STORMWATER MANAGEMENT REPORT

FOR

COLD BROOK CROSSING

NORTH ROAD RESIDENTIAL OVERLAY DISTRICT (NRROD)
& SMART GROWTH OVERLAY DISTRICT (SGOD) PROJECT

NORTH ROAD
SUDBURY, MASSACHUSETTS

PREPARED FOR:

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DATE: MARCH 11, 2020

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1.0 SITE LOCATION AND DESCRIPTION

Civil Design Group, LLC (CDG) has been retained by Quarry North Road, LLC to prepare this Stormwater Management Report for the construction of the *Cold Brook Crossing*, a residential community that will consist of 274 residential units including 123 townhomes and three multi-family buildings containing 151 units on approximately 26 acres.

The project entails the redevelopment of a former gravel pit site. The project site is bordered by Route 117 on the south, Sudbury conservation land and a private age-restricted condominium development (55+) to the west, Concord conservation land to the north, and a wetland system to the north and east. Most of the project site has been significantly disturbed as part of the former sand and gravel operation, with the removal of most vegetation and underlying soils.

The sand/gravel pit consists of excavated land with steep slopes where the site adjoins with abutting properties. Vegetation cover types vary across the site ranging from patches of open field vegetation within the sand and gravel pit, undeveloped forested uplands flanking the sand and gravel pit to the north and east, and scrub-shrub/emergent marsh wetlands located along the northern and eastern property boundaries. A perennial stream flows within the emergent marsh along the northern property boundary before turning south and flowing along the eastern property boundary. The forest uplands occur along a topographic ridge located within the northern and eastern portions of the site, which descends towards the sand and gravel pit to the south and west, and to towards the scrub-shrub/emergent wetlands to the north and east.

Surface water from the vast majority of the site generally flows from west to the north and east across the property toward the receiving wetlands along the northern and eastern edges of the property. Surface water from a small portion of the site flows southwesterly toward a small pond located on the conservation parcel.

This study presents a comparative analysis of the pre-development and post-development hydrologic characteristics of the site, and outlines the proposed measures to mitigate flow, provide groundwater recharge, and improve water quality from the site in accordance with the Town of Sudbury and the Massachusetts Department of Environmental Protection (DEP's) requirements.

2.0 METHODOLOGY

Technical Release 55 (TR-55) methodology was utilized to determine weighted curve numbers (CNs) for each pre and post-development subcatchment area. Weighted CNs are based on ground cover type and hydrologic soil groups (HSGs). The times of concentration (Tcs) for each of the existing and proposed watersheds have been calculated. The areas that do not show a Tc travel path resulted in travel times of less than 6 minutes. CN and Tc values were then utilized to generate hydrographs using HydroCad 10.0, an industry standard software package that develops a hydrologic model based on the SCS method and computes peak discharges from rainfall runoff for urban and rural watersheds.

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3.0 SOILS

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey for Middlesex County, the upland portions of the site contain predominantly Pits, Gravel and Hinckley Loamy Sand, with a minor component of Merrimac Fine Sandy Loam soils. These soils are excessively drained soils that are typically associated with glacial outwash plains, stream terraces, kames, and eskers. The wetland portions of the site contain Freetown Muck, which consist of very deep, very poorly drained soils in depressions or low-lying areas like swamps, marshes, and bogs.

In addition to the NRCS data, subsurface testing was conducted by Provencher Engineering, LLC in July 2019, the results of which are included in Section 3 of this report.

4.0 POINTS OF ANALYSIS

Points of Analysis (POAs) are discharge points or lines toward which runoff from the study area is conveyed via overland flow or through drain pipes. The pre-development and post-development areas of disturbance drain to four (4) POAs listed and described below and shown on Figures 3 and 4.

TABLE-1: POINTS OF ANALYSIS

POINT OF ANALYSIS	DESCRIPTION
POA-1	An analysis point along the southern edge of the site representing North Road. This analysis point receives runoff via overland flow.
POA-2	An analysis point representing the large wetland complex that wraps the northern and eastern portions of the site. This analysis point receives runoff via overland flow and ultimately discharges toward Cold Brook.
POA-3	An analysis point in the eastern portion of the site representing the existing access driveway for the cell tower. This analysis point receives runoff via overland flow and ultimately discharges toward the large wetland complex noted above (POA-2). It was studied separately from POA-2 as it flows through an existing stormwater basin to the east of the cell tower prior to discharging to the wetlands.
POA-4	An analysis point along the northern edge of the proposed open space parcel. This analysis point receives runoff via overland flow.

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5.0 WATERSHED DELINEATION

5.1 EXISTING DRAINAGE WATERSHEDS

The existing watersheds are delineated based on topography and physical characteristics and collect and direct stormwater towards the POAs. This report analyzes the site watersheds and also analyzes offsite watersheds that will ultimately flow through the proposed drainage features.

The total study area includes 44.11 acres consisting of onsite and offsite areas, divided into four (4) pre-development watersheds as described below:

Subcatchment EX-1: The 2.61-acre watershed is comprised of pavement, rooftop, and woods. Runoff travels via overland flow in a southerly direction toward POA-1.

Subcatchment EX-2: The 15.80-acre watershed is comprised of woods, brush areas, gravel surfaces, and wetlands. Runoff travels in a northerly and easterly direction toward POA-2.

Subcatchment EX-3: The 24.92-acre watershed is comprised of woods and brush areas. Runoff travels in an easterly direction toward POA-3.

Subcatchment EX-4: The 0.78-acre watershed is comprised of woods. Runoff travels in a southerly direction toward POA-4.

5.2 PROPOSED DRAINAGE WATERSHEDS

Similar to the existing watersheds, the proposed watersheds are delineated based on topography, physical characteristics and drainage networks within the site limits and collect and direct stormwater towards the POAs. This report analyzes the site watersheds and also analyzes offsite watersheds that flow through the proposed drainage features.

The total study area includes 44.11 acres consisting of onsite and offsite areas, divided into seventeen (17) post-development watersheds as described below:

Subcatchment PR-1A: The 0.50-acre watershed is comprised of woods. Runoff travels via overland flow in a southerly direction toward POA-1.

Subcatchment PR-1B: The 0.27-acre watershed is comprised of woods and pavement. Runoff travels via overland flow in a southerly direction toward POA-1.

Subcatchment PR-1C: The 6.36-acre watershed is comprised of woods, brush, lawn, pavement, and rooftop area. Runoff from this subcatchment flows to Basin 1, an infiltration basin which provides water quality treatment, infiltration, and flow mitigation. While this subcatchment is included in POA-1, Basin 1 is designed to manage up to and including the 100-year storm event solely by way of infiltration with no other outlet and therefore this watershed contributes no flow to POA-1 in any of the storm events.

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Subcatchment PR-1D: The 1.65-acre watershed is comprised predominantly of porous pavement with some lawn area. Runoff from this subcatchment is managed via the reservoir course within the porous pavement section, which has been designed to accommodate and infiltrate up to and including the 100-year storm event Therefore this watershed contributes no flow to POA-1 in any of the storm events.

Subcatchment PR-2: The 12.15-acre watershed is comprised of woods and wetlands. Runoff travels in a northerly and easterly direction toward POA-2.

Subcatchment PR-3A: The 6.41-acre watershed is comprised of lawn and brush. Runoff travels in an easterly direction toward POA-3.

Subcatchment PR-3B: The 1.05-acre watershed is comprised of pavement, porous pavement, rooftop, and lawn. Porous pavement from this watershed was included as impervious area for modeling purposes. Runoff from this subcatchment flows to SIS-10, a subsurface infiltration basin which provides water quality treatment, infiltration, and flow mitigation. While this subcatchment is included in POA-3, the SIS is designed to manage up to and including the 100-year storm event solely by way of infiltration with no other outlet and therefore this watershed contributes no flow to POA-3 in any of the storm events.

Subcatchment PR-3C: The 2.30-acre watershed is comprised of pavement, porous pavement, rooftop, and lawn. Porous pavement from this watershed was included as impervious area for modeling purposes. Runoff from this subcatchment flows to SIS-9, a subsurface infiltration basin which provides water quality treatment, infiltration, and flow mitigation. While this subcatchment is included in POA-3, the SIS is designed to manage up to and including the 100-year storm event solely by way of infiltration with no other outlet and therefore this watershed contributes no flow to POA-3 in any of the storm events.

Subcatchment PR-3D: The 1.21-acre watershed is comprised of rooftop and lawn. Runoff from this subcatchment flows to SIS-7, a subsurface infiltration basin which provides water quality treatment, infiltration, and flow mitigation. While this subcatchment is included in POA-3, the SIS is designed to manage up to and including the 100-year storm event solely by way of infiltration with no other outlet and therefore this watershed contributes no flow to POA-3 in any of the storm events.

Subcatchment PR-3E: The 1.33-acre watershed is comprised of pavement, porous pavement, rooftop, and lawn. Porous pavement from this watershed was included as impervious area for modeling purposes. Runoff from this subcatchment flows to SIS-6, a subsurface infiltration basin which provides water quality treatment, infiltration, and flow mitigation. While this subcatchment is included in POA-3, the SIS is designed to manage up to and including the 100-year storm event solely by way of infiltration with no other outlet and therefore this watershed contributes no flow to POA-3 in any of the storm events.

Subcatchment PR-3F: The 0.59-acre watershed is comprised of rooftop and lawn. Runoff from this subcatchment flows to SIS-5, a subsurface infiltration basin which provides water quality treatment, infiltration, and flow mitigation. While this subcatchment is included in POA-3, the SIS is designed to manage up to and including the 100-year storm event solely by way of infiltration with no other outlet and therefore this watershed contributes no flow to POA-3 in any of the storm events.

Subcatchment PR-3G: The 0.93-acre watershed is comprised of pavement, porous pavement, rooftop, and lawn. Porous pavement from this watershed was included as impervious area for modeling purposes. Runoff

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from this subcatchment flows to SIS-4, a subsurface infiltration basin which provides water quality treatment, infiltration, and flow mitigation. While this subcatchment is included in POA-3, the SIS is designed to manage up to and including the 100-year storm event solely by way of infiltration with no other outlet and therefore this watershed contributes no flow to POA-3 in any of the storm events.

Subcatchment PR-3H: The 1.38-acre watershed is comprised of rooftop and lawn. Runoff from this subcatchment flows to SIS-2, a subsurface infiltration basin which provides water quality treatment, infiltration, and flow mitigation. While this subcatchment is included in POA-3, the SIS is designed to manage up to and including the 100-year storm event solely by way of infiltration with no other outlet and therefore this watershed contributes no flow to POA-3 in any of the storm events.

Subcatchment PR-3I: The 5.79-acre watershed is comprised of pavement, porous pavement, rooftop, and lawn. Porous pavement from this watershed was included as impervious area for modeling purposes. Runoff from this subcatchment flows to SIS-3, a subsurface infiltration basin which provides water quality treatment, infiltration, and flow mitigation. While this subcatchment is included in POA-3, the SIS is designed to manage up to and including the 100-year storm event solely by way of infiltration with no other outlet and therefore this watershed contributes no flow to POA-3 in any of the storm events.

Subcatchment PR-3J: The 1.93-acre watershed is comprised of rooftop, lawn, and woods. Runoff from this subcatchment flows to SIS-1, a subsurface infiltration basin which provides water quality treatment, infiltration, and flow mitigation. While this subcatchment is included in POA-3, the SIS is designed to manage up to and including the 100-year storm event solely by way of infiltration with no other outlet and therefore this watershed contributes no flow to POA-3 in any of the storm events.

Subcatchment PR-3K: The 0.22-acre watershed is comprised of rooftop and lawn. Runoff from this subcatchment flows to SIS-8, a subsurface infiltration basin which provides water quality treatment, infiltration, and flow mitigation. While this subcatchment is included in POA-3, the SIS is designed to manage up to and including the 100-year storm event solely by way of infiltration with no other outlet and therefore this watershed contributes no flow to POA-3 in any of the storm events.

Subcatchment PR-4: The 0.04-acre watershed is comprised of woods. Runoff travels in a southerly direction toward POA-4.

6.0 CURVE NUMBERS

For purposes of generating the weighted Curve Numbers (CNs), the following values were utilized:

- pavement and concrete were classified as “paved parking”
- gravel driveways were classified as “gravel surface”
- roof tops were classified as “roofs”
- brush areas were classified as “brush, fair”
- wooded upland areas were classified as “woods, good”
- wetland areas were assigned a CN of 77
- proposed lawn areas were classified as “>75% grass cover, good”
- the proposed infiltration basin was classified as “water surface”

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- Porous pavement was "porous pavement" and given a CN of 98 in accordance with Hydrocad's published methodology on modeling porous pavement, a copy of which is included in Section 3 of this report.

The proposed development includes 10.12± acres of impervious surfaces (a net increase of 9.82 acres as compared to existing conditions). Out of the 10.12 acres of impervious area in the proposed condition, 4.89± acres consists of paved area and 5.23± acres consists of rooftop area. The proposed development also includes 1.55± acres of porous pavement, the largest contiguous area (1.22± acres) of which is associated with the parking for Buildings 1 and 2. This area was modeled as porous pavement in the stormwater calculations utilizing Hydrocad's published methodology on modeling porous pavement (copy included in Section 3 of this report). The other 0.33± acres of porous pavement areas are scattered throughout the site and were therefore lumped in with the standard pavement areas for modeling purposes. The Hydrocad output therefore reflects 5.22± acres of pavement which includes 4.89 acres of standard pavement and 0.33 acres of miscellaneous porous pavement areas.

7.0 PEAK FLOW MITIGATION

In accordance with state and municipal standards, the stormwater management system is designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates for the 1-inch, 2-year, 10-year, 25-year, and 100-year, 24-hour Type III storm events. The rainfall values used for each of these storms were obtained from the Cornell University Northeast Regional Climate Center *Atlas of Precipitation Extremes for the Northeastern United States and Southeastern Canada*. Peak flow rates for the pre-development and post-development conditions are illustrated below:

TABLE 2: PEAK FLOW RATE COMPARISON

POINT OF ANALYSIS	1-INCH STORM EVENT (1.00"/24-HR)		2-YEAR STORM EVENT (3.20"/24-HR)		10-YEAR STORM EVENT (4.80"/24-HR)		25-YEAR STORM EVENT (6.00"/24-HR)		100-YEAR STORM EVENT (8.60"/24-HR)	
	PRE (CFS)	POST (CFS)	PRE (CFS)	POST (CFS)	PRE (CFS)	POST (CFS)	PRE (CFS)	POST (CFS)	PRE (CFS)	POST (CFS)
POA-1	*0.17*	**0.03**	*0.60*	**0.12**	*0.91*	**0.18**	*1.14*	**0.23**	*1.75*	**0.33**
POA-2	*0.03*	**0.03**	*1.09*	**1.08**	*2.26*	**2.26**	*3.24*	**3.24**	*5.91*	**5.72**
POA-3	*0.00*	**0.00**	*0.00*	**0.00**	*0.17*	**0.07**	*0.93*	**0.44**	*11.37*	**3.83**
POA-4	*0.00*	**0.00**	*0.00*	**0.00**	*0.00*	**0.00**	*0.01*	**0.00**	*0.12*	**0.01**

Peak flow has been mitigated as shown above through the use of infiltration best management practices (BMPs). The design methodology for each of these BMPs is provided below. Pre- and post-development HydroCad output for the various storm events is included in Section 3. Section 3 also includes soil logs for the referenced test pits as well as modeling output for simulated seasonal high groundwater by GeoHydroCycle, Inc. from their hydrogeological study prepared in July 2019.

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BASIN 1:

- Groundwater: Based on simulated groundwater modeling by GeoHydroCycle, Inc., the simulated mounded seasonal high groundwater elevation in the vicinity of Basin 1 was extrapolated to be at elevation 123.5. The bottom of the basin is designed to be elevation 129.0 and will therefore maintain more than 5' separation to seasonal high groundwater.

- Depth: The BMP depth is less than 5' in the 100-year storm event. The BMP does not trigger the dam thresholds of 302 CMR10.00 as it will hold back less than 15 acre-feet of water at the maximum water storage elevation.

- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils. A "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this basin.

- Drawdown Time: Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 60 inches ÷ 8.27 inches/hour = 7.3 hours thereby meeting the DEP drawdown requirement of <72 hours.

- Emergency Spillway Design: This basin does not include include an emergency spillway as it is an excavated basin, not formed by way of a built-up berm. In the unanticipated event that the basin capacity is exceeded, water would simply sheet flow over the top of the embankment.

SIS-1:

- Groundwater: Based on simulated groundwater modeling by GeoHydroCycle, Inc., the simulated mounded seasonal high groundwater elevation in the vicinity of this SIS was extrapolated to be at elevation 124.0. The bottom of the SIS is designed to be elevation 163.00 and will therefore maintain more than 5' separation to seasonal high groundwater.

- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils. A "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.

- Drawdown Time: Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 60 inches ÷ 8.27 inches/hour = 7.3 hours thereby meeting the DEP drawdown requirement of <72 hours.

SIS-2:

- Groundwater: Based on simulated groundwater modeling by GeoHydroCycle, Inc., the simulated mounded seasonal high groundwater elevation in the vicinity of this SIS was extrapolated to be at elevation 125.0. The bottom of the SIS is designed to be elevation 141.50 and will therefore maintain more than 5' separation to seasonal high groundwater.

- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils. A "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.

- Drawdown Time: Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 96 inches ÷ 8.27 inches/hour = 11.6 hours thereby meeting the DEP drawdown requirement of <72 hours.

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SIS-3:

- Groundwater: Based on simulated groundwater modeling by GeoHydroCycle, Inc., the simulated mounded seasonal high groundwater elevation in the vicinity of this SIS was extrapolated to be at elevation 125.0. The bottom of the SIS is designed to be elevation 140.50 and will therefore maintain more than 5' separation to seasonal high groundwater.

- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils. A "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.

- Drawdown Time: Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 96 inches ÷ 8.27 inches/hour = 11.6 hours thereby meeting the DEP drawdown requirement of <72 hours.

SIS-4:

- Groundwater: Based on simulated groundwater modeling by GeoHydroCycle, Inc., the simulated mounded seasonal high groundwater elevation in the vicinity of this SIS was extrapolated to be at elevation 125.0. The bottom of the SIS is designed to be elevation 145.00 and will therefore maintain more than 5' separation to seasonal high groundwater.

- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils. A "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.

- Drawdown Time: Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 96 inches ÷ 8.27 inches/hour = 11.6 hours thereby meeting the DEP drawdown requirement of <72 hours.

SIS-5:

- Groundwater: Based on simulated groundwater modeling by GeoHydroCycle, Inc., the simulated mounded seasonal high groundwater elevation in the vicinity of this SIS was extrapolated to be at elevation 124.5. The bottom of the SIS is designed to be elevation 137.00 and will therefore maintain more than 5' separation to seasonal high groundwater.

- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils. A "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.

- Drawdown Time: Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 96 inches ÷ 8.27 inches/hour = 11.6 hours thereby meeting the DEP drawdown requirement of <72 hours.

SIS-6:

- Groundwater: Based on simulated groundwater modeling by GeoHydroCycle, Inc., the simulated mounded seasonal high groundwater elevation in the vicinity of this SIS was extrapolated to be at elevation 124.5. The bottom of the SIS is designed to be elevation 132.00 and will therefore maintain more than 5' separation to seasonal high groundwater.

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- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils. A "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.

- Drawdown Time: Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 96 inches ÷ 8.27 inches/hour = 11.6 hours thereby meeting the DEP drawdown requirement of <72 hours.

SIS-7:

- Groundwater: Based on simulated groundwater modeling by GeoHydroCycle, Inc., the simulated mounded seasonal high groundwater elevation in the vicinity of this SIS was extrapolated to be at elevation 123.0. The bottom of the SIS is designed to be elevation 131.50 and will therefore maintain more than 5' separation to seasonal high groundwater.

- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils. A "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.

- Drawdown Time: Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 96 inches ÷ 8.27 inches/hour = 11.6 hours thereby meeting the DEP drawdown requirement of <72 hours.

SIS-8:

- Groundwater: Based on simulated groundwater modeling by GeoHydroCycle, Inc., the simulated mounded seasonal high groundwater elevation in the vicinity of this SIS was extrapolated to be at elevation 122.0. The bottom of the SIS is designed to be elevation 127.00 and will therefore maintain 5' separation to seasonal high groundwater.

- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils. A "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.

- Drawdown Time: Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 72 inches ÷ 8.27 inches/hour = 8.7 hours thereby meeting the DEP drawdown requirement of <72 hours.

SIS-9:

- Groundwater: Based on simulated groundwater modeling by GeoHydroCycle, Inc., the simulated mounded seasonal high groundwater elevation in the vicinity of this SIS was extrapolated to be at elevation 121.0. The bottom of the SIS is designed to be elevation 126.00 and will therefore maintain 5' separation to seasonal high groundwater.

- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils. A "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.

- Drawdown Time: Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 96 inches ÷ 8.27 inches/hour = 11.6 hours thereby meeting the DEP drawdown requirement of <72 hours.

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SIS-10:

- Groundwater: Based on simulated groundwater modeling by GeoHydroCycle, Inc., the simulated mounded seasonal high groundwater elevation in the vicinity of this SIS was extrapolated to be at elevation 122.0. The bottom of the SIS is designed to be elevation 127.00 and will therefore maintain 5' separation to seasonal high groundwater.

- Infiltration Rate: NRCS soil maps indicate that this BMP is located within HSG-A soils. A "Rawls" infiltration rate of 8.27 inches/hour was used in the modeling of this system.

- Drawdown Time: Utilizing the "Rawls" infiltration rate of 8.27 inches/hour, the drawdown time is 96 inches ÷ 8.27 inches/hour = 11.6 hours thereby meeting the DEP drawdown requirement of <72 hours.

RIPRAP APRON SIZING:

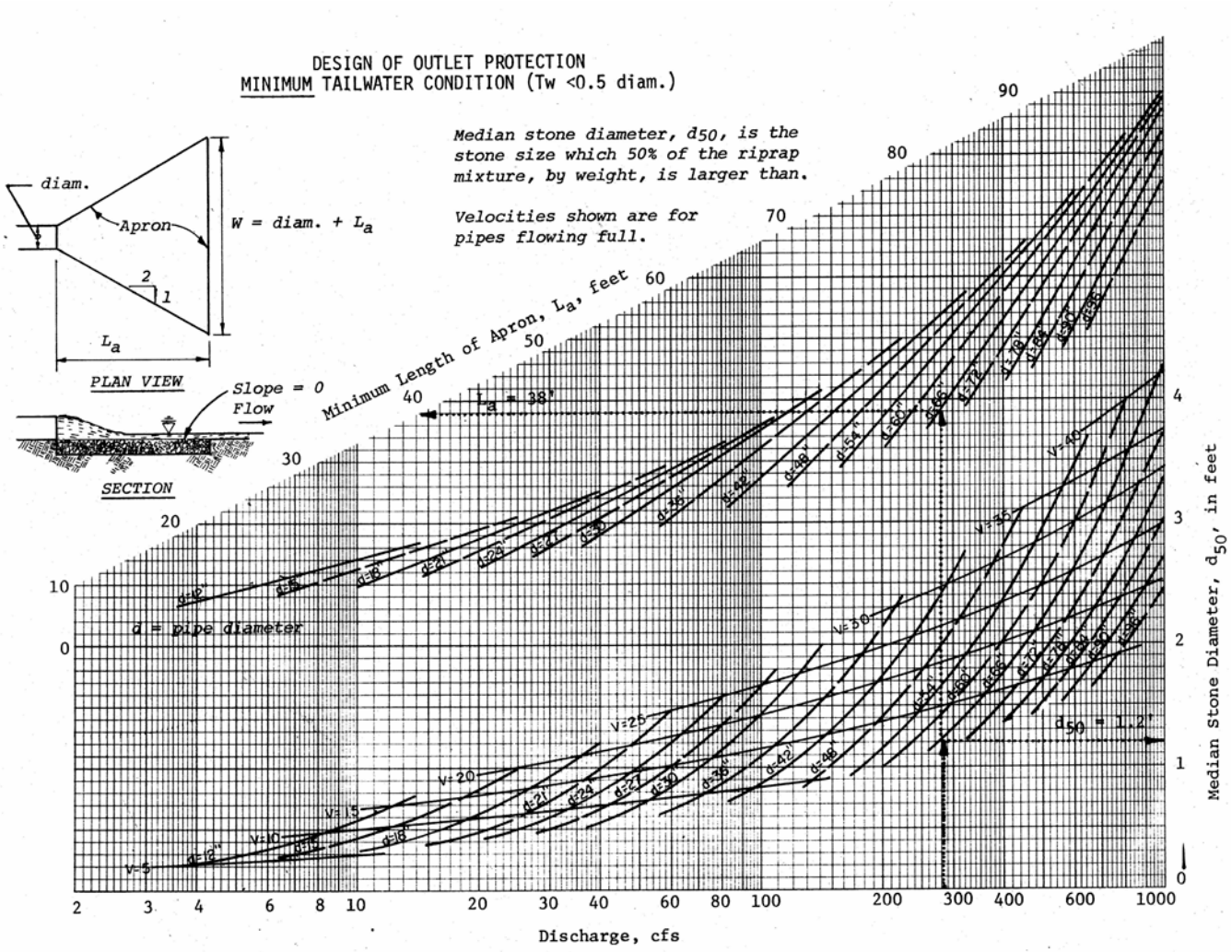
OUTFALL:

A riprap apron has been provided at the inlet into Basin 1 to spread out flow and dissipate energy. NRCS' *Design of Outlet Protection* graph below was utilized to determine the required median stone size, apron length, and apron width based on the 100-year flow rate, to ensure that the provided riprap apron meets or exceeds these requirements. Below is a table summarizing the required apron sizing:

TABLE 3: RIPRAP APRON SIZING

OUTFALL	100-YR PEAK FLOW (CFS)	PIPE DIAMETER (in)	MEDIAN STONE SIZE (ft)	APRON LENGTH (ft)	APRON WIDTH (ft)
FES-1	**16.56**	**18**	**0.5**	**13**	**14.5**

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8.0 WATER QUALITY

The proposed development includes 4.89± acres of standard impervious pavement and 1.55± acres of porous pavement. Runoff from the standard pavement is proposed to be infiltrated after having undergone pretreatment via deep-sump hooded catch basins and proprietary water quality units (Treatment Train #1). Runoff from the porous pavement is proposed to be infiltrated after having undergone pretreatment via the porous pavement section (Treatment Train #2).

- Deep Sump Hooded Catch Basins
  Stormwater runoff from proposed pavement areas will be directed via curbing and site grading to catch basins with deep sumps and hooded outlets. The catch basins are intended trap and remove sediment and larger particles from the stormwater and improve the performance of subsequent BMPs. The sumps will be a minimum of 4' in depth and a regular inspection and cleaning schedule has been proposed to ensure optimal effectiveness. When properly designed and maintained, catch basin sumps are effective in reducing the sediment and pollutant load in runoff.

- Deep Sump Hooded Manholes
  Stormwater runoff from proposed pavement areas collected via trench drains will be directed to manholes with deep sumps and hooded outlets in order to provide the equivalent treatment as deep sump hooded catch basins.

- Proprietary Water Quality Units
  The proposed proprietary water quality units (WQUs) are designed to remove heavy particles, floating debris and hydrocarbons from stormwater. Stormwater enters the system where floatables and oils are separated prior to the clarified stormwater runoff discharging to an outlet pipe. See below for additional information about the TSS rates utilized for these proprietary BMPs.

- Infiltration Basins
  Stormwater from some of the paved areas will be discharged to one of the proposed surface infiltration basin or subsurface infiltration systems for further treatment after undergoing treatment from the BMPs listed above.

- Porous Pavement
  Stormwater from porous paved areas will undergo pretreatment by way of the pavement section itself before being infiltrated, as is recognized as treatment by the Massachusetts Stormwater Handbook.

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TABLE 4: TSS REMOVAL CALCULATION WORKSHEET

TREATMENT TRAIN #1
STANDARD PAVEMENT AREAS

BMP (A)	TSS Removal Rate (B)	Starting TSS Load (C)	Amount Removed (BxC) (D)	Remaining Load (C-D) (E)
Deep Sump CBs[1]	0.25	1.0	0.25	0.75
WQU Unit	0.80[2]	0.75	0.60	0.15
Total TSS Removal = Summation of (D) =			**85%**	

TREATMENT TRAIN #2
POROUS PAVEMENT AREAS

BMP (A)	TSS Removal Rate (B)	Starting TSS Load (C)	Amount Removed (BxC) (D)	Remaining Load (C-D) (E)
Porous Pavement[1]	0.80	1.00	0.80	0.20
Total TSS Removal = Summation of (D) =			**80%**	

(1) Per "Table TSS" in the Massachusetts Stormwater Handbook, Volume 1 Chapter 1.
(2) Refer to attached Contech report demonstrating at least 80% TSS removal for all proposed water quality units

9.0 GROUNDWATER RECHARGE

The DEP Stormwater Management Policy addresses the importance of recharging groundwater and reducing surface runoff. For a new development project, the site's impervious area must be used to calculate the required infiltration in order to approximate the annual recharge from pre-development conditions. On this site, the total proposed impervious area is 10.12± acres as compared with the existing impervious area of 0.30± acres, for a new increase in impervious area of 9.82± acres. The required recharge equals a depth of runoff corresponding to the underlying soil type multiplied by the in impervious area for each soil type in the post development condition. The following values were used for this project:

TABLE 5: IMPERVIOUS AREA BY SOIL GROUP

HSG	RUNOFF DEPTH TO INFILTRATE (in)	EXISTING IMPERVIOUS AREA (ac)	PROPOSED IMPERVIOUS AREA (ac)	NET CHANGE IMPERVIOUS AREA (ac)
A	0.60	0.30	10.12	9.82
B	0.35	0.00	0.00	0.00
C	0.25	0.00	0.00	0.00
D	0.10	0.00	0.00	0.00

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Recharge Volume (Rv) = (required runoff depth) x (newly created impervious area)

= [0.60 inch x 9.82 acres x (43,560 ft^2/acre) x (1 ft/12 inch)]
+ [0.35 inch x 0 acres x (43,560 ft^2/acre) x (1 ft/12 inch)]
+ [0.25 inch x 0 acres x (43,560 ft^2/acre) x (1 ft/12 inch)]
+ [0.10 inch x 0 acres x (43,560 ft^2/acre) x (1 ft/12 inch)]
= **21,388 cubic feet**

The static recharge volume provided in the BMPs far exceeds DEP's recharge requirement as follows:

TABLE 6: STATIC RECHARGE VOLUME OF BMPs

BMP	STATIC RECHARGE VOLUME (cubic feet)
Basin 1	33,592
SIS-1	6,724
SIS-2	8,617
SIS-3	40,095
SIS-4	12,259
SIS-5	4,211
SIS-6	13,356
SIS-7	7,252
SIS-8	2,373
SIS-9	23,143
SIS-10	10,264
TOTAL STATIC RECHARGE VOLUME	**161,886±**

10.0 DRAINAGE CONVEYANCE SYSTEM

The proposed stormwater conveyance system was designed to collect and convey runoff from developed areas to the associated stormwater management system BMP's described in this report. The drainage system consists of deep-sump hooded catch basins, manholes, water quality units, and pipes. Using the rational method to determine peak runoff flows, the proposed conveyance system is designed for the 25-year storm event. Systems have been designed so as not to have any bypass from the most downstream on-grade structures, and to have a ponding depth less than the curb height for the structures in sags. Hydraflow Storm Sewers output for the 25-year storm event is included in Section 4

11.0 CONSTRUCTION PERIOD EROSION & SEDIMENTATION CONTROL

The project is subject to the National Pollutant Discharge Elimination System (NPDES) program of the United States Environmental Protection Agency, which will require construction operations to comply with the NPDES General Permit For Stormwater Discharges From Construction Activities and will require the implementation of a site-specific a Stormwater Pollution Prevention Plan (SWPPP) addressing erosion and sedimentation control practices to be used throughout the construction period. Proposed erosion and sedimentation control measures

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will include compost filter socks, silt fence, crushed stone, riprap, hydroseeding, mulching, erosion control matting, diversion berms, and sedimentation basins. Compost filter sock and siltation fence will be used for the perimeter erosion control barrier and elsewhere as conditions warrant. Sedimentation basins will be used throughout the site to treat runoff and diversion berms will be utilized as needed to divert untreated stormwater to the sedimentation basins. Sedimentation basins and diversion berms will be added, removed, and adjusted as the site evolves throughout the construction process. Hydroseeding or sod will be used as a permanent stabilization measure for all revegetated areas of the site. Slopes 3:1 and steeper will be stabilized with an erosion control matting. Mulching may be used to reinforce seeded areas where erosion control matting is not required or warranted, but where some protection is warranted. Mulching may also be used to stabilize areas where construction activities will temporarily cease for more than 14 days. Silt sacks will be used to protect catch basins prior to binder and elsewhere as conditions warrant. The contractor will be required to keep a reasonable stock of erosion controls on site to be able to supplement or make repairs as necessary.

12.0 COMPLIANCE WITH THE MASSACHUSETTS DEP STORMWATER HANDBOOK

This study presents a comparative analysis of the pre-development and post-development hydrologic characteristics of the site, and outlines the proposed measures to mitigate flow, provide groundwater recharge, and improve water quality from the site. The best management practices (BMPs) outlined in this report include measures to meet the municipal and the Massachusetts Department of Environmental Protection (DEP) requirements. Below is a summary of how the design complies with each applicable DEP standard.

Standard 1: No new stormwater conveyances may discharge untreated directly to or cause erosion in wetlands or waters of the Commonwealth.

The proposed stormwater conveyance system does not include new *untreated* discharges.

Standard 2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

As indicated above and within the supporting HydroCad calculations, the stormwater management system is designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

Standard 3: 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 determine in accordance with the Massachusetts Stormwater Handbook.

As indicated above and within the supporting HydroCad calculations, the recharge volume provided for this project exceeds the requirements of this standard.

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Standard 4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

Runoff from proposed impervious surface area is treated to at least an 80% TSS removal rate as described in this report.

Standard 5: 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.

Not applicable.

Standard 6: 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.

This project is in a Zone II and as such has been designed to achieve at least 44% TSS pretreatment prior to infiltration and has been designed utilizing the 1" water quality volume.

Standard 7: 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 conforms to new development standards.

Standard 8: A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentations, and pollution prevention plan) shall be developed and implemented.

The project design plans include erosion and sedimentation measures to control construction related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities. The project requires coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit. This will require the preparation of a Stormwater Pollution Prevention Plan (SWPPP), which will also include provisions for controlling erosion, sedimentation and other pollutant sources during construction and land disturbance activities.

Standard 9: A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

A post-construction Operation and Maintenance Plan (O&M) is attached.

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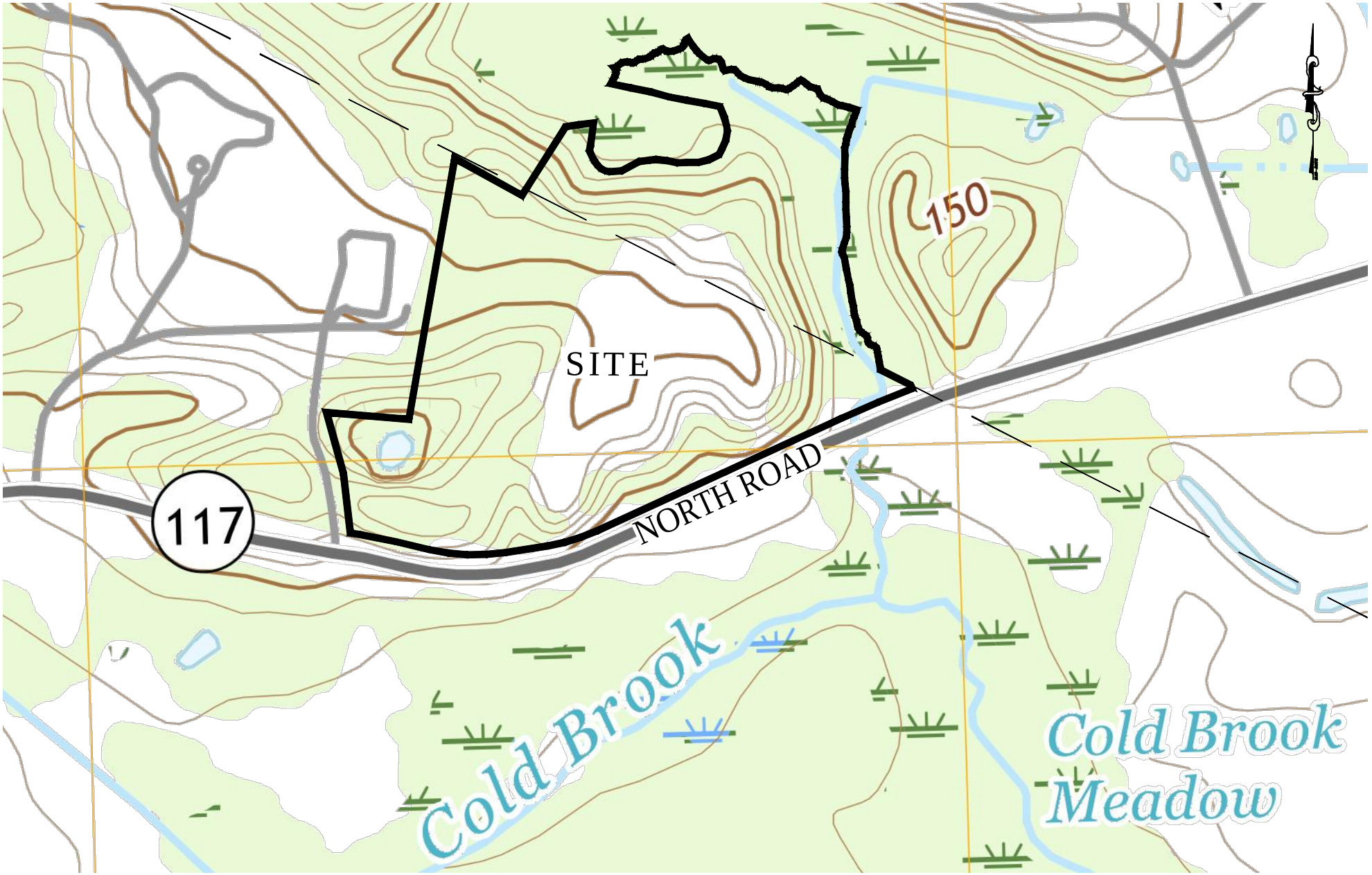
Standard 10: All illicit discharges to the stormwater management system are prohibited.

The proposed stormwater management system does not include any illicit discharges. An illicit discharge statement is attached.

13.0 SUMMARY

The stormwater management system for the proposed development includes measures for collecting, conveying, treating and controlling stormwater runoff from the site. Stormwater controls have been designed such that the post-development peak discharge rates do not exceed pre-development peak discharge rates for the 1-inch, 2-year, 10-year, 25-year, and 100-year, 24-hour Type III storm events. BMPs have been designed to treat the required water quality volume to 80% TSS removal and to exceed the infiltration volume required by DEP. The piped collection system has been designed to convey runoff for the 25-year storm event Rational Method storm event. Comprehensive computations and calculations with supporting figures and plans are attached.

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500 0 250 500 1000

GRAPHIC SCALE IN FEET

SOURCE: USGS TOPO 2018
QUADRANGLE: MAYNARD, MA

PROJECT:

MELONE QUARRY

NORTH ROAD
SUDBURY, MA 01776

PREPARED FOR:

QUARRY NORTH ROAD LLC

2134 SEVILLA WAY
NAPLES, FL 34109

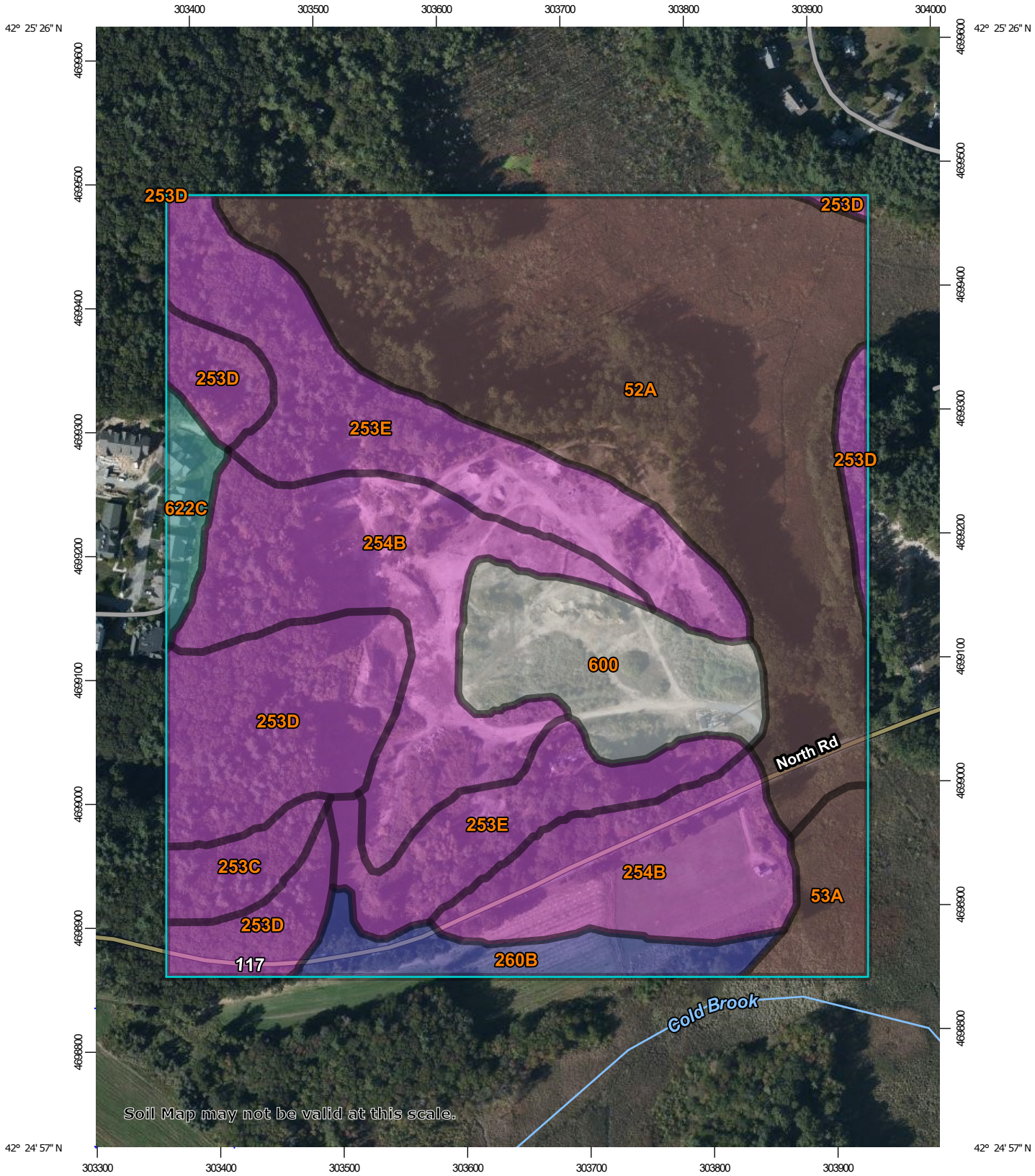
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FIGURE-1
USGS PLAN

MARCH 2020



Map Scale: 1:4,400 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 19, Sep 12, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 9, 2019—Sep 28, 2019

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
52A	Freetown muck, 0 to 1 percent slopes	B/D	29.4	33.1%
53A	Freetown muck, ponded, 0 to 1 percent slopes	B/D	2.4	2.7%
253C	Hinckley loamy sand, 8 to 15 percent slopes	A	1.8	2.0%
253D	Hinckley loamy sand, 15 to 25 percent slopes	A	11.6	13.1%
253E	Hinckley loamy sand, 25 to 35 percent slopes	A	14.9	16.7%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	17.8	20.0%
260B	Sudbury fine sandy loam, 3 to 8 percent slopes	B	3.2	3.5%
600	Pits, gravel		6.5	7.3%
622C	Paxton-Urban land complex, 3 to 15 percent slopes	C	1.5	1.6%
Totals for Area of Interest			**89.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

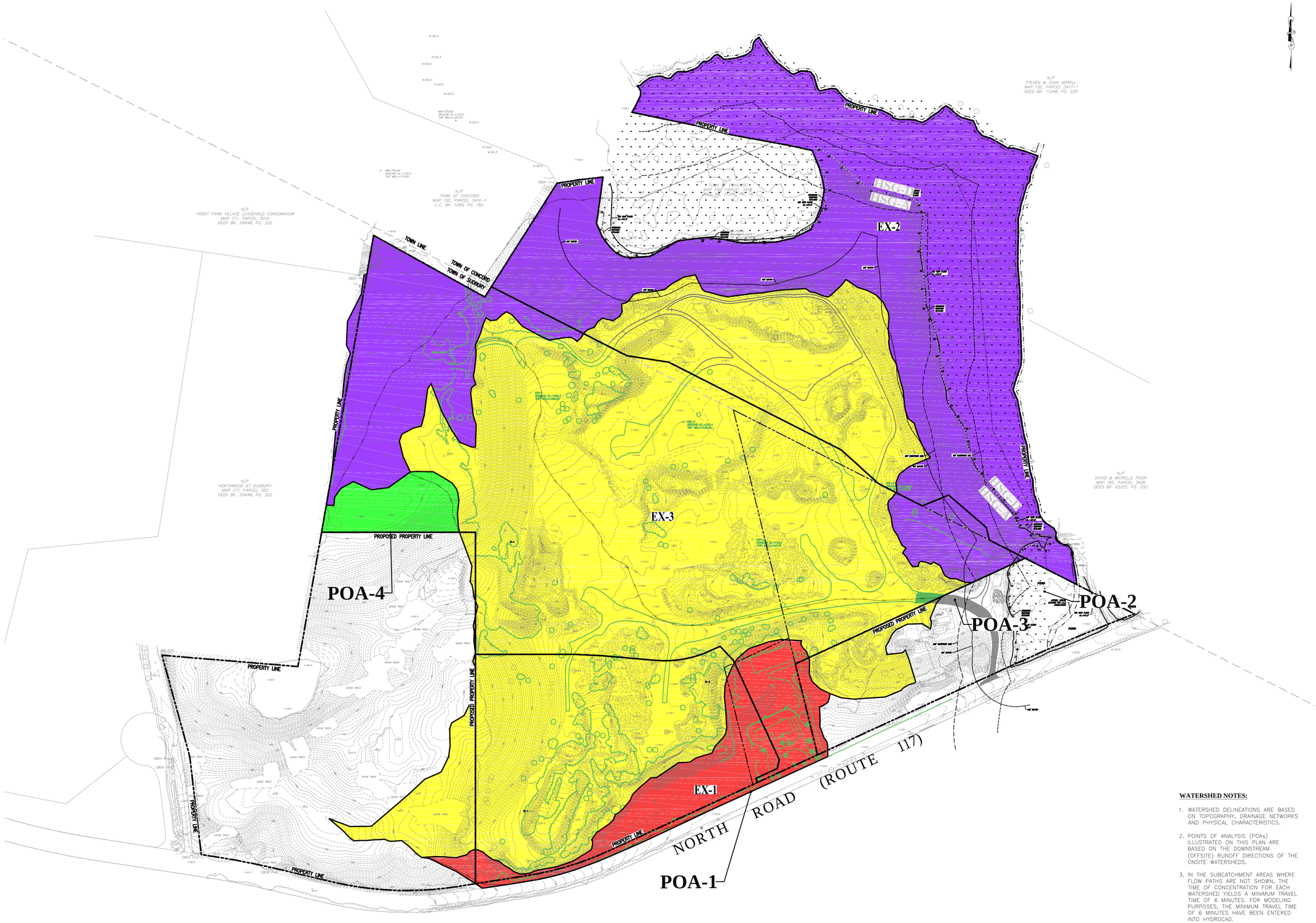
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



WATERSHED NOTES:

1. WATERSHED DELINEATIONS ARE BASED ON TOPOGRAPHY, DRAINAGE NETWORKS AND PHYSICAL CHARACTERISTICS.
2. POINTS OF ANALYSIS (POAs) ILLUSTRATED ON THIS PLAN ARE BASED ON THE DOWNSTREAM (OFFSITE) RUNOFF DIRECTIONS OF THE ONSITE WATERSHEDS.
3. IN THE SUBCATCHMENT AREAS WHERE FLOW PATHS ARE NOT SHOWN, THE TIME OF CONCENTRATION FOR EACH WATERSHED YIELDS A MINIMUM TRAVEL TIME OF 6 MINUTES. FOR MODELING PURPOSES, THE MINIMUM TRAVEL TIME OF 6 MINUTES HAVE BEEN ENTERED INTO HYDROCAD.

