Review, NRPA/ Army Corps)

55 Unit Planned Unit Development on a 22-acre parcel fronting Northport Avenue and Belfast Bay. Project consisted of development of privately owned condominium development with common infrastructure including off-peak sanitary discharge to Municipal wastewater collection system, Public Water Main extension, and approx. 3,300 LF of Private Roads.

BANGOR MALL/ FILENES EXPANSION, Bangor, Maine
(Site Location of Development, Stormwater, MDOT)

$24.0M Expansion consisting of 170,000 GSF addition to the existing 555,000 GSF Bangor Mall Facility on a 104-acre parcel. Project consisted of repairs/modifications to 20-year-old detention basins for 100-year storm event freeboard and discharge, expansion of parking lot (6 additional acres) within a total 18 acre project disturbance area. Project included onsite and offsite City/MDOT traffic widening/ signalization improvements, utility rerouting, and an extensive landscaping and buffering plan.

EMMC/ Waterworks Redevelopment, Bangor, Maine
(Site Location of Development)(NRPA)

$3.0M Renovation/ Redevelopment of existing waterworks facility adjacent to the former Bangor Dam included a 28,000 GSF of office space with parking, retaining wall improvements, infrastructure, landscaping and walks. Historic preservation was a key issue as well as traffic and close proximity to river ecosystem. Non-point source pollution from parking lot runoff was addressed with on-site treatment.

HERMON HIGH SCHOOL, Hermon, Maine
(Site Location of Development, NRPA/ Army Corps, MDOT)

$12.5M High School on new 40-acre site with 410 space parking lot and associated playing fields for projected 800 student population and 50 staff. Development of the parking lots and Baseball, softball, Soccer, Track and multi-purpose fields in conjunction with roof runoff required two detention ponds to control surface runoff. A Wet pond was developed adjacent to U.S. Route 2 to remove phosphorus, nitrate and petroleum pollutants from parking, roof and playing fields.

The 97,000 SF project required avoidance of an adjacent State Jurisdictional wetland, widened Route 2 approaches, and on-site water and sanitary sewer systems. Fire

protection was afforded through development of underground storage for the building sprinkler systems and dry hydrants in the wet ponds.

As a result of the streamlined WBRC/ MDEP Review process and pre-application meetings, the review period was completed in four months.

DARLINGS AUTO MALL, Bangor, Maine
(Site Location of Development, Stormwater)

$4.1M Commercial Subdivision with multi-phased auto dealership and new car display parking lot.

THE DOWNEAST MAINE OUTLET, Ellsworth, Maine
(Site Location of development, NRPA/ Army Corps)

$5M (7) - lot commercial development with 100,560 s.f. multi-phased retail outlet. Extensive expansion to City road systems, access, sanitary and water infrastructure was incorporated into the overall design. Avoidance of wetlands and development of stormwater detention was required.

BANGOR MALL BUSINESS PARK, Bangor, Maine
(Site Location of Development, NRPA/ Army Corps)

$1M commercial subdivision adjacent to Bangor Mall Development and Interstate I-95. Located behind the Shaw's Supermarket and now home to Wal-Mart and Home Quarters (HQ) Warehouses, the project street and lot layout required careful avoidance of State Jurisdictional Wetlands.

BREWER HOUSING AUTHORITY MASTER PLAN, Brewer, Maine
(Site Location of development, NRPA/ Army Corps)

Post-1970 permitting of 102 existing housing units and $3.0M of road systems and phased development of 52 additional housing units. Avoidance of wetlands was required.

BANGOR INTERNATIONAL AIRPORT PARKING LOT EXPANSION, Bangor, Maine
(Site Location of development)

$0.5M, 550 lot expansion to the airport parking complex for contract with the City of Bangor. The project included storm drainage reconstruction, recycling of asphalt base material and parking (traffic) control systems.

LONGWOOD TERRACE SUBDIVISION, Orono, Maine
(Site Location of development, NRPA/Army Corps)

Planned $1.2M, 52 – lot residential subdivision in medium density residential area with extensive wetlands avoidance.

ST. MARY'S PARISH Bangor, Maine
(Site Location of development, Stormwater)

Expansion to existing parish complex consisted of construction of new $1,500,000 educational facility (23,000 SF) and associated parking. Storm drainage / detention and traffic were addressed with various on and off-site improvements. Revision included detention systems modifications to minimize net useable site impact.

BANGOR WATERWORKS REDEVELOPMENT Bangor, Maine
(Site location of development)

Planned $2.8M Redevelopment of existing waterworks facility adjacent to the Bangor Dam included a 37-unit interval ownership resort complete with parking, indoor pool, health club, and game room. Historic preservation was a key issue as well as traffic and close proximity to river ecosystem. Non-point source pollution from parking lot runoff was addressed with on-site treatment.

OCEANARIUM - BAR HARBOR, Bar Harbor, Maine
(NRPA/Army Corps)

Development of a three-phased oceanarium complex on Thomas Island with related nature interpretation trails. Project was the former site of a Wildlife Park and required extensive removals of existing fences, structures, etc. from the upland area. Avoidance of a Coastal Wetland was required.

BFCU / HOGAN ROAD BRIDGE, Bangor, Maine
(NRPA/Army Corps, FEMA)

Site development including 1,000 l.f. access road and bridge to serve a new Credit Union amongst an established retail neighborhood on Hogan Road. This project required avoidance and filling of wetlands, as well as extensive HEC-2 floodplain analysis for bridging/ fill within regulatory floodplain limits.

EVERGREEN WOODS, Bangor, Maine
(Revision - Site Location of development)

Professional / business subdivision located adjacent to Penjajawoc Stream on Mt. Hope Avenue in Bangor, Maine. Project consisted of expansion of parking to existing approved site location of development permit.

SHYKA, SHEPPARD & GARSTER

Land Surveyors

6 State Street, Suite 301 • Bangor, Maine 04401
Phone 207-942-1955 • Fax 207-942-1991

Shyka, Sheppard & Garster Land Surveyors (SSG) provides a full range of surveying services and uses the latest surveying technologies to produce accurate, timely, and cost-effective survey and spatial information for a variety of industry sectors including engineering, architecture, construction, land development, public utilities, and local, state and federal government agencies.

SSG is based in Bangor, Maine and was originally founded in 1994 as "Sheppard & Garster Land Surveyors, Inc". by Stevenson W. Sheppard & Robert J. Garster, Jr. In 1998, Sheppard & Garster acquired the records and assets of Andrew J. Shyka, PLS and became Shyka, Sheppard & Garster Land Surveyors (SSG). Acquisition of the Shyka records provided project records dating back to 1964 and a substantial archive of historic documents.

Now in its eighteenth year of operation, SSG has five licensed surveyors with extensive experience in managing a wide variety of surveying projects from start to finish. SSG's experience with project planning and management provides clients with realistic estimates and schedules, effective workflows, superior quality assurance, and on-budget, on-time delivery of information products.

SSG's Licensed Surveyors and Survey Technicians are highly proficient with a variety of terrestrial, GPS, and scanning data collection technologies including Leica Robotic, Nikon and Sokkia total stations and electronic data collection systems and Trimble and Leica GNSS and Leica 3D laser scanners. Deliverables are prepared using current, networked Autocad Land Development Desktop and Civil 3D capabilities to provide accurate information quickly and efficiently. Always keeping service in mind, SSG provides deliverables using client specified CAD standards.

Shyka, Sheppard and Garster is always prepared to provide tailored services for unique project requirements as well as offering a wide variety of services, including:

- Boundary Surveys
- Topographic Surveys
- Engineering Surveys
- GPS Control Surveys
- Hydrographic Surveys
- Construction Layout and Monitoring
- As-Built Surveys
- Expert Witness Testimony
- 3D Laser Scanning
- Utility Surveys
- GIS Data Collection (GPS Sub-Meter)
- FEMA Surveys (Flood Elevation Certificates)
- Letter of Map Amendment (LOMA) Applications.
- Subdivision Design
- ALTA/ACSM Land Title Surveys

Stevenson W. Sheppard, PLS

Mr. Sheppard is president and co-owner of Shyka, Sheppard & Garster Land Surveyors. He has over has over twenty years experience in the practice of land surveying. He received a BS in Surveying Engineering from the University of Maine. His experience includes subdivision design and permitting, boundary analysis, topographic surveys, engineering surveys, hudrographic surveys, geodetic control surveys and GPS surveys. His specific experience includes both managing and performing a wide variety of surveys throughout Maine and New England. His work has ranged from small boundary surveys in urban areas to acreage verifications for remote woodlands covering thousands of acres, to engineering surveys on a variety of commercial, residential, municipal and industrial sites, to geodetic and engineering surveys on right of way projects covering over a hundred miles. A significant portion of his work has involved the use of GPS to extend high order, geodetic quality control into specific areas to facilitate mapping, design and construction activities.

Mr. Sheppard is also a principal and vice-president of KAPPA Mapping, Inc., a full range photogrammetric services firm. KAPPA is certified in many states as a Disadvantaged Business Enterprise (DBE) and Woman Business Enterprise (WBE).

Education:

- University of Maine: BS Surveying Engineering 1986

Professional Registrations:

- Professional Land Surveyor, Maine - License #2086 (1989)
- Professional Land Surveyor, Pennsylvania License #SU075206 (2008)

Memberships:

- American Congress on Surveying and Mapping (ACSM)
- National Society of Professional Surveyors (NSPS)
- Maine Society of Land Surveyors (MSLS)
- Management Association for Private Photogrammetric Surveyors (MAPPS)
- The Industrial Advisory Committee for the Surveying Technology Program, UM

Robert J. Garster, Jr., PLS

Mr. Garster is the treasurer and co-owner of Shyka, Sheppard & Garster Land Surveyors. His current duties include project and company management. He has over nineteen years experience in the practice of land surveying. His experience includes boundary retracements, subdivision design, topographic surveys, ALTA/ACSM Land Title Surveys, hydrographic surveys, Elevation Certificates and Letter of Map Amendments (LOMA's) and GPS control surveys. His specific experience includes field work inAntarctica, Alaska and Maine. His work has ranged from small boundary surveys to BLM Native Allotment Cadastral surveys. A significant portion of his work has included site development projects for commercial, residential, municipal and industrial sites, as well as projects in remote wilderness regions with access only by airplane, helicopter or boat. Mr. Garster has worked in difficult situations requiring the ability to maintain the quality of work while striving to meet project demands and safety requirements.

Mr. Garster is also a principal and treasurer of KAPPA Mapping, Inc., a full range photogrammetric services firm. KAPPA is certified in many states as a Disadvantaged Business Enterprise (DBE) and Woman Business Enterprise (WBE).

Education:

- BS Civil Engineering 1990, University of Maine
- AS Civil Engineering Technology 1989, University of Maine

Professional Registrations & Certifications:

- Professional Land Surveyor, Maine License #2047
- Engineer-in-Training, Maine Cert. #4115

Memberships:

- American Congress on Surveying and Mapping (ACSM)
- National Society of Professional Surveyors (NSPS)
- Maine Society of Land Surveyors (MSLS)
- Management Association for Private Photogrammetric Surveyors (MAPPS)

Michael J. Avery, PLS

Mr. Avery holds a B.S. in Forestry - Land Surveying from Michigan Technological University, is a registered Professional Land Surveyor in the State of Maine, and has been in the surveying profession since 1979. Mike served as a Supervisory Land Surveyor with the U.S. Dept. of the Interior, BLM, from 1979 to 1987 and established and managed their regional office in Maine, surveying the lands acquired under Maine's "Indian Land Claim Settlement of 1980". He was retained by CES, Inc., located in Brewer, Maine and served as Vice President and Technical Director of Surveying from 1989 to 2008. Mr. Avery has a talent for understanding clients' unique needs, and for developing, explaining, and applying creative approaches to projects. He works closely with clients to finding logical, defendable solutions in resolving conflicts with respect to property boundaries, right of ways and easements. He also specializes in determinations of riparian boundaries. Mr. Avery's 20 years of experience with CES, Inc, an engineering design firm, allows him to work effectively with design teams, and understand their needs. His extensive and well-rounded experience with all aspects of surveying enables him to provide clients with practical, cost effective solutions to their survey projects.

Education:

- B.S., Forestry- Surveying Option, Michigan Technological University
- Advanced Cadastral Survey - University of Arizona
- Land Survey Law - Montana State University

Professional Registrations & Certifications:

- Professional Land Surveyor, State of Maine #1340
- Standard First Aid and Adult CPR
- OSHA 40 Hour Hazmat Training (Require 8 Hour Refresher)

Memberships:

- American Congress of Surveying and Mapping
- Maine Society of Land Surveyors
- National Society of Professional Surveyors
- Planning Board / Town of Hampden
- Lincoln Search and Rescue / High Angle Rescue Team

Glenn Griswold, PLS

Mr. Griswold is a Project Surveyor for Shyka, Sheppard & Garster Land Surveyors. He has over ten years experience working in surveying and with particular expertise in CAD setup, management, customization and production and data management. A significant portion of his work has included residential and commercial subdivisions, ALTA Land Title Surveys, Boundary and Topographic surveys, road and utility layout, GPS control surveys, right of way surveys and LIDAR data editing. Mr. Griswold also provides 3D modelling and custom data collection solutions for construction layout and engineering design/build projects.

Education:

- BS Spatial Information Engineering 2004, University of Maine

Professional Registrations:

- Professional Land Surveyor, Maine License #2405

Memberships:

- Maine Society of Land Surveyors (MSLS)
- National Society of Professional Surveyors (NSPS)

Allan Tubbs, Survey Crew Chief

Mr. Tubbs is an eleven year employee of Shyka, Sheppard & Garster Land Surveyors. His experience includes all facets of fieldwork, field data management, project logistics and setup and crew management. His work experience includes subdivisions, boundary and topographic surveys, engineering surveys, geodetic control surveys and GPS control surveys and is an expert in construction layout and quality control. He is experienced with all SSG field equipment, procedures and data collection software including: Leica TCRP1205R300 Robotic Total Station, Nikon and Sokiaa electronic total stations, Nikon automatic levels, Trimble 5700 GPS receivers, Carlson SurvCE and Tripod Data Systems data collection packages. Mr. Tubbs came to SSG following a more than twenty year career as a general contractor for residential and commercial buildings.

Education:

- AS Business Administration 1970
- Greenfield Community College

Courses:

- AutoCad Course – EMCC - 2004
- Surveying Law - Univ. of Maine - 2008

Military Service:

- Army National Guard 1970-1976
- Mortarman

Memberships:

- Maine Society of Land Surveyors (MSLS)

Community:

- Landmark Heritage Trust 1992 - Founding member and Vice President
- Chair Newburgh Planning Board 1990-1992
- Chair Newburgh Appeals Board 1995-1997
- Experimental Airplane Association 2005 - Trustee
- Licensed Pilot since 1994

Project Examples

Commercial

International Shipping Company - Distribution Center, Hermon, Maine (current)
Boundary and topographic and surveys for design, permitting and construction of 12 acre Distribution Center. Services provided to Plymouth Engineering for International Shipping Company.

Cumberland County Civic Center (2012)
Boundary, topographic and 3D Laser Scanning surveys for development of entire facility (interior and exterior) for a proposed renovations and additions. Services provided to WBRC - Architects * Engineers for Cumberland County Commissioners.

Bangor Savings Bank - Houlton (2012)
Boundary and topographic and surveys for drainage and parking lot improvements. Services provided to WBRC - Architects * Engineers for Bangor Savings Bank.

Bass Park Gaming Facility (2004-2008)
Boundary, topographic and photogrammetric-control surveys for development of an 85 acre site for a proposed gaming facility. Services provided to WBRC - Architects * Engineers for Bangor Historic Track.

Bangor Mall, Bangor, Maine (1996-1999, 2007)
ALTA/ACSM Land Title, topographic, and subdivision surveys of a 93-acre mall performed for an expansion and re-subdivision of the existing mall. Services provided to WBRC - Architects * Engineers and KRAVCO Company.

Bangor Parkade, Bangor, Maine (2006)
Boundary, topographic, and construction surveys to facilitate design and construction activities relating to construction of a new Shopping Mall, Bangor, Maine. Services provided to WBRC Architects•Engineers and Bangor Parkade, Inc.

Hinckley Boatyard, Southwest Harbor, & Trenton, Maine (2005)
ALTA/ACSM Land Title Surveys of the Hinckley Facilities in Southwest Harbor and the Jetboat Facility in Trenton, Maine, Services provided to Ropes & Gray, LLC, One International Place, Boston, MA 021102624.

Wal*Mart, Brunswick, Maine (2002-2005)
Boundary and existing condition survey for proposed expansions of existing retail stores. Services provided to Sain Associates, Inc., Bangor, Maine.

Hampden Business & Commerce Park, Hampden, Maine (2003)
Boundary and topographic survey for multi-use business and commerce park development. Services provided to WBRC - Architects • Engineers and the Town of Hampden.

Hammond Lumber Company – Bangor, Maine (2002)
ALTA/ACSM Land Title Survey of the former Wickes Lumber Company property in Bangor, Maine. Services provided to Hammond Lumber Company, Belgrade, Maine.

Village Subaru & Quirk Chevrolet Cadillac Oldsmobile, Bangor, Maine (2002)
ALTA/ACSM Land Title Survey of the existing car dealerships on the Hogan Road, Bangor, Maine. Services provided to QV Realty Trust, Bangor, Maine.

Wal*Mart, Brewer, Maine (2002)
Boundary and existing condition surveys for design and construction activities for a new supercenter on Wilson Street, Brewer. Services provided to Sain Associates, Inc., Bangor, Maine

Bangor Savings Bank, Various locations in Maine (2002)
Boundary and topographic surveys for bank branch expansions in Augusta & Hampden. Services provided to Bangor Savings Bank.

Wal*Mart, Mexico and Farmington, Maine (2001)
Boundary and existing condition surveys for proposed expansions of existing retail stores. Services provided to Sain Associates

Cold Brook Business Park, Hermon, Maine (2000)
Boundary and topographic surveys for industrial park development. Services provided to Dysart Realty Company.

Service Merchandise/Best Buy, Bangor, Maine (2000)
ALTA/ACSM Land Title and topographic surveys of former retail store in preparation of redevelopment of property. Services provided to Atlantic Asset Management and Appledore Engineering, Inc.

Maine Public Broadcasting, Bangor, Maine (2000)
Boundary and topographic surveys of existing facilities for site improvements. Services provided to WBRC - Architects * Engineers and Maine Public Broadcasting.

Burger King, Newport/Palmyra, Maine (1999)
Boundary and topographic survey services for redevelopment of existing restaurant facility. Services provided to Carrol's Corp.

Country Kitchen Bakery Outlet, Holden, Maine (1999)
Boundary and topographic survey of property being developed for bakery outlet store. Services provided to Technical Services, Inc.

Bangor Savings Bank, Hartland, Maine (1999)
Boundary, ALTA/ACSM Land Title, and topographic surveys of a portion of downtown Hartland, Maine. Services provided in connection with construction of a new branch bank. Services provided to WBRC - Architects*Engineers.

Thirteen Auto Parts Stores, various locations in Maine (1997-1999)
ALTA/ACSM Land Title Surveys of 13 store locations from Houlton to Biddeford. Completed as a unit in 1997 with work continuing in connection with ongoing financing. Services provided to General Parts, Inc.

Hinckley Boatyard, Southwest Harbor, Maine (1999)
Boundary, ALTA/ACSM Land Title, and topographic surveys of 20-acre boat building facility. Services provided to The Hinckley Company.

Wal*Mart, Windham, Oxford, and Presque Isle, Maine (1998-1999)
Boundary and existing condition surveys for proposed expansions of existing retail stores. Services provided to Sain Associates

Church of Latter Day Saints, Dover-Foxcroft, Maine (1997)
Boundary and topographic Survey of an existing church facility for a proposed expansion. Services provided to Church of Latter Day Saints.

Bangor Savings Bank, Old Town, Maine (1997)
Boundary, ALTA/ACSM Land Title, and topographic surveys of a portion of down town Old Town destroyed in a 1995 fire. Services provided in connection with construction of a new branch bank. Services provided to Bangor Savings Bank.

Waterfront & Hydrographic

Sebec Lake Dam, Sebec, Maine (2011 - ongoing)
Engineering survey to determine existing conditions and to monitor dam for crest level deformation and subsidence. Services provided to Renewable Power Consulting, PA.

Bangor Waterfront Devlopment, Bangor, Maine (1999-current)
Engineering survey for environmental testing and elevation study. Ongoing bottom profiling and digital terrain modeling to support contaminant removal, capping and venting project. Services provided to RMT, Inc.

Ellsworth Sewage Treatement Plant (2008-2012)
Hydrographic survey of a tidal portion of the Union River to determine sewer outfall locations in this navigable river. Services provided to Woodard & Curran – Engineering • Science • Operations, Bangor, Maine.

Brewer Riverbank Stabilization Project (2002-2012)
Topographic and hydrographic surveys to facilitate design and construction activities related to rebuilding and/or restoring waterfront cribwork and retaining wall structures. As-built and right-of-way survey for creationg of waterfront trail system. Services provided to Woodard & Curran – Engineering • Science • Operations, Bangor, Maine.

McFarland Brook – Route 230 Crossing (2008)
Topographic Survey on a frequently-flooded brook crossing for design of a new crossing. Project is part of wetland mitigation work being done in connection with the expansion of the Trenton Airport. Services provided to Hoyle, Tanner & Associates, Inc.

Maine Dept. of Inland Fish & Wildlife, T19ED-BPP, Maine (2006)
Topographic survey and river cross-sections for Atlantic Salmon habitat restoration project. Services provided to Maine Department of Inland Fish & Wildlife.

USDA Aquaculture Facility – Franklin, Maine (2003)
Boundary and topographic survey to facilitate design and construction activities for a proposed expansion of existing facility on Taunton Bay, Franklin. Bottom profiling and intake/outfall positioning information. Services provided to Einhorn Yaffee Prescott, Boston, MA.

Waldo-Hancock Bridge Hydrographic Survey (2000)
Penobscot River bottom survey under the bridge between Prospect and Verona Island. Services performed as part of scouring study on existing bridge piers. Services provided to SEA Consultants.

Town Line Survey between Harpswell and Brunswick, Maine (1998)
Survey of town line using GPS and traditional survey techniques on this town line crossing primarily tide affected areas. Line was run to apportion some of the most valuable clam flats in Maine. Joint project with Dirigo Land Services of Bath.

Educational

University of Maine – Multiple sites (Ongoing)
Topographic, Engineering and Right of Way surveys on multiple sites for design, permitting and construction activities related to construction of Munson Road, Fraternity Road, Field House andMemorial Gym, Planetarium, AWEC additions. Services provided to the University of Maine.

M.S.A.D. 22, Hampden, Maine (2007-2012)
Topographic and Right of Way Boundary survey on 80+ acre site for design activities related to construction of new High School serving the communities of Hampden, Newburgh and Winterport. Services provided to WBRC - Architects • Engineers.

John Bapst High School Housing, Bangor, Maine (2012)
Topographic and Boundary surveys for design activities related to renovations and permitting of an existing, historic structure to provide student housing for international students. Services provided to WBRC - Architects • Engineers.

Maine Maritime Academy, Castine, Maine (Ongoing)
Topographic surveys to facilitate various construction activities on and nearby the main campus. Services provided to Maine Maritime Academy, Castine, Maine.

Husson University, Portland, Maine (2012)
Boundary and Topographic surveys on 9 acre urban site for design, permitting and construction activities related to reuse of existing facility to serve as Portland, Maine branch of Husson University.. Services provided to WBRC - Architects • Engineers.

Gouldsboro Elementary School, Gouldsboro, Maine (2008-2011)
Boundary and Topographic survey for design activities related to construction of new Gouldsboro Elementary School. Services provided to WBRC - Architects • Engineers.

Alfond Arena, University of Maine (2010)
Engineering survey of NCAA Division 1 hockey and basketball surface related to possible permafrost deformation analysis. Services provided to WBRC - Architects • Engineers.

Brewer Middle School, Brewer, Maine (2009)
Boundary and topographic surveys of former school site and additional properties for new school construction. Services provided to Brewer School Department.

Winthrop High School, Winthrop, Maine (2003)
Boundary and topographic surveys of existing school and additional properties for new school construction. Services provided to WBRC - Architects * Engineers and Winthrop School Department.

Bath Middle School, Bath, Maine (1999)
Boundary and topographic surveys of existing school for addition and site improvements. Services provided to WBRC - Architects * Engineers and Bath School Department.

Maranacook High School, Readfield, Maine (1998)
GPS wetland location survey of approximately 95 acre school site. Services provided to S.W. Cole Engineering, Inc.

NOVA - School Expansion, Rumford, Maine (1996)
Complete Standard Boundary and Topographic survey of 27-acre property with existing school buildings for proposed vocational education expansion. Services provided to NOVA (Northern Oxford Vocational Area).

Utility/Industrial

Cellular Telephone Tower Sites, Central Maine (2010-2012)
Boundary, Topographic, ALTA/ACSM Land Title and Construction Surveys at multiple sites throughout central Maine. Services provided to Infinigy Surveying PLLC.

Madawaska Biomass Project (2011)
Engineering Survey at Madawaska High School for design, permitting and construction purposes for proposed Biomass Project. Services provided to WBRC - Architects * Engineers and the Madawaska School Department.

Portland Pipeline (2005-2006)
GPS control survey performed with Titcomb Associates to facilitate maintenance and regulatory activities associated with a 150 mile petroleum product pipeline running from South Portland, Maine through New Hampshire and Vermont to the Canadian border. Services provided to Titcomb Associates.

West Old Town Landfill (2003)
Engineering survey to locate monitoring wells, surface water sampling sites, geo-probe points and EM grid points. Services provided to Woodard & Curran – Engineering • Science • Operations, Portland, Maine.

Maine Lumber – Greenville, Maine (2002)
Topographic survey to facilitate design and construction activities related to a new lumber mill in Greenville. Services provided to Woodard & Curran – Engineering • Science • Operations, Bangor, Maine.

Central Maine Power Company, Central Maine (1999)
Engineering surveys of existing power line sections for re-rating project. Surveys were performed on five major transmission lines in a geographic area from Rockport to Pittsfield to Bucksport. Services provided to E\PRO Consulting Engineers.

Cellular Telephone Tower Sites, Central Maine (1996)
GPS consulting to determine horizontal and vertical positions for construction of cellular telephone towers at three sites in central Maine. Services provided to CES included project setup, training, data processing and analysis.

Cellular Telephone Tower Sites, Northeastern Massachusetts (1996)
GPS consulting to determine horizontal and vertical positions for construction of cellular telephone towers near Boston, Massachusetts. Services provided to Atlantis Group included project setup, training, data processing and analysis.

Bangor Gas, Bangor area, Maine (1998-1999)
GPS control surveys for photogrammetric mapping and construction of proposed natural gas distribution lines from South Orrington to Old Town. Services provided to Ames Engineering.

Hermon Landfill, Hermon, Maine (1998)
Topographic survey and wetland locations at an existing landfill site. Services provided to S.W. Cole Engineering, Inc.

Medical/Research

Penobscot Bay Medical Center (Ongoing)
Boundary, topographic and photogrammetric-control surveys for ongoing development and improvements of a 60 acre site for this existing and growing Medical Center serving the mid-coast region. Services provided to WBRC - Architects * Engineers.

Jackson Lab, Bar Harbor, Maine (Ongoing)
Topographic and engineering surveys for construction, photogrammetric mapping and site improvements for various sites within Jackson Laboratory campus. Services provided to WBRC - Architects * Engineers, Woodard & Curran – Engineering • Science • Operations, Bangor, Maine and Einhorn Yaffee Prescott, Boston, MA.

MDI Bio Lab, Salsbury Cove, Maine (Ongoing)
Topographic survey for design and construction activities related to construction of new research facilities. Services provided to WBRC - Architects • Engineers.

Davis Longterm Care, Multiple Locations, Maine (2010-2012)
Boundary and topographic surveys for design, permitting and construction activities for residential long term care facilities on multiple sites throughout Maine. Services provided to WBRC - Architects • Engineers.

Down East Community Hospital (2003)
Boundary and Topographic Survey to facilitate design and construction activities related to construction of new Veterans Hospital. Services provided to Woodard & Curran – Engineering • Science • Operations, Bangor, Maine.

USDA Aquaculture Facility – University of Maine (2002)
Topographic survey to facilitate design and construction activities for a proposed expansion of existing facility on the University of Maine Campus, Orono. Services provided to Einhorn Yaffee Prescott, Boston, MA.

Orono Nursing Home, Orono, Maine (1996)
ALTA/ACSM Land Title Survey of existing nursing home for proposed sale. Services provided to Sandy River Group.

Housing

The Grove, Orono, Maine (Current)
Boundary, topographic and subdivision services on twenty plus acre private student housing project on land adjacent to the University of Maine. Services provided to WBRC - Architects • Engineers.

Dirigo Pines, Orono, Maine (Ongoing)
Subdivision and Site plans, As-Built Survey and Construction Layout for ongoing work at this 55 acre retirement community. Services provided to Dirigo Development Company, LLC.

Griffin Park, Bangor, Maine (2012)
Boundary and topographic Surveys of an existing 5 acre, 52 Unit housing on land adjacent to Airport Mall in Bangor. Services provided to WBRC - Architects • Engineers for Bangor Housing Authority.

Nason Park, Bangor, Maine (2012)
Boundary and topographic Surveys of an existing 4-story, multi-unit apartment complex occupying a city block in downtown Bangor. Services provided to WBRC - Architects • Engineers for Bangor Housing Authority.

Maine Coast Heritage Trust (2008)
Construction layout services to establish foundation corners and a benchmark to facilitate construction of the new MCHT Office Building in Somesville, Maine. Services provided to Nickerson & O'Day, Inc.

Pendleton Drive Subdivision, Hermon, Maine (2007)
Boundary and Topographic survey to facilitate a nine lot subdivision in Hampden, Maine. Services provided to Libby Brothers, Inc., 109 Overlock Road, Levant, Maine.

Windward Family Housing – Searsport, Maine (Current)
Boundary and Topographic survey to facilitate design and construction activities for proposed sudbivision in Searsport, Maine. Services provided to Penquis Cap, Bangor, Maine.

Penobscot Indian Nation Housing Authority (2006)
Boundary and Topographic survey to facilitate design and construction of multi-unit housing projects on Indian Island, Old Town, Maine. Services provided to WBRC - Architects • Engineers.

Stetson Drive Subdivision, Hampden, Maine (2003)
Boundary and Topographic survey to facilitate a nine lot subdivision in Hampden, Maine. Services provided to Libby Brothers, Inc., 109 Overlock Road, Levant, Maine.

Penobscot Commons Housing Project – Orono, Maine (2003)
Boundary and control survey to facilitate design and construction activities for student housing in Orono, Maine. Services provided to Wright-Pierce, Topsham, Maine.

Bangor Waterworks, Bangor, Maine (1999)
Engineering survey of historic building for proposed Eastern Maine Healthcare redevelopment project. Services provided to WBRC - Architects * Engineers.

Burden House, Sargent Head, Northeast Harbor, Maine (1999)
Boundary and topographic surveys of coastal estate provided for redesign and reconstruction of property destroyed in 1999 fire. Services provided to WBRC - Architects * Engineers and the Burden Family.

Apple Tree Acres/MMG Acres, Belfast, Maine (1999-current)
Boundary and GPS photo-control surveys of a 263-acre parcel being developed into 140 residential lots. Services provided to WBRC - Architects * Engineers and to Maine McLean Group.

Crosby Manor Estates, Belfast, Maine (1999-current)
ALTA/ACSM Land Title and topographic surveys of a 21-acre, sixty-unit condominium development on Belfast Bay. Services provided to WBRC - Architects * Engineers and to Maine McLean Group.

Old Town Housing Authority, Old Town, Maine (current)
Boundary, ALTA/ACSM Land Title, and topographic surveys of several OTHA facilities, including undeveloped and existing housing sites. Services provided to Old Town Housing Authority.

Municipal/Government

Maine Orthophoto Project: 5 Year Program, State of Maine (Started 2012)
Project partner responsible for GPS Control Surveys for ongoing Maine GeoLibrary Orthoimagery Program. GPS control for Orthophoto and LiDAR project areas throughout the state, with entire state coverage over 5 year period. Services provided to Woolpert for the State of Maine.

US Post Offices – Multiple Locations, Maine (Ongoing)
Boundary and Topographic Surveys to facilitate building and infrastructure upgrades including parking, drainage, entrances, etc. at US Post Offices and Processing Centers. Projects located throughout Maine including Brewer, Houlton, Caribou, Scarborough, Brunswick, Orono, Old Town, Ellsworth, Lisbon, Lewiston, Monson, Dover Foxcroft, Skowhegan, Passadumkeag and Hampden. Services provided to WBRC - Architects • Engineers.

Maine Army Reserve National Guard Fueling Site, Bangor, Maine (2011-2012)
Topographic and construction surveying services to facilitate design and construction of fuel containment and other structures. Services provided to RCG, LLC, Louisville, Kentucky.

Bucksport Water District, Hampden, Maine (2012)
Boundary and Topographic surveys for water storage tank replacement project. Services provided to Bucksport Water District and Woodard & Curran.

Maine Dept. of Transportation, Bridge Surveys, Multiple Locations, Maine (2012)
Topographic and Right-of-Way surveys for bridge repair and/or replacement activities. Projects in The Forks and Emden, Maine. Services provided to Maine Dept. of Transportation, Augusta, Maine.

Hampden Water District, Hampden, Maine (2012)
Existing condition survey for Cottage, Canoe and VFW Streets for water main replacement project. Services provided to Hampden Water District and Woodard & Curran.

Maine Dept. of Transportation, GPS Surveys, Multiple Locations, Maine (2011-2012)
GPS Control surveys to support photogrammetric mapping services and to establish primary control ties for ground survey activities and new road construction. Projects in multiple locations including Phillips, Strong, Scarborough, and Lisbon Falls. Services provided to Maine Dept. of Transportation, Augusta, Maine.

Maine Dept. of Transportation, River Road, Windham, Maine (2011)
GPS Control survey of a ten mile road corridor to support photogrammetric mapping services and to establish primary control for ground survey activities and new road construction. Services provided to Maine Dept. of Transportation, Augusta, Maine.

Maine Air National Guard Firing Range, Hermon, Maine (2010)
Topographic surveying services to facilitate environmental site remediation and construction activities. Services provided to S.W. Cole Engineering, Inc.

Hermon Municipal Fire Station, Hermon, Maine (2007)
Boundary and Topographic survey for site selection and design activities related to construction of new fire station. Services provided to the Municipality of Hermon.

Somerset County Jail, Madison, Maine (2006)
Boundary and Topographic survey for design and construction activities related to construction of new county jail on a 45 acre site. Services provided to SMRT and Somerset County Commissioners.

Hopkins Street Water Main, Hampden, Maine (2006)
Topographic survey and construction layout for new municipal residential water main. Services provided to Hampden Water District.

Bangor Police Department, Bangor, Maine (2006)
Boundary and Topographic survey for design and construction activities related to construction of new Bangor Police Station. Services provided to WBRC - Architects • Engineers.

INS Border Patrol Stations, Jackman, Baileyville & Van Buren, Maine (2004)
Boundary and Topographic survey for design and construction activities related to construction of new border patrol stations in the above-mentioned towns. Services provided to The Bioengineering Group, Inc., 18 Commercial Street, Salem, MA.

Lincoln and Sagadahoc MultiCounty Jail Authority, Wiscasset, Maine (2003-2004)
Topographic Surveys of an approximately 30-acre site for the construction of proposed correctional facility. Services provided to SMRT.

City of Augusta Parking Improvements – Gingras Lot (2003)

Boundary and topographic survey to facilitate design and construction activities for a new parking garage in downtown Augusta. Services provided to WBRC - Architects • Engineers, Bangor, Maine.

Hampden Water District, Hampden, Maine (1999)
Existing condition survey for Sunset Avenue water main replacement project. Services provided to Hampden Water District and Woodard & Curran.

Northern Maine Juvenile Detention Facility, Charleston, Maine (1994-1999)
Boundary and topographic Surveys of an approximately 25-acre portion of the existing Charleston Correctional Facility for construction and continuing expansion of a juvenile detention facility. Services provided to WBRC - Architects * Engineers and to SMRT.

Airports

Augusta Airport (2011-2012)
As-built survey of reconstructed runway and GPS Control survey to replace Primary Airport Control Station destroyed during obstruction removals, in accordance with FAA Advisory Circulars 16A & 17B. Services provided to Hoyle, tanner & Associates, Inc., Manchester, NH.

FAA VORTAC Site, Hermon, Maine (2010)
Boundary survey of 61 acre site to identify secure radio navigation site boundaries and layout security signage for property. Services provided to the Federal Aviation Administration through the Volpe Center, U.S. Department of Transportation, Cambridge, Massachusetts.

Lincoln Airport (2009)
GPS Control survey to support photogrammetric obstruction mapping services used for air traffic and management safety. Services provided to KAPPA Mapping, Inc., Bangor, Maine.

Bethel Airport (2009)
GPS Control survey to support photogrammetric obstruction mapping services used for air traffic and management safety. Services provided to KAPPA Mapping, Inc., Bangor, Maine.

Oxford Airport (2010)
GPS Control survey to support photogrammetric obstruction mapping services used for air traffic and management safety. Services provided to KAPPA Mapping, Inc., Bangor, Maine.

FAA Air Traffic Control Tower, Bangor, Maine (1995)
Construction layout and monitoring for new five million dollar control tower at Bangor International Airport. Services provided to Handford General Contractors, for a period of approximately one year, included complete site layout and alignment of precast concrete sections for new 125’ control tower complex.

S.W.COLE ENGINEERING, INC.

Our Clients Make Better Decisions From the Ground Up.

Providing Earth-Related Services For Over 30 Years

COMPANY OVERVIEW

S. W. Cole Engineering, Inc. was established in 1979 in Bangor, Maine to provide geotechnical engineering, geology, environmental consulting and construction quality assurance testing services. In addition to our corporate office, our firm includes two branch offices in New Hampshire and three branch offices in Maine to more efficiently provide services to our clients throughout northern New England.

ABOUT OUR FIRM

S. W. Cole Engineering provides services in three major areas: geotechnical engineering, scientific and environmental consulting, and field and laboratory testing. We are a team of more than 90 engineers, scientists and technicians which annually provides services on more than 1,800 projects. Our 30-plus years of experience and six regional offices have allowed us to work with a wide variety of complex geologic and subsurface conditions throughout New England. Our engineers, geologists and construction materials technicians take a hands-on approach and understand the impact of subsurface conditions on construction budgets and schedules. We have a proven track record of aiding the owner, design team and construction team in completing successful projects.

EXPERIENCE WITH BUILDING AND PARKING GARAGE PROJECTS

S. W. Cole Engineering, Inc. has provided geotechnical engineering as well as construction materials testing and environmental services on hundreds of buildings in Maine and New Hampshire, including:

- Office and Commercial Buildings
- Banks
- Parking Garages
- Retail Developments
- Hospitals and Nursing Homes
- Apartment Buildings and Housing Developments

Due to our large amount of project experience in northern New England, we are familiar with the geography and geology of the area and we understand the particular challenges of constructing such buildings and with the many players involved. A partial listing of representative project experience follows this page.

RELATED SERVICES

In addition to our geotechnical engineering and materials testing services, S. W. Cole Engineering, Inc. is also equipped to provide the following services:

- Environmental Site Assessments and Analyses
- Wetlands Delineation and Permitting
- Site Evaluations

S.W.COLE ENGINEERING, INC.

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Selected Building and Parking Garage Project Experience

Geotechnical Engineering

- Proposed AAA Office Building Renovation, Portland
- Columbia Street Parking Garage, Bangor
- Proposed Fore Street Garage Addition, Portland
- Lisbon Community Federal Credit Union, Lewiston
- Bangor Savings Bank Branch, Old Town
- Proposed Veranda Street Facility Expansion, Portland
- Crane Garage, Portland
- Proposed TD Bank, Bangor
- Chestnut Street Garage, Portland
- Machias Savings Bank, Brewer
- Dickman Street Parking Garage, Augusta
- Miss Portland Diner, Portland
- Bangor Savings Bank Branch, Bangor
- Parking Garage Addition, Bangor
- New Credit Union Facility, Augusta
- Bangor Savings Bank Branch, Old Town
- KeyBank Building, Fort Kent
- Proposed Damariscotta Bank & Trust, Damariscotta
- New Credit Union, Waterville
- Addition To Biddeford Savings Bank, Biddeford
- Proposed Bank Building at Westgate Plaza, Portland
- Lisbon Community Federal Credit Union, Lewiston
- Proposed Franklin Savings Bank Branch, Rangeley
- Proposed Fore Street Garage Addition, Portland
- Proposed Ocean Communities Federal Credit Union, Saco
- Proposed Katahdin Trust Bank, Hampden
- Proposed Building Renovation at 258 Commercial Street, Portland
- New Bangor Savings Bank Building, Augusta

Continued Building and Parking Garage Project Experience

Materials Testing

- TD Banknorth, Falmouth
- Ocean Communities Federal Credit Union, Saco
- Proposed Parking Garage and Office Building at 84 Marginal Way, Portland
- Kenduskeag Plaza Parking Garage, Bangor
- Portland International Jetport Parking Garage, Portland
- Keybank Branch, Ellsworth
- Woodard & Curran Office Building Addition, Portland
- Lisbon Community Federal Credit Union, Lewiston
- Evergreen Cemetery Garage, Portland
- Columbia Street Parking Garage Renovation, Bangor
- Ocean Gateway Parking Garage, Portland
- Infinity Credit Union, Arundel
- Central Maine Medical Center Parking Garage, Lewiston
- People's United Bank Retaining Wall and Parking Lot, Bangor
- Congress Street Medical Office Parking Garage Expansion, Portland
- Bangor Savings Bank Branch, Old Town
- Evergreen Cemetery Garage, Portland
- Dickman Street Parking Garage, Augusta
- Portland Post Office at 125 Forest Avenue, Portland
- Parking Garage, Saco
- Mercy Medical Office Building, Portland
- 490 Congress Street Building Renovation, Portland
- Savings Bank of Maine, Gardiner
- Miss Portland Diner, Portland
- Franklin Street Parking Garage, Bangor
- Drainage Improvements at Portland Exposition Building, Portland
- Proposed Franklin Savings Bank, Rangeley
- Medical Office Building and Parking Garage, Portland
- 25 Middle Street Building Addition, Portland
- Merrill Merchants Bank Parking Lot Improvements, Bangor
- Maine Medical Center Parking Garage, Portland
- Eastern Maine Medical Center Parking Garage, Bangor
- Acadia Federal Credit Union Addition, Fort Kent

S.W.COLE ENGINEERING, INC.

Our Clients Make Better Decisions
From the Ground Up.

Robert E. Chaput, Jr., P.E.
Senior Vice President
Chief Operating Officer (COO)
Senior Geotechnical Engineer

Education:
M.S., Geotechnical Engineering, University of Maine

B.S., Construction Management Technology, University of Maine

A.S., Civil Engineering, University of Maine

Registrations:
Professional Engineer (P.E.), Maine, New Hampshire

Certifications:
Certified Nuclear Densometer Operator

Affiliations:
American Society of Civil Engineers (ASCE)

Associated General Contractors of Maine (AGC)

ASFE / Professional Firms Practicing in the Geosciences

American Council of Engineering Companies (ACEC)

Bob Chaput is a native of Winthrop, Maine. An integral part of the growth of S. W. Cole Engineering, Inc., he helped start two of our branch locations. Bob attended the University of Maine, where he earned an A.S. degree in civil engineering and a B.S. in construction management technology. Bob earned an master's degree in geotechnical engineering from the University of Maine in 2004. During college, he worked as an engineering technician for S. W. Cole Engineering, Inc. in Bangor and Morrison Geotechnical Engineering in Winslow, Maine.

In 1990, Bob rejoined S. W. Cole Engineering, Inc. as a materials engineer and helped start our new office in Gray, Maine. The firm later promoted him to the position of geotechnical engineer, and in 1999, after S. W. Cole Engineering acquired the former operation of Morrison Geotechnical Engineering, Bob moved to our new Winslow, Maine office and oversaw its eventual move to Augusta, Maine. Bob is the firm's senior vice president and chief operating officer as well as a senior geotechnical engineer, and he is also the manager of our Augusta office. His responsibilities include office management and project management of geotechnical engineering projects, coordination of subsurface investigations, technical analysis, and design of shallow and deep foundations and earth slopes.

Honors:

- Distinguished Engineer, The Francis Crowe Society, University of Maine, Awarded 2001
- Chapter Honor Member, Chi Epsilon (Civil Engineering Honor Society), Inducted 2003

Achievements:

- Board of Directors, Construction Specifications Institute
- Past President, American Society of Civil Engineers, Maine Section
- Graduate, ASFE Fundamentals of Professional Practice Course
- Board of Directors, S. W. Cole Engineering, Inc.

Specialized Training:

- Fundamentals of Deep Foundations, 45-Hour Short Course, University of Florida

S.W.COLE ENGINEERING, INC.

Our Clients Make Better Decisions
From the Ground Up.

Michael St. Pierre, P.E.
Geotechnical Engineer

Education:
M.S., Civil Engineering (Concentration on Geotechnical Engineering), University of Maine

B.S., Civil Engineering, University of Maine

Registrations:
Professional Engineer (P.E.), Maine and Oregon

Certifications:
OSHA 10-Hour Construction Safety & Health Certified

Affiliations:
American Society of Civil Engineers (ASCE)

Mike St. Pierre received his bachelor's of science and master's of science from the University of Maine in Orono. After receiving his master's, he was an civil engineering instructor at the university, leading courses in materials laboratory, soils laboratory, and civil engineering graphics lecture and laboratory.

Mike has five years of geotechnical engineering experience working in Maine, New Hampshire, Oregon and Washington. He joined S. W. Cole Engineering, Inc. in October 2010. His responsibilities include project management, coordination and supervision of subsurface investigations, geotechnical engineering analyses, preparation of proposals, technical reports and specifications, and quality assurance of computations and reports for fellow engineers. He also performs soil density testing and is responsible for overseeing the implementation of design recommendations for various geotechnical tasks, some of which include pile driving, subgrade observation, foundation preparation and soil compaction.

Mike's experience includes design analyses for spread footing, driven pile and drilled shaft foundations, settlement analyses, pavement design and evaluation, analysis of landslides, slope stability and retaining walls and geotechnical monitoring of construction activities. He has worked on numerous commercial and public infrastructure projects throughout New England and the Pacific Northwest. Mike has experience working on wind power projects in New England, providing exploration coordination and oversight, coordination of subconsulants and evaluation and development of geotechnical foundation design parameters.

Mike's experience has focused on geotechnical evaluations for state and municipal bridge design. He is knowledgable in design methodology following FHWA and AASHTO standards. His foundation analysis experience includes laterial pile evaluation using L-pile and load resistance factor design (LRFD).

Mike's interests outside of work include camping, cycling, golf and hiking.

AUGUSTA OFFICE

555 Eastern Avenue • Augusta, Maine • 04330 • 207.626.0600 • www.swcole.com

3752.00
MEARNG PN 230113
Joint Forces Headquarters
Augusta, Kennebec County, Maine

Exhibit #6 – NRCS Soil Maps

Prepared For: Maine Army National Guard
Attn: Normand Michaud
Bldg #8, Camp Keyes
Augusta, Maine 04333

Prepared By: WBRC Architects-Engineers
44 Central Street
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WBRC ARCHITECTS • ENGINEERS
BANGOR PORTLAND SARASOTA
www.wbrcae.com

Map Scale: 1:7,740 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1,000 1,500

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Gully

Short Steep Slope

Other

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:7,740 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 19N NAD83

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

Soil Survey Area: Kennebec County, Maine
Survey Area Data: Version 11, Jul 27, 2009

Date(s) aerial images were photographed: Data not available.

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

Map Unit Legend

Kennebec County, Maine (ME011)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BuC2	Buxton silt loam, 8 to 15 percent slopes, eroded	0.4	0.2%
HfC	Hartland very fine sandy loam, 8 to 15 percent slopes	8.2	4.7%
HkC	Hinckley gravelly sandy loam, 8 to 15 percent slopes	0.4	0.2%
ScA	Scantic silt loam	6.3	3.6%
SkB	Scio very fine sandy loam, 3 to 8 percent slopes	22.6	13.0%
WmB	Windsor loamy sand, 3 to 8 percent slopes	14.7	8.5%
WmC	Windsor loamy sand, 8 to 15 percent slopes	61.4	35.4%
WmD	Windsor loamy sand, 15 to 30 percent slopes	59.3	34.2%
Totals for Area of Interest		**173.2**	**100.0%**

3752.00
MEARNG PN 230113
Joint Forces Headquarters
Augusta, Kennebec County, Maine

Exhibit #7 – Erosion and Sedimentation Control Plan & Specifications

Prepared For: Maine Army National Guard
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Erosion and Sedimentation Control Plan

All erosion and sedimentation control measures are designed according to the Maine Department of Environmental Protection's Maine Erosion and Sediment Control Best Management Practices Manual, 2003. Sediment control measures must be in place before activity begins. Measures must remain in place and functional until the site is permanently stabilized.

1. Pollution prevention. Minimize disturbed areas and protect natural down-gradient buffer areas to the extent practicable. The discharge may not result in erosion of any open drainage channels, swales, upland, or coastal or freshwater wetlands. Minimize disturbed areas through phasing. If work within an area is not anticipated to begin within two weeks time, leave the area in its naturally existing cover if practicable.

2. Sediment barriers. Prior to construction, properly install sediment barriers at the edge of any down-gradient disturbed area and adjacent to any drainage channels within the disturbed area. Maintain the sediment barriers until the disturbed area is permanently stabilized.

3. Temporary stabilization. Stabilize with mulch or other non-erodable cover any exposed soils that will not be worked for more than 7 days. Stabilize areas within 75 feet of a wetland or waterbody within 48 hours of the initial disturbance of the soil or prior to any storm event, whichever comes first.

4. Removal of temporary sediment control measures. Remove any temporary sediment control measures, such as silt fence, within 30 days after permanent stabilization is attained. Remove any accumulated sediments and stabilize. Remove silt fence by cutting the fence materials at ground level to avoid additional soil disturbance.

5. Permanent stabilization. Permanently stabilize all disturbed areas that will not be worked for more than one year or that have been brought to final grade by planting vegetation, seeding, sod, or through the use of permanent mulch, or riprap, or road sub-base. If using vegetation for stabilization, select the proper vegetation for the light, soil and moisture conditions; amend areas of disturbed subsoils with topsoil, compost, or fertilizers; protect seeded areas with mulch or, if necessary, erosion control blankets; and schedule sodding, planting, and seeding to avoid die-off from summer drought and fall frosts. Newly seeded or sodded areas must be protected from vehicle traffic, excessive pedestrian traffic, and concentrated runoff until the vegetation is well-established. If necessary, areas must be seeded and mulched again if germination is sparse, plant coverage is spotty, or topsoil erosion is evident. One or more of the following may apply to a particular site.

   (a) Seeded areas. For seeded areas, permanent stabilization means a 90% cover of healthy plants with no evidence of washing or rilling of the topsoil.

   (b) Sodded areas. For sodded areas, permanent stabilization means the complete binding of the sod roots into the underlying soil with no slumping of the sod or die-off.

   (c) Permanent Mulch. For mulched areas, permanent mulching means total coverage of the exposed area with an approved mulch material. Erosion control mix may be used as mulch for permanent stabilization according to the approved application rates and limitations.

   (d) Riprap. For areas stabilized with riprap, permanent stabilization means that slopes stabilized with riprap have an appropriate backing of a well-graded gravel or approved geotextile to prevent soil movement from behind the riprap. Stone must be sized appropriately. It is recommended that angular stone be used.

   (e) Agricultural use. For construction projects on land used for agricultural purposes (e.g., pipelines across crop land), permanent stabilization may be accomplished by returning the disturbed land to agricultural use.

(f) Paved areas. For paved areas, permanent stabilization means the placement of the compacted gravel subbase is completed.

(g) Ditches, channels, and swales. For open channels, permanent stabilization means the channel is stabilized with a 90% cover of healthy vegetation, with a well-graded riprap lining, or with another non-erosive lining such as concrete or asphalt pavement. There must be no evidence of slumping of the channel lining, undercutting of the channel banks, or down-cutting of the channel.

6. Winter construction. "Winter construction" is construction activity performed during the period from November 1 through April 15. If disturbed areas are not stabilized with permanent measures by November 1 or new soil disturbance occurs after November 1, but before April 15, then these areas must be protected and runoff from them must be controlled by additional measures and restrictions.

Natural Resource Protection Any areas within 100 feet from any natural resources, if not stabilized with a minimum of 75 % mature vegetation catch, shall be mulched by December 1 and anchored with plastic netting or protected with an erosion control cover. During winter construction, a double row of sediment barriers (i.e. silt fence backed with hay bales or erosion control mix) will be placed between any natural resource and the disturbed area. Projects crossing the natural resource shall be protected a minimum distance of 100 feet on either side from the resource. Existing projects not stabilized by December 1 shall be protected with the second line of sediment barrier to ensure functionality during the spring thaw and rains.

Sediment Barriers During frozen conditions, sediment barriers may consist of erosion control mix berms or any other recognized sediment barriers as frozen soil prevents the proper installation of hay bales or silt fences.

Mulching All area shall be considered to be denuded until seeded and mulched. Hay and straw mulch shall be applied at a rate of 150 lb. per 1,000 square feet or 3 tons/acre (twice the normal accepted rate of 75-lbs./1,000 s.f. or 1.5 tons/acre) and shall be properly anchored. Erosion control mix must be applied with a minimum 4-inch thickness. Mulch shall not be spread on top of snow. The snow will be removed down to a one-inch depth or less prior to application. After each day of final grading, the area will be properly stabilized with anchored hay or straw or erosion control matting. An area shall be considered to have been stabilized when exposed surfaces have been either mulched or adequately anchored so that ground surface is not visible though the mulch. Between the dates of November 1 and April 15, all mulch shall be anchored by either mulch netting, asphalt emulsion chemical, tracking or wood cellulose fiber. The cover will be considered sufficient when the ground surface is not visible though the mulch. After November 1st, mulch and anchoring of all exposed soil shall occur at the end of each final grading workday.

Soil Stockpiling Stockpiles of soil or subsoil will be mulched for over winter protection with hay or straw at twice the normal rate or with a four-inch layer of erosion control mix. This will be done within 24 hours of stocking and re-established prior to any rainfall or snowfall. Any soil stockpile will not be placed (even covered with mulched) within 100 feet from any natural resources.

Seeding Between the dates of October 15 and April 1st, loam or seed will not be required. During periods of above freezing temperatures finished areas shall be fine graded and either protected with mulch or temporarily seeded and mulched until such time as the final treatment can be applied. If the date is after November 1st and if the exposed area has been loomed, final graded with a uniform surface, then the area may be dormant seeded at a rate of 3 times higher than specified for permanent seed and then mulched. Dormant seeding may be placed prior to the placement of mulch or erosion control blankets. If dormant seeding is used for the site, all disturbed areas shall receive 4' of loam and seed at an application rate of 5lbs/1000 s.f. All areas seeded during the winter will be inspected in the spring for adequate catch. All areas insufficiently vegetated (less than 75 % catch) shall be revegetated by replacing loam, seed and mulch. If dormant seeding is not used for the site, all disturbed areas shall be revegetated in the spring.

Overwinter stabilization of ditches and channels All stone-lined ditches and channels must be constructed and stabilized by November 15. All grass-lined ditches and channels must be constructed and stabilized by September 1. If a ditch or channel is not grass-lined by September 1, then one of the following actions must be taken to stabilize the ditch for late fall and winter. Install a sod lining in the ditch: A ditch must be lined with properly installed sod by October 1. Proper installation includes: pinning the sod onto the soil with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, watering the sod to promote root growth into the disturbed soil, and anchoring sod at the base of the ditch with jute or plastic mesh to prevent the sod from sloughing during flow conditions. Install a stone lining in the ditch: A ditch must be lined with stone riprap by November 15. A registered professional engineer must be hired to determine the stone size and lining thickness needed to

withstand the anticipated flow velocities and flow depths within the ditch. If necessary, the contractor will regrade the ditch prior to placing the stone lining so to prevent the stone lining from reducing the ditch's cross-sectional area.

Overwinter stabilization of disturbed slopes All stone-covered slopes must be constructed and stabilized by November 15. And all slopes to be vegetated must be seeded and mulched by September 1. The department will consider any area having a grade greater than 15% to be a slope. If a slope to be vegetated is not stabilized by September 1, then one of the following actions must be taken to stabilize the slope for late fall and winter. Stabilize the soil with temporary vegetation and erosion control mats -- By October 1 the disturbed slope must be seeded with winter rye at a seeding rate of 3 pounds per 1000 square feet and then install erosion control mats or anchored mulch over the seeding. If the rye fails to grow at least three inches or fails to cover at least 75% of the slope by November 1, then the contractor will cover the slope with a layer of erosion control mix or with stone riprap as described in the following standards. Stabilize the soil with sod -- The disturbed slope must be stabilized with properly installed sod by October 1. Proper installation includes the contractor pinning the sod onto the slope with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil. The contractor will not use late-season sod installation to stabilize slopes having a grade greater than 33% (3H:1V) or having groundwater seeps on the slope face. Stabilize the soil with erosion control mix – Erosion control mix must be properly installed by November 15. The contractor will not use erosion control mix to stabilize slopes having grades greater than 50% (2H:1V) or having groundwater seeps on the slope face. Stabilize the soil with stone riprap -- Place a layer of stone riprap on the slope by November 15. The development's owner will hire a registered professional engineer to determine the stone size needed for stability on the slope and to design a filter layer for underneath the riprap.

Overwinter stabilization of disturbed soils By September 15, all disturbed soils on areas having a slope less than 15% must be seeded and mulched. If the disturbed areas are not stabilized by this date, then one of the following actions must be taken to stabilize the soil for late fall and winter. Stabilize the soil with temporary vegetation -- By October 1, seed the disturbed soil with winter rye at a seeding rate of 3 pounds per 1000 square feet, lightly mulch the seeded soil with hay or straw at 75 pounds per 1000 square feet, and anchor the mulch with plastic netting. Monitor growth of the rye over the next 30 days. If the rye fails to grow at least three inches or fails to cover at least 75% of the disturbed soil before November 1, then mulch the area for over-winter protection as described below. Stabilize the soil with sod -- Stabilize the disturbed soil with properly installed sod by October 1. Proper installation includes pinning the sod onto the soil with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil. Stabilize the soil with mulch -- By November 15, mulch the disturbed soil by spreading hay or straw at a rate of at least 150 pounds per 1000 square feet on the area so that no soil is visible through the mulch. Immediately after applying the mulch, anchor the mulch with plastic netting to prevent wind from moving the mulch off the disturbed soil.

MAINTENANCE Maintenance measures shall be applied as needed during the entire construction season. After each rainfall, snow storm or period of thawing and runoff, the site contractor shall perform a visual inspection of all installed erosion control measures and perform repairs as needed to insure their continuous function. Following the temporary and/or final seeding and mulching, the contractor shall, in the spring, inspect and repair any damages and/or bare spots. An established vegetative cover means a minimum of 85 to 90 % of areas vegetated with vigorous growth.

STABILIZATION SCHEDULE BEFORE WINTER

September 15 All disturbed areas must be seeded and mulched. All slopes must be stabilized, seeded and mulched. All grass-lined ditches and channels must be stabilized with mulch or an erosion control blanket.

October 1 If the slope is stabilized with an erosion control blanket and seeded. All disturbed areas to be protected with an annual grass must be seeded at a seeding rate of 3 pounds per 1000 square feet and mulched.

November 15 All stone-lined ditches and channels must be constructed and stabilized. Slopes that are covered with riprap must be constructed by that date.

December 1 All disturbed areas where the growth of vegetation fails to be at least three inches tall or at least 75% of the disturbed soil is covered by vegetation, must be protected for over-winter.

NOTE: The dates given are for projects in South-Central Maine. Adjust the dates given based on the project's location within the state – reducing times up to three weeks for project's in Northern Maine and extending times up to two weeks for project's on the coast in extreme Southern Maine.

7. Stormwater channels. Ditches, swales, and other open stormwater channels must be constructed and stabilized using measures that achieve long-term erosion control. Each channel should be constructed in sections so that the section's grading, shaping, and installation of the permanent lining can be completed the same day. If a channel's final grading or lining installation must be delayed, then diversion berms must be used to divert stormwater away from the channel, properly-spaced check dams must be installed in the channel to slow the water velocity, and a temporary lining installed along the channel to prevent scouring.

8. Roads. Gravel and paved roads must be constructed with crowns or other measures, such as water bars, to ensure that stormwater is delivered immediately to adjacent stable ditches, vegetated buffer areas, catch basin inlets, or street gutters.

9. Culverts. Culvert inlets must be protected with appropriate materials and protection must extend at least as high as the expected maximum elevation of storage behind the culvert. Culvert outlets must incorporate measures, such as aprons or plunge pools, to prevent scour of the stream channel.

10. Parking areas. Parking areas must be constructed to ensure runoff is delivered to adjacent swales, catch basins, curb gutters, or buffer areas without eroding areas downslope. The parking area’s subbase compaction and grading must be done to ensure runoff is evenly distributed to adjacent buffers or side slopes. Catch basins must be located and set to provide enough storage depth at the inlet to allow inflow of peak runoff rates without by-pass of runoff to other areas.

Inspection and Maintenance Plan

Responsible Party:	Name	Normand Michaud
	Job Title	Owner Contact
	Employer	Maine Army National Guard
	Address	194 Winthrop Street, Bldg. #8, Camp Keyes Augusta, Maine 04333
	Phone	(207) 626-7887
	E-mail	normand.g.michaud.mil@mail.mil
Design Professional	Name	John Kenney, P.E., LEED AP
	Job Title	Civil Engineer
	Employer	WBRC Architects / Engineers
	Address	44 Central Street Bangor, Maine 04401
	Phone	(207) 947-4511
	E-mail	john.kenney@wbrcae.com
Proprietary Device Supplier	Name	N/A
	Job Title	
	Employer	
	Address	
	Phone	
	E-mail	

1. During construction. The following standards must be met during construction:

   (a) Inspection and corrective action. Inspect disturbed and impervious areas, erosion control measures, materials storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. Inspect these areas at least once a week as well as before and after a storm event, and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in the permit, shall conduct the inspections.

   (b) Maintenance. Maintain all measures in effective operating condition until areas are permanently stabilized. If best management practices (BMPs) need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation must be completed within 7 calendar days and prior to any storm event (rainfall).

   (c) Documentation. Keep a log (report) summarizing the inspections and any corrective action taken. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, materials storage areas, and vehicles access points to the parcel. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and location(s) where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to department staff and a copy must be provided upon request. The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

WEEKLY SITE INSPECTION REPORT

PROJECT:_____

DATE OF INSPECTION: _____ WEATHER/TEMPERATURE_____

PERSON CONDUCTING THE INSPECTION_____

A. EROSION AND SEDIMENTATION CONTROLS	
1._____ ☐ Functioning _____ ☐ Requires maintenance	1. Where:_____ Action Taken:_____
2._____ ☐ Functioning _____ ☐ Requires maintenance	2. Where:_____ Action Taken:_____
3._____ ☐ Functioning _____ ☐ Requires maintenance	3. Where:_____ Action Taken:_____
4._____ ☐ Functioning _____ ☐ Requires maintenance	4. Where:_____ Action Taken:_____
5._____ ☐ Functioning _____ ☐ Requires maintenance	5. Where:_____ Action Taken:_____
6._____ ☐ Functioning _____ ☐ Requires maintenance	6. Where:_____ Action Taken:_____
B. MATERIALS STORAGE AREA	
1._____ ☐ Functioning _____ ☐ Requires maintenance	1. Where:_____ Action Taken:_____
2._____ ☐ Functioning _____ ☐ Requires maintenance	2. Where:_____ Action Taken:_____
3._____ ☐ Functioning _____ ☐ Requires maintenance	3. Where:_____ Action Taken:_____
C. VEHICLE ACCESS POINTS	
1._____ ☐ Functioning _____ ☐ Requires maintenance	1. Where:_____ Action Taken:_____
2._____ ☐ Functioning _____ ☐ Requires maintenance	2. Where:_____ Action Taken:_____
3._____ ☐ Functioning _____ ☐ Requires maintenance	3. Where:_____ Action Taken:_____

2. Post-construction. The following standards must be met after construction.

   (a) Plan. Carry out the following inspection and maintenance plan.

   (b) Inspection and corrective action. All measures must be maintained in effective operating condition. A person with knowledge of erosion and stormwater control, including the standards and conditions in the permit, shall conduct the inspections. The following areas, facilities, and measures must be inspected and identified deficiencies must be corrected. Areas, facilities, and measures other than those listed below may also require inspection on a specific site. Inspection or maintenance tasks other than those discussed below must be included in the maintenance plan developed for a specific site.

      (i) Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after heavy rains to identify active or potential erosion problems. Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

      (ii) Inspect ditches, swales and other open stormwater channels in the spring, in late fall, and after heavy rains to remove any obstructions to flow, remove accumulated sediments and debris, to control vegetated growth that could obstruct flow, and to repair any erosion of the ditch lining. Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity. Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable. If the ditch has a riprap lining, replace riprap on areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged. The channel must receive adequate routine maintenance to maintain capacity and prevent or correct any erosion of the channel's bottom or sideslopes.

      (iii) Inspect culverts in the spring, in late fall, and after heavy rains to remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit; and to repair any erosion damage at the culvert’s inlet and outlet.

      (iv) Inspect and, if required, clean-out catch basins at least once a year, preferably in early spring. Clean-out must include the removal and legal disposal of any accumulated sediments and debris at the bottom of the basin, at inlet any grates, at any inflow channels to the basin, and at any pipes between basins. If the basin outlet is designed to trap floatable materials, then remove the floating debris and any floating oils (using oil-absorptive pads).

      (v) Inspect resource and treatment buffers at least once a year for evidence of erosion, concentrating flow, and encroachment by development. If flows are concentrating within a buffer, site grading, level spreaders, or ditch turn-outs must be used to ensure a more even distribution of flow into a buffer. Check down slope of all spreaders and turn-outs for erosion. If erosion is present, adjust or modify the spreader’s or turnout’s lip to ensure a better distribution of flow into a buffer. Clean out any accumulation of sediment within the spreader bays or turn-out pools.

   (c) Regular maintenance

      (i) Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader. Grading of gravel roads, or grading of the gravel shoulders of gravel or paved roads, must be routinely performed to ensure that stormwater drains immediately off the road surface to adjacent buffer areas or stable ditches, and is not impeded by accumulations of graded material on the road shoulder or by excavation of false ditches in the shoulder. If water bars or open-top culverts are used to divert runoff from road surfaces, clean out any sediment within or at the outlet of these structures to restore their function.

(ii) Manage each buffer's vegetation consistently with the requirements in any deed restrictions for the buffer. Wooded buffers must remain fully wooded and have no disturbance to the duff layer. Vegetation in non-wooded buffers may not be cut more than three times per year, and may not be cut shorter than six inches.

(d) Documentation. Keep a log (report) summarizing inspections, maintenance, and any corrective actions taken. The log must include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediments or debris, indicate where the sediment and debris was disposed after removal.

The log must be made accessible to department staff and a copy provided to the department upon request. The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

ANNUAL SITE INSPECTION/MAINTENANCE REPORT

PROJECT:_____ YEAR: _____

Vegetated Areas, particularly slopes and embankments – Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after heavy rains to identify active or potential erosion problems. Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

Location	Inspection	Maintenance	Inspected/maintained by
	☐ Functioning ☐ Requires maintenance	☐ Replant bare areas or areas with sparse growth ☐ Armor area with appropriate lining	Inspected/Maintained By: _____ Date:_____ Comments:_____
	☐ Functioning ☐ Requires maintenance	☐ Replant bare areas or areas with sparse growth ☐ Armor area with appropriate lining	Inspected/Maintained By: _____ Date:_____ Comments:_____
	☐ Functioning ☐ Requires maintenance	☐ Replant bare areas or areas with sparse growth ☐ Armor area with appropriate lining	Inspected/Maintained By: _____ Date:_____ Comments:_____
	☐ Functioning ☐ Requires maintenance	☐ Replant bare areas or areas with sparse growth ☐ Armor area with appropriate lining	Inspected/Maintained By: _____ Date:_____ Comments:_____
	☐ Functioning ☐ Requires maintenance	☐ Replant bare areas or areas with sparse growth ☐ Armor area with appropriate lining	Inspected/Maintained By: _____ Date:_____ Comments:_____

ANNUAL SITE INSPECTION/MAINTENANCE REPORT

PROJECT:_____ YEAR: _____

Ditches, Swales, or other Open Stormwater Channels - Inspect in the spring, in late fall, and after heavy rains to remove any obstructions to flow, remove accumulated sediments and debris, to control vegetated growth that could obstruct flow, and to repair any erosion of the ditch lining. Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity. Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable. If the ditch has a riprap lining, replace riprap on areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged. The channel must receive adequate routine maintenance to maintain capacity and prevent or correct any erosion of the channel's bottom or sideslopes.

Location	Inspection	Maintenance	Inspected/maintained by
	☐ Functioning ☐ Requires maintenance	☐ Remove obstructions to flow ☐ Remove sediment & debris ☐ Control vegetated growth ☐ Repair ditch lining ☐ Mow ☐ Repair slumping side slopes ☐ Replace riprap	Inspected/Maintained By: _____ Date:_____ Comments:_____ _____ _____ _____ _____
	☐ Functioning ☐ Requires maintenance	☐ Remove obstructions to flow ☐ Remove sediment & debris ☐ Control vegetated growth ☐ Repair ditch lining ☐ Mow ☐ Repair slumping side slopes ☐ Replace riprap	Inspected/Maintained By: _____ Date:_____ Comments:_____ _____ _____ _____ _____

ANNUAL SITE INSPECTION/MAINTENANCE REPORT

PROJECT:_____ YEAR: _____

Culverts – Inspect culverts in the spring, in late fall, and after heavy rains to remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit; and to repair any erosion damage at the culvert's inlet and outlet.

Location	Inspection	Maintenance	Inspected/maintained by
	☐ Functioning ☐ Requires maintenance	☐ Remove obstructions to flow ☐ Remove sediment & debris ☐ Repair erosion damage at inlet and outlet	Inspected/Maintained By: _____ Date:_____ Comments:_____ _____
	☐ Functioning ☐ Requires maintenance	☐ Remove obstructions to flow ☐ Remove sediment & debris ☐ Repair erosion damage at inlet and outlet	Inspected/Maintained By: _____ Date:_____ Comments:_____ _____
	☐ Functioning ☐ Requires maintenance	☐ Remove obstructions to flow ☐ Remove sediment & debris ☐ Repair erosion damage at inlet and outlet	Inspected/Maintained By: _____ Date:_____ Comments:_____ _____
	☐ Functioning ☐ Requires maintenance	☐ Remove obstructions to flow ☐ Remove sediment & debris ☐ Repair erosion damage at inlet and outlet	Inspected/Maintained By: _____ Date:_____ Comments:_____ _____
	☐ Functioning ☐ Requires maintenance	☐ Remove obstructions to flow ☐ Remove sediment & debris ☐ Repair erosion damage at inlet and outlet	Inspected/Maintained By: _____ Date:_____ Comments:_____ _____

ANNUAL SITE INSPECTION/MAINTENANCE REPORT

PROJECT:_____ YEAR: _____

Catch Basins - Inspect and, if required, clean-out catch basins at least once a year, preferably in early spring. Clean-out must include the removal and legal disposal of any accumulated sediments and debris at the bottom of the basin, at inlet any grates, at any inflow channels to the basin, and at any pipes between basins. If the basin outlet is designed to trap floatable materials, then remove the floating debris and any floating oils (using oil-absorptive pads).

Location	Inspection	Maintenance	Inspected/maintained by
	☐ Functioning ☐ Requires maintenance	☐ Remove sediment & debris from bottom of basin ☐ Remove sediment & debris at inlet grates ☐ Remove sediment & debris from inflow channels ☐ Remove sediment & debris from pipes ☐ Remove floatable debris and oil (with oil-absorptive pads)	Inspected/Maintained By: _____ Date:_____ Comments:_____ _____ _____ _____ _____ _____
	☐ Functioning ☐ Requires maintenance	☐ Remove sediment & debris from bottom of basin ☐ Remove sediment & debris at inlet grates ☐ Remove sediment & debris from inflow channels ☐ Remove sediment & debris from pipes ☐ Remove floatable debris and oil (with oil-absorptive pads)	Inspected/Maintained By: _____ Date:_____ Comments:_____ _____ _____ _____ _____ _____

ANNUAL SITE INSPECTION/MAINTENANCE REPORT

PROJECT:_____ YEAR: _____

Resource and Treatment Buffers – Inspect resource and treatment buffers at least once a year for evidence of erosion, concentrating flow, and encroachment by development. If flows are concentrating within a buffer, site grading, level spreaders, or ditch turn-outs must be used to ensure a more even distribution of flow into a buffer. Check down slope of all spreaders and turn-outs for erosion. If erosion is present, adjust or modify the spreader's or turnout's lip to ensure a better distribution of flow into a buffer. Clean-out any accumulation of sediment within the spreader bays or turn-out pools. Wooded buffers must remain fully wooded and have no disturbance to the duff layer. Vegetation in non-wooded buffers may not be cut more than three times per year, and may not be cut shorter than six inches.

Location	Inspection	Maintenance	Inspected/maintained by
	☐ Functioning ☐ Erosion ☐ Concentrating flow ☐ Encroachment	☐ Grade site ☐ Install/repair level spreader ☐ Install ditch turnout ☐ Remove accumulated sediment ☐ Mow non-wooded buffer	Inspected/Maintained By: _____ Date:_____ Comments:_____ _____ _____
	☐ Functioning ☐ Erosion ☐ Concentrating flow ☐ Encroachment	☐ Grade site ☐ Install/repair level spreader ☐ Install ditch turnout ☐ Remove accumulated sediment ☐ Mow non-wooded buffer	Inspected/Maintained By: _____ Date:_____ Comments:_____ _____ _____
	☐ Functioning ☐ Erosion ☐ Concentrating flow ☐ Encroachment	☐ Grade site ☐ Install/repair level spreader ☐ Install ditch turnout ☐ Remove accumulated sediment ☐ Mow non-wooded buffer	Inspected/Maintained By: _____ Date:_____ Comments:_____ _____ _____

ANNUAL SITE INSPECTION/MAINTENANCE REPORT

PROJECT:_____ YEAR: _____

Regular Maintenance – Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader. Grading of gravel roads, or grading of the gravel shoulders of gravel or paved roads, must be routinely performed to ensure that stormwater drains immediately off the road surface to adjacent buffer areas or stable ditches, and is not impeded by accumulations of graded material on the road shoulder or by excavation of false ditches in the shoulder. If water bars or open-top culverts are used to divert runoff from road surfaces, clean out any sediment within or at the outlet of these structures to restore their function.

Location	Maintenance	Maintained by
	☐ Sweep parking lot ☐ Grade shoulder & remove excess sand	Maintained By: _____ Date:_____ Comments:_____ _____
	☐ Sweep parking lot ☐ Grade shoulder & remove excess sand	Maintained By: _____ Date:_____ Comments:_____ _____
	☐ Sweep parking lot ☐ Grade shoulder & remove excess sand	Maintained By: _____ Date:_____ Comments:_____ _____
	☐ Sweep parking lot ☐ Grade shoulder & remove excess sand	Maintained By: _____ Date:_____ Comments:_____ _____

3. Maintenance contract.

   No proprietary devices are proposed for this project.

4. Re-certification. Submit a certification of the following to the department within three months of the expiration of each five-year interval from the date of issuance of the permit.

   (a) Identification and repair of erosion problems. All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.

   (b) Inspection and repair of stormwater control system. All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the system, or portions of the system.

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

5. Duration of maintenance. Perform maintenance as described and required in the permit unless and until the system is formally accepted by the municipality or quasi-municipal district, or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system. If a municipality or quasi-municipal district chooses to accept a stormwater management system, or a component of a stormwater system, it must provide a letter to the department stating that it assumes responsibility for the system. The letter must specify the components of the system for which the municipality or district will assume responsibility, and that the municipality or district agrees to maintain those components of the system in compliance with department standards. Upon such assumption of responsibility, and approval by the department, the municipality, quasi-municipal district, or association becomes a co-permittee for this purpose only and must comply with all terms and conditions of the permit.

Housekeeping Plan

1. Spill prevention. Controls must be used to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

2. Groundwater protection. During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

3. Fugitive sediment and dust. Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control.

   NOTE: An example of the use of BMPs to control fugitive sediment and dust is as follows. Operations during wet months that experience tracking of mud off the site onto public roads should provide for sweeping of road areas at least once a week and prior to significant storm events. Where chronic mud tracking occurs, a stabilized construction entrance should be provided. Operations during dry months, that experience fugitive dust problems, should wet down the access roads once a week or more frequently as needed.

   NOTE: Dewatering a stream without a permit from the department violates state water quality standards and the Natural Resources Protection Act.

4. Debris and other materials. Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

   NOTE: To prevent these materials from becoming a source of pollutants, construction and post-construction activities related to a project may be required to comply with applicable provision of rules related to solid, universal, and hazardous waste, including, but not limited to, the Maine solid waste and hazardous waste management rules; Maine hazardous waste management rules; Maine oil conveyance and storage rules; and Maine pesticide requirements.

5. Trench or foundation de-watering. Trench de-watering is the removal of water from trenches, foundations, cofferdams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved by the department.

6. Non-stormwater discharges. Identify and prevent contamination by non-stormwater discharges.

SECTION 313000 - SEDIMENTATION AND EROSION CONTROL MEASURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section includes the following:

1. Establishment and maintenance of temporary and permanent drainage areas.
2. Construction, stabilization and maintenance of temporary construction entrances.
3. Construction and maintenance of temporary and permanent outfalls, swales, waterways and embankments.
4. Temporary and permanent vegetative stabilization.
5. Establishment and maintenance of designated stockpile areas.
6. Construction and maintenance of silt fences, stone check dams and hay bale barriers.
7. All erosion and sediment control work required for the safe conduct of the work, whether or not specifically mentioned in these Specifications or indicated on the Drawings.

B. Related Sections include the following:

1. Division 32 Section "Turf and Grasses" for finish grading including preparing and placing planting soil mixes and testing of topsoil material.
2. Division 31 Section "Site Clearing" for temporary measures required for site clearing.
3. Division 31 Section "Earth Moving for Pavements and Structures" for soil materials, excavating, backfilling, and site grading.
4. Division 31 Section "Earth Moving for Utilities" for soil materials, excavating, backfilling for utilities.

1.3 REFERENCES

A. Quality, grades of materials and installation procedure: In conformance with applicable code and standards including:

1. American Society for Testing and Materials (ASTM).
2. State of Maine, Department of Transportation, Standard Specifications (MDOT) 12/2002.
3. Maine Erosion and Sedimentation Control Handbook for Construction: Best Management Practices 3/2003.

B. Land, Air and Water Pollution: Comply with Pollution Control Standards for the State of Maine applicable to the work to ensure that no pollution is caused by work of this Contract.

C. Soil Erosion and Sediment Control: Implement soil erosion and sediment control in strict accordance with provisions of the Erosion and Sedimentation Control Handbook.

D. MDEP Site Location of Development Act (SLODA): Implement soil erosion and sediment control in strict accordance with provisions of this permit.

1.4 DEFINITIONS

A. Sediment: Soil and other debris that have eroded and have been transported by runoff water or wind.

B. Dust: Earthy material and any substance reduced to fine powder.

C. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials, except hazardous waste as defined in paragraph entitled "Hazardous Waste," resulting from industrial, commercial, and agricultural operations and from community activities.

D. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass, crockery, metal, lumber, cans, and bones.

E. Debris: Combustible and noncombustible wastes such as ashes and waste materials resulting from construction or maintenance and repair work, leaves, and tree trimmings.

F. Oily Waste: Petroleum products and bituminous materials.

1.5 SUBMITTALS

A. Factory Test Reports

1. Erosion Control Mesh.
2. Geotextile fabric.
3. Silt Fence.

1.6 ENVIRONMENTAL PROTECTION REQUIREMENTS

A. Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, State, and local regulations pertaining to the environment, including but not limited to water, air, light, and noise pollution.

B. Environmental Protection Plan: Five days after the award of contract, the Contractor shall meet with the contracting Officer to discuss the proposed environmental protection plan and to develop mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, and other measures to be taken.

C. Environmental Planning: Fourteen days after the meeting, the Contractor shall submit to the Architect/Engineer the proposed environmental plan for further discussion, review, and approval.

D. Commencement of the Work: As directed by the Contracting Officer, following approval.

E. Tree Protection: See section 015639 Temporary Tree and Plant Protection.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All Products: As specified by Erosion and Sedimentation Control Handbook.

B. All Fill Materials: In accordance with requirements of Section 312000, “Earth Moving for Structures and Pavements”.

C. Temporary Vegetative Stabilization: Temporary Seeding for graded or cleared areas, which are subject to erosion for a period of 14 days or more. Vegetation in accordance with Handbook.

D. Permanent Vegetative Stabilization: Seeding for graded or cleared areas subject to erosion where a permanent, long-lived vegetation cover is needed. Vegetation in accordance with Handbook.

E. Riprap Waterways and Outfalls:

1. Riprap: Sizes indicated.
2. Drainage Fabric:

a. Outfalls: needle-punched nonwoven geotextile composed of polypropylene fibers, possessing the following characteristics:

Mechanical Properties	Test method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D 4632	N (lbs)	912 (205)	912 (205)
Grab Tensile Elongation	ASTM D 4632	%	50	50
Trapezoid Tear Strength	ASTM D 4533	N (lbs)	356 (80)	356 (80)
CBR Puncture Strength	ASTM D 6241	N (lbs)	2225 (500)	
Apparent Opening Size (AOS) *	ASTM D 4751	mm (U.S. Sieve)	0.18 (80)	
Permittivity	ASTM D 4491	sec^{-1}	1.1	
Flow Rate	ASTM D 4491	$l/min/m^2$ ($gal/min/ft^2$)	3870 (95)	
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70	

* ASTM D 4751: AOS is a Maximum Opening Diameter Value

Physical Properties	Test Method	Unit	Typical Value	
Weight	ASTM D 5261	g/m^2 (oz/yd^2)	271 (8.0)	
Thickness	ASTM D 5199	mm (mils)	1.8 (72)	
Roll Dimensions (width x length)	--	m (ft)	3.8 x 110 (12.5 x 360)	4.5 x 91 (15 x 300)
Roll Area	--	m^2 (yd^2)	418 (500)	
Estimated Roll Weight	--	kg (lb)	120 (265)	

b. Acceptable products: Mirafi 180N or approved equal.

c. Waterways: needle-punched nonwoven geotextile composed of polypropylene fibers, possessing the following characteristics:

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D 4632	N (lbs)	534 (120)	534 (120)
Grab Tensile Elongation	ASTM D 4632	%	50	50
Trapezoid Tear Strength	ASTM D 4533	N (lbs)	223 (50)	223 (50)
CBR Puncture Strength	ASTM D 6241	N (lbs)	1335 (300)	
Apparent Opening Size (AOS) *	ASTM D 4751	mm (U.S. Sieve)	0.212 (70)	
Permittivity	ASTM D 4491	sec^{-1}	1.7	
Flow Rate	ASTM D 4491	$l/min/m^2$ ($gal/min/ft^2$)	5500 (135)	
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70	

* ASTM D 4751: AOS is a Maximum Opening Diameter Value

Physical Properties	Test Method	Unit	Typical Value	
Weight	ASTM D 5261	g/m^2 (oz/yd^2)	163 (4.8)	
Thickness	ASTM D 5199	mm (mils)	1.0 (40)	
Roll Dimensions (width x length)	--	m (ft)	3.8 x 110 (12.5 x 360)	4.5 x 110 (15 x 360)
Roll Area	--	m^2 (yd^2)	418 (500)	502 (600)
Estimated Roll Weight	--	kg (lb)	74 (164)	89 (197)

d. Acceptable products: Mirafi 140N or approved equal.

F. Grass Waterways & Embankments:

1. Vegetation: In accordance with Handbook; Section 329200, “Turf and Grasses”.

2. Erosion Control Mat: for slopes less steep than 2:1, short-term double net erosion control blanket, machine-produced mat of 100% agricultural straw with a functional longevity of up to 12 months.

Property	Test Method	Typical
Thickness	ASTM D6525	0.36 in (9.14 mm)
Resiliency	ECTC Guidelines	80.5%
Water Absorbency	ASTM D1117	514%
Mass/Unit Area	ASTM 6475	10.52 oz/yd^2 (357.7 g/m^2)
Swell	ECTC Guidelines	15%
Smolder Resistance	ECTC Guidelines	Yes
Stiffness	ASTM D1388	6.06 oz-in
Light Penetration	ECTC Guidelines	9.8%
Tensile Strength –MD	ASTM D6818	169.2 lbs/ft (2.51 kN/m)
Elongation – MD	ASTM D6818	17.2%
Tensile Strength – TD	ASTM D6818	164.4 lbs/ft (2.44 kN/m)
Elongation – TD	ASTM D6818	33.1%

3. Acceptable products: North American Green S150 or approved equal.
4. Erosion Control Mat: for slopes 2:1 or steeper, extended-term double net erosion control blanket, machine-produced mat of 70% agricultural straw and 30% coconut fiber with a functional longevity of up to 24 months.

Property	Test Method	Typical
Thickness	ASTM D6525	0.39 in (9.91 mm)
Resiliency	ECTC Guidelines	75%
Water Absorbency	ASTM D1117	285%
Mass/Unit Area	ASTM 6475	11.44 oz/yd^2 (388 g/m^2)
Swell	ECTC Guidelines	30%
Smolder Resistance	ECTC Guidelines	Yes
Stiffness	ASTM D1388	1.11 oz-in
Light Penetration	ECTC Guidelines	8.7%
Tensile Strength –MD	ASTM D6818	146.6 lbs/ft (2.17 kN/m)
Elongation – MD	ASTM D6818	26.9%
Tensile Strength – TD	ASTM D6818	147.6 lbs/fit (2.19 kN/m)
Elongation – TD	ASTM D6818	25.2%

5. Acceptable products: North American Green SC150 or approved equal.

G. Temporary Construction Entrances:

1. Coarse Aggregate in accordance with requirements of Section 312000, “Earth Moving for Structures and Pavements”.
2. Culvert: RCP.
3. Fabric: woven polypropylene separation geotextile, possessing the following characteristics:

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D 4632	N (lbs)	1402 (315)	1402 (315)
Grab Tensile Elongation	ASTM D 4632	%	12	
Trapezoid Tear Strength	ASTM D 4533	N (lbs)	503 (113)	503 (113)
CBR Puncture Strength	ASTM D 6241	N (lbs)	4005 (900)	
Apparent Opening Size (AOS) *	ASTM D 4751	mm (U.S. Sieve)	0.43 (40)	
Permittivity	ASTM D 4491	sec^{-1}	0.05	
Flow Rate	ASTM D 4491	l/min/m^2 (gal/min/ft^2)	163 (4.0)	
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70	

* ASTM D 4751, AOS is a Maximum Opening Diameter Value

Physical Properties	Test Method	Unit	Typical Value	
Weight	ASTM D 5261	g/m^2 (oz/yd^2)	203 (6.0)	
Thickness	ASTM D 5199	mm (mils)	0.6 (25)	
Roll Dimensions (width x length)	--	m (ft)	3.8 x 110 (12.5 x 360)	5.3 x 78.7 (17.5 x 258)
Roll Area	--	m^2 (yd^2)	418 (500)	418 (500)
Estimated Roll Weight	--	kg (lb)	109 (240)	109 (240)

4. Acceptable products: Mirafi 600X or approved equal.

H. Hay Bale Barriers, Dams:

1. Barriers: Wire or nylon bound straw or hay bales.
2. Stakes: Steel rebar or 2 x 2 inch wood stakes.

I. Silt Fence:

1. Posts:

a. Wood: Minimum 2 inch hardwood stakes.
b. Steel: Type T or Type U.

2. Fabric: High strength polypropylene netting treated to ensure protection against sunlight degradation:

Mechanical Properties	Test Method	Unit	Silt Fence Property		Typical Values (English)
			MD	CD	
Grab Tensile Strength	ASTM D 4632	kN	0.55	0.55	125 X125 lbs
Grab Tensile Elongation	ASTM D 4632	%	15	15	15 %
Puncture Strength	ASTM D 4833	kN	266		60 lbs.
Apparent Opening Size (AOS) *	ASTM D 4751	mm	0.60		20 sieve
Permittivity	ASTM D 4491	sec^{-1}	0.10		0.10 sec^{-1}
Flow Rate	ASTM D 4491	$l/min/m^2$	405		8 gal/min/ft2
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70		70 %

* ASTM D 4751, AOS is a Maximum Opening Diameter Value

3. Mirafi Silt Fence.
a. Propex Geotex woven Silt Fence
b. Carthage Mills FX-11 Silt Fence
c. Approved equal.

J. Riprap Embankments:

1. Riprap: Sizes indicated.
2. Drainage Fabric: Mirafi 180N or approved equal.

K. Stone Check Dams:

1. Stone: Sizes indicated.
2. Fabric: woven polypropylene separation geotextile, possessing the following characteristics:

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D 4632	N (lbs)	890 (200)	890 (200)
Grab Tensile Elongation	ASTM D 4632	%	15	10
Trapezoid Tear Strength	ASTM D 4533	N (lbs)	334 (75)	334 (75)
CBR Puncture Strength	ASTM D 6241	N (lbs)	3115 (700)	
Apparent Opening Size (AOS) *	ASTM D 4751	mm (U.S. Sieve)	0.43 (40)	
Permittivity	ASTM D 4491	sec^{-1}	0.05	
Flow Rate	ASTM D 4491	$l/min/m^2$ ($gal/min/ft^2$)	204 (5.0)	
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70	

* ASTM D 4751, AOS is a Maximum Opening Diameter Value

Physical Properties	Test Method	Unit	Typical Value	
Weight	ASTM D 5261	g/m^2 (oz/yd^2)	136 (4.0)	
Thickness	ASTM D 5199	mm (mils)	0.5 (20)	
Roll Dimensions (width x length)	--	m (ft)	3.8 x 132 (12.5 x 432)	5.3 x 94.2 (17.5 x 309)
Roll Area	--	m^2 (yd^2)	502 (600)	502 (600)
Estimated Roll Weight	--	kg (lb)	95 (210)	95 (210)

3. Acceptable products: Mirafi 500X or approved equal.

PART 3 - EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

A. Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work. Confine construction activities to within the limits of the work indicated or specified.

B. Land Resources:

1. Protection of Vegetation: Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the Architect/Engineer permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Architect/Engineer. Where such use of attach ropes, cables, or guys is authorized, the Contractor shall be responsible for any resultant damage. Protect existing trees, which are to remain, and which may be injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. By approved excavation, remove trees with 30 percent or more of their root systems destroyed.

C. Grading

1. Limit initial grading to that required to install required sediment and erosion controls.
2. Extent: Remain just ahead of planned new construction.
3. Plan to control runoff and contain erosion.
4. Do not place fill before existing vegetation has been removed.
5. Do not impair existing surface drainage, create potential hazards, cause hazardous erosion, or cause sediment to collect in drainage systems on adjacent properties, alleys, streets or highways by grading operations.
6. Riprap Outfalls, Outlets, and Waterways: Construct in accordance with details. Embed riprap in approved fabric.
7. Grass Waterways: Construct in accordance with details for specific profile. Pin fabric mesh to subgrade with U or T pins in accordance with fabric manufacturer's recommendations.
8. Hay Bales:

   a. Place at areas indicated in rows with ends tightly butted.
   b. Embed each bale a minimum of 4 inches into soil.
   c. Securely anchor in place with two stakes driven 1-1/2 to 2 feet into ground.

9. Silt Fence:

a. Establish silt fence at areas indicated and as required for control.
b. Space posts as required to adequately support wire and cloth against flow and at a maximum of 6 feet oc. Embed posts into ground a minimum of 18 inches.
c. Fasten woven wire fence securely to posts with wire ties or staples.
d. Fasten filter cloth to wire mesh at top and mid-section with ties spaced every 24 inches; overlap edges minimum 6 inches and fold.
e. Embed filter cloth minimum 8 inches into ground.

D. Borrow Pit Areas: Manage and control borrow pit areas to prevent sediment from entering nearby streams or lakes. Restore areas, including those outside the borrow pit, disturbed by borrow and haul operations. Restoration includes grading, replacement of topsoil, and establishment of a permanent vegetative cover. Uniformly grade side slopes of borrow pit to not more than a slope of 1 part vertical to 2 parts horizontal. Uniformly grade the bottom of the borrow pits to provide a flat bottom and drain by outfall ditches or other suitable means. Stockpile topsoil removed during the borrow pit operation, and use as part of restoring the borrow pit area.

E. Protection of Erodible Soils: Immediately finish the earthwork brought to a final grade, as indicated or specified. Immediately protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

F. Mechanical Retardation and Control to Runoff: Mechanically retard and control the rate of runoff from the construction site. This includes construction of diversion ditches, benches, and berms to retard and divert runoff to protected drainage courses.

G. Vegetation and Mulch: Provide temporary protection on sides and back slopes as soon as rough grading is completed or sufficient soil is exposed to require erosion protection. Protect slopes by accelerated growth of permanent vegetation, temporary vegetation, mulching, or netting. Stabilize slopes by hydroseeding, anchoring mulch in place, covering with anchored netting, sodding, or such combination of these and other methods necessary for effective erosion control.

1. Seeding: Provide new seeding where ground is disturbed. Include topsoil or nutriment during the seeding operation necessary to reestablish a suitable stand of grass. The seeding operation shall be as specified in Section 329200, “Turf and Grasses”.

H. Stabilization

1. Stabilize all cleared or graded areas. Stabilize with temporary or permanent vegetation, mulch, or paving as indicated on Drawings within 15 days of obtaining final grade or 30 days after obtaining temporary grade.
2. For vegetating critical areas where erosion is imminent, place and repeatedly replace adequate mulch, fertilizer, and seed until a vigorous and adequate growth of turf has been established over greater than 80 percent of the area.

I. Replacement: Remove trees and other landscape features scarred or damaged by equipment operations, and replace with equivalent, undamaged trees and landscape features. Obtain Architect/Engineer's approval before replacement.

J. Temporary Construction: Remove traces of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other signs of construction. Grade temporary roads, parking areas, and similar temporarily used areas to conform with surrounding contours.

K. Burnoff: Burnoff of the ground cover is not permitted.

L. Dust Control: Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shaking bags of cement, concrete mortar, or plaster.

3.2 MAINTENANCE

A. Vegetative Stabilization: Irrigate to prevent loss of stand of protective vegetation. Regularly inspect and overseed as necessary. Immediately reestablish damaged stands.

B. Hay Bales: Inspect weekly and after every rain; adjust as needed, removing material when bulges develop.

C. Silt Fence: Inspect weekly and after every rain; adjust as needed, removing material when bulges develop.

D. Construction Entrances: Inspect and repair after every rain. Maintain in a condition to prevent tracking or flowing of sediment onto public right-of-ways. Dress with stone as required.

E. Swales, Outfalls: Inspect regularly and after every rain; maintain clear of obstructions and excessive sediment.

F. Dikes, Embankments, Landgrading: Inspect weekly and after every rain. Repair as required to maintain integrity or drainage areas.

3.3 REPAIRS, REMOVALS

A. At completion of work, remove designated temporary controls and revise all permanent sediment controls to original condition.

B. Repair all damages caused by soil erosion and construction activity at or before the end of every working day.

C. Remove sediment fence when all disturbed areas have been stabilized and a catch of grass greater than 80 percent has been established.

END OF SECTION 313000

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Seeding.
2. Hydroseeding.
3. Turf renovation.

B. Related Sections:

1. Section 311000 "Site Clearing" for topsoil stripping and stockpiling.
2. Section 312000 "Earth Moving" for excavation, filling and backfilling, and rough grading.
3. Section 321443 "Porous Unit Paving" for concrete grid-type pavers shaped to provide open areas between units, planted with grass or other plants.
4. Section 328400 "Planting Irrigation " for turf irrigation.
5. Section 329300 "Plants" for border edgings.
6. Section 334600 "Subdrainage" for subsurface drainage.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture as recommended by testing agency.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified landscape Installer.

B. Product Certificates of Compliance: For soil amendments and fertilizers, from manufacturer.

C. Material Test Reports: For topsoil.

D. Seeding Schedule: Provide seeding schedule to Landscape Architect a minimum of 10 days prior to activity.

E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required initial maintenance periods.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

    a. Certified Landscape Technician - Exterior, with installation specialty area(s), designated CLT-Exterior.
    b. Certified Turfgrass Professional, designated CTP.
    c. Certified Turfgrass Professional of Cool Season Lawns, designated CTP-CSL.

5. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
6. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for turf growth.

a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.8 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: April 15th – June 15th.
2. Fall Planting: August 15th – September 30th.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.9 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 60 days from date of Substantial Completion.

a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

1.10 WARRANTY

A. Provide an 90% catch of grass (turf) by watering, mowing, and maintaining seeded areas until final acceptance. Reseed areas, with specified materials, which fail to provide an 90% catch of grass or where excess flow of water has caused seed to wash away until all affected areas are accepted by the Landscape Architect. Do not remove siltation fences until an approved uniform stand of grass is achieved.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: State-certified seed of grass species as follows:

C. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

1. Lawn Areas - Proscape Winning Colors Tall Fescue Blend by Lebanon Turf.
2. Sports Fields - Proscape Sportsturf Mix by Lebanon Turf.
3. Meadow Mix - Premium Wildflower Seed Mix WFAR-0605 by Seedland.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
3. Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

2.4 FERTILIZERS

A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.5 TOPSOIL

A. Provide material free of subsoil, stumps, rocks larger than 3/4-inch diameter (with maximum 3-percent retained on 1/4-inch screen), brush, weeds, toxic substances, and other material or substance detrimental to plant growth. Topsoil shall be a natural, friable soil representative of productive soils in the vicinity. Modify topsoil provided if necessary conform with the requirements specified in Table II. Provide additional topsoil from approved sources off the site meeting the requirements described in Table II if on-site stockpiled material is not sufficient to complete all indicated work.

PLANTING SOIL

TABLE II

DOA SSIR Soil Survey Investigation Acceptable Report No. 1, Laboratory Test for:	Acceptable Limits
Sand Content	20 to 75-percent by weight
Silt Content	10 to 60-percent by weight
Clay Content	5 to 30-percent by weight
Organic Material (Walkley-Black)	1.5-percent
Ph	5.5 to 7.0
Soluble Salts	600-ppm maximum
Absorption Rate	0.5-inch per hour minimum

2.6 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

D. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.7 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply fertilizer directly to subgrade before loosening.

2. Spread planting soil to a depth of 4 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.
b. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

E. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.
2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at manufacturers recommended rate for seed type.

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with erosion-control mats where shown on Drawings; install and anchor according to manufacturer's written instructions.

F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

3.5 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

3.6 TURF RENOVATION

A. Renovate existing turf.

B. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as required.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

E. Mow, dethatch, core aerate, and rake existing turf.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches (150 mm).

I. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches (100 mm) of existing soil. Install new planting soil to fill low spots and meet finish grades.

J. Apply seed and protect with straw mulch as required for new turf.

K. Water newly planted areas and keep moist until new turf is established.

3.7 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow to a height of 3 inches.

D. Turf Post fertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.8 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

C. If at the end of three weeks a satisfactory of grass has not been produced, the contractor shall renovate and reseed the lawn or unsatisfactory portions thereof immediately or, if after the acceptable planting during the requirements of this specification.

3.9 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.10 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200

3752.00
MEARNG PN 230113
Joint Forces Headquarters
Augusta, Kennebec County, Maine

Exhibit#8 – Stormwater

Prepared For: Maine Army National Guard
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Stormwater

Permits

Due to the increase in impervious area on the site, stormwater will be a factor. The project is a major amendment to the existing 1989 Maine State Veteran's Cemetery Site Location of Development Act (SLODA) permit and will separate 43.4 acres from the 165 acre parcel. A Tier 3 NRPA permit will be filed with the DEP/US Army Corps of Engineers in order to deal with wetland mitigation.

Treatment

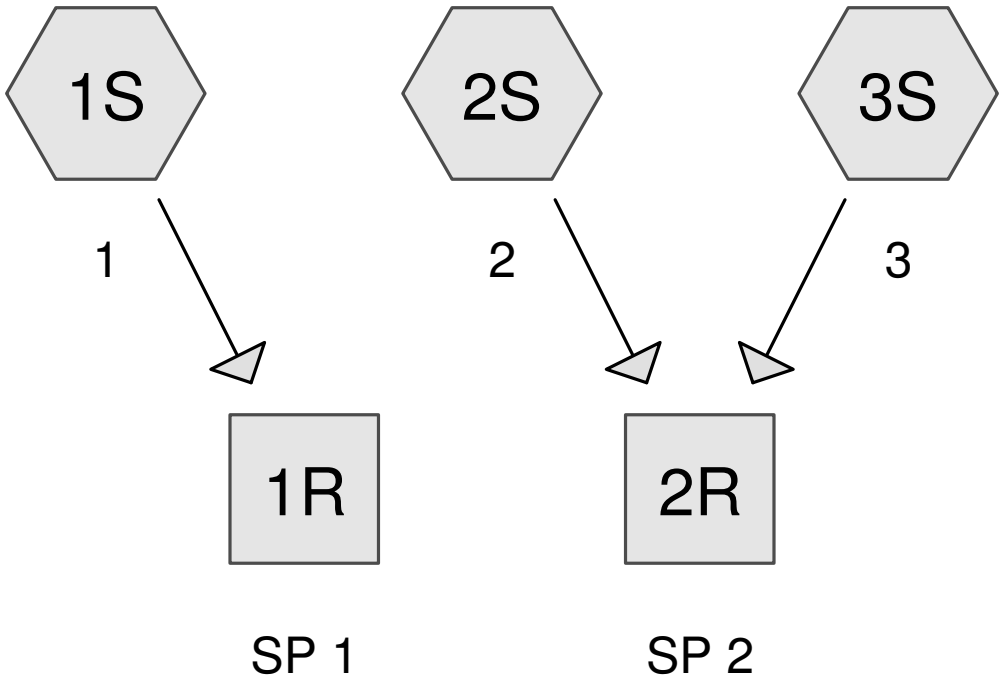
Stormwater will be treated for both quantity and quality with treatment devices from Maine Stormwater Best Management Practices Manual. A wet pond is located to the southeast of the new building. This pond will capture a large portion of the water from the new impervious areas. It will retain the water as well as treat it. The areas not treated by the wet pond will be treated by grassed underdrain soil filters. The water from the pond and soil filters will be discharged and eventually flow into Stone Brook. All Stormwater treatment will be done to conform to the standards set forth in Chapter 500, Stormwater Management from the Maine DEP to satisfy the SLODA permit.

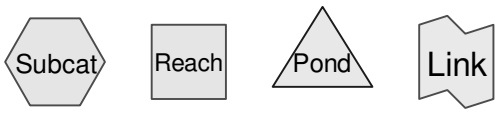
Modeling

The stormwater runoff evaluation was developed in accordance with the methodology outlined and implemented within the HydroCAD stormwater modeling system. The HydroCAD modeling system was developed using techniques from the SCS TR-20 and TR-55 publications. The 2-year, 10-year and 25-year 24-hour, Type III storm events were used to calculate the peak rates of runoff for the proposed development.

Plans

The CG### series and SW### series drawings give additional information of pond, soil filter, catch basin, storm drain, underdrain, and flow path locations. C5## series shows the details of the treatment devices as well as catch basins, storm drains etc.





Drainage Diagram for Pre-Development
Prepared by WBRC A/E, Printed 10/9/2013
HydroCAD® 9.10 s/n 00653 © 2009 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
8.901	30	Meadow, non-grazed, HSG A (1S)
6.762	30	Woods, Good, HSG A (1S, 2S)
4.114	55	Woods, Good, HSG B (2S, 3S)
22.762	70	Woods, Good, HSG C (1S, 2S, 3S)
3.692	71	Meadow, non-grazed, HSG C (1S)
11.868	77	Woods, Good, HSG D (1S, 2S, 3S)
0.788	78	Meadow, non-grazed, HSG D (1S)
0.035	84	50-75% Grass cover, Fair, HSG D (1S)
2.977	98	Impervious (1S, 2S, 3S)
61.901		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
15.663	HSG A	1S, 2S
4.114	HSG B	2S, 3S
26.455	HSG C	1S, 2S, 3S
12.692	HSG D	1S, 2S, 3S
2.977	Other	1S, 2S, 3S
61.901		**TOTAL AREA**

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Fill (inches)
1	1S	0.00	0.00	25.0	0.0100	0.025	24.0	0.0	0.0
2	2S	0.00	0.00	60.0	0.0100	0.025	132.0	0.0	0.0
3	3S	0.00	0.00	40.0	0.0100	0.025	12.0	0.0	0.0

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: 1 Runoff Area=1,173,461 sf 7.19% Impervious Runoff Depth>0.20"
Flow Length=1,870' Tc=44.8 min CN=57 Runoff=1.73 cfs 0.451 af

Subcatchment 2S: 2 Runoff Area=847,487 sf 0.81% Impervious Runoff Depth>0.25"
Flow Length=2,041' Tc=45.4 min CN=59 Runoff=1.79 cfs 0.408 af

Subcatchment 3S: 3 Runoff Area=675,442 sf 5.69% Impervious Runoff Depth>0.76"
Flow Length=1,596' Tc=60.3 min CN=73 Runoff=5.56 cfs 0.978 af

Reach 1R: SP 1 Inflow=1.73 cfs 0.451 af
Outflow=1.73 cfs 0.451 af

Reach 2R: SP 2 Inflow=7.34 cfs 1.386 af
Outflow=7.34 cfs 1.386 af

Total Runoff Area = 61.901 ac Runoff Volume = 1.836 af Average Runoff Depth = 0.36"
95.19% Pervious = 58.924 ac 4.81% Impervious = 2.977 ac

Summary for Subcatchment 1S: 1

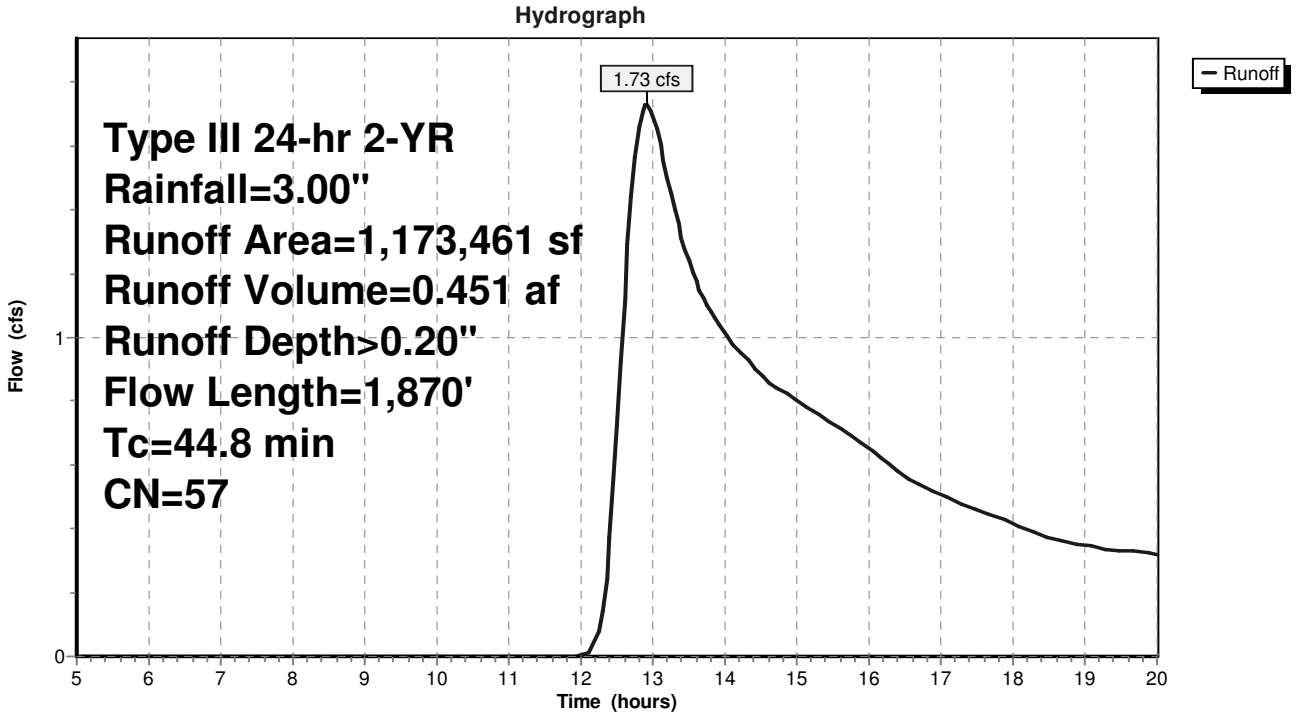
Runoff = 1.73 cfs @ 12.91 hrs, Volume= 0.451 af, Depth> 0.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.00"

	Area (sf)	CN	Description
	104,639	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	124,607	70	Woods, Good, HSG C
	275,433	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	1,546	84	50-75% Grass cover, Fair, HSG D
*	84,344	98	Impervious
	387,729	30	Meadow, non-grazed, HSG A
	160,834	71	Meadow, non-grazed, HSG C
	34,329	78	Meadow, non-grazed, HSG D
	1,173,461	57	Weighted Average
	1,089,117		92.81% Pervious Area
	84,344		7.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	100	0.1300	0.35		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.00"
13.2	945	0.0290	1.19		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.0100	3.74	11.76	**Pipe Channel, CD** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
26.7	800	0.0100	0.50		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
44.8	1,870	Total			

Subcatchment 1S: 1



Summary for Subcatchment 2S: 2

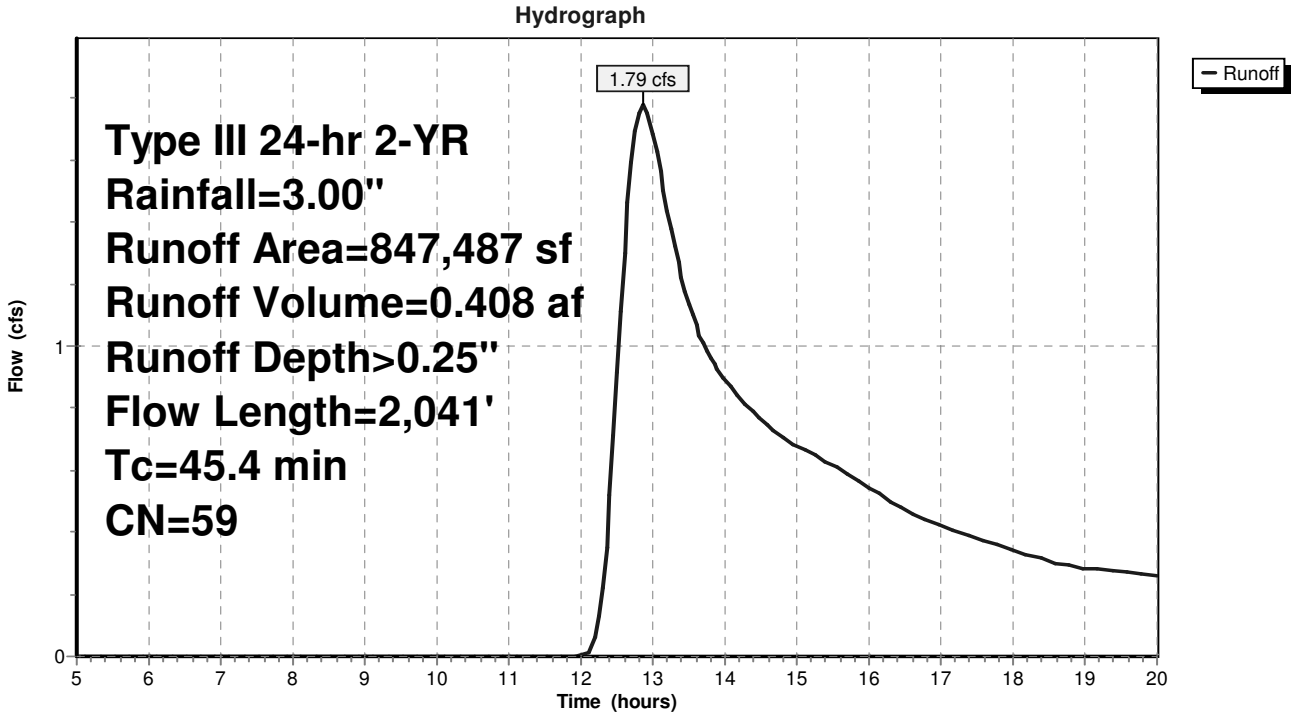
Runoff = 1.79 cfs @ 12.86 hrs, Volume= 0.408 af, Depth> 0.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.00"

	Area (sf)	CN	Description
	189,915	30	Woods, Good, HSG A
	174,291	55	Woods, Good, HSG B
	375,757	70	Woods, Good, HSG C
	100,640	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	6,884	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	847,487	59	Weighted Average
	840,603		99.19% Pervious Area
	6,884		0.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	100	0.0750	0.07		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
17.8	565	0.0450	0.53		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.5	622	0.0270	18.95	5,306.68	**Trap/Vee/Rect Channel Flow, CD** Bot.W=10.00' D=10.00' Z= 1.8 '/' Top.W=46.00' n= 0.040 Winding stream, pools & shoals
0.1	60	0.0100	11.67	1,108.77	**Pipe Channel, DE** 132.0" Round Area= 95.0 sf Perim= 34.6' r= 2.75' n= 0.025 Corrugated metal
4.2	694	0.0040	2.77	373.46	**Trap/Vee/Rect Channel Flow, FG** Bot.W=60.00' D=2.00' Z= 3.7 '/' Top.W=74.80' n= 0.050 Scattered brush, heavy weeds
45.4	2,041	Total			

Subcatchment 2S: 2



Summary for Subcatchment 3S: 3

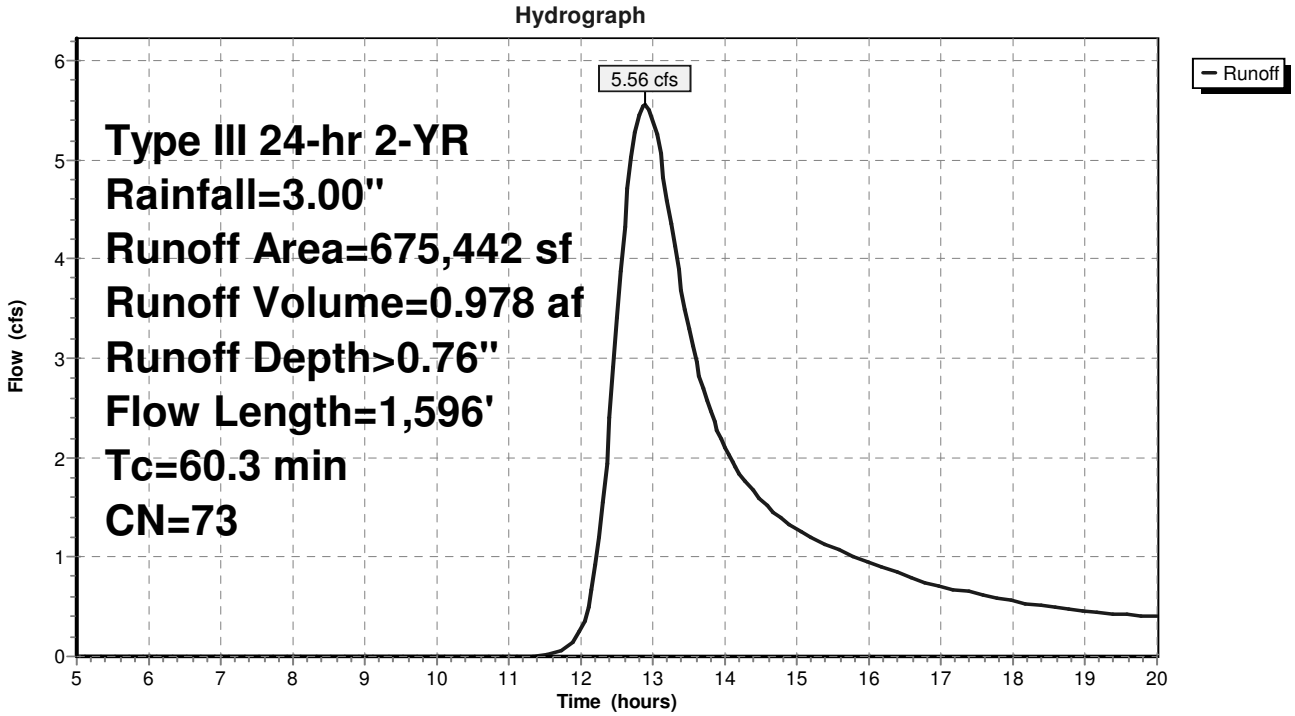
Runoff = 5.56 cfs @ 12.89 hrs, Volume= 0.978 af, Depth> 0.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	4,918	55	Woods, Good, HSG B
	491,166	70	Woods, Good, HSG C
	140,914	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	38,444	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	675,442	73	Weighted Average
	636,998		94.31% Pervious Area
	38,444		5.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.8	100	0.0550	0.06		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
33.2	721	0.0210	0.36		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.3	40	0.0100	2.36	1.85	**Pipe Channel, CD** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.025 Corrugated metal
1.0	735	0.0340	12.15	1,458.15	**Trap/Vee/Rect Channel Flow, DE** Bot.W=10.00' D=4.00' Z= 5.0 '/' Top.W=50.00' n= 0.040 Winding stream, pools & shoals
60.3	1,596	Total			

Subcatchment 3S: 3

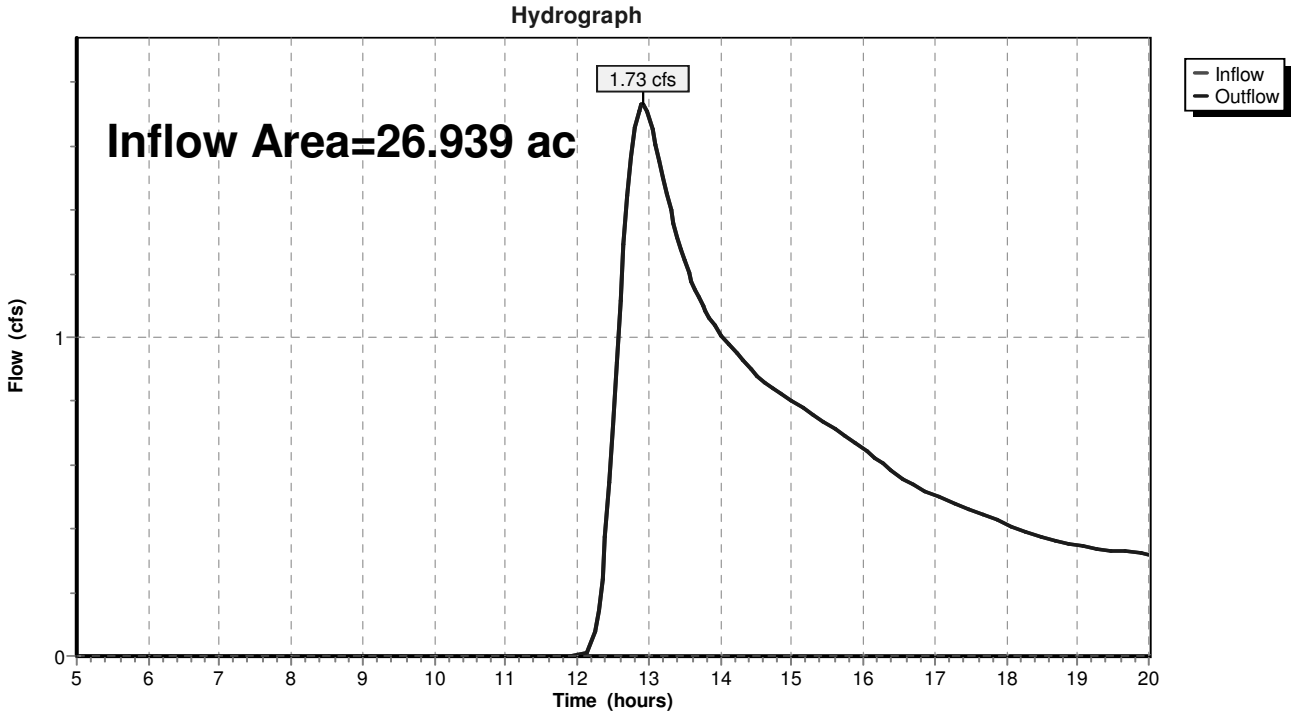


Summary for Reach 1R: SP 1

Inflow Area = 26.939 ac, 7.19% Impervious, Inflow Depth > 0.20" for 2-YR event
Inflow = 1.73 cfs @ 12.91 hrs, Volume= 0.451 af
Outflow = 1.73 cfs @ 12.91 hrs, Volume= 0.451 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: SP 1

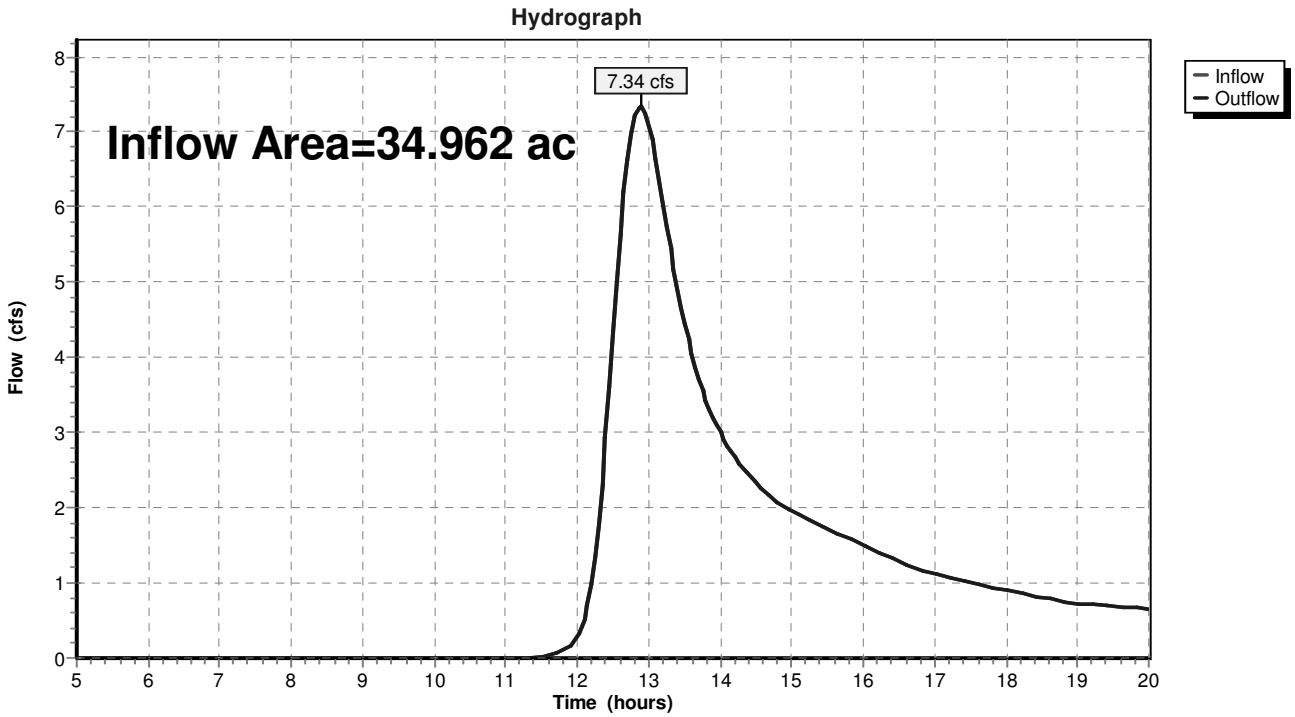


Summary for Reach 2R: SP 2

Inflow Area = 34.962 ac, 2.98% Impervious, Inflow Depth > 0.48" for 2-YR event
Inflow = 7.34 cfs @ 12.88 hrs, Volume= 1.386 af
Outflow = 7.34 cfs @ 12.88 hrs, Volume= 1.386 af, Atten= 0%, Lag= 0.0 min

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

Reach 2R: SP 2



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: 1 Runoff Area=1,173,461 sf 7.19% Impervious Runoff Depth>0.69"
Flow Length=1,870' Tc=44.8 min CN=57 Runoff=9.21 cfs 1.559 af

Subcatchment 2S: 2 Runoff Area=847,487 sf 0.81% Impervious Runoff Depth>0.79"
Flow Length=2,041' Tc=45.4 min CN=59 Runoff=7.91 cfs 1.288 af

Subcatchment 3S: 3 Runoff Area=675,442 sf 5.69% Impervious Runoff Depth>1.64"
Flow Length=1,596' Tc=60.3 min CN=73 Runoff=12.67 cfs 2.119 af

Reach 1R: SP 1 Inflow=9.21 cfs 1.559 af
Outflow=9.21 cfs 1.559 af

Reach 2R: SP 2 Inflow=20.38 cfs 3.407 af
Outflow=20.38 cfs 3.407 af

Total Runoff Area = 61.901 ac Runoff Volume = 4.966 af Average Runoff Depth = 0.96"
95.19% Pervious = 58.924 ac 4.81% Impervious = 2.977 ac

Summary for Subcatchment 1S: 1

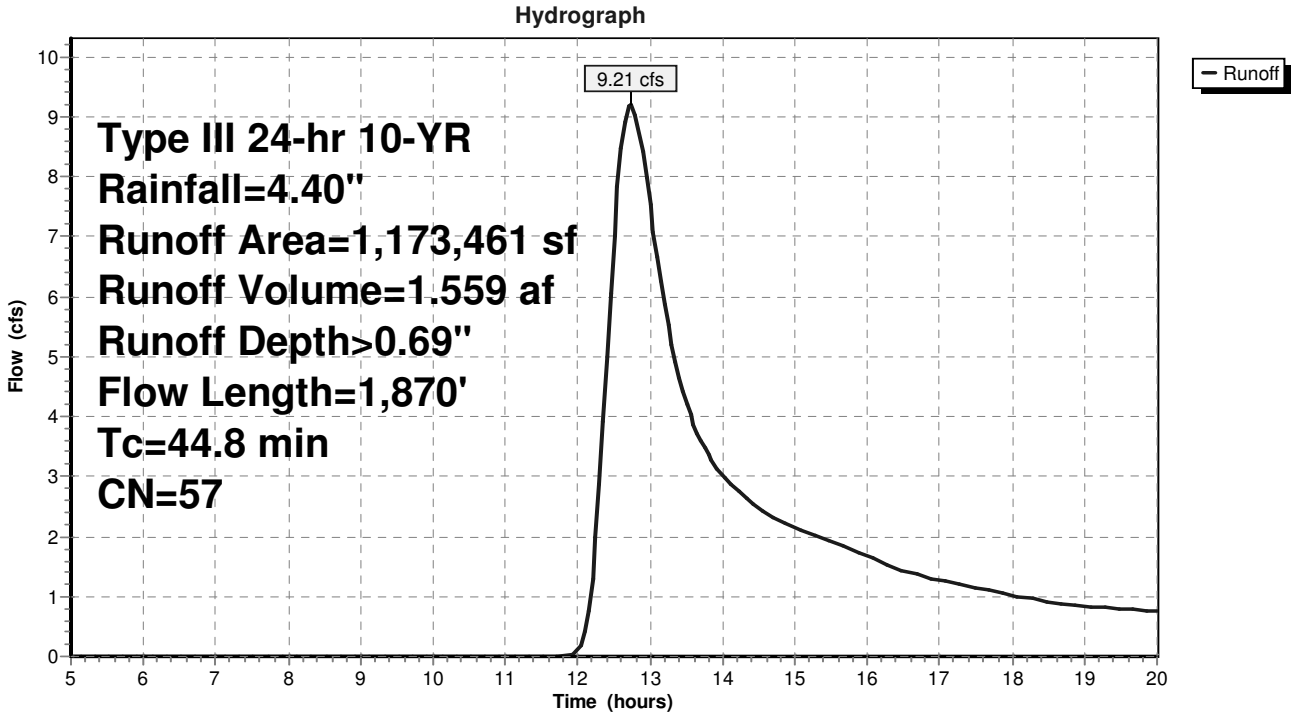
Runoff = 9.21 cfs @ 12.74 hrs, Volume= 1.559 af, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.40"

	Area (sf)	CN	Description
	104,639	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	124,607	70	Woods, Good, HSG C
	275,433	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	1,546	84	50-75% Grass cover, Fair, HSG D
*	84,344	98	Impervious
	387,729	30	Meadow, non-grazed, HSG A
	160,834	71	Meadow, non-grazed, HSG C
	34,329	78	Meadow, non-grazed, HSG D
	1,173,461	57	Weighted Average
	1,089,117		92.81% Pervious Area
	84,344		7.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	100	0.1300	0.35		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.00"
13.2	945	0.0290	1.19		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.0100	3.74	11.76	**Pipe Channel, CD** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
26.7	800	0.0100	0.50		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
44.8	1,870	Total			

Subcatchment 1S: 1



Summary for Subcatchment 2S: 2

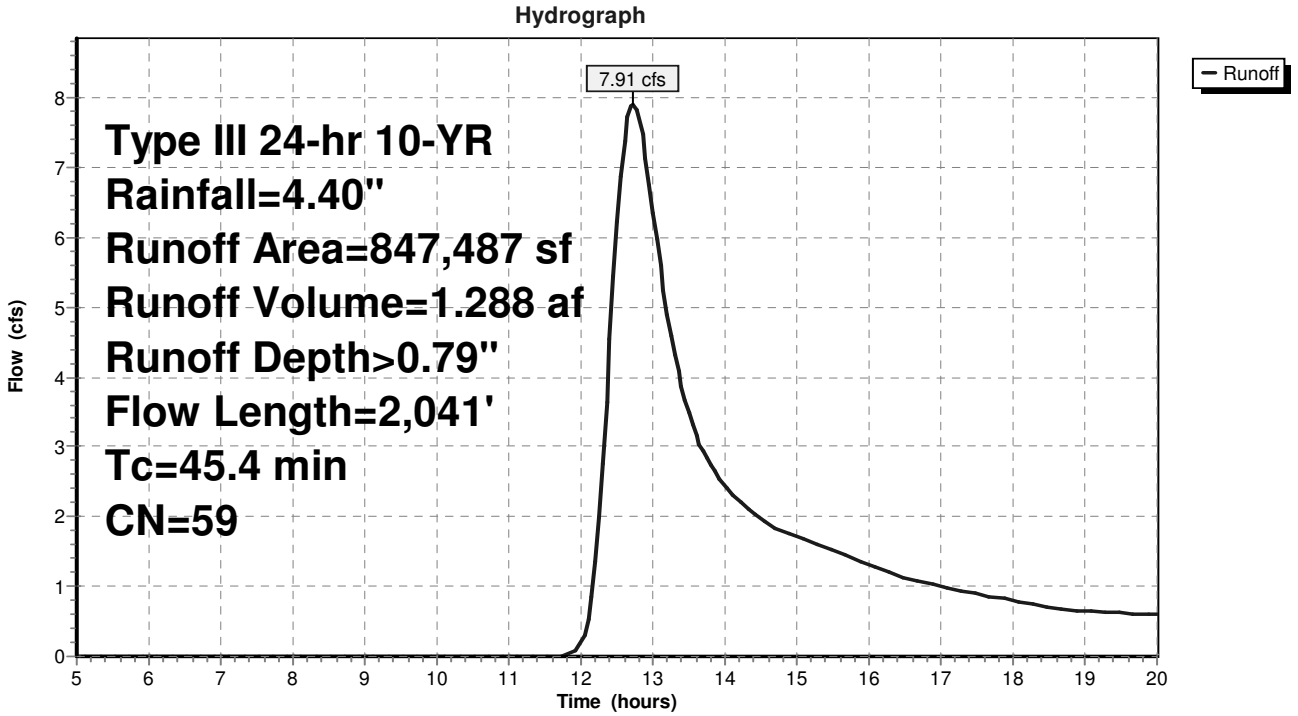
Runoff = 7.91 cfs @ 12.73 hrs, Volume= 1.288 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.40"

	Area (sf)	CN	Description
	189,915	30	Woods, Good, HSG A
	174,291	55	Woods, Good, HSG B
	375,757	70	Woods, Good, HSG C
	100,640	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	6,884	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	847,487	59	Weighted Average
	840,603		99.19% Pervious Area
	6,884		0.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	100	0.0750	0.07		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
17.8	565	0.0450	0.53		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.5	622	0.0270	18.95	5,306.68	**Trap/Vee/Rect Channel Flow, CD** Bot.W=10.00' D=10.00' Z= 1.8 '/' Top.W=46.00' n= 0.040 Winding stream, pools & shoals
0.1	60	0.0100	11.67	1,108.77	**Pipe Channel, DE** 132.0" Round Area= 95.0 sf Perim= 34.6' r= 2.75' n= 0.025 Corrugated metal
4.2	694	0.0040	2.77	373.46	**Trap/Vee/Rect Channel Flow, FG** Bot.W=60.00' D=2.00' Z= 3.7 '/' Top.W=74.80' n= 0.050 Scattered brush, heavy weeds
45.4	2,041	Total			

Subcatchment 2S: 2



Summary for Subcatchment 3S: 3

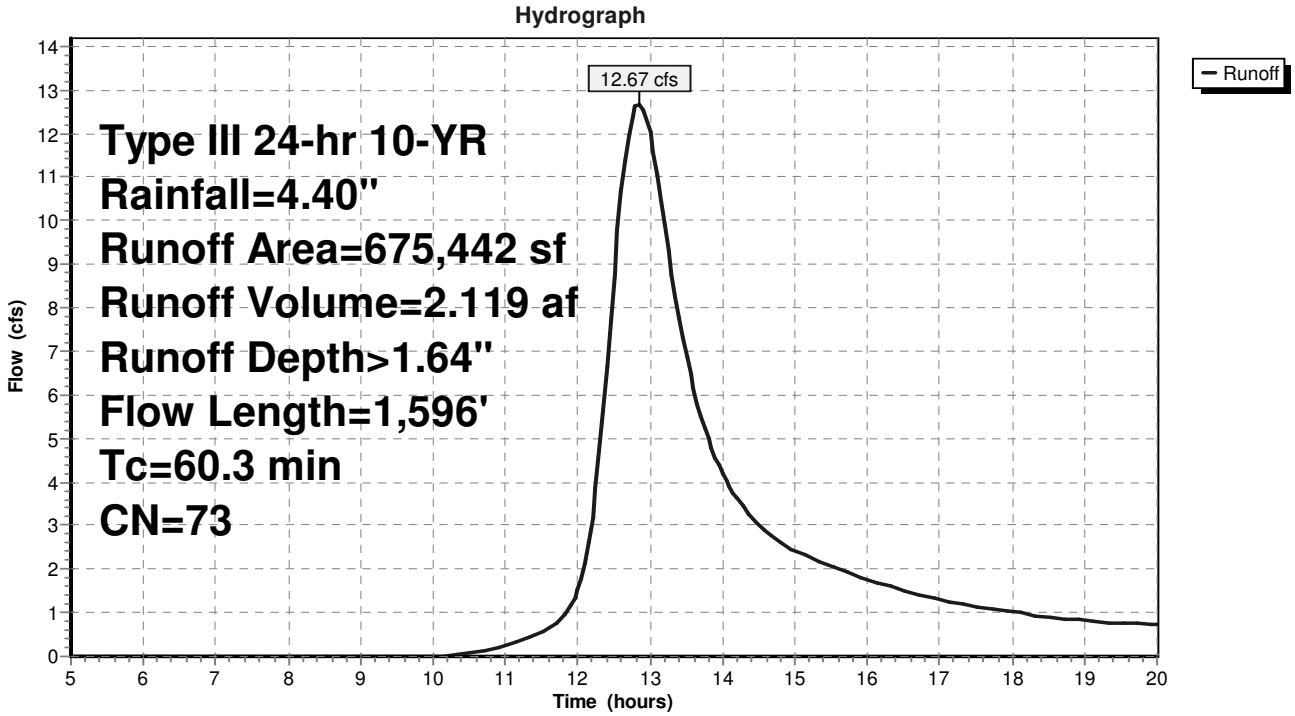
Runoff = 12.67 cfs @ 12.84 hrs, Volume= 2.119 af, Depth> 1.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	4,918	55	Woods, Good, HSG B
	491,166	70	Woods, Good, HSG C
	140,914	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	38,444	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	675,442	73	Weighted Average
	636,998		94.31% Pervious Area
	38,444		5.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.8	100	0.0550	0.06		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
33.2	721	0.0210	0.36		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.3	40	0.0100	2.36	1.85	**Pipe Channel, CD** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.025 Corrugated metal
1.0	735	0.0340	12.15	1,458.15	**Trap/Vee/Rect Channel Flow, DE** Bot.W=10.00' D=4.00' Z= 5.0 '/' Top.W=50.00' n= 0.040 Winding stream, pools & shoals
60.3	1,596	Total			

Subcatchment 3S: 3

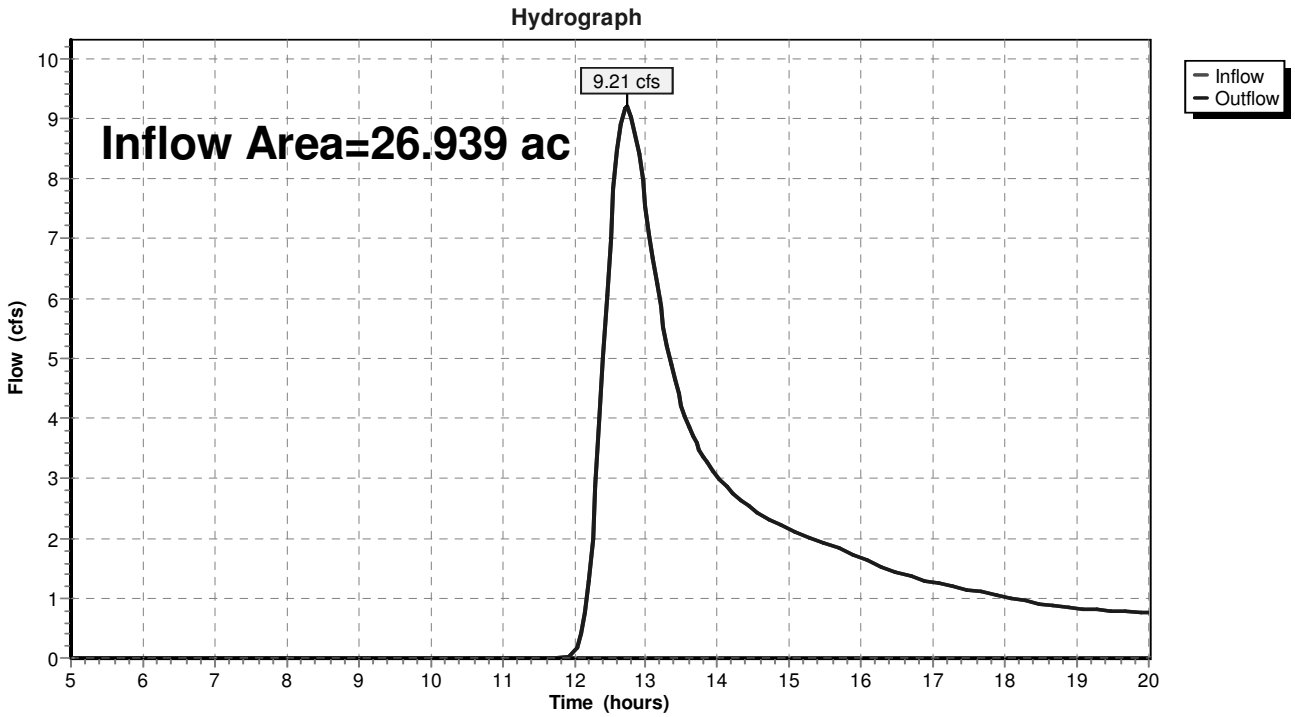


Summary for Reach 1R: SP 1

Inflow Area = 26.939 ac, 7.19% Impervious, Inflow Depth > 0.69" for 10-YR event
Inflow = 9.21 cfs @ 12.74 hrs, Volume= 1.559 af
Outflow = 9.21 cfs @ 12.74 hrs, Volume= 1.559 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: SP 1

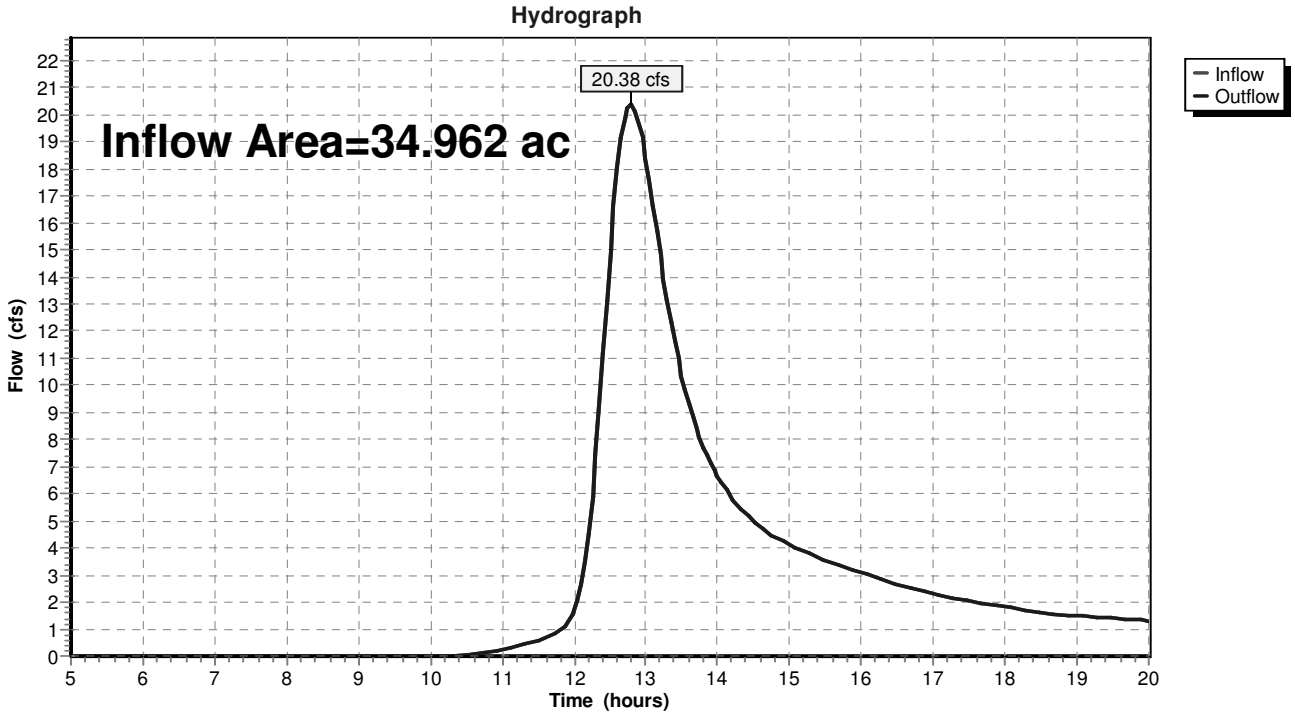


Summary for Reach 2R: SP 2

Inflow Area = 34.962 ac, 2.98% Impervious, Inflow Depth > 1.17" for 10-YR event
Inflow = 20.38 cfs @ 12.79 hrs, Volume= 3.407 af
Outflow = 20.38 cfs @ 12.79 hrs, Volume= 3.407 af, Atten= 0%, Lag= 0.0 min

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

Reach 2R: SP 2



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: 1 Runoff Area=1,173,461 sf 7.19% Impervious Runoff Depth>1.02"
Flow Length=1,870' Tc=44.8 min CN=57 Runoff=14.54 cfs 2.284 af

Subcatchment 2S: 2 Runoff Area=847,487 sf 0.81% Impervious Runoff Depth>1.14"
Flow Length=2,041' Tc=45.4 min CN=59 Runoff=12.03 cfs 1.850 af

Subcatchment 3S: 3 Runoff Area=675,442 sf 5.69% Impervious Runoff Depth>2.14"
Flow Length=1,596' Tc=60.3 min CN=73 Runoff=16.63 cfs 2.762 af

