PLYMOUTH REIT
56 MILLIKEN STREET, PORTLAND, MAINE

TAB 4 - ENVIRONMENTAL AND STORMWATER NARRATIVE

A. NARRATIVE

The intent of this Stormwater Management Plan is to comply with the requirements of the City of Portland Stormwater Management Technical Manual and the Maine Department of Environmental Protection (MDEP) Chapter 500 regulations. The MDEP has delegated review authority to the City of Portland, as discussed in the enclosed correspondence between the MDEP and CES, Inc. This project involves the development of approximately five acres for the construction of a 72,000 square foot (SF) warehousing facility. Additional impervious area includes approximately 57,600 SF of new driveway and maneuvering areas and 26,700 SF of existing impervious area to be conveyed to a new stormwater treatment structure. The stormwater management plan proposes treatment for 100% of the impervious area and 100% of the 178,897 SF of developed area in this project.

The Project is located on an existing developed site consisting of Tax Map parcels 334 A014001 and 354A A006. Total site area is approximately 31.21 acres. The site was originally developed in 1966. In 1995 an expansion of the building and expansion of the truck and car parking areas triggered a Site Location of Development Act (SLODA) permit (L-18722-26-B-D). Since 1975 approximately 5.7 acres of impervious area (Structure) was added to the site. The proposed development will add approximately 2.98 acres of impervious area bring the total impervious area since 1975 to 9.29 acres. MDEP has not asserted jurisdiction. Total existing impervious areas is approximately 11.40 acres. The proposed project will bring the total site impervious area to 14.38 acres.

Erosion control measures will be in place prior to the start of any construction. Temporary and permanent measures will be installed in accordance with Section 4C of this application. Upon completion of the construction and stabilization of all disturbed areas, the temporary erosion control measures will be removed.

Development within Urban Impaired Stream Watersheds: The proposed development is within the watershed of urban impaired stream Dole Brook. The compensation fee for the proposed impact to Dole Brook is $42,775, in accordance with Chapter 501.

Basic Erosion and Sedimentation Control Standards for all Development: Information is provided as required in Section 4C – Basic Standard Submission.

Flooding Standard Submission: The following information is provided in accordance with the Flooding Standard Submission, as required by the City of Portland Stormwater Management Technical Manual – Stormwater Management Plans for New Development.

1. Control of Peak Flows: The project is required to meet Flooding Standards in accordance with Chapter 500 requirements. The Pre and Post-Development Hydrology models and narrative are located in Section 4B.

2. Details, Design, and Specifications: The model runoff calculations are performed using a HydroCAD model. Sizing of the required stormwater treatment methods are included in Section 4A.

General Standards Submission: The following Information is provided as required in the General Standard Submission.

1. Narrative: The proposed project will occupy approximately 5 acres of the 31.21-ac site. Most of the remaining land to the East has been developed. The driveway, parking area and vehicular maneuvering areas account for approximately 84,300 SF of new impervious area. The facility's roof system accounts for 72,000 SF of new impervious area. Treatment methods also account for 26,700 SF of existing impervious area, as the current treatment is in the location of the proposed building. Proposed treatment methods include a roof drip edge and three underdrained soil filters adjacent to the proposed impervious areas.

2. Drainage Plans: A plan set is provided as part of Section 4 requirements and Pre- and Post-Development Hydrology Plans are provided in Section 4B under the Stormwater Management Quantity Report portion of this Application. The plan set includes the locations of BMP's used to treat the stormwater from this development, and a site detail sheet is included in Section 4B that provides detail information on the grassed underdrained soil filters.

3. Calculations: Underdrained soil filter sizes were determined in accordance with Chapter 500 and the MDEP Stormwater BMP Technical Design Manual, Volume III.

4. Details, Designs, and Specifications: The project is currently proposing to control runoff quality issues using a roof drip edge and three grassed underdrained soil filters (GUSF).

5. Phosphorus Standards Submission: The proposed development is not in a lake watershed, and is therefore not required to meet the Phosphorus Standards Submission.

SECTION 4A

STORMWATER QUALITY CONTROL NARRATIVE

The proposed Plymouth REIT is being developed for the construction of a warehousing facility in Portland, Maine. The site will be accessed by a 400-foot driveway off of Riverside Industrial Parkway. The approximately 5-acre development will involve the installation of about 129,600 SF of new impervious area. The development also proposes the removal of an existing underdrained soil filter as it interferes with the new building footprint. The filter treated runoff from approximately 26,700 SF of existing impervious area. Stormwater from the area will be conveyed through catch basins to a new underdrained soil filter. As a result of these improvements, the project is required to comply with the City of Portland Stormwater Management Technical Manual – Stormwater Management Plans for New Development. According to Maine DEP Chapter 500 regulations, 95% of proposed impervious surfaces and 80% of the developed area must be treated.

To treat stormwater associated with the proposed development, Plymouth REIT is proposing the construction of a roof drip edge and three grassed underdrained soil filters (GUSF) to meet stormwater quality standards. The GUSFs will be located in the south edge of the facility entrance to maximize the treatment of runoff. The locations of these BMP's are shown on the plan set.

The following tables summarize the impervious and developed area created by the project as well as the treatment structure, area treated, and relationship with the total developed and impervious areas for the project.

PROJECT SITE AREA

PROJECT AREA	IMPERVIOUS AREA	DEVELOPED AREA
New Site Area	129,596 SF	152,197 SF
Existing Site Area	26,700 SF	26,700 SF
TOTAL	156,296 SF	178,897 SF

STORMWATER TREATMENT SYSTEMS

TREATMENT METHOD	SITE AREA TREATED	
	IMPERVIOUS	DEVELOPED
GUSF 1	58,335 SF	69,830 SF
GUSF 2	3,232 SF	7,431 SF
GUSF 3	6,529 SF	13,436 SF
Roof Drip Edge	88,200	88,200
TOTAL	156,296 SF	178,897 SF
PERCENT OF TOTAL AREA TREATED	**100.0 %**	**100.0 %**

A description of the treatment type is as follows:

1. **Grass Underdrained Soil Filter (GUSF):** Three GUSF's have been proposed to treat stormwater runoff from the site. Runoff from paved areas will be conveyed through ditches along proposed pavements to the corresponding GUSF along the driveway. The proposed stormwater quality control devices have been designed according to the standards outlined in the Stormwater Management for Maine, Volume III BMP Manual, January 2006 and revised May 2016. Construction and maintenance will be according to standards outlined in this manual.

   GUSF 1:
   Impervious Area: 58,335 SF
   Landscape Area: 5,244 SF

   Chapter 500 sizing is based on 1" of the impervious area + 0.4" of the landscaped area.

   55,335 SF x 1" = 4,861 CF or Required Storage
   11,495 SF x 0.4" = 383 CF of Required Storage

   5,244 CF of Required Storage @ 18" Deep = 3,496 SF of Filter Area.
   3,900 SF was provided by design.

   GUSF 2:
   Impervious Area: 3,232 SF
   Landscape Area: 4,199 SF

   Chapter 500 sizing is based on 1" of the impervious area + 0.4" of the landscaped area.

   3,232 SF x 1" = 269 CF or Required Storage
   4,199 SF x 0.4" = 140 CF of Required Storage

   409 CF of Required Storage @ 18" Deep = 273 SF of Filter Area.
   370 SF was provided by design.

   GUSF 3:
   Impervious Area: 6,529 SF
   Landscape Area: 6,907 SF

   Chapter 500 sizing is based on 1" of the impervious area + 0.4" of the landscaped area.

   6,529 SF x 1" = 544 CF or Required Storage
   6,907 SF x 0.4" = 230 CF of Required Storage

   774 CF of Required Storage @ 18" Deep = 516 SF of Filter Area.
   620 SF was provided by design.

2. **Roof Drip Edge:** A roof drip edge has been proposed to treat impervious area from Subarea 5. The drip edge has been sized in accordance with the BMP Manual. The stone's porosity of 0.4 will allow enough runoff to be stored to meet the flooding standard, as presented in the HydroCAD model. The proposed stormwater quality control device has been designed according to the standards outlined in the Stormwater Management for Maine, Volume III BMP Manual, January 2006 and revised May 2016. Construction and maintenance will be according to standards outlined in this manual.

   Roof Area: 72,000 SF

   Chapter 500 sizing is based on 1" of the roof area

   72,000 SF x 1" = 6,000 CF of Required Storage
   6,000 CF of Required Storage @ Porosity of 0.4 = 15,000 CF Stone Required
   Drip Edge Stone Volume Provided to Meet Flooding Standard = 28,500 CF

SECTION 4B

STORMWATER MANAGEMENT QUANTITY NARRATIVE

As previously stated, the project is required to meet the flooding standard under Chapter 500 Section 4.E(2)(a). To meet the flooding standard, HydroCAD calculations were performed to compare pre-development and post-development conditions to determine curve numbers and peak runoff flows.

The undeveloped portion of the property is primarily forested with a mix of softwoods and hardwoods. Terrain is relatively flat, but two streams bisect the area, one entirely on the property and the other primarily on the adjacent property to the North. Both streams are located within steep-sided gullies. There is an additional low area near the north end of the property. Soils on the site are classified by the USDA web soil survey as cut and fill material in the existing development and a combination of Type C and D in the undeveloped portion of the property. A majority of the area proposed for development drains to the stream inside the property boundary. The overall runoff from the site drains south to Dole Brook. The post-development hydrology plan was broken into eight subareas encompassing the same footprint as pre-development hydrology plan. Runoff from the rooftop of the proposed warehouse is stored in the voids of a crushed stone drip edge with an underdrain. This stormwater is conveyed through a storm drainage pipe before outletting to the on-site stream. The existing turnaround is currently treated by an underdrained soil filter to be removed upon construction of the warehouse. To replace this treatment method, stormwater is captured by two catch basins and conveyed through piping to GUSF 1. A majority of new pavements will be contained and treated by a combination of the three proposed underdrained soil filter. These structures will outlet controlled and treated stormwater to the adjacent stream.

A summation point was chosen in the same location between pre-development and post-development to compare peak flow runoff for the 2-year, 10-year, and 25-year storm events. The summation point is located to the South of the site. Based on results of the HydroCAD, it is expected that stormwater runoff from the site will be similar or lessened in post-development conditions as in pre-development conditions. The drip edge and GUSFs detain stormwater runoff to allow a controlled flow before exiting the project site. A comparison of each of the watershed areas in both Pre- and Post-Development is organized in the table below.

		2 Year (cfs)	10 Year (cfs)	25 Year (cfs)	25 Year Net Change	25 Year % Change
Summation Point	Pre	45.70	78.68	105.67	**-3.89**	**-3.65**
	Post	42.65	77.47	101.78		

PRE-DEVELOPMENT HYDROCAD RESULTS

POST-DEVELOPMENT HYDROCAD RESULTS

PRE-DEVELOPMENT HYDROLOGY PLAN

POST-DEVELOPMENT HYDROLOGY PLAN

STORMWATER TREATMENT PLAN

DETAIL SHEETS

SECTION 4C

BASIC STANDARDS SUBMISSION

An Erosion and Sedimentation Plan was prepared for Plymouth REIT. The erosion control notes address permanent stabilization measures, seeding, and mulching rates, as well as the timing of installation. Construction and installation details are also provided for the project. Additional descriptions and specifications are provided in Erosion and Sedimentation Control.

An Inspection and Maintenance Plan has been included in this Section. This plan includes a list of measures to be inspected and maintained. It also includes the frequency and responsible parties to implement the plan. A Housekeeping Plan has also been included in this Section. This plan provides controls to address spill prevention and possible contamination of the site.

EROSION AND SEDIMENTATION CONTROL

The proposed construction will require the implementation of temporary and permanent erosion control measures. These measures will be implemented in accordance with the Maine Erosion and Sediment Control Best Management Practices (BMPs) Manual, prior to removal of any on-site vegetation or disturbance of any on-site soil. The general erosion and sediment control specifications and details, as provided within this section, are intended to describe measures to be used by contractors working on the site to maintain compliance with the standards established in the BMPs.

The proposed location and use of erosion control measures on-site are shown on the plan located in Section 4 of this application. There are no known existing erosion control concerns with the site. Implementation of proper erosion control measures will be required by site contractors to confine sediment and debris within the limit of soil disturbance. Proper use and maintenance of erosion control measures provide protection against off-site transport of sediment and discharge of sediment to undisturbed areas of the development.

EROSION AND SEDIMENTATION CONTROL PLAN

1. Pollution Prevention: The proposed project includes the construction of a warehousing facility in Portland, Maine. The facility will be approximately 72,000 square feet (SF), with associated roads and parking lots totaling approximately 84,300 SF. All disturbed areas, with the exception of the building and parking/maneuvering areas, will be stabilized with vegetation or riprap. Proposed down-gradient wooded areas and streams will be protected with the use of silt fence or additional control devices if necessary during construction.

2. Sediment Barriers: Prior to construction, sediment barriers will be installed downgradient of all disturbed areas. Sediment barriers will include silt fence, bark mulch berms, hay bales or additional measures which may become necessary.

Sediment barriers will also be installed adjacent to any significant natural drainage channel, not otherwise protected. All installed sediment barriers will be maintained until disturbed areas are permanently stabilized.

3. Temporary Stabilization: Disturbed areas, which have lost natural vegetation cover, and will not be worked for more than seven days, will be temporarily stabilized. Areas within 75 feet of a wetland or waterbody will be stabilized within 48 hours of the initial disturbance or prior to any significant storm event, whichever comes first.

Temporary stabilization will include mulch or other non-erodible material such as erosion control mesh mats. In some instances, temporary stabilization may include temporary mulch and seeding, based on the time until the area will be worked or permanently stabilized.

4. Removal of Temporary Sediment Control Measures: After permanent stabilization of disturbed areas has been completed, temporary measures, such as silt fence, will be removed within 30 days. Any accumulated sediments will be removed and any disturbed areas permanently stabilized.

5. Permanent Stabilization: Once proposed construction is completed all disturbed areas, not otherwise permanently stabilized, will be permanently stabilized with vegetation, seeding, or permanent mulch.

Vegetation plantings and seeding will include species which are suitable for the light, soil, and moisture conditions of the area. Seeded areas will be protected with temporary mulch or erosion control blankets.

Concentrated flows will not be allowed on newly seeded areas until an adequate catch of vegetation is established. It may be necessary to reseed and mulch again if germination is sparse, plant coverage is spotty, or topsoil erosion is evident. For seeded areas, permanent stabilization means a 90% cover of healthy plants with no evidence of washing or rilling of the topsoil.

Other permanent measures associated with the project include the following:

A. Permanent Mulch: Permanent mulching means total coverage of exposed area with an approved mulch material. Erosion control mix may be used as mulch for permanent stabilization according to the approved application rates and limitations.

B. Permanent Riprap: Permanent riprap means that slopes and ditches stabilized with riprap have an appropriate backing of well-graded gravel or approved geotextile to prevent soil movement from behind the riprap. Properly sized angular stones will be utilized.

C. Permanent Ditches, Channels, and Swales: Permanent stabilization means the channel is stabilized with a 90% cover of healthy vegetation or with a well-graded riprap lining. There must be no evidence of slumping of the channel lining, undercutting of the channel banks, or down-cutting of the channel.

6. Winter Construction: Winter construction is not anticipated at this time. If Winter construction occurs, additional provision will be made to protect disturbed areas from runoff. Winter construction includes the time between November 1 and April 15.

7. Stormwater Channels: Ditches, swales, and open stormwater channels are planned as part of this project. They will be stabilized with either vegetation or rip rap depending on the situation to prevent soil erosion.

8. Roads: The proposed roadways will vary in width, cross section and surface. These roads will be graded to collect water in various proposed BMP's. Some sections of roadway will be super-elevated to send runoff to the desired BMP.

9. Culverts: Culverts utilized in this project will be protected on both ends and the outlet pool to prevent scour.

10. Parking Areas: The proposed project includes parking areas graded to collect runoff in the various proposed BMP's.

11. Additional Requirements: No additional requirements are proposed at this time.

INSPECTION AND MAINTENANCE

The Owner and their Contractor will be responsible for maintenance during construction. The Owner will be responsible for post construction maintenance of the site and the devices that provide treatment for the stormwater from the site.

A Pre- and Post-Construction Maintenance Plan for the stormwater management system is included in this section. Any questions regarding the design and maintenance of the Stormwater Management and Erosion and Sedimentation Control Systems should be directed to:

John Kuchinski, P.E.
CES, Inc.
146 Main Street, Suite 300
Saco, ME 04072

MAINTENANCE PLAN OF STORMWATER MANAGEMENT SYSTEM

The Maine Department of Environmental Protection's (MDEP) Stormwater Management for Maine: Best Management Practices latest edition and the MDEP's Chapter 500: Stormwater Management were used as guidelines in the development of this Maintenance Plan. General maintenance requirements are listed below.

A. DURING CONSTRUCTION

The general contractor will be responsible for the inspection and maintenance of all stormwater management system components during construction.

Inspection: Inspection of disturbed and impervious areas, erosion control measures, materials storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site will be performed at least once a week as well as before and after a storm event, and prior to completing permanent stabilization measures. Inspections shall be conducted by a person with knowledge of erosion and stormwater control, including the standards and conditions in the permit.

Maintenance: All erosion control measures will be kept in effective operating condition until areas are permanently stabilized. If BMPs need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation will be completed within 7 calendar days and prior to any rainfall event.

Documentation: A log shall be kept summarizing the inspections and any corrective action taken. A copy of the log is provided at the end of this section, and is titled, Log of Inspections During Construction.

B. POST-CONSTRUCTION

The Owner will be responsible for the inspection and maintenance of all stormwater management system components associated with the proposed project. A list of corrective actions titled Inspection and Maintenance Plan for Stormwater Management Structures (BMPs) is provided at the end of this section.

Inspection and Corrective Action

1. **Vegetated Areas:** Inspections and maintenance of vegetated areas will be performed early in the growing season or after significant rainfall to identify any erosion problems. Areas where erosion is evident will be covered with an appropriate lining, or erosive flows will be diverted to an area able to handle the flows. Any bare areas or areas with sparse growth will be replanted.

