STORMWATER MANAGEMENT PLAN

2400-2402 CRANBERRY HIGHWAY
WAREHAM, MASSACHUSETTS 02571

APPLICANT/OWNER

WAREHAM DEVELOPMENT, LLC & JB DEVELOPMENT, LLC
BOURNE ACQUISITION, LLC & 2527 LLC
670 N. COMMERCIAL STREET
SUITE 212
MANCHESTER, NH 03101

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Nobis Project No. 095561.150
REVISED MARCH 20, 2023

COMMONWEALTH OF MASSACHUSETTS
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No. 55704
REGISTERED
PROFESSIONAL ENGINEER

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2400 & 2402 CRANBERRY HIGHWAY, WAREHAM, MA

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TRUE STORAGE FACILITY
2400 & 2402 CRANBERRY HIGHWAY, WAREHAM, MA

1.0 STORMWATER MANAGEMENT REPORT NARRATIVE

This Stormwater Management Report has been prepared to demonstrate compliance with the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards in accordance with the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) and Water Quality Certification Regulations (314 CMR 9.00). The report also demonstrates local compliance with the By-Laws of the Town of Wareham (Division V, Article XI Stormwater Management) and Zoning By-Laws of the Town of Wareham (Article 1260 Analysis of Development Impact: Stormwater Runoff in Compliance with MS4).

1.1 PROJECT DESCRIPTION

The Owner/Applicant, Wareham Development, LLC, JB Development, LLC, Bourne Acquisition, LLC & 2527 LLC, is proposing to develop an existing parcel of land located at 2400 & 2402 Cranberry Highway in Wareham, Massachusetts (the "Site"). The subject properties are identified by the Town of Wareham Assessor's office as Tax Map 108 Lots 1002.B1, 1002.B2, 1002.D, 1003.B1, 1003.B2, and 1003.B3. The Site currently consists of a 6,900 square foot one-story building that was used as a Buick Dealership showroom and garage and most recently as Wareham Pharmacy. The northern portion of the building was used as the auto showroom/pharmacy retail area. The southern portion of the building is a three-bay garage. A former auto body shop was located to the south of the standing structure. This was demolished and little evidence of the structure is left. A residential house was historically located on the southern portion of 2402 Cranberry Highway, this structure was demolished, and no apparent evidence of the structure remains.

The Applicant proposes to develop the Site in order to construct a 60,000 square foot storage facility. As proposed, the Project includes the demolition of the former auto showroom/pharmacy, three-bay garage and the existing pavement parking and driveways including the closer of three driveways to Cranberry Highway. The redevelopment will include the construction of the storage facility building, new parking and drive aisles, landscape improvements, and utility and stormwater management improvements to support the redevelopment.

1.2 SITE DESCRIPTION

The Site is a 3-acre parcel of land located at 2400 & 2402 Cranberry Highway (MA Route 28) in Wareham, Massachusetts bounded by commercial and residential properties. Great Hill Drive and the Great Hill Estates Mobile Home Park are located immediately north and east of the Site. A vacant building is located immediately southeast of the Site. Across Cranberry Highway, wooded land and a truck repair shop are located to the southwest and west of the subject property.

A portion of the Site lies within a surface watershed draining to a wetland complex and stream that is connected to Horseshoe Pond. The surface water runoff is collected along Cranberry Highway and piped to the wetland complex southwest of the site. The north and eastern portions of the Site drain to a low point and infiltrate into the ground surface.

Existing topography from the central portion of the Site slopes from the building(s) at approximately elevation 50.7 to Cranberry Highway to the south and west to approximately elevation 49.5 to 50.0. Existing topography along the north and east of the Site ranges from approximately elevation 52.5 at the North corner adjacent to Great Hill Drive to elevation 46.5 at the eastern low point of the Site. Please refer to the Existing Conditions Plan, which is included as part of the Site Plans.

Based on available information and field observations performed by a professional wetlands scientist, there are no known wetland resource areas or associated buffers located on, or within 100-ft of the Site. According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, 90% of the Site is classified as Urban land (#602B) and 10% of the Site is classified as Montauk fine sandy loam and Montauk-Urban land complex (#301B and #636B). Montauk soils refer to well drained soils formed in lodgment or flow till, in upland hills and moraines.

Nobis Group prepared a Geotechnical Engineering Report for the Site dated November 21, 2021 based on the findings of subsurface investigations. Nobis Group and Provencher Engineering, LLC coordinated and observed numerous test borings and test pits throughout 2020 and 2021. The general subsurface soil conditions encountered in the test borings and test pits consisted of a surficial layer of topsoil and/or fill (up to 7 feet thick) underlain by natural sand/gravel. Groundwater was generally observed 5 to 9 below existing ground. Test pits TP-103 through TP-108 were performed in support of the design of proposed potential stormwater infiltration systems. Constant head and falling head infiltration tests were performed to determine the saturated hydraulic conductivity of the soil where proposed infiltration BMP's could occur. Per the Massachusetts Stormwater Handbook, "Dynamic Field" Method, an infiltration rate of 6.875 inches per hour (in/hr) was used in the hydrologic model where the proposed infiltration basin was proposed. The test pit & boring logs as well as the results of the infiltration testing are provided in Appendix A.

1.3 HYDROLOGIC ANALYSIS

The hydrologic analysis was performed using the HydroCAD computer program. The HydroCAD model is based on the Natural Resources Conservation Service (NRCS) Technical Release 20 (TR-20) Model for Project Formulation Hydrology. Runoff coefficients for the existing and proposed development conditions were determined using NRCS Technical Release 55 (TR-55) methodology as provided in HydroCAD. Rainfall volumes used for this analysis are based on the "Extreme Precipitation in a Changing Climate for New York and the New England States", version 1.12, published by the USDA, NRCS and Cornell University's Northeast Regional Climate Center.

1.3.1 EXISTING CONDITIONS

Under existing conditions, the Site is mostly developed to the south and west and undeveloped woods to the north and east. The developed portion of the Site is abandoned/vacant. Previous uses most recently were a car showroom and garage and retail pharmacy. The existing pavement is deteriorating with vegetation coming up through the cracks in the pavement. Runoff from the developed portion of the Site appears to flow overland, untreated to Cranberry Highway. Runoff from the undeveloped portion of the Site appears to flow overland and infiltrate at a low point in the woods. Figure 1 illustrates the existing drainage patterns on the Site.

Currently, the Site is divided into six (6) drainage areas and stormwater runoff flows to three (3) points of interest, which have been identified as Onsite Infiltration East, Offsite Southeast, and Cranberry Highway. Descriptions of the existing drainage areas are listed below:

- Drainage Area E-1 is a 123,196 square foot area that is located at the north and east portions of the property. The area is primarily wooded but also includes some of the developed Site including the three-car garage bay and small portions of the paved parking lot. Stormwater runoff from this drainage area primarily flows overland and untreated to a depression within the wooded area on-site. The runoff is contained and infiltrates in the local depression for all storm events analyzed.

- Drainage Area E-2 is a 4,645 square foot area that is located adjacent to the southeast property line. The area is primarily grassed and wooded with a small portion of the area containing a rubble stockpile and gravel surface from the previously developed land. Stormwater runoff from this drainage area flows overland and untreated onto the adjacent property to the southeast.

- Drainage Areas E-3 through E-6 total a 65,134 square foot area that is located along the west portion of the property. The area primarily contains the developed area of the Site including buildings, paved surfaces, and portions of Cranberry Highway. Stormwater runoff from this drainage area flows overland and untreated to the drainage system in Cranberry Highway.

1.3.2 PROPOSED CONDITIONS

In the proposed condition, previously untreated runoff from the Site will be directed to new control measures to provide the required water quality treatment and stormwater recharge. The proposed Site layout will result in improved infiltration and groundwater recharge. Figure 2 illustrates the proposed post construction drainage conditions for the Site.

In the proposed condition, the Site will be divided into fifteen (15) drainage areas that discharge treated stormwater to three (3) existing points of interest. Descriptions of the proposed drainage areas are listed below:

- Drainage Area P-1A is a 83,866 square foot area that is located at the north, east, and southeast portions of the property. The area is primarily comprised of an undisturbed wooded area, the proposed sewage disposal system and the proposed stormwater infiltration basin including the sediment forebay.

- Drainage Areas P-1B through P-1E total a 14,792 square foot area consisting almost entirely of paved parking and driveways along the east side of the developed area. The stormwater runoff from these areas is captured in deep-sump hooded catch basins and discharged into Sediment Forebay 1 in Drainage Area P-1A.

- Drainage Area P-1F is a 30,000 square foot area that is located centrally to the Site. The area is comprised of the roof area only. Stormwater runoff is collected by roof drains prior to being discharged to the stormwater infiltration basin located in P-1A.

- Drainage Area P-2 is a 5,227 square foot area that is located adjacent to the southeast property line. The area is primarily grassed and wooded. Stormwater runoff from this drainage area flows overland onto the adjacent property to the southeast similarly to the existing conditions.

- Drainage Areas P-6A through P-6E total a 22,329 square foot area consisting almost entirely of paved parking and driveways along the west side of the developed area. The stormwater runoff from these areas is captured in deep-sump hooded catch basins and discharged into Sediment Forebay 2 in Drainage

Area P-1A.

- Drainage Areas P-3 through P-6 total a 36,761 square foot area that is located along the west portion of the property. The area primarily contains the developed area of the Site including portions of Cranberry Highway, landscaped areas, and the sidewalks and driveway within the State Highway Layout. Stormwater runoff from this drainage area flows overland to the drainage system in Cranberry Highway.

Please refer to Appendix B for detailed printouts of the HydroCAD analysis. Hydrologic results are summarized in the Regulatory Compliance section of this report.

1.4 WATER QUALITY

Stormwater runoff from the proposed driveway areas will be collected in a series of off-line deep-sump hooded catch basins and piped to sediment forebays prior to being discharged to the infiltration basin onsite. Clean runoff from the roof will be collected and routed directly to the infiltration basin for recharge.

1.4.1 WATER QUALITY CONTROL MEASURES

The proposed stormwater management systems implement a treatment train of Best Management Practices (BMPs) that has been designed for this redevelopment project to provide 1) a minimum 80% total suspended solids (TSS) removal, 2) 50% of total phosphorus (TS) removal, and 3) retention of 0.8-inch of volume multiplied by the impervious area of the impervious surface area on the site for stormwater runoff from the proposed roadway and driveways. The use of off-line deep- sump, hooded catch basins and sediment forebays for the infiltration basin provide 44% TSS pretreatment removal. While the infiltration basin provides 80% TSS removal and 60% to 70% TS removal in accordance with the Massachusetts Stormwater Handbook. Calculations for the provided TSS removal and water quality treatment volume are provided in Appendix D.

The treatment train for the proposed infiltration basin provides efficient removal of free oils, debris, TSS, and TS. The BMP's progress through a series of deep-sump hooded catch basins discharging to sediment forebays. The sediment forebays are designed to hold a volume a minimum of 0.1-inch of runoff per impervious acre. From the sediment forebay, the stormwater runoff discharges into the infiltration basin through a stone weir/spillway. The infiltration basin has been designed to treat the 1-inch water quality volume as required within an area with a rapid infiltration rate (greater than 2.4 inches per hour). Calculations for the sediment forebay and riprap apron sizing are provided in Appendix D.

1.4.2 STORMWATER RECHARGE

Stormwater recharge for the proposed redevelopment significantly exceeds the requirements and is provided through the infiltration of treated runoff from the proposed impervious driveways and infiltration of clean runoff from the building roof area. Calculations for the provided recharge volume and system drawdown time for the infiltration basin are provided in Appendix C.

The Massachusetts Stormwater Handbook Volume 3 requires a mounding analysis when the vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than 4 feet and the recharge system is proposed to attenuate the peak discharge from a 10-year or higher 24-hour storm. For this project there is a minimum of 2 feet of separation from the bottom of the exfiltration system to seasonal high groundwater but less than 4 feet of separation and the recharge system is proposed to attenuate the peak discharge from a 100-year 24-hour storm. A mounding analysis has been prepared to demonstrate that the required recharge volume is fully dewatered within 72 hours and that the groundwater mound that forms under the recharge system will not break out above the land or water surface of a wetland. Results of the mounding analysis are provided in Appendix C.

1.5 CONCLUSION

The stormwater management plan presented herein and as shown on the Site Plans has been prepared in accordance with applicable local, state, and federal regulations. The design includes Best Management Practices for maintaining stormwater runoff quality both during and after construction, and is designed to protect downstream and underlying receiving waters from stormwater related impacts. The Project will result in an improvement of stormwater runoff quality and quantity.

2.0 REGULATORY COMPLIANCE

2.1 MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION (MASSDEP) STORMWATER MANAGEMENT STANDARDS

The proposed True Storage Facility has been designed to comply with the stormwater management standards described in the Department of Environmental Protection’s Stormwater Management Policy.

2.1.1 STANDARD #1: NO NEW UNTREATED DISCHARGES

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

The Project has been designed to fully comply with Standard 1.

No new untreated stormwater discharges are proposed under the development. All proposed stormwater conveyances for the Project will not cause erosion or scour to wetlands or receiving waters.

The Best Management Practices (BMPs) included in the proposed stormwater management system have been designed in accordance with the Massachusetts Stormwater Handbook. Supporting information and computations demonstrating that no new untreated discharges will result from the Project are presented below as part of Standards 4 through 6.

The project has been designed so that new stormwater conveyances do not discharge untreated stormwater into, or cause erosion to, wetlands or waters.

2.1.2 STANDARD #2: PEAK RATE ATTENUATION

Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre- development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

The Project has been designed to fully comply with Standard 2.

The rainfall-runoff response of the Site under existing and proposed conditions was analyzed for storm events with recurrence intervals of 2, 10, 25, and 100 years, per MassDEP standards. Rainfall volumes used for this analysis were based on the “Extreme Precipitation in a Changing Climate for New York and the New England States”, version 1.12, published by the USDA, NRCS and Cornell University’s Northeast Regional Climate Center; they were 3.35, 4.94, 6.16 and 8.62 inches, respectively. The results of the analysis, as summarized in Table 1 below, indicate that the post-development discharge rates do not exceed the pre-development discharge rates. Due to the amount of detention and infiltration provided by the infiltration basin, the post-development discharge rates are less than the pre-development discharge rates for all storm events analyzed.

TABLE 1: PEAK DISCHARGE RATES

POI #	DESCRIPTION		STORM EVENT			
			2 Year (cfs)	10 Year (cfs)	25 Year (cfs)	100 Year (cfs)
POI-1	On-site Infiltration	EXIST. = PROP. =	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
POI-2	Off-site Flow to Southeast Abutter	EXIST. = PROP. =	0.1 0.1	0.2 0.2	0.3 0.3	0.5 0.5
POI-3	Off-site Flow to Cranberry Highway	EXIST. = PROP. =	2.9 1.0	4.6 1.9	6.0 2.6	8.6 4.1

Additionally, stormwater volumes were analyzed for all storm events to ensure the Project will not cause any downstream flooding impacts. Again, Due to the amount of detention and infiltration provided by the infiltration basin, the post-development stormwater volumes are less than the pre-development stormwater volumes for all storm events analyzed. Table 2 below summarizes the stormwater volume analysis.

TABLE 2: STORMWATER VOLUME ANALYSIS

POI #	DESCRIPTION		STORM EVENT			
			2 Year (cf)	10 Year (cf)	25 Year (cf)	100 Year (cf)
POI-1	On-site Infiltration	EXIST. = PROP. =	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
POI-2	Off-site Flow to Southeast Abutter	EXIST. = PROP. =	261 221	625 581	955 921	1,704 1,709
POI-3	Off-site Flow to Cranberry Highway	EXIST. = PROP. =	12,228 4,296	20,215 8,014	26,521 11,130	39,463 17,801

Please refer to Appendix B for detailed printouts of the HydroCAD analysis.

2.1.3 STANDARD #3: RECHARGE

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the *annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.*

The Project has been designed to fully comply with Standard 3.

Stormwater recharge for the proposed development is provided through infiltration of treated runoff from the proposed driveways and site roadways, and infiltration of clean runoff from the building roof areas. The Project results in an increase of 15,574 sf of new impervious surfaces for a total of 62,474 sf of total impervious surfaces in the post-development condition. Runoff from all impervious areas on the site will be directed to new BMPs, including a large infiltration basin which is designed to provide stormwater recharge significantly exceeding the requirements. Additionally 44% of the total suspended solids (TSS) are removed through pre-treatment of the stormwater prior to discharges to the infiltration basin as required within an area with a rapid infiltration rate (greater than 2.4 inches per hour). Calculations for the provided recharge volume and system drawdown time are provided in Appendix C.

Table 3 below summarizes the surface cover type areas for the Project.

TABLE 3: SURFACE COVER TYPE AREAS (SQUARE FEET)

Surface Cover Type	Existing	Proposed	Delta
Impervious Surfaces			
Building	7,675	30,520	+22,845
Pavement	23,467	31,949	+ 8,482
Gravel	11,507	0	- 11,507
Rubble	4,246	0	-4,246
Total Impervious	46,895	62,474	+15,574
Open Space	130,558	114,338	-15,574

In addition, the Massachusetts Stormwater Handbook Volume 3 requires a mounding analysis when the vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than 4 feet and the recharge system is proposed to attenuate the peak discharge from a 10-year or higher 24-hour storm. For test pits performed within the infiltration basin, TP-103 and TP-107, the vertical separation from the bottom of an exfiltration system to seasonal high groundwater was observed to be 3.29 feet and 2.24 feet, respectively. Therefore, a mounding analysis has been prepared to demonstrate that the required recharge volume is fully dewatered within 72 hours and that the groundwater mound that forms under the recharge system will not break out above the land or water surface of a wetland. Please refer to Appendix C for computations and supporting information regarding groundwater recharge and mounding analysis.

2.1.4 STANDARD #4: WATER QUALITY

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

a) *Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;*
b) *Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and*
c) *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

The Project has been designed to fully comply with Standard 4.

The proposed stormwater management systems implement a treatment train of BMPs that have been designed to provide a minimum of 80% TSS removal for stormwater runoff from the proposed driveways.

Prior to entering the infiltration basin, the driveway runoff is captured in a series of off-line deep-sump hooded catch basins prior to being discharged into a sediment forebay connecting to the infiltration basin. Roof runoff discharges directly into the infiltration basin with no pre-treatment. The infiltration basin has been designed to treat the 1-inch water quality volume as required within an area with a rapid infiltration rate (greater than 2.4 inches per hour).

In addition to the MassDEP Standards, Town of Wareham By-Laws impose performance standards of 80% TSS, 50% TS removal, and retention of 0.8-inch of volume multiplied by the impervious area of the impervious surface area on the site for redeveloped sites.

Please refer to Appendix D for computations and supporting information regarding water quality including water quality treatment volume calculations, TSS removal percentage calculations, and sediment forebay / riprap apron sizing calculations.

2.1.5 STANDARD #5: LAND USES WITH HIGHER POTENTIAL POLLUTANT LOADS (LUHPPLS)

For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

The Project has been designed to fully comply with Standard 5.

The Project will not generate more than 1,000 vehicle trips per day and therefore is not considered a land use with higher potential pollutant loads (LUHPPL).

2.1.6 STANDARD #6: CRITICAL AREAS

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site- specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

The Project is not within a critical area and therefore has been designed to fully comply with the Standard 6.

The Project is not located within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area.

2.1.7 STANDARD #7: REDEVELOPMENT AND OTHER PROJECTS SUBJECT TO THE STANDARDS ONLY TO THE MAXIMUM EXTENT PRACTICABLE

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The Project is a redevelopment and has been designed to fully comply with the Stormwater Management Standards.

Please refer to each Standard for demonstration of compliance and for applicable computations and supporting information.

2.1.8 STANDARD #8: CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL

A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

The Project will comply with Standard 8.

The Project will disturb approximately 3 acres of land is therefore required to obtain coverage under the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit. As required under the permit, a Stormwater Pollution Prevention Plan (SWPPP) was been developed and is included in Appendix E of this report.

2.1.9 STANDARD #9: OPERATION AND MAINTENANCE PLAN

A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

The Project will comply with Standard 9.

A Stormwater Operation and Maintenance (O&M) Plan has been developed for the Project and is included in Appendix F.

2.1.10 STANDARD #10: PROHIBITION OF ILLICIT DISCHARGE

All illicit discharges to the stormwater management system are prohibited.

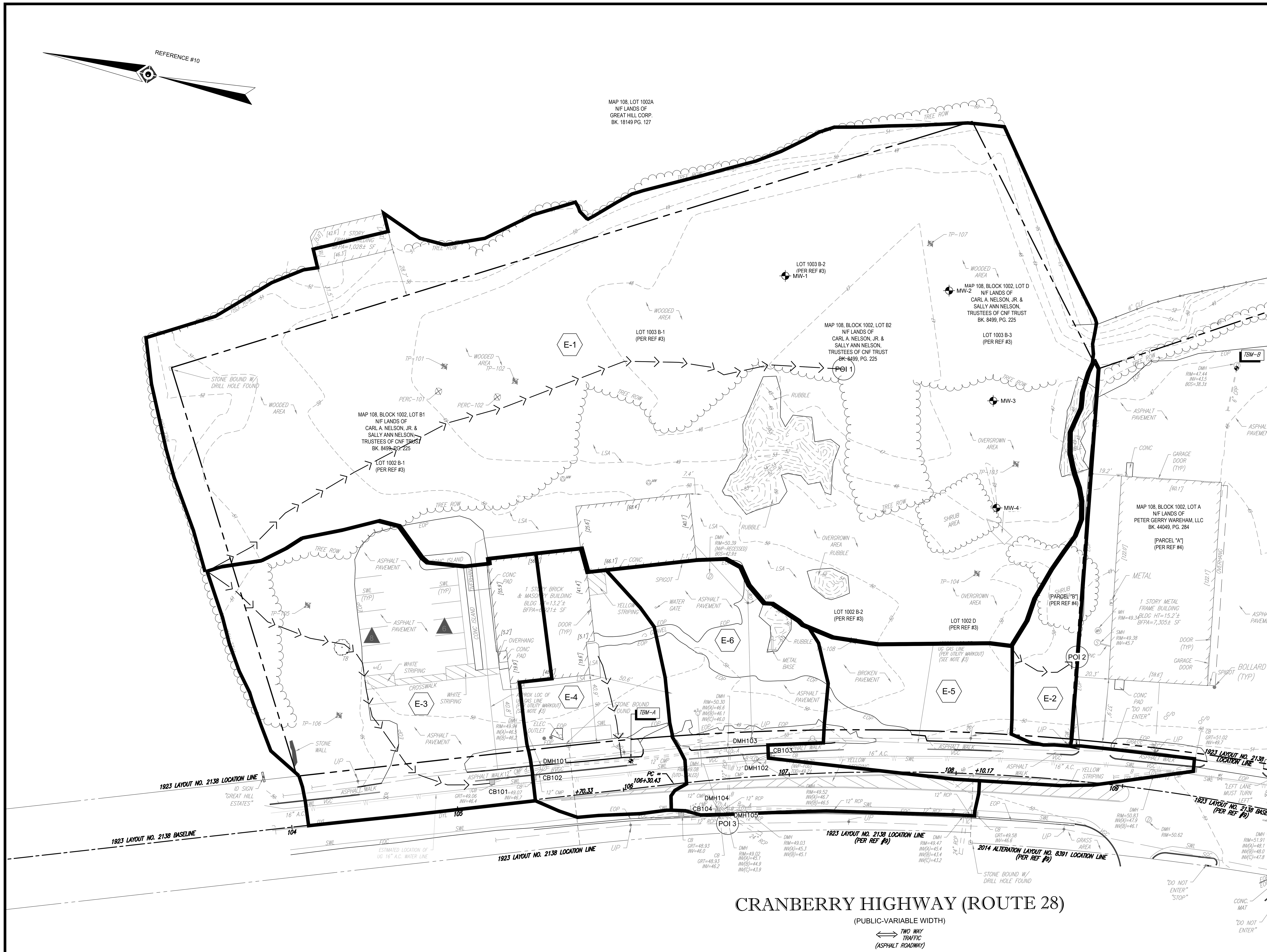
The Project will comply with Standard 10 as no illicit discharges to the stormwater management system are proposed.

2.2 EPA NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

2.2.1 CONSTRUCTION GENERAL PERMIT (CGP)

The Project will result in the disturbance of more than one acre of land and thus requires the preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP) by the site contractor and owner in accordance with the EPA's NPDES General Permit Program for Stormwater Discharges from Construction Sites. The SWPPP is included in Appendix E of this report.

FIGURES



LEGEND

- DRAINAGE AREA BOUNDARY
- FLOW PATH (TIME OF CONCENTRATION)
- E-1 EXISTING CONDITIONS SUBCATCHMENT DESIGNATION
- POI 1 POINT OF INTEREST
- R-1 REACH
- Pd1 POND

NOTES:

1. SOILS ON-SITE CONSIST OF SANDY LOAM BASED ON THE USDA SOIL CLASSIFICATION SYSTEM. TEST PITS WERE OBSERVED BY PROVENCHER ENGINEERING, LLC ON OCTOBER 7, 2021.
2. IN AREAS WHERE Tc WAS CALCULATED AS LESS THAN 5 MINUTES, "DIRECT ENTRY" METHOD WAS USED IN THE HYDROCAD MODEL. THESE Tc LINES ARE NOT SHOWN

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TRUE STORAGE FACILITY

2400 & 2402
CRANBERRY HWY
WAREHAM, MASSACHUSETTS

NO.	DATE	DESCRIPTION
4	03/17/23	RESPONSE TO TOWN COMMENTS
3	11/09/22	RESPONSE TO MASSDOT COMMENTS
2	10/26/22	RESPONSE TO MASSDOT COMMENTS
1	07/18/22	RESPONSE TO MASSDOT COMMENTS

REVISIONS

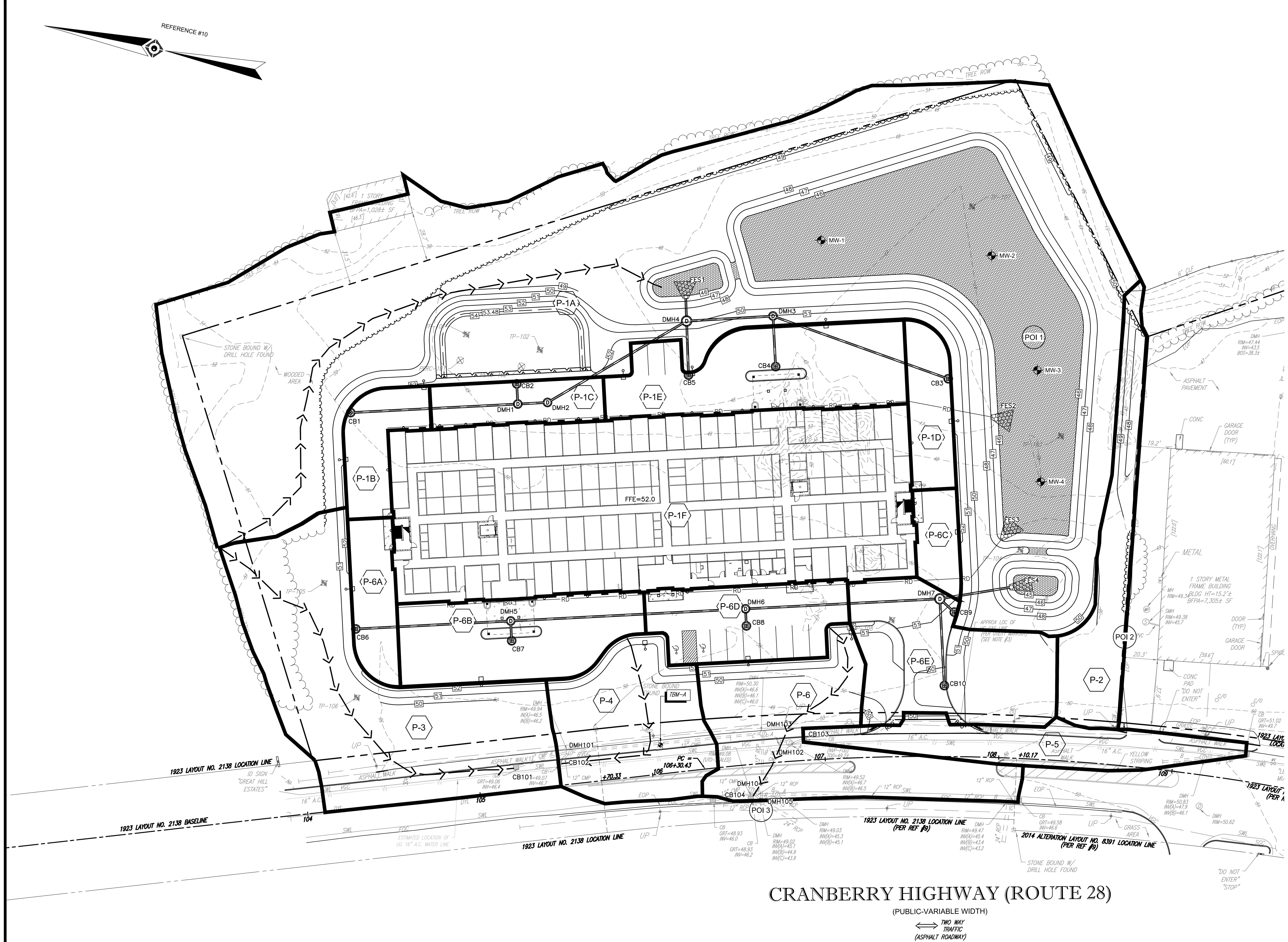
0 30' 60'
GRAPHIC SCALE

DATE:	APRIL 2022
NOBIS PROJECT NO.	95561.15
DRAWN BY:	SM
CHECKED BY:	CK
CAD DRAWING FILE:	95561.15-C-310-DAP.dwg

SHEET TITLE

EXISTING DRAINAGE AREA PLAN

FIGURE
1



LEGEND

- DRAINAGE AREA BOUNDARY
- FLOW PATH (TIME OF CONCENTRATION)
- P-1 — PROPOSED CONDITIONS SUBCATCHMENT DESIGNATION
- POI 1 — POINT OF INTEREST
- R-1 — REACH
- Pd1 — POND

NOTES:

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2. IN AREAS WHERE Tc WAS CALCULATED AS LESS THAN 5 MINUTES, "DIRECT ENTRY" METHOD WAS USED IN THE HYDROCAD MODEL. THESE Tc LINES ARE NOT SHOWN

DRAINAGE SCHEDULE

CB1
RIM = 51.0
INV. OUT = 48.0
L= 93 LF 12" HDPE (TO DMH1)
S = 0.0054 FT/FT

CB2
RIM = 51.0
INV. OUT = 47.6
L= 8 LF 12" HDPE (TO DMH1)
S = 0.0125 FT/FT

DMH1
RIM = 51.5
INV. IN = 47.5
INV. IN = 47.5
INV. OUT = 47.4
L = 13 LF 12" HDPE (TO DMH2)
S = 0.0077 FT /FT

DMH2
RIM = 51.5
INV. IN = 47.3
INV. OUT = 47.2
L = 89 LF 12" HDPE (TO DMH4)
S = 0.0045 FT /FT

CB3
RIM = 51.0
INV. OUT = 47.8
L= 104 LF 12" HDPE (TO DMH3)
S = 0.0058 FT/FT

CB4
RIM = 51.0
INV. OUT = 47.4
L= 25 LF 12" HDPE (TO DMH3)
S = 0.008 FT/FT

DMH3
RIM = 51.0
INV. IN = 47.2
INV. IN = 47.2
INV. OUT = 47.1
L = 46 LF 12" HDPE (TO DMH4)
S = 0.0065 FT /FT

CB5
RIM = 51.5
INV. OUT = 47.0
L= 27 LF 12" HDPE (TO DMH4)
S = 0.0074 FT/FT

DMH4 (5' ID)
RIM = 50.5
INV. IN = 46.8
INV. IN = 46.8
INV. IN = 46.8
INV. OUT = 46.7
L = 11 LF 12" HDPE (TO FES1)
S = 0.0091 FT /FT

FES1
INV. OUT = 46.6

FES2
INV. OUT = 47.0

FES3
INV. OUT = 47.0

CB6
RIM = 51.0
INV. OUT = 48.0
L= 86 LF 12" HDPE (TO DMH5)
S = 0.0058 FT/FT

CB7
RIM = 51.0
INV. OUT = 47.6
L= 8 LF 12" HDPE (TO DMH5)
S = 0.0125 FT/FT

DMH5
RIM = 52.0
INV. IN = 47.5
INV. IN = 47.5
INV. OUT = 47.4
L = 132 LF 12" HDPE (TO DMH6)
S = 0.0053 FT /FT

CB8
RIM = 51.2
INV. OUT = 46.8
L= 6 LF 12" HDPE (TO DMH6)
S = 0.0167 FT/FT

DMH6
RIM = 51.5
INV. IN = 46.7
INV. IN = 46.7
INV. OUT = 46.6
L = 108 LF 12" HDPE (TO DMH7)
S = 0.0056 FT /FT

CB9
RIM = 50.8
INV. OUT = 46.1
L= 7 LF 12" HDPE (TO DMH7)
S = 0.0143 FT/FT

CB10
RIM = 49.7
INV. OUT = 46.3
L = 46 LF 12" HDPE (TO DMH7)
S = 0.0065 FT/FT

DMH7 (6' ID)
RIM = 51.2
INV. IN = 46.0
INV. IN = 46.0
INV. IN = 46.0
INV. OUT = 45.9
L = 38 LF 12" HDPE (TO FES4)
S = 0.0053 FT /FT

FES4
INV. OUT = 45.7

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www.nobis-group.com

COMMONWEALTH OF MASSACHUSETTS
SEAN P. MCDOWELL
CIVIL
No. 55704
REGISTERED PROFESSIONAL ENGINEER

NOT ISSUED FOR CONSTRUCTION

TRUE STORAGE FACILITY

2400 & 2402
CRANBERRY HWY
WAREHAM, MASSACHUSETTS

NO.	DATE	DESCRIPTION
4	03/20/23	RESPONSE TO TOWN COMMENTS
3	11/09/22	RESPONSE TO MASSDOT COMMENTS
2	10/26/22	RESPONSE TO MASSDOT COMMENTS
1	07/18/22	RESPONSE TO MASSDOT COMMENTS

REVISIONS

0 30' 60'
GRAPHIC SCALE

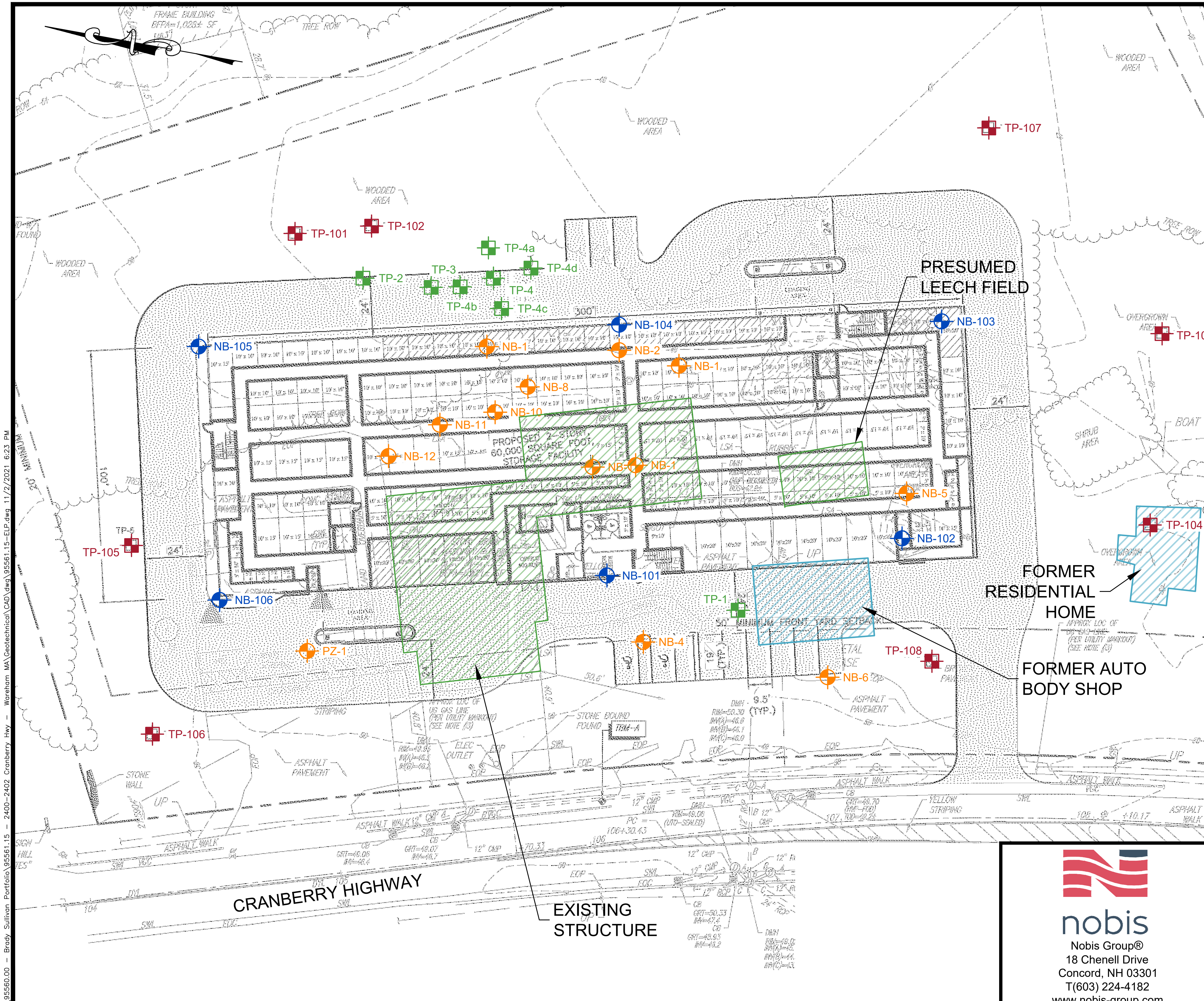
DATE:	APRIL 2022
NOBIS PROJECT NO.	95561.15
DRAWN BY:	SM
CHECKED BY:	CK
CAD DRAWING FILE:	95561.15-C-310-DAP.dwg

SHEET TITLE

PROPOSED DRAINAGE AREA PLAN

FIGURE
2

APPENDIX A – SOIL INFORMATION



NOTES:

1. THE BASE PLAN WAS PREPARED BY NOBIS GROUP AND DATED OCTOBER 12, 2021.
2. LOCATIONS AND SITE FEATURES DEPICTED ARE APPROXIMATE AND GIVEN FOR ILLUSTRATIVE PURPOSES.
3. ELEVATIONS ARE BASED ON NAVD 88.

LEGEND

NB-101	APPROXIMATE BORING LOCATION PERFORMED BY NEW ENGLAND BORING CONTRACTORS OF DERRY, NEW HAMPSHIRE AND OBSERVED BY NOBIS ON OCTOBER 19, AND OCTOBER 20, 2021.
TP-101	APPROXIMATE TEST PIT LOCATION OBSERVED BY PROVENCHER ENGINEERING, LLC ON OCTOBER 7, 2021.
TP-1	APPROXIMATE TEST PIT LOCATION PERFORMED BY ACV ENVIRONMENTAL OF NORFOLK, MASSACHUSETTS AND OBSERVED BY NOBIS ON SEPTEMBER 25, 2020.
NB-1	APPROXIMATE BORING/MONITORING WELL LOCATION PERFORMED BY GEOSEARCH, INC. OF STERLING, MASSACHUSETTS AND OBSERVED BY NOBIS ON SEPTEMBER 23, AND SEPTEMBER 24, 2020.
	EXISTING SITE FEATURE
	FORMER SITE FEATURE

0 40' 80'

GRAPHIC SCALE
(APPROXIMATE)

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FIGURE 2

EXPLORATION LOCATION PLAN
PROPOSED TRUE STORAGE
2400 - 2402 CRANBERRY HIGHWAY
WAREHAM, MASSACHUSETTS

DRAWN BY:	SAK	CHECKED BY:	AJ
PROJECT NO.	95561.150	DATE:	NOVEMBER 2021

BORING LOG

Project:	2400-2402 Cranberry Highway
Location:	Wareham, MA
Nobis Project No.:	95560.15
Boring No.:	NB-1
Boring Location:	See site plan
Checked by:	I. Coles
Date Start:	September 23, 2020
Date Finish:	September 23, 2020
Contractor:	Geosearch, Inc.
Driller:	E. Belsky
Nobis Rep.:	A.Epstein
Rig Type / Model:	Geoprobe 6620DT
Hammer Type:	N/A
Hammer Hoist:	N/A
Ground Surface Elev.:	
Datum:	

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	N/A	1.75 x 60
Advancement	Direct Push	Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
0	S-1	41	0-5		0.1		GRAVELLY SAND / 5.0	S-1: Brown and tan, fine to coarse SAND, little fine Gravel, trace Silt. Dry.	
5	S-2	40	5-10		0			S-2: Tan, fine to medium SAND, trace Silt. Dry.	
10	S-3	55	10-15		0		SILTY SAND / 15.0	S-3: Tan, fine to coarse SAND, trace Silt, Wet at 12". Orange mottling 15-34".	
15								Boring terminated at 15 feet.	

WELL DETAIL: Concrete Road box; Filter sand; Bentonite chips; Filter sand; 10-Slot PVC

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
1) NB-1 9-11' collected at 1345.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

nobis

Project: 2400-2402 Cranberry Highway

Location: Wareham, MA

Nobis Project No.: 95560.15

Boring No.: **NB-2**

Boring Location: See site plan

Checked by: I. Coles

Date Start: September 24, 2020

Date Finish: September 24, 2020

Contractor: Geosearch, Inc.

Driller: E. Belsky

Nobis Rep.: A.Epstein

Rig Type / Model: Geoprobe 6620DT

Hammer Type: N/A

Hammer Hoist: N/A

Ground Surface Elev.:

Datum:

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	N/A	1.75 x 60
Advancement	Direct Push	Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	Stratum Elev. / Depth (ft.)	Sample Description and Remarks (Classification System: Modified Burmister)	Well Detail
0	S-1	32	0-5		0.1		GRAVELLY SAND / 1.0	S-1A (11"): Brown and grey, fine to coarse SAND, little fine Gravel, trace Silt, few roots and leaves. Dry.	Concrete Road box
1					0			S-1B (20"): Orange brown and tan, fine to medium SAND, trace Silt. Dry.	Filter sand
5	S-2	39	5-10		0			S-2: Tan, fine to coarse SAND, trace Silt. Dry.	Bentonite chips
8							SILTY SAND		
10	S-3	50	10-15		0.1			S-3: Tan, fine to coarse SAND, trace Silt, Wet at 13". Orange mottling 13-38".	Filter sand; 10-Slot PVC
15							/ 15.0	Boring terminated at 15 feet.	

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

1) NB-2 9-11' collected at 0915.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

Project: 2400-2402 Cranberry Highway		Boring No.: **NB-3**
Location: Wareham, MA		Boring Location: See site plan
Nobis Project No.: 95560.15		Checked by: I. Coles
		Date Start: September 23, 2020
		Date Finish: September 23, 2020

Contractor: Geosearch, Inc.	Rig Type / Model: Geoprobe 6620DT	Ground Surface Elev.:
Driller: E. Belsky	Hammer Type: N/A	
Nobis Rep.: A.Epstein	Hammer Hoist: N/A	Datum:

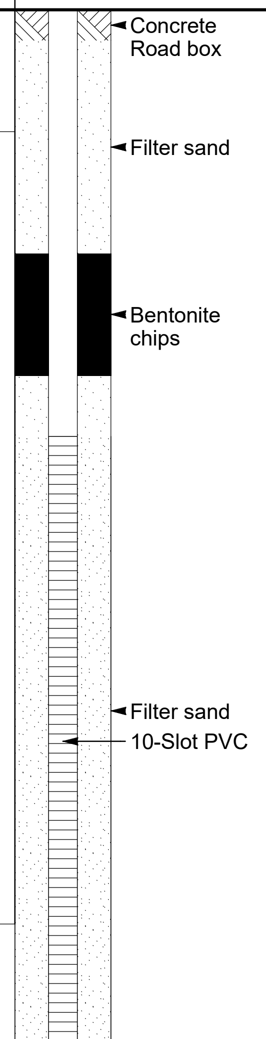
	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	N/A	1.75 x 60
Advancement	Direct Push	Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
0	S-1	35	0-5		0		GRAVELLY SAND	S-1A (16"): Light brown, fine to medium SAND, little fine Gravel, trace Silt. Dry.	
2					0		/ 2.0	S-1B (7"): Black and white, fine to coarse SAND, some fine to coarse Gravel, trace Silt. Dry.	
3					0			S-1C (12"): Brown, fine to medium SAND, trace Silt. Dry.	
5	S-2	43	5-10		0.1			S-2: Tan, fine to coarse SAND, trace Silt. Dry.	
10	S-3	60	10-15		0		SILTY SAND	S-3: Tan, fine to medium SAND, trace Silt, Wet at 33". Orange mottling 43-60".	
15							/ 15.0	Boring terminated at 15 feet.	

WELL DETAIL



Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
1) NB-3 11-13' collected at 0940.
2) Prior to boring completion the garage floor concrete slab was cored. The slab is approximately 7" at this location.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

Project:	2400-2402 Cranberry Highway
Location:	Wareham, MA
Nobis Project No.:	95560.15
Boring No.:	NB-4
Boring Location:	See site plan
Checked by:	I. Coles
Date Start:	September 23, 2020
Date Finish:	September 23, 2020
Contractor:	Geosearch, Inc.
Driller:	E. Belsky
Nobis Rep.:	A.Epstein
Rig Type / Model:	Geoprobe 6620DT
Hammer Type:	N/A
Hammer Hoist:	N/A
Ground Surface Elev.:	
Datum:	

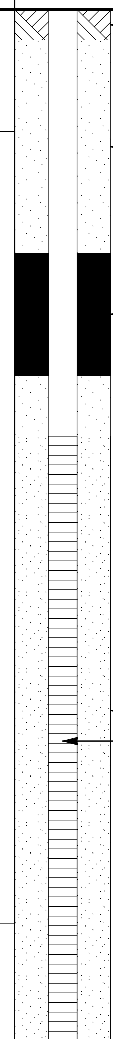
	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	N/A	1.75 x 60
Advancement	Direct Push	Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)
0	S-1	36	0-5		0.2		GRAVELLY SAND	S-1A (4"): Asphalt.
1					0.2			S-1B (18"): Brown, fine to medium SAND, some fine to coarse Gravel, trace Silt. Dry.
2							/ 2.0	
3.5					0.2		SILTY SAND	S-1C (14"): Orangish brown, fine to medium SAND, trace Silt. Dry.
5	S-2	45	5-10		0.2			S-2: Brown and tan, fine to medium SAND, trace Silt. Dry.
10	S-3	51	10-15		0.1			S-3: Tan, fine to coarse SAND, trace Silt, Wet at 28".
15							/ 15.0	Boring terminated at 15 feet.

WELL DETAIL



Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

1) NB-4 4-5' collected at 1030.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

nobis	Project: 2400-2402 Cranberry Highway Location: Wareham, MA Nobis Project No.: 95560.15	Boring No.: **NB-5** Boring Location: See site plan Checked by: I. Coles Date Start: September 23, 2020 Date Finish: September 23, 2020
Contractor: Geosearch, Inc. Driller: E. Belsky Nobis Rep.: A.Epstein	Rig Type / Model: Geoprobe 6620DT Hammer Type: N/A Hammer Hoist: N/A	Ground Surface Elev.: Datum:

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	N/A	1.75 x 60
Advancement	Direct Push	Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	WELL DETAIL	NOTES
0	S-1	38	0-5		0		GRAVELLY SAND / 1.0	S-1A (12"): Light brown, black, and white, fine to medium SAND, little fine Gravel, trace Silt, few roots and leaves. Dry.	Concrete Road box	
1					0			S-1B (26"): Orangish brown and tan, fine to medium SAND, trace Silt. Dry.		
3									Filter sand	
5	S-2	42	5-10		0			S-2: Orangish brown and tan, fine to medium SAND, trace Silt. Dry.		
6									Bentonite chips	
8							SILTY SAND			
10	S-3	41	10-15		0			S-3: Tan, fine to medium SAND, trace Silt, Wet at 24".		
13									Filter sand 10-Slot PVC	
15							/ 15.0	Boring terminated at 15 feet.		
16–20										

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
1) NB-5 11-13' collected at 1250.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

Project:	2400-2402 Cranberry Highway
Location:	Wareham, MA
Nobis Project No.:	95560.15
Boring No.:	**NB-6**
Boring Location:	See site plan
Checked by:	I. Coles
Date Start:	September 23, 2020
Date Finish:	September 23, 2020
Contractor:	Geosearch, Inc.
Driller:	E. Belsky
Nobis Rep.:	A.Epstein
Rig Type / Model:	Geoprobe 6620DT
Hammer Type:	N/A
Hammer Hoist:	N/A
Ground Surface Elev.:	
Datum:	

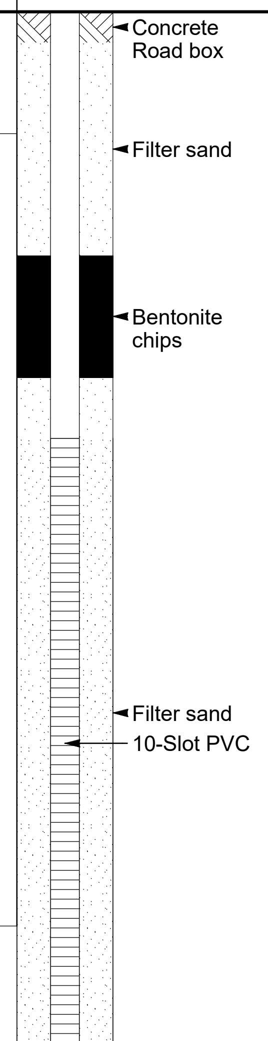
	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	N/A	1.75 x 60
Advancement	Direct Push	Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)
0	S-1	40	0-5		0.1		GRAVELLY SAND	S-1A (4"): Asphalt.
1					0.1			S-1B (18"): Brown, white, and black, fine to coarse SAND, some fine to coarse Gravel, trace Silt. Dry.
2							/ 2.0	
3					0.1		SILTY SAND	S-1C (18"): Orangish brown, fine to medium SAND, trace Silt. Dry.
5	S-2	40	5-10		0.1			S-2: Brown and tan, fine to medium SAND, trace Silt. Dry.
10	S-3	46	10-15		0.1			S-3: Tan, fine to coarse SAND, trace Silt, Wet at 30".
15							/ 15.0	Boring terminated at 15 feet.
20								

WELL DETAIL



NOTES

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
1) NB-6 11-12' collected at 1120.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

nobis	Project: 2400-2402 Cranberry Highway Location: Wareham, MA Nobis Project No.: 95560.15	Boring No.: **NB-7** Boring Location: See site plan Checked by: I. Coles Date Start: September 23, 2020 Date Finish: September 23, 2020
Contractor: Geosearch, Inc. Driller: E. Belsky Nobis Rep.: A.Epstein	Rig Type / Model: Geoprobe 6620DT Hammer Type: N/A Hammer Hoist: N/A	Ground Surface Elev.: Datum:

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	N/A	1.75 x 60
Advancement	Direct Push	Push

Groundwater Observations					
Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
0	S-1	19	0-5		0.1			GRAVELLY SAND	S-1: Brown, fine to coarse SAND, little fine Gravel, trace Silt. Dry.	
5	S-2	39	5-10		0				S-2A (20"): Brown, fine to medium SAND, trace fine Gravel, trace Silt. Dry.	
7					0			/ 7.0	S-2B (19"): Tan, fine to coarse SAND, trace Silt. Dry.	
10	S-3	50	10-15		0			SILTY SAND	S-3: Tan, fine to medium SAND, trace Silt, Moist at 4", Wet at 26".	
15								/ 15.0	Boring terminated at 15 feet.	
20										

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
1) NB-7 9-10' collected at 0915.
2) Prior to boring completion the garage floor concrete slab was cored. The slab is approximately 5" at this location.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

Project:	2400-2402 Cranberry Highway
Location:	Wareham, MA
Nobis Project No.:	95560.15

Boring No.:	**NB-8**
Boring Location:	See site plan
Checked by:	I. Coles
Date Start:	September 24, 2020
Date Finish:	September 24, 2020

Contractor:	Geosearch, Inc.	Rig Type / Model:	Geoprobe 6620DT	Ground Surface Elev.:	
Driller:	E. Belsky	Hammer Type:	N/A		
Nobis Rep.:	A.Epstein	Hammer Hoist:	N/A	Datum:	

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	N/A	1.75 x 60
Advancement	Direct Push	Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
0-1	S-1	40	0-5		0		GRAVELLY SAND / 1.2	S-1A (15"): Light brown, fine to medium SAND, some fine to coarse Gravel, trace Silt. Dry.	
2-3					0			S-1B (25"): Brown, fine to medium SAND, trace Silt. Dry.	
5-6	S-2	47	5-10		0			S-2: Light brown and tan, fine to medium SAND, trace Silt. Dry.	
8							SILTY SAND		
10-11	S-3	60	10-15		0			Light brown and tan, fine to medium SAND, trace Silt, Wet at 25". Orange mottling 26-60".	
15							/ 15.0	Boring terminated at 15 feet.	
16-20									

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

Project:	2400-2402 Cranberry Highway
Location:	Wareham, MA
Nobis Project No.:	95560.15
Boring No.:	NB-9
Boring Location:	See site plan
Checked by:	I. Coles
Date Start:	September 24, 2020
Date Finish:	September 24, 2020
Contractor:	Geosearch, Inc.
Driller:	E. Belsky
Nobis Rep.:	A.Epstein
Rig Type / Model:	Geoprobe 6620DT
Hammer Type:	N/A
Hammer Hoist:	N/A
Ground Surface Elev.:	
Datum:	

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	N/A	1.75 x 60
Advancement	Direct Push	Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
0-2	S-1	35	0-5		0			GRAVELLY SAND / 2.0	S-1A (20"): Brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt, few roots and leaves. Dry.	
2-5					0				S-1B (15"): Orangish brown, fine to medium SAND, trace Silt. Dry.	
5-10	S-2	38	5-10		0			SILTY SAND	S-2: Tan, fine to coarse SAND, trace Silt. Dry.	
10-15	S-3	50	10-15		0			/ 15.0	S-3: Tan, fine to coarse SAND, trace Silt, Wet at 18". Orange mottling 18-46".	
15-20									Boring terminated at 15 feet.	

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

nobis

Project: 2400-2402 Cranberry Highway

Location: Wareham, MA

Nobis Project No.: 95560.15

Boring No.: **NB-10**

Boring Location: See site plan

Checked by: I. Coles

Date Start: September 24, 2020

Date Finish: September 24, 2020

Contractor: Geosearch, Inc.

Driller: E. Belsky

Nobis Rep.: A.Epstein

Rig Type / Model: Geoprobe 6620DT

Hammer Type: N/A

Hammer Hoist: N/A

Ground Surface Elev.:

Datum:

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	N/A	1.75 x 60
Advancement	Direct Push	Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
0	S-1	32	0-5		0		GRAVELLY SAND	S-1: Brown and black, fine to coarse SAND, little fine to coarse Gravel, trace Silt. Dry.	
5	S-2	40	5-10		0		/ 5.0	S-2: Tan, fine to medium SAND, trace Silt. Dry.	
10	S-3	46	10-15		0		SILTY SAND	S-3: Tan, fine to coarse SAND, trace Silt, Wet at 20".	
15							/ 15.0	Boring terminated at 15 feet.	

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

nobis	Project: 2400-2402 Cranberry Highway Location: Wareham, MA Nobis Project No.: 95560.15	Boring No.: **NB-11** Boring Location: See site plan Checked by: I. Coles Date Start: September 24, 2020 Date Finish: September 24, 2020
Contractor: Geosearch, Inc. Driller: E. Belsky Nobis Rep.: A.Epstein	Rig Type / Model: Geoprobe 6620DT Hammer Type: N/A Hammer Hoist: N/A	Ground Surface Elev.: Datum:

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	N/A	1.75 x 60
Advancement	Direct Push	Push

Groundwater Observations					
Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	SAMPLE INFORMATION Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	LITHOLOGY Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
	S-1	34	0-5		0			GRAVELLY SAND / 2.2	S-1A (28"): Tan and black, fine to coarse SAND, little fine Gravel, trace Silt. Dry.	
1										
2										
3					0				S-1B (6"): Orangish brown, fine to medium SAND, trace Silt. Dry.	
4										
5	S-2	44	5-10		0				S-2: Orangish brown and tan, fine to medium SAND, trace Silt. Dry.	
6										
7										
8										
9								SILTY SAND		
10	S-3	53	10-15		0				S-3: Tan, fine to coarse SAND, trace Silt, Wet at 26".	
11										
12										
13										
14										
15								/ 15.0	Boring terminated at 15 feet.	
16										
17										
18										
19										
20										

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

nobis	Project: 2400-2402 Cranberry Highway Location: Wareham, MA Nobis Project No.: 95560.15	Boring No.: **NB-12** Boring Location: See site plan Checked by: I. Coles Date Start: September 24, 2020 Date Finish: September 24, 2020
Contractor: Geosearch, Inc. Driller: E. Belsky Nobis Rep.: A.Epstein	Rig Type / Model: Geoprobe 6620DT Hammer Type: N/A Hammer Hoist: N/A	Ground Surface Elev.: Datum:

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	N/A	1.75 x 60
Advancement	Direct Push	Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
0	S-1	35	0-5		0			GRAVELLY SAND / 2.5	S-1A (2"): Asphalt. S-1B: Brown, white, and black, fine to coarse SAND, some fine to coarse Gravel, trace Silt. Dry.	
1					0					
3					0			SILTY SAND	S-1C: Orangish brown, fine to medium SAND, trace Silt. Dry.	
5	S-2	38	5-10		0				S-2A (18"): Orangish brown, fine to medium SAND, trace Silt. Dry.	
7					0				S-2B (20"): Tan, fine to coarse SAND, trace Silt. Dry.	
10	S-3	46	10-15		0			/ 15.0	S-3: Tan, fine to coarse SAND, trace Silt, Wet at 21".	
15									Boring terminated at 15 feet.	
20										

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

nobis	Project: 2400-2402 Cranberry Highway Location: Wareham, MA Nobis Project No.: 95560.15	Boring No.: **PZ-1** Boring Location: See site plan Checked by: I. Coles Date Start: September 24, 2020 Date Finish: September 24, 2020
Contractor: Geosearch, Inc. Driller: E. Belsky Nobis Rep.: A.Epstein	Rig Type / Model: Geoprobe 6620DT Hammer Type: N/A Hammer Hoist: N/A	Ground Surface Elev.: Datum:

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	N/A	1.75 x 60
Advancement	Direct Push	Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
0	S-1	27	0-5		0			GRAVELLY SAND / 1.0	S-1A (12"): Brown, fine to coarse SAND, little fine Gravel, trace Silt. Dry.	
1					0				S-1B (15"): Orangish brown, fine to medium SAND, trace Silt. Dry.	
2										
3										
4										
5	S-2	35	5-10		0				S-2A (24"): Orangish brown, fine to medium SAND, trace Silt. Dry.	
6										
7					0				S-2B (11"): Tan, fine to coarse SAND, trace Silt. Dry.	
8								SILTY SAND		
9										
10	S-3	60	10-15		0				S-3: Tan, fine to coarse SAND, trace Silt, Wet at 22".	
11										
12										
13										
14										
15								/ 15.0	Boring terminated at 15 feet.	
16										
17										
18										
19										
20										

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

TEST PIT LOG

nobis

PROJECT	
2400-2402 Cranberry Highway	
Wareham, MA	

TEST PIT NO.	TP-1
SHEET	1 of 1
FILE NO.	95560.15
CHKD BY	IC

Engineer	A.Epstein	Make	GEHL	Ground El.	NA
Contractor	ACV	Model	235	Datum	NA
Operator	Paul Kling	Capacity	1/4 yd^3	Time Start	10:45
Weather	70's Sunny	Reach	10 ft	Date	9/25/2020

Depth Below Grade (ft)	Strata Change	Subsurface Description	Excavation Effort	Boulder Qty/Class	PID Field Screening Results
2'	Fill	Tan, fine to medium SAND, some fine to coarse Gravel, trace Silt, trace debris (concrete, plastic, black mesh). Dry. 3.5 ft	E E E		PID 0.4
4' 6' 8' 10'	Native	Tan and orangish-brown, fine to course SAND, little fine Gravel, trace Silt. Dry. 9.5 ft	E E E E E M		PID 0.0
12' 14'		TP terminated at 9.5 ft			

Notes:
1) Soil sample collected for labortory analysis from 9' bgs at 11:30
2)
3)

WATER SYMBOLS
▼ Groundwater
▽ Estimated Seasonal High Groundwater

9ft
4ft

BOULDER	CLASS
12" - 24"	A
24" - 36"	B
>36"	C

PROPORTIONS USED	
0-10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT
E = Easy
M = Moderate
D = Difficult

TEST PIT LOG

nobis	**PROJECT** 2400-2402 Cranberry Highway Wareham, MA	TEST PIT NO. TP-2 SHEET 1 of 1 FILE NO. 95560.15 CHKD BY IC

Engineer	A.Epstein	Make	GEHL	Ground El.	NA
Contractor	ACV	Model	235	Datum	NA
Operator	Paul Kling	Capacity	1/4 yd^3	Time Start	11:50
Weather	70's Sunny	Reach	10 ft	Date	9/25/2020

Depth Below Grade (ft)	Strata Change	Subsurface Description	Excavation Effort	Boulder Qty/Class	PID Field Screening Results
	Top Soil	Brown fine to medium Sand, little fine Gravel, trace Silt, numerous roots and leaves. 1ft	E		PID 0.2
2'	Fill	Tan fine to medium SAND, little fine Gravel, trace Silt. Dry. 4.5 ft	E E E		PID 0.1
4'					
6'	Native	Tan and orangish brown fine to course SAND, trace Silt. Dry. 9.5 ft	E E E E E		PID 0.0
8'					
10'		TP teriminated at 9.5 ft			
12'					
14'					

Notes:
1) Soil sample collected for labortory analysis from 9' collected at 12:25
2)
3)

WATER SYMBOLS
▼ Groundwater
▽ Estimated Seasonal High Groundwater

10ft
4ft

BOULDER	CLASS
12" - 24"	A
24" - 36"	B
>36"	C

PROPORTIONS USED	
0-10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT
E = Easy
M = Moderate
D = Difficult

TEST PIT LOG

nobis

PROJECT

2400-2402 Cranberry Highway

Wareham, MA

TEST PIT NO.	TP-3
SHEET	1 of 1
FILE NO.	95560.15
CHKD BY	IC

Engineer	A.Epstein	Make	GEHL	Ground El.	NA
Contractor	ACV	Model	235	Datum	NA
Operator	Paul Kling	Capacity	1/4 yd^3	Time Start	12:40
Weather	70's Sunny	Reach	10 ft	Date	9/25/2020

Depth Below Grade (ft)	Strata Change	Subsurface Description	Excavation Effort	Boulder Qty/Class	PID Field Screening Results
2'	Fill	Brown and light brown fine to medium SAND, little fine to coarse Gravel, trace Silt. Little roots and leaves. Trace plastic wire. 3 ft	E, E, E		PID 0.3
4'	Native	Tan and orangish brown fine to course SAND, little fine Gravel, trace Silt. Dry. 9 ft	E		PID 0.0
6'			E, E		
8'			E, M		
10'		TP teriminated at 9 ft	M		
12'					
14'					

Notes:
1) Soil sample collected for labortory analysis from 9' collected at 13:10
2)
3)

WATER SYMBOLS
▼ Groundwater
▽ Estimated Seasonal High Groundwater

10ft
4ft

BOULDER	CLASS
12" - 24"	A
24" - 36"	B
>36"	C

PROPORTIONS USED	
0-10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT
E = Easy
M = Moderate
D = Difficult

TEST PIT LOG

nobis

PROJECT

2400-2402 Cranberry Highway
Wareham, MA

TEST PIT NO.	TP-4
SHEET	1 of 1
FILE NO.	95560.15
CHKD BY	IC

Engineer	A.Epstein	Make	GEHL	Ground El.	NA
Contractor	ACV	Model	235	Datum	NA
Operator	Paul Kling	Capacity	1/4 yd^3	Time Start	13:30
Weather	70's Sunny	Reach	10 ft	Date	9/25/2020

Depth Below Grade (ft)	Strata Change	Subsurface Description	Excavation Effort	Boulder Qty/Class	PID Field Screening Results
	Top Soil	Brown fine to medium Sand, little fine Gravel, trace Silt, trace organics (roots and leaves). 1ft	E		PID 0.4
2'	Fill	Light brown fine to medium SAND, little fine to coarse Gravel, trace Silt. Dry. 3.5 ft	E		PID 0.2
			E		
4'	Fill	Orangish-brown, fine to coarse SAND, some fine to coarse Gravel, some Fill (glass, metal, plastic, wires) Dry. 5.5 ft	M		PID 0.5
			M		
6'	Native	Tan fine to course SAND, trace Silt. Dry. 9.5 ft	M		PID 0.0
			M		
8'			E		
			E		
10'		TP teriminated at 9.5 ft			
12'					
14'					

Notes:
1) Soil sample collected for labortory analysis from 5' collected at 14:00
2) Soil sample collected for labortory analysis from 9' collected at 14:05
3) Four additional test pits were completed approximately 10 feet from TP-4 to determine extent of debris. No debris was encountered in the additional test pit locations.

WATER SYMBOLS
▼ Groundwater
▽ Estimated Seasonal High Groundwater

10ft
5ft

BOULDER	CLASS
12" - 24"	A
24" - 36"	B
>36"	C

PROPORTIONS USED

0-10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT
E = Easy
M = Moderate
D = Difficult

TEST PIT LOG

nobis	**PROJECT** 2400-2402 Cranberry Highway Wareham, MA	TEST PIT NO. TP-4A SHEET 1 of 1 FILE NO. 95560.15 CHKD BY IC

Engineer	A.Epstein	Make	GEHL	Ground El.	NA
Contractor	ACV	Model	235	Datum	NA
Operator	Paul Kling	Capacity	1/4 yd^3	Time Start	13:30
Weather	70's Sunny	Reach	10 ft	Date	9/25/2020

Depth Below Grade (ft)	Strata Change	Subsurface Description	Excavation Effort	Boulder Qty/Class	PID Field Screening Results
	Top Soil	Brown fine to medium Sand, little fine Gravel, trace Silt, trace organics (roots and leaves). 1ft	E		PID 0.0
2'	Native	Light brown fine to medium SAND, little fine to coarse Gravel, trace Silt. Dry. 3.5 ft	E		
			E		PID 0.0
4'			M		
		Tan fine to course SAND, trace Silt. Dry. 7.0 ft	M		
6'			M		PID 0.0
			M		
8'					
10'					
12'					
14'					

Notes:
1) No debris was encountered. No laboratory samples collected.
2)
3)

WATER SYMBOLS
▼ Groundwater
▽ Estimated Seasonal High Groundwater

10ft
5ft

BOULDER	CLASS
12" - 24"	A
24" - 36"	B
>36"	C

PROPORTIONS USED	
0-10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT
E = Easy
M = Moderate
D = Difficult

TEST PIT LOG

nobis	**PROJECT**	TEST PIT NO. TP-4B
	2400-2402 Cranberry Highway	SHEET 1 of 1
	Wareham, MA	FILE NO. 95560.15
		CHKD BY IC

Engineer	A.Epstein	Make	GEHL	Ground El.	NA
Contractor	ACV	Model	235	Datum	NA
Operator	Paul Kling	Capacity	1/4 yd^3	Time Start	13:30
Weather	70's Sunny	Reach	10 ft	Date	9/25/2020

Depth Below Grade (ft)	Strata Change	Subsurface Description	Excavation Effort	Boulder Qty/Class	PID Field Screening Results
	Top Soil	Brown fine to medium Sand, little fine Gravel, trace Silt, trace organics (roots and leaves). 1ft	E		PID 0.0
2'	Native	Light brown fine to medium SAND, little fine to coarse Gravel, trace Silt. Dry. 3.5 ft	E		
4'			E		PID 0.0
		Tan fine to course SAND, trace Silt. Dry. 7.0 ft	M		
6'			M		PID 0.0
			M		
			M		
8'					
10'					
12'					
14'					

Notes:
1) No debris was encountered. No laboratory samples collected.
2)
3)

WATER SYMBOLS
▼ Groundwater
▽ Estimated Seasonal High Groundwater

	BOULDER	CLASS	PROPORTIONS USED		EXCAVATION EFFORT
10ft	12" - 24"	A	0-10%	Trace	E = Easy
5ft	24" - 36"	B	10-20%	Little	M = Moderate
	>36"	C	20-35%	Some	D = Difficult
			35-50%	And	

TEST PIT LOG

nobis

PROJECT		
2400-2402 Cranberry Highway	TEST PIT NO.	TP_4C
Wareham, MA	SHEET	1 of 1
	FILE NO.	95560.15
	CHKD BY	IC

Engineer	A.Epstein	Make	GEHL	Ground El.	NA
Contractor	ACV	Model	235	Datum	NA
Operator	Paul Kling	Capacity	1/4 yd^3	Time Start	13:30
Weather	70's Sunny	Reach	10 ft	Date	9/25/2020

Depth Below Grade (ft)	Strata Change	Subsurface Description	Excavation Effort	Boulder Qty/Class	PID Field Screening Results
	Top Soil	Brown fine to medium Sand, little fine Gravel, trace Silt, trace organics (roots and leaves). 1ft	E		PID 0.0
2'	Native	Light brown fine to medium SAND, little fine to coarse Gravel, trace Silt. Dry. 3.5 ft	E		
			E		
4'		Tan fine to course SAND, trace Silt. Dry. 7.0 ft	M		PID 0.0
			M		
6'			M		PID 0.0
			M		
8'					
10'					
12'					
14'					

Notes:
1) No debris was encountered. No laboratory samples collected.
2)
3)

WATER SYMBOLS
▼ Groundwater
▽ Estimated Seasonal High Groundwater

10ft
5ft

BOULDER	CLASS
12" - 24"	A
24" - 36"	B
>36"	C

PROPORTIONS USED	
0-10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT
E = Easy
M = Moderate
D = Difficult

TEST PIT LOG

nobis

PROJECT

2400-2402 Cranberry Highway
Wareham, MA

TEST PIT NO.	TP-4D
SHEET	1 of 1
FILE NO.	95560.15
CHKD BY	IC

Engineer	A.Epstein	Make	GEHL	Ground El.	NA
Contractor	ACV	Model	235	Datum	NA
Operator	Paul Kling	Capacity	1/4 yd^3	Time Start	13:30
Weather	70's Sunny	Reach	10 ft	Date	9/25/2020

Depth Below Grade (ft)	Strata Change	Subsurface Description	Excavation Effort	Boulder Qty/Class	PID Field Screening Results
	Top Soil	Brown fine to medium Sand, little fine Gravel, trace Silt, trace organics (roots and leaves). 1ft	E		PID 0.0
2'	Native	Light brown fine to medium SAND, little fine to coarse Gravel, trace Silt. Dry. 3.5 ft	E		
			E		
4'		Tan fine to course SAND, trace Silt. Dry. 7.0 ft	M		PID 0.0
			M		
6'			M		PID 0.0
			M		
8'					
10'					
12'					
14'					

Notes:
1) No debris was encountered. No laboratory samples collected.
2)
3)

WATER SYMBOLS
▼ Groundwater
▽ Estimated Seasonal High Groundwater

10ft
5ft

BOULDER	CLASS
12" - 24"	A
24" - 36"	B
>36"	C

PROPORTIONS USED	
0-10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT
E = Easy
M = Moderate
D = Difficult

Commonwealth of Massachusetts
City/Town of Wareham
Form 11 - Soil Suitability Assessment for On-Site Stormwater Infiltration

C. On-Site Review:

Deep Observation Hole Number: TP-103 (10/7/2021)

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-3	A	10YR3/2				Sandy loam			Massive	Loose	
3-12	B	10YR4/6				Sandy loam			Massive	Loose	
12-96	C	10YR5/4	60 in	10YR5/8	20	Sand			Granular	Loose	Medium sand

Additional Notes:

Observed Groundwater: weeping at 72”, standing at 72” (Seasonal High GW Mottles at 60” all around test pit)

No Bedrock Observed. Permeability test conducted at 54”

Form 11 - Soil Suitability Assessment for On-Site Stormwater Infiltration

C. On-Site Review:

Deep Observation Hole Number: TP-104 (10/7/2021)

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-12	1C1	10YR3/2				Sandy loam			Massive	Friable	Unsuitable Fill
12-24	1C2	10YR5/4				Sandy loam			Massive	Friable	Unsuitable Fill
24-26	A	10YR3/2				Sandy loam			Massive	Friable	
26-36	Bw	10YR4/6				Sandy loam			Massive	Friable	
36-96	2C1	10YR5/4	66 in	10YR5/8	20	Sand			Granular	Loose	Medium sand

Additional Notes:

Observed Groundwater: weeping at 78”, standing at 78” (Seasonal High GW Mottles at 66” all around test pit)

No Bedrock Observed. Permeability test conducted at 66”

Commonwealth of Massachusetts
City/Town of Wareham
Form 11 - Soil Suitability Assessment for On-Site Stormwater Infiltration

C. On-Site Review:

Deep Observation Hole Number: TP-105 (10/7/2021)

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-8	1C1	10YR3/2				Sandy loam			Massive	Friable	Unsuitable Fill
8-36	1C2	10YR4/4				Sandy loam			Massive	Friable	Unsuitable Fill
36-52	A	10YR2/2				Sandy loam			Massive	Friable	
52-58	Bw	10YR4/3				Sandy loam			Massive	Friable	Fine to Medium
58-96	2C1	10YR5/4	60 in	10YR5/8	20	Sand			Granular	Loose	Medium sand

Additional Notes:

Observed Groundwater: weeping at 84”, standing at 84” (Seasonal High GW Mottles at 60” all around test pit)

No Bedrock Observed. Permeability test conducted at 66”

Commonwealth of Massachusetts
City/Town of Wareham
Form 11 - Soil Suitability Assessment for On-Site Stormwater Infiltration

C. On-Site Review:

Deep Observation Hole Number: TP-106 (10/7/2021)

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-8	1C1	10YR3/2				Sandy loam			Massive	Friable	Unsuitable Fill
8-24	1C2	10YR4/4				Sandy loam			Massive	Friable	Unsuitable Fill
24-30	A	10YR2/2				Sandy loam			Massive	Friable	
30-40	Bw	10YR4/3				Sandy loam			Massive	Friable	Fine to Medium
40-96	2C1	10YR5/4	60 in	10YR5/8	20	Sand			Granular	Loose	Medium sand

Additional Notes:

Observed Groundwater: weeping at 84”, standing at 84” (Seasonal High GW Mottles at 60” all around test pit)

No Bedrock Observed.

Commonwealth of Massachusetts
City/Town of Wareham
Form 11 - Soil Suitability Assessment for On-Site Stormwater Infiltration

C. On-Site Review:

Deep Observation Hole Number: TP-107 (10/7/2021)

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-4	A	10YR3/2				Sandy loam			Massive	Loose	
4-12	B	10YR4/6				Sandy loam			Massive	Loose	
12-96	C	10YR5/4	36 in	10YR5/8	20	Sand			Granular	Loose	Medium sand

Additional Notes:

Observed Groundwater: weeping at 54”, standing at 54” (Seasonal High GW Mottles at 36” all around test pit)

No Bedrock Observed. Permeability test conducted at 36”

Commonwealth of Massachusetts
City/Town of Wareham
Form 11 - Soil Suitability Assessment for On-Site Stormwater Infiltration

C. On-Site Review:

Deep Observation Hole Number: TP-108 (10/7/2021)

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-24	1C1	10YR5/4				Sandy loam			Massive	Very Friable	Unsuitable Fill
24-30	A	10YR3/2				Sandy loam			Massive	Friable	
30-40	Bw	10YR4/6				Sandy loam			Massive	Loose	
40-120	2C1	10YR5/4	108 in	10YR6/8	20	Sand			Granular	Loose	Medium sand

Additional Notes:

Observed Groundwater: weeping at 118", standing at 118" (Seasonal High GW Mottles 108" all around test pit)

No Bedrock Observed.

BORING LOG

Project:	True Storage Facility
Location:	2400 - 2402 Cranberry Highway, Wareham, MA
Nobis Project No.:	95561.15
Boring No.:	NB-101
Boring Location:	See Exploration Location Plan
Checked by:	K. Stanway
Date Start:	October 19, 2021
Date Finish:	October 19, 2021

Contractor:	New England Boring Contractors
Driller:	W. Hoeckle
Nobis Rep.:	S. Kurtzer
Rig Type / Model:	Track / B-53 Mobile
Hammer Type:	Automatic Hammer
Hammer Hoist:	Automatic
Ground Surface Elev.:	(+/-) 50
Datum:	NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
▼ 10/19/21	09:30	8.8	9	9.2	10 min

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
						49.8 / 0.2 ASPHALT	2-inches of asphalt.	
1	S-1	10	0.5-2	7			S-1: Medium dense, light brown, fine to coarse SAND, little fine Gravel, little Silt. Moist. (FILL).	
				7				
2				6				
	S-2	6	2-4	9		FILL	S-2: Medium dense, light brown to dark brown, fine to coarse SAND, little fine Gravel, little Silt. Moist. (FILL).	
3				7				
				9				
4				9		46.0 / 4.0		
	S-3	13	4-6	9			S-3: Medium dense, tan, fine to medium SAND, little Silt. Moist.	
5				6				
				4				
6				6				1
7								
8								
9					▼			
	S-4	8	9-11	3			S-4: Medium dense, tan, fine to medium SAND, trace Silt. Faint redoximorphic staining. Wet.	
10				5				
				5				
11				5				
12						SAND		
13								
14								
	S-5	15	14-16	8			S-5: Medium dense, tan, fine to medium SAND, trace Silt. Seam of fine to coarse sand around 14.5 feet. Faint redoximorphic staining. Wet.	
15				8				
				10				
16				10				
17							Drill rig chatter begins at 16.8 feet.	
18								
19								
	S-6	13	19-21	11			S-6: Medium dense, gray brown, fine to coarse SAND, little fine to coarse Gravel, trace Silt. Wet.	
20				11				

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
1) Water introduced to borehole during drive and wash process at 6 feet.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

nobis	Project: True Storage Facility Location: 2400 - 2402 Cranberry Highway, Wareham, MA Nobis Project No.: 95561.15	Boring No.: **NB-101** Boring Location: See Exploration Location Plan Checked by: K. Stanway Date Start: October 19, 2021 Date Finish: October 19, 2021
Contractor: New England Boring Contractors Driller: W. Hoeckle Nobis Rep.: S. Kurtzer	Rig Type / Model: Track / B-53 Mobile Hammer Type: Automatic Hammer Hammer Hoist: Automatic	Ground Surface Elev.: (+/-) 50 Datum: NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
▼ 10/19/21	09:30	8.8	9	9.2	10 min

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
				6					
21				10					
22									
23							SAND		
24									
	S-7	6	24-25.4	5				S-7: Very dense, gray brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt. Wet.	
25				8					
				50/5"			24.6 / 25.4		
26								Boring terminated at 25.4 feet.	2
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
2) Boring backfilled with drilling spoils upon completion and pavement restored with cold patch asphalt.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

Project: True Storage Facility

Location: 2400 - 2402 Cranberry Highway, Wareham, MA

Nobis Project No.: 95561.15

Boring No.: **NB-102**

Boring Location: See Exploration Location Plan

Checked by: K. Stanway

Date Start: October 19, 2021

Date Finish: October 19, 2021

Contractor: New England Boring Contractors

Driller: W. Hoeckle

Nobis Rep.: S. Kurtzer

Rig Type / Model: Track / B-53 Mobile

Hammer Type: Automatic Hammer

Hammer Hoist: Automatic

Ground Surface Elev.: (+/-) 50

Datum: NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
▼ 10/19/21	11:00	9.3	9	10	10 min

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
	S-1	18	0-2	4, 5, 4, 3		FILL 48.5 / 1.5	S-1A (13"): Loose, brown, fine to coarse SAND, little fine to coarse Gravel, little Silt. Moist. (FILL). S-1B (5"): Loose, dark gray brown to orange, fine to medium SAND, little Silt. Moist.	
2	S-2	17	2-4	1, 2, 4, 4		SAND	S-2: Loose, orange to tan, fine to medium SAND, trace Silt. Moist.	
4	S-3	15	4-6	6, 5, 5, 7			S-3: Medium dense, tan, fine to coarse SAND, trace Silt. Moist.	1
9	S-4	8	9-11	4, 5, 6, 6	▼		S-4: Medium dense, tan, fine to medium SAND, trace Silt. Faint redoximorphic staining. Wet.	
14	S-5	6	14-16	4, 3, 7, 6			S-5: Medium dense, tan, fine to coarse SAND, trace Silt. Wet.	
17.5							Drill rig chatter begins at 17.5 feet.	
19	S-6	20	19-21	9, 9			S-6A (9"): Medium dense, gray brown, fine to medium SAND, some Silt. Wet.	

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

1) Water introduced to borehole during drive and wash process at 6 feet.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

nobis

Project: True Storage Facility

Location: 2400 - 2402 Cranberry Highway, Wareham, MA

Nobis Project No.: 95561.15

Boring No.: **NB-102**

Boring Location: See Exploration Location Plan

Checked by: K. Stanway

Date Start: October 19, 2021

Date Finish: October 19, 2021

Contractor: New England Boring Contractors

Driller: W. Hoeckle

Nobis Rep.: S. Kurtzer

Rig Type / Model: Track / B-53 Mobile

Hammer Type: Automatic Hammer

Hammer Hoist: Automatic

Ground Surface Elev.: (+/-) 50

Datum: NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
10/19/21	11:00	9.3	9	10	10 min

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
				12			S-6B (11"): Medium dense, tan, fine to coarse SAND, trace Silt. Wet.	
21				12		SAND		
22						28.0 / 22.0		
23								
24								
	S-7	12	24-25.8	15		SAND AND GRAVEL	S-7: Dense, tan, fine to coarse SAND, some fine to coarse Gravel, little Silt. Wet.	
25				12				
				22				
26				50/3"		24.2 / 25.8	Boring terminated at 25.8 feet.	2
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

2) Boring backfilled with drilling spoils upon completion.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

nobis

BORING LOG

Project: True Storage Facility

Location: 2400 - 2402 Cranberry Highway, Wareham, MA

Nobis Project No.: 95561.15

Boring No.: **NB-103**
Boring Location: See Exploration Location Plan
Checked by: K. Stanway
Date Start: October 19, 2021
Date Finish: October 19, 2021

Contractor: New England Boring Contractors
Driller: W. Hoeckle
Nobis Rep.: S. Kurtzer

Rig Type / Model: Track / B-53 Mobile
Hammer Type: Automatic Hammer
Hammer Hoist: Automatic

Ground Surface Elev.: (+/-) 47
Datum: NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
▼ 10/19/21	12:00	5.7	out	6	while sampling

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Stratum Elev. / Depth (ft.)	Sample Description and Remarks (Classification System: Modified Burmister)	Notes
	S-1	22	0-2	1		46.8 / 0.2 TOPSOIL	S-1A (2"): Loose, dark brown, fine to coarse SAND and Silt. few root fibers. Moist.	
1				3		SUBSOIL 46.0 / 1.0	S-1B (10"): Loose, dark orangish brown, fine to medium SAND, little Silt. Moist.	
				5			S-1C (10"): Loose, brown to tan, fine to medium SAND, trace Silt. Moist.	
2				6				
	S-2	22	2-4	4			S-2: Medium dense, tan, fine to medium SAND, trace Silt. Moist.	
3				5				
				6				
4				6				
	S-3	20	4-6	8			S-3: Medium dense, gray brown, fine to coarse SAND, trace fine Gravel, trace Silt. Moist to wet.	
5				6				
				7				
6				7	▼			
7								1
8						SAND		
9								
	S-4	12	9-11	3			S-4: Medium dense, gray brown, fine to medium SAND, trace Silt. Wet.	
10				5				
				7				
11				9				
12								
13								
14						33.0 / 14.0		
	S-5	16	14-16	7			S-5: Stiff, gray brown, SILT. Wet.	
15				6				
				7				
16				8		SILT		
17								
18						29.0 / 18.0		
							Drill rig chatter begins at approximately 18 feet.	
19						SAND AND GRAVEL		
	S-6	13	19-21	10			S-6: Medium dense, gray brown, fine to coarse SAND and fine to coarse Gravel, some Silt. Wet.	
20				12				

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
1) Water introduced to borehole during drive and wash process at 6 feet.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

Boring No.:	NB-103
Boring Location:	See Exploration Location Plan
Checked by:	K. Stanway
Date Start:	October 19, 2021
Date Finish:	October 19, 2021

Project: True Storage Facility

Location: 2400 - 2402 Cranberry Highway, Wareham, MA

Nobis Project No.: 95561.15

Contractor:	New England Boring Contractors	Rig Type / Model:	Track / B-53 Mobile	Ground Surface Elev.:	(+/-) 47
Driller:	W. Hoeckle	Hammer Type:	Automatic Hammer		
Nobis Rep.:	S. Kurtzer	Hammer Hoist:	Automatic	Datum:	NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
10/19/21	12:00	5.7	out	6	while sampling

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
				11					
21				11			SAND AND GRAVEL		
22							25.2 / 21.8		
								Roller bit into possible rock or boulder from approximately 21.8 to 24 feet.	
23							ROCK		
24							23.0 / 24.0		
								Boring terminated at 24 feet.	2
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

2) Boring backfilled with drilling spoils upon completion.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

nobis

BORING LOG

Project: True Storage Facility

Location: 2400 - 2402 Cranberry Highway, Wareham, MA

Nobis Project No.: 95561.15

Boring No.: **NB-104**

Boring Location: See Exploration Location Plan

Checked by: K. Stanway

Date Start: October 19, 2021

Date Finish: October 19, 2021

Contractor: New England Boring Contractors

Driller: W. Hoeckle

Nobis Rep.: S. Kurtzer

Rig Type / Model: Track / B-53 Mobile

Hammer Type: Automatic Hammer

Hammer Hoist: Automatic

Ground Surface Elev.: (+/-) 48.5

Datum: NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
▼ 10/19/21	14:50	6.5	out	22.5	5 min

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
1	S-1	18	0-2	3, 2, 3, 2		FILL 47.5 / 1.0	S-1A (9"): Loose, dark brown, fine to coarse SAND, little fine to coarse Gravel, little Silt. Moist. (FILL).	
2						SUBSOIL 46.5 / 2.0	S-1B (9"): Loose, orangish brown, fine to medium SAND, little Silt. Moist.	
3, 4	S-2	16	2-4	3, 2, 4, 4		SAND	S-2: Loose, tan, fine to medium SAND, trace fine Gravel, trace Silt. Faint redoximorphic staining. Moist.	
5, 6	S-3	16	4-6	7, 4, 5, 5			S-3: Loose, tan, fine to medium SAND, trace Silt. Faint redoximorphic staining. Moist.	
7, 8, 9					▼			1
10, 11	S-4	13	9-11	2, 2, 4, 6			S-4: Loose, gray brown, fine to medium SAND, trace Silt. Wet.	
12, 13, 14						34.5 / 14.0		
15, 16	S-5	12	14-16	6, 9, 10, 7		SAND AND GRAVEL	S-5: Medium dense, gray brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt. Wet.	
17, 18, 19								
20	S-6	12	19-21	11, 7			S-6: Medium dense, tan, fine to coarse GRAVEL and fine to coarse Sand, trace Silt. Wet.	

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
1) Water introduced to borehole during drive and wash process at 6 feet.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

nobis	Project: True Storage Facility Location: 2400 - 2402 Cranberry Highway, Wareham, MA Nobis Project No.: 95561.15	Boring No.: **NB-104** Boring Location: See Exploration Location Plan Checked by: K. Stanway Date Start: October 19, 2021 Date Finish: October 19, 2021
Contractor: New England Boring Contractors Driller: W. Hoeckle Nobis Rep.: S. Kurtzer	Rig Type / Model: Track / B-53 Mobile Hammer Type: Automatic Hammer Hammer Hoist: Automatic	Ground Surface Elev.: (+/-) 48.5 Datum: NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
10/19/21	14:50	6.5	out	22.5	5 min

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
				9					
21				21			SAND AND GRAVEL 26.7 / 21.8		
22							ROCK 26.0 / 22.5	Roller bit into possible rock or boulder from approximately 21.8 to 22.5 feet.	
23								Boring terminated at 22.5 feet.	2
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
2) Boring backfilled with drilling spoils upon completion.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

nobis

BORING LOG

Project: True Storage Facility

Location: 2400 - 2402 Cranberry Highway, Wareham, MA

Nobis Project No.: 95561.15

Boring No.: **NB-105**

Boring Location: See Exploration Location Plan

Checked by: K. Stanway

Date Start: October 20, 2021

Date Finish: October 20, 2021

Contractor: New England Boring Contractors

Driller: W. Hoeckle

Nobis Rep.: S. Kurtzer

Rig Type / Model: Track / B-53 Mobile

Hammer Type: Automatic Hammer

Hammer Hoist: Automatic

Ground Surface Elev.: (+/-) 50

Datum: NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
10/20/21	09:45	6.8	24	28.5	5 min
10/20/21	09:55	6.6	out	28.5	15 min

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/6 in.	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
0	S-1	13	0-2	3		TOPSOIL 49.5 / 0.5	S-1A (1"): Loose, brown, SILT, some fine to coarse Sand, several root fibers. Moist.	
1				5		FILL	S-1B (12"): Loose, brown, fine to coarse SAND, little fine to coarse Gravel, little Silt. Moist. (FILL).	
				3				
2				2				
2	S-2	15	2-4	1			S-2A (6"): Very loose, dark brown and gray, fine to medium SAND, little Silt. Moist. (FILL).	
3				2		47.0 / 3.0		
				1		SAND	S-2B (9"): Very loose, brown to tan, fine to medium SAND, trace Silt. Moist.	
4				1				
4	S-3	12	4-6	2			S-3: Loose, tan, fine to medium SAND, trace Silt. Moist.	
5				3				
				5				
6				5				
7					▼			1
8								
9	S-4	9	9-11	2			S-4: Loose, tan, fine to medium SAND, trace Silt. Faint redoximorphic staining. Wet.	
10				3				
				4				
11				5				
12								
13								
14	S-5	13	14-16	5			S-5: Medium dense, gray brown, fine to medium SAND, trace Silt. Wet.	
15				6				
				9				
16				9				
17								
18								
19	S-6	24	19-21	14			S-6A (9"): Dense, tan, fine to medium SAND, trace Silt. Wet.	
20				14		30.2 / 19.8		

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

1) Water introduced to borehole during drive and wash process at 6 feet.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

nobis	Project: True Storage Facility Location: 2400 - 2402 Cranberry Highway, Wareham, MA Nobis Project No.: 95561.15	Boring No.: **NB-105** Boring Location: See Exploration Location Plan Checked by: K. Stanway Date Start: October 20, 2021 Date Finish: October 20, 2021
Contractor: New England Boring Contractors Driller: W. Hoeckle Nobis Rep.: S. Kurtzer	Rig Type / Model: Track / B-53 Mobile Hammer Type: Automatic Hammer Hammer Hoist: Automatic	Ground Surface Elev.: (+/-) 50 Datum: NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
10/20/21	09:45	6.8	24	28.5	5 min
10/20/21	09:55	6.6	out	28.5	15 min

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
				24			S-6B (5"): Dense, tan, fine to coarse SAND and fine to coarse Gravel, trace Silt. Wet.	
21				29			S-6C (10"): Dense, tan, fine to coarse SAND, little fine to coarse Gravel, little Silt. Wet.	
22								
23						SAND AND GRAVEL		
24	S-7	7	24-25.8	6			S-7: Medium dense, tan, fine to coarse SAND, some fine to coarse Gravel, trace Silt. Wet.	
25				7				
				10				
26				14/3"				
27						23.2 / 26.8	Roller bit into possible rock or boulder from approximately 26.8 to 28.5 feet.	
28						ROCK 21.5 / 28.5		
29							Boring terminated at 28.5 feet.	2
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
2) Boring backfilled with drilling spoils upon completion.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

nobis

BORING LOG

Project:	True Storage Facility
Location:	2400 - 2402 Cranberry Highway, Wareham, MA
Nobis Project No.:	95561.15
Boring No.:	NB-106
Boring Location:	See Exploration Location Plan
Checked by:	K. Stanway
Date Start:	October 20, 2021
Date Finish:	October 20, 2021

Contractor:	New England Boring Contractors
Driller:	W. Hoeckle
Nobis Rep.:	S. Kurtzer
Rig Type / Model:	Track / B-53 Mobile
Hammer Type:	Automatic Hammer
Hammer Hoist:	Automatic
Ground Surface Elev.:	(+/-) 50
Datum:	NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
▼ 10/20/21	11:30	8.4	24	26	5 min

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Stratum Elev. / Depth (ft.)	Sample Description and Remarks (Classification System: Modified Burmister)	Notes
0-0.2						49.8 / 0.2 ASPHALT	2-inches of asphalt.	
1	S-1	7	0.5-2	8, 11, 8		FILL	S-1: Medium dense, brown, fine to coarse SAND, little fine to coarse Gravel, little Silt. Moist. (FILL).	
2-4	S-2	18	2-4	9, 5, 8, 5		47.5 / 2.5	S-2A (6"): Medium dense, brown, fine to coarse SAND, little fine to coarse Gravel, little Silt. Moist. (FILL).	
						SAND	S-2B (12"): Medium dense, orangish brown, fine to medium SAND, little Silt. Moist.	
4-6	S-3	16	4-6	7, 6, 7, 7			S-3: Medium dense, tan, fine to medium SAND, trace Silt. Moist.	
7								1
8.4					▼			
9-11	S-4	10	9-11	3, 6, 8, 7			S-4: Medium dense, gray brown, fine to medium SAND, trace Silt. Wet.	
14-16	S-5	14	14-16	3, 4, 6, 7			S-5: Medium dense, gray brown, fine to medium SAND, trace Silt. Wet.	
17.5						32.5 / 17.5 SAND AND GRAVEL	Drill rig chatter begins at 17.5 feet.	
19-20	S-6	14	19-21	11, 14			S-6: Medium dense, gray brown, fine to coarse SAND and fine to coarse Gravel, trace Silt. Wet.	

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
1) Water introduced to borehole during drive and wash process at 6 feet.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

nobis	Project: True Storage Facility Location: 2400 - 2402 Cranberry Highway, Wareham, MA Nobis Project No.: 95561.15	Boring No.: **NB-106** Boring Location: See Exploration Location Plan Checked by: K. Stanway Date Start: October 20, 2021 Date Finish: October 20, 2021
Contractor: New England Boring Contractors Driller: W. Hoeckle Nobis Rep.: S. Kurtzer	Rig Type / Model: Track / B-53 Mobile Hammer Type: Automatic Hammer Hammer Hoist: Automatic	Ground Surface Elev.: (+/-) 50 Datum: NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations					
Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
▼ 10/20/21	11:30	8.4	24	26	5 min

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
				13					
21				12					
22									
23							SAND AND GRAVEL		
24									
	S-7	12	24-25.8	24				S-7: Dense, gray brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt. Wet.	
25				18					
				26			24.2 / 25.8		
26				40/3"				Boring terminated at 25.8 feet.	2
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
2) Boring backfilled with drilling spoils upon completion and pavement restored with cold patch asphalt.

Soil descriptions, and lithology, are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

MEMORANDUM

PROVENCHER ENGINEERING, LLC

Donald A. Provencher, PE
6 Wasserman Heights
Merrimack, NH 03054

Phone / fax: (603) 883-4444
E-mail: Don@Provencher.com
ProvencherEngineering.com

TO:	Cassandra Koutalidis, Nobis Group
FROM:	Donald A. Provencher, P.E.
DATE:	October 20, 2021
REFERENCE:	Permeability Testing – Proposed Potential Stormwater Infiltration Areas Proposed True Storage Facility, Wareham, Massachusetts Project No. PE384.01

Permeability Test Results:

Permeability testing was conducted in the unsaturated zone (above the water table) at the above site to assess the hydraulic conductivity (permeability) of the site to facilitate the design of proposed potential stormwater infiltration systems. Four test sites were evaluated using Constant and Falling Head tests, conducted in the same test apparatus. A Constant Head test was conducted first to achieve a steady-state flow condition, followed by a Falling Head test using the basic Time Lag method.

Test results indicate very permeable soils in the eastern portion of the site, with favorable approximate hydraulic conductivities ranging between 27 and 41 feet per day at TP-103, 104, and 107; and poor (low) conductivity in the extreme western portion of the site of less than 2 feet per day at TP-105.

Permeability Test Set-up:

A test pit was first excavated to identify the receiving layer for the proposed infiltration system. A perc shelf was then excavated at one end of the test pit within the "C"-Horizon receiving layer parent material. The permeability test set-up was configured by first hand-excavating with a perc shovel, an approximate 6 inch diameter hole approximately 18 inches deep in the perc shelf within the parent material. A 3.00-inch inside diameter x 2.66-foot long open-ended PVC test pipe was used at each test location. The test pipe was inserted vertically into the hand-excavated holes, and bentonite clay pellets were placed around the outside of the bottom of the pipes. The pellets were wetted to allow expansion of the clay pellets in an effort to develop a water-tight seal between the outside of the pipe casing and the surrounding soil. After approximately 10 - 15 minutes of wetting, the outside of the test pipe was backfilled and compacted with low-permeable topsoil and subsoil ("A" & "B" horizon soil) to achieve a better seal around the test pipe. Water was introduced inside the pipe and held steady at the top of the pipe for an approximate 10 minute pre-soak.

The above test conditions are representative of "Case C" (flush bottom in uniform soil) for a constant head test, as presented by "Soil Mechanics" text book by T. William Lambe & Robert V. Whitman, Massachusetts Institute of Technology, 1969 (see attached).

Constant Head Permeability Test:
After the presoak, while maintaining the test pipe filled with water to the top of the pipe, one-eighth or one-half gallon volumes of water were introduced into the pipe, while measuring the time to apply each known volume of water into the pipe. Consecutive test trials were employed until a steady-state inflow rate was achieved between two consecutive test trials, while maintaining the test pipe at full height head (Hc). Please refer to the attached calculations.

Falling Head Permeability Test:
After the constant head test was completed, a falling head test was conducted at each test location by filling the test pipe full of water to an initial head Ho (top of the test pipe). Then, the water level was allowed to drop on its own (falling head) without addition of any more water. Successive drops in water level inside the pipe were timed, and the time and water level drop data was recorded.

The depths to water levels were input into a spreadsheet and were converted to height above the bottom of the test pipe (H), and each reading's height versus the initial head (H / Ho) was computed (i.e. head ratio). Please refer to the attached spreadsheet data table. Elapsed time versus head ratio was plotted, with head ratio on the vertical log scale. Initial head at full pipe is Ho, so the initial maximum H/Ho is 1.00. A straight best-fit line (linear regression) was calculated in the spreadsheet and drawn through the data points.

From these graphs, the "Basic Time Lag" method was used in conjunction with the "Case C" equations indicated in the "Soil Mechanics" text book reference, and time values t at H/Ho = 0.37 were selected from the graph as the basic Time Lag "T" valves, and were substituted into the basic time lag equation. Please refer to the attached calculations.

Conclusions:
Both constant and falling head test methods where conducted at each test location, and results between the two test methods yielded consistent results at each test location. We recommend using an average of the conductivity values for each test location in the table below. The following table summarizes the observed and average conductivities.

	Hydraulic Conductivity "K" (Feet / Day)		
Test Site	**Constant Head**	**Falling Head**	**Average**
TP-103	31.3	34.3	32.8
TP-104	27.5	29.8	28.6
TP-105	1.9	1.8	1.8
TP-107	41.5	38.1	39.8

Proposed True Storage Facility
Wareham, Massachusetts

TP-103 Falling Head Test Data - Case "C":

Test Depth:	54	Inches below ground
Test Pipe Height (Ho):	2.66	Feet (Initial Head)
Test Pipe Diam. (D):	3.0	Inches

Depth to Water from Top of Pipe (Feet)	Water Height Above Pipe Bottom (H) (Feet)	Head Ratio (H / Ho)	Elapsed Time (Min:Sec)	Elapsed Time (Seconds)
0.00	2.66	1.00	00:00	0
0.50	2.16	0.81	00:46	46
0.80	1.86	0.70	01:16	76
1.10	1.56	0.59	01:51	111
1.40	1.26	0.47	02:32	152
1.60	1.06	0.40	03:02	182
1.80	0.86	0.32	03:39	219
2.00	0.66	0.25	04:15	255
2.20	0.46	0.17	05:02	302

@H/Ho=0.37, T=	180	Seconds (see graph to right)
K = π D / 11 T =	**34.3**	**Ft / Day**

TP-103 Constant Head Test Data - Case "C":

Test Depth:	54	Inches below ground
Test Pipe Height (Hc):	2.66	Feet (Constant Head Height)
Test Pipe Diam. (D):	3.0	Inches
1/2 gallon applied in	101	Seconds (final steady-state*)
Steady-State Flow (q) =	0.297	Gal/Min.
=	57.175	CuFt/Day
K = q / 2.75 D Hc =	**31.3**	**Ft / Day**

(*) Test Volumes applied in 3 trials: 1:35, 1:41, and 1:41 min:sec

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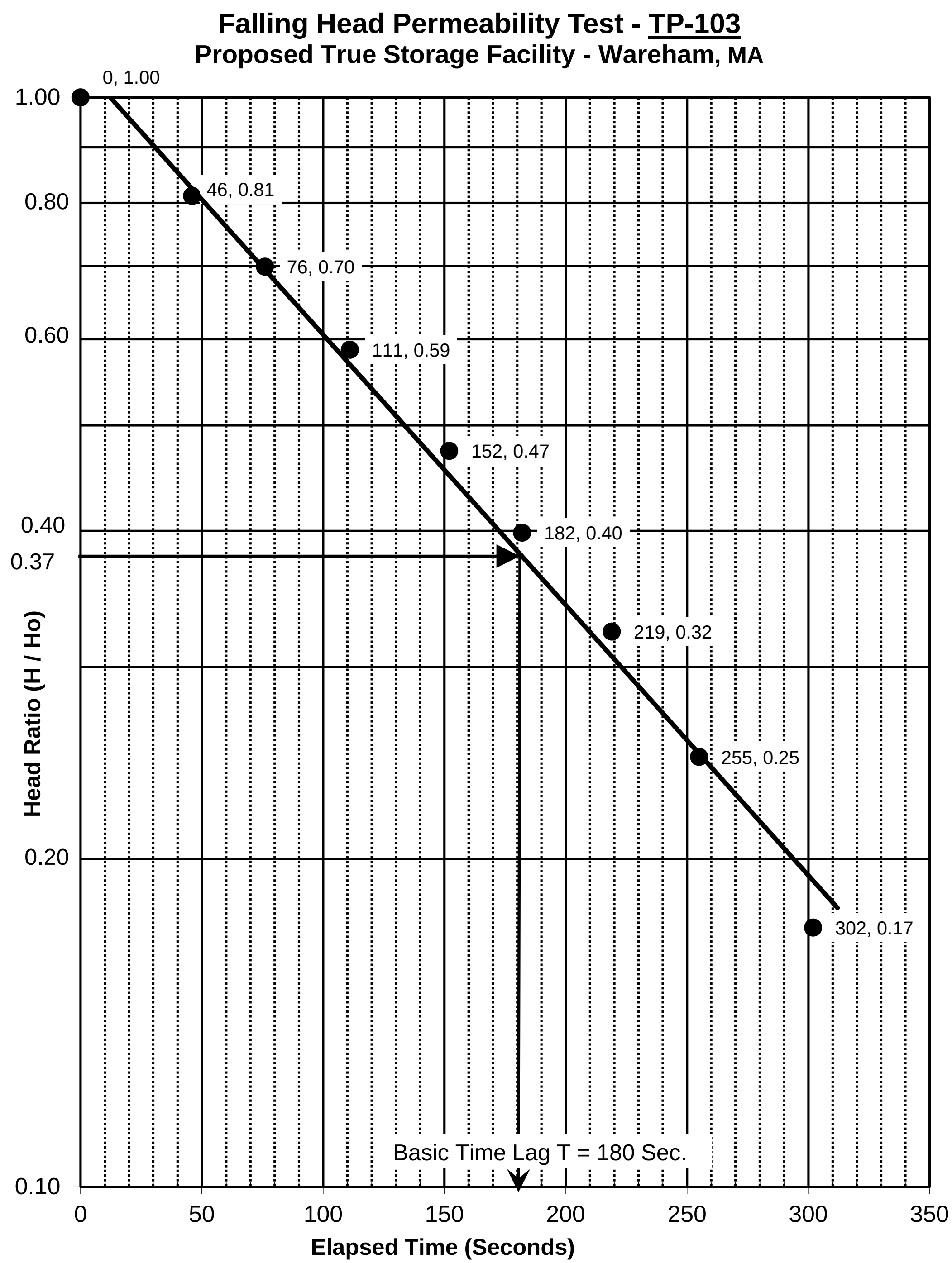


Proposed True Storage Facility
Wareham, Massachusetts

TP-104 Falling Head Test Data - Case "C":

Test Depth:	66	Inches below ground
Test Pipe Height (Ho):	2.66	Feet (Initial Head)
Test Pipe Diam. (D):	3.0	Inches

Depth to Water from Top of Pipe (Feet)	Water Height Above Pipe Bottom (H) (Feet)	Head Ratio (H / Ho)	Elapsed Time (Min:Sec)	Elapsed Time (Seconds)
0.00	2.66	1.00	00:00	0
0.50	2.16	0.81	00:51	51
0.80	1.86	0.70	01:27	87
1.10	1.56	0.59	02:09	129
1.30	1.36	0.51	02:39	159
1.50	1.16	0.44	03:12	192
1.80	0.86	0.32	03:55	235
2.00	0.66	0.25	04:56	296
2.20	0.46	0.17	05:49	349

@H/Ho=0.37, T= 207 Seconds (see graph to right)

K = π D / 11 T = **29.8 Ft / Day**

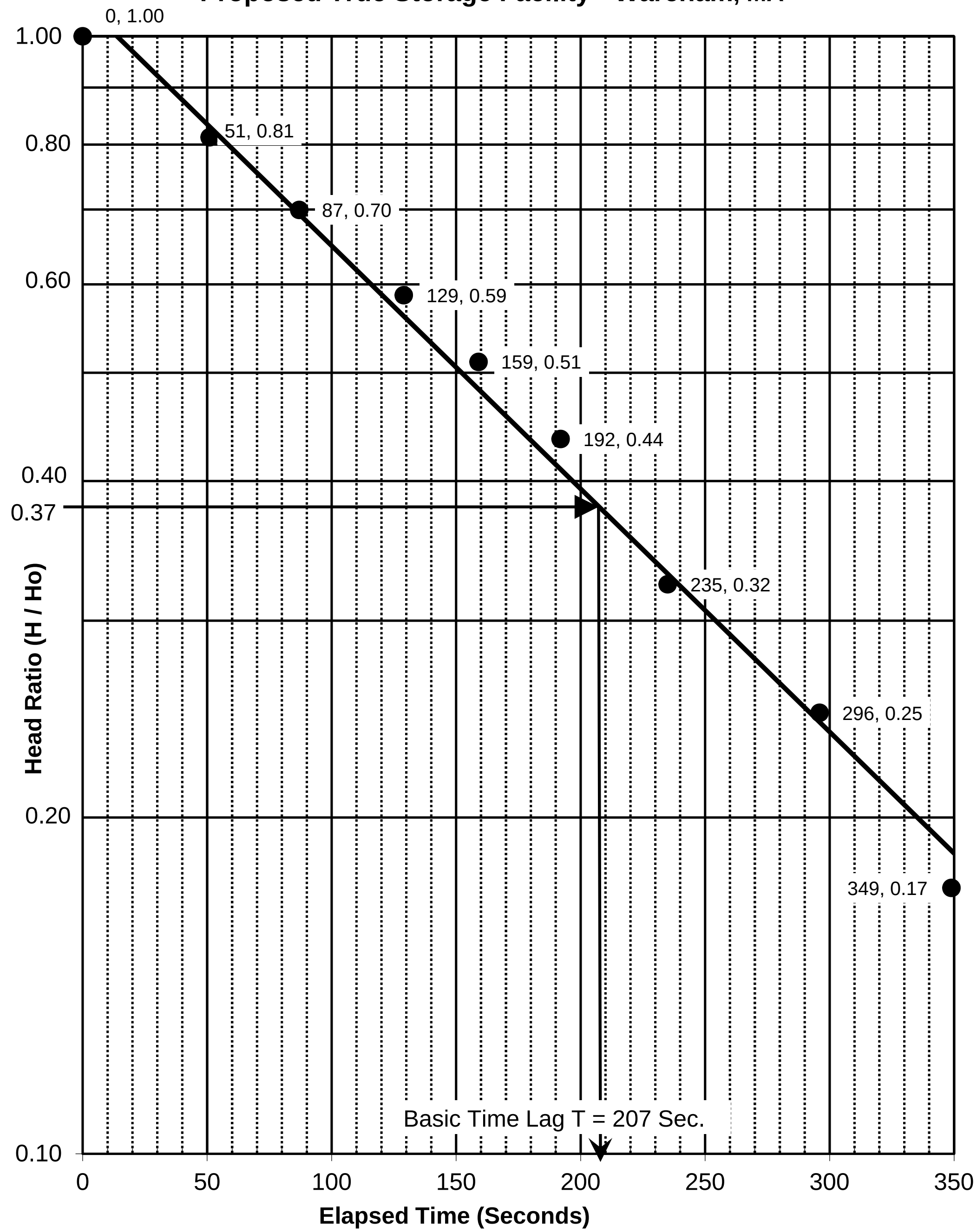
TP-104 Constant Head Test Data - Case "C":

Test Depth:	66	Inches below ground
Test Pipe Height (Hc):	2.66	Feet (Constant Head Height)
Test Pipe Diam. (D):	3.0	Inches
1/2 gallon applied in	115	Seconds (final steady-state*)
Steady-State Flow (q) =	0.261	Gal/Min.
=	50.214	CuFt/Day

K = q / 2.75 D Hc = **27.5 Ft / Day**

(*) Test Volumes applied in 3 trials: 1:51, 1:54, and 1:55 min:sec

Falling Head Permeability Test - TP-104
Proposed True Storage Facility - Wareham, MA



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Proposed True Storage Facility
Wareham, Massachusetts

TP-105 Falling Head Test Data - Case "C":

Test Depth:	66	Inches below ground
Test Pipe Height (Ho):	2.66	Feet (Initial Head)
Test Pipe Diam. (D):	3.0	Inches

Depth to Water from Top of Pipe (Feet)	Water Height Above Pipe Bottom (H) (Feet)	Head Ratio (H / Ho)	Elapsed Time (Min:Sec)	Elapsed Time (Seconds)
0.00	2.66	1.00	00:00	0
0.30	2.36	0.89	08:00	480
0.48	2.18	0.82	13:00	780
0.96	1.7	0.64	28:00	1680
1.32	1.34	0.50	43:00	2580
1.90	0.76	0.29	1:13:00	4380

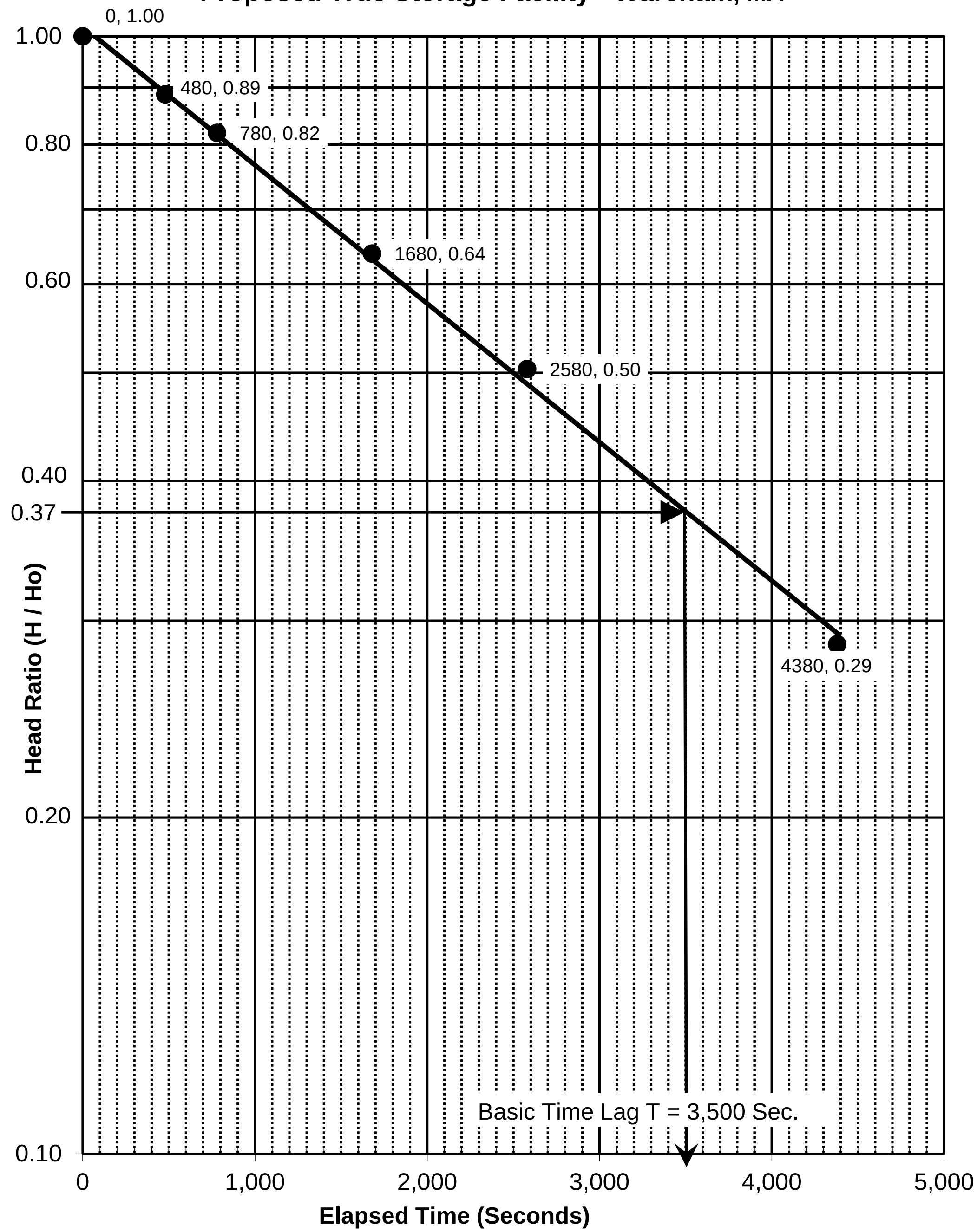
@H/Ho=0.37, T=	3500	Seconds (see graph to right)
K = π D / 11 T =	**1.8**	**Ft / Day**

TP-105 Constant Head Test Data - Case "C":

Test Depth:	66	Inches below ground
Test Pipe Height (Hc):	2.66	Feet (Constant Head Height)
Test Pipe Diam. (D):	3.0	Inches
1/8 gallon applied in	421	Seconds (final steady-state*)
Steady-State Flow (q) =	0.018	Gal/Min.
=	3.429	CuFt/Day
K = q / 2.75 D Hc =	**1.9**	**Ft / Day**

(*) Test Volumes applied in 2 trials: 6:54 and 7:01 min:sec

Falling Head Permeability Test - TP-105
Proposed True Storage Facility - Wareham, MA



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Proposed True Storage Facility
Wareham, Massachusetts

TP-107 Falling Head Test Data - Case "C":

Test Depth:	36	Inches below ground
Test Pipe Height (Ho):	2.66	Feet (Initial Head)
Test Pipe Diam. (D):	3.0	Inches

Depth to Water from Top of Pipe (Feet)	Water Height Above Pipe Bottom (H) (Feet)	Head Ratio (H / Ho)	Elapsed Time (Min:Sec)	Elapsed Time (Seconds)
0.00	2.66	1.00	00:00	0
0.50	2.16	0.81	00:34	34
0.80	1.86	0.70	01:00	60
1.00	1.66	0.62	01:18	78
1.20	1.46	0.55	01:40	100
1.40	1.26	0.47	02:06	126
1.60	1.06	0.40	02:35	155
1.80	0.86	0.32	03:10	190
2.00	0.66	0.25	03:51	231
2.20	0.46	0.17	04:46	286

@H/Ho=0.37, T= 162 Seconds (see graph to right)

$K = \pi D / 11 T =$ **38.1 Ft / Day**

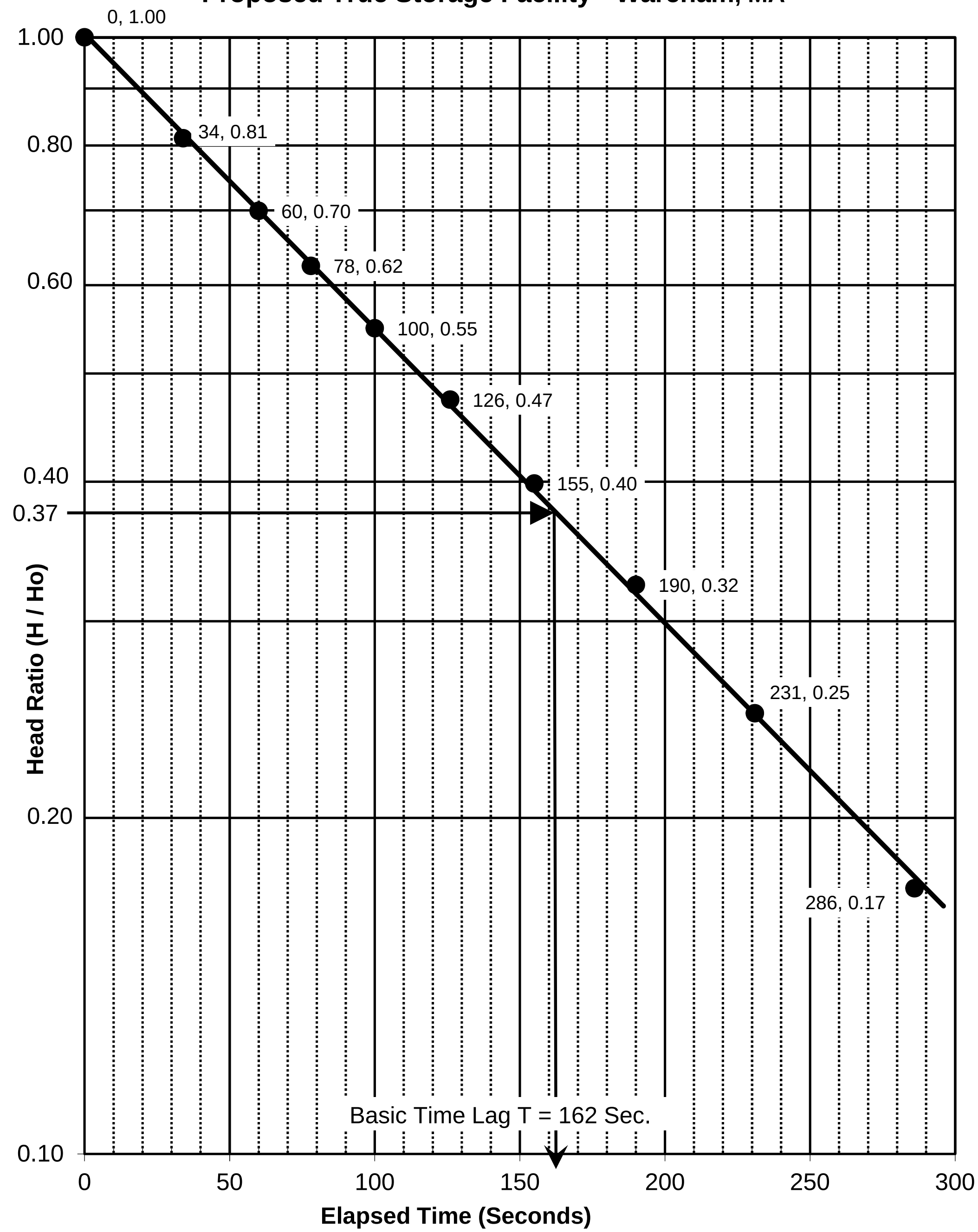
TP-107 Constant Head Test Data - Case "C":

Test Depth:	36	Inches below ground
Test Pipe Height (Hc):	2.66	Feet (Constant Head Height)
Test Pipe Diam. (D):	3.0	Inches
1/2 gallon applied in	76	Seconds (final steady-state*)
Steady-State Flow (q) =	0.395	Gal/Min.
=	75.982	CuFt/Day

K = q / 2.75 D Hc = **41.5 Ft / Day**

(*) Test Volumes applied in 4 trials: 1:17, 1:07, 1:16, and 1:16 min:sec

Falling Head Permeability Test - TP-107
Proposed True Storage Facility - Wareham, MA



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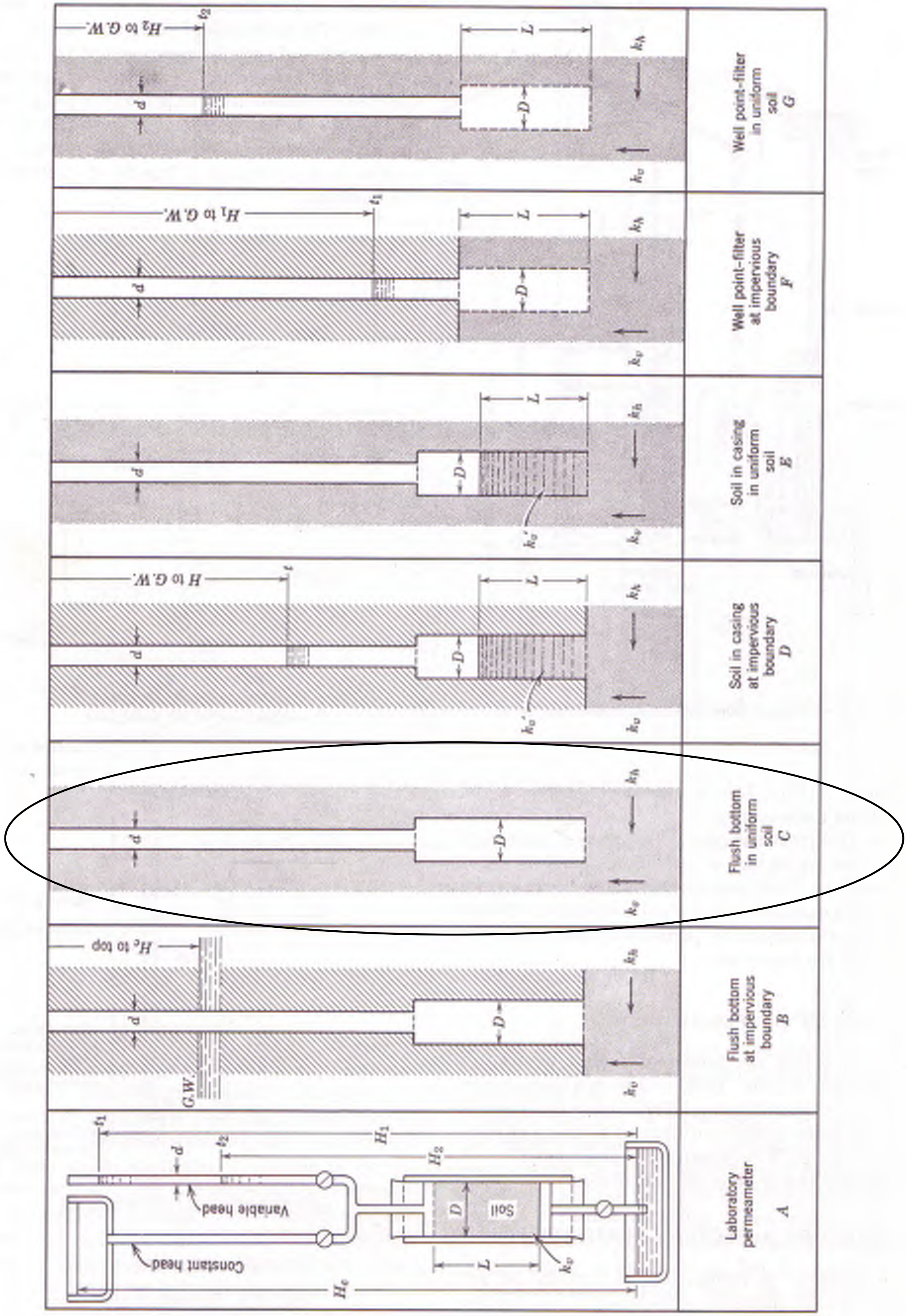
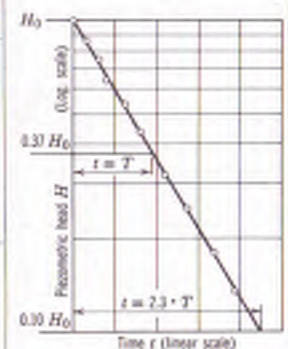


Source: "Soil Mechanics" text book by T. William Lambe & Robert V. Whitman, Massachusetts Institute of Technology, 1969

Case	Constant Head	Variable Head	Basic Time Lag	Notation
A	$k_v = \dfrac{4 \cdot q \cdot L}{\pi \cdot D^2 \cdot H_c}$	$k_v = \dfrac{d^2 \cdot L}{D^2 \cdot (t_2 - t_1)} \ln \dfrac{H_1}{H_2}$ $k_v = \dfrac{L}{t_2 - t_1} \ln \dfrac{H_1}{H_2}$ for $d = D$	$k_v = \dfrac{d^2 \cdot L}{D^2 \cdot T}$ $k_v = \dfrac{L}{T}$ for $d = D$	D = Diam, intake, sample (cm) d = Diameter, standpipe (cm) L = Length, intake, sample (cm) H_c = Constant piez. head (cm) H_1 = Piez. head for $t = t_1$ (cm) H_2 = Piez. head for $t = t_2$ (cm) q = Flow of water (cm³/sec) t = Time (sec) T = Basic time lag (sec) k_v' = Vert. perm. casing (cm/sec)
B	$k_m = \dfrac{q}{2 \cdot D \cdot H_c}$	$k_m = \dfrac{\pi \cdot d^2}{8 \cdot D \cdot (t_2 - t_1)} \ln \dfrac{H_1}{H_2}$ $k_m = \dfrac{\pi \cdot D}{8 \cdot (t_2 - t_1)} \ln \dfrac{H_1}{H_2}$ for $d = D$	$k_m = \dfrac{\pi d^2}{8 \cdot D \cdot T}$ $k_m = \dfrac{\pi \cdot D}{8 \cdot T}$ for $d = D$	
C	$k_m = \dfrac{q}{2.75 \cdot D \cdot H_c}$	$k_m = \dfrac{\pi \cdot d^2}{11 \cdot D \cdot (t_2 - t_1)} \ln \dfrac{H_1}{H_2}$ $k_m = \dfrac{\pi \cdot D}{11 \cdot (t_2 - t_1)} \ln \dfrac{H_1}{H_2}$ for $d = D$	$k_m = \dfrac{\pi \cdot d^2}{11 \cdot D \cdot T}$ $k_m = \dfrac{\pi \cdot D}{11 \cdot T}$ for $d = D$	
D	$k_v' = \dfrac{4 \cdot q\left(\frac{\pi}{8} \cdot \frac{k_v'}{k_v} \cdot \frac{D}{m} + L\right)}{\pi \cdot D^2 \cdot H_c}$	$k_v' = \dfrac{d^2 \cdot \left(\frac{\pi}{8} \cdot \frac{k_v'}{k_v} \cdot \frac{D}{m} + L\right)}{D^2 \cdot (t_2 - t_1)} \ln \dfrac{H_1}{H_2}$ $k_v = \dfrac{\frac{\pi}{8} \cdot \frac{D}{m} + L}{t_2 - t_1} \ln \dfrac{H_1}{H_2}$ for $\begin{cases} k_v' = k_v \\ d = D \end{cases}$	$k_v' = \dfrac{d^2 \cdot \left(\frac{\pi}{8} \cdot \frac{k_v'}{k_v} \cdot \frac{D}{m}\right) + L}{D^2 \cdot T}$ $k_v = \dfrac{\frac{\pi}{8} \cdot \frac{D}{m} + L}{T}$ for $\begin{cases} k_v' = k_v \\ d = D \end{cases}$	k_v = Vert.-perm. ground (cm/sec) k_h = Horz. perm. ground (cm/sec) k_m = Mean coeff. perm. (cm/sec) m = Transformation ratio $k_m = \sqrt{k_h \cdot k_v}$ $m = \sqrt{k_h/k_v}$ $\ln = \log_e = 2.3 \log_{10}$
E	$k_v' = \dfrac{4 \cdot q \cdot \left(\frac{\pi}{11} \cdot \frac{k_v'}{k_v} \cdot \frac{D}{m} + L\right)}{\pi \cdot D^2 \cdot H_c}$	$k_v' = \dfrac{d^2 \cdot \left(\frac{\pi}{11} \cdot \frac{k_v'}{k_v} \cdot \frac{D}{m} + L\right)}{D^2 \cdot (t_2 - t_1)} \ln \dfrac{H_1}{H_2}$ $k_v = \dfrac{\frac{\pi}{11} \cdot \frac{D}{m} + L}{t_2 - t_1} \ln \dfrac{H_1}{H_2}$ for $\begin{cases} k_v' = k_v \\ d = D \end{cases}$	$k_v' = \dfrac{d^2 \cdot \left(\frac{\pi}{11} \cdot \frac{k_v'}{k_v} \cdot \frac{D}{m} + L\right)}{D^2 \cdot T}$ $k_v' = \dfrac{\frac{\pi}{11} \cdot \frac{D}{m} + L}{T}$ for $\begin{cases} k_v' = k_v \\ d = D \end{cases}$	
F	$k_h = \dfrac{q \cdot \ln\left[\frac{2mL}{D} + \sqrt{1 + \left(\frac{2mL}{D}\right)^2}\right]}{2 \cdot \pi \cdot L \cdot H_c}$	$k_h = \dfrac{d^2 \cdot \ln\left[\frac{2mL}{D} + \sqrt{1 + \left(\frac{2mL}{D}\right)^2}\right]}{8 \cdot L \cdot (t_2 - t_1)} \ln \dfrac{H_1}{H_2}$ $k_h = \dfrac{d^2 \cdot \ln\left(\frac{4mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \ln \dfrac{H_1}{H_2}$ for $\dfrac{2mL}{D} > 4$	$k_h = \dfrac{d^2 \cdot \ln\left[\frac{2mL}{D} + \sqrt{1 + \left(\frac{2mL}{D}\right)^2}\right]}{8 \cdot L \cdot T}$ $k_h = \dfrac{d^2 \cdot \ln\left(\frac{4mL}{D}\right)}{8 \cdot L \cdot T}$ for $\dfrac{2mL}{D} > 4$	
G	$k_h = \dfrac{q \cdot \ln\left[\frac{mL}{D} + \sqrt{1 + \left(\frac{mL}{D}\right)^2}\right]}{2 \cdot \pi \cdot L \cdot H_c}$	$k_h = \dfrac{d^2 \cdot \ln\left[\frac{mL}{D} + \sqrt{1 + \left(\frac{mL}{D}\right)^2}\right]}{8 \cdot L \cdot (t_2 - t_1)} \ln \dfrac{H_1}{H_2}$ $k_h = \dfrac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \ln \dfrac{H_1}{H_2}$ for $\dfrac{mL}{D} > 4$	$k_h = \dfrac{d^2 \cdot \ln\left[\frac{mL}{D} + \sqrt{1 + \left(\frac{mL}{D}\right)^2}\right]}{8 \cdot L \cdot T}$ $k_h = \dfrac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot T}$ for $\dfrac{mL}{D} > 4$	Determination basic time lag T

ASSUMPTIONS

Soil at intake, infinite depth, and directional isotropy (k_v and k_h constant). No disturbance, segregation, swelling, or consolidation of soil. No sedimentation or leakage. No air or gas in soil, well point, or pipe. Hydraulic losses in pipes, well point, or filter negligible.

Fig. 19.4 Formulas for determination of permeability (From Hvorslev, 1951).

APPENDIX B – HYDROCAD ANALYSIS

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	Massachusetts
Location	
Longitude	70.745 degrees West
Latitude	41.784 degrees North
Elevation	0 feet
Date/Time	Thu, 09 Dec 2021 10:30:39 -0500

Extreme Precipitation Estimates

	5min	**10min**	**15min**	**30min**	**60min**	**120min**		**1hr**	**2hr**	**3hr**	**6hr**	**12hr**	**24hr**	**48hr**		**1day**	**2day**	**4day**	**7day**	**10day**	
1yr	0.29	0.44	0.55	0.72	0.89	1.13	**1yr**	0.77	1.10	1.32	1.69	2.17	2.80	3.14	**1yr**	2.48	3.02	3.48	4.18	4.83	**1yr**
2yr	0.36	0.56	0.69	0.91	1.15	1.45	**2yr**	0.99	1.36	1.68	2.11	2.66	3.35	3.71	**2yr**	2.97	3.57	4.08	4.83	5.49	**2yr**
5yr	0.43	0.67	0.84	1.13	1.45	1.84	**5yr**	1.25	1.72	2.14	2.68	3.35	4.18	4.67	**5yr**	3.70	4.49	5.11	5.98	6.72	**5yr**
10yr	0.50	0.78	0.98	1.34	1.74	2.22	**10yr**	1.50	2.06	2.58	3.23	4.00	4.94	5.56	**10yr**	4.37	5.35	6.06	7.03	7.83	**10yr**
25yr	0.59	0.94	1.19	1.65	2.20	2.83	**25yr**	1.90	2.62	3.30	4.11	5.06	6.16	7.00	**25yr**	5.45	6.73	7.59	8.71	9.59	**25yr**
50yr	0.68	1.09	1.40	1.96	2.63	3.41	**50yr**	2.27	3.14	3.97	4.93	6.02	7.28	8.34	**50yr**	6.45	8.02	9.00	10.25	11.18	**50yr**
100yr	0.78	1.27	1.63	2.32	3.16	4.10	**100yr**	2.72	3.76	4.78	5.91	7.18	8.62	9.94	**100yr**	7.63	9.56	10.69	12.06	13.05	**100yr**
200yr	0.90	1.47	1.91	2.74	3.78	4.94	**200yr**	3.27	4.51	5.75	7.09	8.57	10.20	11.85	**200yr**	9.03	11.40	12.69	14.20	15.23	**200yr**
500yr	1.11	1.82	2.37	3.44	4.82	6.30	**500yr**	4.16	5.74	7.33	9.00	10.80	12.75	14.96	**500yr**	11.29	14.39	15.93	17.64	18.69	**500yr**

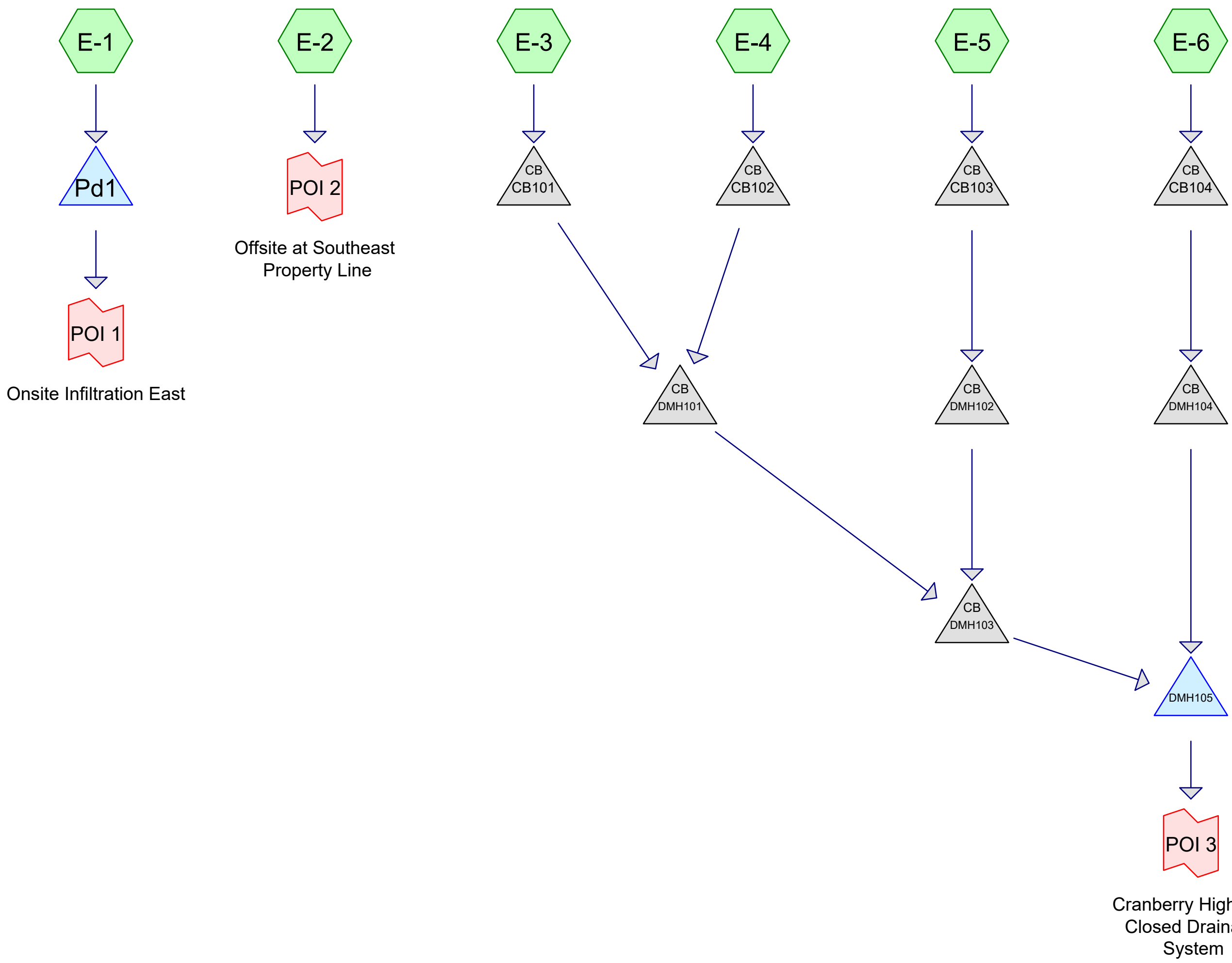
Lower Confidence Limits

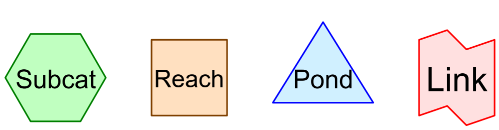
	5min	**10min**	**15min**	**30min**	**60min**	**120min**		**1hr**	**2hr**	**3hr**	**6hr**	**12hr**	**24hr**	**48hr**		**1day**	**2day**	**4day**	**7day**	**10day**	
1yr	0.24	0.38	0.46	0.62	0.76	0.90	**1yr**	0.66	0.88	1.06	1.45	1.93	2.32	2.89	**1yr**	2.06	2.78	2.81	3.54	4.50	**1yr**
2yr	0.35	0.54	0.66	0.89	1.10	1.34	**2yr**	0.95	1.31	1.57	2.07	2.62	3.28	3.64	**2yr**	2.90	3.50	3.98	4.73	5.39	**2yr**
5yr	0.40	0.61	0.76	1.04	1.32	1.59	**5yr**	1.14	1.56	1.85	2.44	3.08	3.95	4.41	**5yr**	3.49	4.24	4.85	5.69	6.40	**5yr**
10yr	0.44	0.67	0.83	1.16	1.50	1.82	**10yr**	1.30	1.78	2.08	2.76	3.46	4.54	5.08	**10yr**	4.02	4.89	5.53	6.52	7.30	**10yr**
25yr	0.50	0.75	0.94	1.34	1.76	2.17	**25yr**	1.52	2.12	2.40	3.23	4.03	5.47	6.13	**25yr**	4.84	5.90	6.55	7.82	8.68	**25yr**
50yr	0.55	0.83	1.04	1.49	2.01	2.46	**50yr**	1.73	2.41	2.65	3.64	4.49	6.29	7.06	**50yr**	5.57	6.79	7.41	8.95	9.91	**50yr**
100yr	0.61	0.92	1.15	1.66	2.28	2.79	**100yr**	1.97	2.73	2.94	4.11	5.02	7.24	8.15	**100yr**	6.41	7.84	8.46	10.28	11.33	**100yr**
200yr	0.67	1.01	1.27	1.84	2.57	3.18	**200yr**	2.22	3.11	3.24	4.61	5.60	8.35	9.40	**200yr**	7.39	9.04	9.69	11.81	12.96	**200yr**
500yr	0.77	1.14	1.47	2.13	3.03	3.76	**500yr**	2.61	3.67	3.68	5.39	6.45	10.08	11.36	**500yr**	8.92	10.93	11.60	14.21	15.51	**500yr**

Upper Confidence Limits

	5min	**10min**	**15min**	**30min**	**60min**	**120min**		**1hr**	**2hr**	**3hr**	**6hr**	**12hr**	**24hr**	**48hr**		**1day**	**2day**	**4day**	**7day**	**10day**	
1yr	0.32	0.49	0.60	0.80	0.99	1.22	**1yr**	0.85	1.19	1.45	1.94	2.44	3.03	3.38	**1yr**	2.68	3.25	3.75	4.48	5.11	**1yr**
2yr	0.38	0.58	0.72	0.97	1.20	1.45	**2yr**	1.04	1.42	1.70	2.23	2.82	3.43	3.82	**2yr**	3.03	3.67	4.27	4.96	5.60	**2yr**
5yr	0.48	0.74	0.92	1.26	1.60	1.94	**5yr**	1.38	1.89	2.24	2.89	3.57	4.42	4.93	**5yr**	3.91	4.74	5.35	6.29	7.04	**5yr**
10yr	0.58	0.90	1.11	1.55	2.00	2.42	**10yr**	1.73	2.37	2.76	3.52	4.31	5.36	6.00	**10yr**	4.75	5.77	6.45	7.55	8.37	**10yr**
25yr	0.76	1.16	1.45	2.06	2.71	3.26	**25yr**	2.34	3.19	3.72	4.62	5.54	6.93	7.77	**25yr**	6.13	7.48	8.29	9.62	10.52	**25yr**
50yr	0.93	1.42	1.77	2.54	3.42	4.10	**50yr**	2.95	4.01	4.64	5.66	6.72	8.40	9.48	**50yr**	7.44	9.12	10.02	11.55	12.51	**50yr**
100yr	1.15	1.74	2.18	3.15	4.32	5.14	**100yr**	3.73	5.03	5.81	6.93	8.18	10.20	11.56	**100yr**	9.03	11.12	12.35	13.87	14.89	**100yr**
200yr	1.41	2.13	2.70	3.90	5.44	6.46	**200yr**	4.70	6.31	7.27	8.52	9.94	12.38	14.11	**200yr**	10.96	13.56	14.98	16.66	17.71	**200yr**
500yr	1.87	2.79	3.59	5.21	7.41	8.73	**500yr**	6.39	8.54	9.84	11.22	12.92	16.01	18.36	**500yr**	14.17	17.66	19.29	21.22	22.26	**500yr**

Existing Conditions





Routing Diagram for 95561.15_Existing HydroCAD_Revised Mar 2023
Prepared by Nobis Group, Printed 3/15/2023
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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
41,686	61	>75% Grass cover, Good, HSG B (E-1, E-2, E-3, E-4, E-5, E-6)
11,507	96	Gravel surface, HSG B (E-1, E-2, E-4, E-5, E-6)
38,989	98	Paved parking, HSG B (E-1, E-3, E-4, E-5, E-6)
7,675	98	Roofs, HSG B (E-1, E-3, E-4)
4,246	96	Rubble, HSG B (E-1, E-2, E-6)
88,872	55	Woods, Good, HSG B (E-1, E-2, E-3)
192,975	**70**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
192,975	HSG B	E-1, E-2, E-3, E-4, E-5, E-6
0	HSG C	
0	HSG D	
0	Other	
192,975		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
0	41,686	0	0	0	41,686	>75% Grass cover, Good	
0	11,507	0	0	0	11,507	Gravel surface	
0	38,989	0	0	0	38,989	Paved parking	
0	7,675	0	0	0	7,675	Roofs	
0	4,246	0	0	0	4,246	Rubble	
0	88,872	0	0	0	88,872	Woods, Good	
0	**192,975**	**0**	**0**	**0**	**192,975**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	CB101	46.40	46.50	29.0	-0.0034	0.011	12.0	0.0	0.0
2	CB102	49.70	49.50	6.0	0.0333	0.011	12.0	0.0	0.0
3	CB103	46.90	46.70	6.0	0.0333	0.011	12.0	0.0	0.0
4	CB104	46.20	46.10	2.0	0.0500	0.011	12.0	0.0	0.0
5	DMH101	46.20	46.00	109.0	0.0018	0.011	12.0	0.0	0.0
6	DMH102	46.50	46.60	13.0	-0.0077	0.011	12.0	0.0	0.0
7	DMH103	46.10	44.90	36.0	0.0333	0.011	12.0	0.0	0.0
8	DMH104	45.30	45.10	5.0	0.0400	0.011	12.0	0.0	0.0

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentE-1: Runoff Area=123,196 sf 3.61% Impervious Runoff Depth=0.47"
Flow Length=416' Tc=27.0 min CN=60 Runoff=0.63 cfs 4,808 cf

SubcatchmentE-2: Runoff Area=4,645 sf 0.00% Impervious Runoff Depth=0.67"
Tc=6.0 min CN=65 Runoff=0.07 cfs 261 cf

SubcatchmentE-3: Runoff Area=27,238 sf 56.92% Impervious Runoff Depth=1.59"
Flow Length=233' Tc=24.0 min CN=81 Runoff=0.72 cfs 3,604 cf

SubcatchmentE-4: Runoff Area=11,276 sf 88.54% Impervious Runoff Depth=2.69"
Tc=6.0 min CN=94 Runoff=0.76 cfs 2,527 cf

SubcatchmentE-5: Runoff Area=11,404 sf 45.90% Impervious Runoff Depth=2.69"
Tc=6.0 min CN=94 Runoff=0.77 cfs 2,556 cf

SubcatchmentE-6: Runoff Area=15,216 sf 75.53% Impervious Runoff Depth=2.79"
Tc=6.0 min CN=95 Runoff=1.05 cfs 3,540 cf

Pond CB101: Peak Elev=47.12' Inflow=0.72 cfs 3,604 cf
12.0" Round Culvert n=0.011 L=29.0' S=-0.0034 '/' Outflow=0.72 cfs 3,604 cf

Pond CB102: Peak Elev=50.14' Inflow=0.76 cfs 2,527 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=0.76 cfs 2,527 cf

Pond CB103: Peak Elev=47.35' Inflow=0.77 cfs 2,556 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=0.77 cfs 2,556 cf

Pond CB104: Peak Elev=46.78' Inflow=1.05 cfs 3,540 cf
12.0" Round Culvert n=0.011 L=2.0' S=0.0500 '/' Outflow=1.05 cfs 3,540 cf

Pond DMH101: Peak Elev=47.07' Inflow=1.11 cfs 6,132 cf
12.0" Round Culvert n=0.011 L=109.0' S=0.0018 '/' Outflow=1.11 cfs 6,132 cf

Pond DMH102: Peak Elev=47.09' Inflow=0.77 cfs 2,556 cf
12.0" Round Culvert n=0.011 L=13.0' S=-0.0077 '/' Outflow=0.77 cfs 2,556 cf

Pond DMH103: Peak Elev=46.85' Inflow=1.87 cfs 8,688 cf
12.0" Round Culvert n=0.011 L=36.0' S=0.0333 '/' Outflow=1.87 cfs 8,688 cf

Pond DMH104: Peak Elev=45.83' Inflow=1.05 cfs 3,540 cf
12.0" Round Culvert n=0.011 L=5.0' S=0.0400 '/' Outflow=1.05 cfs 3,540 cf

Pond DMH105: Inflow=2.92 cfs 12,228 cf
Primary=2.92 cfs 12,228 cf

Pond Pd1: Peak Elev=46.71' Storage=526 cf Inflow=0.63 cfs 4,808 cf
Outflow=0.44 cfs 4,808 cf

Link POI 1: Onsite Infiltration East Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link POI 2: Offsite at Southeast Property Line Inflow=0.07 cfs 261 cf
Primary=0.07 cfs 261 cf

Link POI 3: Cranberry Highway Closed Drainage System Inflow=2.92 cfs 12,228 cf
Primary=2.92 cfs 12,228 cf

Total Runoff Area = 192,975 sf Runoff Volume = 17,297 cf Average Runoff Depth = 1.08"
75.82% Pervious = 146,311 sf 24.18% Impervious = 46,664 sf

Summary for Subcatchment E-1:

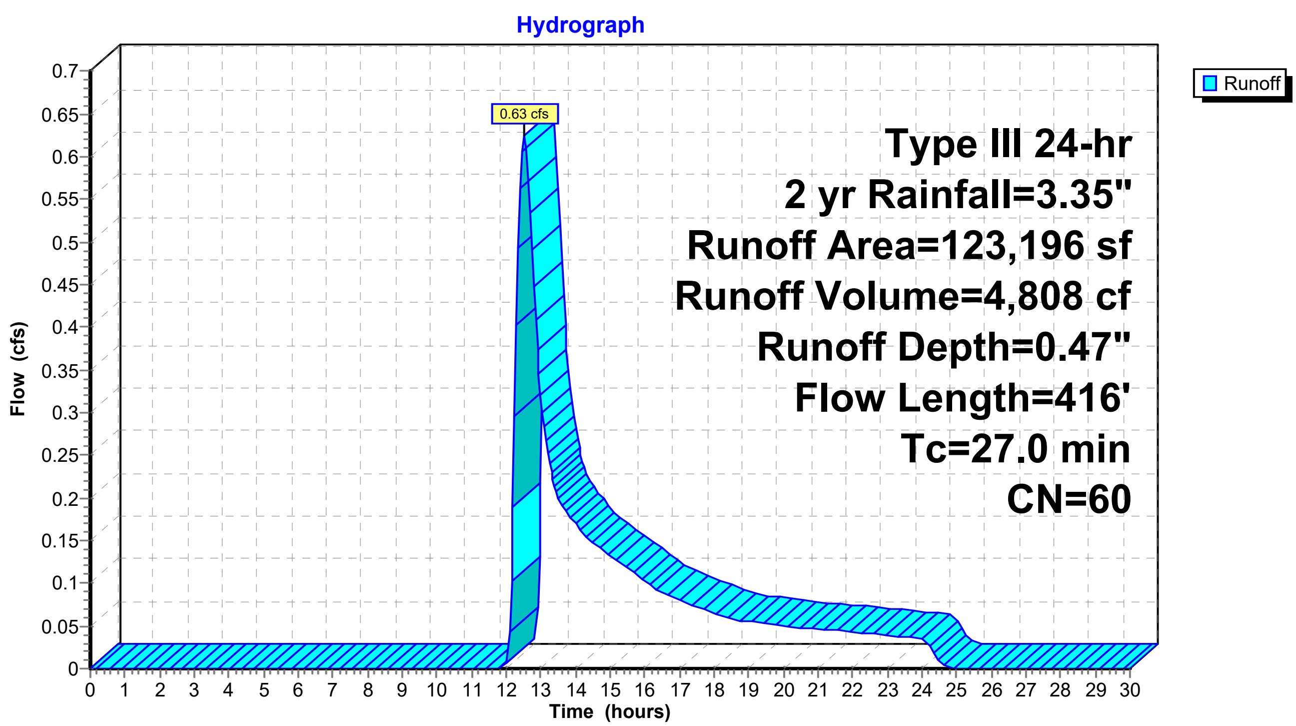
Runoff = 0.63 cfs @ 12.52 hrs, Volume= 4,808 cf, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

	Area (sf)	CN	Description
	84,532	55	Woods, Good, HSG B
	3,249	98	Roofs, HSG B
	1,200	98	Paved parking, HSG B
*	3,560	96	Rubble, HSG B
	3,322	96	Gravel surface, HSG B
	27,333	61	>75% Grass cover, Good, HSG B
	123,196	60	Weighted Average
	118,747		96.39% Pervious Area
	4,449		3.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	50	0.0100	0.05		**Sheet Flow, Woods, 50', 1%** Woods: Light underbrush n= 0.400 P2= 3.35"
11.1	366	0.0120	0.55		**Shallow Concentrated Flow, Woods, 366', 1.2%** Woodland Kv= 5.0 fps
27.0	416	Total			

Subcatchment E-1:



Summary for Subcatchment E-2:

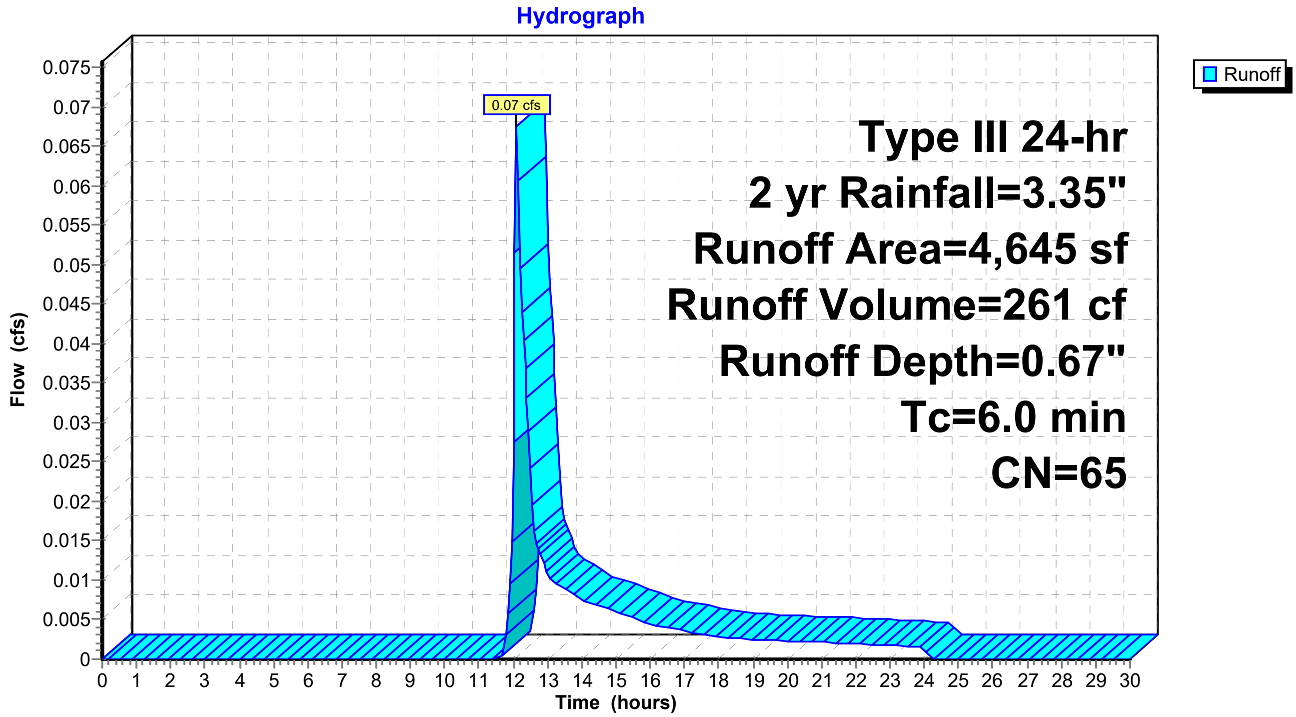
Runoff = 0.07 cfs @ 12.11 hrs, Volume= 261 cf, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

	Area (sf)	CN	Description
	923	55	Woods, Good, HSG B
	379	96	Gravel surface, HSG B
*	363	96	Rubble, HSG B
	2,980	61	>75% Grass cover, Good, HSG B
	4,645	65	Weighted Average
	4,645		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-2:



Summary for Subcatchment E-3:

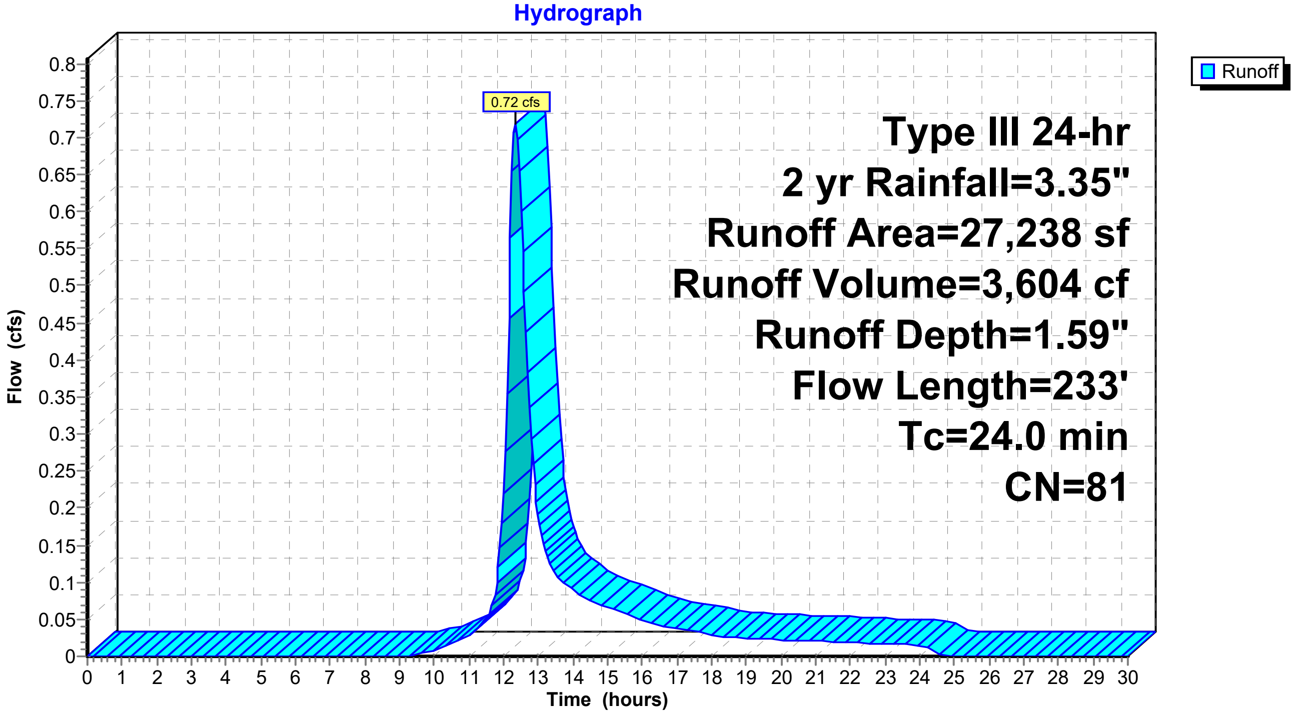
Runoff = 0.72 cfs @ 12.34 hrs, Volume= 3,604 cf, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
3,417	55	Woods, Good, HSG B
2,297	98	Roofs, HSG B
13,207	98	Paved parking, HSG B
8,317	61	>75% Grass cover, Good, HSG B
27,238	81	Weighted Average
11,734		43.08% Pervious Area
15,504		56.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	50	0.0050	0.04		**Sheet Flow, Woods, 50', 0.5%** Woods: Light underbrush n= 0.400 P2= 3.35"
0.2	5	0.0050	0.35		**Shallow Concentrated Flow, Woods, 5', 0.5%** Woodland Kv= 5.0 fps
1.1	57	0.0150	0.86		**Shallow Concentrated Flow, Grass, 57', 1.5%** Short Grass Pasture Kv= 7.0 fps
0.6	34	0.0020	0.91		**Shallow Concentrated Flow, Pavement, 34', 0.2%** Paved Kv= 20.3 fps
0.6	21	0.0080	0.63		**Shallow Concentrated Flow, Grass, 21', 0.8%** Short Grass Pasture Kv= 7.0 fps
0.5	66	0.0100	2.03		**Shallow Concentrated Flow, Pavement, 66', 1%** Paved Kv= 20.3 fps
24.0	233	Total			

Subcatchment E-3:



Summary for Subcatchment E-4:

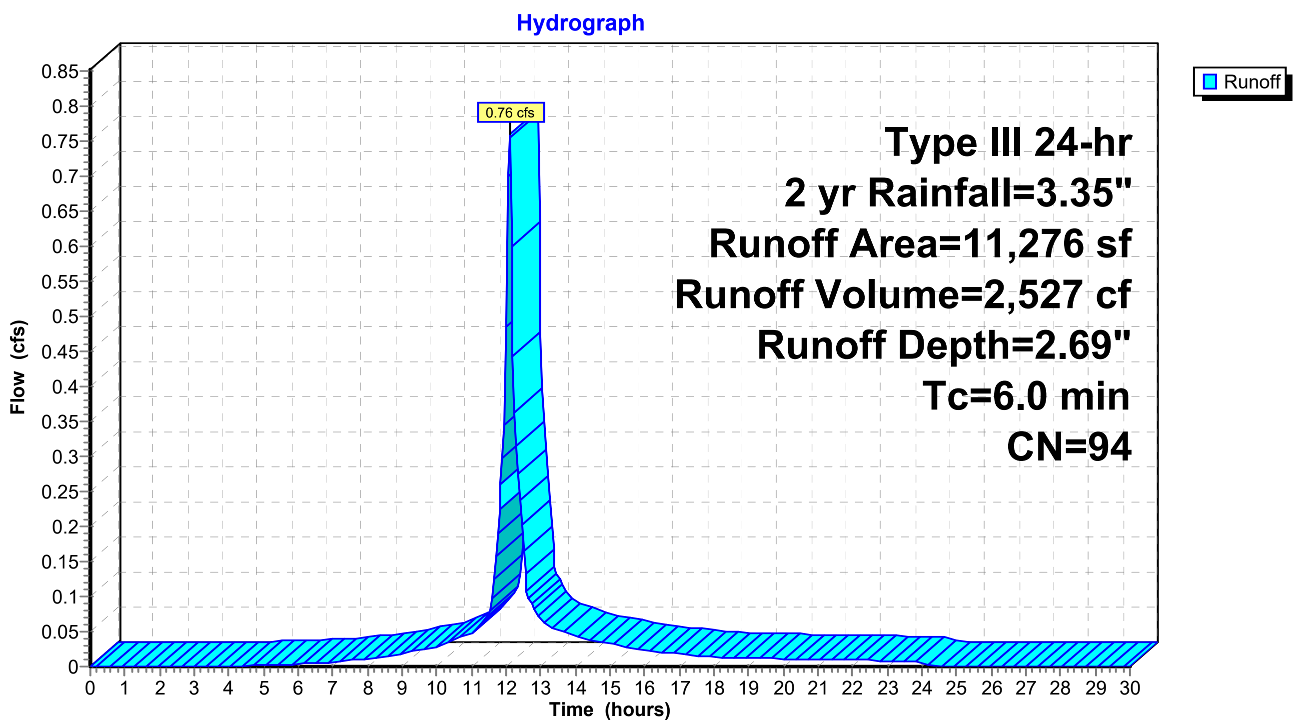
Runoff = 0.76 cfs @ 12.09 hrs, Volume= 2,527 cf, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
2,129	98	Roofs, HSG B
7,855	98	Paved parking, HSG B
208	96	Gravel surface, HSG B
1,084	61	>75% Grass cover, Good, HSG B
11,276	94	Weighted Average
1,292		11.46% Pervious Area
9,984		88.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-4:



Summary for Subcatchment E-5:

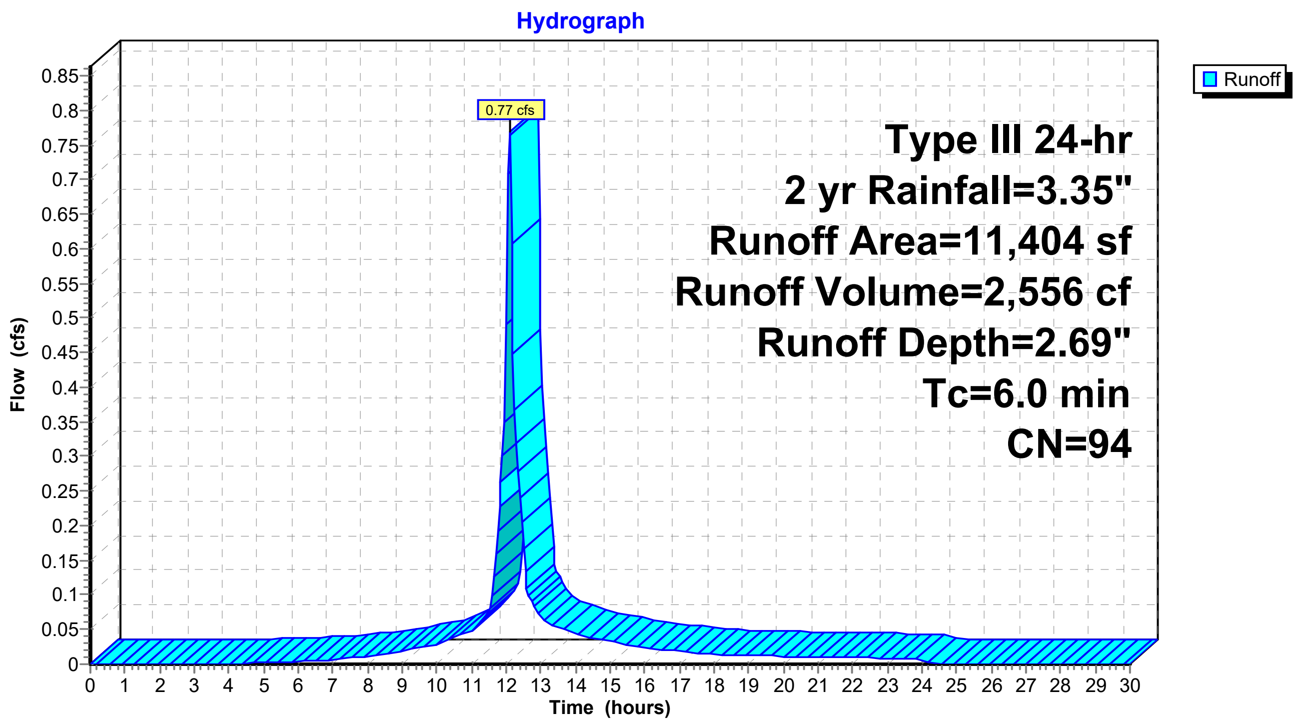
Runoff = 0.77 cfs @ 12.09 hrs, Volume= 2,556 cf, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
5,235	98	Paved parking, HSG B
5,182	96	Gravel surface, HSG B
987	61	>75% Grass cover, Good, HSG B
11,404	94	Weighted Average
6,169		54.10% Pervious Area
5,235		45.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-5:



Summary for Subcatchment E-6:

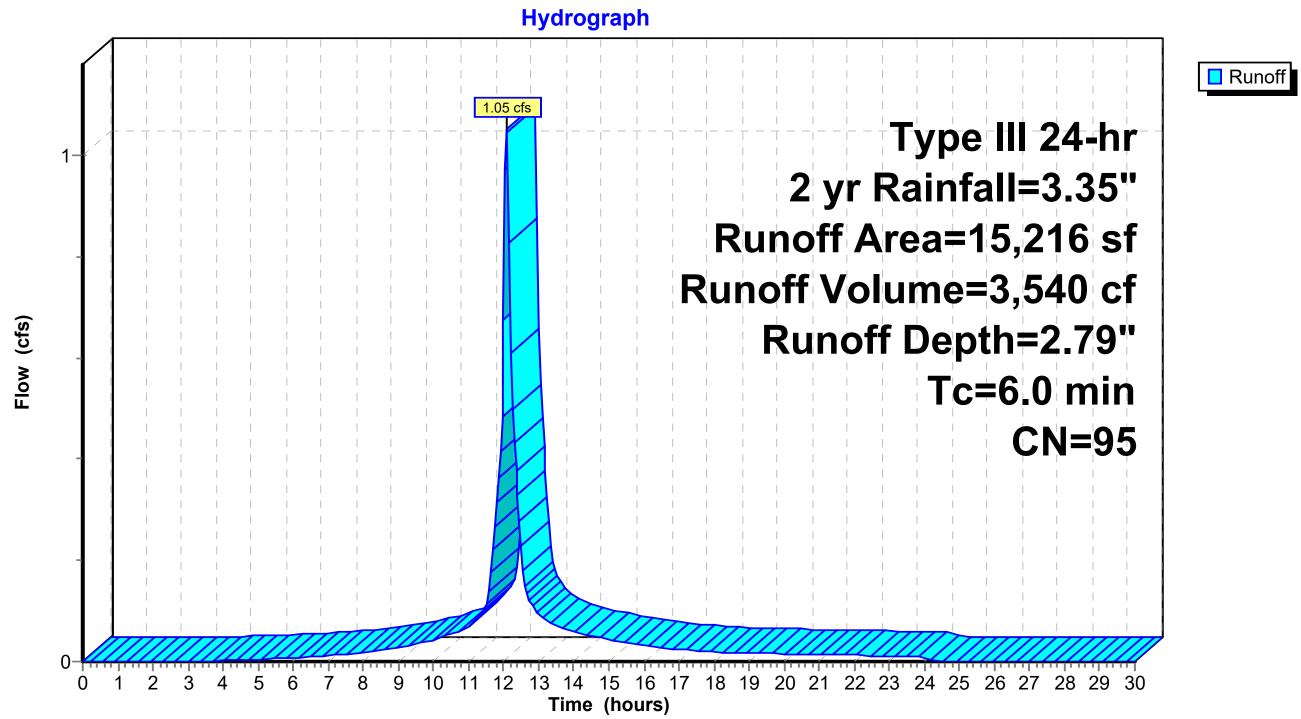
Runoff = 1.05 cfs @ 12.09 hrs, Volume= 3,540 cf, Depth= 2.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

	Area (sf)	CN	Description
	11,492	98	Paved parking, HSG B
*	323	96	Rubble, HSG B
	2,416	96	Gravel surface, HSG B
	985	61	>75% Grass cover, Good, HSG B
	15,216	95	Weighted Average
	3,724		24.47% Pervious Area
	11,492		75.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-6:



Summary for Pond CB101:

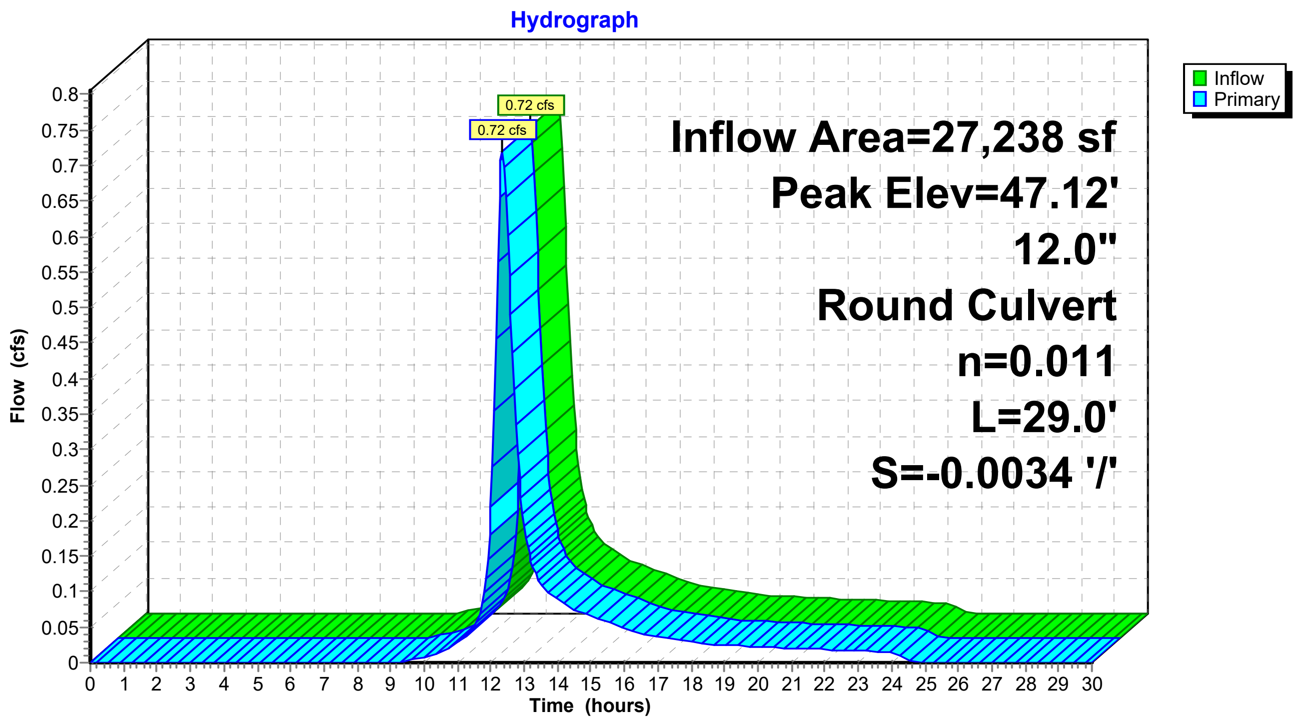
Inflow Area = 27,238 sf, 56.92% Impervious, Inflow Depth = 1.59" for 2 yr event
Inflow = 0.72 cfs @ 12.34 hrs, Volume= 3,604 cf
Outflow = 0.72 cfs @ 12.34 hrs, Volume= 3,604 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.72 cfs @ 12.34 hrs, Volume= 3,604 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.12' @ 12.21 hrs
Flood Elev= 49.06'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.50'	**12.0" Round Culvert** L= 29.0' Ke= 0.500 Inlet / Outlet Invert= 46.40' / 46.50' S= -0.0034 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.76 cfs @ 12.34 hrs HW=47.09' TW=46.97' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.76 cfs @ 1.87 fps)

Pond CB101:



Summary for Pond CB102:

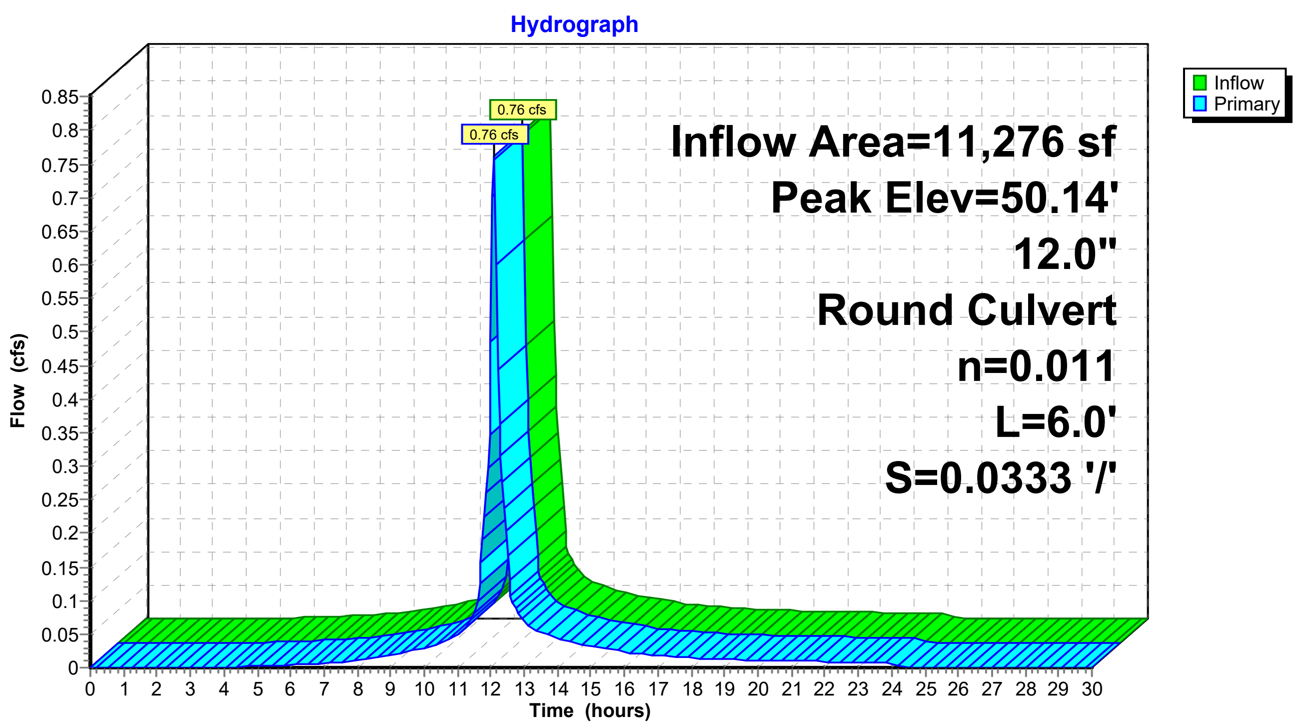
Inflow Area = 11,276 sf, 88.54% Impervious, Inflow Depth = 2.69" for 2 yr event
Inflow = 0.76 cfs @ 12.09 hrs, Volume= 2,527 cf
Outflow = 0.76 cfs @ 12.09 hrs, Volume= 2,527 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.76 cfs @ 12.09 hrs, Volume= 2,527 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 50.14' @ 12.09 hrs
Flood Elev= 49.07'

Device	Routing	Invert	Outlet Devices
#1	Primary	49.70'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 49.70' / 49.50' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.74 cfs @ 12.09 hrs HW=50.14' TW=47.02' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.74 cfs @ 2.25 fps)

Pond CB102:



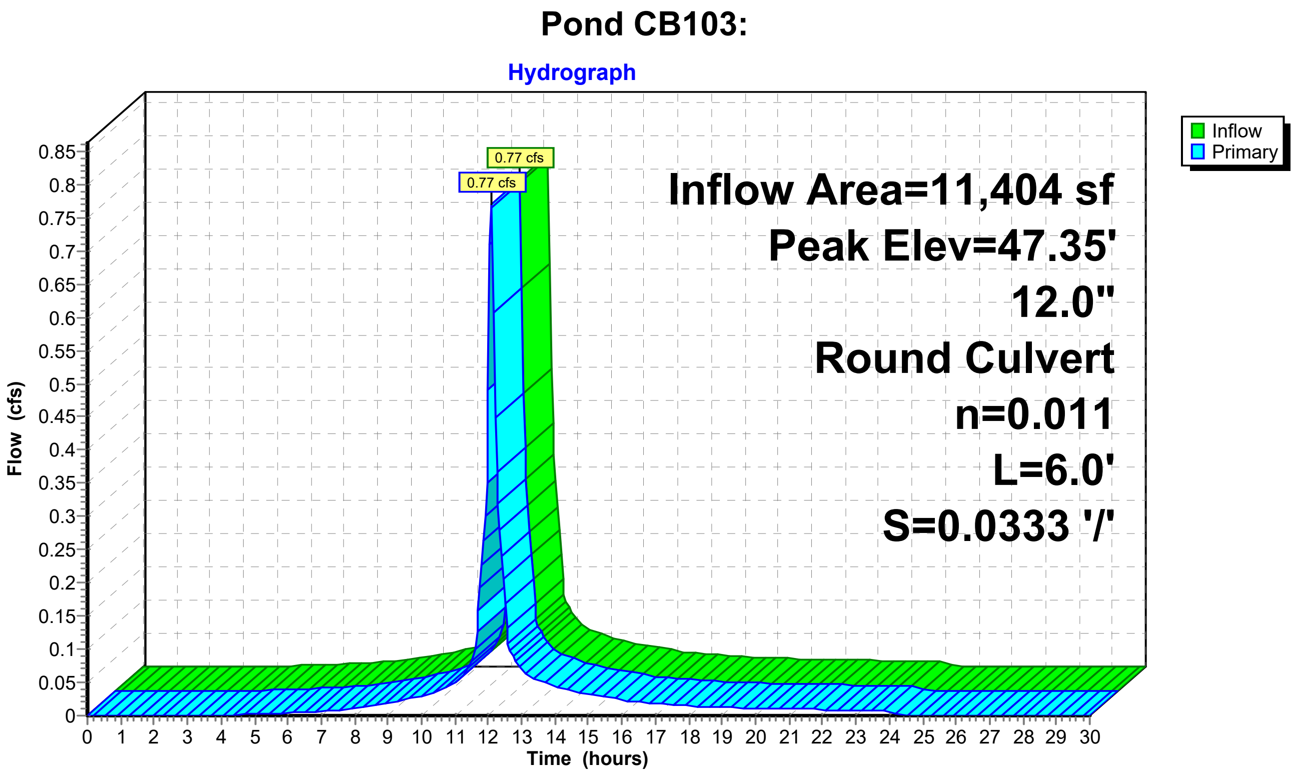
Summary for Pond CB103:

Inflow Area = 11,404 sf, 45.90% Impervious, Inflow Depth = 2.69" for 2 yr event
Inflow = 0.77 cfs @ 12.09 hrs, Volume= 2,556 cf
Outflow = 0.77 cfs @ 12.09 hrs, Volume= 2,556 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.77 cfs @ 12.09 hrs, Volume= 2,556 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.35' @ 12.10 hrs
Flood Elev= 49.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 46.90' / 46.70' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.72 cfs @ 12.09 hrs HW=47.34' TW=47.08' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.72 cfs @ 3.14 fps)



Summary for Pond CB104:

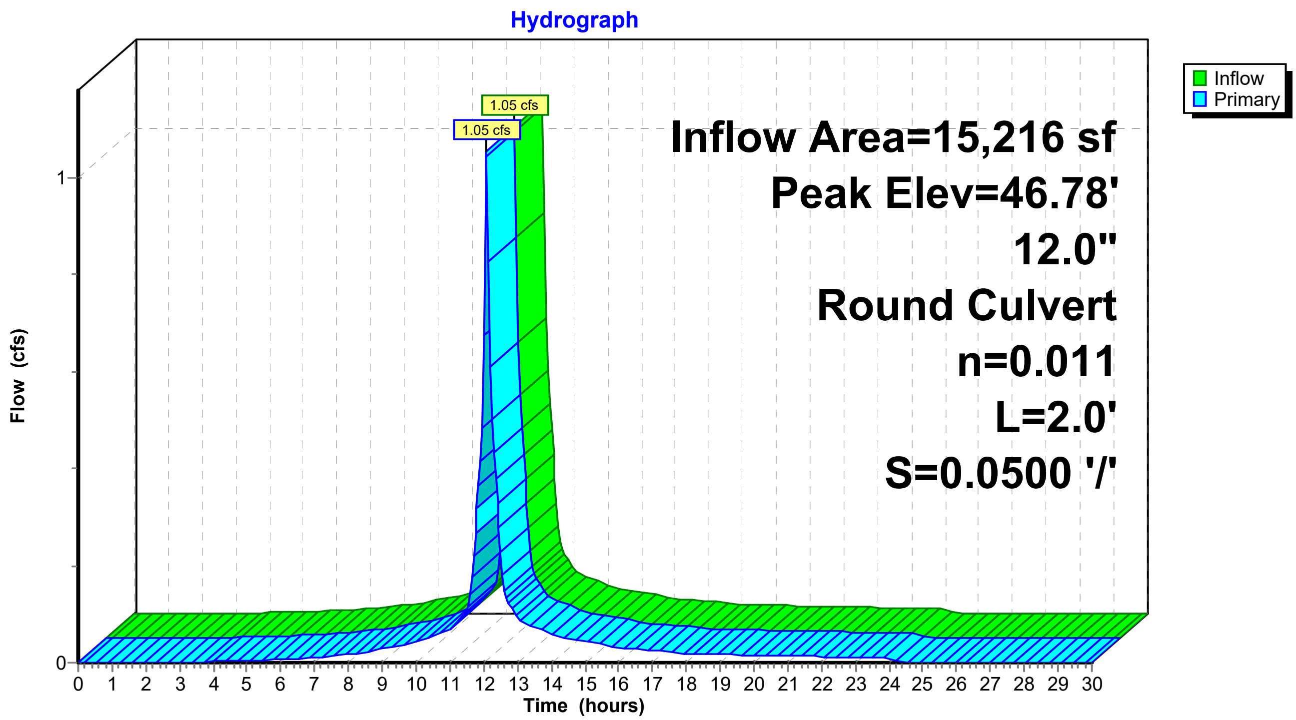
Inflow Area =	15,216 sf,	75.53% Impervious,	Inflow Depth = 2.79"	for 2 yr event	
Inflow =	1.05 cfs @	12.09 hrs,	Volume=	3,540 cf	
Outflow =	1.05 cfs @	12.09 hrs,	Volume=	3,540 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.05 cfs @	12.09 hrs,	Volume=	3,540 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.78' @ 12.09 hrs
Flood Elev= 48.93'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 2.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.10' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.03 cfs @ 12.09 hrs HW=46.77' TW=45.82' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.03 cfs @ 3.18 fps)

Pond CB104:



Summary for Pond DMH101:

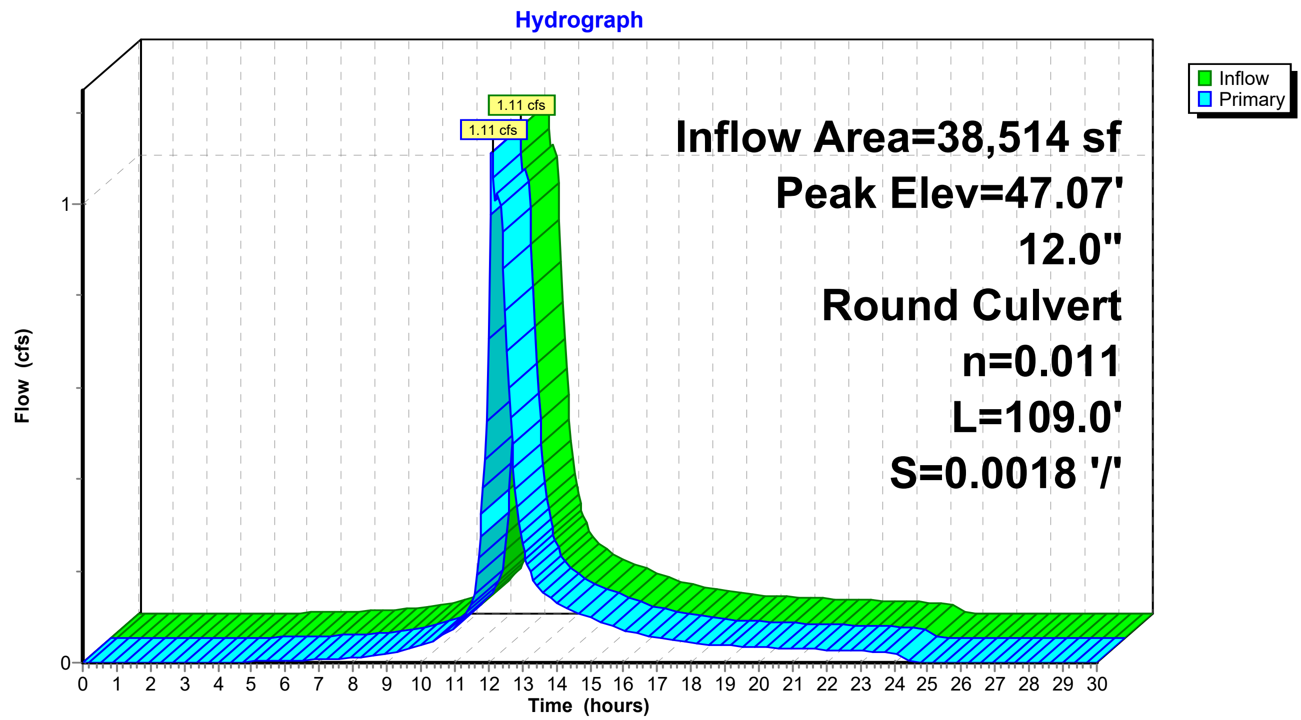
Inflow Area = 38,514 sf, 66.18% Impervious, Inflow Depth = 1.91" for 2 yr event
Inflow = 1.11 cfs @ 12.11 hrs, Volume= 6,132 cf
Outflow = 1.11 cfs @ 12.11 hrs, Volume= 6,132 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.11 cfs @ 12.11 hrs, Volume= 6,132 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.07' @ 12.14 hrs
Flood Elev= 49.94'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 109.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.00' S= 0.0018 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.03 cfs @ 12.11 hrs HW=47.05' TW=46.84' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.03 cfs @ 1.95 fps)

Pond DMH101:



Summary for Pond DMH102:

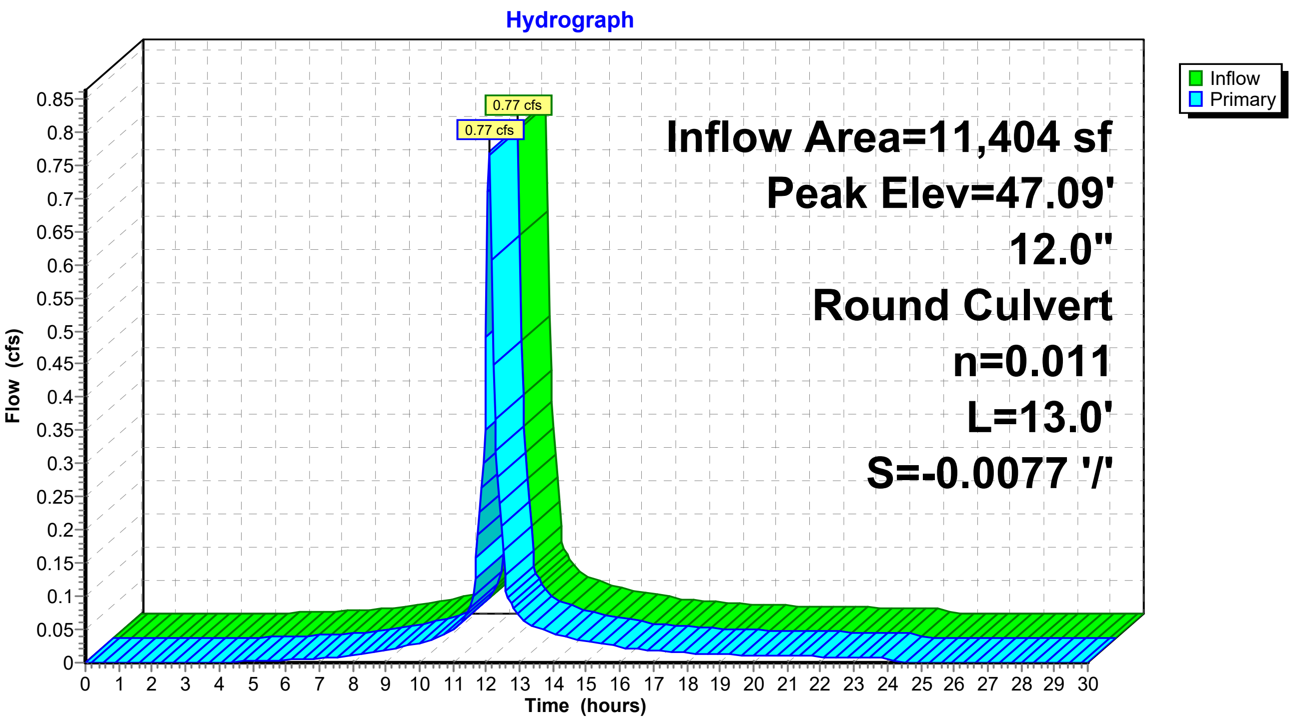
Inflow Area = 11,404 sf, 45.90% Impervious, Inflow Depth = 2.69" for 2 yr event
Inflow = 0.77 cfs @ 12.09 hrs, Volume= 2,556 cf
Outflow = 0.77 cfs @ 12.09 hrs, Volume= 2,556 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.77 cfs @ 12.09 hrs, Volume= 2,556 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.09' @ 12.09 hrs
Flood Elev= 49.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.60'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 46.50' / 46.60' S= -0.0077 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.75 cfs @ 12.09 hrs HW=47.08' TW=46.84' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 0.75 cfs @ 2.27 fps)

Pond DMH102:



Summary for Pond DMH103:

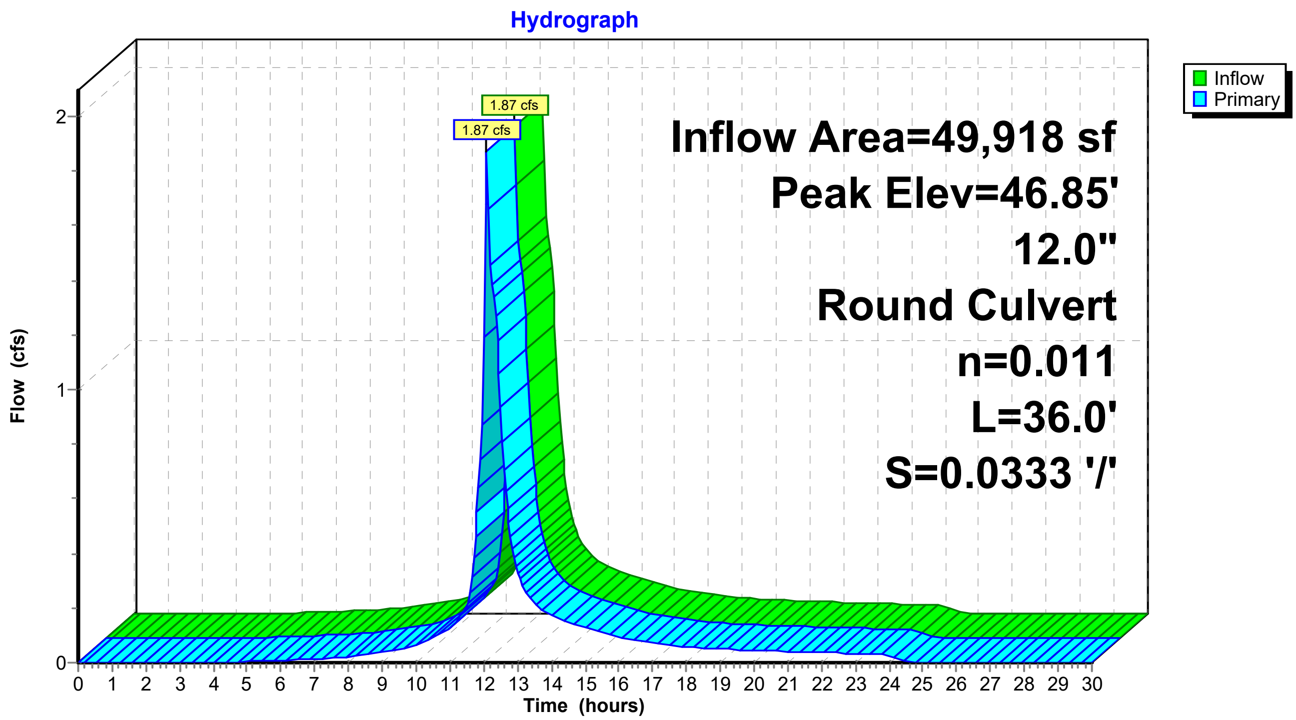
Inflow Area =	49,918 sf,	61.55% Impervious,	Inflow Depth = 2.09"	for 2 yr event	
Inflow =	1.87 cfs @	12.10 hrs,	Volume=	8,688 cf	
Outflow =	1.87 cfs @	12.10 hrs,	Volume=	8,688 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.87 cfs @	12.10 hrs,	Volume=	8,688 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.85' @ 12.10 hrs
Flood Elev= 50.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.10'	**12.0" Round Culvert** L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 46.10' / 44.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.87 cfs @ 12.10 hrs HW=46.85' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.87 cfs @ 2.95 fps)

Pond DMH103:



Summary for Pond DMH104:

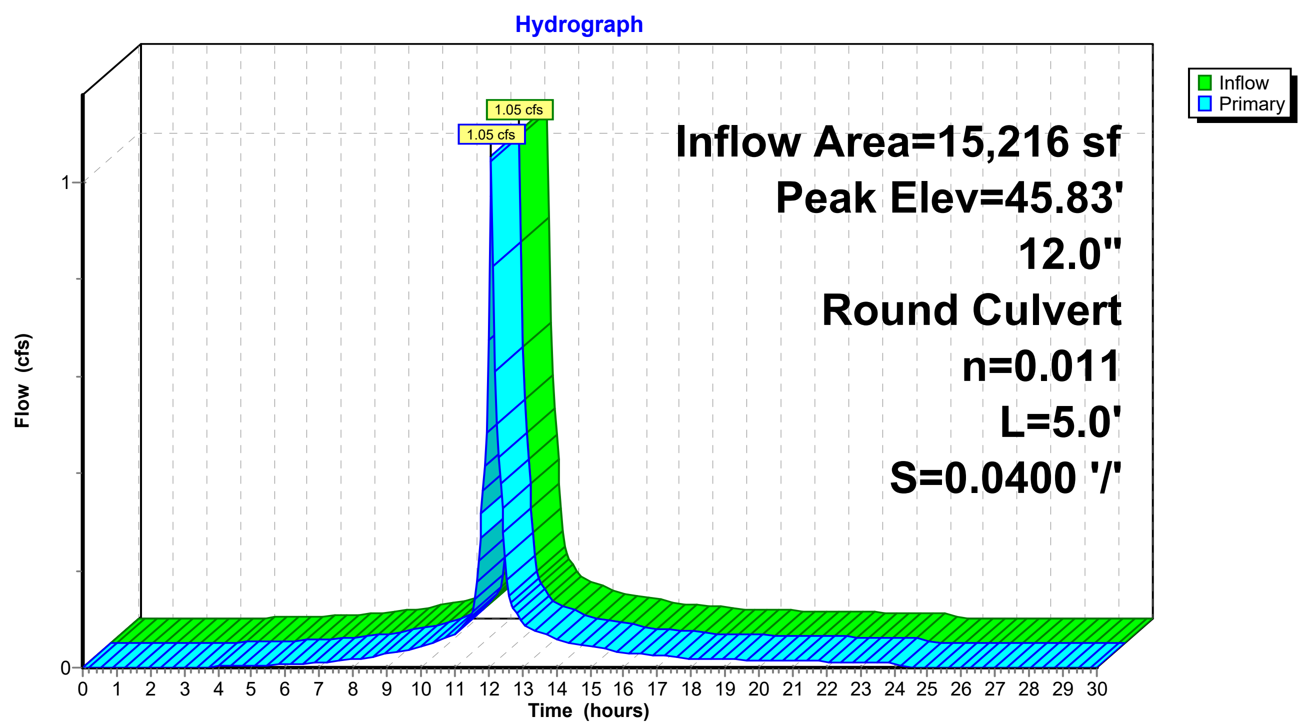
Inflow Area =	15,216 sf,	75.53% Impervious,	Inflow Depth = 2.79"	for 2 yr event	
Inflow =	1.05 cfs @	12.09 hrs,	Volume=	3,540 cf	
Outflow =	1.05 cfs @	12.09 hrs,	Volume=	3,540 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.05 cfs @	12.09 hrs,	Volume=	3,540 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 45.83' @ 12.09 hrs
Flood Elev= 49.08'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.30'	**12.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 45.30' / 45.10' S= 0.0400 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.03 cfs @ 12.09 hrs HW=45.82' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.03 cfs @ 2.46 fps)

Pond DMH104:

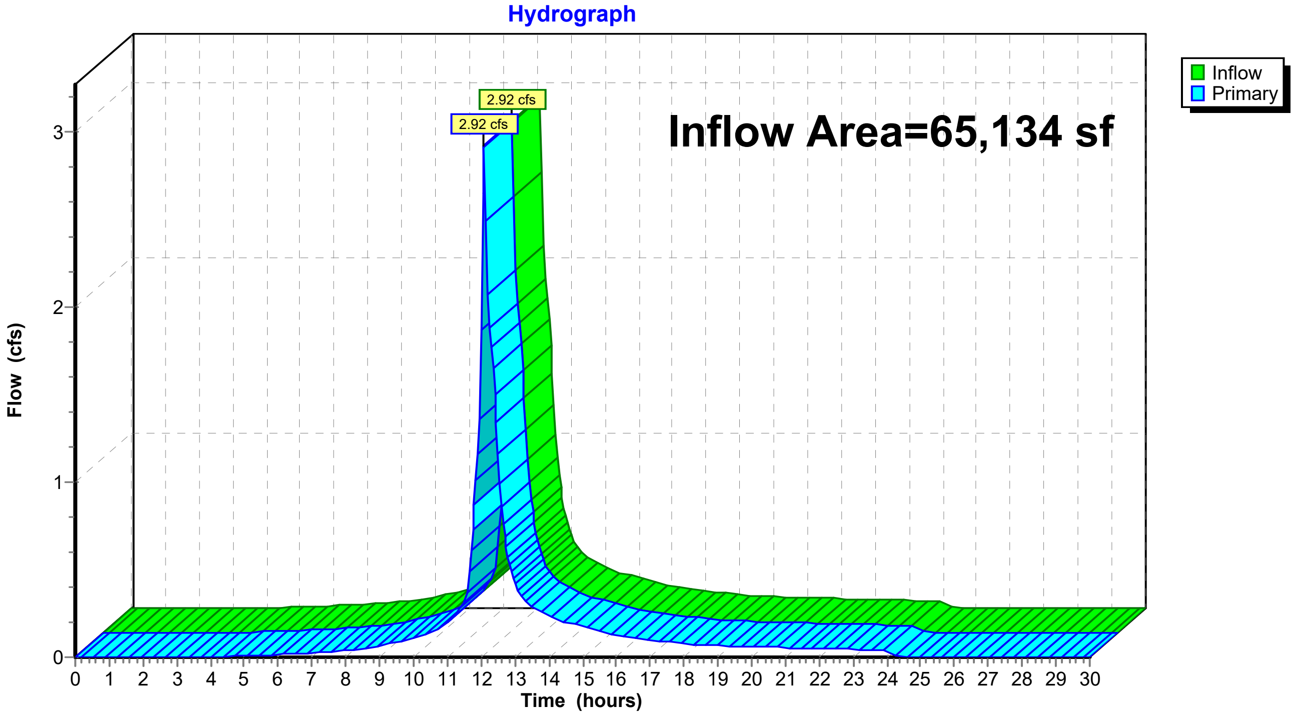


Summary for Pond DMH105:

Inflow Area =	65,134 sf,	64.81% Impervious,	Inflow Depth = 2.25"	for 2 yr event	
Inflow =	2.92 cfs @	12.09 hrs, Volume=	12,228 cf		
Primary =	2.92 cfs @	12.09 hrs, Volume=	12,228 cf,	Atten= 0%,	Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond DMH105:



Summary for Pond Pd1:

Inflow Area = 123,196 sf, 3.61% Impervious, Inflow Depth = 0.47" for 2 yr event
Inflow = 0.63 cfs @ 12.52 hrs, Volume= 4,808 cf
Outflow = 0.44 cfs @ 12.81 hrs, Volume= 4,808 cf, Atten= 30%, Lag= 17.8 min
Discarded = 0.44 cfs @ 12.81 hrs, Volume= 4,808 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.71' @ 12.81 hrs Surf.Area= 3,869 sf Storage= 526 cf

Plug-Flow detention time= 17.2 min calculated for 4,800 cf (100% of inflow)
Center-of-Mass det. time= 17.2 min (951.0 - 933.7)

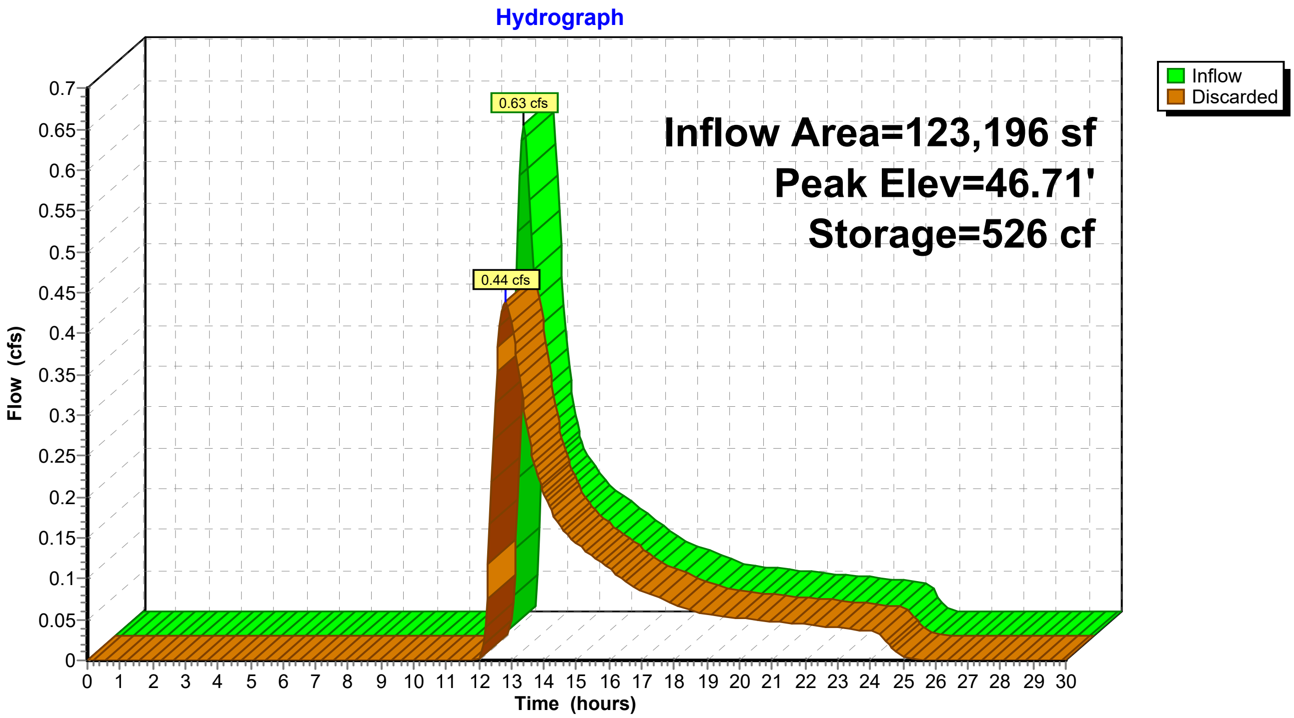
Volume	Invert	Avail.Storage	Storage Description
#1	46.50'	11,412 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.50	1,440	159.0	0	0	1,440
47.00	9,376	562.0	2,415	2,415	24,563
47.50	28,312	963.0	8,997	11,412	73,228

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.50'	**7.825 in/hr Exfiltration over Surface area above 46.50'** Excluded Surface area = 1,440 sf

Discarded OutFlow Max=0.44 cfs @ 12.81 hrs HW=46.71' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.44 cfs)

Pond Pd1:

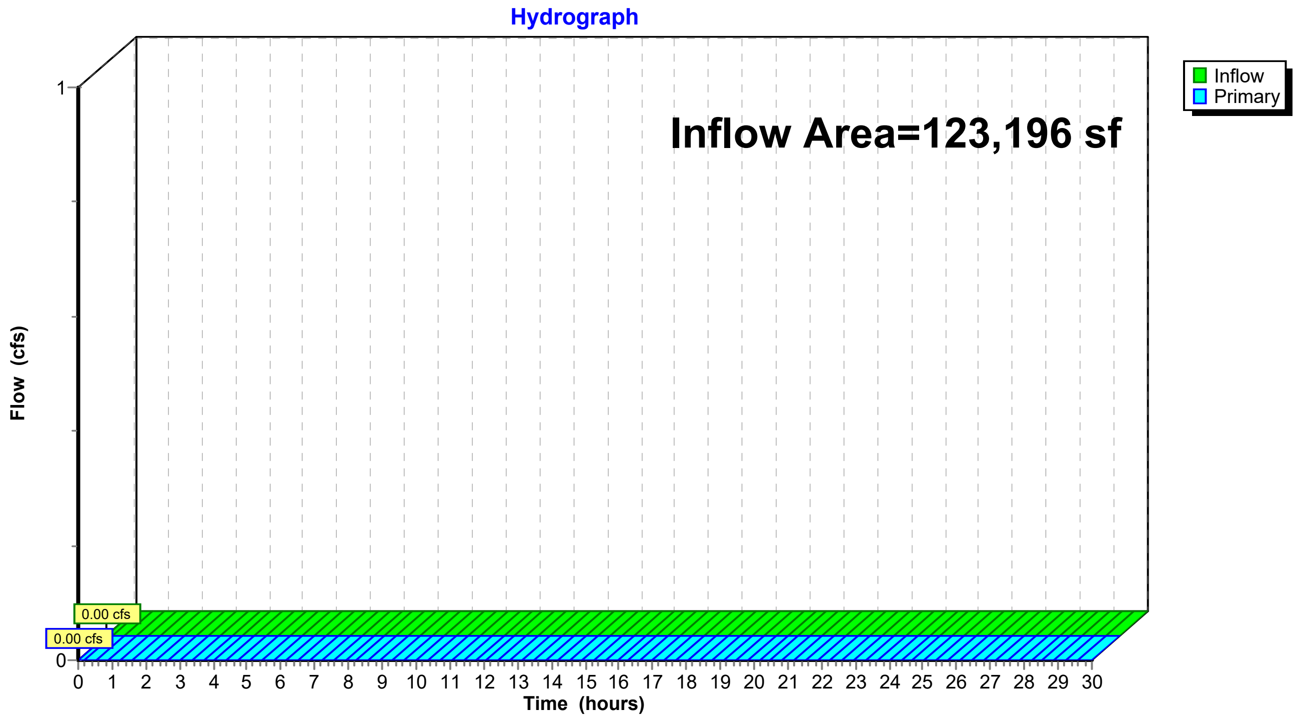

Hydrograph
0.63 cfs
0.44 cfs
Inflow Area=123,196 sf
Peak Elev=46.71'
Storage=526 cf
Inflow
Discarded
Flow (cfs)
0.7
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

Summary for Link POI 1: Onsite Infiltration East

Inflow Area =	123,196 sf,	3.61% Impervious,	Inflow Depth = 0.00"	for 2 yr event
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 1: Onsite Infiltration East

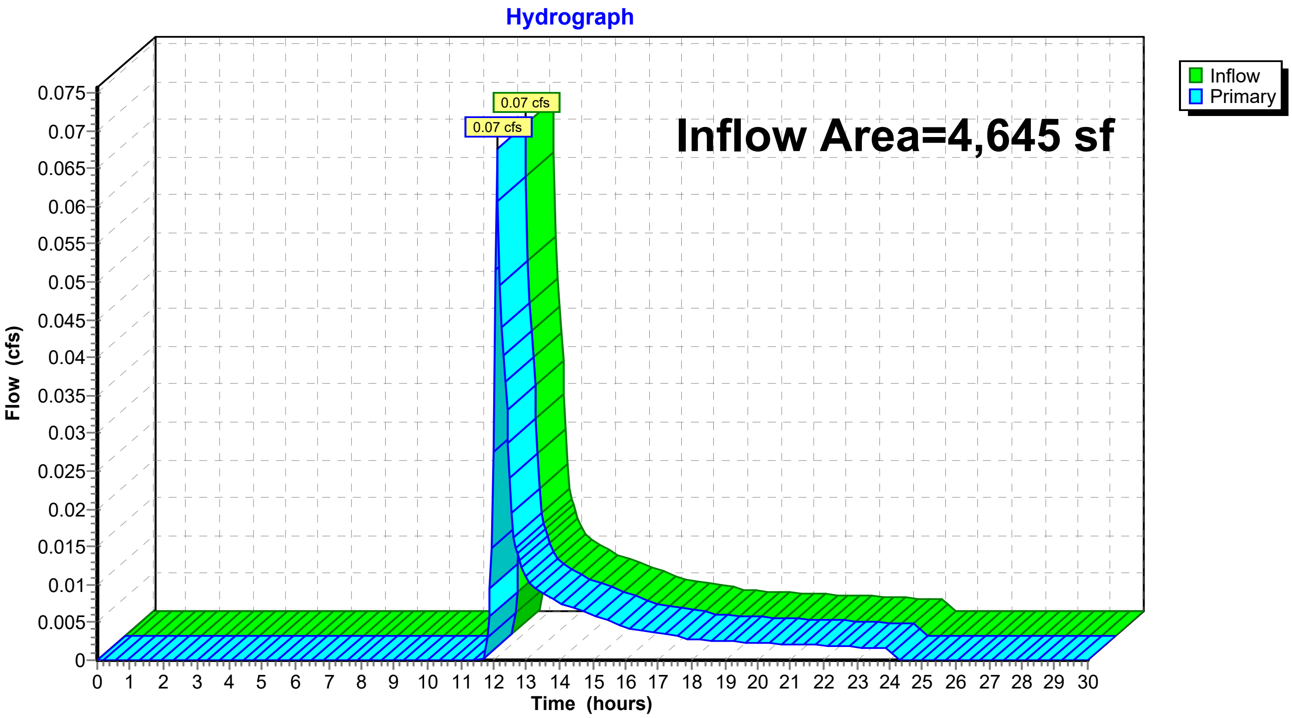


Summary for Link POI 2: Offsite at Southeast Property Line

Inflow Area = 4,645 sf, 0.00% Impervious, Inflow Depth = 0.67" for 2 yr event
Inflow = 0.07 cfs @ 12.11 hrs, Volume= 261 cf
Primary = 0.07 cfs @ 12.11 hrs, Volume= 261 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 2: Offsite at Southeast Property Line

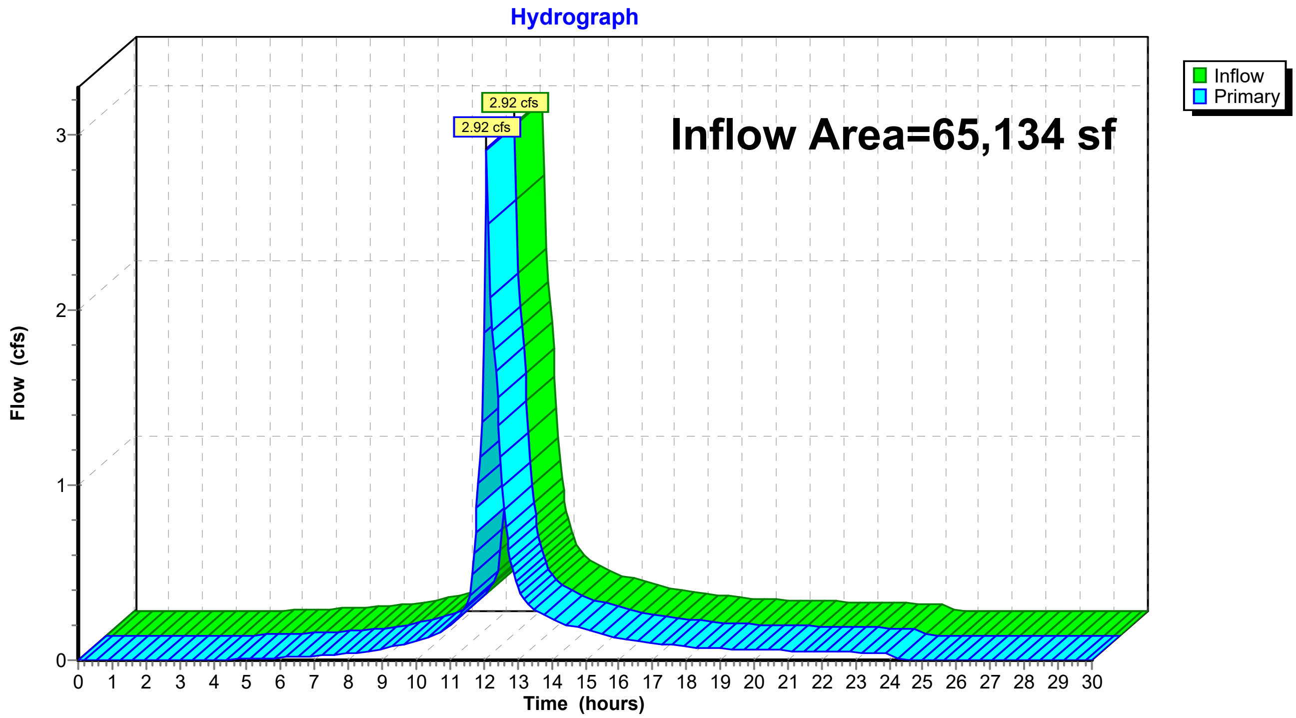


Summary for Link POI 3: Cranberry Highway Closed Drainage System

Inflow Area =	65,134 sf,	64.81% Impervious,	Inflow Depth = 2.25"	for 2 yr event	
Inflow =	2.92 cfs @	12.09 hrs,	Volume=	12,228 cf	
Primary =	2.92 cfs @	12.09 hrs,	Volume=	12,228 cf,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 3: Cranberry Highway Closed Drainage System



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentE-1: Runoff Area=123,196 sf 3.61% Impervious Runoff Depth=1.27"
Flow Length=416' Tc=27.0 min CN=60 Runoff=2.21 cfs 12,999 cf

SubcatchmentE-2: Runoff Area=4,645 sf 0.00% Impervious Runoff Depth=1.61"
Tc=6.0 min CN=65 Runoff=0.19 cfs 625 cf

SubcatchmentE-3: Runoff Area=27,238 sf 56.92% Impervious Runoff Depth=2.93"
Flow Length=233' Tc=24.0 min CN=81 Runoff=1.34 cfs 6,656 cf

SubcatchmentE-4: Runoff Area=11,276 sf 88.54% Impervious Runoff Depth=4.25"
Tc=6.0 min CN=94 Runoff=1.17 cfs 3,992 cf

SubcatchmentE-5: Runoff Area=11,404 sf 45.90% Impervious Runoff Depth=4.25"
Tc=6.0 min CN=94 Runoff=1.19 cfs 4,038 cf

SubcatchmentE-6: Runoff Area=15,216 sf 75.53% Impervious Runoff Depth=4.36"
Tc=6.0 min CN=95 Runoff=1.60 cfs 5,529 cf

Pond CB101: Peak Elev=47.66' Inflow=1.34 cfs 6,656 cf
12.0" Round Culvert n=0.011 L=29.0' S=-0.0034 '/' Outflow=1.34 cfs 6,656 cf

Pond CB102: Peak Elev=50.27' Inflow=1.17 cfs 3,992 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=1.17 cfs 3,992 cf

Pond CB103: Peak Elev=47.51' Inflow=1.19 cfs 4,038 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=1.19 cfs 4,038 cf

Pond CB104: Peak Elev=46.96' Inflow=1.60 cfs 5,529 cf
12.0" Round Culvert n=0.011 L=2.0' S=0.0500 '/' Outflow=1.60 cfs 5,529 cf

Pond DMH101: Peak Elev=47.58' Inflow=1.88 cfs 10,648 cf
12.0" Round Culvert n=0.011 L=109.0' S=0.0018 '/' Outflow=1.88 cfs 10,648 cf

Pond DMH102: Peak Elev=47.35' Inflow=1.19 cfs 4,038 cf
12.0" Round Culvert n=0.011 L=13.0' S=-0.0077 '/' Outflow=1.19 cfs 4,038 cf

Pond DMH103: Peak Elev=47.25' Inflow=3.05 cfs 14,686 cf
12.0" Round Culvert n=0.011 L=36.0' S=0.0333 '/' Outflow=3.05 cfs 14,686 cf

Pond DMH104: Peak Elev=46.00' Inflow=1.60 cfs 5,529 cf
12.0" Round Culvert n=0.011 L=5.0' S=0.0400 '/' Outflow=1.60 cfs 5,529 cf

Pond DMH105: Inflow=4.64 cfs 20,215 cf
Primary=4.64 cfs 20,215 cf

Pond Pd1: Peak Elev=46.98' Storage=2,215 cf Inflow=2.21 cfs 12,999 cf
Outflow=1.35 cfs 12,999 cf

Link POI 1: Onsite Infiltration East Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link POI 2: Offsite at Southeast Property Line Inflow=0.19 cfs 625 cf
Primary=0.19 cfs 625 cf

Link POI 3: Cranberry Highway Closed Drainage System Inflow=4.64 cfs 20,215 cf
Primary=4.64 cfs 20,215 cf

Total Runoff Area = 192,975 sf Runoff Volume = 33,839 cf Average Runoff Depth = 2.10"
75.82% Pervious = 146,311 sf 24.18% Impervious = 46,664 sf

Summary for Subcatchment E-1:

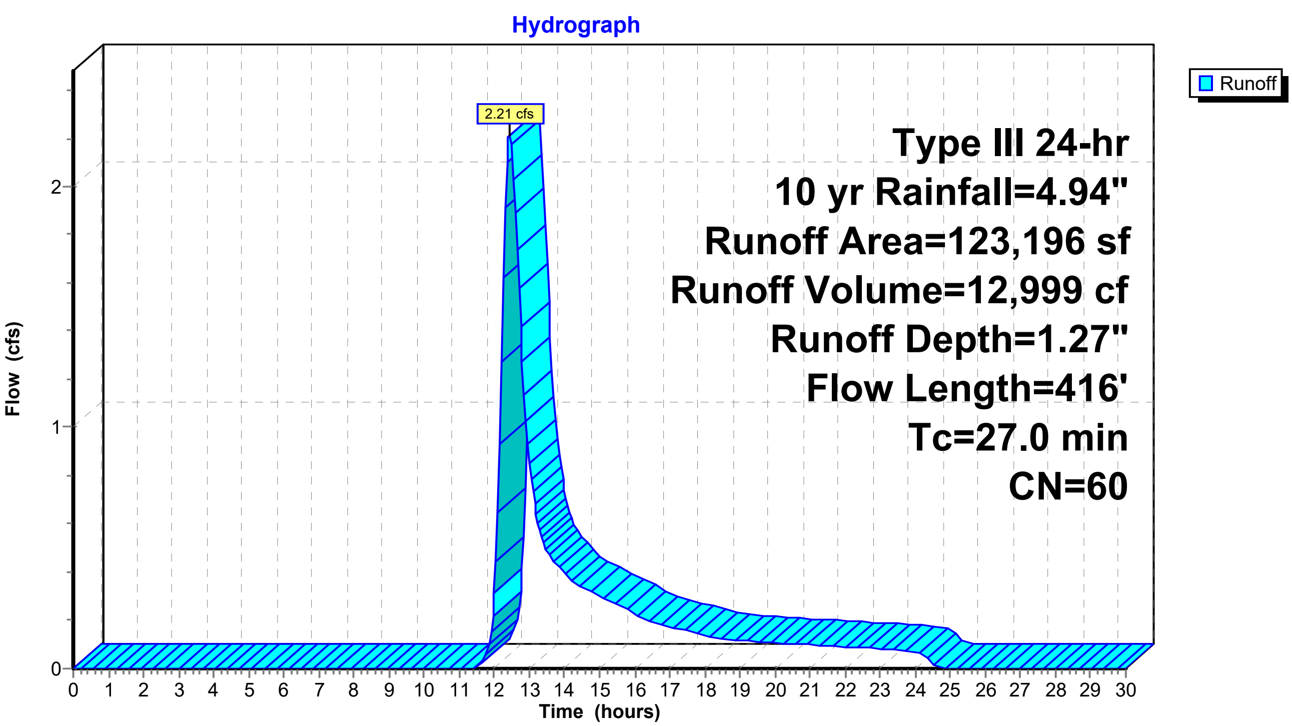
Runoff = 2.21 cfs @ 12.43 hrs, Volume= 12,999 cf, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

	Area (sf)	CN	Description
	84,532	55	Woods, Good, HSG B
	3,249	98	Roofs, HSG B
	1,200	98	Paved parking, HSG B
*	3,560	96	Rubble, HSG B
	3,322	96	Gravel surface, HSG B
	27,333	61	>75% Grass cover, Good, HSG B
	123,196	60	Weighted Average
	118,747		96.39% Pervious Area
	4,449		3.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	50	0.0100	0.05		**Sheet Flow, Woods, 50', 1%** Woods: Light underbrush n= 0.400 P2= 3.35"
11.1	366	0.0120	0.55		**Shallow Concentrated Flow, Woods, 366', 1.2%** Woodland Kv= 5.0 fps
27.0	416	Total			

Subcatchment E-1:



Summary for Subcatchment E-2:

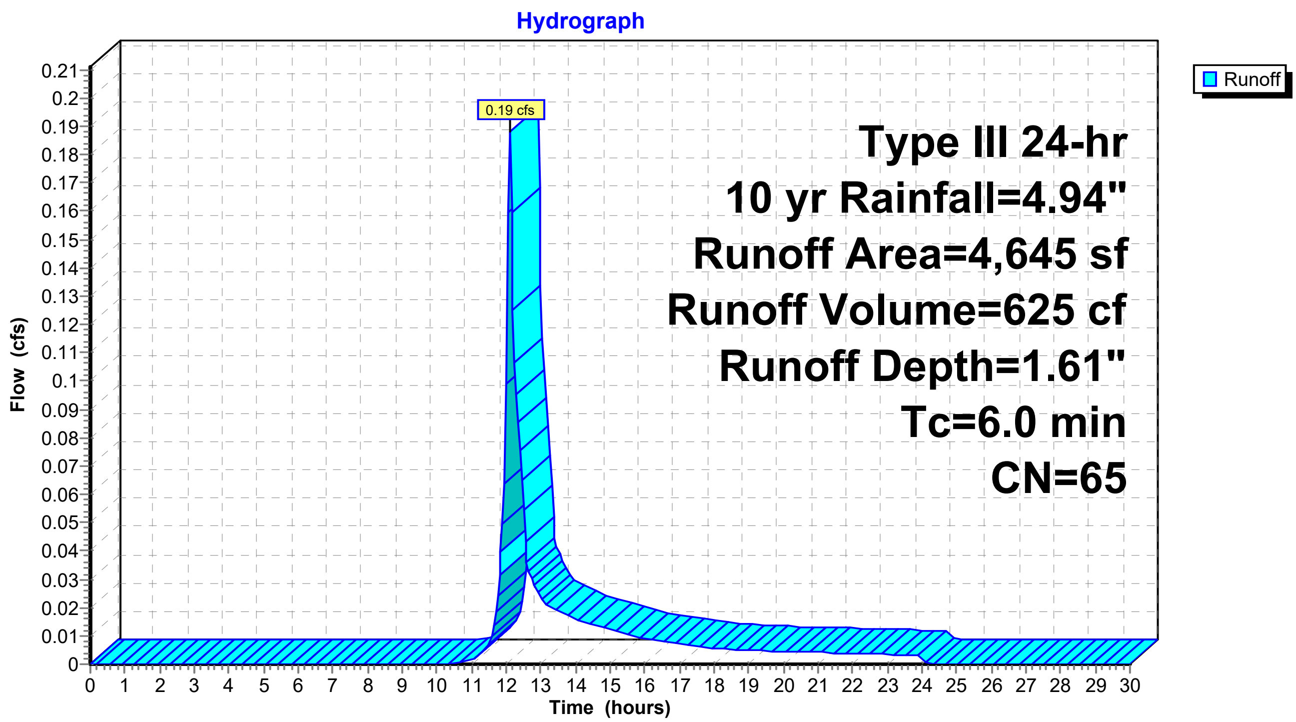
Runoff = 0.19 cfs @ 12.10 hrs, Volume= 625 cf, Depth= 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

	Area (sf)	CN	Description
	923	55	Woods, Good, HSG B
	379	96	Gravel surface, HSG B
*	363	96	Rubble, HSG B
	2,980	61	>75% Grass cover, Good, HSG B
	4,645	65	Weighted Average
	4,645		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-2:



Summary for Subcatchment E-3:

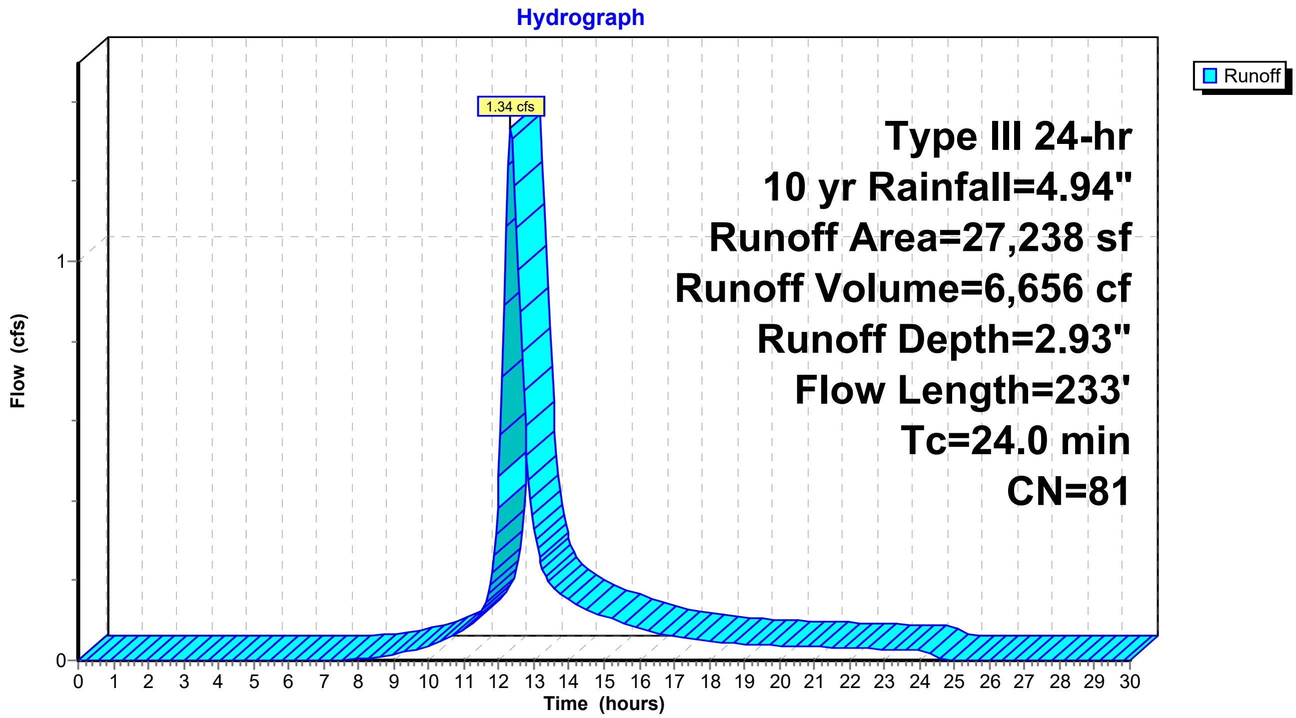
Runoff = 1.34 cfs @ 12.33 hrs, Volume= 6,656 cf, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
3,417	55	Woods, Good, HSG B
2,297	98	Roofs, HSG B
13,207	98	Paved parking, HSG B
8,317	61	>75% Grass cover, Good, HSG B
27,238	81	Weighted Average
11,734		43.08% Pervious Area
15,504		56.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	50	0.0050	0.04		**Sheet Flow, Woods, 50', 0.5%** Woods: Light underbrush n= 0.400 P2= 3.35"
0.2	5	0.0050	0.35		**Shallow Concentrated Flow, Woods, 5', 0.5%** Woodland Kv= 5.0 fps
1.1	57	0.0150	0.86		**Shallow Concentrated Flow, Grass, 57', 1.5%** Short Grass Pasture Kv= 7.0 fps
0.6	34	0.0020	0.91		**Shallow Concentrated Flow, Pavement, 34', 0.2%** Paved Kv= 20.3 fps
0.6	21	0.0080	0.63		**Shallow Concentrated Flow, Grass, 21', 0.8%** Short Grass Pasture Kv= 7.0 fps
0.5	66	0.0100	2.03		**Shallow Concentrated Flow, Pavement, 66', 1%** Paved Kv= 20.3 fps
24.0	233	Total			

Subcatchment E-3:



Summary for Subcatchment E-4:

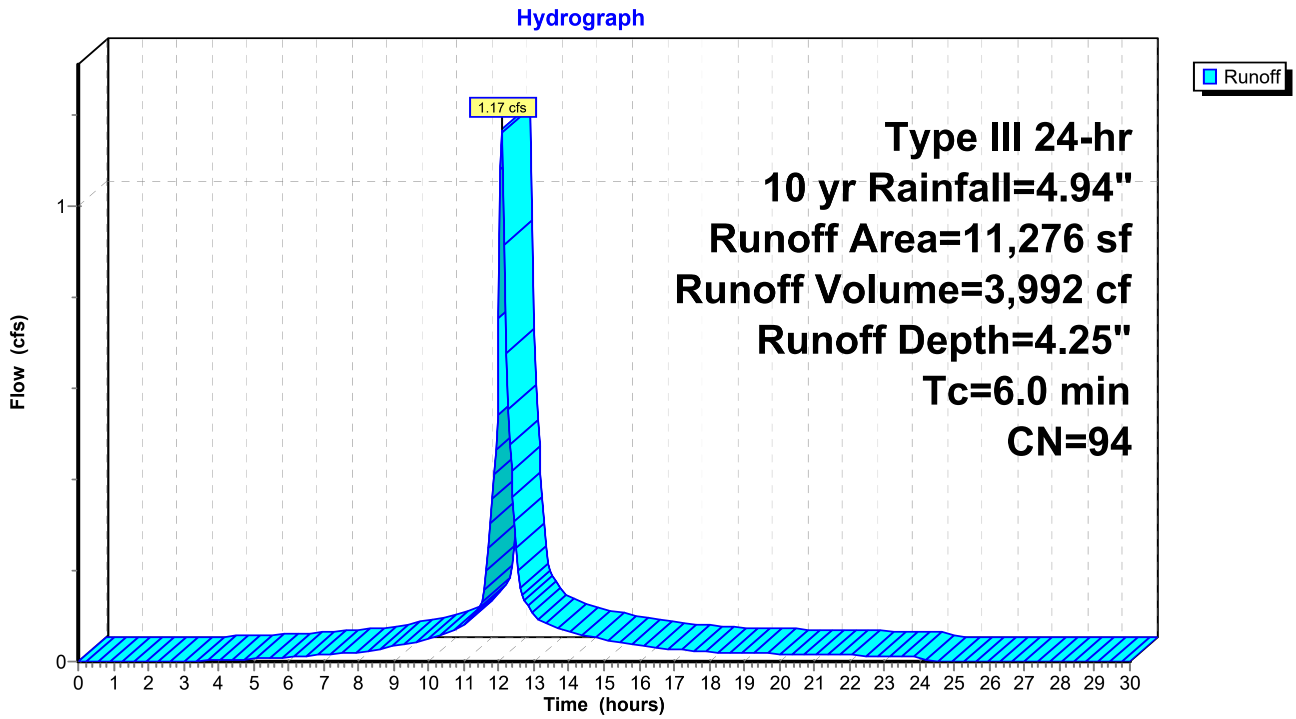
Runoff = 1.17 cfs @ 12.09 hrs, Volume= 3,992 cf, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
2,129	98	Roofs, HSG B
7,855	98	Paved parking, HSG B
208	96	Gravel surface, HSG B
1,084	61	>75% Grass cover, Good, HSG B
11,276	94	Weighted Average
1,292		11.46% Pervious Area
9,984		88.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-4:



Summary for Subcatchment E-5:

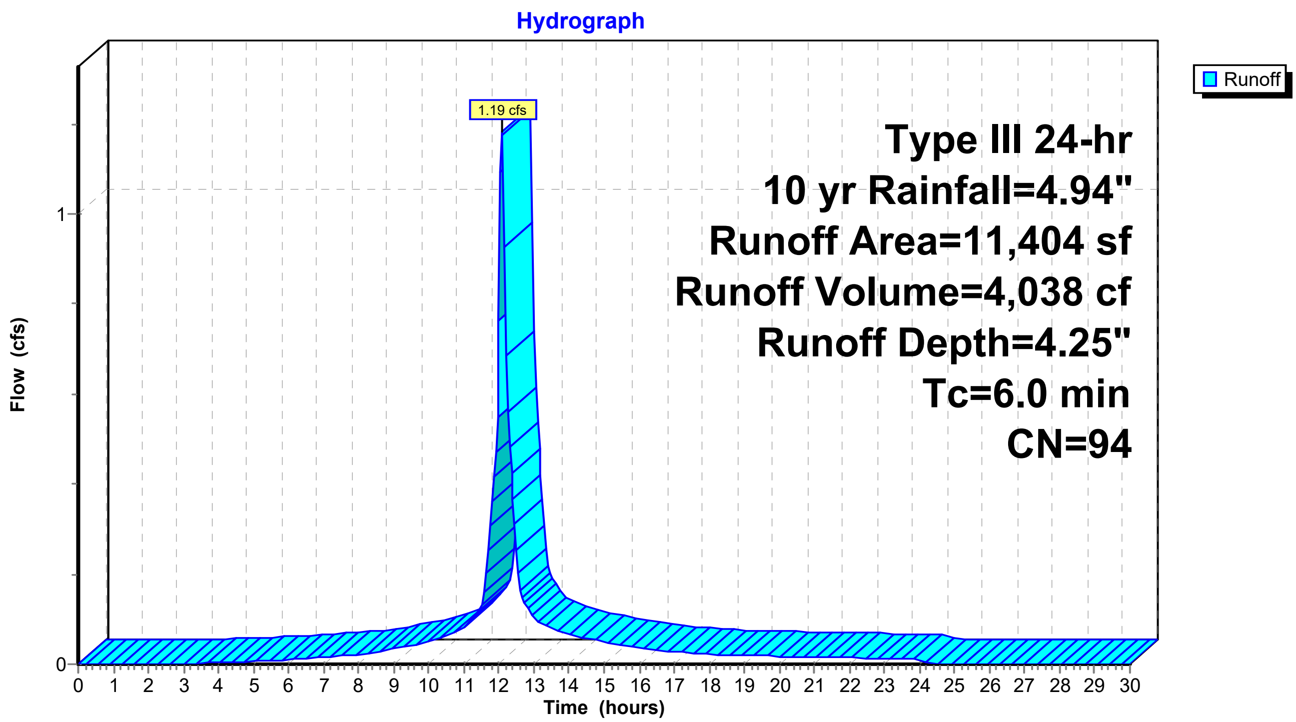
Runoff = 1.19 cfs @ 12.09 hrs, Volume= 4,038 cf, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
5,235	98	Paved parking, HSG B
5,182	96	Gravel surface, HSG B
987	61	>75% Grass cover, Good, HSG B
11,404	94	Weighted Average
6,169		54.10% Pervious Area
5,235		45.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-5:



Summary for Subcatchment E-6:

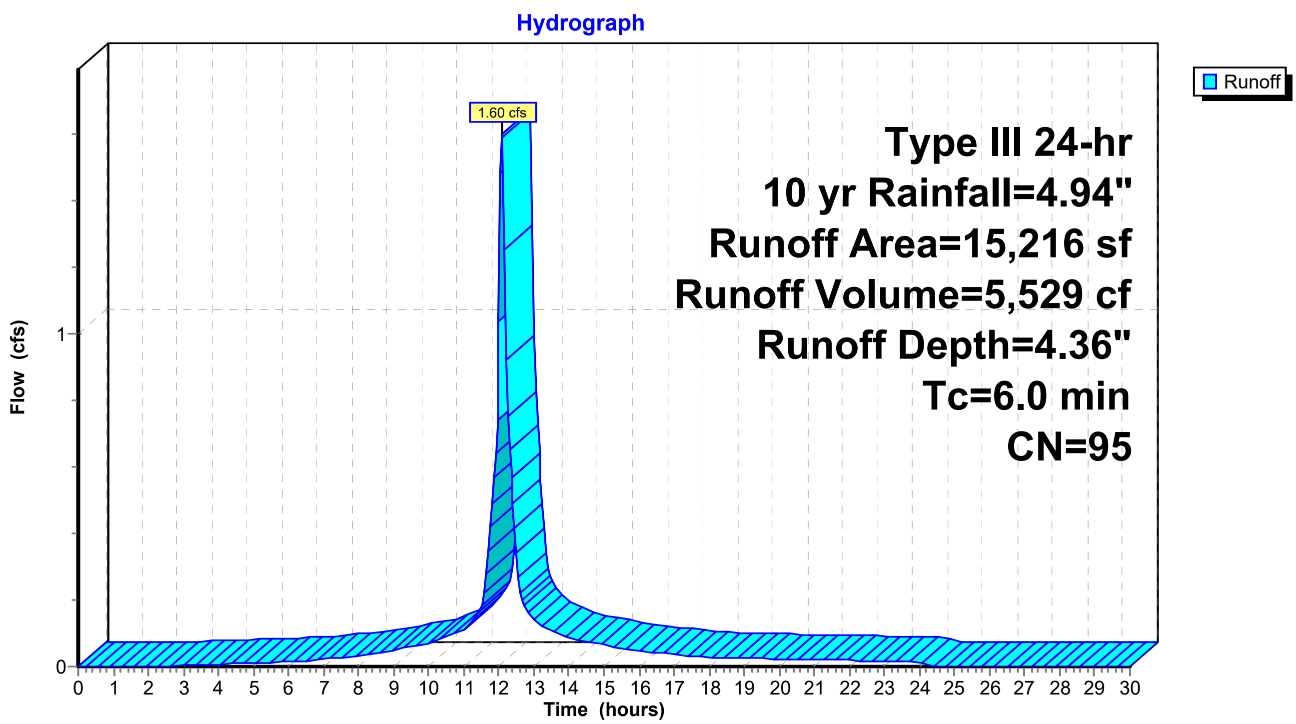
Runoff = 1.60 cfs @ 12.09 hrs, Volume= 5,529 cf, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

	Area (sf)	CN	Description
	11,492	98	Paved parking, HSG B
*	323	96	Rubble, HSG B
	2,416	96	Gravel surface, HSG B
	985	61	>75% Grass cover, Good, HSG B
	15,216	95	Weighted Average
	3,724		24.47% Pervious Area
	11,492		75.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-6:



Summary for Pond CB101:

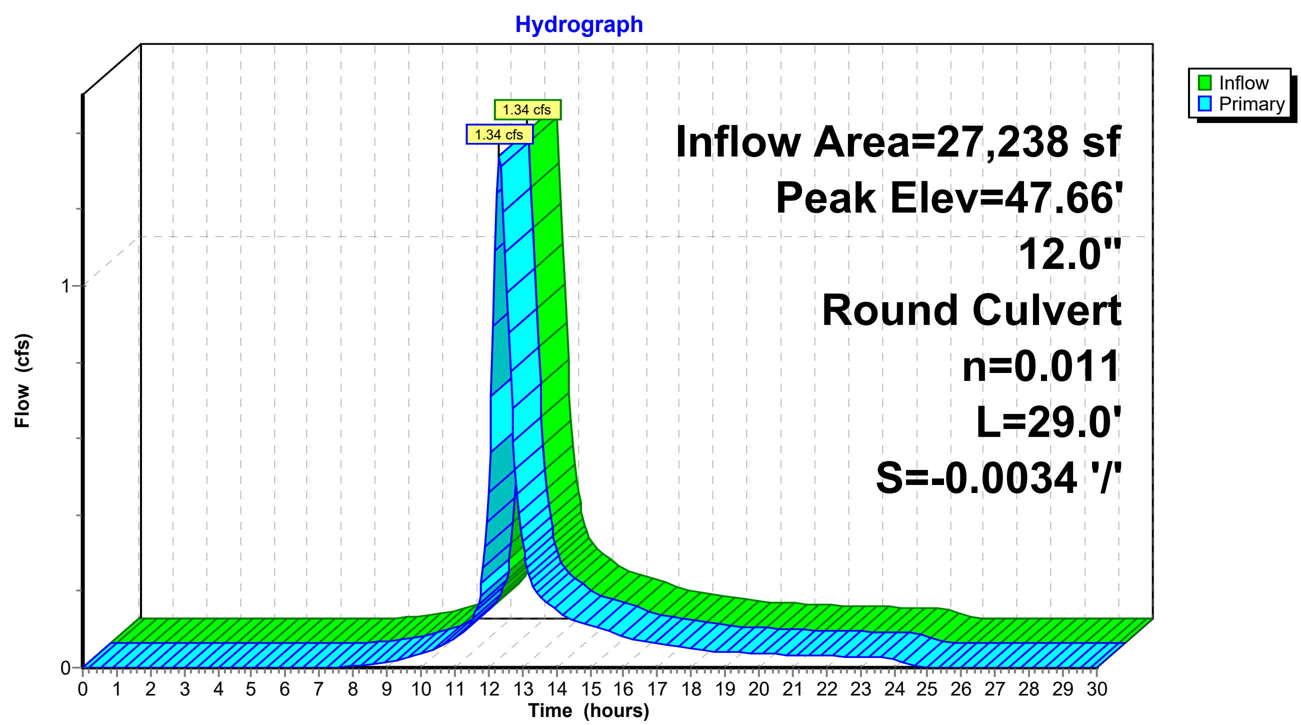
Inflow Area =	27,238 sf,	56.92% Impervious,	Inflow Depth = 2.93"	for 10 yr event
Inflow =	1.34 cfs @	12.33 hrs, Volume=	6,656 cf	
Outflow =	1.34 cfs @	12.33 hrs, Volume=	6,656 cf, Atten= 0%, Lag= 0.0 min	
Primary =	1.34 cfs @	12.33 hrs, Volume=	6,656 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.66' @ 12.20 hrs
Flood Elev= 49.06'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.50'	**12.0" Round Culvert** L= 29.0' Ke= 0.500 Inlet / Outlet Invert= 46.40' / 46.50' S= -0.0034 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.45 cfs @ 12.33 hrs HW=47.46' TW=47.31' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.45 cfs @ 1.87 fps)

Pond CB101:



Summary for Pond CB102:

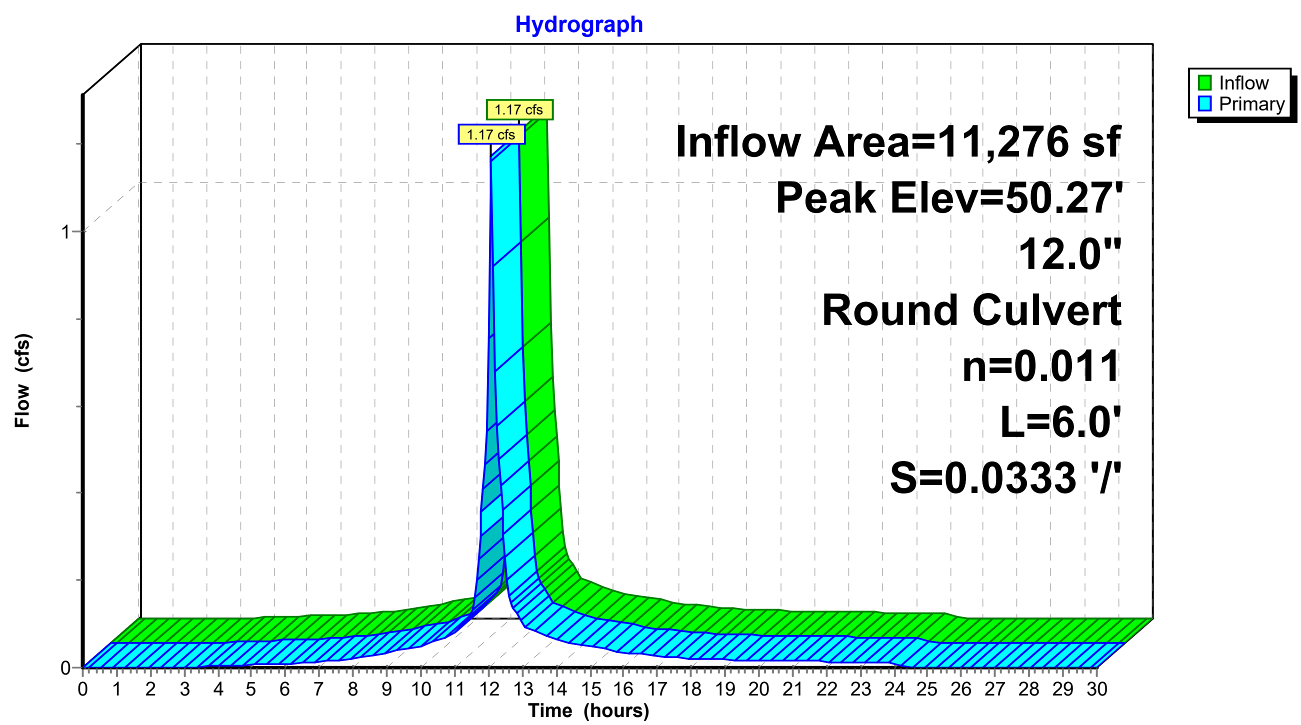
Inflow Area = 11,276 sf, 88.54% Impervious, Inflow Depth = 4.25" for 10 yr event
Inflow = 1.17 cfs @ 12.09 hrs, Volume= 3,992 cf
Outflow = 1.17 cfs @ 12.09 hrs, Volume= 3,992 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.17 cfs @ 12.09 hrs, Volume= 3,992 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 50.27' @ 12.09 hrs
Flood Elev= 49.07'

Device	Routing	Invert	Outlet Devices
#1	Primary	49.70'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 49.70' / 49.50' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.14 cfs @ 12.09 hrs HW=50.26' TW=47.39' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1.14 cfs @ 3.64 fps)

Pond CB102:



Summary for Pond CB103:

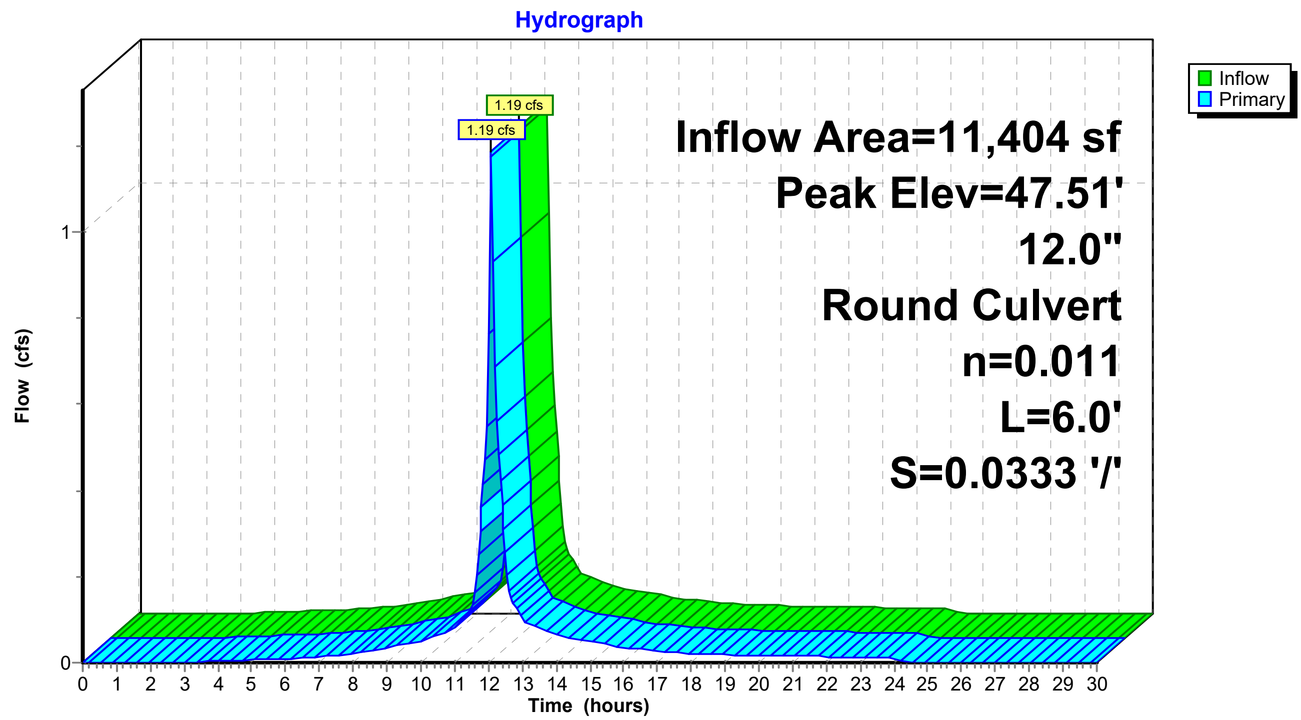
Inflow Area =	11,404 sf,	45.90% Impervious,	Inflow Depth = 4.25"	for 10 yr event
Inflow =	1.19 cfs @	12.09 hrs, Volume=	4,038 cf	
Outflow =	1.19 cfs @	12.09 hrs, Volume=	4,038 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.19 cfs @	12.09 hrs, Volume=	4,038 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.51' @ 12.12 hrs
Flood Elev= 49.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 46.90' / 46.70' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.97 cfs @ 12.09 hrs HW=47.49' TW=47.28' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.97 cfs @ 2.89 fps)

Pond CB103:



Summary for Pond CB104:

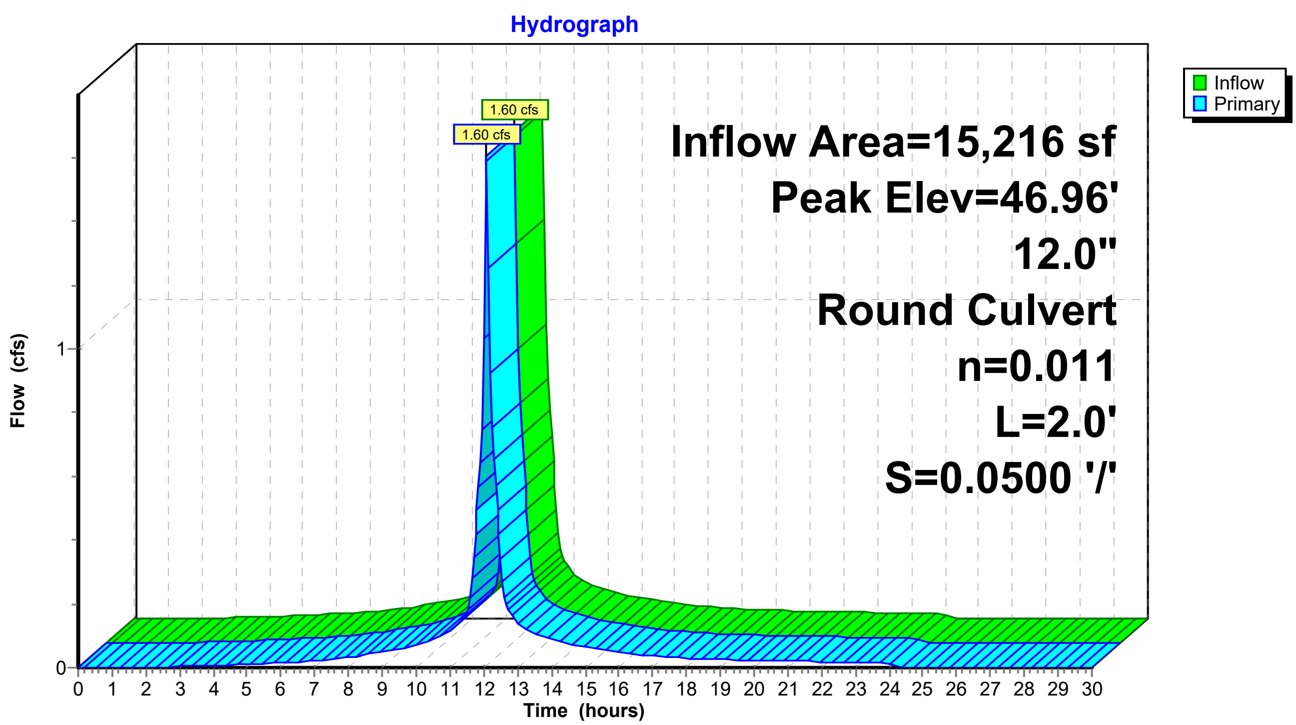
Inflow Area = 15,216 sf, 75.53% Impervious, Inflow Depth = 4.36" for 10 yr event
Inflow = 1.60 cfs @ 12.09 hrs, Volume= 5,529 cf
Outflow = 1.60 cfs @ 12.09 hrs, Volume= 5,529 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.60 cfs @ 12.09 hrs, Volume= 5,529 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.96' @ 12.09 hrs
Flood Elev= 48.93'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 2.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.10' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.56 cfs @ 12.09 hrs HW=46.94' TW=45.98' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.56 cfs @ 3.46 fps)

Pond CB104:



Summary for Pond DMH101:

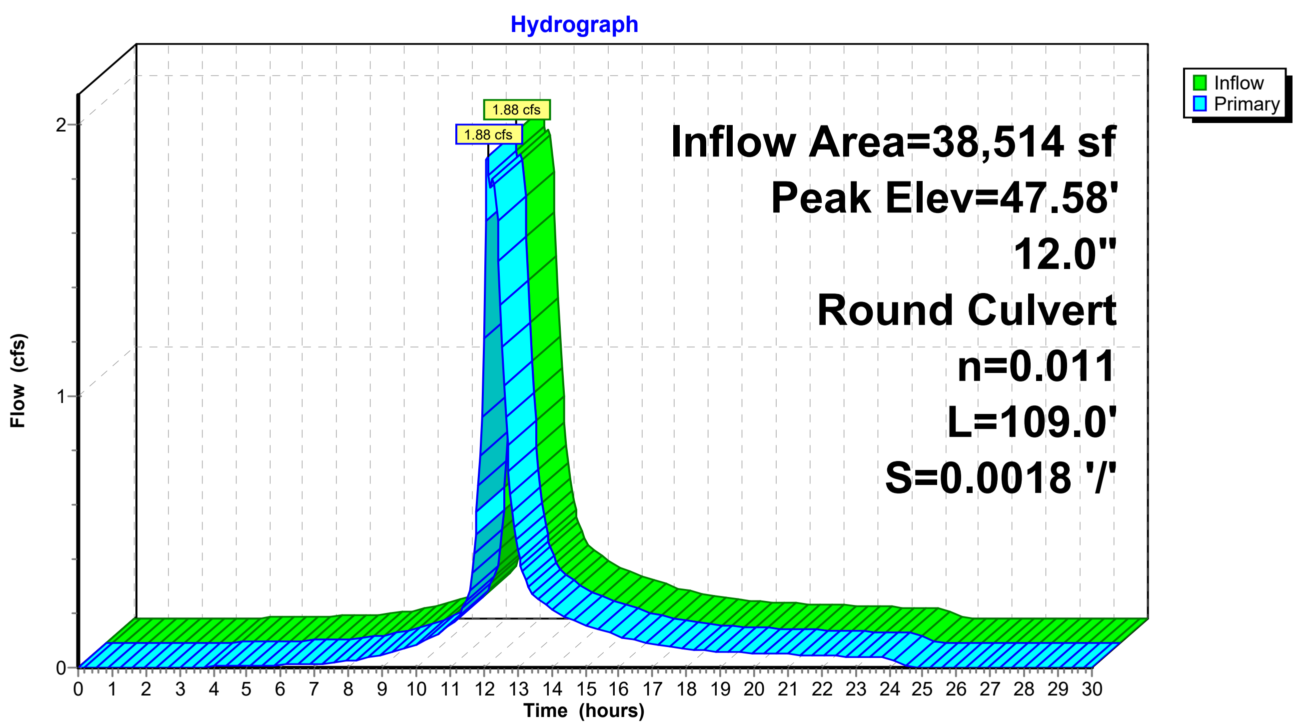
Inflow Area = 38,514 sf, 66.18% Impervious, Inflow Depth = 3.32" for 10 yr event
Inflow = 1.88 cfs @ 12.11 hrs, Volume= 10,648 cf
Outflow = 1.88 cfs @ 12.11 hrs, Volume= 10,648 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.88 cfs @ 12.11 hrs, Volume= 10,648 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.58' @ 12.15 hrs
Flood Elev= 49.94'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 109.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.00' S= 0.0018 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.72 cfs @ 12.11 hrs HW=47.49' TW=47.21' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.72 cfs @ 2.22 fps)

Pond DMH101:



Summary for Pond DMH102:

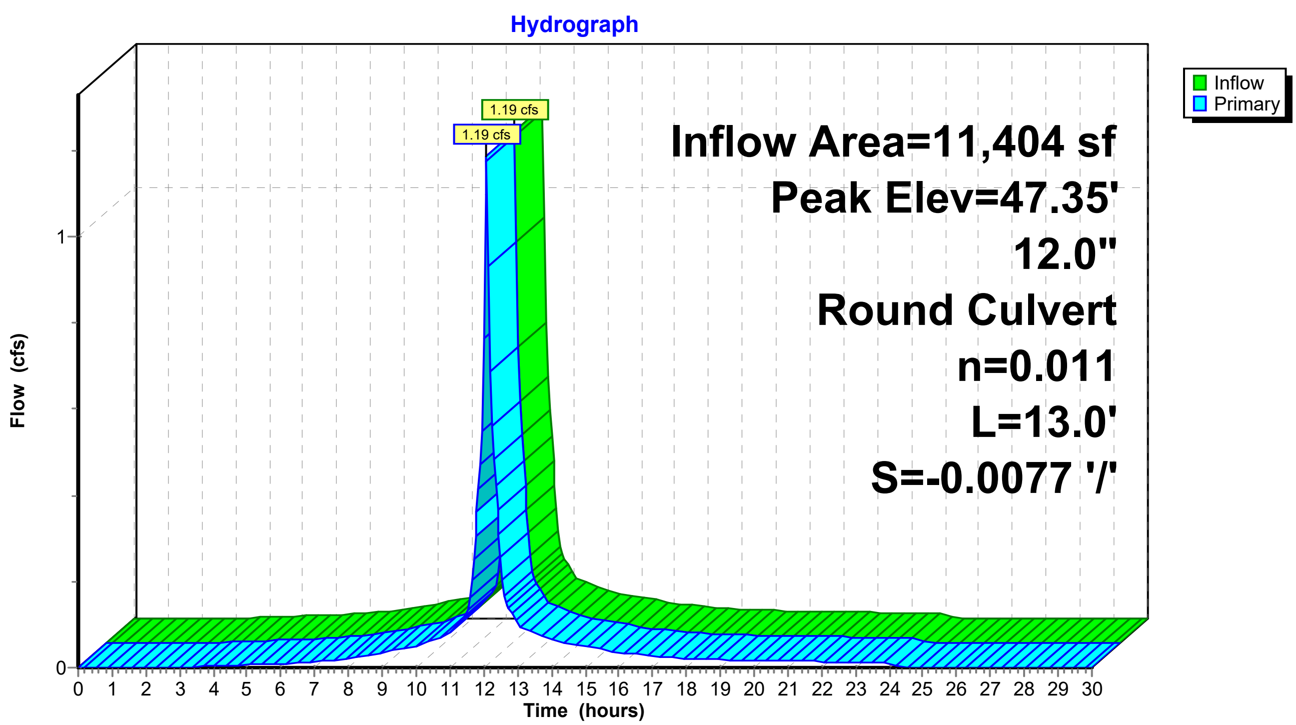
Inflow Area = 11,404 sf, 45.90% Impervious, Inflow Depth = 4.25" for 10 yr event
Inflow = 1.19 cfs @ 12.09 hrs, Volume= 4,038 cf
Outflow = 1.19 cfs @ 12.09 hrs, Volume= 4,038 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.19 cfs @ 12.09 hrs, Volume= 4,038 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.35' @ 12.14 hrs
Flood Elev= 49.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.60'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 46.50' / 46.60' S= -0.0077 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.67 cfs @ 12.09 hrs HW=47.28' TW=47.22' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.67 cfs @ 1.18 fps)

Pond DMH102:



Summary for Pond DMH103:

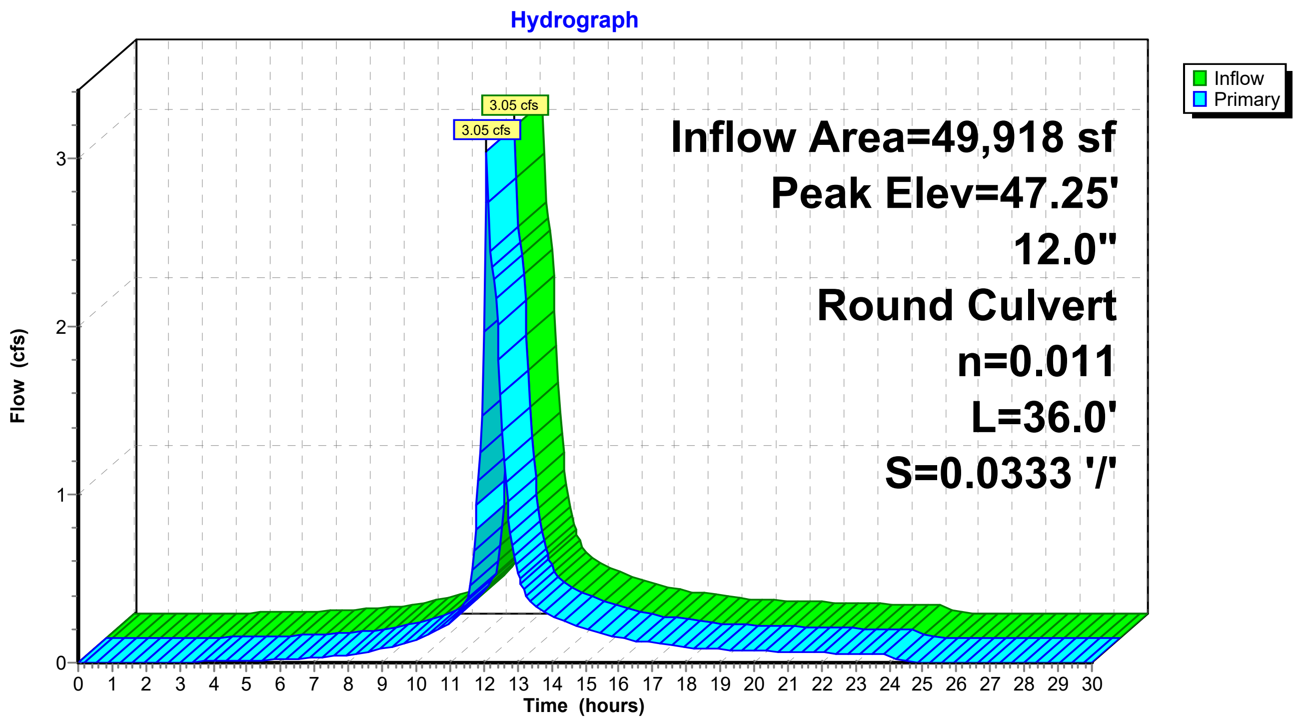
Inflow Area = 49,918 sf, 61.55% Impervious, Inflow Depth = 3.53" for 10 yr event
Inflow = 3.05 cfs @ 12.10 hrs, Volume= 14,686 cf
Outflow = 3.05 cfs @ 12.10 hrs, Volume= 14,686 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.05 cfs @ 12.10 hrs, Volume= 14,686 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.25' @ 12.10 hrs
Flood Elev= 50.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.10'	**12.0" Round Culvert** L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 46.10' / 44.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.05 cfs @ 12.10 hrs HW=47.25' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.05 cfs @ 3.88 fps)

Pond DMH103:



Summary for Pond DMH104:

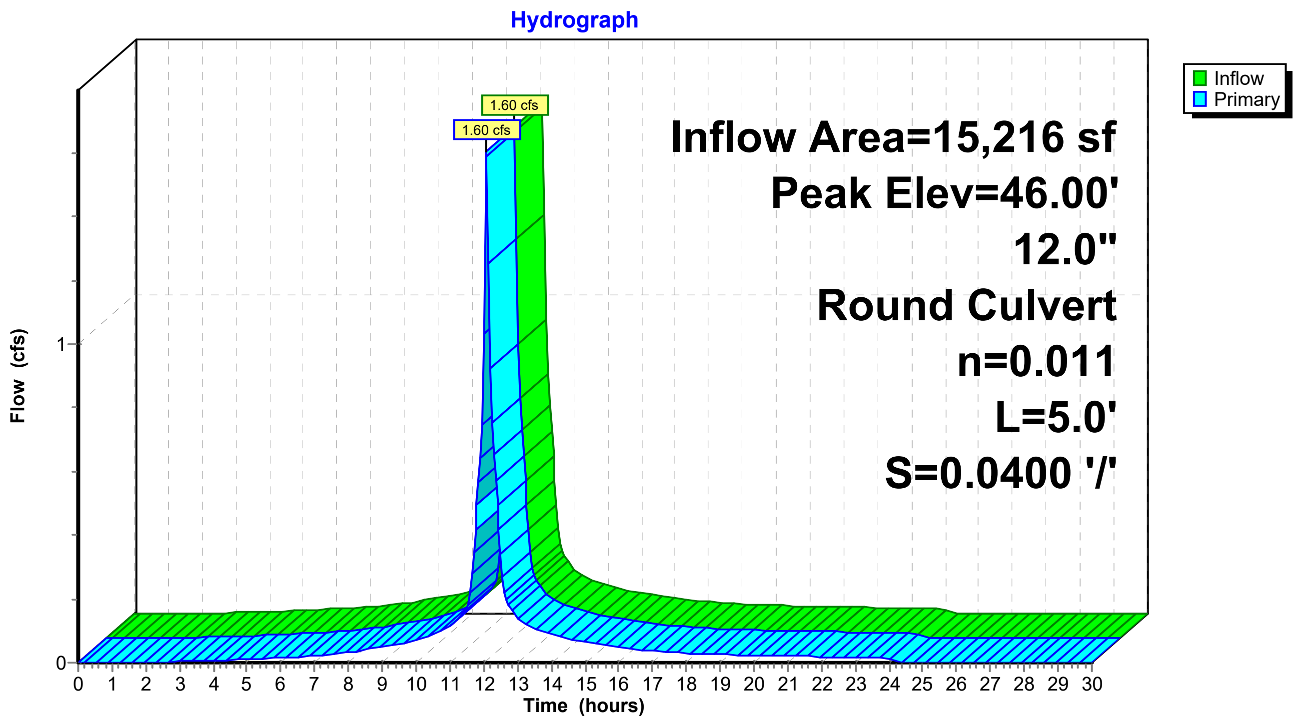
Inflow Area = 15,216 sf, 75.53% Impervious, Inflow Depth = 4.36" for 10 yr event
Inflow = 1.60 cfs @ 12.09 hrs, Volume= 5,529 cf
Outflow = 1.60 cfs @ 12.09 hrs, Volume= 5,529 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.60 cfs @ 12.09 hrs, Volume= 5,529 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.00' @ 12.09 hrs
Flood Elev= 49.08'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.30'	**12.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 45.30' / 45.10' S= 0.0400 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.56 cfs @ 12.09 hrs HW=45.98' TW=0.00' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.56 cfs @ 3.85 fps)

Pond DMH104:

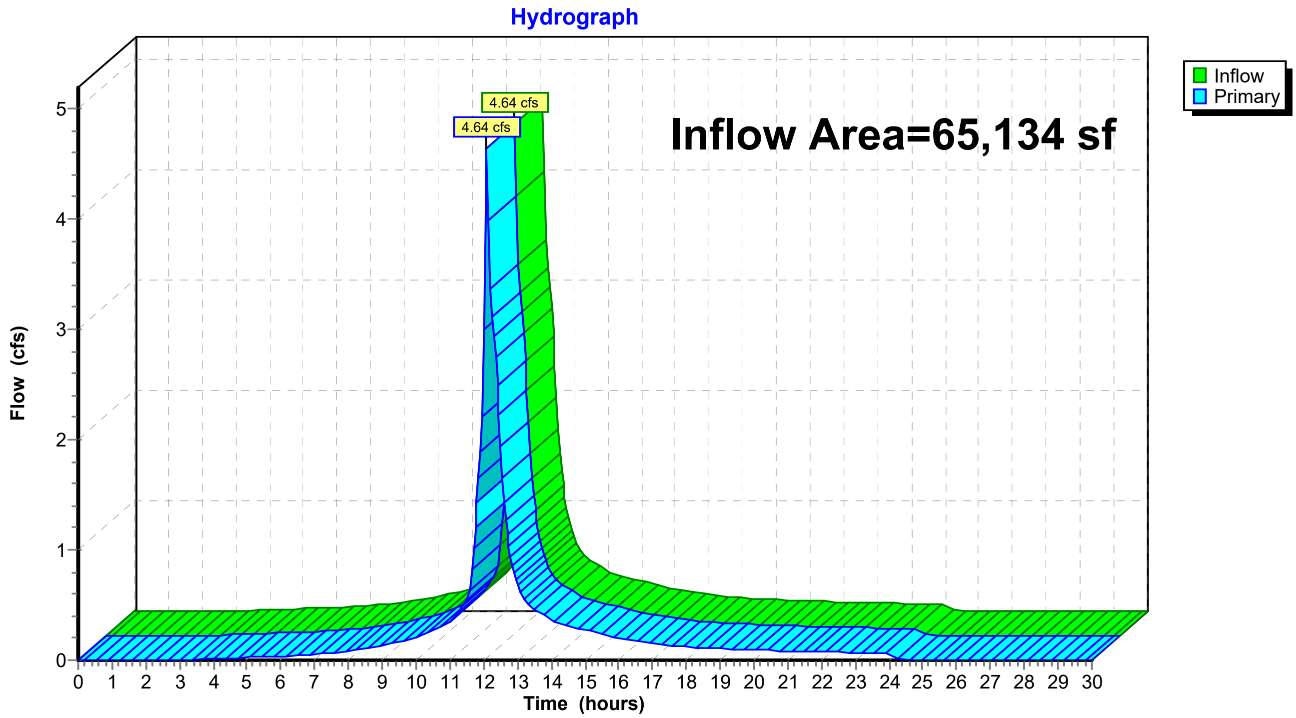


Summary for Pond DMH105:

Inflow Area =	65,134 sf, 64.81% Impervious,	Inflow Depth = 3.72"	for 10 yr event	
Inflow =	4.64 cfs @ 12.09 hrs,	Volume=	20,215 cf	
Primary =	4.64 cfs @ 12.09 hrs,	Volume=	20,215 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond DMH105:



Summary for Pond Pd1:

Inflow Area = 123,196 sf, 3.61% Impervious, Inflow Depth = 1.27" for 10 yr event
Inflow = 2.21 cfs @ 12.43 hrs, Volume= 12,999 cf
Outflow = 1.35 cfs @ 12.77 hrs, Volume= 12,999 cf, Atten= 39%, Lag= 20.7 min
Discarded = 1.35 cfs @ 12.77 hrs, Volume= 12,999 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.98' @ 12.77 hrs Surf.Area= 8,883 sf Storage= 2,215 cf

Plug-Flow detention time= 21.3 min calculated for 12,978 cf (100% of inflow)
Center-of-Mass det. time= 21.4 min (917.1 - 895.8)

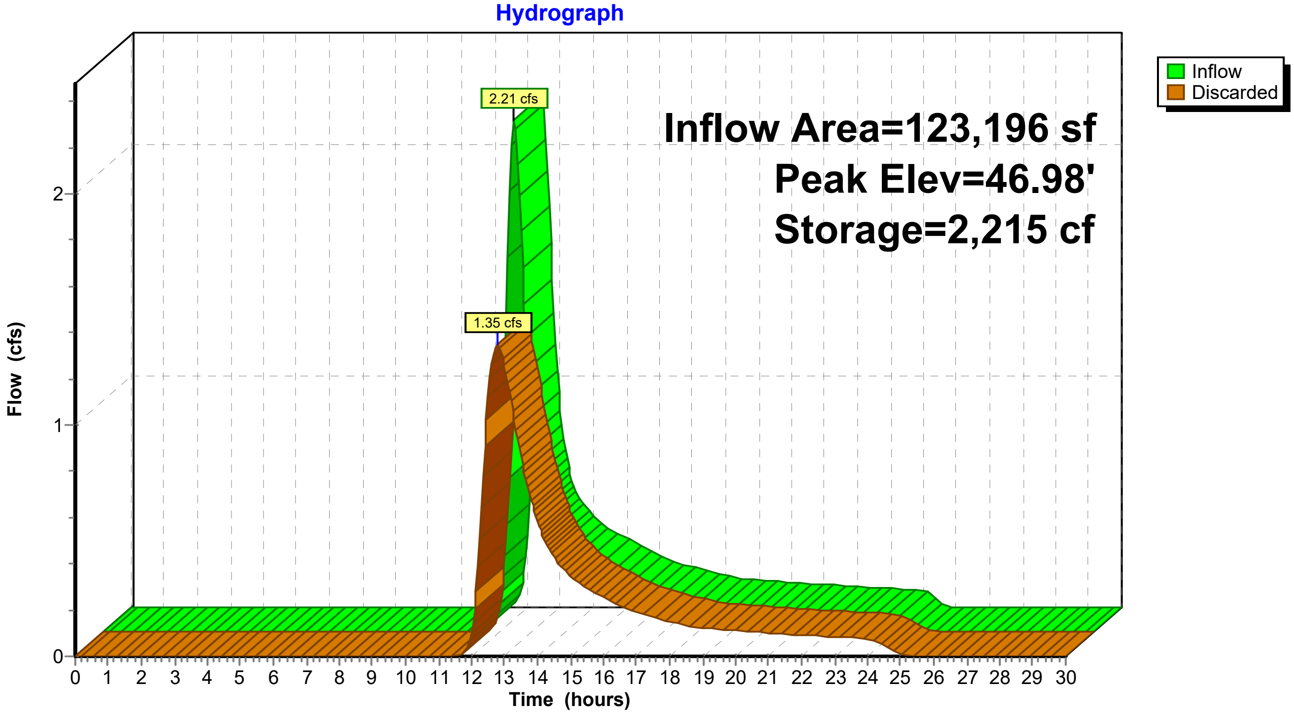
Volume	Invert	Avail.Storage	Storage Description
#1	46.50'	11,412 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.50	1,440	159.0	0	0	1,440
47.00	9,376	562.0	2,415	2,415	24,563
47.50	28,312	963.0	8,997	11,412	73,228

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.50'	**7.825 in/hr Exfiltration over Surface area above 46.50'** Excluded Surface area = 1,440 sf

Discarded OutFlow Max=1.35 cfs @ 12.77 hrs HW=46.98' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 1.35 cfs)

Pond Pd1:

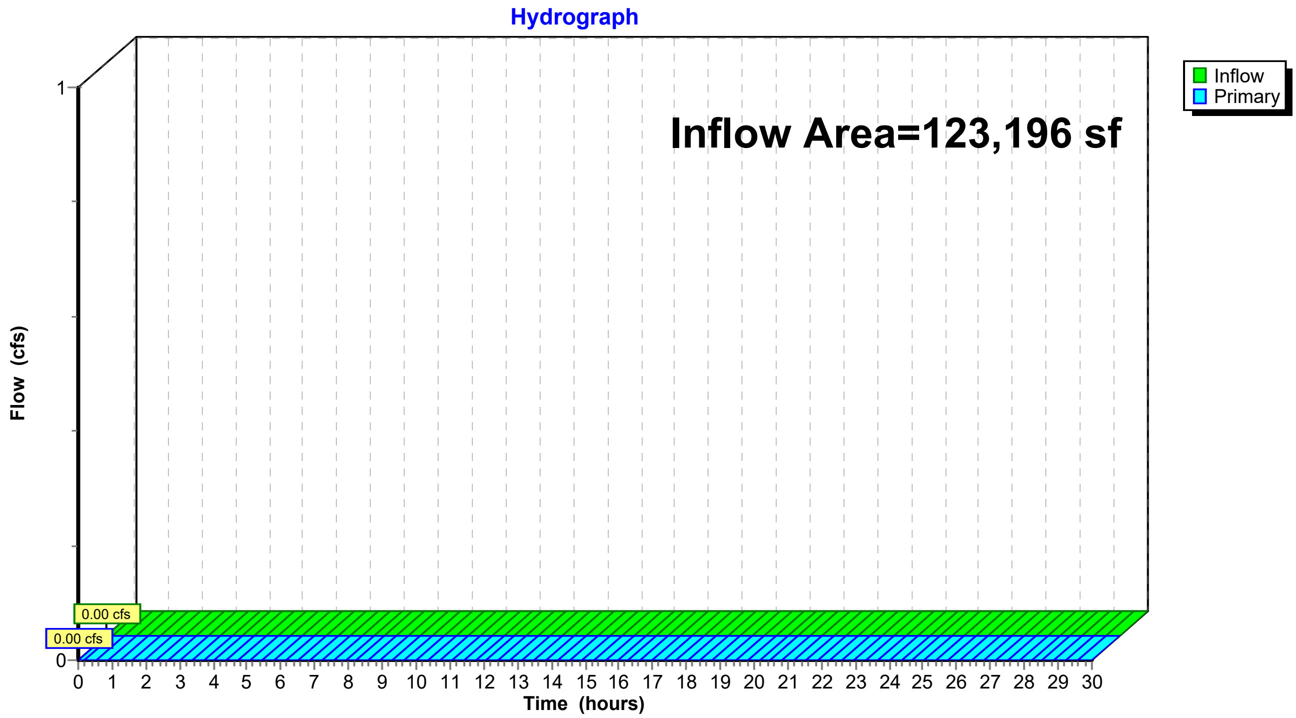

Hydrograph
2.21 cfs
1.35 cfs
Inflow
Discarded
Inflow Area=123,196 sf
Peak Elev=46.98'
Storage=2,215 cf
Flow (cfs)
0
1
2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

Summary for Link POI 1: Onsite Infiltration East

Inflow Area =	123,196 sf,	3.61% Impervious,	Inflow Depth = 0.00"	for 10 yr event	
Inflow =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 1: Onsite Infiltration East

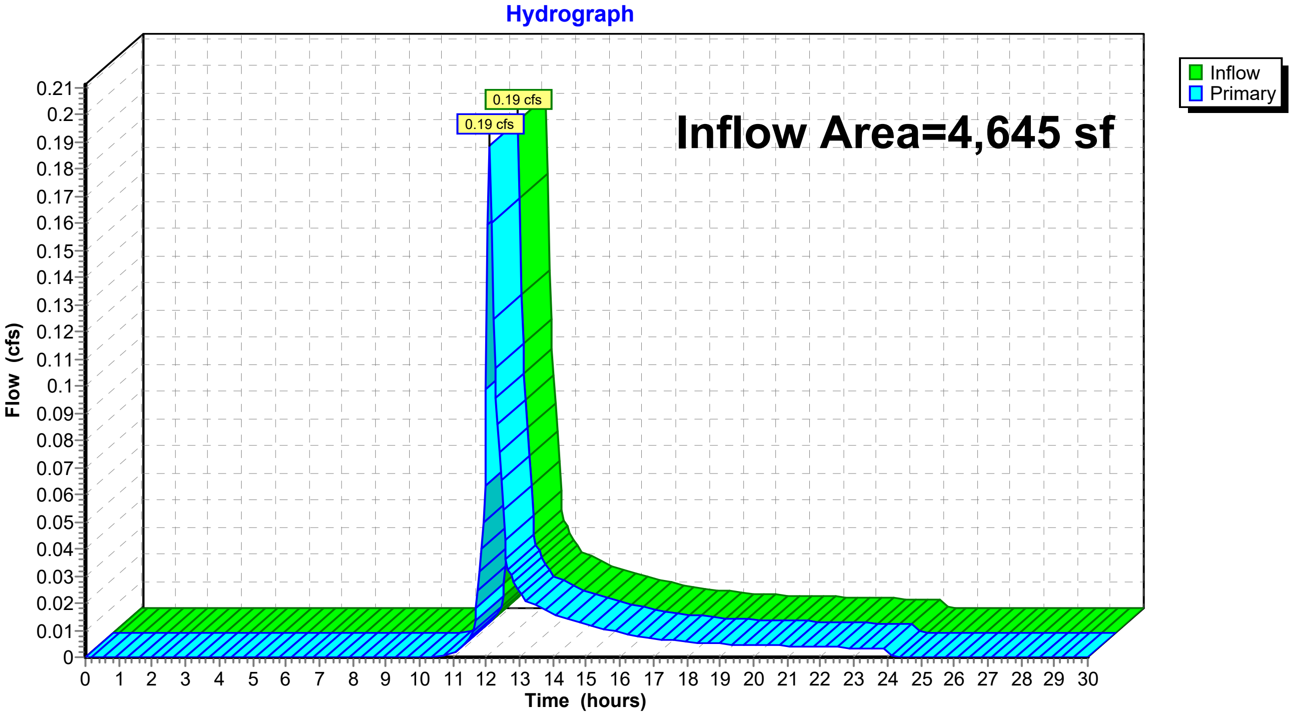


Summary for Link POI 2: Offsite at Southeast Property Line

Inflow Area =	4,645 sf,	0.00% Impervious,	Inflow Depth = 1.61"	for 10 yr event
Inflow =	0.19 cfs @	12.10 hrs, Volume=	625 cf	
Primary =	0.19 cfs @	12.10 hrs, Volume=	625 cf,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 2: Offsite at Southeast Property Line

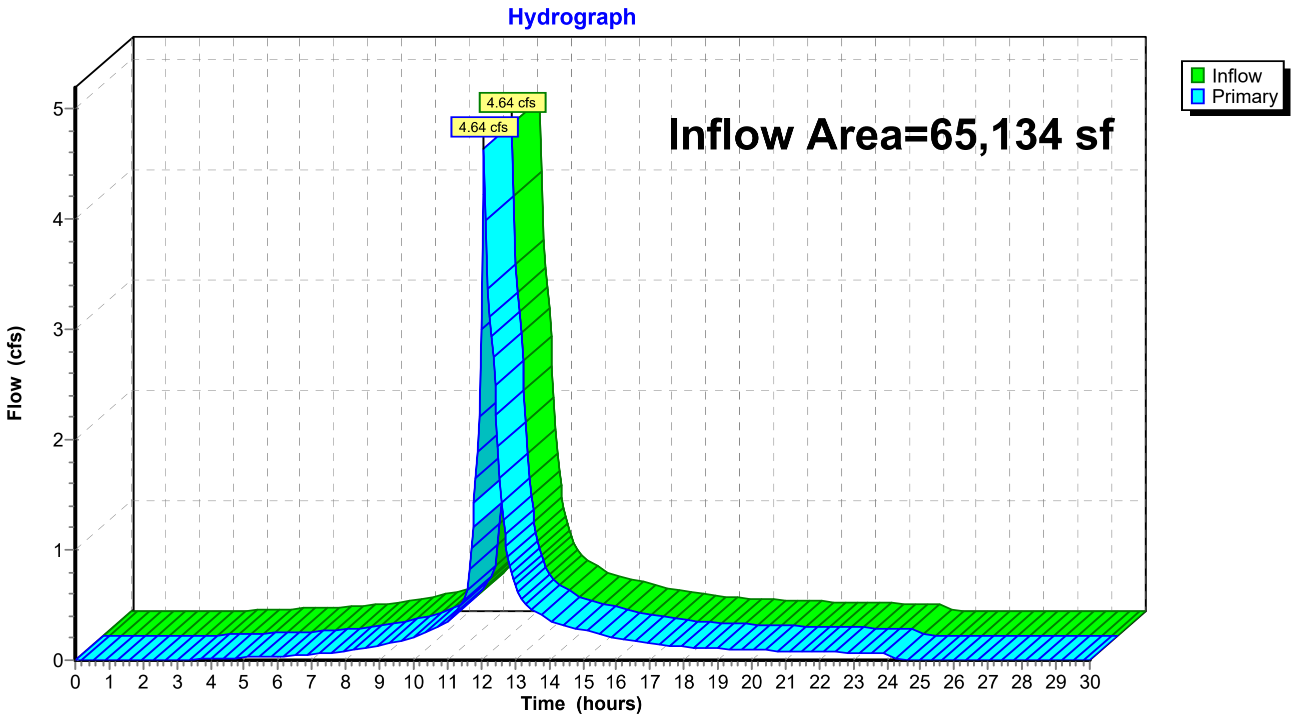


Summary for Link POI 3: Cranberry Highway Closed Drainage System

Inflow Area = 65,134 sf, 64.81% Impervious, Inflow Depth = 3.72" for 10 yr event
Inflow = 4.64 cfs @ 12.09 hrs, Volume= 20,215 cf
Primary = 4.64 cfs @ 12.09 hrs, Volume= 20,215 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 3: Cranberry Highway Closed Drainage System



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentE-1: Runoff Area=123,196 sf 3.61% Impervious Runoff Depth=2.03"
Flow Length=416' Tc=27.0 min CN=60 Runoff=3.77 cfs 20,810 cf

SubcatchmentE-2: Runoff Area=4,645 sf 0.00% Impervious Runoff Depth=2.47"
Tc=6.0 min CN=65 Runoff=0.30 cfs 955 cf

SubcatchmentE-3: Runoff Area=27,238 sf 56.92% Impervious Runoff Depth=4.03"
Flow Length=233' Tc=24.0 min CN=81 Runoff=1.83 cfs 9,147 cf

SubcatchmentE-4: Runoff Area=11,276 sf 88.54% Impervious Runoff Depth=5.46"
Tc=6.0 min CN=94 Runoff=1.48 cfs 5,126 cf

SubcatchmentE-5: Runoff Area=11,404 sf 45.90% Impervious Runoff Depth=5.46"
Tc=6.0 min CN=94 Runoff=1.50 cfs 5,184 cf

SubcatchmentE-6: Runoff Area=15,216 sf 75.53% Impervious Runoff Depth=5.57"
Tc=6.0 min CN=95 Runoff=2.02 cfs 7,063 cf

Pond CB101: Peak Elev=48.43' Inflow=1.83 cfs 9,147 cf
12.0" Round Culvert n=0.011 L=29.0' S=-0.0034 '/' Outflow=1.83 cfs 9,147 cf

Pond CB102: Peak Elev=50.36' Inflow=1.48 cfs 5,126 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=1.48 cfs 5,126 cf

Pond CB103: Peak Elev=47.85' Inflow=1.50 cfs 5,184 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=1.50 cfs 5,184 cf

Pond CB104: Peak Elev=47.08' Inflow=2.02 cfs 7,063 cf
12.0" Round Culvert n=0.011 L=2.0' S=0.0500 '/' Outflow=2.02 cfs 7,063 cf

Pond DMH101: Peak Elev=48.27' Inflow=2.49 cfs 14,273 cf
12.0" Round Culvert n=0.011 L=109.0' S=0.0018 '/' Outflow=2.49 cfs 14,273 cf

Pond DMH102: Peak Elev=47.79' Inflow=1.50 cfs 5,184 cf
12.0" Round Culvert n=0.011 L=13.0' S=-0.0077 '/' Outflow=1.50 cfs 5,184 cf

Pond DMH103: Peak Elev=47.69' Inflow=3.96 cfs 19,457 cf
12.0" Round Culvert n=0.011 L=36.0' S=0.0333 '/' Outflow=3.96 cfs 19,457 cf

Pond DMH104: Peak Elev=46.11' Inflow=2.02 cfs 7,063 cf
12.0" Round Culvert n=0.011 L=5.0' S=0.0400 '/' Outflow=2.02 cfs 7,063 cf

Pond DMH105: Inflow=5.96 cfs 26,521 cf
Primary=5.96 cfs 26,521 cf

Pond Pd1: Peak Elev=47.14' Storage=4,033 cf Inflow=3.77 cfs 20,810 cf
Outflow=2.22 cfs 20,810 cf

Link POI 1: Onsite Infiltration East Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link POI 2: Offsite at Southeast Property Line Inflow=0.30 cfs 955 cf
Primary=0.30 cfs 955 cf

Link POI 3: Cranberry Highway Closed Drainage System Inflow=5.96 cfs 26,521 cf
Primary=5.96 cfs 26,521 cf

Total Runoff Area = 192,975 sf Runoff Volume = 48,286 cf Average Runoff Depth = 3.00"
75.82% Pervious = 146,311 sf 24.18% Impervious = 46,664 sf

Summary for Subcatchment E-1:

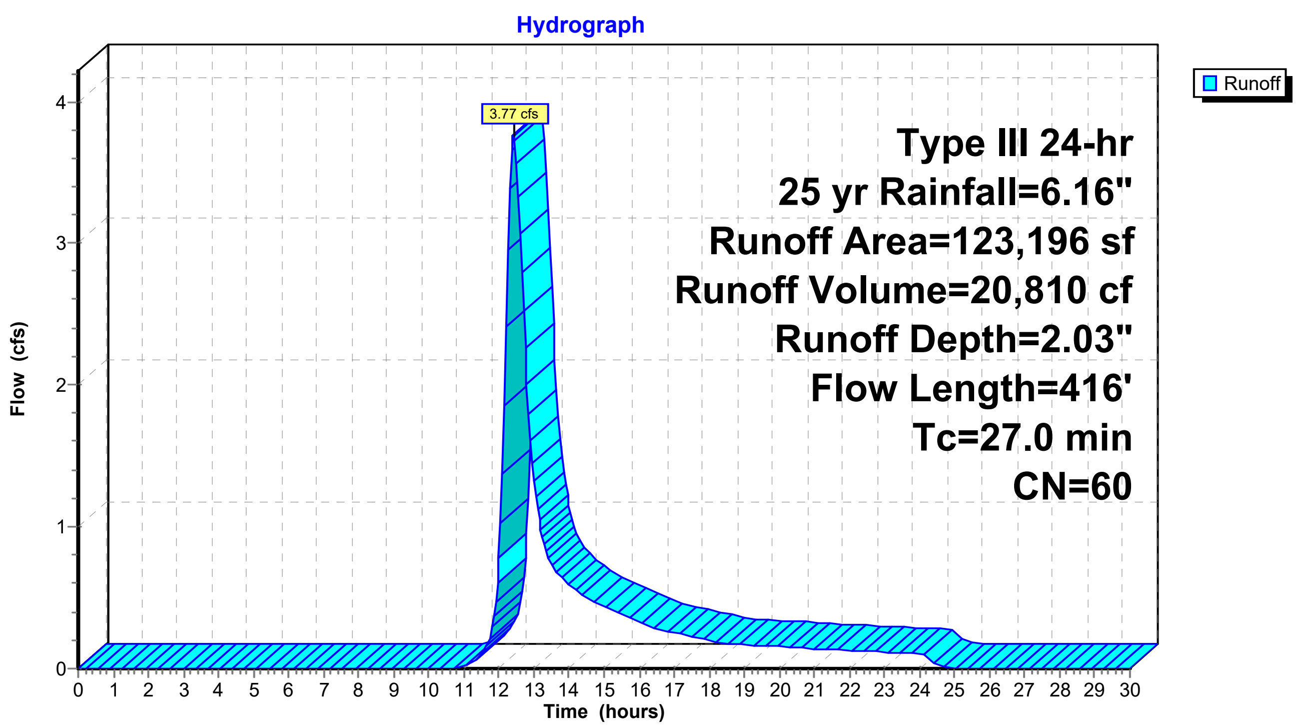
Runoff = 3.77 cfs @ 12.41 hrs, Volume= 20,810 cf, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

	Area (sf)	CN	Description
	84,532	55	Woods, Good, HSG B
	3,249	98	Roofs, HSG B
	1,200	98	Paved parking, HSG B
*	3,560	96	Rubble, HSG B
	3,322	96	Gravel surface, HSG B
	27,333	61	>75% Grass cover, Good, HSG B
	123,196	60	Weighted Average
	118,747		96.39% Pervious Area
	4,449		3.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	50	0.0100	0.05		**Sheet Flow, Woods, 50', 1%** Woods: Light underbrush n= 0.400 P2= 3.35"
11.1	366	0.0120	0.55		**Shallow Concentrated Flow, Woods, 366', 1.2%** Woodland Kv= 5.0 fps
27.0	416	Total			

Subcatchment E-1:



Summary for Subcatchment E-2:

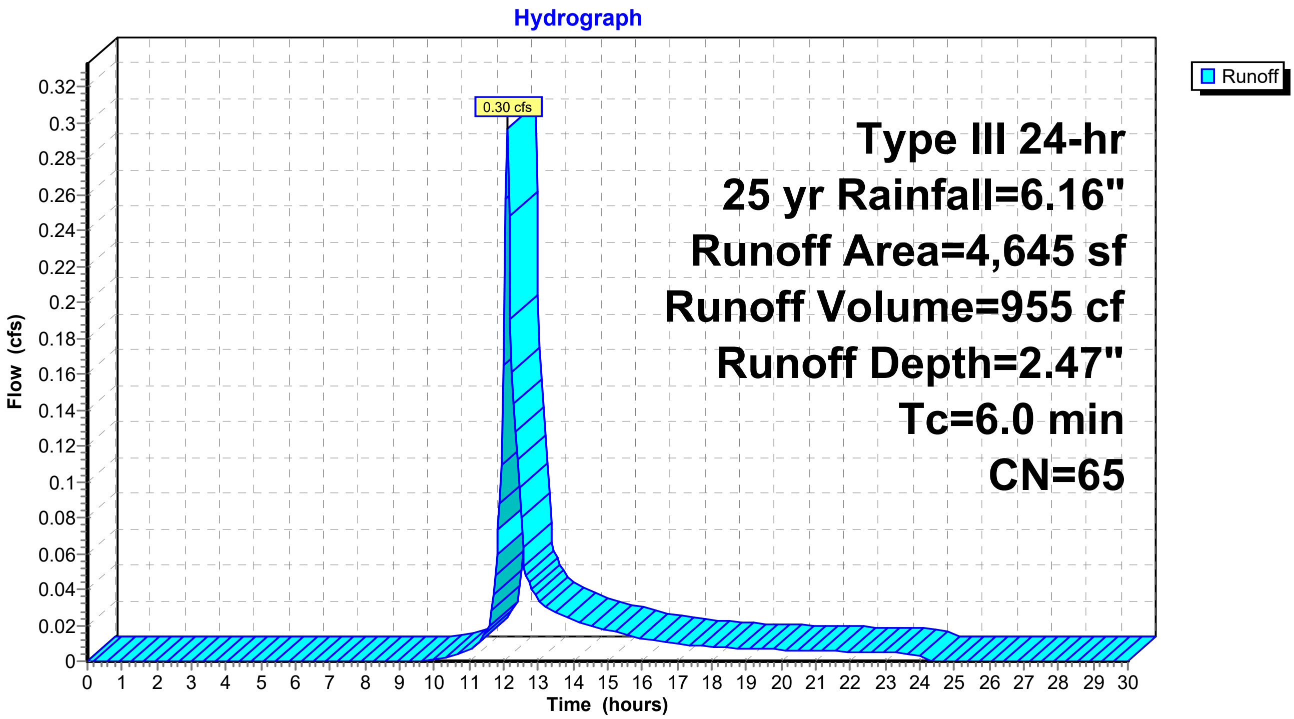
Runoff = 0.30 cfs @ 12.10 hrs, Volume= 955 cf, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

	Area (sf)	CN	Description
	923	55	Woods, Good, HSG B
	379	96	Gravel surface, HSG B
*	363	96	Rubble, HSG B
	2,980	61	>75% Grass cover, Good, HSG B
	4,645	65	Weighted Average
	4,645		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-2:



Summary for Subcatchment E-3:

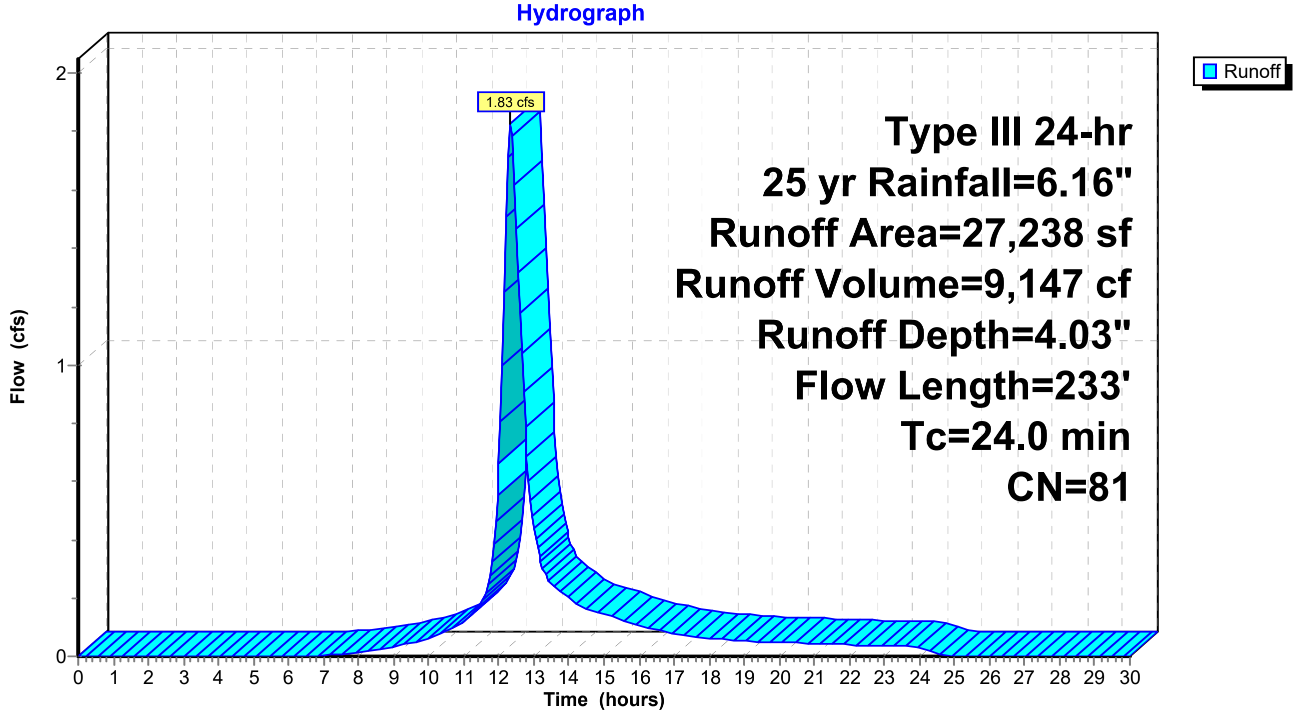
Runoff = 1.83 cfs @ 12.33 hrs, Volume= 9,147 cf, Depth= 4.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
3,417	55	Woods, Good, HSG B
2,297	98	Roofs, HSG B
13,207	98	Paved parking, HSG B
8,317	61	>75% Grass cover, Good, HSG B
27,238	81	Weighted Average
11,734		43.08% Pervious Area
15,504		56.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	50	0.0050	0.04		**Sheet Flow, Woods, 50', 0.5%** Woods: Light underbrush n= 0.400 P2= 3.35"
0.2	5	0.0050	0.35		**Shallow Concentrated Flow, Woods, 5', 0.5%** Woodland Kv= 5.0 fps
1.1	57	0.0150	0.86		**Shallow Concentrated Flow, Grass, 57', 1.5%** Short Grass Pasture Kv= 7.0 fps
0.6	34	0.0020	0.91		**Shallow Concentrated Flow, Pavement, 34', 0.2%** Paved Kv= 20.3 fps
0.6	21	0.0080	0.63		**Shallow Concentrated Flow, Grass, 21', 0.8%** Short Grass Pasture Kv= 7.0 fps
0.5	66	0.0100	2.03		**Shallow Concentrated Flow, Pavement, 66', 1%** Paved Kv= 20.3 fps
24.0	233	Total			

Subcatchment E-3:



Summary for Subcatchment E-4:

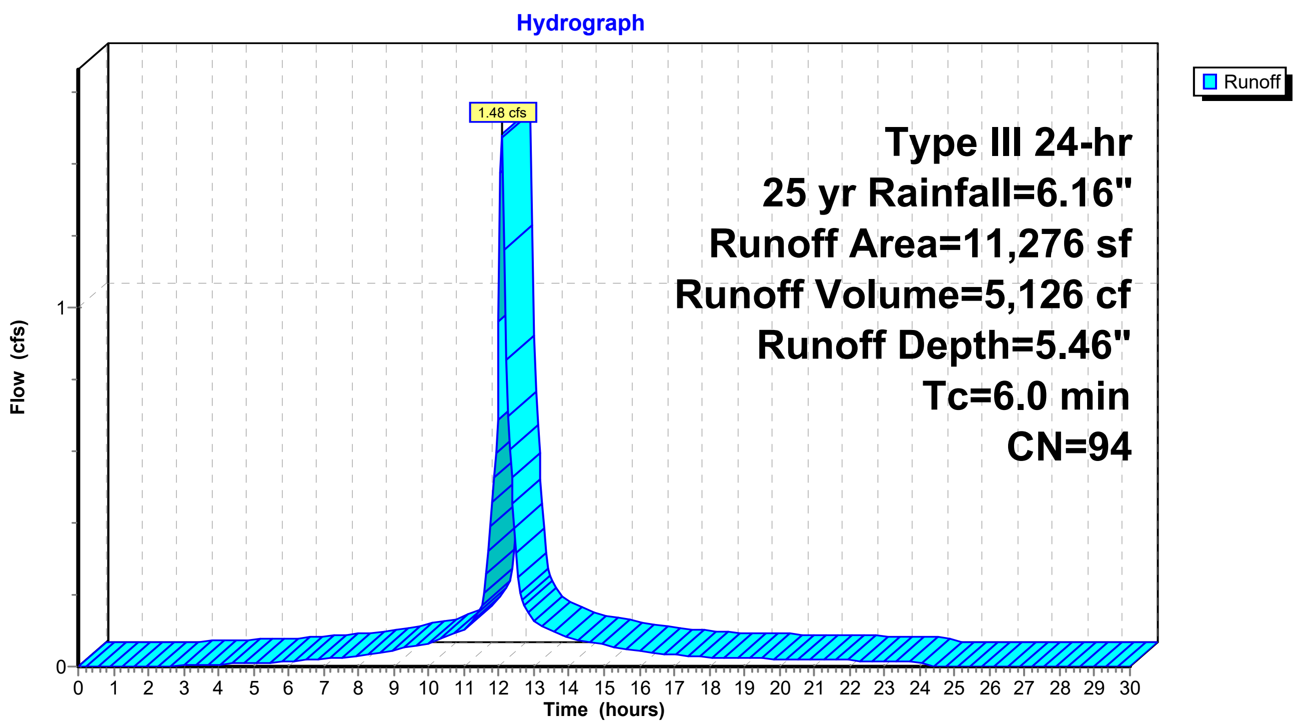
Runoff = 1.48 cfs @ 12.09 hrs, Volume= 5,126 cf, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
2,129	98	Roofs, HSG B
7,855	98	Paved parking, HSG B
208	96	Gravel surface, HSG B
1,084	61	>75% Grass cover, Good, HSG B
11,276	94	Weighted Average
1,292		11.46% Pervious Area
9,984		88.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-4:



Summary for Subcatchment E-5:

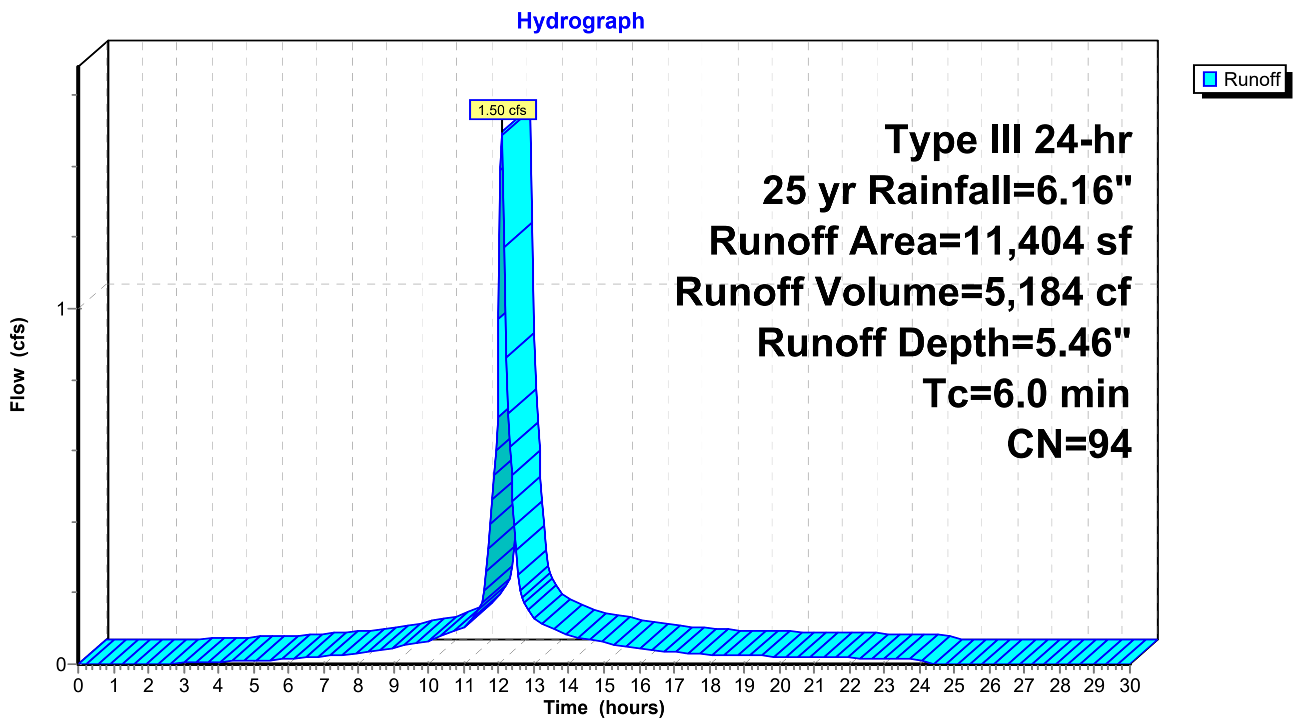
Runoff = 1.50 cfs @ 12.09 hrs, Volume= 5,184 cf, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
5,235	98	Paved parking, HSG B
5,182	96	Gravel surface, HSG B
987	61	>75% Grass cover, Good, HSG B
11,404	94	Weighted Average
6,169		54.10% Pervious Area
5,235		45.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-5:



Summary for Subcatchment E-6:

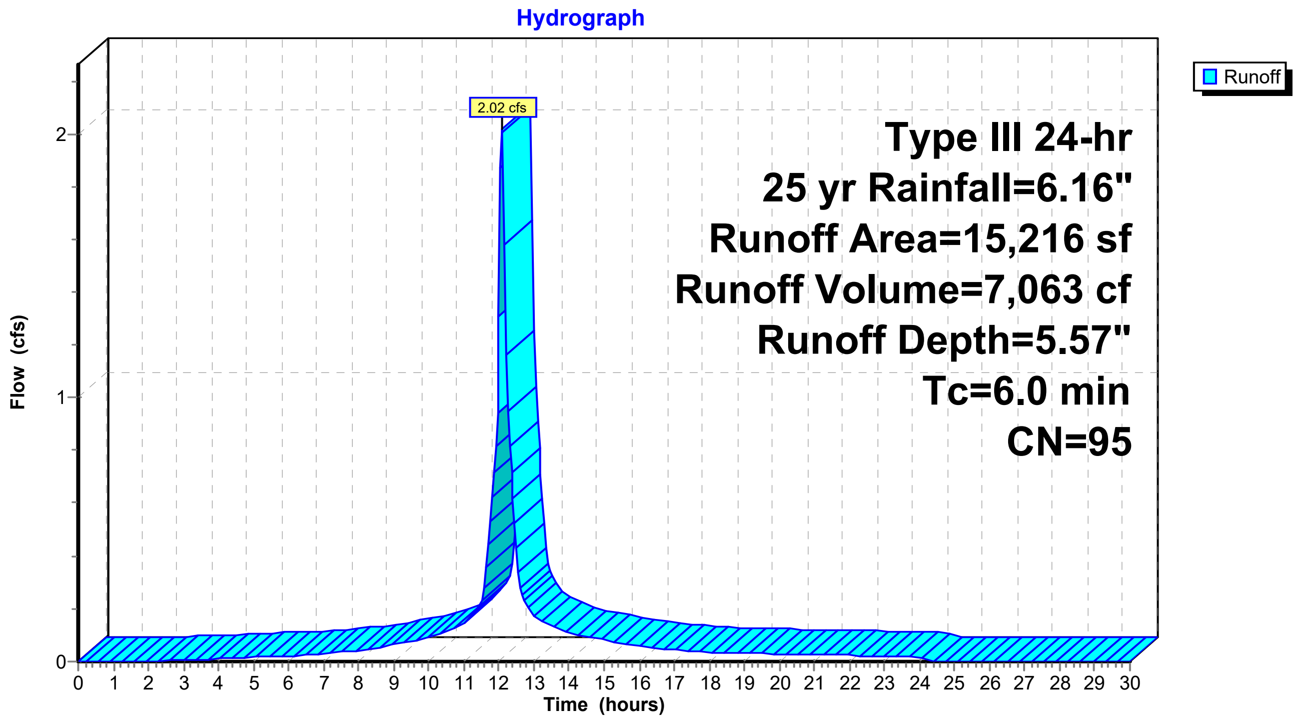
Runoff = 2.02 cfs @ 12.09 hrs, Volume= 7,063 cf, Depth= 5.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

	Area (sf)	CN	Description
	11,492	98	Paved parking, HSG B
*	323	96	Rubble, HSG B
	2,416	96	Gravel surface, HSG B
	985	61	>75% Grass cover, Good, HSG B
	15,216	95	Weighted Average
	3,724		24.47% Pervious Area
	11,492		75.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-6:



Summary for Pond CB101:

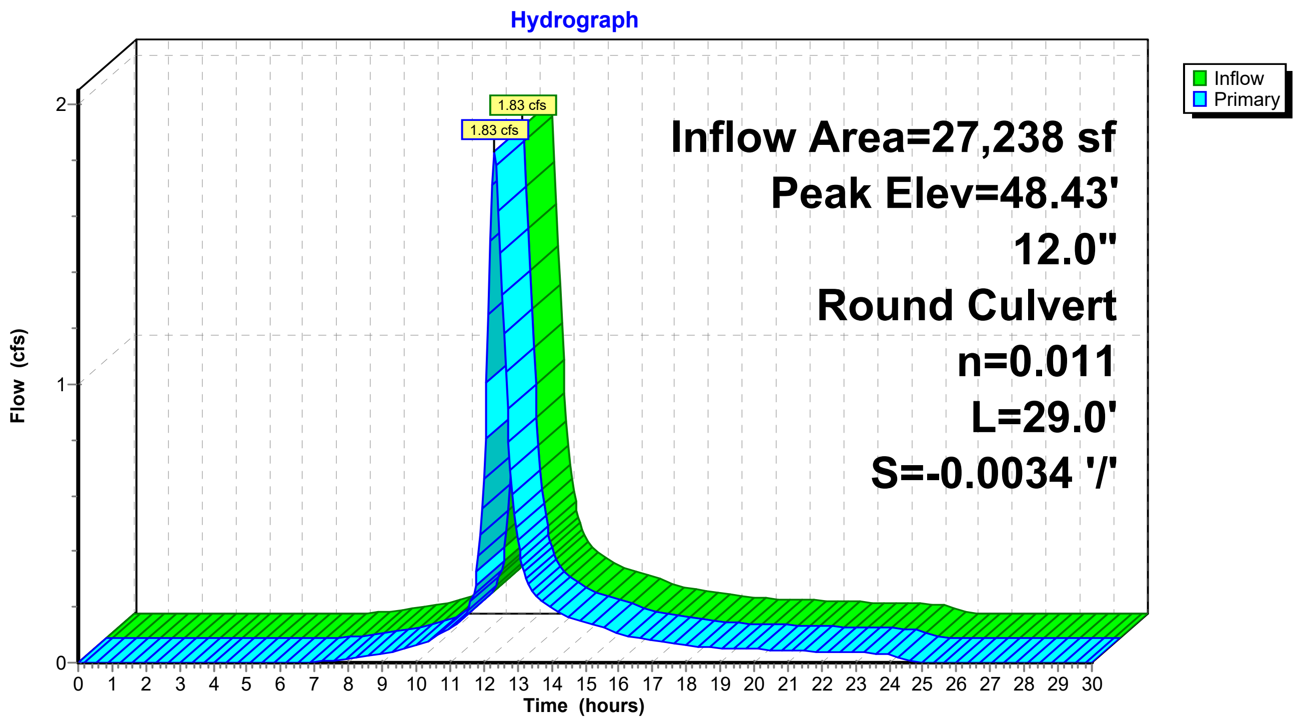
Inflow Area = 27,238 sf, 56.92% Impervious, Inflow Depth = 4.03" for 25 yr event
Inflow = 1.83 cfs @ 12.33 hrs, Volume= 9,147 cf
Outflow = 1.83 cfs @ 12.33 hrs, Volume= 9,147 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.83 cfs @ 12.33 hrs, Volume= 9,147 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.43' @ 12.20 hrs
Flood Elev= 49.06'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.50'	**12.0" Round Culvert** L= 29.0' Ke= 0.500 Inlet / Outlet Invert= 46.40' / 46.50' S= -0.0034 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.04 cfs @ 12.33 hrs HW=48.12' TW=47.82' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.04 cfs @ 2.60 fps)

Pond CB101:



Summary for Pond CB102:

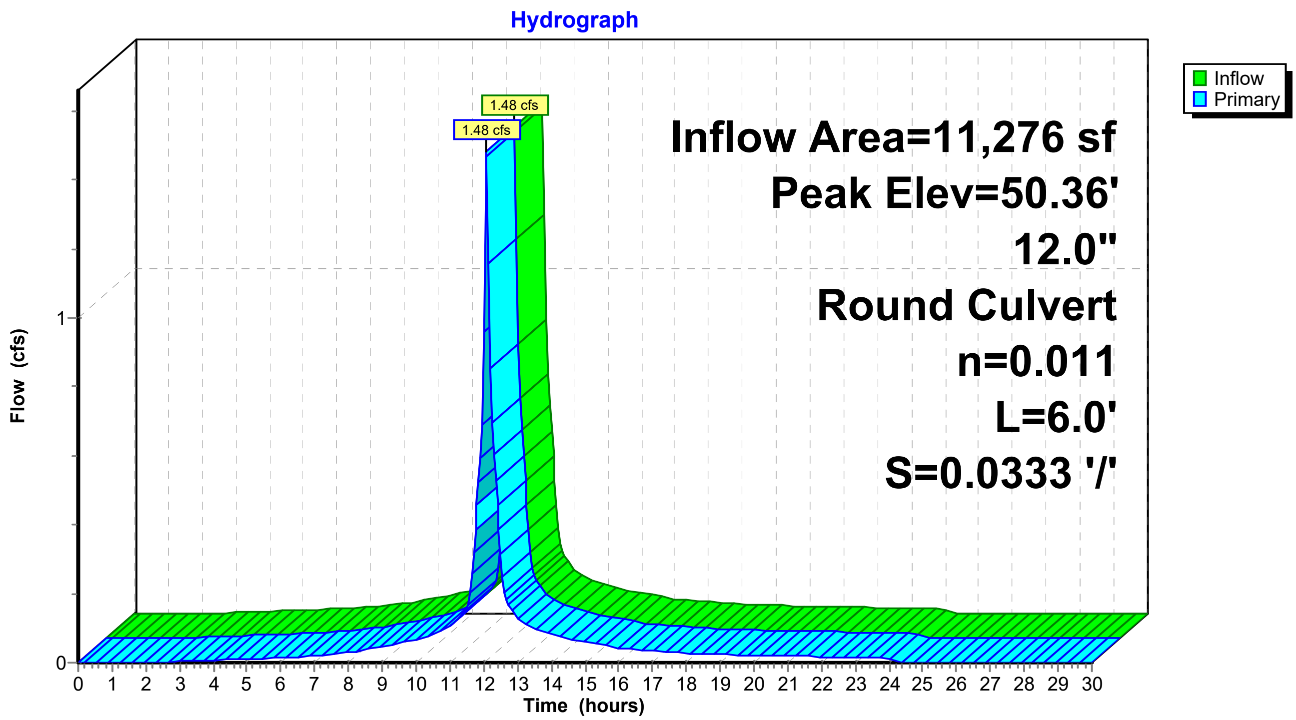
Inflow Area =	11,276 sf,	88.54% Impervious,	Inflow Depth = 5.46"	for 25 yr event	
Inflow =	1.48 cfs @	12.09 hrs,	Volume=	5,126 cf	
Outflow =	1.48 cfs @	12.09 hrs,	Volume=	5,126 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.48 cfs @	12.09 hrs,	Volume=	5,126 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 50.36' @ 12.09 hrs
Flood Elev= 49.07'

Device	Routing	Invert	Outlet Devices
#1	Primary	49.70'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 49.70' / 49.50' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.44 cfs @ 12.09 hrs HW=50.35' TW=47.94' (Dynamic Tailwater)
↑**—1=Culvert** (Barrel Controls 1.44 cfs @ 3.78 fps)

Pond CB102:



Summary for Pond CB103:

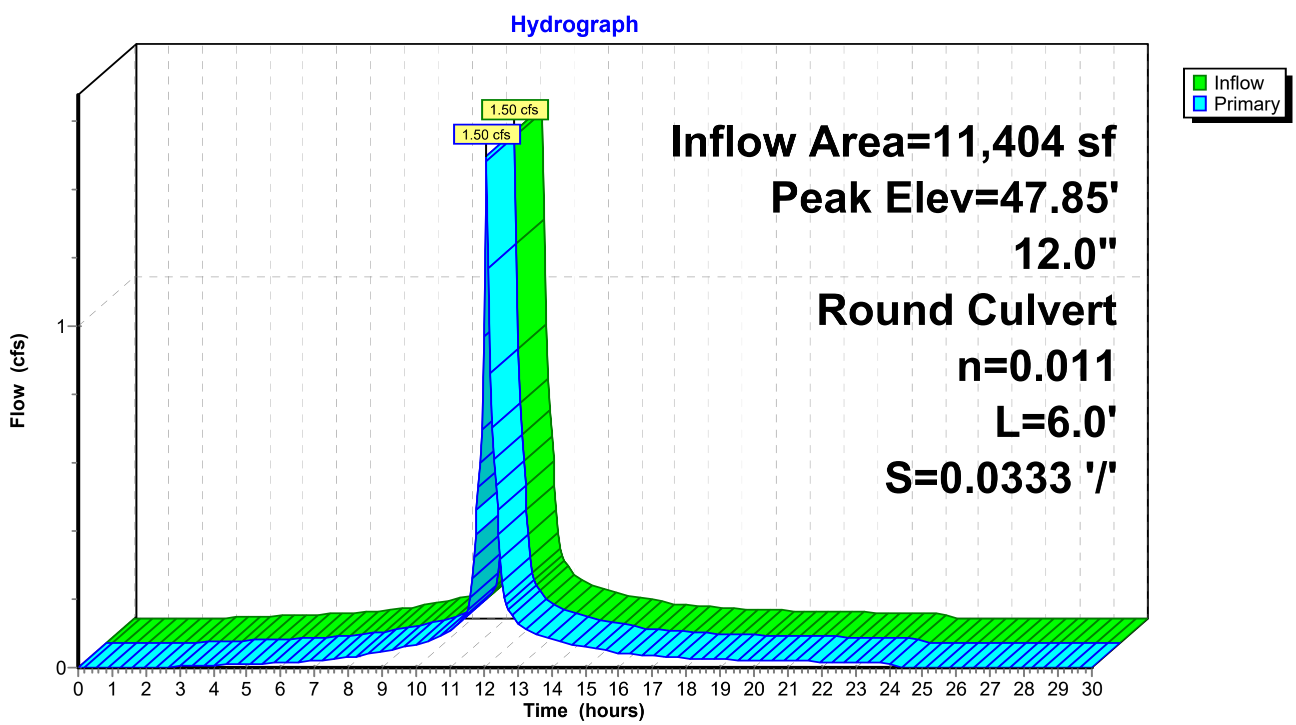
Inflow Area = 11,404 sf, 45.90% Impervious, Inflow Depth = 5.46" for 25 yr event
Inflow = 1.50 cfs @ 12.09 hrs, Volume= 5,184 cf
Outflow = 1.50 cfs @ 12.09 hrs, Volume= 5,184 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.50 cfs @ 12.09 hrs, Volume= 5,184 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.85' @ 12.19 hrs
Flood Elev= 49.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 46.90' / 46.70' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.52 cfs @ 12.09 hrs HW=47.60' TW=47.56' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.52 cfs @ 1.24 fps)

Pond CB103:



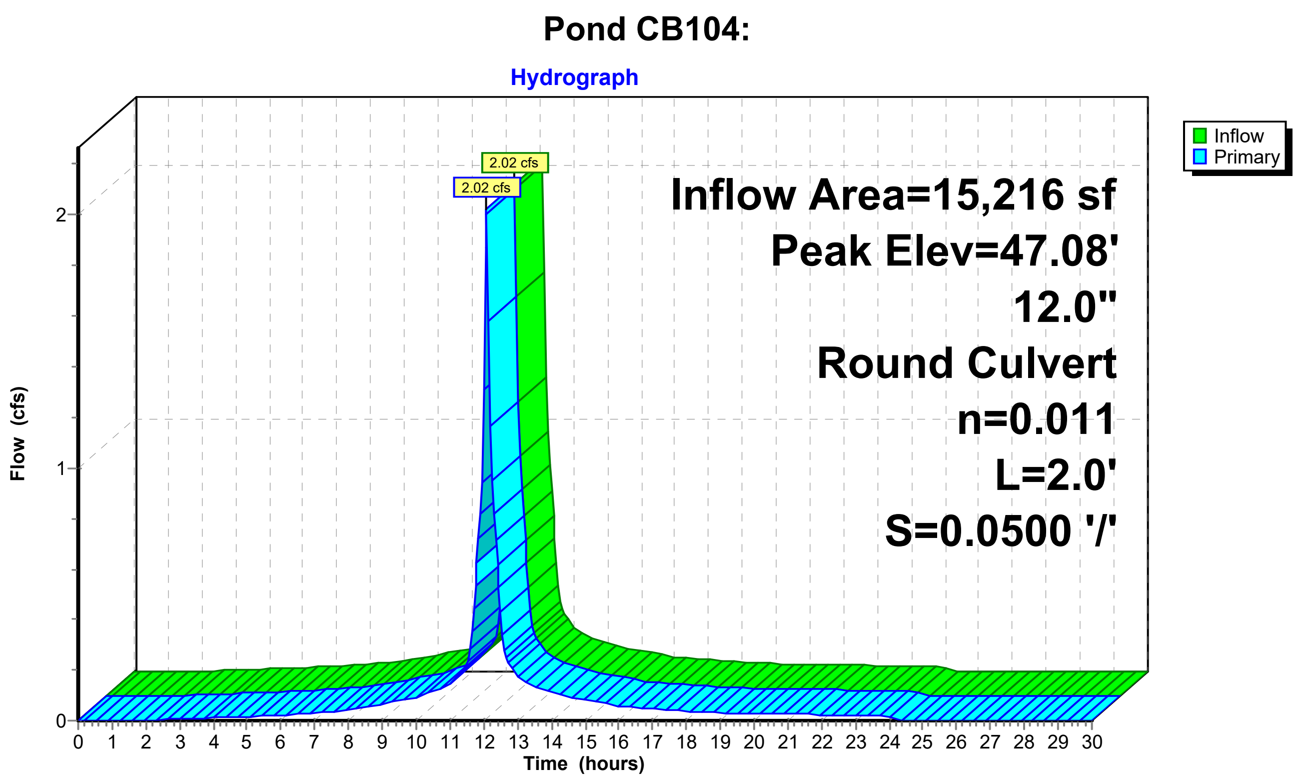
Summary for Pond CB104:

Inflow Area =	15,216 sf,	75.53% Impervious,	Inflow Depth = 5.57"	for 25 yr event
Inflow =	2.02 cfs @	12.09 hrs, Volume=	7,063 cf	
Outflow =	2.02 cfs @	12.09 hrs, Volume=	7,063 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.02 cfs @	12.09 hrs, Volume=	7,063 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.08' @ 12.09 hrs
Flood Elev= 48.93'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 2.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.10' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.97 cfs @ 12.09 hrs HW=47.07' TW=46.10' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.97 cfs @ 3.64 fps)



Summary for Pond DMH101:

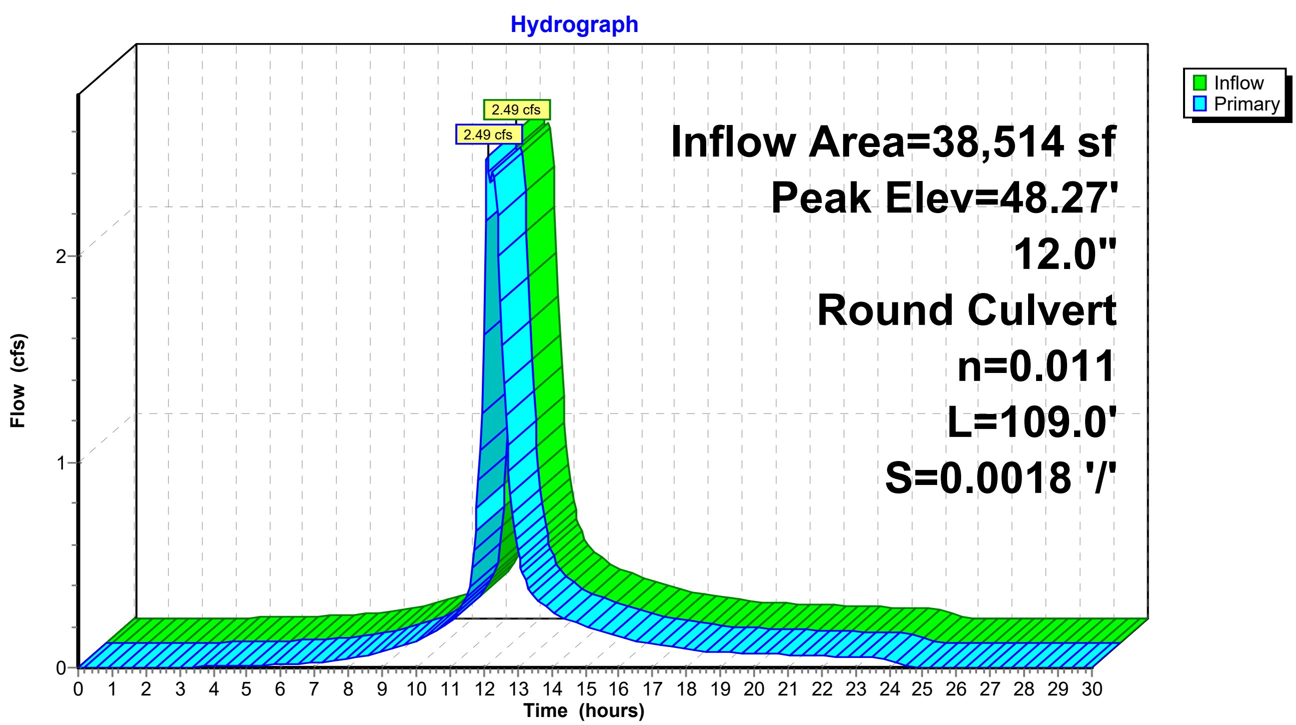
Inflow Area =	38,514 sf,	66.18% Impervious,	Inflow Depth = 4.45"	for 25 yr event
Inflow =	2.49 cfs @	12.12 hrs, Volume=	14,273 cf	
Outflow =	2.49 cfs @	12.12 hrs, Volume=	14,273 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.49 cfs @	12.12 hrs, Volume=	14,273 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.27' @ 12.15 hrs
Flood Elev= 49.94'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 109.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.00' S= 0.0018 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.29 cfs @ 12.12 hrs HW=48.15' TW=47.63' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 2.29 cfs @ 2.92 fps)

Pond DMH101:



Summary for Pond DMH102:

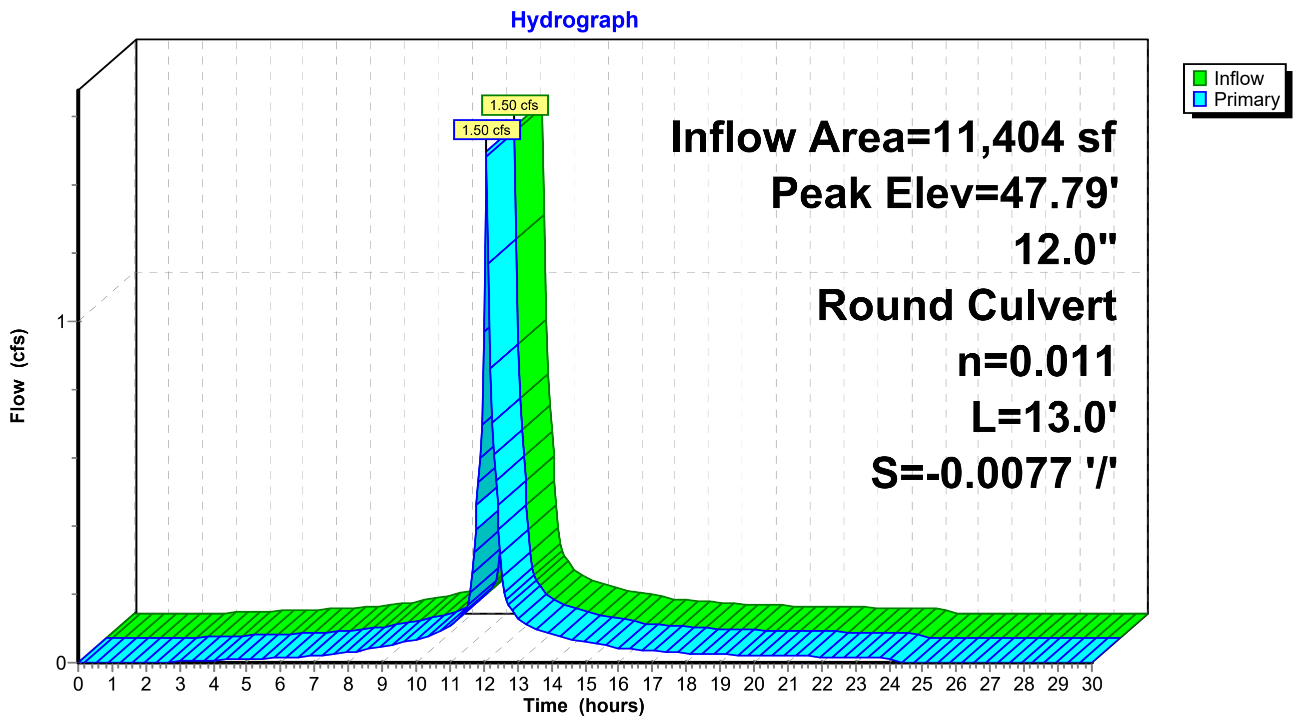
Inflow Area = 11,404 sf, 45.90% Impervious, Inflow Depth = 5.46" for 25 yr event
Inflow = 1.50 cfs @ 12.09 hrs, Volume= 5,184 cf
Outflow = 1.50 cfs @ 12.09 hrs, Volume= 5,184 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.50 cfs @ 12.09 hrs, Volume= 5,184 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.79' @ 12.14 hrs
Flood Elev= 49.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.60'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 46.50' / 46.60' S= -0.0077 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=47.56' TW=47.64' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond DMH102:



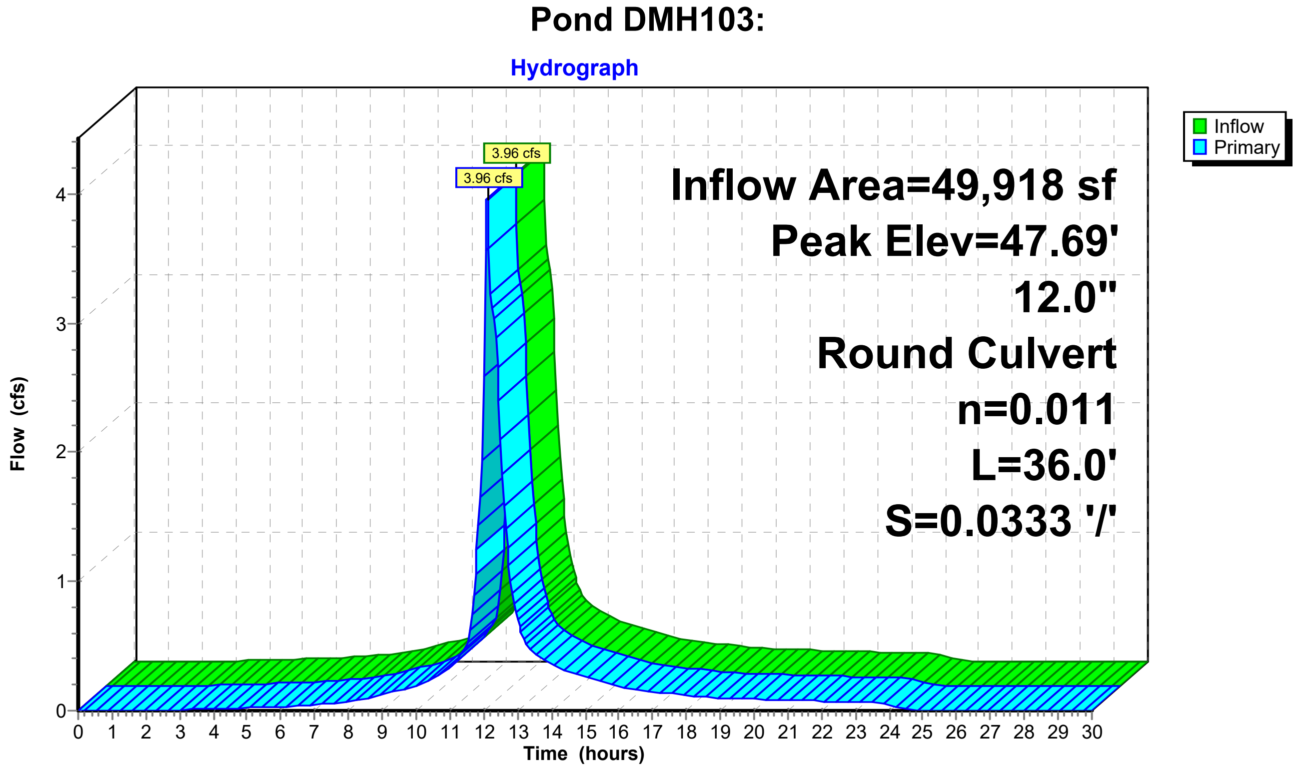
Summary for Pond DMH103:

Inflow Area = 49,918 sf, 61.55% Impervious, Inflow Depth = 4.68" for 25 yr event
Inflow = 3.96 cfs @ 12.10 hrs, Volume= 19,457 cf
Outflow = 3.96 cfs @ 12.10 hrs, Volume= 19,457 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.96 cfs @ 12.10 hrs, Volume= 19,457 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.69' @ 12.10 hrs
Flood Elev= 50.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.10'	**12.0" Round Culvert** L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 46.10' / 44.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.95 cfs @ 12.10 hrs HW=47.69' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 3.95 cfs @ 5.03 fps)



Summary for Pond DMH104:

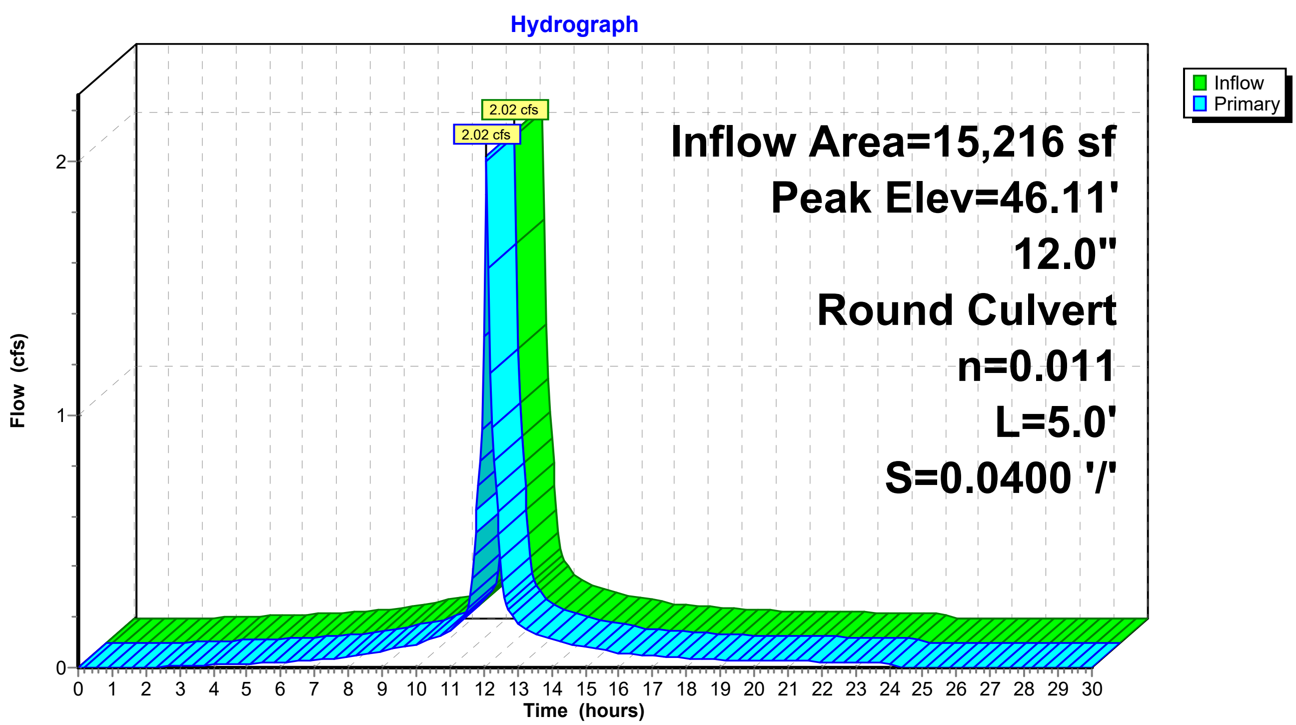
Inflow Area = 15,216 sf, 75.53% Impervious, Inflow Depth = 5.57" for 25 yr event
Inflow = 2.02 cfs @ 12.09 hrs, Volume= 7,063 cf
Outflow = 2.02 cfs @ 12.09 hrs, Volume= 7,063 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.02 cfs @ 12.09 hrs, Volume= 7,063 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.11' @ 12.09 hrs
Flood Elev= 49.08'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.30'	**12.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 45.30' / 45.10' S= 0.0400 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.97 cfs @ 12.09 hrs HW=46.10' TW=0.00' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.97 cfs @ 4.01 fps)

Pond DMH104:

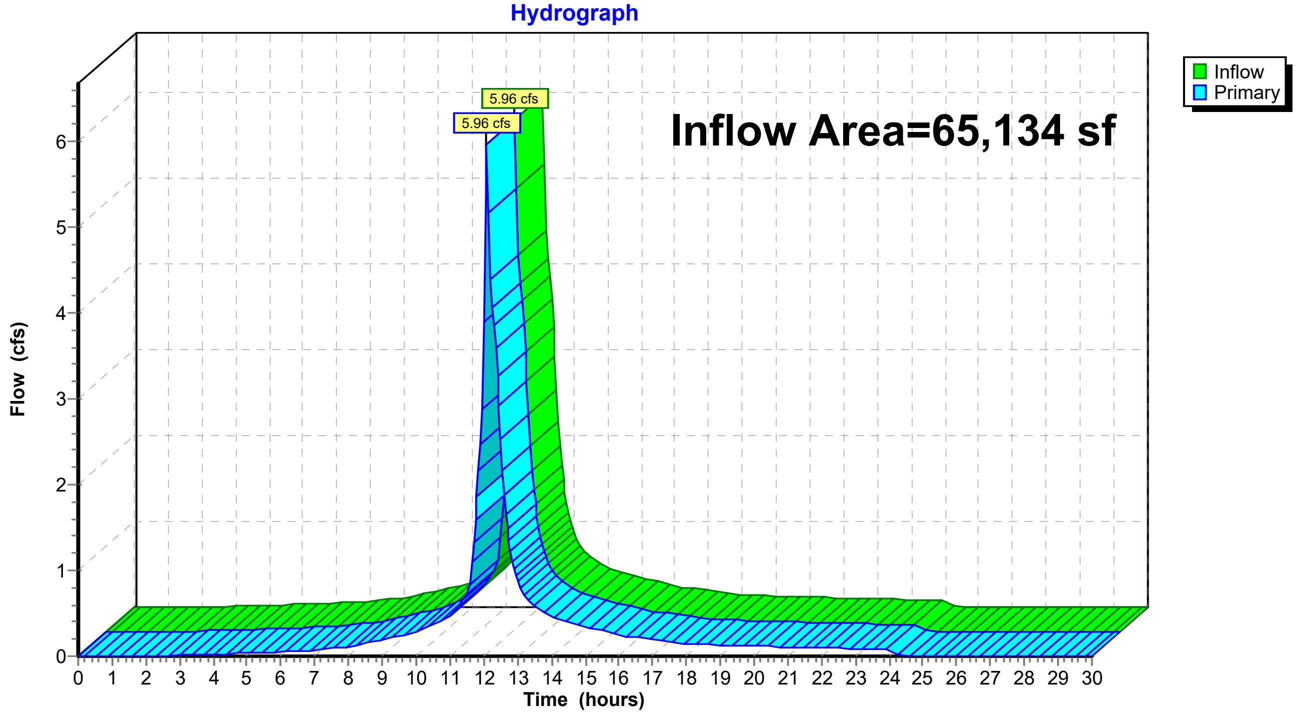


Summary for Pond DMH105:

Inflow Area = 65,134 sf, 64.81% Impervious, Inflow Depth = 4.89" for 25 yr event
Inflow = 5.96 cfs @ 12.09 hrs, Volume= 26,521 cf
Primary = 5.96 cfs @ 12.09 hrs, Volume= 26,521 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond DMH105:



Summary for Pond Pd1:

Inflow Area = 123,196 sf, 3.61% Impervious, Inflow Depth = 2.03" for 25 yr event
Inflow = 3.77 cfs @ 12.41 hrs, Volume= 20,810 cf
Outflow = 2.22 cfs @ 12.76 hrs, Volume= 20,810 cf, Atten= 41%, Lag= 21.0 min
Discarded = 2.22 cfs @ 12.76 hrs, Volume= 20,810 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.14' @ 12.76 hrs Surf.Area= 13,688 sf Storage= 4,033 cf

Plug-Flow detention time= 23.8 min calculated for 20,775 cf (100% of inflow)
Center-of-Mass det. time= 23.8 min (904.5 - 880.6)

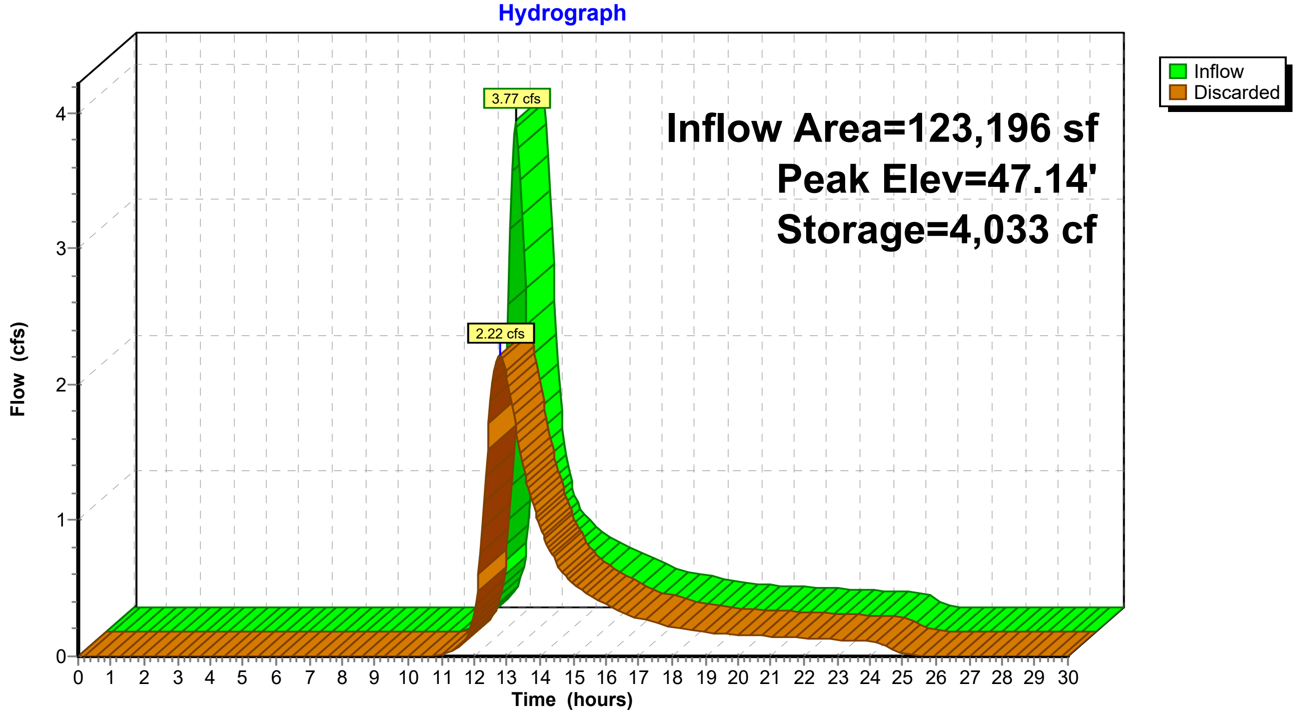
Volume	Invert	Avail.Storage	Storage Description
#1	46.50'	11,412 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.50	1,440	159.0	0	0	1,440
47.00	9,376	562.0	2,415	2,415	24,563
47.50	28,312	963.0	8,997	11,412	73,228

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.50'	**7.825 in/hr Exfiltration over Surface area above 46.50'** Excluded Surface area = 1,440 sf

Discarded OutFlow Max=2.22 cfs @ 12.76 hrs HW=47.14' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 2.22 cfs)

Pond Pd1:

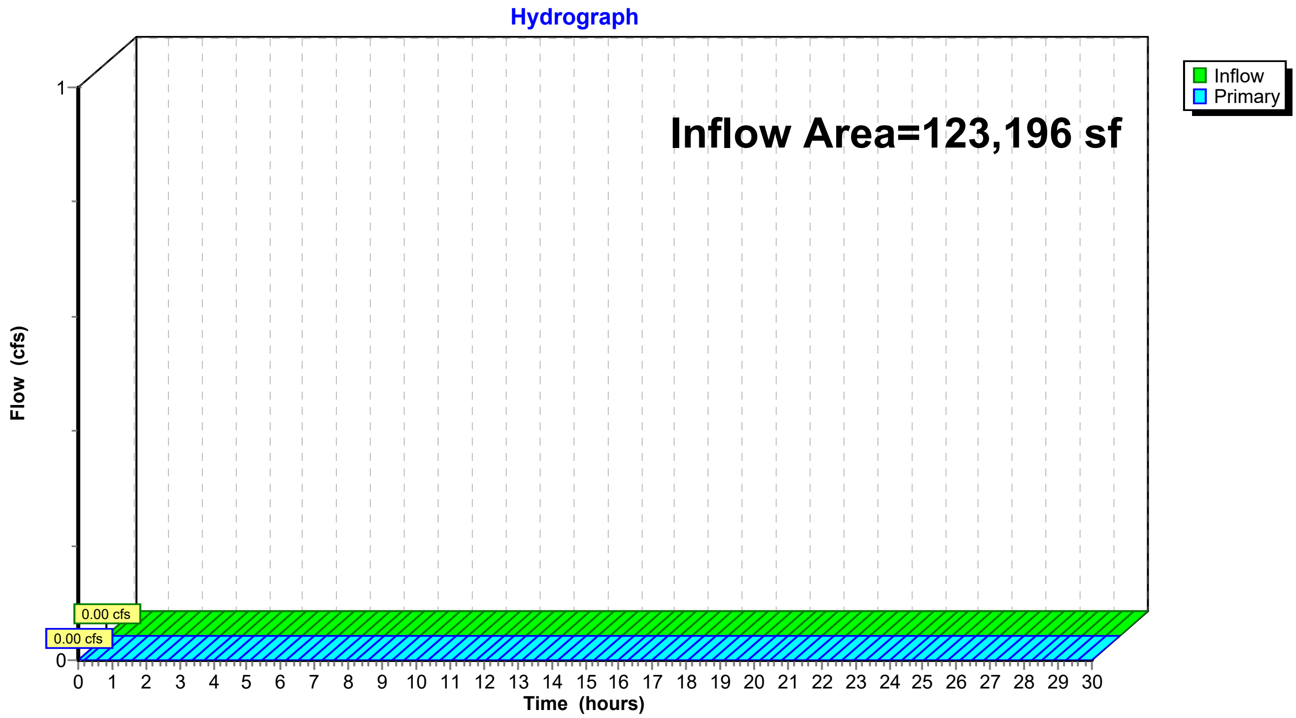

Hydrograph
3.77 cfs
2.22 cfs
Inflow Area=123,196 sf
Peak Elev=47.14'
Storage=4,033 cf
Inflow
Discarded
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

Summary for Link POI 1: Onsite Infiltration East

Inflow Area =	123,196 sf,	3.61% Impervious,	Inflow Depth = 0.00"	for 25 yr event	
Inflow =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 1: Onsite Infiltration East

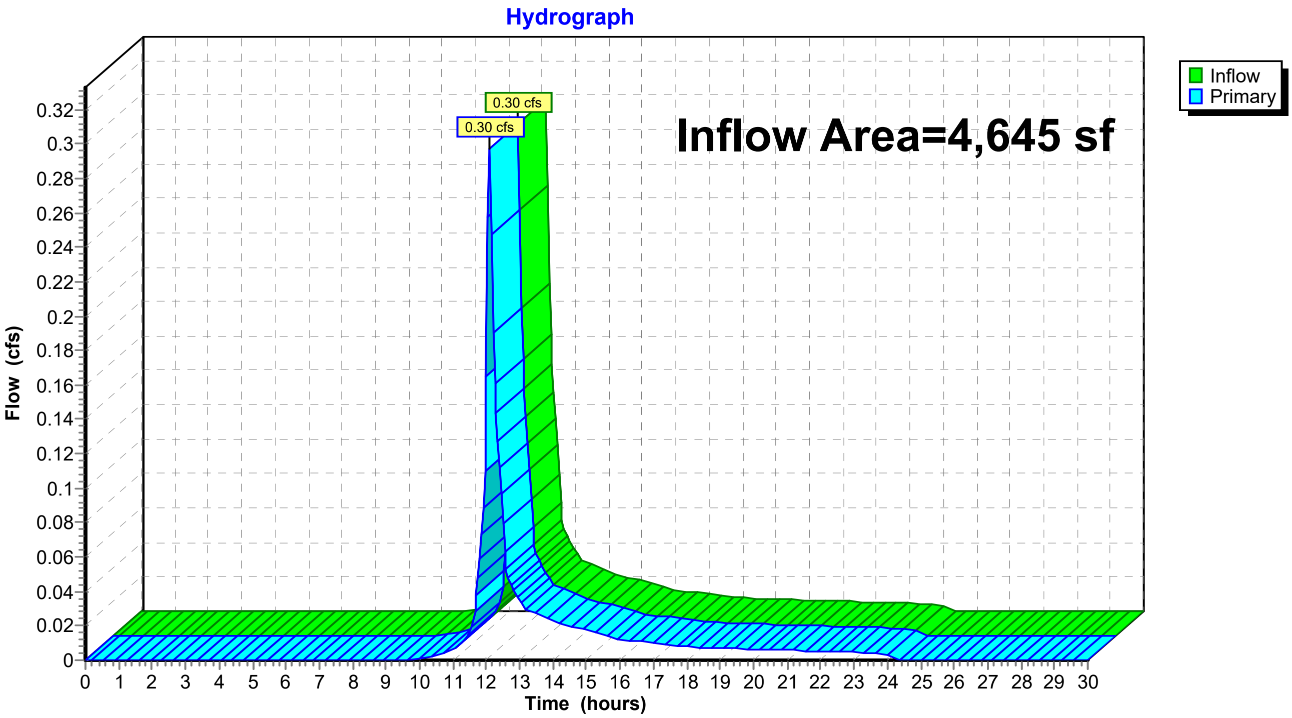


Summary for Link POI 2: Offsite at Southeast Property Line

Inflow Area = 4,645 sf, 0.00% Impervious, Inflow Depth = 2.47" for 25 yr event
Inflow = 0.30 cfs @ 12.10 hrs, Volume= 955 cf
Primary = 0.30 cfs @ 12.10 hrs, Volume= 955 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 2: Offsite at Southeast Property Line

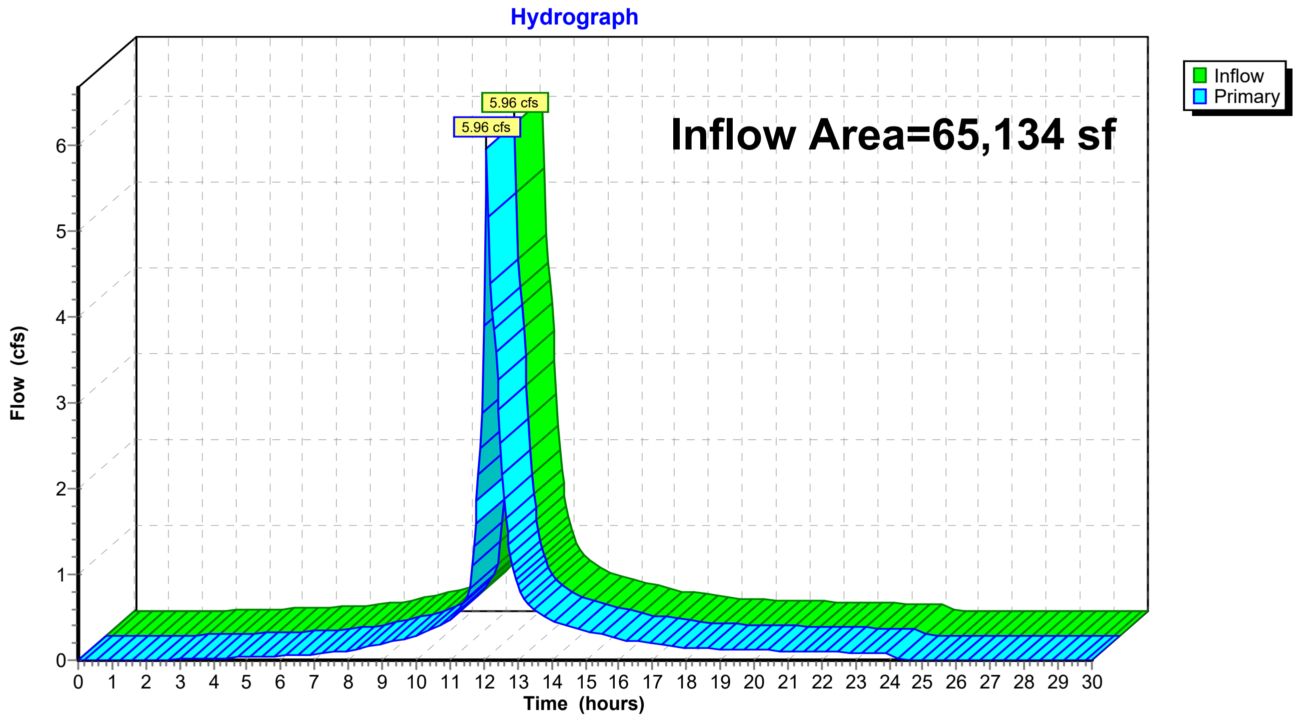


Summary for Link POI 3: Cranberry Highway Closed Drainage System

Inflow Area = 65,134 sf, 64.81% Impervious, Inflow Depth = 4.89" for 25 yr event
Inflow = 5.96 cfs @ 12.09 hrs, Volume= 26,521 cf
Primary = 5.96 cfs @ 12.09 hrs, Volume= 26,521 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 3: Cranberry Highway Closed Drainage System



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentE-1: Runoff Area=123,196 sf 3.61% Impervious Runoff Depth=3.81"
Flow Length=416' Tc=27.0 min CN=60 Runoff=7.37 cfs 39,066 cf

SubcatchmentE-2: Runoff Area=4,645 sf 0.00% Impervious Runoff Depth=4.40"
Tc=6.0 min CN=65 Runoff=0.54 cfs 1,704 cf

SubcatchmentE-3: Runoff Area=27,238 sf 56.92% Impervious Runoff Depth=6.33"
Flow Length=233' Tc=24.0 min CN=81 Runoff=2.84 cfs 14,367 cf

SubcatchmentE-4: Runoff Area=11,276 sf 88.54% Impervious Runoff Depth=7.90"
Tc=6.0 min CN=94 Runoff=2.11 cfs 7,422 cf

SubcatchmentE-5: Runoff Area=11,404 sf 45.90% Impervious Runoff Depth=7.90"
Tc=6.0 min CN=94 Runoff=2.13 cfs 7,506 cf

SubcatchmentE-6: Runoff Area=15,216 sf 75.53% Impervious Runoff Depth=8.02"
Tc=6.0 min CN=95 Runoff=2.86 cfs 10,168 cf

Pond CB101: Peak Elev=50.66' Inflow=2.84 cfs 14,367 cf
12.0" Round Culvert n=0.011 L=29.0' S=-0.0034 '/' Outflow=2.84 cfs 14,367 cf

Pond CB102: Peak Elev=50.54' Inflow=2.11 cfs 7,422 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=2.11 cfs 7,422 cf

Pond CB103: Peak Elev=49.26' Inflow=2.13 cfs 7,506 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=2.13 cfs 7,506 cf

Pond CB104: Peak Elev=47.33' Inflow=2.86 cfs 10,168 cf
12.0" Round Culvert n=0.011 L=2.0' S=0.0500 '/' Outflow=2.86 cfs 10,168 cf

Pond DMH101: Peak Elev=50.26' Inflow=3.72 cfs 21,789 cf
12.0" Round Culvert n=0.011 L=109.0' S=0.0018 '/' Outflow=3.72 cfs 21,789 cf

Pond DMH102: Peak Elev=49.15' Inflow=2.13 cfs 7,506 cf
12.0" Round Culvert n=0.011 L=13.0' S=-0.0077 '/' Outflow=2.13 cfs 7,506 cf

Pond DMH103: Peak Elev=48.95' Inflow=5.80 cfs 29,295 cf
12.0" Round Culvert n=0.011 L=36.0' S=0.0333 '/' Outflow=5.80 cfs 29,295 cf

Pond DMH104: Peak Elev=46.37' Inflow=2.86 cfs 10,168 cf
12.0" Round Culvert n=0.011 L=5.0' S=0.0400 '/' Outflow=2.86 cfs 10,168 cf

Pond DMH105: Inflow=8.64 cfs 39,463 cf
Primary=8.64 cfs 39,463 cf

Pond Pd1: Peak Elev=47.40' Storage=8,704 cf Inflow=7.37 cfs 39,066 cf
Outflow=4.00 cfs 39,066 cf

Link POI 1: Onsite Infiltration East Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link POI 2: Offsite at Southeast Property Line Inflow=0.54 cfs 1,704 cf
Primary=0.54 cfs 1,704 cf

Link POI 3: Cranberry Highway Closed Drainage System Inflow=8.64 cfs 39,463 cf
Primary=8.64 cfs 39,463 cf

Total Runoff Area = 192,975 sf Runoff Volume = 80,233 cf Average Runoff Depth = 4.99"
75.82% Pervious = 146,311 sf 24.18% Impervious = 46,664 sf

Summary for Subcatchment E-1:

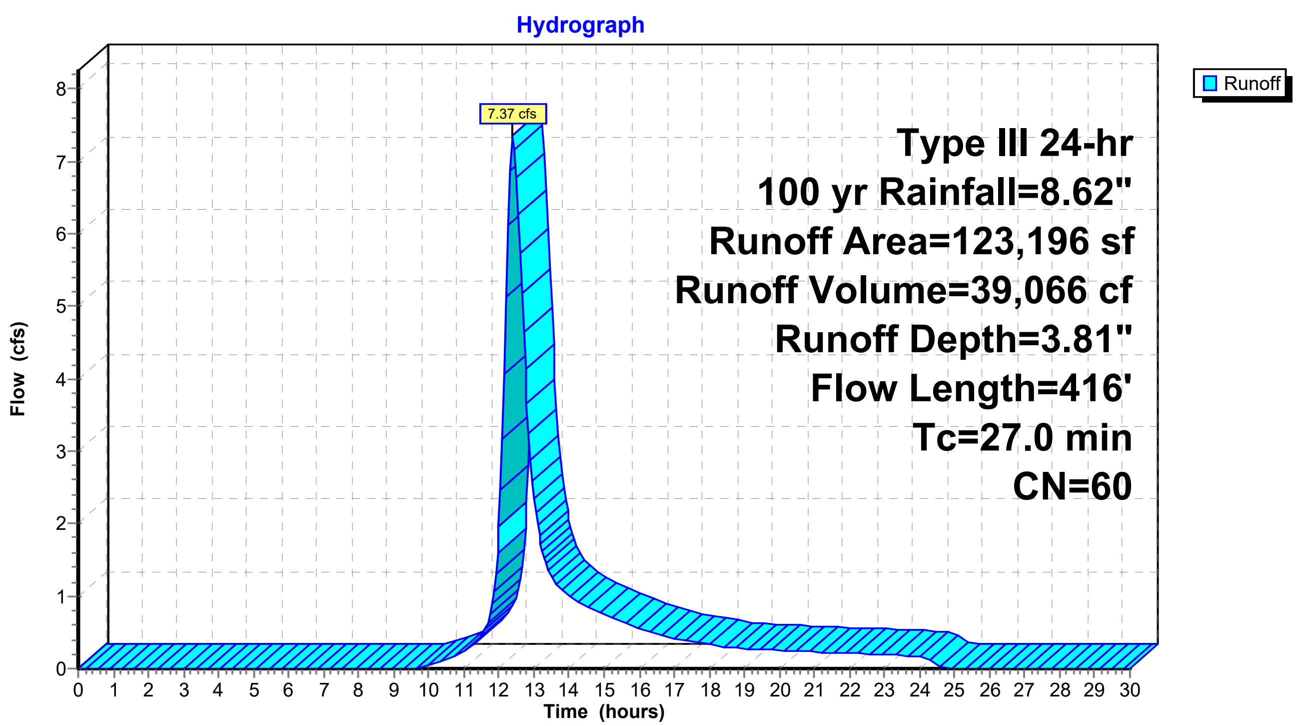
Runoff = 7.37 cfs @ 12.39 hrs, Volume= 39,066 cf, Depth= 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

	Area (sf)	CN	Description
	84,532	55	Woods, Good, HSG B
	3,249	98	Roofs, HSG B
	1,200	98	Paved parking, HSG B
*	3,560	96	Rubble, HSG B
	3,322	96	Gravel surface, HSG B
	27,333	61	>75% Grass cover, Good, HSG B
	123,196	60	Weighted Average
	118,747		96.39% Pervious Area
	4,449		3.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	50	0.0100	0.05		**Sheet Flow, Woods, 50', 1%** Woods: Light underbrush n= 0.400 P2= 3.35"
11.1	366	0.0120	0.55		**Shallow Concentrated Flow, Woods, 366', 1.2%** Woodland Kv= 5.0 fps
27.0	416	Total			

Subcatchment E-1:



Summary for Subcatchment E-2:

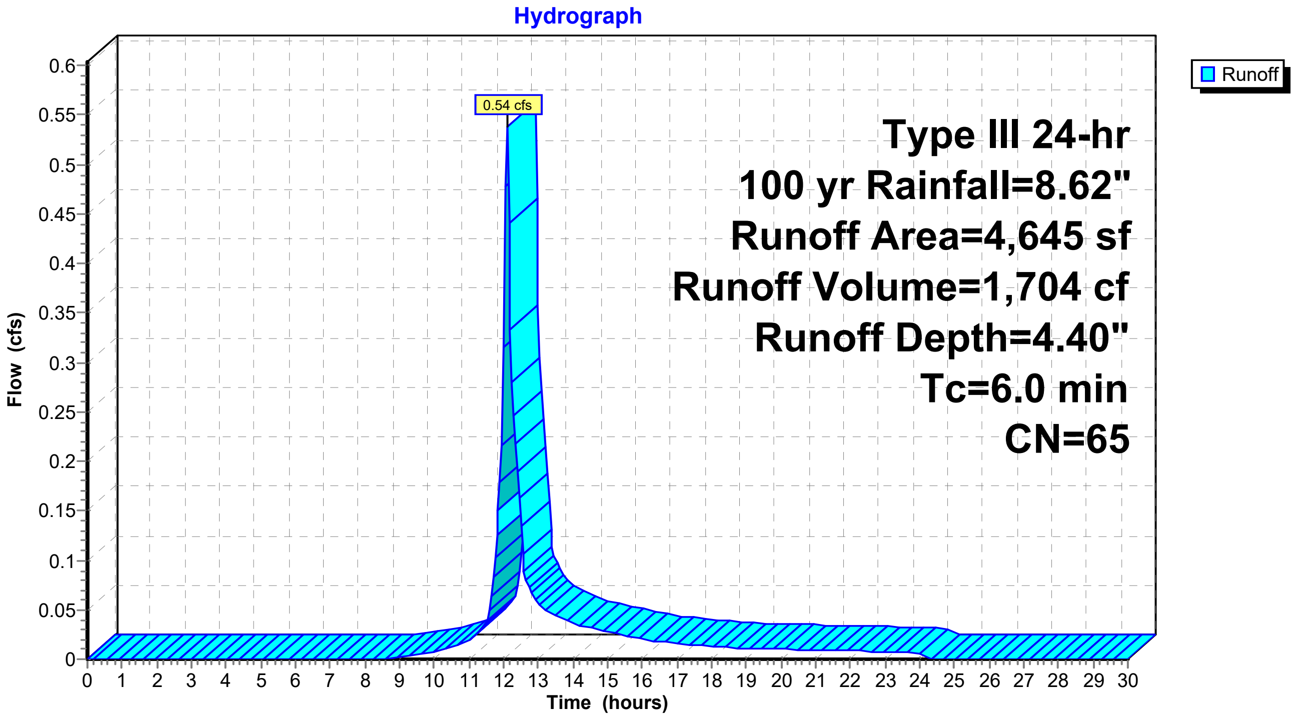
Runoff = 0.54 cfs @ 12.09 hrs, Volume= 1,704 cf, Depth= 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

	Area (sf)	CN	Description
	923	55	Woods, Good, HSG B
	379	96	Gravel surface, HSG B
*	363	96	Rubble, HSG B
	2,980	61	>75% Grass cover, Good, HSG B
	4,645	65	Weighted Average
	4,645		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-2:



Summary for Subcatchment E-3:

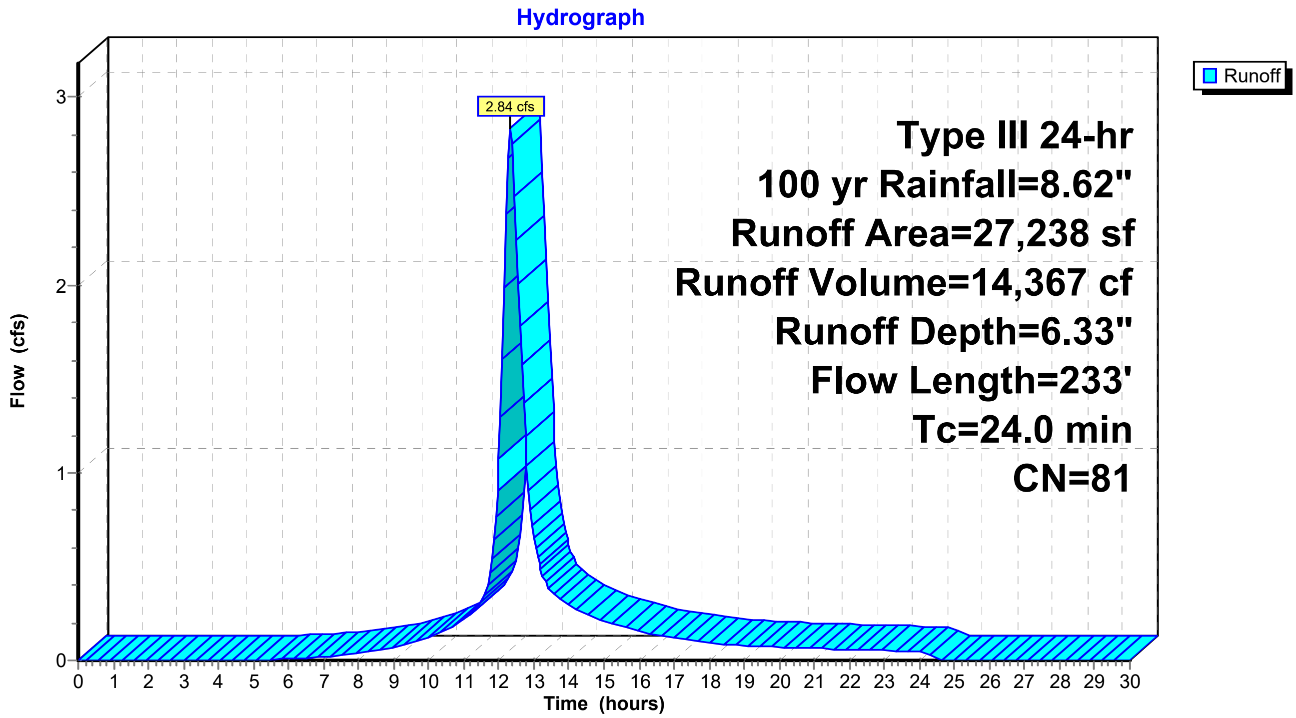
Runoff = 2.84 cfs @ 12.32 hrs, Volume= 14,367 cf, Depth= 6.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
3,417	55	Woods, Good, HSG B
2,297	98	Roofs, HSG B
13,207	98	Paved parking, HSG B
8,317	61	>75% Grass cover, Good, HSG B
27,238	81	Weighted Average
11,734		43.08% Pervious Area
15,504		56.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	50	0.0050	0.04		**Sheet Flow, Woods, 50', 0.5%** Woods: Light underbrush n= 0.400 P2= 3.35"
0.2	5	0.0050	0.35		**Shallow Concentrated Flow, Woods, 5', 0.5%** Woodland Kv= 5.0 fps
1.1	57	0.0150	0.86		**Shallow Concentrated Flow, Grass, 57', 1.5%** Short Grass Pasture Kv= 7.0 fps
0.6	34	0.0020	0.91		**Shallow Concentrated Flow, Pavement, 34', 0.2%** Paved Kv= 20.3 fps
0.6	21	0.0080	0.63		**Shallow Concentrated Flow, Grass, 21', 0.8%** Short Grass Pasture Kv= 7.0 fps
0.5	66	0.0100	2.03		**Shallow Concentrated Flow, Pavement, 66', 1%** Paved Kv= 20.3 fps
24.0	233	Total			

Subcatchment E-3:



Summary for Subcatchment E-4:

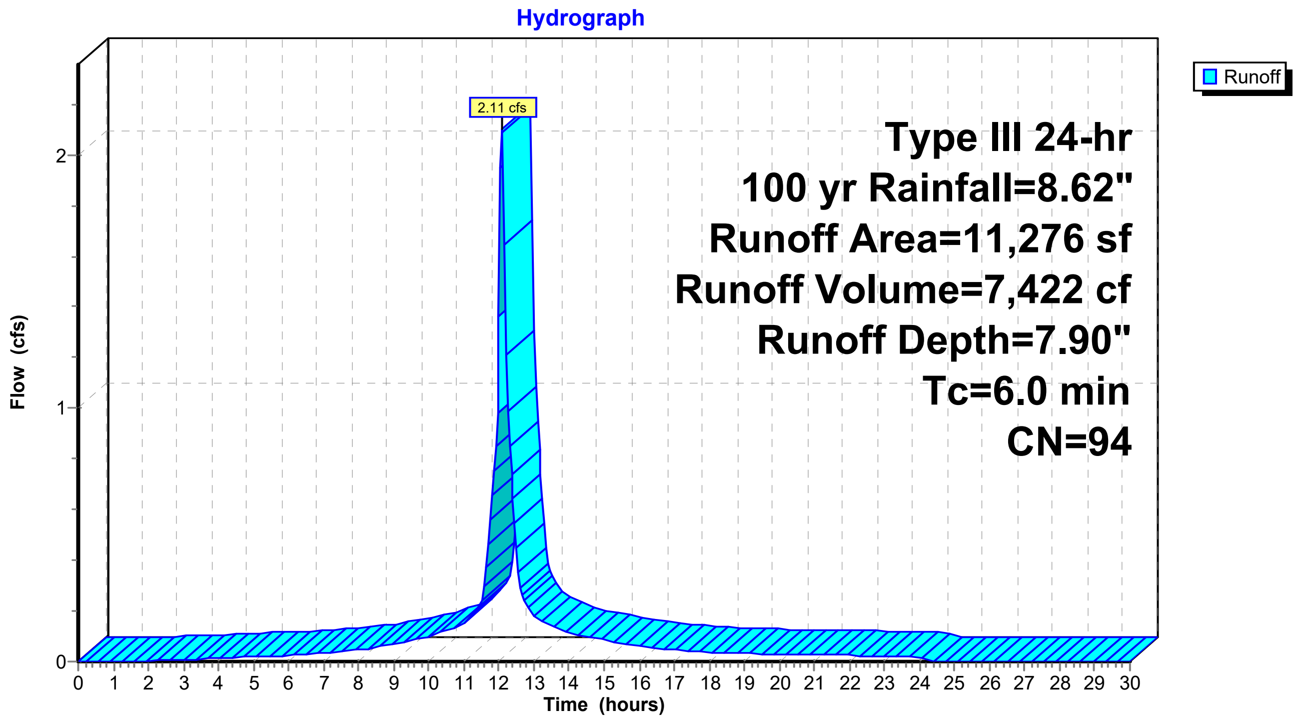
Runoff = 2.11 cfs @ 12.09 hrs, Volume= 7,422 cf, Depth= 7.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
2,129	98	Roofs, HSG B
7,855	98	Paved parking, HSG B
208	96	Gravel surface, HSG B
1,084	61	>75% Grass cover, Good, HSG B
11,276	94	Weighted Average
1,292		11.46% Pervious Area
9,984		88.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-4:



Summary for Subcatchment E-5:

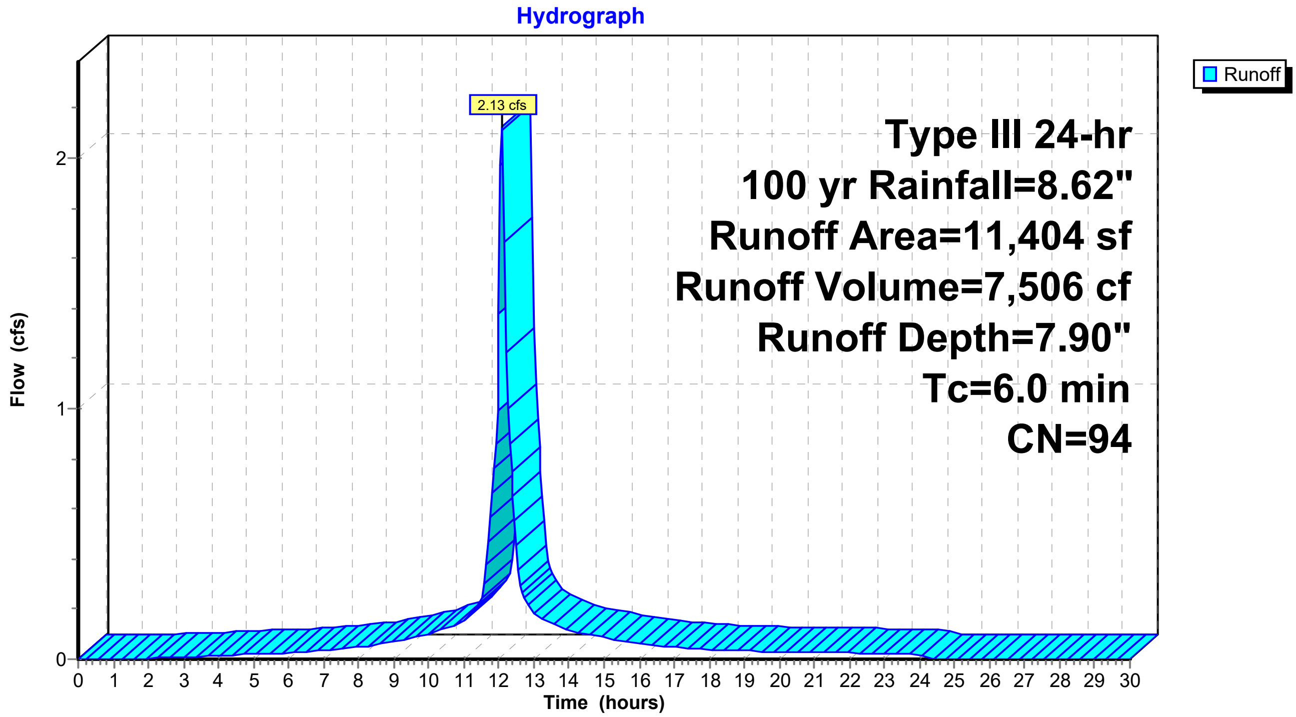
Runoff = 2.13 cfs @ 12.09 hrs, Volume= 7,506 cf, Depth= 7.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
5,235	98	Paved parking, HSG B
5,182	96	Gravel surface, HSG B
987	61	>75% Grass cover, Good, HSG B
11,404	94	Weighted Average
6,169		54.10% Pervious Area
5,235		45.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-5:



Summary for Subcatchment E-6:

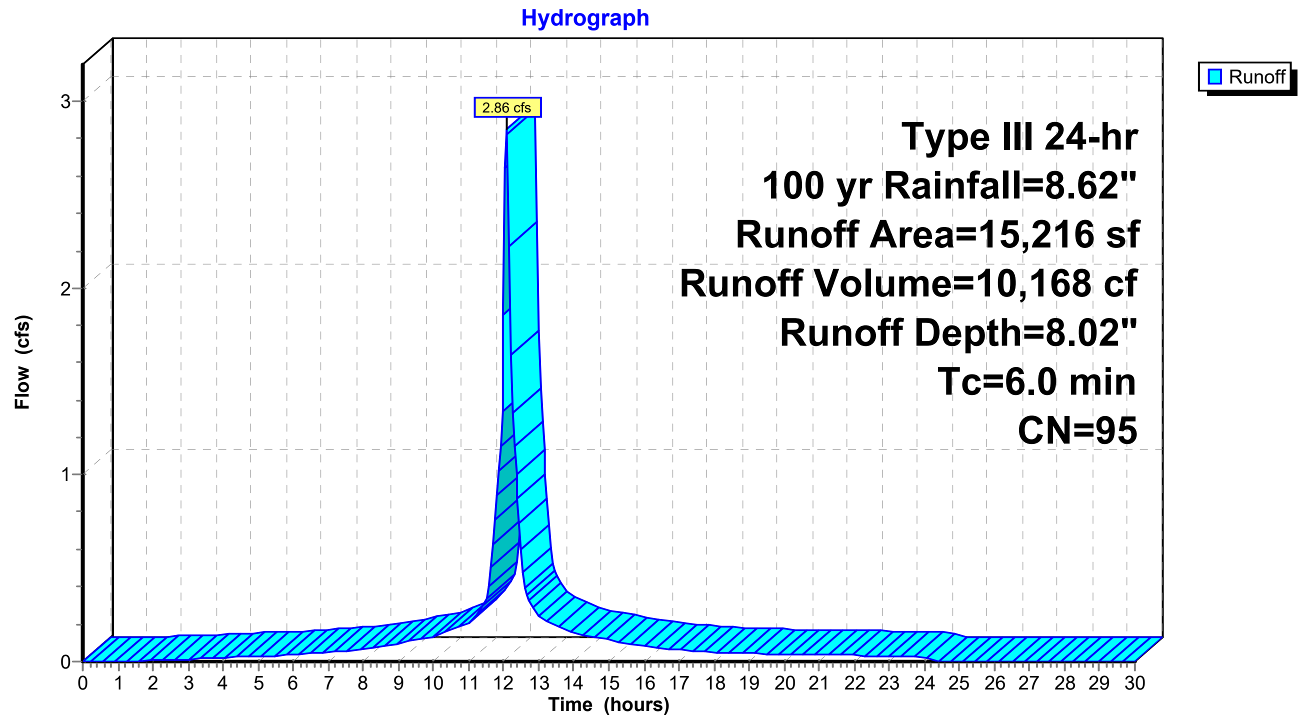
Runoff = 2.86 cfs @ 12.09 hrs, Volume= 10,168 cf, Depth= 8.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

	Area (sf)	CN	Description
	11,492	98	Paved parking, HSG B
*	323	96	Rubble, HSG B
	2,416	96	Gravel surface, HSG B
	985	61	>75% Grass cover, Good, HSG B
	15,216	95	Weighted Average
	3,724		24.47% Pervious Area
	11,492		75.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-6:



Summary for Pond CB101:

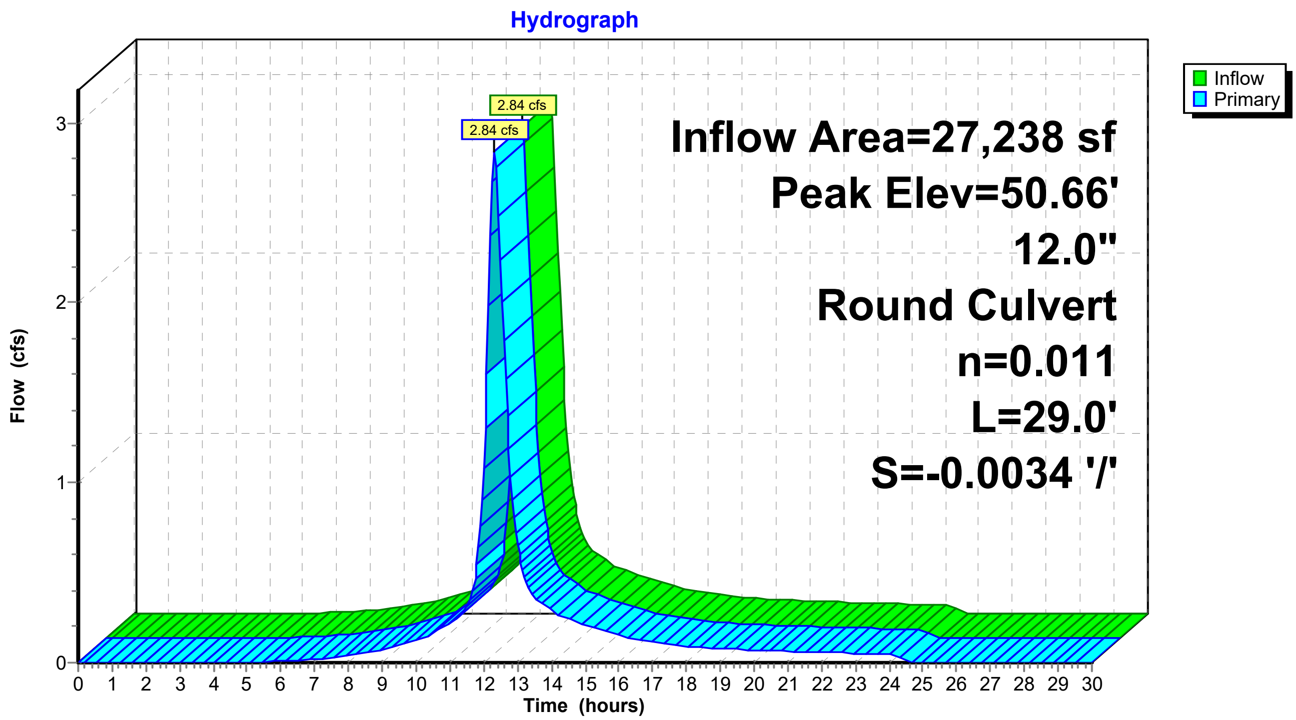
Inflow Area =	27,238 sf,	56.92% Impervious,	Inflow Depth = 6.33"	for 100 yr event
Inflow =	2.84 cfs @	12.32 hrs, Volume=	14,367 cf	
Outflow =	2.84 cfs @	12.32 hrs, Volume=	14,367 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.84 cfs @	12.32 hrs, Volume=	14,367 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 50.66' @ 12.21 hrs
Flood Elev= 49.06'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.50'	**12.0" Round Culvert** L= 29.0' Ke= 0.500 Inlet / Outlet Invert= 46.40' / 46.50' S= -0.0034 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.11 cfs @ 12.32 hrs HW=50.07' TW=49.39' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 3.11 cfs @ 3.96 fps)

Pond CB101:



Summary for Pond CB102:

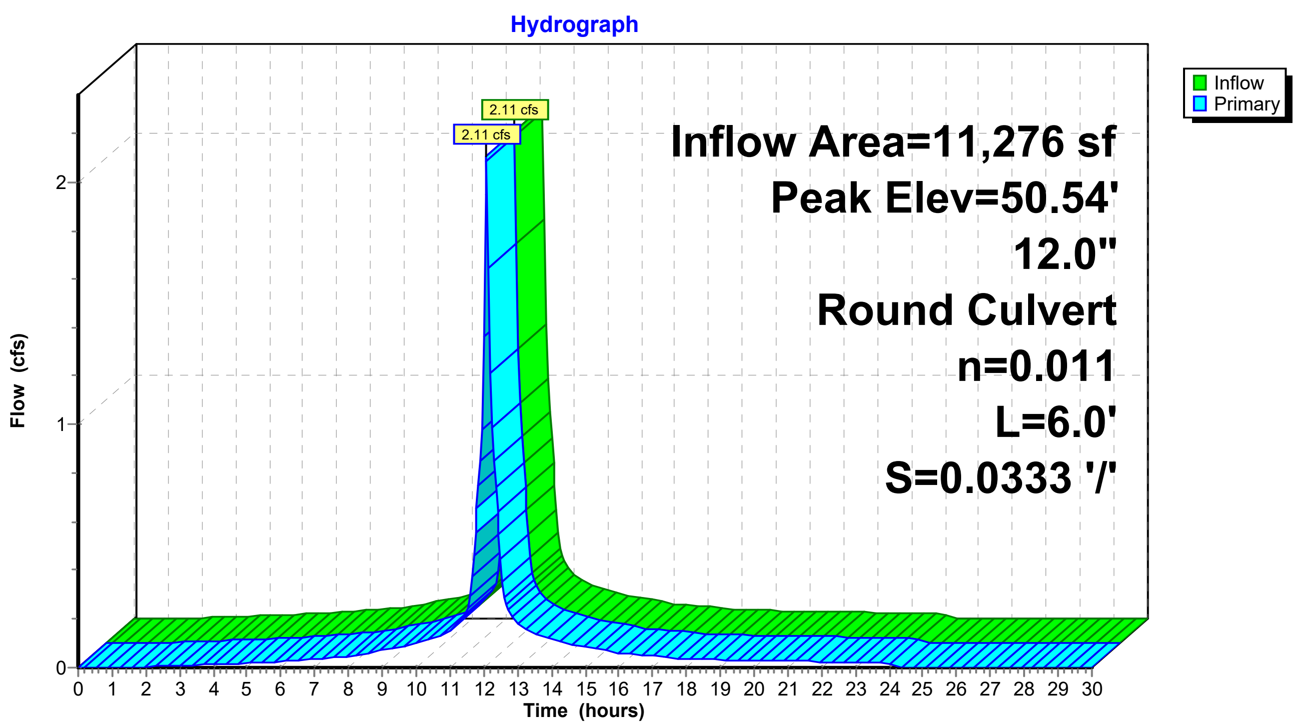
Inflow Area =	11,276 sf,	88.54% Impervious,	Inflow Depth = 7.90"	for 100 yr event	
Inflow =	2.11 cfs @	12.09 hrs,	Volume=	7,422 cf	
Outflow =	2.11 cfs @	12.09 hrs,	Volume=	7,422 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.11 cfs @	12.09 hrs,	Volume=	7,422 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 50.54' @ 12.09 hrs
Flood Elev= 49.07'

Device	Routing	Invert	Outlet Devices
#1	Primary	49.70'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 49.70' / 49.50' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.05 cfs @ 12.09 hrs HW=50.52' TW=49.54' (Dynamic Tailwater)
1=Culvert (Barrel Controls 2.05 cfs @ 4.02 fps)

Pond CB102:



Summary for Pond CB103:

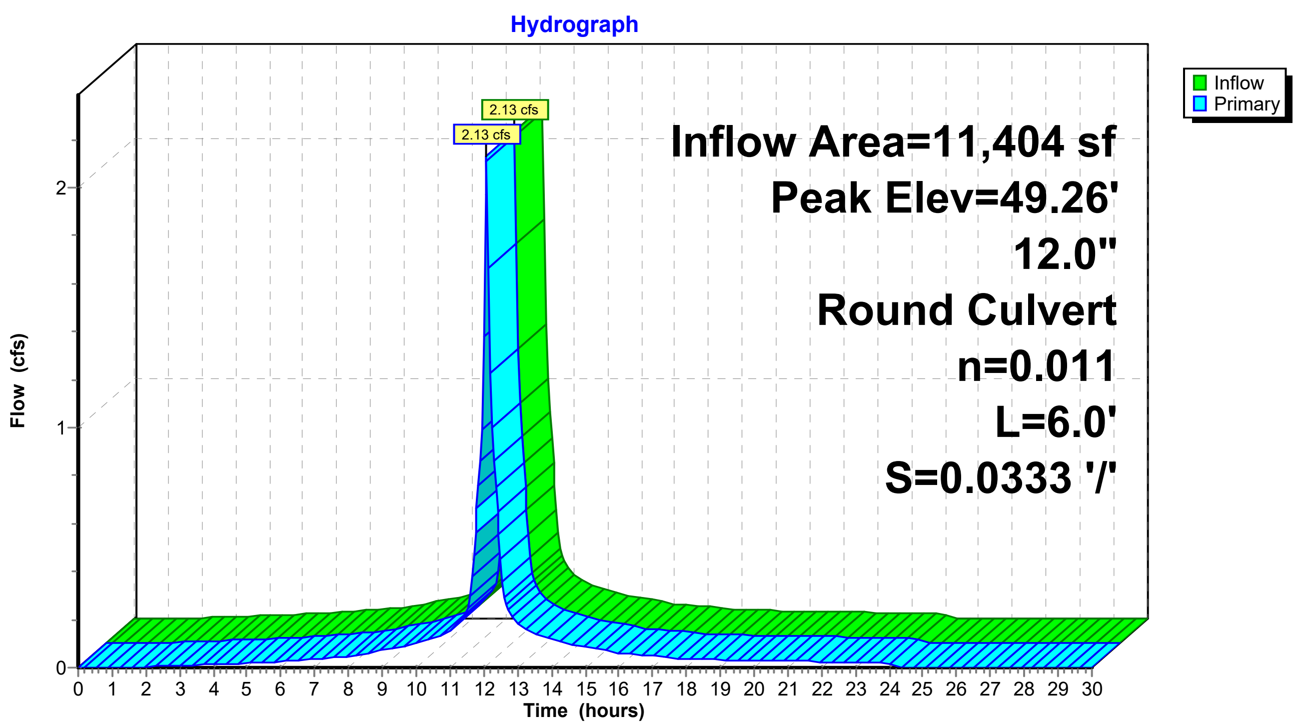
Inflow Area =	11,404 sf,	45.90% Impervious,	Inflow Depth = 7.90"	for 100 yr event	
Inflow =	2.13 cfs @	12.09 hrs,	Volume=	7,506 cf	
Outflow =	2.13 cfs @	12.09 hrs,	Volume=	7,506 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.13 cfs @	12.09 hrs,	Volume=	7,506 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 49.26' @ 12.19 hrs
Flood Elev= 49.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 46.90' / 46.70' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.08' TW=48.57' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond CB103:



Summary for Pond CB104:

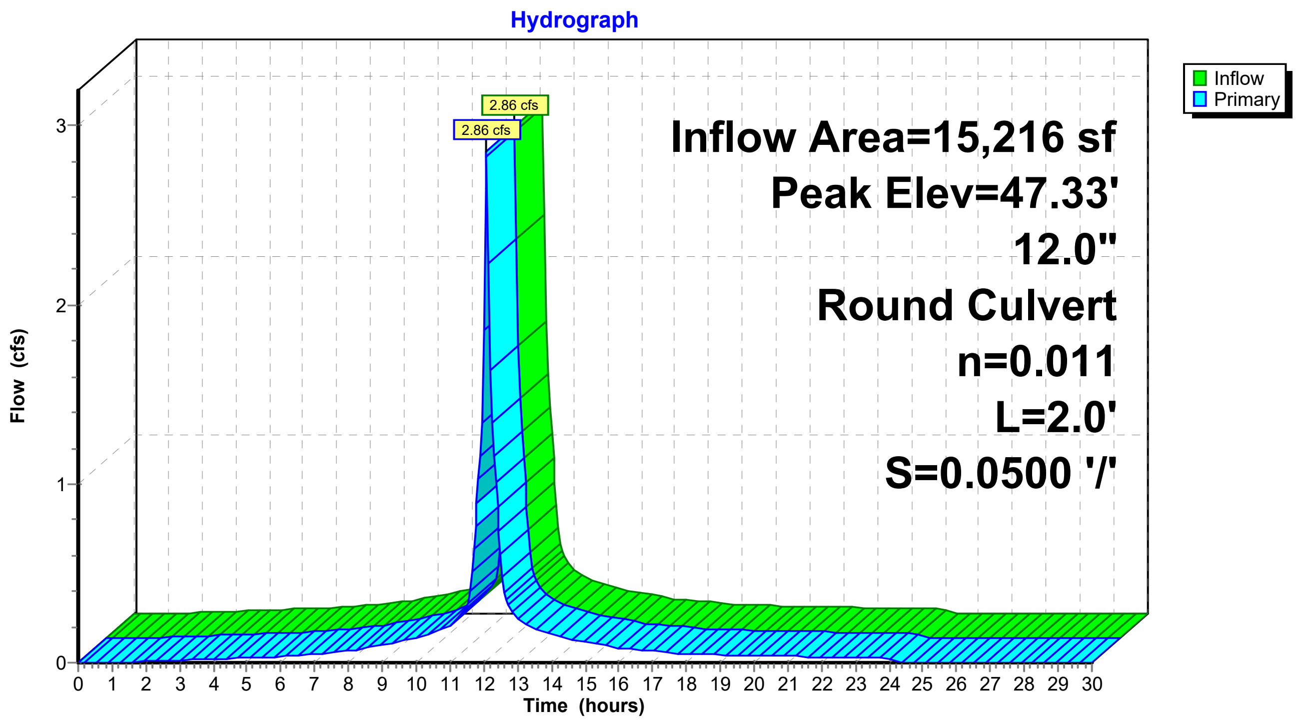
Inflow Area =	15,216 sf,	75.53% Impervious,	Inflow Depth = 8.02"	for 100 yr event	
Inflow =	2.86 cfs @	12.09 hrs,	Volume=	10,168 cf	
Outflow =	2.86 cfs @	12.09 hrs,	Volume=	10,168 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.86 cfs @	12.09 hrs,	Volume=	10,168 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.33' @ 12.09 hrs
Flood Elev= 48.93'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 2.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.10' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.78 cfs @ 12.09 hrs HW=47.31' TW=46.34' (Dynamic Tailwater)
└—**1=Culvert** (Barrel Controls 2.78 cfs @ 3.98 fps)

Pond CB104:



Summary for Pond DMH101:

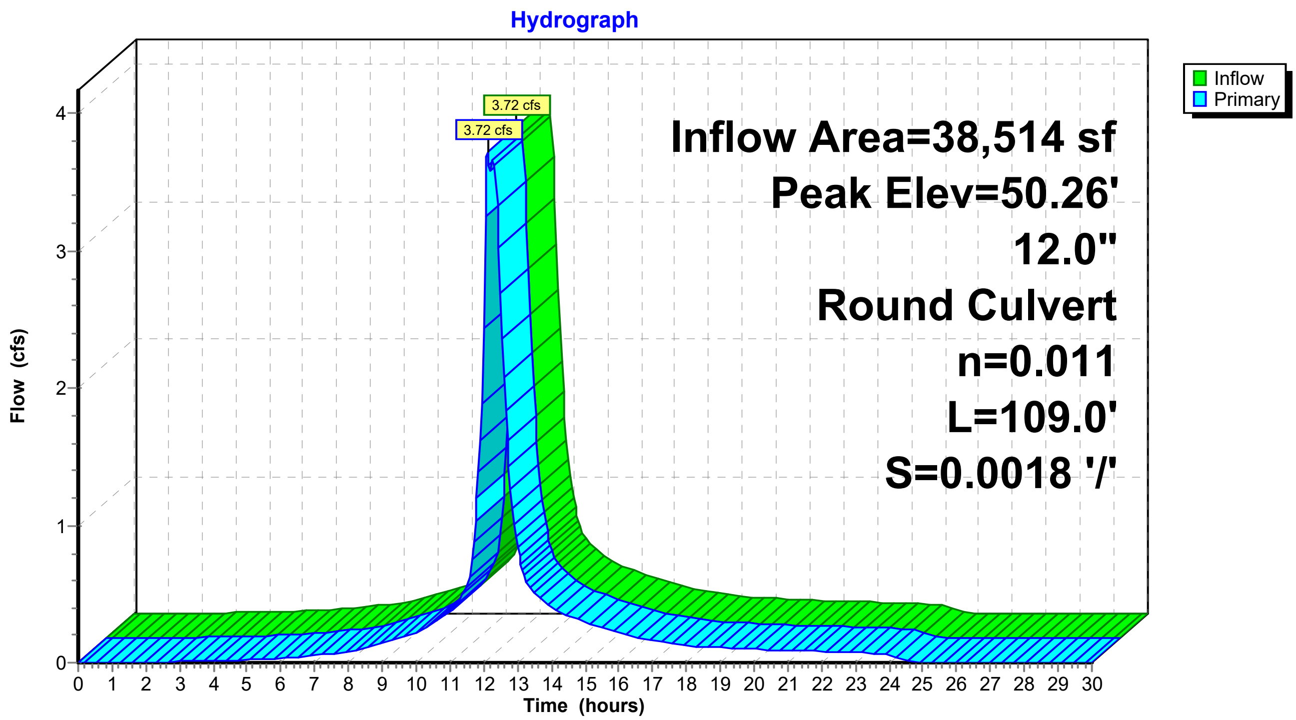
Inflow Area = 38,514 sf, 66.18% Impervious, Inflow Depth = 6.79" for 100 yr event
Inflow = 3.72 cfs @ 12.12 hrs, Volume= 21,789 cf
Outflow = 3.72 cfs @ 12.12 hrs, Volume= 21,789 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.72 cfs @ 12.12 hrs, Volume= 21,789 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 50.26' @ 12.15 hrs
Flood Elev= 49.94'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 109.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.00' S= 0.0018 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.49 cfs @ 12.12 hrs HW=50.01' TW=48.80' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 3.49 cfs @ 4.44 fps)

Pond DMH101:



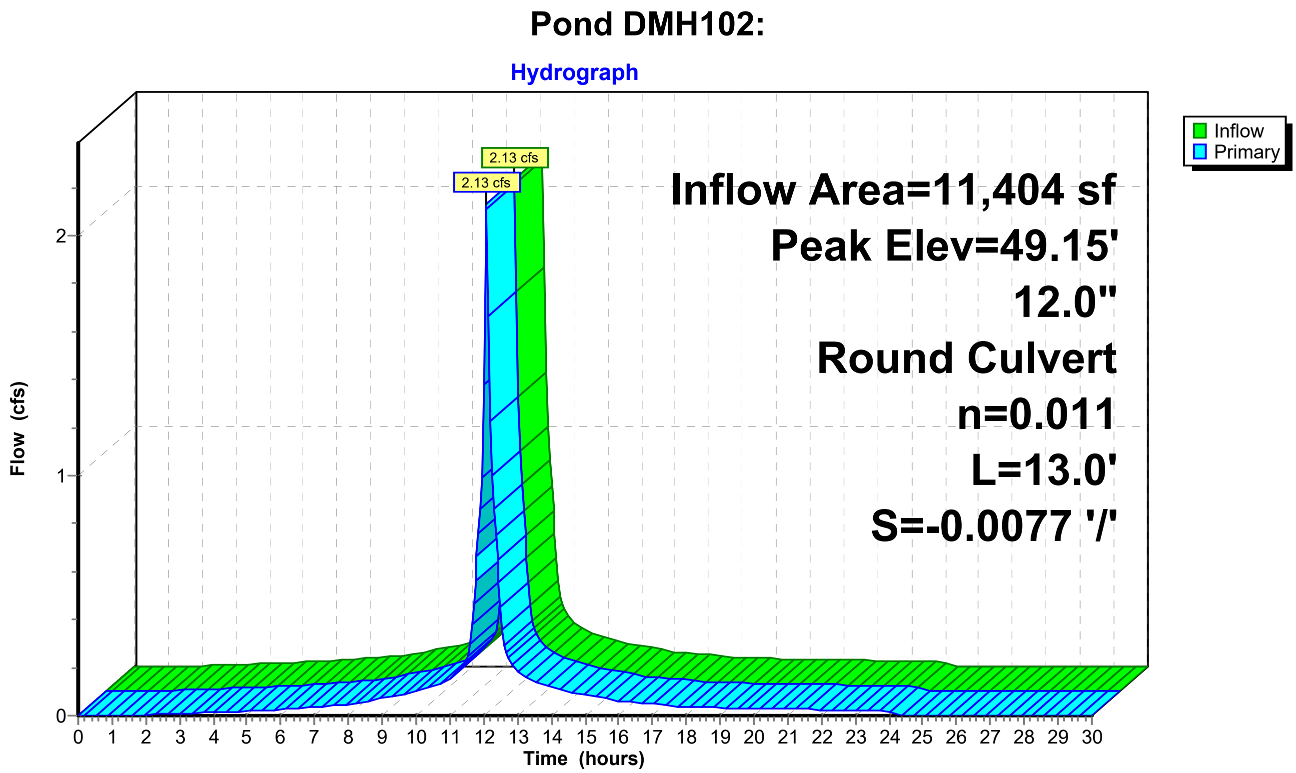
Summary for Pond DMH102:

Inflow Area =	11,404 sf,	45.90% Impervious,	Inflow Depth = 7.90"	for 100 yr event	
Inflow =	2.13 cfs @	12.09 hrs,	Volume=	7,506 cf	
Outflow =	2.13 cfs @	12.09 hrs,	Volume=	7,506 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.13 cfs @	12.09 hrs,	Volume=	7,506 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 49.15' @ 12.15 hrs
Flood Elev= 49.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.60'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 46.50' / 46.60' S= -0.0077 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.57' TW=48.83' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)



Summary for Pond DMH103:

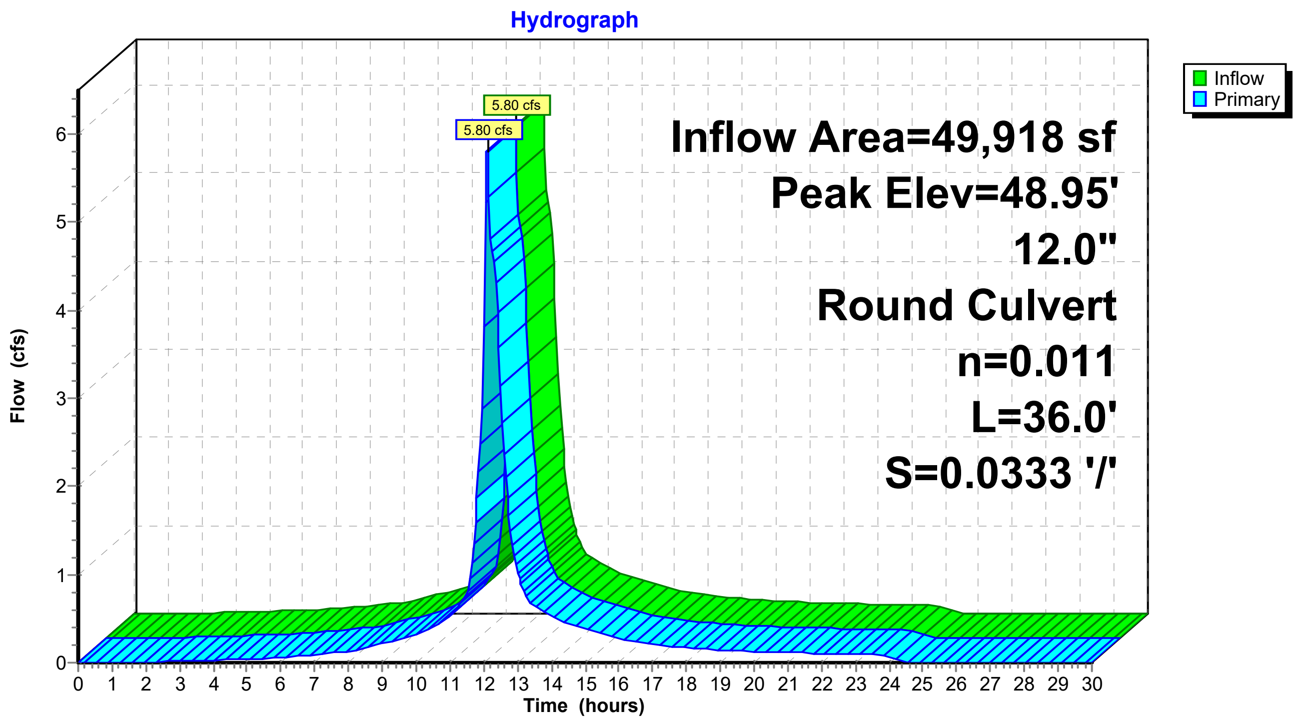
Inflow Area =	49,918 sf,	61.55% Impervious,	Inflow Depth = 7.04"	for 100 yr event	
Inflow =	5.80 cfs @	12.10 hrs,	Volume=	29,295 cf	
Outflow =	5.80 cfs @	12.10 hrs,	Volume=	29,295 cf,	Atten= 0%, Lag= 0.0 min
Primary =	5.80 cfs @	12.10 hrs,	Volume=	29,295 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.95' @ 12.10 hrs
Flood Elev= 50.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.10'	**12.0" Round Culvert** L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 46.10' / 44.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=5.78 cfs @ 12.10 hrs HW=48.94' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.78 cfs @ 7.36 fps)

Pond DMH103:



Summary for Pond DMH104:

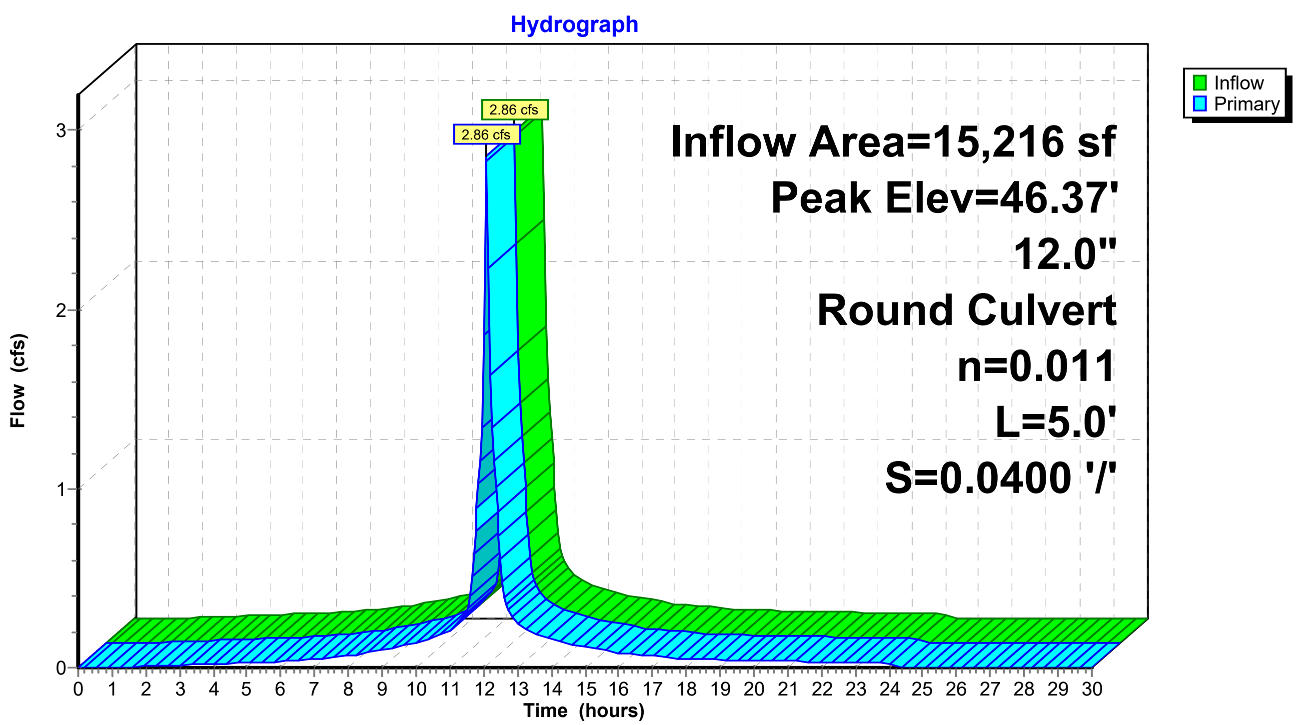
Inflow Area = 15,216 sf, 75.53% Impervious, Inflow Depth = 8.02" for 100 yr event
Inflow = 2.86 cfs @ 12.09 hrs, Volume= 10,168 cf
Outflow = 2.86 cfs @ 12.09 hrs, Volume= 10,168 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.86 cfs @ 12.09 hrs, Volume= 10,168 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.37' @ 12.09 hrs
Flood Elev= 49.08'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.30'	**12.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 45.30' / 45.10' S= 0.0400 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.78 cfs @ 12.09 hrs HW=46.34' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 2.78 cfs @ 3.54 fps)

Pond DMH104:

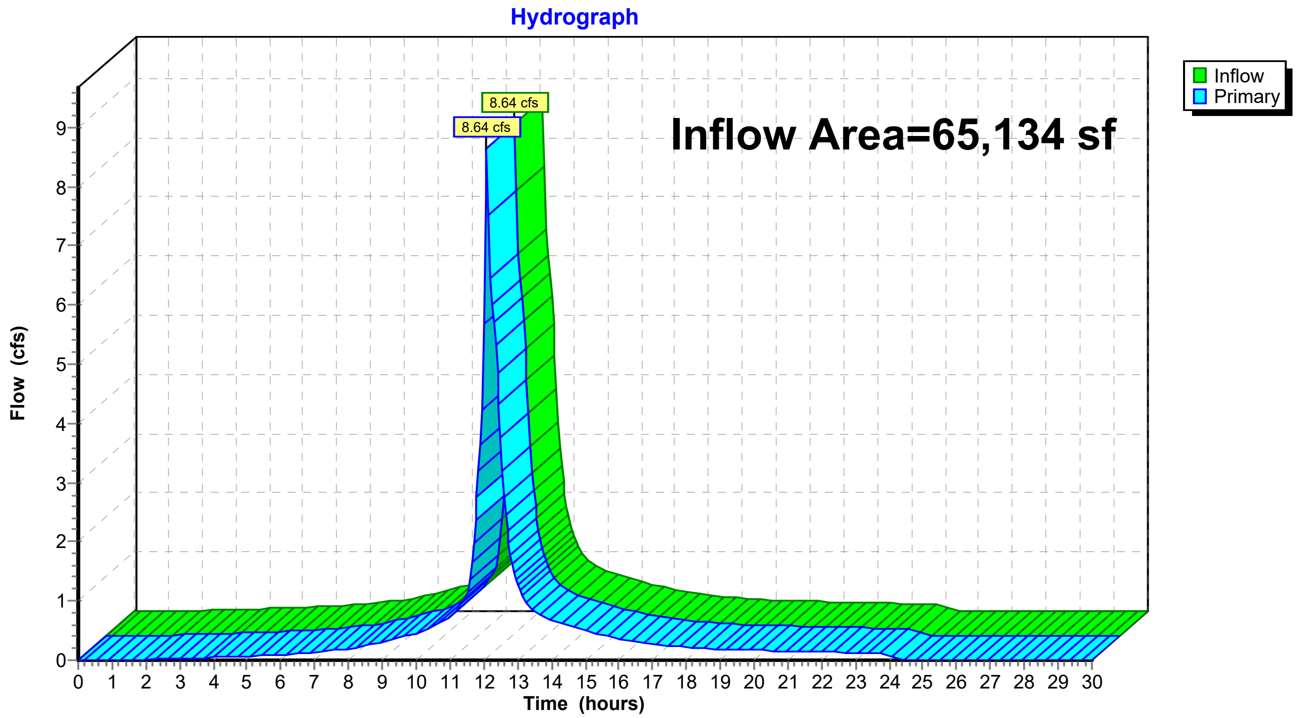


Summary for Pond DMH105:

Inflow Area = 65,134 sf, 64.81% Impervious, Inflow Depth = 7.27" for 100 yr event
Inflow = 8.64 cfs @ 12.10 hrs, Volume= 39,463 cf
Primary = 8.64 cfs @ 12.10 hrs, Volume= 39,463 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond DMH105:



Summary for Pond Pd1:

Inflow Area = 123,196 sf, 3.61% Impervious, Inflow Depth = 3.81" for 100 yr event
Inflow = 7.37 cfs @ 12.39 hrs, Volume= 39,066 cf
Outflow = 4.00 cfs @ 12.76 hrs, Volume= 39,066 cf, Atten= 46%, Lag= 22.5 min
Discarded = 4.00 cfs @ 12.76 hrs, Volume= 39,066 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.40' @ 12.76 hrs Surf.Area= 23,504 sf Storage= 8,704 cf

Plug-Flow detention time= 28.0 min calculated for 39,066 cf (100% of inflow)
Center-of-Mass det. time= 27.8 min (889.5 - 861.7)

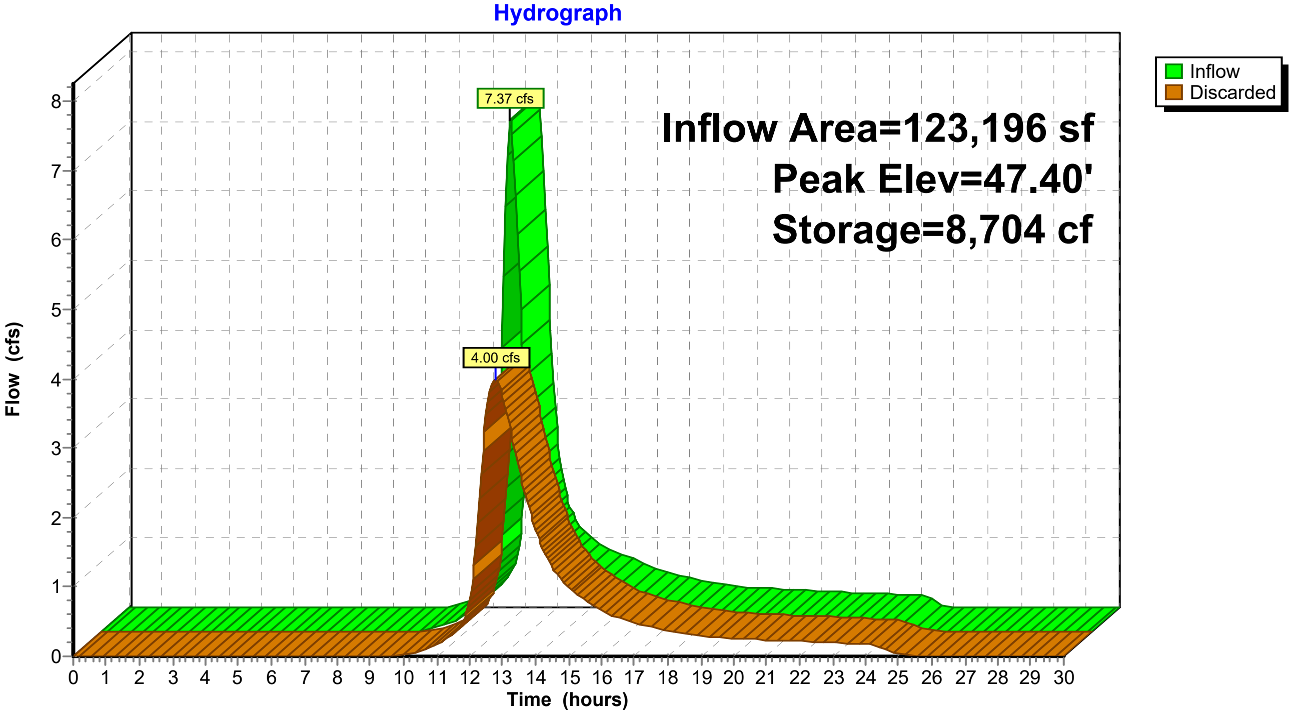
Volume	Invert	Avail.Storage	Storage Description
#1	46.50'	11,412 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.50	1,440	159.0	0	0	1,440
47.00	9,376	562.0	2,415	2,415	24,563
47.50	28,312	963.0	8,997	11,412	73,228

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.50'	**7.825 in/hr Exfiltration over Surface area above 46.50'** Excluded Surface area = 1,440 sf

Discarded OutFlow Max=3.99 cfs @ 12.76 hrs HW=47.39' (Free Discharge)
1=Exfiltration (Exfiltration Controls 3.99 cfs)

Pond Pd1:

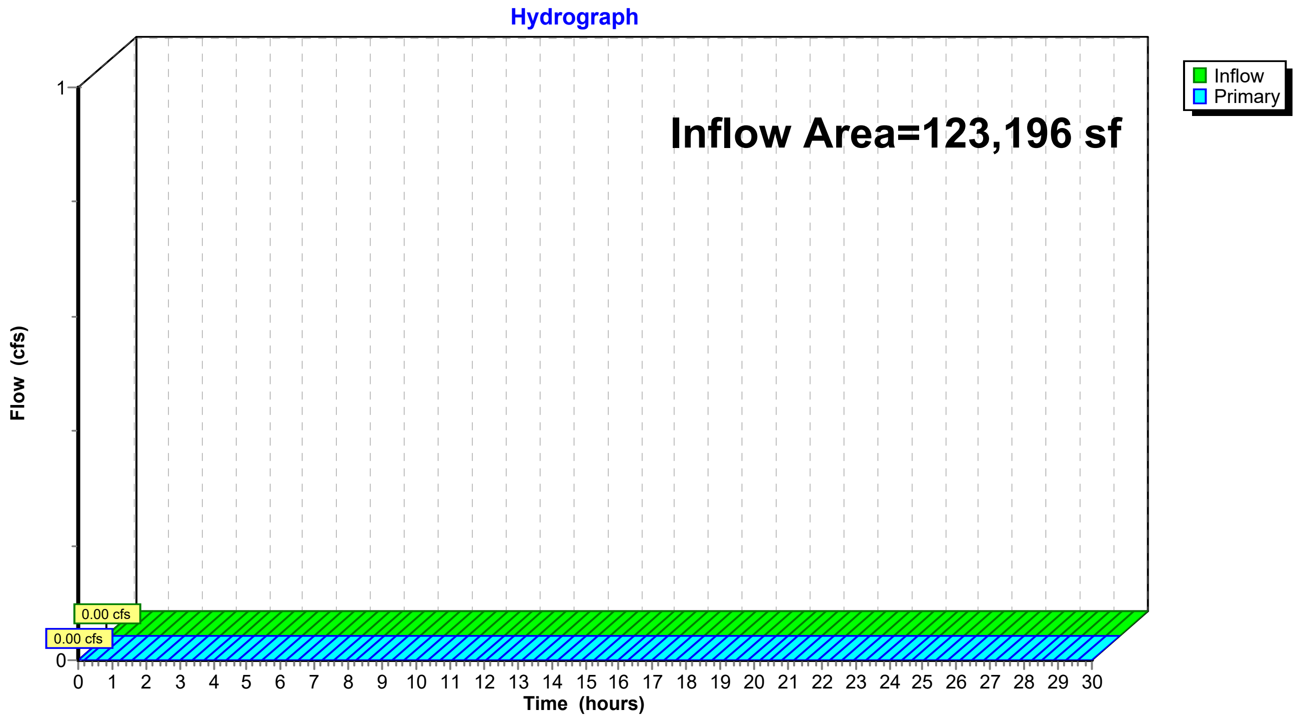

Hydrograph
Inflow
Discarded
7.37 cfs
4.00 cfs
Inflow Area=123,196 sf
Peak Elev=47.40'
Storage=8,704 cf
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Summary for Link POI 1: Onsite Infiltration East

Inflow Area =	123,196 sf,	3.61% Impervious,	Inflow Depth = 0.00"	for 100 yr event	
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf		
Primary =	0.00 cfs @	0.00 hrs, Volume=	0 cf,	Atten= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 1: Onsite Infiltration East

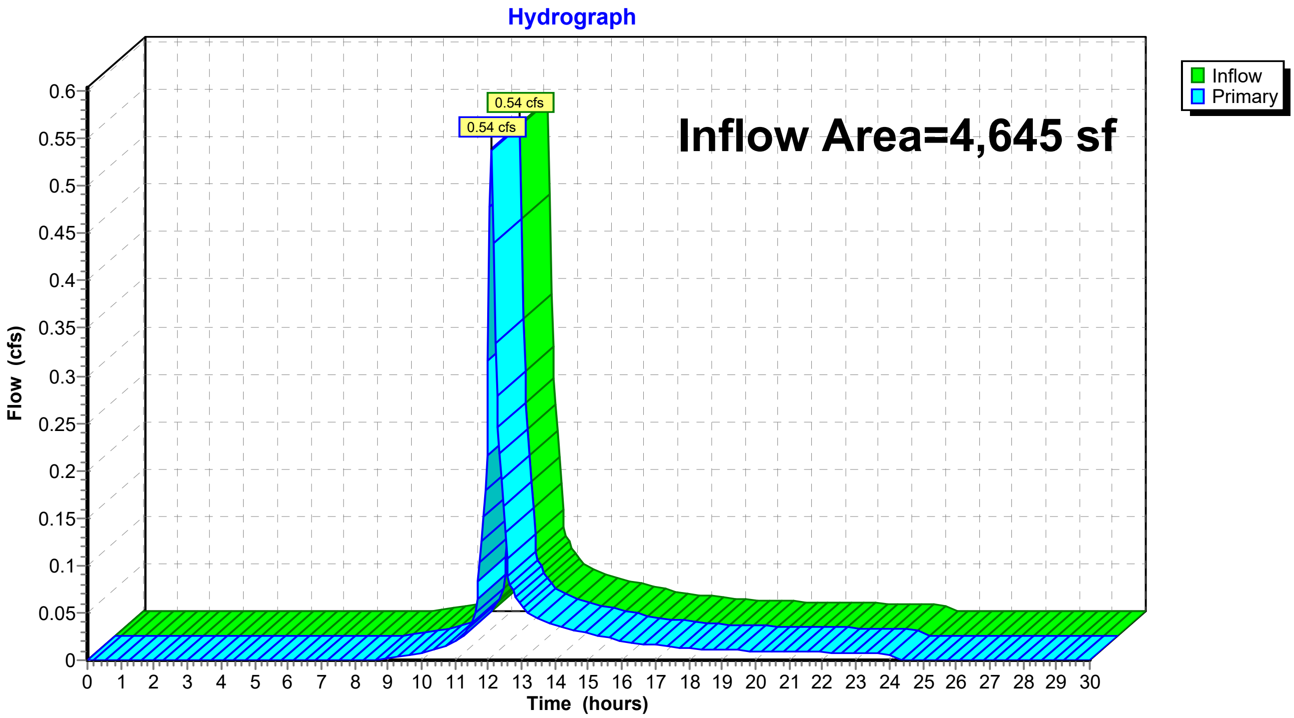


Summary for Link POI 2: Offsite at Southeast Property Line

Inflow Area = 4,645 sf, 0.00% Impervious, Inflow Depth = 4.40" for 100 yr event
Inflow = 0.54 cfs @ 12.09 hrs, Volume= 1,704 cf
Primary = 0.54 cfs @ 12.09 hrs, Volume= 1,704 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 2: Offsite at Southeast Property Line

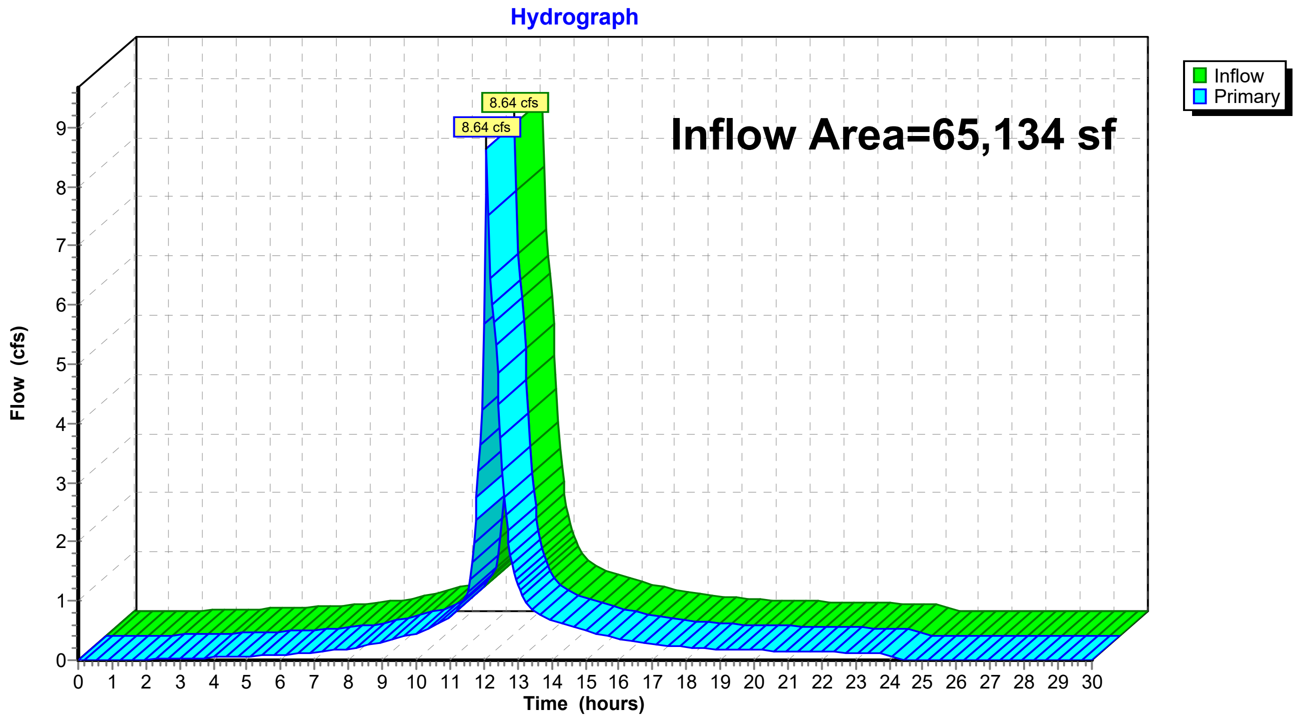


Summary for Link POI 3: Cranberry Highway Closed Drainage System

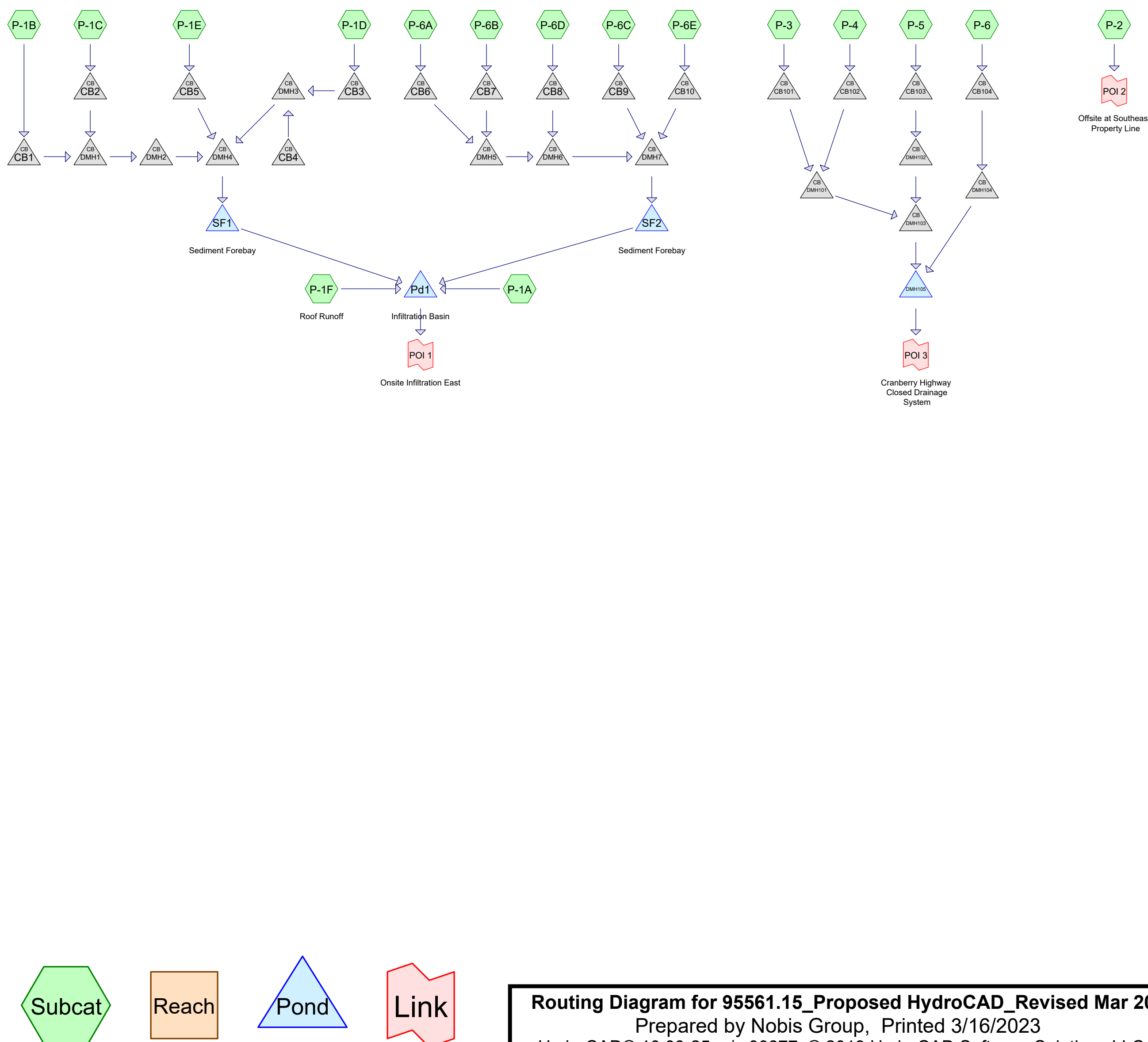
Inflow Area = 65,134 sf, 64.81% Impervious, Inflow Depth = 7.27" for 100 yr event
Inflow = 8.64 cfs @ 12.10 hrs, Volume= 39,463 cf
Primary = 8.64 cfs @ 12.10 hrs, Volume= 39,463 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 3: Cranberry Highway Closed Drainage System



Proposed Conditions



Routing Diagram for 95561.15_Proposed HydroCAD_Revised Mar 2023
Prepared by Nobis Group, Printed 3/16/2023
HydroCAD® 10.00-25 s/n 00877 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
86,390	61	>75% Grass cover, Good, HSG B (P-1A, P-1E, P-2, P-3, P-4, P-5, P-6, P-6B, P-6E)
47,794	98	Paved parking, HSG B (P-1B, P-1C, P-1D, P-1E, P-3, P-4, P-5, P-6, P-6A, P-6B, P-6C, P-6D, P-6E)
30,520	98	Roofs, HSG B (P-1A, P-1F)
28,271	55	Woods, Good, HSG B (P-1A, P-2, P-3)
192,975	**75**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
192,975	HSG B	P-1A, P-1B, P-1C, P-1D, P-1E, P-1F, P-2, P-3, P-4, P-5, P-6, P-6A, P-6B, P-6C, P-6D, P-6E
0	HSG C	
0	HSG D	
0	Other	
192,975		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
0	86,390	0	0	0	86,390	>75% Grass cover, Good	
0	47,794	0	0	0	47,794	Paved parking	
0	30,520	0	0	0	30,520	Roofs	
0	28,271	0	0	0	28,271	Woods, Good	
0	**192,975**	**0**	**0**	**0**	**192,975**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	CB1	48.00	47.50	93.0	0.0054	0.011	12.0	0.0	0.0
2	CB10	46.30	46.00	46.0	0.0065	0.011	12.0	0.0	0.0
3	CB101	46.40	46.50	29.0	-0.0034	0.011	12.0	0.0	0.0
4	CB102	49.70	49.50	6.0	0.0333	0.011	12.0	0.0	0.0
5	CB103	46.90	46.70	6.0	0.0333	0.011	12.0	0.0	0.0
6	CB104	46.20	46.10	2.0	0.0500	0.011	12.0	0.0	0.0
7	CB2	47.60	47.50	8.0	0.0125	0.011	12.0	0.0	0.0
8	CB3	47.80	47.20	104.0	0.0058	0.011	12.0	0.0	0.0
9	CB4	47.40	47.20	25.0	0.0080	0.011	12.0	0.0	0.0
10	CB5	47.00	46.80	27.0	0.0074	0.011	12.0	0.0	0.0
11	CB6	48.00	47.50	86.0	0.0058	0.011	12.0	0.0	0.0
12	CB7	47.60	47.50	8.0	0.0125	0.011	12.0	0.0	0.0
13	CB8	46.80	46.70	6.0	0.0167	0.011	12.0	0.0	0.0
14	CB9	46.10	46.00	7.0	0.0143	0.011	12.0	0.0	0.0
15	DMH1	47.40	47.30	13.0	0.0077	0.011	12.0	0.0	0.0
16	DMH101	46.20	46.00	109.0	0.0018	0.011	12.0	0.0	0.0
17	DMH102	46.50	46.60	13.0	-0.0077	0.011	12.0	0.0	0.0
18	DMH103	46.10	44.90	36.0	0.0333	0.011	12.0	0.0	0.0
19	DMH104	45.30	45.10	5.0	0.0400	0.011	12.0	0.0	0.0
20	DMH2	47.20	46.80	89.0	0.0045	0.011	12.0	0.0	0.0
21	DMH3	47.10	46.80	46.0	0.0065	0.011	12.0	0.0	0.0
22	DMH4	46.70	46.60	11.0	0.0091	0.011	12.0	0.0	0.0
23	DMH5	47.40	46.70	132.0	0.0053	0.011	12.0	0.0	0.0
24	DMH6	46.60	46.00	108.0	0.0056	0.011	12.0	0.0	0.0
25	DMH7	45.90	45.70	38.0	0.0053	0.011	12.0	0.0	0.0

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentP-1A: Runoff Area=83,866 sf 0.62% Impervious Runoff Depth=0.43"
Flow Length=347' Tc=19.6 min CN=59 Runoff=0.41 cfs 3,014 cf

SubcatchmentP-1B: Runoff Area=2,421 sf 100.00% Impervious Runoff Depth=3.12"
Tc=6.0 min CN=98 Runoff=0.18 cfs 629 cf

SubcatchmentP-1C: Runoff Area=2,478 sf 100.00% Impervious Runoff Depth=3.12"
Tc=6.0 min CN=98 Runoff=0.18 cfs 644 cf

SubcatchmentP-1D: Runoff Area=2,367 sf 100.00% Impervious Runoff Depth=3.12"
Tc=6.0 min CN=98 Runoff=0.17 cfs 615 cf

SubcatchmentP-1E: Runoff Area=7,526 sf 97.81% Impervious Runoff Depth=3.01"
Tc=6.0 min CN=97 Runoff=0.54 cfs 1,885 cf

SubcatchmentP-1F: Roof Runoff Runoff Area=30,000 sf 100.00% Impervious Runoff Depth=3.12"
Tc=6.0 min CN=98 Runoff=2.19 cfs 7,792 cf

SubcatchmentP-2: Runoff Area=5,227 sf 0.00% Impervious Runoff Depth=0.51"
Tc=6.0 min CN=61 Runoff=0.05 cfs 221 cf

SubcatchmentP-3: Runoff Area=15,280 sf 18.69% Impervious Runoff Depth=0.77"
Flow Length=242' Tc=26.3 min CN=67 Runoff=0.16 cfs 977 cf

SubcatchmentP-4: Runoff Area=7,214 sf 39.20% Impervious Runoff Depth=1.26"
Tc=6.0 min CN=76 Runoff=0.23 cfs 756 cf

SubcatchmentP-5: Runoff Area=4,858 sf 99.28% Impervious Runoff Depth=3.12"
Tc=6.0 min CN=98 Runoff=0.35 cfs 1,262 cf

SubcatchmentP-6: Runoff Area=9,409 sf 56.68% Impervious Runoff Depth=1.66"
Flow Length=123' Tc=5.3 min CN=82 Runoff=0.42 cfs 1,301 cf

SubcatchmentP-6A: Runoff Area=2,359 sf 100.00% Impervious Runoff Depth=3.12"
Tc=6.0 min CN=98 Runoff=0.17 cfs 613 cf

SubcatchmentP-6B: Runoff Area=6,232 sf 97.35% Impervious Runoff Depth=3.01"
Tc=6.0 min CN=97 Runoff=0.45 cfs 1,561 cf

SubcatchmentP-6C: Runoff Area=1,457 sf 100.00% Impervious Runoff Depth=3.12"
Tc=6.0 min CN=98 Runoff=0.11 cfs 378 cf

SubcatchmentP-6D: Runoff Area=4,650 sf 100.00% Impervious Runoff Depth=3.12"
Tc=6.0 min CN=98 Runoff=0.34 cfs 1,208 cf

SubcatchmentP-6E: Runoff Area=7,631 sf 36.61% Impervious Runoff Depth=1.20"
Tc=6.0 min CN=75 Runoff=0.23 cfs 761 cf

Pond CB1:	Peak Elev=48.23' Inflow=0.18 cfs 629 cf 12.0" Round Culvert n=0.011 L=93.0' S=0.0054 '/' Outflow=0.18 cfs 629 cf
Pond CB10:	Peak Elev=47.66' Inflow=0.23 cfs 761 cf 12.0" Round Culvert n=0.011 L=46.0' S=0.0065 '/' Outflow=0.23 cfs 761 cf
Pond CB101:	Peak Elev=46.70' Inflow=0.16 cfs 977 cf 12.0" Round Culvert n=0.011 L=29.0' S=-0.0034 '/' Outflow=0.16 cfs 977 cf
Pond CB102:	Peak Elev=49.94' Inflow=0.23 cfs 756 cf 12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=0.23 cfs 756 cf
Pond CB103:	Peak Elev=47.19' Inflow=0.35 cfs 1,262 cf 12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=0.35 cfs 1,262 cf
Pond CB104:	Peak Elev=46.53' Inflow=0.42 cfs 1,301 cf 12.0" Round Culvert n=0.011 L=2.0' S=0.0500 '/' Outflow=0.42 cfs 1,301 cf
Pond CB2:	Peak Elev=47.90' Inflow=0.18 cfs 644 cf 12.0" Round Culvert n=0.011 L=8.0' S=0.0125 '/' Outflow=0.18 cfs 644 cf
Pond CB3:	Peak Elev=48.06' Inflow=0.17 cfs 615 cf 12.0" Round Culvert n=0.011 L=104.0' S=0.0058 '/' Outflow=0.17 cfs 615 cf
Pond CB4:	Peak Elev=0.00' 12.0" Round Culvert n=0.011 L=25.0' S=0.0080 '/' Primary=0.00 cfs 0 cf
Pond CB5:	Peak Elev=47.85' Inflow=0.54 cfs 1,885 cf 12.0" Round Culvert n=0.011 L=27.0' S=0.0074 '/' Outflow=0.54 cfs 1,885 cf
Pond CB6:	Peak Elev=48.23' Inflow=0.17 cfs 613 cf 12.0" Round Culvert n=0.011 L=86.0' S=0.0058 '/' Outflow=0.17 cfs 613 cf
Pond CB7:	Peak Elev=47.99' Inflow=0.45 cfs 1,561 cf 12.0" Round Culvert n=0.011 L=8.0' S=0.0125 '/' Outflow=0.45 cfs 1,561 cf
Pond CB8:	Peak Elev=47.69' Inflow=0.34 cfs 1,208 cf 12.0" Round Culvert n=0.011 L=6.0' S=0.0167 '/' Outflow=0.34 cfs 1,208 cf
Pond CB9:	Peak Elev=47.66' Inflow=0.11 cfs 378 cf 12.0" Round Culvert n=0.011 L=7.0' S=0.0143 '/' Outflow=0.11 cfs 378 cf
Pond DMH1:	Peak Elev=47.88' Inflow=0.36 cfs 1,272 cf 12.0" Round Culvert n=0.011 L=13.0' S=0.0077 '/' Outflow=0.36 cfs 1,272 cf
Pond DMH101:	Peak Elev=46.62' Inflow=0.28 cfs 1,733 cf 12.0" Round Culvert n=0.011 L=109.0' S=0.0018 '/' Outflow=0.28 cfs 1,733 cf
Pond DMH102:	Peak Elev=46.90' Inflow=0.35 cfs 1,262 cf 12.0" Round Culvert n=0.011 L=13.0' S=-0.0077 '/' Outflow=0.35 cfs 1,262 cf

Pond DMH103: Peak Elev=46.50' Inflow=0.63 cfs 2,995 cf
12.0" Round Culvert n=0.011 L=36.0' S=0.0333 '/' Outflow=0.63 cfs 2,995 cf

Pond DMH104: Peak Elev=45.62' Inflow=0.42 cfs 1,301 cf
12.0" Round Culvert n=0.011 L=5.0' S=0.0400 '/' Outflow=0.42 cfs 1,301 cf

Pond DMH105: Inflow=1.04 cfs 4,296 cf
Primary=1.04 cfs 4,296 cf

Pond DMH2: Peak Elev=47.86' Inflow=0.36 cfs 1,272 cf
12.0" Round Culvert n=0.011 L=89.0' S=0.0045 '/' Outflow=0.36 cfs 1,272 cf

Pond DMH3: Peak Elev=47.84' Inflow=0.17 cfs 615 cf
12.0" Round Culvert n=0.011 L=46.0' S=0.0065 '/' Outflow=0.17 cfs 615 cf

Pond DMH4: Peak Elev=47.83' Inflow=1.07 cfs 3,773 cf
12.0" Round Culvert n=0.011 L=11.0' S=0.0091 '/' Outflow=1.07 cfs 3,773 cf

Pond DMH5: Peak Elev=47.88' Inflow=0.62 cfs 2,174 cf
12.0" Round Culvert n=0.011 L=132.0' S=0.0053 '/' Outflow=0.62 cfs 2,174 cf

Pond DMH6: Peak Elev=47.69' Inflow=0.96 cfs 3,381 cf
12.0" Round Culvert n=0.011 L=108.0' S=0.0056 '/' Outflow=0.96 cfs 3,381 cf

Pond DMH7: Peak Elev=47.66' Inflow=1.30 cfs 4,521 cf
12.0" Round Culvert n=0.011 L=38.0' S=0.0053 '/' Outflow=1.30 cfs 4,521 cf

Pond Pd1: Infiltration Basin Peak Elev=46.03' Storage=517 cf Inflow=3.87 cfs 16,060 cf
Outflow=2.65 cfs 16,122 cf

Pond SF1: Sediment Forebay Peak Elev=47.77' Storage=1,387 cf Inflow=1.07 cfs 3,773 cf
Outflow=1.02 cfs 2,537 cf

Pond SF2: Sediment Forebay Peak Elev=47.63' Storage=1,971 cf Inflow=1.30 cfs 4,521 cf
Outflow=1.09 cfs 2,716 cf

Link POI 1: Onsite Infiltration East Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link POI 2: Offsite at Southeast Property Line Inflow=0.05 cfs 221 cf
Primary=0.05 cfs 221 cf

Link POI 3: Cranberry Highway Closed Drainage System Inflow=1.04 cfs 4,296 cf
Primary=1.04 cfs 4,296 cf

Total Runoff Area = 192,975 sf Runoff Volume = 23,616 cf Average Runoff Depth = 1.47"
59.42% Pervious = 114,661 sf 40.58% Impervious = 78,314 sf

Summary for Subcatchment P-1A:

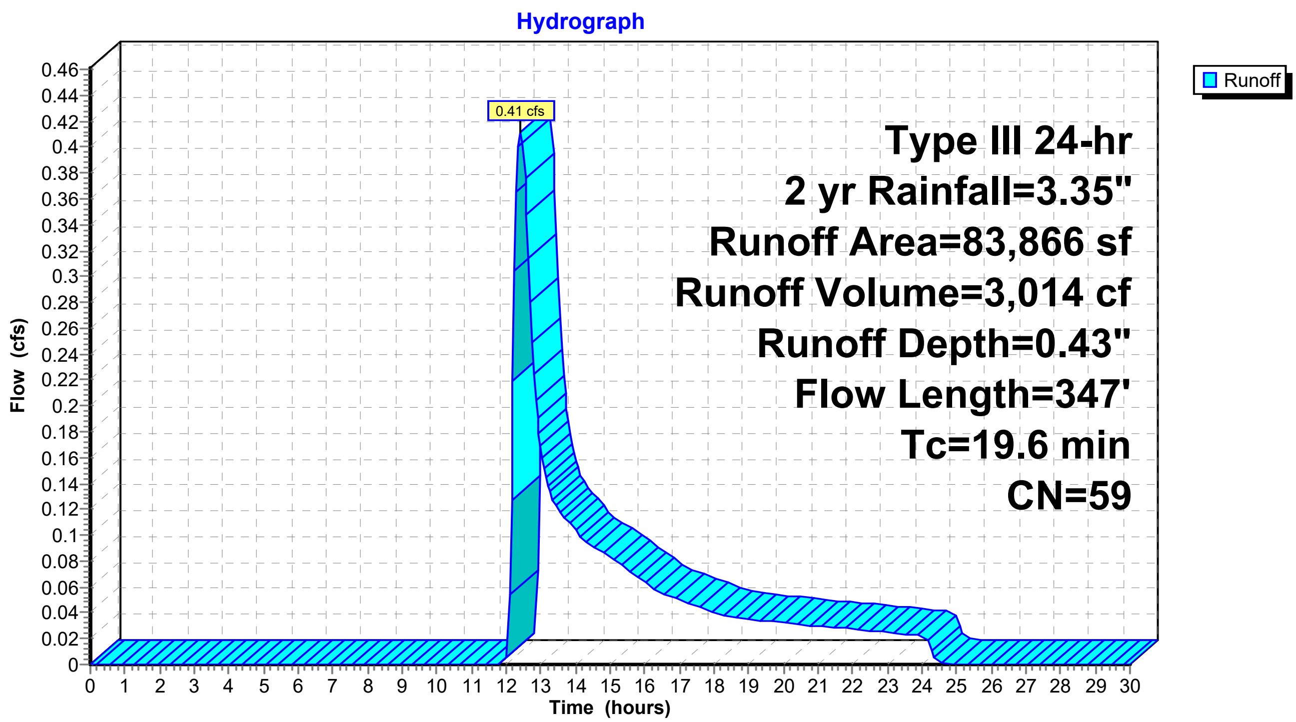
Runoff = 0.41 cfs @ 12.42 hrs, Volume= 3,014 cf, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
25,220	55	Woods, Good, HSG B
520	98	Roofs, HSG B
58,126	61	>75% Grass cover, Good, HSG B
83,866	59	Weighted Average
83,346		99.38% Pervious Area
520		0.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	50	0.0200	0.07		**Sheet Flow, Woods, 50', 2%** Woods: Light underbrush n= 0.400 P2= 3.35"
5.3	160	0.0100	0.50		**Shallow Concentrated Flow, Woods, 160', 1%** Woodland Kv= 5.0 fps
2.2	137	0.0230	1.06		**Shallow Concentrated Flow, Grass, 137', 2.3%** Short Grass Pasture Kv= 7.0 fps
19.6	347	Total			

Subcatchment P-1A:



Summary for Subcatchment P-1B:

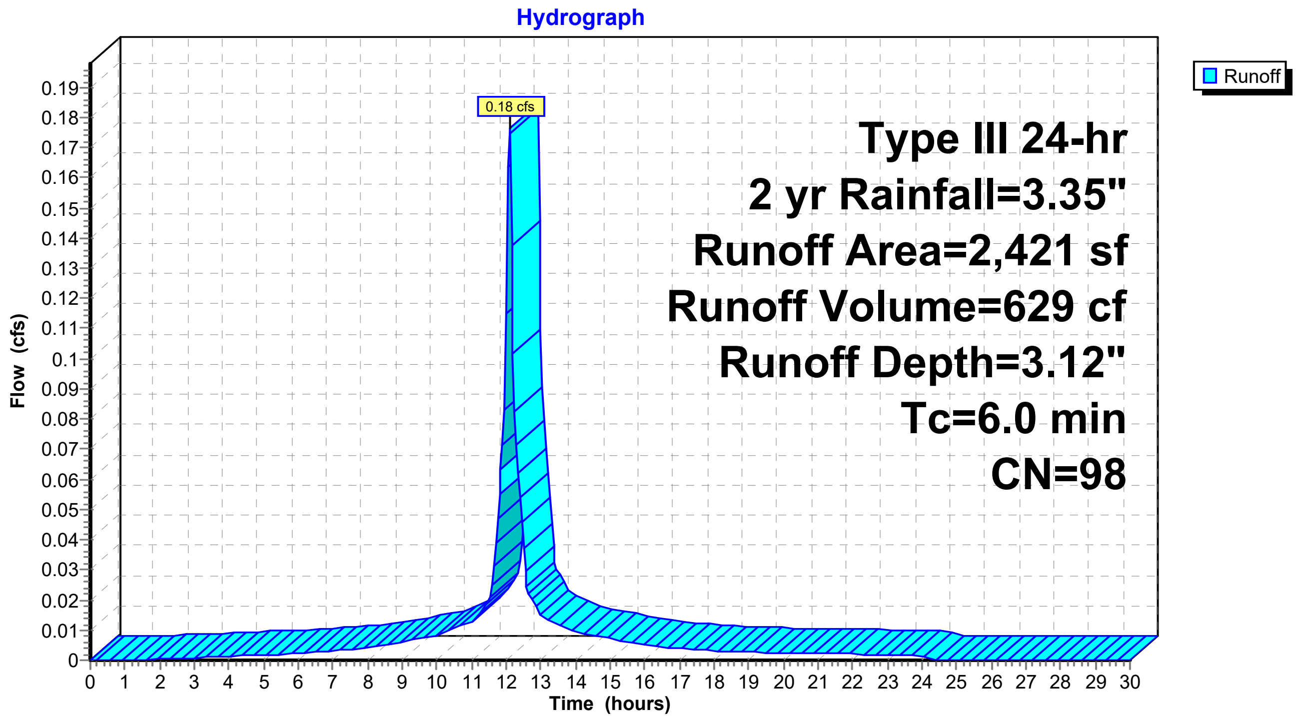
Runoff = 0.18 cfs @ 12.09 hrs, Volume= 629 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
2,421	98	Paved parking, HSG B
2,421		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1B:



Summary for Subcatchment P-1C:

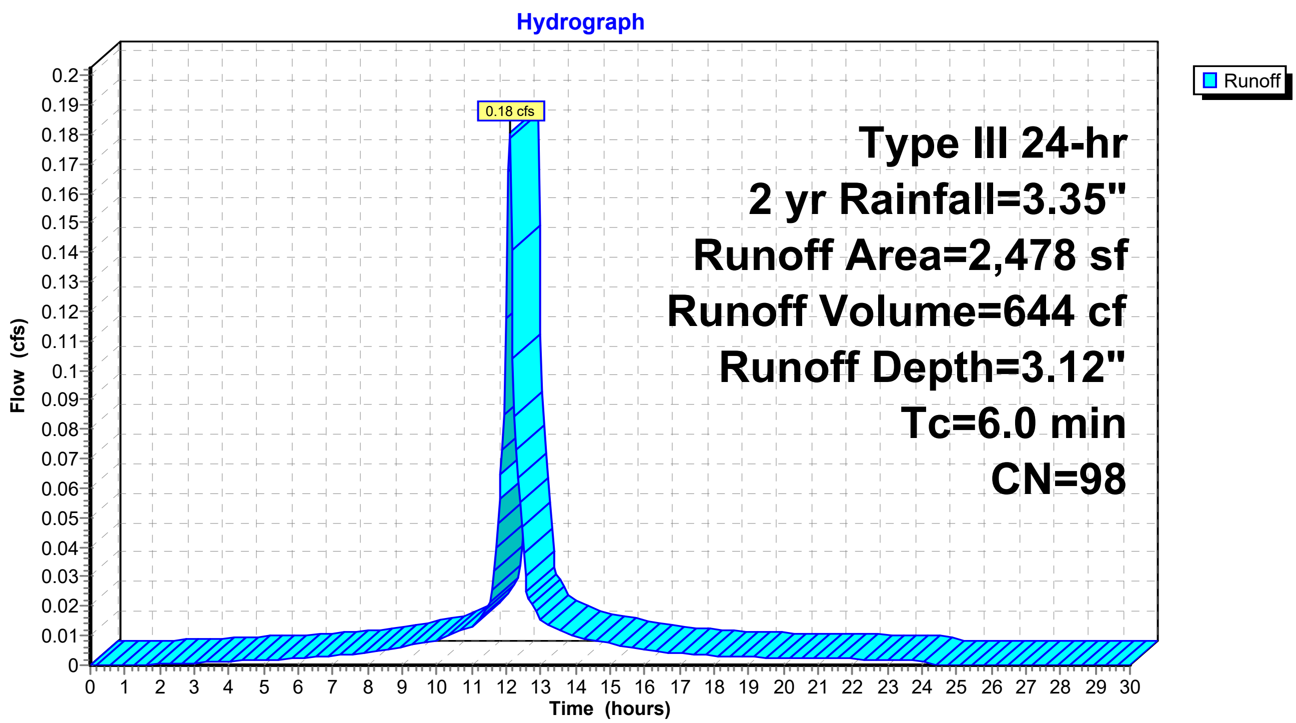
Runoff = 0.18 cfs @ 12.09 hrs, Volume= 644 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
2,478	98	Paved parking, HSG B
2,478		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1C:



Summary for Subcatchment P-1D:

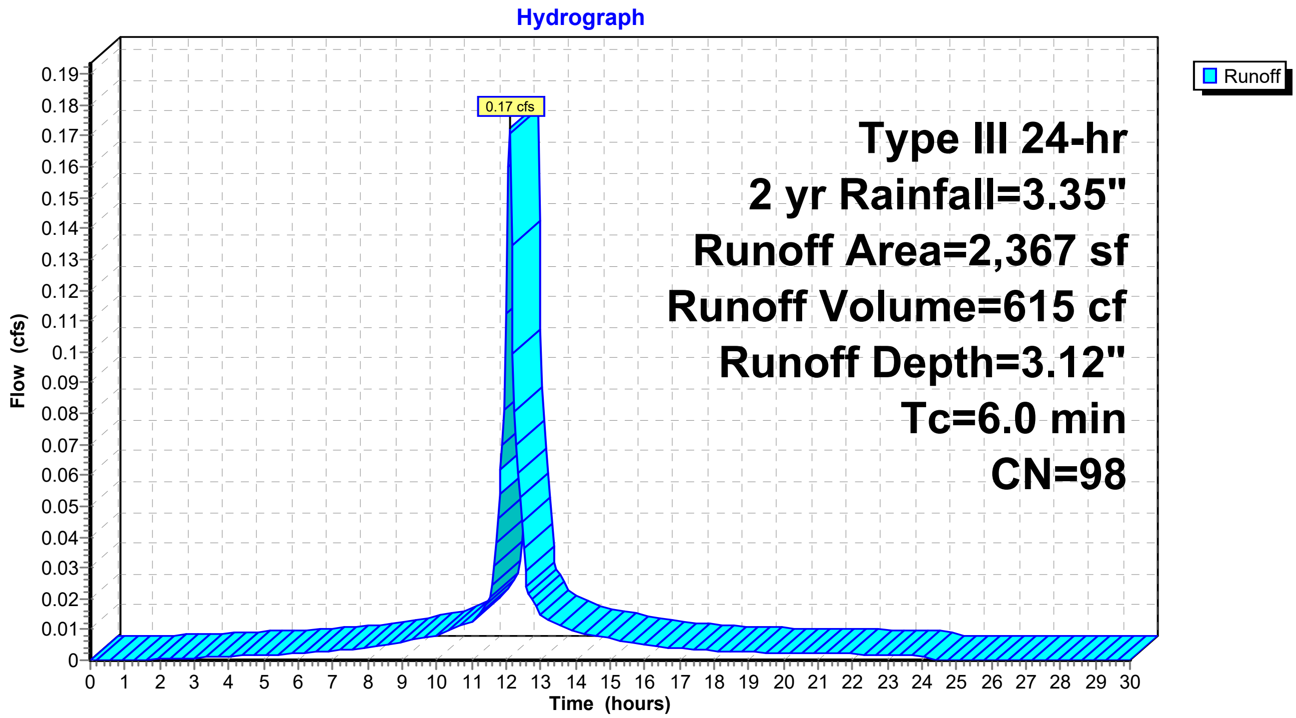
Runoff = 0.17 cfs @ 12.09 hrs, Volume= 615 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
2,367	98	Paved parking, HSG B
2,367		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1D:



Summary for Subcatchment P-1E:

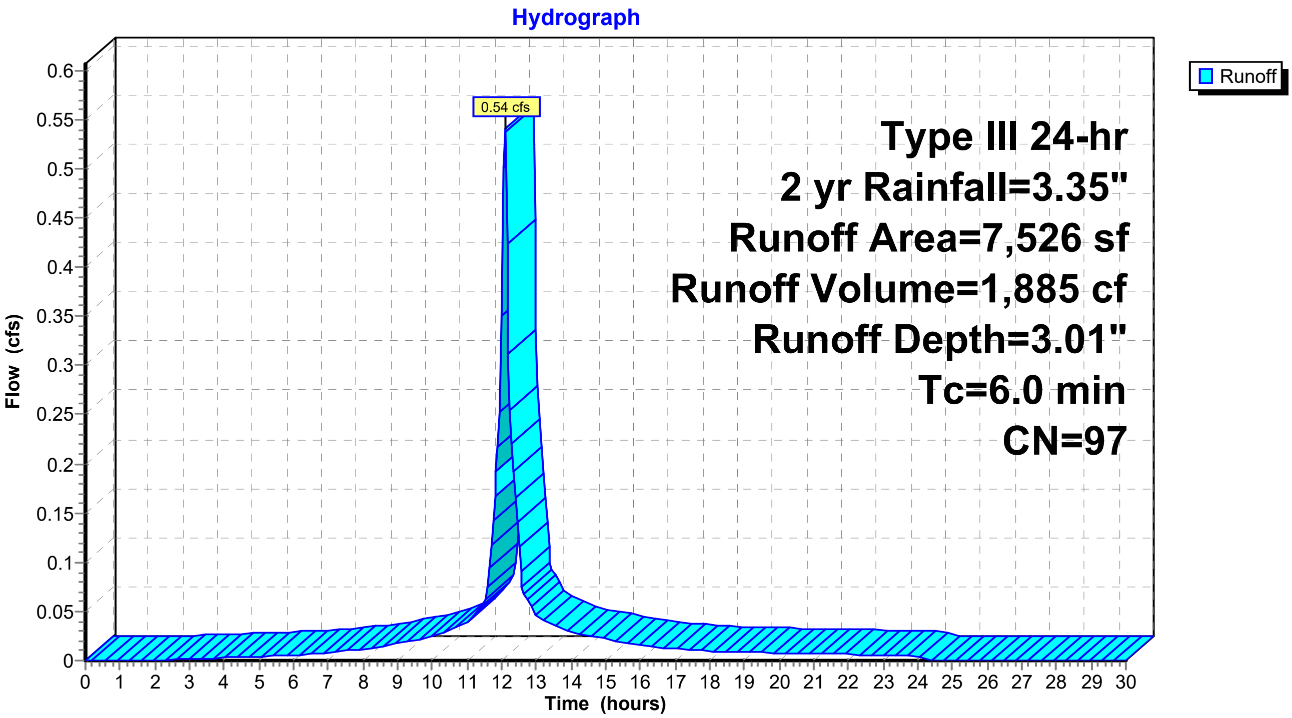
Runoff = 0.54 cfs @ 12.09 hrs, Volume= 1,885 cf, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
7,361	98	Paved parking, HSG B
165	61	>75% Grass cover, Good, HSG B
7,526	97	Weighted Average
165		2.19% Pervious Area
7,361		97.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1E:



Summary for Subcatchment P-1F: Roof Runoff

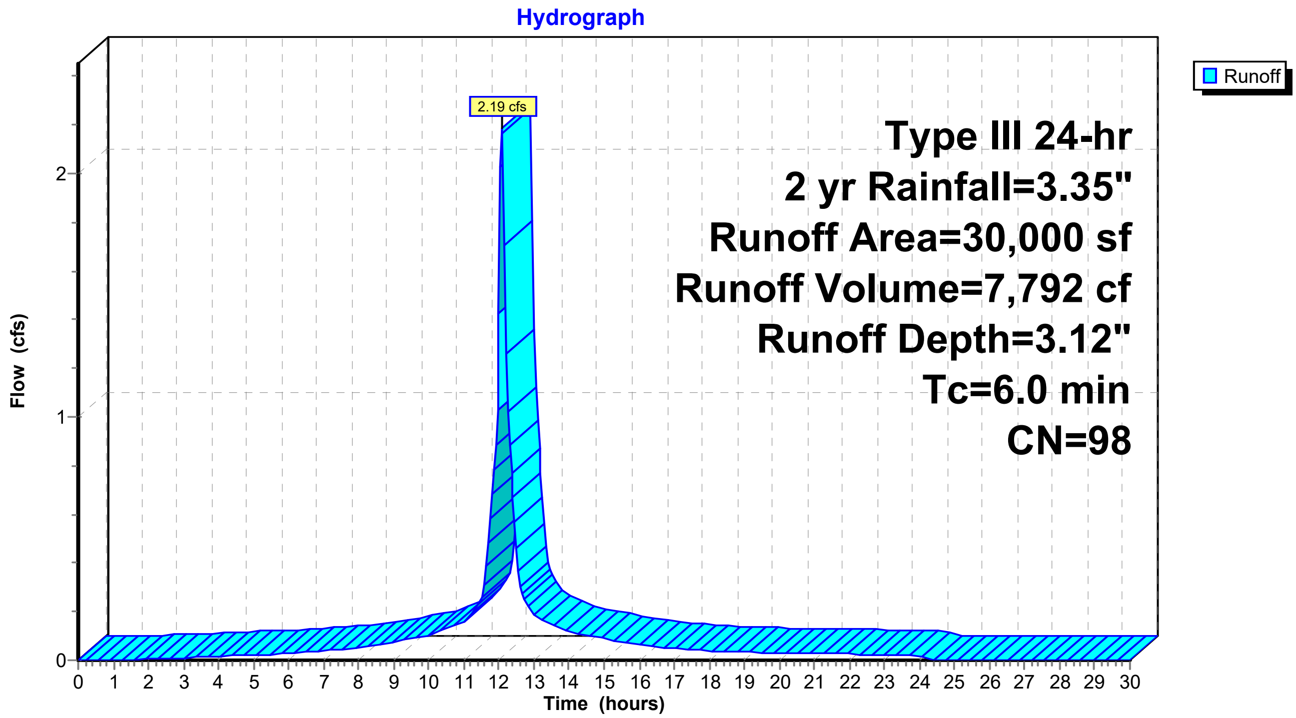
Runoff = 2.19 cfs @ 12.09 hrs, Volume= 7,792 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
30,000	98	Roofs, HSG B
30,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1F: Roof Runoff



Summary for Subcatchment P-2:

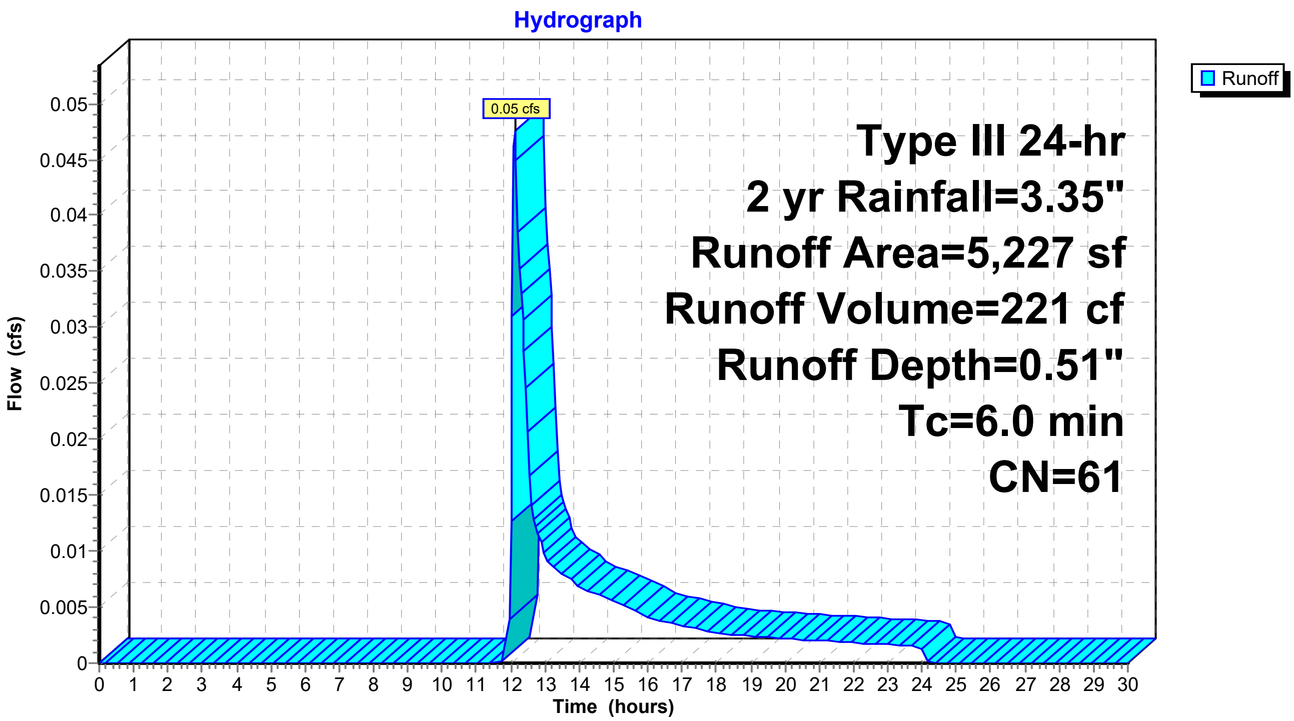
Runoff = 0.05 cfs @ 12.12 hrs, Volume= 221 cf, Depth= 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
153	55	Woods, Good, HSG B
5,074	61	>75% Grass cover, Good, HSG B
5,227	61	Weighted Average
5,227		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-2:



Summary for Subcatchment P-3:

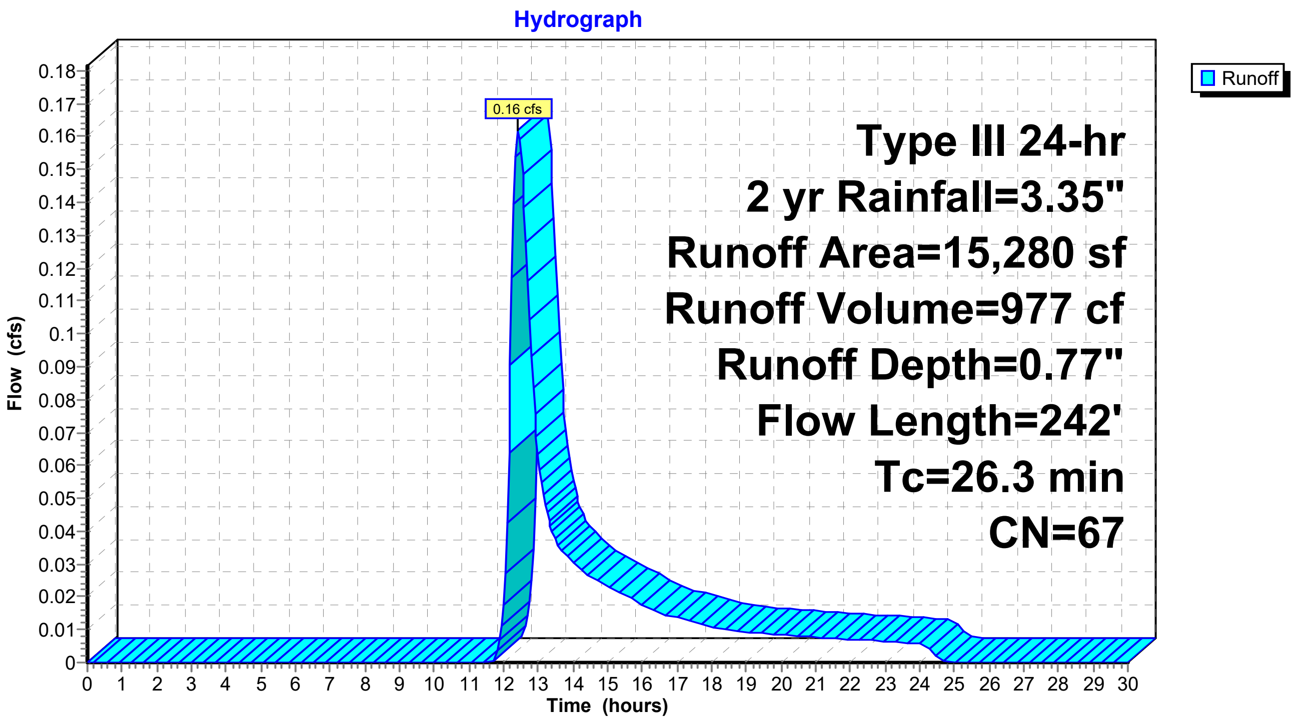
Runoff = 0.16 cfs @ 12.43 hrs, Volume= 977 cf, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
2,898	55	Woods, Good, HSG B
2,856	98	Paved parking, HSG B
9,526	61	>75% Grass cover, Good, HSG B
15,280	67	Weighted Average
12,424		81.31% Pervious Area
2,856		18.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	55	0.0050	0.04		**Sheet Flow, Woods, 55', 0.5%** Woods: Light underbrush n= 0.400 P2= 3.35"
0.2	5	0.0050	0.35		**Shallow Concentrated Flow, Woods, 5%, 0.5%** Woodland Kv= 5.0 fps
2.8	117	0.0100	0.70		**Shallow Concentrated Flow, Grass, 117', 1%** Short Grass Pasture Kv= 7.0 fps
0.6	65	0.0080	1.82		**Shallow Concentrated Flow, Pavement, 65', 0.8%** Paved Kv= 20.3 fps
26.3	242	Total			

Subcatchment P-3:



Summary for Subcatchment P-4:

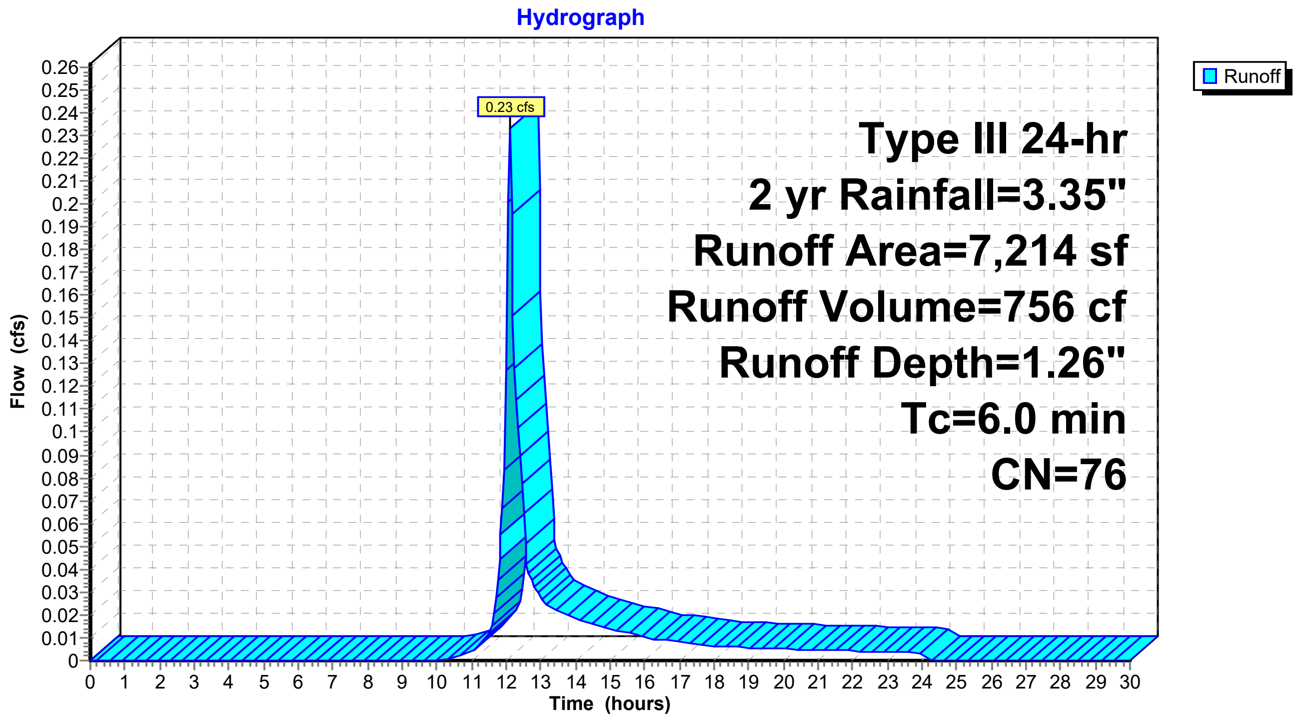
Runoff = 0.23 cfs @ 12.10 hrs, Volume= 756 cf, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
2,828	98	Paved parking, HSG B
4,386	61	>75% Grass cover, Good, HSG B
7,214	76	Weighted Average
4,386		60.80% Pervious Area
2,828		39.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-4:



Summary for Subcatchment P-5:

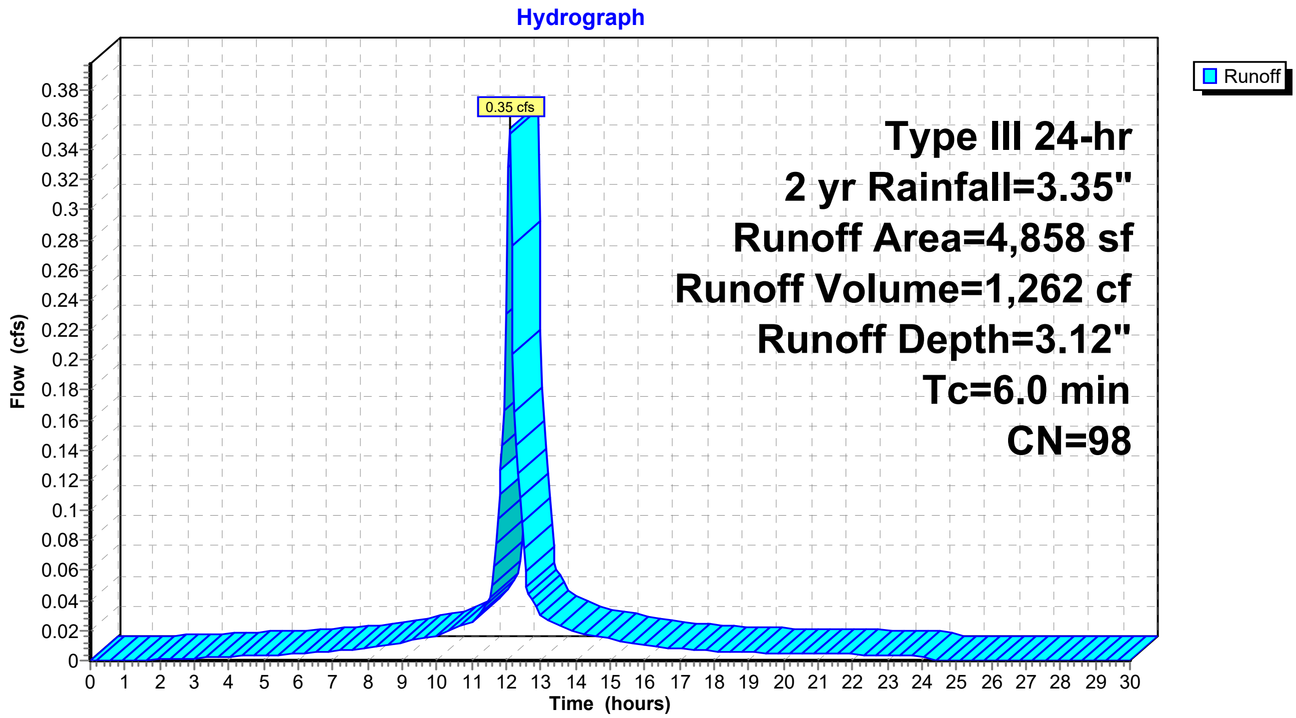
Runoff = 0.35 cfs @ 12.09 hrs, Volume= 1,262 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
4,823	98	Paved parking, HSG B
35	61	>75% Grass cover, Good, HSG B
4,858	98	Weighted Average
35		0.72% Pervious Area
4,823		99.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-5:



Summary for Subcatchment P-6:

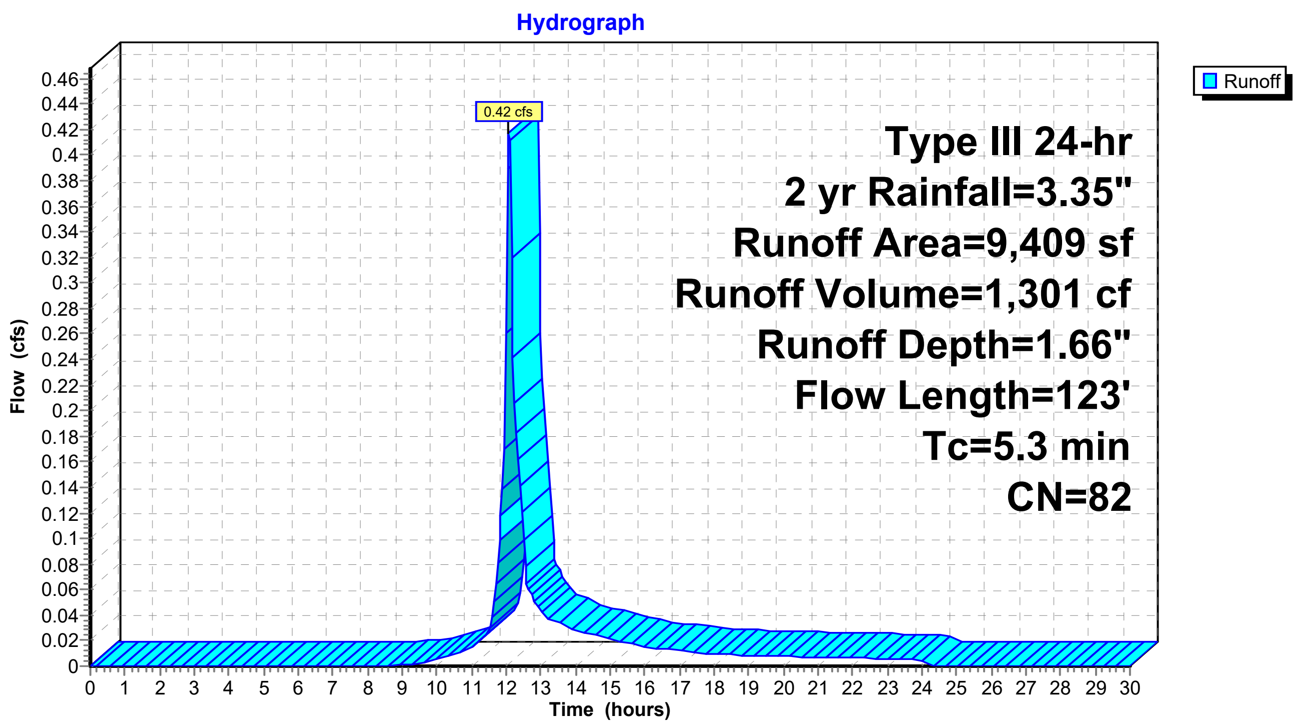
Runoff = 0.42 cfs @ 12.08 hrs, Volume= 1,301 cf, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
5,333	98	Paved parking, HSG B
4,076	61	>75% Grass cover, Good, HSG B
9,409	82	Weighted Average
4,076		43.32% Pervious Area
5,333		56.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.0300	0.18		**Sheet Flow, Grass, 50', 3%** Grass: Short n= 0.150 P2= 3.35"
0.4	30	0.0300	1.21		**Shallow Concentrated Flow, Grass, 30', 3%** Short Grass Pasture Kv= 7.0 fps
0.2	43	0.0200	2.87		**Shallow Concentrated Flow, Pavement, 43', 2%** Paved Kv= 20.3 fps
5.3	123	Total			

Subcatchment P-6:



Summary for Subcatchment P-6A:

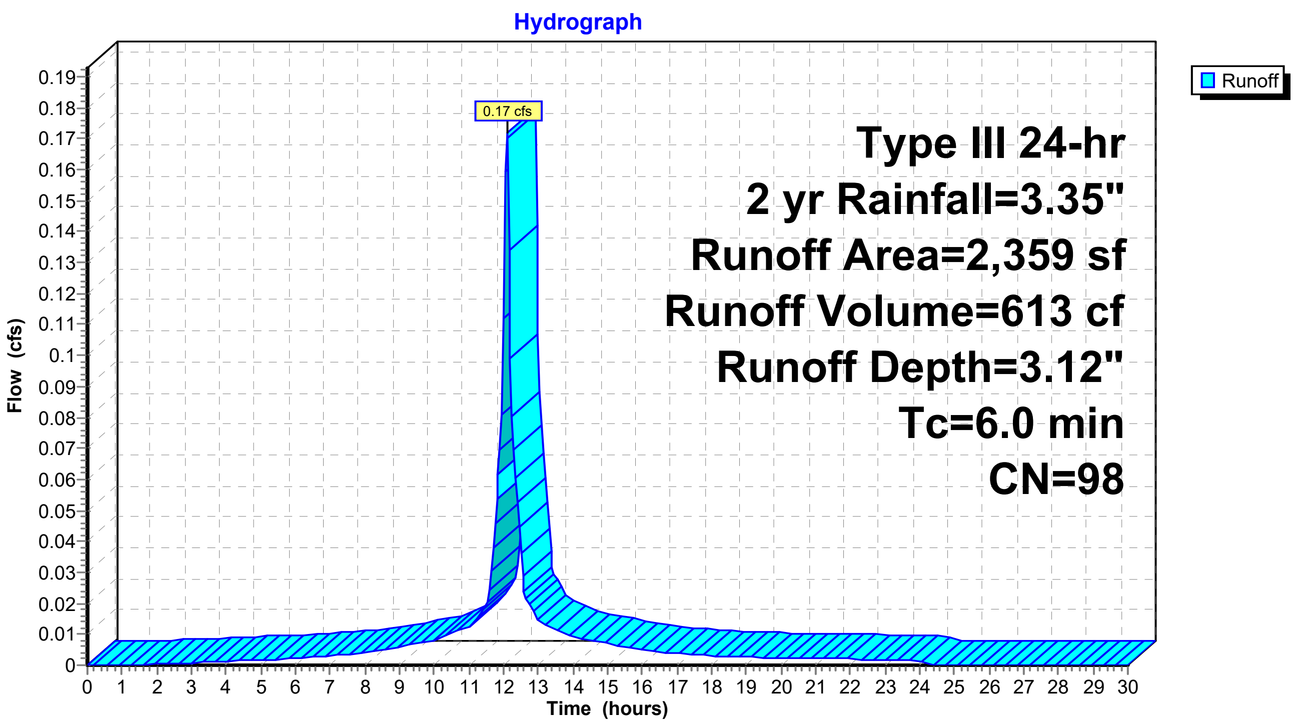
Runoff = 0.17 cfs @ 12.09 hrs, Volume= 613 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
2,359	98	Paved parking, HSG B
2,359		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6A:



Summary for Subcatchment P-6B:

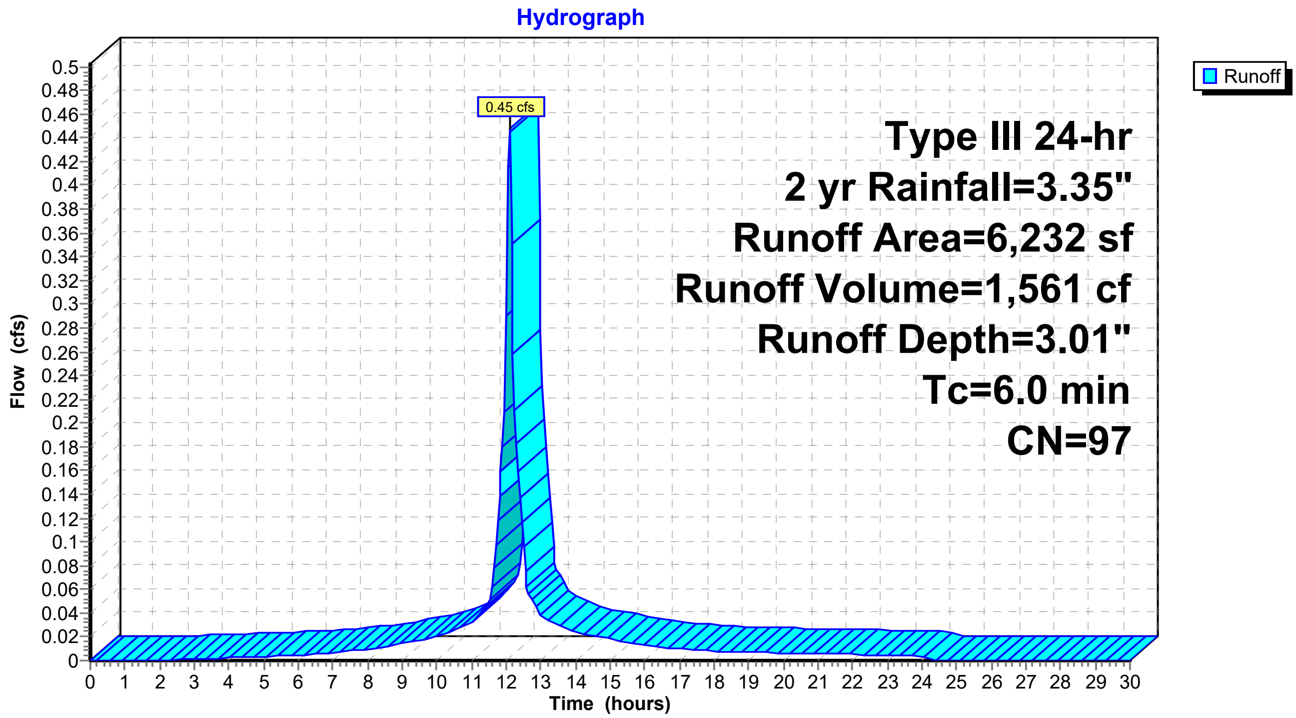
Runoff = 0.45 cfs @ 12.09 hrs, Volume= 1,561 cf, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
6,067	98	Paved parking, HSG B
165	61	>75% Grass cover, Good, HSG B
6,232	97	Weighted Average
165		2.65% Pervious Area
6,067		97.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6B:



Summary for Subcatchment P-6C:

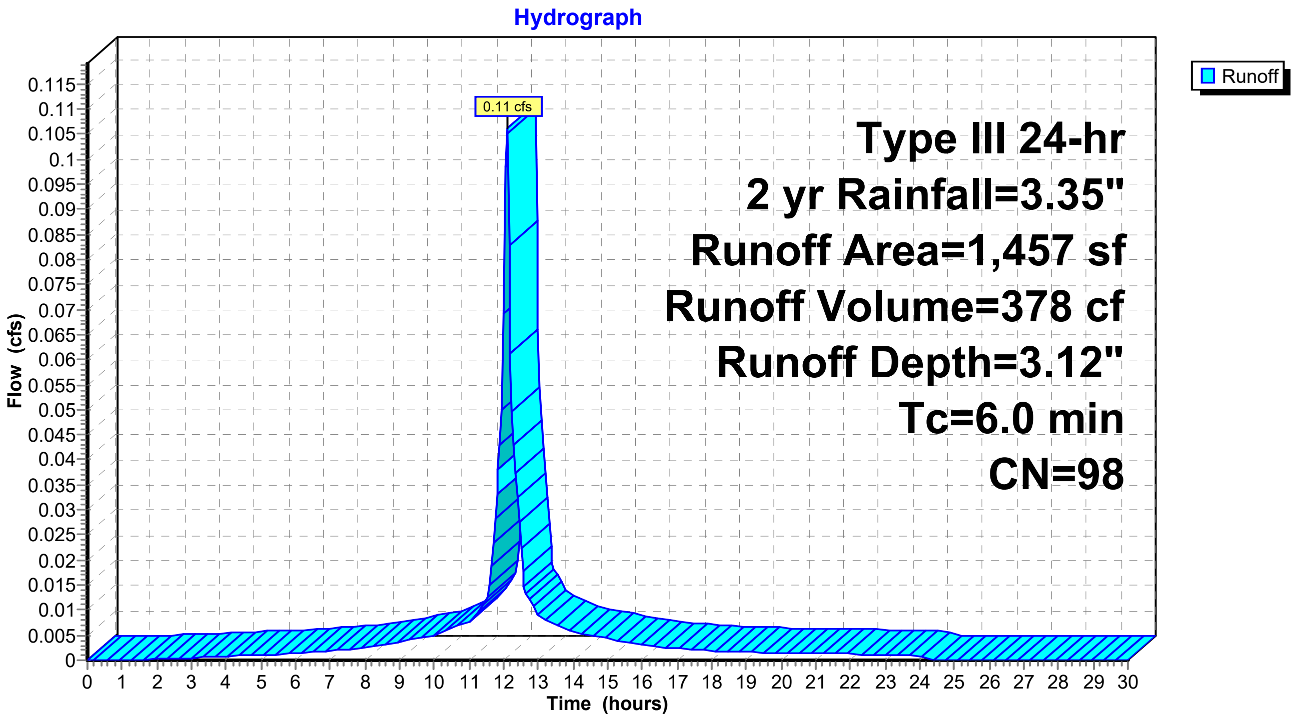
Runoff = 0.11 cfs @ 12.09 hrs, Volume= 378 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
1,457	98	Paved parking, HSG B
1,457		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6C:



Summary for Subcatchment P-6D:

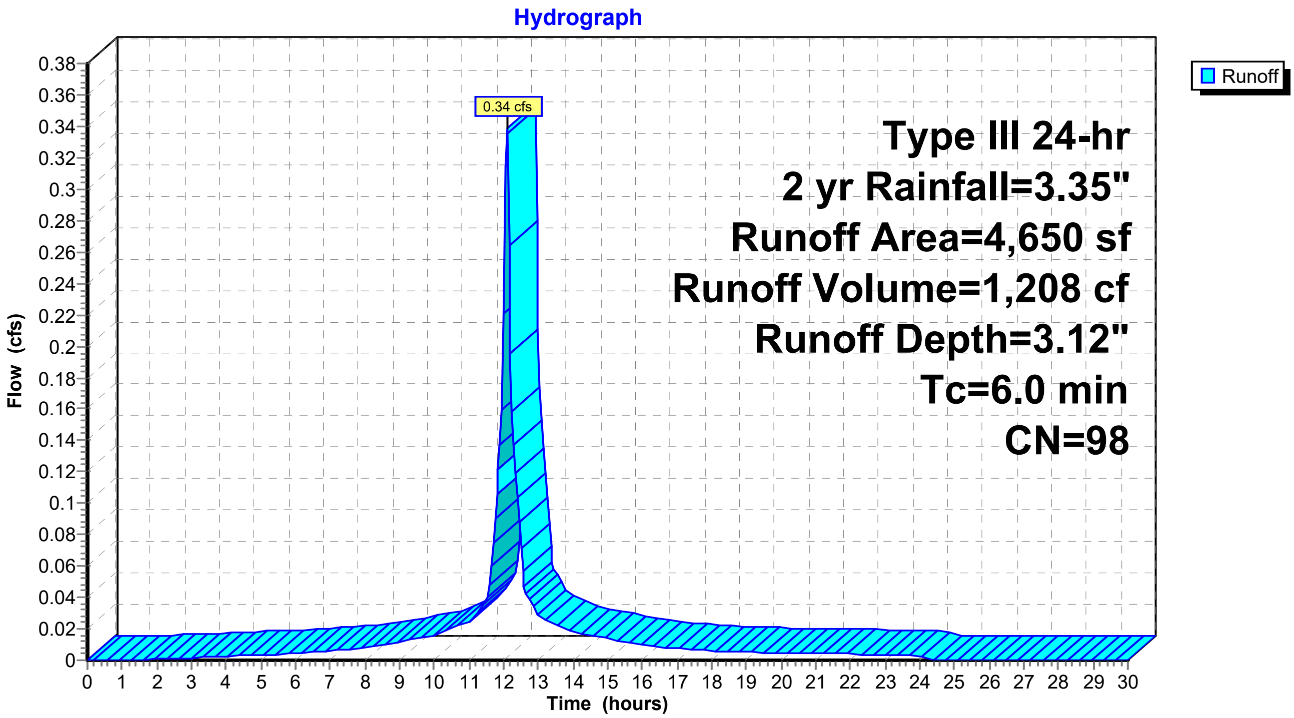
Runoff = 0.34 cfs @ 12.09 hrs, Volume= 1,208 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
4,650	98	Paved parking, HSG B
4,650		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6D:



Summary for Subcatchment P-6E:

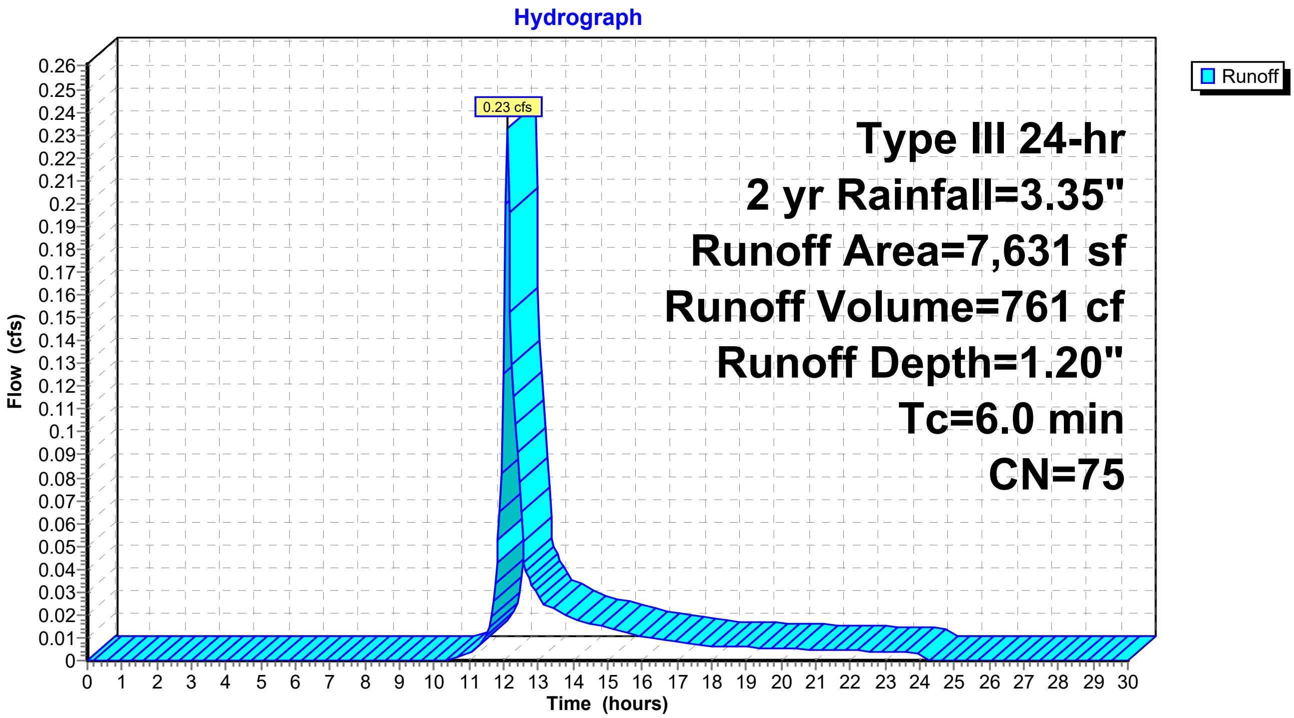
Runoff = 0.23 cfs @ 12.10 hrs, Volume= 761 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.35"

Area (sf)	CN	Description
2,794	98	Paved parking, HSG B
4,837	61	>75% Grass cover, Good, HSG B
7,631	75	Weighted Average
4,837		63.39% Pervious Area
2,794		36.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6E:



Summary for Pond CB1:

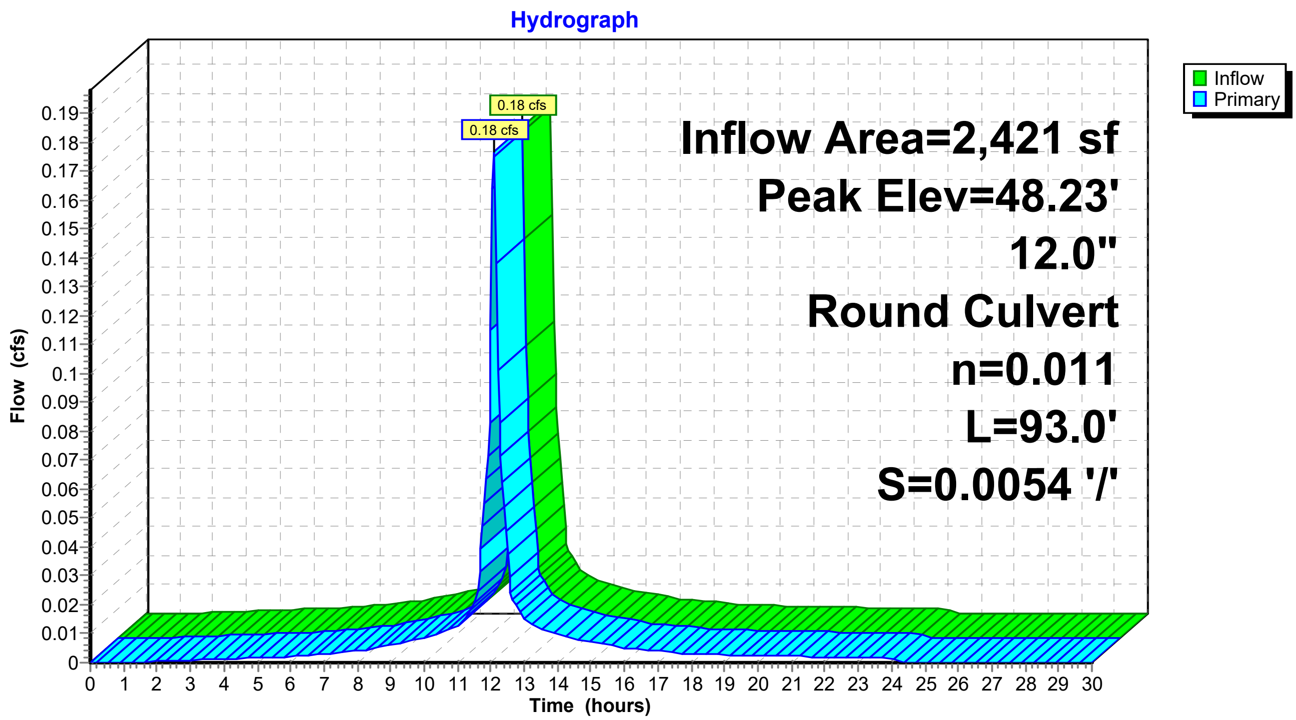
Inflow Area =	2,421 sf,100.00% Impervious,	Inflow Depth = 3.12"	for 2 yr event	
Inflow =	0.18 cfs @	12.09 hrs, Volume=	629 cf	
Outflow =	0.18 cfs @	12.09 hrs, Volume=	629 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.18 cfs @	12.09 hrs, Volume=	629 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.23' @ 12.10 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 93.0' Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0054 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.16 cfs @ 12.09 hrs HW=48.23' TW=47.84' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.16 cfs @ 1.76 fps)

Pond CB1:



Summary for Pond CB10:

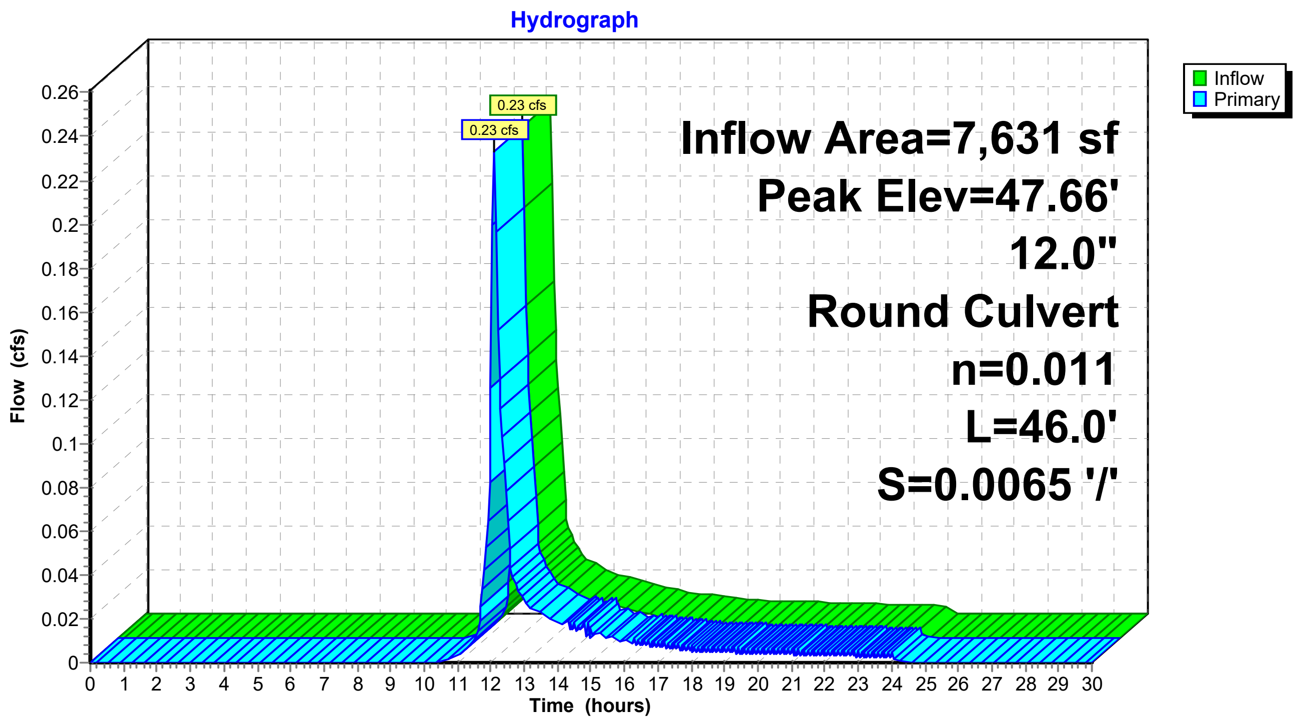
Inflow Area =	7,631 sf,	36.61% Impervious,	Inflow Depth = 1.20"	for 2 yr event	
Inflow =	0.23 cfs @	12.10 hrs,	Volume=	761 cf	
Outflow =	0.23 cfs @	12.10 hrs,	Volume=	761 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.23 cfs @	12.10 hrs,	Volume=	761 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.66' @ 12.25 hrs
Flood Elev= 49.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.30'	**12.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 46.30' / 46.00' S= 0.0065 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.10 hrs HW=47.36' TW=47.53' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB10:



Summary for Pond CB101:

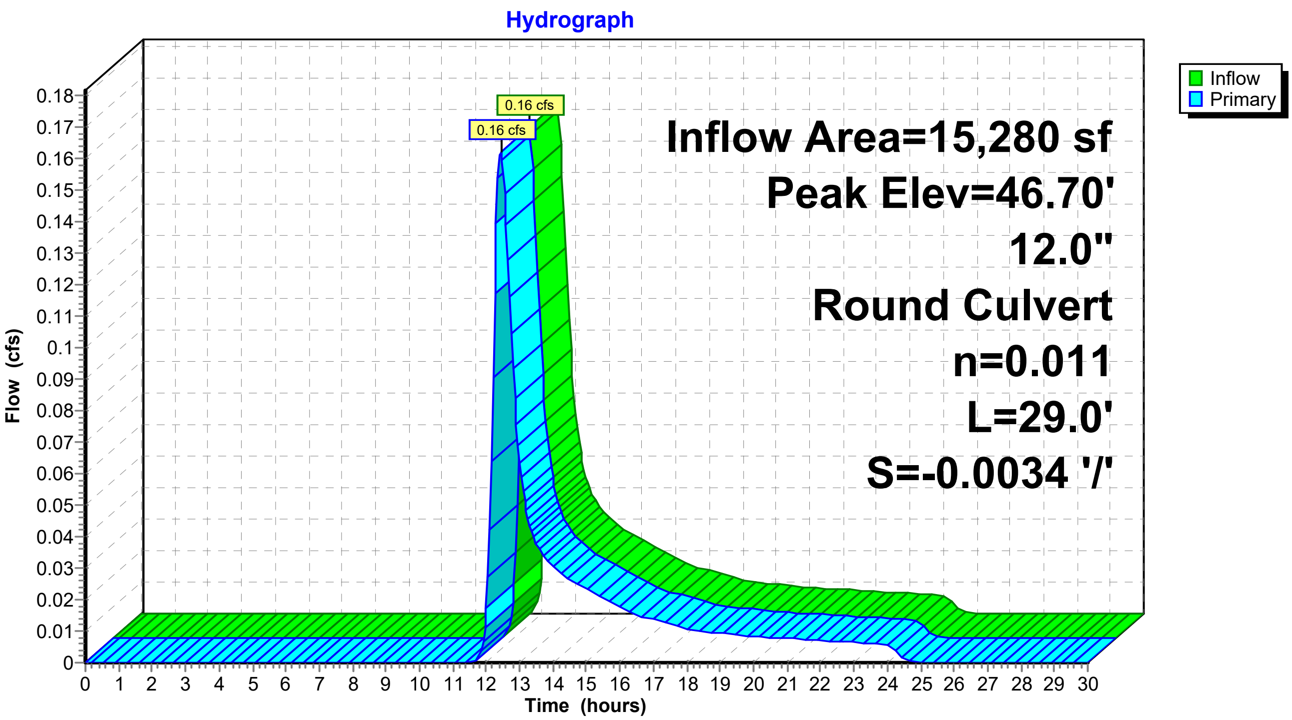
Inflow Area =	15,280 sf,	18.69% Impervious,	Inflow Depth = 0.77"	for 2 yr event
Inflow =	0.16 cfs @	12.43 hrs, Volume=	977 cf	
Outflow =	0.16 cfs @	12.43 hrs, Volume=	977 cf, Atten= 0%, Lag= 0.0 min	
Primary =	0.16 cfs @	12.43 hrs, Volume=	977 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.70' @ 12.43 hrs
Flood Elev= 49.06'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.50'	**12.0" Round Culvert** L= 29.0' Ke= 0.500 Inlet / Outlet Invert= 46.40' / 46.50' S= -0.0034 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.16 cfs @ 12.43 hrs HW=46.69' TW=46.57' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.16 cfs @ 1.25 fps)

Pond CB101:



Summary for Pond CB102:

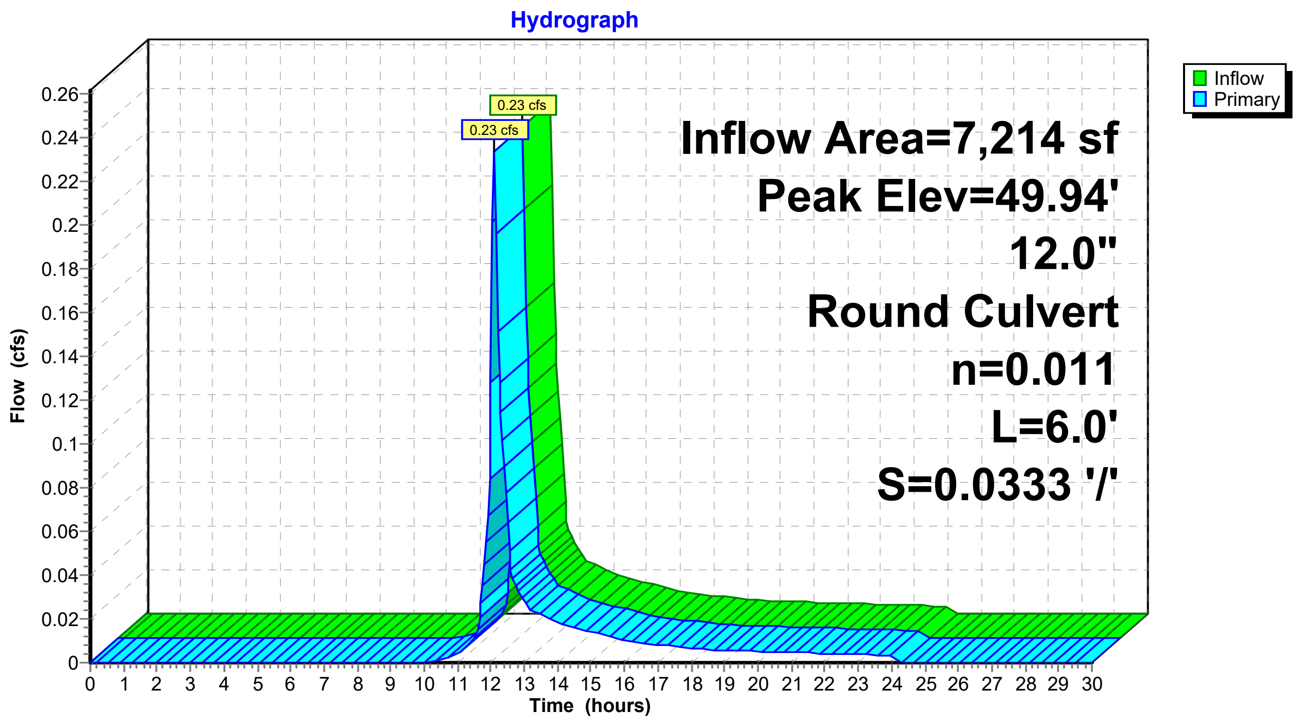
Inflow Area = 7,214 sf, 39.20% Impervious, Inflow Depth = 1.26" for 2 yr event
Inflow = 0.23 cfs @ 12.10 hrs, Volume= 756 cf
Outflow = 0.23 cfs @ 12.10 hrs, Volume= 756 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.23 cfs @ 12.10 hrs, Volume= 756 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 49.94' @ 12.10 hrs
Flood Elev= 49.07'

Device	Routing	Invert	Outlet Devices
#1	Primary	49.70'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 49.70' / 49.50' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.23 cfs @ 12.10 hrs HW=49.93' TW=46.62' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.23 cfs @ 1.65 fps)

Pond CB102:



Summary for Pond CB103:

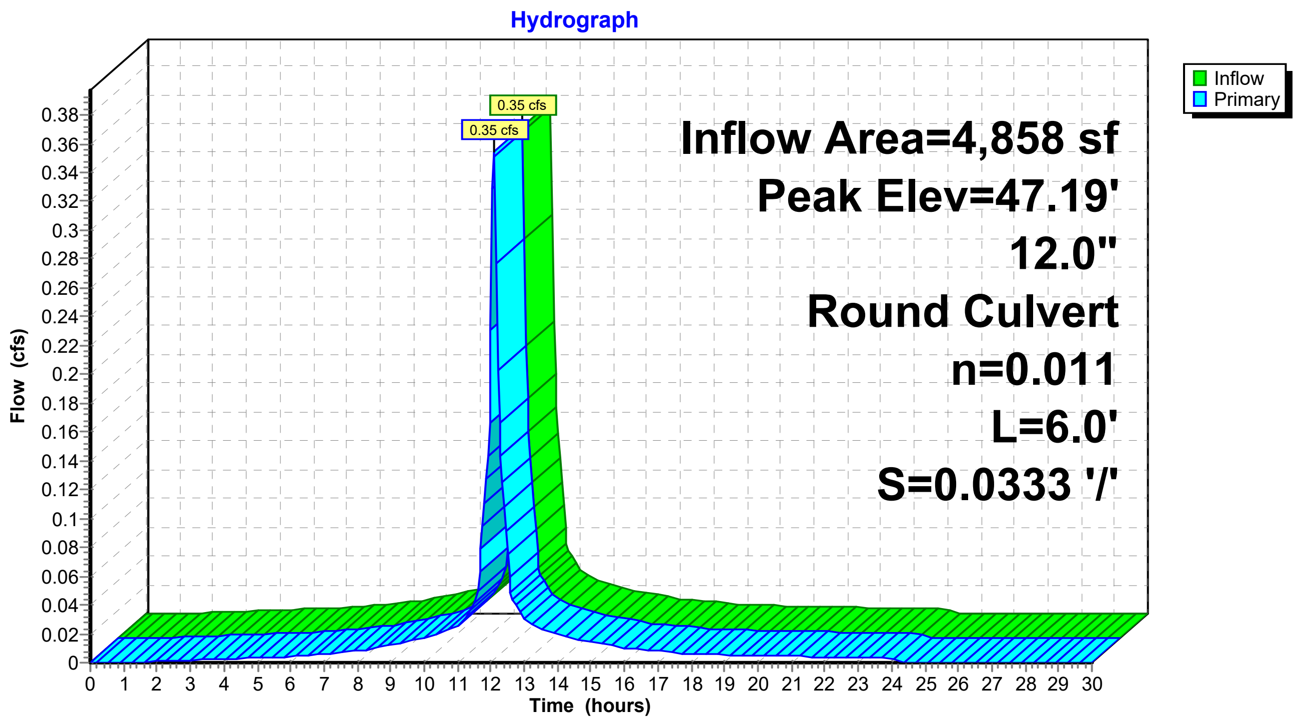
Inflow Area =	4,858 sf,	99.28% Impervious,	Inflow Depth = 3.12"	for 2 yr event	
Inflow =	0.35 cfs @	12.09 hrs,	Volume=	1,262 cf	
Outflow =	0.35 cfs @	12.09 hrs,	Volume=	1,262 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.35 cfs @	12.09 hrs,	Volume=	1,262 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.19' @ 12.09 hrs
Flood Elev= 49.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 46.90' / 46.70' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.34 cfs @ 12.09 hrs HW=47.19' TW=46.89' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.34 cfs @ 1.83 fps)

Pond CB103:



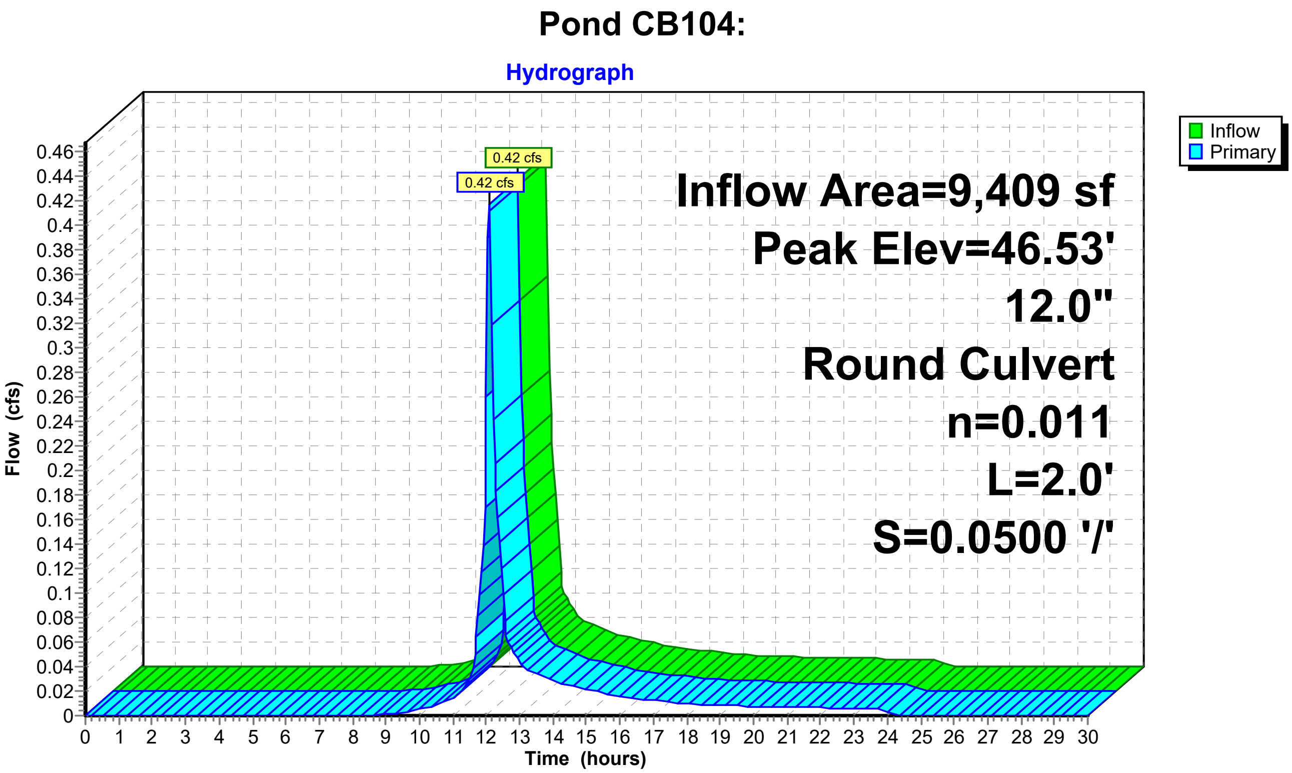
Summary for Pond CB104:

Inflow Area = 9,409 sf, 56.68% Impervious, Inflow Depth = 1.66" for 2 yr event
Inflow = 0.42 cfs @ 12.08 hrs, Volume= 1,301 cf
Outflow = 0.42 cfs @ 12.08 hrs, Volume= 1,301 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.42 cfs @ 12.08 hrs, Volume= 1,301 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.53' @ 12.08 hrs
Flood Elev= 48.93'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 2.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.10' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.41 cfs @ 12.08 hrs HW=46.53' TW=45.62' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.41 cfs @ 2.71 fps)



Summary for Pond CB2:

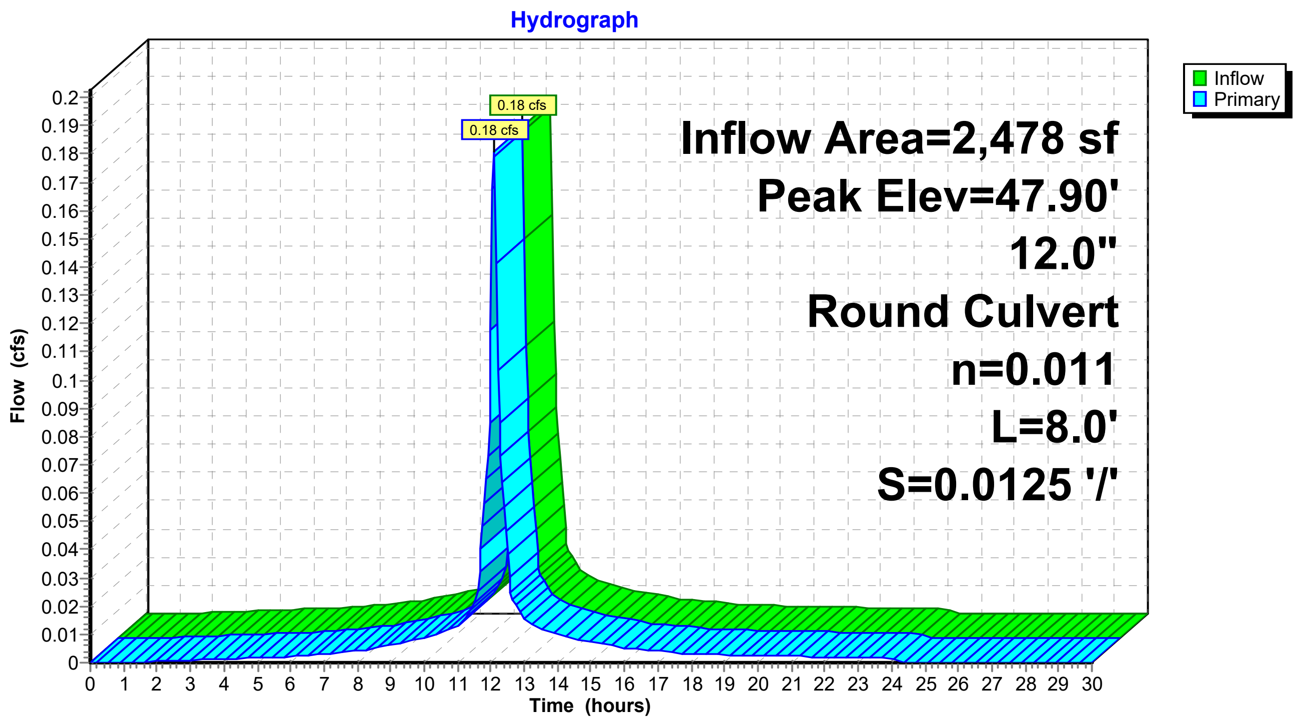
Inflow Area =	2,478 sf,100.00% Impervious,	Inflow Depth = 3.12"	for 2 yr event		
Inflow =	0.18 cfs @	12.09 hrs,	Volume=	644 cf	
Outflow =	0.18 cfs @	12.09 hrs,	Volume=	644 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.18 cfs @	12.09 hrs,	Volume=	644 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.90' @ 12.20 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.60'	**12.0" Round Culvert** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 47.60' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.09 cfs @ 12.09 hrs HW=47.86' TW=47.84' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.09 cfs @ 0.83 fps)

Pond CB2:



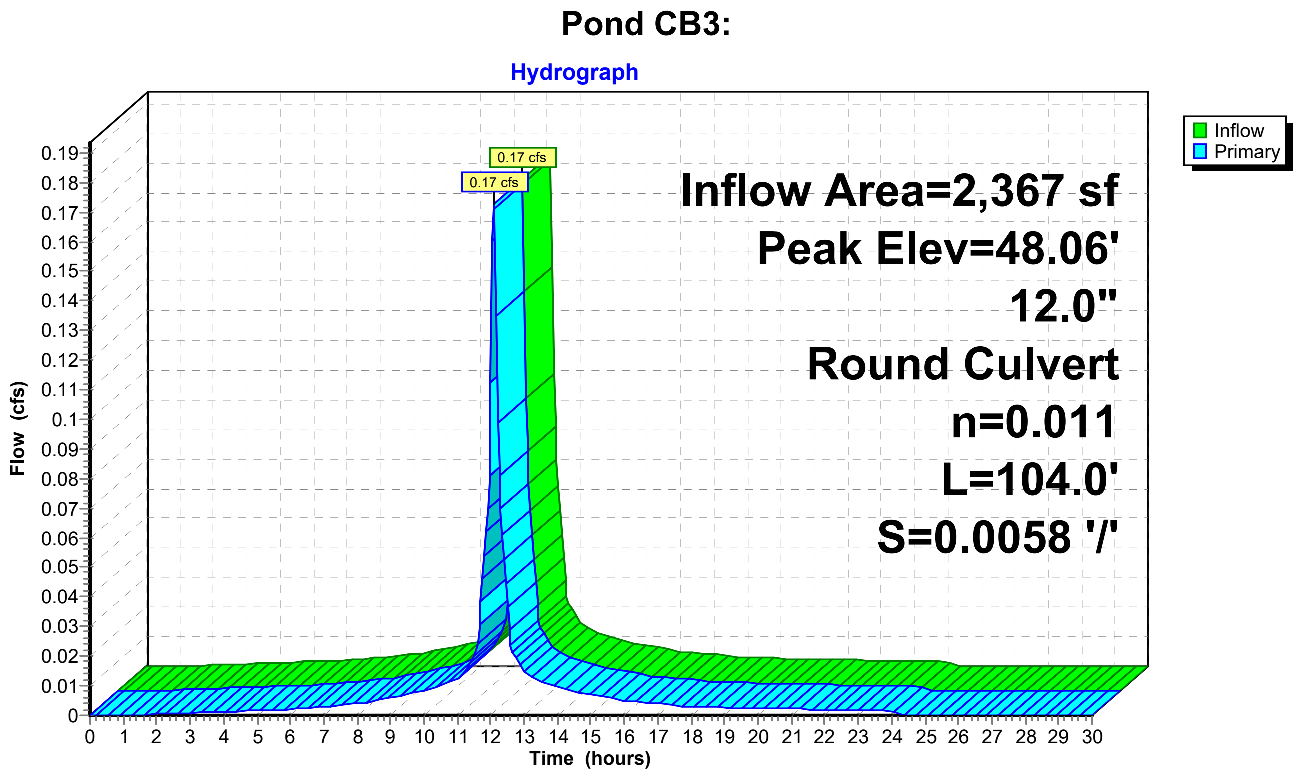
Summary for Pond CB3:

Inflow Area = 2,367 sf,100.00% Impervious, Inflow Depth = 3.12" for 2 yr event
Inflow = 0.17 cfs @ 12.09 hrs, Volume= 615 cf
Outflow = 0.17 cfs @ 12.09 hrs, Volume= 615 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.17 cfs @ 12.09 hrs, Volume= 615 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.06' @ 12.10 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.80'	**12.0" Round Culvert** L= 104.0' Ke= 0.500 Inlet / Outlet Invert= 47.80' / 47.20' S= 0.0058 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.15 cfs @ 12.09 hrs HW=48.05' TW=47.79' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.15 cfs @ 1.46 fps)

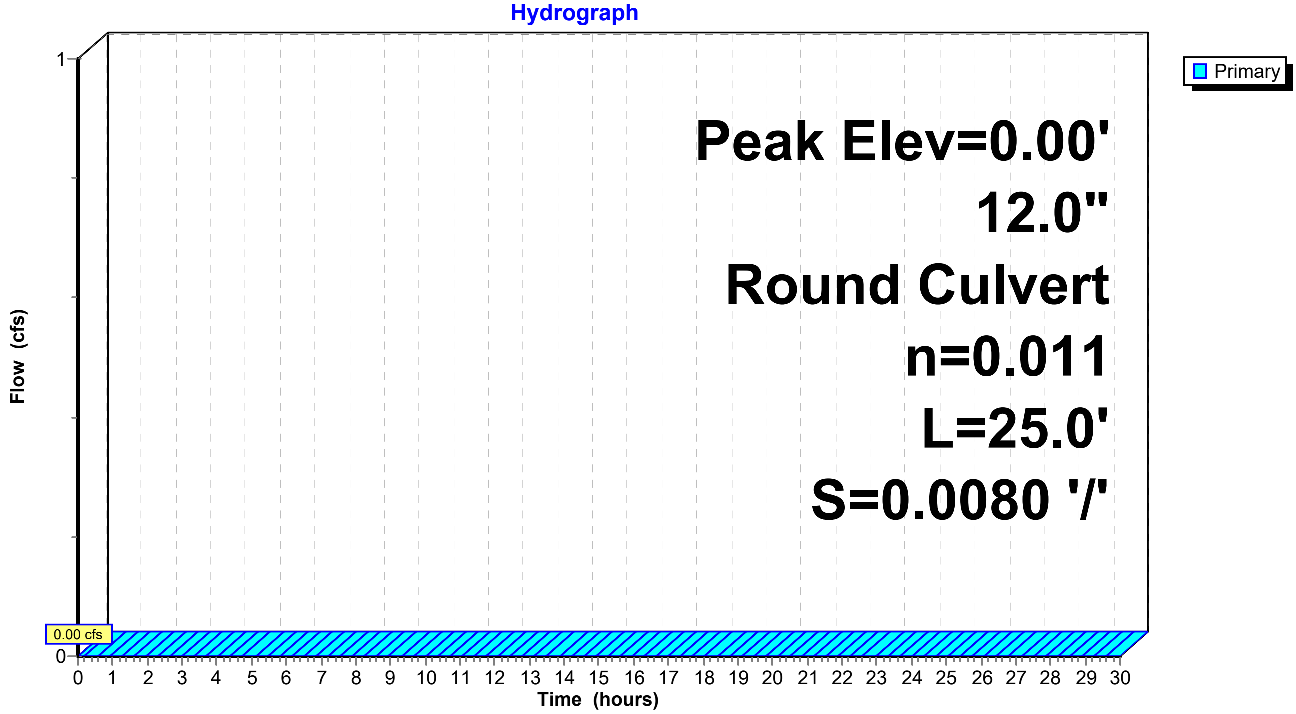


Summary for Pond CB4:

Device	Routing	Invert	Outlet Devices
#1	Primary	47.40'	**12.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 47.40' / 47.20' S= 0.0080 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=47.10' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond CB4:



Summary for Pond CB5:

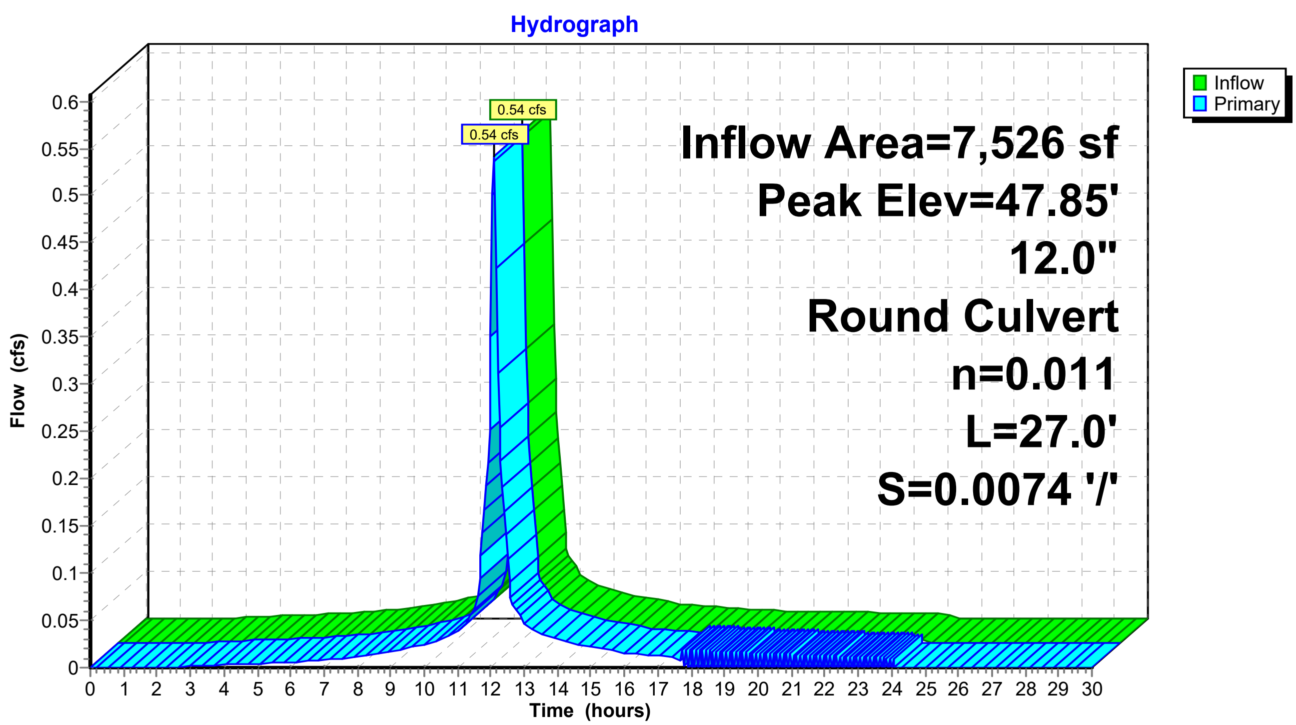
Inflow Area = 7,526 sf, 97.81% Impervious, Inflow Depth = 3.01" for 2 yr event
Inflow = 0.54 cfs @ 12.09 hrs, Volume= 1,885 cf
Outflow = 0.54 cfs @ 12.09 hrs, Volume= 1,885 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.54 cfs @ 12.09 hrs, Volume= 1,885 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.85' @ 12.15 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.00'	**12.0" Round Culvert** L= 27.0' Ke= 0.500 Inlet / Outlet Invert= 47.00' / 46.80' S= 0.0074 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=47.81' TW=47.82' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond CB5:



Summary for Pond CB6:

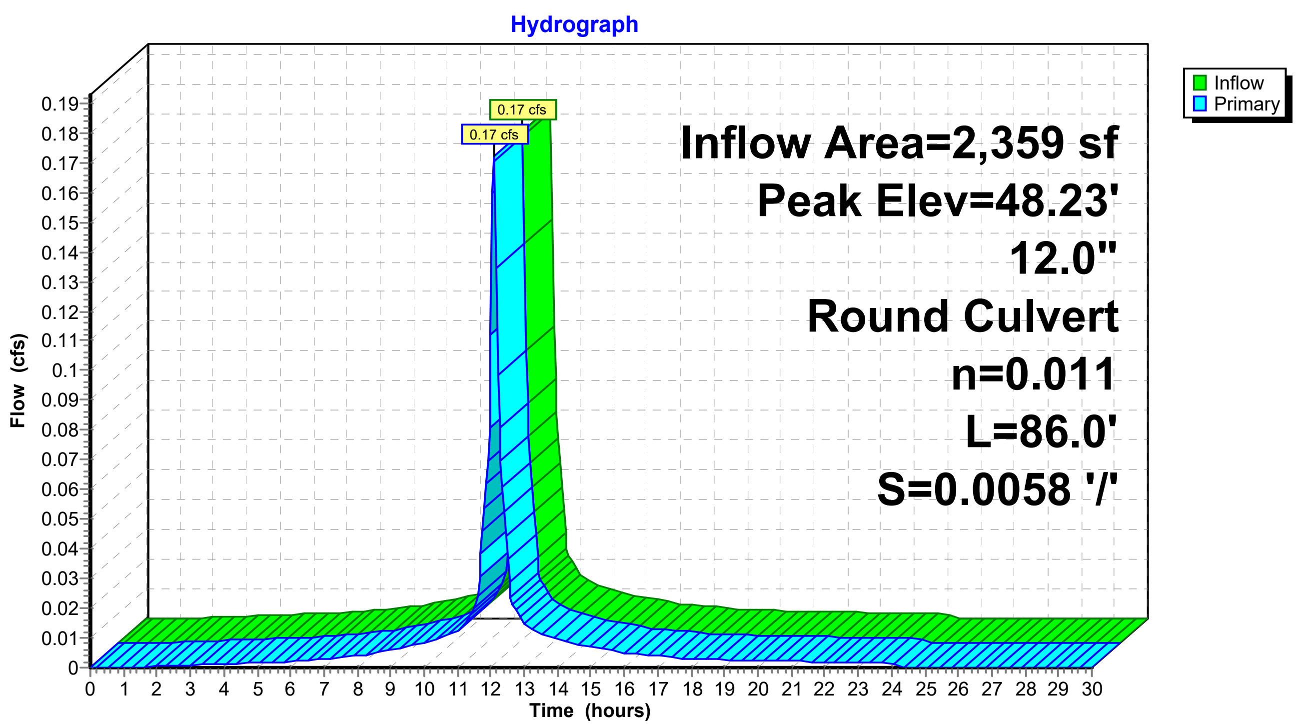
Inflow Area =	2,359 sf,100.00% Impervious,	Inflow Depth = 3.12" for 2 yr event		
Inflow =	0.17 cfs @	12.09 hrs, Volume=	613 cf	
Outflow =	0.17 cfs @	12.09 hrs, Volume=	613 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.17 cfs @	12.09 hrs, Volume=	613 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.23' @ 12.10 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 86.0' Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0058 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.16 cfs @ 12.09 hrs HW=48.23' TW=47.87' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.16 cfs @ 1.74 fps)

Pond CB6:



Summary for Pond CB7:

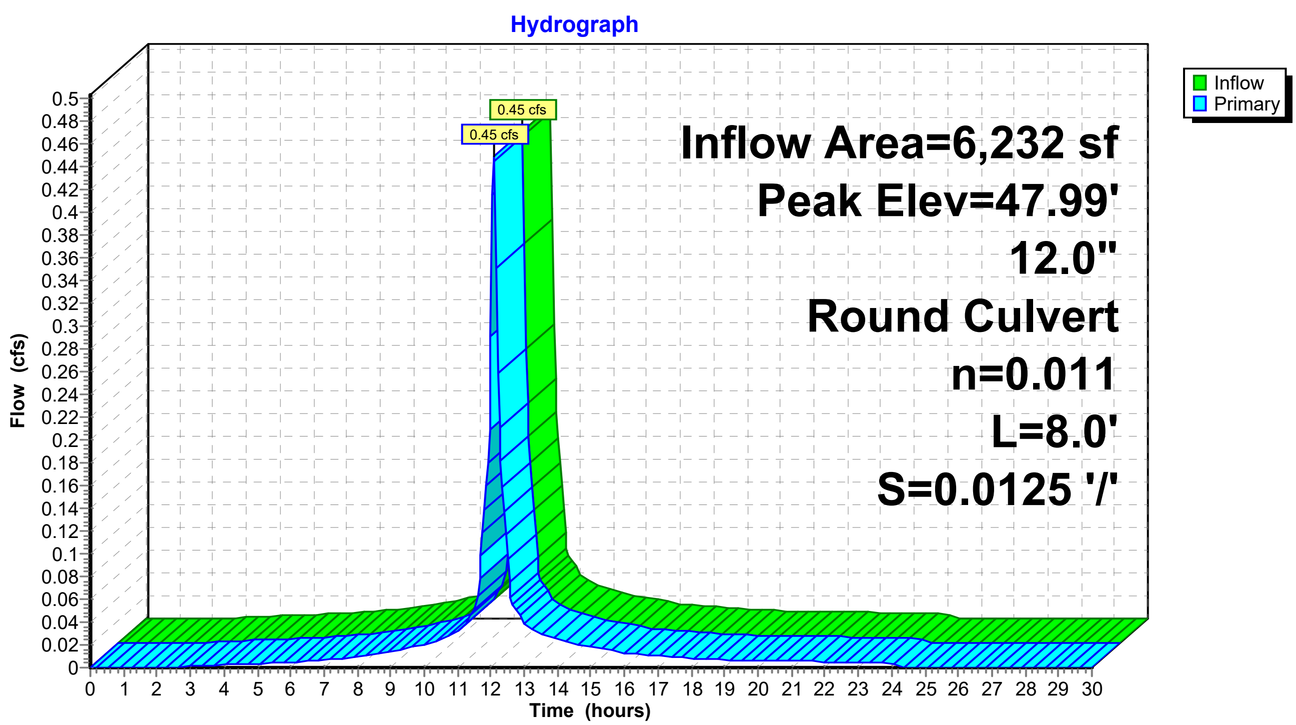
Inflow Area = 6,232 sf, 97.35% Impervious, Inflow Depth = 3.01" for 2 yr event
Inflow = 0.45 cfs @ 12.09 hrs, Volume= 1,561 cf
Outflow = 0.45 cfs @ 12.09 hrs, Volume= 1,561 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.45 cfs @ 12.09 hrs, Volume= 1,561 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.99' @ 12.12 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.60'	**12.0" Round Culvert** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 47.60' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.36 cfs @ 12.09 hrs HW=47.98' TW=47.87' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 0.36 cfs @ 1.96 fps)

Pond CB7:



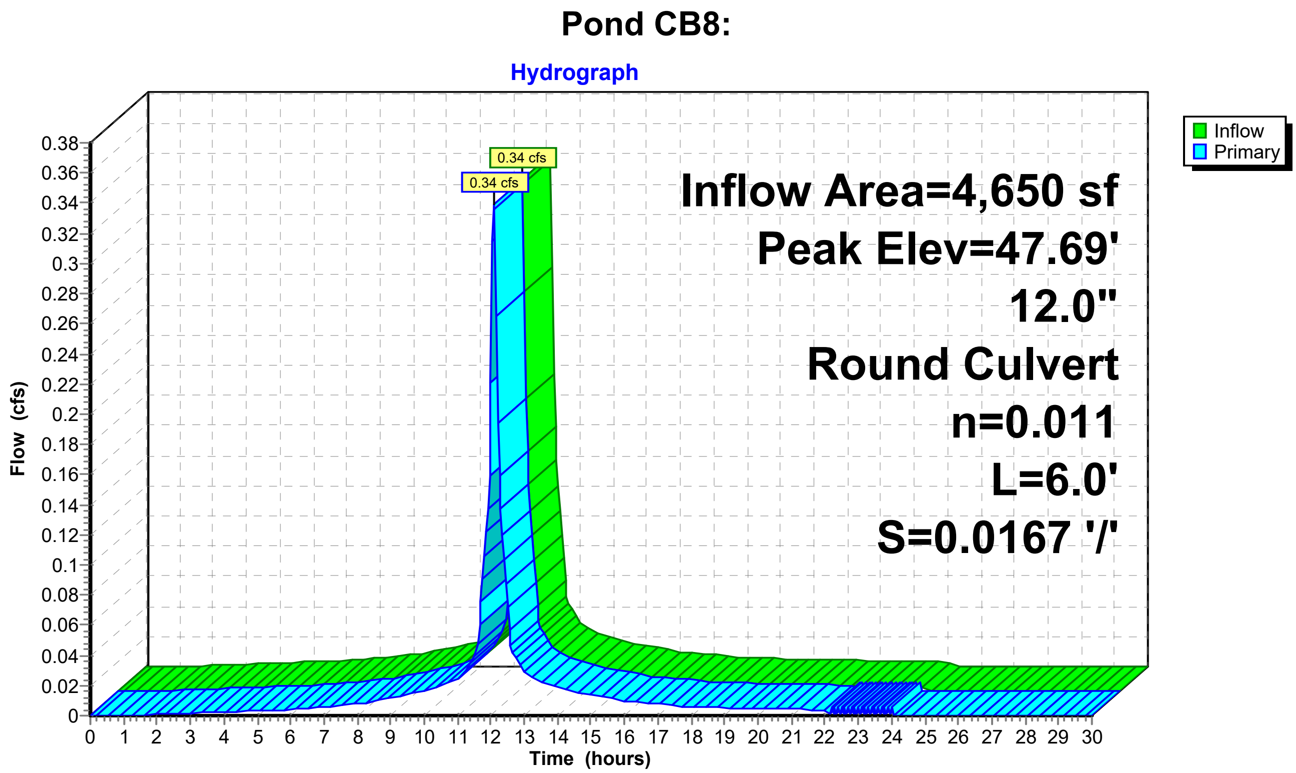
Summary for Pond CB8:

Inflow Area =	4,650 sf,100.00% Impervious,	Inflow Depth = 3.12" for 2 yr event		
Inflow =	0.34 cfs @	12.09 hrs, Volume=	1,208 cf	
Outflow =	0.34 cfs @	12.09 hrs, Volume=	1,208 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.34 cfs @	12.09 hrs, Volume=	1,208 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.69' @ 12.29 hrs
Flood Elev= 51.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.80'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 46.80' / 46.70' S= 0.0167 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=47.38' TW=47.48' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)



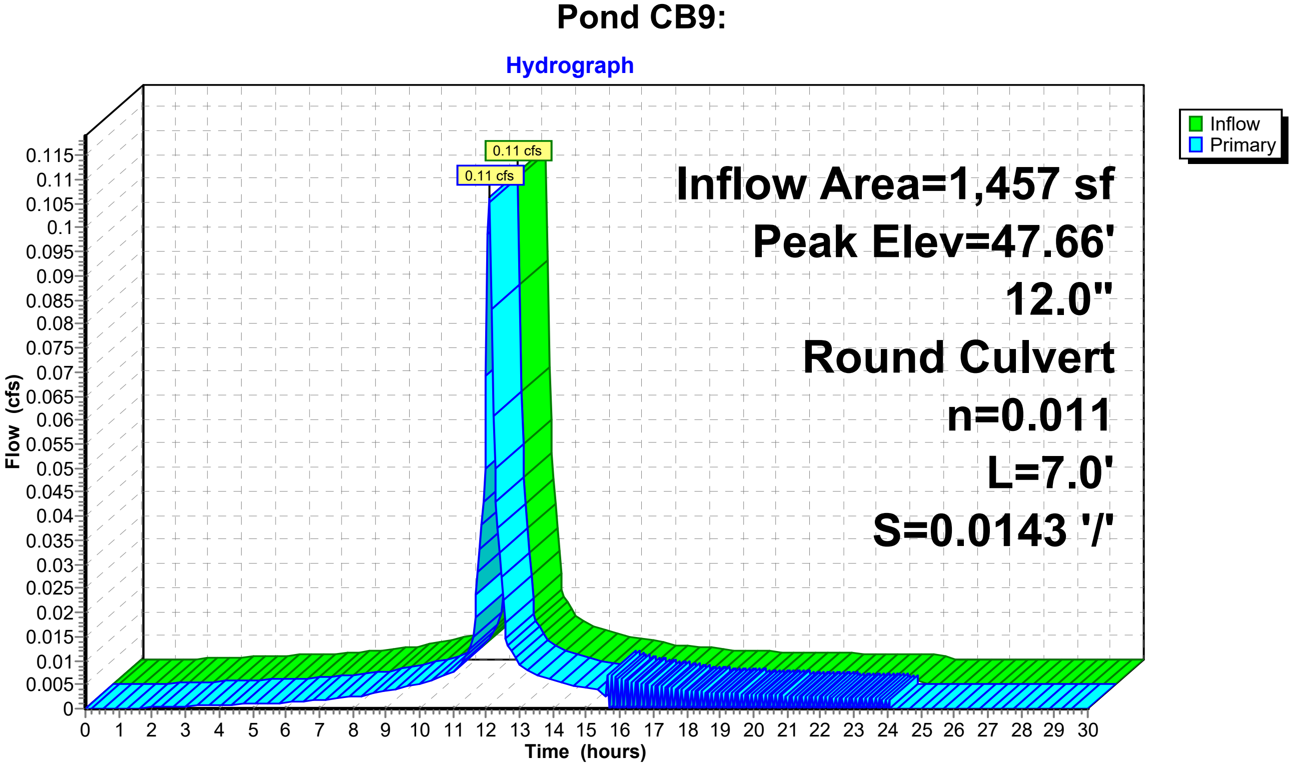
Summary for Pond CB9:

Inflow Area =	1,457 sf,100.00% Impervious,	Inflow Depth = 3.12" for 2 yr event		
Inflow =	0.11 cfs @	12.09 hrs, Volume=	378 cf	
Outflow =	0.11 cfs @	12.09 hrs, Volume=	378 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.11 cfs @	12.09 hrs, Volume=	378 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.66' @ 12.25 hrs
Flood Elev= 50.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.10'	**12.0" Round Culvert** L= 7.0' Ke= 0.500 Inlet / Outlet Invert= 46.10' / 46.00' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=47.32' TW=47.48' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)



Summary for Pond DMH1:

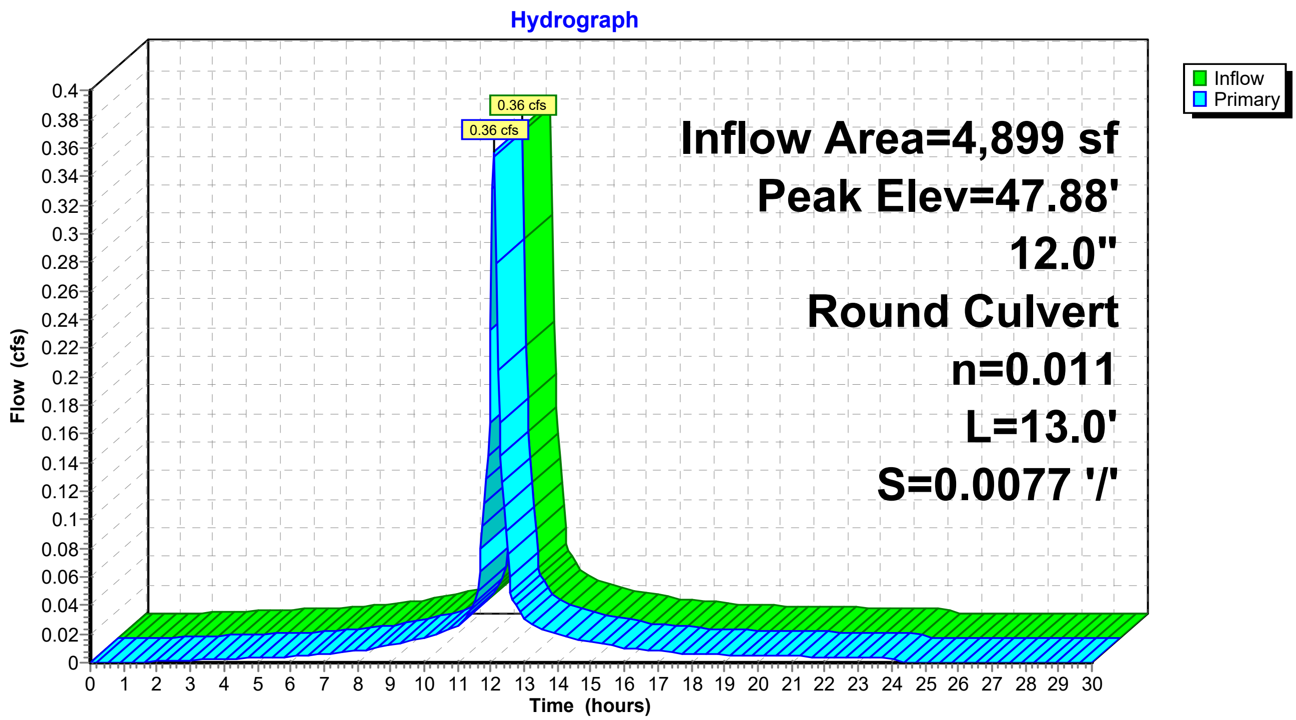
Inflow Area = 4,899 sf,100.00% Impervious, Inflow Depth = 3.12" for 2 yr event
Inflow = 0.36 cfs @ 12.09 hrs, Volume= 1,272 cf
Outflow = 0.36 cfs @ 12.09 hrs, Volume= 1,272 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.36 cfs @ 12.09 hrs, Volume= 1,272 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.88' @ 12.17 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.40'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 47.40' / 47.30' S= 0.0077 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.13 cfs @ 12.09 hrs HW=47.84' TW=47.83' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.13 cfs @ 0.58 fps)

Pond DMH1:



Summary for Pond DMH101:

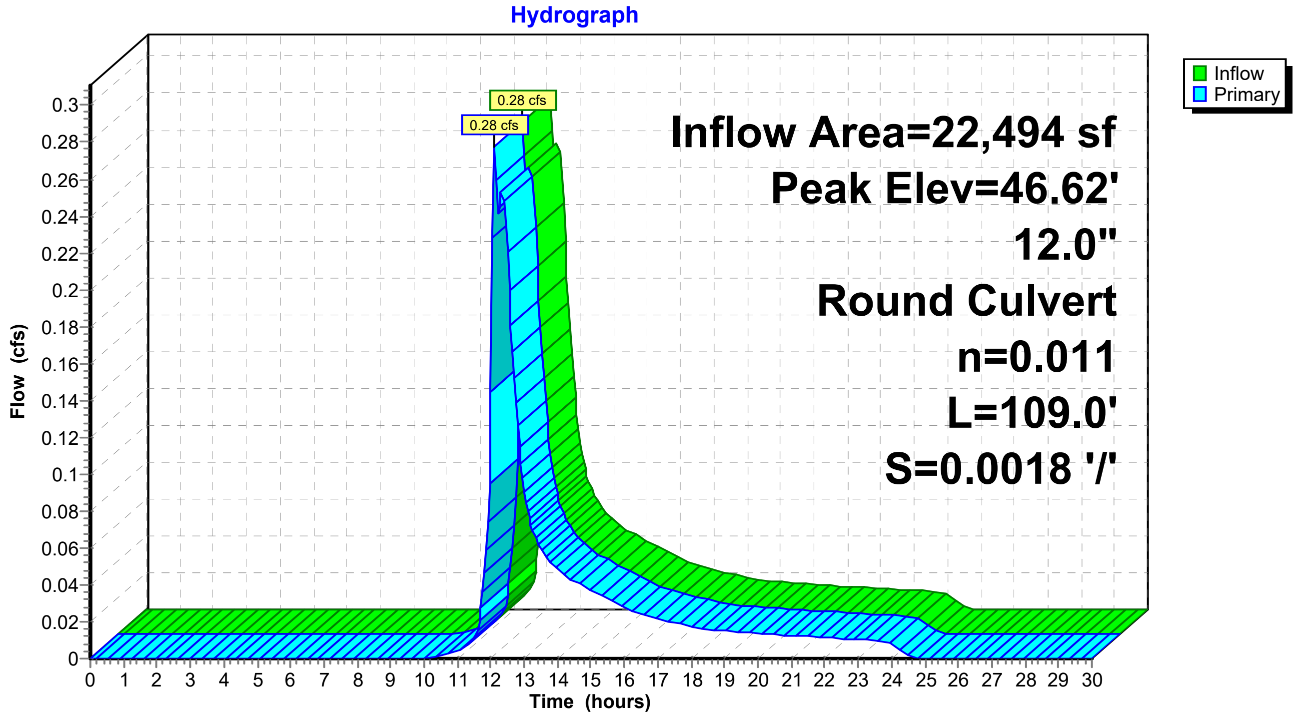
Inflow Area = 22,494 sf, 25.27% Impervious, Inflow Depth = 0.92" for 2 yr event
Inflow = 0.28 cfs @ 12.11 hrs, Volume= 1,733 cf
Outflow = 0.28 cfs @ 12.11 hrs, Volume= 1,733 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.28 cfs @ 12.11 hrs, Volume= 1,733 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.62' @ 12.13 hrs
Flood Elev= 49.94'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 109.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.00' S= 0.0018 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.11 hrs HW=46.62' TW=46.49' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.26 cfs @ 1.24 fps)

Pond DMH101:



Summary for Pond DMH102:

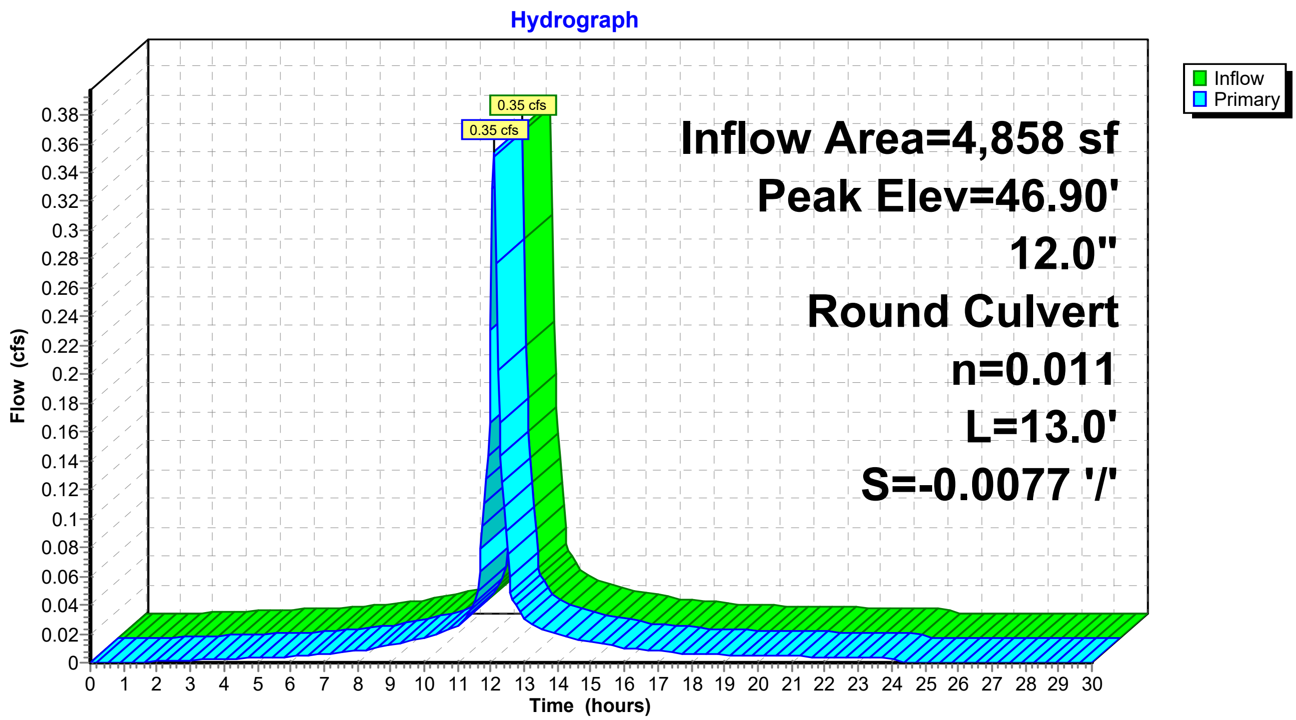
Inflow Area = 4,858 sf, 99.28% Impervious, Inflow Depth = 3.12" for 2 yr event
Inflow = 0.35 cfs @ 12.09 hrs, Volume= 1,262 cf
Outflow = 0.35 cfs @ 12.09 hrs, Volume= 1,262 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.35 cfs @ 12.09 hrs, Volume= 1,262 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.90' @ 12.09 hrs
Flood Elev= 49.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.60'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 46.50' / 46.60' S= -0.0077 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.34 cfs @ 12.09 hrs HW=46.89' TW=46.49' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 0.34 cfs @ 1.78 fps)

Pond DMH102:



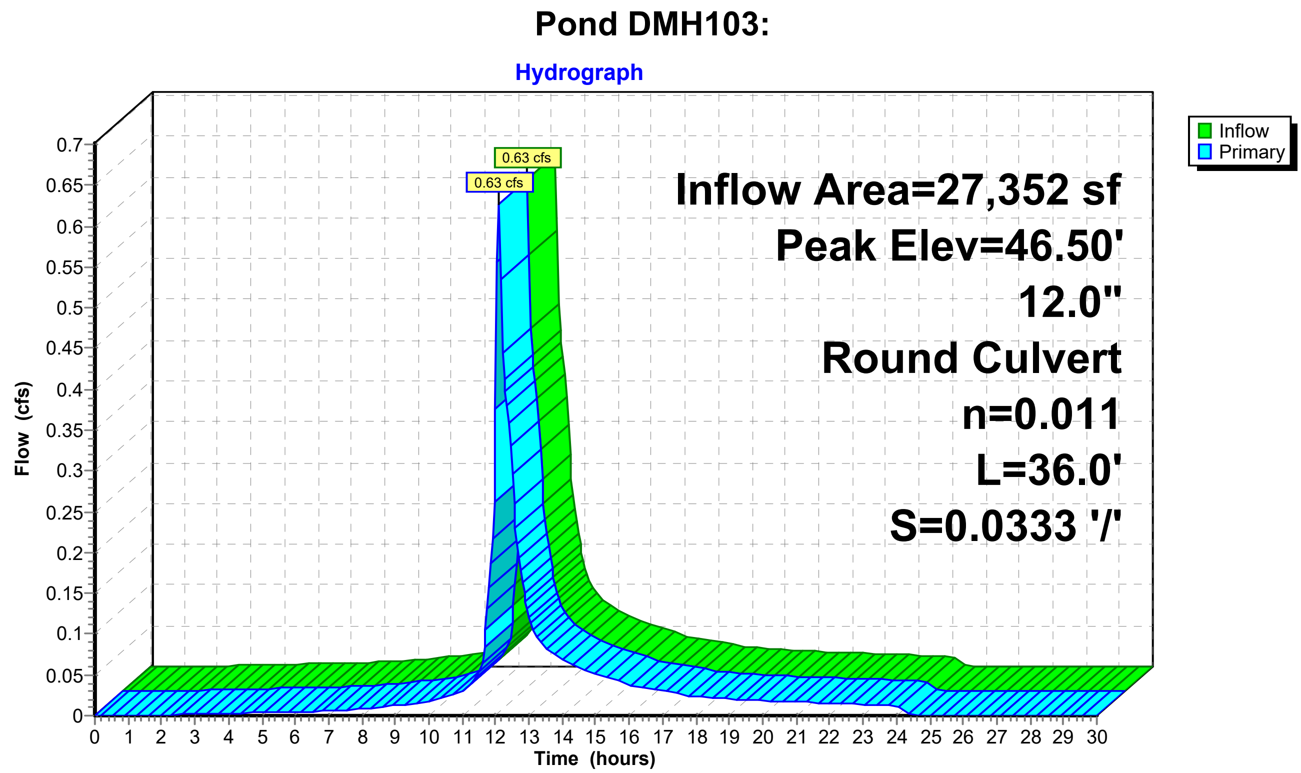
Summary for Pond DMH103:

Inflow Area =	27,352 sf,	38.41% Impervious,	Inflow Depth = 1.31"	for 2 yr event	
Inflow =	0.63 cfs @	12.10 hrs,	Volume=	2,995 cf	
Outflow =	0.63 cfs @	12.10 hrs,	Volume=	2,995 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.63 cfs @	12.10 hrs,	Volume=	2,995 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.50' @ 12.10 hrs
Flood Elev= 50.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.10'	**12.0" Round Culvert** L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 46.10' / 44.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.62 cfs @ 12.10 hrs HW=46.50' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.62 cfs @ 2.14 fps)



Summary for Pond DMH104:

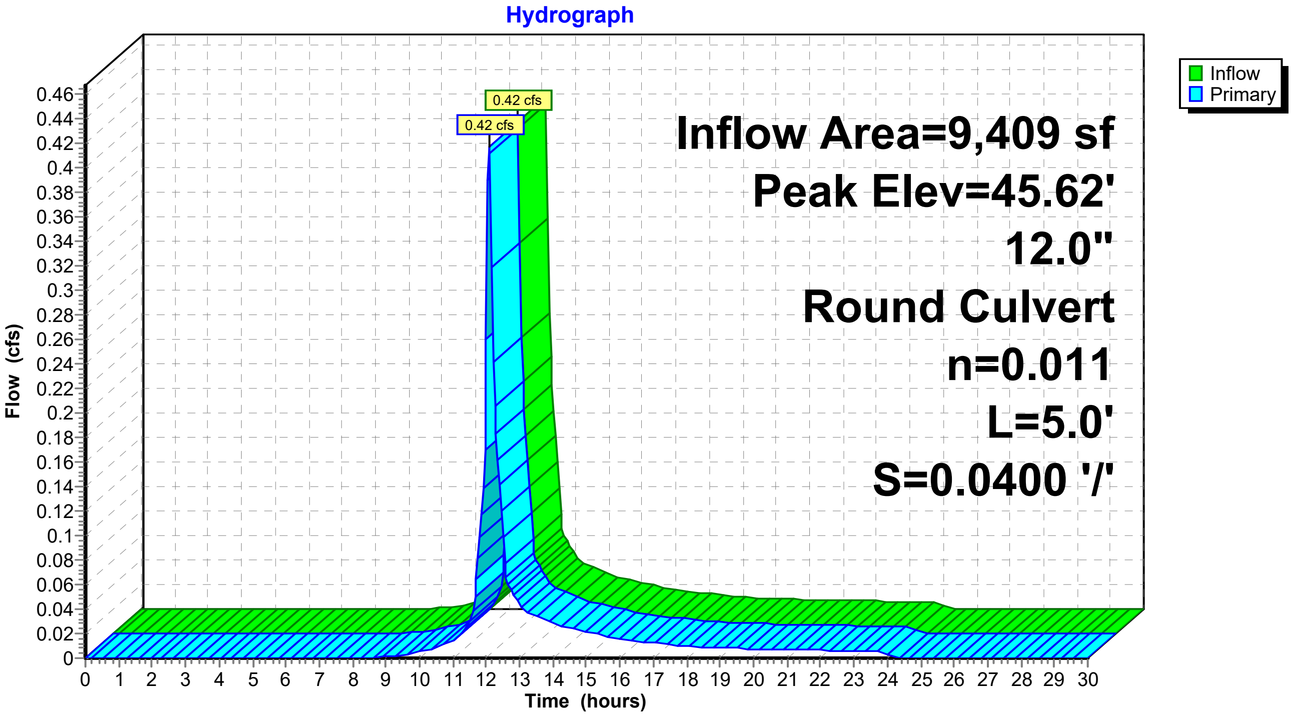
Inflow Area = 9,409 sf, 56.68% Impervious, Inflow Depth = 1.66" for 2 yr event
Inflow = 0.42 cfs @ 12.08 hrs, Volume= 1,301 cf
Outflow = 0.42 cfs @ 12.08 hrs, Volume= 1,301 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.42 cfs @ 12.08 hrs, Volume= 1,301 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 45.62' @ 12.08 hrs
Flood Elev= 49.08'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.30'	**12.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 45.30' / 45.10' S= 0.0400 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.41 cfs @ 12.08 hrs HW=45.62' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.41 cfs @ 1.91 fps)

Pond DMH104:

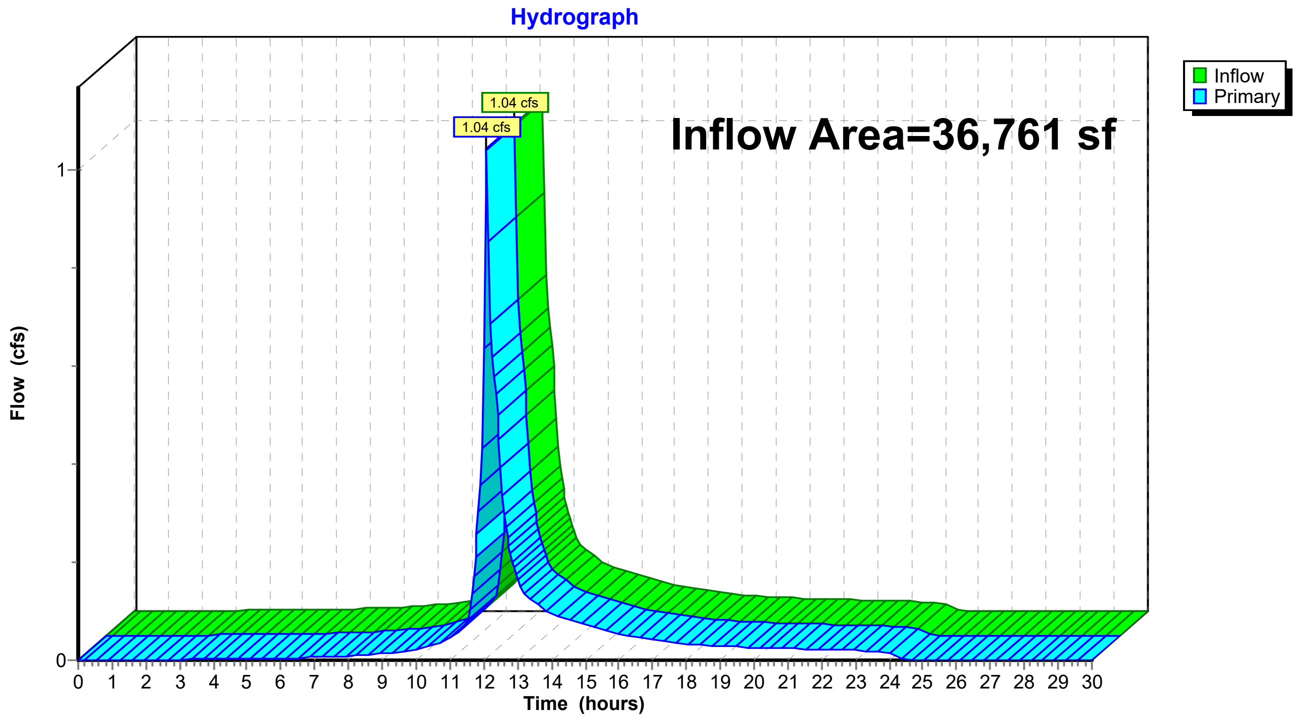


Summary for Pond DMH105:

Inflow Area =	36,761 sf, 43.09% Impervious,	Inflow Depth = 1.40"	for 2 yr event
Inflow =	1.04 cfs @ 12.09 hrs, Volume=	4,296 cf	
Primary =	1.04 cfs @ 12.09 hrs, Volume=	4,296 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond DMH105:



Summary for Pond DMH2:

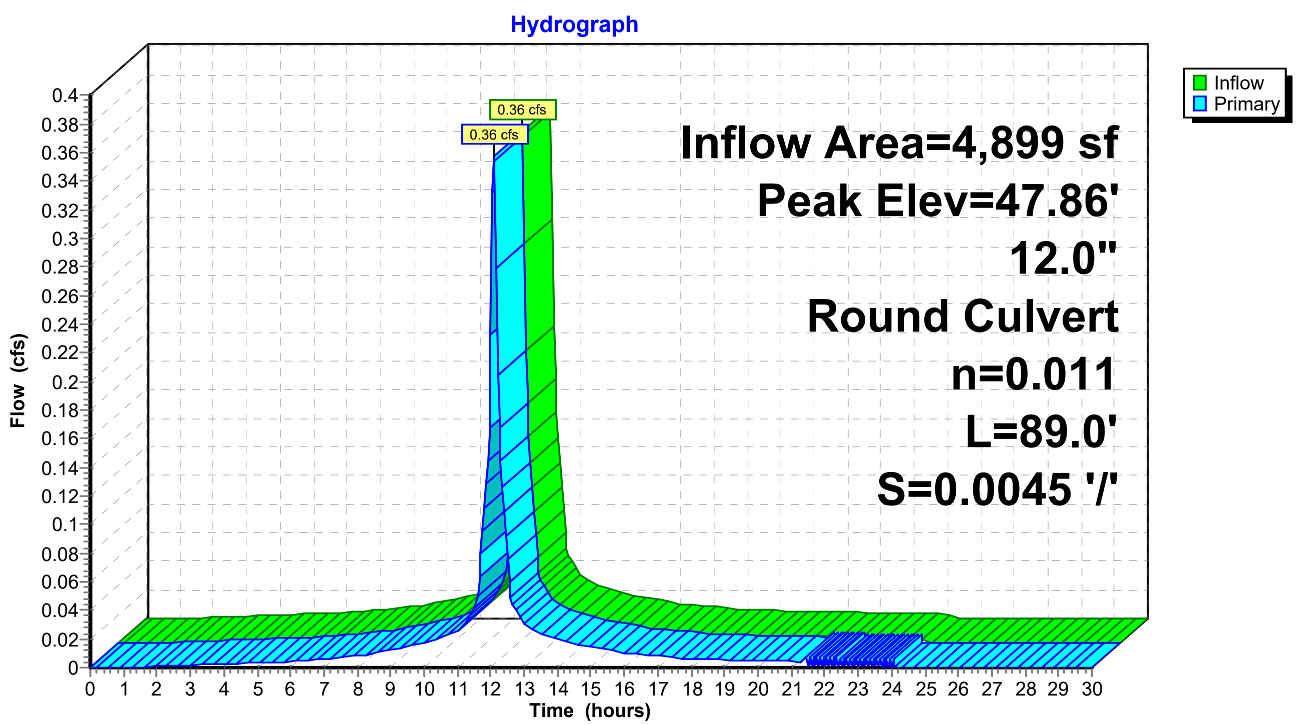
Inflow Area = 4,899 sf,100.00% Impervious, Inflow Depth = 3.12" for 2 yr event
Inflow = 0.36 cfs @ 12.09 hrs, Volume= 1,272 cf
Outflow = 0.36 cfs @ 12.09 hrs, Volume= 1,272 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.36 cfs @ 12.09 hrs, Volume= 1,272 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.86' @ 12.14 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.20'	**12.0" Round Culvert** L= 89.0' Ke= 0.500 Inlet / Outlet Invert= 47.20' / 46.80' S= 0.0045 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.14 cfs @ 12.09 hrs HW=47.83' TW=47.82' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.14 cfs @ 0.38 fps)

Pond DMH2:



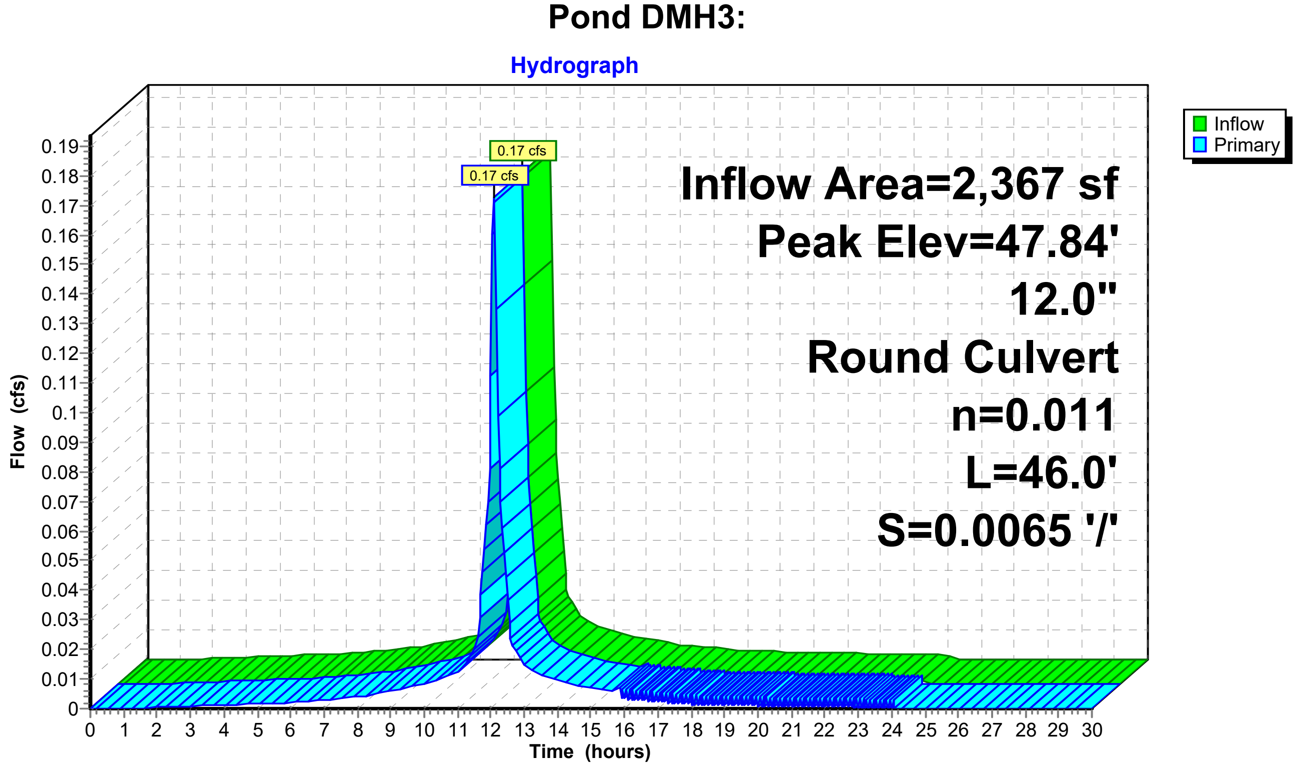
Summary for Pond DMH3:

Inflow Area = 2,367 sf,100.00% Impervious, Inflow Depth = 3.12" for 2 yr event
Inflow = 0.17 cfs @ 12.09 hrs, Volume= 615 cf
Outflow = 0.17 cfs @ 12.09 hrs, Volume= 615 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.17 cfs @ 12.09 hrs, Volume= 615 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.84' @ 12.16 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.10'	**12.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 47.10' / 46.80' S= 0.0065 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=47.79' TW=47.82' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)



Summary for Pond DMH4:

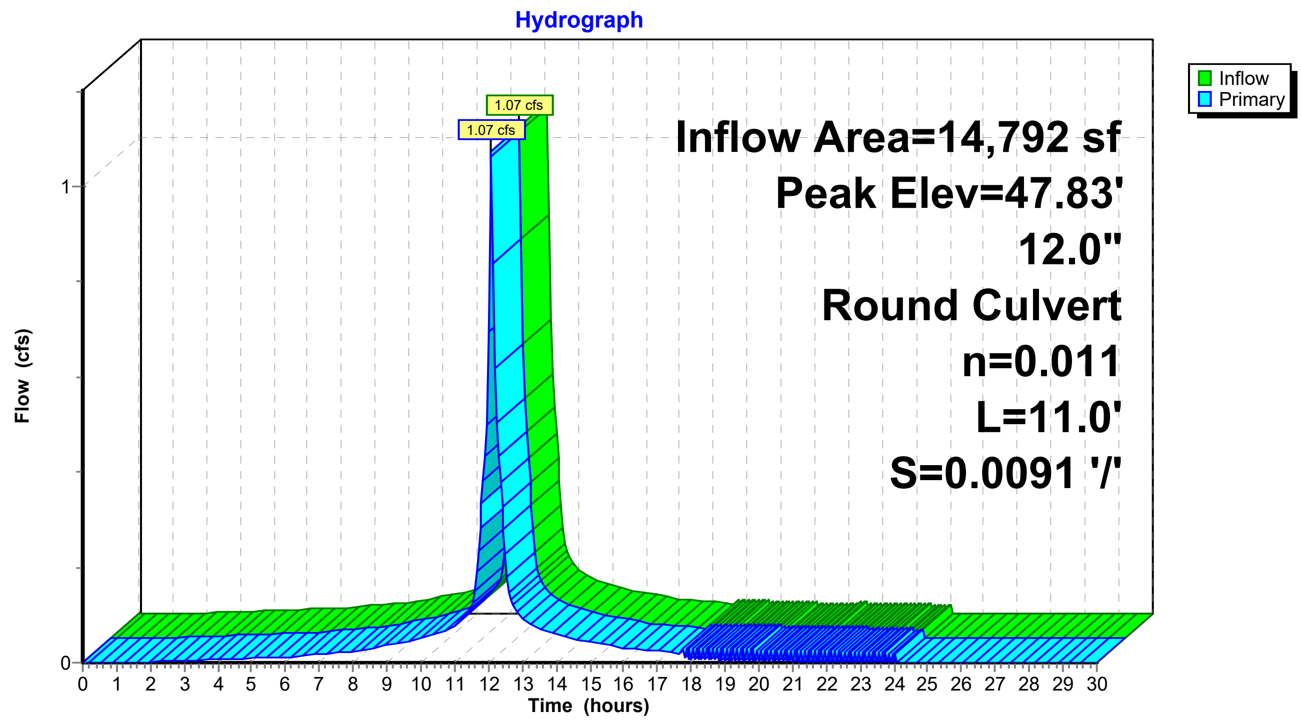
Inflow Area = 14,792 sf, 98.88% Impervious, Inflow Depth = 3.06" for 2 yr event
Inflow = 1.07 cfs @ 12.09 hrs, Volume= 3,773 cf
Outflow = 1.07 cfs @ 12.09 hrs, Volume= 3,773 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.07 cfs @ 12.09 hrs, Volume= 3,773 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.83' @ 12.11 hrs
Flood Elev= 50.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.70'	**12.0" Round Culvert** L= 11.0' Ke= 0.500 Inlet / Outlet Invert= 46.70' / 46.60' S= 0.0091 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.90 cfs @ 12.09 hrs HW=47.82' TW=47.77' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.90 cfs @ 1.15 fps)

Pond DMH4:



Summary for Pond DMH5:

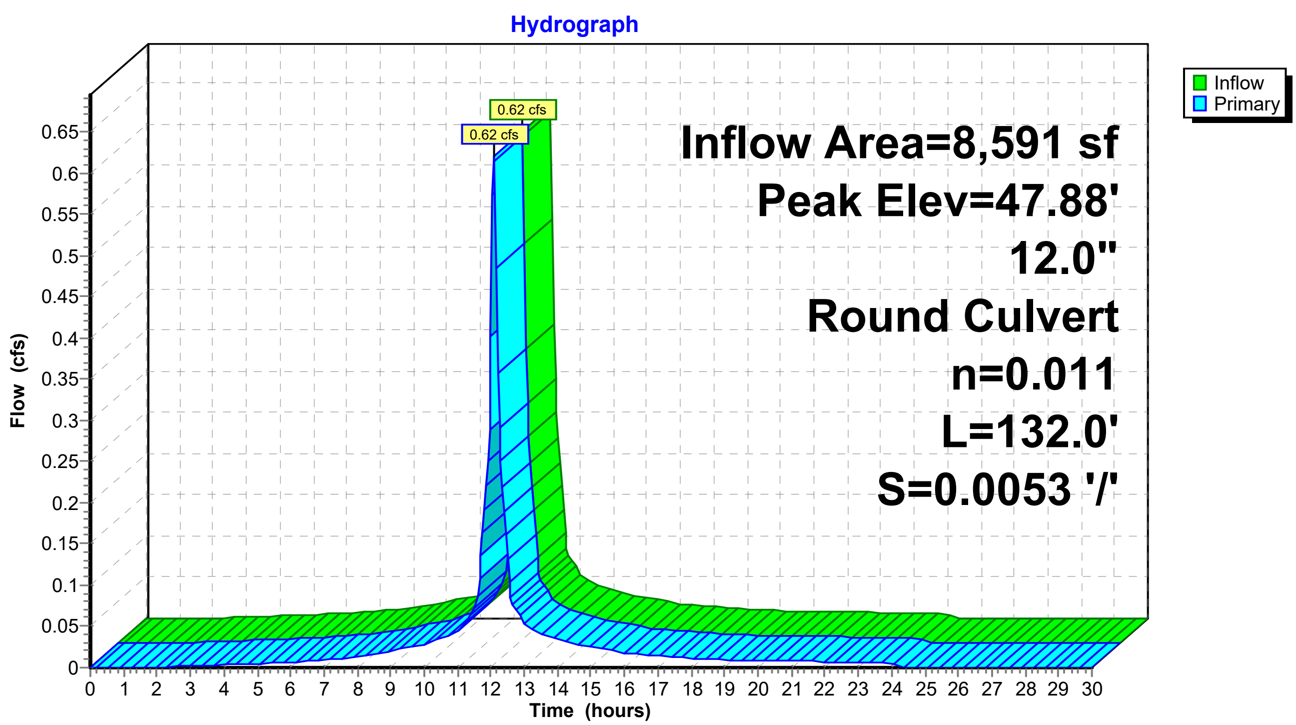
Inflow Area = 8,591 sf, 98.08% Impervious, Inflow Depth = 3.04" for 2 yr event
Inflow = 0.62 cfs @ 12.09 hrs, Volume= 2,174 cf
Outflow = 0.62 cfs @ 12.09 hrs, Volume= 2,174 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.62 cfs @ 12.09 hrs, Volume= 2,174 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.88' @ 12.11 hrs
Flood Elev= 52.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.40'	**12.0" Round Culvert** L= 132.0' Ke= 0.500 Inlet / Outlet Invert= 47.40' / 46.70' S= 0.0053 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.53 cfs @ 12.09 hrs HW=47.87' TW=47.48' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.53 cfs @ 2.12 fps)

Pond DMH5:



Summary for Pond DMH6:

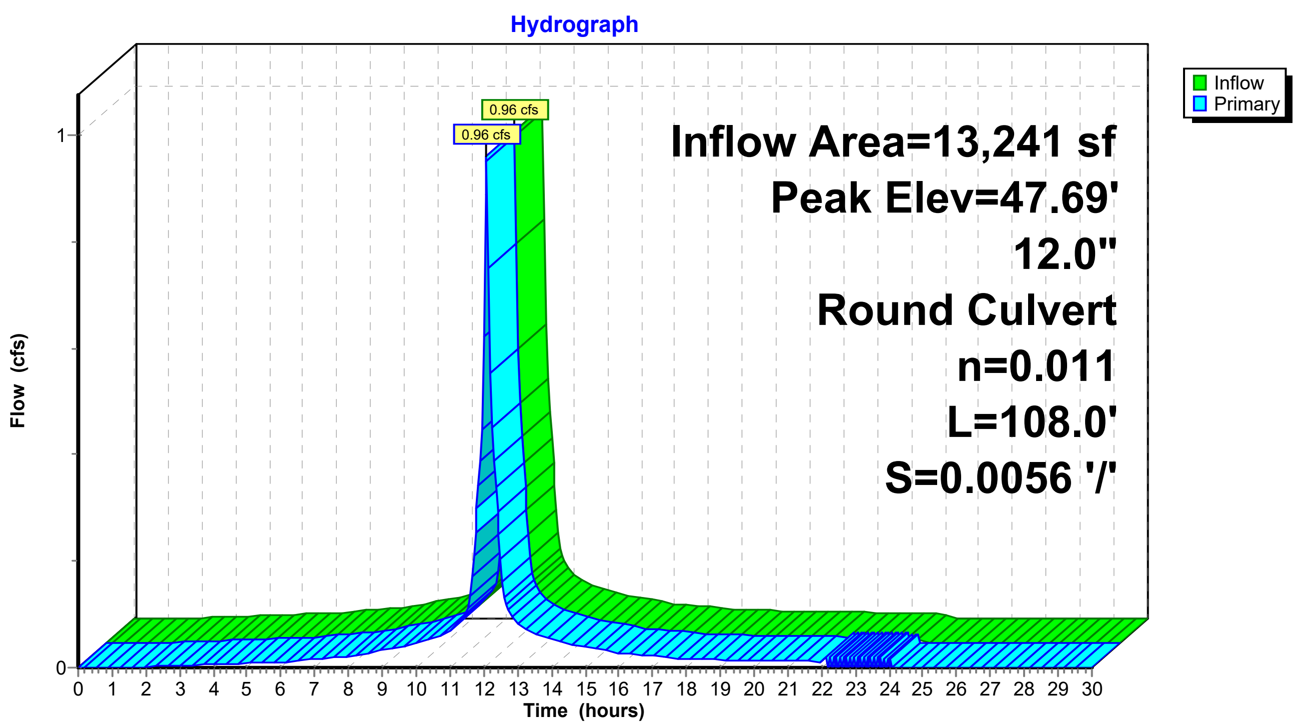
Inflow Area = 13,241 sf, 98.75% Impervious, Inflow Depth = 3.06" for 2 yr event
Inflow = 0.96 cfs @ 12.09 hrs, Volume= 3,381 cf
Outflow = 0.96 cfs @ 12.09 hrs, Volume= 3,381 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.96 cfs @ 12.09 hrs, Volume= 3,381 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.69' @ 12.24 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.60'	**12.0" Round Culvert** L= 108.0' Ke= 0.500 Inlet / Outlet Invert= 46.60' / 46.00' S= 0.0056 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=47.48' TW=47.49' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond DMH6:



Summary for Pond DMH7:

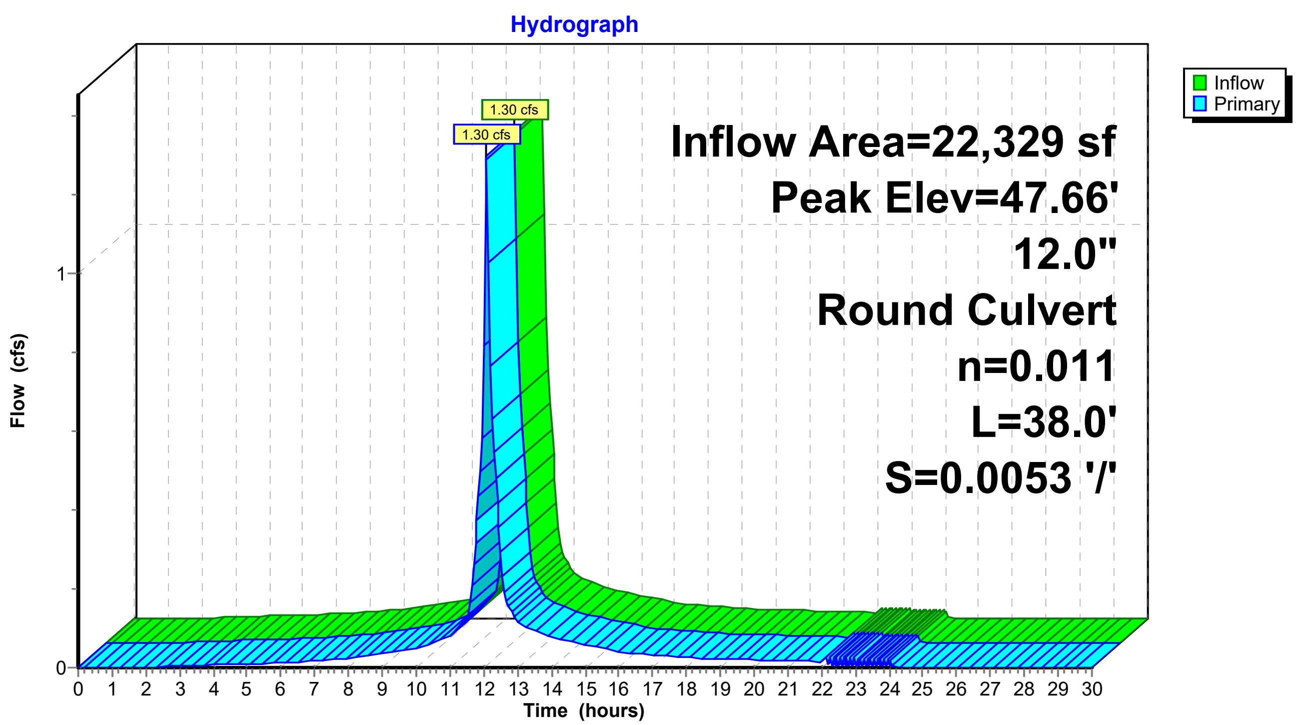
Inflow Area = 22,329 sf, 77.60% Impervious, Inflow Depth = 2.43" for 2 yr event
Inflow = 1.30 cfs @ 12.09 hrs, Volume= 4,521 cf
Outflow = 1.30 cfs @ 12.09 hrs, Volume= 4,521 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.30 cfs @ 12.09 hrs, Volume= 4,521 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.66' @ 12.20 hrs
Flood Elev= 51.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.90'	**12.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 45.90' / 45.70' S= 0.0053 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=47.49' TW=47.53' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond DMH7:



Summary for Pond Pd1: Infiltration Basin

Inflow Area = 150,987 sf, 41.38% Impervious, Inflow Depth = 1.28" for 2 yr event
Inflow = 3.87 cfs @ 12.14 hrs, Volume= 16,060 cf
Outflow = 2.65 cfs @ 12.25 hrs, Volume= 16,122 cf, Atten= 32%, Lag= 7.1 min
Discarded = 2.65 cfs @ 12.25 hrs, Volume= 16,122 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.03' @ 12.25 hrs Surf.Area= 16,654 sf Storage= 517 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.0 min (824.8 - 823.8)

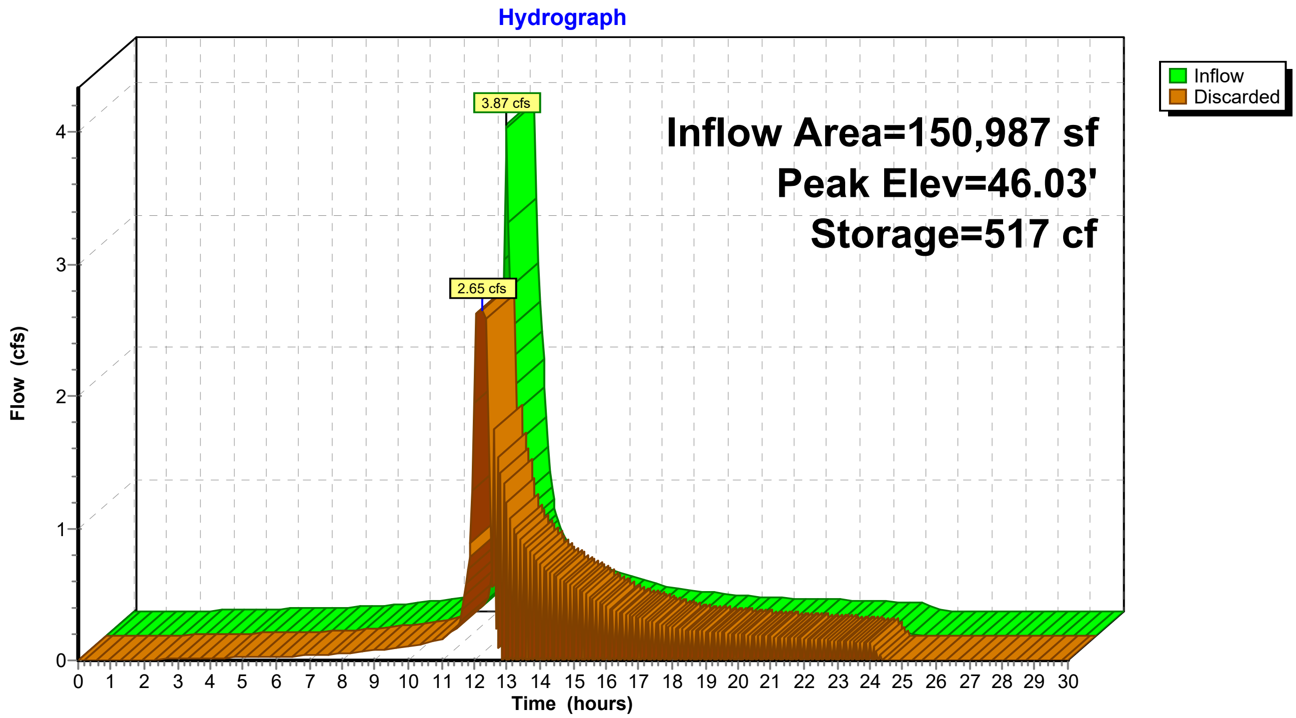
Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	70,036 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.00	16,566	726.0	0	0	16,566
47.00	19,520	751.0	18,023	18,023	19,596
48.00	25,598	1,033.0	22,490	40,513	59,640
49.00	33,630	1,171.0	29,523	70,036	83,869

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.00'	**6.875 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.65 cfs @ 12.25 hrs HW=46.03' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.65 cfs)

Pond Pd1: Infiltration Basin



Summary for Pond SF1: Sediment Forebay

Inflow Area = 14,792 sf, 98.88% Impervious, Inflow Depth = 3.06" for 2 yr event
Inflow = 1.07 cfs @ 12.09 hrs, Volume= 3,773 cf
Outflow = 1.02 cfs @ 12.11 hrs, Volume= 2,537 cf, Atten= 5%, Lag= 1.7 min
Primary = 1.02 cfs @ 12.11 hrs, Volume= 2,537 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.77' @ 12.11 hrs Surf.Area= 1,298 sf Storage= 1,387 cf

Plug-Flow detention time= 183.1 min calculated for 2,533 cf (67% of inflow)
Center-of-Mass det. time= 87.1 min (847.4 - 760.3)

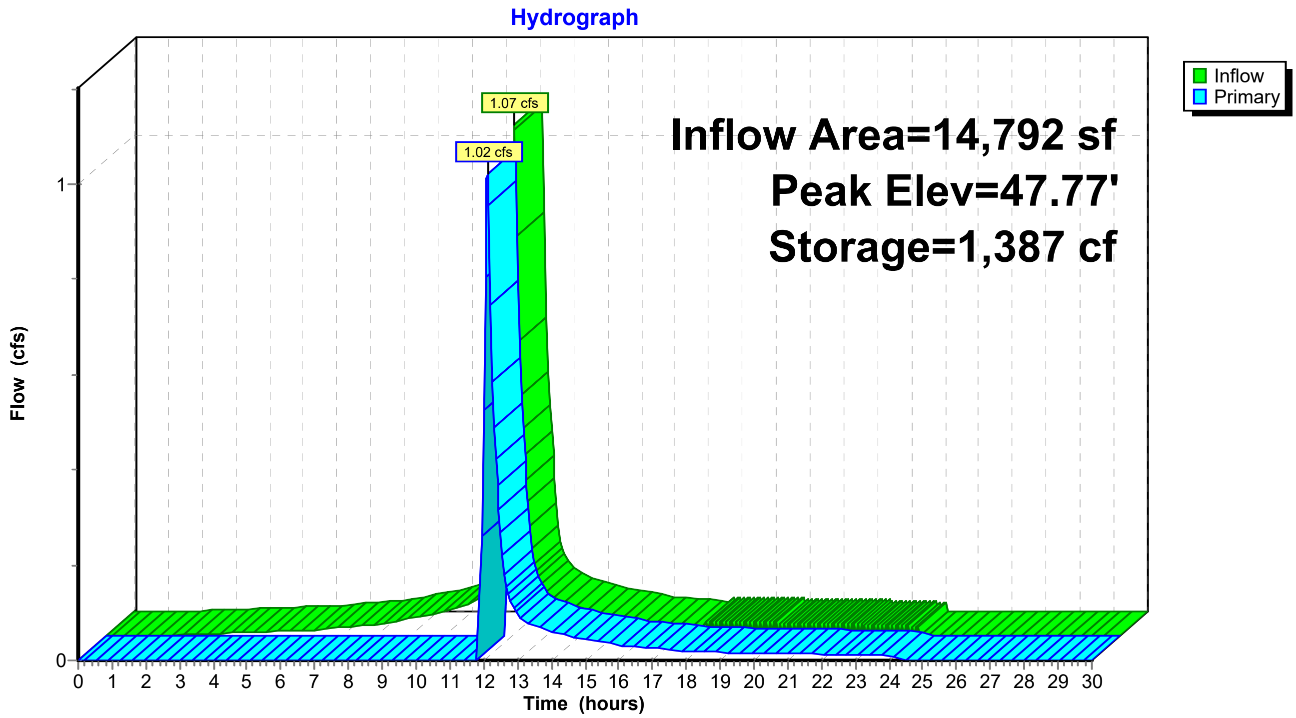
Volume	Invert	Avail.Storage	Storage Description
#1	46.20'	1,701 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.20	519	101.0	0	0	519
47.00	880	125.0	553	553	960
48.00	1,438	154.0	1,148	1,701	1,619

Device	Routing	Invert	Outlet Devices
#1	Primary	47.65'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.99 cfs @ 12.11 hrs HW=47.77' TW=46.01' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.99 cfs @ 0.84 fps)

Pond SF1: Sediment Forebay



Summary for Pond SF2: Sediment Forebay

Inflow Area = 22,329 sf, 77.60% Impervious, Inflow Depth = 2.43" for 2 yr event
Inflow = 1.30 cfs @ 12.09 hrs, Volume= 4,521 cf
Outflow = 1.09 cfs @ 12.17 hrs, Volume= 2,716 cf, Atten= 16%, Lag= 4.6 min
Primary = 1.09 cfs @ 12.17 hrs, Volume= 2,716 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.63' @ 12.17 hrs Surf.Area= 1,341 sf Storage= 1,971 cf

Plug-Flow detention time= 211.2 min calculated for 2,712 cf (60% of inflow)
Center-of-Mass det. time= 101.8 min (877.5 - 775.7)

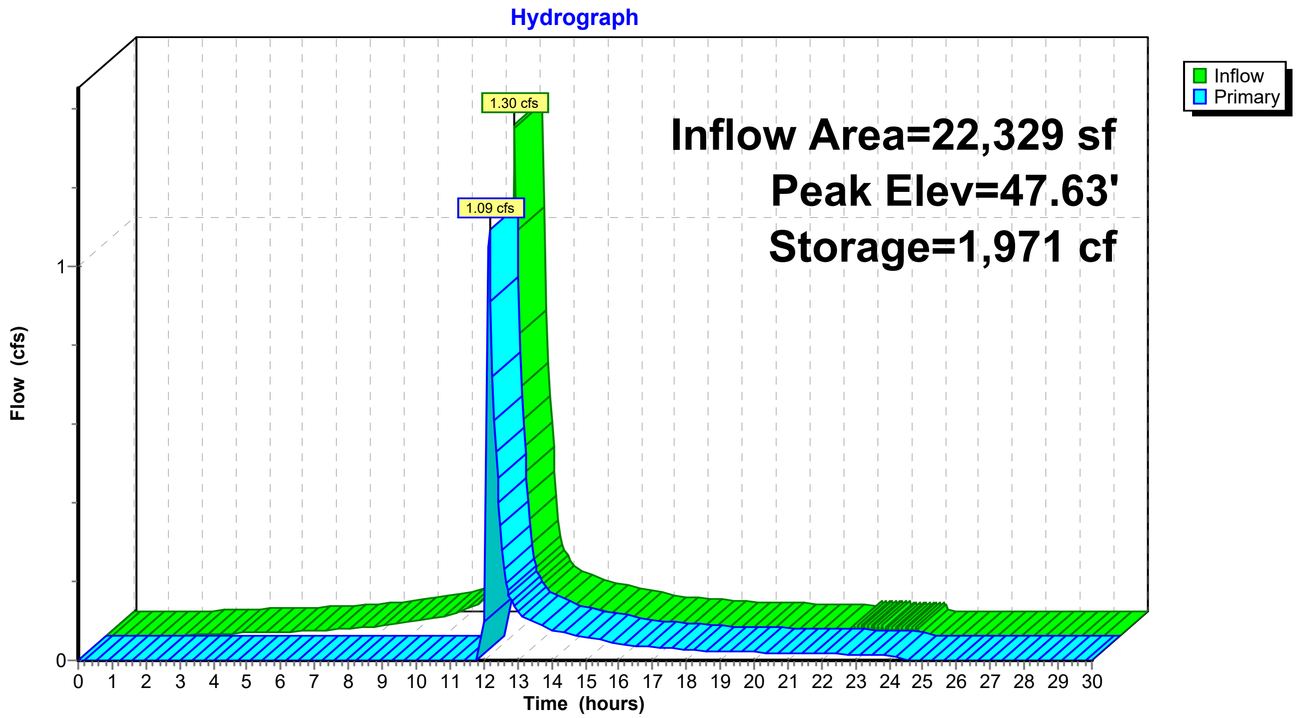
Volume	Invert	Avail.Storage	Storage Description
#1	45.00'	2,509 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
45.00	275	66.0	0	0	275
46.00	601	93.0	428	428	626
47.00	1,025	118.0	804	1,231	1,059
48.00	1,549	144.0	1,278	2,509	1,616

Device	Routing	Invert	Outlet Devices
#1	Primary	47.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=1.00 cfs @ 12.17 hrs HW=47.62' TW=46.02' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.00 cfs @ 0.84 fps)

Pond SF2: Sediment Forebay

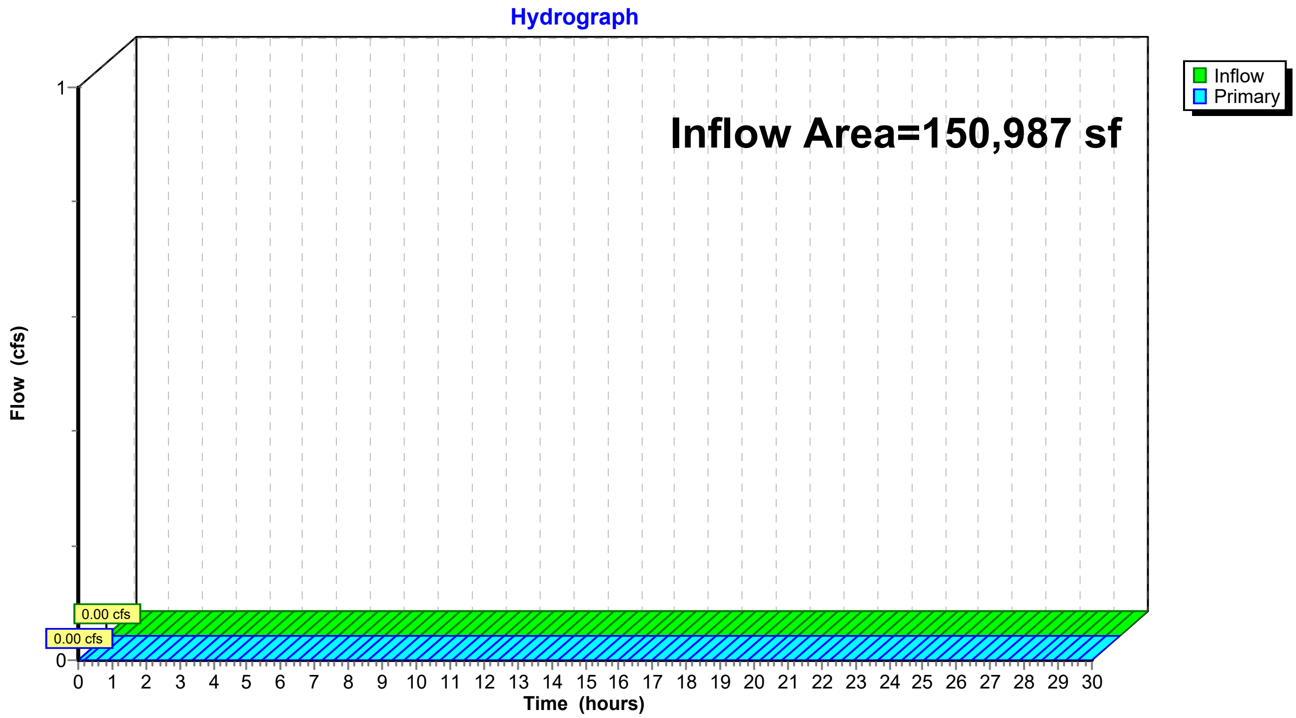


Summary for Link POI 1: Onsite Infiltration East

Inflow Area =	150,987 sf,	41.38% Impervious,	Inflow Depth = 0.00"	for 2 yr event
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 1: Onsite Infiltration East

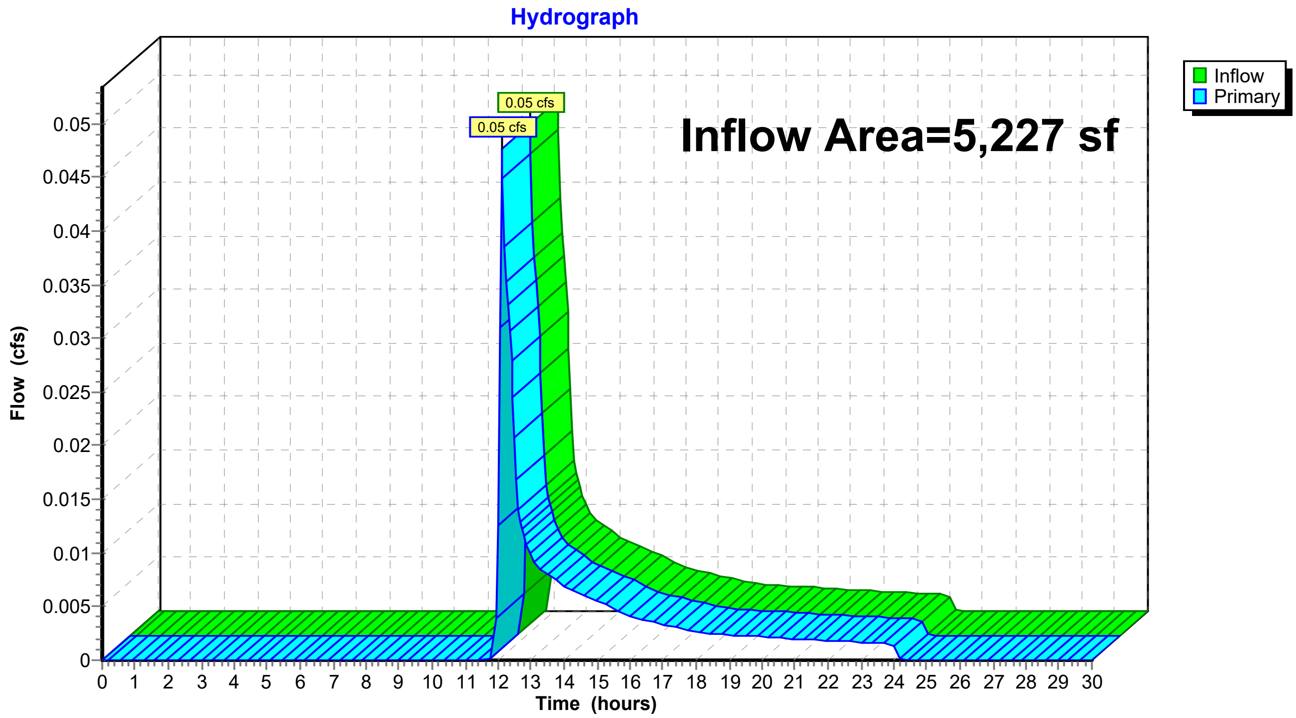


Summary for Link POI 2: Offsite at Southeast Property Line

Inflow Area = 5,227 sf, 0.00% Impervious, Inflow Depth = 0.51" for 2 yr event
Inflow = 0.05 cfs @ 12.12 hrs, Volume= 221 cf
Primary = 0.05 cfs @ 12.12 hrs, Volume= 221 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 2: Offsite at Southeast Property Line

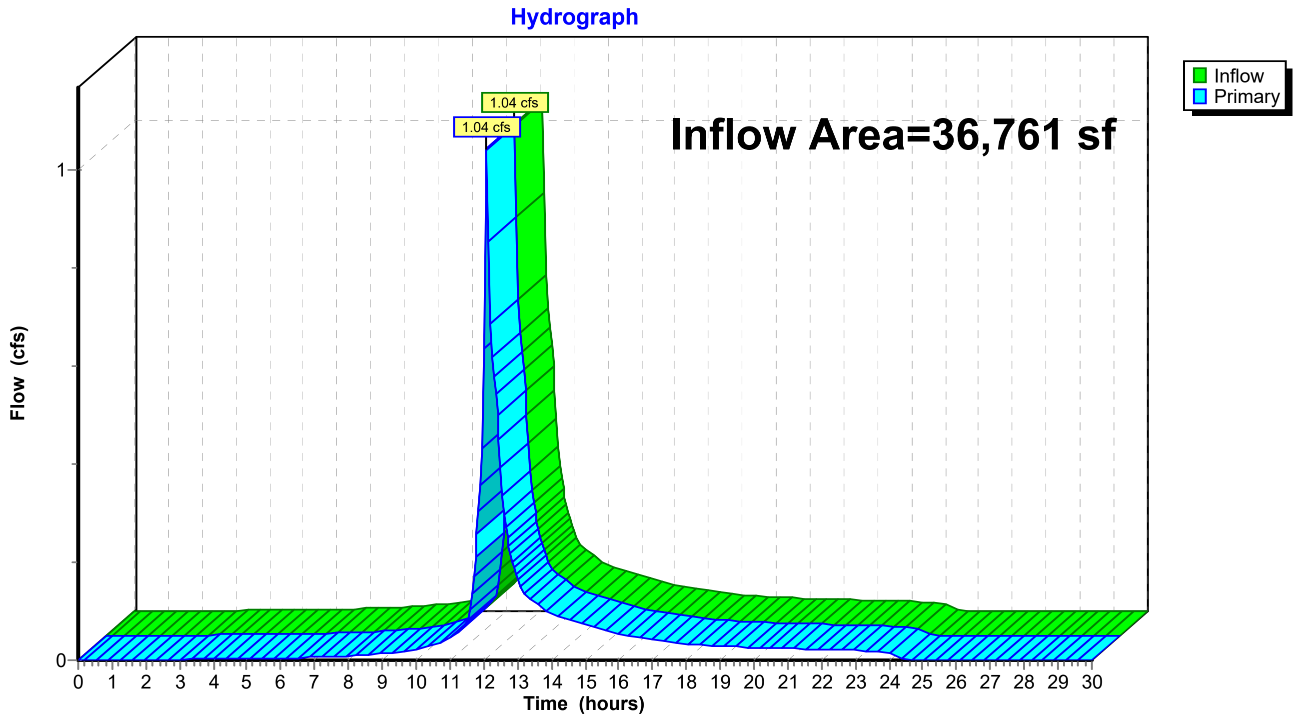


Summary for Link POI 3: Cranberry Highway Closed Drainage System

Inflow Area = 36,761 sf, 43.09% Impervious, Inflow Depth = 1.40" for 2 yr event
Inflow = 1.04 cfs @ 12.09 hrs, Volume= 4,296 cf
Primary = 1.04 cfs @ 12.09 hrs, Volume= 4,296 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 3: Cranberry Highway Closed Drainage System



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentP-1A:	Runoff Area=83,866 sf 0.62% Impervious Runoff Depth=1.20" Flow Length=347' Tc=19.6 min CN=59 Runoff=1.60 cfs 8,390 cf
SubcatchmentP-1B:	Runoff Area=2,421 sf 100.00% Impervious Runoff Depth=4.70" Tc=6.0 min CN=98 Runoff=0.26 cfs 949 cf
SubcatchmentP-1C:	Runoff Area=2,478 sf 100.00% Impervious Runoff Depth=4.70" Tc=6.0 min CN=98 Runoff=0.27 cfs 971 cf
SubcatchmentP-1D:	Runoff Area=2,367 sf 100.00% Impervious Runoff Depth=4.70" Tc=6.0 min CN=98 Runoff=0.26 cfs 928 cf
SubcatchmentP-1E:	Runoff Area=7,526 sf 97.81% Impervious Runoff Depth=4.59" Tc=6.0 min CN=97 Runoff=0.81 cfs 2,877 cf
SubcatchmentP-1F: Roof Runoff	Runoff Area=30,000 sf 100.00% Impervious Runoff Depth=4.70" Tc=6.0 min CN=98 Runoff=3.25 cfs 11,758 cf
SubcatchmentP-2:	Runoff Area=5,227 sf 0.00% Impervious Runoff Depth=1.33" Tc=6.0 min CN=61 Runoff=0.17 cfs 581 cf
SubcatchmentP-3:	Runoff Area=15,280 sf 18.69% Impervious Runoff Depth=1.76" Flow Length=242' Tc=26.3 min CN=67 Runoff=0.42 cfs 2,243 cf
SubcatchmentP-4:	Runoff Area=7,214 sf 39.20% Impervious Runoff Depth=2.49" Tc=6.0 min CN=76 Runoff=0.47 cfs 1,495 cf
SubcatchmentP-5:	Runoff Area=4,858 sf 99.28% Impervious Runoff Depth=4.70" Tc=6.0 min CN=98 Runoff=0.53 cfs 1,904 cf
SubcatchmentP-6:	Runoff Area=9,409 sf 56.68% Impervious Runoff Depth=3.03" Flow Length=123' Tc=5.3 min CN=82 Runoff=0.76 cfs 2,372 cf
SubcatchmentP-6A:	Runoff Area=2,359 sf 100.00% Impervious Runoff Depth=4.70" Tc=6.0 min CN=98 Runoff=0.26 cfs 925 cf
SubcatchmentP-6B:	Runoff Area=6,232 sf 97.35% Impervious Runoff Depth=4.59" Tc=6.0 min CN=97 Runoff=0.67 cfs 2,382 cf
SubcatchmentP-6C:	Runoff Area=1,457 sf 100.00% Impervious Runoff Depth=4.70" Tc=6.0 min CN=98 Runoff=0.16 cfs 571 cf
SubcatchmentP-6D:	Runoff Area=4,650 sf 100.00% Impervious Runoff Depth=4.70" Tc=6.0 min CN=98 Runoff=0.50 cfs 1,823 cf
SubcatchmentP-6E:	Runoff Area=7,631 sf 36.61% Impervious Runoff Depth=2.40" Tc=6.0 min CN=75 Runoff=0.48 cfs 1,527 cf

Pond CB1: Peak Elev=48.30' Inflow=0.26 cfs 949 cf
12.0" Round Culvert n=0.011 L=93.0' S=0.0054 '/' Outflow=0.26 cfs 949 cf

Pond CB10: Peak Elev=47.97' Inflow=0.48 cfs 1,527 cf
12.0" Round Culvert n=0.011 L=46.0' S=0.0065 '/' Outflow=0.48 cfs 1,526 cf

Pond CB101: Peak Elev=46.88' Inflow=0.42 cfs 2,243 cf
12.0" Round Culvert n=0.011 L=29.0' S=-0.0034 '/' Outflow=0.42 cfs 2,243 cf

Pond CB102: Peak Elev=50.04' Inflow=0.47 cfs 1,495 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=0.47 cfs 1,495 cf

Pond CB103: Peak Elev=47.26' Inflow=0.53 cfs 1,904 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=0.53 cfs 1,904 cf

Pond CB104: Peak Elev=46.68' Inflow=0.76 cfs 2,372 cf
12.0" Round Culvert n=0.011 L=2.0' S=0.0500 '/' Outflow=0.76 cfs 2,372 cf

Pond CB2: Peak Elev=48.03' Inflow=0.27 cfs 971 cf
12.0" Round Culvert n=0.011 L=8.0' S=0.0125 '/' Outflow=0.27 cfs 971 cf

Pond CB3: Peak Elev=48.12' Inflow=0.26 cfs 928 cf
12.0" Round Culvert n=0.011 L=104.0' S=0.0058 '/' Outflow=0.26 cfs 928 cf

Pond CB4: Peak Elev=0.00'
12.0" Round Culvert n=0.011 L=25.0' S=0.0080 '/' Primary=0.00 cfs 0 cf

Pond CB5: Peak Elev=47.99' Inflow=0.81 cfs 2,877 cf
12.0" Round Culvert n=0.011 L=27.0' S=0.0074 '/' Outflow=0.81 cfs 2,877 cf

Pond CB6: Peak Elev=48.33' Inflow=0.26 cfs 925 cf
12.0" Round Culvert n=0.011 L=86.0' S=0.0058 '/' Outflow=0.26 cfs 925 cf

Pond CB7: Peak Elev=48.24' Inflow=0.67 cfs 2,382 cf
12.0" Round Culvert n=0.011 L=8.0' S=0.0125 '/' Outflow=0.67 cfs 2,382 cf

Pond CB8: Peak Elev=48.11' Inflow=0.50 cfs 1,823 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0167 '/' Outflow=0.50 cfs 1,823 cf

Pond CB9: Peak Elev=47.96' Inflow=0.16 cfs 571 cf
12.0" Round Culvert n=0.011 L=7.0' S=0.0143 '/' Outflow=0.17 cfs 572 cf

Pond DMH1: Peak Elev=48.02' Inflow=0.53 cfs 1,920 cf
12.0" Round Culvert n=0.011 L=13.0' S=0.0077 '/' Outflow=0.53 cfs 1,920 cf

Pond DMH101: Peak Elev=46.83' Inflow=0.64 cfs 3,737 cf
12.0" Round Culvert n=0.011 L=109.0' S=0.0018 '/' Outflow=0.64 cfs 3,737 cf

Pond DMH102: Peak Elev=46.99' Inflow=0.53 cfs 1,904 cf
12.0" Round Culvert n=0.011 L=13.0' S=-0.0077 '/' Outflow=0.53 cfs 1,904 cf

Pond DMH103: Peak Elev=46.66' Inflow=1.16 cfs 5,641 cf
12.0" Round Culvert n=0.011 L=36.0' S=0.0333 '/' Outflow=1.16 cfs 5,641 cf

Pond DMH104: Peak Elev=45.74' Inflow=0.76 cfs 2,372 cf
12.0" Round Culvert n=0.011 L=5.0' S=0.0400 '/' Outflow=0.76 cfs 2,372 cf

Pond DMH105: Inflow=1.91 cfs 8,014 cf
Primary=1.91 cfs 8,014 cf

Pond DMH2: Peak Elev=48.00' Inflow=0.53 cfs 1,920 cf
12.0" Round Culvert n=0.011 L=89.0' S=0.0045 '/' Outflow=0.53 cfs 1,920 cf

Pond DMH3: Peak Elev=47.97' Inflow=0.26 cfs 928 cf
12.0" Round Culvert n=0.011 L=46.0' S=0.0065 '/' Outflow=0.26 cfs 928 cf

Pond DMH4: Peak Elev=47.96' Inflow=1.60 cfs 5,725 cf
12.0" Round Culvert n=0.011 L=11.0' S=0.0091 '/' Outflow=1.60 cfs 5,725 cf

Pond DMH5: Peak Elev=48.21' Inflow=0.93 cfs 3,307 cf
12.0" Round Culvert n=0.011 L=132.0' S=0.0053 '/' Outflow=0.93 cfs 3,307 cf

Pond DMH6: Peak Elev=48.10' Inflow=1.43 cfs 5,129 cf
12.0" Round Culvert n=0.011 L=108.0' S=0.0056 '/' Outflow=1.43 cfs 5,129 cf

Pond DMH7: Peak Elev=47.96' Inflow=2.08 cfs 7,227 cf
12.0" Round Culvert n=0.011 L=38.0' S=0.0053 '/' Outflow=2.08 cfs 7,227 cf

Pond Pd1: Infiltration Basin Peak Elev=46.27' Storage=4,516 cf Inflow=7.42 cfs 30,060 cf
Outflow=2.76 cfs 30,211 cf

Pond SF1: Sediment Forebay Peak Elev=47.81' Storage=1,436 cf Inflow=1.60 cfs 5,725 cf
Outflow=1.53 cfs 4,490 cf

Pond SF2: Sediment Forebay Peak Elev=47.69' Storage=2,054 cf Inflow=2.08 cfs 7,227 cf
Outflow=1.99 cfs 5,422 cf

Link POI 1: Onsite Infiltration East Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link POI 2: Offsite at Southeast Property Line Inflow=0.17 cfs 581 cf
Primary=0.17 cfs 581 cf

Link POI 3: Cranberry Highway Closed Drainage System Inflow=1.91 cfs 8,014 cf
Primary=1.91 cfs 8,014 cf

Total Runoff Area = 192,975 sf Runoff Volume = 41,694 cf Average Runoff Depth = 2.59"
59.42% Pervious = 114,661 sf 40.58% Impervious = 78,314 sf

Summary for Subcatchment P-1A:

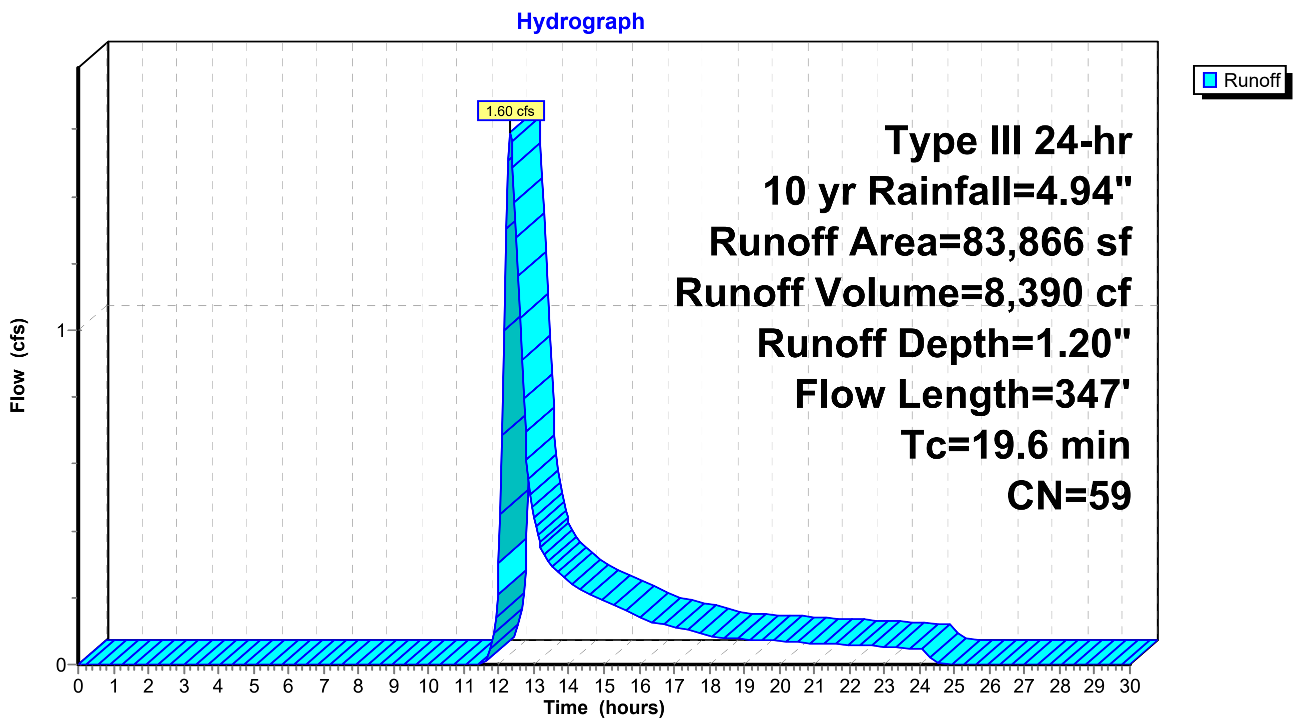
Runoff = 1.60 cfs @ 12.31 hrs, Volume= 8,390 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
25,220	55	Woods, Good, HSG B
520	98	Roofs, HSG B
58,126	61	>75% Grass cover, Good, HSG B
83,866	59	Weighted Average
83,346		99.38% Pervious Area
520		0.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	50	0.0200	0.07		**Sheet Flow, Woods, 50', 2%** Woods: Light underbrush n= 0.400 P2= 3.35"
5.3	160	0.0100	0.50		**Shallow Concentrated Flow, Woods, 160', 1%** Woodland Kv= 5.0 fps
2.2	137	0.0230	1.06		**Shallow Concentrated Flow, Grass, 137', 2.3%** Short Grass Pasture Kv= 7.0 fps
19.6	347	Total			

Subcatchment P-1A:



Summary for Subcatchment P-1B:

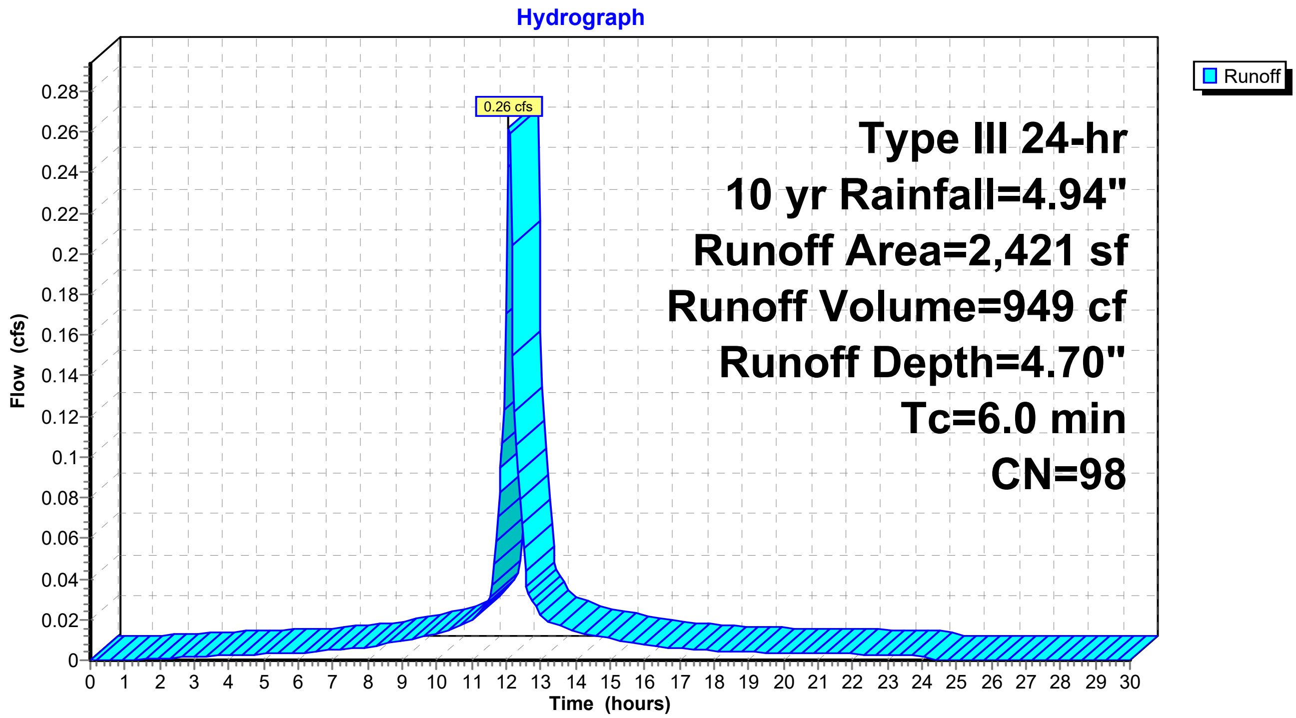
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 949 cf, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
2,421	98	Paved parking, HSG B
2,421		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1B:



Summary for Subcatchment P-1C:

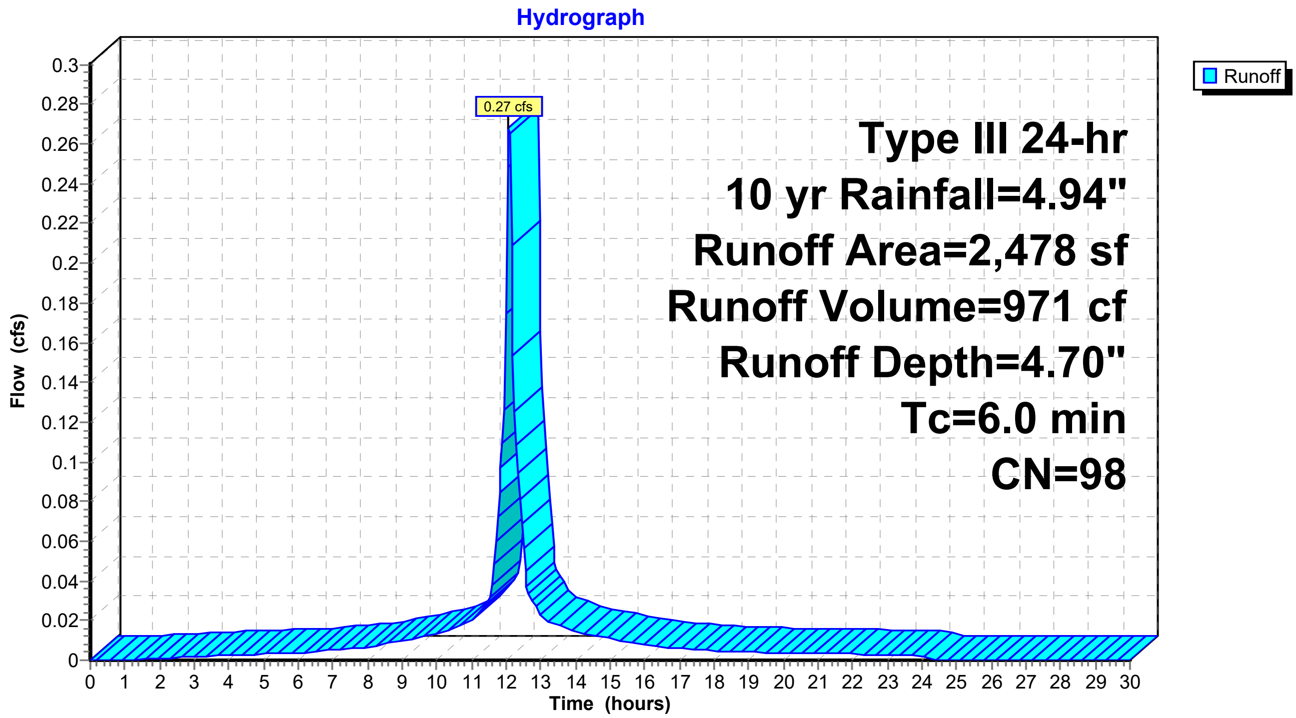
Runoff = 0.27 cfs @ 12.09 hrs, Volume= 971 cf, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
2,478	98	Paved parking, HSG B
2,478		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1C:



Summary for Subcatchment P-1D:

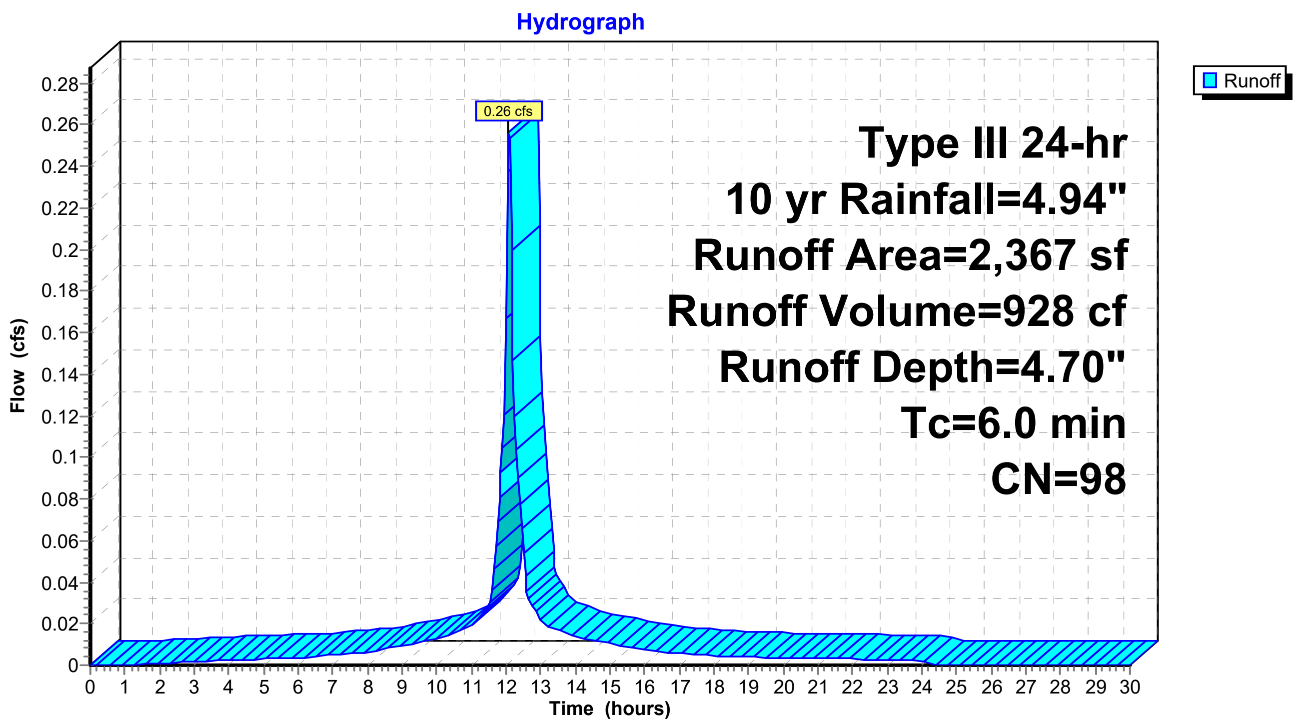
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 928 cf, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
2,367	98	Paved parking, HSG B
2,367		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1D:



Summary for Subcatchment P-1E:

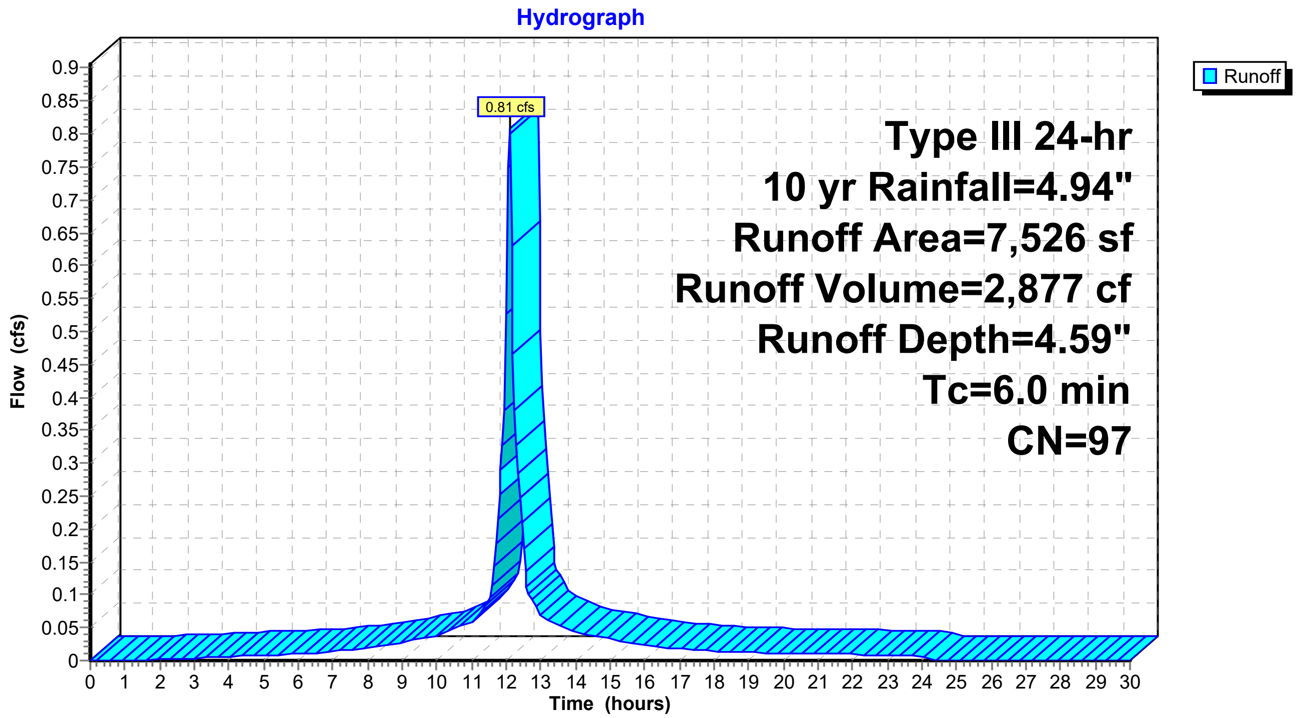
Runoff = 0.81 cfs @ 12.09 hrs, Volume= 2,877 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
7,361	98	Paved parking, HSG B
165	61	>75% Grass cover, Good, HSG B
7,526	97	Weighted Average
165		2.19% Pervious Area
7,361		97.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1E:



Summary for Subcatchment P-1F: Roof Runoff

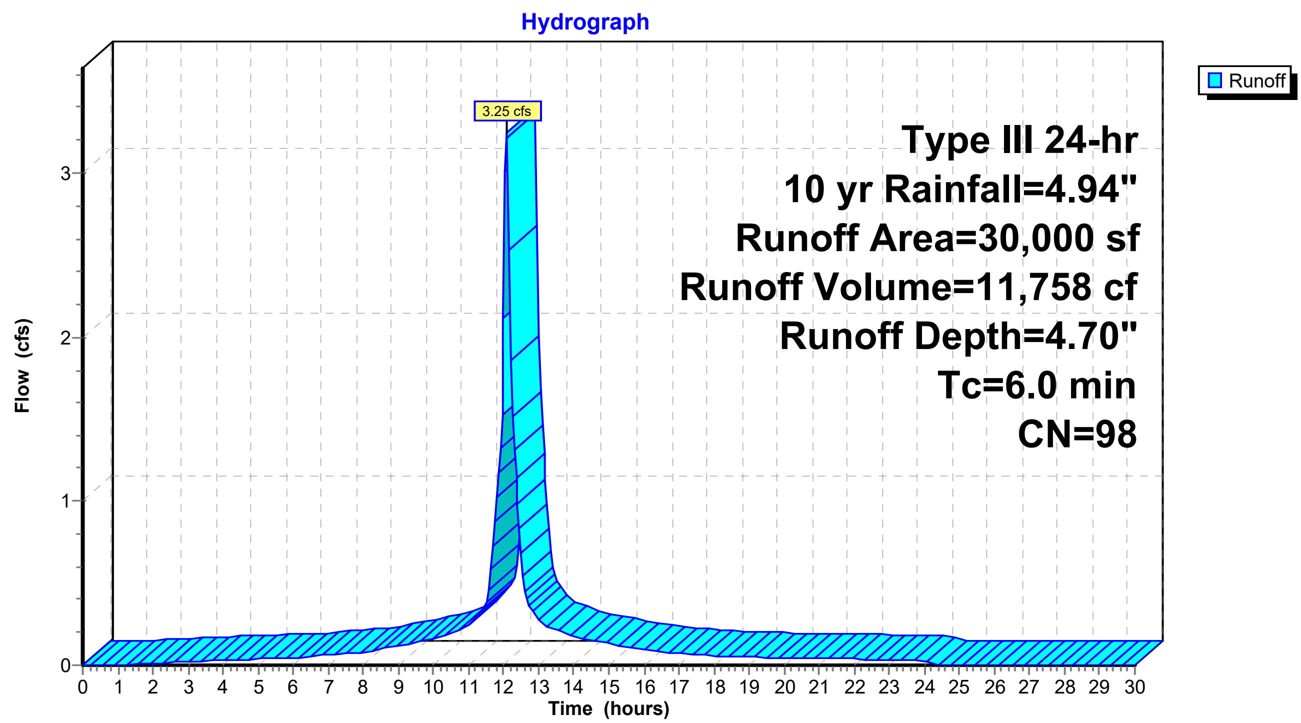
Runoff = 3.25 cfs @ 12.09 hrs, Volume= 11,758 cf, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
30,000	98	Roofs, HSG B
30,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1F: Roof Runoff



Summary for Subcatchment P-2:

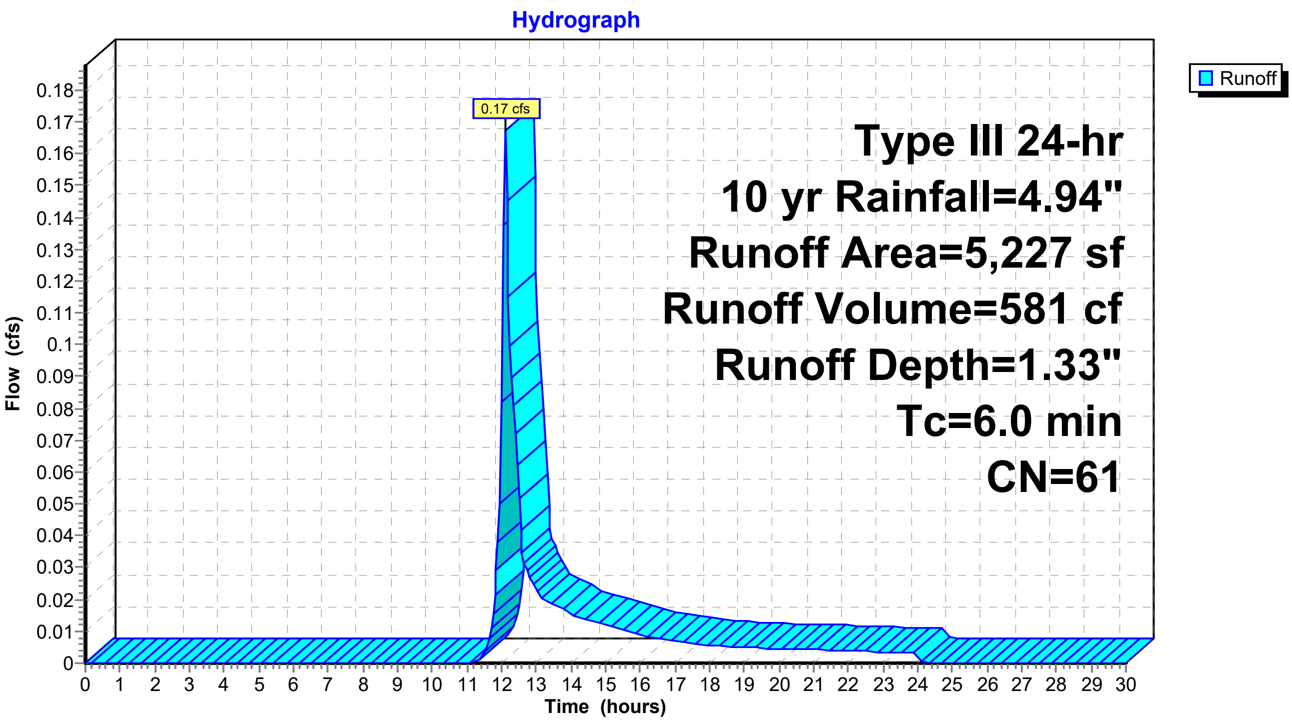
Runoff = 0.17 cfs @ 12.10 hrs, Volume= 581 cf, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
153	55	Woods, Good, HSG B
5,074	61	>75% Grass cover, Good, HSG B
5,227	61	Weighted Average
5,227		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-2:



Summary for Subcatchment P-3:

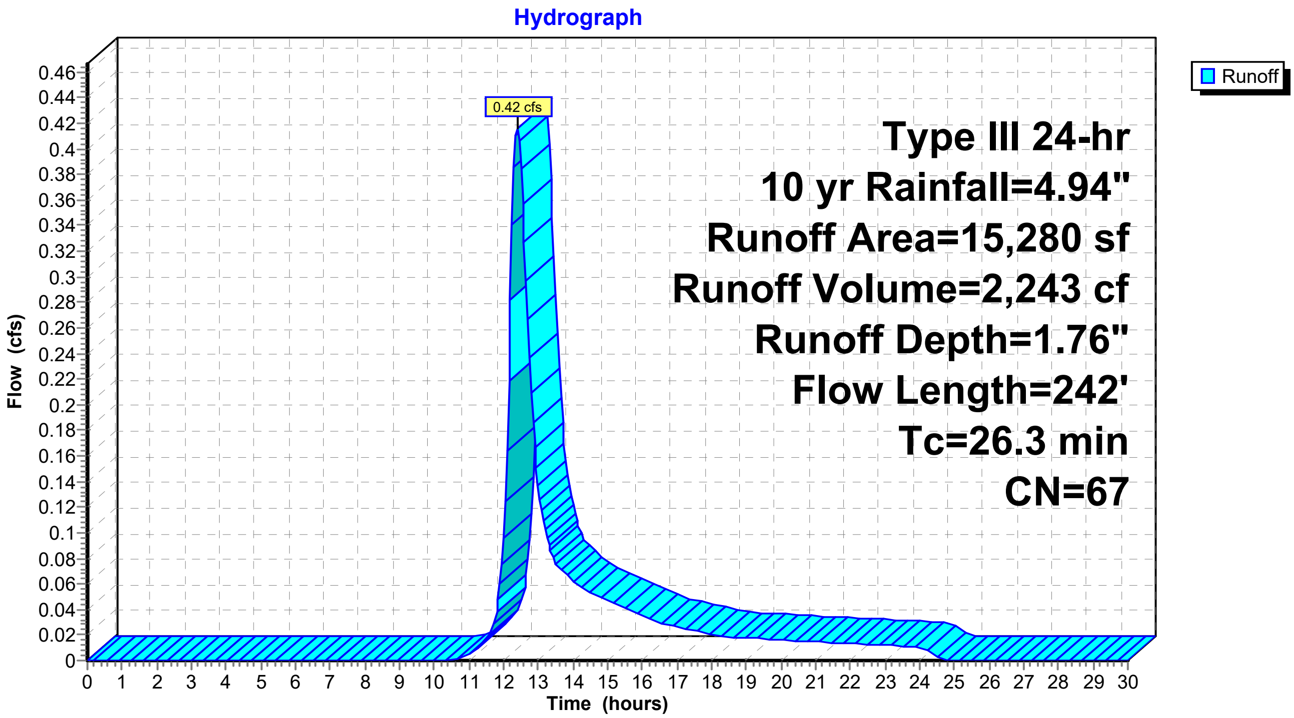
Runoff = 0.42 cfs @ 12.39 hrs, Volume= 2,243 cf, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
2,898	55	Woods, Good, HSG B
2,856	98	Paved parking, HSG B
9,526	61	>75% Grass cover, Good, HSG B
15,280	67	Weighted Average
12,424		81.31% Pervious Area
2,856		18.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	55	0.0050	0.04		**Sheet Flow, Woods, 55', 0.5%** Woods: Light underbrush n= 0.400 P2= 3.35"
0.2	5	0.0050	0.35		**Shallow Concentrated Flow, Woods, 5%, 0.5%** Woodland Kv= 5.0 fps
2.8	117	0.0100	0.70		**Shallow Concentrated Flow, Grass, 117', 1%** Short Grass Pasture Kv= 7.0 fps
0.6	65	0.0080	1.82		**Shallow Concentrated Flow, Pavement, 65', 0.8%** Paved Kv= 20.3 fps
26.3	242	Total			

