STORMWATER MANAGEMENT REPORT

FOR

SUDBURY ROAD IMPROVEMENTS

ACTON, MA

(DECEMBER 30, 2008)

Prepared for:

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Project Number:
C-472.08
Acton, Massachusetts

STORMWATER MANAGEMENT REPORT

Sudbury Road
Acton, MA

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PROJECT NARRATIVE
Sudbury Road Drainage Improvements, Acton, MA

As a condition of the approval for the development of the housing community at Alexan Concord, roadway improvements are being proposed, including the stormwater management system outlined below.

Proposed Stormwater Management Design

The existing stormwater management system on Sudbury Road consists of three catch basins and a drain manhole located near the intersection of Sudbury Road and Route 62, with an outfall into the Assabet River.

Proposed improvements include installing several upstream structures to collect the stormwater before it travels to the base of Sudbury Road. Three leaching catch basins will be installed at the intersection of West Side Road and overflow of the larger storms will be directed to the existing stormwater system on West Side Road. A secondary overflow pipe will be installed along Sudbury Road to connect to the existing system that discharges to the Assabet River. The last catch basin in the closed system leading to the Assabet River will be replaced with a Stormceptor Unit for the additional TSS removal as suggested by the Acton Engineering Department.

The alternative to using Westside Drive as a partial discharge point is to continue to use the Assabet River as the discharge point for all of the stormwater from Sudbury Road.

Compliance with the Stormwater Management Policy

The development is subject to the Department of Environmental Protection (DEP) Stormwater Management Policy. The policy includes ten standards for stormwater management compliance. The following is a description of how the proposed project will comply with each standard.

1. ***No new stormwater conveyances may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the commonwealth.***

   There are no new stormwater discharges proposed into nearby wetlands. The existing stormwater outfall to the Assabet River will be used for this project. Proposed improvements to Sudbury Road include installing a Stormceptor (or equal) to treat the stormwater prior to discharge, which meets this standard.

2. ***Storm water management systems must be designed so that the post – development peak discharge rates do not exceed pre-development peak discharge rates.***

The Table below shows the differences in existing and proposed peak runoff conditions for the 10yr and 100yr storm events:

	Existing Conditions (cfs)	Proposed Conditions (cfs)
Assabet River 10 Yr	3.45	1.04
Assabet River 100 Yr	5.17	1.50
Westside Drive 10 Yr	0.00	0.00
Westside Drive 100 Yr	4.02	3.59

Proposed conditions meet Standard 2.

3. ***Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to the maximum extent practicable. The annual recharge from the post development site should approximate the annual recharge from the pre-development of existing conditions, based on soil types.***

This proposal includes an improvement to an existing roadway. Approximately 9,378 sf of impervious area is being created as a result of widening Sudbury Raod for this project. Leaching catch basins are included as part of this proposal, thereby improving the recharge conditions at this site, which meets this standard. Soils are hydrologic group D.

The proposed leaching catch basins are designed to infiltrate the 10-year storm event (4.5 inches) from the upper portion of Sudbury Road. Approximately 11,340 cf [(4.5 inches/12 inch/foot) * 30,238 sf of treated paved surface].

This exceeds the Stormwater Management Standard 3.

4. ***For new development stormwater management systems must be designed to remove 80% of the average annual load (post-development conditions) of Total Suspended solids (TSS) It is presumed that this standard is met when:***
   - ***a. Suitable nonstructural practices for source control and pollution prevention are implemented;***
   - ***b. Stormwater management best management practices (BMPs) are sized to capture the prescribed runoff volume; and***
   - ***c. Stormwater management BMPs are maintained and designed.***

Water Quality Treatment Volume

V_{WQ} = (D_{WQ}/12 inches/foot) * (A_{IMP} * 43,560 square feet/acre)

V_{WQ} = *Required Water Quality Volume* (in cubic feet)

D_{WQ} = Water Quality Depth: one-inch for discharges within a Zone II or Interim Wellhead Protection Area, to or near another critical area, runoff from a LUHPPL, or exfiltration to soils with infiltration rate greater than 2.4 inches/hour or greater; ½-inch for discharges near or to other areas.

A_{IMP} = Impervious Area (in acres)

The volume to be treated is calculated as 1 inches of runoff times the total impervious area of the post-development project site. The existing impervious area of the project site is approximately 30,870 square feet of roadway. The proposed impervious area is 40,248 sf of paved surfaces due to the widening of a portion of the roadway.

V_{WQ} = (1inch/12 inches/foot) * (*40,248* square feet) = 3,354 cf

The proposed stormwater management system is designed to handle the 10-year storm event (4.5 inches) from Sudbury Road. This exceeds the Stormwater Management Standards.

Regular inspection and maintenance of the stormwater management system on Sudbury Road will ensure that the system is operating as intended. 80% TSS removal is achieved using a combination of deep sump catch basins, the dry wells, and the installation of a Stormceptor or equal at the intersection of Sudbury Road and Route 62. A TSS removal worksheet is included in this package. At least 85% TSS removal will be achieved prior to discharge to the Assabet River.

This standard has been met.

5. ***Stormwater discharges from areas with higher potential pollutant loads require the use of specific stormwater management BMPs. The use of infiltration practices without pretreatment is prohibited.***

There are no higher potential pollutant loads proposed for this project. This standard has been met.

6. ***Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas. Critical areas are Outstanding Resource Waters (ORWs), shellfish beds, swimming beaches, coldwater fisheries and rechargeable areas for public water supplies.***

The Assabet River is considered a Class B Outstanding Resource Water per 314 CMR 4.06. The BMPs proposed for use at this site include deep sump catch basins, leaching catch basins and a Stormceptor water quality structure.

The proposal is to increase treatment of the stormwater prior to discharge. Stormwater from each portion of the roadway travels through two deep sump basins prior to reaching the infiltration areas achieving the 44% TSS removal required. In addition, 1 inch was used in the Water Quality Calculations.

7. ***Redevelopment of previously developed sites must meet Stormwater Management Standards to the maximum extent practicable. However, if it is not practicable to meet all the Standards, new stormwater management systems must be designed to improve existing conditions.***

   This project is considered a redevelopment project because it consists of the maintenance and improvement of an existing roadway, including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems, and repaving;

   The project meets this standard by:

   (1) Meeting the requirements of Standards 2 and 3 and the pretreatment and structural stormwater best management practices requirements of Standards 4, 5, and 6 and to bring existing outfalls into compliance with Standard 1.

   (2) A complete evaluation of possible stormwater management measures, including environmentally sensitive site design that minimizes land disturbance and impervious surfaces, low impact development techniques and structural stormwater BMPs has been conducted, and

   (3) The highest practicable level of stormwater management has been achieved.

8. ***Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.***

   An Erosion and Sedimentation Control Plan for construction activities and Long Term Operation and Maintenance Plan for the stormwater management system will be provided prior to land disturbance.

9. ***All storm water management systems must have an operation and maintenance plan to ensure that systems function as designed.***

   A Long Term Operation and Maintenance Plan for the stormwater management system is attached.

10. ***All illicit discharges to the stormwater management system are prohibited.***
    An Illicit Discharge Compliance Statement is attached.

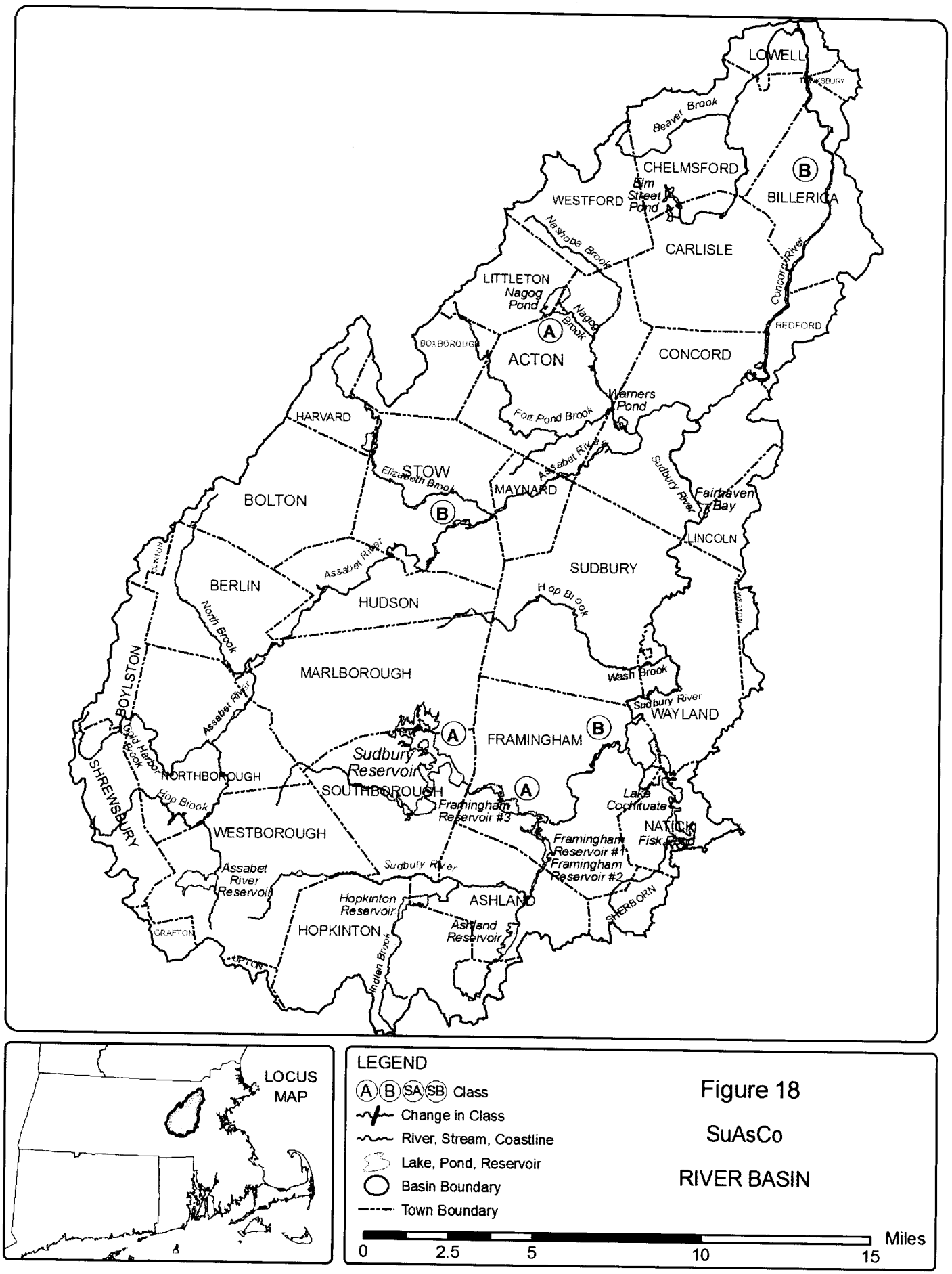


Figure 18

SuAsCo

RIVER BASIN

SuAsCo RIVER BASIN

BOUNDARY	MILE POINT	CLASS	QUALIFIERS
Sudbury River			
Source to Fruit Street Bridge in Hopkinton	29.1	B	Warm Water Outstanding Resource Water
Fruit Street Bridge to Outlet to Saxonville Pond	29.1-16.2	B	Warm Water High Quality Water
Outlet Saxonville Pond to Hop Brook confluence	16.2 - 10.6	B	Aquatic Life High Quality Water
Hop Brook confluence to Assabet River confluence	10.6-0.00	B	Aquatic Life
Denney Brook, Jackstraw Brook Picadilly Brook, Rutters Brook and Whitehall Brook	-	B	Outstanding Resource Water
Hop Brook			
Source to Sudbury River confluence	9.7 - 0.0	B	Warm Water
Concord River			
Confluence of Assabet and Sudbury to Billerica Water Supply Intake	15.4 - 5.9	B	Warm Water Treated Water Supply
Billerica Water Supply Intake to Rogers Street	5.9 - 1.0	B	Warm Water
Rogers Street to confluence with Merrimack River	1.0 - 0.0	B	Warm Water CSO
Assabet River			
Source to Westborough WWTF	31.8 - 30.4	B	Warm Water High Quality Water
Westborough WWTF to outlet to Boones Pond (Lake Boon)	30.4 - 12.4	B	Warm Water
Outlet of Boones Pond to confluence with Sudbury River	12.4 - 0.0	B	Warm Water
Nagog Pond			
Source to outlet in Acton and those	-	A	Public Water Supply

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

The Long-term Pollution Prevention Plan and the Construction Period Erosion and Sedimentation Control Plan will be completed and submitted by the applicant prior to land disturbance and are not included in this package.

Registered Professional Engineer Block and Signature

12·30·08

Signature, Date

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☐ New Development
- ☒ Redevelopment
- ☐ Mix of New Development and Redevelopment

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ❑ Credit 1
  - ❑ Credit 2
  - ❑ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☐ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.
☒ Required Recharge Volume calculation provided
☐ Required Recharge volume reduced through use of the LID site Design Credits.
☐ Sizing the infiltration, BMPs is based on the following method: Circle the method used.
Static Simple Dynamic Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.
☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
☒ Site is comprised solely of C and D soils and/or bedrock at the land surface
☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
☐ Solid Waste Landfill pursuant to 310 CMR 19.000
☒ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.
☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☐ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☒ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☒ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☒ Limited Project
- ☐ Small Residential Projects:
  5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

☒ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;

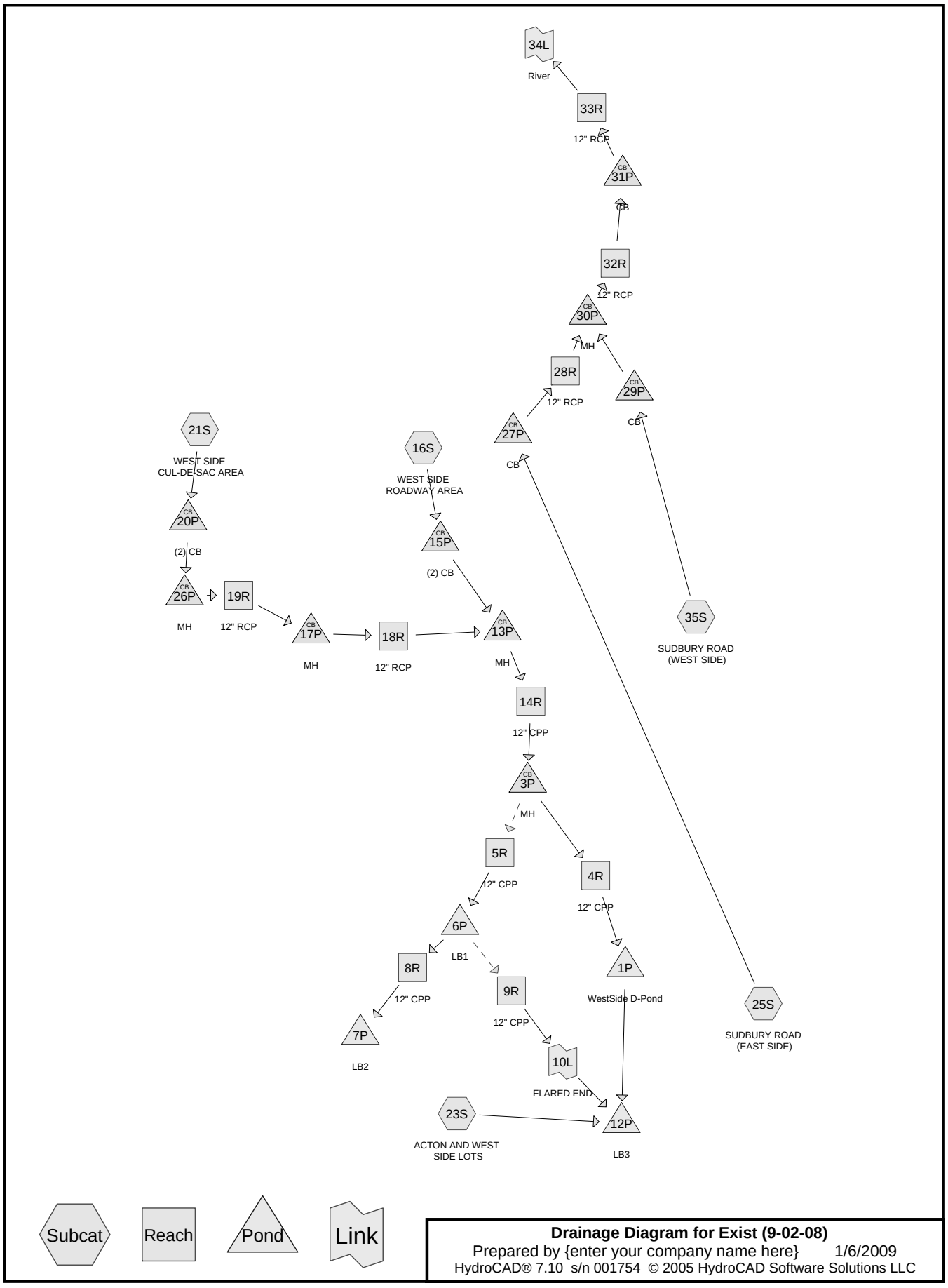
☐ Estimated operation and maintenance budget; and
☒ Operation and Maintenance Log Form.

☒ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
☒ An Illicit Discharge Compliance Statement is attached;
☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.


34L
River
33R
12" RCP
CB
31P
CB
32R
12" RCP
CB
30P
MH
28R
12" RCP
CB
29P
CB
27P
CB
21S
WEST SIDE
CUL-DE-SAC AREA
16S
WEST SIDE
ROADWAY AREA
CB
20P
(2) CB
CB
15P
(2) CB
CB
26P
MH
19R
12" RCP
CB
17P
MH
18R
12" RCP
CB
13P
MH
35S
SUDBURY ROAD
(WEST SIDE)
14R
12" CPP
CB
3P
MH
5R
12" CPP
4R
12" CPP
6P
LB1
8R
12" CPP
9R
12" CPP
1P
WestSide D-Pond
25S
SUDBURY ROAD
(EAST SIDE)
7P
LB2
10L
FLARED END
23S
ACTON AND WEST
SIDE LOTS
12P
LB3
Subcat
Reach
Pond
Link
Drainage Diagram for Exist (9-02-08)
Prepared by {enter your company name here} 1/6/2009
HydroCAD® 7.10 s/n 001754 © 2005 HydroCAD Software Solutions LLC

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

Subcatchment 16S: WEST SIDE ROADWAY AREA Runoff Area=36,499 sf Runoff Depth>0.29"
Tc=0.0 min CN=59 Runoff=0.18 cfs 878 cf

Subcatchment 21S: WEST SIDE CUL-DE-SAC AREA Runoff Area=31,802 sf Runoff Depth>0.32"
Tc=0.0 min CN=60 Runoff=0.19 cfs 844 cf

Subcatchment 23S: ACTON AND WEST SIDE LOTS Runoff Area=84,935 sf Runoff Depth>0.00"
Tc=0.0 min CN=41 Runoff=0.00 cfs 3 cf

Subcatchment 25S: SUDBURY ROAD (EAST SIDE) Runoff Area=27,391 sf Runoff Depth>1.94"
Flow Length=1,086' Tc=5.0 min CN=90 Runoff=1.52 cfs 4,435 cf

Subcatchment 35S: SUDBURY ROAD (WEST SIDE) Runoff Area=10,780 sf Runoff Depth>2.21"
Flow Length=1,086' Tc=5.0 min CN=93 Runoff=0.66 cfs 1,986 cf

Reach 4R: 12" CPP Peak Depth=0.25' Max Vel=2.2 fps Inflow=0.33 cfs 1,717 cf
D=12.0" n=0.020 L=27.0' S=0.0111 '/' Capacity=2.44 cfs Outflow=0.33 cfs 1,716 cf

Reach 5R: 12" CPP Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0 cf
D=12.0" n=0.020 L=16.0' S=0.0313 '/' Capacity=4.09 cfs Outflow=0.00 cfs 0 cf

Reach 8R: 12" CPP Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0 cf
D=12.0" n=0.020 L=30.0' S=0.0033 '/' Capacity=1.34 cfs Outflow=0.00 cfs 0 cf

Reach 9R: 12" CPP Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0 cf
D=12.0" n=0.020 L=48.0' S=0.0115 '/' Capacity=2.48 cfs Outflow=0.00 cfs 0 cf

Reach 14R: 12" CPP Peak Depth=0.23' Max Vel=2.7 fps Inflow=0.36 cfs 1,720 cf
D=12.0" n=0.020 L=135.0' S=0.0200 '/' Capacity=3.28 cfs Outflow=0.33 cfs 1,717 cf

Reach 18R: 12" RCP Peak Depth=0.12' Max Vel=3.6 fps Inflow=0.19 cfs 843 cf
D=12.0" n=0.011 L=145.0' S=0.0221 '/' Capacity=6.26 cfs Outflow=0.18 cfs 842 cf

Reach 19R: 12" RCP Peak Depth=0.11' Max Vel=4.3 fps Inflow=0.19 cfs 844 cf
D=12.0" n=0.011 L=62.0' S=0.0371 '/' Capacity=8.11 cfs Outflow=0.19 cfs 843 cf

Reach 28R: 12" RCP Peak Depth=0.37' Max Vel=5.7 fps Inflow=1.52 cfs 4,435 cf
D=12.0" n=0.011 L=94.0' S=0.0149 '/' Capacity=5.14 cfs Outflow=1.50 cfs 4,433 cf

Reach 32R: 12" RCP Peak Depth=0.36' Max Vel=8.5 fps Inflow=2.15 cfs 6,419 cf
D=12.0" n=0.011 L=62.0' S=0.0347 '/' Capacity=7.84 cfs Outflow=2.14 cfs 6,418 cf

Reach 33R: 12" RCP Peak Depth=0.19' Max Vel=20.1 fps Inflow=2.14 cfs 6,418 cf
D=12.0" n=0.011 L=13.0' S=0.3885 '/' Capacity=26.24 cfs Outflow=2.14 cfs 6,418 cf

Pond 1P: WestSide D-Pond Peak Elev=178.18' Storage=1,714 cf Inflow=0.33 cfs 1,716 cf
Outflow=0.00 cfs 0 cf

Pond 3P: MH Peak Elev=176.28' Inflow=0.33 cfs 1,717 cf
Primary=0.33 cfs 1,717 cf Secondary=0.00 cfs 0 cf Outflow=0.33 cfs 1,717 cf

Pond 6P: LB1 Peak Elev=167.50' Storage=0.000 af Inflow=0.00 cfs 0 cf
Discarded=0.00 cfs 0 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf

Pond 7P: LB2 Peak Elev=167.00' Storage=0.000 af Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Pond 12P: LB3 Peak Elev=167.00' Storage=0 cf Inflow=0.00 cfs 3 cf
Discarded=0.00 cfs 3 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 3 cf

Pond 13P: MH Peak Elev=180.00' Inflow=0.36 cfs 1,720 cf
Outflow=0.36 cfs 1,720 cf

Pond 15P: (2) CB Peak Elev=180.29' Inflow=0.18 cfs 878 cf
12.0" x 10.0' Culvert Outflow=0.18 cfs 878 cf

Pond 17P: MH Peak Elev=183.21' Inflow=0.19 cfs 843 cf
Outflow=0.19 cfs 843 cf

Pond 20P: (2) CB Peak Elev=185.78' Inflow=0.19 cfs 844 cf
12.0" x 9.0' Culvert Outflow=0.19 cfs 844 cf

Pond 26P: MH Peak Elev=185.61' Inflow=0.19 cfs 844 cf
Outflow=0.19 cfs 844 cf

Pond 27P: CB Peak Elev=143.36' Inflow=1.52 cfs 4,435 cf
Outflow=1.52 cfs 4,435 cf

Pond 29P: CB Peak Elev=143.11' Inflow=0.66 cfs 1,986 cf
Outflow=0.66 cfs 1,986 cf

Pond 30P: MH Peak Elev=142.03' Inflow=2.15 cfs 6,419 cf
Outflow=2.15 cfs 6,419 cf

Pond 31P: CB Peak Elev=139.87' Inflow=2.14 cfs 6,418 cf
Outflow=2.14 cfs 6,418 cf

Link 10L: FLARED END Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 34L: River Inflow=2.14 cfs 6,418 cf
Primary=2.14 cfs 6,418 cf

Total Runoff Area = 191,407 sf Runoff Volume = 8,146 cf Average Runoff Depth = 0.51"

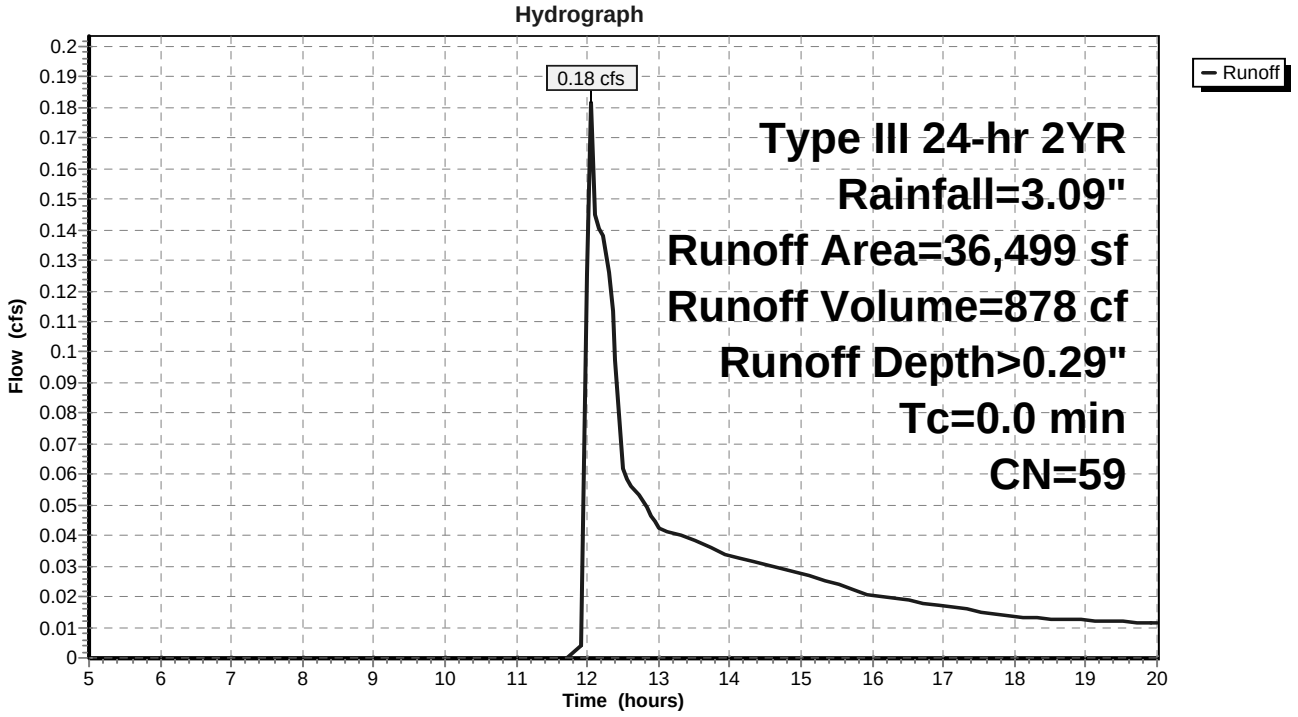
Subcatchment 16S: WEST SIDE ROADWAY AREA

Runoff = 0.18 cfs @ 12.06 hrs, Volume= 878 cf, Depth> 0.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.09"

Area (sf)	CN	Description
12,279	98	Paved parking & roofs
20,007	39	>75% Grass cover, Good, HSG A
4,213	39	OFFSITE GRASS
36,499	59	Weighted Average

Subcatchment 16S: WEST SIDE ROADWAY AREA



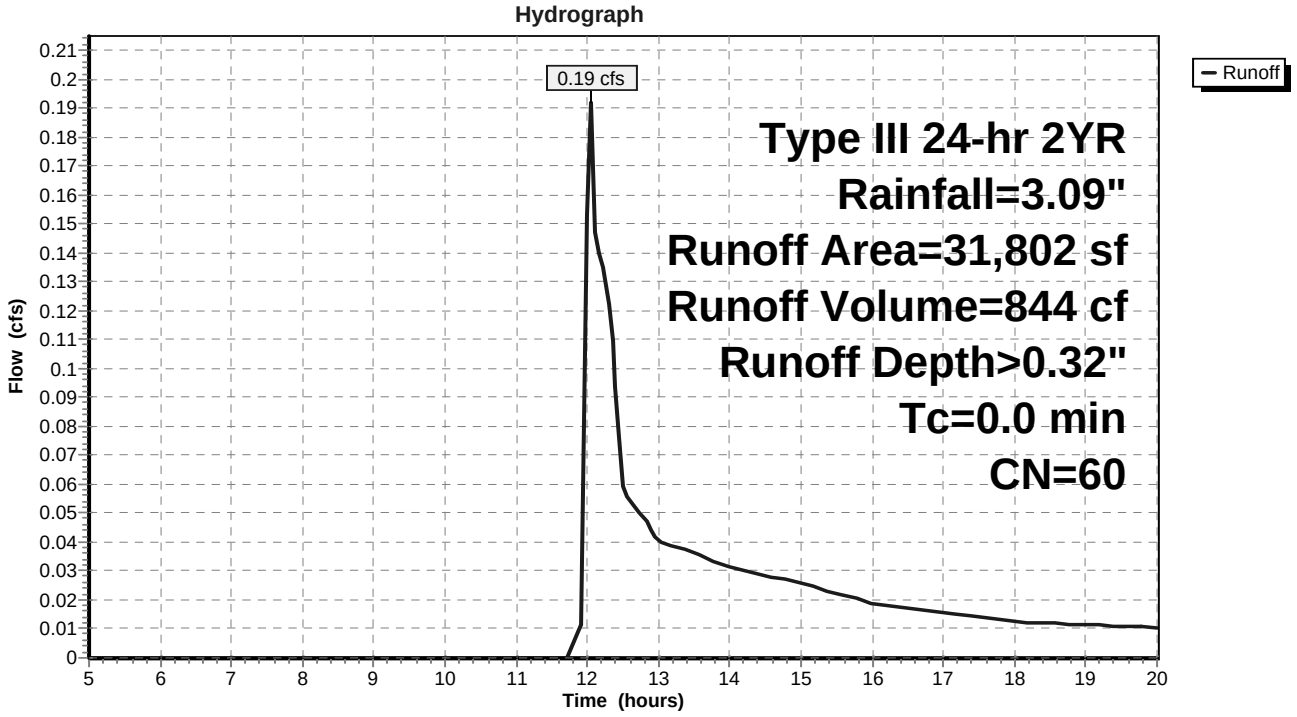
Subcatchment 21S: WEST SIDE CUL-DE-SAC AREA

Runoff = 0.19 cfs @ 12.05 hrs, Volume= 844 cf, Depth> 0.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.09"

Area (sf)	CN	Description
11,344	98	Paved parking & roofs
17,104	39	>75% Grass cover, Good, HSG A
3,354	39	OFFSITE GRASS
31,802	60	Weighted Average

Subcatchment 21S: WEST SIDE CUL-DE-SAC AREA



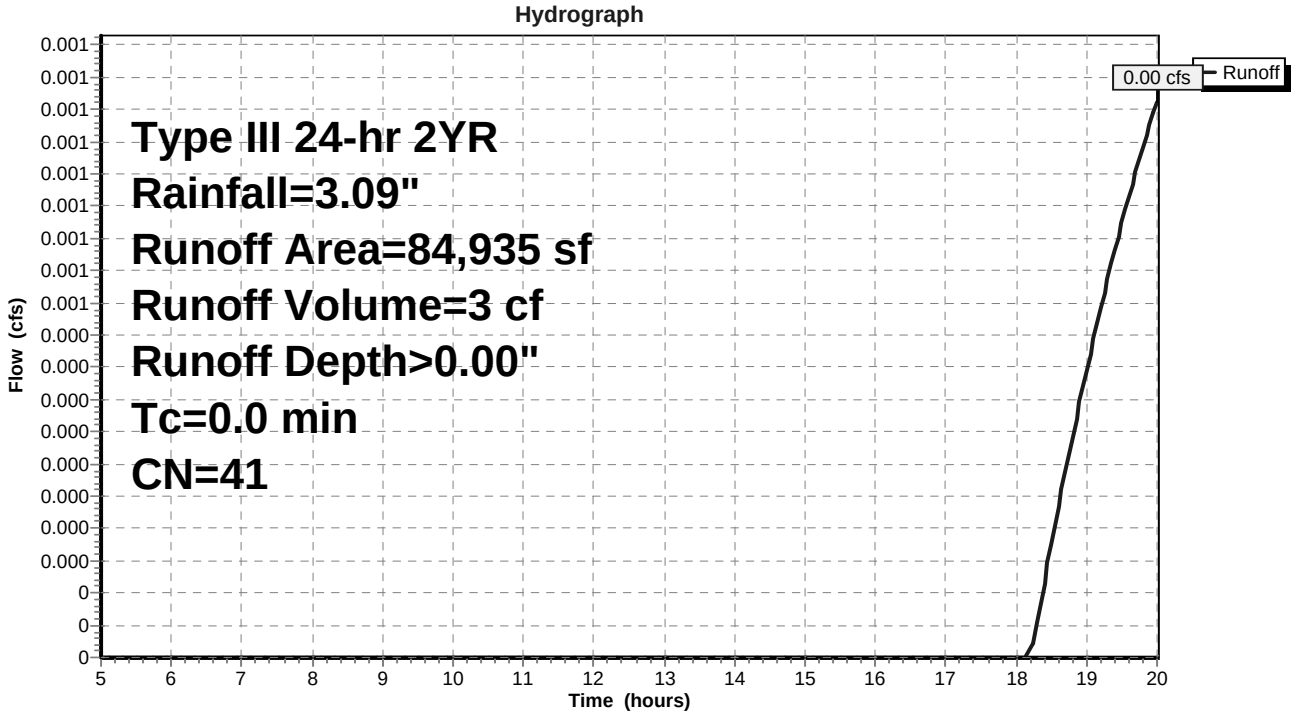
Subcatchment 23S: ACTON AND WEST SIDE LOTS

Runoff = 0.00 cfs @ 20.00 hrs, Volume= 3 cf, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.09"

Area (sf)	CN	Description
9,619	98	Paved parking & roofs
42,441	30	Woods, Good, HSG A
19,562	39	>75% Grass cover, Good, HSG A
13,313	39	OFFSITE GRASS
84,935	41	Weighted Average

Subcatchment 23S: ACTON AND WEST SIDE LOTS



Subcatchment 25S: SUDBURY ROAD (EAST SIDE)

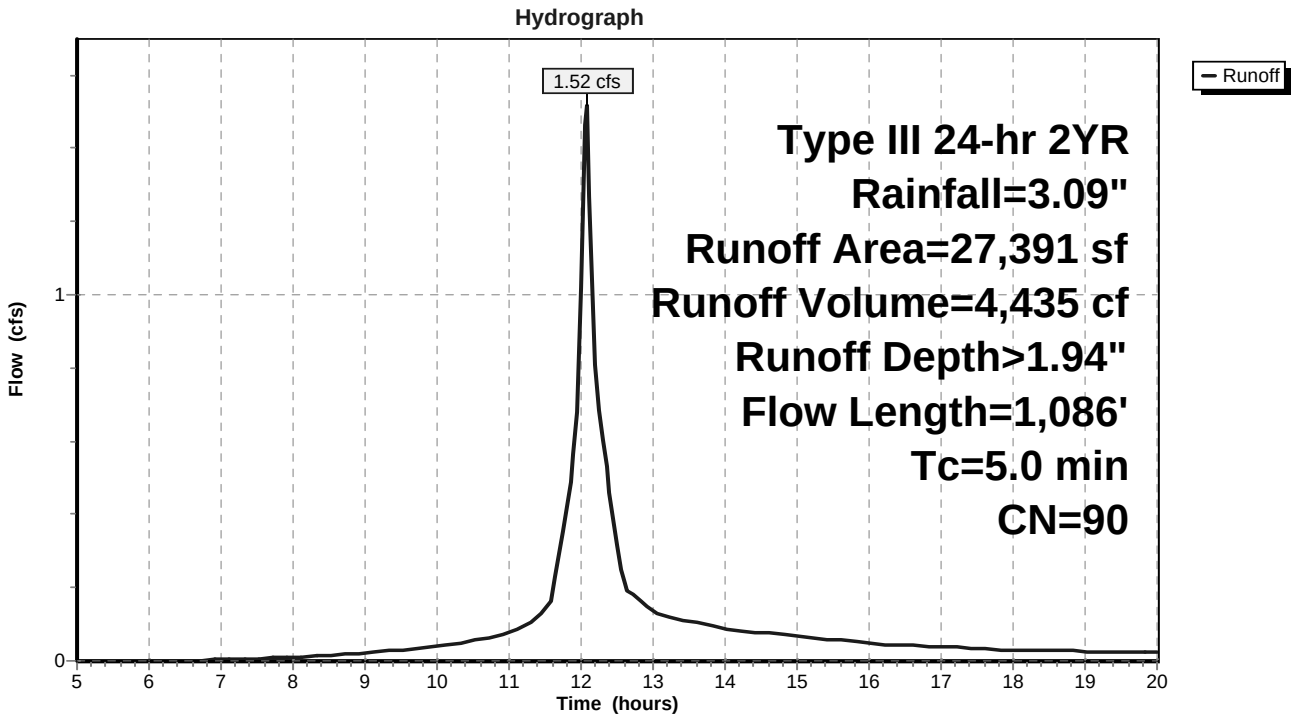
Runoff = 1.52 cfs @ 12.07 hrs, Volume= 4,435 cf, Depth> 1.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.09"

Area (sf)	CN	Description
21,856	98	Paved roads w/curbs & sewers
5,535	57	Woods/grass comb., Poor, HSG A
27,391	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	1,036	0.0800	5.7		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	50	0.0800	2.0		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.09"
3.4	1,086	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 25S: SUDBURY ROAD (EAST SIDE)



Subcatchment 35S: SUDBURY ROAD (WEST SIDE)

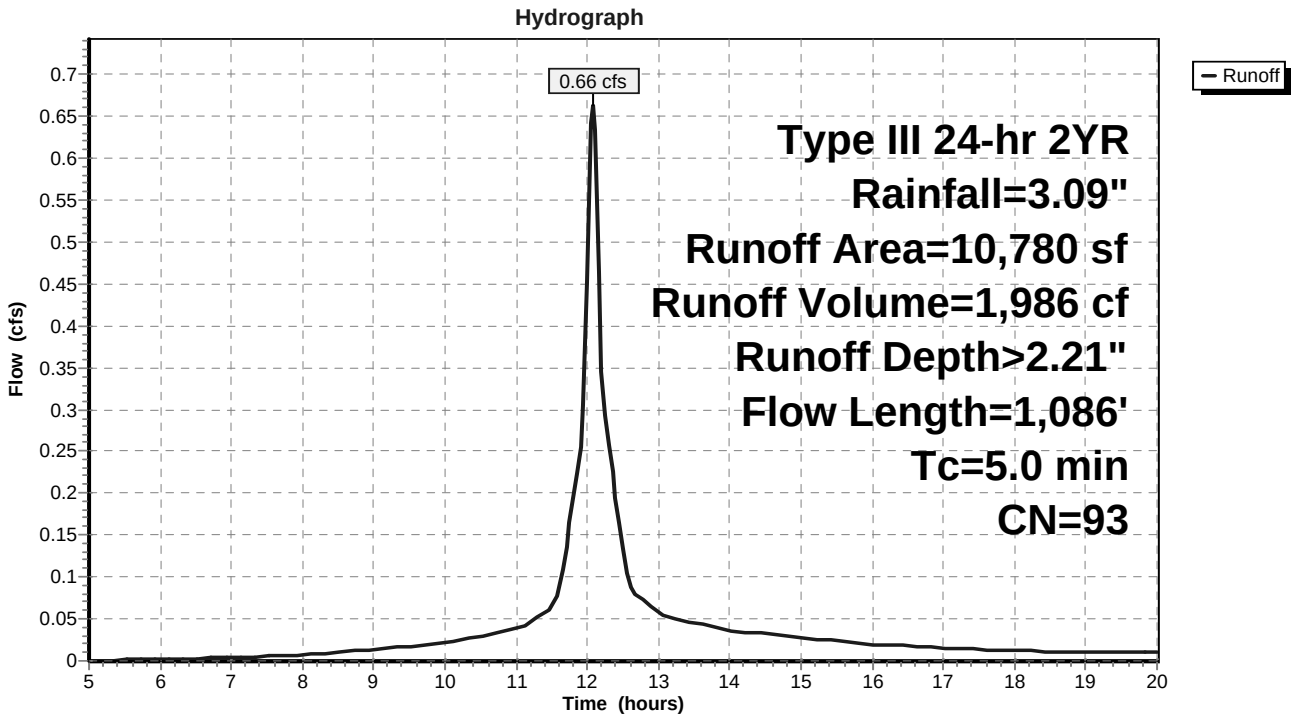
Runoff = 0.66 cfs @ 12.07 hrs, Volume= 1,986 cf, Depth> 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.09"

Area (sf)	CN	Description
9,014	98	Paved roads w/curbs & sewers
1,766	68	<50% Grass cover, Poor, HSG A
10,780	93	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	1,036	0.0800	5.7		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	50	0.0800	2.0		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.09"
3.4	1,086	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 35S: SUDBURY ROAD (WEST SIDE)



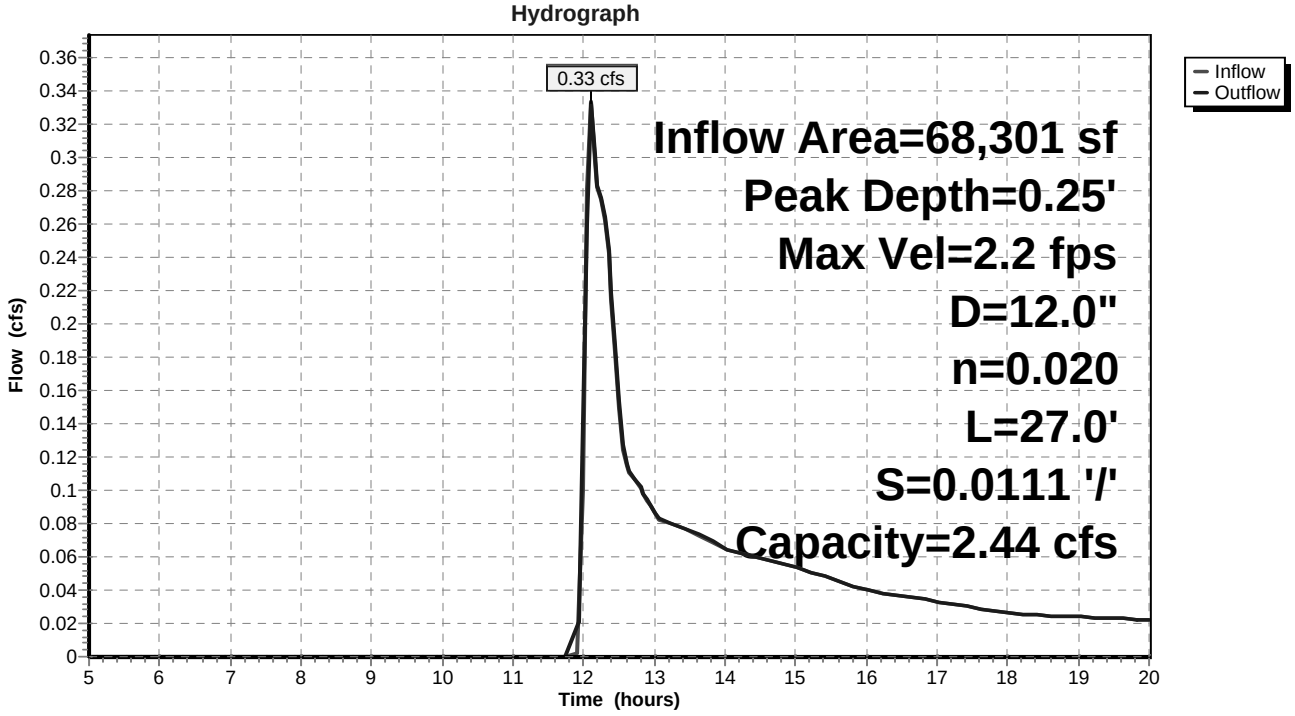
Reach 4R: 12" CPP

Inflow Area = 68,301 sf, Inflow Depth > 0.30" for 2YR event
Inflow = 0.33 cfs @ 12.10 hrs, Volume= 1,717 cf
Outflow = 0.33 cfs @ 12.11 hrs, Volume= 1,716 cf, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.2 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.2 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.25' @ 12.11 hrs
Capacity at bank full= 2.44 cfs
Inlet Invert= 176.00', Outlet Invert= 175.70'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 27.0' Slope= 0.0111 '/'

Reach 4R: 12" CPP



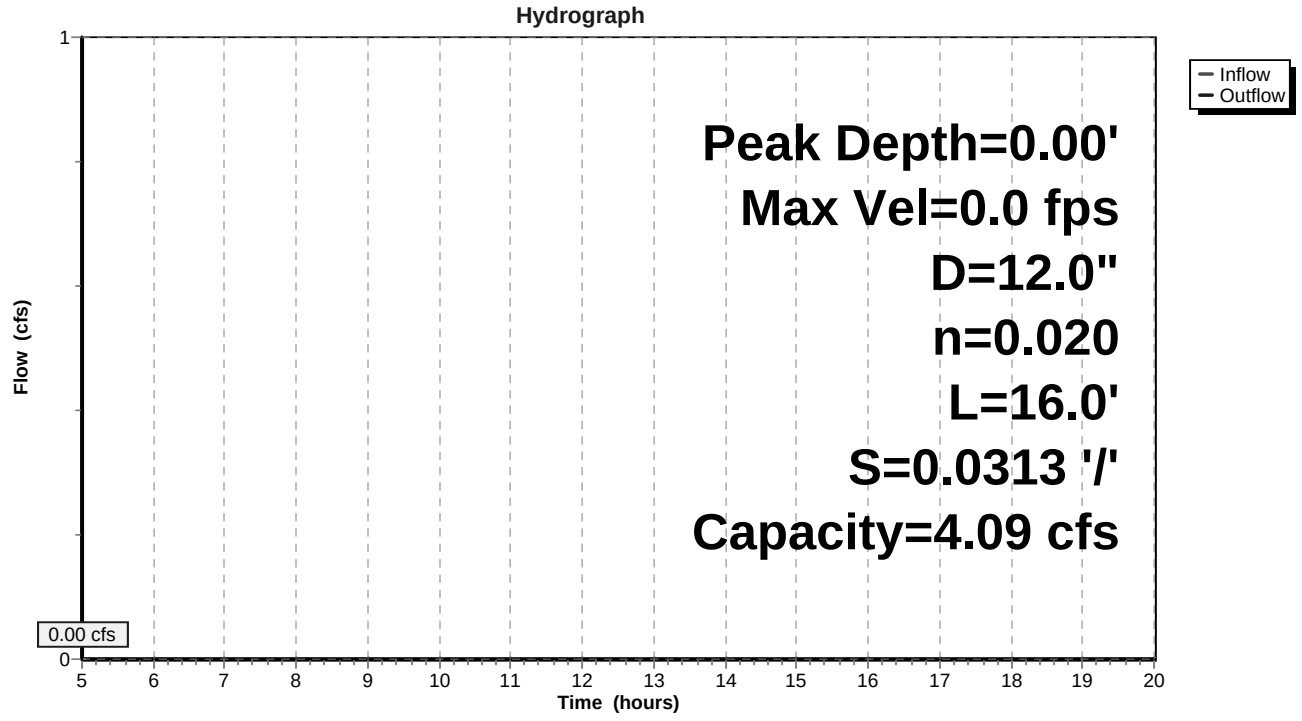
Reach 5R: 12" CPP

Inflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

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

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 4.09 cfs
Inlet Invert= 176.00', Outlet Invert= 175.50'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 16.0' Slope= 0.0313 '/'