2. **Ditches, Swales, and Culverts:** Inspections and maintenance of ditches, culverts, and swales will be performed in the Spring, late Fall, and after rain events greater than 1-inch in depth to remove any obstructions to flow, to remove any accumulated sediments within the structures, and to repair any erosion of channel linings, check dams, inlet protection, or outlet protection. Vegetated ditches and swales must be mowed no more than twice per year and cut no less than 6-inch in height.

3. **Grassed Underdrained Soil Filter (GUSF):** Inspections and maintenance of GUSF's will be performed annually in the spring and late fall to clean the basins of debris, sediment and hydrocarbons. Accumulated sediments within the basin shall be removed and disposed of, and basin media shall be renewed if it fails to drain within 72 hours after a one-inch rainfall event. GUSF's are to be tilled, seeded and mulched if vegetation is sparse. Repair all riprap where underlying filter fabric or gravel is showing or where stones have dislodged.

4. **Roof Drip Edge:** Inspections and maintenance of the roof drip edge will be performed annually in the spring and late fall to clean the basins of debris, sediment and hydrocarbons. Accumulated sediments within the filtration system shall be removed and disposed of, and basin media shall be renewed if it fails to drain within 72 hours after a one-inch rainfall event. Repair all stone where underlying filter fabric or gravel is showing or where stones have dislodged.

C. DOCUMENTATION

A log shall be kept summarizing the inspections, maintenance, and any corrective action taken. A copy of the log is provided at the end of this section, and is titled, BMP Inspection Log

HOUSEKEEPING

1. **Spill Prevention** - During construction, controls will be used to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

2. **Groundwater Protection**- During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater will not be stored or handled in areas of the site draining to an infiltration area. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

3. **Fugitive Sediment and Dust** - Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil will not be used for dust control. Water will be used for dust control during construction. Operations during wet months that cause mud to be tracked off the site onto public roads will provide sweeping of the road areas at least once per week and prior to significant storm events.

4. **Debris and Other Materials** - Litter, construction debris, and chemicals exposed to stormwater will be prevented from becoming a pollutant source.

5. **Trench or Foundation De-Watering** - If de-watering is necessary, the collected water will be removed from the ponded area and spread through natural wooded buffers or discharged into a construction sedimentation basin. The water will not be allowed to flow over disturbed areas to the site.

6. **Non Stormwater Discharges** – Identify and prevent contamination by non-stormwater discharges.

7. **Additional Requirements** – Additional requirements may be applied on a site-specific basis.

PLYMOUTH REIT
LOG OF INSPECTIONS DURING CONSTRUCTION

Inspection Date	Inspector (Name and Qualifications)	Major Observations	Work Performed

Notes

1) Major Observations include the operation and maintenance of erosion and sedimentation controls, materials storage areas, and vehicle access points to the parcel. Major Observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations(s) where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken.
2) Work Performed will include a description of the corrective action taken, the date the corrective action was taken, and the name and qualifications of the person taking the corrective actions
3) The log must be made accessible to MDEP staff and a copy must be provided upon request.
4) The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

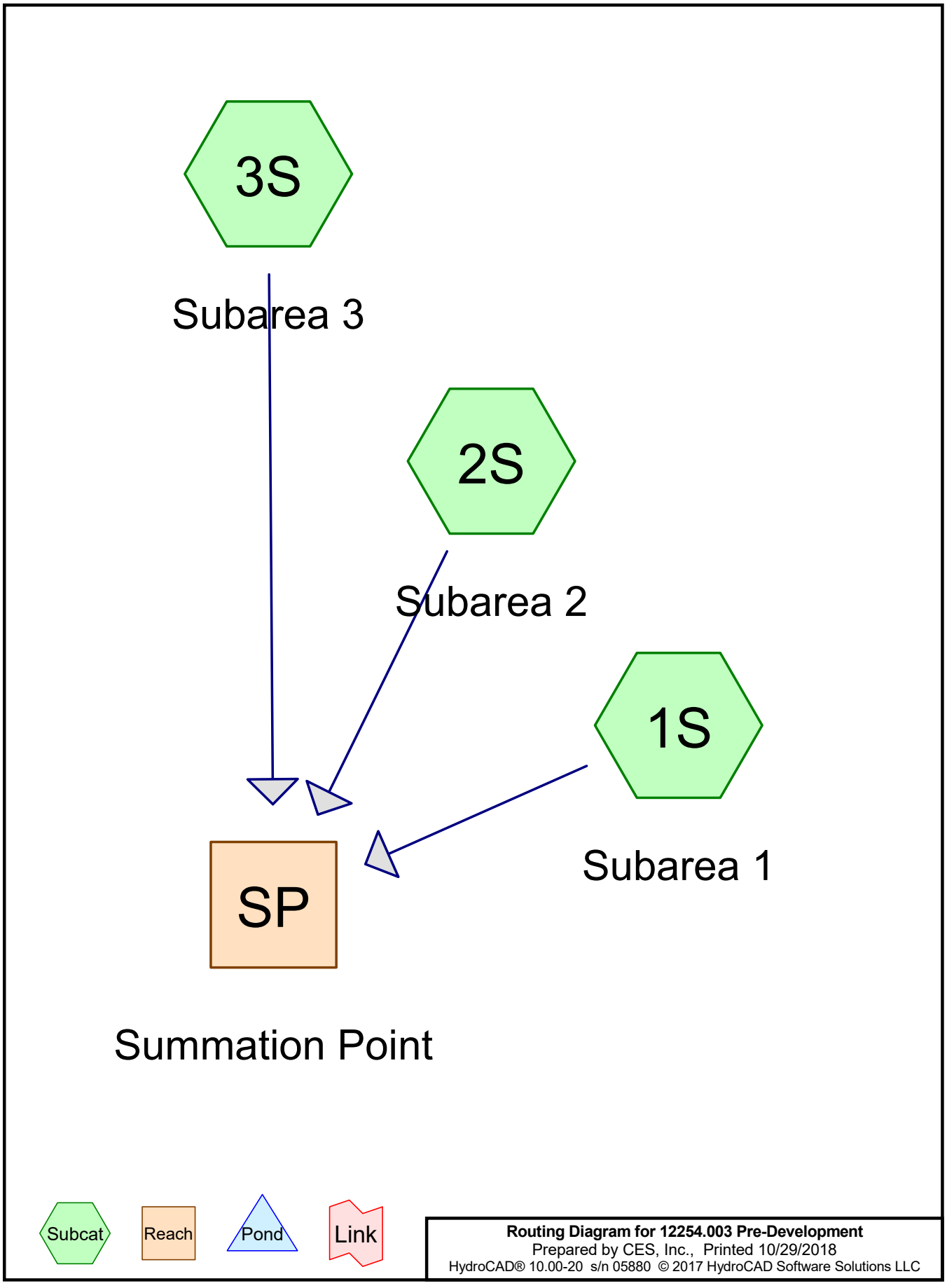
PLYMOUTH REIT
BMP INSPECTION LOG

Date	Inspector (Name and Qualifications)	ID Number	BMP Structure	Work Performed	Comments

Notes

1) If a maintenance task requires the clean-out of any sediments or debris, indicate where the sediment and debris was disposed after removal.
2) BMP structures shall be numbered sequentially and located on attached site map.
3) The log must be made accessible to MDEP staff and a copy must be provided upon request.
4) The permittee shall retain a copy of the log for a period of at least five years from the completion of permanent stabilization.

INSPECTION AND MAINTENANCE PLAN FOR STORMWATER MANAGEMENT STRUCTURES (BMPS)		
	INSPECTION SCHEDULE	**CORRECTIVE ACTIONS**
VEGETATED AREAS	Annually early spring and after heavy rains	Inspect all slopes and embankments and replant areas of bare soil or with sparse growth
		Armor rill erosion areas with riprap or divert the runoff to a stable area
		Inspect and repair down-slope of all spreaders and turn-outs for erosion
		Mow vegetation as specified for the area
DITCHES, SWALES AND OPEN STORMWATER CHANNELS	Annually spring and late fall and after heavy rains	Remove obstructions, sediments or debris from ditches, swales and other open channels
		Repair any erosion of the ditch lining
		Mow vegetated ditches
		Remove woody vegetation growing through riprap
		Repair any slumping side slopes
		Repair riprap where underlying filter fabric or gravel is showing or if stones have dislodged
CULVERTS	Spring and late fall and after heavy rains	Remove accumulated sediments and debris at the inlet, outlet, or within the conduit
		Remove any obstruction to flow
		Repair any erosion damage at the culvert's inlet and outlet
CATCHBASINS	Annually in the spring	Remove sediments and debris from the bottom of the basin and inlet grates
		Remove floating debris and oils (using oil absorptive pads) from any trap
ROADWAYS AND PARKING AREAS	Annually in the spring or as needed	Clear and remove accumulated winter sand in parking lots and along roadways
		Sweep pavement to remove sediment
		Grade road shoulders and remove accumulated winter sand
		Grade gravel roads and gravel shoulders
		Clean-out the sediment within water bars or open-top culverts
		Ensure that stormwater runoff is not impeded by false ditches of sediment in the shoulder
RESOURCE AND TREATEMENT BUFFERS	Annually in the spring	Inspect buffers for evidence of erosion, concentrated flow, or encroachment by development
		Manage the buffer's vegetation with the requirements in any deed restrictions
		Repair any sign of erosion within a buffer
		Inspect and repair down-slope of all spreaders and turn-outs for erosion
		Install more level spreaders, or ditch turn-outs if needed for a better distribution of flow
		Clean-out any accumulation of sediment within the spreader bays or turnout pools
		Mow non-wooded buffers no shorter than six inches and less than three times per year
WETPONDS AND DETENTION BASINS	Annually in fall and after heavy rains	Inspect the embankments for settlement, slope erosion, piping, and slumping
		Mow the embankment to control woody vegetation
		Inspect the outlet structure for broken seals, obstructed orifices, and plugged trash racks
		Remove and dispose of sediments and debris within the control structure
		Repair any damage to trash racks or debris guards
		Replace any dislodged stone in riprap spillways
		Remove and dispose of accumulated sediments within the impoundment and forebay
FILTRATION AND INFILTRATION BASINS	Annually in the spring and late fall	Clean the basin of debris, sediment and hydrocarbons
		Provide for the removal and disposal of accumulated sediments within the basin
		Renew the basin media if it fails to drain within 72 hours after a one inch rainfall event
		Till, seed and mulch the basin if vegetation is sparse
		Repair riprap where underlying filter fabric or gravel is showing or where stones have dislodged
PROPRIETARY DEVICES	As specified by manufacturer	Contract with a third-party for inspection and maintenance
		Follow the manufacturer's plan for cleaning of devices
OTHER PRACTICES	As specified for devices	Contact the department for appropriate inspection and maintenance requirements for other drainage control and runoff treatment measures.



Routing Diagram for 12254.003 Pre-Development
Prepared by CES, Inc., Printed 10/29/2018

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

Subcatchment 1S: Subarea 1 Runoff Area=665,147 sf 36.39% Impervious Runoff Depth>1.47"
Flow Length=1,215' Tc=11.7 min CN=84 Runoff=35.00 cfs 1.872 af

Subcatchment 2S: Subarea 2 Runoff Area=173,753 sf 100.00% Impervious Runoff Depth>2.65"
Flow Length=785' Slope=0.0100 '/' Tc=3.1 min CN=98 Runoff=18.58 cfs 0.882 af

Subcatchment 3S: Subarea 3 Runoff Area=15,247 sf 100.00% Impervious Runoff Depth>2.65"
Flow Length=385' Slope=0.0100 '/' Tc=2.9 min CN=98 Runoff=1.63 cfs 0.077 af

Reach SP: Summation Point Inflow=45.70 cfs 2.832 af
Outflow=45.70 cfs 2.832 af

Total Runoff Area = 19.609 ac Runoff Volume = 2.832 af Average Runoff Depth = 1.73"
49.53% Pervious = 9.713 ac 50.47% Impervious = 9.896 ac

Summary for Subcatchment 1S: Subarea 1

Runoff = 35.00 cfs @ 12.04 hrs, Volume= 1.872 af, Depth> 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
30,736	78	Meadow, non-grazed, HSG D
111,998	82	Woods/grass comb., Fair, HSG D
11,049	98	Roofs, HSG C
230,999	98	Paved parking, HSG C
123,625	76	Woods/grass comb., Fair, HSG C
156,740	71	Meadow, non-grazed, HSG C
665,147	84	Weighted Average
423,099		63.61% Pervious Area
242,048		36.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0210	1.38		**Sheet Flow, SF 1-1** Smooth surfaces n= 0.011 P2= 3.10"
2.9	520	0.0210	2.94		**Shallow Concentrated Flow, SCF 1-1** Paved Kv= 20.3 fps
7.6	595	0.0350	1.31		**Shallow Concentrated Flow, SCF 1-2** Short Grass Pasture Kv= 7.0 fps
11.7	1,215	Total			

Summary for Subcatchment 2S: Subarea 2

Runoff = 18.58 cfs @ 11.93 hrs, Volume= 0.882 af, Depth> 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
173,753	98	Roofs, HSG C
173,753		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.03		**Sheet Flow, SF 2-1** Smooth surfaces n= 0.011 P2= 3.10"
1.5	685	0.0100	7.73	13.66	**Pipe Channel, PC 2-1** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.010 PVC, smooth interior
3.1	785	Total			

Summary for Subcatchment 3S: Subarea 3

Runoff = 1.63 cfs @ 11.93 hrs, Volume= 0.077 af, Depth> 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
15,247	98	Roofs, HSG C
15,247		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.89		**Sheet Flow, SF 3-1** Smooth surfaces n= 0.011 P2= 3.10"
2.0	335	0.0100	2.84	0.25	**Pipe Channel, PC 3-1** 4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08' n= 0.010 PVC, smooth interior
2.9	385	Total			

Summary for Reach SP: Summation Point

Inflow Area = 19.609 ac, 50.47% Impervious, Inflow Depth > 1.73" for 2-yr event
Inflow = 45.70 cfs @ 11.98 hrs, Volume= 2.832 af
Outflow = 45.70 cfs @ 11.98 hrs, Volume= 2.832 af, Atten= 0%, Lag= 0.0 min

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

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

Subcatchment 1S: Subarea 1 Runoff Area=665,147 sf 36.39% Impervious Runoff Depth>2.70"
Flow Length=1,215' Tc=11.7 min CN=84 Runoff=62.86 cfs 3.435 af

Subcatchment 2S: Subarea 2 Runoff Area=173,753 sf 100.00% Impervious Runoff Depth>4.01"
Flow Length=785' Slope=0.0100 '/' Tc=3.1 min CN=98 Runoff=27.74 cfs 1.333 af

Subcatchment 3S: Subarea 3 Runoff Area=15,247 sf 100.00% Impervious Runoff Depth>4.01"
Flow Length=385' Slope=0.0100 '/' Tc=2.9 min CN=98 Runoff=2.44 cfs 0.117 af

Reach SP: Summation Point Inflow=78.68 cfs 4.885 af
Outflow=78.68 cfs 4.885 af

Total Runoff Area = 19.609 ac Runoff Volume = 4.885 af Average Runoff Depth = 2.99"
49.53% Pervious = 9.713 ac 50.47% Impervious = 9.896 ac

Summary for Subcatchment 1S: Subarea 1

Runoff = 62.86 cfs @ 12.03 hrs, Volume= 3.435 af, Depth> 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
30,736	78	Meadow, non-grazed, HSG D
111,998	82	Woods/grass comb., Fair, HSG D
11,049	98	Roofs, HSG C
230,999	98	Paved parking, HSG C
123,625	76	Woods/grass comb., Fair, HSG C
156,740	71	Meadow, non-grazed, HSG C
665,147	84	Weighted Average
423,099		63.61% Pervious Area
242,048		36.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0210	1.38		**Sheet Flow, SF 1-1** Smooth surfaces n= 0.011 P2= 3.10"
2.9	520	0.0210	2.94		**Shallow Concentrated Flow, SCF 1-1** Paved Kv= 20.3 fps
7.6	595	0.0350	1.31		**Shallow Concentrated Flow, SCF 1-2** Short Grass Pasture Kv= 7.0 fps
11.7	1,215	Total			

Summary for Subcatchment 2S: Subarea 2

Runoff = 27.74 cfs @ 11.93 hrs, Volume= 1.333 af, Depth> 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
173,753	98	Roofs, HSG C
173,753		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.03		**Sheet Flow, SF 2-1** Smooth surfaces n= 0.011 P2= 3.10"
1.5	685	0.0100	7.73	13.66	**Pipe Channel, PC 2-1** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.010 PVC, smooth interior
3.1	785	Total			

Summary for Subcatchment 3S: Subarea 3

Runoff = 2.44 cfs @ 11.93 hrs, Volume= 0.117 af, Depth> 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
15,247	98	Roofs, HSG C
15,247		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.89		**Sheet Flow, SF 3-1** Smooth surfaces n= 0.011 P2= 3.10"
2.0	335	0.0100	2.84	0.25	**Pipe Channel, PC 3-1** 4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08' n= 0.010 PVC, smooth interior
2.9	385	Total			

Summary for Reach SP: Summation Point

Inflow Area = 19.609 ac, 50.47% Impervious, Inflow Depth > 2.99" for 10-yr event
Inflow = 78.68 cfs @ 11.98 hrs, Volume= 4.885 af
Outflow = 78.68 cfs @ 11.98 hrs, Volume= 4.885 af, Atten= 0%, Lag= 0.0 min

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

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

Subcatchment 1S: Subarea 1 Runoff Area=665,147 sf 36.39% Impervious Runoff Depth>3.74"
Flow Length=1,215' Tc=11.7 min CN=84 Runoff=85.64 cfs 4.759 af

Subcatchment 2S: Subarea 2 Runoff Area=173,753 sf 100.00% Impervious Runoff Depth>5.09"
Flow Length=785' Slope=0.0100 '/' Tc=3.1 min CN=98 Runoff=35.05 cfs 1.692 af

Subcatchment 3S: Subarea 3 Runoff Area=15,247 sf 100.00% Impervious Runoff Depth>5.09"
Flow Length=385' Slope=0.0100 '/' Tc=2.9 min CN=98 Runoff=3.08 cfs 0.148 af

Reach SP: Summation Point Inflow=105.67 cfs 6.599 af
Outflow=105.67 cfs 6.599 af

Total Runoff Area = 19.609 ac Runoff Volume = 6.599 af Average Runoff Depth = 4.04"
49.53% Pervious = 9.713 ac 50.47% Impervious = 9.896 ac