Reach 1R: SP 1 Inflow=14.54 cfs 2.284 af
Outflow=14.54 cfs 2.284 af

Reach 2R: SP 2 Inflow=28.27 cfs 4.612 af
Outflow=28.27 cfs 4.612 af

Total Runoff Area = 61.901 ac Runoff Volume = 6.897 af Average Runoff Depth = 1.34"
95.19% Pervious = 58.924 ac 4.81% Impervious = 2.977 ac

Summary for Subcatchment 1S: 1

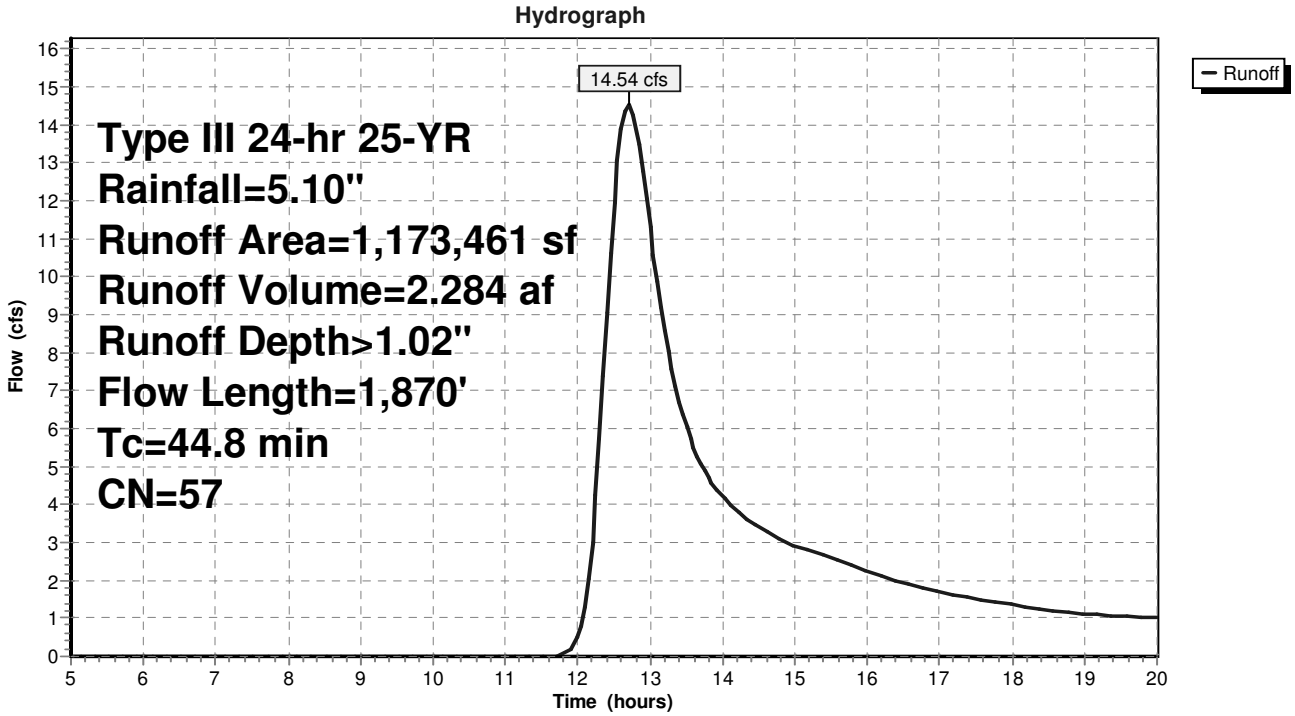
Runoff = 14.54 cfs @ 12.71 hrs, Volume= 2.284 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.10"

	Area (sf)	CN	Description
	104,639	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	124,607	70	Woods, Good, HSG C
	275,433	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	1,546	84	50-75% Grass cover, Fair, HSG D
*	84,344	98	Impervious
	387,729	30	Meadow, non-grazed, HSG A
	160,834	71	Meadow, non-grazed, HSG C
	34,329	78	Meadow, non-grazed, HSG D
	1,173,461	57	Weighted Average
	1,089,117		92.81% Pervious Area
	84,344		7.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	100	0.1300	0.35		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.00"
13.2	945	0.0290	1.19		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.0100	3.74	11.76	**Pipe Channel, CD** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
26.7	800	0.0100	0.50		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
44.8	1,870	Total			

Subcatchment 1S: 1



Summary for Subcatchment 2S: 2

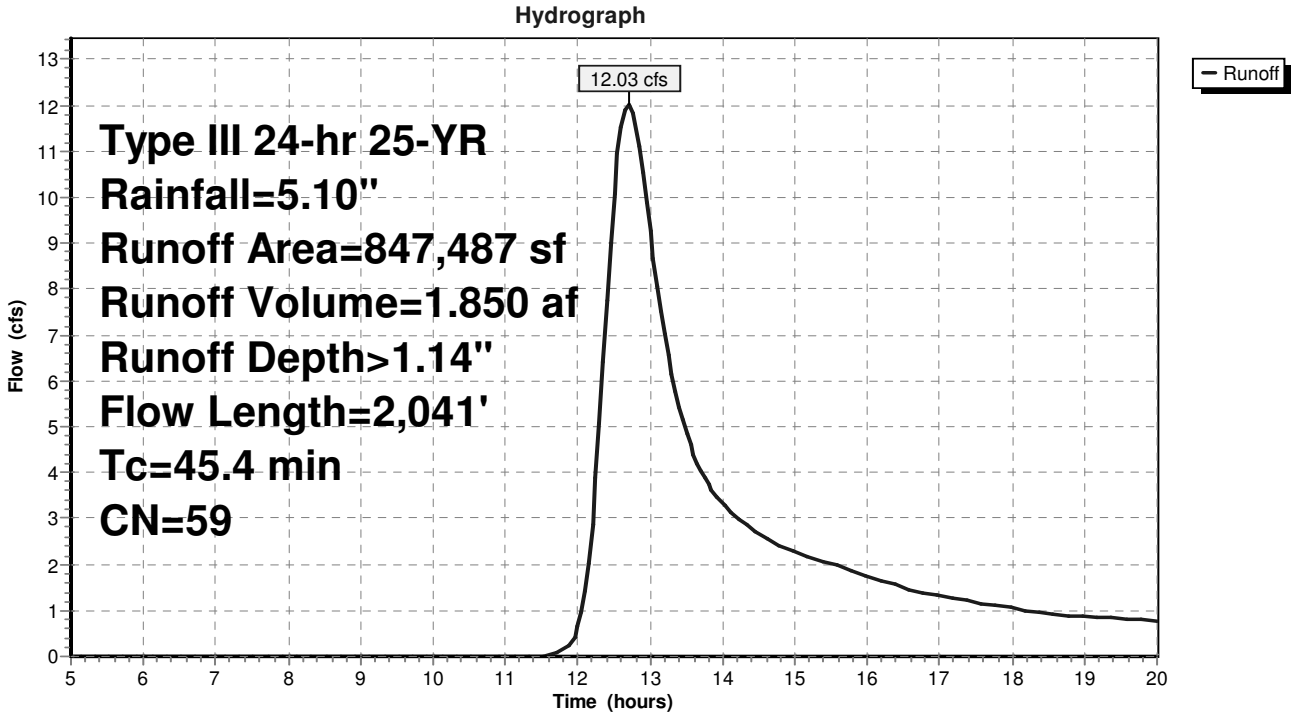
Runoff = 12.03 cfs @ 12.70 hrs, Volume= 1.850 af, Depth> 1.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.10"

	Area (sf)	CN	Description
	189,915	30	Woods, Good, HSG A
	174,291	55	Woods, Good, HSG B
	375,757	70	Woods, Good, HSG C
	100,640	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	6,884	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	847,487	59	Weighted Average
	840,603		99.19% Pervious Area
	6,884		0.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	100	0.0750	0.07		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
17.8	565	0.0450	0.53		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.5	622	0.0270	18.95	5,306.68	**Trap/Vee/Rect Channel Flow, CD** Bot.W=10.00' D=10.00' Z= 1.8 '/' Top.W=46.00' n= 0.040 Winding stream, pools & shoals
0.1	60	0.0100	11.67	1,108.77	**Pipe Channel, DE** 132.0" Round Area= 95.0 sf Perim= 34.6' r= 2.75' n= 0.025 Corrugated metal
4.2	694	0.0040	2.77	373.46	**Trap/Vee/Rect Channel Flow, FG** Bot.W=60.00' D=2.00' Z= 3.7 '/' Top.W=74.80' n= 0.050 Scattered brush, heavy weeds
45.4	2,041	Total			

Subcatchment 2S: 2



Summary for Subcatchment 3S: 3

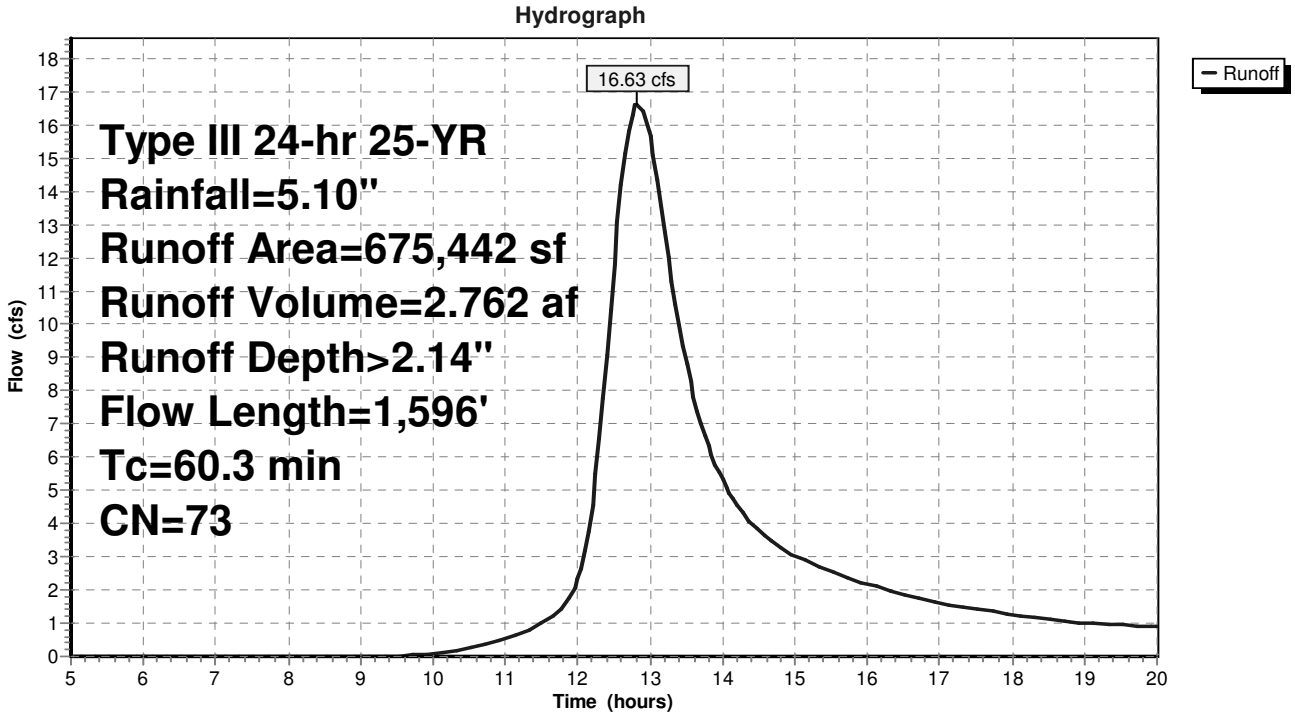
Runoff = 16.63 cfs @ 12.83 hrs, Volume= 2.762 af, Depth> 2.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	4,918	55	Woods, Good, HSG B
	491,166	70	Woods, Good, HSG C
	140,914	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	38,444	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	675,442	73	Weighted Average
	636,998		94.31% Pervious Area
	38,444		5.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.8	100	0.0550	0.06		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
33.2	721	0.0210	0.36		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.3	40	0.0100	2.36	1.85	**Pipe Channel, CD** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.025 Corrugated metal
1.0	735	0.0340	12.15	1,458.15	**Trap/Vee/Rect Channel Flow, DE** Bot.W=10.00' D=4.00' Z= 5.0 '/' Top.W=50.00' n= 0.040 Winding stream, pools & shoals
60.3	1,596	Total			

Subcatchment 3S: 3

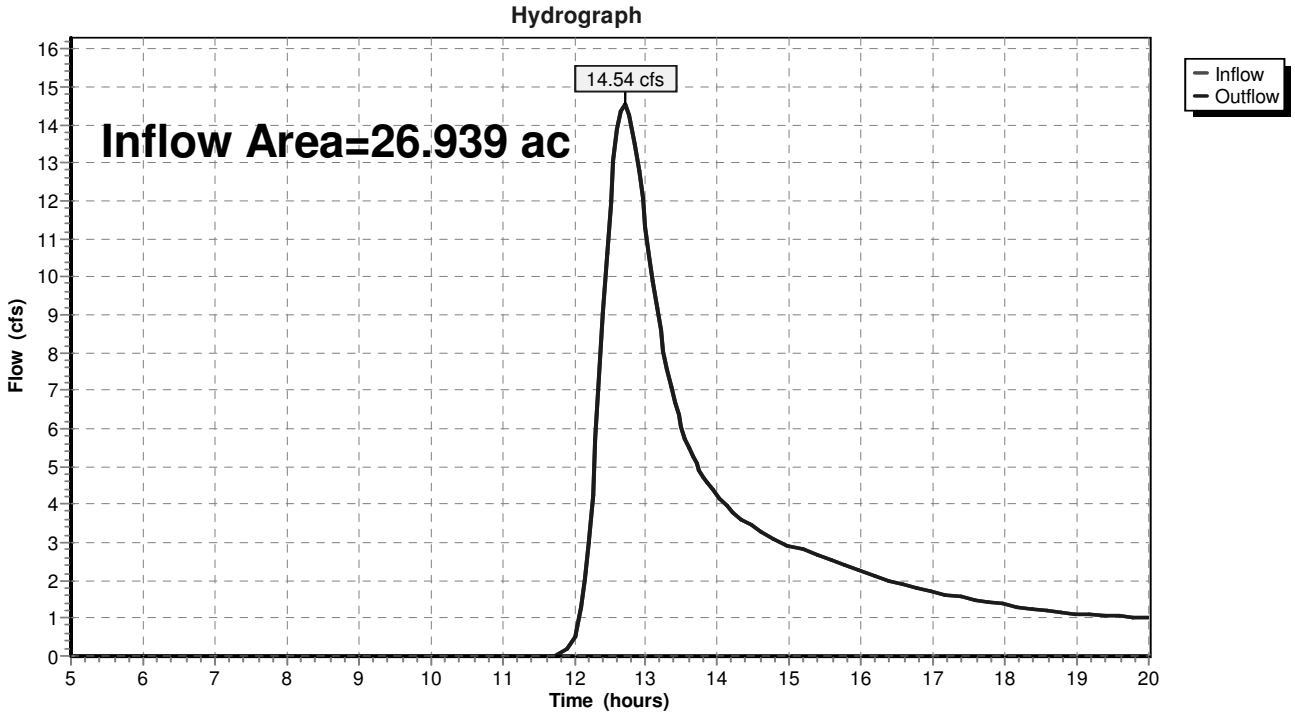


Summary for Reach 1R: SP 1

Inflow Area = 26.939 ac, 7.19% Impervious, Inflow Depth > 1.02" for 25-YR event
Inflow = 14.54 cfs @ 12.71 hrs, Volume= 2.284 af
Outflow = 14.54 cfs @ 12.71 hrs, Volume= 2.284 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: SP 1

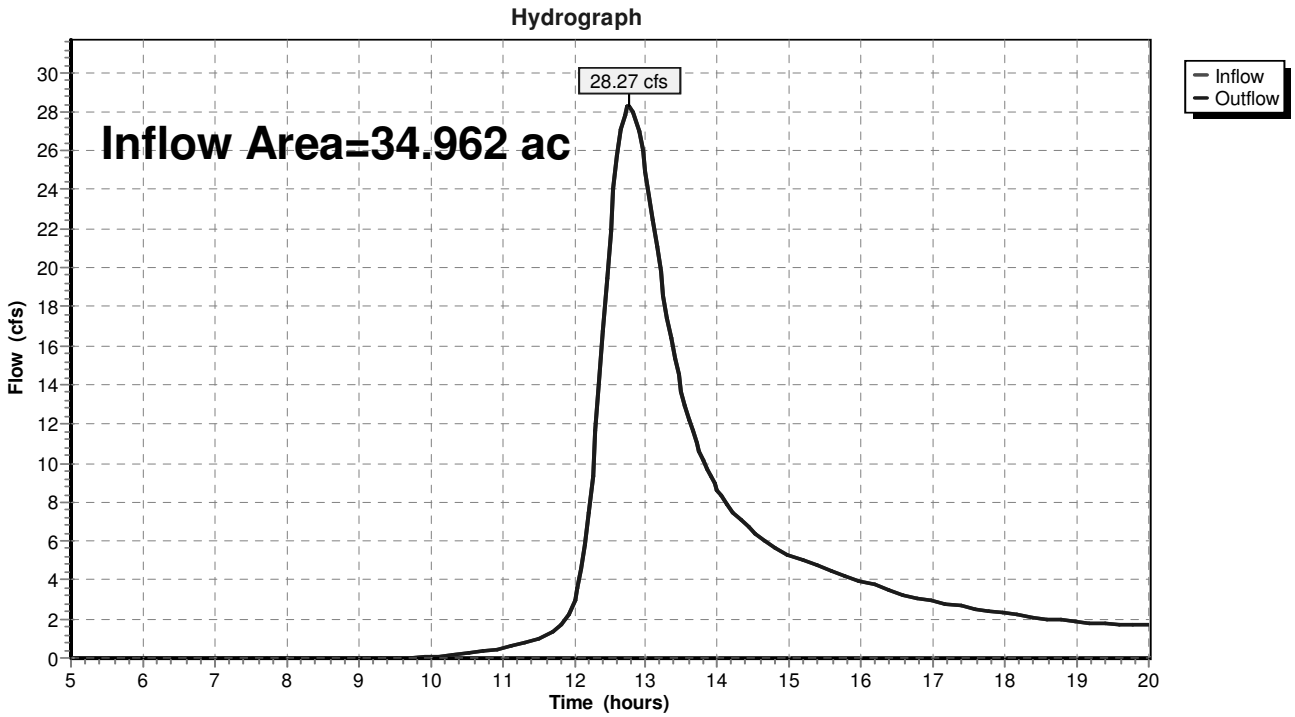


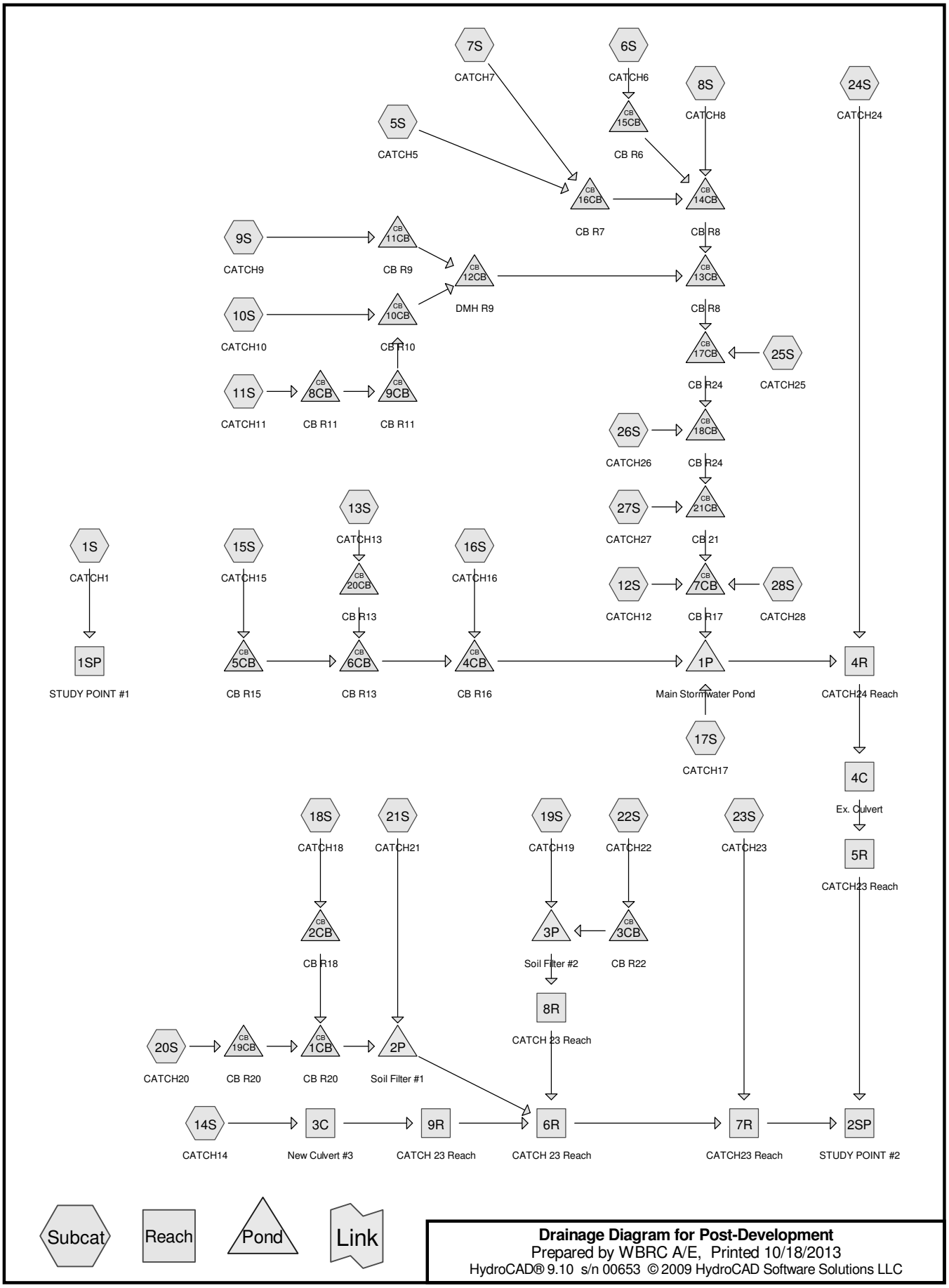
Summary for Reach 2R: SP 2

Inflow Area = 34.962 ac, 2.98% Impervious, Inflow Depth > 1.58" for 25-YR event
Inflow = 28.27 cfs @ 12.77 hrs, Volume= 4.612 af
Outflow = 28.27 cfs @ 12.77 hrs, Volume= 4.612 af, Atten= 0%, Lag= 0.0 min

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

Reach 2R: SP 2





Drainage Diagram for Post-Development
Prepared by WBRC A/E, Printed 10/18/2013
HydroCAD® 9.10 s/n 00653 © 2009 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
8.877	30	Meadow, non-grazed, HSG A (1S)
6.762	30	Woods, Good, HSG A (1S, 24S)
4.064	55	Woods, Good, HSG B (23S, 24S)
15.974	70	Woods, Good, HSG C (1S, 5S, 6S, 7S, 10S, 14S, 15S, 17S, 18S, 19S, 20S, 21S, 22S, 23S, 24S)
3.482	71	Meadow, non-grazed, HSG C (1S)
4.973	77	Woods, Good, HSG D (1S, 5S, 6S, 7S, 10S, 14S, 15S, 18S, 19S, 22S, 23S, 24S)
0.932	78	Meadow, non-grazed, HSG D (1S)
2.507	79	50-75% Grass cover, Fair, HSG C (6S, 7S, 8S, 9S, 10S, 12S, 13S, 15S, 16S, 17S, 18S, 19S, 23S, 24S, 25S, 26S, 27S, 28S)
1.837	84	50-75% Grass cover, Fair, HSG D (1S, 6S, 7S, 8S, 9S, 10S, 12S, 13S, 15S, 16S, 17S, 18S, 19S)
12.095	98	Impervious (1S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 17S, 18S, 19S, 20S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S)
0.326	98	Water Surface, HSG C (17S)
61.828		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
15.639	HSG A	1S, 24S
4.064	HSG B	23S, 24S
22.289	HSG C	1S, 5S, 6S, 7S, 8S, 9S, 10S, 12S, 13S, 14S, 15S, 16S, 17S, 18S, 19S, 20S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S
7.742	HSG D	1S, 5S, 6S, 7S, 8S, 9S, 10S, 12S, 13S, 14S, 15S, 16S, 17S, 18S, 19S, 22S, 23S, 24S
12.095	Other	1S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 17S, 18S, 19S, 20S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S
61.828		**TOTAL AREA**

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Fill (inches)
1	1S	0.00	0.00	25.0	0.0100	0.025	24.0	0.0	0.0
2	12S	0.00	0.00	238.0	0.0200	0.010	8.0	0.0	0.0
3	12S	0.00	0.00	133.0	0.0100	0.013	42.0	0.0	0.0
4	13S	0.00	0.00	12.0	0.2800	0.013	12.0	0.0	0.0
5	14S	0.00	0.00	21.0	0.0700	0.013	18.0	0.0	0.0
6	15S	0.00	0.00	52.0	0.0500	0.013	12.0	0.0	0.0
7	3C	224.75	222.00	75.0	0.0367	0.030	8.0	3.0	0.0
8	4C	212.00	211.25	75.0	0.0100	0.030	115.0	76.0	0.0
9	1CB	227.15	226.90	40.5	0.0062	0.013	15.0	0.0	0.0
10	1P	225.80	225.00	93.0	0.0086	0.013	18.0	0.0	0.0
11	2CB	227.75	227.25	21.5	0.0233	0.013	15.0	0.0	0.0
12	2P	221.67	221.50	21.0	0.0081	0.013	36.0	0.0	0.0
13	3CB	226.75	226.25	43.0	0.0116	0.013	12.0	0.0	0.0
14	3P	221.40	221.00	89.0	0.0045	0.013	36.0	0.0	0.0
15	4CB	235.90	231.00	245.0	0.0200	0.013	19.0	0.0	0.0
16	5CB	238.00	237.30	41.0	0.0171	0.013	12.0	0.0	0.0
17	6CB	237.20	236.00	69.3	0.0173	0.013	18.0	0.0	0.0
18	7CB	232.25	231.00	168.0	0.0074	0.013	42.0	0.0	0.0
19	8CB	244.80	244.40	45.0	0.0089	0.010	8.0	0.0	0.0
20	9CB	244.30	240.25	160.6	0.0252	0.010	10.0	0.0	0.0
21	10CB	240.15	238.20	188.0	0.0104	0.013	21.0	0.0	0.0
22	11CB	239.75	238.20	55.0	0.0282	0.013	16.0	0.0	0.0
23	12CB	238.10	236.90	154.5	0.0078	0.013	24.0	0.0	0.0
24	13CB	236.40	235.70	93.0	0.0075	0.013	24.0	0.0	0.0
25	14CB	236.90	236.50	43.0	0.0093	0.013	36.0	0.0	0.0
26	15CB	244.00	240.50	352.5	0.0099	0.013	18.0	0.0	0.0
27	16CB	239.75	236.75	279.7	0.0107	0.013	24.0	0.0	0.0
28	17CB	235.60	234.10	193.0	0.0078	0.013	36.0	0.0	0.0
29	18CB	234.00	233.50	71.0	0.0070	0.013	42.0	0.0	0.0
30	19CB	229.00	227.25	86.3	0.0203	0.013	12.0	0.0	0.0
31	20CB	237.60	237.30	28.0	0.0107	0.013	18.0	0.0	0.0
32	21CB	233.40	232.25	130.0	0.0088	0.013	42.0	0.0	0.0

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: CATCH1 Runoff Area=1,018,520 sf 9.29% Impervious Runoff Depth>0.16"
Flow Length=1,870' Tc=44.8 min CN=55 Runoff=0.97 cfs 0.303 af

Subcatchment 5S: CATCH5 Runoff Area=13,612 sf 99.52% Impervious Runoff Depth>2.59"
Flow Length=337' Tc=2.8 min CN=98 Runoff=0.99 cfs 0.067 af

Subcatchment 6S: CATCH6 Runoff Area=40,309 sf 43.35% Impervious Runoff Depth>1.87"
Flow Length=241' Tc=2.0 min CN=90 Runoff=2.33 cfs 0.144 af

Subcatchment 7S: CATCH7 Runoff Area=71,244 sf 81.62% Impervious Runoff Depth>2.32"
Flow Length=404' Tc=3.1 min CN=95 Runoff=4.82 cfs 0.316 af

Subcatchment 8S: CATCH8 Runoff Area=51,409 sf 94.88% Impervious Runoff Depth>2.50"
Flow Length=246' Slope=0.0150 '/' Tc=2.4 min CN=97 Runoff=3.67 cfs 0.246 af

Subcatchment 9S: CATCH9 Runoff Area=41,989 sf 65.90% Impervious Runoff Depth>2.04"
Flow Length=206' Tc=2.4 min CN=92 Runoff=2.61 cfs 0.164 af

Subcatchment 10S: CATCH10 Runoff Area=70,177 sf 74.40% Impervious Runoff Depth>2.22"
Flow Length=270' Slope=0.0200 '/' Tc=1.9 min CN=94 Runoff=4.65 cfs 0.298 af

Subcatchment 11S: CATCH11 Runoff Area=700 sf 100.00% Impervious Runoff Depth>2.59"
Flow Length=7' Slope=0.0100 '/' Tc=0.2 min CN=98 Runoff=0.05 cfs 0.003 af

Subcatchment 12S: CATCH12 Runoff Area=83,464 sf 98.25% Impervious Runoff Depth>2.59"
Flow Length=433' Tc=2.3 min CN=98 Runoff=6.06 cfs 0.414 af

Subcatchment 13S: CATCH13 Runoff Area=48,060 sf 51.29% Impervious Runoff Depth>1.86"
Flow Length=255' Tc=6.8 min CN=90 Runoff=2.44 cfs 0.171 af

Subcatchment 14S: CATCH14 Runoff Area=229,540 sf 9.88% Impervious Runoff Depth>0.82"
Flow Length=934' Tc=9.7 min CN=74 Runoff=4.55 cfs 0.362 af

Subcatchment 15S: CATCH15 Runoff Area=12,183 sf 70.56% Impervious Runoff Depth>2.04"
Flow Length=289' Tc=2.0 min CN=92 Runoff=0.76 cfs 0.048 af

Subcatchment 16S: CATCH16 Runoff Area=32,840 sf 3.66% Impervious Runoff Depth>1.21"
Flow Length=243' Tc=11.1 min CN=81 Runoff=0.96 cfs 0.076 af

Subcatchment 17S: CATCH17 Runoff Area=52,372 sf 32.27% Impervious Runoff Depth>1.48"
Flow Length=123' Tc=5.0 min CN=85 Runoff=2.24 cfs 0.148 af

Subcatchment 18S: CATCH18 Runoff Area=22,493 sf 77.70% Impervious Runoff Depth>2.22"
Flow Length=365' Slope=0.0260 '/' Tc=2.4 min CN=94 Runoff=1.49 cfs 0.096 af

Subcatchment 19S: CATCH19 Runoff Area=71,665 sf 29.40% Impervious Runoff Depth>1.15"
Flow Length=286' Tc=10.8 min CN=80 Runoff=2.00 cfs 0.158 af

Subcatchment 20S: CATCH20 Runoff Area=5,850 sf 88.77% Impervious Runoff Depth>2.32"
Flow Length=189' Slope=0.0150 '/' Tc=2.0 min CN=95 Runoff=0.40 cfs 0.026 af

Subcatchment 21S: CATCH21 Runoff Area=7,351 sf 0.80% Impervious Runoff Depth>0.64"
Flow Length=55' Slope=0.1000 '/' Tc=3.3 min CN=70 Runoff=0.13 cfs 0.009 af

Subcatchment 22S: CATCH22 Runoff Area=3,330 sf 77.27% Impervious Runoff Depth>2.04"
Flow Length=148' Slope=0.0150 '/' Tc=1.5 min CN=92 Runoff=0.21 cfs 0.013 af

Subcatchment 23S: CATCH23 Runoff Area=189,711 sf 4.90% Impervious Runoff Depth>0.68"
Flow Length=433' Tc=25.3 min CN=71 Runoff=2.10 cfs 0.247 af

Subcatchment 24S: CATCH24 Runoff Area=605,992 sf 0.76% Impervious Runoff Depth>0.12"
Flow Length=1,057' Tc=33.5 min CN=53 Runoff=0.37 cfs 0.135 af

Subcatchment 25S: CATCH25 Runoff Area=14,927 sf 57.32% Impervious Runoff Depth>1.87"
Flow Length=340' Slope=0.0150 '/' Tc=2.7 min CN=90 Runoff=0.86 cfs 0.053 af

Subcatchment 26S: CATCH26 Runoff Area=1,125 sf 58.84% Impervious Runoff Depth>1.87"
Flow Length=44' Slope=0.0150 '/' Tc=0.6 min CN=90 Runoff=0.07 cfs 0.004 af

Subcatchment 27S: CATCH27 Runoff Area=2,087 sf 59.08% Impervious Runoff Depth>1.87"
Flow Length=42' Slope=0.0150 '/' Tc=0.5 min CN=90 Runoff=0.13 cfs 0.007 af

Subcatchment 28S: CATCH28 Runoff Area=2,298 sf 50.17% Impervious Runoff Depth>1.78"
Flow Length=104' Slope=0.0150 '/' Tc=0.9 min CN=89 Runoff=0.13 cfs 0.008 af

Reach 1SP: STUDY POINT #1 Inflow=0.97 cfs 0.303 af
Outflow=0.97 cfs 0.303 af

Reach 2SP: STUDY POINT #2 Inflow=4.59 cfs 1.096 af
Outflow=4.59 cfs 1.096 af

Reach 3C: New Culvert #3 Avg. Flow Depth=0.25' Max Vel=2.36 fps Inflow=4.55 cfs 0.362 af
8.0" x 3.0" Box Pipe n=0.030 L=75.0' S=0.0367 '/' Capacity=0.32 cfs Outflow=0.32 cfs 0.225 af

Reach 4C: Ex. Culvert Avg. Flow Depth=0.10' Max Vel=1.09 fps Inflow=1.02 cfs 0.363 af
115.0" x 76.0" Box Pipe n=0.030 L=75.0' S=0.0100 '/' Capacity=586.94 cfs Outflow=1.02 cfs 0.361 af

Reach 4R: CATCH24 Reach Avg. Flow Depth=0.08' Max Vel=1.29 fps Inflow=1.02 cfs 0.372 af
n=0.030 L=383.7' S=0.0208 '/' Capacity=444.84 cfs Outflow=1.02 cfs 0.363 af

Reach 5R: CATCH23 Reach Avg. Flow Depth=0.02' Max Vel=0.59 fps Inflow=1.02 cfs 0.361 af
n=0.030 L=646.0' S=0.0031 '/' Capacity=12,048.05 cfs Outflow=0.98 cfs 0.332 af

Reach 6R: CATCH 23 Reach Avg. Flow Depth=0.14' Max Vel=2.12 fps Inflow=3.60 cfs 0.524 af
n=0.030 L=77.2' S=0.0324 '/' Capacity=1,385.41 cfs Outflow=3.50 cfs 0.523 af

Reach 7R: CATCH23 Reach Avg. Flow Depth=0.16' Max Vel=1.23 fps Inflow=4.63 cfs 0.769 af
n=0.030 L=182.5' S=0.0082 '/' Capacity=5,255.57 cfs Outflow=4.59 cfs 0.764 af

Reach 8R: CATCH 23 Reach Avg. Flow Depth=0.02' Max Vel=1.69 fps Inflow=2.09 cfs 0.171 af
n=0.022 L=79.0' S=0.0886 '/' Capacity=1,415.96 cfs Outflow=2.04 cfs 0.170 af

Reach 9R: CATCH 23 Reach Avg. Flow Depth=0.03' Max Vel=1.06 fps Inflow=0.32 cfs 0.225 af
n=0.030 L=162.0' S=0.0494 '/' Capacity=1,710.82 cfs Outflow=0.32 cfs 0.223 af

Pond 1CB: CB R20 Peak Elev=227.96' Inflow=1.89 cfs 0.122 af
15.0" Round Culvert n=0.013 L=40.5' S=0.0062 '/' Outflow=1.89 cfs 0.122 af

Pond 1P: Main Stormwater Pond Peak Elev=232.46' Storage=82,203 cf Inflow=31.67 cfs 2.168 af
Discarded=0.05 cfs 0.059 af Primary=0.81 cfs 0.237 af Outflow=0.86 cfs 0.295 af

Pond 2CB: CB R18 Peak Elev=228.42' Inflow=1.49 cfs 0.096 af
15.0" Round Culvert n=0.013 L=21.5' S=0.0233 '/' Outflow=1.49 cfs 0.096 af

Pond 2P: Soil Filter #1 Peak Elev=224.00' Storage=3 cf Inflow=2.02 cfs 0.131 af
Outflow=2.02 cfs 0.131 af

Pond 3CB: CB R22 Peak Elev=227.00' Inflow=0.21 cfs 0.013 af
12.0" Round Culvert n=0.013 L=43.0' S=0.0116 '/' Outflow=0.21 cfs 0.013 af

Pond 3P: Soil Filter #2 Peak Elev=224.01' Storage=15 cf Inflow=2.09 cfs 0.171 af
Outflow=2.09 cfs 0.171 af

Pond 4CB: CB R16 Peak Elev=236.94' Inflow=3.78 cfs 0.295 af
19.0" Round Culvert n=0.013 L=245.0' S=0.0200 '/' Outflow=3.78 cfs 0.295 af

Pond 5CB: CB R15 Peak Elev=238.50' Inflow=0.76 cfs 0.048 af
12.0" Round Culvert n=0.013 L=41.0' S=0.0171 '/' Outflow=0.76 cfs 0.048 af

Pond 6CB: CB R13 Peak Elev=238.13' Inflow=2.99 cfs 0.219 af
18.0" Round Culvert n=0.013 L=69.3' S=0.0173 '/' Outflow=2.99 cfs 0.219 af

Pond 7CB: CB R17 Peak Elev=234.50' Inflow=26.26 cfs 1.725 af
42.0" Round Culvert n=0.013 L=168.0' S=0.0074 '/' Outflow=26.26 cfs 1.725 af

Pond 8CB: CB R11 Peak Elev=244.94' Inflow=0.05 cfs 0.003 af
8.0" Round Culvert n=0.010 L=45.0' S=0.0089 '/' Outflow=0.05 cfs 0.003 af

Pond 9CB: CB R11 Peak Elev=244.43' Inflow=0.05 cfs 0.003 af
10.0" Round Culvert n=0.010 L=160.6' S=0.0252 '/' Outflow=0.05 cfs 0.003 af

Pond 10CB: CB R10 Peak Elev=241.28' Inflow=4.69 cfs 0.302 af
21.0" Round Culvert n=0.013 L=188.0' S=0.0104 '/' Outflow=4.69 cfs 0.302 af

Pond 11CB: CB R9 Peak Elev=240.66' Inflow=2.61 cfs 0.164 af
16.0" Round Culvert n=0.013 L=55.0' S=0.0282 '/' Outflow=2.61 cfs 0.164 af

Pond 12CB: DMH R9 Peak Elev=239.48' Inflow=7.29 cfs 0.466 af
24.0" Round Culvert n=0.013 L=154.5' S=0.0078 '/' Outflow=7.29 cfs 0.466 af

Pond 13CB: CB R8 Peak Elev=239.94' Inflow=19.06 cfs 1.239 af
24.0" Round Culvert n=0.013 L=93.0' S=0.0075 '/' Outflow=19.06 cfs 1.239 af

Pond 14CB: CB R8 Peak Elev=238.44' Inflow=11.78 cfs 0.773 af
36.0" Round Culvert n=0.013 L=43.0' S=0.0093 '/' Outflow=11.78 cfs 0.773 af

Pond 15CB: CB R6 Peak Elev=244.81' Inflow=2.33 cfs 0.144 af
18.0" Round Culvert n=0.013 L=352.5' S=0.0099 '/' Outflow=2.33 cfs 0.144 af

Pond 16CB: CB R7 Peak Elev=240.95' Inflow=5.80 cfs 0.383 af
24.0" Round Culvert n=0.013 L=279.7' S=0.0107 '/' Outflow=5.80 cfs 0.383 af

Pond 17CB: CB R24 Peak Elev=237.66' Inflow=19.92 cfs 1.292 af
36.0" Round Culvert n=0.013 L=193.0' S=0.0078 '/' Outflow=19.92 cfs 1.292 af

Pond 18CB: CB R24 Peak Elev=235.97' Inflow=19.98 cfs 1.296 af
42.0" Round Culvert n=0.013 L=71.0' S=0.0070 '/' Outflow=19.98 cfs 1.296 af

Pond 19CB: CB R20 Peak Elev=229.35' Inflow=0.40 cfs 0.026 af
12.0" Round Culvert n=0.013 L=86.3' S=0.0203 '/' Outflow=0.40 cfs 0.026 af

Pond 20CB: CB R13 Peak Elev=238.43' Inflow=2.44 cfs 0.171 af
18.0" Round Culvert n=0.013 L=28.0' S=0.0107 '/' Outflow=2.44 cfs 0.171 af

Pond 21CB: CB 21 Peak Elev=235.32' Inflow=20.09 cfs 1.304 af
42.0" Round Culvert n=0.013 L=130.0' S=0.0088 '/' Outflow=20.09 cfs 1.304 af

Total Runoff Area = 61.828 ac Runoff Volume = 3.516 af Average Runoff Depth = 0.68"
79.91% Pervious = 49.408 ac 20.09% Impervious = 12.421 ac

Summary for Subcatchment 1S: CATCH1

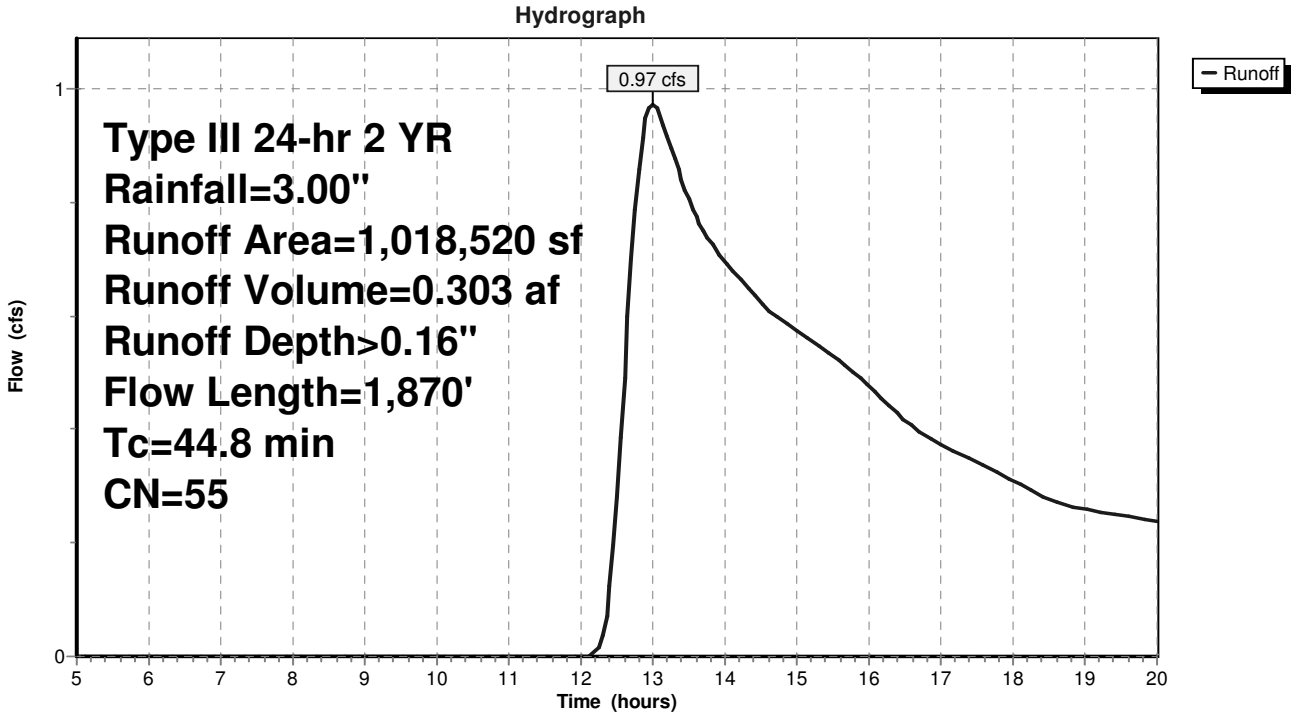
Runoff = 0.97 cfs @ 13.00 hrs, Volume= 0.303 af, Depth> 0.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	95,226	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	94,031	70	Woods, Good, HSG C
	154,141	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	1,546	84	50-75% Grass cover, Fair, HSG D
*	94,602	98	Impervious
	386,699	30	Meadow, non-grazed, HSG A
	151,690	71	Meadow, non-grazed, HSG C
	40,585	78	Meadow, non-grazed, HSG D
	1,018,520	55	Weighted Average
	923,918		90.71% Pervious Area
	94,602		9.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	100	0.1300	0.35		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.00"
13.2	945	0.0290	1.19		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.0100	3.74	11.76	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
26.7	800	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
44.8	1,870	Total			

Subcatchment 1S: CATCH1



Summary for Subcatchment 5S: CATCH5

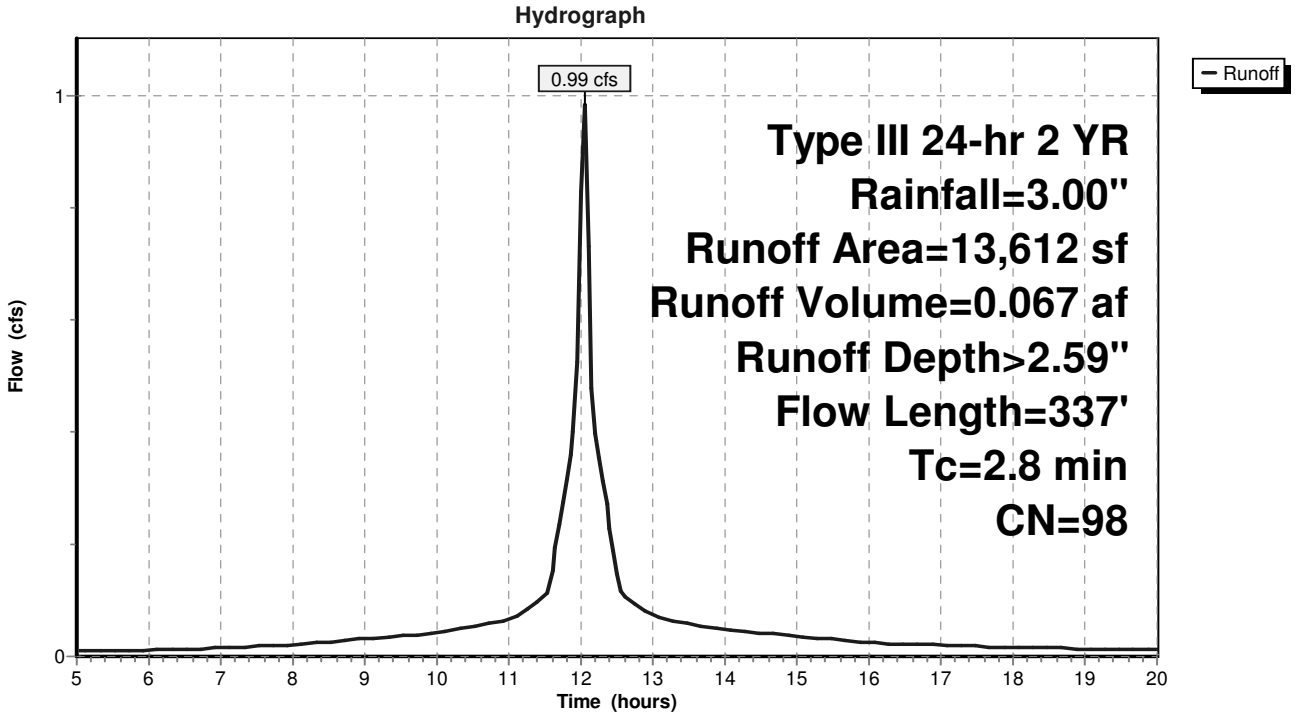
Runoff = 0.99 cfs @ 12.04 hrs, Volume= 0.067 af, Depth> 2.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	4	70	Woods, Good, HSG C
	62	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	13,546	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	13,612	98	Weighted Average
	66		0.48% Pervious Area
	13,546		99.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.33		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.4	62	0.0200	2.87		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
1.1	175	0.0170	2.65		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
2.8	337	Total			

Subcatchment 5S: CATCH5



Summary for Subcatchment 6S: CATCH6

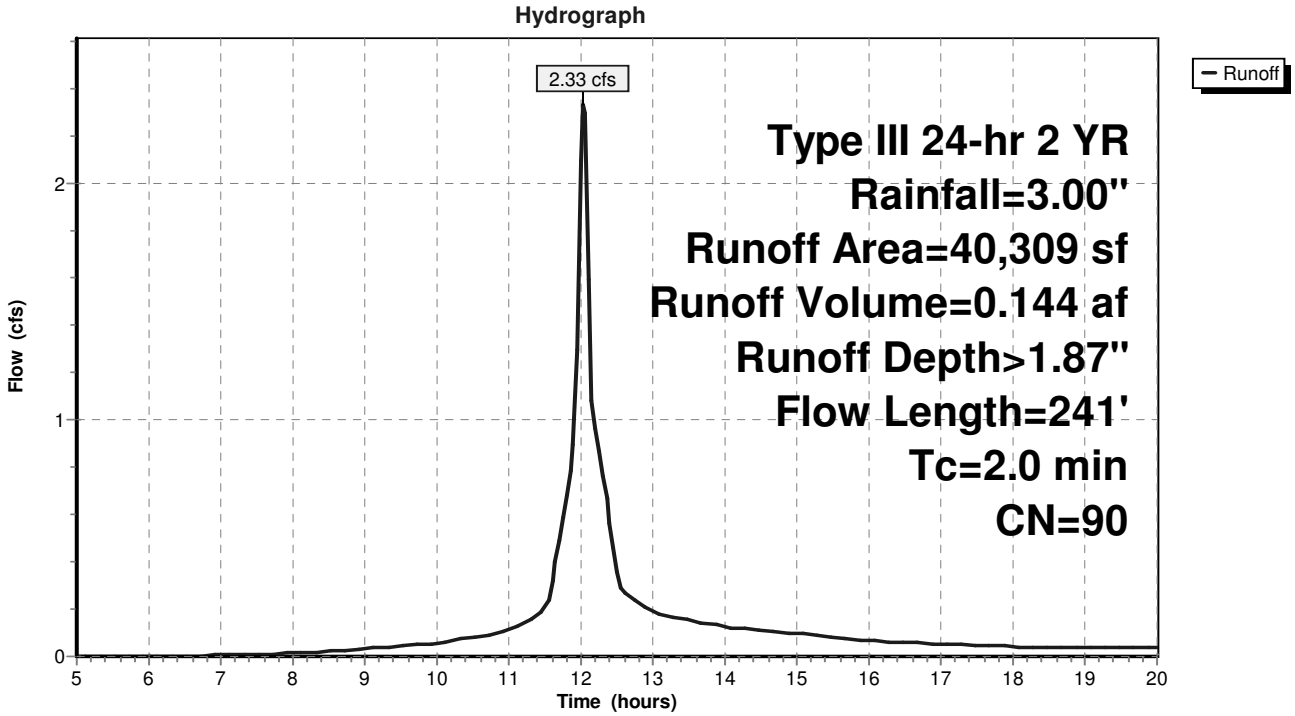
Runoff = 2.33 cfs @ 12.04 hrs, Volume= 0.144 af, Depth> 1.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	133	70	Woods, Good, HSG C
	222	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,788	79	50-75% Grass cover, Fair, HSG C
	20,691	84	50-75% Grass cover, Fair, HSG D
*	17,475	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	40,309	90	Weighted Average
	22,834		56.65% Pervious Area
	17,475		43.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.25		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.1	22	0.0170	2.65		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
0.6	119	0.0500	3.35		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
2.0	241	Total			

Subcatchment 6S: CATCH6



Summary for Subcatchment 7S: CATCH7

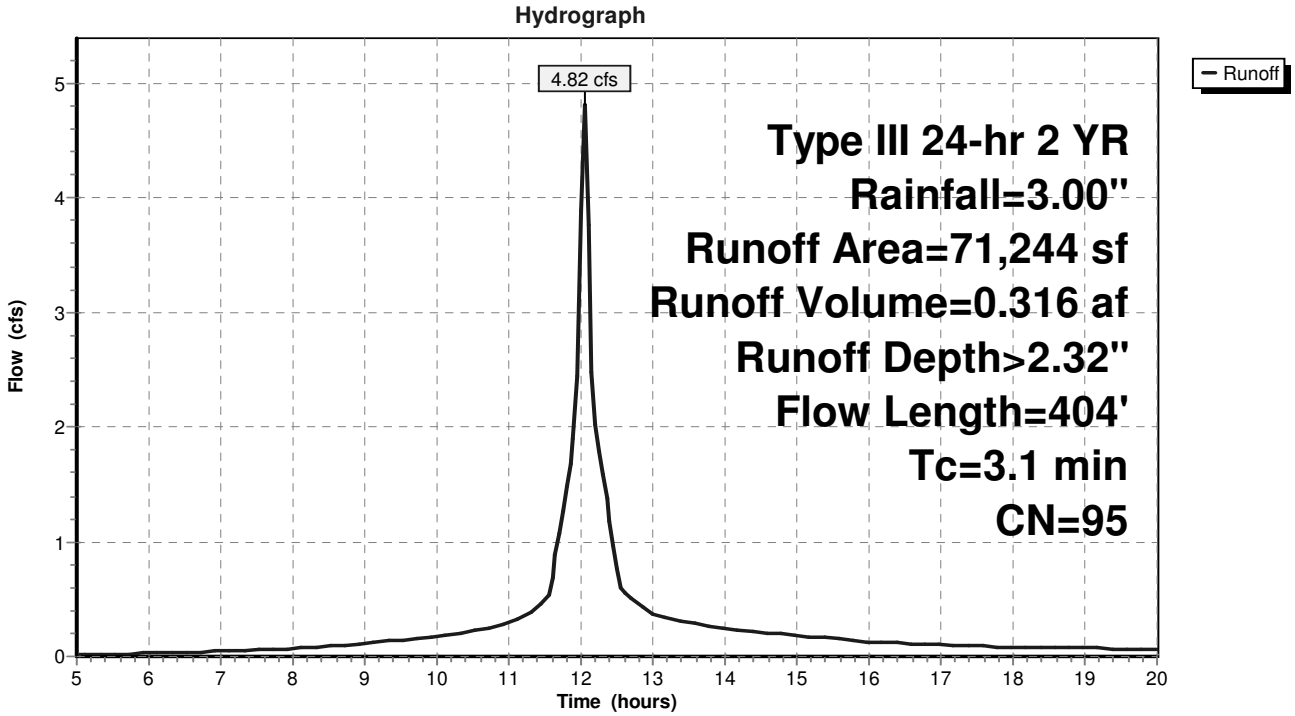
Runoff = 4.82 cfs @ 12.05 hrs, Volume= 0.316 af, Depth> 2.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	3	70	Woods, Good, HSG C
	590	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,164	79	50-75% Grass cover, Fair, HSG C
	11,338	84	50-75% Grass cover, Fair, HSG D
*	58,149	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	71,244	95	Weighted Average
	13,095		18.38% Pervious Area
	58,149		81.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	92	0.0220	1.36		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.8	114	0.0260	2.42		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
0.1	23	0.0260	3.27		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
1.1	175	0.0170	2.65		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
3.1	404	Total			

Subcatchment 7S: CATCH7



Summary for Subcatchment 8S: CATCH8

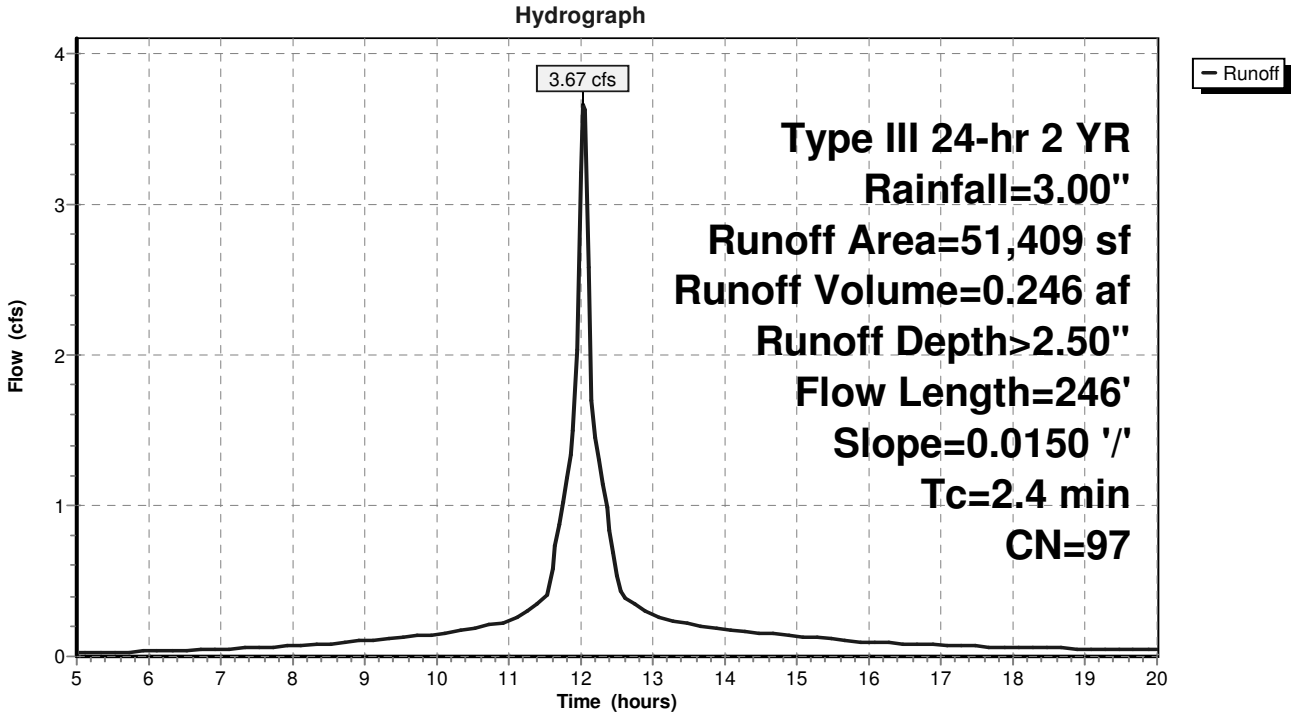
Runoff = 3.67 cfs @ 12.04 hrs, Volume= 0.246 af, Depth> 2.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,806	79	50-75% Grass cover, Fair, HSG C
	827	84	50-75% Grass cover, Fair, HSG D
*	48,776	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	51,409	97	Weighted Average
	2,633		5.12% Pervious Area
	48,776		94.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0150	1.19		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
1.0	146	0.0150	2.49		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
2.4	246	Total			

Subcatchment 8S: CATCH8



Summary for Subcatchment 9S: CATCH9

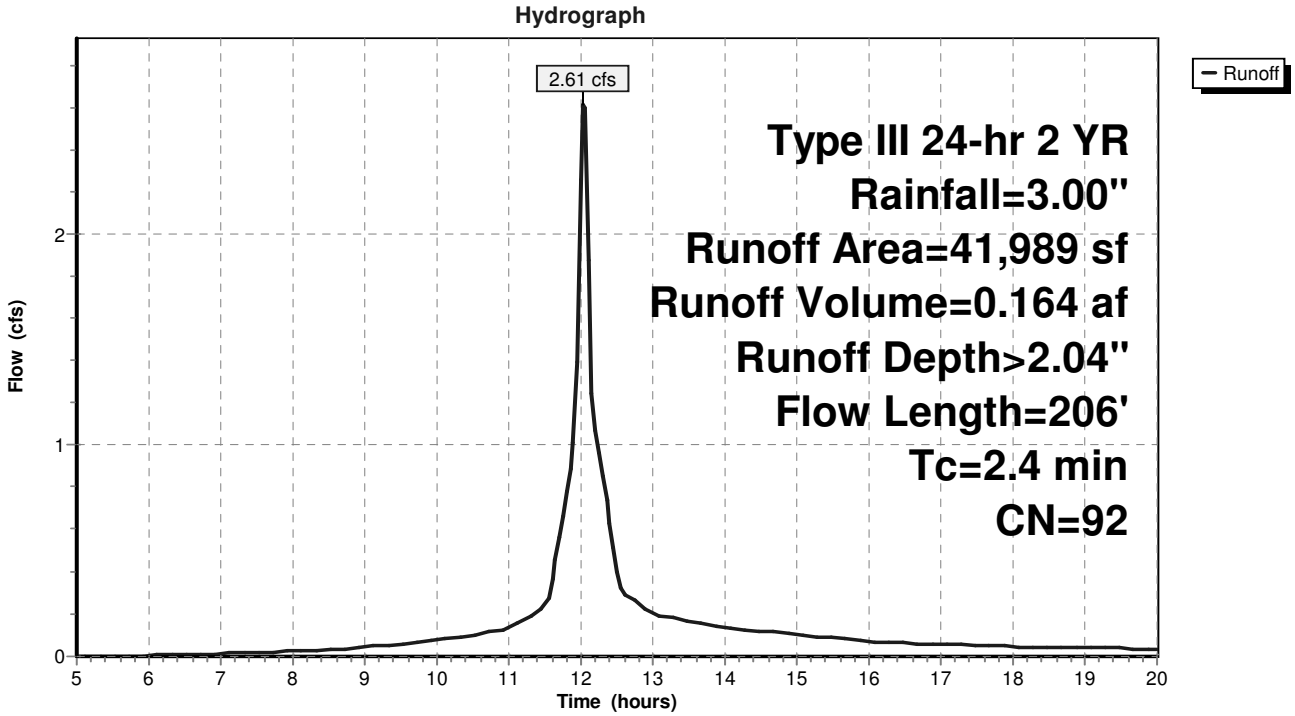
Runoff = 2.61 cfs @ 12.04 hrs, Volume= 0.164 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	7,382	79	50-75% Grass cover, Fair, HSG C
	6,938	84	50-75% Grass cover, Fair, HSG D
*	27,669	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	41,989	92	Weighted Average
	14,320		34.10% Pervious Area
	27,669		65.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	100	0.0100	1.01		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.7	106	0.0170	2.65		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
2.4	206	Total			

Subcatchment 9S: CATCH9



Summary for Subcatchment 10S: CATCH10

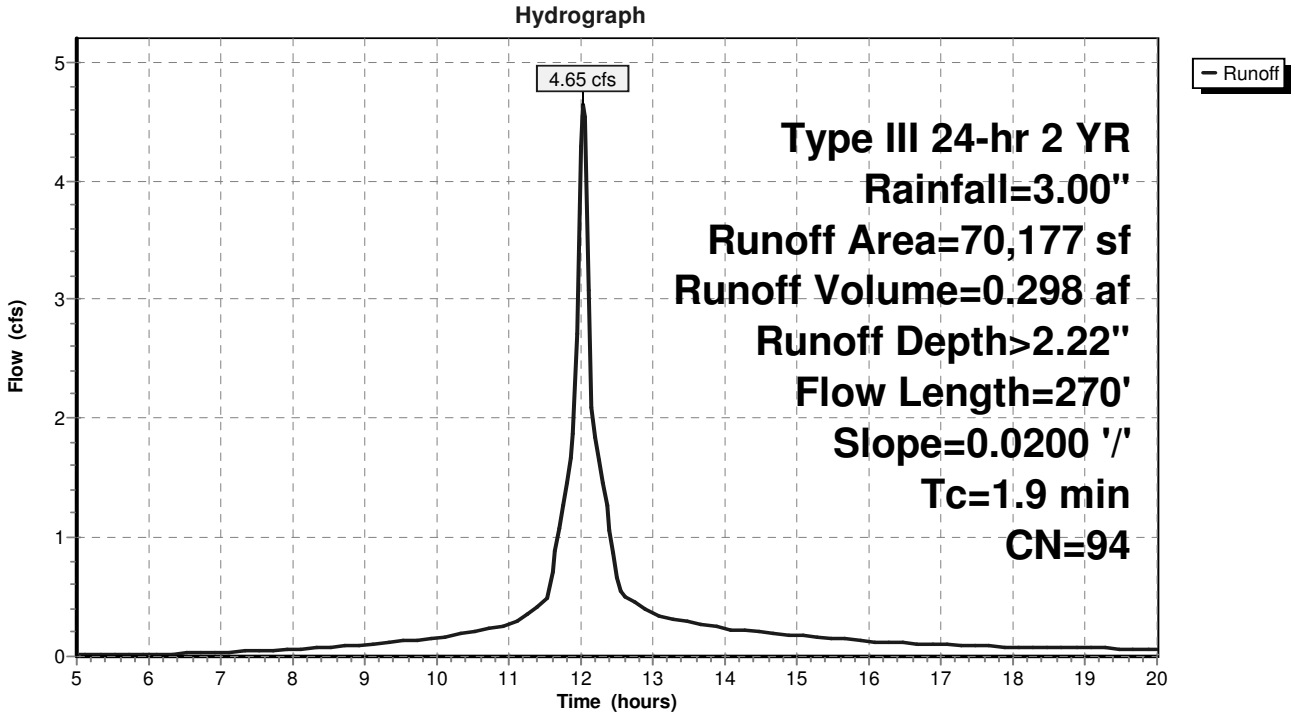
Runoff = 4.65 cfs @ 12.03 hrs, Volume= 0.298 af, Depth> 2.22"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	2,226	70	Woods, Good, HSG C
	1,483	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	2,572	79	50-75% Grass cover, Fair, HSG C
	11,683	84	50-75% Grass cover, Fair, HSG D
*	52,213	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	70,177	94	Weighted Average
	17,964		25.60% Pervious Area
	52,213		74.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0200	1.11		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
1.3	230	0.0200	2.87		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
1.9	270	Total			

Subcatchment 10S: CATCH10



Summary for Subcatchment 11S: CATCH11

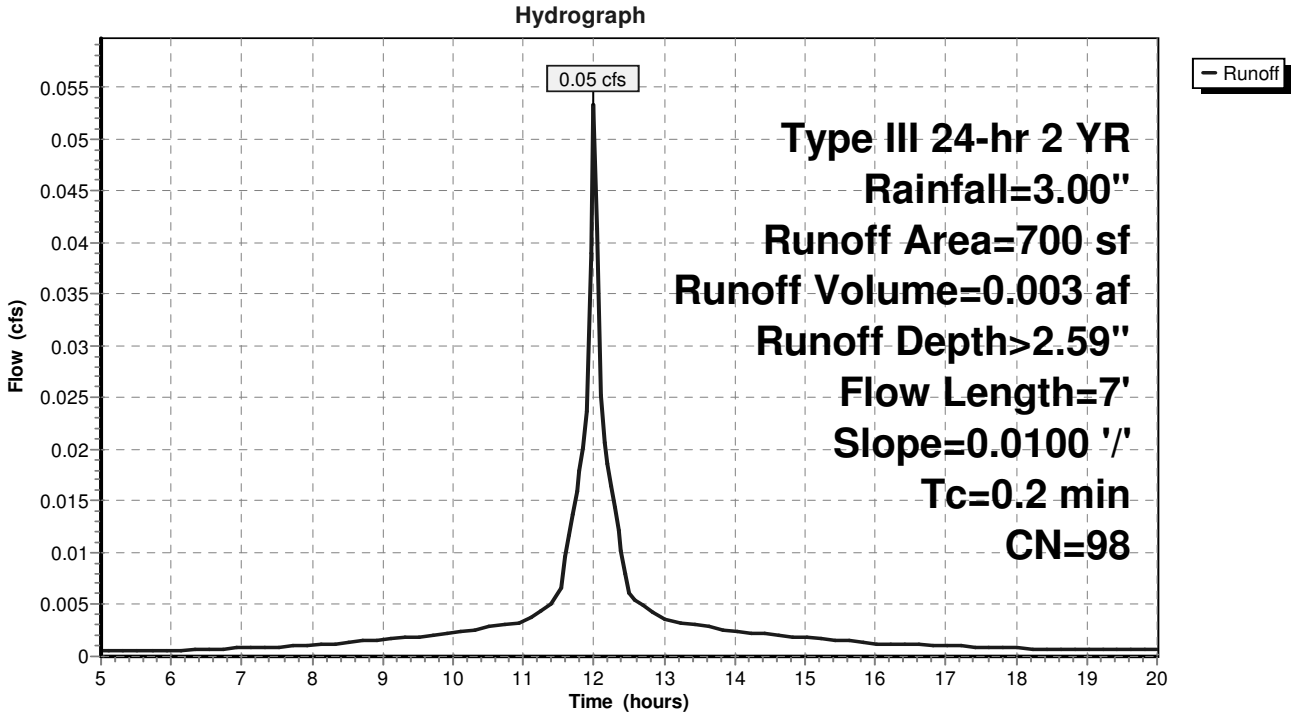
Runoff = 0.05 cfs @ 12.00 hrs, Volume= 0.003 af, Depth> 2.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	700	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	700	98	Weighted Average
	700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	7	0.0100	0.59		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment 11S: CATCH11



Summary for Subcatchment 12S: CATCH12

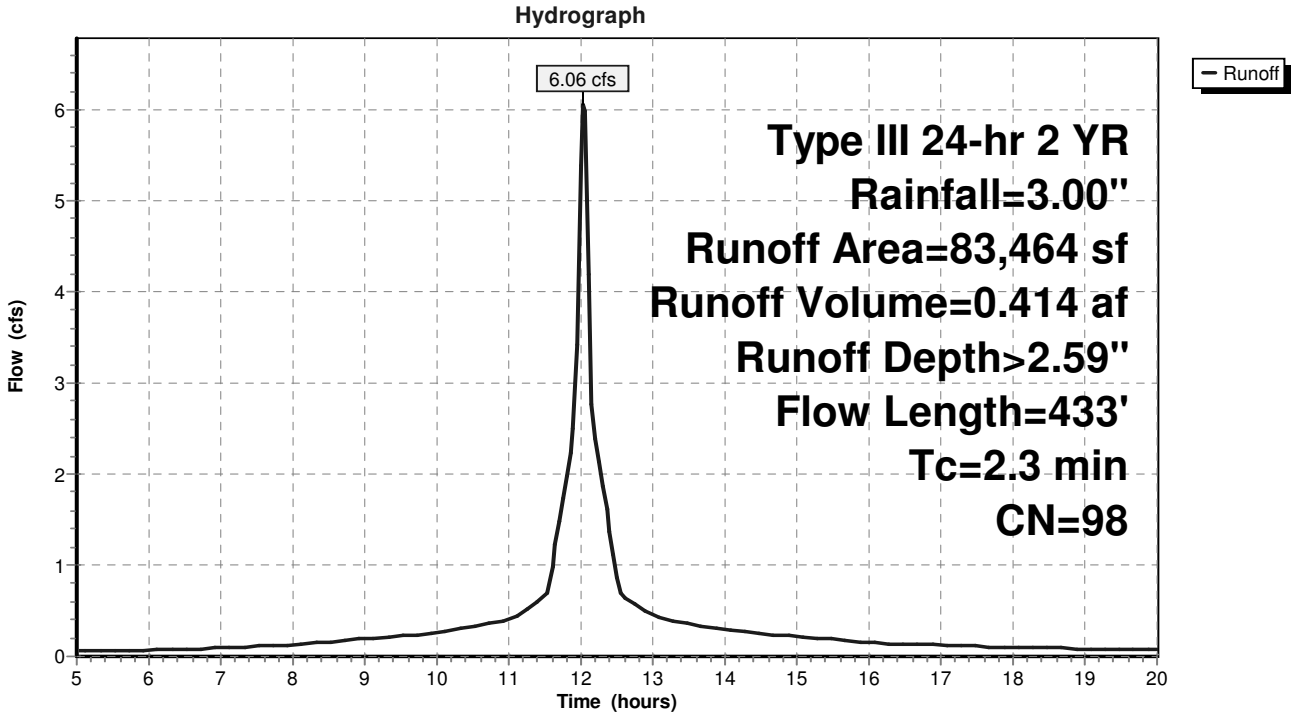
Runoff = 6.06 cfs @ 12.04 hrs, Volume= 0.414 af, Depth> 2.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,158	79	50-75% Grass cover, Fair, HSG C
	305	84	50-75% Grass cover, Fair, HSG D
*	82,001	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	83,464	98	Weighted Average
	1,463		1.75% Pervious Area
	82,001		98.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	62	0.0050	0.70		**Sheet Flow, Rooftop** Smooth surfaces n= 0.011 P2= 3.00"
0.6	238	0.0200	6.36	2.22	**Pipe Channel, internal roof drains** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.2	133	0.0100	10.46	100.61	**Pipe Channel,** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.013 Corrugated PE, smooth interior
2.3	433	Total			

Subcatchment 12S: CATCH12



Summary for Subcatchment 13S: CATCH13

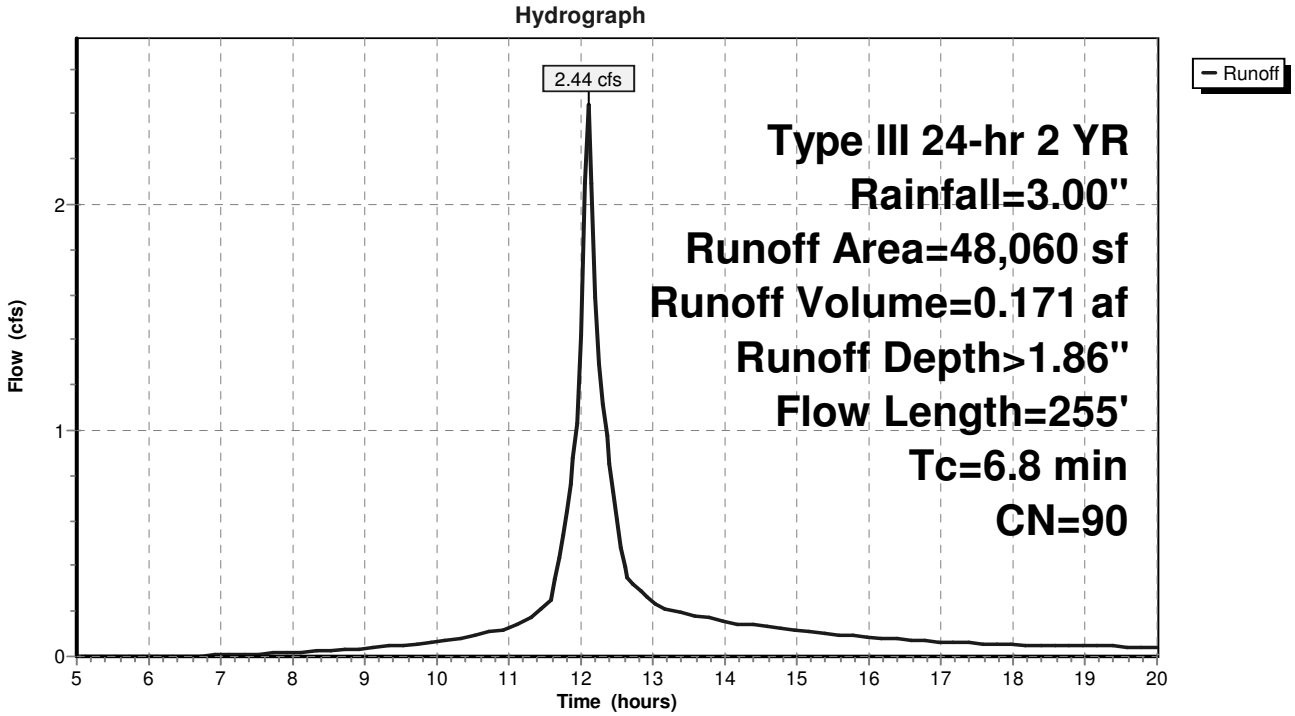
Runoff = 2.44 cfs @ 12.10 hrs, Volume= 0.171 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	9,556	79	50-75% Grass cover, Fair, HSG C
	13,854	84	50-75% Grass cover, Fair, HSG D
*	24,650	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	48,060	90	Weighted Average
	23,410		48.71% Pervious Area
	24,650		51.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	47	0.0200	0.14		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.00"
0.2	28	0.0200	2.87		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
1.1	168	0.0300	2.60		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
0.0	12	0.2800	24.00	18.85	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
6.8	255	Total			

Subcatchment 13S: CATCH13



Summary for Subcatchment 14S: CATCH14

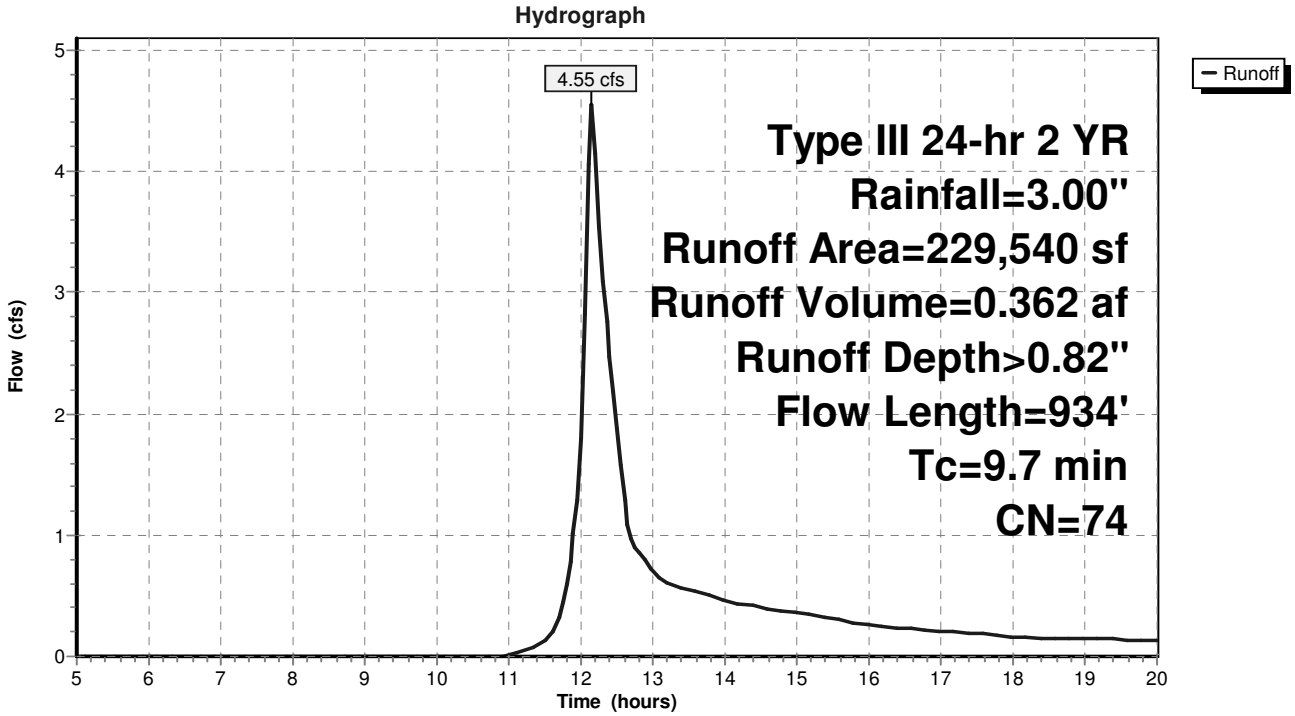
Runoff = 4.55 cfs @ 12.15 hrs, Volume= 0.362 af, Depth> 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	177,302	70	Woods, Good, HSG C
	29,548	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	22,690	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	229,540	74	Weighted Average
	206,850		90.12% Pervious Area
	22,690		9.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	31	0.0480	0.18		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.00"
5.9	704	0.0178	2.00		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
0.0	21	0.0700	15.73	27.79	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
1.0	178	0.0400	3.00		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
9.7	934	Total			

Subcatchment 14S: CATCH14



Summary for Subcatchment 15S: CATCH15

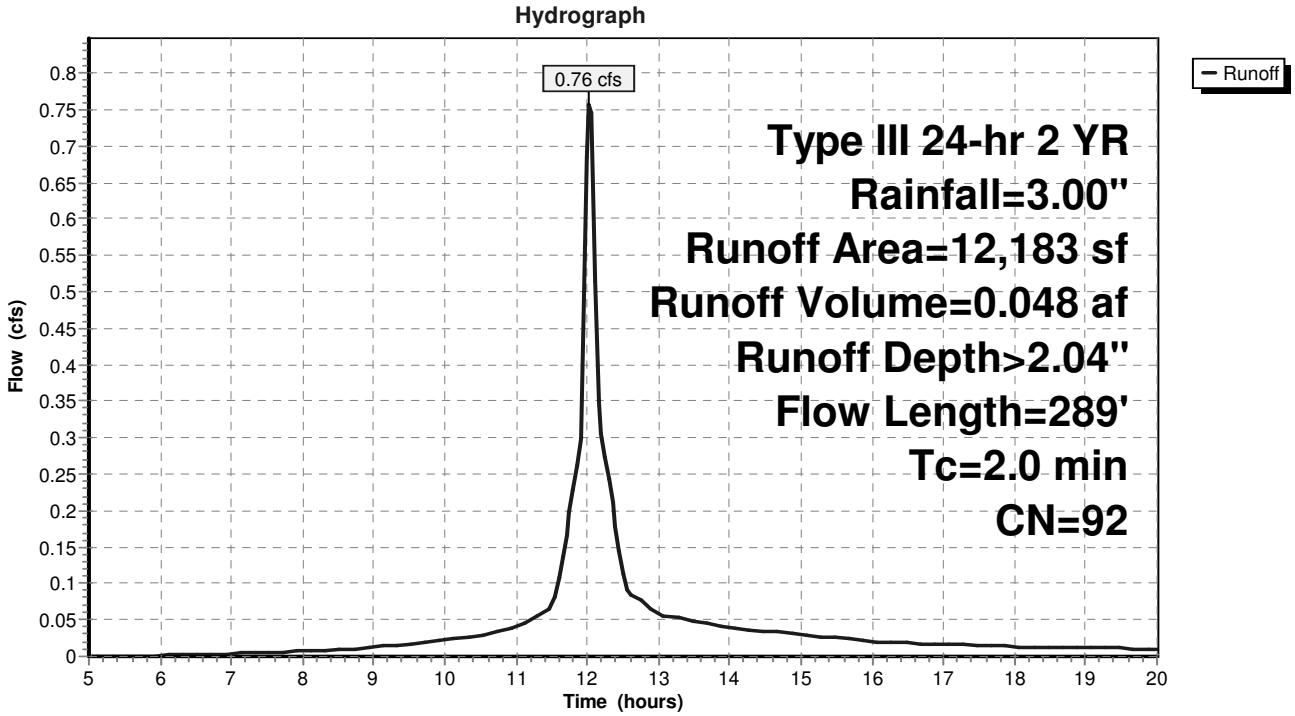
Runoff = 0.76 cfs @ 12.04 hrs, Volume= 0.048 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	65	70	Woods, Good, HSG C
	34	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	3,199	79	50-75% Grass cover, Fair, HSG C
	289	84	50-75% Grass cover, Fair, HSG D
*	8,596	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	12,183	92	Weighted Average
	3,587		29.44% Pervious Area
	8,596		70.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.33		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.00"
0.6	137	0.0400	4.06		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
0.1	52	0.0500	10.14	7.97	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
2.0	289	Total			

Subcatchment 15S: CATCH15



Summary for Subcatchment 16S: CATCH16

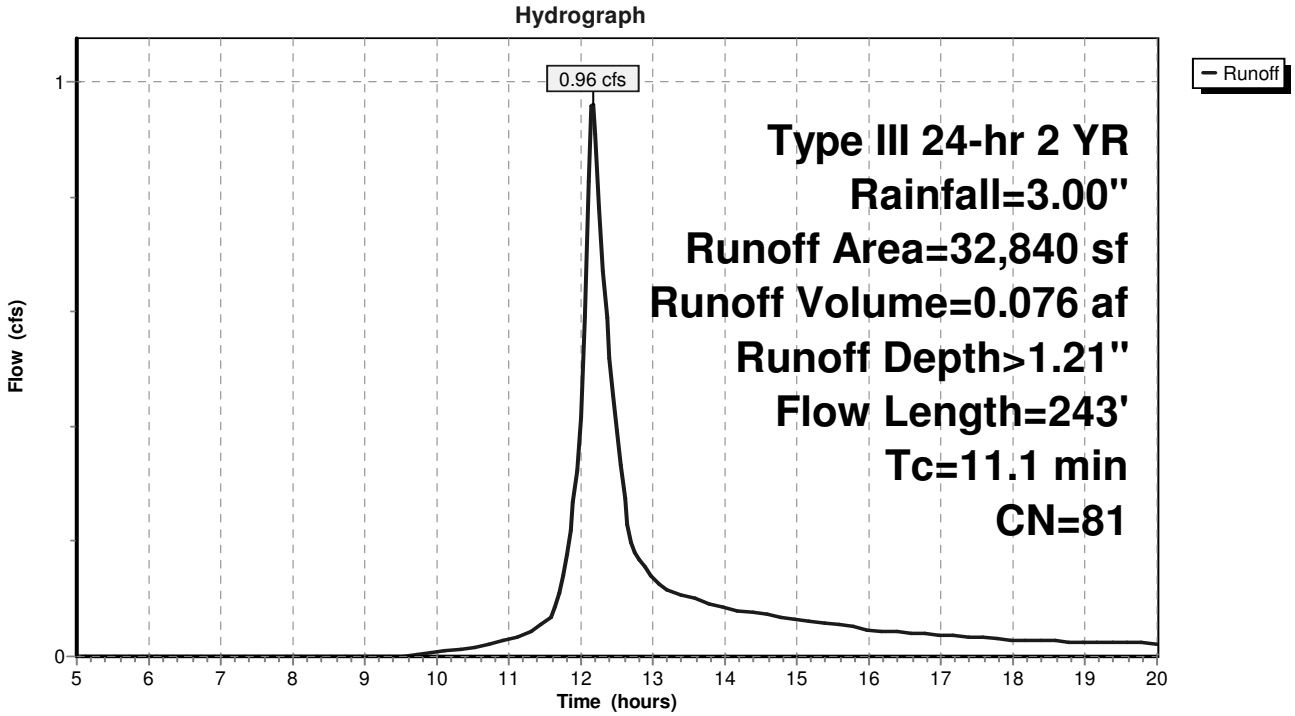
Runoff = 0.96 cfs @ 12.16 hrs, Volume= 0.076 af, Depth> 1.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	21,095	79	50-75% Grass cover, Fair, HSG C
	10,542	84	50-75% Grass cover, Fair, HSG D
*	1,203	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	32,840	81	Weighted Average
	31,637		96.34% Pervious Area
	1,203		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0200	0.16		**Sheet Flow, Sheet**
					Grass: Short n= 0.150 P2= 3.00"
1.0	127	0.0200	2.12		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
0.0	16	0.3300	8.62		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
11.1	243	Total			

Subcatchment 16S: CATCH16



Summary for Subcatchment 17S: CATCH17

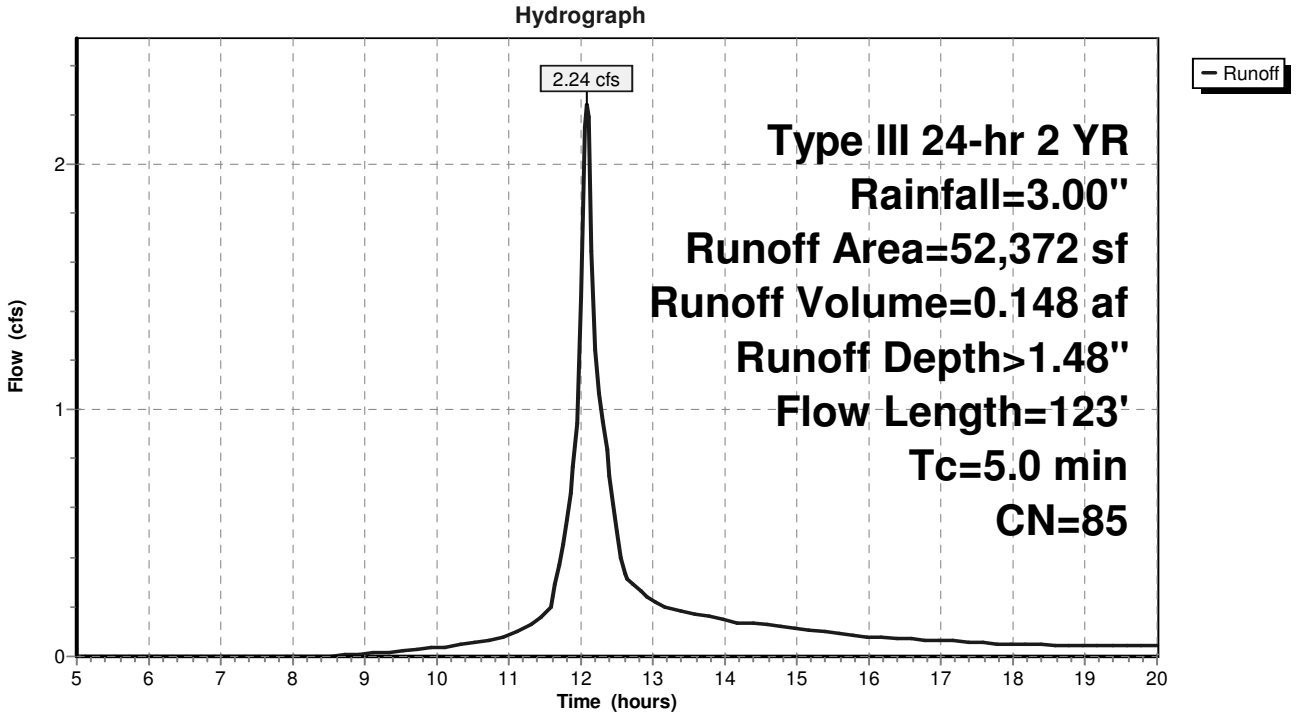
Runoff = 2.24 cfs @ 12.08 hrs, Volume= 0.148 af, Depth> 1.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	1,801	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	33,394	79	50-75% Grass cover, Fair, HSG C
	278	84	50-75% Grass cover, Fair, HSG D
*	2,699	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	14,200	98	Water Surface, HSG C
	52,372	85	Weighted Average
	35,473		67.73% Pervious Area
	16,899		32.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	55	0.0380	0.19		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.00"
0.1	68	0.2050	9.19		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
5.0	123	Total			

Subcatchment 17S: CATCH17



Summary for Subcatchment 18S: CATCH18

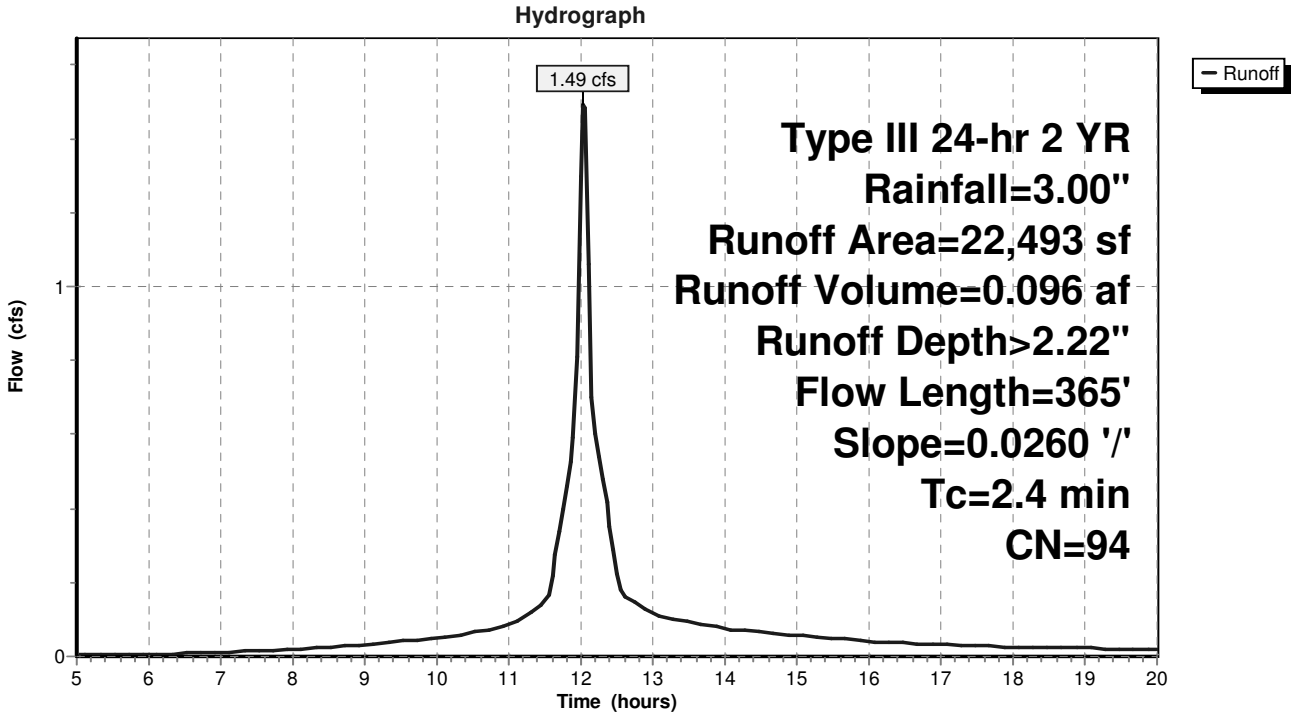
Runoff = 1.49 cfs @ 12.04 hrs, Volume= 0.096 af, Depth> 2.22"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	147	70	Woods, Good, HSG C
	2	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	4,636	79	50-75% Grass cover, Fair, HSG C
	230	84	50-75% Grass cover, Fair, HSG D
*	17,478	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	22,493	94	Weighted Average
	5,015		22.30% Pervious Area
	17,478		77.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	75	0.0260	1.40		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
1.5	290	0.0260	3.27		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
2.4	365	Total			

Subcatchment 18S: CATCH18



Summary for Subcatchment 19S: CATCH19

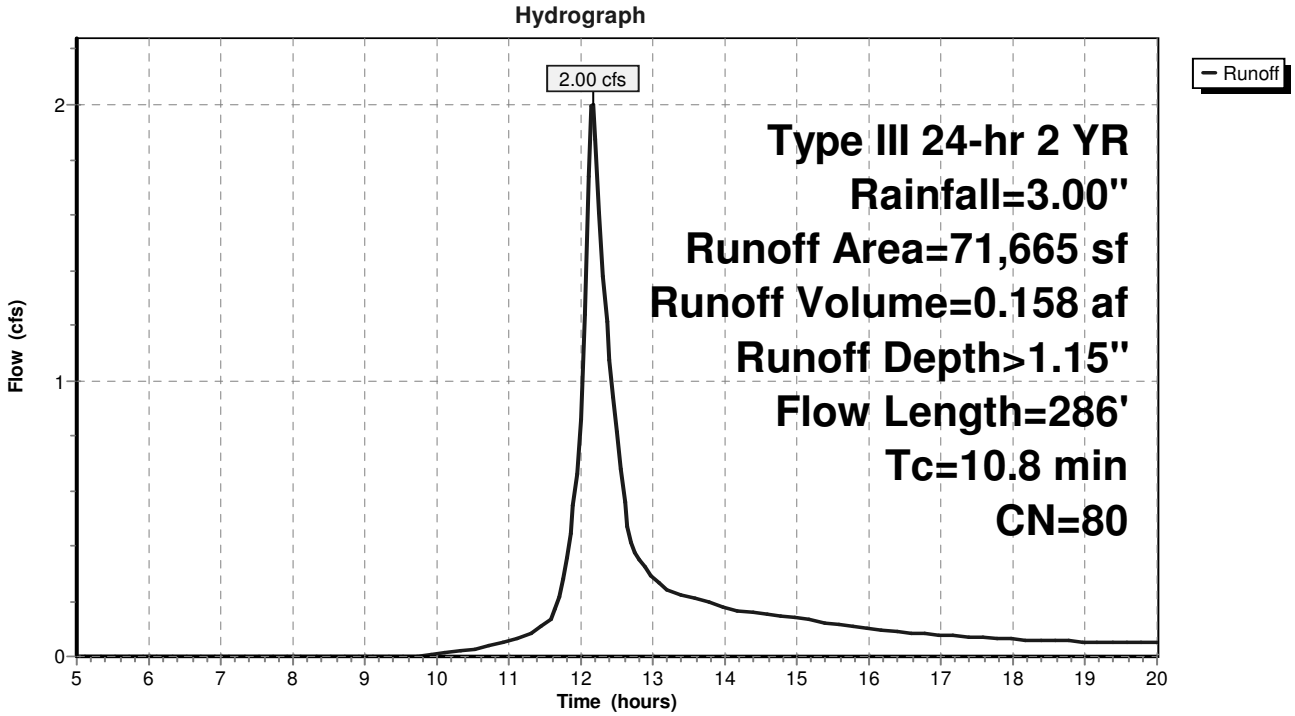
Runoff = 2.00 cfs @ 12.16 hrs, Volume= 0.158 af, Depth> 1.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	34,282	70	Woods, Good, HSG C
	11,225	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	3,570	79	50-75% Grass cover, Fair, HSG C
	1,520	84	50-75% Grass cover, Fair, HSG D
*	21,068	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	71,665	80	Weighted Average
	50,597		70.60% Pervious Area
	21,068		29.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	75	0.0130	0.13		**Sheet Flow, Sheet**
					Grass: Short n= 0.150 P2= 3.00"
1.1	165	0.0270	2.46		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
0.1	46	0.2300	7.19		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
10.8	286	Total			

Subcatchment 19S: CATCH19



Summary for Subcatchment 20S: CATCH20

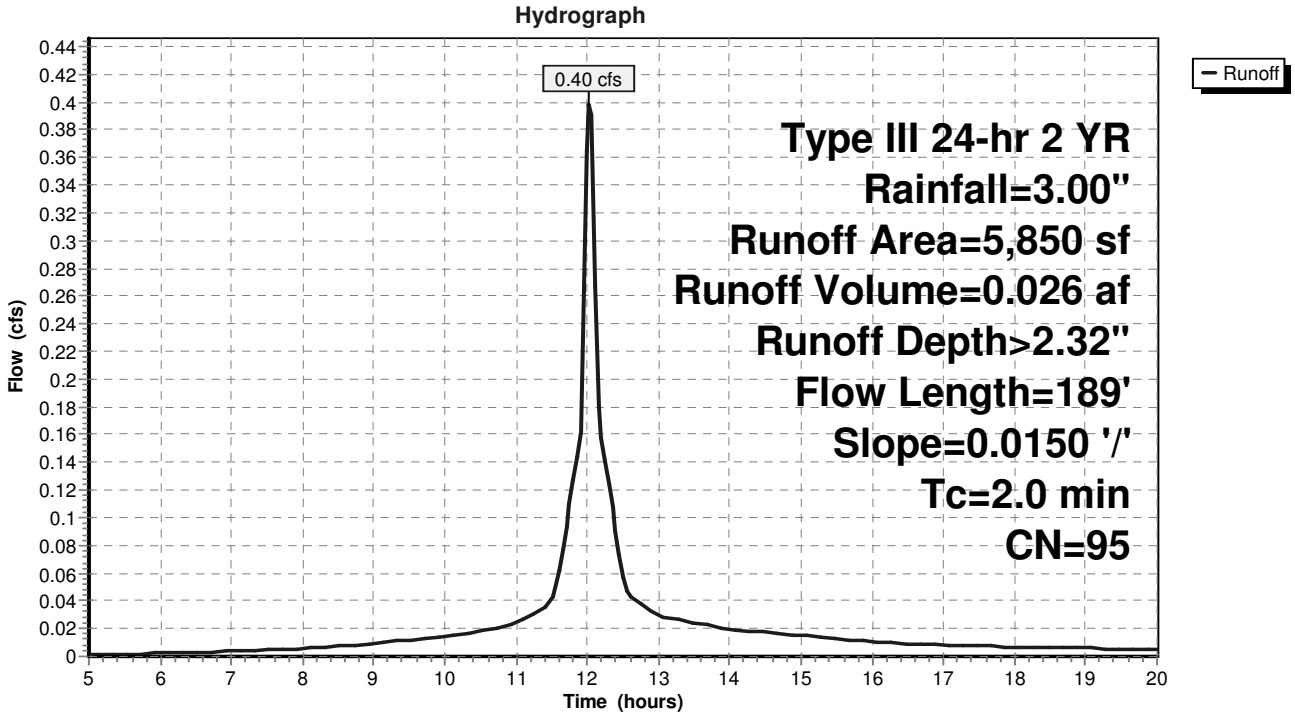
Runoff = 0.40 cfs @ 12.03 hrs, Volume= 0.026 af, Depth> 2.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	657	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	5,193	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	5,850	95	Weighted Average
	657		11.23% Pervious Area
	5,193		88.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0150	1.19		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.6	89	0.0150	2.49		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
2.0	189	Total			

Subcatchment 20S: CATCH20



Summary for Subcatchment 21S: CATCH21

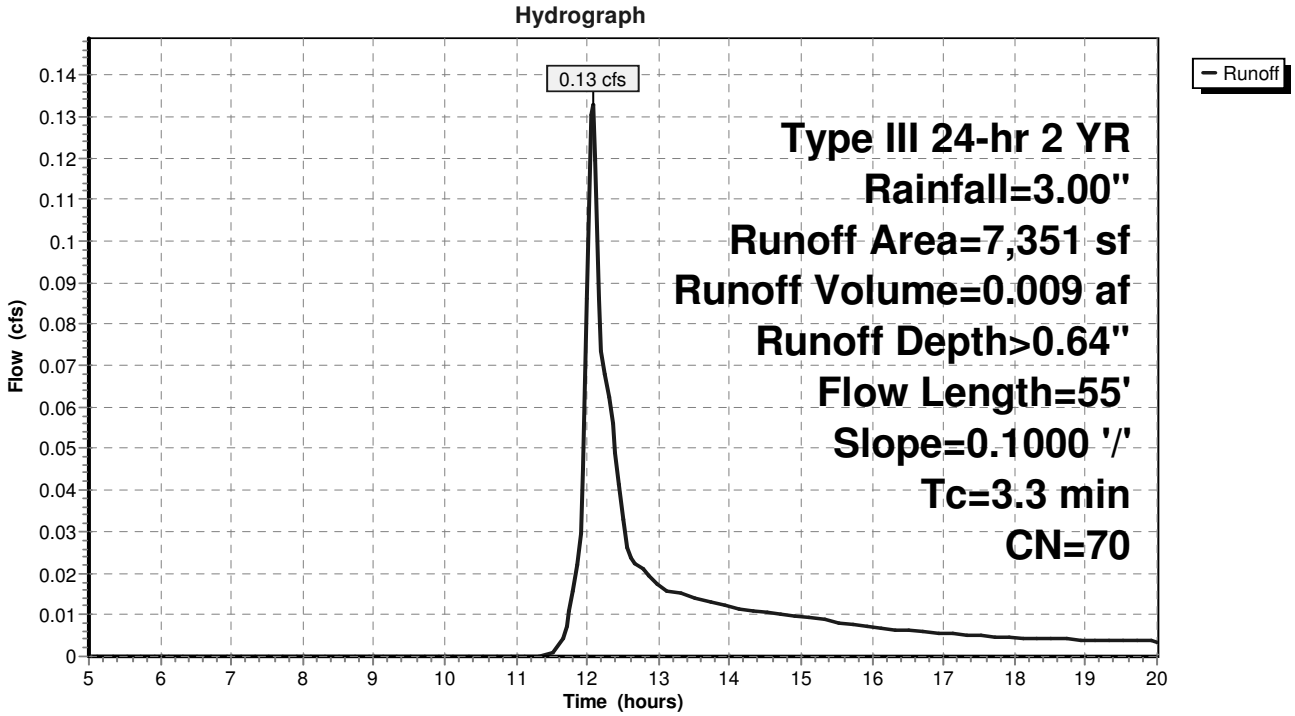
Runoff = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af, Depth> 0.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	7,292	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	59	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	7,351	70	Weighted Average
	7,292		99.20% Pervious Area
	59		0.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	55	0.1000	0.28		**Sheet Flow, Sheet**
					Grass: Short n= 0.150 P2= 3.00"

Subcatchment 21S: CATCH21



Summary for Subcatchment 22S: CATCH22

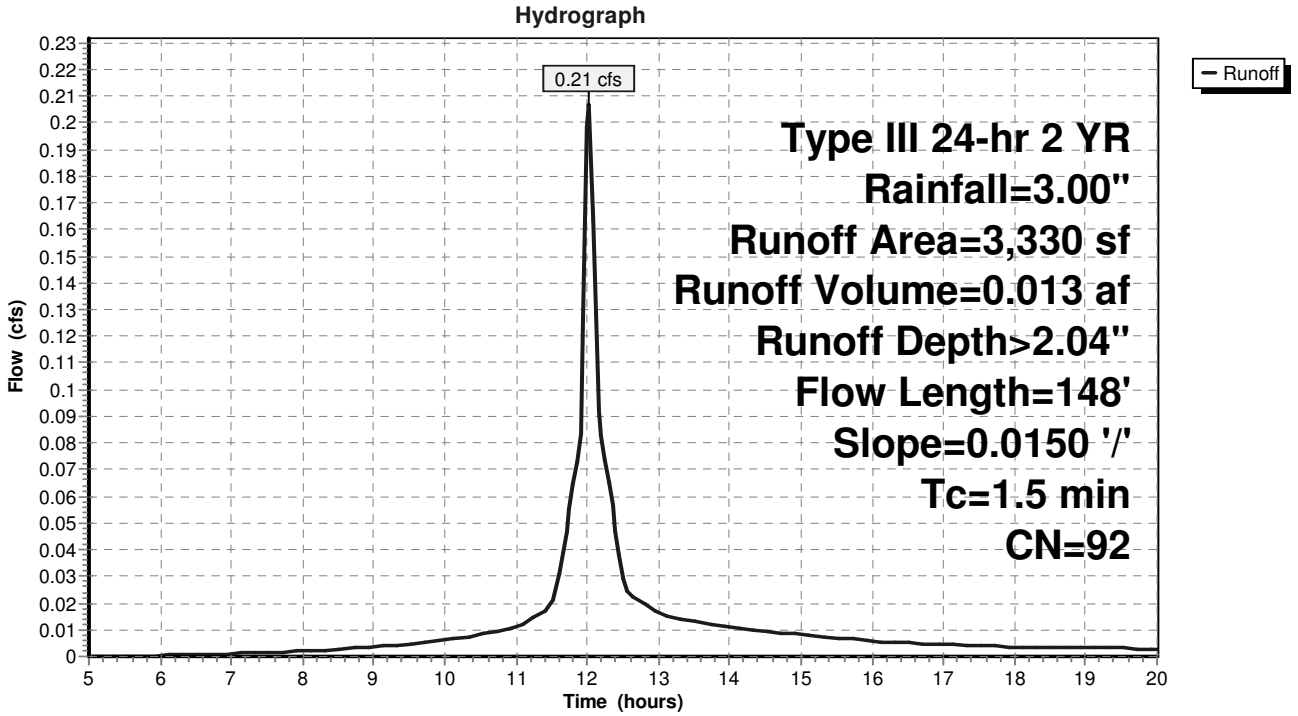
Runoff = 0.21 cfs @ 12.02 hrs, Volume= 0.013 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	708	70	Woods, Good, HSG C
	49	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	2,573	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	3,330	92	Weighted Average
	757		22.73% Pervious Area
	2,573		77.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.03		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.7	98	0.0150	2.49		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
1.5	148	Total			

Subcatchment 22S: CATCH22



Summary for Subcatchment 23S: CATCH23

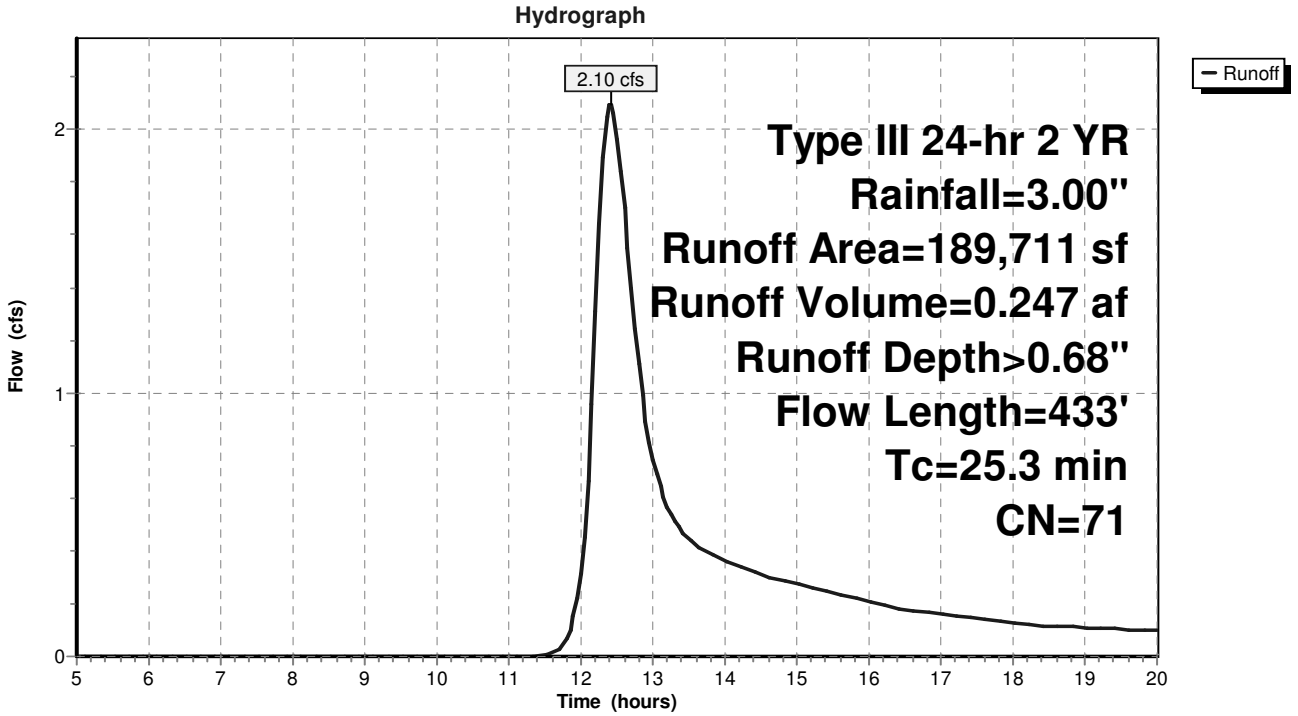
Runoff = 2.10 cfs @ 12.40 hrs, Volume= 0.247 af, Depth> 0.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	4,918	55	Woods, Good, HSG B
	163,256	70	Woods, Good, HSG C
	7,346	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	4,901	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	9,290	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	189,711	71	Weighted Average
	180,421		95.10% Pervious Area
	9,290		4.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0250	0.08		**Sheet Flow, Sheet**
					Woods: Light underbrush n= 0.400 P2= 3.00"
5.0	333	0.0500	1.12		**Shallow Concentrated Flow, SCF**
					Woodland Kv= 5.0 fps
25.3	433	Total			

Subcatchment 23S: CATCH23



Summary for Subcatchment 24S: CATCH24

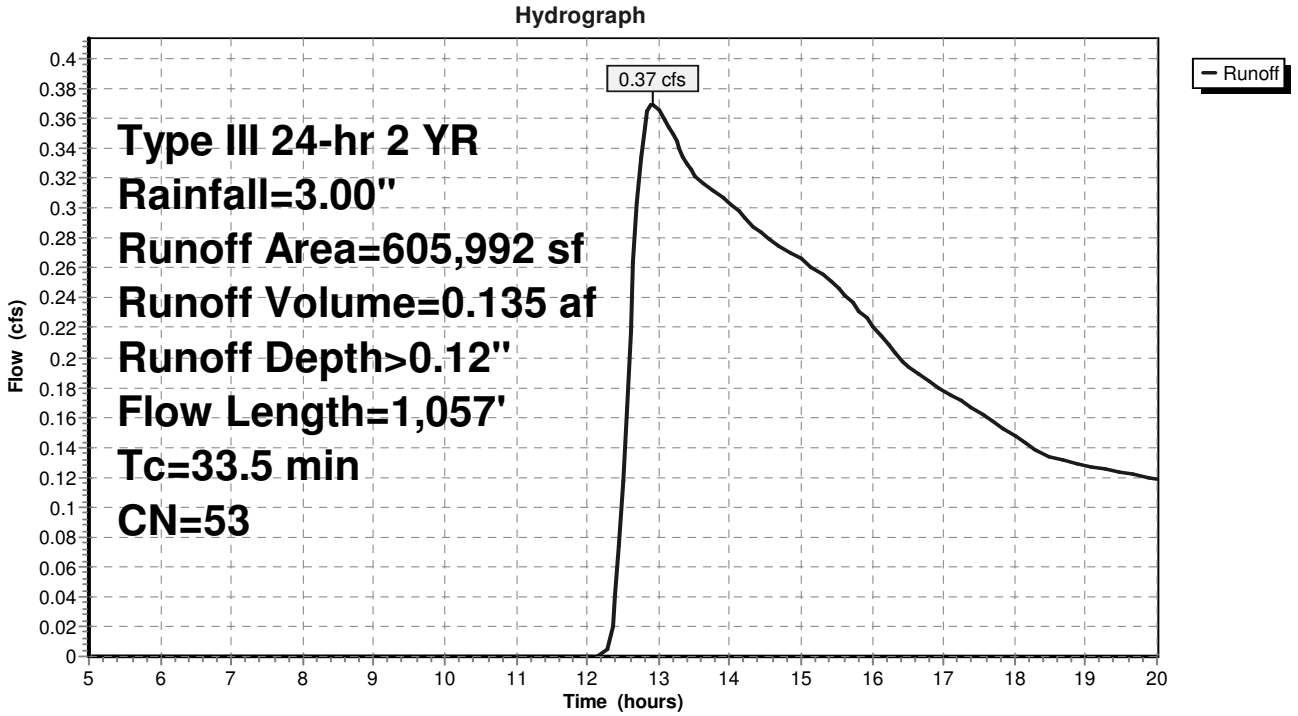
Runoff = 0.37 cfs @ 12.92 hrs, Volume= 0.135 af, Depth> 0.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	199,327	30	Woods, Good, HSG A
	172,097	55	Woods, Good, HSG B
	213,901	70	Woods, Good, HSG C
	11,916	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	4,137	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	4,614	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	605,992	53	Weighted Average
	601,378		99.24% Pervious Area
	4,614		0.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.4	100	0.0100	0.09		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 3.00"
2.7	275	0.0130	1.71		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
11.4	682	0.0400	1.00		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
33.5	1,057	Total			

Subcatchment 24S: CATCH24



Summary for Subcatchment 25S: CATCH25

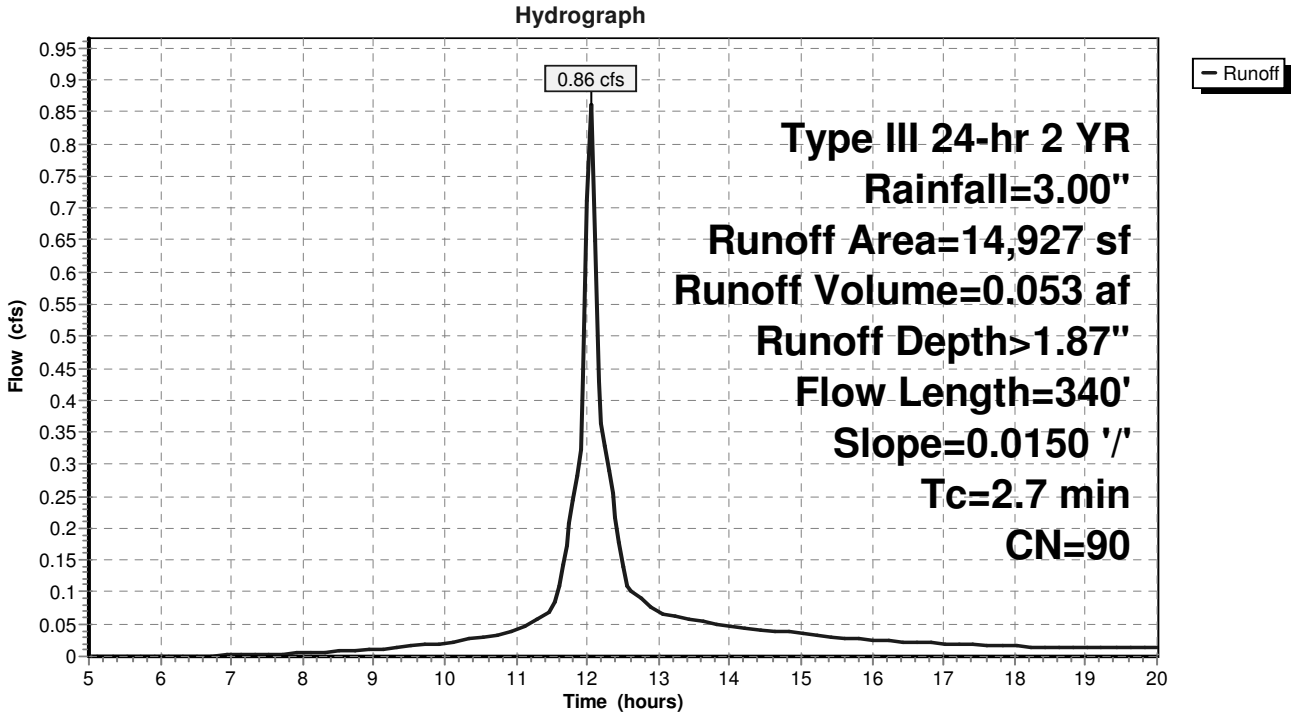
Runoff = 0.86 cfs @ 12.05 hrs, Volume= 0.053 af, Depth> 1.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	6,371	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	8,556	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	14,927	90	Weighted Average
	6,371		42.68% Pervious Area
	8,556		57.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	45	0.0150	1.01		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
2.0	295	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.7	340	Total			

Subcatchment 25S: CATCH25



Summary for Subcatchment 26S: CATCH26

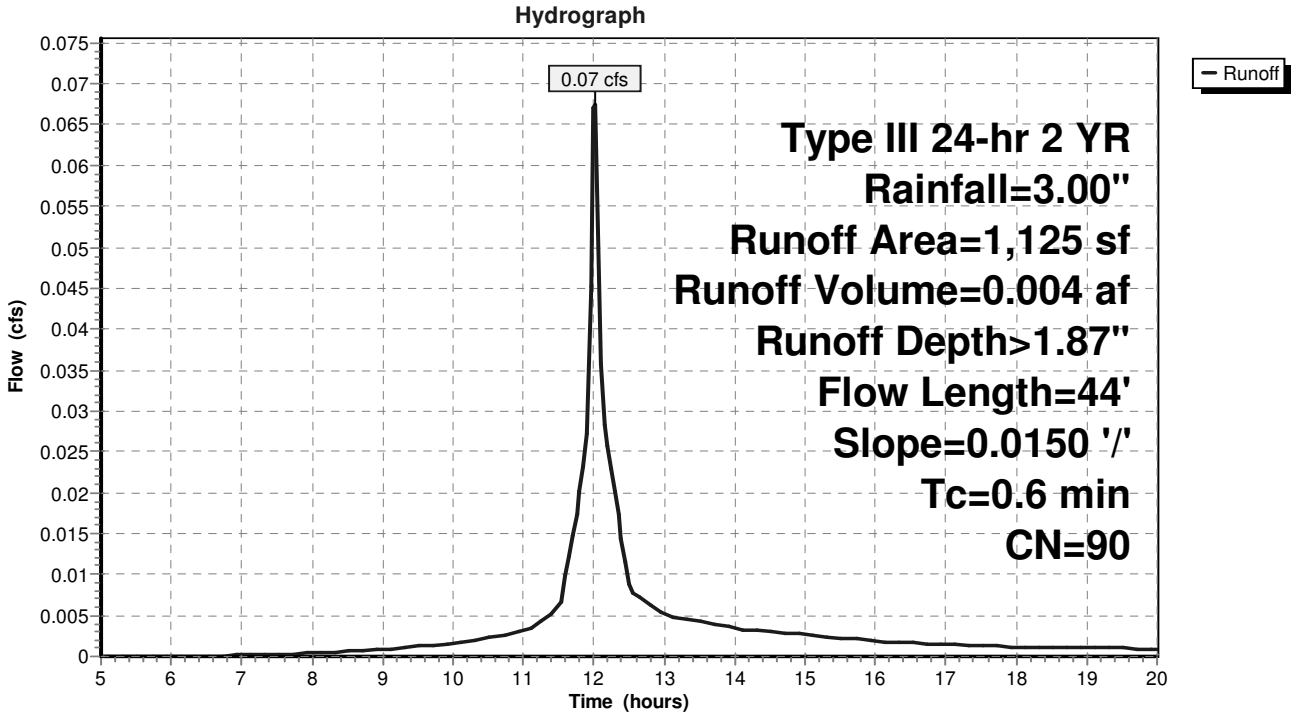
Runoff = 0.07 cfs @ 12.01 hrs, Volume= 0.004 af, Depth> 1.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	463	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	662	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	1,125	90	Weighted Average
	463		41.16% Pervious Area
	662		58.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	21	0.0150	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.2	23	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	44	Total			

Subcatchment 26S: CATCH26



Summary for Subcatchment 27S: CATCH27

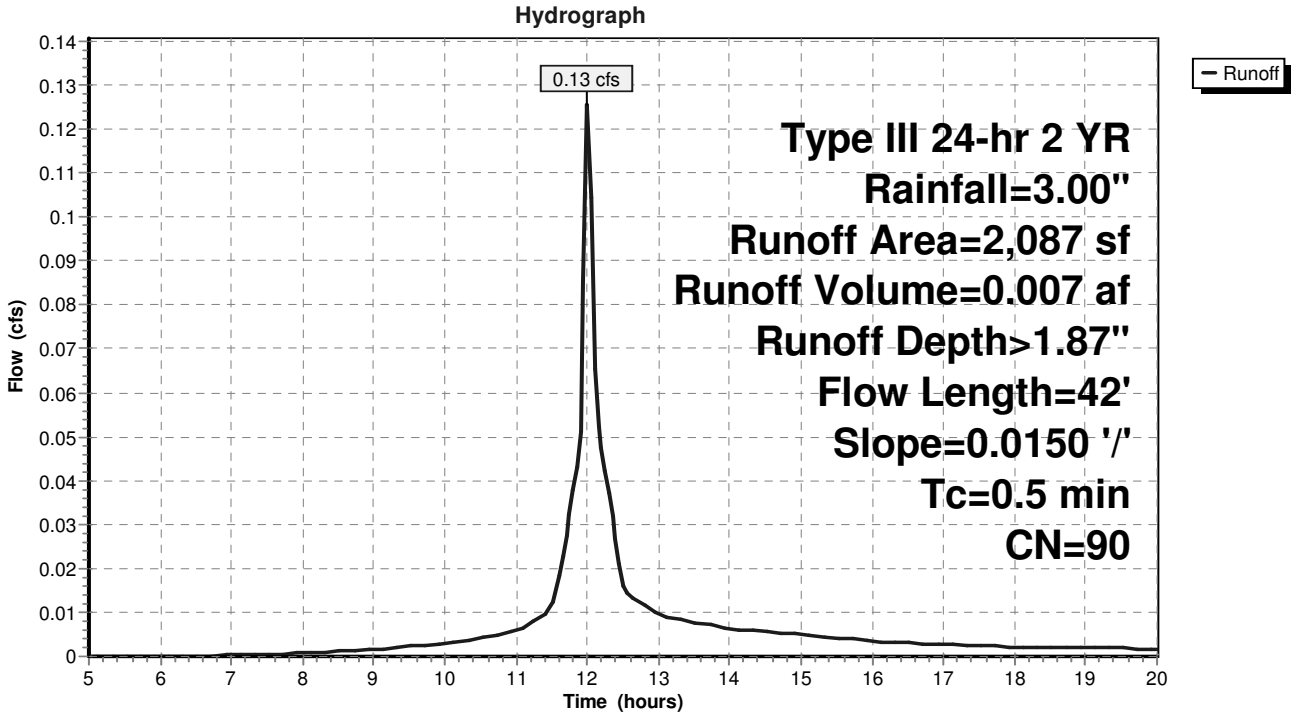
Runoff = 0.13 cfs @ 12.01 hrs, Volume= 0.007 af, Depth> 1.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	854	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	1,233	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	2,087	90	Weighted Average
	854		40.92% Pervious Area
	1,233		59.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	22	0.0150	0.88		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.1	20	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.5	42	Total			

Subcatchment 27S: CATCH27



Summary for Subcatchment 28S: CATCH28

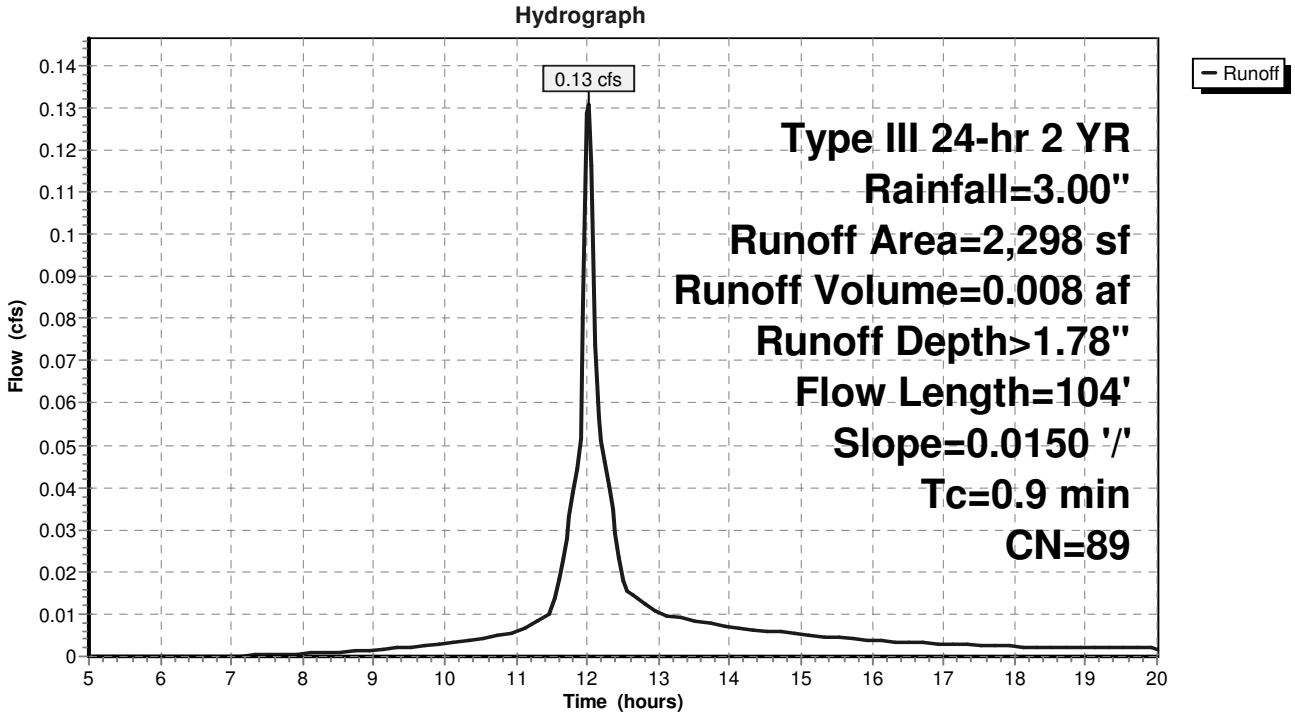
Runoff = 0.13 cfs @ 12.01 hrs, Volume= 0.008 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.00"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,145	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	1,153	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	2,298	89	Weighted Average
	1,145		49.83% Pervious Area
	1,153		50.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	22	0.0150	0.88		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.5	82	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	104	Total			

Subcatchment 28S: CATCH28

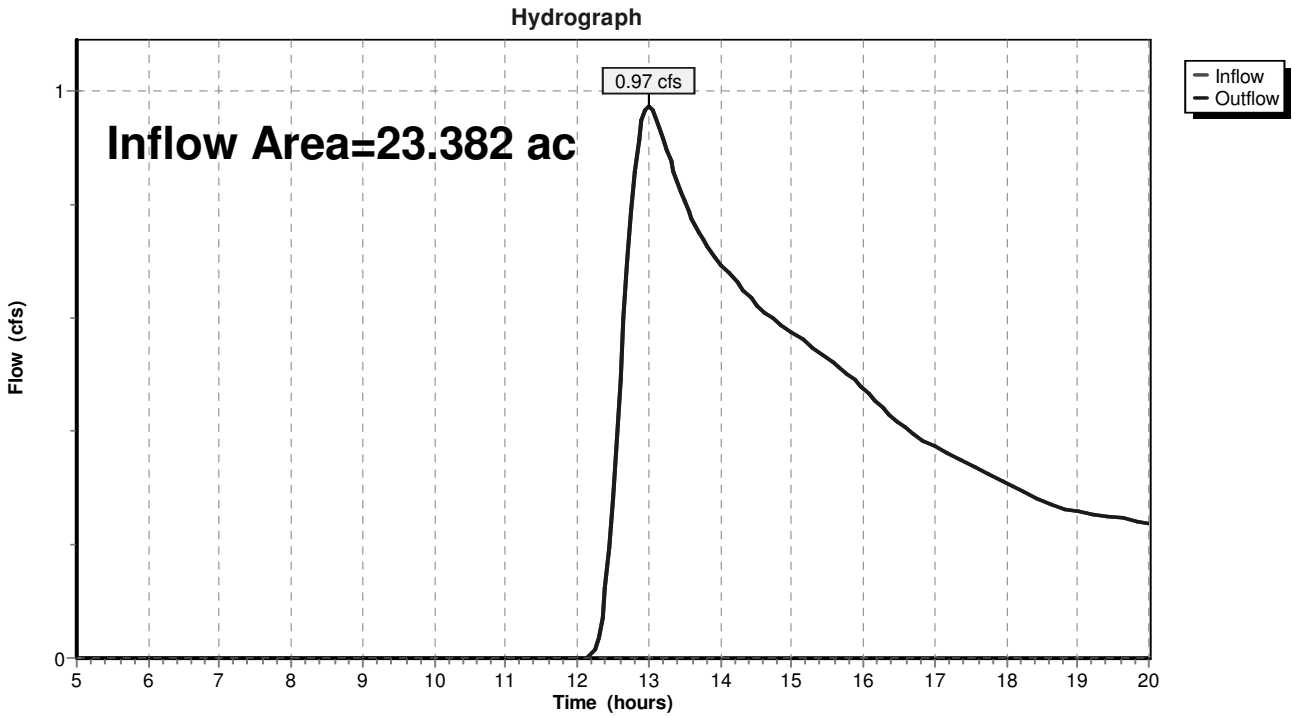


Summary for Reach 1SP: STUDY POINT #1

Inflow Area = 23.382 ac, 9.29% Impervious, Inflow Depth > 0.16" for 2 YR event
Inflow = 0.97 cfs @ 13.00 hrs, Volume= 0.303 af
Outflow = 0.97 cfs @ 13.00 hrs, Volume= 0.303 af, Atten= 0%, Lag= 0.0 min

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

Reach 1SP: STUDY POINT #1

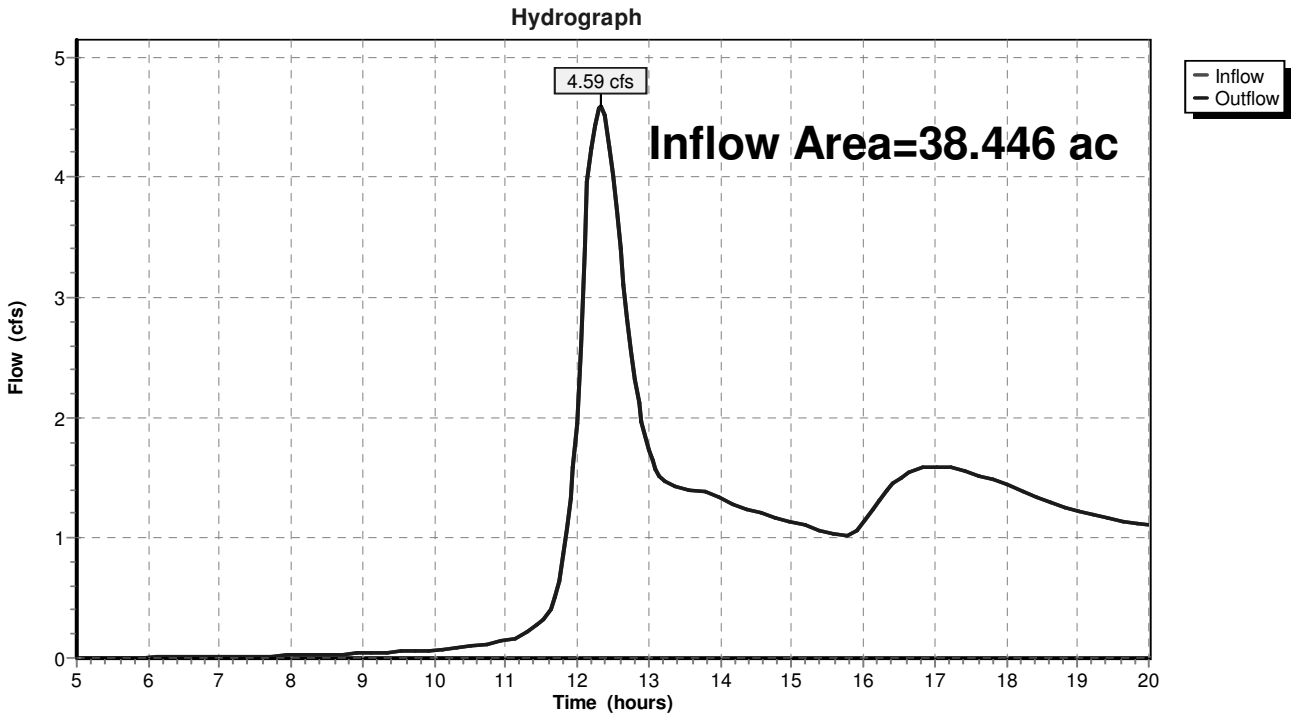


Summary for Reach 2SP: STUDY POINT #2

Inflow Area = 38.446 ac, 26.66% Impervious, Inflow Depth > 0.34" for 2 YR event
Inflow = 4.59 cfs @ 12.32 hrs, Volume= 1.096 af
Outflow = 4.59 cfs @ 12.32 hrs, Volume= 1.096 af, Atten= 0%, Lag= 0.0 min

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

Reach 2SP: STUDY POINT #2



Summary for Reach 3C: New Culvert #3

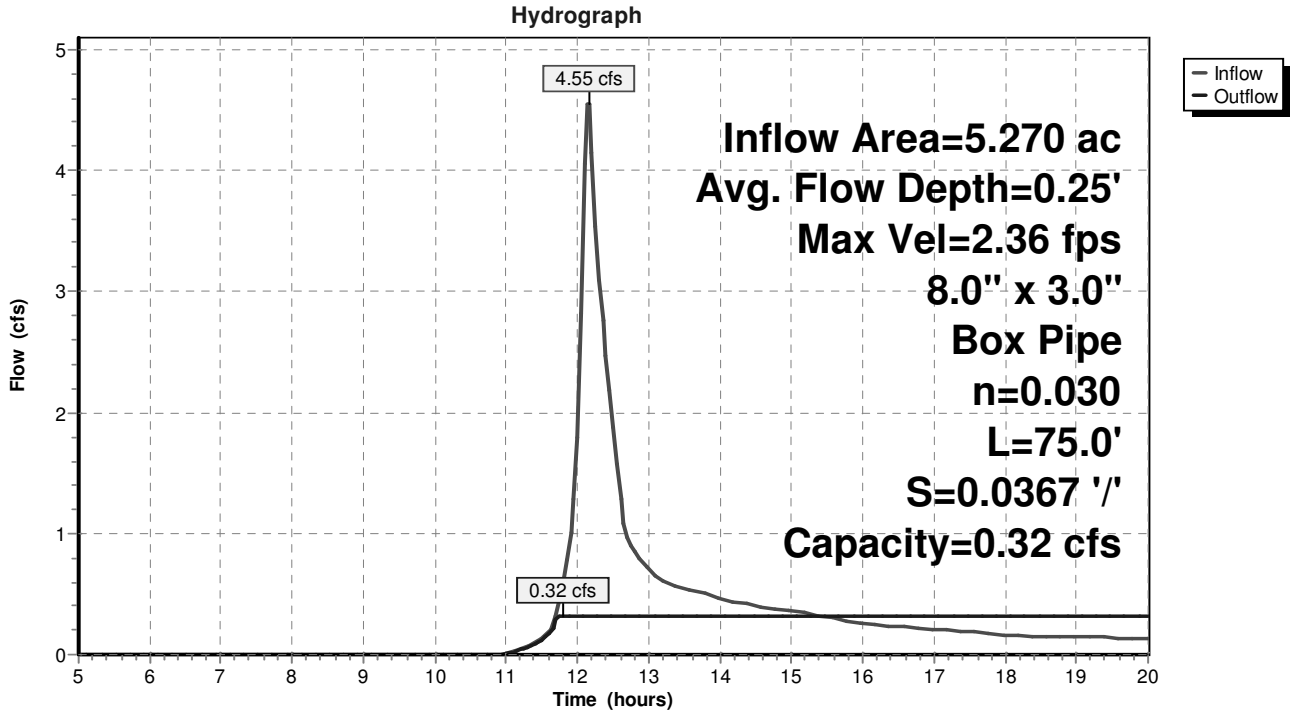
Inflow Area = 5.270 ac, 9.88% Impervious, Inflow Depth > 0.82" for 2 YR event
Inflow = 4.55 cfs @ 12.15 hrs, Volume= 0.362 af
Outflow = 0.32 cfs @ 11.80 hrs, Volume= 0.225 af, Atten= 93%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.36 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.86 fps, Avg. Travel Time= 0.7 min

Peak Storage= 13 cf @ 11.75 hrs
Average Depth at Peak Storage= 0.25'
Defined Flood Depth= 233.50', Capacity at Flood Depth= -9,929.77 cfs
Bank-Full Depth= 0.25', Capacity at Bank-Full= 0.32 cfs

8.0" W x 3.0" H Box Pipe
n= 0.030 Stream, clean & straight
Length= 75.0' Slope= 0.0367 '/'
Inlet Invert= 224.75', Outlet Invert= 222.00'

Reach 3C: New Culvert #3



Summary for Reach 4C: Ex. Culvert

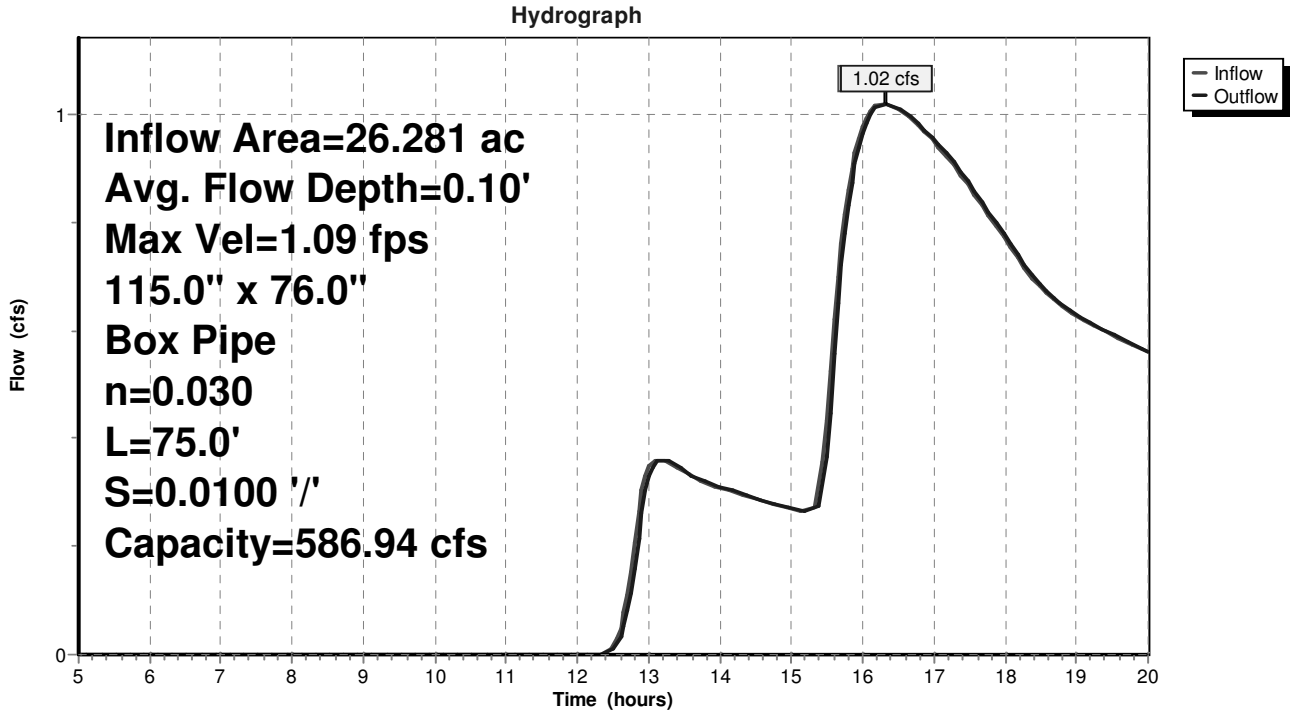
Inflow Area = 26.281 ac, 32.15% Impervious, Inflow Depth > 0.17" for 2 YR event
Inflow = 1.02 cfs @ 16.29 hrs, Volume= 0.363 af
Outflow = 1.02 cfs @ 16.33 hrs, Volume= 0.361 af, Atten= 0%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.09 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 1.4 min

Peak Storage= 70 cf @ 16.31 hrs
Average Depth at Peak Storage= 0.10'
Defined Flood Depth= 224.50', Capacity at Flood Depth= 26,590.01 cfs
Bank-Full Depth= 6.33', Capacity at Bank-Full= 586.94 cfs

115.0" W x 76.0" H Box Pipe
n= 0.030 Stream, clean & straight
Length= 75.0' Slope= 0.0100 '/'
Inlet Invert= 212.00', Outlet Invert= 211.25'

Reach 4C: Ex. Culvert



Summary for Reach 4R: CATCH24 Reach

Inflow Area = 26.281 ac, 32.15% Impervious, Inflow Depth > 0.17" for 2 YR event
Inflow = 1.02 cfs @ 16.16 hrs, Volume= 0.372 af
Outflow = 1.02 cfs @ 16.29 hrs, Volume= 0.363 af, Atten= 0%, Lag= 8.1 min