Reach 5R: 12" CPP



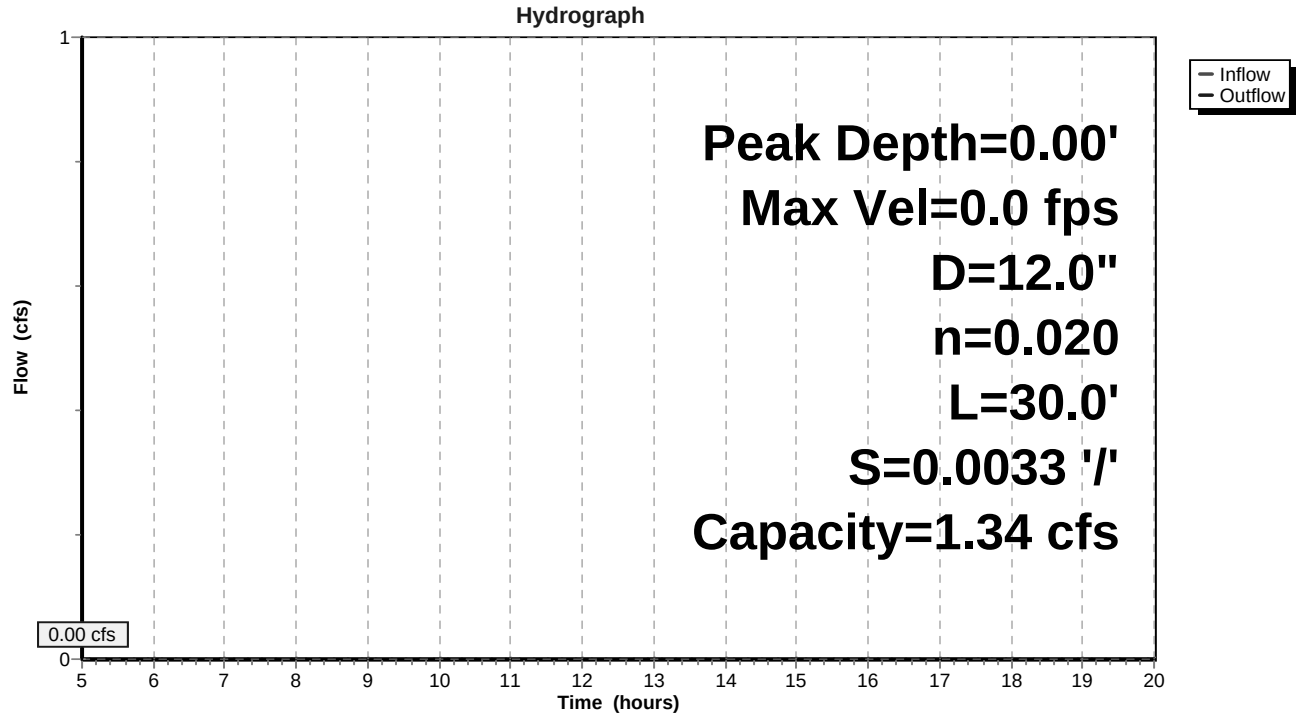
Reach 8R: 12" CPP

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

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

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 1.34 cfs
Inlet Invert= 175.20', Outlet Invert= 175.10'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 30.0' Slope= 0.0033 '/'

Reach 8R: 12" CPP



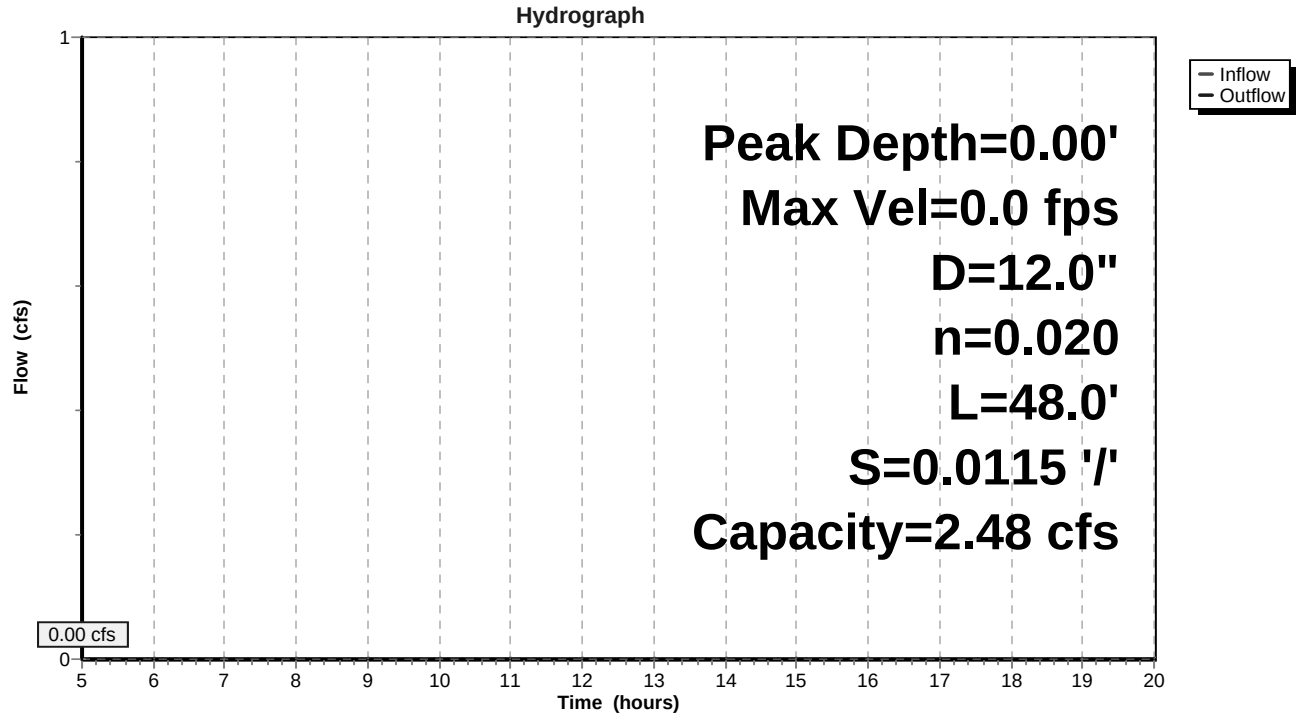
Reach 9R: 12" CPP

Inflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

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

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 2.48 cfs
Inlet Invert= 177.00', Outlet Invert= 176.45'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 48.0' Slope= 0.0115 '/'

Reach 9R: 12" CPP



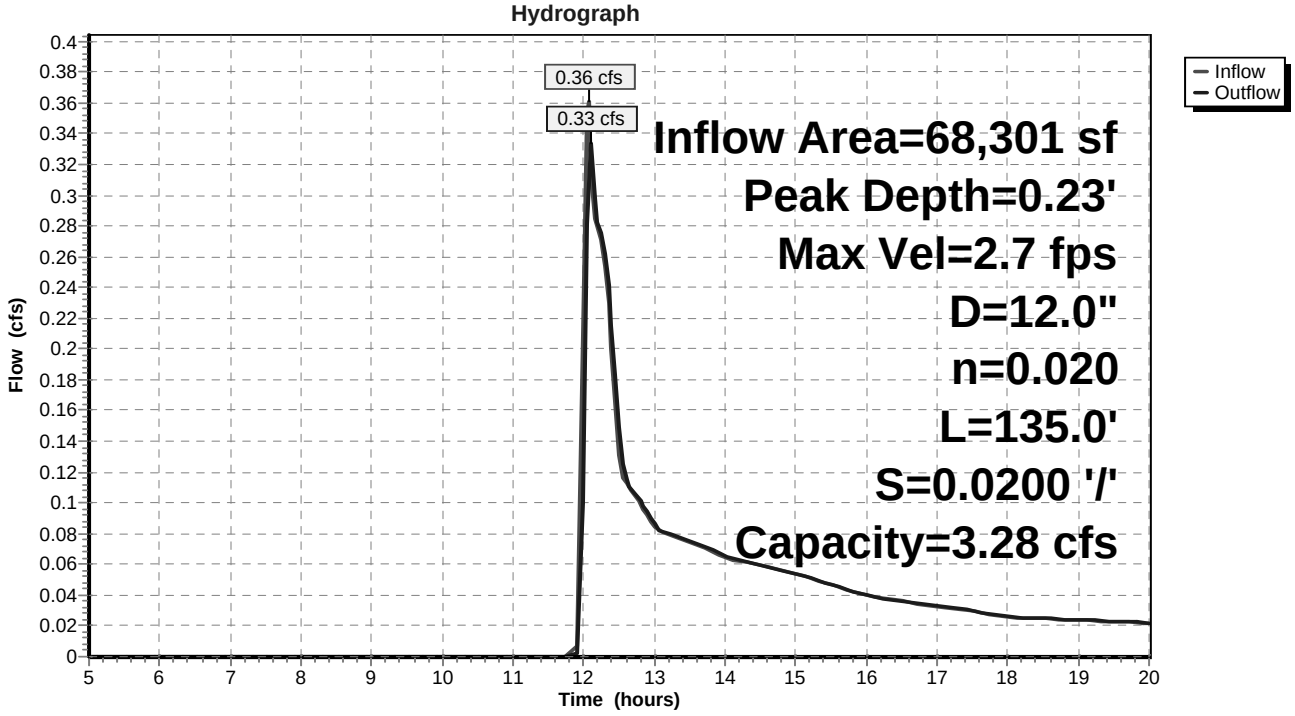
Reach 14R: 12" CPP

Inflow Area = 68,301 sf, Inflow Depth > 0.30" for 2YR event
Inflow = 0.36 cfs @ 12.06 hrs, Volume= 1,720 cf
Outflow = 0.33 cfs @ 12.10 hrs, Volume= 1,717 cf, Atten= 8%, Lag= 2.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.7 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.5 fps, Avg. Travel Time= 1.5 min

Peak Depth= 0.23' @ 12.07 hrs
Capacity at bank full= 3.28 cfs
Inlet Invert= 179.70', Outlet Invert= 177.00'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 135.0' Slope= 0.0200 '/'

Reach 14R: 12" CPP



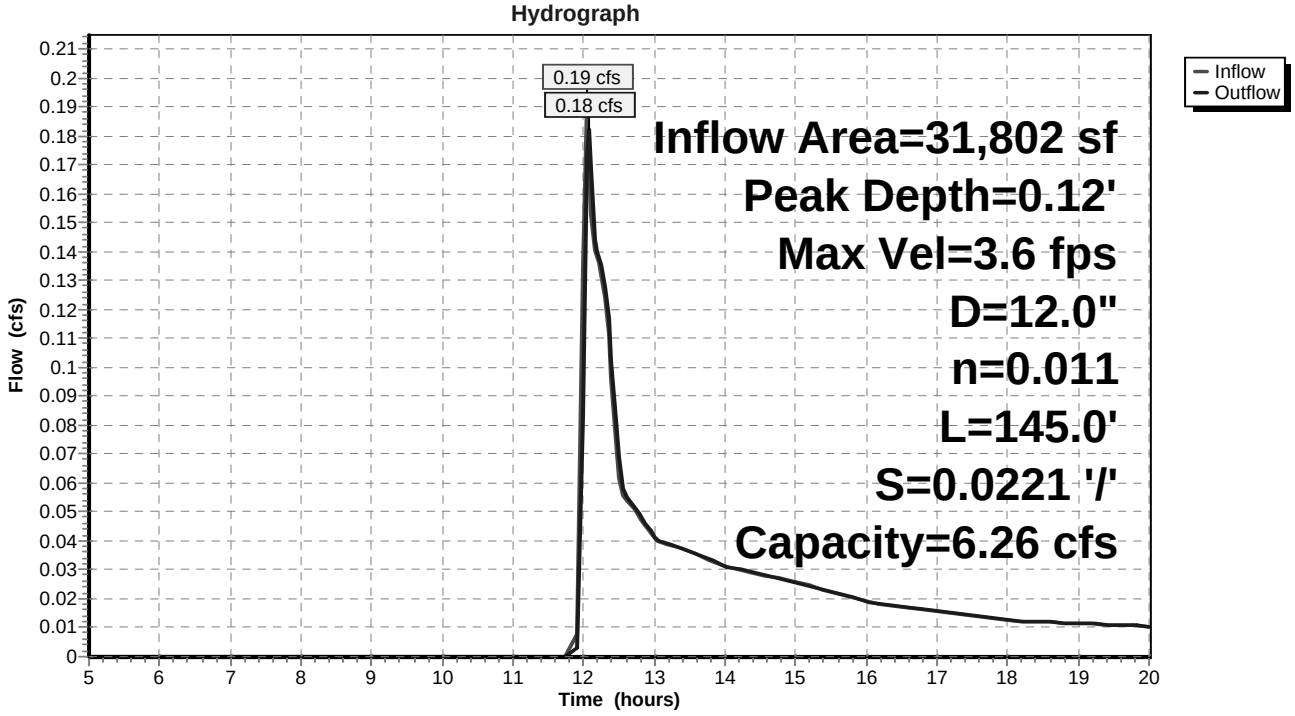
Reach 18R: 12" RCP

Inflow Area = 31,802 sf, Inflow Depth > 0.32" for 2YR event
Inflow = 0.19 cfs @ 12.05 hrs, Volume= 843 cf
Outflow = 0.18 cfs @ 12.07 hrs, Volume= 842 cf, Atten= 5%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.6 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 1.3 min

Peak Depth= 0.12' @ 12.06 hrs
Capacity at bank full= 6.26 cfs
Inlet Invert= 183.00', Outlet Invert= 179.80'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 145.0' Slope= 0.0221 '/'

Reach 18R: 12" RCP



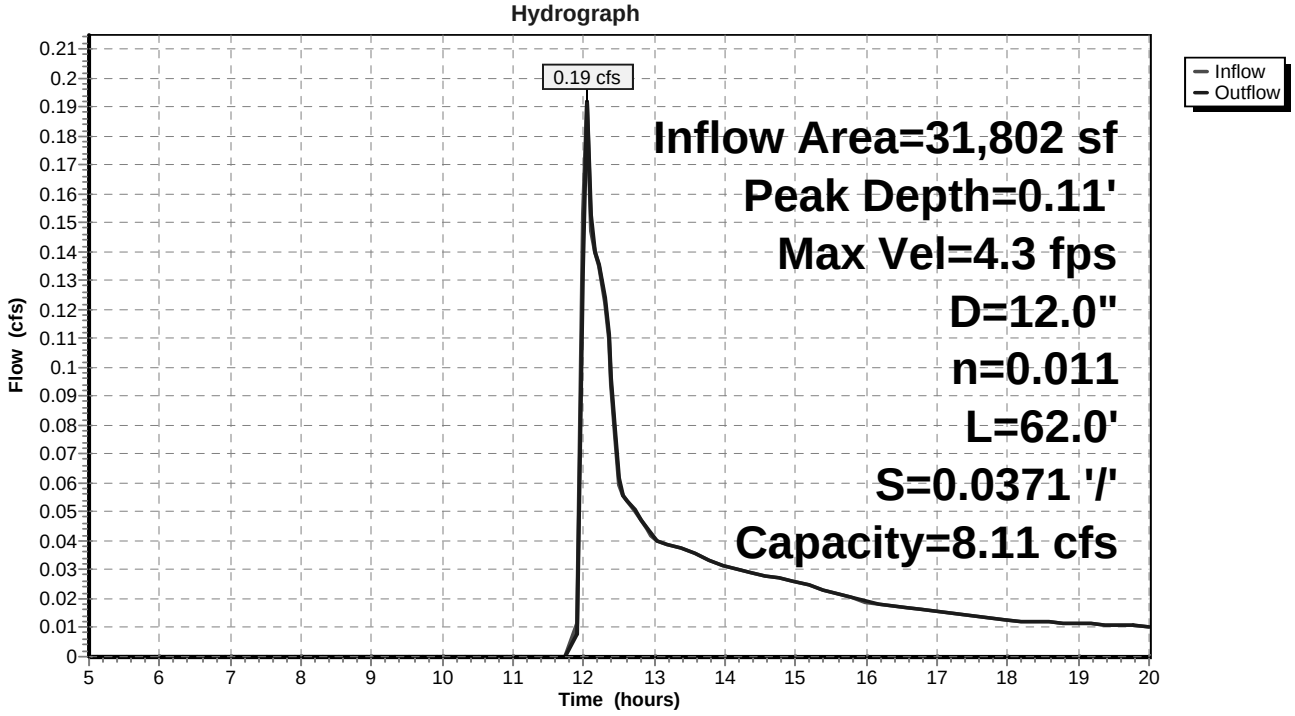
Reach 19R: 12" RCP

Inflow Area = 31,802 sf, Inflow Depth > 0.32" for 2YR event
Inflow = 0.19 cfs @ 12.05 hrs, Volume= 844 cf
Outflow = 0.19 cfs @ 12.05 hrs, Volume= 843 cf, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.3 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.3 fps, Avg. Travel Time= 0.5 min

Peak Depth= 0.11' @ 12.05 hrs
Capacity at bank full= 8.11 cfs
Inlet Invert= 185.40', Outlet Invert= 183.10'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 62.0' Slope= 0.0371 '/'

Reach 19R: 12" RCP



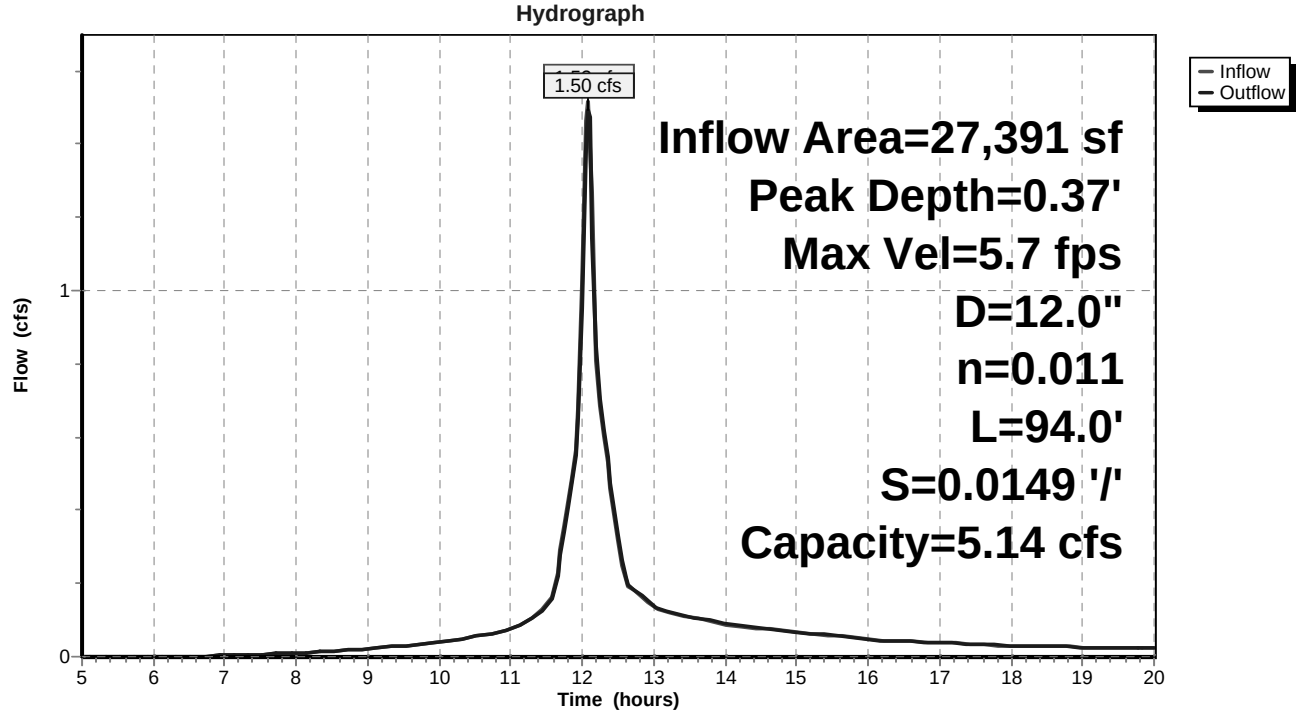
Reach 28R: 12" RCP

Inflow Area = 27,391 sf, Inflow Depth > 1.94" for 2YR event
Inflow = 1.52 cfs @ 12.07 hrs, Volume= 4,435 cf
Outflow = 1.50 cfs @ 12.08 hrs, Volume= 4,433 cf, Atten= 1%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.7 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.1 fps, Avg. Travel Time= 0.8 min

Peak Depth= 0.37' @ 12.08 hrs
Capacity at bank full= 5.14 cfs
Inlet Invert= 142.70', Outlet Invert= 141.30'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 94.0' Slope= 0.0149 '/'

Reach 28R: 12" RCP



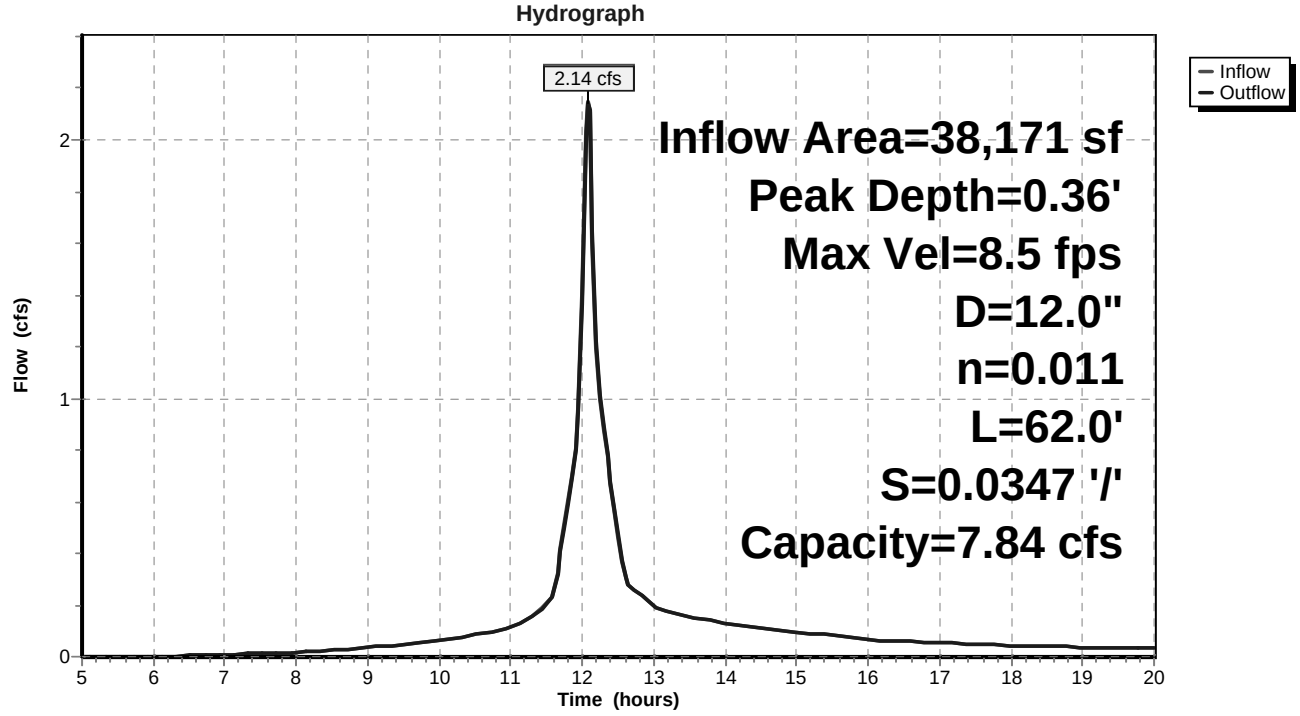
Reach 32R: 12" RCP

Inflow Area = 38,171 sf, Inflow Depth > 2.02" for 2YR event
Inflow = 2.15 cfs @ 12.08 hrs, Volume= 6,419 cf
Outflow = 2.14 cfs @ 12.09 hrs, Volume= 6,418 cf, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.5 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.0 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.36' @ 12.08 hrs
Capacity at bank full= 7.84 cfs
Inlet Invert= 141.20', Outlet Invert= 139.05'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 62.0' Slope= 0.0347 '/'

Reach 32R: 12" RCP



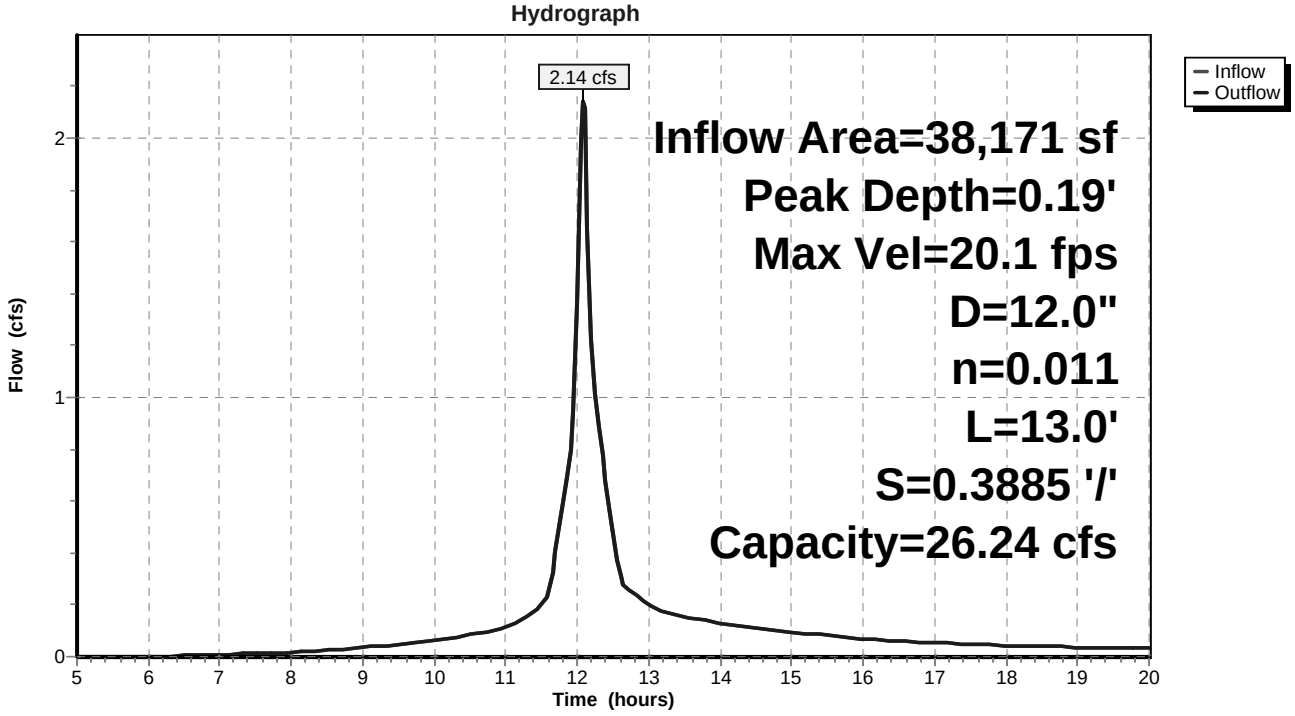
Reach 33R: 12" RCP

Inflow Area = 38,171 sf, Inflow Depth > 2.02" for 2YR event
Inflow = 2.14 cfs @ 12.09 hrs, Volume= 6,418 cf
Outflow = 2.14 cfs @ 12.09 hrs, Volume= 6,418 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 20.1 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 7.0 fps, Avg. Travel Time= 0.0 min

Peak Depth= 0.19' @ 12.09 hrs
Capacity at bank full= 26.24 cfs
Inlet Invert= 139.05', Outlet Invert= 134.00'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 13.0' Slope= 0.3885 '/'

Reach 33R: 12" RCP



Pond 1P: WestSide D-Pond

Inflow Area = 68,301 sf, Inflow Depth > 0.30" for 2YR event
Inflow = 0.33 cfs @ 12.11 hrs, Volume= 1,716 cf
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 178.18' @ 20.00 hrs Surf.Area= 831 sf Storage= 1,714 cf
Flood Elev= 177.00' Surf.Area= 598 sf Storage= 869 cf
Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

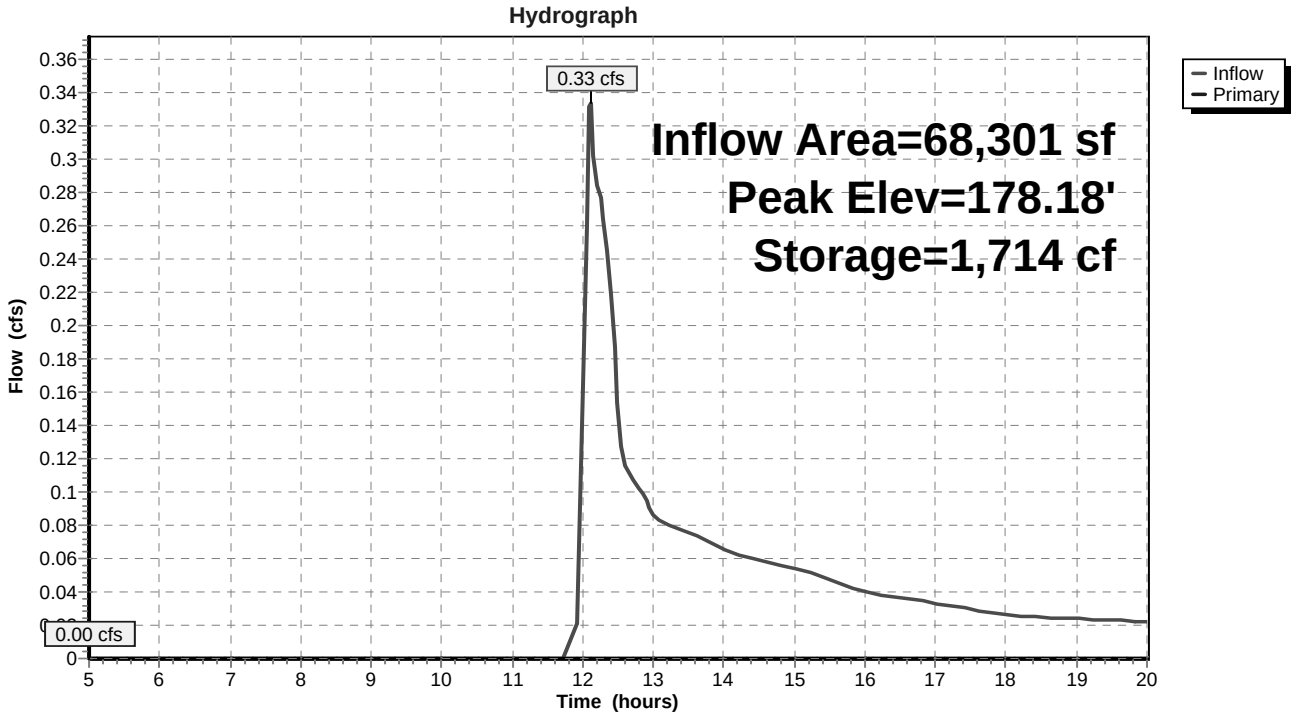
Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	1,987 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	284	0	0
176.00	428	356	356
177.00	598	513	869
178.00	792	695	1,564
178.50	899	423	1,987

Device	Routing	Invert	Outlet Devices
#1	Primary	178.50'	**10.0' long x 110.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=175.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: WestSide D-Pond



Pond 3P: MH

Inflow Area = 68,301 sf, Inflow Depth > 0.30" for 2YR event
Inflow = 0.33 cfs @ 12.10 hrs, Volume= 1,717 cf
Outflow = 0.33 cfs @ 12.10 hrs, Volume= 1,717 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.33 cfs @ 12.10 hrs, Volume= 1,717 cf
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

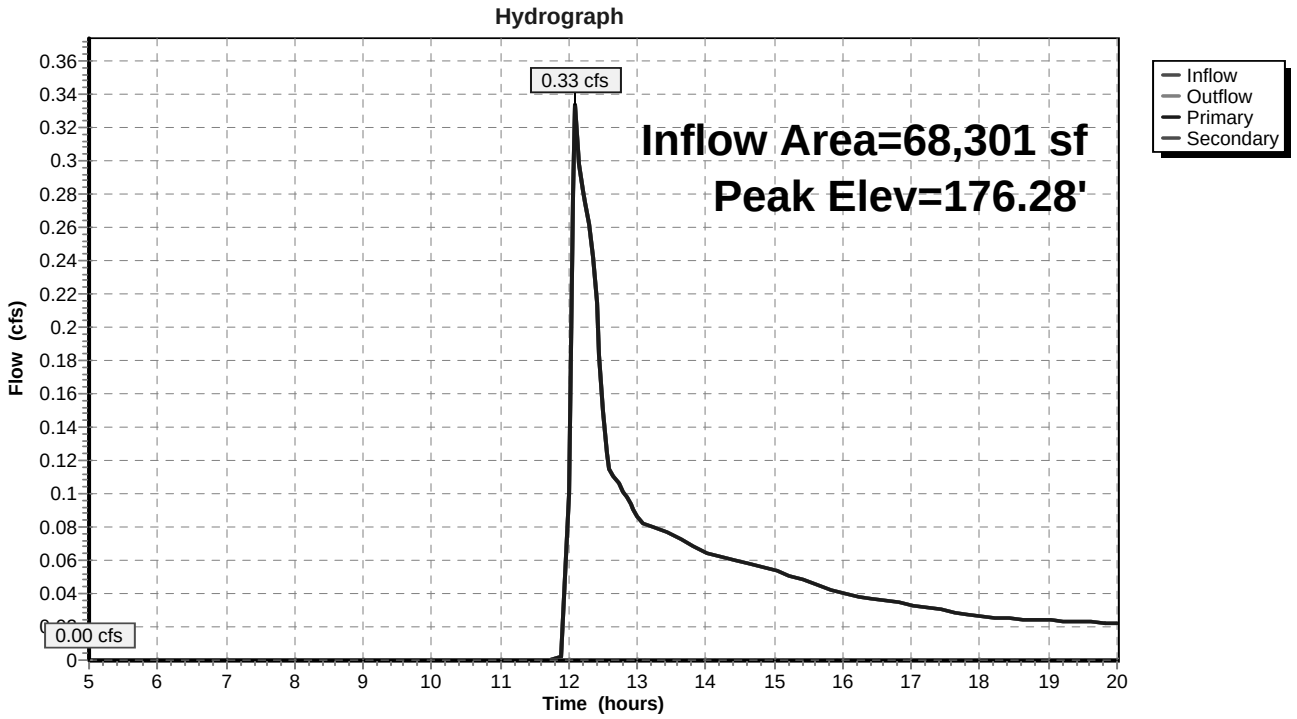
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 176.28' @ 12.10 hrs
Flood Elev= 180.30'
Plug-Flow detention time= 0.0 min calculated for 1,717 cf (100% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Secondary	177.00'	**0.5' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	176.00'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.33 cfs @ 12.10 hrs HW=176.28' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 0.33 cfs @ 1.8 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=176.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: MH



Pond 6P: LB1

Inflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Discarded	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Primary	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Secondary	=	0.00 cfs @	5.00 hrs, Volume=	0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 167.50' @ 5.00 hrs Surf.Area= 0.006 ac Storage= 0.000 af
Flood Elev= 180.00' Surf.Area= 0.007 ac Storage= 0.029 af
Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	175.50'	0.005 af	**8.00'D x 4.50'H Vertical Cone/Cylinder**
#2	168.50'	0.008 af	**8.00'D x 7.00'H Vertical Cone/Cylinder** Inside #3
#3	167.50'	0.015 af	**18.00'D x 8.00'H Vertical Cone/Cylinder** 0.047 af Overall - 0.008 af Embedded = 0.039 af x 40.0% Voids
		0.029 af	Total Available Storage

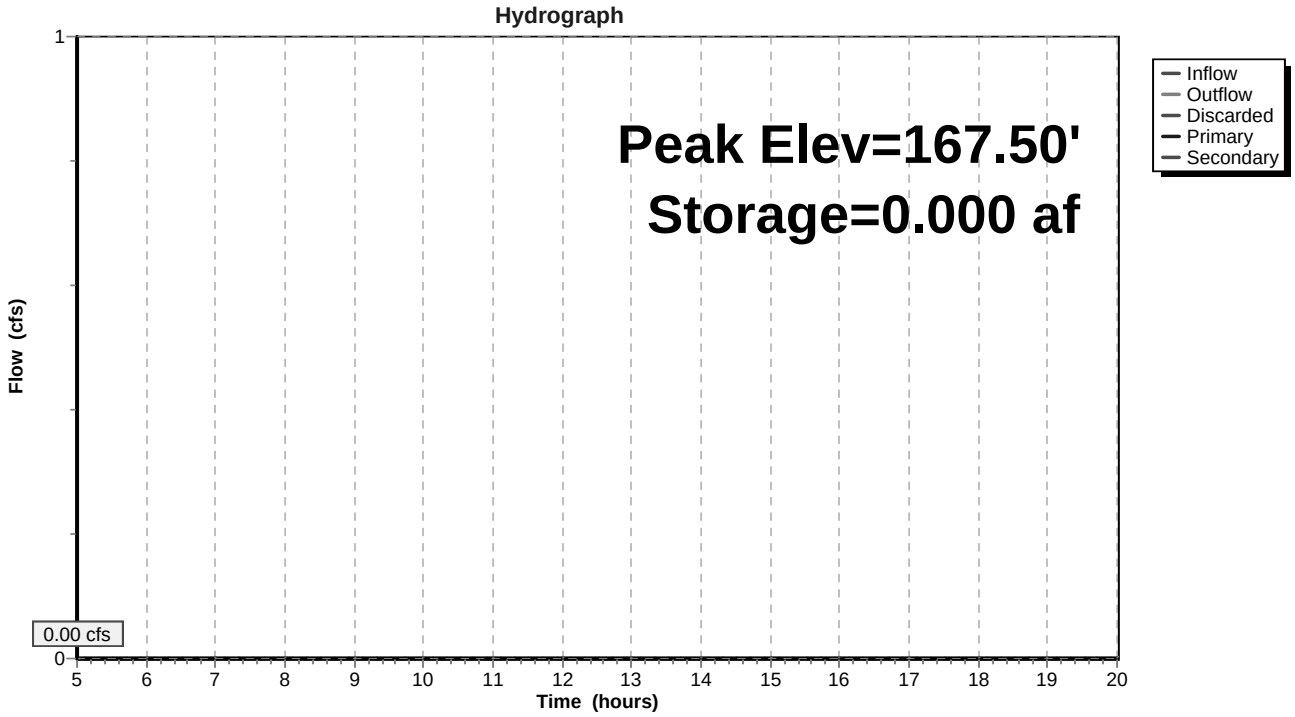
Device	Routing	Invert	Outlet Devices
#1	Primary	175.20'	**12.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	177.00'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	0.00'	**60.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 5.00 hrs HW=167.50' (Free Discharge)
└**3=Exfiltration** (Passes 0.00 cfs of 0.35 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=167.50' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=167.50' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 6P: LB1


Hydrograph
Peak Elev=167.50'
Storage=0.000 af
Inflow
Outflow
Discarded
Primary
Secondary
Flow (cfs)
0.00 cfs
1
0
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Time (hours)

Pond 7P: LB2

Inflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Discarded	=	0.00 cfs @	5.00 hrs, Volume=	0 cf

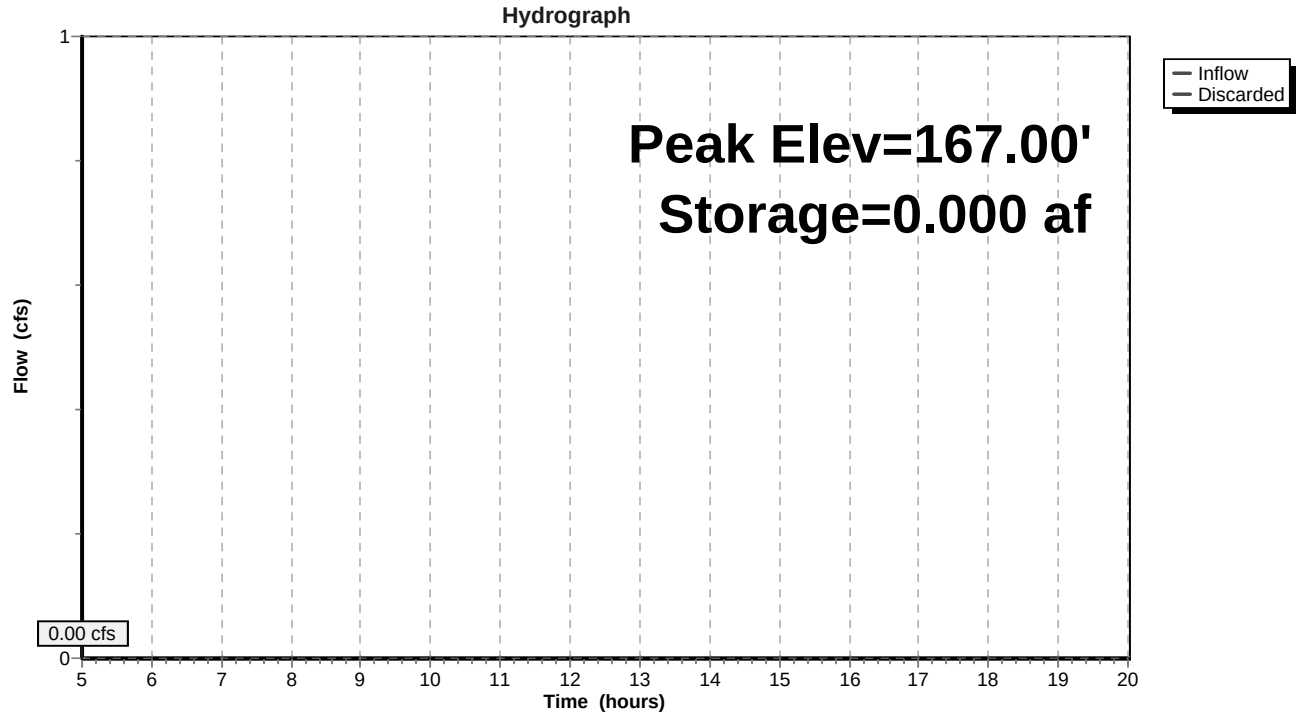
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 167.00' @ 5.00 hrs Surf.Area= 0.006 ac Storage= 0.000 af
Flood Elev= 180.50' Surf.Area= 0.007 ac Storage= 0.030 af
Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	0.006 af	**8.00'D x 5.50'H Vertical Cone/Cylinder**
#2	168.30'	0.008 af	**8.00'D x 6.70'H Vertical Cone/Cylinder** Inside #3
#3	167.00'	0.016 af	**18.00'D x 8.00'H Vertical Cone/Cylinder**
			0.047 af Overall - 0.008 af Embedded = 0.039 af x 40.0% Voids
		0.030 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**60.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 5.00 hrs HW=167.00' (Free Discharge)
1=Exfiltration (Passes 0.00 cfs of 0.35 cfs potential flow)

Pond 7P: LB2



Pond 12P: LB3

Inflow Area = 153,236 sf, Inflow Depth > 0.00" for 2YR event
Inflow = 0.00 cfs @ 20.00 hrs, Volume= 3 cf
Outflow = 0.00 cfs @ 20.00 hrs, Volume= 3 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 20.00 hrs, Volume= 3 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 167.00' @ 20.00 hrs Surf.Area= 254 sf Storage= 0 cf
Plug-Flow detention time= 0.5 min calculated for 3 cf (99% of inflow)
Center-of-Mass det. time= 0.2 min (1,163.7 - 1,163.5)

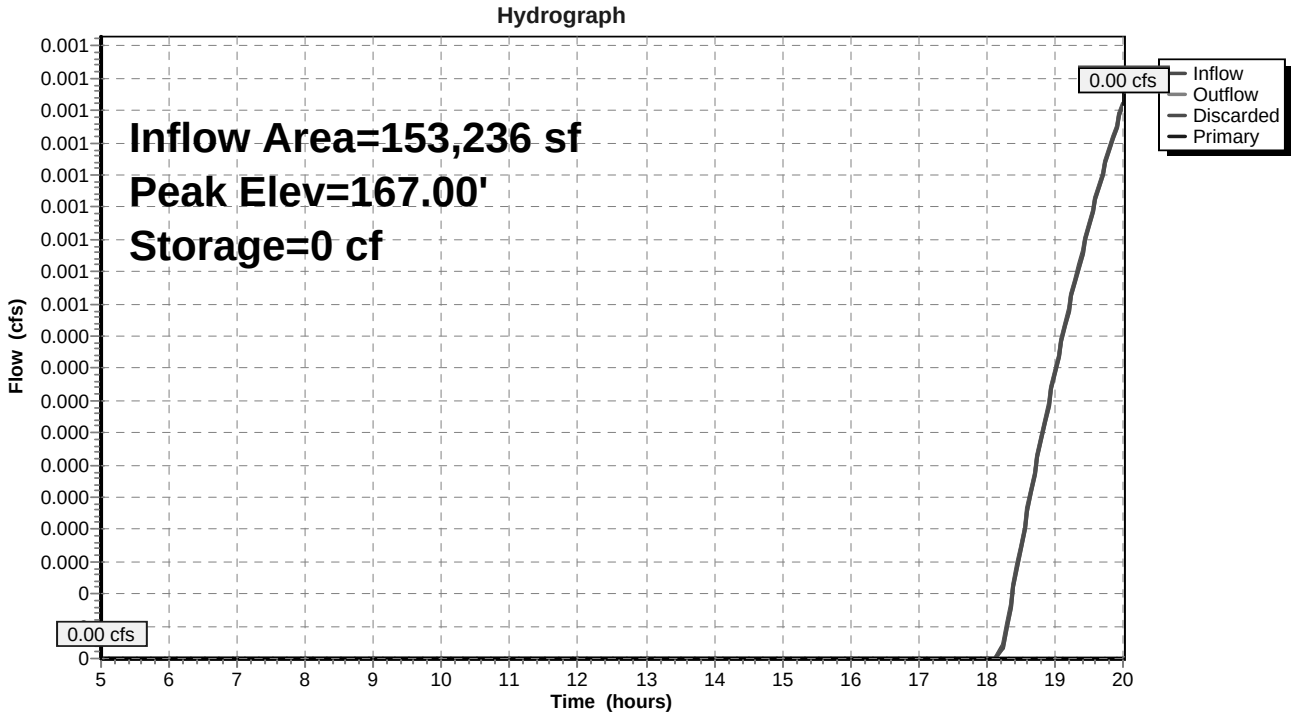
Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	73 cf	**8.00'D x 1.45'H Vertical Cone/Cylinder**
#2	168.30'	337 cf	**8.00'D x 6.70'H Vertical Cone/Cylinder** Inside #3
#3	167.00'	680 cf	**18.00'D x 8.00'H Vertical Cone/Cylinder** 2,036 cf Overall - 337 cf Embedded = 1,699 cf x 40.0% Voids
		1,089 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**60.000 in/hr Exfiltration over Surface area**
#2	Primary	176.45'	**2.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.35 cfs @ 20.00 hrs HW=167.00' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=167.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 12P: LB3


Hydrograph
Inflow Area=153,236 sf
Peak Elev=167.00'
Storage=0 cf
0.00 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0.001
0.000
0
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Pond 13P: MH

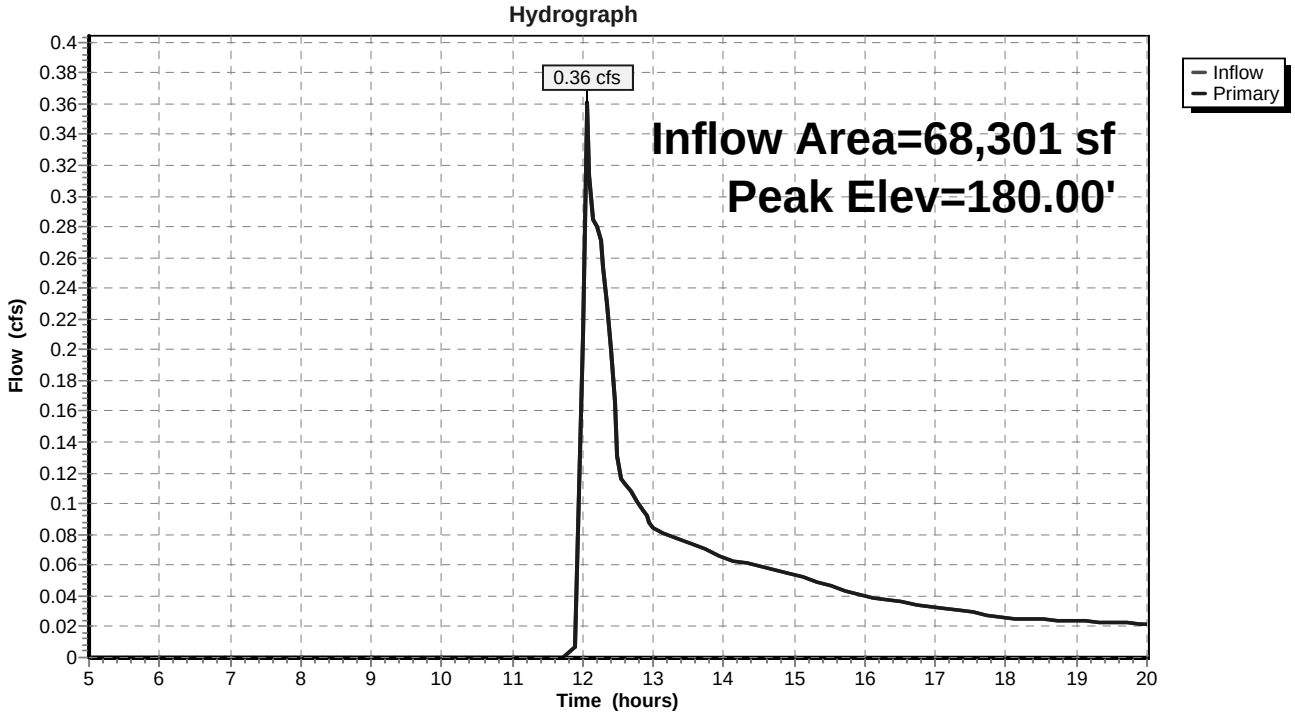
Inflow Area = 68,301 sf, Inflow Depth > 0.30" for 2YR event
Inflow = 0.36 cfs @ 12.06 hrs, Volume= 1,720 cf
Outflow = 0.36 cfs @ 12.06 hrs, Volume= 1,720 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.36 cfs @ 12.06 hrs, Volume= 1,720 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 180.00' @ 12.06 hrs
Flood Elev= 184.90'
Plug-Flow detention time= 0.0 min calculated for 1,714 cf (100% of inflow)
Center-of-Mass det. time= 0.0 min (863.8 - 863.8)