Summary for Subcatchment 1S: Subarea 1

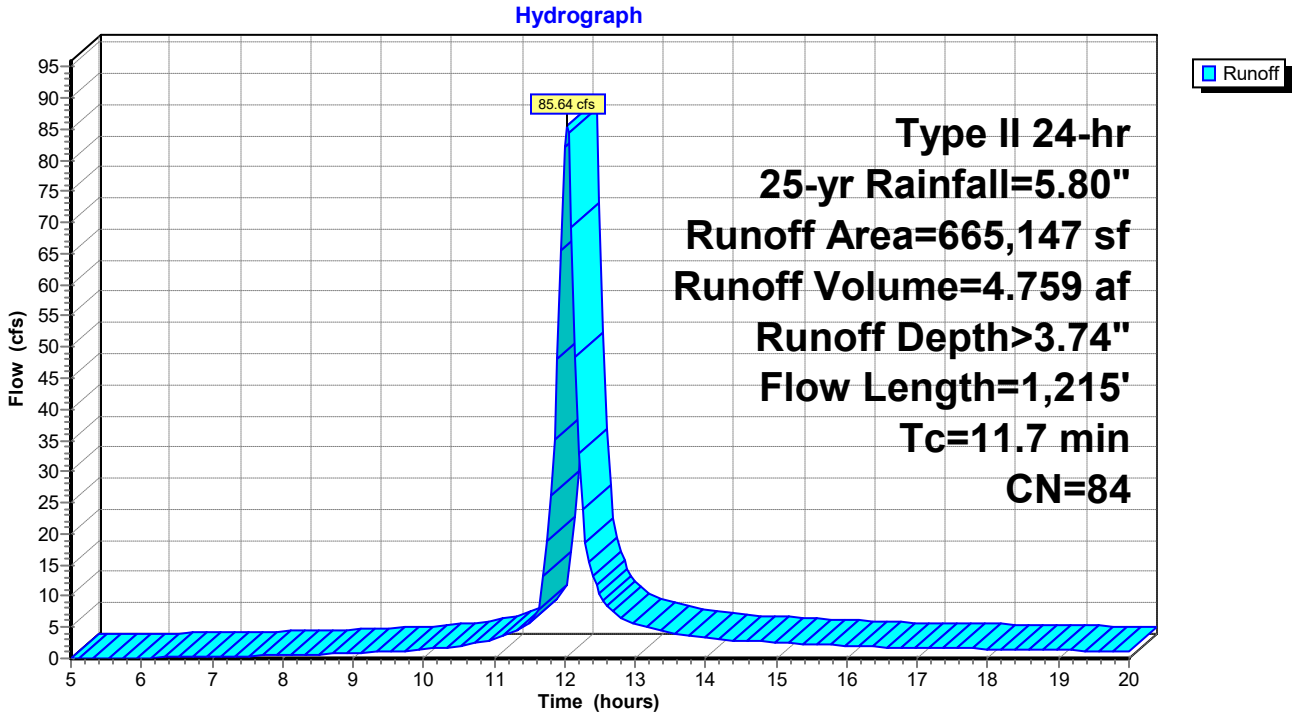
Runoff = 85.64 cfs @ 12.03 hrs, Volume= 4.759 af, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.80"

Area (sf)	CN	Description
30,736	78	Meadow, non-grazed, HSG D
111,998	82	Woods/grass comb., Fair, HSG D
11,049	98	Roofs, HSG C
230,999	98	Paved parking, HSG C
123,625	76	Woods/grass comb., Fair, HSG C
156,740	71	Meadow, non-grazed, HSG C
665,147	84	Weighted Average
423,099		63.61% Pervious Area
242,048		36.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0210	1.38		**Sheet Flow, SF 1-1** Smooth surfaces n= 0.011 P2= 3.10"
2.9	520	0.0210	2.94		**Shallow Concentrated Flow, SCF 1-1** Paved Kv= 20.3 fps
7.6	595	0.0350	1.31		**Shallow Concentrated Flow, SCF 1-2** Short Grass Pasture Kv= 7.0 fps
11.7	1,215	Total			

Subcatchment 1S: Subarea 1



Summary for Subcatchment 2S: Subarea 2

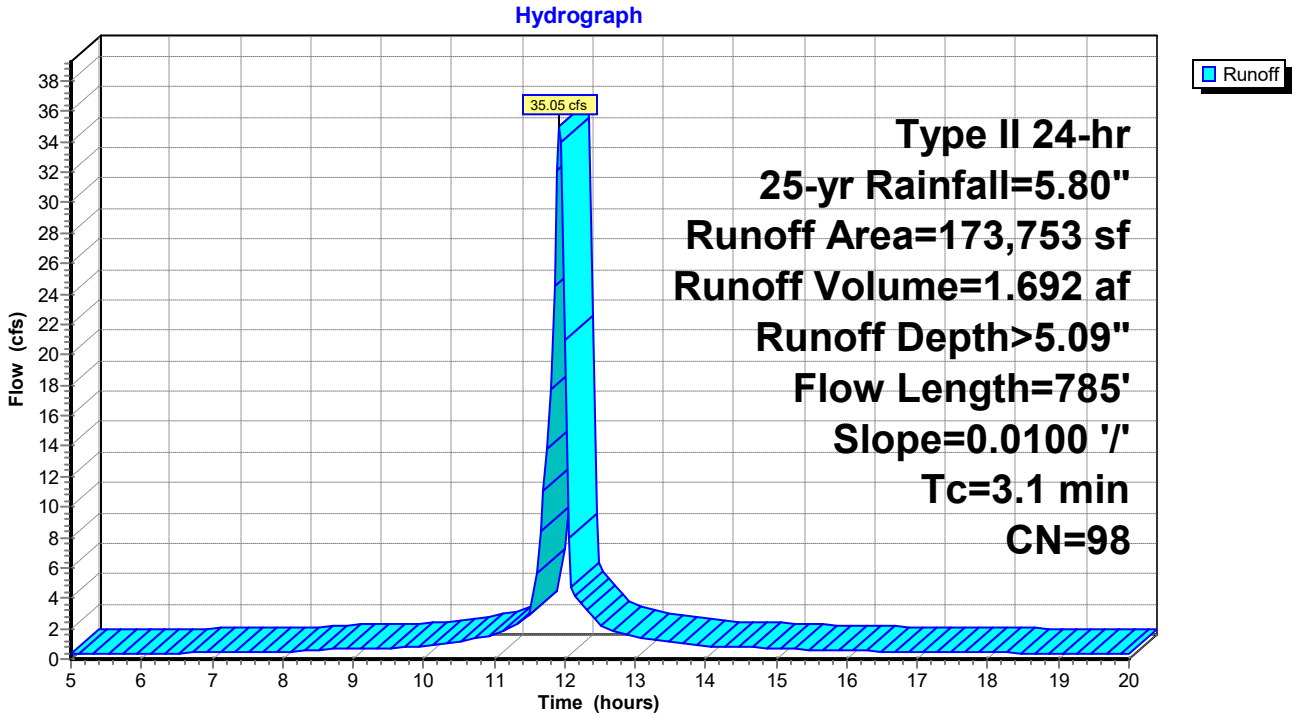
Runoff = 35.05 cfs @ 11.93 hrs, Volume= 1.692 af, Depth> 5.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.80"

Area (sf)	CN	Description
173,753	98	Roofs, HSG C
173,753		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.03		**Sheet Flow, SF 2-1** Smooth surfaces n= 0.011 P2= 3.10"
1.5	685	0.0100	7.73	13.66	**Pipe Channel, PC 2-1** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.010 PVC, smooth interior
3.1	785	Total			

Subcatchment 2S: Subarea 2



Summary for Subcatchment 3S: Subarea 3

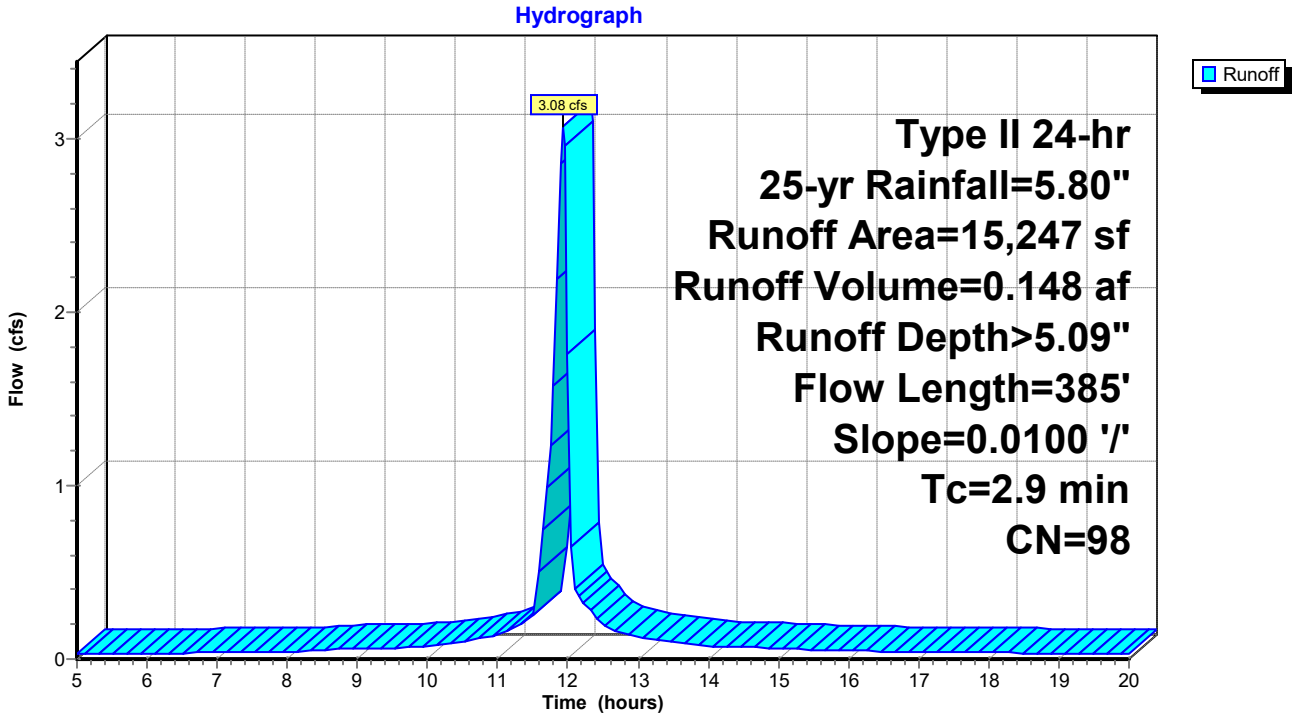
Runoff = 3.08 cfs @ 11.93 hrs, Volume= 0.148 af, Depth> 5.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.80"

Area (sf)	CN	Description
15,247	98	Roofs, HSG C
15,247		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.89		**Sheet Flow, SF 3-1** Smooth surfaces n= 0.011 P2= 3.10"
2.0	335	0.0100	2.84	0.25	**Pipe Channel, PC 3-1** 4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08' n= 0.010 PVC, smooth interior
2.9	385	Total			

Subcatchment 3S: Subarea 3

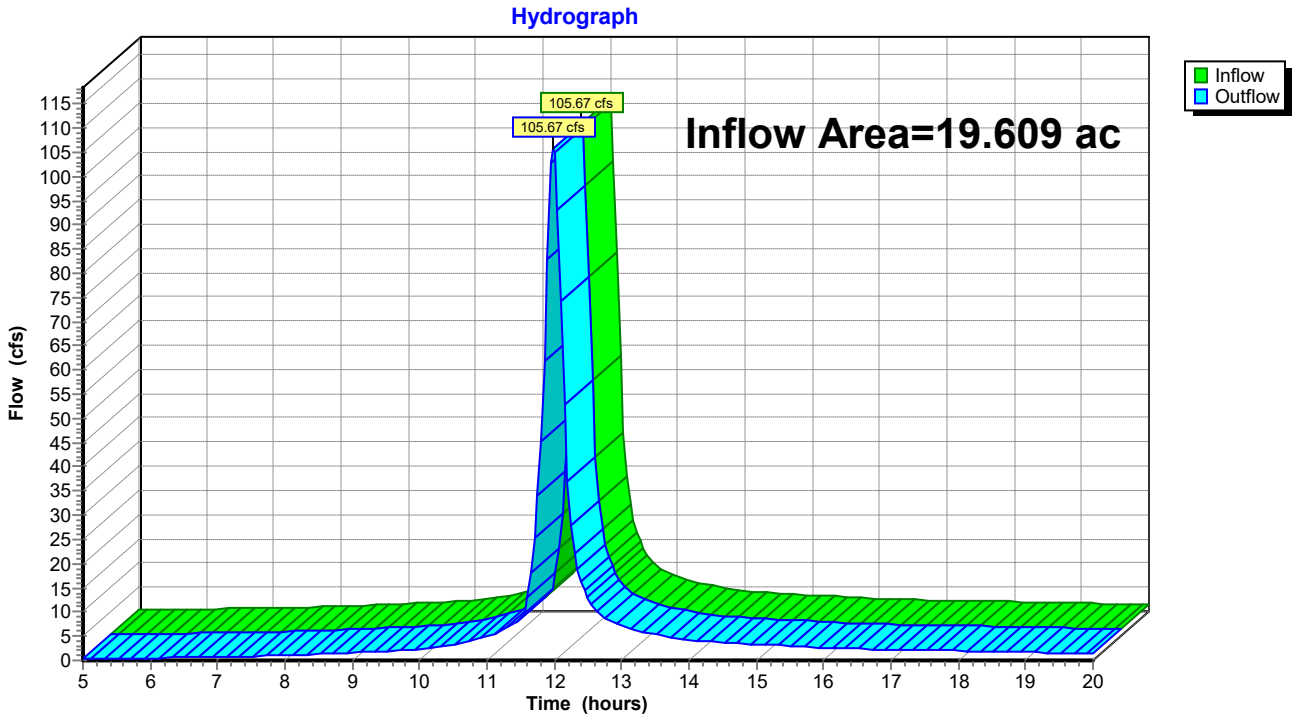


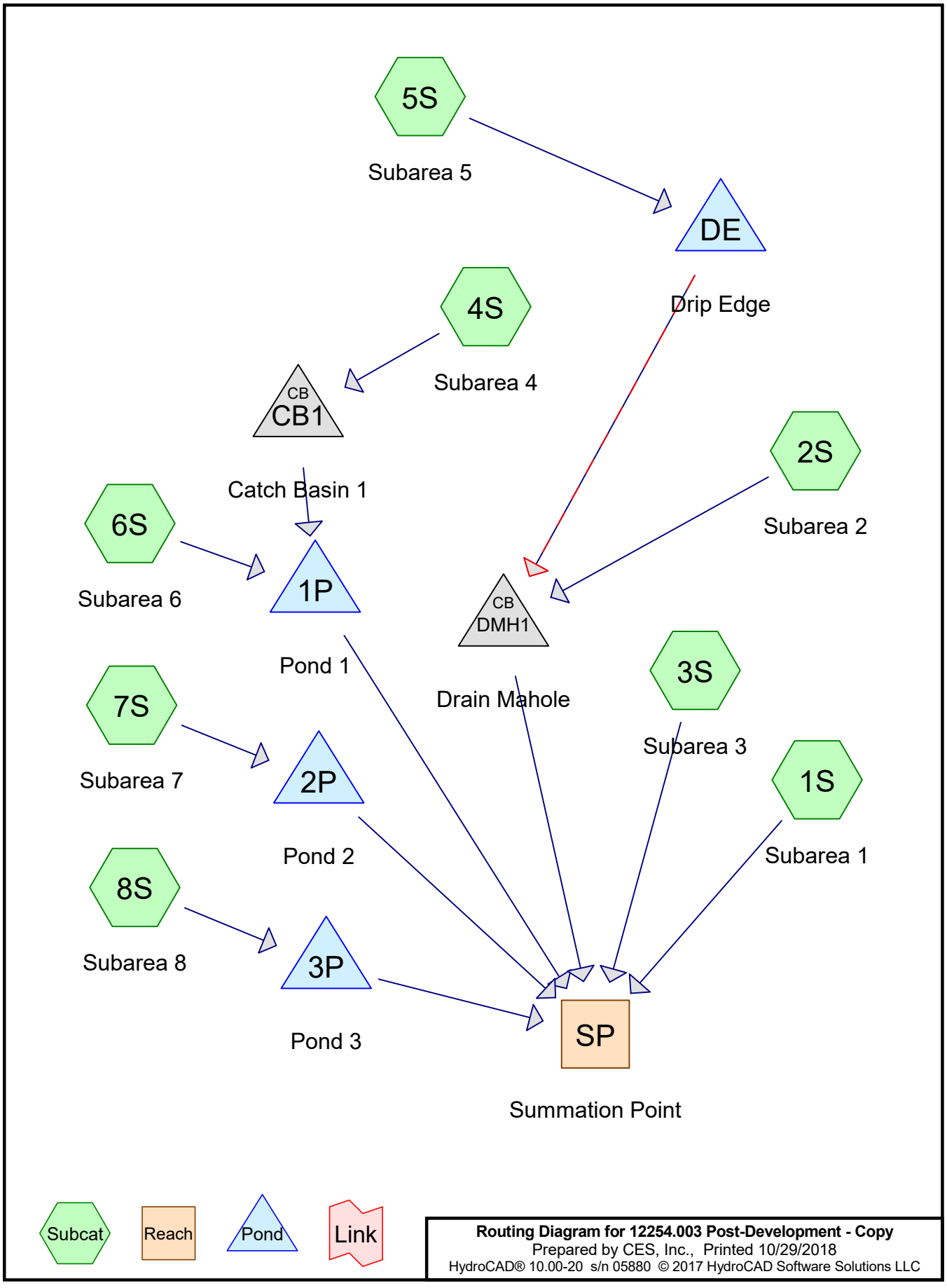
Summary for Reach SP: Summation Point

Inflow Area = 19.609 ac, 50.47% Impervious, Inflow Depth > 4.04" for 25-yr event
Inflow = 105.67 cfs @ 11.98 hrs, Volume= 6.599 af
Outflow = 105.67 cfs @ 11.98 hrs, Volume= 6.599 af, Atten= 0%, Lag= 0.0 min