Subcatchment P-3:



Summary for Subcatchment P-4:

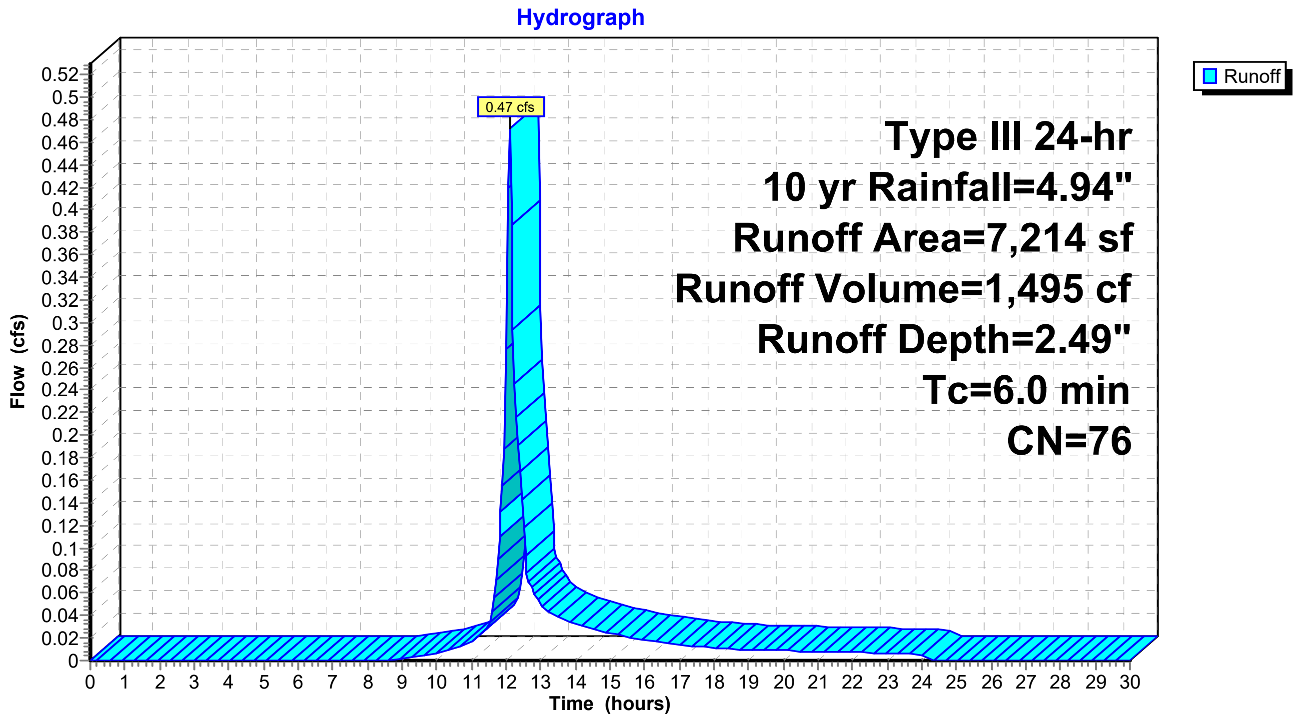
Runoff = 0.47 cfs @ 12.09 hrs, Volume= 1,495 cf, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
2,828	98	Paved parking, HSG B
4,386	61	>75% Grass cover, Good, HSG B
7,214	76	Weighted Average
4,386		60.80% Pervious Area
2,828		39.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-4:



Summary for Subcatchment P-5:

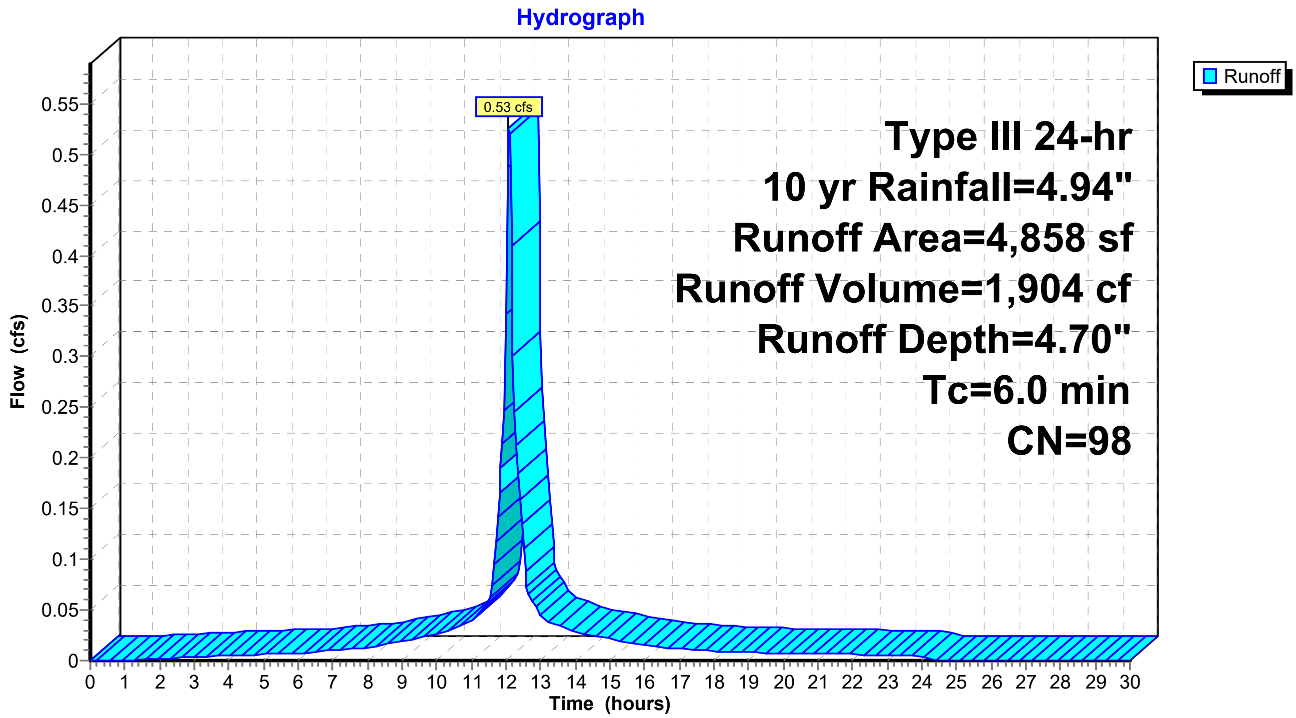
Runoff = 0.53 cfs @ 12.09 hrs, Volume= 1,904 cf, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
4,823	98	Paved parking, HSG B
35	61	>75% Grass cover, Good, HSG B
4,858	98	Weighted Average
35		0.72% Pervious Area
4,823		99.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-5:



Summary for Subcatchment P-6:

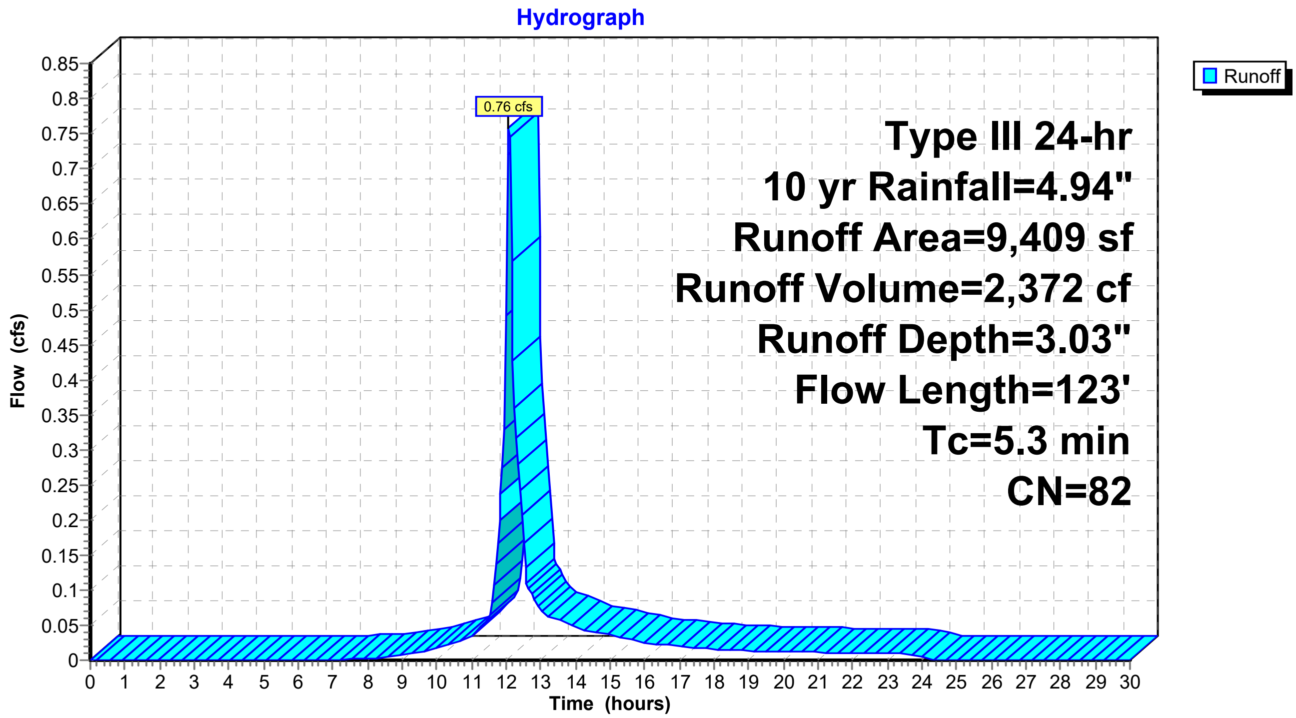
Runoff = 0.76 cfs @ 12.08 hrs, Volume= 2,372 cf, Depth= 3.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
5,333	98	Paved parking, HSG B
4,076	61	>75% Grass cover, Good, HSG B
9,409	82	Weighted Average
4,076		43.32% Pervious Area
5,333		56.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.0300	0.18		**Sheet Flow, Grass, 50', 3%** Grass: Short n= 0.150 P2= 3.35"
0.4	30	0.0300	1.21		**Shallow Concentrated Flow, Grass, 30', 3%** Short Grass Pasture Kv= 7.0 fps
0.2	43	0.0200	2.87		**Shallow Concentrated Flow, Pavement, 43', 2%** Paved Kv= 20.3 fps
5.3	123	Total			

Subcatchment P-6:



Summary for Subcatchment P-6A:

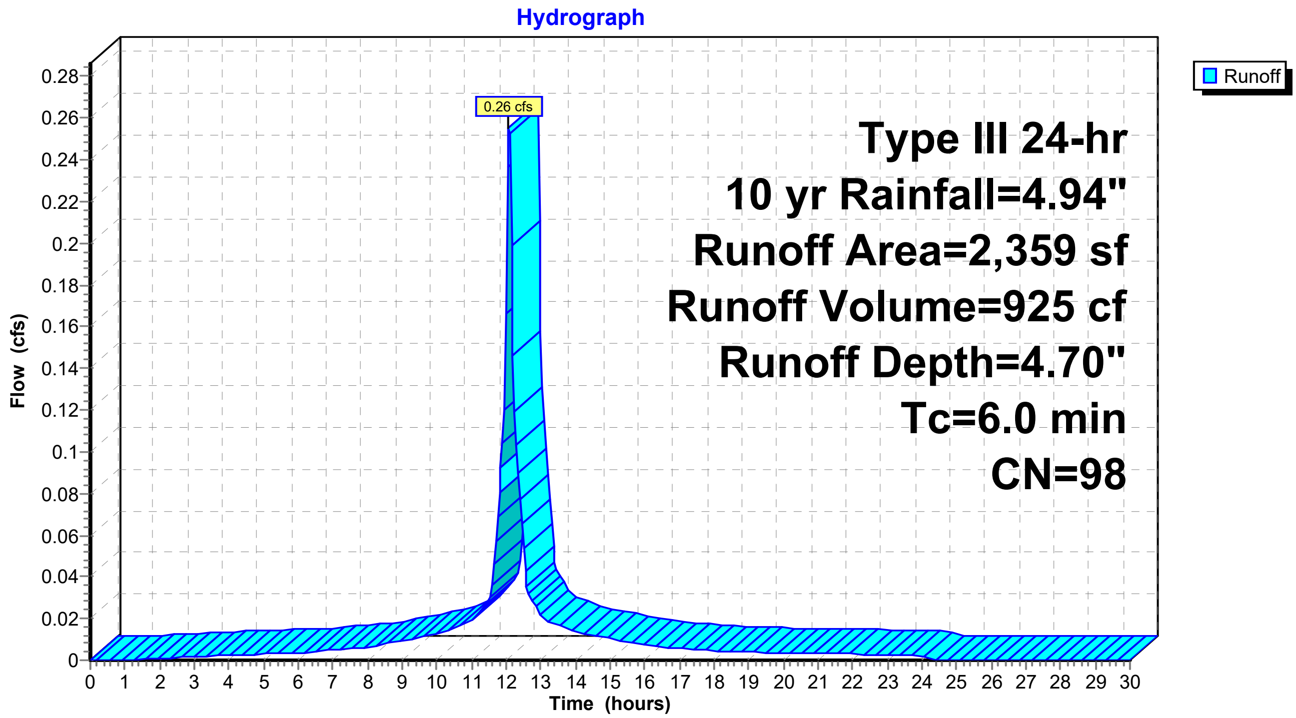
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 925 cf, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
2,359	98	Paved parking, HSG B
2,359		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6A:



Summary for Subcatchment P-6B:

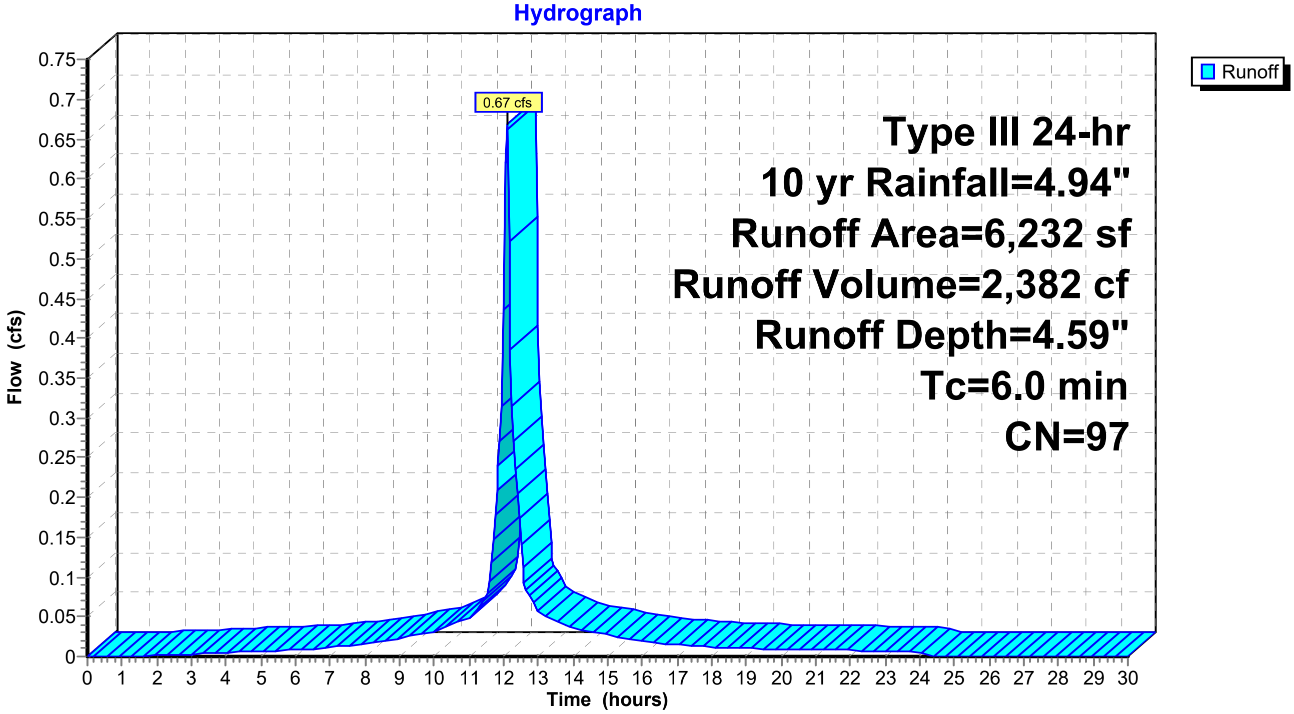
Runoff = 0.67 cfs @ 12.09 hrs, Volume= 2,382 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
6,067	98	Paved parking, HSG B
165	61	>75% Grass cover, Good, HSG B
6,232	97	Weighted Average
165		2.65% Pervious Area
6,067		97.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6B:



Summary for Subcatchment P-6C:

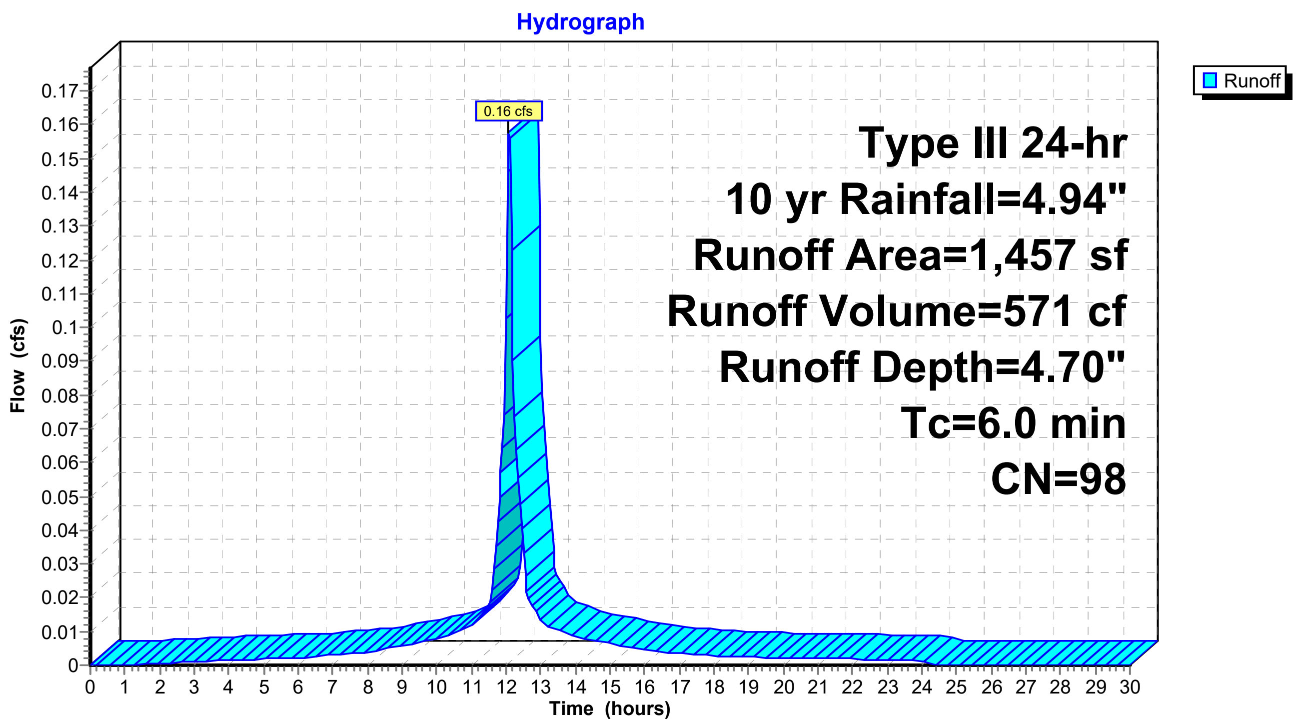
Runoff = 0.16 cfs @ 12.09 hrs, Volume= 571 cf, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
1,457	98	Paved parking, HSG B
1,457		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6C:



Summary for Subcatchment P-6D:

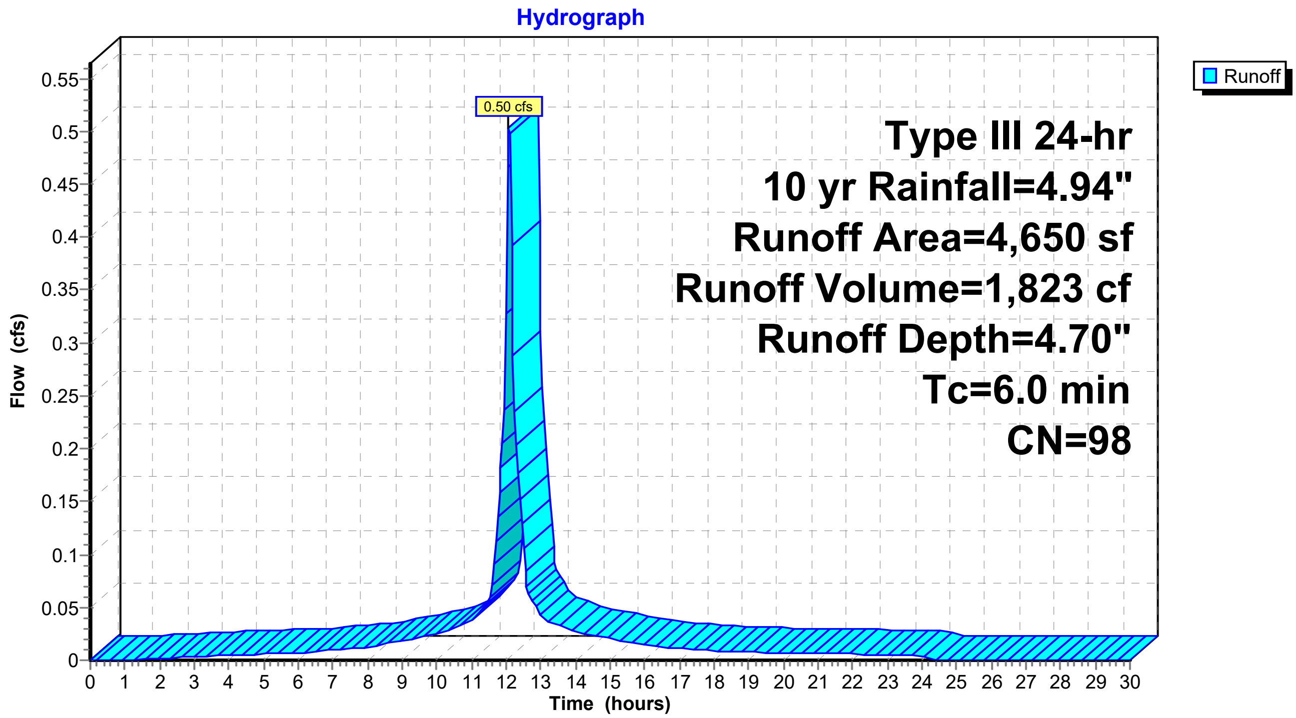
Runoff = 0.50 cfs @ 12.09 hrs, Volume= 1,823 cf, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
4,650	98	Paved parking, HSG B
4,650		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6D:



Summary for Subcatchment P-6E:

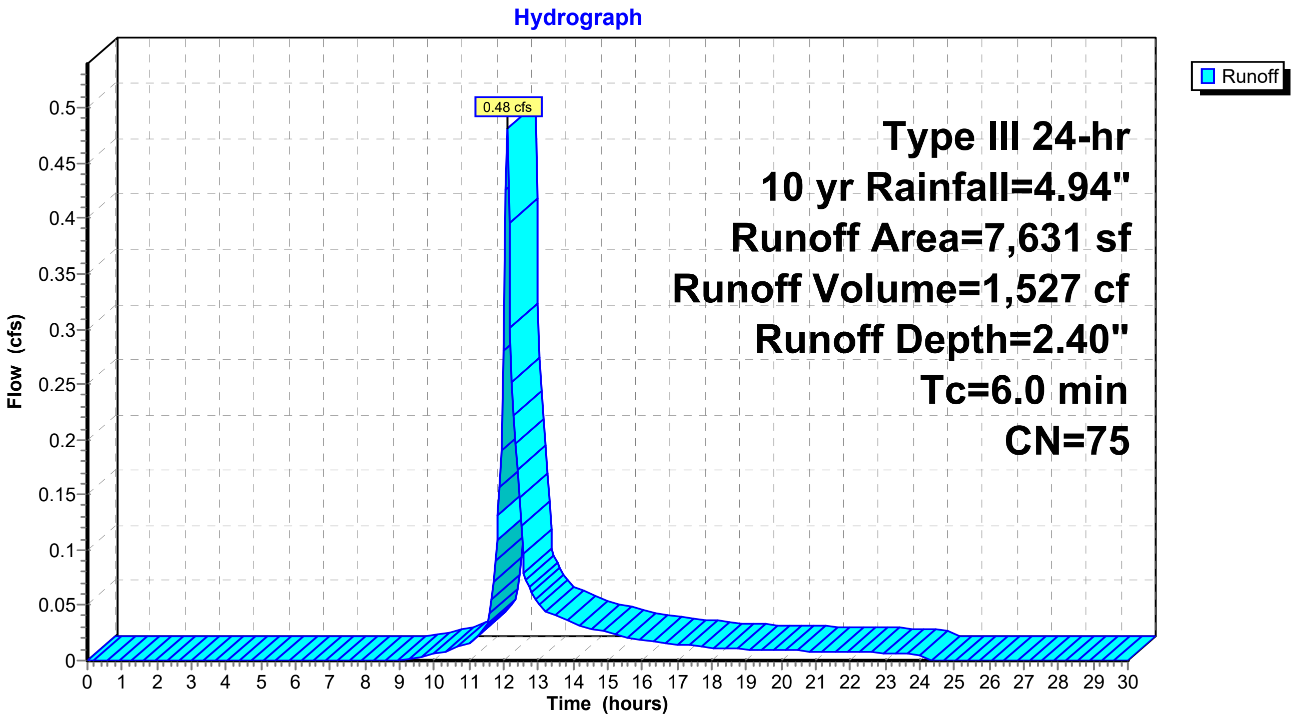
Runoff = 0.48 cfs @ 12.09 hrs, Volume= 1,527 cf, Depth= 2.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.94"

Area (sf)	CN	Description
2,794	98	Paved parking, HSG B
4,837	61	>75% Grass cover, Good, HSG B
7,631	75	Weighted Average
4,837		63.39% Pervious Area
2,794		36.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6E:



Summary for Pond CB1:

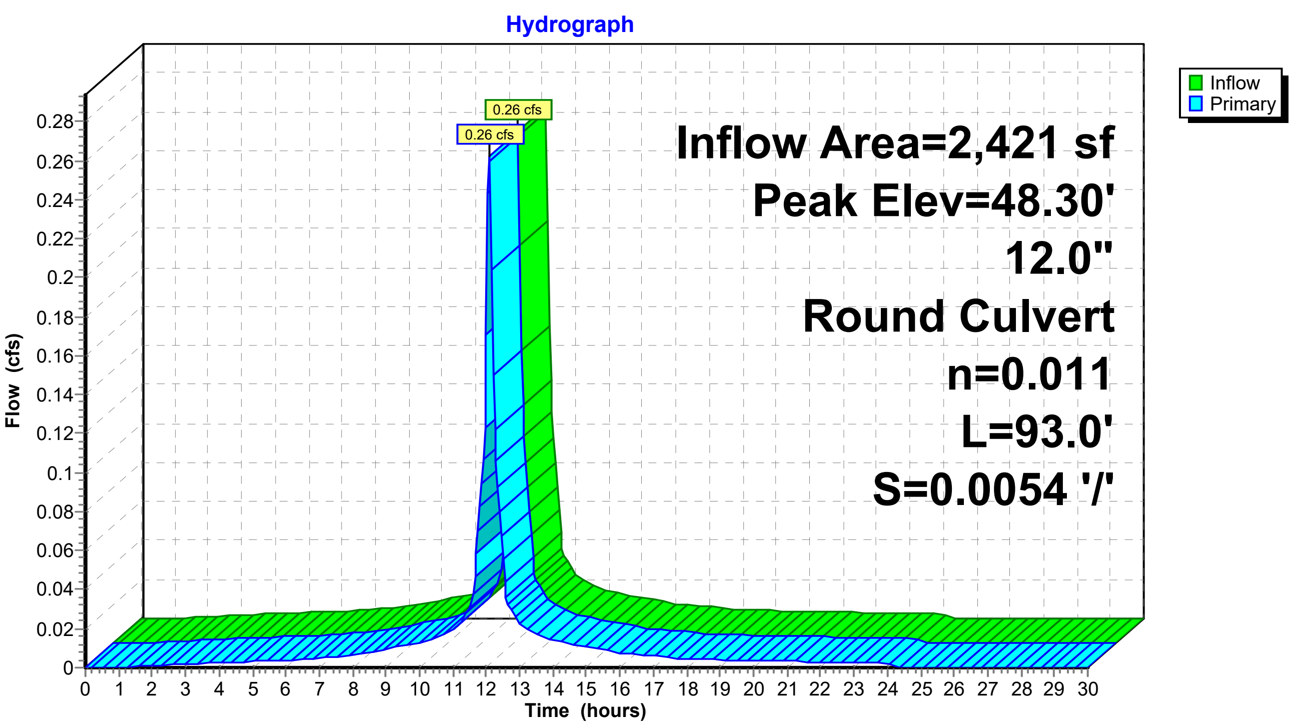
Inflow Area = 2,421 sf,100.00% Impervious, Inflow Depth = 4.70" for 10 yr event
Inflow = 0.26 cfs @ 12.09 hrs, Volume= 949 cf
Outflow = 0.26 cfs @ 12.09 hrs, Volume= 949 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.26 cfs @ 12.09 hrs, Volume= 949 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.30' @ 12.10 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 93.0' Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0054 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.24 cfs @ 12.09 hrs HW=48.29' TW=47.96' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.24 cfs @ 1.84 fps)

Pond CB1:



Summary for Pond CB10:

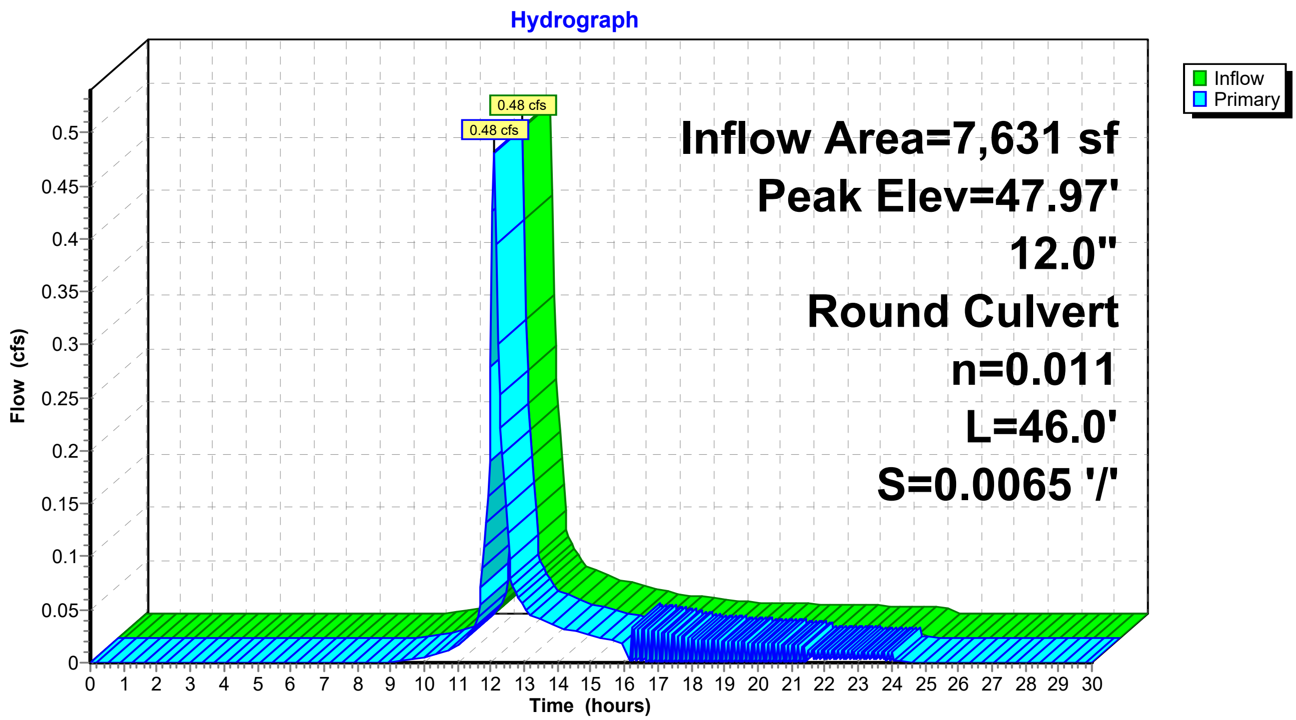
Inflow Area = 7,631 sf, 36.61% Impervious, Inflow Depth = 2.40" for 10 yr event
Inflow = 0.48 cfs @ 12.09 hrs, Volume= 1,527 cf
Outflow = 0.48 cfs @ 12.09 hrs, Volume= 1,526 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.48 cfs @ 12.09 hrs, Volume= 1,526 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.97' @ 12.15 hrs
Flood Elev= 49.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.30'	**12.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 46.30' / 46.00' S= 0.0065 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=47.88' TW=47.95' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB10:



Summary for Pond CB101:

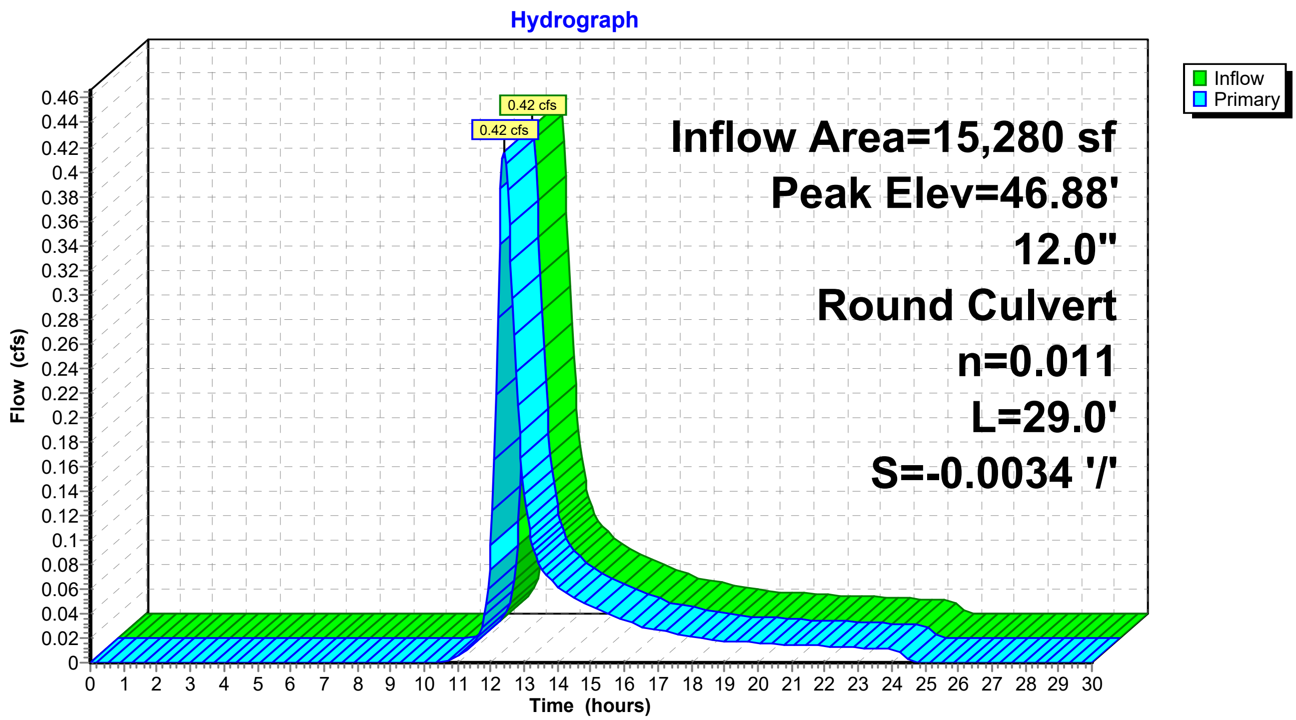
Inflow Area =	15,280 sf,	18.69% Impervious,	Inflow Depth =	1.76"	for 10 yr event	
Inflow =	0.42 cfs @	12.39 hrs,	Volume=	2,243 cf		
Outflow =	0.42 cfs @	12.39 hrs,	Volume=	2,243 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	0.42 cfs @	12.39 hrs,	Volume=	2,243 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.88' @ 12.38 hrs
Flood Elev= 49.06'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.50'	**12.0" Round Culvert** L= 29.0' Ke= 0.500 Inlet / Outlet Invert= 46.40' / 46.50' S= -0.0034 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.43 cfs @ 12.39 hrs HW=46.88' TW=46.77' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.43 cfs @ 1.58 fps)

Pond CB101:



Summary for Pond CB102:

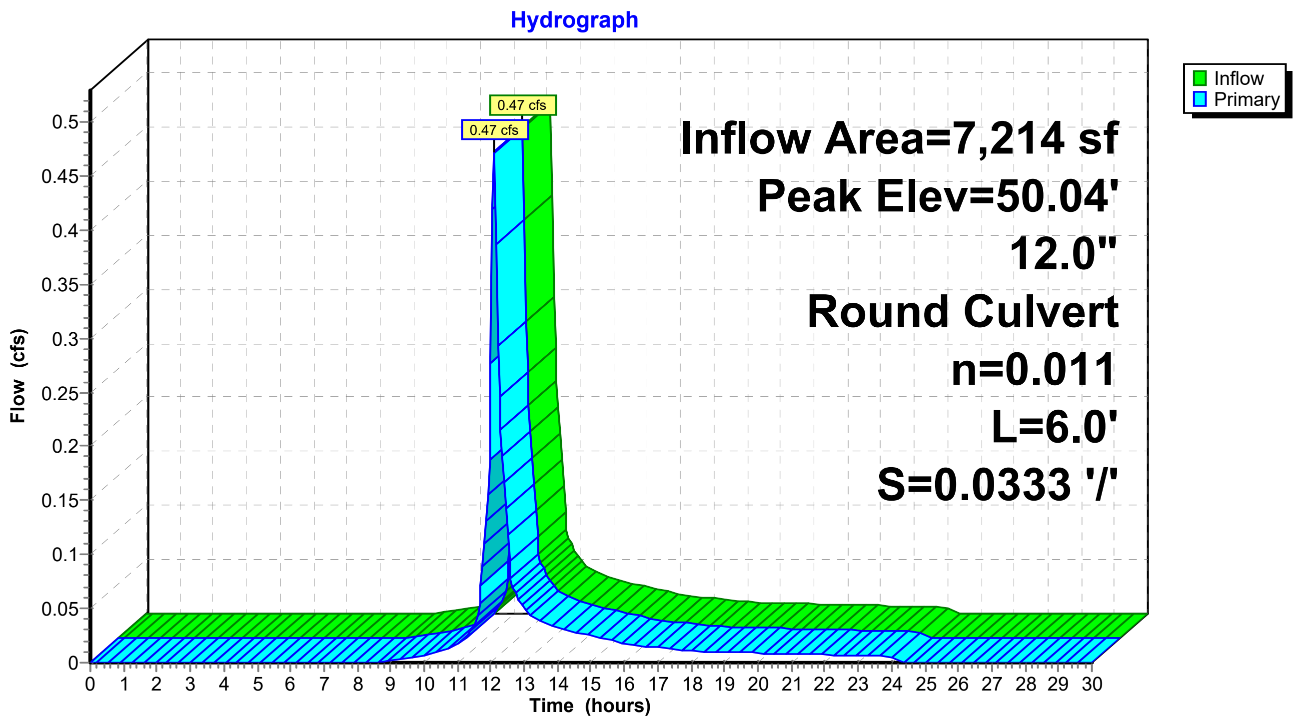
Inflow Area =	7,214 sf,	39.20% Impervious,	Inflow Depth = 2.49"	for 10 yr event	
Inflow =	0.47 cfs @	12.09 hrs,	Volume=	1,495 cf	
Outflow =	0.47 cfs @	12.09 hrs,	Volume=	1,495 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.47 cfs @	12.09 hrs,	Volume=	1,495 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 50.04' @ 12.09 hrs
Flood Elev= 49.07'

Device	Routing	Invert	Outlet Devices
#1	Primary	49.70'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 49.70' / 49.50' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.47 cfs @ 12.09 hrs HW=50.04' TW=46.81' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.47 cfs @ 1.98 fps)

Pond CB102:



Summary for Pond CB103:

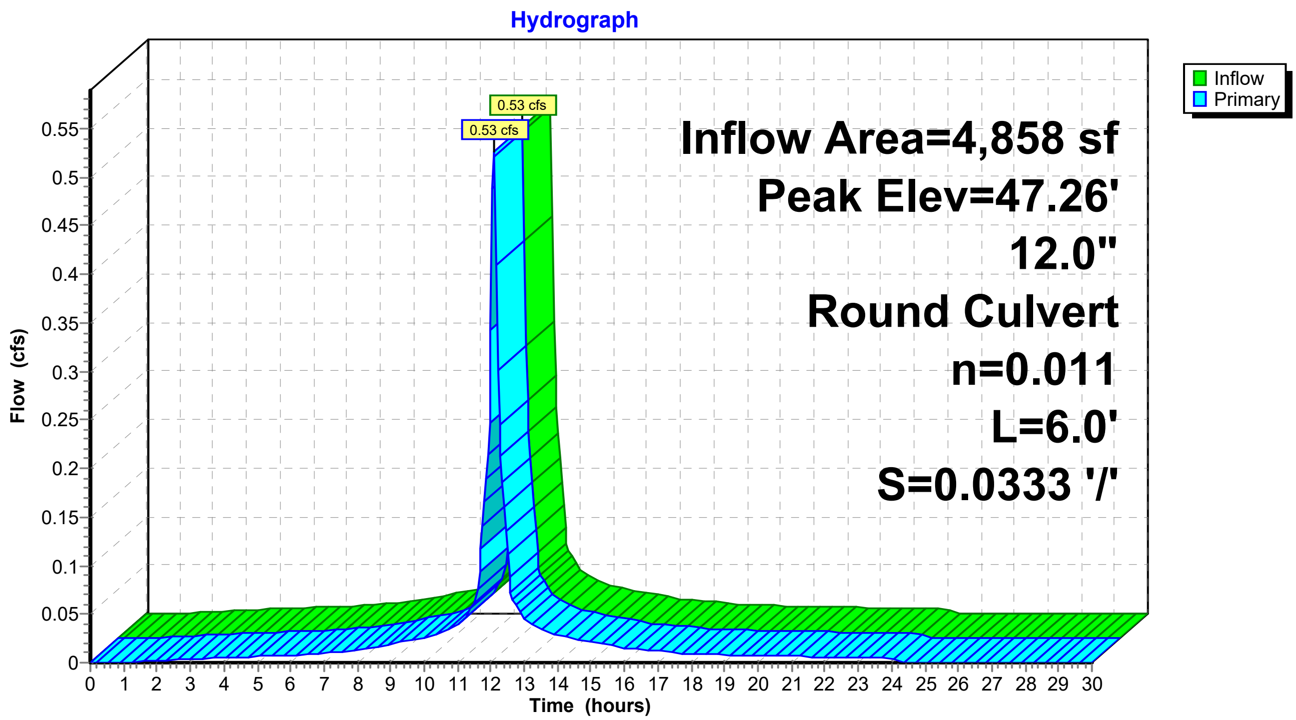
Inflow Area =	4,858 sf,	99.28% Impervious,	Inflow Depth = 4.70"	for 10 yr event
Inflow =	0.53 cfs @	12.09 hrs, Volume=	1,904 cf	
Outflow =	0.53 cfs @	12.09 hrs, Volume=	1,904 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.53 cfs @	12.09 hrs, Volume=	1,904 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.26' @ 12.09 hrs
Flood Elev= 49.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 46.90' / 46.70' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.51 cfs @ 12.09 hrs HW=47.26' TW=46.98' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.51 cfs @ 2.03 fps)

Pond CB103:



Summary for Pond CB104:

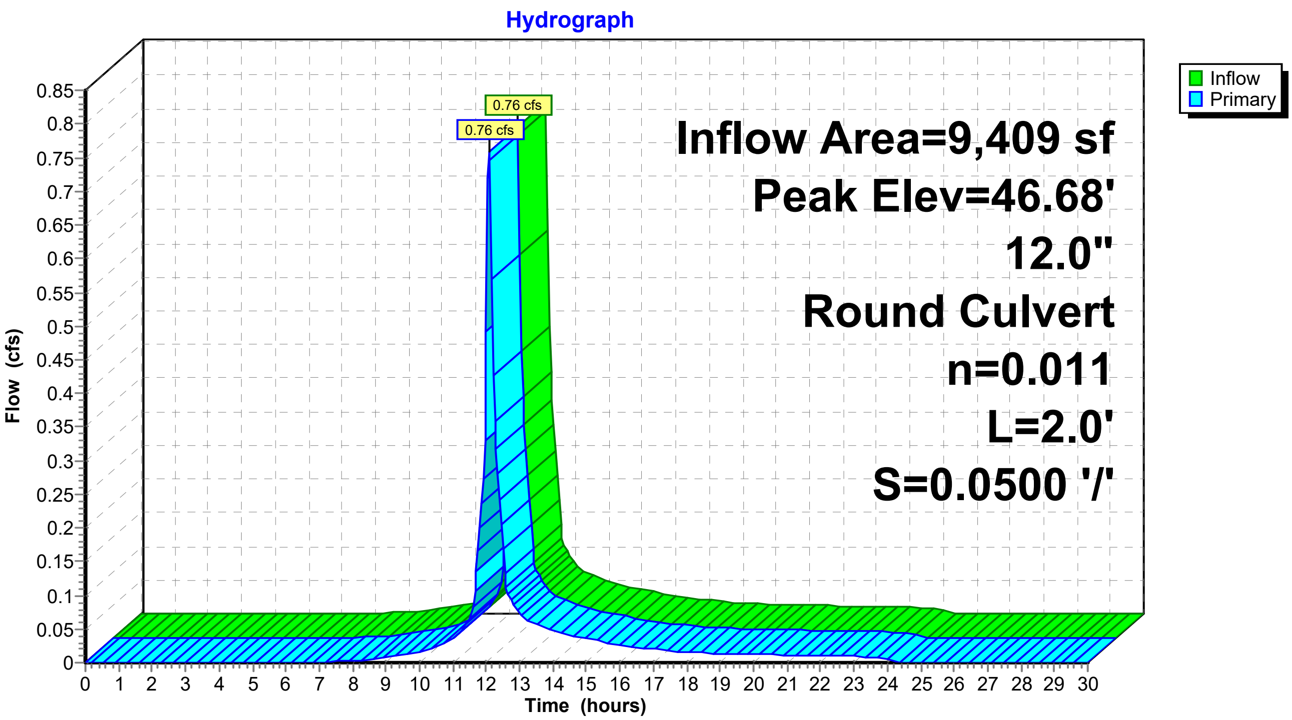
Inflow Area = 9,409 sf, 56.68% Impervious, Inflow Depth = 3.03" for 10 yr event
Inflow = 0.76 cfs @ 12.08 hrs, Volume= 2,372 cf
Outflow = 0.76 cfs @ 12.08 hrs, Volume= 2,372 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.76 cfs @ 12.08 hrs, Volume= 2,372 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.68' @ 12.08 hrs
Flood Elev= 48.93'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 2.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.10' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.74 cfs @ 12.08 hrs HW=46.67' TW=45.73' (Dynamic Tailwater)
1=Culvert (Barrel Controls 0.74 cfs @ 2.99 fps)

Pond CB104:



Summary for Pond CB2:

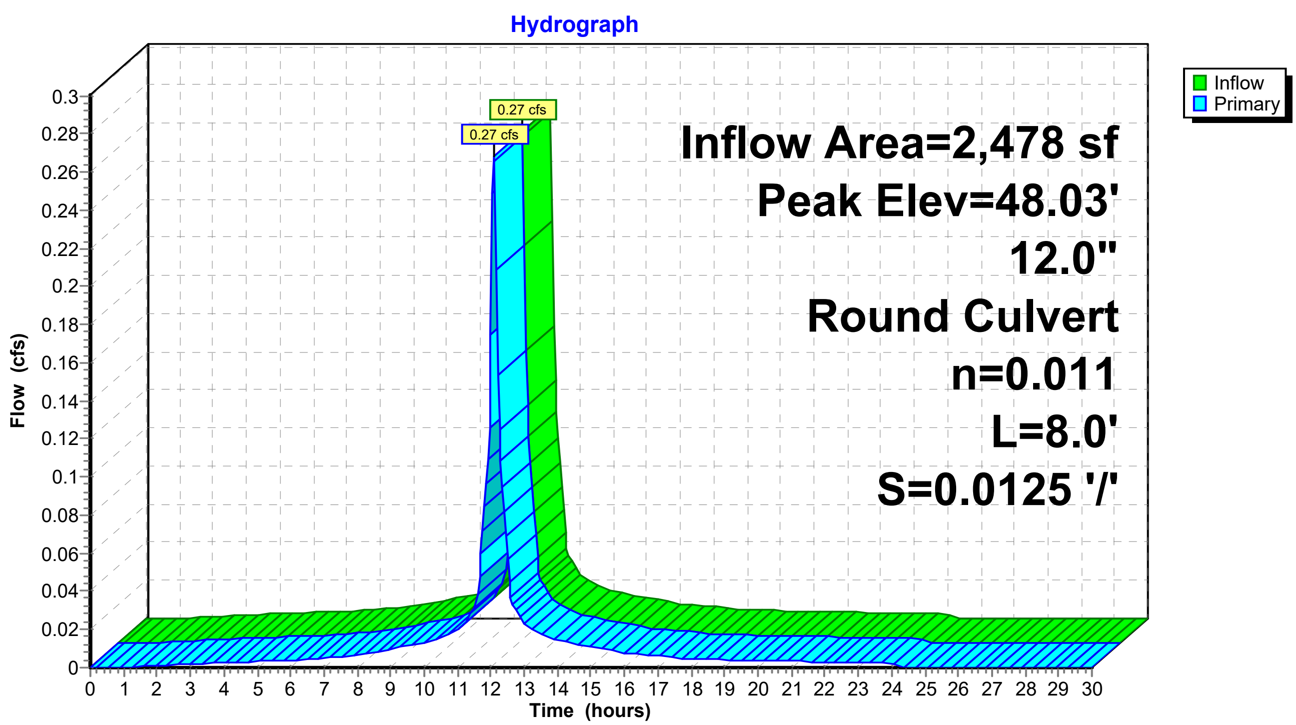
Inflow Area = 2,478 sf,100.00% Impervious, Inflow Depth = 4.70" for 10 yr event
Inflow = 0.27 cfs @ 12.09 hrs, Volume= 971 cf
Outflow = 0.27 cfs @ 12.09 hrs, Volume= 971 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.27 cfs @ 12.09 hrs, Volume= 971 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.03' @ 12.23 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.60'	**12.0" Round Culvert** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 47.60' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.09 cfs @ 12.09 hrs HW=47.96' TW=47.96' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.09 cfs @ 0.54 fps)

Pond CB2:



Summary for Pond CB3:

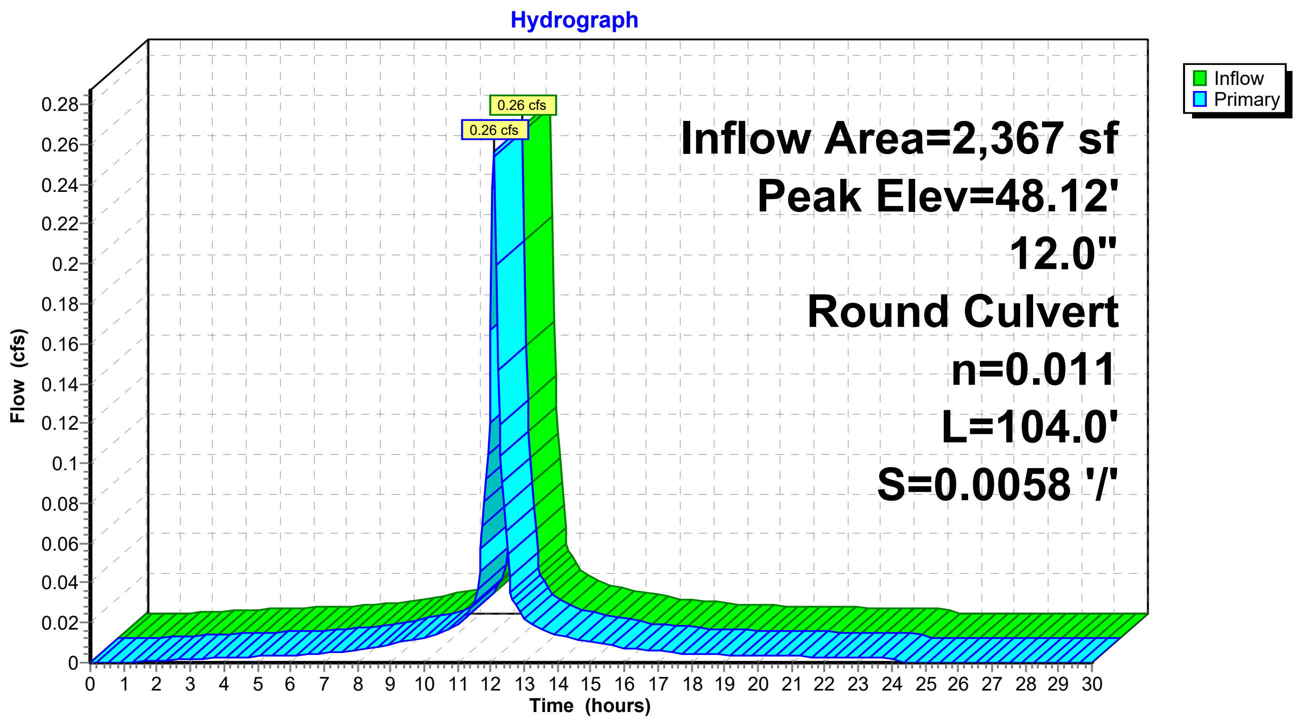
Inflow Area = 2,367 sf,100.00% Impervious, Inflow Depth = 4.70" for 10 yr event
Inflow = 0.26 cfs @ 12.09 hrs, Volume= 928 cf
Outflow = 0.26 cfs @ 12.09 hrs, Volume= 928 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.26 cfs @ 12.09 hrs, Volume= 928 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.12' @ 12.11 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.80'	**12.0" Round Culvert** L= 104.0' Ke= 0.500 Inlet / Outlet Invert= 47.80' / 47.20' S= 0.0058 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.21 cfs @ 12.09 hrs HW=48.12' TW=47.90' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.21 cfs @ 1.48 fps)

Pond CB3:

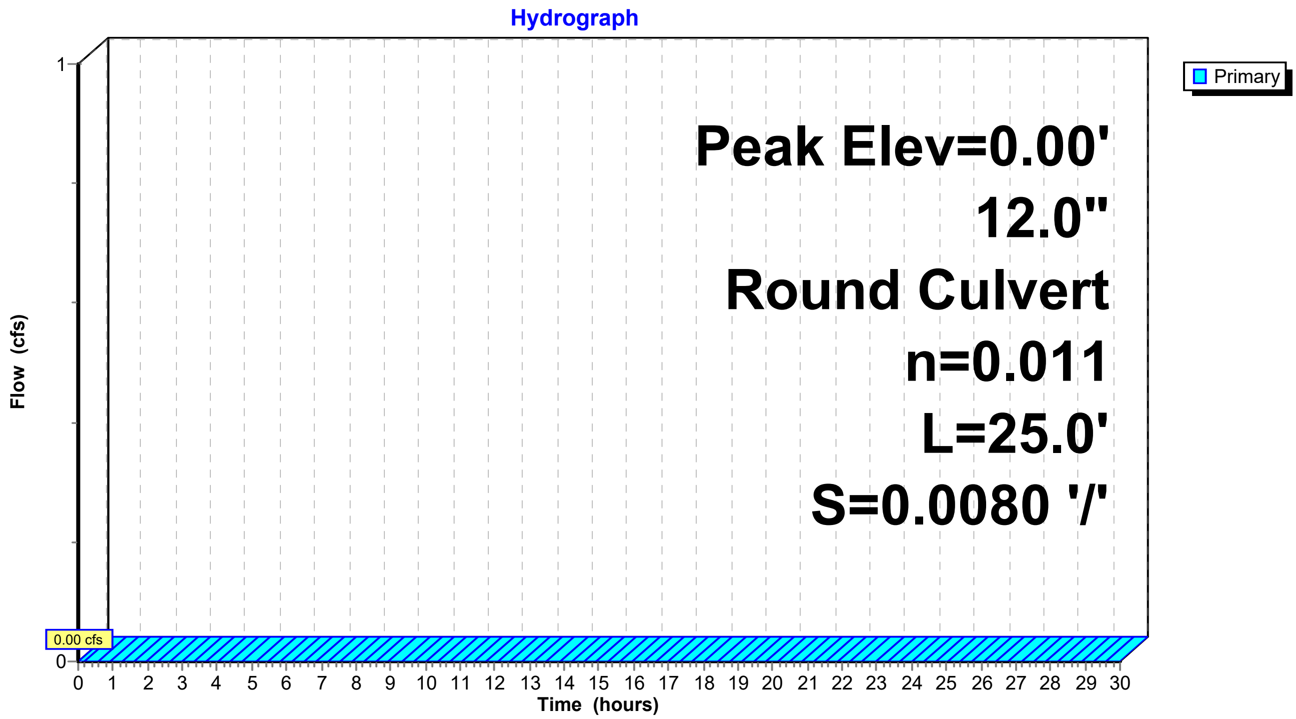


Summary for Pond CB4:

Device	Routing	Invert	Outlet Devices
#1	Primary	47.40'	**12.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 47.40' / 47.20' S= 0.0080 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=47.10' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB4:



Summary for Pond CB5:

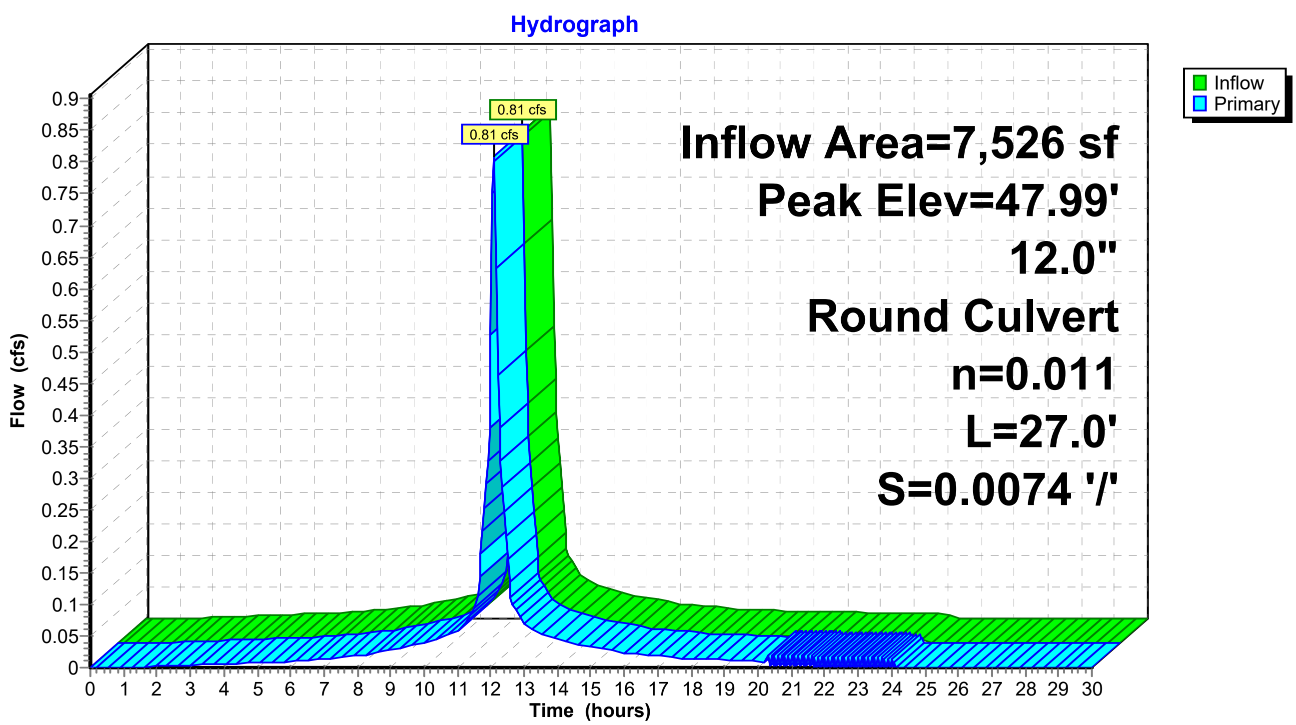
Inflow Area = 7,526 sf, 97.81% Impervious, Inflow Depth = 4.59" for 10 yr event
Inflow = 0.81 cfs @ 12.09 hrs, Volume= 2,877 cf
Outflow = 0.81 cfs @ 12.09 hrs, Volume= 2,877 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.81 cfs @ 12.09 hrs, Volume= 2,877 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.99' @ 12.14 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.00'	**12.0" Round Culvert** L= 27.0' Ke= 0.500 Inlet / Outlet Invert= 47.00' / 46.80' S= 0.0074 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=47.94' TW=47.95' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond CB5:



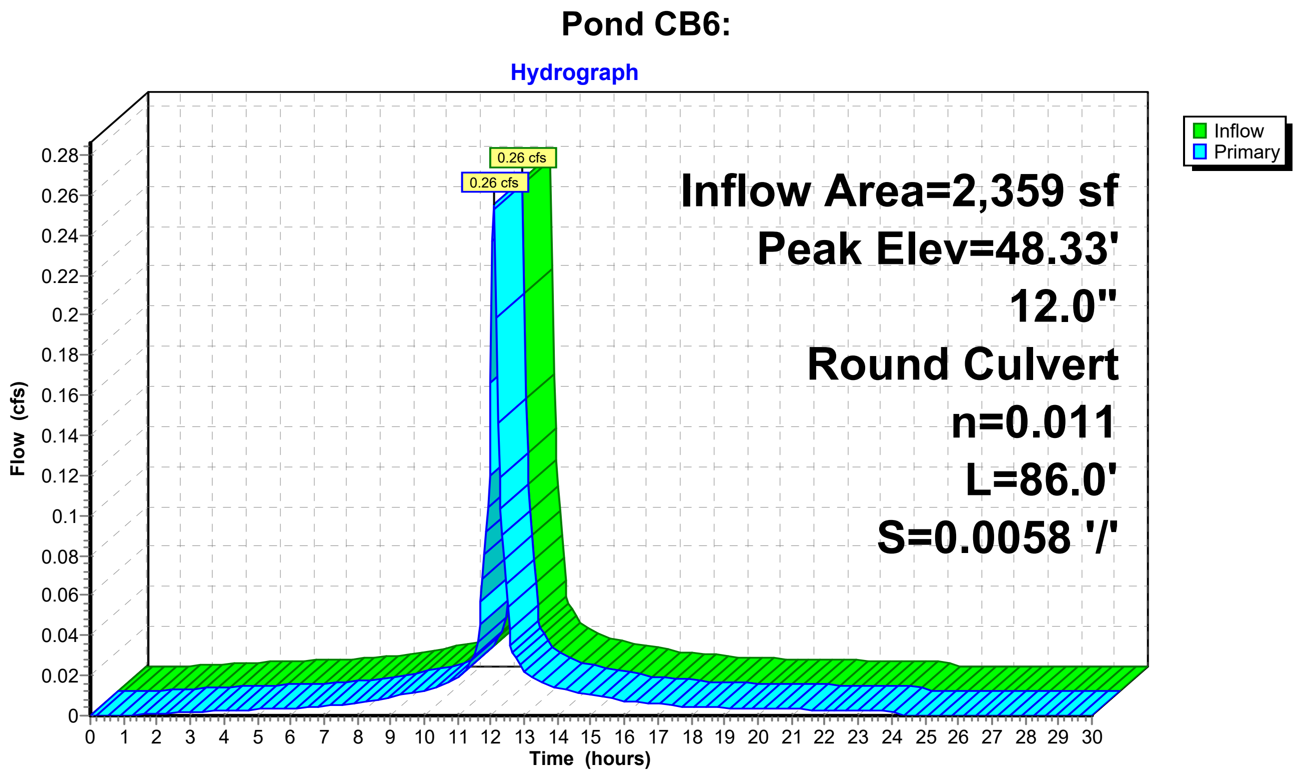
Summary for Pond CB6:

Inflow Area = 2,359 sf,100.00% Impervious, Inflow Depth = 4.70" for 10 yr event
Inflow = 0.26 cfs @ 12.09 hrs, Volume= 925 cf
Outflow = 0.26 cfs @ 12.09 hrs, Volume= 925 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.26 cfs @ 12.09 hrs, Volume= 925 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.33' @ 12.12 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 86.0' Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0058 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.21 cfs @ 12.09 hrs HW=48.32' TW=48.13' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.21 cfs @ 1.45 fps)



Summary for Pond CB7:

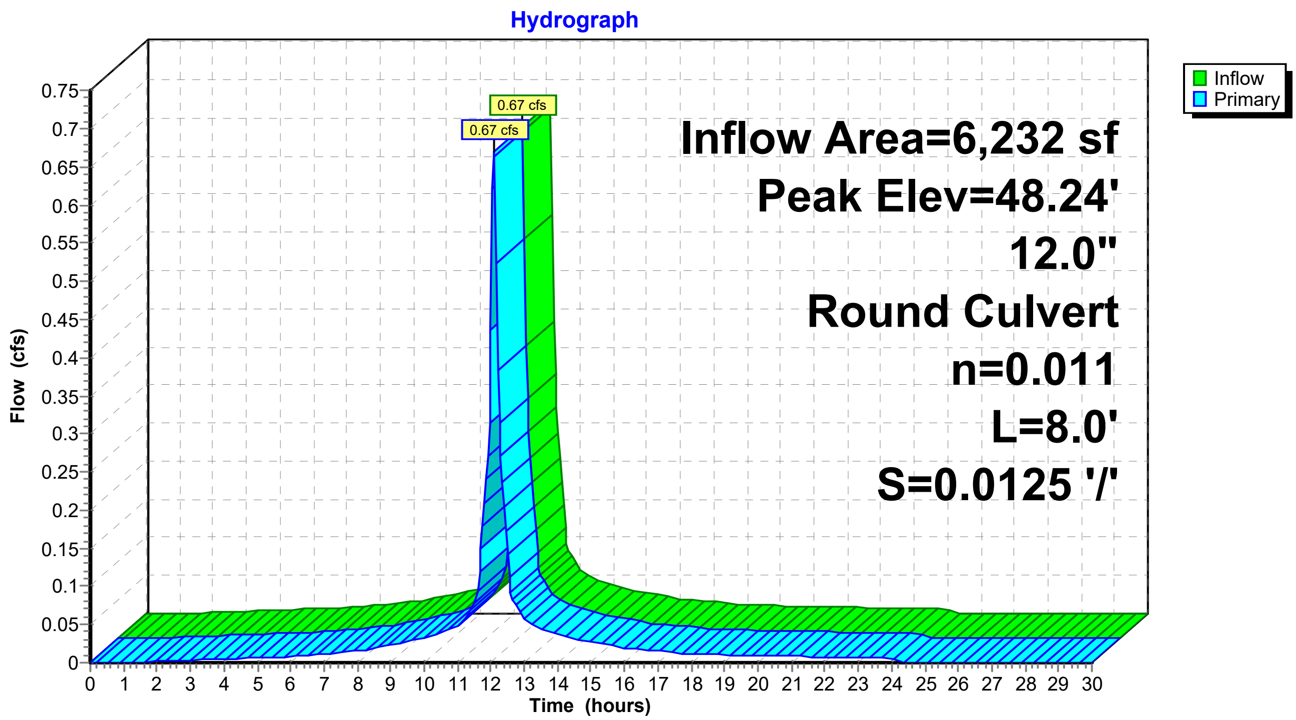
Inflow Area = 6,232 sf, 97.35% Impervious, Inflow Depth = 4.59" for 10 yr event
Inflow = 0.67 cfs @ 12.09 hrs, Volume= 2,382 cf
Outflow = 0.67 cfs @ 12.09 hrs, Volume= 2,382 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.67 cfs @ 12.09 hrs, Volume= 2,382 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.24' @ 12.19 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.60'	**12.0" Round Culvert** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 47.60' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.32 cfs @ 12.09 hrs HW=48.16' TW=48.13' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 0.32 cfs @ 1.03 fps)

Pond CB7:



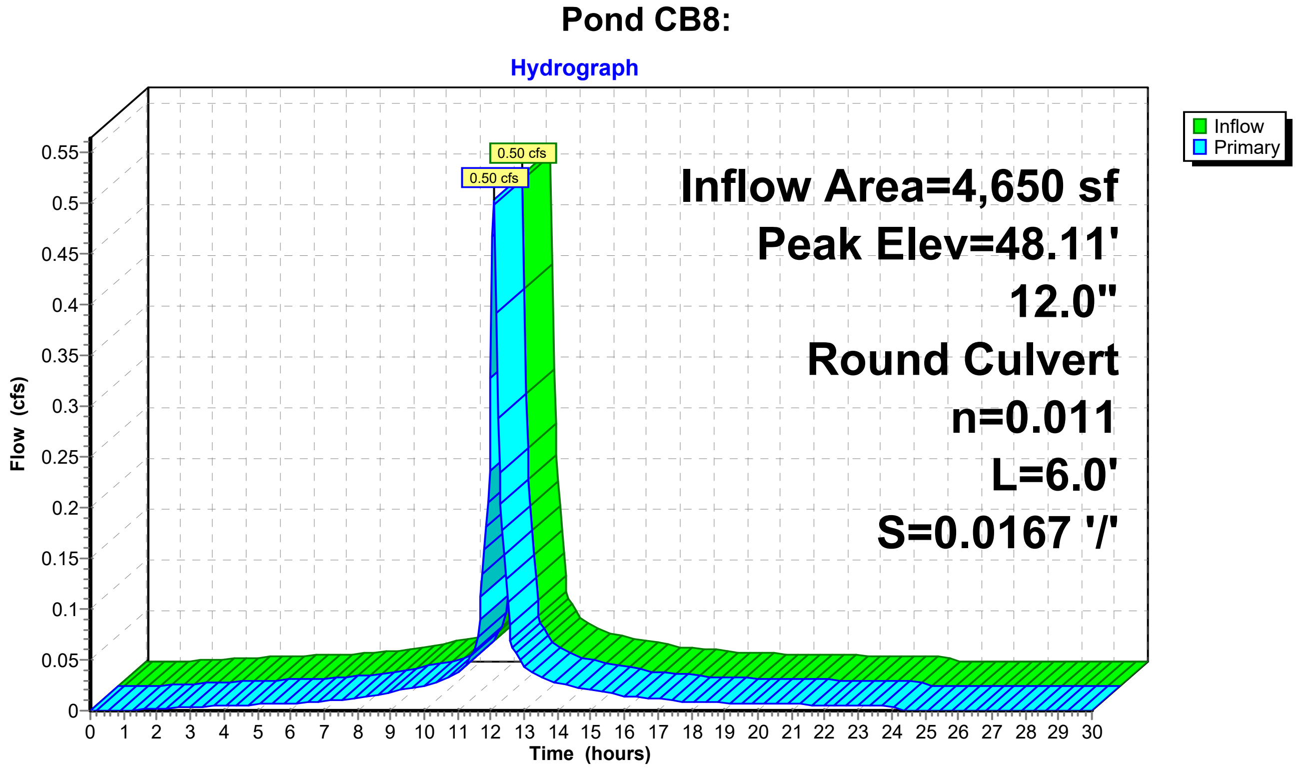
Summary for Pond CB8:

Inflow Area = 4,650 sf,100.00% Impervious, Inflow Depth = 4.70" for 10 yr event
Inflow = 0.50 cfs @ 12.09 hrs, Volume= 1,823 cf
Outflow = 0.50 cfs @ 12.09 hrs, Volume= 1,823 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.50 cfs @ 12.09 hrs, Volume= 1,823 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.11' @ 12.18 hrs
Flood Elev= 51.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.80'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 46.80' / 46.70' S= 0.0167 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=47.87' TW=48.02' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)



Summary for Pond CB9:

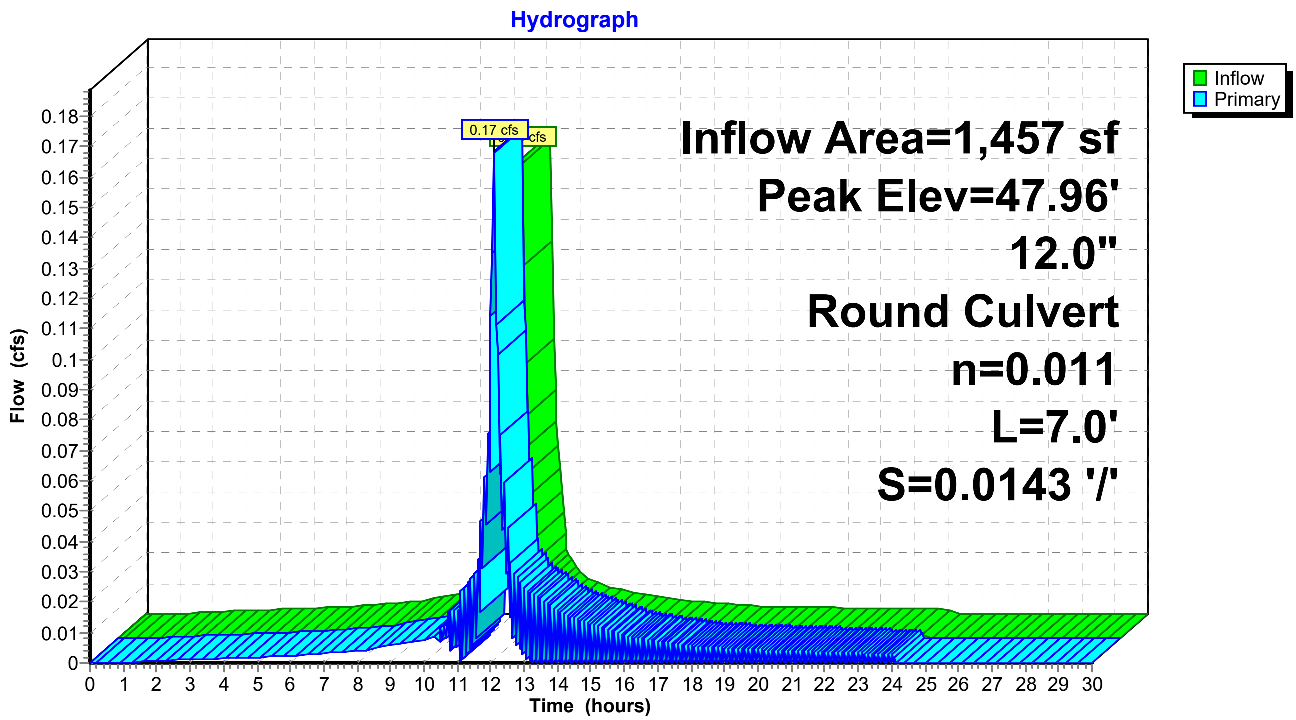
Inflow Area = 1,457 sf,100.00% Impervious, Inflow Depth = 4.70" for 10 yr event
Inflow = 0.16 cfs @ 12.09 hrs, Volume= 571 cf
Outflow = 0.17 cfs @ 12.09 hrs, Volume= 572 cf, Atten= 0%, Lag= 0.4 min
Primary = 0.17 cfs @ 12.09 hrs, Volume= 572 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.96' @ 12.15 hrs
Flood Elev= 50.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.10'	**12.0" Round Culvert** L= 7.0' Ke= 0.500 Inlet / Outlet Invert= 46.10' / 46.00' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=47.86' TW=47.95' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond CB9:



Summary for Pond DMH1:

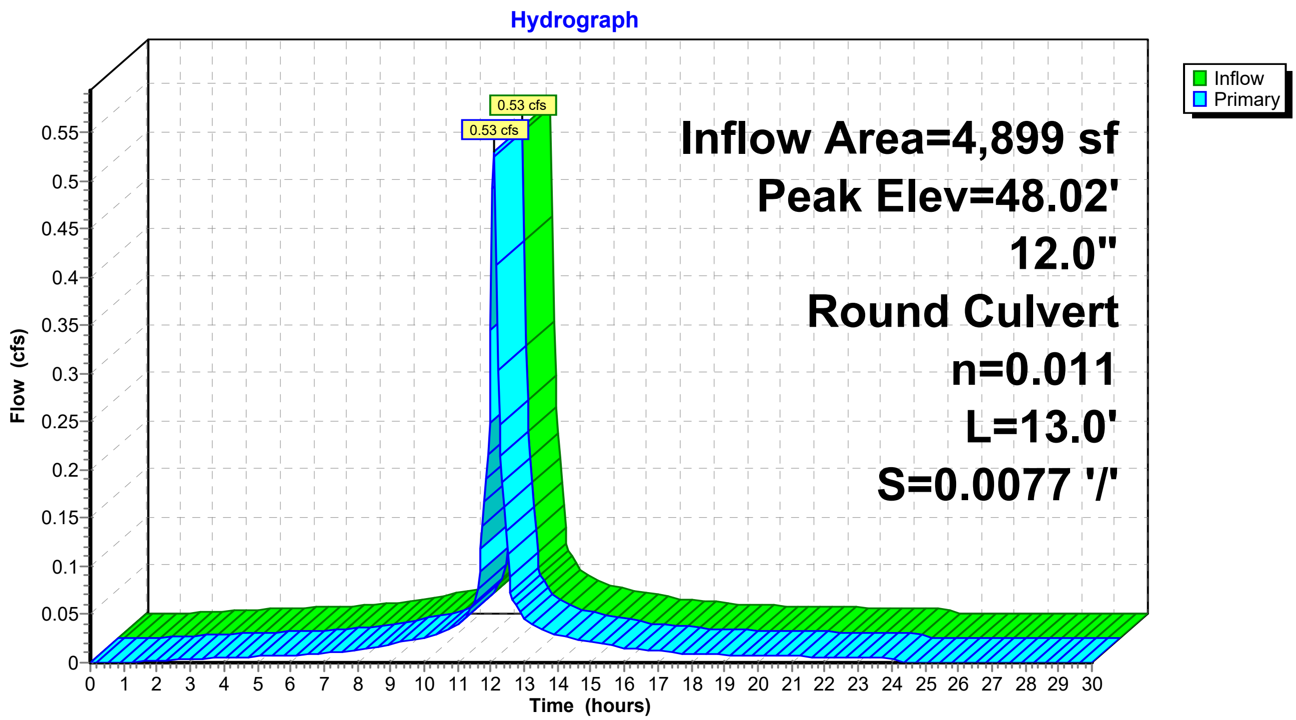
Inflow Area = 4,899 sf,100.00% Impervious, Inflow Depth = 4.70" for 10 yr event
Inflow = 0.53 cfs @ 12.09 hrs, Volume= 1,920 cf
Outflow = 0.53 cfs @ 12.09 hrs, Volume= 1,920 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.53 cfs @ 12.09 hrs, Volume= 1,920 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.02' @ 12.18 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.40'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 47.40' / 47.30' S= 0.0077 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.09 cfs @ 12.09 hrs HW=47.96' TW=47.95' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.09 cfs @ 0.30 fps)

Pond DMH1:



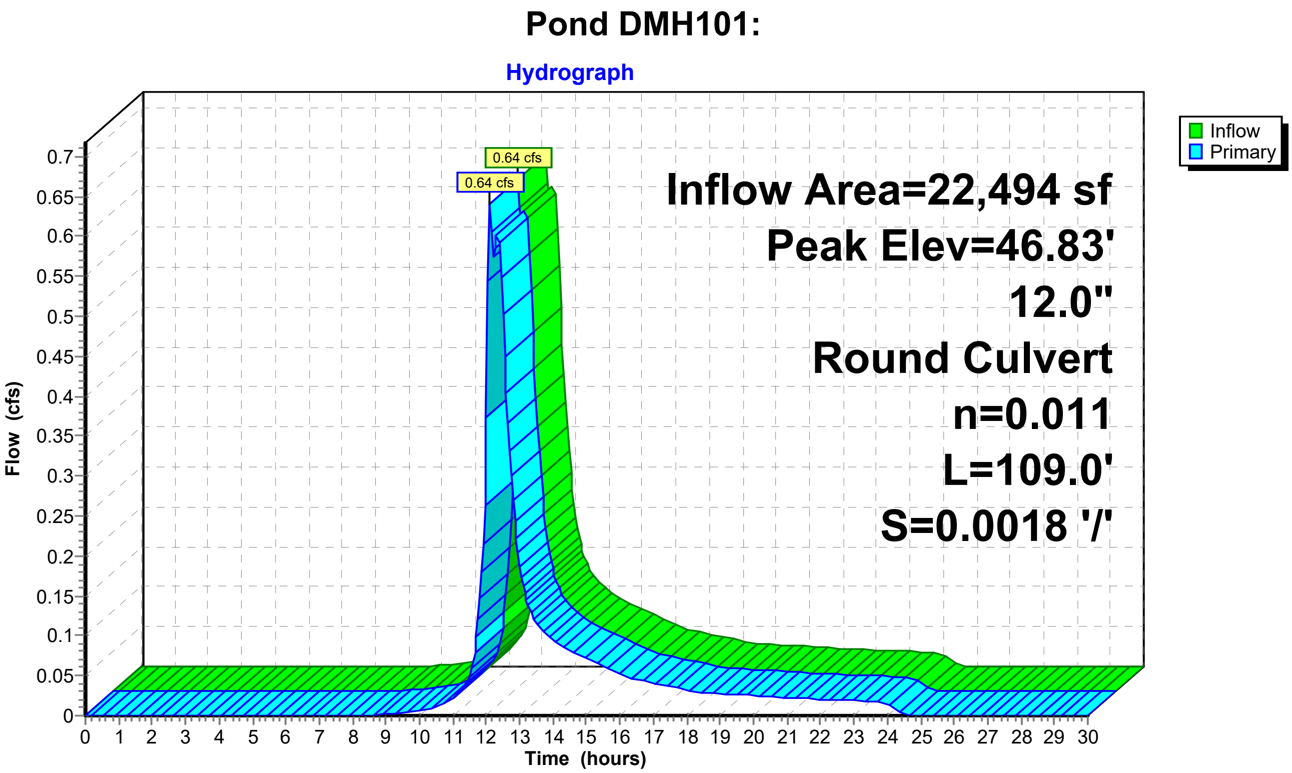
Summary for Pond DMH101:

Inflow Area = 22,494 sf, 25.27% Impervious, Inflow Depth = 1.99" for 10 yr event
Inflow = 0.64 cfs @ 12.11 hrs, Volume= 3,737 cf
Outflow = 0.64 cfs @ 12.11 hrs, Volume= 3,737 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.64 cfs @ 12.11 hrs, Volume= 3,737 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.83' @ 12.14 hrs
Flood Elev= 49.94'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 109.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.00' S= 0.0018 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.60 cfs @ 12.11 hrs HW=46.83' TW=46.65' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.60 cfs @ 1.66 fps)



Summary for Pond DMH102:

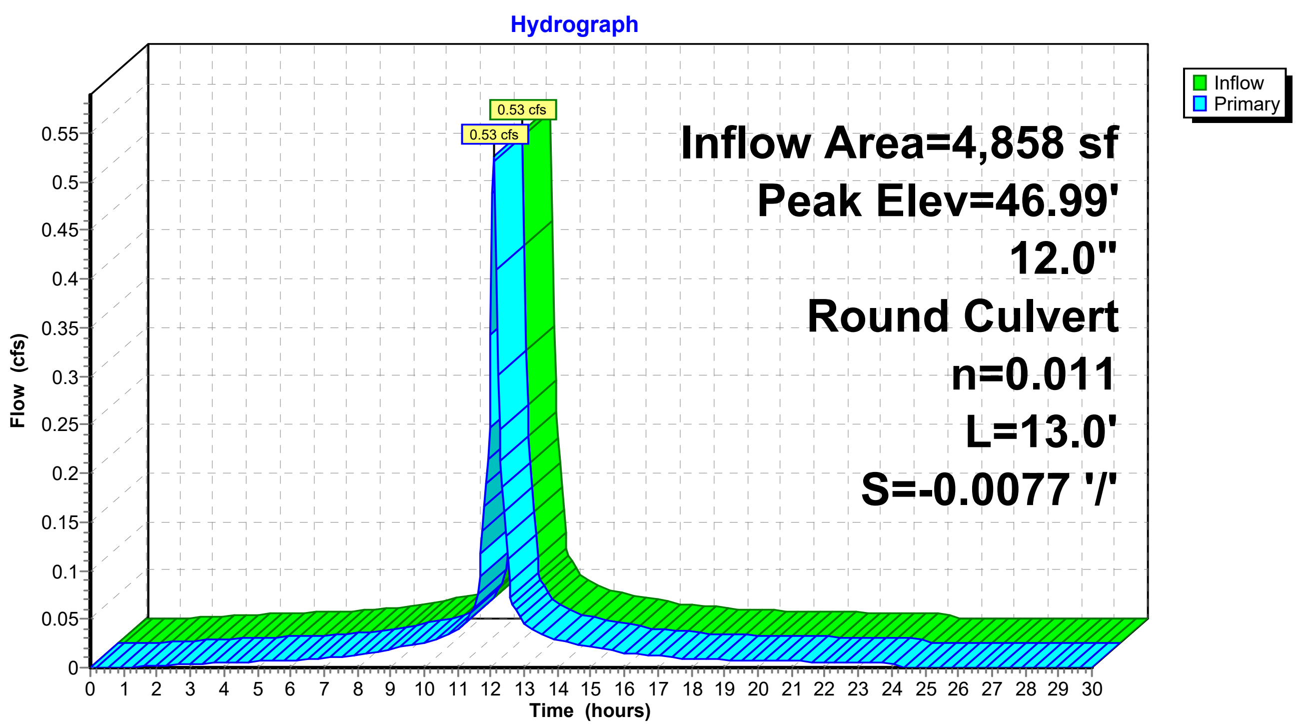
Inflow Area = 4,858 sf, 99.28% Impervious, Inflow Depth = 4.70" for 10 yr event
Inflow = 0.53 cfs @ 12.09 hrs, Volume= 1,904 cf
Outflow = 0.53 cfs @ 12.09 hrs, Volume= 1,904 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.53 cfs @ 12.09 hrs, Volume= 1,904 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.99' @ 12.09 hrs
Flood Elev= 49.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.60'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 46.50' / 46.60' S= -0.0077 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.51 cfs @ 12.09 hrs HW=46.98' TW=46.65' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.51 cfs @ 2.02 fps)

Pond DMH102:



Summary for Pond DMH103:

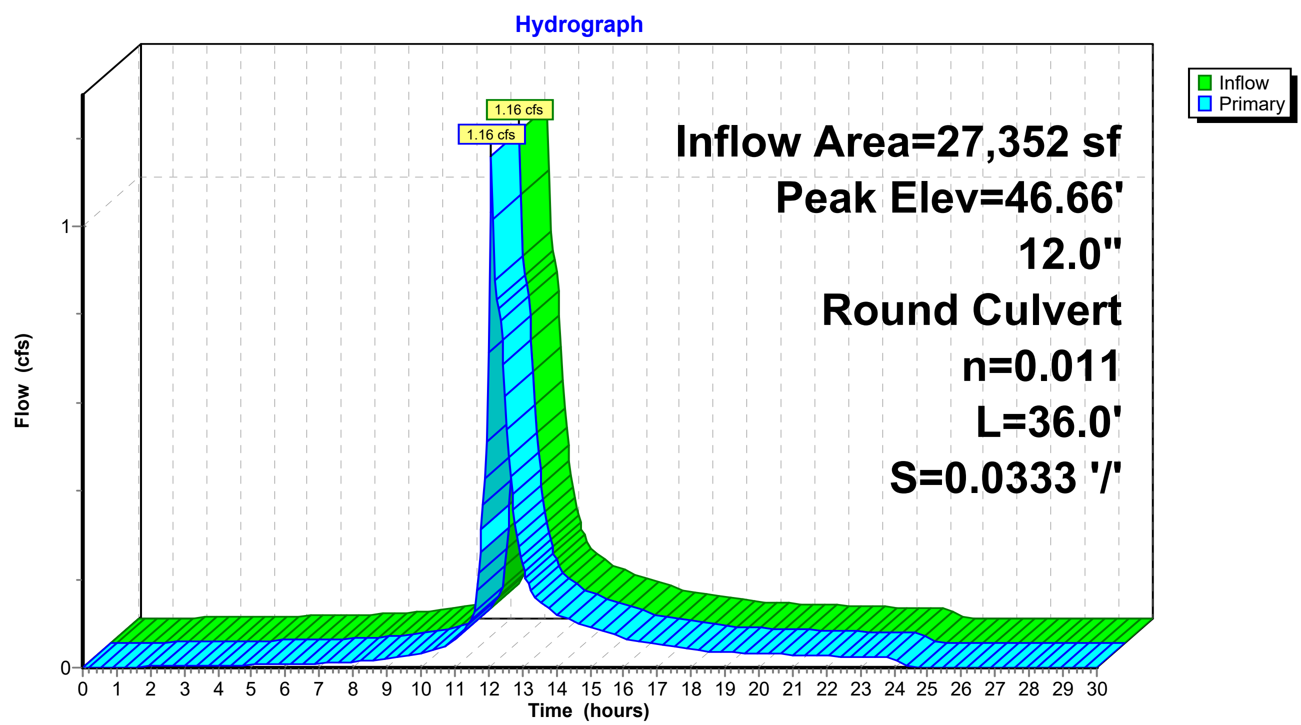
Inflow Area = 27,352 sf, 38.41% Impervious, Inflow Depth = 2.48" for 10 yr event
Inflow = 1.16 cfs @ 12.10 hrs, Volume= 5,641 cf
Outflow = 1.16 cfs @ 12.10 hrs, Volume= 5,641 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.16 cfs @ 12.10 hrs, Volume= 5,641 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.66' @ 12.10 hrs
Flood Elev= 50.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.10'	**12.0" Round Culvert** L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 46.10' / 44.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.15 cfs @ 12.10 hrs HW=46.66' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.15 cfs @ 2.55 fps)

Pond DMH103:



Summary for Pond DMH104:

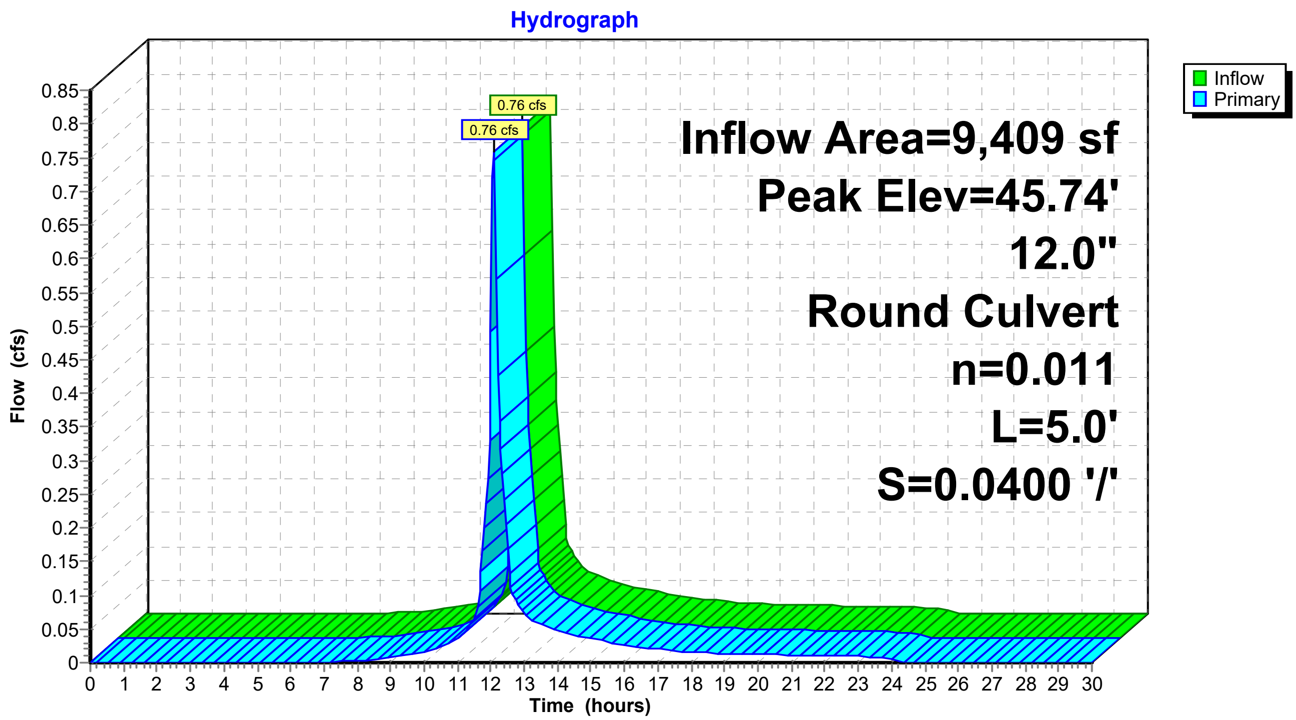
Inflow Area = 9,409 sf, 56.68% Impervious, Inflow Depth = 3.03" for 10 yr event
Inflow = 0.76 cfs @ 12.08 hrs, Volume= 2,372 cf
Outflow = 0.76 cfs @ 12.08 hrs, Volume= 2,372 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.76 cfs @ 12.08 hrs, Volume= 2,372 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 45.74' @ 12.08 hrs
Flood Elev= 49.08'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.30'	**12.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 45.30' / 45.10' S= 0.0400 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.74 cfs @ 12.08 hrs HW=45.73' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.74 cfs @ 2.25 fps)

Pond DMH104:

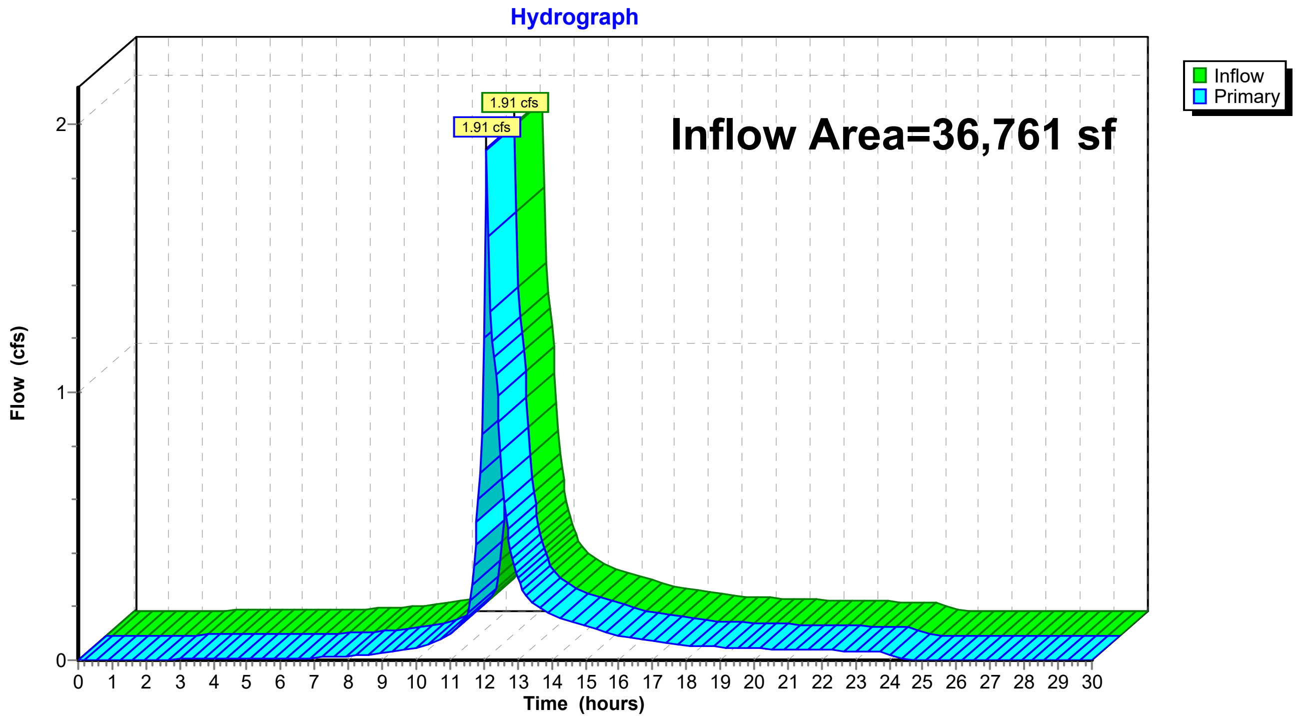


Summary for Pond DMH105:

Inflow Area = 36,761 sf, 43.09% Impervious, Inflow Depth = 2.62" for 10 yr event
Inflow = 1.91 cfs @ 12.09 hrs, Volume= 8,014 cf
Primary = 1.91 cfs @ 12.09 hrs, Volume= 8,014 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond DMH105:



Summary for Pond DMH2:

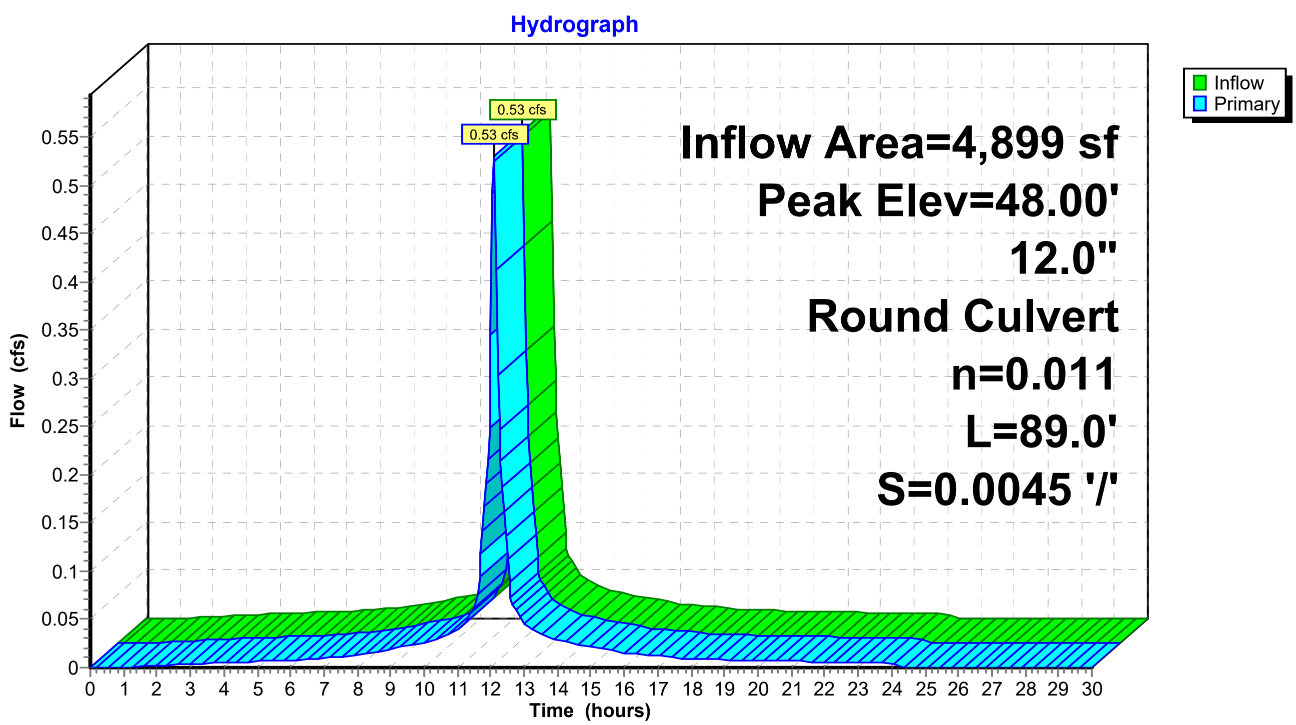
Inflow Area = 4,899 sf,100.00% Impervious, Inflow Depth = 4.70" for 10 yr event
Inflow = 0.53 cfs @ 12.09 hrs, Volume= 1,920 cf
Outflow = 0.53 cfs @ 12.09 hrs, Volume= 1,920 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.53 cfs @ 12.09 hrs, Volume= 1,920 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.00' @ 12.14 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.20'	**12.0" Round Culvert** L= 89.0' Ke= 0.500 Inlet / Outlet Invert= 47.20' / 46.80' S= 0.0045 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.13 cfs @ 12.09 hrs HW=47.95' TW=47.95' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.13 cfs @ 0.29 fps)

Pond DMH2:



Summary for Pond DMH3:

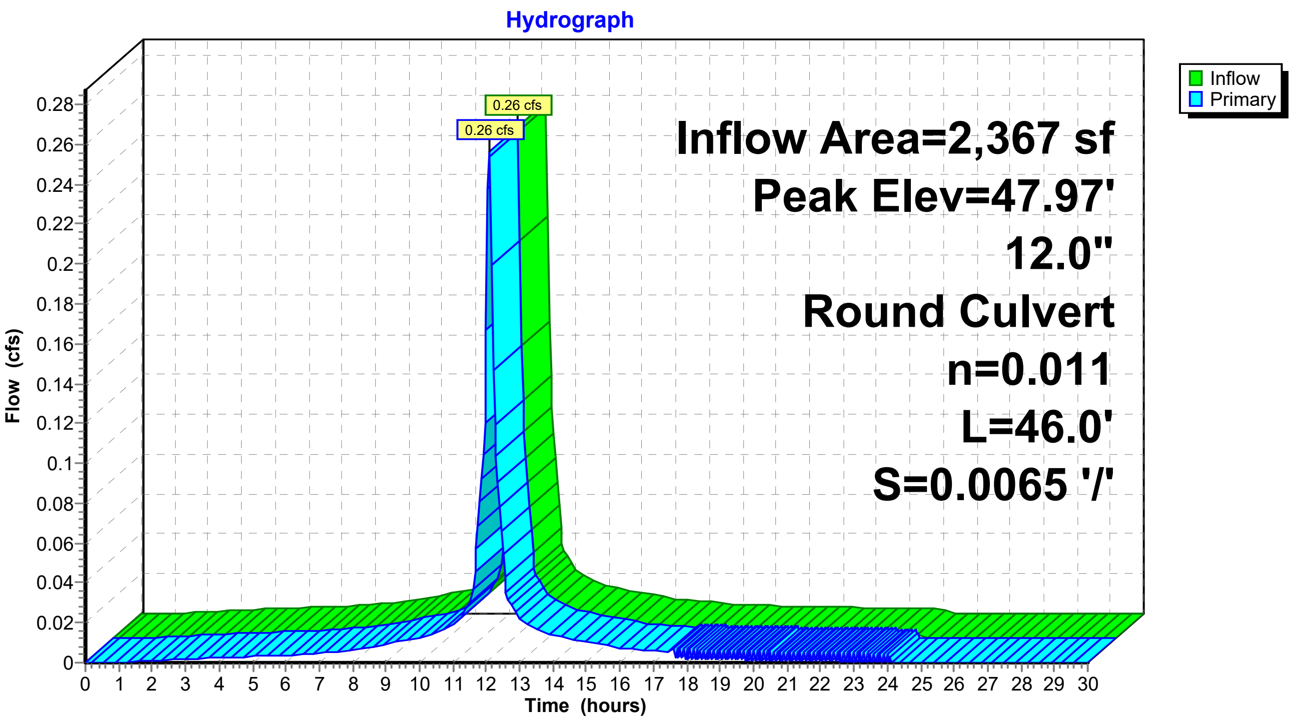
Inflow Area = 2,367 sf,100.00% Impervious, Inflow Depth = 4.70" for 10 yr event
Inflow = 0.26 cfs @ 12.09 hrs, Volume= 928 cf
Outflow = 0.26 cfs @ 12.09 hrs, Volume= 928 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.26 cfs @ 12.09 hrs, Volume= 928 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.97' @ 12.15 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.10'	**12.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 47.10' / 46.80' S= 0.0065 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=47.90' TW=47.95' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond DMH3:



Summary for Pond DMH4:

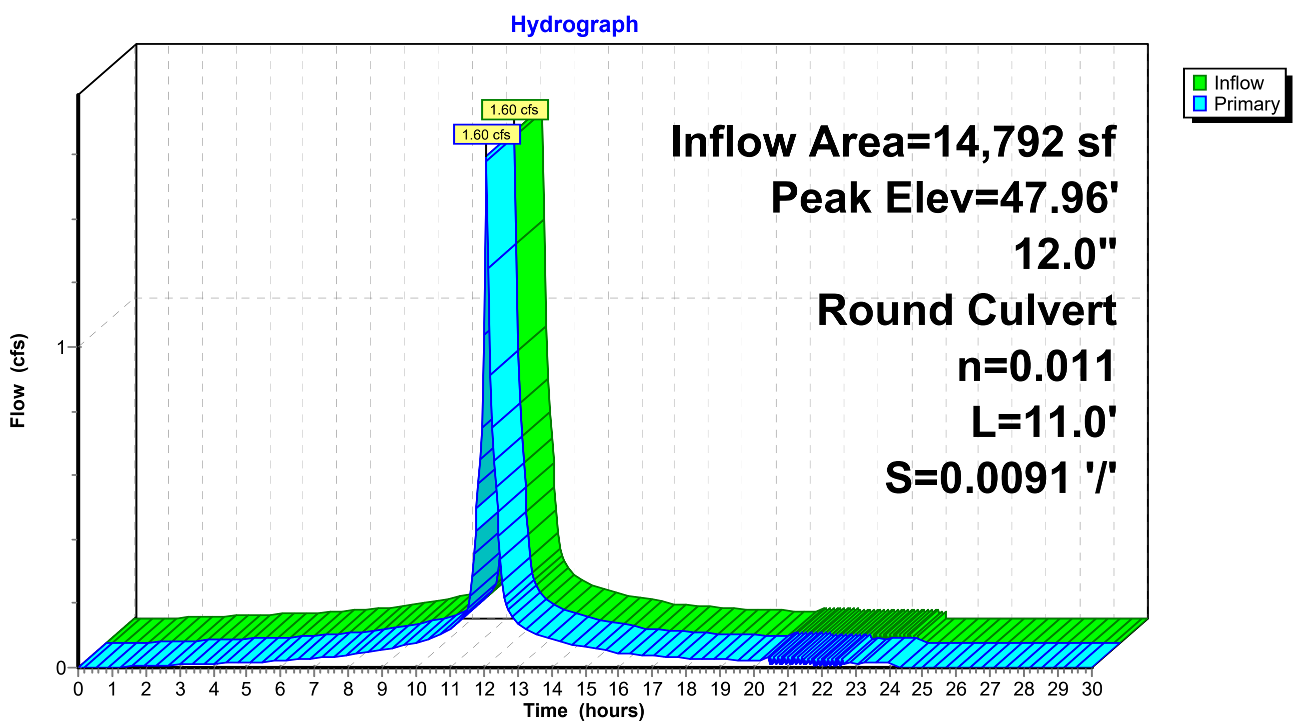
Inflow Area = 14,792 sf, 98.88% Impervious, Inflow Depth = 4.64" for 10 yr event
Inflow = 1.60 cfs @ 12.09 hrs, Volume= 5,725 cf
Outflow = 1.60 cfs @ 12.09 hrs, Volume= 5,725 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.60 cfs @ 12.09 hrs, Volume= 5,725 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.96' @ 12.10 hrs
Flood Elev= 50.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.70'	**12.0" Round Culvert** L= 11.0' Ke= 0.500 Inlet / Outlet Invert= 46.70' / 46.60' S= 0.0091 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.45 cfs @ 12.09 hrs HW=47.95' TW=47.80' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.45 cfs @ 1.84 fps)

Pond DMH4:



Summary for Pond DMH5:

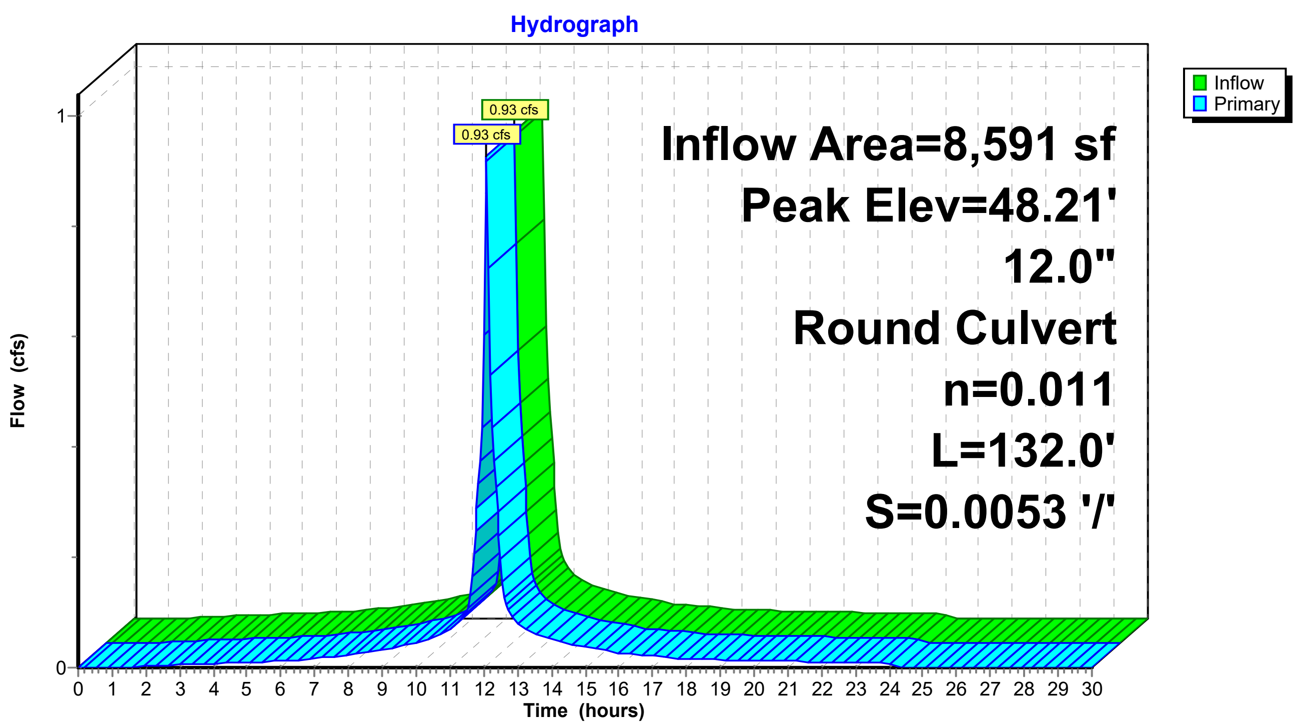
Inflow Area = 8,591 sf, 98.08% Impervious, Inflow Depth = 4.62" for 10 yr event
Inflow = 0.93 cfs @ 12.09 hrs, Volume= 3,307 cf
Outflow = 0.93 cfs @ 12.09 hrs, Volume= 3,307 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.93 cfs @ 12.09 hrs, Volume= 3,307 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.21' @ 12.15 hrs
Flood Elev= 52.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.40'	**12.0" Round Culvert** L= 132.0' Ke= 0.500 Inlet / Outlet Invert= 47.40' / 46.70' S= 0.0053 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.56 cfs @ 12.09 hrs HW=48.13' TW=48.02' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.56 cfs @ 1.27 fps)

Pond DMH5:



Summary for Pond DMH6:

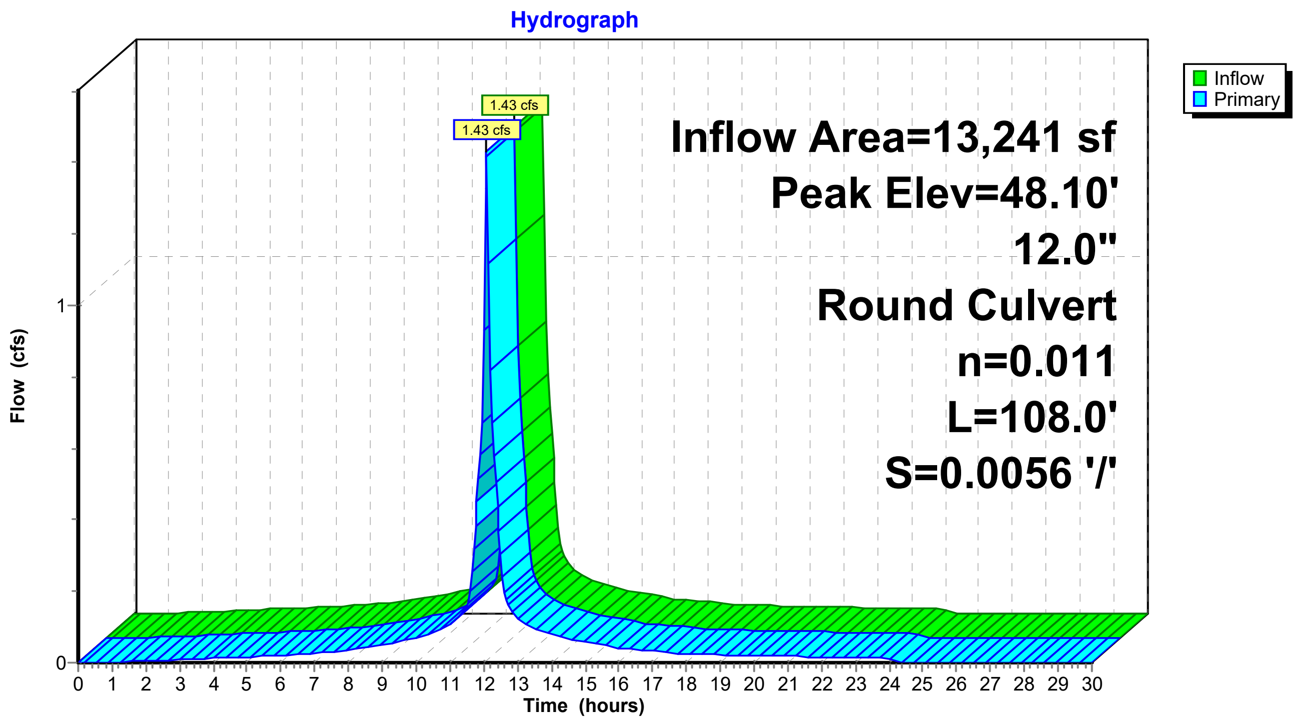
Inflow Area = 13,241 sf, 98.75% Impervious, Inflow Depth = 4.65" for 10 yr event
Inflow = 1.43 cfs @ 12.09 hrs, Volume= 5,129 cf
Outflow = 1.43 cfs @ 12.09 hrs, Volume= 5,129 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.43 cfs @ 12.09 hrs, Volume= 5,129 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.10' @ 12.13 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.60'	**12.0" Round Culvert** L= 108.0' Ke= 0.500 Inlet / Outlet Invert= 46.60' / 46.00' S= 0.0056 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.94 cfs @ 12.09 hrs HW=48.02' TW=47.94' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.94 cfs @ 1.20 fps)

Pond DMH6:



Summary for Pond DMH7:

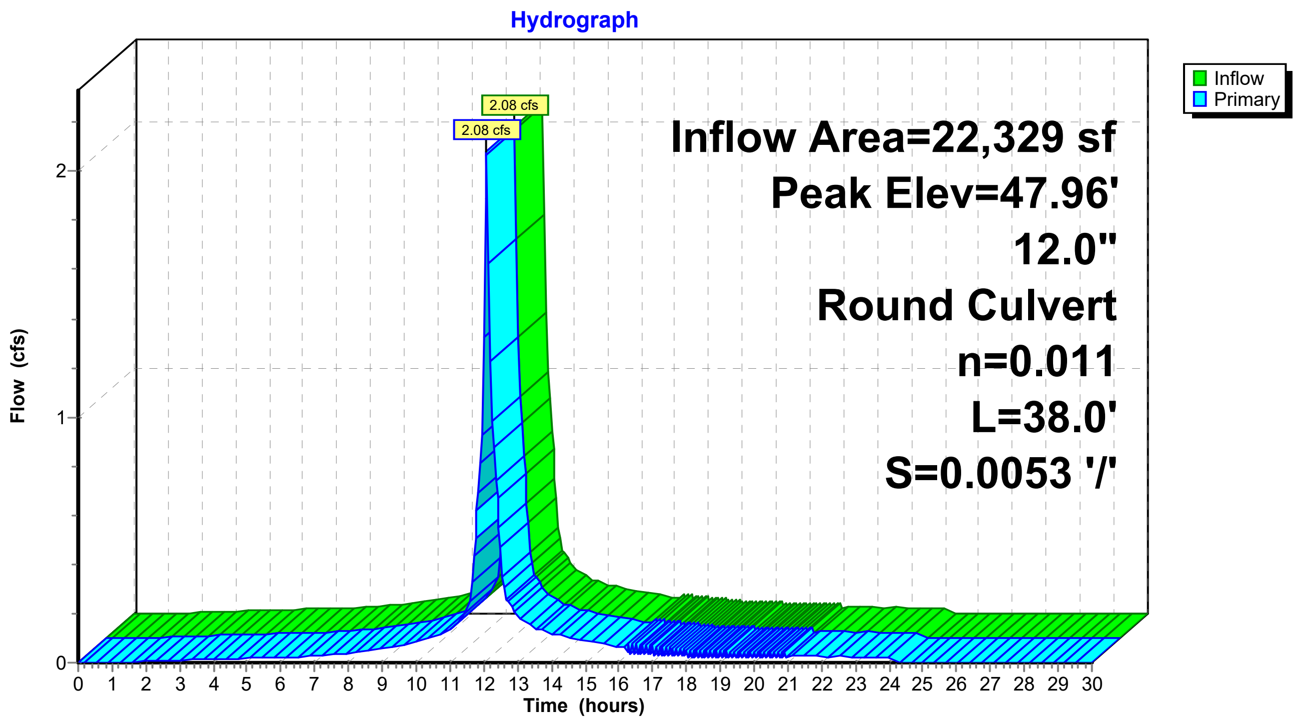
Inflow Area = 22,329 sf, 77.60% Impervious, Inflow Depth = 3.88" for 10 yr event
Inflow = 2.08 cfs @ 12.09 hrs, Volume= 7,227 cf
Outflow = 2.08 cfs @ 12.09 hrs, Volume= 7,227 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.08 cfs @ 12.09 hrs, Volume= 7,227 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.96' @ 12.10 hrs
Flood Elev= 51.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.90'	**12.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 45.90' / 45.70' S= 0.0053 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.93 cfs @ 12.09 hrs HW=47.94' TW=47.68' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.93 cfs @ 2.45 fps)

Pond DMH7:



Summary for Pond Pd1: Infiltration Basin

Inflow Area = 150,987 sf, 41.38% Impervious, Inflow Depth = 2.39" for 10 yr event
Inflow = 7.42 cfs @ 12.11 hrs, Volume= 30,060 cf
Outflow = 2.76 cfs @ 12.51 hrs, Volume= 30,211 cf, Atten= 63%, Lag= 24.5 min
Discarded = 2.76 cfs @ 12.51 hrs, Volume= 30,211 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.27' @ 12.51 hrs Surf.Area= 17,329 sf Storage= 4,516 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 8.3 min (824.7 - 816.4)

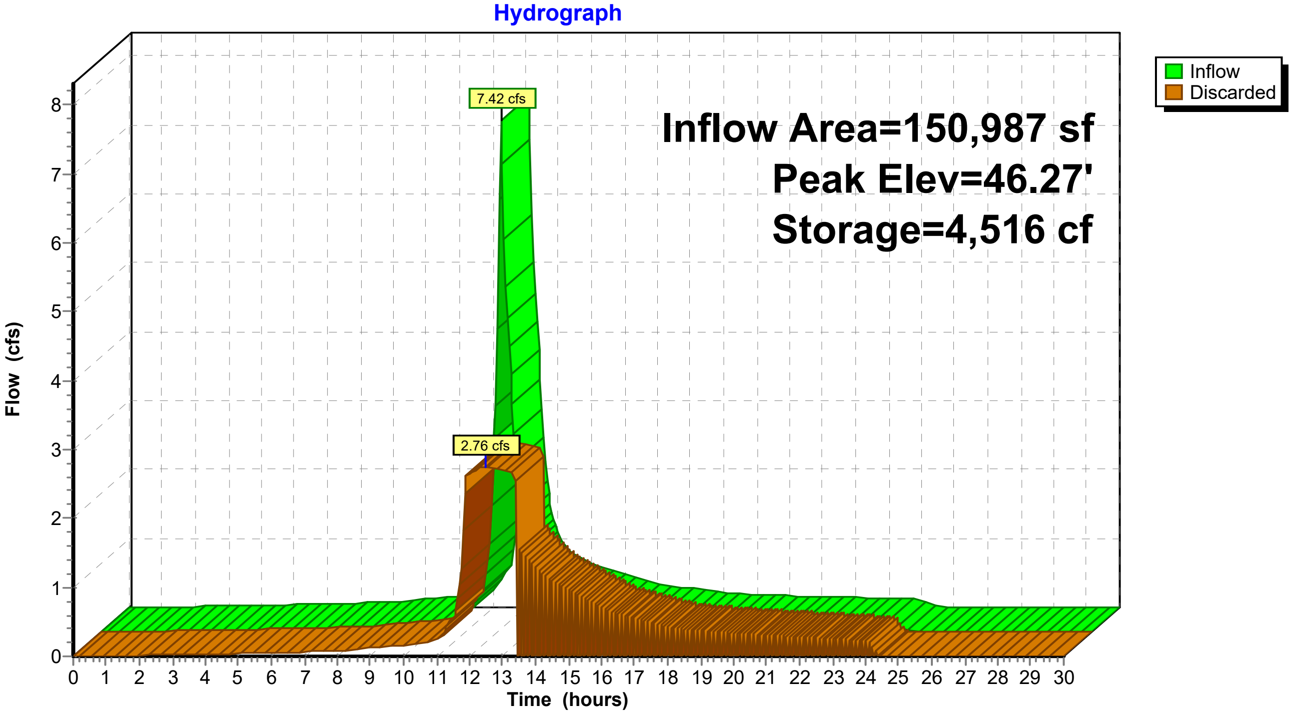
Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	70,036 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.00	16,566	726.0	0	0	16,566
47.00	19,520	751.0	18,023	18,023	19,596
48.00	25,598	1,033.0	22,490	40,513	59,640
49.00	33,630	1,171.0	29,523	70,036	83,869

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.00'	**6.875 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.76 cfs @ 12.51 hrs HW=46.27' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 2.76 cfs)

Pond Pd1: Infiltration Basin



Summary for Pond SF1: Sediment Forebay

Inflow Area = 14,792 sf, 98.88% Impervious, Inflow Depth = 4.64" for 10 yr event
Inflow = 1.60 cfs @ 12.09 hrs, Volume= 5,725 cf
Outflow = 1.53 cfs @ 12.11 hrs, Volume= 4,490 cf, Atten= 4%, Lag= 1.5 min
Primary = 1.53 cfs @ 12.11 hrs, Volume= 4,490 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.81' @ 12.11 hrs Surf.Area= 1,320 sf Storage= 1,436 cf

Plug-Flow detention time= 149.7 min calculated for 4,483 cf (78% of inflow)
Center-of-Mass det. time= 70.9 min (823.1 - 752.2)

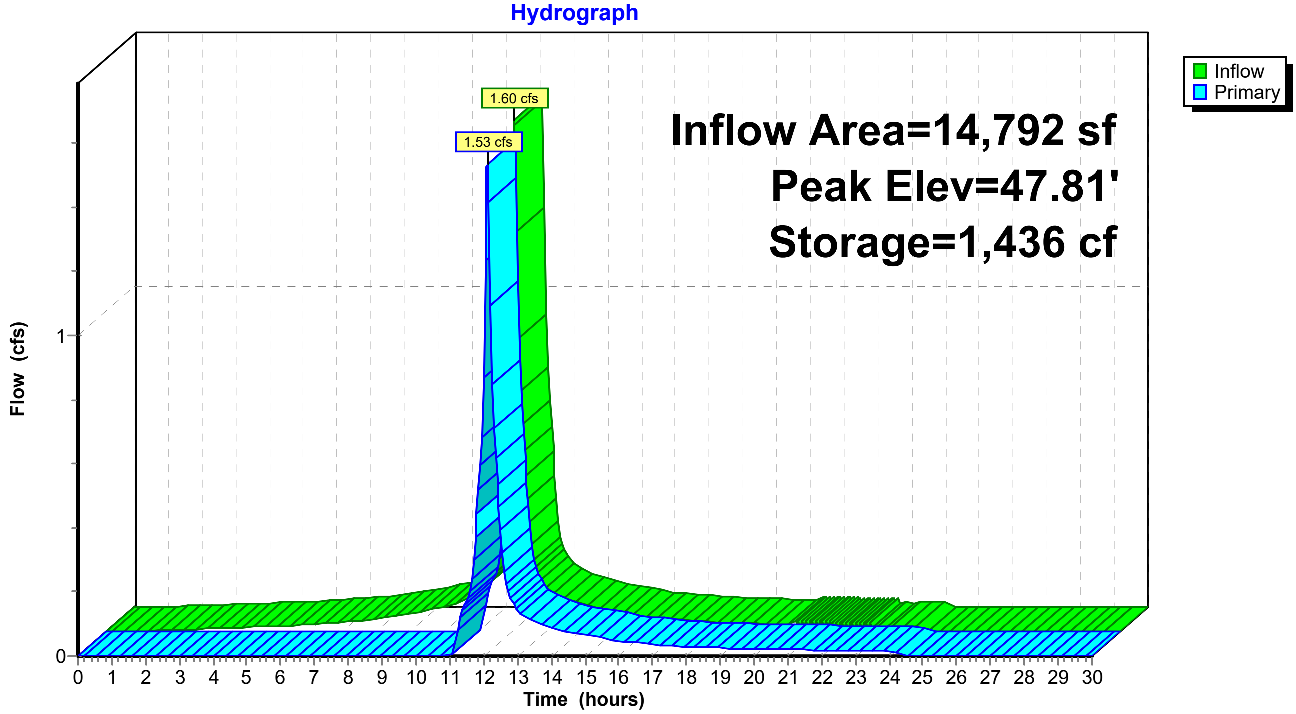
Volume	Invert	Avail.Storage	Storage Description
#1	46.20'	1,701 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.20	519	101.0	0	0	519
47.00	880	125.0	553	553	960
48.00	1,438	154.0	1,148	1,701	1,619

Device	Routing	Invert	Outlet Devices
#1	Primary	47.65'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=1.50 cfs @ 12.11 hrs HW=47.81' TW=46.10' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.50 cfs @ 0.96 fps)

Pond SF1: Sediment Forebay



Summary for Pond SF2: Sediment Forebay

Inflow Area = 22,329 sf, 77.60% Impervious, Inflow Depth = 3.88" for 10 yr event
Inflow = 2.08 cfs @ 12.09 hrs, Volume= 7,227 cf
Outflow = 1.99 cfs @ 12.11 hrs, Volume= 5,422 cf, Atten= 4%, Lag= 1.4 min
Primary = 1.99 cfs @ 12.11 hrs, Volume= 5,422 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.69' @ 12.11 hrs Surf.Area= 1,374 sf Storage= 2,054 cf

Plug-Flow detention time= 160.4 min calculated for 5,422 cf (75% of inflow)
Center-of-Mass det. time= 72.3 min (841.6 - 769.2)

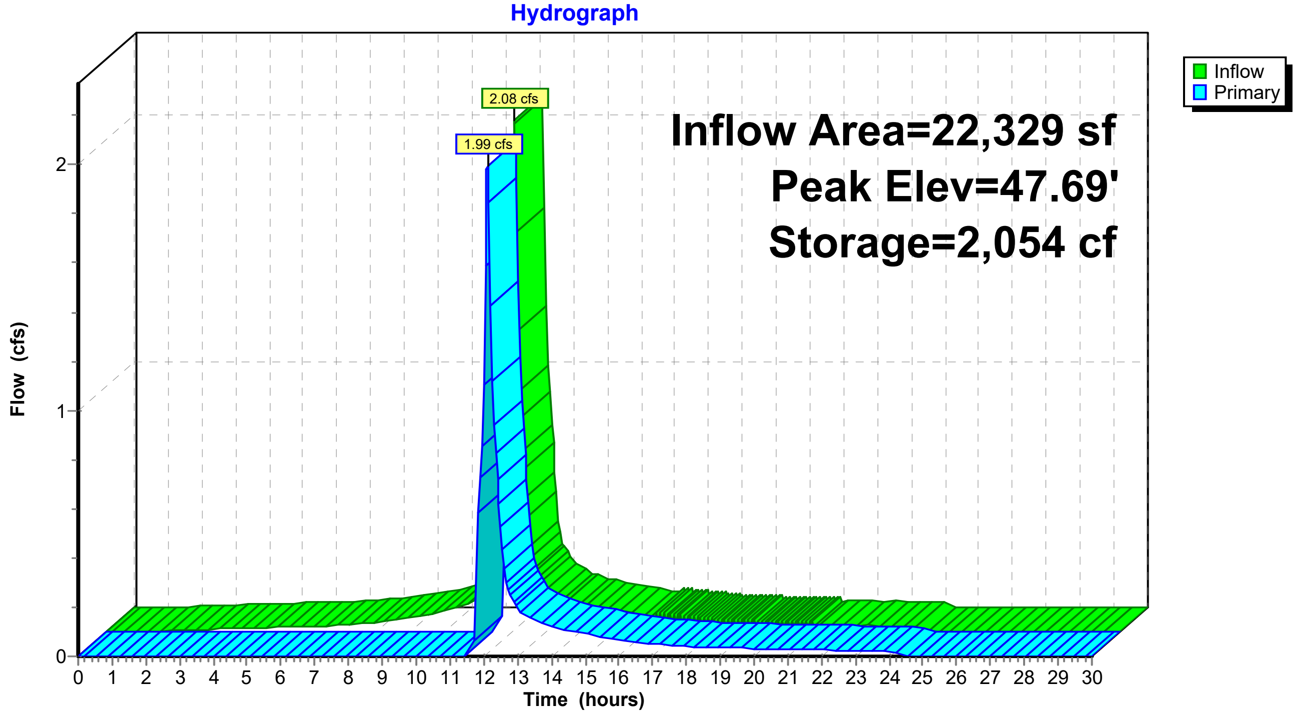
Volume	Invert	Avail.Storage	Storage Description
#1	45.00'	2,509 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
45.00	275	66.0	0	0	275
46.00	601	93.0	428	428	626
47.00	1,025	118.0	804	1,231	1,059
48.00	1,549	144.0	1,278	2,509	1,616

Device	Routing	Invert	Outlet Devices
#1	Primary	47.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=1.94 cfs @ 12.11 hrs HW=47.69' TW=46.10' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.94 cfs @ 1.05 fps)

Pond SF2: Sediment Forebay

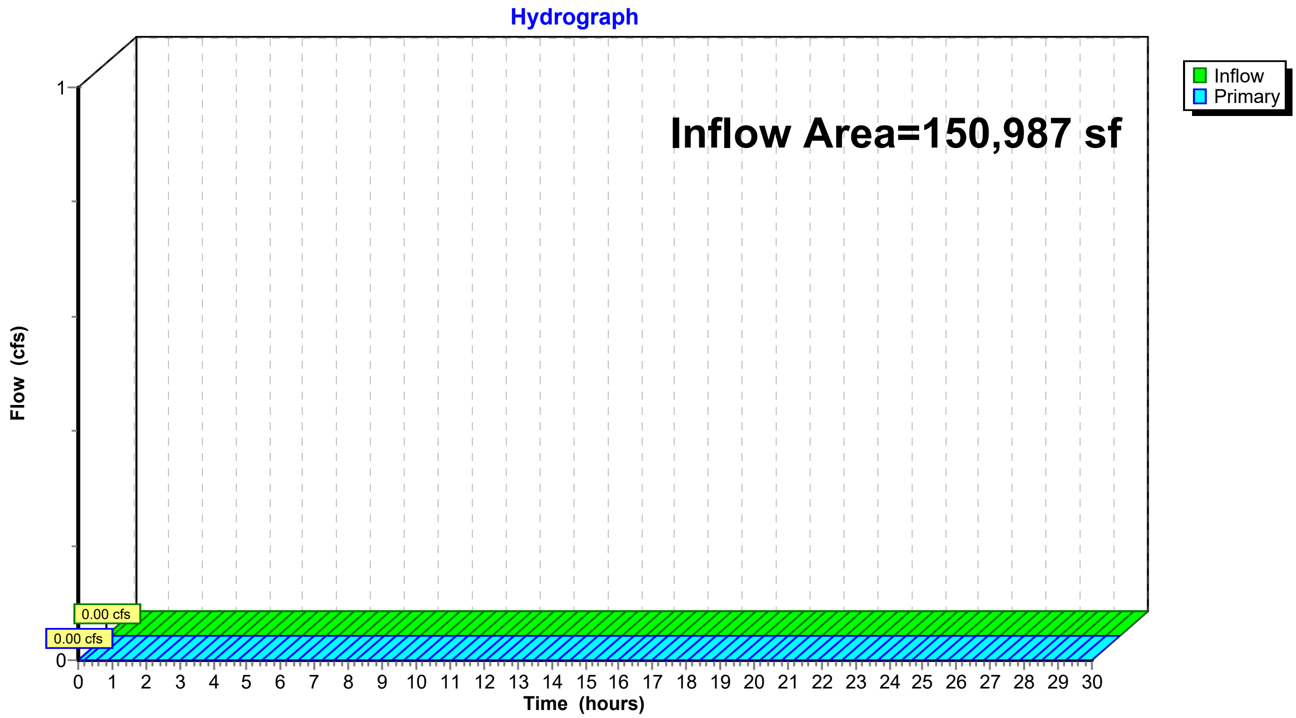


Summary for Link POI 1: Onsite Infiltration East

Inflow Area = 150,987 sf, 41.38% Impervious, Inflow Depth = 0.00" for 10 yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 1: Onsite Infiltration East

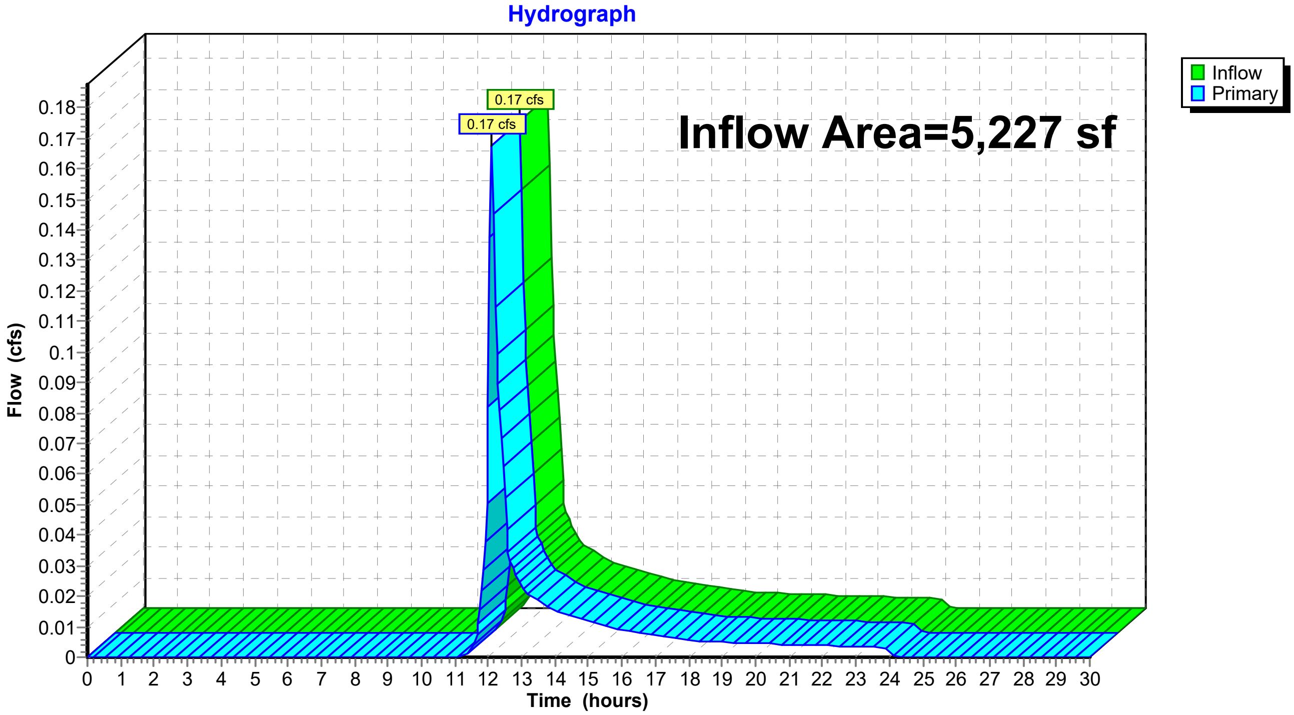


Summary for Link POI 2: Offsite at Southeast Property Line

Inflow Area =	5,227 sf,	0.00% Impervious,	Inflow Depth = 1.33"	for 10 yr event	
Inflow =	0.17 cfs @	12.10 hrs,	Volume=	581 cf	
Primary =	0.17 cfs @	12.10 hrs,	Volume=	581 cf,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 2: Offsite at Southeast Property Line

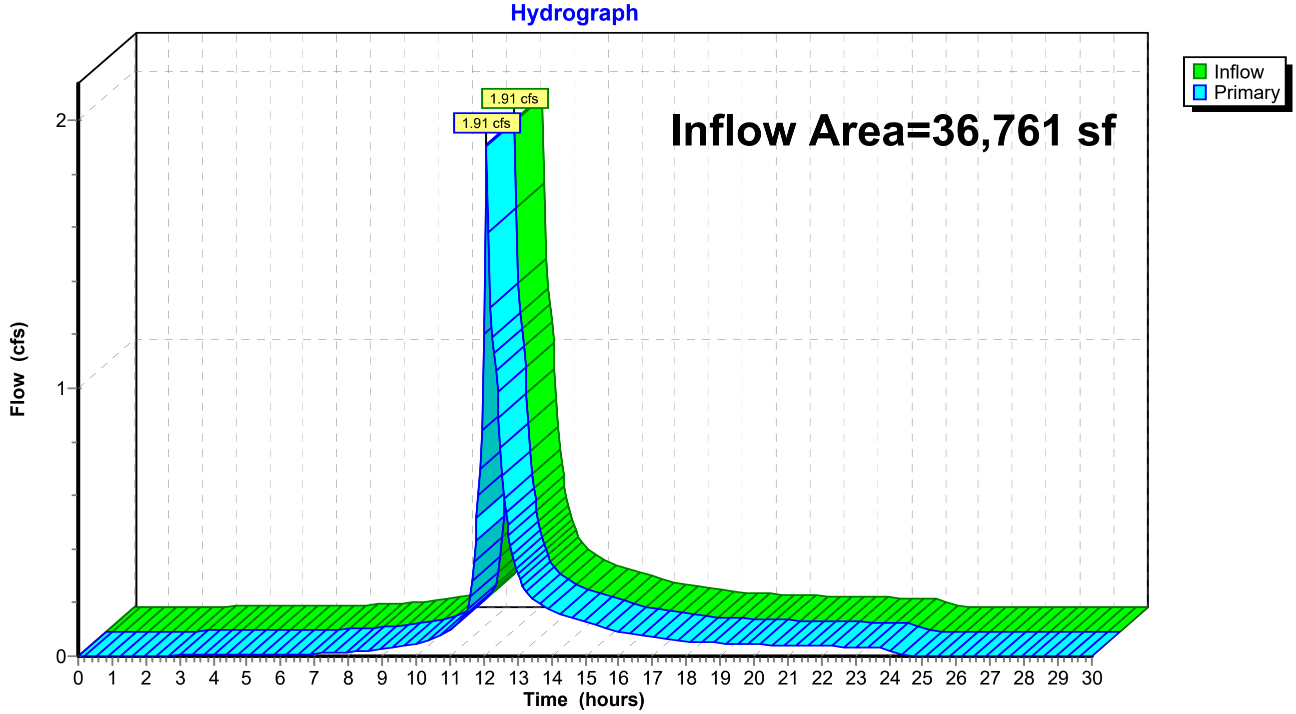


Summary for Link POI 3: Cranberry Highway Closed Drainage System

Inflow Area =	36,761 sf,	43.09% Impervious,	Inflow Depth = 2.62"	for 10 yr event	
Inflow =	1.91 cfs @	12.09 hrs,	Volume=	8,014 cf	
Primary =	1.91 cfs @	12.09 hrs,	Volume=	8,014 cf,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 3: Cranberry Highway Closed Drainage System



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentP-1A: Runoff Area=83,866 sf 0.62% Impervious Runoff Depth=1.94"
Flow Length=347' Tc=19.6 min CN=59 Runoff=2.78 cfs 13,570 cf

SubcatchmentP-1B: Runoff Area=2,421 sf 100.00% Impervious Runoff Depth=5.92"
Tc=6.0 min CN=98 Runoff=0.33 cfs 1,195 cf

SubcatchmentP-1C: Runoff Area=2,478 sf 100.00% Impervious Runoff Depth=5.92"
Tc=6.0 min CN=98 Runoff=0.34 cfs 1,223 cf

SubcatchmentP-1D: Runoff Area=2,367 sf 100.00% Impervious Runoff Depth=5.92"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,168 cf

SubcatchmentP-1E: Runoff Area=7,526 sf 97.81% Impervious Runoff Depth=5.80"
Tc=6.0 min CN=97 Runoff=1.01 cfs 3,640 cf

SubcatchmentP-1F: Roof Runoff Runoff Area=30,000 sf 100.00% Impervious Runoff Depth=5.92"
Tc=6.0 min CN=98 Runoff=4.06 cfs 14,804 cf

SubcatchmentP-2: Runoff Area=5,227 sf 0.00% Impervious Runoff Depth=2.11"
Tc=6.0 min CN=61 Runoff=0.28 cfs 921 cf

SubcatchmentP-3: Runoff Area=15,280 sf 18.69% Impervious Runoff Depth=2.65"
Flow Length=242' Tc=26.3 min CN=67 Runoff=0.64 cfs 3,376 cf

SubcatchmentP-4: Runoff Area=7,214 sf 39.20% Impervious Runoff Depth=3.52"
Tc=6.0 min CN=76 Runoff=0.67 cfs 2,115 cf

SubcatchmentP-5: Runoff Area=4,858 sf 99.28% Impervious Runoff Depth=5.92"
Tc=6.0 min CN=98 Runoff=0.66 cfs 2,397 cf

SubcatchmentP-6: Runoff Area=9,409 sf 56.68% Impervious Runoff Depth=4.13"
Flow Length=123' Tc=5.3 min CN=82 Runoff=1.03 cfs 3,242 cf

SubcatchmentP-6A: Runoff Area=2,359 sf 100.00% Impervious Runoff Depth=5.92"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,164 cf

SubcatchmentP-6B: Runoff Area=6,232 sf 97.35% Impervious Runoff Depth=5.80"
Tc=6.0 min CN=97 Runoff=0.84 cfs 3,014 cf

SubcatchmentP-6C: Runoff Area=1,457 sf 100.00% Impervious Runoff Depth=5.92"
Tc=6.0 min CN=98 Runoff=0.20 cfs 719 cf

SubcatchmentP-6D: Runoff Area=4,650 sf 100.00% Impervious Runoff Depth=5.92"
Tc=6.0 min CN=98 Runoff=0.63 cfs 2,295 cf

SubcatchmentP-6E: Runoff Area=7,631 sf 36.61% Impervious Runoff Depth=3.42"
Tc=6.0 min CN=75 Runoff=0.69 cfs 2,174 cf

Pond CB1: Peak Elev=48.34' Inflow=0.33 cfs 1,195 cf
12.0" Round Culvert n=0.011 L=93.0' S=0.0054 '/' Outflow=0.33 cfs 1,195 cf

Pond CB10: Peak Elev=48.21' Inflow=0.69 cfs 2,174 cf
12.0" Round Culvert n=0.011 L=46.0' S=0.0065 '/' Outflow=0.69 cfs 2,173 cf

Pond CB101: Peak Elev=47.04' Inflow=0.64 cfs 3,376 cf
12.0" Round Culvert n=0.011 L=29.0' S=-0.0034 '/' Outflow=0.64 cfs 3,376 cf

Pond CB102: Peak Elev=50.11' Inflow=0.67 cfs 2,115 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=0.67 cfs 2,115 cf

Pond CB103: Peak Elev=47.31' Inflow=0.66 cfs 2,397 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=0.66 cfs 2,397 cf

Pond CB104: Peak Elev=46.77' Inflow=1.03 cfs 3,242 cf
12.0" Round Culvert n=0.011 L=2.0' S=0.0500 '/' Outflow=1.03 cfs 3,242 cf

Pond CB2: Peak Elev=48.16' Inflow=0.34 cfs 1,223 cf
12.0" Round Culvert n=0.011 L=8.0' S=0.0125 '/' Outflow=0.34 cfs 1,223 cf

Pond CB3: Peak Elev=48.18' Inflow=0.32 cfs 1,168 cf
12.0" Round Culvert n=0.011 L=104.0' S=0.0058 '/' Outflow=0.32 cfs 1,168 cf

Pond CB4: Peak Elev=0.00'
12.0" Round Culvert n=0.011 L=25.0' S=0.0080 '/' Primary=0.00 cfs 0 cf

Pond CB5: Peak Elev=48.13' Inflow=1.01 cfs 3,640 cf
12.0" Round Culvert n=0.011 L=27.0' S=0.0074 '/' Outflow=1.01 cfs 3,640 cf

Pond CB6: Peak Elev=48.51' Inflow=0.32 cfs 1,164 cf
12.0" Round Culvert n=0.011 L=86.0' S=0.0058 '/' Outflow=0.32 cfs 1,164 cf

Pond CB7: Peak Elev=48.51' Inflow=0.84 cfs 3,014 cf
12.0" Round Culvert n=0.011 L=8.0' S=0.0125 '/' Outflow=0.84 cfs 3,014 cf

Pond CB8: Peak Elev=48.43' Inflow=0.63 cfs 2,295 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0167 '/' Outflow=0.63 cfs 2,295 cf

Pond CB9: Peak Elev=48.19' Inflow=0.20 cfs 719 cf
12.0" Round Culvert n=0.011 L=7.0' S=0.0143 '/' Outflow=0.20 cfs 719 cf

Pond DMH1: Peak Elev=48.15' Inflow=0.66 cfs 2,418 cf
12.0" Round Culvert n=0.011 L=13.0' S=0.0077 '/' Outflow=0.66 cfs 2,418 cf

Pond DMH101: Peak Elev=46.98' Inflow=0.95 cfs 5,491 cf
12.0" Round Culvert n=0.011 L=109.0' S=0.0018 '/' Outflow=0.95 cfs 5,491 cf

Pond DMH102: Peak Elev=47.05' Inflow=0.66 cfs 2,397 cf
12.0" Round Culvert n=0.011 L=13.0' S=-0.0077 '/' Outflow=0.66 cfs 2,397 cf

Pond DMH103: Peak Elev=46.78' Inflow=1.60 cfs 7,889 cf
12.0" Round Culvert n=0.011 L=36.0' S=0.0333 '/' Outflow=1.60 cfs 7,889 cf

Pond DMH104: Peak Elev=45.83' Inflow=1.03 cfs 3,242 cf
12.0" Round Culvert n=0.011 L=5.0' S=0.0400 '/' Outflow=1.03 cfs 3,242 cf

Pond DMH105: Inflow=2.62 cfs 11,130 cf
Primary=2.62 cfs 11,130 cf

Pond DMH2: Peak Elev=48.12' Inflow=0.66 cfs 2,418 cf
12.0" Round Culvert n=0.011 L=89.0' S=0.0045 '/' Outflow=0.66 cfs 2,418 cf

Pond DMH3: Peak Elev=48.09' Inflow=0.32 cfs 1,168 cf
12.0" Round Culvert n=0.011 L=46.0' S=0.0065 '/' Outflow=0.32 cfs 1,168 cf

Pond DMH4: Peak Elev=48.08' Inflow=2.00 cfs 7,225 cf
12.0" Round Culvert n=0.011 L=11.0' S=0.0091 '/' Outflow=2.00 cfs 7,225 cf

Pond DMH5: Peak Elev=48.49' Inflow=1.16 cfs 4,178 cf
12.0" Round Culvert n=0.011 L=132.0' S=0.0053 '/' Outflow=1.16 cfs 4,178 cf

Pond DMH6: Peak Elev=48.42' Inflow=1.79 cfs 6,473 cf
12.0" Round Culvert n=0.011 L=108.0' S=0.0056 '/' Outflow=1.79 cfs 6,473 cf

Pond DMH7: Peak Elev=48.19' Inflow=2.68 cfs 9,365 cf
12.0" Round Culvert n=0.011 L=38.0' S=0.0053 '/' Outflow=2.68 cfs 9,365 cf

Pond Pd1: Infiltration Basin Peak Elev=46.51' Storage=8,806 cf Inflow=9.96 cfs 41,924 cf
Outflow=2.87 cfs 41,952 cf

Pond SF1: Sediment Forebay Peak Elev=47.83' Storage=1,471 cf Inflow=2.00 cfs 7,225 cf
Outflow=1.93 cfs 5,990 cf

Pond SF2: Sediment Forebay Peak Elev=47.72' Storage=2,103 cf Inflow=2.68 cfs 9,365 cf
Outflow=2.60 cfs 7,560 cf

Link POI 1: Onsite Infiltration East Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link POI 2: Offsite at Southeast Property Line Inflow=0.28 cfs 921 cf
Primary=0.28 cfs 921 cf

Link POI 3: Cranberry Highway Closed Drainage System Inflow=2.62 cfs 11,130 cf
Primary=2.62 cfs 11,130 cf

Total Runoff Area = 192,975 sf Runoff Volume = 57,016 cf Average Runoff Depth = 3.55"
59.42% Pervious = 114,661 sf 40.58% Impervious = 78,314 sf

Summary for Subcatchment P-1A:

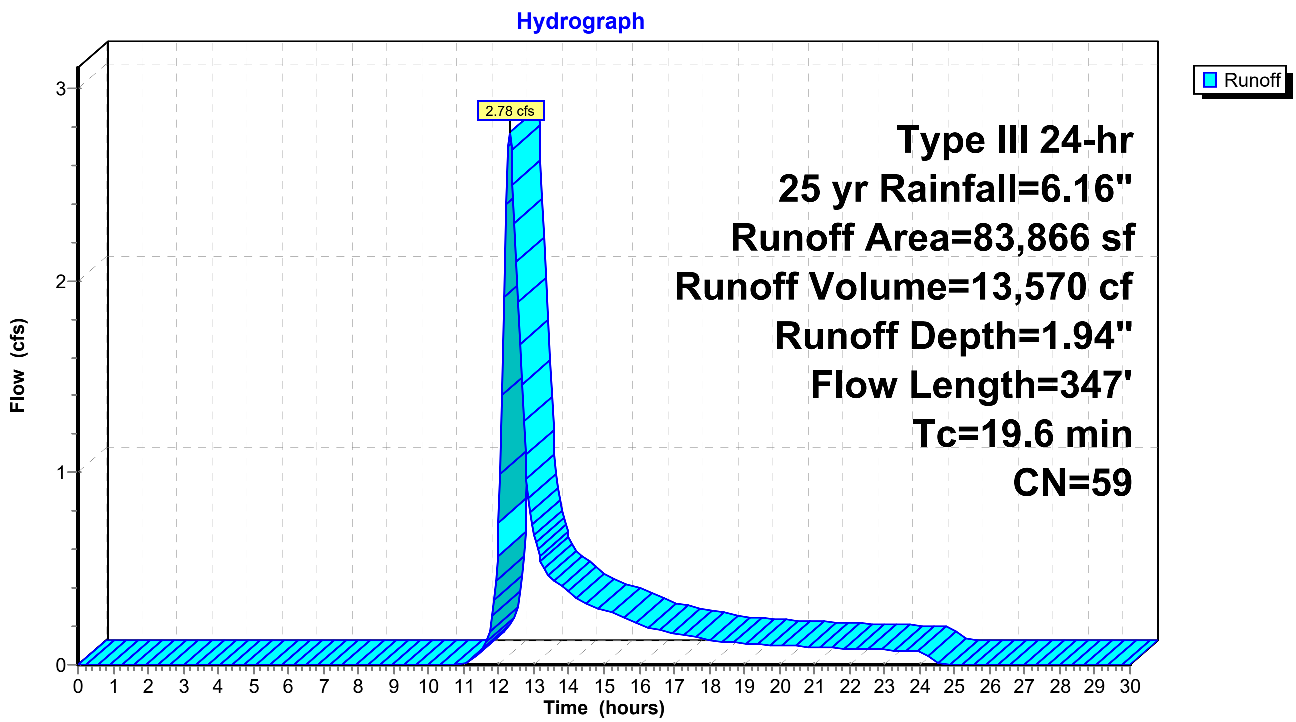
Runoff = 2.78 cfs @ 12.30 hrs, Volume= 13,570 cf, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
25,220	55	Woods, Good, HSG B
520	98	Roofs, HSG B
58,126	61	>75% Grass cover, Good, HSG B
83,866	59	Weighted Average
83,346		99.38% Pervious Area
520		0.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	50	0.0200	0.07		**Sheet Flow, Woods, 50', 2%** Woods: Light underbrush n= 0.400 P2= 3.35"
5.3	160	0.0100	0.50		**Shallow Concentrated Flow, Woods, 160', 1%** Woodland Kv= 5.0 fps
2.2	137	0.0230	1.06		**Shallow Concentrated Flow, Grass, 137', 2.3%** Short Grass Pasture Kv= 7.0 fps
19.6	347	Total			

Subcatchment P-1A:



Summary for Subcatchment P-1B:

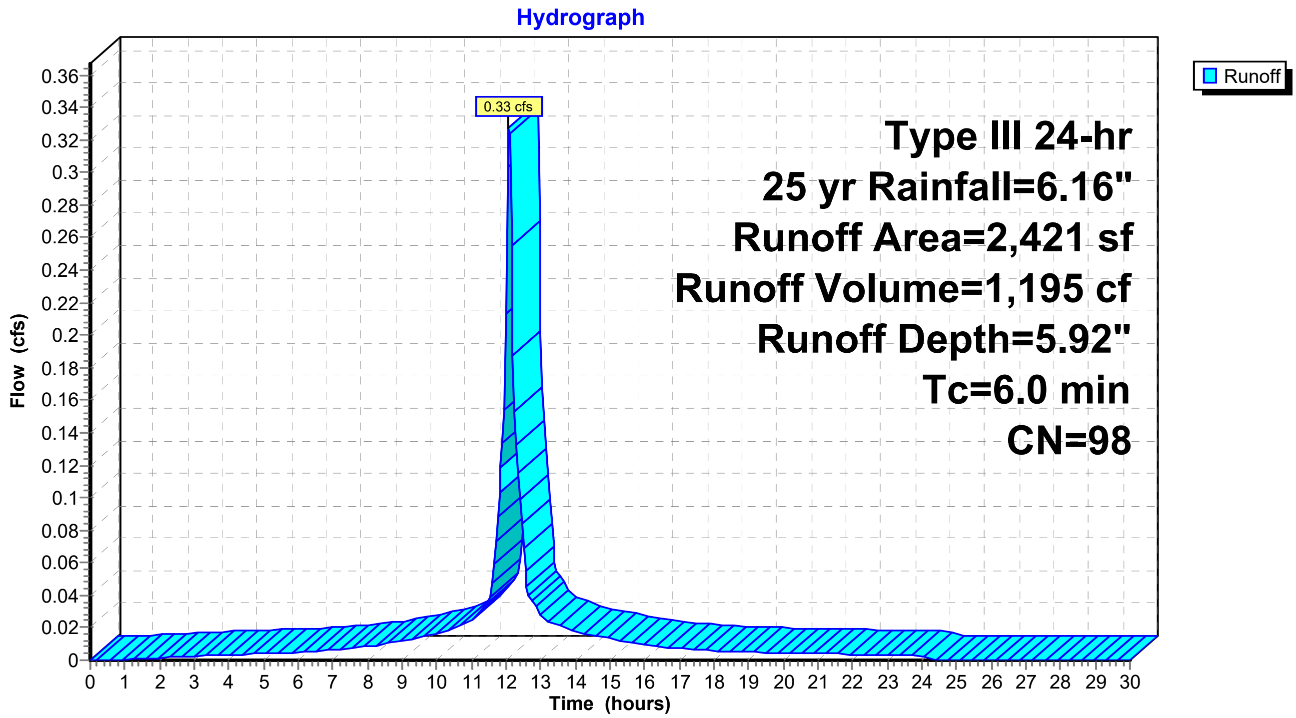
Runoff = 0.33 cfs @ 12.09 hrs, Volume= 1,195 cf, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
2,421	98	Paved parking, HSG B
2,421		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1B:



Summary for Subcatchment P-1C:

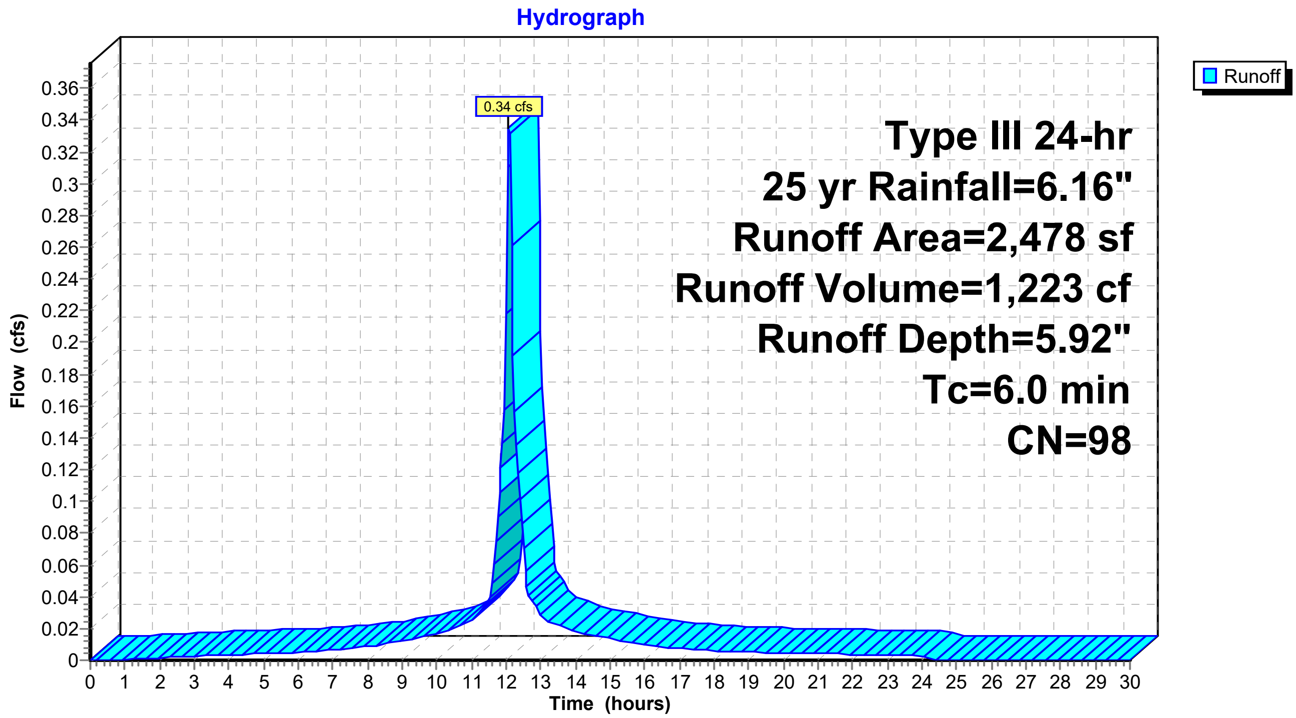
Runoff = 0.34 cfs @ 12.09 hrs, Volume= 1,223 cf, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
2,478	98	Paved parking, HSG B
2,478		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1C:



Summary for Subcatchment P-1D:

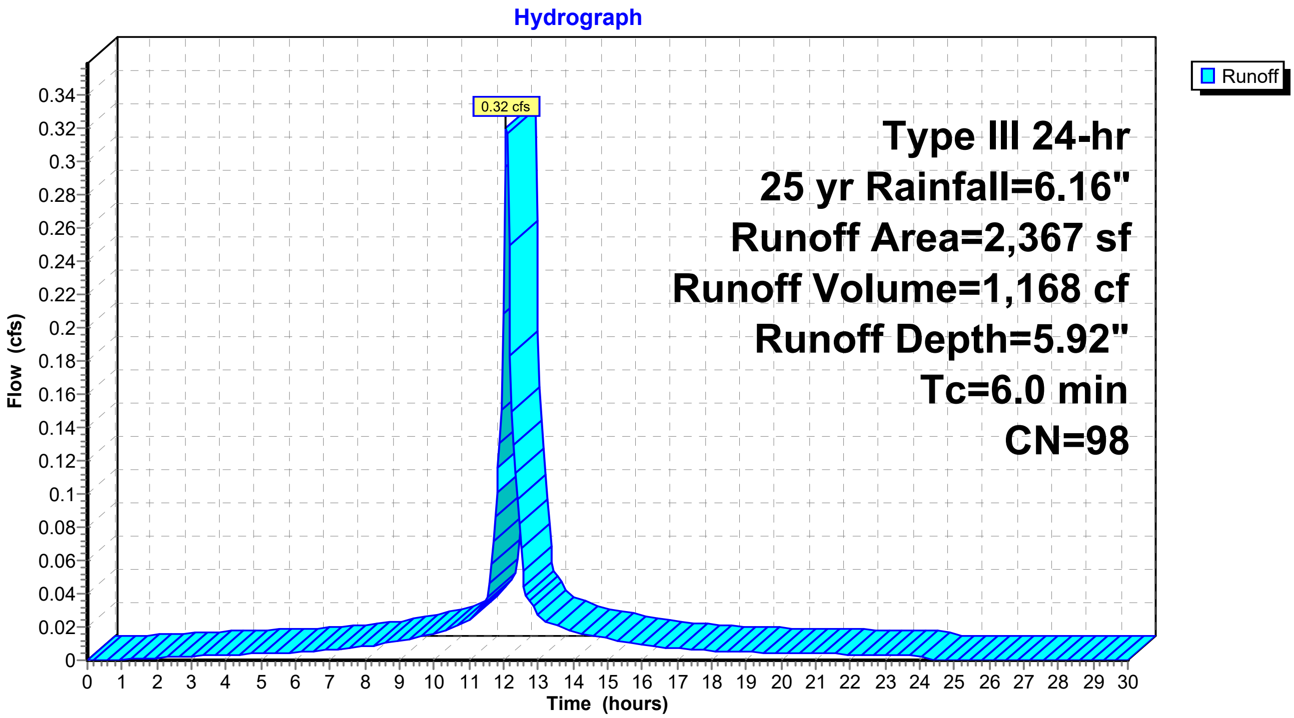
Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,168 cf, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
2,367	98	Paved parking, HSG B
2,367		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1D:



Summary for Subcatchment P-1E:

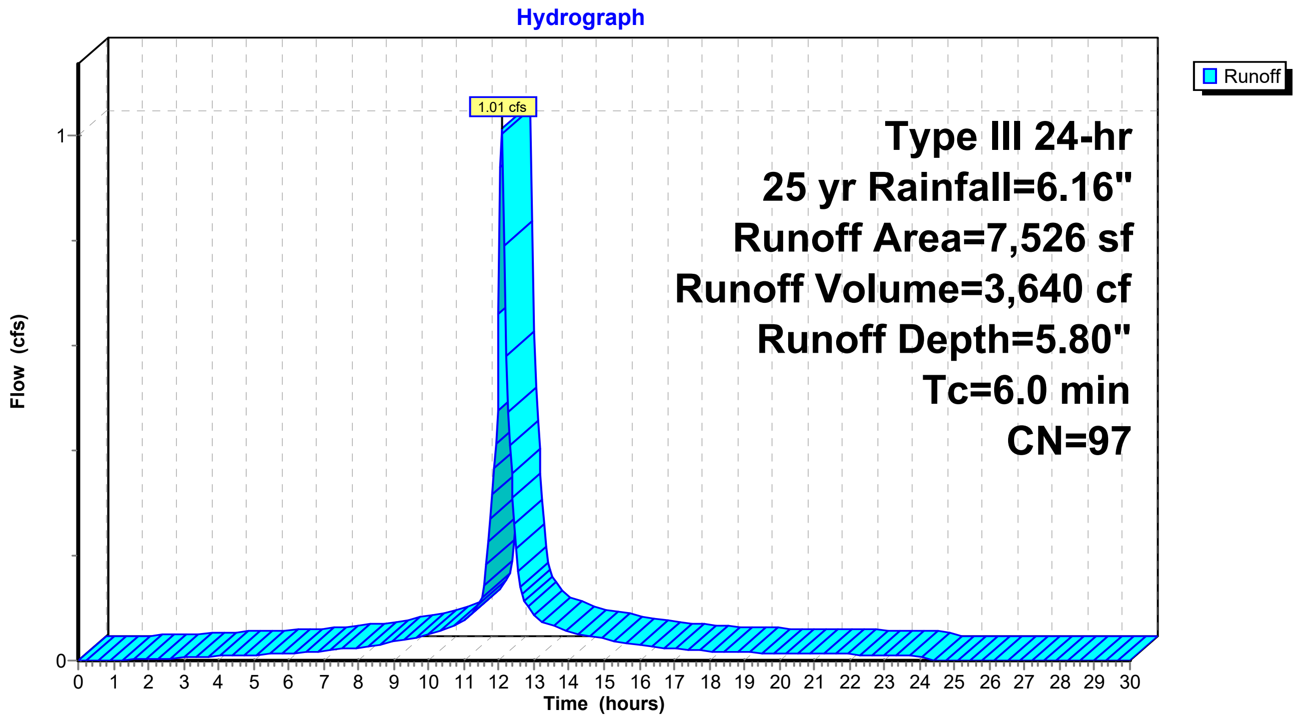
Runoff = 1.01 cfs @ 12.09 hrs, Volume= 3,640 cf, Depth= 5.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
7,361	98	Paved parking, HSG B
165	61	>75% Grass cover, Good, HSG B
7,526	97	Weighted Average
165		2.19% Pervious Area
7,361		97.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1E:



Summary for Subcatchment P-1F: Roof Runoff

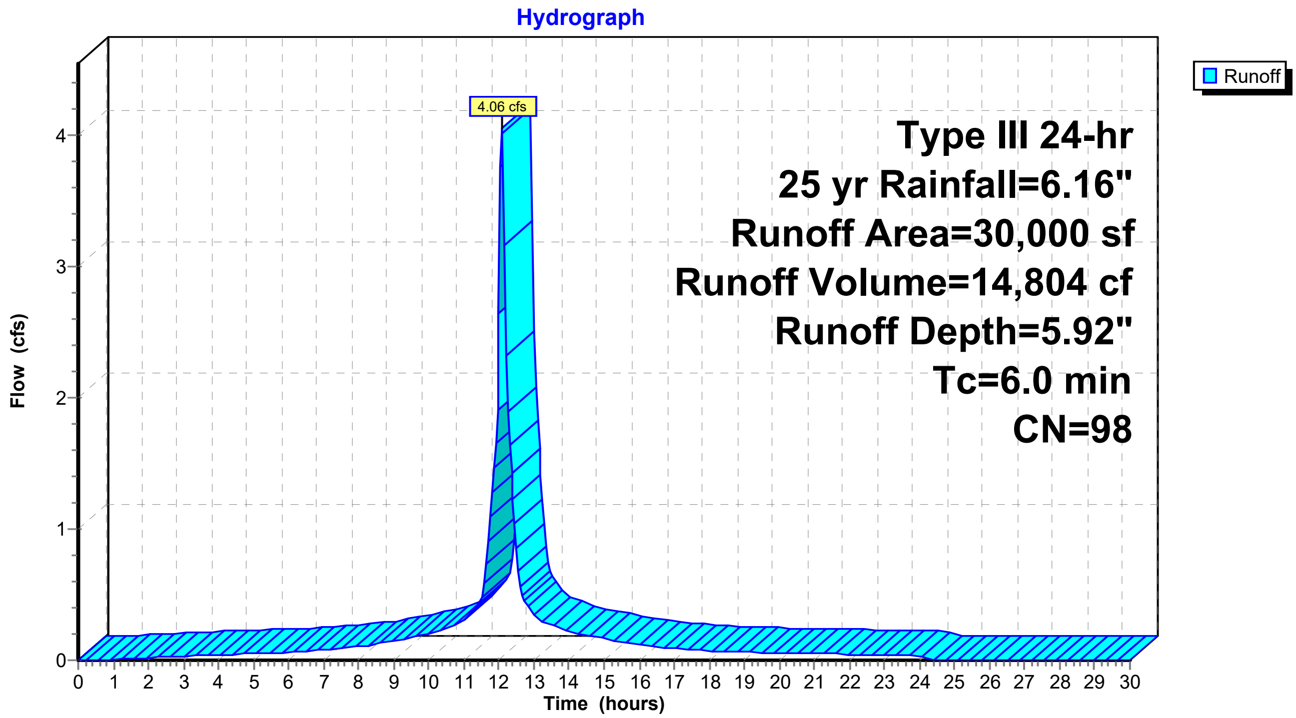
Runoff = 4.06 cfs @ 12.09 hrs, Volume= 14,804 cf, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
30,000	98	Roofs, HSG B
30,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1F: Roof Runoff



Summary for Subcatchment P-2:

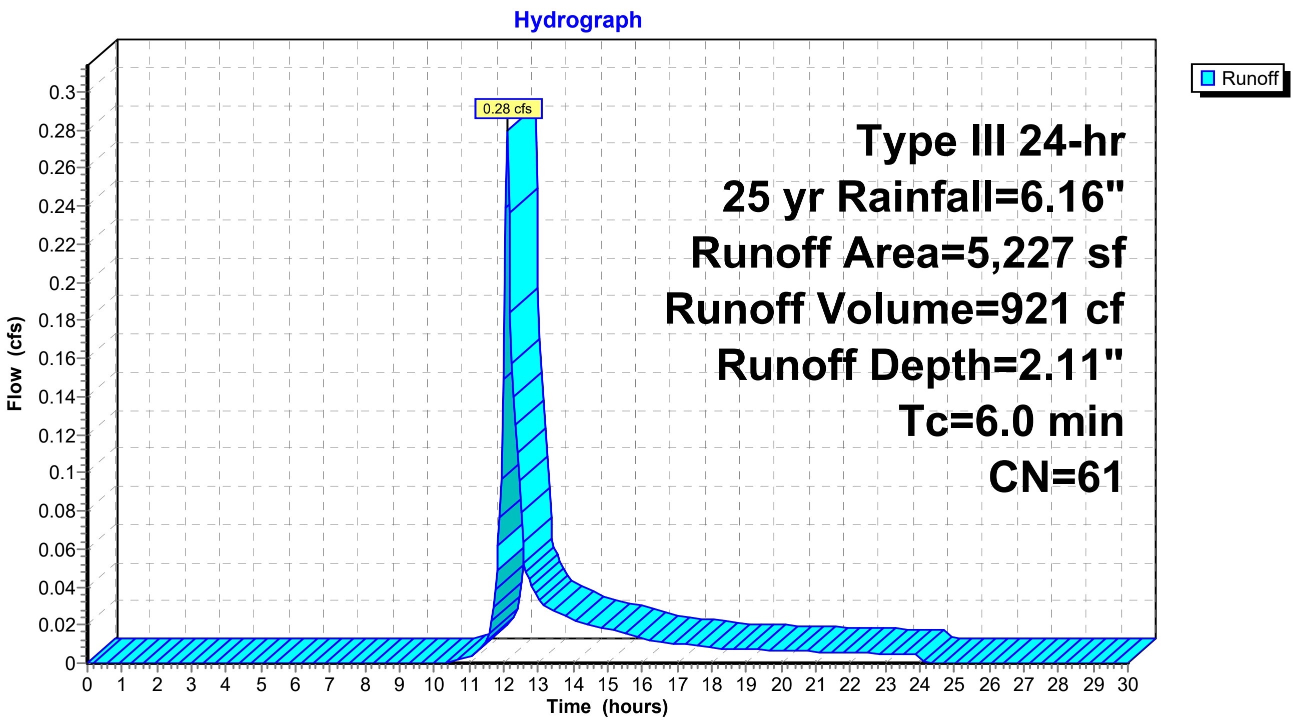
Runoff = 0.28 cfs @ 12.10 hrs, Volume= 921 cf, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
153	55	Woods, Good, HSG B
5,074	61	>75% Grass cover, Good, HSG B
5,227	61	Weighted Average
5,227		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-2:



Summary for Subcatchment P-3:

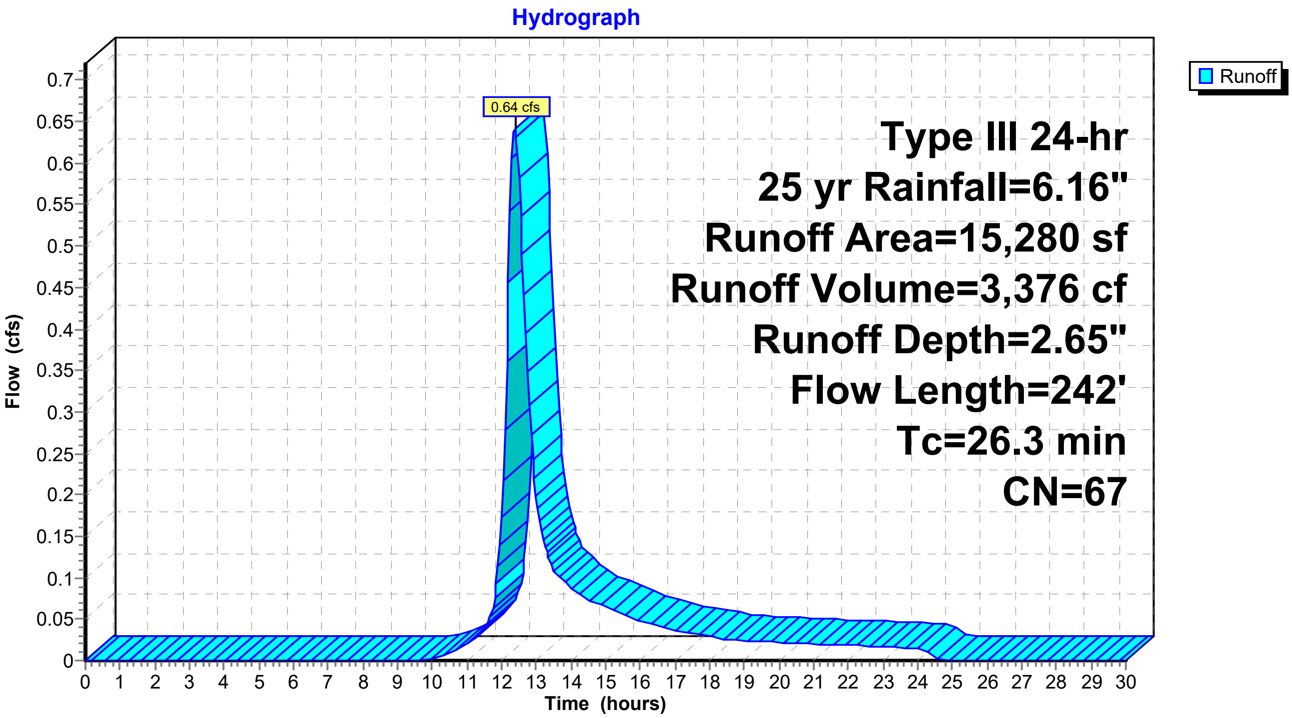
Runoff = 0.64 cfs @ 12.38 hrs, Volume= 3,376 cf, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
2,898	55	Woods, Good, HSG B
2,856	98	Paved parking, HSG B
9,526	61	>75% Grass cover, Good, HSG B
15,280	67	Weighted Average
12,424		81.31% Pervious Area
2,856		18.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	55	0.0050	0.04		**Sheet Flow, Woods, 55', 0.5%** Woods: Light underbrush n= 0.400 P2= 3.35"
0.2	5	0.0050	0.35		**Shallow Concentrated Flow, Woods, 5%, 0.5%** Woodland Kv= 5.0 fps
2.8	117	0.0100	0.70		**Shallow Concentrated Flow, Grass, 117', 1%** Short Grass Pasture Kv= 7.0 fps
0.6	65	0.0080	1.82		**Shallow Concentrated Flow, Pavement, 65', 0.8%** Paved Kv= 20.3 fps
26.3	242	Total			

Subcatchment P-3:



Summary for Subcatchment P-4:

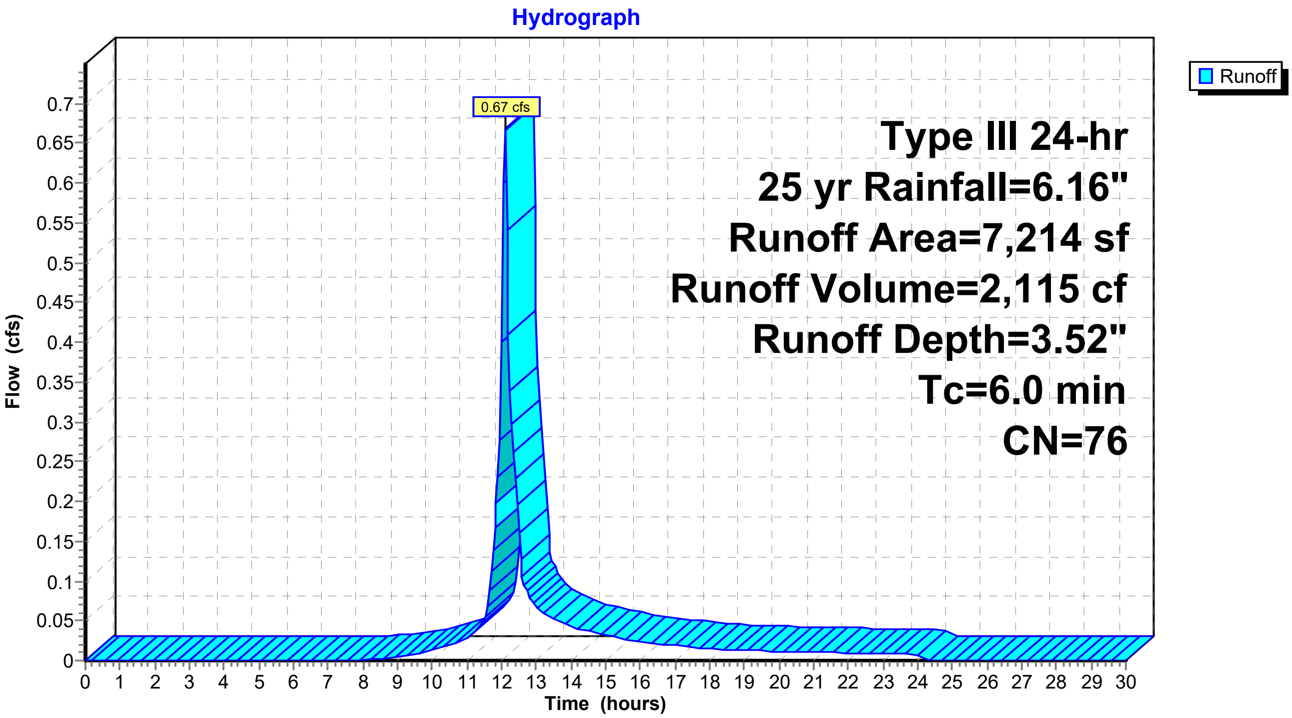
Runoff = 0.67 cfs @ 12.09 hrs, Volume= 2,115 cf, Depth= 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
2,828	98	Paved parking, HSG B
4,386	61	>75% Grass cover, Good, HSG B
7,214	76	Weighted Average
4,386		60.80% Pervious Area
2,828		39.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-4:



Summary for Subcatchment P-5:

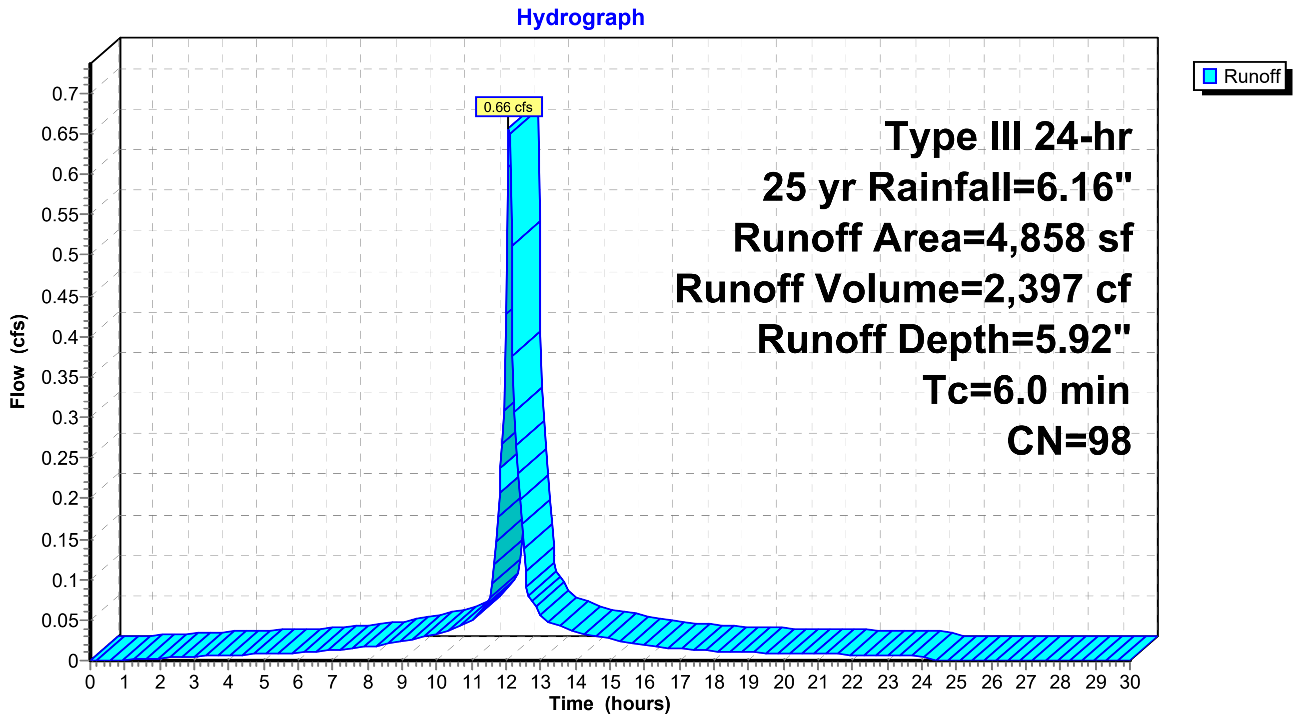
Runoff = 0.66 cfs @ 12.09 hrs, Volume= 2,397 cf, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
4,823	98	Paved parking, HSG B
35	61	>75% Grass cover, Good, HSG B
4,858	98	Weighted Average
35		0.72% Pervious Area
4,823		99.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-5:



Summary for Subcatchment P-6:

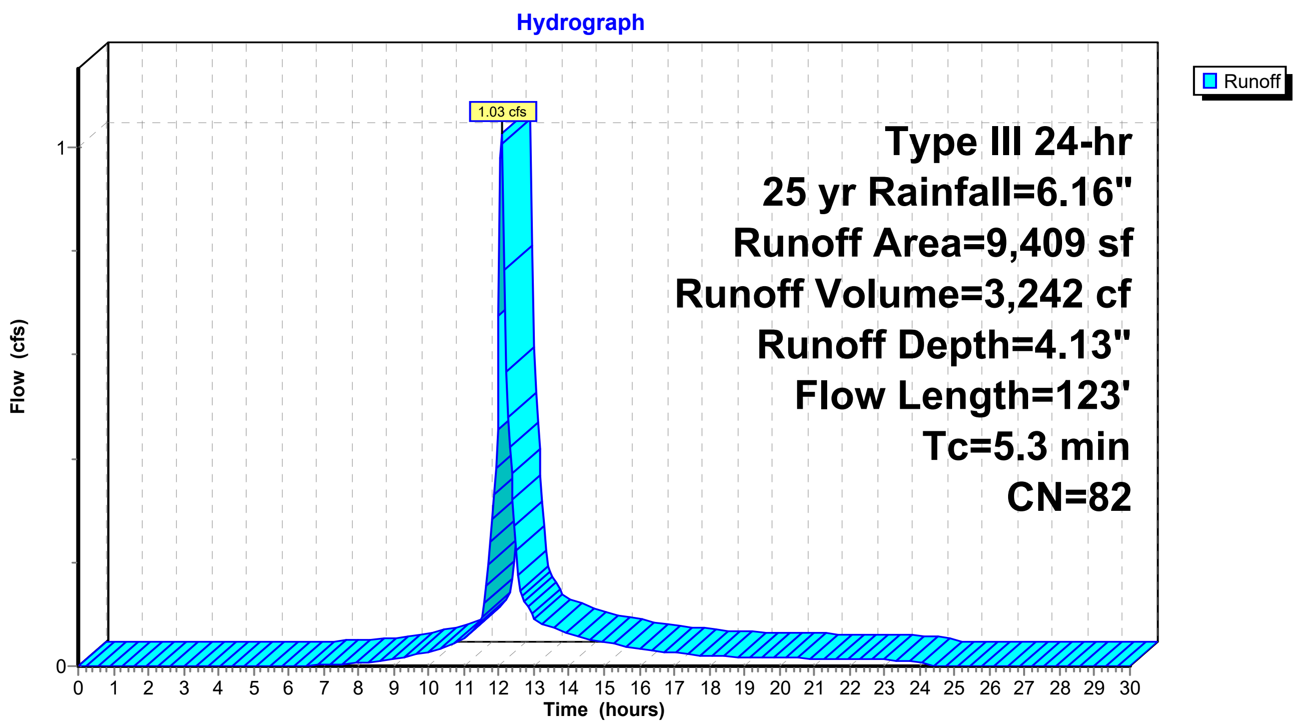
Runoff = 1.03 cfs @ 12.08 hrs, Volume= 3,242 cf, Depth= 4.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
5,333	98	Paved parking, HSG B
4,076	61	>75% Grass cover, Good, HSG B
9,409	82	Weighted Average
4,076		43.32% Pervious Area
5,333		56.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.0300	0.18		**Sheet Flow, Grass, 50', 3%** Grass: Short n= 0.150 P2= 3.35"
0.4	30	0.0300	1.21		**Shallow Concentrated Flow, Grass, 30', 3%** Short Grass Pasture Kv= 7.0 fps
0.2	43	0.0200	2.87		**Shallow Concentrated Flow, Pavement, 43', 2%** Paved Kv= 20.3 fps
5.3	123	Total			

Subcatchment P-6:



Summary for Subcatchment P-6A:

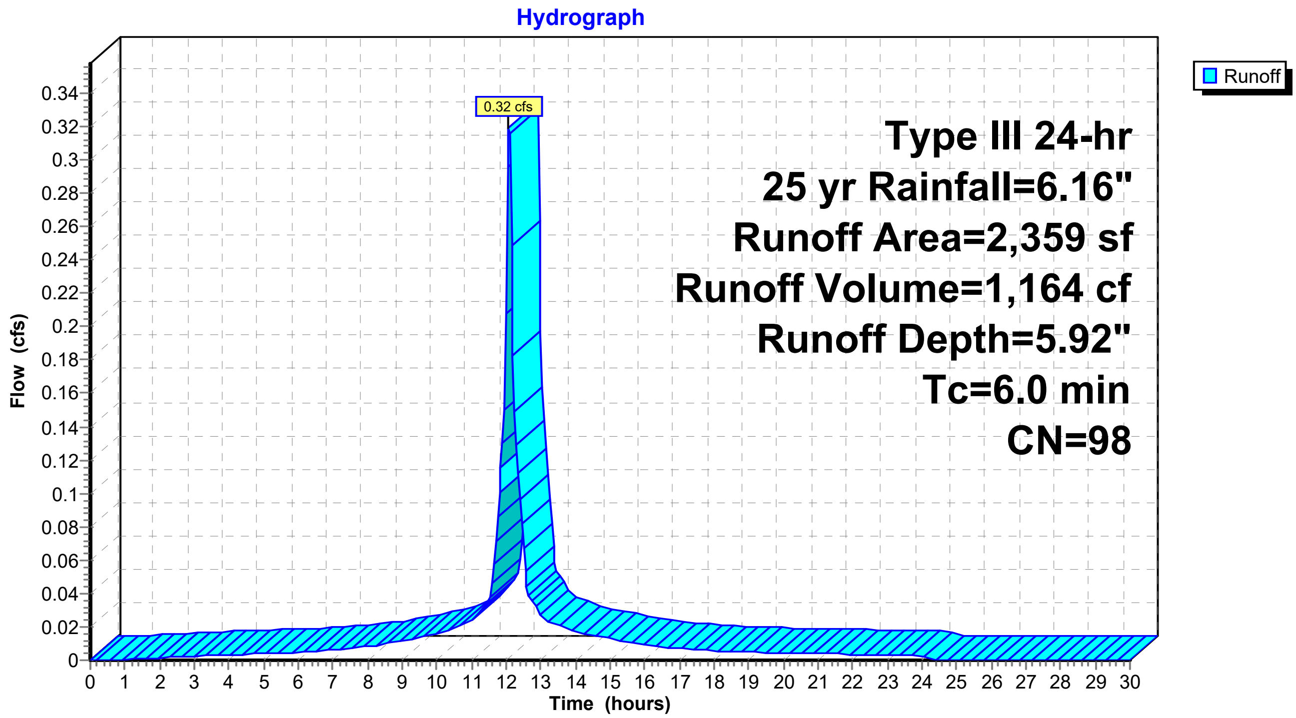
Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,164 cf, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
2,359	98	Paved parking, HSG B
2,359		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6A:



Summary for Subcatchment P-6B:

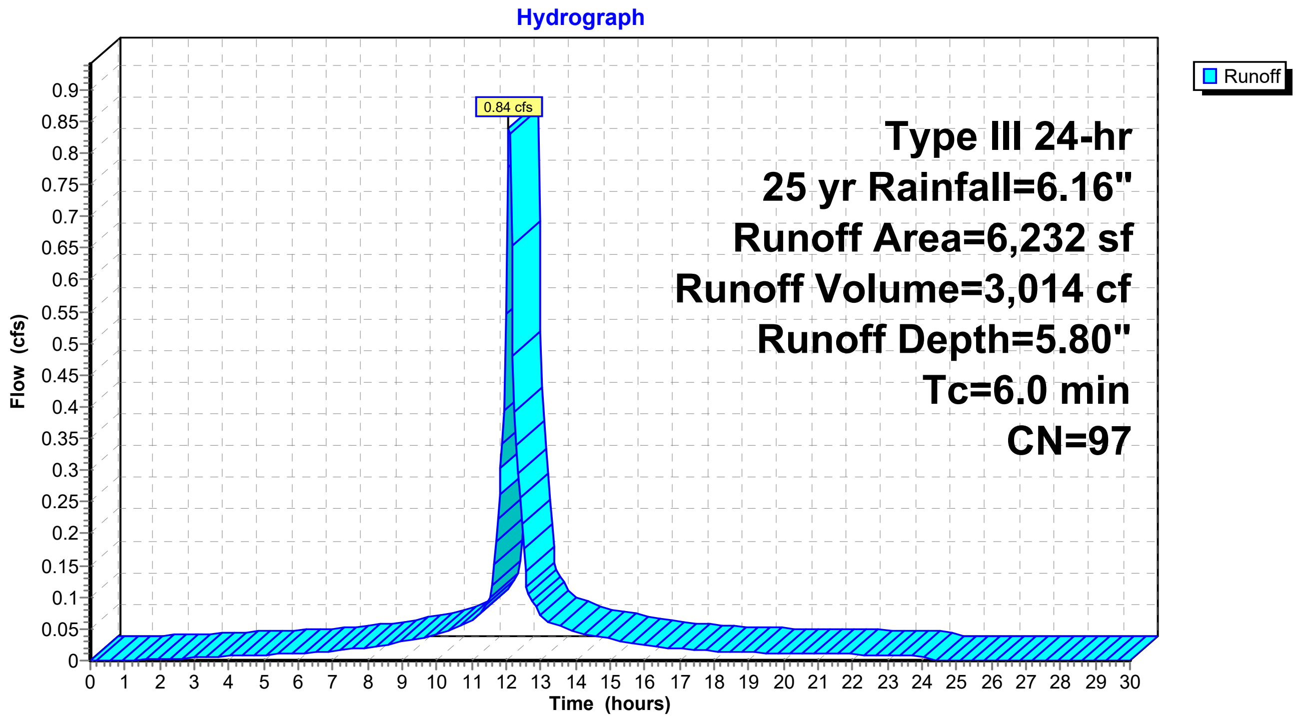
Runoff = 0.84 cfs @ 12.09 hrs, Volume= 3,014 cf, Depth= 5.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
6,067	98	Paved parking, HSG B
165	61	>75% Grass cover, Good, HSG B
6,232	97	Weighted Average
165		2.65% Pervious Area
6,067		97.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6B:



Summary for Subcatchment P-6C:

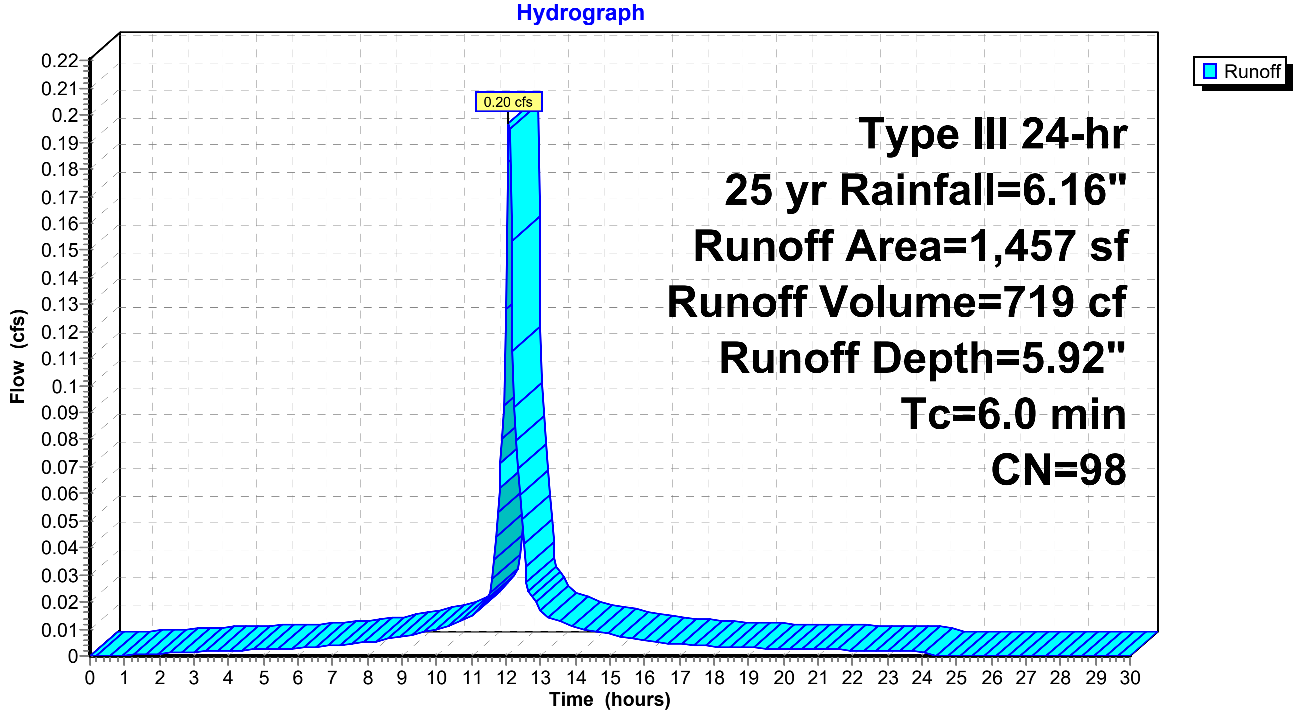
Runoff = 0.20 cfs @ 12.09 hrs, Volume= 719 cf, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
1,457	98	Paved parking, HSG B
1,457		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6C:



Summary for Subcatchment P-6D:

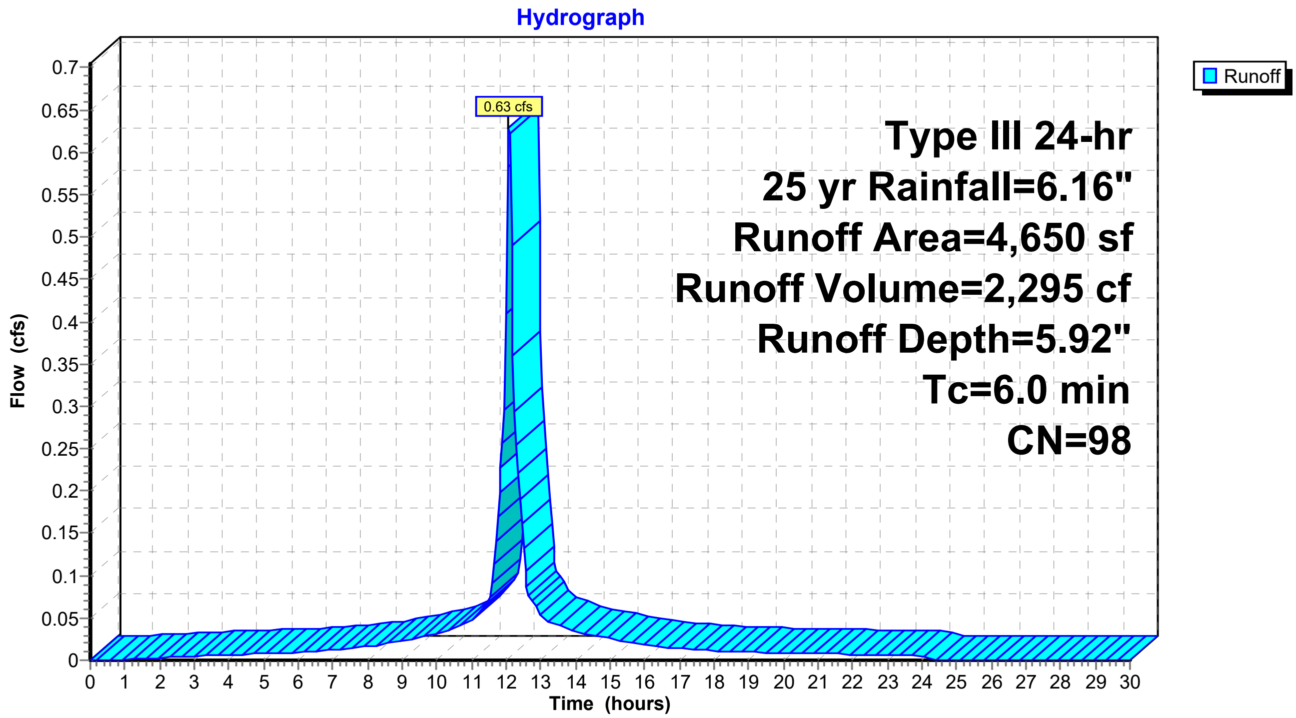
Runoff = 0.63 cfs @ 12.09 hrs, Volume= 2,295 cf, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
4,650	98	Paved parking, HSG B
4,650		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6D:



Summary for Subcatchment P-6E:

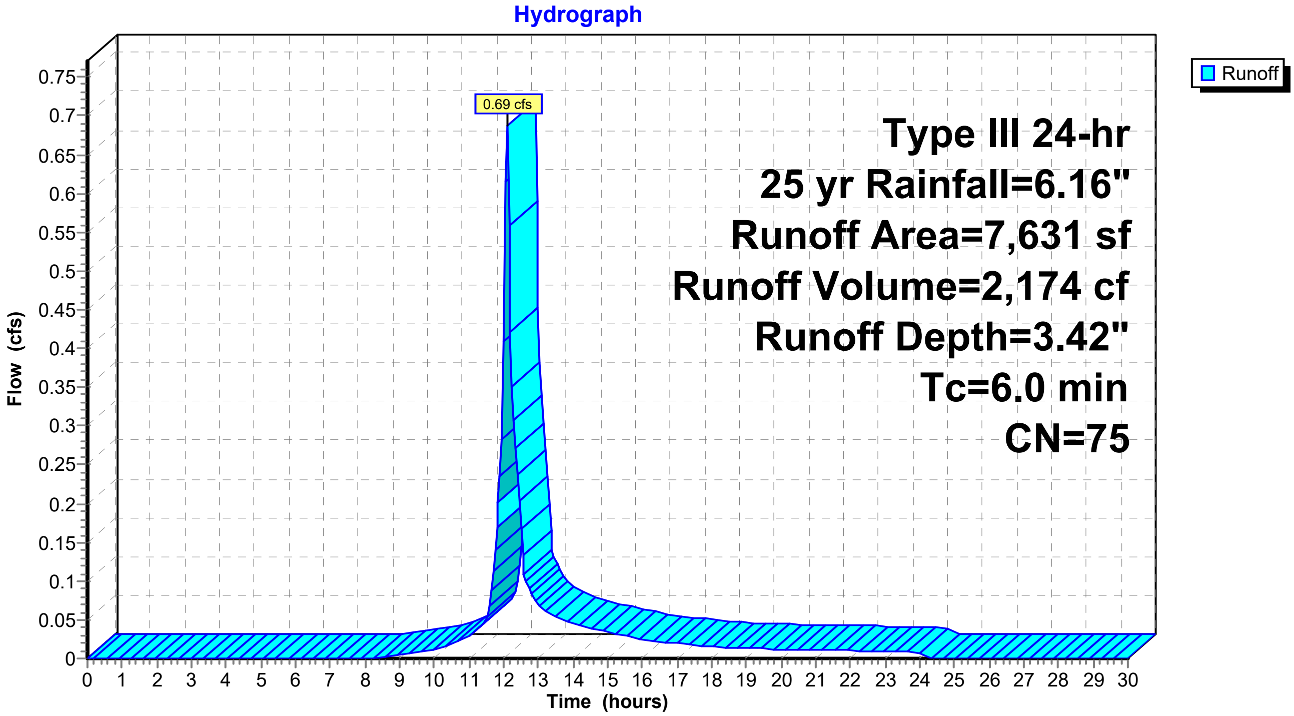
Runoff = 0.69 cfs @ 12.09 hrs, Volume= 2,174 cf, Depth= 3.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=6.16"

Area (sf)	CN	Description
2,794	98	Paved parking, HSG B
4,837	61	>75% Grass cover, Good, HSG B
7,631	75	Weighted Average
4,837		63.39% Pervious Area
2,794		36.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6E:



Summary for Pond CB1:

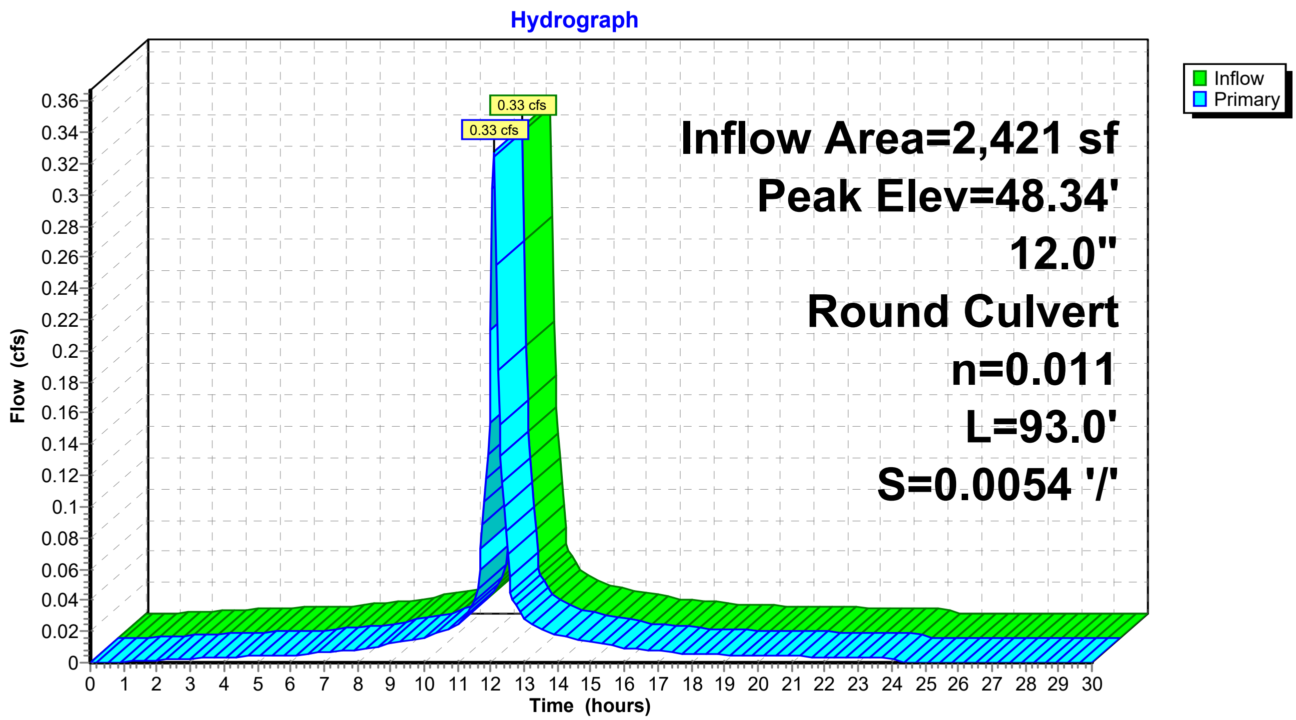
Inflow Area =	2,421 sf,100.00% Impervious,	Inflow Depth = 5.92"	for 25 yr event		
Inflow =	0.33 cfs @	12.09 hrs,	Volume=	1,195 cf	
Outflow =	0.33 cfs @	12.09 hrs,	Volume=	1,195 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.33 cfs @	12.09 hrs,	Volume=	1,195 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.34' @ 12.10 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 93.0' Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0054 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.29 cfs @ 12.09 hrs HW=48.34' TW=48.03' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.29 cfs @ 1.85 fps)

Pond CB1:



Summary for Pond CB10:

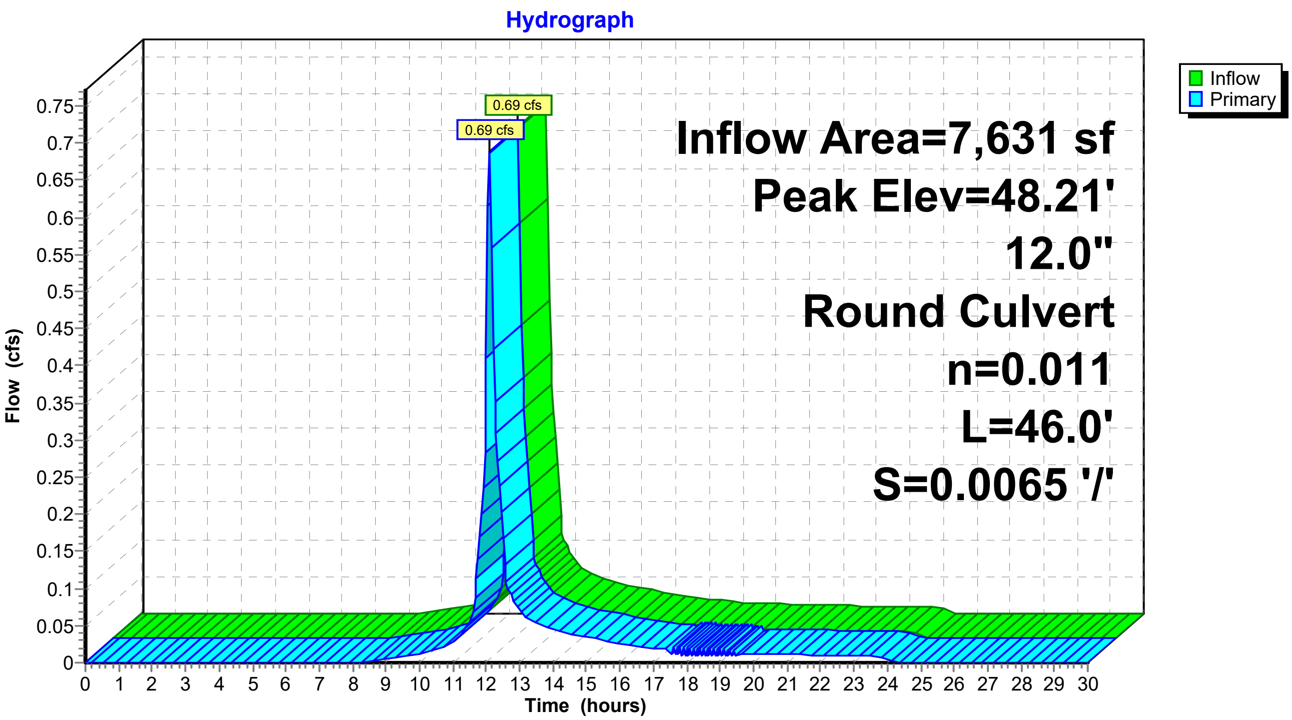
Inflow Area = 7,631 sf, 36.61% Impervious, Inflow Depth = 3.42" for 25 yr event
Inflow = 0.69 cfs @ 12.09 hrs, Volume= 2,174 cf
Outflow = 0.69 cfs @ 12.09 hrs, Volume= 2,173 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.69 cfs @ 12.09 hrs, Volume= 2,173 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.21' @ 12.14 hrs
Flood Elev= 49.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.30'	**12.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 46.30' / 46.00' S= 0.0065 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.07' TW=48.17' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond CB10:



Summary for Pond CB101:

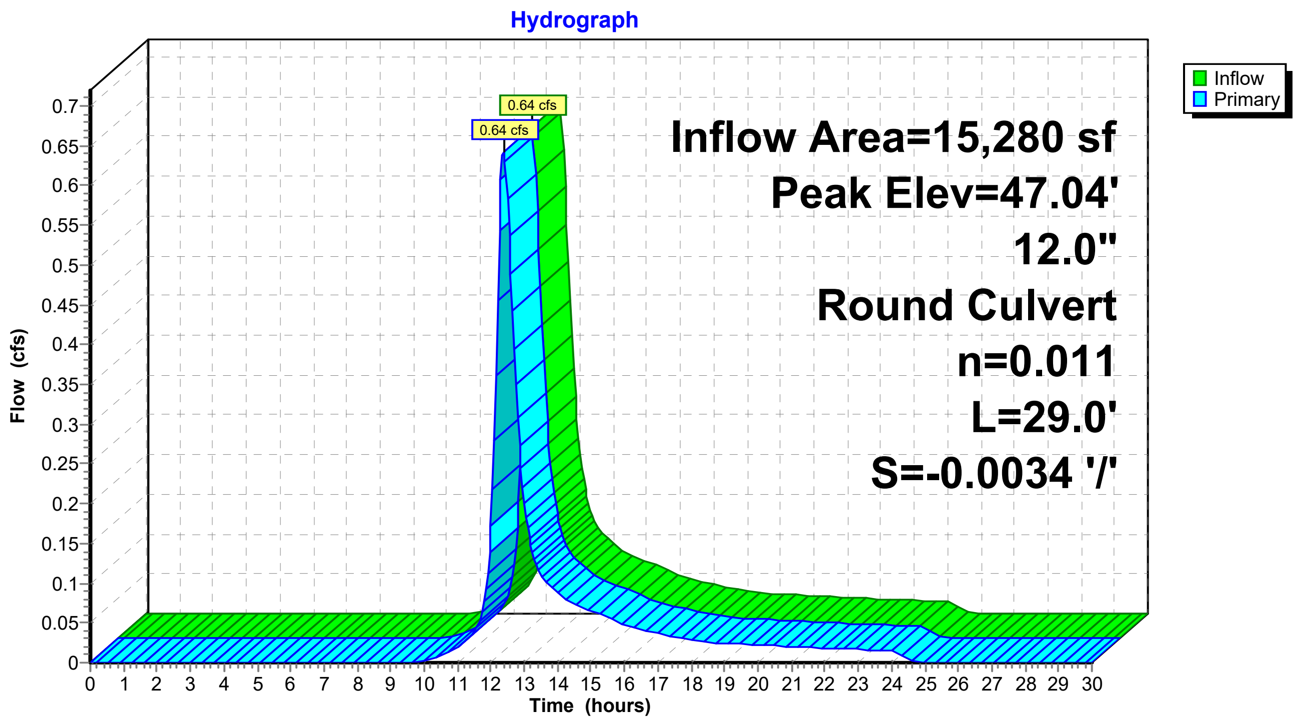
Inflow Area = 15,280 sf, 18.69% Impervious, Inflow Depth = 2.65" for 25 yr event
Inflow = 0.64 cfs @ 12.38 hrs, Volume= 3,376 cf
Outflow = 0.64 cfs @ 12.38 hrs, Volume= 3,376 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.64 cfs @ 12.38 hrs, Volume= 3,376 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.04' @ 12.21 hrs
Flood Elev= 49.06'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.50'	**12.0" Round Culvert** L= 29.0' Ke= 0.500 Inlet / Outlet Invert= 46.40' / 46.50' S= -0.0034 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.67 cfs @ 12.38 hrs HW=47.03' TW=46.91' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.67 cfs @ 1.84 fps)

Pond CB101:



Summary for Pond CB102:

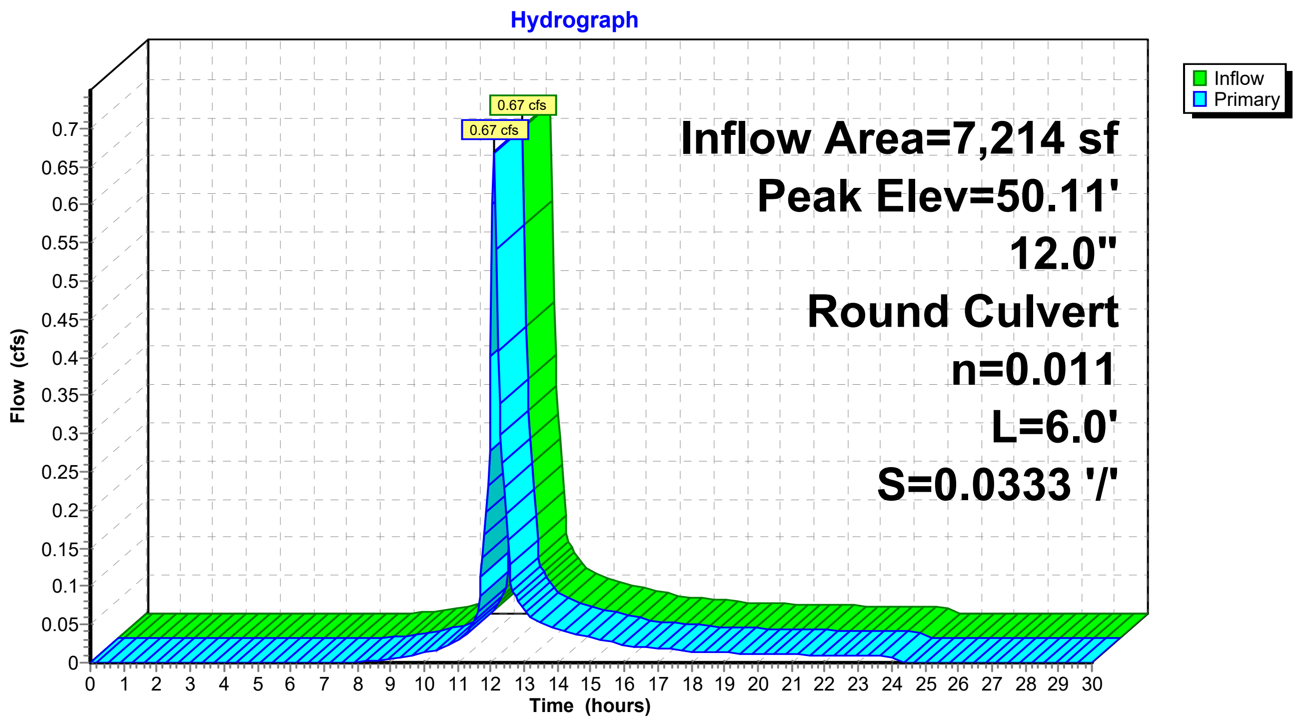
Inflow Area =	7,214 sf,	39.20% Impervious,	Inflow Depth = 3.52"	for 25 yr event	
Inflow =	0.67 cfs @	12.09 hrs,	Volume=	2,115 cf	
Outflow =	0.67 cfs @	12.09 hrs,	Volume=	2,115 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.67 cfs @	12.09 hrs,	Volume=	2,115 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 50.11' @ 12.09 hrs
Flood Elev= 49.07'

Device	Routing	Invert	Outlet Devices
#1	Primary	49.70'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 49.70' / 49.50' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.66 cfs @ 12.09 hrs HW=50.11' TW=46.95' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.66 cfs @ 2.18 fps)

Pond CB102:



Summary for Pond CB103:

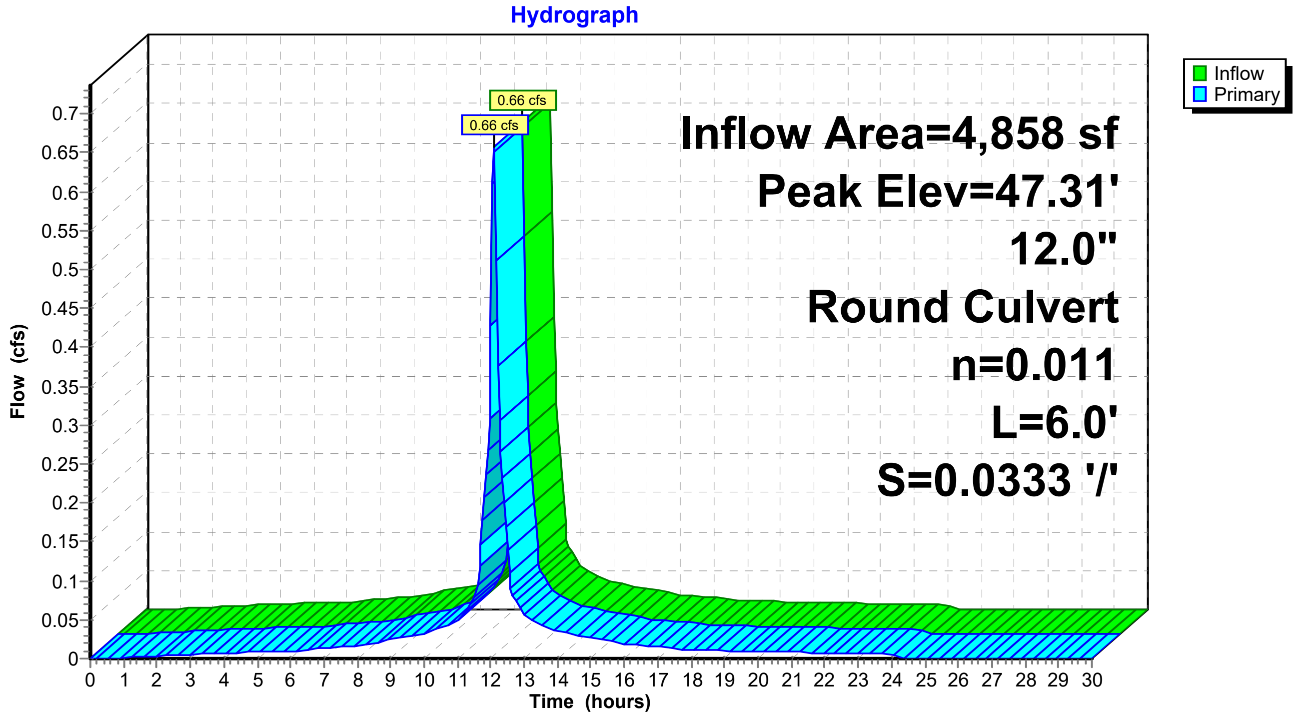
Inflow Area =	4,858 sf,	99.28% Impervious,	Inflow Depth = 5.92"	for 25 yr event	
Inflow =	0.66 cfs @	12.09 hrs,	Volume=	2,397 cf	
Outflow =	0.66 cfs @	12.09 hrs,	Volume=	2,397 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.66 cfs @	12.09 hrs,	Volume=	2,397 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.31' @ 12.09 hrs
Flood Elev= 49.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 46.90' / 46.70' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.63 cfs @ 12.09 hrs HW=47.30' TW=47.04' (Dynamic Tailwater)
└—**1=Culvert** (Outlet Controls 0.63 cfs @ 3.15 fps)

Pond CB103:



Summary for Pond CB104:

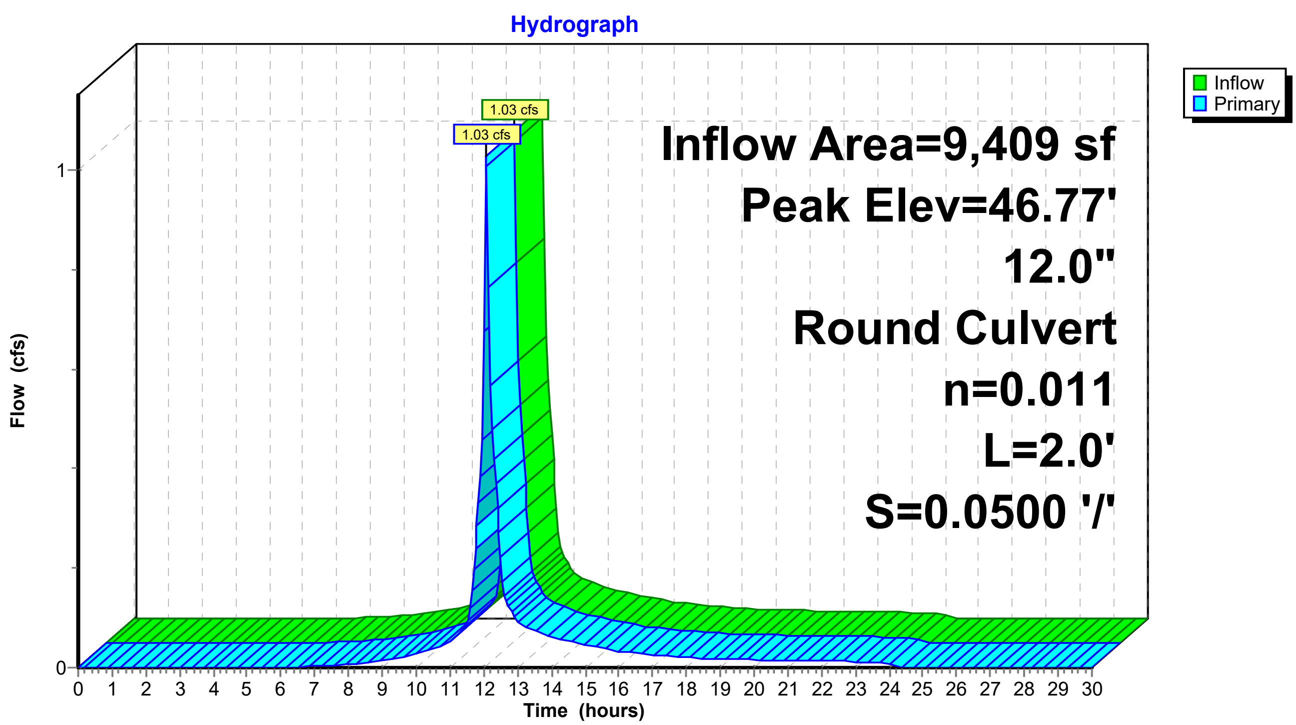
Inflow Area = 9,409 sf, 56.68% Impervious, Inflow Depth = 4.13" for 25 yr event
Inflow = 1.03 cfs @ 12.08 hrs, Volume= 3,242 cf
Outflow = 1.03 cfs @ 12.08 hrs, Volume= 3,242 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.03 cfs @ 12.08 hrs, Volume= 3,242 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.77' @ 12.08 hrs
Flood Elev= 48.93'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 2.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.10' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.00 cfs @ 12.08 hrs HW=46.76' TW=45.82' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 1.00 cfs @ 3.16 fps)

Pond CB104:



Summary for Pond CB2:

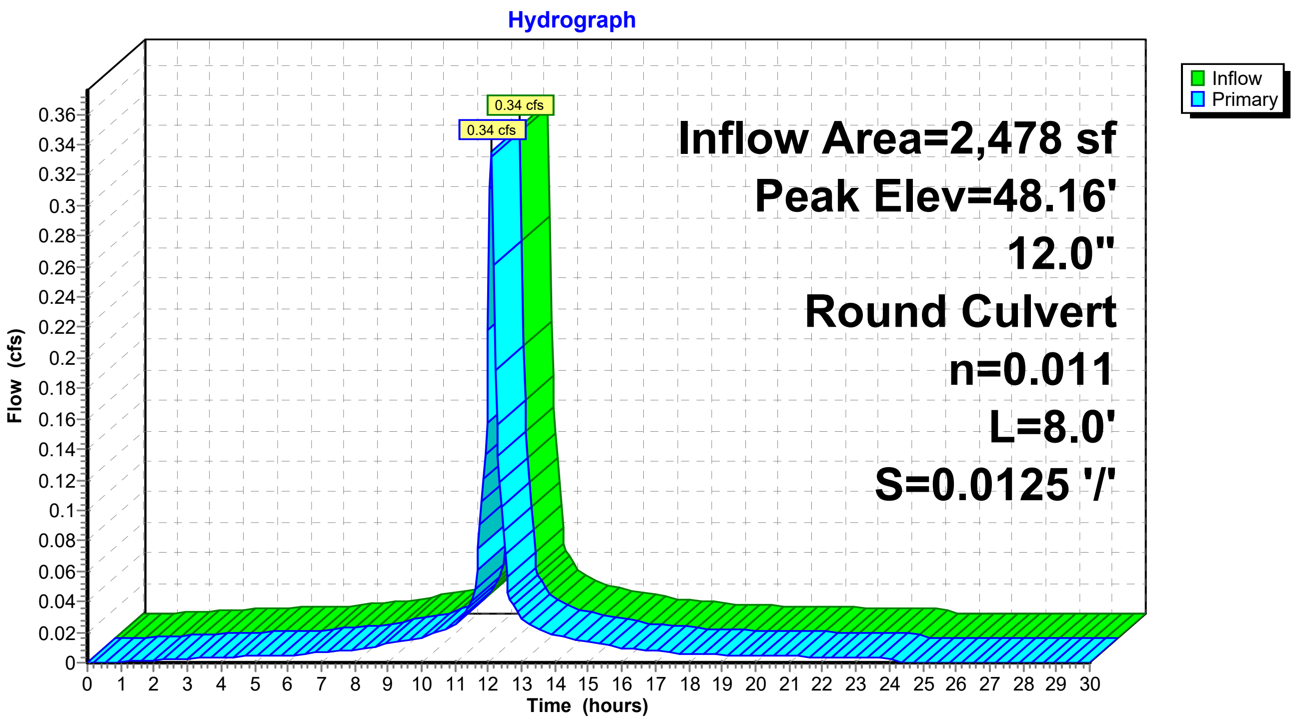
Inflow Area =	2,478 sf,100.00% Impervious,	Inflow Depth = 5.92"	for 25 yr event	
Inflow =	0.34 cfs @	12.09 hrs, Volume=	1,223 cf	
Outflow =	0.34 cfs @	12.09 hrs, Volume=	1,223 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.34 cfs @	12.09 hrs, Volume=	1,223 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.16' @ 12.23 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.60'	**12.0" Round Culvert** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 47.60' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.02' TW=48.03' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB2:



Summary for Pond CB3:

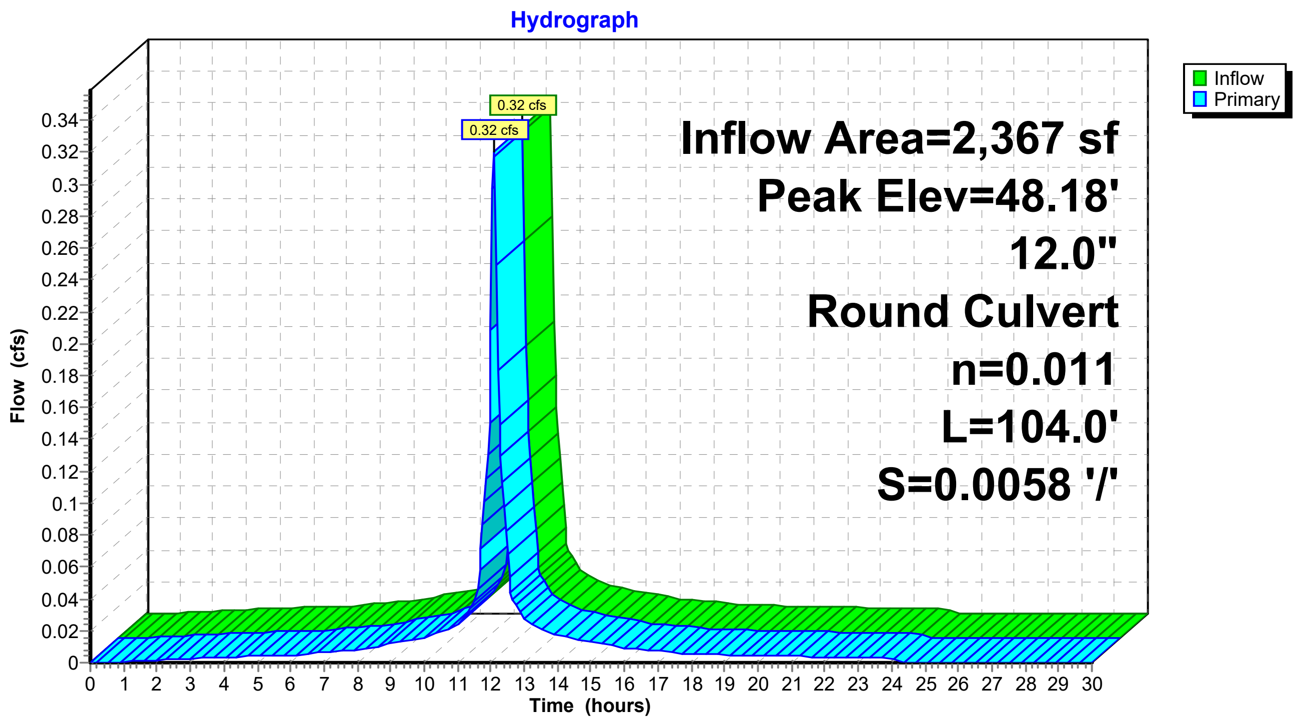
Inflow Area = 2,367 sf,100.00% Impervious, Inflow Depth = 5.92" for 25 yr event
Inflow = 0.32 cfs @ 12.09 hrs, Volume= 1,168 cf
Outflow = 0.32 cfs @ 12.09 hrs, Volume= 1,168 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 12.09 hrs, Volume= 1,168 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.18' @ 12.16 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.80'	**12.0" Round Culvert** L= 104.0' Ke= 0.500 Inlet / Outlet Invert= 47.80' / 47.20' S= 0.0058 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.24 cfs @ 12.09 hrs HW=48.16' TW=47.99' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.24 cfs @ 1.39 fps)

Pond CB3:

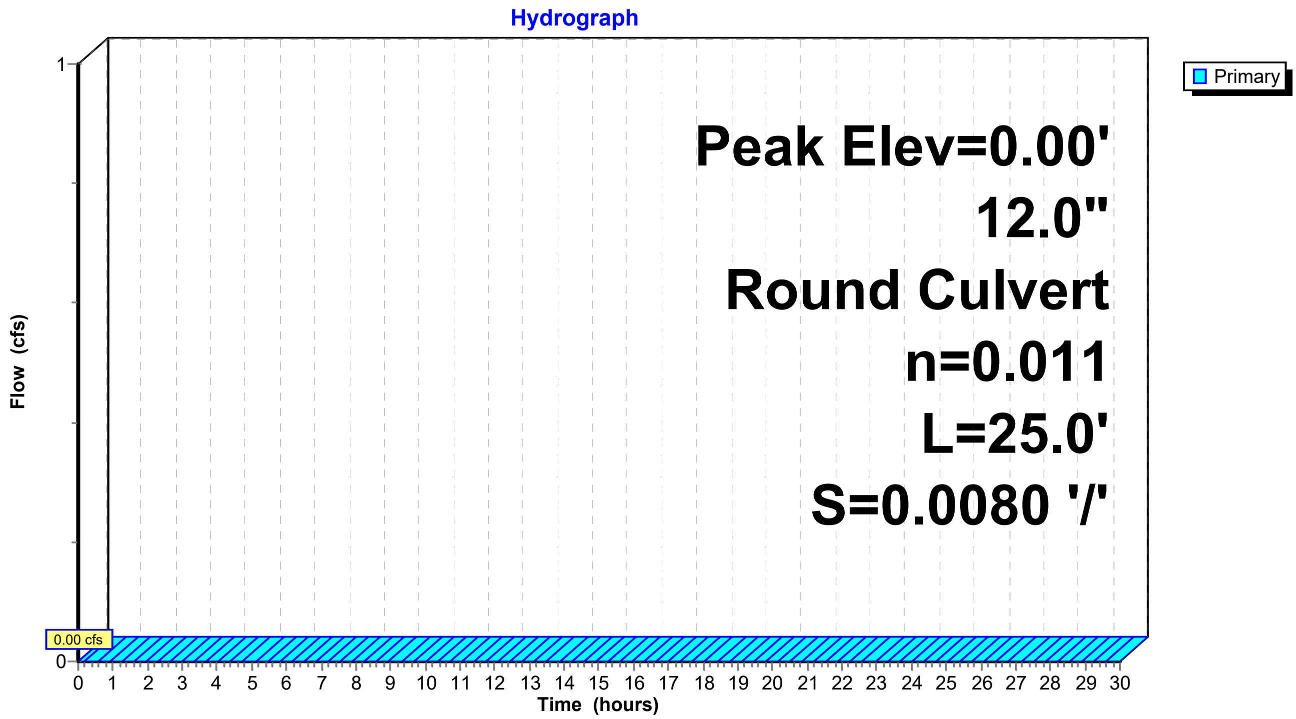


Summary for Pond CB4:

Device	Routing	Invert	Outlet Devices
#1	Primary	47.40'	**12.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 47.40' / 47.20' S= 0.0080 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=47.10' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB4:



Summary for Pond CB5:

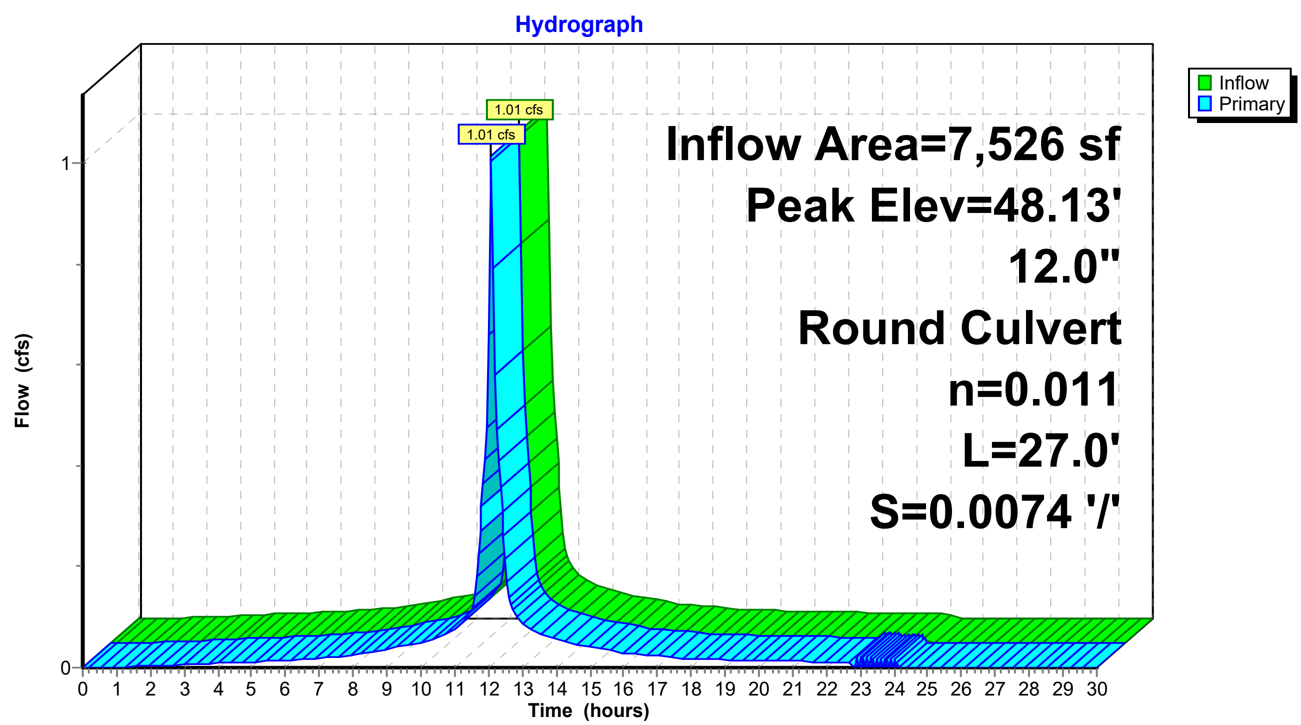
Inflow Area =	7,526 sf,	97.81% Impervious,	Inflow Depth = 5.80"	for 25 yr event	
Inflow =	1.01 cfs @	12.09 hrs,	Volume=	3,640 cf	
Outflow =	1.01 cfs @	12.09 hrs,	Volume=	3,640 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.01 cfs @	12.09 hrs,	Volume=	3,640 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.13' @ 12.14 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.00'	**12.0" Round Culvert** L= 27.0' Ke= 0.500 Inlet / Outlet Invert= 47.00' / 46.80' S= 0.0074 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.05' TW=48.07' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB5:



Summary for Pond CB6:

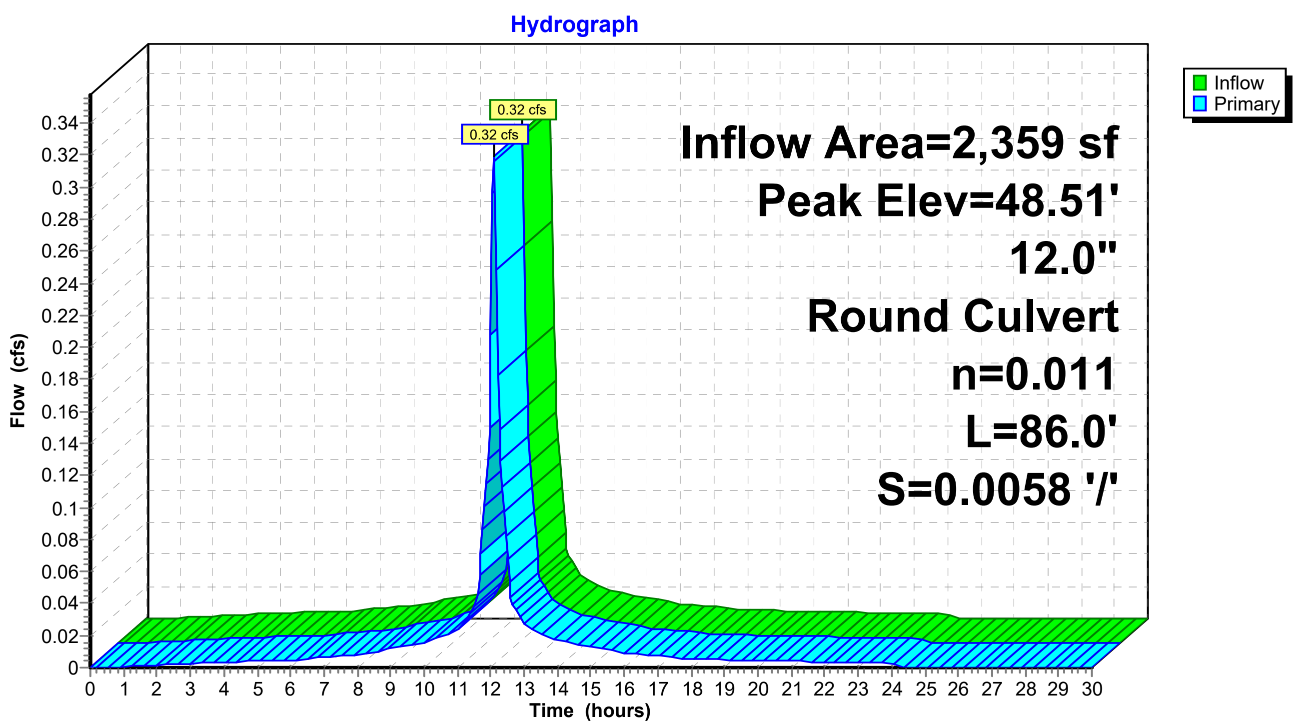
Inflow Area = 2,359 sf,100.00% Impervious, Inflow Depth = 5.92" for 25 yr event
Inflow = 0.32 cfs @ 12.09 hrs, Volume= 1,164 cf
Outflow = 0.32 cfs @ 12.09 hrs, Volume= 1,164 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 12.09 hrs, Volume= 1,164 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.51' @ 12.21 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 86.0' Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0058 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.19 cfs @ 12.09 hrs HW=48.37' TW=48.29' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.19 cfs @ 1.04 fps)

Pond CB6:



Summary for Pond CB7:

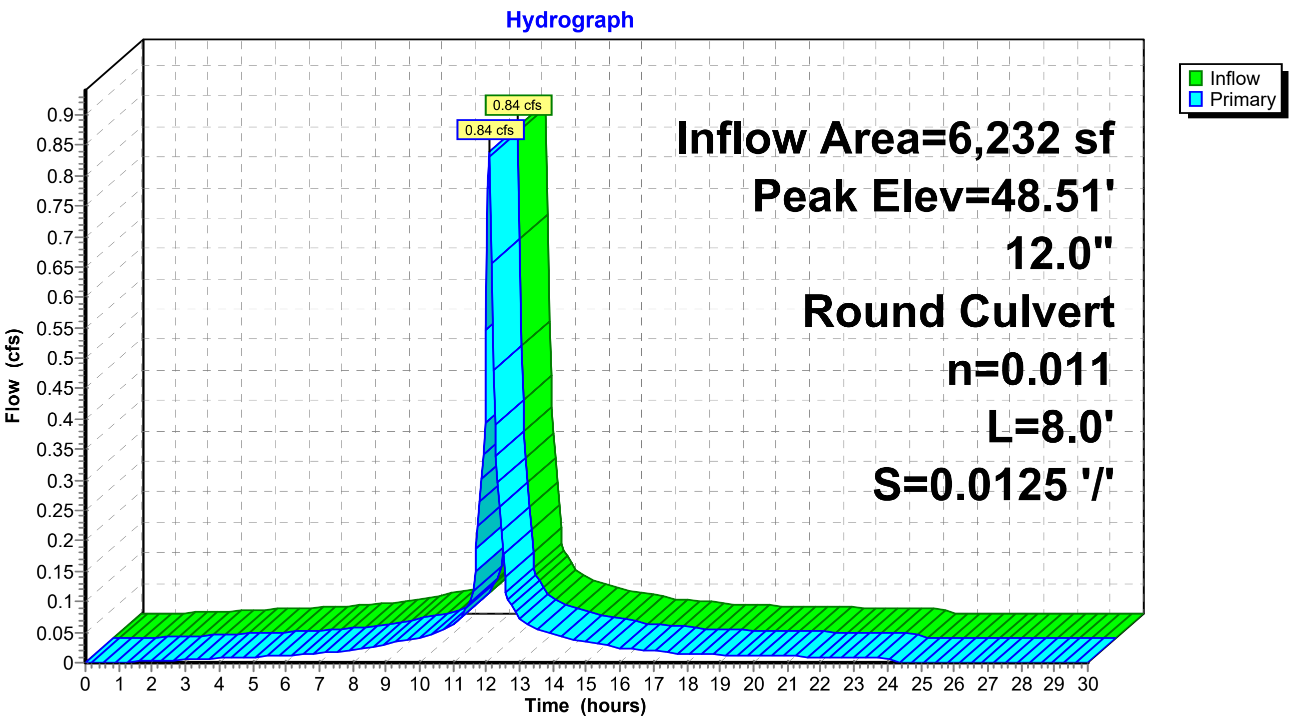
Inflow Area = 6,232 sf, 97.35% Impervious, Inflow Depth = 5.80" for 25 yr event
Inflow = 0.84 cfs @ 12.09 hrs, Volume= 3,014 cf
Outflow = 0.84 cfs @ 12.09 hrs, Volume= 3,014 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.84 cfs @ 12.09 hrs, Volume= 3,014 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.51' @ 12.21 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.60'	**12.0" Round Culvert** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 47.60' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.26' TW=48.29' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB7:



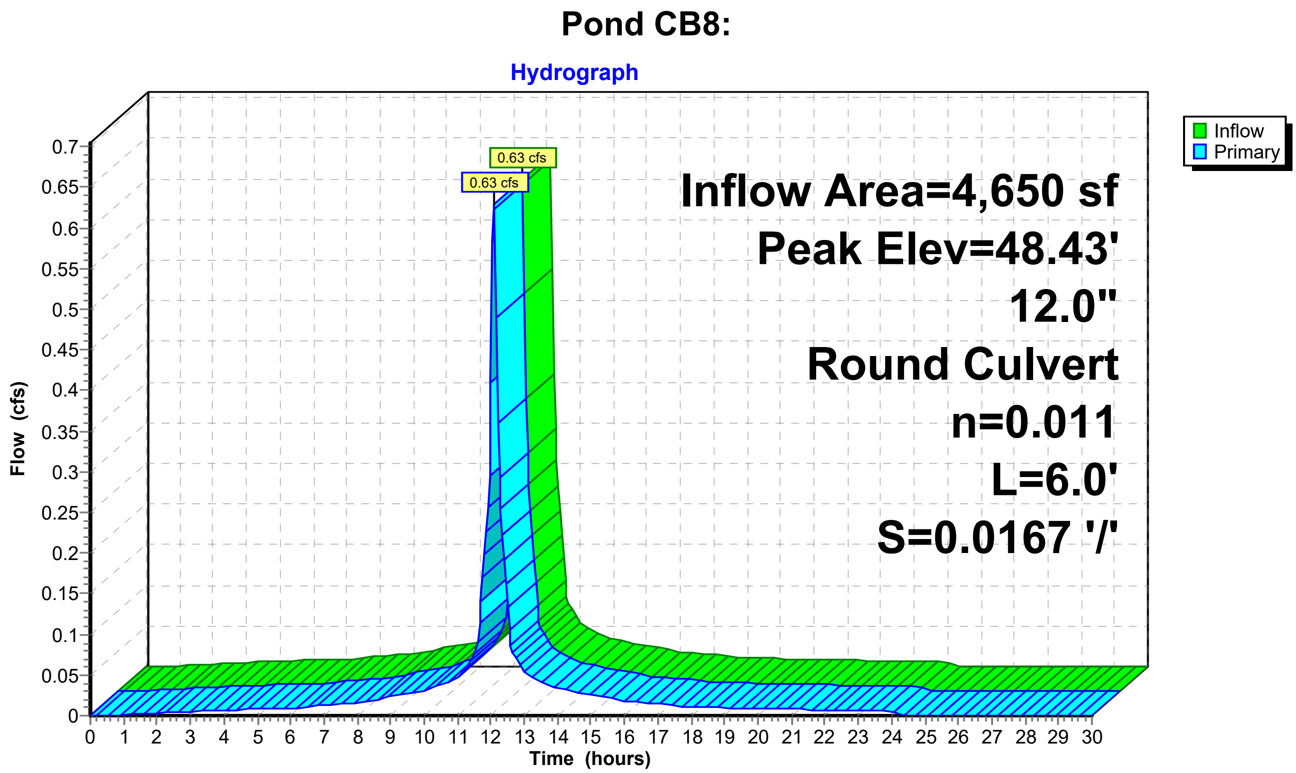
Summary for Pond CB8:

Inflow Area = 4,650 sf,100.00% Impervious, Inflow Depth = 5.92" for 25 yr event
Inflow = 0.63 cfs @ 12.09 hrs, Volume= 2,295 cf
Outflow = 0.63 cfs @ 12.09 hrs, Volume= 2,295 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.63 cfs @ 12.09 hrs, Volume= 2,295 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.43' @ 12.17 hrs
Flood Elev= 51.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.80'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 46.80' / 46.70' S= 0.0167 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.06' TW=48.31' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)



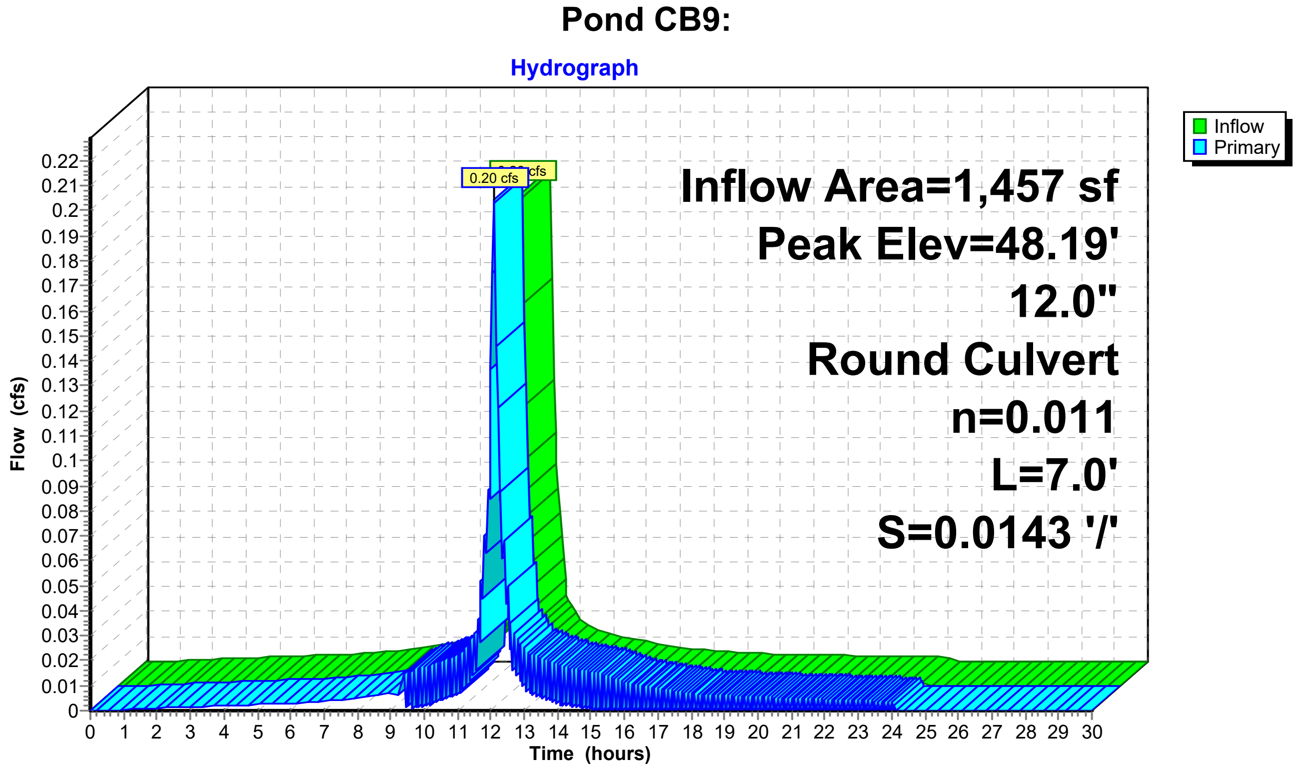
Summary for Pond CB9:

Inflow Area =	1,457 sf,100.00% Impervious,	Inflow Depth = 5.92"	for 25 yr event	
Inflow =	0.20 cfs @	12.09 hrs, Volume=	719 cf	
Outflow =	0.20 cfs @	12.09 hrs, Volume=	719 cf,	Atten= 0%, Lag= 0.3 min
Primary =	0.20 cfs @	12.09 hrs, Volume=	719 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.19' @ 12.15 hrs
Flood Elev= 50.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.10'	**12.0" Round Culvert** L= 7.0' Ke= 0.500 Inlet / Outlet Invert= 46.10' / 46.00' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.03' TW=48.17' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)



Summary for Pond DMH1:

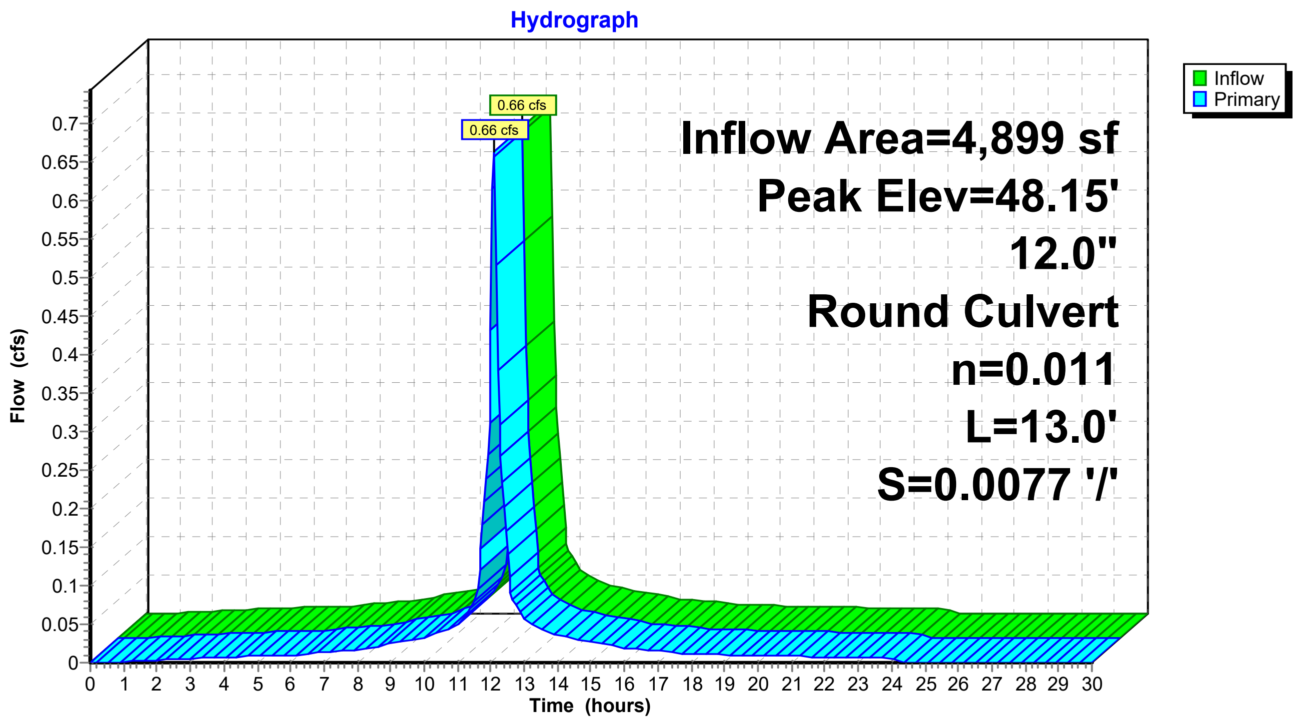
Inflow Area = 4,899 sf,100.00% Impervious, Inflow Depth = 5.92" for 25 yr event
Inflow = 0.66 cfs @ 12.09 hrs, Volume= 2,418 cf
Outflow = 0.66 cfs @ 12.09 hrs, Volume= 2,418 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.66 cfs @ 12.09 hrs, Volume= 2,418 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.15' @ 12.18 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.40'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 47.40' / 47.30' S= 0.0077 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.03' TW=48.05' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond DMH1:



Summary for Pond DMH101:

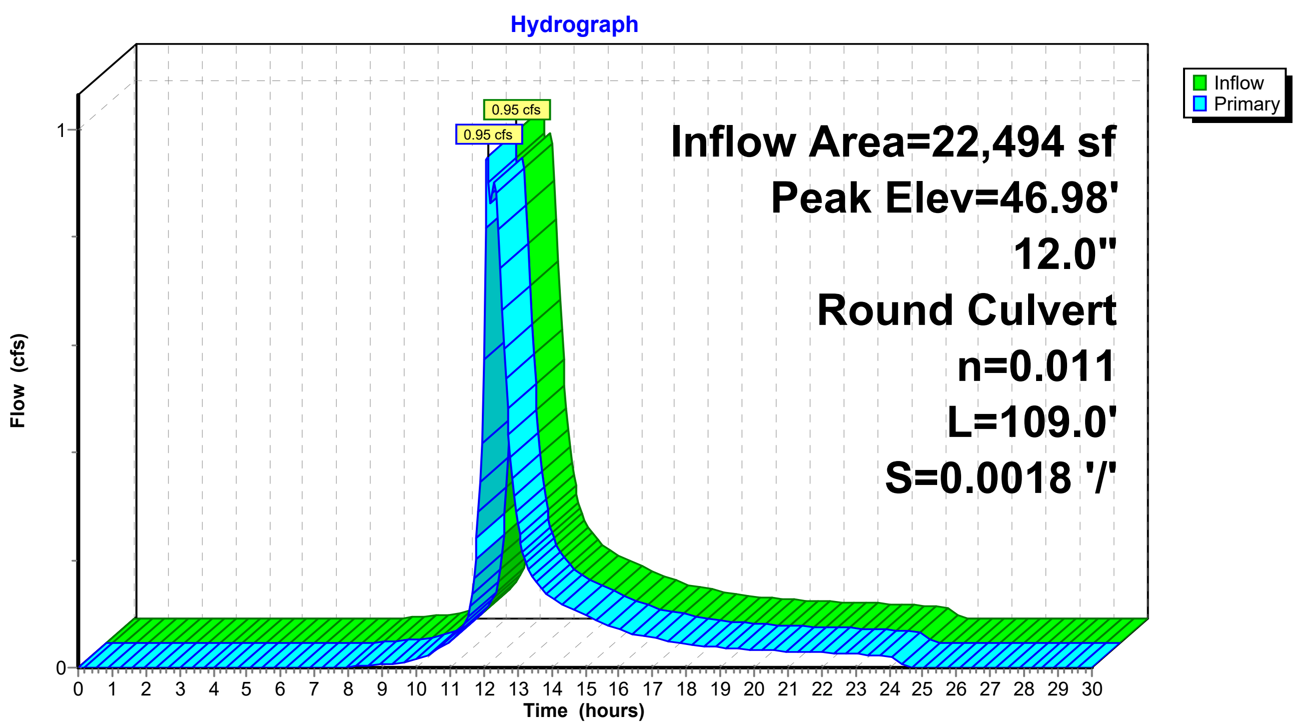
Inflow Area = 22,494 sf, 25.27% Impervious, Inflow Depth = 2.93" for 25 yr event
Inflow = 0.95 cfs @ 12.11 hrs, Volume= 5,491 cf
Outflow = 0.95 cfs @ 12.11 hrs, Volume= 5,491 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.95 cfs @ 12.11 hrs, Volume= 5,491 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.98' @ 12.14 hrs
Flood Elev= 49.94'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 109.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.00' S= 0.0018 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.89 cfs @ 12.11 hrs HW=46.97' TW=46.77' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.89 cfs @ 1.89 fps)

Pond DMH101:



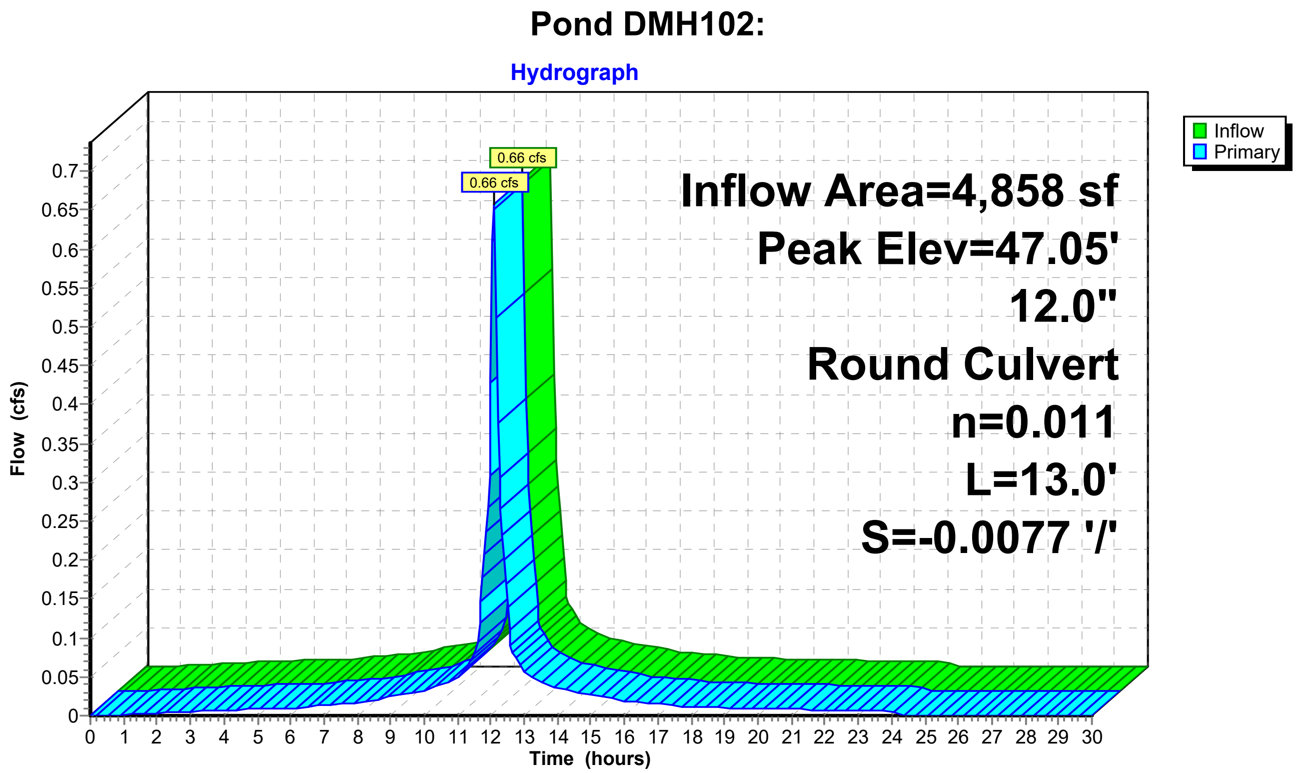
Summary for Pond DMH102:

Inflow Area =	4,858 sf,	99.28% Impervious,	Inflow Depth = 5.92"	for 25 yr event
Inflow =	0.66 cfs @	12.09 hrs, Volume=	2,397 cf	
Outflow =	0.66 cfs @	12.09 hrs, Volume=	2,397 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.66 cfs @	12.09 hrs, Volume=	2,397 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.05' @ 12.09 hrs
Flood Elev= 49.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.60'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 46.50' / 46.60' S= -0.0077 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.64 cfs @ 12.09 hrs HW=47.04' TW=46.77' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.64 cfs @ 2.16 fps)



Summary for Pond DMH103:

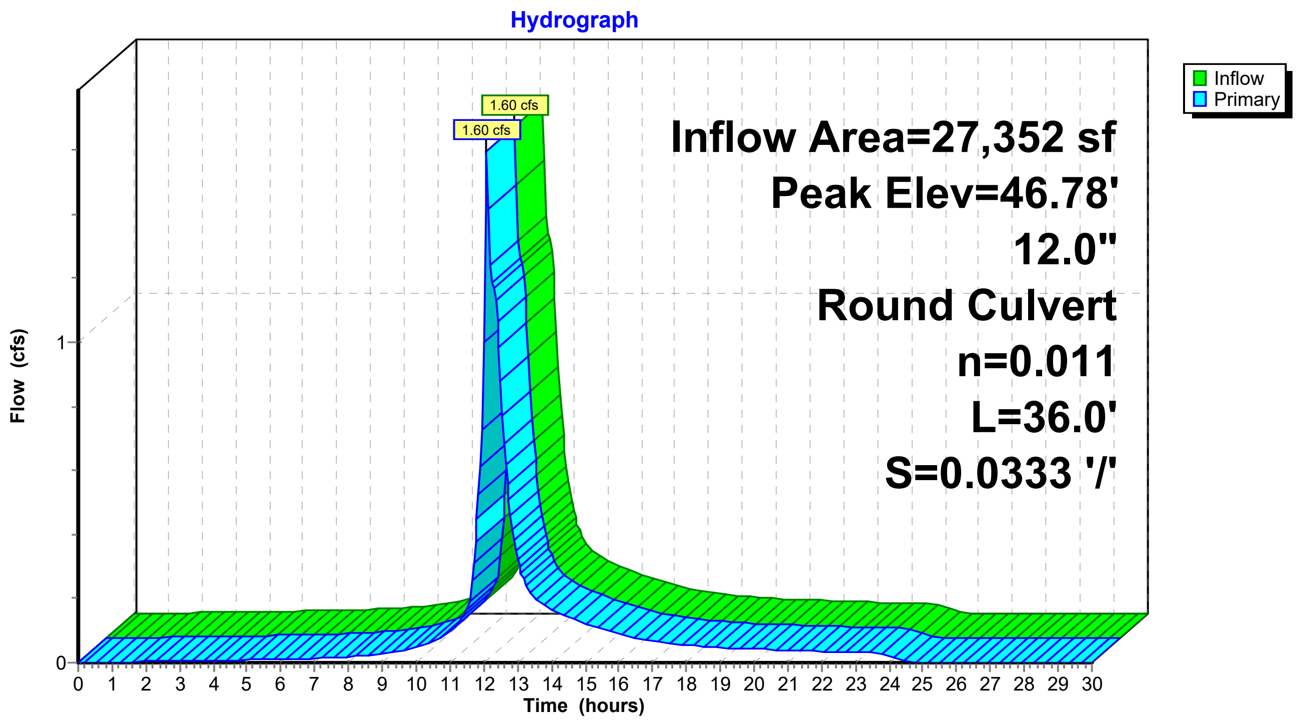
Inflow Area = 27,352 sf, 38.41% Impervious, Inflow Depth = 3.46" for 25 yr event
Inflow = 1.60 cfs @ 12.10 hrs, Volume= 7,889 cf
Outflow = 1.60 cfs @ 12.10 hrs, Volume= 7,889 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.60 cfs @ 12.10 hrs, Volume= 7,889 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.78' @ 12.10 hrs
Flood Elev= 50.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.10'	**12.0" Round Culvert** L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 46.10' / 44.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.59 cfs @ 12.10 hrs HW=46.78' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.59 cfs @ 2.81 fps)

Pond DMH103:



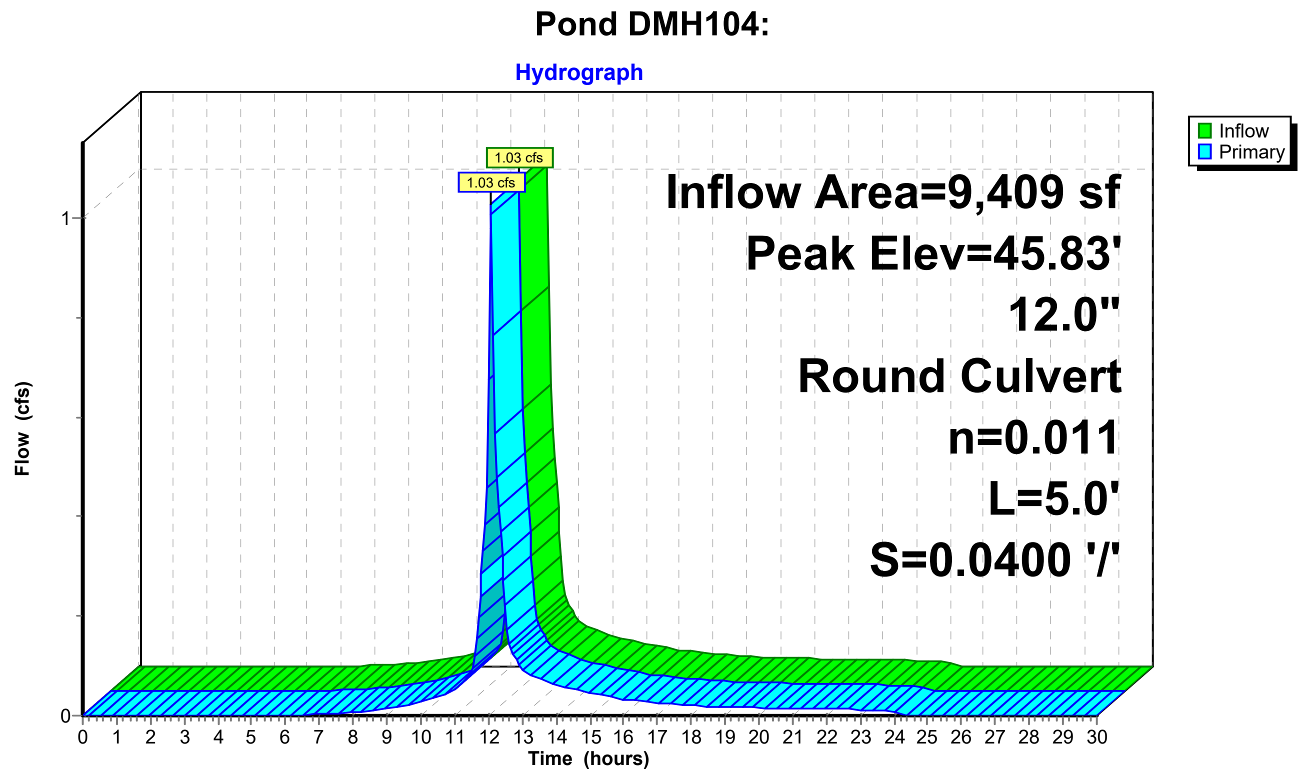
Summary for Pond DMH104:

Inflow Area =	9,409 sf,	56.68% Impervious,	Inflow Depth = 4.13"	for 25 yr event	
Inflow =	1.03 cfs @	12.08 hrs, Volume=	3,242 cf		
Outflow =	1.03 cfs @	12.08 hrs, Volume=	3,242 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	1.03 cfs @	12.08 hrs, Volume=	3,242 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 45.83' @ 12.08 hrs
Flood Elev= 49.08'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.30'	**12.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 45.30' / 45.10' S= 0.0400 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.00 cfs @ 12.08 hrs HW=45.82' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.00 cfs @ 2.44 fps)

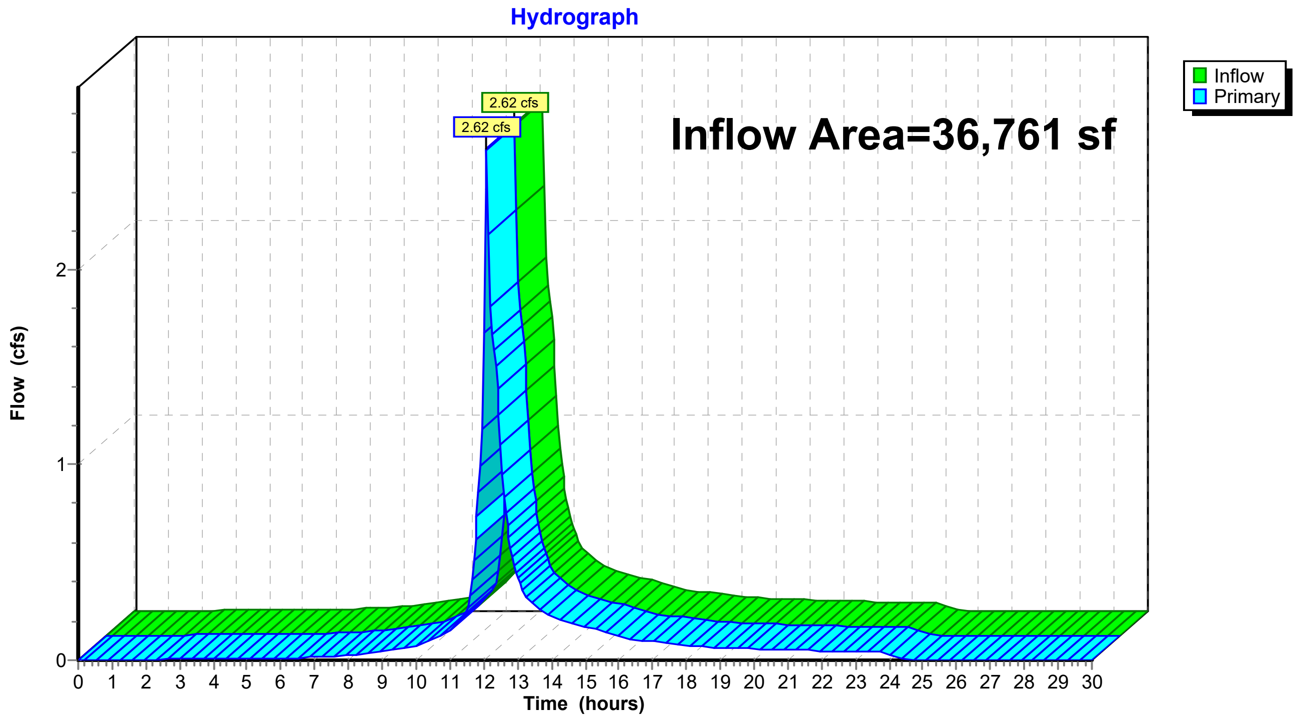


Summary for Pond DMH105:

Inflow Area = 36,761 sf, 43.09% Impervious, Inflow Depth = 3.63" for 25 yr event
Inflow = 2.62 cfs @ 12.09 hrs, Volume= 11,130 cf
Primary = 2.62 cfs @ 12.09 hrs, Volume= 11,130 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond DMH105:



Summary for Pond DMH2:

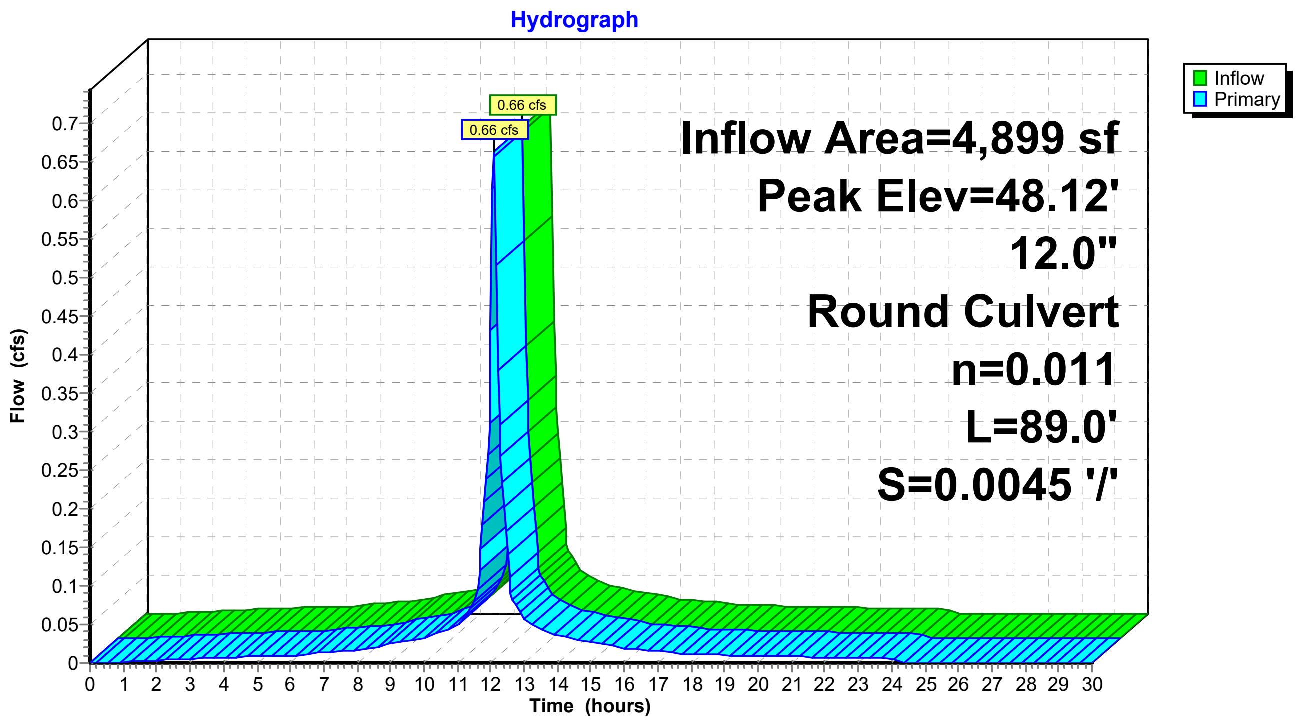
Inflow Area = 4,899 sf,100.00% Impervious, Inflow Depth = 5.92" for 25 yr event
Inflow = 0.66 cfs @ 12.09 hrs, Volume= 2,418 cf
Outflow = 0.66 cfs @ 12.09 hrs, Volume= 2,418 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.66 cfs @ 12.09 hrs, Volume= 2,418 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.12' @ 12.14 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.20'	**12.0" Round Culvert** L= 89.0' Ke= 0.500 Inlet / Outlet Invert= 47.20' / 46.80' S= 0.0045 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.05' TW=48.07' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond DMH2:



Summary for Pond DMH3:

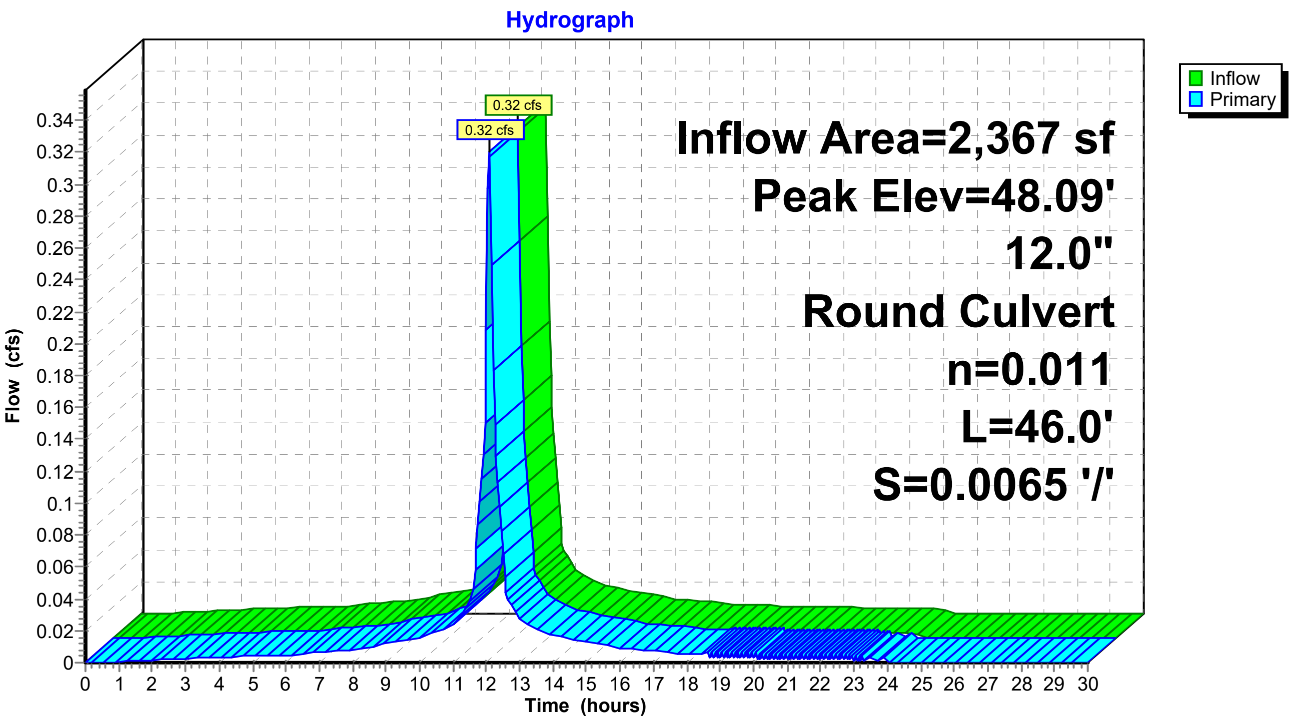
Inflow Area =	2,367 sf,100.00% Impervious,	Inflow Depth = 5.92"	for 25 yr event		
Inflow =	0.32 cfs @	12.09 hrs,	Volume=	1,168 cf	
Outflow =	0.32 cfs @	12.09 hrs,	Volume=	1,168 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.32 cfs @	12.09 hrs,	Volume=	1,168 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.09' @ 12.15 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.10'	**12.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 47.10' / 46.80' S= 0.0065 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=47.99' TW=48.07' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond DMH3:



Summary for Pond DMH4:

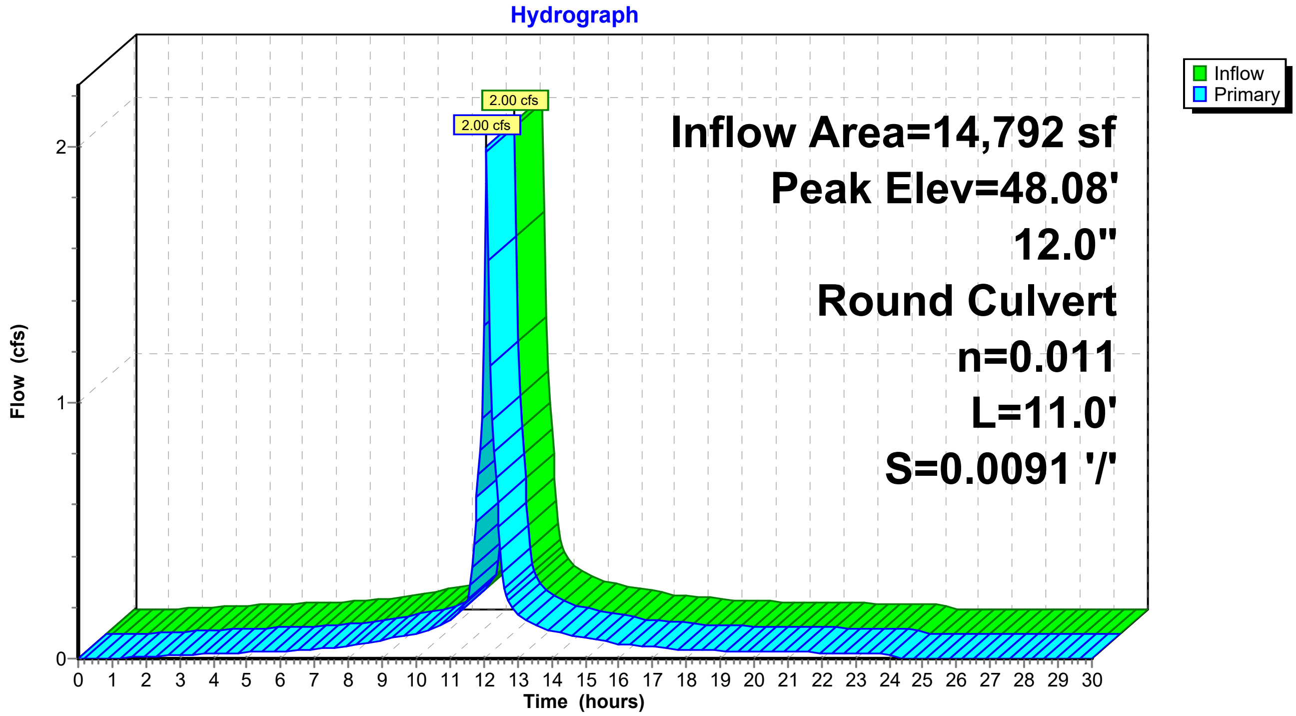
Inflow Area = 14,792 sf, 98.88% Impervious, Inflow Depth = 5.86" for 25 yr event
Inflow = 2.00 cfs @ 12.09 hrs, Volume= 7,225 cf
Outflow = 2.00 cfs @ 12.09 hrs, Volume= 7,225 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.00 cfs @ 12.09 hrs, Volume= 7,225 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.08' @ 12.10 hrs
Flood Elev= 50.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.70'	**12.0" Round Culvert** L= 11.0' Ke= 0.500 Inlet / Outlet Invert= 46.70' / 46.60' S= 0.0091 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.85 cfs @ 12.09 hrs HW=48.07' TW=47.83' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.85 cfs @ 2.35 fps)

Pond DMH4:



Summary for Pond DMH5:

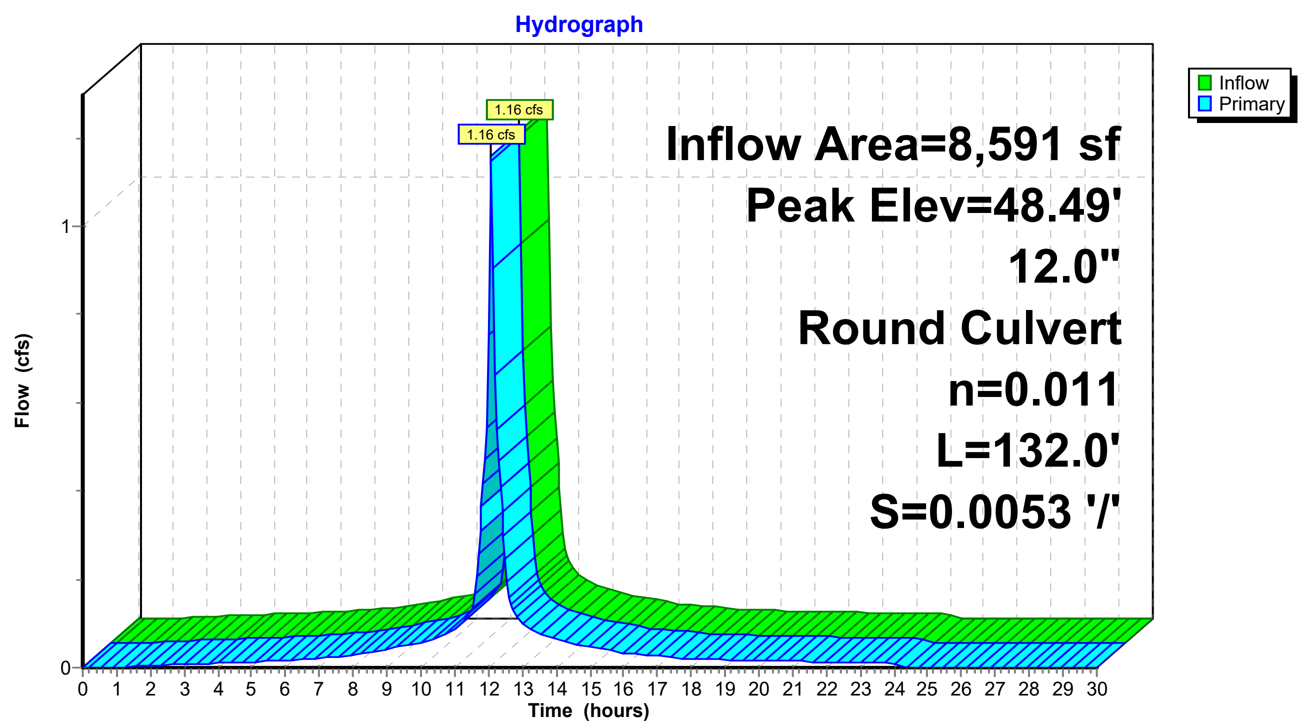
Inflow Area =	8,591 sf,	98.08% Impervious,	Inflow Depth = 5.84"	for 25 yr event
Inflow =	1.16 cfs @	12.09 hrs, Volume=	4,178 cf	
Outflow =	1.16 cfs @	12.09 hrs, Volume=	4,178 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.16 cfs @	12.09 hrs, Volume=	4,178 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.49' @ 12.16 hrs
Flood Elev= 52.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.40'	**12.0" Round Culvert** L= 132.0' Ke= 0.500 Inlet / Outlet Invert= 47.40' / 46.70' S= 0.0053 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.29' TW=48.31' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond DMH5:



Summary for Pond DMH6:

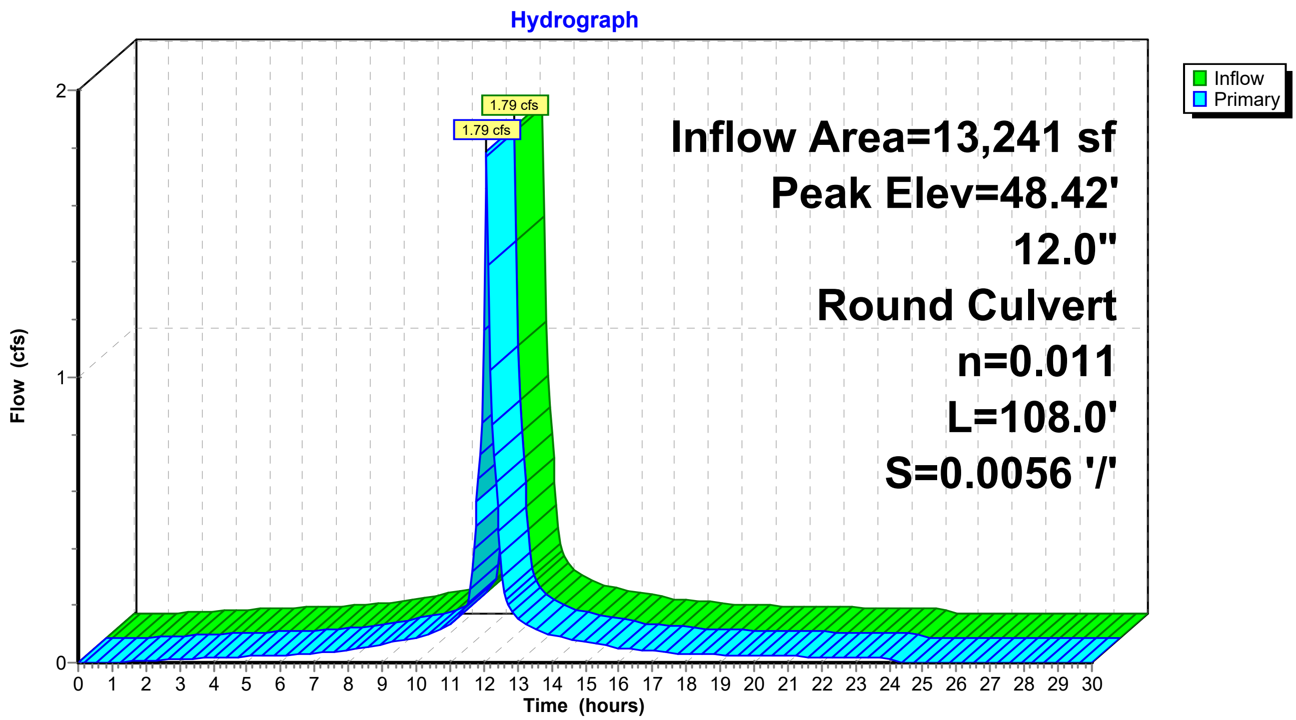
Inflow Area = 13,241 sf, 98.75% Impervious, Inflow Depth = 5.87" for 25 yr event
Inflow = 1.79 cfs @ 12.09 hrs, Volume= 6,473 cf
Outflow = 1.79 cfs @ 12.09 hrs, Volume= 6,473 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.79 cfs @ 12.09 hrs, Volume= 6,473 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.42' @ 12.12 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.60'	**12.0" Round Culvert** L= 108.0' Ke= 0.500 Inlet / Outlet Invert= 46.60' / 46.00' S= 0.0056 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.23 cfs @ 12.09 hrs HW=48.31' TW=48.16' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.23 cfs @ 1.57 fps)

Pond DMH6:



Summary for Pond DMH7:

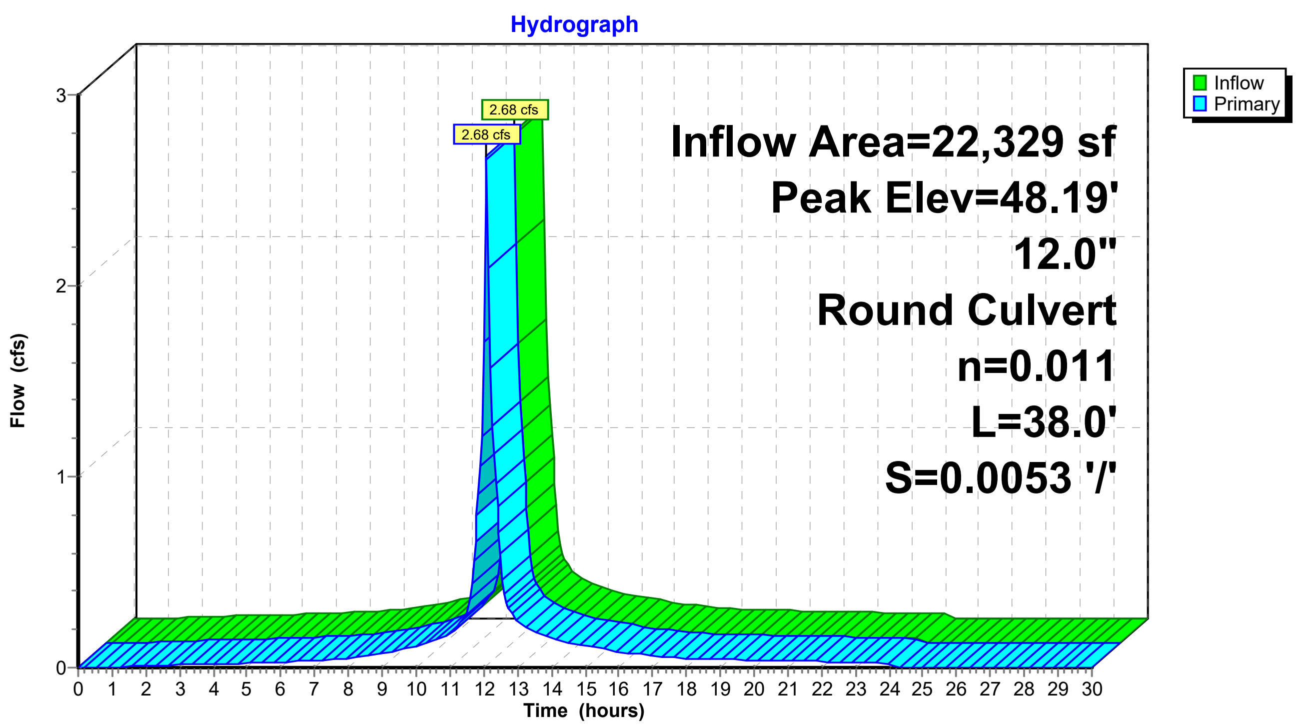
Inflow Area = 22,329 sf, 77.60% Impervious, Inflow Depth = 5.03" for 25 yr event
Inflow = 2.68 cfs @ 12.09 hrs, Volume= 9,365 cf
Outflow = 2.68 cfs @ 12.09 hrs, Volume= 9,365 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.68 cfs @ 12.09 hrs, Volume= 9,365 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.19' @ 12.10 hrs
Flood Elev= 51.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.90'	**12.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 45.90' / 45.70' S= 0.0053 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.52 cfs @ 12.09 hrs HW=48.16' TW=47.72' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.52 cfs @ 3.21 fps)

Pond DMH7:



Summary for Pond Pd1: Infiltration Basin

Inflow Area = 150,987 sf, 41.38% Impervious, Inflow Depth = 3.33" for 25 yr event
Inflow = 9.96 cfs @ 12.11 hrs, Volume= 41,924 cf
Outflow = 2.87 cfs @ 12.62 hrs, Volume= 41,952 cf, Atten= 71%, Lag= 30.5 min
Discarded = 2.87 cfs @ 12.62 hrs, Volume= 41,952 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.51' @ 12.62 hrs Surf.Area= 18,040 sf Storage= 8,806 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 17.3 min (829.5 - 812.1)

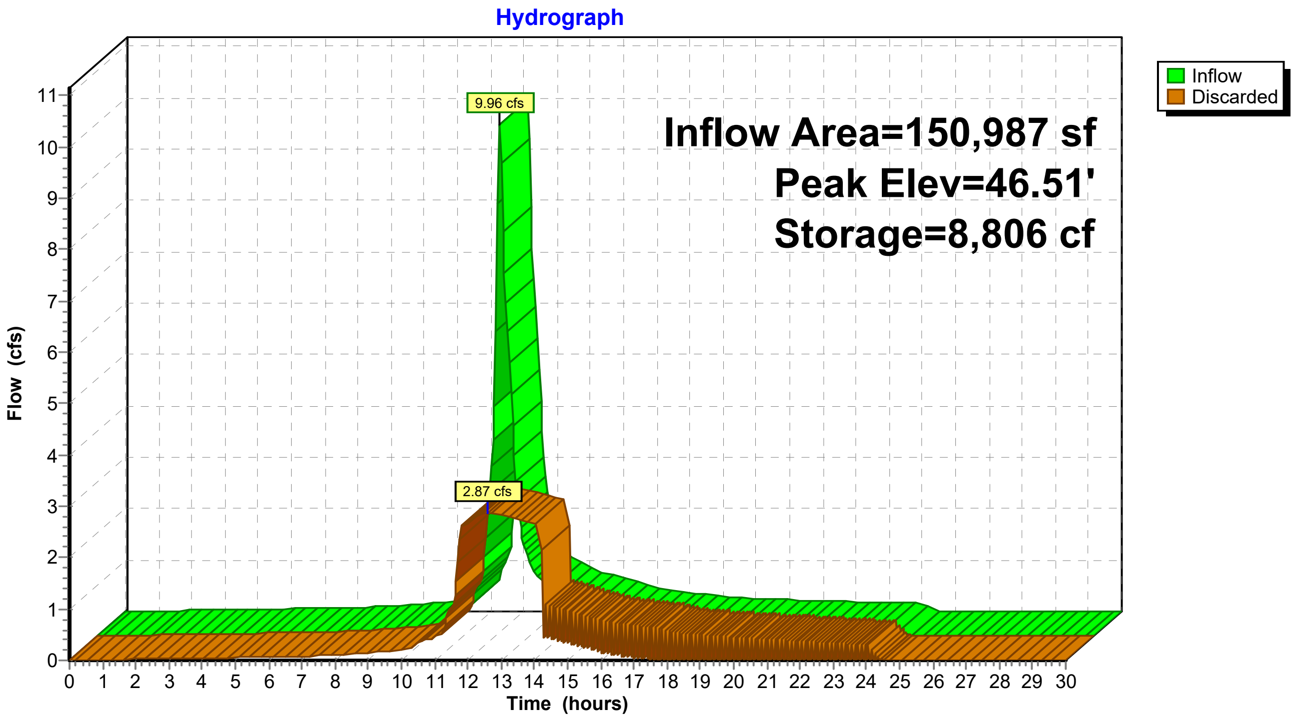
Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	70,036 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.00	16,566	726.0	0	0	16,566
47.00	19,520	751.0	18,023	18,023	19,596
48.00	25,598	1,033.0	22,490	40,513	59,640
49.00	33,630	1,171.0	29,523	70,036	83,869

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.00'	**6.875 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.87 cfs @ 12.62 hrs HW=46.51' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 2.87 cfs)

Pond Pd1: Infiltration Basin



Summary for Pond SF1: Sediment Forebay

Inflow Area = 14,792 sf, 98.88% Impervious, Inflow Depth = 5.86" for 25 yr event
Inflow = 2.00 cfs @ 12.09 hrs, Volume= 7,225 cf
Outflow = 1.93 cfs @ 12.11 hrs, Volume= 5,990 cf, Atten= 3%, Lag= 1.4 min
Primary = 1.93 cfs @ 12.11 hrs, Volume= 5,990 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.83' @ 12.11 hrs Surf.Area= 1,336 sf Storage= 1,471 cf

Plug-Flow detention time= 134.0 min calculated for 5,990 cf (83% of inflow)
Center-of-Mass det. time= 63.6 min (811.8 - 748.2)

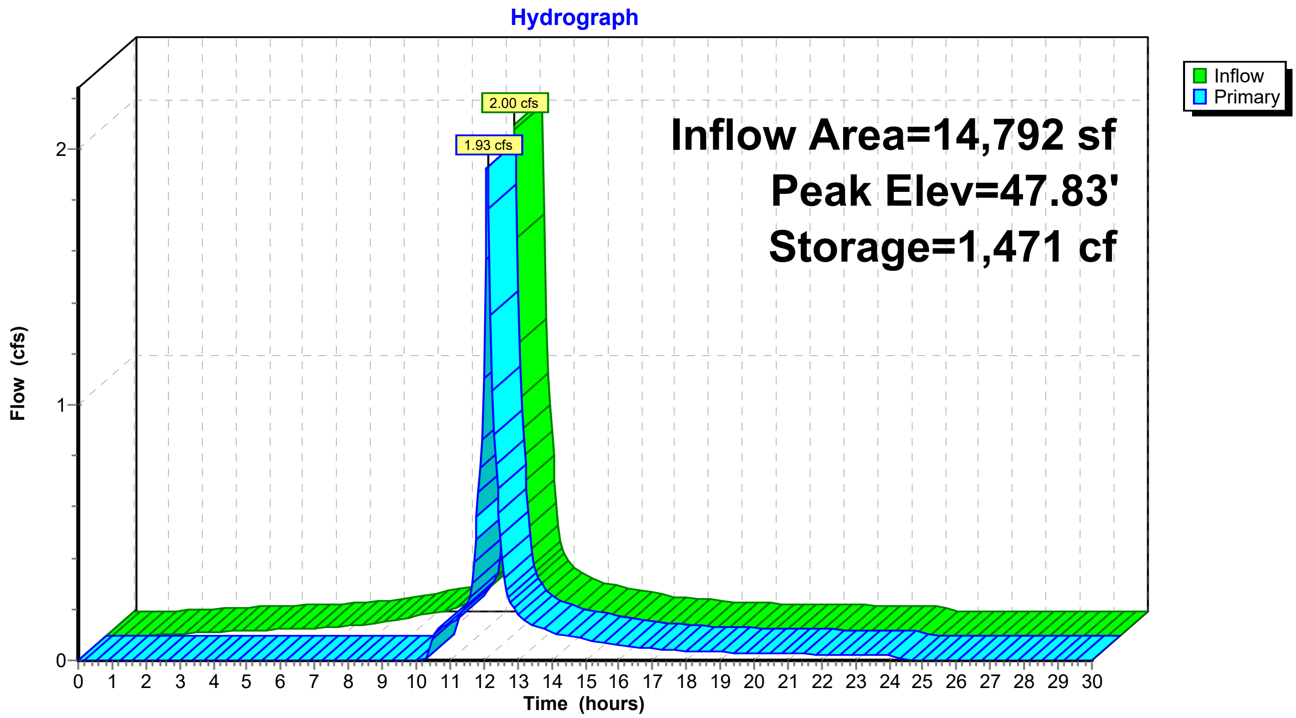
Volume	Invert	Avail.Storage	Storage Description
#1	46.20'	1,701 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.20	519	101.0	0	0	519
47.00	880	125.0	553	553	960
48.00	1,438	154.0	1,148	1,701	1,619

Device	Routing	Invert	Outlet Devices
#1	Primary	47.65'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=1.89 cfs @ 12.11 hrs HW=47.83' TW=46.19' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.89 cfs @ 1.04 fps)

Pond SF1: Sediment Forebay



Summary for Pond SF2: Sediment Forebay

Inflow Area = 22,329 sf, 77.60% Impervious, Inflow Depth = 5.03" for 25 yr event
Inflow = 2.68 cfs @ 12.09 hrs, Volume= 9,365 cf
Outflow = 2.60 cfs @ 12.11 hrs, Volume= 7,560 cf, Atten= 3%, Lag= 1.3 min
Primary = 2.60 cfs @ 12.11 hrs, Volume= 7,560 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.72' @ 12.11 hrs Surf.Area= 1,393 sf Storage= 2,103 cf

Plug-Flow detention time= 139.4 min calculated for 7,560 cf (81% of inflow)
Center-of-Mass det. time= 63.2 min (828.8 - 765.7)

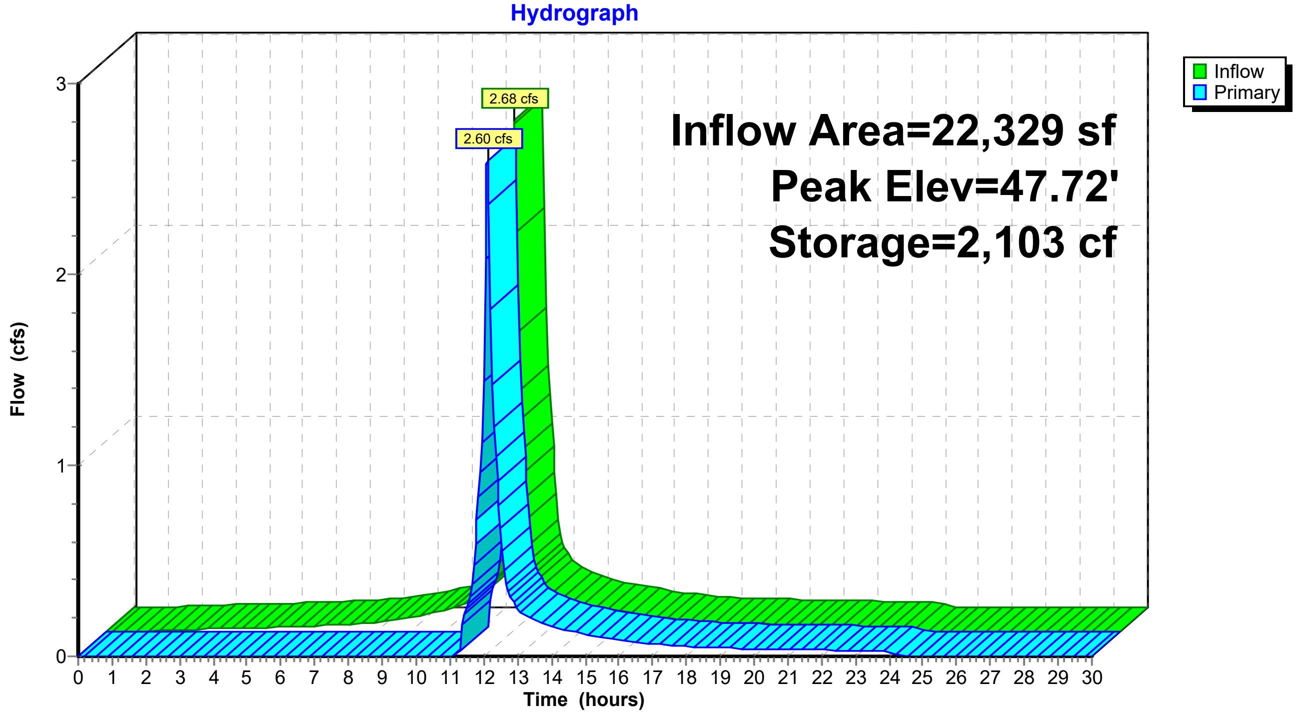
Volume	Invert	Avail.Storage	Storage Description
#1	45.00'	2,509 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
45.00	275	66.0	0	0	275
46.00	601	93.0	428	428	626
47.00	1,025	118.0	804	1,231	1,059
48.00	1,549	144.0	1,278	2,509	1,616

Device	Routing	Invert	Outlet Devices
#1	Primary	47.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=2.54 cfs @ 12.11 hrs HW=47.72' TW=46.19' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.54 cfs @ 1.15 fps)

Pond SF2: Sediment Forebay

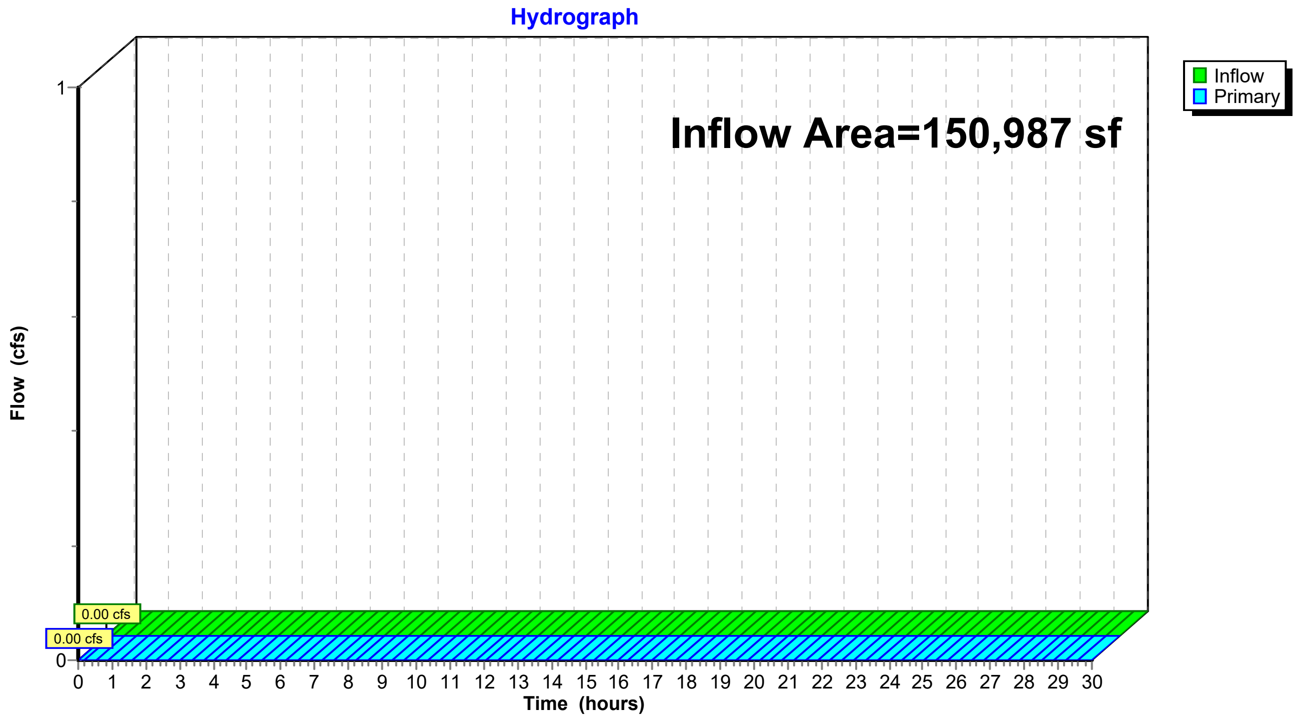


Summary for Link POI 1: Onsite Infiltration East

Inflow Area = 150,987 sf, 41.38% Impervious, Inflow Depth = 0.00" for 25 yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 1: Onsite Infiltration East

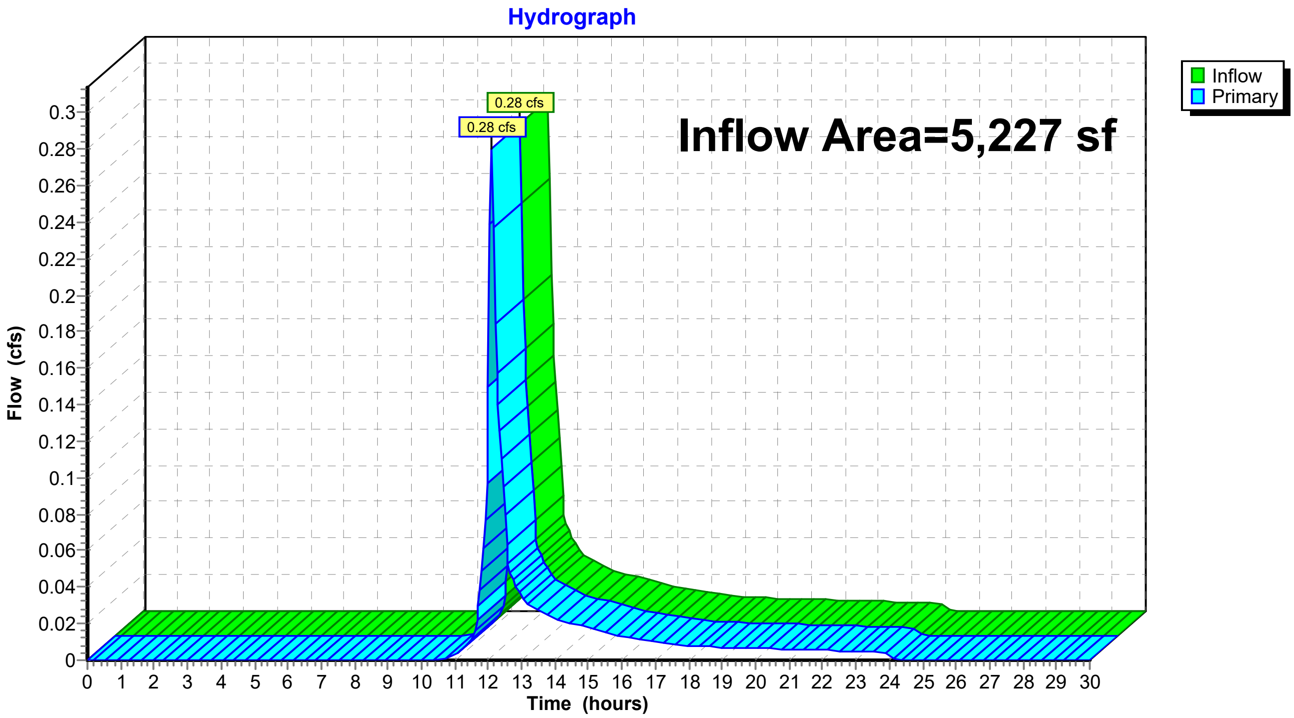


Summary for Link POI 2: Offsite at Southeast Property Line

Inflow Area = 5,227 sf, 0.00% Impervious, Inflow Depth = 2.11" for 25 yr event
Inflow = 0.28 cfs @ 12.10 hrs, Volume= 921 cf
Primary = 0.28 cfs @ 12.10 hrs, Volume= 921 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 2: Offsite at Southeast Property Line

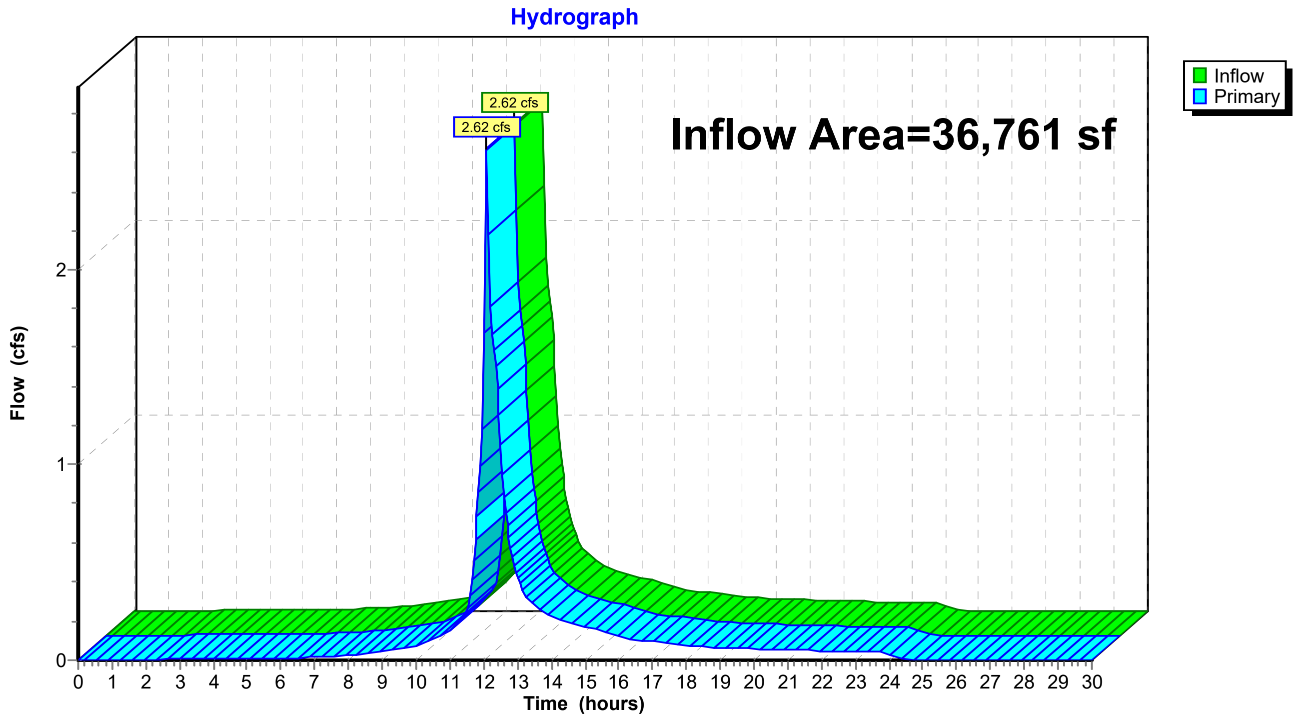


Summary for Link POI 3: Cranberry Highway Closed Drainage System

Inflow Area = 36,761 sf, 43.09% Impervious, Inflow Depth = 3.63" for 25 yr event
Inflow = 2.62 cfs @ 12.09 hrs, Volume= 11,130 cf
Primary = 2.62 cfs @ 12.09 hrs, Volume= 11,130 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 3: Cranberry Highway Closed Drainage System



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentP-1A: Runoff Area=83,866 sf 0.62% Impervious Runoff Depth=3.69"
Flow Length=347' Tc=19.6 min CN=59 Runoff=5.54 cfs 25,766 cf

SubcatchmentP-1B: Runoff Area=2,421 sf 100.00% Impervious Runoff Depth=8.38"
Tc=6.0 min CN=98 Runoff=0.46 cfs 1,691 cf

SubcatchmentP-1C: Runoff Area=2,478 sf 100.00% Impervious Runoff Depth=8.38"
Tc=6.0 min CN=98 Runoff=0.47 cfs 1,730 cf

SubcatchmentP-1D: Runoff Area=2,367 sf 100.00% Impervious Runoff Depth=8.38"
Tc=6.0 min CN=98 Runoff=0.45 cfs 1,653 cf

SubcatchmentP-1E: Runoff Area=7,526 sf 97.81% Impervious Runoff Depth=8.26"
Tc=6.0 min CN=97 Runoff=1.42 cfs 5,180 cf

SubcatchmentP-1F: Roof Runoff Runoff Area=30,000 sf 100.00% Impervious Runoff Depth=8.38"
Tc=6.0 min CN=98 Runoff=5.69 cfs 20,950 cf

SubcatchmentP-2: Runoff Area=5,227 sf 0.00% Impervious Runoff Depth=3.92"
Tc=6.0 min CN=61 Runoff=0.54 cfs 1,709 cf

SubcatchmentP-3: Runoff Area=15,280 sf 18.69% Impervious Runoff Depth=4.64"
Flow Length=242' Tc=26.3 min CN=67 Runoff=1.14 cfs 5,910 cf

SubcatchmentP-4: Runoff Area=7,214 sf 39.20% Impervious Runoff Depth=5.73"
Tc=6.0 min CN=76 Runoff=1.08 cfs 3,442 cf

SubcatchmentP-5: Runoff Area=4,858 sf 99.28% Impervious Runoff Depth=8.38"
Tc=6.0 min CN=98 Runoff=0.92 cfs 3,392 cf

SubcatchmentP-6: Runoff Area=9,409 sf 56.68% Impervious Runoff Depth=6.45"
Flow Length=123' Tc=5.3 min CN=82 Runoff=1.58 cfs 5,058 cf

SubcatchmentP-6A: Runoff Area=2,359 sf 100.00% Impervious Runoff Depth=8.38"
Tc=6.0 min CN=98 Runoff=0.45 cfs 1,647 cf

SubcatchmentP-6B: Runoff Area=6,232 sf 97.35% Impervious Runoff Depth=8.26"
Tc=6.0 min CN=97 Runoff=1.18 cfs 4,290 cf

SubcatchmentP-6C: Runoff Area=1,457 sf 100.00% Impervious Runoff Depth=8.38"
Tc=6.0 min CN=98 Runoff=0.28 cfs 1,017 cf

SubcatchmentP-6D: Runoff Area=4,650 sf 100.00% Impervious Runoff Depth=8.38"
Tc=6.0 min CN=98 Runoff=0.88 cfs 3,247 cf

SubcatchmentP-6E: Runoff Area=7,631 sf 36.61% Impervious Runoff Depth=5.60"
Tc=6.0 min CN=75 Runoff=1.12 cfs 3,564 cf

Pond CB1: Peak Elev=48.51' Inflow=0.46 cfs 1,691 cf
12.0" Round Culvert n=0.011 L=93.0' S=0.0054 '/' Outflow=0.46 cfs 1,691 cf

Pond CB10: Peak Elev=48.87' Inflow=1.12 cfs 3,564 cf
12.0" Round Culvert n=0.011 L=46.0' S=0.0065 '/' Outflow=1.12 cfs 3,563 cf

Pond CB101: Peak Elev=47.36' Inflow=1.14 cfs 5,910 cf
12.0" Round Culvert n=0.011 L=29.0' S=-0.0034 '/' Outflow=1.14 cfs 5,910 cf

Pond CB102: Peak Elev=50.24' Inflow=1.08 cfs 3,442 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=1.08 cfs 3,442 cf

Pond CB103: Peak Elev=47.41' Inflow=0.92 cfs 3,392 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=0.92 cfs 3,392 cf

Pond CB104: Peak Elev=46.95' Inflow=1.58 cfs 5,058 cf
12.0" Round Culvert n=0.011 L=2.0' S=0.0500 '/' Outflow=1.58 cfs 5,058 cf

Pond CB2: Peak Elev=48.47' Inflow=0.47 cfs 1,730 cf
12.0" Round Culvert n=0.011 L=8.0' S=0.0125 '/' Outflow=0.47 cfs 1,730 cf

Pond CB3: Peak Elev=48.44' Inflow=0.45 cfs 1,653 cf
12.0" Round Culvert n=0.011 L=104.0' S=0.0058 '/' Outflow=0.45 cfs 1,653 cf

Pond CB4: Peak Elev=0.00'
12.0" Round Culvert n=0.011 L=25.0' S=0.0080 '/' Primary=0.00 cfs 0 cf

Pond CB5: Peak Elev=48.49' Inflow=1.42 cfs 5,180 cf
12.0" Round Culvert n=0.011 L=27.0' S=0.0074 '/' Outflow=1.42 cfs 5,180 cf

Pond CB6: Peak Elev=49.42' Inflow=0.45 cfs 1,647 cf
12.0" Round Culvert n=0.011 L=86.0' S=0.0058 '/' Outflow=0.45 cfs 1,647 cf

Pond CB7: Peak Elev=49.44' Inflow=1.18 cfs 4,290 cf
12.0" Round Culvert n=0.011 L=8.0' S=0.0125 '/' Outflow=1.18 cfs 4,290 cf

Pond CB8: Peak Elev=49.30' Inflow=0.88 cfs 3,247 cf
12.0" Round Culvert n=0.011 L=6.0' S=0.0167 '/' Outflow=0.88 cfs 3,247 cf

Pond CB9: Peak Elev=48.81' Inflow=0.28 cfs 1,017 cf
12.0" Round Culvert n=0.011 L=7.0' S=0.0143 '/' Outflow=0.28 cfs 1,012 cf

Pond DMH1: Peak Elev=48.46' Inflow=0.93 cfs 3,421 cf
12.0" Round Culvert n=0.011 L=13.0' S=0.0077 '/' Outflow=0.93 cfs 3,421 cf

Pond DMH101: Peak Elev=47.30' Inflow=1.62 cfs 9,351 cf
12.0" Round Culvert n=0.011 L=109.0' S=0.0018 '/' Outflow=1.62 cfs 9,351 cf

Pond DMH102: Peak Elev=47.16' Inflow=0.92 cfs 3,392 cf
12.0" Round Culvert n=0.011 L=13.0' S=-0.0077 '/' Outflow=0.92 cfs 3,392 cf

Pond DMH103: Peak Elev=47.04' Inflow=2.53 cfs 12,744 cf
12.0" Round Culvert n=0.011 L=36.0' S=0.0333 '/' Outflow=2.53 cfs 12,744 cf

Pond DMH104: Peak Elev=45.99' Inflow=1.58 cfs 5,058 cf
12.0" Round Culvert n=0.011 L=5.0' S=0.0400 '/' Outflow=1.58 cfs 5,058 cf

Pond DMH105: Inflow=4.08 cfs 17,801 cf
Primary=4.08 cfs 17,801 cf

Pond DMH2: Peak Elev=48.44' Inflow=0.93 cfs 3,421 cf
12.0" Round Culvert n=0.011 L=89.0' S=0.0045 '/' Outflow=0.93 cfs 3,421 cf

Pond DMH3: Peak Elev=48.40' Inflow=0.45 cfs 1,653 cf
12.0" Round Culvert n=0.011 L=46.0' S=0.0065 '/' Outflow=0.45 cfs 1,653 cf

Pond DMH4: Peak Elev=48.39' Inflow=2.80 cfs 10,254 cf
12.0" Round Culvert n=0.011 L=11.0' S=0.0091 '/' Outflow=2.80 cfs 10,254 cf