Device	Routing	Invert	Outlet Devices
#1	Primary	179.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.34 cfs @ 12.06 hrs HW=179.99' (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.34 cfs @ 1.8 fps)

Pond 13P: MH



Pond 15P: (2) CB

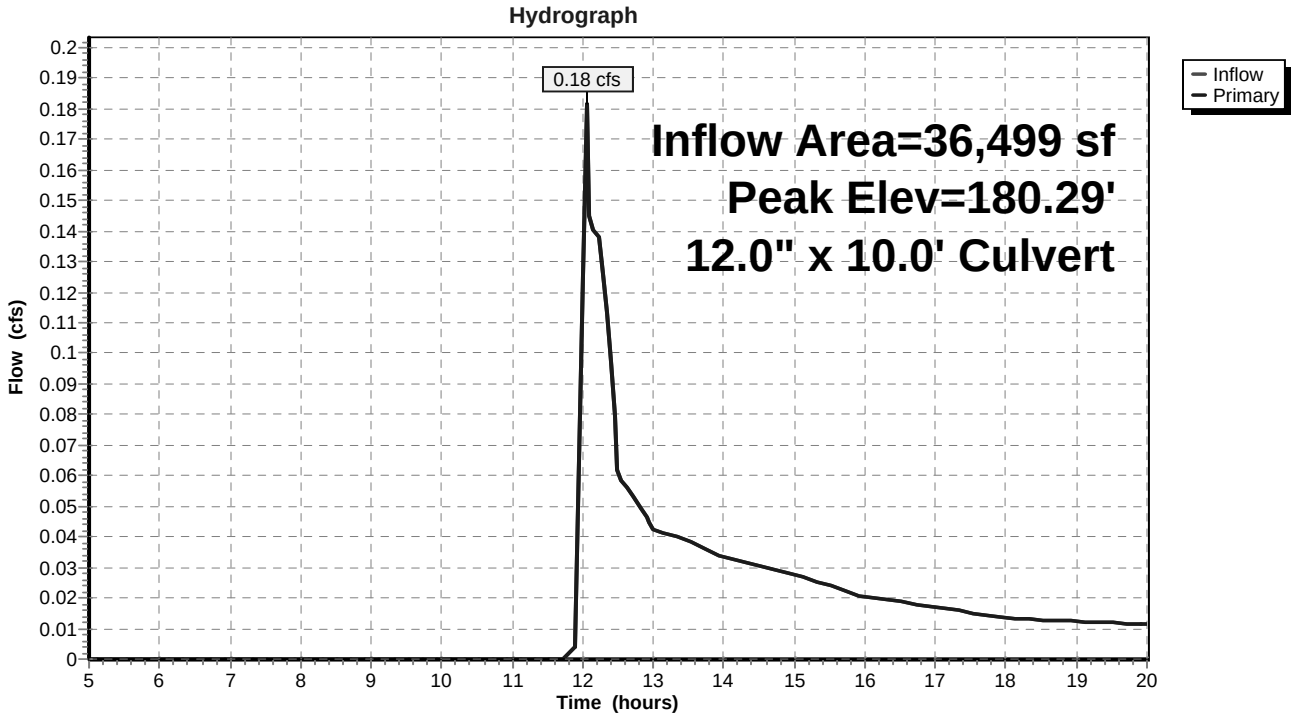
Inflow Area = 36,499 sf, Inflow Depth > 0.29" for 2YR event
Inflow = 0.18 cfs @ 12.06 hrs, Volume= 878 cf
Outflow = 0.18 cfs @ 12.06 hrs, Volume= 878 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.18 cfs @ 12.06 hrs, Volume= 878 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 180.29' @ 12.06 hrs
Flood Elev= 184.90'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Primary	180.15'	**12.0" x 10.0' long Culvert X 2.00** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 179.80' S= 0.0350 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior

Primary OutFlow Max=0.17 cfs @ 12.06 hrs HW=180.29' (Free Discharge)
1=Culvert (Barrel Controls 0.17 cfs @ 2.1 fps)

Pond 15P: (2) CB



Pond 17P: MH

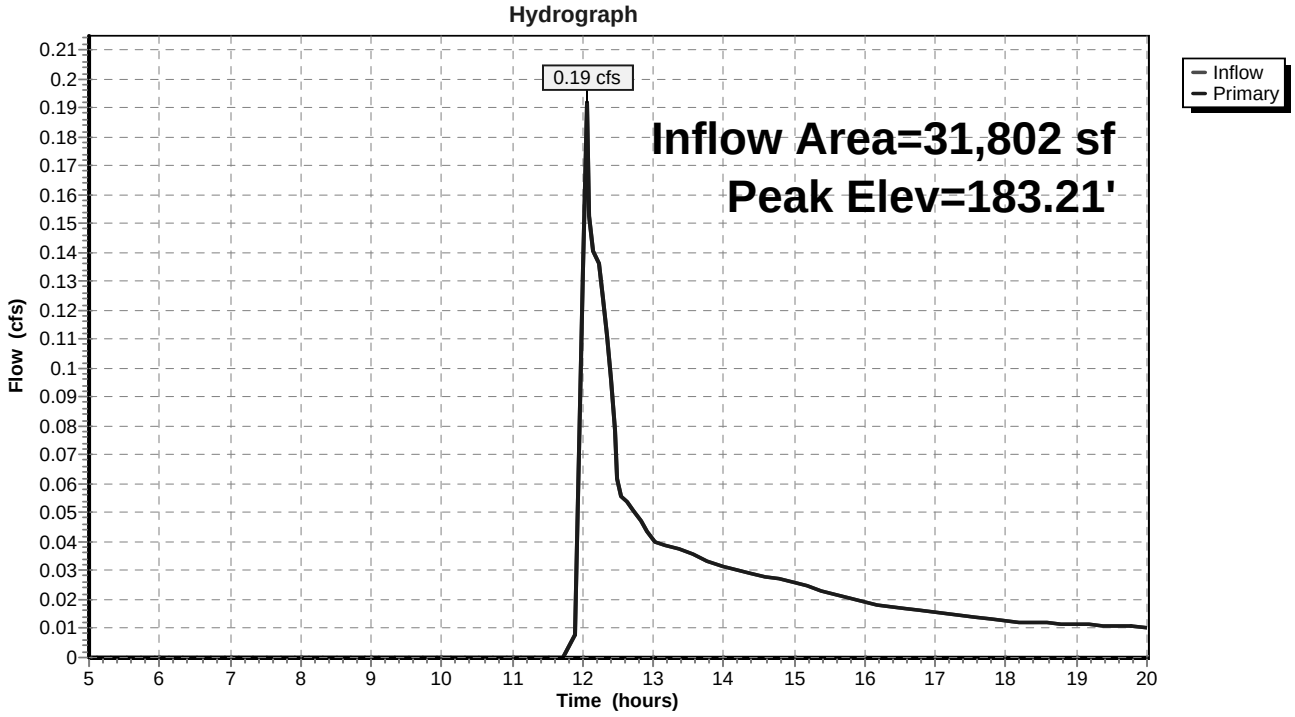
Inflow Area = 31,802 sf, Inflow Depth > 0.32" for 2YR event
Inflow = 0.19 cfs @ 12.05 hrs, Volume= 843 cf
Outflow = 0.19 cfs @ 12.05 hrs, Volume= 843 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.19 cfs @ 12.05 hrs, Volume= 843 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 183.21' @ 12.06 hrs
Flood Elev= 188.05'
Plug-Flow detention time= 0.0 min calculated for 840 cf (100% of inflow)
Center-of-Mass det. time= 0.0 min (861.0 - 861.0)

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.19 cfs @ 12.05 hrs HW=183.21' (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.19 cfs @ 1.6 fps)

Pond 17P: MH



Pond 20P: (2) CB

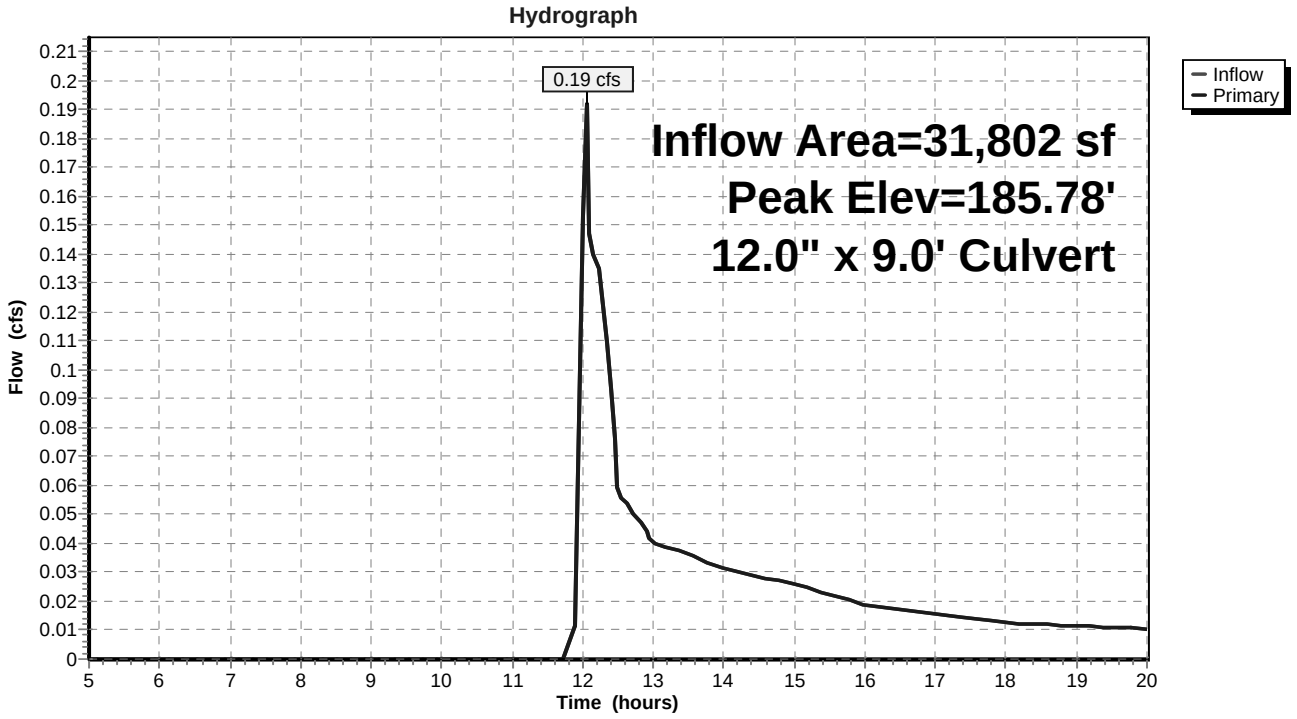
Inflow Area = 31,802 sf, Inflow Depth > 0.32" for 2YR event
Inflow = 0.19 cfs @ 12.05 hrs, Volume= 844 cf
Outflow = 0.19 cfs @ 12.05 hrs, Volume= 844 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.19 cfs @ 12.05 hrs, Volume= 844 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 185.78' @ 12.05 hrs
Flood Elev= 190.14'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (860.5 - 860.5)

Device	Routing	Invert	Outlet Devices
#1	Primary	185.65'	**12.0" x 9.0' long Culvert X 2.00** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 185.40' S= 0.0278 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=0.19 cfs @ 12.05 hrs HW=185.78' (Free Discharge)
1=Culvert (Inlet Controls 0.19 cfs @ 1.5 fps)

Pond 20P: (2) CB



Pond 26P: MH

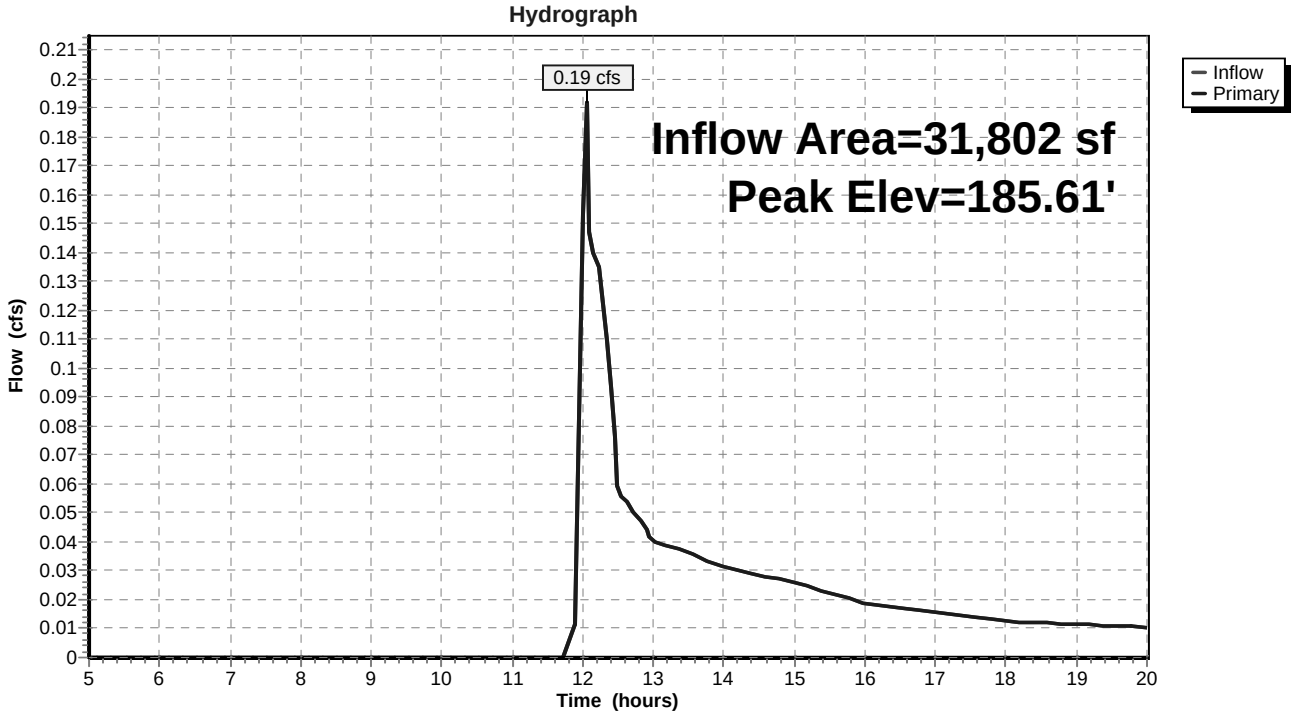
Inflow Area = 31,802 sf, Inflow Depth > 0.32" for 2YR event
Inflow = 0.19 cfs @ 12.05 hrs, Volume= 844 cf
Outflow = 0.19 cfs @ 12.05 hrs, Volume= 844 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.19 cfs @ 12.05 hrs, Volume= 844 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 185.61' @ 12.05 hrs
Flood Elev= 190.08'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (860.5 - 860.5)

Device	Routing	Invert	Outlet Devices
#1	Primary	185.40'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.19 cfs @ 12.05 hrs HW=185.61' (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.19 cfs @ 1.6 fps)

Pond 26P: MH



Pond 27P: CB

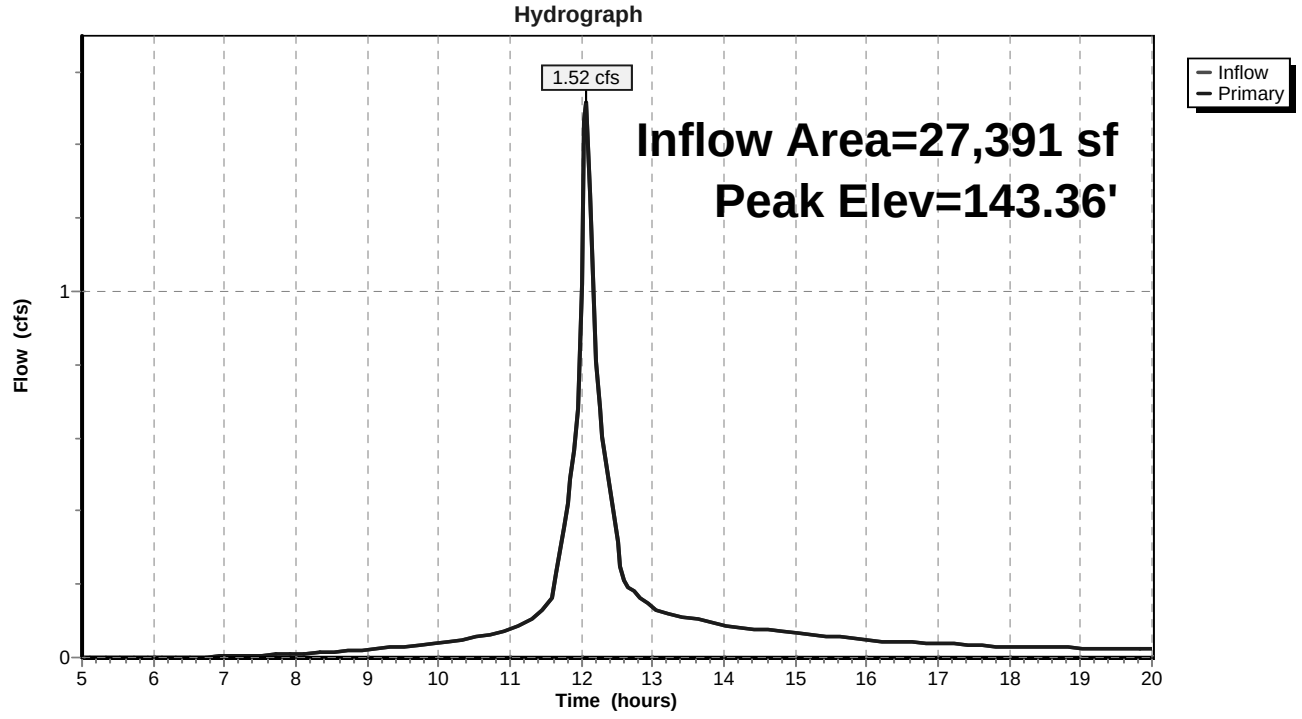
Inflow Area = 27,391 sf, Inflow Depth > 1.94" for 2YR event
Inflow = 1.52 cfs @ 12.07 hrs, Volume= 4,435 cf
Outflow = 1.52 cfs @ 12.07 hrs, Volume= 4,435 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.52 cfs @ 12.07 hrs, Volume= 4,435 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 143.36' @ 12.07 hrs
Flood Elev= 146.98'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Primary	142.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.46 cfs @ 12.07 hrs HW=143.34' (Free Discharge)
1=Orifice/Grate (Orifice Controls 1.46 cfs @ 2.7 fps)

Pond 27P: CB



Pond 29P: CB

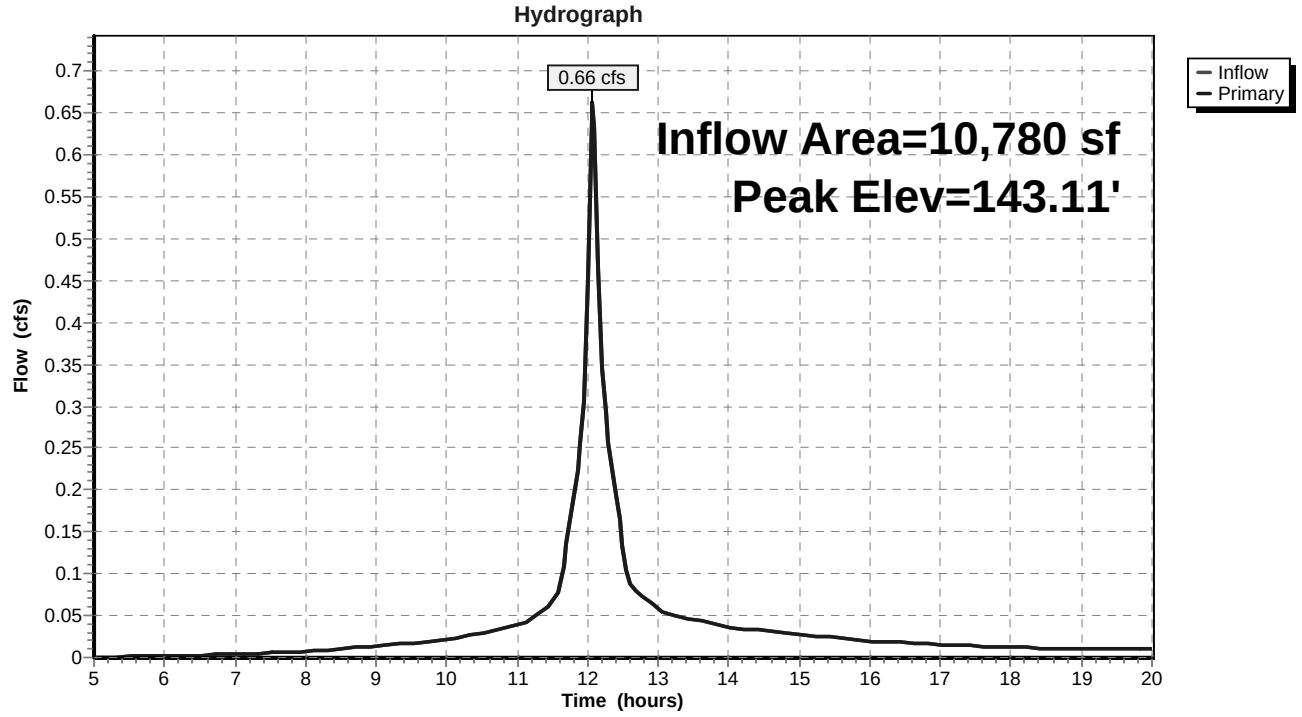
Inflow Area = 10,780 sf, Inflow Depth > 2.21" for 2YR event
Inflow = 0.66 cfs @ 12.07 hrs, Volume= 1,986 cf
Outflow = 0.66 cfs @ 12.07 hrs, Volume= 1,986 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.66 cfs @ 12.07 hrs, Volume= 1,986 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 143.11' @ 12.07 hrs
Flood Elev= 145.60'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Primary	142.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.64 cfs @ 12.07 hrs HW=143.10' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.64 cfs @ 2.2 fps)

Pond 29P: CB



Pond 30P: MH

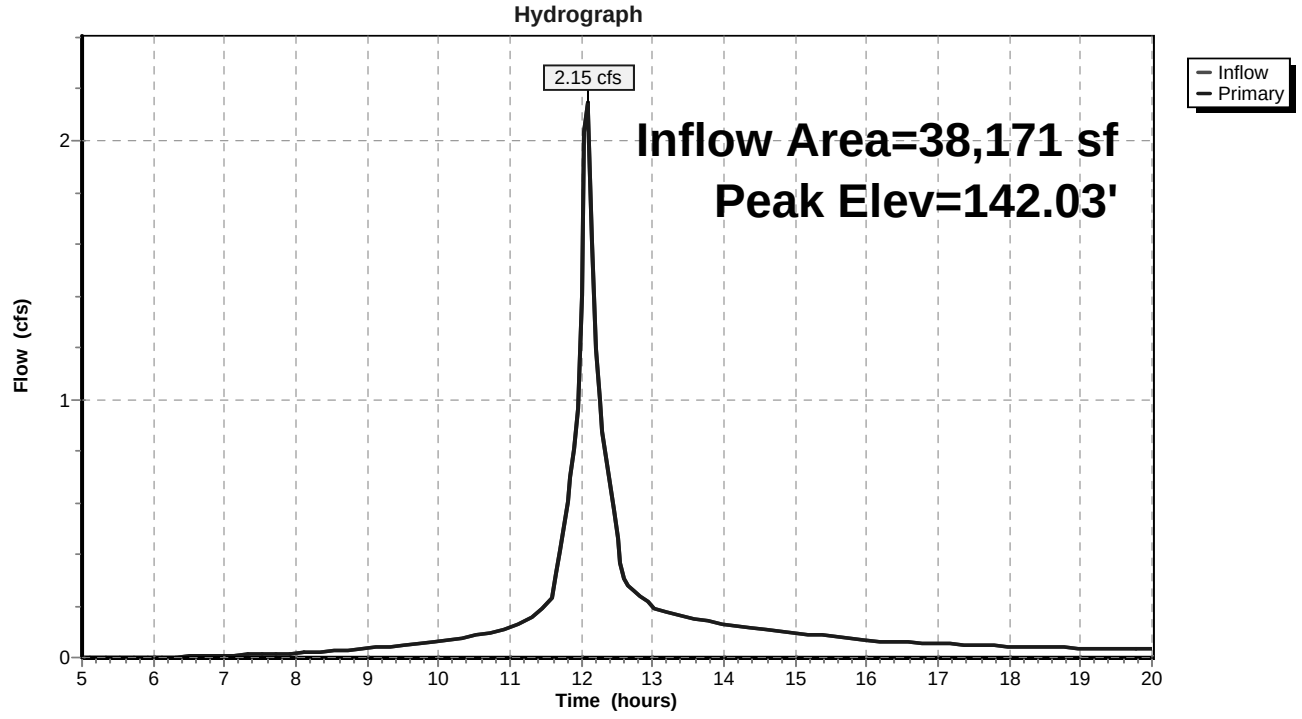
Inflow Area = 38,171 sf, Inflow Depth > 2.02" for 2YR event
Inflow = 2.15 cfs @ 12.08 hrs, Volume= 6,419 cf
Outflow = 2.15 cfs @ 12.08 hrs, Volume= 6,419 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.15 cfs @ 12.08 hrs, Volume= 6,419 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 142.03' @ 12.08 hrs
Flood Elev= 145.60'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Primary	141.20'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=2.08 cfs @ 12.08 hrs HW=142.01' (Free Discharge)
1=Orifice/Grate (Orifice Controls 2.08 cfs @ 3.1 fps)

Pond 30P: MH



Pond 31P: CB

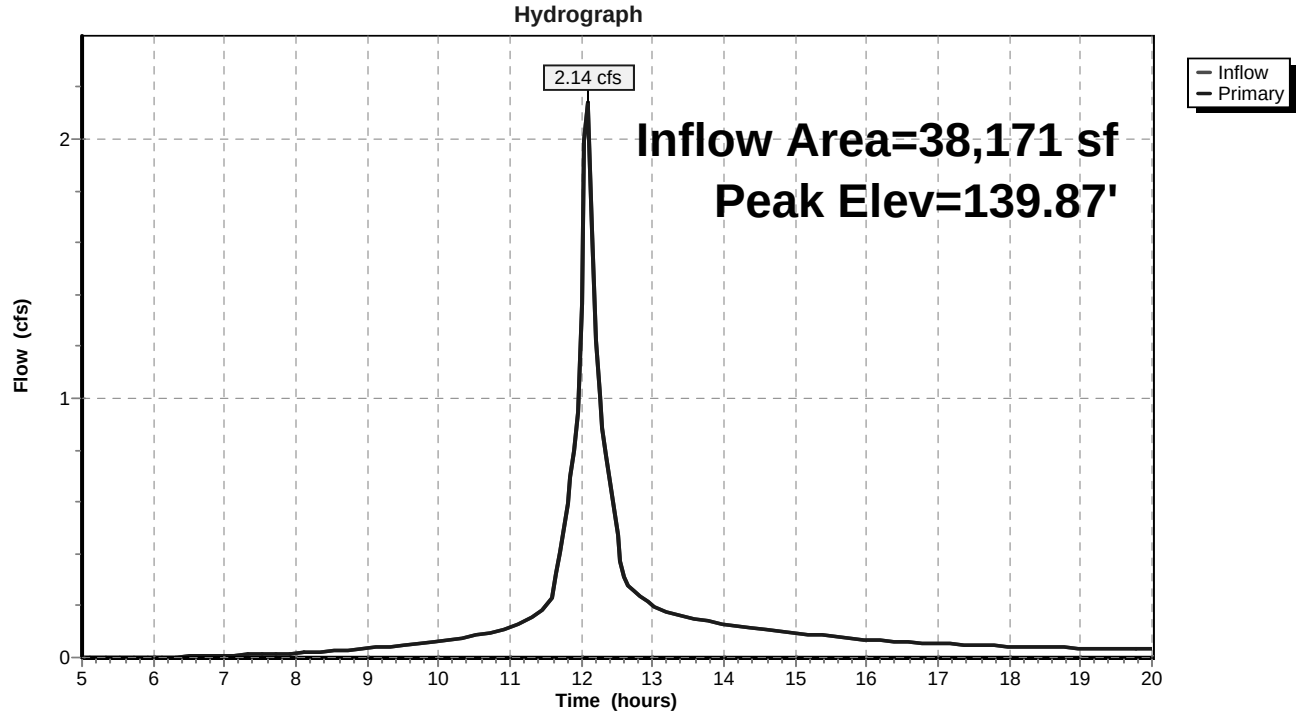
Inflow Area = 38,171 sf, Inflow Depth > 2.02" for 2YR event
Inflow = 2.14 cfs @ 12.09 hrs, Volume= 6,418 cf
Outflow = 2.14 cfs @ 12.09 hrs, Volume= 6,418 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.14 cfs @ 12.09 hrs, Volume= 6,418 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 139.87' @ 12.09 hrs
Flood Elev= 142.00'
Plug-Flow detention time= 0.0 min calculated for 6,418 cf (100% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Primary	139.05'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=2.08 cfs @ 12.09 hrs HW=139.86' (Free Discharge)
1=Orifice/Grate (Orifice Controls 2.08 cfs @ 3.1 fps)

Pond 31P: CB

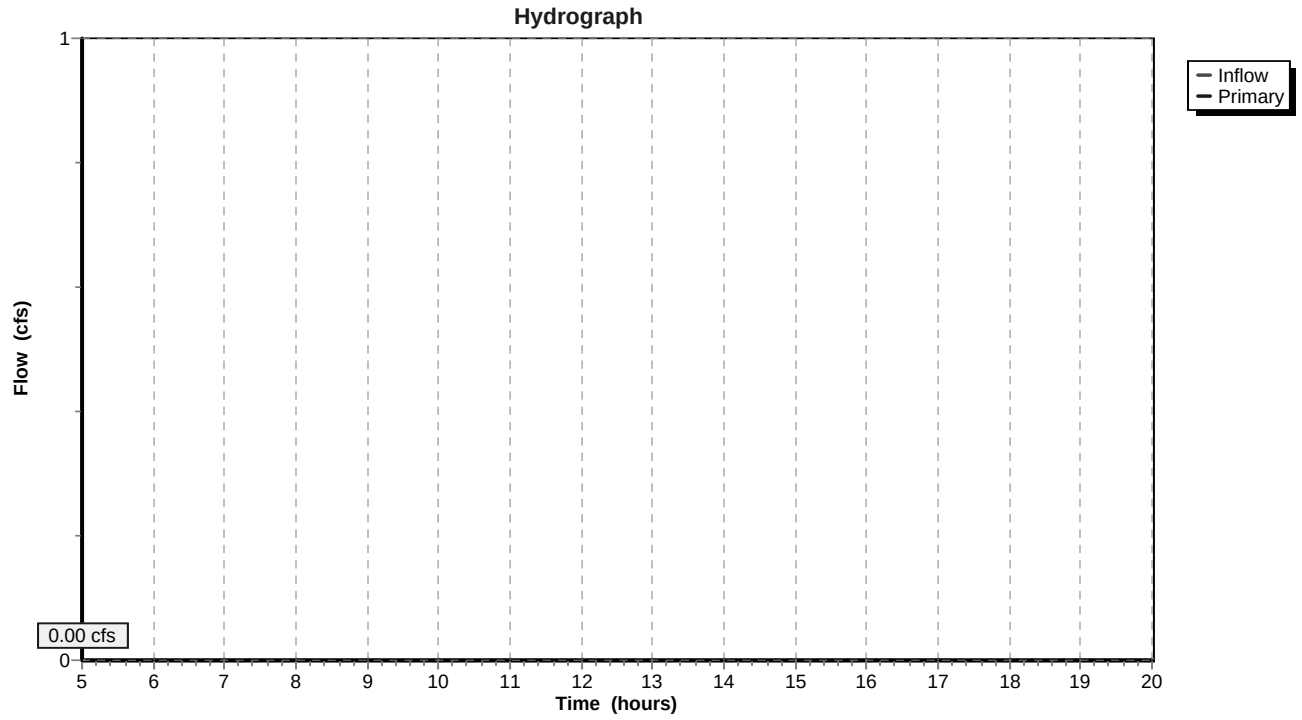


Link 10L: FLARED END

Inflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Primary	=	0.00 cfs @	5.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

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

Link 10L: FLARED END

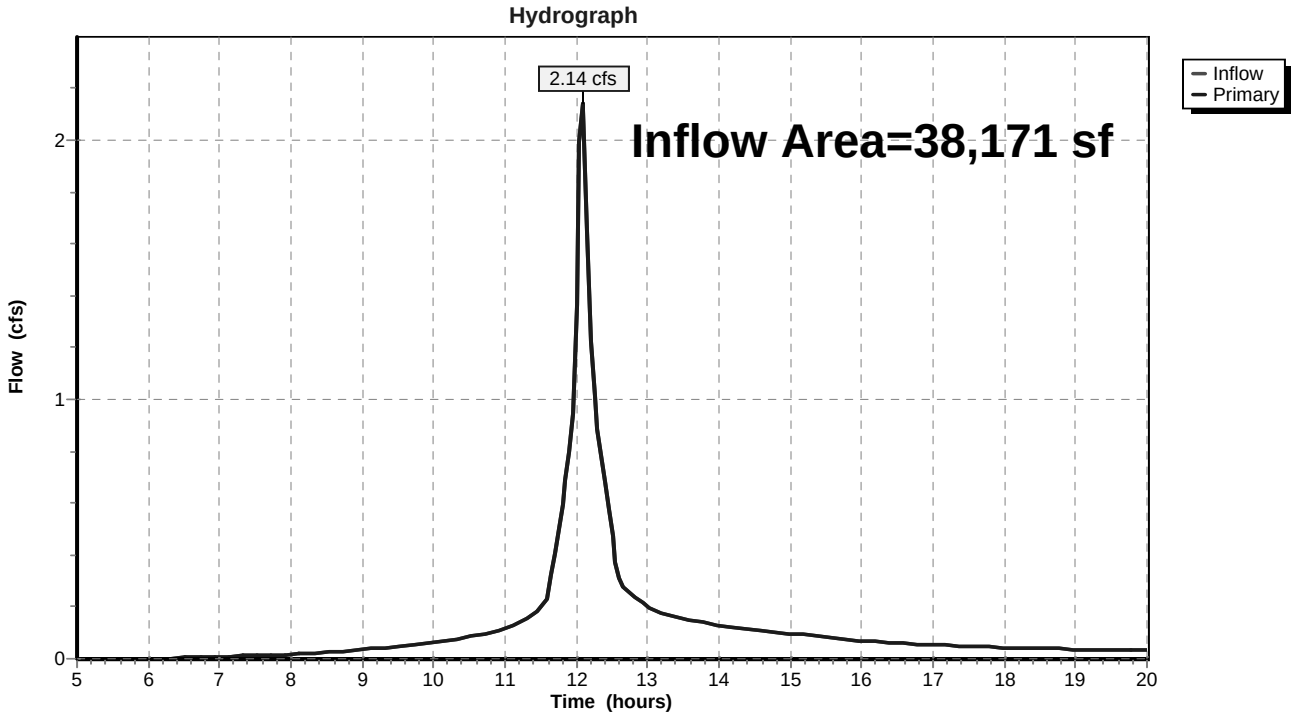


Link 34L: River

Inflow Area = 38,171 sf, Inflow Depth > 2.02" for 2YR event
Inflow = 2.14 cfs @ 12.09 hrs, Volume= 6,418 cf
Primary = 2.14 cfs @ 12.09 hrs, Volume= 6,418 cf, Atten= 0%, Lag= 0.0 min

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

Link 34L: River



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 16S: WEST SIDE ROADWAY AREA Runoff Area=36,499 sf Runoff Depth>0.89"
Tc=0.0 min CN=59 Runoff=0.94 cfs 2,699 cf

Subcatchment 21S: WEST SIDE CUL-DE-SAC AREA Runoff Area=31,802 sf Runoff Depth>0.94"
Tc=0.0 min CN=60 Runoff=0.89 cfs 2,499 cf

Subcatchment 23S: ACTON AND WEST SIDE LOTS Runoff Area=84,935 sf Runoff Depth>0.14"
Tc=0.0 min CN=41 Runoff=0.06 cfs 974 cf

Subcatchment 25S: SUDBURY ROAD (EAST SIDE) Runoff Area=27,391 sf Runoff Depth>3.25"
Flow Length=1,086' Tc=5.0 min CN=90 Runoff=2.48 cfs 7,425 cf

Subcatchment 35S: SUDBURY ROAD (WEST SIDE) Runoff Area=10,780 sf Runoff Depth>3.55"
Flow Length=1,086' Tc=5.0 min CN=93 Runoff=1.04 cfs 3,189 cf

Reach 4R: 12" CPP Peak Depth=0.61' Max Vel=3.4 fps Inflow=1.69 cfs 5,188 cf
D=12.0" n=0.020 L=27.0' S=0.0111 '/' Capacity=2.44 cfs Outflow=1.68 cfs 5,187 cf

Reach 5R: 12" CPP Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0 cf
D=12.0" n=0.020 L=16.0' S=0.0313 '/' Capacity=4.09 cfs Outflow=0.00 cfs 0 cf

Reach 8R: 12" CPP Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0 cf
D=12.0" n=0.020 L=30.0' S=0.0033 '/' Capacity=1.34 cfs Outflow=0.00 cfs 0 cf

Reach 9R: 12" CPP Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0 cf
D=12.0" n=0.020 L=48.0' S=0.0115 '/' Capacity=2.48 cfs Outflow=0.00 cfs 0 cf

Reach 14R: 12" CPP Peak Depth=0.52' Max Vel=4.2 fps Inflow=1.75 cfs 5,194 cf
D=12.0" n=0.020 L=135.0' S=0.0200 '/' Capacity=3.28 cfs Outflow=1.69 cfs 5,188 cf

Reach 18R: 12" RCP Peak Depth=0.25' Max Vel=5.5 fps Inflow=0.87 cfs 2,498 cf
D=12.0" n=0.011 L=145.0' S=0.0221 '/' Capacity=6.26 cfs Outflow=0.83 cfs 2,496 cf

Reach 19R: 12" RCP Peak Depth=0.22' Max Vel=6.7 fps Inflow=0.89 cfs 2,499 cf
D=12.0" n=0.011 L=62.0' S=0.0371 '/' Capacity=8.11 cfs Outflow=0.87 cfs 2,498 cf

Reach 28R: 12" RCP Peak Depth=0.49' Max Vel=6.4 fps Inflow=2.48 cfs 7,425 cf
D=12.0" n=0.011 L=94.0' S=0.0149 '/' Capacity=5.14 cfs Outflow=2.44 cfs 7,422 cf

Reach 32R: 12" RCP Peak Depth=0.47' Max Vel=9.6 fps Inflow=3.46 cfs 10,612 cf
D=12.0" n=0.011 L=62.0' S=0.0347 '/' Capacity=7.84 cfs Outflow=3.45 cfs 10,610 cf

Reach 33R: 12" RCP Peak Depth=0.25' Max Vel=23.0 fps Inflow=3.45 cfs 10,610 cf
D=12.0" n=0.011 L=13.0' S=0.3885 '/' Capacity=26.24 cfs Outflow=3.45 cfs 10,610 cf

Pond 1P: WestSide D-Pond Peak Elev=178.60' Storage=1,987 cf Inflow=1.68 cfs 5,187 cf
Outflow=0.89 cfs 3,226 cf

Pond 3P: MH Peak Elev=176.70' Inflow=1.69 cfs 5,188 cf
Primary=1.69 cfs 5,188 cf Secondary=0.00 cfs 0 cf Outflow=1.69 cfs 5,188 cf

Pond 6P: LB1 Peak Elev=167.50' Storage=0.000 af Inflow=0.00 cfs 0 cf
Discarded=0.00 cfs 0 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf

Pond 7P: LB2 Peak Elev=167.00' Storage=0.000 af Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Pond 12P: LB3 Peak Elev=168.03' Storage=105 cf Inflow=0.95 cfs 4,200 cf
Discarded=0.35 cfs 4,203 cf Primary=0.00 cfs 0 cf Outflow=0.35 cfs 4,203 cf

Pond 13P: MH Peak Elev=180.42' Inflow=1.75 cfs 5,194 cf
Outflow=1.75 cfs 5,194 cf

Pond 15P: (2) CB Peak Elev=180.47' Inflow=0.94 cfs 2,699 cf
12.0" x 10.0' Culvert Outflow=0.94 cfs 2,699 cf

Pond 17P: MH Peak Elev=183.48' Inflow=0.87 cfs 2,498 cf
Outflow=0.87 cfs 2,498 cf

Pond 20P: (2) CB Peak Elev=185.94' Inflow=0.89 cfs 2,499 cf
12.0" x 9.0' Culvert Outflow=0.89 cfs 2,499 cf

Pond 26P: MH Peak Elev=185.88' Inflow=0.89 cfs 2,499 cf
Outflow=0.89 cfs 2,499 cf

Pond 27P: CB Peak Elev=143.62' Inflow=2.48 cfs 7,425 cf
Outflow=2.48 cfs 7,425 cf

Pond 29P: CB Peak Elev=143.23' Inflow=1.04 cfs 3,189 cf
Outflow=1.04 cfs 3,189 cf

Pond 30P: MH Peak Elev=142.53' Inflow=3.46 cfs 10,612 cf
Outflow=3.46 cfs 10,612 cf

Pond 31P: CB Peak Elev=140.38' Inflow=3.45 cfs 10,610 cf
Outflow=3.45 cfs 10,610 cf

Link 10L: FLARED END Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 34L: River Inflow=3.45 cfs 10,610 cf
Primary=3.45 cfs 10,610 cf

Total Runoff Area = 191,407 sf Runoff Volume = 16,786 cf Average Runoff Depth = 1.05"

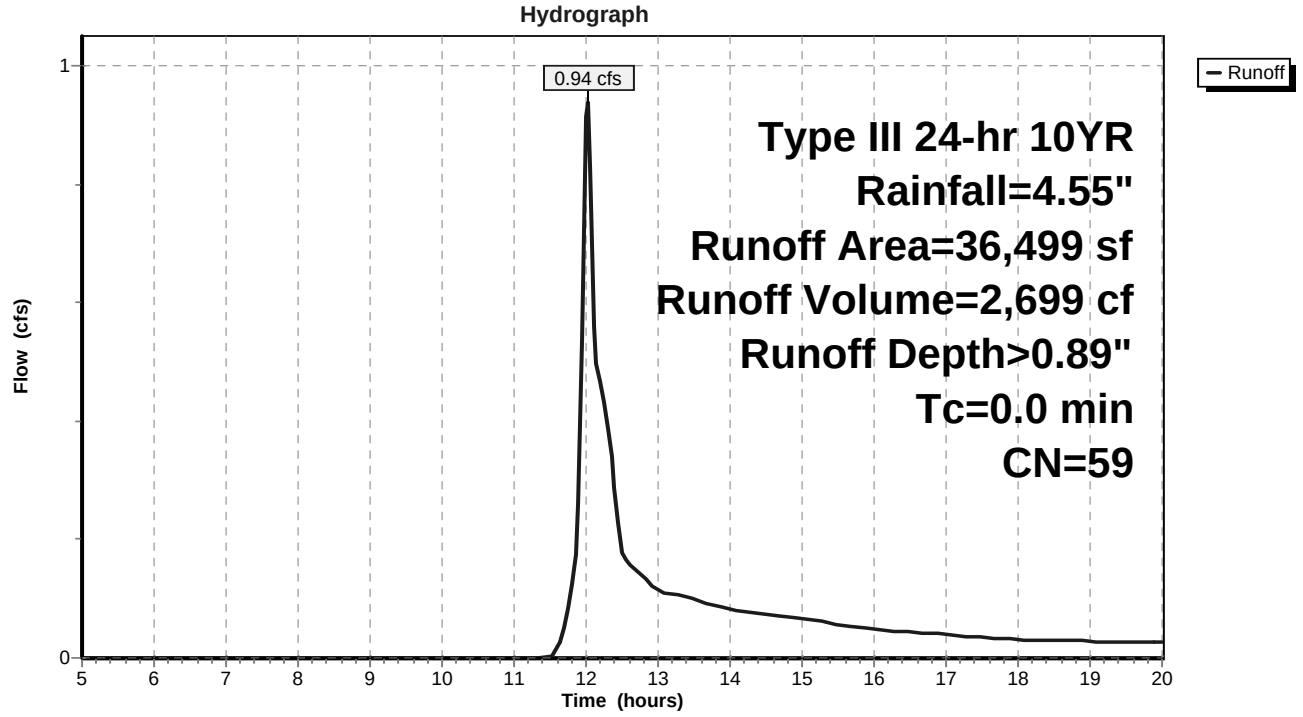
Subcatchment 16S: WEST SIDE ROADWAY AREA

Runoff = 0.94 cfs @ 12.02 hrs, Volume= 2,699 cf, Depth> 0.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.55"

Area (sf)	CN	Description
12,279	98	Paved parking & roofs
20,007	39	>75% Grass cover, Good, HSG A
4,213	39	OFFSITE GRASS
36,499	59	Weighted Average

Subcatchment 16S: WEST SIDE ROADWAY AREA



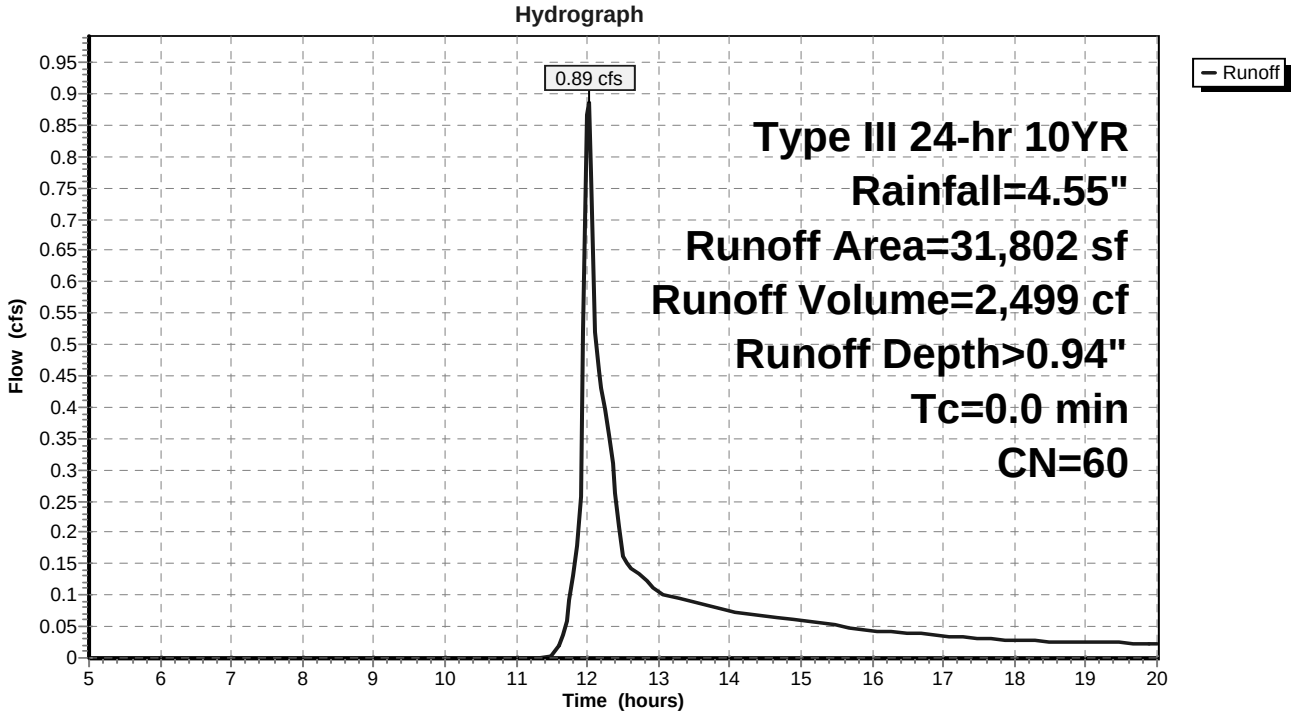
Subcatchment 21S: WEST SIDE CUL-DE-SAC AREA