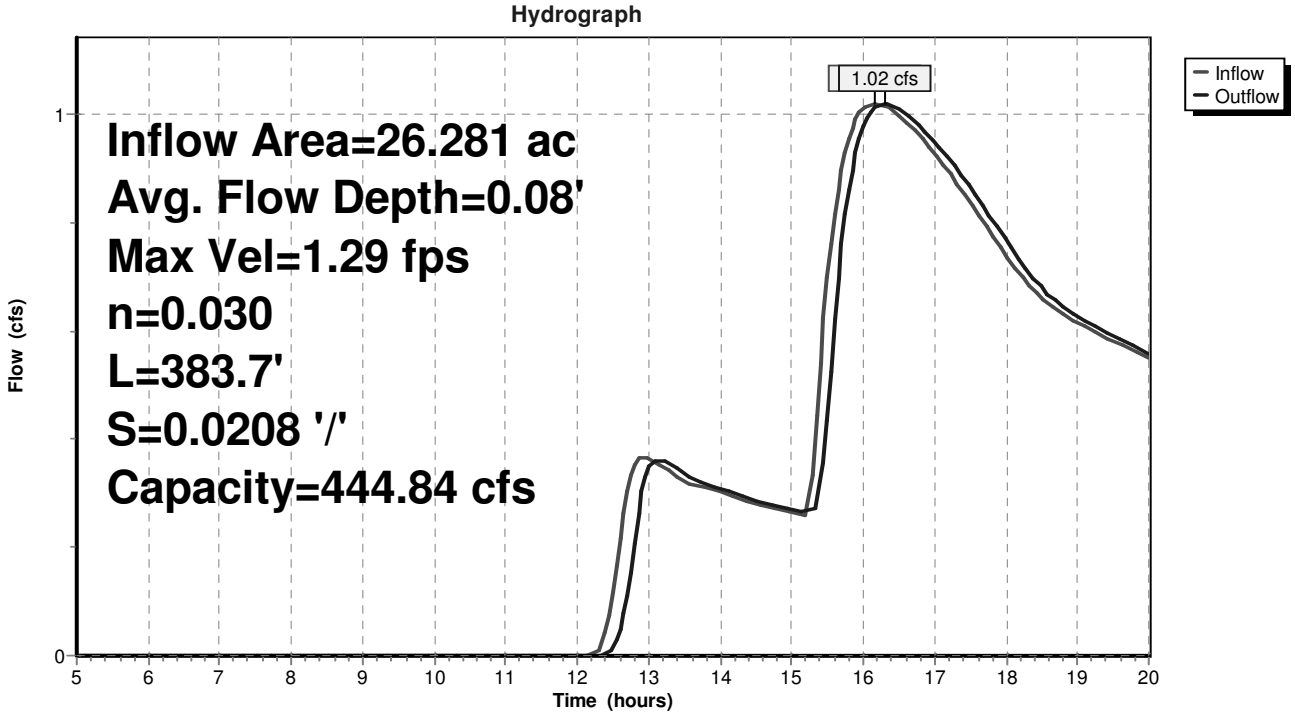
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.29 fps, Min. Travel Time= 5.0 min
Avg. Velocity = 1.01 fps, Avg. Travel Time= 6.3 min

Peak Storage= 305 cf @ 16.21 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 2.50', Capacity at Bank-Full= 444.84 cfs

10.00' x 2.50' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 25.00'
Length= 383.7' Slope= 0.0208 '/'
Inlet Invert= 220.00', Outlet Invert= 212.00'

‡

Reach 4R: CATCH24 Reach



Summary for Reach 5R: CATCH23 Reach

Inflow Area = 26.281 ac, 32.15% Impervious, Inflow Depth > 0.16" for 2 YR event
Inflow = 1.02 cfs @ 16.33 hrs, Volume= 0.361 af
Outflow = 0.98 cfs @ 17.11 hrs, Volume= 0.332 af, Atten= 4%, Lag= 47.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.59 fps, Min. Travel Time= 18.2 min
Avg. Velocity = 0.59 fps, Avg. Travel Time= 18.2 min

Peak Storage= 1,070 cf @ 16.81 hrs
Average Depth at Peak Storage= 0.02'
Bank-Full Depth= 10.00', Capacity at Bank-Full= 12,048.05 cfs

85.00' x 10.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 2.5 '/' Top Width= 135.00'
Length= 646.0' Slope= 0.0031 '/'
Inlet Invert= 212.00', Outlet Invert= 210.00'

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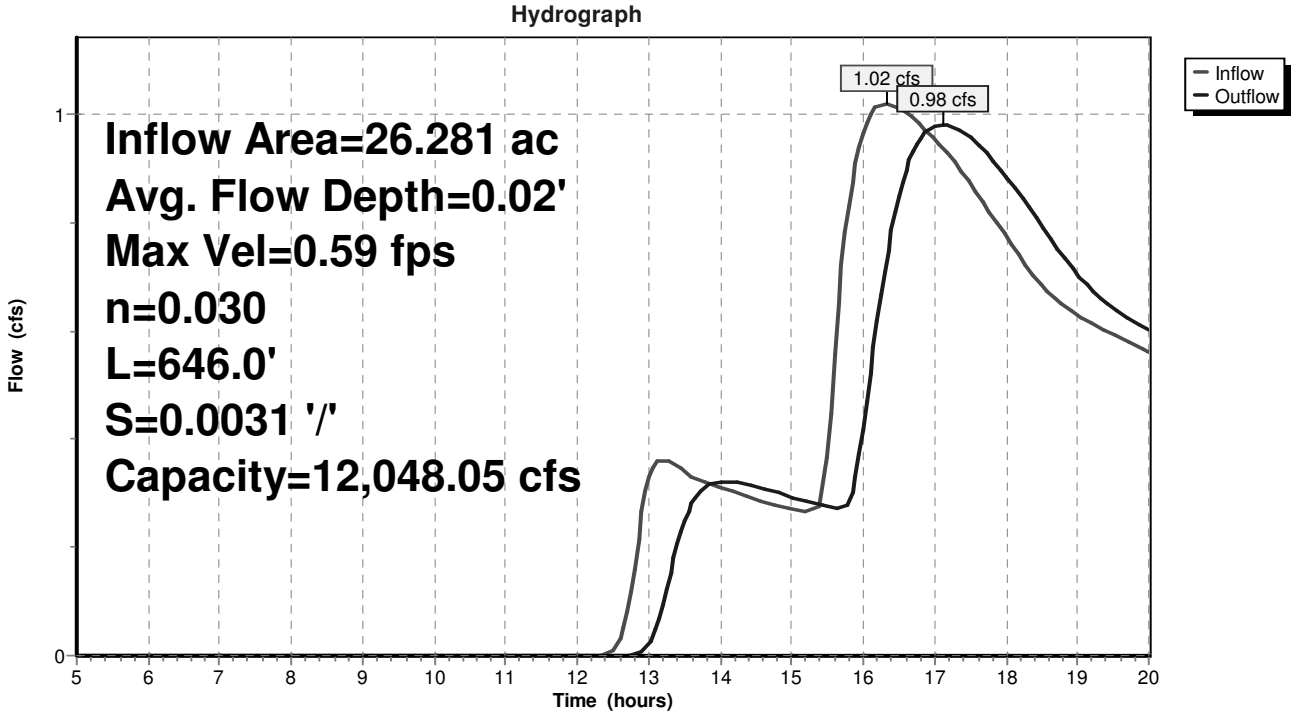
Reach 5R: CATCH23 Reach



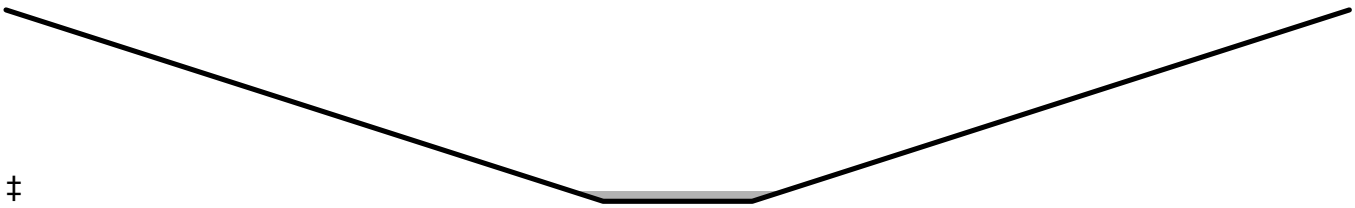
Summary for Reach 6R: CATCH 23 Reach

Inflow Area = 7.811 ac, 20.30% Impervious, Inflow Depth > 0.81" for 2 YR event
Inflow = 3.60 cfs @ 12.07 hrs, Volume= 0.524 af
Outflow = 3.50 cfs @ 12.10 hrs, Volume= 0.523 af, Atten= 3%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.12 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.99 fps, Avg. Travel Time= 1.3 min

Peak Storage= 130 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 2.50', Capacity at Bank-Full= 1,385.41 cfs

10.00' x 2.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 16.0 '/' Top Width= 90.00'
Length= 77.2' Slope= 0.0324 '/'
Inlet Invert= 214.00', Outlet Invert= 211.50'



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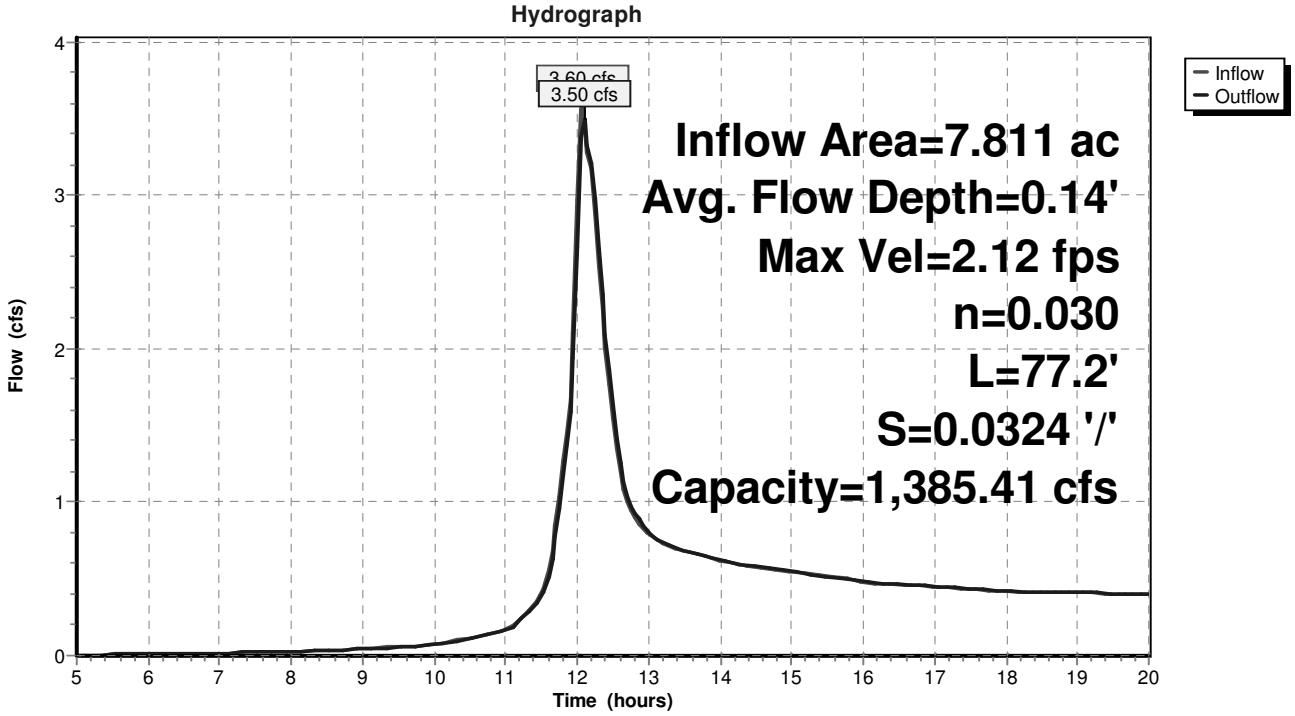
Reach 6R: CATCH 23 Reach



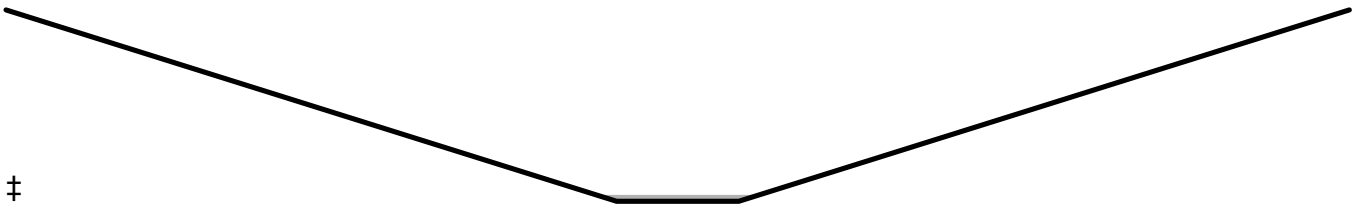
Summary for Reach 7R: CATCH23 Reach

Inflow Area = 12.166 ac, 14.78% Impervious, Inflow Depth > 0.76" for 2 YR event
Inflow = 4.63 cfs @ 12.25 hrs, Volume= 0.769 af
Outflow = 4.59 cfs @ 12.32 hrs, Volume= 0.764 af, Atten= 1%, Lag= 4.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.23 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 4.7 min

Peak Storage= 683 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 5.00', Capacity at Bank-Full= 5,255.57 cfs

20.00' x 5.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 20.0 '/' Top Width= 220.00'
Length= 182.5' Slope= 0.0082 '/'
Inlet Invert= 211.50', Outlet Invert= 210.00'



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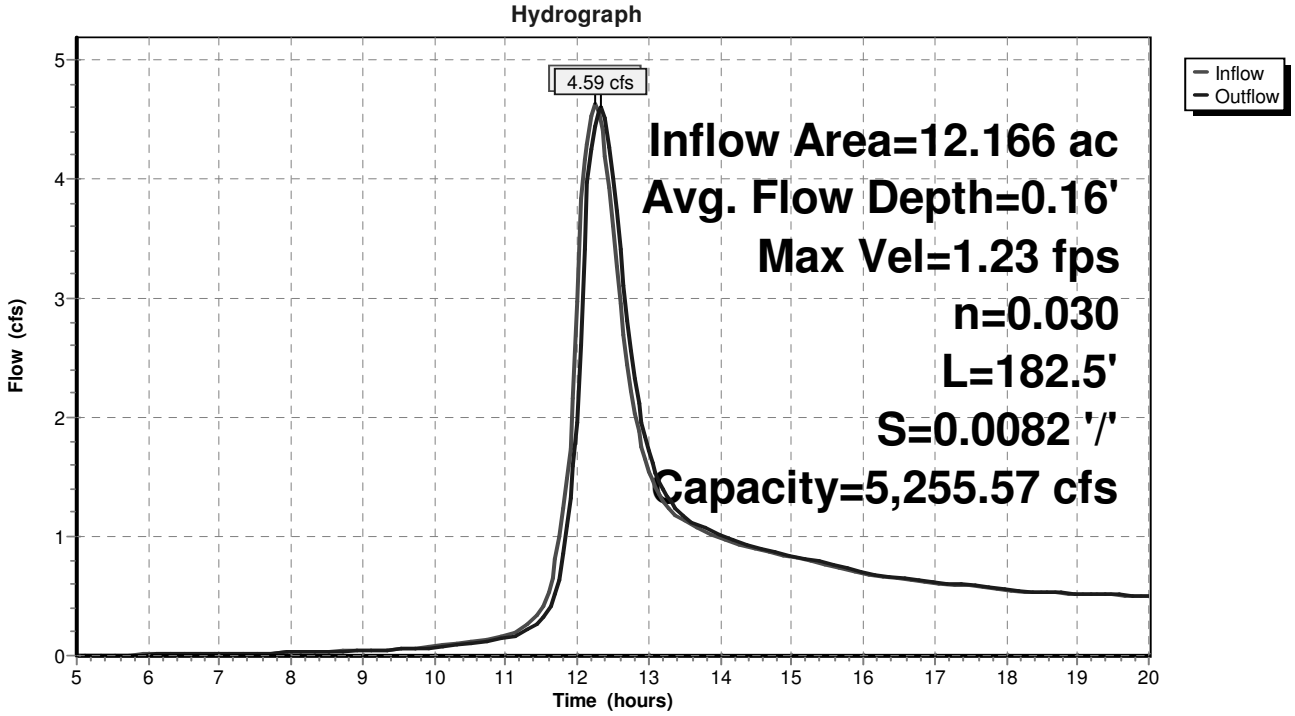
Reach 7R: CATCH23 Reach



Summary for Reach 8R: CATCH 23 Reach

Inflow Area = 1.722 ac, 31.52% Impervious, Inflow Depth > 1.19" for 2 YR event
Inflow = 2.09 cfs @ 12.16 hrs, Volume= 0.171 af
Outflow = 2.04 cfs @ 12.18 hrs, Volume= 0.170 af, Atten= 2%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.69 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.95 fps, Avg. Travel Time= 1.4 min

Peak Storage= 97 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.02'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 1,415.96 cfs

50.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 40.0 '/' Top Width= 130.00'
Length= 79.0' Slope= 0.0886 '/'
Inlet Invert= 221.00', Outlet Invert= 214.00'

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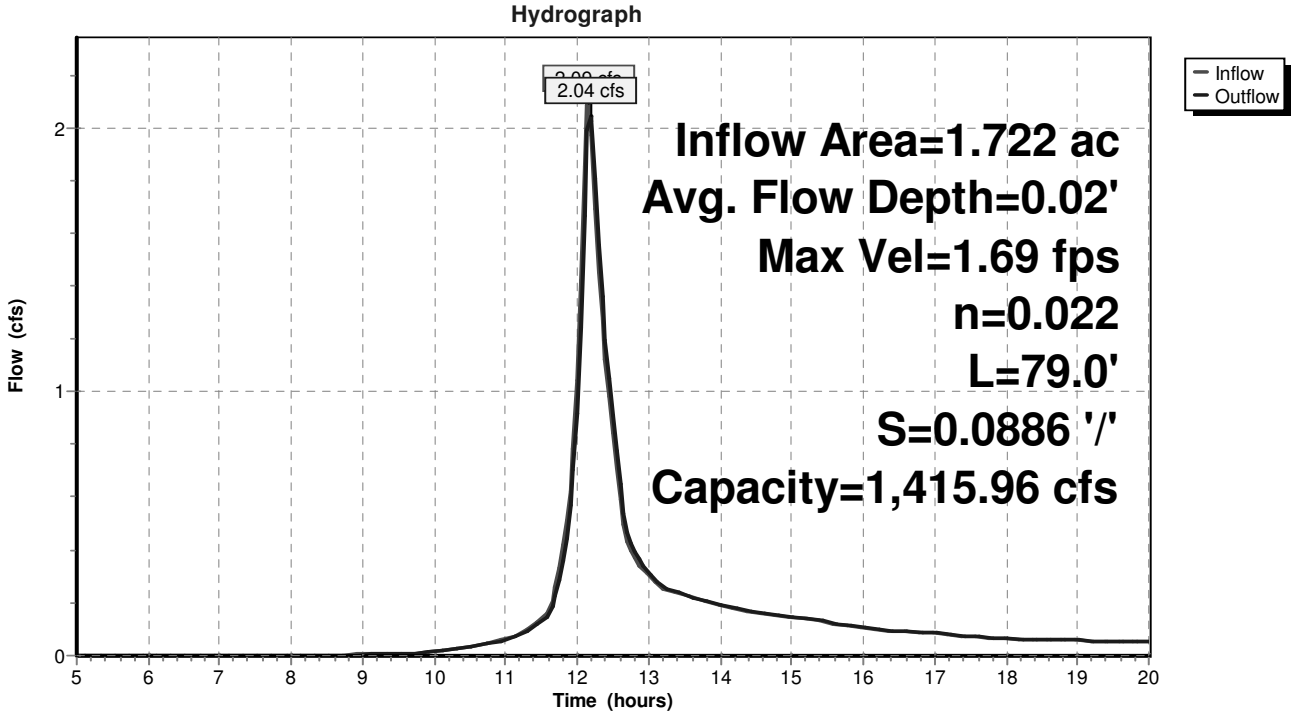
Reach 8R: CATCH 23 Reach



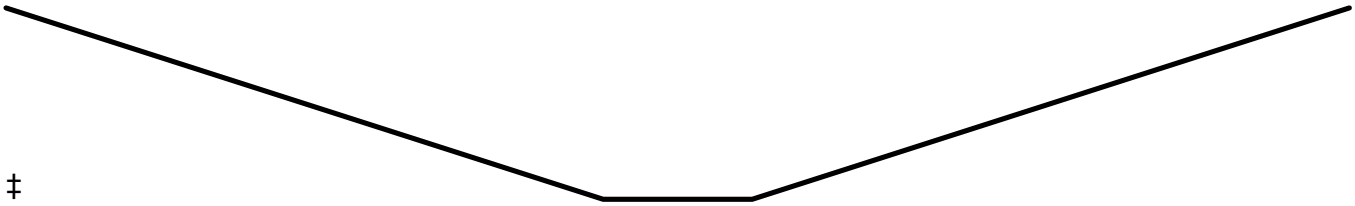
Summary for Reach 9R: CATCH 23 Reach

Inflow Area = 5.270 ac, 9.88% Impervious, Inflow Depth > 0.51" for 2 YR event
Inflow = 0.32 cfs @ 11.80 hrs, Volume= 0.225 af
Outflow = 0.32 cfs @ 11.90 hrs, Volume= 0.223 af, Atten= 0%, Lag= 6.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.06 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 1.04 fps, Avg. Travel Time= 2.6 min

Peak Storage= 49 cf @ 11.85 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 2.50', Capacity at Bank-Full= 1,710.82 cfs

10.00' x 2.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 16.0 '/' Top Width= 90.00'
Length= 162.0' Slope= 0.0494 '/'
Inlet Invert= 222.00', Outlet Invert= 214.00'



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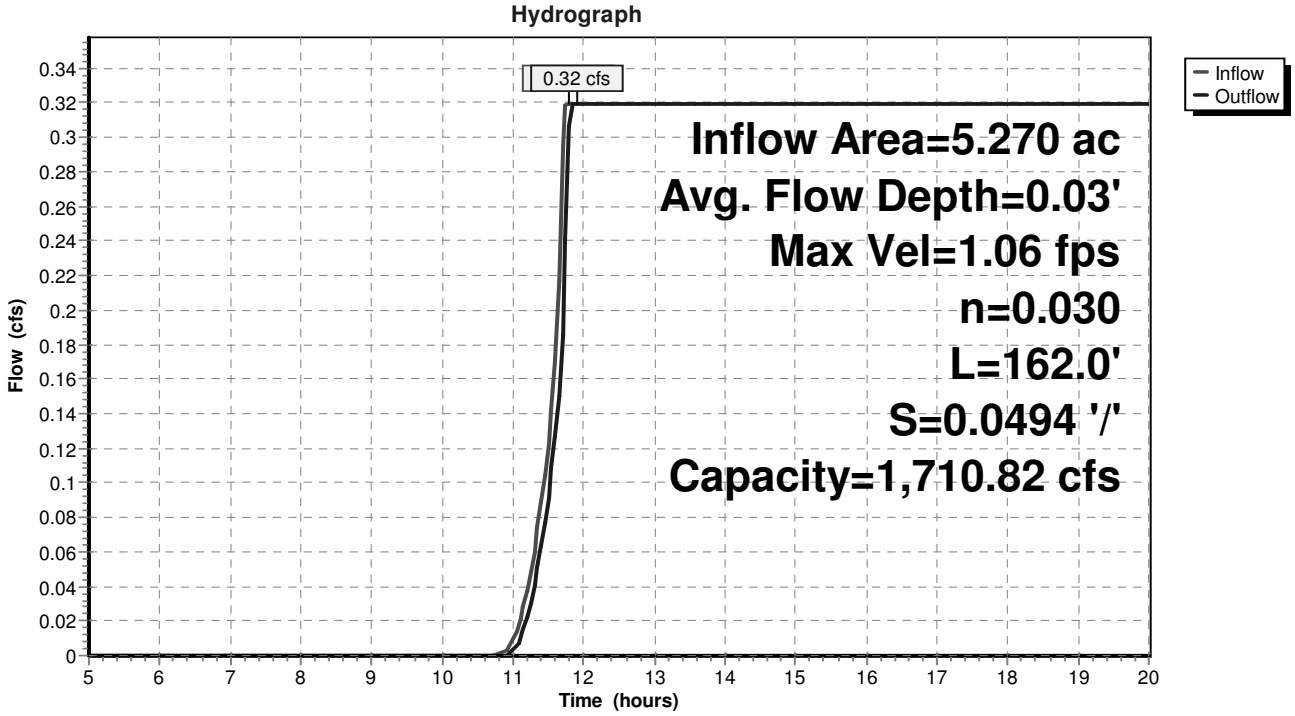
Reach 9R: CATCH 23 Reach



Summary for Pond 1CB: CB R20

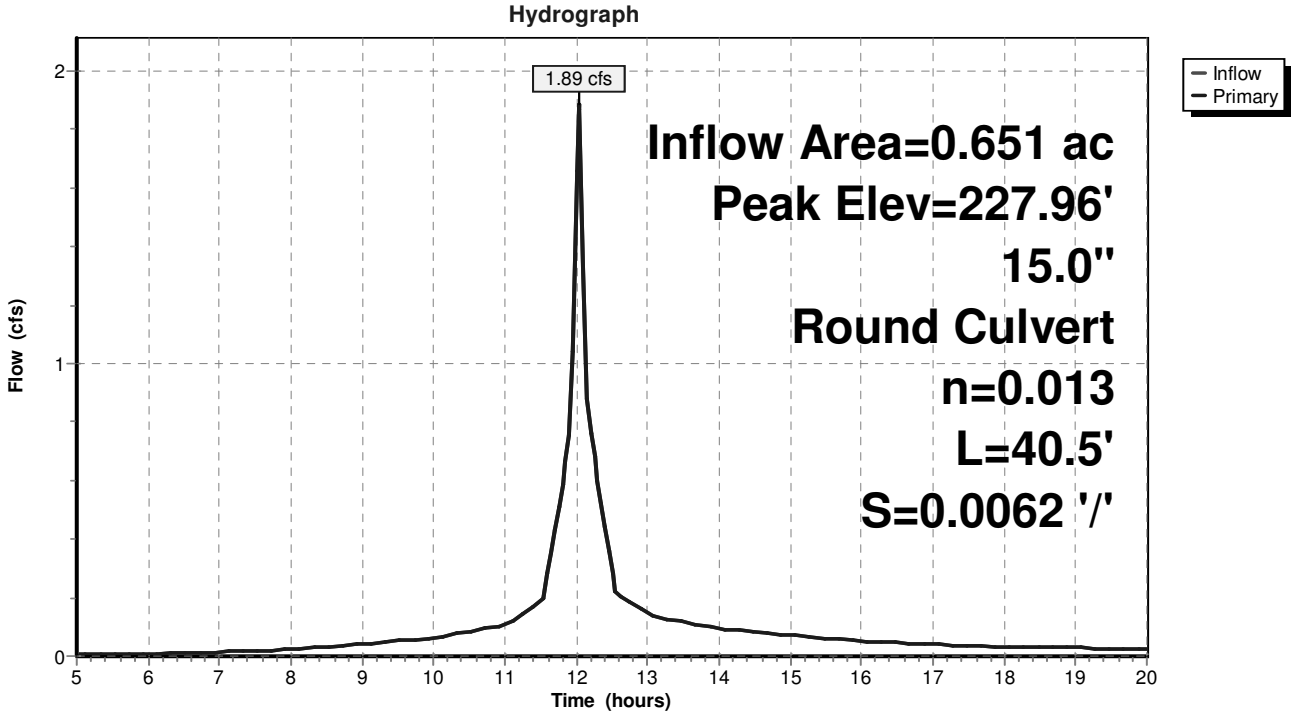
Inflow Area = 0.651 ac, 79.99% Impervious, Inflow Depth > 2.24" for 2 YR event
Inflow = 1.89 cfs @ 12.04 hrs, Volume= 0.122 af
Outflow = 1.89 cfs @ 12.04 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min
Primary = 1.89 cfs @ 12.04 hrs, Volume= 0.122 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 227.96' @ 12.04 hrs
Flood Elev= 232.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	227.15'	**15.0" Round Culvert** L= 40.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 227.15' / 226.90' S= 0.0062 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.82 cfs @ 12.04 hrs HW=227.94' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.82 cfs @ 3.16 fps)

Pond 1CB: CB R20



Summary for Pond 1P: Main Stormwater Pond

Inflow Area =	12.369 ac, 67.46% Impervious, Inflow Depth > 2.10" for 2 YR event				
Inflow =	31.67 cfs @	12.04 hrs,	Volume=	2.168 af	
Outflow =	0.86 cfs @	16.29 hrs,	Volume=	0.295 af,	Atten= 97%, Lag= 254.5 min
Discarded =	0.05 cfs @	6.65 hrs,	Volume=	0.059 af	
Primary =	0.81 cfs @	16.29 hrs,	Volume=	0.237 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 232.46' @ 16.29 hrs Surf.Area= 20,779 sf Storage= 82,203 cf
Flood Elev= 236.00' Surf.Area= 30,941 sf Storage= 171,614 cf

Plug-Flow detention time= 436.1 min calculated for 0.295 af (14% of inflow)
Center-of-Mass det. time= 236.6 min (994.8 - 758.3)

Volume	Invert	Avail.Storage	Storage Description
#1	226.00'	171,614 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

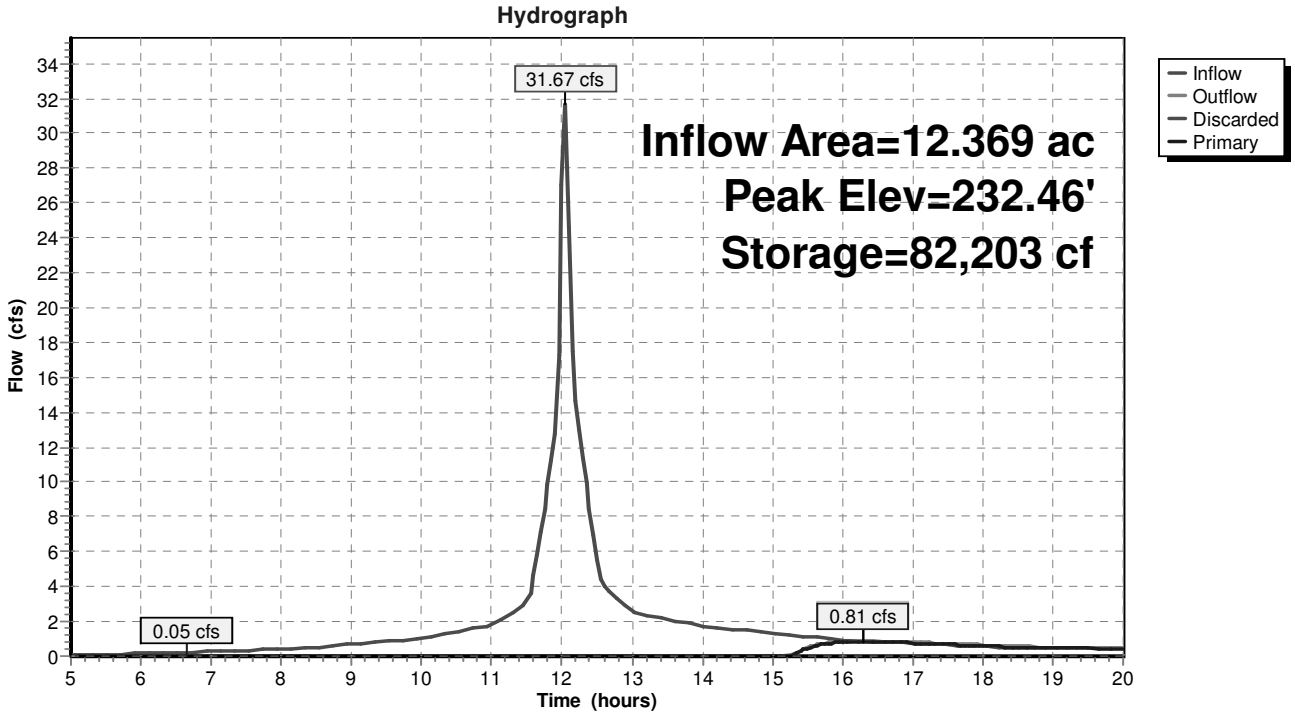
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
226.00	7,493	0	0
227.00	8,752	8,123	8,123
228.00	10,068	9,410	17,533
229.00	11,440	10,754	28,287
230.00	12,868	12,154	40,441
230.92	14,353	12,522	52,962
231.00	17,493	1,274	54,236
232.00	19,712	18,603	72,839
232.75	21,442	15,433	88,271
233.00	22,031	5,434	93,705
234.00	24,451	23,241	116,946
235.00	26,972	25,712	142,658
236.00	30,941	28,957	171,614

Device	Routing	Invert	Outlet Devices
#1	Primary	225.80'	**18.0" Round Culvert** L= 93.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 225.80' / 225.00' S= 0.0086 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	232.40'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	226.00'	**0.05 cfs Exfiltration at all elevations**
#4	Primary	233.75'	**20.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.05 cfs @ 6.65 hrs HW=226.10' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.64 cfs @ 16.29 hrs HW=232.46' (Free Discharge)
├─**1=Culvert** (Passes 0.64 cfs of 16.33 cfs potential flow)
│ └─**2=Orifice/Grate** (Weir Controls 0.64 cfs @ 0.82 fps)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Main Stormwater Pond



Summary for Pond 2CB: CB R18

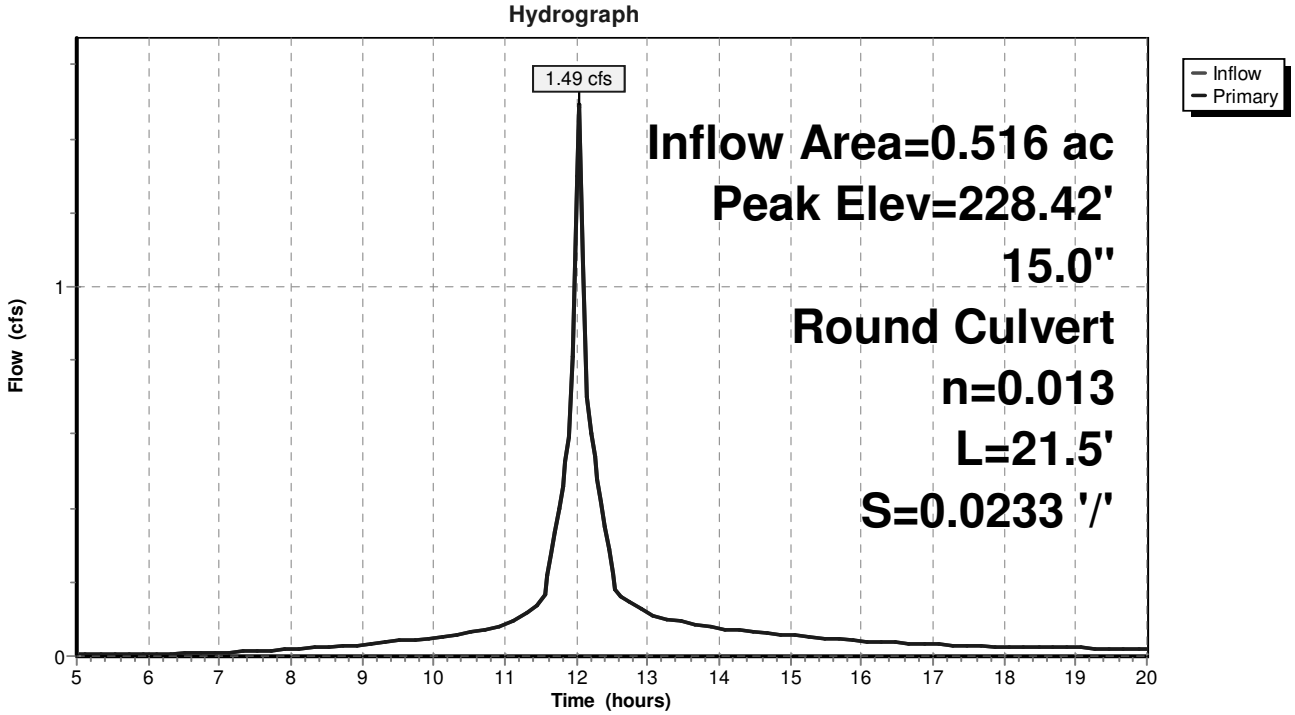
Inflow Area =	0.516 ac, 77.70% Impervious, Inflow Depth > 2.22" for 2 YR event				
Inflow =	1.49 cfs @	12.04 hrs,	Volume=	0.096 af	
Outflow =	1.49 cfs @	12.04 hrs,	Volume=	0.096 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.49 cfs @	12.04 hrs,	Volume=	0.096 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 228.42' @ 12.04 hrs
Flood Elev= 232.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	227.75'	**15.0" Round Culvert** L= 21.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 227.75' / 227.25' S= 0.0233 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.44 cfs @ 12.04 hrs HW=228.41' (Free Discharge)
└**1=Culvert** (Inlet Controls 1.44 cfs @ 2.19 fps)

Pond 2CB: CB R18



Summary for Pond 2P: Soil Filter #1

Inflow Area = 0.819 ac, 63.68% Impervious, Inflow Depth > 1.91" for 2 YR event
Inflow = 2.02 cfs @ 12.04 hrs, Volume= 0.131 af
Outflow = 2.02 cfs @ 12.04 hrs, Volume= 0.131 af, Atten= 0%, Lag= 0.0 min
Primary = 2.02 cfs @ 12.04 hrs, Volume= 0.131 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 224.00' @ 12.04 hrs Surf.Area= 1,591 sf Storage= 3 cf

Plug-Flow detention time= 0.0 min calculated for 0.131 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (760.9 - 760.8)

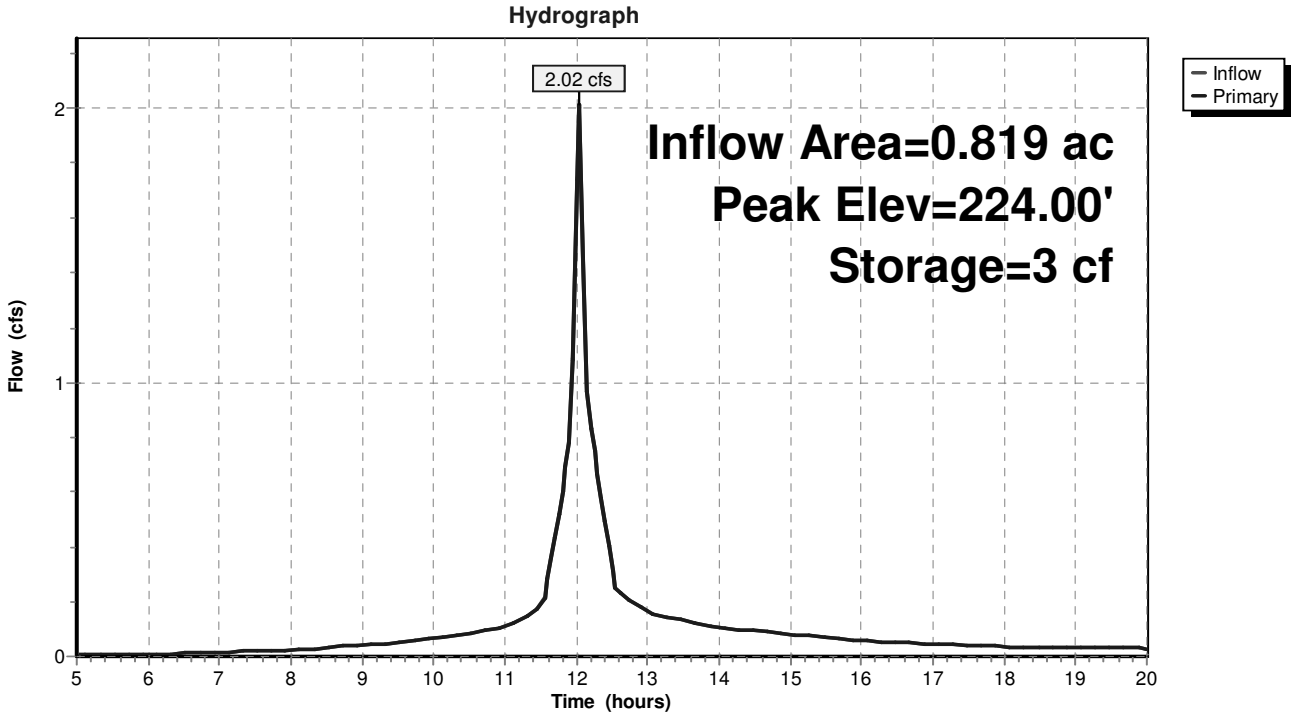
Volume	Invert	Avail.Storage	Storage Description
#1	224.00'	4,151 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
224.00	1,590	0	0
225.00	2,063	1,827	1,827
225.50	2,321	1,096	2,923
226.00	2,593	1,229	4,151

Device	Routing	Invert	Outlet Devices
#1	Primary	226.00'	**8.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#2	Primary	225.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	221.67'	**36.0" Round Culvert** L= 21.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 221.67' / 221.50' S= 0.0081 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=20.88 cfs @ 12.04 hrs HW=224.00' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Orifice/Grate** (Controls 0.00 cfs)
- **3=Culvert** (Barrel Controls 20.88 cfs @ 4.88 fps)

Pond 2P: Soil Filter #1



Summary for Pond 3CB: CB R22

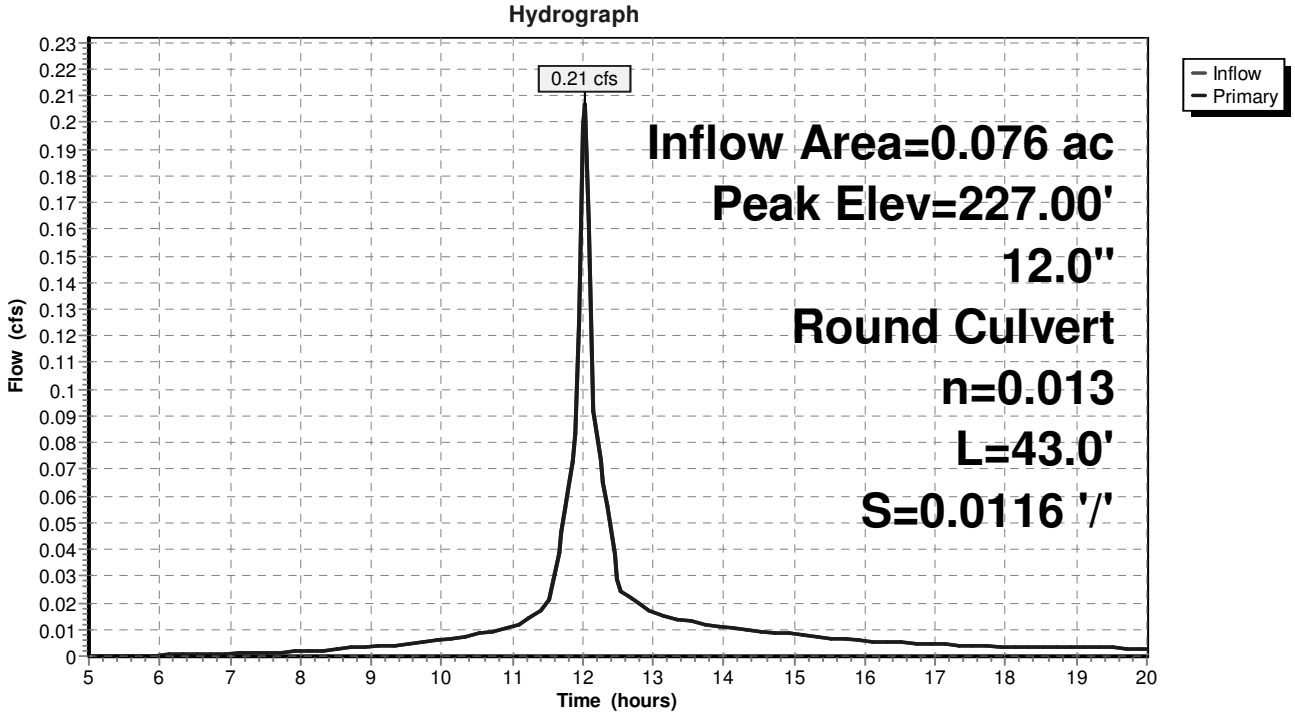
Inflow Area = 0.076 ac, 77.27% Impervious, Inflow Depth > 2.04" for 2 YR event
Inflow = 0.21 cfs @ 12.02 hrs, Volume= 0.013 af
Outflow = 0.21 cfs @ 12.02 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min
Primary = 0.21 cfs @ 12.02 hrs, Volume= 0.013 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 227.00' @ 12.02 hrs
Flood Elev= 231.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	226.75'	**12.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 226.75' / 226.25' S= 0.0116 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.20 cfs @ 12.02 hrs HW=226.99' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.20 cfs @ 1.33 fps)

Pond 3CB: CB R22



Summary for Pond 3P: Soil Filter #2

Inflow Area = 1.722 ac, 31.52% Impervious, Inflow Depth > 1.19" for 2 YR event
Inflow = 2.09 cfs @ 12.16 hrs, Volume= 0.171 af
Outflow = 2.09 cfs @ 12.16 hrs, Volume= 0.171 af, Atten= 0%, Lag= 0.1 min
Primary = 2.09 cfs @ 12.16 hrs, Volume= 0.171 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 224.01' @ 12.16 hrs Surf.Area= 2,296 sf Storage= 15 cf
Flood Elev= 232.25' Surf.Area= 3,962 sf Storage= 7,751 cf

Plug-Flow detention time= 0.1 min calculated for 0.170 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (806.7 - 806.6)

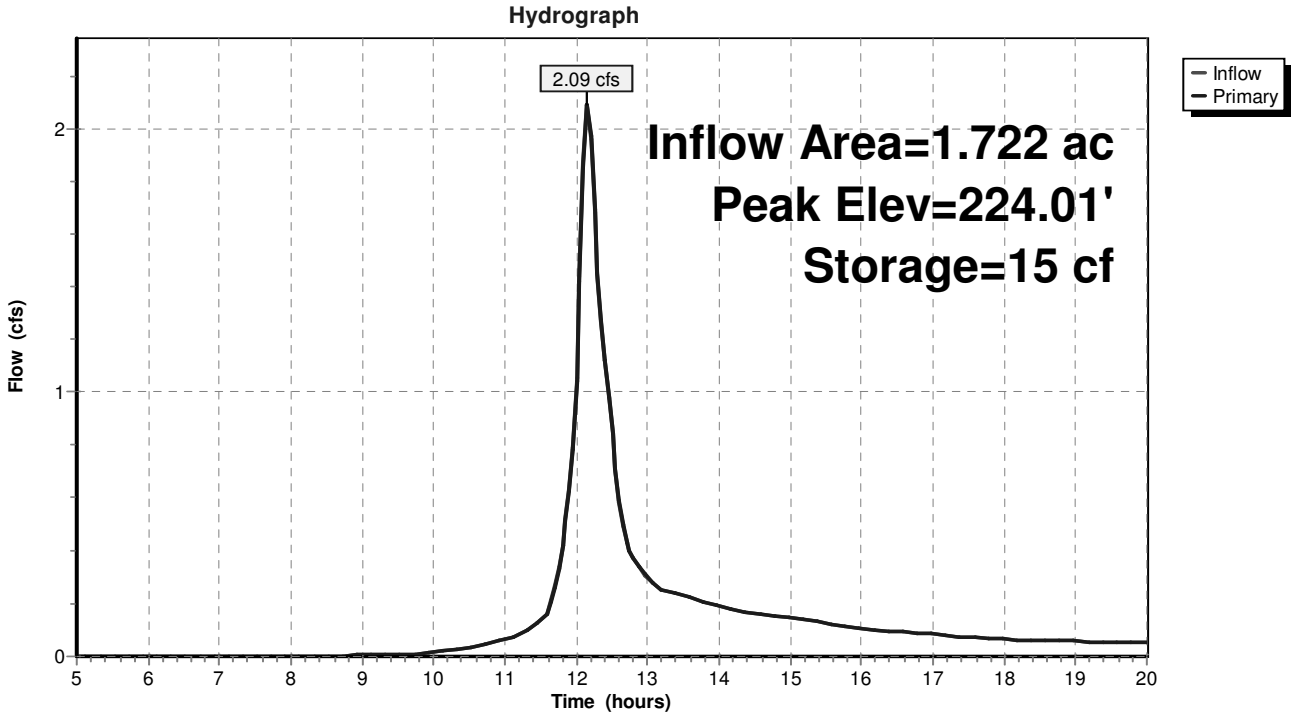
Volume	Invert	Avail.Storage	Storage Description
#1	224.00'	7,751 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
224.00	2,292	0	0
225.00	2,918	2,605	2,605
225.50	3,252	1,543	4,148
226.00	3,600	1,713	5,861
226.50	3,962	1,891	7,751

Device	Routing	Invert	Outlet Devices
#1	Primary	226.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	221.40'	**36.0" Round Culvert** L= 89.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 221.40' / 221.00' S= 0.0045 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=25.73 cfs @ 12.16 hrs HW=224.01' (Free Discharge)
└─**1=Orifice/Grate** (Controls 0.00 cfs)
└─**2=Culvert** (Barrel Controls 25.73 cfs @ 5.27 fps)

Pond 3P: Soil Filter #2



Summary for Pond 4CB: CB R16

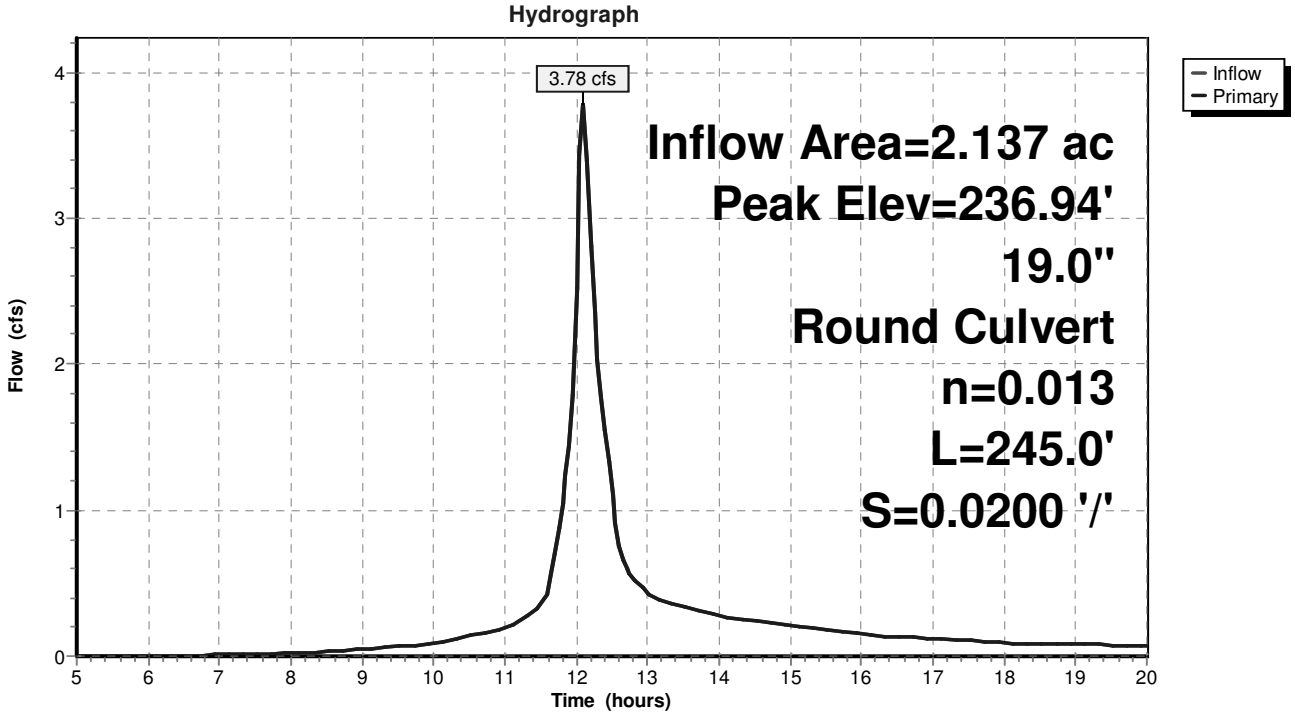
Inflow Area =	2.137 ac, 37.01% Impervious, Inflow Depth > 1.66" for 2 YR event				
Inflow =	3.78 cfs @	12.10 hrs,	Volume=	0.295 af	
Outflow =	3.78 cfs @	12.10 hrs,	Volume=	0.295 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.78 cfs @	12.10 hrs,	Volume=	0.295 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 236.94' @ 12.10 hrs
Flood Elev= 242.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.90'	**19.0" Round Culvert** L= 245.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 235.90' / 231.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.77 cfs @ 12.10 hrs HW=236.94' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.77 cfs @ 2.74 fps)

Pond 4CB: CB R16



Summary for Pond 5CB: CB R15

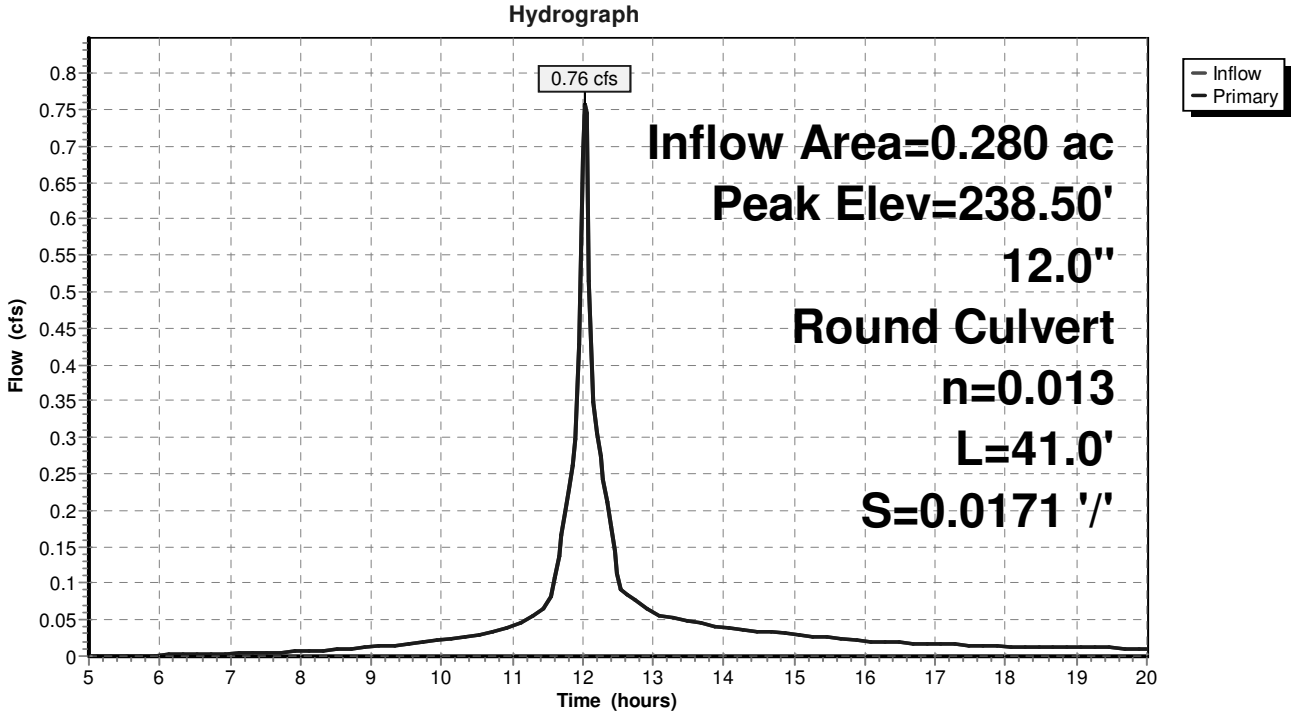
Inflow Area =	0.280 ac, 70.56% Impervious, Inflow Depth > 2.04" for 2 YR event				
Inflow =	0.76 cfs @	12.04 hrs,	Volume=	0.048 af	
Outflow =	0.76 cfs @	12.04 hrs,	Volume=	0.048 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.76 cfs @	12.04 hrs,	Volume=	0.048 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 238.50' @ 12.03 hrs
Flood Elev= 243.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	238.00'	**12.0" Round Culvert** L= 41.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 238.00' / 237.30' S= 0.0171 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.73 cfs @ 12.04 hrs HW=238.49' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.73 cfs @ 1.89 fps)

Pond 5CB: CB R15



Summary for Pond 6CB: CB R13

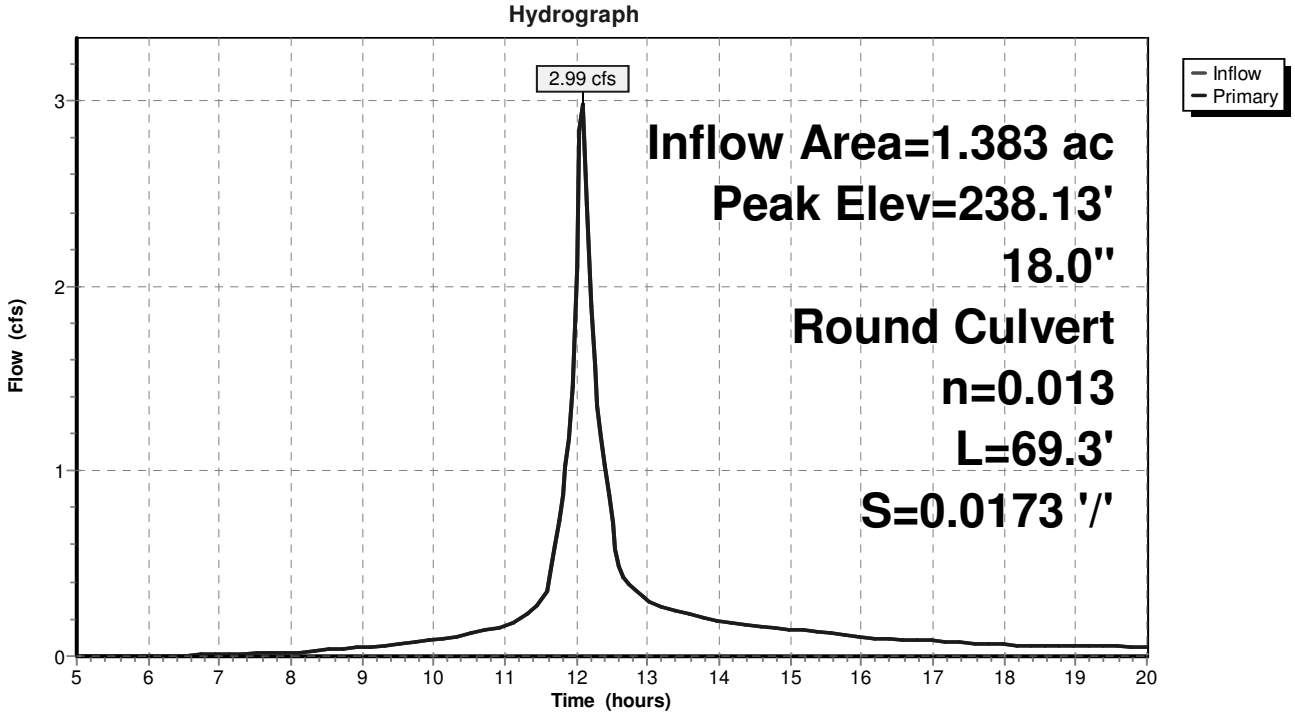
Inflow Area =	1.383 ac, 55.19% Impervious, Inflow Depth > 1.90" for 2 YR event				
Inflow =	2.99 cfs @	12.08 hrs,	Volume=	0.219 af	
Outflow =	2.99 cfs @	12.08 hrs,	Volume=	0.219 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.99 cfs @	12.08 hrs,	Volume=	0.219 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 238.13' @ 12.08 hrs
Flood Elev= 243.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	237.20'	**18.0" Round Culvert** L= 69.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.20' / 236.00' S= 0.0173 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.92 cfs @ 12.08 hrs HW=238.12' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.92 cfs @ 2.57 fps)

Pond 6CB: CB R13



Summary for Pond 7CB: CB R17

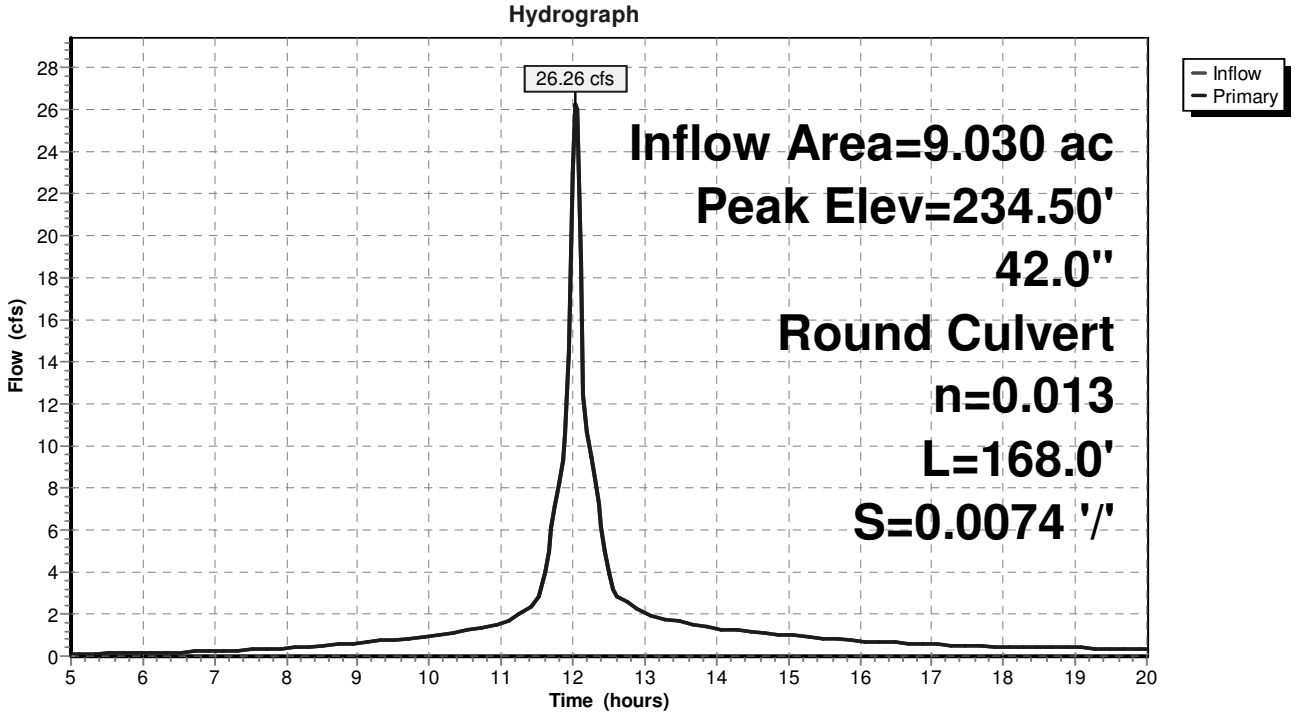
Inflow Area = 9.030 ac, 79.35% Impervious, Inflow Depth > 2.29" for 2 YR event
Inflow = 26.26 cfs @ 12.04 hrs, Volume= 1.725 af
Outflow = 26.26 cfs @ 12.04 hrs, Volume= 1.725 af, Atten= 0%, Lag= 0.0 min
Primary = 26.26 cfs @ 12.04 hrs, Volume= 1.725 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 234.50' @ 12.04 hrs
Flood Elev= 246.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	232.25'	**42.0" Round Culvert** L= 168.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 232.25' / 231.00' S= 0.0074 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=25.39 cfs @ 12.04 hrs HW=234.45' (Free Discharge)
└**1=Culvert** (Inlet Controls 25.39 cfs @ 3.99 fps)

Pond 7CB: CB R17



Summary for Pond 8CB: CB R11

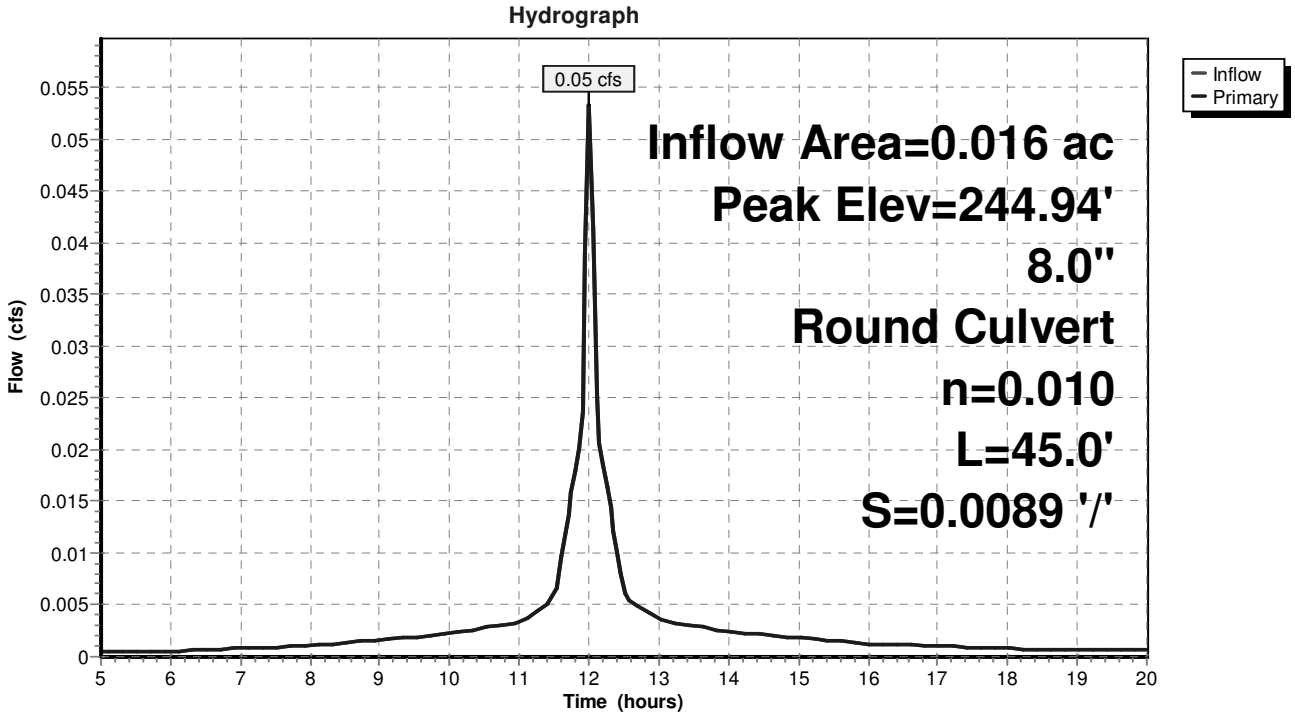
Inflow Area = 0.016 ac,100.00% Impervious, Inflow Depth > 2.59" for 2 YR event
Inflow = 0.05 cfs @ 12.00 hrs, Volume= 0.003 af
Outflow = 0.05 cfs @ 12.00 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min
Primary = 0.05 cfs @ 12.00 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 244.94' @ 12.00 hrs
Flood Elev= 249.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	244.80'	**8.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 244.80' / 244.40' S= 0.0089 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.05 cfs @ 12.00 hrs HW=244.94' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.05 cfs @ 1.00 fps)

Pond 8CB: CB R11



Summary for Pond 9CB: CB R11

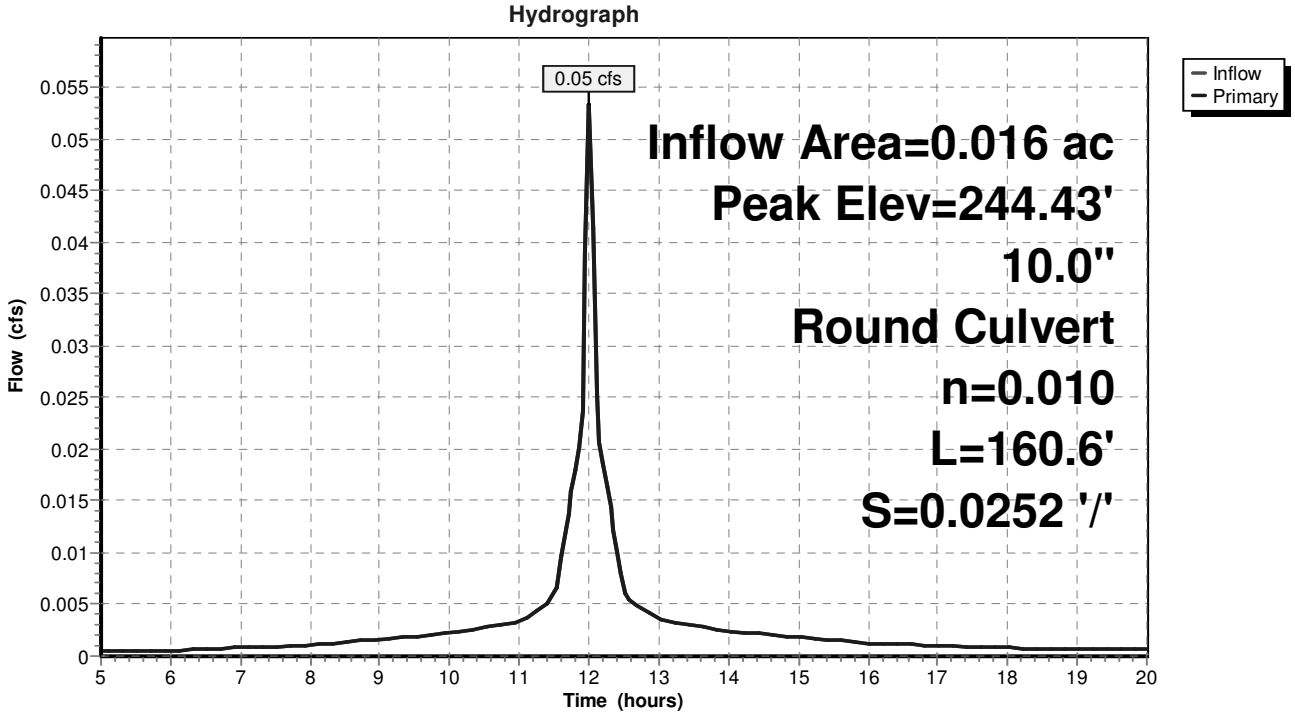
Inflow Area =	0.016 ac,100.00% Impervious, Inflow Depth > 2.59" for 2 YR event				
Inflow =	0.05 cfs @	12.00 hrs,	Volume=	0.003 af	
Outflow =	0.05 cfs @	12.00 hrs,	Volume=	0.003 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.05 cfs @	12.00 hrs,	Volume=	0.003 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 244.43' @ 12.00 hrs
Flood Elev= 249.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	244.30'	**10.0" Round Culvert** L= 160.6' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 244.30' / 240.25' S= 0.0252 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.05 cfs @ 12.00 hrs HW=244.43' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.05 cfs @ 0.96 fps)

Pond 9CB: CB R11



Summary for Pond 10CB: CB R10

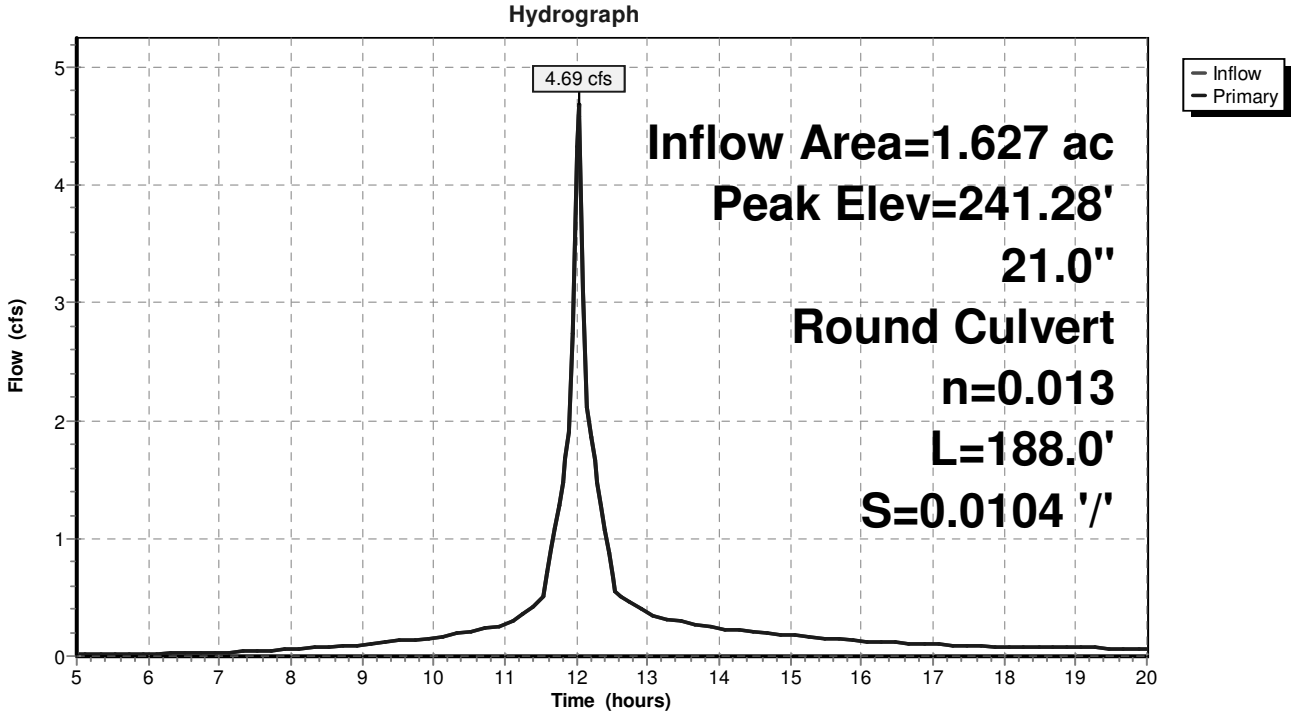
Inflow Area =	1.627 ac, 74.65% Impervious, Inflow Depth > 2.23" for 2 YR event				
Inflow =	4.69 cfs @	12.03 hrs,	Volume=	0.302 af	
Outflow =	4.69 cfs @	12.03 hrs,	Volume=	0.302 af,	Atten= 0%, Lag= 0.0 min
Primary =	4.69 cfs @	12.03 hrs,	Volume=	0.302 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 241.28' @ 12.03 hrs
Flood Elev= 245.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	240.15'	**21.0" Round Culvert** L= 188.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 240.15' / 238.20' S= 0.0104 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=4.49 cfs @ 12.03 hrs HW=241.25' (Free Discharge)
└**1=Culvert** (Inlet Controls 4.49 cfs @ 2.82 fps)

Pond 10CB: CB R10



Summary for Pond 11CB: CB R9

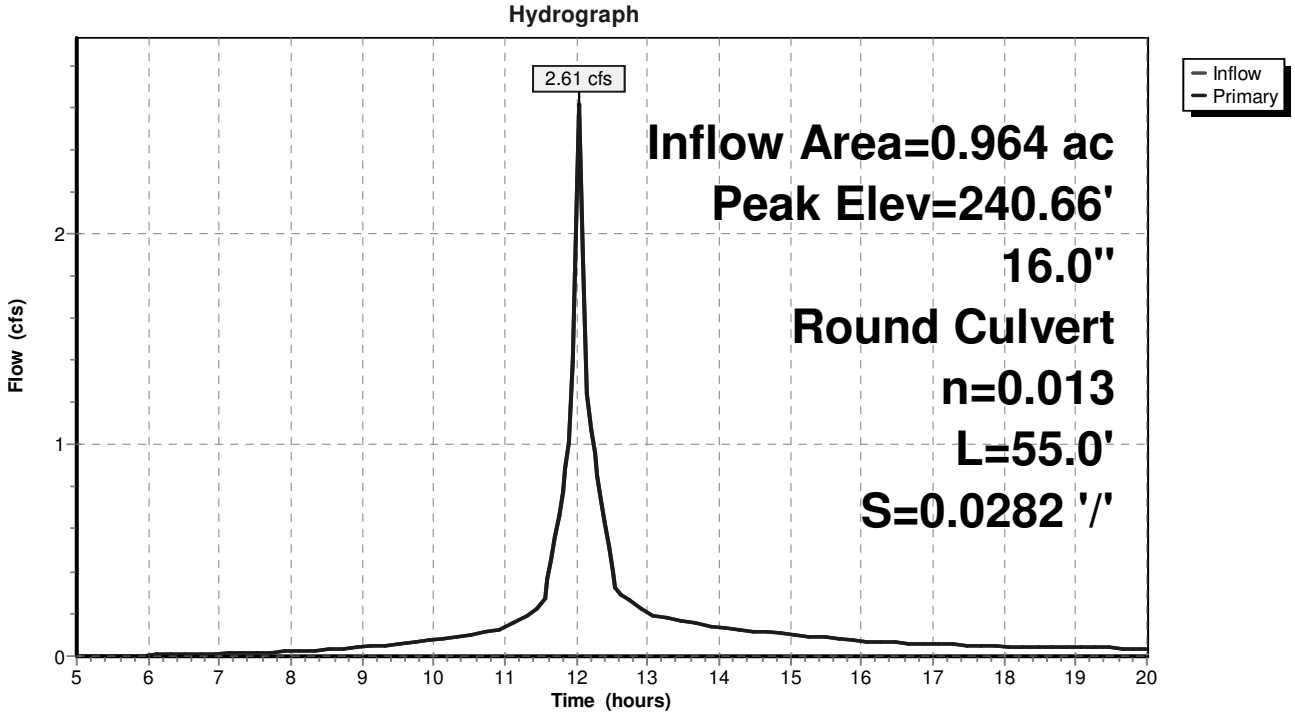
Inflow Area =	0.964 ac, 65.90% Impervious, Inflow Depth > 2.04" for 2 YR event				
Inflow =	2.61 cfs @	12.04 hrs, Volume=	0.164 af		
Outflow =	2.61 cfs @	12.04 hrs, Volume=	0.164 af, Atten= 0%, Lag= 0.0 min		
Primary =	2.61 cfs @	12.04 hrs, Volume=	0.164 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 240.66' @ 12.04 hrs
Flood Elev= 245.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.75'	**16.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.75' / 238.20' S= 0.0282 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.53 cfs @ 12.04 hrs HW=240.65' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.53 cfs @ 2.54 fps)

Pond 11CB: CB R9



Summary for Pond 12CB: DMH R9

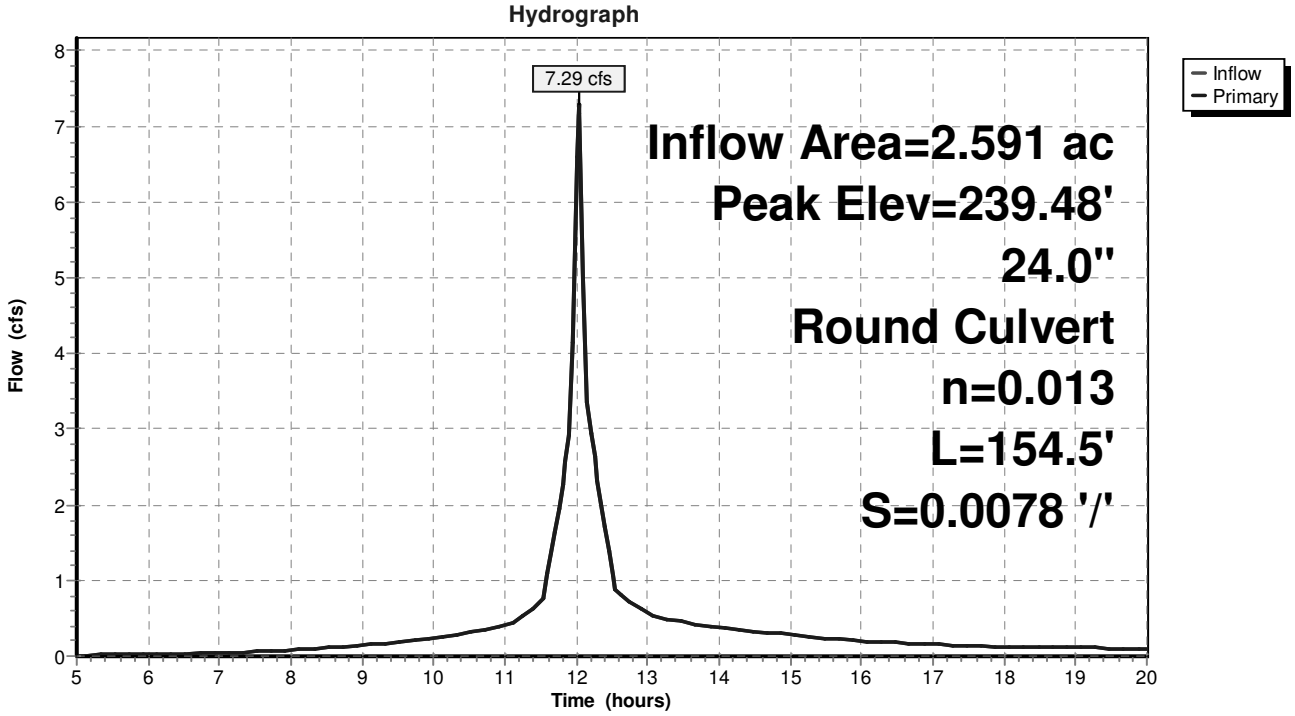
Inflow Area =	2.591 ac, 71.40% Impervious, Inflow Depth > 2.16" for 2 YR event				
Inflow =	7.29 cfs @	12.04 hrs,	Volume=	0.466 af	
Outflow =	7.29 cfs @	12.04 hrs,	Volume=	0.466 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.29 cfs @	12.04 hrs,	Volume=	0.466 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 239.48' @ 12.04 hrs
Flood Elev= 246.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	238.10'	**24.0" Round Culvert** L= 154.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 238.10' / 236.90' S= 0.0078 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=7.01 cfs @ 12.04 hrs HW=239.45' (Free Discharge)
└**1=Culvert** (Inlet Controls 7.01 cfs @ 3.12 fps)

Pond 12CB: DMH R9



Summary for Pond 13CB: CB R8

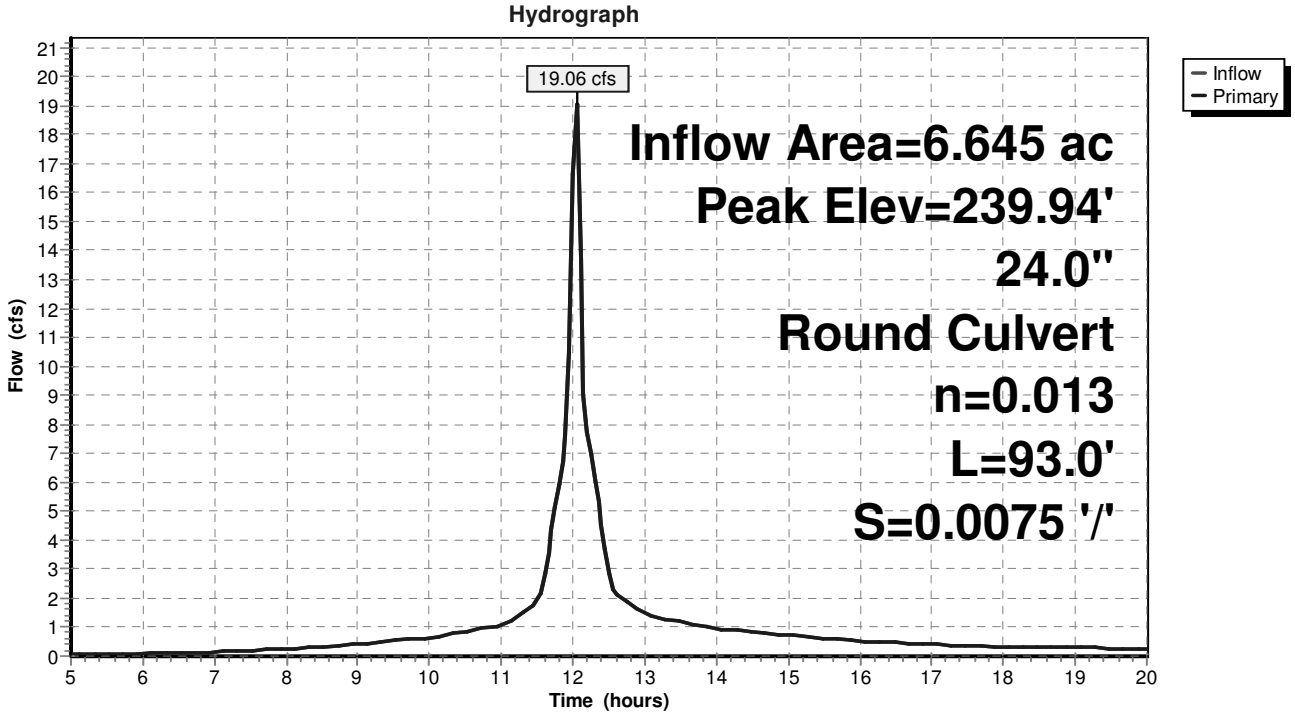
Inflow Area = 6.645 ac, 75.50% Impervious, Inflow Depth > 2.24" for 2 YR event
Inflow = 19.06 cfs @ 12.04 hrs, Volume= 1.239 af
Outflow = 19.06 cfs @ 12.04 hrs, Volume= 1.239 af, Atten= 0%, Lag= 0.0 min
Primary = 19.06 cfs @ 12.04 hrs, Volume= 1.239 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 239.94' @ 12.04 hrs
Flood Elev= 247.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	236.40'	**24.0" Round Culvert** L= 93.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 236.40' / 235.70' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=18.48 cfs @ 12.04 hrs HW=239.80' (Free Discharge)
└**1=Culvert** (Inlet Controls 18.48 cfs @ 5.88 fps)

Pond 13CB: CB R8



Summary for Pond 14CB: CB R8

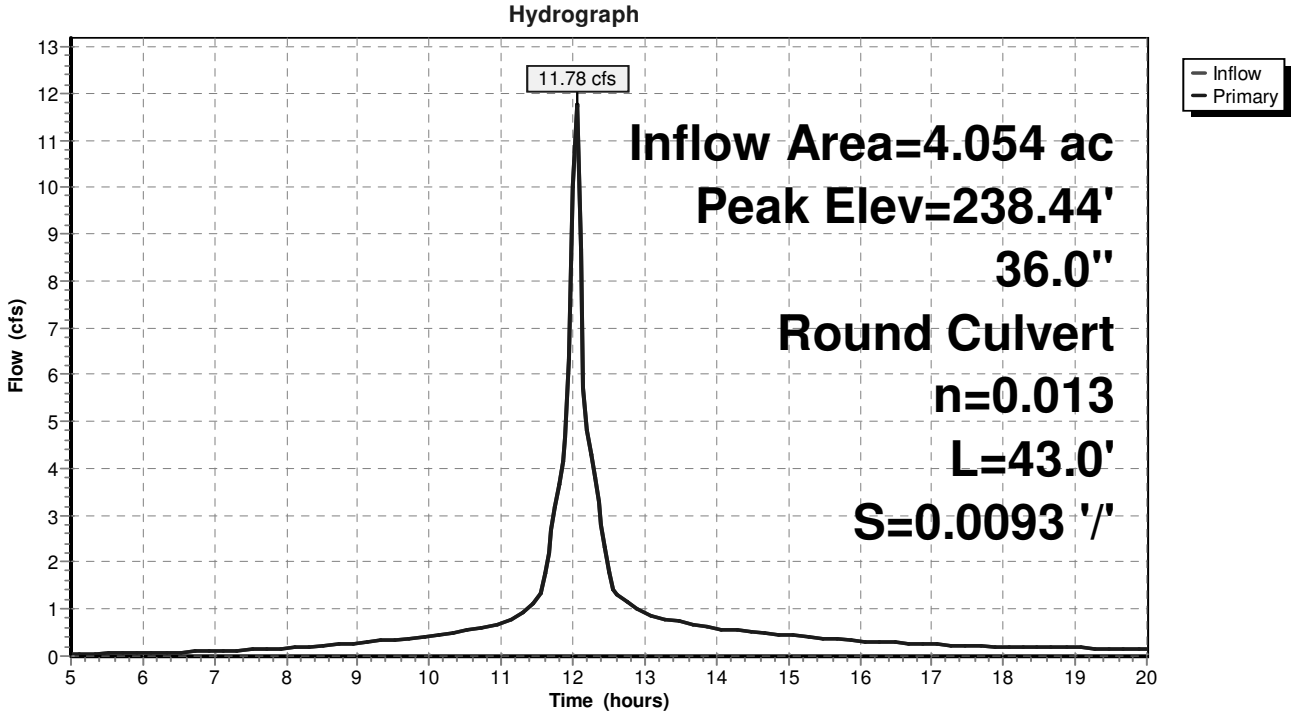
Inflow Area = 4.054 ac, 78.12% Impervious, Inflow Depth > 2.29" for 2 YR event
Inflow = 11.78 cfs @ 12.04 hrs, Volume= 0.773 af
Outflow = 11.78 cfs @ 12.04 hrs, Volume= 0.773 af, Atten= 0%, Lag= 0.0 min
Primary = 11.78 cfs @ 12.04 hrs, Volume= 0.773 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 238.44' @ 12.04 hrs
Flood Elev= 247.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	236.90'	**36.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 236.90' / 236.50' S= 0.0093 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=11.48 cfs @ 12.04 hrs HW=238.42' (Free Discharge)
└**1=Culvert** (Barrel Controls 11.48 cfs @ 4.67 fps)

Pond 14CB: CB R8



Summary for Pond 15CB: CB R6

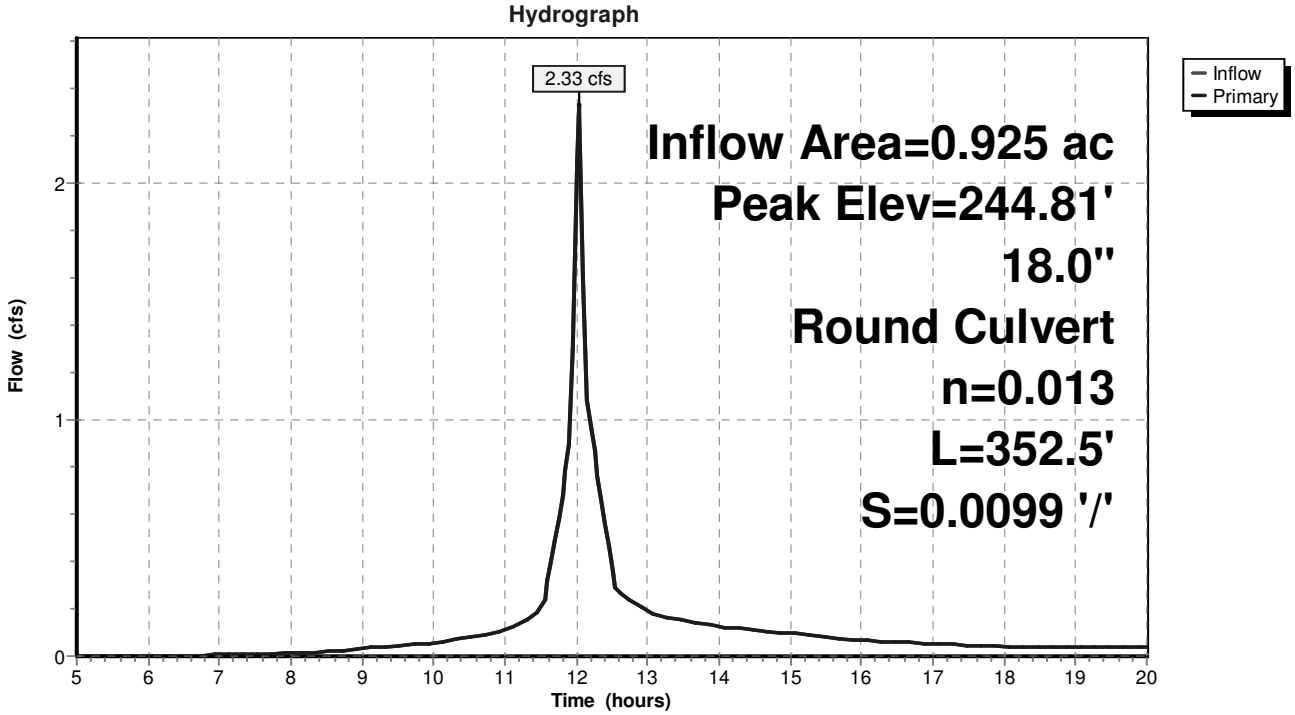
Inflow Area =	0.925 ac, 43.35% Impervious, Inflow Depth > 1.87" for 2 YR event				
Inflow =	2.33 cfs @	12.04 hrs, Volume=	0.144 af		
Outflow =	2.33 cfs @	12.04 hrs, Volume=	0.144 af, Atten= 0%, Lag= 0.0 min		
Primary =	2.33 cfs @	12.04 hrs, Volume=	0.144 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 244.81' @ 12.04 hrs
Flood Elev= 249.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	244.00'	**18.0" Round Culvert** L= 352.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 244.00' / 240.50' S= 0.0099 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.24 cfs @ 12.04 hrs HW=244.79' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.24 cfs @ 2.39 fps)

Pond 15CB: CB R6



Summary for Pond 16CB: CB R7

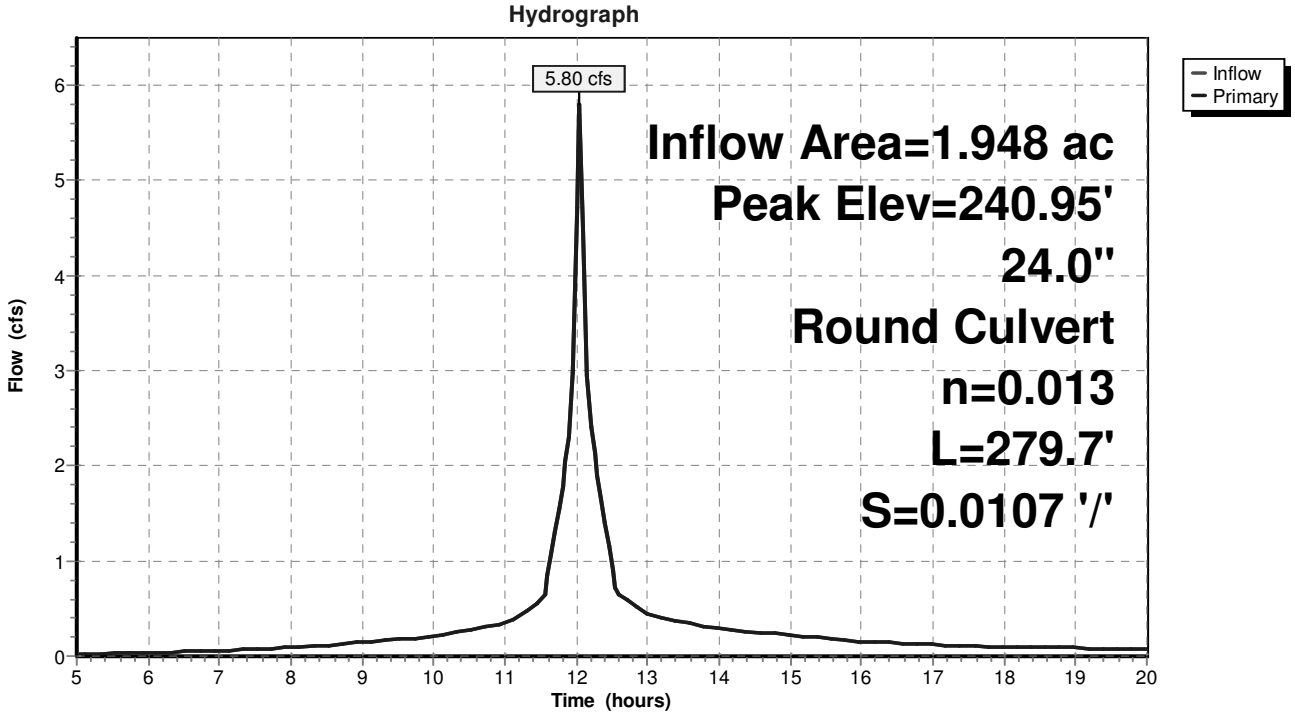
Inflow Area =	1.948 ac, 84.49% Impervious, Inflow Depth > 2.36" for 2 YR event				
Inflow =	5.80 cfs @	12.05 hrs,	Volume=	0.383 af	
Outflow =	5.80 cfs @	12.05 hrs,	Volume=	0.383 af,	Atten= 0%, Lag= 0.0 min
Primary =	5.80 cfs @	12.05 hrs,	Volume=	0.383 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 240.95' @ 12.05 hrs
Flood Elev= 245.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.75'	**24.0" Round Culvert** L= 279.7' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.75' / 236.75' S= 0.0107 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=5.75 cfs @ 12.05 hrs HW=240.94' (Free Discharge)
└**1=Culvert** (Inlet Controls 5.75 cfs @ 2.94 fps)

Pond 16CB: CB R7



Summary for Pond 17CB: CB R24

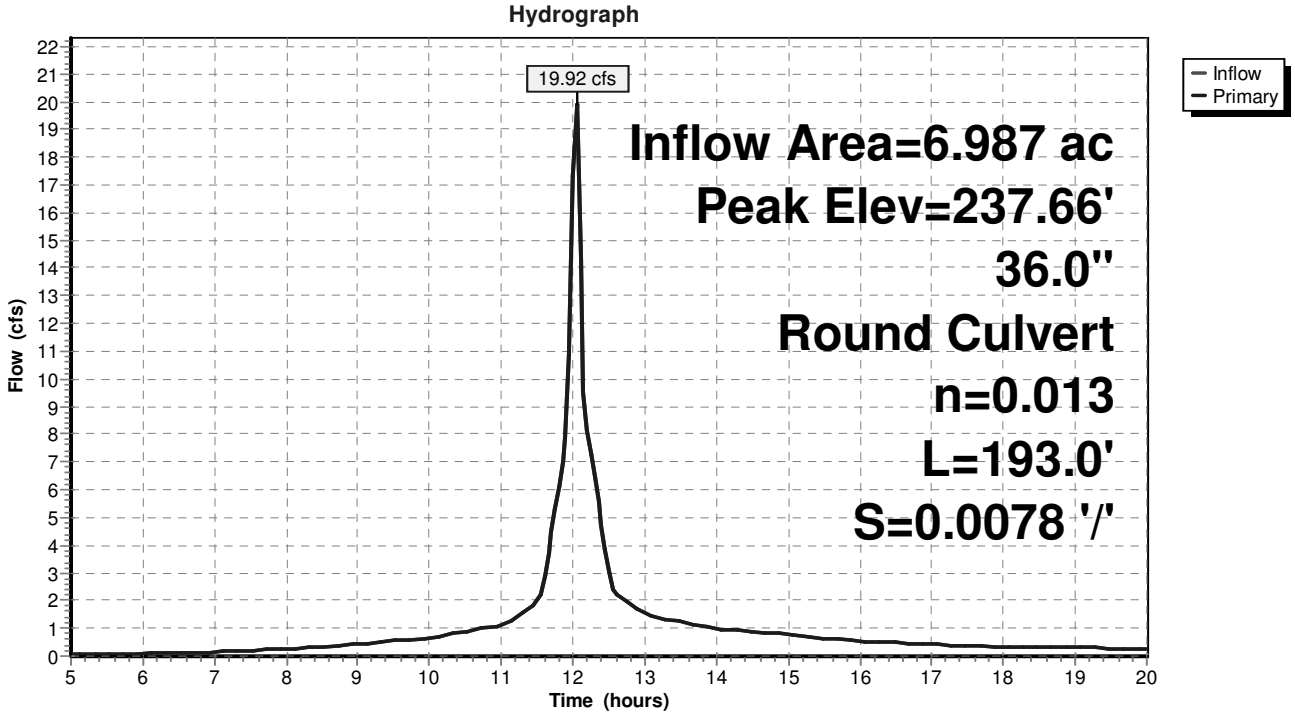
Inflow Area =	6.987 ac, 74.61% Impervious, Inflow Depth > 2.22" for 2 YR event				
Inflow =	19.92 cfs @	12.04 hrs,	Volume=	1.292 af	
Outflow =	19.92 cfs @	12.04 hrs,	Volume=	1.292 af,	Atten= 0%, Lag= 0.0 min
Primary =	19.92 cfs @	12.04 hrs,	Volume=	1.292 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 237.66' @ 12.04 hrs
Flood Elev= 247.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.60'	**36.0" Round Culvert** L= 193.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 235.60' / 234.10' S= 0.0078 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=19.30 cfs @ 12.04 hrs HW=237.62' (Free Discharge)
└**1=Culvert** (Inlet Controls 19.30 cfs @ 3.82 fps)

Pond 17CB: CB R24



Summary for Pond 18CB: CB R24

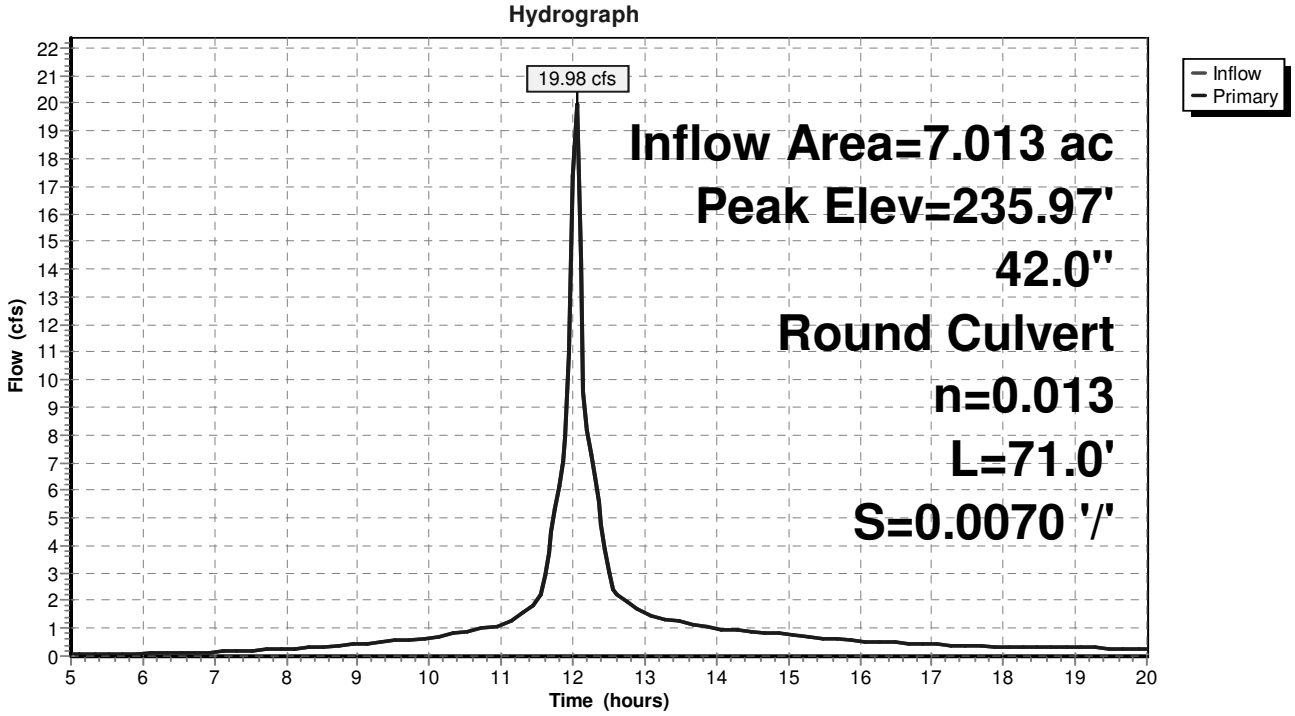
Inflow Area =	7.013 ac, 74.55% Impervious, Inflow Depth > 2.22" for 2 YR event				
Inflow =	19.98 cfs @	12.04 hrs,	Volume=	1.296 af	
Outflow =	19.98 cfs @	12.04 hrs,	Volume=	1.296 af,	Atten= 0%, Lag= 0.0 min
Primary =	19.98 cfs @	12.04 hrs,	Volume=	1.296 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 235.97' @ 12.04 hrs
Flood Elev= 249.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.00'	**42.0" Round Culvert** L= 71.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 234.00' / 233.50' S= 0.0070 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=19.35 cfs @ 12.04 hrs HW=235.93' (Free Discharge)
└**1=Culvert** (Barrel Controls 19.35 cfs @ 5.14 fps)

Pond 18CB: CB R24



Summary for Pond 19CB: CB R20

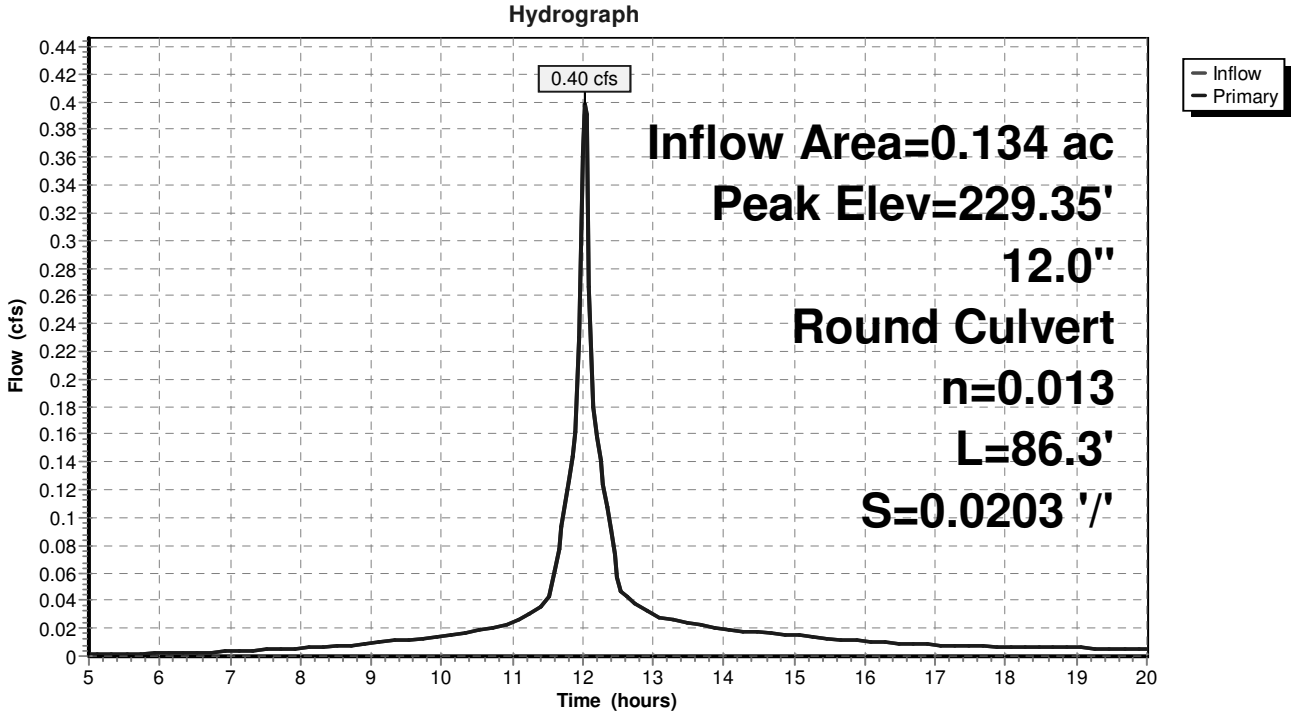
Inflow Area =	0.134 ac, 88.77% Impervious, Inflow Depth > 2.32" for 2 YR event				
Inflow =	0.40 cfs @	12.03 hrs,	Volume=	0.026 af	
Outflow =	0.40 cfs @	12.03 hrs,	Volume=	0.026 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.40 cfs @	12.03 hrs,	Volume=	0.026 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 229.35' @ 12.03 hrs
Flood Elev= 234.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.00'	**12.0" Round Culvert** L= 86.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 229.00' / 227.25' S= 0.0203 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.38 cfs @ 12.03 hrs HW=229.35' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.38 cfs @ 1.58 fps)

Pond 19CB: CB R20



Summary for Pond 20CB: CB R13

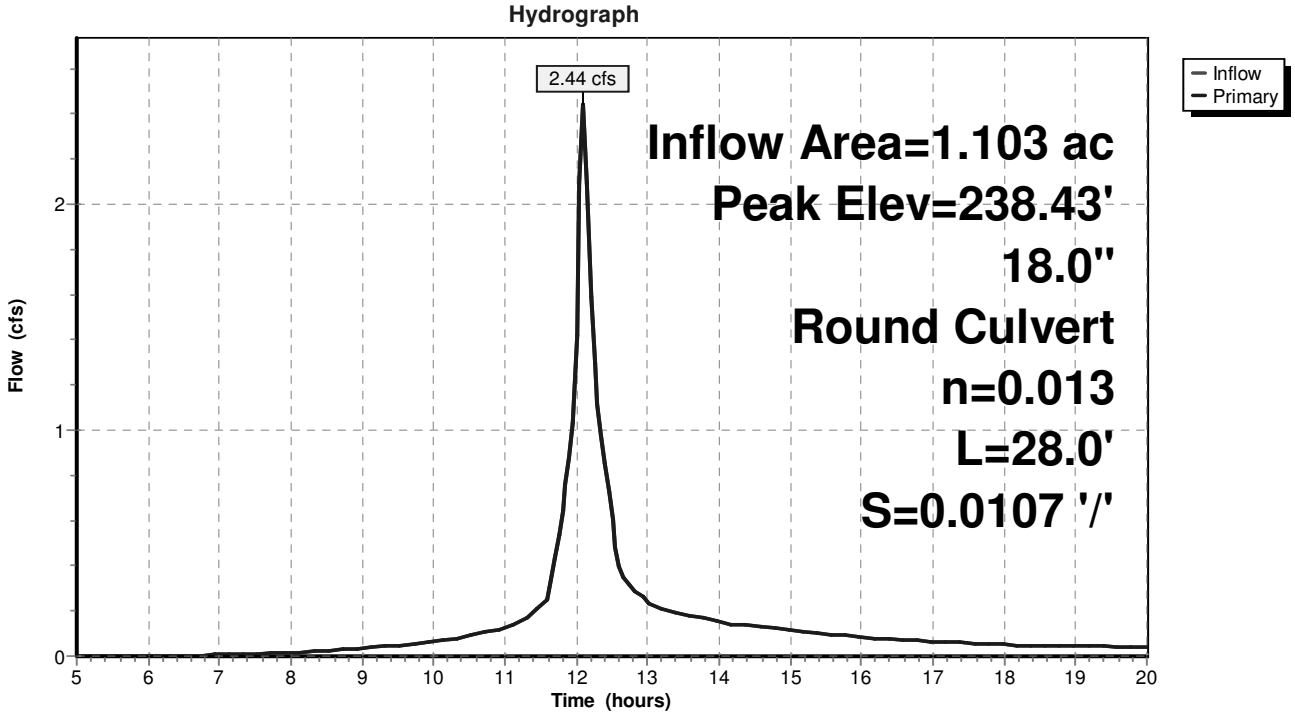
Inflow Area =	1.103 ac, 51.29% Impervious, Inflow Depth > 1.86" for 2 YR event				
Inflow =	2.44 cfs @	12.10 hrs, Volume=	0.171 af		
Outflow =	2.44 cfs @	12.10 hrs, Volume=	0.171 af, Atten= 0%, Lag= 0.0 min		
Primary =	2.44 cfs @	12.10 hrs, Volume=	0.171 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 238.43' @ 12.10 hrs
Flood Elev= 243.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	237.60'	**18.0" Round Culvert** L= 28.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.60' / 237.30' S= 0.0107 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.44 cfs @ 12.10 hrs HW=238.43' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.44 cfs @ 2.44 fps)

Pond 20CB: CB R13



Summary for Pond 21CB: CB 21

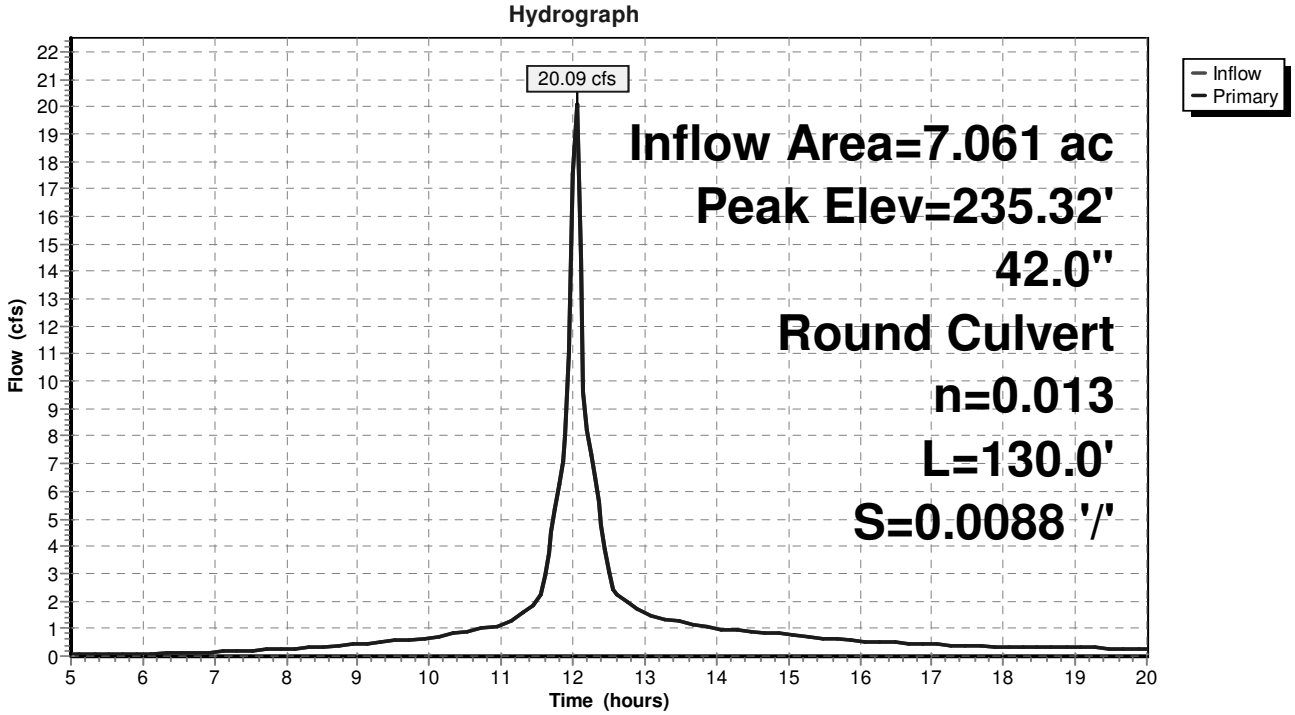
Inflow Area = 7.061 ac, 74.45% Impervious, Inflow Depth > 2.22" for 2 YR event
Inflow = 20.09 cfs @ 12.04 hrs, Volume= 1.304 af
Outflow = 20.09 cfs @ 12.04 hrs, Volume= 1.304 af, Atten= 0%, Lag= 0.0 min
Primary = 20.09 cfs @ 12.04 hrs, Volume= 1.304 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 235.32' @ 12.04 hrs
Flood Elev= 248.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	233.40'	**42.0" Round Culvert** L= 130.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 233.40' / 232.25' S= 0.0088 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=19.44 cfs @ 12.04 hrs HW=235.28' (Free Discharge)
└**1=Culvert** (Inlet Controls 19.44 cfs @ 3.69 fps)

Pond 21CB: CB 21



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: CATCH1 Runoff Area=1,018,520 sf 9.29% Impervious Runoff Depth>0.60"
Flow Length=1,870' Tc=44.8 min CN=55 Runoff=6.52 cfs 1.168 af

Subcatchment 5S: CATCH5 Runoff Area=13,612 sf 99.52% Impervious Runoff Depth>3.87"
Flow Length=337' Tc=2.8 min CN=98 Runoff=1.46 cfs 0.101 af

Subcatchment 6S: CATCH6 Runoff Area=40,309 sf 43.35% Impervious Runoff Depth>3.12"
Flow Length=241' Tc=2.0 min CN=90 Runoff=3.79 cfs 0.240 af

Subcatchment 7S: CATCH7 Runoff Area=71,244 sf 81.62% Impervious Runoff Depth>3.61"
Flow Length=404' Tc=3.1 min CN=95 Runoff=7.33 cfs 0.492 af

Subcatchment 8S: CATCH8 Runoff Area=51,409 sf 94.88% Impervious Runoff Depth>3.79"
Flow Length=246' Slope=0.0150 '/' Tc=2.4 min CN=97 Runoff=5.47 cfs 0.373 af

Subcatchment 9S: CATCH9 Runoff Area=41,989 sf 65.90% Impervious Runoff Depth>3.32"
Flow Length=206' Tc=2.4 min CN=92 Runoff=4.13 cfs 0.266 af

Subcatchment 10S: CATCH10 Runoff Area=70,177 sf 74.40% Impervious Runoff Depth>3.51"
Flow Length=270' Slope=0.0200 '/' Tc=1.9 min CN=94 Runoff=7.15 cfs 0.472 af

Subcatchment 11S: CATCH11 Runoff Area=700 sf 100.00% Impervious Runoff Depth>3.87"
Flow Length=7' Slope=0.0100 '/' Tc=0.2 min CN=98 Runoff=0.08 cfs 0.005 af

Subcatchment 12S: CATCH12 Runoff Area=83,464 sf 98.25% Impervious Runoff Depth>3.87"
Flow Length=433' Tc=2.3 min CN=98 Runoff=8.95 cfs 0.618 af

Subcatchment 13S: CATCH13 Runoff Area=48,060 sf 51.29% Impervious Runoff Depth>3.11"
Flow Length=255' Tc=6.8 min CN=90 Runoff=3.98 cfs 0.286 af

Subcatchment 14S: CATCH14 Runoff Area=229,540 sf 9.88% Impervious Runoff Depth>1.75"
Flow Length=934' Tc=9.7 min CN=74 Runoff=10.06 cfs 0.767 af

Subcatchment 15S: CATCH15 Runoff Area=12,183 sf 70.56% Impervious Runoff Depth>3.32"
Flow Length=289' Tc=2.0 min CN=92 Runoff=1.20 cfs 0.077 af

Subcatchment 16S: CATCH16 Runoff Area=32,840 sf 3.66% Impervious Runoff Depth>2.29"
Flow Length=243' Tc=11.1 min CN=81 Runoff=1.82 cfs 0.144 af

Subcatchment 17S: CATCH17 Runoff Area=52,372 sf 32.27% Impervious Runoff Depth>2.64"
Flow Length=123' Tc=5.0 min CN=85 Runoff=3.95 cfs 0.265 af

Subcatchment 18S: CATCH18 Runoff Area=22,493 sf 77.70% Impervious Runoff Depth>3.51"
Flow Length=365' Slope=0.0260 '/' Tc=2.4 min CN=94 Runoff=2.30 cfs 0.151 af

Subcatchment 19S: CATCH19 Runoff Area=71,665 sf 29.40% Impervious Runoff Depth>2.21"
Flow Length=286' Tc=10.8 min CN=80 Runoff=3.87 cfs 0.303 af

Subcatchment 20S: CATCH20 Runoff Area=5,850 sf 88.77% Impervious Runoff Depth>3.61"
Flow Length=189' Slope=0.0150 '/' Tc=2.0 min CN=95 Runoff=0.61 cfs 0.040 af

Subcatchment 21S: CATCH21 Runoff Area=7,351 sf 0.80% Impervious Runoff Depth>1.47"
Flow Length=55' Slope=0.1000 '/' Tc=3.3 min CN=70 Runoff=0.33 cfs 0.021 af

Subcatchment 22S: CATCH22 Runoff Area=3,330 sf 77.27% Impervious Runoff Depth>3.32"
Flow Length=148' Slope=0.0150 '/' Tc=1.5 min CN=92 Runoff=0.33 cfs 0.021 af

Subcatchment 23S: CATCH23 Runoff Area=189,711 sf 4.90% Impervious Runoff Depth>1.53"
Flow Length=433' Tc=25.3 min CN=71 Runoff=5.05 cfs 0.554 af

Subcatchment 24S: CATCH24 Runoff Area=605,992 sf 0.76% Impervious Runoff Depth>0.51"
Flow Length=1,057' Tc=33.5 min CN=53 Runoff=3.56 cfs 0.596 af

Subcatchment 25S: CATCH25 Runoff Area=14,927 sf 57.32% Impervious Runoff Depth>3.12"
Flow Length=340' Slope=0.0150 '/' Tc=2.7 min CN=90 Runoff=1.40 cfs 0.089 af

Subcatchment 26S: CATCH26 Runoff Area=1,125 sf 58.84% Impervious Runoff Depth>3.12"
Flow Length=44' Slope=0.0150 '/' Tc=0.6 min CN=90 Runoff=0.11 cfs 0.007 af

Subcatchment 27S: CATCH27 Runoff Area=2,087 sf 59.08% Impervious Runoff Depth>3.12"
Flow Length=42' Slope=0.0150 '/' Tc=0.5 min CN=90 Runoff=0.20 cfs 0.012 af

Subcatchment 28S: CATCH28 Runoff Area=2,298 sf 50.17% Impervious Runoff Depth>3.02"
Flow Length=104' Slope=0.0150 '/' Tc=0.9 min CN=89 Runoff=0.22 cfs 0.013 af

Reach 1SP: STUDY POINT #1 Inflow=6.52 cfs 1.168 af
Outflow=6.52 cfs 1.168 af

Reach 2SP: STUDY POINT #2 Inflow=15.12 cfs 3.391 af
Outflow=15.12 cfs 3.391 af

Reach 3C: New Culvert #3 Avg. Flow Depth=0.25' Max Vel=2.53 fps Inflow=10.06 cfs 0.767 af
8.0" x 3.0" Box Pipe n=0.030 L=75.0' S=0.0367 '/' Capacity=0.32 cfs Outflow=0.39 cfs 0.252 af

Reach 4C: Ex. Culvert Avg. Flow Depth=0.51' Max Vel=2.97 fps Inflow=14.67 cfs 2.106 af
115.0" x 76.0" Box Pipe n=0.030 L=75.0' S=0.0100 '/' Capacity=586.94 cfs Outflow=14.64 cfs 2.103 af

Reach 4R: CATCH24 Reach Avg. Flow Depth=0.38' Max Vel=3.49 fps Inflow=14.81 cfs 2.115 af
n=0.030 L=383.7' S=0.0208 '/' Capacity=444.84 cfs Outflow=14.67 cfs 2.106 af

Reach 5R: CATCH23 Reach Avg. Flow Depth=0.16' Max Vel=0.85 fps Inflow=14.64 cfs 2.103 af
n=0.030 L=646.0' S=0.0031 '/' Capacity=12,048.05 cfs Outflow=11.73 cfs 2.059 af

Reach 6R: CATCH 23 Reach Avg. Flow Depth=0.18' Max Vel=2.53 fps Inflow=6.17 cfs 0.786 af
n=0.030 L=77.2' S=0.0324 '/' Capacity=1,385.41 cfs Outflow=6.04 cfs 0.785 af

Reach 7R: CATCH23 Reach Avg. Flow Depth=0.24' Max Vel=1.55 fps Inflow=9.36 cfs 1.339 af
n=0.030 L=182.5' S=0.0082 '/' Capacity=5,255.57 cfs Outflow=9.29 cfs 1.333 af

Reach 8R: CATCH 23 Reach Avg. Flow Depth=0.04' Max Vel=2.17 fps Inflow=4.02 cfs 0.324 af
n=0.022 L=79.0' S=0.0886 '/' Capacity=1,415.96 cfs Outflow=3.95 cfs 0.324 af

Reach 9R: CATCH 23 Reach Avg. Flow Depth=0.03' Max Vel=1.13 fps Inflow=0.39 cfs 0.252 af
n=0.030 L=162.0' S=0.0494 '/' Capacity=1,710.82 cfs Outflow=0.37 cfs 0.250 af

Pond 1CB: CB R20 Peak Elev=228.21' Inflow=2.90 cfs 0.192 af
15.0" Round Culvert n=0.013 L=40.5' S=0.0062 '/' Outflow=2.90 cfs 0.192 af

Pond 1P: Main Stormwater Pond Peak Elev=232.84' Storage=90,187 cf Inflow=49.48 cfs 3.461 af
Discarded=0.05 cfs 0.060 af Primary=12.00 cfs 1.519 af Outflow=12.05 cfs 1.579 af

Pond 2CB: CB R18 Peak Elev=228.62' Inflow=2.30 cfs 0.151 af
15.0" Round Culvert n=0.013 L=21.5' S=0.0233 '/' Outflow=2.30 cfs 0.151 af

Pond 2P: Soil Filter #1 Peak Elev=224.00' Storage=5 cf Inflow=3.22 cfs 0.212 af
Outflow=3.22 cfs 0.212 af

Pond 3CB: CB R22 Peak Elev=227.07' Inflow=0.33 cfs 0.021 af
12.0" Round Culvert n=0.013 L=43.0' S=0.0116 '/' Outflow=0.33 cfs 0.021 af

Pond 3P: Soil Filter #2 Peak Elev=224.01' Storage=28 cf Inflow=4.02 cfs 0.324 af
Outflow=4.02 cfs 0.324 af

Pond 4CB: CB R16 Peak Elev=237.41' Inflow=6.39 cfs 0.508 af
19.0" Round Culvert n=0.013 L=245.0' S=0.0200 '/' Outflow=6.39 cfs 0.508 af

Pond 5CB: CB R15 Peak Elev=238.66' Inflow=1.20 cfs 0.077 af
12.0" Round Culvert n=0.013 L=41.0' S=0.0171 '/' Outflow=1.20 cfs 0.077 af

Pond 6CB: CB R13 Peak Elev=238.47' Inflow=4.84 cfs 0.364 af
18.0" Round Culvert n=0.013 L=69.3' S=0.0173 '/' Outflow=4.84 cfs 0.364 af

Pond 7CB: CB R17 Peak Elev=235.21' Inflow=40.14 cfs 2.689 af
42.0" Round Culvert n=0.013 L=168.0' S=0.0074 '/' Outflow=40.14 cfs 2.689 af

Pond 8CB: CB R11 Peak Elev=244.97' Inflow=0.08 cfs 0.005 af
8.0" Round Culvert n=0.010 L=45.0' S=0.0089 '/' Outflow=0.08 cfs 0.005 af

Pond 9CB: CB R11 Peak Elev=244.46' Inflow=0.08 cfs 0.005 af
10.0" Round Culvert n=0.010 L=160.6' S=0.0252 '/' Outflow=0.08 cfs 0.005 af

Pond 10CB: CB R10 Peak Elev=241.65' Inflow=7.22 cfs 0.477 af
21.0" Round Culvert n=0.013 L=188.0' S=0.0104 '/' Outflow=7.22 cfs 0.477 af

Pond 11CB: CB R9 Peak Elev=241.01' Inflow=4.13 cfs 0.266 af
16.0" Round Culvert n=0.013 L=55.0' S=0.0282 '/' Outflow=4.13 cfs 0.266 af

Pond 12CB: DMH R9 Peak Elev=239.98' Inflow=11.34 cfs 0.743 af
24.0" Round Culvert n=0.013 L=154.5' S=0.0078 '/' Outflow=11.34 cfs 0.743 af

Pond 13CB: CB R8 Peak Elev=243.40' Inflow=29.31 cfs 1.949 af
24.0" Round Culvert n=0.013 L=93.0' S=0.0075 '/' Outflow=29.31 cfs 1.949 af

Pond 14CB: CB R8 Peak Elev=238.89' Inflow=18.01 cfs 1.206 af
36.0" Round Culvert n=0.013 L=43.0' S=0.0093 '/' Outflow=18.01 cfs 1.206 af

Pond 15CB: CB R6 Peak Elev=245.08' Inflow=3.79 cfs 0.240 af
18.0" Round Culvert n=0.013 L=352.5' S=0.0099 '/' Outflow=3.79 cfs 0.240 af

Pond 16CB: CB R7 Peak Elev=241.31' Inflow=8.79 cfs 0.593 af
24.0" Round Culvert n=0.013 L=279.7' S=0.0107 '/' Outflow=8.79 cfs 0.593 af

Pond 17CB: CB R24 Peak Elev=238.38' Inflow=30.71 cfs 2.038 af
36.0" Round Culvert n=0.013 L=193.0' S=0.0078 '/' Outflow=30.71 cfs 2.038 af

Pond 18CB: CB R24 Peak Elev=236.57' Inflow=30.81 cfs 2.045 af
42.0" Round Culvert n=0.013 L=71.0' S=0.0070 '/' Outflow=30.81 cfs 2.045 af

Pond 19CB: CB R20 Peak Elev=229.45' Inflow=0.61 cfs 0.040 af
12.0" Round Culvert n=0.013 L=86.3' S=0.0203 '/' Outflow=0.61 cfs 0.040 af

Pond 20CB: CB R13 Peak Elev=238.71' Inflow=3.98 cfs 0.286 af
18.0" Round Culvert n=0.013 L=28.0' S=0.0107 '/' Outflow=3.98 cfs 0.286 af

Pond 21CB: CB 21 Peak Elev=235.89' Inflow=30.99 cfs 2.057 af
42.0" Round Culvert n=0.013 L=130.0' S=0.0088 '/' Outflow=30.99 cfs 2.057 af

Total Runoff Area = 61.828 ac Runoff Volume = 7.083 af Average Runoff Depth = 1.37"
79.91% Pervious = 49.408 ac 20.09% Impervious = 12.421 ac

Summary for Subcatchment 1S: CATCH1

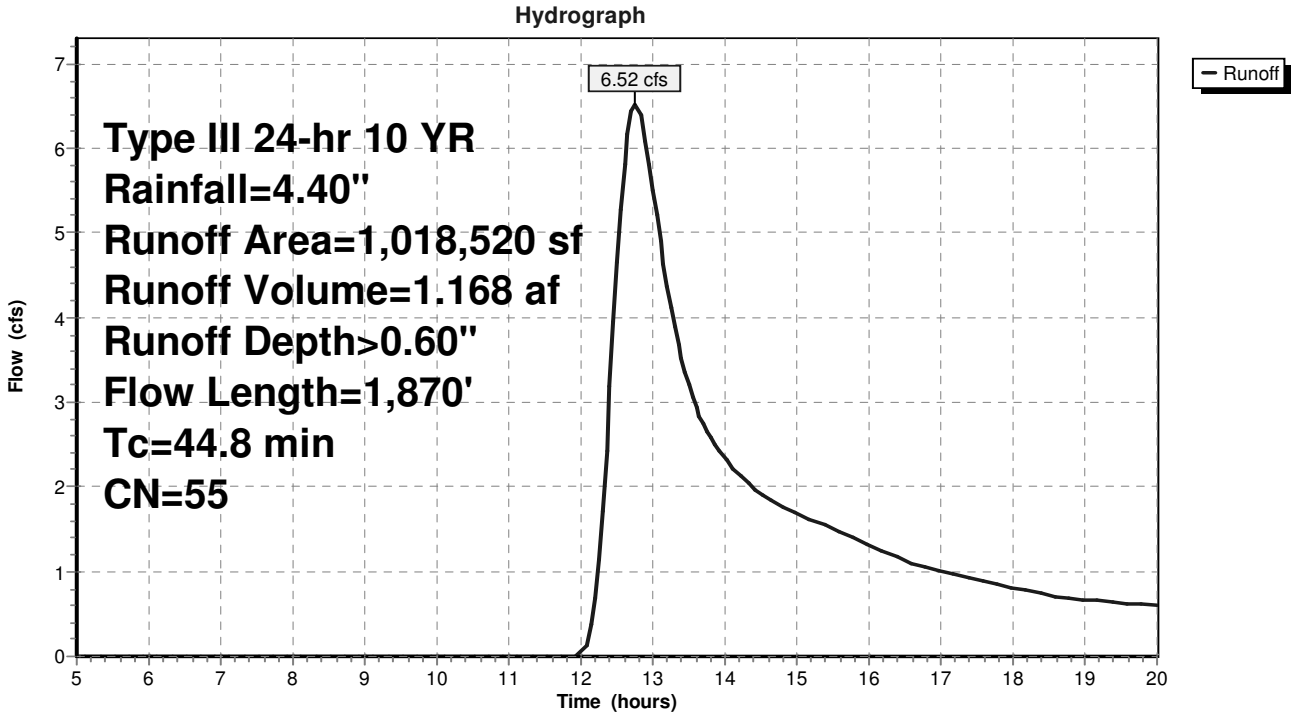
Runoff = 6.52 cfs @ 12.76 hrs, Volume= 1.168 af, Depth> 0.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	95,226	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	94,031	70	Woods, Good, HSG C
	154,141	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	1,546	84	50-75% Grass cover, Fair, HSG D
*	94,602	98	Impervious
	386,699	30	Meadow, non-grazed, HSG A
	151,690	71	Meadow, non-grazed, HSG C
	40,585	78	Meadow, non-grazed, HSG D
	1,018,520	55	Weighted Average
	923,918		90.71% Pervious Area
	94,602		9.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	100	0.1300	0.35		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.00"
13.2	945	0.0290	1.19		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.0100	3.74	11.76	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
26.7	800	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
44.8	1,870	Total			

Subcatchment 1S: CATCH1



Summary for Subcatchment 5S: CATCH5

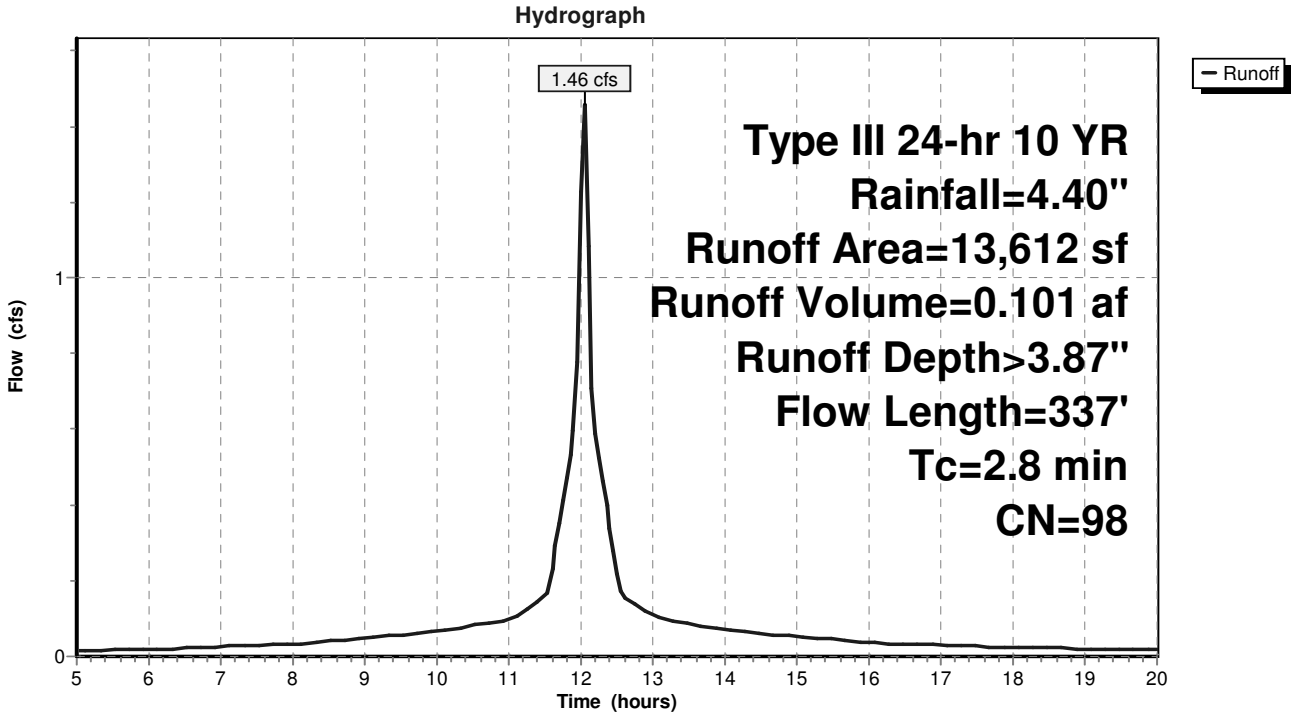
Runoff = 1.46 cfs @ 12.04 hrs, Volume= 0.101 af, Depth> 3.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	4	70	Woods, Good, HSG C
	62	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	13,546	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	13,612	98	Weighted Average
	66		0.48% Pervious Area
	13,546		99.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.33		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.4	62	0.0200	2.87		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
1.1	175	0.0170	2.65		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
2.8	337	Total			

Subcatchment 5S: CATCH5



Summary for Subcatchment 6S: CATCH6

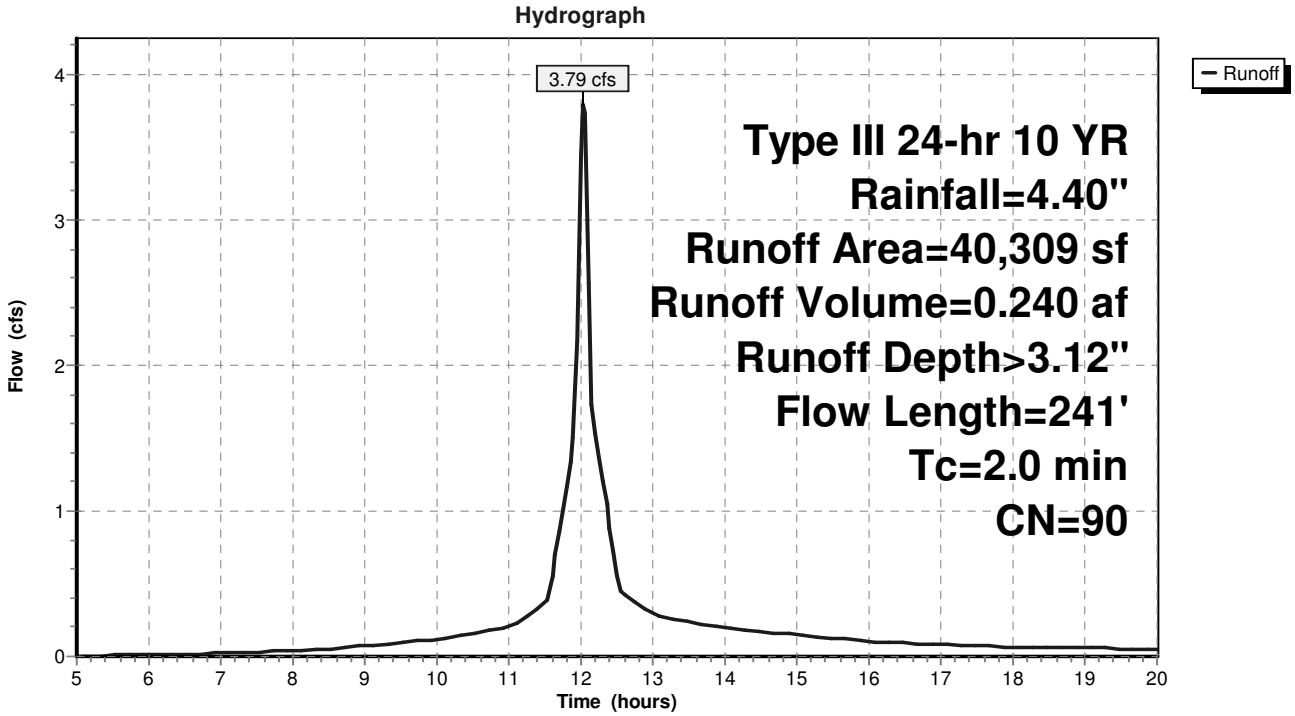
Runoff = 3.79 cfs @ 12.03 hrs, Volume= 0.240 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	133	70	Woods, Good, HSG C
	222	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,788	79	50-75% Grass cover, Fair, HSG C
	20,691	84	50-75% Grass cover, Fair, HSG D
*	17,475	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	40,309	90	Weighted Average
	22,834		56.65% Pervious Area
	17,475		43.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.25		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.1	22	0.0170	2.65		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
0.6	119	0.0500	3.35		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
2.0	241	Total			

Subcatchment 6S: CATCH6



Summary for Subcatchment 7S: CATCH7

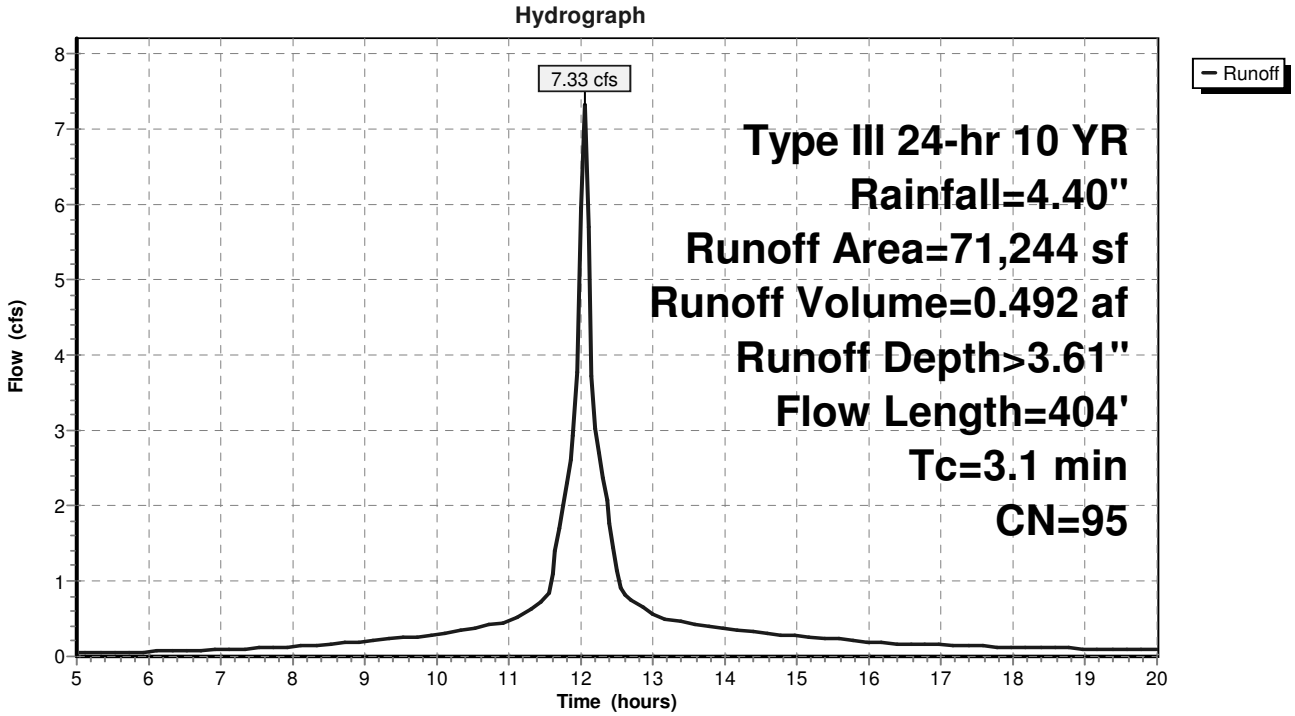
Runoff = 7.33 cfs @ 12.05 hrs, Volume= 0.492 af, Depth> 3.61"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	3	70	Woods, Good, HSG C
	590	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,164	79	50-75% Grass cover, Fair, HSG C
	11,338	84	50-75% Grass cover, Fair, HSG D
*	58,149	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	71,244	95	Weighted Average
	13,095		18.38% Pervious Area
	58,149		81.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	92	0.0220	1.36		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.00"
0.8	114	0.0260	2.42		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
0.1	23	0.0260	3.27		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
1.1	175	0.0170	2.65		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
3.1	404	Total			

Subcatchment 7S: CATCH7



Summary for Subcatchment 8S: CATCH8

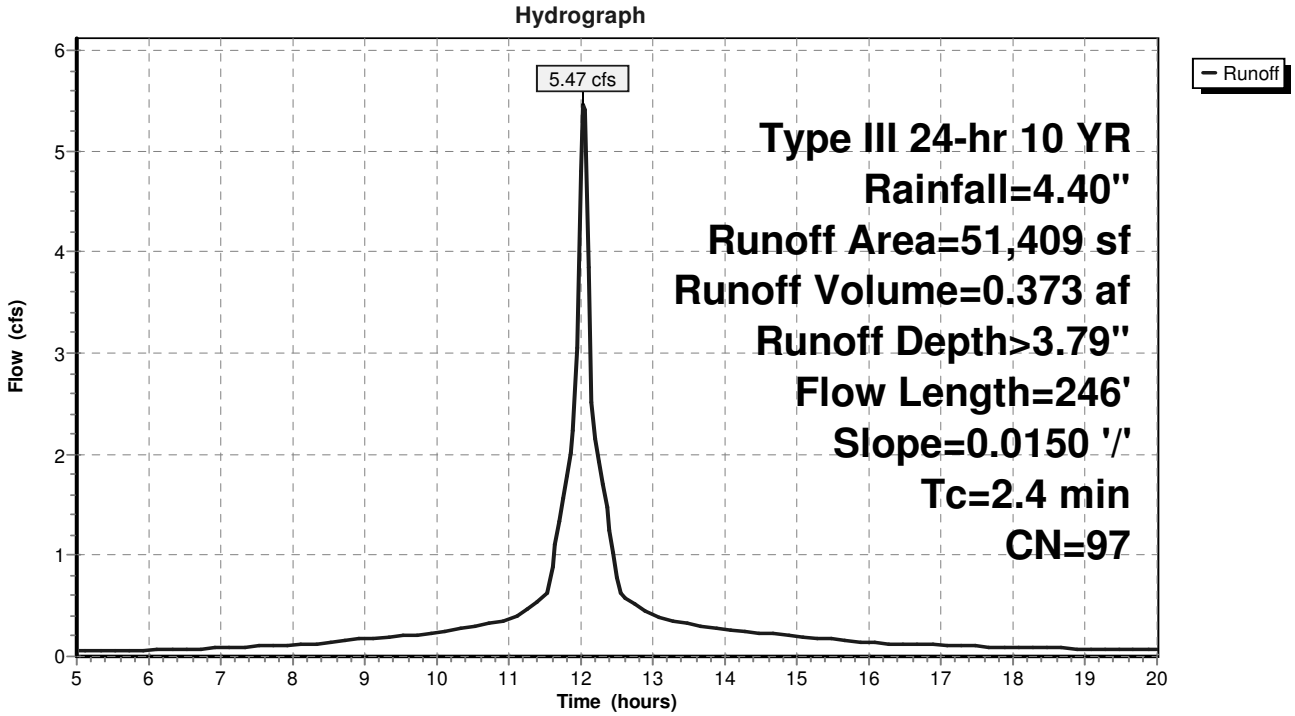
Runoff = 5.47 cfs @ 12.04 hrs, Volume= 0.373 af, Depth> 3.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,806	79	50-75% Grass cover, Fair, HSG C
	827	84	50-75% Grass cover, Fair, HSG D
*	48,776	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	51,409	97	Weighted Average
	2,633		5.12% Pervious Area
	48,776		94.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0150	1.19		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
1.0	146	0.0150	2.49		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
2.4	246	Total			