TIME OF CONCENTRATION (Tc) FLOWPATH >>>>

NOT FOR CONSTRUCTION

CDG PROJECT #: 19044 & 19045

REVISIONS:

REV	DATE	COMMENT
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

PLANNING BOARD:

SEAL:

MATTHEW A. LEIDNER, P.E.

PREPARED BY:

CIVIL DESIGN GROUP, LLC

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PREPARED FOR:

QUARRY NORTH ROAD LLC

2134 SEVILLA WAY
NAPLES, FL 34109

PROJECT:

COLD BROOK CROSSING

NORTH ROAD
SUDBURY, MASSACHUSETTS

SCALE:

100 0 50 100 200

GRAPHIC SCALE IN FEET

SHEET:

PRE-DEVELOPMENT WATERSHEDS

FIGURE 3

DATE: 03/11/2020



WATERSHED NOTES:

1. WATERSHED DELINEATIONS ARE BASED ON TOPOGRAPHY, DRAINAGE NETWORKS AND PHYSICAL CHARACTERISTICS.
2. POINTS OF ANALYSIS (POAs) ILLUSTRATED ON THIS PLAN ARE BASED ON THE DOWNSTREAM (OFFSITE) RUNOFF DIRECTIONS OF THE ONSITE WATERSHEDS.
3. IN THE SUBCATCHMENT AREAS WHERE FLOW PATHS ARE NOT SHOWN, THE TIME OF CONCENTRATION FOR EACH WATERSHED YIELDS A MINIMUM TRAVEL TIME OF 6 MINUTES. FOR MODELING PURPOSES, THE MINIMUM TRAVEL TIME OF 6 MINUTES HAVE BEEN ENTERED INTO HYDROCAD.

TIME OF CONCENTRATION (Tc) FLOWPATH ——>>——>>——

NOT FOR CONSTRUCTION

CDG PROJECT #: 19044 & 19045

REVISIONS:

REV	DATE	COMMENT
1		
2		
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PLANNING BOARD:

SEAL:

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PROJECT:

COLD BROOK CROSSING

NORTH ROAD
SUDBURY, MASSACHUSETTS

SCALE:

100 0 50 100 200

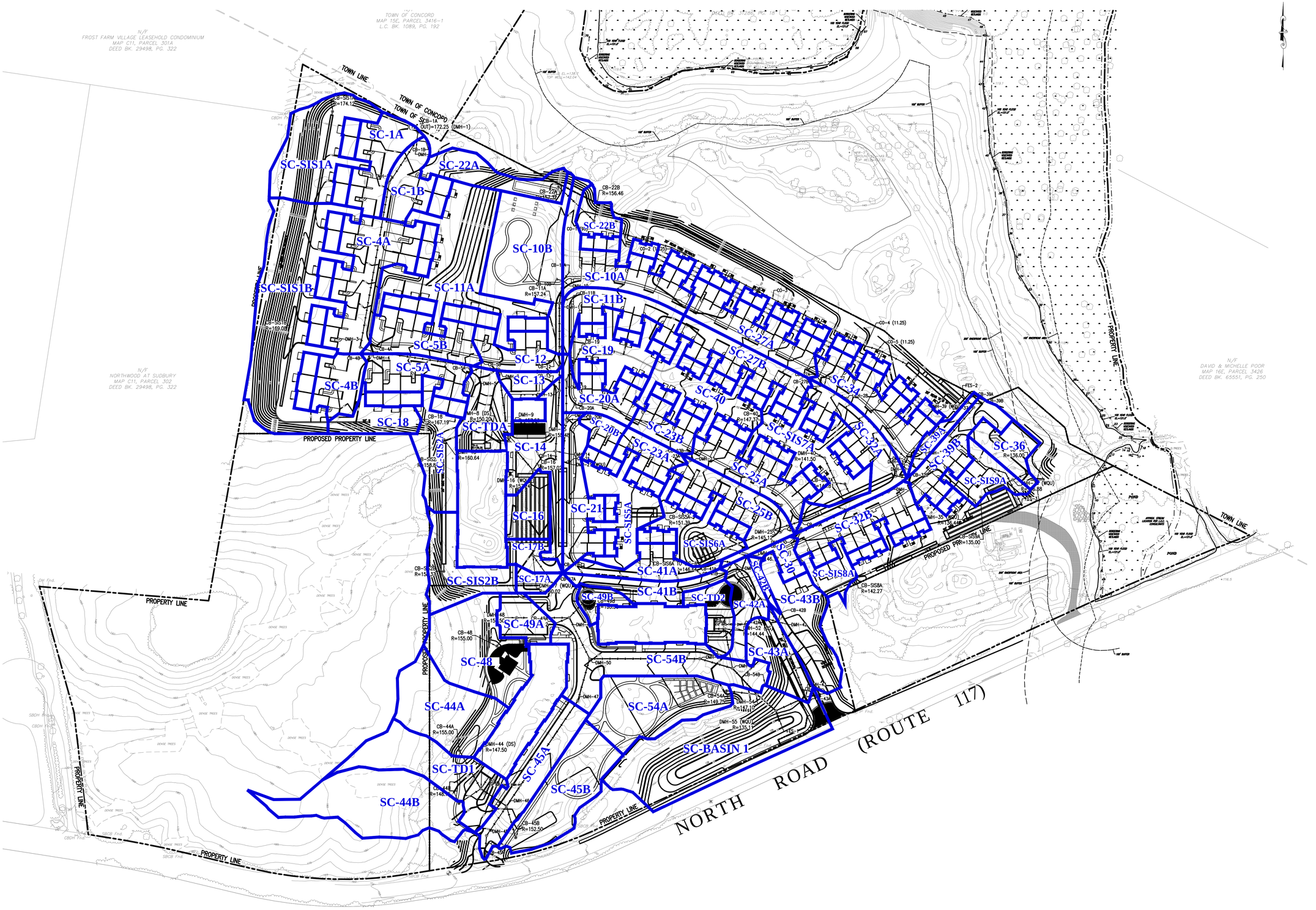
GRAPHIC SCALE IN FEET

SHEET:

POST-DEVELOPMENT WATERSHEDS

FIGURE 4

DATE: 03/11/2020



NOT FOR CONSTRUCTION

CDG PROJECT #: 19044 & 19045

REVISIONS:

REV	DATE	COMMENT
1		
2		
3		
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10		

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NORTH ROAD
SUDBURY, MASSACHUSETTS

SCALE:

80 0 40 80 160

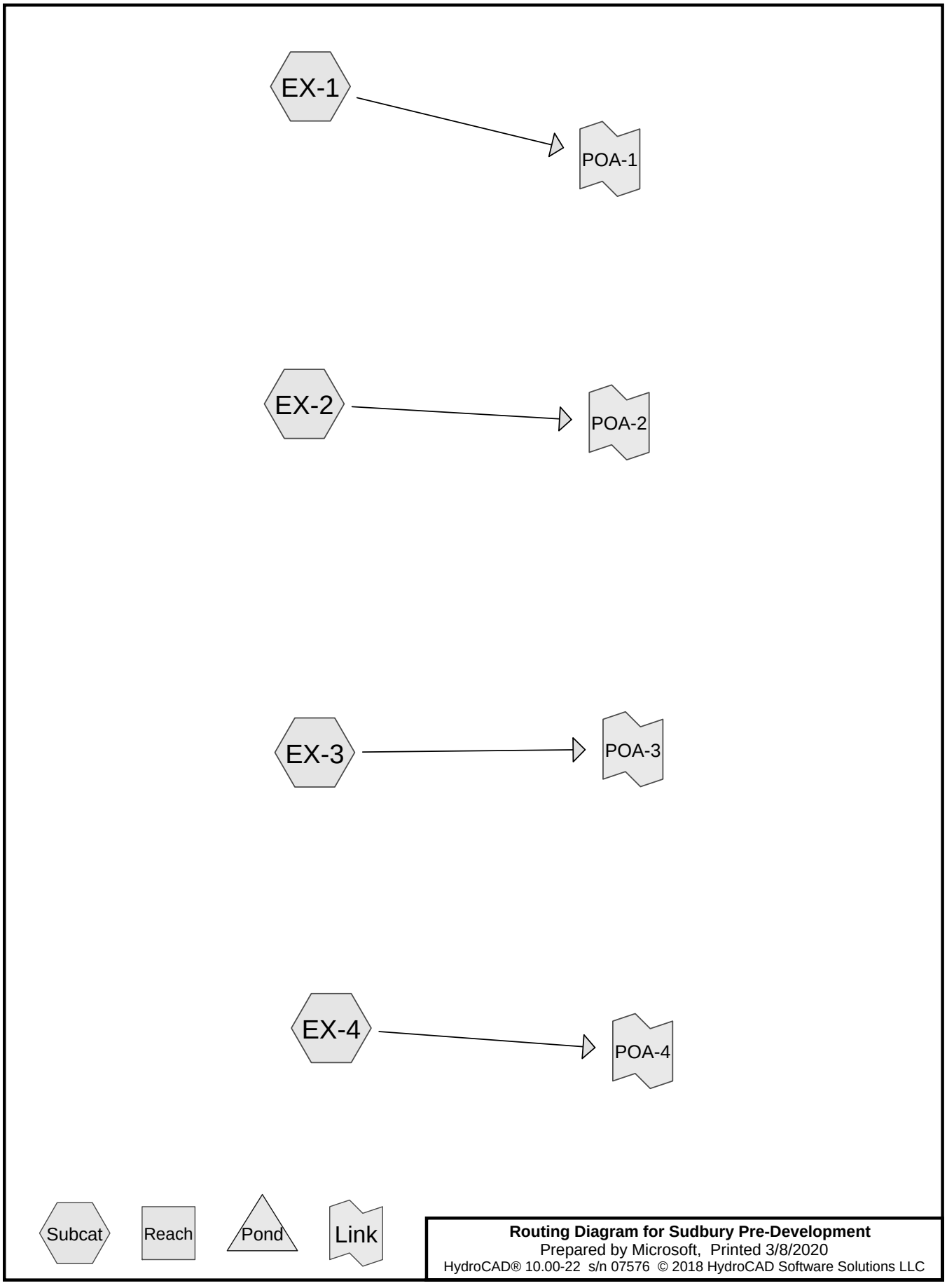
GRAPHIC SCALE IN FEET

SHEET:

CATCH BASIN WATERSHEDS

FIGURE 5

DATE: 03/11/2020



Routing Diagram for Sudbury Pre-Development
Prepared by Microsoft, Printed 3/8/2020
HydroCAD® 10.00-22 s/n 07576 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
24.240	35	Brush, Fair, HSG A (EX-2, EX-3)
0.030	96	Gravel surface, HSG A (EX-2)
0.170	98	Paved parking, HSG A (EX-1)
0.130	98	Roofs, HSG A (EX-1)
6.230	77	Wetland (EX-2)
13.310	30	Woods, Good, HSG A (EX-1, EX-2, EX-3, EX-4)
44.110	**40**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
37.880	HSG A	EX-1, EX-2, EX-3, EX-4
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
6.230	Other	EX-2
44.110		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Runoff Area=2.610 ac 11.49% Impervious Runoff Depth>0.09"
Flow Length=805' Tc=22.6 min CN=WQ Runoff=0.17 cfs 0.020 af

Subcatchment EX-2: Runoff Area=15.800 ac 0.00% Impervious Runoff Depth>0.02"
Flow Length=2,765' Tc=314.3 min CN=WQ Runoff=0.03 cfs 0.020 af

Subcatchment EX-3: Runoff Area=24.920 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=1,505' Tc=19.6 min CN=WQ Runoff=0.00 cfs 0.000 af

Subcatchment EX-4: Runoff Area=0.780 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=193' Tc=23.5 min CN=30 Runoff=0.00 cfs 0.000 af

Link POA-1: Inflow=0.17 cfs 0.020 af
Primary=0.17 cfs 0.020 af

Link POA-2: Inflow=0.03 cfs 0.020 af
Primary=0.03 cfs 0.020 af

Link POA-3: Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link POA-4: Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 44.110 ac Runoff Volume = 0.040 af Average Runoff Depth = 0.01"
99.32% Pervious = 43.810 ac 0.68% Impervious = 0.300 ac

Summary for Subcatchment EX-1:

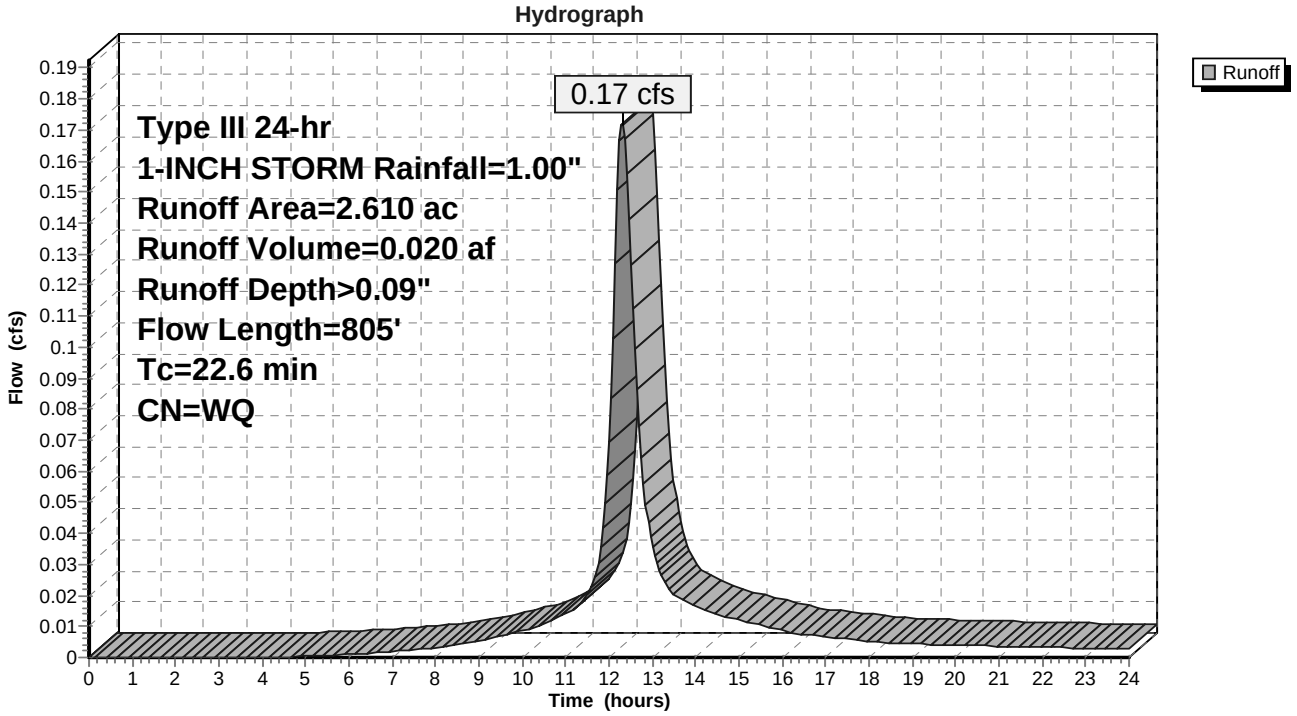
Runoff = 0.17 cfs @ 12.30 hrs, Volume= 0.020 af, Depth> 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.170	98	Paved parking, HSG A
0.130	98	Roofs, HSG A
2.310	30	Woods, Good, HSG A
2.610		Weighted Average
2.310		88.51% Pervious Area
0.300		11.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.2600	0.10		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.00"
0.5	70	0.2600	2.55		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
14.2	685	0.0260	0.81		**Shallow Concentrated Flow, Overland adjacent to roadway** Woodland Kv= 5.0 fps
22.6	805	Total			

Subcatchment EX-1:



Summary for Subcatchment EX-2:

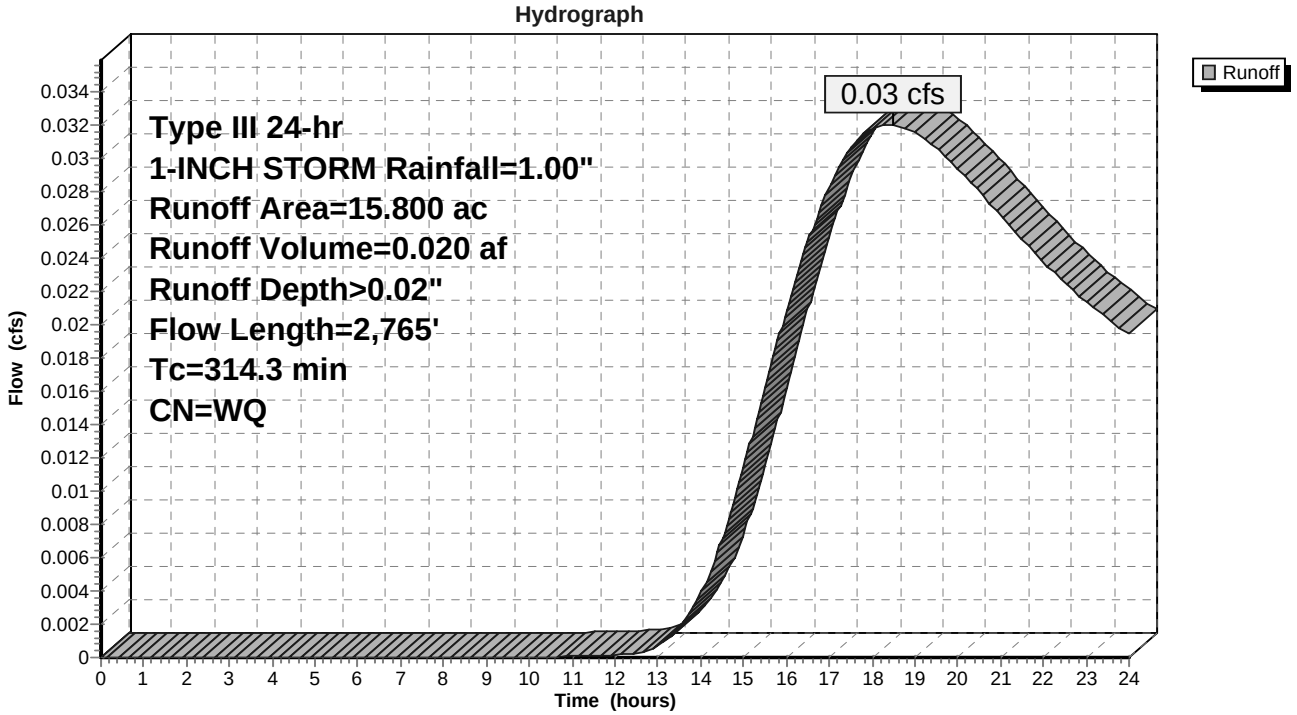
Runoff = 0.03 cfs @ 18.49 hrs, Volume= 0.020 af, Depth> 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

	Area (ac)	CN	Description
	0.030	96	Gravel surface, HSG A
	0.910	35	Brush, Fair, HSG A
	8.630	30	Woods, Good, HSG A
*	6.230	77	Wetland
	15.800		Weighted Average
	15.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	50	0.0400	0.05		**Sheet Flow, Sheet-Woods** Woods: Dense underbrush n= 0.800 P2= 3.00"
4.4	265	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.8	673	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
287.3	1,777	0.0017	0.10		**Shallow Concentrated Flow, Wetland** Forest w/Heavy Litter Kv= 2.5 fps
314.3	2,765	Total			

Subcatchment EX-2:



Summary for Subcatchment EX-3:

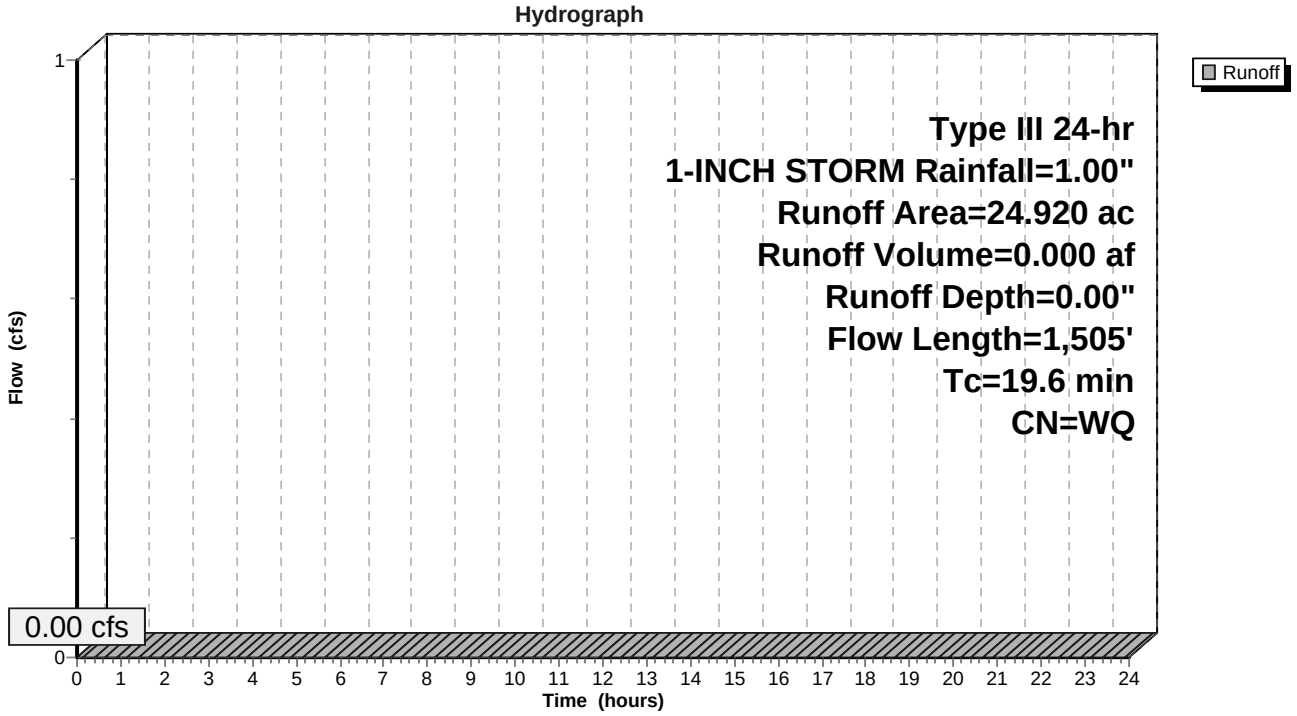
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
23.330	35	Brush, Fair, HSG A
1.590	30	Woods, Good, HSG A
24.920		Weighted Average
24.920		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	26	0.1100	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
1.8	355	0.1100	3.32		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
14.0	1,124	0.0180	1.34		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
19.6	1,505	Total			

Subcatchment EX-3:



Summary for Subcatchment EX-4:

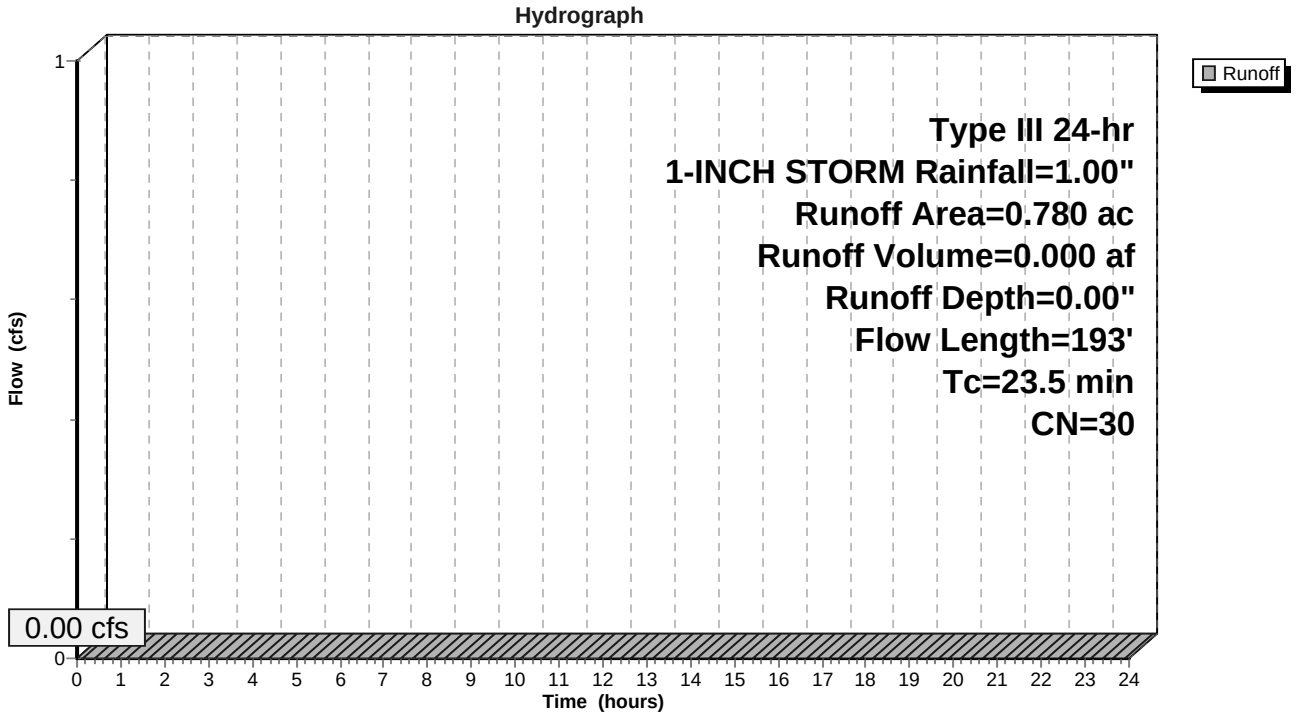
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.780	30	Woods, Good, HSG A
0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
1.3	143	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.5	193	Total			

Subcatchment EX-4:

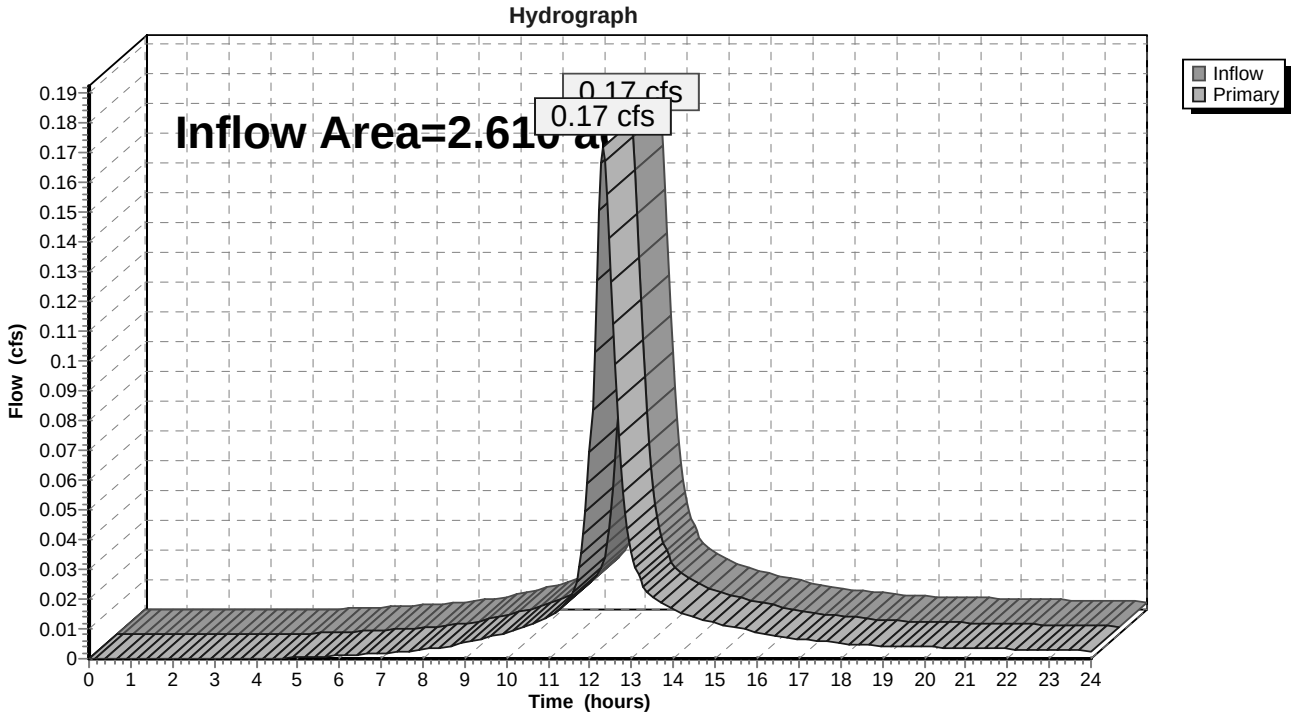


Summary for Link POA-1:

Inflow Area = 2.610 ac, 11.49% Impervious, Inflow Depth > 0.09" for 1-INCH STORM event
Inflow = 0.17 cfs @ 12.30 hrs, Volume= 0.020 af
Primary = 0.17 cfs @ 12.30 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-1:

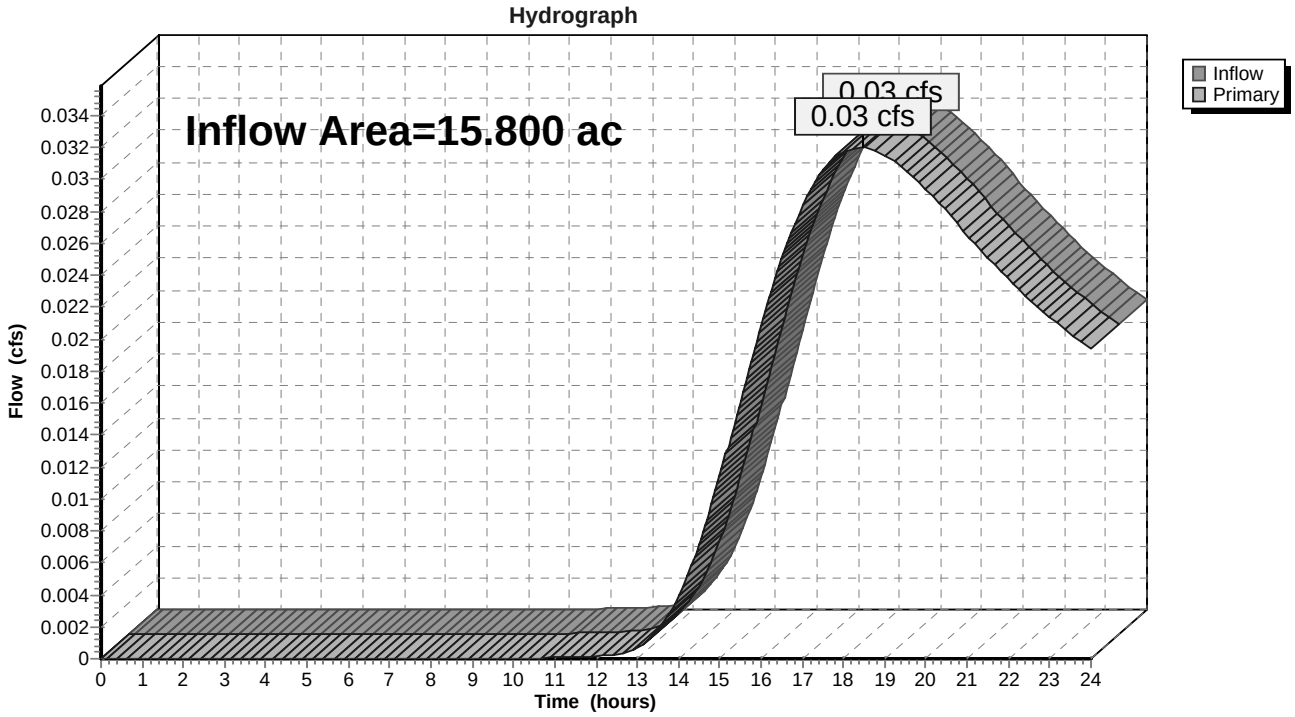


Summary for Link POA-2:

Inflow Area = 15.800 ac, 0.00% Impervious, Inflow Depth > 0.02" for 1-INCH STORM event
Inflow = 0.03 cfs @ 18.49 hrs, Volume= 0.020 af
Primary = 0.03 cfs @ 18.49 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-2:

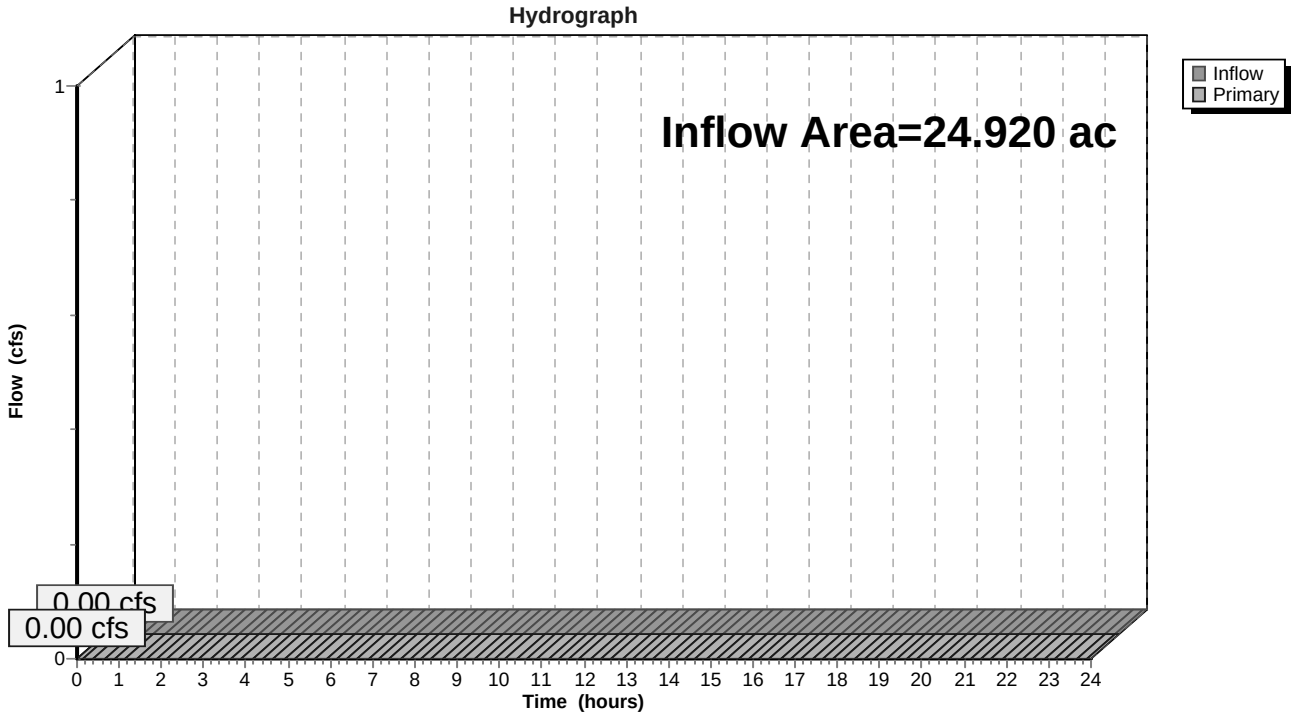


Summary for Link POA-3:

Inflow Area = 24.920 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-INCH STORM event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-3:

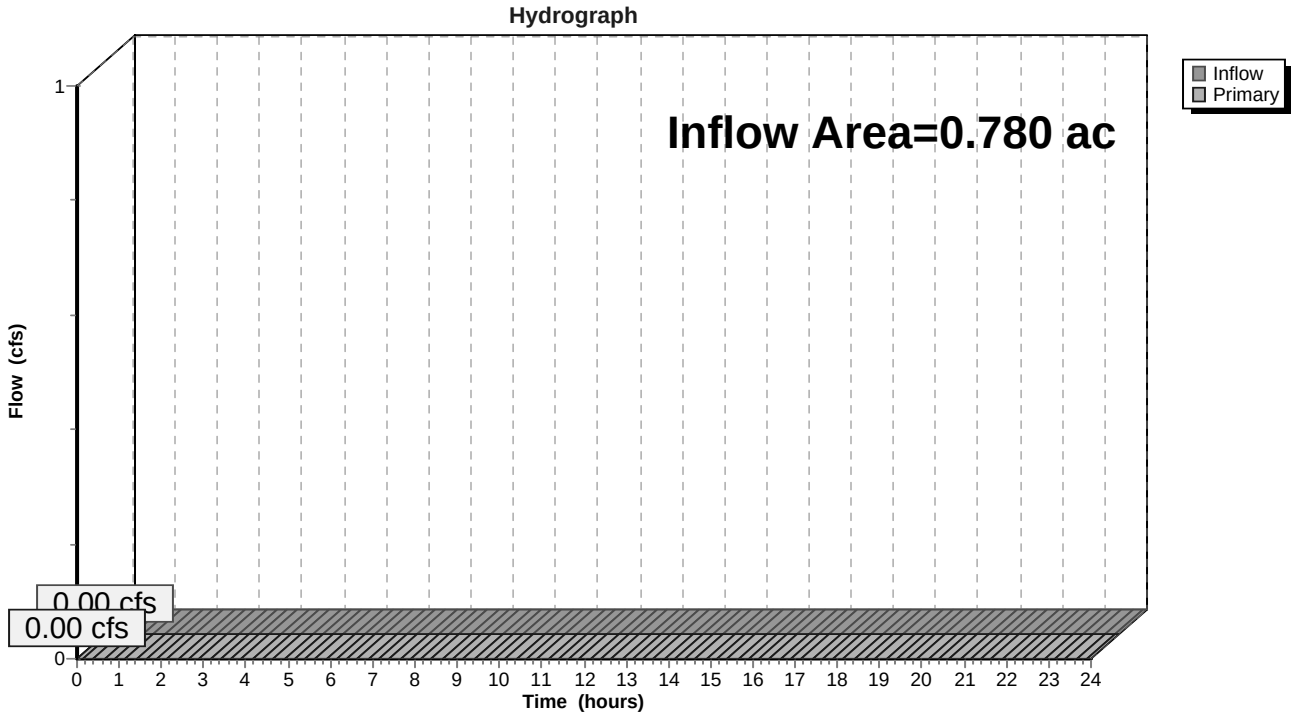


Summary for Link POA-4:

Inflow Area = 0.780 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-INCH STORM event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-4:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Runoff Area=2.610 ac 11.49% Impervious Runoff Depth>0.34"
Flow Length=805' Tc=22.6 min CN=WQ Runoff=0.60 cfs 0.074 af

Subcatchment EX-2: Runoff Area=15.800 ac 0.00% Impervious Runoff Depth>0.42"
Flow Length=2,765' Tc=314.3 min CN=WQ Runoff=1.09 cfs 0.559 af

Subcatchment EX-3: Runoff Area=24.920 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=1,505' Tc=19.6 min CN=WQ Runoff=0.00 cfs 0.000 af

Subcatchment EX-4: Runoff Area=0.780 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=193' Tc=23.5 min CN=30 Runoff=0.00 cfs 0.000 af

Link POA-1: Inflow=0.60 cfs 0.074 af
Primary=0.60 cfs 0.074 af

Link POA-2: Inflow=1.09 cfs 0.559 af
Primary=1.09 cfs 0.559 af

Link POA-3: Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link POA-4: Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 44.110 ac Runoff Volume = 0.633 af Average Runoff Depth = 0.17"
99.32% Pervious = 43.810 ac 0.68% Impervious = 0.300 ac

Summary for Subcatchment EX-1:

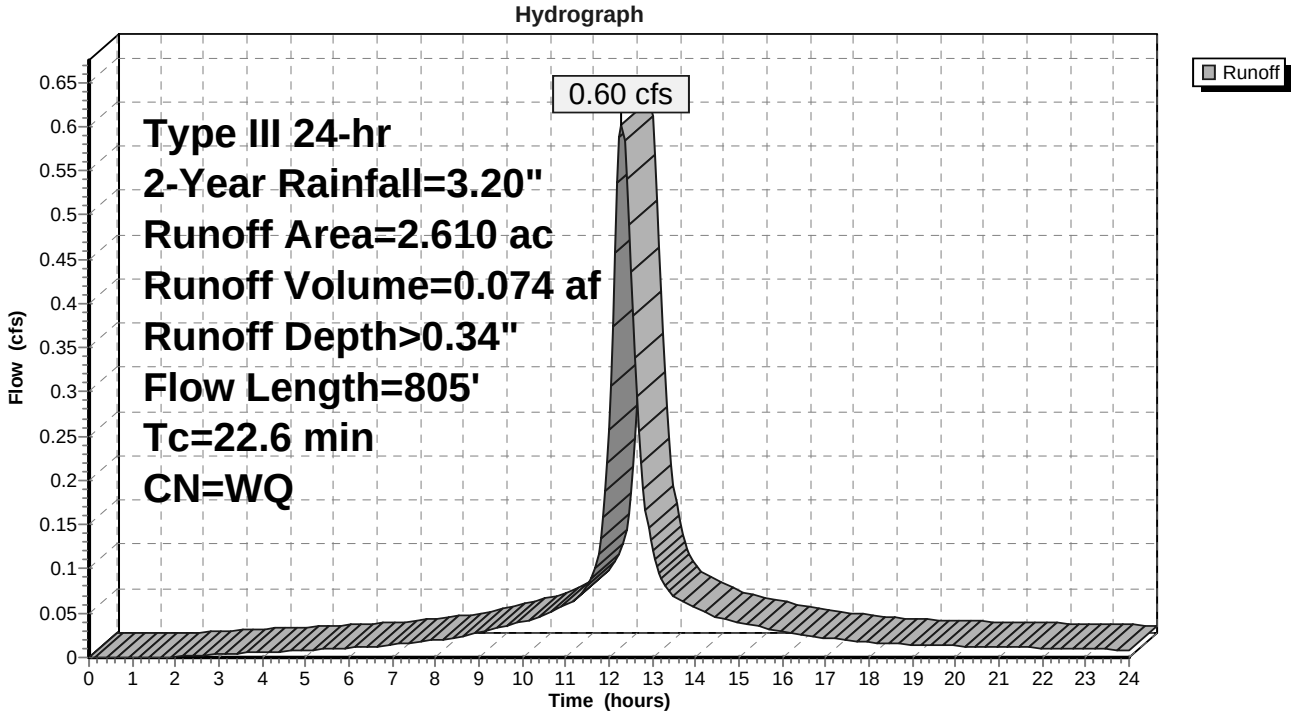
Runoff = 0.60 cfs @ 12.30 hrs, Volume= 0.074 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.170	98	Paved parking, HSG A
0.130	98	Roofs, HSG A
2.310	30	Woods, Good, HSG A
2.610		Weighted Average
2.310		88.51% Pervious Area
0.300		11.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.2600	0.10		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.00"
0.5	70	0.2600	2.55		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
14.2	685	0.0260	0.81		**Shallow Concentrated Flow, Overland adjacent to roadway** Woodland Kv= 5.0 fps
22.6	805	Total			