Runoff = 0.89 cfs @ 12.01 hrs, Volume= 2,499 cf, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.55"

Area (sf)	CN	Description
11,344	98	Paved parking & roofs
17,104	39	>75% Grass cover, Good, HSG A
3,354	39	OFFSITE GRASS
31,802	60	Weighted Average

Subcatchment 21S: WEST SIDE CUL-DE-SAC AREA



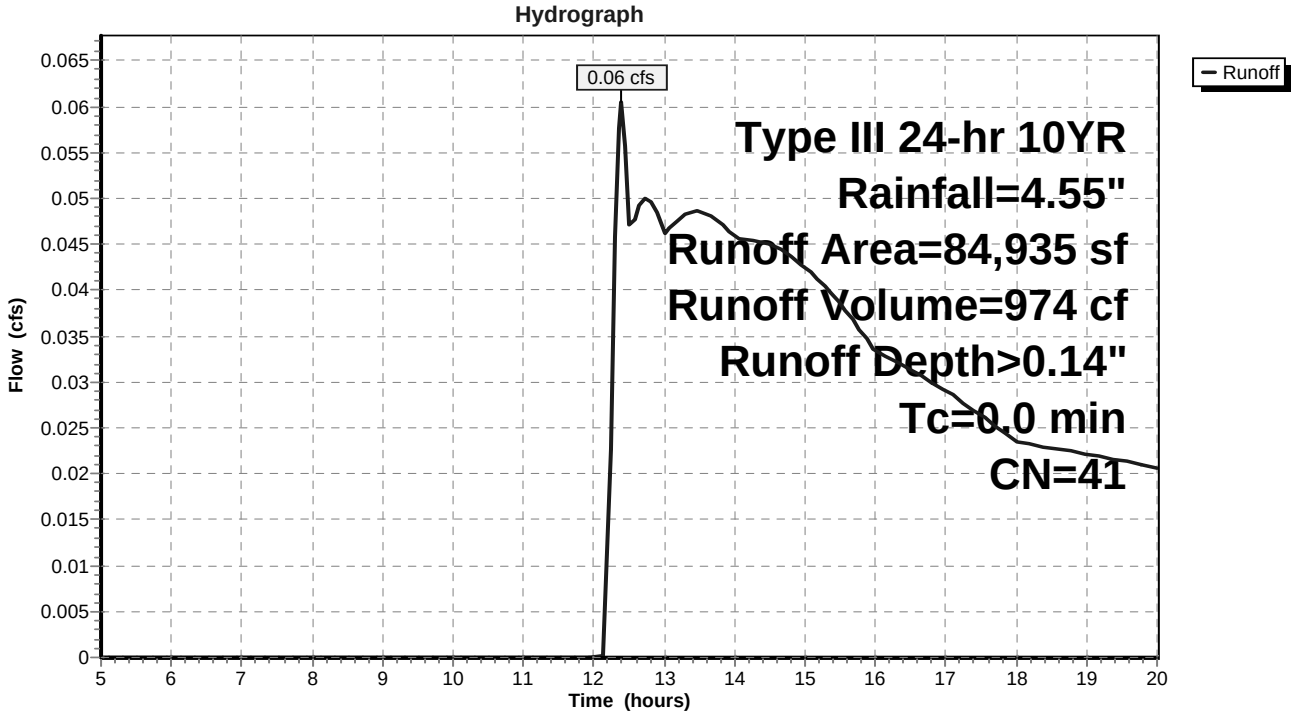
Subcatchment 23S: ACTON AND WEST SIDE LOTS

Runoff = 0.06 cfs @ 12.39 hrs, Volume= 974 cf, Depth> 0.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.55"

Area (sf)	CN	Description
9,619	98	Paved parking & roofs
42,441	30	Woods, Good, HSG A
19,562	39	>75% Grass cover, Good, HSG A
13,313	39	OFFSITE GRASS
84,935	41	Weighted Average

Subcatchment 23S: ACTON AND WEST SIDE LOTS



Subcatchment 25S: SUDBURY ROAD (EAST SIDE)

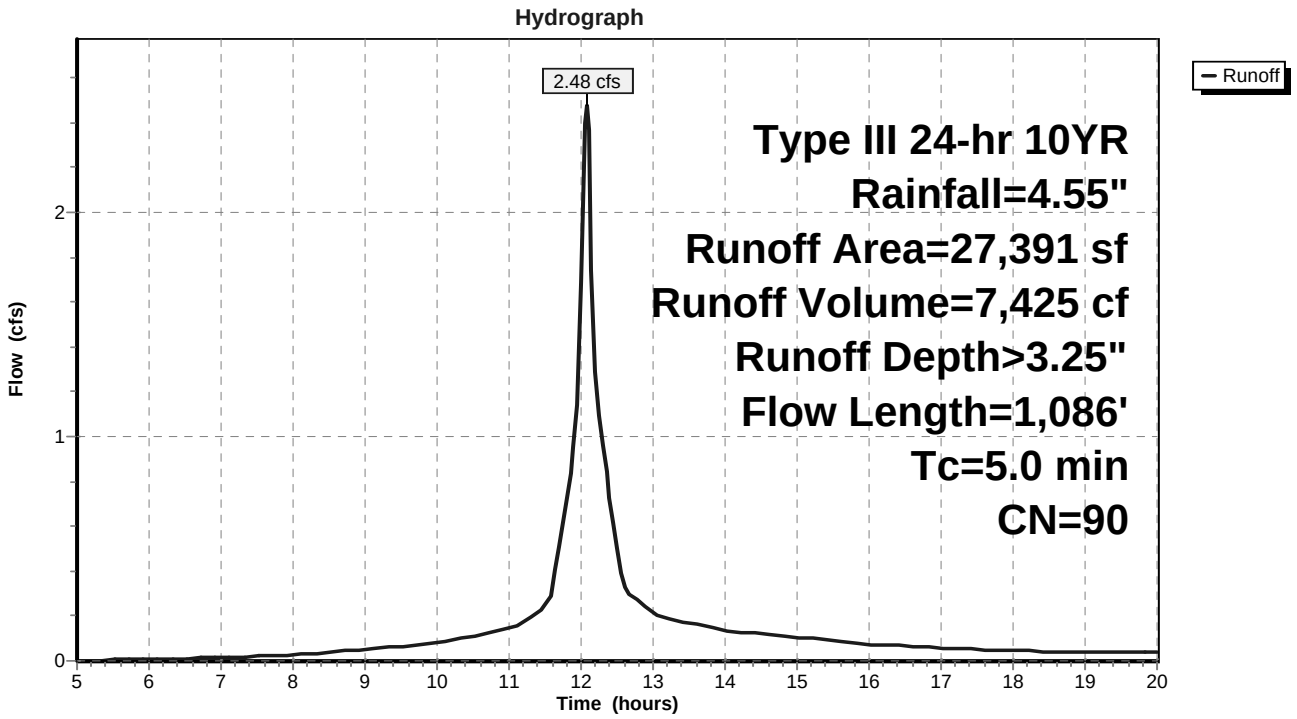
Runoff = 2.48 cfs @ 12.07 hrs, Volume= 7,425 cf, Depth> 3.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.55"

Area (sf)	CN	Description
21,856	98	Paved roads w/curbs & sewers
5,535	57	Woods/grass comb., Poor, HSG A
27,391	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	1,036	0.0800	5.7		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	50	0.0800	2.0		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.09"
3.4	1,086	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 25S: SUDBURY ROAD (EAST SIDE)



Subcatchment 35S: SUDBURY ROAD (WEST SIDE)

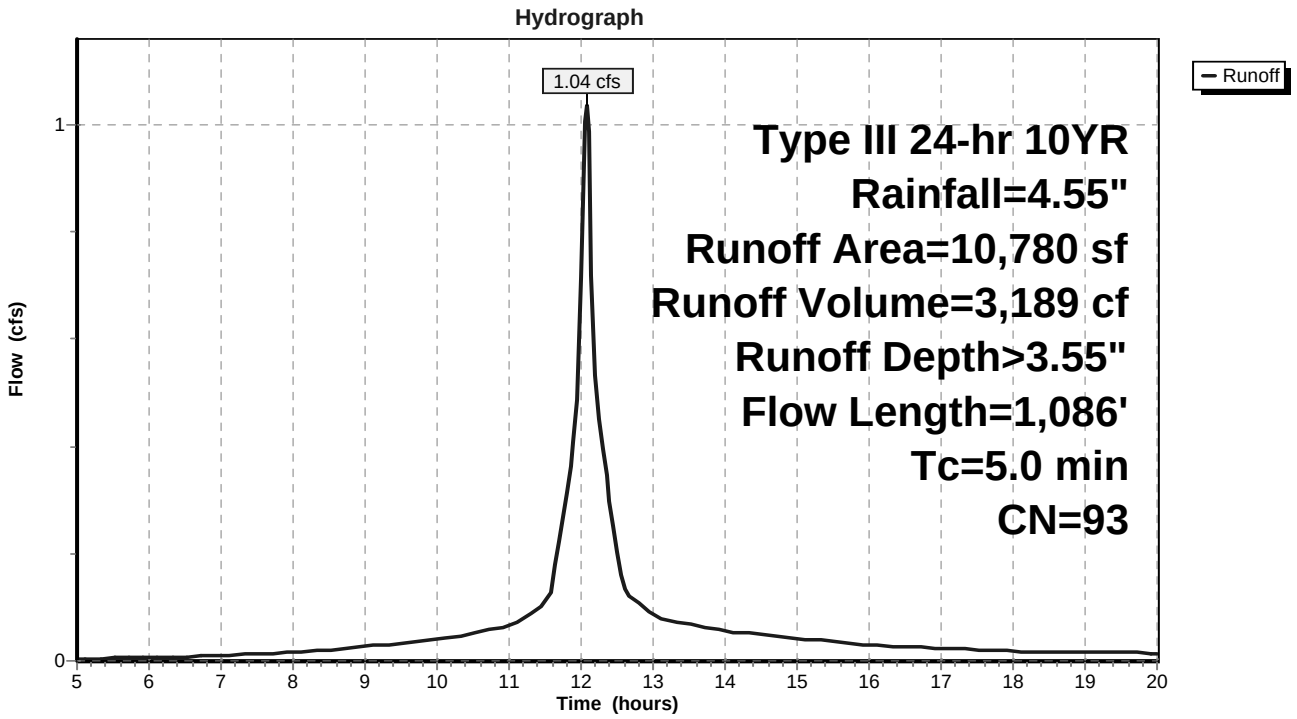
Runoff = 1.04 cfs @ 12.07 hrs, Volume= 3,189 cf, Depth> 3.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.55"

Area (sf)	CN	Description
9,014	98	Paved roads w/curbs & sewers
1,766	68	<50% Grass cover, Poor, HSG A
10,780	93	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	1,036	0.0800	5.7		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	50	0.0800	2.0		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.09"
3.4	1,086	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 35S: SUDBURY ROAD (WEST SIDE)



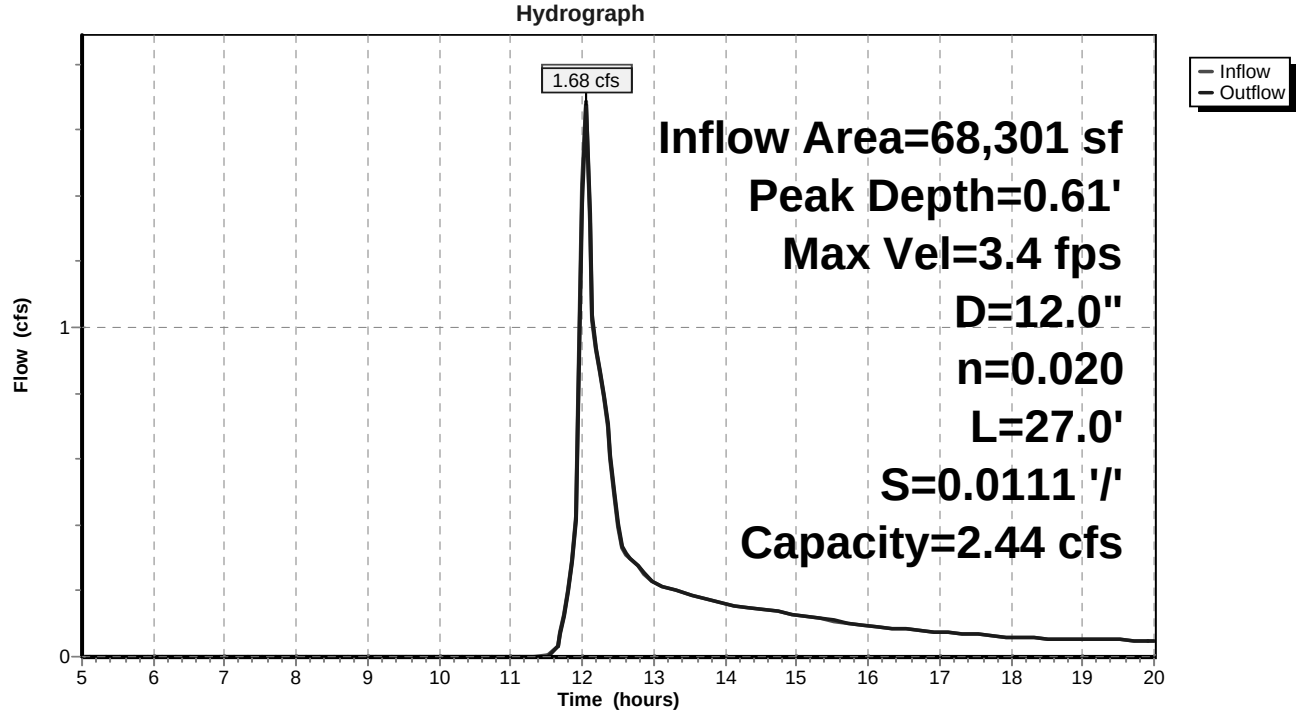
Reach 4R: 12" CPP

Inflow Area = 68,301 sf, Inflow Depth > 0.91" for 10YR event
Inflow = 1.69 cfs @ 12.05 hrs, Volume= 5,188 cf
Outflow = 1.68 cfs @ 12.05 hrs, Volume= 5,187 cf, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.4 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.61' @ 12.05 hrs
Capacity at bank full= 2.44 cfs
Inlet Invert= 176.00', Outlet Invert= 175.70'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 27.0' Slope= 0.0111 '/'

Reach 4R: 12" CPP



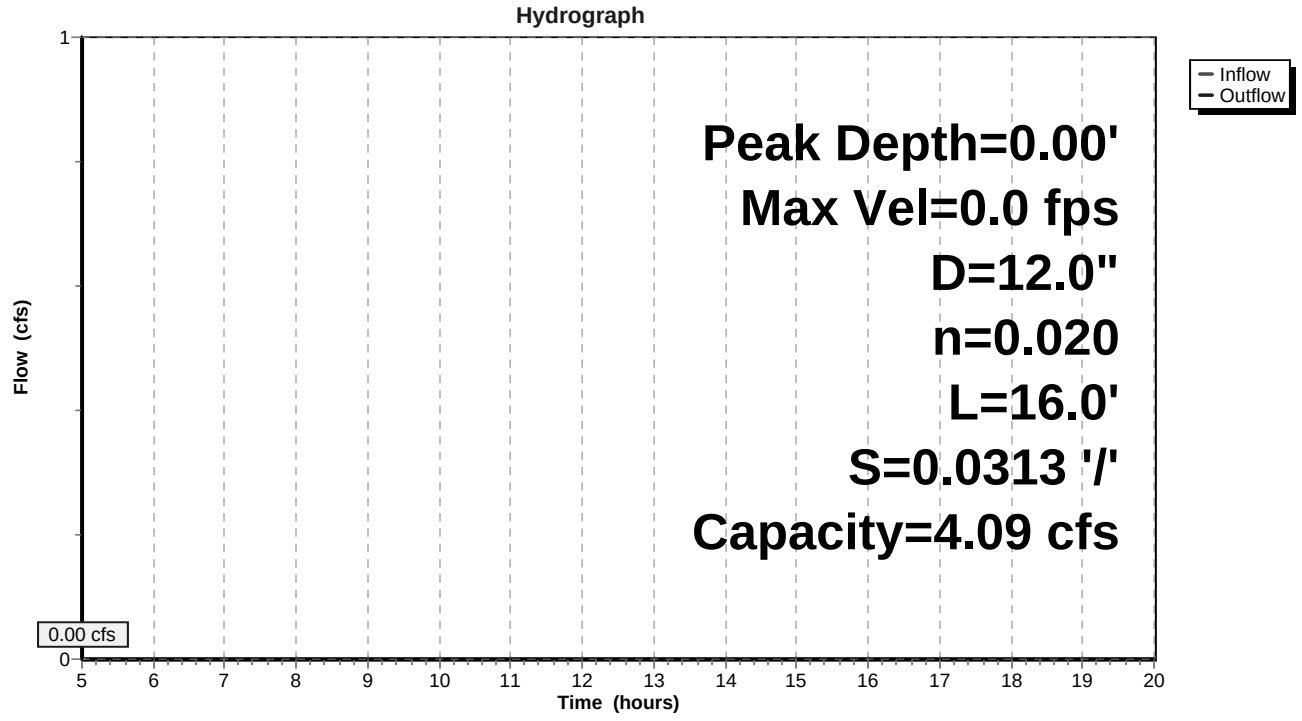
Reach 5R: 12" CPP

Inflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

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

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 4.09 cfs
Inlet Invert= 176.00', Outlet Invert= 175.50'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 16.0' Slope= 0.0313 '/'

Reach 5R: 12" CPP



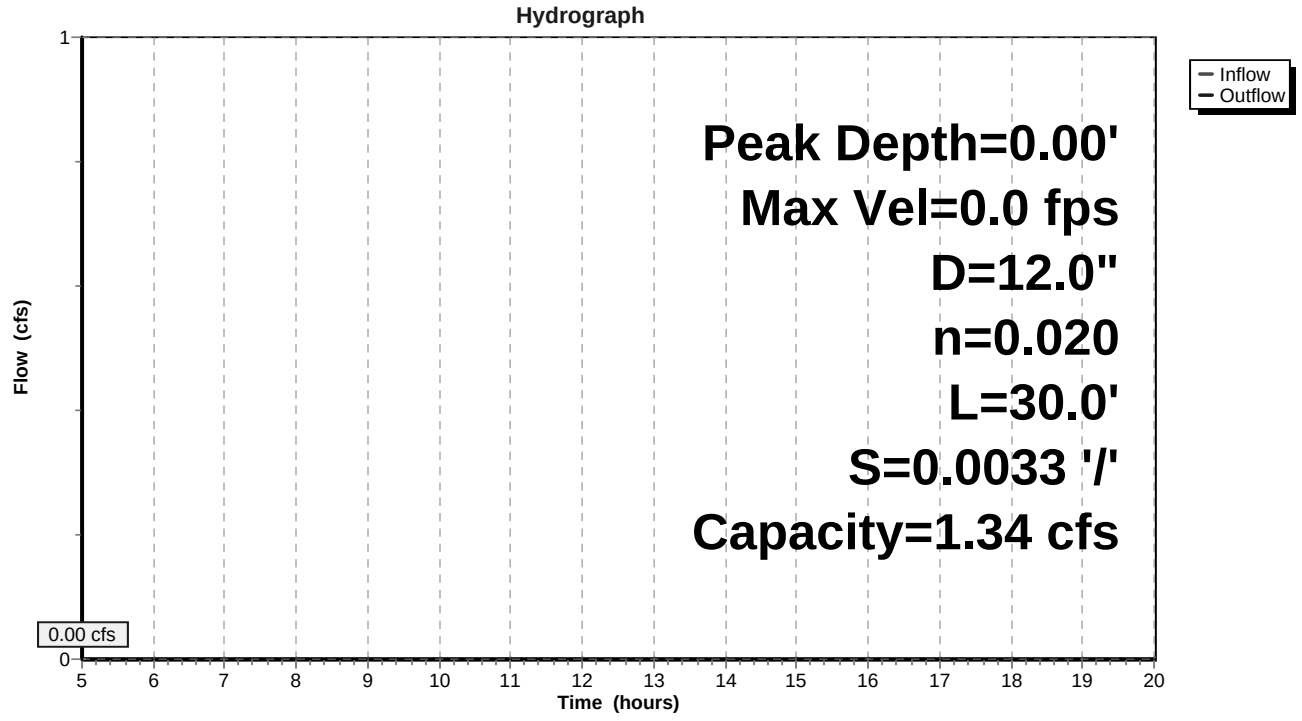
Reach 8R: 12" CPP

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

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

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 1.34 cfs
Inlet Invert= 175.20', Outlet Invert= 175.10'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 30.0' Slope= 0.0033 '/'

Reach 8R: 12" CPP



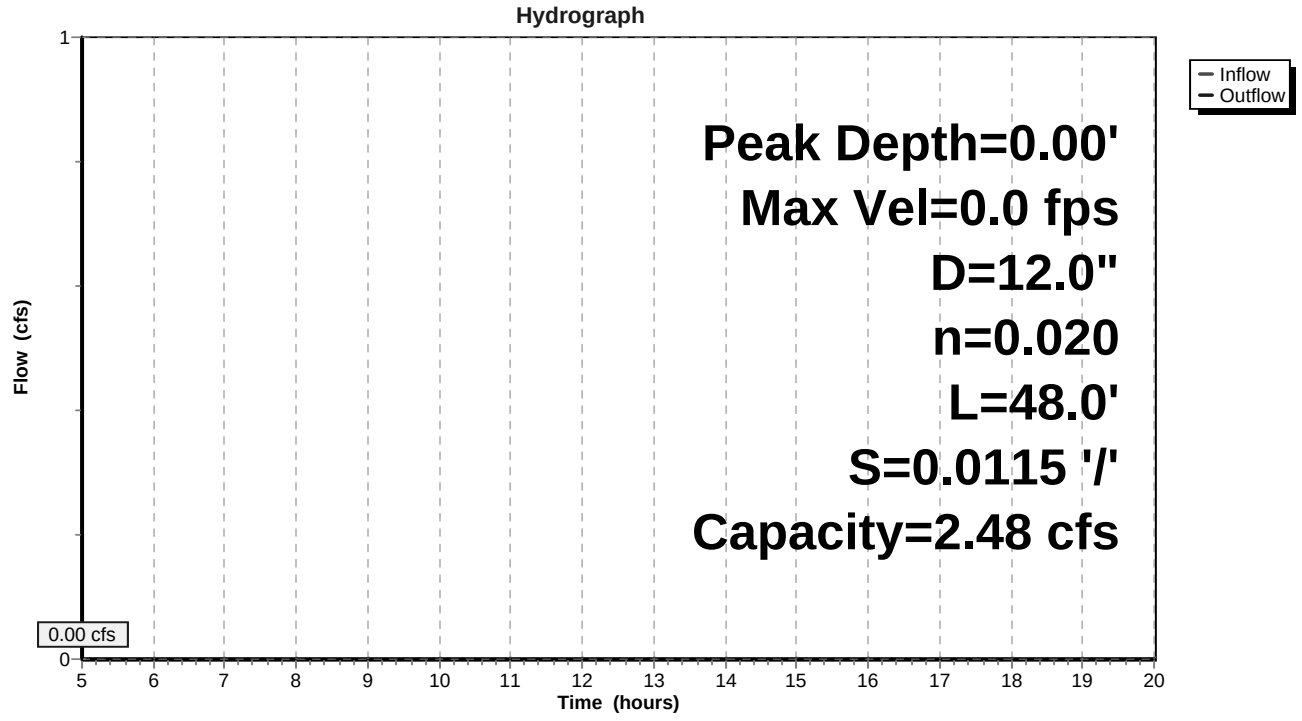
Reach 9R: 12" CPP

Inflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

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

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 2.48 cfs
Inlet Invert= 177.00', Outlet Invert= 176.45'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 48.0' Slope= 0.0115 '/'

Reach 9R: 12" CPP



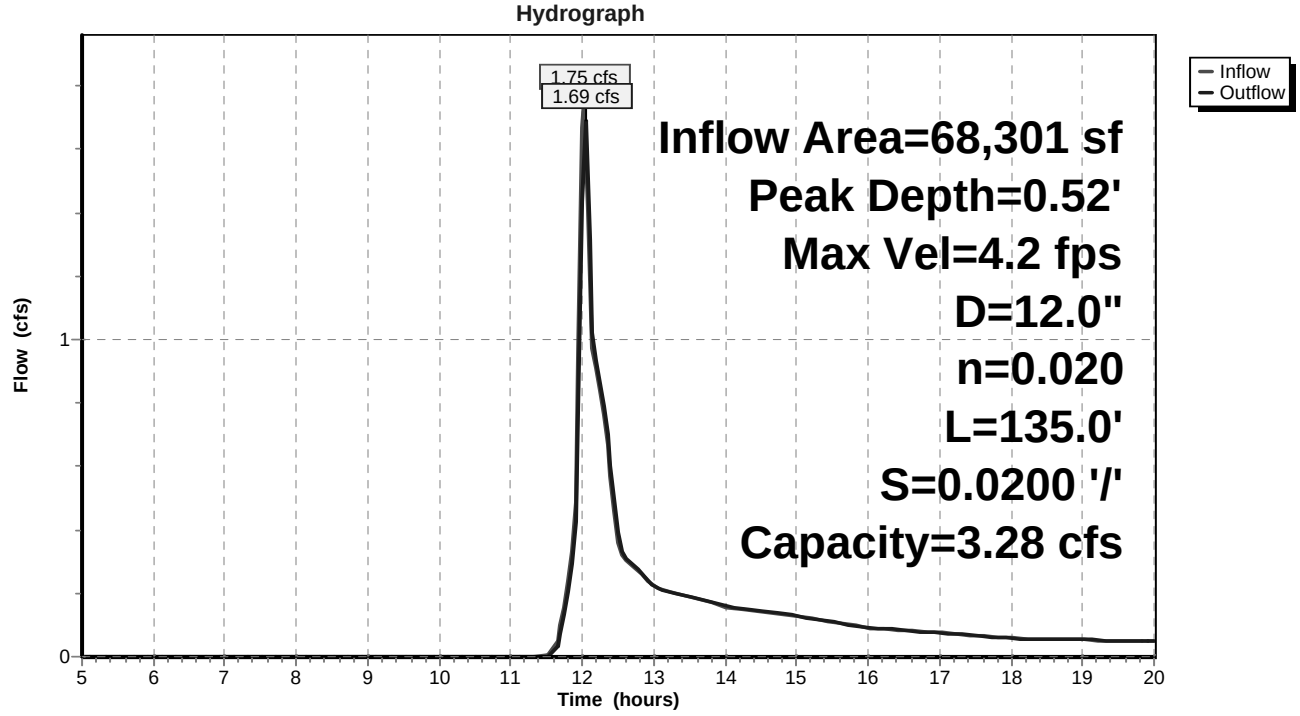
Reach 14R: 12" CPP

Inflow Area = 68,301 sf, Inflow Depth > 0.91" for 10YR event
Inflow = 1.75 cfs @ 12.02 hrs, Volume= 5,194 cf
Outflow = 1.69 cfs @ 12.05 hrs, Volume= 5,188 cf, Atten= 3%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.2 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 2.0 fps, Avg. Travel Time= 1.1 min

Peak Depth= 0.52' @ 12.04 hrs
Capacity at bank full= 3.28 cfs
Inlet Invert= 179.70', Outlet Invert= 177.00'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 135.0' Slope= 0.0200 '/'

Reach 14R: 12" CPP



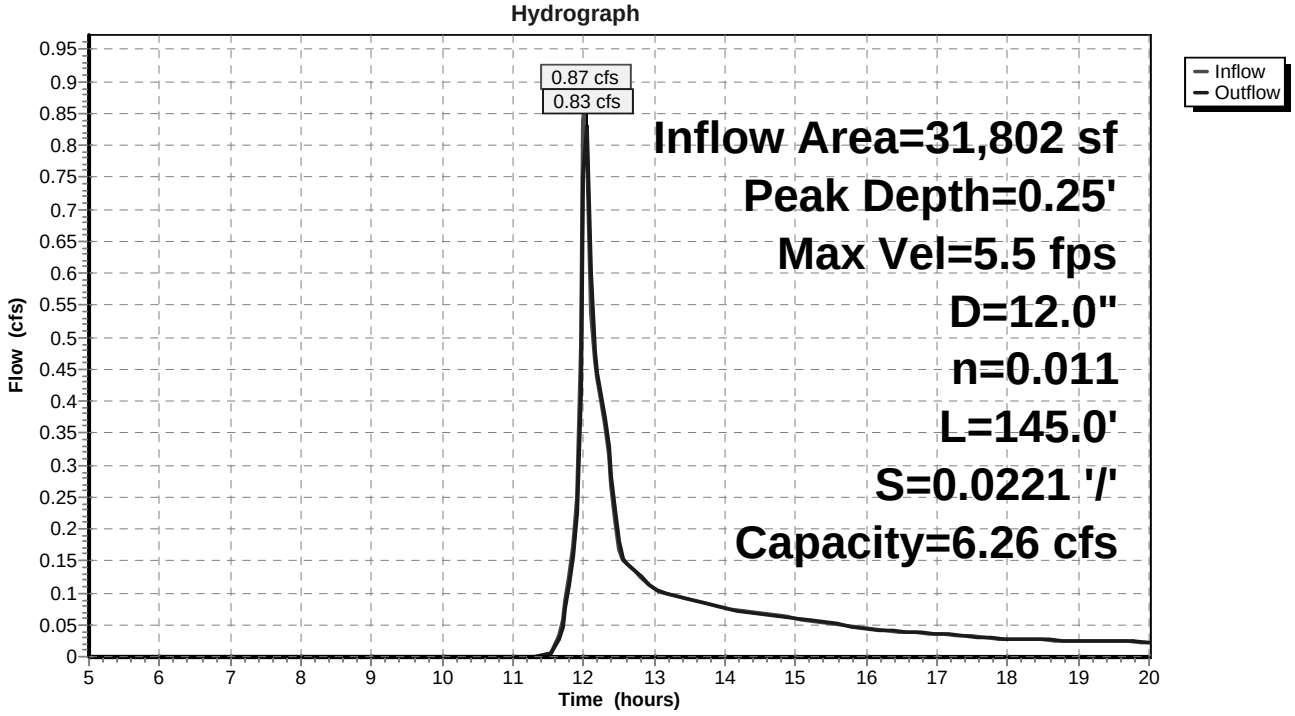
Reach 18R: 12" RCP

Inflow Area = 31,802 sf, Inflow Depth > 0.94" for 10YR event
Inflow = 0.87 cfs @ 12.02 hrs, Volume= 2,498 cf
Outflow = 0.83 cfs @ 12.04 hrs, Volume= 2,496 cf, Atten= 4%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.5 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.5 fps, Avg. Travel Time= 1.0 min

Peak Depth= 0.25' @ 12.03 hrs
Capacity at bank full= 6.26 cfs
Inlet Invert= 183.00', Outlet Invert= 179.80'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 145.0' Slope= 0.0221 '/'

Reach 18R: 12" RCP



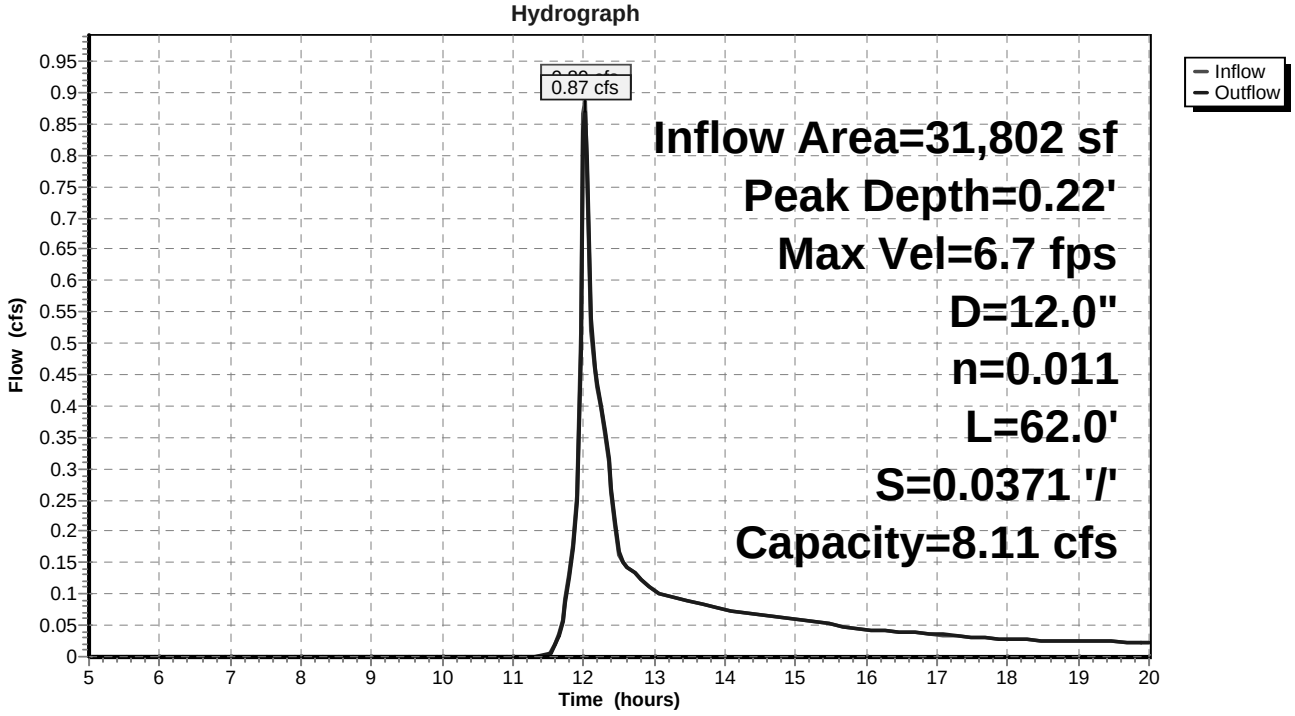
Reach 19R: 12" RCP

Inflow Area = 31,802 sf, Inflow Depth > 0.94" for 10YR event
Inflow = 0.89 cfs @ 12.01 hrs, Volume= 2,499 cf
Outflow = 0.87 cfs @ 12.02 hrs, Volume= 2,498 cf, Atten= 2%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.7 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.0 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.22' @ 12.02 hrs
Capacity at bank full= 8.11 cfs
Inlet Invert= 185.40', Outlet Invert= 183.10'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 62.0' Slope= 0.0371 '/'

Reach 19R: 12" RCP



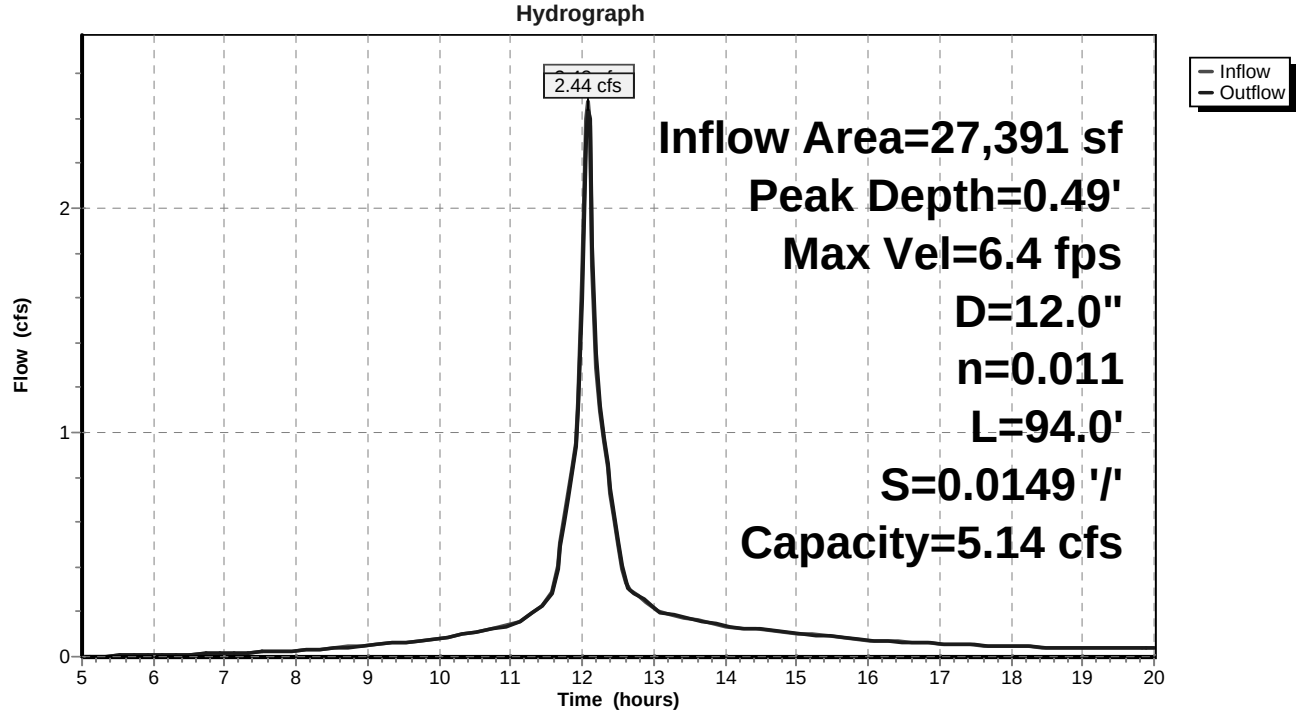
Reach 28R: 12" RCP

Inflow Area = 27,391 sf, Inflow Depth > 3.25" for 10YR event
Inflow = 2.48 cfs @ 12.07 hrs, Volume= 7,425 cf
Outflow = 2.44 cfs @ 12.08 hrs, Volume= 7,422 cf, Atten= 2%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.4 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.4 fps, Avg. Travel Time= 0.7 min

Peak Depth= 0.49' @ 12.08 hrs
Capacity at bank full= 5.14 cfs
Inlet Invert= 142.70', Outlet Invert= 141.30'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 94.0' Slope= 0.0149 '/'

Reach 28R: 12" RCP



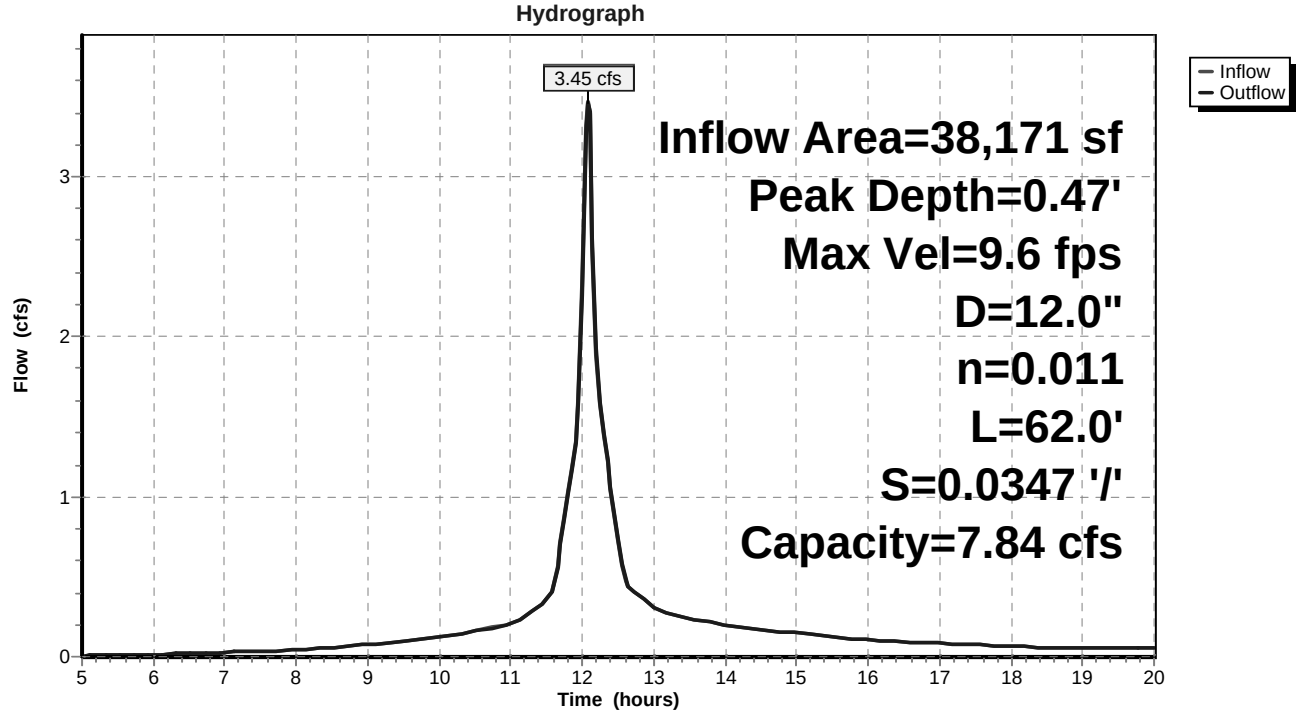
Reach 32R: 12" RCP

Inflow Area = 38,171 sf, Inflow Depth > 3.34" for 10YR event
Inflow = 3.46 cfs @ 12.08 hrs, Volume= 10,612 cf
Outflow = 3.45 cfs @ 12.08 hrs, Volume= 10,610 cf, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.6 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.6 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.47' @ 12.08 hrs
Capacity at bank full= 7.84 cfs
Inlet Invert= 141.20', Outlet Invert= 139.05'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 62.0' Slope= 0.0347 '/'

Reach 32R: 12" RCP



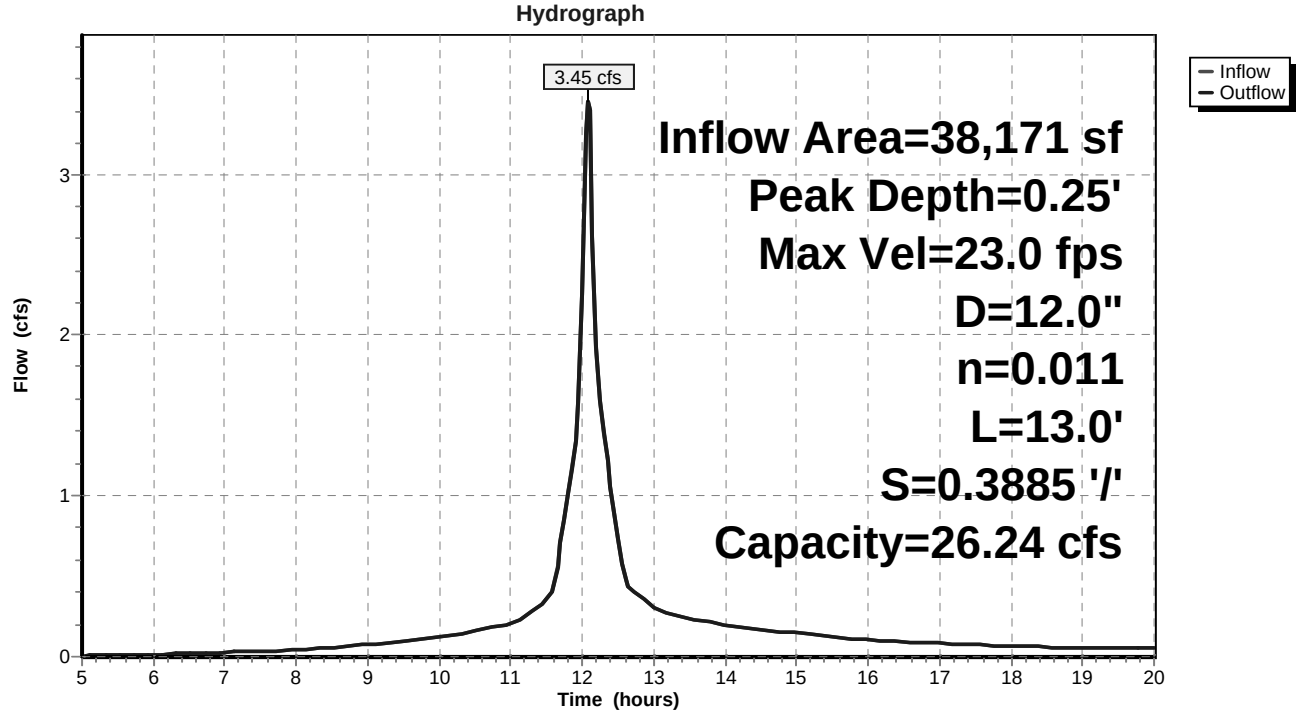
Reach 33R: 12" RCP

Inflow Area = 38,171 sf, Inflow Depth > 3.34" for 10YR event
Inflow = 3.45 cfs @ 12.08 hrs, Volume= 10,610 cf
Outflow = 3.45 cfs @ 12.08 hrs, Volume= 10,610 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 23.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 8.3 fps, Avg. Travel Time= 0.0 min

Peak Depth= 0.25' @ 12.08 hrs
Capacity at bank full= 26.24 cfs
Inlet Invert= 139.05', Outlet Invert= 134.00'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 13.0' Slope= 0.3885 '/'

Reach 33R: 12" RCP



Pond 1P: WestSide D-Pond

Inflow Area = 68,301 sf, Inflow Depth > 0.91" for 10YR event
Inflow = 1.68 cfs @ 12.05 hrs, Volume= 5,187 cf
Outflow = 0.89 cfs @ 12.45 hrs, Volume= 3,226 cf, Atten= 47%, Lag= 24.1 min
Primary = 0.89 cfs @ 12.45 hrs, Volume= 3,226 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 178.60' @ 12.45 hrs Surf.Area= 899 sf Storage= 1,987 cf
Flood Elev= 177.00' Surf.Area= 598 sf Storage= 869 cf
Plug-Flow detention time= 150.1 min calculated for 3,226 cf (62% of inflow)
Center-of-Mass det. time= 64.7 min (897.1 - 832.4)

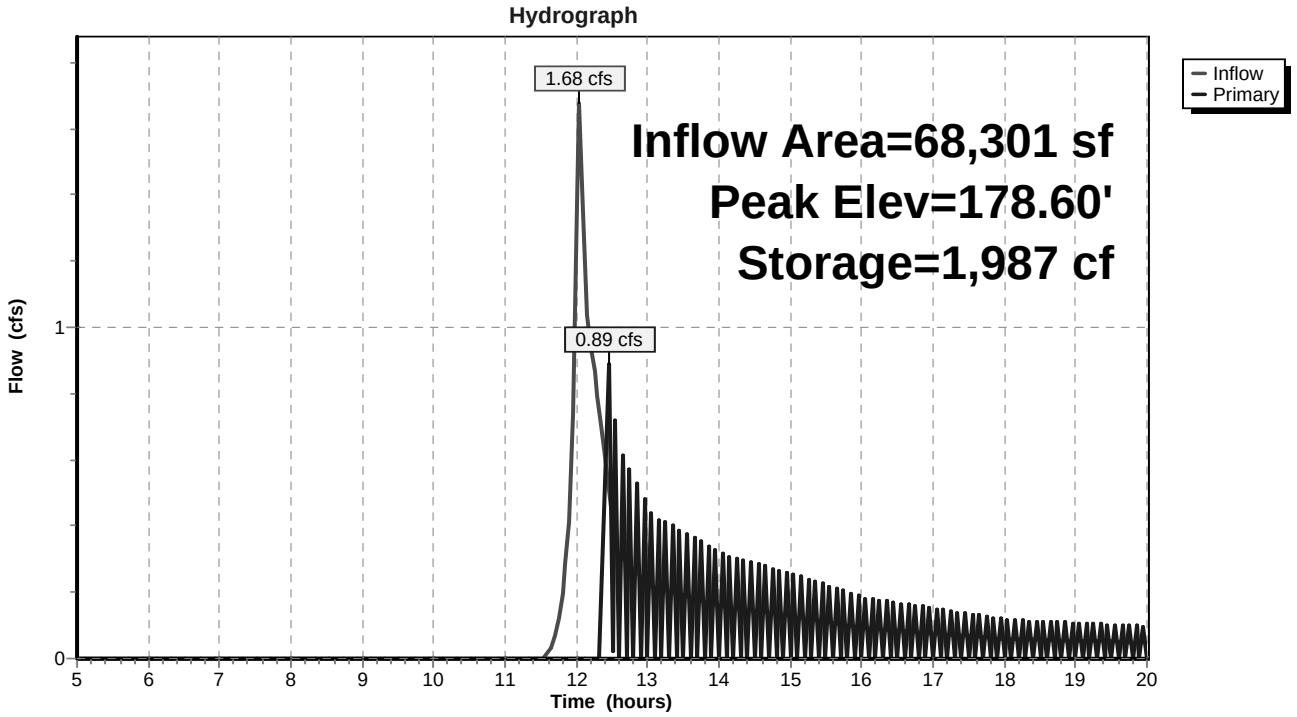
Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	1,987 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	284	0	0
176.00	428	356	356
177.00	598	513	869
178.00	792	695	1,564
178.50	899	423	1,987