Subcatchment 8S: CATCH8



Summary for Subcatchment 9S: CATCH9

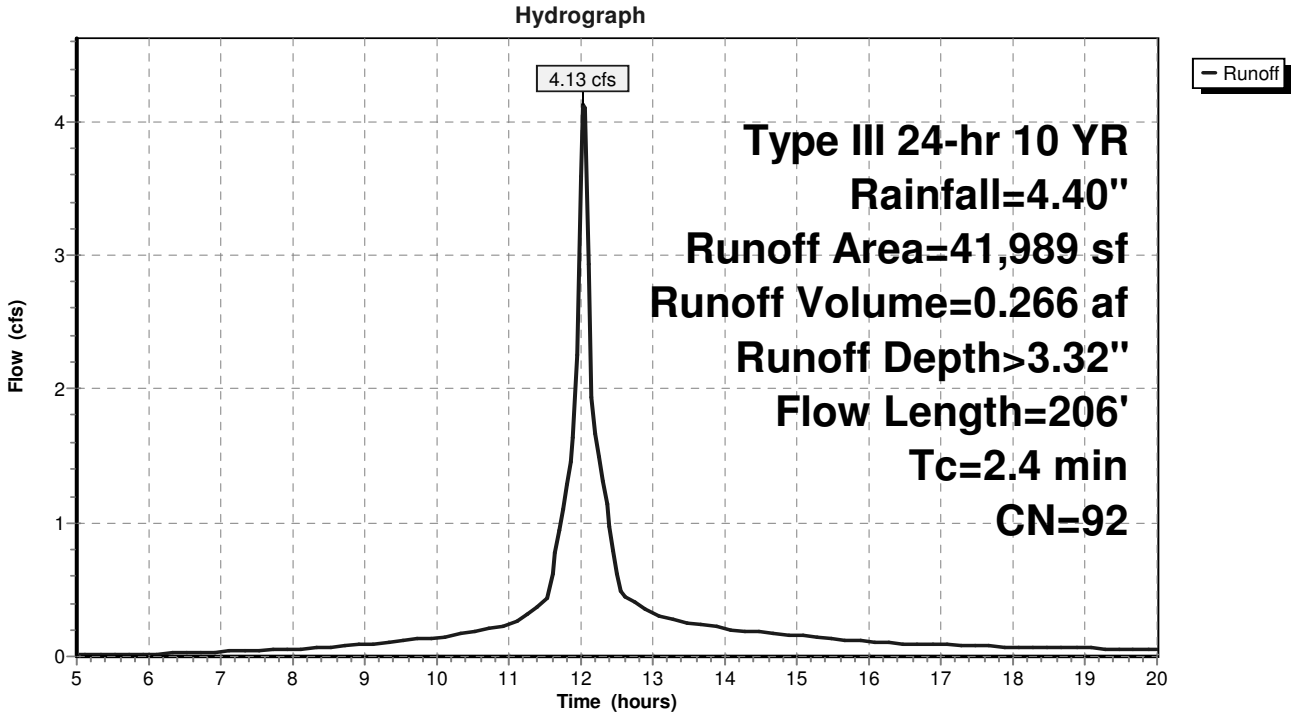
Runoff = 4.13 cfs @ 12.04 hrs, Volume= 0.266 af, Depth> 3.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	7,382	79	50-75% Grass cover, Fair, HSG C
	6,938	84	50-75% Grass cover, Fair, HSG D
*	27,669	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	41,989	92	Weighted Average
	14,320		34.10% Pervious Area
	27,669		65.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	100	0.0100	1.01		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.7	106	0.0170	2.65		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
2.4	206	Total			

Subcatchment 9S: CATCH9



Summary for Subcatchment 10S: CATCH10

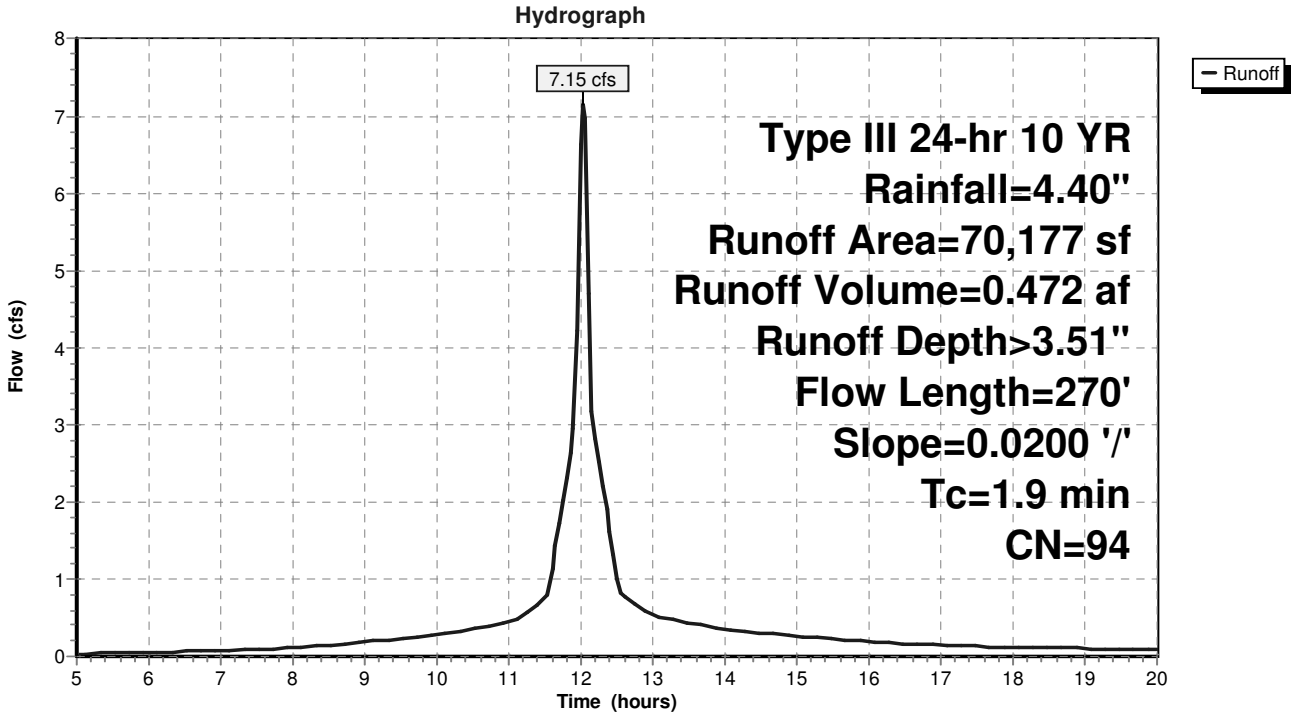
Runoff = 7.15 cfs @ 12.03 hrs, Volume= 0.472 af, Depth> 3.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	2,226	70	Woods, Good, HSG C
	1,483	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	2,572	79	50-75% Grass cover, Fair, HSG C
	11,683	84	50-75% Grass cover, Fair, HSG D
*	52,213	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	70,177	94	Weighted Average
	17,964		25.60% Pervious Area
	52,213		74.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0200	1.11		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.00"
1.3	230	0.0200	2.87		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
1.9	270	Total			

Subcatchment 10S: CATCH10



Summary for Subcatchment 11S: CATCH11

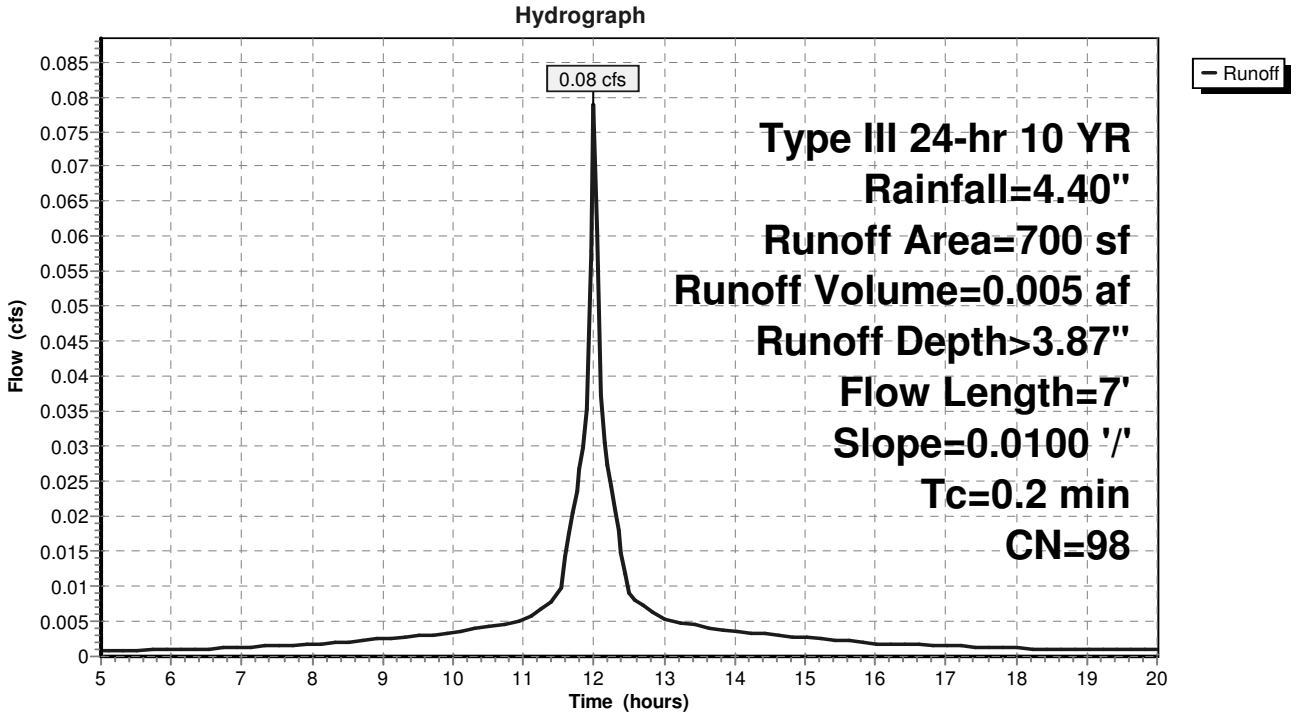
Runoff = 0.08 cfs @ 12.00 hrs, Volume= 0.005 af, Depth> 3.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	700	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	700	98	Weighted Average
	700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	7	0.0100	0.59		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment 11S: CATCH11



Summary for Subcatchment 12S: CATCH12

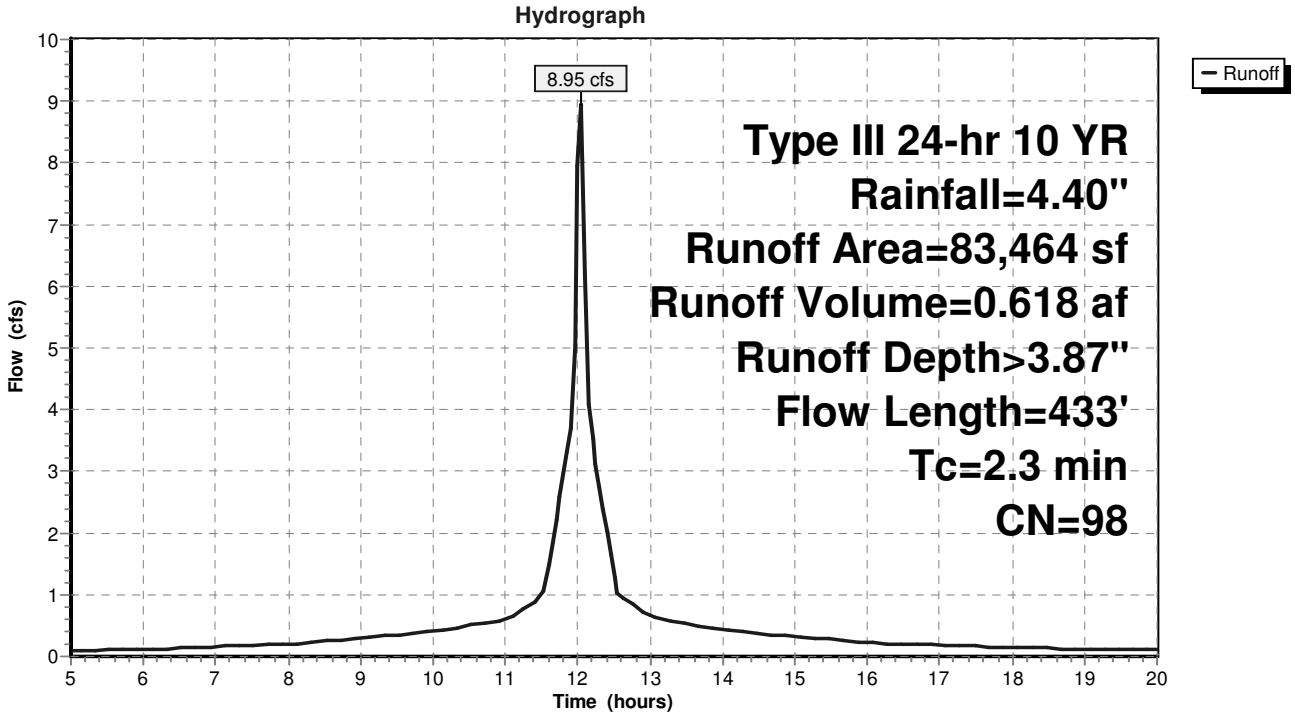
Runoff = 8.95 cfs @ 12.04 hrs, Volume= 0.618 af, Depth> 3.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,158	79	50-75% Grass cover, Fair, HSG C
	305	84	50-75% Grass cover, Fair, HSG D
*	82,001	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	83,464	98	Weighted Average
	1,463		1.75% Pervious Area
	82,001		98.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	62	0.0050	0.70		**Sheet Flow, Rooftop** Smooth surfaces n= 0.011 P2= 3.00"
0.6	238	0.0200	6.36	2.22	**Pipe Channel, internal roof drains** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.2	133	0.0100	10.46	100.61	**Pipe Channel,** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.013 Corrugated PE, smooth interior
2.3	433	Total			

Subcatchment 12S: CATCH12



Summary for Subcatchment 13S: CATCH13

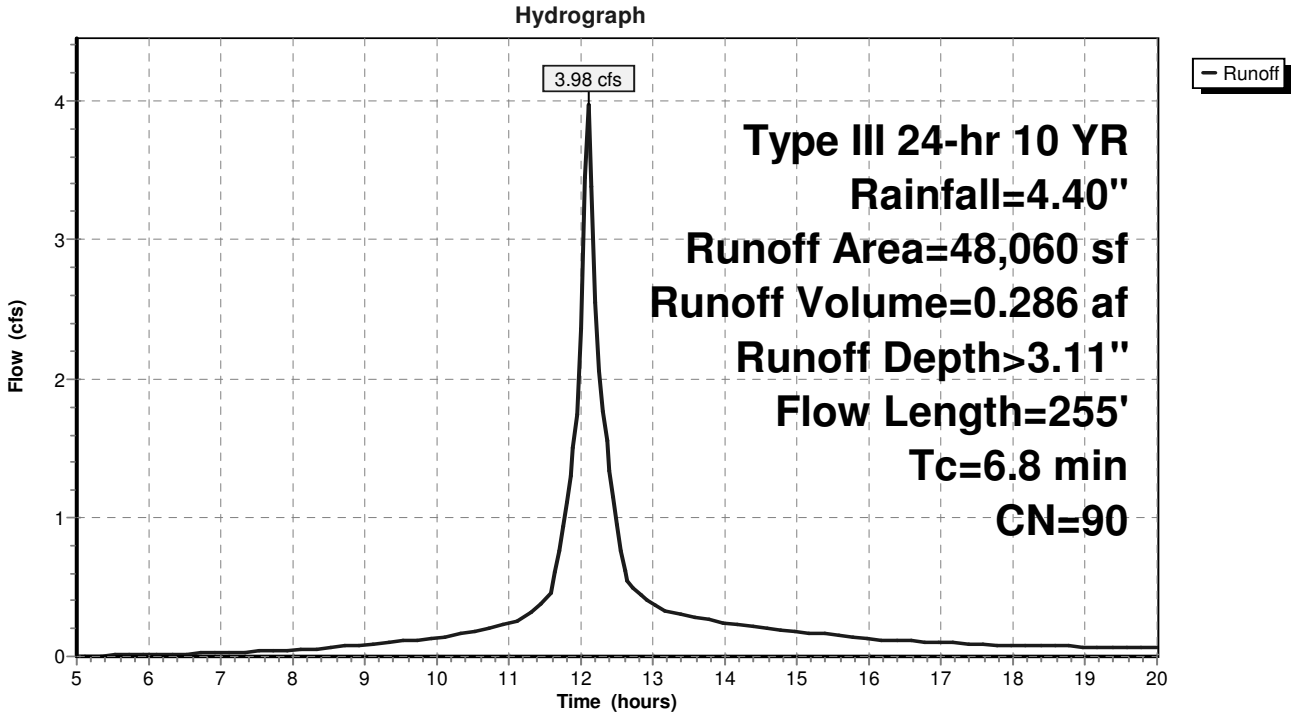
Runoff = 3.98 cfs @ 12.10 hrs, Volume= 0.286 af, Depth> 3.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	9,556	79	50-75% Grass cover, Fair, HSG C
	13,854	84	50-75% Grass cover, Fair, HSG D
*	24,650	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	48,060	90	Weighted Average
	23,410		48.71% Pervious Area
	24,650		51.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	47	0.0200	0.14		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.00"
0.2	28	0.0200	2.87		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
1.1	168	0.0300	2.60		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
0.0	12	0.2800	24.00	18.85	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
6.8	255	Total			

Subcatchment 13S: CATCH13



Summary for Subcatchment 14S: CATCH14

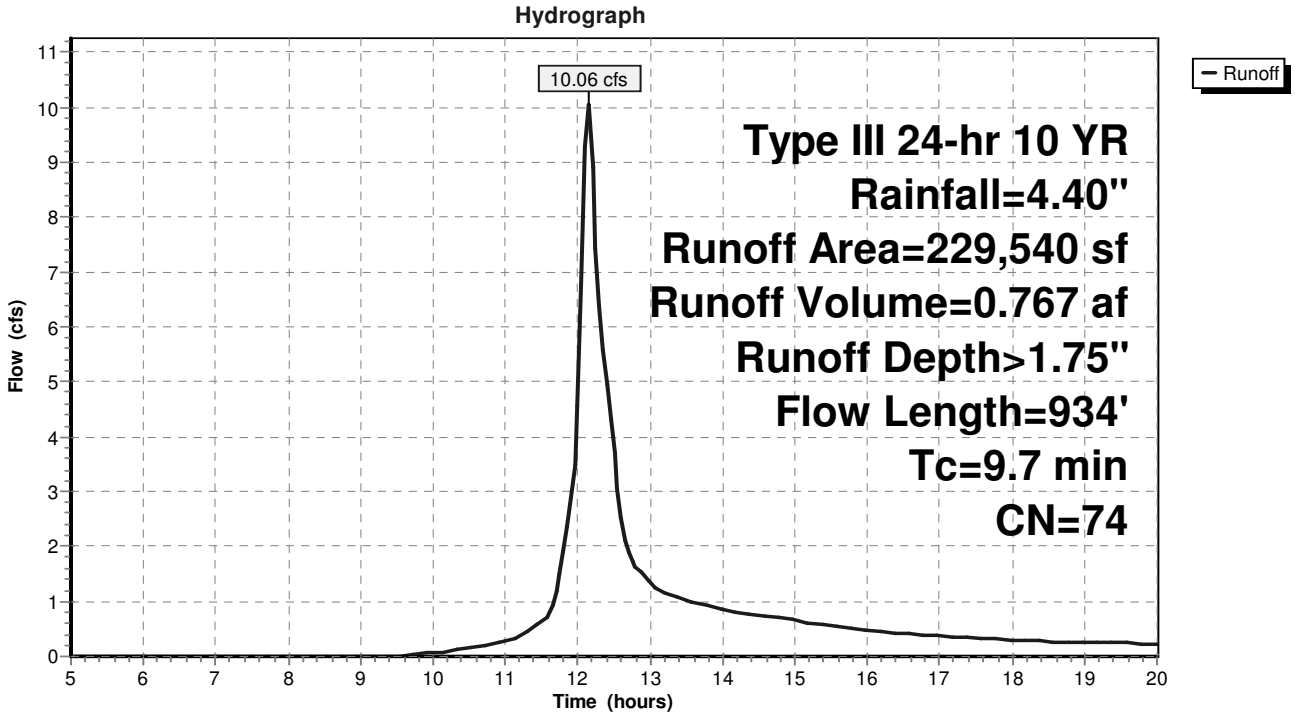
Runoff = 10.06 cfs @ 12.15 hrs, Volume= 0.767 af, Depth> 1.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	177,302	70	Woods, Good, HSG C
	29,548	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	22,690	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	229,540	74	Weighted Average
	206,850		90.12% Pervious Area
	22,690		9.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	31	0.0480	0.18		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.00"
5.9	704	0.0178	2.00		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
0.0	21	0.0700	15.73	27.79	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
1.0	178	0.0400	3.00		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
9.7	934	Total			

Subcatchment 14S: CATCH14



Summary for Subcatchment 15S: CATCH15

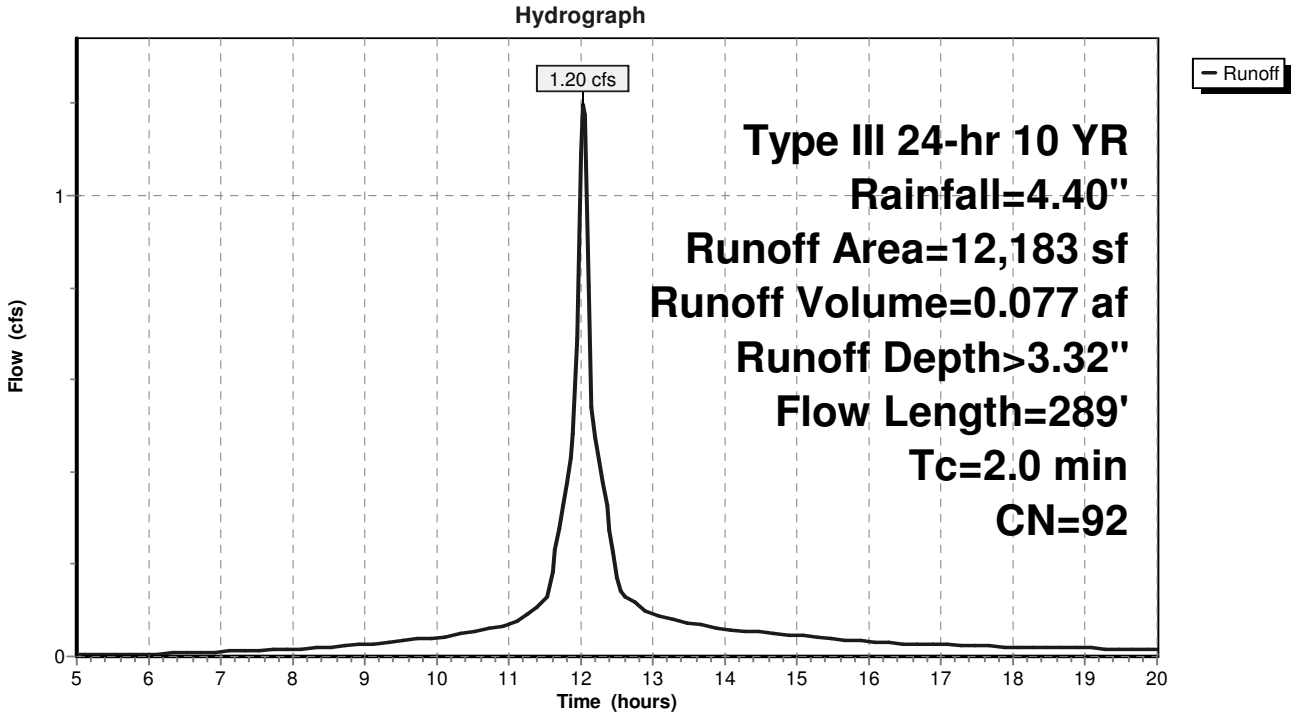
Runoff = 1.20 cfs @ 12.03 hrs, Volume= 0.077 af, Depth> 3.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	65	70	Woods, Good, HSG C
	34	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	3,199	79	50-75% Grass cover, Fair, HSG C
	289	84	50-75% Grass cover, Fair, HSG D
*	8,596	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	12,183	92	Weighted Average
	3,587		29.44% Pervious Area
	8,596		70.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.33		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.00"
0.6	137	0.0400	4.06		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
0.1	52	0.0500	10.14	7.97	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
2.0	289	Total			

Subcatchment 15S: CATCH15



Summary for Subcatchment 16S: CATCH16

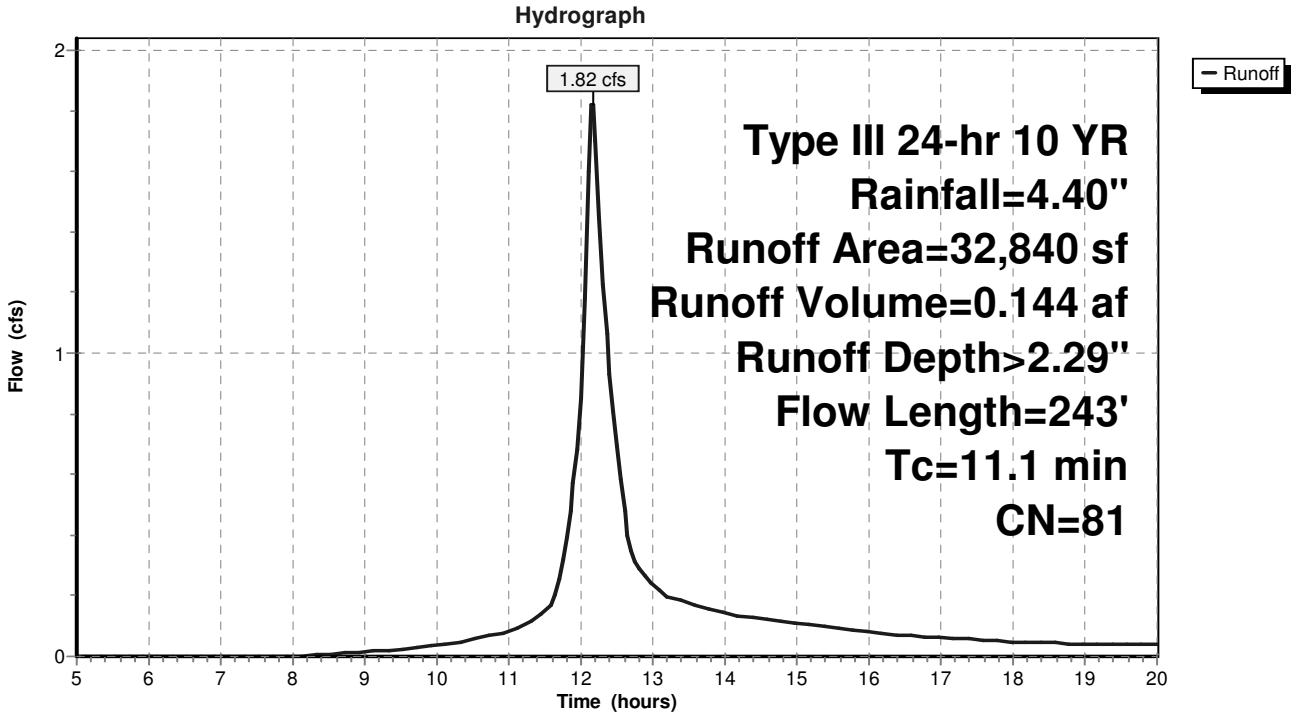
Runoff = 1.82 cfs @ 12.16 hrs, Volume= 0.144 af, Depth> 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	21,095	79	50-75% Grass cover, Fair, HSG C
	10,542	84	50-75% Grass cover, Fair, HSG D
*	1,203	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	32,840	81	Weighted Average
	31,637		96.34% Pervious Area
	1,203		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0200	0.16		**Sheet Flow, Sheet**
					Grass: Short n= 0.150 P2= 3.00"
1.0	127	0.0200	2.12		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
0.0	16	0.3300	8.62		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
11.1	243	Total			

Subcatchment 16S: CATCH16



Summary for Subcatchment 17S: CATCH17

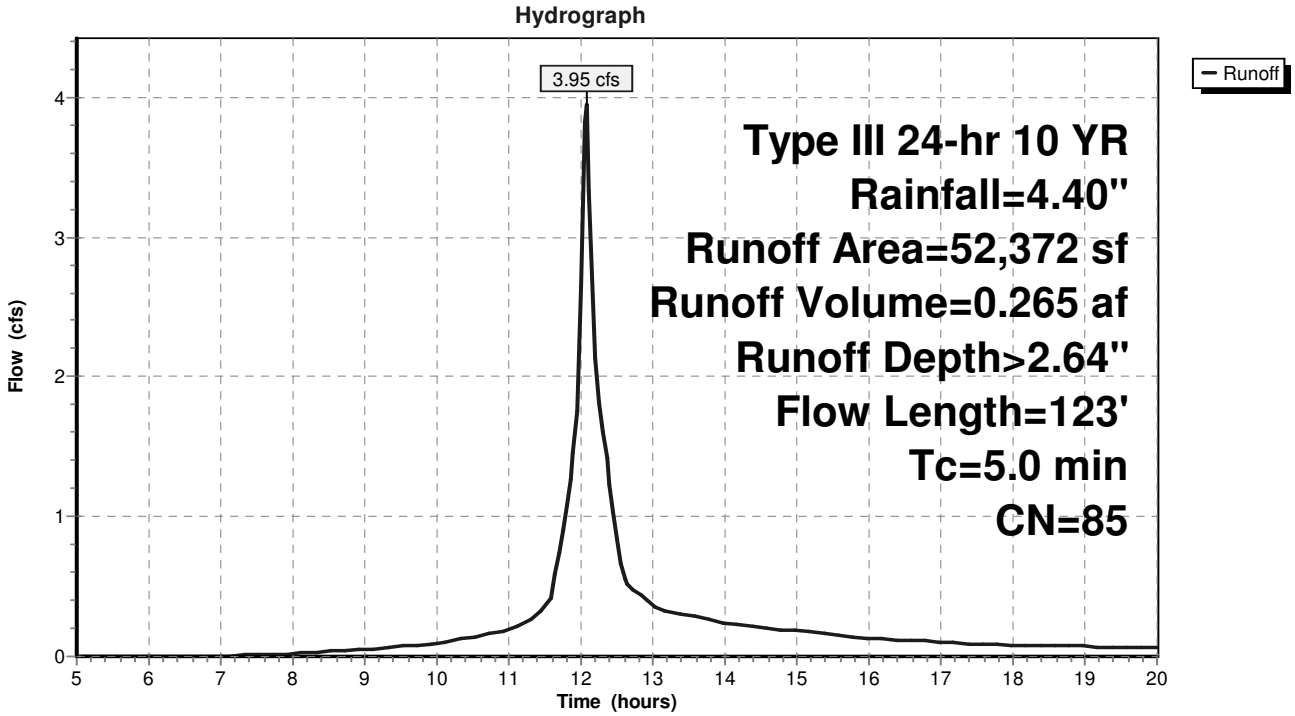
Runoff = 3.95 cfs @ 12.08 hrs, Volume= 0.265 af, Depth> 2.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	1,801	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	33,394	79	50-75% Grass cover, Fair, HSG C
	278	84	50-75% Grass cover, Fair, HSG D
*	2,699	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	14,200	98	Water Surface, HSG C
	52,372	85	Weighted Average
	35,473		67.73% Pervious Area
	16,899		32.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	55	0.0380	0.19		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.00"
0.1	68	0.2050	9.19		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
5.0	123	Total			

Subcatchment 17S: CATCH17



Summary for Subcatchment 18S: CATCH18

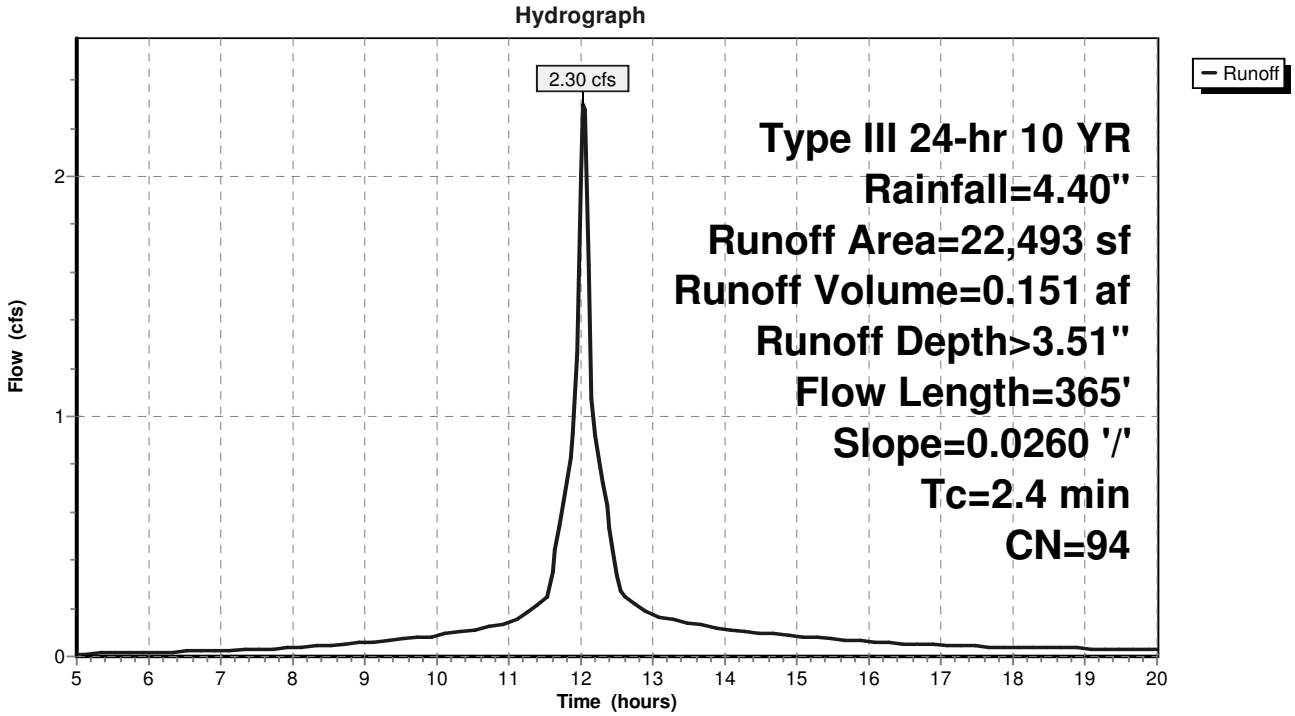
Runoff = 2.30 cfs @ 12.04 hrs, Volume= 0.151 af, Depth> 3.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	147	70	Woods, Good, HSG C
	2	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	4,636	79	50-75% Grass cover, Fair, HSG C
	230	84	50-75% Grass cover, Fair, HSG D
*	17,478	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	22,493	94	Weighted Average
	5,015		22.30% Pervious Area
	17,478		77.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	75	0.0260	1.40		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.00"
1.5	290	0.0260	3.27		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
2.4	365	Total			

Subcatchment 18S: CATCH18



Summary for Subcatchment 19S: CATCH19

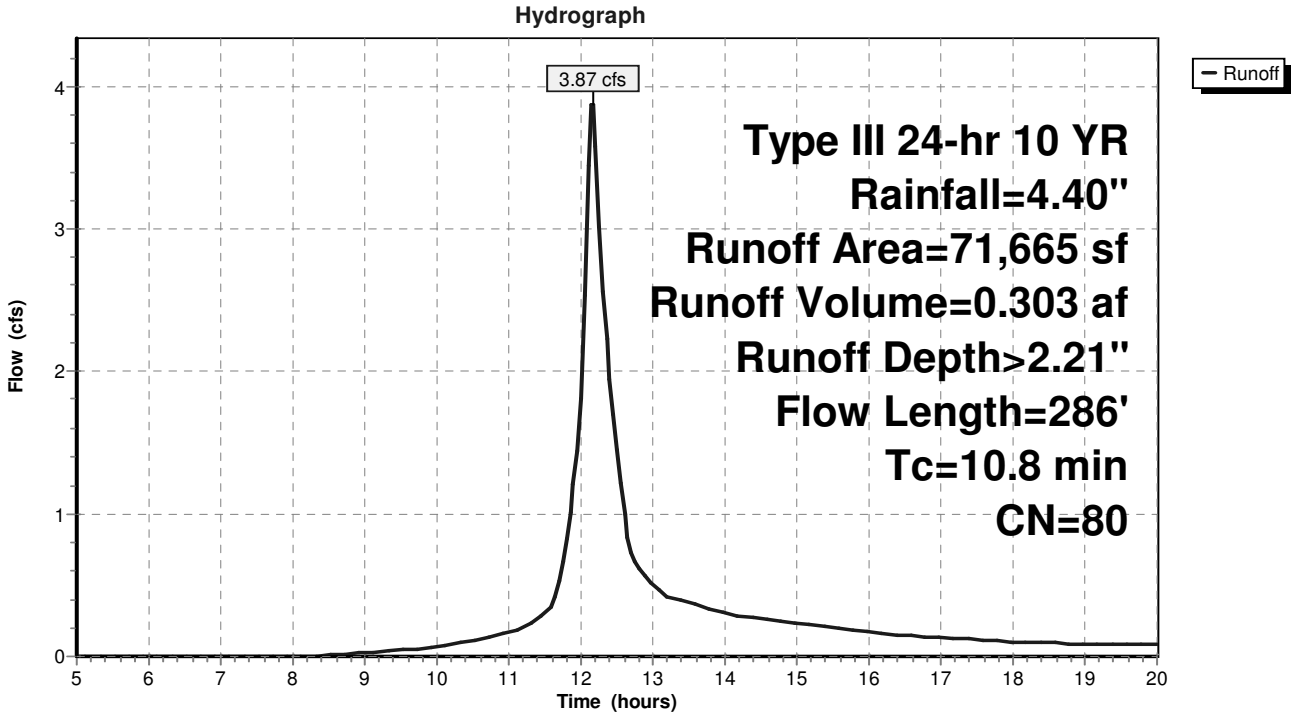
Runoff = 3.87 cfs @ 12.15 hrs, Volume= 0.303 af, Depth> 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	34,282	70	Woods, Good, HSG C
	11,225	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	3,570	79	50-75% Grass cover, Fair, HSG C
	1,520	84	50-75% Grass cover, Fair, HSG D
*	21,068	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	71,665	80	Weighted Average
	50,597		70.60% Pervious Area
	21,068		29.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	75	0.0130	0.13		**Sheet Flow, Sheet**
					Grass: Short n= 0.150 P2= 3.00"
1.1	165	0.0270	2.46		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
0.1	46	0.2300	7.19		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
10.8	286	Total			

Subcatchment 19S: CATCH19



Summary for Subcatchment 20S: CATCH20

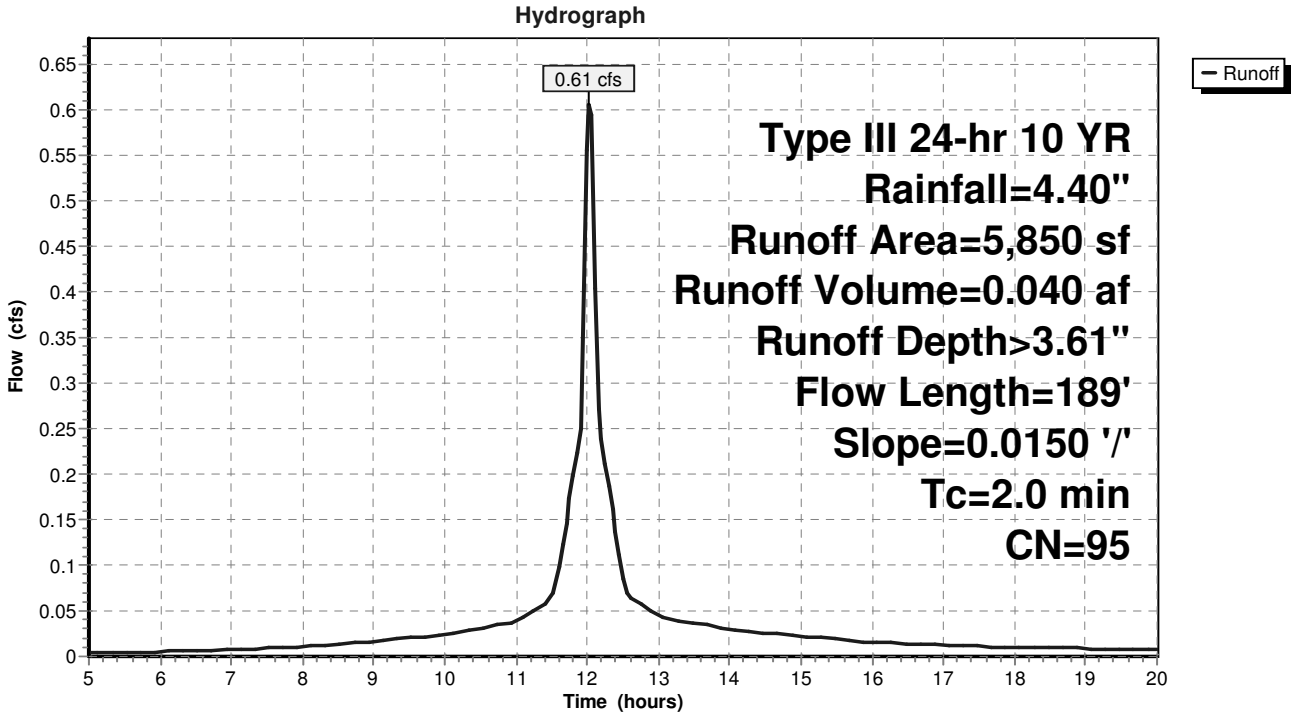
Runoff = 0.61 cfs @ 12.03 hrs, Volume= 0.040 af, Depth> 3.61"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	657	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	5,193	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	5,850	95	Weighted Average
	657		11.23% Pervious Area
	5,193		88.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0150	1.19		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.6	89	0.0150	2.49		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
2.0	189	Total			

Subcatchment 20S: CATCH20



Summary for Subcatchment 21S: CATCH21

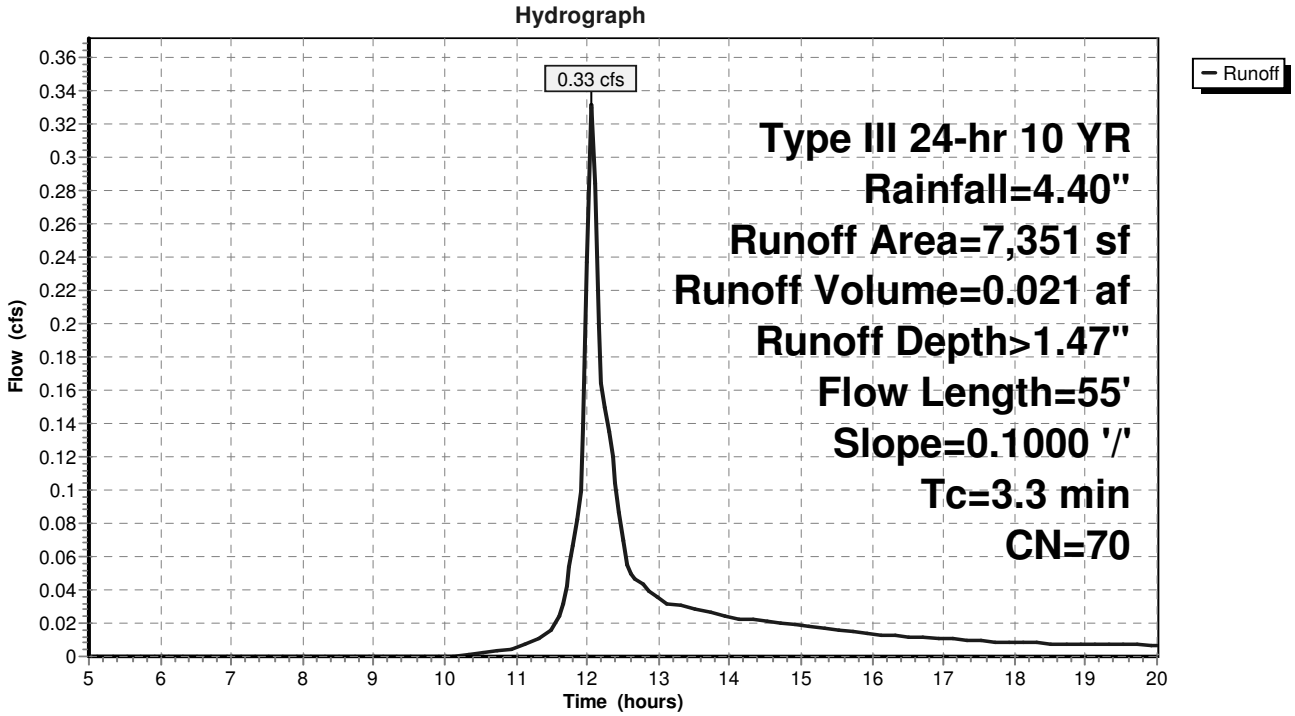
Runoff = 0.33 cfs @ 12.06 hrs, Volume= 0.021 af, Depth> 1.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	7,292	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	59	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	7,351	70	Weighted Average
	7,292		99.20% Pervious Area
	59		0.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	55	0.1000	0.28		**Sheet Flow, Sheet**
					Grass: Short n= 0.150 P2= 3.00"

Subcatchment 21S: CATCH21



Summary for Subcatchment 22S: CATCH22

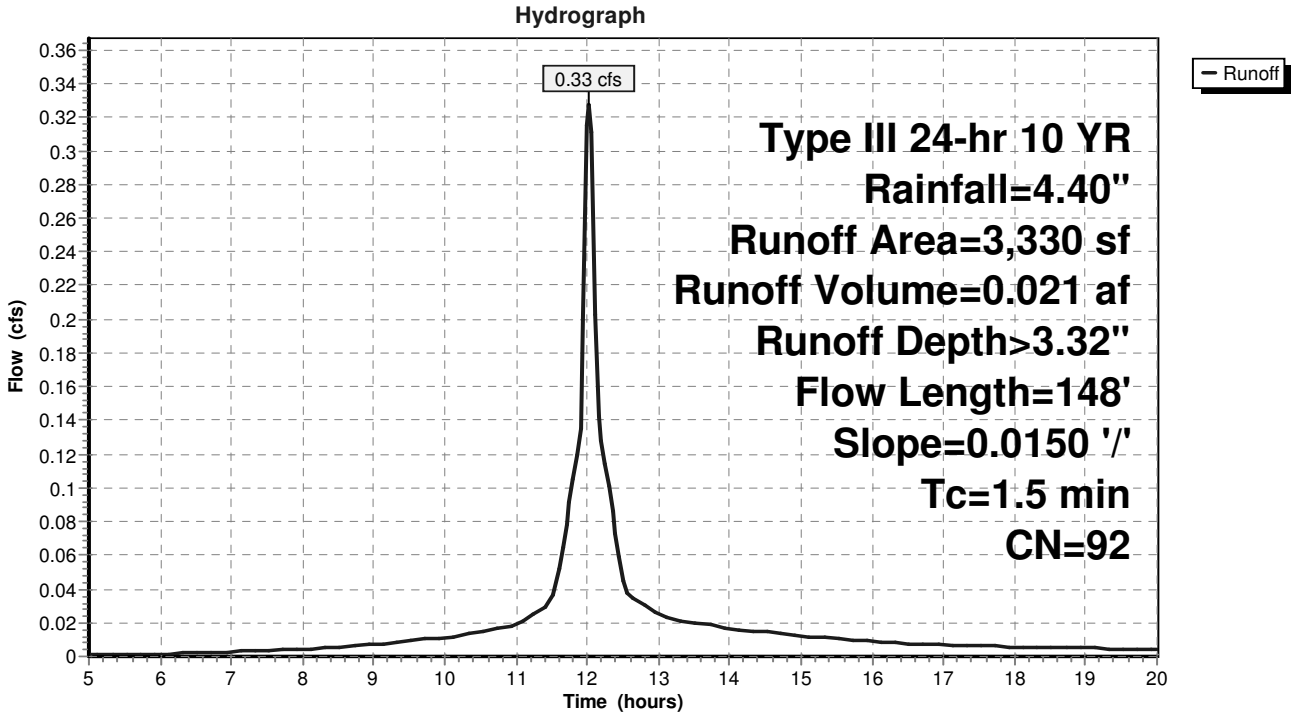
Runoff = 0.33 cfs @ 12.02 hrs, Volume= 0.021 af, Depth> 3.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	708	70	Woods, Good, HSG C
	49	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	2,573	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	3,330	92	Weighted Average
	757		22.73% Pervious Area
	2,573		77.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.03		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.7	98	0.0150	2.49		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
1.5	148	Total			

Subcatchment 22S: CATCH22



Summary for Subcatchment 23S: CATCH23

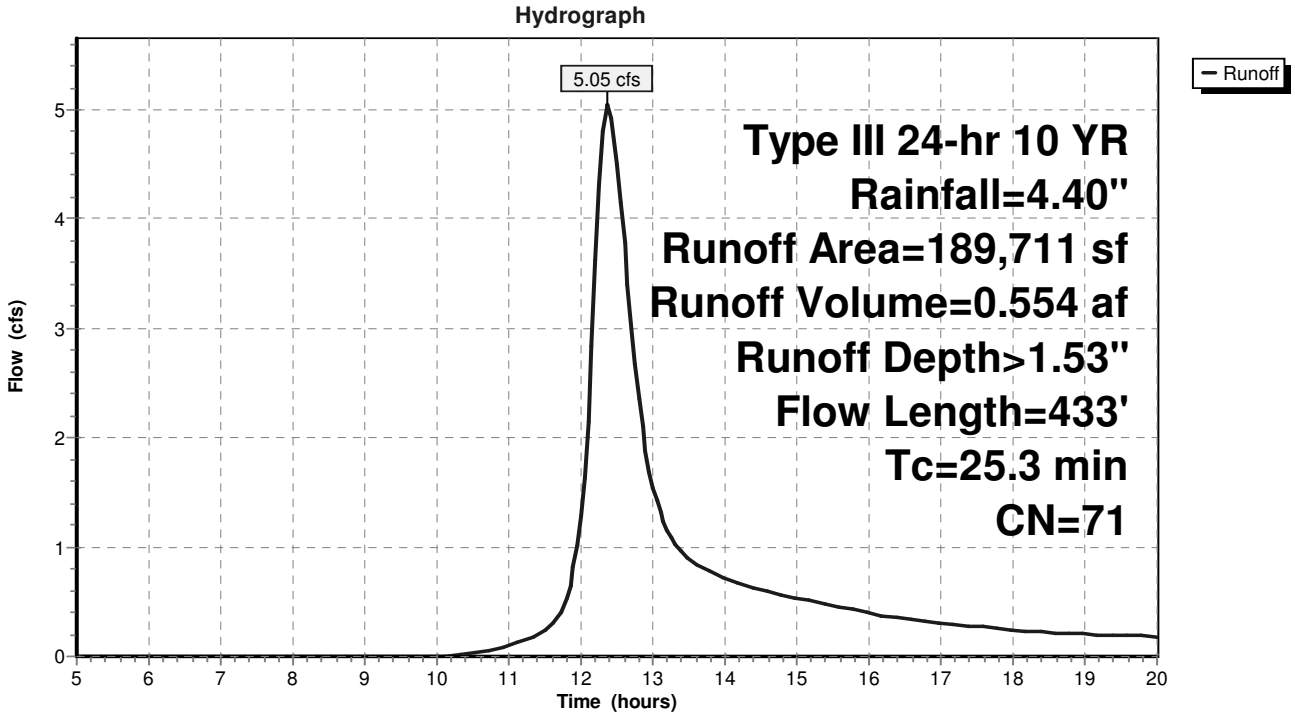
Runoff = 5.05 cfs @ 12.37 hrs, Volume= 0.554 af, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	4,918	55	Woods, Good, HSG B
	163,256	70	Woods, Good, HSG C
	7,346	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	4,901	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	9,290	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	189,711	71	Weighted Average
	180,421		95.10% Pervious Area
	9,290		4.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0250	0.08		**Sheet Flow, Sheet**
					Woods: Light underbrush n= 0.400 P2= 3.00"
5.0	333	0.0500	1.12		**Shallow Concentrated Flow, SCF**
					Woodland Kv= 5.0 fps
25.3	433	Total			

Subcatchment 23S: CATCH23



Summary for Subcatchment 24S: CATCH24

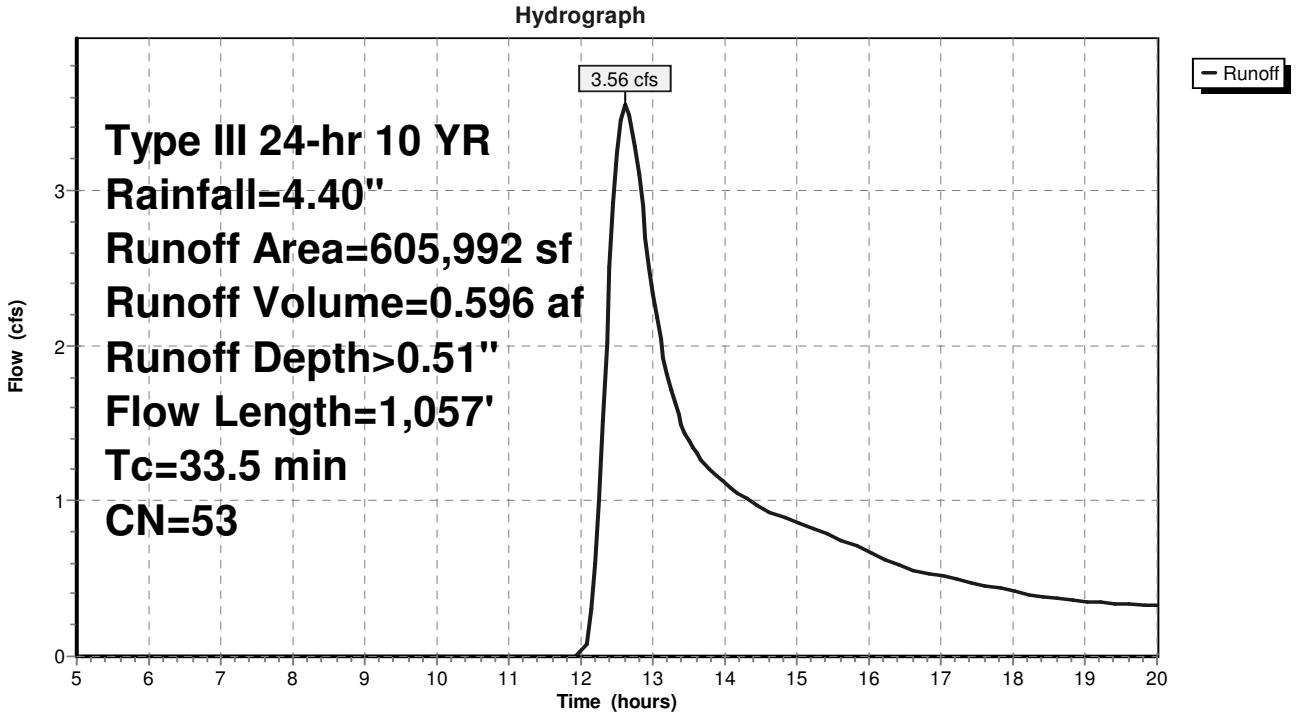
Runoff = 3.56 cfs @ 12.62 hrs, Volume= 0.596 af, Depth> 0.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	199,327	30	Woods, Good, HSG A
	172,097	55	Woods, Good, HSG B
	213,901	70	Woods, Good, HSG C
	11,916	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	4,137	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	4,614	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	605,992	53	Weighted Average
	601,378		99.24% Pervious Area
	4,614		0.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.4	100	0.0100	0.09		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 3.00"
2.7	275	0.0130	1.71		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
11.4	682	0.0400	1.00		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
33.5	1,057	Total			

Subcatchment 24S: CATCH24



Summary for Subcatchment 25S: CATCH25

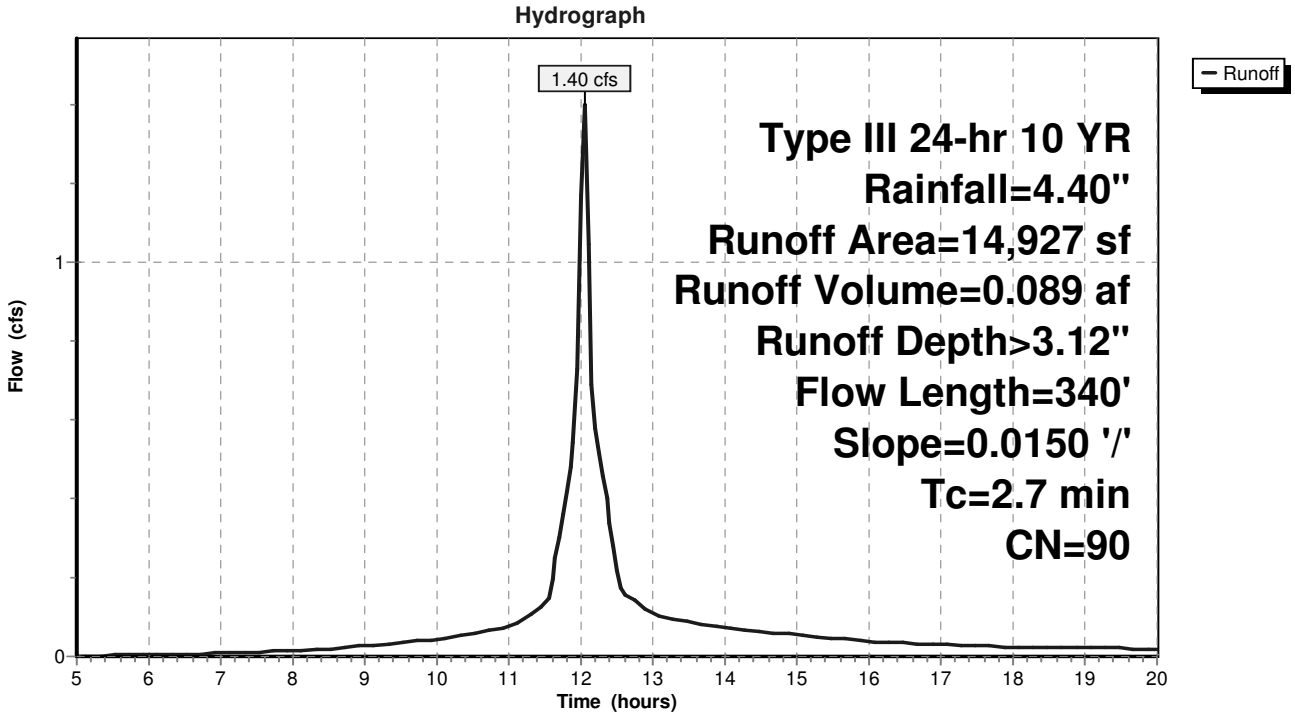
Runoff = 1.40 cfs @ 12.04 hrs, Volume= 0.089 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	6,371	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	8,556	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	14,927	90	Weighted Average
	6,371		42.68% Pervious Area
	8,556		57.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	45	0.0150	1.01		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
2.0	295	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.7	340	Total			

Subcatchment 25S: CATCH25



Summary for Subcatchment 26S: CATCH26

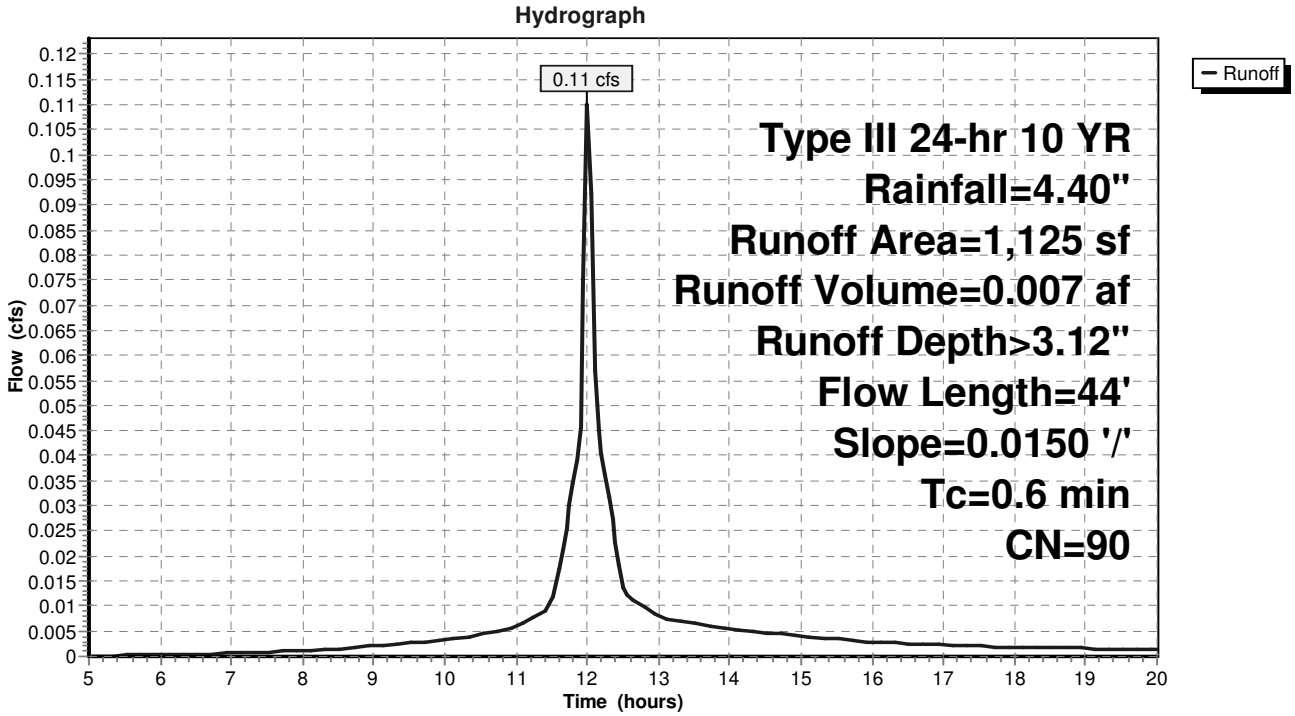
Runoff = 0.11 cfs @ 12.01 hrs, Volume= 0.007 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	463	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	662	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	1,125	90	Weighted Average
	463		41.16% Pervious Area
	662		58.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	21	0.0150	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.2	23	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	44	Total			

Subcatchment 26S: CATCH26



Summary for Subcatchment 27S: CATCH27

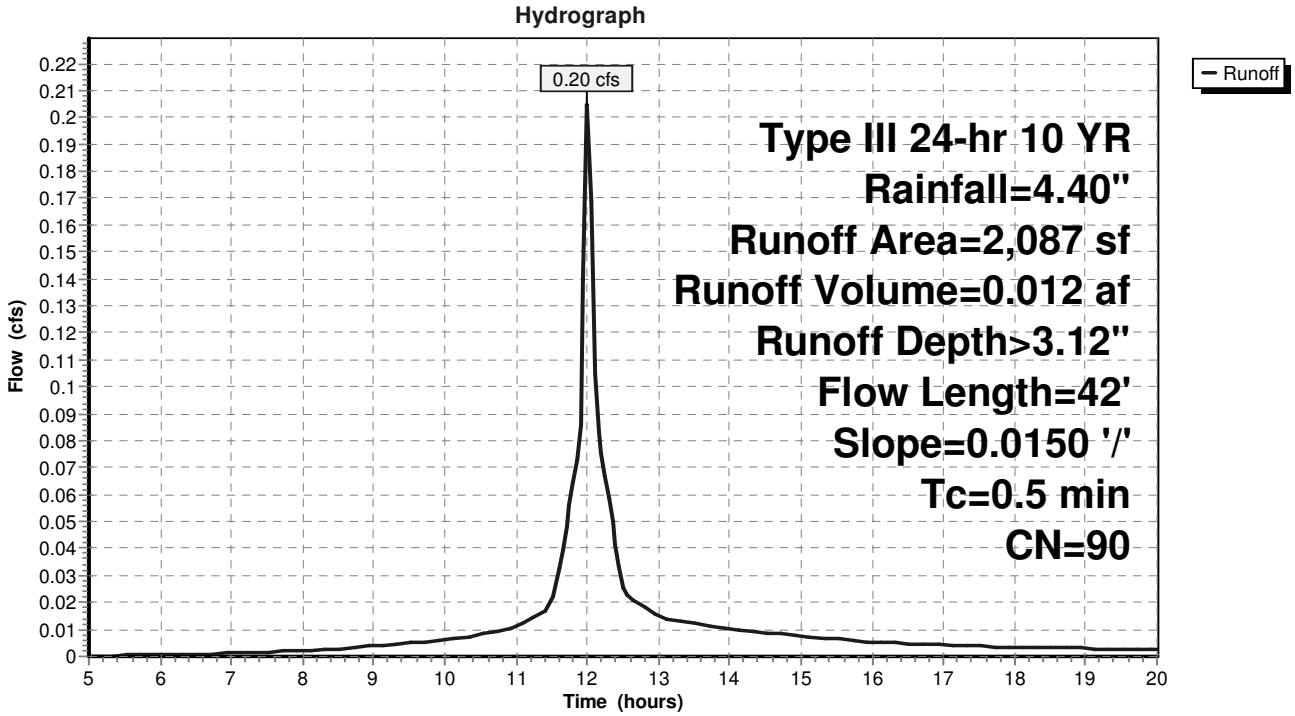
Runoff = 0.20 cfs @ 12.01 hrs, Volume= 0.012 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	854	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	1,233	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	2,087	90	Weighted Average
	854		40.92% Pervious Area
	1,233		59.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	22	0.0150	0.88		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.1	20	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.5	42	Total			

Subcatchment 27S: CATCH27



Summary for Subcatchment 28S: CATCH28

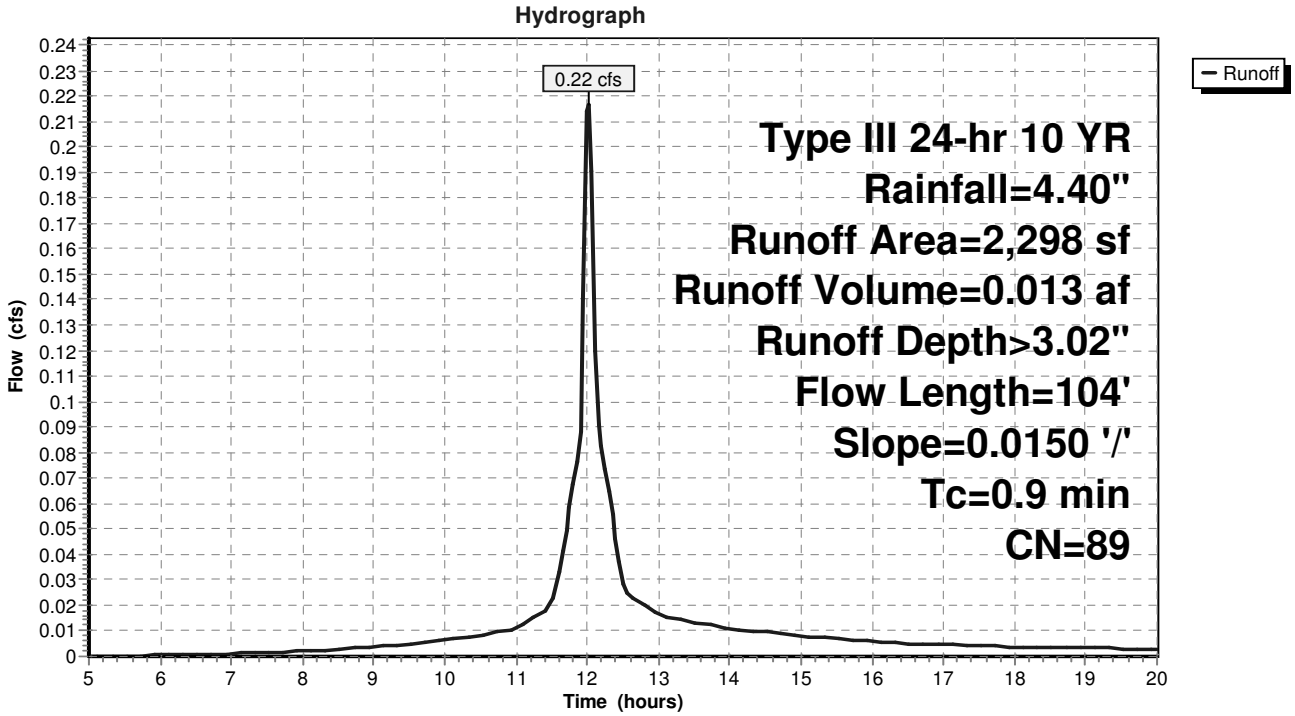
Runoff = 0.22 cfs @ 12.01 hrs, Volume= 0.013 af, Depth> 3.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.40"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,145	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	1,153	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	2,298	89	Weighted Average
	1,145		49.83% Pervious Area
	1,153		50.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	22	0.0150	0.88		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.5	82	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	104	Total			

Subcatchment 28S: CATCH28

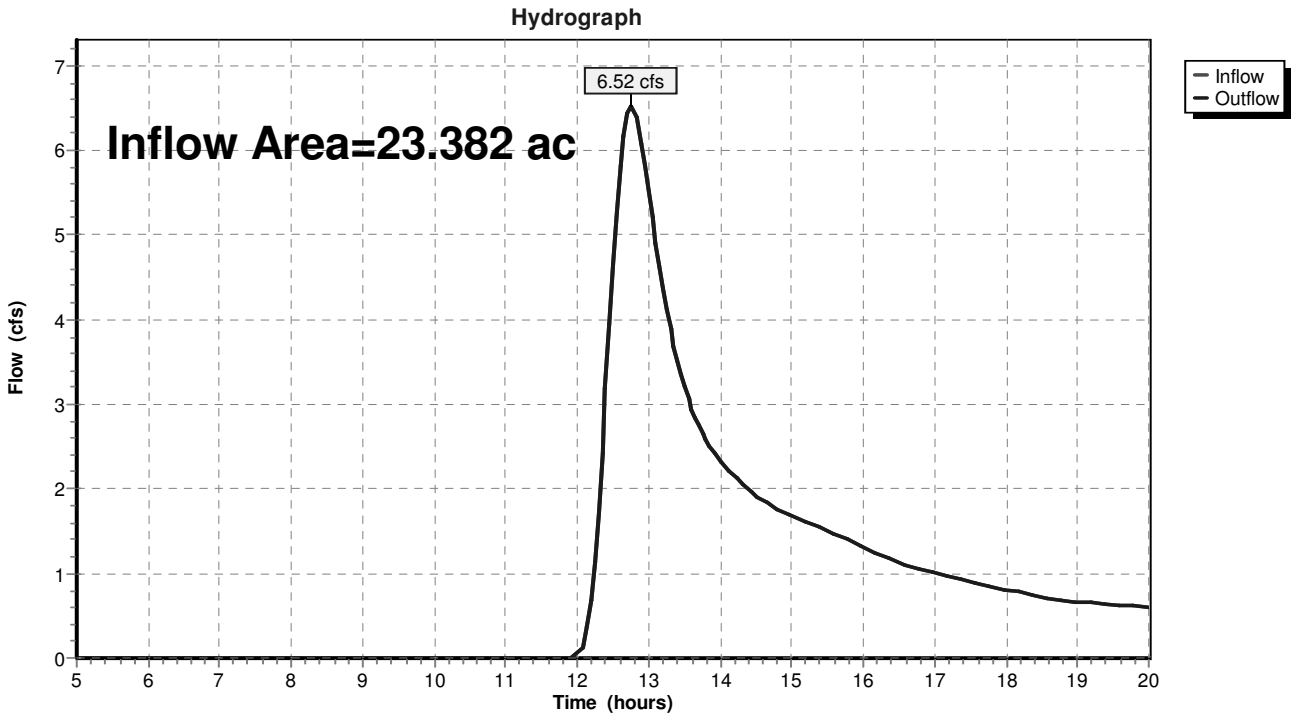


Summary for Reach 1SP: STUDY POINT #1

Inflow Area = 23.382 ac, 9.29% Impervious, Inflow Depth > 0.60" for 10 YR event
Inflow = 6.52 cfs @ 12.76 hrs, Volume= 1.168 af
Outflow = 6.52 cfs @ 12.76 hrs, Volume= 1.168 af, Atten= 0%, Lag= 0.0 min

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

Reach 1SP: STUDY POINT #1

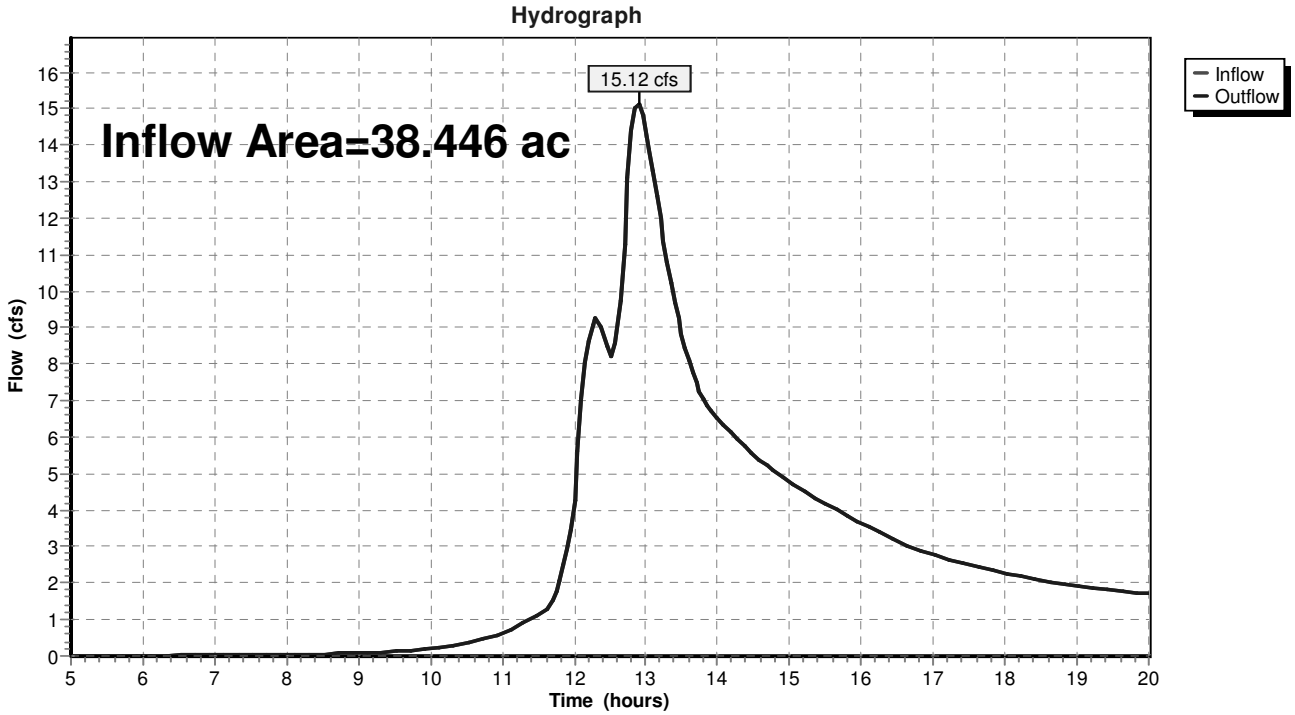


Summary for Reach 2SP: STUDY POINT #2

Inflow Area = 38.446 ac, 26.66% Impervious, Inflow Depth > 1.06" for 10 YR event
Inflow = 15.12 cfs @ 12.89 hrs, Volume= 3.391 af
Outflow = 15.12 cfs @ 12.89 hrs, Volume= 3.391 af, Atten= 0%, Lag= 0.0 min

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

Reach 2SP: STUDY POINT #2



Summary for Reach 3C: New Culvert #3

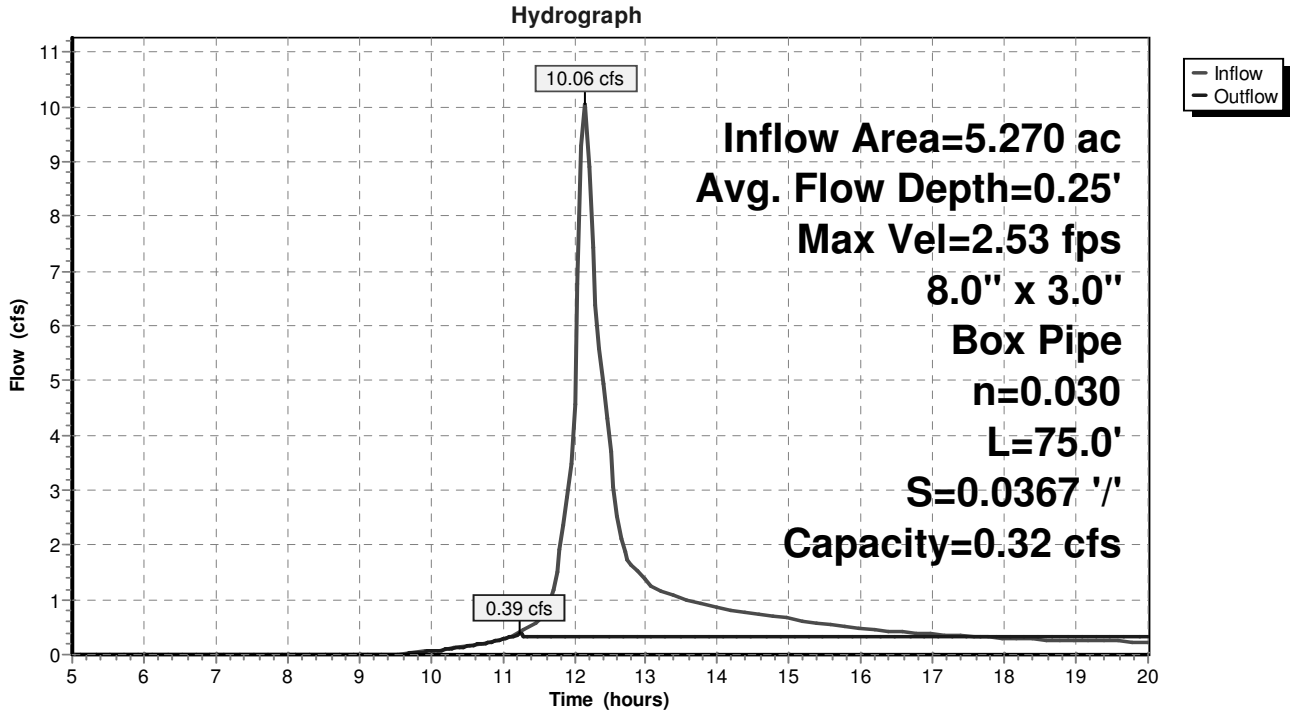
Inflow Area = 5.270 ac, 9.88% Impervious, Inflow Depth > 1.75" for 10 YR event
Inflow = 10.06 cfs @ 12.15 hrs, Volume= 0.767 af
Outflow = 0.39 cfs @ 11.24 hrs, Volume= 0.252 af, Atten= 96%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.53 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.87 fps, Avg. Travel Time= 0.7 min

Peak Storage= 13 cf @ 11.30 hrs
Average Depth at Peak Storage= 0.25'
Defined Flood Depth= 233.50', Capacity at Flood Depth= -9,929.77 cfs
Bank-Full Depth= 0.25', Capacity at Bank-Full= 0.32 cfs

8.0" W x 3.0" H Box Pipe
n= 0.030 Stream, clean & straight
Length= 75.0' Slope= 0.0367 '/'
Inlet Invert= 224.75', Outlet Invert= 222.00'

Reach 3C: New Culvert #3



Summary for Reach 4C: Ex. Culvert

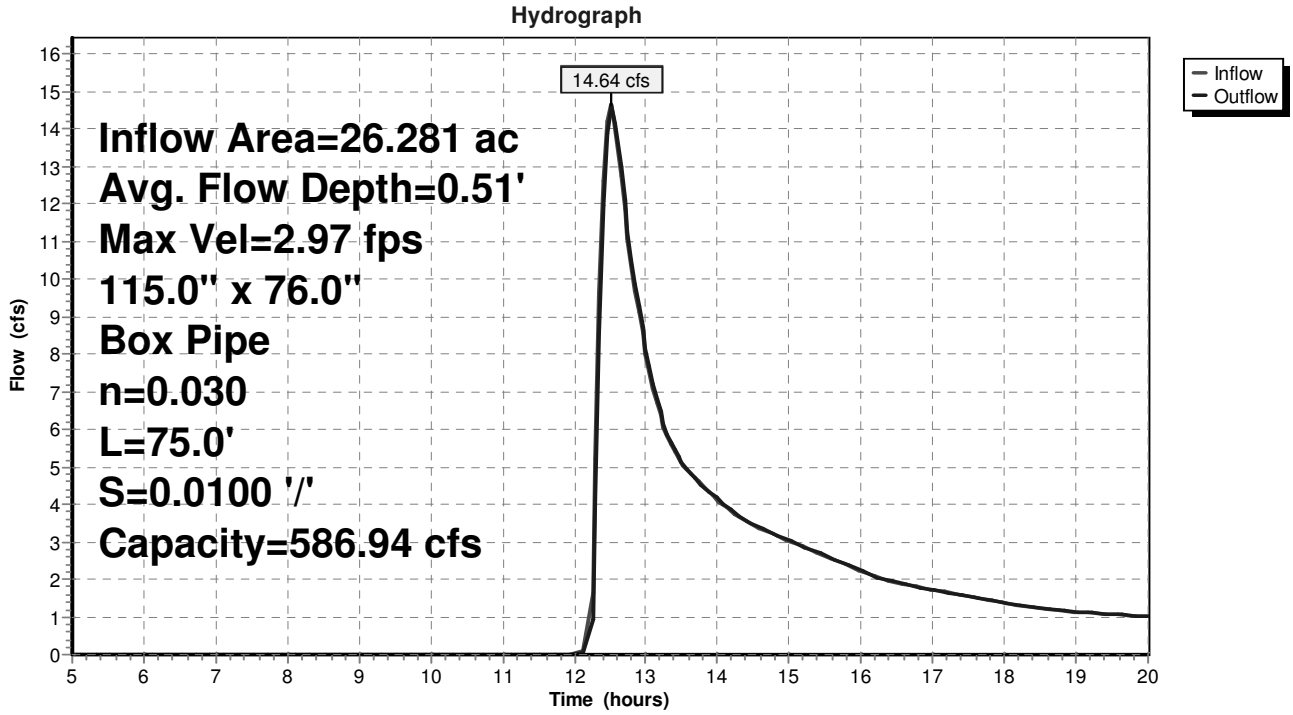
Inflow Area = 26.281 ac, 32.15% Impervious, Inflow Depth > 0.96" for 10 YR event
Inflow = 14.67 cfs @ 12.51 hrs, Volume= 2.106 af
Outflow = 14.64 cfs @ 12.52 hrs, Volume= 2.103 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.97 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.54 fps, Avg. Travel Time= 0.8 min

Peak Storage= 370 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.51'
Defined Flood Depth= 224.50', Capacity at Flood Depth= 26,590.01 cfs
Bank-Full Depth= 6.33', Capacity at Bank-Full= 586.94 cfs

115.0" W x 76.0" H Box Pipe
n= 0.030 Stream, clean & straight
Length= 75.0' Slope= 0.0100 '/'
Inlet Invert= 212.00', Outlet Invert= 211.25'

Reach 4C: Ex. Culvert



Summary for Reach 4R: CATCH24 Reach

Inflow Area = 26.281 ac, 32.15% Impervious, Inflow Depth > 0.97" for 10 YR event
Inflow = 14.81 cfs @ 12.45 hrs, Volume= 2.115 af
Outflow = 14.67 cfs @ 12.51 hrs, Volume= 2.106 af, Atten= 1%, Lag= 3.3 min

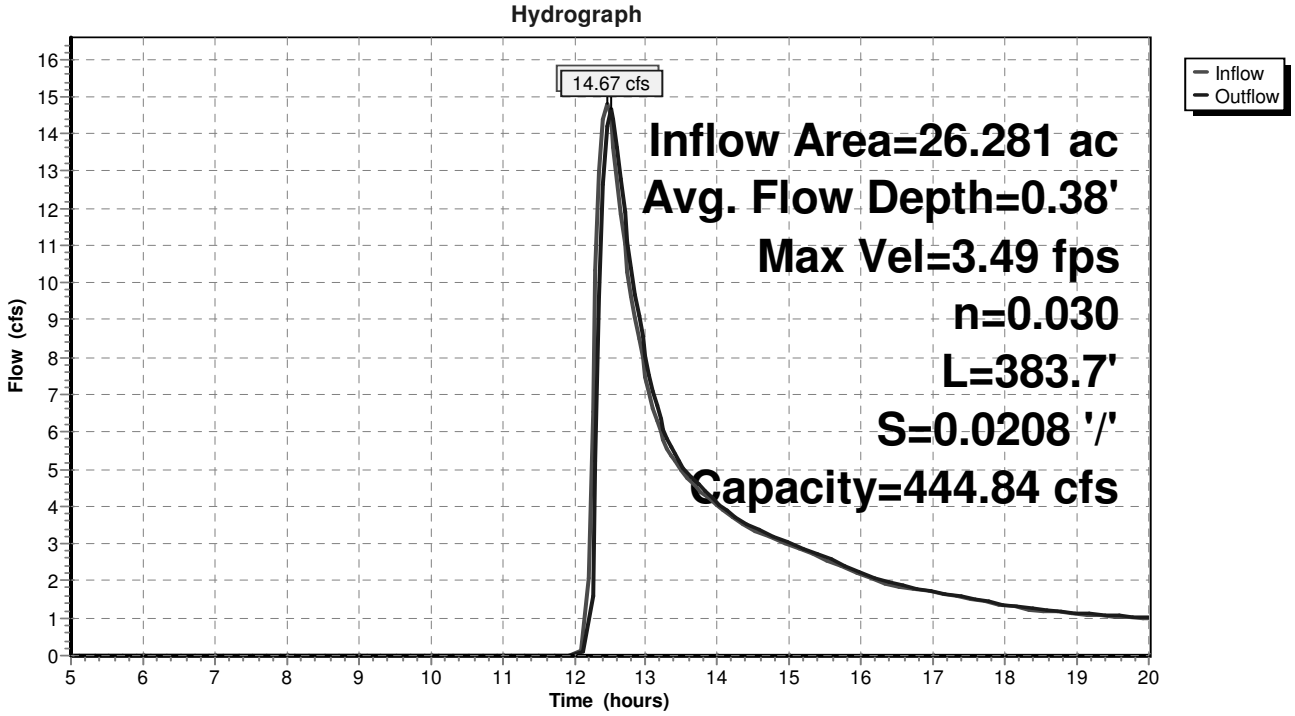
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.49 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 1.82 fps, Avg. Travel Time= 3.5 min

Peak Storage= 1,623 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 2.50', Capacity at Bank-Full= 444.84 cfs

10.00' x 2.50' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 25.00'
Length= 383.7' Slope= 0.0208 '/'
Inlet Invert= 220.00', Outlet Invert= 212.00'

‡

Reach 4R: CATCH24 Reach



Summary for Reach 5R: CATCH23 Reach

Inflow Area = 26.281 ac, 32.15% Impervious, Inflow Depth > 0.96" for 10 YR event
Inflow = 14.64 cfs @ 12.52 hrs, Volume= 2.103 af
Outflow = 11.73 cfs @ 12.94 hrs, Volume= 2.059 af, Atten= 20%, Lag= 25.1 min

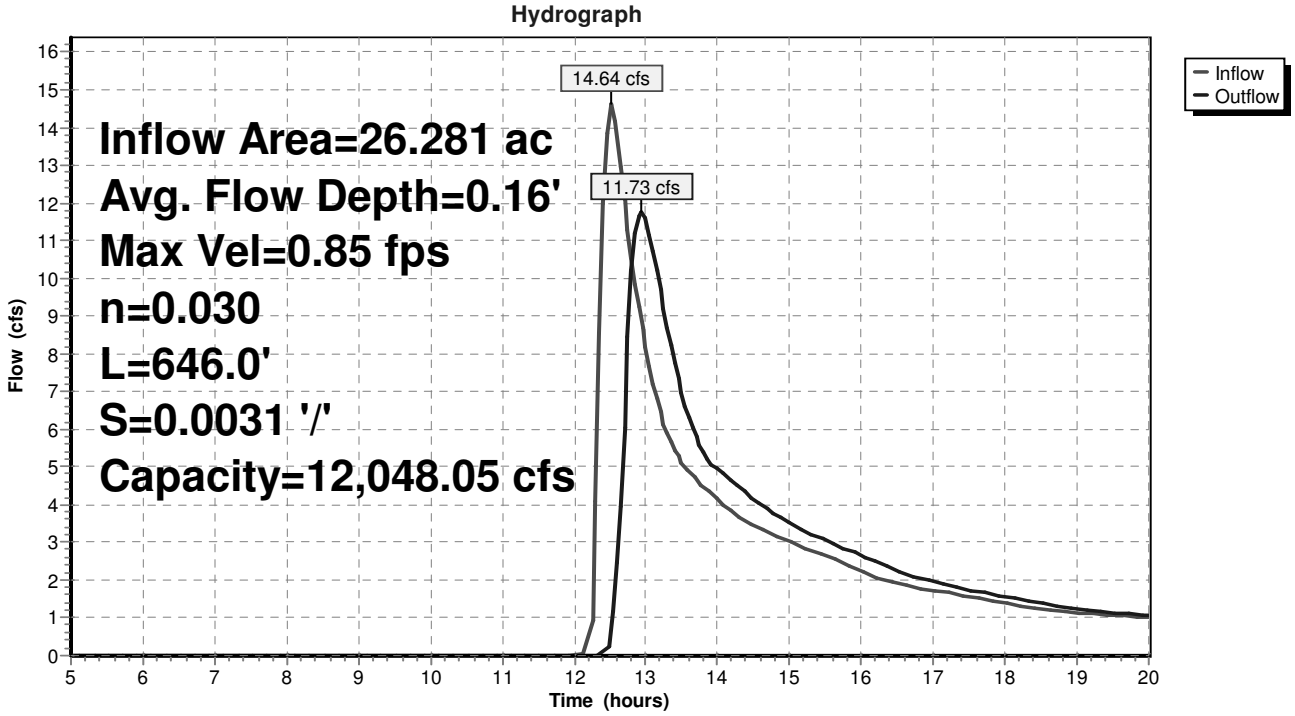
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.85 fps, Min. Travel Time= 12.6 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 17.5 min

Peak Storage= 8,894 cf @ 12.72 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 10.00', Capacity at Bank-Full= 12,048.05 cfs

85.00' x 10.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 2.5 '/' Top Width= 135.00'
Length= 646.0' Slope= 0.0031 '/'
Inlet Invert= 212.00', Outlet Invert= 210.00'

‡

Reach 5R: CATCH23 Reach



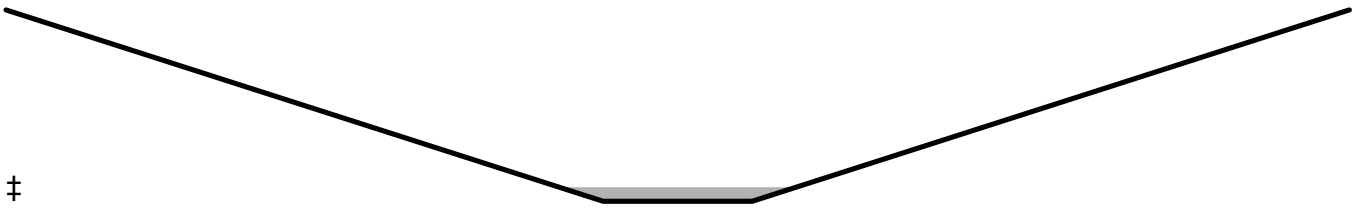
Summary for Reach 6R: CATCH 23 Reach

Inflow Area = 7.811 ac, 20.30% Impervious, Inflow Depth > 1.21" for 10 YR event
Inflow = 6.17 cfs @ 12.07 hrs, Volume= 0.786 af
Outflow = 6.04 cfs @ 12.10 hrs, Volume= 0.785 af, Atten= 2%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.53 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.08 fps, Avg. Travel Time= 1.2 min

Peak Storage= 185 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 2.50', Capacity at Bank-Full= 1,385.41 cfs

10.00' x 2.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 16.0 '/' Top Width= 90.00'
Length= 77.2' Slope= 0.0324 '/'
Inlet Invert= 214.00', Outlet Invert= 211.50'



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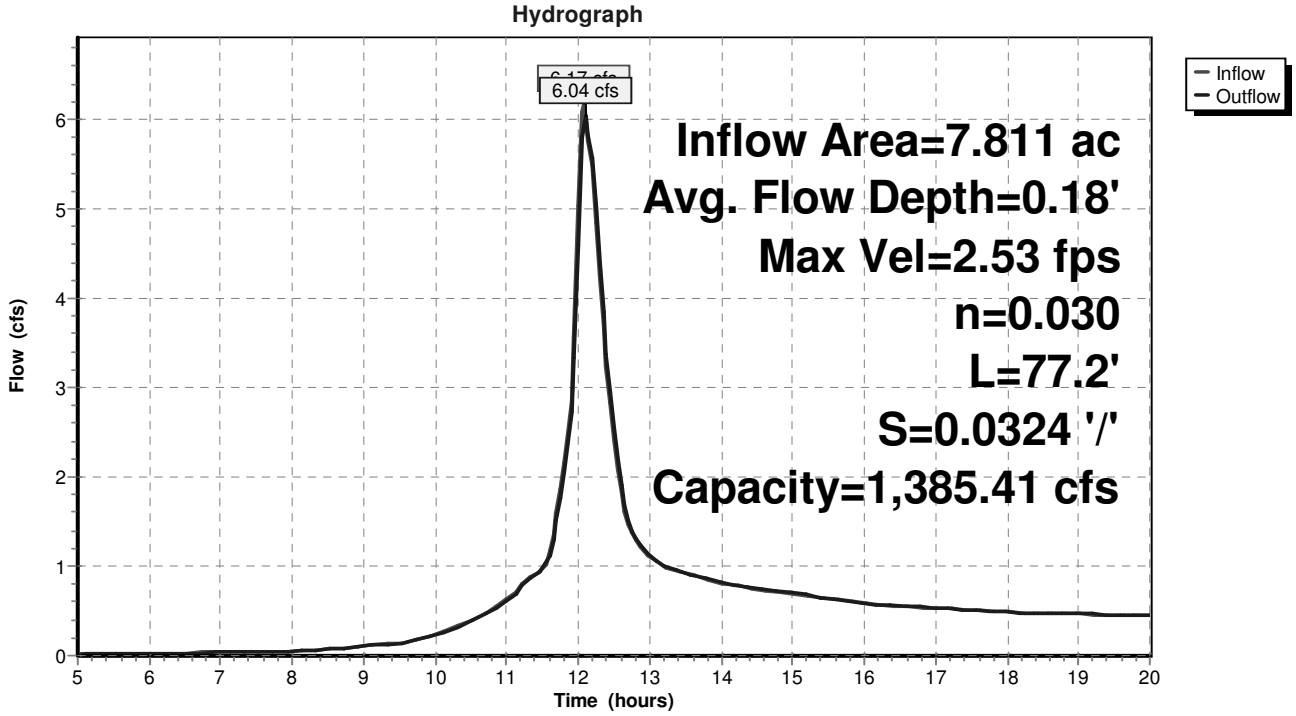
Reach 6R: CATCH 23 Reach



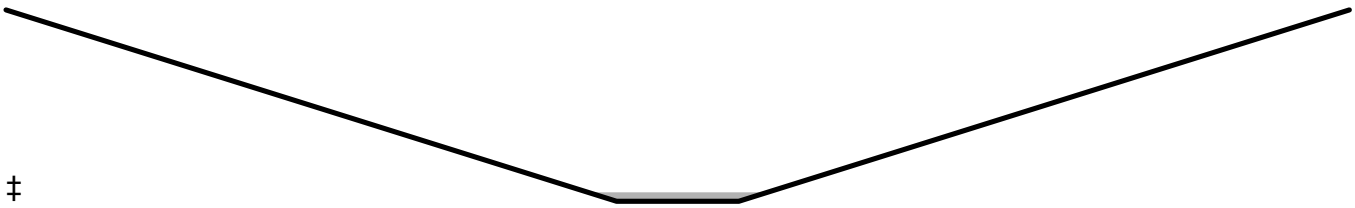
Summary for Reach 7R: CATCH23 Reach

Inflow Area = 12.166 ac, 14.78% Impervious, Inflow Depth > 1.32" for 10 YR event
Inflow = 9.36 cfs @ 12.25 hrs, Volume= 1.339 af
Outflow = 9.29 cfs @ 12.31 hrs, Volume= 1.333 af, Atten= 1%, Lag= 3.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.55 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.72 fps, Avg. Travel Time= 4.2 min

Peak Storage= 1,097 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 5.00', Capacity at Bank-Full= 5,255.57 cfs

20.00' x 5.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 20.0 '/' Top Width= 220.00'
Length= 182.5' Slope= 0.0082 '/'
Inlet Invert= 211.50', Outlet Invert= 210.00'



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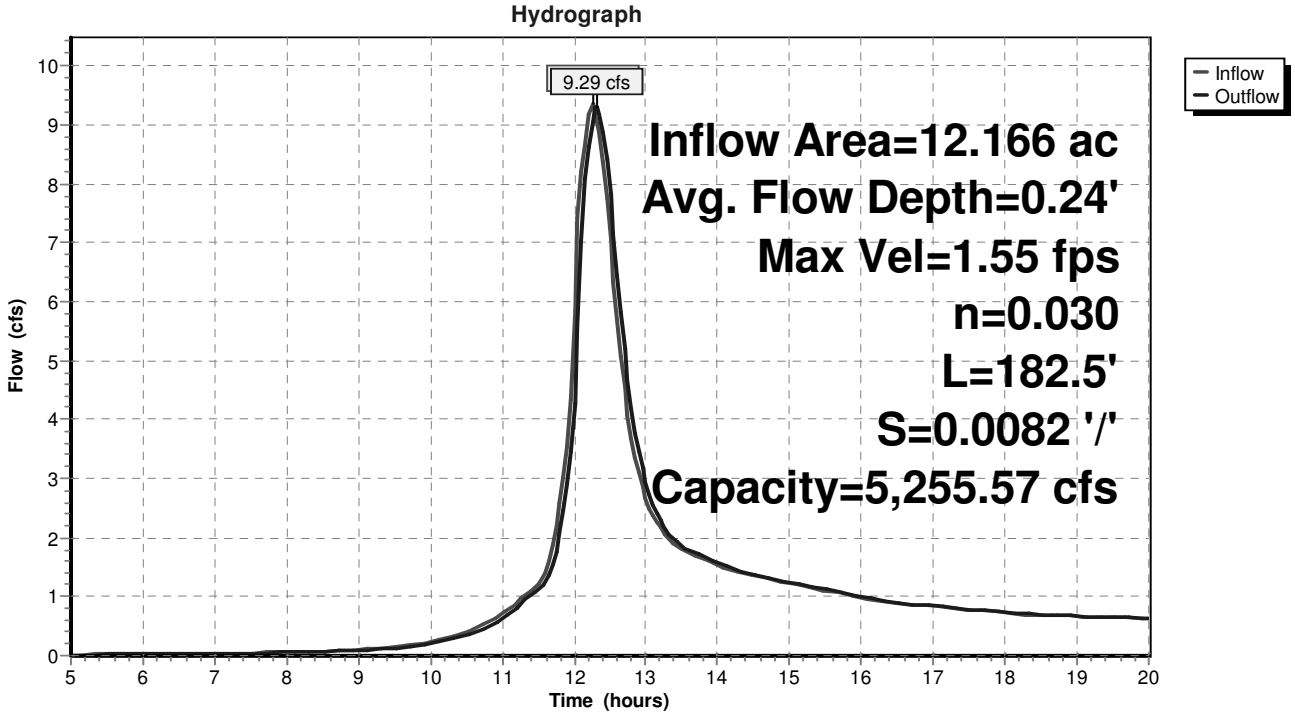
Reach 7R: CATCH23 Reach



Summary for Reach 8R: CATCH 23 Reach

Inflow Area = 1.722 ac, 31.52% Impervious, Inflow Depth > 2.26" for 10 YR event
Inflow = 4.02 cfs @ 12.15 hrs, Volume= 0.324 af
Outflow = 3.95 cfs @ 12.17 hrs, Volume= 0.324 af, Atten= 2%, Lag= 1.0 min

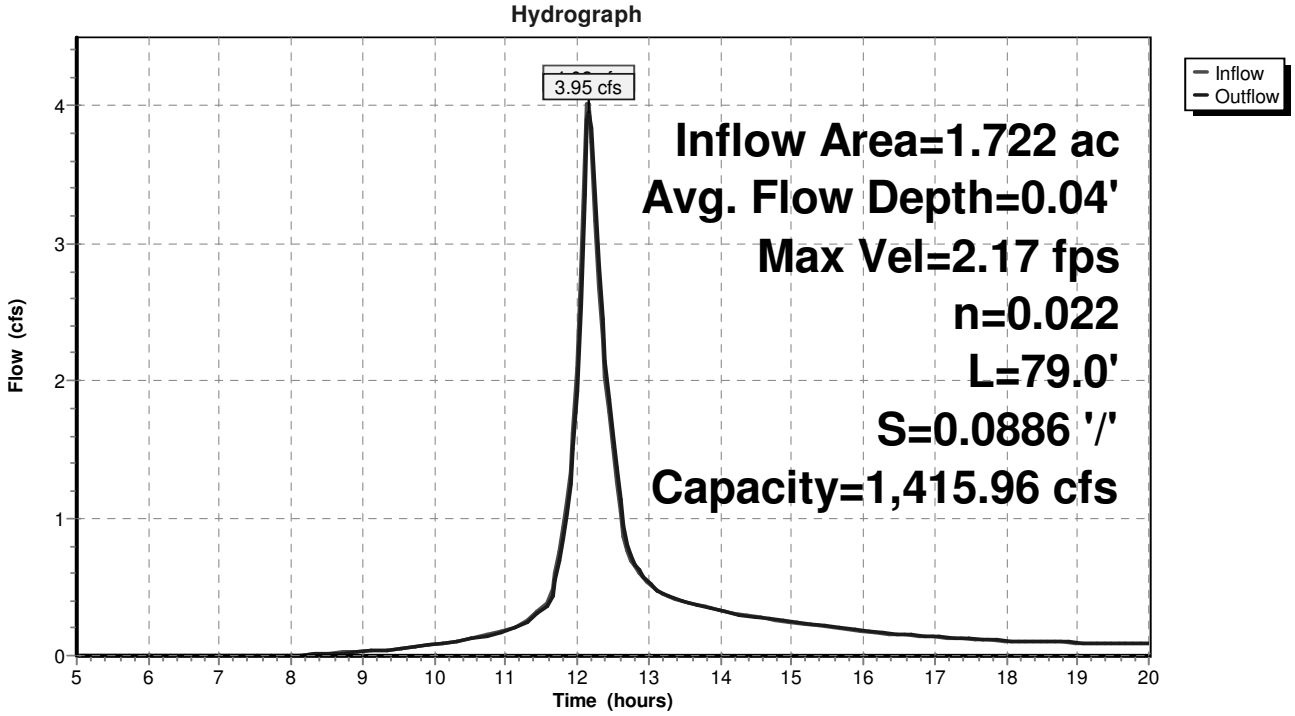
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.17 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.98 fps, Avg. Travel Time= 1.3 min

Peak Storage= 146 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 1,415.96 cfs

50.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 40.0 '/' Top Width= 130.00'
Length= 79.0' Slope= 0.0886 '/'
Inlet Invert= 221.00', Outlet Invert= 214.00'

‡

Reach 8R: CATCH 23 Reach



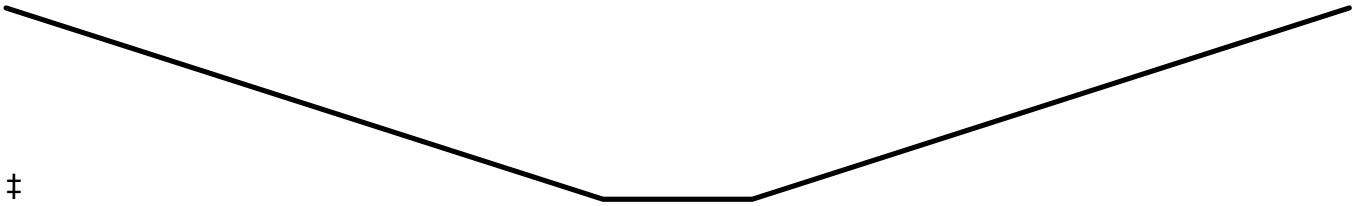
Summary for Reach 9R: CATCH 23 Reach

Inflow Area = 5.270 ac, 9.88% Impervious, Inflow Depth > 0.57" for 10 YR event
Inflow = 0.39 cfs @ 11.24 hrs, Volume= 0.252 af
Outflow = 0.37 cfs @ 11.30 hrs, Volume= 0.250 af, Atten= 5%, Lag= 3.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.13 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 1.04 fps, Avg. Travel Time= 2.6 min

Peak Storage= 54 cf @ 11.26 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 2.50', Capacity at Bank-Full= 1,710.82 cfs

10.00' x 2.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 16.0 '/' Top Width= 90.00'
Length= 162.0' Slope= 0.0494 '/'
Inlet Invert= 222.00', Outlet Invert= 214.00'



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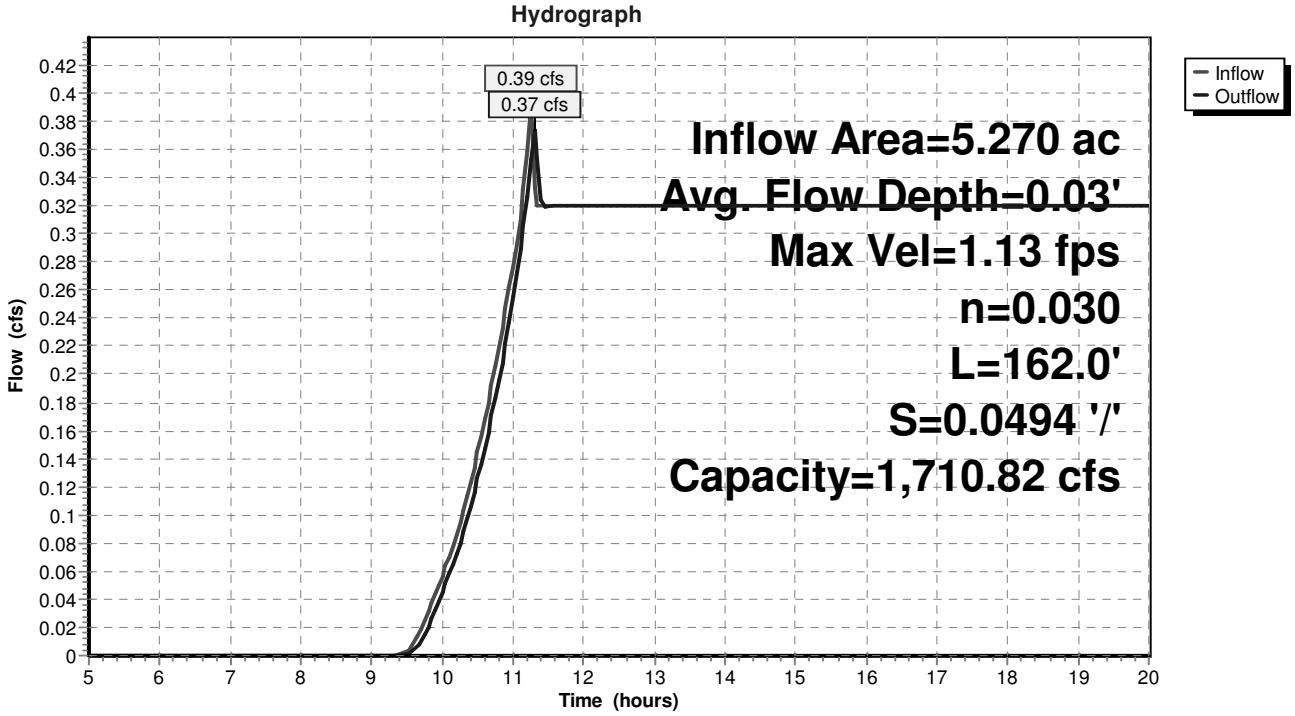
Reach 9R: CATCH 23 Reach



Summary for Pond 1CB: CB R20

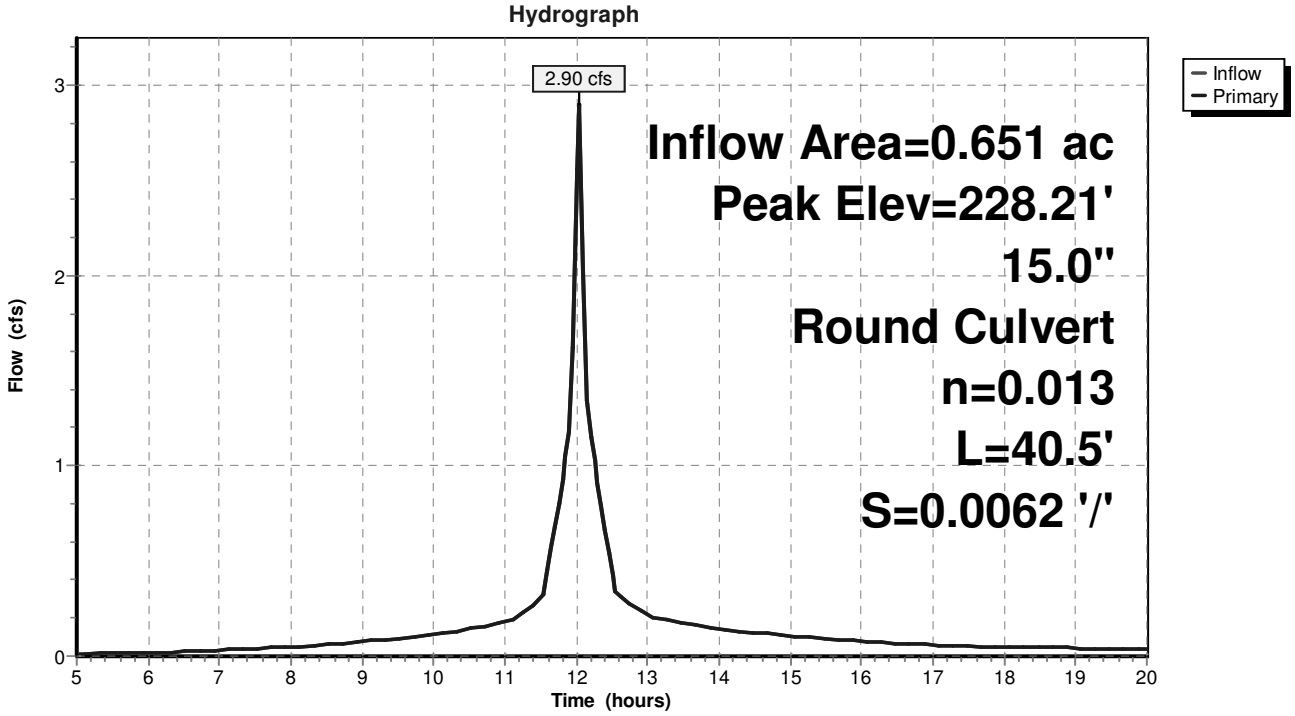
Inflow Area =	0.651 ac, 79.99% Impervious, Inflow Depth > 3.53" for 10 YR event				
Inflow =	2.90 cfs @	12.04 hrs, Volume=	0.192 af		
Outflow =	2.90 cfs @	12.04 hrs, Volume=	0.192 af, Atten= 0%, Lag= 0.0 min		
Primary =	2.90 cfs @	12.04 hrs, Volume=	0.192 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 228.21' @ 12.04 hrs
Flood Elev= 232.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	227.15'	**15.0" Round Culvert** L= 40.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 227.15' / 226.90' S= 0.0062 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.80 cfs @ 12.04 hrs HW=228.19' (Free Discharge)
└**1=Culvert** (Barrel Controls 2.80 cfs @ 3.48 fps)

Pond 1CB: CB R20



Summary for Pond 1P: Main Stormwater Pond

Inflow Area =	12.369 ac, 67.46% Impervious, Inflow Depth > 3.36" for 10 YR event				
Inflow =	49.48 cfs @	12.04 hrs,	Volume=	3.461 af	
Outflow =	12.05 cfs @	12.42 hrs,	Volume=	1.579 af,	Atten= 76%, Lag= 22.8 min
Discarded =	0.05 cfs @	5.80 hrs,	Volume=	0.060 af	
Primary =	12.00 cfs @	12.42 hrs,	Volume=	1.519 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 232.84' @ 12.42 hrs Surf.Area= 21,651 sf Storage= 90,187 cf
Flood Elev= 236.00' Surf.Area= 30,941 sf Storage= 171,614 cf

Plug-Flow detention time= 203.8 min calculated for 1.574 af (45% of inflow)
Center-of-Mass det. time= 108.5 min (859.4 - 750.9)

Volume	Invert	Avail.Storage	Storage Description
#1	226.00'	171,614 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

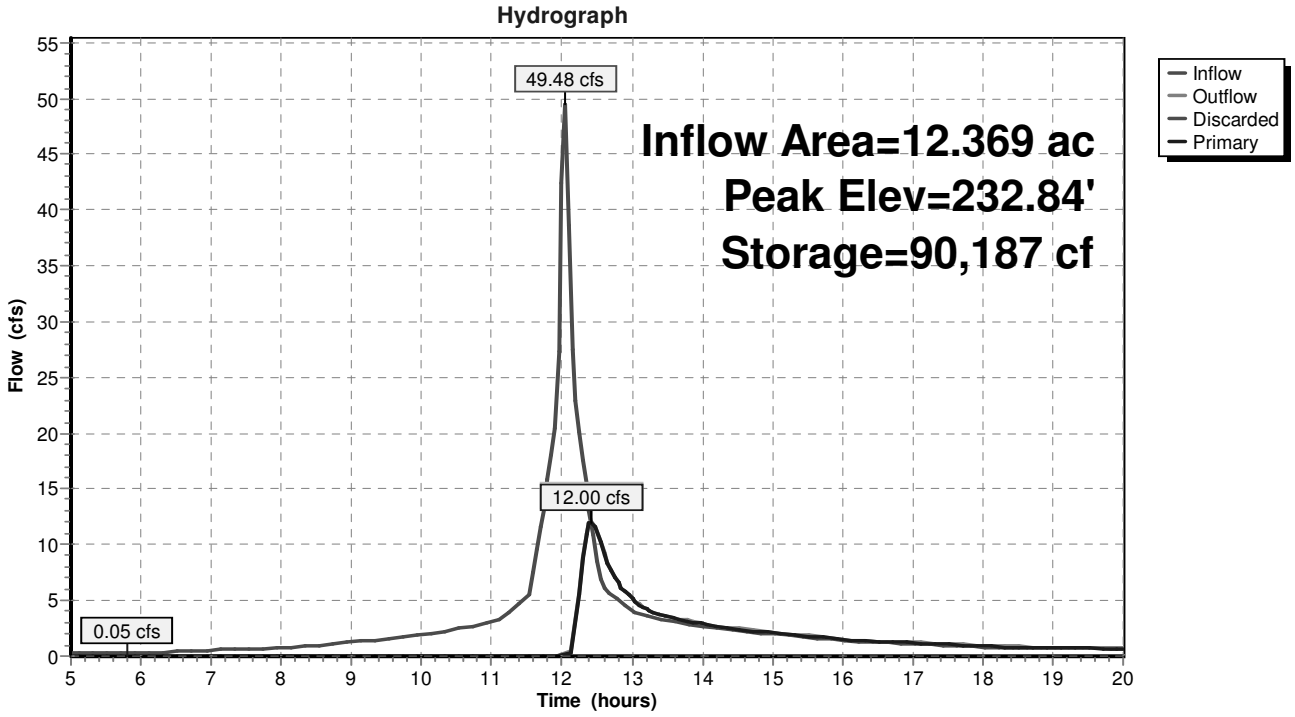
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
226.00	7,493	0	0
227.00	8,752	8,123	8,123
228.00	10,068	9,410	17,533
229.00	11,440	10,754	28,287
230.00	12,868	12,154	40,441
230.92	14,353	12,522	52,962
231.00	17,493	1,274	54,236
232.00	19,712	18,603	72,839
232.75	21,442	15,433	88,271
233.00	22,031	5,434	93,705
234.00	24,451	23,241	116,946
235.00	26,972	25,712	142,658
236.00	30,941	28,957	171,614

Device	Routing	Invert	Outlet Devices
#1	Primary	225.80'	**18.0" Round Culvert** L= 93.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 225.80' / 225.00' S= 0.0086 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	232.40'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	226.00'	**0.05 cfs Exfiltration at all elevations**
#4	Primary	233.75'	**20.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.05 cfs @ 5.80 hrs HW=226.10' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=11.83 cfs @ 12.42 hrs HW=232.84' (Free Discharge)
├─**1=Culvert** (Passes 11.83 cfs of 16.84 cfs potential flow)
│ └─**2=Orifice/Grate** (Weir Controls 11.83 cfs @ 2.16 fps)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Main Stormwater Pond



Summary for Pond 2CB: CB R18

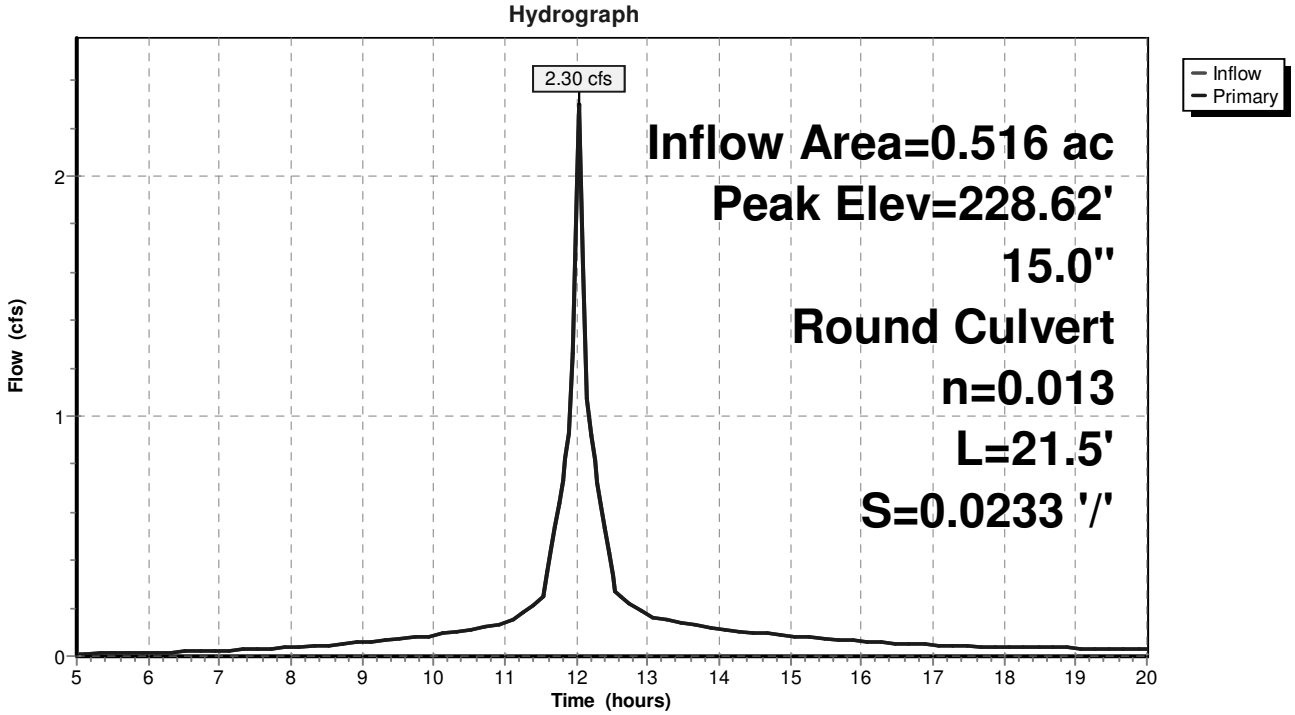
Inflow Area =	0.516 ac, 77.70% Impervious, Inflow Depth > 3.51" for 10 YR event				
Inflow =	2.30 cfs @	12.04 hrs, Volume=	0.151 af		
Outflow =	2.30 cfs @	12.04 hrs, Volume=	0.151 af, Atten= 0%, Lag= 0.0 min		
Primary =	2.30 cfs @	12.04 hrs, Volume=	0.151 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 228.62' @ 12.04 hrs
Flood Elev= 232.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	227.75'	**15.0" Round Culvert** L= 21.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 227.75' / 227.25' S= 0.0233 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.22 cfs @ 12.04 hrs HW=228.60' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.22 cfs @ 2.48 fps)

Pond 2CB: CB R18



Summary for Pond 2P: Soil Filter #1

Inflow Area = 0.819 ac, 63.68% Impervious, Inflow Depth > 3.11" for 10 YR event
Inflow = 3.22 cfs @ 12.04 hrs, Volume= 0.212 af
Outflow = 3.22 cfs @ 12.04 hrs, Volume= 0.212 af, Atten= 0%, Lag= 0.0 min
Primary = 3.22 cfs @ 12.04 hrs, Volume= 0.212 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 224.00' @ 12.04 hrs Surf.Area= 1,591 sf Storage= 5 cf

Plug-Flow detention time= 0.0 min calculated for 0.211 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (753.3 - 753.3)

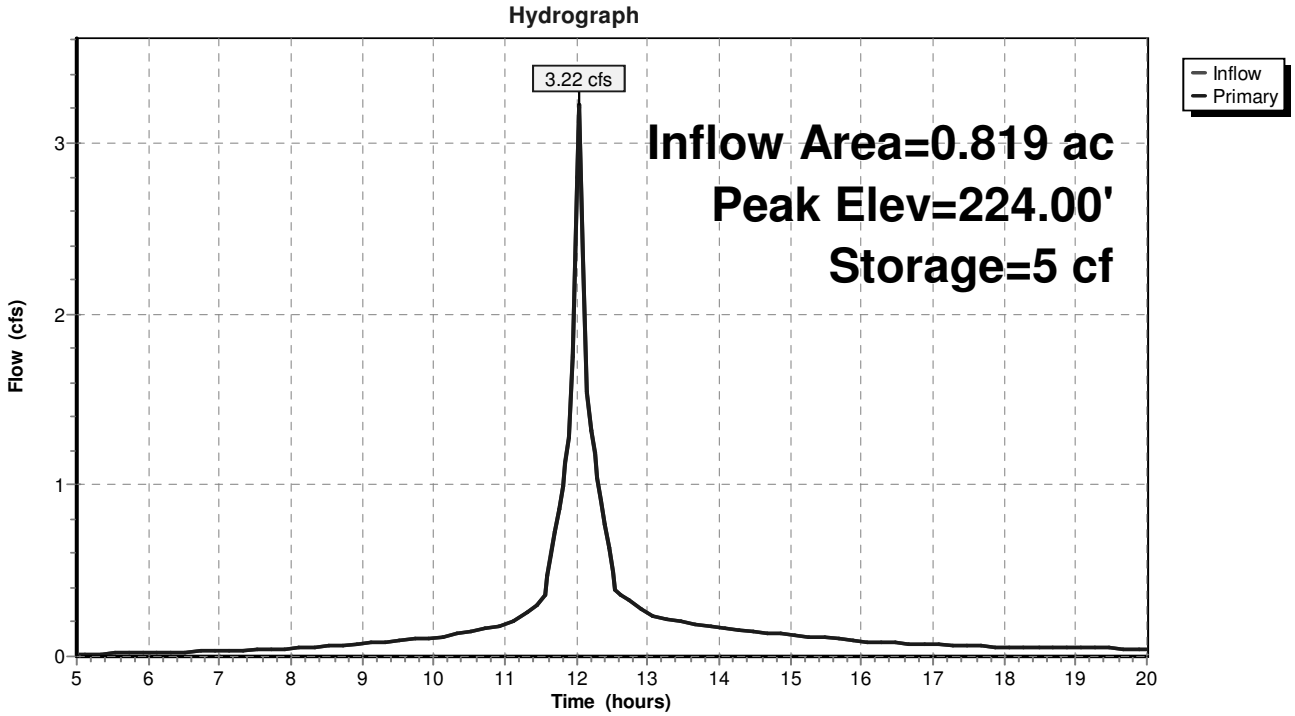
Volume	Invert	Avail.Storage	Storage Description
#1	224.00'	4,151 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
224.00	1,590	0	0
225.00	2,063	1,827	1,827
225.50	2,321	1,096	2,923
226.00	2,593	1,229	4,151

Device	Routing	Invert	Outlet Devices
#1	Primary	226.00'	**8.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#2	Primary	225.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	221.67'	**36.0" Round Culvert** L= 21.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 221.67' / 221.50' S= 0.0081 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=20.90 cfs @ 12.04 hrs HW=224.00' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Orifice/Grate** (Controls 0.00 cfs)
- **3=Culvert** (Barrel Controls 20.90 cfs @ 4.88 fps)

Pond 2P: Soil Filter #1



Summary for Pond 3CB: CB R22

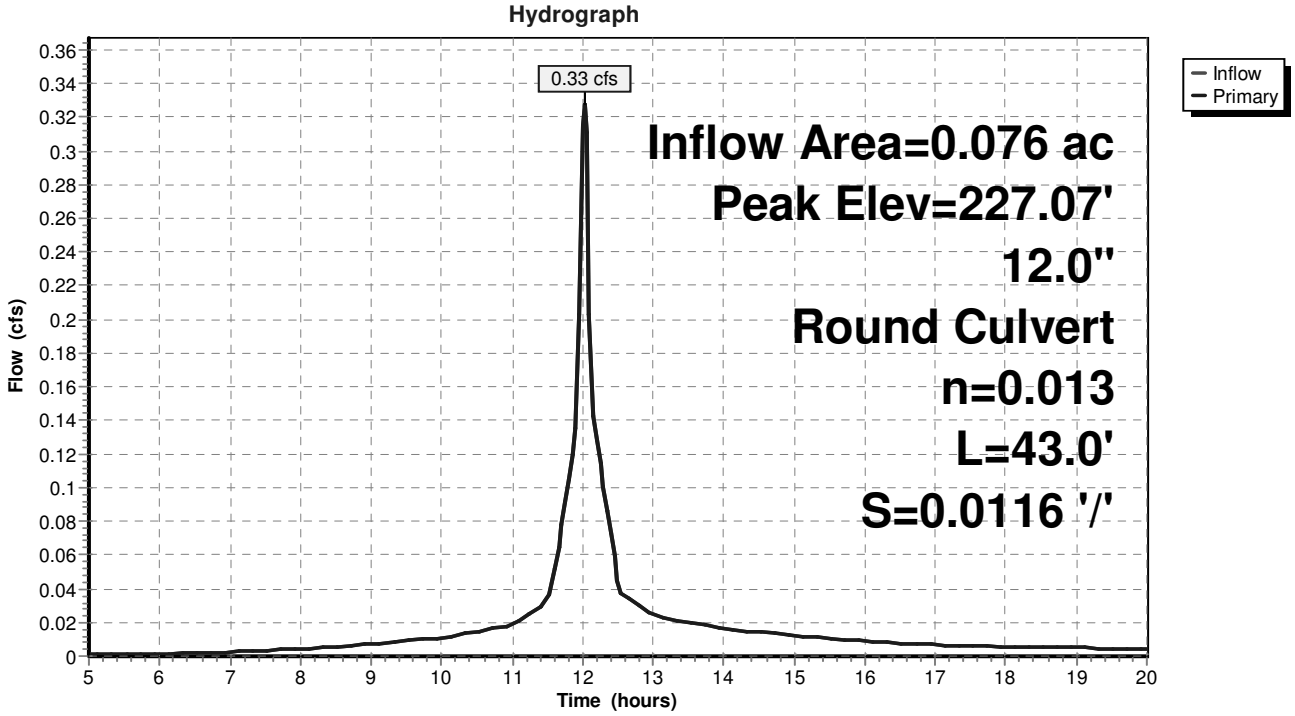
Inflow Area =	0.076 ac, 77.27% Impervious, Inflow Depth > 3.32" for 10 YR event				
Inflow =	0.33 cfs @	12.02 hrs, Volume=	0.021 af		
Outflow =	0.33 cfs @	12.02 hrs, Volume=	0.021 af, Atten= 0%, Lag= 0.0 min		
Primary =	0.33 cfs @	12.02 hrs, Volume=	0.021 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 227.07' @ 12.02 hrs
Flood Elev= 231.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	226.75'	**12.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 226.75' / 226.25' S= 0.0116 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.31 cfs @ 12.02 hrs HW=227.06' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.31 cfs @ 1.50 fps)

Pond 3CB: CB R22



Summary for Pond 3P: Soil Filter #2

Inflow Area = 1.722 ac, 31.52% Impervious, Inflow Depth > 2.26" for 10 YR event
Inflow = 4.02 cfs @ 12.15 hrs, Volume= 0.324 af
Outflow = 4.02 cfs @ 12.15 hrs, Volume= 0.324 af, Atten= 0%, Lag= 0.1 min
Primary = 4.02 cfs @ 12.15 hrs, Volume= 0.324 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 224.01' @ 12.15 hrs Surf.Area= 2,300 sf Storage= 28 cf
Flood Elev= 232.25' Surf.Area= 3,962 sf Storage= 7,751 cf

Plug-Flow detention time= 0.1 min calculated for 0.324 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (792.8 - 792.7)

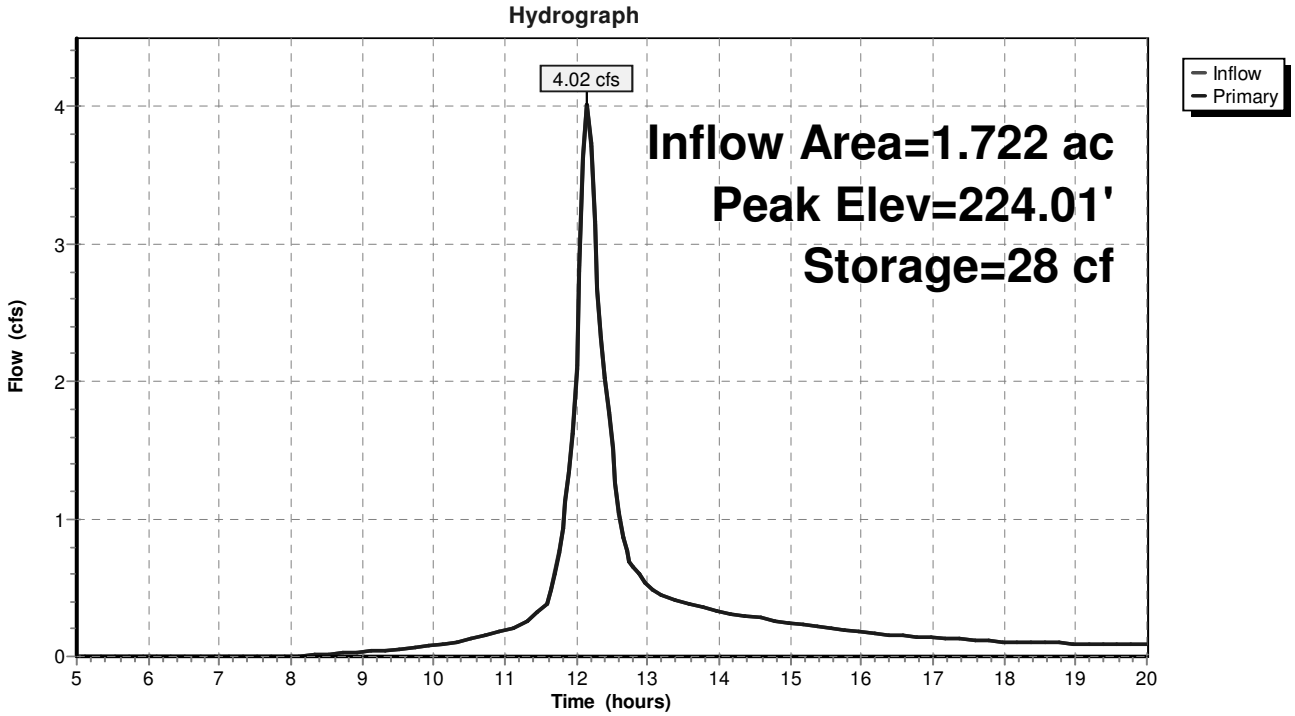
Volume	Invert	Avail.Storage	Storage Description
#1	224.00'	7,751 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
224.00	2,292	0	0
225.00	2,918	2,605	2,605
225.50	3,252	1,543	4,148
226.00	3,600	1,713	5,861
226.50	3,962	1,891	7,751

Device	Routing	Invert	Outlet Devices
#1	Primary	226.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	221.40'	**36.0" Round Culvert** L= 89.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 221.40' / 221.00' S= 0.0045 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=25.82 cfs @ 12.15 hrs HW=224.01' (Free Discharge)
└─**1=Orifice/Grate** (Controls 0.00 cfs)
└─**2=Culvert** (Barrel Controls 25.82 cfs @ 5.28 fps)

Pond 3P: Soil Filter #2



Summary for Pond 4CB: CB R16

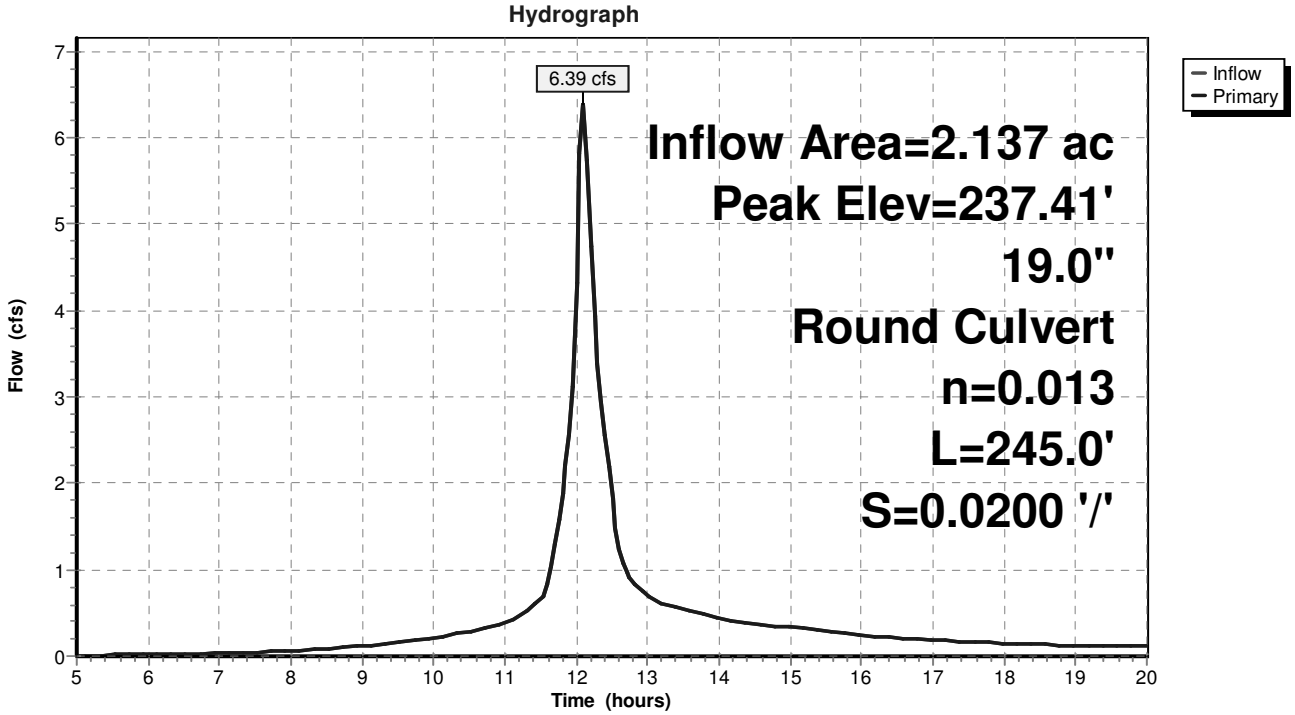
Inflow Area =	2.137 ac, 37.01% Impervious, Inflow Depth > 2.85" for 10 YR event				
Inflow =	6.39 cfs @	12.10 hrs,	Volume=	0.508 af	
Outflow =	6.39 cfs @	12.10 hrs,	Volume=	0.508 af,	Atten= 0%, Lag= 0.0 min
Primary =	6.39 cfs @	12.10 hrs,	Volume=	0.508 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 237.41' @ 12.10 hrs
Flood Elev= 242.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.90'	**19.0" Round Culvert** L= 245.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 235.90' / 231.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=6.38 cfs @ 12.10 hrs HW=237.41' (Free Discharge)
└**1=Culvert** (Inlet Controls 6.38 cfs @ 3.30 fps)

Pond 4CB: CB R16



Summary for Pond 5CB: CB R15

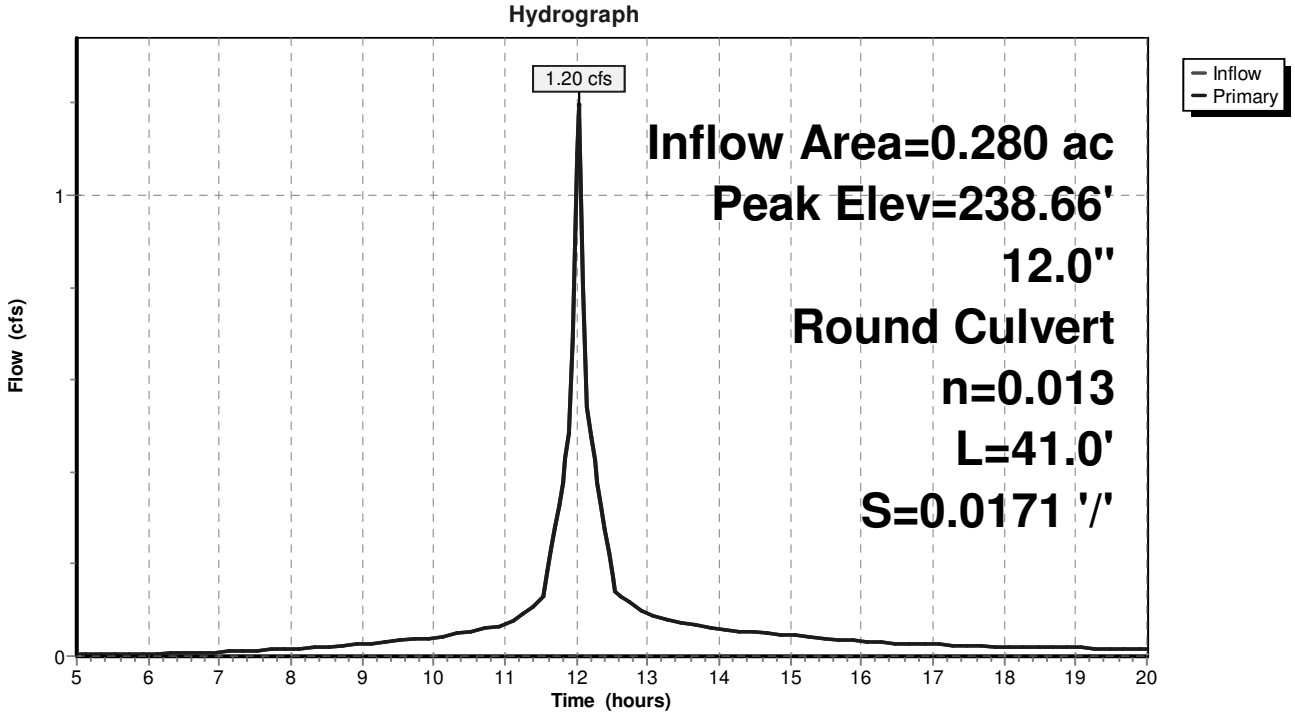
Inflow Area =	0.280 ac, 70.56% Impervious, Inflow Depth > 3.32" for 10 YR event				
Inflow =	1.20 cfs @	12.03 hrs,	Volume=	0.077 af	
Outflow =	1.20 cfs @	12.03 hrs,	Volume=	0.077 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.20 cfs @	12.03 hrs,	Volume=	0.077 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 238.66' @ 12.03 hrs
Flood Elev= 243.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	238.00'	**12.0" Round Culvert** L= 41.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 238.00' / 237.30' S= 0.0171 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.15 cfs @ 12.03 hrs HW=238.64' (Free Discharge)
└─**1=Culvert** (Inlet Controls 1.15 cfs @ 2.15 fps)