Subcatchment EX-1:



Summary for Subcatchment EX-2:

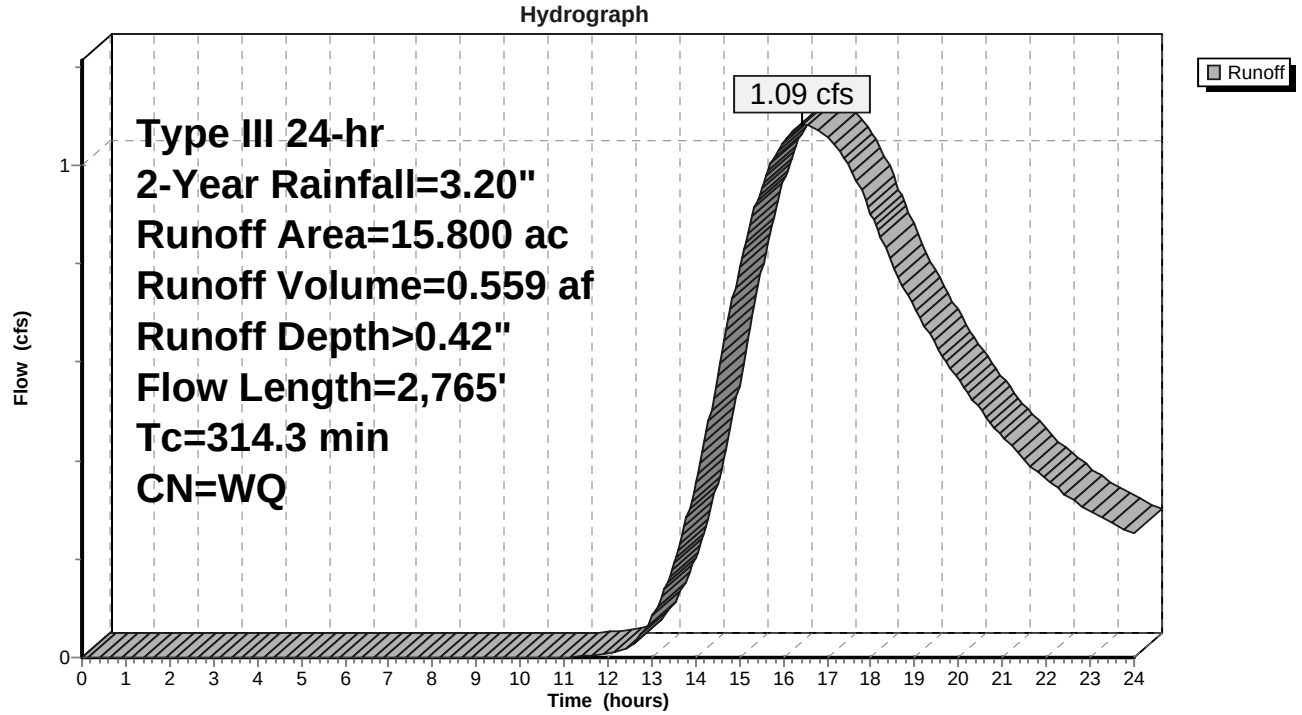
Runoff = 1.09 cfs @ 16.43 hrs, Volume= 0.559 af, Depth> 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (ac)	CN	Description
	0.030	96	Gravel surface, HSG A
	0.910	35	Brush, Fair, HSG A
	8.630	30	Woods, Good, HSG A
*	6.230	77	Wetland
	15.800		Weighted Average
	15.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	50	0.0400	0.05		**Sheet Flow, Sheet-Woods** Woods: Dense underbrush n= 0.800 P2= 3.00"
4.4	265	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.8	673	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
287.3	1,777	0.0017	0.10		**Shallow Concentrated Flow, Wetland** Forest w/Heavy Litter Kv= 2.5 fps
314.3	2,765	Total			

Subcatchment EX-2:



Summary for Subcatchment EX-3:

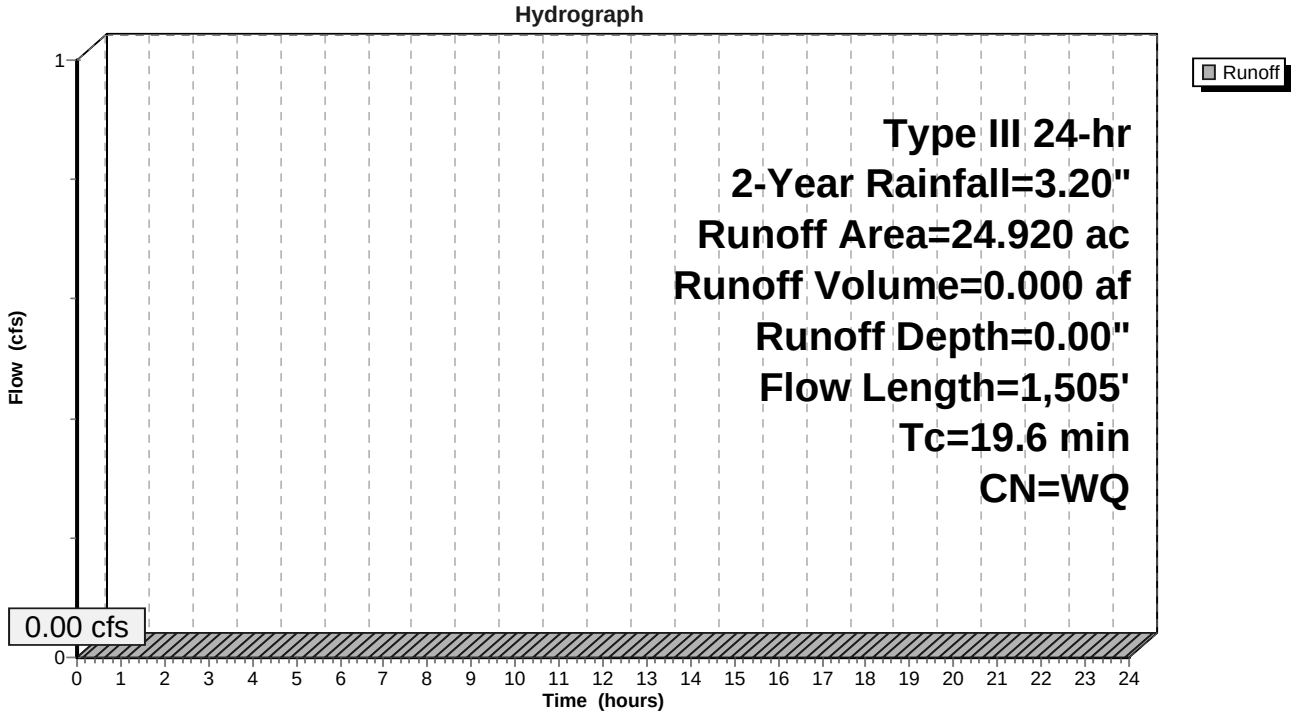
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
23.330	35	Brush, Fair, HSG A
1.590	30	Woods, Good, HSG A
24.920		Weighted Average
24.920		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	26	0.1100	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
1.8	355	0.1100	3.32		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
14.0	1,124	0.0180	1.34		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
19.6	1,505	Total			

Subcatchment EX-3:



Summary for Subcatchment EX-4:

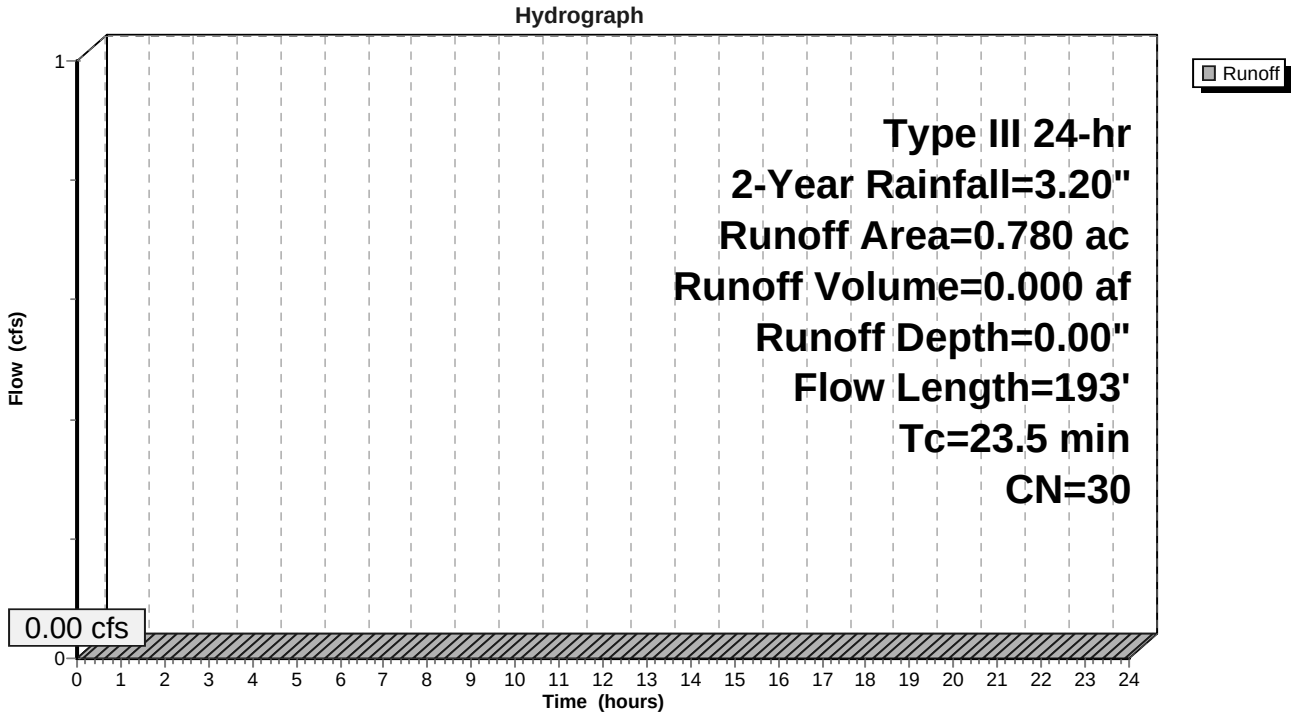
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.780	30	Woods, Good, HSG A
0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
1.3	143	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.5	193	Total			

Subcatchment EX-4:

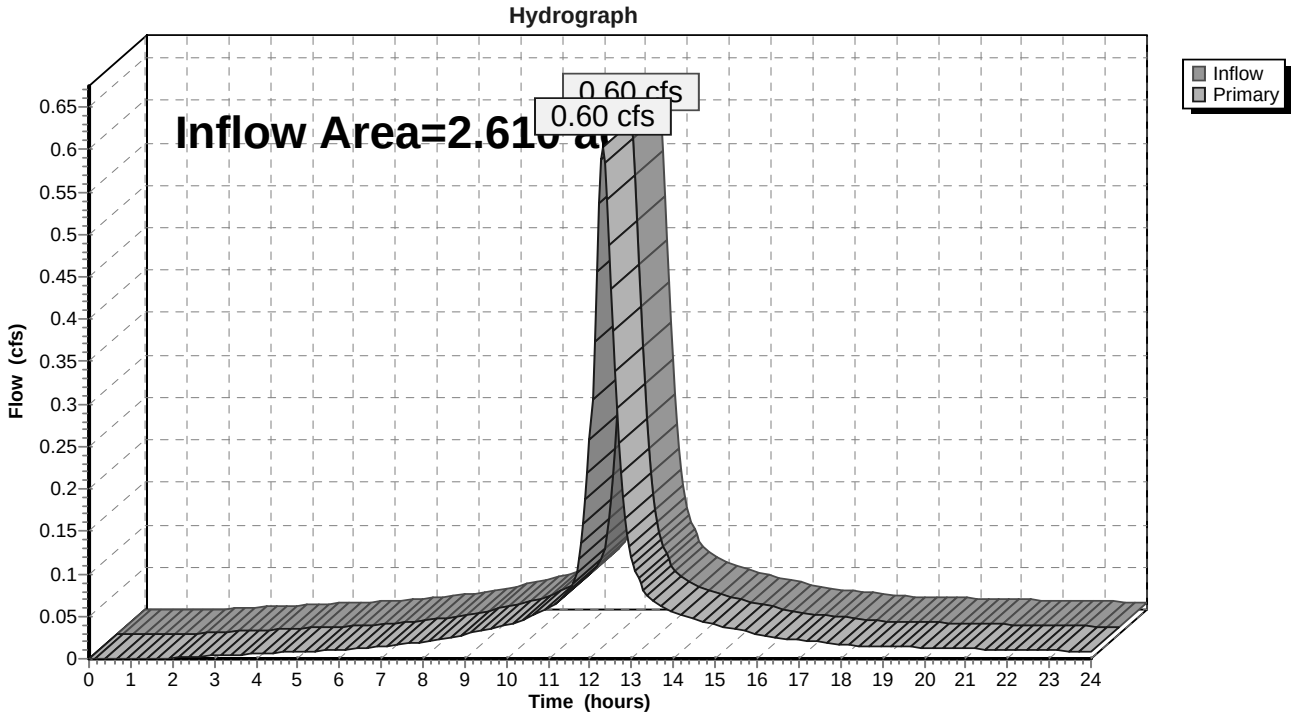


Summary for Link POA-1:

Inflow Area = 2.610 ac, 11.49% Impervious, Inflow Depth > 0.34" for 2-Year event
Inflow = 0.60 cfs @ 12.30 hrs, Volume= 0.074 af
Primary = 0.60 cfs @ 12.30 hrs, Volume= 0.074 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-1:

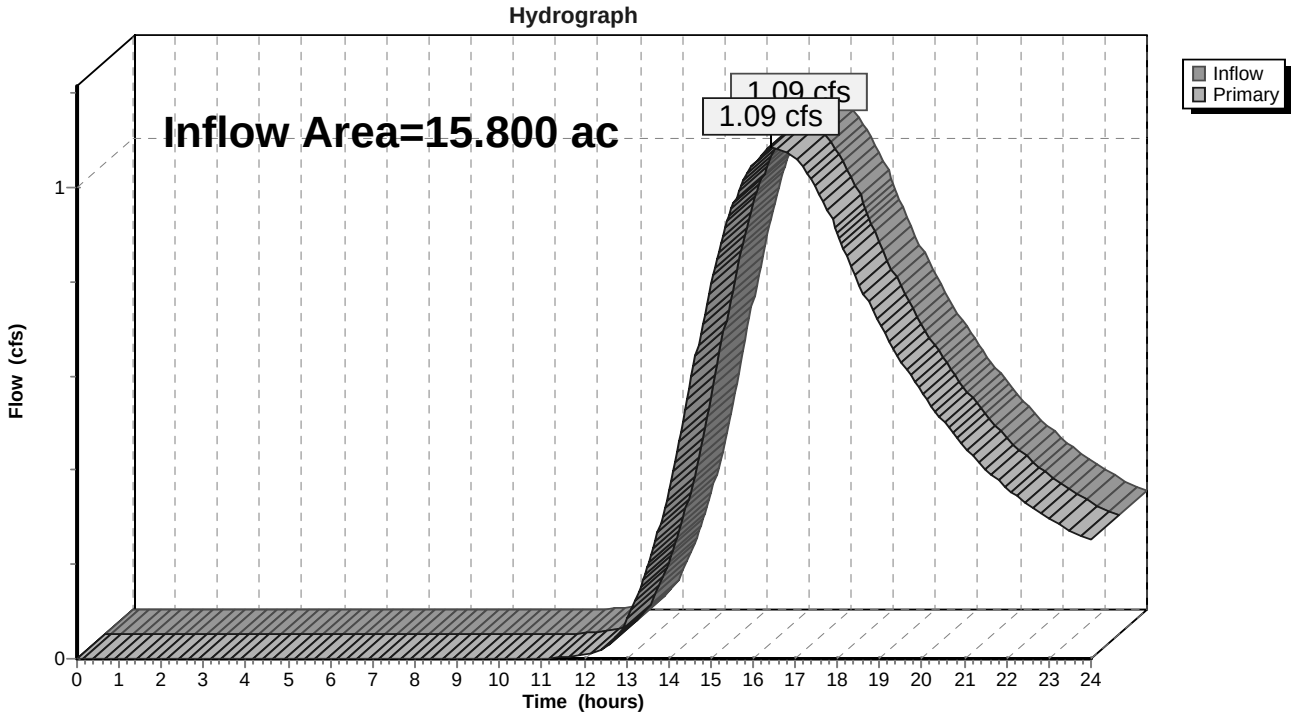


Summary for Link POA-2:

Inflow Area = 15.800 ac, 0.00% Impervious, Inflow Depth > 0.42" for 2-Year event
Inflow = 1.09 cfs @ 16.43 hrs, Volume= 0.559 af
Primary = 1.09 cfs @ 16.43 hrs, Volume= 0.559 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-2:

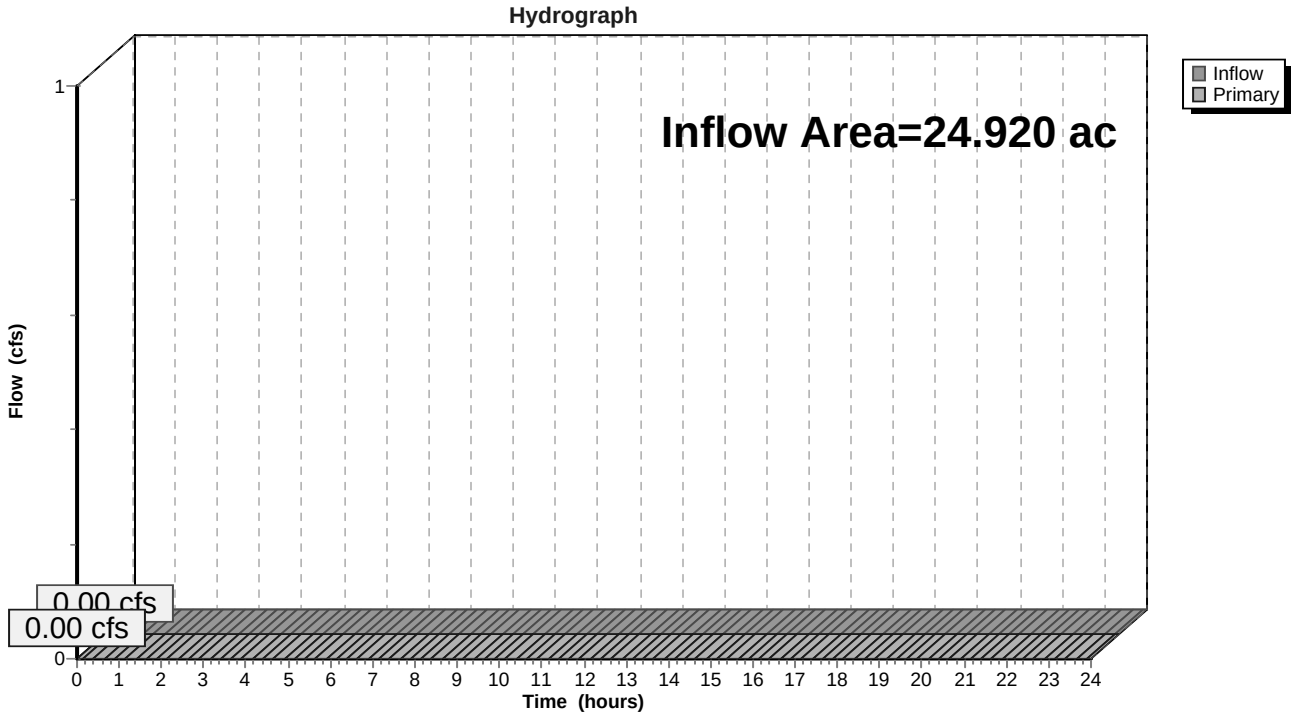


Summary for Link POA-3:

Inflow Area = 24.920 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-3:

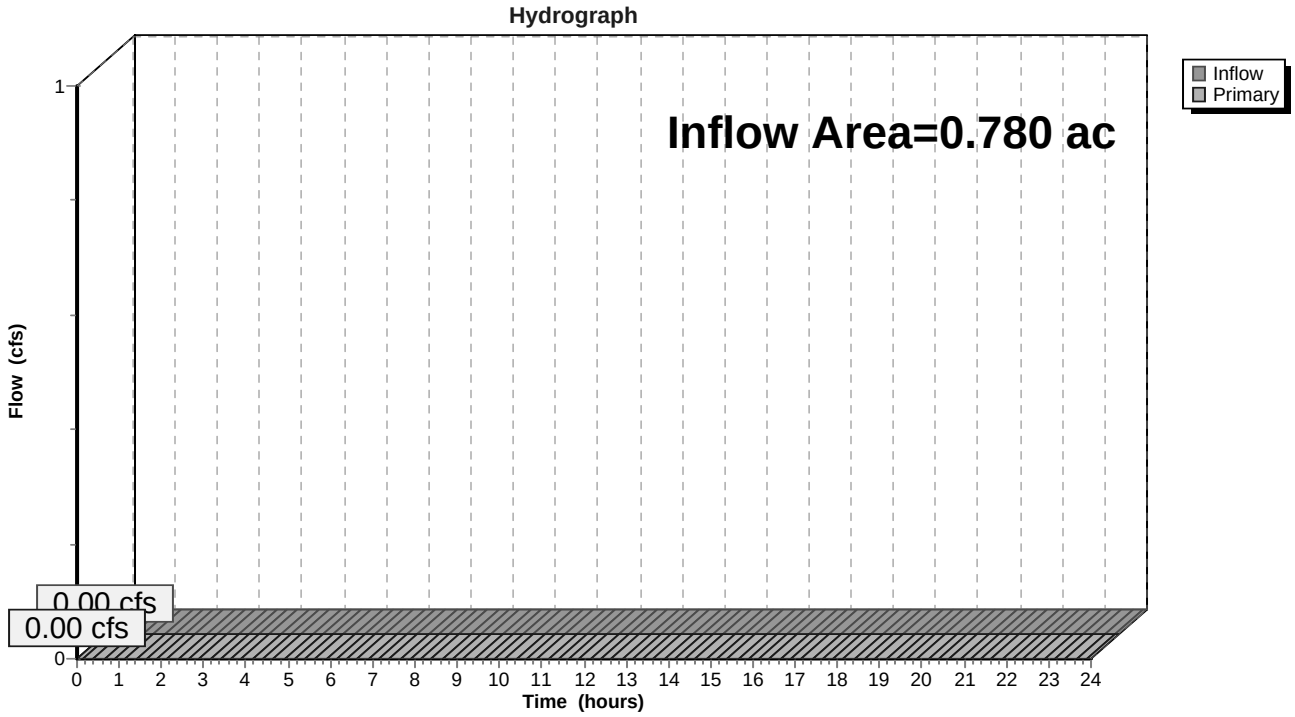


Summary for Link POA-4:

Inflow Area = 0.780 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-4:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Runoff Area=2.610 ac 11.49% Impervious Runoff Depth>0.52"
Flow Length=805' Tc=22.6 min CN=WQ Runoff=0.91 cfs 0.114 af

Subcatchment EX-2: Runoff Area=15.800 ac 0.00% Impervious Runoff Depth>0.88"
Flow Length=2,765' Tc=314.3 min CN=WQ Runoff=2.26 cfs 1.153 af

Subcatchment EX-3: Runoff Area=24.920 ac 0.00% Impervious Runoff Depth>0.06"
Flow Length=1,505' Tc=19.6 min CN=WQ Runoff=0.17 cfs 0.114 af

Subcatchment EX-4: Runoff Area=0.780 ac 0.00% Impervious Runoff Depth>0.00"
Flow Length=193' Tc=23.5 min CN=30 Runoff=0.00 cfs 0.000 af

Link POA-1: Inflow=0.91 cfs 0.114 af
Primary=0.91 cfs 0.114 af

Link POA-2: Inflow=2.26 cfs 1.153 af
Primary=2.26 cfs 1.153 af

Link POA-3: Inflow=0.17 cfs 0.114 af
Primary=0.17 cfs 0.114 af

Link POA-4: Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 44.110 ac Runoff Volume = 1.381 af Average Runoff Depth = 0.38"
99.32% Pervious = 43.810 ac 0.68% Impervious = 0.300 ac

Summary for Subcatchment EX-1:

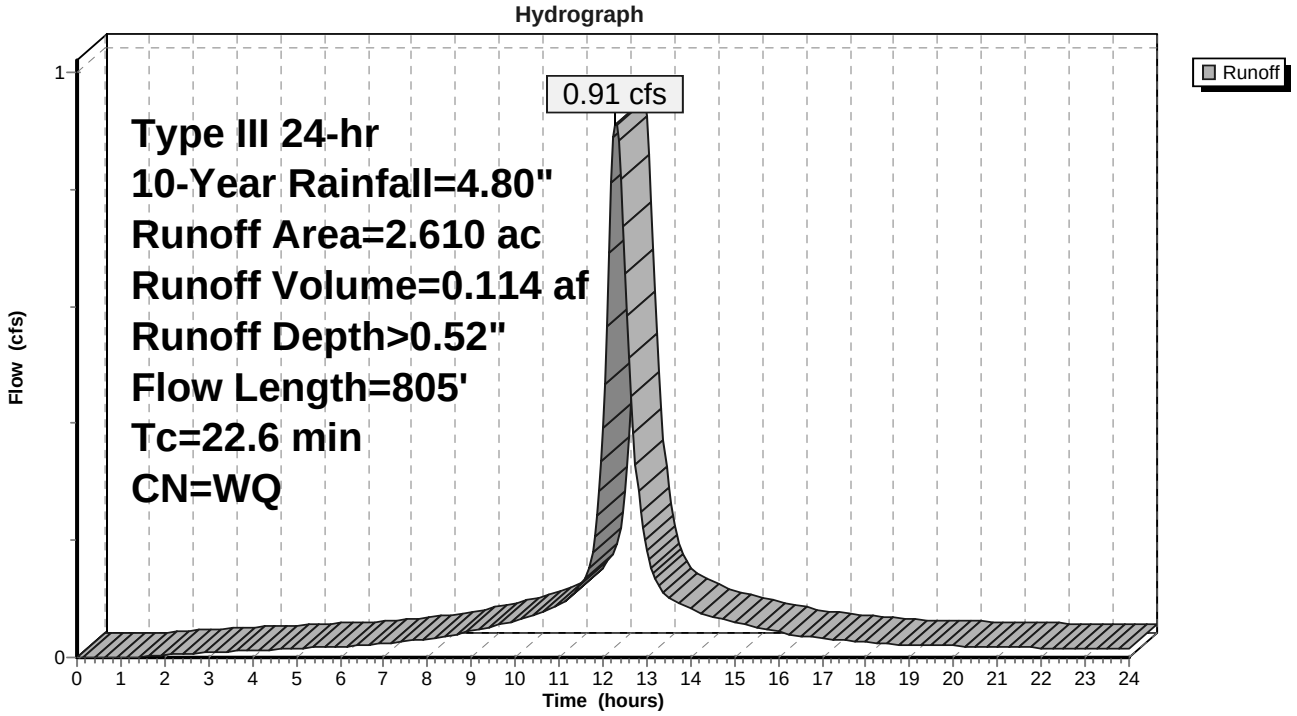
Runoff = 0.91 cfs @ 12.30 hrs, Volume= 0.114 af, Depth> 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.170	98	Paved parking, HSG A
0.130	98	Roofs, HSG A
2.310	30	Woods, Good, HSG A
2.610		Weighted Average
2.310		88.51% Pervious Area
0.300		11.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.2600	0.10		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.00"
0.5	70	0.2600	2.55		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
14.2	685	0.0260	0.81		**Shallow Concentrated Flow, Overland adjacent to roadway** Woodland Kv= 5.0 fps
22.6	805	Total			

Subcatchment EX-1:



Summary for Subcatchment EX-2:

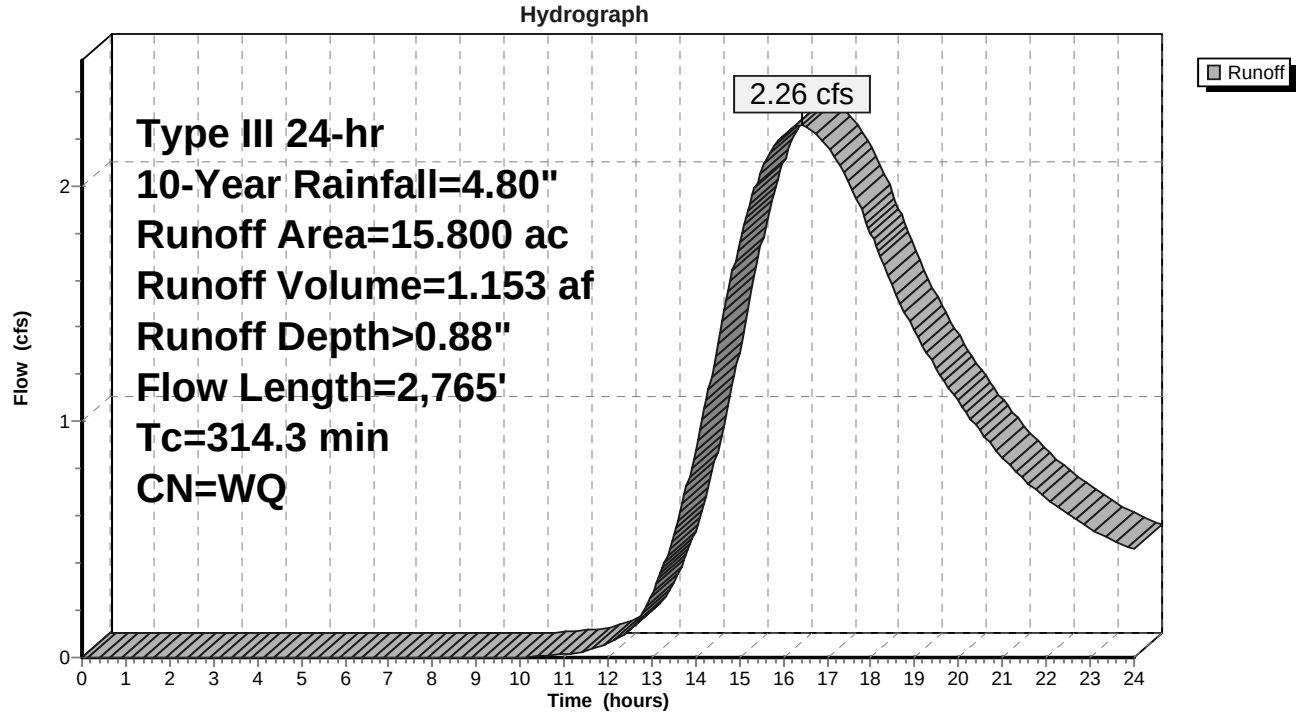
Runoff = 2.26 cfs @ 16.40 hrs, Volume= 1.153 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (ac)	CN	Description
	0.030	96	Gravel surface, HSG A
	0.910	35	Brush, Fair, HSG A
	8.630	30	Woods, Good, HSG A
*	6.230	77	Wetland
	15.800		Weighted Average
	15.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	50	0.0400	0.05		**Sheet Flow, Sheet-Woods** Woods: Dense underbrush n= 0.800 P2= 3.00"
4.4	265	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.8	673	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
287.3	1,777	0.0017	0.10		**Shallow Concentrated Flow, Wetland** Forest w/Heavy Litter Kv= 2.5 fps
314.3	2,765	Total			

Subcatchment EX-2:



Summary for Subcatchment EX-3:

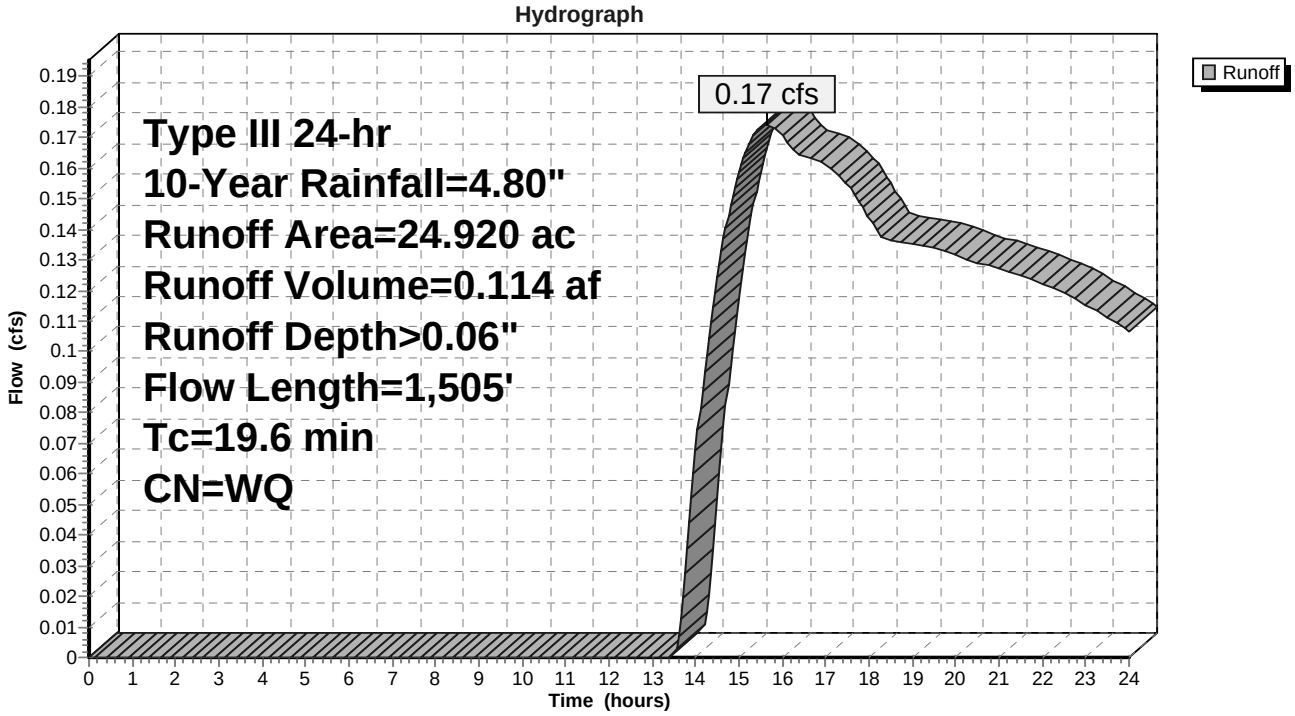
Runoff = 0.17 cfs @ 15.67 hrs, Volume= 0.114 af, Depth> 0.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
23.330	35	Brush, Fair, HSG A
1.590	30	Woods, Good, HSG A
24.920		Weighted Average
24.920		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	26	0.1100	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
1.8	355	0.1100	3.32		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
14.0	1,124	0.0180	1.34		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
19.6	1,505	Total			

Subcatchment EX-3:



Summary for Subcatchment EX-4:

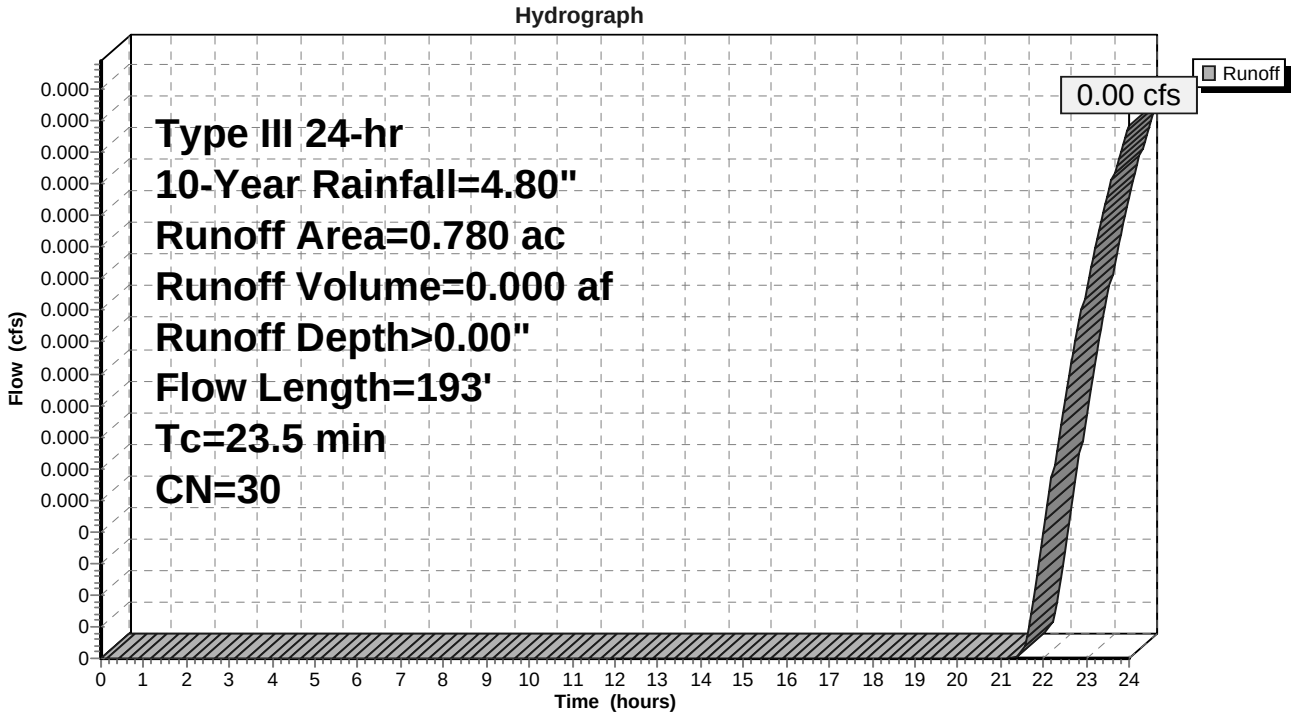
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.780	30	Woods, Good, HSG A
0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
1.3	143	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.5	193	Total			

Subcatchment EX-4:

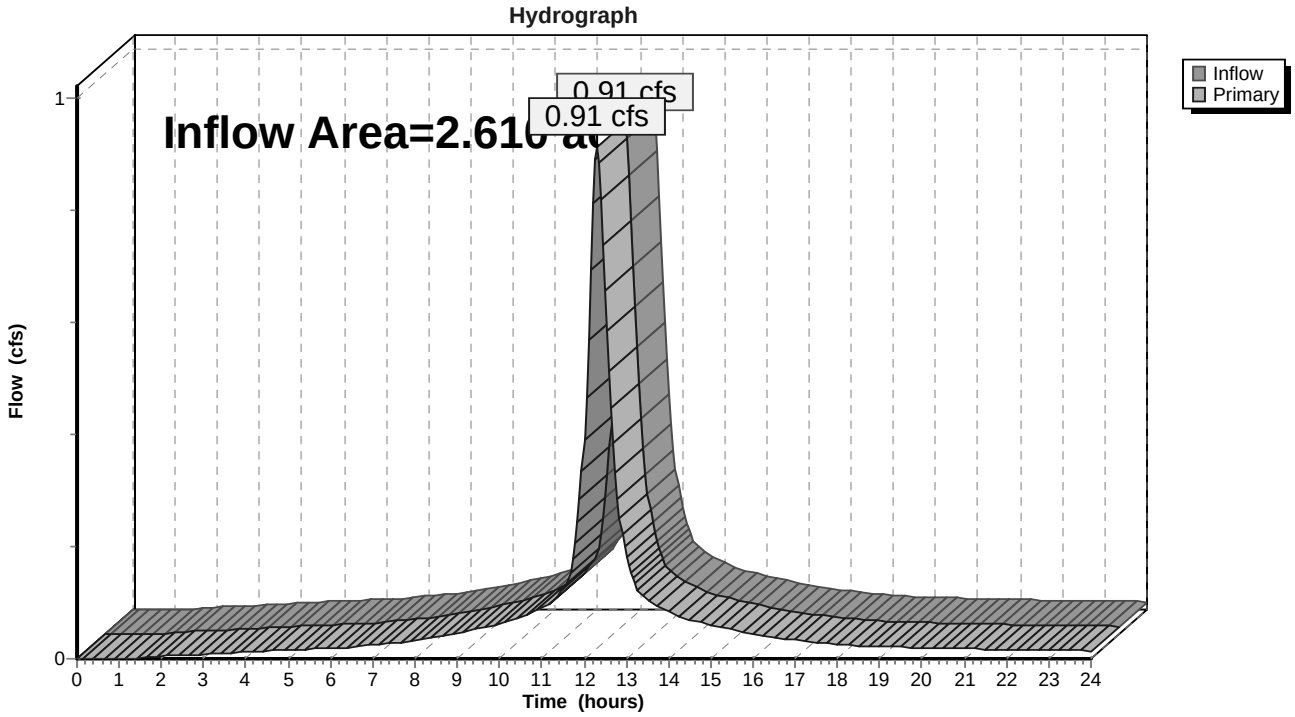


Summary for Link POA-1:

Inflow Area = 2.610 ac, 11.49% Impervious, Inflow Depth > 0.52" for 10-Year event
Inflow = 0.91 cfs @ 12.30 hrs, Volume= 0.114 af
Primary = 0.91 cfs @ 12.30 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-1:

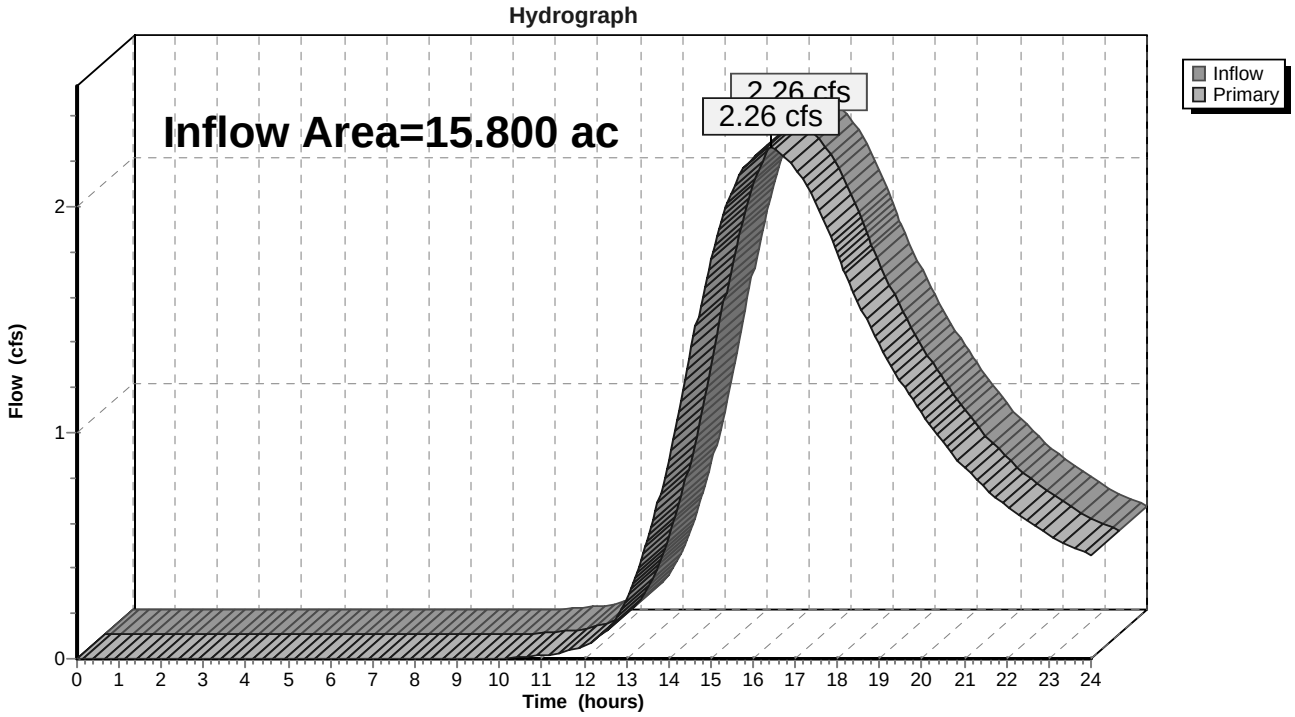


Summary for Link POA-2:

Inflow Area = 15.800 ac, 0.00% Impervious, Inflow Depth > 0.88" for 10-Year event
Inflow = 2.26 cfs @ 16.40 hrs, Volume= 1.153 af
Primary = 2.26 cfs @ 16.40 hrs, Volume= 1.153 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-2:

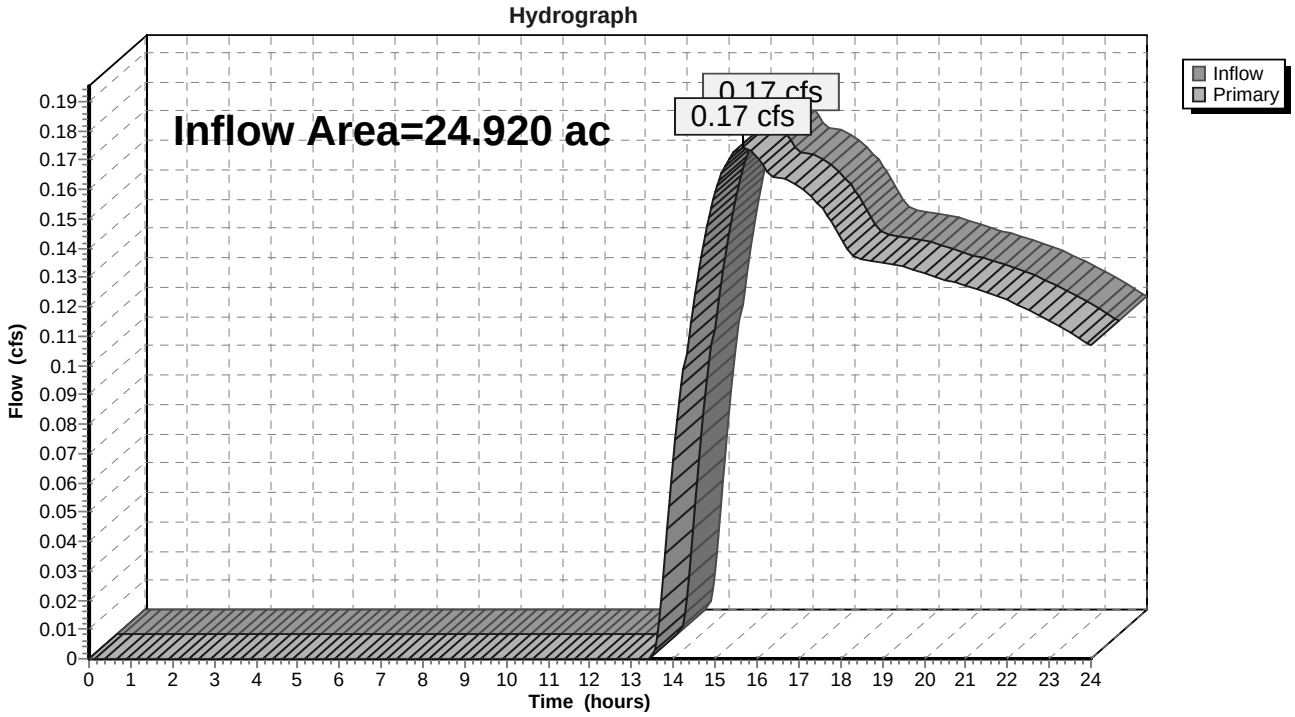


Summary for Link POA-3:

Inflow Area = 24.920 ac, 0.00% Impervious, Inflow Depth > 0.06" for 10-Year event
Inflow = 0.17 cfs @ 15.67 hrs, Volume= 0.114 af
Primary = 0.17 cfs @ 15.67 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-3:

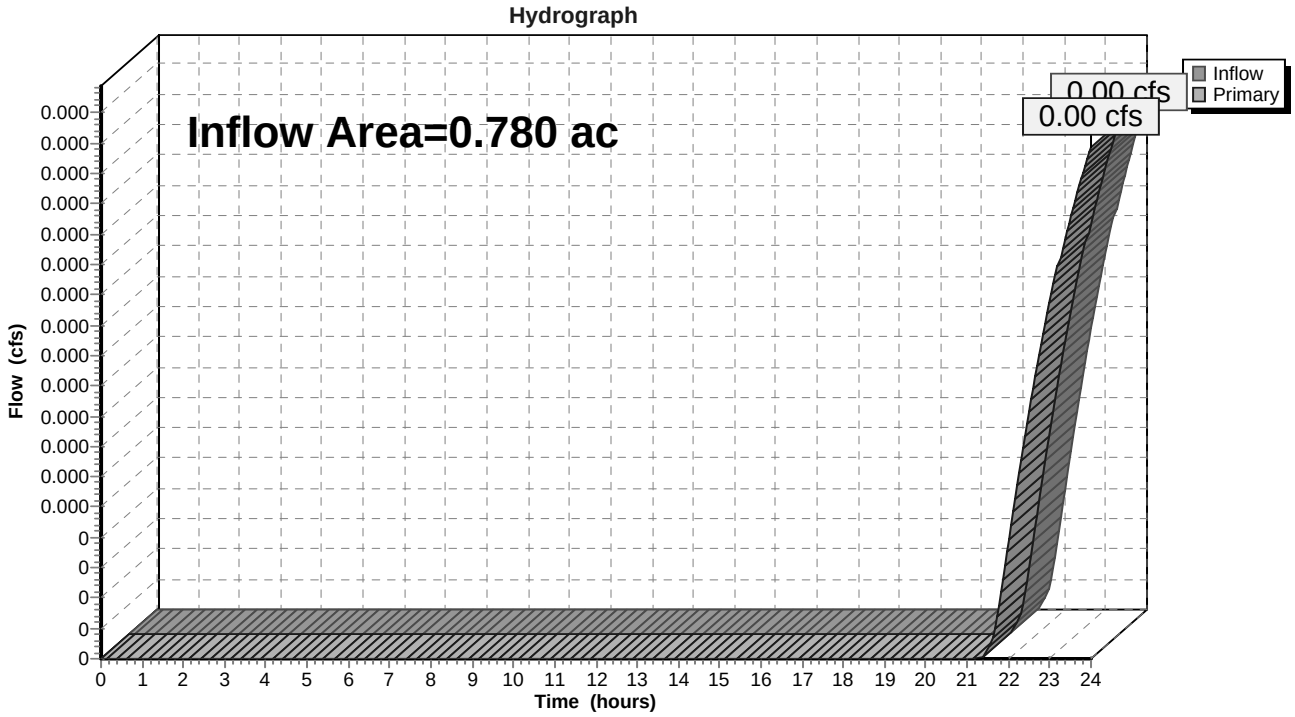


Summary for Link POA-4:

Inflow Area = 0.780 ac, 0.00% Impervious, Inflow Depth > 0.00" for 10-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-4:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Runoff Area=2.610 ac 11.49% Impervious Runoff Depth>0.72"
Flow Length=805' Tc=22.6 min CN=WQ Runoff=1.14 cfs 0.157 af

Subcatchment EX-2: Runoff Area=15.800 ac 0.00% Impervious Runoff Depth>1.28"
Flow Length=2,765' Tc=314.3 min CN=WQ Runoff=3.24 cfs 1.683 af

Subcatchment EX-3: Runoff Area=24.920 ac 0.00% Impervious Runoff Depth>0.24"
Flow Length=1,505' Tc=19.6 min CN=WQ Runoff=0.93 cfs 0.491 af

Subcatchment EX-4: Runoff Area=0.780 ac 0.00% Impervious Runoff Depth>0.07"
Flow Length=193' Tc=23.5 min CN=30 Runoff=0.01 cfs 0.005 af

Link POA-1: Inflow=1.14 cfs 0.157 af
Primary=1.14 cfs 0.157 af

Link POA-2: Inflow=3.24 cfs 1.683 af
Primary=3.24 cfs 1.683 af

Link POA-3: Inflow=0.93 cfs 0.491 af
Primary=0.93 cfs 0.491 af

Link POA-4: Inflow=0.01 cfs 0.005 af
Primary=0.01 cfs 0.005 af

Total Runoff Area = 44.110 ac Runoff Volume = 2.335 af Average Runoff Depth = 0.64"
99.32% Pervious = 43.810 ac 0.68% Impervious = 0.300 ac

Summary for Subcatchment EX-1:

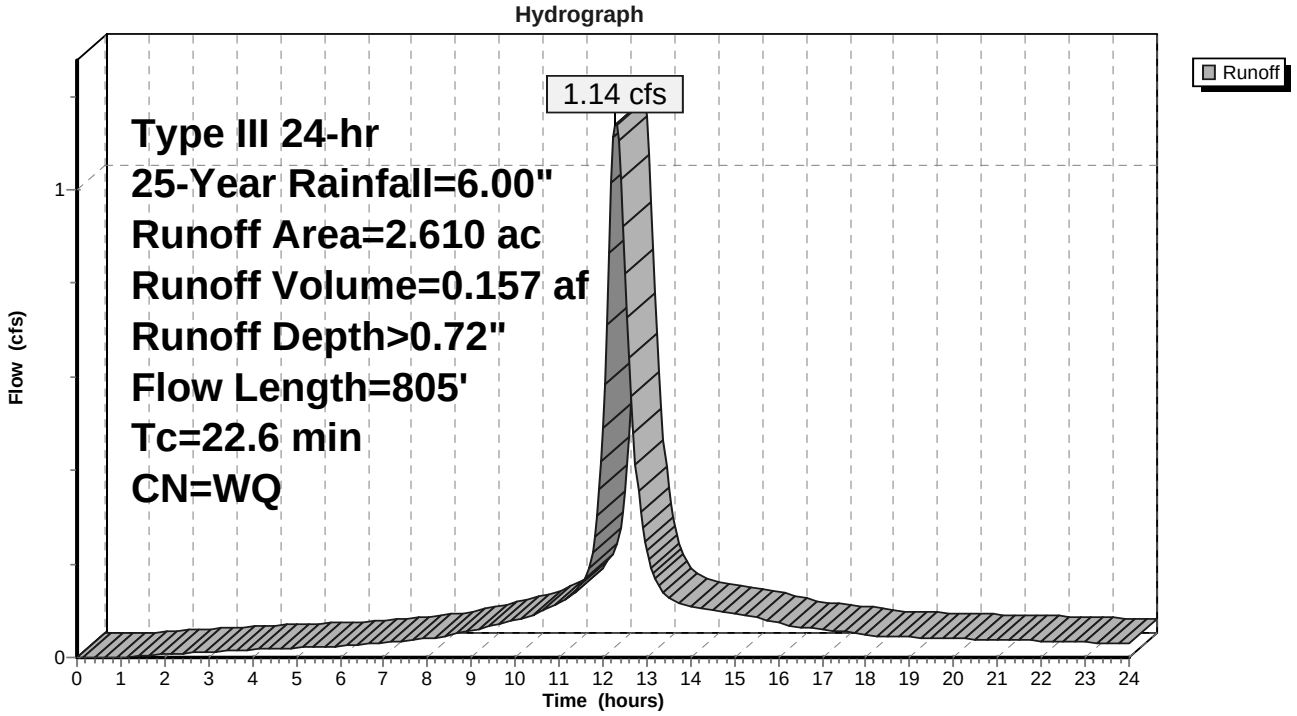
Runoff = 1.14 cfs @ 12.30 hrs, Volume= 0.157 af, Depth> 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.170	98	Paved parking, HSG A
0.130	98	Roofs, HSG A
2.310	30	Woods, Good, HSG A
2.610		Weighted Average
2.310		88.51% Pervious Area
0.300		11.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.2600	0.10		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.00"
0.5	70	0.2600	2.55		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
14.2	685	0.0260	0.81		**Shallow Concentrated Flow, Overland adjacent to roadway** Woodland Kv= 5.0 fps
22.6	805	Total			

Subcatchment EX-1:



Summary for Subcatchment EX-2:

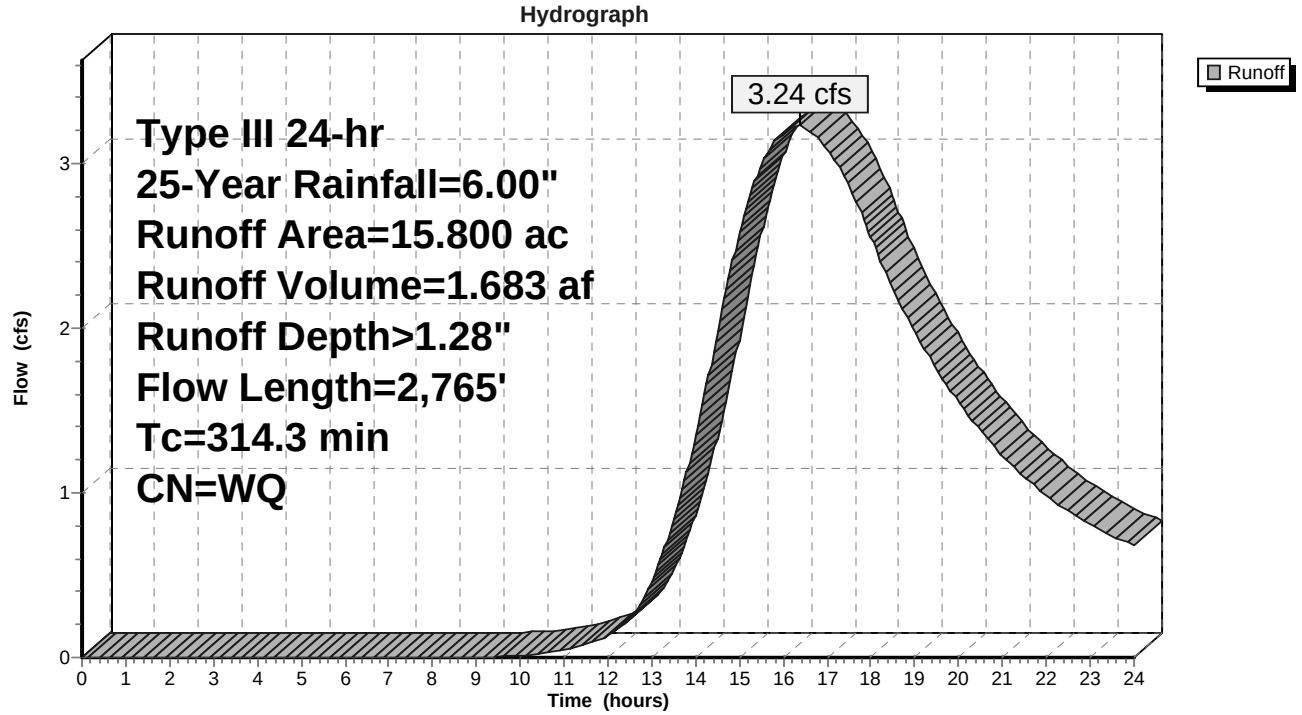
Runoff = 3.24 cfs @ 16.40 hrs, Volume= 1.683 af, Depth> 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (ac)	CN	Description
	0.030	96	Gravel surface, HSG A
	0.910	35	Brush, Fair, HSG A
	8.630	30	Woods, Good, HSG A
*	6.230	77	Wetland
	15.800		Weighted Average
	15.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	50	0.0400	0.05		**Sheet Flow, Sheet-Woods** Woods: Dense underbrush n= 0.800 P2= 3.00"
4.4	265	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.8	673	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
287.3	1,777	0.0017	0.10		**Shallow Concentrated Flow, Wetland** Forest w/Heavy Litter Kv= 2.5 fps
314.3	2,765	Total			

Subcatchment EX-2:



Summary for Subcatchment EX-3:

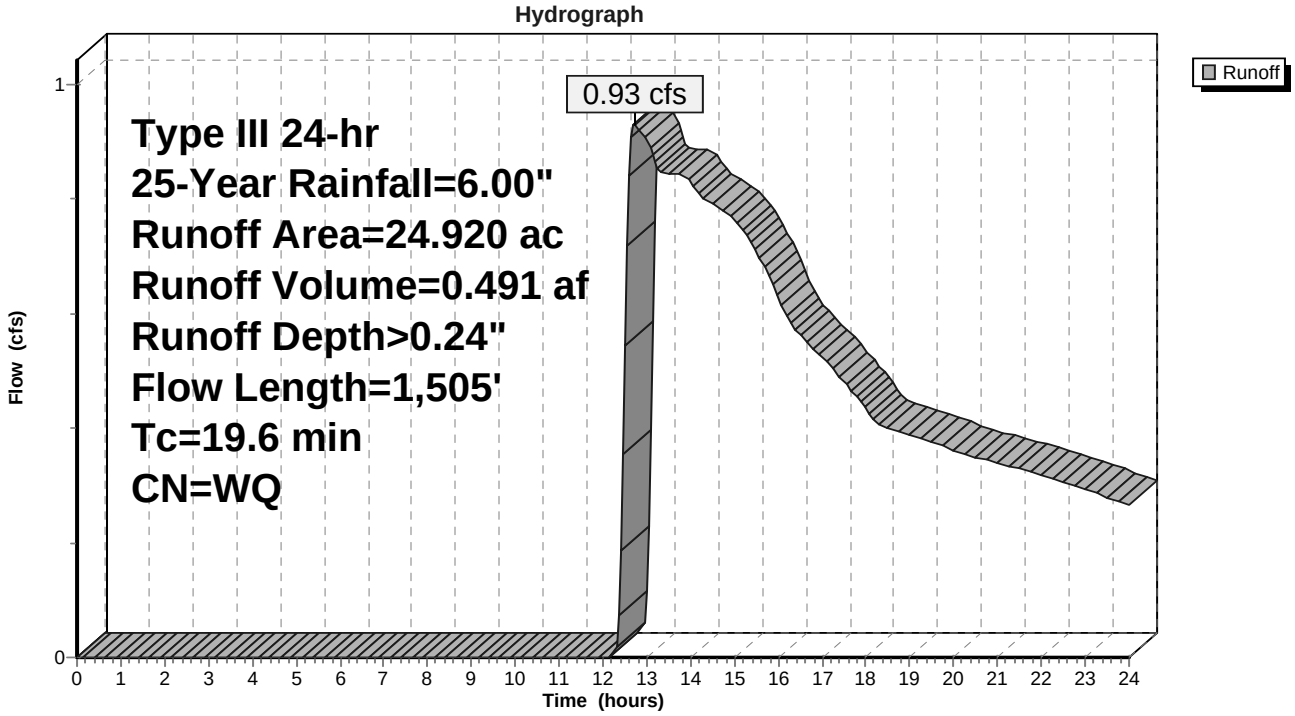
Runoff = 0.93 cfs @ 12.72 hrs, Volume= 0.491 af, Depth> 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
23.330	35	Brush, Fair, HSG A
1.590	30	Woods, Good, HSG A
24.920		Weighted Average
24.920		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	26	0.1100	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
1.8	355	0.1100	3.32		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
14.0	1,124	0.0180	1.34		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
19.6	1,505	Total			

Subcatchment EX-3:



Summary for Subcatchment EX-4:

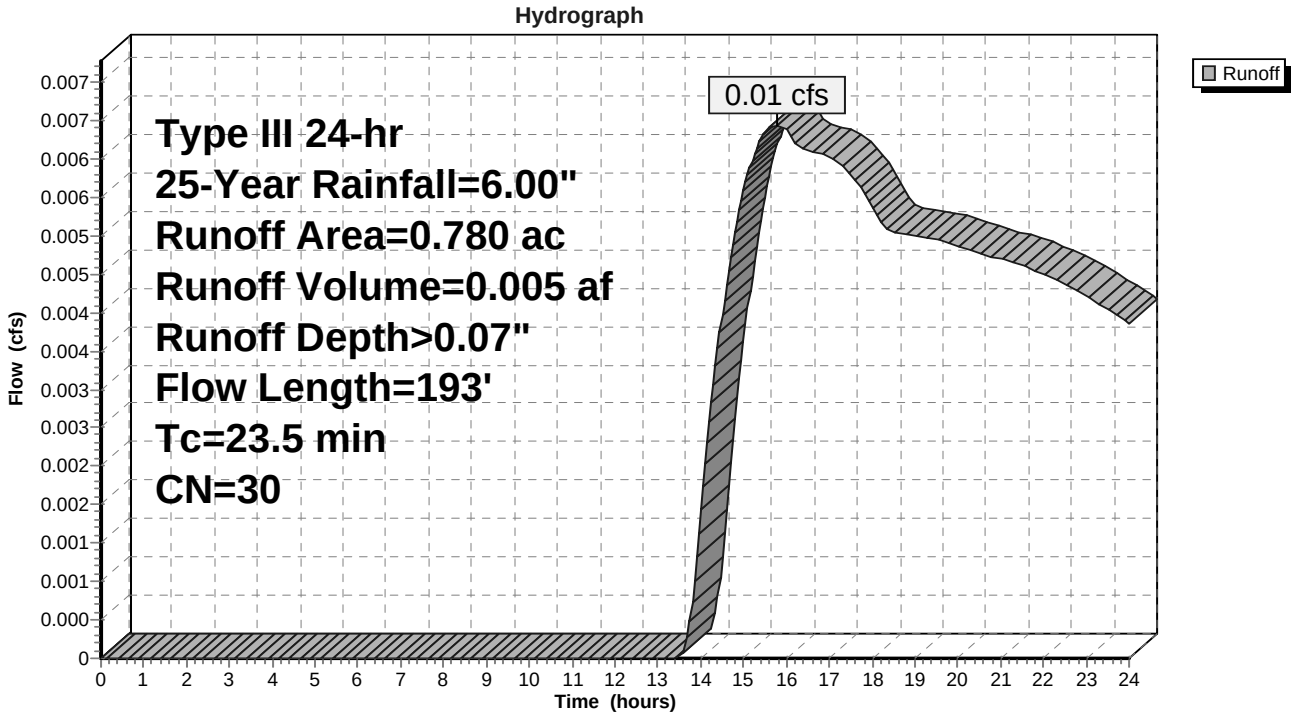
Runoff = 0.01 cfs @ 15.77 hrs, Volume= 0.005 af, Depth> 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.780	30	Woods, Good, HSG A
0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
1.3	143	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.5	193	Total			

Subcatchment EX-4:

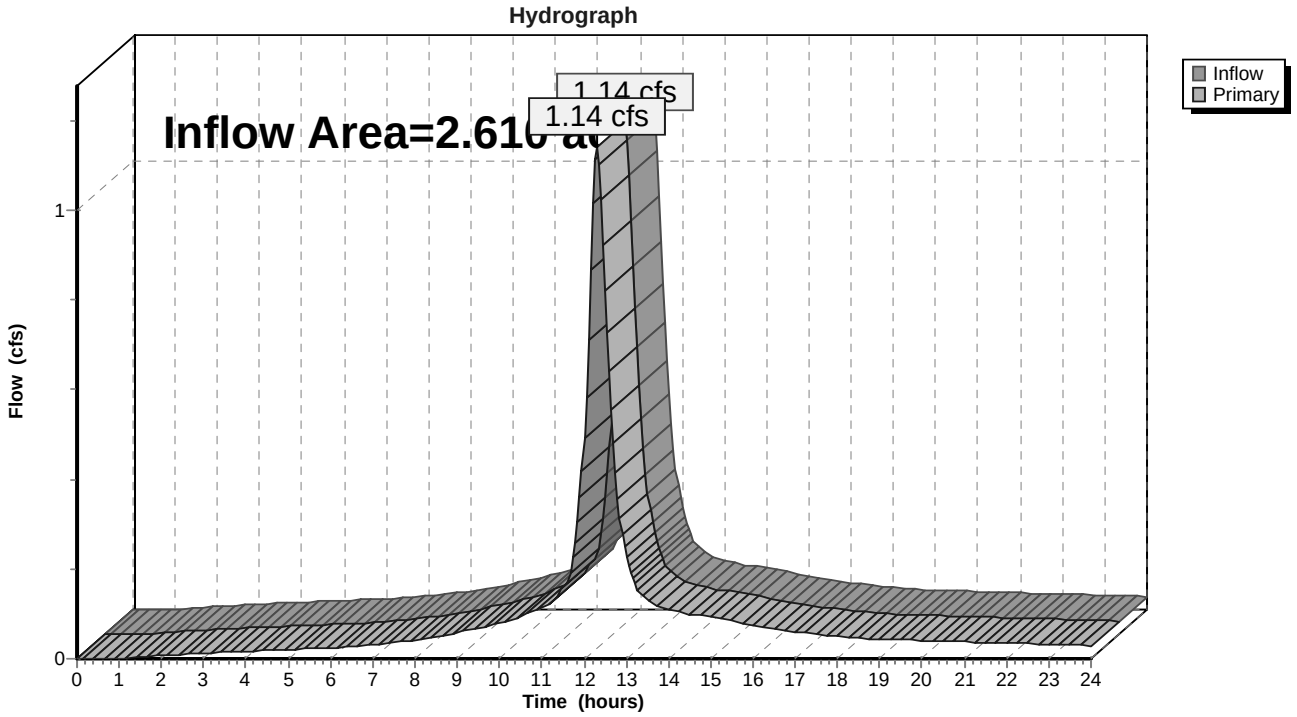


Summary for Link POA-1:

Inflow Area = 2.610 ac, 11.49% Impervious, Inflow Depth > 0.72" for 25-Year event
Inflow = 1.14 cfs @ 12.30 hrs, Volume= 0.157 af
Primary = 1.14 cfs @ 12.30 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-1:

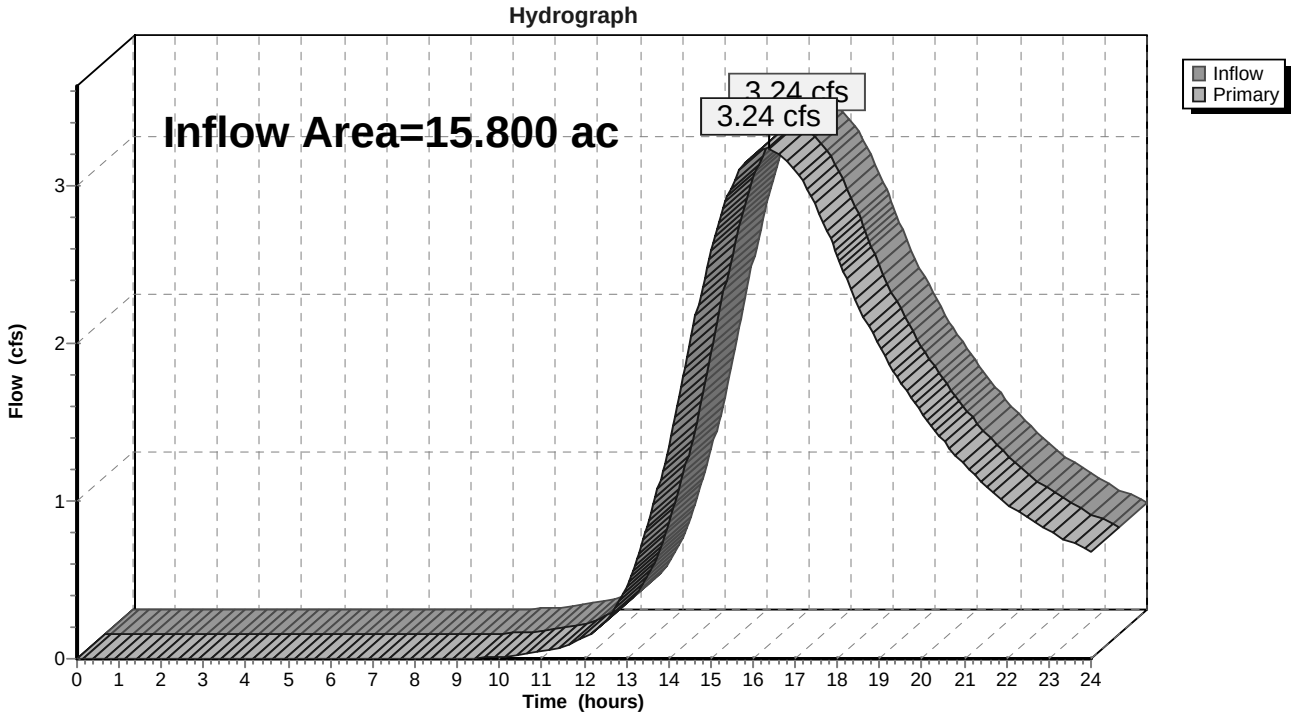


Summary for Link POA-2:

Inflow Area = 15.800 ac, 0.00% Impervious, Inflow Depth > 1.28" for 25-Year event
Inflow = 3.24 cfs @ 16.40 hrs, Volume= 1.683 af
Primary = 3.24 cfs @ 16.40 hrs, Volume= 1.683 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-2:

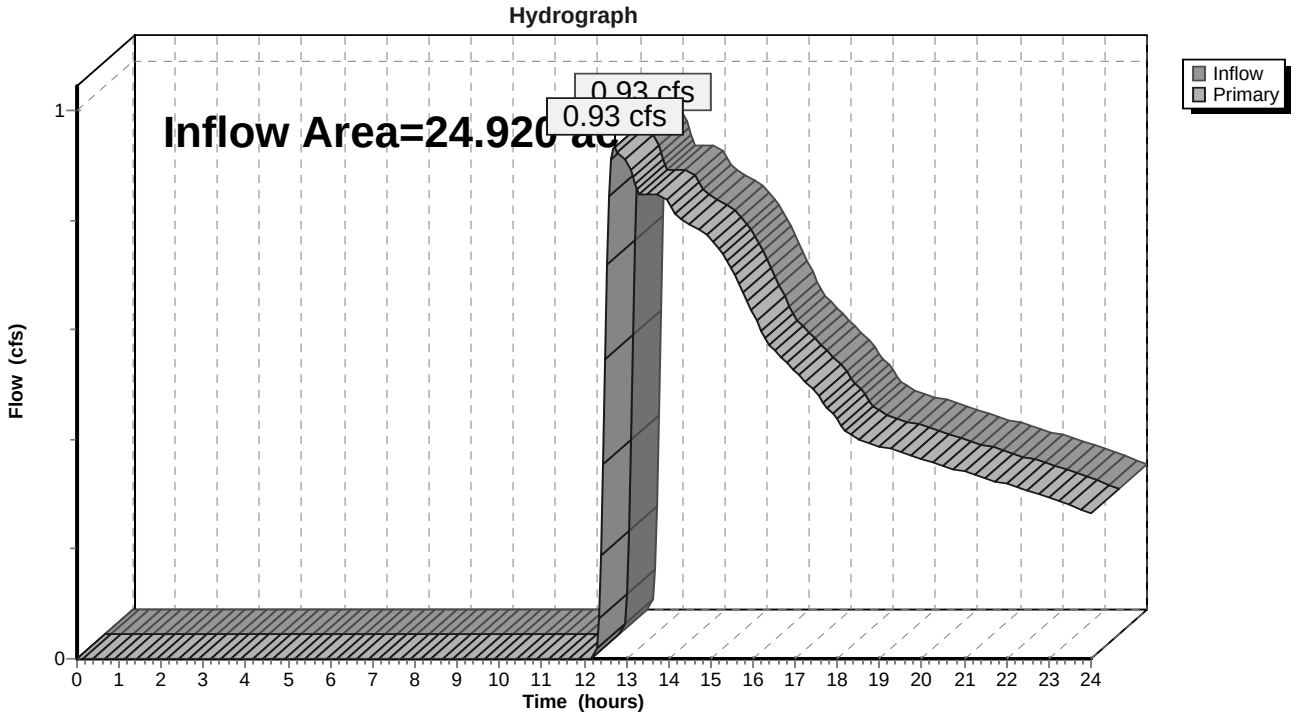


Summary for Link POA-3:

Inflow Area = 24.920 ac, 0.00% Impervious, Inflow Depth > 0.24" for 25-Year event
Inflow = 0.93 cfs @ 12.72 hrs, Volume= 0.491 af
Primary = 0.93 cfs @ 12.72 hrs, Volume= 0.491 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-3:

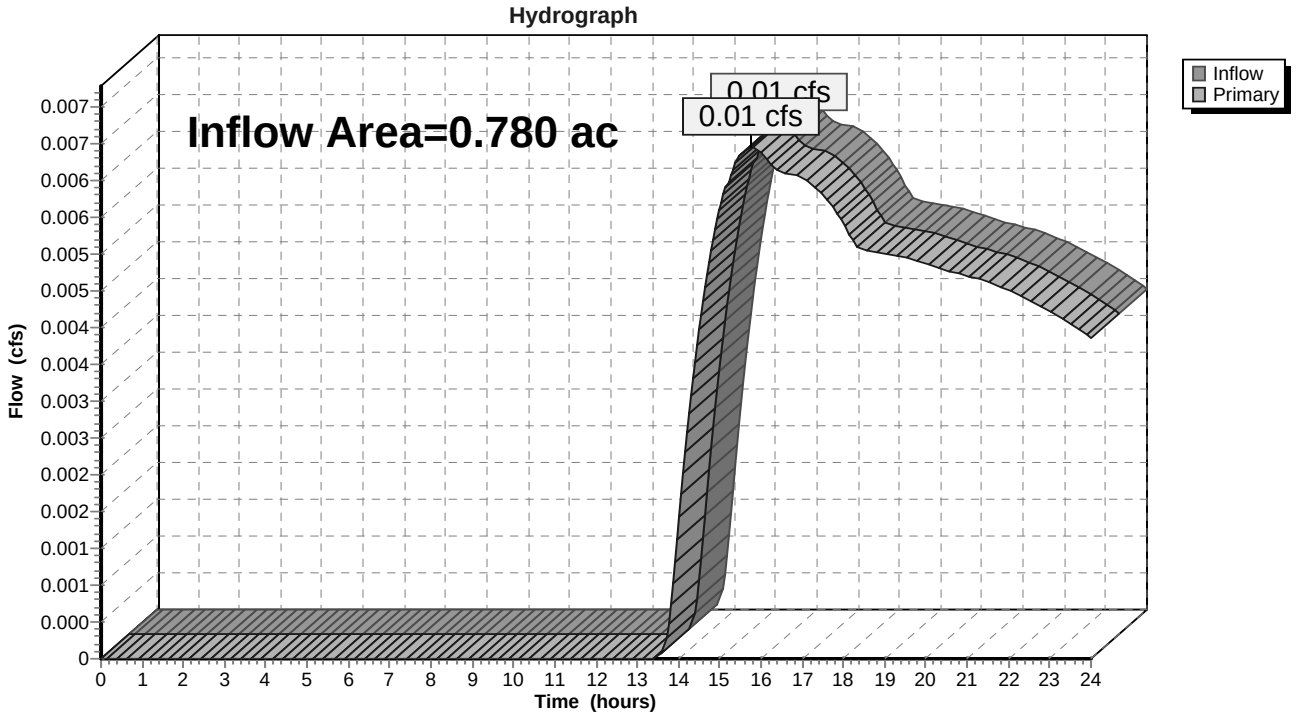


Summary for Link POA-4:

Inflow Area = 0.780 ac, 0.00% Impervious, Inflow Depth > 0.07" for 25-Year event
Inflow = 0.01 cfs @ 15.77 hrs, Volume= 0.005 af
Primary = 0.01 cfs @ 15.77 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-4:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Runoff Area=2.610 ac 11.49% Impervious Runoff Depth>1.45"
Flow Length=805' Tc=22.6 min CN=WQ Runoff=1.75 cfs 0.316 af

Subcatchment EX-2: Runoff Area=15.800 ac 0.00% Impervious Runoff Depth>2.39"
Flow Length=2,765' Tc=314.3 min CN=WQ Runoff=5.91 cfs 3.144 af

Subcatchment EX-3: Runoff Area=24.920 ac 0.00% Impervious Runoff Depth>0.98"
Flow Length=1,505' Tc=19.6 min CN=WQ Runoff=11.37 cfs 2.038 af

Subcatchment EX-4: Runoff Area=0.780 ac 0.00% Impervious Runoff Depth>0.56"
Flow Length=193' Tc=23.5 min CN=30 Runoff=0.12 cfs 0.036 af

Link POA-1: Inflow=1.75 cfs 0.316 af
Primary=1.75 cfs 0.316 af

Link POA-2: Inflow=5.91 cfs 3.144 af
Primary=5.91 cfs 3.144 af

Link POA-3: Inflow=11.37 cfs 2.038 af
Primary=11.37 cfs 2.038 af

Link POA-4: Inflow=0.12 cfs 0.036 af
Primary=0.12 cfs 0.036 af

Total Runoff Area = 44.110 ac Runoff Volume = 5.535 af Average Runoff Depth = 1.51"
99.32% Pervious = 43.810 ac 0.68% Impervious = 0.300 ac

Summary for Subcatchment EX-1:

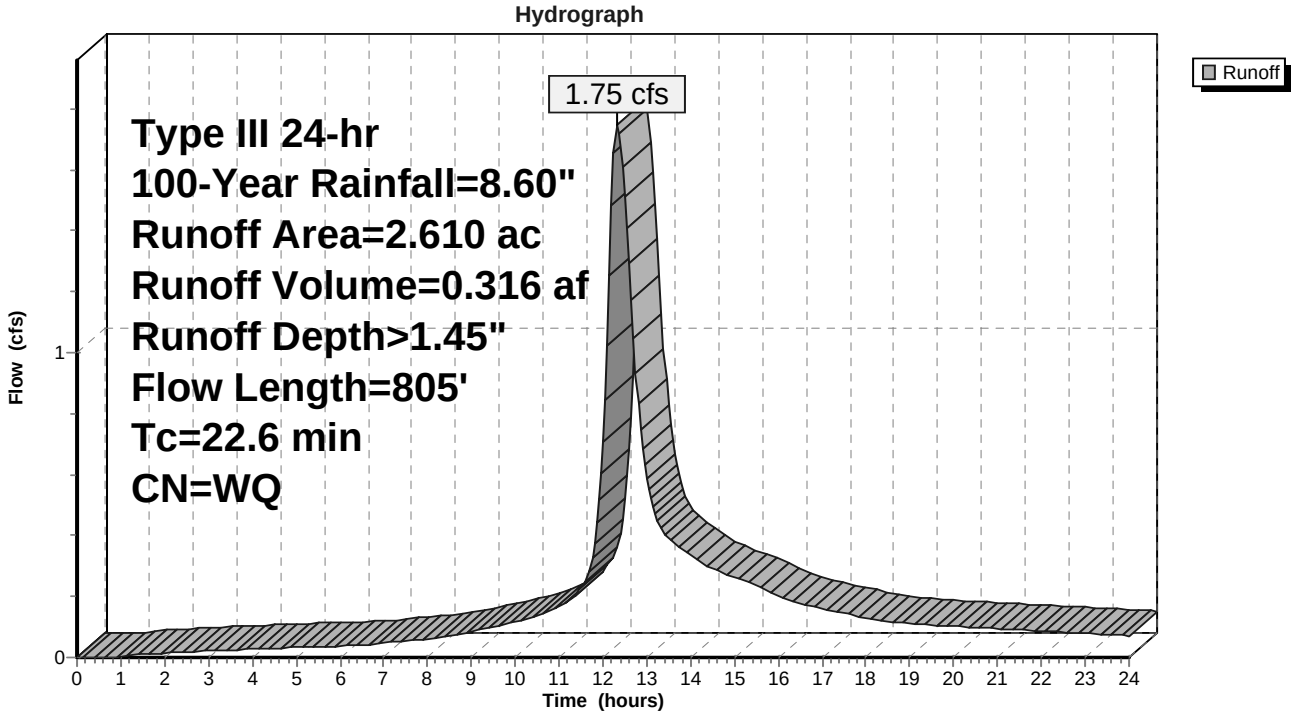
Runoff = 1.75 cfs @ 12.33 hrs, Volume= 0.316 af, Depth> 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.170	98	Paved parking, HSG A
0.130	98	Roofs, HSG A
2.310	30	Woods, Good, HSG A
2.610		Weighted Average
2.310		88.51% Pervious Area
0.300		11.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.2600	0.10		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.00"
0.5	70	0.2600	2.55		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
14.2	685	0.0260	0.81		**Shallow Concentrated Flow, Overland adjacent to roadway** Woodland Kv= 5.0 fps
22.6	805	Total			

Subcatchment EX-1:



Summary for Subcatchment EX-2:

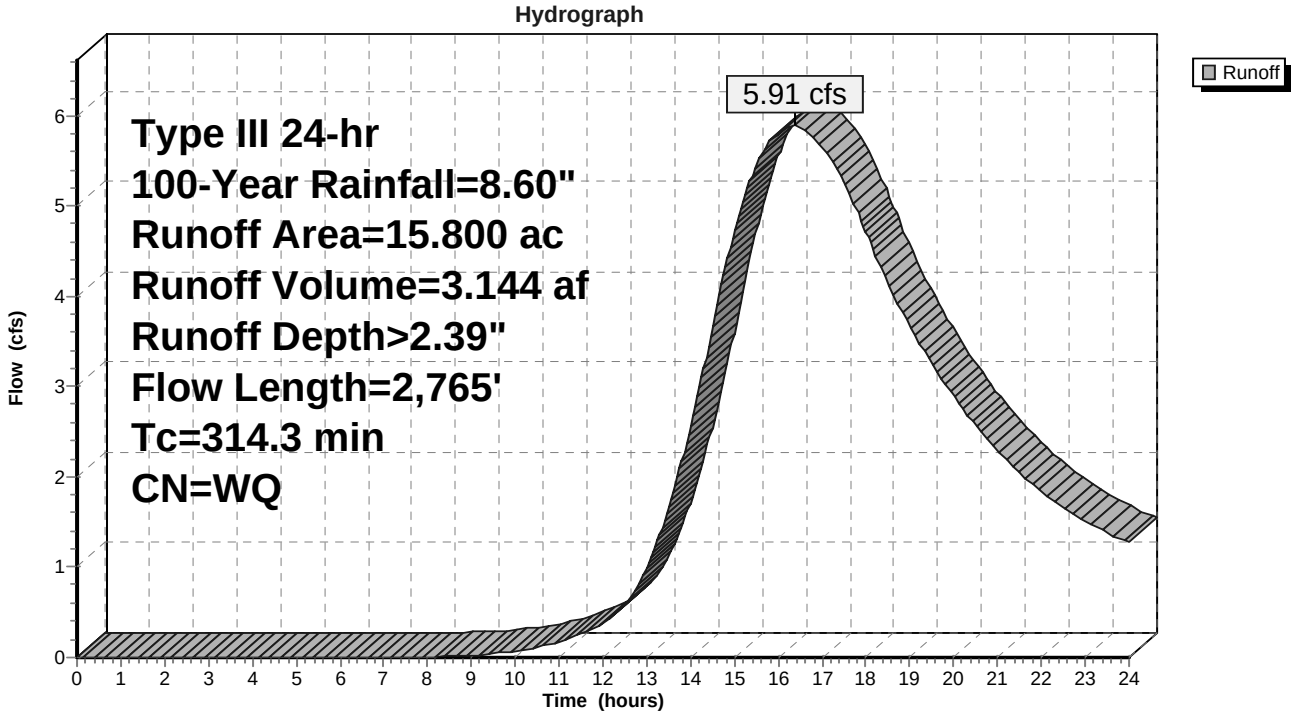
Runoff = 5.91 cfs @ 16.40 hrs, Volume= 3.144 af, Depth> 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (ac)	CN	Description
	0.030	96	Gravel surface, HSG A
	0.910	35	Brush, Fair, HSG A
	8.630	30	Woods, Good, HSG A
*	6.230	77	Wetland
	15.800		Weighted Average
	15.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	50	0.0400	0.05		**Sheet Flow, Sheet-Woods** Woods: Dense underbrush n= 0.800 P2= 3.00"
4.4	265	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.8	673	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
287.3	1,777	0.0017	0.10		**Shallow Concentrated Flow, Wetland** Forest w/Heavy Litter Kv= 2.5 fps
314.3	2,765	Total			

Subcatchment EX-2:



Summary for Subcatchment EX-3:

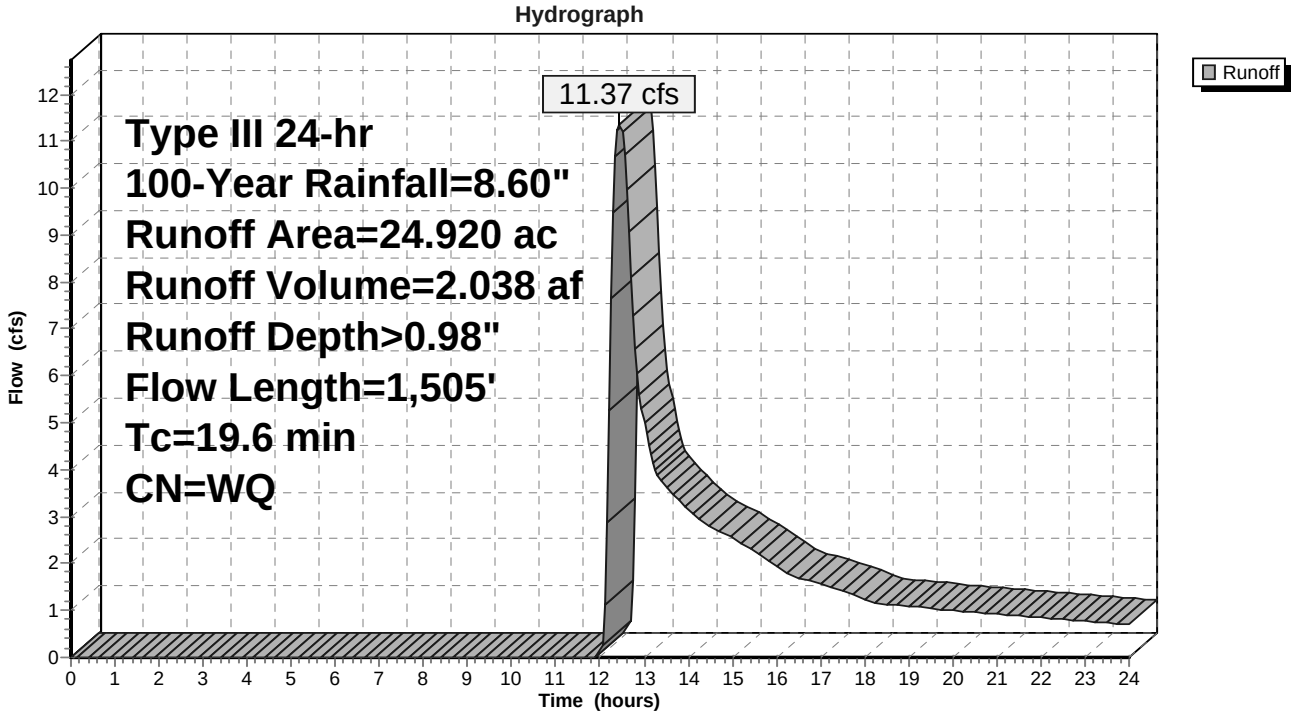
Runoff = 11.37 cfs @ 12.45 hrs, Volume= 2.038 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
23.330	35	Brush, Fair, HSG A
1.590	30	Woods, Good, HSG A
24.920		Weighted Average
24.920		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	26	0.1100	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
1.8	355	0.1100	3.32		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
14.0	1,124	0.0180	1.34		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
19.6	1,505	Total			

Subcatchment EX-3:



Summary for Subcatchment EX-4:

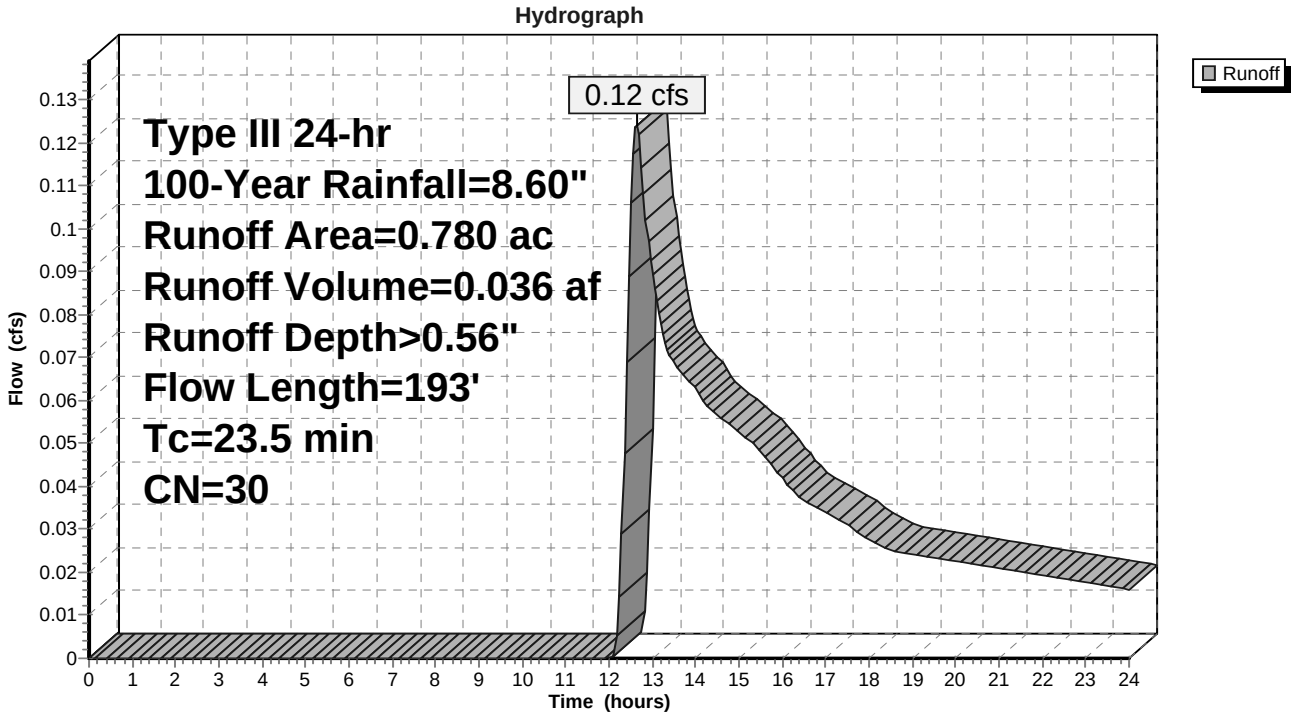
Runoff = 0.12 cfs @ 12.63 hrs, Volume= 0.036 af, Depth> 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.780	30	Woods, Good, HSG A
0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
1.3	143	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.5	193	Total			

Subcatchment EX-4:

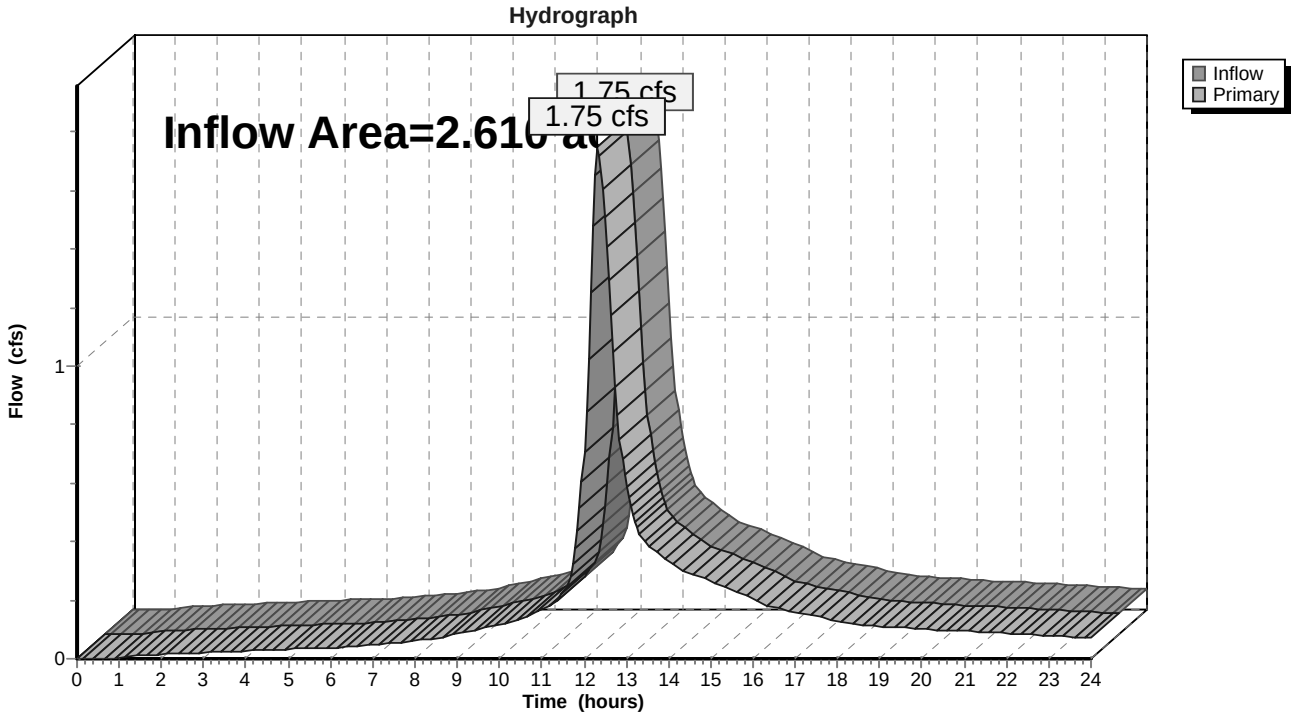


Summary for Link POA-1:

Inflow Area = 2.610 ac, 11.49% Impervious, Inflow Depth > 1.45" for 100-Year event
Inflow = 1.75 cfs @ 12.33 hrs, Volume= 0.316 af
Primary = 1.75 cfs @ 12.33 hrs, Volume= 0.316 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-1:

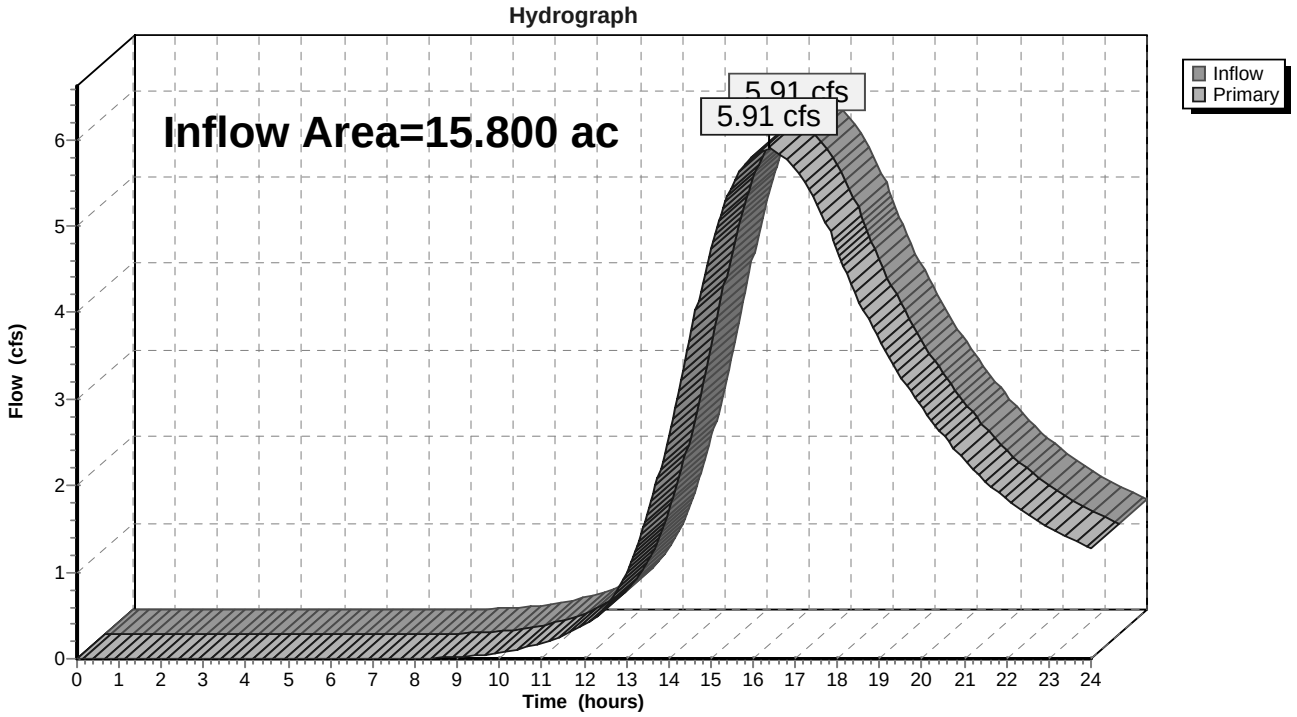


Summary for Link POA-2:

Inflow Area = 15.800 ac, 0.00% Impervious, Inflow Depth > 2.39" for 100-Year event
Inflow = 5.91 cfs @ 16.40 hrs, Volume= 3.144 af
Primary = 5.91 cfs @ 16.40 hrs, Volume= 3.144 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-2:

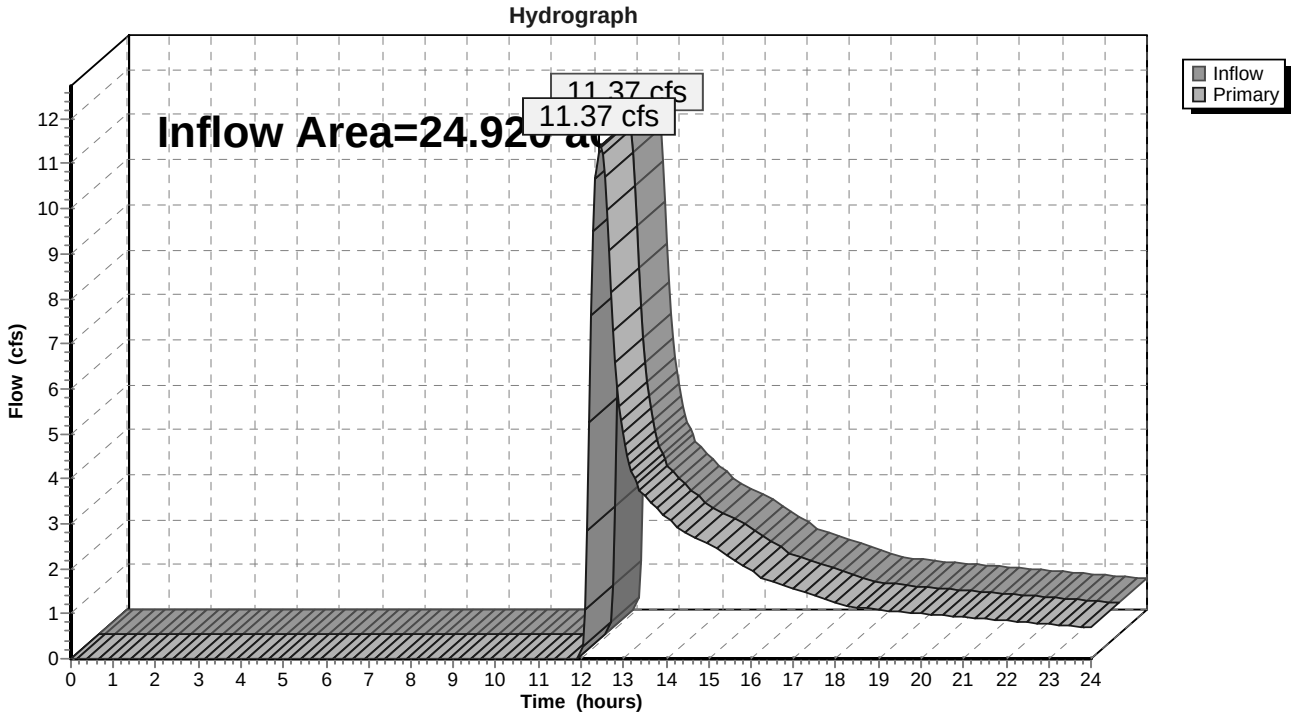


Summary for Link POA-3:

Inflow Area = 24.920 ac, 0.00% Impervious, Inflow Depth > 0.98" for 100-Year event
Inflow = 11.37 cfs @ 12.45 hrs, Volume= 2.038 af
Primary = 11.37 cfs @ 12.45 hrs, Volume= 2.038 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-3:

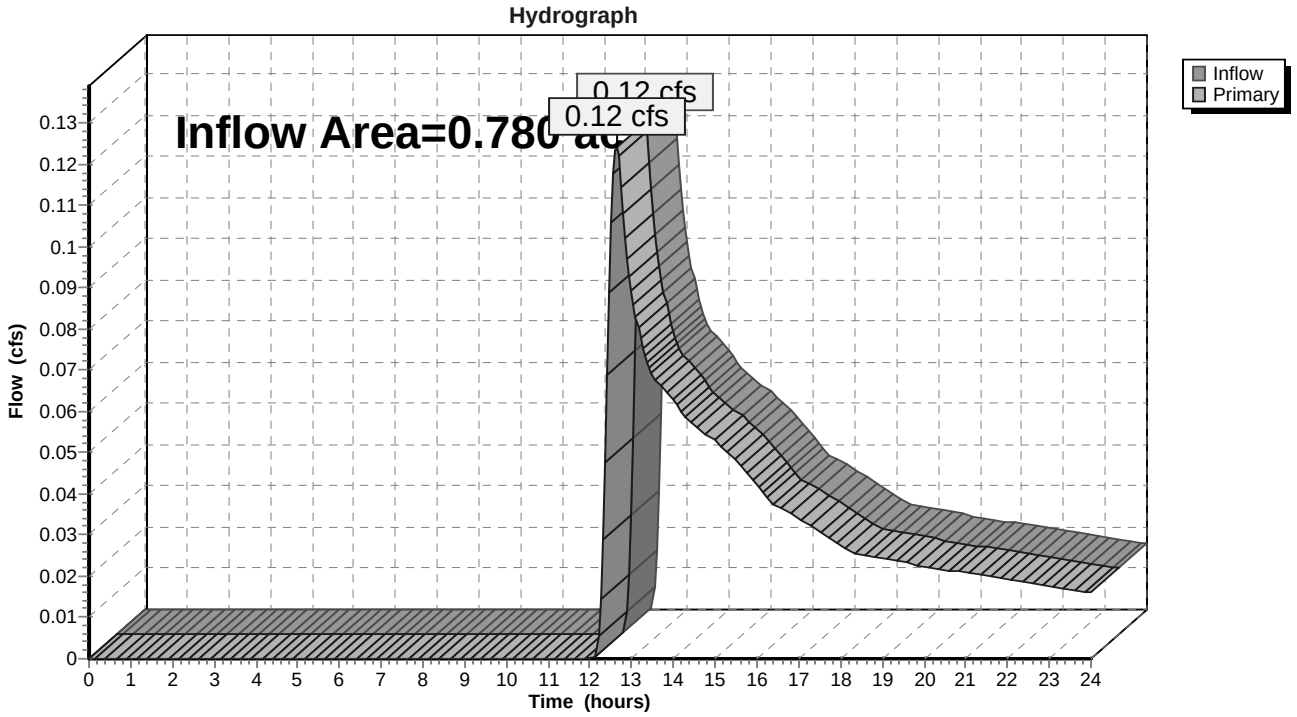


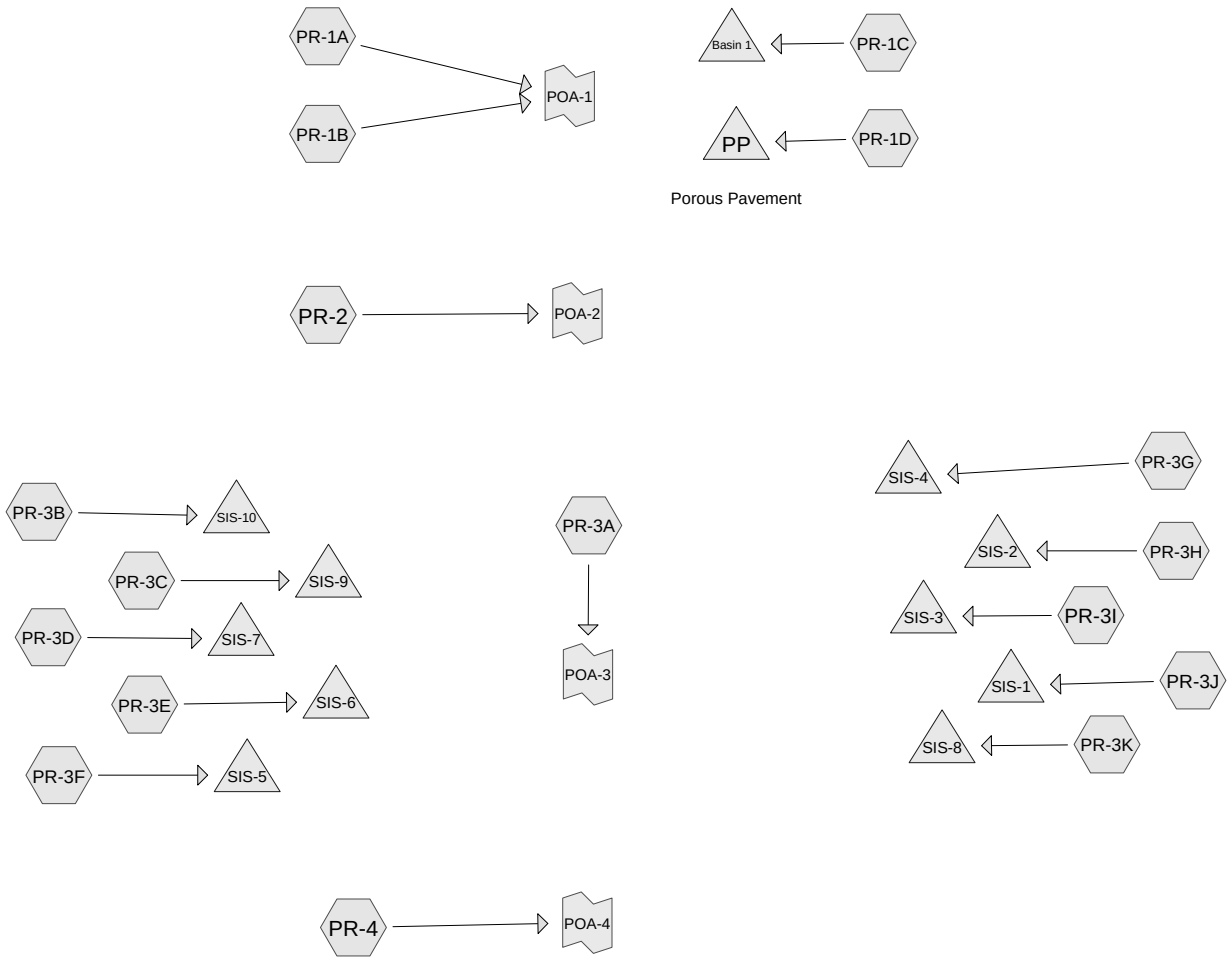
Summary for Link POA-4:

Inflow Area = 0.780 ac, 0.00% Impervious, Inflow Depth > 0.56" for 100-Year event
Inflow = 0.12 cfs @ 12.63 hrs, Volume= 0.036 af
Primary = 0.12 cfs @ 12.63 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-4:





Subcat Reach Pond Link

Routing Diagram for Sudbury Post-Development
Prepared by Microsoft, Printed 3/8/2020
HydroCAD® 10.00-22 s/n 07576 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
12.400	39	>75% Grass cover, Good, HSG A (PR-1C, PR-1D, PR-3A, PR-3B, PR-3C, PR-3D, PR-3E, PR-3F, PR-3G, PR-3H, PR-3I, PR-3J, PR-3K)
5.450	35	Brush, Fair, HSG A (PR-1C, PR-3A)
5.220	98	Paved parking, HSG A (PR-1B, PR-1C, PR-3B, PR-3C, PR-3E, PR-3G, PR-3I)
1.220	98	Porous Pavement, HSG A (PR-1D)
5.230	98	Roofs, HSG A (PR-1C, PR-3B, PR-3C, PR-3D, PR-3E, PR-3F, PR-3G, PR-3H, PR-3I, PR-3J, PR-3K)
0.180	98	Water Surface, HSG A (PR-1C)
6.230	77	Wetland (PR-2)
8.180	30	Woods, Good, HSG A (PR-1A, PR-1B, PR-1C, PR-2, PR-3J, PR-4)
44.110	**58**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
37.880	HSG A	PR-1A, PR-1B, PR-1C, PR-1D, PR-2, PR-3A, PR-3B, PR-3C, PR-3D, PR-3E, PR-3F, PR-3G, PR-3H, PR-3I, PR-3J, PR-3K, PR-4
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
6.230	Other	PR-2
44.110		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1A: Runoff Area=0.500 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=557' Tc=11.7 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment PR-1B: Runoff Area=0.270 ac 14.81% Impervious Runoff Depth>0.12"
Flow Length=188' Tc=6.1 min CN=WQ Runoff=0.03 cfs 0.003 af

Subcatchment PR-1C: Runoff Area=6.360 ac 29.40% Impervious Runoff Depth>0.23"
Tc=6.0 min CN=WQ Runoff=1.63 cfs 0.123 af

Subcatchment PR-1D: Runoff Area=1.650 ac 73.94% Impervious Runoff Depth>0.29"
Tc=790.0 min CN=WQ Runoff=0.07 cfs 0.040 af

Subcatchment PR-2: Runoff Area=12.150 ac 0.00% Impervious Runoff Depth>0.02"
Flow Length=2,069' Tc=304.8 min CN=WQ Runoff=0.03 cfs 0.019 af

Subcatchment PR-3A: Runoff Area=6.410 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=1,024' Tc=14.9 min CN=WQ Runoff=0.00 cfs 0.000 af

Subcatchment PR-3B: Runoff Area=1.250 ac 57.60% Impervious Runoff Depth>0.46"
Tc=6.0 min CN=WQ Runoff=0.63 cfs 0.047 af

Subcatchment PR-3C: Runoff Area=2.300 ac 77.39% Impervious Runoff Depth>0.61"
Tc=6.0 min CN=WQ Runoff=1.55 cfs 0.117 af

Subcatchment PR-3D: Runoff Area=1.110 ac 44.14% Impervious Runoff Depth>0.35"
Tc=6.0 min CN=WQ Runoff=0.43 cfs 0.032 af

Subcatchment PR-3E: Runoff Area=1.330 ac 62.41% Impervious Runoff Depth>0.49"
Tc=6.0 min CN=WQ Runoff=0.72 cfs 0.055 af

Subcatchment PR-3F: Runoff Area=0.590 ac 47.46% Impervious Runoff Depth>0.38"
Tc=6.0 min CN=WQ Runoff=0.24 cfs 0.018 af

Subcatchment PR-3G: Runoff Area=1.330 ac 66.92% Impervious Runoff Depth>0.53"
Tc=6.0 min CN=WQ Runoff=0.77 cfs 0.059 af

Subcatchment PR-3H: Runoff Area=1.380 ac 39.13% Impervious Runoff Depth>0.31"
Tc=6.0 min CN=WQ Runoff=0.47 cfs 0.036 af

Subcatchment PR-3I: Runoff Area=5.290 ac 51.98% Impervious Runoff Depth>0.41"
Tc=6.0 min CN=WQ Runoff=2.39 cfs 0.181 af

Subcatchment PR-3J: Runoff Area=1.930 ac 15.54% Impervious Runoff Depth>0.12"
Tc=6.0 min CN=WQ Runoff=0.26 cfs 0.020 af

Subcatchment PR-3K: Runoff Area=0.220 ac 63.64% Impervious Runoff Depth>0.50"
Tc=6.0 min CN=WQ Runoff=0.12 cfs 0.009 af

Subcatchment PR-4: Runoff Area=0.040 ac 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.000 af

Pond Basin 1: Peak Elev=129.55' Storage=1,136 cf Inflow=1.63 cfs 0.123 af
Outflow=0.51 cfs 0.123 af

Pond PP: Porous Pavement Peak Elev=0.03' Storage=0.040 af Inflow=0.07 cfs 0.040 af
Outflow=0.00 cfs 0.000 af

Pond SIS-1: Peak Elev=163.02' Storage=20 cf Inflow=0.26 cfs 0.020 af
Outflow=0.25 cfs 0.020 af

Pond SIS-10: Peak Elev=127.20' Storage=130 cf Inflow=0.63 cfs 0.047 af
Outflow=0.41 cfs 0.047 af

Pond SIS-2: Peak Elev=141.65' Storage=78 cf Inflow=0.47 cfs 0.036 af
Outflow=0.34 cfs 0.036 af

Pond SIS-3: Peak Elev=140.70' Storage=611 cf Inflow=2.39 cfs 0.181 af
Outflow=1.44 cfs 0.181 af

Pond SIS-4: Peak Elev=145.23' Storage=213 cf Inflow=0.77 cfs 0.059 af
Outflow=0.44 cfs 0.059 af

Pond SIS-5: Peak Elev=137.18' Storage=46 cf Inflow=0.24 cfs 0.018 af
Outflow=0.17 cfs 0.018 af

Pond SIS-6: Peak Elev=132.54' Storage=278 cf Inflow=0.72 cfs 0.055 af
Outflow=0.33 cfs 0.055 af

Pond SIS-7: Peak Elev=131.68' Storage=82 cf Inflow=0.43 cfs 0.032 af
Outflow=0.29 cfs 0.032 af

Pond SIS-8: Peak Elev=127.05' Storage=11 cf Inflow=0.12 cfs 0.009 af
Outflow=0.12 cfs 0.009 af

Pond SIS-9: Peak Elev=126.26' Storage=376 cf Inflow=1.55 cfs 0.117 af
Outflow=0.91 cfs 0.117 af

Link POA-1: Inflow=0.03 cfs 0.003 af
Primary=0.03 cfs 0.003 af

Link POA-2: Inflow=0.03 cfs 0.019 af
Primary=0.03 cfs 0.019 af

Link POA-3: Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link POA-4: Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 44.110 ac Runoff Volume = 0.759 af Average Runoff Depth = 0.21"
73.14% Pervious = 32.260 ac 26.86% Impervious = 11.850 ac

Summary for Subcatchment PR-1A:

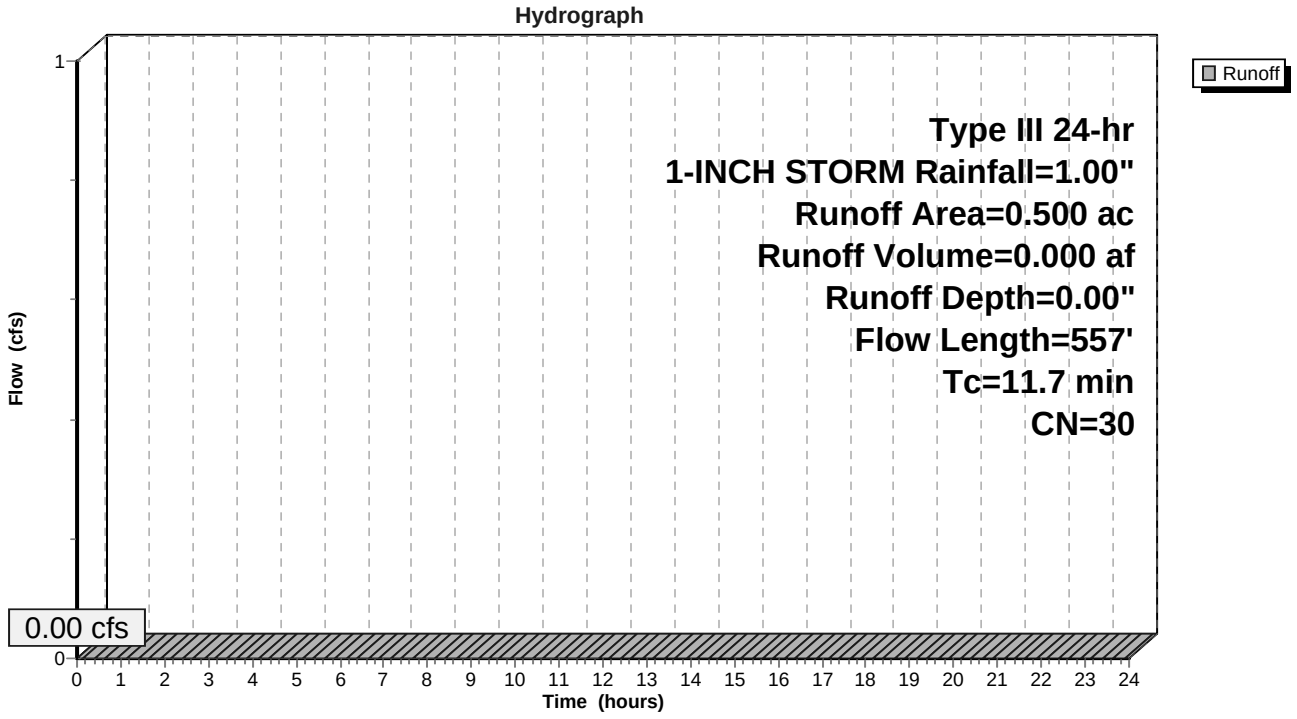
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.500	30	Woods, Good, HSG A
0.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.2400	0.10		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
1.0	73	0.2400	1.22		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.5	434	0.0370	2.89		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
11.7	557	Total			

Subcatchment PR-1A:



Summary for Subcatchment PR-1B:

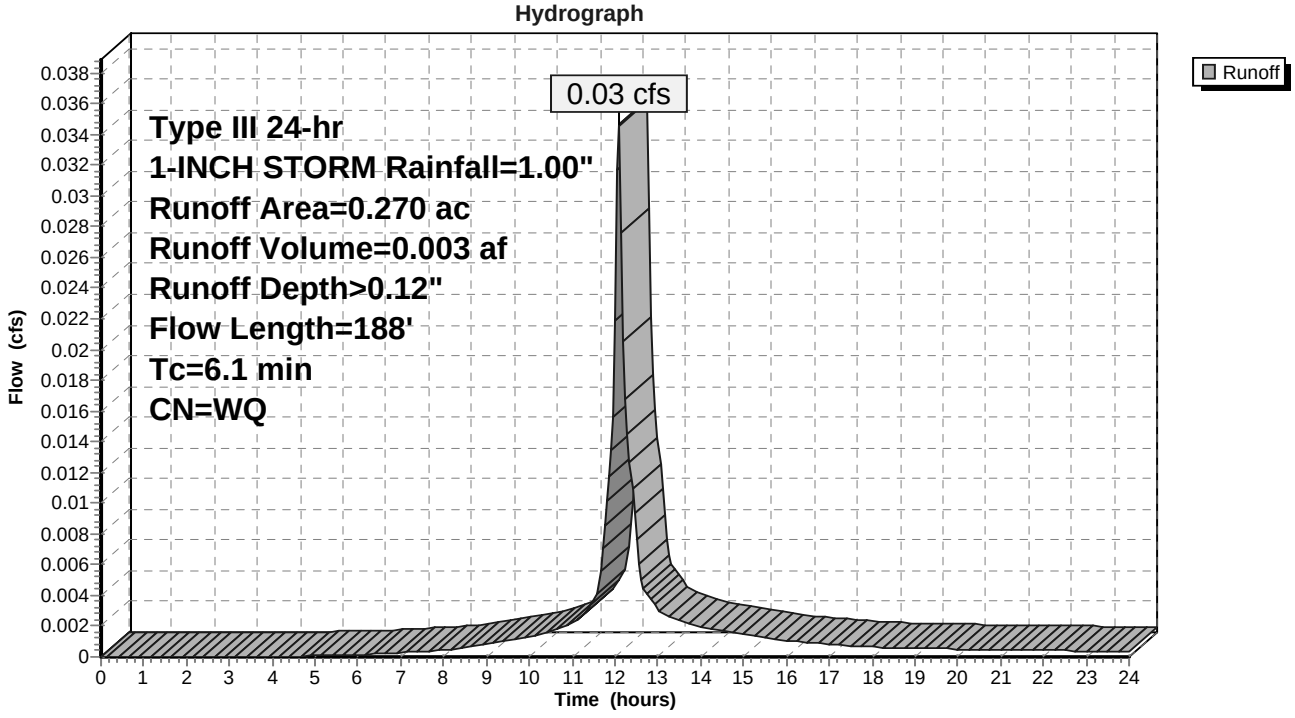
Runoff = 0.03 cfs @ 12.09 hrs, Volume= 0.003 af, Depth> 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.040	98	Paved parking, HSG A
0.230	30	Woods, Good, HSG A
0.270		Weighted Average
0.230		85.19% Pervious Area
0.040		14.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	44	0.1600	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
1.1	144	0.1040	2.26		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.1	188	Total			

Subcatchment PR-1B:



Summary for Subcatchment PR-1C:

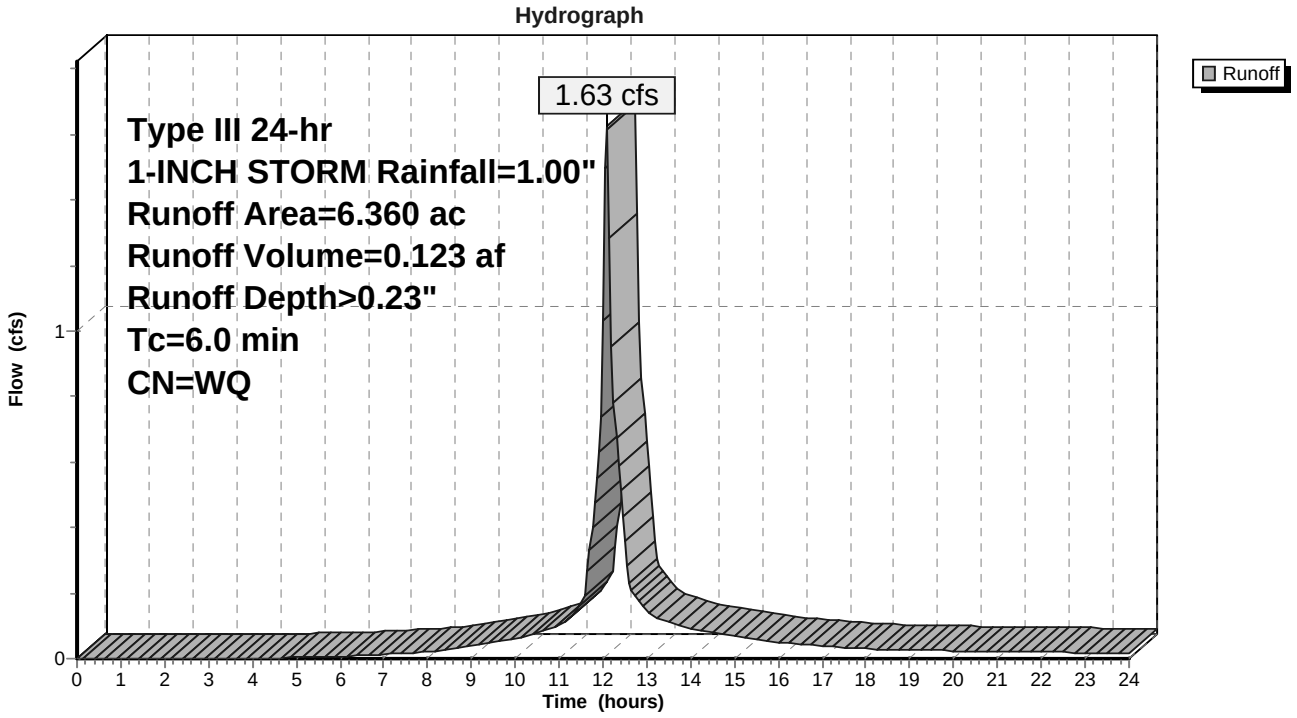
Runoff = 1.63 cfs @ 12.09 hrs, Volume= 0.123 af, Depth> 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.940	98	Paved parking, HSG A
0.750	98	Roofs, HSG A
2.580	39	>75% Grass cover, Good, HSG A
0.660	35	Brush, Fair, HSG A
1.250	30	Woods, Good, HSG A
0.180	98	Water Surface, HSG A
6.360		Weighted Average
4.490		70.60% Pervious Area
1.870		29.40% Impervious Area

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

Subcatchment PR-1C:



Summary for Subcatchment PR-1D:

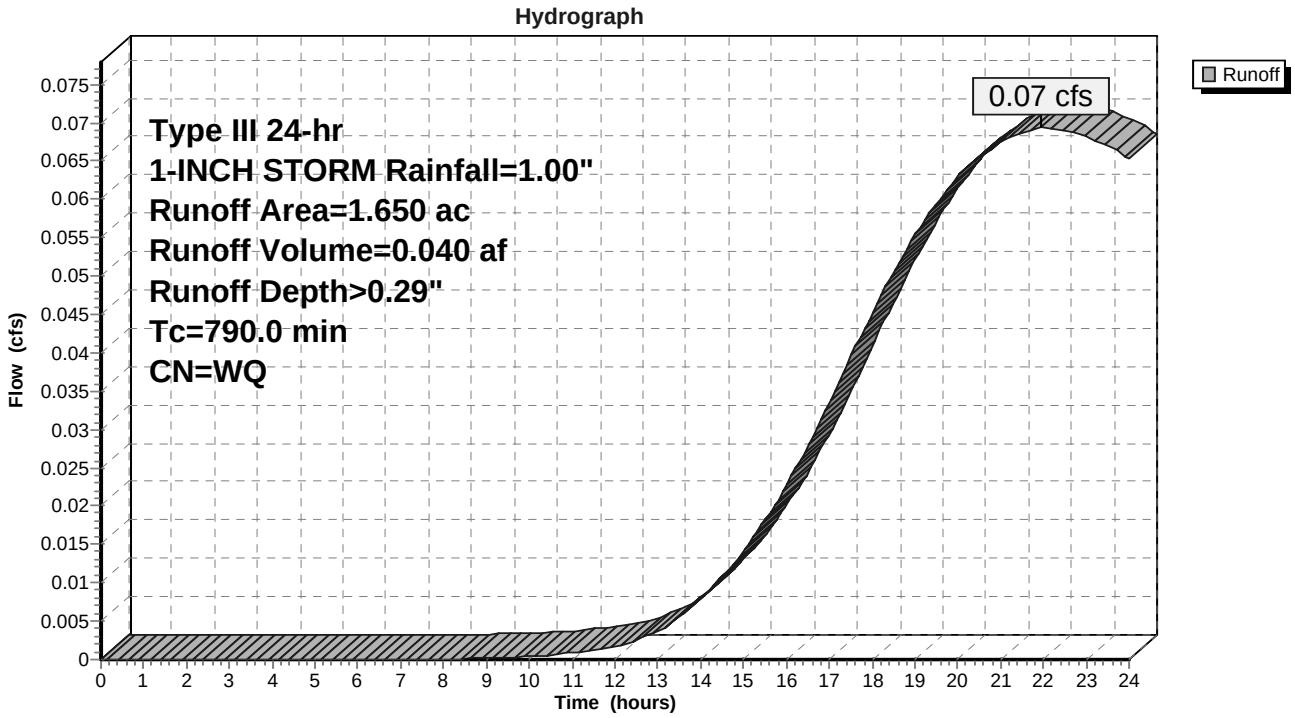
Runoff = 0.07 cfs @ 21.96 hrs, Volume= 0.040 af, Depth> 0.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

	Area (ac)	CN	Description
*	1.220	98	Porous Pavement, HSG A
	0.430	39	>75% Grass cover, Good, HSG A
	1.650		Weighted Average
	0.430		26.06% Pervious Area
	1.220		73.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
790.0					**Direct Entry, Per Hydrocad porous pavement design guidance**

Subcatchment PR-1D:



Summary for Subcatchment PR-2:

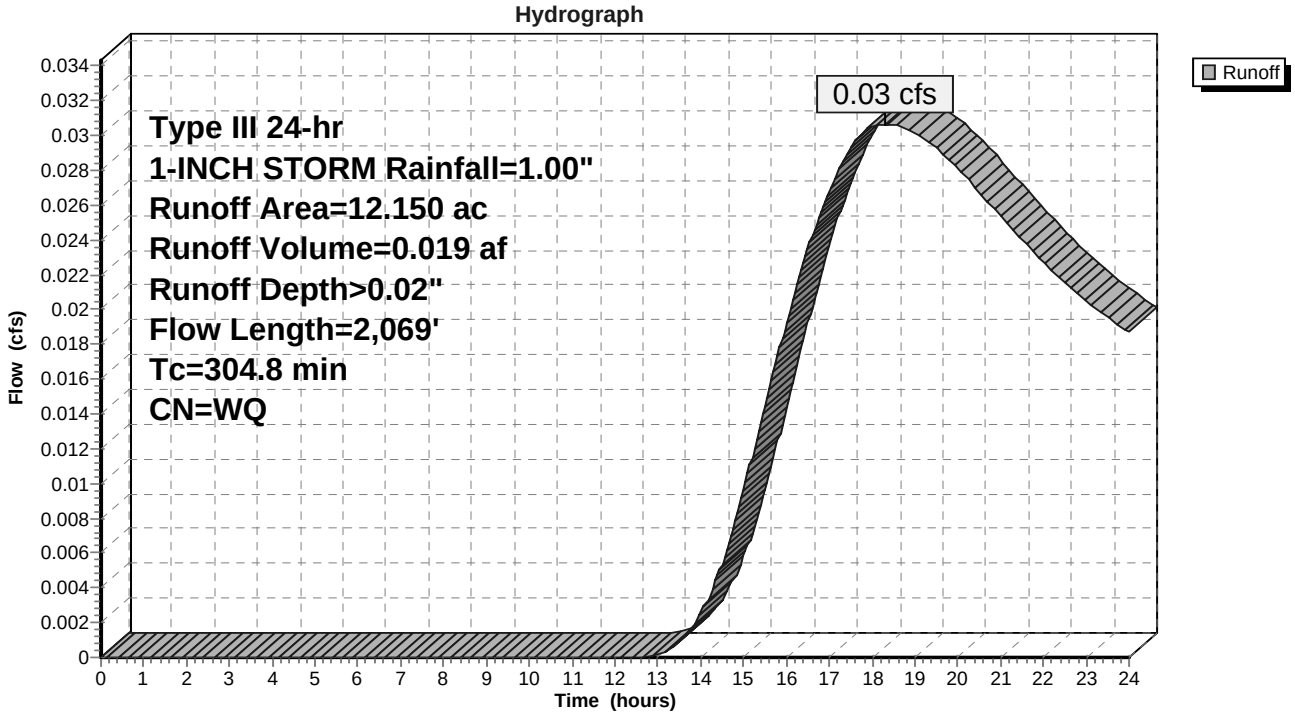
Runoff = 0.03 cfs @ 18.31 hrs, Volume= 0.019 af, Depth> 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