Device	Routing	Invert	Outlet Devices
#1	Primary	178.50'	**10.0' long x 110.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.88 cfs @ 12.45 hrs HW=178.60' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.88 cfs @ 0.9 fps)

Pond 1P: WestSide D-Pond



Pond 3P: MH

Inflow Area = 68,301 sf, Inflow Depth > 0.91" for 10YR event
Inflow = 1.69 cfs @ 12.05 hrs, Volume= 5,188 cf
Outflow = 1.69 cfs @ 12.05 hrs, Volume= 5,188 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.69 cfs @ 12.05 hrs, Volume= 5,188 cf
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

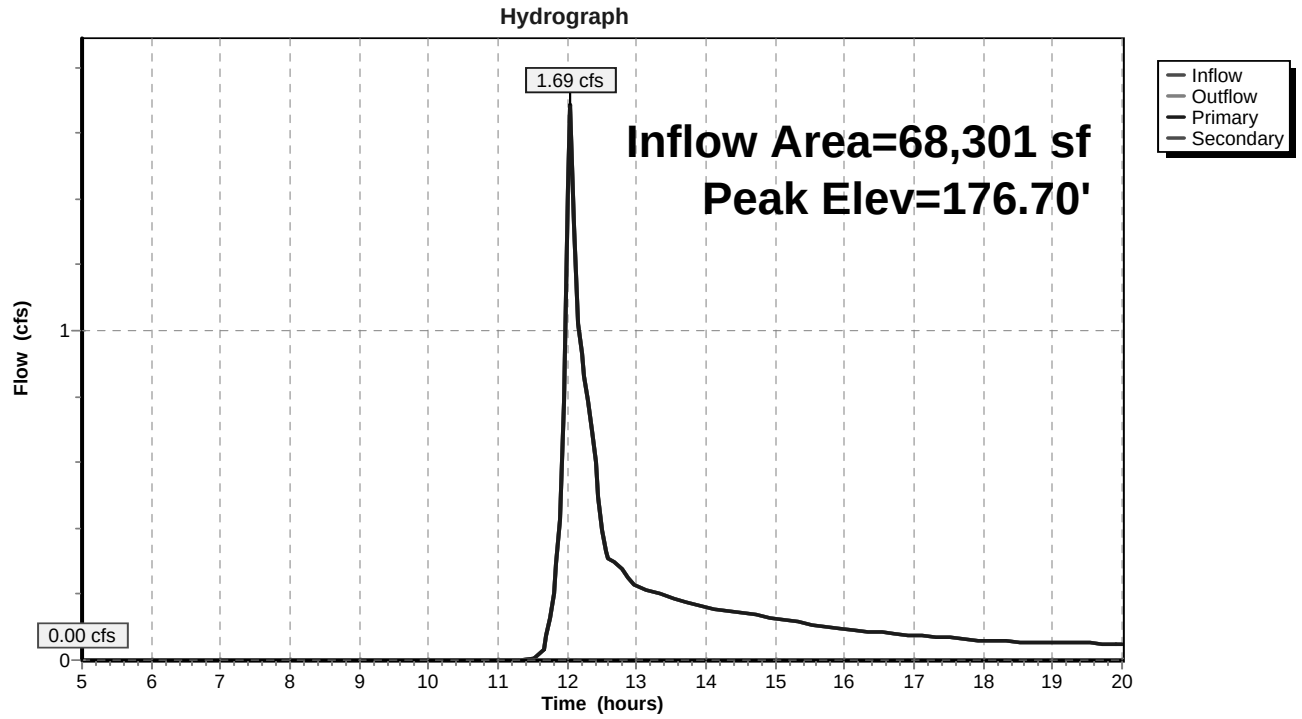
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 176.70' @ 12.05 hrs
Flood Elev= 180.30'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (832.1 - 832.1)

Device	Routing	Invert	Outlet Devices
#1	Secondary	177.00'	**0.5' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	176.00'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.66 cfs @ 12.05 hrs HW=176.70' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 1.66 cfs @ 2.8 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=176.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: MH



Pond 6P: LB1

Inflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Discarded	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Primary	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Secondary	=	0.00 cfs @	5.00 hrs, Volume=	0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 167.50' @ 5.00 hrs Surf.Area= 0.006 ac Storage= 0.000 af
Flood Elev= 180.00' Surf.Area= 0.007 ac Storage= 0.029 af
Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	175.50'	0.005 af	**8.00'D x 4.50'H Vertical Cone/Cylinder**
#2	168.50'	0.008 af	**8.00'D x 7.00'H Vertical Cone/Cylinder** Inside #3
#3	167.50'	0.015 af	**18.00'D x 8.00'H Vertical Cone/Cylinder** 0.047 af Overall - 0.008 af Embedded = 0.039 af x 40.0% Voids
		0.029 af	Total Available Storage

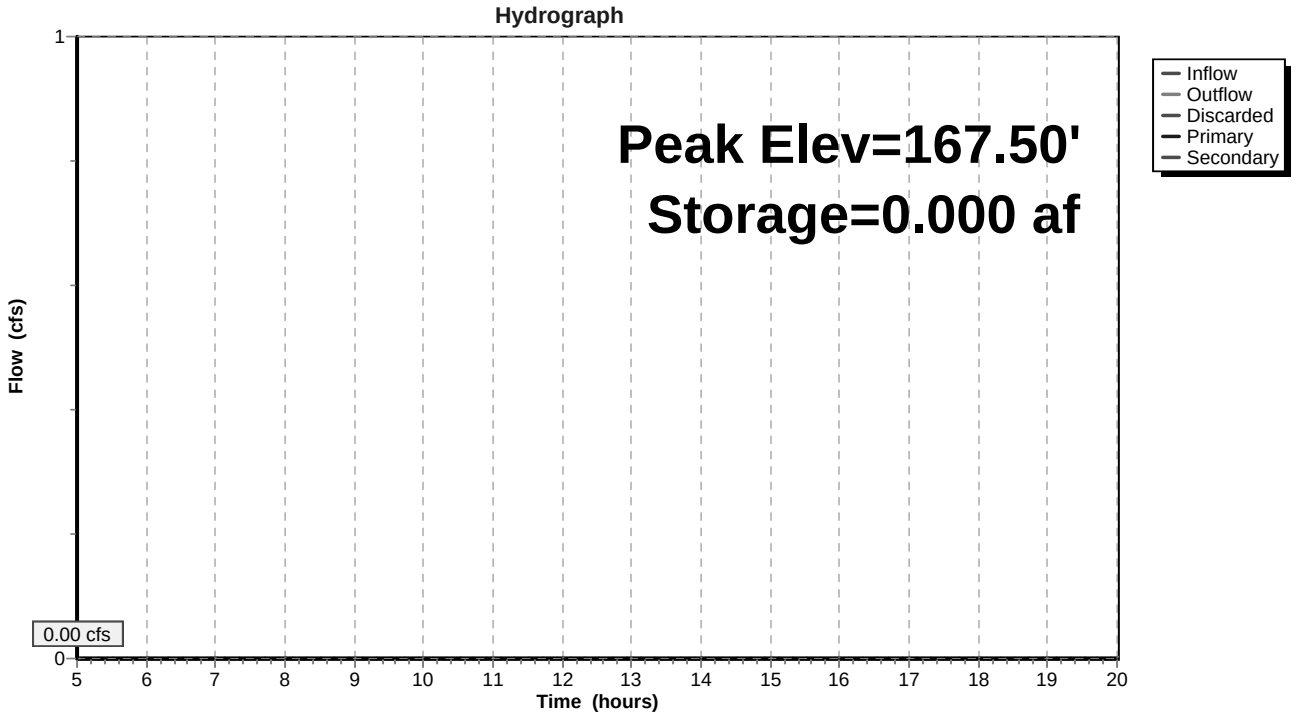
Device	Routing	Invert	Outlet Devices
#1	Primary	175.20'	**12.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	177.00'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	0.00'	**60.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 5.00 hrs HW=167.50' (Free Discharge)
└**3=Exfiltration** (Passes 0.00 cfs of 0.35 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=167.50' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=167.50' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 6P: LB1


Hydrograph
Peak Elev=167.50'
Storage=0.000 af
Inflow
Outflow
Discarded
Primary
Secondary
Flow (cfs)
0.00 cfs
1
0
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Time (hours)

Pond 7P: LB2

Inflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Discarded	=	0.00 cfs @	5.00 hrs, Volume=	0 cf

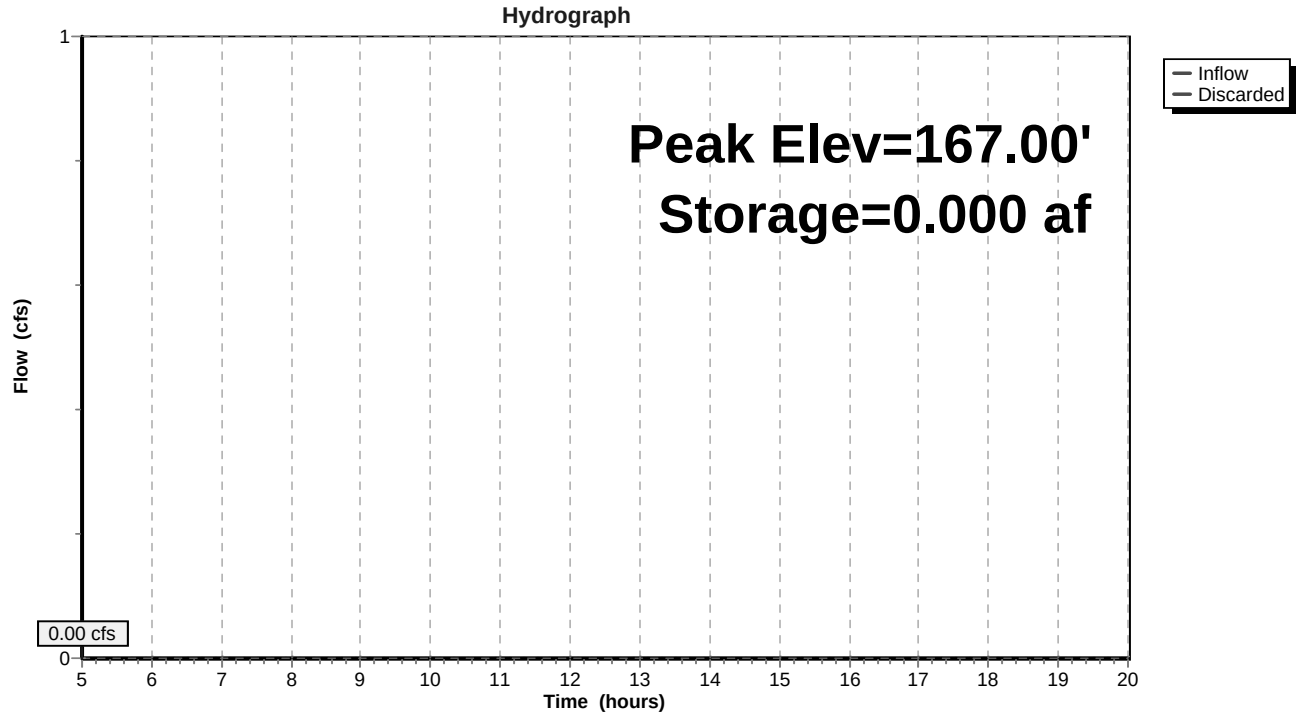
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 167.00' @ 5.00 hrs Surf.Area= 0.006 ac Storage= 0.000 af
Flood Elev= 180.50' Surf.Area= 0.007 ac Storage= 0.030 af
Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	0.006 af	**8.00'D x 5.50'H Vertical Cone/Cylinder**
#2	168.30'	0.008 af	**8.00'D x 6.70'H Vertical Cone/Cylinder** Inside #3
#3	167.00'	0.016 af	**18.00'D x 8.00'H Vertical Cone/Cylinder**
			0.047 af Overall - 0.008 af Embedded = 0.039 af x 40.0% Voids
		0.030 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**60.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 5.00 hrs HW=167.00' (Free Discharge)
1=Exfiltration (Passes 0.00 cfs of 0.35 cfs potential flow)

Pond 7P: LB2



Pond 12P: LB3

Inflow Area = 153,236 sf, Inflow Depth > 0.33" for 10YR event
Inflow = 0.95 cfs @ 12.45 hrs, Volume= 4,200 cf
Outflow = 0.35 cfs @ 12.45 hrs, Volume= 4,203 cf, Atten= 63%, Lag= 0.0 min
Discarded = 0.35 cfs @ 12.45 hrs, Volume= 4,203 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 168.03' @ 12.68 hrs Surf.Area= 254 sf Storage= 105 cf
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.3 min (905.6 - 904.2)

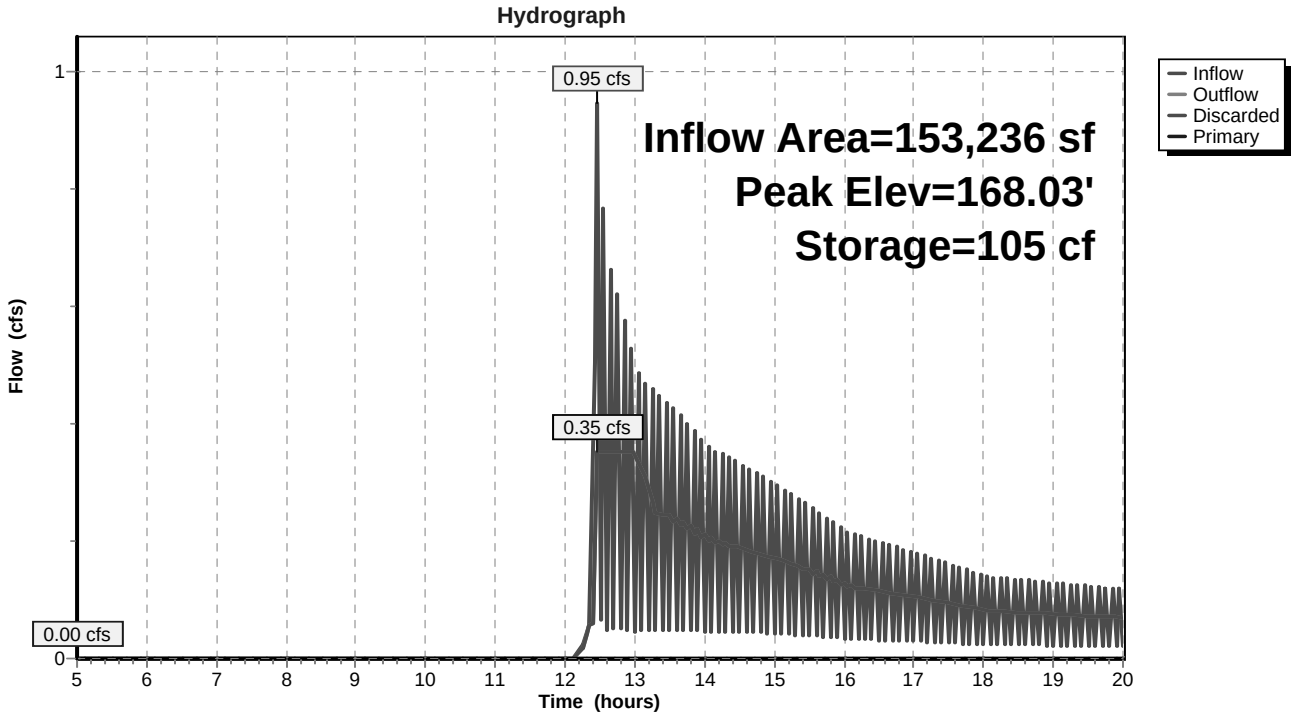
Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	73 cf	**8.00'D x 1.45'H Vertical Cone/Cylinder**
#2	168.30'	337 cf	**8.00'D x 6.70'H Vertical Cone/Cylinder** Inside #3
#3	167.00'	680 cf	**18.00'D x 8.00'H Vertical Cone/Cylinder** 2,036 cf Overall - 337 cf Embedded = 1,699 cf x 40.0% Voids
		1,089 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**60.000 in/hr Exfiltration over Surface area**
#2	Primary	176.45'	**2.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.35 cfs @ 12.45 hrs HW=167.54' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=167.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 12P: LB3


Hydrograph
Inflow Area=153,236 sf
Peak Elev=168.03'
Storage=105 cf
0.95 cfs
0.35 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0
1
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Pond 13P: MH

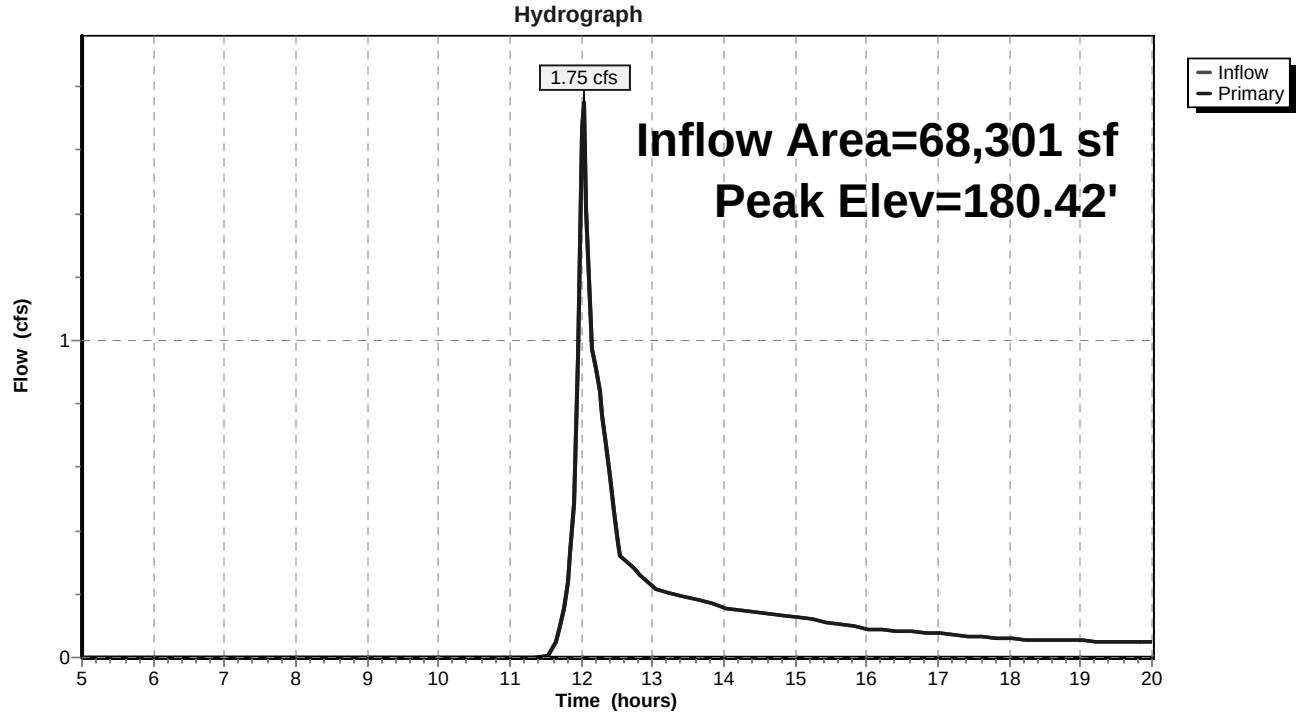
Inflow Area = 68,301 sf, Inflow Depth > 0.91" for 10YR event
Inflow = 1.75 cfs @ 12.02 hrs, Volume= 5,194 cf
Outflow = 1.75 cfs @ 12.02 hrs, Volume= 5,194 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.75 cfs @ 12.02 hrs, Volume= 5,194 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 180.42' @ 12.02 hrs
Flood Elev= 184.90'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (831.1 - 831.1)

Device	Routing	Invert	Outlet Devices
#1	Primary	179.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.66 cfs @ 12.02 hrs HW=180.40' (Free Discharge)
1=Orifice/Grate (Orifice Controls 1.66 cfs @ 2.8 fps)

Pond 13P: MH



Pond 15P: (2) CB

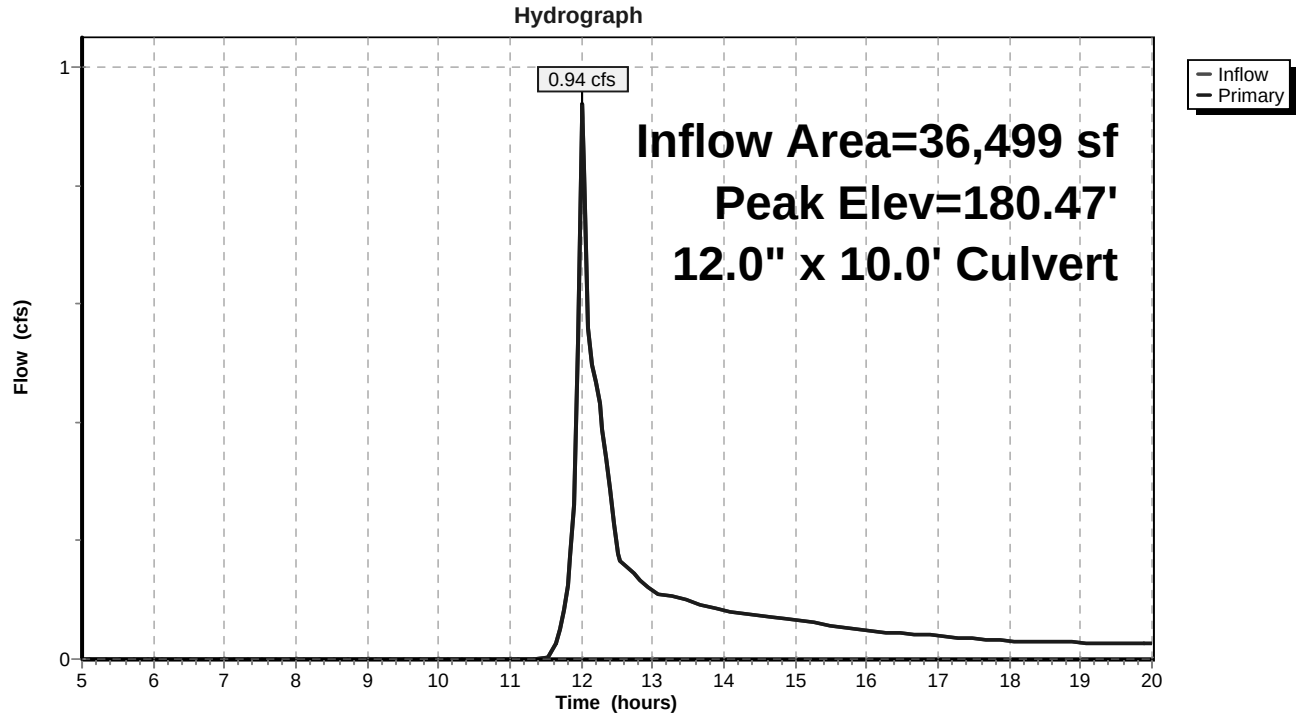
Inflow Area = 36,499 sf, Inflow Depth > 0.89" for 10YR event
Inflow = 0.94 cfs @ 12.02 hrs, Volume= 2,699 cf
Outflow = 0.94 cfs @ 12.02 hrs, Volume= 2,699 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 12.02 hrs, Volume= 2,699 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 180.47' @ 12.02 hrs
Flood Elev= 184.90'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (831.8 - 831.8)

Device	Routing	Invert	Outlet Devices
#1	Primary	180.15'	**12.0" x 10.0' long Culvert X 2.00** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 179.80' S= 0.0350 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior

Primary OutFlow Max=0.88 cfs @ 12.02 hrs HW=180.46' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.88 cfs @ 3.1 fps)

Pond 15P: (2) CB



Pond 17P: MH

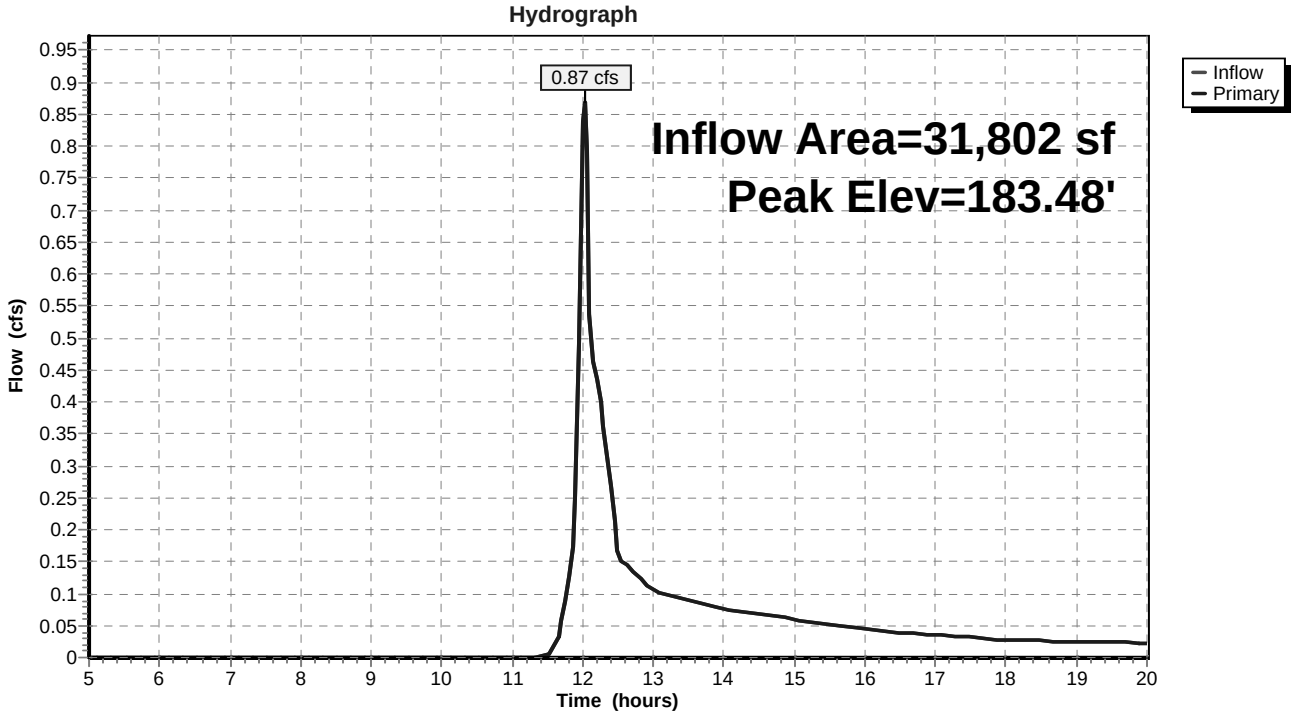
Inflow Area = 31,802 sf, Inflow Depth > 0.94" for 10YR event
Inflow = 0.87 cfs @ 12.02 hrs, Volume= 2,498 cf
Outflow = 0.87 cfs @ 12.02 hrs, Volume= 2,498 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.87 cfs @ 12.02 hrs, Volume= 2,498 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 183.48' @ 12.02 hrs
Flood Elev= 188.05'
Plug-Flow detention time= 0.0 min calculated for 2,498 cf (100% of inflow)
Center-of-Mass det. time= 0.0 min (829.5 - 829.5)

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.82 cfs @ 12.02 hrs HW=183.46' (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.82 cfs @ 2.3 fps)

Pond 17P: MH



Pond 20P: (2) CB

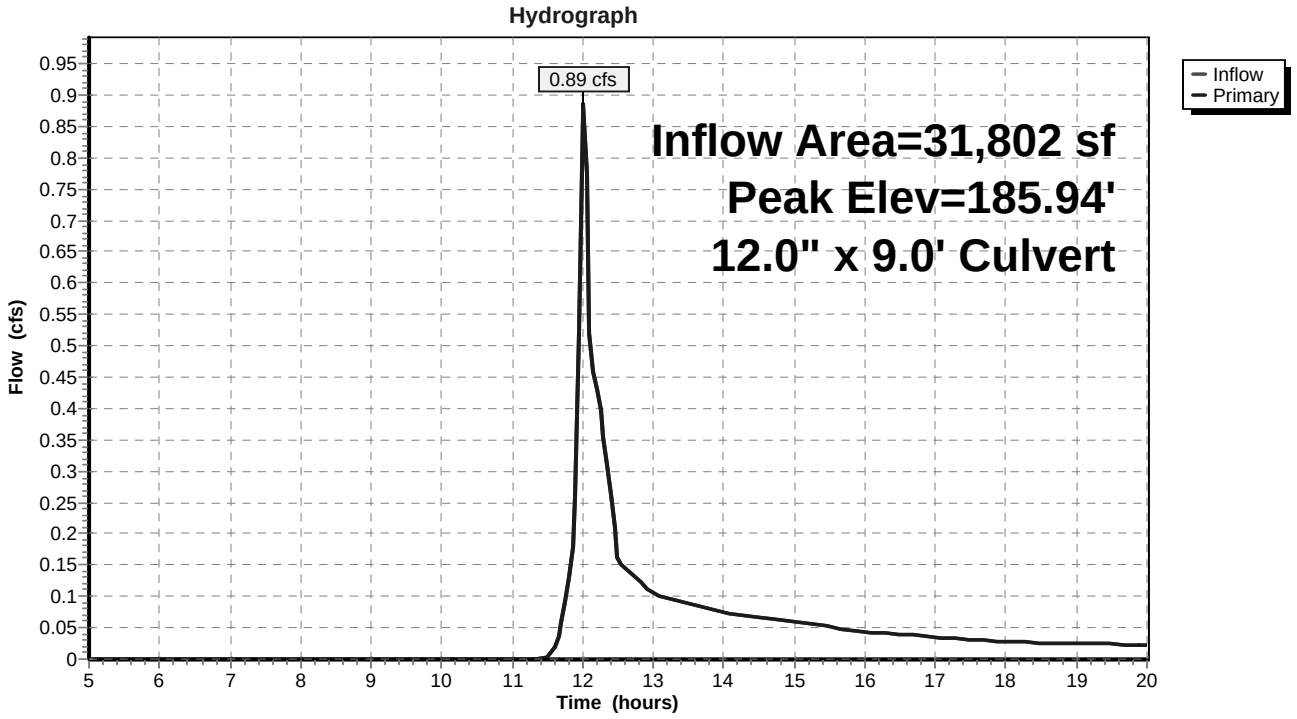
Inflow Area = 31,802 sf, Inflow Depth > 0.94" for 10YR event
Inflow = 0.89 cfs @ 12.01 hrs, Volume= 2,499 cf
Outflow = 0.89 cfs @ 12.01 hrs, Volume= 2,499 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.89 cfs @ 12.01 hrs, Volume= 2,499 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 185.94' @ 12.02 hrs
Flood Elev= 190.14'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (829.2 - 829.2)

Device	Routing	Invert	Outlet Devices
#1	Primary	185.65'	**12.0" x 9.0' long Culvert X 2.00** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 185.40' S= 0.0278 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=0.84 cfs @ 12.01 hrs HW=185.93' (Free Discharge)
1=Culvert (Inlet Controls 0.84 cfs @ 2.3 fps)

Pond 20P: (2) CB



Pond 26P: MH

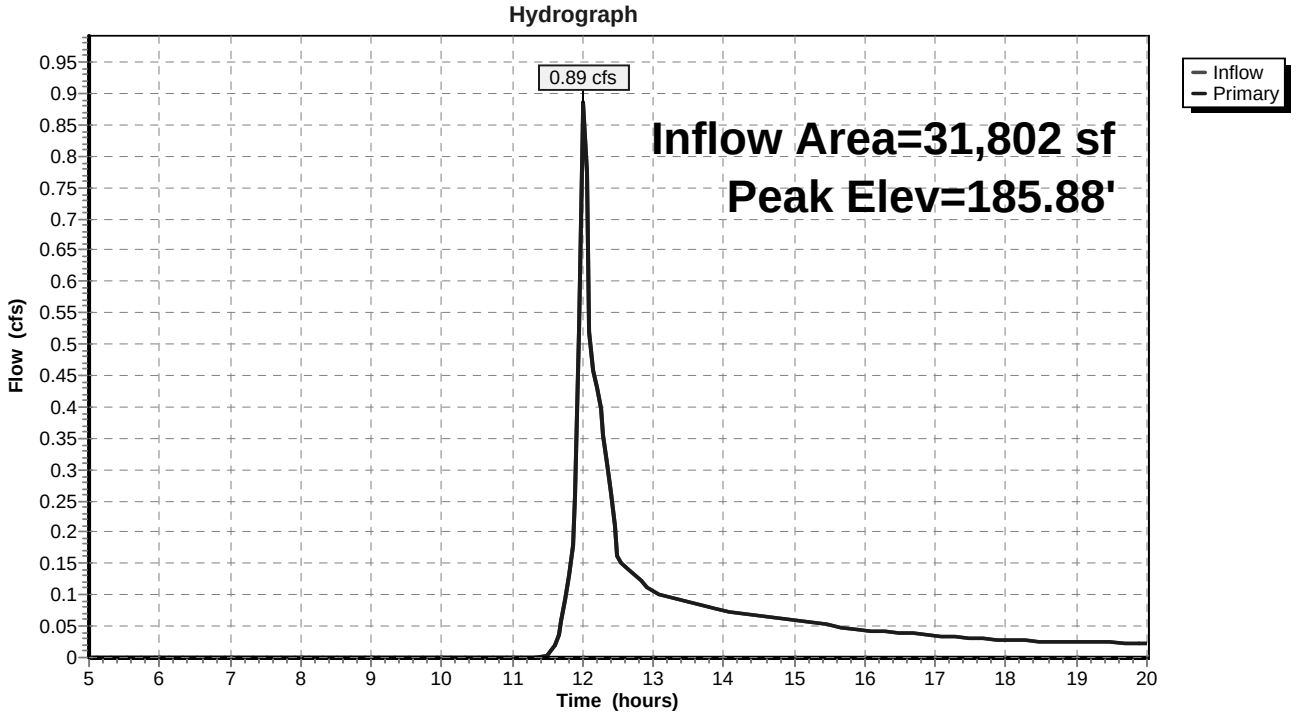
Inflow Area = 31,802 sf, Inflow Depth > 0.94" for 10YR event
Inflow = 0.89 cfs @ 12.01 hrs, Volume= 2,499 cf
Outflow = 0.89 cfs @ 12.01 hrs, Volume= 2,499 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.89 cfs @ 12.01 hrs, Volume= 2,499 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 185.88' @ 12.01 hrs
Flood Elev= 190.08'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Primary	185.40'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.84 cfs @ 12.01 hrs HW=185.87' (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.84 cfs @ 2.3 fps)

Pond 26P: MH



Pond 27P: CB

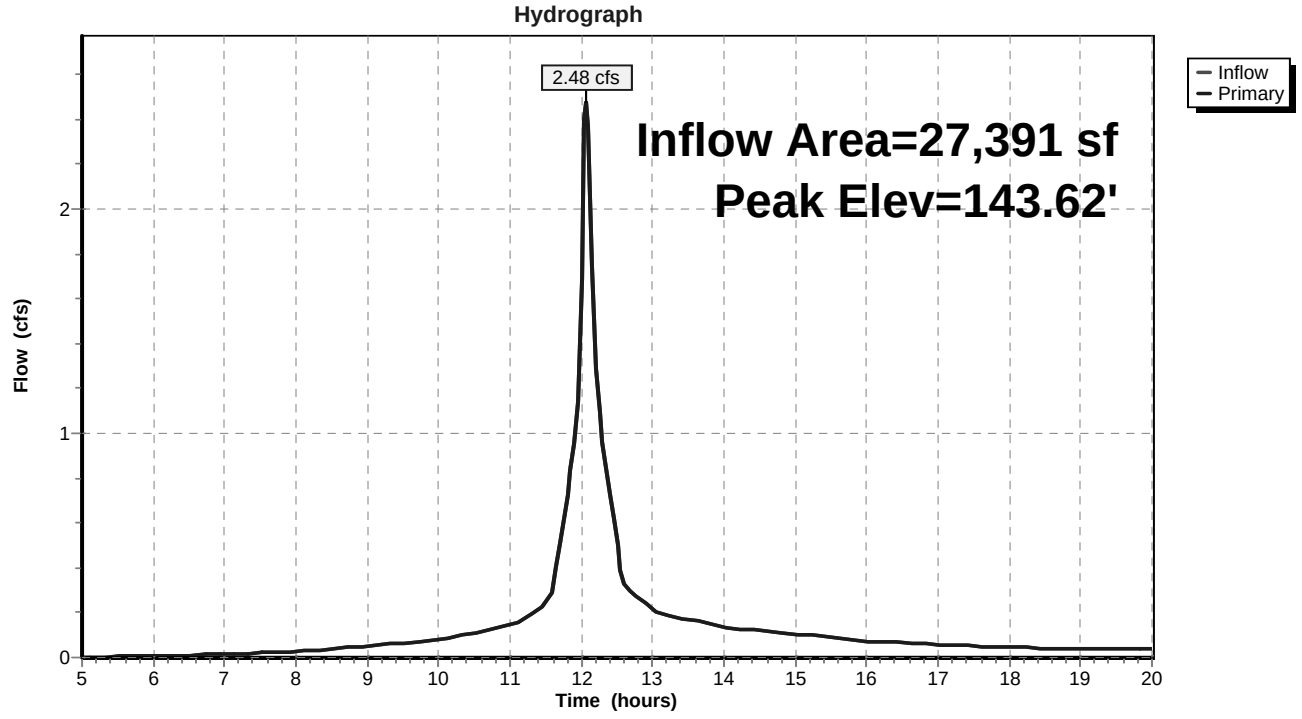
Inflow Area = 27,391 sf, Inflow Depth > 3.25" for 10YR event
Inflow = 2.48 cfs @ 12.07 hrs, Volume= 7,425 cf
Outflow = 2.48 cfs @ 12.07 hrs, Volume= 7,425 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.48 cfs @ 12.07 hrs, Volume= 7,425 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 143.62' @ 12.07 hrs
Flood Elev= 146.98'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (762.7 - 762.7)

Device	Routing	Invert	Outlet Devices
#1	Primary	142.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=2.39 cfs @ 12.07 hrs HW=143.59' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 2.39 cfs @ 3.2 fps)

Pond 27P: CB



Pond 29P: CB

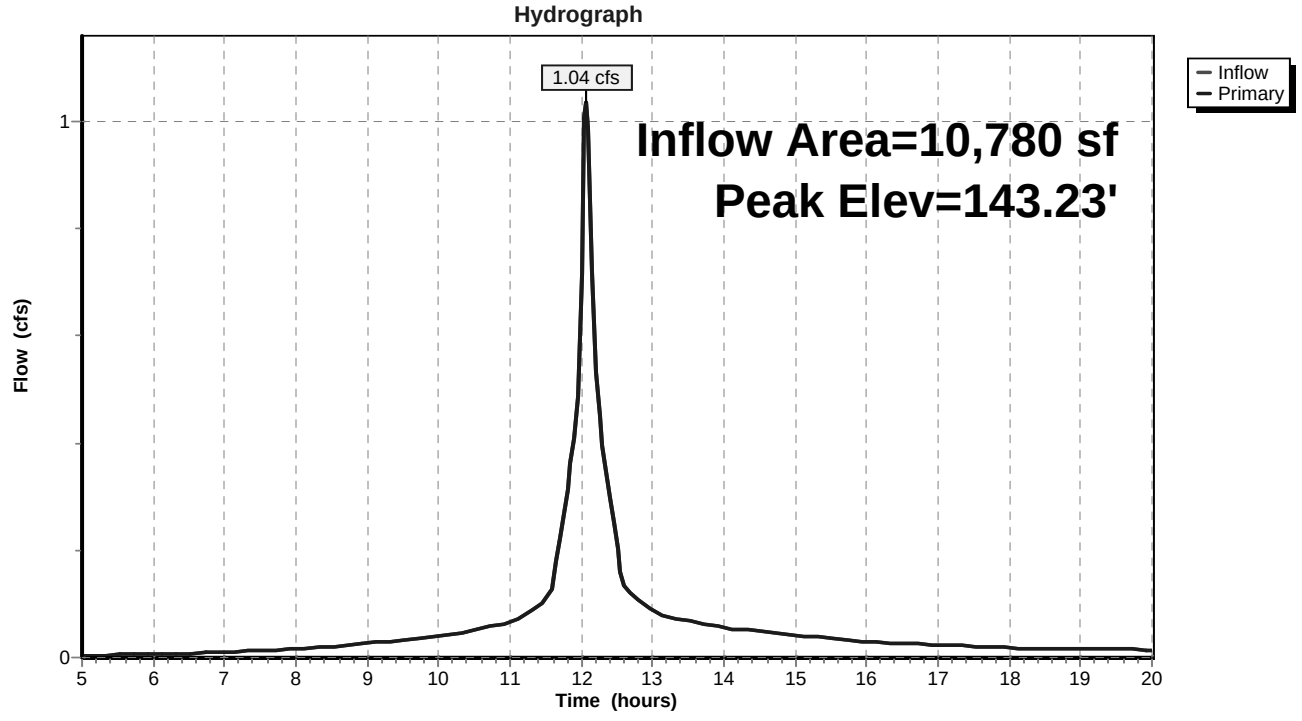
Inflow Area = 10,780 sf, Inflow Depth > 3.55" for 10YR event
Inflow = 1.04 cfs @ 12.07 hrs, Volume= 3,189 cf
Outflow = 1.04 cfs @ 12.07 hrs, Volume= 3,189 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.04 cfs @ 12.07 hrs, Volume= 3,189 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 143.23' @ 12.07 hrs
Flood Elev= 145.60'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (752.7 - 752.7)

Device	Routing	Invert	Outlet Devices
#1	Primary	142.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.00 cfs @ 12.07 hrs HW=143.22' (Free Discharge)
1=Orifice/Grate (Orifice Controls 1.00 cfs @ 2.4 fps)

Pond 29P: CB



Pond 30P: MH

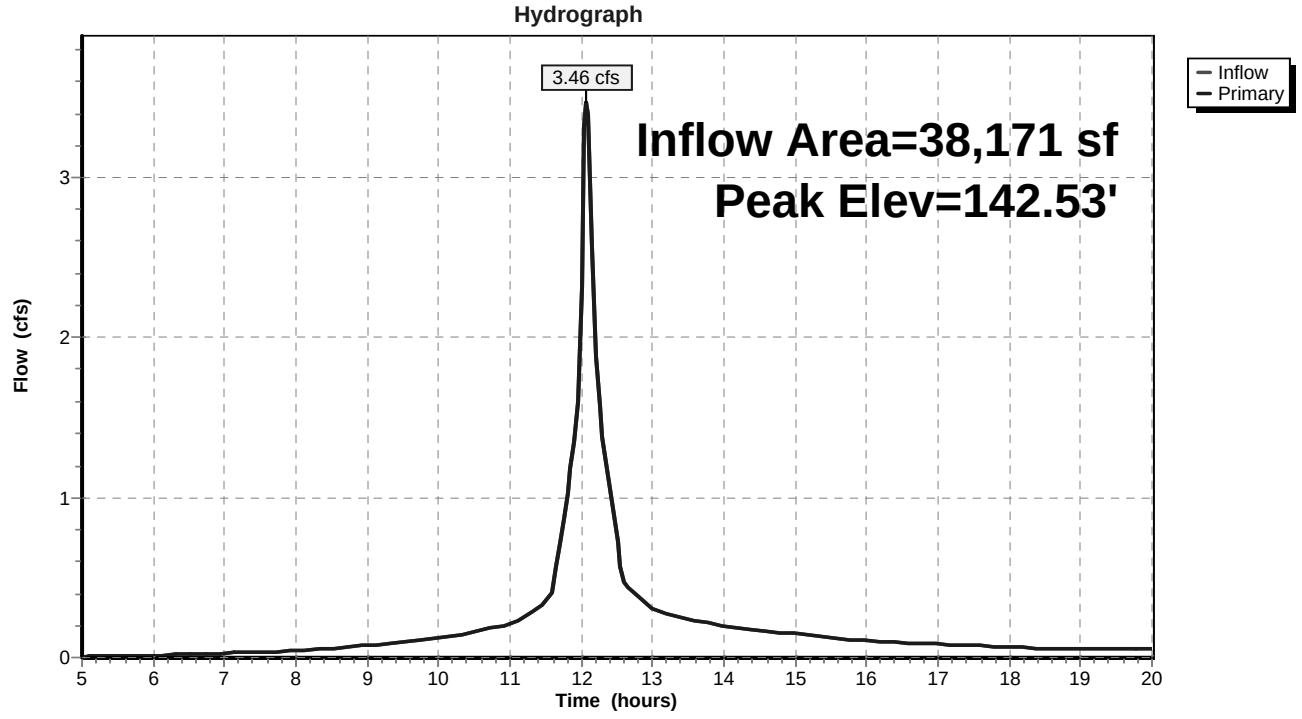
Inflow Area = 38,171 sf, Inflow Depth > 3.34" for 10YR event
Inflow = 3.46 cfs @ 12.08 hrs, Volume= 10,612 cf
Outflow = 3.46 cfs @ 12.08 hrs, Volume= 10,612 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.46 cfs @ 12.08 hrs, Volume= 10,612 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 142.53' @ 12.08 hrs
Flood Elev= 145.60'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (760.1 - 760.1)

Device	Routing	Invert	Outlet Devices
#1	Primary	141.20'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=3.35 cfs @ 12.08 hrs HW=142.49' (Free Discharge)
1=Orifice/Grate (Orifice Controls 3.35 cfs @ 4.3 fps)

Pond 30P: MH



Pond 31P: CB

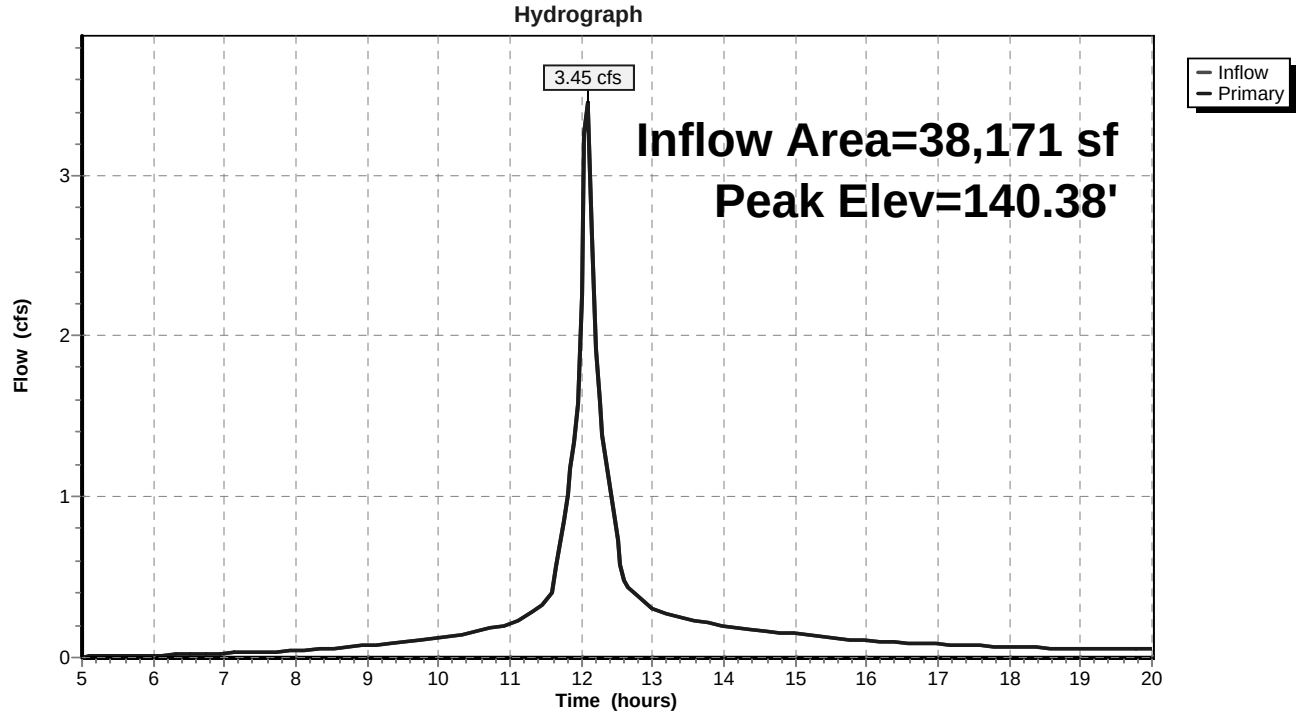
Inflow Area = 38,171 sf, Inflow Depth > 3.34" for 10YR event
Inflow = 3.45 cfs @ 12.08 hrs, Volume= 10,610 cf
Outflow = 3.45 cfs @ 12.08 hrs, Volume= 10,610 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.45 cfs @ 12.08 hrs, Volume= 10,610 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 140.38' @ 12.08 hrs
Flood Elev= 142.00'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (760.3 - 760.3)

Device	Routing	Invert	Outlet Devices
#1	Primary	139.05'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=3.35 cfs @ 12.08 hrs HW=140.33' (Free Discharge)
1=Orifice/Grate (Orifice Controls 3.35 cfs @ 4.3 fps)