Pond 5CB: CB R15



Summary for Pond 6CB: CB R13

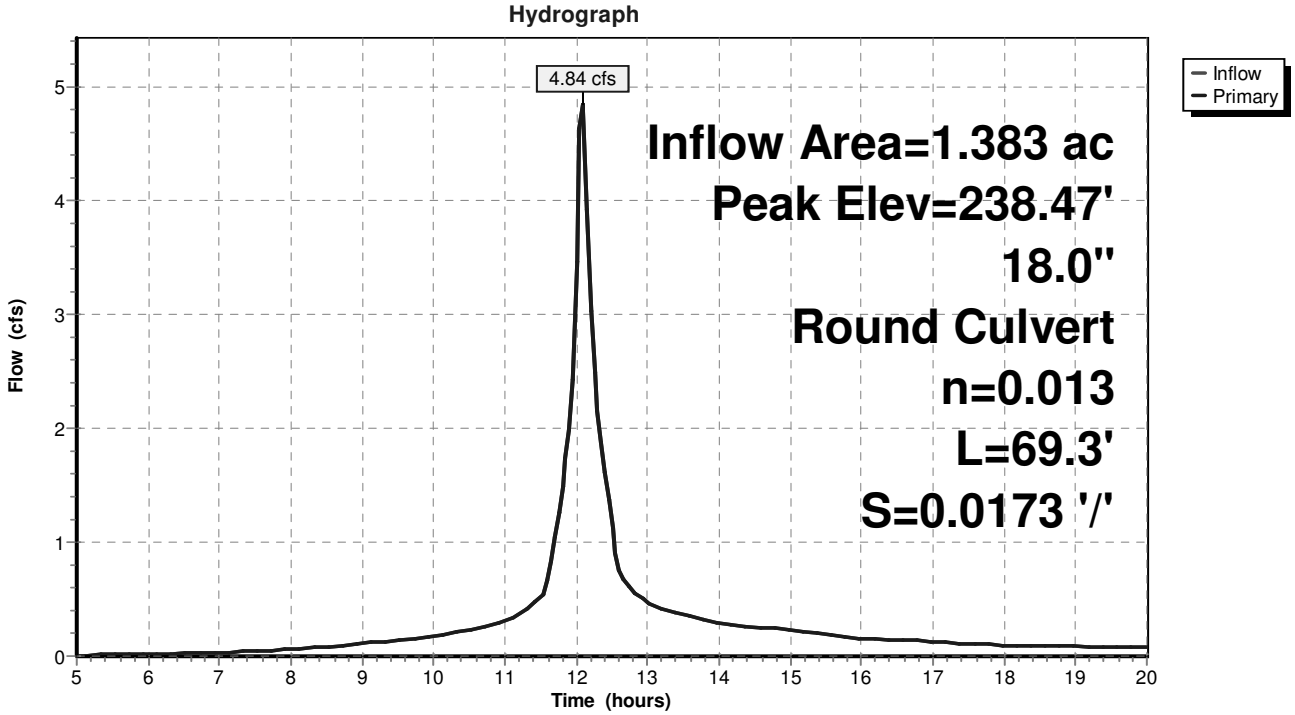
Inflow Area =	1.383 ac, 55.19% Impervious, Inflow Depth > 3.16" for 10 YR event				
Inflow =	4.84 cfs @	12.08 hrs,	Volume=	0.364 af	
Outflow =	4.84 cfs @	12.08 hrs,	Volume=	0.364 af,	Atten= 0%, Lag= 0.0 min
Primary =	4.84 cfs @	12.08 hrs,	Volume=	0.364 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 238.47' @ 12.08 hrs
Flood Elev= 243.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	237.20'	**18.0" Round Culvert** L= 69.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.20' / 236.00' S= 0.0173 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=4.73 cfs @ 12.08 hrs HW=238.45' (Free Discharge)
└**1=Culvert** (Inlet Controls 4.73 cfs @ 3.01 fps)

Pond 6CB: CB R13



Summary for Pond 7CB: CB R17

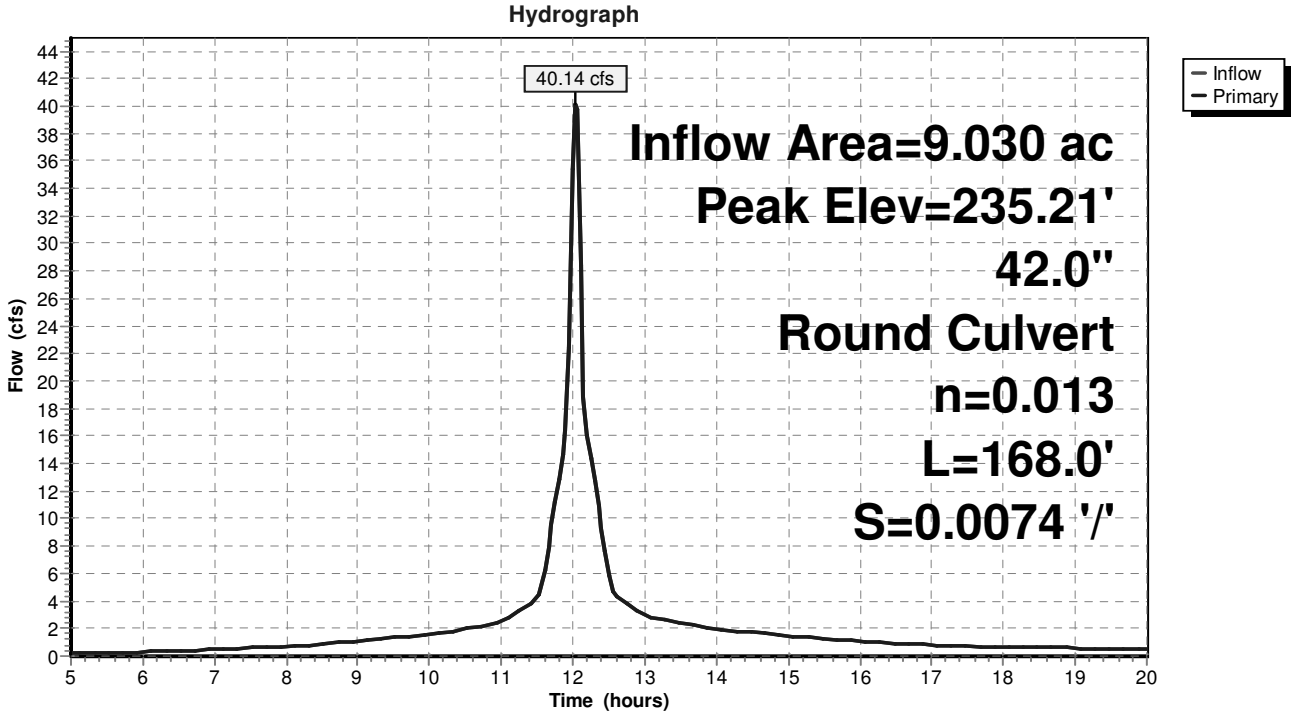
Inflow Area =	9.030 ac, 79.35% Impervious, Inflow Depth > 3.57" for 10 YR event				
Inflow =	40.14 cfs @	12.04 hrs,	Volume=	2.689 af	
Outflow =	40.14 cfs @	12.04 hrs,	Volume=	2.689 af,	Atten= 0%, Lag= 0.0 min
Primary =	40.14 cfs @	12.04 hrs,	Volume=	2.689 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 235.21' @ 12.04 hrs
Flood Elev= 246.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	232.25'	**42.0" Round Culvert** L= 168.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 232.25' / 231.00' S= 0.0074 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=38.80 cfs @ 12.04 hrs HW=235.14' (Free Discharge)
└**1=Culvert** (Inlet Controls 38.80 cfs @ 4.57 fps)

Pond 7CB: CB R17



Summary for Pond 8CB: CB R11

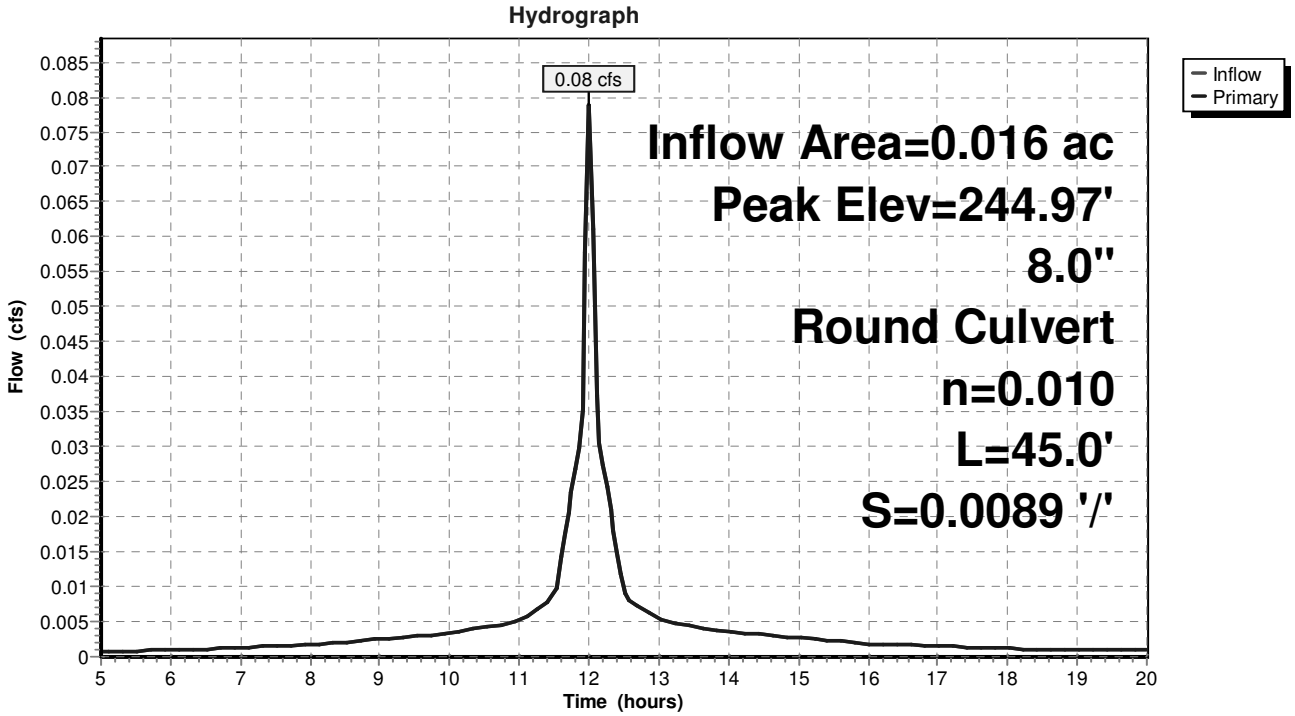
Inflow Area = 0.016 ac,100.00% Impervious, Inflow Depth > 3.87" for 10 YR event
Inflow = 0.08 cfs @ 12.00 hrs, Volume= 0.005 af
Outflow = 0.08 cfs @ 12.00 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min
Primary = 0.08 cfs @ 12.00 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 244.97' @ 12.00 hrs
Flood Elev= 249.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	244.80'	**8.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 244.80' / 244.40' S= 0.0089 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.08 cfs @ 12.00 hrs HW=244.97' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.08 cfs @ 1.10 fps)

Pond 8CB: CB R11



Summary for Pond 9CB: CB R11

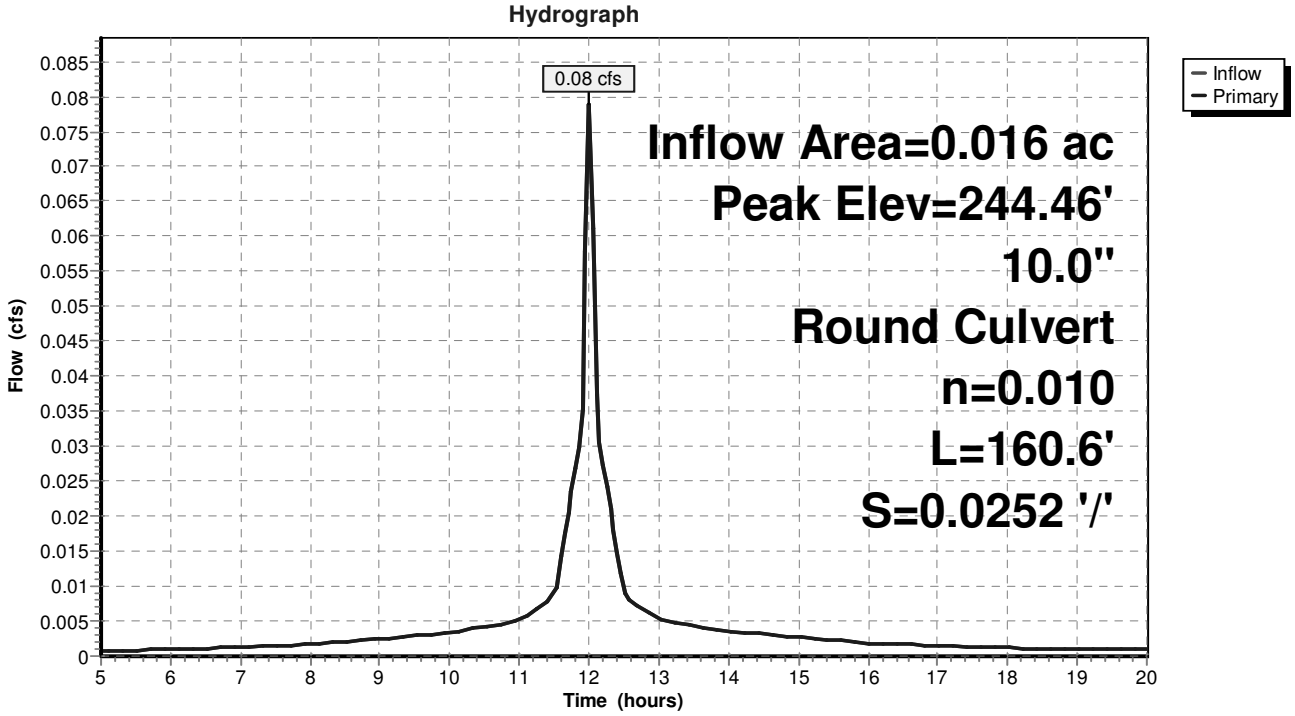
Inflow Area =	0.016 ac,100.00% Impervious, Inflow Depth > 3.87" for 10 YR event				
Inflow =	0.08 cfs @	12.00 hrs,	Volume=	0.005 af	
Outflow =	0.08 cfs @	12.00 hrs,	Volume=	0.005 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.08 cfs @	12.00 hrs,	Volume=	0.005 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 244.46' @ 12.00 hrs
Flood Elev= 249.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	244.30'	**10.0" Round Culvert** L= 160.6' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 244.30' / 240.25' S= 0.0252 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.08 cfs @ 12.00 hrs HW=244.46' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.08 cfs @ 1.07 fps)

Pond 9CB: CB R11



Summary for Pond 10CB: CB R10

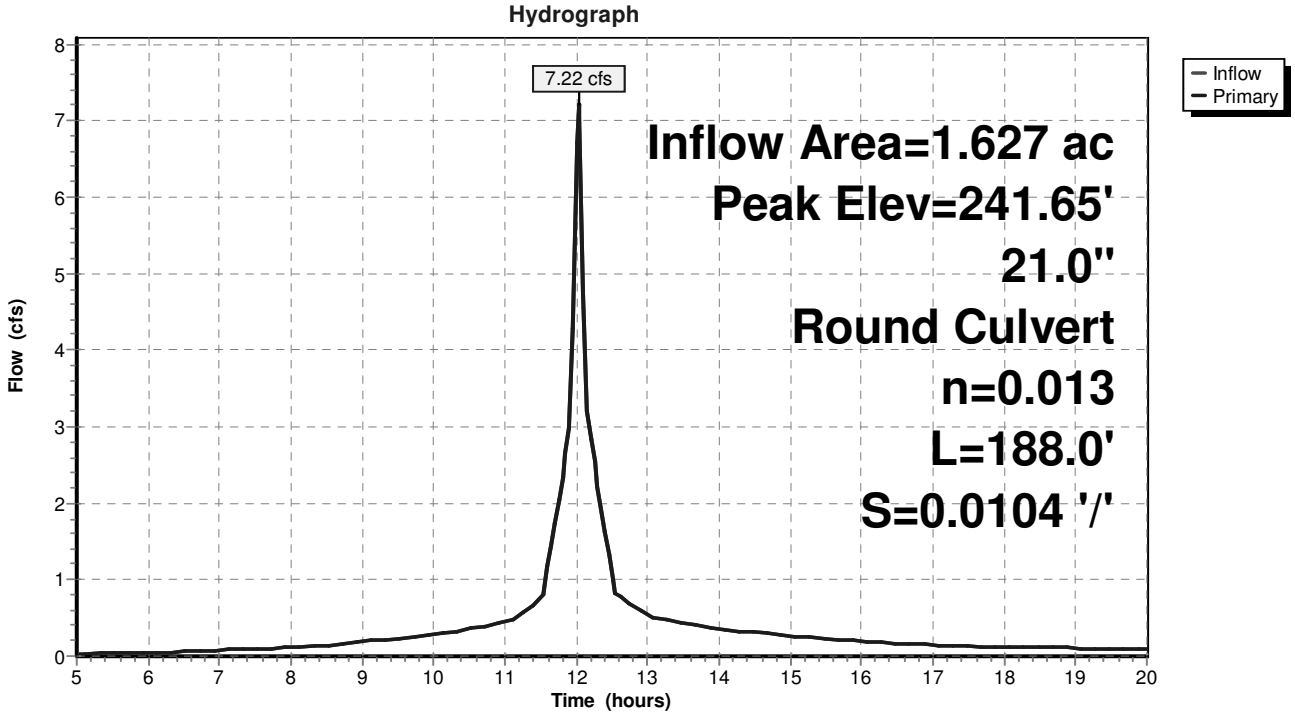
Inflow Area =	1.627 ac, 74.65% Impervious, Inflow Depth > 3.52" for 10 YR event				
Inflow =	7.22 cfs @	12.03 hrs, Volume=	0.477 af		
Outflow =	7.22 cfs @	12.03 hrs, Volume=	0.477 af, Atten= 0%, Lag= 0.0 min		
Primary =	7.22 cfs @	12.03 hrs, Volume=	0.477 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 241.65' @ 12.03 hrs
Flood Elev= 245.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	240.15'	**21.0" Round Culvert** L= 188.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 240.15' / 238.20' S= 0.0104 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=6.92 cfs @ 12.03 hrs HW=241.60' (Free Discharge)
└**1=Culvert** (Inlet Controls 6.92 cfs @ 3.24 fps)

Pond 10CB: CB R10



Summary for Pond 11CB: CB R9

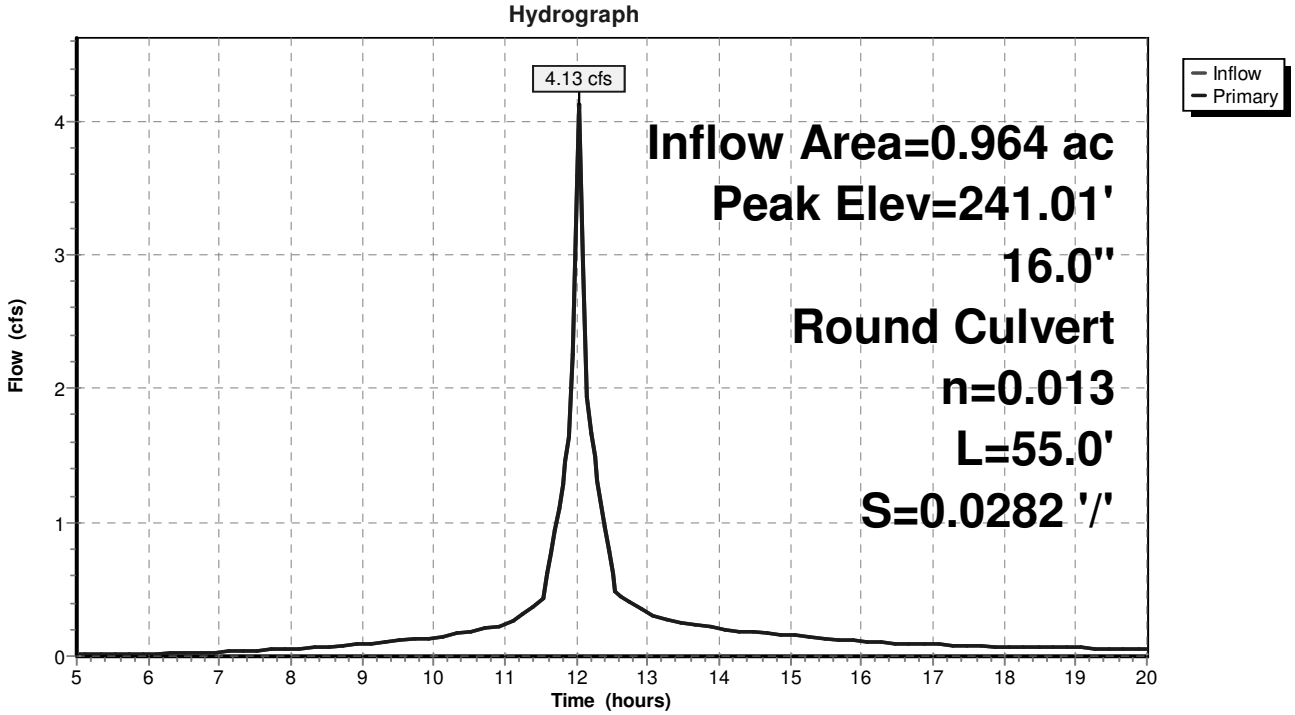
Inflow Area =	0.964 ac, 65.90% Impervious, Inflow Depth > 3.32" for 10 YR event				
Inflow =	4.13 cfs @	12.04 hrs, Volume=	0.266 af		
Outflow =	4.13 cfs @	12.04 hrs, Volume=	0.266 af, Atten= 0%, Lag= 0.0 min		
Primary =	4.13 cfs @	12.04 hrs, Volume=	0.266 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 241.01' @ 12.04 hrs
Flood Elev= 245.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.75'	**16.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.75' / 238.20' S= 0.0282 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=4.01 cfs @ 12.04 hrs HW=240.98' (Free Discharge)
└**1=Culvert** (Inlet Controls 4.01 cfs @ 2.98 fps)

Pond 11CB: CB R9



Summary for Pond 12CB: DMH R9

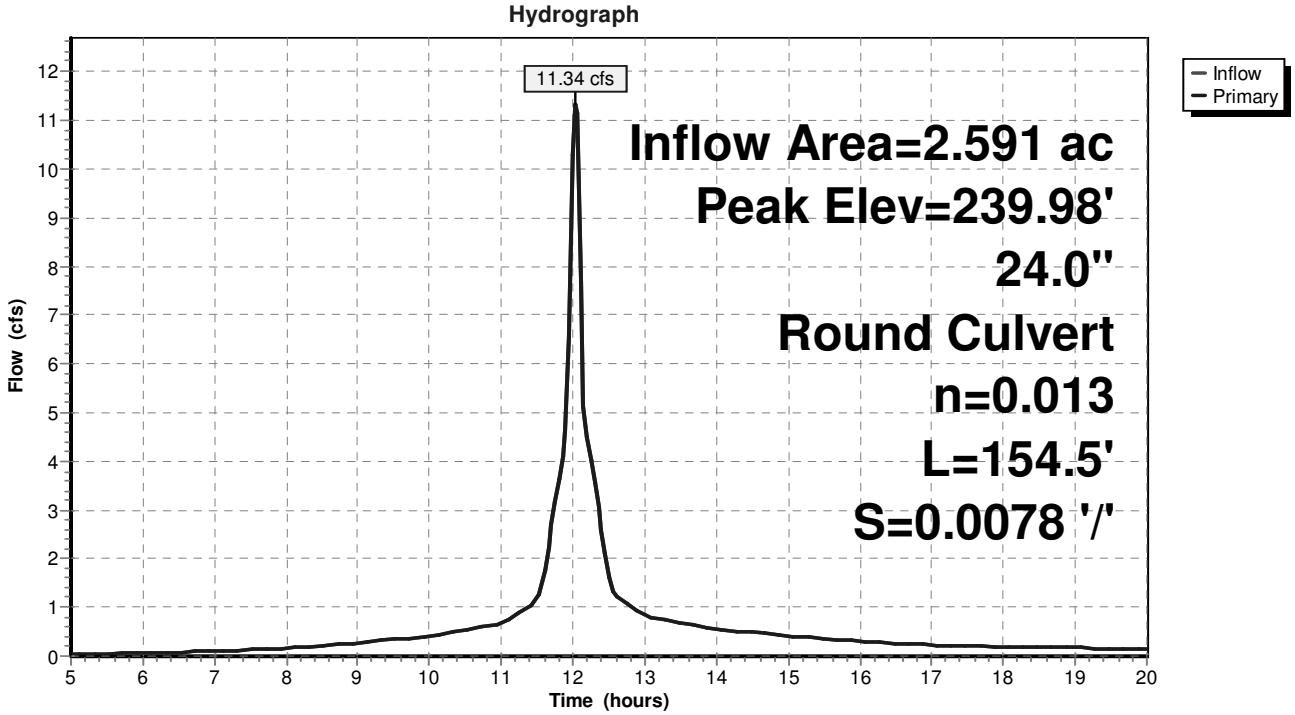
Inflow Area =	2.591 ac, 71.40% Impervious, Inflow Depth > 3.44" for 10 YR event				
Inflow =	11.34 cfs @	12.03 hrs,	Volume=	0.743 af	
Outflow =	11.34 cfs @	12.03 hrs,	Volume=	0.743 af,	Atten= 0%, Lag= 0.0 min
Primary =	11.34 cfs @	12.03 hrs,	Volume=	0.743 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 239.98' @ 12.04 hrs
Flood Elev= 246.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	238.10'	**24.0" Round Culvert** L= 154.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 238.10' / 236.90' S= 0.0078 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=10.90 cfs @ 12.03 hrs HW=239.92' (Free Discharge)
└**1=Culvert** (Inlet Controls 10.90 cfs @ 3.63 fps)

Pond 12CB: DMH R9



Summary for Pond 13CB: CB R8

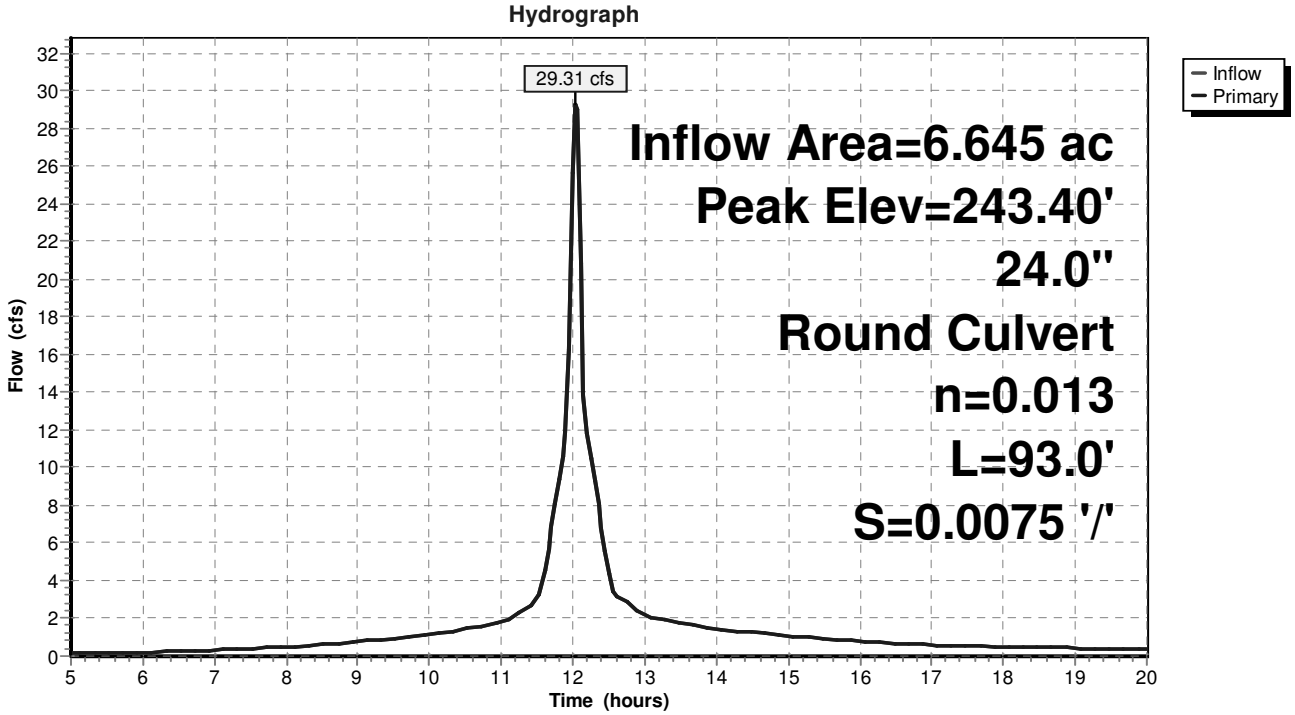
Inflow Area =	6.645 ac, 75.50% Impervious, Inflow Depth > 3.52" for 10 YR event				
Inflow =	29.31 cfs @	12.04 hrs,	Volume=	1.949 af	
Outflow =	29.31 cfs @	12.04 hrs,	Volume=	1.949 af,	Atten= 0%, Lag= 0.0 min
Primary =	29.31 cfs @	12.04 hrs,	Volume=	1.949 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 243.40' @ 12.04 hrs
Flood Elev= 247.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	236.40'	**24.0" Round Culvert** L= 93.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 236.40' / 235.70' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=28.39 cfs @ 12.04 hrs HW=243.05' (Free Discharge)
└**1=Culvert** (Inlet Controls 28.39 cfs @ 9.04 fps)

Pond 13CB: CB R8



Summary for Pond 14CB: CB R8

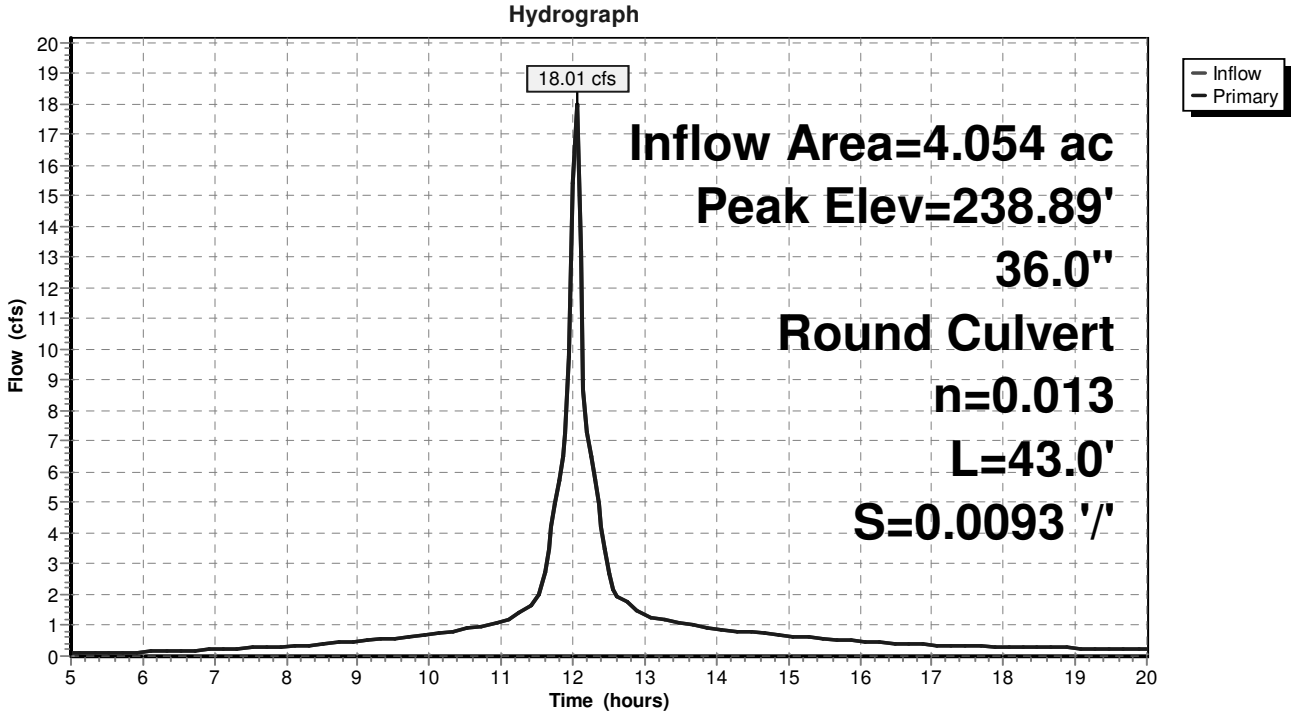
Inflow Area =	4.054 ac, 78.12% Impervious, Inflow Depth > 3.57" for 10 YR event				
Inflow =	18.01 cfs @	12.04 hrs,	Volume=	1.206 af	
Outflow =	18.01 cfs @	12.04 hrs,	Volume=	1.206 af,	Atten= 0%, Lag= 0.0 min
Primary =	18.01 cfs @	12.04 hrs,	Volume=	1.206 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 238.89' @ 12.04 hrs
Flood Elev= 247.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	236.90'	**36.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 236.90' / 236.50' S= 0.0093 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=17.52 cfs @ 12.04 hrs HW=238.86' (Free Discharge)
└**1=Culvert** (Barrel Controls 17.52 cfs @ 5.08 fps)

Pond 14CB: CB R8



Summary for Pond 15CB: CB R6

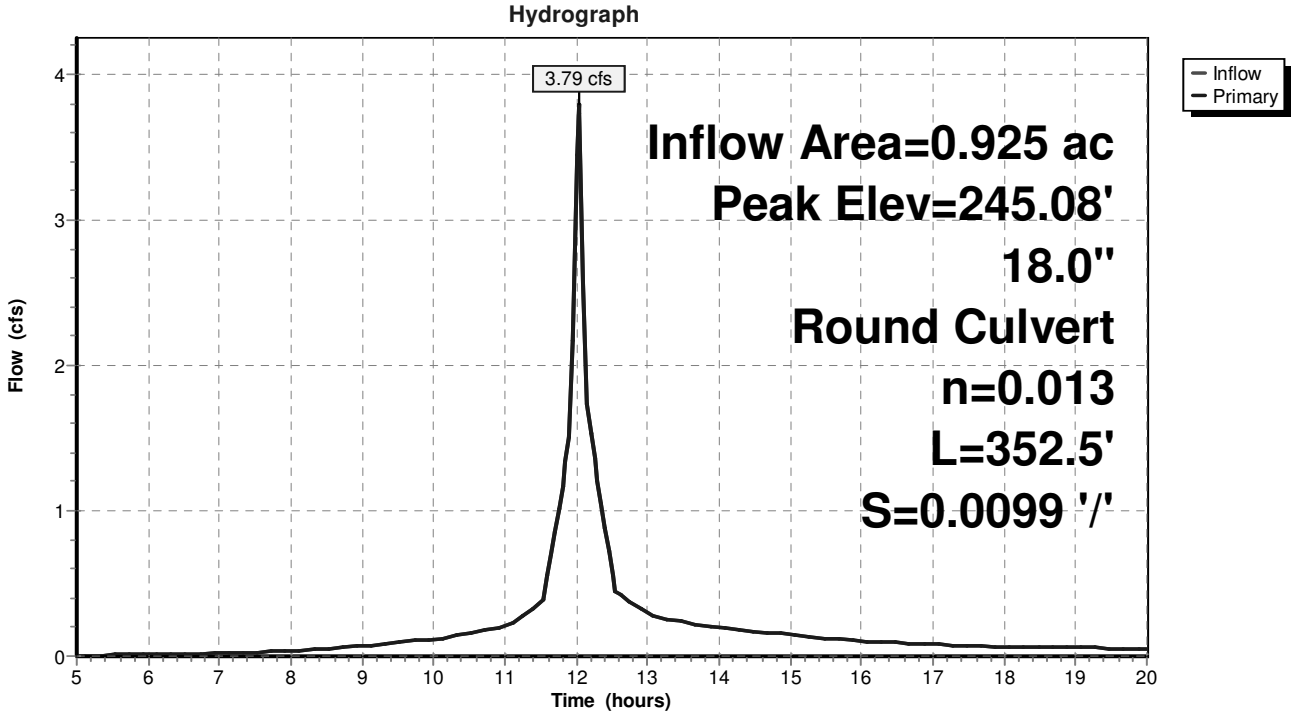
Inflow Area =	0.925 ac, 43.35% Impervious, Inflow Depth > 3.12" for 10 YR event				
Inflow =	3.79 cfs @ 12.03 hrs, Volume=	0.240 af			
Outflow =	3.79 cfs @ 12.03 hrs, Volume=	0.240 af, Atten= 0%, Lag= 0.0 min			
Primary =	3.79 cfs @ 12.03 hrs, Volume=	0.240 af			

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 245.08' @ 12.03 hrs
Flood Elev= 249.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	244.00'	**18.0" Round Culvert** L= 352.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 244.00' / 240.50' S= 0.0099 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.64 cfs @ 12.03 hrs HW=245.05' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.64 cfs @ 2.75 fps)

Pond 15CB: CB R6



Summary for Pond 16CB: CB R7

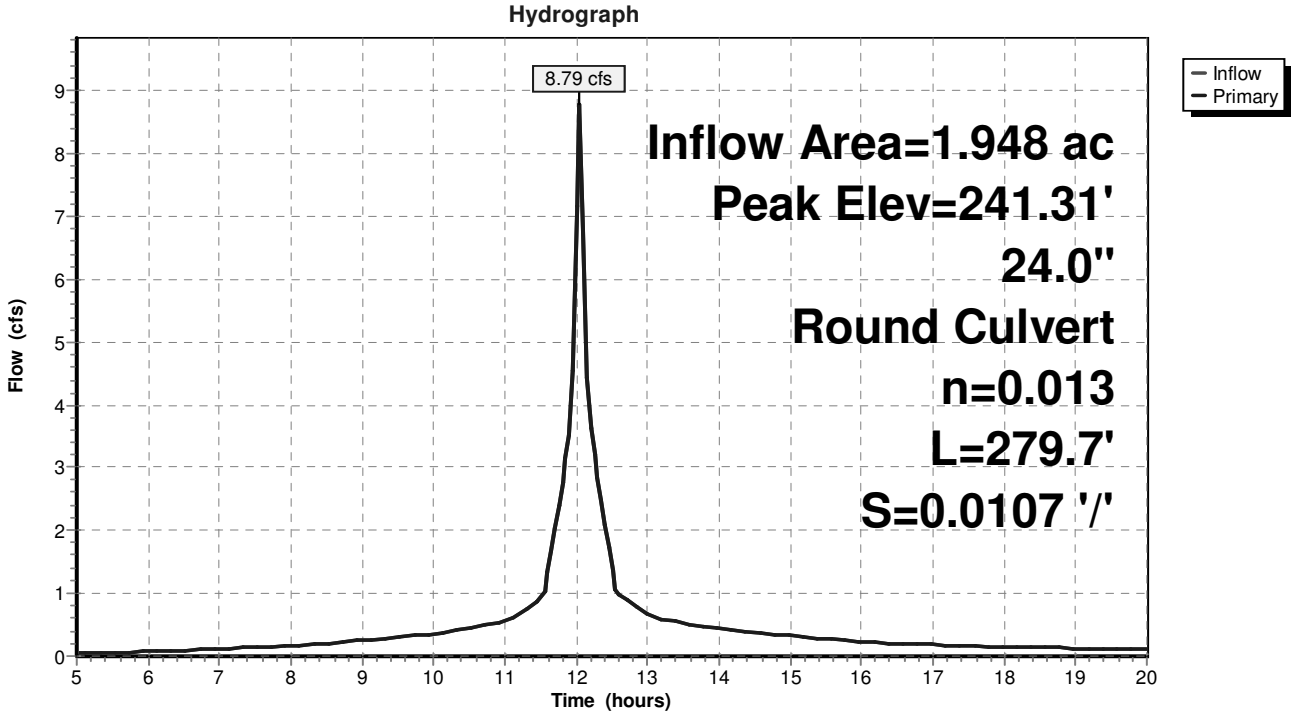
Inflow Area =	1.948 ac, 84.49% Impervious, Inflow Depth > 3.65" for 10 YR event				
Inflow =	8.79 cfs @	12.05 hrs,	Volume=	0.593 af	
Outflow =	8.79 cfs @	12.05 hrs,	Volume=	0.593 af,	Atten= 0%, Lag= 0.0 min
Primary =	8.79 cfs @	12.05 hrs,	Volume=	0.593 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 241.31' @ 12.05 hrs
Flood Elev= 245.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.75'	**24.0" Round Culvert** L= 279.7' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.75' / 236.75' S= 0.0107 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=8.69 cfs @ 12.05 hrs HW=241.29' (Free Discharge)
└**1=Culvert** (Inlet Controls 8.69 cfs @ 3.34 fps)

Pond 16CB: CB R7



Summary for Pond 17CB: CB R24

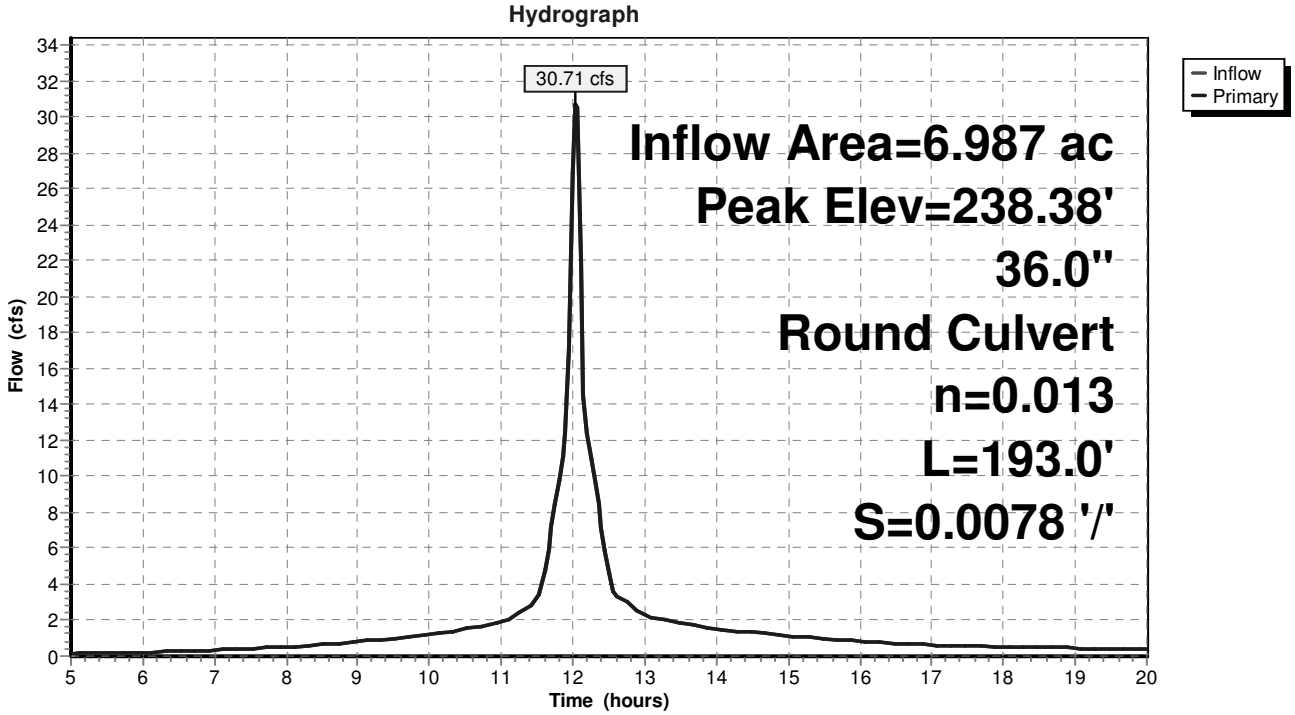
Inflow Area =	6.987 ac, 74.61% Impervious, Inflow Depth > 3.50" for 10 YR event				
Inflow =	30.71 cfs @	12.04 hrs,	Volume=	2.038 af	
Outflow =	30.71 cfs @	12.04 hrs,	Volume=	2.038 af,	Atten= 0%, Lag= 0.0 min
Primary =	30.71 cfs @	12.04 hrs,	Volume=	2.038 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 238.38' @ 12.04 hrs
Flood Elev= 247.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.60'	**36.0" Round Culvert** L= 193.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 235.60' / 234.10' S= 0.0078 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=29.79 cfs @ 12.04 hrs HW=238.31' (Free Discharge)
└**1=Culvert** (Inlet Controls 29.79 cfs @ 4.43 fps)

Pond 17CB: CB R24



Summary for Pond 18CB: CB R24

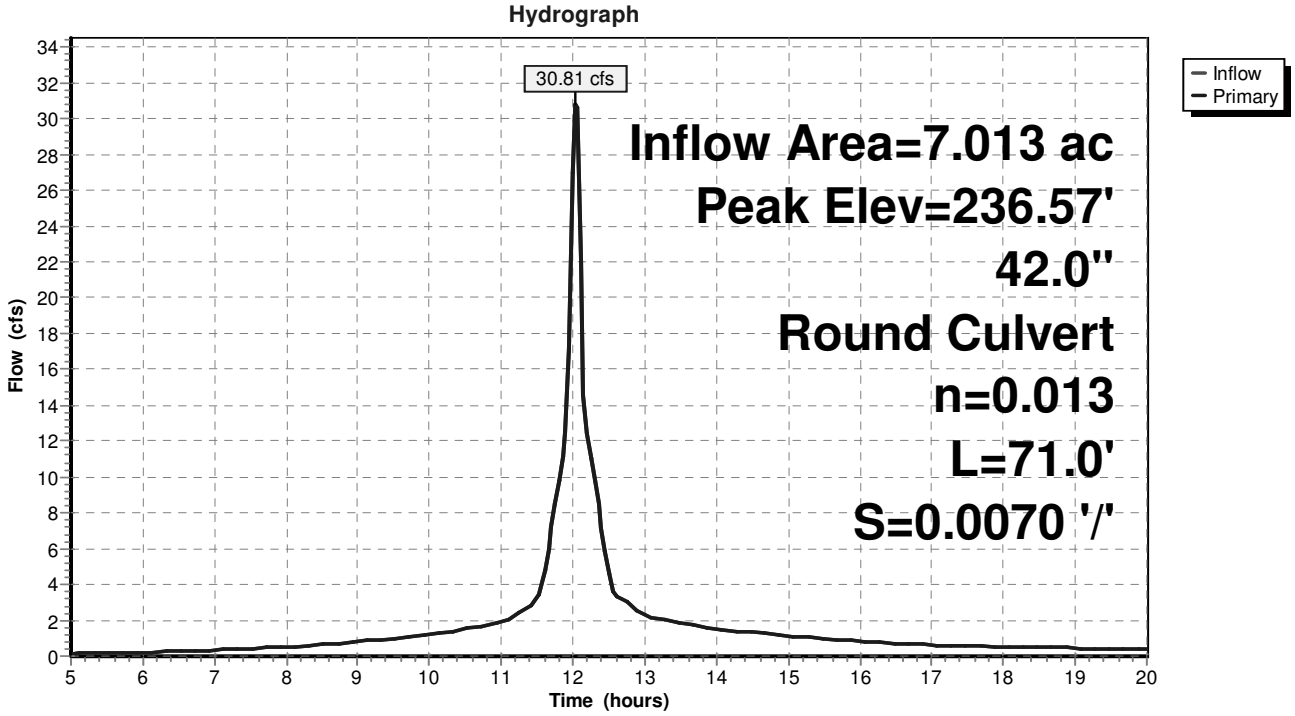
Inflow Area =	7.013 ac, 74.55% Impervious, Inflow Depth > 3.50" for 10 YR event				
Inflow =	30.81 cfs @	12.04 hrs,	Volume=	2.045 af	
Outflow =	30.81 cfs @	12.04 hrs,	Volume=	2.045 af,	Atten= 0%, Lag= 0.0 min
Primary =	30.81 cfs @	12.04 hrs,	Volume=	2.045 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 236.57' @ 12.04 hrs
Flood Elev= 249.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.00'	**42.0" Round Culvert** L= 71.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 234.00' / 233.50' S= 0.0070 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=29.80 cfs @ 12.04 hrs HW=236.52' (Free Discharge)
└**1=Culvert** (Barrel Controls 29.80 cfs @ 5.63 fps)

Pond 18CB: CB R24



Summary for Pond 19CB: CB R20

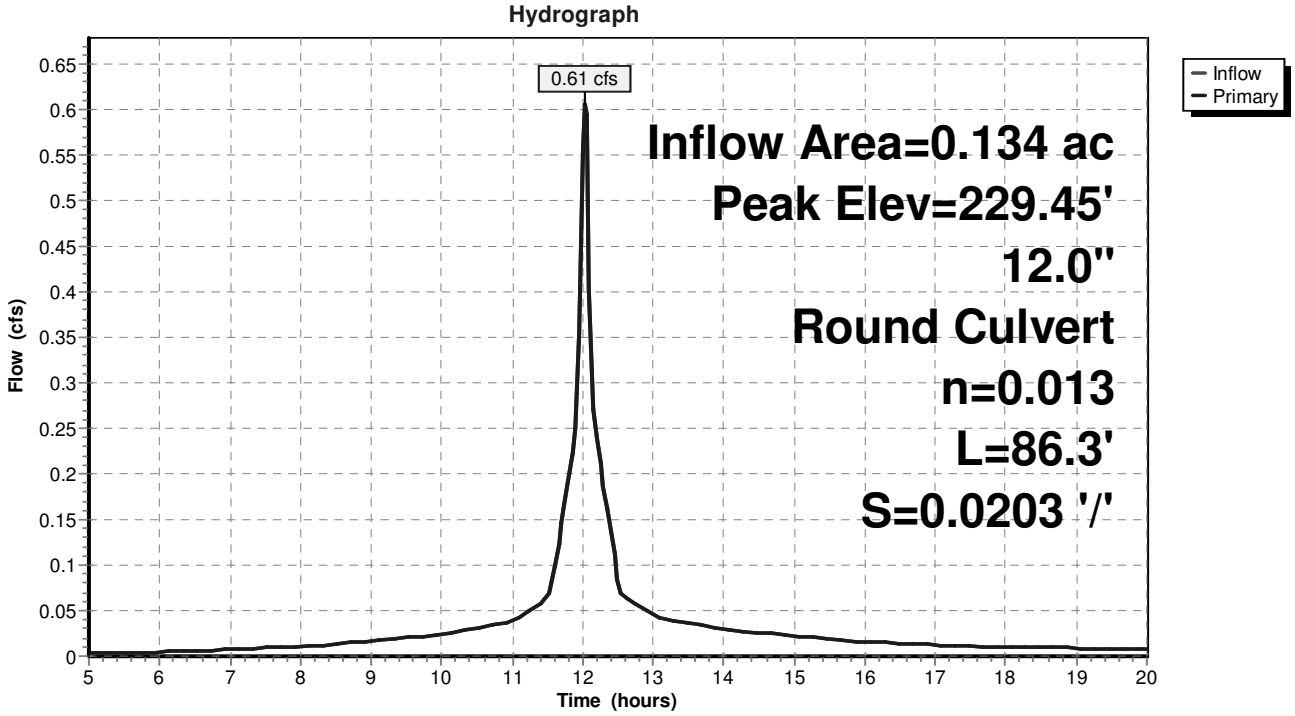
Inflow Area =	0.134 ac, 88.77% Impervious, Inflow Depth > 3.61" for 10 YR event				
Inflow =	0.61 cfs @	12.03 hrs,	Volume=	0.040 af	
Outflow =	0.61 cfs @	12.03 hrs,	Volume=	0.040 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.61 cfs @	12.03 hrs,	Volume=	0.040 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 229.45' @ 12.03 hrs
Flood Elev= 234.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.00'	**12.0" Round Culvert** L= 86.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 229.00' / 227.25' S= 0.0203 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.58 cfs @ 12.03 hrs HW=229.43' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.58 cfs @ 1.77 fps)

Pond 19CB: CB R20



Summary for Pond 20CB: CB R13

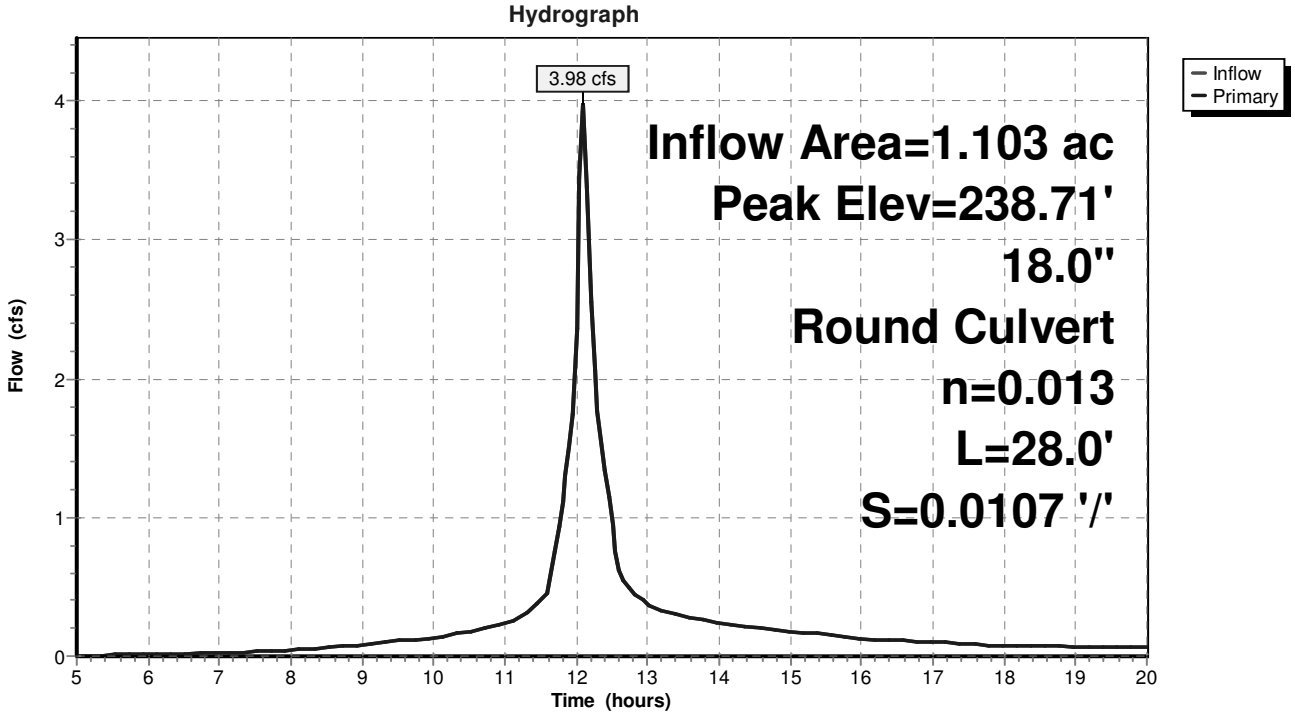
Inflow Area =	1.103 ac, 51.29% Impervious, Inflow Depth > 3.11" for 10 YR event				
Inflow =	3.98 cfs @	12.10 hrs,	Volume=	0.286 af	
Outflow =	3.98 cfs @	12.10 hrs,	Volume=	0.286 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.98 cfs @	12.10 hrs,	Volume=	0.286 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 238.71' @ 12.10 hrs
Flood Elev= 243.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	237.60'	**18.0" Round Culvert** L= 28.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.60' / 237.30' S= 0.0107 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.96 cfs @ 12.10 hrs HW=238.71' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.96 cfs @ 2.83 fps)

Pond 20CB: CB R13



Summary for Pond 21CB: CB 21

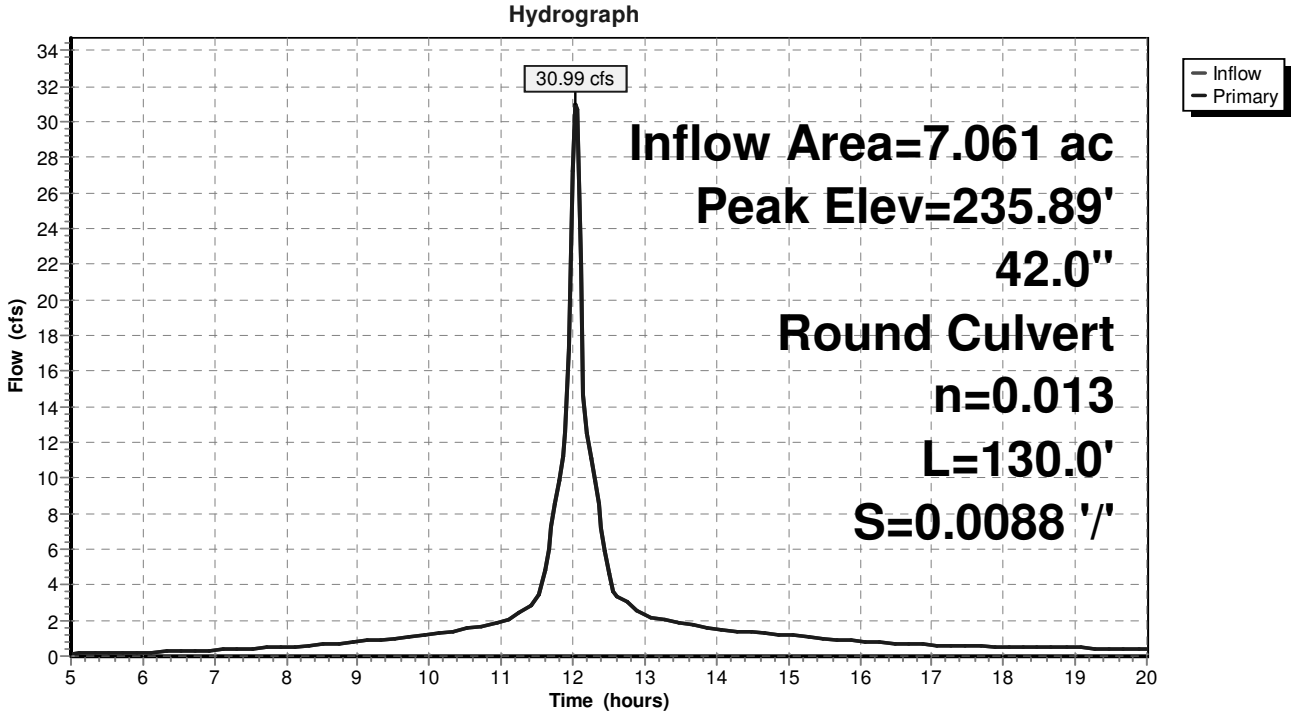
Inflow Area =	7.061 ac, 74.45% Impervious, Inflow Depth > 3.50" for 10 YR event				
Inflow =	30.99 cfs @	12.04 hrs,	Volume=	2.057 af	
Outflow =	30.99 cfs @	12.04 hrs,	Volume=	2.057 af,	Atten= 0%, Lag= 0.0 min
Primary =	30.99 cfs @	12.04 hrs,	Volume=	2.057 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 235.89' @ 12.04 hrs
Flood Elev= 248.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	233.40'	**42.0" Round Culvert** L= 130.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 233.40' / 232.25' S= 0.0088 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=29.97 cfs @ 12.04 hrs HW=235.84' (Free Discharge)
└**1=Culvert** (Inlet Controls 29.97 cfs @ 4.19 fps)

Pond 21CB: CB 21



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: CATCH1 Runoff Area=1,018,520 sf 9.29% Impervious Runoff Depth>0.90"
Flow Length=1,870' Tc=44.8 min CN=55 Runoff=10.75 cfs 1.751 af

Subcatchment 5S: CATCH5 Runoff Area=13,612 sf 99.52% Impervious Runoff Depth>4.51"
Flow Length=337' Tc=2.8 min CN=98 Runoff=1.69 cfs 0.117 af

Subcatchment 6S: CATCH6 Runoff Area=40,309 sf 43.35% Impervious Runoff Depth>3.76"
Flow Length=241' Tc=2.0 min CN=90 Runoff=4.52 cfs 0.290 af

Subcatchment 7S: CATCH7 Runoff Area=71,244 sf 81.62% Impervious Runoff Depth>4.25"
Flow Length=404' Tc=3.1 min CN=95 Runoff=8.58 cfs 0.580 af

Subcatchment 8S: CATCH8 Runoff Area=51,409 sf 94.88% Impervious Runoff Depth>4.43"
Flow Length=246' Slope=0.0150 '/' Tc=2.4 min CN=97 Runoff=6.36 cfs 0.436 af

Subcatchment 9S: CATCH9 Runoff Area=41,989 sf 65.90% Impervious Runoff Depth>3.96"
Flow Length=206' Tc=2.4 min CN=92 Runoff=4.88 cfs 0.318 af

Subcatchment 10S: CATCH10 Runoff Area=70,177 sf 74.40% Impervious Runoff Depth>4.16"
Flow Length=270' Slope=0.0200 '/' Tc=1.9 min CN=94 Runoff=8.39 cfs 0.558 af

Subcatchment 11S: CATCH11 Runoff Area=700 sf 100.00% Impervious Runoff Depth>4.51"
Flow Length=7' Slope=0.0100 '/' Tc=0.2 min CN=98 Runoff=0.09 cfs 0.006 af

Subcatchment 12S: CATCH12 Runoff Area=83,464 sf 98.25% Impervious Runoff Depth>4.51"
Flow Length=433' Tc=2.3 min CN=98 Runoff=10.39 cfs 0.720 af

Subcatchment 13S: CATCH13 Runoff Area=48,060 sf 51.29% Impervious Runoff Depth>3.75"
Flow Length=255' Tc=6.8 min CN=90 Runoff=4.75 cfs 0.345 af

Subcatchment 14S: CATCH14 Runoff Area=229,540 sf 9.88% Impervious Runoff Depth>2.26"
Flow Length=934' Tc=9.7 min CN=74 Runoff=13.08 cfs 0.994 af

Subcatchment 15S: CATCH15 Runoff Area=12,183 sf 70.56% Impervious Runoff Depth>3.96"
Flow Length=289' Tc=2.0 min CN=92 Runoff=1.42 cfs 0.092 af

Subcatchment 16S: CATCH16 Runoff Area=32,840 sf 3.66% Impervious Runoff Depth>2.87"
Flow Length=243' Tc=11.1 min CN=81 Runoff=2.28 cfs 0.180 af

Subcatchment 17S: CATCH17 Runoff Area=52,372 sf 32.27% Impervious Runoff Depth>3.25"
Flow Length=123' Tc=5.0 min CN=85 Runoff=4.85 cfs 0.326 af

Subcatchment 18S: CATCH18 Runoff Area=22,493 sf 77.70% Impervious Runoff Depth>4.16"
Flow Length=365' Slope=0.0260 '/' Tc=2.4 min CN=94 Runoff=2.70 cfs 0.179 af

Subcatchment 19S: CATCH19 Runoff Area=71,665 sf 29.40% Impervious Runoff Depth>2.78"
Flow Length=286' Tc=10.8 min CN=80 Runoff=4.86 cfs 0.381 af

Subcatchment 20S: CATCH20 Runoff Area=5,850 sf 88.77% Impervious Runoff Depth>4.26"
Flow Length=189' Slope=0.0150 '/' Tc=2.0 min CN=95 Runoff=0.71 cfs 0.048 af

Subcatchment 21S: CATCH21 Runoff Area=7,351 sf 0.80% Impervious Runoff Depth>1.95"
Flow Length=55' Slope=0.1000 '/' Tc=3.3 min CN=70 Runoff=0.44 cfs 0.027 af

Subcatchment 22S: CATCH22 Runoff Area=3,330 sf 77.27% Impervious Runoff Depth>3.96"
Flow Length=148' Slope=0.0150 '/' Tc=1.5 min CN=92 Runoff=0.39 cfs 0.025 af

Subcatchment 23S: CATCH23 Runoff Area=189,711 sf 4.90% Impervious Runoff Depth>2.01"
Flow Length=433' Tc=25.3 min CN=71 Runoff=6.72 cfs 0.729 af

Subcatchment 24S: CATCH24 Runoff Area=605,992 sf 0.76% Impervious Runoff Depth>0.79"
Flow Length=1,057' Tc=33.5 min CN=53 Runoff=6.19 cfs 0.917 af

Subcatchment 25S: CATCH25 Runoff Area=14,927 sf 57.32% Impervious Runoff Depth>3.76"
Flow Length=340' Slope=0.0150 '/' Tc=2.7 min CN=90 Runoff=1.67 cfs 0.107 af

Subcatchment 26S: CATCH26 Runoff Area=1,125 sf 58.84% Impervious Runoff Depth>3.76"
Flow Length=44' Slope=0.0150 '/' Tc=0.6 min CN=90 Runoff=0.13 cfs 0.008 af

Subcatchment 27S: CATCH27 Runoff Area=2,087 sf 59.08% Impervious Runoff Depth>3.76"
Flow Length=42' Slope=0.0150 '/' Tc=0.5 min CN=90 Runoff=0.24 cfs 0.015 af

Subcatchment 28S: CATCH28 Runoff Area=2,298 sf 50.17% Impervious Runoff Depth>3.66"
Flow Length=104' Slope=0.0150 '/' Tc=0.9 min CN=89 Runoff=0.26 cfs 0.016 af

Reach 1SP: STUDY POINT #1 Inflow=10.75 cfs 1.751 af
Outflow=10.75 cfs 1.751 af

Reach 2SP: STUDY POINT #2 Inflow=27.05 cfs 4.668 af
Outflow=27.05 cfs 4.668 af

Reach 3C: New Culvert #3 Avg. Flow Depth=0.25' Max Vel=2.56 fps Inflow=13.08 cfs 0.994 af
8.0" x 3.0" Box Pipe n=0.030 L=75.0' S=0.0367 '/' Capacity=0.32 cfs Outflow=0.41 cfs 0.266 af

Reach 4C: Ex. Culvert Avg. Flow Depth=0.68' Max Vel=3.52 fps Inflow=23.14 cfs 3.075 af
115.0" x 76.0" Box Pipe n=0.030 L=75.0' S=0.0100 '/' Capacity=586.94 cfs Outflow=23.09 cfs 3.073 af

Reach 4R: CATCH24 Reach Avg. Flow Depth=0.49' Max Vel=4.09 fps Inflow=23.38 cfs 3.086 af
n=0.030 L=383.7' S=0.0208 '/' Capacity=444.84 cfs Outflow=23.14 cfs 3.075 af

Reach 5R: CATCH23 Reach Avg. Flow Depth=0.24' Max Vel=1.08 fps Inflow=23.09 cfs 3.073 af
n=0.030 L=646.0' S=0.0031 '/' Capacity=12,048.05 cfs Outflow=21.82 cfs 3.022 af

Reach 6R: CATCH 23 Reach Avg. Flow Depth=0.21' Max Vel=2.69 fps Inflow=7.52 cfs 0.924 af
n=0.030 L=77.2' S=0.0324 '/' Capacity=1,385.41 cfs Outflow=7.37 cfs 0.923 af

Reach 7R: CATCH23 Reach Avg. Flow Depth=0.28' Max Vel=1.68 fps Inflow=11.94 cfs 1.652 af
n=0.030 L=182.5' S=0.0082 '/' Capacity=5,255.57 cfs Outflow=11.85 cfs 1.646 af

Reach 8R: CATCH 23 Reach Avg. Flow Depth=0.04' Max Vel=2.36 fps Inflow=5.03 cfs 0.406 af
n=0.022 L=79.0' S=0.0886 '/' Capacity=1,415.96 cfs Outflow=4.95 cfs 0.406 af

Reach 9R: CATCH 23 Reach Avg. Flow Depth=0.03' Max Vel=1.16 fps Inflow=0.41 cfs 0.266 af
n=0.030 L=162.0' S=0.0494 '/' Capacity=1,710.82 cfs Outflow=0.39 cfs 0.264 af

Pond 1CB: CB R20 Peak Elev=228.34' Inflow=3.40 cfs 0.227 af
15.0" Round Culvert n=0.013 L=40.5' S=0.0062 '/' Outflow=3.40 cfs 0.227 af

Pond 1P: Main Stormwater Pond Peak Elev=233.17' Storage=97,490 cf Inflow=58.37 cfs 4.116 af
Discarded=0.05 cfs 0.061 af Primary=17.28 cfs 2.169 af Outflow=17.33 cfs 2.229 af

Pond 2CB: CB R18 Peak Elev=228.72' Inflow=2.70 cfs 0.179 af
15.0" Round Culvert n=0.013 L=21.5' S=0.0233 '/' Outflow=2.70 cfs 0.179 af

Pond 2P: Soil Filter #1 Peak Elev=224.00' Storage=6 cf Inflow=3.84 cfs 0.254 af
Outflow=3.84 cfs 0.254 af

Pond 3CB: CB R22 Peak Elev=227.10' Inflow=0.39 cfs 0.025 af
12.0" Round Culvert n=0.013 L=43.0' S=0.0116 '/' Outflow=0.39 cfs 0.025 af

Pond 3P: Soil Filter #2 Peak Elev=224.02' Storage=35 cf Inflow=5.02 cfs 0.406 af
Outflow=5.03 cfs 0.406 af

Pond 4CB: CB R16 Peak Elev=237.75' Inflow=7.71 cfs 0.618 af
19.0" Round Culvert n=0.013 L=245.0' S=0.0200 '/' Outflow=7.71 cfs 0.618 af

Pond 5CB: CB R15 Peak Elev=238.73' Inflow=1.42 cfs 0.092 af
12.0" Round Culvert n=0.013 L=41.0' S=0.0171 '/' Outflow=1.42 cfs 0.092 af

Pond 6CB: CB R13 Peak Elev=238.67' Inflow=5.77 cfs 0.437 af
18.0" Round Culvert n=0.013 L=69.3' S=0.0173 '/' Outflow=5.77 cfs 0.437 af

Pond 7CB: CB R17 Peak Elev=235.62' Inflow=47.03 cfs 3.172 af
42.0" Round Culvert n=0.013 L=168.0' S=0.0074 '/' Outflow=47.03 cfs 3.172 af

Pond 8CB: CB R11 Peak Elev=244.98' Inflow=0.09 cfs 0.006 af
8.0" Round Culvert n=0.010 L=45.0' S=0.0089 '/' Outflow=0.09 cfs 0.006 af

Pond 9CB: CB R11 Peak Elev=244.47' Inflow=0.09 cfs 0.006 af
10.0" Round Culvert n=0.010 L=160.6' S=0.0252 '/' Outflow=0.09 cfs 0.006 af

Pond 10CB: CB R10 Peak Elev=241.86' Inflow=8.47 cfs 0.564 af
21.0" Round Culvert n=0.013 L=188.0' S=0.0104 '/' Outflow=8.47 cfs 0.564 af

Pond 11CB: CB R9 Peak Elev=241.26' Inflow=4.88 cfs 0.318 af
16.0" Round Culvert n=0.013 L=55.0' S=0.0282 '/' Outflow=4.88 cfs 0.318 af

Pond 12CB: DMH R9 Peak Elev=240.33' Inflow=13.34 cfs 0.882 af
24.0" Round Culvert n=0.013 L=154.5' S=0.0078 '/' Outflow=13.34 cfs 0.882 af

Pond 13CB: CB R8 Peak Elev=245.66' Inflow=34.40 cfs 2.306 af
24.0" Round Culvert n=0.013 L=93.0' S=0.0075 '/' Outflow=34.40 cfs 2.306 af

Pond 14CB: CB R8 Peak Elev=239.10' Inflow=21.10 cfs 1.423 af
36.0" Round Culvert n=0.013 L=43.0' S=0.0093 '/' Outflow=21.10 cfs 1.423 af

Pond 15CB: CB R6 Peak Elev=245.21' Inflow=4.52 cfs 0.290 af
18.0" Round Culvert n=0.013 L=352.5' S=0.0099 '/' Outflow=4.52 cfs 0.290 af

Pond 16CB: CB R7 Peak Elev=241.49' Inflow=10.27 cfs 0.697 af
24.0" Round Culvert n=0.013 L=279.7' S=0.0107 '/' Outflow=10.27 cfs 0.697 af

Pond 17CB: CB R24 Peak Elev=238.89' Inflow=36.07 cfs 2.413 af
36.0" Round Culvert n=0.013 L=193.0' S=0.0078 '/' Outflow=36.07 cfs 2.413 af

Pond 18CB: CB R24 Peak Elev=236.85' Inflow=36.19 cfs 2.421 af
42.0" Round Culvert n=0.013 L=71.0' S=0.0070 '/' Outflow=36.19 cfs 2.421 af

Pond 19CB: CB R20 Peak Elev=229.49' Inflow=0.71 cfs 0.048 af
12.0" Round Culvert n=0.013 L=86.3' S=0.0203 '/' Outflow=0.71 cfs 0.048 af

Pond 20CB: CB R13 Peak Elev=238.85' Inflow=4.75 cfs 0.345 af
18.0" Round Culvert n=0.013 L=28.0' S=0.0107 '/' Outflow=4.75 cfs 0.345 af

Pond 21CB: CB 21 Peak Elev=236.16' Inflow=36.40 cfs 2.436 af
42.0" Round Culvert n=0.013 L=130.0' S=0.0088 '/' Outflow=36.40 cfs 2.436 af

Total Runoff Area = 61.828 ac Runoff Volume = 9.167 af Average Runoff Depth = 1.78"
79.91% Pervious = 49.408 ac 20.09% Impervious = 12.421 ac

Summary for Subcatchment 1S: CATCH1

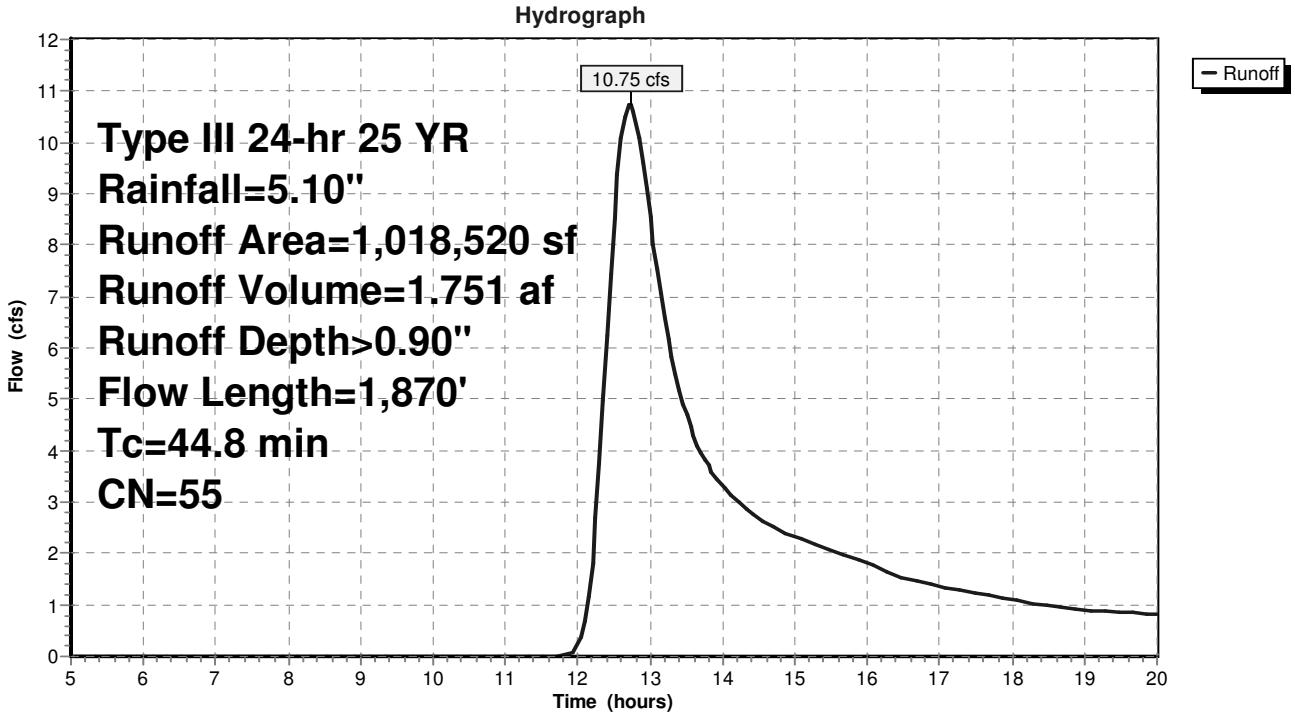
Runoff = 10.75 cfs @ 12.72 hrs, Volume= 1.751 af, Depth> 0.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	95,226	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	94,031	70	Woods, Good, HSG C
	154,141	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	1,546	84	50-75% Grass cover, Fair, HSG D
*	94,602	98	Impervious
	386,699	30	Meadow, non-grazed, HSG A
	151,690	71	Meadow, non-grazed, HSG C
	40,585	78	Meadow, non-grazed, HSG D
	1,018,520	55	Weighted Average
	923,918		90.71% Pervious Area
	94,602		9.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	100	0.1300	0.35		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.00"
13.2	945	0.0290	1.19		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.0100	3.74	11.76	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
26.7	800	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
44.8	1,870	Total			

Subcatchment 1S: CATCH1



Summary for Subcatchment 5S: CATCH5

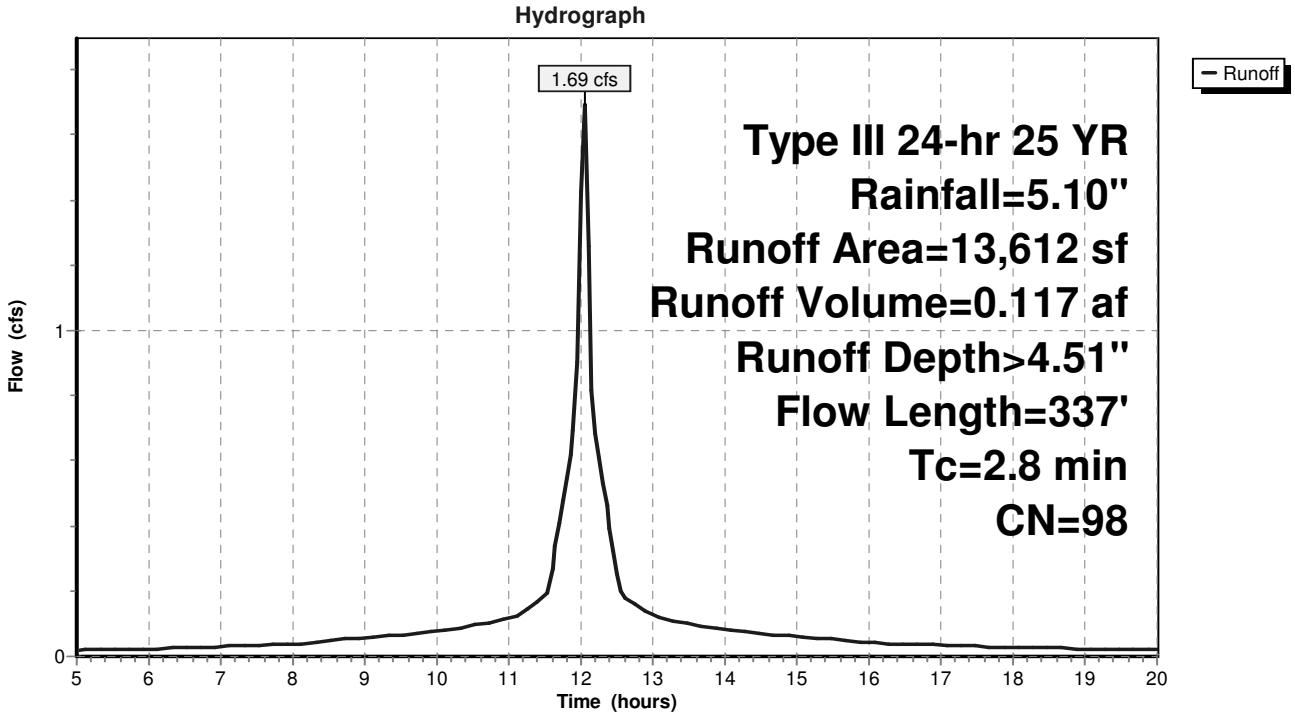
Runoff = 1.69 cfs @ 12.04 hrs, Volume= 0.117 af, Depth> 4.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	4	70	Woods, Good, HSG C
	62	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	13,546	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	13,612	98	Weighted Average
	66		0.48% Pervious Area
	13,546		99.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.33		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.4	62	0.0200	2.87		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
1.1	175	0.0170	2.65		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
2.8	337	Total			

Subcatchment 5S: CATCH5



Summary for Subcatchment 6S: CATCH6

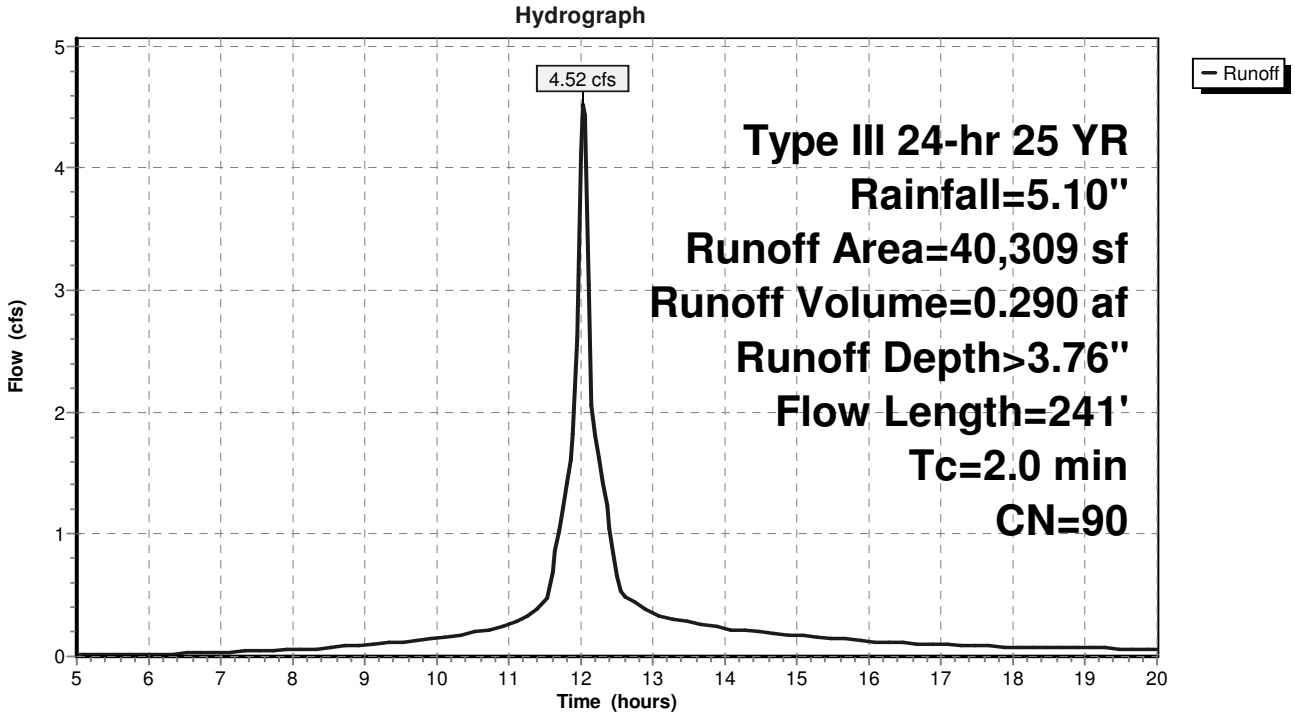
Runoff = 4.52 cfs @ 12.03 hrs, Volume= 0.290 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	133	70	Woods, Good, HSG C
	222	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,788	79	50-75% Grass cover, Fair, HSG C
	20,691	84	50-75% Grass cover, Fair, HSG D
*	17,475	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	40,309	90	Weighted Average
	22,834		56.65% Pervious Area
	17,475		43.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.25		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.00"
0.1	22	0.0170	2.65		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
0.6	119	0.0500	3.35		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
2.0	241	Total			

Subcatchment 6S: CATCH6



Summary for Subcatchment 7S: CATCH7

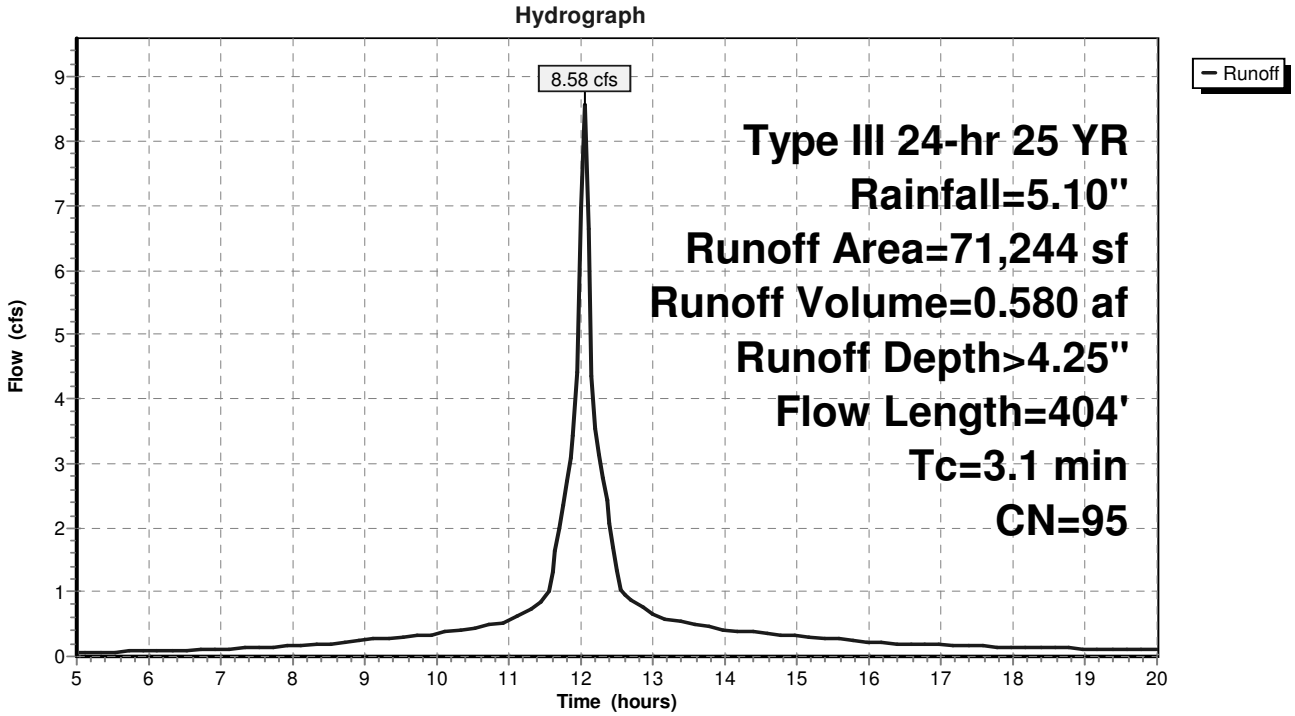
Runoff = 8.58 cfs @ 12.05 hrs, Volume= 0.580 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	3	70	Woods, Good, HSG C
	590	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,164	79	50-75% Grass cover, Fair, HSG C
	11,338	84	50-75% Grass cover, Fair, HSG D
*	58,149	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	71,244	95	Weighted Average
	13,095		18.38% Pervious Area
	58,149		81.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	92	0.0220	1.36		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.8	114	0.0260	2.42		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
0.1	23	0.0260	3.27		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
1.1	175	0.0170	2.65		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
3.1	404	Total			

Subcatchment 7S: CATCH7



Summary for Subcatchment 8S: CATCH8

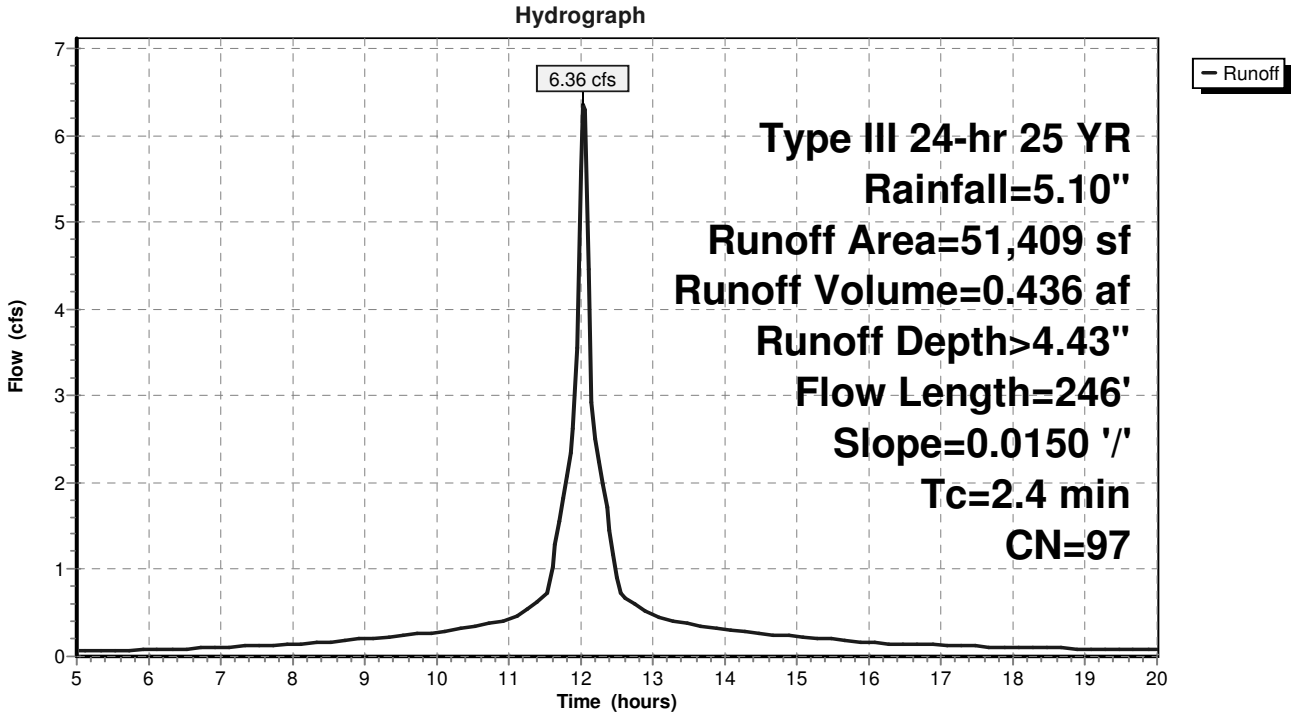
Runoff = 6.36 cfs @ 12.04 hrs, Volume= 0.436 af, Depth> 4.43"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,806	79	50-75% Grass cover, Fair, HSG C
	827	84	50-75% Grass cover, Fair, HSG D
*	48,776	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	51,409	97	Weighted Average
	2,633		5.12% Pervious Area
	48,776		94.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0150	1.19		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
1.0	146	0.0150	2.49		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
2.4	246	Total			

Subcatchment 8S: CATCH8



Summary for Subcatchment 9S: CATCH9

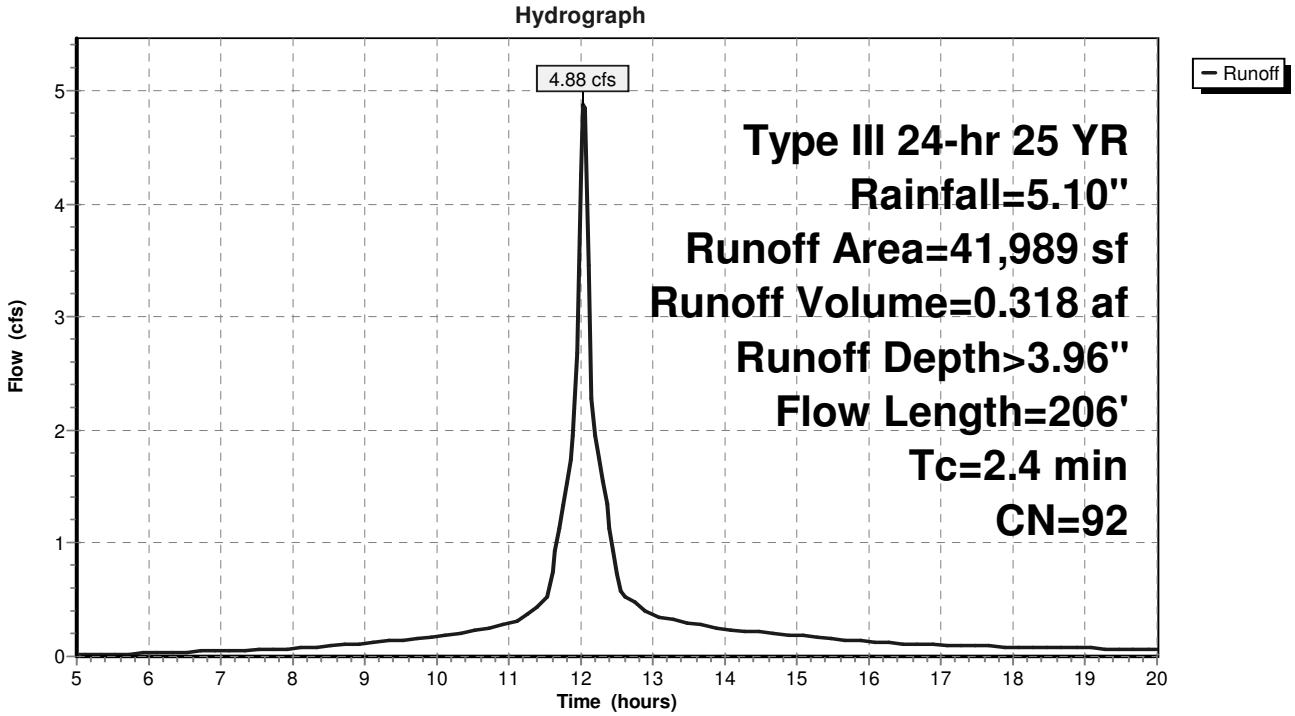
Runoff = 4.88 cfs @ 12.04 hrs, Volume= 0.318 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	7,382	79	50-75% Grass cover, Fair, HSG C
	6,938	84	50-75% Grass cover, Fair, HSG D
*	27,669	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	41,989	92	Weighted Average
	14,320		34.10% Pervious Area
	27,669		65.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	100	0.0100	1.01		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.7	106	0.0170	2.65		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
2.4	206	Total			

Subcatchment 9S: CATCH9



Summary for Subcatchment 10S: CATCH10

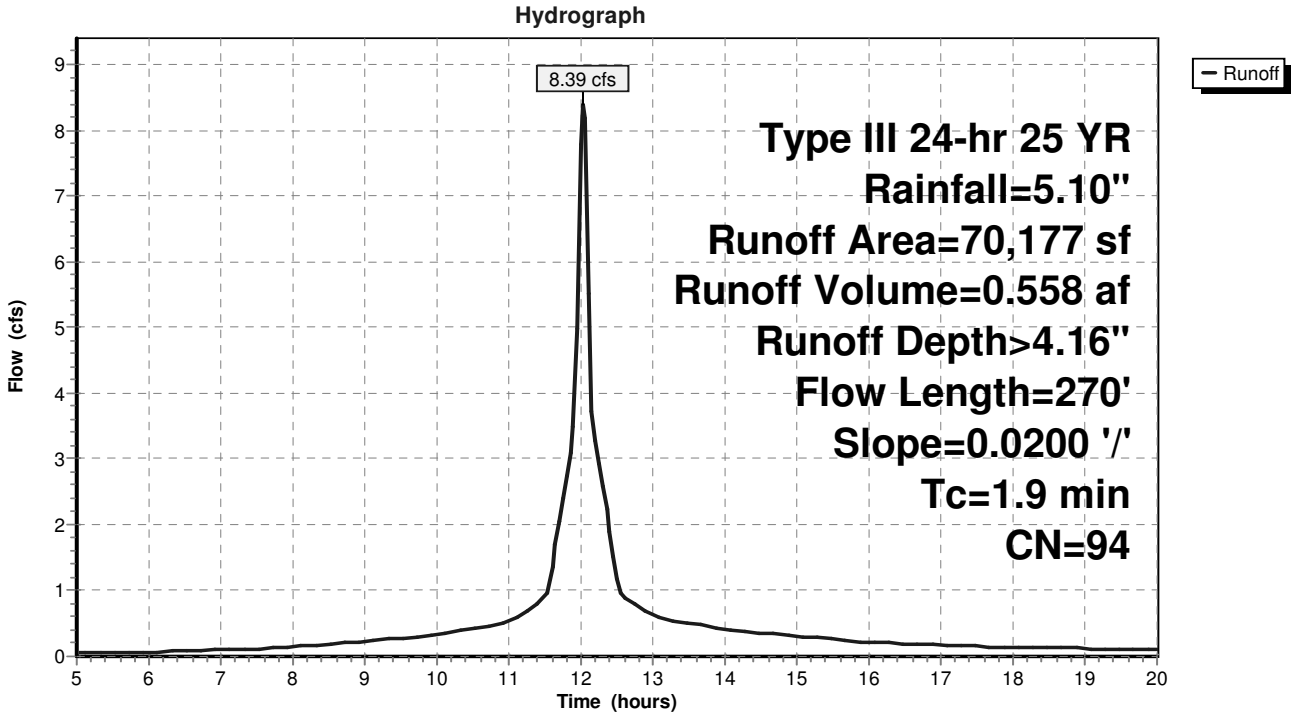
Runoff = 8.39 cfs @ 12.03 hrs, Volume= 0.558 af, Depth> 4.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	2,226	70	Woods, Good, HSG C
	1,483	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	2,572	79	50-75% Grass cover, Fair, HSG C
	11,683	84	50-75% Grass cover, Fair, HSG D
*	52,213	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	70,177	94	Weighted Average
	17,964		25.60% Pervious Area
	52,213		74.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0200	1.11		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.00"
1.3	230	0.0200	2.87		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
1.9	270	Total			

Subcatchment 10S: CATCH10



Summary for Subcatchment 11S: CATCH11

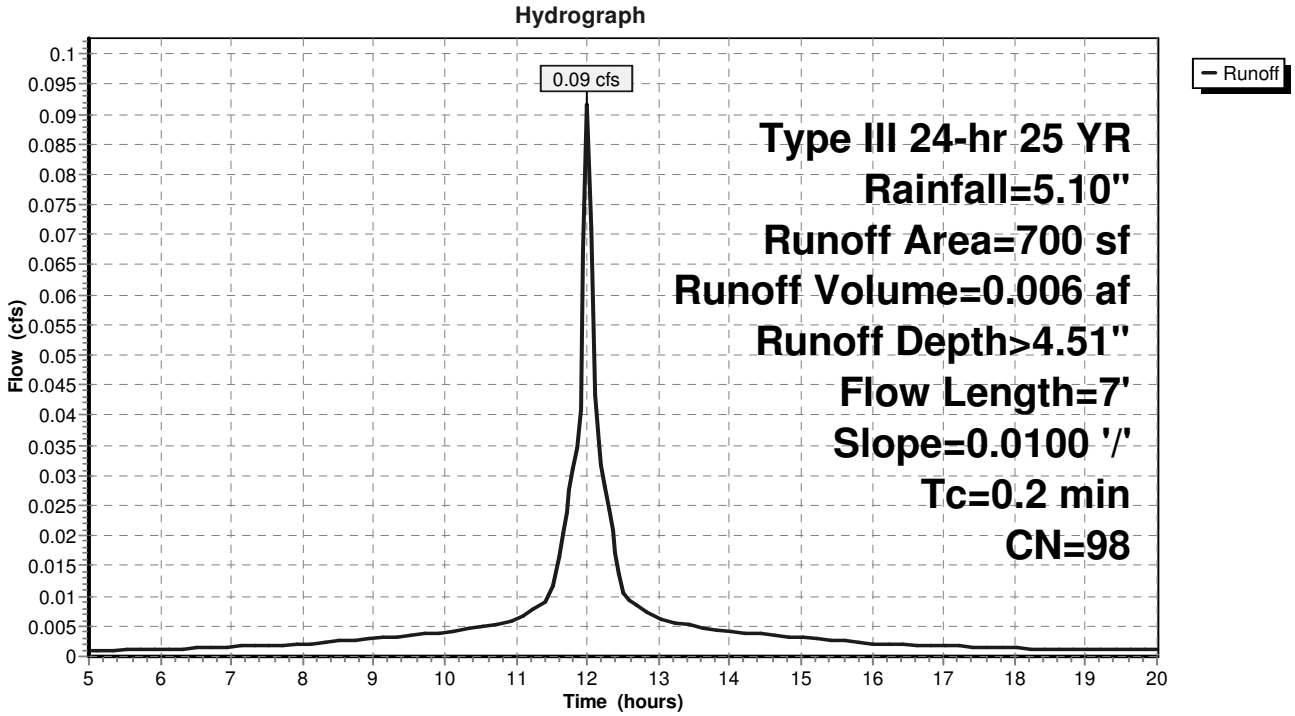
Runoff = 0.09 cfs @ 12.00 hrs, Volume= 0.006 af, Depth> 4.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	700	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	700	98	Weighted Average
	700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	7	0.0100	0.59		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment 11S: CATCH11



Summary for Subcatchment 12S: CATCH12

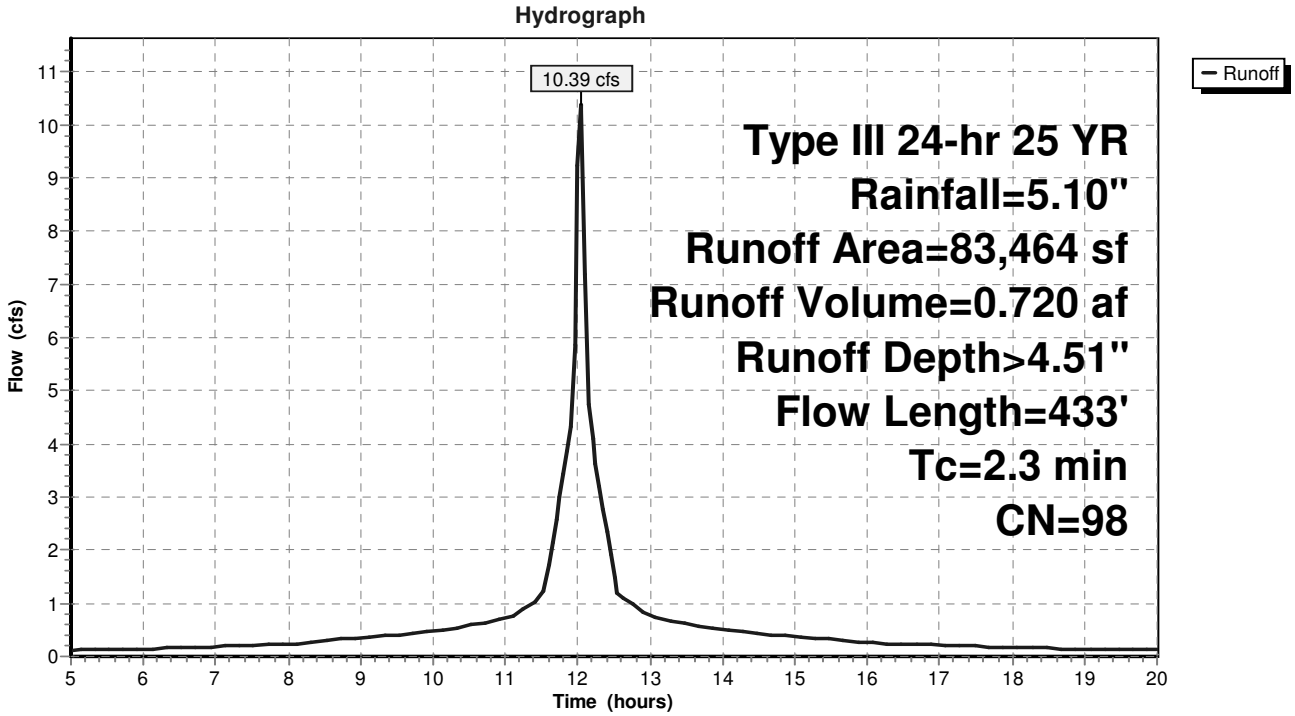
Runoff = 10.39 cfs @ 12.04 hrs, Volume= 0.720 af, Depth> 4.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,158	79	50-75% Grass cover, Fair, HSG C
	305	84	50-75% Grass cover, Fair, HSG D
*	82,001	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	83,464	98	Weighted Average
	1,463		1.75% Pervious Area
	82,001		98.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	62	0.0050	0.70		**Sheet Flow, Rooftop** Smooth surfaces n= 0.011 P2= 3.00"
0.6	238	0.0200	6.36	2.22	**Pipe Channel, internal roof drains** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.2	133	0.0100	10.46	100.61	**Pipe Channel,** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.013 Corrugated PE, smooth interior
2.3	433	Total			

Subcatchment 12S: CATCH12



Summary for Subcatchment 13S: CATCH13

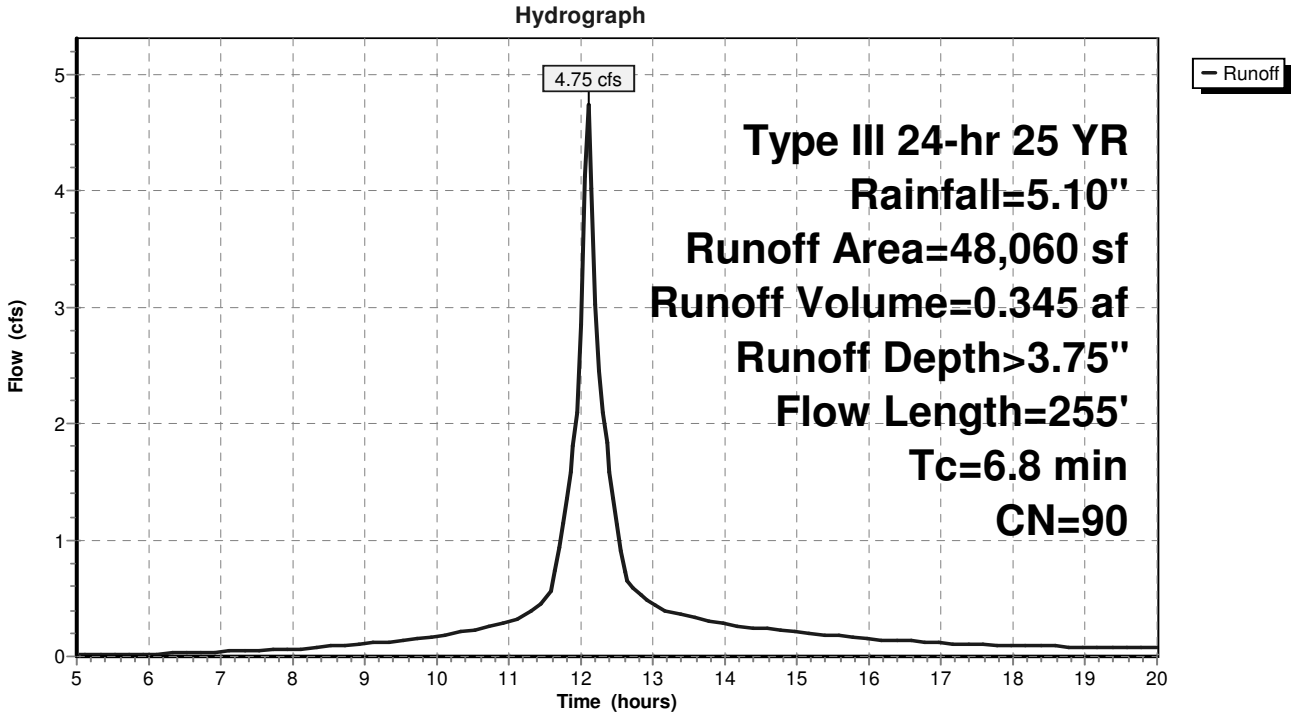
Runoff = 4.75 cfs @ 12.10 hrs, Volume= 0.345 af, Depth> 3.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	9,556	79	50-75% Grass cover, Fair, HSG C
	13,854	84	50-75% Grass cover, Fair, HSG D
*	24,650	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	48,060	90	Weighted Average
	23,410		48.71% Pervious Area
	24,650		51.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	47	0.0200	0.14		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.00"
0.2	28	0.0200	2.87		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
1.1	168	0.0300	2.60		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
0.0	12	0.2800	24.00	18.85	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
6.8	255	Total			

Subcatchment 13S: CATCH13



Summary for Subcatchment 14S: CATCH14

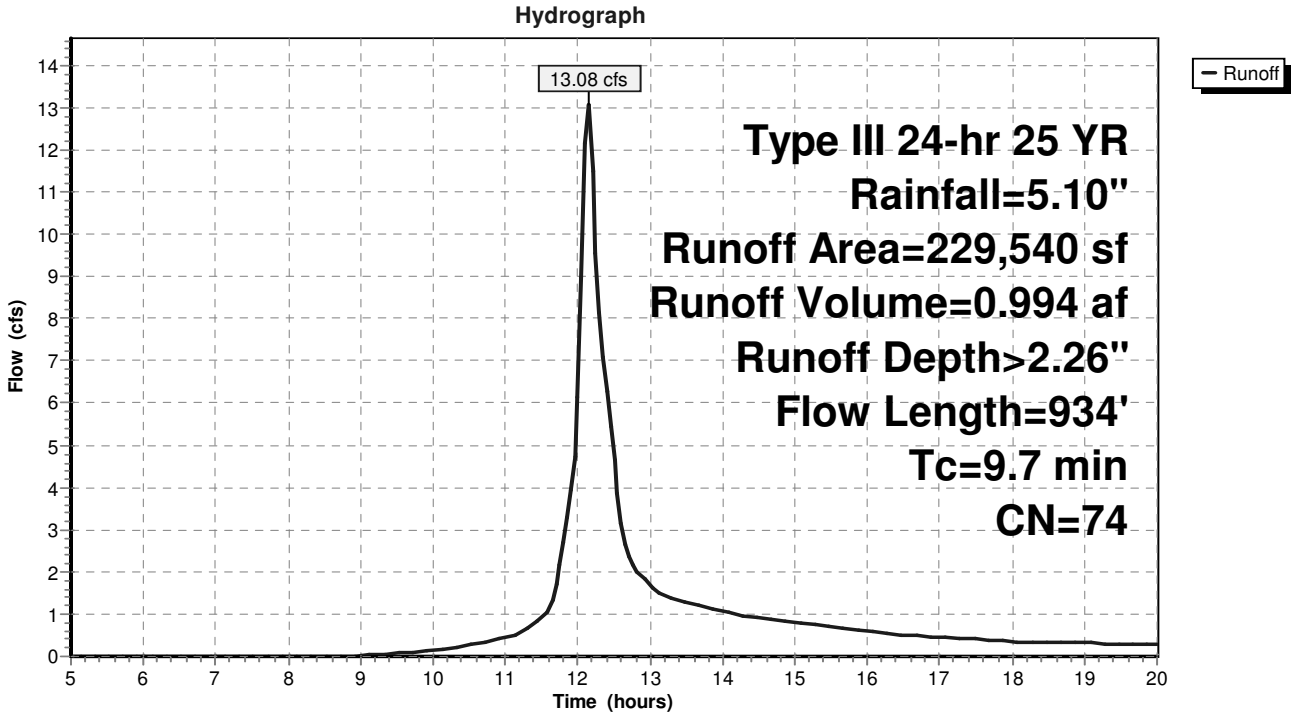
Runoff = 13.08 cfs @ 12.14 hrs, Volume= 0.994 af, Depth> 2.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	177,302	70	Woods, Good, HSG C
	29,548	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	22,690	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	229,540	74	Weighted Average
	206,850		90.12% Pervious Area
	22,690		9.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	31	0.0480	0.18		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.00"
5.9	704	0.0178	2.00		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
0.0	21	0.0700	15.73	27.79	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
1.0	178	0.0400	3.00		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
9.7	934	Total			

Subcatchment 14S: CATCH14



Summary for Subcatchment 15S: CATCH15

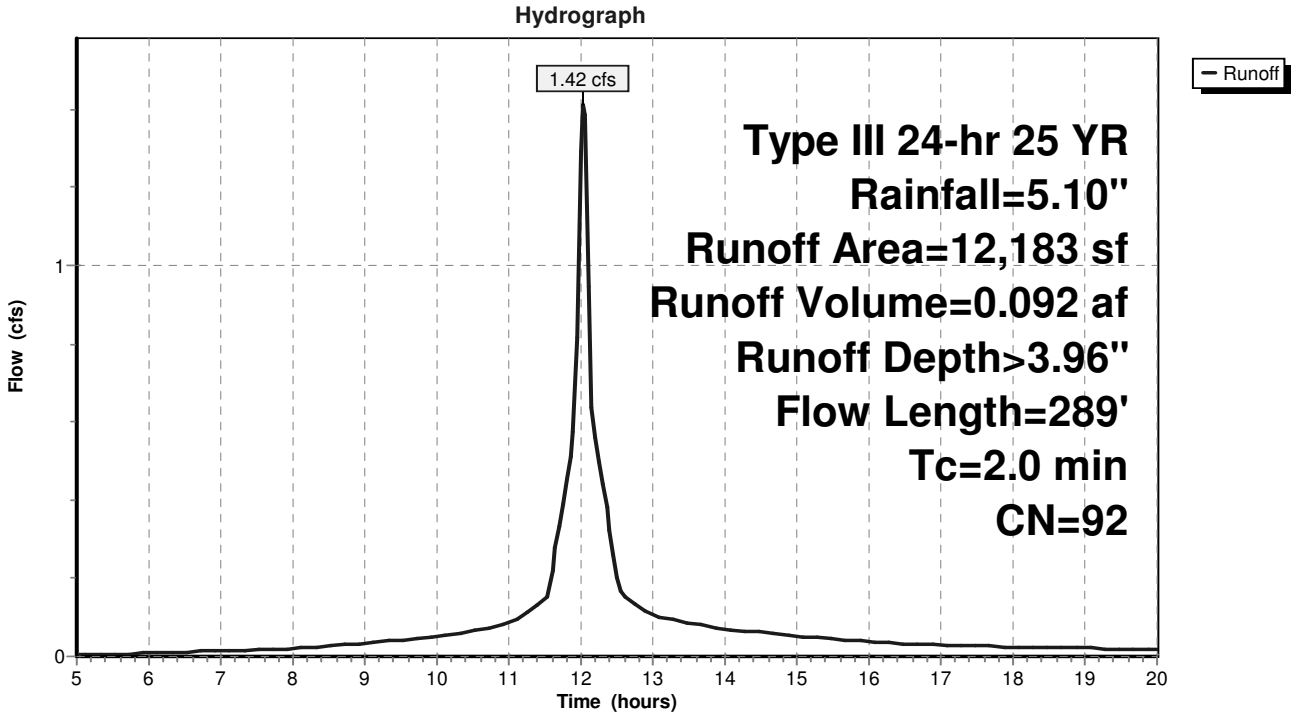
Runoff = 1.42 cfs @ 12.03 hrs, Volume= 0.092 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	65	70	Woods, Good, HSG C
	34	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	3,199	79	50-75% Grass cover, Fair, HSG C
	289	84	50-75% Grass cover, Fair, HSG D
*	8,596	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	12,183	92	Weighted Average
	3,587		29.44% Pervious Area
	8,596		70.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.33		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.00"
0.6	137	0.0400	4.06		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
0.1	52	0.0500	10.14	7.97	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
2.0	289	Total			

Subcatchment 15S: CATCH15



Summary for Subcatchment 16S: CATCH16

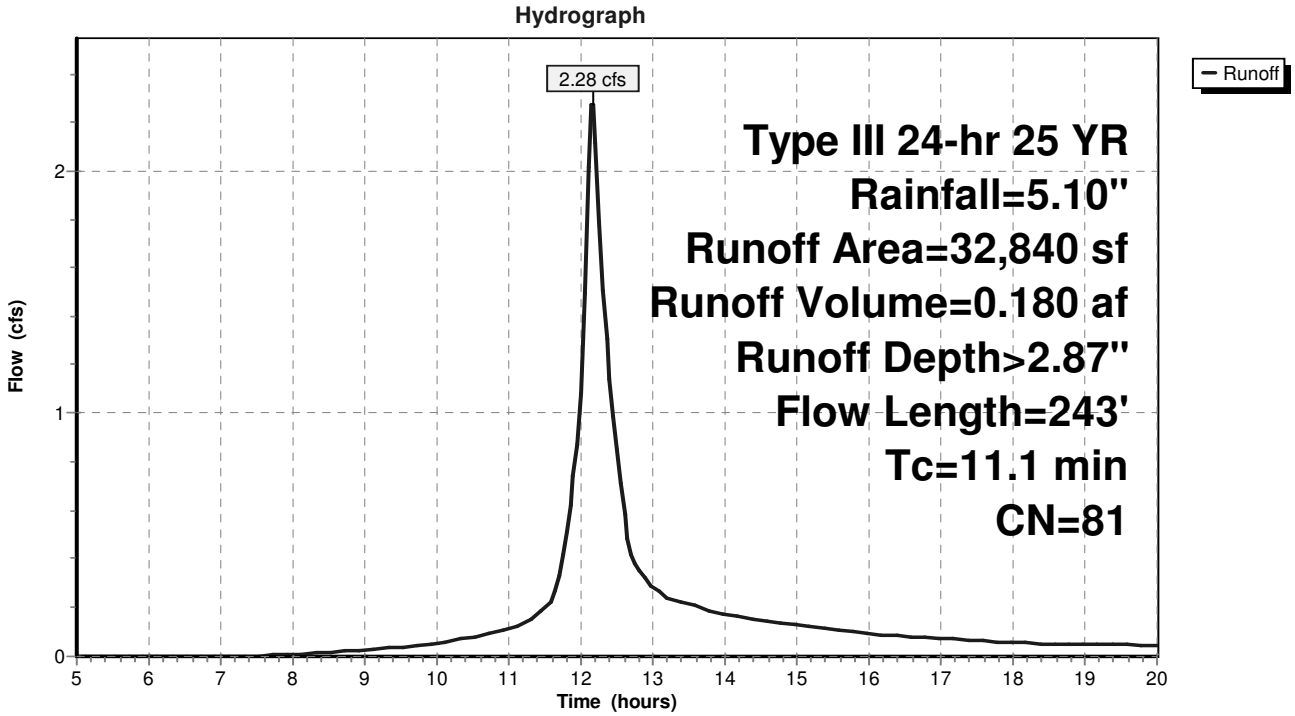
Runoff = 2.28 cfs @ 12.16 hrs, Volume= 0.180 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	21,095	79	50-75% Grass cover, Fair, HSG C
	10,542	84	50-75% Grass cover, Fair, HSG D
*	1,203	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	32,840	81	Weighted Average
	31,637		96.34% Pervious Area
	1,203		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0200	0.16		**Sheet Flow, Sheet**
					Grass: Short n= 0.150 P2= 3.00"
1.0	127	0.0200	2.12		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
0.0	16	0.3300	8.62		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
11.1	243	Total			

Subcatchment 16S: CATCH16



Summary for Subcatchment 17S: CATCH17

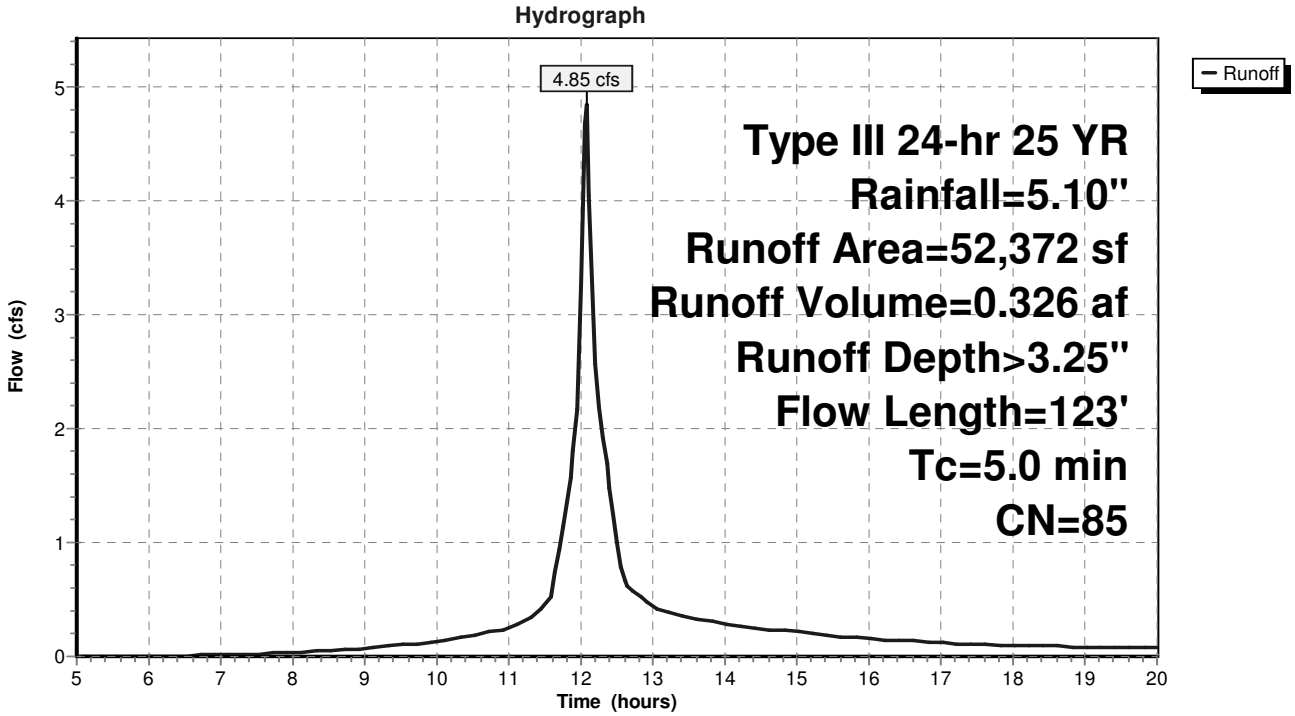
Runoff = 4.85 cfs @ 12.07 hrs, Volume= 0.326 af, Depth> 3.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	1,801	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	33,394	79	50-75% Grass cover, Fair, HSG C
	278	84	50-75% Grass cover, Fair, HSG D
*	2,699	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	14,200	98	Water Surface, HSG C
	52,372	85	Weighted Average
	35,473		67.73% Pervious Area
	16,899		32.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	55	0.0380	0.19		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.00"
0.1	68	0.2050	9.19		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
5.0	123	Total			

Subcatchment 17S: CATCH17



Summary for Subcatchment 18S: CATCH18

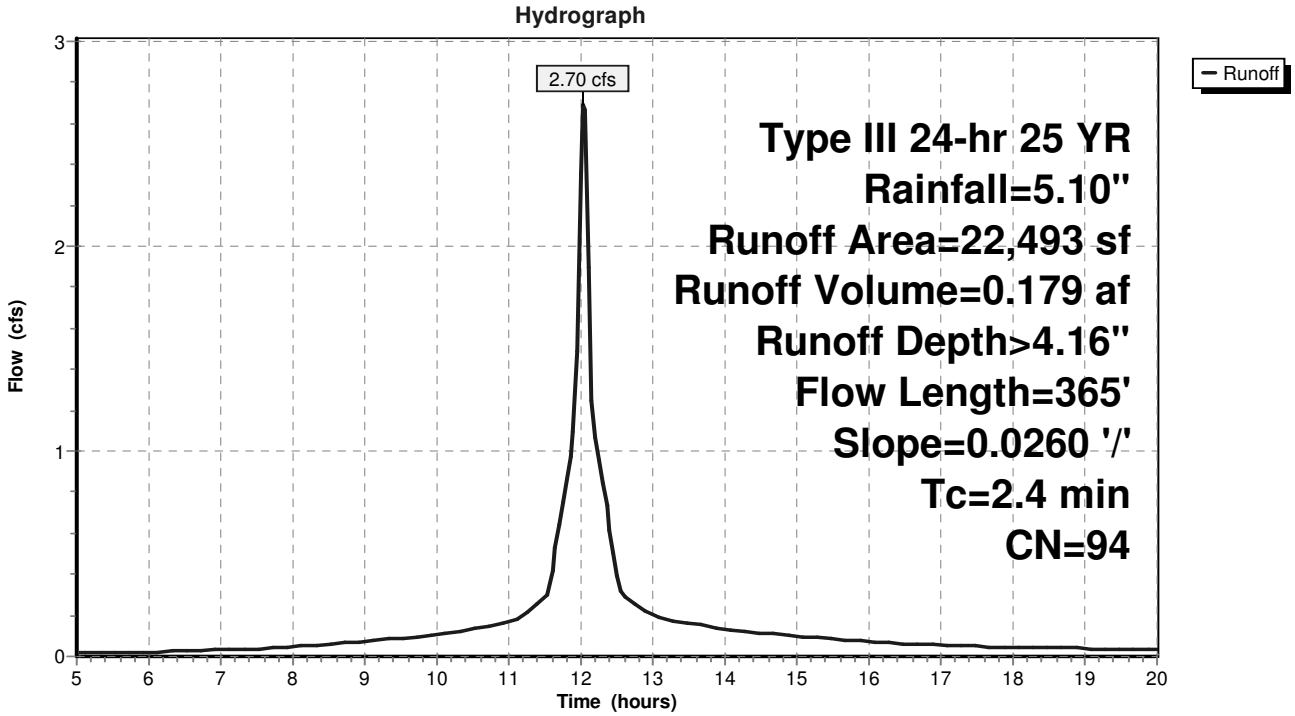
Runoff = 2.70 cfs @ 12.04 hrs, Volume= 0.179 af, Depth> 4.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	147	70	Woods, Good, HSG C
	2	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	4,636	79	50-75% Grass cover, Fair, HSG C
	230	84	50-75% Grass cover, Fair, HSG D
*	17,478	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	22,493	94	Weighted Average
	5,015		22.30% Pervious Area
	17,478		77.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	75	0.0260	1.40		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.00"
1.5	290	0.0260	3.27		**Shallow Concentrated Flow, SCF** Paved Kv= 20.3 fps
2.4	365	Total			

Subcatchment 18S: CATCH18



Summary for Subcatchment 19S: CATCH19

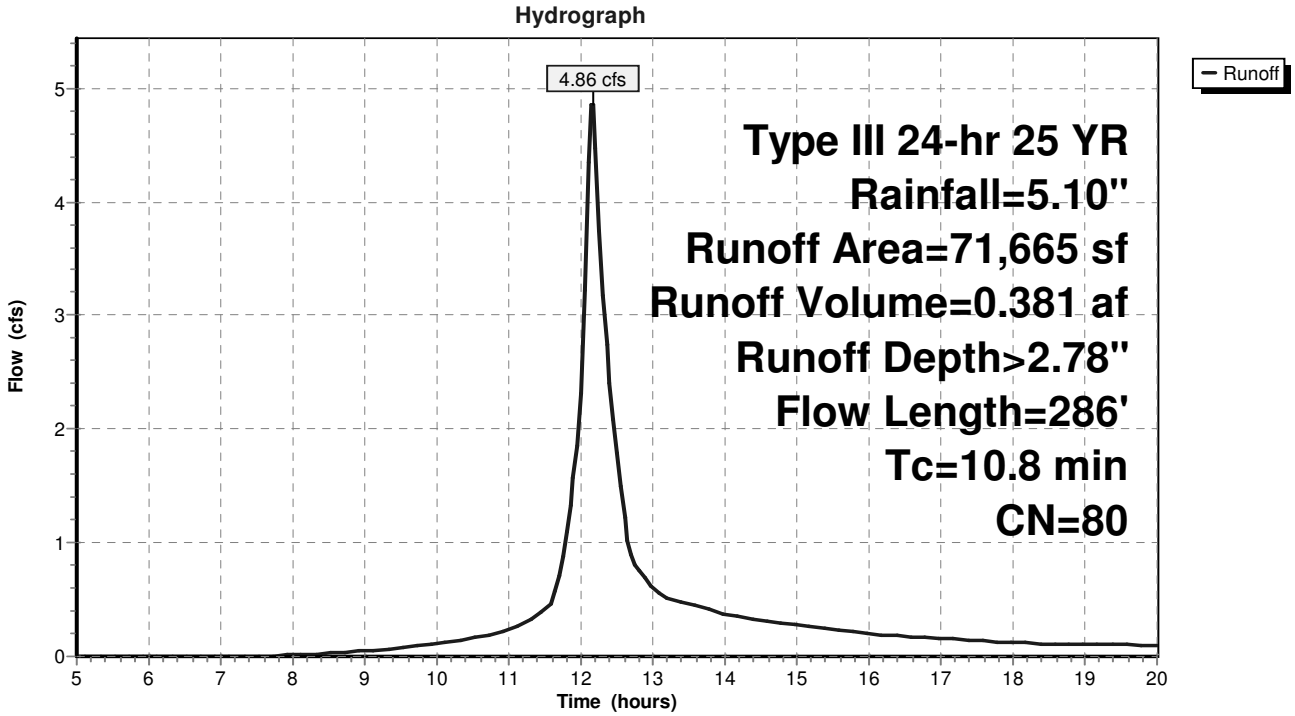
Runoff = 4.86 cfs @ 12.15 hrs, Volume= 0.381 af, Depth> 2.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	34,282	70	Woods, Good, HSG C
	11,225	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	3,570	79	50-75% Grass cover, Fair, HSG C
	1,520	84	50-75% Grass cover, Fair, HSG D
*	21,068	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	71,665	80	Weighted Average
	50,597		70.60% Pervious Area
	21,068		29.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	75	0.0130	0.13		**Sheet Flow, Sheet**
					Grass: Short n= 0.150 P2= 3.00"
1.1	165	0.0270	2.46		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
0.1	46	0.2300	7.19		**Shallow Concentrated Flow, SCF**
					Grassed Waterway Kv= 15.0 fps
10.8	286	Total			

Subcatchment 19S: CATCH19



Summary for Subcatchment 20S: CATCH20

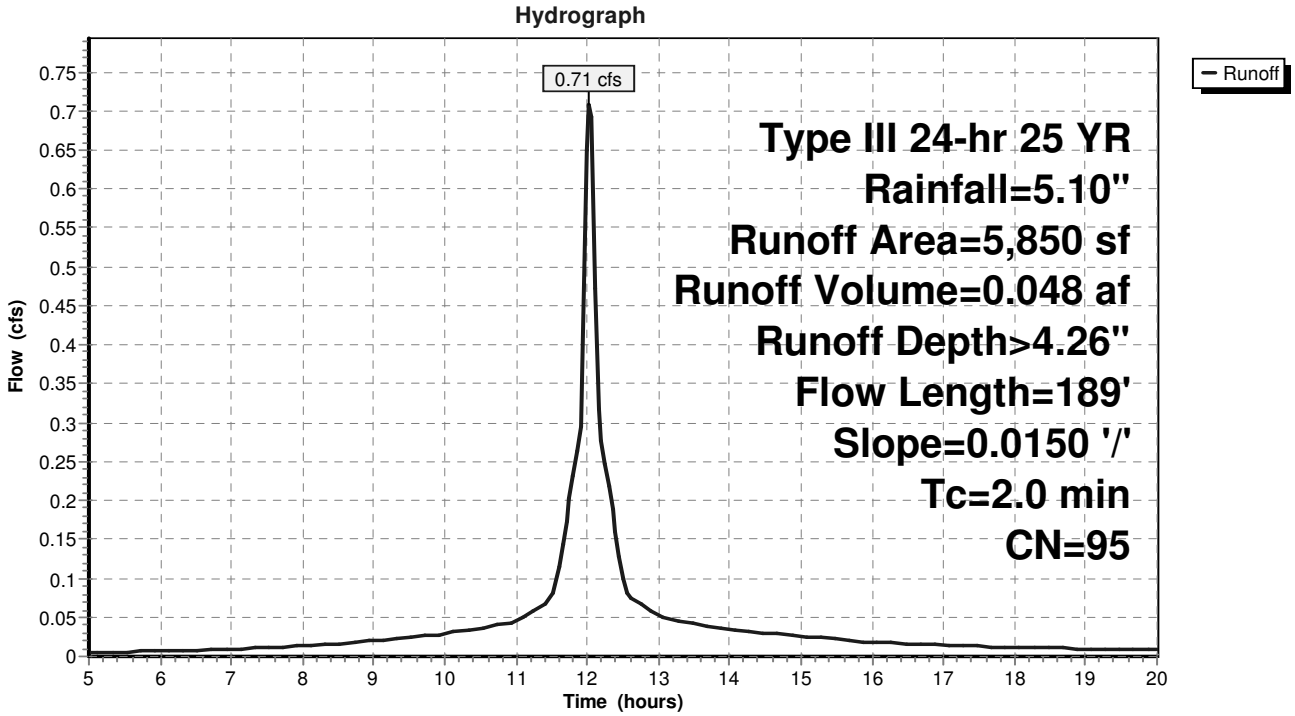
Runoff = 0.71 cfs @ 12.03 hrs, Volume= 0.048 af, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	657	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	5,193	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	5,850	95	Weighted Average
	657		11.23% Pervious Area
	5,193		88.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0150	1.19		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.6	89	0.0150	2.49		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
2.0	189	Total			

Subcatchment 20S: CATCH20



Summary for Subcatchment 21S: CATCH21

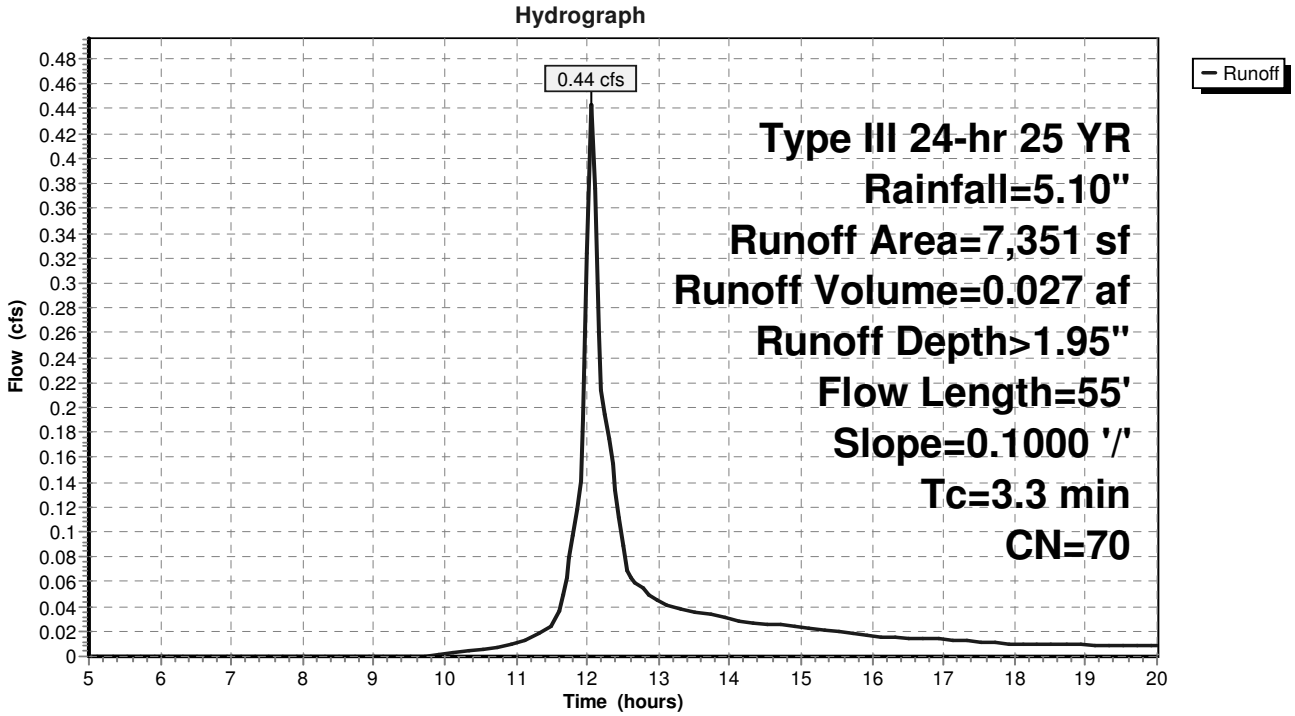
Runoff = 0.44 cfs @ 12.06 hrs, Volume= 0.027 af, Depth> 1.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	7,292	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	59	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	7,351	70	Weighted Average
	7,292		99.20% Pervious Area
	59		0.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	55	0.1000	0.28		**Sheet Flow, Sheet**
					Grass: Short n= 0.150 P2= 3.00"

Subcatchment 21S: CATCH21



Summary for Subcatchment 22S: CATCH22

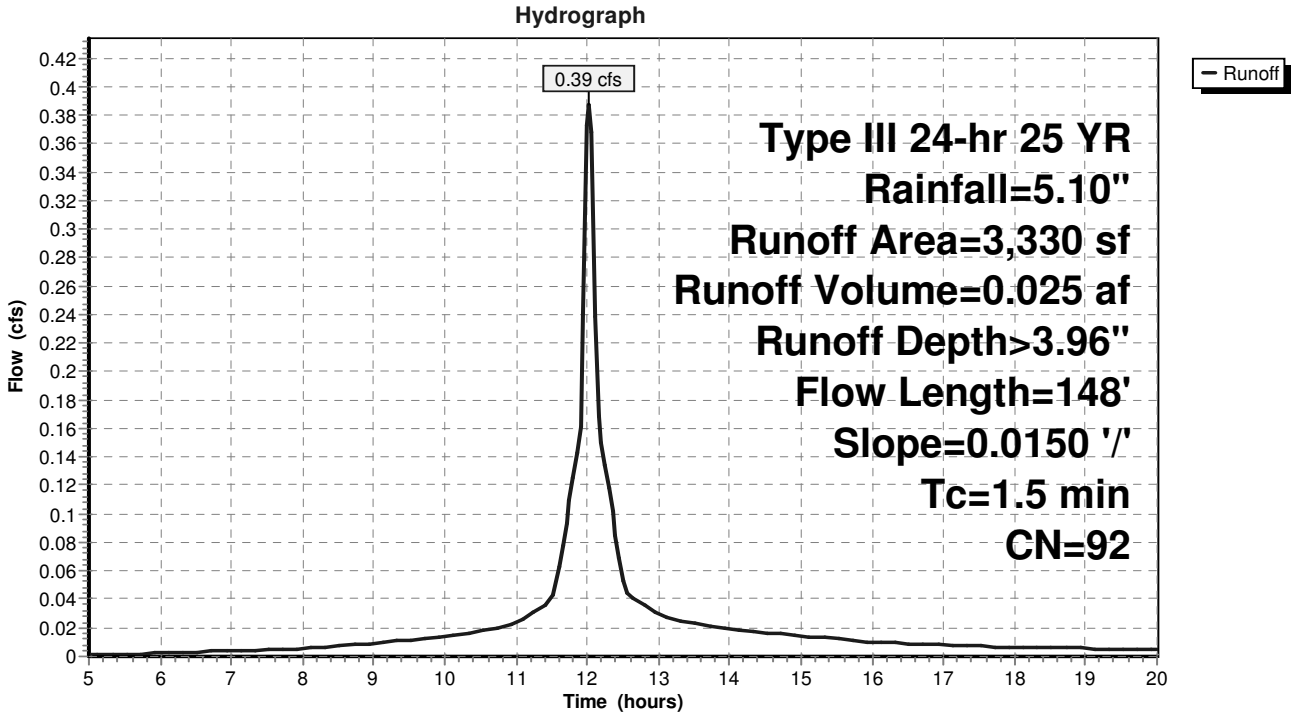
Runoff = 0.39 cfs @ 12.02 hrs, Volume= 0.025 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	708	70	Woods, Good, HSG C
	49	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	0	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	2,573	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	3,330	92	Weighted Average
	757		22.73% Pervious Area
	2,573		77.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.03		**Sheet Flow, Sheet**
					Smooth surfaces n= 0.011 P2= 3.00"
0.7	98	0.0150	2.49		**Shallow Concentrated Flow, SCF**
					Paved Kv= 20.3 fps
1.5	148	Total			

Subcatchment 22S: CATCH22



Summary for Subcatchment 23S: CATCH23

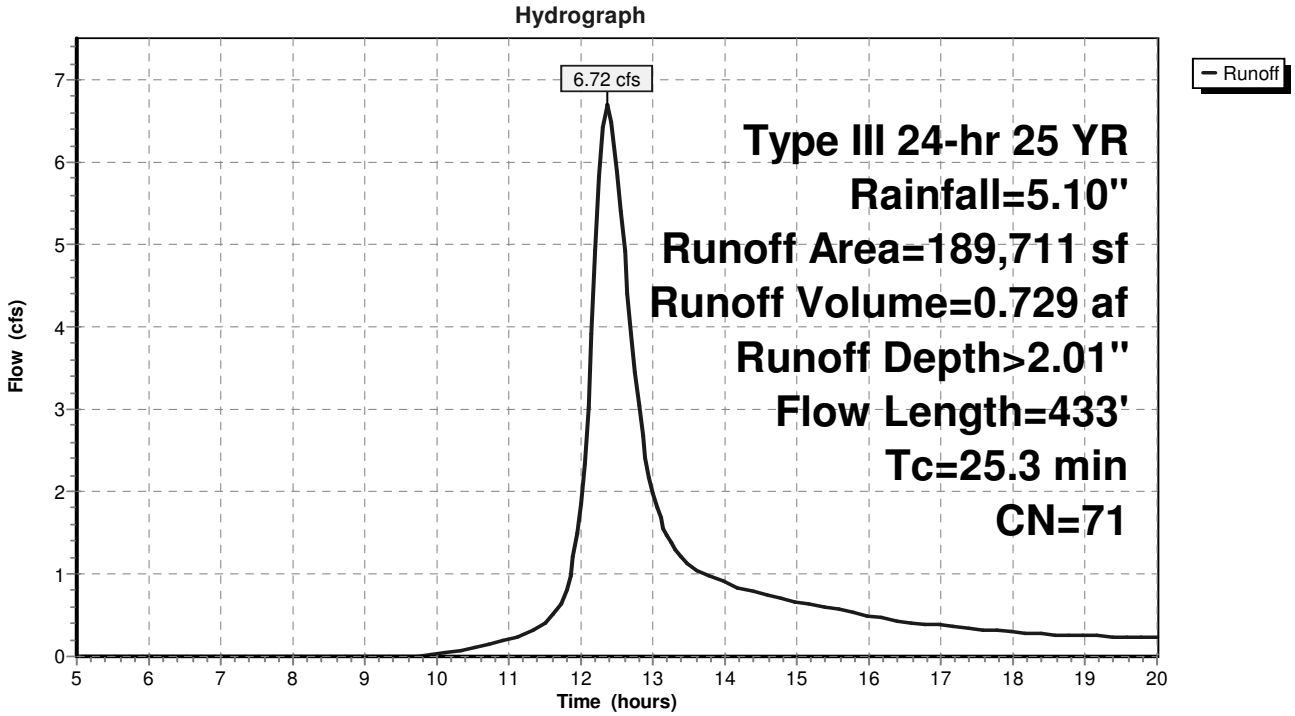
Runoff = 6.72 cfs @ 12.37 hrs, Volume= 0.729 af, Depth> 2.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	4,918	55	Woods, Good, HSG B
	163,256	70	Woods, Good, HSG C
	7,346	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	4,901	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	9,290	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	189,711	71	Weighted Average
	180,421		95.10% Pervious Area
	9,290		4.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0250	0.08		**Sheet Flow, Sheet**
					Woods: Light underbrush n= 0.400 P2= 3.00"
5.0	333	0.0500	1.12		**Shallow Concentrated Flow, SCF**
					Woodland Kv= 5.0 fps
25.3	433	Total			

Subcatchment 23S: CATCH23



Summary for Subcatchment 24S: CATCH24

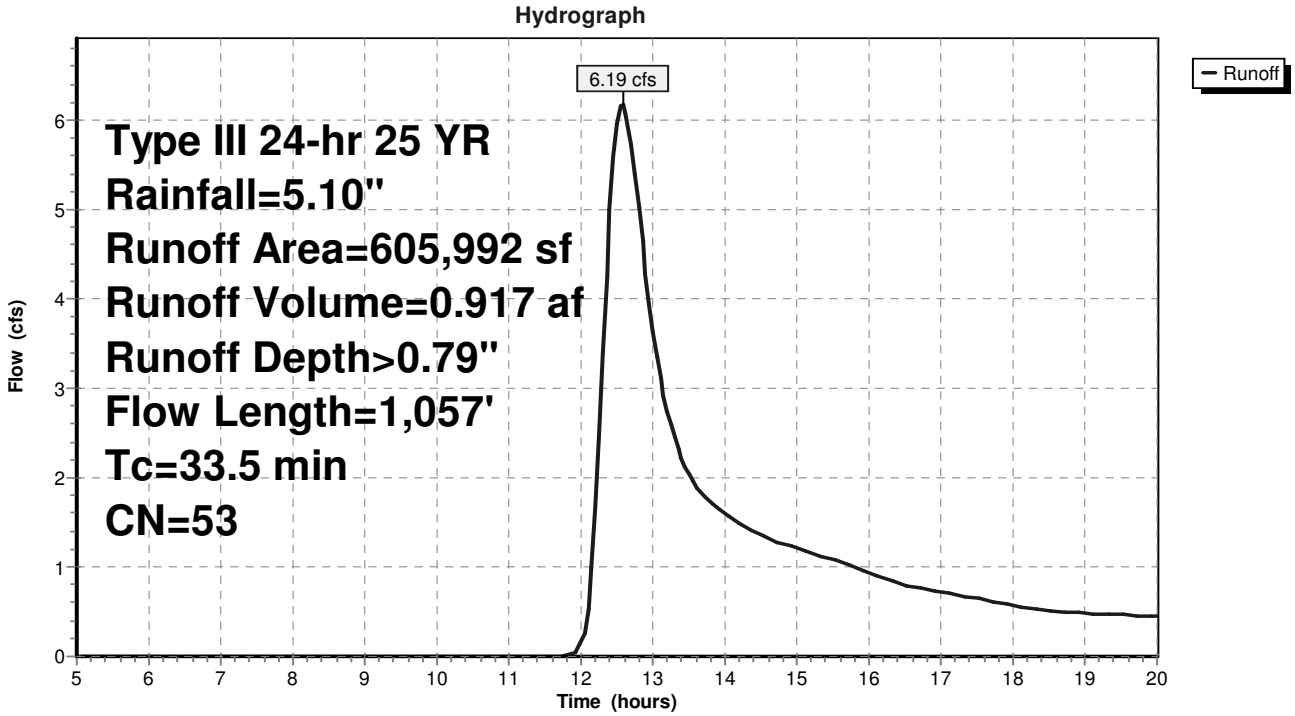
Runoff = 6.19 cfs @ 12.58 hrs, Volume= 0.917 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	199,327	30	Woods, Good, HSG A
	172,097	55	Woods, Good, HSG B
	213,901	70	Woods, Good, HSG C
	11,916	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	4,137	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	4,614	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	605,992	53	Weighted Average
	601,378		99.24% Pervious Area
	4,614		0.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.4	100	0.0100	0.09		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 3.00"
2.7	275	0.0130	1.71		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
11.4	682	0.0400	1.00		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
33.5	1,057	Total			