	Area (ac)	CN	Description
	5.920	30	Woods, Good, HSG A
*	6.230	77	Wetland
	12.150		Weighted Average
	12.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	50	0.0500	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
2.1	242	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
287.3	1,777	0.0017	0.10		**Shallow Concentrated Flow, Wetland** Forest w/Heavy Litter Kv= 2.5 fps
304.8	2,069	Total			

Subcatchment PR-2:



Summary for Subcatchment PR-3A:

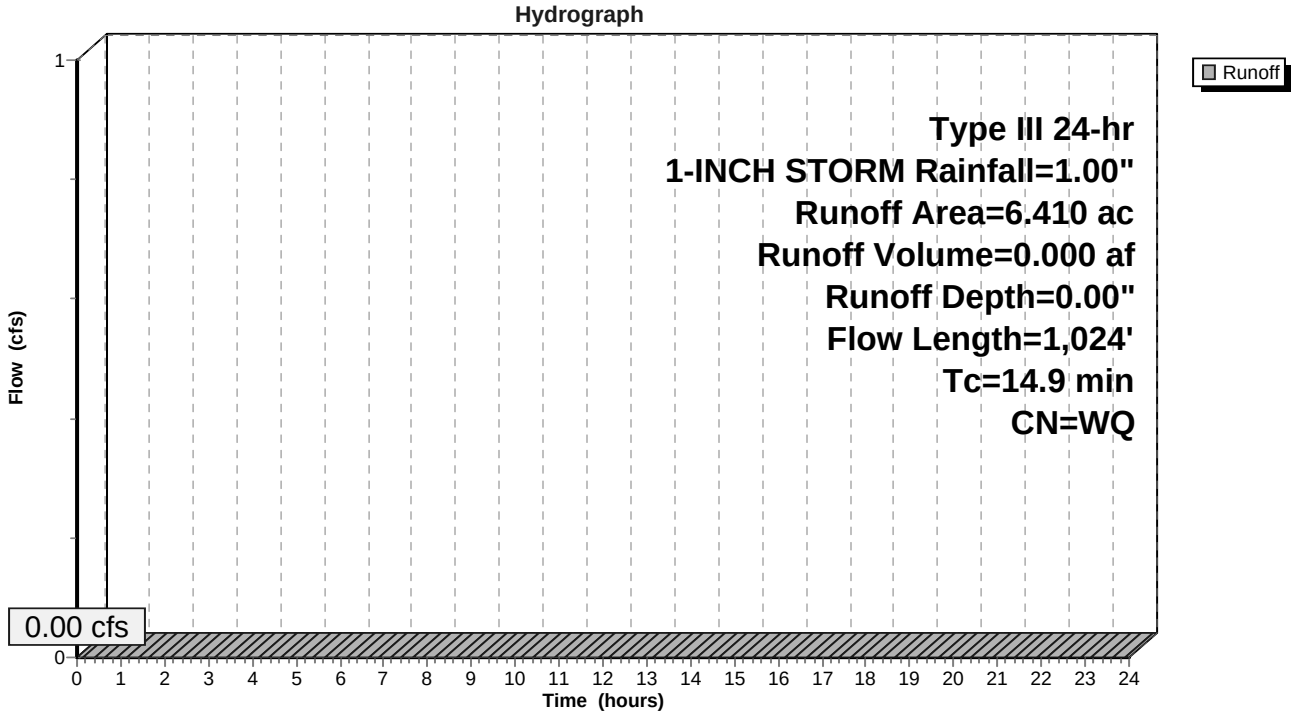
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
1.620	39	>75% Grass cover, Good, HSG A
4.790	35	Brush, Fair, HSG A
6.410		Weighted Average
6.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	252	0.1350	1.84		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.2	672	0.0100	1.00		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
1.4	100	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.9	1,024	Total			

Subcatchment PR-3A:



Summary for Subcatchment PR-3B:

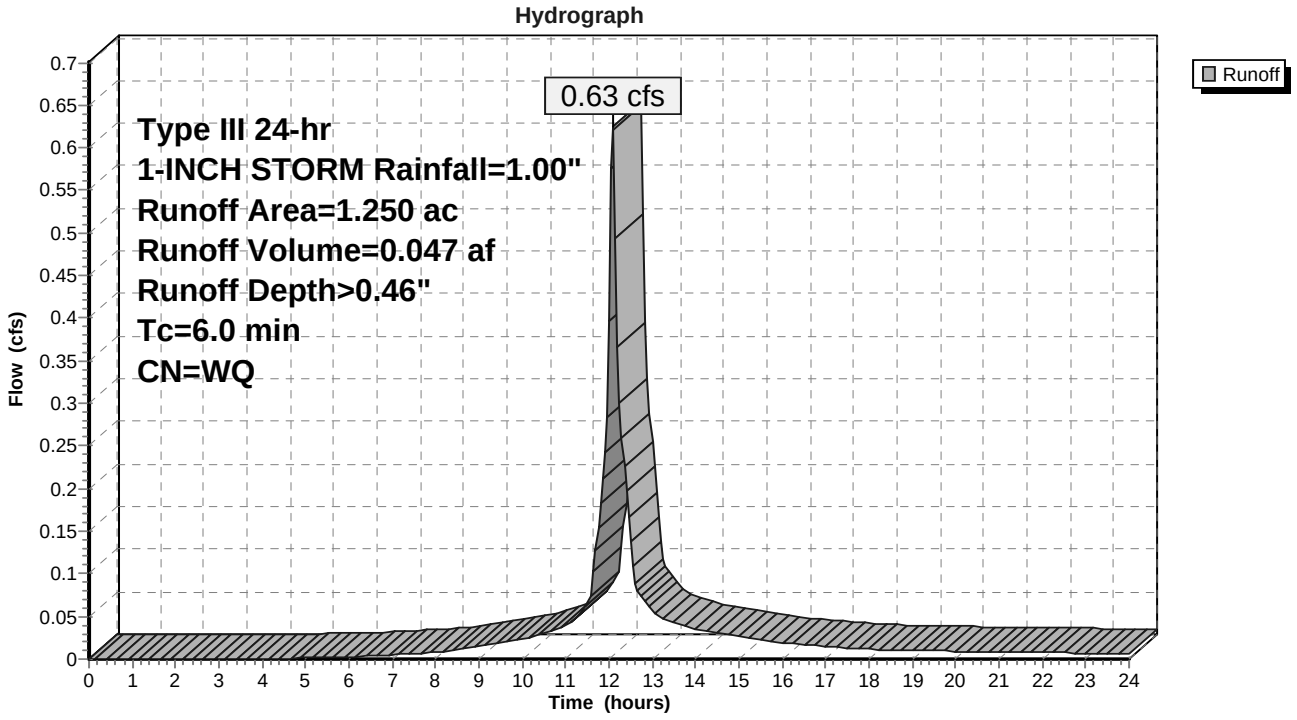
Runoff = 0.63 cfs @ 12.09 hrs, Volume= 0.047 af, Depth> 0.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG A
0.410	98	Roofs, HSG A
0.530	39	>75% Grass cover, Good, HSG A
1.250		Weighted Average
0.530		42.40% Pervious Area
0.720		57.60% Impervious Area

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

Subcatchment PR-3B:



Summary for Subcatchment PR-3C:

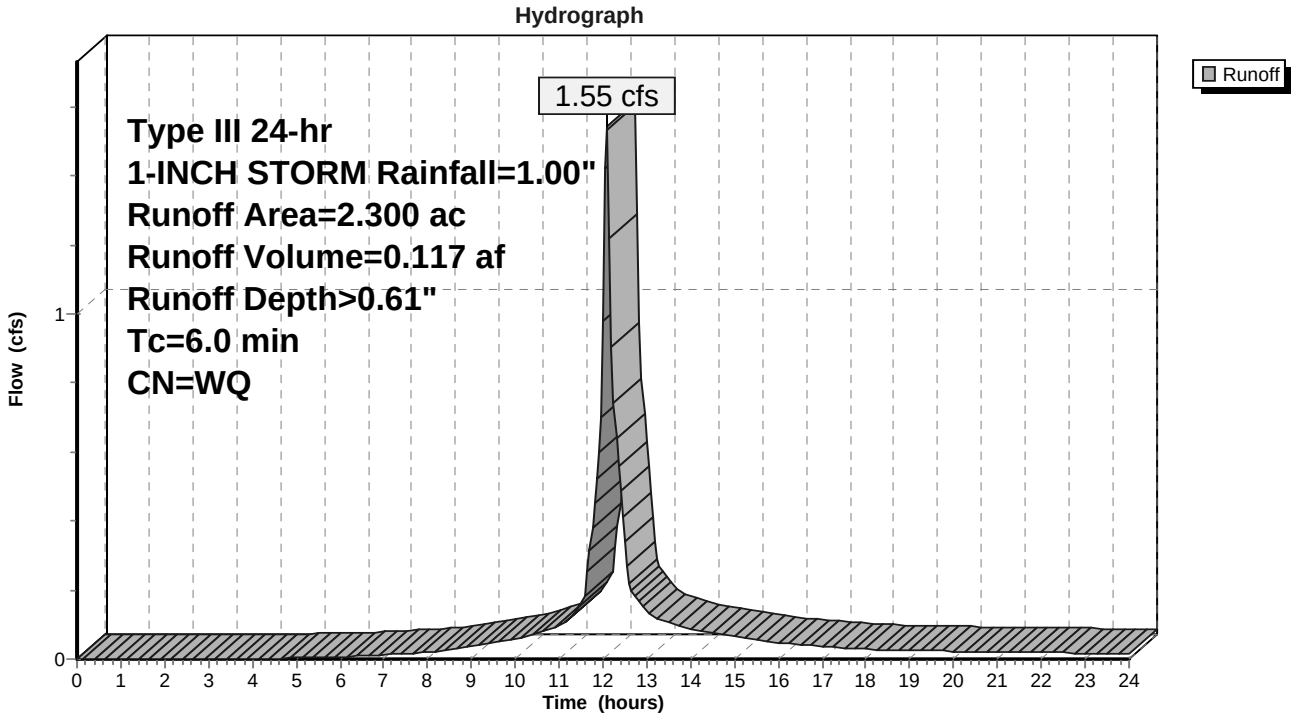
Runoff = 1.55 cfs @ 12.09 hrs, Volume= 0.117 af, Depth> 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
1.120	98	Paved parking, HSG A
0.660	98	Roofs, HSG A
0.520	39	>75% Grass cover, Good, HSG A
2.300		Weighted Average
0.520		22.61% Pervious Area
1.780		77.39% Impervious Area

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

Subcatchment PR-3C:



Summary for Subcatchment PR-3D:

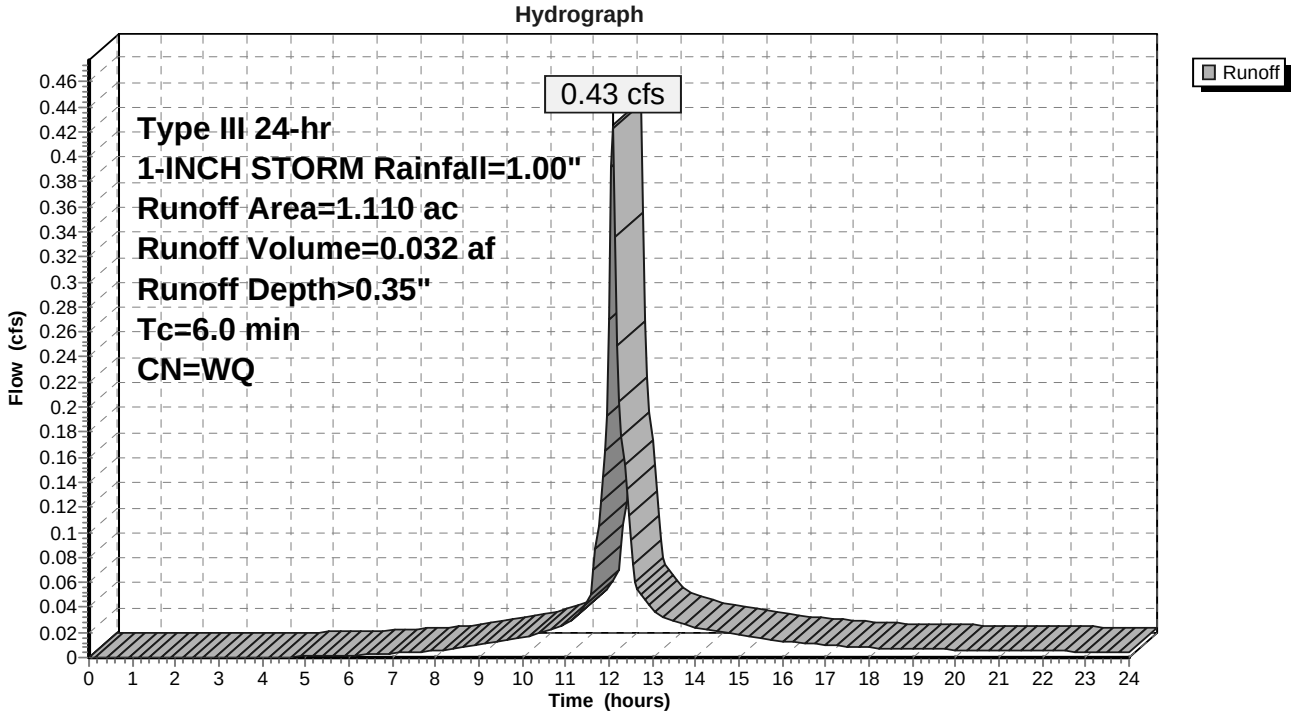
Runoff = 0.43 cfs @ 12.09 hrs, Volume= 0.032 af, Depth> 0.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.490	98	Roofs, HSG A
0.620	39	>75% Grass cover, Good, HSG A
1.110		Weighted Average
0.620		55.86% Pervious Area
0.490		44.14% Impervious Area

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

Subcatchment PR-3D:



Summary for Subcatchment PR-3E:

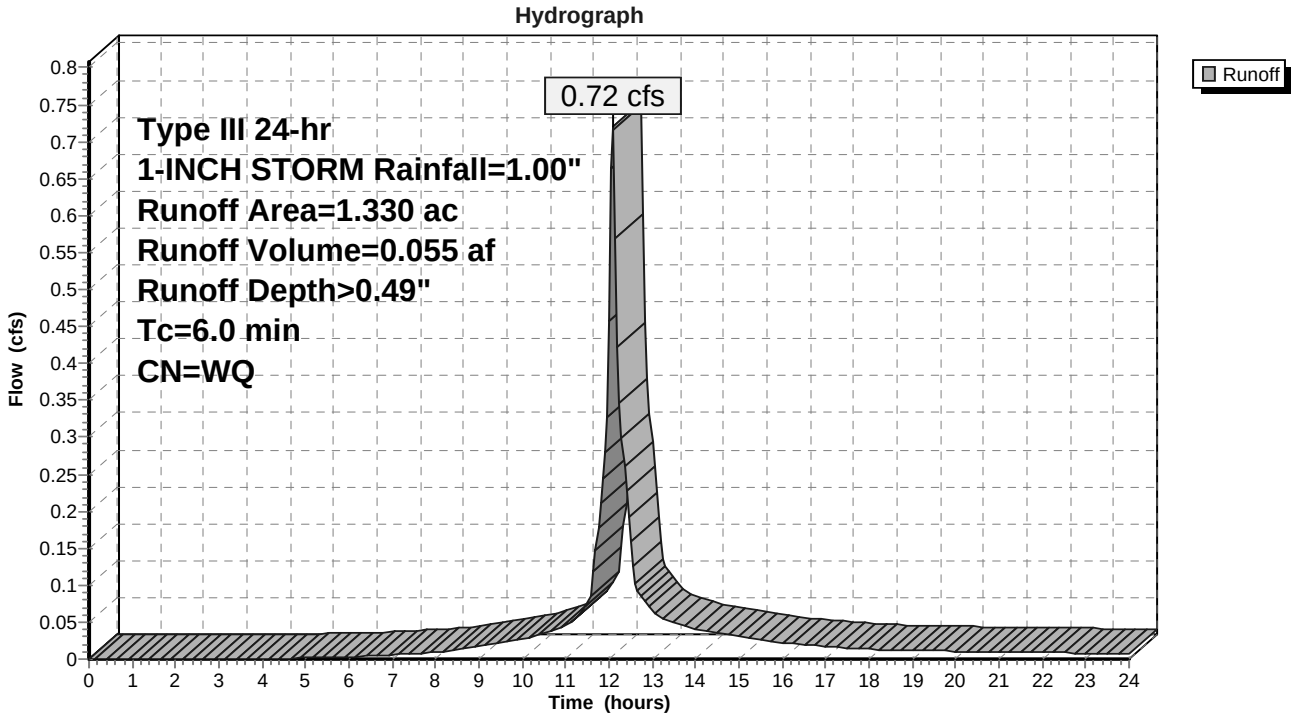
Runoff = 0.72 cfs @ 12.09 hrs, Volume= 0.055 af, Depth> 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.510	98	Paved parking, HSG A
0.320	98	Roofs, HSG A
0.500	39	>75% Grass cover, Good, HSG A
1.330		Weighted Average
0.500		37.59% Pervious Area
0.830		62.41% Impervious Area

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

Subcatchment PR-3E:



Summary for Subcatchment PR-3F:

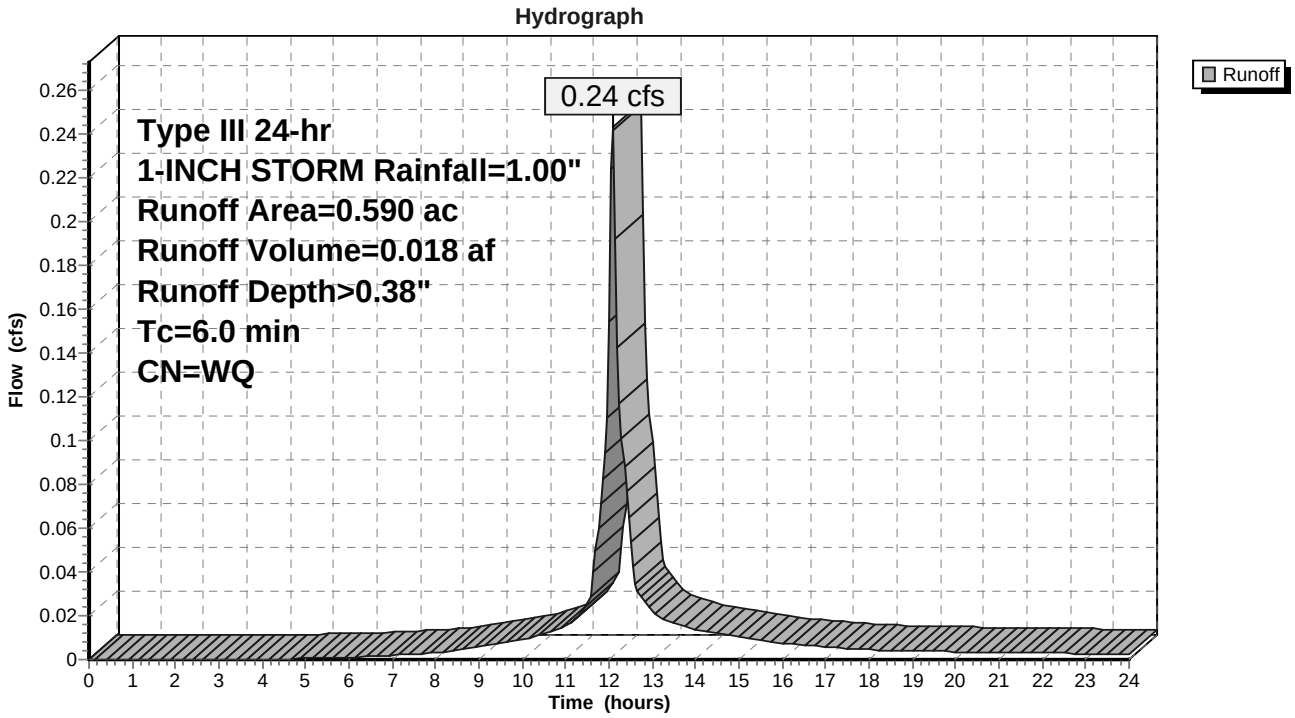
Runoff = 0.24 cfs @ 12.09 hrs, Volume= 0.018 af, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.280	98	Roofs, HSG A
0.310	39	>75% Grass cover, Good, HSG A
0.590		Weighted Average
0.310		52.54% Pervious Area
0.280		47.46% Impervious Area

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

Subcatchment PR-3F:



Summary for Subcatchment PR-3G:

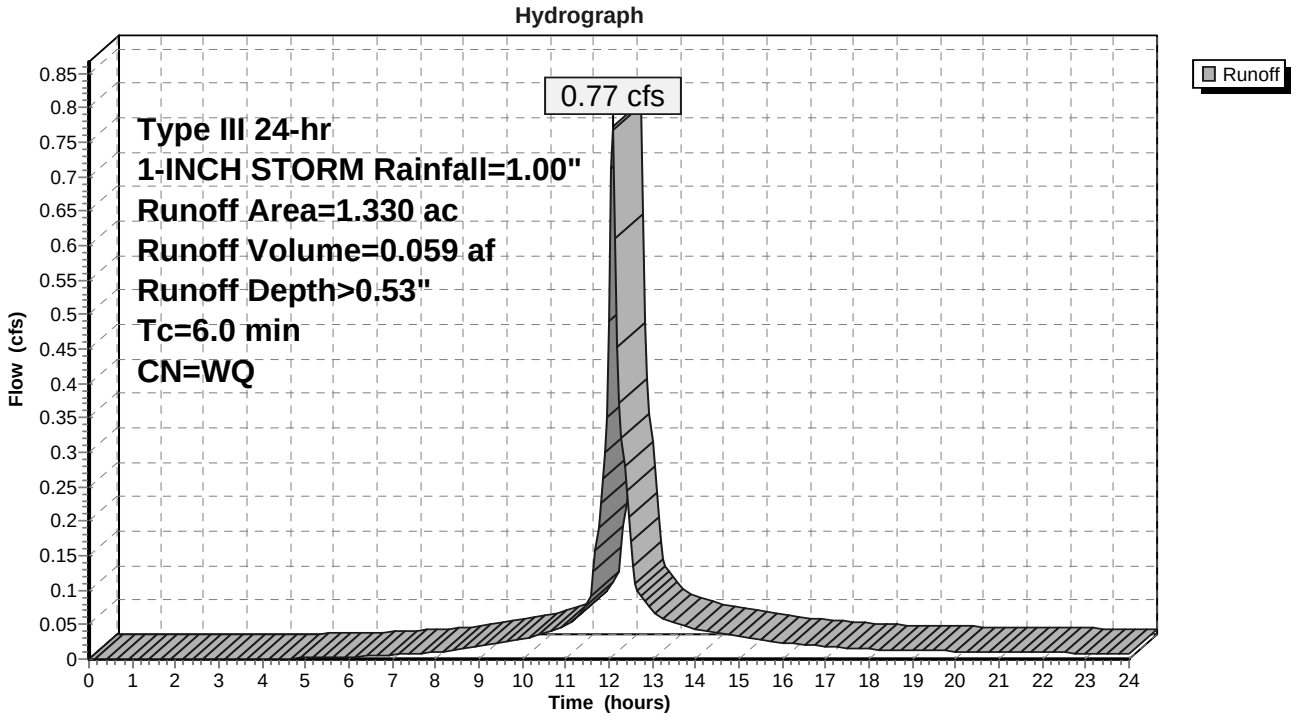
Runoff = 0.77 cfs @ 12.09 hrs, Volume= 0.059 af, Depth> 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG A
0.160	98	Roofs, HSG A
0.440	39	>75% Grass cover, Good, HSG A
1.330		Weighted Average
0.440		33.08% Pervious Area
0.890		66.92% Impervious Area

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

Subcatchment PR-3G:



Summary for Subcatchment PR-3H:

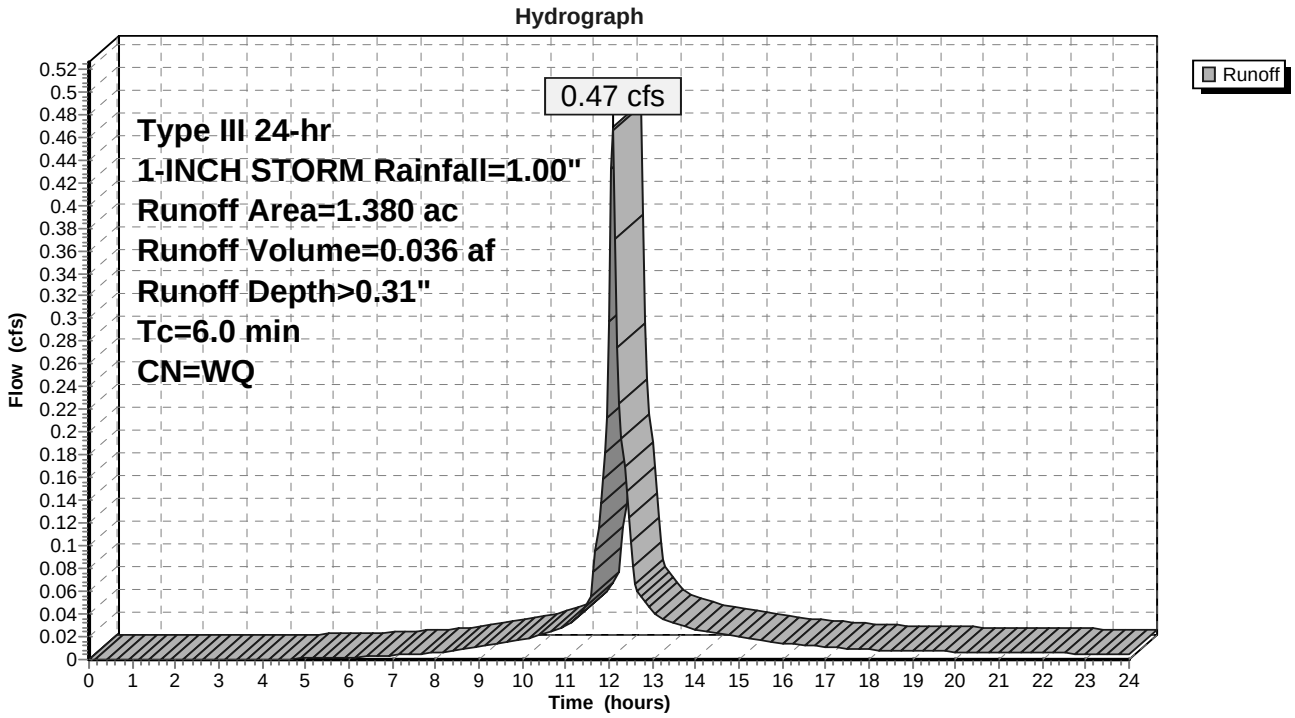
Runoff = 0.47 cfs @ 12.09 hrs, Volume= 0.036 af, Depth> 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.540	98	Roofs, HSG A
0.840	39	>75% Grass cover, Good, HSG A
1.380		Weighted Average
0.840		60.87% Pervious Area
0.540		39.13% Impervious Area

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

Subcatchment PR-3H:



Summary for Subcatchment PR-3I:

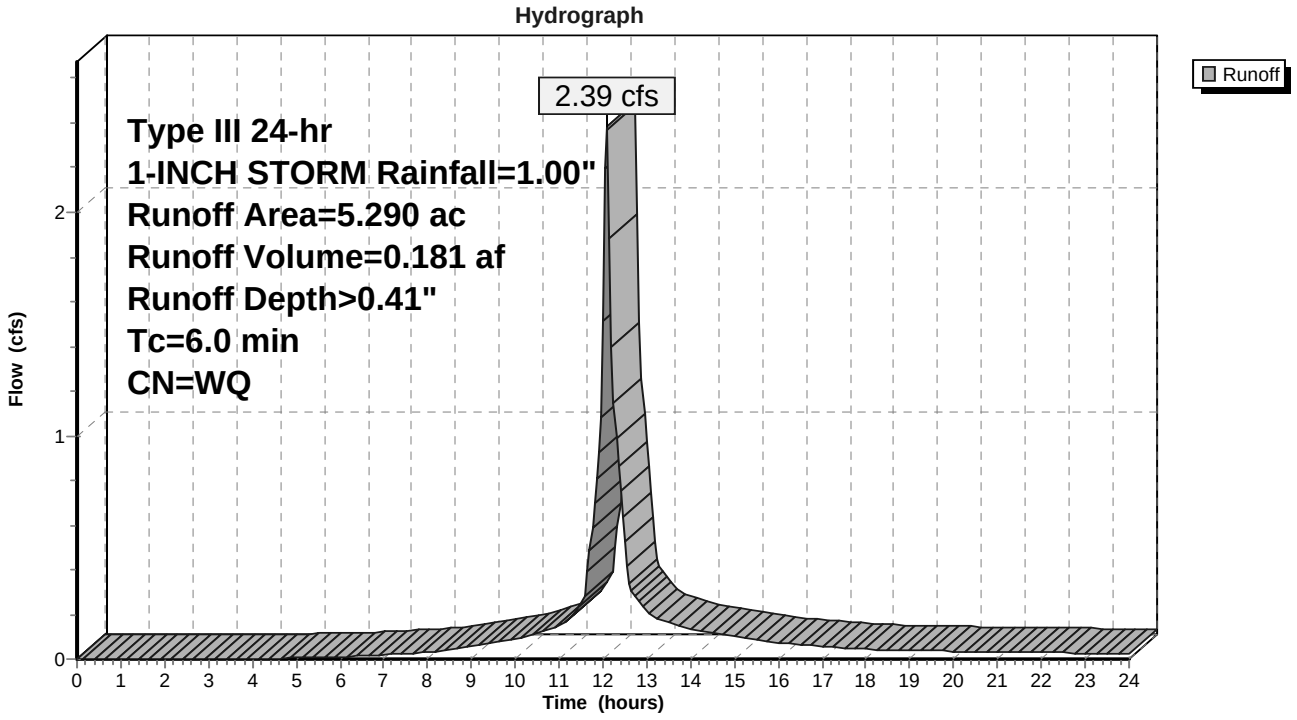
Runoff = 2.39 cfs @ 12.09 hrs, Volume= 0.181 af, Depth> 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
1.570	98	Paved parking, HSG A
1.180	98	Roofs, HSG A
2.540	39	>75% Grass cover, Good, HSG A
5.290		Weighted Average
2.540		48.02% Pervious Area
2.750		51.98% Impervious Area

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

Subcatchment PR-3I:



Summary for Subcatchment PR-3J:

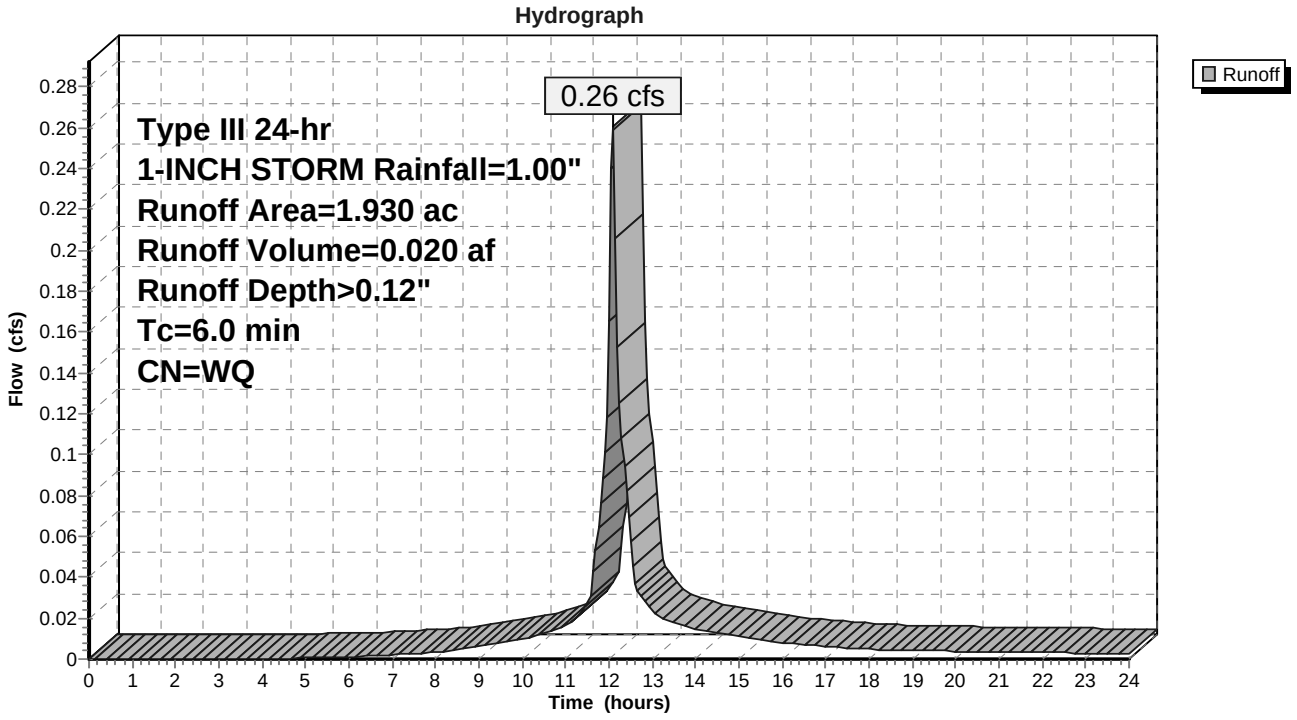
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 0.020 af, Depth> 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.300	98	Roofs, HSG A
1.390	39	>75% Grass cover, Good, HSG A
0.240	30	Woods, Good, HSG A
1.930		Weighted Average
1.630		84.46% Pervious Area
0.300		15.54% Impervious Area

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

Subcatchment PR-3J:



Summary for Subcatchment PR-3K:

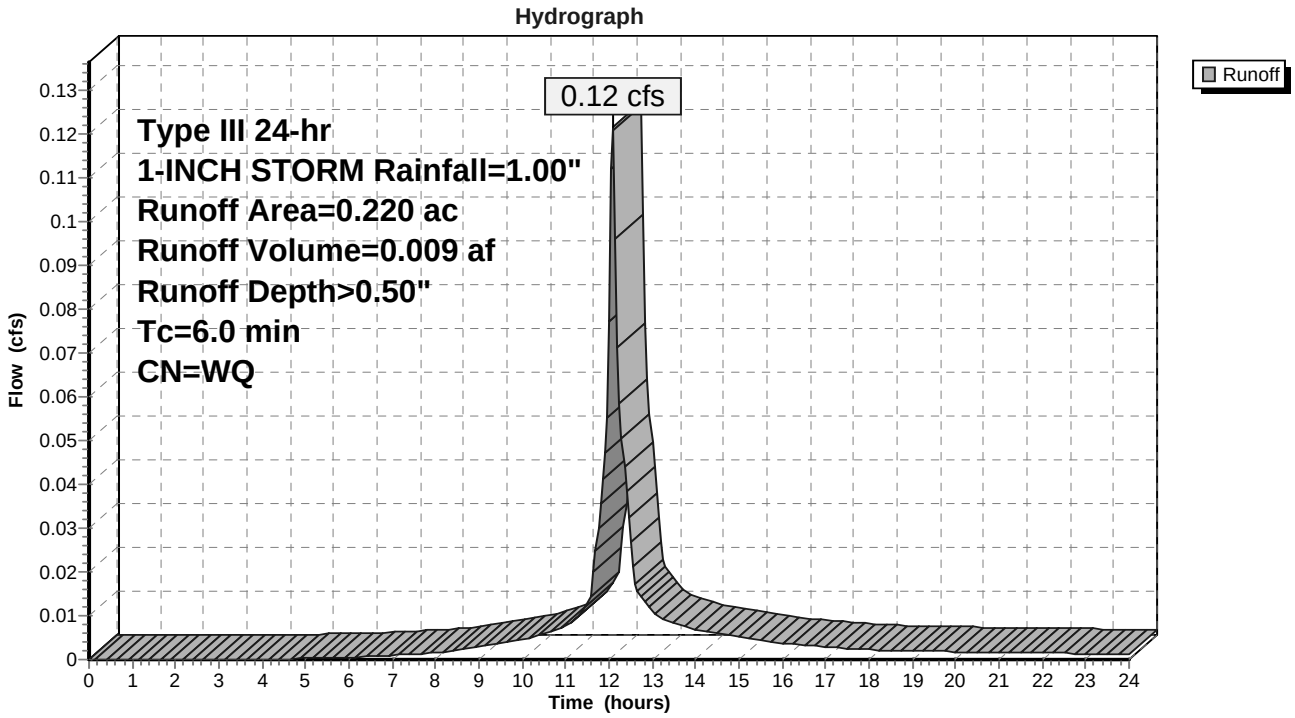
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 0.009 af, Depth> 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.140	98	Roofs, HSG A
0.080	39	>75% Grass cover, Good, HSG A
0.220		Weighted Average
0.080		36.36% Pervious Area
0.140		63.64% Impervious Area

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

Subcatchment PR-3K:



Summary for Subcatchment PR-4:

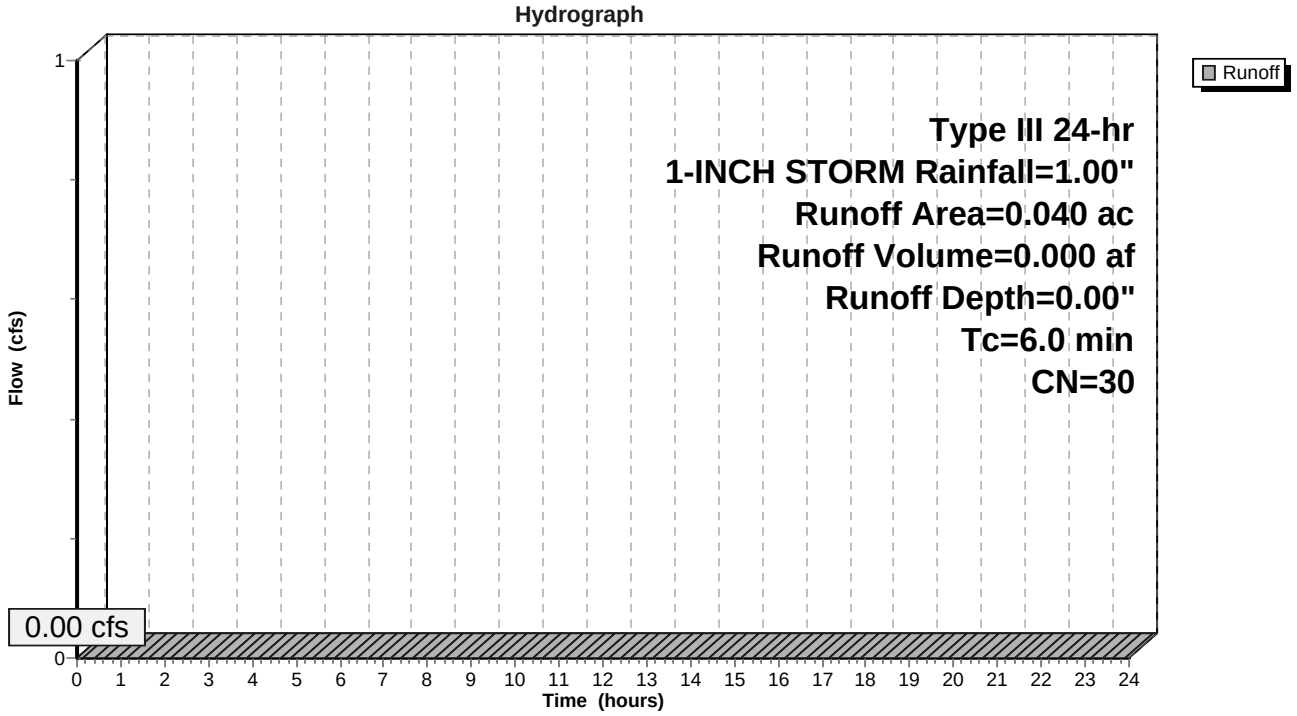
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-INCH STORM Rainfall=1.00"

Area (ac)	CN	Description
0.040	30	Woods, Good, HSG A
0.040		100.00% Pervious Area

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

Subcatchment PR-4:



Summary for Pond Basin 1:

Inflow Area = 6.360 ac, 29.40% Impervious, Inflow Depth > 0.23" for 1-INCH STORM event
Inflow = 1.63 cfs @ 12.09 hrs, Volume= 0.123 af
Outflow = 0.51 cfs @ 12.40 hrs, Volume= 0.123 af, Atten= 69%, Lag= 18.8 min
Discarded = 0.51 cfs @ 12.40 hrs, Volume= 0.123 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 129.55' @ 12.40 hrs Surf.Area= 2,658 sf Storage= 1,136 cf

Plug-Flow detention time= 15.1 min calculated for 0.123 af (100% of inflow)
Center-of-Mass det. time= 14.6 min (802.0 - 787.4)

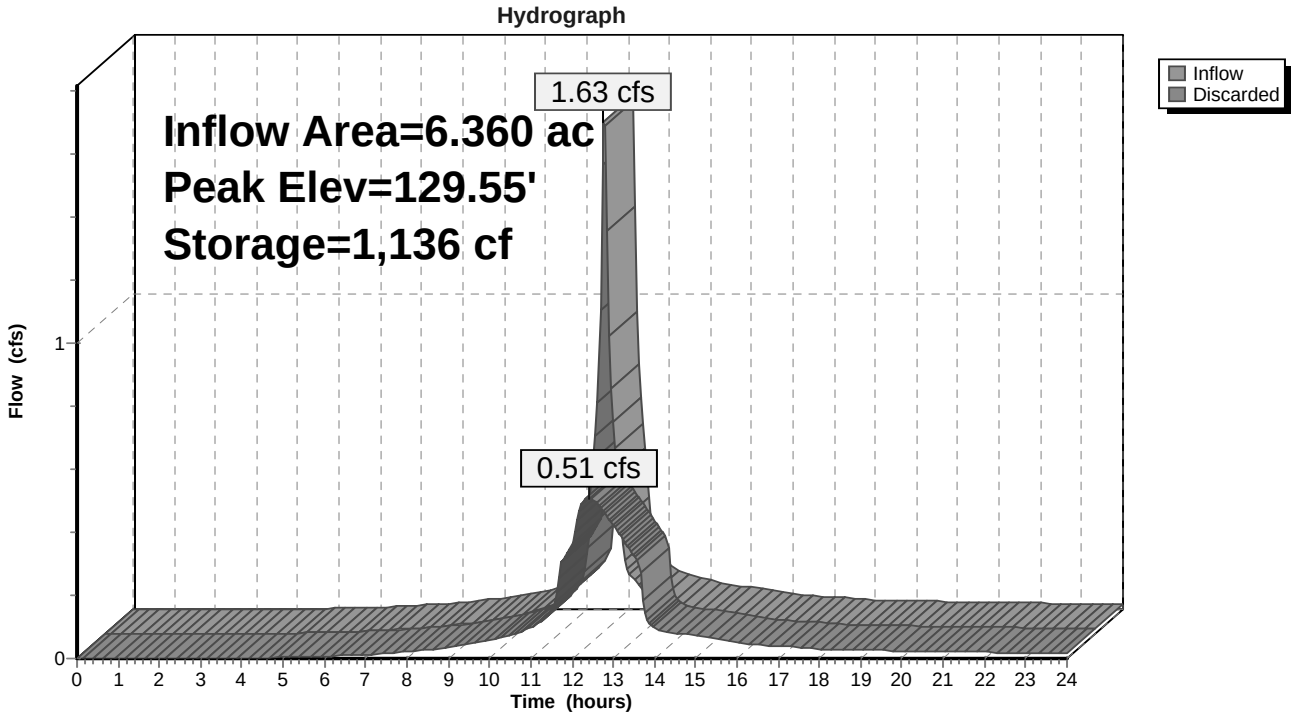
Volume	Invert	Avail.Storage	Storage Description
#1	129.00'	33,592 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
129.00	1,494	0	0
130.00	3,621	2,558	2,558
132.00	7,748	11,369	13,927
134.00	11,917	19,665	33,592