Pond DMH5: Peak Elev=49.42' Inflow=1.63 cfs 5,937 cf
12.0" Round Culvert n=0.011 L=132.0' S=0.0053 '/' Outflow=1.63 cfs 5,937 cf

Pond DMH6: Peak Elev=49.27' Inflow=2.51 cfs 9,184 cf
12.0" Round Culvert n=0.011 L=108.0' S=0.0056 '/' Outflow=2.51 cfs 9,184 cf

Pond DMH7: Peak Elev=48.81' Inflow=3.91 cfs 13,759 cf
12.0" Round Culvert n=0.011 L=38.0' S=0.0053 '/' Outflow=3.91 cfs 13,759 cf

Pond Pd1: Infiltration Basin Peak Elev=47.07' Storage=19,395 cf Inflow=15.39 cfs 67,689 cf
Outflow=3.17 cfs 67,813 cf

Pond SF1: Sediment Forebay Peak Elev=47.88' Storage=1,534 cf Inflow=2.80 cfs 10,254 cf
Outflow=2.73 cfs 9,019 cf

Pond SF2: Sediment Forebay Peak Elev=47.79' Storage=2,191 cf Inflow=3.91 cfs 13,759 cf
Outflow=3.82 cfs 11,955 cf

Link POI 1: Onsite Infiltration East Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link POI 2: Offsite at Southeast Property Line Inflow=0.54 cfs 1,709 cf
Primary=0.54 cfs 1,709 cf

Link POI 3: Cranberry Highway Closed Drainage System Inflow=4.08 cfs 17,801 cf
Primary=4.08 cfs 17,801 cf

Total Runoff Area = 192,975 sf Runoff Volume = 90,246 cf Average Runoff Depth = 5.61"
59.42% Pervious = 114,661 sf 40.58% Impervious = 78,314 sf

Summary for Subcatchment P-1A:

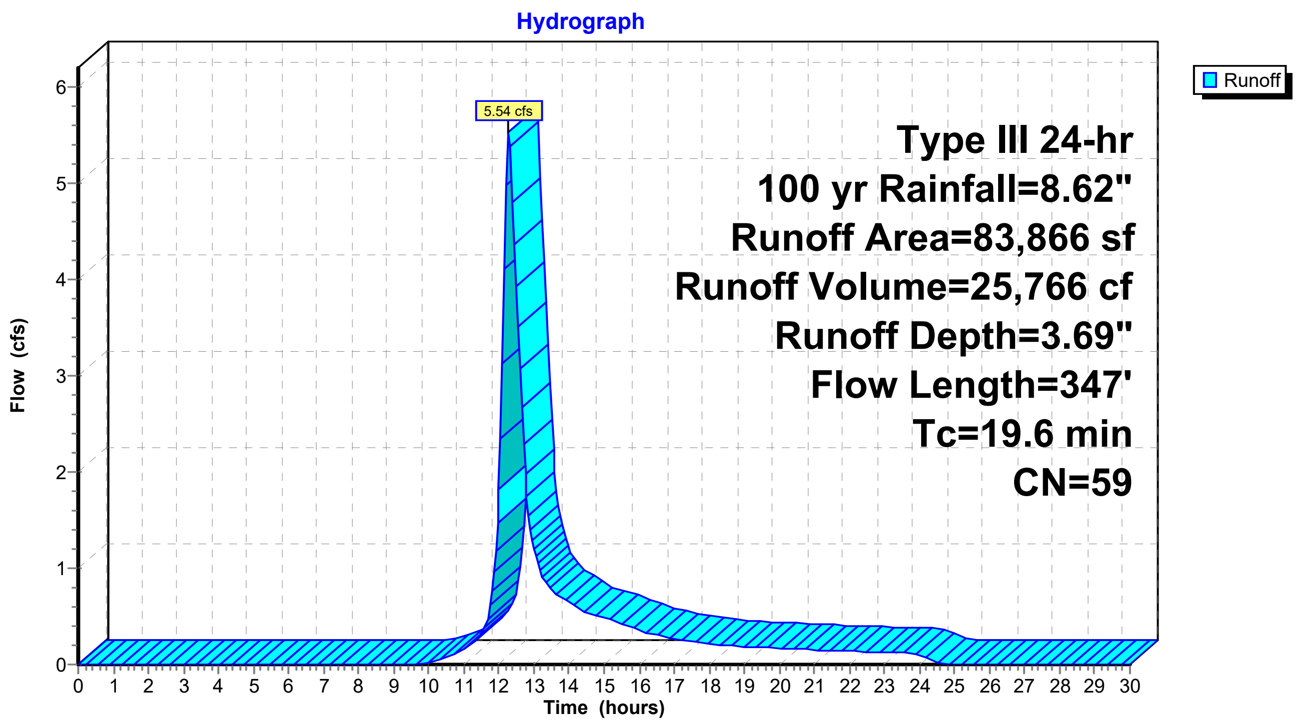
Runoff = 5.54 cfs @ 12.28 hrs, Volume= 25,766 cf, Depth= 3.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
25,220	55	Woods, Good, HSG B
520	98	Roofs, HSG B
58,126	61	>75% Grass cover, Good, HSG B
83,866	59	Weighted Average
83,346		99.38% Pervious Area
520		0.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	50	0.0200	0.07		**Sheet Flow, Woods, 50', 2%** Woods: Light underbrush n= 0.400 P2= 3.35"
5.3	160	0.0100	0.50		**Shallow Concentrated Flow, Woods, 160', 1%** Woodland Kv= 5.0 fps
2.2	137	0.0230	1.06		**Shallow Concentrated Flow, Grass, 137', 2.3%** Short Grass Pasture Kv= 7.0 fps
19.6	347	Total			

Subcatchment P-1A:



Summary for Subcatchment P-1B:

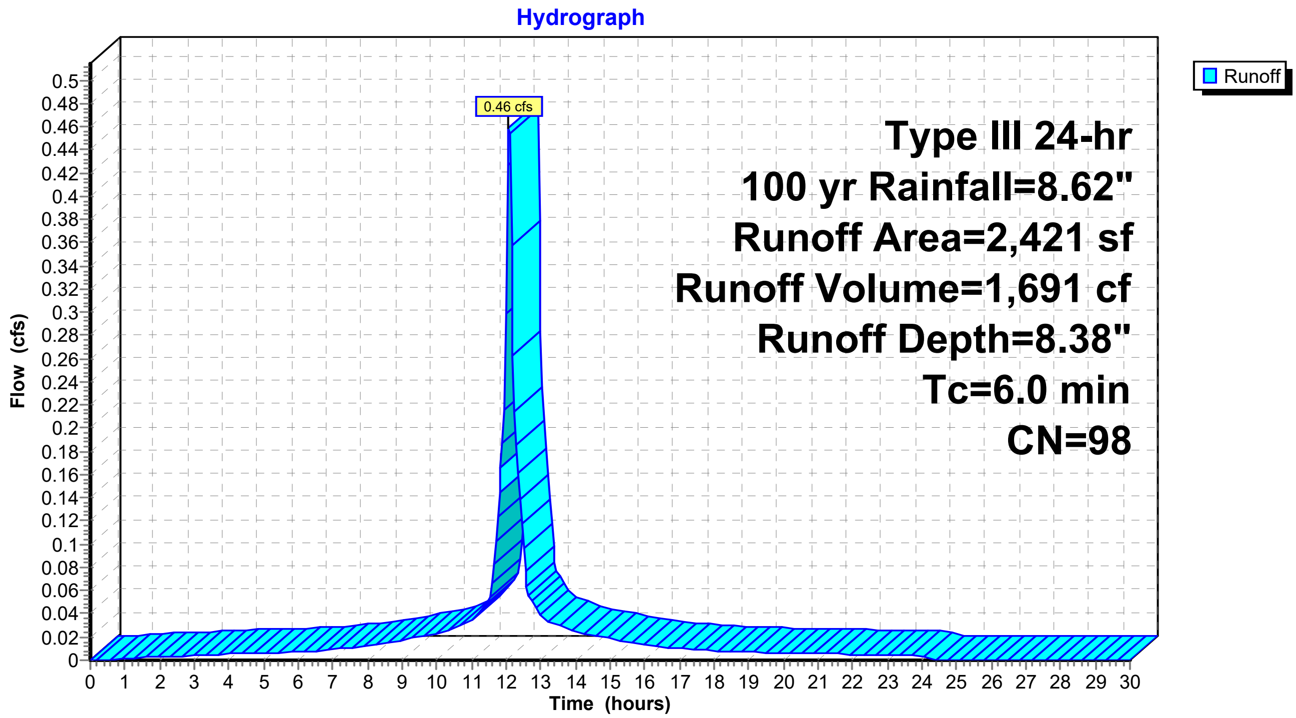
Runoff = 0.46 cfs @ 12.09 hrs, Volume= 1,691 cf, Depth= 8.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
2,421	98	Paved parking, HSG B
2,421		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1B:



Summary for Subcatchment P-1C:

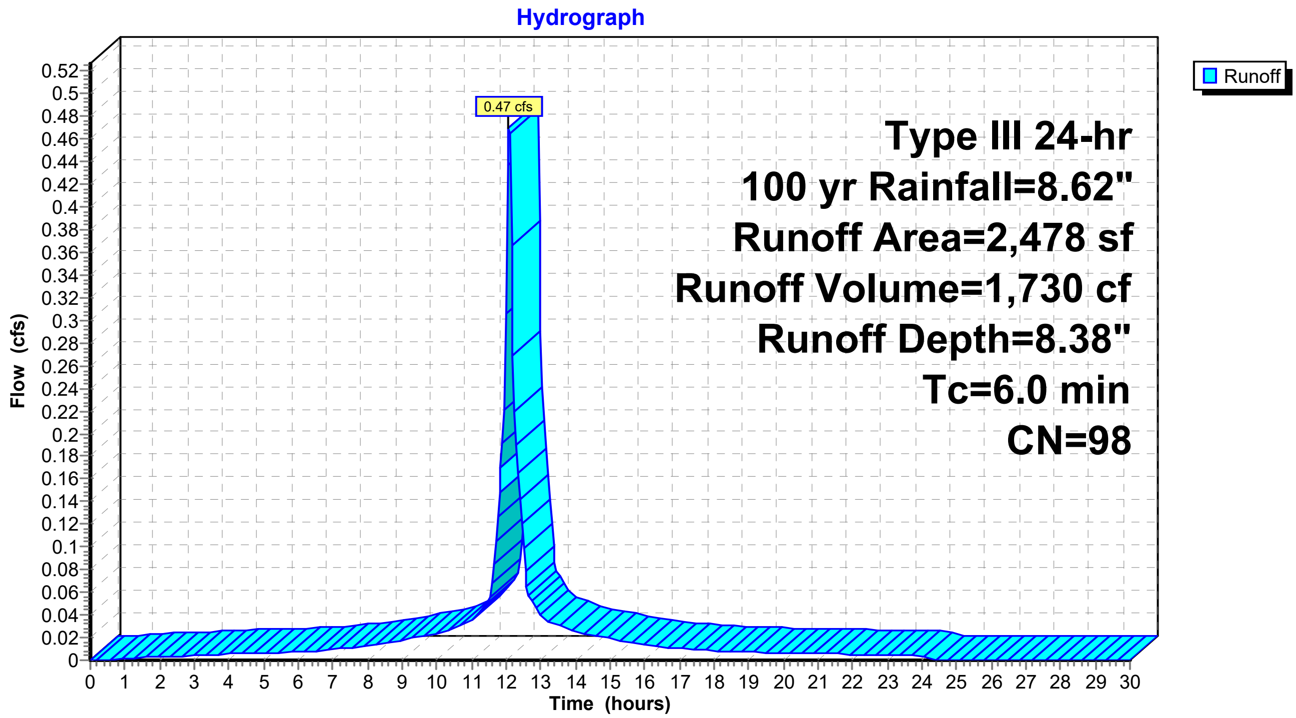
Runoff = 0.47 cfs @ 12.09 hrs, Volume= 1,730 cf, Depth= 8.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
2,478	98	Paved parking, HSG B
2,478		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1C:



Summary for Subcatchment P-1D:

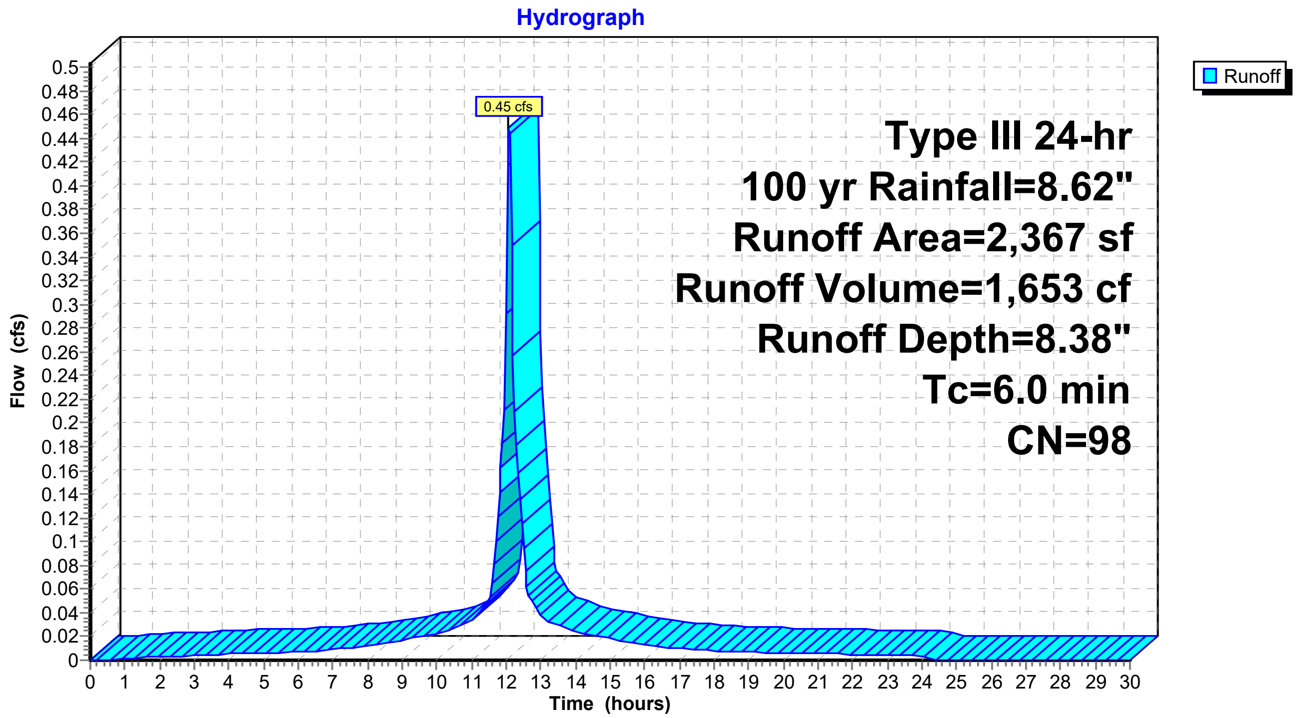
Runoff = 0.45 cfs @ 12.09 hrs, Volume= 1,653 cf, Depth= 8.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
2,367	98	Paved parking, HSG B
2,367		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1D:



Summary for Subcatchment P-1E:

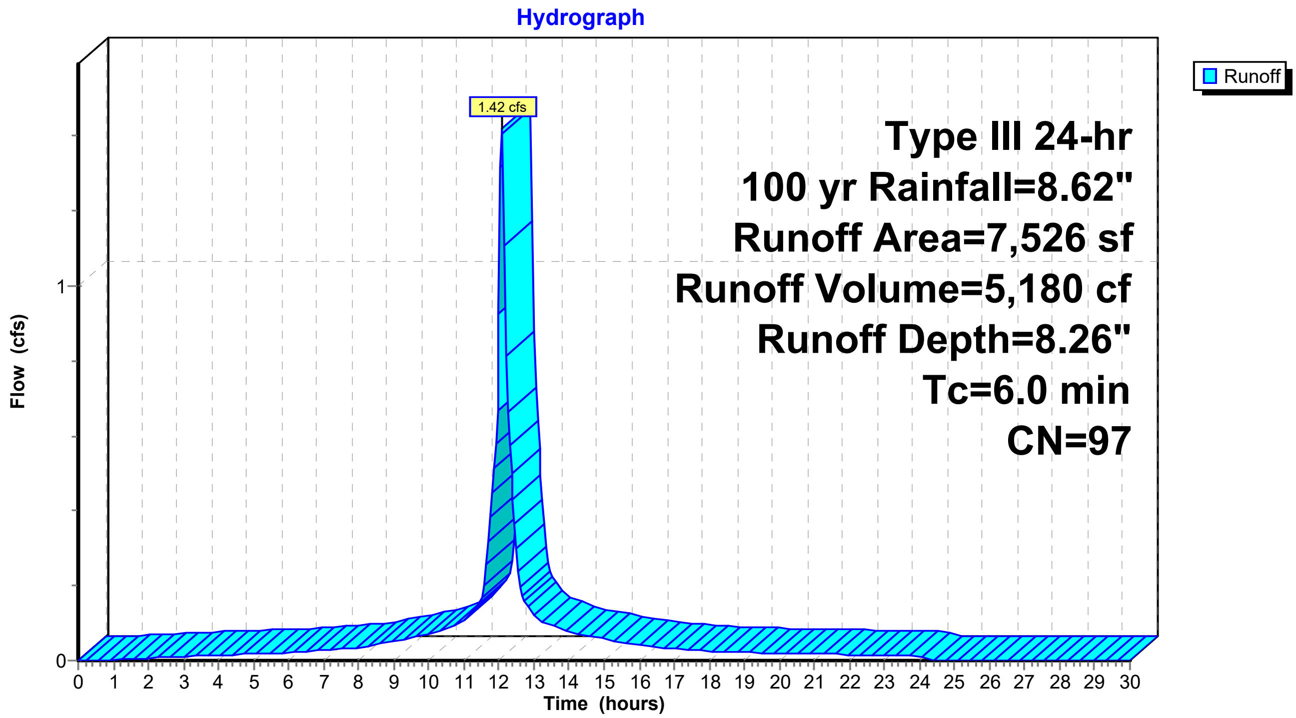
Runoff = 1.42 cfs @ 12.09 hrs, Volume= 5,180 cf, Depth= 8.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
7,361	98	Paved parking, HSG B
165	61	>75% Grass cover, Good, HSG B
7,526	97	Weighted Average
165		2.19% Pervious Area
7,361		97.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1E:



Summary for Subcatchment P-1F: Roof Runoff

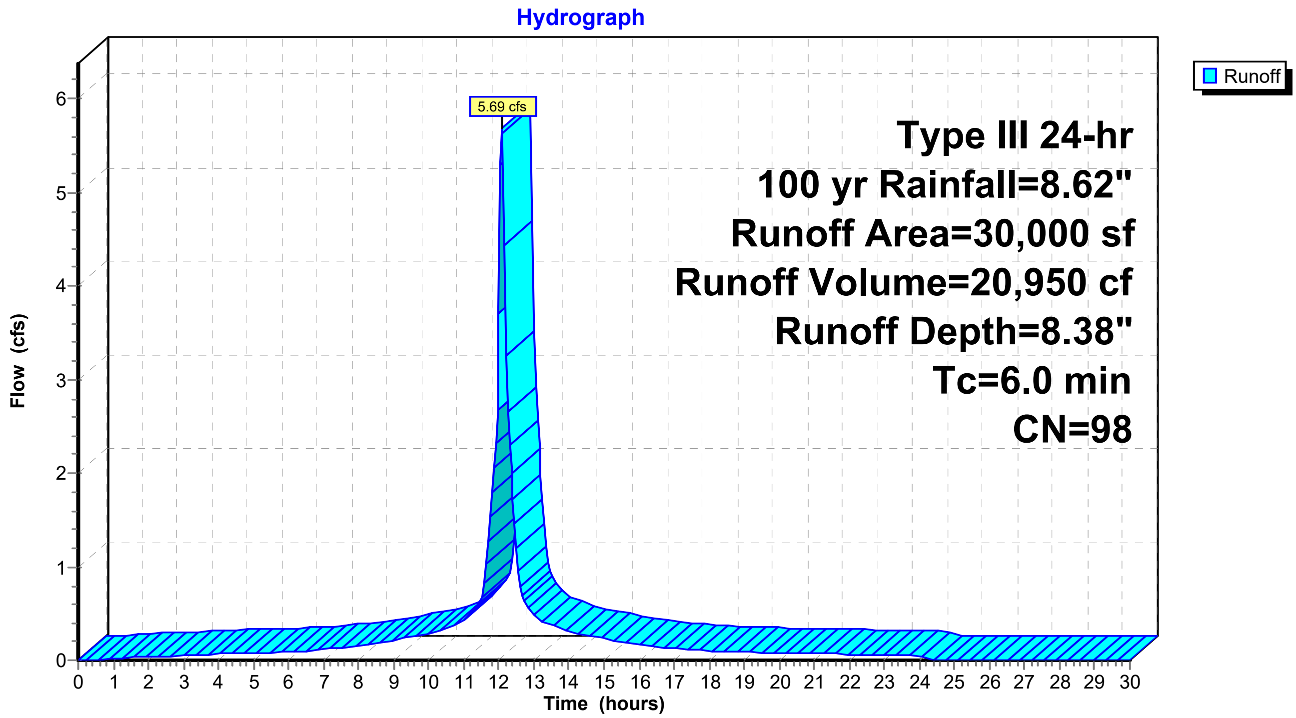
Runoff = 5.69 cfs @ 12.09 hrs, Volume= 20,950 cf, Depth= 8.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
30,000	98	Roofs, HSG B
30,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-1F: Roof Runoff



Summary for Subcatchment P-2:

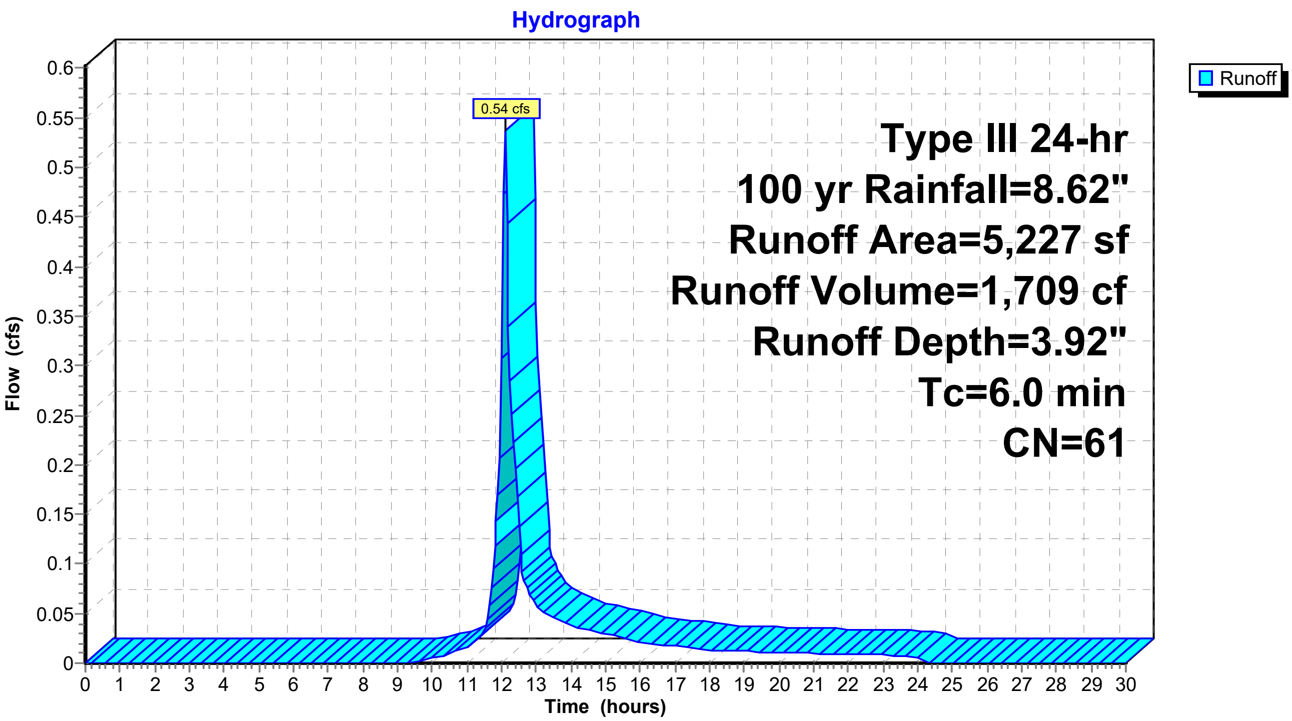
Runoff = 0.54 cfs @ 12.10 hrs, Volume= 1,709 cf, Depth= 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
153	55	Woods, Good, HSG B
5,074	61	>75% Grass cover, Good, HSG B
5,227	61	Weighted Average
5,227		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-2:



Summary for Subcatchment P-3:

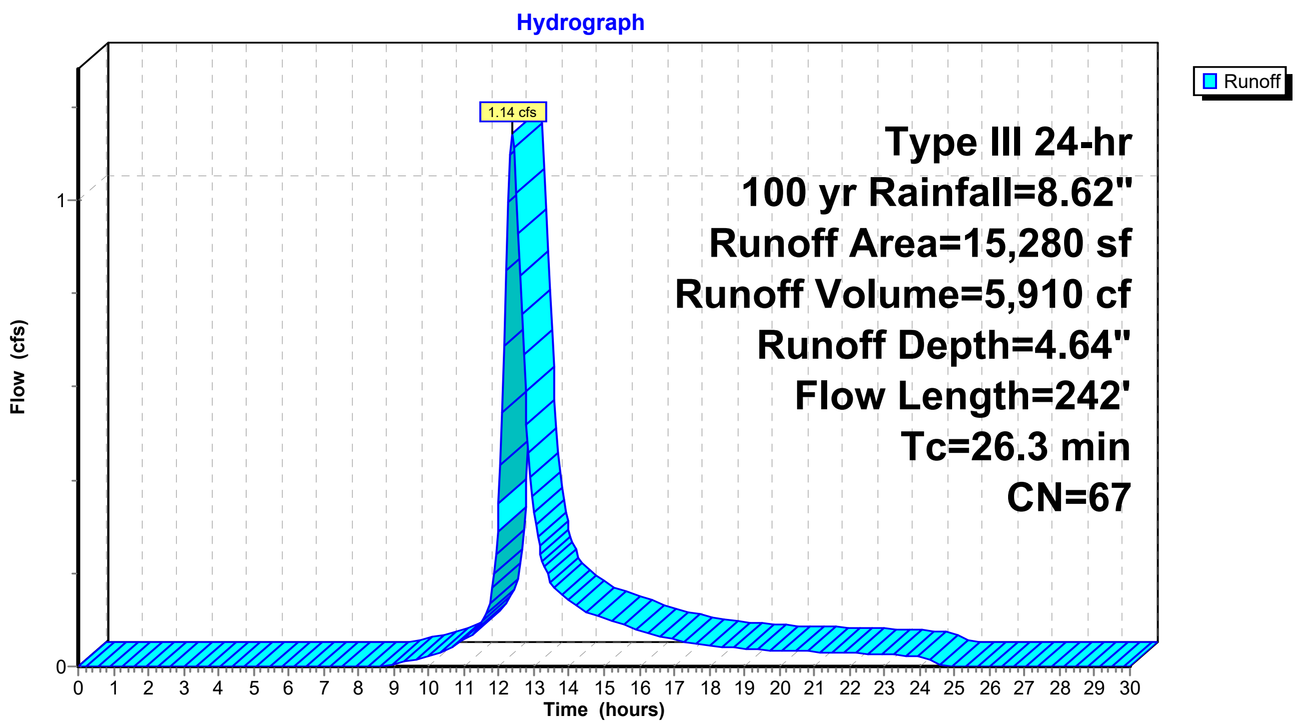
Runoff = 1.14 cfs @ 12.37 hrs, Volume= 5,910 cf, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
2,898	55	Woods, Good, HSG B
2,856	98	Paved parking, HSG B
9,526	61	>75% Grass cover, Good, HSG B
15,280	67	Weighted Average
12,424		81.31% Pervious Area
2,856		18.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	55	0.0050	0.04		**Sheet Flow, Woods, 55', 0.5%** Woods: Light underbrush n= 0.400 P2= 3.35"
0.2	5	0.0050	0.35		**Shallow Concentrated Flow, Woods, 5%, 0.5%** Woodland Kv= 5.0 fps
2.8	117	0.0100	0.70		**Shallow Concentrated Flow, Grass, 117', 1%** Short Grass Pasture Kv= 7.0 fps
0.6	65	0.0080	1.82		**Shallow Concentrated Flow, Pavement, 65', 0.8%** Paved Kv= 20.3 fps
26.3	242	Total			

Subcatchment P-3:



Summary for Subcatchment P-4:

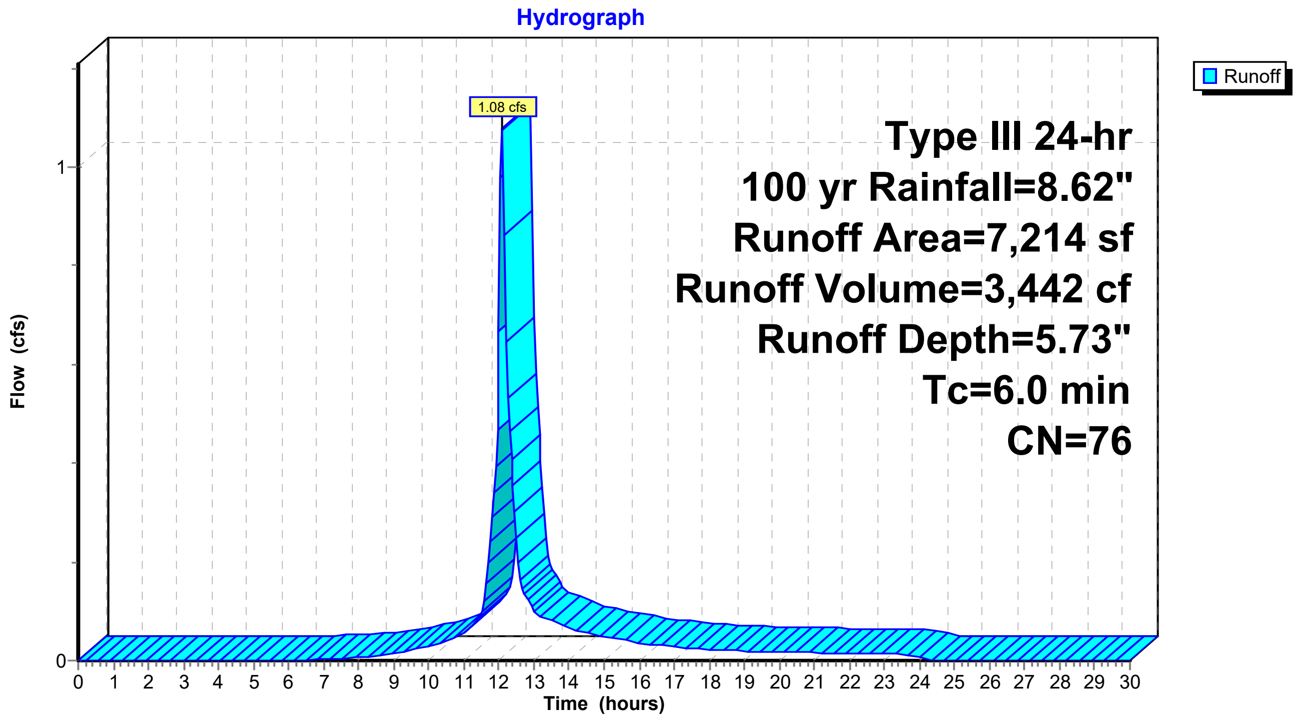
Runoff = 1.08 cfs @ 12.09 hrs, Volume= 3,442 cf, Depth= 5.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
2,828	98	Paved parking, HSG B
4,386	61	>75% Grass cover, Good, HSG B
7,214	76	Weighted Average
4,386		60.80% Pervious Area
2,828		39.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-4:



Summary for Subcatchment P-5:

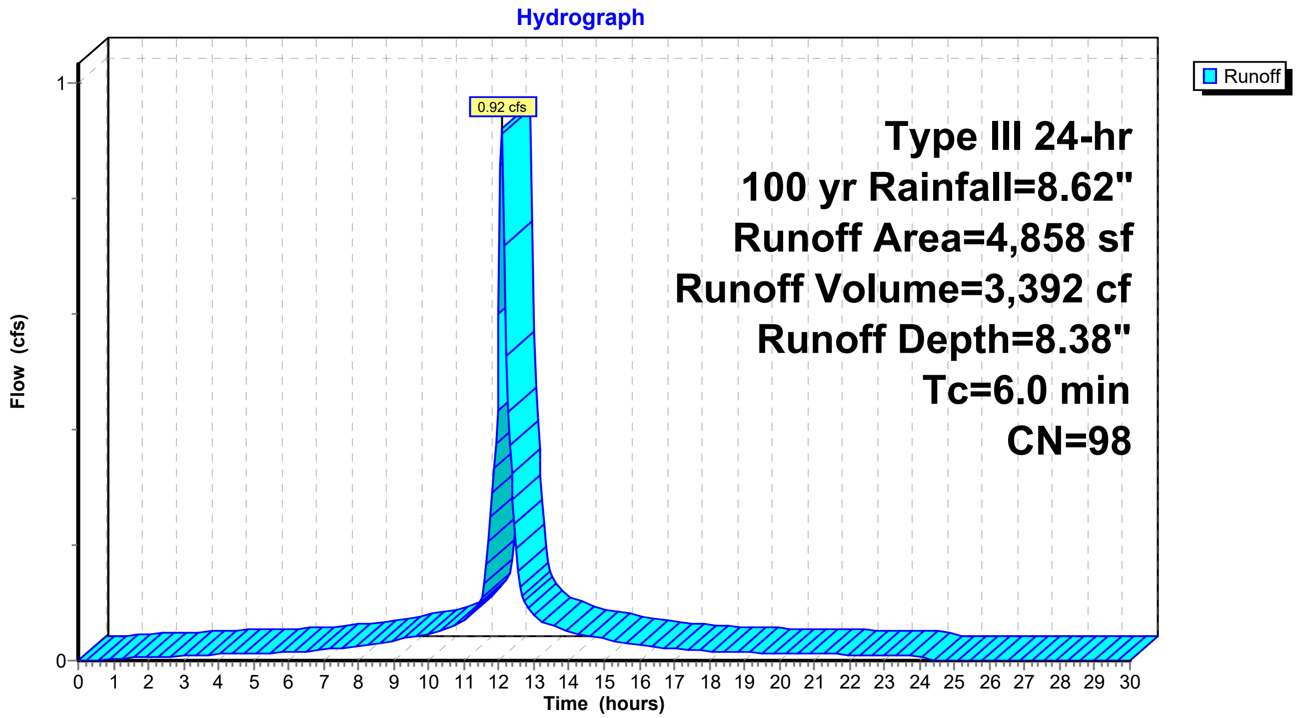
Runoff = 0.92 cfs @ 12.09 hrs, Volume= 3,392 cf, Depth= 8.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
4,823	98	Paved parking, HSG B
35	61	>75% Grass cover, Good, HSG B
4,858	98	Weighted Average
35		0.72% Pervious Area
4,823		99.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-5:



Summary for Subcatchment P-6:

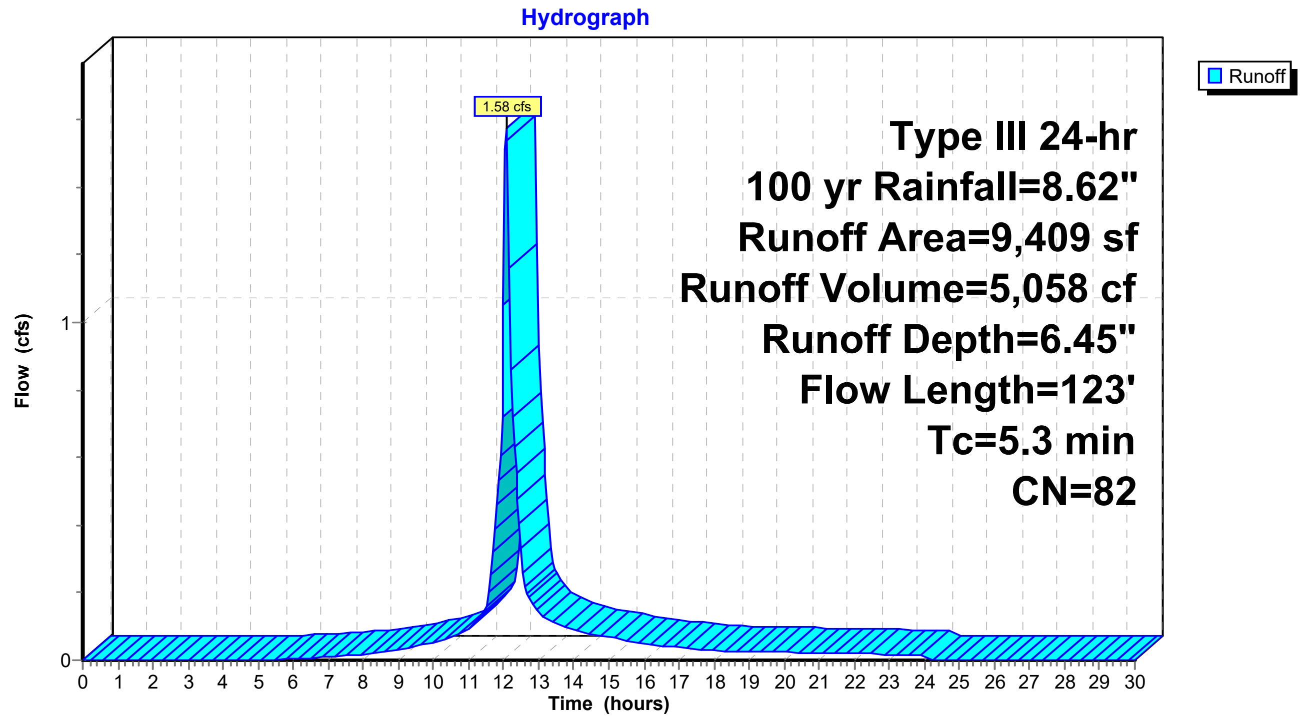
Runoff = 1.58 cfs @ 12.08 hrs, Volume= 5,058 cf, Depth= 6.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
5,333	98	Paved parking, HSG B
4,076	61	>75% Grass cover, Good, HSG B
9,409	82	Weighted Average
4,076		43.32% Pervious Area
5,333		56.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.0300	0.18		**Sheet Flow, Grass, 50', 3%** Grass: Short n= 0.150 P2= 3.35"
0.4	30	0.0300	1.21		**Shallow Concentrated Flow, Grass, 30', 3%** Short Grass Pasture Kv= 7.0 fps
0.2	43	0.0200	2.87		**Shallow Concentrated Flow, Pavement, 43', 2%** Paved Kv= 20.3 fps
5.3	123	Total			

Subcatchment P-6:



Summary for Subcatchment P-6A:

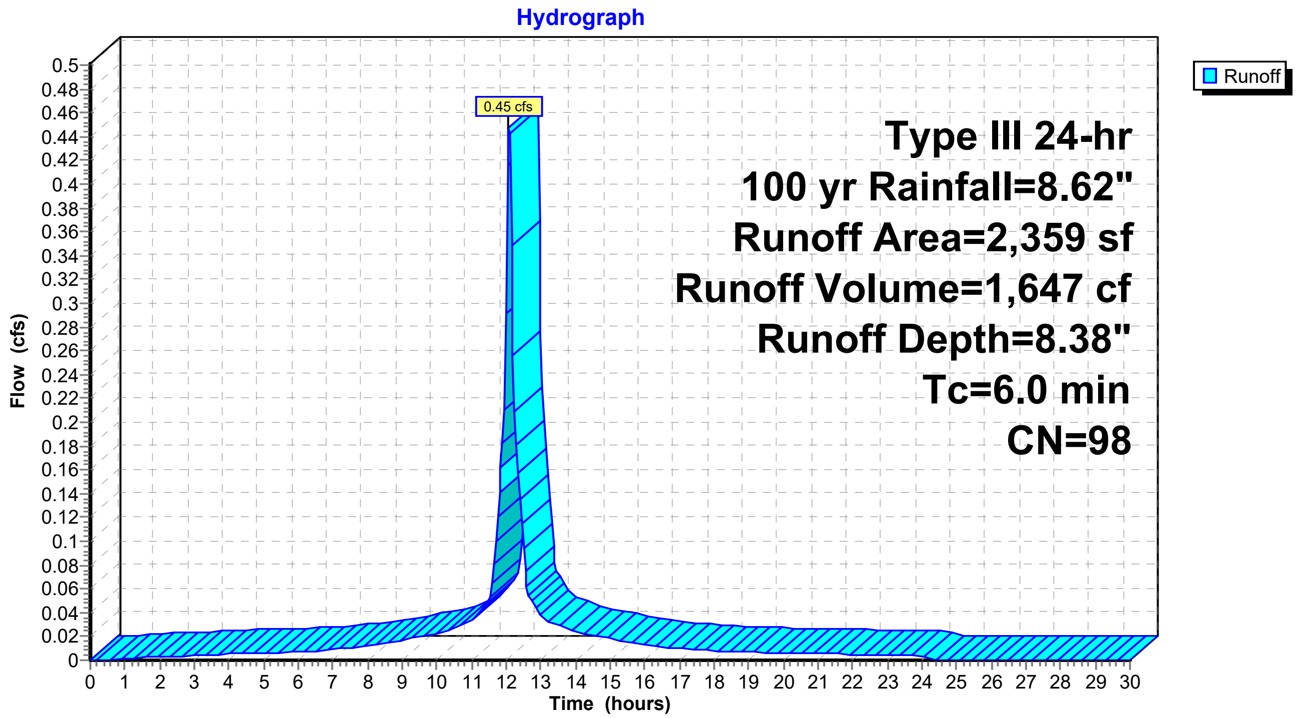
Runoff = 0.45 cfs @ 12.09 hrs, Volume= 1,647 cf, Depth= 8.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
2,359	98	Paved parking, HSG B
2,359		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6A:



Summary for Subcatchment P-6B:

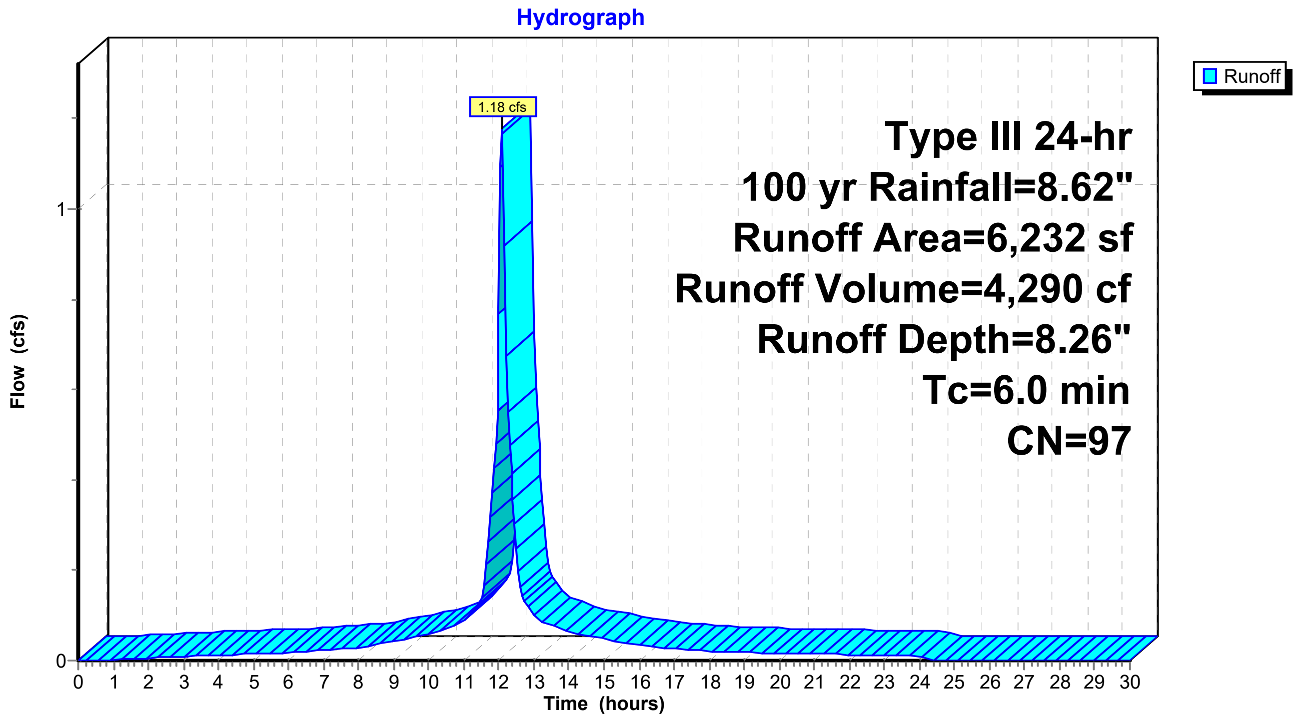
Runoff = 1.18 cfs @ 12.09 hrs, Volume= 4,290 cf, Depth= 8.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
6,067	98	Paved parking, HSG B
165	61	>75% Grass cover, Good, HSG B
6,232	97	Weighted Average
165		2.65% Pervious Area
6,067		97.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6B:



Summary for Subcatchment P-6C:

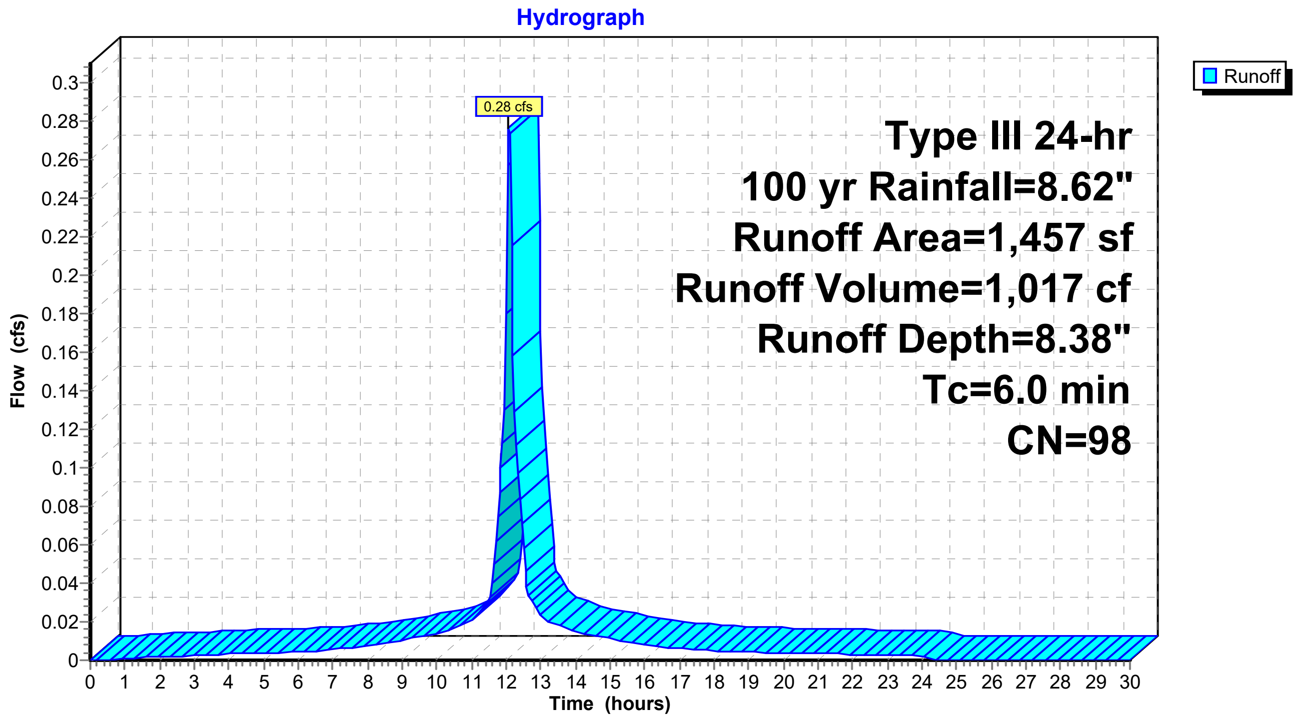
Runoff = 0.28 cfs @ 12.09 hrs, Volume= 1,017 cf, Depth= 8.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
1,457	98	Paved parking, HSG B
1,457		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6C:



Summary for Subcatchment P-6D:

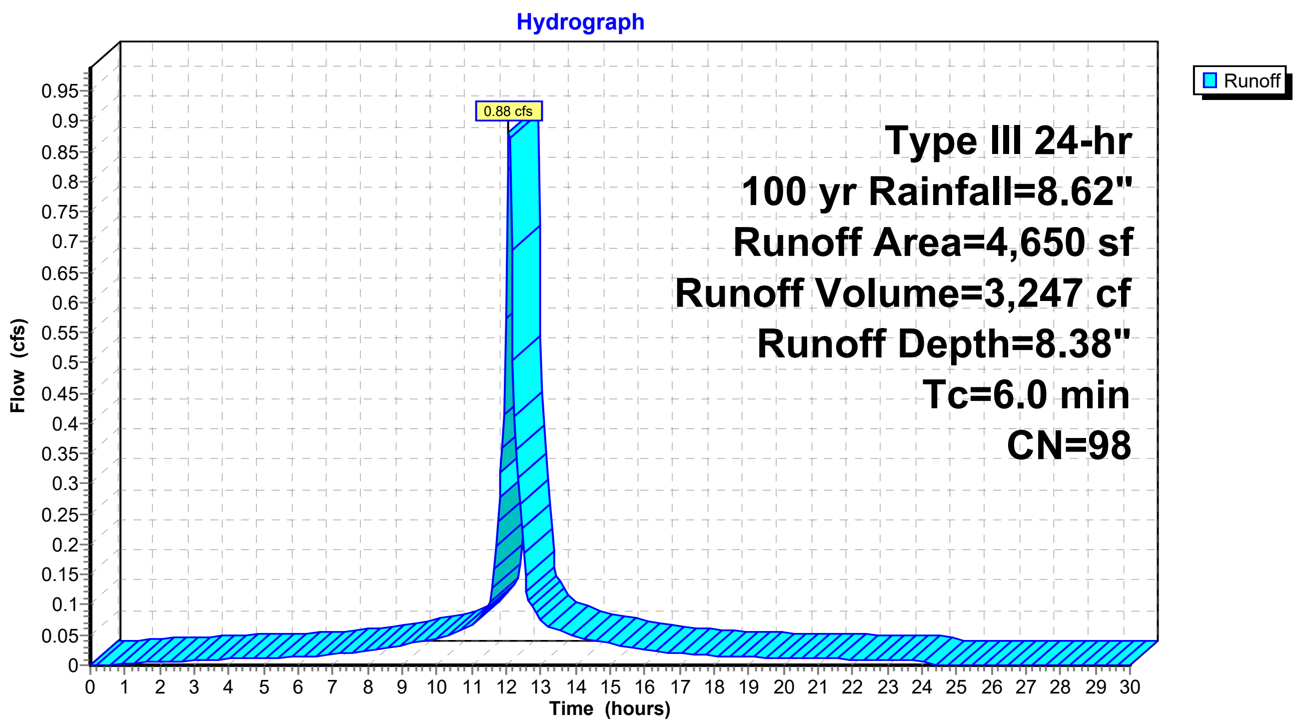
Runoff = 0.88 cfs @ 12.09 hrs, Volume= 3,247 cf, Depth= 8.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
4,650	98	Paved parking, HSG B
4,650		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6D:



Summary for Subcatchment P-6E:

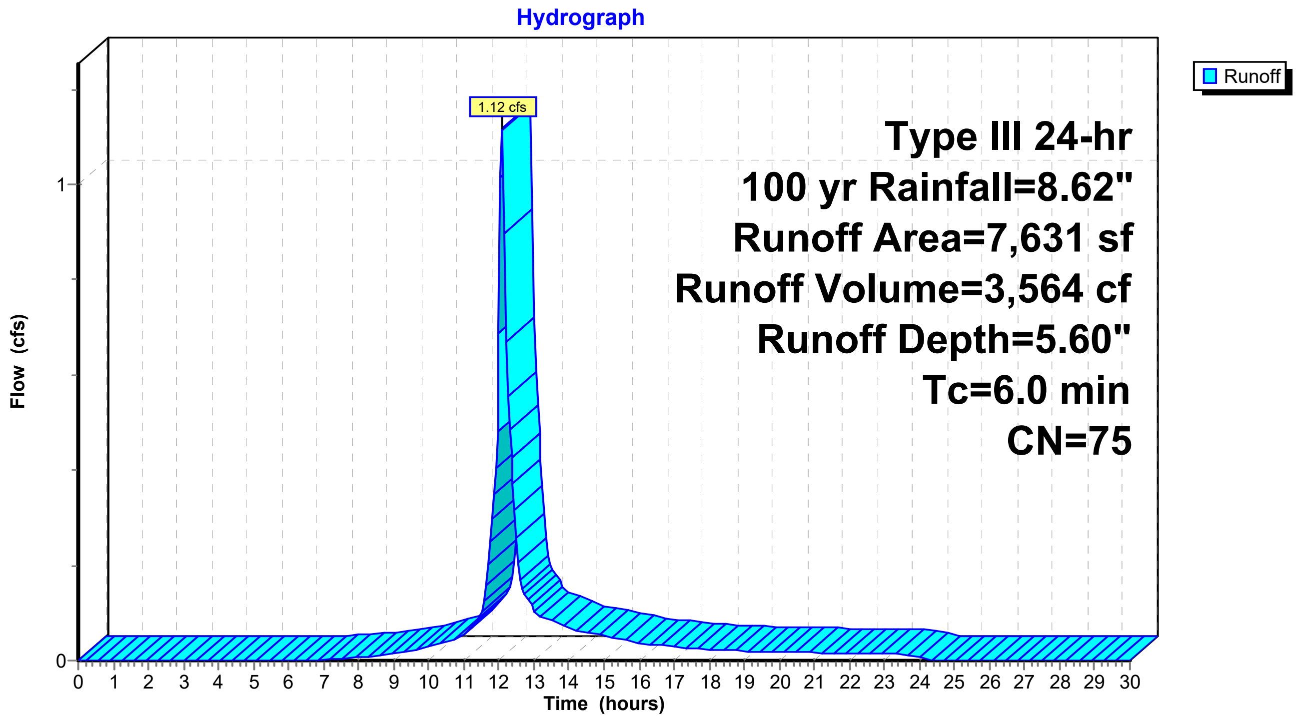
Runoff = 1.12 cfs @ 12.09 hrs, Volume= 3,564 cf, Depth= 5.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=8.62"

Area (sf)	CN	Description
2,794	98	Paved parking, HSG B
4,837	61	>75% Grass cover, Good, HSG B
7,631	75	Weighted Average
4,837		63.39% Pervious Area
2,794		36.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-6E:



Summary for Pond CB1:

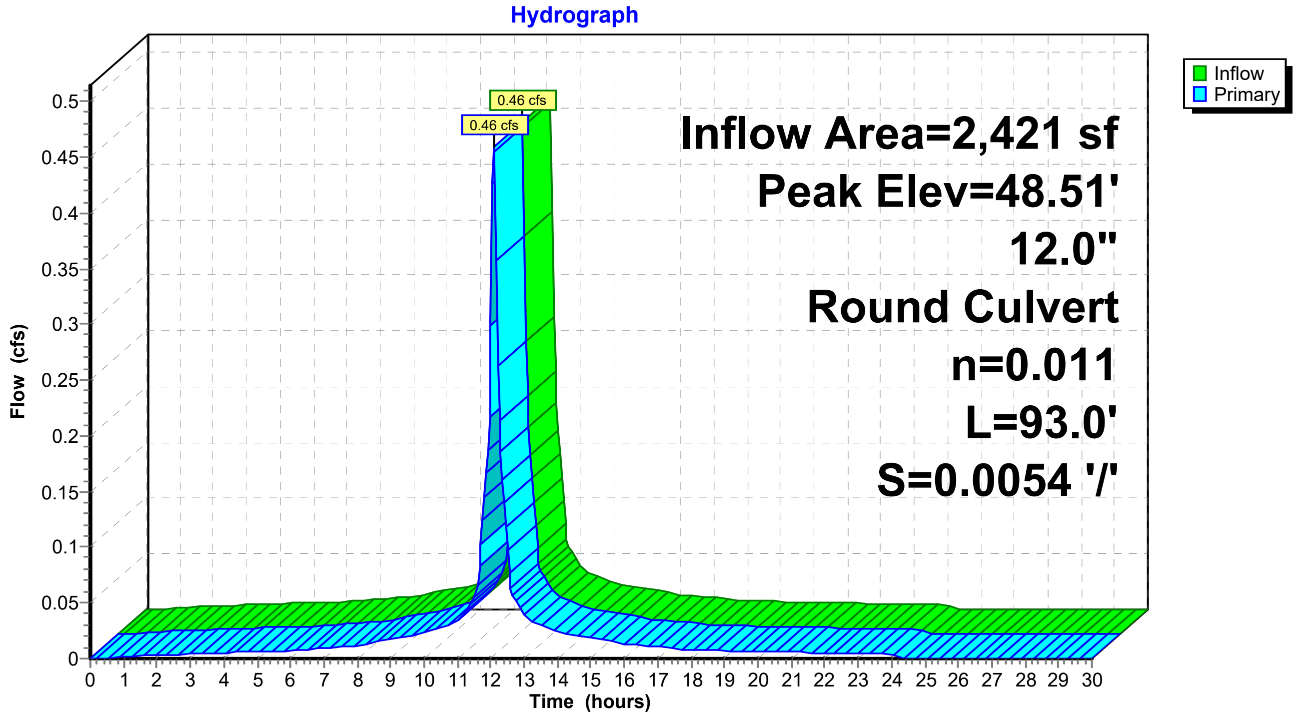
Inflow Area = 2,421 sf,100.00% Impervious, Inflow Depth = 8.38" for 100 yr event
Inflow = 0.46 cfs @ 12.09 hrs, Volume= 1,691 cf
Outflow = 0.46 cfs @ 12.09 hrs, Volume= 1,691 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.46 cfs @ 12.09 hrs, Volume= 1,691 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.51' @ 12.23 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 93.0' Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0054 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.37 cfs @ 12.09 hrs HW=48.42' TW=48.18' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.37 cfs @ 1.76 fps)

Pond CB1:



Summary for Pond CB10:

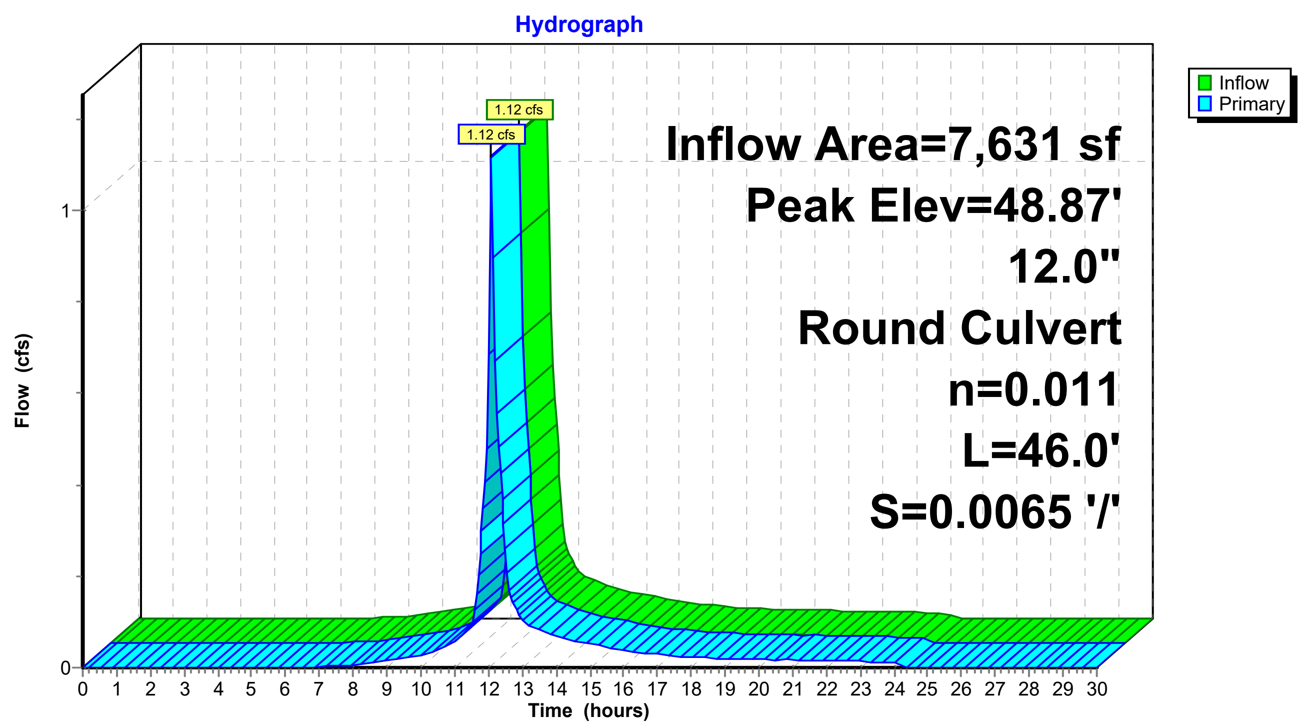
Inflow Area = 7,631 sf, 36.61% Impervious, Inflow Depth = 5.60" for 100 yr event
Inflow = 1.12 cfs @ 12.09 hrs, Volume= 3,564 cf
Outflow = 1.12 cfs @ 12.09 hrs, Volume= 3,563 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.12 cfs @ 12.09 hrs, Volume= 3,563 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.87' @ 12.14 hrs
Flood Elev= 49.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.30'	**12.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 46.30' / 46.00' S= 0.0065 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.59' TW=48.77' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB10:



Summary for Pond CB101:

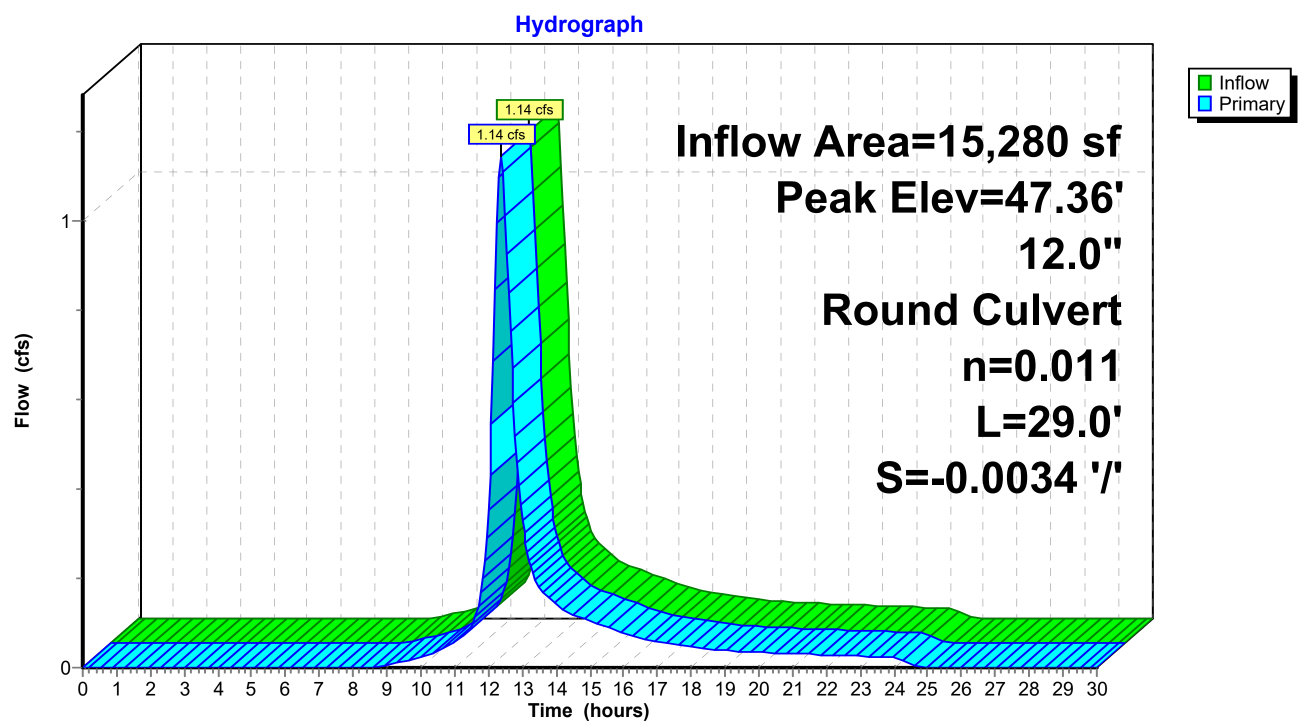
Inflow Area = 15,280 sf, 18.69% Impervious, Inflow Depth = 4.64" for 100 yr event
Inflow = 1.14 cfs @ 12.37 hrs, Volume= 5,910 cf
Outflow = 1.14 cfs @ 12.37 hrs, Volume= 5,910 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.14 cfs @ 12.37 hrs, Volume= 5,910 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.36' @ 12.20 hrs
Flood Elev= 49.06'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.50'	**12.0" Round Culvert** L= 29.0' Ke= 0.500 Inlet / Outlet Invert= 46.40' / 46.50' S= -0.0034 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.20 cfs @ 12.37 hrs HW=47.32' TW=47.18' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.20 cfs @ 2.08 fps)

Pond CB101:



Summary for Pond CB102:

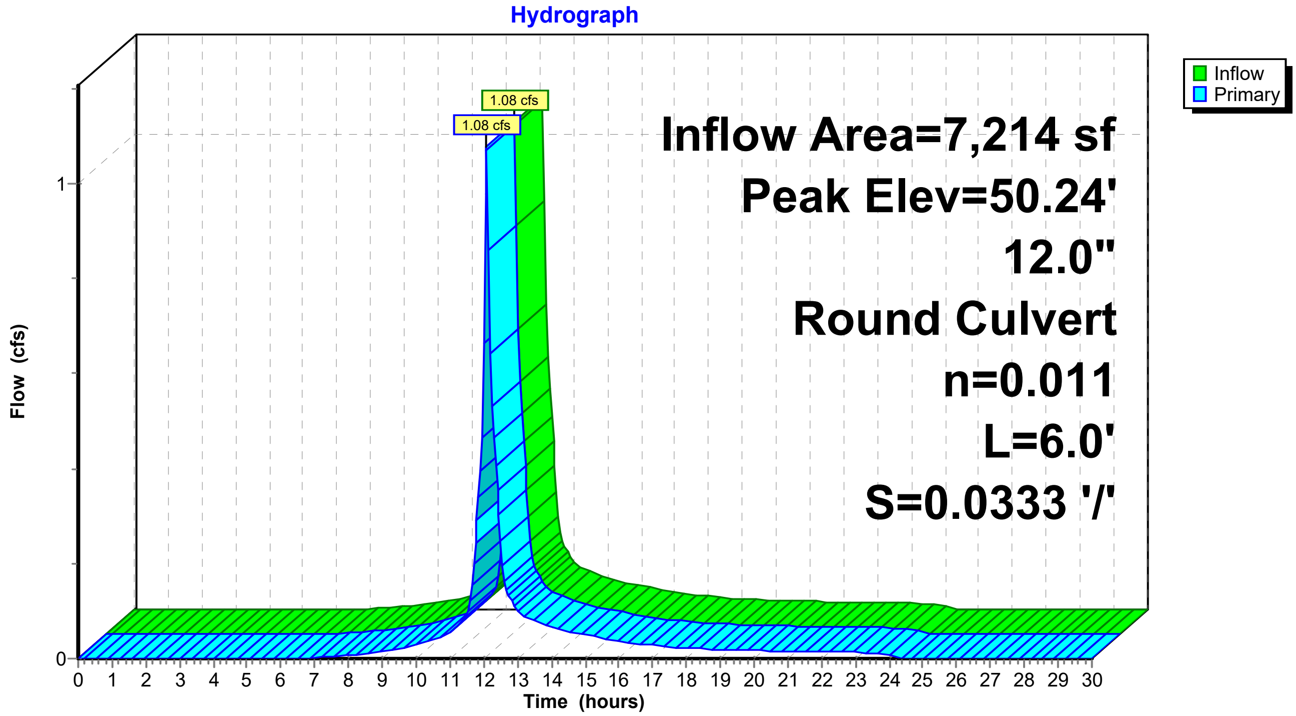
Inflow Area = 7,214 sf, 39.20% Impervious, Inflow Depth = 5.73" for 100 yr event
Inflow = 1.08 cfs @ 12.09 hrs, Volume= 3,442 cf
Outflow = 1.08 cfs @ 12.09 hrs, Volume= 3,442 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.08 cfs @ 12.09 hrs, Volume= 3,442 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 50.24' @ 12.09 hrs
Flood Elev= 49.07'

Device	Routing	Invert	Outlet Devices
#1	Primary	49.70'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 49.70' / 49.50' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.06 cfs @ 12.09 hrs HW=50.23' TW=47.23' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.06 cfs @ 3.59 fps)

Pond CB102:



Summary for Pond CB103:

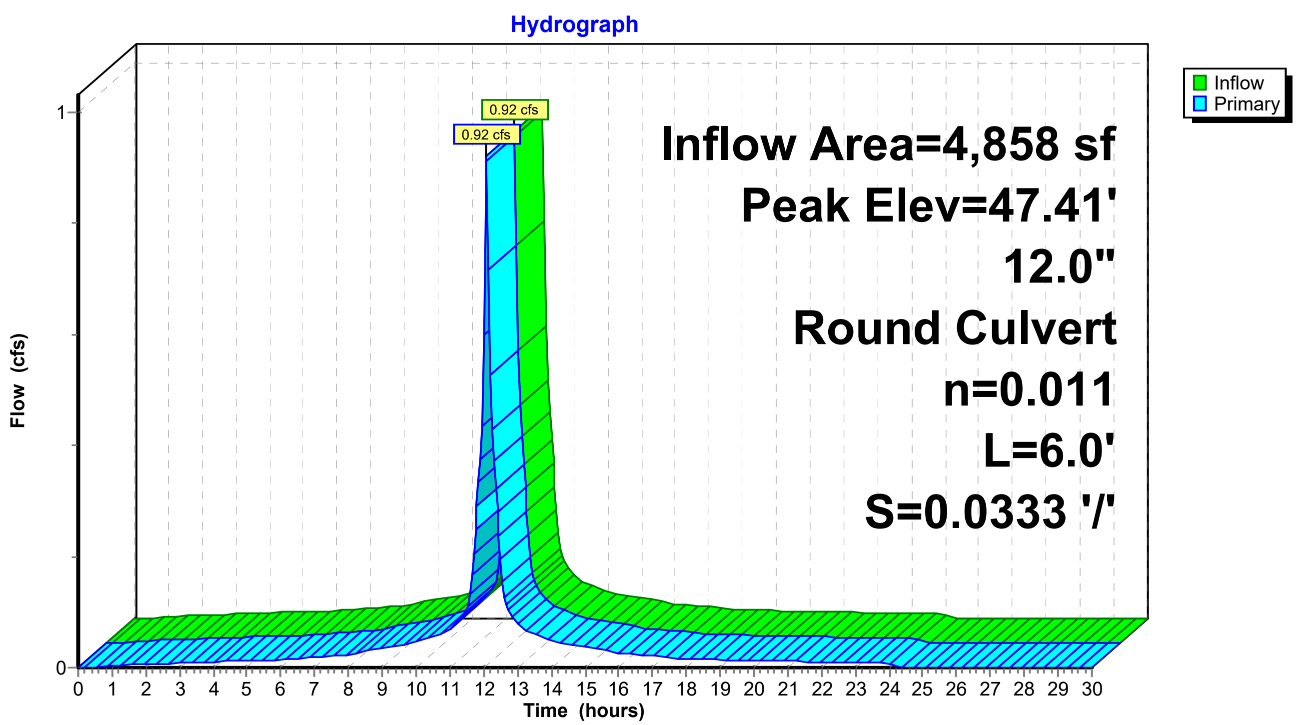
Inflow Area =	4,858 sf,	99.28% Impervious,	Inflow Depth = 8.38"	for 100 yr event	
Inflow =	0.92 cfs @	12.09 hrs, Volume=	3,392 cf		
Outflow =	0.92 cfs @	12.09 hrs, Volume=	3,392 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	0.92 cfs @	12.09 hrs, Volume=	3,392 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.41' @ 12.10 hrs
Flood Elev= 49.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 46.90' / 46.70' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.85 cfs @ 12.09 hrs HW=47.40' TW=47.14' (Dynamic Tailwater)
└—**1=Culvert** (Outlet Controls 0.85 cfs @ 3.14 fps)

Pond CB103:



Summary for Pond CB104:

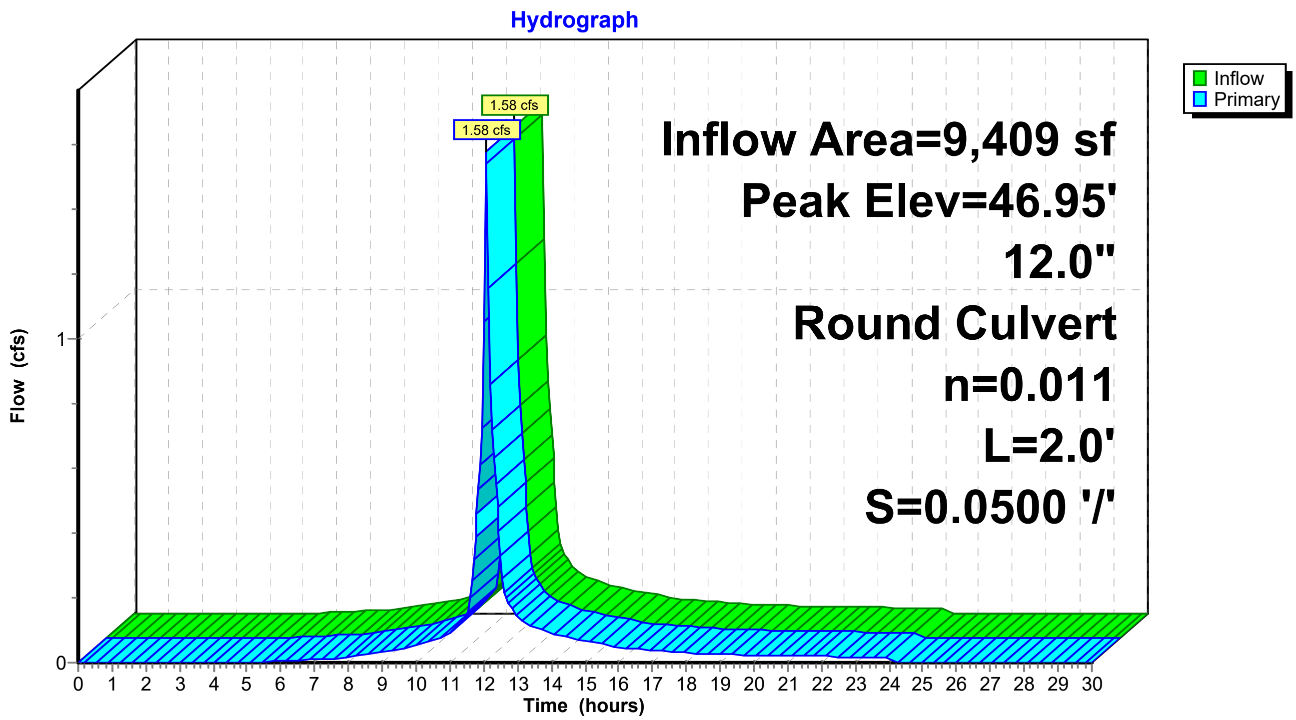
Inflow Area =	9,409 sf,	56.68% Impervious,	Inflow Depth = 6.45"	for 100 yr event	
Inflow =	1.58 cfs @	12.08 hrs, Volume=	5,058 cf		
Outflow =	1.58 cfs @	12.08 hrs, Volume=	5,058 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	1.58 cfs @	12.08 hrs, Volume=	5,058 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 46.95' @ 12.08 hrs
Flood Elev= 48.93'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 2.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.10' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.53 cfs @ 12.08 hrs HW=46.93' TW=45.97' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 1.53 cfs @ 3.44 fps)

Pond CB104:



Summary for Pond CB2:

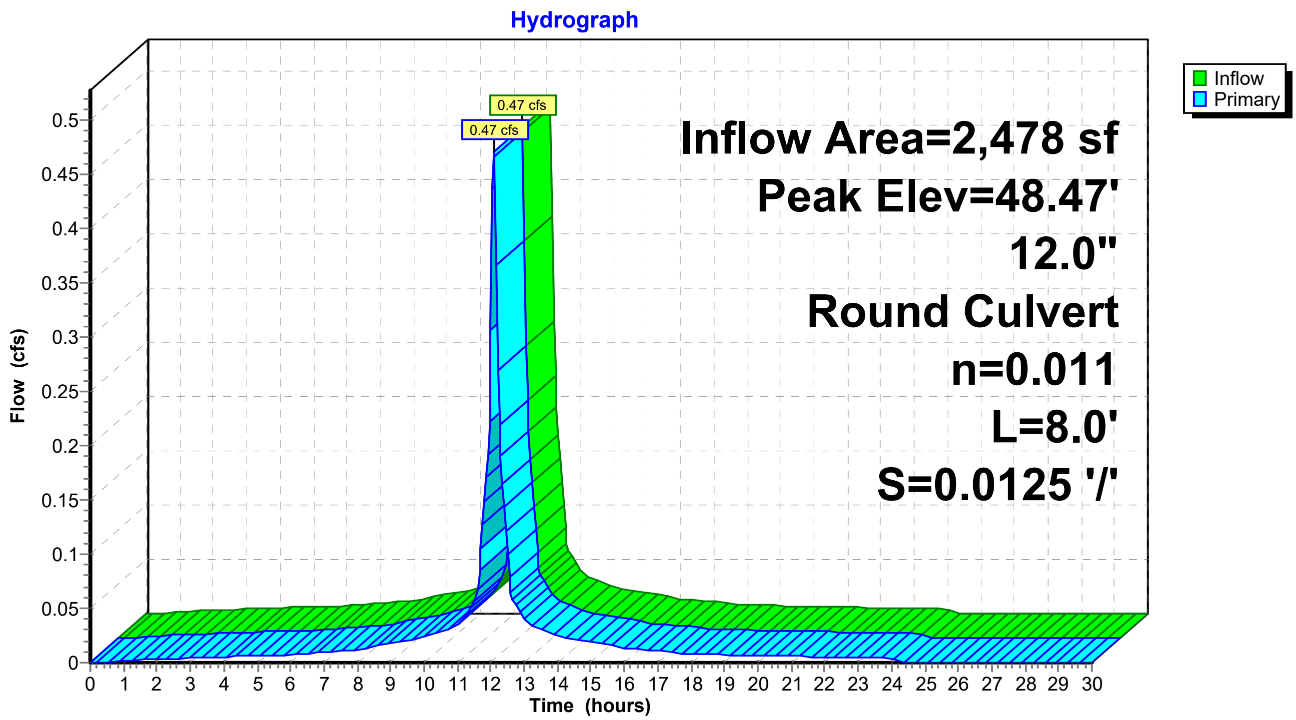
Inflow Area = 2,478 sf,100.00% Impervious, Inflow Depth = 8.38" for 100 yr event
Inflow = 0.47 cfs @ 12.09 hrs, Volume= 1,730 cf
Outflow = 0.47 cfs @ 12.09 hrs, Volume= 1,730 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.47 cfs @ 12.09 hrs, Volume= 1,730 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.47' @ 12.24 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.60'	**12.0" Round Culvert** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 47.60' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.14' TW=48.18' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB2:



Summary for Pond CB3:

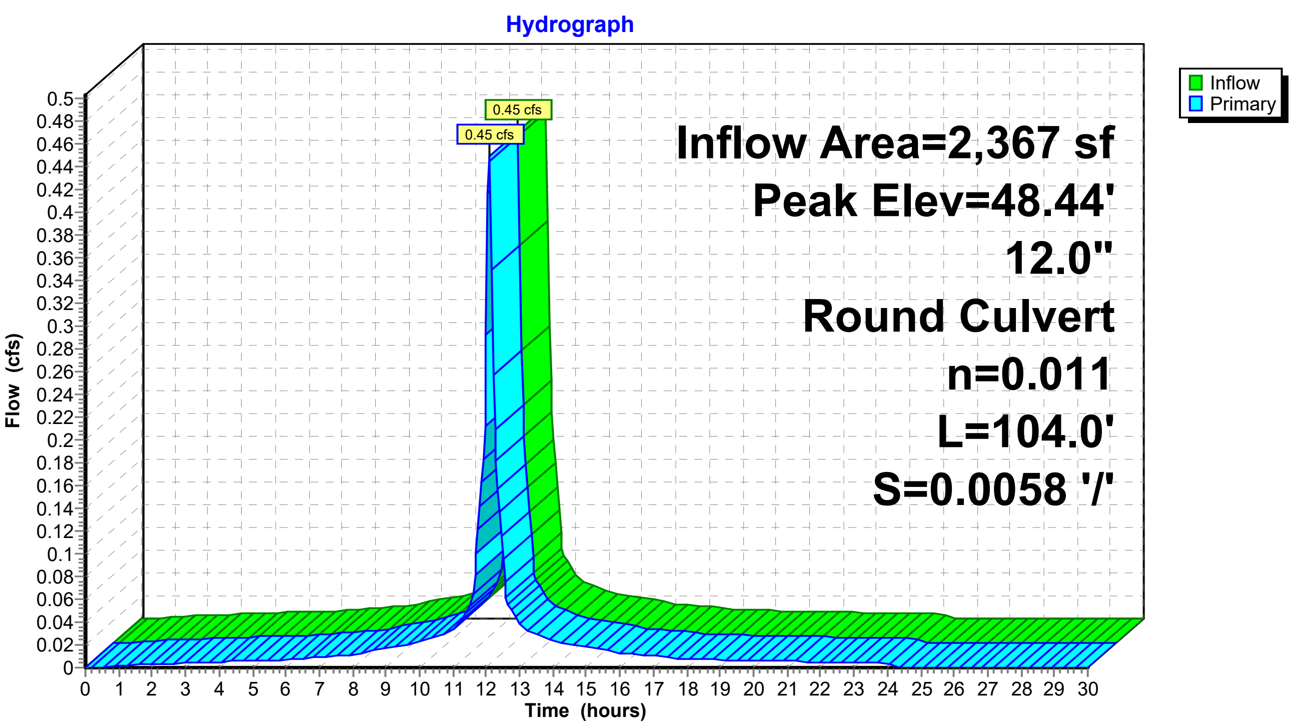
Inflow Area = 2,367 sf,100.00% Impervious, Inflow Depth = 8.38" for 100 yr event
Inflow = 0.45 cfs @ 12.09 hrs, Volume= 1,653 cf
Outflow = 0.45 cfs @ 12.09 hrs, Volume= 1,653 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.45 cfs @ 12.09 hrs, Volume= 1,653 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.44' @ 12.19 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.80'	**12.0" Round Culvert** L= 104.0' Ke= 0.500 Inlet / Outlet Invert= 47.80' / 47.20' S= 0.0058 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.16 cfs @ 12.09 hrs HW=48.26' TW=48.23' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.16 cfs @ 0.65 fps)

Pond CB3:

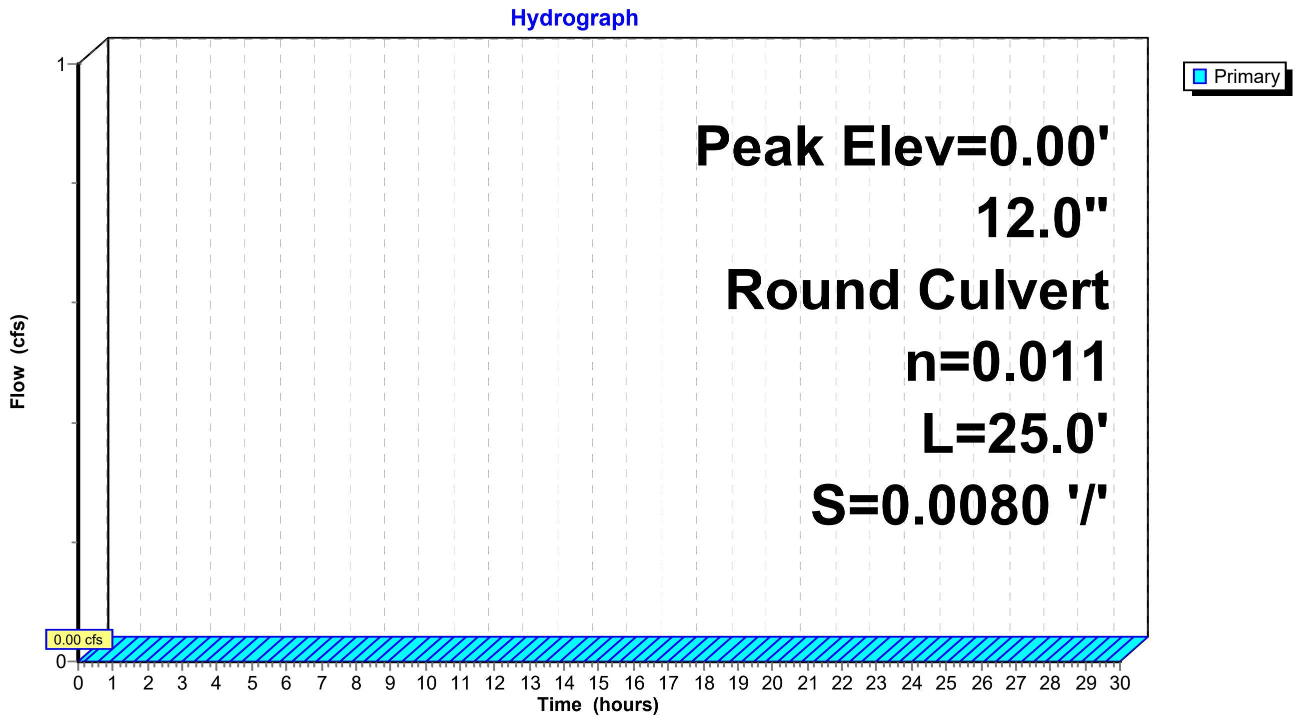


Summary for Pond CB4:

Device	Routing	Invert	Outlet Devices
#1	Primary	47.40'	**12.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 47.40' / 47.20' S= 0.0080 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=47.10' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond CB4:



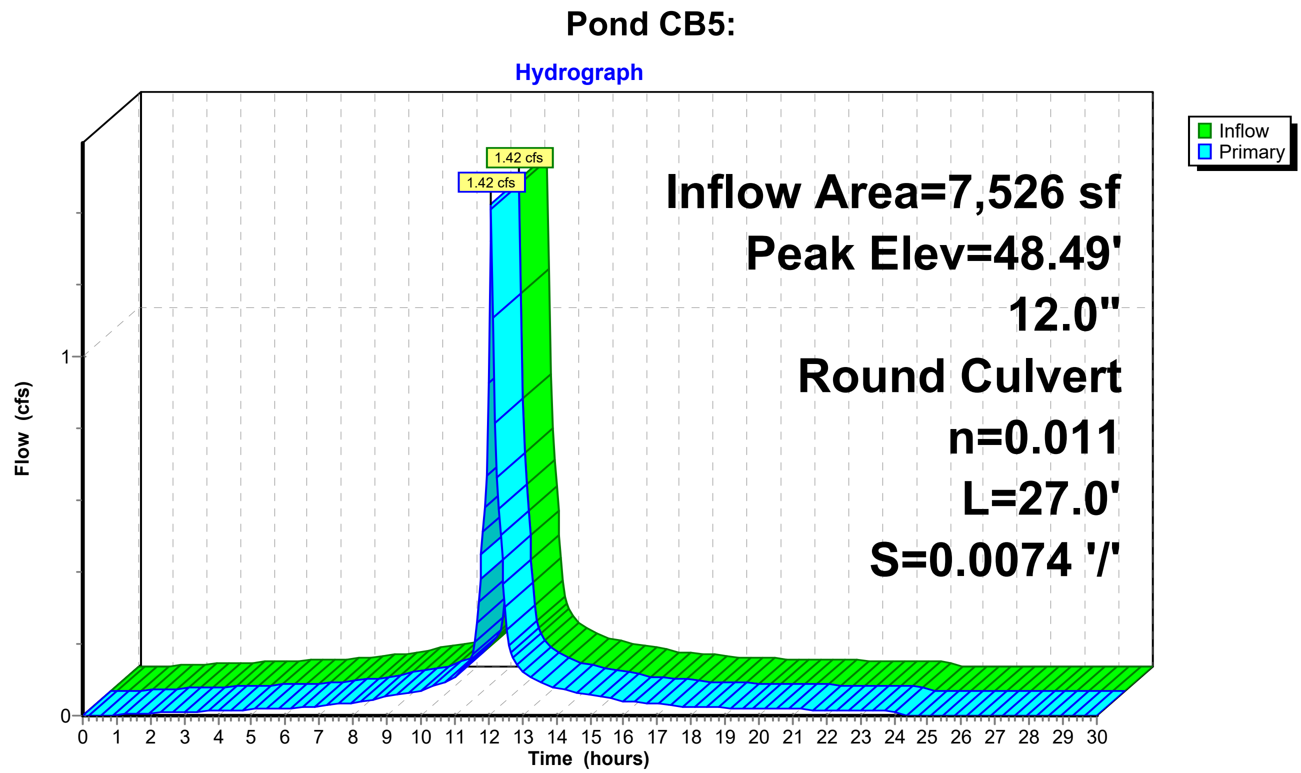
Summary for Pond CB5:

Inflow Area = 7,526 sf, 97.81% Impervious, Inflow Depth = 8.26" for 100 yr event
Inflow = 1.42 cfs @ 12.09 hrs, Volume= 5,180 cf
Outflow = 1.42 cfs @ 12.09 hrs, Volume= 5,180 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.42 cfs @ 12.09 hrs, Volume= 5,180 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.49' @ 12.14 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.00'	**12.0" Round Culvert** L= 27.0' Ke= 0.500 Inlet / Outlet Invert= 47.00' / 46.80' S= 0.0074 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.35' TW=48.36' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)



Summary for Pond CB6:

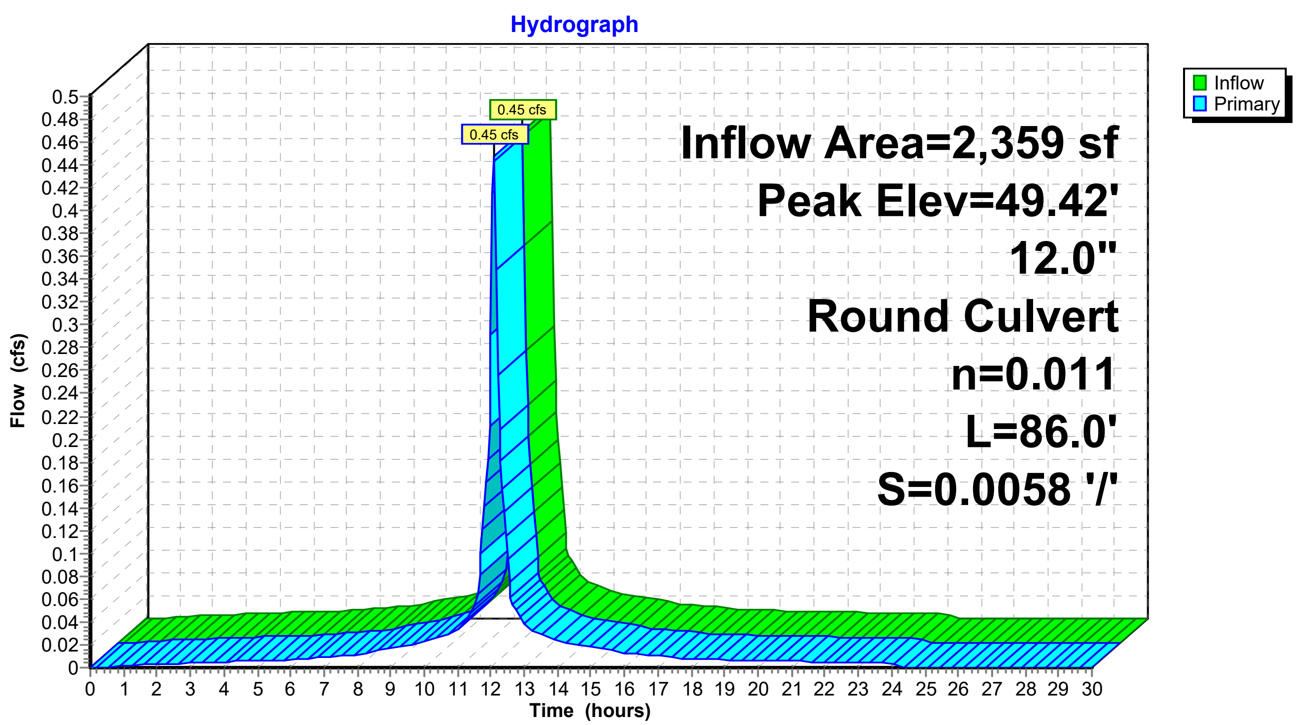
Inflow Area =	2,359 sf,100.00% Impervious,	Inflow Depth = 8.38"	for 100 yr event	
Inflow =	0.45 cfs @	12.09 hrs, Volume=	1,647 cf	
Outflow =	0.45 cfs @	12.09 hrs, Volume=	1,647 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.45 cfs @	12.09 hrs, Volume=	1,647 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 49.42' @ 12.21 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 86.0' Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0058 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.53' TW=48.80' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB6:



Summary for Pond CB7:

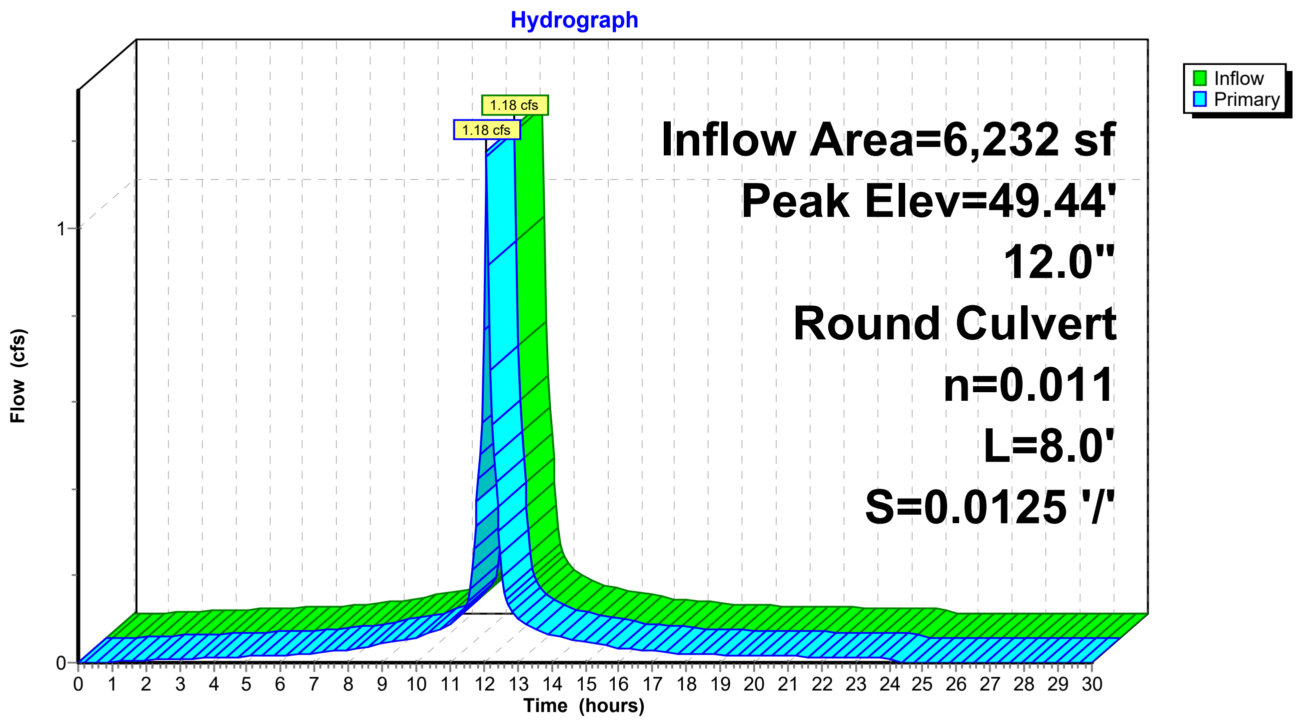
Inflow Area = 6,232 sf, 97.35% Impervious, Inflow Depth = 8.26" for 100 yr event
Inflow = 1.18 cfs @ 12.09 hrs, Volume= 4,290 cf
Outflow = 1.18 cfs @ 12.09 hrs, Volume= 4,290 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.18 cfs @ 12.09 hrs, Volume= 4,290 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 49.44' @ 12.21 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.60'	**12.0" Round Culvert** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 47.60' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.50' TW=48.80' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB7:



Summary for Pond CB8:

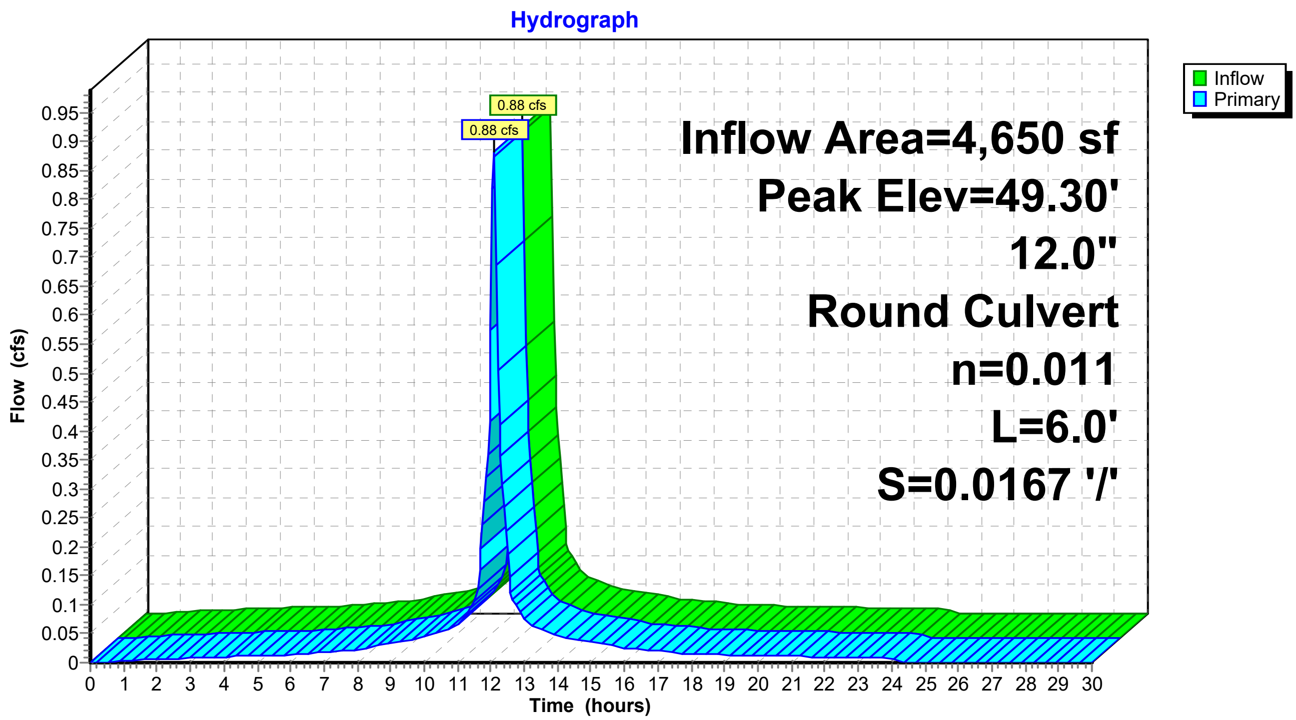
Inflow Area = 4,650 sf,100.00% Impervious, Inflow Depth = 8.38" for 100 yr event
Inflow = 0.88 cfs @ 12.09 hrs, Volume= 3,247 cf
Outflow = 0.88 cfs @ 12.09 hrs, Volume= 3,247 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.88 cfs @ 12.09 hrs, Volume= 3,247 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 49.30' @ 12.17 hrs
Flood Elev= 51.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.80'	**12.0" Round Culvert** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 46.80' / 46.70' S= 0.0167 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.56' TW=49.06' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB8:



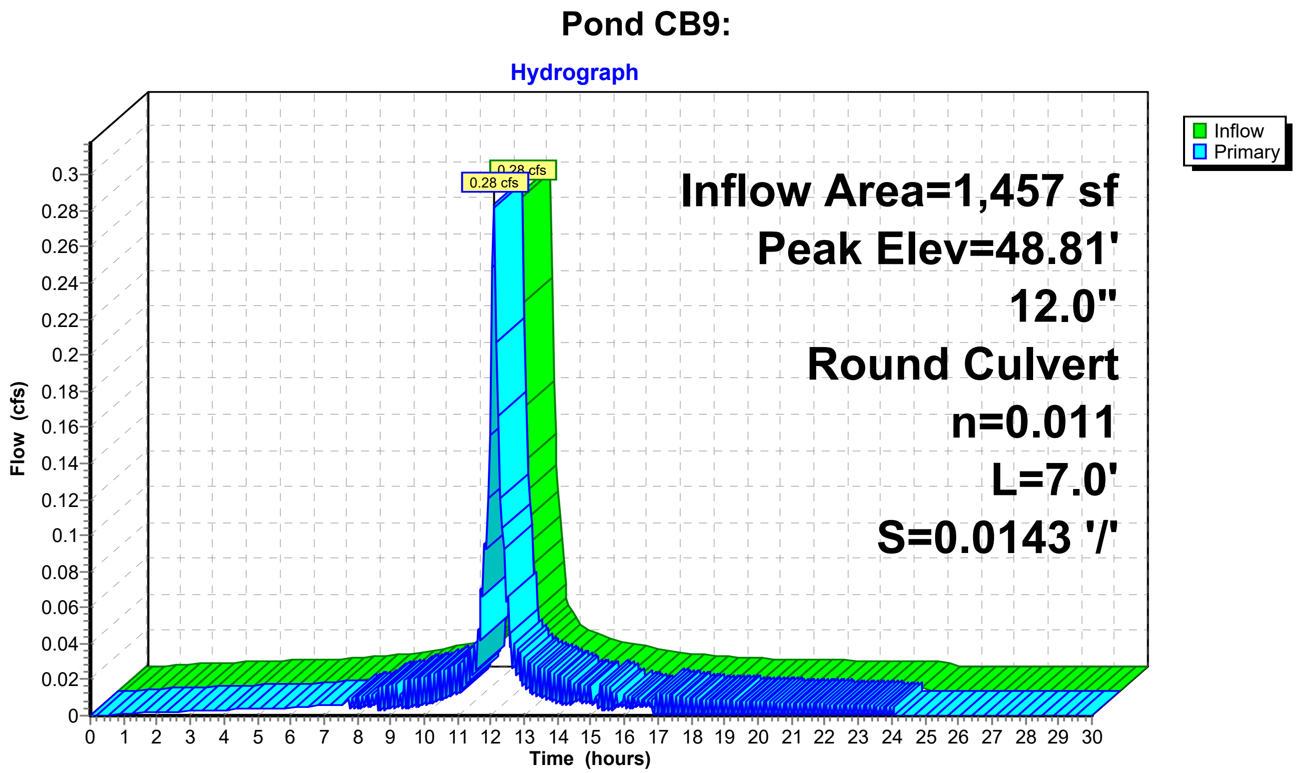
Summary for Pond CB9:

Inflow Area = 1,457 sf,100.00% Impervious, Inflow Depth = 8.38" for 100 yr event
Inflow = 0.28 cfs @ 12.09 hrs, Volume= 1,017 cf
Outflow = 0.28 cfs @ 12.09 hrs, Volume= 1,012 cf, Atten= 0%, Lag= 0.2 min
Primary = 0.28 cfs @ 12.09 hrs, Volume= 1,012 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.81' @ 12.14 hrs
Flood Elev= 50.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.10'	**12.0" Round Culvert** L= 7.0' Ke= 0.500 Inlet / Outlet Invert= 46.10' / 46.00' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.51' TW=48.76' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)



Summary for Pond DMH1:

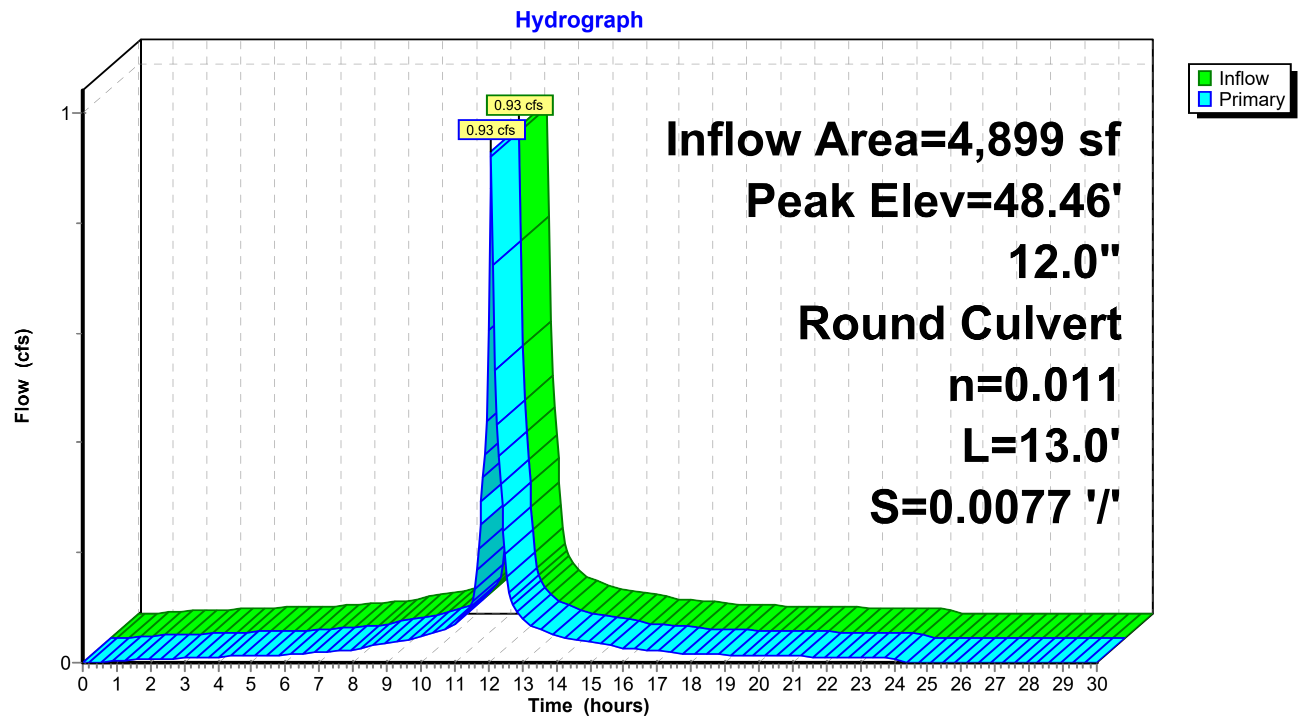
Inflow Area = 4,899 sf,100.00% Impervious, Inflow Depth = 8.38" for 100 yr event
Inflow = 0.93 cfs @ 12.09 hrs, Volume= 3,421 cf
Outflow = 0.93 cfs @ 12.09 hrs, Volume= 3,421 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.93 cfs @ 12.09 hrs, Volume= 3,421 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.46' @ 12.19 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.40'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 47.40' / 47.30' S= 0.0077 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.18' TW=48.30' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond DMH1:



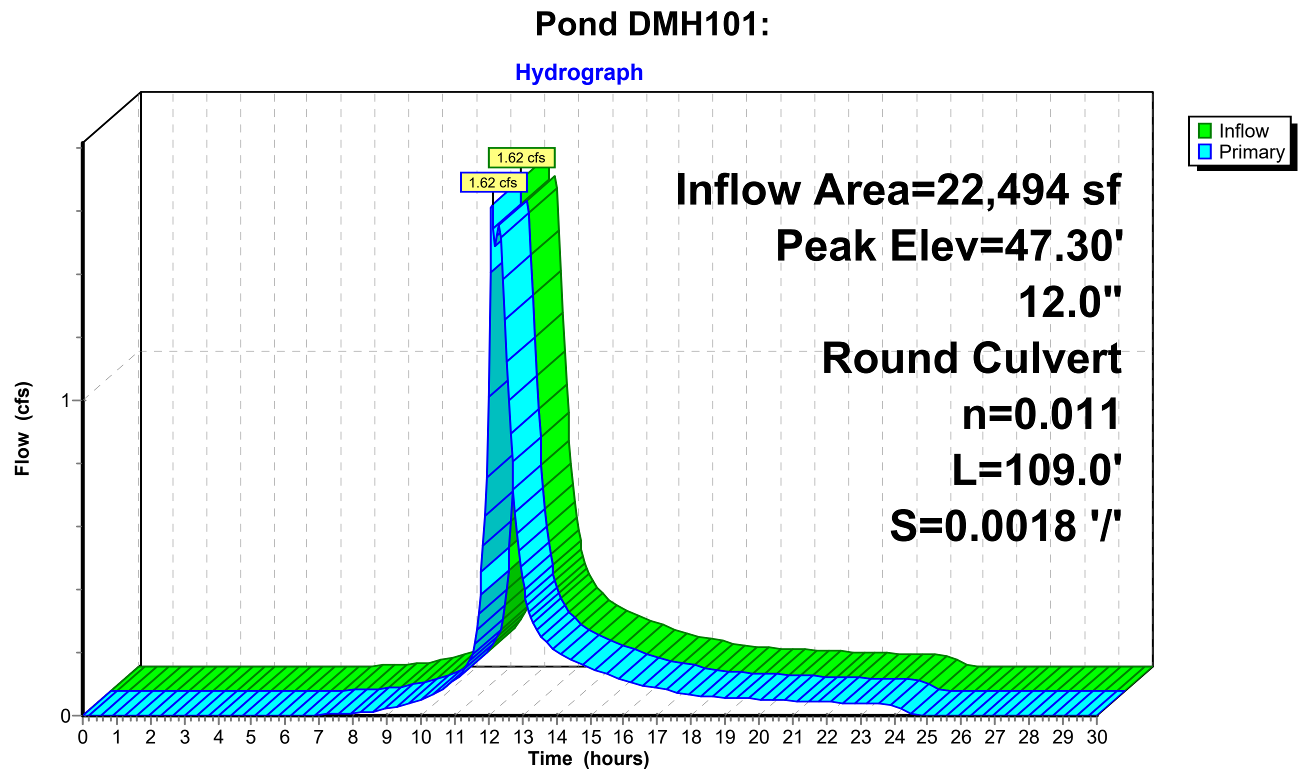
Summary for Pond DMH101:

Inflow Area = 22,494 sf, 25.27% Impervious, Inflow Depth = 4.99" for 100 yr event
Inflow = 1.62 cfs @ 12.11 hrs, Volume= 9,351 cf
Outflow = 1.62 cfs @ 12.11 hrs, Volume= 9,351 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.62 cfs @ 12.11 hrs, Volume= 9,351 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.30' @ 12.14 hrs
Flood Elev= 49.94'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.20'	**12.0" Round Culvert** L= 109.0' Ke= 0.500 Inlet / Outlet Invert= 46.20' / 46.00' S= 0.0018 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.49 cfs @ 12.11 hrs HW=47.27' TW=47.02' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 1.49 cfs @ 2.20 fps)



Summary for Pond DMH102:

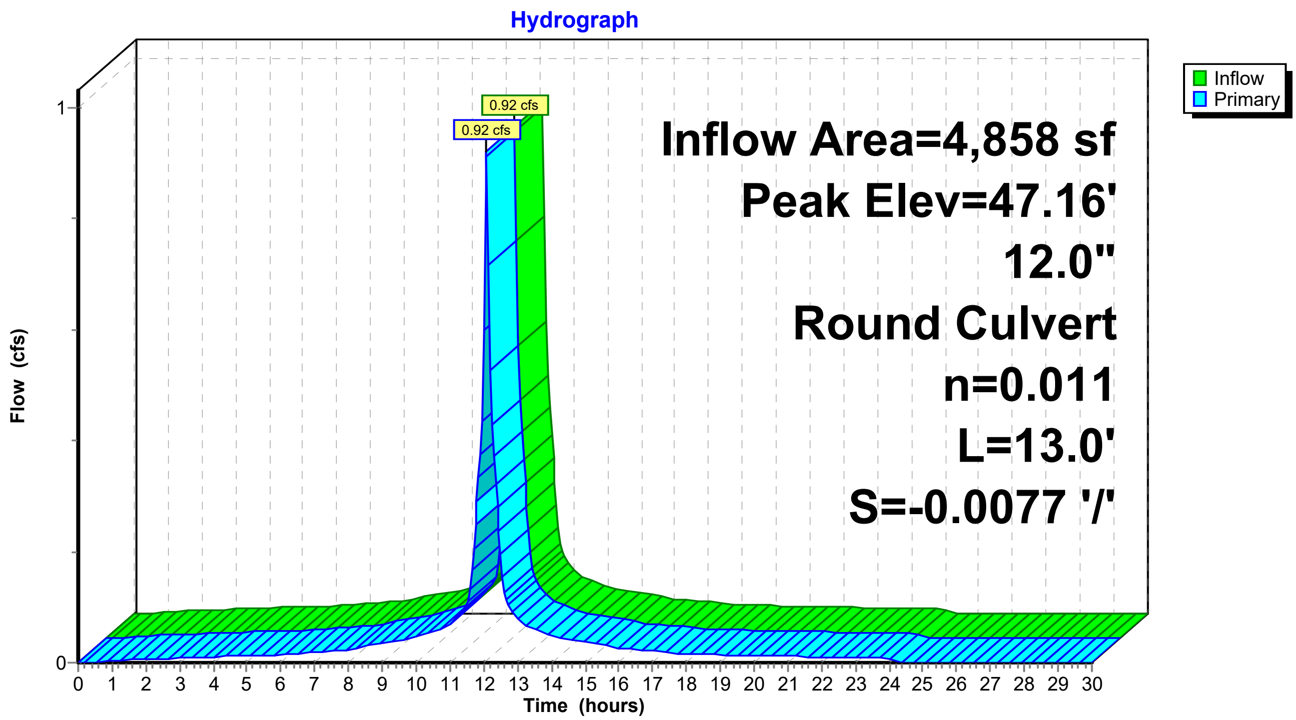
Inflow Area = 4,858 sf, 99.28% Impervious, Inflow Depth = 8.38" for 100 yr event
Inflow = 0.92 cfs @ 12.09 hrs, Volume= 3,392 cf
Outflow = 0.92 cfs @ 12.09 hrs, Volume= 3,392 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.92 cfs @ 12.09 hrs, Volume= 3,392 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.16' @ 12.13 hrs
Flood Elev= 49.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.60'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 46.50' / 46.60' S= -0.0077 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.74 cfs @ 12.09 hrs HW=47.14' TW=47.02' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.74 cfs @ 1.70 fps)

Pond DMH102:



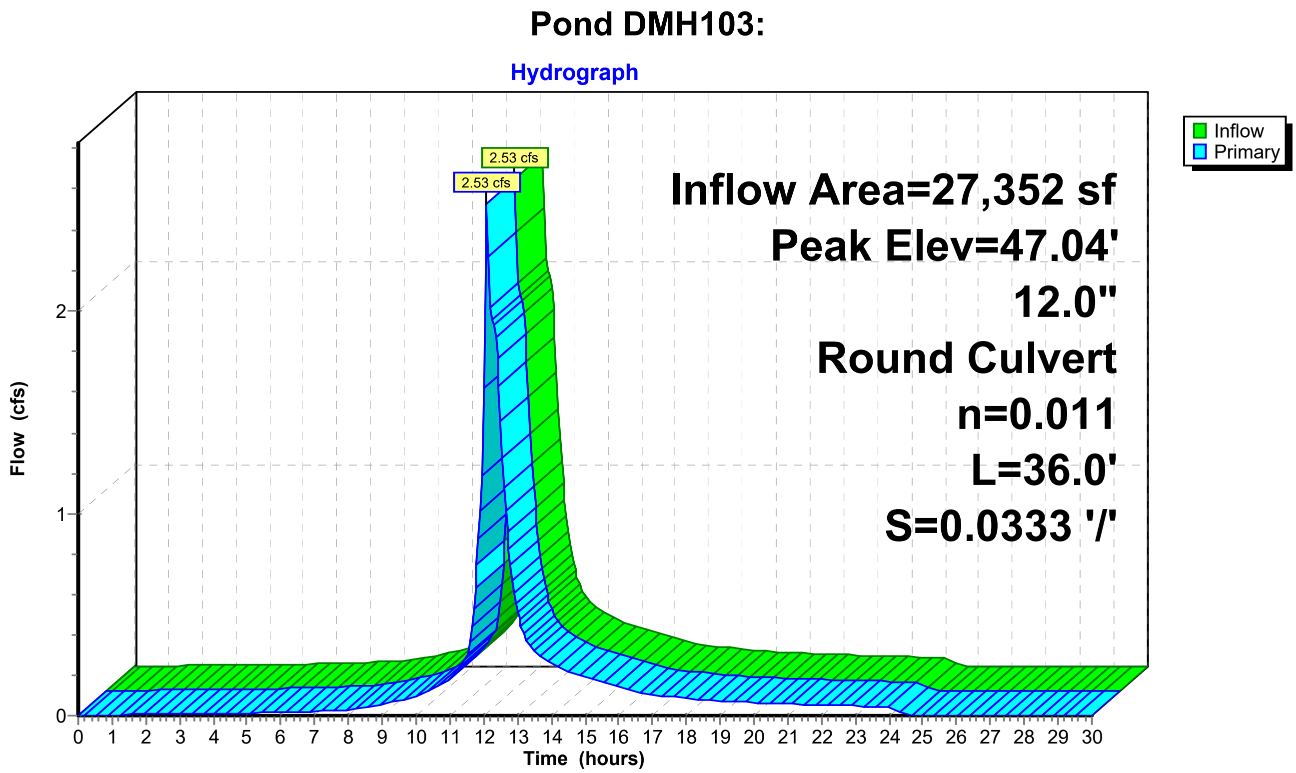
Summary for Pond DMH103:

Inflow Area =	27,352 sf,	38.41% Impervious,	Inflow Depth = 5.59"	for 100 yr event	
Inflow =	2.53 cfs @	12.10 hrs,	Volume=	12,744 cf	
Outflow =	2.53 cfs @	12.10 hrs,	Volume=	12,744 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.53 cfs @	12.10 hrs,	Volume=	12,744 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.04' @ 12.10 hrs
Flood Elev= 50.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.10'	**12.0" Round Culvert** L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 46.10' / 44.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.53 cfs @ 12.10 hrs HW=47.04' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 2.53 cfs @ 3.30 fps)



Summary for Pond DMH104:

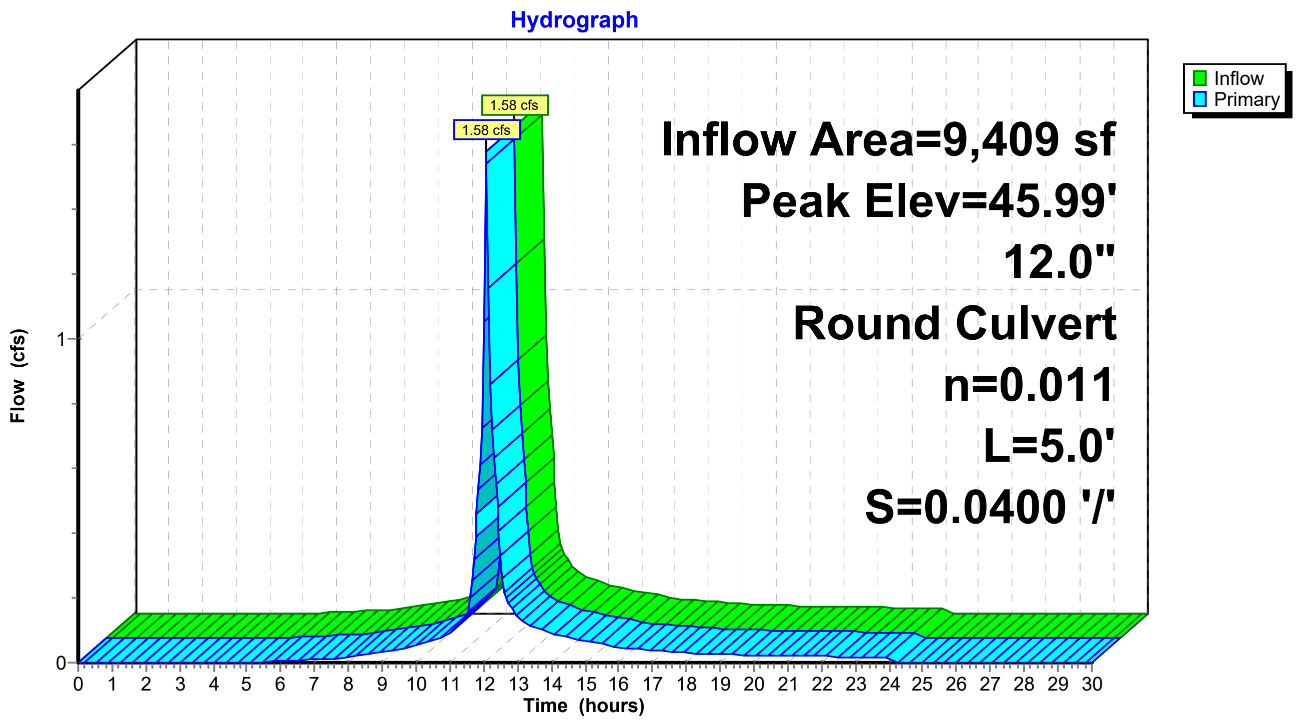
Inflow Area = 9,409 sf, 56.68% Impervious, Inflow Depth = 6.45" for 100 yr event
Inflow = 1.58 cfs @ 12.08 hrs, Volume= 5,058 cf
Outflow = 1.58 cfs @ 12.08 hrs, Volume= 5,058 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.58 cfs @ 12.08 hrs, Volume= 5,058 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 45.99' @ 12.08 hrs
Flood Elev= 49.08'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.30'	**12.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 45.30' / 45.10' S= 0.0400 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.53 cfs @ 12.08 hrs HW=45.97' TW=0.00' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.53 cfs @ 3.84 fps)

Pond DMH104:

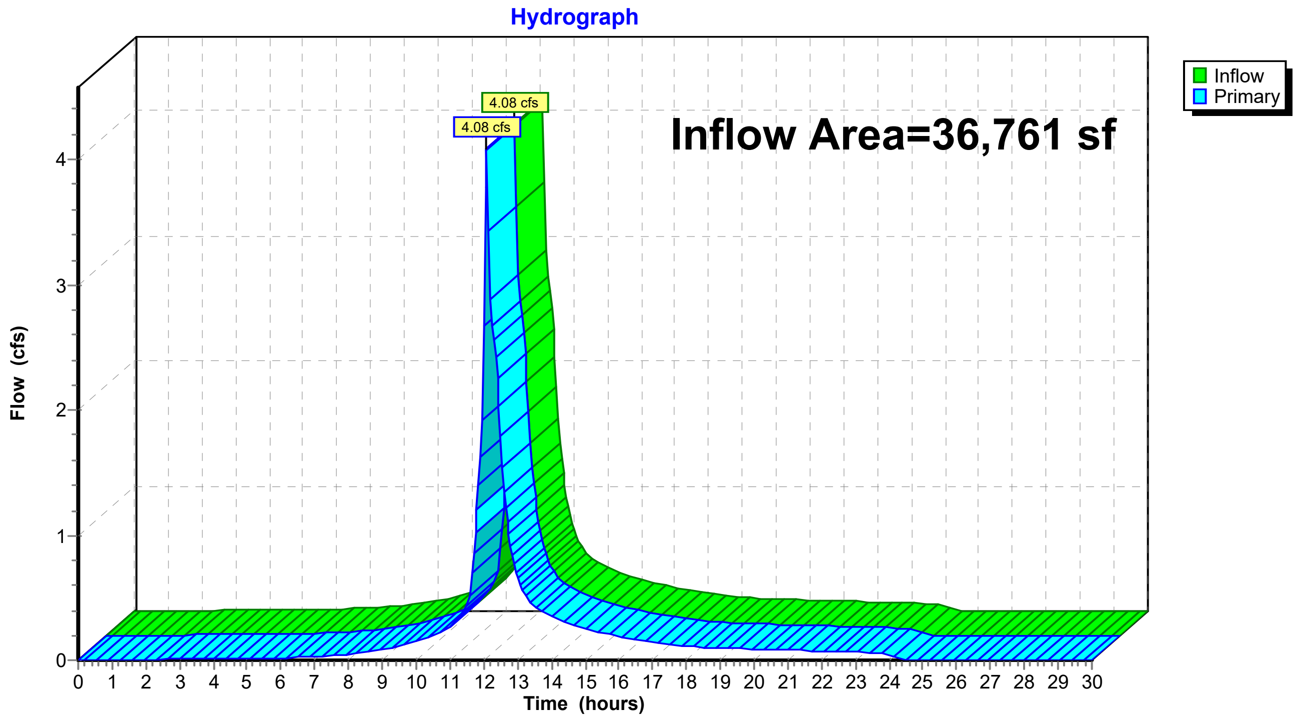


Summary for Pond DMH105:

Inflow Area = 36,761 sf, 43.09% Impervious, Inflow Depth = 5.81" for 100 yr event
Inflow = 4.08 cfs @ 12.09 hrs, Volume= 17,801 cf
Primary = 4.08 cfs @ 12.09 hrs, Volume= 17,801 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond DMH105:



Summary for Pond DMH2:

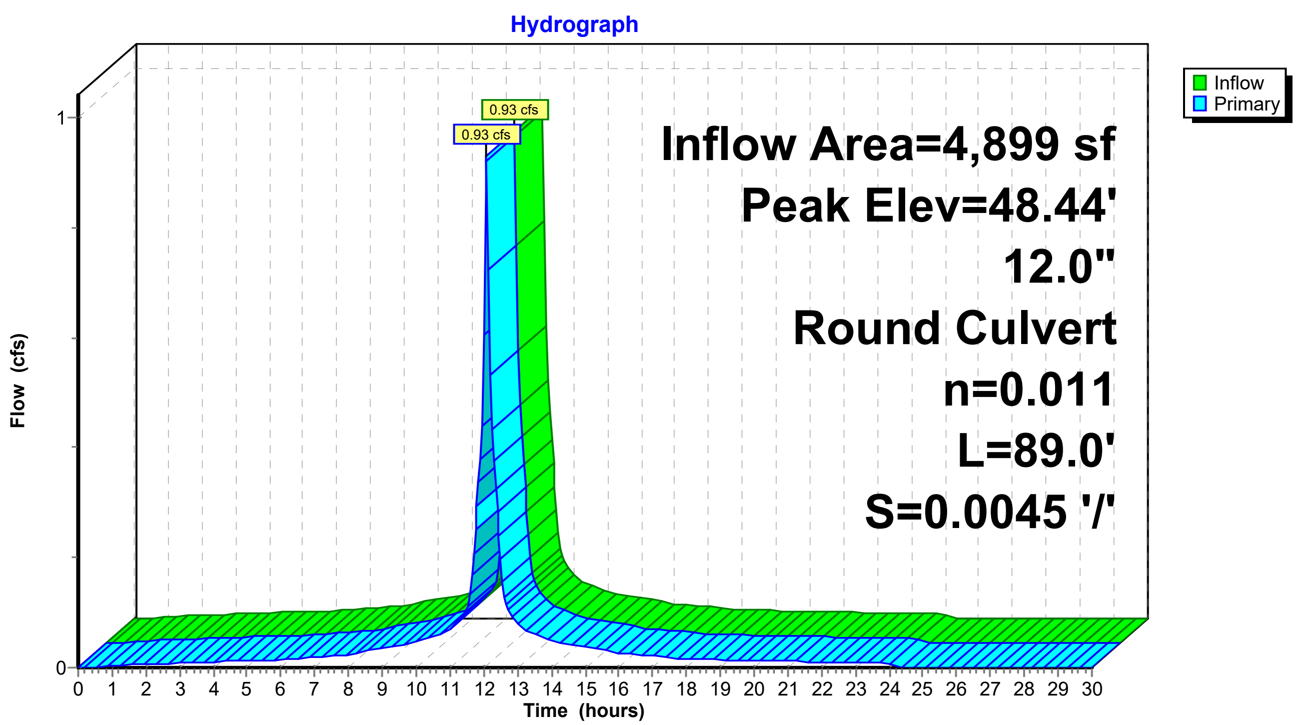
Inflow Area = 4,899 sf,100.00% Impervious, Inflow Depth = 8.38" for 100 yr event
Inflow = 0.93 cfs @ 12.09 hrs, Volume= 3,421 cf
Outflow = 0.93 cfs @ 12.09 hrs, Volume= 3,421 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.93 cfs @ 12.09 hrs, Volume= 3,421 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.44' @ 12.14 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.20'	**12.0" Round Culvert** L= 89.0' Ke= 0.500 Inlet / Outlet Invert= 47.20' / 46.80' S= 0.0045 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.30' TW=48.36' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond DMH2:



Summary for Pond DMH3:

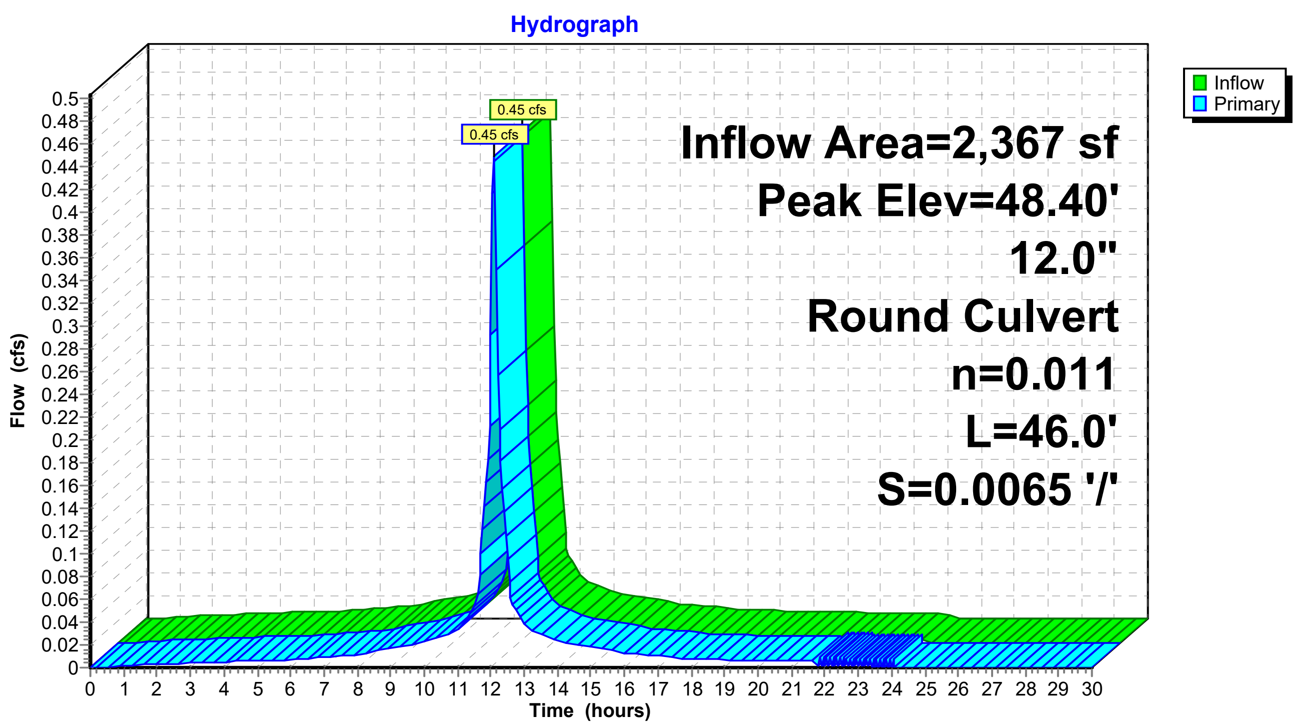
Inflow Area = 2,367 sf,100.00% Impervious, Inflow Depth = 8.38" for 100 yr event
Inflow = 0.45 cfs @ 12.09 hrs, Volume= 1,653 cf
Outflow = 0.45 cfs @ 12.09 hrs, Volume= 1,653 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.45 cfs @ 12.09 hrs, Volume= 1,653 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.40' @ 12.14 hrs
Flood Elev= 51.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.10'	**12.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 47.10' / 46.80' S= 0.0065 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.23' TW=48.36' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond DMH3:



Summary for Pond DMH4:

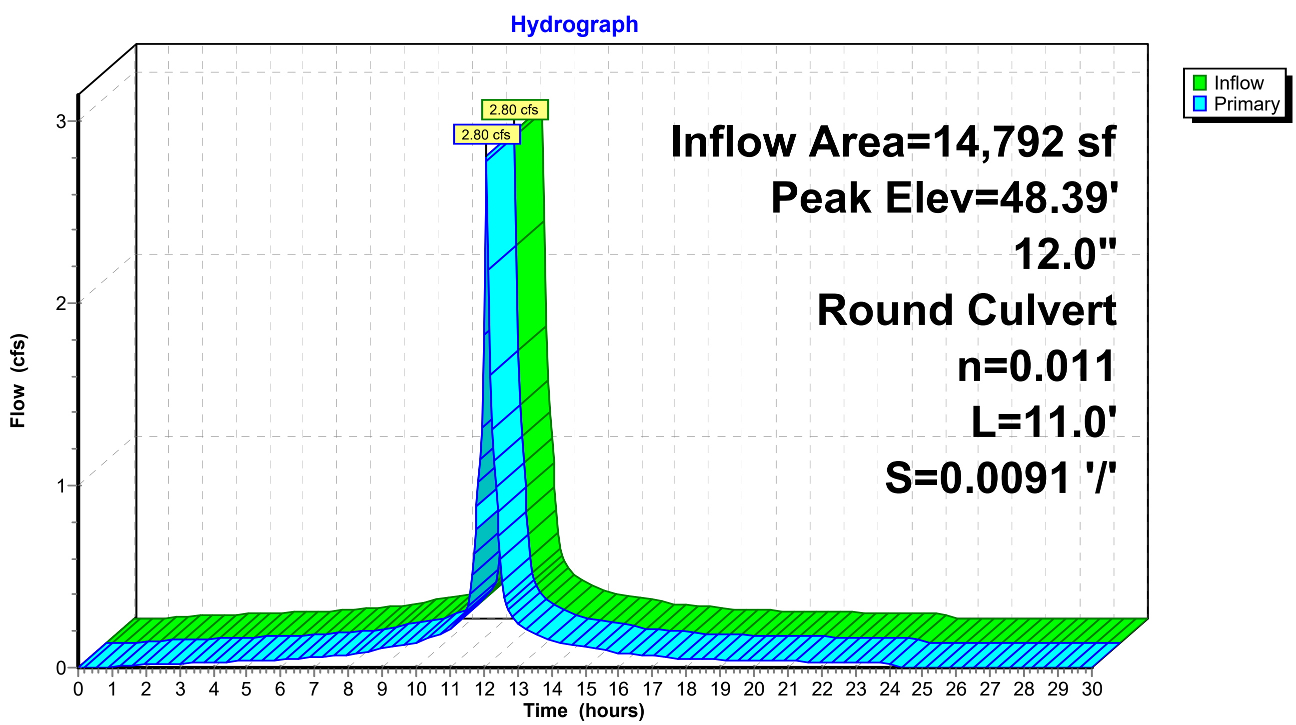
Inflow Area = 14,792 sf, 98.88% Impervious, Inflow Depth = 8.32" for 100 yr event
Inflow = 2.80 cfs @ 12.09 hrs, Volume= 10,254 cf
Outflow = 2.80 cfs @ 12.09 hrs, Volume= 10,254 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.80 cfs @ 12.09 hrs, Volume= 10,254 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.39' @ 12.09 hrs
Flood Elev= 50.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.70'	**12.0" Round Culvert** L= 11.0' Ke= 0.500 Inlet / Outlet Invert= 46.70' / 46.60' S= 0.0091 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.64 cfs @ 12.09 hrs HW=48.36' TW=47.87' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.64 cfs @ 3.37 fps)

Pond DMH4:



Summary for Pond DMH5:

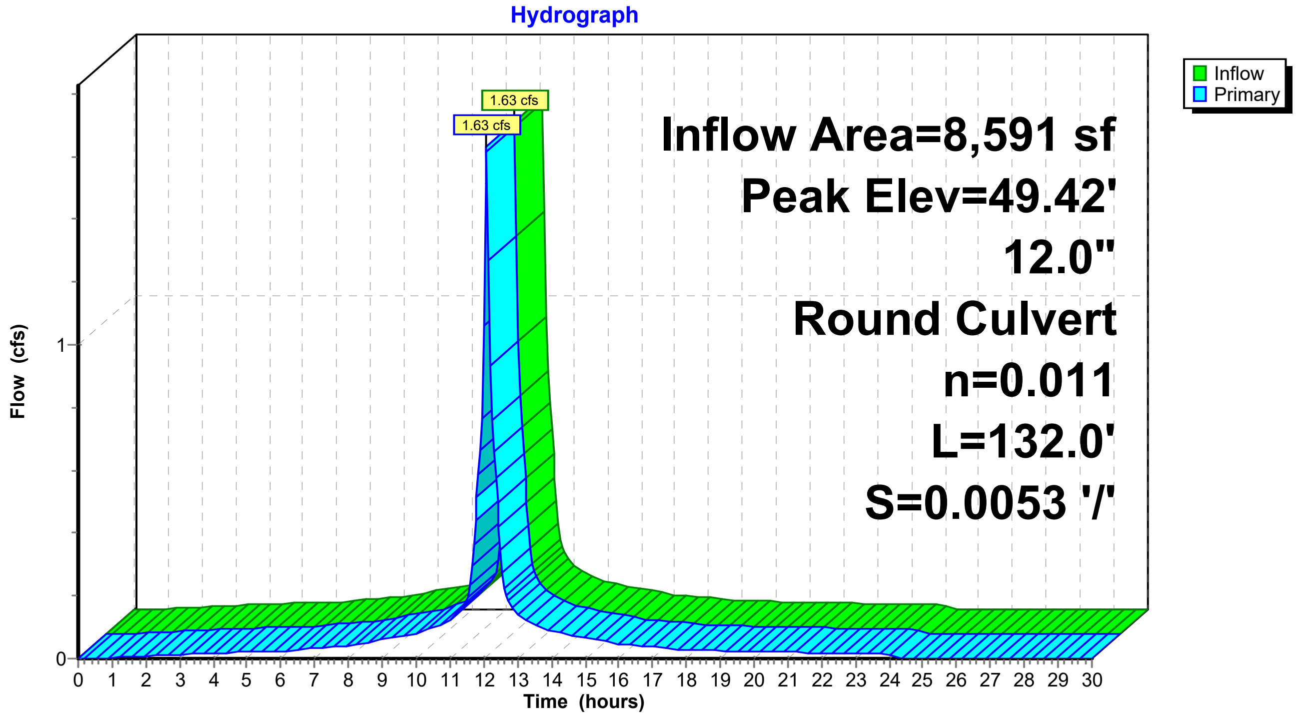
Inflow Area = 8,591 sf, 98.08% Impervious, Inflow Depth = 8.29" for 100 yr event
Inflow = 1.63 cfs @ 12.09 hrs, Volume= 5,937 cf
Outflow = 1.63 cfs @ 12.09 hrs, Volume= 5,937 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.63 cfs @ 12.09 hrs, Volume= 5,937 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 49.42' @ 12.17 hrs
Flood Elev= 52.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	47.40'	**12.0" Round Culvert** L= 132.0' Ke= 0.500 Inlet / Outlet Invert= 47.40' / 46.70' S= 0.0053 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=48.80' TW=49.06' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond DMH5:



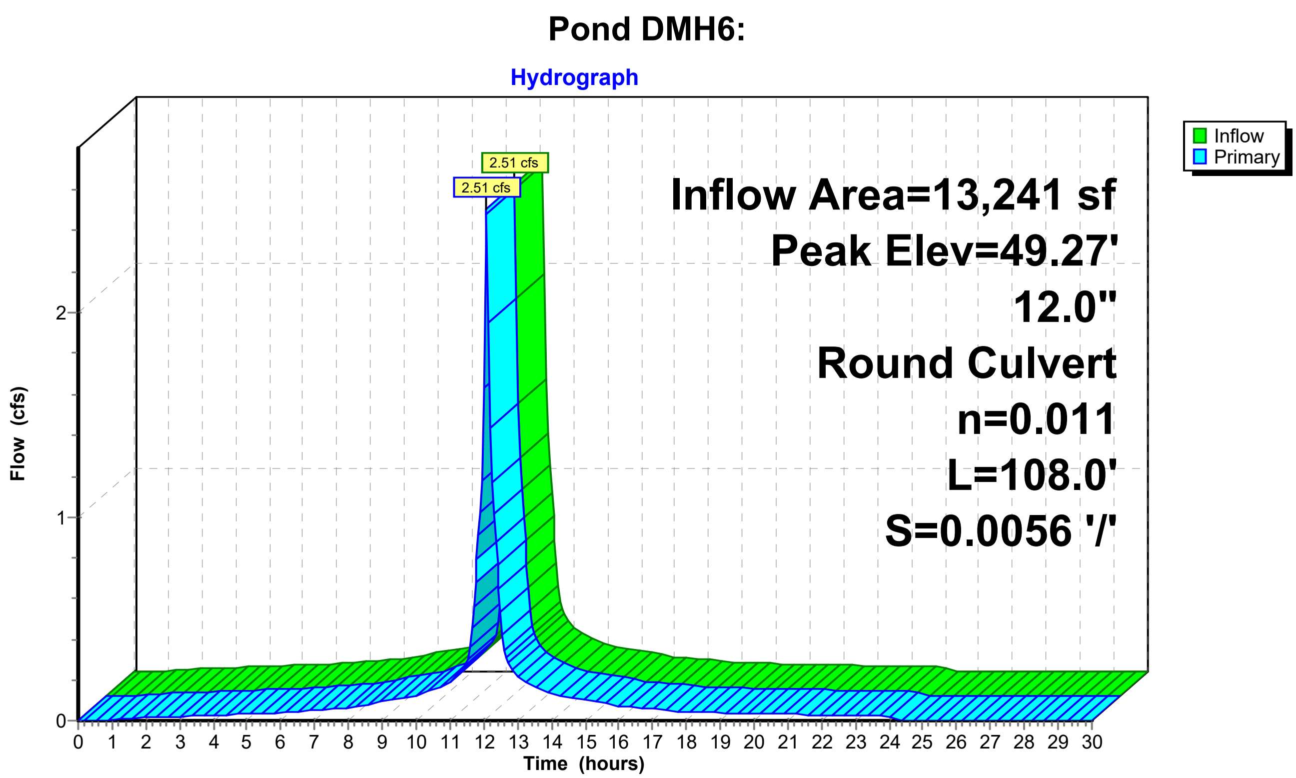
Summary for Pond DMH6:

Inflow Area =	13,241 sf,	98.75% Impervious,	Inflow Depth = 8.32"	for 100 yr event	
Inflow =	2.51 cfs @	12.09 hrs,	Volume=	9,184 cf	
Outflow =	2.51 cfs @	12.09 hrs,	Volume=	9,184 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.51 cfs @	12.09 hrs,	Volume=	9,184 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 49.27' @ 12.12 hrs
Flood Elev= 51.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	46.60'	**12.0" Round Culvert** L= 108.0' Ke= 0.500 Inlet / Outlet Invert= 46.60' / 46.00' S= 0.0056 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.76 cfs @ 12.09 hrs HW=49.06' TW=48.75' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.76 cfs @ 2.24 fps)



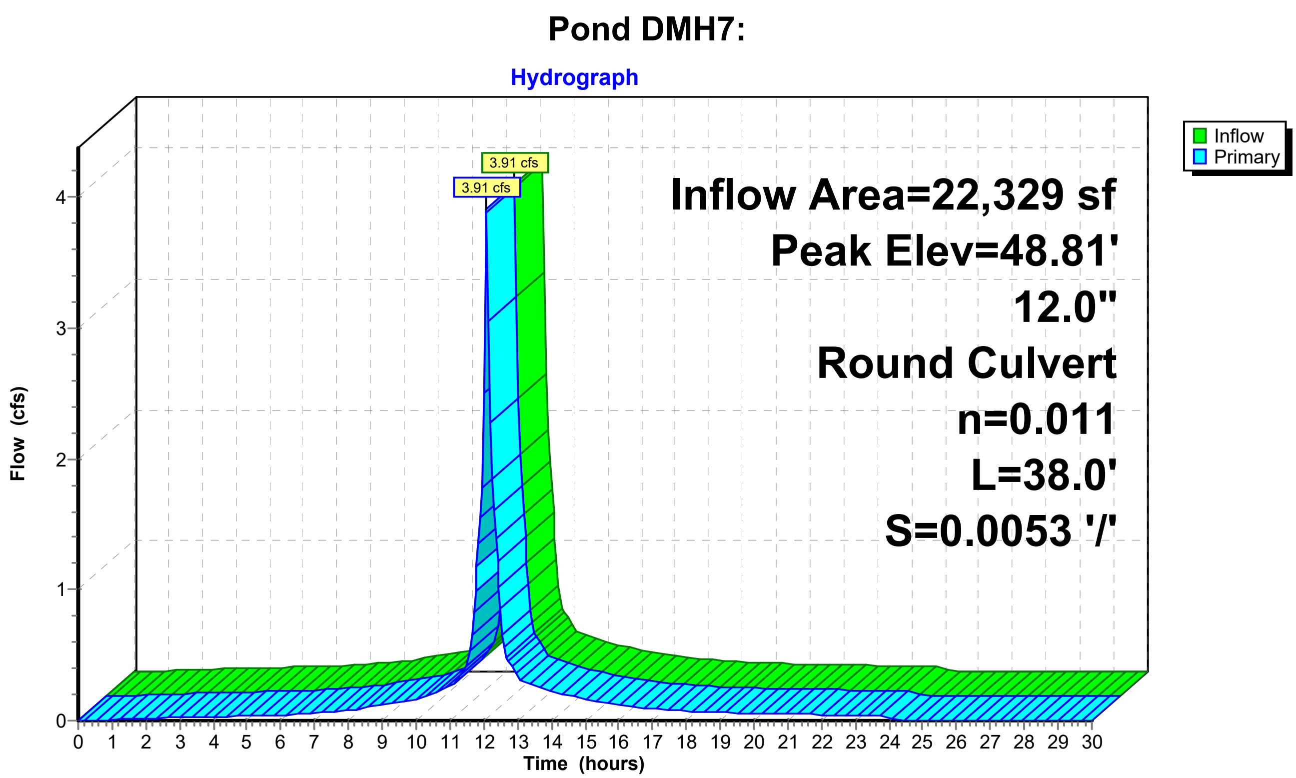
Summary for Pond DMH7:

Inflow Area = 22,329 sf, 77.60% Impervious, Inflow Depth = 7.39" for 100 yr event
Inflow = 3.91 cfs @ 12.09 hrs, Volume= 13,759 cf
Outflow = 3.91 cfs @ 12.09 hrs, Volume= 13,759 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.91 cfs @ 12.09 hrs, Volume= 13,759 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 48.81' @ 12.09 hrs
Flood Elev= 51.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.90'	**12.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 45.90' / 45.70' S= 0.0053 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.74 cfs @ 12.09 hrs HW=48.76' TW=47.78' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.74 cfs @ 4.76 fps)



Summary for Pond Pd1: Infiltration Basin

Inflow Area = 150,987 sf, 41.38% Impervious, Inflow Depth = 5.38" for 100 yr event
Inflow = 15.39 cfs @ 12.11 hrs, Volume= 67,689 cf
Outflow = 3.17 cfs @ 12.79 hrs, Volume= 67,813 cf, Atten= 79%, Lag= 40.6 min
Discarded = 3.17 cfs @ 12.79 hrs, Volume= 67,813 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.07' @ 12.79 hrs Surf.Area= 19,916 sf Storage= 19,395 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 42.4 min (847.3 - 804.9)

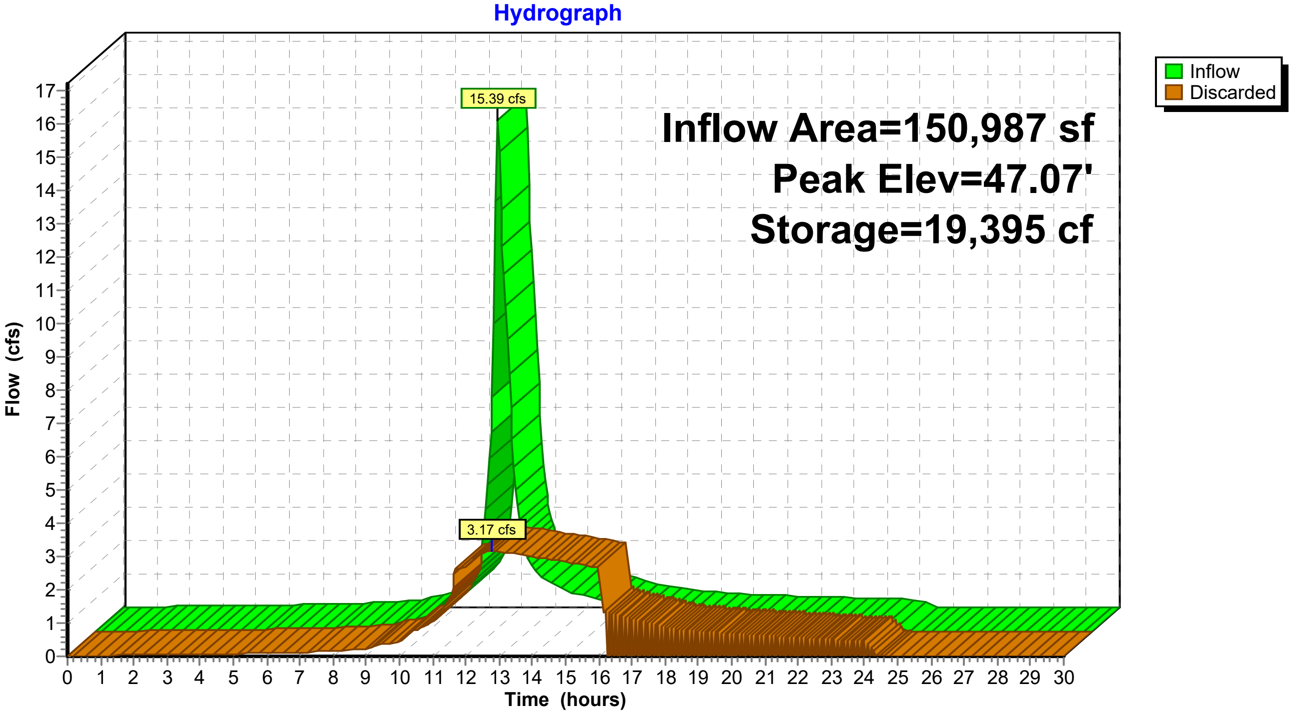
Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	70,036 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.00	16,566	726.0	0	0	16,566
47.00	19,520	751.0	18,023	18,023	19,596
48.00	25,598	1,033.0	22,490	40,513	59,640
49.00	33,630	1,171.0	29,523	70,036	83,869

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.00'	**6.875 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=3.17 cfs @ 12.79 hrs HW=47.07' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 3.17 cfs)

Pond Pd1: Infiltration Basin



Summary for Pond SF1: Sediment Forebay

Inflow Area = 14,792 sf, 98.88% Impervious, Inflow Depth = 8.32" for 100 yr event
Inflow = 2.80 cfs @ 12.09 hrs, Volume= 10,254 cf
Outflow = 2.73 cfs @ 12.11 hrs, Volume= 9,019 cf, Atten= 2%, Lag= 1.3 min
Primary = 2.73 cfs @ 12.11 hrs, Volume= 9,019 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.88' @ 12.11 hrs Surf.Area= 1,365 sf Storage= 1,534 cf

Plug-Flow detention time= 109.3 min calculated for 9,004 cf (88% of inflow)
Center-of-Mass det. time= 53.3 min (796.4 - 743.2)

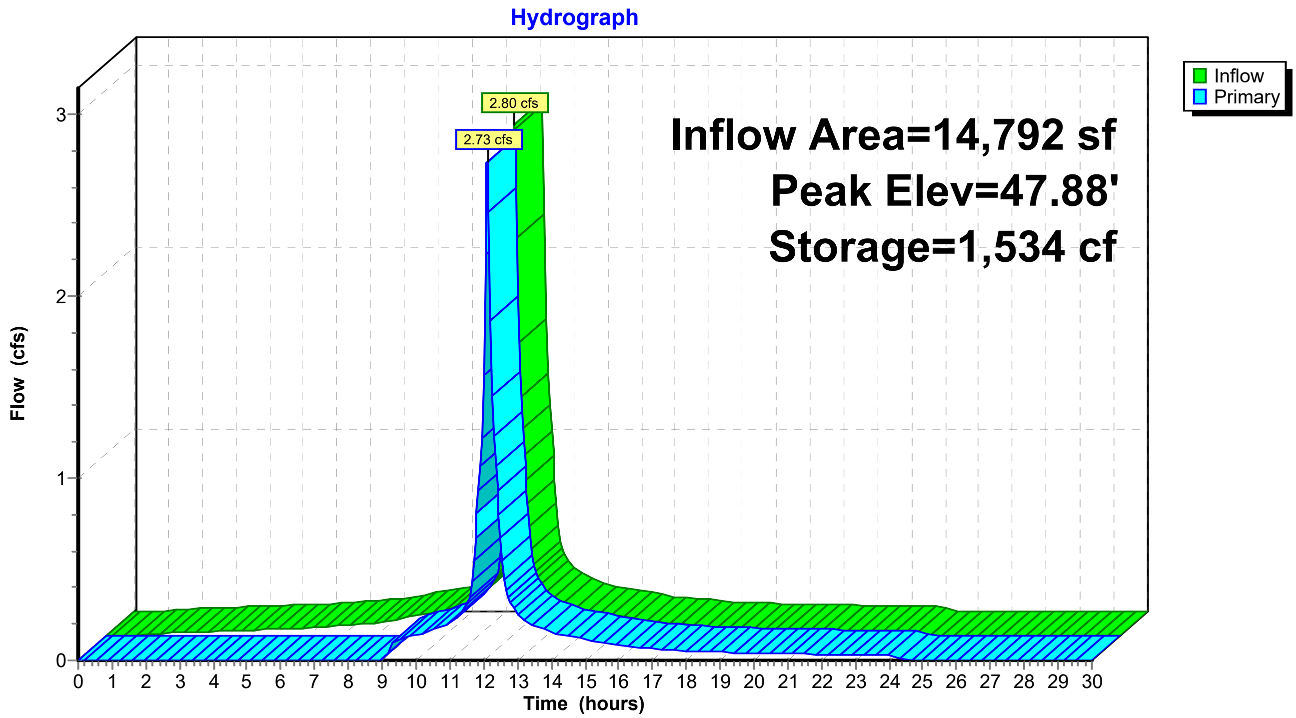
Volume	Invert	Avail.Storage	Storage Description
#1	46.20'	1,701 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.20	519	101.0	0	0	519
47.00	880	125.0	553	553	960
48.00	1,438	154.0	1,148	1,701	1,619

Device	Routing	Invert	Outlet Devices
#1	Primary	47.65'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=2.69 cfs @ 12.11 hrs HW=47.88' TW=46.40' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 2.69 cfs @ 1.18 fps)

Pond SF1: Sediment Forebay



Summary for Pond SF2: Sediment Forebay

Inflow Area = 22,329 sf, 77.60% Impervious, Inflow Depth = 7.39" for 100 yr event
Inflow = 3.91 cfs @ 12.09 hrs, Volume= 13,759 cf
Outflow = 3.82 cfs @ 12.11 hrs, Volume= 11,955 cf, Atten= 2%, Lag= 1.1 min
Primary = 3.82 cfs @ 12.11 hrs, Volume= 11,955 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 47.79' @ 12.11 hrs Surf.Area= 1,428 sf Storage= 2,191 cf

Plug-Flow detention time= 111.9 min calculated for 11,955 cf (87% of inflow)
Center-of-Mass det. time= 51.8 min (812.1 - 760.4)

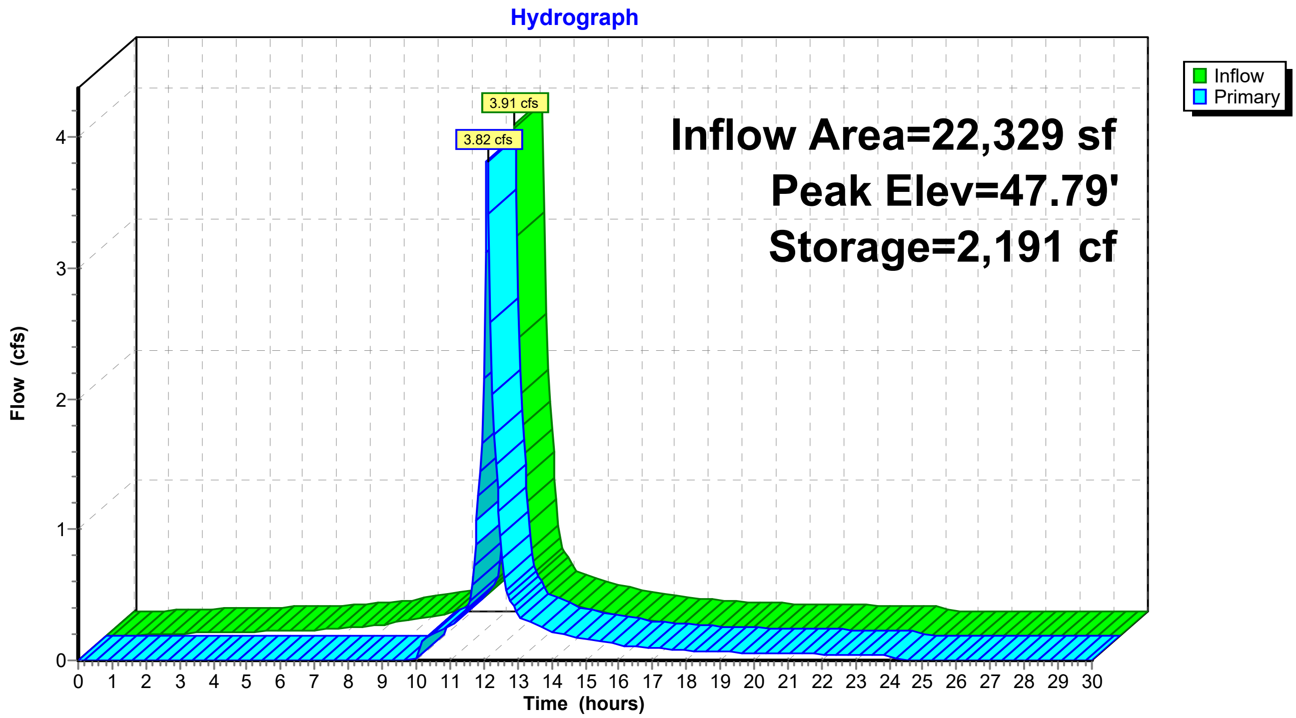
Volume	Invert	Avail.Storage	Storage Description
#1	45.00'	2,509 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
45.00	275	66.0	0	0	275
46.00	601	93.0	428	428	626
47.00	1,025	118.0	804	1,231	1,059
48.00	1,549	144.0	1,278	2,509	1,616

Device	Routing	Invert	Outlet Devices
#1	Primary	47.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=3.76 cfs @ 12.11 hrs HW=47.78' TW=46.40' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 3.76 cfs @ 1.33 fps)

Pond SF2: Sediment Forebay

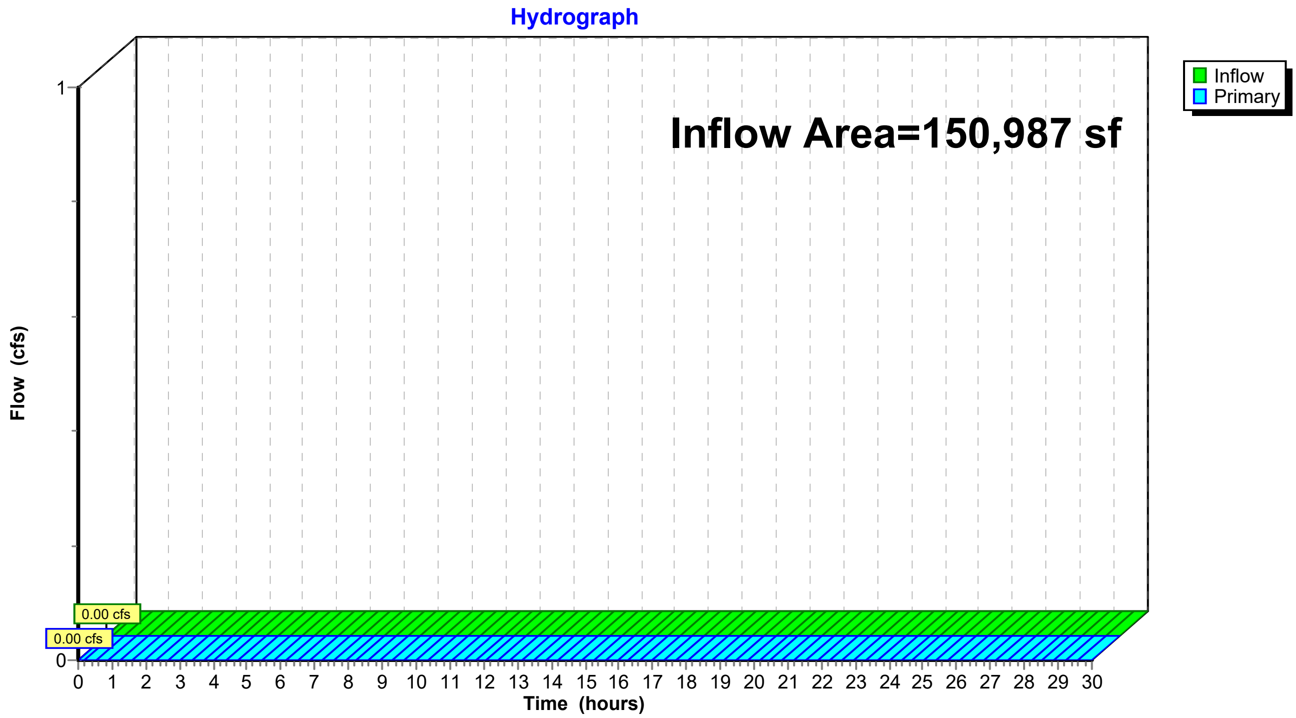


Summary for Link POI 1: Onsite Infiltration East

Inflow Area = 150,987 sf, 41.38% Impervious, Inflow Depth = 0.00" for 100 yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 1: Onsite Infiltration East

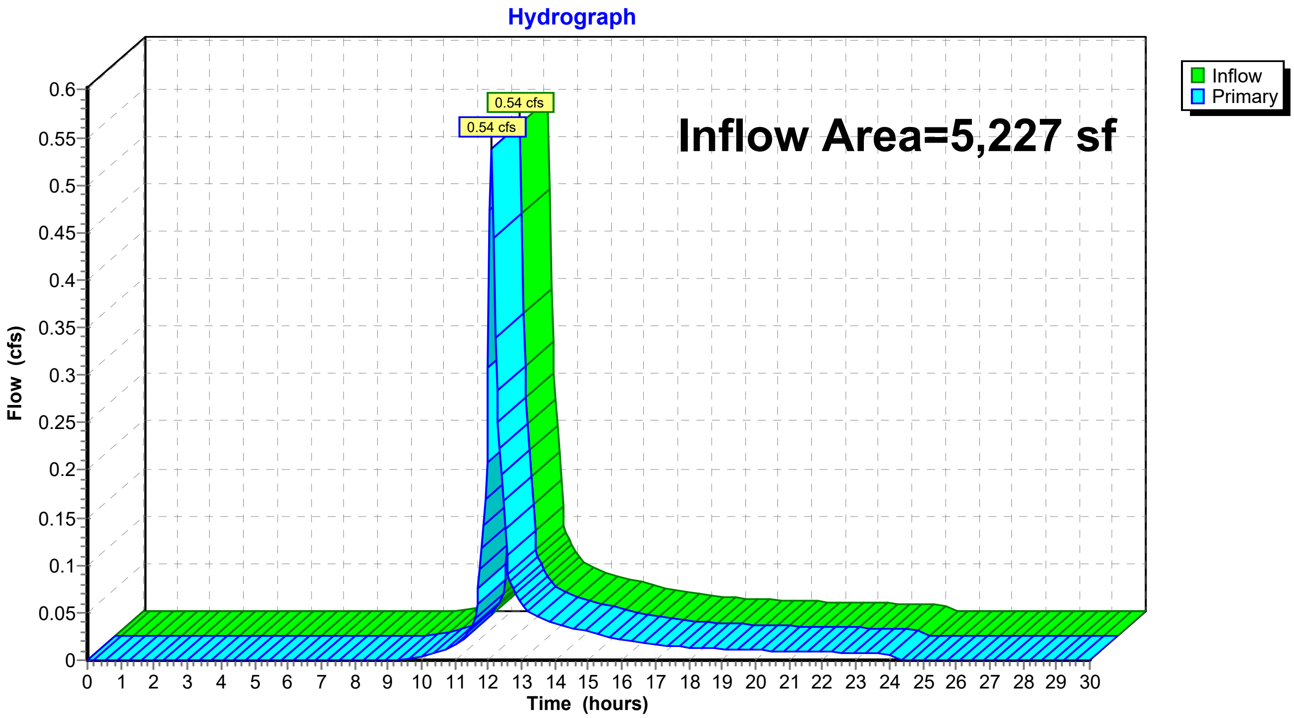


Summary for Link POI 2: Offsite at Southeast Property Line

Inflow Area =	5,227 sf,	0.00% Impervious,	Inflow Depth = 3.92"	for 100 yr event	
Inflow =	0.54 cfs @	12.10 hrs,	Volume=	1,709 cf	
Primary =	0.54 cfs @	12.10 hrs,	Volume=	1,709 cf,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 2: Offsite at Southeast Property Line

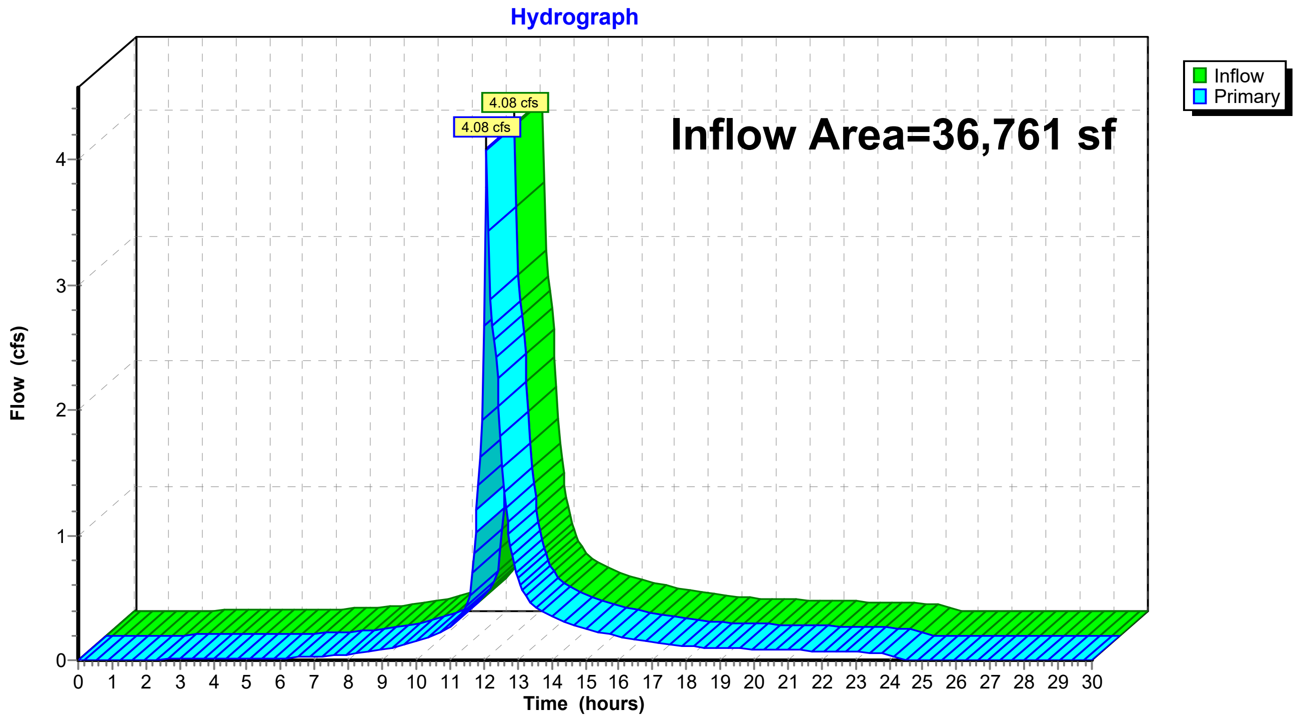


Summary for Link POI 3: Cranberry Highway Closed Drainage System

Inflow Area = 36,761 sf, 43.09% Impervious, Inflow Depth = 5.81" for 100 yr event
Inflow = 4.08 cfs @ 12.09 hrs, Volume= 17,801 cf
Primary = 4.08 cfs @ 12.09 hrs, Volume= 17,801 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 3: Cranberry Highway Closed Drainage System



APPENDIX C – RECHARGE VOLUME & DRAWDOWN CALCULATIONS

Standard 3: Recharge Calculations

1. Recharge Volume Calculations

Required Recharge Volume Sizing (R_V)

R_V (required) = F x Impervious Area

Where: R_V = Required Recharge Volume (cu. Ft.)
F = Target Depth Factor

Hydrologic Soil Group	Soil Texture	Target Depth Factor	
A	Sand	0.60	inches
B	Loam	0.35	inches
C	Silt Loam	0.25	inches
D	Clay	0.10	inches

New Impervious Area by Hydrologic Soil Type

Impervious Area (A-soils)	0 sq. ft.	0%
Impervious Area (B-soils)	62,474 sq. ft.	100%
Impervious Area (C-soils)	0 sq. ft.	0%
Impervious Area (D-soils)	0 sq. ft.	0%
Total Impervious Area	62,474 sq. ft.	100%

Using Massachusetts Stormwater Handbook "Static" Method;

R_v (required) = F x Impervious Area

R_v (required) = (0.35 in. * (1 ft. / 12 in.)) x 62,474 sq. ft.
= **1,822 cu. ft.**

Using Massachusetts Stormwater Handbook "Dynamic Field" Method;

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The amount of precipitation was determined iteratively by developing a hydrograph that generates the Required Water Quality Volume over a 24-hour period. A hydrograph generated a storm that produces 0.58 inches of precipitation over 24 hours with runoff entering the infiltration basin at a maximum rate of 0.64 cfs during the most intense period of the storm. Based on the hydrograph, runoff leaves the infiltration basin at 0.56 cfs. Using the bottom surface area of the infiltration basin, 16,566 sq. ft., and 6.875 inches per hour (50% of the in-situ saturated hydraulic conductivity rated determined by field-testing) the model calculates a storage capacity of 106 cubic feet and pond peak elevation of 0.01 feet. Refer to HydroCAD outputs included in this appendix.