Subcatchment 24S: CATCH24



Summary for Subcatchment 25S: CATCH25

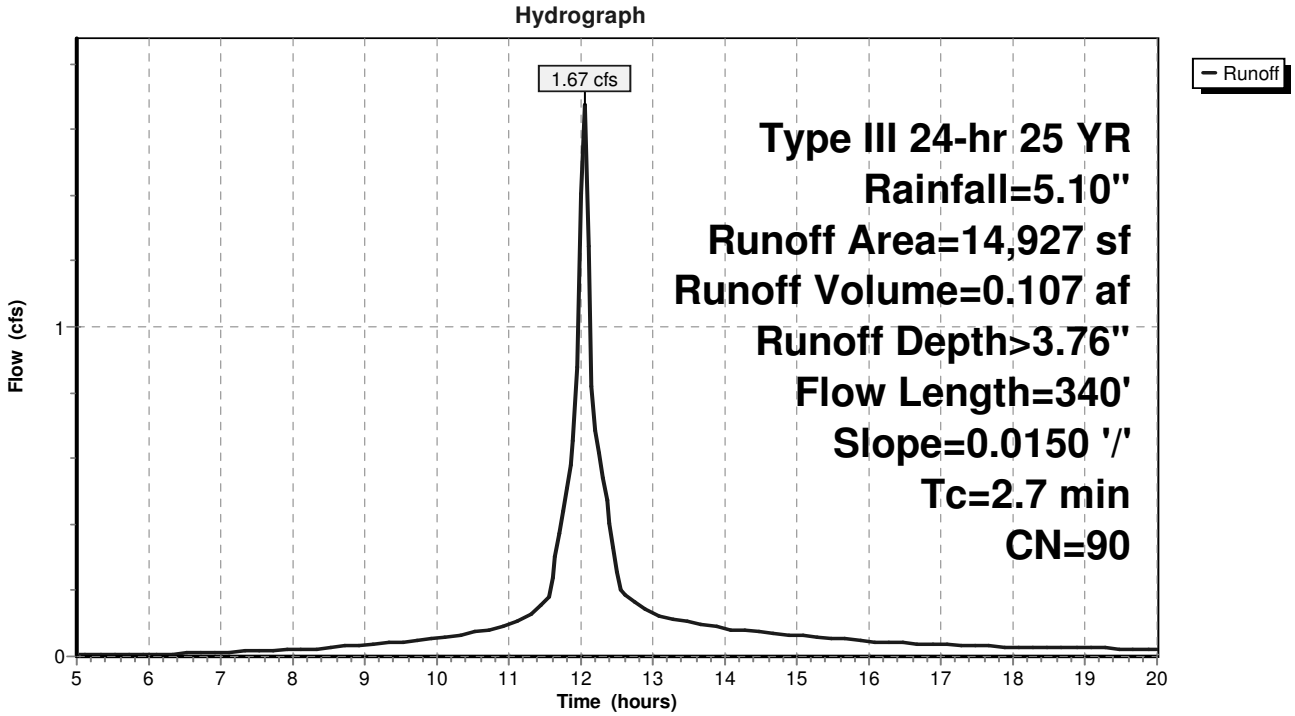
Runoff = 1.67 cfs @ 12.04 hrs, Volume= 0.107 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	6,371	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	8,556	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	14,927	90	Weighted Average
	6,371		42.68% Pervious Area
	8,556		57.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	45	0.0150	1.01		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
2.0	295	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.7	340	Total			

Subcatchment 25S: CATCH25



Summary for Subcatchment 26S: CATCH26

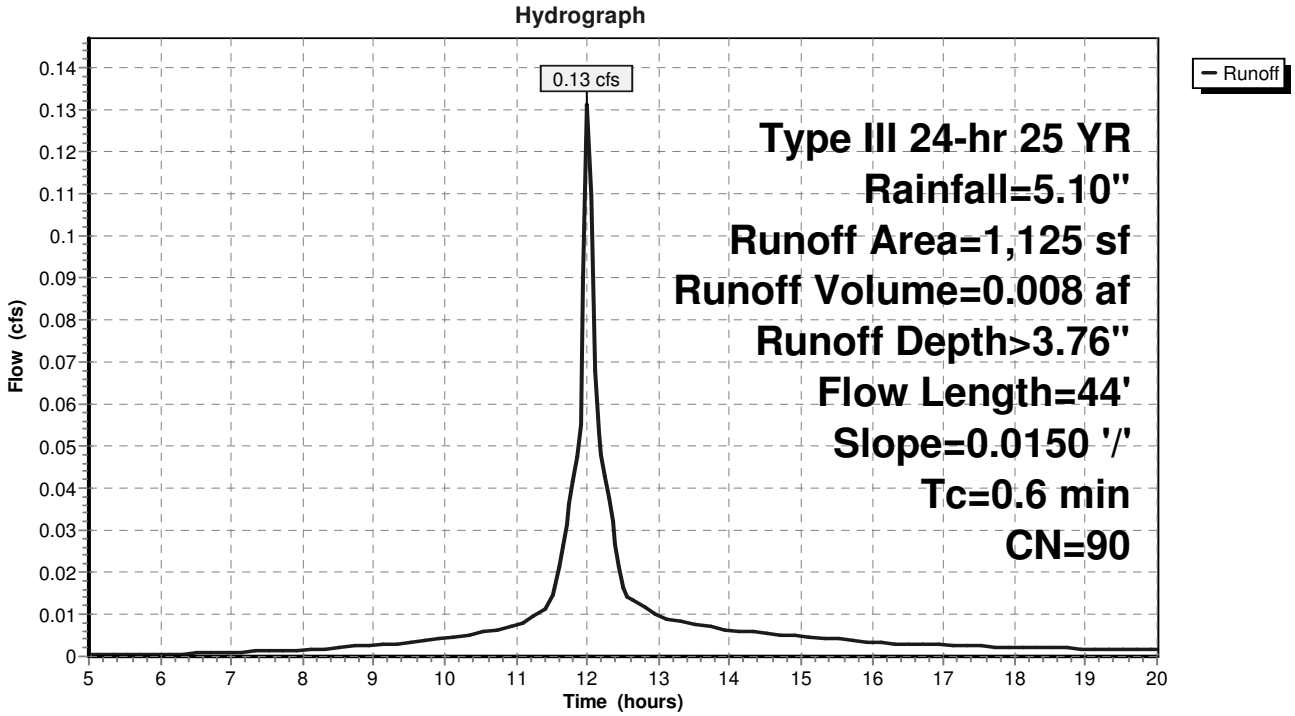
Runoff = 0.13 cfs @ 12.01 hrs, Volume= 0.008 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	463	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	662	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	1,125	90	Weighted Average
	463		41.16% Pervious Area
	662		58.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	21	0.0150	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.2	23	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	44	Total			

Subcatchment 26S: CATCH26



Summary for Subcatchment 27S: CATCH27

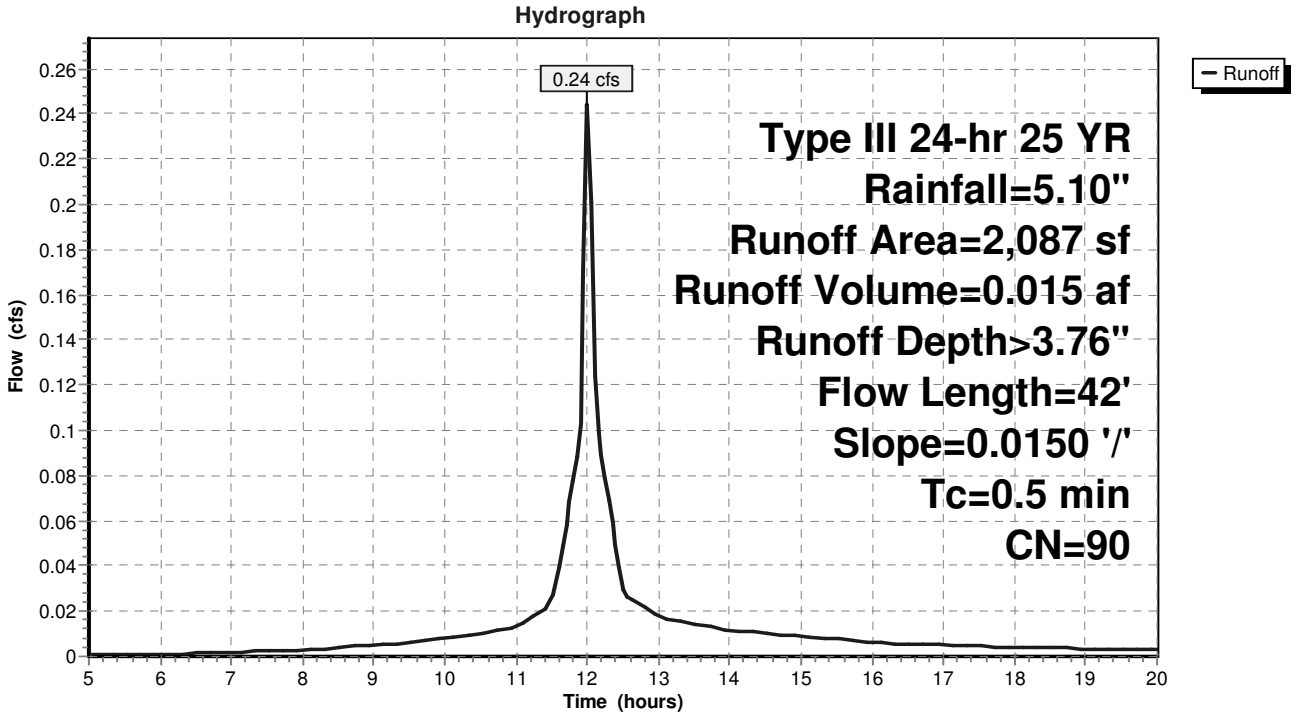
Runoff = 0.24 cfs @ 12.01 hrs, Volume= 0.015 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	854	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	1,233	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	2,087	90	Weighted Average
	854		40.92% Pervious Area
	1,233		59.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	22	0.0150	0.88		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.1	20	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.5	42	Total			

Subcatchment 27S: CATCH27



Summary for Subcatchment 28S: CATCH28

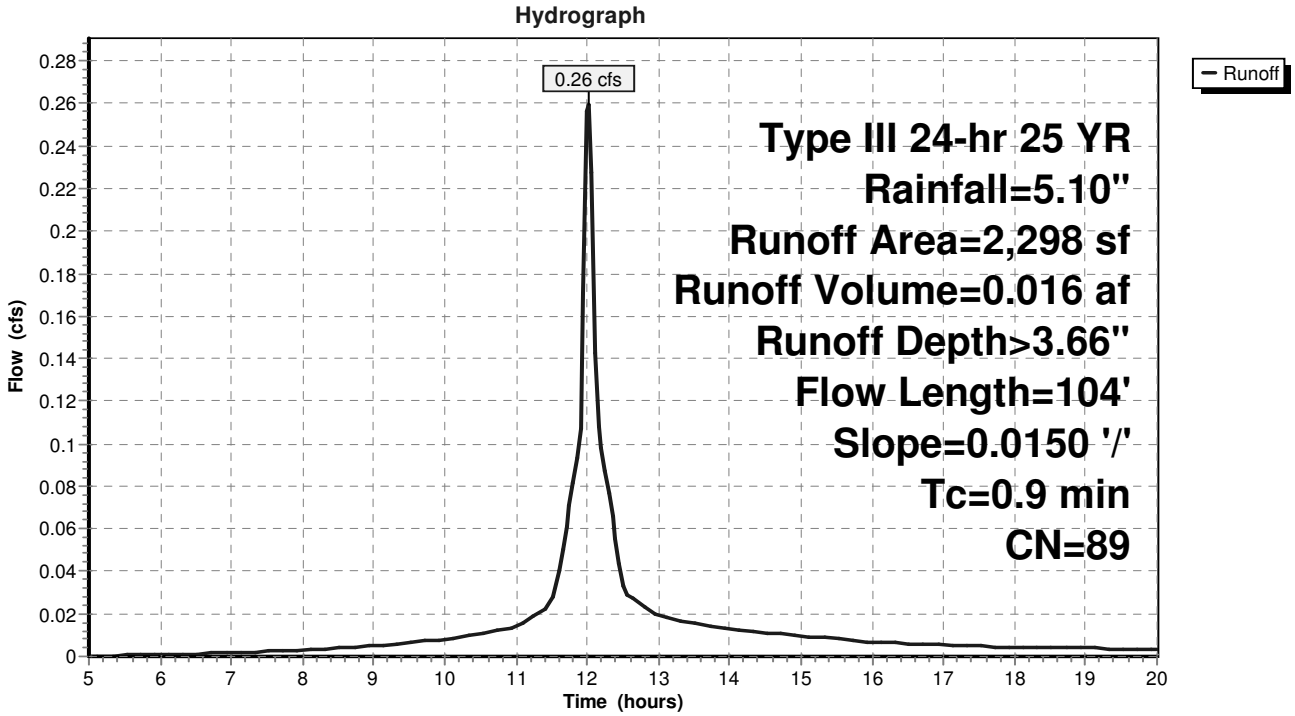
Runoff = 0.26 cfs @ 12.01 hrs, Volume= 0.016 af, Depth> 3.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.10"

	Area (sf)	CN	Description
	0	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	0	49	50-75% Grass cover, Fair, HSG A
	1,145	79	50-75% Grass cover, Fair, HSG C
	0	84	50-75% Grass cover, Fair, HSG D
*	1,153	98	Impervious
	0	30	Meadow, non-grazed, HSG A
	0	71	Meadow, non-grazed, HSG C
	0	78	Meadow, non-grazed, HSG D
	2,298	89	Weighted Average
	1,145		49.83% Pervious Area
	1,153		50.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	22	0.0150	0.88		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.5	82	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	104	Total			

Subcatchment 28S: CATCH28

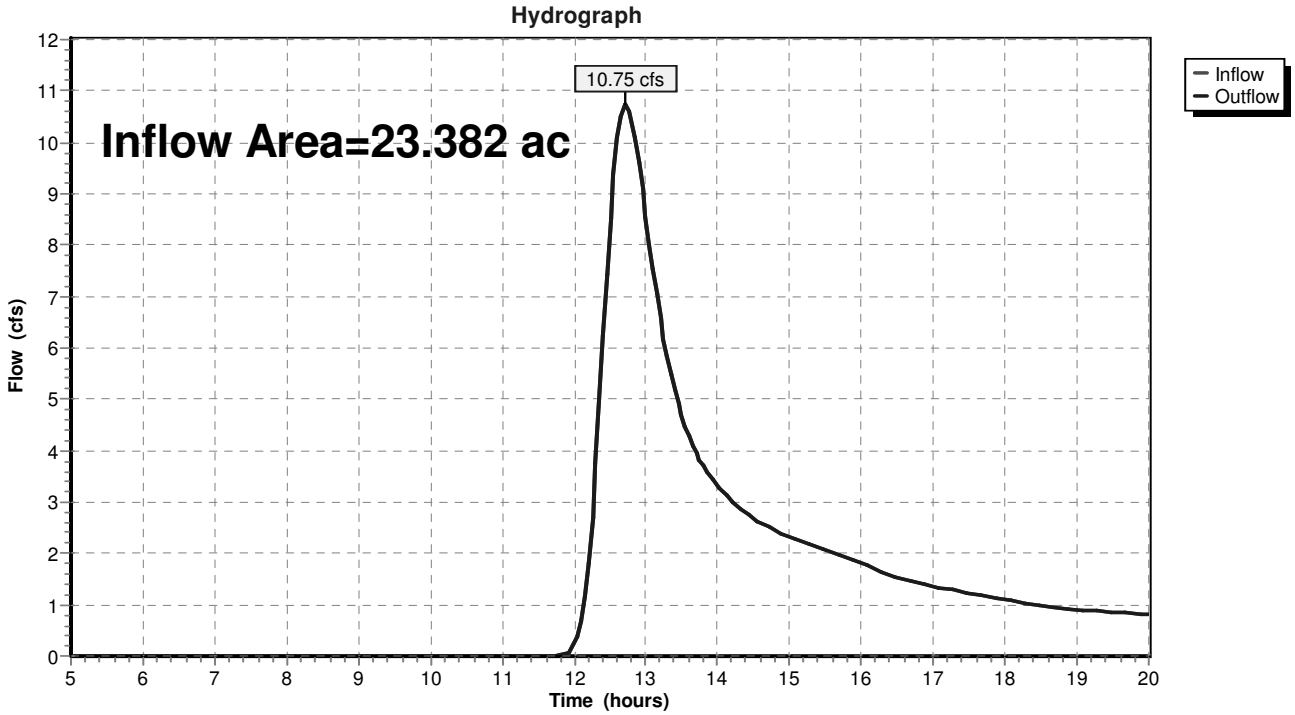


Summary for Reach 1SP: STUDY POINT #1

Inflow Area = 23.382 ac, 9.29% Impervious, Inflow Depth > 0.90" for 25 YR event
Inflow = 10.75 cfs @ 12.72 hrs, Volume= 1.751 af
Outflow = 10.75 cfs @ 12.72 hrs, Volume= 1.751 af, Atten= 0%, Lag= 0.0 min

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

Reach 1SP: STUDY POINT #1

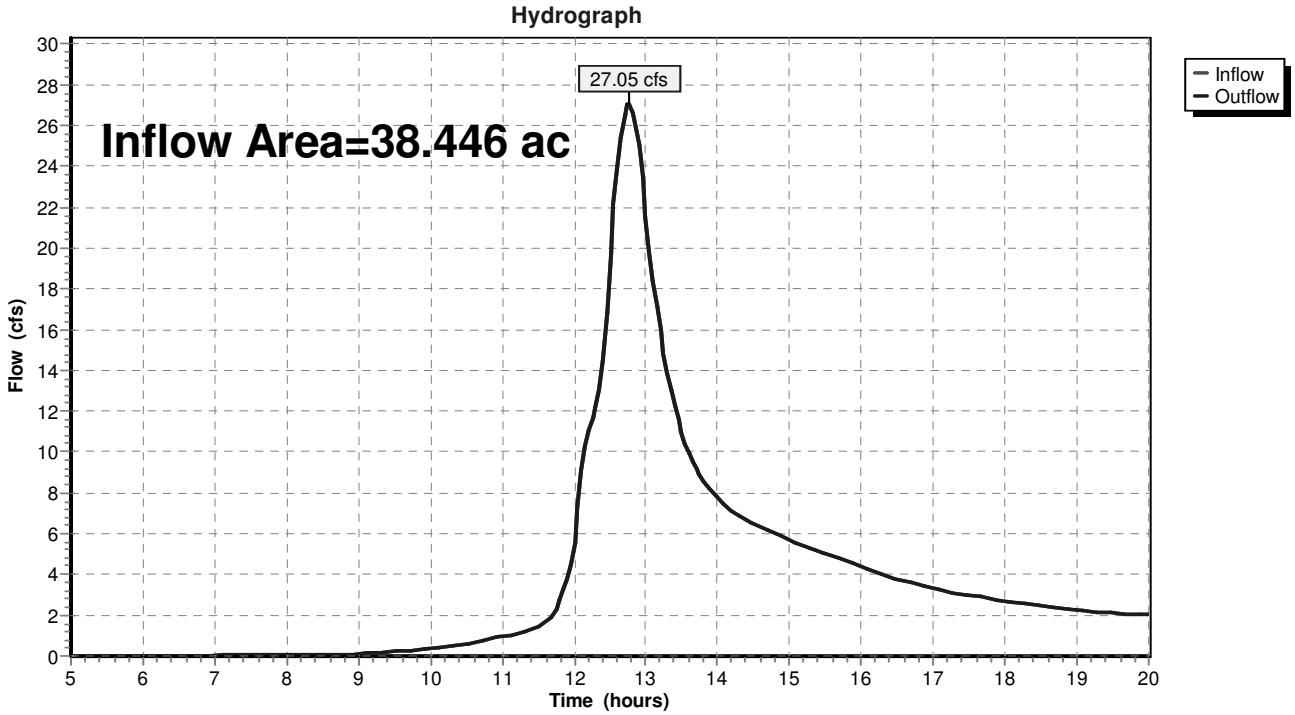


Summary for Reach 2SP: STUDY POINT #2

Inflow Area = 38.446 ac, 26.66% Impervious, Inflow Depth > 1.46" for 25 YR event
Inflow = 27.05 cfs @ 12.77 hrs, Volume= 4.668 af
Outflow = 27.05 cfs @ 12.77 hrs, Volume= 4.668 af, Atten= 0%, Lag= 0.0 min

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

Reach 2SP: STUDY POINT #2



Summary for Reach 3C: New Culvert #3

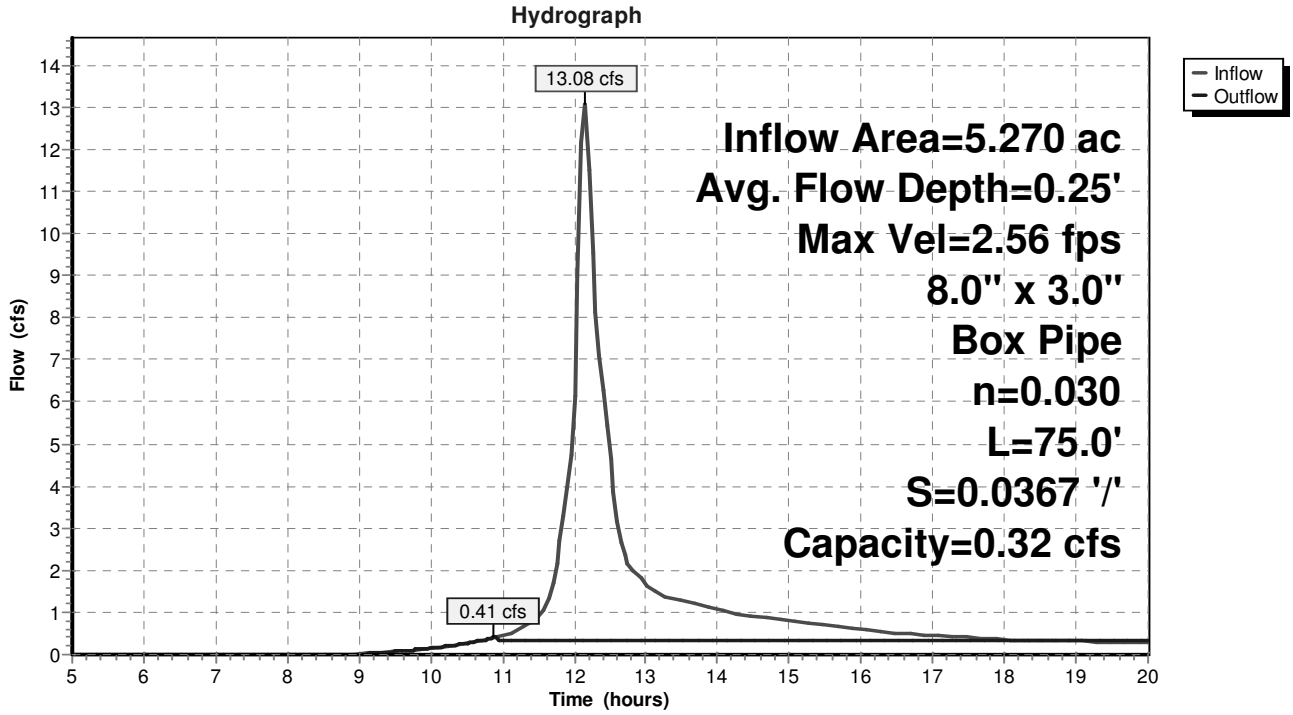
Inflow Area = 5.270 ac, 9.88% Impervious, Inflow Depth > 2.26" for 25 YR event
Inflow = 13.08 cfs @ 12.14 hrs, Volume= 0.994 af
Outflow = 0.41 cfs @ 10.89 hrs, Volume= 0.266 af, Atten= 97%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.56 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.87 fps, Avg. Travel Time= 0.7 min

Peak Storage= 13 cf @ 10.95 hrs
Average Depth at Peak Storage= 0.25'
Defined Flood Depth= 233.50', Capacity at Flood Depth= -9,929.77 cfs
Bank-Full Depth= 0.25', Capacity at Bank-Full= 0.32 cfs

8.0" W x 3.0" H Box Pipe
n= 0.030 Stream, clean & straight
Length= 75.0' Slope= 0.0367 '/'
Inlet Invert= 224.75', Outlet Invert= 222.00'

Reach 3C: New Culvert #3



Summary for Reach 4C: Ex. Culvert

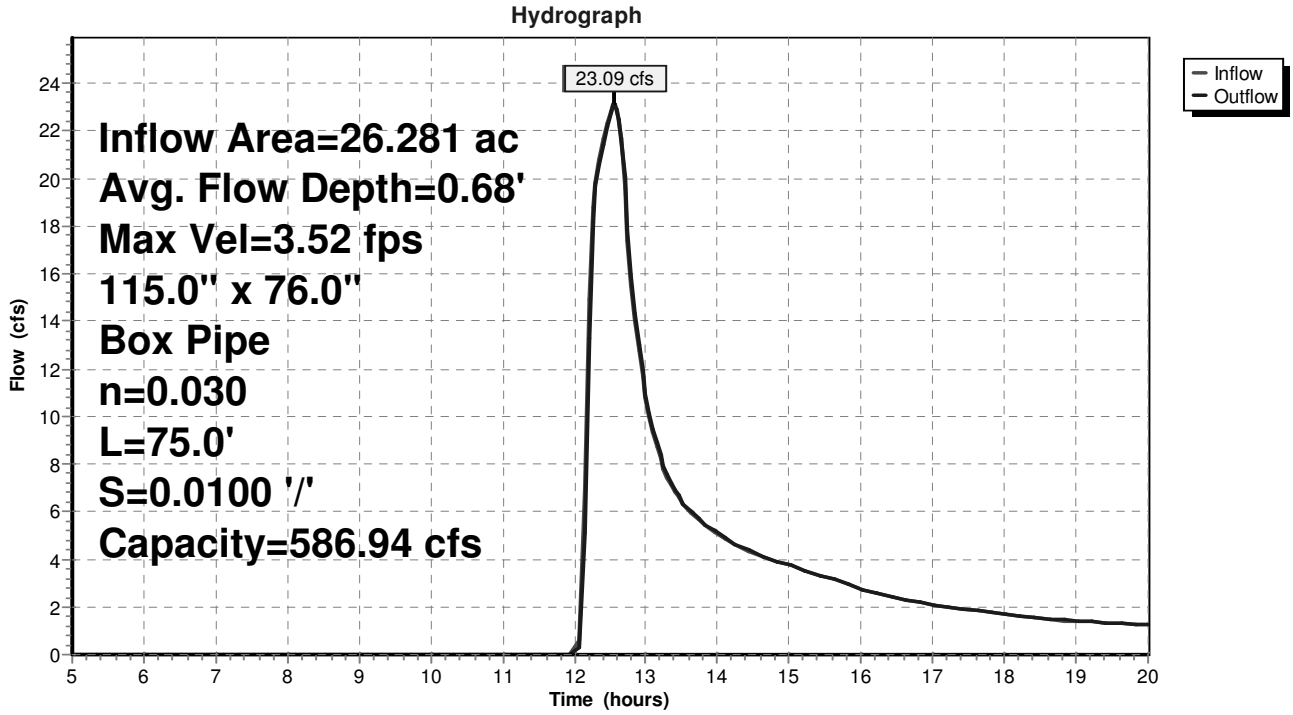
Inflow Area = 26.281 ac, 32.15% Impervious, Inflow Depth > 1.40" for 25 YR event
Inflow = 23.14 cfs @ 12.55 hrs, Volume= 3.075 af
Outflow = 23.09 cfs @ 12.56 hrs, Volume= 3.073 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.52 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.72 fps, Avg. Travel Time= 0.7 min

Peak Storage= 492 cf @ 12.56 hrs
Average Depth at Peak Storage= 0.68'
Defined Flood Depth= 224.50', Capacity at Flood Depth= 26,590.01 cfs
Bank-Full Depth= 6.33', Capacity at Bank-Full= 586.94 cfs

115.0" W x 76.0" H Box Pipe
n= 0.030 Stream, clean & straight
Length= 75.0' Slope= 0.0100 '/'
Inlet Invert= 212.00', Outlet Invert= 211.25'

Reach 4C: Ex. Culvert



Summary for Reach 4R: CATCH24 Reach

Inflow Area = 26.281 ac, 32.15% Impervious, Inflow Depth > 1.41" for 25 YR event
Inflow = 23.38 cfs @ 12.53 hrs, Volume= 3.086 af
Outflow = 23.14 cfs @ 12.55 hrs, Volume= 3.075 af, Atten= 1%, Lag= 1.4 min

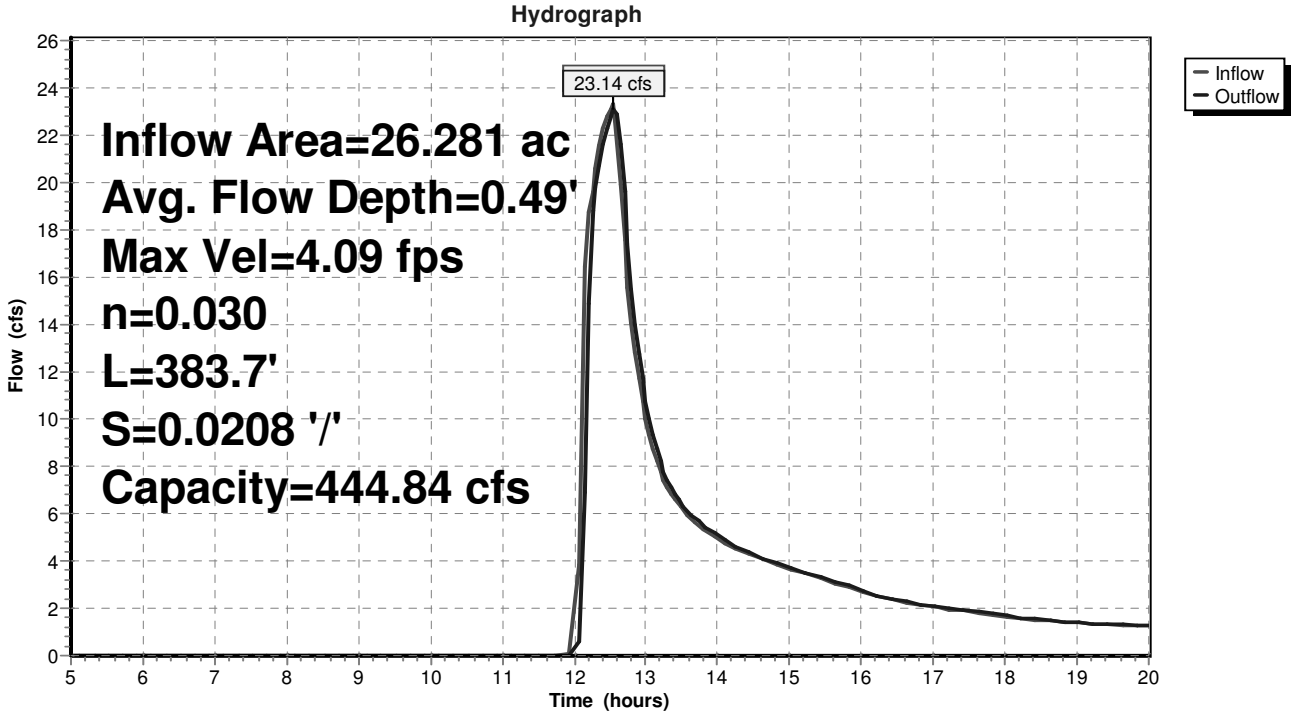
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.09 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 2.03 fps, Avg. Travel Time= 3.1 min

Peak Storage= 2,181 cf @ 12.54 hrs
Average Depth at Peak Storage= 0.49'
Bank-Full Depth= 2.50', Capacity at Bank-Full= 444.84 cfs

10.00' x 2.50' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 25.00'
Length= 383.7' Slope= 0.0208 '/'
Inlet Invert= 220.00', Outlet Invert= 212.00'

‡

Reach 4R: CATCH24 Reach



Summary for Reach 5R: CATCH23 Reach

Inflow Area = 26.281 ac, 32.15% Impervious, Inflow Depth > 1.40" for 25 YR event
Inflow = 23.09 cfs @ 12.56 hrs, Volume= 3.073 af
Outflow = 21.82 cfs @ 12.82 hrs, Volume= 3.022 af, Atten= 6%, Lag= 15.3 min

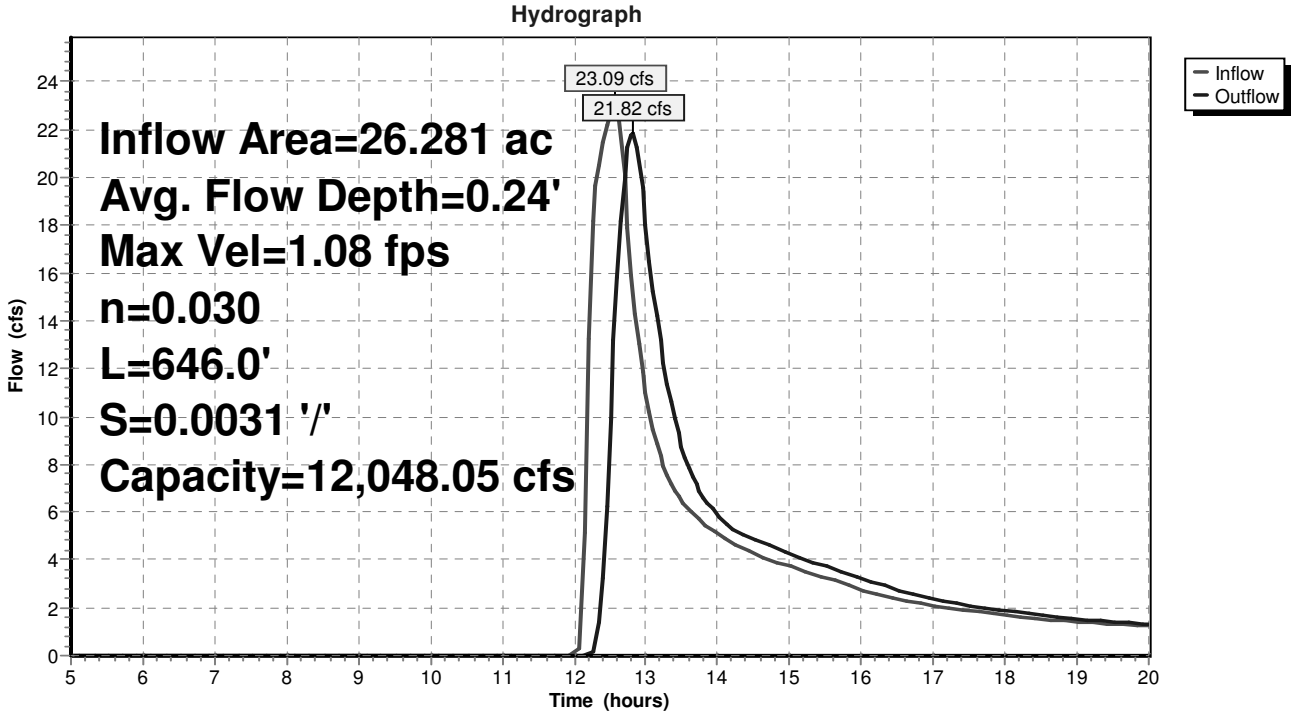
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.08 fps, Min. Travel Time= 10.0 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 16.7 min

Peak Storage= 13,152 cf @ 12.65 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 10.00', Capacity at Bank-Full= 12,048.05 cfs

85.00' x 10.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 2.5 '/' Top Width= 135.00'
Length= 646.0' Slope= 0.0031 '/'
Inlet Invert= 212.00', Outlet Invert= 210.00'

‡

Reach 5R: CATCH23 Reach



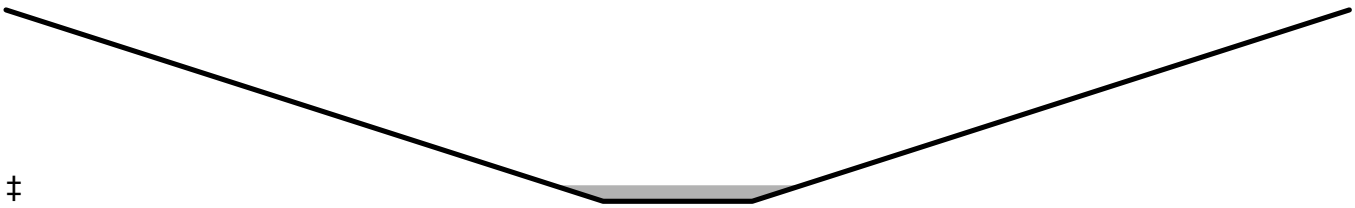
Summary for Reach 6R: CATCH 23 Reach

Inflow Area = 7.811 ac, 20.30% Impervious, Inflow Depth > 1.42" for 25 YR event
Inflow = 7.52 cfs @ 12.07 hrs, Volume= 0.924 af
Outflow = 7.37 cfs @ 12.10 hrs, Volume= 0.923 af, Atten= 2%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.69 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.13 fps, Avg. Travel Time= 1.1 min

Peak Storage= 212 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 2.50', Capacity at Bank-Full= 1,385.41 cfs

10.00' x 2.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 16.0 '/' Top Width= 90.00'
Length= 77.2' Slope= 0.0324 '/'
Inlet Invert= 214.00', Outlet Invert= 211.50'



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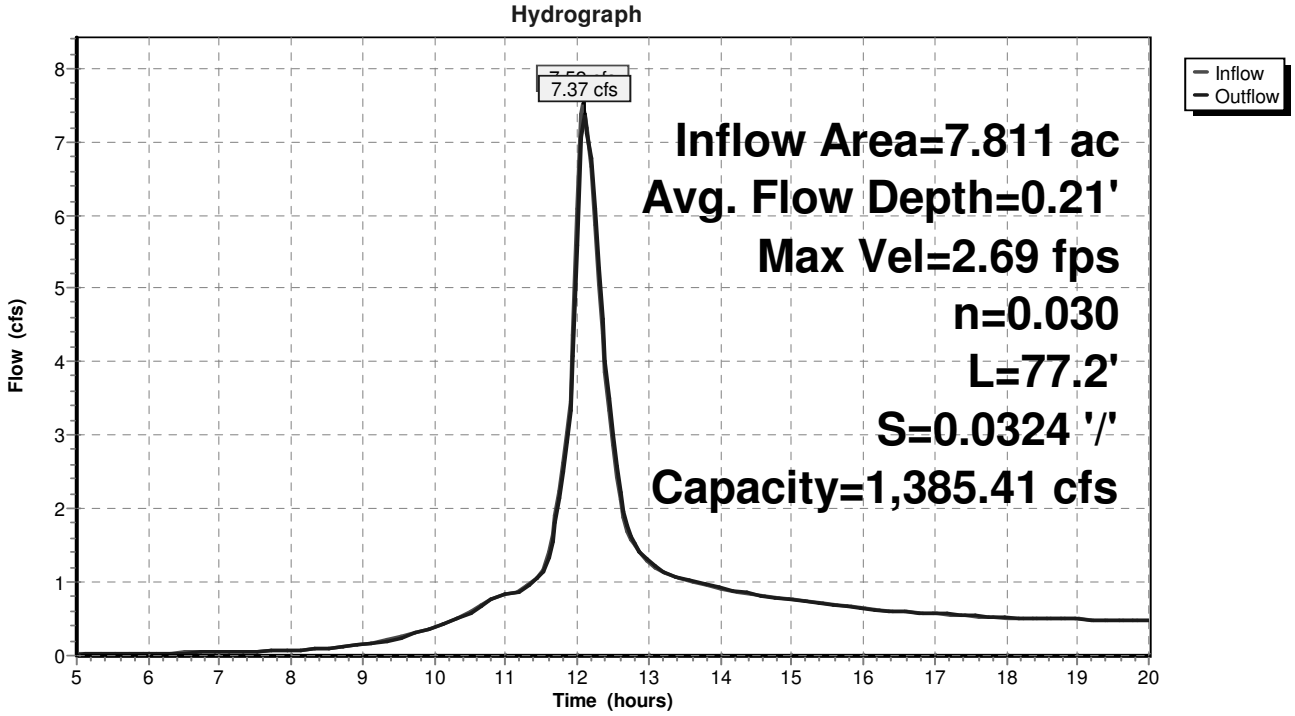
Reach 6R: CATCH 23 Reach



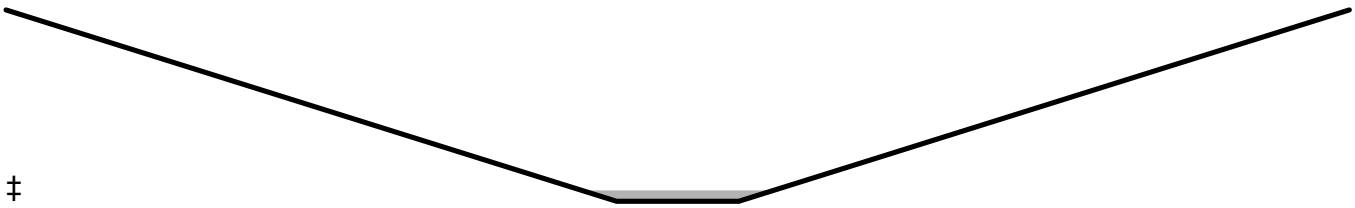
Summary for Reach 7R: CATCH23 Reach

Inflow Area = 12.166 ac, 14.78% Impervious, Inflow Depth > 1.63" for 25 YR event
Inflow = 11.94 cfs @ 12.25 hrs, Volume= 1.652 af
Outflow = 11.85 cfs @ 12.30 hrs, Volume= 1.646 af, Atten= 1%, Lag= 3.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.68 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.75 fps, Avg. Travel Time= 4.0 min

Peak Storage= 1,293 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 5.00', Capacity at Bank-Full= 5,255.57 cfs

20.00' x 5.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 20.0 '/' Top Width= 220.00'
Length= 182.5' Slope= 0.0082 '/'
Inlet Invert= 211.50', Outlet Invert= 210.00'



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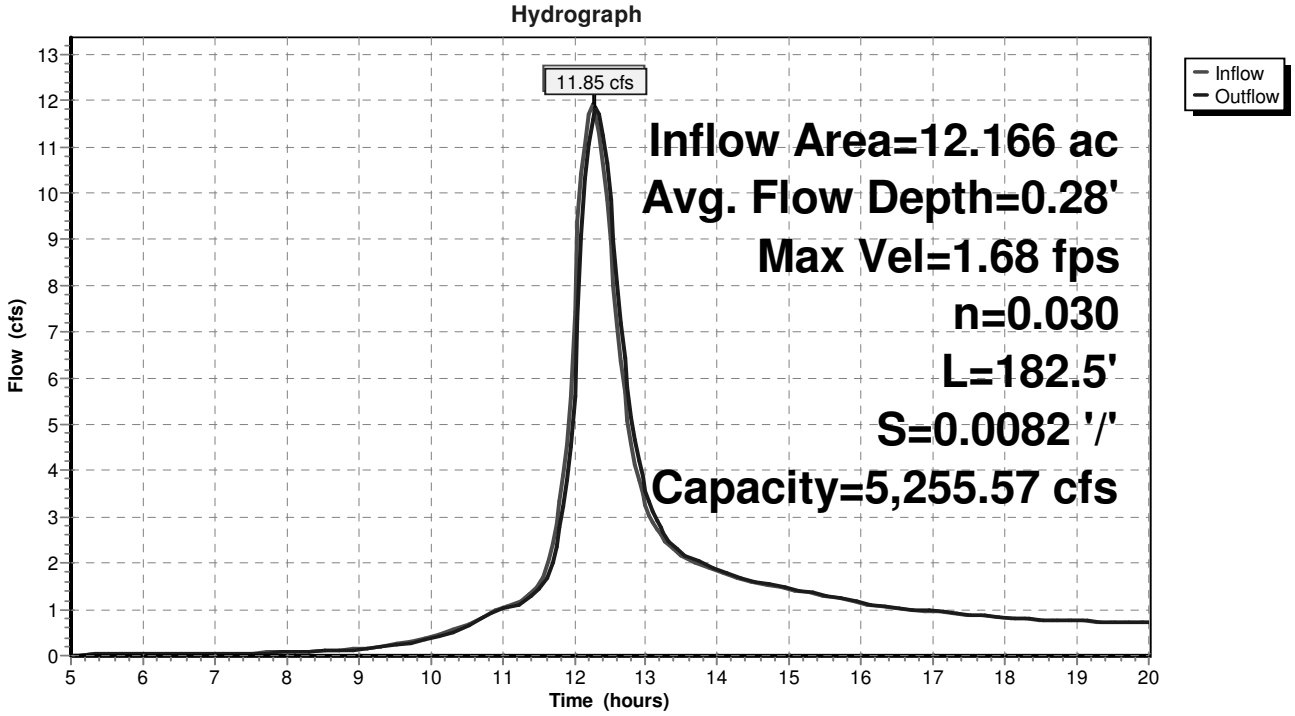
Reach 7R: CATCH23 Reach



Summary for Reach 8R: CATCH 23 Reach

Inflow Area = 1.722 ac, 31.52% Impervious, Inflow Depth > 2.83" for 25 YR event
Inflow = 5.03 cfs @ 12.15 hrs, Volume= 0.406 af
Outflow = 4.95 cfs @ 12.17 hrs, Volume= 0.406 af, Atten= 2%, Lag= 0.9 min

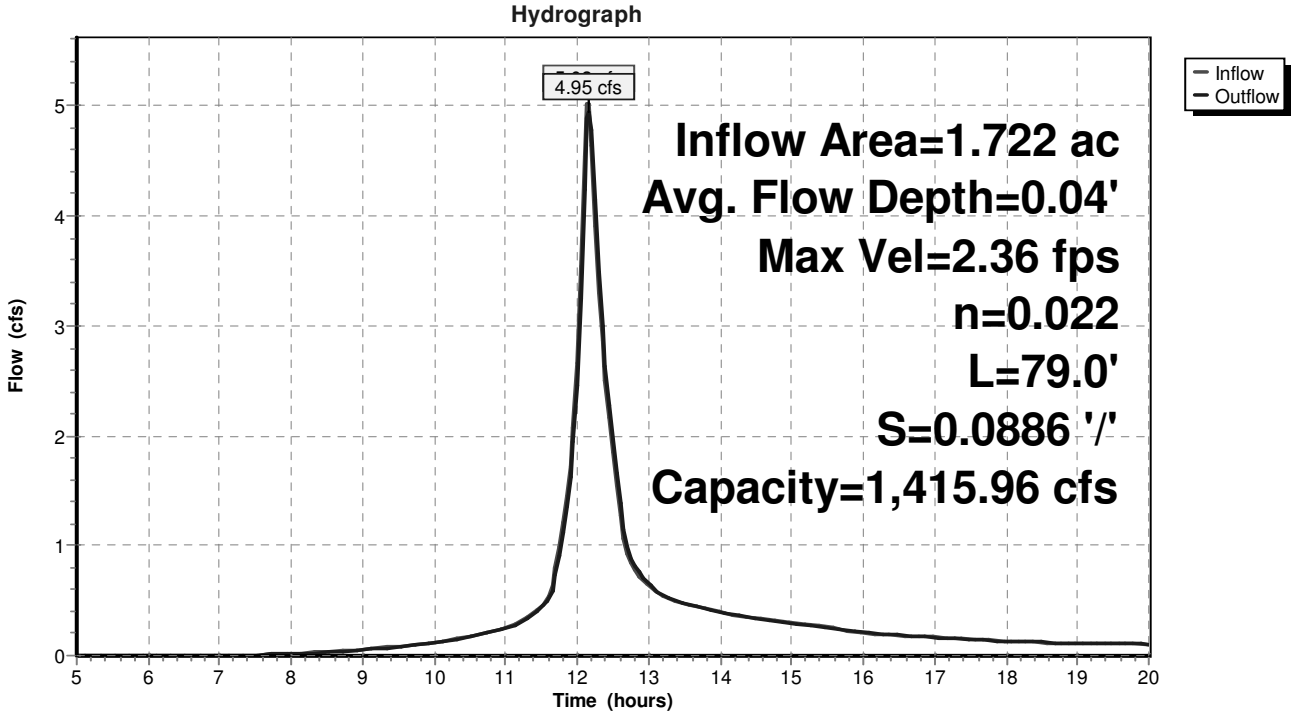
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.36 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.99 fps, Avg. Travel Time= 1.3 min

Peak Storage= 168 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 1,415.96 cfs

50.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 40.0 '/' Top Width= 130.00'
Length= 79.0' Slope= 0.0886 '/'
Inlet Invert= 221.00', Outlet Invert= 214.00'

‡

Reach 8R: CATCH 23 Reach



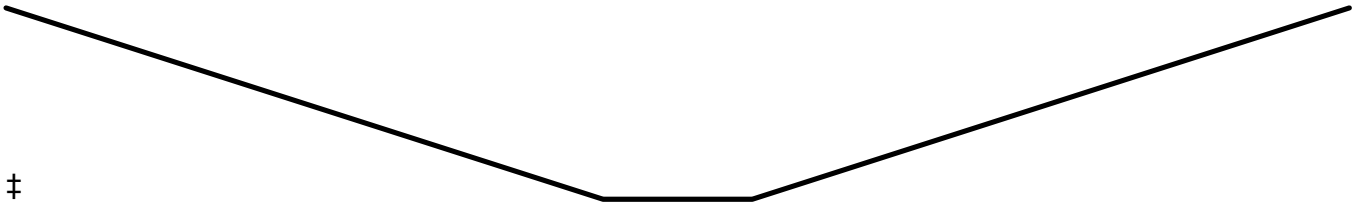
Summary for Reach 9R: CATCH 23 Reach

Inflow Area = 5.270 ac, 9.88% Impervious, Inflow Depth > 0.61" for 25 YR event
Inflow = 0.41 cfs @ 10.89 hrs, Volume= 0.266 af
Outflow = 0.39 cfs @ 10.94 hrs, Volume= 0.264 af, Atten= 4%, Lag= 3.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.16 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.04 fps, Avg. Travel Time= 2.6 min

Peak Storage= 56 cf @ 10.90 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 2.50', Capacity at Bank-Full= 1,710.82 cfs

10.00' x 2.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 16.0 '/' Top Width= 90.00'
Length= 162.0' Slope= 0.0494 '/'
Inlet Invert= 222.00', Outlet Invert= 214.00'



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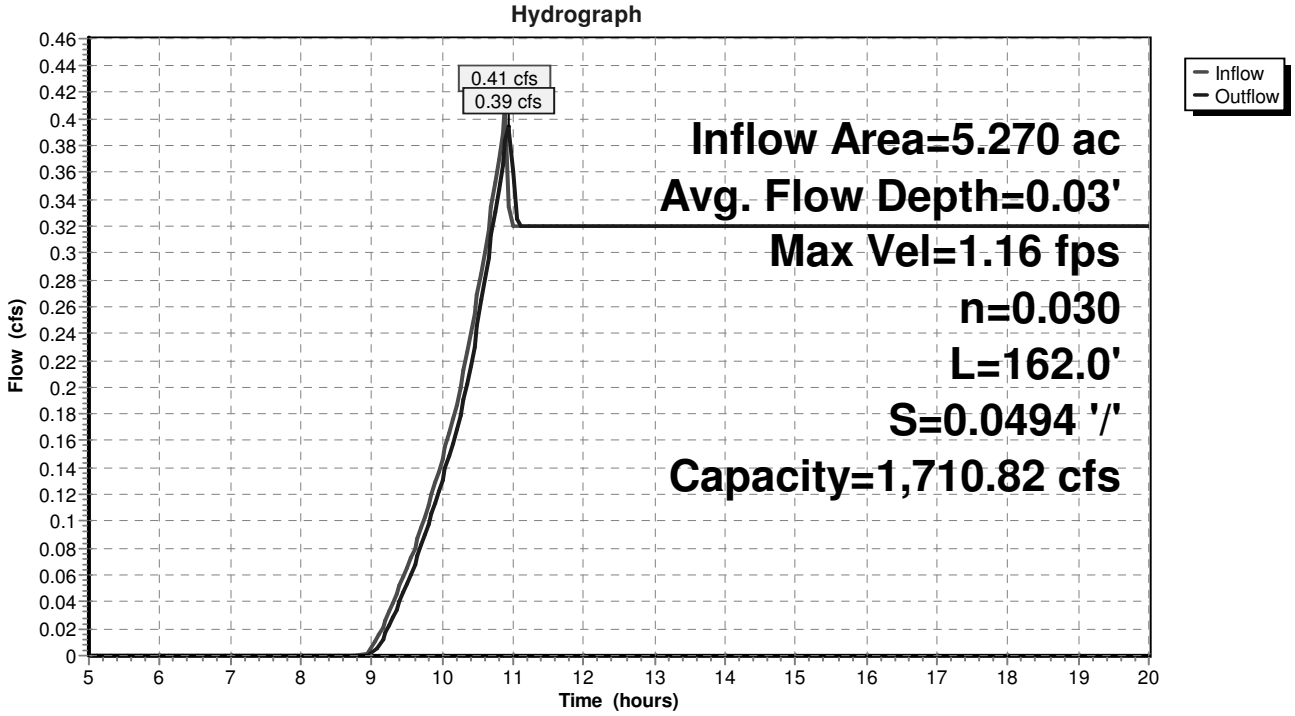
Reach 9R: CATCH 23 Reach



Summary for Pond 1CB: CB R20

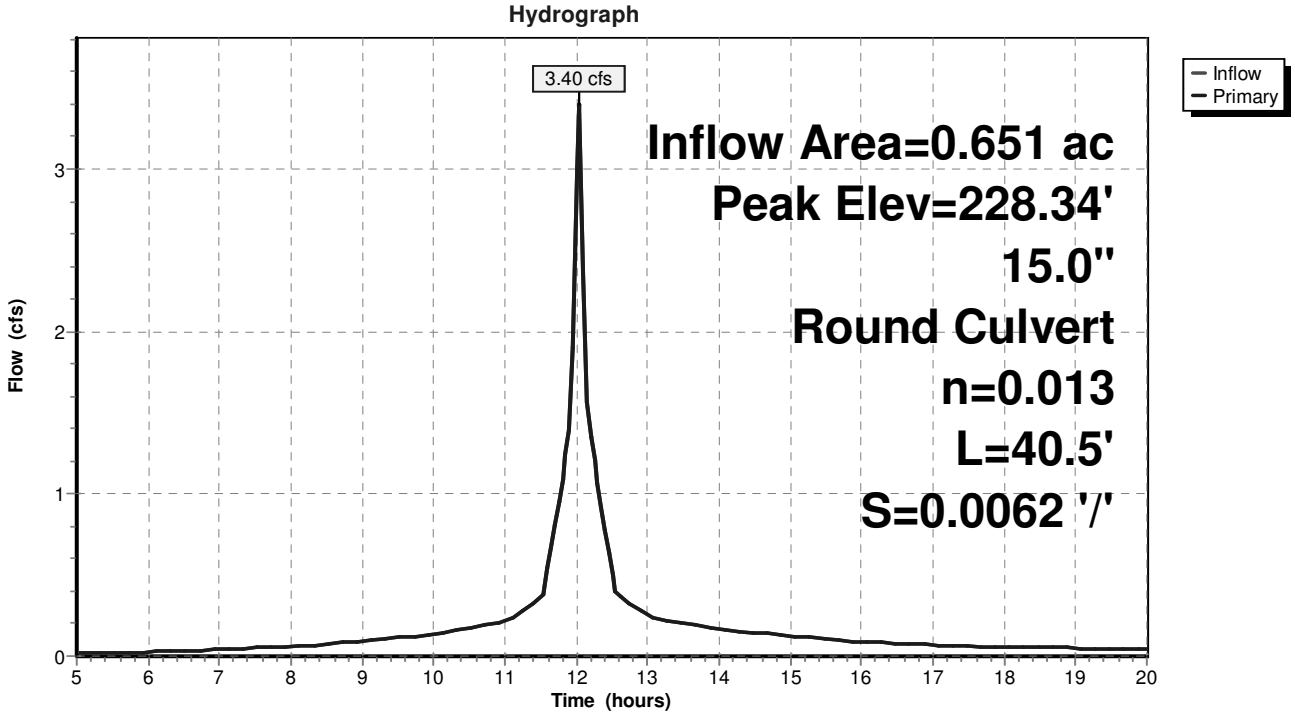
Inflow Area =	0.651 ac, 79.99% Impervious, Inflow Depth > 4.18" for 25 YR event				
Inflow =	3.40 cfs @	12.04 hrs, Volume=	0.227 af		
Outflow =	3.40 cfs @	12.04 hrs, Volume=	0.227 af, Atten= 0%, Lag= 0.0 min		
Primary =	3.40 cfs @	12.04 hrs, Volume=	0.227 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 228.34' @ 12.04 hrs
Flood Elev= 232.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	227.15'	**15.0" Round Culvert** L= 40.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 227.15' / 226.90' S= 0.0062 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.28 cfs @ 12.04 hrs HW=228.31' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.28 cfs @ 3.61 fps)

Pond 1CB: CB R20



Summary for Pond 1P: Main Stormwater Pond

Inflow Area =	12.369 ac, 67.46% Impervious, Inflow Depth > 3.99" for 25 YR event				
Inflow =	58.37 cfs @	12.04 hrs,	Volume=	4.116 af	
Outflow =	17.33 cfs @	12.36 hrs,	Volume=	2.229 af,	Atten= 70%, Lag= 19.1 min
Discarded =	0.05 cfs @	5.65 hrs,	Volume=	0.061 af	
Primary =	17.28 cfs @	12.36 hrs,	Volume=	2.169 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 233.17' @ 12.36 hrs Surf.Area= 22,443 sf Storage= 97,490 cf
Flood Elev= 236.00' Surf.Area= 30,941 sf Storage= 171,614 cf

Plug-Flow detention time= 175.9 min calculated for 2.229 af (54% of inflow)
Center-of-Mass det. time= 90.6 min (839.0 - 748.4)

Volume	Invert	Avail.Storage	Storage Description
#1	226.00'	171,614 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

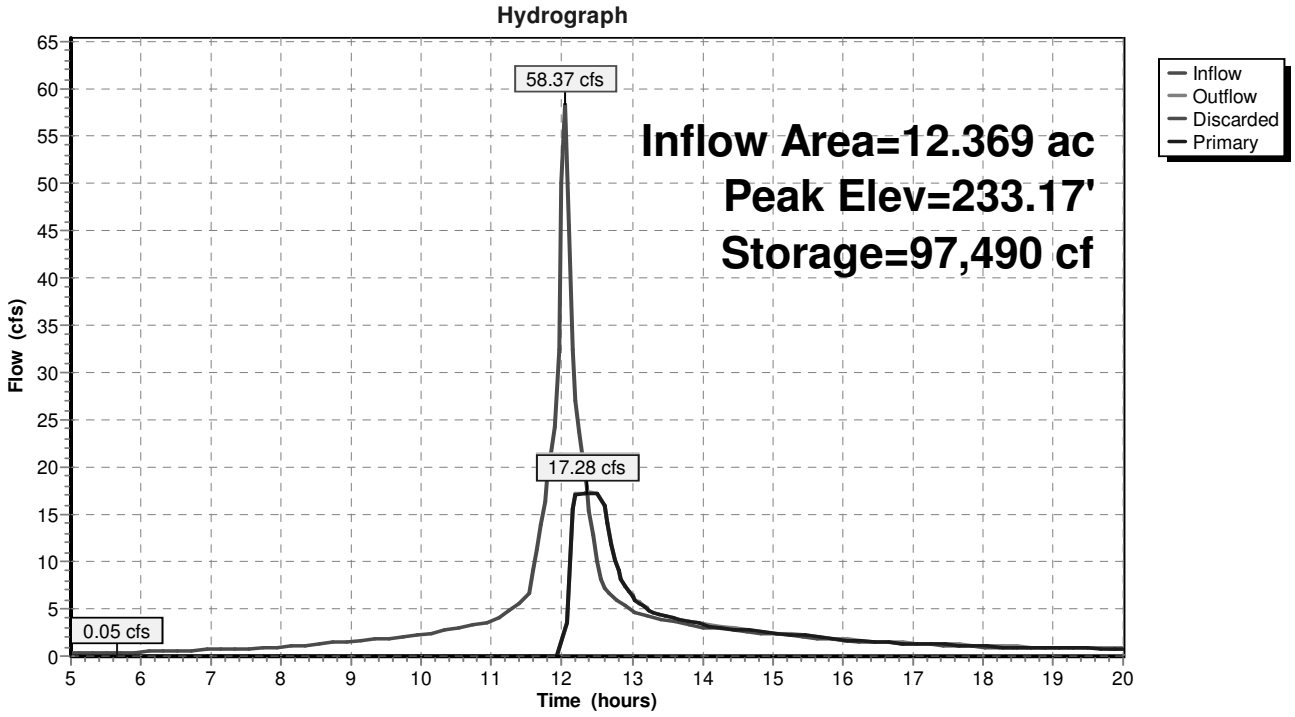
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
226.00	7,493	0	0
227.00	8,752	8,123	8,123
228.00	10,068	9,410	17,533
229.00	11,440	10,754	28,287
230.00	12,868	12,154	40,441
230.92	14,353	12,522	52,962
231.00	17,493	1,274	54,236
232.00	19,712	18,603	72,839
232.75	21,442	15,433	88,271
233.00	22,031	5,434	93,705
234.00	24,451	23,241	116,946
235.00	26,972	25,712	142,658
236.00	30,941	28,957	171,614

Device	Routing	Invert	Outlet Devices
#1	Primary	225.80'	**18.0" Round Culvert** L= 93.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 225.80' / 225.00' S= 0.0086 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	232.40'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	226.00'	**0.05 cfs Exfiltration at all elevations**
#4	Primary	233.75'	**20.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.05 cfs @ 5.65 hrs HW=226.11' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=17.28 cfs @ 12.36 hrs HW=233.17' (Free Discharge)
├─**1=Culvert** (Inlet Controls 17.28 cfs @ 9.78 fps)
│ └─**2=Orifice/Grate** (Passes 17.28 cfs of 27.66 cfs potential flow)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Main Stormwater Pond



Summary for Pond 2CB: CB R18

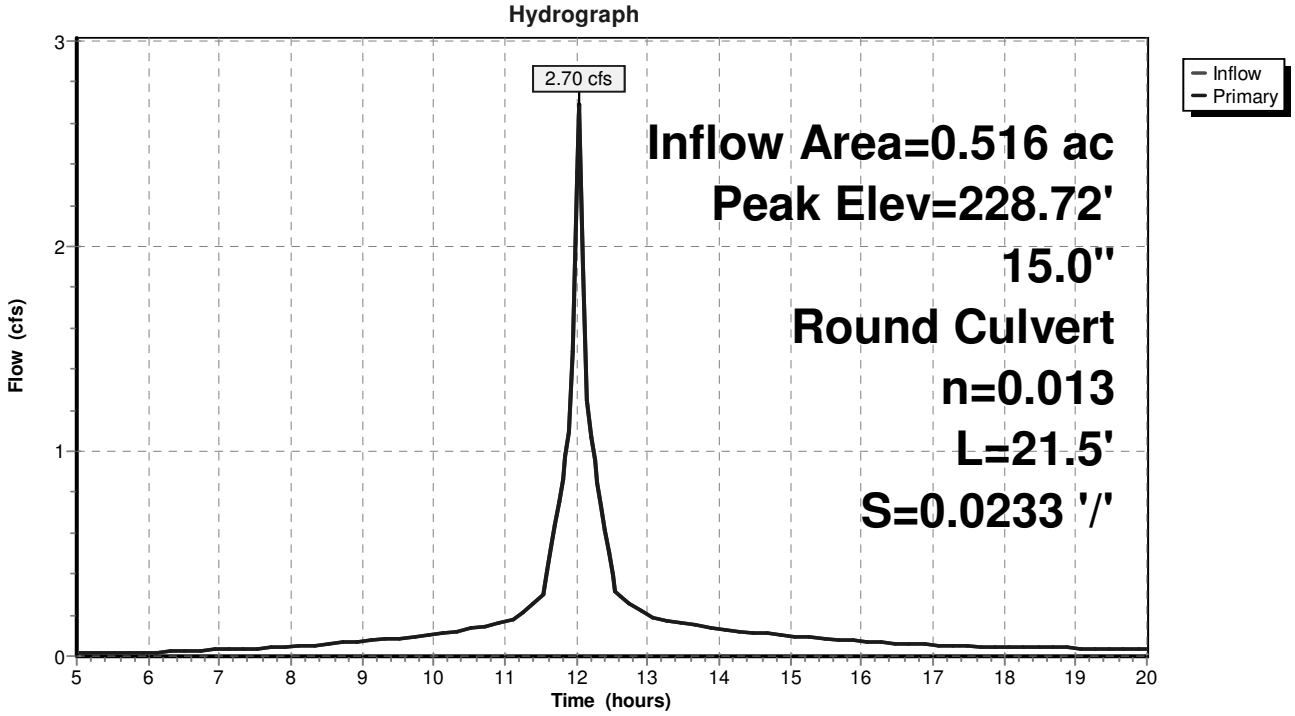
Inflow Area =	0.516 ac, 77.70% Impervious, Inflow Depth > 4.16" for 25 YR event				
Inflow =	2.70 cfs @	12.04 hrs, Volume=	0.179 af		
Outflow =	2.70 cfs @	12.04 hrs, Volume=	0.179 af, Atten= 0%, Lag= 0.0 min		
Primary =	2.70 cfs @	12.04 hrs, Volume=	0.179 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 228.72' @ 12.04 hrs
Flood Elev= 232.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	227.75'	**15.0" Round Culvert** L= 21.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 227.75' / 227.25' S= 0.0233 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.61 cfs @ 12.04 hrs HW=228.70' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.61 cfs @ 2.61 fps)

Pond 2CB: CB R18



Summary for Pond 2P: Soil Filter #1

Inflow Area = 0.819 ac, 63.68% Impervious, Inflow Depth > 3.72" for 25 YR event
Inflow = 3.84 cfs @ 12.04 hrs, Volume= 0.254 af
Outflow = 3.84 cfs @ 12.04 hrs, Volume= 0.254 af, Atten= 0%, Lag= 0.0 min
Primary = 3.84 cfs @ 12.04 hrs, Volume= 0.254 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 224.00' @ 12.04 hrs Surf.Area= 1,592 sf Storage= 6 cf

Plug-Flow detention time= 0.0 min calculated for 0.253 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (750.8 - 750.8)

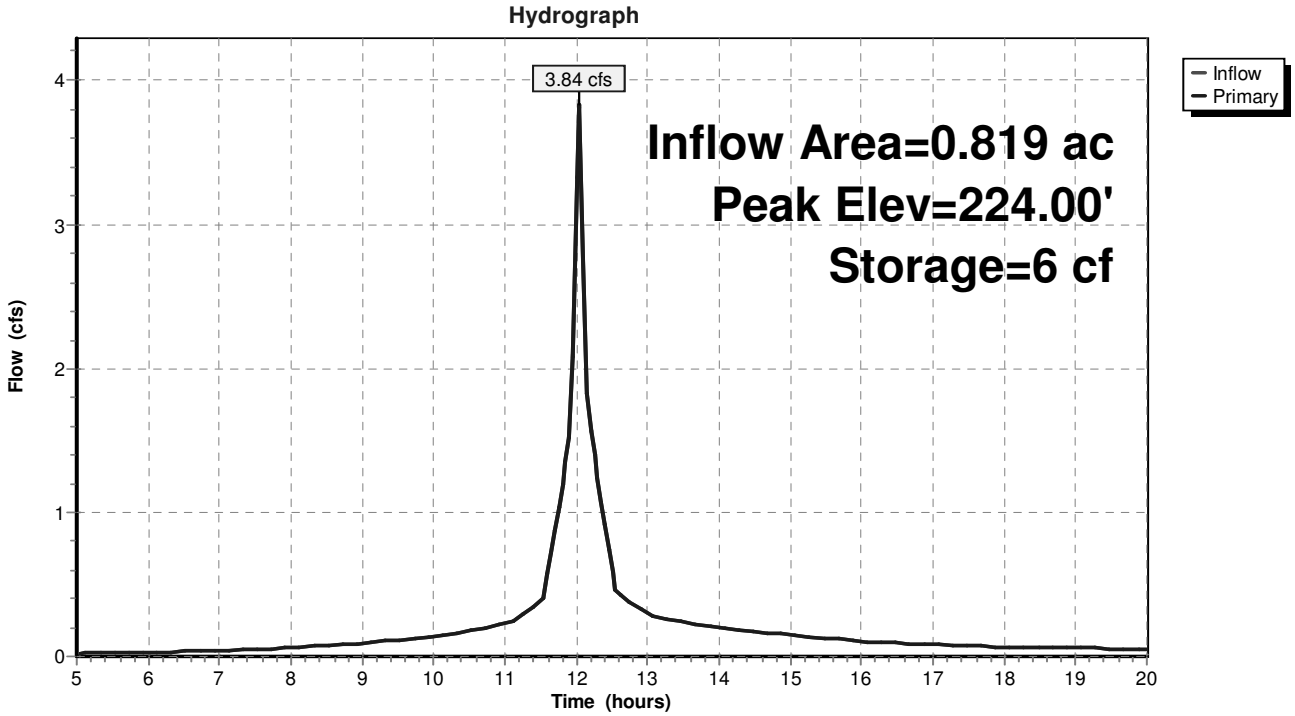
Volume	Invert	Avail.Storage	Storage Description
#1	224.00'	4,151 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
224.00	1,590	0	0
225.00	2,063	1,827	1,827
225.50	2,321	1,096	2,923
226.00	2,593	1,229	4,151

Device	Routing	Invert	Outlet Devices
#1	Primary	226.00'	**8.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#2	Primary	225.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	221.67'	**36.0" Round Culvert** L= 21.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 221.67' / 221.50' S= 0.0081 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=20.90 cfs @ 12.04 hrs HW=224.00' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Orifice/Grate** (Controls 0.00 cfs)
- **3=Culvert** (Barrel Controls 20.90 cfs @ 4.88 fps)

Pond 2P: Soil Filter #1



Summary for Pond 3CB: CB R22

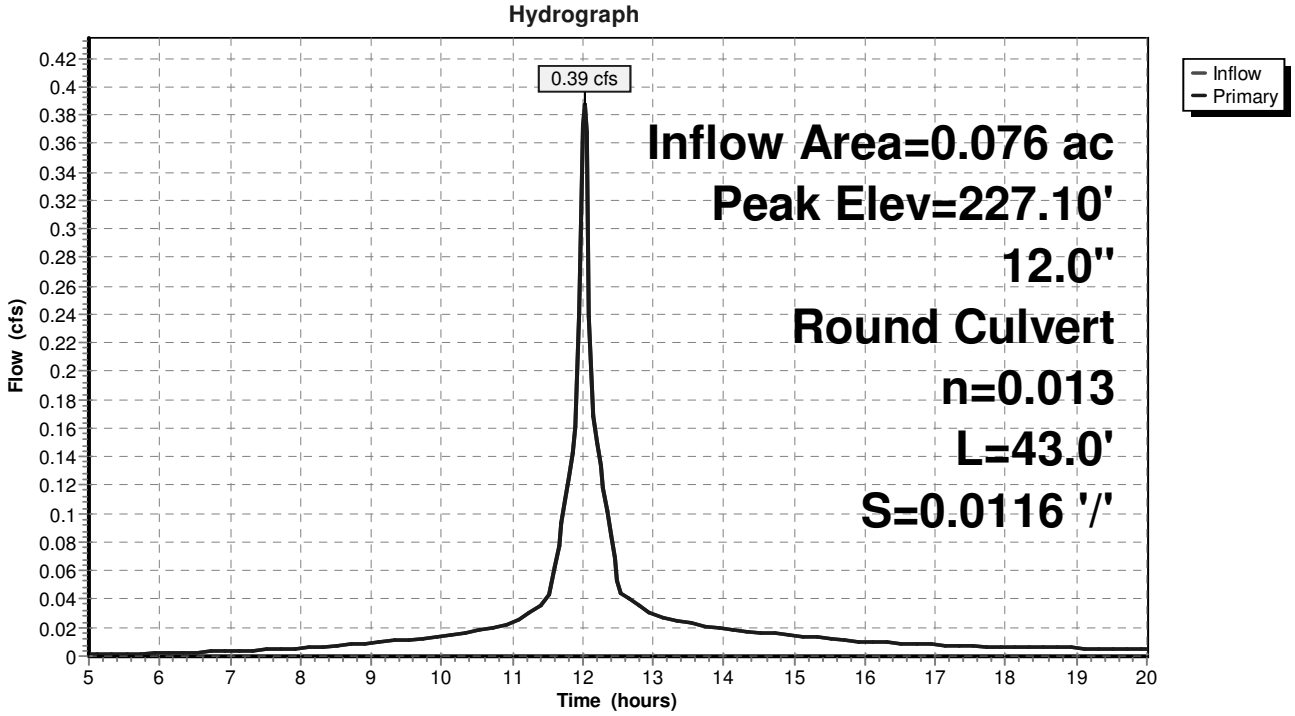
Inflow Area =	0.076 ac, 77.27% Impervious, Inflow Depth > 3.96" for 25 YR event				
Inflow =	0.39 cfs @	12.02 hrs,	Volume=	0.025 af	
Outflow =	0.39 cfs @	12.02 hrs,	Volume=	0.025 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.39 cfs @	12.02 hrs,	Volume=	0.025 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 227.10' @ 12.02 hrs
Flood Elev= 231.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	226.75'	**12.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 226.75' / 226.25' S= 0.0116 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.37 cfs @ 12.02 hrs HW=227.09' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.37 cfs @ 1.57 fps)

Pond 3CB: CB R22



Summary for Pond 3P: Soil Filter #2

Inflow Area = 1.722 ac, 31.52% Impervious, Inflow Depth > 2.83" for 25 YR event
Inflow = 5.02 cfs @ 12.15 hrs, Volume= 0.406 af
Outflow = 5.03 cfs @ 12.15 hrs, Volume= 0.406 af, Atten= 0%, Lag= 0.1 min
Primary = 5.03 cfs @ 12.15 hrs, Volume= 0.406 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 224.02' @ 12.15 hrs Surf.Area= 2,302 sf Storage= 35 cf
Flood Elev= 232.25' Surf.Area= 3,962 sf Storage= 7,751 cf

Plug-Flow detention time= 0.1 min calculated for 0.406 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (787.8 - 787.7)

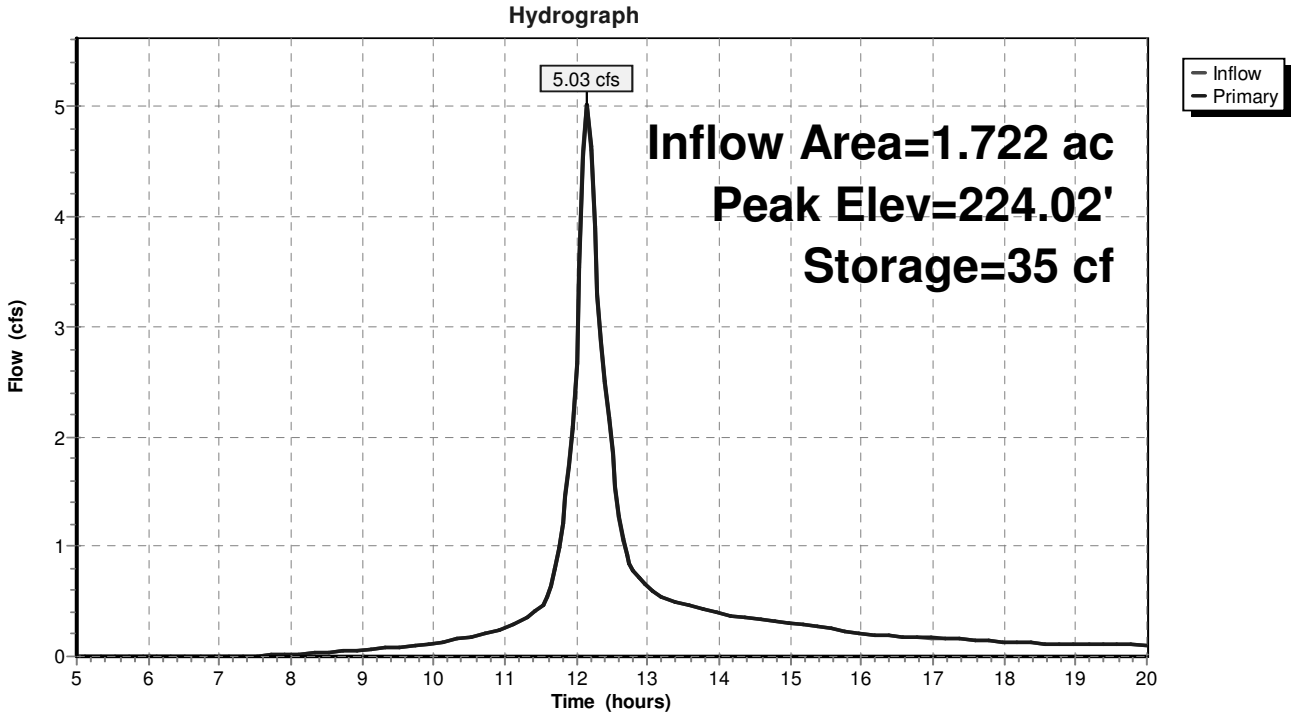
Volume	Invert	Avail.Storage	Storage Description
#1	224.00'	7,751 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
224.00	2,292	0	0
225.00	2,918	2,605	2,605
225.50	3,252	1,543	4,148
226.00	3,600	1,713	5,861
226.50	3,962	1,891	7,751

Device	Routing	Invert	Outlet Devices
#1	Primary	226.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	221.40'	**36.0" Round Culvert** L= 89.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 221.40' / 221.00' S= 0.0045 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=25.86 cfs @ 12.15 hrs HW=224.02' (Free Discharge)
└─**1=Orifice/Grate** (Controls 0.00 cfs)
└─**2=Culvert** (Barrel Controls 25.86 cfs @ 5.28 fps)

Pond 3P: Soil Filter #2



Summary for Pond 4CB: CB R16

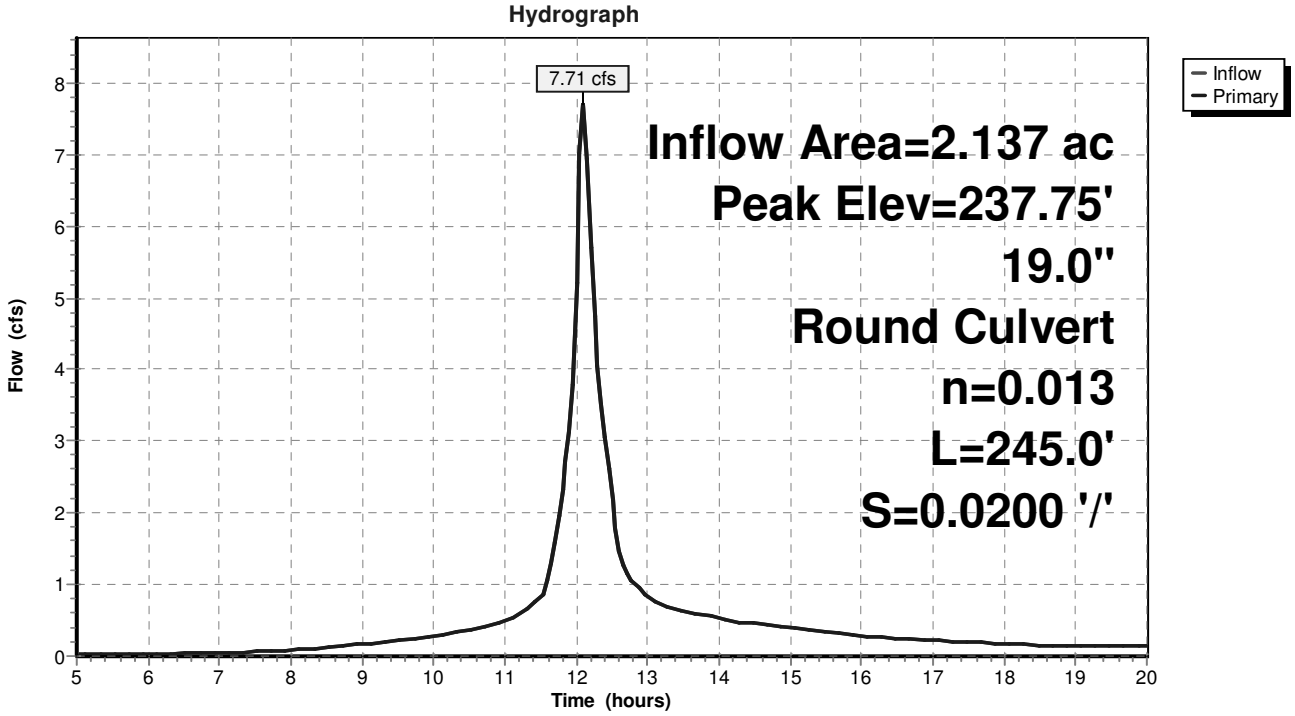
Inflow Area =	2.137 ac, 37.01% Impervious, Inflow Depth > 3.47" for 25 YR event				
Inflow =	7.71 cfs @	12.10 hrs,	Volume=	0.618 af	
Outflow =	7.71 cfs @	12.10 hrs,	Volume=	0.618 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.71 cfs @	12.10 hrs,	Volume=	0.618 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 237.75' @ 12.10 hrs
Flood Elev= 242.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.90'	**19.0" Round Culvert** L= 245.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 235.90' / 231.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=7.69 cfs @ 12.10 hrs HW=237.75' (Free Discharge)
└**1=Culvert** (Inlet Controls 7.69 cfs @ 3.91 fps)

Pond 4CB: CB R16



Summary for Pond 5CB: CB R15

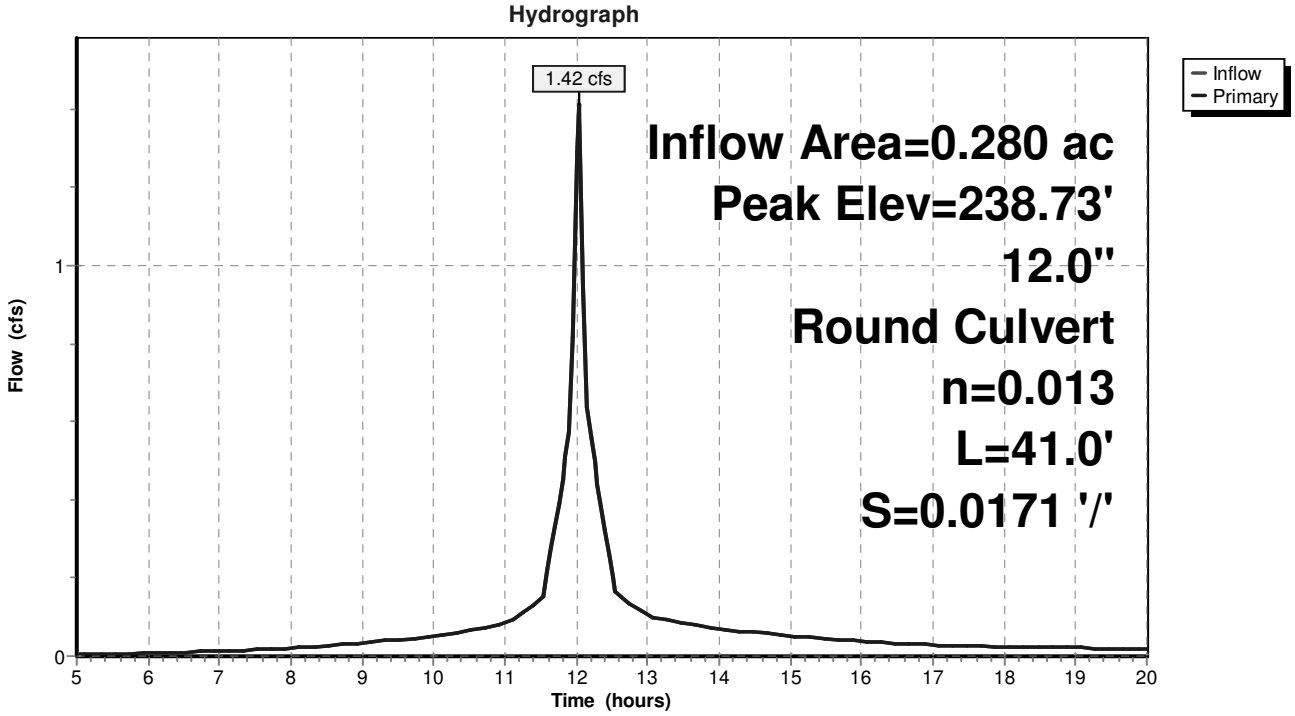
Inflow Area =	0.280 ac, 70.56% Impervious, Inflow Depth > 3.96" for 25 YR event				
Inflow =	1.42 cfs @	12.03 hrs, Volume=	0.092 af		
Outflow =	1.42 cfs @	12.03 hrs, Volume=	0.092 af, Atten= 0%, Lag= 0.0 min		
Primary =	1.42 cfs @	12.03 hrs, Volume=	0.092 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 238.73' @ 12.03 hrs
Flood Elev= 243.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	238.00'	**12.0" Round Culvert** L= 41.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 238.00' / 237.30' S= 0.0171 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.36 cfs @ 12.03 hrs HW=238.71' (Free Discharge)
└**1=Culvert** (Inlet Controls 1.36 cfs @ 2.27 fps)

Pond 5CB: CB R15



Summary for Pond 6CB: CB R13

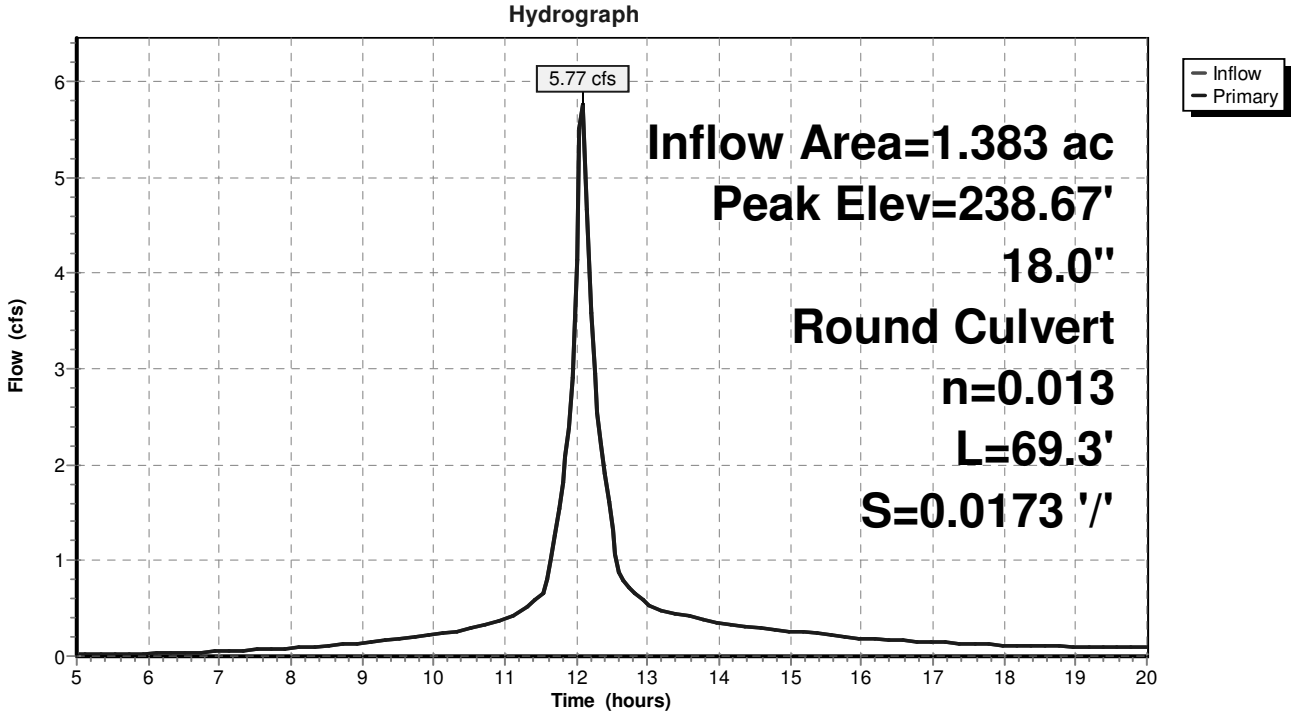
Inflow Area =	1.383 ac, 55.19% Impervious, Inflow Depth > 3.80" for 25 YR event				
Inflow =	5.77 cfs @	12.08 hrs,	Volume=	0.437 af	
Outflow =	5.77 cfs @	12.08 hrs,	Volume=	0.437 af,	Atten= 0%, Lag= 0.0 min
Primary =	5.77 cfs @	12.08 hrs,	Volume=	0.437 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 238.67' @ 12.08 hrs
Flood Elev= 243.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	237.20'	**18.0" Round Culvert** L= 69.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.20' / 236.00' S= 0.0173 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=5.64 cfs @ 12.08 hrs HW=238.64' (Free Discharge)
└**1=Culvert** (Inlet Controls 5.64 cfs @ 3.23 fps)

Pond 6CB: CB R13



Summary for Pond 7CB: CB R17

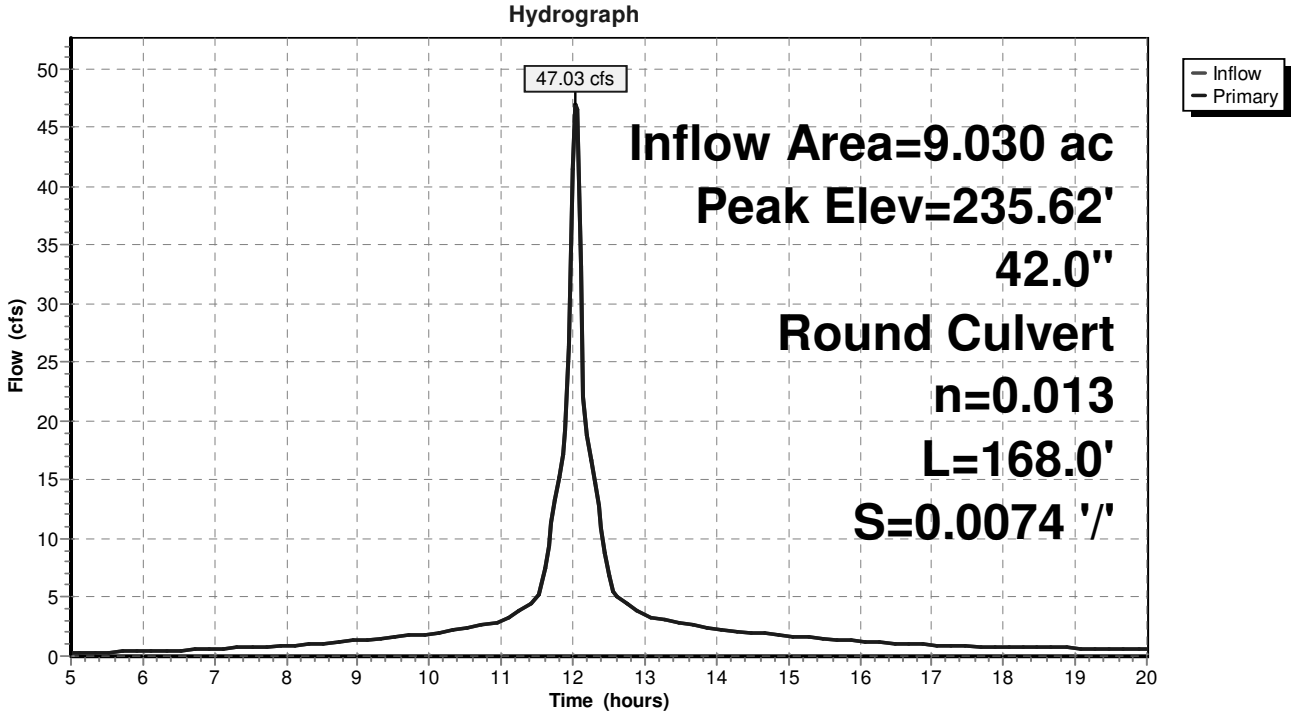
Inflow Area =	9.030 ac, 79.35% Impervious, Inflow Depth > 4.22" for 25 YR event				
Inflow =	47.03 cfs @	12.04 hrs,	Volume=	3.172 af	
Outflow =	47.03 cfs @	12.04 hrs,	Volume=	3.172 af,	Atten= 0%, Lag= 0.0 min
Primary =	47.03 cfs @	12.04 hrs,	Volume=	3.172 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 235.62' @ 12.04 hrs
Flood Elev= 246.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	232.25'	**42.0" Round Culvert** L= 168.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 232.25' / 231.00' S= 0.0074 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=45.54 cfs @ 12.04 hrs HW=235.53' (Free Discharge)
└**1=Culvert** (Inlet Controls 45.54 cfs @ 4.86 fps)

Pond 7CB: CB R17



Summary for Pond 8CB: CB R11

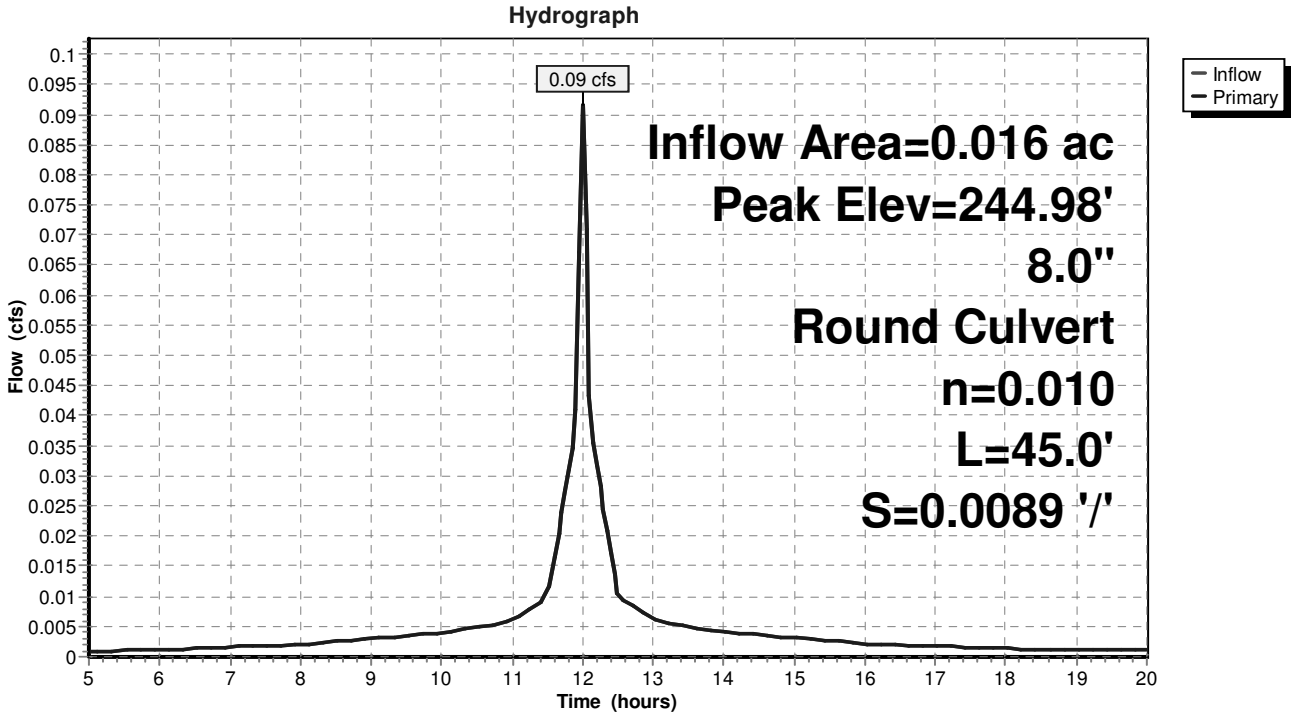
Inflow Area = 0.016 ac,100.00% Impervious, Inflow Depth > 4.51" for 25 YR event
Inflow = 0.09 cfs @ 12.00 hrs, Volume= 0.006 af
Outflow = 0.09 cfs @ 12.00 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min
Primary = 0.09 cfs @ 12.00 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 244.98' @ 12.00 hrs
Flood Elev= 249.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	244.80'	**8.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 244.80' / 244.40' S= 0.0089 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.09 cfs @ 12.00 hrs HW=244.98' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.09 cfs @ 1.15 fps)

Pond 8CB: CB R11



Summary for Pond 9CB: CB R11

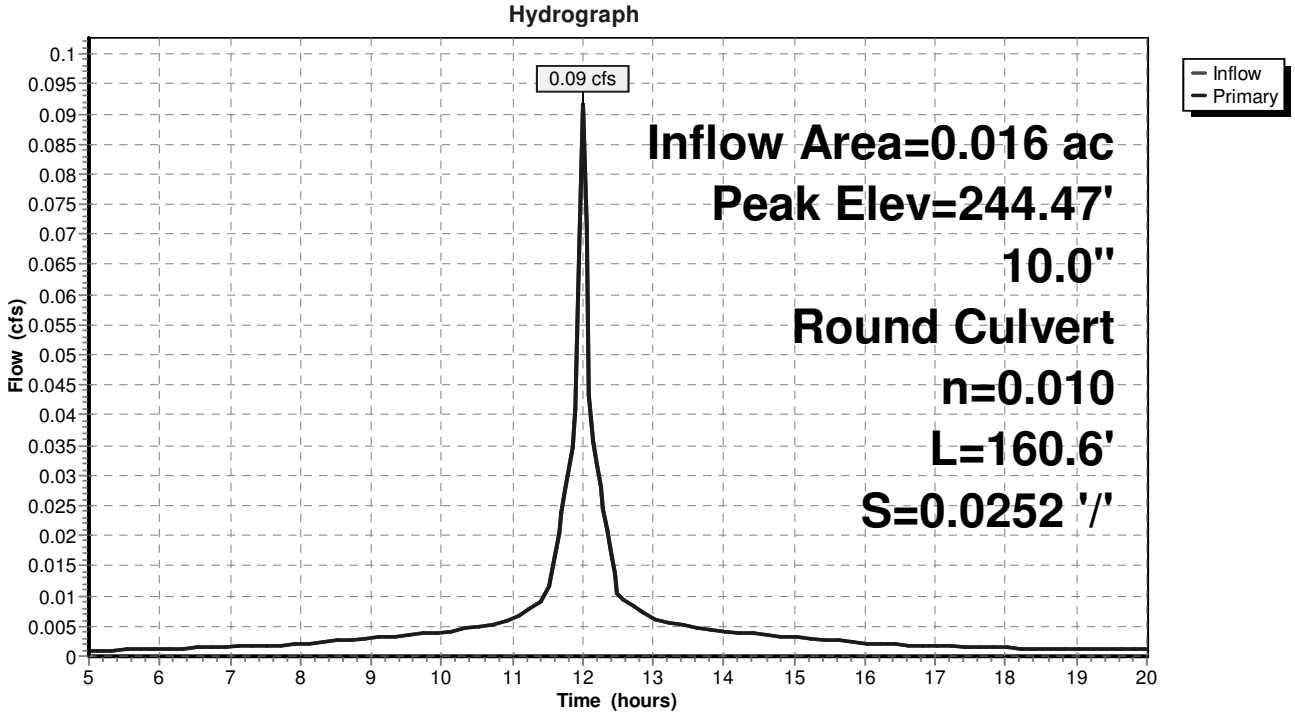
Inflow Area =	0.016 ac,100.00% Impervious, Inflow Depth > 4.51" for 25 YR event				
Inflow =	0.09 cfs @	12.00 hrs,	Volume=	0.006 af	
Outflow =	0.09 cfs @	12.00 hrs,	Volume=	0.006 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.09 cfs @	12.00 hrs,	Volume=	0.006 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 244.47' @ 12.00 hrs
Flood Elev= 249.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	244.30'	**10.0" Round Culvert** L= 160.6' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 244.30' / 240.25' S= 0.0252 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.09 cfs @ 12.00 hrs HW=244.47' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.09 cfs @ 1.11 fps)

Pond 9CB: CB R11



Summary for Pond 10CB: CB R10

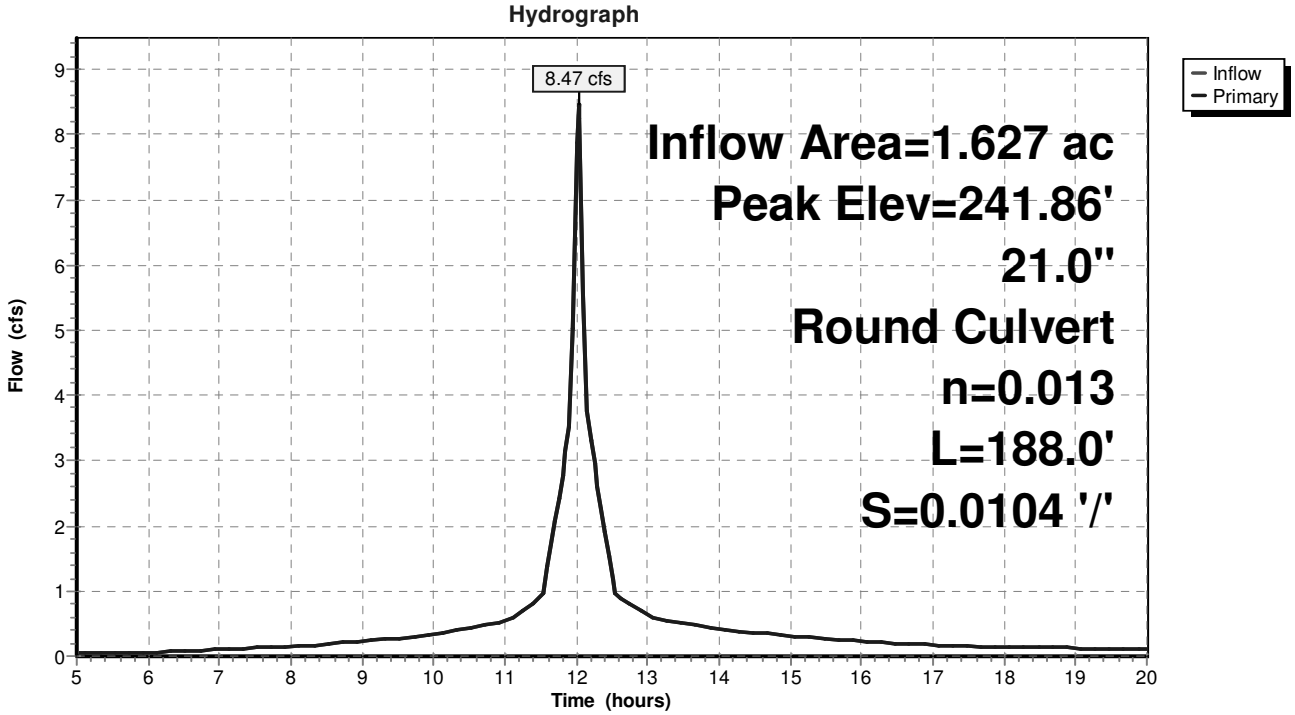
Inflow Area =	1.627 ac, 74.65% Impervious, Inflow Depth > 4.16" for 25 YR event				
Inflow =	8.47 cfs @	12.03 hrs, Volume=	0.564 af		
Outflow =	8.47 cfs @	12.03 hrs, Volume=	0.564 af, Atten= 0%, Lag= 0.0 min		
Primary =	8.47 cfs @	12.03 hrs, Volume=	0.564 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 241.86' @ 12.03 hrs
Flood Elev= 245.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	240.15'	**21.0" Round Culvert** L= 188.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 240.15' / 238.20' S= 0.0104 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=8.12 cfs @ 12.03 hrs HW=241.80' (Free Discharge)
└**1=Culvert** (Inlet Controls 8.12 cfs @ 3.45 fps)

Pond 10CB: CB R10



Summary for Pond 11CB: CB R9

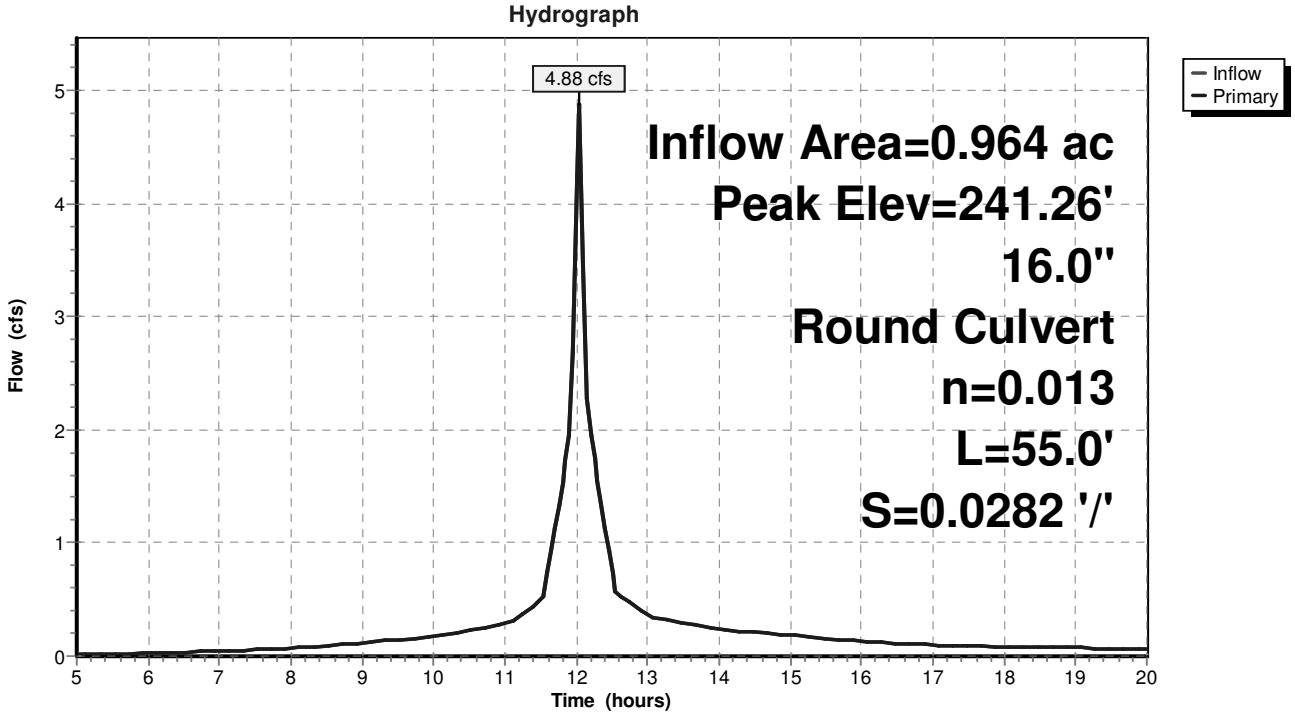
Inflow Area =	0.964 ac, 65.90% Impervious, Inflow Depth > 3.96" for 25 YR event				
Inflow =	4.88 cfs @	12.04 hrs,	Volume=	0.318 af	
Outflow =	4.88 cfs @	12.04 hrs,	Volume=	0.318 af,	Atten= 0%, Lag= 0.0 min
Primary =	4.88 cfs @	12.04 hrs,	Volume=	0.318 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 241.26' @ 12.04 hrs
Flood Elev= 245.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.75'	**16.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.75' / 238.20' S= 0.0282 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=4.73 cfs @ 12.04 hrs HW=241.21' (Free Discharge)
└─**1=Culvert** (Inlet Controls 4.73 cfs @ 3.39 fps)

Pond 11CB: CB R9



Summary for Pond 12CB: DMH R9

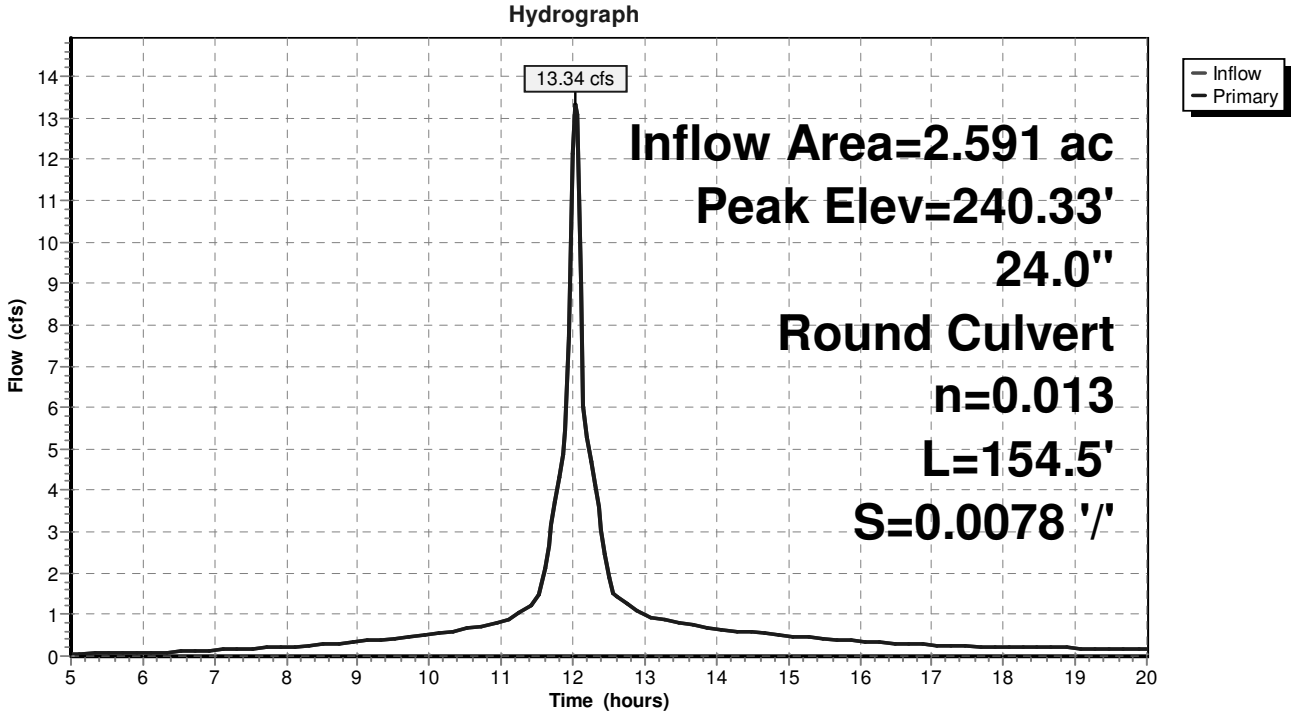
Inflow Area =	2.591 ac, 71.40% Impervious, Inflow Depth > 4.09" for 25 YR event				
Inflow =	13.34 cfs @	12.03 hrs,	Volume=	0.882 af	
Outflow =	13.34 cfs @	12.03 hrs,	Volume=	0.882 af,	Atten= 0%, Lag= 0.0 min
Primary =	13.34 cfs @	12.03 hrs,	Volume=	0.882 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 240.33' @ 12.04 hrs
Flood Elev= 246.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	238.10'	**24.0" Round Culvert** L= 154.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 238.10' / 236.90' S= 0.0078 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=12.81 cfs @ 12.03 hrs HW=240.25' (Free Discharge)
└**1=Culvert** (Inlet Controls 12.81 cfs @ 4.08 fps)

Pond 12CB: DMH R9



Summary for Pond 13CB: CB R8

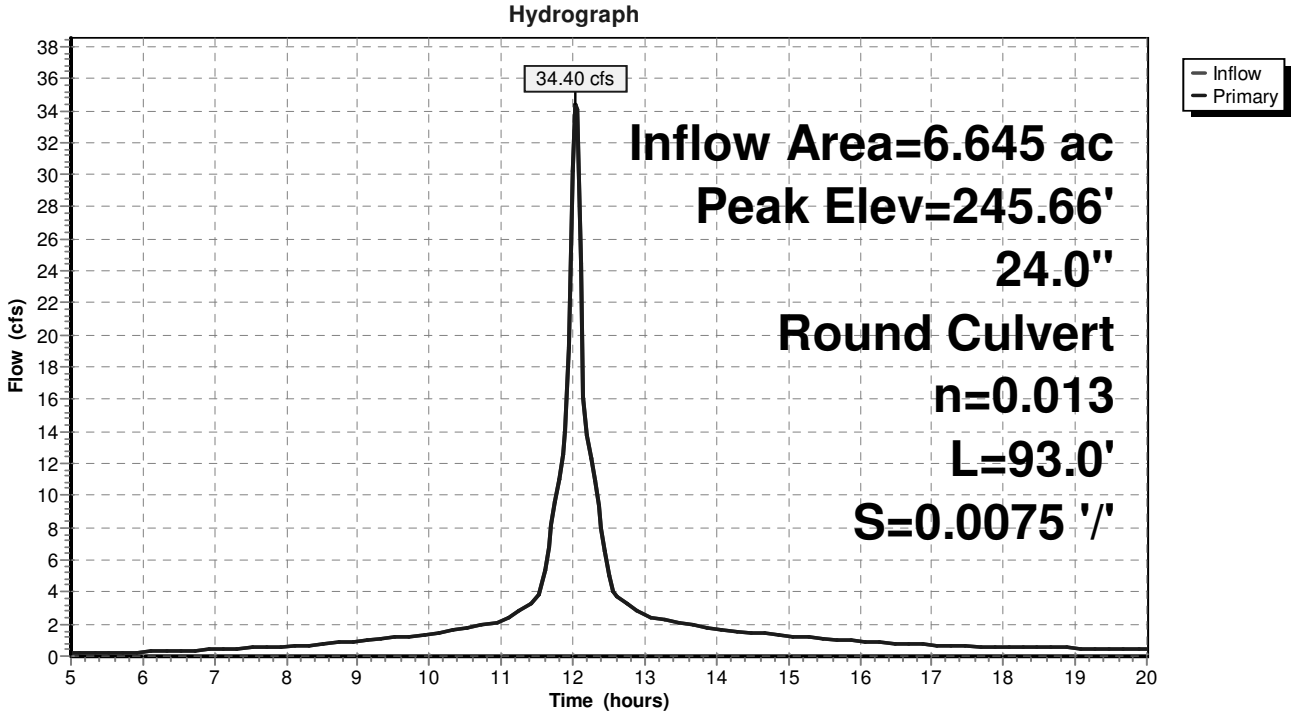
Inflow Area =	6.645 ac, 75.50% Impervious, Inflow Depth > 4.16" for 25 YR event				
Inflow =	34.40 cfs @	12.04 hrs,	Volume=	2.306 af	
Outflow =	34.40 cfs @	12.04 hrs,	Volume=	2.306 af,	Atten= 0%, Lag= 0.0 min
Primary =	34.40 cfs @	12.04 hrs,	Volume=	2.306 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 245.66' @ 12.04 hrs
Flood Elev= 247.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	236.40'	**24.0" Round Culvert** L= 93.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 236.40' / 235.70' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=33.30 cfs @ 12.04 hrs HW=245.18' (Free Discharge)
└**1=Culvert** (Inlet Controls 33.30 cfs @ 10.60 fps)

Pond 13CB: CB R8



Summary for Pond 14CB: CB R8

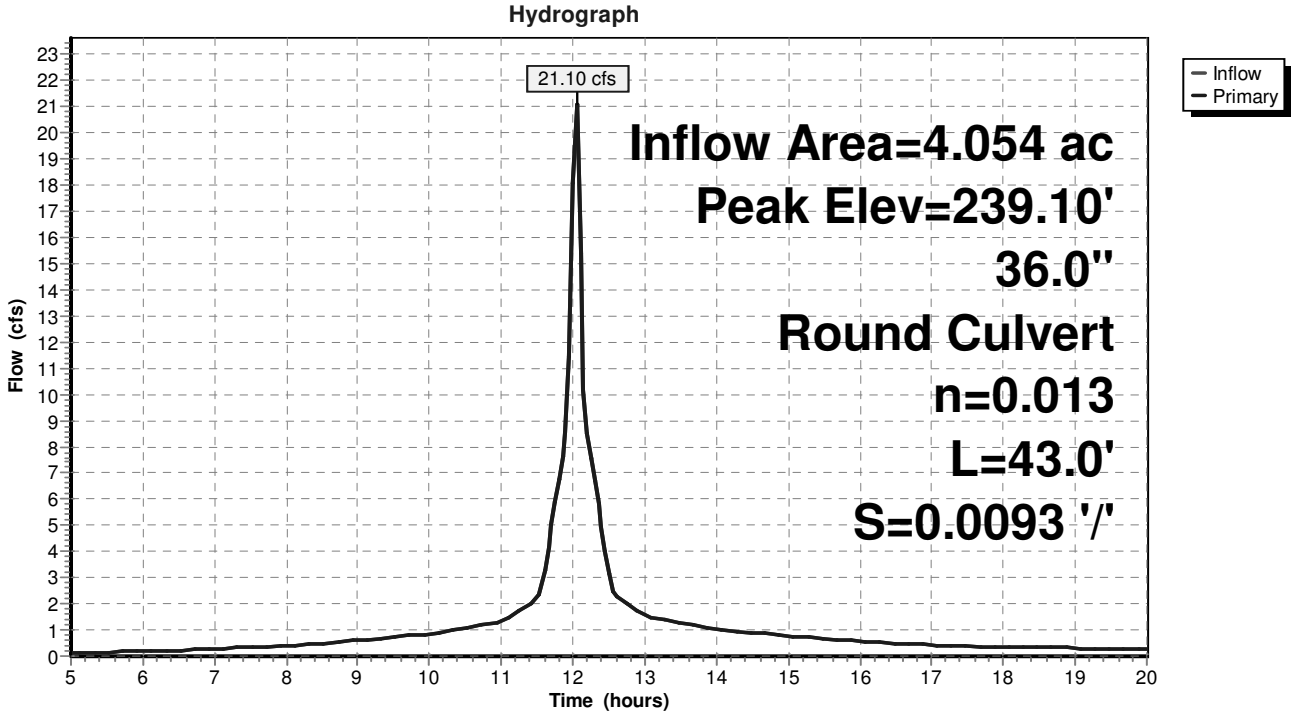
Inflow Area = 4.054 ac, 78.12% Impervious, Inflow Depth > 4.21" for 25 YR event
Inflow = 21.10 cfs @ 12.04 hrs, Volume= 1.423 af
Outflow = 21.10 cfs @ 12.04 hrs, Volume= 1.423 af, Atten= 0%, Lag= 0.0 min
Primary = 21.10 cfs @ 12.04 hrs, Volume= 1.423 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 239.10' @ 12.04 hrs
Flood Elev= 247.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	236.90'	**36.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 236.90' / 236.50' S= 0.0093 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=20.53 cfs @ 12.04 hrs HW=239.06' (Free Discharge)
└**1=Culvert** (Barrel Controls 20.53 cfs @ 5.26 fps)

Pond 14CB: CB R8



Summary for Pond 15CB: CB R6

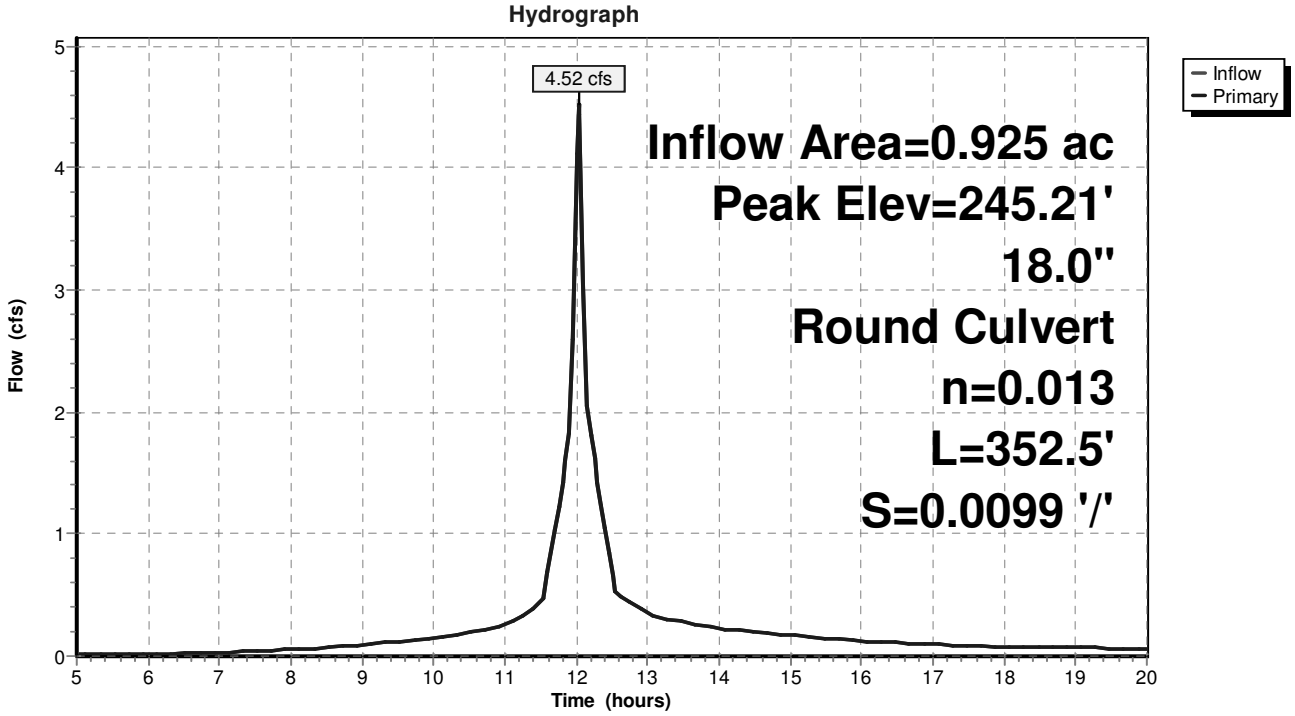
Inflow Area =	0.925 ac, 43.35% Impervious, Inflow Depth > 3.76" for 25 YR event				
Inflow =	4.52 cfs @	12.03 hrs, Volume=	0.290 af		
Outflow =	4.52 cfs @	12.03 hrs, Volume=	0.290 af, Atten= 0%, Lag= 0.0 min		
Primary =	4.52 cfs @	12.03 hrs, Volume=	0.290 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 245.21' @ 12.03 hrs
Flood Elev= 249.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	244.00'	**18.0" Round Culvert** L= 352.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 244.00' / 240.50' S= 0.0099 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=4.34 cfs @ 12.03 hrs HW=245.18' (Free Discharge)
└**1=Culvert** (Inlet Controls 4.34 cfs @ 2.92 fps)

Pond 15CB: CB R6



Summary for Pond 16CB: CB R7

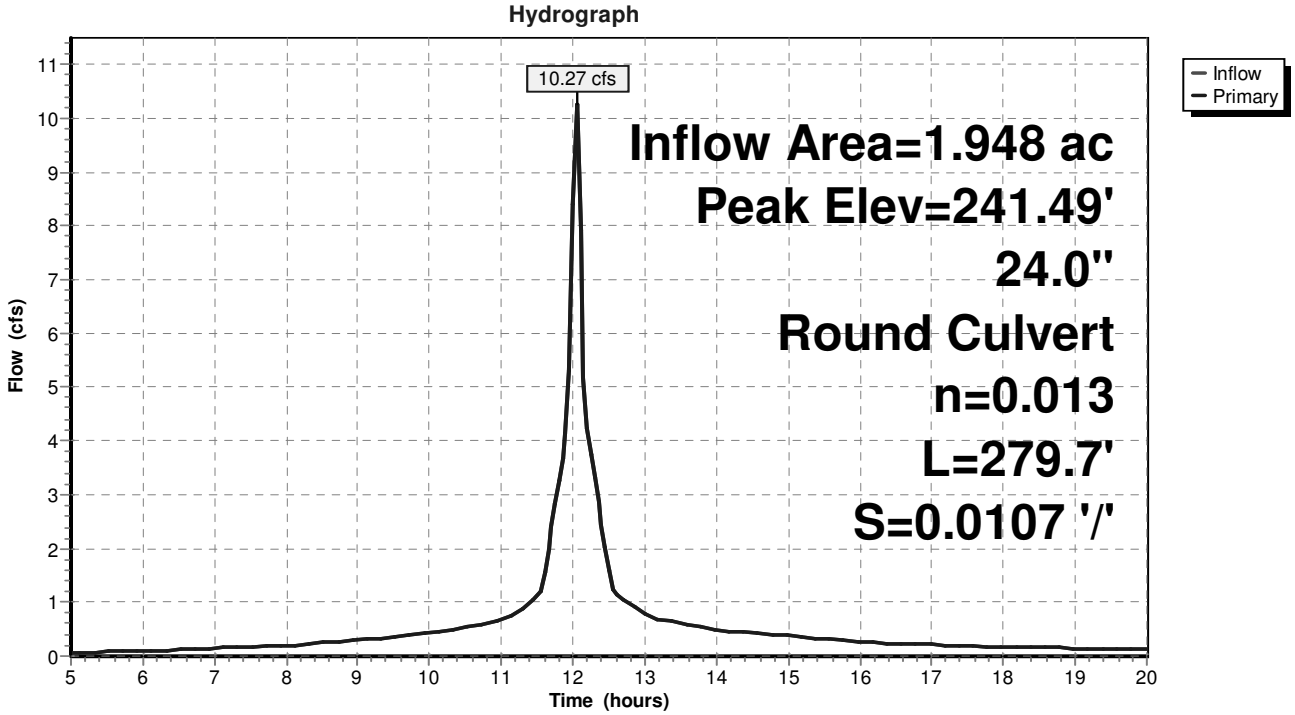
Inflow Area =	1.948 ac, 84.49% Impervious, Inflow Depth > 4.30" for 25 YR event				
Inflow =	10.27 cfs @	12.05 hrs,	Volume=	0.697 af	
Outflow =	10.27 cfs @	12.05 hrs,	Volume=	0.697 af,	Atten= 0%, Lag= 0.0 min
Primary =	10.27 cfs @	12.05 hrs,	Volume=	0.697 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 241.49' @ 12.05 hrs
Flood Elev= 245.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.75'	**24.0" Round Culvert** L= 279.7' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.75' / 236.75' S= 0.0107 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=10.16 cfs @ 12.05 hrs HW=241.47' (Free Discharge)
└**1=Culvert** (Inlet Controls 10.16 cfs @ 3.53 fps)

Pond 16CB: CB R7



Summary for Pond 17CB: CB R24

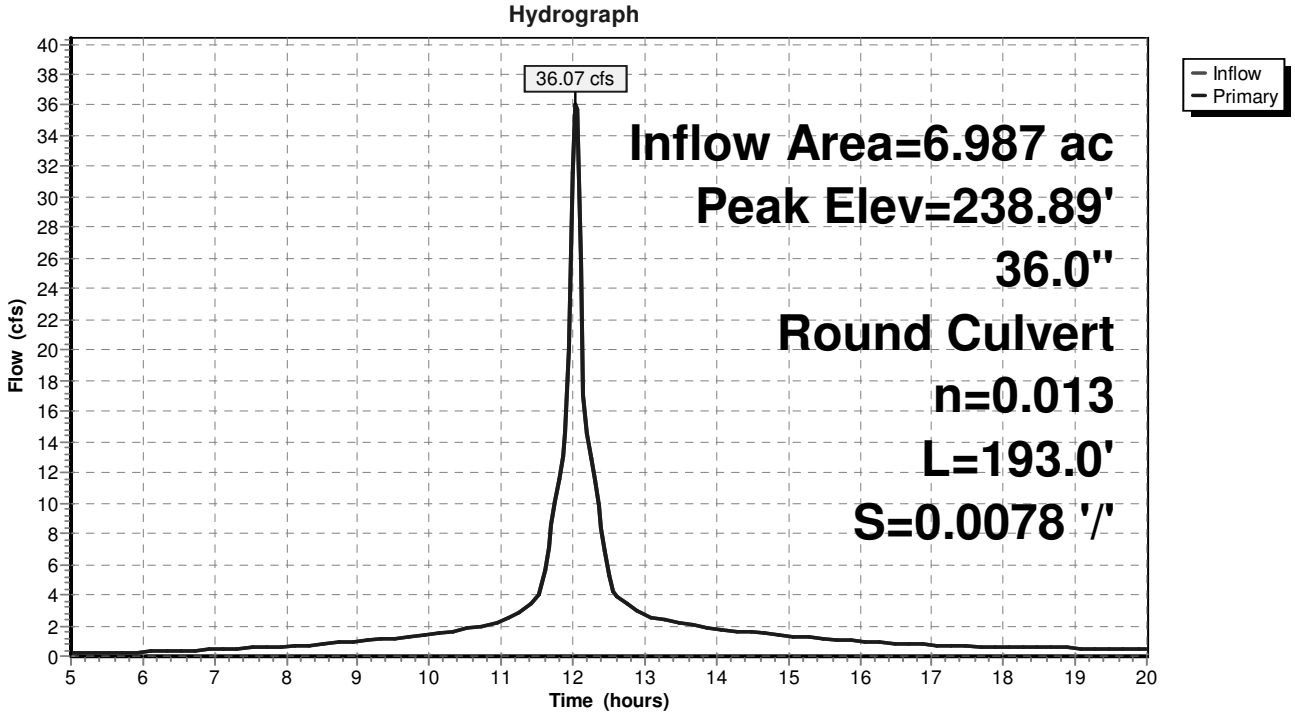
Inflow Area =	6.987 ac, 74.61% Impervious, Inflow Depth > 4.14" for 25 YR event				
Inflow =	36.07 cfs @	12.04 hrs,	Volume=	2.413 af	
Outflow =	36.07 cfs @	12.04 hrs,	Volume=	2.413 af,	Atten= 0%, Lag= 0.0 min
Primary =	36.07 cfs @	12.04 hrs,	Volume=	2.413 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 238.89' @ 12.04 hrs
Flood Elev= 247.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.60'	**36.0" Round Culvert** L= 193.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 235.60' / 234.10' S= 0.0078 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=34.90 cfs @ 12.04 hrs HW=238.79' (Free Discharge)
└**1=Culvert** (Inlet Controls 34.90 cfs @ 4.94 fps)

Pond 17CB: CB R24



Summary for Pond 18CB: CB R24

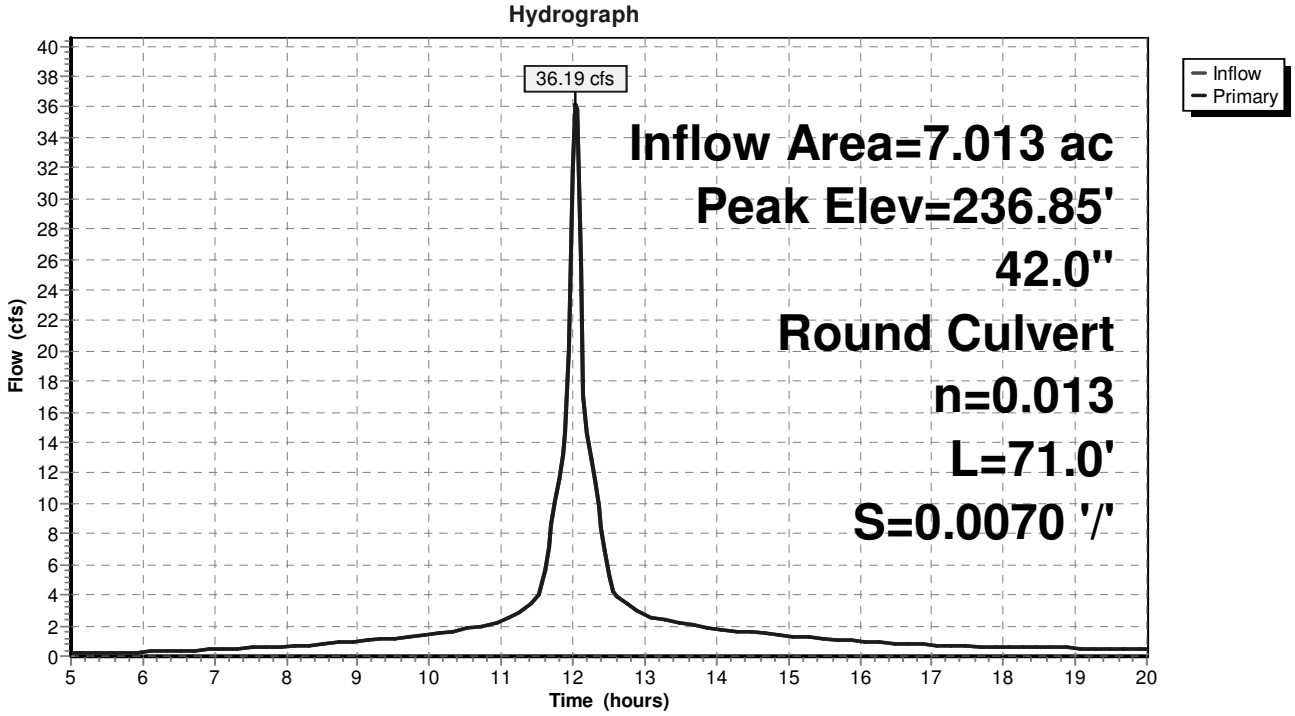
Inflow Area =	7.013 ac, 74.55% Impervious, Inflow Depth > 4.14" for 25 YR event				
Inflow =	36.19 cfs @ 12.04 hrs, Volume=	2.421 af			
Outflow =	36.19 cfs @ 12.04 hrs, Volume=	2.421 af, Atten= 0%, Lag= 0.0 min			
Primary =	36.19 cfs @ 12.04 hrs, Volume=	2.421 af			

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 236.85' @ 12.04 hrs
Flood Elev= 249.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.00'	**42.0" Round Culvert** L= 71.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 234.00' / 233.50' S= 0.0070 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=34.99 cfs @ 12.04 hrs HW=236.79' (Free Discharge)
└**1=Culvert** (Barrel Controls 34.99 cfs @ 5.83 fps)

Pond 18CB: CB R24



Summary for Pond 19CB: CB R20

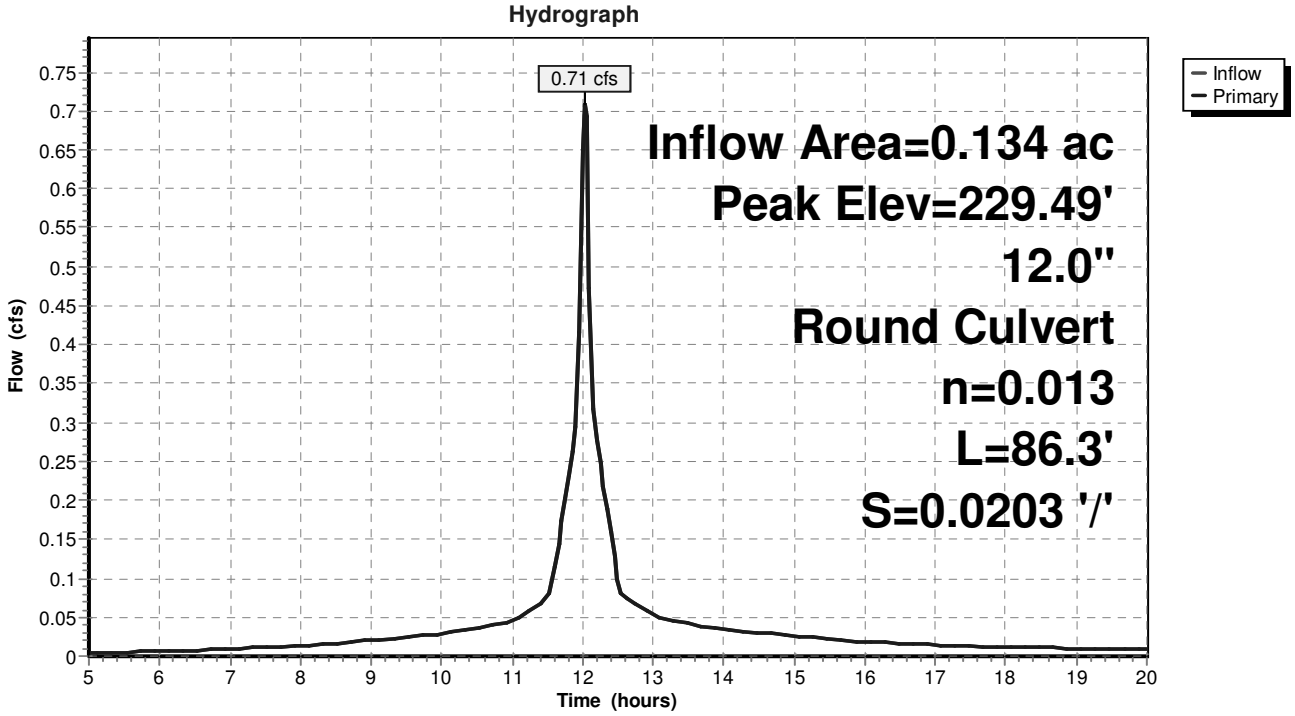
Inflow Area =	0.134 ac, 88.77% Impervious, Inflow Depth > 4.26" for 25 YR event				
Inflow =	0.71 cfs @	12.03 hrs,	Volume=	0.048 af	
Outflow =	0.71 cfs @	12.03 hrs,	Volume=	0.048 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.71 cfs @	12.03 hrs,	Volume=	0.048 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 229.49' @ 12.03 hrs
Flood Elev= 234.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.00'	**12.0" Round Culvert** L= 86.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 229.00' / 227.25' S= 0.0203 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.68 cfs @ 12.03 hrs HW=229.47' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.68 cfs @ 1.85 fps)

Pond 19CB: CB R20



Summary for Pond 20CB: CB R13

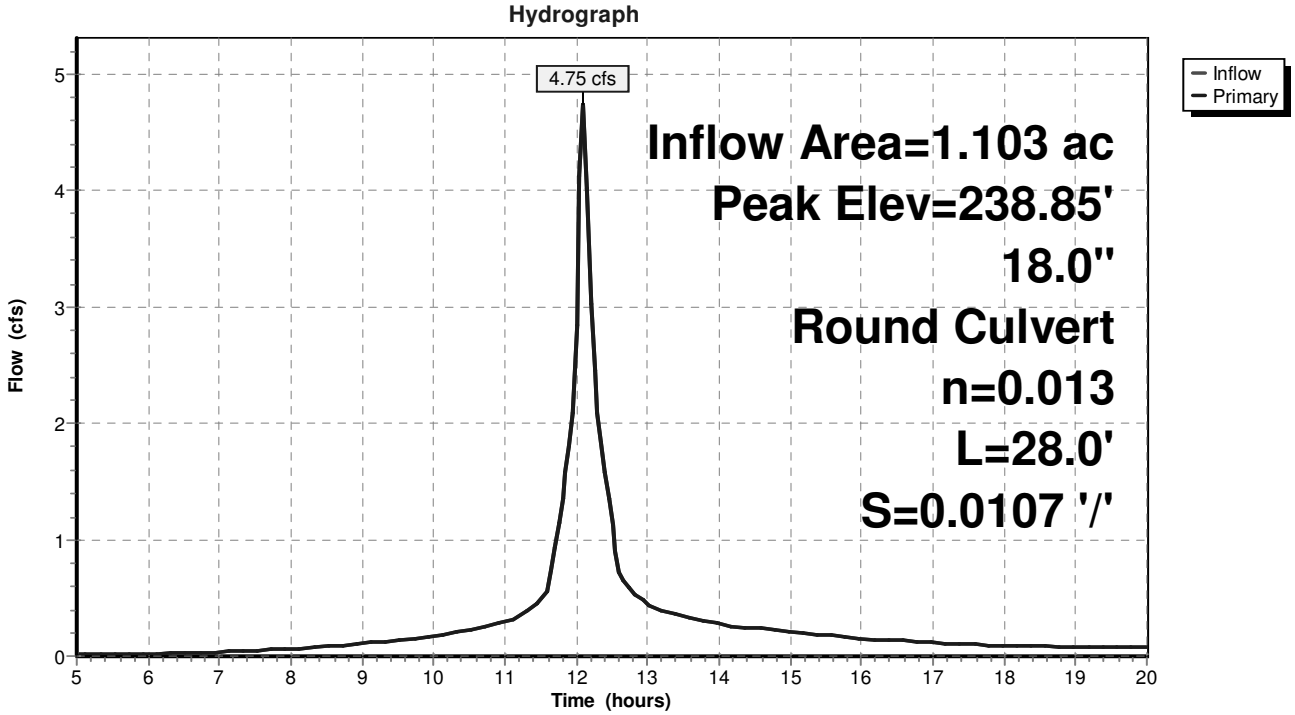
Inflow Area =	1.103 ac, 51.29% Impervious, Inflow Depth > 3.75" for 25 YR event				
Inflow =	4.75 cfs @	12.10 hrs,	Volume=	0.345 af	
Outflow =	4.75 cfs @	12.10 hrs,	Volume=	0.345 af,	Atten= 0%, Lag= 0.0 min
Primary =	4.75 cfs @	12.10 hrs,	Volume=	0.345 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 238.85' @ 12.10 hrs
Flood Elev= 243.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	237.60'	**18.0" Round Culvert** L= 28.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.60' / 237.30' S= 0.0107 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=4.72 cfs @ 12.10 hrs HW=238.85' (Free Discharge)
└**1=Culvert** (Inlet Controls 4.72 cfs @ 3.00 fps)

Pond 20CB: CB R13



Summary for Pond 21CB: CB 21

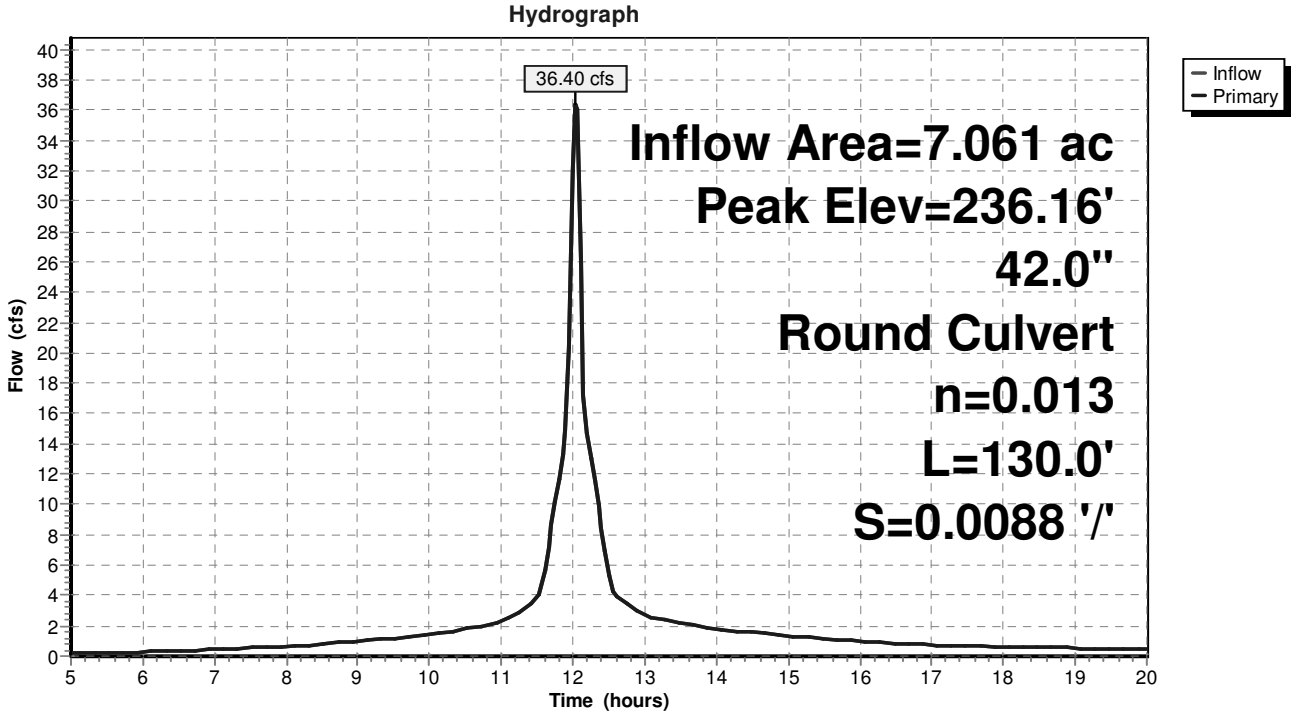
Inflow Area = 7.061 ac, 74.45% Impervious, Inflow Depth > 4.14" for 25 YR event
Inflow = 36.40 cfs @ 12.04 hrs, Volume= 2.436 af
Outflow = 36.40 cfs @ 12.04 hrs, Volume= 2.436 af, Atten= 0%, Lag= 0.0 min
Primary = 36.40 cfs @ 12.04 hrs, Volume= 2.436 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 236.16' @ 12.04 hrs
Flood Elev= 248.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	233.40'	**42.0" Round Culvert** L= 130.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 233.40' / 232.25' S= 0.0088 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=35.21 cfs @ 12.04 hrs HW=236.10' (Free Discharge)
└**1=Culvert** (Inlet Controls 35.21 cfs @ 4.42 fps)

Pond 21CB: CB 21



3752.00
MEARNG PN 230113
Joint Forces Headquarters
Augusta, Kennebec County, Maine

Exhibit#9 – Traffic Analysis and Parking Requirements

Parking and Loading Requirements Narrative
MDOT Traffic Permit Applications

Prepared For: Maine Army National Guard
Attn: Normand Michaud
Bldg #8, Camp Keyes
Augusta, Maine 04333

Prepared By: WBRC Architects-Engineers
44 Central Street
Bangor, Maine 04401
(207) 947-4511
(207) 947-4628
www.wbrcae.com

WBRC ARCHITECTS • ENGINEERS
BANGOR PORTLAND SARASOTA
www.wbrcae.com

Parking Requirements

5.1.14.2 Off-Street parking

(a) Parking stalls.