Device	Routing	Invert	Outlet Devices
#1	Discarded	129.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.51 cfs @ 12.40 hrs HW=129.55' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.51 cfs)

Pond Basin 1:


Hydrograph
Inflow
Discarded
1.63 cfs
0.51 cfs
Inflow Area=6.360 ac
Peak Elev=129.55'
Storage=1,136 cf
Flow (cfs)
0
1
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

Summary for Pond PP: Porous Pavement

Inflow Area = 1.650 ac, 73.94% Impervious, Inflow Depth > 0.29" for 1-INCH STORM event
Inflow = 0.07 cfs @ 21.96 hrs, Volume= 0.040 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

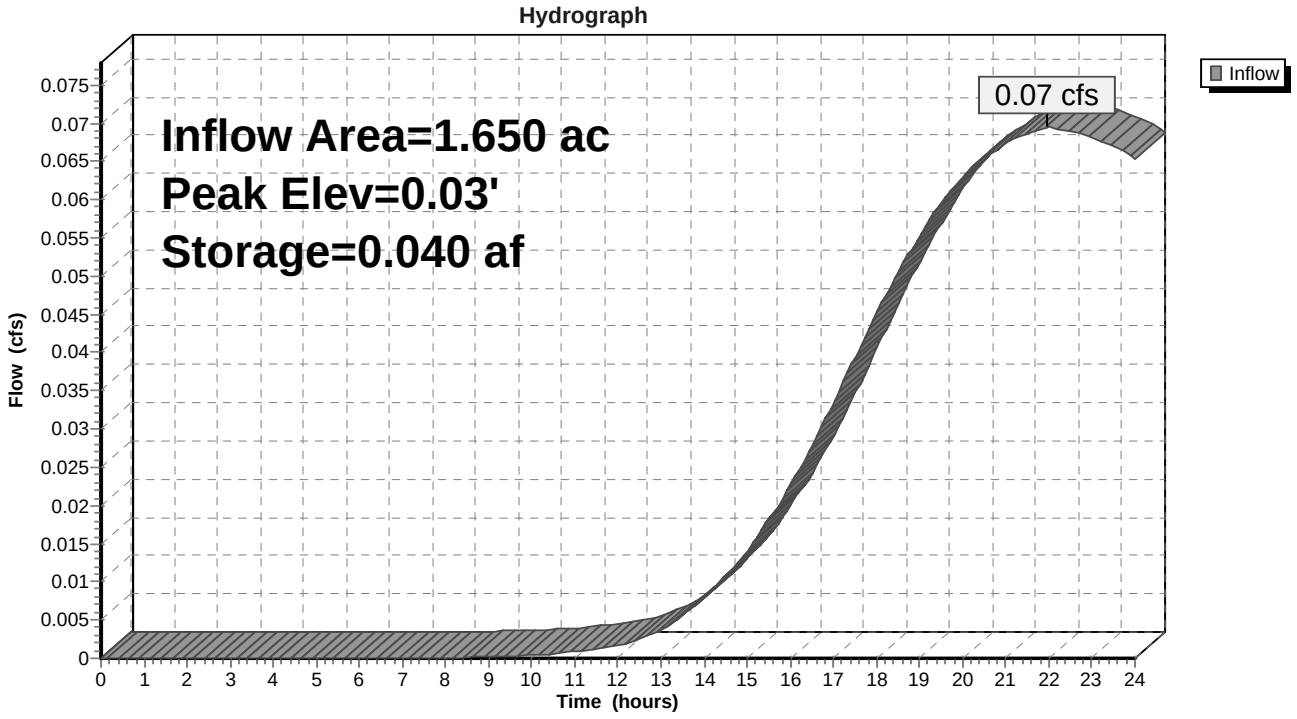
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.03' @ 24.00 hrs Surf.Area= 1.220 ac Storage= 0.040 af

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

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2.952 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
0.00	1.220	0.000	0.000
2.42	1.220	2.952	2.952

Pond PP: Porous Pavement



Summary for Pond SIS-1:

Inflow Area = 1.930 ac, 15.54% Impervious, Inflow Depth > 0.12" for 1-INCH STORM event
Inflow = 0.26 cfs @ 12.09 hrs, Volume= 0.020 af
Outflow = 0.25 cfs @ 12.11 hrs, Volume= 0.020 af, Atten= 3%, Lag= 1.2 min
Discarded = 0.25 cfs @ 12.11 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 163.02' @ 12.11 hrs Surf.Area= 2,705 sf Storage= 20 cf

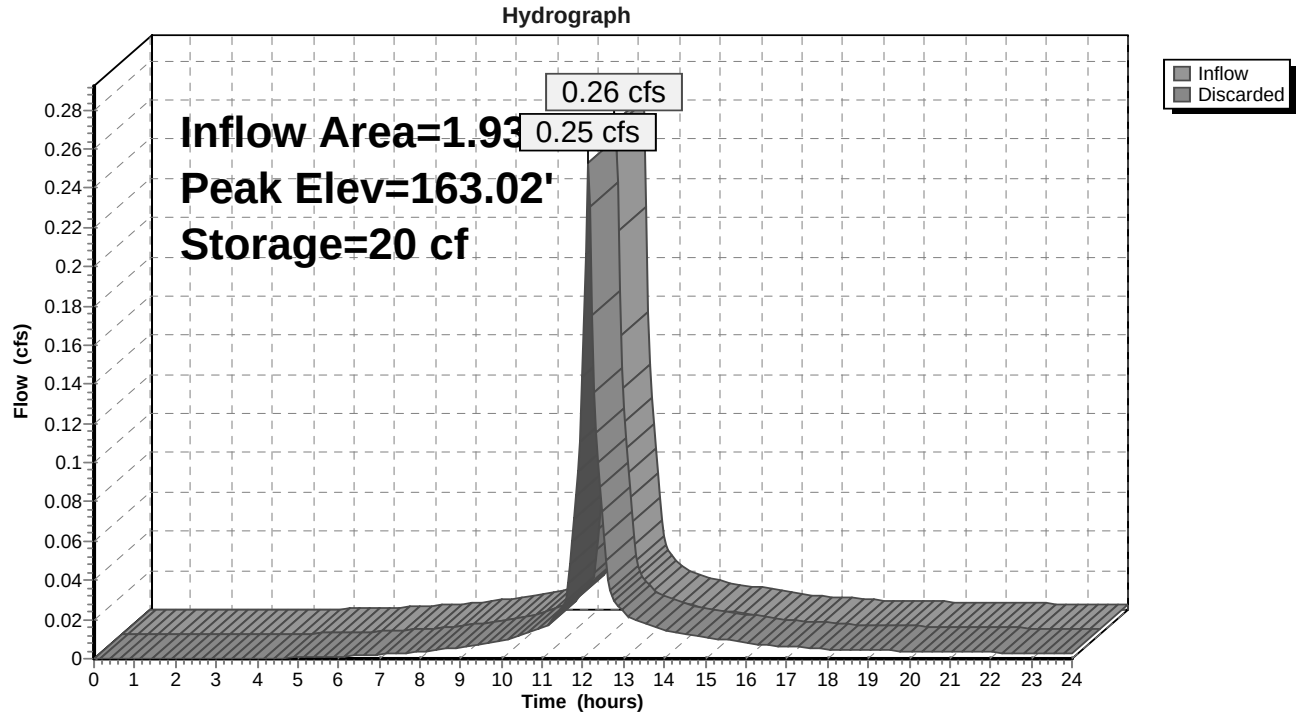
Plug-Flow detention time= 1.3 min calculated for 0.020 af (100% of inflow)
Center-of-Mass det. time= 1.2 min (788.6 - 787.4)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	2,915 cf	**5.00'W x 541.00'L x 5.00'H Prismatoid** 13,525 cf Overall - 3,810 cf Embedded = 9,715 cf x 30.0% Voids
#2	164.00'	3,810 cf	**36.0" Round Pipe Storage** Inside #1 L= 539.0'
		6,724 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	163.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.52 cfs @ 12.11 hrs HW=163.02' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.52 cfs)

Pond SIS-1:



Summary for Pond SIS-10:

Inflow Area = 1.250 ac, 57.60% Impervious, Inflow Depth > 0.46" for 1-INCH STORM event
Inflow = 0.63 cfs @ 12.09 hrs, Volume= 0.047 af
Outflow = 0.41 cfs @ 12.05 hrs, Volume= 0.047 af, Atten= 35%, Lag= 0.0 min
Discarded = 0.41 cfs @ 12.05 hrs, Volume= 0.047 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 127.20' @ 12.19 hrs Surf.Area= 2,116 sf Storage= 130 cf

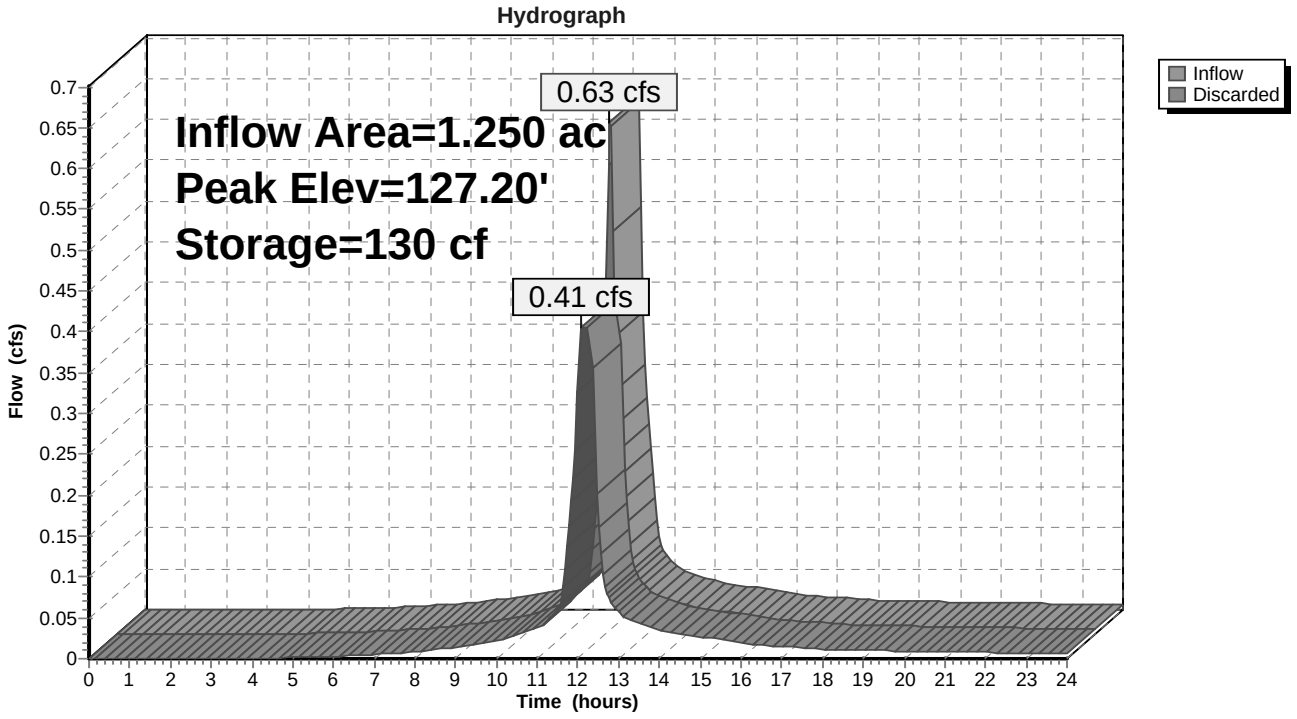
Plug-Flow detention time= 2.6 min calculated for 0.047 af (100% of inflow)
Center-of-Mass det. time= 2.3 min (789.7 - 787.4)

Volume	Invert	Avail.Storage	Storage Description
#1	127.00'	2,788 cf	**46.00'W x 46.00'L x 8.00'H Prismatoid** 16,928 cf Overall - 7,634 cf Embedded = 9,294 cf x 30.0% Voids
#2	128.00'	7,634 cf	**72.0" Round Pipe Storage** Inside #1 L= 270.0'
		10,422 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	127.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.41 cfs @ 12.05 hrs HW=127.10' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.41 cfs)

Pond SIS-10:



Summary for Pond SIS-2:

Inflow Area = 1.380 ac, 39.13% Impervious, Inflow Depth > 0.31" for 1-INCH STORM event
Inflow = 0.47 cfs @ 12.09 hrs, Volume= 0.036 af
Outflow = 0.34 cfs @ 12.05 hrs, Volume= 0.036 af, Atten= 28%, Lag= 0.0 min
Discarded = 0.34 cfs @ 12.05 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 141.65' @ 12.17 hrs Surf.Area= 1,776 sf Storage= 78 cf

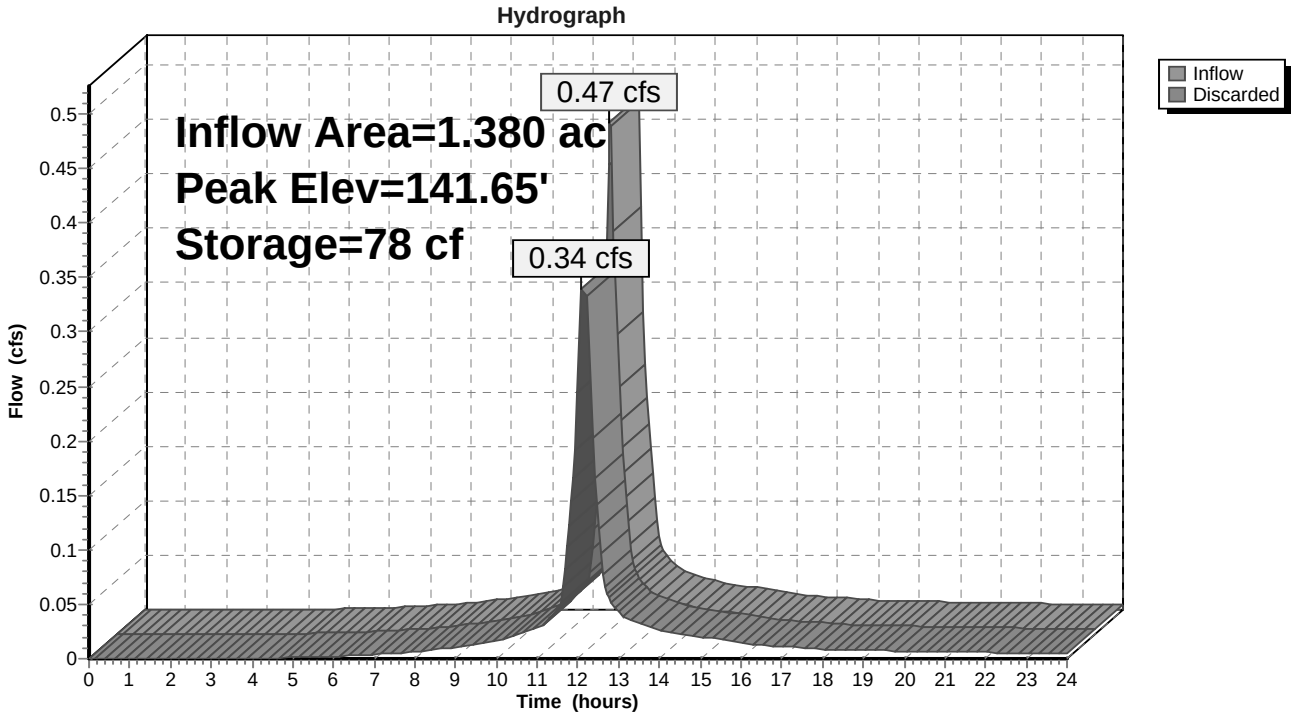
Plug-Flow detention time= 2.3 min calculated for 0.035 af (100% of inflow)
Center-of-Mass det. time= 2.0 min (789.5 - 787.4)

Volume	Invert	Avail.Storage	Storage Description
#1	141.50'	2,396 cf	**8.00'W x 222.00'L x 8.00'H Prismatoid** 14,208 cf Overall - 6,220 cf Embedded = 7,988 cf x 30.0% Voids
#2	142.50'	6,220 cf	**72.0" Round Pipe Storage** Inside #1 L= 220.0'
		8,617 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	141.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.34 cfs @ 12.05 hrs HW=141.58' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.34 cfs)

Pond SIS-2:



Summary for Pond SIS-3:

Inflow Area = 5.290 ac, 51.98% Impervious, Inflow Depth > 0.41" for 1-INCH STORM event
Inflow = 2.39 cfs @ 12.09 hrs, Volume= 0.181 af
Outflow = 1.44 cfs @ 12.05 hrs, Volume= 0.181 af, Atten= 40%, Lag= 0.0 min
Discarded = 1.44 cfs @ 12.05 hrs, Volume= 0.181 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 140.70' @ 12.20 hrs Surf.Area= 7,504 sf Storage= 611 cf

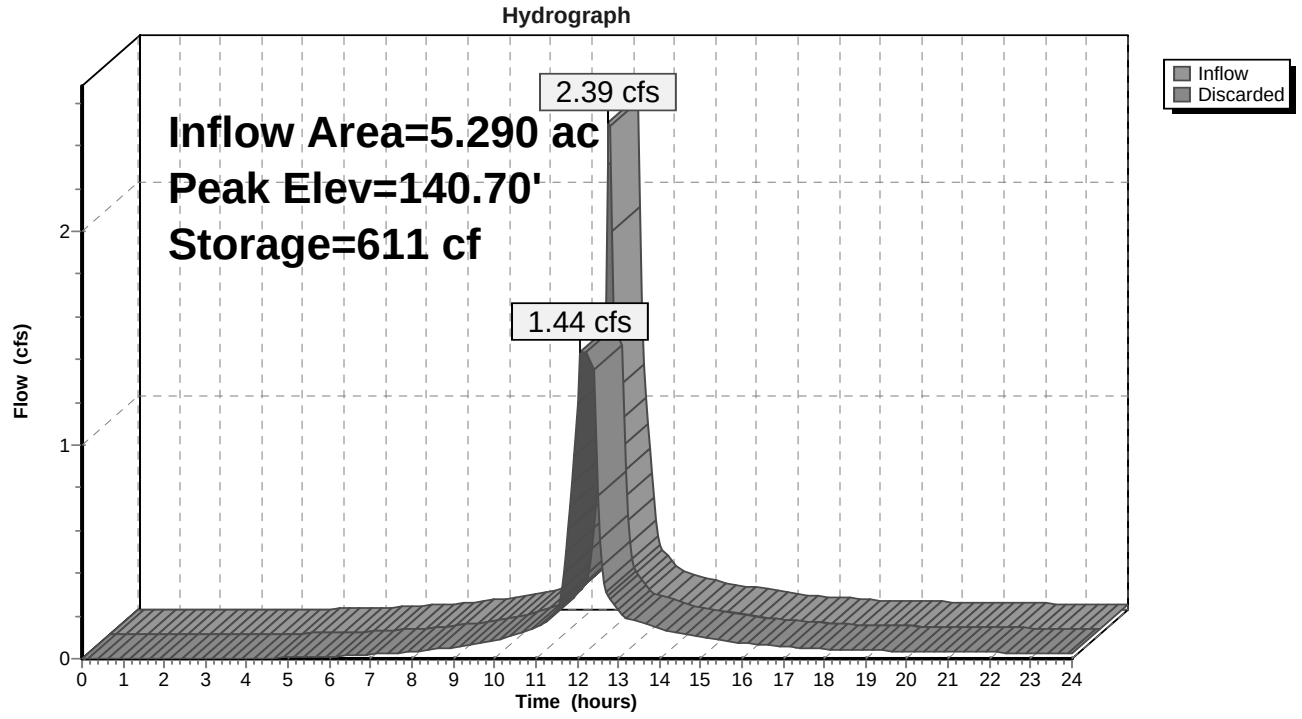
Plug-Flow detention time= 3.5 min calculated for 0.181 af (100% of inflow)
Center-of-Mass det. time= 3.2 min (790.6 - 787.4)

Volume	Invert	Avail.Storage	Storage Description
#1	140.50'	13,291 cf	**56.00'W x 134.00'L x 8.00'H Prismatoid** 60,032 cf Overall - 26,804 cf Embedded = 33,228 cf x 40.0% Voids
#2	141.50'	26,804 cf	**72.0" Round Pipe Storage** Inside #1 L= 948.0'
		40,095 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=1.44 cfs @ 12.05 hrs HW=140.60' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.44 cfs)

Pond SIS-3:



Summary for Pond SIS-4:

Inflow Area = 1.330 ac, 66.92% Impervious, Inflow Depth > 0.53" for 1-INCH STORM event
Inflow = 0.77 cfs @ 12.09 hrs, Volume= 0.059 af
Outflow = 0.44 cfs @ 12.05 hrs, Volume= 0.059 af, Atten= 43%, Lag= 0.0 min
Discarded = 0.44 cfs @ 12.05 hrs, Volume= 0.059 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 145.23' @ 12.21 hrs Surf.Area= 2,304 sf Storage= 213 cf

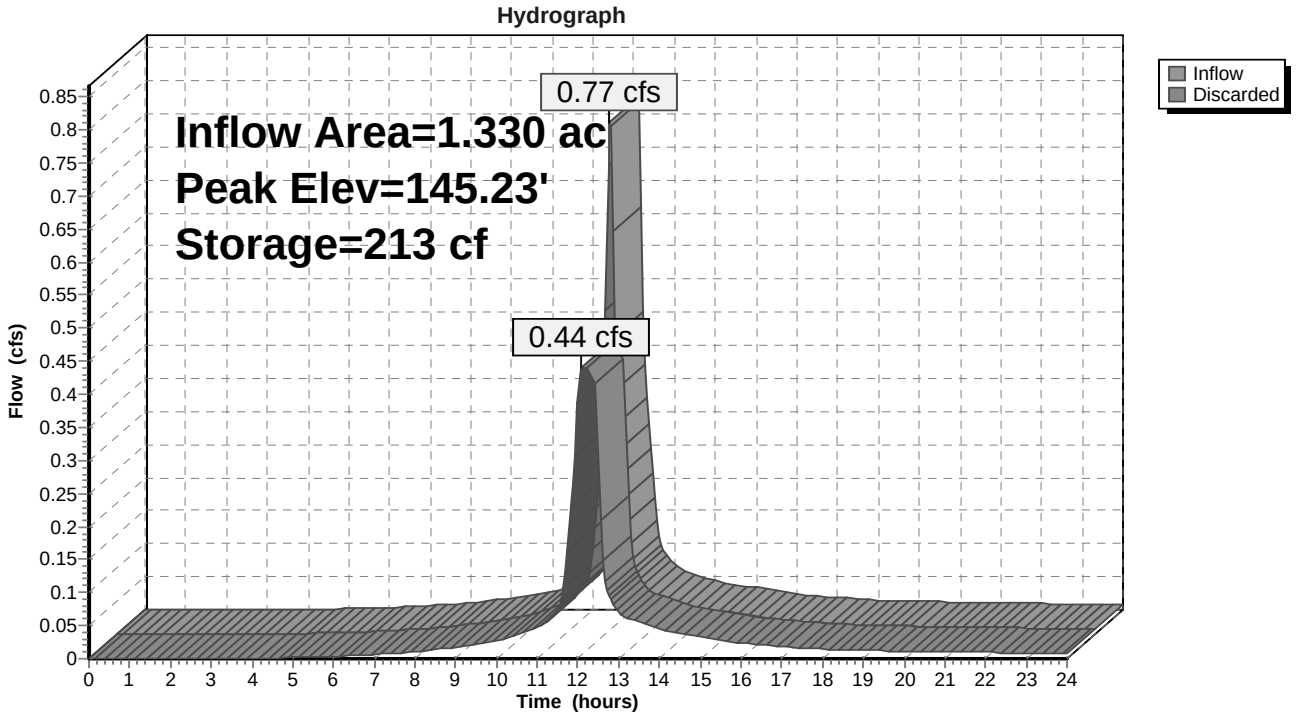
Plug-Flow detention time= 3.7 min calculated for 0.058 af (100% of inflow)
Center-of-Mass det. time= 3.4 min (790.8 - 787.4)

Volume	Invert	Avail.Storage	Storage Description
#1	145.00'	4,116 cf	**16.00'W x 144.00'L x 8.00'H Prismatoid** 18,432 cf Overall - 8,143 cf Embedded = 10,289 cf x 40.0% Voids
#2	146.00'	8,143 cf	**72.0" Round Pipe Storage** Inside #1 L= 288.0'
		12,259 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	145.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.44 cfs @ 12.05 hrs HW=145.11' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.44 cfs)

Pond SIS-4:



Summary for Pond SIS-5:

Inflow Area = 0.590 ac, 47.46% Impervious, Inflow Depth > 0.38" for 1-INCH STORM event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 0.018 af
Outflow = 0.17 cfs @ 12.05 hrs, Volume= 0.018 af, Atten= 32%, Lag= 0.0 min
Discarded = 0.17 cfs @ 12.05 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 137.18' @ 12.18 hrs Surf.Area= 864 sf Storage= 46 cf

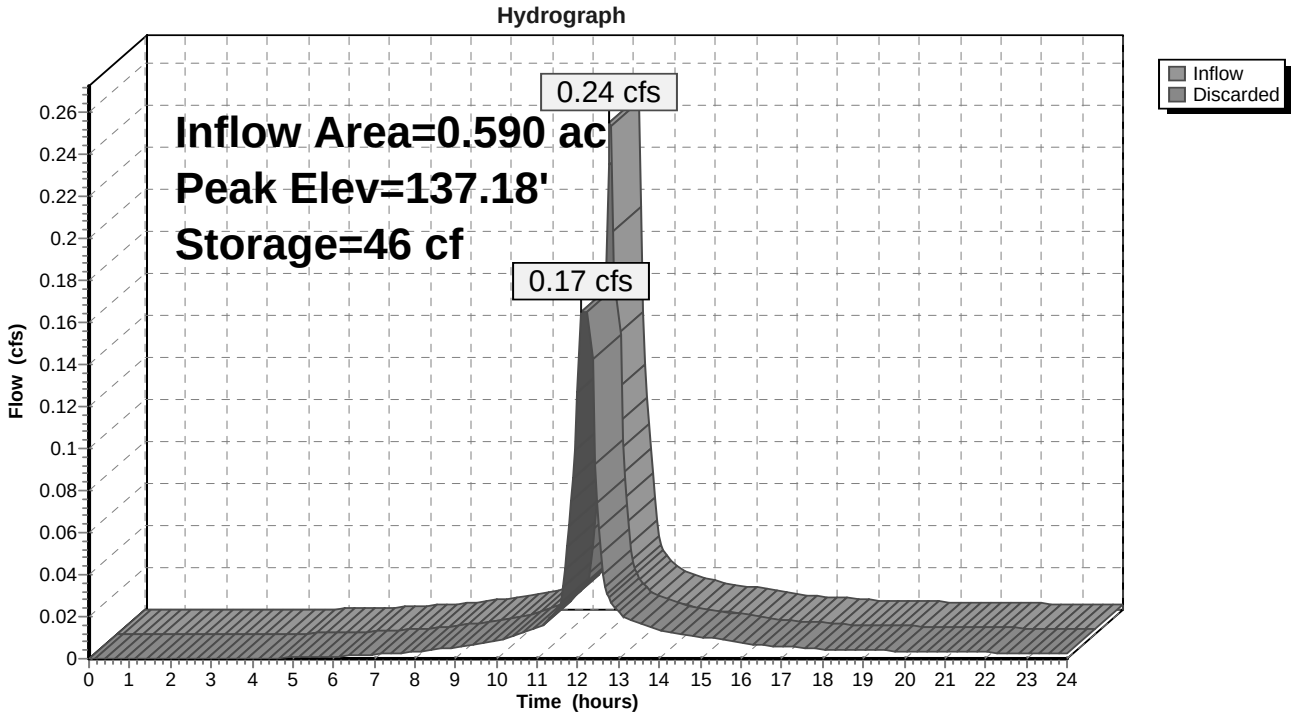
Plug-Flow detention time= 2.4 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 2.2 min (789.6 - 787.4)

Volume	Invert	Avail.Storage	Storage Description
#1	137.00'	1,158 cf	**16.00'W x 54.00'L x 8.00'H Prismatoid** 6,912 cf Overall - 3,054 cf Embedded = 3,858 cf x 30.0% Voids
#2	138.00'	3,054 cf	**72.0" Round Pipe Storage** Inside #1 L= 108.0'
		4,211 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	137.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.17 cfs @ 12.05 hrs HW=137.09' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.17 cfs)

Pond SIS-5:



Summary for Pond SIS-6:

Inflow Area = 1.330 ac, 62.41% Impervious, Inflow Depth > 0.49" for 1-INCH STORM event
Inflow = 0.72 cfs @ 12.09 hrs, Volume= 0.055 af
Outflow = 0.33 cfs @ 12.00 hrs, Volume= 0.055 af, Atten= 54%, Lag= 0.0 min
Discarded = 0.33 cfs @ 12.00 hrs, Volume= 0.055 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 132.54' @ 12.27 hrs Surf.Area= 1,728 sf Storage= 278 cf

Plug-Flow detention time= 5.9 min calculated for 0.055 af (100% of inflow)
Center-of-Mass det. time= 5.4 min (792.8 - 787.4)

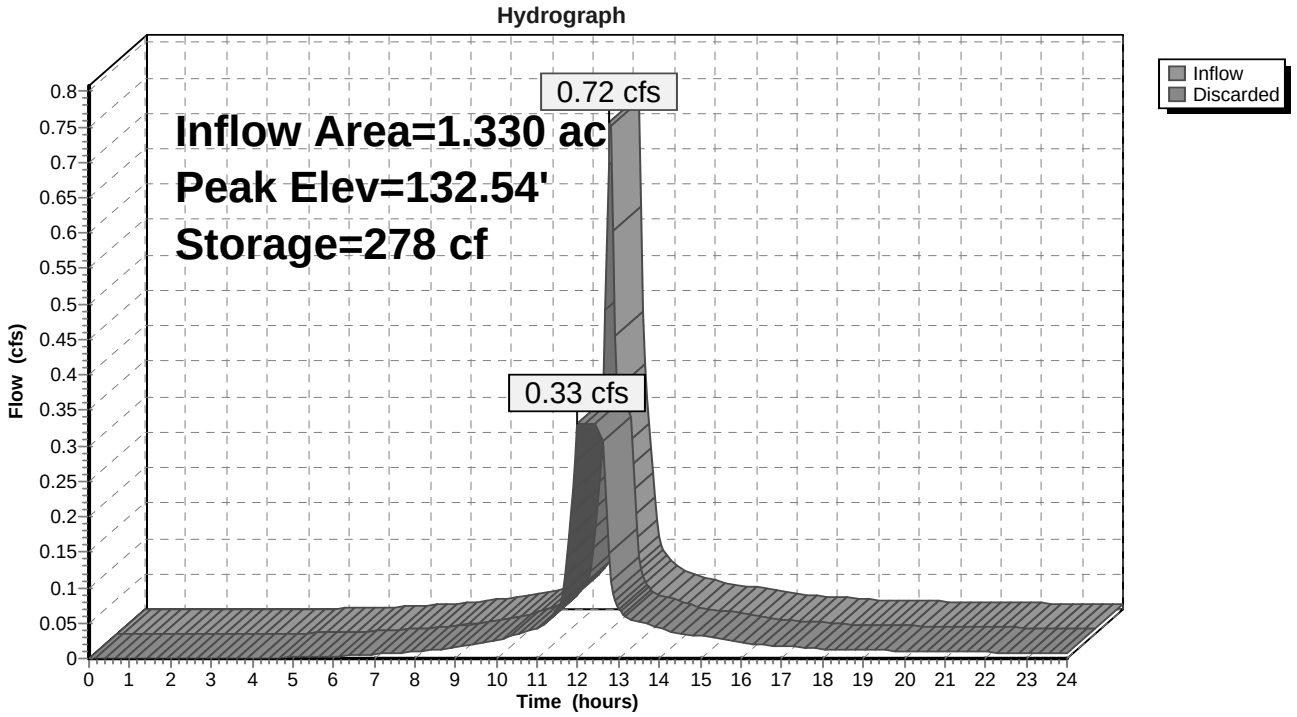
Volume	Invert	Avail.Storage	Storage Description
#1	132.00'	2,281 cf	**32.00'W x 54.00'L x 8.00'H Prismatoid** 13,824 cf Overall - 6,220 cf Embedded = 7,604 cf x 30.0% Voids
#2	133.00'	6,220 cf	**72.0" Round Pipe Storage** Inside #1 L= 220.0'
#3	142.00'	4,855 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		13,356 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
142.00	0	0	0
144.00	1,185	1,185	1,185
146.00	2,485	3,670	4,855

Device	Routing	Invert	Outlet Devices
#1	Discarded	132.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.33 cfs @ 12.00 hrs HW=132.15' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Pond SIS-6:


Hydrograph
Inflow
Discarded
0.72 cfs
0.33 cfs
Inflow Area=1.330 ac
Peak Elev=132.54'
Storage=278 cf
Flow (cfs)
Time (hours)
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8
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

Summary for Pond SIS-7:

Inflow Area = 1.110 ac, 44.14% Impervious, Inflow Depth > 0.35" for 1-INCH STORM event
Inflow = 0.43 cfs @ 12.09 hrs, Volume= 0.032 af
Outflow = 0.29 cfs @ 12.05 hrs, Volume= 0.032 af, Atten= 33%, Lag= 0.0 min
Discarded = 0.29 cfs @ 12.05 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 131.68' @ 12.18 hrs Surf.Area= 1,496 sf Storage= 82 cf

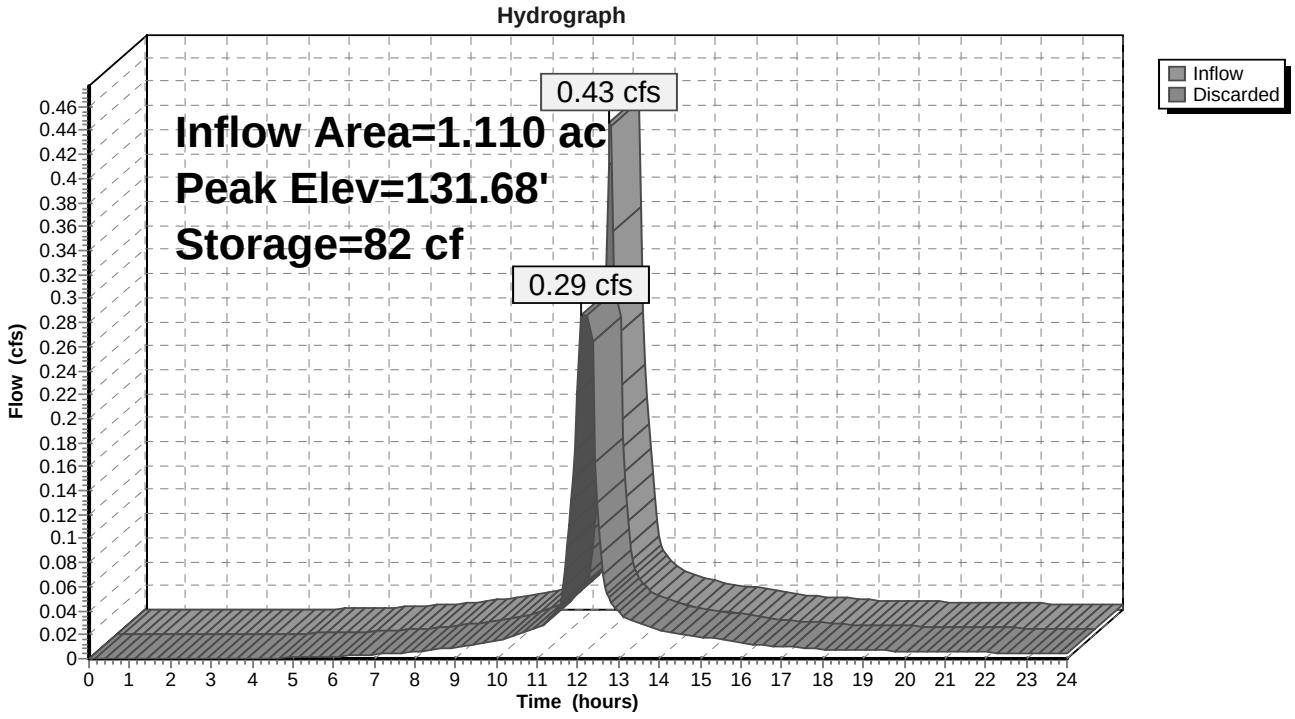
Plug-Flow detention time= 2.5 min calculated for 0.032 af (100% of inflow)
Center-of-Mass det. time= 2.2 min (789.6 - 787.4)

Volume	Invert	Avail.Storage	Storage Description
#1	131.50'	2,021 cf	**8.00'W x 187.00'L x 8.00'H Prismatoid** 11,968 cf Overall - 5,231 cf Embedded = 6,737 cf x 30.0% Voids
#2	132.50'	5,231 cf	**72.0" Round Pipe Storage** Inside #1 L= 185.0'
		7,252 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	131.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.29 cfs @ 12.05 hrs HW=131.59' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.29 cfs)

Pond SIS-7:



Summary for Pond SIS-8:

Inflow Area = 0.220 ac, 63.64% Impervious, Inflow Depth > 0.50" for 1-INCH STORM event
Inflow = 0.12 cfs @ 12.09 hrs, Volume= 0.009 af
Outflow = 0.12 cfs @ 12.11 hrs, Volume= 0.009 af, Atten= 4%, Lag= 1.5 min
Discarded = 0.12 cfs @ 12.11 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 127.05' @ 12.11 hrs Surf.Area= 732 sf Storage= 11 cf

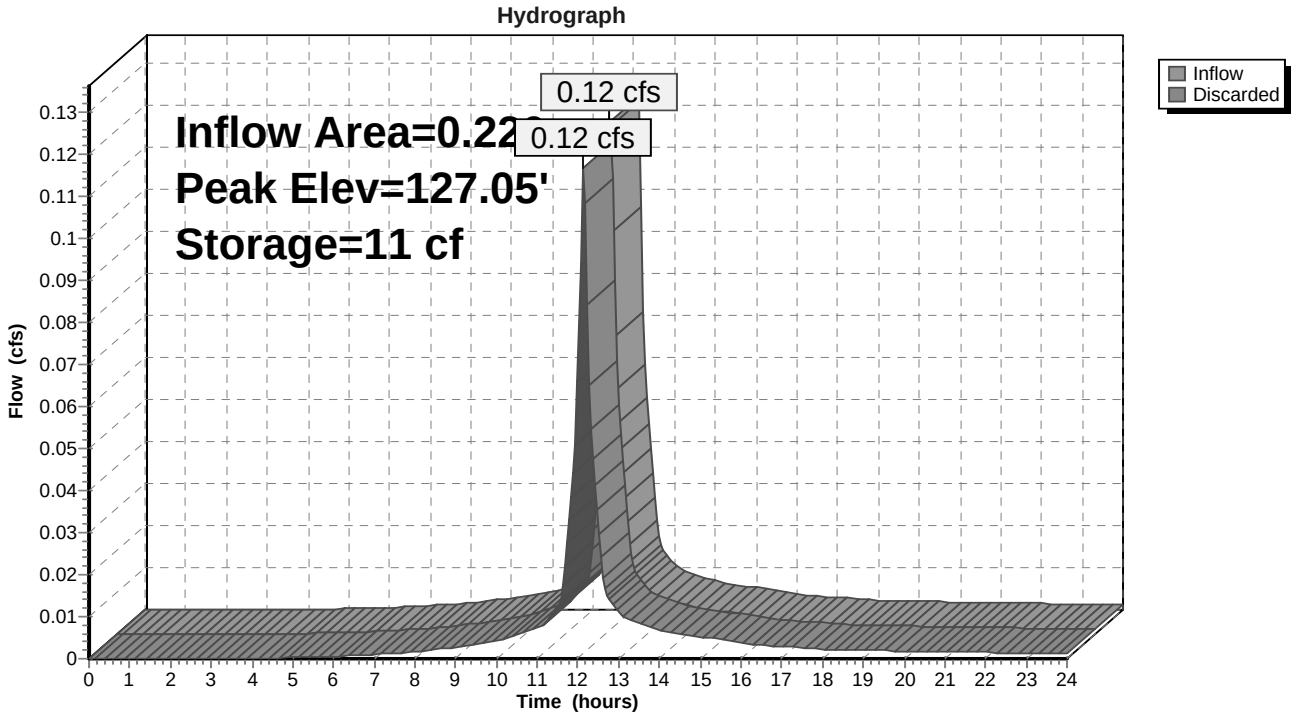
Plug-Flow detention time= 1.6 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (788.8 - 787.4)

Volume	Invert	Avail.Storage	Storage Description
#1	127.00'	865 cf	**6.00'W x 122.00'L x 6.00'H Prismatoid** 4,392 cf Overall - 1,508 cf Embedded = 2,884 cf x 30.0% Voids
#2	128.00'	1,508 cf	**48.0" Round Pipe Storage** Inside #1 L= 120.0'
		2,373 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	127.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.14 cfs @ 12.11 hrs HW=127.05' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.14 cfs)

Pond SIS-8:



Summary for Pond SIS-9:

Inflow Area = 2.300 ac, 77.39% Impervious, Inflow Depth > 0.61" for 1-INCH STORM event
Inflow = 1.55 cfs @ 12.09 hrs, Volume= 0.117 af
Outflow = 0.91 cfs @ 12.05 hrs, Volume= 0.117 af, Atten= 41%, Lag= 0.0 min
Discarded = 0.91 cfs @ 12.05 hrs, Volume= 0.117 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 126.26' @ 12.21 hrs Surf.Area= 4,761 sf Storage= 376 cf

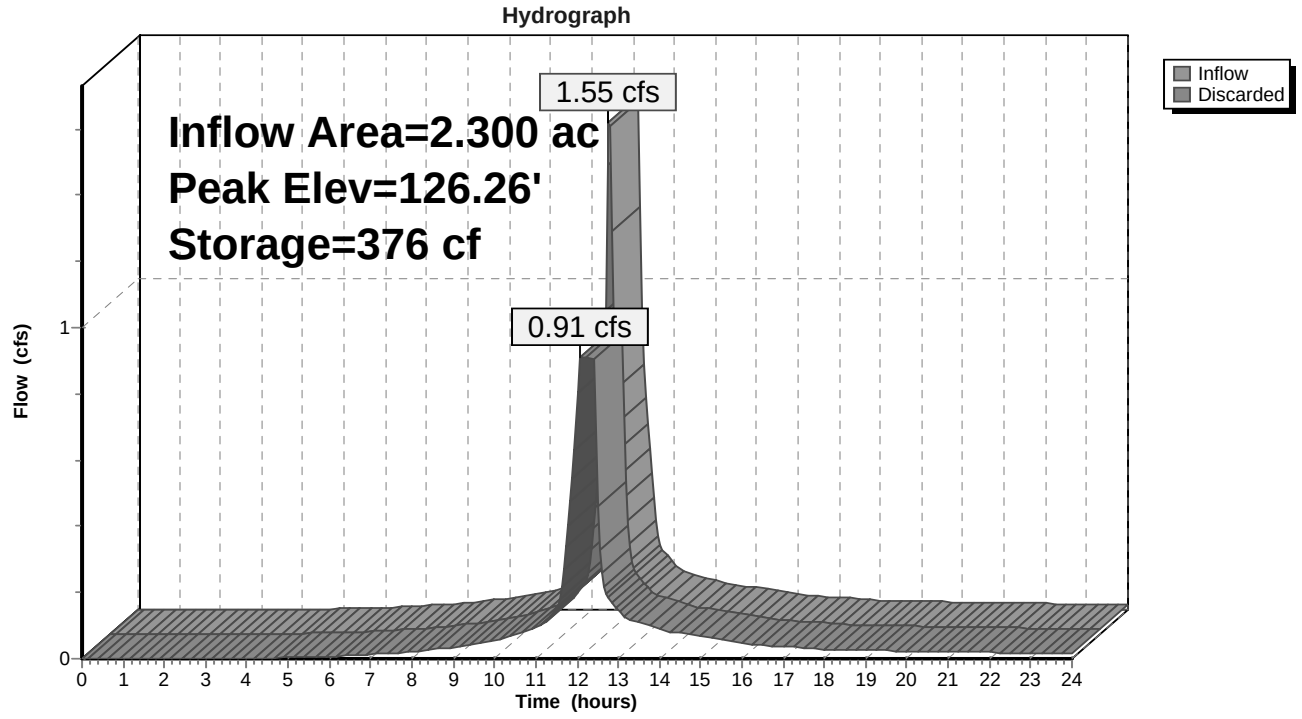
Plug-Flow detention time= 2.9 min calculated for 0.117 af (100% of inflow)
Center-of-Mass det. time= 2.7 min (790.1 - 787.4)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	6,184 cf	**69.00'W x 69.00'L x 8.00'H Prismatoid** 38,088 cf Overall - 17,474 cf Embedded = 20,614 cf x 30.0% Voids
#2	127.00'	17,474 cf	**72.0" Round Pipe Storage** Inside #1 L= 618.0'
		23,658 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	126.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.91 cfs @ 12.05 hrs HW=126.11' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.91 cfs)