Pond 31P: CB

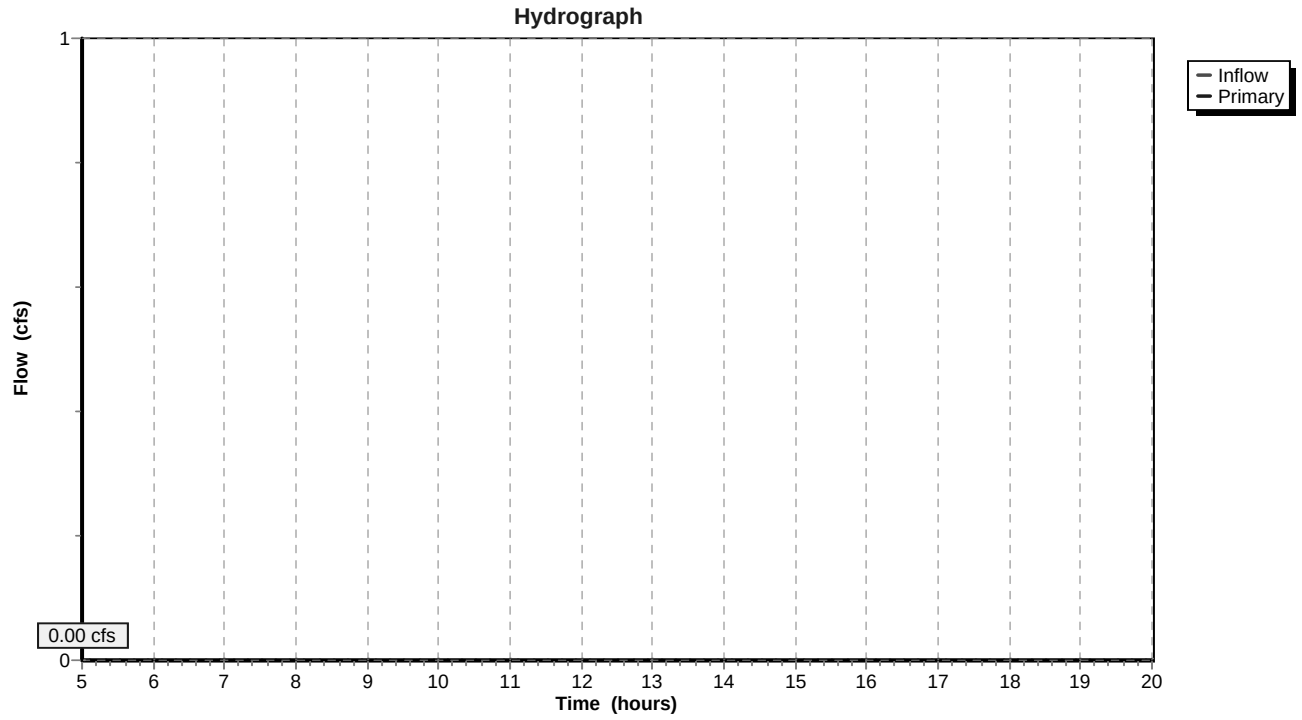


Link 10L: FLARED END

Inflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Primary	=	0.00 cfs @	5.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

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

Link 10L: FLARED END

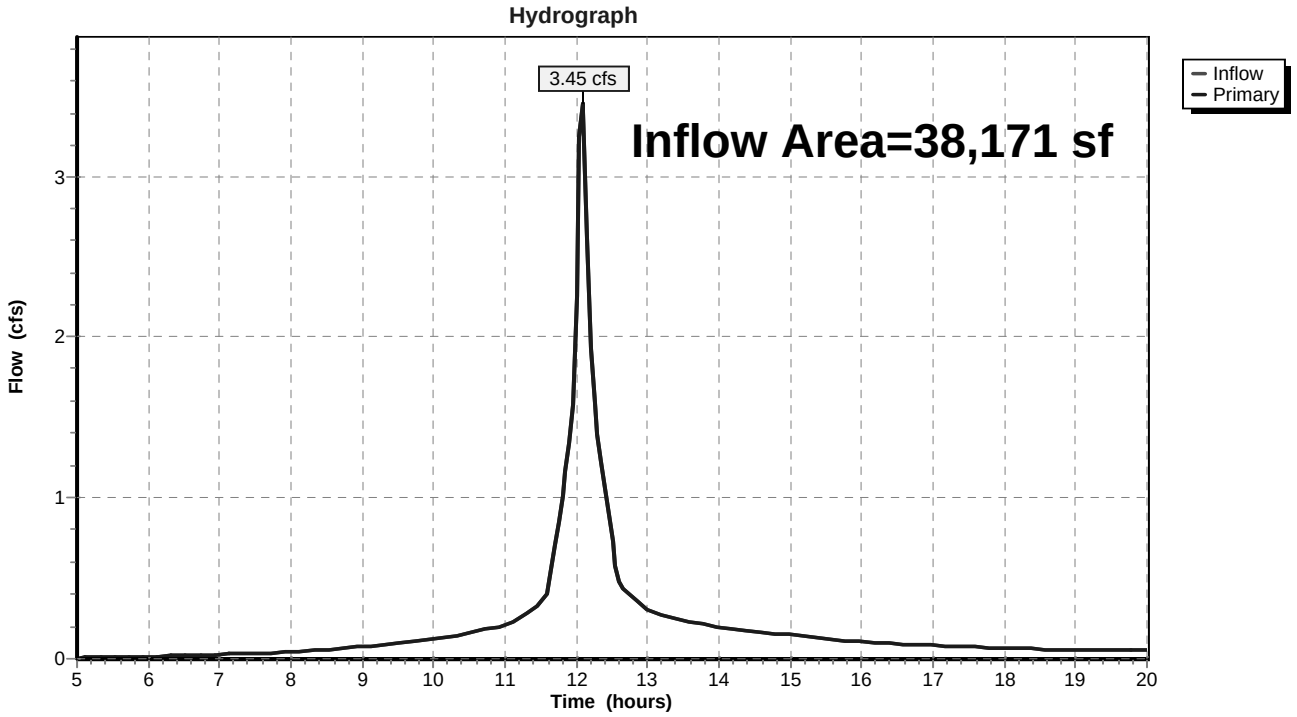


Link 34L: River

Inflow Area = 38,171 sf, Inflow Depth > 3.34" for 10YR event
Inflow = 3.45 cfs @ 12.08 hrs, Volume= 10,610 cf
Primary = 3.45 cfs @ 12.08 hrs, Volume= 10,610 cf, Atten= 0%, Lag= 0.0 min

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

Link 34L: River



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 16S: WEST SIDE ROADWAY AREA Runoff Area=36,499 sf Runoff Depth>1.97"
Tc=0.0 min CN=59 Runoff=2.32 cfs 5,991 cf

Subcatchment 21S: WEST SIDE CUL-DE-SAC AREA Runoff Area=31,802 sf Runoff Depth>2.06"
Tc=0.0 min CN=60 Runoff=2.12 cfs 5,448 cf

Subcatchment 23S: ACTON AND WEST SIDE LOTS Runoff Area=84,935 sf Runoff Depth>0.62"
Tc=0.0 min CN=41 Runoff=0.94 cfs 4,418 cf

Subcatchment 25S: SUDBURY ROAD (EAST SIDE) Runoff Area=27,391 sf Runoff Depth>5.02"
Flow Length=1,086' Tc=5.0 min CN=90 Runoff=3.74 cfs 11,465 cf

Subcatchment 35S: SUDBURY ROAD (WEST SIDE) Runoff Area=10,780 sf Runoff Depth>5.33"
Flow Length=1,086' Tc=5.0 min CN=93 Runoff=1.53 cfs 4,790 cf

Reach 4R: 12" CPP Peak Depth=1.00' Max Vel=3.5 fps Inflow=3.17 cfs 11,359 cf
D=12.0" n=0.020 L=27.0' S=0.0111 '/' Capacity=2.44 cfs Outflow=2.44 cfs 11,357 cf

Reach 5R: 12" CPP Peak Depth=0.12' Max Vel=2.3 fps Inflow=0.12 cfs 67 cf
D=12.0" n=0.020 L=16.0' S=0.0313 '/' Capacity=4.09 cfs Outflow=0.12 cfs 67 cf

Reach 8R: 12" CPP Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0 cf
D=12.0" n=0.020 L=30.0' S=0.0033 '/' Capacity=1.34 cfs Outflow=0.00 cfs 0 cf

Reach 9R: 12" CPP Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0 cf
D=12.0" n=0.020 L=48.0' S=0.0115 '/' Capacity=2.48 cfs Outflow=0.00 cfs 0 cf

Reach 14R: 12" CPP Peak Depth=1.00' Max Vel=4.7 fps Inflow=4.31 cfs 11,435 cf
D=12.0" n=0.020 L=135.0' S=0.0200 '/' Capacity=3.28 cfs Outflow=3.29 cfs 11,426 cf

Reach 18R: 12" RCP Peak Depth=0.40' Max Vel=7.1 fps Inflow=2.09 cfs 5,447 cf
D=12.0" n=0.011 L=145.0' S=0.0221 '/' Capacity=6.26 cfs Outflow=2.00 cfs 5,444 cf

Reach 19R: 12" RCP Peak Depth=0.35' Max Vel=8.7 fps Inflow=2.12 cfs 5,448 cf
D=12.0" n=0.011 L=62.0' S=0.0371 '/' Capacity=8.11 cfs Outflow=2.09 cfs 5,447 cf

Reach 28R: 12" RCP Peak Depth=0.63' Max Vel=7.1 fps Inflow=3.74 cfs 11,465 cf
D=12.0" n=0.011 L=94.0' S=0.0149 '/' Capacity=5.14 cfs Outflow=3.68 cfs 11,461 cf

Reach 32R: 12" RCP Peak Depth=0.59' Max Vel=10.6 fps Inflow=5.19 cfs 16,251 cf
D=12.0" n=0.011 L=62.0' S=0.0347 '/' Capacity=7.84 cfs Outflow=5.17 cfs 16,249 cf

Reach 33R: 12" RCP Peak Depth=0.30' Max Vel=25.8 fps Inflow=5.17 cfs 16,249 cf
D=12.0" n=0.011 L=13.0' S=0.3885 '/' Capacity=26.24 cfs Outflow=5.17 cfs 16,248 cf

Pond 1P: WestSide D-Pond Peak Elev=178.75' Storage=1,987 cf Inflow=2.44 cfs 11,357 cf
Outflow=3.40 cfs 9,440 cf

Pond 3P: MH Peak Elev=177.20' Inflow=3.29 cfs 11,426 cf
Primary=3.17 cfs 11,359 cf Secondary=0.12 cfs 67 cf Outflow=3.29 cfs 11,426 cf

Pond 6P: LB1 Peak Elev=167.54' Storage=0.000 af Inflow=0.12 cfs 67 cf
Discarded=0.12 cfs 68 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.12 cfs 68 cf

Pond 7P: LB2 Peak Elev=167.00' Storage=0.000 af Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Pond 12P: LB3 Peak Elev=177.29' Storage=1,089 cf Inflow=4.40 cfs 13,859 cf
Discarded=0.42 cfs 9,571 cf Primary=4.02 cfs 4,292 cf Outflow=4.44 cfs 13,863 cf

Pond 13P: MH Peak Elev=181.48' Inflow=4.31 cfs 11,435 cf
Outflow=4.31 cfs 11,435 cf

Pond 15P: (2) CB Peak Elev=180.69' Inflow=2.32 cfs 5,991 cf
12.0" x 10.0' Culvert Outflow=2.32 cfs 5,991 cf

Pond 17P: MH Peak Elev=183.81' Inflow=2.09 cfs 5,447 cf
Outflow=2.09 cfs 5,447 cf

Pond 20P: (2) CB Peak Elev=186.14' Inflow=2.12 cfs 5,448 cf
12.0" x 9.0' Culvert Outflow=2.12 cfs 5,448 cf

Pond 26P: MH Peak Elev=186.22' Inflow=2.12 cfs 5,448 cf
Outflow=2.12 cfs 5,448 cf

Pond 27P: CB Peak Elev=144.17' Inflow=3.74 cfs 11,465 cf
Outflow=3.74 cfs 11,465 cf

Pond 29P: CB Peak Elev=143.36' Inflow=1.53 cfs 4,790 cf
Outflow=1.53 cfs 4,790 cf

Pond 30P: MH Peak Elev=143.57' Inflow=5.19 cfs 16,251 cf
Outflow=5.19 cfs 16,251 cf

Pond 31P: CB Peak Elev=141.41' Inflow=5.17 cfs 16,249 cf
Outflow=5.17 cfs 16,249 cf

Link 10L: FLARED END Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 34L: River Inflow=5.17 cfs 16,248 cf
Primary=5.17 cfs 16,248 cf

Total Runoff Area = 191,407 sf Runoff Volume = 32,113 cf Average Runoff Depth = 2.01"

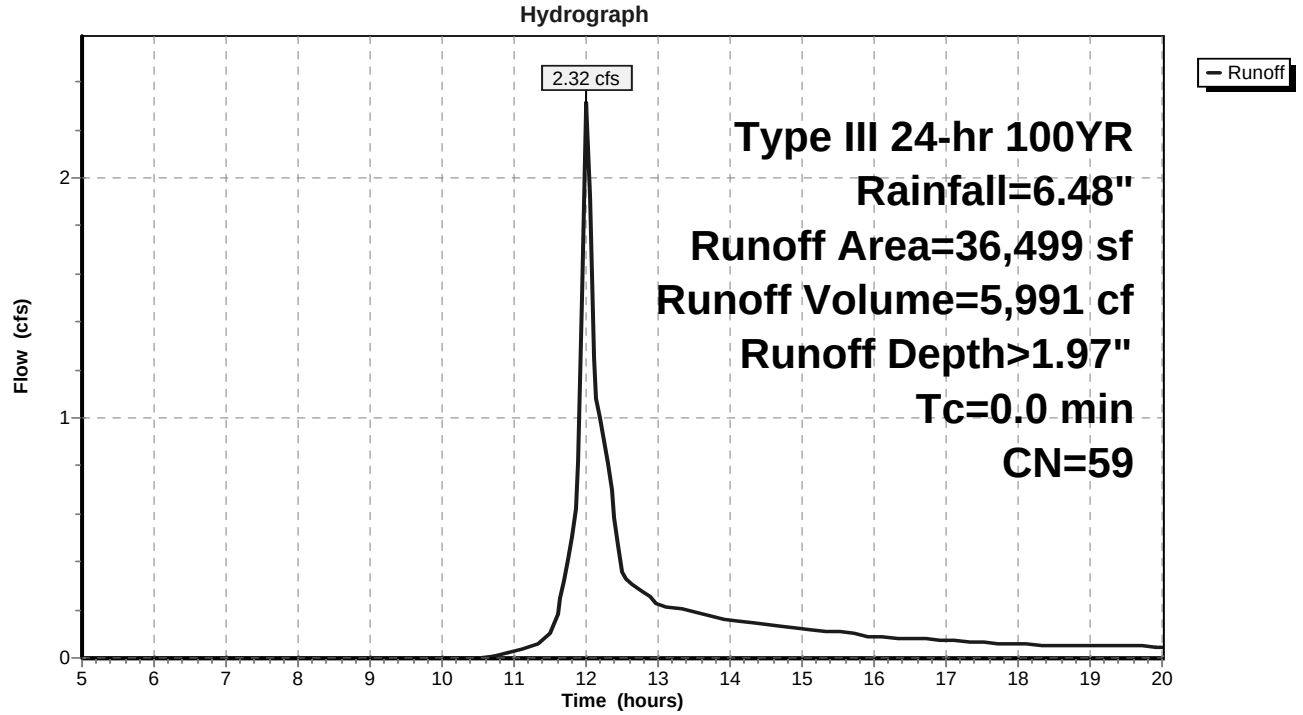
Subcatchment 16S: WEST SIDE ROADWAY AREA

Runoff = 2.32 cfs @ 12.01 hrs, Volume= 5,991 cf, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.48"

Area (sf)	CN	Description
12,279	98	Paved parking & roofs
20,007	39	>75% Grass cover, Good, HSG A
4,213	39	OFFSITE GRASS
36,499	59	Weighted Average

Subcatchment 16S: WEST SIDE ROADWAY AREA



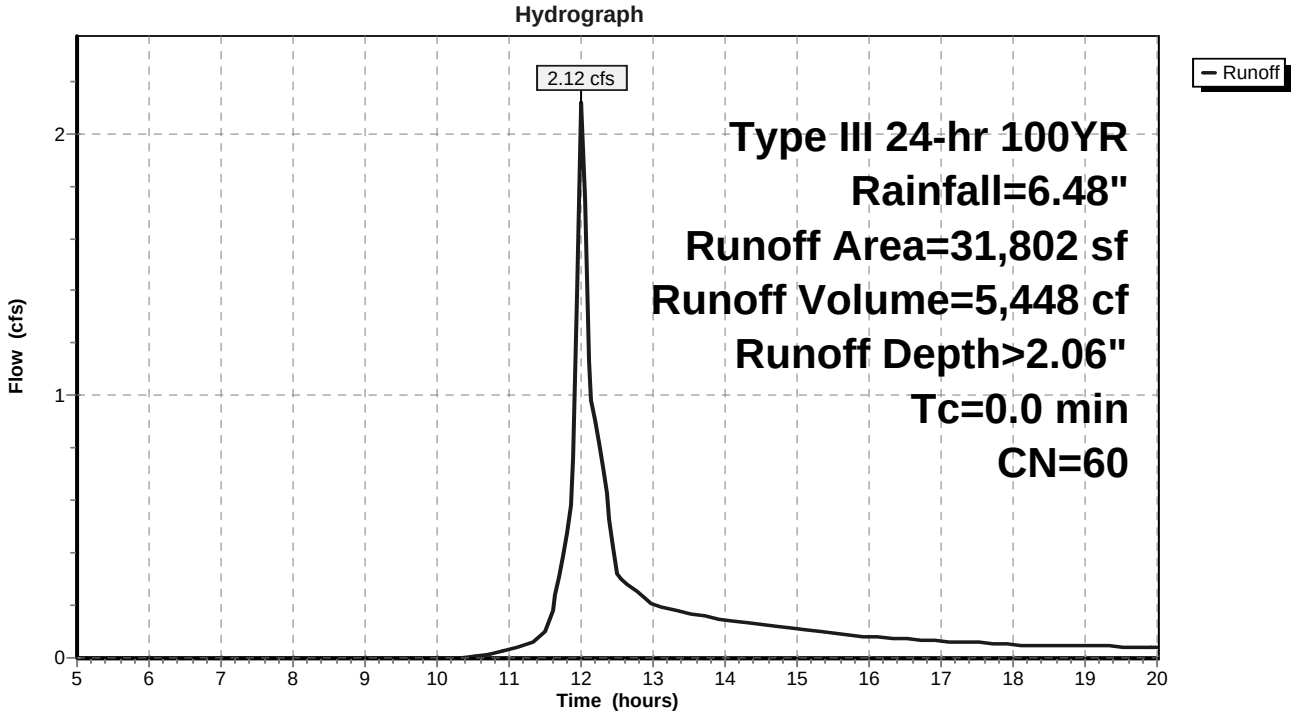
Subcatchment 21S: WEST SIDE CUL-DE-SAC AREA

Runoff = 2.12 cfs @ 12.01 hrs, Volume= 5,448 cf, Depth> 2.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.48"

Area (sf)	CN	Description
11,344	98	Paved parking & roofs
17,104	39	>75% Grass cover, Good, HSG A
3,354	39	OFFSITE GRASS
31,802	60	Weighted Average

Subcatchment 21S: WEST SIDE CUL-DE-SAC AREA



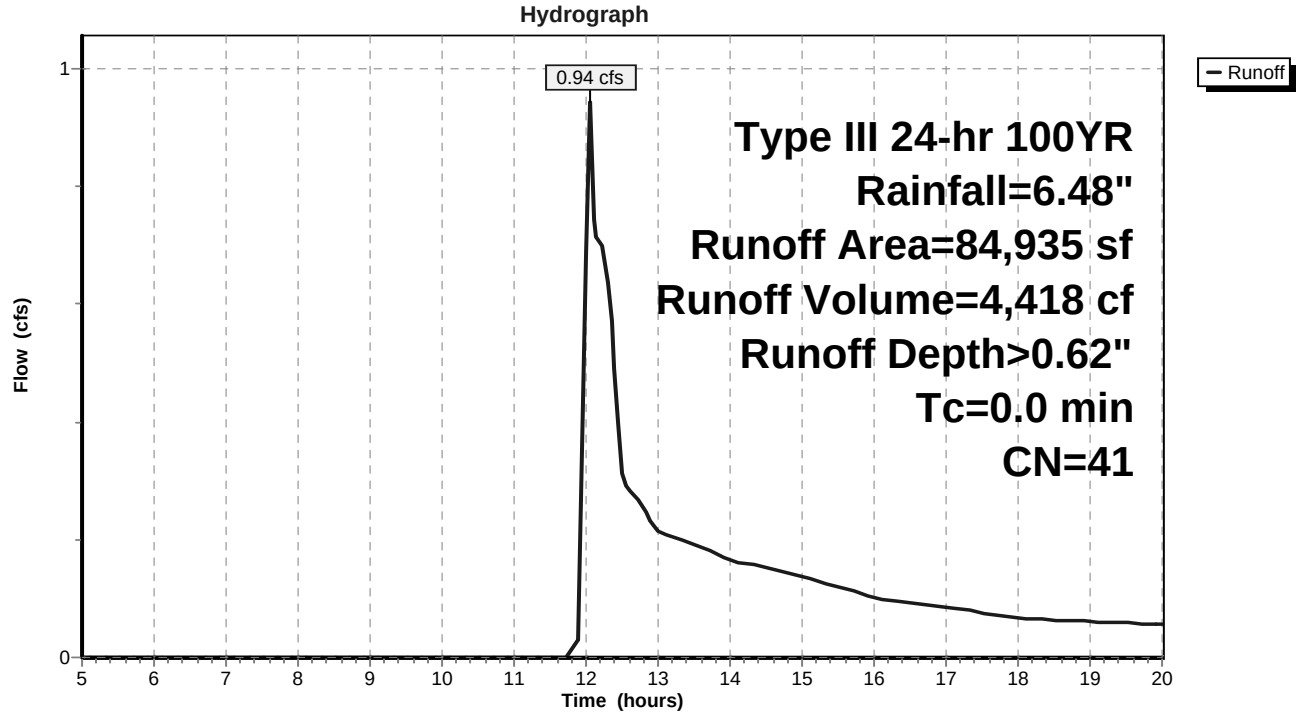
Subcatchment 23S: ACTON AND WEST SIDE LOTS

Runoff = 0.94 cfs @ 12.05 hrs, Volume= 4,418 cf, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.48"

Area (sf)	CN	Description
9,619	98	Paved parking & roofs
42,441	30	Woods, Good, HSG A
19,562	39	>75% Grass cover, Good, HSG A
13,313	39	OFFSITE GRASS
84,935	41	Weighted Average

Subcatchment 23S: ACTON AND WEST SIDE LOTS



Subcatchment 25S: SUDBURY ROAD (EAST SIDE)

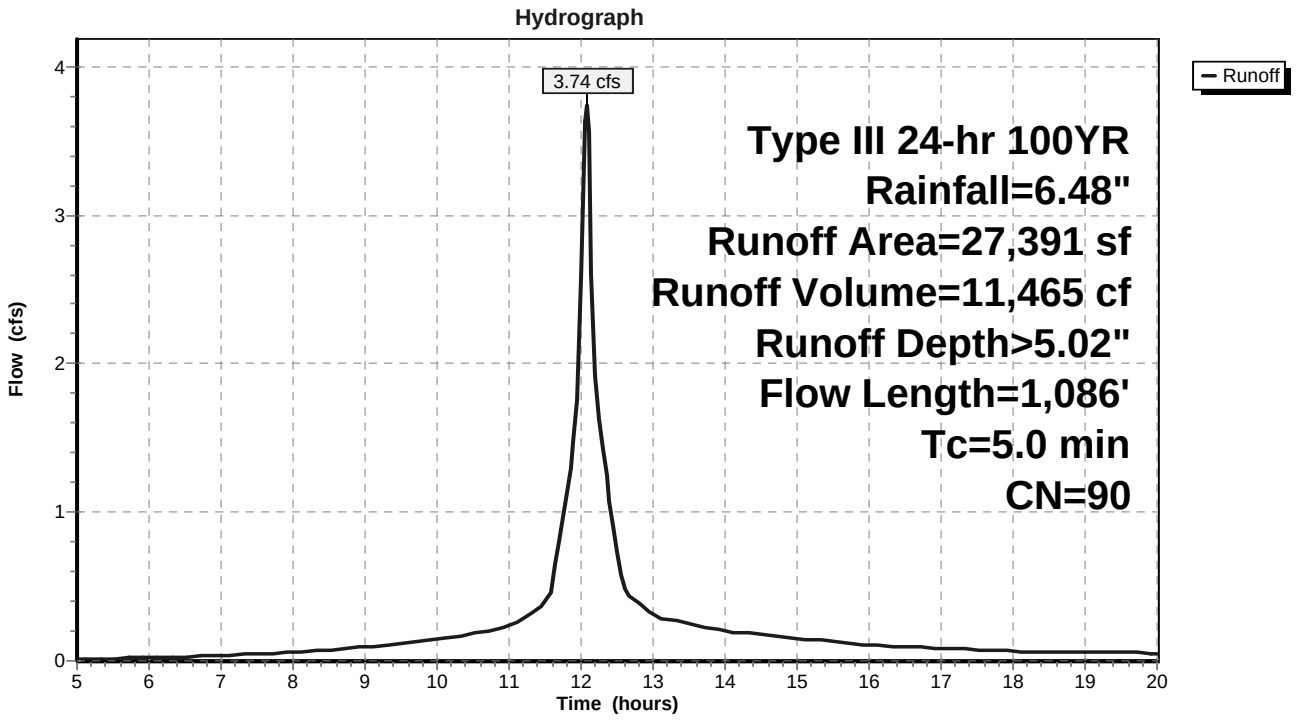
Runoff = 3.74 cfs @ 12.07 hrs, Volume= 11,465 cf, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.48"

Area (sf)	CN	Description
21,856	98	Paved roads w/curbs & sewers
5,535	57	Woods/grass comb., Poor, HSG A
27,391	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	1,036	0.0800	5.7		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	50	0.0800	2.0		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.09"
3.4	1,086	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 25S: SUDBURY ROAD (EAST SIDE)



Subcatchment 35S: SUDBURY ROAD (WEST SIDE)

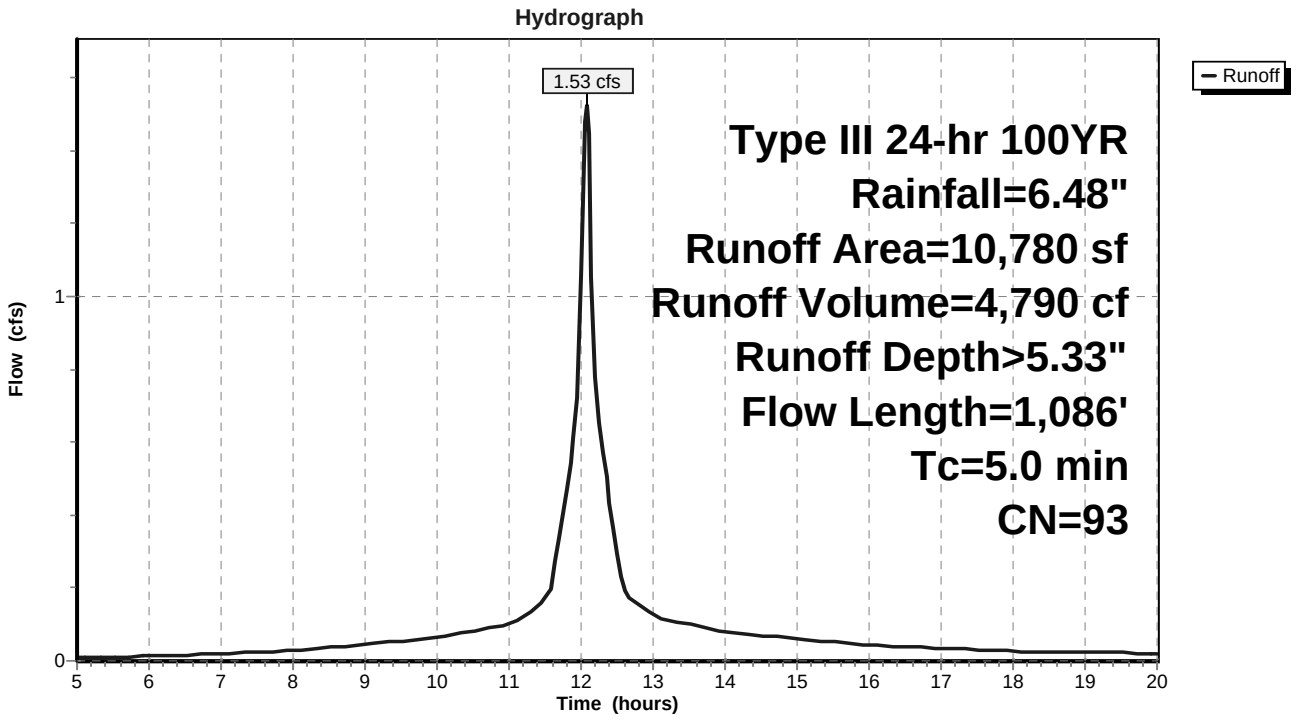
Runoff = 1.53 cfs @ 12.07 hrs, Volume= 4,790 cf, Depth> 5.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.48"

Area (sf)	CN	Description
9,014	98	Paved roads w/curbs & sewers
1,766	68	<50% Grass cover, Poor, HSG A
10,780	93	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	1,036	0.0800	5.7		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	50	0.0800	2.0		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.09"
3.4	1,086	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 35S: SUDBURY ROAD (WEST SIDE)



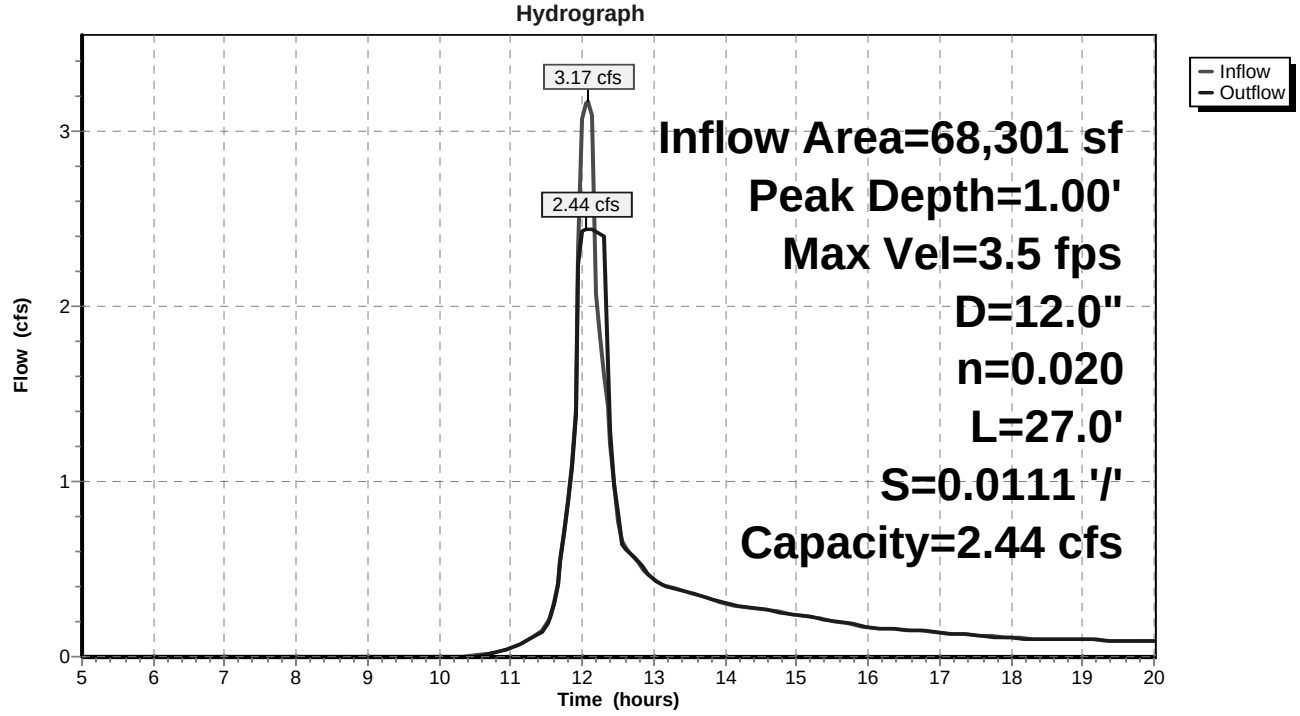
Reach 4R: 12" CPP

Inflow Area = 68,301 sf, Inflow Depth > 2.00" for 100YR event
Inflow = 3.17 cfs @ 12.08 hrs, Volume= 11,359 cf
Outflow = 2.44 cfs @ 12.05 hrs, Volume= 11,357 cf, Atten= 23%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.5 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 0.2 min

Peak Depth= 1.00' @ 12.00 hrs
Capacity at bank full= 2.44 cfs
Inlet Invert= 176.00', Outlet Invert= 175.70'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 27.0' Slope= 0.0111 '/'

Reach 4R: 12" CPP



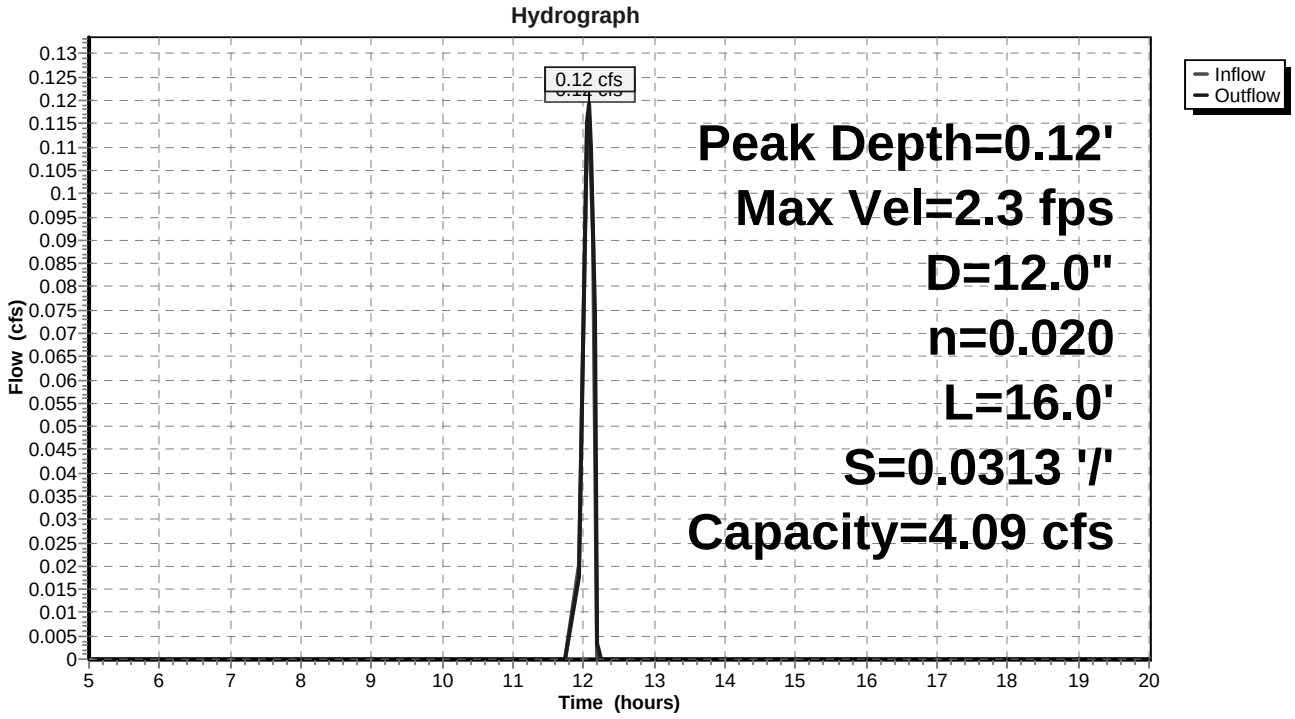
Reach 5R: 12" CPP

Inflow = 0.12 cfs @ 12.08 hrs, Volume= 67 cf
Outflow = 0.12 cfs @ 12.07 hrs, Volume= 67 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.3 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.8 fps, Avg. Travel Time= 0.1 min

Peak Depth= 0.12' @ 12.07 hrs
Capacity at bank full= 4.09 cfs
Inlet Invert= 176.00', Outlet Invert= 175.50'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 16.0' Slope= 0.0313 '/'

Reach 5R: 12" CPP



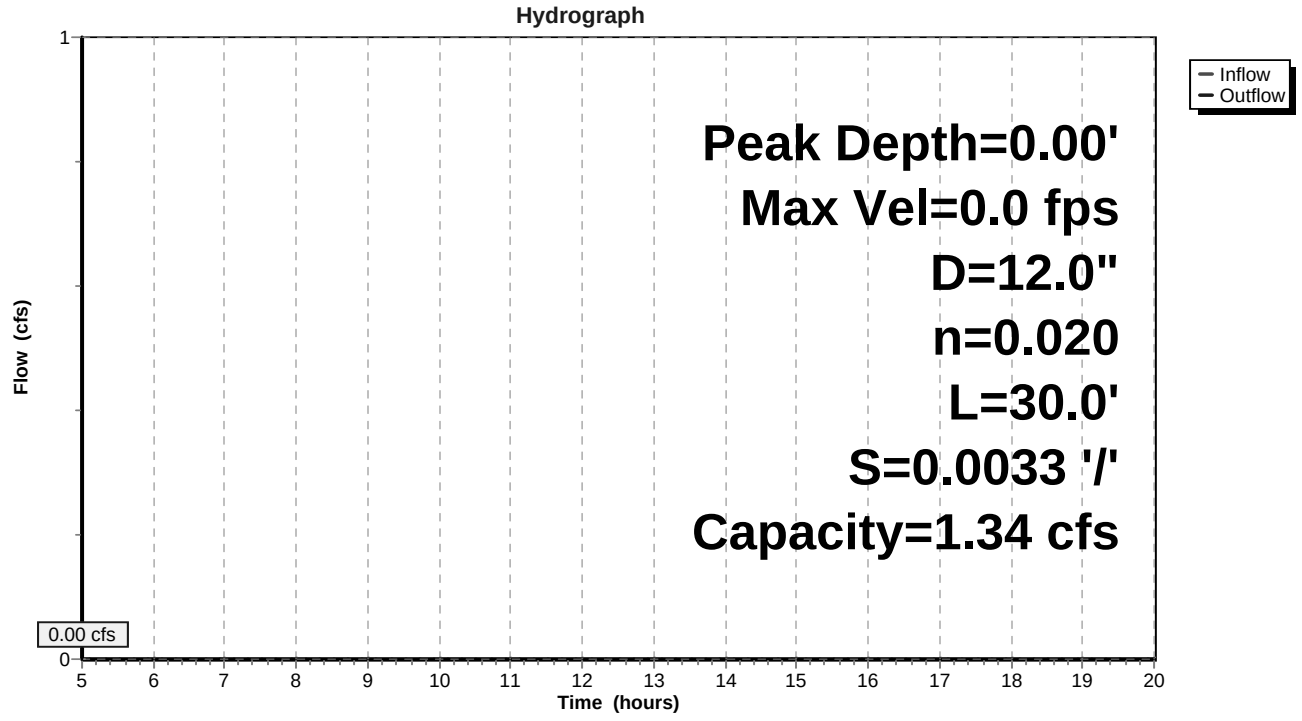
Reach 8R: 12" CPP

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

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

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 1.34 cfs
Inlet Invert= 175.20', Outlet Invert= 175.10'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 30.0' Slope= 0.0033 '/'

Reach 8R: 12" CPP



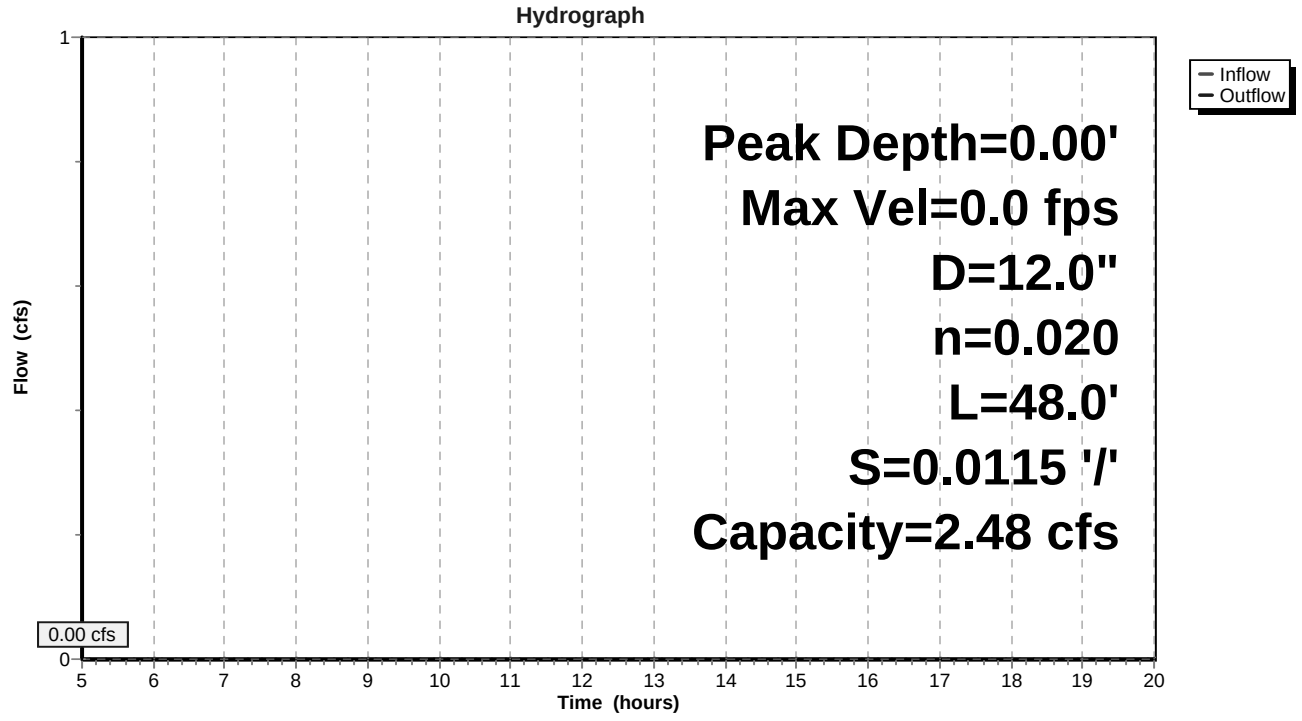
Reach 9R: 12" CPP

Inflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

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

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 2.48 cfs
Inlet Invert= 177.00', Outlet Invert= 176.45'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 48.0' Slope= 0.0115 '/'

Reach 9R: 12" CPP



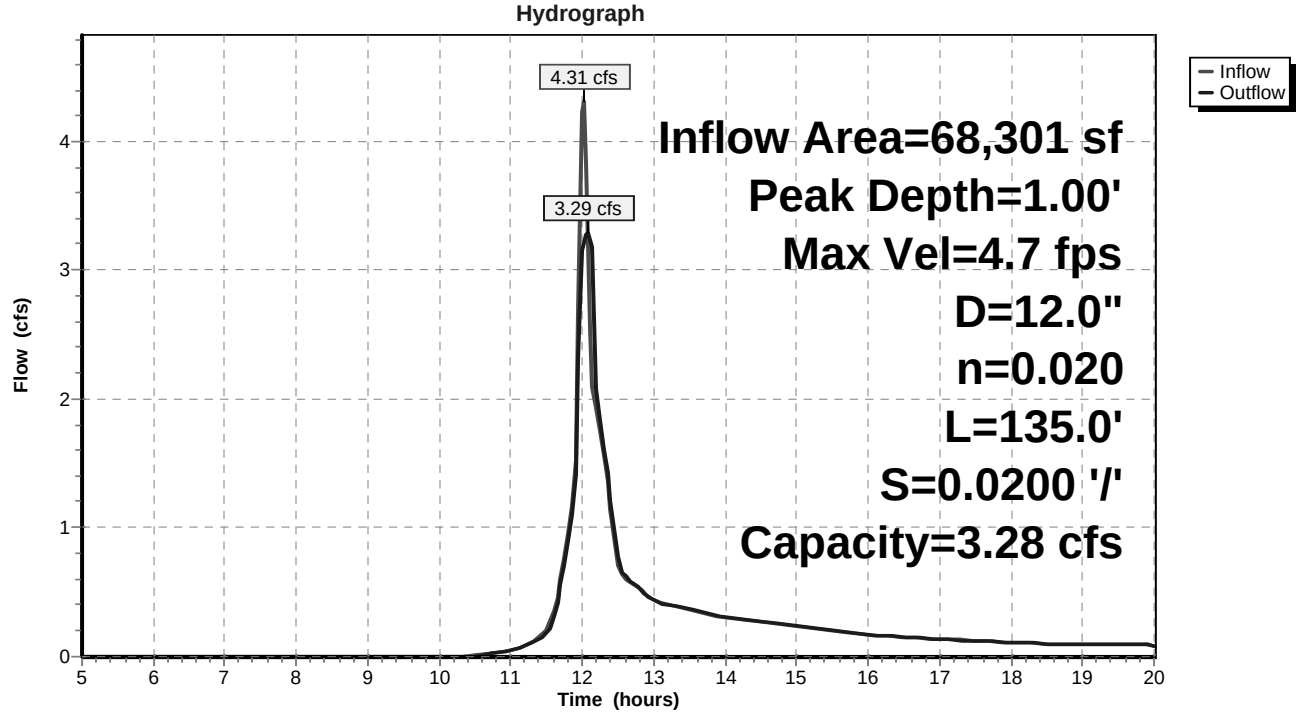
Reach 14R: 12" CPP

Inflow Area = 68,301 sf, Inflow Depth > 2.01" for 100YR event
Inflow = 4.31 cfs @ 12.01 hrs, Volume= 11,435 cf
Outflow = 3.29 cfs @ 12.08 hrs, Volume= 11,426 cf, Atten= 24%, Lag= 3.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.7 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 2.3 fps, Avg. Travel Time= 1.0 min

Peak Depth= 1.00' @ 12.00 hrs
Capacity at bank full= 3.28 cfs
Inlet Invert= 179.70', Outlet Invert= 177.00'
12.0" Diameter Pipe, n= 0.020 Corrugated PE, corrugated interior
Length= 135.0' Slope= 0.0200 '/'

Reach 14R: 12" CPP



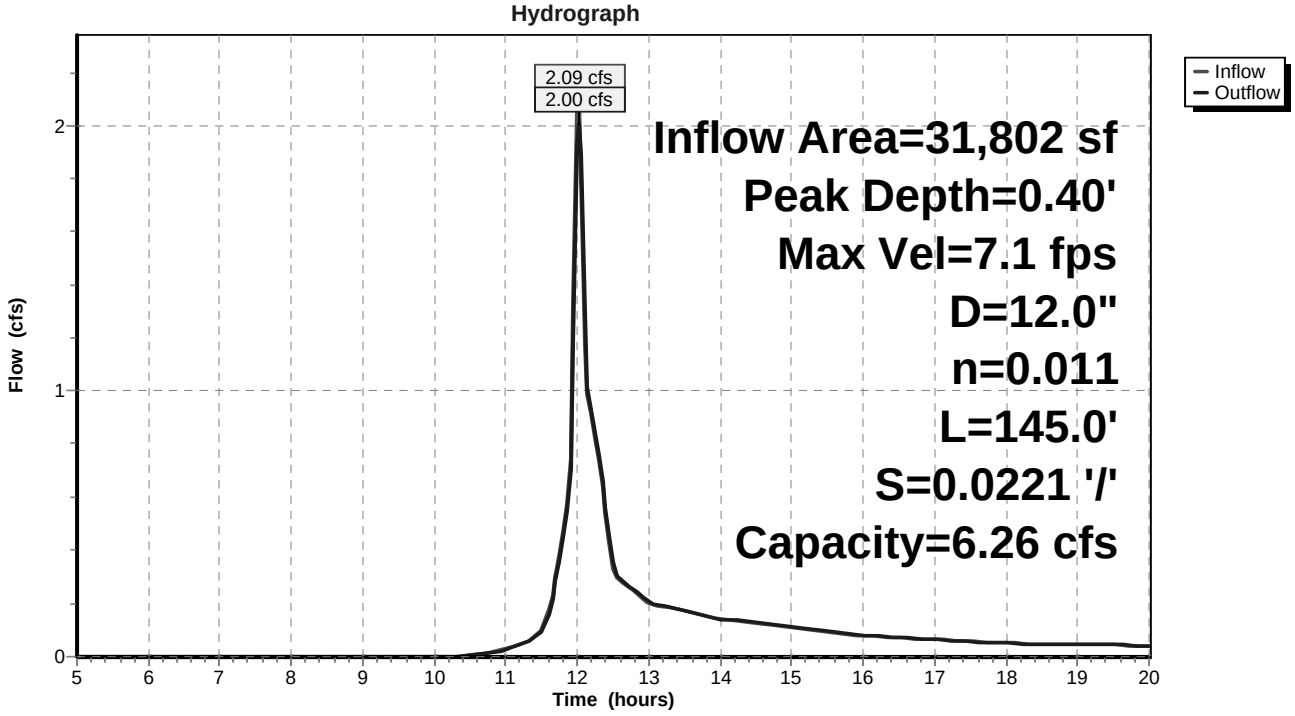
Reach 18R: 12" RCP

Inflow Area = 31,802 sf, Inflow Depth > 2.06" for 100YR event
Inflow = 2.09 cfs @ 12.01 hrs, Volume= 5,447 cf
Outflow = 2.00 cfs @ 12.02 hrs, Volume= 5,444 cf, Atten= 4%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.1 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.9 fps, Avg. Travel Time= 0.8 min