Parking	*Application*	*Stall Width*	*Stall Depth*	*Aisle Width*
90 degree	Standard	9 feet	18 feet	26 feet

All parking on the site is 90 degree parking. The parking stalls are 9 feet x 18 feet. In order to keep wetland impact less than one acre and reduce total impervious area, we are providing 24 foot aisle widths. The 24 foot aisle widths are ideal for this project due its high requirement of parking for both personal vehicles and military vehicles. Lionel Cayer, the City Engineer, indicated in a phone call that the 24 foot aisle widths would be acceptable under these circumstances.

(b) Schedule of required off-street parking.

Tabled 5.1.1.14-A Schedule of Required Off-Street Parking

Land Use	*Unit of Measure*	*Standard- # spaces*
Government Services:		
Administration	GFA	3.0/GFA

The GFA of the building is 100,791 sq. ft. which requires the site to have 303 parking spaces. The site has 287 parking spaces. This reduction is being requested per Section 5.1.14.2.e.i. Under 5.1.14.2 (1-b) the land use ordinance requires 4% of parking to be ADA accessible if over 25 total spaces. In order to keep wetland impact as low as possible we have included eight (8) ADA accessible parking spaces. This meets the requirement set forth in *ADA Standards for Accessible Design 4.1.2 (5).* The site also has a 63,000 sq. ft. of fenced off military vehicle parking area.

(c) Off-street loading.

All off street loading was designed based on dimensional guidelines in the City of Augusta Technical Standards Handbook.

See sheet series CP### - Site Layout Plans for location of parking and loading areas.

Maine Traffic Resources
25 Vine Street Gardiner, ME 04345
(207) 582-5252 FAX (207) 582-1677
mainetrafficresources.com

LETTER OF TRANSMITTAL

Date: *4/12/13* Project: *Augusta – MEANG JFHQ*

Attention: *Mr. A. Ray Bolduc, P.E.*

RE: *Traffic Movement Permit Application*

RECEIVED
APR 15 2013
WBRC Architects/Engineers
PROJ#
FILE FOLDER#
CC:

WE ARE SENDING YOU ☐ Attached ☑ Enclosed

NUMBER	DESCRIPTION
1	*Bound Copy of Traffic Permit Application*

THESE ARE TRANSMITTED AS CHECKED BELOW:

☐ For review and approval ☐ For your information ☐ As requested
☐ For review and comment ☑ Other FOR YOUR RECORDS

REMARKS

Hi Ray,

Enclosed you will find one bound copy of Sections 1 – 6 of the Traffic Movement Permit application (without plans) for the Joint Forces Headquarters project in Augusta. I have also sent one bound copy (with plans) directly to Normand Bouchard for his records. A copy was also sent directly to Lionel Cayer at the city.

I will let you know as soon as I hear back from MaineDOT regarding the scheduling of the Scoping Meeting. Please do not hesitate to call me if you have any questions or need anything else.

COPY TO: File SIGNED: Diane Morabito

Diane W. Morabito, P.E. PTOE

Maine Traffic Resources
25 Vine Street Gardiner, ME 04345
(207) 582-5252 FAX (207) 582-1677
mainetrafficresources.com

April 12, 2013

Mr. David Allen, P.E.
Mid-Coast Region 2 Traffic Engineer
Maine Department of Transportation
45 Commerce Drive
98 State House Station
Augusta, ME 04333-0098

RE: Traffic Movement Permit Application for Proposed Joint Forces Headquarters Facility in Augusta

Dear David,

Enclosed you will find three copies of Sections 1- 6 of the Traffic Movement Permit application for the proposed Maine Army National Guard Joint Forces Headquarters facility in Augusta. I have also forwarded a copy directly to Lionel Cayer, City Engineer, in Augusta. Lastly, a check for the initial $ 500 application fee is enclosed.

I look forward to your scheduling of the Scoping Meeting. As always, please do not hesitate to contact me if you have any questions or need any additional information regarding this application.

Sincerely,

Diane W. Morabito

Diane W. Morabito, P.E. PTOE
President

cc: A. Ray Bolduc, WBRC
Normand Michaud, MEARNG

Maine Traffic Resources
25 Vine Street Gardiner, ME 04345
(207) 582-5252 FAX (207) 582-1677
mainetrafficresources.com

April 12, 2013

Mr. Lionel Cayer, P.E.
Director of Engineering
City Center Plaza
16 Cony Street
Augusta, ME 04330

RE: Sections 1-6 – Traffic Permit Application for Proposed Joint Forces Headquarters facility on Civic Center Drive

Dear Lionel:

Enclosed you will find a copy of Sections 1- 6 of the Traffic Movement Permit application for the Maine Army National Guard Joint Forces Headquarters facility, which is being submitted to the Maine Department of Transportation to request a Scoping Meeting. As you know, it is required that a copy of the application and all supporting materials be filed at the municipal office so that members of the public can review the application. As always, please don't hesitate to contact me if you have any questions regarding this application or the traffic permitting process.

Sincerely,

Diane W. Morabito

Diane W. Morabito, P.E. PTOE
President

cc: A. Ray Bolduc, WBRC
Normand Michaud, MEARNG

PROPOSED JOINT FORCES HEADQUARTERS
AUGUSTA, MAINE

TRAFFIC MOVEMENT PERMIT APPLICATION
SECTIONS 1 – 6

Submitted to:

MAINE DEPARTMENT OF TRANSPORTATION

April 2013

Applicant:

Maine Army National Guard
Building # 8, Camp Keyes
33 State House Station
Augusta, ME 04333-0033

Prepared by:

Maine Traffic Resources

25 Vine Street Gardiner, ME 04345
(207) 582-5252 FAX (207) 582-1677
mainetrafficresources.com

Department of Transportation
Traffic Engineering Division
16 State House Station
Augusta, Maine 04333
Telephone: 207-287-3775

FOR MDOT USE 1/2001
ID #:

Total Fees:
Date: Received

****

PERMIT APPLICATION – TRAFFIC
TRAFFIC MOVEMENT PERMIT, 23 M.R.S.A.§ 704 -A

Please type or print:
This application is for (check all that applies): Traffic 100-200 PCE's _____
Traffic 200+ PCE's ___X___

Name of Applicant: Maine Army National Guard Attn: Normand Michaud

Address: Building # 8, Camp Keyes, 33 State House Station , Augusta, ME 04333-0033
Telephone: (207) 626-7887

Name of local contact or agent: Diane W. Morabito, P.E. PTOE Maine Traffic Resources

Address: 25 Vine Street, Gardiner, ME 04345 Telephone: (207) 582-5252

Name and type of development: New Joint Forces Headquarters Facility for Maine National Guard

Location of development: Easterly side of Civic Center Drive, just north of Darin Drive

City/Town/Plantation: Augusta County: Kennebec Tax Map # 5 Lot # 13

Do you want a consolidated review with DEP pursuant to 23 M.R.S.A.§ 704-A (7)?
Yes_____ No_X_

Was this development started prior to obtaining traffic permit? No

Is the project located in an area designated as a growth area (as defined in M.R.S.A. title 30-A, chapter 187)?
Yes ____ No ____

Is project located within a compact area of an urban compact municipality? Yes _X_ No ____

Is this development or any portion of the site currently subject to state or municipal enforcement action?

_____

Existing DEP or MDOT permit number (if applicable): N/A

Name(s) of DOT staff person(s) contacted concerning this application: Stephen Landry, David Allen

Name(s) of DOT staff person(s) present at the scoping meeting for 200+ applications: _____

_____

1/2000

CERTIFICATION

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

Signature: Diane W. Morabito Re/Cert/Lic No.: Maine PE # 5077
PTOE # 571

Name(print): Diane W. Morabito

Date: 4/12/13

If the signature below is not the applicant's signature, attach letter of agent authorization signed by applicant.

"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 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. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Ray Bolduc 4/3/13

Signature of Applicant AGENT (RAY BOLDUC) Date

FORM C 7/97

STATE OF MAINE
DIANE W. MORABITO
No. 5077
LICENSED
PROFESSIONAL ENGINEER

DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT
JOINT FORCE HEADQUARTERS, MAINE NATIONAL GUARD
33 STATE HOUSE STATION
AUGUSTA, ME 04333-0033

March 29, 2013

To David Allen:
16 State House Station
Augusta, ME 04333-0016

The Department of Defense, Veterans and Emergency Management has retained WBRC Architects/Engineers to prepare requisite local, state, and federal permit applications for the proposed construction of a Joint Force Headquarters and related site improvements on a parcel of land off Civic Center Drive in Augusta, Maine.

WBRC Architects/Engineers and other sub-consultants are authorized to act on the behalf of the Department of Defense, Veterans and Emergency Management in matters related to these permits. Please contact the undersigned @ (207) 626-7887 should you have any questions.

Sincerely,

Normand G. Michaud,
LTC, EN MEARNG
Department of Defense, Veterans and Emergency Management

Maine
Traffic
Resources

25 Vine Street Gardiner, ME 04345
(207) 582-5252 FAX (207) 582-1677
mainetrafficresources.com

NOTICE OF INTENT TO FILE

Please take notice that the Maine Army National Guard, Building # 8, Camp Keyes, 33 State House Station, Augusta, ME 04333-0033 telephone (207) 626-7887 is intending to file a Traffic Movement Permit application with the Maine Department of Transportation pursuant to the provisions of 23 M.R.S.A. § 704-A on or about April 15, 2013.

The application is for a Joint Force Headquarters facility. The facility is to be located on the easterl side of Civic Center Drive, north of Darin Drive, in Augusta. Construction is expected to begin in 2015 with occupancy planned for 2017. The project is expected to generate approximately 208 one-way trips during the weekday AM peak hour and 200 trips during the PM peak hour period.

A request for a public hearing 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. Public comment on the application will be accepted throughout the processing of the application.

The application will be filed for public inspection at the Maine Department of Transportation Mid-Coast Region 2 Office, 45 Commerce Drive, Augusta, ME 04333-0098 during normal working hours. A copy of the application may also be seen at the municipal offices at 16 Cony Street in Augusta, Maine.

Written public comments may be sent to the Department of Transportation, Traffic Engineering Division, 16 State House Station, Augusta, Maine 04333.

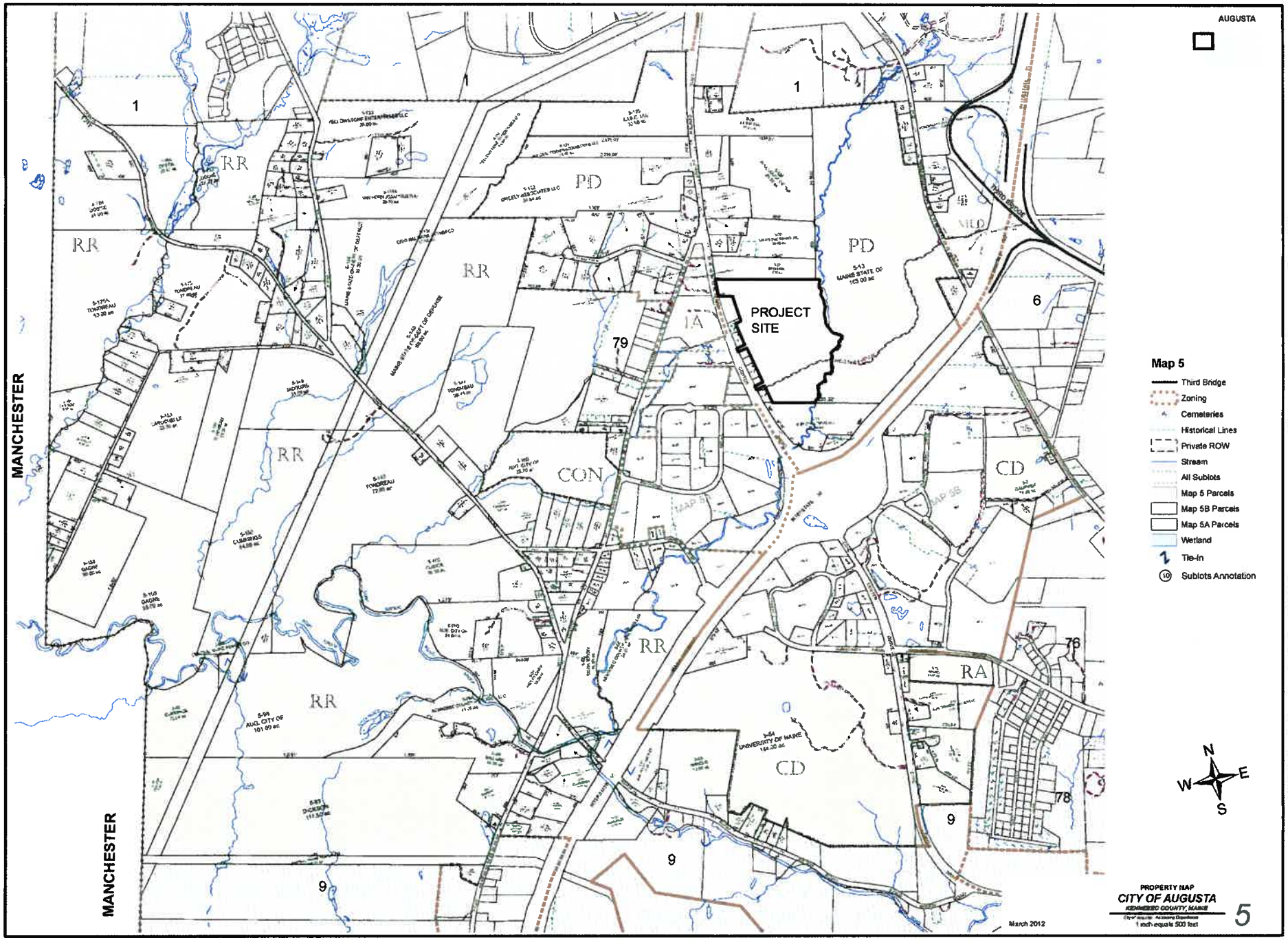
Diane W. Morabito

Diane W. Morabito, P.E. PTOE

Abutter List

Map	Lot	Address	Name	Mailing Address (If Different)
5	18	314 OLD BELGRADE ROAD	WELLS LESTER E & BETTIE J	
5	17	306 OLD BELGRADE ROAD	CHAREST M DAWN	
5	16	300 OLD BELGRADE ROAD	MACKINNON CAROL ANN	325 MAIN ST APT 2, YARMOUTH, ME 04096
5	14	292 OLD BELGRADE ROAD	BROCHU IDA M	
5	22	287 OLD BELGRADE ROAD	LAJOIE KENNETH O & LOIS A	
5	23	275 OLD BELGRADE ROAD	SMITH ANDREW T	26 EASTERN AVE, AUGUSTA, ME 04330
5	26A	269 OLD BELGRADE ROAD	DUGAL MELISSA F	
5	26	261 OLD BELGRADE ROAD	FLEWELLING JEFFREY L & NANCY E	
5	27A	249 OLD BELGRADE ROAD	SMITH ANDREW	26 EASTERN AVE, AUGUSTA, ME 04330
5	27	231 OLD BELGRADE ROAD	MAINE GREYHOUND PLACEMENT SERVICE	
5	28	221 OLD BELGRADE ROAD	BONENFANT BERNADETTE T	
5	12	220 OLD BELGRADE ROAD	JACQUES RAYMOND J & LUCIENNE	
5	38	281 CIVIC CENTER DRIVE	MARLIN CAPITAL CORP ATTN: Martin Noli	306 GAY ST STE 210, NASHVILLE, TN 37201
5	38	281 CIVIC CENTER DRIVE	GIRI CIVIC DRIVE LLC C/O COMFORT INN	
5	37	369 CIVIC CENTER DRIVE	BABCOCK RUTH E	
5	36	375 CIVIC CENTER DRIVE	YAYA'S BACKYARD INC C/O LAURA GABRIEL	8 BRENTWOOD RD, AUGUSTA, ME 04330
5	32A	397 CIVIC CENTER DRIVE	ELKS-AUGUSTA LODGE OF THE	
5	29	443 CIVIC CENTER DRIVE	J.J.S.C. LLC	14 BURDOCK LN, AUGUSTA, ME 04330
5B	12	80 STEPHEN KING DRIVE	INTERSTATE AUGUSTA PROPERTIES LLC C/O SR WEINER & ASSOCIATES	1330 BOYLSTON ST-SUITE 212, CHESTNUT HILL, MA 02467
79	1	347 CIVIC CENTER DRIVE	GABOURY CLEMENTE L & DOSTIE SUSAN TRUSTEES	
79	2	339 CIVIC CENTER DRIVE	BOLDUC LUKE M	3 QUARRY LANE, HALLOWELL, ME 04347-9704
79	4	333 CIVIC CENTER DRIVE	DOYON FERNANDE HEIRS C/O DIANE LYNN GAGNE	227 PHILBRICK RD, SIDNEY, ME 04330
79	5	CIVIC CENTER DRIVE	POULIN GEORGE E & THERESA	37 BOOTHBY ST, AUGUSTA, ME 04330
79	5A	317 CIVIC CENTER DRIVE	VEILLEUX MARCEL E & THOMPSON NANCY D	
79	6	315 CIVIC CENTER DRIVE	DUPLESSIS GERALD R	
79	8	309 CIVIC CENTER DRIVE	VANDER PUTTEN CARL J	67 SHAKER RD #8, GRAY, ME 04039-9640
79	11	11 DARIN DRIVE	GGG ASSOCIATES LIM. PARTNERSHIP C/O FRED T LLC	PO BOX 500, NEW GLOUCESTER, ME 04260
79	13	308 CIVIC CENTER DRIVE	SS REALTY LLC ATTN: SIDNEY SPIEGEL	132 SHEPPARD AVE WEST STE 100, NORTH YORK, ON M2N 1M5
79	13A	314 CIVIC CENTER DRIVE	KENNEBEC SAVINGS BANK	PO BOX 50, AUGUSTA, ME 04332-0050
79	14	330 CIVIC CENTER DRIVE	HARPER'S NORTH LLC	134 MAIN ST SUITE 2A , WINTHROP, ME 04364-1442
79	16	352 CIVIC CENTER DRIVE	POMERLEAU FRANK X TRUSTEE HEIRS	PO BOX 2068, AUGUSTA, ME 04338-2068
79	17	360 CIVIC CENTER DRIVE	ALLEN NORMAN L	PO BOX 19, AUGUSTA, ME 04332-0019

79	18	661 LEIGHTON ROAD	ALLEN NORMAN L	PO BOX 19, AUGUSTA, ME 04332-0019
1	1D	38 HENRYS WAY	MORIN ROGER & LINDA	[redacted]
1	1C	35 HENRYS WAY	ALBERT JAMES H & JUNE B	1710 FREDRICKSBURG AVE, LAKELAND, FL 33803
1	1	336 OLD BELGRADE ROAD	MAINE STATE OF DEPARTMENT OF TRANSPORTATION	16 STATE HOUSE STATION, AUGUSTA, ME 04333-0016


AUGUSTA
MANCHESTER
MANCHESTER
PROJECT SITE
RR
PD
CON
IA
CD
RA
MLD
1
6
9
76
78
79
Map 5
Third Bridge
Zoning
Cemeteries
Historical Lines
Private ROW
Stream
All Sublots
Map 5 Parcels
Map 5B Parcels
Map 5A Parcels
Wetland
Tie-In
Sublots Annotation
N
E
S
W
March 2012
PROPERTY MAP
CITY OF AUGUSTA
KENNEBEC COUNTY, MAINE
1 inch equals 500 feet
5

INTRODUCTION

The purpose of this application is to summarize the information required by the Maine Department of Transportation (MaineDOT) in a Traffic Movement Permit application to request a Scoping Meeting for the proposed Joint Force Headquarters on Civic Center Drive in Augusta, Maine. This facility is expected to function as a corporate headquarters office building for the Maine Army National Guard. Since the project is expected to generate in excess of 100 new peak hour trips a Traffic Movement Permit (TMP) will be required from MaineDOT.

SITE DESCRIPTION - SECTION 1A

The proposed site is located on the easterly side of Civic Center Drive, north of Darin Drive in Augusta, Maine. The overall site is approximately 43.4 acres in size with varied terrain and wetlands at the rear of the parcel.

EXISTING AND PROPOSED USES - SECTION 1B

The site being developed for the new headquarters facility is currently vacant. The proposed building will be two stories in height, with an initial total square footage (S.F.) of 99,883. The initial building is expected to provide for 181 occupants. A Phase II expansion will increase the building size by 9,238 S.F., providing for 42 additional occupants. Lastly, a potential future addition of 24,970 S.F. with an estimated occupant increase of 62 would bring the total facility to 134,091 S.F. with 268 occupants at full-build.

SITE VICINITY - SECTION 1C

The site location and vicinity are shown on the map in Figure 1.

OTHER DEVELOPMENT - SECTION 1D

The City of Augusta Planning Department was contacted to determine if there are any other proposed or approved developments that are expected to significantly impact study area traffic volumes. Three other development projects were identified that are expected to impact Civic Center Drive volumes. The first is the new MaineGeneral hospital, which is under construction on Old Belgrade Road. The second is a new office building being constructed at the Commerce Center off Belgrade Road. The trips for MaineGeneral were obtained from the traffic impact study prepared by Gorrill-Palmer Consulting Engineers, Inc. The trips for the Commerce Center building were estimated based upon information provide by Eaton Traffic Engineering and the City of Augusta using LUC 770 – Business Park. The third development project is a new Skowhegan Savings Bank branch, which is currently under

construction just north of Leighton Road. The trips to be generated by this branch bank were obtained from the traffic impact study prepared by Maine Traffic Resources. Lastly, the proposed changes in volumes due to the new Exit 113 interchange, which is currently under construction, need to be considered. These trips were also obtained from the traffic study prepared by Gorrill-Palmer for MaineGeneral. All of these other development trips are shown in Figure 2.

TRIP GENERATION - SECTION 1E

The number of trips to be generated by the joint forces headquarters facility was estimated using the Institute of Transportation Engineers (ITE) "Trip Generation, 7th Edition", the edition currently being used by the Maine Department of Transportation (MaineDOT) for traffic permitting purposes. The trips were estimated on the basis of both square footage and employees using land use code (LUC) 710 – General Office Building. The results are summarized for the initial construction (99,883 S.F. with 181 occupants) as well as for build conditions (134,091 S.F. with 268 occupants) in the following table:

	ITE Projected Trip Generation (one-way trip ends)			
	Initial Project		**Full-Build**	
Time Period	S.F.	Employees	S.F.	Employees
Weekday	1,100	600	1,476	890
AM Peak Hour	155	87	208	129
Entering	136	77	183	114
Exiting	19	10	25	15
PM Peak Hour	149	83	200	123
Entering	25	14	34	21
Exiting	124	69	166	102

As can be seen above, the ITE results based upon square footage yielded much greater trip estimates. Since these higher numbers, obtained based upon square footage, are close to what the Maine Army National Guard projects for peak hour trips they will be used as the basis of this application and for the ensuing traffic study. The initial headquarters facility is expected to generate 155 one-way trips during the weekday AM peak hour and 149 PM peak hour trips. At full-build out the facility will generate 208 AM peak hour trips and 200 PM peak hour trips.

The proposed project will require a Traffic Movement Permit (TMP) from the Maine Department of Transportation (MaineDOT) since trip generation will exceed the 100-trip permit threshold. Since new trip generation will exceed 200 trips a full traffic study will be required for the state traffic permitting process. Based upon information provided by the Guard, the headquarters facility will generate similar traffic volumes on weekdays and during weekend drills. Given this, it was determined in a preliminary meeting with MaineDOT that the analysis period would focus upon the weekday PM peak hour.

TRIP DISTRIBUTION AND ASSIGNMENT - SECTION 1F & G

The trip assignments were based upon the recorded traffic patterns in the area during turning movement counts. Turning movement counts were conducted at the following intersections on the noted dates:

Civic Center Drive Intersection	Date
Leighton Road	Tuesday, June 5, 2012
Darrin Drive and Cemetery Entrance	Wednesday, June 20, 2012
I-95 Northbound Ramps	Tuesday, June 12, 2102
I-95 Southbound Ramps	Tuesday, June 19, 2012

The above counts were factored using Maine Department of Transportation (MaineDOT) group mean factors to reflect 30th highest hour volumes, the hourly volumes used for design and traffic analysis purposes. These 30th highest hour volumes generally occur during peak summer conditions, in late July/early August, in Maine. The resulting volumes, expected to be representative of peak summer 2012 conditions, are shown in Figure 3.

The trips were assigned to the study area based upon the traffic patterns recorded during the turning movement counts. These patterns are summarized below:

	PM Peak Hour
To and North on Civic Center Drive	20 %
To and From South on I-95	30 %
To and From North on I-95	20 %
To and From South on Civic Center Drive	25 %
To and From Southwest via Darin Drive	5 %

The resulting trip assignments are shown in Figure 4 for the PM peak hour analysis period for full-build conditions.

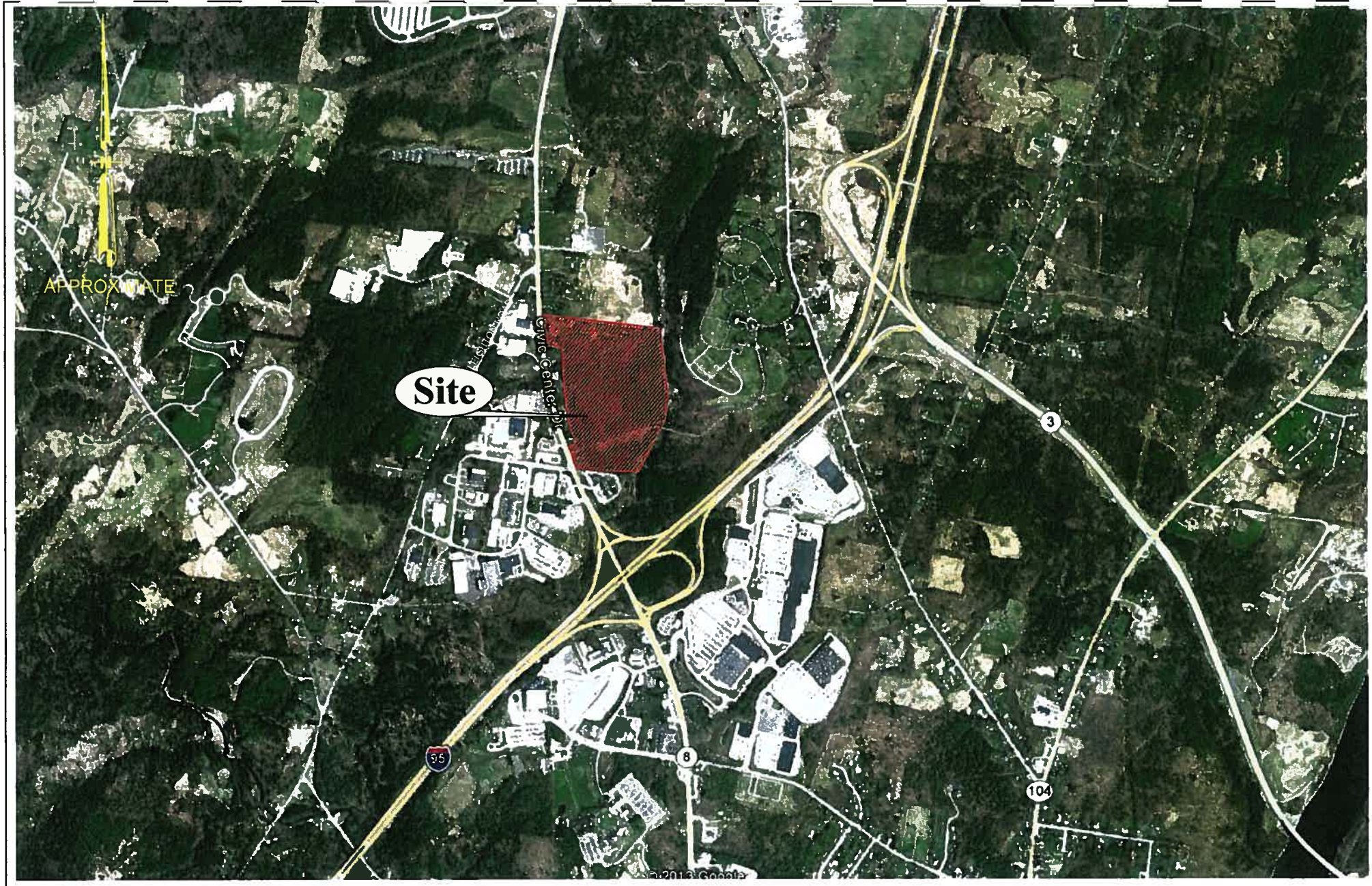


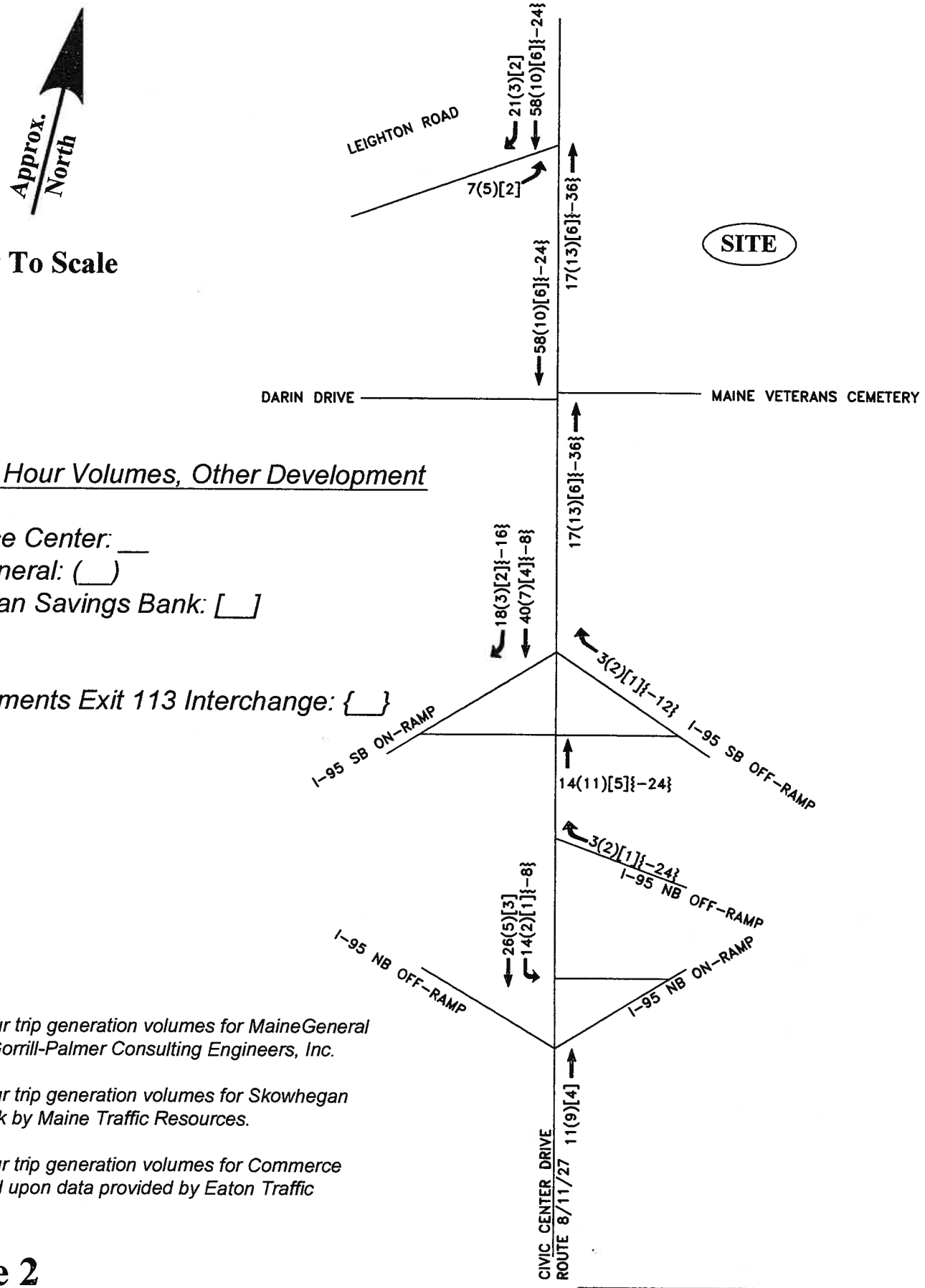
Figure 1

Site Location

Joint Forces Headquarters

Augusta, Maine

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677



PM Peak Hour Volumes, Other Development

Commerce Center: __
MaineGeneral: (__)
Skowhegan Savings Bank: [__]

Reassignments Exit 113 Interchange: {__}

PM peak hour trip generation volumes for MaineGeneral hospital by Gorrill-Palmer Consulting Engineers, Inc.

PM peak hour trip generation volumes for Skowhegan Savings Bank by Maine Traffic Resources.

PM peak hour trip generation volumes for Commerce Center based upon data provided by Eaton Traffic Engineering.

Figure 2

Other Development Volumes
Joint Forces Headquarters
Augusta, Maine

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677

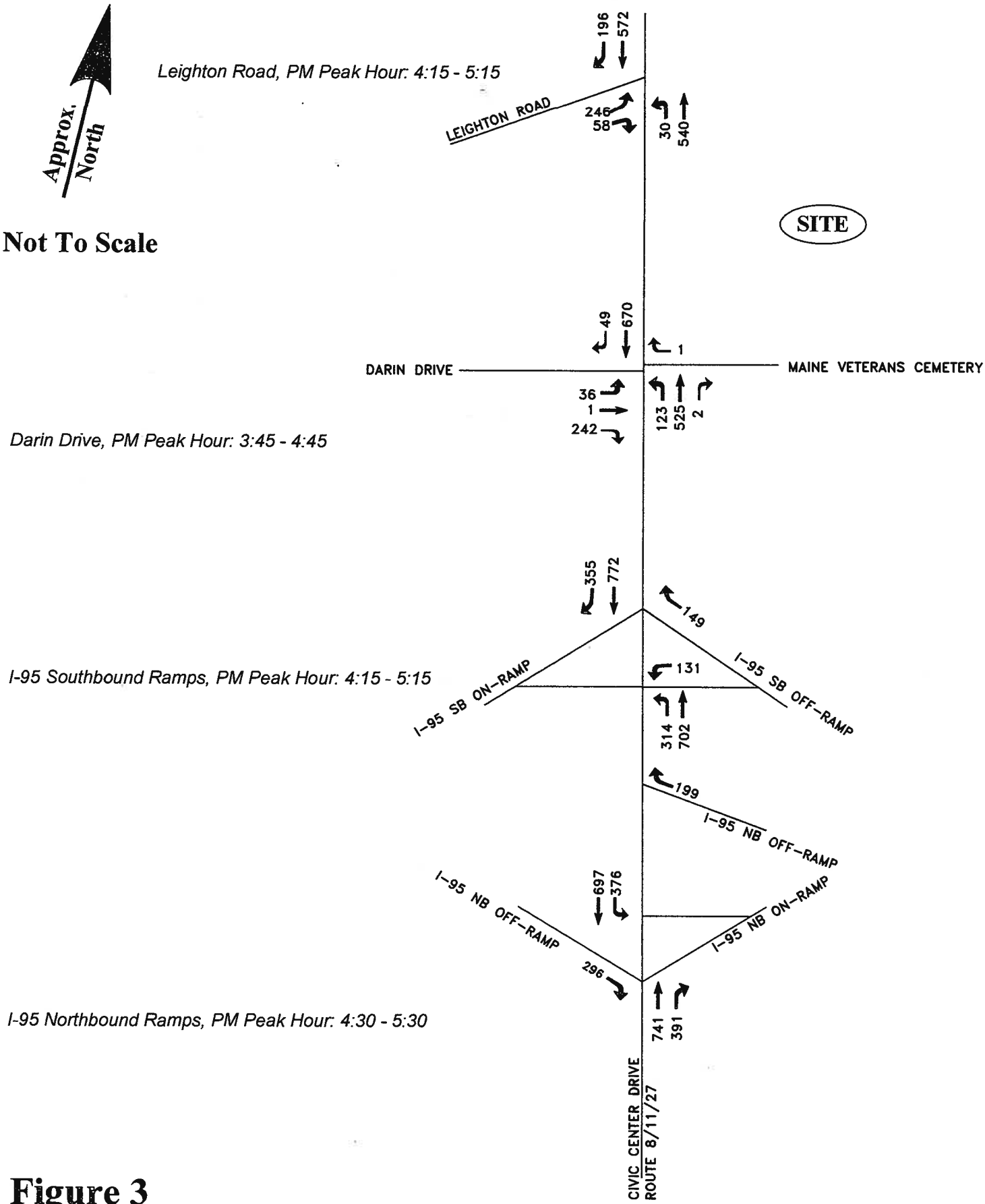


Figure 3

Joint Forces Headquarters
2012 PM Peak Hour
30th Highest Hour Volumes

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677

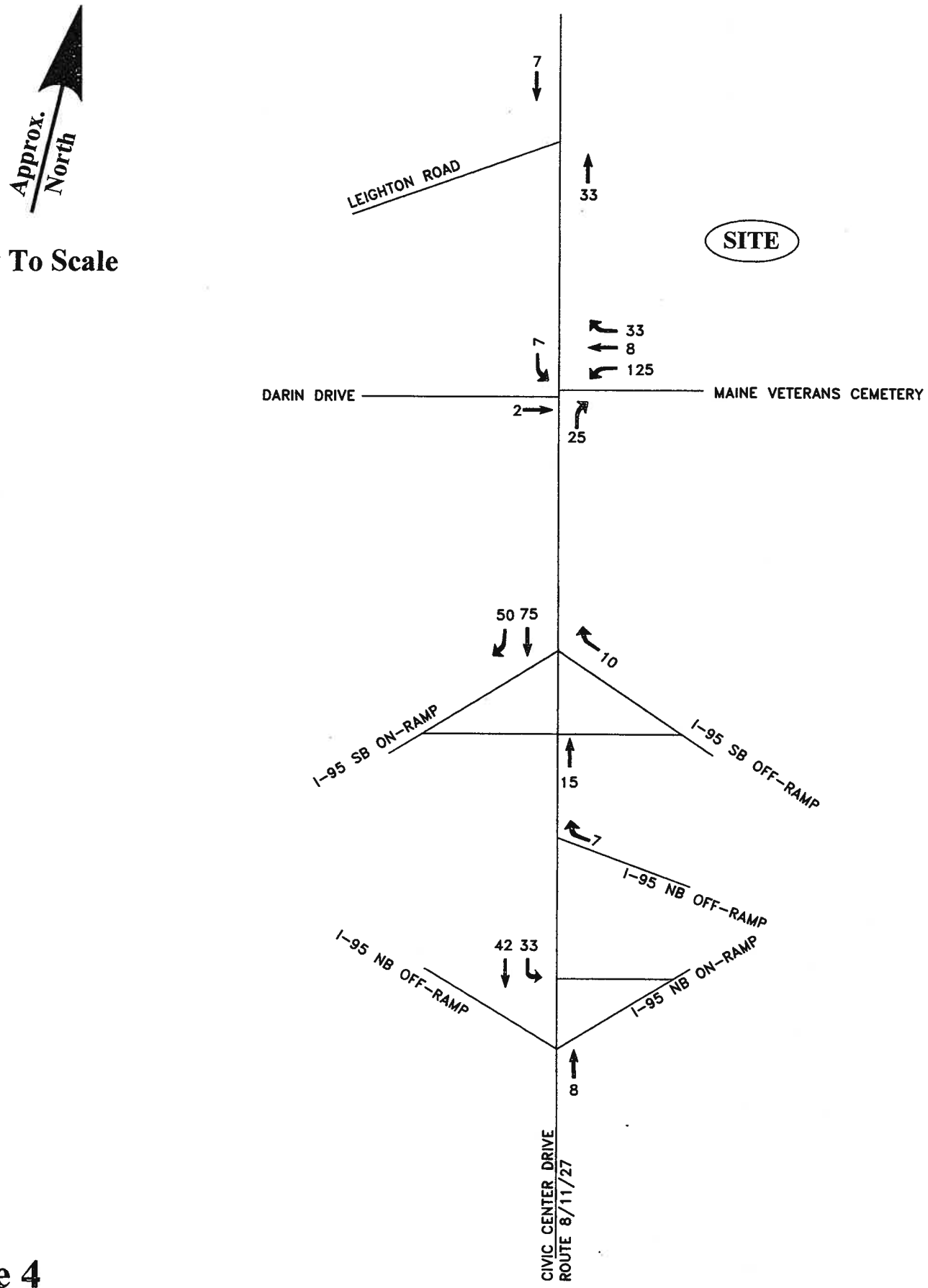


Figure 4

Joint Forces Headquarters
PM Peak Hour
Trip Assignments

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677

Maine Traffic Resources
25 Vine Street
Gardiner, ME 04345
mainetrafficresources.com

Civic Center Drive and 95 NB Ramps
Augusta
MRD/AC
Partly Cloudy

File Name : AugustaJFHQ95NBPMCombine
Site Code : 22222222
Start Date : 6/12/2012
Page No : 1

Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Civic Center Drive From North					95 NB Ramp to Civic Center Drive From East					Civic Center Drive From South					95 NB Ramp to Civic Center Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
03:00 PM	1	132	47	0	180	31	0	0	0	31	52	164	0	0	216	52	0	0	0	52	479
03:15 PM	0	121	48	0	169	39	0	0	0	39	67	168	0	2	237	46	0	0	1	47	492
03:30 PM	0	172	80	0	252	57	0	0	0	57	81	170	0	0	251	50	0	0	0	50	610
03:45 PM	0	143	52	0	195	49	0	0	0	49	91	149	0	1	241	63	0	0	4	67	552
Total	1	568	227	0	796	176	0	0	0	176	291	651	0	3	945	211	0	0	5	216	2133
04:00 PM	0	181	81	0	262	43	0	1	0	44	85	220	0	0	305	49	0	0	2	51	662
04:15 PM	0	130	66	0	196	45	0	0	0	45	77	189	0	0	266	60	0	0	0	60	567
04:30 PM	0	181	91	0	272	39	0	0	0	39	113	184	0	0	297	69	0	0	2	71	679
04:45 PM	0	156	73	0	229	45	0	0	0	45	69	160	0	0	229	59	0	0	0	59	562
Total	0	648	311	0	959	172	0	1	0	173	344	753	0	0	1097	237	0	0	4	241	2470
05:00 PM	0	207	96	0	303	44	0	0	0	44	80	184	0	0	264	69	0	0	0	69	680
05:15 PM	0	172	61	0	233	49	0	0	0	49	70	197	0	0	267	59	0	0	2	61	610
05:30 PM	0	159	52	0	211	55	0	0	0	55	83	142	0	0	225	57	0	0	0	57	548
05:45 PM	0	128	37	1	166	46	0	0	0	46	57	132	0	1	190	77	0	0	1	78	480
Total	0	666	246	1	913	194	0	0	0	194	290	655	0	1	946	262	0	0	3	265	2318
Grand Total	1	1882	784	1	2668	542	0	1	0	543	925	2059	0	4	2988	710	0	0	12	722	6921
Apprch %	0.0	70.5	29.4	0.0		99.8	0.0	0.2	0.0		31.0	68.9	0.0	0.1		98.3	0.0	0.0	1.7		
Total %	0.0	27.2	11.3	0.0	38.5	7.8	0.0	0.0	0.0	7.8	13.4	29.8	0.0	0.1	43.2	10.3	0.0	0.0	0.2	10.4	

	Civic Center Drive From North					95 NB Ramp to Civic Center Drive From East					Civic Center Drive From South					95 NB Ramp to Civic Center Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	04:30 PM																				
Volume	0	716	321	0	1037	177	0	0	0	177	332	725	0	0	1057	256	0	0	4	260	2531
Percent	0.0	69.0	31.0	0.0		100.0	0.0	0.0	0.0		31.4	68.6	0.0	0.0		98.5	0.0	0.0	1.5		
05:00 Volume	0	207	96	0	303	44	0	0	0	44	80	184	0	0	264	69	0	0	0	69	680
Peak Factor																					0.931
High Int.	05:00 PM					05:15 PM					04:30 PM					04:30 PM					
Volume	0	207	96	0	303	49	0	0	0	49	113	184	0	0	297	69	0	0	2	71	
Peak Factor					0.856					0.903					0.890					0.915	

740 370 204 383 750 295

Civic Center Drive: GLD I: $\frac{0.90}{0.87}$ = 1.034

I-95 Ramps: ATR = 1.153

Maine Traffic Resources
25 Vine Street
Gardiner, ME 04345
mainetrafficresources.com

Civic Center Drive and 95 SB Ramps
Augusta
MRD/AC
Clear

File Name : AugustaJFHQ95SBPMCombine
Site Code : 77777777
Start Date : 6/19/2012
Page No : 1

Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Civic Center Drive From North					95 SB Ramp to Civic Center Drive From East					Civic Center Drive From South					95 SB Ramp to Civic Center Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
03:00 PM	62	147	0	0	209	31	0	28	0	59	0	154	59	0	213	0	0	0	0	0	481
03:15 PM	63	152	0	0	215	29	0	25	0	54	0	136	46	0	182	0	0	0	1	1	452
03:30 PM	68	168	0	0	236	35	1	29	0	65	0	157	52	1	210	0	0	0	0	0	511
03:45 PM	84	166	0	1	251	45	0	14	0	59	0	142	52	0	194	0	0	0	0	0	504
Total	277	633	0	1	911	140	1	96	0	237	0	589	209	1	799	0	0	0	1	1	1948
04:00 PM	81	232	0	0	313	40	0	25	0	65	0	153	55	0	208	0	0	0	1	1	587
04:15 PM	75	164	0	2	241	31	0	31	0	62	0	154	50	0	204	0	0	0	0	0	507
04:30 PM	93	207	0	0	300	41	0	31	0	72	0	170	76	0	246	0	0	0	0	0	618
04:45 PM	61	149	0	1	211	30	0	32	0	62	0	149	66	1	216	0	0	0	1	1	490
Total	310	752	0	3	1065	142	0	119	0	261	0	626	247	1	874	0	0	0	2	2	2202
05:00 PM	79	227	0	1	307	27	0	20	0	47	0	206	80	0	286	0	0	0	0	0	640
05:15 PM	50	152	0	0	202	45	0	35	0	80	0	165	51	0	216	0	0	0	1	1	499
05:30 PM	40	148	0	0	188	23	0	31	0	54	0	146	42	0	188	0	0	0	0	0	430
05:45 PM	30	99	0	0	129	23	0	14	0	37	0	110	47	0	157	0	0	0	0	0	323
Total	199	626	0	1	826	118	0	100	0	218	0	627	220	0	847	0	0	0	1	1	1892
Grand Total	786	2011	0	5	2802	400	1	315	0	716	0	1842	676	2	2520	0	0	0	4	4	6042
Apprch %	28.1	71.8	0.0	0.2		55.9	0.1	44.0	0.0		0.0	73.1	26.8	0.1		0.0	0.0	0.0	100.0		
Total %	13.0	33.3	0.0	0.1	46.4	6.6	0.0	5.2	0.0	11.9	0.0	30.5	11.2	0.0	41.7	0.0	0.0	0.0	0.1	0.1	

	Civic Center Drive From North					95 SB Ramp to Civic Center Drive From East					Civic Center Drive From South					95 SB Ramp to Civic Center Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	04:15 PM																				
Volume	308	747	0	4	1059	129	0	114	0	243	0	679	272	1	952	0	0	0	1	1	2255
Percent	29.1	70.5	0.0	0.4		53.1	0.0	46.9	0.0		0.0	71.3	28.6	0.1		0.0	0.0	0.0	100.0		
05:00 Volume	79	227	0	1	307	27	0	20	0	47	0	206	80	0	286	0	0	0	0	0	640
Peak Factor																					0.881
High Int.	05:00 PM					04:30 PM					05:00 PM					04:45 PM					
Volume	79	227	0	1	307	41	0	31	0	72	0	206	80	0	286	0	0	0	1	1	
Peak Factor					0.862					0.844					0.832					0.250	

355
772

149 131

702
314

CIVIC CENTER DRIVE : GRP I $\frac{0.90}{0.87}$ 1.034

I-95 RAMPS - ATR = 1.153

Maine Traffic Resources
25 Vine Street
Gardiner, ME 04345
mainetrafficresources.com

ivic Center Drive and Darin Drive
ugusta
MRD
Clear

File Name : AugustaJFHQCivicCenDarinDrivePM
Site Code : 11111111
Start Date : 6/20/2012
Page No : 1

Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Civic Center Drive From North					Maine Veterans Memorial Cemetery From East					Civic Center Drive From South					Darin Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
03:00 PM	11	160	0	0	171	1	0	0	0	1	1	127	37	0	165	29	0	7	0	36	373
03:15 PM	8	187	0	0	195	0	0	0	0	0	1	116	42	0	159	55	0	6	0	61	415
03:30 PM	14	127	0	0	141	0	0	1	0	1	1	117	26	0	144	68	0	16	0	84	370
03:45 PM	20	134	0	0	154	0	0	0	0	0	0	123	33	0	156	39	0	6	0	45	355
Total	53	608	0	0	661	1	0	1	0	2	3	483	138	0	624	191	0	35	0	226	1513
04:00 PM	11	162	0	1	174	0	0	0	0	0	0	132	30	0	162	86	0	10	0	96	432
04:15 PM	7	160	0	0	167	1	0	0	0	1	2	117	29	0	148	57	1	11	0	69	385
04:30 PM	9	192	0	0	201	0	0	0	0	0	0	136	27	0	163	52	0	8	0	60	424
04:45 PM	1	133	0	0	134	0	0	1	0	1	0	117	24	0	141	47	0	12	0	59	335
Total	28	647	0	1	676	1	0	1	0	2	2	502	110	0	614	242	1	41	0	284	1576
05:00 PM	9	164	0	0	173	0	0	0	0	0	1	117	19	0	137	78	0	6	0	84	394
05:15 PM	9	140	0	0	149	0	0	0	0	0	0	106	30	0	136	53	0	9	0	62	347
05:30 PM	5	120	0	0	125	0	0	0	0	0	0	122	23	0	145	33	0	8	0	41	311
05:45 PM	7	90	0	0	97	0	0	0	0	0	0	90	26	0	116	22	0	10	0	32	245
Total	30	514	0	0	544	0	0	0	0	0	1	435	98	0	534	186	0	33	0	219	1297
Grand Total	111	1769	0	1	1881	2	0	2	0	4	6	1420	346	0	1772	619	1	109	0	729	4386
Apprch %	5.9	94.0	0.0	0.1		50.0	0.0	50.0	0.0		0.3	80.1	19.5	0.0		84.9	0.1	15.0	0.0		
Total %	2.5	40.3	0.0	0.0	42.9	0.0	0.0	0.0	0.0	0.1	0.1	32.4	7.9	0.0	40.4	14.1	0.0	2.5	0.0	16.6	

	Civic Center Drive From North					Maine Veterans Memorial Cemetery From East					Civic Center Drive From South					Darin Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	03:45 PM																				
Volume	47	648	0	1	696	1	0	0	0	1	2	508	119	0	629	234	1	35	0	270	1596
Percent	6.8	93.1	0.0	0.1		100.0	0.0	0.0	0.0		0.3	80.8	18.9	0.0		86.7	0.4	13.0	0.0		
04:00 Volume	11	162	0	1	174	0	0	0	0	0	0	132	30	0	162	86	0	10	0	96	432
Peak Factor																					0.924
High Int.	04:30 PM					04:15 PM					04:30 PM					04:00 PM					
Volume	9	192	0	0	201	1	0	0	0	1	0	136	27	0	163	86	0	10	0	96	
Peak Factor					0.866					0.250					0.965					0.703	

49 670 1 52 2 123 242 36 1

CIVIC CENTER DRIVE : GRP I $\frac{0.90}{0.7} = 1.07$
DARIN DRIVE : GRP II

Maine Traffic Resources
25 Vine Street
Gardiner, ME 04345
mainetrafficresources.com

Civic Center Drive and Leighton Road PM
Augusta
MRD
Overcast/Light Rain

File Name : AugustaSSBPM
Site Code : 11111111
Start Date : 6/5/2012
Page No : 1

Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Belgrade Road From North					Driveway From East					Civic Center Drive From South					Leighton Road From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
03:00 PM	26	121	0	0	147	0	0	0	0	0	1	90	7	0	98	5	0	31	0	36	281
03:15 PM	30	136	0	0	166	0	0	0	0	0	0	92	8	0	100	8	0	50	0	58	324
03:30 PM	51	189	0	0	240	0	0	0	0	0	2	87	2	0	91	10	0	40	0	50	381
03:45 PM	27	137	0	0	164	1	0	0	0	1	0	124	3	0	127	8	0	41	0	49	341
Total	134	583	0	0	717	1	0	0	0	1	3	393	20	0	416	31	0	162	0	193	1327
04:00 PM	39	187	0	0	226	0	0	0	0	0	0	135	7	0	142	9	0	44	0	53	421
04:15 PM	34	121	0	0	155	0	0	0	0	0	0	129	10	0	139	15	0	54	0	69	363
04:30 PM	39	150	0	0	189	0	0	0	0	0	0	142	9	0	151	14	0	56	0	70	410
04:45 PM	46	120	0	0	166	0	0	0	0	0	0	117	6	0	123	13	0	52	0	65	354
Total	158	578	0	0	736	0	0	0	0	0	0	523	32	0	555	51	0	206	0	257	1548
05:00 PM	71	162	0	0	233	0	0	0	0	0	0	134	4	0	138	14	0	76	0	90	461
05:15 PM	29	113	0	0	142	0	0	0	0	0	0	123	5	0	128	7	1	48	0	56	326
05:30 PM	21	124	0	0	145	0	0	0	0	0	1	97	3	0	101	10	1	39	0	50	296
05:45 PM	16	73	0	0	89	0	0	0	0	0	0	84	0	0	84	1	0	23	0	24	197
Total	137	472	0	0	609	0	0	0	0	0	1	438	12	0	451	32	2	186	0	220	1280
Grand Total	429	1633	0	0	2062	1	0	0	0	1	4	1354	64	0	1422	114	2	554	0	670	4155
Apprch %	20.8	79.2	0.0	0.0		100.0	0.0	0.0	0.0		0.3	95.2	4.5	0.0		17.0	0.3	82.7	0.0		
Total %	10.3	39.3	0.0	0.0	49.6	0.0	0.0	0.0	0.0	0.0	0.1	32.6	1.5	0.0	34.2	2.7	0.0	13.3	0.0	16.1	

	Belgrade Road From North					Driveway From East					Civic Center Drive From South					Leighton Road From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	04:15 PM																				
Volume	190	553	0	0	743	0	0	0	0	0	0	522	29	0	551	56	0	238	0	294	1588
Percent	25.6	74.4	0.0	0.0		0.0	0.0	0.0	0.0		0.0	94.7	5.3	0.0		19.0	0.0	81.0	0.0		
05:00 Volume	71	162	0	0	233	0	0	0	0	0	0	134	4	0	138	14	0	76	0	90	461
Peak Factor																					0.861
High Int.	05:00 PM					2:45:00 PM					04:30 PM					05:00 PM					
Volume	71	162	0	0	233	0	0	0	0	0	0	142	9	0	151	14	0	76	0	90	
Peak Factor					0.797										0.912					0.817	

196 572

190 = 1,034
32

540 30

58 246

BELGRADE RD — GRP I
LEIGHTON RD — GRP I

ACCIDENT REVIEW - SECTION 2

The Maine Department of Transportation uses two criteria to determine high crash locations (HCLs). The first is the critical rate factor (CRF), which is a measure of the accident rate. A CRF greater than one indicates a location which has a higher than expected accident rate. The expected rate is calculated as a statewide average of similar facilities.

The second criterion, which must also be met, is based upon the number of accidents that occur at a particular location. Eight or more accidents must occur over the three-year study period for the location to be considered a high crash location. The CRF and number of accidents are summarized by location for the three-year period 2009 to 2011 below:

Civic Center Location Description	# of Acc.	CRF
Intersection of Leighton Road	10	0.51
Between Leighton Road and Darin Drive	2	0.20
Intersection of Darin Drive	**8**	**1.41**
Between Darin Dr. and NB off-ramp from I-95 SB	**12**	**1.53**
Intersection of NB off-ramp from I-95 SB	6	1.09
Intersection of SB off-ramp from I-95	12	0.50
Between on-ramp to I-95 SB and overpass		0.38
At overpass of Maine Turnpike SB	1	0.29
Intersection of NB off-ramp from I-95	**9**	**1.37**
Between off-ramp from I-95 NB and on-ramp to I-95 NB	1	0.48
Intersection of SB on-ramp to I-95 NB	3	0.58
Intersection of NB on-ramp to I-95 NB	3	0.22

As can be seen in the above accident table, there are three high crash locations within the vicinity of the site (highlighted in bold print). Collision diagrams were prepared for each to determine if there are any accident patterns or trends evident that may indicate an existing safety deficiency. The diagrams are discussed as follows:

Intersection of Civic Center Drive and Darin Drive

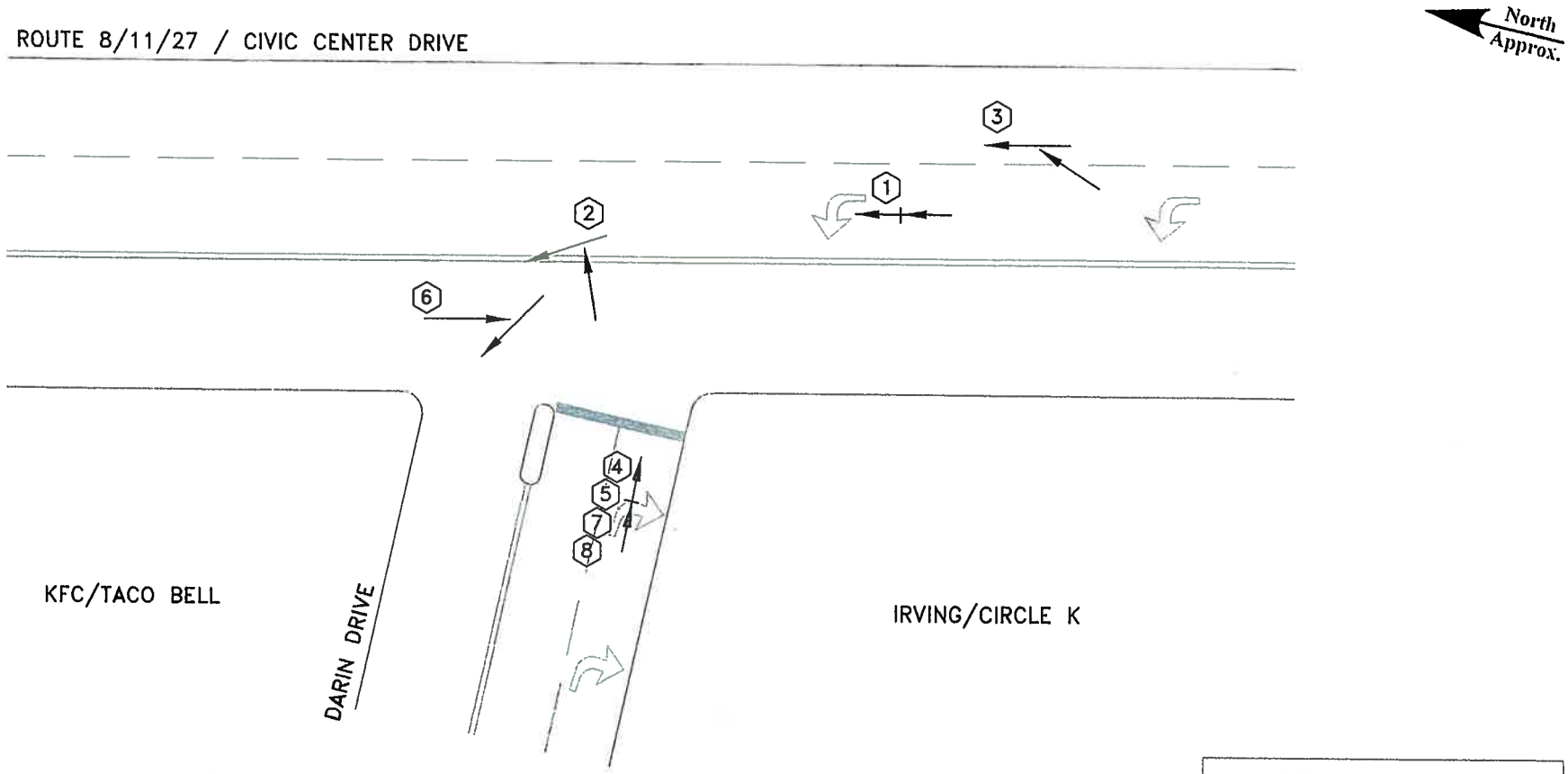
There were four accidents in 2009, three in 2010 and one in 2011 at this intersection. Four of the accidents were rear-end collisions on Darin Drive, which can often be attributed to congestion as vehicles start to go and then stop. In addition, there was a rear-end collision on Civic Center Drive in the left-turn lane. There was a single sideswipe type accident as a vehicle improperly changed lanes on Civic Center Drive. There were two angle collisions with through Civic Center Drive vehicles, one with an exiting left and one with an entering left. There is no clear pattern of correctable type accidents since the rear-ends on Darin Drive are generally considered uncorrectable. MaineDOT plans intersection improvements at this location which will hopefully address the accident problem.

Civic Center Drive between Darin Drive and NB off-ramp from I-95 SB

There five accidents in 2009, four in 2010 and three in 2011. There were three rear-ends on Civic Center Drive. There were three single vehicle type accidents. There was one sideswipe type collision due to a lane change. The remaining five collisions were angle accidents with entering or exiting drive movements. There is no concentration of accidents at any one drive or any apparent accident pattern evident from the diagram.

Intersection of Civic Center Drive and NB off-ramp from I-95 NB

There were four accidents in 2009, two in 2010 and three in 2011. All accidents were rear-end collisions on the I-95 off ramp. This type of accident is common on off-ramps due to the skew. The driver is focused towards their left and not at the vehicle in front of them. There is no solution to eliminate this type of accident at an unsignalized skewed off-ramp without a total reconfiguration of the ramp.



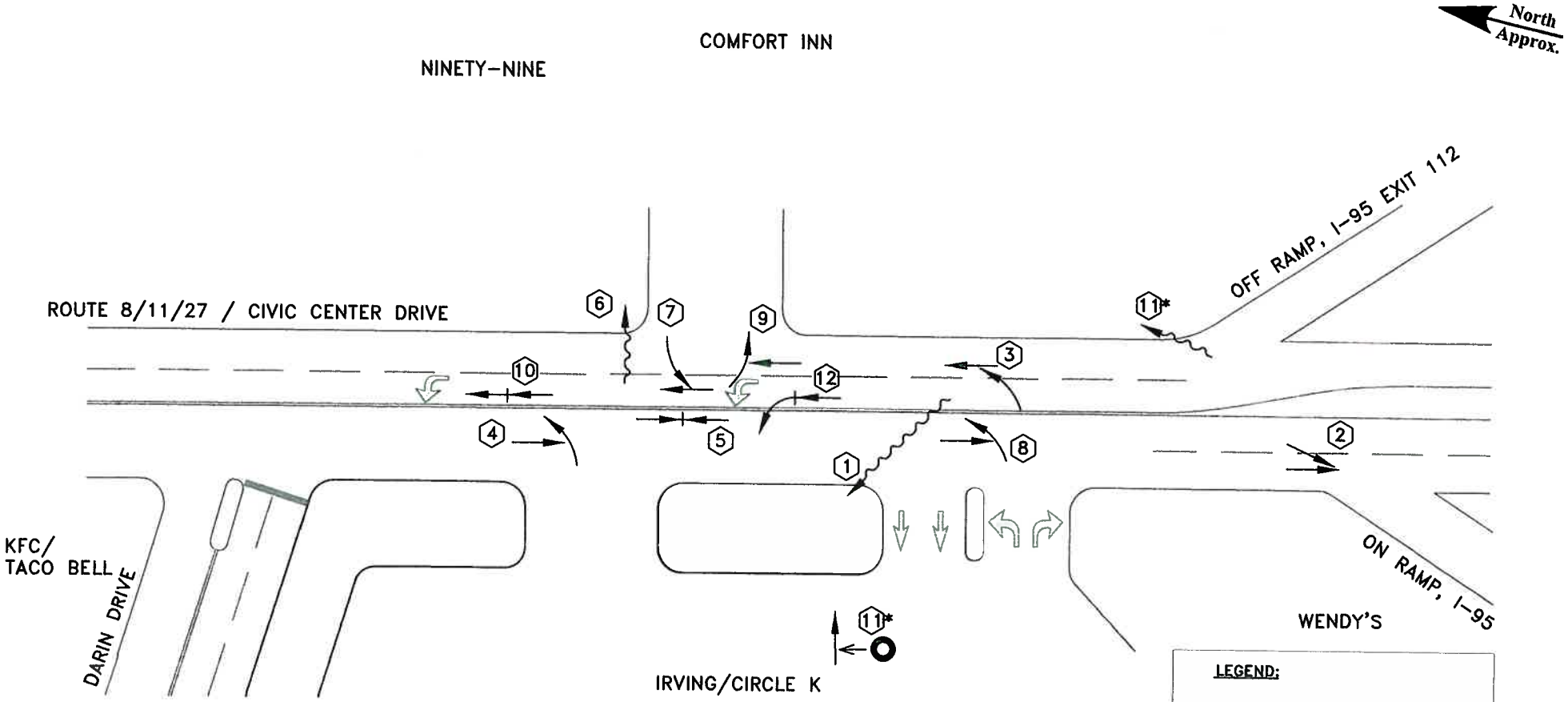
#	DATE	TIME	CONTRIBUTING FACTORS	REPORT #
1	01/26/09	13:05	DRIVER INATTENTION/REAR-END	09002-132-AC
2	04/23/09	14:11	FAILURE TO YIELD RIGHT OT WAY	09002-455-AC
3	05/19/09	12:37	IMPROPER LANE CHANGE	09002-550-AC
4	08/10/09	17:11	START & STOP/REAR-END	09002-831-AC
5	05/27/10	16:23	FOLLOWING TOO CLOSELY/REAR-END	10002-429-AC
6	07/29/10	16:29	FAILURE TO YIELD RIGHT OF WAY	10002-623-AC
7	08/10/10	12:06	FOLLOWING TOO CLOSELY/REAR-END	10002-653-AC
8	02/11/11	13:00	START & STOP/REAR-END	11002-186-AC

LEGEND:

- Moving Vehicle
- Vehicle Backing
- Overturned Vehicle
- Out of Control Vehicle
- Rear End Collision
- Sideswipe Collision
- Head On Collision
- Angle Collision

Augusta, Maine
Collision Diagram - 2009-2011
MDOT Node #26399

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677



#	DATE	TIME	CONTRIBUTING FACTORS	REPORT #
1	04/03/09	05:00	DRIVER FATIGUED/LOST CONTROL/STRUCK LIGHT POLE	09002-404-AC
2	05/22/09	16:46	IMPROPER-UNSAFE LANE CHANGE	09002-562-AC
3	09/10/09	14:22	FAILURE TO YIELD RIGHT OF WAY	09002-920-AC
4	10/15/09	08:28	FAILURE TO YIELD RIGHT OF WAY	09002-1024-AC
5	12/22/09	06:45	DRIVER INATTENTION/CROSSED CENTER LINE/SIDESWIPE	09002-1280-AC
6	02/08/10	15:11	FAILURE TO SET EMERGENCY BRAKE/STRUCK MAILBOXES	10002-135-AC
7	02/19/10	12:08	FAILURE TO YIELD RIGHT OF WAY	10002-161-AC
8	08/09/10	17:02	FAILURE TO YIELD RIGHT OF WAY	10002-652-AC
9	09/03/10	18:39	FAILURE TO YIELD RIGHT OF WAY/WAVED AHEAD	10002-730-AC
10	05/18/11	10:09	FOLLOWING TOO CLOSELY/REAR-END	11002-477-AC
11	07/15/11	20:36	EQUIPMENT FAILURE/TIRE STRUCK VEHICLE	11002-668-AC
12	10/28/11	15:31	FOLLOWING TOO CLOSELY/REAR-END	11002-966-AC

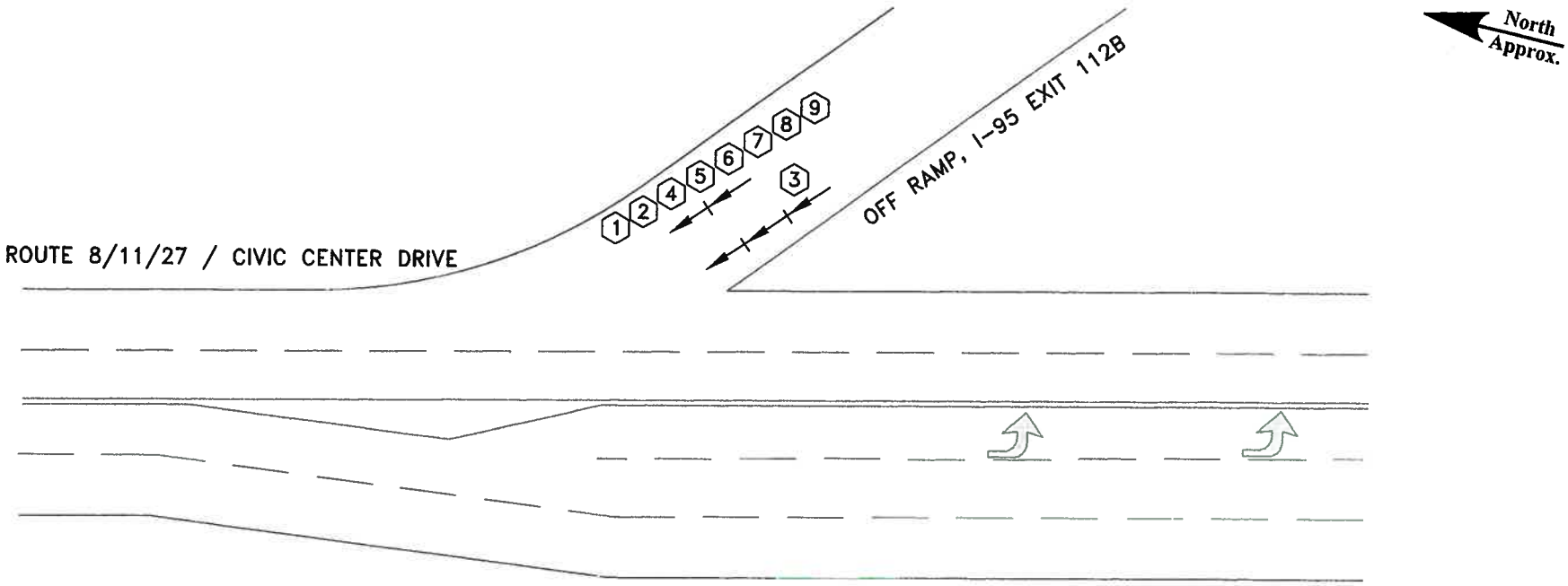
LEGEND:

- Moving Vehicle
- Vehicle Backing
- Overturned Vehicle
- Out of Control Vehicle
- Rear End Collision
- Sideswipe Collision
- Head On Collision
- Angle Collision

*SINGLE ACCIDENT AT TWO LOCATIONS

Augusta, Maine
Collision Diagram - 2009-2011
MDOT Link #26399-28846

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677



#	DATE	TIME	CONTRIBUTING FACTORS	REPORT #
1	03/13/09	15:45	START & STOP/REAR-END	016646
2	07/02/09	16:05	DRIVER INATTENTION/REAR-END	045358
3	09/16/09	17:00	DRIVER INATTENTION/START & STOP/REAR-END	067622
4	10/30/09	08:44	FOLLOWING TOO CLOSELY/REAR-END	09002-1070-AC
5	06/25/10	13:25	DRIVER INATTENTION/REAR-END	043941
6	09/22/10	08:17	DRIVER INATTENTION/REAR-END	069373
7	04/17/11	15:45	START & STOP/REAR-END	026983
8	10/29/11	16:28	FOLLOWING TOO CLOSELY/REAR-END	082066
9	12/12/11	16:15	START & STOP/REAR-END	092797

LEGEND:

- Moving Vehicle
- Vehicle Backing
- Overturned Vehicle
- Out of Control Vehicle
- Rear End Collision
- Sideswipe Collision
- Head On Collision
- Angle Collision

Augusta, Maine
Collision Diagram - 2009-2011
MDOT Node #28792

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☑ Crash Summary I ☑ Section Detail ☑ Crash Summary II ☐ 1320 Included ☐ 1320 & Driver Report Included

REPORT DESCRIPTION

Rt 8

REPORT PARAMETERS

Year 2009, Start Month 1 through Year 2011 End Month: 12

Route: **0008X**	Start Node: **63298** End Node: **28000**	Start Offset: **0** End Offset: **0**	☑ **Exclude First Node** ☐ **Exclude Last Node**
Route: **0008S**	Start Node: **63298** End Node: **63300**	Start Offset: **0** End Offset: **0**	☐ **Exclude First Node** ☐ **Exclude Last Node**

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary I

Nodes

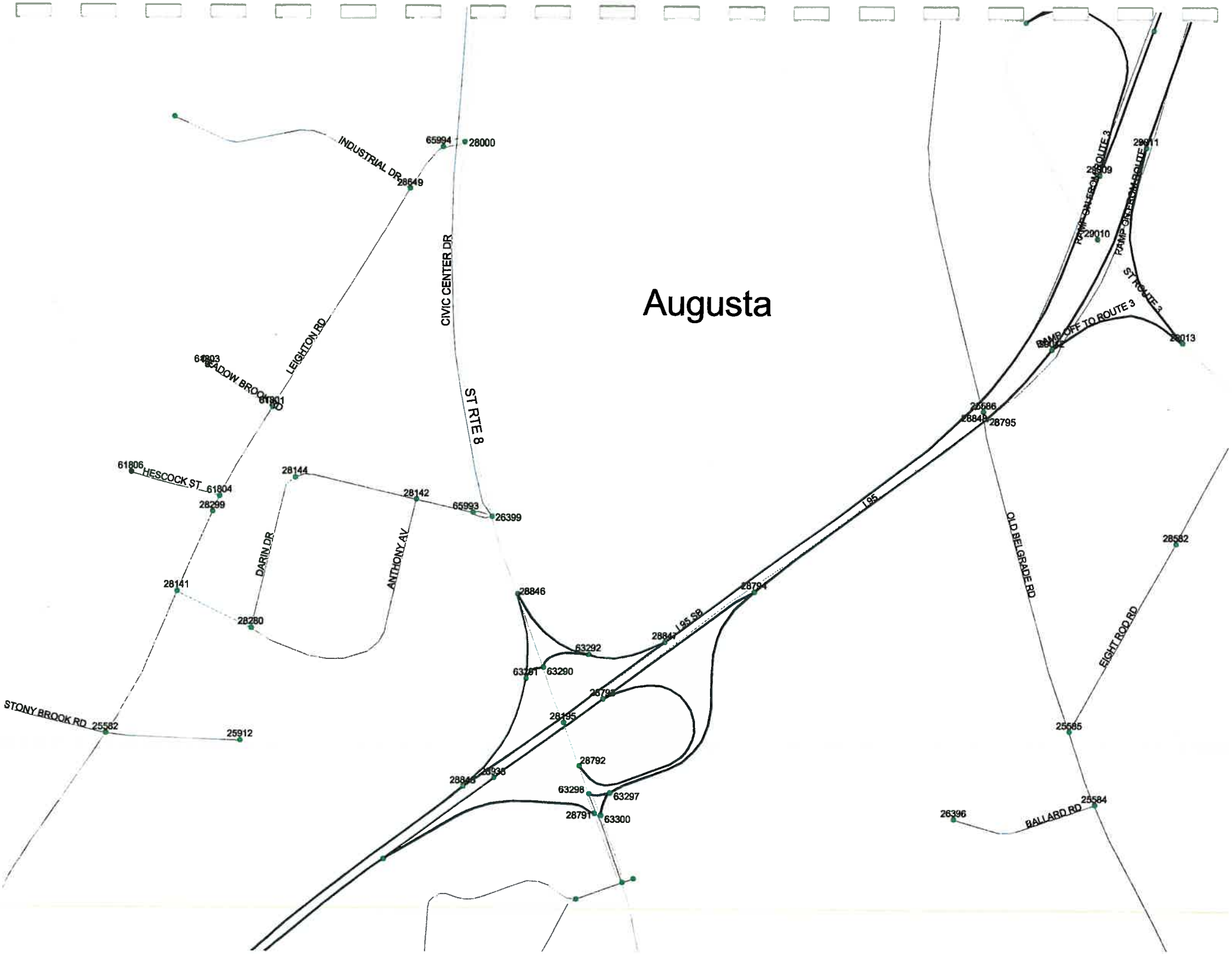
Node	Route - MP	Node Description	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF
28792	0008X - 2.88	Int of CIVIC CENTER DR, RAMP OFF TO CIVIC CENTER DR	2	9	0	0	2	3	4	55.6	7.149	0.42	0.31	1.37
												Statewide Crash Rate:	0.13	
28195	0008X - 2.96	BRG 1465, CIVIC CENTER DR under MTPK SB	2	1	0	0	0	0	1	0.0	3.360	0.10	0.35	0.00
												Statewide Crash Rate:	0.12	
63290	0008X - 3.02	Int of CIVIC CENTER DR, RAMP OFF TO CIVIC CENTER DR	9	12	0	0	0	7	5	58.3	7.813	0.51	1.02	0.00
												Statewide Crash Rate:	0.62	
28846	0008X - 3.10	Int of CIVIC CENTER DR, RAMP OFF TO CIVIC CENTER DR	2	6	0	0	0	1	5	16.7	5.594	0.36	0.33	1.09
												Statewide Crash Rate:	0.13	
26399	0008X - 3.22	Int of CIVIC CENTER DR, DARIN DR	2	8	0	0	0	2	6	25.0	6.338	0.42	0.30	1.41
												Statewide Crash Rate:	0.12	
28000	0008X - 3.68	Int of BELGRADE RD, CIVIC CENTER DR, LEIGHTON RD	9	10	0	0	2	4	4	60.0	6.174	0.54	1.06	0.00
												Statewide Crash Rate:	0.62	
63298	0008S - 0.03	Int of CIVIC CENTER DR, RAMP ON FROM CIVIC CENTER D	2	3	0	0	0	1	2	33.3	5.285	0.19	0.33	0.00
												Statewide Crash Rate:	0.13	
28009	0008S - 0.03	Int of DEPOT RD, ROUTE 27, ROUTE 8	1	6	0	1	0	0	5	16.7	2.101	0.95	0.32	2.99
												Statewide Crash Rate:	0.09	
63300	0008S - 0.07	Int of CIVIC CENTER DR, RAMP OFF TO CIVIC CENTER DR	9	3	0	0	0	1	2	33.3	4.011	0.25	1.16	0.00
												Statewide Crash Rate:	0.62	
		NODE TOTALS:		58	0	1	4	19	34	41.4	47.825	0.40	0.43	0.95

Study Years: 3.00

Crash Summary I

Sections

Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
26399	28000	2861921	0 - 0.46	0008X - 2.76	0.46	2	4	0	0	0	2	2	50.0	0.02240	59.53	293.57	0.00
Int of CIVIC CENTER DR, DARIN DR				ST RTE 8											Statewide Crash Rate: 171.04		
63298	28792	2650652	0 - 0.02	0008X - 2.86	0.02	2	1	0	0	0	0	1	0.0	0.00117	284.32	596.95	0.00
Int of CIVIC CENTER DR, RAMP ON FROM CIVIC CENTER DR				ST RTE 8											Statewide Crash Rate: 171.04		
28195	28792	205839	0 - 0.08	0008X - 2.88	0.08	2	0	0	0	0	0	0	0.0	0.00538	0.00	405.32	0.00
BRG 1465, CIVIC CENTER DR under MTPK SB				ST RTE 8											Statewide Crash Rate: 171.04		
28195	63290	2650601	0 - 0.06	0008X - 2.96	0.06	2	2	0	0	0	1	1	50.0	0.00403	165.35	436.03	0.00
BRG 1465, CIVIC CENTER DR under MTPK SB				ST RTE 8											Statewide Crash Rate: 171.04		
63290	28846	2650602	0 - 0.08	0008X - 3.02	0.08	2	0	0	0	0	0	0	0.0	0.00363	0.00	448.07	0.00
Int of CIVIC CENTER DR, RAMP OFF TO CIVIC CENTER DR, RAMP ON FROM CIVIC CENTER D				ST RTE 8											Statewide Crash Rate: 171.04		
26399	28846	2861857	0 - 0.12	0008X - 3.10	0.12	2	12	0	0	1	1	10	16.7	0.00682	586.54	382.13	1.53
Int of CIVIC CENTER DR, DARIN DR				ST RTE 8											Statewide Crash Rate: 171.04		
63298	63300	2650703	0 - 0.04	0008S - 0.03	0.04	2	0	0	0	0	0	0	0.0	0.00117	0.00	596.95	0.00
Int of CIVIC CENTER DR, RAMP ON FROM CIVIC CENTER DR				ST RTE 8S											Statewide Crash Rate: 171.04		
Study Years: 3.00				**Section Totals:**	0.86		19	0	0	1	4	14	26.3	0.04460	142.01	259.41	0.55
				Grand Totals:	0.86		77	0	1	5	23	48	37.7	0.04460	575.53	377.12	1.53


Augusta
INDUSTRIAL DR
65994
28000
28649
CIVIC CENTER DR
ST RTE 8
LEIGHTON RD
MEADOW BROOK RD
61806
HESCOCK ST
61804
28299
28144
28142
65993
26399
DARIN DR
ANTHONY AV
28141
28280
28846
63292
63291
63290
28847
I 95 SB
28794
28795
28195
28792
28848
28938
63298
63297
28791
63300
STONY BROOK RD
25582
25912
I 95
OLD BELGRADE RD
RAMP ON FROM ROUTE 3
29011
29009
29010
RAMP OFF FROM ROUTE 3
ST ROUTE 3
29013
RAMP OFF TO ROUTE 3
25586
28795
28582
EIGHT ROD RD
25585
25584
26396
BALLARD RD

ENTRANCES AND EXITS - SECTION 3

Access to the project will be provided by a single full movement primary drive to Civic Center Drive, opposite Darin Drive. This drive is expected to be signalized through intersection improvements being designed and implemented by MaineDOT. A gated emergency access drive will also be provided to Civic Center Drive along the northern portion of the property as required by the Department of Defense for this facility. The speed limit on Civic Center Drive is posted at 45 mph and the sight distances are shown on the site plan prepared by WBRC, included in this application.

TITLE, RIGHT OR INTEREST - SECTION 4

The deed for the parcel is included in this application package. In addition, MaineDOT will be making improvements at the intersection of Darin Drive, which are expected to encompass the beginning of the entry drive. It is understood that MaineDOT will be acquiring the rights for the beginning portion of the primary access drive.

718 Cross Hill Road
Vassalboro, Maine 04989
Telephone: (207) 923-3443
Fax: (207) 923-3648

Morin Land Surveying

Date: February 13, 2012

File #: AU102K

Plan #: 459

Grantor: State of Maine

Deed Reference: Book 1688, Page 295, 09-28-1973
Book 1614, Page 220, 02-09-1973
Book 1498, Page 64, 06-30-1969

Location: Civic Center Drive, Augusta

Purpose: Proposed Conveyance 43.4 Acres +/-

EXHIBIT "A"

A certain lot or parcel of land situated on the easterly side of Civic Center Drive, so called, in the City of Augusta, County of Kennebec, State of Maine and being more particularly described as follows:

Beginning at a 5/8" iron rebar with identification cap #2157 set on the easterly side of Civic Center Drive on the southwesterly corner of the parcel of land Ruth E. Babcock received by deed dated August 29, 1977 and recorded in the Kennebec County Registry of Deeds, Book 2039, Page 124. Said point also being located S 02°-19'-51"W, a distance of 238.35 feet from granite highway monument found.

Thence S 78°-34'-37" E along the land of said Babcock, a distance of 1311.49 feet to a ⅜" iron rod found.

Thence S 78°-34'-37" E along the land of said Babcock and the remaining land of the grantor, a distance of 105 feet more or less to a point in the thread of Stone Brook.

Thence in a general southerly direction along the thread of said Stone Brook and the remaining land of the grantor a distance of 1282 feet more or less to a point on the northeasterly terminus of a 60 foot wide right of way as described below. A straight line between said iron rod found and said point being S 00°-28'-35" E, a distance of 1097.47 feet.

Thence S 17°-08'-35" W along the thread of said Stone Brook and the remaining land of the grantor, a distance of 60.05 feet to a point on the southeasterly terminus of said right of way.

Thence in a general southerly direction along the thread of said Stone Brook and the remaining land of the grantor, a distance of 718 feet more or less to a point.

Thence N 78°-04'-30" W along the land Giri Civic Drive, LLC received by deed dated July 15, 2008 as recorded in said Registry of Deeds, Book 9803, Page 289, a distance of 96 feet more or less to a ¾" iron rebar with identification cap #1059 found. A straight line between said point on the southeasterly right of way terminus and said iron rebar being S 42°-47'-47" W, a distance of 637.20 feet.

Thence N 78°-04'-30" W along the land of said Giri Civic Drive, LLC, a distance of 615.57 feet to a point on the easterly side of said Civic Center Drive. Said point being located S 78°-04'-30" E, a distance of 1.84 feet from a 5/8" iron rebar with identification cap #66 found.

Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 143.29 feet to a point on the southwesterly terminus of said right of way. A straight line between said last two points being N 16°-05'-34" W, a distance of 143.28 feet.

Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 60.01 feet to a point on the northwesterly terminus of said right of way. A straight line between said last two points being N 15°-04'-03" W, a distance of 60.01 feet.

Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 52.30 feet to a point. A straight line between said last two points being N 14°-30'-03" W, a distance of 52.30 feet. Said point being located N 79°-15'-38" E, a distance of 0.61 feet from a 2" iron pipe found.

Thence N 79°-15'-38" E along the land Carl J. Vander Putten received by deed dated September 15, 1989 as recorded in said Registry of Deeds, Book 3616, Page 184, a distance of 118.00 feet to a 1 ¾" iron pipe found.

Thence N 11°-12'-11" W along the land Said Vander Putten received by deed dated September 15, 1989 as recorded in said Registry of Deeds, Book 3616, Page 184 and the land Gerald R. Duplessis received by deed dated June 7, 2000 as recorded in said Registry of Deeds, Book 6220, Page 339, a distance of 200.21 feet to a 1" iron pipe found.

Thence N 10°-23'-26" W along the land of said Duplessis, a distance of 99.18 feet to a 1" iron pipe found.

Thence N 10°-44'-40" W along the land Marcel E. Veilleux and Nancy D. Thompson received by deed dated April 24, 2009 as recorded in said Registry of Deeds, Book 10338, Page 222, a distance of 100.15 feet to a 1" iron pipe found.

Thence N 10°-38'-06" W along the land George E. Poulin and Therese Poulin received by deed dated March 26, 1965 as recorded in said Registry of Deeds, Book 1372, Page 95, a distance of 99.94 feet to a 1 ¾" iron pipe found.

Thence S 79°-14'-44" W along the land of said Poulin, a distance of 125.68 feet to a point. Said point being located S 79°-14'-44" W, a distance of 0.38 feet from a 1 ½" iron pipe found.

Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 50.10 feet to a point. A straight line between said last two points being N 08°-56'-38" W, a distance of 50.10 feet. Said point being located S 79°-14'-31" W, a distance of 0.25 feet from a 1" iron pipe found.

Thence N 79°-14'-31" E along the land Emilien J. Doyon and Fernande Doyon received by deed dated April 13, 1977 as recorded in said Registry of Deeds, Book 1988, Page 333, a distance of 124.06 feet to a 1 ¾" iron pipe found.

Thence N 10°-31'-48" W along the land of said Doyon, a distance of 200.18 feet to a 1 ¾" iron pipe found.

Thence N 09°-59'-11" W along the land Luke M. Bolduc received by deed dated April 24, 2006 as recorded in said Registry of Deeds, Book 8921, Page 101, a distance of 151.04 feet to a ½" iron rebar found.

Thence N 77°-41'-43" E along the land Clemente L. Gaboury and Susan Dostie, trustees of the Donald J. Gaboury Living Trust received by deed dated October 17, 1998 as recorded in said Registry of Deeds, Book 5763, Page 234, a distance of 90.34 feet to a 1 ¾" iron pipe found.

Thence N 02°-49'-45" W along the land of said Donald J. Gaboury Living Trust, a distance of 299.58 feet to a 1 ¾" iron pipe found.

Thence N 78°-34'-37" W along the land of said Donald J. Gaboury Living Trust, a distance of 200.25 feet to a point on said Civic Center Drive. Said point being located N 78°-34'-37" W, a distance of 0.17 feet from a 1 ¾" iron pipe found.

Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 243.27 feet to the point of beginning. A straight line between said last point and said point of beginning being N 00°-05'-55" W, a distance of 243.25 feet.

The parcel described above contains 43.4 acres more or less.

The above described parcel is subject to a 60 foot wide right of way for all purposes including but not limited to roadway construction, maintenance and improvement for ingress and egress by vehicles and foot with maintenance rights, utility rights and the right to convey these rights to others. Said right of way is described as follows:

Beginning at a point on the easterly side of Civic Center Drive. Said point being located S 14°-30'-03" E, a distance of 52.30 feet from a point located on the southwesterly corner of the land Carl J. Vander Putten received by deed dated September 15, 1989 as recorded in the Kennebec County Registry of Deeds, Book 3616, Page 184.

Thence N 75°-46'-08" E, a distance of 830.71 feet to a point.

Thence in a Easterly direction following a curve concave to the south having a radius of 600.00 feet, a distance of 306.31 feet to a point in the thread of Stone Brook at the remaining land of the grantor. A straight line between the last two points being S 89°-36'-21" E, a distance of 303.00 feet.

Thence S 17°-08'-35" W along the thread of said Stone Brook and the remaining land of the grantor, a distance of 60.05 feet to a point.

Thence in a Westerly direction following a curve concave to the south having a radius of 540.00 feet, a distance of 273.45 feet to a point. A straight line between the last two points being N 89°-43'-26" W, a distance of 270.54 feet.

Thence S 75°-46'-08" W, a distance of 829.83 feet to a point on the easterly side of said Civic Center Drive.

Thence in a Northerly direction following a curve concave to the east having a radius of 5679.58 feet along said Civic Center Drive, a distance of 60.01 feet to the point of beginning. A straight line between said last point and said point of beginning being N 15°-04'-03" W, a distance of 60.01 feet.

Bearings referenced are based on True North, NAD 83 West Zone.

Meaning and intending convey a portion of the land the State of Maine received by deed dated September 28, 1973 as recorded in the Kennebec County Registry of Deeds, Book 1688, Page 295, by deed dated February 09, 1973 as recorded in the Kennebec County Registry of Deeds, Book 1614, Page 220 and by deed dated June 30, 1969 as recorded in the Kennebec County Registry of Deeds, Book 1498, Page 64.

Reference is made to a Boundary Survey of a proposed lot division for the Department of Defense, Dated 01-18-2012, by Morin Land Surveying, Plan No. 459, File No. AU102K.

KNOW ALL MEN BY THESE PRESENTS,

16772

THAT we, Donald J. Gaboury, Rita M. Evers and Lorraine E. Bumford, all of Augusta in the County of Kennebec and State of Maine; Robert R. Gaboury of Levant in the County of Penobscot and said State; Muriel Kelley of Gardiner in said County of Kennebec and said State; and Jeannette M. Albert of Milford in the County of Hillsboro and State of New Hampshire; in consideration of thirty-seven thousand five-hundred dollars ($37,500.00) paid by State of Maine the receipt whereof we do hereby acknowledge, do hereby give, grant, bargain, sell and convey, unto the said State of Maine, its successors and assigns forever, that portion of the following land which is located on the east side of the New Belgrade Road, (also known as the New Oakland Road) in said Augusta and bounded and described as follows: Northerly by land formerly of Edward Tillson, deceased, later occupied by Gertrude Tillson and now owned by the State of Maine; Easterly by land owned by the State of Maine, formerly by one Liberte; South by land now or formerly of George Scott; Westerly by the State Highway leading from Coombs Mills, so-called, to Sidney.

Meaning and intending hereby to convey the same premises conveyed to us by Donald J. Gaboury et al. by deed recorded in Kennebec County Registry of Deeds in Book 1604, Page 236.

Excepting and reserving, nevertheless, a parcel bounded and described as follows, as well as excepting and reserving premises excepted and reserved in Book 1604, Page 236:

Commencing at the south-westerly corner of a parcel owned by Donald J. Gaboury and Clemente L. Gaboury recorded in said Registry in Book 1378, Page 396, being a point located on the easterly side of the New Belgrade Road; thence running in an easterly direction along the southerly boundary of said parcel owned by Donald J. Gaboury and Clemente L. Gaboury a distance of 193.2 feet to the south-easterly corner of said parcel owned by Donald J. Gaboury and Clemente L. Gaboury; thence turning and running in a southerly direction a distance of 50.3 feet in an extended line of the easterly boundary of said parcel owned by Donald J. Gaboury and Clemente L. Gaboury; thence turning and running in a westerly direction to a point on the easterly side of the New Belgrade Road that is at a distance of 50.3 feet southerly

along the easterly line of said New Belgrade Road from said southwesterly corner of said parcel owned by Donald J. Gaboury and Clemente L. Gaboury; thence turning and running in a northerly direction along the easterly line of said New Belgrade Road to the point of beginning.

TO HAVE AND TO HOLD the aforegranted and bargained premises with all the privileges and appurtenances thereof to the said State of Maine, its successors and assigns, to its and their use and behoof forever.

AND we do COVENANT with the said Grantee, its successors and assigns, that we are lawfully seized in fee of the premises that they are free of all encumbrances: that we have good right to sell and convey the same to the said Grantee to hold as aforesaid; and that we and our heirs shall and will WARRANT and DEFEND the same to the said Grantee, its successors and assigns forever, against the lawful claims and demands of all persons.

IN WITNESS WHEREOF, we, the said Donald J. Gaboury and his wife Clemente L. Gaboury; Rita M. Evers and her husband John T. Evers; Lorraine E. Bumford and her husband Richard A. Bumford; Robert R. Gaboury and his wife Julianne Gaboury; Muriel Kelley and her husband Thomas T. Kelley; and Jeannette M. Albert and her husband Edward L. Albert, joining in this deed as Grantors, and relinquishing and conveying all right by descent and all other rights in the above described premises, have hereunto set their hands and seals this 28th day of September in the year of our Lord one thousand nine hundred and seventy-three.

Signed, Sealed and Delivered
in presence of

Donald J. Gaboury

Clemente L. Gaboury

Rita M. Evers

John T. Evers

Lorraine E. Bumford

Richard A. Bumford

Robert R. Gaboury

Julianne Gaboury

Muriel Kelley

Thomas T. Kelley

Jeannette M. Albert

Edward L. Albert

STATE OF MAINE, Kennebec) ss. September 28, 1973

Personally appeared the above named Donald J. Gaboury and acknowledged the above instrument to be his free act and deed.

Before me,

Notary Public

SEAL

KENNEBEC SS:
RECEIVED 11/7/73 3 H.45 M.P. M.
AND RECORDED FROM ORIGINAL

08594

Known all Men by these Presents,

That we, Cecil D. Quimby and Shirley A. Quimby, husband and wife, both of Augusta, County of Kennebec, State of Maine, in consideration of one dollar and other valuable considerations

paid by STATE OF MAINE

the receipt whereof we do hereby acknowledge, do hereby give, grant, bargain, sell and convey, unto the said STATE OF MAINE its successors ~~heirs~~ and assigns forever, a certain lot or parcel of land situated in said Augusta, bounded and described as follows, to wit:

Beginning at a point in the northerly line of another parcel of land of the State of Maine, said point being 200 feet westerly along said northerly line from the northeasterly corner of said parcel of the State of Maine at the westerly line of the Old Belgrade Road; thence from said point westerly along said northerly line 439 feet more or less to a corner of a stone wall; thence southerly along said land of the State of Maine, 8 1/4 rods more or less to a corner in the stone wall; thence westerly along said land of the State of Maine 5 rods more or less to a corner of the stone wall; thence southerly along said land of the State of Maine 77 1/2 rods more or less to a corner of the stone wall; thence westerly along said land of the State of Maine 37 1/2 rods more or less to the southeast corner of land of Joseph Babcock; thence northerly along the easterly line of said Babcock, of Merle Grover, of Robert G. Fuller and of other land of the grantors, 138 1/2 rods more or less to the southerly line of land of Lipman Poultry Company; thence easterly along the line of said Lipman land to a point 200 feet westerly of the southeasterly corner of said Lipman land at the westerly line of said Old Belgrade Road; thence southerly parallel with the westerly line of said Road and 200 feet westerly thereof 49 1/2 rods more or less to the point of beginning.

Excepting and reserving to the said Cecil D. Quimby, and his sons Jeffrey and John, for so long as they have cattle on the grantors' adjoining land, the use of the parcel herein conveyed for pasturing said cattle and cutting fence posts for a minimum period of 3 years, and after then until such time as the State of Maine desires to use the land for its own purposes, at which time a 50-foot lane near the northerly line of the above parcel will be established at a mutually agreed upon location for the passage of said cattle from the adjoining land of the grantors to the brook for watering purposes.

Also, after the State of Maine has marked those trees on the above parcel that it desires to have left standing for its purposes, the said Cecil D. Quimby reserves the remaining trees to be cut and removed by him or his agent, within a reasonable time required for said cutting and removing.

The parcel conveyed herein is a portion of land conveyed to the grantors herein by Earl C. Wyman, et al, by warranty deed dated September 3, 1963, recorded in the Kennebec County Registry of Deeds, Book 1315, Page 90 being a portion of the Fourth Parcel and all of the Fifth Parcel described therein.

To have and to hold the aforegranted and bargained premises with all the privileges and appurtenances thereof to the said

STATE OF MAINE

its successors ~~heirs~~ and assigns, to its and their use and behoof forever.

And we do COVENANT with the said Grantee, its successors ~~heirs~~ and assigns, that we are lawfully seized in fee of the premises that they are free of all encumbrances:

Know all Men by these Presents,

That I, Fred L. Turner of Augusta in the County of Kennebec and State Maine,

in consideration of Eight Thousand Dollars ($8,000.00)

paid by State of Maine

the receipt whereof I do hereby acknowledge, do hereby give, grant, bargain, sell and convey, unto the said State of Maine, its successors ~~heirs~~ and assigns forever,

a certain lot or parcel of land situate in said Augusta, bounded Northerly by land formerly owned or occupied by Rufus Bean, now or formerly of Eugene G. Stevens; Easterly by land of or formerly of Mason C. Farrar; Southerly by land of or formerly of Clara O. Hallowell; Westerly by the new Belgrade Road, containing eight acres, more or less; being part of the same premises conveyed under quit-claim deed of Frank E. Stevens, et als to Edwin H. Tillson and Gertrude E. Tillson, dated March 12, 1913, recorded in Kennebec Registry of Deeds, Book 523, Page 599, and by quit-claim deed of said Edwin H. Tillson to said Gertrude E. Tillson, dated September 14, 1914, recorded in said Registry, Book 548, Page 268.

The grantor reserves the right to remove during 1973 any apple trees or apple harvest from said premises, with a reasonable right of access over said land to accomplish such purpose.

Know all Men by these Presents

That We, Donald J. Gaboury and Clemente L. Gaboury, both of Augusta in the County of Kennebec and State of Maine,

20722

in consideration of one dollar and other valuable consideration,

paid by Donald J. Gaboury, Rita M. Evers and Lorraine E. Bumford, all of said Augusta; Robert R. Gaboury of Levant in the County of Penobscot and said State; Muriel Kelley of Gardiner in said County of Kennebec and said State; and Jeannette M. Albert of Milford in the County of Hillsboro and State of New Hampshire;

the receipt whereof we *do hereby acknowledge, do hereby* **give, grant,**

bargain, sell and convey *unto the said* Donald J. Gaboury, Rita M. Evers, Lorraine E. Bumford, Robert R. Gaboury, Muriel Kelley and Jeannette M. Albert

as joint tenants and not as tenants in common, and their heirs and assigns, and the survivor of them,

and the heirs and assigns of the survivor of them, forever. that portion of the following land which is located on the east side of the New Oakland Road in said Augusta and bounded and described as follows:

Northerly by land formerly of Edward Tillson, deceased, now occupied by Gertrude Tillson; Easterly by one Liberte; South by land of George Scott; Westerly by the State Highway leading from Coombs Mills, so-called, to Sidney.

Meaning and intending hereby to convey the same premises conveyed to us by Fred Gabourie and Beatrice Gabourie by deed recorded in Kennebec County Registry of Deeds in Book 1464, Page 11.

Excepting and reserving any portion of the above which has already been conveyed off by said Fred Gabourie et al. and excepting and reserving any portion thereof on the west side of the New Oakland Road.

The Grantors herein specifically except from this transaction a portion of property owned by them located north and west of the above-described property, said parcel being property obtained by them through another source, said parcel being bounded and described as follows: Commencing at a point located on the easterly side of the New Belgrade Road; thence running in a northerly direction along the New Belgrade Road 380.25 feet to an iron pin; thence turning and running in a southeasterly direction 200 feet along the southerly boundary of property now or formerly owned by Turner to an iron pin; thence turning and running in a southerly direction 300 feet to an iron pin; thence turning and running in a westerly direction 193.2 feet to the point of beginning.

No revenue required.

(106) BOOK 1599 PAGE 181

15522

Know all Men by these Presents,

That we, Joseph H. Chrissman and Dolores Chrissman, both of Augusta, in the County of Kennebec and State of Maine

in consideration of Two Thousand Four Hundred Dollars ($2,400.00)

paid by State of Maine

the receipt whereof we do hereby acknowledge, do hereby give, grant, bargain, sell and convey, unto the said State of Maine, its successors ~~heirs~~ and assigns forever, a certain lot or parcel of land situated in said Augusta, and bounded and described as follows: On the east by Interstate 95; on the south by land of Raymond and Luciene Jacques, formerly of William Beck; on the west by the Meadow Brook, so-called; on the north by land of the State of Maine, formerly of Frank Lovejoy.

Meaning and intending to convey a portion of the premises conveyed to us by deed of Roland H. Barney and Ruth Barney dated May 9, 1961 and recorded in the Kennebec County Registry of Deeds Book 1222, Page 211.

BOOK 1493 PAGE 64

Know All Men By These Presents,

That Dostie Bros., Inc., a corporation organized and existing under the laws of the State of Maine and having its place of business in Augusta, in the County of Kennebec and State of Maine, by its officer hereunto duly authorized,

06867

in consideration of one dollar and other valuable considerations

paid by State of Maine

the receipt whereof it *does hereby acknowledge, does hereby* give, grant, bargain, sell and convey *unto the said* State of Maine, its successors and assigns forever,

a certain lot or parcel of land in said Augusta and bounded and described as follows, to-wit:

Beginning at a point in the westerly side line of the Old Belgrade Road, so-called, at the southeasterly corner of land now or formerly of Cecil D. Quimby, et. al.; thence generally southerly along the westerly line of said road to the southeasterly corner of land formerly of John B. Pinkham; thence westerly along said Pinkham's southerly line 300 feet; thence southerly parallel with the Old Belgrade Road to the northwesterly line of Route 95; thence southwesterly along the line of said Route 95 to the northeasterly corner of land now or formerly of C. H. Kissman and Joseph H. Dolores; thence westerly to Meadow Brook, so-called; thence northerly along said brook to land of said Quimby; thence easterly to the corner of a stone wall at the southeasterly corner of land of said Quimby; thence northerly along said wall 77½ rods more or less to a corner in the wall; thence easterly along the wall 5 rods to a corner; thence northerly 8⅓ rods to a corner; thence easterly along the wall 38 3/4 rods to the westerly line of said Old Belgrade Road and the point of beginning.

Reference is hereby made to source of title in deed recorded in Book 1464, Page 491 at the Kennebec Registry.

Excepting and reserving the right to the Grantor to remove a small building on said premises owned by it within thirty days from the date hereof.

Also conveying any motor vehicles located on said property.

The purpose of this deed is to confirm eminent domain taking made by said Grantee.

Also conveying any scrap or junk, or other personal property on said land as of the date hereof, together with the small building above mentioned if it is not removed within the time specified as aforesaid.

As part of the consideration, the grantee assumes and agrees to pay $181.00 of the 1969 real and personal property taxes.

State of Maine Attorney Generals Dept State House Jul 18 1969

Know All Men by These Presents,

That We, EARL C. WYMAN and LENA H. WYMAN, both of Augusta in the County of Kennebec and State of Maine

in consideration of one dollar and other valuable considerations

paid by CECIL D. QUIMBY and SHIRLEY A. QUIMBY, both of said Augusta

the receipt whereof we do hereby acknowledge, do hereby give, grant, bargain, sell and convey unto the said CECIL D. QUIMBY and SHIRLEY A. QUIMBY

as joint tenants and not as tenants in common, and their heirs and assigns, and the survivor of them, and the heirs and assigns of the survivor of them, forever, certain lots or parcels of land, together with any buildings thereon, located in Augusta, and bounded and described as follows:

FIRST PARCEL: Being that part of Lot No. 24 in the third range of lots West of the Kennebec River conveyed to Everett Withee by Augustus Z. Withee by Warranty Deeds dated April 20, 1900, recorded in Kennebec Registry of Deeds, Book 436, Page 192, and June 10, 1911, recorded in said Registry, Book 575, Page 214. Containing about 21 acres more or less.

SECOND PARCEL: Being that part of Lot No. 24 in the third range of lots west of the Kennebec River, described in deed from Ellen E. Ward to Augustus Z. Withee and Everett Withee, dated September 11, 1895, and recorded in said Registry, Book 410, Page 228, and the same conveyed by said Augustus Z. Withee to the said Everett Withee by deed recorded in Kennebec Registry of Deeds, Book 530, Page 236, Containing 12 acres more or less.

THIRD PARCEL: Being that part of Lot No. 22 in the third range of lots in said Augusta, described in the deed from Augustus Z. Withee to Isabel J. Withee, dated November 28, 1908, recorded in said Registry, Book 557, Page 181. Containing 26 acres more or less.

FOURTH PARCEL: Being the parcel described in a Warranty Deed from Willard R. Ayers to Everett Withee, dated November 5, 1912, and recorded in said Registry, Book 530, Page 40. Containing about 29 acres.

FIFTH PARCEL: Being the same premises described in a deed from Arthur E. Percival to Everett Withee, dated June 29, 1925, and recorded in said Registry, Book 626, Page 525.

SIXTH PARCEL: Being the same premises described in a Warranty Deed from Annie Wilton to Everett Withee and Isabel J. Withee, dated April 11, 1911, recorded in said Registry, Book 514, Page 9; excepting and reserving from this parcel a certain lot or parcel of land conveyed by the said Everett Withee and Isabel J. Withee to Pearl M. White, reference to which deed is hereby made for a more specific description of the lot hereby excepted and reserved.

Excepting and reserving from the foregoing such rights, if any, as may exist in others in connection with the road from Coombs Mills to Sidney which passes through some of the lots above described.

Excepting and reserving certain lots or parcels of land conveyed to Pearl White, Clarence White, Central Maine Power Company Power Rights, and Highway deed given to State of Maine. Together with all cattle, farm machinery, milking machinery,

tank, equipment, and tools used on said farm, stove, refrigerator, deep freeze, and kitchen furniture but except furniture in the rest of the house on said premises.

Also excepting and reserving a certain lot conveyed by Earl C. Wyman and Cecil D. Quimby to Robert D. Dostie, et al by deed dated August 8, 1960, and recorded in Kennebec County Registry of Deeds, Book 1253, Page 135.

All of the above described parcels of land being the same premises conveyed to Earl C. Wyman by Alice M. Cummings by deed dated September 10, 1942, and recorded in Kennebec Registry of Deeds, Book 790, Page 545, with the exceptions and reservations above listed.

SEVENTH PARCEL: Also another certain lot or parcel of land, located in Augusta, and bounded and described as follows: Beginning on the westerly line of the Oakland Road, at the northeast corner of land now owned or occupied by one Geneseo; thence northerly on said road to the southeast corner of lot now owned or occupied by one Miller (formerly of Finley); thence westerly on said Miller's south line to his southwest corner; thence northerly on said Miller's west line to land now owned or occupied by one Hescock; thence westerly on said Hescock's south line to his southwest corner; thence westerly along my wire fence to a point where said fence nears the gully; thence in a generally westerly direction and southwesterly direction following said fence (which in turn follows said gully on the southerly side thereof) to a point where said fence crosses said gully; thence southerly following said gully and curving to the southeast and east, following said gully, to the northwest corner of said Geneseo's land; thence easterly on said Geneseo's north line to said Oakland Road at the point of beginning. Containing 30 acres more or less.

Being the same premises conveyed to Lena H. Wyman by Joseph Tondreau et al by deed dated October 18, 1954 and recorded in Kennebec Registry of Deeds in Book 980, Page 138.

As a part of the consideration hereof, grantees assume and agree to pay real estate taxes for the year 1963.

Excepting and reserving, however, such rights as Thomas DiCanzo may have under a rock permit agreement conveying rights to a section of said above described property, said agreement to be recorded in Kennebec County Registry of Deeds.

To have and to hold the aforegranted and bargained premises with all the privileges and appurtenances thereof, to the said Cecil D. Quimby and Shirley A. Quimby

as joint tenants and not as tenants in common, and their heirs and assigns, and the survivor of them, and the heirs and assigns of the survivor of them, to them and their use and behoof forever.

And we do covenant with the said Grantees, as aforesaid, that we are lawfully seized in fee of the premises, that they are free of all incumbrances,

Know all Men by these Presents, That

I, ARTHUR E. PERCIVAL of Augusta, in the County of Kennebec and State of Maine,

in consideration of one dollar and other valuable considerations, paid by EVERETT WITHEE of said Augusta,

the receipt whereof I do hereby acknowledge, do hereby Give, Grant, Bargain, Sell and Convey unto the said Everett Withee, his Heirs and Assigns forever, a certain lot or parcel of land, situated in said AUGUSTA and bounded and described as follows, to-wit: Commencing on the west side of the Belgrade Road at the Northeast corner of the land hereby conveyed and continuing in a westerly direction eight-one (81) rods, more or less, to the end of a stone wall; thence in a southerly direction one hundred and eight and three-fourths (108¾) rods, more or less, to a stone post to land of Frank Lajoie; thence in an easterly direction thirty-seven and one-half (37½) rods, more or less, to a stone wall; thence in a northerly direction seventy-seven and one-half (77½) rods, more or less, to the corner in a stone wall; thence in an easterly direction along a stone wall five (5) rods more or less, to a corner; thence along said stone wall eight and one-quarter (8¼) rods, more or less, to a corner in a stone wall; thence in an easterly direction thirty-eight and three-fourth (38¾) rods, more or less, to the westerly line of said Road; thence along said westerly line nineteen and three-fourths (19¾) rods, more or less, to the point of beginning.

Meaning and intending hereby to convey a portion of the land conveyed to me by J.E.McGuinness.

To have and to hold the afore granted and bargained Premises, with all the privileges and appurtenances thereof to the said Everett Withee, his Heirs and Assigns, to him and their use and behoof forever. And I do covenant with the said Grantee, his Heirs and Assigns, that I am lawfully seized in fee of the premises; that they are free of all incumbrances: that I have good right to sell and convey the same to the said Grantee to hold as aforesaid. And that I and my heirs shall and will Warrant and defend the same to the said Grantee, his Heirs and Assigns forever, against the lawful claims and demands of all persons

In Witness Whereof, I the said Arthur E. Percival and Eva A. Percival wife of the said Arthur E. Percival joining in this deed as Grantor, and relinquishing and conveying my rights by descent and all other rights in the above described premises have hereunto set our hands and seals this twenty-ninth day of June in the year of our Lord one thousand nine hundred and twenty-five.

Signed, Sealed and Delivered in presence of

Walter M. Sanborn

Arthur E. Percival Seal

Eva A. Percival Seal

County of

State of Maine, Kennebec, ss. June 29, 1925.

Personally appeared the above named Arthur E. Percival and acknowledged the above instrument to be his free act and deed

Before me, Walter M. Sanborn Notary Public.

Seal

Recorded July 14, 1925

Transfer Tax $1.50 Revenue Stamps A.E.P. June 30. 1925.

Know all Men by these Presents, That

I, WILLARD R. AYERS of Augusta in the County of Kennebec and State of Maine

in consideration of One Dollar and other valuable considerations paid by EVERETT WITHEE of said Augusta,

the receipt whereof I do hereby acknowledge, do hereby Give, Grant, Bargain, Sell and Convey unto the said EVERETT WITHEE, his Heirs and Assigns forever, a certain lot or parcel of land situate in said AUGUSTA and bounded and described as follows, viz: Beginning at the southeasterly corner of land now or formerly owned by George L. Guoir in the westerly line of said road leading from Augusta to Belgrade; thence running Southerly in the westerly line of said road about twenty-nine and three-fourths rods to land now or formerly owned by Jonathan B. Pinkham; thence Westerly in the northerly line of said Pinkham's land, about one-half mile to the westerly line of said lot number twenty-three; thence Northerly in said westerly line about twenty-nine and one-half rods to the southwest corner of said George L. Guoir's land; and thence Easterly in the southerly line of said George L. Guoir's land about one-half mile to the bound begun at; containing about twenty-nine acres. Being the same premises mentioned in warranty deed from John C. Arnold to me, dated October 9, 1911, and recorded in Kennebec Registry of Deeds, Book 509, Page 277, being described in second parcel; together with all my right, title and interest in and to the rangeways adjoining said parcel of land.

To have and to hold the afore granted and bargained Premises, with all the privileges and appurtenances thereof to, the said Everett Withee, his Heirs and Assigns, to their use and behoof forever. And I do covenant with the said Grantee, his Heirs and Assigns, that I am lawfully seized in fee of the premises; that they are free of all incumbrances; that I have good right to sell and convey the same to the said Grantee to hold as aforesaid. And that I and my heirs shall and will Warrant and Defend the same to the said Grantee, his Heirs and Assigns forever, against the lawful claims and demands of all persons.

In Witness Whereof, I the said Willard R. Ayers, and Flora M. Ayers wife of the said grantor joining in this deed as Grantor, and relinquishing and conveying my rights by descent and all my other rights in the above described premises have hereunto set our hands and seals this fifth day of November in the year of our Lord one thousand nine hundred and twelve

Signed, Sealed and Delivered In Presence of
M. E. Hunt

Willard R. Ayers Seal
Flora M. Ayers Seal

State of Maine. Kennebec, ss. November 5th, 1912.

Personally appeared the above named Willard R. Ayers and acknowledged the above instrument to be his free act and deed.

Before me, Mary E. Hunt, Authorized to Administer Oaths, etc.

Kennebec, ss. Received Nov. 11, 1912 at 8H. A.M.

Mailed Grantee Nov. 20-1912

372

380/372

Know all Men by these Presents, that

I, John F. Arnold of Augusta in the County of Kennebec and State of Maine,

in consideration of my valuable consideration,

paid by Juliet Arnold of said Augusta,

the receipt whereof I do hereby acknowledge, do hereby remise, release, bargain, sell and convey, and forever quit-claim unto the said Juliet Arnold, her

Heirs and Assigns forever, all my right, title and interest in and to a certain lot of land and buildings thereon, being the homestead farm of John Arnold late of said Augusta, deceased, and bounded Northerly by land of George L. Hardy, land of Eliza D. Cummings, and land formerly owned by George Gray, deceased; Easterly by the ravine or stream the first and second mile West of Kennebec river; Southerly by the eight rod road, so called, and land of Jonathan B. Pinkham; and Westerly by the Belgrade road, so called, and the ravine between the second and third mile West of Kennebec river, containing about one hundred and twenty acres, more or less; my said interest being one hundredth seventh part thereof - together with all my right, title and interest in said ravine.

To have and to hold the aforegranted and bargained premises, together with all the privileges and appurtenances thereunto belonging to the said Juliet Arnold, her Heirs and Assigns, forever. And I do covenant with the said Juliet Arnold, her Heirs and Assigns, that I will Warrant and forever Defend the same premises to the said Juliet Arnold, her Heirs and Assigns forever, against the lawful claims and demands of all persons claiming by, through or under me.

In Witness Whereof, I the said John F. Arnold,

have hereunto set my hand and seal this eighth day of May in the year of our Lord one thousand eight hundred and ninety-one.

Signed, Sealed and Delivered in presence of

[illegible]

John F. Arnold Seal.

State of Maine, Kennebec, ss. May 8th, 1891.

Personally appeared the above named John F. Arnold and acknowledged the above instrument to be his free act and deed.

Before me,

[illegible] Justice of the Peace.

Kennebec, ss. Received May 8, 1891, at 11 H. 45 M. A.M.

G R Smith Register.

Deld J. F. Arnold Nov. 22. 1897.

251 / 417

R. S. P. R. Stamp 50 cts.

KNOW ALL MEN BY THESE PRESENTS,

That We, Lydia M. Day, in her right & Daniel H. Day, her husband & Aralize M. Taylor as to her right of dower only, all of Augusta.

in consideration of the sum of three hundred & sixty five dollars

paid by Maranda Leighton, of Augusta, in the County of Kennebec.

the receipt whereof we do hereby acknowledge, do hereby give, grant, bargain, sell, and convey unto the said Maranda, her

Heirs and Assigns forever a certain piece of land in Augusta, in said County, on the west side of the river & west side of the road from Augusta to Belgrade & bounded as follows: Beginning at the west bank of the brook in the north line of the lot conveyed by Sarah & Anna B. Gale to Elias Taylor Jr. in 1840: thence Southerly in a straight line to the South line of said lot, to a large stone near the fence, to land owned by Wm Stone; thence westerly to the west line of said lot, to land owned by Reuben Wing; thence Northerly by said Wing's line to the North west corner of said lot herein conveyed, to land owned by Maranda Leighton; & thence by said Maranda's line to the point begun at, containing sixteen acres, more or less.

To have and to hold the aforegranted and bargained Premises, with all the privileges and appurtenances thereof, to the said Maranda, her Heirs and Assigns, to their use and behoof forever. And we do covenant with the said Maranda, her Heirs and Assigns, that we lawfully seized in fee of the Premises, that they are free of all incumbrances; that we have good right to sell and convey the same to the said Maranda to hold as aforesaid; and that we and our Heirs shall and will WARRANT AND DEFEND the same to the said Maranda, her Heirs and Assigns forever, against the lawful claims and demands of all persons.

In witness whereof, we the said Lydia M. Day & Daniel H. Day and Aralize M. Taylor wife of ~~the said~~ Alanson G. Taylor in testimony of her relinquishment of her right of dower in the above described premises, have hereunto set our hands and seals this eighteenth day of November in the year of our Lord one thousand eight hundred and sixty five.

Signed, Sealed, and Delivered, in the presence of,

Joseph Baker

Lydia M. Day (seal)
Daniel H. Day (seal)
Aralize M. Taylor (seal)

Kennebec, ss. November 18th 1865. Personally appeared the above named Aralize Taylor & Daniel H. Day and acknowledged the above Instrument to be their free act and deed. Before me,

Joseph Baker JUSTICE OF THE PEACE.

Kennebec, ss. Received November 20th 1865, at 11 H. 55 M. A. M. Entered and compared with the original, by

J. A. Reichards, REGISTER.

Know all Men by these Presents,

That We, Mary S. Woods & Samuel Woods Jr. of Augusta in the County of Kennebec & State of Maine;

in consideration of the sum of Thirteen hundred dollars paid by Mirenda Leighton of said Augusta, in said County and said State, Married Woman;

U.S.I.R. Stamps $2.70

the receipt whereof we do hereby acknowledge, do hereby give, grant, bargain, sell, and convey unto the said Mirenda Leighton in her right, her Heirs and Assigns forever A certain piece of land and the buildings thereon situate in said Augusta on the West side of the Kennebec River containing about forty five acres more or less, and bounded and described as follows, viz:— Beginning at the South West corner of land formerly owned by Thomas Fuller, and in the East line of the Rangeway, between the second and third miles West of said River; thence running Southerly in the East line of said range way about fifty eight rods to land owned by Samuel Shaw formerly; thence Easterly in the North line of the land formerly owned by said Shaw and continuing in the North line of land formerly owned by Silas Taylor deceased, about one hundred and thirty rods to the Meadow Brook so called; thence Northerly by said Brook about sixty rods to said Fuller's land; thence Westerly in the South line of said Fullers land about one hundred & twenty three rods to the bound begun at, being the same piece of land conveyed to said Mary S. Woods by Samuel Woods by deed dated March 17, 1860, recorded in Kennebec Registry Book 258 page 297.

To have and to hold the aforegranted and bargained Premises, with all the privileges and appurtenances thereof, to the said Mirenda Leighton in her right her Heirs and Assigns, to her their use and behoof forever. And we do covenant with the said Mirenda Leighton her Heirs and Assigns, that we are lawfully seized in fee of the Premises, that they are free of all incumbrances; that we have good right to sell and convey the same to the said Mirenda Leighton to hold as aforesaid; and that we and our Heirs shall and will WARRANT AND DEFEND the same to the said Mirenda Leighton her Heirs and Assigns forever, against the lawful claims and demands of all persons.

In witness whereof, We the said Mary S. Woods and Samuel Woods Jr. ~~the husband of the said in testimony of his relinquishment of his right of Dower in the said Premises~~ have hereunto set our hands and seals this Fourteenth day of April — in the year of our Lord one thousand eight hundred and sixty four,

Signed, Sealed and Delivered, in presence of

M. Cunningham

Mary S. Woods (Seal)
Samuel Woods Jr. (Seal)

Kennebec, ss. April 30th 1864 Personally appeared the above named Mary S. Woods & Samuel Woods Jr.

and acknowledged the above Instrument to be their free act and deed. Before me,

Melvin Cunningham, Justice of the Peace.

Kennebec, ss. Received April 30, 1864, at 4 H. 0 M. P. M. Entered and compared with the original, by

J. H. Richards, Register.

PUBLIC OR PRIVATE RIGHTS-OF-WAY - SECTION 5

No new public right-of-ways are proposed for this project. The Cemetery Access Road right-of-way is 60' wide, based upon the survey performed by Morin Land Surveying, which is included in this application.

SCHEDULE - SECTION 6

The current schedule calls for construction to begin in late 2015. Occupancy of the facility is expected to occur in 2017.

Maine Traffic Resources
25 Vine Street Gardiner, ME 04345
(207) 582-5252 FAX (207) 582-1677
mainetrafficresources.com

RECEIVED
JUN 10 2013
WBRC Architects/Engineers
PROJ#
FILE FOLDER#
CC:

LETTER OF TRANSMITTAL

Date: 6/6/13 Project: Augusta – MEANG JFHQ

Attention: Mr. A. Ray Bolduc, P.E.

RE: Section 7 of Traffic Movement Permit Application

WE ARE SENDING YOU ☐ Attached ☑ Enclosed

NUMBER	DESCRIPTION
1	Copy of Section 7 of Traffic Movement Permit Application

THESE ARE TRANSMITTED AS CHECKED BELOW:

☐ For review and approval ☑ For your information ☐ As requested
☐ For review and comment ☑ Other for your records

REMARKS

Hi Ray,

Enclosed you will find one copy of Section 7 (the traffic study) of the Traffic Movement Permit application for the Joint Forces Headquarters project in Augusta. I have also a copy directly to Normand Bouchard for his records. Copies were also sent directly to Lionel Cayer and Matt Nazar at the city. As always, don't hesitate to call me if you have any questions or need anything else.

COPY TO: File SIGNED: Diane W. Morabito

Diane W. Morabito, P.E. PTOE

Maine Traffic Resources
25 Vine Street Gardiner, ME 04345
(207) 582-5252 FAX (207) 582-1677
mainetrafficresources.com

June 6, 2013

Mr. David Allen, P.E.
Mid-Coast Region 2 Traffic Engineer
Maine Department of Transportation
45 Commerce Drive
98 State House Station
Augusta, ME 04333-0098

RE: Traffic Movement Permit Application for Proposed Joint Forces Headquarters Facility in Augusta

Dear David,

Enclosed you will find three copies of Section 7 of the Traffic Movement Permit application for the proposed Maine Army National Guard Joint Forces Headquarters facility in Augusta. I have also forwarded copies directly to Lionel Cayer, City Engineer, and Matt Nazar, City Planner. As you will see in the study we did not identify any capacity or queuing concerns other the existing constraint at Darin Drive, which will be corrected by the proposed signalization project.

I have also enclosed a DVD with the Synchro files for your use and review. Lastly, a check for the additional $ 1,500 application fee is enclosed. As always, please do not hesitate to contact me if you have any questions or need any additional information regarding the study or this application.

Sincerely,

Diane W. Morabito

Diane W. Morabito, P.E. PTOE
President

cc: A. Ray Bolduc, WBRC
Normand Michaud, MEARNG

Maine Traffic Resources
25 Vine Street Gardiner, ME 04345
(207) 582-5252 FAX (207) 582-1677
mainetrafficresources.com

June 6, 2013

Mr. Matt Nazar
Deputy Director of Development Services
City Center Plaza
16 Cony Street
Augusta, ME 04330

RE: Section 7 Traffic Study - Traffic Movement Permit Application for Proposed Joint Forces Headquarters facility on Civic Center Drive

Dear Matt:

Enclosed you will find a copy of Section 7 (the traffic study) of the Traffic Movement Permit application for the Maine Army National Guard Joint Forces Headquarters facility, which is being submitted to the Maine Department of Transportation. As you know, it is required that a copy of the application and all supporting materials be filed at the municipal office so that members of the public can review the application. I have also forwarded a copy directly to Lionel Cayer for his information. As always, please don't hesitate to contact me if you have any questions regarding this study.

Sincerely,

Diane W. Morabito

Diane W. Morabito, P.E. PTOE
President

cc: A. Ray Bolduc, WBRC
Normand Michaud, MEARNG

Maine Traffic Resources
25 Vine Street Gardiner, ME 04345
(207) 582-5252 FAX (207) 582-1677
mainetrafficresources.com

June 6, 2013

Mr. Lionel Cayer, P.E.
Director of Engineering
City Center Plaza
16 Cony Street
Augusta, ME 04330

RE: Section 7 Traffic Study - Traffic Movement Permit Application for Proposed Joint Forces Headquarters facility on Civic Center Drive

Dear Lionel:

Enclosed you will find a copy of Section 7, the traffic study, of the Traffic Movement Permit application for the Maine Army National Guard Joint Forces Headquarters facility, which is being submitted to the Maine Department of Transportation. As you know, it is required that a copy of the application and all supporting materials be filed at the municipal office so that members of the public can review the application. I have also forwarded a copy directly to Matt Nazar for his information. As always, please don't hesitate to contact me if you have any questions regarding this study.

Sincerely,

Diane W. Morabito

Diane W. Morabito, P.E. PTOE
President

cc: A. Ray Bolduc, WBRC
Normand Michaud, MEARNG

PROPOSED JOINT FORCES HEADQUARTERS
AUGUSTA, MAINE

TRAFFIC MOVEMENT PERMIT APPLICATION
SECTION 7 – TRAFFIC STUDY

Submitted to:
MAINE DEPARTMENT OF TRANSPORTATION

June, 2013

Applicant:
Maine Army National Guard
Building # 8, Camp Keyes
33 State House Station
Augusta, ME 04333-0033

Maine Traffic Resources

25 Vine Street Gardiner, ME 04345
(207) 582-5252 FAX (207) 582-1677
mainetrafficresources.com

PROPOSED JOINT FORCES HEADQUARTERS
AUGUSTA, MAINE

TRAFFIC MOVEMENT PERMIT APPLICATION
SECTION 7 – TRAFFIC STUDY

Submitted to:
MAINE DEPARTMENT OF TRANSPORTATION

June, 2013

STATE OF MAINE
DIANE W. MORABITO
No. 5077
LICENSED
PROFESSIONAL ENGINEER

Diane Morabito
6/6/13

Applicant:
Maine Army National Guard
Building # 8, Camp Keyes
33 State House Station
Augusta, ME 04333-0033

Maine Traffic Resources
25 Vine Street Gardiner, ME 04345
(207) 582-5252 FAX (207) 582-1677
mainetrafficresources.com

Introduction

The purpose of this report is to summarize the traffic study components requested by the Maine Department of Transportation (MaineDOT) during the Scoping Meeting for a Traffic Movement Permit (TMP) for the proposed Joint Force Headquarters facility on Civic Center Drive in Augusta, Maine. The Scoping Meeting was held on May 29, 2013 at 1:00 PM at Augusta City Center.

A. Study Preparation

This study was prepared by Diane W. Morabito, Maine P.E. # 5077 and PTOE # 571.

B. Study Horizon

2017 was selected as the study year for traffic analysis purposes given the intended construction schedule and occupancy date.

C. Site and Traffic Information

The site is located on the easterly side of Civic Center Drive, just north of Darin Drive, in front of the Veteran's Cemetery, as shown on the map in Figure 1. The portion of the site that is going to be developed is currently vacant of any development.

The proposed building will be two stories in height, with an initial total square footage (S.F.) of 99,883. The initial building is expected to provide for 181 occupants. A Phase II expansion will increase the building size by 9,238 S.F., providing for 42 additional occupants. Lastly, a potential future addition of 24,970 S.F. with an estimated occupant increase of 62 would bring the total facility to 134,091 S.F. with 268 occupants at full-build.

The number of trips to be generated by the joint forces headquarters facility was estimated using the Institute of Transportation Engineers (ITE) "Trip Generation, 7th Edition", the edition currently being used by the Maine Department of Transportation (MaineDOT) for traffic permitting purposes. The trips were estimated on the basis of both square footage and employees using land use code (LUC) 710 – General Office Building. The results are summarized for the initial construction (99,883 S.F. with 181 occupants) as well as for build conditions (134,091 S.F. with 268 occupants) in the following table:

ITE Projected Trip Generation (one-way trip ends)

Time Period	Initial Project S.F.	Initial Project Employees	Full-Build S.F.	Full-Build Employees
Weekday	1,100	600	1,476	890
AM Peak Hour	155	87	208	129
Entering	136	77	183	114
Exiting	19	10	25	15
PM Peak Hour	149	83	200	123
Entering	25	14	34	21
Exiting	124	69	166	102

As can be seen above, the ITE results based upon square footage yielded much greater trip estimates. Since these higher numbers, obtained based upon square footage, are close to what the Maine Army National Guard projects for peak hour trips they will be used as the basis of this application and for the ensuing traffic study. The initial headquarters facility is expected to generate 155 one-way trips during the weekday AM peak hour and 149 PM peak hour trips. At full-build out the facility will generate 208 AM peak hour trips and 200 PM peak hour trips.

The proposed project will require a Traffic Movement Permit (TMP) from the Maine Department of Transportation (MaineDOT) since trip generation will exceed the 100-trip permit threshold. Since new trip generation will exceed 200 trips a full traffic study will be required for the state traffic permitting process. Based upon information provided by the National Guard, the headquarters facility will generate similar traffic volumes on weekdays and during weekend drills. Given this, it was determined in a preliminary meeting with MaineDOT that the analysis period would focus upon the weekday PM peak hour.

D. Trip Assignments

The trip assignments were based upon the traffic patterns recorded in the area during turning movement counts. PM peak hour turning movement counts were conducted at the following intersections on the noted dates:

Civic Center Drive Intersection	Date	Peak Hour
Leighton Road	Tuesday, June 5, 2012	4:15 – 5:15
Darin Drive and Cemetery Entrance	Wednesday, June 20, 2012	3:45 – 4:45
I-95 Northbound Ramps	Tuesday, June 12, 2102	4:30 – 5:30
I-95 Southbound Ramps	Tuesday, June 19, 2012	4:15 – 5:15
Irving Drive and Comfort Inn Drive	Thursday, May 30, 2013	4:15 – 5:15

The counts were factored using Maine Department of Transportation (MaineDOT) group mean factors to reflect 30th highest hour volumes, the hourly volumes used for design and traffic analysis purposes. These 30th highest hour volumes generally occur during peak summer conditions, in late July/early August, in Maine. The resulting volumes, expected to be representative of peak summer 2012 conditions, are shown in Figure 2.

The trips were assigned to the study area based upon the traffic patterns recorded during the turning movement counts. These patterns are summarized below:

Origin/Destination	Percentage
To and From North on Civic Center Drive	20 %
To and From South on I-95	30 %
To and From North on I-95	20 %
To and From South on Civic Center Drive	25 %
To and From Southwest via Darin Drive	5 %

The resulting trip assignments are shown in Figure 3. The study area for capacity purposes was determined at the Scoping Meeting based upon these trip assignments, extending from the I-95 northbound ramp intersection northerly along Civic Center Drive to the Leighton Road intersection.

E. Traffic Volumes

Existing average annual daily traffic (AADT) data for the vicinity was obtained from "Traffic Volume Counts, 2012, 2011 and 2006 Annual Reports", published by MaineDOT. This data is summarized below:

	Average Annual Daily Traffic						
Location	2003	2005	2006	2007	2008	2010	2011
Civic Center Drive, north of Townsend Road	16790	15180	15110	14490	15500	---	12930
Civic Center Drive, north of I-95 NB ramps	---	---	---	20250	---	---	18410
Civic Center Drive, south of I-95 SB ramps	19090	18490	20210	---	---	---	---
Civic Center Drive, north of Darin Drive	---	----	---	13260	---	---	---
Civic Center Drive, south of Leighton Road	---	---	---	12840	---	---	---
Civic Center Drive, south of Bog Road	11890	12360	12940	---	11590	---	11180

As can be seen above, annual daily traffic volumes on Civic Center Drive in this area have consistently declined during the period 2003 to 2011. The counts also do not show any growth during the more recent 2007 to 2011 period. Given the historical growth, and to be conservative, a 1/2 % annual traffic growth rate was used to project the 2012 volumes to existing 2013 conditions and to base 2017 conditions. The 2013 volumes, expected to be representative of existing conditions, are shown in Figure 4.

The City of Augusta Planning Department was contacted to determine if there are any other proposed or approved developments that are expected to significantly impact study area traffic volumes. Three other development projects were identified that are expected to impact Civic Center Drive volumes. The first is the new MaineGeneral hospital, which is under construction on Old Belgrade Road. The second is a new office building being constructed at the Commerce Center off Belgrade Road. The trips for MaineGeneral were obtained from the traffic impact study prepared by Gorrill-Palmer Consulting Engineers, Inc. The trips for the Commerce Center building were estimated based upon information provided by Eaton Traffic Engineering and the City of Augusta using LUC 770 – Business Park. The third development project is a new Skowhegan Savings Bank branch, which is currently under construction just north of Leighton Road. The trips to be generated by this branch bank were obtained from the traffic impact study prepared by Maine Traffic Resources. Lastly, the proposed changes in volumes due to the new Exit 113 interchange, which is currently under construction, need to be considered. These trips were also obtained from the traffic study prepared by Gorrill-Palmer for MaineGeneral. All of these other development trips are shown in Figure 5.

The projected 2017 no-build volumes, allowing for both annual traffic growth and the other developments to be fully occupied, are shown in Figure 6. For 2017 build volumes, the site drive (and Veteran's Cemetery drive) is aligned with Darin Drive, forming a four-way intersection. The primary drive for the adjacent Comfort Inn and Ninety-Nine Restaurant is assumed to be relocated to connect to the new signalized site drive intersection. A right-turn only entrance will remain on Civic Center Drive for the existing Comfort Inn development. The resulting full build volumes are shown in Figure 7.

F. Capacity Analysis

Traffic operations are evaluated in terms of level of service (LOS). Level of service is a qualitative measure that describes operations by letter designation. The levels range from A - very little delay to F - extreme delays. Level of service "D" is generally considered acceptable in urban locations while LOS "E" is generally considered the capacity of a facility and the minimum tolerable level. The level of service for signalized intersections is based upon the average control or signal delay per vehicle. These criteria are defined in the following table excerpted from the 2000 "Highway Capacity Manual":

Signalized Intersection Level of Service

LOS	Delay Range
A	<= 10.0 seconds
B	> 10.0 and <= 20.0
C	> 20.0 and <= 35.0
D	> 35.0 and <= 55.0
E	> 55.0 and <= 80.0
F	> 80.0

The level of service for unsignalized intersections is based upon average control delay per vehicle for each minor, opposed movement, as defined in the following table:

Unsignalized Intersection Level of Service

LOS	Delay Range
A	<= 10.0 seconds
B	> 10.0 and <= 15.0
C	> 15.0 and <= 25.0
D	> 25.0 and <= 35.0
E	> 35.0 and <= 50.0
F	> 50.0

Unsignalized Intersection Analyses

The level of service was calculated for the unsignalized intersection of Civic Center Drive and Darin Drive for existing 2013 and projected 2017 no-build conditions using HCS+ software. The 2017 build conditions are evaluated later assuming that this intersection is signalized since MaineDOT intends to signalize this intersection given its historically failing level of service. The results are summarized with the LOS followed by the delay, in seconds, in parentheses as follows:

Civic Center Drive and Darin Drive
PM Peak Hour Level of Service

Approach/Movement	2013 Existing	2017 No-Build
Eastbound Darin Drive Lefts	F (72.8)	F (91.8)
Eastbound Darin Drive Rights	E (47.7)	F (69.7)
Eastbound Overall	F (50.9)	F (72.6)
Northbound CCD Lefts	B (10.4)	B (10.9)

As can be seen above, the unsignalized intersection is currently operating at a poor level of service with volumes exceeding capacity, resulting in unacceptable conditions and long delays. Left-turns exiting Darin Drive operate at LOS "F", over capacity, and have been at this level for many years. Under projected 2017 no-build volumes right-turns are also projected to be at LOS "F". Under build conditions, the intersection will be a four-way signalized intersection addressing this existing capacity constraint.

Northbound CCD Lefts onto Leighton	B (10.6)	B (13.0)	B (13.2)
Northbound Through/Rights	B (11.0)	B (11.5)	B (12.1)
Northbound CCD Overall	B (10.9)	B (11.6)	B (12.1)
Southbound CCD Throughs/Lefts	B (19.4)	C (24.0)	C (24.7)
Southbound Rights onto Leighton	B (11.4)	B (12.1)	B (12.1)
Southbound CCD Overall	B (17.4)	C (20.9)	C (21.4)
Overall Intersection	**B (20.7)**	**C (23.4)**	**C (23.6)**

As can be seen above, all lane movements at all off-site signalized intersections within the study area are projected to operate at acceptable levels of service, "D" or better, under 2017 build volumes. The Synchro analysis shows similar levels of service and minimal increases in delay at these signalized study area intersections, illustrating that the new Joint Forces Headquarters will have no significant impact on off-site traffic operations.

The proposed signalized site drive intersection, opposite Darin Drive, was evaluated assuming existing intersection lanes and usages. The results for this analysis are summarized below:

	Civic Center Drive, Darin Drive and Site Drive PM Peak Hour Level of Service
Approach/Movement	2017 Build
Eastbound Darin Drive Throughs/Lefts	D (40.7)
Eastbound Darin Drive Rights	D (53.4)
Eastbound Darin Drive Overall	D (51.7)
Westbound Site Drive Lefts	C (34.2)
Westbound Site Drive Throughs/Rights	C (30.0)
Westbound Site Drive Overall	C (33.2)
Northbound CCD Lefts	A (8.8)
Northbound CCD Throughs/Rights	A (7.8)
Northbound Overall	A (8.0)
Southbound CCD	D (37.4)
Overall Intersection	**C (30.0)**

As can be seen above, the intersection, which is currently failing under unsignalized conditions, will operate at acceptable levels of service under signal control with the addition of the combined Joint Forces Headquarters drive, the Veteran's Cemetery volumes and the relocated Comfort Inn drive volumes. This analysis assumed that no new turn lanes are added to Civic Center Drive. The addition of other turn lanes on Civic Center Drive would be expected to result in even better overall operations. The site drive was assumed to provide dual exit lanes, a left-turn lane and a through/right turn lane, for this analysis.

Queue Analyses

Queue analysis was also performed for the signalized study area intersections to assure that the existing turn-lane lengths are adequate to store the projected queues and to assure that queuing from one intersection does not spillback into another. The analysis was also performed using Synchro 7. The results are summarized in the following tables:

Civic Center Drive and I-95 Northbound Ramps
PM Peak Hour 95th Percentile Queue Lengths

Approach/Movement	Available Storage	2013 Existing	2017 No-Build	2017 Build
Eastbound Right Turn Off-Ramp	150' +	40'	45'	50'
Southbound CCD Throughs	500' +	85'	95'	100'

Civic Center Drive and I-95 Southbound Ramps
PM Peak Hour 95th Percentile Queue Lengths

Approach/Movement	Available Storage	2013 Existing	2017 No-Build	2017 Build
Westbound Left Turn Off-Ramp	150'	75'	75'	75'
Northbound CCD Lefts	400' +	80'	95'	125'
Northbound CCD Throughs	400' +	240'	250'	260'
Southbound CCD Throughs	400' +	220'	250'	255'

Civic Center Drive, Darin Drive and Site Drive
PM Peak Hour 95th Percentile Queue Lengths

Approach/Movement	Available Storage	2013 Existing	2017 No-Build	2017 Build
Eastbound Darin Drive Lefts	300'	55'	65'	---
Eastbound Darin Drive Rights	300'	195'	250'	110'
Eastbound Darin Drive Throughs/Lefts	300'	---	---	55'
Westbound Site Drive Lefts	150'	---	---	140'
Westbound Site Drive Throughs/Rights	150'	---	---	35'
Northbound CCD Lefts	150'	20'	20'	35'
Northbound CCD Throughs	400'	---	---	140'
Southbound CCD Throughs	---	---	---	785'

Civic Center Drive and Leighton Road
PM Peak Hour 95th Percentile Queue Lengths

Approach/Movement	Available Storage	2013 Existing	2017 No-Build	2017 Build
Eastbound Leighton Through/Lefts	---	255'	280'	280'
Eastbound Rights	150'	30'	30'	30'
Westbound Drive	100' +	20'	20'	20'
Northbound CCD Lefts	200'	20'	20'	20'
Northbound Through/Rights	---	260'	270'	295'
Southbound CCD Through/Lefts	---	410'	480'	500'
Southbound Rights	150'	55'	65'	65'

The preceding queue analysis did not identify any queuing concerns. All existing turn-lane storage lengths are adequate to store the projected queues. No Civic Center Drive through queues are expected to impact upon other intersections. The queue analysis shows that dual exit lanes should be provided on the westbound site drive approach for a minim of 150'.