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

Reach SP: Summation Point





Routing Diagram for 12254.003 Post-Development - Copy
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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subarea 1 Runoff Area=448,435 sf 48.10% Impervious Runoff Depth>1.54"
Flow Length=1,215' Tc=11.7 min CN=85 Runoff=24.65 cfs 1.323 af

Subcatchment 2S: Subarea 2 Runoff Area=173,753 sf 100.00% Impervious Runoff Depth>2.65"
Flow Length=785' Slope=0.0100 '/' Tc=3.1 min CN=98 Runoff=18.58 cfs 0.882 af

Subcatchment 3S: Subarea 3 Runoff Area=15,247 sf 100.00% Impervious Runoff Depth>2.65"
Flow Length=380' Slope=0.0100 '/' Tc=2.8 min CN=98 Runoff=1.63 cfs 0.077 af

Subcatchment 4S: Subarea 4 Runoff Area=44,955 sf 62.82% Impervious Runoff Depth>1.85"
Flow Length=217' Slope=0.0220 '/' Tc=12.3 min CN=89 Runoff=2.85 cfs 0.159 af

Subcatchment 5S: Subarea 5 Runoff Area=93,335 sf 94.50% Impervious Runoff Depth>2.57"
Flow Length=230' Slope=0.0200 '/' Tc=2.2 min CN=97 Runoff=9.72 cfs 0.459 af

Subcatchment 6S: Subarea 6 Runoff Area=45,394 sf 66.29% Impervious Runoff Depth>1.86"
Flow Length=461' Tc=2.9 min CN=89 Runoff=3.88 cfs 0.161 af

Subcatchment 7S: Subarea 7 Runoff Area=10,526 sf 30.70% Impervious Runoff Depth>1.21"
Flow Length=160' Tc=1.8 min CN=80 Runoff=0.62 cfs 0.024 af

Subcatchment 8S: Subarea 8 Runoff Area=22,538 sf 28.97% Impervious Runoff Depth>1.21"
Flow Length=137' Tc=1.4 min CN=80 Runoff=1.34 cfs 0.052 af

Reach SP: Summation Point Inflow=43.03 cfs 2.732 af
Outflow=43.03 cfs 2.732 af

Pond 1P: Pond 1 Peak Elev=67.40' Storage=0.320 af Inflow=5.88 cfs 0.320 af
Outflow=0.00 cfs 0.000 af

Pond 2P: Pond 2 Peak Elev=59.40' Storage=0.024 af Inflow=0.62 cfs 0.024 af
Outflow=0.00 cfs 0.000 af

Pond 3P: Pond 3 Peak Elev=55.40' Storage=0.052 af Inflow=1.34 cfs 0.052 af
Outflow=0.00 cfs 0.000 af

Pond CB1: Catch Basin 1 Peak Elev=76.04' Inflow=2.85 cfs 0.159 af
15.0" Round Culvert n=0.013 L=100.0' S=0.0050 '/' Outflow=2.85 cfs 0.159 af

Pond DE: Drip Edge Peak Elev=78.91' Storage=5,115 cf Inflow=9.72 cfs 0.459 af
15.0" Round Culvert n=0.013 L=100.0' S=0.0100 '/' Outflow=5.29 cfs 0.449 af

Pond DMH1: Drain Mahole Peak Elev=75.80' Inflow=23.43 cfs 1.332 af
24.0" Round Culvert n=0.013 L=150.0' S=0.0033 '/' Outflow=23.43 cfs 1.332 af

Total Runoff Area = 19.609 ac Runoff Volume = 3.139 af Average Runoff Depth = 1.92"
34.32% Pervious = 6.730 ac 65.68% Impervious = 12.879 ac

Summary for Subcatchment 1S: Subarea 1

Runoff = 24.65 cfs @ 12.04 hrs, Volume= 1.323 af, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
11,049	98	Roofs, HSG C
204,658	98	Paved parking, HSG C
15,335	82	Woods/grass comb., Fair, HSG D
92,772	73	Woods, Fair, HSG C
7,805	78	Meadow, non-grazed, HSG D
116,816	71	Meadow, non-grazed, HSG C
448,435	85	Weighted Average
232,728		51.90% Pervious Area
215,707		48.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0210	1.38		**Sheet Flow, SF 1-1** Smooth surfaces n= 0.011 P2= 3.10"
2.9	520	0.0210	2.94		**Shallow Concentrated Flow, SCF 1-1** Paved Kv= 20.3 fps
7.6	595	0.0350	1.31		**Shallow Concentrated Flow, SCF 1-2** Short Grass Pasture Kv= 7.0 fps
11.7	1,215	Total			

Summary for Subcatchment 2S: Subarea 2

Runoff = 18.58 cfs @ 11.93 hrs, Volume= 0.882 af, Depth> 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
173,753	98	Roofs, HSG C
173,753		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.03		**Sheet Flow, SF 2-1** Smooth surfaces n= 0.011 P2= 3.10"
1.5	685	0.0100	7.73	13.66	**Pipe Channel, PC 2-1** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.010 PVC, smooth interior
3.1	785	Total			

Summary for Subcatchment 3S: Subarea 3

Runoff = 1.63 cfs @ 11.93 hrs, Volume= 0.077 af, Depth> 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
15,247	98	Roofs, HSG C
15,247		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.89		**Sheet Flow, SF 3-1** Smooth surfaces n= 0.011 P2= 3.10"
1.9	330	0.0100	2.84	0.25	**Pipe Channel, PC 3-1** 4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08' n= 0.010 PVC, smooth interior
2.8	380	Total			

Summary for Subcatchment 4S: Subarea 4

Runoff = 2.85 cfs @ 12.04 hrs, Volume= 0.159 af, Depth> 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
23,905	98	Paved parking, HSG C
4,337	98	Paved parking, HSG D
3,033	82	Woods/grass comb., Fair, HSG D
8,788	71	Meadow, non-grazed, HSG C
4,892	78	Meadow, non-grazed, HSG D
44,955	89	Weighted Average
16,713		37.18% Pervious Area
28,242		62.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	65	0.0220	0.11		**Sheet Flow, SF 4-1** Grass: Dense n= 0.240 P2= 3.10"
0.5	35	0.0220	1.14		**Sheet Flow, SF 4-2** Smooth surfaces n= 0.011 P2= 3.10"
1.9	117	0.0220	1.04		**Shallow Concentrated Flow, SCF 4-1** Short Grass Pasture Kv= 7.0 fps
12.3	217	Total			

Summary for Subcatchment 5S: Subarea 5

Runoff = 9.72 cfs @ 11.92 hrs, Volume= 0.459 af, Depth> 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
72,000	98	Roofs, HSG D
16,200	98	Paved parking, HSG D
3,478	79	Woods, Fair, HSG D
1,657	78	Meadow, non-grazed, HSG D
93,335	97	Weighted Average
5,135		5.50% Pervious Area
88,200		94.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0200	1.35		**Sheet Flow, SF 5-1** Smooth surfaces n= 0.011 P2= 3.10"
1.0	130	0.0200	2.28		**Shallow Concentrated Flow, SCF 5-1** Unpaved Kv= 16.1 fps
2.2	230	Total			

Summary for Subcatchment 6S: Subarea 6

Runoff = 3.88 cfs @ 11.93 hrs, Volume= 0.161 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
13,298	98	Paved parking, HSG D
16,795	98	Paved parking, HSG C
708	78	Meadow, non-grazed, HSG D
14,593	71	Meadow, non-grazed, HSG C
45,394	89	Weighted Average
15,301		33.71% Pervious Area
30,093		66.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0400	1.79		**Sheet Flow, SF 6-1** Smooth surfaces n= 0.011 P2= 3.10"
2.0	361	0.0220	3.01		**Shallow Concentrated Flow, SCF 6-1** Paved Kv= 20.3 fps
2.9	461	Total			

Summary for Subcatchment 7S: Subarea 7

Runoff = 0.62 cfs @ 11.92 hrs, Volume= 0.024 af, Depth> 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
551	76	Woods/grass comb., Fair, HSG C
3,232	98	Paved parking, HSG C
6,743	71	Meadow, non-grazed, HSG C
10,526	80	Weighted Average
7,294		69.30% Pervious Area
3,232		30.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	60	0.0330	1.49		**Sheet Flow, SF 7-1** Smooth surfaces n= 0.011 P2= 3.10"
1.1	100	0.0480	1.53		**Shallow Concentrated Flow, SCF 7-1** Short Grass Pasture Kv= 7.0 fps
1.8	160	Total			

Summary for Subcatchment 8S: Subarea 8

Runoff = 1.34 cfs @ 11.91 hrs, Volume= 0.052 af, Depth> 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
6,529	98	Paved parking, HSG C
4,143	76	Woods/grass comb., Fair, HSG C
11,866	71	Meadow, non-grazed, HSG C
22,538	80	Weighted Average
16,009		71.03% Pervious Area
6,529		28.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	100	0.0360	1.71		**Sheet Flow, SF 8-1** Smooth surfaces n= 0.011 P2= 3.10"
0.4	37	0.0530	1.61		**Shallow Concentrated Flow, SCF 8-1** Short Grass Pasture Kv= 7.0 fps
1.4	137	Total			

Summary for Reach SP: Summation Point

Inflow Area = 19.609 ac, 65.68% Impervious, Inflow Depth > 1.67" for 2-yr event
Inflow = 43.03 cfs @ 11.96 hrs, Volume= 2.732 af
Outflow = 43.03 cfs @ 11.96 hrs, Volume= 2.732 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond 1P: Pond 1

Inflow Area = 2.074 ac, 64.57% Impervious, Inflow Depth > 1.85" for 2-yr event
Inflow = 5.88 cfs @ 11.95 hrs, Volume= 0.320 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 67.40' @ 20.00 hrs Surf.Area= 3,899.039 ac Storage= 0.320 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	67.40'	11,938.500 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
67.40	3,899.000	0.000	0.000
68.00	4,181.000	2,424.000	2,424.000
69.00	4,573.000	4,377.000	6,801.000
70.00	5,702.000	5,137.500	11,938.500

Device	Routing	Invert	Outlet Devices
#1	Primary	68.90'	**10.0' 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

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=67.40' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 2P: Pond 2

Inflow Area = 0.242 ac, 30.70% Impervious, Inflow Depth > 1.21" for 2-yr event
Inflow = 0.62 cfs @ 11.92 hrs, Volume= 0.024 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

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

Peak Elev= 59.40' @ 20.00 hrs Surf.Area= 368.013 ac Storage= 0.024 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	59.40'	1,675.800 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
59.40	368.000	0.000	0.000
60.00	483.000	255.300	255.300
61.00	696.000	589.500	844.800
62.00	966.000	831.000	1,675.800

Device	Routing	Invert	Outlet Devices
#1	Primary	60.90'	**7.0' 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

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=59.40' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: Pond 3

Inflow Area = 0.517 ac, 28.97% Impervious, Inflow Depth > 1.21" for 2-yr event
Inflow = 1.34 cfs @ 11.91 hrs, Volume= 0.052 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 55.40' @ 20.00 hrs Surf.Area= 619.010 ac Storage= 0.052 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	55.40'	2,102.100 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
55.40	619.000	0.000	0.000
57.00	803.000	1,137.600	1,137.600
57.50	963.000	441.500	1,579.100
58.00	1,129.000	523.000	2,102.100

Device	Routing	Invert	Outlet Devices
#1	Primary	56.90'	**9.0' 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

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=55.40' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond CB1: Catch Basin 1

Inflow Area = 1.032 ac, 62.82% Impervious, Inflow Depth > 1.85" for 2-yr event
Inflow = 2.85 cfs @ 12.04 hrs, Volume= 0.159 af
Outflow = 2.85 cfs @ 12.04 hrs, Volume= 0.159 af, Atten= 0%, Lag= 0.0 min
Primary = 2.85 cfs @ 12.04 hrs, Volume= 0.159 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 76.04' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	75.00'	**15.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 75.00' / 74.50' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.80 cfs @ 12.04 hrs HW=76.03' (Free Discharge)
1=Culvert (Barrel Controls 2.80 cfs @ 3.54 fps)

Summary for Pond DE: Drip Edge

Inflow Area = 2.143 ac, 94.50% Impervious, Inflow Depth > 2.57" for 2-yr event
Inflow = 9.72 cfs @ 11.92 hrs, Volume= 0.459 af
Outflow = 5.29 cfs @ 12.00 hrs, Volume= 0.449 af, Atten= 46%, Lag= 4.9 min
Primary = 5.29 cfs @ 12.00 hrs, Volume= 0.449 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 78.91' @ 12.00 hrs Surf.Area= 6,696 sf Storage= 5,115 cf

Plug-Flow detention time= 31.6 min calculated for 0.449 af (98% of inflow)
Center-of-Mass det. time= 22.2 min (757.6 - 735.4)

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	10,714 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 26,784 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	6,696	0	0
78.00	6,696	6,696	6,696
79.00	6,696	6,696	13,392
80.00	6,696	6,696	20,088
81.00	6,696	6,696	26,784

Device	Routing	Invert	Outlet Devices
#1	Primary	77.00'	**15.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 77.00' / 76.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=5.28 cfs @ 12.00 hrs HW=78.91' (Free Discharge)
1=Culvert (Inlet Controls 5.28 cfs @ 4.30 fps)

Summary for Pond DMH1: Drain Mahole

Inflow Area = 6.131 ac, 98.08% Impervious, Inflow Depth > 2.61" for 2-yr event
Inflow = 23.43 cfs @ 11.94 hrs, Volume= 1.332 af
Outflow = 23.43 cfs @ 11.94 hrs, Volume= 1.332 af, Atten= 0%, Lag= 0.0 min
Primary = 23.43 cfs @ 11.94 hrs, Volume= 1.332 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 75.80' @ 11.94 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	71.00'	**24.0" Round Culvert** L= 150.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.00' / 70.50' S= 0.0033 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=22.59 cfs @ 11.94 hrs HW=75.58' (Free Discharge)
1=Culvert (Inlet Controls 22.59 cfs @ 7.19 fps)

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

Subcatchment 1S: Subarea 1 Runoff Area=448,435 sf 48.10% Impervious Runoff Depth>2.79"
Flow Length=1,215' Tc=11.7 min CN=85 Runoff=43.58 cfs 2.394 af

Subcatchment 2S: Subarea 2 Runoff Area=173,753 sf 100.00% Impervious Runoff Depth>4.01"
Flow Length=785' Slope=0.0100 '/' Tc=3.1 min CN=98 Runoff=27.74 cfs 1.333 af

Subcatchment 3S: Subarea 3 Runoff Area=15,247 sf 100.00% Impervious Runoff Depth>4.01"
Flow Length=380' Slope=0.0100 '/' Tc=2.8 min CN=98 Runoff=2.44 cfs 0.117 af

Subcatchment 4S: Subarea 4 Runoff Area=44,955 sf 62.82% Impervious Runoff Depth>3.17"
Flow Length=217' Slope=0.0220 '/' Tc=12.3 min CN=89 Runoff=4.75 cfs 0.273 af

Subcatchment 5S: Subarea 5 Runoff Area=93,335 sf 94.50% Impervious Runoff Depth>3.93"
Flow Length=230' Slope=0.0200 '/' Tc=2.2 min CN=97 Runoff=14.62 cfs 0.703 af

Subcatchment 6S: Subarea 6 Runoff Area=45,394 sf 66.29% Impervious Runoff Depth>3.18"
Flow Length=461' Tc=2.9 min CN=89 Runoff=6.39 cfs 0.276 af

Subcatchment 7S: Subarea 7 Runoff Area=10,526 sf 30.70% Impervious Runoff Depth>2.36"
Flow Length=160' Tc=1.8 min CN=80 Runoff=1.17 cfs 0.047 af

Subcatchment 8S: Subarea 8 Runoff Area=22,538 sf 28.97% Impervious Runoff Depth>2.36"
Flow Length=137' Tc=1.4 min CN=80 Runoff=2.55 cfs 0.102 af

Reach SP: Summation Point Inflow=69.80 cfs 4.535 af
Outflow=69.80 cfs 4.535 af

Pond 1P: Pond 1 Peak Elev=67.40' Storage=0.548 af Inflow=9.78 cfs 0.549 af
Outflow=0.00 cfs 0.000 af

Pond 2P: Pond 2 Peak Elev=59.40' Storage=0.047 af Inflow=1.17 cfs 0.047 af
Outflow=0.00 cfs 0.000 af

Pond 3P: Pond 3 Peak Elev=55.40' Storage=0.101 af Inflow=2.55 cfs 0.102 af
Outflow=0.00 cfs 0.000 af

Pond CB1: Catch Basin 1 Peak Elev=76.73' Inflow=4.75 cfs 0.273 af
15.0" Round Culvert n=0.013 L=100.0' S=0.0050 '/' Outflow=4.75 cfs 0.273 af

Pond DE: Drip Edge Peak Elev=79.93' Storage=7,856 cf Inflow=14.62 cfs 0.703 af
15.0" Round Culvert n=0.013 L=100.0' S=0.0100 '/' Outflow=7.09 cfs 0.691 af

Pond DMH1: Drain Mahole Peak Elev=80.14' Inflow=34.21 cfs 2.023 af
24.0" Round Culvert n=0.013 L=150.0' S=0.0033 '/' Outflow=34.21 cfs 2.023 af

Total Runoff Area = 19.609 ac Runoff Volume = 5.244 af Average Runoff Depth = 3.21"
34.32% Pervious = 6.730 ac 65.68% Impervious = 12.879 ac

Summary for Subcatchment 1S: Subarea 1

Runoff = 43.58 cfs @ 12.03 hrs, Volume= 2.394 af, Depth> 2.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
11,049	98	Roofs, HSG C
204,658	98	Paved parking, HSG C
15,335	82	Woods/grass comb., Fair, HSG D
92,772	73	Woods, Fair, HSG C
7,805	78	Meadow, non-grazed, HSG D
116,816	71	Meadow, non-grazed, HSG C
448,435	85	Weighted Average
232,728		51.90% Pervious Area
215,707		48.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0210	1.38		**Sheet Flow, SF 1-1** Smooth surfaces n= 0.011 P2= 3.10"
2.9	520	0.0210	2.94		**Shallow Concentrated Flow, SCF 1-1** Paved Kv= 20.3 fps
7.6	595	0.0350	1.31		**Shallow Concentrated Flow, SCF 1-2** Short Grass Pasture Kv= 7.0 fps
11.7	1,215	Total			