Peak Depth= 0.40' @ 12.02 hrs
Capacity at bank full= 6.26 cfs
Inlet Invert= 183.00', Outlet Invert= 179.80'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 145.0' Slope= 0.0221 '/'

Reach 18R: 12" RCP



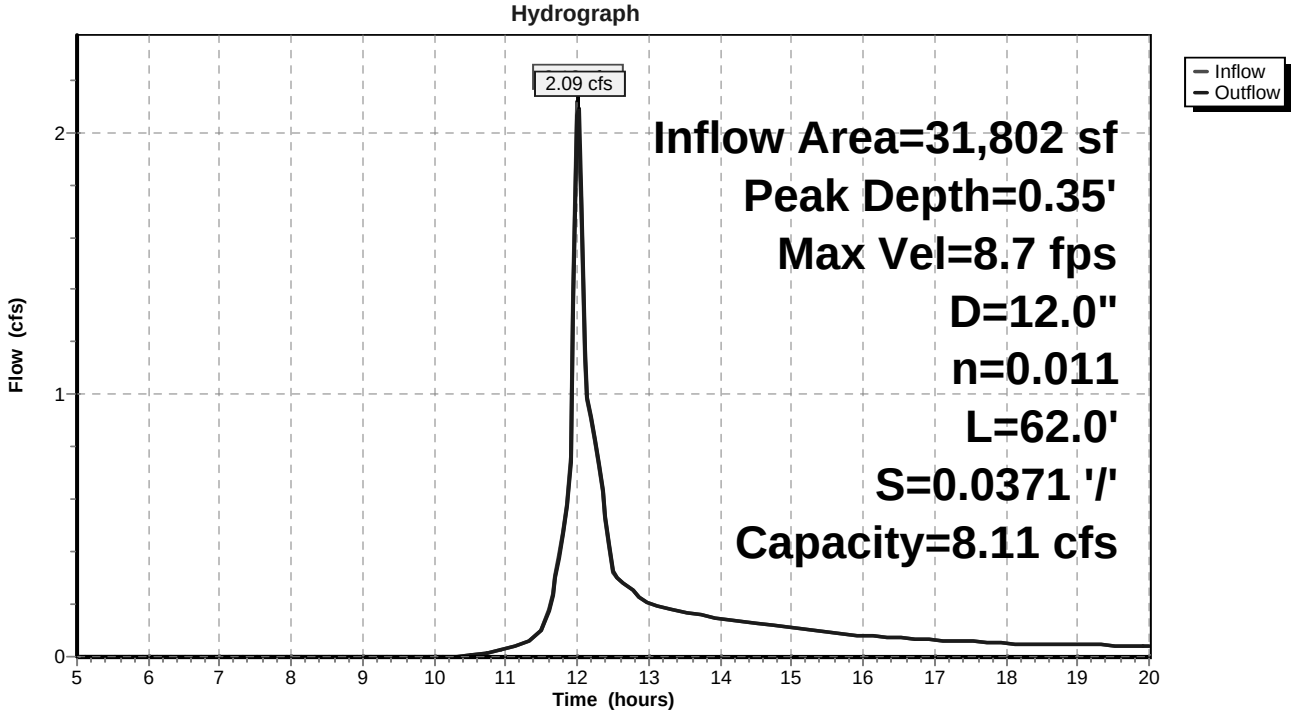
Reach 19R: 12" RCP

Inflow Area = 31,802 sf, Inflow Depth > 2.06" for 100YR event
Inflow = 2.12 cfs @ 12.01 hrs, Volume= 5,448 cf
Outflow = 2.09 cfs @ 12.01 hrs, Volume= 5,447 cf, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.7 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.5 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.35' @ 12.01 hrs
Capacity at bank full= 8.11 cfs
Inlet Invert= 185.40', Outlet Invert= 183.10'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 62.0' Slope= 0.0371 '/'

Reach 19R: 12" RCP



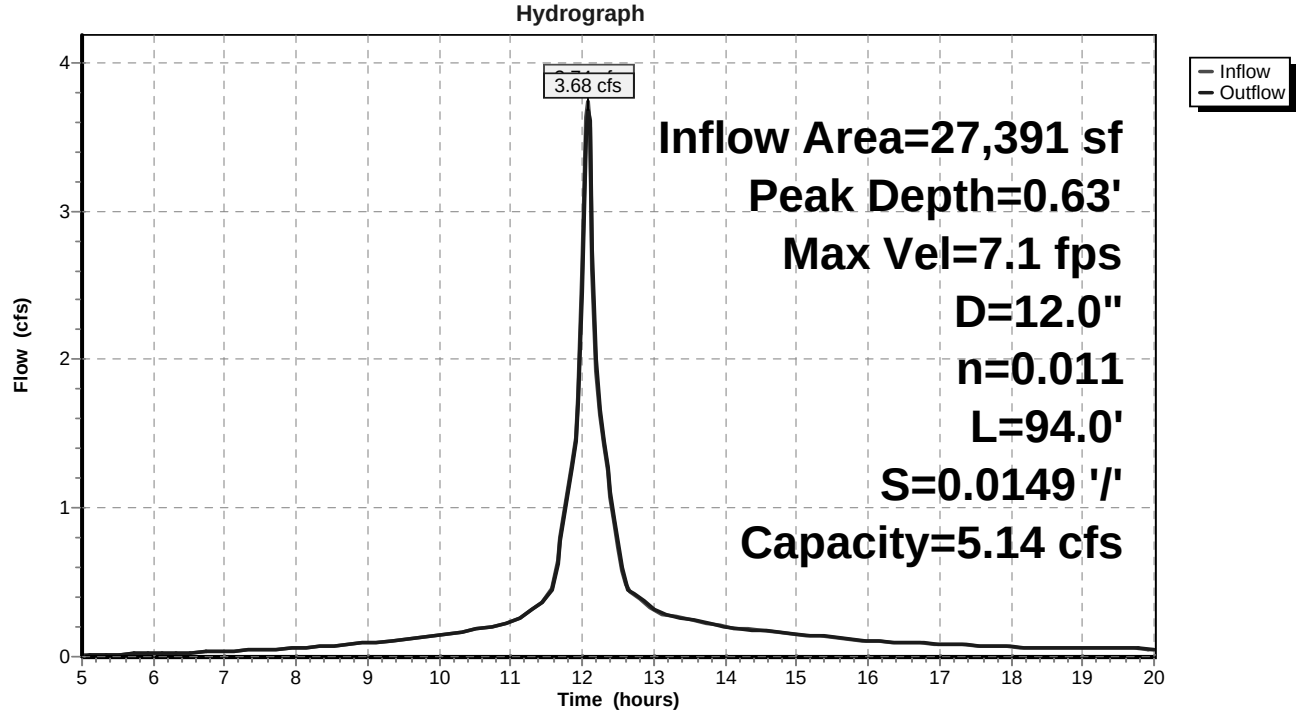
Reach 28R: 12" RCP

Inflow Area = 27,391 sf, Inflow Depth > 5.02" for 100YR event
Inflow = 3.74 cfs @ 12.07 hrs, Volume= 11,465 cf
Outflow = 3.68 cfs @ 12.08 hrs, Volume= 11,461 cf, Atten= 2%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.1 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.7 fps, Avg. Travel Time= 0.6 min

Peak Depth= 0.63' @ 12.08 hrs
Capacity at bank full= 5.14 cfs
Inlet Invert= 142.70', Outlet Invert= 141.30'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 94.0' Slope= 0.0149 '/'

Reach 28R: 12" RCP



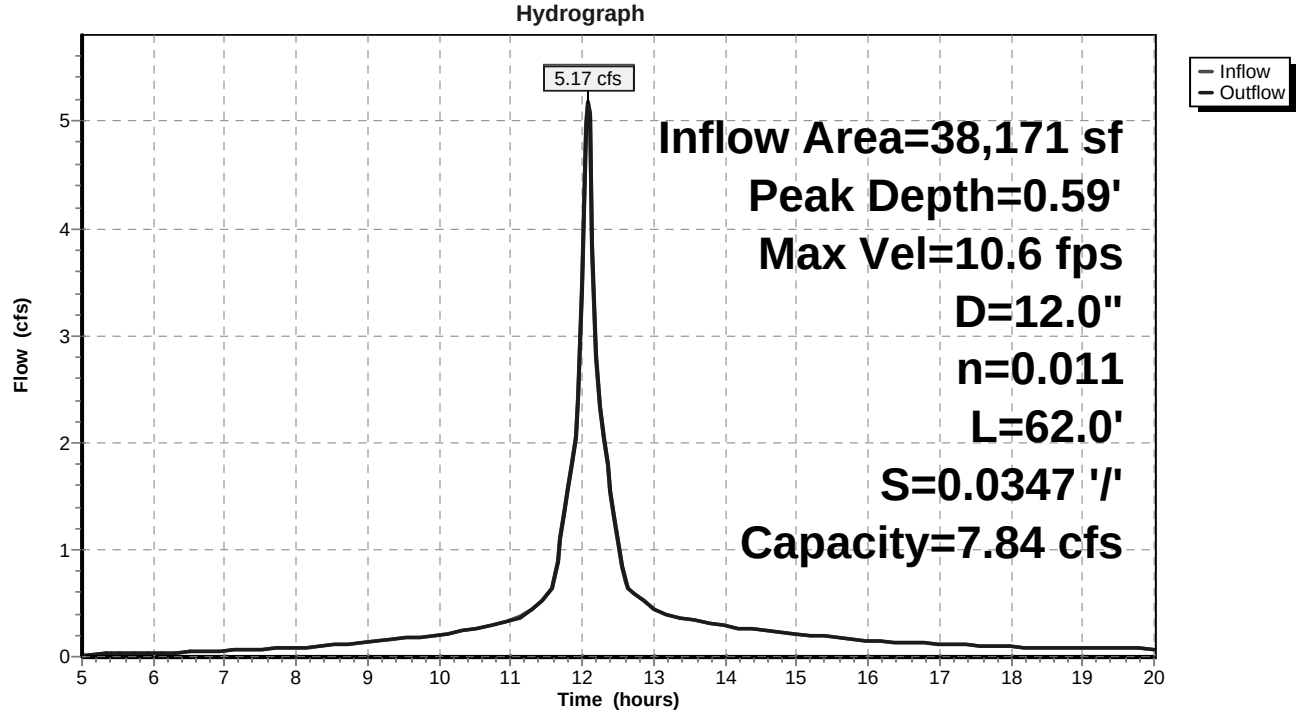
Reach 32R: 12" RCP

Inflow Area = 38,171 sf, Inflow Depth > 5.11" for 100YR event
Inflow = 5.19 cfs @ 12.08 hrs, Volume= 16,251 cf
Outflow = 5.17 cfs @ 12.08 hrs, Volume= 16,249 cf, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.6 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.1 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.59' @ 12.08 hrs
Capacity at bank full= 7.84 cfs
Inlet Invert= 141.20', Outlet Invert= 139.05'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 62.0' Slope= 0.0347 '/'

Reach 32R: 12" RCP



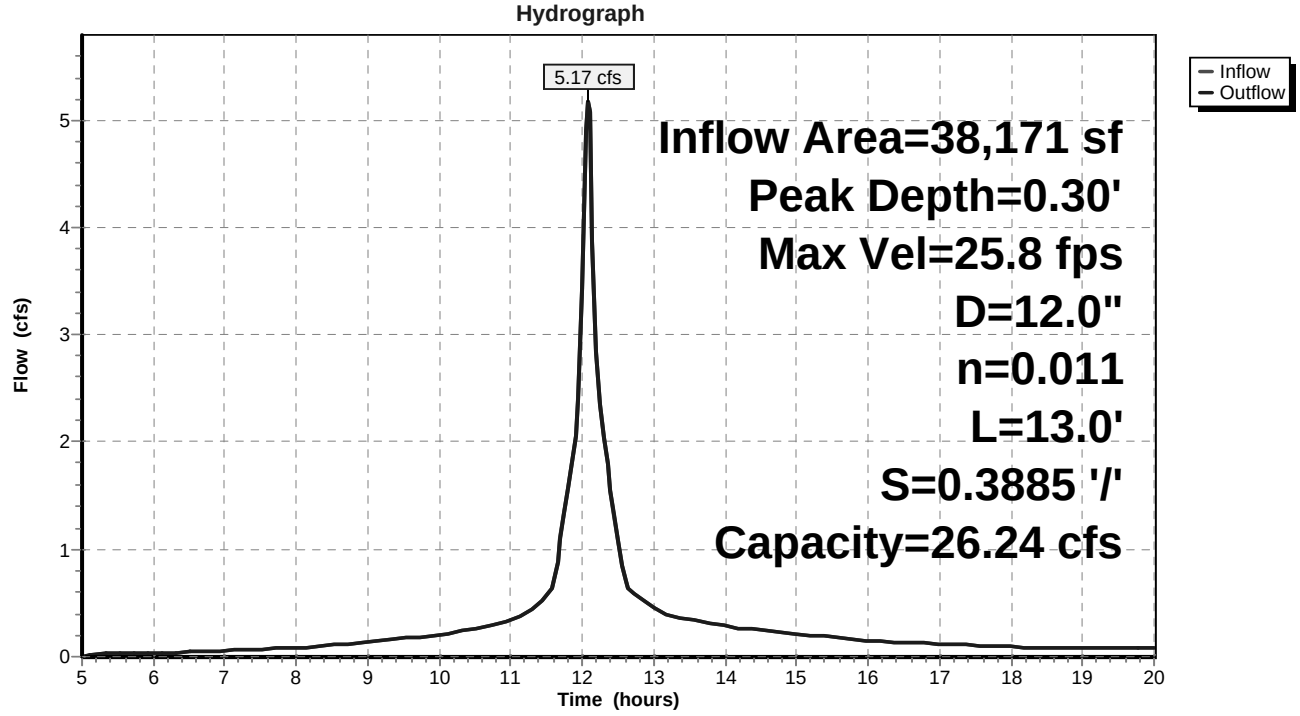
Reach 33R: 12" RCP

Inflow Area = 38,171 sf, Inflow Depth > 5.11" for 100YR event
Inflow = 5.17 cfs @ 12.08 hrs, Volume= 16,249 cf
Outflow = 5.17 cfs @ 12.08 hrs, Volume= 16,248 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 25.8 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 9.6 fps, Avg. Travel Time= 0.0 min

Peak Depth= 0.30' @ 12.08 hrs
Capacity at bank full= 26.24 cfs
Inlet Invert= 139.05', Outlet Invert= 134.00'
12.0" Diameter Pipe, n= 0.011 Concrete pipe, straight & clean
Length= 13.0' Slope= 0.3885 '/'

Reach 33R: 12" RCP



Pond 1P: WestSide D-Pond

Inflow Area = 68,301 sf, Inflow Depth > 2.00" for 100YR event
Inflow = 2.44 cfs @ 12.05 hrs, Volume= 11,357 cf
Outflow = 3.40 cfs @ 12.05 hrs, Volume= 9,440 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.40 cfs @ 12.05 hrs, Volume= 9,440 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 178.75' @ 12.05 hrs Surf.Area= 899 sf Storage= 1,987 cf
Flood Elev= 177.00' Surf.Area= 598 sf Storage= 869 cf
Plug-Flow detention time= 70.1 min calculated for 9,409 cf (83% of inflow)
Center-of-Mass det. time= 22.2 min (836.8 - 814.6)

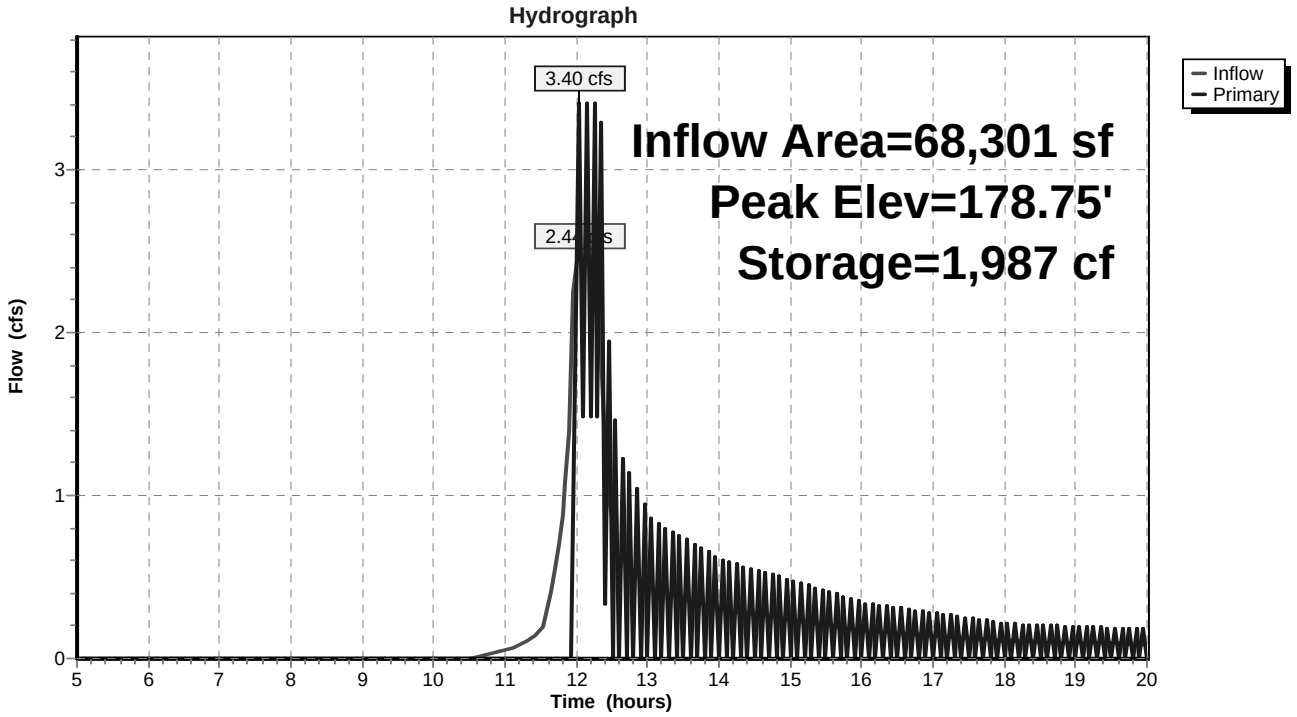
Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	1,987 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	284	0	0
176.00	428	356	356
177.00	598	513	869
178.00	792	695	1,564
178.50	899	423	1,987

Device	Routing	Invert	Outlet Devices
#1	Primary	178.50'	**10.0' long x 110.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.40 cfs @ 12.05 hrs HW=178.75' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 3.40 cfs @ 1.3 fps)

Pond 1P: WestSide D-Pond



Pond 3P: MH

Inflow Area = 68,301 sf, Inflow Depth > 2.01" for 100YR event
Inflow = 3.29 cfs @ 12.08 hrs, Volume= 11,426 cf
Outflow = 3.29 cfs @ 12.08 hrs, Volume= 11,426 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.17 cfs @ 12.08 hrs, Volume= 11,359 cf
Secondary = 0.12 cfs @ 12.08 hrs, Volume= 67 cf

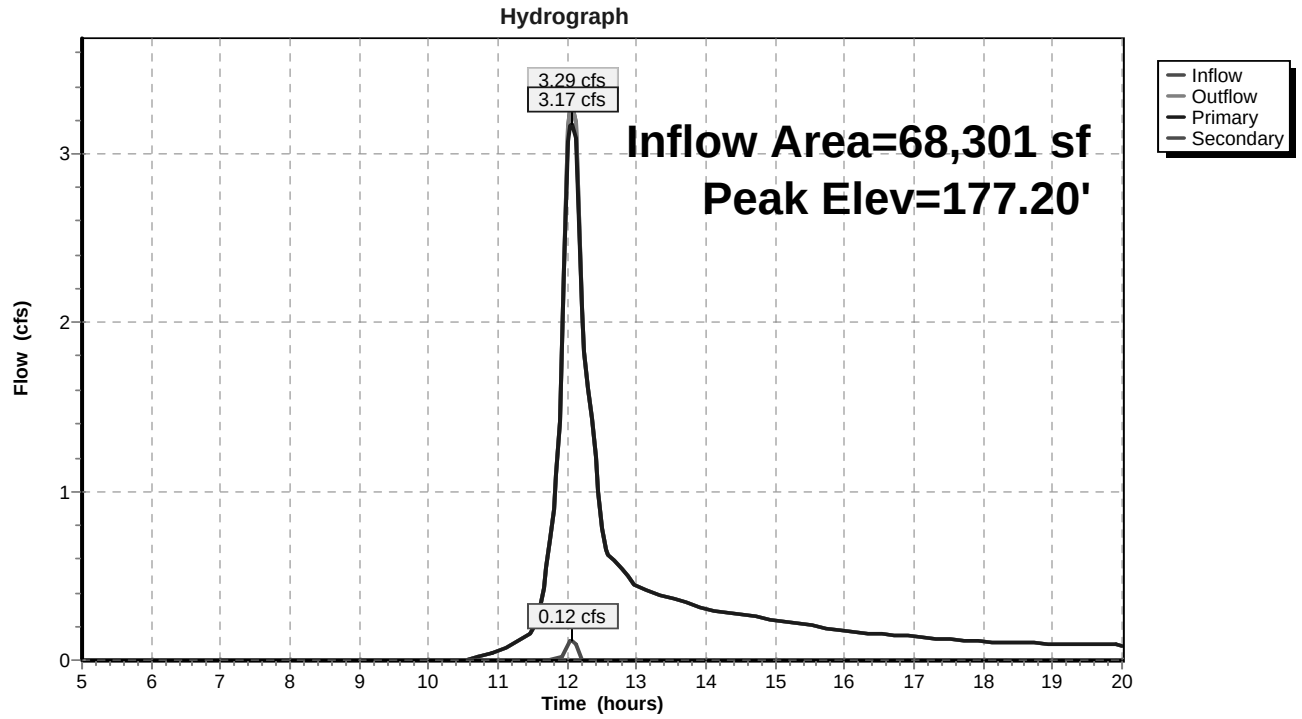
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 177.20' @ 12.08 hrs
Flood Elev= 180.30'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Secondary	177.00'	**0.5' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	176.00'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=3.16 cfs @ 12.08 hrs HW=177.20' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 3.16 cfs @ 4.0 fps)

Secondary OutFlow Max=0.11 cfs @ 12.08 hrs HW=177.20' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.11 cfs @ 1.1 fps)

Pond 3P: MH



Pond 6P: LB1

Inflow	=	0.12 cfs @	12.07 hrs,	Volume=	67 cf
Outflow	=	0.12 cfs @	12.08 hrs,	Volume=	68 cf, Atten= 2%, Lag= 0.5 min
Discarded	=	0.12 cfs @	12.08 hrs,	Volume=	68 cf
Primary	=	0.00 cfs @	5.00 hrs,	Volume=	0 cf
Secondary	=	0.00 cfs @	5.00 hrs,	Volume=	0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 167.54' @ 12.08 hrs Surf.Area= 0.006 ac Storage= 0.000 af
Flood Elev= 180.00' Surf.Area= 0.007 ac Storage= 0.029 af
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.7 min (725.3 - 724.6)

Volume	Invert	Avail.Storage	Storage Description
#1	175.50'	0.005 af	**8.00'D x 4.50'H Vertical Cone/Cylinder**
#2	168.50'	0.008 af	**8.00'D x 7.00'H Vertical Cone/Cylinder** Inside #3
#3	167.50'	0.015 af	**18.00'D x 8.00'H Vertical Cone/Cylinder** 0.047 af Overall - 0.008 af Embedded = 0.039 af x 40.0% Voids
		0.029 af	Total Available Storage

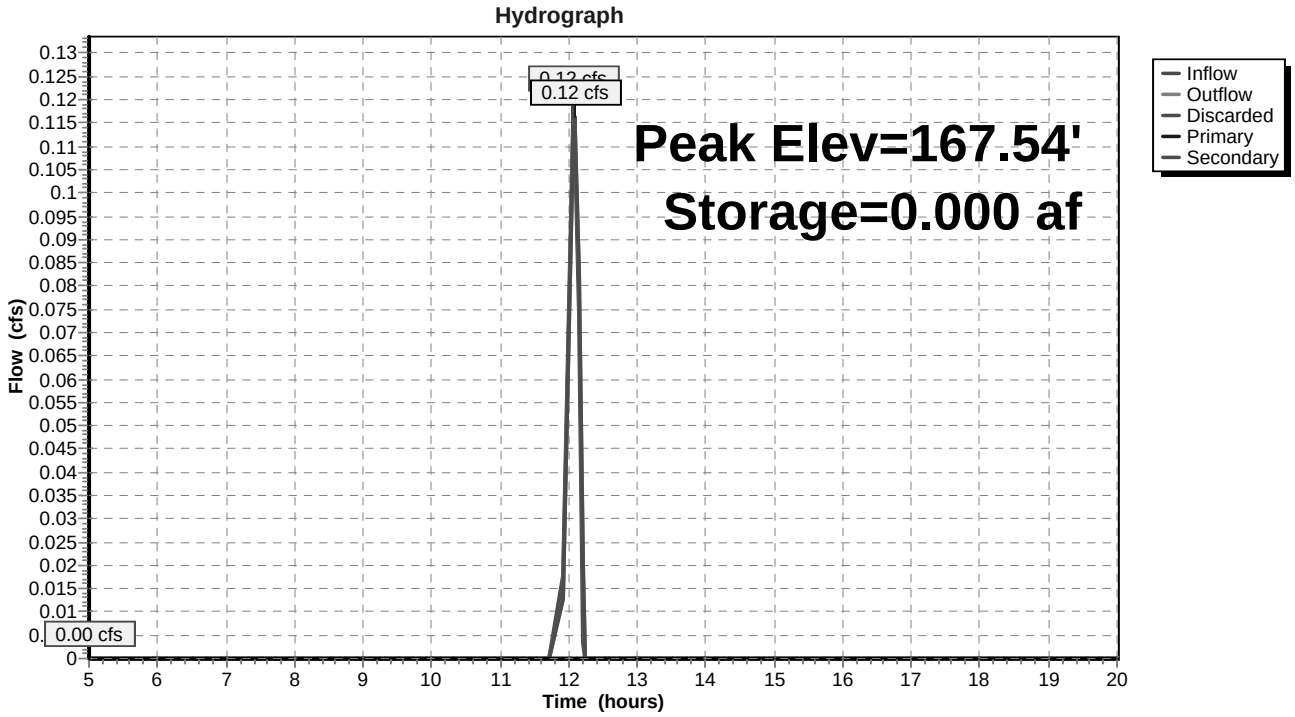
Device	Routing	Invert	Outlet Devices
#1	Primary	175.20'	**12.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	177.00'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	0.00'	**60.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.35 cfs @ 12.08 hrs HW=167.54' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=167.50' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=167.50' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 6P: LB1


Hydrograph
Peak Elev=167.54'
Storage=0.000 af
0.12 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Secondary
Flow (cfs)
Time (hours)
0.13
0.125
0.12
0.115
0.11
0.105
0.1
0.095
0.09
0.085
0.08
0.075
0.07
0.065
0.06
0.055
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Pond 7P: LB2

Inflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Discarded	=	0.00 cfs @	5.00 hrs, Volume=	0 cf

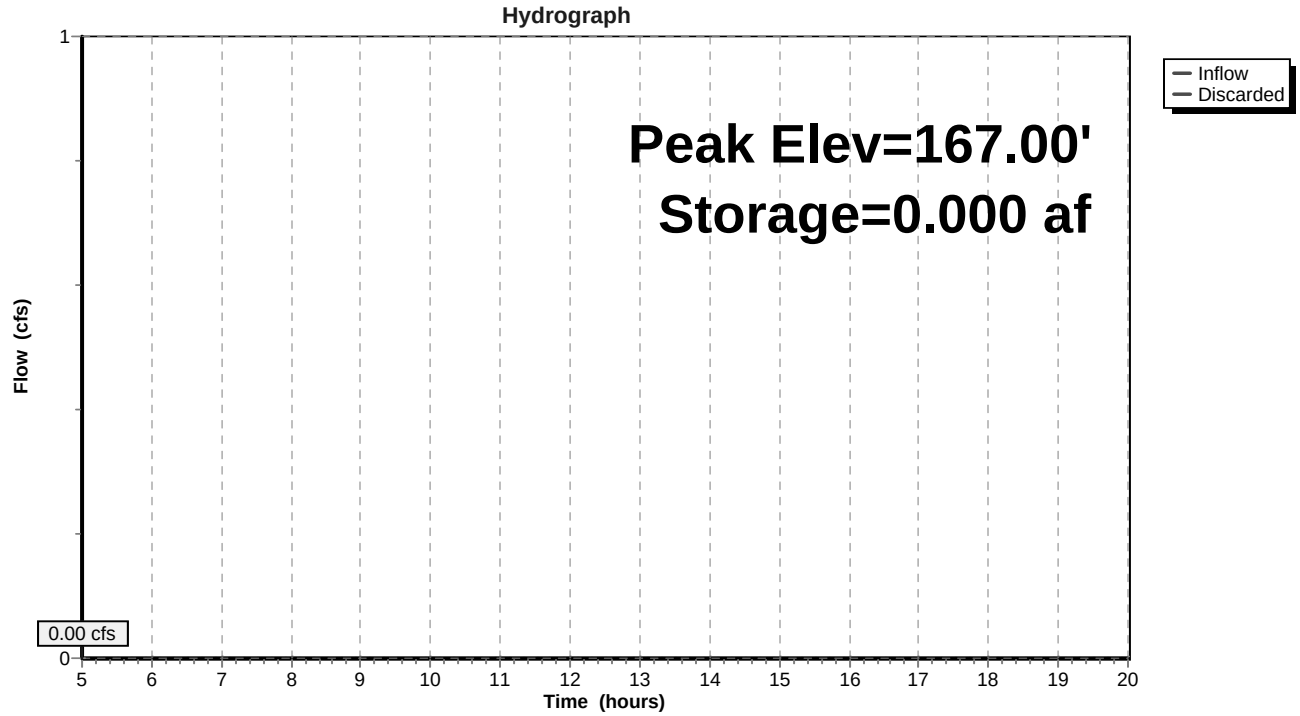
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 167.00' @ 5.00 hrs Surf.Area= 0.006 ac Storage= 0.000 af
Flood Elev= 180.50' Surf.Area= 0.007 ac Storage= 0.030 af
Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	0.006 af	**8.00'D x 5.50'H Vertical Cone/Cylinder**
#2	168.30'	0.008 af	**8.00'D x 6.70'H Vertical Cone/Cylinder** Inside #3
#3	167.00'	0.016 af	**18.00'D x 8.00'H Vertical Cone/Cylinder**
			0.047 af Overall - 0.008 af Embedded = 0.039 af x 40.0% Voids
		0.030 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**60.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 5.00 hrs HW=167.00' (Free Discharge)
1=Exfiltration (Passes 0.00 cfs of 0.35 cfs potential flow)

Pond 7P: LB2



Pond 12P: LB3

Inflow Area = 153,236 sf, Inflow Depth > 1.09" for 100YR event
Inflow = 4.40 cfs @ 12.06 hrs, Volume= 13,859 cf
Outflow = 4.44 cfs @ 12.15 hrs, Volume= 13,863 cf, Atten= 0%, Lag= 5.6 min
Discarded = 0.42 cfs @ 12.15 hrs, Volume= 9,571 cf
Primary = 4.02 cfs @ 12.15 hrs, Volume= 4,292 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 177.29' @ 12.15 hrs Surf.Area= 305 sf Storage= 1,089 cf
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 22.5 min (867.9 - 845.4)

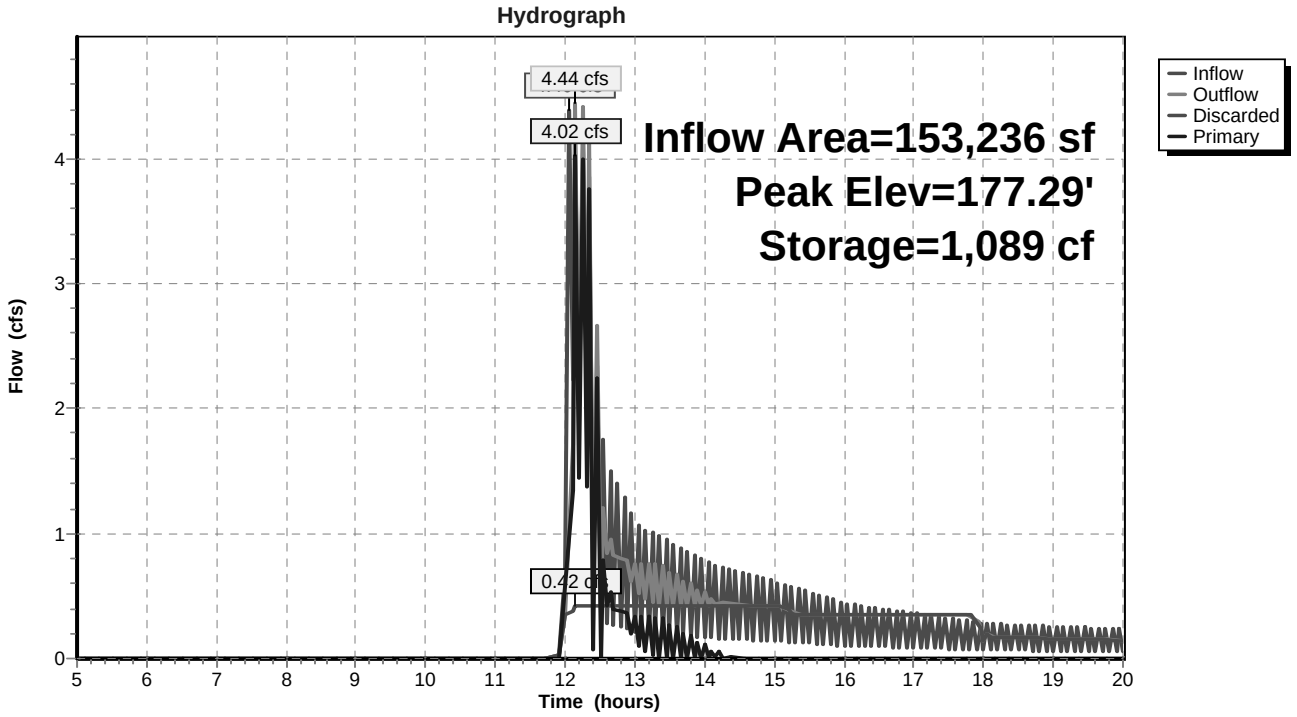
Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	73 cf	**8.00'D x 1.45'H Vertical Cone/Cylinder**
#2	168.30'	337 cf	**8.00'D x 6.70'H Vertical Cone/Cylinder** Inside #3
#3	167.00'	680 cf	**18.00'D x 8.00'H Vertical Cone/Cylinder** 2,036 cf Overall - 337 cf Embedded = 1,699 cf x 40.0% Voids
		1,089 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**60.000 in/hr Exfiltration over Surface area**
#2	Primary	176.45'	**2.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.42 cfs @ 12.15 hrs HW=177.29' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.42 cfs)

Primary OutFlow Max=4.02 cfs @ 12.15 hrs HW=177.29' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 4.02 cfs @ 2.4 fps)

Pond 12P: LB3


Hydrograph
4.44 cfs
4.02 cfs
0.42 cfs
Inflow Area=153,236 sf
Peak Elev=177.29'
Storage=1,089 cf
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Pond 13P: MH

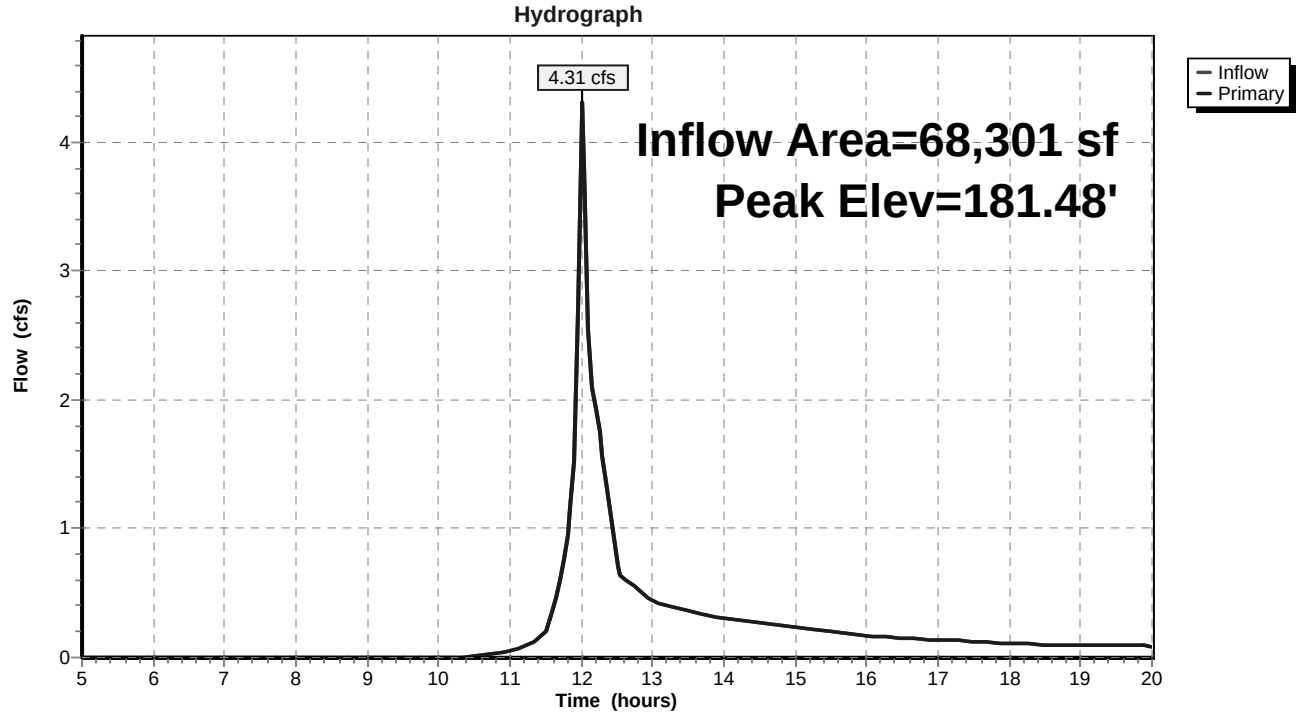
Inflow Area = 68,301 sf, Inflow Depth > 2.01" for 100YR event
Inflow = 4.31 cfs @ 12.01 hrs, Volume= 11,435 cf
Outflow = 4.31 cfs @ 12.01 hrs, Volume= 11,435 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.31 cfs @ 12.01 hrs, Volume= 11,435 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 181.48' @ 12.01 hrs
Flood Elev= 184.90'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Primary	179.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=4.11 cfs @ 12.01 hrs HW=181.38' (Free Discharge)
1=Orifice/Grate (Orifice Controls 4.11 cfs @ 5.2 fps)

Pond 13P: MH



Pond 15P: (2) CB

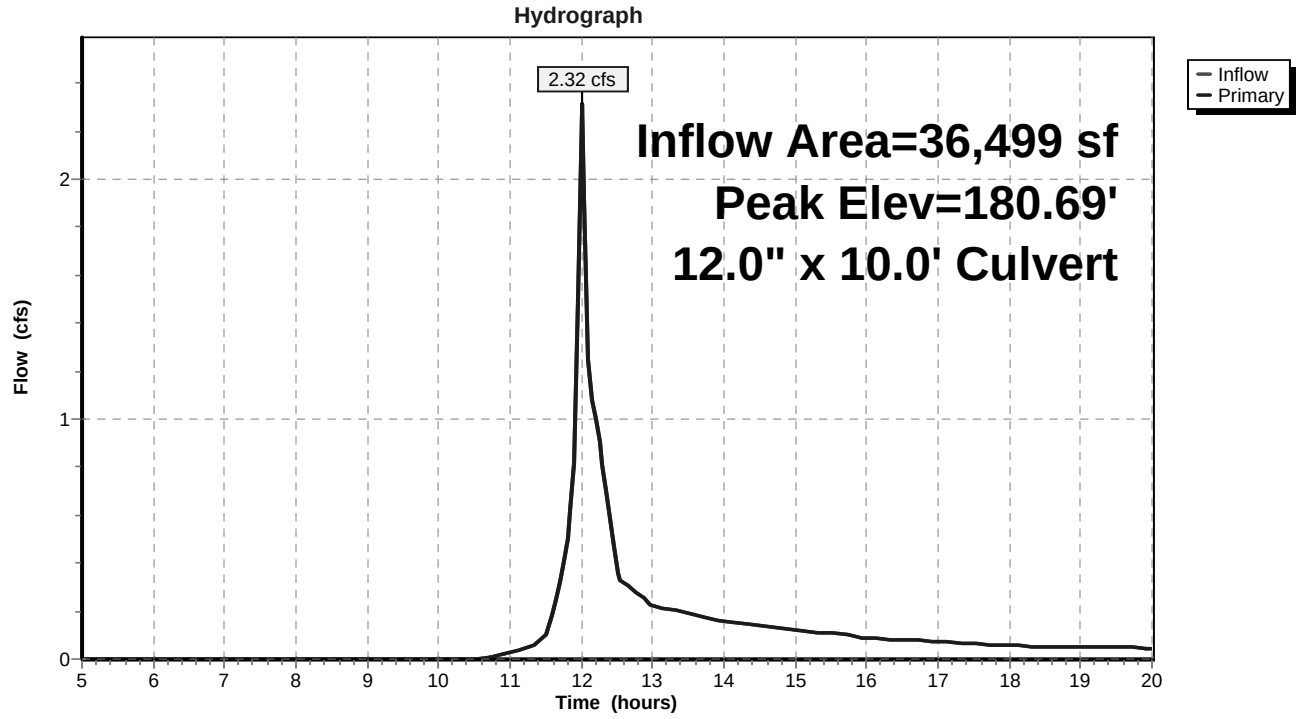
Inflow Area = 36,499 sf, Inflow Depth > 1.97" for 100YR event
Inflow = 2.32 cfs @ 12.01 hrs, Volume= 5,991 cf
Outflow = 2.32 cfs @ 12.01 hrs, Volume= 5,991 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.32 cfs @ 12.01 hrs, Volume= 5,991 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 180.69' @ 12.01 hrs
Flood Elev= 184.90'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (812.7 - 812.7)

Device	Routing	Invert	Outlet Devices
#1	Primary	180.15'	**12.0" x 10.0' long Culvert X 2.00** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 179.80' S= 0.0350 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior

Primary OutFlow Max=2.23 cfs @ 12.01 hrs HW=180.68' (Free Discharge)
└**1=Culvert** (Barrel Controls 2.23 cfs @ 3.8 fps)

Pond 15P: (2) CB



Pond 17P: MH

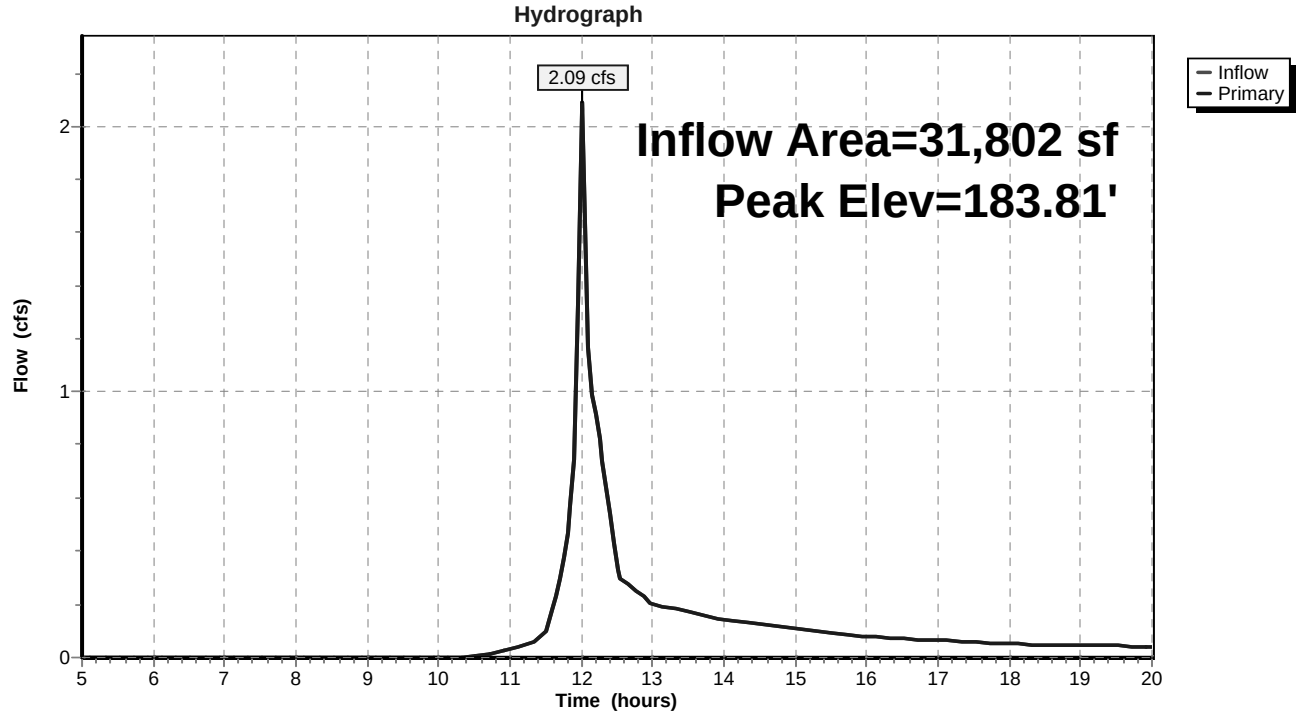
Inflow Area = 31,802 sf, Inflow Depth > 2.06" for 100YR event
Inflow = 2.09 cfs @ 12.01 hrs, Volume= 5,447 cf
Outflow = 2.09 cfs @ 12.01 hrs, Volume= 5,447 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.09 cfs @ 12.01 hrs, Volume= 5,447 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 183.81' @ 12.01 hrs
Flood Elev= 188.05'
Plug-Flow detention time= 0.0 min calculated for 5,447 cf (100% of inflow)
Center-of-Mass det. time= 0.0 min (811.0 - 811.0)

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=2.00 cfs @ 12.01 hrs HW=183.79' (Free Discharge)
1=Orifice/Grate (Orifice Controls 2.00 cfs @ 3.0 fps)