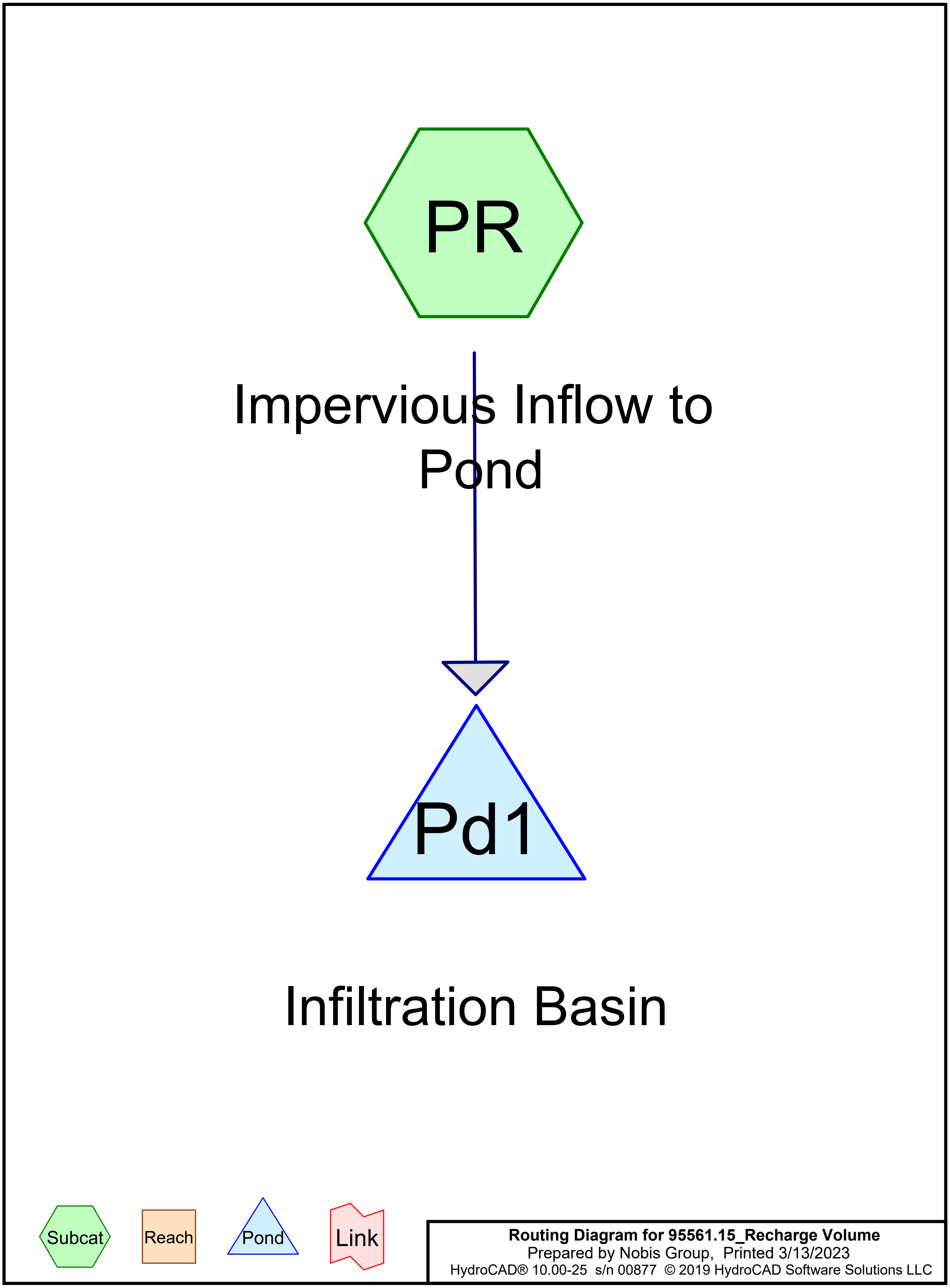
R_v (required) = **106 cu. ft.**

Recharge Volume Provided

Recharge Facility	**Volume Provided**
Infiltration Basin	19,395 cu. ft.*
Total	19,395 cu. ft.

R_V(provided) 19,395 cu. ft. > 106 cu. ft. R_V(required)

*Volume represents the available storage in the Infiltration Basin from the pond bottom elevation = 46 to the 100-yr flood elevation = 47.07.



Routing Diagram for 95561.15_Recharge Volume
Prepared by Nobis Group, Printed 3/13/2023
HydroCAD® 10.00-25 s/n 00877 © 2019 HydroCAD Software Solutions LLC

Time span=6.00-18.00 hrs, dt=0.05 hrs, 241 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPR: Impervious Inflow to Runoff Area=62,474 sf 100.00% Impervious Runoff Depth>0.35"
Tc=6.0 min CN=98 Runoff=0.64 cfs 0.042 af

Pond Pd1: Infiltration Basin Peak Elev=46.01' Storage=106 cf Inflow=0.64 cfs 0.042 af
Outflow=0.56 cfs 0.042 af

Total Runoff Area = 1.434 ac Runoff Volume = 0.042 af Average Runoff Depth = 0.35"
0.00% Pervious = 0.000 ac 100.00% Impervious = 1.434 ac

Summary for Subcatchment PR: Impervious Inflow to Pond

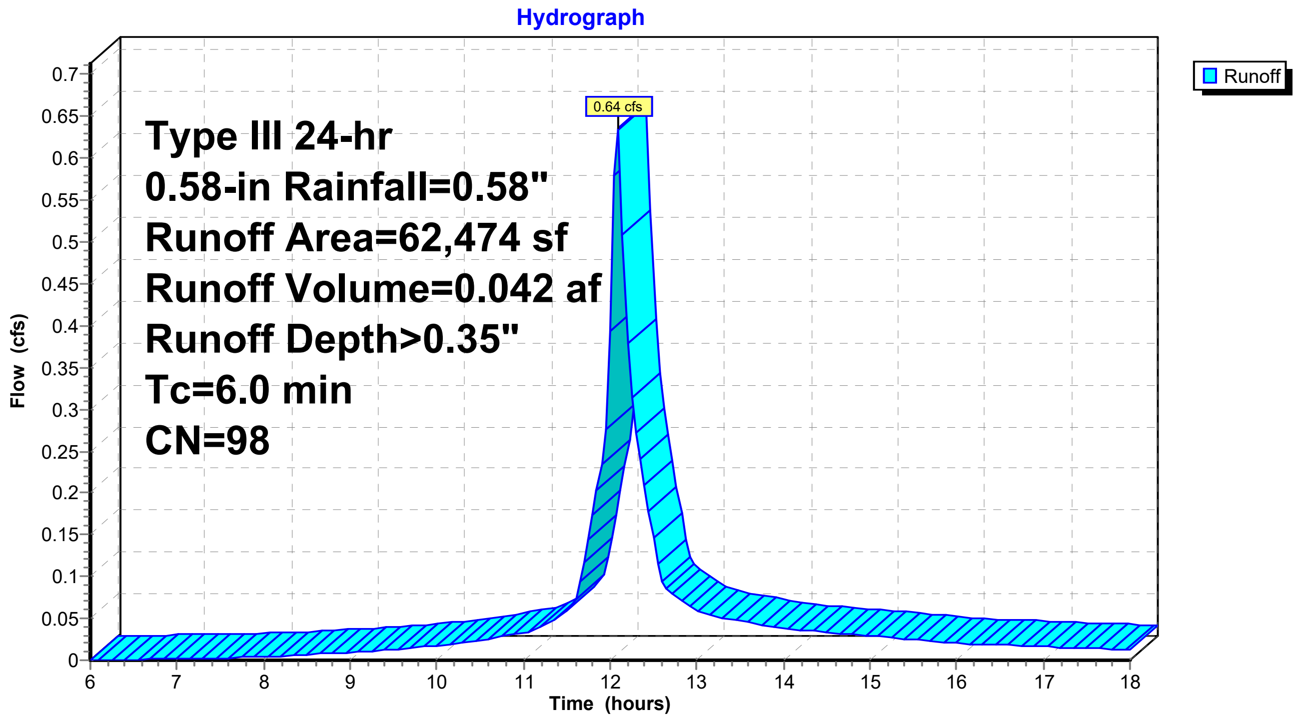
Runoff = 0.64 cfs @ 12.09 hrs, Volume= 0.042 af, Depth> 0.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-18.00 hrs, dt= 0.05 hrs
Type III 24-hr 0.58-in Rainfall=0.58"

Area (sf)	CN	Description
62,474	98	Paved parking, HSG B
62,474		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PR: Impervious Inflow to Pond



Summary for Pond Pd1: Infiltration Basin

Inflow Area = 1.434 ac,100.00% Impervious, Inflow Depth > 0.35" for 0.58-in event
Inflow = 0.64 cfs @ 12.09 hrs, Volume= 0.042 af
Outflow = 0.56 cfs @ 12.14 hrs, Volume= 0.042 af, Atten= 11%, Lag= 2.7 min
Discarded = 0.56 cfs @ 12.14 hrs, Volume= 0.042 af

Routing by Stor-Ind method, Time Span= 6.00-18.00 hrs, dt= 0.05 hrs
Peak Elev= 46.01' @ 12.14 hrs Surf.Area= 16,584 sf Storage= 106 cf

Plug-Flow detention time= 3.1 min calculated for 0.042 af (99% of inflow)
Center-of-Mass det. time= 2.7 min (761.6 - 758.9)

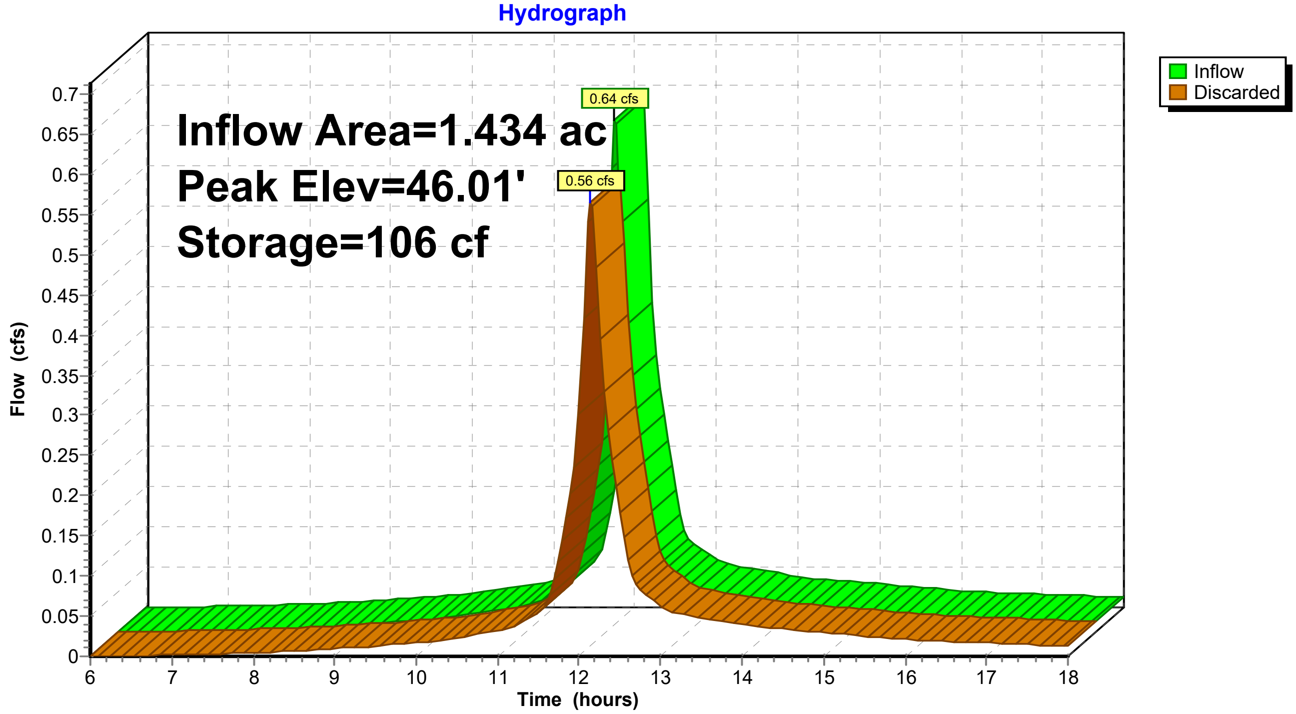
Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	70,036 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.00	16,566	726.0	0	0	16,566
47.00	19,520	751.0	18,023	18,023	19,596
48.00	25,598	1,033.0	22,490	40,513	59,640
49.00	33,630	1,171.0	29,523	70,036	83,869

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.00'	**6.875 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.64 cfs @ 12.14 hrs HW=46.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 2.64 cfs)

Pond Pd1: Infiltration Basin



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2. Drawdown Time Calculations

$T_{DRAWDOWN} = R_V / KA$

Where: $T_{DRAWDOWN}$ = Time in Hours

R_v = Required Recharge Volume (cu. ft.)

K = Rawls Rate or In-Situ Field Testing Rate (in/hr)

A = Bottom Area of Recharge Facility (cu. ft.)

Infiltration Basin

R_v = 1,822 cu. ft.

K = 6.875 in/hr (50 % of Field Testing) (0.57 ft/hr)

A = 16,566 sq. ft.

$T_{DRAWDOWN}$ = 0.2 hours < 72 hours for the "Dynamic" Method

Since the infiltration basin is utilized for control of the 100-year storm event, drawdown calculations are also provided to include the entire storage volume associated with the 100-yr storm event.

Infiltration Basin

R_v = 19,395 cu. ft. (volume associated with 100-yr flood elevation of 47.07)

K = 6.875 in/hr (50 % of Field Testing) (0.57 ft/hr)

A = 16,566 sq. ft.

$T_{DRAWDOWN}$ = 2 hours < 72 hours for 100-yr Storm Event

3. Mounding Analysis

The Massachusetts Stormwater Handbook Volume 3 requires a mounding analysis when the vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than 4 feet and the recharge system is proposed to attenuate the peak discharge from a 10-year or higher 24-hour storm. In such cases, the mounding analysis must demonstrate that the Required Recharge Volume is fully dewatered within 72 hours. The mounding analysis must also show that the groundwater mound that forms under the recharge system will not break out above the land or water surface of a wetland.

Bottom Elevation of Pond = 46.0
Approx. Elevation of Seasonal High Groundwater at TP-103 = 42.71
∆ between pond bottom and ESHGWT = 3.29'
Approx. Elevation of Seasonal High Groundwater at TP-107 = 43.76
∆ between pond bottom and ESHGWT = 2.24'

The Massachusetts Stormwater Handbook requires the mounding analysis be performed using the Hantush Method (Hantush, 1967). The following are the Hantush Method inputs:

R = The recharge or infiltration rate
Infiltration rate was determined to be the quantity of water discarded in a 100-yr storm over the drain time of the system.
R = (67,816 cu. ft. / 1 day) / 19,916 sq. ft. = 3.4 ft / day

S_Y = Specific Yield or Effective Porosity
S_Y = 0.3 (for sand)

K_H = Horizontal Hydraulic Conductivity
Vertical hydraulic conductivity is assumed to be one-fifth of the horizontal hydraulic conductivity (in sand or coarser materials). Vertical hydraulic conductivity is 6.875 in / hr = 13.75 ft / day.
K_H = 68.75 ft / day

x = ½ Detention System Length
x = 165 ft

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y = ½ Detention System Width
y = 25 ft

t = Duration of Infiltration
t = 2 hours or 0.08 days

hi = Initial Thickness of Saturated Zone
Test pit ground elevation minus depth to bedrock
hi = 47'-21.8' = 25.2'

The mounding analysis reports 0.79' of mounding at the center of the infiltration basin which is less than the 3.29' and 2.24' of separation from the pond bottom to ESHGW for TP-103 and TP-107, respectively. Therefore, the mounding analysis demonstrates the mound that forms under the basin will not break out above the ground surface. Refer to the excel workbook modeling the Hantush Method included in this appendix.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values				
2.2300	***R***	**Recharge (infiltration) rate (feet/day)**		
0.300	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**		
68.75	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***		
165.000	**x**	**1/2 length of basin (x direction, in feet)**		
25.000	**y**	**1/2 width of basin (y direction, in feet)**		
0.170	**t**	**duration of infiltration period (days)**		
25.200	**hi(0)**	**initial thickness of saturated zone (feet)**		

Conversion Table

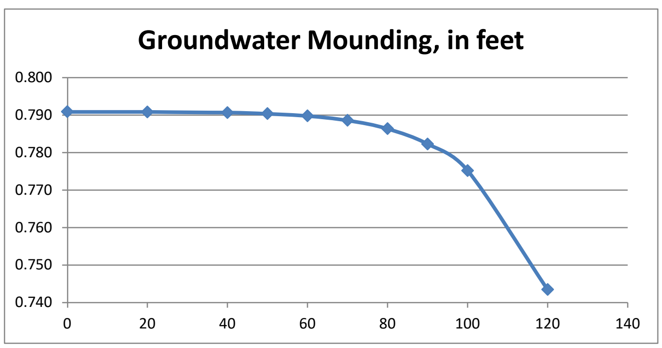
inch/hour	**feet/day**
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

25.991	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.791	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
0.791	**0**
0.791	**20**
0.791	**40**
0.790	**50**
0.790	**60**
0.789	**70**
0.786	**80**
0.782	**90**
0.775	**100**
0.743	**120**

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

APPENDIX D – WATER QUALITY & TSS REMOVAL CALCULATIONS

Standard 4: Water Quality

1. Water Quality Treatment Volume Calculations

Stormwater runoff volumes to be treated for water quality are based on the following calculations:

Recharge Volume Required

V_{WQ} (required) = $D_{WQ} * A_{IMP}$

Where: V_{WQ} = Required Water Quality Volume (cu. ft.)

D_{WQ} = Water Quality Depth (ft): 1-inch for discharges within a Zone II or Interim Wellhead Protection Area, to or near another critical area, runoff from a LUHPPL, or exfiltration to soils with infiltration rate greater than 2.4 inches/hour or greater; ½-inch for discharges near or to other areas.

A_{IMP} = Impervious Area (sq. ft.)

Project Site

D_{WQ} = 0.083 ft. = (1-inch / (12-inches / 1 ft.))

A_{IMP} = 62,474 sq. ft.

V_{WQ} (required) = 0.083 ft * 62,474 sq. ft. = 5,206 cu. ft.

Recharge Volume Provided

Recharge Facility	Volume Provided
Infiltration Basin	19,395 cu. ft.*
Total	19,395 cu. ft.

V_{WQ} (provided) 19,395 cu. ft. > 5,206 cu. ft. V_{WQ} (required)

*Volume represents the available storage in the Infiltration Basin from the pond bottom elevation = 46 to the 100-yr flood elevation = 47.07.

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2. TSS and Total Phosphorus Removal Percentage Computations

The Massachusetts Department of Environmental Protection has forms available to prepare TSS removal computations. A completed form must be provided to demonstrate that the proposed treatment options will remove 80% of the TSS load on a design basis. A separate form must be completed for each stormwater outlet. For stormwater discharges that require 44% TSS pretreatment (e.g. within areas with rapid infiltration rates, Zone II's, Interim Wellhead Protection Areas, or near or to other Critical Areas), the form must also be submitted to demonstrate that 44% TSS removal has been achieved prior to discharge to an infiltration BMP.

Two completed forms have been provided in this appendix for the infiltration basin 1) 44% TSS pretreatment prior to entering the infiltration basin 2) 80% TSS removal for the infiltration basin.

In addition to TSS Removal requirements, the proposed project is also subject to a MS4 Stormwater Management Permit (SMP). The SMP requires that redeveloped sites have complied with 0.8-inch infiltration volume (see water quality volume calculations for 1-inch volume above), removal of 80% TSS (see MassDEP TSS worksheets in this appendix), and removal of 50% total phosphorus from the total post-construction impervious surfaces. Per the Massachusetts Stormwater Handbook Volume 2, infiltration basins have a total phosphorus removal efficiency of 60% t0 70%, exceeding that of the 50% required for redeveloped sites.

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

Version 1, Automated: Mar. 4, 2008

Location: Pretreatment Prior to Infiltration

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**

Total TSS Removal = 44%

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

Project: **2400 & 2402 Cranberry Highway**
Prepared By: **Sean McDowell**
Date: **3/6/2023**

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

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

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

Version 1, Automated: Mar. 4, 2008

Location: Infiltration Basin

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Infiltration Basin	**0.80**	**1.00**	**0.80**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**

Total TSS Removal = 80%

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

Project: **2400 & 2402 Cranberry Highway**
Prepared By: **Sean McDowell**
Date: **3/6/2023**

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

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

Mass. Dept. of Environmental Protection

nobis

3. Sediment Forebay Sizing Calculations

Per the Massachusetts Stormwater Handbook Volume 2, sediment forebays are used as pretreatment devices to slow stormwater runoff and settle out sediment. At a minimum, sediment forebays should be designed to hold 0.1-inch per impervious acre to pretreat the water quality volume. The following calculations are provided for each of the sediment forebays prior to entering the infiltration basin.

V_{SF} (required) = 0.1-inch / impervious acre

Sediment Forebay 1

V_{SF} (required) = 0.1-inch / impervious acre
= 0.1-inch / (14,627 sq. ft. / (43,560 sq. ft. / 1 ac)
= 121 cu. ft.

V_{SF} (provided) = 1,235 cu. ft.*

*Volume represents the available storage in the sediment forebay from the forebay bottom elevation = 46 to the stone weir elevation = 47.65. See attached stage-storage table from HydroCAD in this appendix.

Sediment Forebay 2

V_{SF} (required) = 0.1-inch / impervious acre
= 0.1-inch / (17,327 sq. ft. / (43,560 sq. ft. / 1 ac)
= 144 cu. ft.

V_{SF} (provided) = 1,805 cu. ft.*

*Volume represents the available storage in the sediment forebay from the forebay bottom elevation = 45 to the stone weir elevation = 47.5. See attached stage-storage table from HydroCAD in this appendix.

Stage-Area-Storage for Pond SF1: Sediment Forebay

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
46.20	519	0
46.22	527	10
46.24	535	21
46.26	543	32
46.28	551	43
46.30	559	54
46.32	567	65
46.34	575	77
46.36	584	88
46.38	592	100
46.40	600	112
46.42	609	124
46.44	617	136
46.46	626	149
46.48	635	161
46.50	643	174
46.52	652	187
46.54	661	200
46.56	670	213
46.58	679	227
46.60	688	241
46.62	697	254
46.64	706	268
46.66	715	283
46.68	724	297
46.70	734	312
46.72	743	326
46.74	752	341
46.76	762	356
46.78	771	372
46.80	781	387
46.82	791	403
46.84	800	419
46.86	810	435
46.88	820	451
46.90	830	468
46.92	840	485
46.94	850	501
46.96	860	518
46.98	870	536
47.00	880	553
47.02	890	571
47.04	900	589
47.06	910	607
47.08	920	625
47.10	930	644
47.12	940	662
47.14	950	681
47.16	960	700
47.18	970	720
47.20	981	739
47.22	991	759
47.24	1,001	779
47.26	1,012	799
47.28	1,022	819
47.30	1,033	840
47.32	1,044	861
47.34	1,054	882
47.36	1,065	903
47.38	1,076	924
47.40	1,087	946
47.42	1,098	968
47.44	1,109	990
47.46	1,120	1,012
47.48	1,131	1,035
47.50	1,142	1,057
47.52	1,153	1,080
47.54	1,164	1,103
47.56	1,176	1,127
47.58	1,187	1,151
47.60	1,198	1,174
47.62	1,210	1,198
47.64	1,221	1,223
47.66	1,233	1,247
47.68	1,245	1,272
47.70	1,256	1,297
47.72	1,268	1,322
47.74	1,280	1,348
47.76	1,292	1,374
47.78	1,304	1,399
47.80	1,315	1,426
47.82	1,327	1,452
47.84	1,340	1,479
47.86	1,352	1,506
47.88	1,364	1,533
47.90	1,376	1,560
47.92	1,388	1,588
47.94	1,401	1,616
47.96	1,413	1,644
47.98	1,426	1,672
48.00	**1,438**	**1,701**

Stage-Area-Storage for Pond SF2: Sediment Forebay

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
45.00	275	0
45.05	288	14
45.10	302	29
45.15	316	44
45.20	330	60
45.25	345	77
45.30	360	95
45.35	375	113
45.40	390	132
45.45	406	152
45.50	422	173
45.55	439	195
45.60	455	217
45.65	473	240
45.70	490	264
45.75	508	289
45.80	526	315
45.85	544	342
45.90	563	369
45.95	582	398
46.00	601	428
46.05	620	458
46.10	638	489
46.15	657	522
46.20	677	555
46.25	696	590
46.30	716	625
46.35	737	661
46.40	757	699
46.45	778	737
46.50	799	776
46.55	820	817
46.60	842	858
46.65	864	901
46.70	886	945
46.75	908	990
46.80	931	1,036
46.85	954	1,083
46.90	978	1,131
46.95	1,001	1,180
47.00	1,025	1,231
47.05	1,049	1,283
47.10	1,073	1,336
47.15	1,097	1,390
47.20	1,121	1,446
47.25	1,146	1,502
47.30	1,171	1,560
47.35	1,196	1,619
47.40	1,222	1,680
47.45	1,247	1,742
47.50	1,274	1,805
47.55	1,300	1,869
47.60	1,326	1,935
47.65	1,353	2,002
47.70	1,380	2,070
47.75	1,408	2,140
47.80	1,436	2,211
47.85	1,464	2,283
47.90	1,492	2,357
47.95	1,520	2,432
48.00	**1,549**	**2,509**

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RIPRAP OUTLET APRON SIZING CALCULATIONS

DESCRIPTION / ID **FES1**

Do=	Diameter of pipe or width of channel(ft)	Do=	1
Q=	Discharge from pipe or channel(cfs)	Q10=	1.6
La=	Length of apron(ft)	Tw =	0.1
Wa=	Width of apron at the outlet(ft)	Tw<1/2Do?	YES
Tw=	Tailwater at outlet(depth above invert(ft))	Well defined channel?	no
W =	Width of apron at the downstream end(ft)		

Wa= 3*Do $\boxed{3}$

When Tailwater depth at the outlet of the pipe or channel is less than one half the diameter of the pipe or one half the width of the channel

$$La = \frac{1.8*Q}{Do^{3/2}} + 7*Do = \boxed{9.880}$$

When Tailwater depth at the outlet of the pipe or channel is equal to or greater than one half the diameter of the pipe or one half the width of the channel

$$La = \frac{3.0*Q}{Do^{3/2}} + 7*Do = \boxed{N/A}$$

When Tailwater depth at the outlet of the pipe or channel is less than one half the diameter of the pipe or one half the width of the channel

*W= 3*Do+La = $\boxed{12.880}$

When Tailwater depth at the outlet of the pipe or channel is equal to or greater than one half the diameter of the pipe or one half the width of the channel

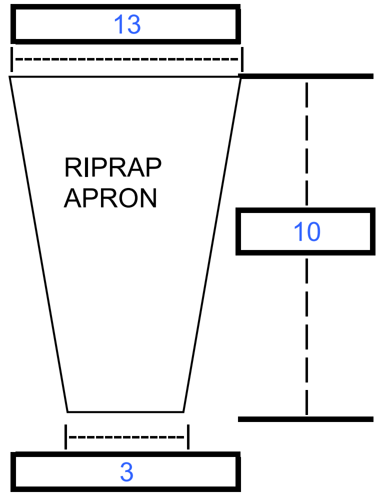
*W= 3*Do+0.4*La = $\boxed{N/A}$

*Where there is a stable well-defined channel downstream of the apron the bottom width of the apron shall be equal to the width of the channel

Rip-Rap size (need depth of TW)

$$D_{50} = \frac{0.02*Q^{(4/3)}}{T_w*D_o} =$$ 0.37 feet 4.49 inches

$D_{50}=$ 4 inches



Rip-Rap thickness:

$2.25*D_{50}=$ 10 inches

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RIPRAP OUTLET APRON SIZING CALCULATIONS

DESCRIPTION / ID **FES2 & 3**

Do= Diameter of pipe or width of channel(ft)		Do=	0.5
Q= Discharge from pipe or channel(cfs)		Q10=	1.62
La= Length of apron(ft)		Tw =	0.13
Wa= Width of apron at the outlet(ft)		Tw<1/2Do?	YES
Tw= Tailwater at outlet(depth above invert(ft))		Well defined channel?	no
W = Width of apron at the downstream end(ft)			

Wa= 3*Do = 1.5

When Tailwater depth at the outlet of the pipe or channel is less than one half the diameter of the pipe or one half the width of the channel

$$La = \frac{1.8 \cdot Q}{Do^{3/2}} + 7 \cdot Do = 11.748$$

When Tailwater depth at the outlet of the pipe or channel is equal to or greater than one half the diameter of the pipe or one half the width of the channel

$$La = \frac{3.0 \cdot Q}{Do^{3/2}} + 7 \cdot Do =$$ N/A

When Tailwater depth at the outlet of the pipe or channel is less than one half the diameter of the pipe or one half the width of the channel

*W= 3*Do+La = 13.248

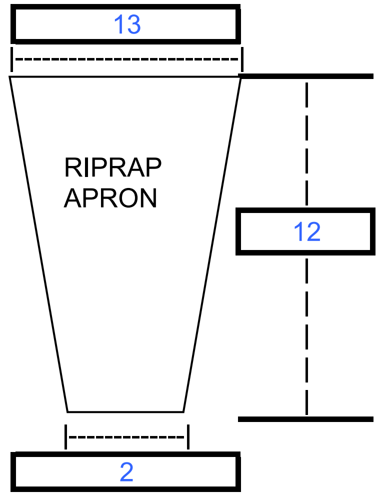
When Tailwater depth at the outlet of the pipe or channel is equal to or greater than one half the diameter of the pipe or one half the width of the channel

*W= 3*Do+0.4*La = N/A

*Where there is a stable well-defined channel downstream of the apron the bottom width of the apron shall be equal to the width of the channel

Rip-Rap size (need depth of TW)

$$D_{50=}\ \frac{0.02*Q^{(4/3)}}{T_w*D_o} =$$ 0.59 feet 7.03 inches



$D_{50=}$ 7 inches

Rip-Rap thickness:

$2.25*D_{50}=$ 16 inches

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RIPRAP OUTLET APRON SIZING CALCULATIONS

DESCRIPTION / ID **FES4**

Do=	Diameter of pipe or width of channel(ft)	Do=	1
Q=	Discharge from pipe or channel(cfs)	Q10=	2.07
La=	Length of apron(ft)	Tw =	1.1
Wa=	Width of apron at the outlet(ft)	Tw<1/2Do?	NO
Tw=	Tailwater at outlet(depth above invert(ft))	Well defined channel?	no
W =	Width of apron at the downstream end(ft)		

Wa= 3*Do = 3

When Tailwater depth at the outlet of the pipe or channel is less than one half the diameter of the pipe or one half the width of the channel

$$La = \frac{1.8*Q}{Do^{3/2}} + 7*Do =$$ N/A

When Tailwater depth at the outlet of the pipe or channel is equal to or greater than one half the diameter of the pipe or one half the width of the channel

$$La = \frac{3.0*Q}{Do^{3/2}} + 7*Do =$$ 13.210

When Tailwater depth at the outlet of the pipe or channel is less than one half the diameter of the pipe or one half the width of the channel

*W= 3*Do+La = N/A

When Tailwater depth at the outlet of the pipe or channel is equal to or greater than one half the diameter of the pipe or one half the width of the channel

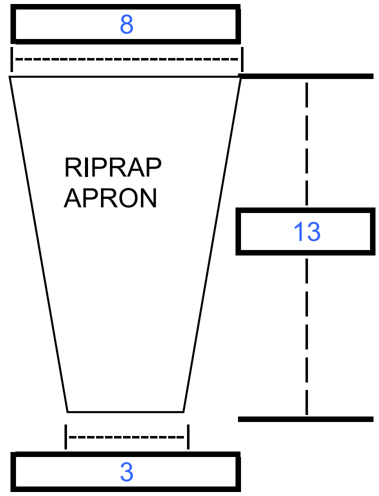
*W= 3*Do+0.4*La = 8.284

*Where there is a stable well-defined channel downstream of the apron the bottom width of the apron shall be equal to the width of the channel

Rip-Rap size (need depth of TW)

$$D_{50=} \frac{0.02*Q^{(4/3)}}{T_w*D_o} =$$ 0.05 feet 0.58 inches

$D_{50=}$ 4 inches



Rip-Rap thickness:

$2.25*D_{50}=$ 9 inches

APPENDIX E – STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

STORMWATER POLLUTION PREVENTION PLAN

TRUE STORAGE FACILITY
2400 & 2402 CRANBERRY HIGHWAY
WAREHAM, MASSACHUSETTS

FOR

TRUE STORAGE, LLC
670 NORTH COMMERCIAL
SUITE 212
MANCHESTER, NEW HAMPSHIRE

BY
NOBIS GROUP®

(800) 394-4182

Nobis Project No. 095561.150

Date: April 5, 2022

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2400 & 2402 CRANBERRY HIGHWAY
WAREHAM, MASSACHUSETTS

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APPENDICES

SECTION 1: CONTACT INFORMATION / RESPONSIBLE PARTIES

1.1 Operator(s) / Subcontractor(s)

Operator(s):
Insert Company or Organization Name:
Insert Name:
Insert Address:
Insert City, State, Zip Code:
Insert Telephone Number:
Insert Fax/Email:
Insert area of control (if more than one operator at site):

[Repeat as necessary.]

Subcontractor(s):
Insert Company or Organization Name:
Insert Name:
Insert Address:
Insert City, State, Zip Code:
Insert Telephone Number:
Insert Fax/Email:
Insert area of control (if more than one operator at site):

[Repeat as necessary.]

Emergency 24-Hr. Contact:

Organization: ____
Name: ____
Telephone Number: __________________________________

1.2 Stormwater Team

Stormwater Team

Name and/or Position, and Contact	Responsibilities	I Have Completed Training Required by CGP Part 6.2	I Have Read the CGP and Understand the Applicable Requirements
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Responsibility	☐ Yes ☐ No	☐ Yes Date: Click here to enter a date.
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Responsibility	☐ Yes ☐ No	☐ Yes Date: Click here to enter a date.
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Responsibility	☐ Yes ☐ No	☐ Yes Date: Click here to enter a date.

[Insert or delete rows as necessary.]

Stormwater Team Members Who Conduct Inspections Pursuant to CGP Part 4

Name and/or Position and Contact	Training(s) Received	Date Training(s) Completed	If Training is a Non-EPA Training, Confirm that it Satisfies the Minimum Elements of CGP Part 6.3.b
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Title of Training Received	Date: Click here to enter a date.	☐ Principles and practices of erosion and sediment control and pollution prevention practices at construction sites ☐ Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites ☐ Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Title of Training Received	Date: Click here to enter a date.	☐ Principles and practices of erosion and sediment control and pollution prevention practices at construction sites ☐ Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites ☐ Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Title of Training Received	Date: Click here to enter a date.	☐ Principles and practices of erosion and sediment control and pollution prevention practices at construction sites ☐ Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites ☐ Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4

[Insert or delete rows as necessary.]

SECTION 2: SITE EVALUATION, ASSESSMENT, AND PLANNING

2.1 Project/Site Information

Project Name and Address

Project/Site Name: True Storage Facility

Project Street/Location: 2400 & 2402 Cranberry Highway

City: Wareham

State: Massachusetts

ZIP Code: 02571

County or Similar Subdivision: Plymouth

Project Latitude/Longitude

Latitude:	Longitude:
41º 47' 1.57' N	-70º 44' 42.40'' W
(degrees, minutes, seconds)	(degrees, minutes, seconds)

Method for determining latitude/longitude:

☐ USGS topographic map (specify scale: ____) ☐ EPA Web site ☐ GPS

☒ Other (please specify):
Google Maps

Horizontal Reference Datum:

☐ NAD 27 ☒ NAD 83 or WGS 84 ☐ Unknown

Additional Project Information

Is the project/site located on Indian country lands, or located on a property of religious or cultural significance to an Indian tribe? ☐ Yes ☒ No

If yes, provide the name of the Indian tribe associated with the area of Indian country (including the name of Indian reservation if applicable), or if not in Indian country, provide the name of the Indian tribe associated with the property:

2.2 Discharge Information

Does your project/site discharge storm water into a Municipal Separate Storm Sewer System (MS4)? ☒ Yes ☐ No

Are there any surface waters that are located within 50 feet of your construction disturbances?

☐ Yes ☒ No

For each point of discharge, provide a point of discharge ID (a unique 3-digit ID, e.g. 001, 002), the name of the first receiving water that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to, and the following receiving water information, if applicable:

Point of Discharge ID	Name of receiving water that receives stormwater discharge:	Is the receiving water impaired (on the CWA 303(d) list)?	If yes, list the pollutants that are causing the impairment:	Has a TMDL been completed for this receiving waterbody?	If yes, list TMDL Name and ID:	Pollutant(s) for which there is a TMDL:	Is this receiving water designated as a Tier 2, Tier 2.5, or Tier 3 water?	If yes, specify which Tier (2, 2.5, or 3)?
[001]	Wetland Complex/Stream as tributary to Horseshoe Pond	☐ Yes ☒ No		☐ Yes ☒ No			☐ Yes ☒ No	
[002]		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	
[003]		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	
[004]		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	
[005]		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	
[006]		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	

[Include additional rows or delete as necessary.]

2.3 Nature of the Construction Activity

General Description of Project

The Owner/Applicant is proposing to develop an existing parcel of land located at 2400 & 2402 Cranberry Highway in Wareham, Massachusetts (the "Site"). The subject properties are identified by the Town of Wareham Assessor's office as Tax Map 108 Lots 1002.B1, 1002.B2, 1002.D, 1003.B1, 1003.B2, and 1003.B3. The Site currently consists of a 6,900 square foot one-story building that was used as a Buick Dealership showroom and garage and most recently as Wareham Pharmacy. The northern portion of the building was used as the auto showroom/pharmacy retail area. The southern portion of the building is a three-bay garage. A former auto body shop was located to the south of the standing structure. This was demolished and little evidence of the structure is left. A residential house was historically located on the southern portion of 2402 Cranberry Highway, this structure was demolished, and no apparent evidence of the structure remains.

The Applicant proposes to develop the Site in order to construct a 60,000 square foot storage facility. As proposed, the Project includes the demolition of the former auto showroom/pharmacy, three-bay garage and the existing pavement parking and driveways including the closer of three driveways to Cranberry Highway. The new development will include the construction of the storage facility building, new parking and drive aisles, landscape improvements, and utility and stormwater management improvements to support the development.

The Site is a 3-acre parcel of land located at 2400 & 2402 Cranberry Highway (MA Route 28) in Wareham, Massachusetts bounded by commercial and residential properties. Great Hill Drive and the Great Hill Estates Mobile Home Park are located immediately north and east of the Site. A vacant building is located immediately southeast of the Site. Across Cranberry Highway, wooded land and a truck repair shop are located to the southwest and west of the subject property.

A portion of the Site lies within a surface watershed to a wetland complex and stream that is connected to Horseshoe Pond. The surface water runoff is collected along Cranberry Highway and piped to the wetland complex southwest of the site. The north and eastern portions of the Site drain to a low point and infiltrate into the ground surface.

Existing topography from the central portion of the Site slopes from the building(s) at approximately elevation 50.7 to Cranberry Highway to the south and west to approximately elevation 49.5 to 50.0. Existing topography along the north and east of the Site ranges from approximately elevation 52.5 at the North corner adjacent to Great Hill Drive to elevation 46.5 at the eastern low point of the Site.

Based on available information and field observations, there are no known wetland resource areas or associated buffers located on, or within 100-ft of the Site. According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, 90% of the Site is classified as Urban land (#602B) and 10% of the Site is classified as Montauk fine sandy loam and Montauk-Urban land complex (#301B and #636B). Montauk soils refer to well drained soils formed in lodgment or flow till, in upland hills and moraines.

Nobis Group and Provencher Engineering, LLC coordinated and observed numerous test borings and test pits throughout 2020 and 2021 to document soil conditions. The general subsurface soil conditions encountered in the test borings and test pits consisted of a surficial layer of topsoil and/or fill (up to 7 feet thick) underlain by natural sand/gravel with a rapid infiltration rate. Groundwater was generally observed 5 to 9 below existing ground.

Under existing conditions, the Site is mostly developed to the south and west and undeveloped woods to the north and east. The developed portion of the Site is abandoned/vacant. Previous uses most recently were a car showroom and garage and retail pharmacy. The existing pavement is deteriorating with vegetation coming up through the cracks in the pavement. Runoff from the developed portion of the Site appears to flow overland, untreated to Cranberry Highway. Runoff from the undeveloped portion of the Site appears to flow overland and infiltrate at a low point in the woods.

In the proposed condition, previously untreated runoff from the Site will be directed to new control measures to provide the required water quality treatment and stormwater recharge. The proposed Site layout will result in improved infiltration and groundwater recharge.

The Project work and details, along with enhancements to the drainage infrastructure, are depicted in the plan set "True Storage Facility, 2400 & 2402 Cranberry Highway, Wareham, Massachusetts" in **Appendix A**.

The primary Best Management Practices (BMP) 'measures' work is anticipated to primarily involve: 1) toe or perimeter control silt fence or sediment logs for control of sediment at all toe of slope and top of ditch/swale areas and the protection of areas adjacent to wetlands, as necessary; 2) temporary stabilization of bare slope soils, followed by or current with, prompt permanent stabilization of slopes and prompt construction and stabilization of other vegetated areas; 3) treatment as necessary of any dewatering discharge; 4) drainage activity phasing such as maintaining flow in existing features until re-route/replacement feature are complete and stabilized; 7) prompt permanent stabilization of contructed stormwater controls and 8)

Monitoring of the weather forecast daily. Refer to **Appendix O** for detailed descriptions of the above listed BMP's and refer to **Appendix A** for construction details depicting standard construction of these BMP's.

2.4 Sequence and Estimated Dates of Construction Activities

The Contractor shall prepare a written schedule (including dates) of when interim and permanent grading and stabilization/erosion control measures will be or have been implemented, and include it in **SWPPP Appendix H**. This work should begin at the start of construction and finish once the site has been stabilized. The following sequence of construction activities identifies the proposed soil erosion and sediment control and storm water management measures that are to be implemented prior to and during construction during any given project phase:

1. Construct temporary erosion and sediment control measures prior to any earth moving operations. Inspect erosion and sediment control measures weekly and within 24 hours of any significant rainfall event (1/2" of rain or more). Perform any needed maintenance and stabilization as needed.

2. Disturbances of areas shall be minimized. No disturbed area shall be left unstabilized for longer than two weeks during the growing season. Areas which will not be permanently seeded within two weeks of disturbance shall be temporarily seeded and mulched. All areas shall be stabilized with seed mulch and tackifier within 72 hours of achieving finished grade and prior to the end of the growing season.

3. Perform demolition of existing site features as shown on the demolition plan in SWPPP Appendix A.

4. Perform clearing and grubbing to limits shown on site plan in SWPPP Appendix A.

5. Excavate and grade, then install loam, seed, and erosion control matting to stabilize detention ponds and other stormwater controls, as needed.

6. Remove and temporarily stockpile loam and topsoil for reuse, if needed, on site. Seed and/or mulch stockpiles and encircle with silt fence.

7. Conduct all underground utility structure and piping installation, backfill, and compact.

8. Construct building foundation.

9. Place and compact new gravel courses in the parking, loading, sidewalk, and gravel access drive areas.

10. Place, grade, and stabilize disturbed areas with temporary seeding and mulching.

11. Begin construction of building and remaining site work.

12. Place pavement courses, sidewalks, and curbing.

13. All cut and fill slopes shall be stabilized, loamed, seeded, and mulched.

14. Complete permanent seeding and landscaping in accordance with the landscape design and details.

15. Sweep completed pavement and clean out catch basins and drainage pipes during construction close-out procedures. Properly dispose of collected sediment and debris.

16. Remove temporary erosion control measures and properly dispose of following construction and once full ground cover has been established.

17. Refer to this SWPPP and the plan set in SWPPP Appendix A for additional details relative to the required construction sequence and erosion and sediment control BMPs. Maintenance of all erosion control components shall be an ongoing practice and in strict accordance with the approved plan.

Phase I

• Insert General Description of Phase	
• Estimated Start Date of Construction Activities for this Phase	• Insert Estimated Date
• Estimated End Date of Construction Activities for this Phase	• Insert Estimated Date
• Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	• Insert Estimated Date • *[Add additional dates as necessary]*
• Estimated Date(s) when Stormwater Controls will be Removed	• Insert Estimated Date • *[Add additional dates as necessary]*

Phase II

• Insert General Description of Phase	
• Estimated Start Date of Construction Activities for this Phase	• Insert Estimated Date
• Estimated End Date of Construction Activities for this Phase	• Insert Estimated Date
• Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	• Insert Estimated Date • *[Add additional dates as necessary]*
• Estimated Date(s) when Stormwater Controls will be Removed	• Insert Estimated Date • *[Add additional dates as necessary]*

[Repeat as needed.]

2.5 Authorized Non-Storm Water Discharges

List of Allowable Non-Storm Water Discharges Present at the Site

Authorized Non-Storm Water Discharge	Will or May Likely Occur at Your Site?
• Discharges from emergency fire-fighting activities	• ☒ YES ☐ NO
• Fire hydrant flushing	• ☒ YES ☐ NO
• Landscape irrigation	• ☐ YES ☒ NO
• Waters used to wash vehicles and equipment	• ☒ YES ☐ NO
• Water used to control dust	• ☒ YES ☐ NO
• Potable water including uncontaminated water line flushings	• ☒ YES ☐ NO
• External building washdown (soaps/solvents are not used and external surfaces do not contain hazardous substances)	• ☒ YES ☐ NO
• Pavement wash waters	• ☒ YES ☐ NO

• Uncontaminated air conditioning or compressor condensate	• ☐ YES ☒ NO
• Uncontaminated, non-turbid discharges of groundwater or spring water	• ☒ YES ☐ NO
• Foundation or footing drains	• ☐ YES ☒ NO
• Uncontaminated construction dewatering water	• ☒ YES ☐ NO

The Contractor shall identify the likely locations of these allowable non-storm water discharges on the site map or erosion control plan.

2.6 Site Maps

Refer to **SWPPP Appendix A** for Site Plans. The Site Plans include the requirements of CGP Part 7.2.4.

SECTION 3: DOCUMENTATION OF COMPLIANCE WITH OTHER FEDERAL REQUIREMENTS

3.1 Endangered Species Protection

Eligibility Criterion

Following the process outlined in Appendix D of the 2022 CGP, under which criterion are you eligible for coverage under this permit?

☐ **Criterion A**: No ESA-listed species and/or designated critical habitat present in action area. Using the process outlined in Appendix D of the CGP, you certify that ESA-listed species and designated critical habitat(s) under the jurisdiction of the USFWS or NMFS are not likely to occur in your site's "action area" as defined in Appendix A of the CGP. *Please Note: NMFS' jurisdiction includes ESA-listed marine and estuarine species that spawn in inland rivers.*

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D (Note: reliance on State resources is not acceptable; see CGP Appendix D).

Documentation: Insert Text Here

Eligibility Criterion

Following the process outlined in Appendix D of the 2022 CGP, under which criterion are you eligible for coverage under this permit?

☐ **Criterion B**: Eligibility requirements met by another operator under the 2022 CGP. The construction site's discharges and discharge-related activities were already addressed in another operator's valid certification of eligibility for your "action area" under eligibility Criterion A, C, D, E, or F of the 2022 CGP and you have confirmed that no additional ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS not considered in the that certification may be present or located in the "action area." To certify your eligibility under this criterion, there must be no lapse of NPDES permit coverage in the other CGP operator's certification. By certifying eligibility under this criterion, you agree to comply with any conditions upon which the other CGP operator's certification was based. You must include in your NOI the NPDES ID from the other 2022 CGP operator's notification of authorization under this permit and list any measures that you must comply with. If your certification is based on another 2022 CGP operator's certification under criterion C, you must provide EPA with the relevant supporting information required of existing dischargers in Criterion C.

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.
Documentation: Insert Text Here

Eligibility Criterion

Following the process outlined in Appendix D of the 2022 CGP, under which criterion are you eligible for coverage under this permit?

☒ **Criterion C**: Discharges not likely to result in any short- or long-term adverse effects to ESA-listed species and/or designated critical habitat. ESA-listed species and/or designated critical habitat(s) under the jurisdiction of the USFWS and/or NMFS are likely to occur in or near your site's "action area," and you certify to EPA that your site's discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects to ESA-listed threatened or endangered species and/or designated critical habitat. This certification may include consideration of any stormwater controls and/or management practices you will adopt to ensure that your discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects to ESA-listed species and/or designated critical habitat. To certify your eligibility under this criterion, indicate 1) the ESA-listed species and/or designated habitat located in your "action area" using the process outlined in Appendix D of this permit; 2) the distance between the site and the listed species and/or designated critical habitat in the action area (in miles); and 3) a rationale describing specifically how short- or long-term adverse effects to ESA-listed species will be avoided from the discharges and discharge-related activities. (Note: You must include a copy of your site map from your SWPPP showing the upland and in-water extent of your "action area" with your NOI.)

☒ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: **Verification checks of USFWS and NMFS ESA-listed species and designated critical habitat(s).**

Eligibility Criterion

Following the process outlined in Appendix D of the 2022 CGP, under which criterion are you eligible for coverage under this permit?

☐ **Criterion D**: Coordination with USFWS and/or NMFS has successfully concluded. Coordination between you and the USFWS and/or NMFS has concluded. The coordination must have addressed the effects of your site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS, and resulted in a written confirmation from USFWS and/or NMFS that the effects of your site's discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects. By certifying eligibility under this criterion, you agree to comply with any conditions you must meet for your site's discharges and discharge-related activities to not likely result in any short- or long-term adverse effects. You must include copies of the correspondence with the participating agencies in your SWPPP and this NOI.

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.
Documentation: Insert Text Here

☐ **Criterion E**: ESA Section 7 consultation has successfully concluded. Consultation between a Federal agency and the USFWS and/or NMFS under section 7 of the ESA has concluded. Consultations can be either formal or informal, and would have occurred only as a result of a separate Federal action (e.g., during application for an individual wastewater discharge permit or the issuance of a wetlands dredge and fill permit), and the consultation must have addressed the effects of your construction activity's discharges and discharge-related activities on all ESA-listed threatened or endangered species and all designated critical habitat under the jurisdiction of each Service, as appropriate, in your action area. The result of this consultation must be either:

i. A biological opinion currently in effect that determined that the action in question (taking into account the effects of your facility's discharges and discharge-related activities) is likely to adversely affect, but is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The biological opinion must have included the effects of your facility's discharges and discharge-related activities on all the listed species and designated critical habitat in your action area under the jurisdiction of each Service, as appropriate. To be eligible under (i), any reasonable and prudent measures specified in the incidental take statement must be implemented;

ii. Written concurrence (e.g., letter of concurrence) from the applicable Service(s) with a determination that your facility's discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat. The concurrence letter must have included the effects of your facility's discharges and discharge-related activities on all the ESA-listed species and/or designated critical habitat on your species list(s) acquired from USFWS and/or NMFS as part of this worksheet.

The consultation does not warrant reinitiation under 50 CFR §402.16; or, if reinitiation of consultation is required (e.g., due to a new species listing, critical habitat designation, or new information), the Federal action agency has reinitiated the consultation and the result of the consultation is consistent with the statements above. (Note: you must include any reinitiation documentation from the Services or consulting Federal agency with your NOI.)

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.
Documentation: Insert Text Here

Eligibility Criterion

Following the process outlined in Appendix D of the 2022 CGP, under which criterion are you eligible for coverage under this permit?

☒ **Criterion F**: Issuance of section 10 permit. Potential take is authorized through the issuance of a permit under section 10 of the ESA by the USFWS and/or NMFS, and this authorization addresses the effects of the site's discharges and discharge-related activities on ESA-listed species and designated critical habitat. You must include copies of the correspondence between yourself and the participating agencies in your SWPPP and your NOI.

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.
Documentation: Insert Text Here

3.2 Historic Property Screening Process

Appendix E, Step 1

Do you plan on installing any stormwater controls that require subsurface earth disturbance, including, but not limited to, any of the following stormwater controls at your site? Check all that apply below, and proceed to Appendix E, Step 2.

- ☐ Dike
- ☐ Berm
- ☒ Catch Basin
- ☒ Pond
- ☐ Constructed Site Drainage Feature (e.g., ditch, trench, perimeter drain, swale, etc.)
- ☒ Culvert
- ☐ Channel
- ☐ Other type of ground-disturbing storm water control:

Appendix E, Step 2

If you answered yes in Step 1, have prior surveys or evaluations conducted on the site already determined that historic properties do not exist, or have prior disturbances at the site have precluded the existence of historic properties? ☒ YES ☐ NO

If yes, no further documentation is required for Section 3.2 of the Template and you may provide the prior documentation in your SWPPP.

Refer to **SWPPP Appendix L** for Phase I and Phase II Environmental Site Assessments performed on the Site by Nobis Group in November of 2020.

If no, proceed to Appendix E, Step 3.

Appendix E, Step 3

If you answered no in Step 2, have you determined that your installation of subsurface earth-disturbing stormwater controls will have no effect on historic properties? ☐ YES ☐ NO

If yes, provide documentation of the basis for your determination.

If no, proceed to Appendix E, Step 4.

Appendix E, Steps 4 and 5

If you answered no in Step 3, did the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Office (THPO), or other tribal representative (whichever applies) respond to you within 15 calendar days to indicate their views as to the likelihood that historic properties are potentially present on your site and may be impacted by the installation of stormwater controls that require subsurface earth disturbance?

☐ YES ☐ NO

- If yes, describe the nature of their response:
  - ☐ Written indication that no historic properties will be affected by the installation of stormwater controls.
  - ☐ Written indication that adverse effects to historic properties from the installation of stormwater controls can be mitigated by agreed upon actions.
  - ☐ No agreement has been reached regarding measures to mitigate effects to historic properties from the installation of stormwater controls.
  - ☐ Other:
- If no, no further documentation is required for Section 3.2 of the Template.

3.3 Safe Drinking Water Act Underground Injection Control Requirements

Do you plan to install any of the following controls? Check all that apply below.

- ☐ Infiltration trenches (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)
- ☐ Commercially manufactured pre-cast or pre-built proprietary subsurface detention vaults, chambers, or other devices designed to capture and infiltrate stormwater flow
- ☐ Drywells, seepage pits, or improved sinkholes (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)

SECTION 4: EROSION AND SEDIMENT CONTROLS

4.1 Erosion and Sediment Control Best Management Practices (BMP's)

The Stormwater Pollution Prevention Plan (SWPPP or "Plan"), including erosion control measures, has been prepared by Nobis Group to provide the Contractor and the Owner with information and procedures to be used during construction of this project ("Site", or "Project"), such that significant erosion and sedimentation to adjacent land, including 'resources' and environmentally sensitive areas (wetlands, surface waters, aquifers) does not occur. Related work/activity includes the protection of project surroundings and groundwater from pollutants. The Plan has been prepared to meet the CGP requirements as applicable.

The Contractor is responsible for 'means and methods' and timely actions to achieve adequate implementation of this Plan. This Plan is to be used in conjunction with the attachments as provided herewith, with any necessary permits, and/or as further directed by the Engineer. It should be noted that all specific lawful engineering/construction requirements of the Project Plans take precedence over the engineering or BMP aspects of this document. The environmental permits (as applicable) also take precedence over this document.

"Best Management Practices (BMPs) for controlling nonpoint sources of pollution are the methods, measures, practices, or a combination of practices determined to be the most effective and practicable means (including technological, economic, and institutional considerations) to control nonpoint pollutants at levels compatible with environmental quality goals. As used in this document, BMPs are synonymous with erosion control measures."

All erosion control measures depicted in this Plan and/or in the Project Contract Documents are to be maintained, as necessary but also as practicable, throughout construction and until the areas have been permanently stabilized. Installation of other erosion control devices, beyond those referenced herein may be required to prevent transport of sediments from localized disturbed areas. Additional erosion and sedimentation control methods or devices may be deemed to be necessary in the field by the Contractor or Engineer. If necessary, work on construction activities related to land clearing may be suspended during the development of further erosion and sedimentation control plan measures.

Prior to selecting control methods, it is necessary to first discern which erosion processes are the primary operators for a given area. (e.g., raindrop/splash erosion, runoff erosion, mass wasting, or channel erosion). It is then possible to choose the appropriate controls for the applicable erosion processes.

The selection of appropriate BMPs is based on several factors, such as, but not limited to:

- Amount of runoff (flow);
- Ground slope (velocity);
- Existing and proposed groundcover (erosion);
- Type and sequence of construction activities;
- Soil type.

The successful implementation of this SWPPP depends largely on selecting a combination of sediment and erosion control measures that minimize the opportunities for erosion to occur, limit the timeframe within which erosion can occur, and achieve maximum pollutant removal.

The selection and implementation of erosion and sediment control BMPs is a process that matches the unique characteristics and problems posed by this specific site, at specific times within the construction process, with the BMPs for erosion control. The following sections highlight the key erosion and sediment control BMPs that the Contractor shall implement throughout the construction process as necessary.

For a detailed overview of the Erosion and Sediment Control measures for this project see **SWPPP Appendix A**.

4.2 Natural Buffers or Equivalent Sediment Controls

Buffer Compliance Alternatives

Are there any surface waters within 50 feet of your project's earth disturbances?

☐ YES ☒ NO

Check the compliance alternative that you have chosen:

☐ I will provide and maintain a 50-foot undisturbed natural buffer.

☐ I will provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by additional BMP erosion and sediment controls, which in combination achieves the sediment load reduction equivalent to a 50-foot undisturbed natural buffer. The additional BMP protection will consist of:

- Further limit of disturbance area
- Double-row silt fence installation (or silt fence paired with a single row of organic sediment log/sock) shall be used for embankment disturbance (down slope of disturbance yielding sheet flow runoff), or for protection of headwall areas
- Within 50' of wetlands or streams, using stone cover or matted vegetated slopes for slope reconstruction
- Within 100' or flow to wetland or streams, protecting swales with pinned matting or suitable stone

☐ It is infeasible to provide and maintain an undisturbed natural buffer of any size, therefore I will implement erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

☐ I qualify for one of the exceptions in Part 2.2.1.b. (If you have checked this box, provide information on the applicable buffer exception that applies, below.)

Buffer Exceptions

Which of the following exceptions to the buffer requirements applies to your site?

☐ There is no discharge of stormwater to waters of the U.S. through the area between the disturbed portions of the site and any waters of the U.S. located within 50 feet of the site.

☐ No natural buffer exists due to preexisting development disturbances (e.g., structures, impervious surfaces) that occurred prior to the initiation of planning for this project.

☐ For “linear construction sites” (defined in CGP Appendix A), site constraints (e.g., limited right-of-way) make it infeasible to meet any of the CGP Part 2.2.1.a compliance alternatives, provided that, to the extent feasible, you limit disturbances within 50 feet of the receiving water.

☐ The project qualifies as “small residential lot” construction (defined in Appendix A as “a lot being developed for residential purposes that will disturb less than 1 acre of land, but is part of a larger residential project that will ultimately disturb greater than or equal to 1 acre”) (see CGP Appendix F, Part F.3.2).

☐ Buffer disturbances are authorized under a CWA Section 404 permit.

☐ Buffer disturbances will occur for the construction of a water-dependent structure or water access area (e.g., pier, boat ramp, and trail).

4.3 Perimeter Controls

General

- Install sediment controls along any perimeter area of the site that will receive pollutant discharges. Installation of perimeter controls must be completed prior to the commencement of earth- disturbing activities.

Specific Perimeter Controls

Silt Fencing	
Description: Silt fence shall be placed to trap sediment transported by runoff prior to entering the drainage system and/or leaving the property. It shall be embedded in the existing ground and shall remain in place until the area has been permanently stabilized. The silt fence will be replaced as determined by periodic field inspections.	
Installation	At initiation of construction activities.
Maintenance Requirements	Silt fencing will be inspected weekly and after any rainfall. Inspection shall be in compliance with the inspection schedule specified in CGP Part 4 and maintained routinely throughout the duration of the project. Minimum maintenance and key items to check shall include sediment build up and broken stakes. In accordance with the CGP Part 2.2.3.c, the contractor

	must remove sediment before it has accumulated to one-half of the above-ground height of any perimeter control.
Design Specifications	Refer to silt fence detail and location included in the Erosion and Sediment Control Plans in SWPPP Appendix A.

Compost Filter Socks	
Description: Filter socks are used in support of silt fence and shall be placed to trap sediment transported by runoff prior to entering the wetlands onsite. It shall be staked in front of the silt fence and shall remain in place until the area has been permanently stabilized. The filter sock support will be replaced as determined by periodic field inspections.	
Installation	At initiation of construction activities.
Maintenance Requirements	Filter socks will be inspected weekly and after any rainfall. Inspection shall be in compliance with the inspection schedule specified in CGP Part 4 and maintained routinely throughout the duration of the project. Minimum maintenance and key items to check shall include sediment build up and broken stakes. In accordance with the CGP Part 2.2.3.c, the contractor must remove sediment before it has accumulated to one-half of the above-ground height of any perimeter control.
Design Specifications	Refer to sediment log detail and location included in the Erosion and Sediment Control Plans in SWPPP Appendix A.

4.4 Sediment Track-Out

General

- Install a temporary matting designed specifically to control sediment track at the access point to the area of site modifications being completed.

Specific Track-Out Controls

Gravel and Construction Entrance/Exit	
Description: A temporary crushed-stone construction entrance/exit will be constructed to prevent tracking of sediments from the area of proposed work. If deemed necessary after construction begins, a wash pad may be included to wash off vehicle wheels before leaving this project site.	
Installation	At initiation of construction activities

Maintenance Requirements	The exit shall be maintained which shall prevent tracking or flowing of sediment into public rights-of-way. This may require periodic top dressing with additional stone as conditions demand. It may also require repair or clean out of any measures used to trap sediment. Where sediment has been tracked-out from the site onto paved roads, sidewalks, or other paved areas outside of your site, remove the deposited sediment by the end of the same business day in which the track-out occurs or by the end of the next business day if track-out occurs on a non-business day. Remove the track-out by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. Hosing or sweeping tracked-out sediment into any stormwater conveyance, storm drain inlet, or water of the U.S is prohibited. The stabilized construction exit shall be removed prior to final finished materials being stabilized.
Design Specifications	Refer to “Tracking Control Pad/Construction Entrance” detail and location included in the Erosion and Sediment Control Plans in SWPPP Appendix A.

4.5 Stockpiles or Land Clearing Debris Piles Comprised of Sediment or Soil

General

- Any areas of exposed soil or stockpiles that will remain inactive for more than 14 days will be temporarily stabilized with vegetative or non-vegetative stabilization practices. The installation of stabilization measures will be completed as soon as practical, but no later than seven (7) calendar days after stabilization has been initiated. Silt fence shall be installed as a sediment barrier along all downgradient perimeter areas of the stockpiles to trap sediment transported by runoff prior to entering the drainage system and/or leaving the property. Piles shall be located outside of any natural buffers and away from any stormwater conveyances, drain inlets, and areas where stormwater flow is concentrated.

Specific Stockpile Controls

Stabilization of Stockpile	
Description: Stabilization of open surfaces will be implemented within 14 days after grading or construction activities have temporarily or permanently ceased, unless there is sufficient snow cover to prohibit implementation. Vegetative slope stabilization will be used to minimize erosion on slops of 3:1 or flatter. Annual grasses, such as annual rye, will be used to ensure rapid germination and production of root mass. Permanent stabilization will be completed with the planting of perennial grasses or legumes. Establishment of temporary and permanent cover may be established hydro seeding or sodding. A suitable topsoil, good seedbed preparation, and adequate lime, fertilizer and water will be provided for effective establishment of these vegetative stabilization methods. Mulch will also be used after permanent seeding to protect soil from the impact of falling rain and to increase the capacity of the soil to absorb water.	
Installation	As needed during construction
Maintenance Requirements	Hosing down or sweeping soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or water of the U.S. is prohibited.
Design Specifications	Refer to details included in the Erosion and Sediment Control Plans in SWPPP Appendix A.

4.6 Minimize Dust

General

- When necessary during grading operations, larger areas of exposed soil will be wetted to prevent wind borne transport of fine-grained soils.

Specific Dust Controls

Soil Wetting	
Description: Spray down areas with water as necessary during grading operations to prevent dust migration. Enough water shall be applied to wet the upper 0.5 inch of soil. The water will be applied as a fine spray to prevent erosion.	
Installation	As needed during construction.
Maintenance Requirements	Large areas of exposed soils will routinely be inspected to determine if soil wetting is required. Inspect daily during dry period of earthwork to ensure dust is not settling in or near the project site. Clean up any transported sediment and take necessary measures to prevent future dust accumulation
Design Specifications	

4.7 Minimize the Disturbance of Steep Slopes

General

- CGP **Appendix A** defines steep slopes as “where a state, Tribal, local government, or industry technical manuals (e.g. stormwater bmp manual) has defined what is to be considered a “steep slope”, this permit’s definition automatically adopts that definition. Where no such definition exists, steep slopes are automatically defined as those that are 15 percent or greater in grade”. According to the Massachusetts Department of Environmental Protection (MassDEP) 310 CMR 15, a steep slope is defined as a slope greater than 3:1, horizontal to vertical.

Specific Steep Slope Controls

Erosion Control Blanket	
Description: Erosion control blankets will be utilized during grading operations where bare earth that is steeper than 3:1 will be exposed. It shall be stapled with an overlap and remain in place until the area has been permanently stabilized with vegetation. The erosion control blanket will be replaced or repaired as determined by periodic field inspections.	
Installation	Once grading operations expose slopes greater than 3:1.
Maintenance Requirements	Erosion control blankets will be inspected weekly and after any rainfall. Inspection shall be in compliance with the inspection schedule specified in CGP Part 4 and maintained routinely throughout the duration of the project. Minimum maintenance and key items to check shall include torn or missing blanket or missing staples. Additionally, the slope under the blanket should be inspected for any erosion to ensure adequacy of installation.
Design Specifications	Refer to details and location included in the Erosion and Sediment Control Plans in SWPPP Appendix A.

4.8 Topsoil

General

- Native topsoil shall be preserved on the site to the greatest extent feasible. Native soil helps to maintain the soil structure and provides a growing medium for vegetative stabilization measures. Better vegetative stabilization reduces erosion rates of the underlying soil and also increases the infiltrative capacity of the soil, thereby reducing the amount of sediment transported to downslope sediment and perimeter controls. Topsoil can be preserved by stockpiling the native topsoil on the site for later use (e.g., for vegetative stabilization), or by limiting disturbance and removal of the topsoil and associated vegetation.

Specific Topsoil Controls

Not Applicable	
Description:	
Installation	
Maintenance Requirements	
Design Specifications	

4.9 Soil Compaction

General

- To allow for final vegetative stabilization the Contractor must either restrict vehicle and equipment use in these locations to avoid soil compaction; or prior to seeding or planting areas of exposed soil that have been compacted, use techniques that condition the soils to support vegetative growth, if necessary and feasible.
- Rough slope surfaces are preferred because they aid the establishment of vegetation, improve water infiltration, and decrease runoff velocity. Graded areas with smooth, hard surfaces may be initially attractive, but such surfaces increase the potential for erosion. A rough, loose soil surface gives a mulching effect that provides more favorable moisture conditions than hard, smooth surfaces; this aids seed germination. Refer to **SWPPP Appendix M** for surface roughening details.
- In areas where final vegetative stabilization will occur or where infiltration practices will be installed soil compaction should be avoided when feasible.

Specific Topsoil Controls

Not Applicable	
Description:	
Installation	
Maintenance Requirements	
Design Specifications	

4.10 Storm Drain Inlets

General

- Prior to any earth-disturbing activities, inlet protection measures will be installed that remove sediment from discharges prior to entry into any storm drain inlet that carries stormwater flowfrom the site to a water of the U.S.

Specific Storm Drain Inlet Controls

Silt Sack	
Description: Siltsack sediment traps will be installed at the inlets of existing and proposed catch basins throughout the site. Catch basin grates will be placed over siltsack.	
Installation	At initiation of construction activities and as needed during construction.
Maintenance Requirements	Clean, or remove and replace the protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, remove the deposited sediment by the end of the same business day in which it is found or by the end of the following business day if removal by the same business day is not feasible.
Design Specifications	Refer to "Siltsack" detail and location included in the Erosion and Sediment Control Plans in Appendix A.

4.11 Constructed Site Drainage Feature / Conveyance Channels

General

- Conveyance channels are used to direct water to provided stormwater control structures. Conveyance channels will be needed to route stormwater to temporary sediment basins during construction.

Specific Conveyance Channel Controls

Temporary Diversion Swale	
Description: Temporary diversion swales will be installed to convey stormwater runoff to provided temporary sediment basins. Check dams will be installed at specified points within the swales to control runoff flow rates.	
Installation	At initiation of construction activities and as needed during construction.
Maintenance Requirements	Temporary diversion swales will be inspected weekly and after any rainfall. Inspection shall be in compliance with the inspection schedule specified in CGP Part 4 and maintained routinely throughout the duration of the project. Minimum maintenance and key items to check shall include sediment build up and berm stability. In accordance with the CGP Part

	2.2.3.a, the contractor must remove sediment before it has accumulated to one-half of the above-ground height of any perimeter control.
Design Specifications	Refer to temporary diversion swale detail and location included in the Erosion and Sediment Control Plans in SWPPP Appendix A.

4.12 Sediment Basins

General

- Sediment basins are used to capture runoff during rain events. The basins are used for larger drainage areas that exist during construction which are more susceptible to sediment washout.

Specific Sediment Basin Controls

Temporary Sediment Basin	
Description: Sediment basins will be utilized to capture excess sediment in run off. Sediment basins will be used in areas collecting drainage of 1 acre or more. The site will require the use of multiple temporary sediment basins.	
Installation	At initiation of construction activities and as needed during construction.
Maintenance Requirements	Sediment Basins will be inspected weekly and after any rainfall. Inspection shall be in compliance with the inspection schedule specified in CGP Part 4.3 and maintained routinely throughout the duration of the project. Minimum maintenance and key items to check shall include sediment build up and berm stability.
Design Specifications	Refer to “MassDEP’s Stormwater Handbook” in SWPPP Appendix O for design details and CGP Part 2.2.12.

4.13 Chemical Treatment

Soil Types

- List all the soil types (including soil types expected to be found in fill material) that are expected to be exposed during construction in areas of the project that will drain to chemical treatment systems: **Not Applicable**

Treatment Chemicals

- List all treatment chemicals that will be used at the site and explain why these chemicals are suited to the soil characteristics: **Not Applicable**
- Describe the dosage of all treatment chemicals you will use at the site or the methodology you will use to determine dosage: **Not Applicable**

- Provide information from any applicable Safety Data Sheets (SDS): **Not Applicable**
- Describe how each of the chemicals will stored: **Not Applicable**
- Include references to applicable state or local requirements affecting the use of treatment chemicals, and copies of applicable manufacturer's specifications regarding the use of your specific treatment chemicals and/or chemical treatment systems: **Not Applicable**

Special Controls for Cationic Treatment Chemicals (if applicable)

- If the applicable EPA Regional Office authorized you to use cationic treatment chemicals, include the official EPA authorization letter or other communication, and identify the specific controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to an exceedance of water quality standards: **Not Applicable**

Schematic Drawings of Stormwater Controls/Chemical Treatment Systems

- Provide schematic drawings of any chemically-enhanced stormwater controls or chemical treatment systems to be used for application of treatment chemicals: **Not Applicable**

Training

- Describe the training that personnel who handle and apply chemicals have received prior to permit coverage, or will receive prior to the use of treatment chemicals: **Not Applicable**

4.14 Dewatering Practices

General

- Dewatering is the act of draining rainwater and/or groundwater from building foundations, vaults, and trenches.

Specific Dewatering Practices

Dewatering Filter Bag	
Description: Dewatering filter bags will be placed on relatively flat terrain, free of brush and stumps, to avoid ruptures and punctures. The contractor will use a ten-foot by ten-foot geotextile filter bag on any dewatering hoses. A maximum of one six-inch discharge hose will be allowed per filter bag.	
Installation	As needed during construction.

Maintenance Requirements	With backwash water, either haul it away for disposal or return it to the beginning of the treatment process; and replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.
Design Specifications	

4.15 Other Stormwater Controls

General

- No other stormwater controls are proposed at this time.

Specific Stormwater Control Practices

Not Applicable	
Description:	
Installation	
Maintenance Requirements	
Design Specifications	

4.16 Site Stabilization

Total Amount of Land Disturbance Occurring at Any One Time

☒ *Five Acres or less*

☐ *More than Five Acres*

Seeding
☒ *Vegetative* ☐ *Non-Vegetative* ☐ *Temporary* ☒*Permanent*

Description: ▪ Since stormwater runoff from the site discharges to a water that is identified as Tier 2 for antidegradation purposes, stabilization of open surfaces will be implemented within 7 days after grading or construction activities have temporarily or permanently ceased, unless there is sufficient snow cover to prohibit implementation. Vegetative slope stabilization will be used to minimize erosion on slops of 3:1 or flatter. Annual grasses, such as annual rye, will be used to ensure rapid germination and production of root mass. Permanent stabilization will be completed with the planting of perennial grasses or legumes. Establishment of temporary and permanent cover may be established by hydro seeding or sodding. A suitable topsoil, good seedbed preparation, and adequate lime, fertilizer and water will be provided for effective establishment of these vegetative stabilization methods.	
Installation	As needed during construction. Seed will be applied by October 15 in any calendar year.
Completion	Prior to completion of construction.
Maintenance Requirements	Contractor will inspect vegetated areas after rain events until growth of vegetation has established correctly.
Design Specifications	

Mulching	
☒ *Vegetative* ☐ *Non-Vegetative* ☐ *Temporary* ☒ *Permanent*	
Description: ▪ When construction will be temporarily or permanently ceased, mulching shall occur immediately over seeding, as required, for erosion control while vegetation is being established. Mulch will be used after permanent seeding to protect soil from the impact of falling rain and to increase the capacity of the soil to absorb water.	
Installation	As needed during construction.
Completion	Prior to completion of construction.
Maintenance Requirements	Periodic inspections shall occur once a week and after every rainstorm 0.25 inches or greater.
Design Specifications	

SECTION 5: POLLUTION PREVENTION CONTROLS

5.1 Potential Sources of Pollution

Construction Site Pollutants

Pollutant-Generating Activity	Pollutants or Pollutant Constituents (that could be discharged if exposed to storm water)
Clearing, grading and excavation	Sediment
Paving operations	Trash, debris, solids
Concrete washout and waste	Heavy metals, pH, & debris
Structure construction/painting/cleaning	Nutrients, pH, trash, debris & solids, other toxic chemicals
Dewatering Operations	Nutrients, sediment
Drilling and blasting operations	Sediment, pH, trash, debris & solids
Landscaping Operations	Pesticides & herbicides, sediment, nutrients, trash, debris & solids
Material delivery, storage & use during the construction process	Nutrients, heavy metals, pH, pesticides & herbicides, oil & grease, trash, debris & solids, other toxic chemicals
Solid waste (trash and other debris)	Trash, debris & solids
Spills	Nutrients, heavy metals, pH, pesticides & herbicides, oil & grease, trash, debris & solids, other chemicals
Vehicle equipment fueling and maintenance	Oil & grease, other toxic chemicals
Vehicle equipment use and storage	Oil & grease, other toxic chemicals

5.2 Spill Prevention and Response

A spill kit with containment berms and absorbent materials will be maintained onsite at all times during construction and the contractor will train employees in appropriate containment and cleanup procedures.

The following agencies should be contacted in case of a spill:
Wareham Fire Department – (508) 295-2973
Hingham Board of Health – (508) 291-3100 ext. 3197

Hingham Police Department – (508) 295-1212
MassDEP Southeast Region – (508) 946-2700

5.3 Fueling and Maintenance of Equipment or Vehicles

General

- The contractor will provide an effective means of eliminating the discharge of spilled or leaked chemicals, including fuel, from the area where these activities will take place. This will be accomplished by ensuring all refueling and maintenance of equipment and vehicles will occur on a paved surface. Additionally, a spill kit with containment berms and absorbent materials will be present during the refueling of any equipment.

Specific Pollution Prevention Practices

Spill Kit	
Description: A spill kit will be maintained and kept onsite.	
Installation	At initiation of construction activities.
Maintenance Requirements	The spill kit will be refurbished after each use and inspected weekly.
Design Specifications	

5.4 Washing of Equipment and Vehicles

General

- As listed in CGP 2.3.2, the contractor must provide an effective means of minimizing discharge of pollutants from equipment and vehicle washing, wheel wash water, and other types of washing. Washing activities from vehicle and wheel washing will be located away from stormwater inlets. Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on the site. Soaps, detergents, or solvents that are stored onsite in designated storage areas will be covered with plastic sheeting to prevent these materials from coming into contact with rainwater.

Specific Pollution Prevention Practices

Washing of Equipment and Vehicles	
Description: Washing activities from vehicle and wheel washing will be located away from stormwater inlets. Soaps, detergents, or solvents that are stored onsite in designated storage areas will be covered with plastic sheeting to prevent these materials from coming into contact with rainwater.	
Installation	At initiation of construction activities.
Maintenance Requirements	Contractor to inspect plastic sheeting for punctures to ensure rainwater is not coming in contact with the containers.
Design Specifications	

5.5 Storage, Handling, and Disposal of Building Products, Materials, and Wastes

5.5.1 Building Materials and Building Products

General

- In accordance with CGP Part 2.3.3.a, the contractor will:
  - Provide either a cover (e.g., plastic sheeting, temporary roofs) to minimize the exposure of these containers to precipitation and to stormwater or a similarly effective meansdesigned to minimize the discharge of pollutants from these areas.

Specific Pollution Prevention Practices

Plastic Sheeting Cover	
Description: Building products that are stored onsite in designated storage areas will be covered with plastic sheeting to prevent these materials from coming into contact with rainwater.	
Installation	At initiation of construction activities.
Maintenance Requirements	Contractor to inspect plastic sheeting for punctures to ensure rainwater is not coming in contact with the containers.
Design Specifications	

5.5.2 Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials

General

- In accordance with CGP Part 2.3.3.b, the contractor will:
  - In storage areas, provide either a cover (e.g., plastic sheeting, temporary roofs) to minimize the exposure of these containers to precipitation and to

stormwater or a similarly effective means designed to minimize the discharge of pollutants from these areas; and
- Comply with all application and disposal requirements included on the registered pesticide, herbicide, insecticide, and fertilizer label.

Specific Pollution Prevention Practices

Plastic Sheeting Cover	
Description: Fertilizers and landscape materials will be covered with plastic sheeting to prevent these materials from coming into contact with rainwater.	
Installation	At initiation of construction activities.
Maintenance Requirements	Contractor to inspect plastic sheeting for punctures to ensure rainwater is not coming in contact with the containers. The contractor will comply with all application and disposal requirements included on the registered fertilizer label.
Design Specifications	

5.5.3 Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals

General

- In accordance with CGP Part 2.3.3.c, the contractor will:
  - Store chemicals in water-tight containers, and provide either a cover (e.g., plastic sheeting, temporary roofs) to minimize the exposure of these containers to precipitation and to stormwater or a similarly effective means designed to minimize the discharge of pollutants from these areas (e.g., having a spill kit available on site and ensuring personnel are available to respond expeditiously in the event of a leak or spill), or provide secondary containment (e.g., spill berms, decks, spill containment pallets); and
  - Clean up spills immediately, using dry clean-up methods where possible, and dispose of used materials properly. It is prohibited to clean surfaces or spills by hosing the area down. Eliminate the source of the spill to prevent a discharge or a furtherance of an ongoing discharge.

Specific Pollution Prevention Practices

Water-tight Containers for Chemicals	
Description: Chemicals will be stored in water-tight containers and covered with plastic sheeting to prevent these containers from coming into contact with rainwater.	
Installation	At initiation of construction activities.

Maintenance Requirements	Contractor to inspect plastic sheeting for punctures to ensure rainwater is not coming in contact with the containers.
Design Specifications	

5.5.4 Hazardous or Toxic Waste

General

- In accordance with CGP Part 2.3.3.d, the contractor will:
  - Separate hazardous or toxic waste from construction and domestic waste;
  - Store waste in sealed containers, which are constructed of suitable materials to prevent leakage and corrosion, and which are labeled in accordance with applicable Resource Conservation and Recovery Act (RCRA) requirements and all other applicable federal, state, tribal, or local requirements;
  - Store all outside containers within appropriately-sized secondary containment (e.g., spill berms, decks, spill containment pallets) to prevent spills from being discharged, or provide a similarly effective means designed to prevent the discharge of pollutants from these areas (e.g., storing chemicals in covered area or having a spill kit available onsite);
  - Dispose of hazardous or toxic waste in accordance with the manufacturer's recommended method of disposal and in compliance with federal, state, tribal, and local requirements; and
  - Clean up spills immediately, using dry clean-up methods, and dispose of used materials properly. It is prohibited to clean surfaces or spills by hosing the area down. Eliminate the source of the spill to prevent a discharge or a furtherance of an ongoing discharge.
  - Follow all other federal, state, tribal, and local requirements regarding hazardous or toxic waste.

Specific Pollution Prevention Practices

Sealed Containers for Hazardous Waste Material	
Description: All hazardous waste materials will be stored in sealed containers and disposed in the manner specified by local and state regulation, or by the manufacturer.	
Installation	At initiation of construction activities.
Maintenance Requirements	Site personnel will be instructed of manufacturer, local, and state regulations for handling of hazardous waste materials. The site construction supervisor will be responsible for seeing that the procedures are followed.
Design Specifications	

5.5.5 Construction and Domestic Waste

General

- The contractor will provide waste containers (e.g., dumpster or trash receptacle).

Specific Pollution Prevention Practices

Waste Containers	
Description: The contractor will provide waste containers (e.g., dumpster or trash receptacle) of sufficient size and number to contain construction and domestic wastes. Daily loose trash removal will prevent litter, construction debris, and construction chemicals exposed to stormwater from becoming a pollutant source for stormwater discharges.	
Installation	At initiation of construction activities.
Maintenance Requirements	Waste container lids shall be closed when not in use and at the end of the business day for those containers that are actively used throughout the day. For waste containers that do not have lids, contractor shall provide a cover or similarly effective means to minimize the discharge of the pollutants. The short-term storage will be removed weekly to appropriate off-site locations. Daily removal will be mandated for debris that may become windborne. On business days, clean up and dispose of waste in designated waste containers. Clean up immediately if containers overflow.
Design Specifications	

5.5.6 Sanitary Waste

General

- The contractor will install portable toilets within the project site.

Specific Pollution Prevention Practices

Portable Toilets	
Description: Portable toilets will be positioned so that they are secure and will not be tipped or knocked over and located away from waters of the U.S. and stormwater inlets or conveyances. All sanitary waste will be collected from the portable units by a licensed contractor as required and disposed of in compliance with state and local regulations.	
Installation	At initiation of construction activities.

Maintenance Requirements	The units will be services by the provider of the portable toilet.
Design Specifications	

5.6 Washing of Applicators and Containers used for Paint, Concrete or Other Materials

General

- The contractor will provide an effective means of eliminating the discharge of water from the washout and cleanout of stucco, paint, concrete, form release oils, curing compounds, and other construction materials by using a leak-proof washout pit to handle washout and cleanout wastes. The washout pits will be located in designated areas and located as far away from stormwater inlets as possible.

Specific Pollution Prevention Practices

Leak-proof Washout Pits	
Description: Leak-proof washout pits will be used to handle washout and cleanout of wastes. These pits will be located in designated areas as indicated on the Erosion and Sedimentation Plan.	
Installation	At initiation of construction activities.
Maintenance Requirements	The cleanout pit will be inspected weekly to ensure that no overflows have or can occur. The contractor will remove accumulation from the pit as necessary in accordance with the CGP Part 2.3.4.
Design Specifications	

5.7 Fertilizers

General

- As included in CGP Part 2.3.5, the contractor must follow the requirements below when applying fertilizer products:
    - Apply at a rate and in amounts consistent with manufacturer's specifications, or document departures from the manufacturer specifications where appropriate in Part 7.2.6.b.ix;
    - Apply at the appropriate time of year for your location, and preferably timed to coincide as closely as possible to the period of maximum vegetation uptake and growth;
    - Avoid applying before heavy rains that could cause excess nutrients to be discharged;
    - Never apply to frozen ground;

- Never apply to stormwater conveyance channels; and
- Follow all other federal, state, tribal, and local requirements regarding fertilizer application.

Specific Pollution Prevention Practices

Slow-Release Fertilizers	
Description: The use of slow-release fertilizers in the landscaped areas will minimize discharges of fertilizers containing nitrogen or phosphorus that could enter the stormwater system. Fertilizer use will be reduced once the proposed landscaping is established.	
Installation	As needed for the establishment of landscaped areas.
Maintenance Requirements	None.
Design Specifications	

5.8 Other Pollution Prevention Practices

General

- Pavement sweeping may be performed daily or as needed, when track-out has occurred. The sweeping program will remove sediments and contaminants directly from paved surfaces before the release into stormwater runoff. Pavement sweeping has been demonstrated to be an effective initial treatment for reducing pollutant loading into stormwater.

Specific Pollution Prevention Practices

Pavement Sweeping	
Description: Pavement sweeping will minimize the release of sediments and contaminants from paved surfaces into the stormwater runoff.	
Installation	As needed to remove contaminant directly from paved surfaces.
Maintenance Requirements	None.
Design Specifications	

SECTION 6: INSPECTION AND CORRECTIVE ACTION

6.1 Inspection Personnel and Procedures

Personnel Responsible for Inspections

Inspections are to be performed by "qualified personnel" as defined in Part 4.1 of the Permit. For projects that receive coverage under the 2022 GCP on or after February 17, 2023, to be considered a qualified person under Part 4.1 for conducting inspections under Part 4, you must, at a minimum, either:

- Have completed the EPA construction inspection course developed for this permit and have passed the exam; or
- Hold a current valid construction inspection certification or license from a program that, at a minimum, covers the following:
  - Principles and practices of erosion and sediment control and pollution prevention practices at construction sites;
  - Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites; and
  - Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4.

For projects that receive coverage under this permit prior to February 17, 2023, any personnel conducting site inspections pursuant to Part 4 on your site must, at a minimum, be a person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality, and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

Inspections shall include all areas of the site disturbed by construction activity and areas used for materials storage that are exposed to precipitation based on CGP Part 4.5. The Inspector must look for evidence of, or the potential for, pollutants entering the system, inspect the BMPs installed as part of the Plan, inspect the site egress points for tracking, and inspect material, waste, borrow, or equipment storage and maintenance areas. If, in the course of the inspection, the inspector identifies an eroded area or an area impacted by sedimentation, additional erosion and sedimentation controls will be implemented, the discharge will be documented, and the SWPPP will be revised to include these changes.

Site Inspection Frequency

Select the inspection frequency(ies) that applies, based on CGP Parts 4.2, 4.3, or 4.4.

Standard Frequency:

☐ Every 7 calendar days

☐ Every 14 calendar days and within 24 hours of either:

- A storm event that produces 0.25 inches or more of rain within a 24-hour period (including when there are multiple, smaller storms that alone produce less than 0.25 inches but together produce 0.25 inches or more in 24 hours), or
- A storm event that produces 0.25 inches or more of rain within a 24-hour period on the first day of a storm and continues to produce 0.25 inches or more of rain on subsequent days (you conduct an inspection within 24 hours of the first day of the storm and within 24 hours after the last day of the storm that produces 0.25 inches or more of rain (i.e., only two inspections would be required for such a storm event)), or
- A discharge caused by snowmelt from a storm event that produces 3.25 inches or more of snow within a 24-hour period.

Increased Frequency (if applicable):

For areas of sites discharging to sediment or nutrient-impaired waters or to waters designated as Tier 2, Tier 2.5, or Tier 3

☐ Every 7 days and within 24 hours of either:

- A storm event that produces 0.25 inches or more of rain within a 24-hour period, or
- A discharge caused by snowmelt from a storm event that produces 3.25 inches or more of snow within a 24-hour period.

Reduced Frequency (if applicable)

For stabilized areas

☐ Twice during first month, no more than 14 calendar days apart; then once per month after first month until permit coverage is terminated consistent with Part 9 in any area of your site where the stabilization steps in 2.2.14.a have been completed.

- Specify locations where stabilization steps have been completed
- Insert date that they were completed

For stabilized areas on "linear construction sites" (as defined in Appendix A)

☐ Twice during first month, no more than 14 calendar days apart; then once more within 24 hours of a storm event that produces 0.25 inches or more of rain within a 24-hour period, or within 24 hours of a snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period

- Specify locations where stabilization steps have been completed
- Insert date that they were completed

For arid, semi-arid, or drought-stricken areas during seasonally dry periods or during drought ☐ Once per month and within 24 hours of either: ▪ A storm event that produces 0.25 inches or more of rain within a 24-hour period, or ▪ A snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period. Insert beginning and ending month identified as the seasonally dry period for your area or the valid period of drought: ▪ Beginning month of the seasonally dry period: Insert approximate date ▪ Ending month of the seasonally dry period: Insert approximate date
For frozen conditions where construction activities are being conducted ☐ Once per month Insert beginning and ending dates of frozen conditions on your site: ▪ Beginning date of frozen conditions: Insert approximate date ▪ Ending date of frozen conditions: Insert approximate date
For frozen conditions where construction activities are suspended ☐ Inspections are temporarily suspended Insert beginning and ending dates of frozen conditions on your site: ▪ Beginning date of frozen conditions: Insert approximate date ▪ Ending date of frozen conditions: Insert approximate date

Dewatering Inspection Frequency

Select the inspection frequency that applies based on CGP Part 4.3.2

Dewatering Inspection
☐ Once per day on which the discharge of dewatering water occurs.

Rain Gauge Location (if applicable)

Specify location(s) of rain gauge to be used for determining whether a rain event of 0.25 inches or greater has occurred (only applies to inspections conducted for Part 4.2.2, 4.3, or 4.4.2). If a rain gauge is not used onsite, the storm event information must be obtained from a weather station that is representative of the site. For any 24-hour period during which there is 0.25 inches or more of rainfall, you must record the total rainfall measured for that day in accordance with CGP Part 4.7.1d.

Inspection Report Forms

Refer to **SWPPP Appendix D** for a copy of an inspection report form. The form must be completed with 24 hours of completing any site inspection.

6.2 Corrective Action

Personnel Responsible for Corrective Actions

Corrective actions will be taken by the Contractor per the direction of the Stormwater Team, Engineer or per applicable local, state, or federal agency and/or their representative(s).

Requirements for Taking Corrective Action

Corrective Actions must take place to address any of the following conditions identified at the site:

- A stormwater control needs a significant repair or a new or replacement control is needed, or, in accordance with CGP Part 2.1.4c, you find it necessary to repeatedly (i.e., three (3) or more times) conduct the same routine maintenance fix to the same control at the same location (unless you document in your inspection report under CGP Part 4.7.1c that the specific reoccurrence of this same problem should still be addressed as a routine maintenance fix under CGP Part 2.1.4); or
- A stormwater control necessary to comply with the requirements of this permit was never installed, or was installed incorrectly; or
- Discharges are not meeting applicable water quality standards;
- A prohibited discharge has occurred (see CGP Part 1.3); or
- During discharge from site dewatering activities:
  - The weekly average of the turbidity monitoring results exceeds the 50 NTU benchmark (or alternate benchmark if approved by EPA pursuant to CGP Part 3.3.2b); or
  - Observed or informed by EPA, State, or local authorities of the presence of the conditions specified in CGP Part 4.6.3e.

Corrective Action Deadlines

The Contractor must complete the following corrective actions in accordance with the deadlines specified in CGP Part 5 and as outlined below:

- Immediately take all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events; and
- When the problem does not require a new or replacement control or significant repair, the corrective action must be completed by the close of the next business day; or
- When the problem requires a new or replacement control or significant repair, install the new or modified control and make it operational, or complete the repair, by no later than seven (7) calendar days from the time of discovery. If it is infeasible to complete the installation or repair within seven (7) calendar days, you must document in your records why it is infeasible to complete the installation or repair within the 7-day timeframe and document your schedule for installing the stormwater control(s) and making it operational as soon as feasible after the 7-day timeframe. Where these actions result in changes to any of the stormwater controls or procedures documented in your SWPPP, you must modify the SWPPP accordingly within seven (7) calendar days of completing this work.

If responding to triggering conditions related to site dewatering activities, the Contractor must:

- Immediately take all reasonable steps to minimize or prevent the discharge of pollutants until you can implement a solution, including shutting off the dewatering discharge as soon as possible depending on the severity of the condition taking safety considerations into account;
- Determine whether the dewatering controls are operating effectively and whether they are causing the conditions; and
- Make any necessary adjustments, repairs, or replacements to the dewatering controls to lower the turbidity levels below the benchmark or remove the visible plume or sheen.

When you have completed these steps and made any changes deemed necessary, you may resume discharging from your dewatering activities.

Corrective Action Log

For each corrective action taken in accordance with CGP Part 5, the Contractor must complete a corrective action report, which includes the applicable information in CGP Parts 5.4.1 and 5.4.2. The Contractor must keep a copy of the corrective action log at the site or at an easily accessible location, so that it can be made immediately available at the time of an on-site inspection or upon request by EPA. The corrective action logs must be retained for at least three (3) years from the date that the permit coverage expires or is terminated

Note that these reports must be maintained in the Contractor's records but do not need to be provided to EPA except upon request.

Corrective Action Forms

Refer to **SWPPP Appendix E** for a copy of a corrective action form.

6.3 Delegation of Authority

Refer to **SWPPP Appendix J** for a copy of the signed delegation of authority.

Duly Authorized Representative(s) or Position(s):

Insert Company or Organization Name Insert Name
Insert Position Insert Address
Insert City, State, Zip Code Insert Telephone Number
Insert Fax/Email

SECTION 7: TURBIDITY BENCHMARK MONITORING FOR DEWATERING DISCHARGES

Part 3.3 of the CGP requires turbidity benchmark monitoring for site discharging dewatering water to "sensitive waters" (i.e. receiving waters listed as impaired for sediment or a sediment-related parameter, or receiving waters of the designated as a Tier 2, Tier 2.5, Tier 3 for antidegradation purposes) to comply with benchmark monitoring requirements in Part 3.3 of the CGP and document the procedures you will pursuant to Part 7.2.8 of the CGP. Although dewatering may be required for the project, no dewatering discharges will be discharged to "sensitive waters". Dewatering shall follow the practices discussed in Section 4.14 of this SWPPP.

Procedures: Not applicable

Collecting and evaluating samples	Describe how you will collect and evaluate samples
Reporting results and keeping monitoring information records	Describe how you will report results to EPA and keep monitoring information records
Taking corrective action when necessary	Describe how you will take corrective action when necesary

Turbidity Meter: Not applicable

Type of turbidity meter	Insert the type of turbidity meter

Turbidity meter manuals and manufacturer instructions

Coordinating Arrangements for Turbidity Monitoring: Not applicable

Permitted operator name	Insert operator name
Permitted operator NPDES ID	Insert operator NPDES ID
Coordinating Arrangement	Describe the coordinating arrangement including which parties are tasked with specifc responsibilities

[Repeat as necessary.]

Alternate turbidity benchmark: Not applicable

Alternate turbidity benchmark (**NTU**)	Insert alternate turbidity benchmark
Data and documentation used to request the alternate benchmark	Insert the data and documentation that was submitted to EPA to request the alternate benchmark

SECTION 8: CERTIFICATIONS AND NOTIFICATION

- I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: ______________________________ Title: ______________________________

Signature: ______________________________________ Date: __________________

[Repeat as needed for multiple construction operators at the site.]

SWPPP APPENDICES

Appendix A – Site Maps

Appendix B – Copy of 2022 CGP

Appendix C – NOI and EPA Authorization Email

Appendix D – Site Inspection Form and Dewatering Inspection Form (if applicable)

Appendix E – Corrective Action Log

Appendix F – SWPPP Amendment Log

Appendix G – Subcontractor Certifications/Agreements

Appendix H – Grading and Stabilization Activities Log

Appendix I – Training Documentation

Appendix J – Delegation of Authority

Appendix K – Endangered Species Documentation

Appendix L – Historic Preservation Documentation

Appendix M – Rainfall Gauge Recording

Appendix N – Turbidity Meter Manual and Manufacturer's Instructions

Appendix O – Structural BMP Specifications for the Mass. Stormwater Handbook

Appendix A – Site Maps

Appendix B – Copy of 2022 CGP

The 2022 CGP is available at https://www.epa.gov/npdes/2022-construction-general-permit-cgp)

Appendix C – Copy of NOI and EPA Authorization Email

INSERT COPY OF NOI AND EPA'S AUTHORIZATION EMAIL PROVIDING COVERAGE UNDER THE CGP

Appendix D – Copy of Site and Dewatering Inspection Forms

Project Name: ______________________________
NPDES ID Number: ______________________________

Section A – General Information (If necessary, complete additional inspection reports for each separate inspection location.)	
Inspector Information	
Inspector Name:	**Title:**
Company Name:	**Email:**
Address:	**Phone Number:**
Inspection Details	
Inspection Date:	**Inspection Location:**
Inspection Start Time:	**Inspection End Time:**
Current Phase of Construction:	**Weather Conditions During Inspection:**
Did you determine that any portion of your site was unsafe for inspection per CGP Part 4.5? ☐ Yes ☐ No **If "Yes," provide the following information:** Location of unsafe conditions: The conditions that prevented you inspecting this location:	
Indicate the required inspection frequency: (Check all that apply. You may be subject to different inspection frequencies in different areas of the site.)	
Standard Frequency (CGP Part 4.2): ☐ At least once every 7 calendar days; **OR** ☐ Once every 14 calendar days *and* within 24 hours of the occurrence of either: • A storm event that produces 0.25 inches or more of rain within a 24-hour period, or • A snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period	
Increased Frequency (CGP Part 4.3.1) (If site discharges to sediment or nutrient-impaired waters or to waters designated as Tier 2, Tier 2.5, or Tier 3): ☐ Once every 7 calendar days *and* within 24 hours of the occurrence of either: • A storm event that produces 0.25 inches or more of rain within a 24-hour period, or • A snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period	

Reduced Frequency (CGP Part 4.4):

- ☐ For stabilized areas: Twice during first month, no more than 14 calendar days apart; then once per month after first month until permit coverage is terminated
- ☐ For stabilized areas on "linear construction sites": Twice during first month, no more than 14 calendar days apart; then once more within 24 hours of the occurrence of either:
  - A storm event that produces 0.25 inches or more of rain within a 24-hour period, or
  - A snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period
- ☐ For arid, semi-arid, or drought-stricken areas during seasonally dry periods or during drought: Once per month and within 24 hours of the occurrence of either:
  - A storm event that produces 0.25 inches or more of rain within a 24-hour period, or
  - A snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period
- ☐ For frozen conditions where construction activities are being conducted: Once per month

Was this inspection triggered by a storm event producing 0.25 inches or more of rain within a 24-hour period? ☐ Yes ☐ No

If "Yes," how did you determine whether the storm produced 0.25 inches or more of rain?

- ☐ On-site rain gauge
- ☐ Weather station representative of site.
  Weather station location:

Total rainfall amount that triggered the inspection (inches):

Was this inspection triggered by a snowmelt discharge from a storm event producing 3.25 inches or more of snow within a 24-hour period? ☐ Yes ☐ No

If "Yes," how did you determine whether the storm produced 3.25 inches or more of snow?

- ☐ On-site rain gauge
- ☐ Weather station representative of site.
  Weather station location:

Total snowfall amount that triggered the inspection (inches):

Section B – Condition and Effectiveness of Erosion and Sediment (E&S) Controls (CGP Part 2.2)

(Insert additional rows if needed)

Type and Location of E&S Control	Conditions Requiring Routine Maintenance?[1]	If "Yes," How Many Times (Including This Occurrence) Has This Condition Been Identified?	Conditions Requiring Corrective Action?[2, 3]	Date on Which Condition First Observed (If Applicable)?	Description of Conditions Observed
1.	☐ Yes ☐ No		☐ Yes ☐ No		
2.	☐ Yes ☐ No		☐ Yes ☐ No		
3.	☐ Yes ☐ No		☐ Yes ☐ No		
4.	☐ Yes ☐ No		☐ Yes ☐ No		
5.	☐ Yes ☐ No		☐ Yes ☐ No		

If the same routine maintenance was found to be necessary three or more times for the same control at the same location (including this occurrence), follow the corrective action requirements and record the required information in your corrective action log, or describe here why you believe the specific condition should still be addressed as routine maintenance:

[1] Routine maintenance includes minor repairs or other upkeep performed to ensure that the site's stormwater controls remain in effective operating condition, not including significant repairs or the need to install a new or replacement control. Routine maintenance is also required for specific conditions: (1) for perimeter controls, whenever sediment has accumulated to half or more the above-ground height of the control (CGP Part 2.2.3.c.i); (2) where sediment has been tracked-out from the site onto paved roads, sidewalks, or other paved areas (CGP Part 2.2.4.d); (3) for inlet protection measures, when sediment accumulates, the filter becomes clogged, and/or performance is compromised (CGP Part 2.2.10.b); and (4) for sediment basins, as necessary to maintain at least half of the design capacity of the basin (CGP Part 2.2.12.f)

[2] Corrective actions are triggered only for specific conditions (CGP Part 5.1):

1. A stormwater control needs a significant repair or a new or replacement control is needed, or, in accordance with Part 2.1.4.c, you find it necessary to repeatedly (i.e., three (3) or more times) conduct the same routine maintenance fix to the same control at the same location (unless you document in your inspection report under Part 4.7.1.c that the specific reoccurrence of this same problem should still be addressed as a routine maintenance fix under 2.1.4); or
2. A stormwater control necessary to comply with the requirements of this permit was never installed, or was installed incorrectly; or
3. Your discharges are not meeting applicable water quality standards; or
4. A prohibited discharge has occurred (see CGP Part 1.3); or
5. During the discharge from site dewatering activities:
   a. The weekly average of your turbidity monitoring results exceeds the 50 NTU benchmark (or alternate benchmark if approved by EPA pursuant to Part 3.3.2.b); or
   b. You observe or you are informed by EPA, State, or local authorities of the presence of the conditions specified in Part 4.6.3.e.

[3] If a condition on your site requires a corrective action, you must also fill out a corrective action log found at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates. See CGP Part 5.4 for more information.

Section C – Condition and Effectiveness of Pollution Prevention (P2) Practices and Controls (CGP Part 2.3) (Insert additional rows if needed)					
Type and Location of P2 Practices and Controls	**Conditions Requiring Routine Maintenance?[1]**	**If "Yes," How Many Times (Including This Occurrence) Has This Condition Been Identified?**	**Conditions Requiring Corrective Action?[2, 3]**	**Date on Which Condition First Observed (If Applicable)?**	**Description of Conditions Observed**
1.	☐ Yes ☐ No		☐ Yes ☐ No		
2.	☐ Yes ☐ No		☐ Yes ☐ No		
3.	☐ Yes ☐ No		☐ Yes ☐ No		
4.	☐ Yes ☐ No		☐ Yes ☐ No		
5.	☐ Yes ☐ No		☐ Yes ☐ No		
If the same routine maintenance was found to be necessary three or more times for the same control at the same location (including this occurrence), follow the corrective action requirements and record the required information in your corrective action log, or describe here why you believe the specific condition should still be addressed as routine maintenance:					

Section D – Stabilization of Exposed Soil (CGP Part 2.2.14) (Insert additional rows if needed)					
Specific Location That Has Been or Will Be Stabilized	**Stabilization Method and Applicable Deadline**	**Stabilization Initiated?**	**Final Stabilization Criteria Met?**	**Final Stabilization Photos Taken?**	**Notes**
1.		☐ Yes ☐ No If "Yes," date initiated:	☐ Yes ☐ No If "Yes," date criteria met:	☐ Yes ☐ No	
2.		☐ Yes ☐ No If "Yes," date initiated:	☐ Yes ☐ No If "Yes," date criteria met:	☐ Yes ☐ No	
3.		☐ Yes ☐ No If "Yes," date initiated:	☐ Yes ☐ No If "Yes," date criteria met:	☐ Yes ☐ No	
4.		☐ Yes ☐ No If "Yes," date initiated:	☐ Yes ☐ No If "Yes," date criteria met:	☐ Yes ☐ No	
5.		☐ Yes ☐ No If "Yes," date initiated:	☐ Yes ☐ No If "Yes," date criteria met:	☐ Yes ☐ No	

Section E – Description of Discharges (CGP Part 4.6.2) (Insert additional rows if needed)	
Was a discharge (not including dewatering) occurring from any part of your site at the time of the inspection?[4] ☐ Yes ☐ No **If "Yes," for each point of discharge, document the following:** • The visual quality of the discharge. • The characteristics of the discharge, including color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of stormwater pollutants. • Signs of the above pollutant characteristics that are visible from your site and attributable to your discharge in receiving waters or in other constructed or natural site drainage features.	
Discharge Location	**Observations**
1.	
2.	
3.	
4.	
5.	

[4] If a dewatering discharge was occurring, you must conduct a dewatering inspection pursuant to CGP Part 4.3.2 and complete a separate dewatering inspection report.

Section F – Signature and Certification (CGP Part 4.7.2)	
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information contained therein. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information contained is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."	
MANDATORY: Signature of Operator or "Duly Authorized Representative:"	
Signature:	**Date:**
Printed Name:	**Affiliation:**
OPTIONAL: Signature of Contractor or Subcontractor	
Signature:	**Date:**
Printed Name:	**Affiliation:**

General Tips for Using This Template

This Site Inspection Report Template is provided to assist you in preparing site inspection reports for EPA's 2022 Construction General Permit (CGP). If you are covered under the 2022 CGP, you can use this template to create a site inspection report form that is customized to the specific circumstances of your site and that complies with the minimum reporting requirements of Part 4.7 of the permit. Note that the use of this form is optional; you may use your own site inspection report form provided it includes the minimum information required in Part 4.7 of the CGP.

This template does not address the CGP's inspection reporting requirements related to dewatering activities. A separate inspection template has been developed specifically for dewatering activities and is available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates.

Keep in mind that this document is a template and not an "off-the-shelf" inspection report that is ready to use without some modification. You must first customize this form to include the specifics of your project in order for it to be useable for your inspection reports. Once you have entered all of your site-specific information into the blank fields, you may use this form to complete inspection reports.

The following tips for using this template will help you ensure that the minimum permit requirements are met:

- **Review the inspection requirements.** Before you start developing your inspection report form, read the CGP's Part 4 inspection requirements. This will ensure that you have a working understanding of the permit's underlying inspection requirements.
- **Complete all required blank fields.** Fill out all blank fields. Only by filling out all fields will the template be compliant with the requirements of the permit. (Note: Where you do not need the number of rows provided in the template form for your inspection, you may delete these or cross them off as you see fit. Or, if you need more space to document your findings, you may insert additional rows in the electronic version of this form or use the bottom of the page in the field version of this form.)
- **Use your site map to document inspection findings.** In several places in the template, you are directed to specify the location of certain features of your site, including where stormwater controls are installed and where you will be stabilizing exposed soil. You are also asked to fill in location information for unsafe conditions and the locations of any discharges occurring during your inspections. Where you are asked for location information, EPA encourages you to reference the point on your SWPPP site map that corresponds to the requested location on the inspection form. Using the site map as a tool in this way will help you conduct efficient inspections, will assist you in evaluating problems found, and will ensure proper documentation.
- **Complete the inspection report within 24 hours of completing a site inspection.** You must complete an inspection report in accordance with Part 4.7.1 of the CGP.
- **Include the inspection form with your SWPPP.** Once your form is complete, make sure to include a copy of the inspection form in your SWPPP in accordance with Part 7.2.7.e of the CGP.
- **Retain copies of all inspection reports with your records.** You must also retain in your records copies of all inspection reports in accordance with the requirements in Part 4.7.3 of the CGP. These reports must be retained for at least 3 years from the date your permit coverage expires or is terminated in accordance with the requirements in Part 4.7.4 of the CGP.

Instructions for Section A

Inspector Name

Enter the name of the person that conducted the inspection. Include the person's contact information (title, affiliated company name, address, email, and phone number).

Inspection Date and Time

Enter the date you performed the inspection and the time you started and ended the inspection.

Weather Conditions During Inspection

Enter the weather conditions occurring during the inspection, e.g., sunny, overcast, light rain, heavy rain, snowing, icy, windy.

Current Phase of Construction
If this project is being completed in more than one phase, indicate which phase it is currently in.

Inspection Location
If your project has multiple locations where you conduct separate inspections, specify the location where this inspection is being conducted. If only one inspection is conducted for your entire project, enter "Entire Site." If necessary, complete additional inspection report forms for each separate inspection location.

Unsafe Conditions for Inspection (CGP Part 4.5.7)
Inspections are not required where a portion of the site or the entire site is subject to unsafe conditions. These conditions should not regularly occur and should not be consistently present on a site. Generally, unsafe conditions are those that render the site (or a portion of it) inaccessible or that would pose a significant probability of injury to applicable personnel. Examples could include severe storm or flood conditions, high winds, and downed electrical wires.

If your site, or a portion of it, is affected by unsafe conditions during the time of your inspection, provide a description of the conditions that prevented you from conducting the inspection and what parts of the site were affected. If the entire site was considered unsafe, specify the location as "Entire Site."

Inspection Frequency
Check all the inspection frequencies that apply to your project. Note that you may be subject to different inspection frequencies in different areas of your site.

Inspection Triggered by a Storm Event
If you were required to conduct this inspection because of a storm event that produced 0.25 inches or more of rain within a 24-hour period, indicate whether you relied on an on-site rain gauge or a nearby weather station (and where the weather station is located). Also, specify the total amount of rainfall for this specific storm event.

If you were required to conduct this inspection because of a snowmelt discharge from a storm event that produced 3.25 inches or more of snow within a 24-hour period, then indicate whether you relied on an on-site measurement or a nearby weather station (and where the weather station is located). Also, specify the total amount of snowfall for this specific storm event.

Instructions for Section B

Type and Location of Erosion and Sediment (E&S) Controls
Provide a list of all erosion and sediment (E&S) controls that your SWPPP indicates will be installed and implemented at your site. This list must include at a minimum all E&S controls required by CGP Part 2.2. Include also any natural buffers established under CGP Part 2.2.1. Buffer requirements apply if your project's earth-disturbing activities will occur within 50 feet of a discharge to receiving water. You may group your E&S controls on your form if you have several of the same type of controls (e.g., you may group "Inlet Protection Measures," "Perimeter Controls," and "Stockpile Controls" together on one line), but if there are any problems with a specific control, you must separately identify the location of the control, whether routine maintenance or corrective action is necessary, and in the notes section you must describe the specifics about the problem you observed.

Conditions Requiring Routine Maintenance?
Answer "Yes" if the E&S control requires routine maintenance as defined in footnote 1 of this template. Note that in many cases, "Yes" answers are expected and indicate a project with an active operation and maintenance program. You should also answer "Yes" if work to fix the problem is still ongoing from the previous inspection, though necessary work must be initiated immediately and completed by the end of the next business day or within seven calendar days if documented in accordance with CGP Part 2.1.4.b.

If "Yes," How Many Times (Including this Occurrence) Has this Condition Been Identified?
Indicate how many times the routine maintenance has been required for the same control at the same location.

Conditions Requiring Corrective Action?
Answer "Yes" if you found any of the conditions listed in footnote 2 in this template to be present during your inspection (CGP Part 5.1). If you answer "Yes," you must take corrective action and complete a corrective action log, found at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates. You should also answer "Yes" if work to fix the problem from a previous inspection is still ongoing, though the operator must comply with the corrective action deadlines in CGP Part 5.2.

Date on Which Condition First Observed (If Applicable)?
Provide the date on which the condition that triggered the need for routine maintenance or corrective action was first identified. If the condition was just discovered during this inspection, enter the inspection date. If the condition is a carryover from a previous inspection, enter the original date of the condition's discovery.

Description of Conditions Observed
For each E&S control and the area immediately surrounding it, describe whether the control is properly installed and whether it appears to be working to minimize sediment discharge. Indicate also whether a new or modified control is necessary to comply with the permit. Describe any problem condition(s) you observed such as the following:

1. Failure to install or to properly install a required E&S control
2. Damage or destruction to an E&S control caused by vehicles, equipment, or personnel, a storm event, or other event
3. Mud or sediment deposits found downslope from E&S controls, including in receiving waters, or on nearby streets, curbs, or open conveyance channels
4. Sediment tracked out onto paved areas by vehicles leaving construction site
5. Noticeable erosion or sedimentation at discharge outlets or at adjacent streambanks or channels
6. Erosion of the site's sloped areas (e.g., formation of rills or gullies)
7. E&S control is no longer working due to lack of maintenance
8. Other incidents of noncompliance

Describe also why you think the problem condition(s) occurred as well as actions (e.g., routine maintenance or corrective action) you will take or have taken to fix the problem.

For buffer areas, make note of whether they are marked off as required, whether there are signs of construction disturbance within the buffer, which is prohibited under the CGP, and whether there are visible signs of erosion resulting from discharges through the area.

If routine maintenance or corrective action is required, briefly note the reason. If routine maintenance or corrective action has been completed, make a note of the date it was completed and what was done. *If corrective action is required, note that you will need to complete a separate corrective action log describing the condition and your work to fix the problem*.

Routine Maintenance Need Has Been Found to be Necessary Three (3) or More Times for the Same Control at the Same Location (Including this Occurrence)
If routine maintenance has been required three (3) or more times for the same control at the same location, the permit requires (CGP Part 2.1.4.c) you to fix the problem using the corrective action procedures in CGP Part 5 or to document why you believe the reoccurring problem can be addressed as a routine maintenance fix. If you believe the problem can continue to be fixed as routine maintenance, describe why you believe the specific condition should still be addressed as routine maintenance.

Instructions for Section C

Type and Location of Pollution Prevention (P2) Practices and Controls
Provide a list of all pollution prevention (P2) practices and controls that are implemented at your site. This list must include all P2 practices and controls required by CGP Part 2.3 and those that are described in your SWPPP.

Conditions Requiring Routine Maintenance?
Answer "Yes" if the P2 practice or control requires routine maintenance as defined in footnote 1of this template. Note that in many cases, "Yes" answers are expected and indicate a project with an active operation and maintenance program. You should also answer "Yes" if work to fix the problem is still ongoing

from the previous inspection, though necessary work must be initiated immediately and completed by the end of the next business day or within seven calendar days if documented in accordance with CGP Part 2.1.4.b.

If "Yes," How Many Times (Including this Occurrence) Has this Condition Been Identified?
Indicate how many times the routine maintenance has been required for the same practice or control at the same location.

Conditions Requiring Corrective Action?
Answer "Yes" if you found any of the conditions listed in footnote 2 in this template to be present during your inspection (CGP Part 5.1). If you answer "Yes," you must take corrective action and complete a corrective action log, found at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates. You should also answer "Yes" if work to fix the problem from a previous inspection is still ongoing, though the operator must comply with the corrective action deadlines in CGP Part 5.2.

Date on Which Condition First Observed (If Applicable)?
Provide the date on which the condition that triggered the need for maintenance or corrective action was first identified. If the condition was just discovered during this inspection, enter the inspection date. If the condition is a carryover from a previous inspection, enter the original date of the condition's discovery.

Description of Conditions Observed
For each P2 control and the area immediately surrounding it, describe whether the control is properly installed, and whether it appears to be working to minimize or eliminate pollutant discharges. Indicate also whether a new or modified control is necessary to comply with the permit. Describe any problem condition(s) you observed such as the following:

1. Failure to install or to properly install a required P2 control
2. Damage or destruction to a P2 control caused by vehicles, equipment, or personnel, or a storm event
3. Evidence of a spill, leak, or other type of pollutant discharge, or failure to have properly cleaned up a previous spill, leak, or other type of pollutant discharge
4. Spill response supplies are absent, insufficient, or not where they are supposed to be located
5. Improper storage, handling, or disposal of chemicals, building materials or products, fuels, or wastes
6. P2 control is no longer working due to lack of maintenance
7. Other incidents of noncompliance

Describe also why you think the problem condition(s) occurred as well as actions (e.g., routine maintenance or corrective action) you will take or have taken to fix the problem.

If routine maintenance or corrective action is required, briefly note the reason. If routine maintenance or corrective action has been completed, make a note of the date it was completed and what was done. *If corrective action is required, note that you will need to complete a separate corrective action log describing the condition and your work to fix the problem*.

Routine Maintenance Need Was Found to be Necessary Three (3) or More Times for the Same Control at the Same Location (Including this Occurrence)
If routine maintenance has been required three (3) or more times for the same control at the same location, the permit requires (CGP Part 2.1.4.c) you to fix the problem using the corrective action procedures in CGP Part 5 or to document why you believe the reoccurring problem can be addressed as a routine maintenance fix. If you believe the problem can continue to be fixed as routine maintenance, describe why you believe the specific condition should still be addressed as routine maintenance.

Instructions for Section D

Specific Location That Has Been or Will Be Stabilized
List all areas where soil stabilization is required to begin because construction work in that area has permanently stopped or temporarily stopped (i.e., work will stop for 14 or more days), and all areas where stabilization has been implemented (CGP Part 2.2.14).

Stabilization Method and Applicable Deadline
For each area, specify the method of stabilization (e.g., hydroseed, sod, planted vegetation, erosion control blanket, mulch, rock).

Specify also which of the following stabilization deadlines apply to this location:

1. 5 acres or less of land disturbance occurring at any one time at site: Complete no later than 14 calendar days after stabilization initiated.
2. More than 5 acres of land disturbance occurring at any one time at site: Complete no later than 7 calendar days after stabilization initiated.
3. Arid, semi-arid, and drought-stricken areas: See CGP Part 2.2.14.b.i.
4. Unforeseen circumstances: See CGP Part 2.2.14.b.ii.
5. Discharges to a sediment- or nutrient-impaired water or to a water identified as Tier 2, 2.5, or 3 for antidegradation purposes: Complete no later than 7 days after stabilization initiated.

Stabilization Initiated?
For each area, indicate whether stabilization has been initiated. If "Yes," then enter the date stabilization was initiated.

Final Stabilization Criteria Met?
For each area, indicate whether the final stabilization criteria in CGP Part 2.2.14.c have been met. If "Yes," then enter the date final stabilization criteria were met.

Final Stabilization Photos Taken?
Answer "Yes" if you have taken photos before and after meeting the stabilization criteria as required in CGP Part 8.2.1.a.

Notes
For each area where stabilization has been initiated, describe the progress that has been made and what additional actions are necessary to complete stabilization. Note the effectiveness of stabilization in preventing erosion. If stabilization has been initiated but not completed, make a note of the date it is to be completed. If stabilization has been completed, make a note of the date it was completed. If stabilization has not yet been initiated, make a note of the date it is to be initiated and the date it is to be completed.

Instructions for Section E
You are only required to complete this section if a discharge is occurring at the time of the inspection (CGP Part 4.6.2).

Was a discharge (not including dewatering) occurring from any part of your site at the time of the inspection?
During your inspection, examine all points of discharge from your site, and determine whether a discharge is occurring. If a dewatering discharge was occurring, you must conduct a dewatering inspection pursuant to CGP Part 4.3.2. If there is a discharge, answer "Yes" and complete the questions below regarding the specific discharge. If there is not a discharge, answer "No" and skip to the next page.

Discharge Location (Repeat as necessary if there are multiple points of discharge.)
Specify the location on your site where the discharge is occurring. The location may be an outlet from a stormwater control or constructed stormwater channel, a discharge into a storm sewer inlet, or a specific point on the site. Be as specific as possible; it is recommended that you refer to a precise point on your site map.

Observations
Document the visual quality of the discharge and take note of the characteristics of the stormwater discharge, including color; odor; floating, settled, or suspended solids; foam; oily sheen; and other indicators of stormwater pollutants. Also, document signs of these same pollutant characteristics that are visible from your site and attributable to your discharge in receiving waters or in other constructed or natural site drainage features.

Instructions for Section F

Each inspection report must be signed and certified to be considered complete (CGP Part 4.7.2).

Operator or "Duly Authorized Representative" – MANDATORY (CGP Appendix G Part G.11.2 and CGP Appendix H Section X)

At a minimum, the site inspection report must be signed by either (1) the person who signed the NOI, or (2) a duly authorized representative of that person. The following requirements apply:

If the signatory will be the person who signed the NOI for permit coverage, as a reminder, that person must be one of the following types of individuals:

- *For a corporation*: By a responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- *For a partnership or sole proprietorship*: By a general partner or the proprietor, respectively.
- *For a municipality, State, Federal, or other public agency*: By either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a Federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

If the signatory will be a duly authorized representative, the following requirements must be met:

- The authorization is made in writing by the person who signed the NOI (see above);
- The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
- The signed and dated written authorization is included in the SWPPP. A copy must be submitted to EPA, if requested.

Sign, date and print your name and affiliation.

Contractor or Subcontractor - OPTIONAL

Where you rely on a contractor or subcontractor to complete the site inspection report, you should consider requiring the individual(s) to sign and certify each report. Note that this does not relieve you, the permitted operator, of the requirement to sign and certify the site inspection report as well. If applicable, sign, date, and print your name and affiliation.

Note

While EPA has made every effort to ensure the accuracy of all instructions contained in this template, it is the permit, not this template, that determines the actual obligations of regulated construction stormwater discharges. In the event of a conflict between this template and any corresponding provision of the CGP, you must abide by the requirements in the permit. EPA welcomes comments on this Site Inspection Report Template at any time and will consider those comments in any future revision. You may contact EPA for CGP-related inquiries at cgp@epa.gov

Project Name: ______________________________
NPDES ID Number: ______________________________

Section A – Dewatering Discharges (CGP Part 4.6.3) Complete this section within 24 hours of completing the inspection. (If necessary, complete additional inspection reports for each separate inspection location.)	
Inspector Information	
Inspector Name:	**Title:**
Company Name:	**Email:**
Address:	**Phone Number:**
Inspection Details	
Inspection Date:	**Inspection Location:**
Discharge Start Time:	**Discharge End Time:**
Rate of Discharge (gallons per day):	**Corrective Action Required?**[1] ☐ Yes ☐ No
Describe Indicators of Pollutant Discharge at Point of Dewatering Discharge:[1]	
Attach Photographs of: 1. Dewatering water prior to treatment by a dewatering control(s) and the final discharge after treatment; and 2. Dewatering control(s); and 3. Point of discharge to any receiving waters flowing through or immediately adjacent to the site and/or to constructed or natural site drainage features, storm drain inlets, and other conveyances to receiving waters.	

[1] If you observe any of the following indicators of pollutant discharge, you are required to take corrective action under Part 5.1.5.b:
- a sediment plume, suspended solids, unusual color, presence of odor, decreased clarity, or presence of foam; or
- a visible sheen on the water surface or visible oily deposits on the bottom or shoreline of the receiving water.

Section B – Signature and Certification (CGP Part 4.7.2)	
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information contained therein. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information contained is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."	
MANDATORY: Signature of Operator or "Duly Authorized Representative:"	
Signature:	**Date:**
Printed Name:	**Affiliation:**
OPTIONAL: Signature of Contractor or Subcontractor	
Signature:	**Date:**
Printed Name:	**Affiliation:**

General Tips for Using This Template

This Dewatering Inspection Report Template is provided to assist you in preparing dewatering inspection reports for EPA's 2022 Construction General Permit (CGP). If you are covered under the 2022 CGP, you can use this template to create a dewatering inspection report form that complies with the minimum reporting requirements of Part 4.6.3 of the permit. Note that the use of this form is optional; you may use your own inspection report form provided it includes the minimum information required in Part 4.6.3 of the CGP.

This template is for dewatering inspections only. A separate site inspection report template that does not include dewatering inspections and complies with the minimum reporting requirements of Part 4.7 of the permit is available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates.

If you are covered under a State CGP, this template may be helpful in developing a report that can be used for that permit; however, it will need to be modified to meet the specific requirements of that permit. If your permitting authority requires you to use a specific inspection report form, you should not use this form.

The following tips for using this template will help you ensure that the minimum permit requirements are met:

- **Review the inspection requirements.** Before you start developing your inspection report form, read the CGP's Part 4 inspection requirements. This will ensure that you have a working understanding of the permit's underlying inspection requirements.
- **Complete all required blank fields.** Fill out all blank fields. Only by filling out all fields will the template be compliant with the requirements of the permit. (Note: Where you do not need the number of rows provided in the template form for your inspection, you may delete these as you see fit. Or, if you need more space to document your findings, you may insert additional rows in the electronic version of this form or use the bottom of the page in the field version of this form.)
- **Use your site map to document inspection findings.** In several places in the template, you are directed to specify the location of certain features of your site, including where stormwater controls are installed and where you will be stabilizing exposed soil. You are also asked to fill in location information for unsafe conditions and the locations of any discharges occurring during your inspections. Where you are asked for location information, EPA encourages you to reference the point on your SWPPP site map that corresponds to the requested location on the inspection form. Using the site map as a tool in this way will help you conduct efficient inspections, will assist you in evaluating problems found, and will ensure proper documentation.
- **Include the inspection form with your SWPPP.** Once your form is complete, make sure to include a copy of the inspection form in your SWPPP in accordance with Part 7.2.7.e of the CGP.
- **Retain copies of all inspection reports with your records.** You must also retain copies of all inspection reports in your records in accordance with the requirements in Part 4.7.3 of the CGP. These reports must be retained for at least 3 years from the date your permit coverage expires or is terminated in accordance with the requirements in Part 4.7.4 of the CGP.

Instructions for Section A

Inspector Name

Enter the name of the person that conducted the inspection. Include the person's contact information (title, affiliated company name, address, email, and phone number).

Inspection Date

Enter the date you performed the inspection.

Inspection Location

If your project has multiple locations where you conduct separate dewatering inspections, specify the location where this inspection is being conducted. Otherwise, you can enter "dewatering operation."

Discharge Start and End Times

Enter the approximate time the dewatering discharge started and ended on the day of the inspection.

Rate of Discharge

Enter the rate of discharge in gallons per day on the day of inspection.

To estimate the approximate discharge rate on the day of dewatering inspection, one approach is to use the manufacturer's design pump rating for the pump model in use. For example, a pump rated at 164 gpm (gallons per minute) by the manufacturer can be assumed to be discharging at 164 gpm in most cases. To convert to gallons per day, multiply the rate in gpm by the ratio of minutes in one-day (1,440 minutes per day), resulting in a discharge rate of 236,160 gallons per day.

In cases where the dewatering discharge is being pumped over long distances or a substantial distance uphill, which will result in a reduced pump rate relative to manufacturer's specification, the operator may improve the accuracy of the estimate by estimating the time required to fill a container of a known volume. For example, if it takes 60 seconds to fill an empty 55-gallon barrel, the estimated discharge rate is 55 gpm, or 79,200 gallons per day.

Indicators of Pollutant Discharge

For the point of discharge, describe any observed sediment plume, suspended solids, unusual color, presence of odor, decreased clarity, or presence of foam; and/or a visible sheen on the water surface or visible oily deposits on the bottom or shoreline of the receiving water.

Corrective Action Required?

Answer "Yes" if during your inspection you found any of the conditions listed above in the instructions for the Indicators of Pollutant Discharge section. If you answer "Yes," you must take corrective action and complete a corrective action log, found at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates. Answer "No" if you did not observe any of the listed pollutant indicators.

Photographs

As required in CGP Part 8.2.1.a, attach photos of: (1) dewatering water prior to treatment by a dewatering control(s) and the final discharge after treatment; (2) the dewatering control(s); and (3) the point of discharge to any receiving waters flowing through or immediately adjacent to the site and/or to constructed or natural site drainage features, storm drain inlets, and other conveyances to receiving waters.

Instructions for Section B

Each inspection report must be signed and certified to be considered complete (CGP Part 4.7.2).

Operator or "Duly Authorized Representative" – MANDATORY (CGP Appendix G Part G.11.2 and CGP Appendix H Section X)

At a minimum, the dewatering inspection report must be signed by either (1) the person who signed the NOI, or (2) a duly authorized representative of that person. The following requirements apply:

If the signatory will be the person who signed the NOI for permit coverage, as a reminder, that person must be one of the following types of individuals:

- *For a corporation*: By a responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- *For a partnership or sole proprietorship*: By a general partner or the proprietor, respectively.

- *For a municipality, State, Federal, or other public agency*: By either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a Federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

If the signatory will be a duly authorized representative, the following requirements must be met:

- The authorization is made in writing by the person who signed the NOI (see above);
- The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
- The signed and dated written authorization is included in the SWPPP. A copy must be submitted to EPA, if requested.

Sign, date and print your name and affiliation.

Contractor or Subcontractor - OPTIONAL

Where you rely on a contractor or subcontractor to complete the dewatering inspection report, you should consider requiring the individual(s) to sign and certify each report. Note that this does not relieve you, the permitted operator, of the requirement to sign and certify the dewatering inspection report as well. If applicable, sign, date, and print your name and affiliation.

Note

While EPA has made every effort to ensure the accuracy of all instructions contained in this template, it is the permit, not this template, that determines the actual obligations of regulated construction stormwater discharges. In the event of a conflict between this template and any corresponding provision of the CGP, you must abide by the requirements in the permit. EPA welcomes comments on this Dewatering Inspection Report Template at any time and will consider those comments in any future revision. You may contact EPA for CGP-related inquiries at cgp@epa.gov

Appendix E – Copy of Corrective Action Log

2022 CGP Corrective Action Log
Project Name: ____
NPDES ID Number: ____

Section A – Individual Completing this Log	
Name:	**Title:**
Company Name:	**Email:**
Address:	**Phone Number:**
Section B – Details of the Problem (CGP Part 5.4.1.a) Complete this section within 24 hours of discovering the condition that triggered corrective action.	
Date problem was first identified:	**Time problem was first identified**:
What site conditions triggered this corrective action? *(Check the box that applies. See instructions for a description of each triggering condition (1 thru 6).)* ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5a ☐ 5b ☐ 6	
Specific location where problem identified:	
Provide a description of the specific condition that triggered the need for corrective action and the cause (if identifiable):	
Section C – Corrective Action Completion (CGP Part 5.4.1.b) Complete this section within 24 hours after completing the corrective action.	
For site condition # 1, 2, 3, 4, or 6 (those not related to a dewatering discharge) confirm that you met the following deadlines (CGP Part 5.2.1):	
☐ Immediately took all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events. **AND**	
☐ Completed corrective action by the close of the next business day, unless a new or replacement control, or significant repair, was required. **OR**	
☐ Completed corrective action within seven (7) calendar days from the time of discovery because a new or replacement control, or significant repair, was necessary to complete the installation of the new or modified control or complete the repair. **OR**	
☐ It was infeasible to complete the installation or repair within 7 calendar days from the time of discovery. Provide the following additional information: Explain why 7 calendar days was infeasible to complete the installation or repair:	

Provide your schedule for installing the stormwater control and making it operational as soon as feasible after the 7 calendar days:

For site condition # 5a, 5b, or 6 (those related to a dewatering discharge), confirm that you met the following deadlines:

- ☐ Immediately took all reasonable steps to minimize or prevent the discharge of pollutants until a solution could be implemented, including shutting off the dewatering discharge as soon as possible depending on the severity of the condition taking safety considerations into account.
- ☐ Determined whether the dewatering controls were operating effectively and whether they were causing the conditions.
- ☐ Made any necessary adjustments, repairs, or replacements to the dewatering controls to lower the turbidity levels below the benchmark or remove the visible plume or sheen.

Describe any modification(s) made as part of corrective action: (Insert additional rows below if applicable)	**Date of completion:**	**SWPPP update necessary?**	**If yes, date SWPPP was updated:**
1.		☐ Yes ☐ No	
2.		☐ Yes ☐ No	

Section D - Signature and Certification (CGP Part 5.4.2)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information contained therein. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information contained is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

MANDATORY: Signature of Operator or "Duly Authorized Representative:"	
Signature:	**Date:**
Printed Name:	**Affiliation:**

OPTIONAL: Signature of Contractor or Subcontractor	
Signature:	**Date:**
Printed Name:	**Affiliation:**

General Instructions

This Corrective Action Log Template is provided to assist you creating a corrective action log that complies with the minimum reporting requirements of Part 5.4 of the EPA's Construction General Permit (CGP). For each triggering condition on your site, you will need to fill out a separate corrective action log.

The entire form must be completed to be compliant with the requirements of the permit. (Note: In Section C, if you do not need the number of rows provided in the corrective action log, you may delete these or cross them off. Alternatively, if you need more space to describe any modifications, you may insert additional rows in the electronic version of this form or use the bottom of the page in the field version of this form.)

If you are covered under a State CGP, this template may be helpful in developing a log that can be used for that permit; however, you will likely need to modify this form to meet the specific requirements of any State-issued permit. If your permitting authority requires you to use a specific corrective action log, you should not use this template.

Instructions for Section A

Individual completing this form Enter the name of the person completing this log. Include the person's contact information (title, affiliated company name, address, email, and phone number).

Instructions for Section B

You must complete Section B within 24 hours of discovering the condition that triggered corrective action. (CGP Part 5.4)

When was the problem first discovered?
Specify the date and time when the triggering condition was first discovered.

What site conditions triggered this corrective action? (CGP Parts 5.1 and 5.3)
Check the box corresponding to the numbered triggering condition below that applies to your site.

1. A stormwater control needs a significant repair or a new or replacement control is needed, or, in accordance with Part Error! Reference source not found., you find it necessary to repeatedly (i.e., 3 or more times) conduct the same routine maintenance fix to the same control at the same location (unless you document in your inspection report under Part Error! Reference source not found. that the specific reoccurrence of this same problem should still be addressed as a routine maintenance fix under Part Error! Reference source not found.);
2. A stormwater control necessary to comply with the requirements of this permit was never installed, or was installed incorrectly;
3. Your discharges are not meeting applicable water quality standards;
4. A prohibited discharge has occurred (see Part 1.3);
5. During discharge from site dewatering activities:
   a. The weekly average of your turbidity monitoring results exceeds the 50 NTU benchmark (or alternate benchmark if approved by EPA pursuant to Part **Error! Reference source not found.**); or
   b. You observe or you are informed by EPA, State, or local authorities of the presence of any of the following at the point of discharge to a receiving water flowing through or immediately adjacent to your site and/or to constructed or natural site drainage features or storm drain inlets:
      - sediment plume
      - suspended solids
      - unusual color
      - presence of odor
      - decreased clarity
      - presence of foam
      - visible sheen on the water surface or visible oily deposits on the bottom or shoreline of the receiving water
6. EPA requires corrective action as a result of permit violations found during an inspection carried out under Part 4.8.

Provide a description of the problem (CGP Part 5.4.1.a)
Provide a summary description of the condition you found that triggered corrective action, the cause of the problem (if identifiable), and the specific location where it was found. Be as specific as possible about the location; it is recommended that you refer to a precise point on your site map.

Instructions for Section C

You must complete Section C within 24 hours after completing the correction action. (CGP Part 5.4)

Deadlines for completing corrective action for condition # 1, 2, 3, 4, or 6 (if not relating to a dewatering discharge) (CGP Part 5.2.1)
Check the box to confirm that you met the deadlines that apply to each triggering condition. You are always required to check the first box (i.e., Immediately took all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events.). Only one of the next three boxes should be checked depending on the situation that applies to this corrective action.

Check the second box if the corrective action for this particular triggering condition does not require a new or replacement control, or a significant repair. These actions must be completed by the close of the next business day from the time of discovery of the condition.

Check the third box if the corrective action for this particular triggering condition requires a new or replacement control, or a significant repair. These actions must be completed by no later than seven calendar days from the time of discover of the condition.

Check the fourth box if the corrective action for this particular triggering condition requires a new or replacement control, or a significant repair, and if it is infeasible to complete the work within seven calendar days. Additionally, you will need to fill out the table below the checkbox that requires:

1. An explanation as to why it was infeasible to complete the installation or repair within seven calendar days of discovering the condition.
2. Provide the schedule you will adhere to for installing the stormwater control and making it operational as soon as feasible after the seventh day following discovery.

Note: Per Part 5.2.1.c, where these actions result in changes to any of the stormwater controls or procedures documented in your SWPPP, you must modify your SWPPP accordingly within seven calendar days of completing this work.

Deadlines for completing corrective action for condition # 5a, 5b, or 6 related to a dewatering discharge (CGP Part 5.2.2)
These deadlines apply to conditions relating to construction dewatering activities. Check the box to confirm that you met the deadlines that apply to each triggering condition. You are required to check all of the boxes in this section to indicate your compliance with the corrective action deadlines.

List of modification(s) to correct problem
Provide a list of modifications you completed to correct the problem.

Date of completion
Enter the date you completed the modification. The work must be completed by the deadline you indicated above.

SWPPP update necessary?
Check "Yes" or "No" to indicate if a SWPPP update is necessary consistent with Part 7.4.1.a in order to reflect changes implemented at your site. If "Yes," then enter the date you updated your SWPPP. The SWPPP updates must be made within seven calendar days of completing a corrective action. (CGP Part 5.2.1.c)

Instructions for Section D

Each corrective action log entry must be signed and certified following completion of Section D to be considered complete. (CGP Part 5.4.2)

Operator or "Duly Authorized Representative" – MANDATORY (CGP Appendix G Part G.11.2 and CGP Appendix H Section X)

At a minimum, the corrective action log must be signed by either (1) the person who signed the NOI, or (2) a duly authorized representative of that person. The following requirements apply:

If the signatory will be the person who signed the NOI for permit coverage, as a reminder, that person must be one of the following types of individuals:

- *For a corporation*: By a responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- *For a partnership or sole proprietorship*: By a general partner or the proprietor, respectively.
- *For a municipality, State, Federal, or other public agency*: By either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a Federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

If the signatory will be a duly authorized representative, the following requirements must be met:

- The authorization is made in writing by the person who signed the NOI (see above);
- The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
- The signed and dated written authorization is included in the SWPPP. A copy must be submitted to EPA, if requested.

Sign, date and print your name and affiliation.

Contractor or Subcontractor - OPTIONAL
Where you rely on a contractor or subcontractor to complete this log and the associated corrective action, you should consider requiring the individual(s) to sign and certify each log entry. Note that this does not relieve you, the permitted operator, of the requirement to sign and certify the log as well. If applicable, sign, date, and print your name and affiliation.

Recordkeeping

Logs must be retained for at least 3 years from the date your permit coverage expires or is terminated. (CGP Part 5.4.4)

Keep copies of your signed corrective action log entries at the site or at an easily accessible location so that it can be made immediately available at the time of an on-site inspection or upon request by EPA. (CGP Part 5.4.3) Include a copy of the corrective action log in your SWPPP. (CGP Part 7.2.7.e)

Note

While EPA has made every effort to ensure the accuracy of all instructions contained in this template, it is the permit, not this template, that determines the actual obligations of regulated construction stormwater discharges. In the event of a conflict between this template and any corresponding provision of the CGP, you must abide by the requirements in the permit. EPA welcomes comments on this Corrective Action Log Template at any time and will consider those comments in any future revision. You may contact EPA for CGP-related inquiries at cgp@epa.gov

Appendix F – SWPPP Amendment Log

Appendix F – SWPPP Amendment Log

No.	Description of the Amendment	Date of Amendment	Amendment Prepared by [Name(s) and Title]
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	

Appendix G – Subcontractor Certifications/Agreements

Appendix G – Subcontractor Certifications/Agreements

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Number: ____

Project Title: ____

Operator(s): ____

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the practices described in the SWPPP.

This certification is hereby signed in reference to the above named project:

Company: ____

Address: ____

Telephone Number: ______________________

Type of construction service to be provided: ______________________________

____

____

Signature: ______________________

Title: ______________________

Date: ______________________

Appendix H – Grading and Stabilization Activities Log

Appendix H – Grading and Stabilization Activities Log

Date Grading Activity Initiated	Description of Grading Activity	Description of Stabilization Measure and Location	Date Grading Activity Ceased (Indicate Temporary or Permanent)	Date When Stabilization Measures Initiated
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE

Date Grading Activity Initiated	**Description of Grading Activity**	**Description of Stabilization Measure and Location**	**Date Grading Activity Ceased** (Indicate Temporary or Permanent)	**Date When Stabilization Measures Initiated**
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE

Appendix I –Training Documentation

CONTRACTOR TO INSERT TRAINING DOCUMENTATION REQUIRED BY THE CGP

Appendix J – Delegation of Authority Form

Appendix J – Delegation of Authority Form

Delegation of Authority

I, ______________________ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the EPA's Construction General Permit (CGP), at the __________________________________ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

______________________________________ (name of person or position)
______________________________________ (company)
______________________________________ (address)
______________________________________ (city, State, zip)
______________________________________ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in Appendix G of EPA's CGP, and that the designee above meets the definition of a "duly authorized representative" as set forth in Appendix G.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: ____

Company: ____

Title: ____

Signature: ____

Date: ____

Appendix K – Endangered Species Documentation

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Project information

NAME

True Storage Facility

LOCATION

Plymouth County, Massachusetts

DESCRIPTION

Some(The Owner is proposing to develop an existing parcel of land located at 2400 & 2402 Cranberry Highway in Wareham, Massachusetts (the "Site"). The subject properties are identified by the Town of Wareham Assessor's office as Tax Map 108 Lots 1002.B1, 1002.B2, 1002.D, 1003.B1, 1003.B2, and 1003.B3. The Site currently consists of a 6,900 square foot one-story building that was used as a Buick Dealership showroom and garage and most recently as Wareham Pharmacy. The northern portion of the building was used as the auto showroom/pharmacy retail area. The southern portion of the building is a three-bay garage. A former auto body shop was located to the south of the standing structure. This was demolished and little evidence of the structure is left. A residential house was historically located on the southern portion of 2402 Cranberry Highway, this structure was demolished, and no apparent evidence of the structure remains.

The Applicant proposes to develop the Site in order to construct a two-story 60,000 square foot storage facility. As proposed, the Project includes the demolition of the former auto showroom/pharmacy, three-bay garage and the existing pavement parking and driveways including the closer of three driveways to Cranberry Highway. The new development will include the construction of the storage facility building, new parking and drive aisles, landscape improvements, and utility and stormwater management improvements to support the development.)

Local office

New England Ecological Services Field Office

(603) 223-2541
(603) 223-0104

70 Commercial Street, Suite 300
Concord, NH 03301-5094

http://www.fws.gov/newengland

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Reptiles

NAME	STATUS
Plymouth Redbelly Turtle *Pseudemys rubriventris bangsi* Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/451	Endangered

Insects

NAME	STATUS

Monarch Butterfly Danaus plexippus | Candidate
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/9743

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
American Oystercatcher Haematopus palliatus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8935	Breeds Apr 15 to Aug 31

Bald Eagle Haliaeetus leucocephalus

Breeds Oct 15 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1626

Black-billed Cuckoo Coccyzus erythropthalmus

Breeds May 15 to Oct 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9399

Lesser Yellowlegs Tringa flavipes

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Ruddy Turnstone Arenaria interpres morinella

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Rusty Blackbird Euphagus carolinus

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Willet Tringa semipalmata

Breeds Apr 20 to Aug 5

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wood Thrush Hylocichla mustelina

Breeds May 10 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

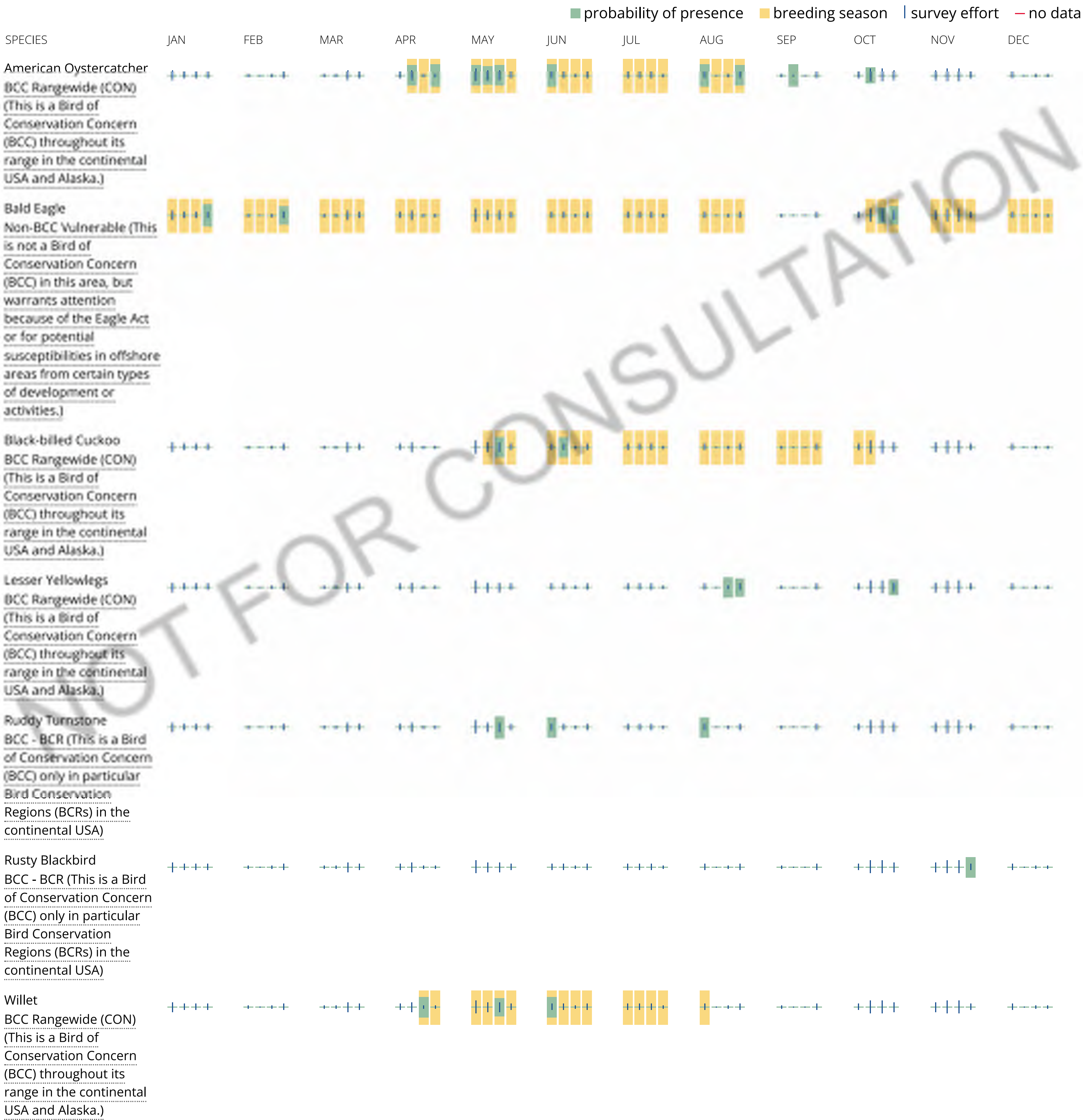
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Wood Thrush
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME
This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Drawn Action Area & Overlapping S7 Consultation Areas

Area of Interest (AOI) Information

Area : 2,198.44 acres

Mar 24 2022 15:52:57 Eastern Daylight Time

Summary

Name	Count	Area(acres)	Length(mi)
Atlantic Sturgeon	0	0	N/A
Shortnose Sturgeon	0	0	N/A
Atlantic Salmon	0	0	N/A
Sea Turtles	0	0	N/A
Atlantic Large Whales	0	0	N/A
In or Near Critical Habitat	0	0	N/A

Appendix L – Historic Properties Documentation

Phase I and II Environmental Site Assessment Reports prepared by Nobis are available upon request

Appendix N – Turbidity Monitoring Sampling Documentation (Not Applicable)

Appendix O – Structural BMP Specifications for the Mass. Stormwater Handbook

The MassDEP Stormwater Handbook Volume 2 Chapter 2 is available at

https://www.mass.gov/doc/massachusetts-stormwater-handbook-vol-2-ch-2-stormwater-best-management-practices/download

APPENDIX F – OPERATIONS & MAINTENANCE PLAN

INSPECTION & MAINTENANCE PROCEDURES

TRUE STORAGE FACILITY
2400 & 2402 CRANBERRY HIGHWAY, WAREHAM, MA

RESPONSIBLE PARTIES

Inspection/Maintenance/Record Keeping:
Wareham Development, LLC, & JB Development, LLC,
Bourne Acquisition, LLC & 2527 LLC
670 N. Commercial Street, Suite 212
Manchester, NH 03101

INSPECTION & MAINTENANCE SCHEDULE & PROCEDURES

Sediment Forebay	Sediment forebay shall be inspected prior to directing stormwater to them. Thereafter, each forebay will be inspected at least monthly. Clean sediment forebays at least 4 times per year and when sediment depth is between 3 to 6 feet. Grass height shall be kept no lower than 3 inches and no greater than 6 inches. Inspection and maintenance results will be recorded using the Inspection Form at the end of this document.
Infiltration Basin	Basins shall be inspected prior to directing stormwater to them. Thereafter, the basin will be inspected as least twice annually, and following any rainfall event exceed 2.5” in a 24-hour period. At least once annually the basin areas will be inspected for drawdown time. Vegetation will also be inspected at least annually and twice a year, mow the buffer area and side slopes. Inspection and maintenance results will be recorded using the Inspection Form at the end of this document.

Catch Basins	Catch basins shall be inspected prior to directing stormwater to them. Inspect monthly for the first year, then four times per year thereafter. Clean when the sump is half full (2 feet) of sediment.
Other Vegetated Areas	Prune and weed twice per year. Inspect trees and shrubs four times per year.

True Storage Facility Inspection & Maintenance Checklist

General Information		
Date of Inspection		
Inspector's Name(s)		
Inspector's Title(s)		
Type of Inspection:	❑ Routine (annual)	❑ Post-storm event

❑ Inspection of BMP's
❑ No Follow Up Action Required
❑ Follow Up Action Required as Detailed Below

Location	Visible Erosion/Damage?	Maintenance Required? Provide detail below
Infiltration Basin	❑Yes ❑No	❑Yes ❑No
Sediment Forebay	❑Yes ❑No	❑Yes ❑No
Catch Basins	❑Yes ❑No	❑Yes ❑No
Other Vegetated Areas	❑Yes ❑No	❑Yes ❑No

Corrective Action Needed and Notes

True Storage Facility Inspection and Maintenance Log

Date:			
Performed by:			
Practice:			
Basins ❑Inspection ❑Maintenance	Sediment Forebay ❑Inspection ❑Maintenance	Catch Basins ❑Inspection ❑Maintenance	Vegetation ❑Inspection ❑Maintenance
Date:			
Performed by:			
Practice:			
Date:			
Performed by:			
Practice:			
Basins ❑Inspection ❑Maintenance	Sediment Forebay ❑Inspection ❑Maintenance	Catch Basins ❑Inspection ❑Maintenance	Vegetation ❑Inspection ❑Maintenance
Date:			
Performed by:			
Practice:			
Basins ❑Inspection ❑Maintenance	Sediment Forebay ❑Inspection ❑Maintenance	Catch Basins ❑Inspection ❑Maintenance	Vegetation ❑Inspection ❑Maintenance
Date:			
Performed by:			
Practice:			
Basins ❑Inspection ❑Maintenance	Sediment Forebay ❑Inspection ❑Maintenance	Catch Basins ❑Inspection ❑Maintenance	Vegetation ❑Inspection ❑Maintenance

APPENDIX G – MASSDEP CHECKLIST FOR STORMWATER REPORT

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

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[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

3/15/2023

Signature and Date

Checklist

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

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☐ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of “country drainage” versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☒ Other (describe): Infiltration Basin

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☒ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:
- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

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

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

☐ is within the Zone II or Interim Wellhead Protection Area

☐ is near or to other critical areas

☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)

☐ involves runoff from land uses with higher potential pollutant loads.

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

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

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Appendix A
MassDOT Highway Division
Illicit Discharge Compliance Statement

____
(MassDOT Permit Number)

I, as Owner/Applicant, certify, that; (1) the property located at:

2400 & 2400 Cranberry Highway (MA Route 28)

(Street name, route number and station location of proposed stormwater drainage connection)

in, Wareham, Massachusetts;
(City/Town)

(2) the property does not have any illicit* or unauthorized drainage connections or discharges including, but not limited to, non-stormwater discharges occurring due to spills, dumping and improper connections to the MassDOT drainage system from residential, industrial, commercial or institutional establishments.

(3) that the attached plan/map clearly identifies the following:

- The location of all on-site systems for conveying wastewater, stormwater and/or groundwater.
- The location of any measures taken to prevent the entry of illicit discharges into the MassDOT storm drain system.
- That there are no connections between the wastewater management system and the MassDOT storm drain system; and

(4) that the following actions have been taken to identify and remove illicit discharges for existing and redevelopment projects:

- Visual screening/inspection
- Dye or smoke testing
- Water quality sampling
- Removal of illicit discharges (List type and location):______________________________
- Other method of illicit detection (List method):______________________________

Property Owner:

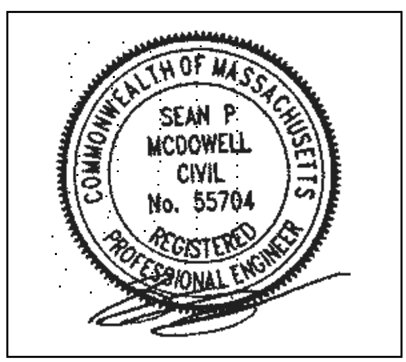
Name: True Storage LLC

Address: 670 N Commercial St #212

City/Town: Manchester, NH 03101

Signature: Joshua Sullivan

Registered Professional Engineer:



*An illicit discharge includes direct or indirect discharges to the MassDOT storm drain system that are not composed entirely of storm water, except as exempted in MassDOT's Drainage and Connection Policy, P-06-002, dated, 6/26/2006. Illicit discharges include, without limitation, sewage, process wastewater, or wash water and any connections from indoor drains, sinks, or toilets, regardless of whether said connection was previously allowed, permitted, or approved.