Summary for Subcatchment 2S: Subarea 2

Runoff = 27.74 cfs @ 11.93 hrs, Volume= 1.333 af, Depth> 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
173,753	98	Roofs, HSG C
173,753		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.03		**Sheet Flow, SF 2-1** Smooth surfaces n= 0.011 P2= 3.10"
1.5	685	0.0100	7.73	13.66	**Pipe Channel, PC 2-1** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.010 PVC, smooth interior
3.1	785	Total			

Summary for Subcatchment 3S: Subarea 3

Runoff = 2.44 cfs @ 11.93 hrs, Volume= 0.117 af, Depth> 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
15,247	98	Roofs, HSG C
15,247		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.89		**Sheet Flow, SF 3-1** Smooth surfaces n= 0.011 P2= 3.10"
1.9	330	0.0100	2.84	0.25	**Pipe Channel, PC 3-1** 4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08' n= 0.010 PVC, smooth interior
2.8	380	Total			

Summary for Subcatchment 4S: Subarea 4

Runoff = 4.75 cfs @ 12.04 hrs, Volume= 0.273 af, Depth> 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
23,905	98	Paved parking, HSG C
4,337	98	Paved parking, HSG D
3,033	82	Woods/grass comb., Fair, HSG D
8,788	71	Meadow, non-grazed, HSG C
4,892	78	Meadow, non-grazed, HSG D
44,955	89	Weighted Average
16,713		37.18% Pervious Area
28,242		62.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	65	0.0220	0.11		**Sheet Flow, SF 4-1** Grass: Dense n= 0.240 P2= 3.10"
0.5	35	0.0220	1.14		**Sheet Flow, SF 4-2** Smooth surfaces n= 0.011 P2= 3.10"
1.9	117	0.0220	1.04		**Shallow Concentrated Flow, SCF 4-1** Short Grass Pasture Kv= 7.0 fps
12.3	217	Total			

Summary for Subcatchment 5S: Subarea 5

Runoff = 14.62 cfs @ 11.92 hrs, Volume= 0.703 af, Depth> 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
72,000	98	Roofs, HSG D
16,200	98	Paved parking, HSG D
3,478	79	Woods, Fair, HSG D
1,657	78	Meadow, non-grazed, HSG D
93,335	97	Weighted Average
5,135		5.50% Pervious Area
88,200		94.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0200	1.35		**Sheet Flow, SF 5-1** Smooth surfaces n= 0.011 P2= 3.10"
1.0	130	0.0200	2.28		**Shallow Concentrated Flow, SCF 5-1** Unpaved Kv= 16.1 fps
2.2	230	Total			

Summary for Subcatchment 6S: Subarea 6

Runoff = 6.39 cfs @ 11.93 hrs, Volume= 0.276 af, Depth> 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
13,298	98	Paved parking, HSG D
16,795	98	Paved parking, HSG C
708	78	Meadow, non-grazed, HSG D
14,593	71	Meadow, non-grazed, HSG C
45,394	89	Weighted Average
15,301		33.71% Pervious Area
30,093		66.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0400	1.79		**Sheet Flow, SF 6-1** Smooth surfaces n= 0.011 P2= 3.10"
2.0	361	0.0220	3.01		**Shallow Concentrated Flow, SCF 6-1** Paved Kv= 20.3 fps
2.9	461	Total			

Summary for Subcatchment 7S: Subarea 7

Runoff = 1.17 cfs @ 11.92 hrs, Volume= 0.047 af, Depth> 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
551	76	Woods/grass comb., Fair, HSG C
3,232	98	Paved parking, HSG C
6,743	71	Meadow, non-grazed, HSG C
10,526	80	Weighted Average
7,294		69.30% Pervious Area
3,232		30.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	60	0.0330	1.49		**Sheet Flow, SF 7-1** Smooth surfaces n= 0.011 P2= 3.10"
1.1	100	0.0480	1.53		**Shallow Concentrated Flow, SCF 7-1** Short Grass Pasture Kv= 7.0 fps
1.8	160	Total			

Summary for Subcatchment 8S: Subarea 8

Runoff = 2.55 cfs @ 11.91 hrs, Volume= 0.102 af, Depth> 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
6,529	98	Paved parking, HSG C
4,143	76	Woods/grass comb., Fair, HSG C
11,866	71	Meadow, non-grazed, HSG C
22,538	80	Weighted Average
16,009		71.03% Pervious Area
6,529		28.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	100	0.0360	1.71		**Sheet Flow, SF 8-1** Smooth surfaces n= 0.011 P2= 3.10"
0.4	37	0.0530	1.61		**Shallow Concentrated Flow, SCF 8-1** Short Grass Pasture Kv= 7.0 fps
1.4	137	Total			

Summary for Reach SP: Summation Point

Inflow Area = 19.609 ac, 65.68% Impervious, Inflow Depth > 2.77" for 10-yr event
Inflow = 69.80 cfs @ 11.97 hrs, Volume= 4.535 af
Outflow = 69.80 cfs @ 11.97 hrs, Volume= 4.535 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond 1P: Pond 1

Inflow Area = 2.074 ac, 64.57% Impervious, Inflow Depth > 3.17" for 10-yr event
Inflow = 9.78 cfs @ 11.95 hrs, Volume= 0.549 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 67.40' @ 20.00 hrs Surf.Area= 3,899.066 ac Storage= 0.548 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	67.40'	11,938.500 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
67.40	3,899.000	0.000	0.000
68.00	4,181.000	2,424.000	2,424.000
69.00	4,573.000	4,377.000	6,801.000
70.00	5,702.000	5,137.500	11,938.500

Device	Routing	Invert	Outlet Devices
#1	Primary	68.90'	**10.0' 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

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=67.40' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 2P: Pond 2

Inflow Area = 0.242 ac, 30.70% Impervious, Inflow Depth > 2.36" for 10-yr event
Inflow = 1.17 cfs @ 11.92 hrs, Volume= 0.047 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

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

Peak Elev= 59.40' @ 20.00 hrs Surf.Area= 368.025 ac Storage= 0.047 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	59.40'	1,675.800 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
59.40	368.000	0.000	0.000
60.00	483.000	255.300	255.300
61.00	696.000	589.500	844.800
62.00	966.000	831.000	1,675.800

Device	Routing	Invert	Outlet Devices
#1	Primary	60.90'	**7.0' 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

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=59.40' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: Pond 3

Inflow Area = 0.517 ac, 28.97% Impervious, Inflow Depth > 2.36" for 10-yr event
Inflow = 2.55 cfs @ 11.91 hrs, Volume= 0.102 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 55.40' @ 20.00 hrs Surf.Area= 619.019 ac Storage= 0.101 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	55.40'	2,102.100 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
55.40	619.000	0.000	0.000
57.00	803.000	1,137.600	1,137.600
57.50	963.000	441.500	1,579.100
58.00	1,129.000	523.000	2,102.100

Device	Routing	Invert	Outlet Devices
#1	Primary	56.90'	**9.0' 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

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=55.40' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond CB1: Catch Basin 1

Inflow Area = 1.032 ac, 62.82% Impervious, Inflow Depth > 3.17" for 10-yr event
Inflow = 4.75 cfs @ 12.04 hrs, Volume= 0.273 af
Outflow = 4.75 cfs @ 12.04 hrs, Volume= 0.273 af, Atten= 0%, Lag= 0.0 min
Primary = 4.75 cfs @ 12.04 hrs, Volume= 0.273 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 76.73' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	75.00'	**15.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 75.00' / 74.50' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=4.61 cfs @ 12.04 hrs HW=76.68' (Free Discharge)
1=Culvert (Barrel Controls 4.61 cfs @ 3.76 fps)

Summary for Pond DE: Drip Edge

Inflow Area = 2.143 ac, 94.50% Impervious, Inflow Depth > 3.93" for 10-yr event
Inflow = 14.62 cfs @ 11.92 hrs, Volume= 0.703 af
Outflow = 7.09 cfs @ 12.01 hrs, Volume= 0.691 af, Atten= 52%, Lag= 5.4 min
Primary = 7.09 cfs @ 12.01 hrs, Volume= 0.691 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 79.93' @ 12.01 hrs Surf.Area= 6,696 sf Storage= 7,856 cf

Plug-Flow detention time= 27.9 min calculated for 0.690 af (98% of inflow)
Center-of-Mass det. time= 20.1 min (751.0 - 730.9)

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	10,714 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 26,784 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	6,696	0	0
78.00	6,696	6,696	6,696
79.00	6,696	6,696	13,392
80.00	6,696	6,696	20,088
81.00	6,696	6,696	26,784

Device	Routing	Invert	Outlet Devices
#1	Primary	77.00'	**15.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 77.00' / 76.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=7.06 cfs @ 12.01 hrs HW=79.91' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 7.06 cfs @ 5.75 fps)

Summary for Pond DMH1: Drain Mahole

Inflow Area = 6.131 ac, 98.08% Impervious, Inflow Depth > 3.96" for 10-yr event
Inflow = 34.21 cfs @ 11.93 hrs, Volume= 2.023 af
Outflow = 34.21 cfs @ 11.93 hrs, Volume= 2.023 af, Atten= 0%, Lag= 0.0 min
Primary = 34.21 cfs @ 11.93 hrs, Volume= 2.023 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 80.14' @ 11.94 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	71.00'	**24.0" Round Culvert** L= 150.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.00' / 70.50' S= 0.0033 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=32.92 cfs @ 11.93 hrs HW=79.60' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 32.92 cfs @ 10.48 fps)

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

Subcatchment 1S: Subarea 1 Runoff Area=448,435 sf 48.10% Impervious Runoff Depth>3.84"
Flow Length=1,215' Tc=11.7 min CN=85 Runoff=58.96 cfs 3.296 af

Subcatchment 2S: Subarea 2 Runoff Area=173,753 sf 100.00% Impervious Runoff Depth>5.09"
Flow Length=785' Slope=0.0100 '/' Tc=3.1 min CN=98 Runoff=35.05 cfs 1.692 af

Subcatchment 3S: Subarea 3 Runoff Area=15,247 sf 100.00% Impervious Runoff Depth>5.09"
Flow Length=380' Slope=0.0100 '/' Tc=2.8 min CN=98 Runoff=3.08 cfs 0.148 af

Subcatchment 4S: Subarea 4 Runoff Area=44,955 sf 62.82% Impervious Runoff Depth>4.25"
Flow Length=217' Slope=0.0220 '/' Tc=12.3 min CN=89 Runoff=6.26 cfs 0.366 af

Subcatchment 5S: Subarea 5 Runoff Area=93,335 sf 94.50% Impervious Runoff Depth>5.02"
Flow Length=230' Slope=0.0200 '/' Tc=2.2 min CN=97 Runoff=18.52 cfs 0.896 af

Subcatchment 6S: Subarea 6 Runoff Area=45,394 sf 66.29% Impervious Runoff Depth>4.26"
Flow Length=461' Tc=2.9 min CN=89 Runoff=8.39 cfs 0.370 af

Subcatchment 7S: Subarea 7 Runoff Area=10,526 sf 30.70% Impervious Runoff Depth>3.35"
Flow Length=160' Tc=1.8 min CN=80 Runoff=1.63 cfs 0.068 af

Subcatchment 8S: Subarea 8 Runoff Area=22,538 sf 28.97% Impervious Runoff Depth>3.35"
Flow Length=137' Tc=1.4 min CN=80 Runoff=3.56 cfs 0.145 af

Reach SP: Summation Point Inflow=91.34 cfs 6.019 af
Outflow=91.34 cfs 6.019 af

Pond 1P: Pond 1 Peak Elev=67.40' Storage=0.735 af Inflow=12.90 cfs 0.736 af
Outflow=0.00 cfs 0.000 af

Pond 2P: Pond 2 Peak Elev=59.40' Storage=0.067 af Inflow=1.63 cfs 0.068 af
Outflow=0.00 cfs 0.000 af

Pond 3P: Pond 3 Peak Elev=55.40' Storage=0.144 af Inflow=3.56 cfs 0.145 af
Outflow=0.00 cfs 0.000 af

Pond CB1: Catch Basin 1 Peak Elev=77.46' Inflow=6.26 cfs 0.366 af
15.0" Round Culvert n=0.013 L=100.0' S=0.0050 '/' Outflow=6.26 cfs 0.366 af

Pond DE: Drip Edge Peak Elev=80.81' Storage=10,212 cf Inflow=18.52 cfs 0.896 af
15.0" Round Culvert n=0.013 L=100.0' S=0.0100 '/' Outflow=8.33 cfs 0.883 af

Pond DMH1: Drain Mahole Peak Elev=84.63' Inflow=42.63 cfs 2.575 af
24.0" Round Culvert n=0.013 L=150.0' S=0.0033 '/' Outflow=42.63 cfs 2.575 af

Total Runoff Area = 19.609 ac Runoff Volume = 6.980 af Average Runoff Depth = 4.27"
34.32% Pervious = 6.730 ac 65.68% Impervious = 12.879 ac

Summary for Subcatchment 1S: Subarea 1

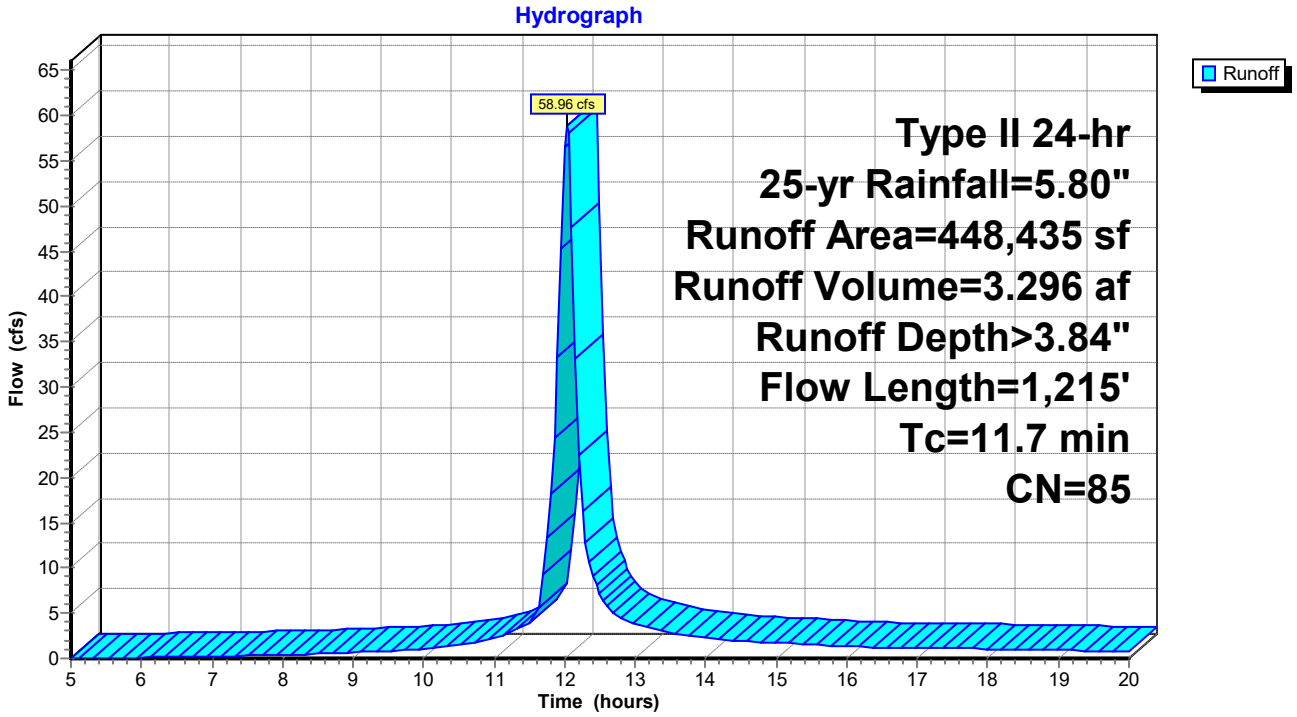
Runoff = 58.96 cfs @ 12.03 hrs, Volume= 3.296 af, Depth> 3.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.80"

Area (sf)	CN	Description
11,049	98	Roofs, HSG C
204,658	98	Paved parking, HSG C
15,335	82	Woods/grass comb., Fair, HSG D
92,772	73	Woods, Fair, HSG C
7,805	78	Meadow, non-grazed, HSG D
116,816	71	Meadow, non-grazed, HSG C
448,435	85	Weighted Average
232,728		51.90% Pervious Area
215,707		48.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0210	1.38		**Sheet Flow, SF 1-1** Smooth surfaces n= 0.011 P2= 3.10"
2.9	520	0.0210	2.94		**Shallow Concentrated Flow, SCF 1-1** Paved Kv= 20.3 fps
7.6	595	0.0350	1.31		**Shallow Concentrated Flow, SCF 1-2** Short Grass Pasture Kv= 7.0 fps
11.7	1,215	Total			