Pond 17P: MH



Pond 20P: (2) CB

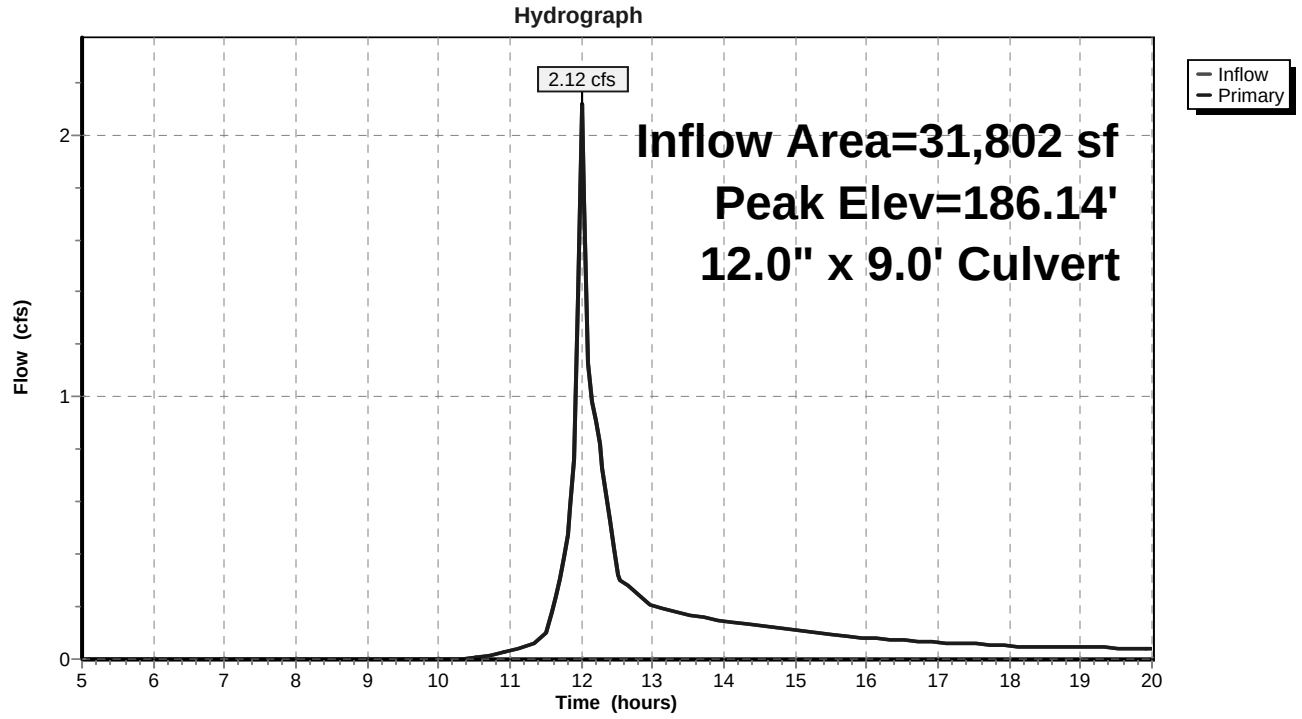
Inflow Area = 31,802 sf, Inflow Depth > 2.06" for 100YR event
Inflow = 2.12 cfs @ 12.01 hrs, Volume= 5,448 cf
Outflow = 2.12 cfs @ 12.01 hrs, Volume= 5,448 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.12 cfs @ 12.01 hrs, Volume= 5,448 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 186.14' @ 12.01 hrs
Flood Elev= 190.14'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Primary	185.65'	**12.0" x 9.0' long Culvert X 2.00** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 185.40' S= 0.0278 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=2.04 cfs @ 12.01 hrs HW=186.13' (Free Discharge)
└**1=Culvert** (Barrel Controls 2.04 cfs @ 4.0 fps)

Pond 20P: (2) CB



Pond 26P: MH

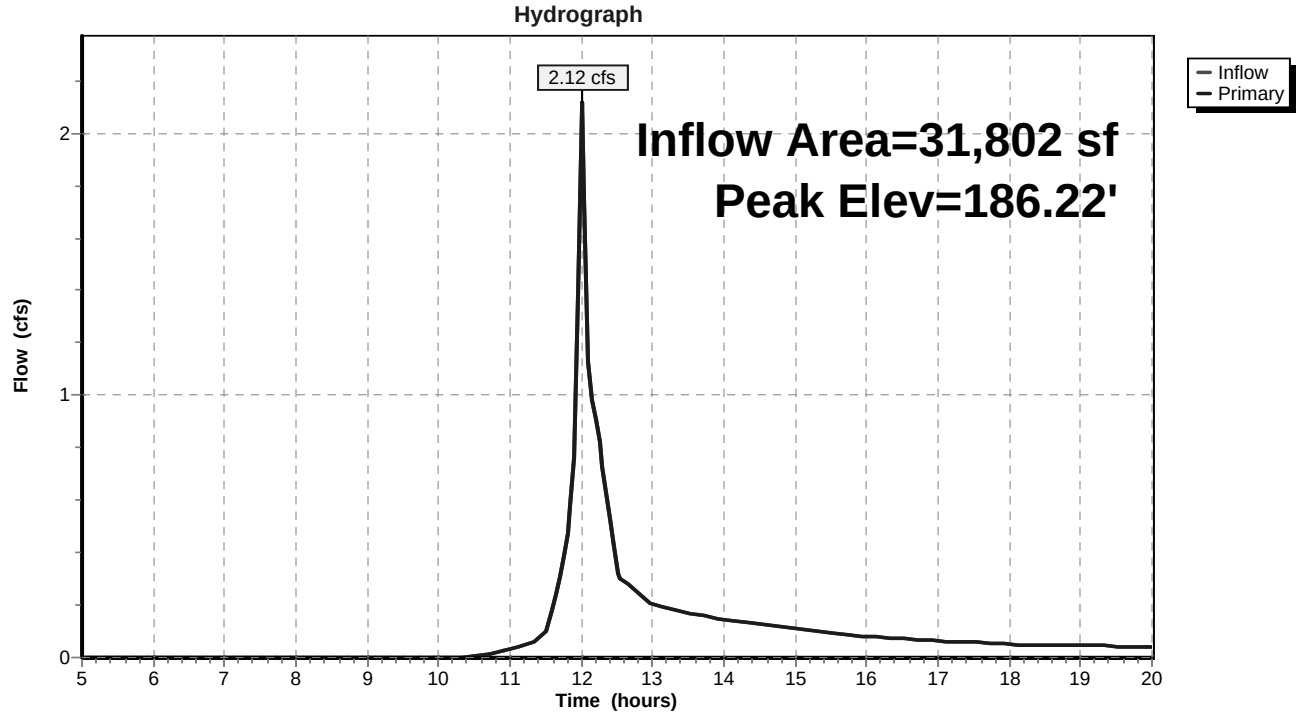
Inflow Area = 31,802 sf, Inflow Depth > 2.06" for 100YR event
Inflow = 2.12 cfs @ 12.01 hrs, Volume= 5,448 cf
Outflow = 2.12 cfs @ 12.01 hrs, Volume= 5,448 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.12 cfs @ 12.01 hrs, Volume= 5,448 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 186.22' @ 12.01 hrs
Flood Elev= 190.08'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (810.8 - 810.8)

Device	Routing	Invert	Outlet Devices
#1	Primary	185.40'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=2.05 cfs @ 12.01 hrs HW=186.20' (Free Discharge)
1=Orifice/Grate (Orifice Controls 2.05 cfs @ 3.0 fps)

Pond 26P: MH



Pond 27P: CB

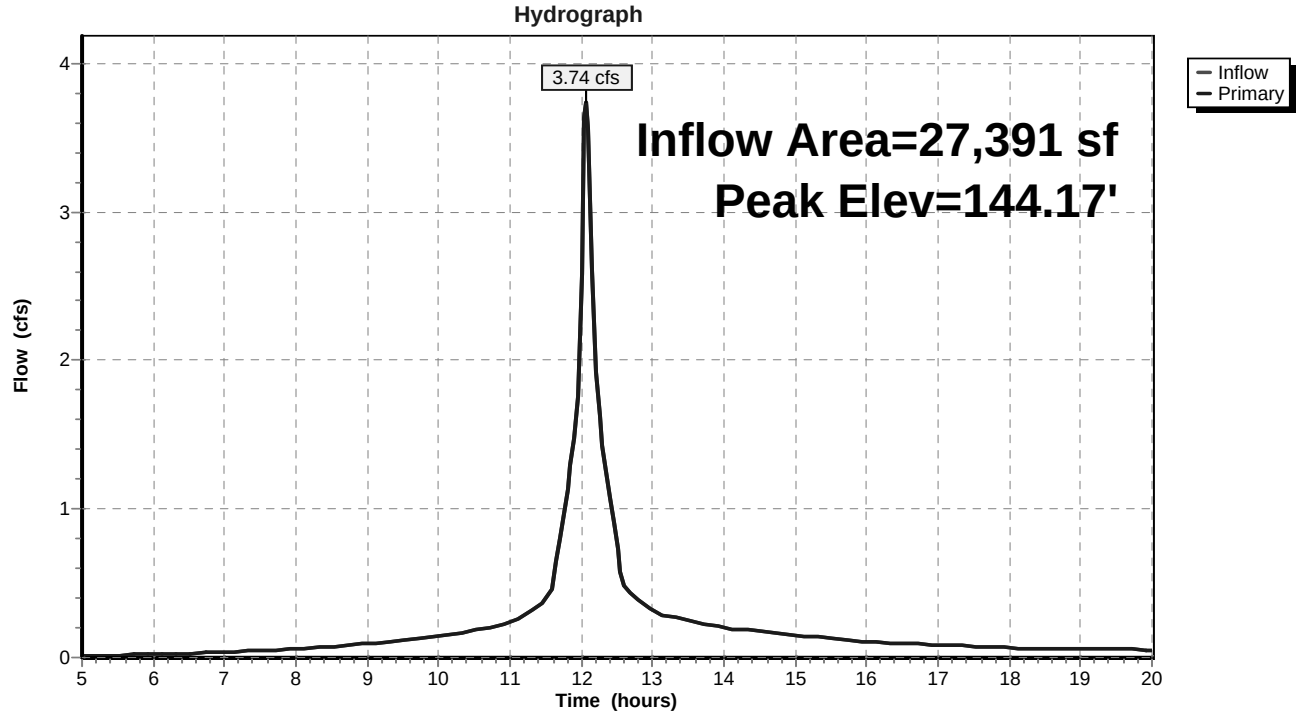
Inflow Area = 27,391 sf, Inflow Depth > 5.02" for 100YR event
Inflow = 3.74 cfs @ 12.07 hrs, Volume= 11,465 cf
Outflow = 3.74 cfs @ 12.07 hrs, Volume= 11,465 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.74 cfs @ 12.07 hrs, Volume= 11,465 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 144.17' @ 12.07 hrs
Flood Elev= 146.98'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (753.5 - 753.5)

Device	Routing	Invert	Outlet Devices
#1	Primary	142.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=3.60 cfs @ 12.07 hrs HW=144.11' (Free Discharge)
1=Orifice/Grate (Orifice Controls 3.60 cfs @ 4.6 fps)

Pond 27P: CB



Pond 29P: CB

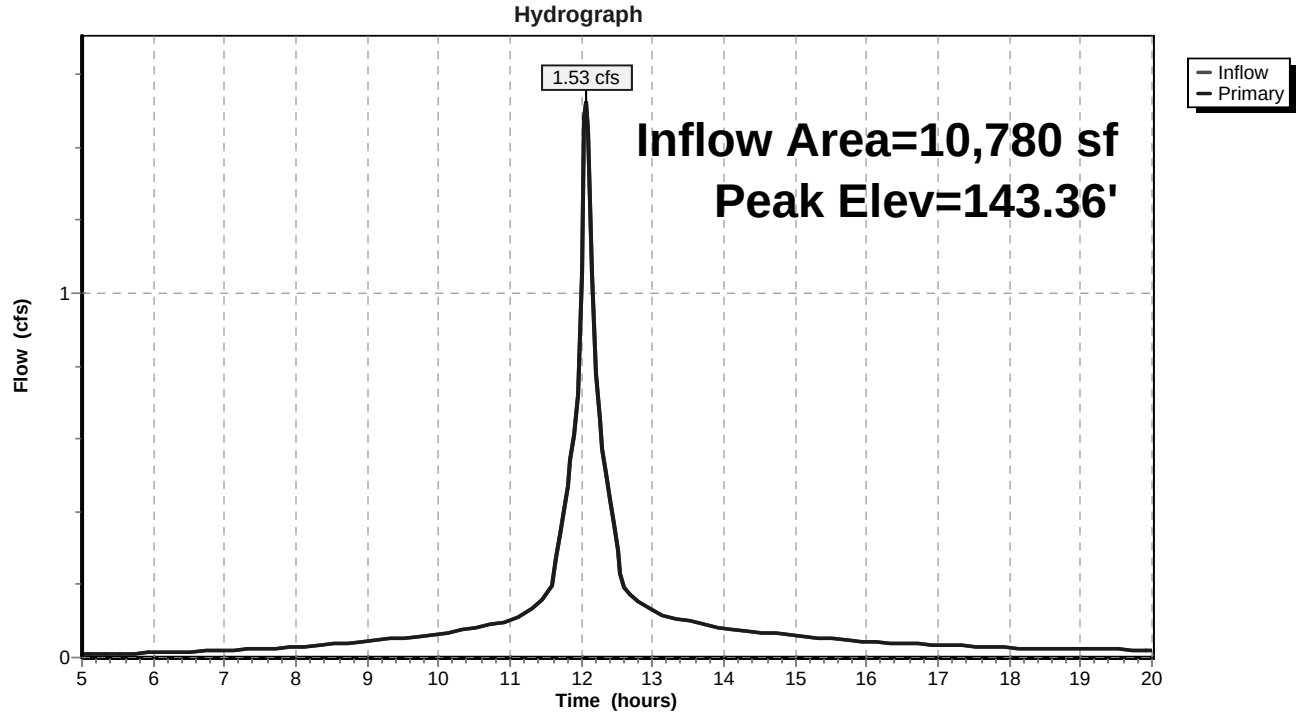
Inflow Area = 10,780 sf, Inflow Depth > 5.33" for 100YR event
Inflow = 1.53 cfs @ 12.07 hrs, Volume= 4,790 cf
Outflow = 1.53 cfs @ 12.07 hrs, Volume= 4,790 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.53 cfs @ 12.07 hrs, Volume= 4,790 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 143.36' @ 12.07 hrs
Flood Elev= 145.60'
Plug-Flow detention time= 0.0 min calculated for 4,774 cf (100% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Primary	142.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.47 cfs @ 12.07 hrs HW=143.35' (Free Discharge)
1=Orifice/Grate (Orifice Controls 1.47 cfs @ 2.7 fps)

Pond 29P: CB



Pond 30P: MH

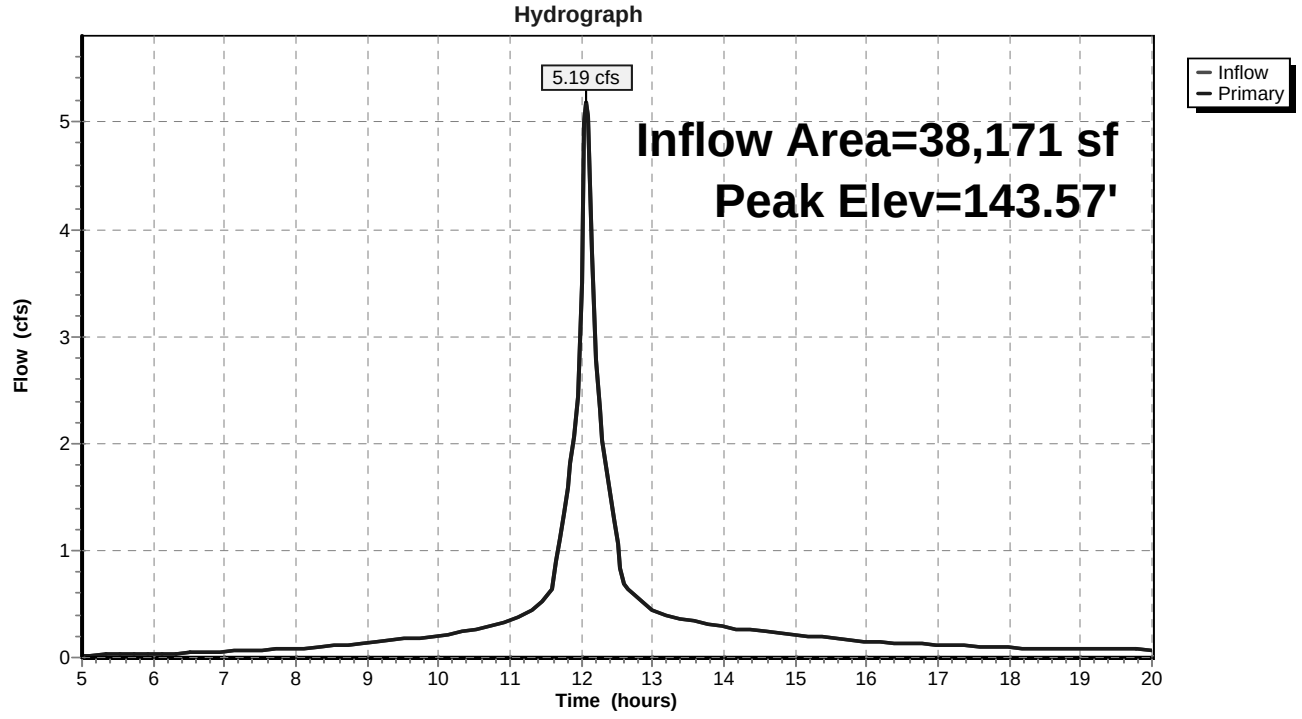
Inflow Area = 38,171 sf, Inflow Depth > 5.11" for 100YR event
Inflow = 5.19 cfs @ 12.08 hrs, Volume= 16,251 cf
Outflow = 5.19 cfs @ 12.08 hrs, Volume= 16,251 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.19 cfs @ 12.08 hrs, Volume= 16,251 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 143.57' @ 12.08 hrs
Flood Elev= 145.60'
Plug-Flow detention time= 0.0 min calculated for 16,197 cf (100% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Primary	141.20'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=5.02 cfs @ 12.08 hrs HW=143.46' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 5.02 cfs @ 6.4 fps)

Pond 30P: MH



Pond 31P: CB

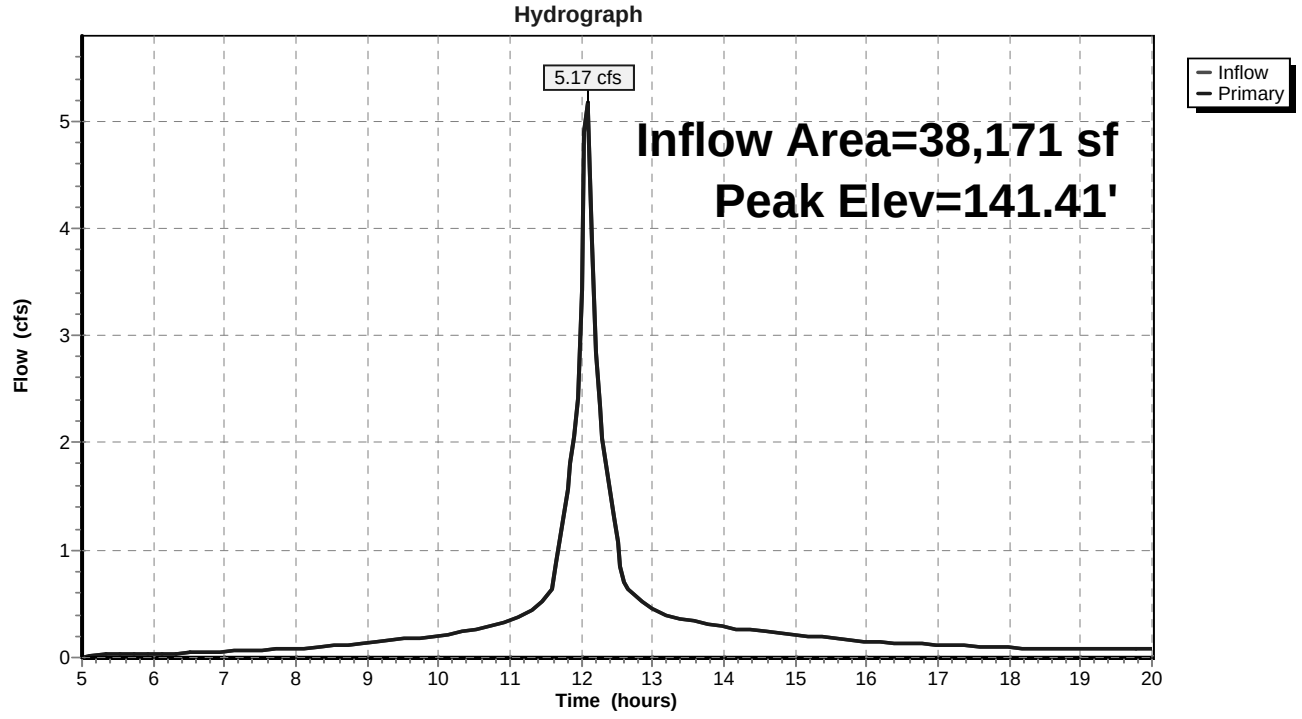
Inflow Area = 38,171 sf, Inflow Depth > 5.11" for 100YR event
Inflow = 5.17 cfs @ 12.08 hrs, Volume= 16,249 cf
Outflow = 5.17 cfs @ 12.08 hrs, Volume= 16,249 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.17 cfs @ 12.08 hrs, Volume= 16,249 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 141.41' @ 12.08 hrs
Flood Elev= 142.00'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (751.9 - 751.9)

Device	Routing	Invert	Outlet Devices
#1	Primary	139.05'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=5.01 cfs @ 12.08 hrs HW=141.31' (Free Discharge)
1=Orifice/Grate (Orifice Controls 5.01 cfs @ 6.4 fps)

Pond 31P: CB

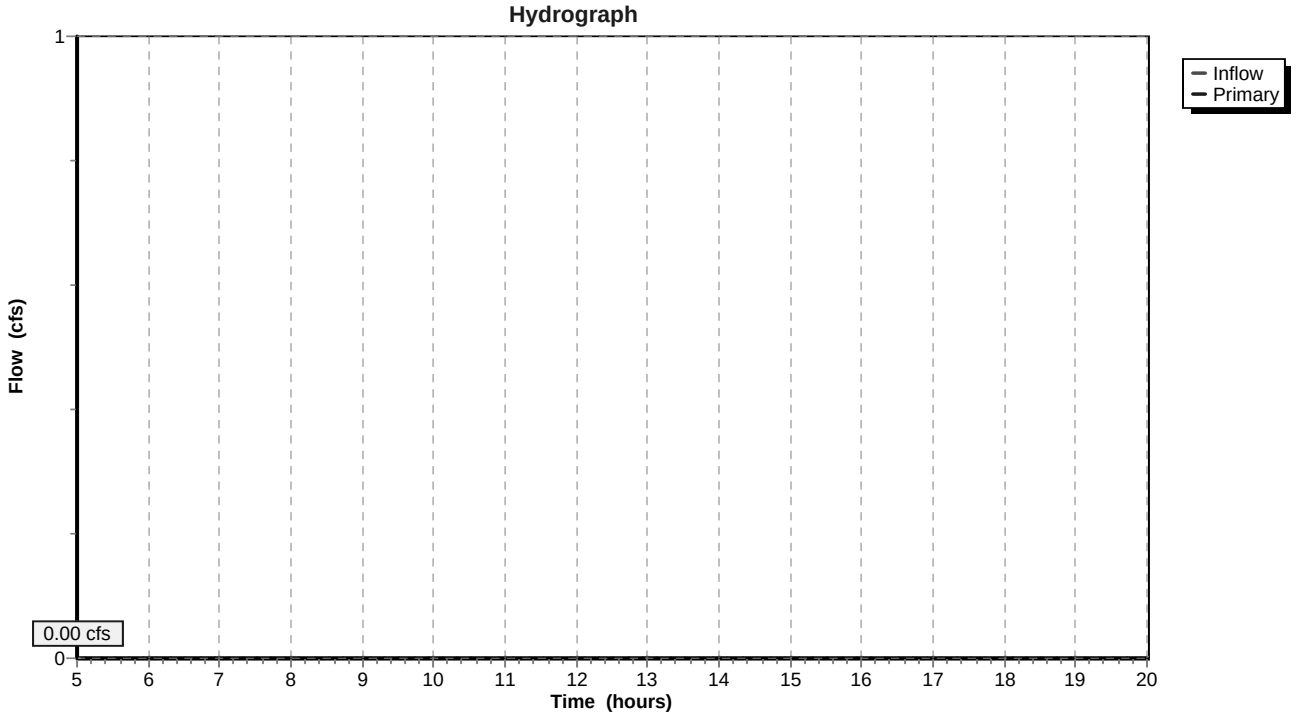


Link 10L: FLARED END

Inflow	=	0.00 cfs @	5.00 hrs, Volume=	0 cf
Primary	=	0.00 cfs @	5.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

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

Link 10L: FLARED END

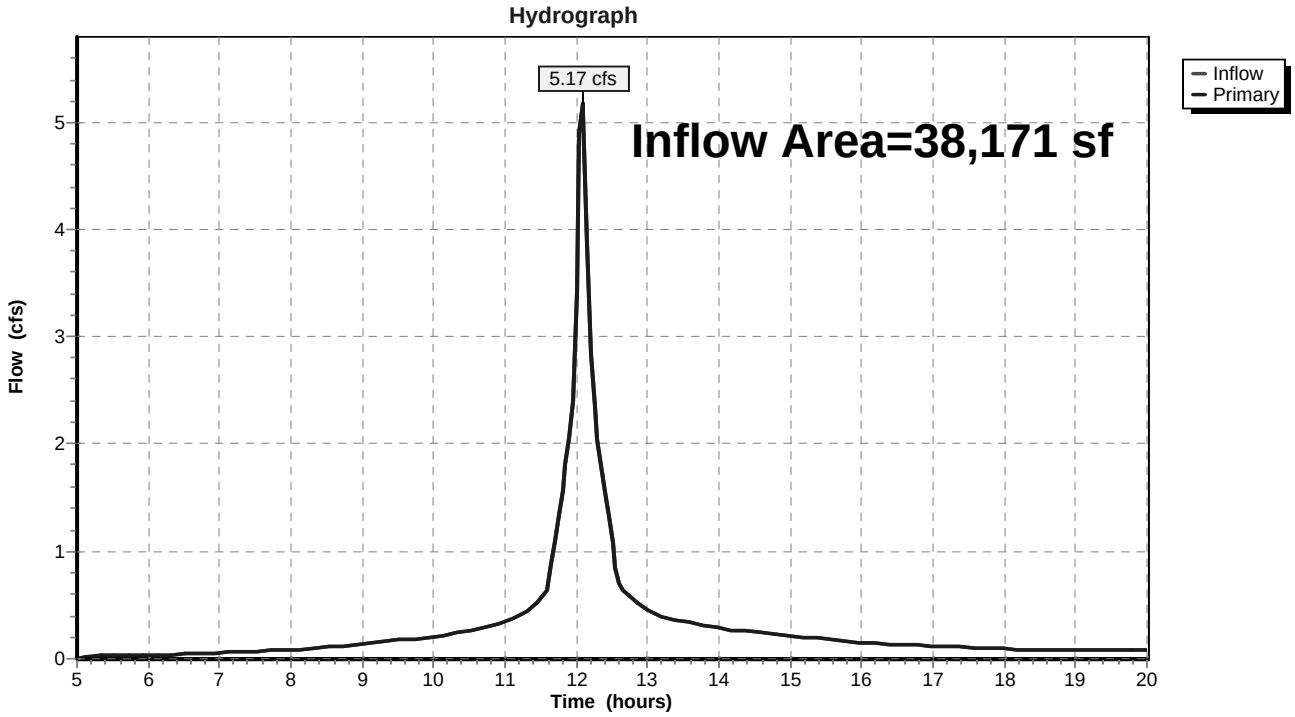


Link 34L: River

Inflow Area = 38,171 sf, Inflow Depth > 5.11" for 100YR event
Inflow = 5.17 cfs @ 12.08 hrs, Volume= 16,248 cf
Primary = 5.17 cfs @ 12.08 hrs, Volume= 16,248 cf, Atten= 0%, Lag= 0.0 min

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

Link 34L: River



SOIL SURVEY MAP

Soil Map—Middlesex County, Massachusetts
(Sudbury Road, Acton, MA)

USDA Natural Resources Conservation Service

Web Soil Survey 2.1
National Cooperative Soil Survey

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
- Oceans
- Streams and Canals

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

MAP INFORMATION

Map Scale: 1:3,840 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:25,000.

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: Middlesex County, Massachusetts
Survey Area Data: Version 5, Jan 3, 2007

Date(s) aerial images were photographed: 7/10/2003; 8/14/2003

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

Middlesex County, Massachusetts (MA017)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
1	Water	2.8	5.9%
4A	Rippowam fine sandy loam, 0 to 3 percent slopes	4.6	9.6%
36A	Saco mucky silt loam, 0 to 1 percent slopes	0.2	0.3%
253D	Hinckley loamy sand, 15 to 25 percent slopes	4.7	9.8%
253E	Hinckley loamy sand, 25 to 35 percent slopes	4.7	9.8%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	1.2	2.4%
602	Urban land	22.5	47.0%
654	Udorthents, loamy	1.8	3.8%
656	Udorthents-Urban land complex	5.5	11.5%
Totals for Area of Interest		**47.9**	**100.0%**

TSS REMOVAL CALCULATIONS

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Sudbury Road, Alexan Concord to Westside Drive

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Leaching Catch Basin	**0.80**	**0.75**	**0.60**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**

Total TSS Removal = **85%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Alexan Concord

Prepared By: **Beals Associates**

Date: **8/11/2008**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Sudbury Road, Westside Drive to Route 62

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Leaching Catch Basin	**0.80**	**0.75**	**0.60**	**0.15**
StormCeptor900	0.86	**0.15**	0.13	0.02

Total TSS Removal = 98%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Alexan Concord
Prepared By: Beals Associates
Date: 8/11/2008

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Stormceptor CD Sizing Program
United States
Version 4.0.0

Project Details

Project	Alexan Concord	Project #	C-472.08
Location	Sudbury Road, Acton	Company	Beals Associates, Inc.
Date	12-29-08	Contact	

Selected Rainfall Station

State	Massachusetts
Name	MILTON BLUE HILL OBS
ID #	736
Elev. (ft)	630
Latitude	N 42 deg 12 min
Longitude	W 71 deg 6 min

Site Parameters

Total Area (ac)	0.92
Imperviousness (%)	98
Impervious Area (ac)	.90

Particle Size Distribution

Diam. (um)	Percent (%)	Spec. Gravity
20	20	1.30
60	20	1.80
150	20	2.20
400	20	2.65
2000	20	2.65

Stormceptor Sizing Table

Stormceptor Model	% Runoff Treated	% TSS Removal
STC 450	70	78
STC 900	87	86
STC 1200	87	86
STC 1800	87	86
STC 2400	94	89
STC 3600	94	90
STC 4800	98	92
STC 6000	98	92
STC 7200	99	93
STC 11000	100	95
STC 13000	100	95
STC 16000	100	96

Comments :

Fact Sheet #4

Stormwater Technology: Stormceptor

(Hydro Conduit, formerly CSR New England Pipe)

Revised February 2003

*The **Stormceptor Fact Sheet** is one in a series of fact sheets for stormwater technologies and related performance evaluations, which are undertaken by the Massachusetts STrategic Envirotechnology Partnership (STEP).*

A summary of the STEP evaluation entitled, *Technology Assessment, Stormceptor CSR New England Pipe*, January 1998 is provided in this fact sheet. When a more thorough understanding of a system is required, the full *Technology Assessment* should be reviewed. Copies are available for downloading from the STEP Web site (www.stepsite.org/progress/reports) or by contacting the STEP Program (Phone: 617/626/1197, FAX: 617/626/1180, email: linda.benevides@state.ma.us). The information in this fact sheet is subject to future updates as additional performance information becomes available.

Description/Definition

Stormceptor is a prefabricated, underground unit that separates oils, grease, and sediment from stormwater runoff when installed with an existing or new pipe conveyance system. The unit is divided into two chambers–a treatment and a flow bypass chamber. During typical storm events, runoff is directed by the inflow weir through a drop pipe into the lower treatment chamber where sediment, oil, and grease are separated from the flow by gravity. The bypass chamber is designed to convey excess stormwater, which overtops the inflow weir, through the system without treatment.

Equipment and Sizing

The on-line Stormceptor units are available in eight sizes ranging from six and twelve feet in diameter with capacities of 900 to 7200 gallons. Since issuing the STEP assessment in 1998, the manufacturer has expanded the Stormceptor product line to include a storm drain inlet (STC 450i) and three units (Models STC 11000, STC 13000, and STC16000). These systems are not included in the STEP evaluation. Users and decision-makers may require additional field test results and new data for these new systems in order to accept performance ratings, particularly if they are higher than those reported in the STEP technology assessment and this fact sheet.

Stormceptor units are available in either precast concrete or fiberglass for special applications. Concrete units are pre-engineered for HS-20 min. traffic loading at the surface. Fiberglass units can be used in areas where there is a potential for oil and chemical spills.

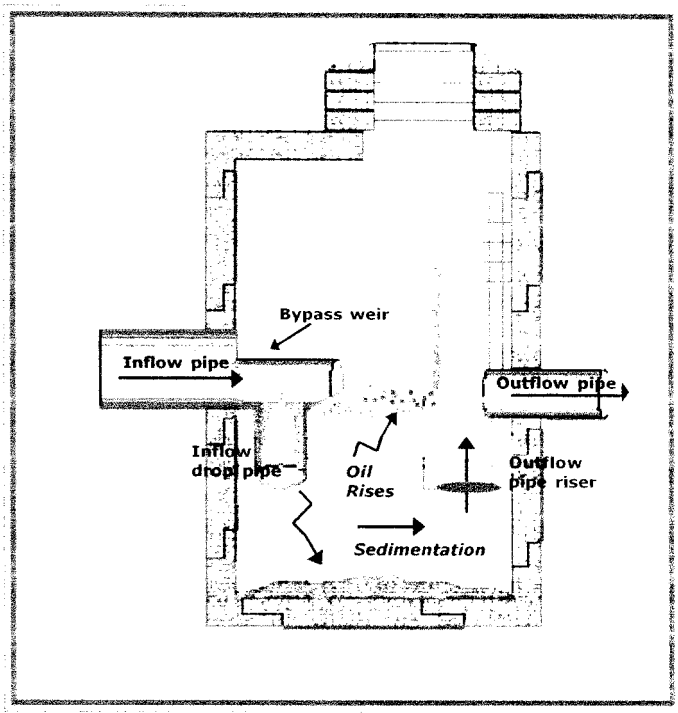


Figure 1. Stormceptor operation during average flow conditions.

Performance/Effectiveness

The system is designed to provide separation of sediment, oil, and grease from stormwater by routing runoff into a low-turbulence environment where solids settle and oils float out of solution. The system sizing is based on the drainage area, historical rainfall data, and

the solids removal efficiency required. It is recommended that the system be used in combination with other stormwater controls to conform with the Massachusetts Stormwater Management Policy and standards.

An Imperial Model STC 2000 (equivalent to the Model STC 2400) in Edmonton, Canada treats flow from a 9.8 acre commercial parking lot. This system was monitored during four storm events in 1996 and shown to have an average total suspended solids (TSS) removal efficiency of 52 percent. In designing a system to achieve a comparable removal efficiency, the relationship between system size and impervious drainage area should be considered, as detailed in Table 1 and the Technology Assessment Report.

A Model STC 1200 in Westwood, Massachusetts treats flow from 0.65 acres consisting of a paved truck loading area at a manufacturing facility. The unit was monitored for six storm events in 1997, but only four events had measurable TSS influent concentrations. Of these four events, the average TSS removal efficiency was calculated to be 77 percent, which is less than the 80 percent removal targeted by the manufacturer.

Based on these field monitoring results, and when the unit sizing follows the guidance in Table 1, removal efficiencies between 52 percent and 77 percent may be achieved where installations have similar rainfall and land use characteristics as those reviewed for the STEP evaluation. It is recommended that additional field research and new data be evaluated to validate performance ratings higher than those verified by STEP.

STC 900	0.45	0.9
STC 1200	0.7	1.45
STC 1800	1.25	2.55
STC 2400	1.65	3.35
STC 3600	2.6	5.3
STC 4800	3.6	7.25
STC 6000	4.6	9.25
STC 7200	5.55	11.25

Table 1: Adapted from the Stormceptor sizing for TSS removal in the STEP Technology Assessment. Notes: 1) On some sites, the maximum impervious area may need to be reduced to achieve these TSS removal rates. 2) The terms "critical area sizing" (to achieve 77 percent TSS removal) and "treatment train sizing" (for 52 percent removal) are no longer used by the manufacturer, but unit sizing is still applicable.

Specific performance claims for oil and grease were not evaluated by STEP. However, total petroleum hydrocarbons (TPH) were analyzed during the Westwood study. Results indicated that the unit was effective in capturing oils.

Technology Status

The Stormceptor system provides greater solids separation and higher TSS removal efficiencies than oil and grit separators. Stormceptor systems are among the category of hydrodynamic separators, which are flow-through devices with the capacity to settle or separate grit, oil, sediment, or other pollutants from stormwater. According to the U.S. Environmental Protection Agency, "Hydrodynamic separators are most effective where the materials to be removed from runoff are heavy particulates - which can be settled - or floatables - which can be captured, rather than solids with poor settleability or dissolved pollutants."

Although Stormceptor appears to remove sediment, grit, oil, and grease as claimed by the manufacturer, additional research is needed to determine how much sediment moves through the system untreated. The field studies evaluated for the STEP assessment predate the Stormwater Best Management Practice Demonstration Tier II Protocol (2001), which is applicable in Massachusetts and other states in the Technology Acceptance Reciprocity Partnership (TARP), to ensure quality controlled studies that can be shared among participating states. Therefore, interstate reciprocity is not available to the manufacturer, based on performance claims that were evaluated by STEP in 1998. If the TARP Protocol requirements are fulfilled in the future, the manufacturer could pursue reciprocal verification for Stormceptor systems in participating TARP states. More information on the TARP Protocol is available on the following Web site: www.dep.state.pa.us/dep/deputate/pollprev/techservices/tarp.

Applications/Advantages

- Stormceptor systems identified in Table 1 should be used in combination with other BMPs to remove 80 percent of the average annual load of TSS (DEP Stormwater Policy Standard 4). Systems may be well suited for pretreatment in a mixed component system designed for stormwater recharge.
- Performance data show that Stormceptor may provide TSS removal rates in the range of 52 percent to 77 percent when sized according to Table 1. Higher TSS removal rates were achieved during low flow, low intensity storms with less than one third of an inch of runoff. Also, by reducing the impervious drainage area,

relative to the system size, the STEP Technology Assessment Report indicated that higher removal efficiencies may be achievable. However, STEP recommends collection of additional data "representing a varied set of operating conditions over a realistic maintenance cycle to verify TSS removal rates greater than 80 percent."

- The Stormceptor system is suitable for new and retrofit applications. For retrofit applications, it should not take the place of a catch basin for the systems that have been verified. Also, for retrofit applications, it should be installed in lateral lines and not main trunk lines.
- The system is particularly well suited in constricted areas and where space is limited.
- It also is suitable for use in areas of high potential pollutant loads (DEP Stormwater Policy Standard 5), where it may be used effectively in capturing and containing oil and chemical spills. *Web site:* www.state.ma.us/dep/brp/stormwtr/stormpub.htm.

Considerations/Limitations

- Systems are not expected to provide significant nutrient (nitrogen and phosphorus) or fecal coliform removal.
- The systems are not recommended for use in critical areas, such as public drinking water supplies, certified vernal pools, public swimming beaches, shellfish growing areas, cold water fisheries, and some Areas of Critical Environmental Concern (ACECs), except as a pretreatment device for BMPs that have been approved by DEP for use in critical areas. The structural BMPs approved for use in critical areas are described in Standard 6 of the Stormwater Management Policy, www.state.ma.us/dep/brp/stormwtr/stormpub.htm.
- There is a limited set of useful data for predicting the relationship between treatment efficiency and loading rates. Removal efficiencies have not been demonstrated for all unit sizes.
- Further research is needed to determine how much TSS bypasses the treatment chamber during certain, higher velocity storm events which recur less frequently.
- Systems require regular maintenance to minimize the potential for washout of the accumulated sediments.

Reliability/Maintenance

All BMPs require scheduled, routine maintenance to ensure that they operate as efficiently as possible. Although maintenance requirements are site specific, a general relationship between cleaning needs and depths of sediment has been established by the manufacturer. Inspection of the Stormceptor interior should be done after major storm events, particularly in the first year of operation. It is recommended that material in the treatment chamber be pumped out by a vacuum truck semiannually, or when the sediment and pollutant loads reach about 15 percent of the total storage. If the unit is used for spill containment, it should be pumped after the event is contained. Typical cleaning costs were estimated by the manufacturer in 1998 to be $250, with disposal costs averaging $300 to $500. The expected life of a system has been estimated to be 50 to 100 years.

STC 900	0.5
STC 1200	0.75
STC 1800	1
STC 2400	1
STC 3600	1.25
STC 4800	1
STC 6000	1.5
STC 7200	1.25

Table 2: The Stormceptor system clean out is based on 15 percent of the sediment storage volume in the unit.

References

Winkler, E.S. 1998. "Technology Assessment, Stormceptor." University of Massachusetts, Amherst, MA. *STEP Web site:* www.stepsite.org/progress/reports

Massachusetts Department of Environmental Protection and Office of Coastal Zone Management. 1997. "Stormwater Management Handbooks, Volumes One and Two." Boston, MA. *Handbooks Web site:* www.state.ma.us/dep/brp/stormwtr/stormpub.htm.

"Performance of a Proprietary Stormwater Treatment Device: The Stormceptor. The Practice of Watershed Protection: Article 120. Thomas. R. Schueler and Heather K. Holland editors. 2000. Ellicott City, MD.

United States Environmental Protection Agency. "Storm Water Technology Fact Sheet Hydrodynamic Separators." EPA 832-F-99-017.

Stormceptor Web sites: www.rinkermaterials.com stormceptor

TARP Web site: www.dep.state.pa.us/dep/deputate/pollprev/techservices/tarp.

Technology Assessment Report

Stormceptor®

CSR™ New England Pipe

Prepared for
The Massachusetts Strategic
Envirotechnology Partnership
STEP

December, 1997

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PREFACE

The STEP technology assessment process is designed to identify those technologies that will support the economic and environmental/energy goals of the Commonwealth of Massachusetts and may benefit from STEP assistance. The process is meant to be one of screening, in which technologies are evaluated by independent technical specialists. Recommendation from this process does not constitute an endorsement of the technology or of the absolute validity of the technology. Rather, STEP technical assessments attest only that, through the screening process, the reviewers feel there may be benefit to the Commonwealth of Massachusetts.

EXECUTIVE SUMMARY

The technology described in this review is Stormceptor® and is currently owned by Stormceptor® Corporation and licensed to CSR/New England Pipe (CSR/NEP) of Wauregan, CT, for distribution in Massachusetts, among other states. The system is being commercialized by CSR/NEP. The Stormceptor technology addresses treatment of stormwater runoff. It is proposed as an effective spill control and stormwater quality enhancement system, capable of retaining grit, suspended solids, oils and grease during periods of both low and high flows. It is proposed as a replacement for conventional manholes within a storm drain system. It is not designed as a catch basin or detention system. It can be used within any new or existing lateral piped conveyance system and comes in several sizes with outlets up to 60". The system is claimed as capable of removing 50 - 80% of TSS when properly sized. The Stormceptor system is recommended as a stand alone or as a component to a system or in combination with different BMPs. An example configuration may include the following components: catch basin or water quality inlet, Stormceptor, detention basin or infiltration system.

The system is a prefabricated well type structure which provides sedimentation, oil, and grease separation. It is manufactured in both concrete or fiberglass. Current sizes range from 900 to 7200 gallons, with diameters between 6 and 12 feet. The design of the system provides two sections, a treatment chamber and bypass chamber. The structural components of the system are separated by an insert which has a weir, inflow drop pipe, and outflow riser. Operation of the system is passive with respect to flow control and treatment. During low flows or frequent storm events, stormwater from the inlet is directed down the inflow drop pipe located adjacent to the inlet of the treatment chamber. Flow in excess of the inflow drop pipe capacity is directed into the bypass chamber to the outlet of the system. The effective treatment capacity is set by a weir which surrounds the inflow drop pipe at the inlet and the volume of the treatment chamber. Effluent from the treatment chamber exits via the outflow riser which extends below the water surface in the treatment chamber up to the overflow chamber and to the system outlet. Sediment is retained in the bottom of the treatment chamber and oils and grease are retained at the top of the treatment chamber in a quiescent area.

The Stormceptor system is stormwater treatment structure providing event based solids separation. The value added in the Stormceptor system is the ability to reduce turbulence in the treatment chamber, which makes it better at removing TSS and TPH than conventional BMPs of the same category. The Stormceptor system has been demonstrated to provide at least 52% removal of TSS when sized according to Stormceptor's "Treatment Train" criteria and 77% when sized according to Stormceptor's "Sensitive Area" criteria. It is likely that a higher removal efficiency, greater than 80%, could be expected if the contributing drainage area is smaller than the sizing recommended. The system is likely to remove grease and oils with its inflow and outflow pipe configurations. The Stormceptor system appears to be a good control technology in areas of higher pollution potential, Standard 5 described in the Stormwater Management Handbooks (DEP and CZM, 1997). Stormceptor system may be used as a component in combination with different BMPs or may be used as a stand alone installation provided it is sized for 80% TSS removal. STEP recommends collection of additional data representing a varied set of operating conditions over a realistic maintenance cycle to verify TSS removal rates greater than 80%.

HIGHLIGHTS

- Performance data available demonstrates that the Stormceptor system can provide TSS removal rates of 77% when sized according to the "Sensitive Area" criteria. Evidence suggests that the Stormceptor system may be capable of achieving TSS removal rates between 89% and 99% when sized accordingly, under conditions similar to those reported in the Westwood Massachusetts site, including: climate and land use intensity.
- Performance data available to this reviewer suggest that the Stormceptor system can provide TSS removal rates of 52% when sized according to the "Treatment Train" criteria.
- Use of the Stormceptor system as a pretreatment component in combination with different BMPs, when sized according to the "Treatment Train" criteria, will likely meet standards 4 and 6 of the Stormwater Management Handbooks (DEP and CZM,1997). Use as a stand alone device may be justified when sized according to the "Sensitive Area" criteria.
- The Stormceptor system is likely to perform in areas with higher potential pollutant levels in Standard 5 of the Stormwater Management Handbooks (DEP and CZM,1997).
- The Stormceptor system is useful for new and retrofit installations in Standard 7 of the Stormwater Management Handbooks (DEP and CZM,1997), especially where space is limited.
- The Stormceptor system is also suited for secondary sediment control from construction related sediment loads specified in Standard 8 (DEP and CZM,1997).

POST CONSTRUCTION OPERATION AND MAINTENANCE PLAN

Operation and Maintenance Plan
Sudbury Road Stormwater Management System
December 30, 2008

The stormwater management system for Sudbury Road in Acton includes deep sump catch basins and manholes, leaching catch basins and a Stormceptor 900. Please refer to plan titled "Plan to Accompany a Notice of Intent for Sudbury Road in Acton" dated December 30, 2008 by Beals Associates, Inc., as revised.

Owner and Responsible Party

Town of Acton
Highway Department
14 Forest Road
Acton, MA

Maintenance Schedule

Deep sump catch basins, manholes, leaching catch basins and the Stormceptor shall be inspected **quarterly** for the first year to establish a maintenance schedule. Sediment shall be removed when the depth is greater than 6 inches in the Stormceptor and leaching catch basins and 24 inches in the deep sump basins and manholes.

Oil shall be removed from the structures immediately after a spill to prevent oil from reaching the leaching catch basins or the Assabet River. Any oil and sediment removed from the basins shall be disposed of in accordance with state and local regulations.

Maintenance Procedures

Deep sump catch basins, manholes and leaching catch basins

Basins will be inspected quarterly and directly after any spills. Accumulated sediment and debris will be removed when the depth of sediment reaches 24 inches. Oil, grease, and floatables will be removed when observed in the basins.

Stormceptor

Inspect and maintain the In-Line Stormceptor® from the surface, without entry into the unit. Perform maintenance once the stored volume reaches 15 percent of the Stormceptor® capacity (6 inches for the STC900), or immediately in the event of a spill.

Oil and sediment shall be removed through the 24-inch diameter outlet-riser pipe. Floatables and hydrocarbons shall be removed through the 6-inch oil inspection port.

Operation and Maintenance Log Form
Sudbury Road
Acton, MA

QUARTERLY for the first year after roadway and drainage is installed to determine appropriate schedule.

Deep Sump Catch Bains	**Date Completed**
Inspect storm drain for sediment.	
Hire a Vacuum Service to remove the sediment when the depth reaches 24 inches	
Deep Sump Manholes	**Date Completed**
Inspect storm drain for sediment.	
Hire a Vacuum Service to remove the sediment when the depth reaches 24 inches	
Leaching Catch Basins	**Date Completed**
Inspect storm drain for sediment.	
Hire a Vacuum Service to remove the sediment when the depth reaches 6 inches	
Stormceptor 900	**Date Completed**
Stormceptor units shall also be inspected after spill events and any oil captured by the Stormceptor shall be removed promptly.	
Check for oil using a dipstick or tube.	
Remove any oil using a small portable pump.	
Check for sediment accumulation	
Hire a Vacuum service to remove the sediment when the depth reaches 6 inches for the inlet STC 900	

ILLICIT DISCHARGE COMPLIANCE STATEMENT

Illicit Discharge Compliance Statement

Sudbury Road
Acton, MA

The stormwater management system is the system for conveying, treating, and infiltrating stormwater on site including stormwater best management practices and any pipes intended to transport stormwater to the ground water, a surface water, or municipal separate storm sewer system. The stormwater management system for this site is limited to deep sump catch basins and manholes, leaching catch bains and a Stormceptor.

Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater. There are no illicit discharges, nor are there proposed to be any illicit discharges on site.