G. Traffic Signals

No traffic signal warrant analysis was requested at the Scoping Meeting.

H. Sight Distance Analysis

No additional sight distance analysis was requested at the Scoping Meeting.

I. Traffic Accidents

No additional traffic accident analysis was requested at the Scoping Meeting.

J. Recommendations

The traffic study did not identify any capacity constraints except for the existing unsignalized intersection of Civic Center Drive and Darin Drive. The proposed MaineDOT improvement project, which will signalize this intersection, will address this existing capacity constraint. It is understood that the Joint Force Headquarters project will pay an impact fee to MaineDOT to assist in the costs of the intersection improvements and to mitigate their impact on the overall intersection. The site drive should provide dual exit lanes for a minimum of 150' based upon the results of the Synchro capacity and queuing analysis

K. Conclusion

Safe and efficient operations should be provided on Civic Center Drive with the site drive located opposite Darin Drive and with the proposed MaineDOT signalization of this intersection.

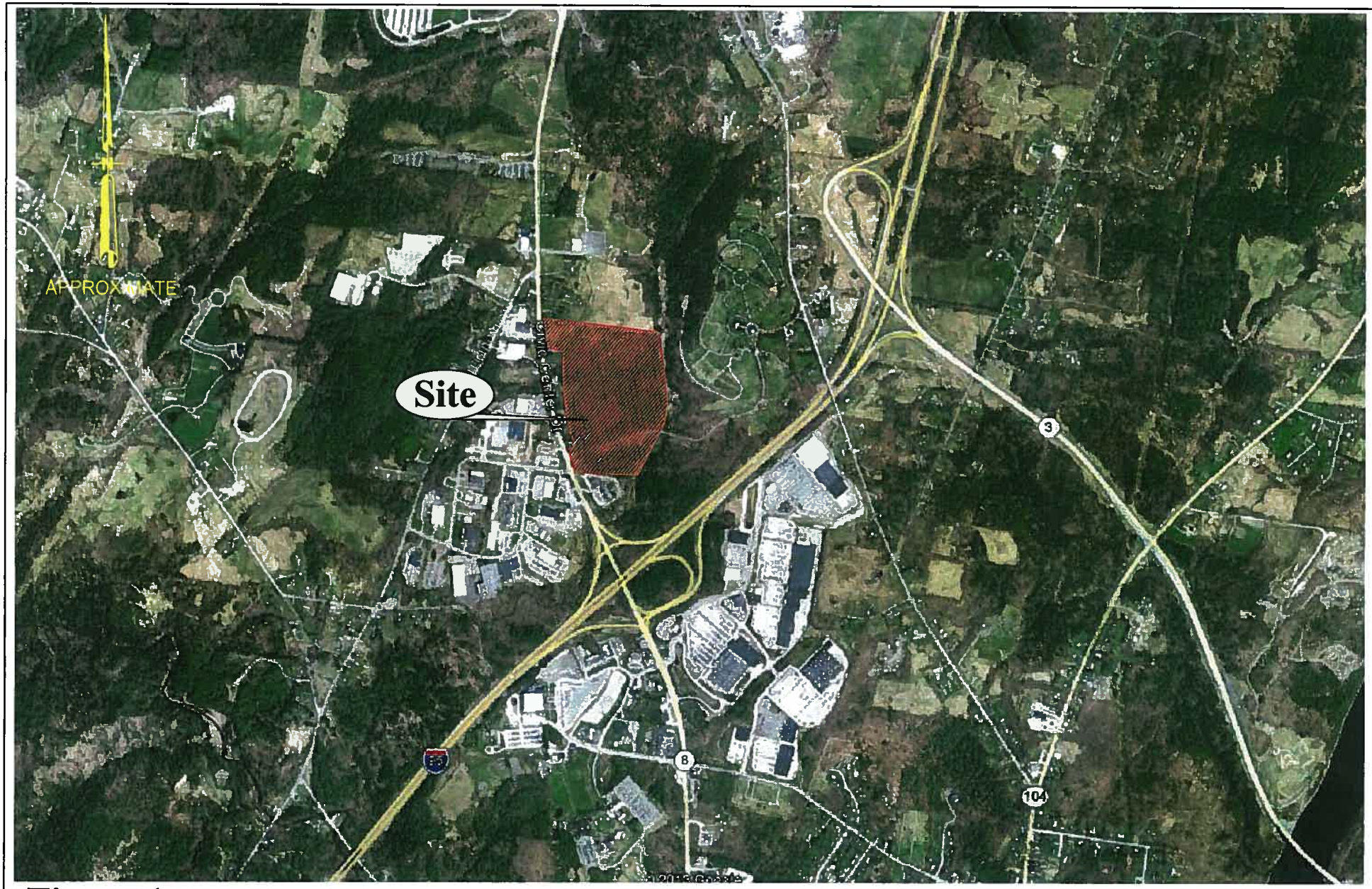


Figure 1

Site Location

Joint Forces Headquarters

Augusta, Maine

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677

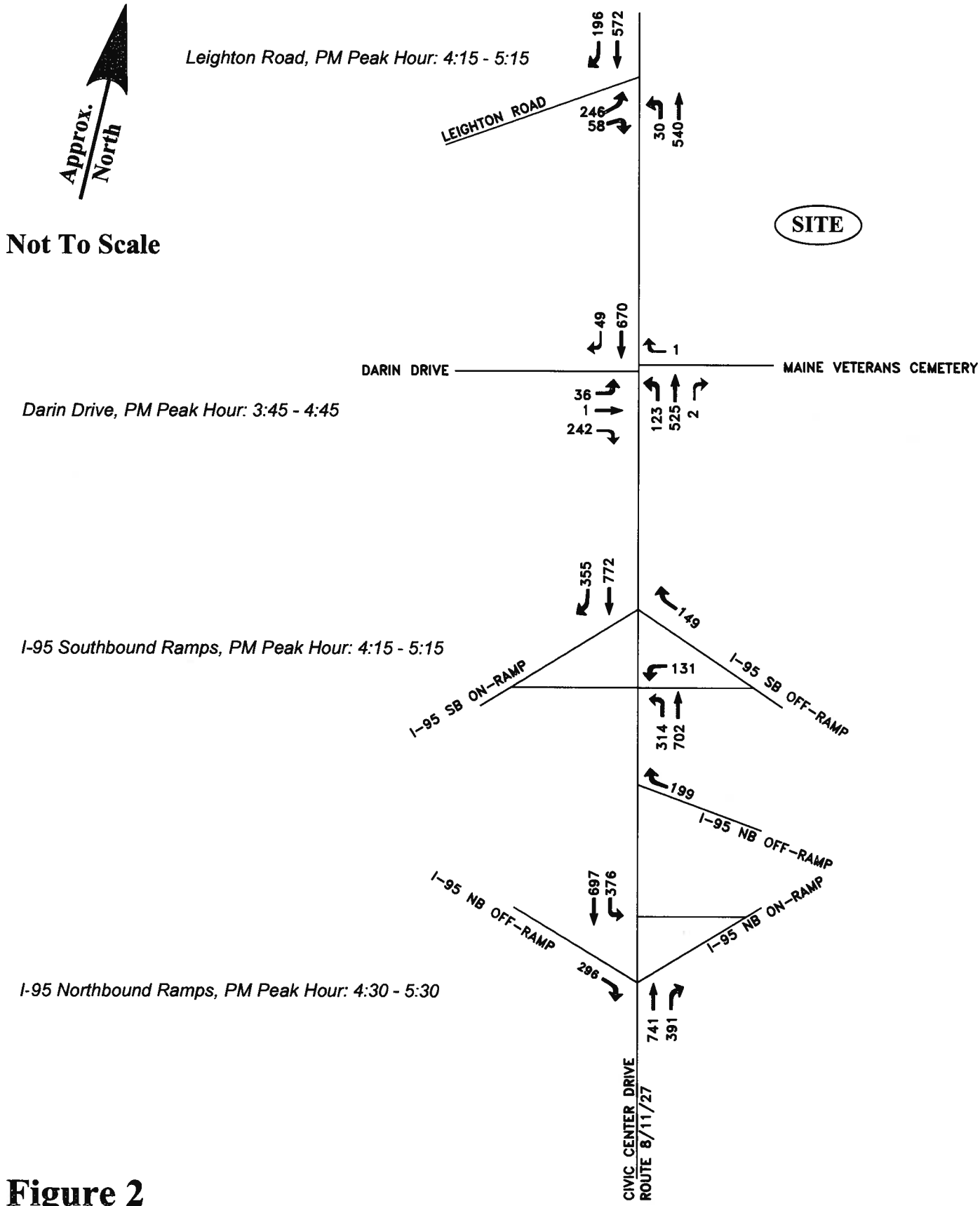


Figure 2

2012 PM Peak Hour
Joint Forces Headquarters
30th Highest Hour Volumes

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677

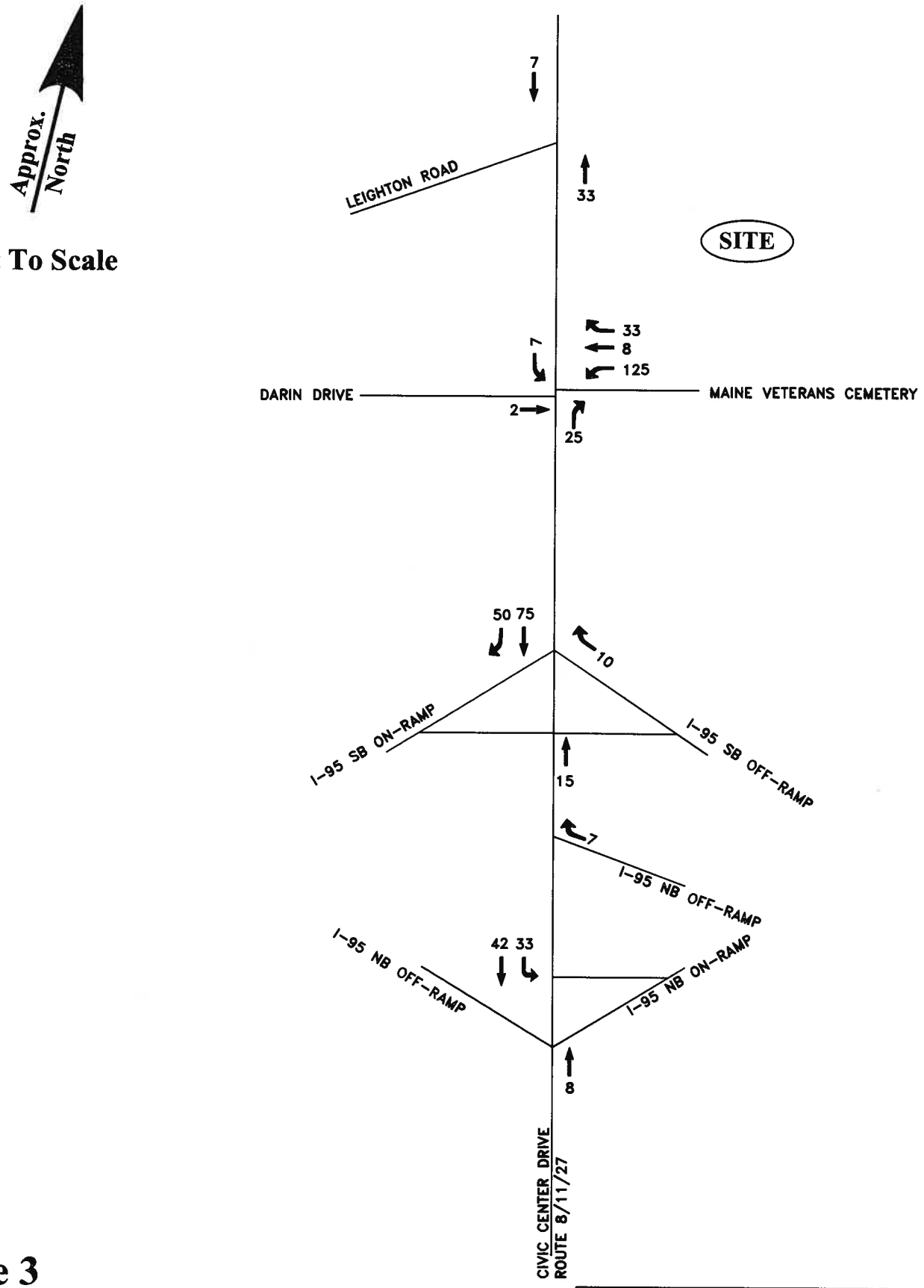


Figure 3

PM Peak Hour
Trip Assignments
Augusta, JFHQ

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677

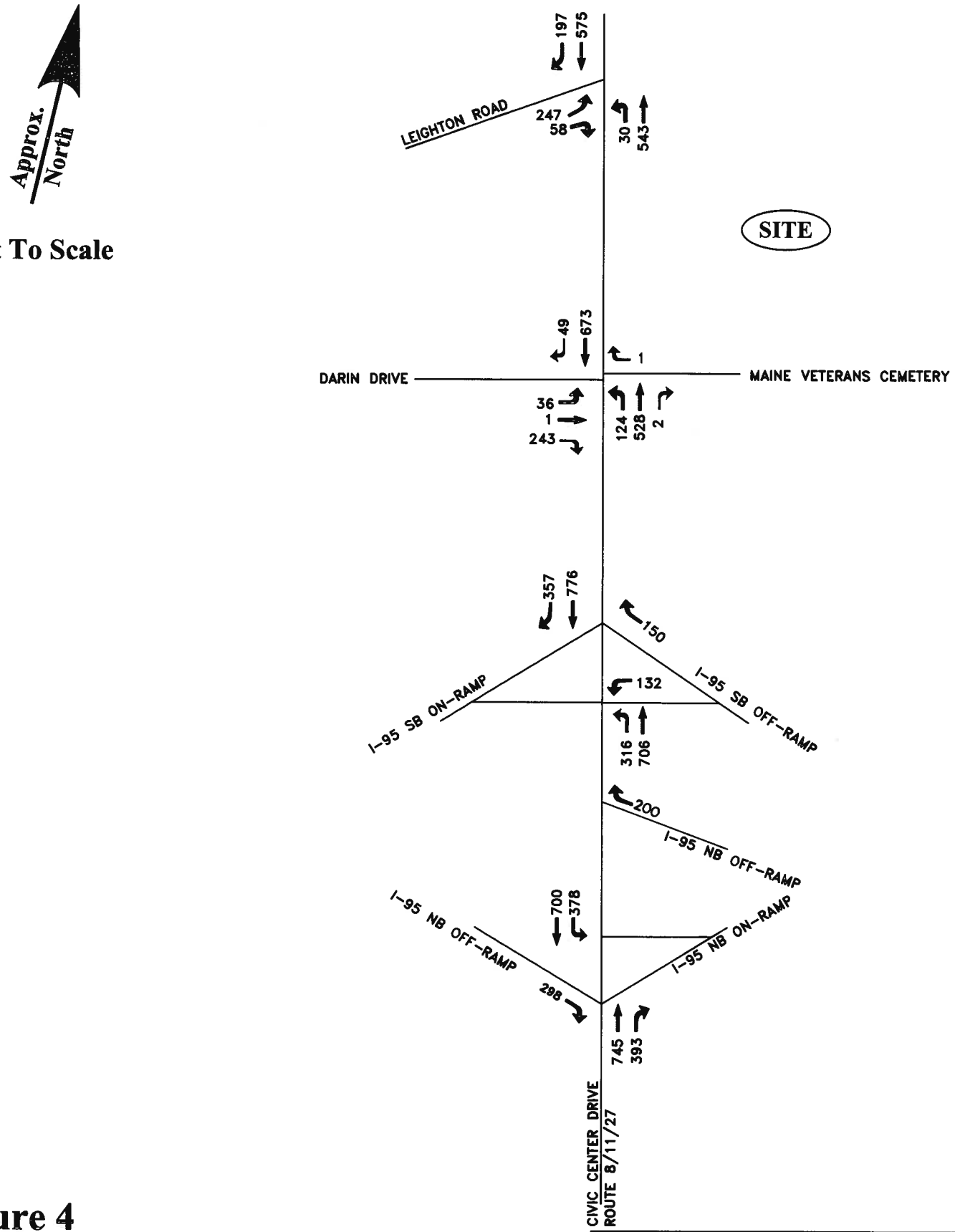
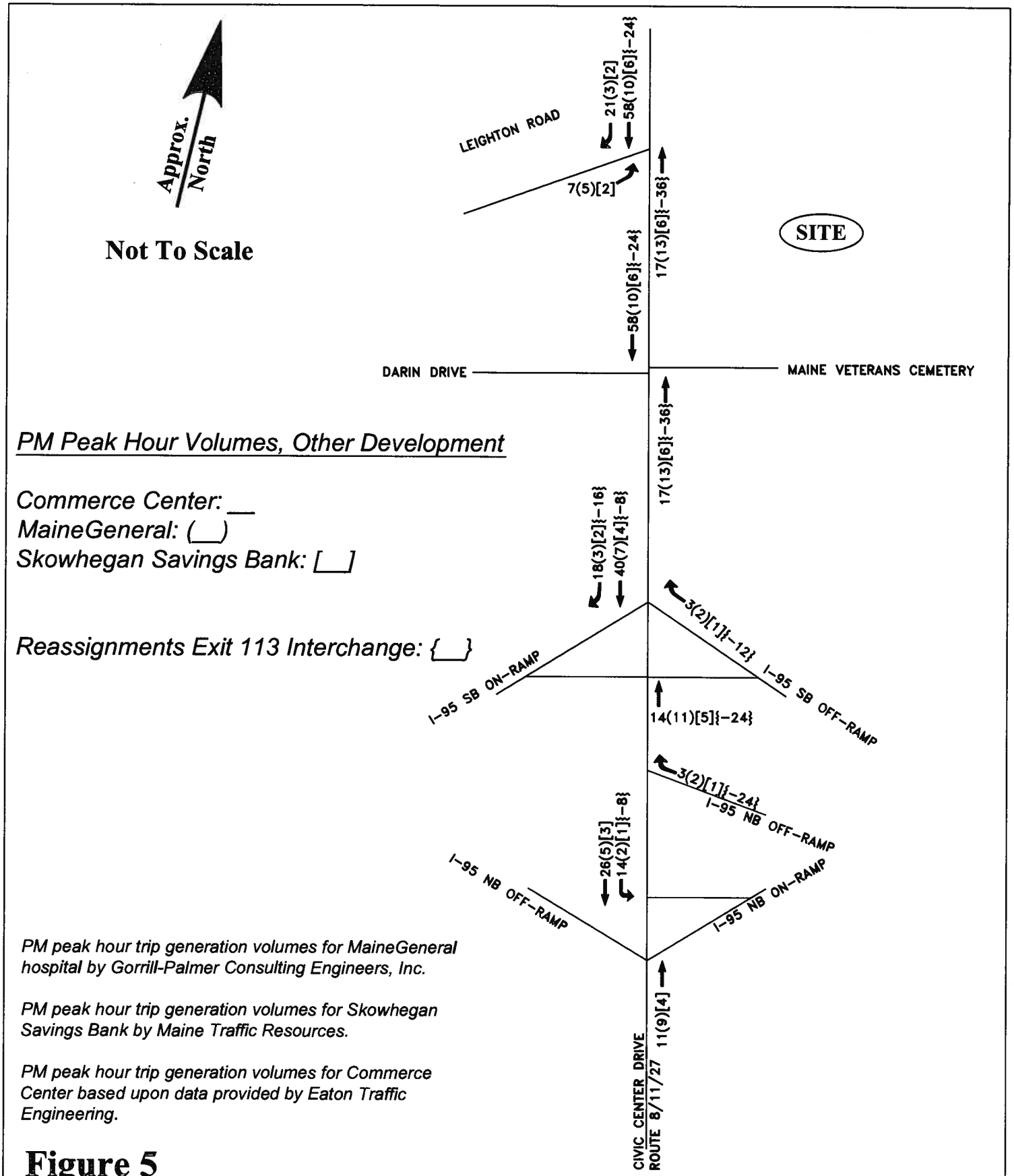


Figure 4

Existing 2013 PM Peak Hour
Joint Forces Headquarters
Augusta, Maine

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677



PM peak hour trip generation volumes for MaineGeneral hospital by Gorrill-Palmer Consulting Engineers, Inc.

PM peak hour trip generation volumes for Skowhegan Savings Bank by Maine Traffic Resources.

PM peak hour trip generation volumes for Commerce Center based upon data provided by Eaton Traffic Engineering.

Figure 5

Other Development Volumes
Joint Forces Headquarters
Augusta, Maine

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677

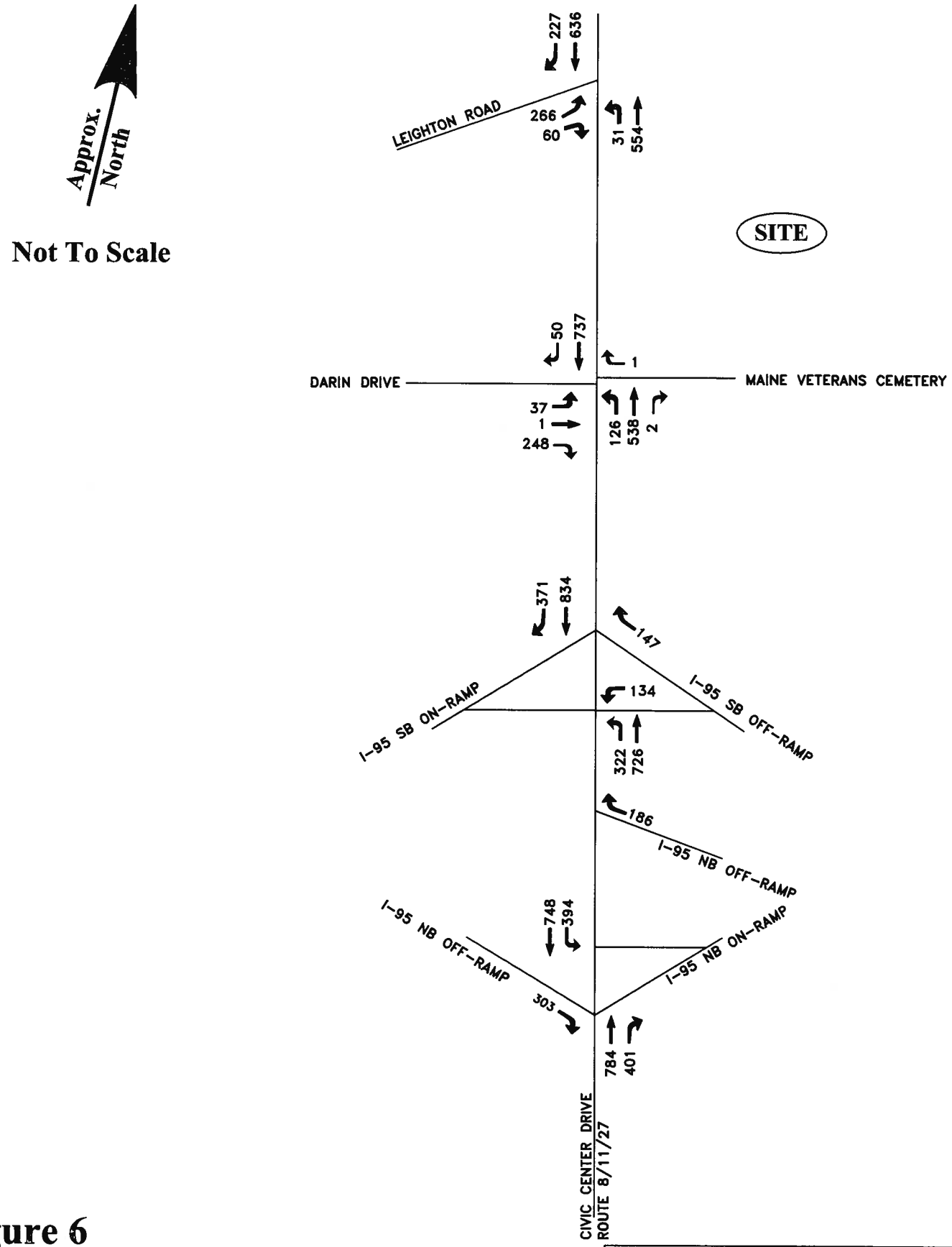


Figure 6

2017 PM Peak Hour, No-Build

Joint Forces Headquarters

Augusta, Maine

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677

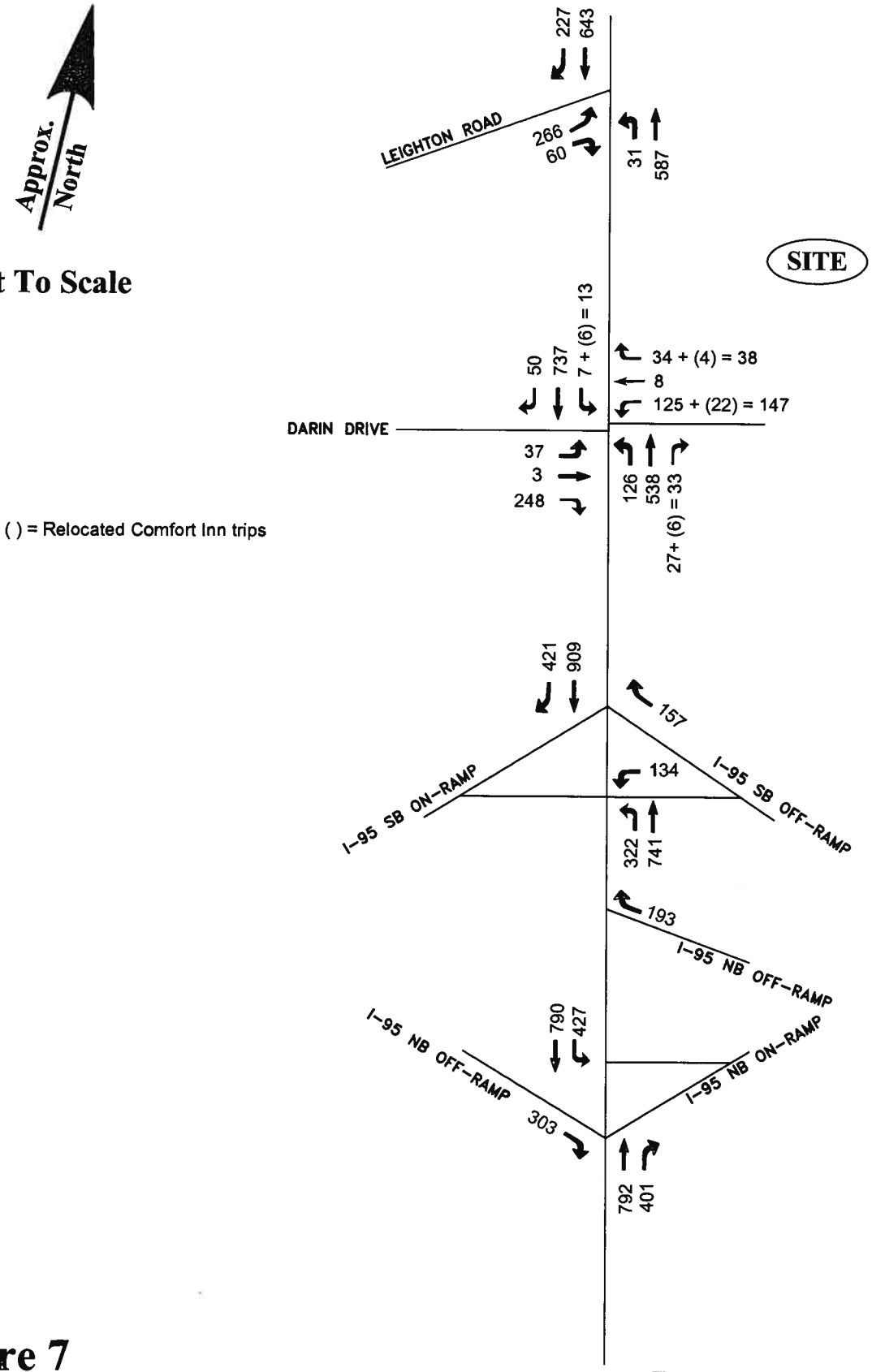


Figure 7

2017 PM Peak Hour, Build
Joint Forces Headquarters
Augusta, Maine

Maine Traffic Resources
25 Vine Street
Gardiner, ME
04345
tel: (207) 582-5252
fax: (207) 582-1677

APPENDIX

Turning Movement Counts

Capacity and Queue Analysis

Maine Traffic Resources
25 Vine Street
Gardiner, ME 04345
mainetrafficresources.com

Civic Center Drive and 95 NB Ramps
Augusta
MRD/AC
Partly Cloudy

File Name : AugustaJFHQ95NBPMCombine
Site Code : 22222222
Start Date : 6/12/2012
Page No : 1

Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Civic Center Drive From North					95 NB Ramp to Civic Center Drive From East					Civic Center Drive From South					95 NB Ramp to Civic Center Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
03:00 PM	1	132	47	0	180	31	0	0	0	31	52	164	0	0	216	52	0	0	0	52	479
03:15 PM	0	121	48	0	169	39	0	0	0	39	67	168	0	2	237	46	0	0	1	47	492
03:30 PM	0	172	80	0	252	57	0	0	0	57	81	170	0	0	251	50	0	0	0	50	610
03:45 PM	0	143	52	0	195	49	0	0	0	49	91	149	0	1	241	63	0	0	4	67	552
Total	1	568	227	0	796	176	0	0	0	176	291	651	0	3	945	211	0	0	5	216	2133
04:00 PM	0	181	81	0	262	43	0	1	0	44	85	220	0	0	305	49	0	0	2	51	682
04:15 PM	0	130	66	0	196	45	0	0	0	45	77	189	0	0	266	60	0	0	0	60	567
04:30 PM	0	181	91	0	272	39	0	0	0	39	113	184	0	0	297	69	0	0	2	71	679
04:45 PM	0	156	73	0	229	45	0	0	0	45	69	160	0	0	229	59	0	0	0	59	562
Total	0	648	311	0	959	172	0	1	0	173	344	753	0	0	1097	237	0	0	4	241	2470
05:00 PM	0	207	96	0	303	44	0	0	0	44	80	184	0	0	264	69	0	0	0	69	680
05:15 PM	0	172	61	0	233	49	0	0	0	49	70	197	0	0	267	59	0	0	2	61	610
05:30 PM	0	159	52	0	211	55	0	0	0	55	83	142	0	0	225	57	0	0	0	57	546
05:45 PM	0	128	37	1	166	46	0	0	0	46	57	132	0	1	190	77	0	0	1	78	480
Total	0	666	246	1	913	194	0	0	0	194	290	655	0	1	946	262	0	0	3	265	2318
Grand Total	1	1882	784	1	2668	542	0	1	0	543	925	2059	0	4	2988	710	0	0	12	722	6921
Apprch %	0.0	70.5	29.4	0.0		99.8	0.0	0.2	0.0		31.0	68.9	0.0	0.1		98.3	0.0	0.0	1.7		
Total %	0.0	27.2	11.3	0.0	38.5	7.8	0.0	0.0	0.0	7.8	13.4	29.8	0.0	0.1	43.2	10.3	0.0	0.0	0.2	10.4	

	Civic Center Drive From North					95 NB Ramp to Civic Center Drive From East					Civic Center Drive From South					95 NB Ramp to Civic Center Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	04:30 PM																				
Volume	0	716	321	0	1037	177	0	0	0	177	332	725	0	0	1057	256	0	0	4	260	2531
Percent	0.0	69.0	31.0	0.0		100.0	0.0	0.0	0.0		31.4	68.6	0.0	0.0		98.5	0.0	0.0	1.5		
05:00 Volume	0	207	96	0	303	44	0	0	0	44	80	184	0	0	264	69	0	0	0	69	680
Peak Factor																					0.931
High Int.	05:00 PM					05:15 PM					04:30 PM					04:30 PM					
Volume	0	207	96	0	303	49	0	0	0	49	113	184	0	0	297	69	0	0	2	71	
Peak Factor					0.856					0.903					0.890					0.915	

740 370 204 383 750 295

Civic Center Drive: GRD I: $\frac{0.90}{0.87}$ = 1.034

I-95 Ramps: ATR = 1.153

Maine Traffic Resources
25 Vine Street
Gardiner, ME 04345
mainetrafficresources.com

Civic Center Drive and 95 SB Ramps
Augusta
MRD/AC
Clear

File Name : AugustaJFHQ95SBPMCombine
Site Code : 77777777
Start Date : 6/19/2012
Page No : 1

Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Civic Center Drive From North					95 SB Ramp to Civic Center Drive From East					Civic Center Drive From South					95 SB Ramp to Civic Center Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
03:00 PM	62	147	0	0	209	31	0	28	0	59	0	154	59	0	213	0	0	0	0	0	481
03:15 PM	63	152	0	0	215	29	0	25	0	54	0	136	46	0	182	0	0	0	1	1	452
03:30 PM	68	168	0	0	236	35	1	29	0	65	0	157	52	1	210	0	0	0	0	0	511
03:45 PM	84	166	0	1	251	45	0	14	0	59	0	142	52	0	194	0	0	0	0	0	504
Total	277	633	0	1	911	140	1	96	0	237	0	589	209	1	799	0	0	0	1	1	1948
04:00 PM	81	232	0	0	313	40	0	25	0	65	0	153	55	0	208	0	0	0	1	1	587
04:15 PM	75	164	0	2	241	31	0	31	0	62	0	154	50	0	204	0	0	0	0	0	507
04:30 PM	93	207	0	0	300	41	0	31	0	72	0	170	76	0	246	0	0	0	0	0	618
04:45 PM	61	149	0	1	211	30	0	32	0	62	0	149	66	1	216	0	0	0	1	1	490
Total	310	752	0	3	1065	142	0	119	0	261	0	626	247	1	874	0	0	0	2	2	2202
05:00 PM	79	227	0	1	307	27	0	20	0	47	0	206	80	0	286	0	0	0	0	0	640
05:15 PM	50	152	0	0	202	45	0	35	0	80	0	165	51	0	216	0	0	0	1	1	499
05:30 PM	40	148	0	0	188	23	0	31	0	54	0	146	42	0	186	0	0	0	0	0	430
05:45 PM	30	99	0	0	129	23	0	14	0	37	0	110	47	0	157	0	0	0	0	0	323
Total	199	626	0	1	826	118	0	100	0	218	0	627	220	0	847	0	0	0	1	1	1892
Grand Total	786	2011	0	5	2802	400	1	315	0	716	0	1842	676	2	2520	0	0	0	4	4	6042
Apprch %	28.1	71.8	0.0	0.2		55.9	0.1	44.0	0.0		0.0	73.1	26.8	0.1		0.0	0.0	0.0	100.0		
Total %	13.0	33.3	0.0	0.1	46.4	6.6	0.0	5.2	0.0	11.9	0.0	30.5	11.2	0.0	41.7	0.0	0.0	0.0	0.1	0.1	

	Civic Center Drive From North					95 SB Ramp to Civic Center Drive From East					Civic Center Drive From South					95 SB Ramp to Civic Center Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	04:15 PM																				
Volume	308	747	0	4	1059	129	0	114	0	243	0	679	272	1	952	0	0	0	1	1	2255
Percent	29.1	70.5	0.0	0.4		53.1	0.0	46.9	0.0		0.0	71.3	28.6	0.1		0.0	0.0	0.0	100.0		
05:00 Volume	79	227	0	1	307	27	0	20	0	47	0	206	80	0	286	0	0	0	0	0	640
Peak Factor																					0.881
High Int.	05:00 PM					04:30 PM					05:00 PM					04:45 PM					
Volume	79	227	0	1	307	41	0	31	0	72	0	206	80	0	286	0	0	0	1	1	
Peak Factor					0.862					0.844					0.832					0.250	

355
772

149 131

702
314

CIVIC CENTER DRIVE : GRP I 0.99 / 0.97 1.034

I-95 RAMPS: APR = 1.053

Maine Traffic Resources
25 Vine Street
Gardiner, ME 04345
mainetrafficresources.com

Civic Center Drive and Darin Drive
Augusta
MRD
Clear

File Name : AugustaJFHQCivicCenDarinDrivePM
Site Code : 11111111
Start Date : 6/20/2012
Page No : 1

Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Civic Center Drive From North					Maine Veterans Memorial Cemetery From East					Civic Center Drive From South					Darin Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
03:00 PM	11	160	0	0	171	1	0	0	0	1	1	127	37	0	165	29	0	7	0	36	373
03:15 PM	8	187	0	0	195	0	0	0	0	0	1	116	42	0	159	55	0	6	0	61	415
03:30 PM	14	127	0	0	141	0	0	1	0	1	1	117	26	0	144	68	0	16	0	84	370
03:45 PM	20	134	0	0	154	0	0	0	0	0	0	123	33	0	156	39	0	6	0	45	355
Total	53	608	0	0	661	1	0	1	0	2	3	483	138	0	624	191	0	35	0	226	1513
04:00 PM	11	162	0	1	174	0	0	0	0	0	0	132	30	0	162	86	0	10	0	96	432
04:15 PM	7	160	0	0	167	1	0	0	0	1	2	117	29	0	148	57	1	11	0	69	385
04:30 PM	9	192	0	0	201	0	0	0	0	0	0	136	27	0	163	52	0	8	0	60	424
04:45 PM	1	133	0	0	134	0	0	1	0	1	0	117	24	0	141	47	0	12	0	59	335
Total	28	647	0	1	676	1	0	1	0	2	2	502	110	0	614	242	1	41	0	284	1576
05:00 PM	9	164	0	0	173	0	0	0	0	0	1	117	19	0	137	78	0	6	0	84	394
05:15 PM	9	140	0	0	149	0	0	0	0	0	0	106	30	0	136	53	0	9	0	62	347
05:30 PM	5	120	0	0	125	0	0	0	0	0	0	122	23	0	145	33	0	8	0	41	311
05:45 PM	7	90	0	0	97	0	0	0	0	0	0	90	26	0	116	22	0	10	0	32	245
Total	30	514	0	0	544	0	0	0	0	0	1	435	98	0	534	186	0	33	0	219	1297
Grand Total	111	1769	0	1	1881	2	0	2	0	4	6	1420	346	0	1772	619	1	109	0	729	4386
Apprch %	5.9	94.0	0.0	0.1		50.0	0.0	50.0	0.0		0.3	80.1	19.5	0.0		84.9	0.1	15.0	0.0		
Total %	2.5	40.3	0.0	0.0	42.9	0.0	0.0	0.0	0.0	0.1	0.1	32.4	7.9	0.0	40.4	14.1	0.0	2.5	0.0	16.6	

	Civic Center Drive From North					Maine Veterans Memorial Cemetery From East					Civic Center Drive From South					Darin Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	03:45 PM																				
Volume	47	648	0	1	696	1	0	0	0	1	2	508	119	0	629	234	1	35	0	270	1596
Percent	6.8	93.1	0.0	0.1		100.0	0.0	0.0	0.0		0.3	80.8	18.9	0.0		86.7	0.4	13.0	0.0		
04:00 Volume	11	162	0	1	174	0	0	0	0	0	0	132	30	0	162	86	0	10	0	96	432
Peak Factor																					0.924
High Int.	04:30 PM					04:15 PM					04:30 PM					04:00 PM					
Volume	9	192	0	0	201	1	0	0	0	1	0	136	27	0	163	86	0	10	0	96	
Peak Factor					0.866					0.250					0.965					0.703	

49 670 1 2 123 242 36 1

CIVIC CENTER DRIVE : GRP I $\frac{0.90}{0.87} = 1.034$
DARIN DRIVE : GRP I

Maine Traffic Resources
25 Vine Street
Gardiner, ME 04345
mainetrafficresources.com

Civic Center Drive and Leighton Road PM
Augusta
MRD
Overcast/Light Rain

File Name : AugustaSSBPM
Site Code : 11111111
Start Date : 6/5/2012
Page No : 1

Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Belgrade Road From North					Driveway From East					Civic Center Drive From South					Leighton Road From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
03:00 PM	26	121	0	0	147	0	0	0	0	0	1	90	7	0	98	5	0	31	0	36	281
03:15 PM	30	136	0	0	166	0	0	0	0	0	0	92	8	0	100	8	0	50	0	58	324
03:30 PM	51	189	0	0	240	0	0	0	0	0	2	87	2	0	91	10	0	40	0	50	381
03:45 PM	27	137	0	0	164	1	0	0	0	1	0	124	3	0	127	8	0	41	0	49	341
Total	134	583	0	0	717	1	0	0	0	1	3	393	20	0	416	31	0	162	0	193	1327
04:00 PM	39	187	0	0	226	0	0	0	0	0	0	135	7	0	142	9	0	44	0	53	421
04:15 PM	34	121	0	0	155	0	0	0	0	0	0	129	10	0	139	15	0	54	0	69	363
04:30 PM	39	150	0	0	189	0	0	0	0	0	0	142	9	0	151	14	0	56	0	70	410
04:45 PM	46	120	0	0	166	0	0	0	0	0	0	117	6	0	123	13	0	52	0	65	354
Total	158	578	0	0	736	0	0	0	0	0	0	523	32	0	555	51	0	206	0	257	1548
05:00 PM	71	162	0	0	233	0	0	0	0	0	0	134	4	0	138	14	0	76	0	90	461
05:15 PM	29	113	0	0	142	0	0	0	0	0	0	123	5	0	128	7	1	48	0	56	326
05:30 PM	21	124	0	0	145	0	0	0	0	0	1	97	3	0	101	10	1	39	0	50	296
05:45 PM	16	73	0	0	89	0	0	0	0	0	0	84	0	0	84	1	0	23	0	24	197
Total	137	472	0	0	609	0	0	0	0	0	1	438	12	0	451	32	2	186	0	220	1280
Grand Total	429	1633	0	0	2062	1	0	0	0	1	4	1354	64	0	1422	114	2	554	0	670	4155
Apprch %	20.8	79.2	0.0	0.0		100.0	0.0	0.0	0.0		0.3	95.2	4.5	0.0		17.0	0.3	82.7	0.0		
Total %	10.3	39.3	0.0	0.0	49.6	0.0	0.0	0.0	0.0	0.0	0.1	32.6	1.5	0.0	34.2	2.7	0.0	13.3	0.0	16.1	

	Belgrade Road From North					Driveway From East					Civic Center Drive From South					Leighton Road From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	04:15 PM																				
Volume	190	553	0	0	743	0	0	0	0	0	0	522	29	0	551	56	0	238	0	294	1588
Percent	25.6	74.4	0.0	0.0		0.0	0.0	0.0	0.0		0.0	94.7	5.3	0.0		19.0	0.0	81.0	0.0		
05:00 Volume	71	162	0	0	233	0	0	0	0	0	0	134	4	0	138	14	0	76	0	90	461
Peak Factor																					0.861
High Int.	05:00 PM					2:45:00 PM					04:30 PM					05:00 PM					
Volume	71	162	0	0	233	0	0	0	0	0	0	142	9	0	151	14	0	76	0	90	
Peak Factor					0.797									0.912						0.817	

196 572

540 30

58 246

$\frac{190}{183} = 1.034$

BELGRADE RD — GRP I

LEIGHTON RD — GRP I

Maine Traffic Resources
25 Vine Street
Gardiner, ME 04345
mainetrafficresources.com

Civic Center Drive and Comfort Inn
Town: Augusta
Counter: ZG
Weather: sunny

File Name : untitled6
Site Code : 11111111
Start Date : 5/30/2013
Page No : 1

Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Civic Center Drive From North					Comfort Inn From East					Civic Center Drive From South					Irving Gas Station From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
03:30 PM	8	242	5	1	256	0	0	1	0	1	3	141	3	0	147	1	0	2	0	3	407
03:45 PM	29	264	4	1	298	2	0	2	0	4	8	172	6	0	186	3	0	0	0	3	491
Total	37	506	9	2	554	2	0	3	0	5	11	313	9	0	333	4	0	2	0	6	898
04:00 PM	10	242	2	0	254	3	0	3	0	6	5	167	4	0	176	7	0	1	0	8	444
04:15 PM	10	301	1	0	312	5	1	2	1	9	7	161	3	0	171	8	0	1	0	9	501
04:30 PM	11	228	2	0	241	1	0	3	0	4	10	171	1	0	182	4	1	2	0	7	434
04:45 PM	9	303	1	0	313	3	1	2	0	6	7	188	4	0	199	5	0	0	0	5	523
Total	40	1074	6	0	1120	12	2	10	1	25	29	687	12	0	728	24	1	4	0	29	1902
05:00 PM	9	271	2	0	282	7	0	1	0	8	11	198	8	0	217	6	1	2	0	9	516
05:15 PM	11	270	3	1	285	1	0	2	2	5	21	170	4	0	195	12	1	3	0	16	501
Grand Total	97	2121	20	3	2241	22	2	16	3	43	72	1368	33	0	1473	46	3	11	0	60	3817
Apprch %	4.3	94.6	0.9	0.1		51.2	4.7	37.2	7.0		4.9	92.9	2.2	0.0		76.7	5.0	18.3	0.0		
Total %	2.5	55.6	0.5	0.1	58.7	0.6	0.1	0.4	0.1	1.1	1.9	35.8	0.9	0.0	38.6	1.2	0.1	0.3	0.0	1.6	

	Civic Center Drive From North					Comfort Inn From East					Civic Center Drive From South					Irving Gas Station From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 03:30 PM to 05:15 PM - Peak 1 of 1																					
Intersection	04:15 PM																				
Volume	39	1103	6	0	1148	16	2	8	1	27	35	718	16	0	769	23	2	5	0	30	1974
Percent	3.4	96.1	0.5	0.0		59.3	7.4	29.6	3.7		4.6	93.4	2.1	0.0		76.7	6.7	16.7	0.0		
04:45 Volume	9	303	1	0	313	3	1	2	0	6	7	188	4	0	199	5	0	0	0	5	523
Peak Factor																					0.944
High Int.	04:45 PM					04:15 PM					05:00 PM					04:15 PM					
Volume	9	303	1	0	313	5	1	2	1	9	11	198	8	0	217	8	0	1	0	9	
Peak Factor					0.917					0.750					0.886					0.833	

9 1128 6 16 2 8 35 135 16 23 2 5

Civic Center Drive, GRPI: $\frac{0.90}{0.88} = 1.023$

Comfort Inn & Irving drives, $1 + \frac{0.023}{2} = 1.012$

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	ZG	Intersection	Rte 8/11/27 & Darin Drive
Agency/Co.	MTR	Jurisdiction	Augusta
Date Performed	6/4/2013	Analysis Year	2013
Analysis Time Period	3:45-4:45 PM		

Project Description	Augusta JFHQ 2013 Existing
East/West Street: Darin Drive	North/South Street: Rte 8/11/27
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	124	528			673	49
Peak-Hour Factor, PHF	0.97	0.97	1.00	1.00	0.87	0.87
Hourly Flow Rate, HFR (veh/h)	127	544	0	0	773	56
Percent Heavy Vehicles	5	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	36		243			
Peak-Hour Factor, PHF	0.75	1.00	0.75	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	48	0	324	0	0	0
Percent Heavy Vehicles	1	0	1	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L					L		R
v (veh/h)	127					48		324
C (m) (veh/h)	790					98		386
v/c	0.16					0.49		0.84
95% queue length	0.57					2.14		7.81
Control Delay (s/veh)	10.4					72.8		47.7
LOS	B					F		E
Approach Delay (s/veh)	--	--				50.9		
Approach LOS	--	--				F		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	ZG	Intersection	Rte 8/11/27 & Darin Drive
Agency/Co.	MTR	Jurisdiction	Augusta
Date Performed	6/4/2013	Analysis Year	2017
Analysis Time Period	3:45-4:45 PM		

Project Description	Augusta JFHQ 2017 No-Build
East/West Street: Darin Drive	North/South Street: Rte 8/11/27
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	126	538			737	50
Peak-Hour Factor, PHF	0.97	0.97	1.00	1.00	0.87	0.87
Hourly Flow Rate, HFR (veh/h)	129	554	0	0	847	57
Percent Heavy Vehicles	5	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	37		248			
Peak-Hour Factor, PHF	0.75	1.00	0.75	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	49	0	330	0	0	0
Percent Heavy Vehicles	1	0	1	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L					L		R
v (veh/h)	129					49		330
C (m) (veh/h)	740					86		350
v/c	0.17					0.57		0.94
95% queue length	0.63					2.56		9.94
Control Delay (s/veh)	10.9					91.8		69.7
LOS	B					F		F
Approach Delay (s/veh)	--	--				72.6		
Approach LOS	--	--				F		

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Lane Group	EBR	NBT	SBT
Lane Configurations			
Volume (vph)	298	1138	700
Turn Type	custom		
Protected Phases		Free	6
Permitted Phases	4		
Detector Phase	4		6
Switch Phase			
Minimum Initial (s)	6.0		6.0
Minimum Split (s)	11.0		21.0
Total Split (s)	19.0	0.0	26.0
Total Split (%)	42.2%	0.0%	57.8%
Yellow Time (s)	3.0		3.0
All-Red Time (s)	2.0		2.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	5.0	4.0	5.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	None		C-Max
Act Effct Green (s)	7.6	45.0	27.4
Actuated g/C Ratio	0.17	1.00	0.61
v/c Ratio	0.48	0.36	0.36
Control Delay	8.7	0.3	5.4
Queue Delay	0.0	0.0	0.0
Total Delay	8.7	0.3	5.4
LOS	A	A	A
Approach Delay		0.3	5.4
Approach LOS		A	A

Intersection Summary

Cycle Length: 45
Actuated Cycle Length: 45
Offset: 0 (0%), Referenced to phase 6:SBT, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 3.1 Intersection LOS: A
Intersection Capacity Utilization 38.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: I-95 NB Off-ramp & #8/11/27

Queues
3: I-95 NB Off-ramp & #8/11/27

6/3/2013

Lane Group	EBR	NBT	SBT
Lane Group Flow (vph)	314	1264	778
v/c Ratio	0.48	0.36	0.36
Control Delay	8.7	0.3	5.4
Queue Delay	0.0	0.0	0.0
Total Delay	8.7	0.3	5.4
Queue Length 50th (ft)	13	0	40
Queue Length 95th (ft)	38	0	81
Internal Link Dist (ft)		1016	65
Turn Bay Length (ft)	150		
Base Capacity (vph)	1013	3539	2153
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.31	0.36	0.36

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	298	0	1138	700	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		4.0	5.0	
Lane Util. Factor		0.88		0.95	0.95	
Frt		0.85		1.00	1.00	
Flt Protected		1.00		1.00	1.00	
Satd. Flow (prot)		2787		3539	3539	
Flt Permitted		1.00		1.00	1.00	
Satd. Flow (perm)		2787		3539	3539	
Peak-hour factor, PHF	0.95	0.95	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	314	0	1264	778	0
RTOR Reduction (vph)	0	176	0	0	0	0
Lane Group Flow (vph)	0	138	0	1264	778	0
Turn Type		custom				
Protected Phases				Free	6	
Permitted Phases		4				
Actuated Green, G (s)		7.6		45.0	27.4	
Effective Green, g (s)		7.6		45.0	27.4	
Actuated g/C Ratio		0.17		1.00	0.61	
Clearance Time (s)		5.0			5.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		471		3539	2155	
v/s Ratio Prot				0.36	0.22	
v/s Ratio Perm		0.05				
v/c Ratio		0.29		0.36	0.36	
Uniform Delay, d1		16.3		0.0	4.4	
Progression Factor		1.00		1.00	1.00	
Incremental Delay, d2		0.3		0.3	0.5	
Delay (s)		16.7		0.3	4.9	
Level of Service		B		A	A	
Approach Delay (s)	16.7			0.3	4.9	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	4.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

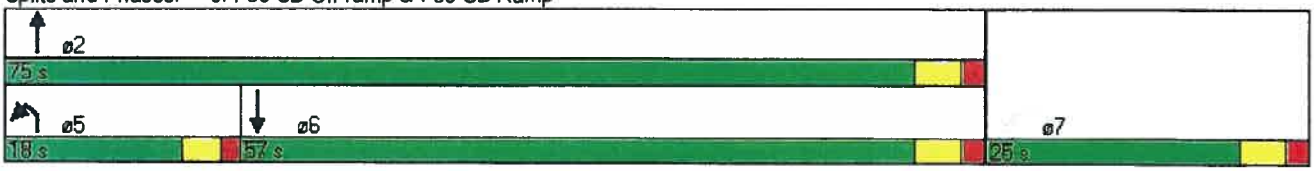
c Critical Lane Group

Lane Group	WBL2	WBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	132	150	316	706	776	357
Turn Type	custom	Free	pm+pt			Free
Protected Phases			5	2	6	
Permitted Phases	7	Free	2			Free
Detector Phase	7		5	2	6	
Switch Phase						
Minimum Initial (s)	4.0		4.0	12.0	4.0	
Minimum Split (s)	25.0		12.0	75.0	45.0	
Total Split (s)	25.0	0.0	18.0	75.0	57.0	0.0
Total Split (%)	25.0%	0.0%	18.0%	75.0%	57.0%	0.0%
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	2.0		1.5	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	4.0	4.5	5.5	5.5	4.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None		None	C-Max	C-Max	
Act Effct Green (s)	9.9	100.0	80.1	79.1	62.5	100.0
Actuated g/C Ratio	0.10	1.00	0.80	0.79	0.62	1.00
v/c Ratio	0.46	0.11	0.67	0.56	0.39	0.25
Control Delay	46.5	0.1	9.2	6.0	10.8	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.5	0.1	9.2	6.0	10.8	0.4
LOS	D	A	A	A	B	A
Approach Delay				7.0	7.5	
Approach LOS				A	A	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 9.0 Intersection LOS: A
Intersection Capacity Utilization 54.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 6: I-95 SB Off-ramp & I-95 SB Ramp



Queues

6: I-95 SB Off-ramp & I-95 SB Ramp

6/3/2013

Lane Group	WBL2	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	155	176	372	831	862	397
v/c Ratio	0.46	0.11	0.67	0.56	0.39	0.25
Control Delay	46.5	0.1	9.2	6.0	10.8	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.5	0.1	9.2	6.0	10.8	0.4
Queue Length 50th (ft)	48	0	45	156	127	0
Queue Length 95th (ft)	73	0	76	238	217	0
Internal Link Dist (ft)				820	946	
Turn Bay Length (ft)		260				300
Base Capacity (vph)	669	1583	588	1474	2211	1583
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.11	0.63	0.56	0.39	0.25

Intersection Summary

Movement	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations											
Volume (vph)	132	0	150	316	706	0	0	776	357	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5		4.0	4.5	5.5			5.5	4.0		
Lane Util. Factor	0.97		1.00	1.00	1.00			0.95	1.00		
Frt	1.00		0.85	1.00	1.00			1.00	0.85		
Flt Protected	0.95		1.00	0.95	1.00			1.00	1.00		
Satd. Flow (prot)	3433		1583	1770	1863			3539	1583		
Flt Permitted	0.95		1.00	0.27	1.00			1.00	1.00		
Satd. Flow (perm)	3433		1583	505	1863			3539	1583		
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.92	0.92
Adj. Flow (vph)	155	0	176	372	831	0	0	862	397	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	155	0	176	372	831	0	0	862	397	0	0
Turn Type	custom		Free	pm+pt					Free		
Protected Phases				5	2			6			
Permitted Phases	7		Free	2					Free		
Actuated Green, G (s)	9.9		100.0	79.1	79.1			62.4	100.0		
Effective Green, g (s)	9.9		100.0	79.1	79.1			62.4	100.0		
Actuated g/C Ratio	0.10		1.00	0.79	0.79			0.62	1.00		
Clearance Time (s)	5.5			4.5	5.5			5.5			
Vehicle Extension (s)	3.0			3.0	3.0			3.0			
Lane Grp Cap (vph)	340		1583	554	1474			2208	1583		
v/s Ratio Prot				c0.08	0.45			0.24			
v/s Ratio Perm	c0.05		0.11	c0.45					0.25		
v/c Ratio	0.46		0.11	0.67	0.56			0.39	0.25		
Uniform Delay, d1	42.5		0.0	4.5	3.9			9.3	0.0		
Progression Factor	1.00		1.00	1.00	1.00			1.00	1.00		
Incremental Delay, d2	1.0		0.1	3.2	1.6			0.5	0.4		
Delay (s)	43.5		0.1	7.7	5.5			9.9	0.4		
Level of Service	D		A	A	A			A	A		
Approach Delay (s)		20.4			6.2			6.9		0.0	
Approach LOS		C			A			A		A	

Intersection Summary			
HCM Average Control Delay	8.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Volume (vph)	247	0	58	1	30	543	575	197
Turn Type	Perm		Perm		pm+pt			Perm
Protected Phases		4		8	5	2	6	
Permitted Phases	4		4		2			6
Detector Phase	4	4	4	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	10.0	10.0	10.0
Minimum Split (s)	18.0	18.0	18.0	12.0	15.0	42.0	42.0	42.0
Total Split (s)	29.0	29.0	29.0	29.0	15.0	61.0	46.0	46.0
Total Split (%)	32.2%	32.2%	32.2%	32.2%	16.7%	67.8%	51.1%	51.1%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.5	3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	4.5	7.5	7.5	7.5
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	None
Act Effct Green (s)		21.8	21.8	21.8	58.7	55.7	49.1	49.1
Actuated g/C Ratio		0.24	0.24	0.24	0.65	0.62	0.55	0.55
v/c Ratio		0.85	0.16	0.00	0.09	0.50	0.71	0.26
Control Delay		56.1	7.7	24.0	6.9	11.8	22.5	5.6
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		56.1	7.7	24.0	6.9	11.8	22.5	5.6
LOS		E	A	C	A	B	C	A
Approach Delay		46.9		24.0		11.5	18.2	
Approach LOS		D		C		B	B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 21.5 Intersection LOS: C
Intersection Capacity Utilization 61.0% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 14: Leighton Road & #8/11/27

Queues
14: Leighton Road & #8/11/27

6/3/2013

Lane Group	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	291	68	1	32	572	719	246
v/c Ratio	0.85	0.16	0.00	0.09	0.50	0.71	0.26
Control Delay	56.1	7.7	24.0	6.9	11.8	22.5	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.1	7.7	24.0	6.9	11.8	22.5	5.6
Queue Length 50th (ft)	153	0	0	6	175	334	24
Queue Length 95th (ft)	#251	27	3	16	259	407	52
Internal Link Dist (ft)	1354		217		320	945	
Turn Bay Length (ft)		150		200			150
Base Capacity (vph)	376	472	497	406	1154	1017	940
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.14	0.00	0.08	0.50	0.71	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	247	0	58	0	1	0	30	543	0	0	575	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0		4.5	7.5			7.5	7.5
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00			1.00	1.00
Frt		1.00	0.85		1.00		1.00	1.00			1.00	0.85
Flt Protected		0.95	1.00		1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1770	1583		1863		1770	1863			1863	1583
Flt Permitted		0.76	1.00		1.00		0.20	1.00			1.00	1.00
Satd. Flow (perm)		1410	1583		1863		372	1863			1863	1583
Peak-hour factor, PHF	0.85	0.85	0.85	0.75	0.75	0.75	0.95	0.95	0.95	0.80	0.80	0.80
Adj. Flow (vph)	291	0	68	0	1	0	32	572	0	0	719	246
RTOR Reduction (vph)	0	0	52	0	0	0	0	0	0	0	0	79
Lane Group Flow (vph)	0	291	16	0	1	0	32	572	0	0	719	167
Turn Type	Perm		Perm	Perm			pm+pt			Perm		Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		21.8	21.8		21.8		55.7	55.7			47.3	47.3
Effective Green, g (s)		21.8	21.8		21.8		55.7	55.7			47.3	47.3
Actuated g/C Ratio		0.24	0.24		0.24		0.62	0.62			0.53	0.53
Clearance Time (s)		5.0	5.0		5.0		4.5	7.5			7.5	7.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		342	383		451		291	1153			979	832
v/s Ratio Prot					0.00		0.00	c0.31			c0.39	
v/s Ratio Perm		c0.21	0.01				0.06					0.11
v/c Ratio		0.85	0.04		0.00		0.11	0.50			0.73	0.20
Uniform Delay, d1		32.5	26.1		25.9		10.4	9.4			16.5	11.3
Progression Factor		1.00	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		18.0	0.0		0.0		0.2	1.5			2.9	0.1
Delay (s)		50.5	26.2		25.9		10.6	11.0			19.4	11.4
Level of Service		D	C		C		B	B			B	B
Approach Delay (s)		45.9			25.9			10.9			17.4	
Approach LOS		D			C			B			B	

Intersection Summary			
HCM Average Control Delay	20.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

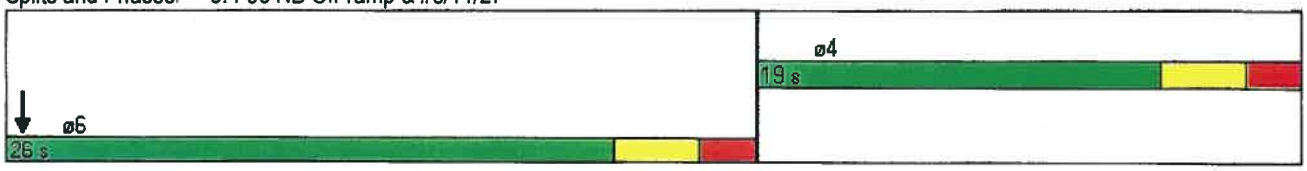
c Critical Lane Group

Lane Group	EBR	NBT	SBT
Lane Configurations			
Volume (vph)	303	1185	748
Turn Type	custom		
Protected Phases		Free	6
Permitted Phases	4		
Detector Phase	4		6
Switch Phase			
Minimum Initial (s)	6.0		6.0
Minimum Split (s)	11.0		21.0
Total Split (s)	19.0	0.0	26.0
Total Split (%)	42.2%	0.0%	57.8%
Yellow Time (s)	3.0		3.0
All-Red Time (s)	2.0		2.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	5.0	4.0	5.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	None		C-Max
Act Effct Green (s)	8.0	45.0	27.0
Actuated g/C Ratio	0.18	1.00	0.60
v/c Ratio	0.49	0.37	0.39
Control Delay	10.0	0.3	5.8
Queue Delay	0.0	0.0	0.0
Total Delay	10.0	0.3	5.8
LOS	A	A	A
Approach Delay		0.3	5.8
Approach LOS		A	A

Intersection Summary

Cycle Length: 45
Actuated Cycle Length: 45
Offset: 0 (0%), Referenced to phase 6:SBT, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 3.4 Intersection LOS: A
Intersection Capacity Utilization 39.6% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: I-95 NB Off-ramp & #8/11/27



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	303	0	1185	748	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		4.0	5.0	
Lane Util. Factor		0.88		0.95	0.95	
Frt		0.85		1.00	1.00	
Flt Protected		1.00		1.00	1.00	
Satd. Flow (prot)		2787		3539	3539	
Flt Permitted		1.00		1.00	1.00	
Satd. Flow (perm)		2787		3539	3539	
Peak-hour factor, PHF	0.95	0.95	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	319	0	1317	831	0
RTOR Reduction (vph)	0	150	0	0	0	0
Lane Group Flow (vph)	0	169	0	1317	831	0
Turn Type		custom				
Protected Phases				Free	6	
Permitted Phases		4				
Actuated Green, G (s)		8.0		45.0	27.0	
Effective Green, g (s)		8.0		45.0	27.0	
Actuated g/C Ratio		0.18		1.00	0.60	
Clearance Time (s)		5.0			5.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		495		3539	2123	
v/s Ratio Prot				0.37	0.23	
v/s Ratio Perm		0.06				
v/c Ratio		0.34		0.37	0.39	
Uniform Delay, d1		16.2		0.0	4.7	
Progression Factor		1.00		1.00	1.00	
Incremental Delay, d2		0.4		0.3	0.5	
Delay (s)		16.6		0.3	5.2	
Level of Service		B		A	A	
Approach Delay (s)	16.6			0.3	5.2	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	4.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

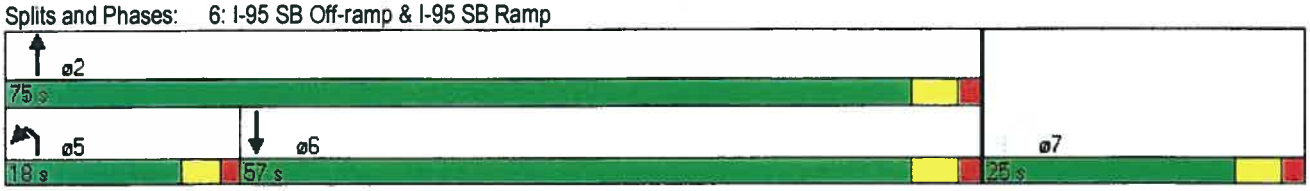
c Critical Lane Group

Lane Group	WBL2	WBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	134	147	322	726	834	371
Turn Type	custom	Free	pm+pt			Free
Protected Phases			5	2	6	
Permitted Phases	7	Free	2			Free
Detector Phase	7		5	2	6	
Switch Phase						
Minimum Initial (s)	4.0		3.5	12.0	4.0	
Minimum Split (s)	25.0		8.0	75.0	45.0	
Total Split (s)	25.0	0.0	18.0	75.0	57.0	0.0
Total Split (%)	25.0%	0.0%	18.0%	75.0%	57.0%	0.0%
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	2.0		1.5	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	4.0	4.5	5.5	5.5	4.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None		None	C-Max	C-Max	
Act Effct Green (s)	9.9	100.0	80.1	79.1	61.0	100.0
Actuated g/C Ratio	0.10	1.00	0.80	0.79	0.61	1.00
v/c Ratio	0.46	0.11	0.70	0.58	0.43	0.26
Control Delay	46.6	0.1	11.4	6.2	12.0	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	0.1	11.4	6.2	12.0	0.4
LOS	D	A	B	A	B	A
Approach Delay				7.8	8.4	
Approach LOS				A	A	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 9.8 Intersection LOS: A
Intersection Capacity Utilization 56.4% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 6: I-95 SB Off-ramp & I-95 SB Ramp



Queues
6: I-95 SB Off-ramp & I-95 SB Ramp

6/3/2013

Lane Group	WBL2	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	158	173	379	854	927	412
v/c Ratio	0.46	0.11	0.70	0.58	0.43	0.26
Control Delay	46.6	0.1	11.4	6.2	12.0	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	0.1	11.4	6.2	12.0	0.4
Queue Length 50th (ft)	50	0	47	163	144	0
Queue Length 95th (ft)	75	0	93	250	250	0
Internal Link Dist (ft)				820	946	
Turn Bay Length (ft)		260				300
Base Capacity (vph)	669	1583	566	1473	2160	1583
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.11	0.67	0.58	0.43	0.26

Intersection Summary

HCM Signalized Intersection Capacity Analysis
6: I-95 SB Off-ramp & I-95 SB Ramp

6/3/2013

Movement	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations											
Volume (vph)	134	0	147	322	726	0	0	834	371	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5		4.0	4.5	5.5			5.5	4.0		
Lane Util. Factor	0.97		1.00	1.00	1.00			0.95	1.00		
Frt	1.00		0.85	1.00	1.00			1.00	0.85		
Flt Protected	0.95		1.00	0.95	1.00			1.00	1.00		
Satd. Flow (prot)	3433		1583	1770	1863			3539	1583		
Flt Permitted	0.95		1.00	0.24	1.00			1.00	1.00		
Satd. Flow (perm)	3433		1583	456	1863			3539	1583		
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.92	0.92
Adj. Flow (vph)	158	0	173	379	854	0	0	927	412	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	158	0	173	379	854	0	0	927	412	0	0
Turn Type	custom		Free	pm+pt					Free		
Protected Phases				5	2			6			
Permitted Phases	7		Free	2					Free		
Actuated Green, G (s)	9.9		100.0	79.1	79.1			61.1	100.0		
Effective Green, g (s)	9.9		100.0	79.1	79.1			61.1	100.0		
Actuated g/C Ratio	0.10		1.00	0.79	0.79			0.61	1.00		
Clearance Time (s)	5.5			4.5	5.5			5.5			
Vehicle Extension (s)	3.0			3.0	3.0			3.0			
Lane Grp Cap (vph)	340		1583	538	1474			2162	1583		
v/s Ratio Prot				c0.10	0.46			0.26			
v/s Ratio Perm	c0.05		0.11	c0.46					0.26		
v/c Ratio	0.46		0.11	0.70	0.58			0.43	0.26		
Uniform Delay, d1	42.5		0.0	5.4	4.0			10.3	0.0		
Progression Factor	1.00		1.00	1.00	1.00			1.00	1.00		
Incremental Delay, d2	1.0		0.1	4.2	1.7			0.6	0.4		
Delay (s)	43.6		0.1	9.6	5.7			10.9	0.4		
Level of Service	D		A	A	A			B	A		
Approach Delay (s)		20.9			6.9			7.7		0.0	
Approach LOS		C			A			A		A	

Intersection Summary			
HCM Average Control Delay	8.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	247	0	58	0	1	0	30	543	0	0	575	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0		4.5	7.5			7.5	7.5
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00			1.00	1.00
Frt		1.00	0.85		1.00		1.00	1.00			1.00	0.85
Flt Protected		0.95	1.00		1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1770	1583		1863		1770	1863			1863	1583
Flt Permitted		0.76	1.00		1.00		0.20	1.00			1.00	1.00
Satd. Flow (perm)		1410	1583		1863		372	1863			1863	1583
Peak-hour factor, PHF	0.85	0.85	0.85	0.75	0.75	0.75	0.95	0.95	0.95	0.80	0.80	0.80
Adj. Flow (vph)	291	0	68	0	1	0	32	572	0	0	719	246
RTOR Reduction (vph)	0	0	52	0	0	0	0	0	0	0	0	79
Lane Group Flow (vph)	0	291	16	0	1	0	32	572	0	0	719	167
Turn Type	Perm		Perm	Perm			pm+pt			Perm		Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		21.8	21.8		21.8		55.7	55.7			47.3	47.3
Effective Green, g (s)		21.8	21.8		21.8		55.7	55.7			47.3	47.3
Actuated g/C Ratio		0.24	0.24		0.24		0.62	0.62			0.53	0.53
Clearance Time (s)		5.0	5.0		5.0		4.5	7.5			7.5	7.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		342	383		451		291	1153			979	832
v/s Ratio Prot					0.00		0.00	c0.31			c0.39	
v/s Ratio Perm		c0.21	0.01				0.06					0.11
v/c Ratio		0.85	0.04		0.00		0.11	0.50			0.73	0.20
Uniform Delay, d1		32.5	26.1		25.9		10.4	9.4			16.5	11.3
Progression Factor		1.00	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		18.0	0.0		0.0		0.2	1.5			2.9	0.1
Delay (s)		50.5	26.2		25.9		10.6	11.0			19.4	11.4
Level of Service		D	C		C		B	B			B	B
Approach Delay (s)		45.9			25.9			10.9			17.4	
Approach LOS		D			C			B			B	

Intersection Summary			
HCM Average Control Delay	20.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	NBT	SBT
Lane Configurations			
Volume (vph)	303	1185	748
Turn Type	custom		
Protected Phases		Free	6
Permitted Phases	4		
Detector Phase	4		6
Switch Phase			
Minimum Initial (s)	6.0		6.0
Minimum Split (s)	11.0		21.0
Total Split (s)	19.0	0.0	26.0
Total Split (%)	42.2%	0.0%	57.8%
Yellow Time (s)	3.0		3.0
All-Red Time (s)	2.0		2.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	5.0	4.0	5.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	None		C-Max
Act Effct Green (s)	8.0	45.0	27.0
Actuated g/C Ratio	0.18	1.00	0.60
v/c Ratio	0.49	0.37	0.39
Control Delay	10.0	0.3	5.8
Queue Delay	0.0	0.0	0.0
Total Delay	10.0	0.3	5.8
LOS	A	A	A
Approach Delay		0.3	5.8
Approach LOS		A	A

Intersection Summary

Cycle Length: 45
Actuated Cycle Length: 45
Offset: 0 (0%), Referenced to phase 6:SBT, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 3.4 Intersection LOS: A
Intersection Capacity Utilization 39.6% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: I-95 NB Off-ramp & #8/11/27

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	303	0	1185	748	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		4.0	5.0	
Lane Util. Factor		0.88		0.95	0.95	
Frt		0.85		1.00	1.00	
Flt Protected		1.00		1.00	1.00	
Satd. Flow (prot)		2787		3539	3539	
Flt Permitted		1.00		1.00	1.00	
Satd. Flow (perm)		2787		3539	3539	
Peak-hour factor, PHF	0.95	0.95	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	319	0	1317	831	0
RTOR Reduction (vph)	0	150	0	0	0	0
Lane Group Flow (vph)	0	169	0	1317	831	0
Turn Type		custom				
Protected Phases				Free	6	
Permitted Phases		4				
Actuated Green, G (s)		8.0		45.0	27.0	
Effective Green, g (s)		8.0		45.0	27.0	
Actuated g/C Ratio		0.18		1.00	0.60	
Clearance Time (s)		5.0			5.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		495		3539	2123	
v/s Ratio Prot				0.37	0.23	
v/s Ratio Perm		0.06				
v/c Ratio		0.34		0.37	0.39	
Uniform Delay, d1		16.2		0.0	4.7	
Progression Factor		1.00		1.00	1.00	
Incremental Delay, d2		0.4		0.3	0.5	
Delay (s)		16.6		0.3	5.2	
Level of Service		B		A	A	
Approach Delay (s)	16.6			0.3	5.2	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	4.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL2	WBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	134	147	322	726	834	371
Turn Type	custom	Free	pm+pt			Free
Protected Phases			5	2	6	
Permitted Phases	7	Free	2			Free
Detector Phase	7		5	2	6	
Switch Phase						
Minimum Initial (s)	4.0		3.5	12.0	4.0	
Minimum Split (s)	25.0		8.0	75.0	45.0	
Total Split (s)	25.0	0.0	18.0	75.0	57.0	0.0
Total Split (%)	25.0%	0.0%	18.0%	75.0%	57.0%	0.0%
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	2.0		1.5	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	4.0	4.5	5.5	5.5	4.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None		None	C-Max	C-Max	
Act Effct Green (s)	9.9	100.0	80.1	79.1	61.0	100.0
Actuated g/C Ratio	0.10	1.00	0.80	0.79	0.61	1.00
v/c Ratio	0.46	0.11	0.70	0.58	0.43	0.26
Control Delay	46.6	0.1	11.4	6.2	12.0	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	0.1	11.4	6.2	12.0	0.4
LOS	D	A	B	A	B	A
Approach Delay				7.8	8.4	
Approach LOS				A	A	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 9.8 Intersection LOS: A
Intersection Capacity Utilization 56.4% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 6: I-95 SB Off-ramp & I-95 SB Ramp

Queues
6: I-95 SB Off-ramp & I-95 SB Ramp

6/3/2013

Lane Group	WBL2	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	158	173	379	854	927	412
v/c Ratio	0.46	0.11	0.70	0.58	0.43	0.26
Control Delay	46.6	0.1	11.4	6.2	12.0	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	0.1	11.4	6.2	12.0	0.4
Queue Length 50th (ft)	50	0	47	163	144	0
Queue Length 95th (ft)	75	0	93	250	250	0
Internal Link Dist (ft)				820	946	
Turn Bay Length (ft)		260				300
Base Capacity (vph)	669	1583	566	1473	2160	1583
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.11	0.67	0.58	0.43	0.26

Intersection Summary

Movement	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations											
Volume (vph)	134	0	147	322	726	0	0	834	371	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5		4.0	4.5	5.5			5.5	4.0		
Lane Util. Factor	0.97		1.00	1.00	1.00			0.95	1.00		
Frt	1.00		0.85	1.00	1.00			1.00	0.85		
Flt Protected	0.95		1.00	0.95	1.00			1.00	1.00		
Satd. Flow (prot)	3433		1583	1770	1863			3539	1583		
Flt Permitted	0.95		1.00	0.24	1.00			1.00	1.00		
Satd. Flow (perm)	3433		1583	456	1863			3539	1583		
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.92	0.92
Adj. Flow (vph)	158	0	173	379	854	0	0	927	412	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	158	0	173	379	854	0	0	927	412	0	0
Turn Type	custom		Free	pm+pt					Free		
Protected Phases				5	2			6			
Permitted Phases	7		Free	2					Free		
Actuated Green, G (s)	9.9		100.0	79.1	79.1			61.1	100.0		
Effective Green, g (s)	9.9		100.0	79.1	79.1			61.1	100.0		
Actuated g/C Ratio	0.10		1.00	0.79	0.79			0.61	1.00		
Clearance Time (s)	5.5			4.5	5.5			5.5			
Vehicle Extension (s)	3.0			3.0	3.0			3.0			
Lane Grp Cap (vph)	340		1583	538	1474			2162	1583		
v/s Ratio Prot				c0.10	0.46			0.26			
v/s Ratio Perm	c0.05		0.11	c0.46					0.26		
v/c Ratio	0.46		0.11	0.70	0.58			0.43	0.26		
Uniform Delay, d1	42.5		0.0	5.4	4.0			10.3	0.0		
Progression Factor	1.00		1.00	1.00	1.00			1.00	1.00		
Incremental Delay, d2	1.0		0.1	4.2	1.7			0.6	0.4		
Delay (s)	43.6		0.1	9.6	5.7			10.9	0.4		
Level of Service	D		A	A	A			B	A		
Approach Delay (s)		20.9			6.9			7.7		0.0	
Approach LOS		C			A			A		A	

Intersection Summary			
HCM Average Control Delay	8.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

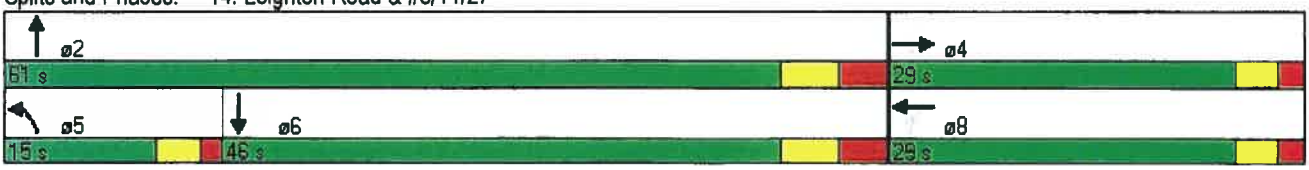
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Volume (vph)	266	0	60	1	31	554	636	227
Turn Type	Perm		Perm		pm+pt			Perm
Protected Phases		4		8	5	2	6	
Permitted Phases	4		4		2			6
Detector Phase	4	4	4	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	10.0	4.0	4.0
Minimum Split (s)	18.0	18.0	18.0	12.0	15.0	42.0	42.0	42.0
Total Split (s)	29.0	29.0	29.0	29.0	15.0	61.0	46.0	46.0
Total Split (%)	32.2%	32.2%	32.2%	32.2%	16.7%	67.8%	51.1%	51.1%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.5	3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	4.5	7.5	7.5	7.5
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	None
Act Effct Green (s)		22.5	22.5	22.5	58.0	55.0	48.4	48.4
Actuated g/C Ratio		0.25	0.25	0.25	0.64	0.61	0.54	0.54
v/c Ratio		0.89	0.16	0.00	0.12	0.51	0.79	0.30
Control Delay		60.1	7.5	24.0	7.3	12.3	26.7	6.5
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		60.1	7.5	24.0	7.3	12.3	26.7	6.5
LOS		E	A	C	A	B	C	A
Approach Delay		50.4		24.0		12.0	21.4	
Approach LOS		D		C		B	C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 24.0 Intersection LOS: C
Intersection Capacity Utilization 65.3% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 14: Leighton Road & #8/11/27



Lane Group	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	313	71	1	33	583	795	284
v/c Ratio	0.89	0.16	0.00	0.12	0.51	0.79	0.30
Control Delay	60.1	7.5	24.0	7.3	12.3	26.7	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.1	7.5	24.0	7.3	12.3	26.7	6.5
Queue Length 50th (ft)	168	0	0	6	180	396	33
Queue Length 95th (ft)	#280	28	3	17	267	#477	64
Internal Link Dist (ft)	1354		217		320	945	
Turn Bay Length (ft)		150		200			150
Base Capacity (vph)	376	474	497	345	1138	1001	932
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.15	0.00	0.10	0.51	0.79	0.30

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	266	0	60	0	1	0	31	554	0	0	636	227
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0		4.5	7.5			7.5	7.5
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00			1.00	1.00
Frt		1.00	0.85		1.00		1.00	1.00			1.00	0.85
Flt Protected		0.95	1.00		1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1770	1583		1863		1770	1863			1863	1583
Flt Permitted		0.76	1.00		1.00		0.14	1.00			1.00	1.00
Satd. Flow (perm)		1410	1583		1863		263	1863			1863	1583
Peak-hour factor, PHF	0.85	0.85	0.85	0.75	0.75	0.75	0.95	0.95	0.95	0.80	0.80	0.80
Adj. Flow (vph)	313	0	71	0	1	0	33	583	0	0	795	284
RTOR Reduction (vph)	0	0	53	0	0	0	0	0	0	0	0	84
Lane Group Flow (vph)	0	313	18	0	1	0	33	583	0	0	795	200
Turn Type	Perm		Perm	Perm			pm+pt			Perm		Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		22.5	22.5		22.5		55.0	55.0			46.6	46.6
Effective Green, g (s)		22.5	22.5		22.5		55.0	55.0			46.6	46.6
Actuated g/C Ratio		0.25	0.25		0.25		0.61	0.61			0.52	0.52
Clearance Time (s)		5.0	5.0		5.0		4.5	7.5			7.5	7.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		353	396		466		226	1139			965	820
v/s Ratio Prot					0.00		0.01	c0.31			c0.43	
v/s Ratio Perm		c0.22	0.01				0.08					0.13
v/c Ratio		0.89	0.04		0.00		0.15	0.51			0.82	0.24
Uniform Delay, d1		32.5	25.6		25.3		12.7	9.9			18.2	12.0
Progression Factor		1.00	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		22.4	0.0		0.0		0.3	1.6			5.8	0.2
Delay (s)		54.9	25.6		25.3		13.0	11.5			24.0	12.1
Level of Service		D	C		C		B	B			C	B
Approach Delay (s)		49.5			25.3			11.6			20.9	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM Average Control Delay	23.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Timings
3: I-95 NB Off-ramp & #8/11/27

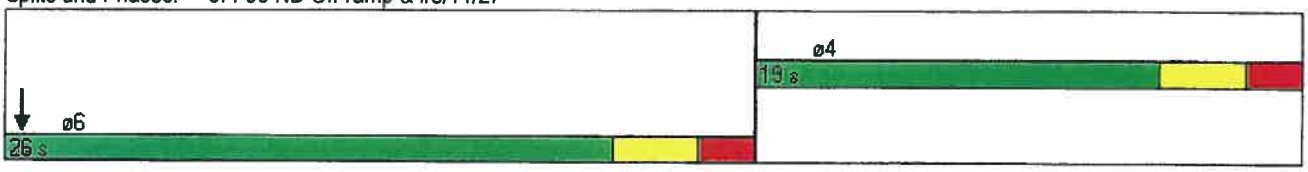
6/4/2013

Lane Group	EBR	NBT	SBT
Lane Configurations			
Volume (vph)	303	1193	790
Turn Type	custom		
Protected Phases		Free	6
Permitted Phases	4		
Detector Phase	4		6
Switch Phase			
Minimum Initial (s)	6.0		6.0
Minimum Split (s)	11.0		21.0
Total Split (s)	19.0	0.0	26.0
Total Split (%)	42.2%	0.0%	57.8%
Yellow Time (s)	3.0		3.0
All-Red Time (s)	2.0		2.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	5.0	4.0	5.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	None		C-Max
Act Effct Green (s)	8.3	45.0	26.7
Actuated g/C Ratio	0.18	1.00	0.59
v/c Ratio	0.50	0.37	0.42
Control Delay	10.9	0.3	6.2
Queue Delay	0.0	0.0	0.0
Total Delay	10.9	0.3	6.2
LOS	B	A	A
Approach Delay		0.3	6.2
Approach LOS		A	A

Intersection Summary

Cycle Length: 45
Actuated Cycle Length: 45
Offset: 0 (0%), Referenced to phase 6:SBT, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 3.7 — Intersection LOS: A
Intersection Capacity Utilization 40.8% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: I-95 NB Off-ramp & #8/11/27



Queues
3: I-95 NB Off-ramp & #8/11/27

6/4/2013

Lane Group	EBR	NBT	SBT
Lane Group Flow (vph)	319	1326	878
v/c Ratio	0.50	0.37	0.42
Control Delay	10.9	0.3	6.2
Queue Delay	0.0	0.0	0.0
Total Delay	10.9	0.3	6.2
Queue Length 50th (ft)	21	0	51
Queue Length 95th (ft)	46	0	100
Internal Link Dist (ft)		1016	65
Turn Bay Length (ft)	150		
Base Capacity (vph)	976	3539	2098
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.33	0.37	0.42

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	303	0	1193	790	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		4.0	5.0	
Lane Util. Factor		0.88		0.95	0.95	
Frt		0.85		1.00	1.00	
Flt Protected		1.00		1.00	1.00	
Satd. Flow (prot)		2787		3539	3539	
Flt Permitted		1.00		1.00	1.00	
Satd. Flow (perm)		2787		3539	3539	
Peak-hour factor, PHF	0.95	0.95	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	319	0	1326	878	0
RTOR Reduction (vph)	0	129	0	0	0	0
Lane Group Flow (vph)	0	190	0	1326	878	0
Turn Type		custom				
Protected Phases				Free	6	
Permitted Phases		4				
Actuated Green, G (s)		8.3		45.0	26.7	
Effective Green, g (s)		8.3		45.0	26.7	
Actuated g/C Ratio		0.18		1.00	0.59	
Clearance Time (s)		5.0			5.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		514		3539	2100	
v/s Ratio Prot				0.37	0.25	
v/s Ratio Perm		0.07				
v/c Ratio		0.37		0.37	0.42	
Uniform Delay, d1		16.1		0.0	4.9	
Progression Factor		1.00		1.00	1.00	
Incremental Delay, d2		0.5		0.3	0.6	
Delay (s)		16.5		0.3	5.6	
Level of Service		B		A	A	
Approach Delay (s)	16.5			0.3	5.6	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	4.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL2	WBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	134	163	322	741	909	421
Turn Type	custom	Free	pm+pt			Free
Protected Phases			5	2	6	
Permitted Phases	7	Free	2			Free
Detector Phase	7		5	2	6	
Switch Phase						
Minimum Initial (s)	4.0		4.0	12.0	4.0	
Minimum Split (s)	25.0		18.0	75.0	45.0	
Total Split (s)	25.0	0.0	18.0	75.0	57.0	0.0
Total Split (%)	25.0%	0.0%	18.0%	75.0%	57.0%	0.0%
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	2.0		1.5	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	4.0	4.5	5.5	5.5	4.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None		None	C-Max	C-Max	
Act Effct Green (s)	9.9	100.0	80.1	79.1	59.4	100.0
Actuated g/C Ratio	0.10	1.00	0.80	0.79	0.59	1.00
v/c Ratio	0.46	0.12	0.72	0.59	0.48	0.30
Control Delay	46.6	0.2	14.4	6.4	14.9	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	0.2	14.4	6.4	14.9	0.3
LOS	D	A	B	A	B	A
Approach Delay				8.8	10.3	
Approach LOS				A	B	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 10.9 Intersection LOS: B
Intersection Capacity Utilization 58.5% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 6: I-95 SB Off-ramp & I-95 SB Ramp

Queues
6: I-95 SB Off-ramp & I-95 SB Ramp

6/4/2013

Lane Group	WBL2	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	158	192	379	872	1010	468
v/c Ratio	0.46	0.12	0.72	0.59	0.48	0.30
Control Delay	46.6	0.2	14.4	6.4	14.9	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	0.2	14.4	6.4	14.9	0.3
Queue Length 50th (ft)	50	0	47	170	204	0
Queue Length 95th (ft)	75	0	125	259	m253	m0
Internal Link Dist (ft)				820	946	
Turn Bay Length (ft)		260				300
Base Capacity (vph)	669	1583	540	1473	2103	1583
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.12	0.70	0.59	0.48	0.30

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations											
Volume (vph)	134	0	163	322	741	0	0	909	421	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5		4.0	4.5	5.5			5.5	4.0		
Lane Util. Factor	0.97		1.00	1.00	1.00			0.95	1.00		
Frt	1.00		0.85	1.00	1.00			1.00	0.85		
Flt Protected	0.95		1.00	0.95	1.00			1.00	1.00		
Satd. Flow (prot)	3433		1583	1770	1863			3539	1583		
Flt Permitted	0.95		1.00	0.21	1.00			1.00	1.00		
Satd. Flow (perm)	3433		1583	397	1863			3539	1583		
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.92	0.92
Adj. Flow (vph)	158	0	192	379	872	0	0	1010	468	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	158	0	192	379	872	0	0	1010	468	0	0
Turn Type	custom		Free	pm+pt					Free		
Protected Phases				5	2			6			
Permitted Phases	7		Free	2					Free		
Actuated Green, G (s)	9.9		100.0	79.1	79.1			59.5	100.0		
Effective Green, g (s)	9.9		100.0	79.1	79.1			59.5	100.0		
Actuated g/C Ratio	0.10		1.00	0.79	0.79			0.60	1.00		
Clearance Time (s)	5.5			4.5	5.5			5.5			
Vehicle Extension (s)	3.0			3.0	3.0			3.0			
Lane Grp Cap (vph)	340		1583	521	1474			2106	1583		
v/s Ratio Prot				c0.11	0.47			0.29			
v/s Ratio Perm	c0.05		0.12	c0.47					0.30		
v/c Ratio	0.46		0.12	0.73	0.59			0.48	0.30		
Uniform Delay, d1	42.5		0.0	7.3	4.1			11.5	0.0		
Progression Factor	1.00		1.00	1.00	1.00			1.14	1.00		
Incremental Delay, d2	1.0		0.2	5.0	1.8			0.5	0.3		
Delay (s)	43.6		0.2	12.3	5.9			13.6	0.3		
Level of Service	D		A	B	A			B	A		
Approach Delay (s)		19.7			7.8			9.4		0.0	
Approach LOS		B			A			A		A	

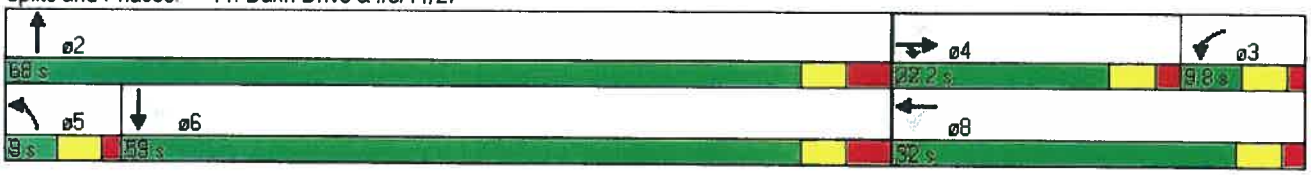
Intersection Summary			
HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	37	3	248	147	8	126	538	13	737
Turn Type	Perm		Prot	pm+pt		pm+pt		Perm	
Protected Phases		4	4	3	8	5	2		6
Permitted Phases	4			8		2		6	
Detector Phase	4	4	4	3	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.5	9.5	9.5	9.0	9.5	9.0	23.0	20.0	20.0
Total Split (s)	22.2	22.2	22.2	9.8	32.0	9.0	68.0	59.0	59.0
Total Split (%)	22.2%	22.2%	22.2%	9.8%	32.0%	9.0%	68.0%	59.0%	59.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	1.5	2.0	1.5	3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.0	5.5	5.0	7.0	7.0	7.0
Lead/Lag	Lead	Lead	Lead	Lag		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		Yes		Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)		12.8	12.8	23.6	23.1	66.4	64.4		54.1
Actuated g/C Ratio		0.13	0.13	0.24	0.23	0.66	0.64		0.54
v/c Ratio		0.31	0.85	0.47	0.12	0.36	0.49		0.93
Control Delay		42.8	36.1	37.3	12.0	8.1	8.4		39.2
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay		42.8	36.1	37.3	12.0	8.1	8.4		39.2
LOS		D	D	D	B	A	A		D
Approach Delay		37.0			31.2		8.3		39.2
Approach LOS		D			C		A		D

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 28.1 Intersection LOS: C
Intersection Capacity Utilization 103.9% ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 11: Darin Drive & #8/11/27



Queues
11: Darin Drive & #8/11/27

6/4/2013

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	53	331	160	50	130	589	919
v/c Ratio	0.31	0.85	0.47	0.12	0.36	0.49	0.93
Control Delay	42.8	36.1	37.3	12.0	8.1	8.4	39.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.8	36.1	37.3	12.0	8.1	8.4	39.2
Queue Length 50th (ft)	31	72	84	4	20	104	537
Queue Length 95th (ft)	54	109	140	33	35	136	#781
Internal Link Dist (ft)	1212			846		946	1932
Turn Bay Length (ft)		300	150				
Base Capacity (vph)	220	441	339	463	359	1191	989
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.75	0.47	0.11	0.36	0.49	0.93

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
11: Darin Drive & #8/11/27

6/4/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	3	248	147	8	38	126	538	33	13	737	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5	5.0	5.5		5.0	7.0			7.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	0.88		1.00	0.99			0.99	
Flt Protected		0.96	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)		1780	1583	1770	1634		1770	1847			1846	
Flt Permitted		0.71	1.00	0.72	1.00		0.23	1.00			0.99	
Satd. Flow (perm)		1315	1583	1346	1634		432	1847			1824	
Peak-hour factor, PHF	0.75	0.75	0.75	0.92	0.92	0.92	0.97	0.97	0.97	0.87	0.87	0.87
Adj. Flow (vph)	49	4	331	160	9	41	130	555	34	15	847	57
RTOR Reduction (vph)	0	0	185	0	32	0	0	2	0	0	2	0
Lane Group Flow (vph)	0	53	146	160	18	0	130	587	0	0	917	0
Turn Type	Perm		Prot	pm+pt			pm+pt			Perm		
Protected Phases		4	4	3	8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.8	12.8	23.6	23.1		64.4	64.4			54.0	
Effective Green, g (s)		12.8	12.8	23.6	23.1		64.4	64.4			54.0	
Actuated g/C Ratio		0.13	0.13	0.24	0.23		0.64	0.64			0.54	
Clearance Time (s)		5.5	5.5	5.0	5.5		5.0	7.0			7.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		168	203	340	377		350	1189			985	
v/s Ratio Prot			c0.09	c0.02	0.01		0.02	c0.32				
v/s Ratio Perm		0.04		0.09			0.22				c0.50	
v/c Ratio		0.32	0.72	0.47	0.05		0.37	0.49			0.93	
Uniform Delay, d1		39.6	41.9	33.1	29.9		10.2	9.3			21.3	
Progression Factor		1.00	1.00	1.00	1.00		0.80	0.70			1.00	
Incremental Delay, d2		1.1	11.6	1.0	0.1		0.6	1.3			16.2	
Delay (s)		40.7	53.4	34.2	30.0		8.8	7.8			37.4	
Level of Service		D	D	C	C		A	A			D	
Approach Delay (s)		51.7			33.2			8.0			37.4	
Approach LOS		D			C			A			D	

Intersection Summary			
HCM Average Control Delay	30.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	103.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Volume (vph)	266	0	60	1	31	589	643	227
Turn Type	Perm		Perm		pm+pt			Perm
Protected Phases		4		8	5	2	6	
Permitted Phases	4		4		2			6
Detector Phase	4	4	4	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	10.0	4.0	4.0
Minimum Split (s)	18.0	18.0	18.0	12.0	15.0	42.0	42.0	42.0
Total Split (s)	29.0	29.0	29.0	29.0	15.0	61.0	46.0	46.0
Total Split (%)	32.2%	32.2%	32.2%	32.2%	16.7%	67.8%	51.1%	51.1%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.5	3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	4.5	7.5	7.5	7.5
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	None
Act Effct Green (s)		22.5	22.5	22.5	58.0	55.0	48.4	48.4
Actuated g/C Ratio		0.25	0.25	0.25	0.64	0.61	0.54	0.54
v/c Ratio		0.89	0.16	0.00	0.12	0.54	0.80	0.31
Control Delay		60.1	7.5	24.0	7.4	12.9	27.3	6.6
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		60.1	7.5	24.0	7.4	12.9	27.3	6.6
LOS		E	A	C	A	B	C	A
Approach Delay		50.4		24.0		12.6	21.9	
Approach LOS		D		C		B	C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 24.2 Intersection LOS: C
Intersection Capacity Utilization 65.7% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 14: Leighton Road & #8/11/27

Queues
14: Leighton Road & #8/11/27

6/4/2013

Lane Group	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	313	71	1	33	620	804	284
v/c Ratio	0.89	0.16	0.00	0.12	0.54	0.80	0.31
Control Delay	60.1	7.5	24.0	7.4	12.9	27.3	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.1	7.5	24.0	7.4	12.9	27.3	6.6
Queue Length 50th (ft)	168	0	0	6	197	404	34
Queue Length 95th (ft)	#280	28	3	17	291	#496	65
Internal Link Dist (ft)	1354		217		320	945	
Turn Bay Length (ft)		150		200			150
Base Capacity (vph)	376	474	497	339	1138	1001	931
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.15	0.00	0.10	0.54	0.80	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	266	0	60	0	1	0	31	589	0	0	643	227
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0		4.5	7.5			7.5	7.5
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00			1.00	1.00
Frt		1.00	0.85		1.00		1.00	1.00			1.00	0.85
Flt Protected		0.95	1.00		1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1770	1583		1863		1770	1863			1863	1583
Flt Permitted		0.76	1.00		1.00		0.14	1.00			1.00	1.00
Satd. Flow (perm)		1410	1583		1863		252	1863			1863	1583
Peak-hour factor, PHF	0.85	0.85	0.85	0.75	0.75	0.75	0.95	0.95	0.95	0.80	0.80	0.80
Adj. Flow (vph)	313	0	71	0	1	0	33	620	0	0	804	284
RTOR Reduction (vph)	0	0	53	0	0	0	0	0	0	0	0	83
Lane Group Flow (vph)	0	313	18	0	1	0	33	620	0	0	804	201
Turn Type	Perm		Perm	Perm			pm+pt			Perm		Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		22.5	22.5		22.5		55.0	55.0			46.6	46.6
Effective Green, g (s)		22.5	22.5		22.5		55.0	55.0			46.6	46.6
Actuated g/C Ratio		0.25	0.25		0.25		0.61	0.61			0.52	0.52
Clearance Time (s)		5.0	5.0		5.0		4.5	7.5			7.5	7.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		353	396		466		220	1139			965	820
v/s Ratio Prot					0.00		0.01	c0.33			c0.43	
v/s Ratio Perm		c0.22	0.01				0.09					0.13
v/c Ratio		0.89	0.04		0.00		0.15	0.54			0.83	0.24
Uniform Delay, d1		32.5	25.6		25.3		12.9	10.2			18.4	12.0
Progression Factor		1.00	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		22.4	0.0		0.0		0.3	1.9			6.3	0.2
Delay (s)		54.9	25.6		25.3		13.2	12.1			24.7	12.1
Level of Service		D	C		C		B	B			C	B
Approach Delay (s)		49.5			25.3			12.1			21.4	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM Average Control Delay	23.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

3752.00
MEARNG PN 230113
Joint Forces Headquarters
Augusta, Kennebec County, Maine

Exhibit #10 – Site Lighting and Buffer Requirements

Site Lighting and Buffer Narrative
Site Lighting Cutsheets

Prepared For: Maine Army National Guard
Attn: Normand Michaud
Bldg #8, Camp Keyes
Augusta, Maine 04333

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Site Lighting

See attached lighting cutsheets for information on site lighting. See the ES1## series of drawings for light pole locations and additional information on site lighting. The light fixture schedule tables on ES101, ES102, and ES103 give information for the cutsheets. All lighting fixtures are full-cutoff and light levels will not exceed the permitted threshold at the lot lines.

Buffering

As previously stated, due to a 207' standoff setback a lot of existing trees and vegetation will remain between Civic Center Drive/access road and the building. Areas that don't have adequate buffering will receive additional landscaping or berms. See LP### series sheets for additional buffering/planting information. There is also a 100' salmon setback from Stone Brook which will not be impacted as part of this project.

D-Series Size 1
LED Area Luminaire

DESIGNLIGHTS CONSORTIUM · NIGHTTIME FRIENDLY · LED lighting facts

Catalog Number

Notes

Type

Hit the Tab key or mouse over the page to see all interactive elements.

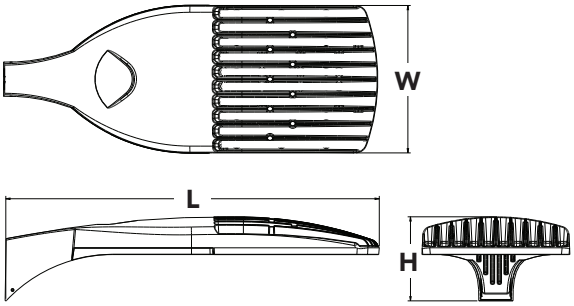
Introduction

The modern styling of the D-Series is striking yet unobtrusive - making a bold, progressive statement even as it blends seamlessly with its environment.

The D-Series distills the benefits of the latest in LED technology into a high performance, high efficacy, long-life luminaire. The outstanding photometric performance results in sites with excellent uniformity, greater pole spacing and lower power density. It is ideal for replacing 100 – 400W metal halide in pedestrian and area lighting applications with typical energy savings of 65% and expected service life of over 100,000 hours.

Specifications

EPA:	1.2 ft² (0.11 m²)
Length:	33″ (83.8 cm)
Width:	13″ (33.0 cm)
Height:	7-1/2″ (19.0 cm)
Weight (max):	27 lbs (12.2 kg)



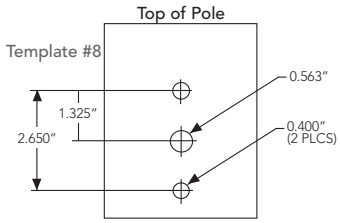
Ordering Information

EXAMPLE: DSX1 LED 60C 1000 40K T3M MVOLT SPA DDBXD

DSX1 LED

Series	LEDs	Drive current	Color temperature	Distribution	Voltage	Mounting	Control options	Other options	Finish *(required)*
DSX1 LED	**Forward optics** 30C 30 LEDs (one engine) 40C 40 LEDs (two engines) **Rotated optics** 60C 60 LEDs (two engines)	530 530 mA 700 700 mA 1000 1000 mA (1 A)	30K 3000K (80 CRI min.) 40K 4000K (70 CRI min.)[1] 50K 5000K (67 CRI)	T1S Type I short T2S Type II short T2M Type II medium T3S Type III short T3M Type III medium T4M Type IV medium TFTM Forward throw medium T5VS Type V very short T5S Type V short T5M Type V medium T5W Type V wide	MVOLT[2] 120[2] 208[2] 240[2] 277[2] 347[3] 480[3]	**Shipped included** SPA Square pole mounting RPA Round pole mounting WBA Wall bracket	**Shipped installed** PER NEMA twist-lock receptacle only (no controls) DMG 0-10V dimming driver (no controls)[4] DCR Dimmable and controllable via ROAM® (no controls)[5] DS Dual switching[6,7] PIR Motion sensor, 8-15′ mounting height[4,8] PIRH Motion sensor, 15-30′ mounting height[4,9] BL30 Bi-level switched dimming, 30%[4,7,10] BL50 Bi-level switched dimming, 50%[4,7,10]	**Shipped installed** HS House-side shield[11] WTB Utility terminal block[12] SF Single fuse (120, 277, 347V)[13] DF Double fuse (208, 240, 480V)[13] TLS Tool-less entry trigger latch[14] L90 Left rotated optics[15] R90 Right rotated optics[15]	DDBXD Dark bronze DBLXD Black DNAXD Natural aluminum DWHXD White DDBTXD Textured dark bronze DBLBXD Textured black DNATXD Textured natural aluminum DWHGXD Textured white

Drilling



DSX1 shares a unique drilling pattern with the AERIS™ family. Specify this drilling pattern when specifying poles, per the table below.

DM19AS	Single unit	**DM29AS**	2 at 90°*
DM28AS	2 at 180°	**DM39AS**	3 at 90°*
DM49AS	4 at 90°*	**DM32AS**	3 at 120° **

Example: SSA 20 4C **DM19AS** DDBXD

Visit Lithonia Lighting's POLES CENTRAL to see our wide selection of poles, accessories and educational tools.

Tenon Mounting Slipfitter *

Tenon O.D.	Single Unit	2 at 180°	2 at 90°	3 at 120°	3 at 90°	4 at 90°
2-3/8″	AST20-190	AST20-280	N/A	N/A	N/A	N/A
2-7/8″	AST25-190	AST25-280	N/A	AST25-320	N/A	N/A
4″	AST35-190	AST35-280	AST35-290	AST35-320	AST35-390	AST35-490

** Round pole top must be 3.25″ O.D. minimum.*
*** For round pole mounting (RPA) only.*

Accessories

Ordered and shipped separately.

DLL127F 1.5 JU	Photocell - SSL twist-lock (120-277V)[16]
DLL347F 1.5 CUL JU	Photocell - SSL twist-lock (347V)[16]
DLL480F 1.5 CUL JU	Photocell - SSL twist-lock (480V)[16]
SC U	Shorting cap[16]
DSX1HS 30C U	House-side shield for 30 LED unit
DSX1HS 40C U	House-side shield for 40 LED unit
DSX1HS 60C U	House-side shield for 60 LED unit
SPA19/MR2 DDBXD U	Square pole DM19 to DM19AS adapter (specify finish)
RPA19/MR2 DDBXD U	Round pole DM19 to DM19AS adapter (specify finish)

For more control options, visit DTL and ROAM online.

NOTES

1. Configured with 4000K (40K) provides the shortest lead times. Consult factory for 3000K (30K) and 5000K (50K) lead times.
2. MVOLT driver operates on any line voltage from 120-277V (50/60 Hz). Specify 120, 208, 240 or 277 options only when ordering with fusing (SF, DF options).
3. Not available with single board, 530mA product (30C 530). N/A with 1000 mA.
4. Not available with 347 or 480V.
5. Specifies a ROAM® enabled luminaire with 0-10V dimming capability; PER option required. Not available with 347 or 480V. Additional hardware and services required for ROAM® deployment; must be purchased separately. Call 1-800-442-6745 or email: sales@roamservices.net. N/A with PIR or PIRH.
6. Requires 40C or 60C. Provides 50/50 luminaire operation via two independent drivers on two separate circuits. N/A with PER, DCR, DMG, WTB, PIR, or PIRH.
7. Requires an additional switched circuit.
8. Specifies the SensorSwitch SBR-10-ODP control; see Motion Sensor Guide for details. Dimming driver standard. Not available with DCR, DS, TLS or WTB.
9. Specifies the SensorSwitch SBR-6-ODP control; see Motion Sensor Guide for details. Dimming driver standard. Not available with DCR, DS, TLS or WTB.
10. Dimming driver standard. MVOLT only. Not available with DCR or WTB.
11. Also available as a separate accessory; see Accessories information.
12. WTB not available with BL30, BL50, DS, PIR or PIRH.
13. Single fuse (SF) requires 120, 277 or 347 voltage option. Double fuse (DF) requires 208, 240 or 480 voltage option.
14. With TLS option, the luminaire is no longer IP65 rated. Not available with PIR or PIRH.
15. Available with 60 LEDs (60C option) only.
16. Requires luminaire to be specified with PER option. Ordered and shipped as a separate line item.

LITHONIA LIGHTING

One Lithonia Way • Conyers, Georgia 30012 • Phone: 800.279.8041 • Fax: 770.918.1209 • www.lithonia.com

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Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Actual wattage may differ by +/- 8% when operating between 120-480V +/-10%. Contact factory for performance data on any configurations not shown here.

LEDs	Drive Current (mA)	Performance Package	System Watts	Dist. Type	30K (3000K, 80 minimum CRI)					40K (4000K, 70 minimum CRI)					50K (5000K, 67 CRI)				
					Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
30C (30 LEDs)	700 mA	30C 700 --K	68 W	T1S	5,290	1	0	1	78	6,524	2	0	2	96	7,053	2	0	2	104
				T2S	5,540	1	0	1	81	6,833	2	0	2	100	7,387	2	0	2	109
				T2M	5,360	1	0	2	79	6,611	2	0	2	97	7,147	2	0	2	105
				T3S	5,479	1	0	1	81	6,757	1	0	2	99	7,305	2	0	2	107
				T3M	5,452	1	0	2	80	6,724	2	0	2	99	7,269	2	0	2	107
				T4M	5,461	1	0	2	80	6,736	2	0	2	99	7,282	2	0	2	107
				TFTM	5,378	1	0	2	79	6,633	1	0	2	98	7,171	1	0	2	105
				T5VS	5,708	2	0	0	84	7,040	3	0	0	104	7,611	3	0	1	112
				T5S	5,639	2	0	0	83	6,955	2	0	0	102	7,519	3	0	0	111
				T5M	5,710	3	0	1	84	7,042	3	0	1	104	7,613	3	0	2	112
				T5W	5,551	3	0	1	82	6,847	3	0	2	101	7,401	3	0	2	109
	1000 mA	30C 1000 --K	105 W	T1S	7,229	2	0	2	69	9,168	2	0	2	87	9,874	2	0	2	94
				T2S	7,572	2	0	2	72	9,603	2	0	2	91	10,342	2	0	2	98
				T2M	7,325	2	0	2	70	9,291	2	0	2	88	10,005	2	0	3	95
				T3S	7,488	2	0	2	71	9,496	2	0	2	90	10,227	2	0	2	97
				T3M	7,451	2	0	2	71	9,450	2	0	2	90	10,177	2	0	2	97
				T4M	7,464	2	0	2	71	9,467	2	0	2	90	10,195	2	0	2	97
				TFTM	7,351	1	0	2	70	9,323	2	0	2	89	10,040	2	0	3	96
				T5VS	7,801	3	0	1	74	9,894	3	0	1	94	10,655	3	0	1	101
				T5S	7,803	3	0	2	74	9,774	3	0	1	93	10,526	3	0	1	100
				T5M	7,707	3	0	0	73	9,897	3	0	2	94	10,658	4	0	2	102
				T5W	7,586	3	0	2	72	9,621	4	0	2	92	10,363	4	0	2	99
40C (40 LEDs)	700 mA	40C 700 --K	89 W	T1S	6,876	2	0	2	77	8,639	2	0	2	97	9,345	2	0	2	105
				T2S	7,202	2	0	2	81	9,049	2	0	2	102	9,788	2	0	2	110
				T2M	6,968	2	0	2	78	8,755	2	0	2	98	9,469	2	0	3	106
				T3S	7,122	2	0	2	80	8,948	2	0	2	101	9,679	2	0	2	109
				T3M	7,088	2	0	2	80	8,905	2	0	2	100	9,632	2	0	2	108
				T4M	7,100	2	0	2	80	8,920	2	0	2	100	9,649	2	0	2	108
				TFTM	6,992	1	0	2	79	8,785	2	0	2	99	9,502	2	0	2	107
				T5VS	7,421	3	0	0	83	9,323	3	0	1	105	10,085	3	0	1	113
				T5S	7,331	2	0	0	82	9,210	3	0	1	103	9,962	3	0	1	112
				T5M	7,423	3	0	2	83	9,326	3	0	2	105	10,087	4	0	2	113
				T5W	7,216	3	0	2	81	9,066	4	0	2	102	9,807	4	0	2	110
	1000 mA	40C 1000 --K	138 W	T1S	9,521	2	0	2	69	11,970	2	0	2	87	12,871	3	3	0	93
				T2S	9,972	2	0	2	72	12,558	3	0	3	91	13,481	3	0	3	98
				T2M	9,648	2	0	3	70	12,149	3	0	3	88	13,043	3	0	3	95
				T3S	9,862	2	0	2	71	12,418	2	0	2	90	13,331	2	0	2	97
				T3M	9,814	2	0	2	71	12,358	3	0	3	90	13,267	3	0	3	96
				T4M	9,831	2	0	2	71	12,379	2	0	3	90	13,290	2	0	3	96
				TFTM	9,681	2	0	2	70	12,191	2	0	3	88	13,087	2	0	3	95
				T5VS	10,275	3	0	1	74	12,937	3	0	1	94	13,890	4	0	1	101
				T5S	10,150	3	0	1	74	12,782	3	0	1	93	13,721	3	0	1	99
				T5M	10,278	4	0	2	74	12,942	4	0	2	94	13,894	4	0	2	101
				T5W	9,991	4	0	2	72	12,582	4	0	2	91	13,507	4	0	2	98
60C (60 LEDs)	700 mA	60C 700 --K	131 W	T1S	10,226	2	0	2	78	12,871	3	0	3	98	13,929	3	0	3	106
				T2S	10,711	2	0	2	82	13,481	3	0	3	103	14,589	3	0	3	111
				T2M	10,363	2	0	3	79	13,043	3	0	3	100	14,115	3	0	3	108
				T3S	10,592	2	0	2	81	13,331	2	0	2	102	14,427	3	0	3	110
				T3M	10,541	2	0	2	80	13,267	3	0	3	101	14,357	3	0	3	110
				T4M	10,559	2	0	2	81	13,290	2	0	3	101	14,382	3	0	3	110
				TFTM	10,398	2	0	3	79	13,087	2	0	3	100	14,163	2	0	3	108
				T5VS	11,036	3	0	1	84	13,890	4	0	4	106	15,032	4	0	1	115
				T5S	10,902	3	0	1	83	13,721	3	0	1	105	14,849	4	0	1	113
				T5M	11,039	4	0	2	84	13,894	4	0	2	106	15,036	4	0	2	115
				T5W	10,732	4	0	2	82	13,507	4	0	2	103	14,617	4	0	2	112
	1000 mA	60C 1000 --K	209 W	T1S	14,017	3	0	3	67	17,632	3	0	3	84	19,007	3	0	3	91
				T2S	14,681	3	0	3	70	18,467	3	0	3	88	19,908	3	0	3	95
				T2M	14,204	3	0	3	68	17,867	3	0	3	85	19,260	3	0	3	92
				T3S	14,518	3	0	3	69	18,262	3	0	3	87	19,687	3	0	3	94
				T3M	14,448	3	0	3	69	18,173	3	0	4	87	19,591	3	0	4	94
				T4M	14,473	3	0	3	69	18,205	3	0	3	87	19,625	3	0	4	94
				TFTM	14,253	2	0	3	68	17,928	3	0	4	86	19,326	3	0	4	92
				T5VS	15,127	4	0	1	72	19,028	4	0	1	91	20,512	4	0	1	98
				T5S	14,943	4	0	1	71	18,797	4	0	1	90	20,263	4	0	1	97
				T5M	15,131	4	0	2	72	19,033	4	0	2	91	20,517	5	0	3	98
				T5W	14,710	4	0	2	70	18,503	5	0	3	89	19,946	5	0	3	95

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Performance Data

Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

Ambient		Lumen Multiplier
0°C	32°F	1.02
10°C	50°F	1.01
20°C	68°F	1.00
25°C	**77°F**	**1.00**
30°C	86°F	1.00
40°C	104°F	0.99

Electrical Load

			Current (A)					
Number of LEDs	Drive Current (mA)	System Watts	120	208	240	277	347	480
30	530	52	0.52	0.30	0.26	0.23	--	--
	700	68	0.68	0.39	0.34	0.30	0.24	0.17
	1000	105	1.03	0.59	0.51	0.45	--	--
40	530	68	0.67	0.39	0.34	0.29	0.23	0.17
	700	89	0.89	0.51	0.44	0.38	0.31	0.22
	1000	138	1.35	0.78	0.67	0.58	--	--
60	530	99	0.97	0.56	0.48	0.42	0.34	0.24
	700	131	1.29	0.74	0.65	0.56	0.45	0.32
	1000	209	1.98	1.14	0.99	0.86	--	--

Projected LED Lumen Maintenance

Data references the extrapolated performance projections for the platforms noted in a **25°C ambient**, based on 10,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

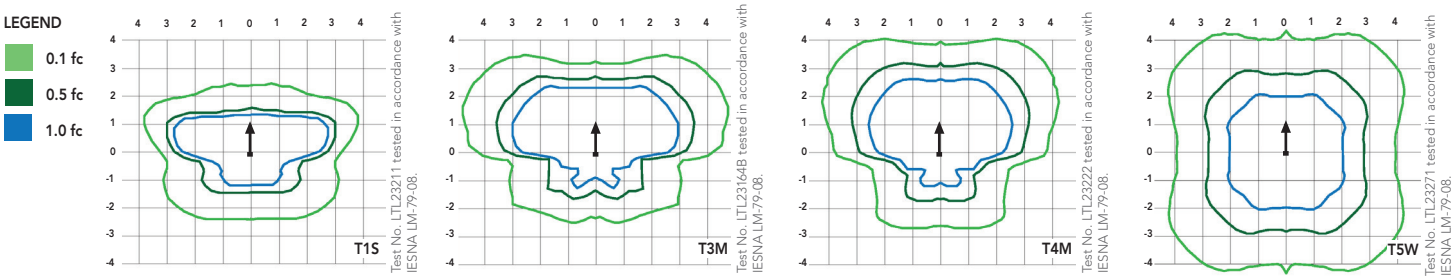
To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

Operating Hours	0	25,000	50,000	100,000
Lumen Maintenance Factor	DSX1 LED 60C 1000			
	1.0	0.95	0.93	0.88
	DSX1 LED 60C 700			
	1.0	0.99	0.98	0.96

Photometric Diagrams

To see complete photometric reports or download .ies files for this product, visit Lithonia Lighting's D-Series Area Size 1 homepage.

Isofootcandle plots for the DSX1 LED 60C 1000 40K. Distances are in units of mounting height (20').



FEATURES & SPECIFICATIONS

INTENDED USE

The sleek design of the D-Series Size 1 reflects the embedded high performance LED technology. It is ideal for many commercial and municipal applications, such as parking lots, plazas, campuses, and streetscapes.

CONSTRUCTION

Single-piece die-cast aluminum housing has integral heat sink fins to optimize thermal management through conductive and convective cooling. Modular design allows for ease of maintenance and future light engine upgrades. The LED driver is mounted in direct contact with the casting to promote low operating temperature and long life. Housing is completely sealed against moisture and environmental contaminants (IP65). Low EPA (1.2 ft^2) for optimized pole wind loading.

FINISH

Exterior parts are protected by a zinc-infused Super Durable TGIC thermoset powder coat finish that provides superior resistance to corrosion and weathering. A tightly controlled multi-stage process ensures a minimum 3 mils thickness for a finish that can withstand extreme climate changes without cracking or peeling. Available in both textured and non-textured finishes.

OPTICS

Precision-molded proprietary acrylic lenses are engineered for superior area lighting distribution, uniformity, and pole spacing. Light engines are available in standard 4000K (70 minimum CRI) or optional 3000K (80 minimum CRI) or 5000K (67 CRI) configurations. The D-Series Size 1 has zero uplight and qualifies as a Nighttime Friendly™ product, meaning it is consistent with the LEED® and Green Globes™ criteria for eliminating wasteful uplight.

ELECTRICAL

Light engine configurations consist of 30, 40 or 60 high-efficacy LEDs mounted to metal-core circuit boards to maximize heat dissipation and promote long life (up to L96/100,000 hours at 25°C). Class 1 electronic drivers are designed to have a power factor >90%, THD <20%, and an expected life of 100,000 hours with <1% failure rate. Easily serviceable 10kV or 6kV surge protection device meets a minimum Category C Low operation (per ANSI/IEEE C62.41.2).

INSTALLATION

Included mounting block and integral arm facilitate quick and easy installation. Stainless steel bolts fasten the mounting block securely to poles and walls, enabling the D-Series Size 1 to withstand up to a 3.0 G vibration load rating per ANSI C136.31. The D-Series Size 1 utilizes the AERIS™ series pole drilling pattern. Optional terminal block, tool-less entry, and NEMA photocontrol receptacle are also available.

LISTINGS

CSA certified to U.S. and Canadian standards. Light engines are IP66 rated; luminaire is IP65 rated. Rated for -40°C minimum ambient. U.S. Patent No. D672,492 S. International patent pending.

WARRANTY

Five-year limited warranty. Full warranty terms located at:
www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

Note: Specifications subject to change without notice.

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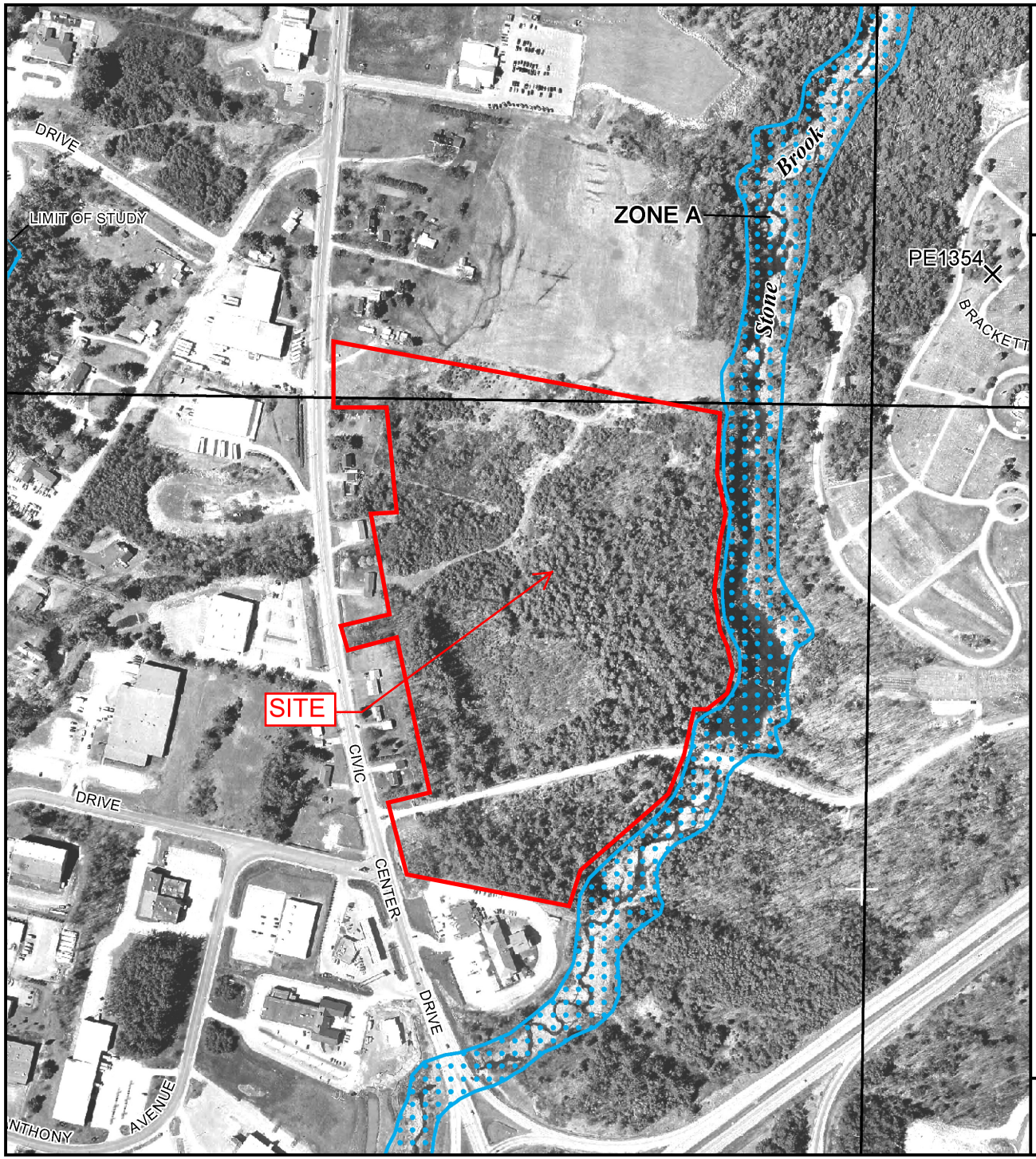
3752.00
MEARNG PN 230113
Joint Forces Headquarters
Augusta, Kennebec County, Maine

Exhibit #11 – FEMA Flood Map

Prepared For: Maine Army National Guard
Attn: Normand Michaud
Bldg #8, Camp Keyes
Augusta, Maine 04333

Prepared By: WBRC Architects-Engineers
44 Central Street
Bangor, Maine 04401
(207) 947-4511
(207) 947-4628
www.wbrcae.com

WBRC ARCHITECTS • ENGINEERS
BANGOR PORTLAND SARASOTA
www.wbrcae.com



MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0506D

FIRM

FLOOD INSURANCE RATE MAP

KENNEBEC COUNTY, MAINE

(ALL JURISDICTIONS)

PANEL 506 OF 775

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
AUGUSTA, CITY OF	230067	0506	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
23011C0506D

EFFECTIVE DATE
JUNE 16, 2011

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

3752.00
MEARNG PN 230113
Joint Forces Headquarters
Augusta, Kennebec County, Maine

Exhibit#12 – Letters

IFW Letter
MHPC Letter
NAP Letter
Water Letter
Sewer Letter
Solid Waste Letter

Prepared For: Maine Army National Guard
Attn: Normand Michaud
Bldg #8, Camp Keyes
Augusta, Maine 04333

Prepared By: WBRC Architects-Engineers
44 Central Street
Bangor, Maine 04401
(207) 947-4511
(207) 947-4628
www.wbrcae.com

WBRC ARCHITECTS • ENGINEERS
BANGOR PORTLAND SARASOTA
www.wbrcae.com

STATE OF MAINE
DEPARTMENT OF INLAND FISHERIES & WILDLIFE
284 STATE STREET
41 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0041

Paul R. LePage
GOVERNOR

Chandler E. Woodcock
COMMISSIONER

September 26, 2011

Noel Musson
Project Manager
CES, Inc.
1366 State Highway 102
Suite #6
Bar Harbor, ME 04609

RE: Proposed Joint Forces Headquarters, Augusta, Maine

Dear Mr. Musson:

On behalf of the Maine Department of Inland Fisheries and Wildlife, I have reviewed plans that your office provided for the Maine Army National Guard's proposed Joint Forces Headquarters project on property currently owned by the State of Maine as part of the Maine Veterans Memorial Cemetery.

This project will have no direct impacts to any known occurrences of rare, threatened, or endangered animal species, or direct impacts to mapped Significant Wildlife Habitat. However, given the proximity of the site to Stone Brook, a direct tributary to Bond Brook (an important cold water fishery habitat), we recommend that the project maintain a minimum 100-foot undisturbed buffer from any proposed development areas and the high waterline of any wetlands areas directly associated with Stone Brook.

Please feel free to contact my office if you have any questions, or if I can be of any further assistance.

Best regards,

Steve Walker
Acting Environmental Review Coordinator

RECEIVED
2011 APR 29 A 10: 56

DEPARTMENT OF
DEFENSE, VETERANS AND EMERGENCY MANAGEMENT
Military Bureau
Joint Force Headquarters, Maine National Guard
Directorate of Facilities Engineering
SHS #33, Building 8, Camp Keyes
Augusta, Maine 04333-0033

RECEIVED
APR 04 2011
By 0555-11

Earle G. Shettleworth, Jr.
Maine Historic Preservation Commission
55 Capitol Street, 65 SHS
Augusta, ME 04333-0065

March 31, 2011

Dear Mr. Shettleworth,

The Maine National Guard (MENG) plans to construct a new Joint Forces Headquarters in FY14 off Civic Center Drive on a portion (36 acres) of State owned property known as the Maine Veterans Memorial Cemetery in Augusta, Maine. This 120,000 SF structure and associated support structures will be built to Army/Air National Guard Standards and will provide adequate areas to support the Maine National Guard Command. We request your concurrence that for this undertaking there are no historic properties or cultural resources affected.

For your review, enclosed is a project location map, proposed boundary map, and proposed site layout of the structure and associated support structures.

Your prompt attention is appreciated. If we do not receive a response after 30 days, we will proceed with the undertaking in accordance with provisions of 36 CFR 800.3(c)(4) and 36 CFR 800.4(d)(1)(i).

If you require additional information, please contact John Blais at 207-430-2177 or by email at john.blais@us.army.mil. Please send all correspondence to John Blais at the above address.

FOR THE ADJUTANT GENERAL:

John Blais
Senior Planner, DFE
Maine Army National Guard

Enclosures (3)

I concur that no historic properties or cultural resources will be affected:

Kirk F. Mohney
DEPUTY State Historic Preservation Officer

4/27/11
Date

DEPARTMENT OF CONSERVATION
93 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0093

PAUL R. LEPAGE
GOVERNOR

WILLIAM H. BEARDSLEY
COMMISSIONER

RECEIVED
6259
SEP 30 2011
AND SCANNED

September 28, 2011

Noel Musson
CES, Inc.
465 South Main Street
PO Box 639
Brewer, Maine 04412

Re: Rare and exemplary botanical features in proximity to: CES Project #6259, Proposed Joint Forces Headquarters for Maine National Guard, Augusta, Maine

Dear Mr. Musson:

I have searched the Natural Areas Program's Biological and Conservation Data System files in response to your request of September 22, 2011 for information on the presence of rare or unique botanical features documented from the vicinity of the project site in Augusta, Maine. Rare and unique botanical features include the habitat of rare, threatened, or endangered plant species and unique or exemplary natural communities. Our review involves examining maps, manual and computerized records, other sources of information such as scientific articles or published references, and the personal knowledge of staff or cooperating experts.

Our official response covers only botanical features. For authoritative information and official response for zoological features you must make a similar request to the Maine Department of Inland Fisheries and Wildlife, 284 State Street, Augusta, Maine 04333.

According to the information currently in our Biological and Conservation Data System files, there are no rare botanical features documented specifically within the project area. This lack of data may indicate minimal survey efforts rather than confirm the absence of rare botanical features. You may want to have the site inventoried by a qualified field biologist to ensure that no undocumented rare features are inadvertently harmed.

If a field survey of the project area is conducted, please refer to the enclosed supplemental information regarding rare and exemplary botanical features documented to occur in the vicinity of the project site. The list may include information on features that have been known to occur historically in the area as well as recently field-verified information. While historic records have not been documented in several years, they may persist in the area if suitable habitat exists. The enclosed list identifies features with potential to occur in the area, and it should be considered if you choose to conduct field surveys.

This finding is available and appropriate for preparation and review of environmental assessments, but it is not a substitute for on-site surveys. Comprehensive field surveys do not exist for all natural areas in Maine, and in the absence of a specific field investigation, the Maine Natural Areas Program cannot provide a definitive statement on the presence or absence of unusual natural features at this site.

MAINE NATURAL AREAS PROGRAM
MOLLY DOCHERTY, DIRECTOR

PHONE: (207) 287-8044
FAX: (207) 287-8040
TTY: (207) 287-2213

The Natural Areas Program is continuously working to achieve a more comprehensive database of exemplary natural features in Maine. We would appreciate the contribution of any information obtained should you decide to do field work. The Natural Areas Program welcomes coordination with individuals or organizations proposing environmental alteration, or conducting environmental assessments. If, however, data provided by the Natural Areas Program are to be published in any form, the Program should be informed at the outset and credited as the source.

The Natural Areas Program has instituted a fee structure of $75.00 an hour to recover the actual cost of processing your request for information. You will receive an invoice for $75.00 for our services.

Thank you for using the Natural Areas Program in the environmental review process. Please do not hesitate to contact me if you have further questions about the Natural Areas Program or about rare or unique botanical features on this site.

Sincerely,

Don Cameron
Ecologist
Maine Natural Areas Program
207-287-8041
don.s.cameron@maine.gov

Rare and Exemplary Botanical Features in the Project Vicinity

Documented within a four-mile radius of the Proposed Joint Forces Headquarters for Maine National Guard, Augusta, Maine, CES Project #6259.

Feature Name	Global Rank	State Rank	State Status	EO Number	Last Seen	Habitat
Fimbristylis autumnalis	G5	S2S3	T	20	2003-10-03	Open wetland, not coastal nor rivershore (non-forested, wetland)
Lipocarpha micrantha	G5	S1	T	6	2003-10-03	Open wetland, not coastal nor rivershore (non-forested, wetland)
Elymus hystrix	G5	S3	SC	11	1905-08-05	Hardwood to mixed forest (forest, upland)
Platanthera flava var. herbiola	G4T4Q	S2	SC	21	1916-07-06	Open wetland, not coastal nor rivershore (non-forested, wetland)
Allium canadense	G5	S2	SC	4	1983-07-14	Hardwood to mixed forest (forest, upland)
Elymus hystrix	G5	S3	SC	12	1916-08-18	Hardwood to mixed forest (forest, upland)
Malaxis monophyllos	G5	S1	E	15	1878-06	Forested wetland
Galearis spectabilis	G5	S1	E	12	1915-08-12	Hardwood to mixed forest (forest, upland)
uncus alpinoarticulatus ssp. nodulosus	G5T5?	S3	SC	6	1916-07-06	Non-tidal rivershore (non-forested, seasonally wet)
Cypripedium reginae	G4	S3	T	36	1874-07-04	Open wetland, not coastal nor rivershore (non-forested, wetland)
Ophioglossum pusillum	G5	S1	SC	8	1924-07	Old field/roadside (non-forested, wetland or upland)
Phryma leptostachya	G5	SH	PE	4	1916-08	Hardwood to mixed forest (forest, upland)
Carex alopecoidea	G5	SH	PE	2	1916-07-06	Forested wetland
Lonicera dioica	G5	S2	E	1	1975-pre	Dry barrens (partly forested, upland)
Phegopteris hexagonoptera	G5	S2	SC	9	1897-08-30	Hardwood to mixed forest (forest, upland)
Cypripedium reginae	G4	S3	T	33	1903-06	Forested wetland

Documented within a four-mile radius of the Proposed Joint Forces Headquarters for Maine National Guard, Augusta, Maine, CES Project #6259.

Feature Name	Global Rank	State Rank	State Status	EO Number	Last Seen	Habitat
Cryptotaenia canadensis	G5	SH	PE	3	1916-08-18	Hardwood to mixed forest (forest, upland)
Cryptotaenia canadensis	G5	SH	PE	4	1936-07	Hardwood to mixed forest (forest, upland)
Panax quinquefolius	G3G4	S3	E	18	1907-07-28	Hardwood to mixed forest (forest, upland)
Galearis spectabilis	G5	S1	E	15	1941	Hardwood to mixed forest (forest, upland)
Leatherleaf boggy fen	G5	S4		9	1997-09-16	Open wetland, not coastal nor rivershore (non-forested, wetland)
Raised level bog ecosystem	GNR	S4		4	2004	Open wetland, not coastal nor rivershore (non-forested, wetland)
Kettlehole bog-pond ecosystem	GNR	S4		2	1997-09-16	Open wetland, not coastal nor rivershore (non-forested, wetland)
Salix interior	G5	S1	E	4	2006-09-03	Non-tidal rivershore (non-forested, seasonally wet)
Cyperus squarrosus	G5	S2	SC	11	2006-09-03	Non-tidal rivershore (non-forested, seasonally wet)
Carex atherodes	G5	S1	E	5	2007-08-13	Coastal non-tidal wetland (non-forested, wetland)

STATE RARITY RANKS

S1	Critically imperiled in Maine because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extirpation from the State of Maine.
S2	Imperiled in Maine because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
S3	Rare in Maine (20-100 occurrences).
S4	Apparently secure in Maine.
S5	Demonstrably secure in Maine.
SU	Under consideration for assigning rarity status; more information needed on threats or distribution.
SNR	Not yet ranked.
SNA	Rank not applicable.
S#?	Current occurrence data suggests assigned rank, but lack of survey effort along with amount of potential habitat create uncertainty (e.g. S3?).

Note: **State Rarity Ranks** are determined by the Maine Natural Areas Program for rare plants and rare and exemplary natural communities and ecosystems. The Maine Department of Inland Fisheries and Wildlife determines State Rarity Ranks for animals.

GLOBAL RARITY RANKS

G1	Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extinction.
G2	Globally imperiled because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
G3	Globally rare (20-100 occurrences).
G4	Apparently secure globally.
G5	Demonstrably secure globally.
GNR	Not yet ranked.

Note: **Global Ranks** are determined by NatureServe.

STATE LEGAL STATUS

Note: State legal status is according to 5 M.R.S.A. § 13076-13079, which mandates the Department of Conservation to produce and biennially update the official list of Maine's **Endangered** and **Threatened** plants. The list is derived by a technical advisory committee of botanists who use data in the Natural Areas Program's database to recommend status changes to the Department of Conservation.

E	ENDANGERED; Rare and in danger of being lost from the state in the foreseeable future; or federally listed as Endangered.
T	THREATENED; Rare and, with further decline, could become endangered; or federally listed as Threatened.

NON-LEGAL STATUS

SC	SPECIAL CONCERN: Rare in Maine, based on available information, but not sufficiently rare to be considered Threatened or Endangered.
PE	Potentially Extirpated; Species has not been documented in Maine in past 20 years or loss of last known occurrence has been documented.

ELEMENT OCCURRENCE RANKS - EO RANKS

Element Occurrence ranks are used to describe the quality of a rare plant population or natural community based on three factors:

- **Size**: Size of community or population relative to other known examples in Maine. Community or population's viability, capability to maintain itself.
- **Condition**: For communities, condition includes presence of representative species, maturity of species, and evidence of human-caused disturbance. For plants, factors include species vigor and evidence of human-caused disturbance.
- **Landscape context**: Land uses and/or condition of natural communities surrounding the observed area. Ability of the observed community or population to be protected from effects of adjacent land uses.

These three factors are combined into an overall ranking of the feature of **A**, **B**, **C**, or **D**, where **A** indicates an **excellent** example of the community or population and **D** indicates a **poor** example of the community or population. A rank of **E** indicates that the community or population is **extant** but there is not enough data to assign a quality rank. The Maine Natural Areas Program tracks all occurrences of rare (S1-S3) plants and natural communities as well as A and B ranked common (S4-S5) natural communities.

Note: **Element Occurrence Ranks** are determined by the Maine Natural Areas Program for rare plants and rare and exemplary natural communities and ecosystems. The Maine Department of Inland Fisheries and Wildlife determines Element Occurrence ranks for animals.

Visit our website for more information on rare, threatened, and endangered species!
http://www.maine.gov/doc/nrimc/mnap

Phone: (207) 622-3701

GREATER AUGUSTA UTILITY DISTRICT

12 Williams Street
Augusta, ME 04330-5225
www.greateraugustautilitydistrict.org

Fax: (207) 622-4539

BRIAN TARBUCK
General Manager

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KENNETH R. KNIGHT, Chair
DAVID P. SMITH, Vice Chair
STEPHEN J. ROBERGE, Clerk
CHARLENE HAMIWKA, Treasurer

TRUSTEES:
LESLEY JONES
ANDREW McPHERSON
DONALD A. ROBERTS
SUKEY SIKORA

October 4, 2013

Mr. Chris Parent
WBRC Architects
44 Central Street
Bangor, Maine 04401

RE: 3752.00 – Joint Forces Headquarters, Civic Center Drive, Augusta, Maine

Dear Mr. Parent:

This letter is to covey to you that the District has sufficient capacity of safe drinking water within its system to adequately supply the proposed development of the Joint Forces Headquarters located within the Maine Veterans Cemetery adjacent to Civic Center Drive with an estimated demand of 7,165 gpd. The area water pressure is approximately 75 psig.

The District also has adequate capacity within the sanitary sewer system to accept discharge in the estimated amount of 7,165 gpd. Based on the projected daily usage, the District's Sewer Availability Fee is calculated at $10.00 per gallon per day or a total fee of $71,650.00. This fee must be paid prior to physically connecting into the District's sewer system.

Please note that the proposed force sewer service crossing Civic Center Drive and discharging into the District's MH on Darin Drive will be entirely private, owned and maintained by the Joint Forces Headquarters.

The District will require the submittal of site plans showing all utilities and grading, as well as building floor and plumbing plans for review well in advance of beginning the project. All costs associated with installation, inspection and testing will be determined during the plan review process.

Please contact me at 622-3701 ext. 123 or e-mail at mmorey@augustawater.org should you have any questions or concerns.

Sincerely,

GREATER AUGUSTA UTILITY DISTRICT

Michael A. Morey
Engineering Services Supervisor

H:\Public\Projects\Client Projects\Water & Sewer Availability\Civic Center Drive - Joint Forces Headquarters - Oct. 4, 2013.docx

PINE TREE
WASTE SERVICES

September 19, 2013

WBRC Architects
44 Central St
Bangor ME 04401

Attn: Chris Parent

Re: Capabilities Statement – Joint Forces Headquarters, Augusta, ME

Dear Mr. Parent,

This letter is to confirm that Pine Tree Waste Services located in Waterville, ME, has the capabilities to pick up, truck, and dispose of all volumes of Construction and Demolition Debris generated by the proposed construction at the Joint Forces Headquarters in Augusta, ME. This includes, but is not limited to the 4,283 cubic yards of anticipated debris. These materials can be disposed of at the Juniper Ridge Secured Landfill Facility located in West Old Town, ME.

Pine Tree Waste Services can also transport unlimited volumes of non-hazardous MSW (Municipal Solid Waste) to the Penobscot Energy Recovery Corporation facility located in Orrington, ME. We are also prepared to handle all amounts of recycled products that may be generated from this development, as well Universal Waste and Land Clearing Debris, to include the anticipated 9,000yards of stump waste..

This letter is not a quote for services. Rather it is a statement of capabilities. The sole purpose of this letter is to communicate the willingness and capabilities that Pine Tree Waste Services has towards providing this services as requested.

Please feel free to contact me with any future requests. I can be reached at (207) 310-0509.

Sincerely,

Adam Graham
Accounts Manager
Pine Tree Waste Services

3752.00
MEARNG PN 230113
Joint Forces Headquarters
Augusta, Kennebec County, Maine

Exhibit #13 – Site Plans

GI001	*COVER SHEET*
C-001	*SITE GENERAL NOTES & ABBREVIATIONS*
C-002	*SITE VICINITY PLAN*
C-003	*SITE LOCATION MAP*
CS101	*SITE EXISTING CONDITIONS PLAN*
CD100	*SITE OVERALL REMOVALS PLAN*
CD101	*SITE REMOVALS PLAN*
CD102	*SITE REMOVALS PLAN*
CD103	*SITE REMOVALS PLAN*
CP100	*SITE OVERALL LAYOUT & MATERIALS PLAN*
CP101	*SITE LAYOUT & MATERIALS PLAN*
CP102	*SITE LAYOUT & MATERIALS PLAN*
CP103	*SITE LAYOUT & MATERIALS PLAN*
CG100	*SITE OVERALL GRADING & EROSION CONTROL PLAN*
CG101	*SITE GRADING & EROSION CONTROL PLAN*
CG102	*SITE GRADING & EROSION CONTROL PLAN*
CG103	*SITE GRADING & EROSION CONTROL PLAN*
CU100	*SITE OVERALL SEWER, WATER, & GAS PLAN*
CU101	*SITE SEWER, WATER, & GAS PLAN*
CU102	*SITE SEWER, WATER, & GAS PLAN*
CW100	*SITE OVERALL STORM DRAINAGE PLAN*
CW101	*SITE STORM DRAINAGE PLAN*
CW102	*SITE STORM DRAINAGE PLAN*
CW103	*SITE STORM DRAINAGE PLAN*
ES100	*SITE OVERALL ELECTRICAL PLAN*
ES101	*SITE ELECTRICAL PLAN*
ES102	*SITE ELECTRICAL PLAN*
ES103	*SITE ELECTRICAL PLAN*
C501	*SITE DETAILS*
C502	*SITE DETAILS*
C503	*SITE DETAILS*
C504	*SITE DETAILS*
C505	*SITE DETAILS*
C506	*SITE DETAILS*
LP101	*SITE PLANTING PLAN*
LP102	*SITE PLANTING PLAN*
LP103	*SITE PLANTING PLAN*
SW101	*PRE-DEVELOPMENT STORMWATER PLAN*
SW102	*POST-DEVELOPMENT STORMWATER PLAN*
SW103	*STORMWATER TREATMENT PLAN*

Prepared For: Maine Army National Guard
Attn: Normand Michaud
Bldg #8, Camp Keyes
Augusta, Maine 04333

Prepared By: WBRC Architects-Engineers
44 Central Street
Bangor, Maine 04401
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