Subcatchment 1S: Subarea 1



Summary for Subcatchment 2S: Subarea 2

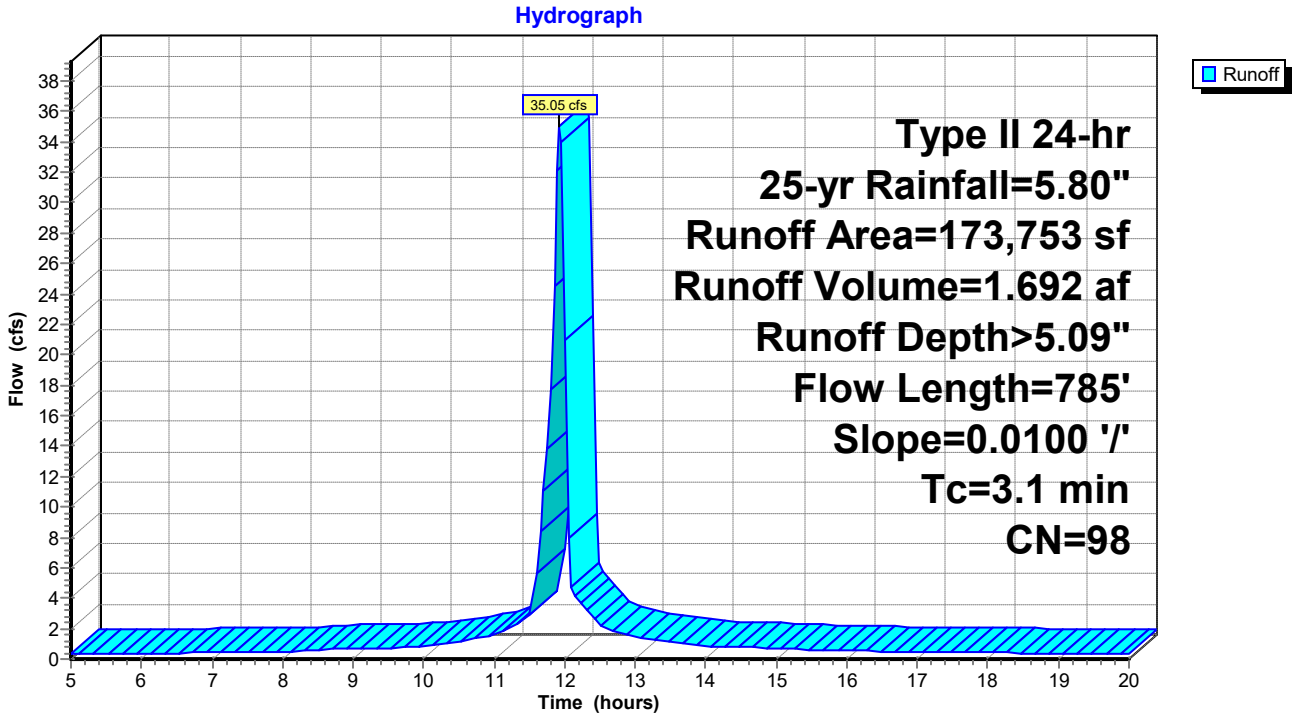
Runoff = 35.05 cfs @ 11.93 hrs, Volume= 1.692 af, Depth> 5.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.80"

Area (sf)	CN	Description
173,753	98	Roofs, HSG C
173,753		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.03		**Sheet Flow, SF 2-1** Smooth surfaces n= 0.011 P2= 3.10"
1.5	685	0.0100	7.73	13.66	**Pipe Channel, PC 2-1** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.010 PVC, smooth interior
3.1	785	Total			

Subcatchment 2S: Subarea 2



Summary for Subcatchment 3S: Subarea 3

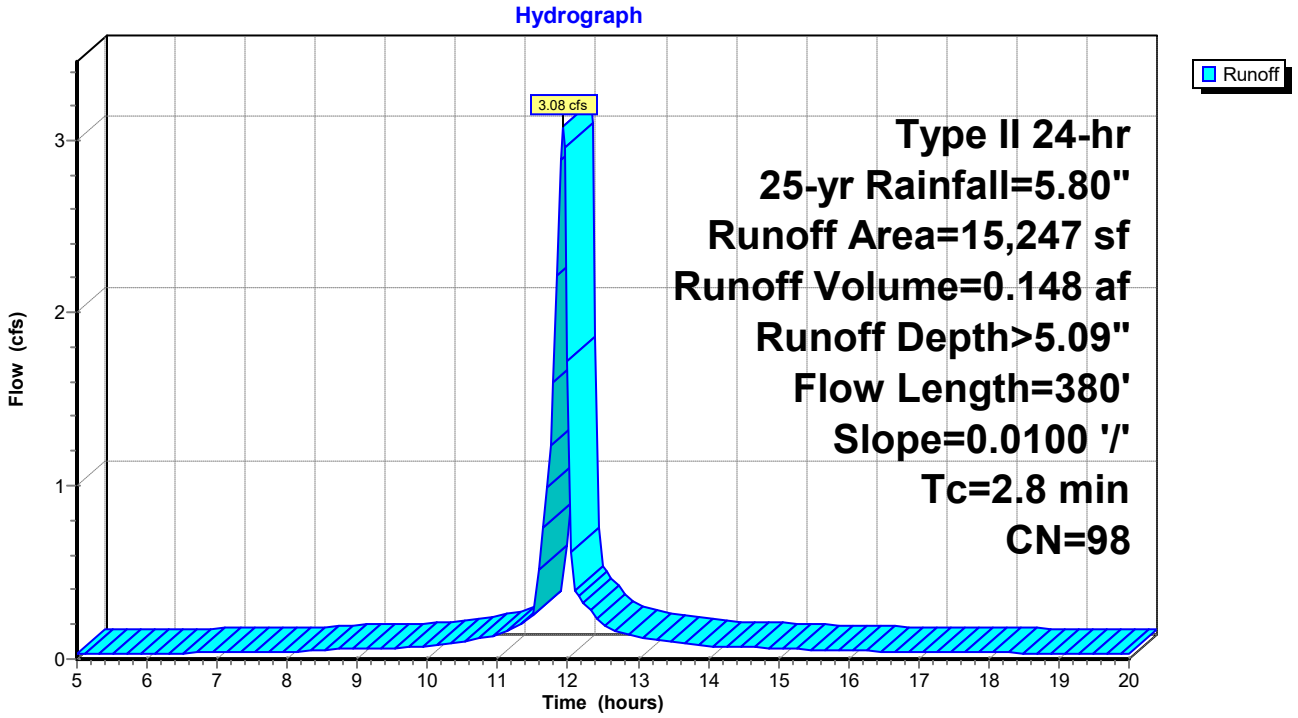
Runoff = 3.08 cfs @ 11.93 hrs, Volume= 0.148 af, Depth> 5.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.80"

Area (sf)	CN	Description
15,247	98	Roofs, HSG C
15,247		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.89		**Sheet Flow, SF 3-1** Smooth surfaces n= 0.011 P2= 3.10"
1.9	330	0.0100	2.84	0.25	**Pipe Channel, PC 3-1** 4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08' n= 0.010 PVC, smooth interior
2.8	380	Total			

Subcatchment 3S: Subarea 3



Summary for Subcatchment 4S: Subarea 4

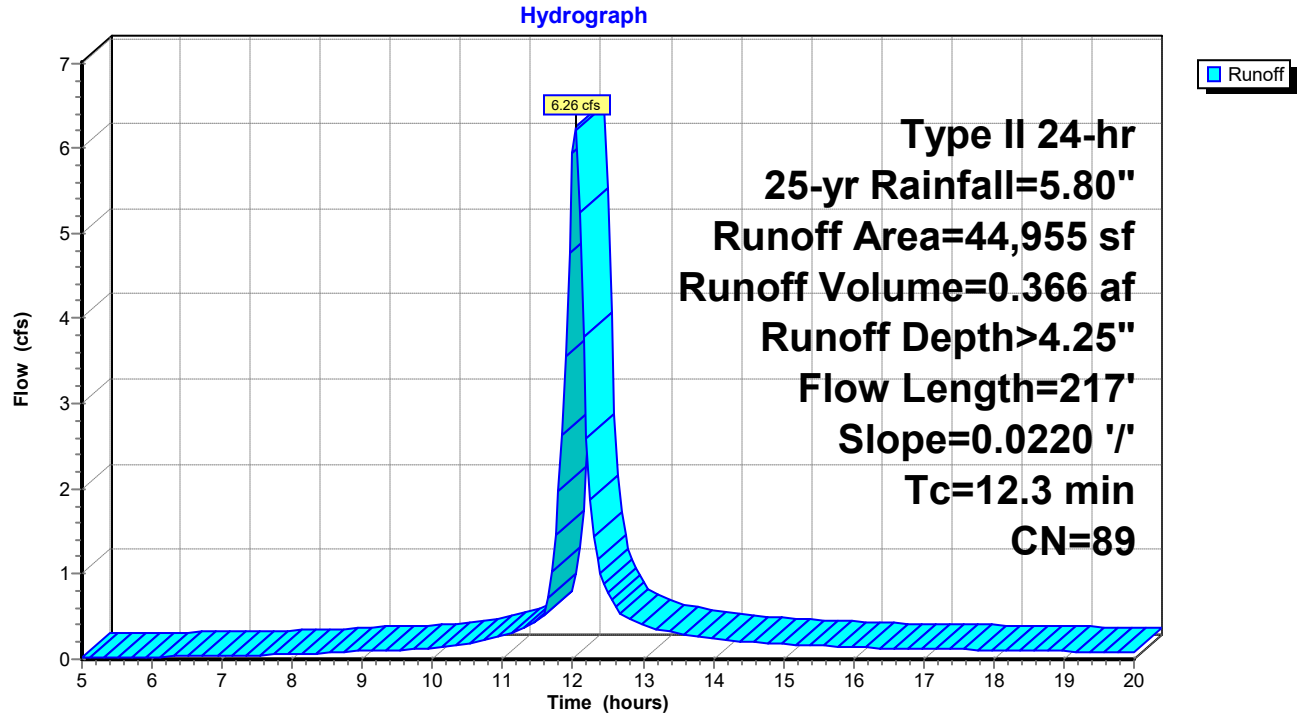
Runoff = 6.26 cfs @ 12.04 hrs, Volume= 0.366 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.80"

Area (sf)	CN	Description
23,905	98	Paved parking, HSG C
4,337	98	Paved parking, HSG D
3,033	82	Woods/grass comb., Fair, HSG D
8,788	71	Meadow, non-grazed, HSG C
4,892	78	Meadow, non-grazed, HSG D
44,955	89	Weighted Average
16,713		37.18% Pervious Area
28,242		62.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	65	0.0220	0.11		**Sheet Flow, SF 4-1** Grass: Dense n= 0.240 P2= 3.10"
0.5	35	0.0220	1.14		**Sheet Flow, SF 4-2** Smooth surfaces n= 0.011 P2= 3.10"
1.9	117	0.0220	1.04		**Shallow Concentrated Flow, SCF 4-1** Short Grass Pasture Kv= 7.0 fps
12.3	217	Total			

Subcatchment 4S: Subarea 4



Summary for Subcatchment 5S: Subarea 5

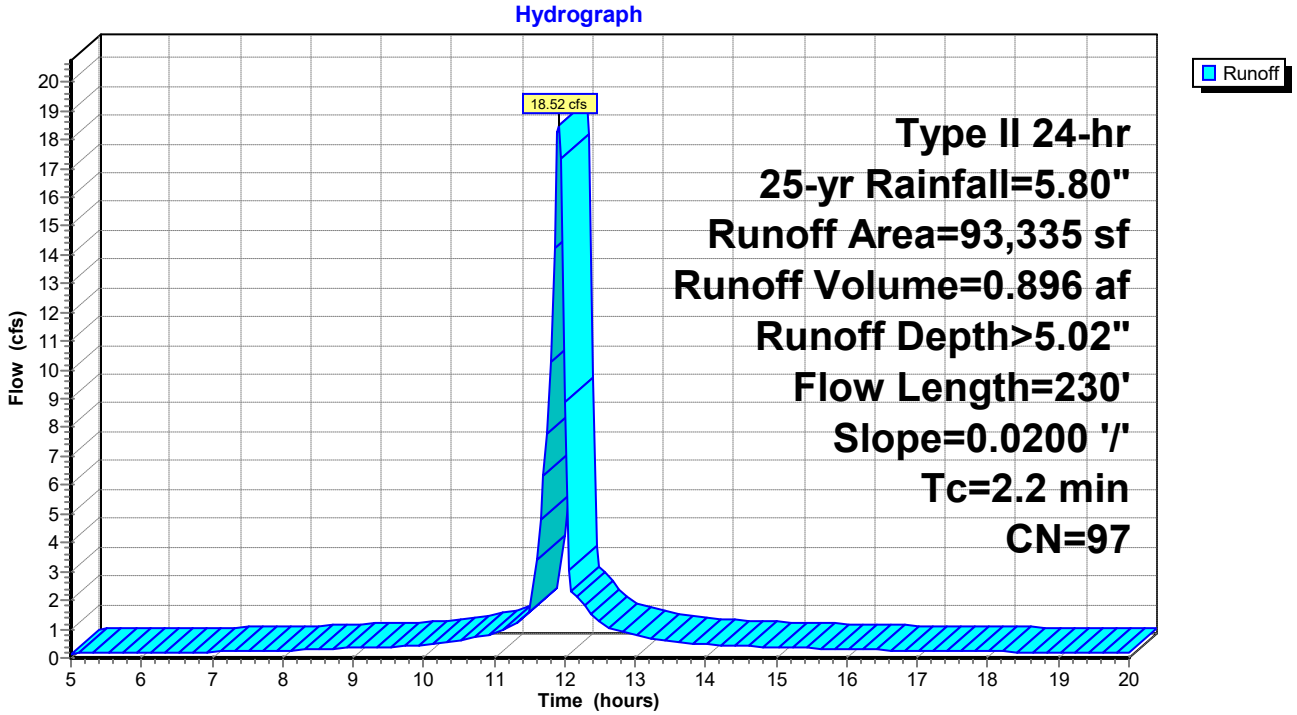
Runoff = 18.52 cfs @ 11.92 hrs, Volume= 0.896 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.80"

Area (sf)	CN	Description
72,000	98	Roofs, HSG D
16,200	98	Paved parking, HSG D
3,478	79	Woods, Fair, HSG D
1,657	78	Meadow, non-grazed, HSG D
93,335	97	Weighted Average
5,135		5.50% Pervious Area
88,200		94.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0200	1.35		**Sheet Flow, SF 5-1** Smooth surfaces n= 0.011 P2= 3.10"
1.0	130	0.0200	2.28		**Shallow Concentrated Flow, SCF 5-1** Unpaved Kv= 16.1 fps
2.2	230	Total			

Subcatchment 5S: Subarea 5



Summary for Subcatchment 6S: Subarea 6

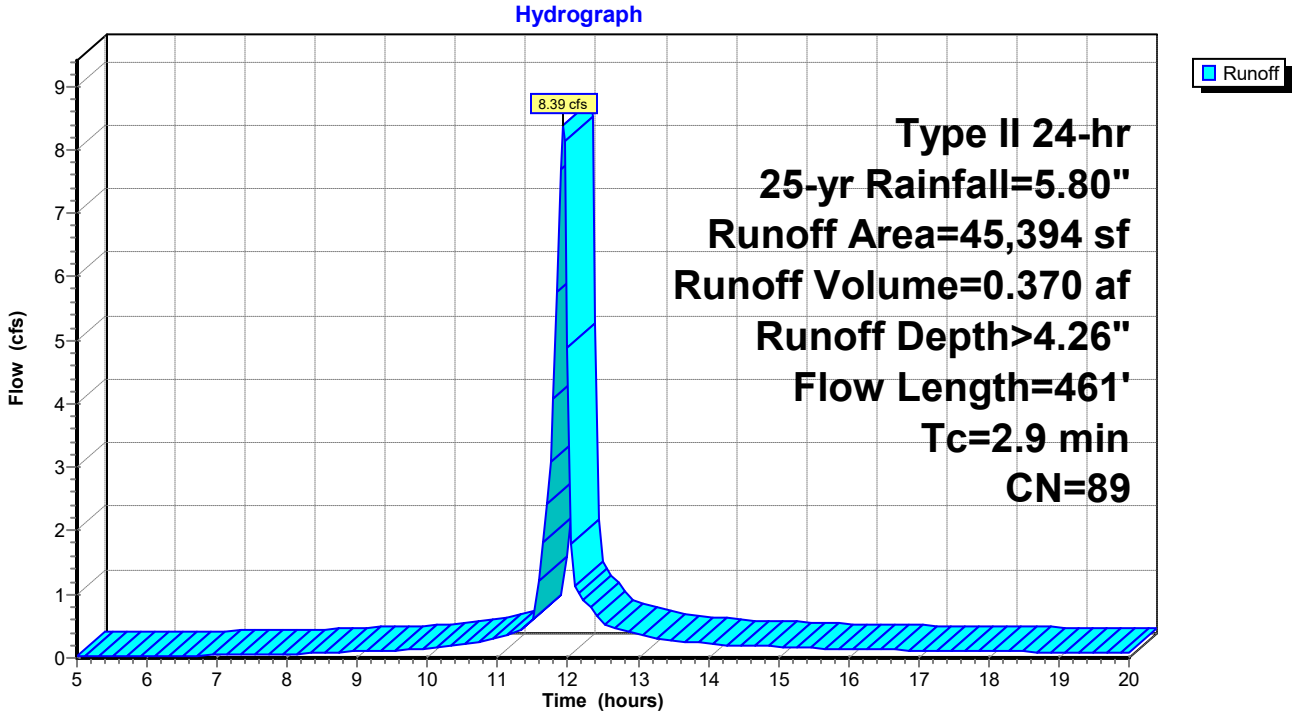
Runoff = 8.39 cfs @ 11.93 hrs, Volume= 0.370 af, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.80"

Area (sf)	CN	Description
13,298	98	Paved parking, HSG D
16,795	98	Paved parking, HSG C
708	78	Meadow, non-grazed, HSG D
14,593	71	Meadow, non-grazed, HSG C
45,394	89	Weighted Average
15,301		33.71% Pervious Area
30,093		66.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0400	1.79		**Sheet Flow, SF 6-1** Smooth surfaces n= 0.011 P2= 3.10"
2.0	361	0.0220	3.01		**Shallow Concentrated Flow, SCF 6-1** Paved Kv= 20.3 fps
2.9	461	Total			

Subcatchment 6S: Subarea 6



Summary for Subcatchment 7S: Subarea 7

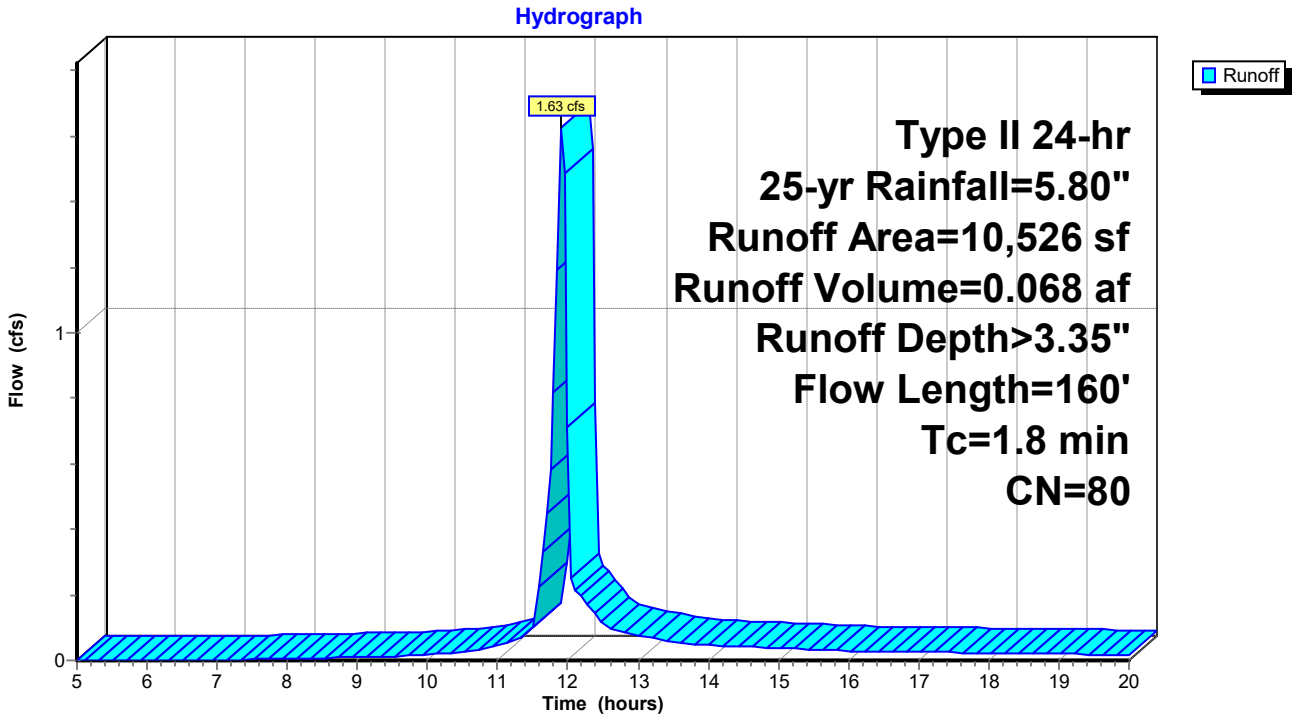
Runoff = 1.63 cfs @ 11.91 hrs, Volume= 0.068 af, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.80"

Area (sf)	CN	Description
551	76	Woods/grass comb., Fair, HSG C
3,232	98	Paved parking, HSG C
6,743	71	Meadow, non-grazed, HSG C
10,526	80	Weighted Average
7,294		69.30% Pervious Area
3,232		30.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	60	0.0330	1.49		**Sheet Flow, SF 7-1** Smooth surfaces n= 0.011 P2= 3.10"
1.1	100	0.0480	1.53		**Shallow Concentrated Flow, SCF 7-1** Short Grass Pasture Kv= 7.0 fps
1.8	160	Total			

Subcatchment 7S: Subarea 7



Summary for Subcatchment 8S: Subarea 8

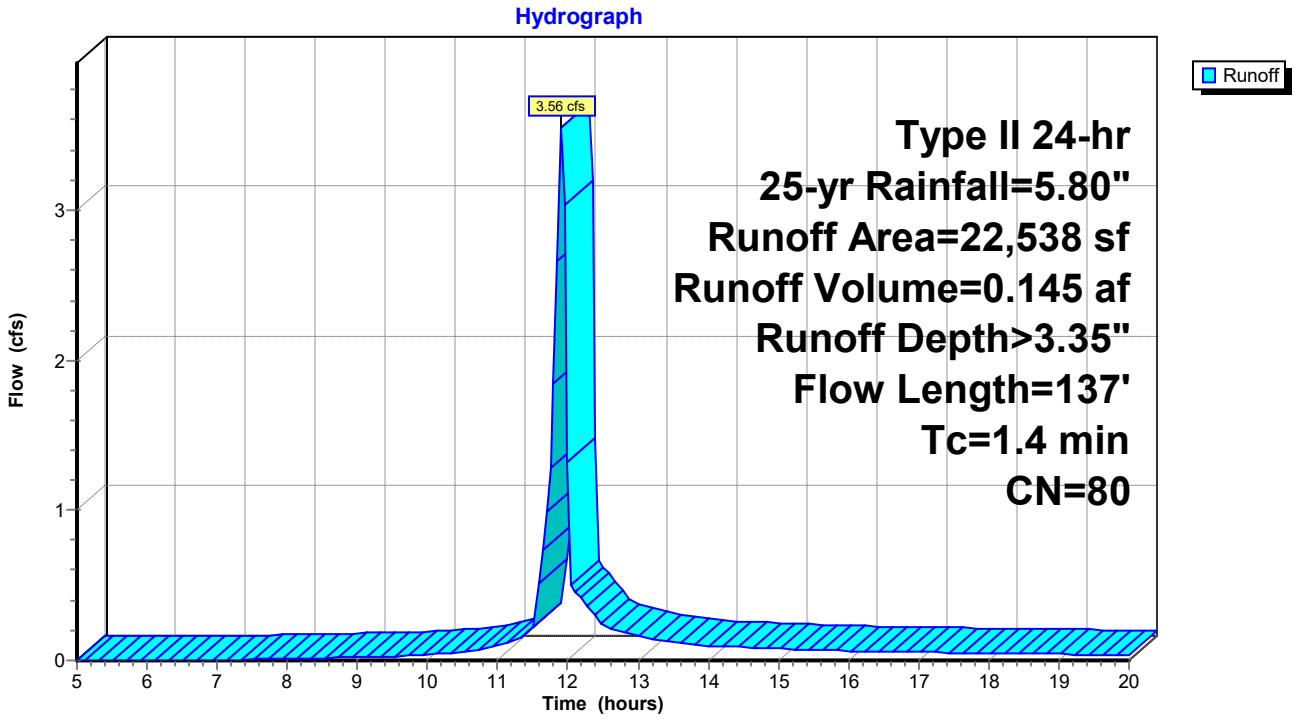
Runoff = 3.56 cfs @ 11.91 hrs, Volume= 0.145 af, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.80"

Area (sf)	CN	Description
6,529	98	Paved parking, HSG C
4,143	76	Woods/grass comb., Fair, HSG C
11,866	71	Meadow, non-grazed, HSG C
22,538	80	Weighted Average
16,009		71.03% Pervious Area
6,529		28.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	100	0.0360	1.71		**Sheet Flow, SF 8-1** Smooth surfaces n= 0.011 P2= 3.10"
0.4	37	0.0530	1.61		**Shallow Concentrated Flow, SCF 8-1** Short Grass Pasture Kv= 7.0 fps
1.4	137	Total			

Subcatchment 8S: Subarea 8

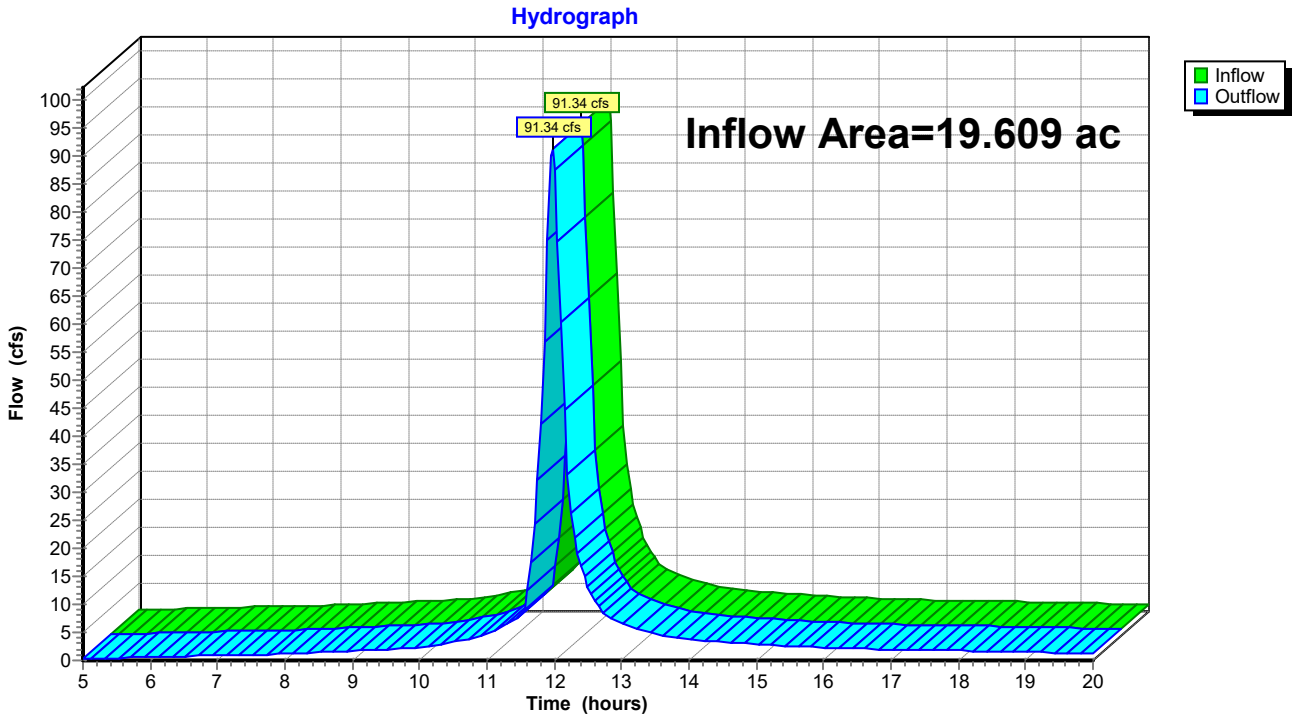


Summary for Reach SP: Summation Point

Inflow Area = 19.609 ac, 65.68% Impervious, Inflow Depth > 3.68" for 25-yr event
Inflow = 91.34 cfs @ 11.97 hrs, Volume= 6.019 af
Outflow = 91.34 cfs @ 11.97 hrs, Volume= 6.019 af, Atten= 0%, Lag= 0.0 min

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

Reach SP: Summation Point



Summary for Pond 1P: Pond 1

Inflow Area = 2.074 ac, 64.57% Impervious, Inflow Depth > 4.26" for 25-yr event
Inflow = 12.90 cfs @ 11.95 hrs, Volume= 0.736 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 67.40' @ 20.00 hrs Surf.Area= 3,899.089 ac Storage= 0.735 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

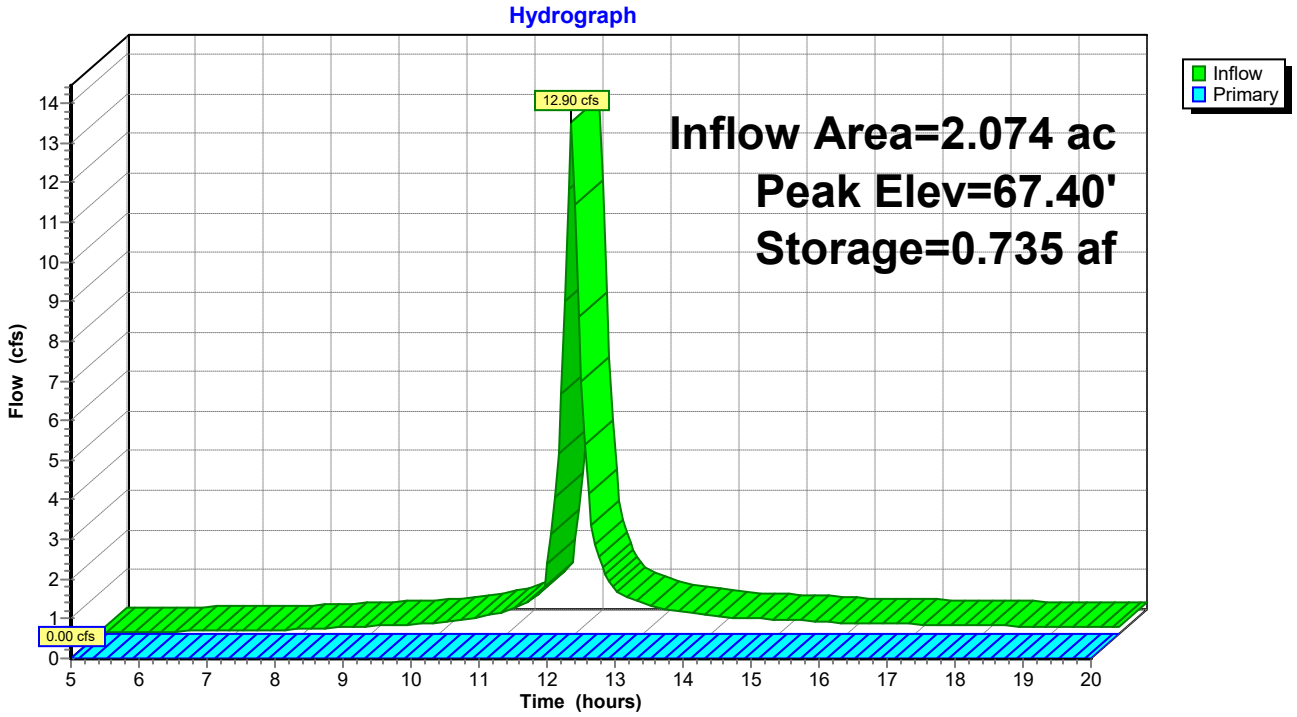
Volume	Invert	Avail.Storage	Storage Description
#1	67.40'	11,938.500 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
67.40	3,899.000	0.000	0.000
68.00	4,181.000	2,424.000	2,424.000
69.00	4,573.000	4,377.000	6,801.000
70.00	5,702.000	5,137.500	11,938.500

Device	Routing	Invert	Outlet Devices
#1	Primary	68.90'	**10.0' 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

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=67.40' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Pond 1



Summary for Pond 2P: Pond 2

Inflow Area = 0.242 ac, 30.70% Impervious, Inflow Depth > 3.35" for 25-yr event
Inflow = 1.63 cfs @ 11.91 hrs, Volume= 0.068 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 59.40' @ 20.00 hrs Surf.Area= 368.035 ac Storage= 0.067 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

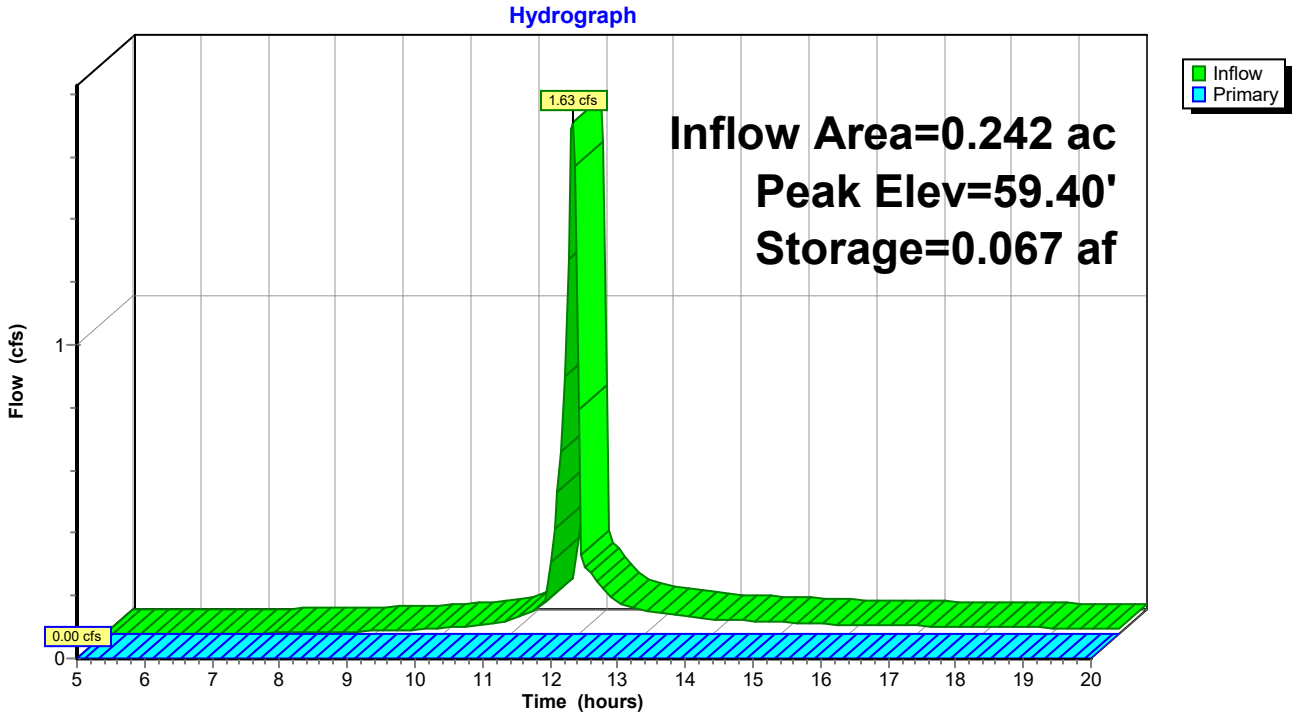
Volume	Invert	Avail.Storage	Storage Description
#1	59.40'	1,675.800 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
59.40	368.000	0.000	0.000
60.00	483.000	255.300	255.300
61.00	696.000	589.500	844.800
62.00	966.000	831.000	1,675.800

Device	Routing	Invert	Outlet Devices
#1	Primary	60.90'	**7.0' 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

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=59.40' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2P: Pond 2



Summary for Pond 3P: Pond 3

Inflow Area = 0.517 ac, 28.97% Impervious, Inflow Depth > 3.35" for 25-yr event
Inflow = 3.56 cfs @ 11.91 hrs, Volume= 0.145 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 55.40' @ 20.00 hrs Surf.Area= 619.027 ac Storage= 0.144 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

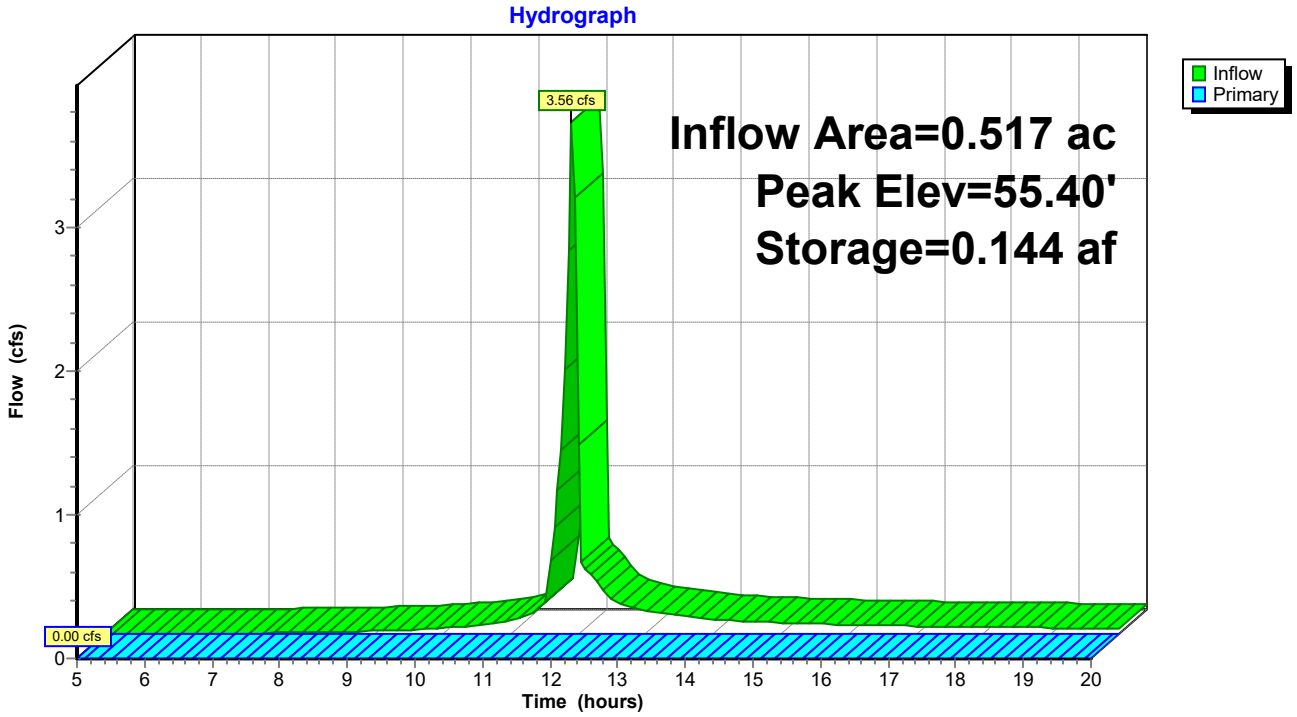
Volume	Invert	Avail.Storage	Storage Description
#1	55.40'	2,102.100 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
55.40	619.000	0.000	0.000
57.00	803.000	1,137.600	1,137.600
57.50	963.000	441.500	1,579.100
58.00	1,129.000	523.000	2,102.100

Device	Routing	Invert	Outlet Devices
#1	Primary	56.90'	**9.0' 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

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=55.40' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Pond 3



Summary for Pond CB1: Catch Basin 1

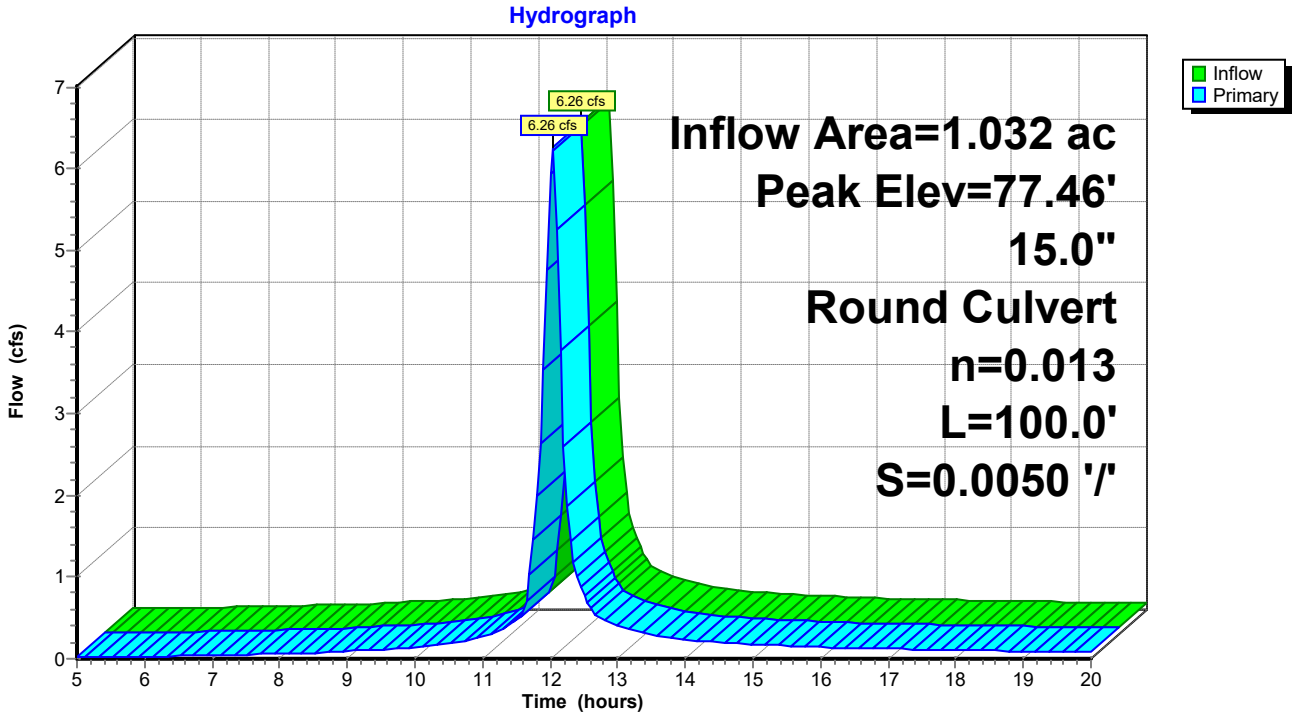
Inflow Area = 1.032 ac, 62.82% Impervious, Inflow Depth > 4.25" for 25-yr event
Inflow = 6.26 cfs @ 12.04 hrs, Volume= 0.366 af
Outflow = 6.26 cfs @ 12.04 hrs, Volume= 0.366 af, Atten= 0%, Lag= 0.0 min
Primary = 6.26 cfs @ 12.04 hrs, Volume= 0.366 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 77.46' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	75.00'	**15.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 75.00' / 74.50' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=6.14 cfs @ 12.04 hrs HW=77.39' (Free Discharge)
1=Culvert (Barrel Controls 6.14 cfs @ 5.00 fps)

Pond CB1: Catch Basin 1



Summary for Pond DE: Drip Edge

Inflow Area = 2.143 ac, 94.50% Impervious, Inflow Depth > 5.02" for 25-yr event
Inflow = 18.52 cfs @ 11.92 hrs, Volume= 0.896 af
Outflow = 8.33 cfs @ 12.01 hrs, Volume= 0.883 af, Atten= 55%, Lag= 5.6 min
Primary = 8.33 cfs @ 12.01 hrs, Volume= 0.883 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 80.81' @ 12.01 hrs Surf.Area= 6,696 sf Storage= 10,212 cf

Plug-Flow detention time= 26.3 min calculated for 0.883 af (98% of inflow)
Center-of-Mass det. time= 19.4 min (748.4 - 729.0)

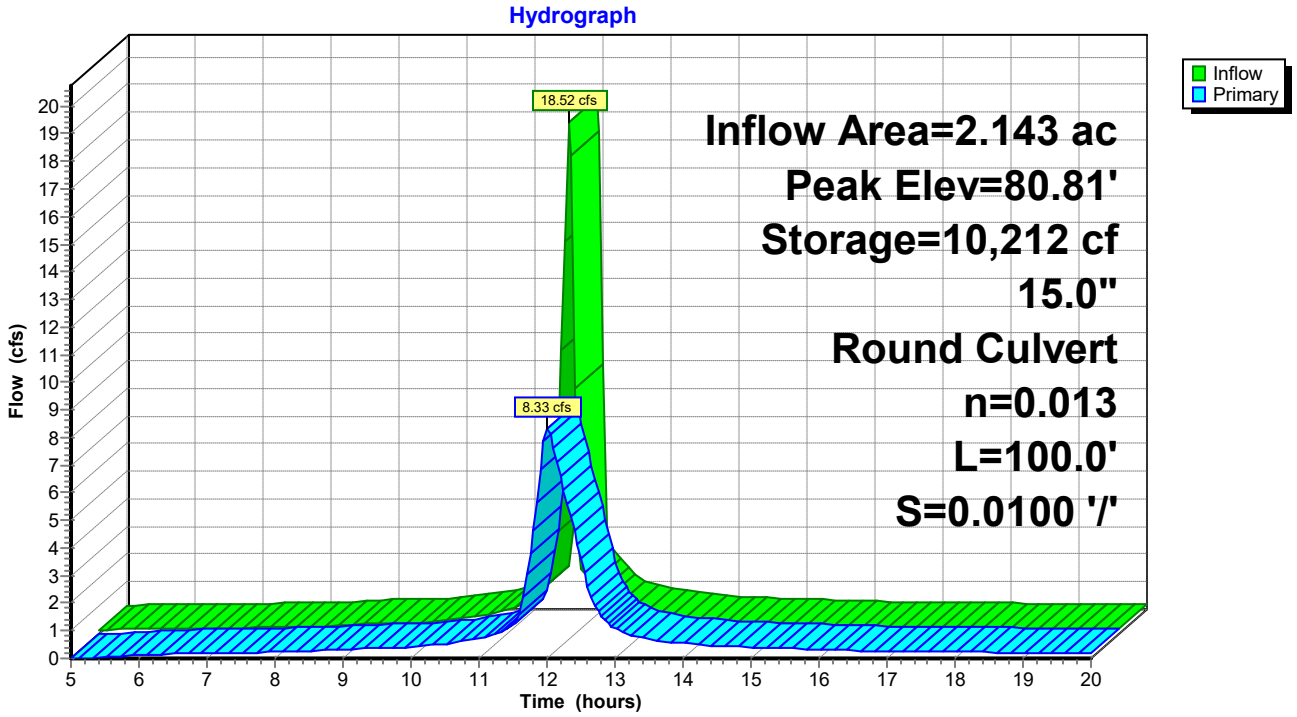
Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	10,714 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 26,784 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	6,696	0	0
78.00	6,696	6,696	6,696
79.00	6,696	6,696	13,392
80.00	6,696	6,696	20,088
81.00	6,696	6,696	26,784

Device	Routing	Invert	Outlet Devices
#1	Primary	77.00'	**15.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 77.00' / 76.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=8.28 cfs @ 12.01 hrs HW=80.77' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 8.28 cfs @ 6.75 fps)

Pond DE: Drip Edge



Summary for Pond DMH1: Drain Mahole

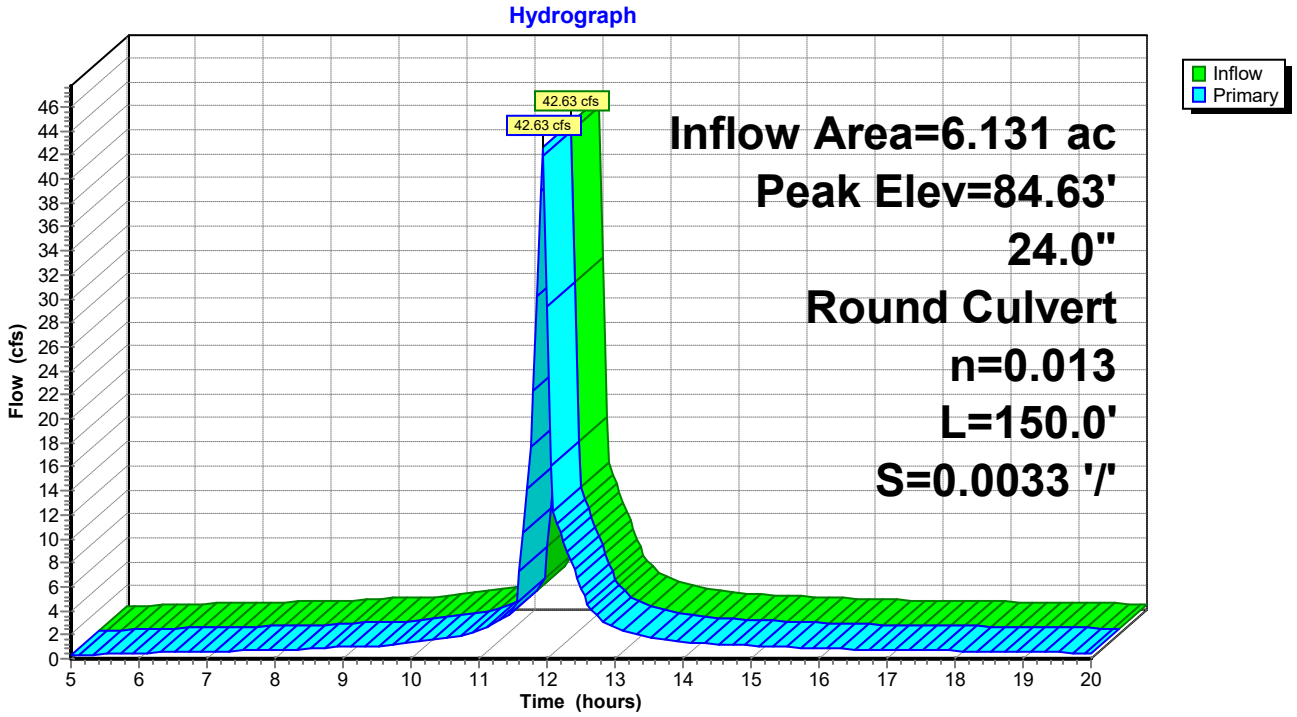
Inflow Area = 6.131 ac, 98.08% Impervious, Inflow Depth > 5.04" for 25-yr event
Inflow = 42.63 cfs @ 11.93 hrs, Volume= 2.575 af
Outflow = 42.63 cfs @ 11.93 hrs, Volume= 2.575 af, Atten= 0%, Lag= 0.0 min
Primary = 42.63 cfs @ 11.93 hrs, Volume= 2.575 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 84.63' @ 11.94 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	71.00'	**24.0" Round Culvert** L= 150.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.00' / 70.50' S= 0.0033 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=40.99 cfs @ 11.93 hrs HW=83.78' (Free Discharge)
1=Culvert (Inlet Controls 40.99 cfs @ 13.05 fps)

Pond DMH1: Drain Mahole



From: Sirois, Alison
To: John Kuchinski
Cc: Sean Thies; Barbara Barhydt
Subject: RE: 56 Milliken Street, Portland
Date: Wednesday, August 22, 2018 9:56:21 AM

Hello John

Based on the information provided and acknowledgement from the City of Portland, the Department is waiving state jurisdiction and delegating review to the City of Portland as the municipality pursuant to §489-A. Municipal review of development (1-A) (B). The City is required to submit a copy of the project to the Department under delegated review and if there are any questions the Department will work with the City to discuss it.

Alison Sirois
Regional Licensing and Compliance Manager, Southern Maine
Bureau of Land Resources, Maine Department of Environmental Protection
Phone (207)699-7028 Office (207)822-6300
www.maine.gov/dep

From: John Kuchinski [mailto:jkuchinski@ces-maine.com]
Sent: Monday, August 20, 2018 7:05 AM
To: Sirois, Alison <Alison.Sirois@maine.gov>
Cc: Sean Thies <sthies@ces-maine.com>; Barbara Barhydt <bab@portlandmaine.gov>
Subject: RE: 56 Milliken Street, Portland

Alison

As a follow up to our phone conversation on Friday the following is the summary of the development history at 56 Milliken St:
The original structure and site was constructed in 1966. By 1975 the site contained approximately 5.7 acres of impervious area. In 1993 the City of Portland issued a SLODA permit for expansion of the building and parking. There have been several small amendments until the last permit issued by the City of Portland in 2013. The total impervious area on the site is currently 11.4 acres. The amount of "structure" under Site Law is approximately 5.7 acres. Our proposal will add approximately 2.8 acres of "Structure" to bring the total area to 8.5 acres.

We are requesting that DEP grant a waiver of the 7 acre threshold to allow the City of Portland to continue to review and permit the site.

John Kuchinski, P.E. ◆ Senior Project Engineer
P 207.283.9151 | **F** 207.283.9151 | **C** 207.899.5307 | www.ces-maine.com

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From: Sirois, Alison <Alison.Sirois@maine.gov>

Sent: Monday, August 6, 2018 4:22 PM
To: John Kuchinski <jkuchinski@ces-maine.com>
Cc: Sean Thies <sthies@ces-maine.com>; Barbara Barhydt <bab@portlandmaine.gov>
Subject: RE: 56 Milliken Street, Portland

Hi John,

Does the proposed project with the combination of previous projects for this location, exceed 7 acres of structure? If it does, the Department generally takes jurisdiction over that review but can waive it under certain circumstances. Let me know if you have any further questions.

Alison Sirois
Regional Licensing and Compliance Manager, Southern Maine
Bureau of Land Resources, Maine Department of Environmental Protection
Phone (207)699-7028 Office (207)822-6300
www.maine.gov/dep

From: John Kuchinski [mailto:jkuchinski@ces-maine.com]
Sent: Monday, July 30, 2018 9:55 AM
To: Sirois, Alison <Alison.Sirois@maine.gov>
Cc: Sean Thies <sthies@ces-maine.com>; Barbara Barhydt <bab@portlandmaine.gov>
Subject: 56 Milliken Street, Portland

Allison

I met with the City staff last week on this project. It is a new 72,000 square foot warehouse/industrial building at 56 Milliken Street. I has a SLODA permit from the City and several modifications to the SLODA under delegated review authority. Will this proposal continue to be permitted by the City of Portland under delegated review?

Thank you,

John Kuchinski, P.E. ◆ Senior Project Engineer
P 207.283.9151 | **F** 207.283.9151 | **C** 207.899.5307

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