Pond SIS-9:

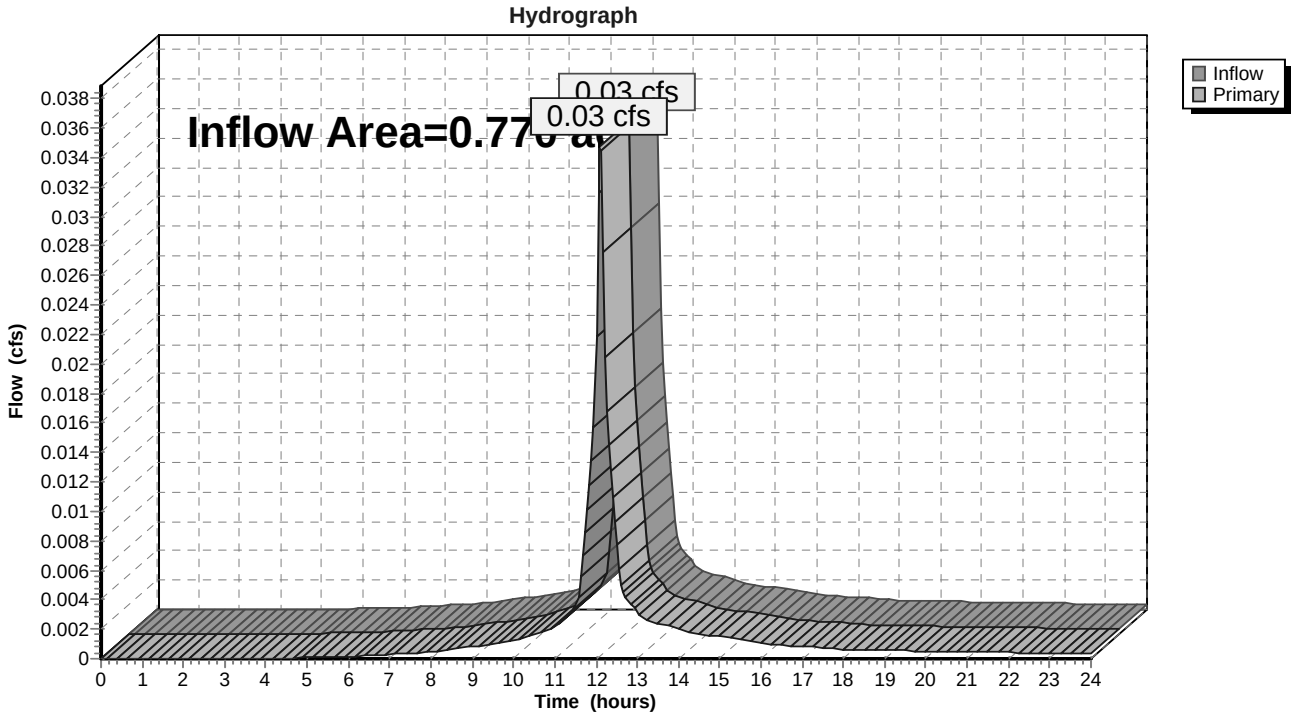


Summary for Link POA-1:

Inflow Area = 0.770 ac, 5.19% Impervious, Inflow Depth > 0.04" for 1-INCH STORM event
Inflow = 0.03 cfs @ 12.09 hrs, Volume= 0.003 af
Primary = 0.03 cfs @ 12.09 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-1:

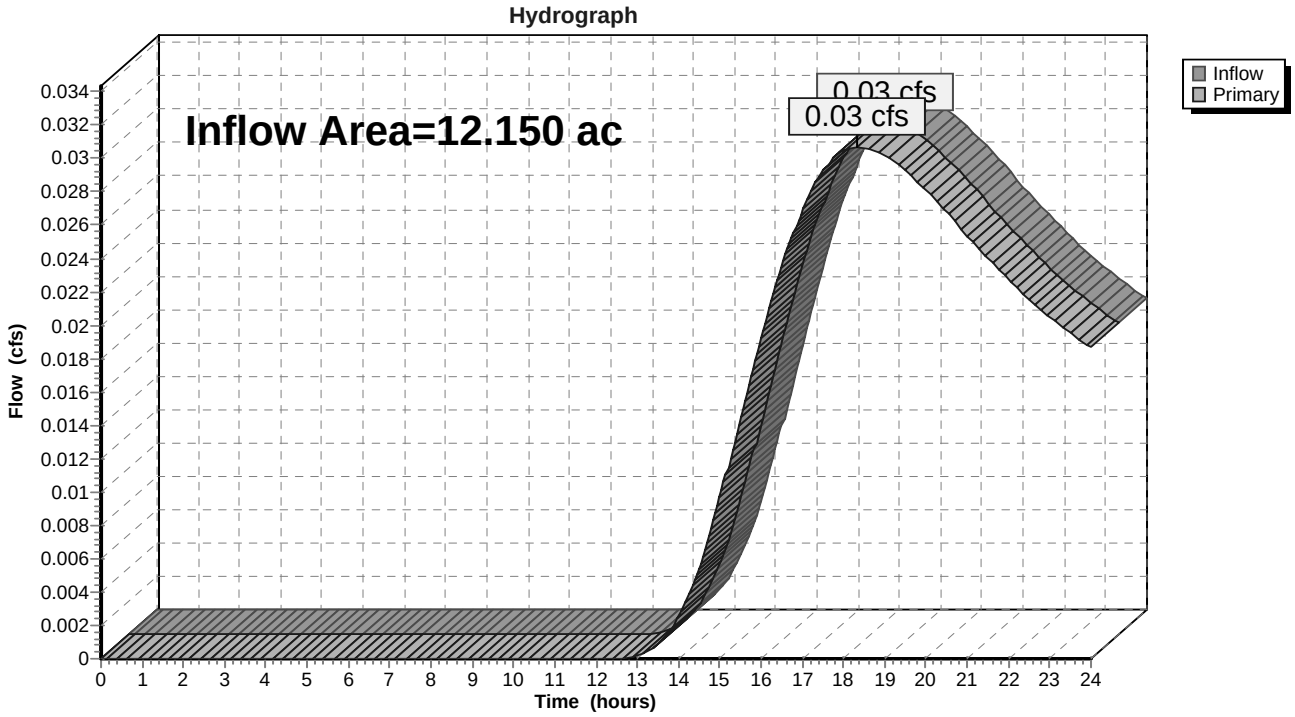


Summary for Link POA-2:

Inflow Area = 12.150 ac, 0.00% Impervious, Inflow Depth > 0.02" for 1-INCH STORM event
Inflow = 0.03 cfs @ 18.31 hrs, Volume= 0.019 af
Primary = 0.03 cfs @ 18.31 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-2:

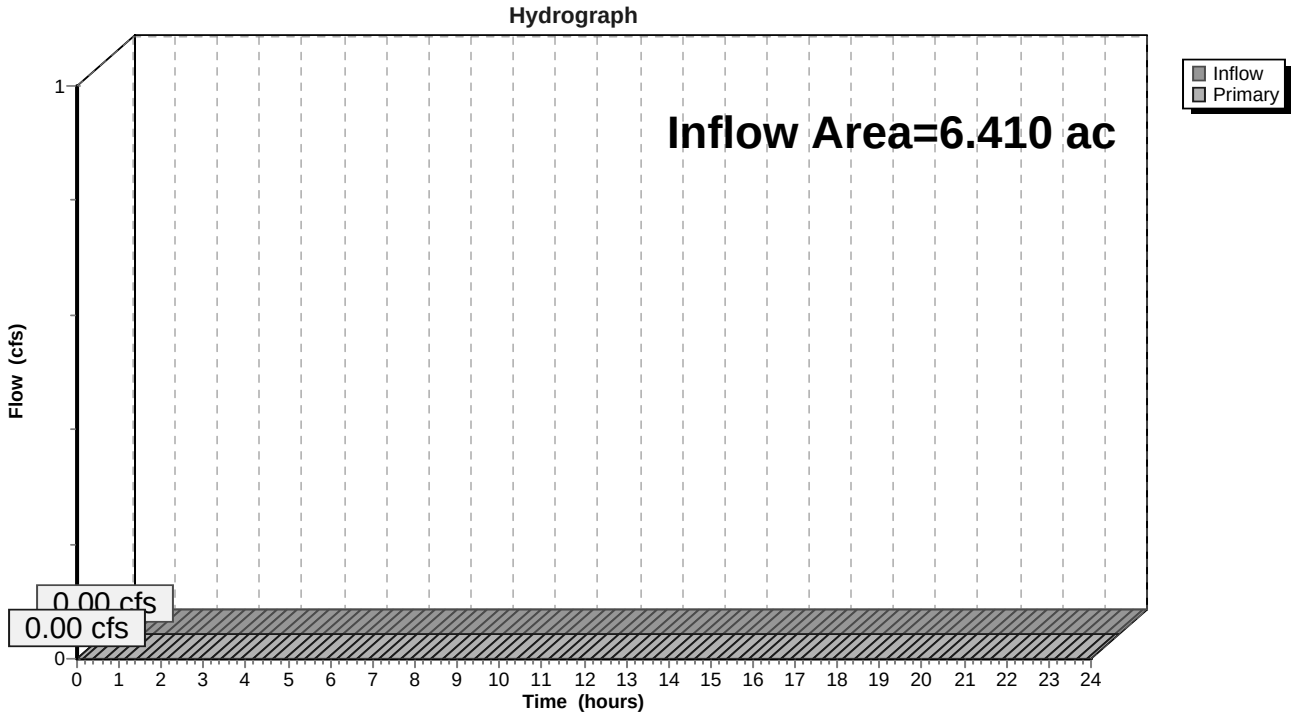


Summary for Link POA-3:

Inflow Area = 6.410 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-INCH STORM event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-3:

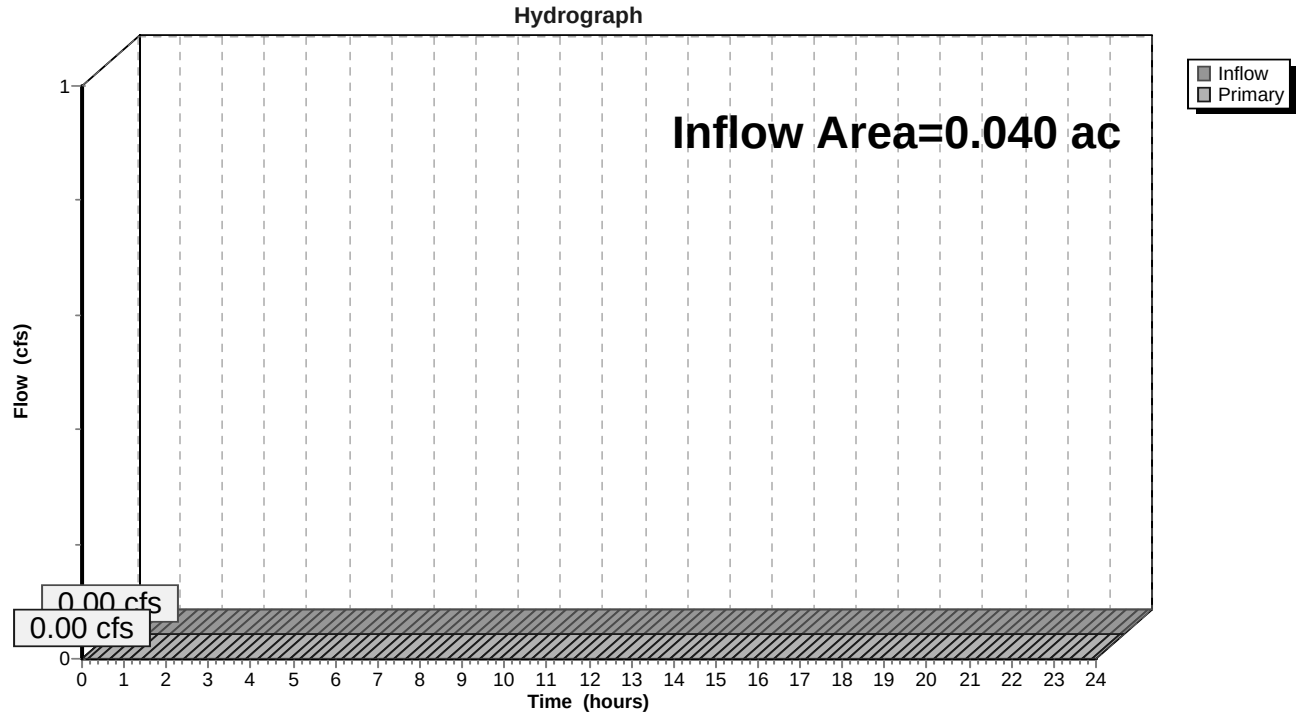


Summary for Link POA-4:

Inflow Area = 0.040 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-INCH STORM event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-4:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1A: Runoff Area=0.500 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=557' Tc=11.7 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment PR-1B: Runoff Area=0.270 ac 14.81% Impervious Runoff Depth>0.44"
Flow Length=188' Tc=6.1 min CN=WQ Runoff=0.12 cfs 0.010 af

Subcatchment PR-1C: Runoff Area=6.360 ac 29.40% Impervious Runoff Depth>0.87"
Tc=6.0 min CN=WQ Runoff=5.67 cfs 0.462 af

Subcatchment PR-1D: Runoff Area=1.650 ac 73.94% Impervious Runoff Depth>1.16"
Tc=790.0 min CN=WQ Runoff=0.26 cfs 0.160 af

Subcatchment PR-2: Runoff Area=12.150 ac 0.00% Impervious Runoff Depth>0.55"
Flow Length=2,069' Tc=304.8 min CN=WQ Runoff=1.08 cfs 0.557 af

Subcatchment PR-3A: Runoff Area=6.410 ac 0.00% Impervious Runoff Depth>0.00"
Flow Length=1,024' Tc=14.9 min CN=WQ Runoff=0.00 cfs 0.000 af

Subcatchment PR-3B: Runoff Area=1.250 ac 57.60% Impervious Runoff Depth>1.71"
Tc=6.0 min CN=WQ Runoff=2.18 cfs 0.178 af

Subcatchment PR-3C: Runoff Area=2.300 ac 77.39% Impervious Runoff Depth>2.30"
Tc=6.0 min CN=WQ Runoff=5.40 cfs 0.440 af

Subcatchment PR-3D: Runoff Area=1.110 ac 44.14% Impervious Runoff Depth>1.31"
Tc=6.0 min CN=WQ Runoff=1.49 cfs 0.121 af

Subcatchment PR-3E: Runoff Area=1.330 ac 62.41% Impervious Runoff Depth>1.85"
Tc=6.0 min CN=WQ Runoff=2.52 cfs 0.205 af

Subcatchment PR-3F: Runoff Area=0.590 ac 47.46% Impervious Runoff Depth>1.41"
Tc=6.0 min CN=WQ Runoff=0.85 cfs 0.069 af

Subcatchment PR-3G: Runoff Area=1.330 ac 66.92% Impervious Runoff Depth>1.98"
Tc=6.0 min CN=WQ Runoff=2.70 cfs 0.220 af

Subcatchment PR-3H: Runoff Area=1.380 ac 39.13% Impervious Runoff Depth>1.16"
Tc=6.0 min CN=WQ Runoff=1.64 cfs 0.133 af

Subcatchment PR-3I: Runoff Area=5.290 ac 51.98% Impervious Runoff Depth>1.54"
Tc=6.0 min CN=WQ Runoff=8.34 cfs 0.680 af

Subcatchment PR-3J: Runoff Area=1.930 ac 15.54% Impervious Runoff Depth>0.46"
Tc=6.0 min CN=WQ Runoff=0.91 cfs 0.074 af

Subcatchment PR-3K: Runoff Area=0.220 ac 63.64% Impervious Runoff Depth>1.89"
Tc=6.0 min CN=WQ Runoff=0.42 cfs 0.035 af

Subcatchment PR-4: Runoff Area=0.040 ac 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.000 af

Pond Basin 1: Peak Elev=130.86' Storage=6,412 cf Inflow=5.67 cfs 0.462 af
Outflow=1.03 cfs 0.462 af

Pond PP: Porous Pavement Peak Elev=0.13' Storage=0.159 af Inflow=0.26 cfs 0.160 af
Outflow=0.00 cfs 0.000 af

Pond SIS-1: Peak Elev=163.26' Storage=210 cf Inflow=0.91 cfs 0.074 af
Outflow=0.52 cfs 0.074 af

Pond SIS-10: Peak Elev=129.05' Storage=1,930 cf Inflow=2.18 cfs 0.178 af
Outflow=0.41 cfs 0.178 af

Pond SIS-2: Peak Elev=143.33' Storage=1,343 cf Inflow=1.64 cfs 0.133 af
Outflow=0.34 cfs 0.133 af

Pond SIS-3: Peak Elev=142.50' Storage=7,769 cf Inflow=8.34 cfs 0.680 af
Outflow=1.44 cfs 0.679 af

Pond SIS-4: Peak Elev=147.12' Storage=2,590 cf Inflow=2.70 cfs 0.220 af
Outflow=0.44 cfs 0.220 af

Pond SIS-5: Peak Elev=138.96' Storage=727 cf Inflow=0.85 cfs 0.069 af
Outflow=0.17 cfs 0.069 af

Pond SIS-6: Peak Elev=134.91' Storage=2,703 cf Inflow=2.52 cfs 0.205 af
Outflow=0.33 cfs 0.205 af

Pond SIS-7: Peak Elev=133.48' Storage=1,281 cf Inflow=1.49 cfs 0.121 af
Outflow=0.29 cfs 0.121 af

Pond SIS-8: Peak Elev=128.01' Storage=222 cf Inflow=0.42 cfs 0.035 af
Outflow=0.14 cfs 0.035 af

Pond SIS-9: Peak Elev=128.25' Storage=5,054 cf Inflow=5.40 cfs 0.440 af
Outflow=0.91 cfs 0.440 af

Link POA-1: Inflow=0.12 cfs 0.010 af
Primary=0.12 cfs 0.010 af

Link POA-2: Inflow=1.08 cfs 0.557 af
Primary=1.08 cfs 0.557 af

Link POA-3: Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link POA-4: Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 44.110 ac Runoff Volume = 3.345 af Average Runoff Depth = 0.91"
73.14% Pervious = 32.260 ac 26.86% Impervious = 11.850 ac

Summary for Subcatchment PR-1A:

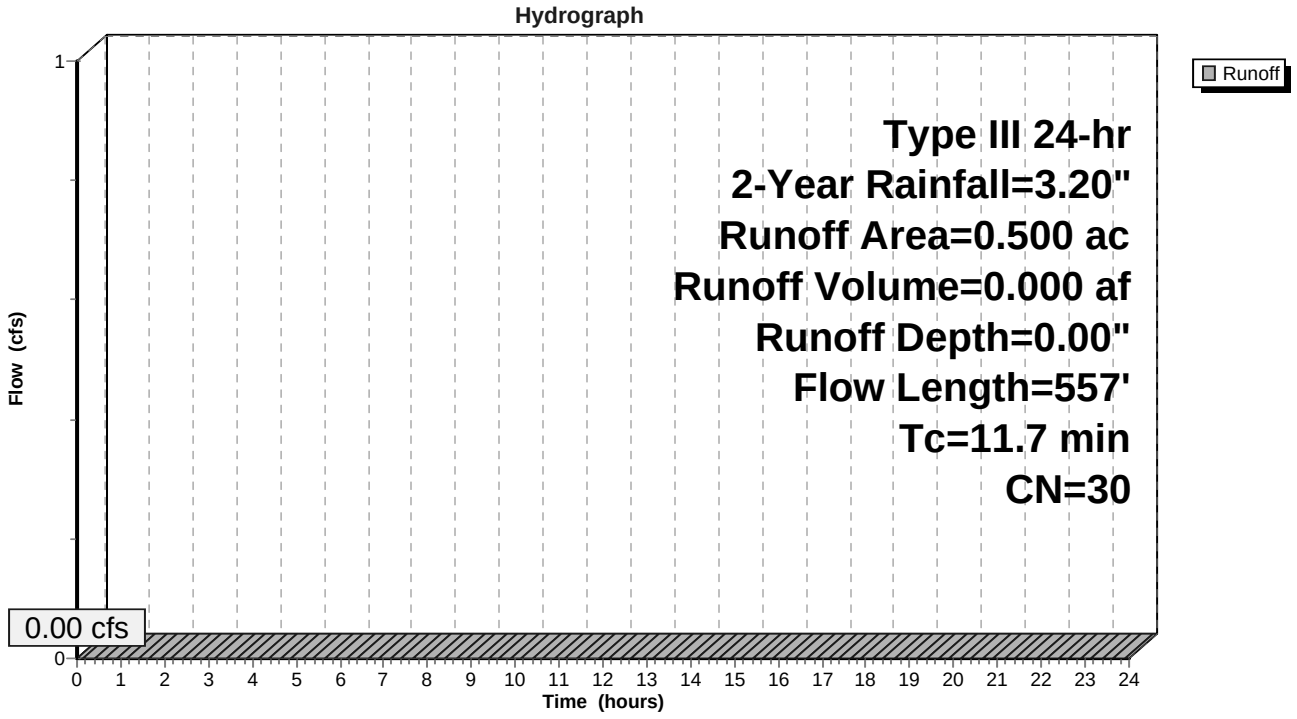
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.500	30	Woods, Good, HSG A
0.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.2400	0.10		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
1.0	73	0.2400	1.22		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.5	434	0.0370	2.89		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
11.7	557	Total			

Subcatchment PR-1A:



Summary for Subcatchment PR-1B:

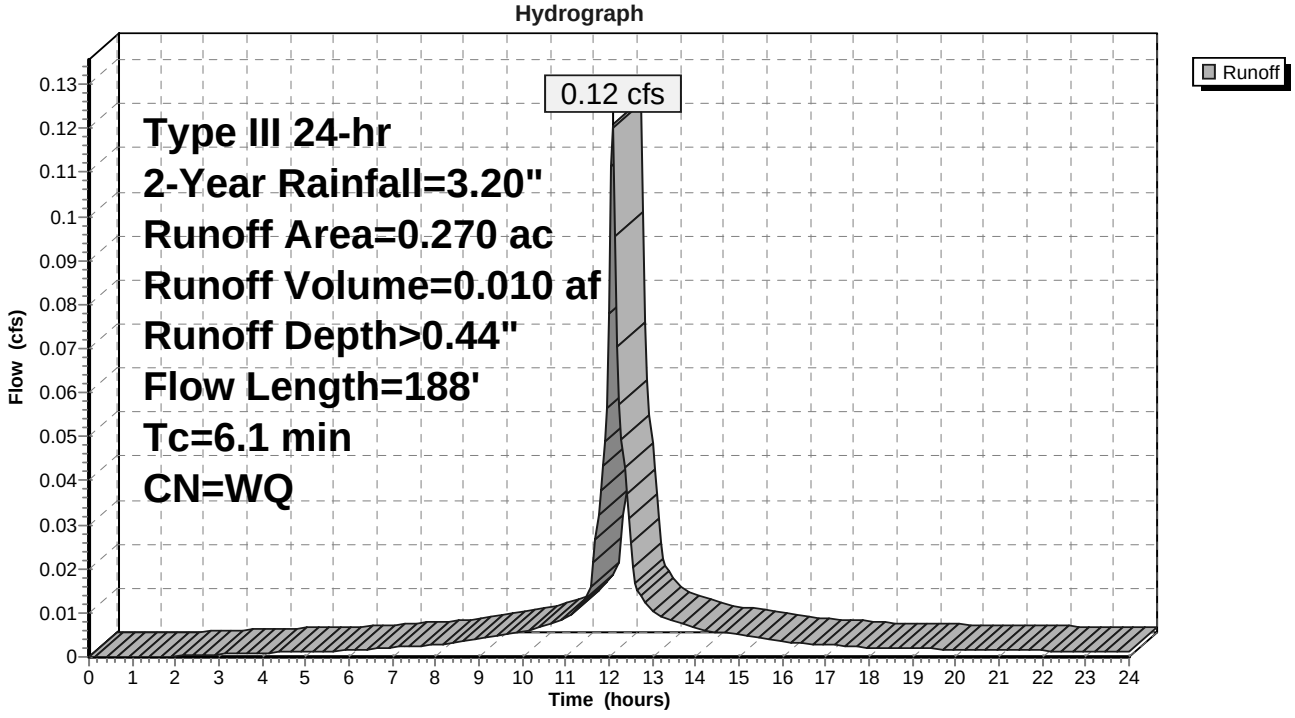
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 0.010 af, Depth> 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.040	98	Paved parking, HSG A
0.230	30	Woods, Good, HSG A
0.270		Weighted Average
0.230		85.19% Pervious Area
0.040		14.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	44	0.1600	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
1.1	144	0.1040	2.26		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.1	188	Total			

Subcatchment PR-1B:



Summary for Subcatchment PR-1C:

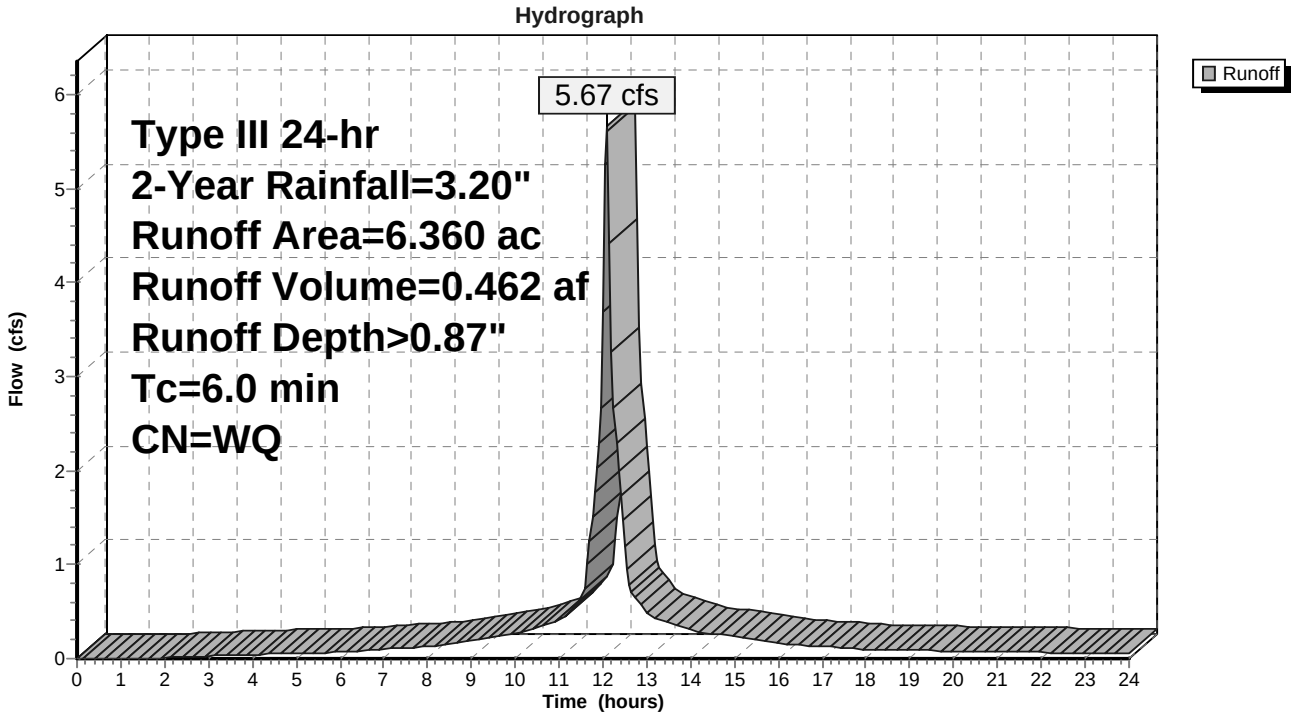
Runoff = 5.67 cfs @ 12.09 hrs, Volume= 0.462 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.940	98	Paved parking, HSG A
0.750	98	Roofs, HSG A
2.580	39	>75% Grass cover, Good, HSG A
0.660	35	Brush, Fair, HSG A
1.250	30	Woods, Good, HSG A
0.180	98	Water Surface, HSG A
6.360		Weighted Average
4.490		70.60% Pervious Area
1.870		29.40% Impervious Area

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

Subcatchment PR-1C:



Summary for Subcatchment PR-1D:

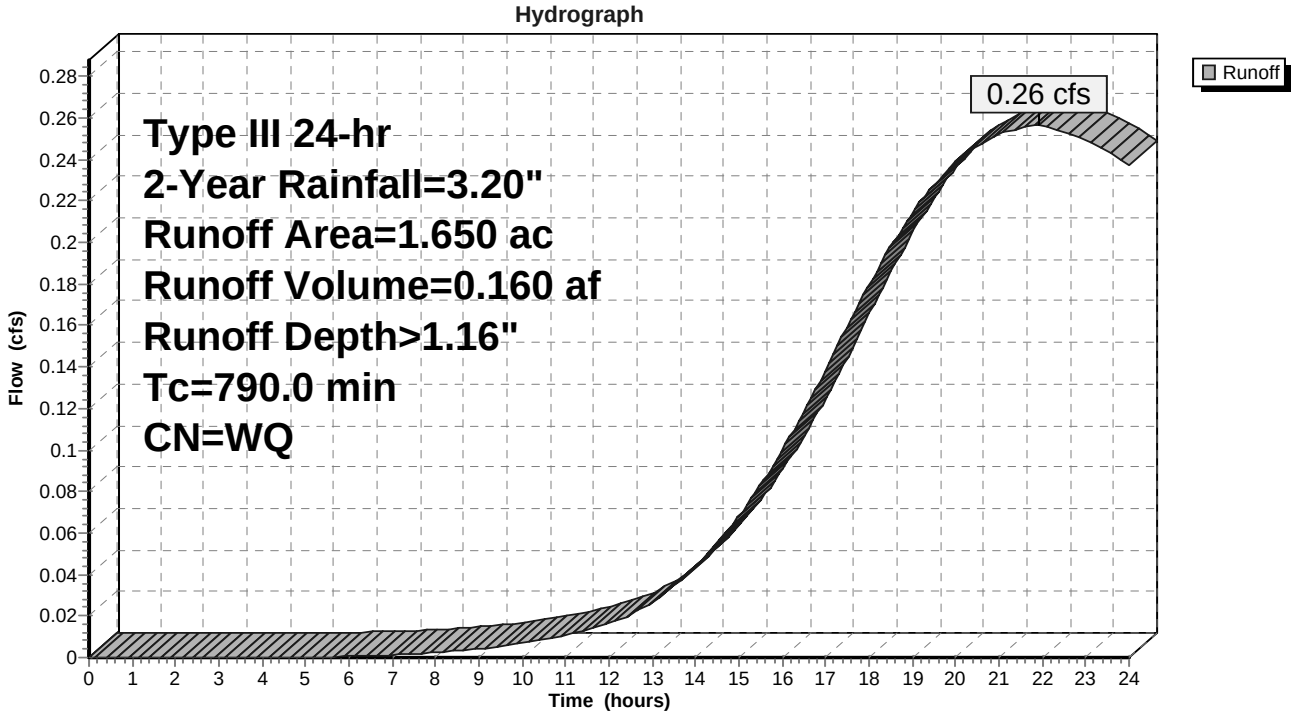
Runoff = 0.26 cfs @ 21.94 hrs, Volume= 0.160 af, Depth> 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (ac)	CN	Description
*	1.220	98	Porous Pavement, HSG A
	0.430	39	>75% Grass cover, Good, HSG A
	1.650		Weighted Average
	0.430		26.06% Pervious Area
	1.220		73.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
790.0					**Direct Entry, Per Hydrocad porous pavement design guidance**

Subcatchment PR-1D:



Summary for Subcatchment PR-2:

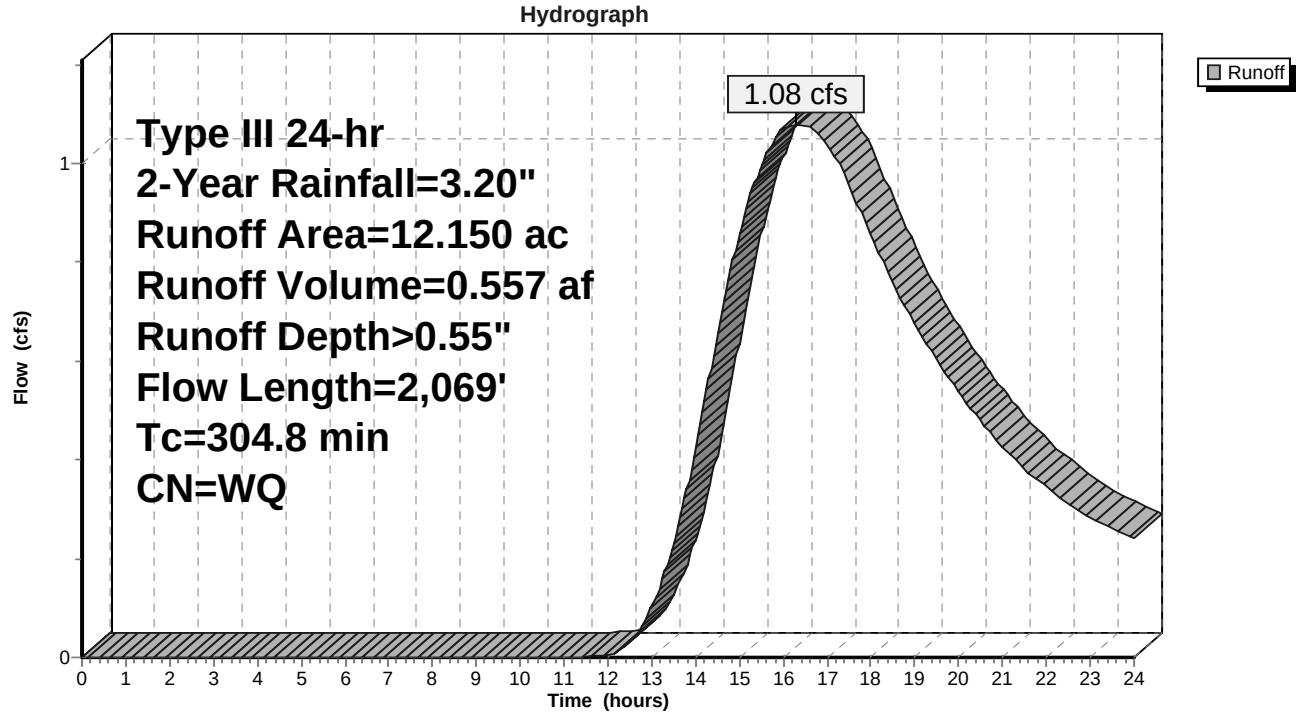
Runoff = 1.08 cfs @ 16.27 hrs, Volume= 0.557 af, Depth> 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (ac)	CN	Description
	5.920	30	Woods, Good, HSG A
*	6.230	77	Wetland
	12.150		Weighted Average
	12.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	50	0.0500	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
2.1	242	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
287.3	1,777	0.0017	0.10		**Shallow Concentrated Flow, Wetland** Forest w/Heavy Litter Kv= 2.5 fps
304.8	2,069	Total			

Subcatchment PR-2:



Summary for Subcatchment PR-3A:

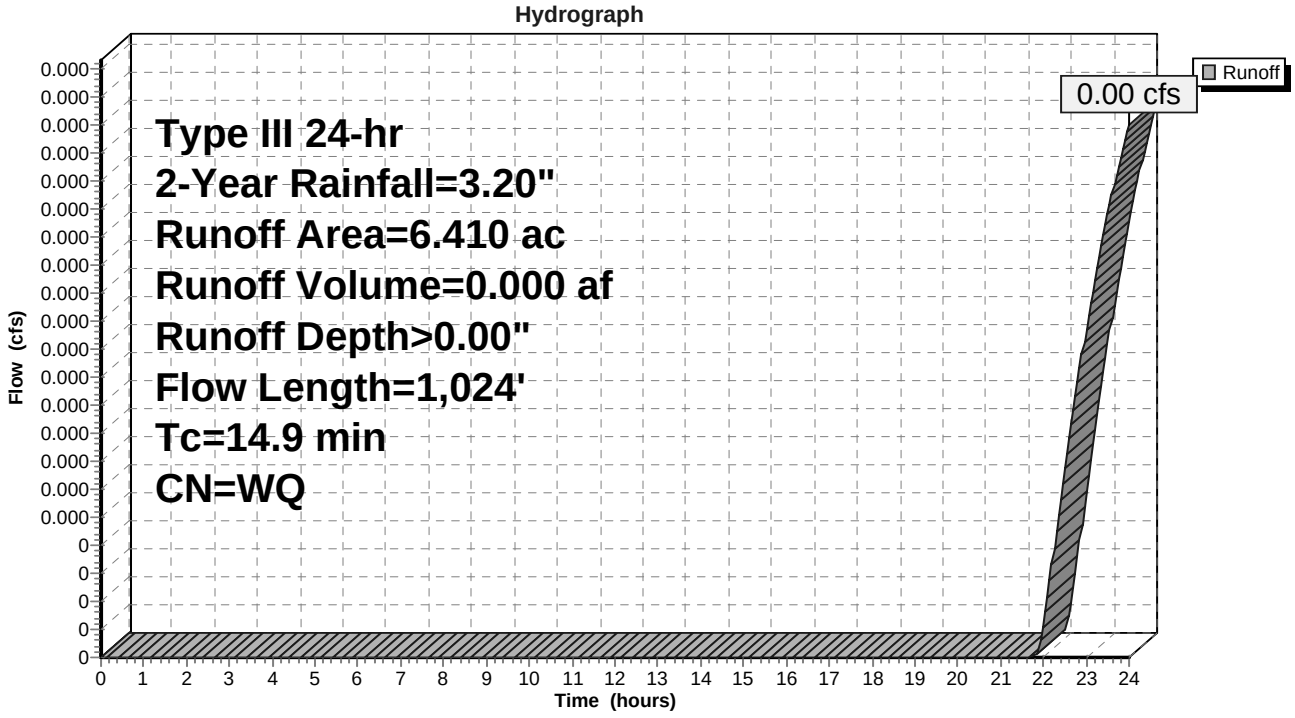
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
1.620	39	>75% Grass cover, Good, HSG A
4.790	35	Brush, Fair, HSG A
6.410		Weighted Average
6.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	252	0.1350	1.84		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.2	672	0.0100	1.00		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
1.4	100	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.9	1,024	Total			

Subcatchment PR-3A:



Summary for Subcatchment PR-3B:

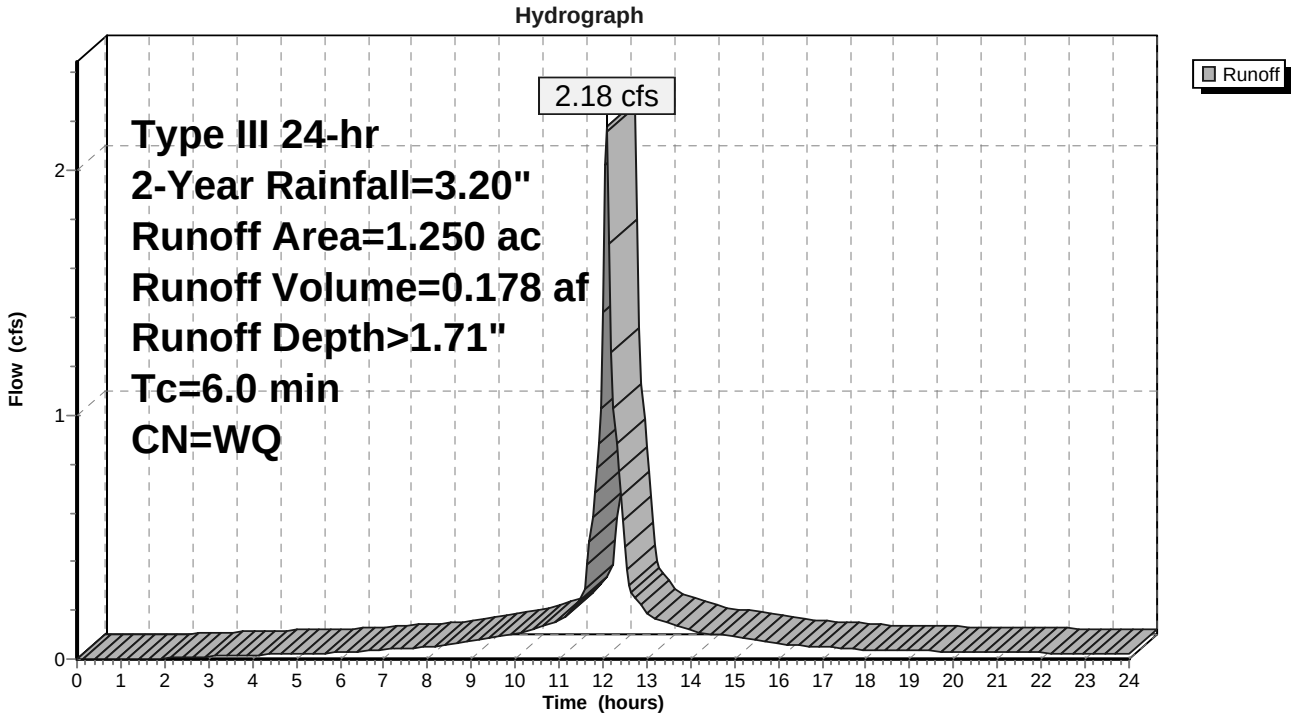
Runoff = 2.18 cfs @ 12.09 hrs, Volume= 0.178 af, Depth> 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG A
0.410	98	Roofs, HSG A
0.530	39	>75% Grass cover, Good, HSG A
1.250		Weighted Average
0.530		42.40% Pervious Area
0.720		57.60% Impervious Area

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

Subcatchment PR-3B:



Summary for Subcatchment PR-3C:

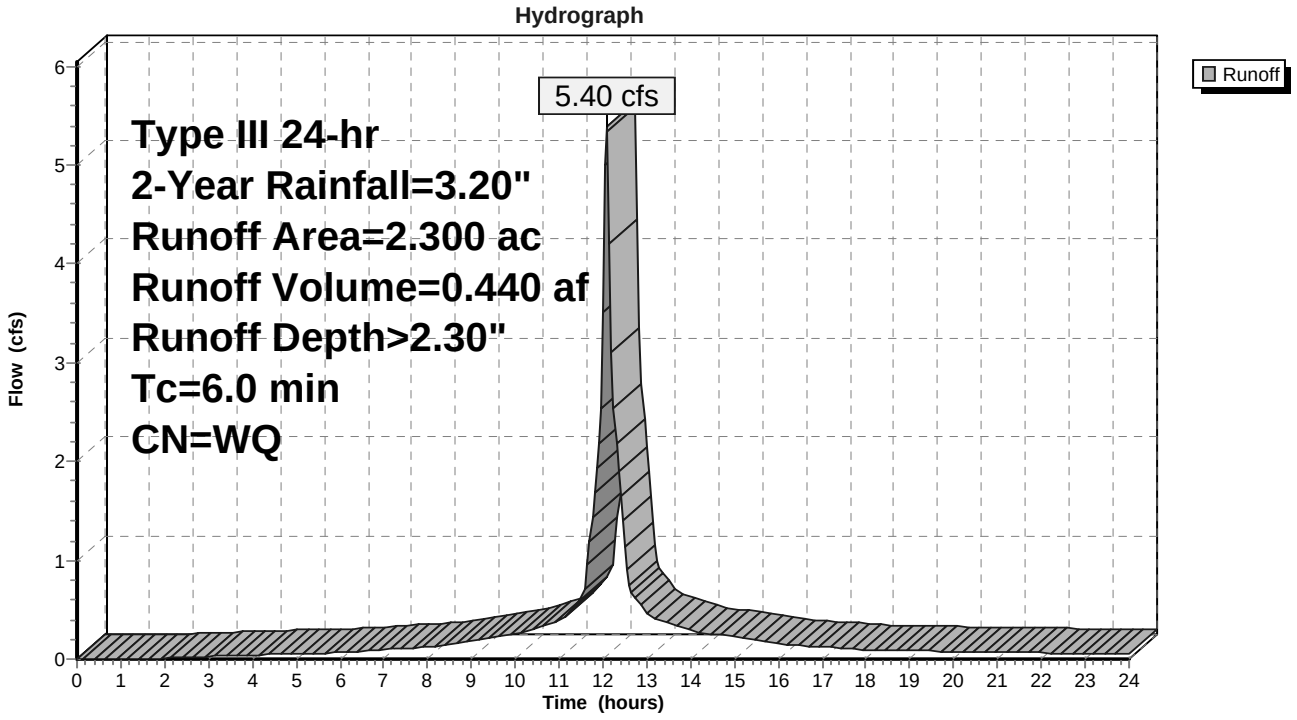
Runoff = 5.40 cfs @ 12.09 hrs, Volume= 0.440 af, Depth> 2.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
1.120	98	Paved parking, HSG A
0.660	98	Roofs, HSG A
0.520	39	>75% Grass cover, Good, HSG A
2.300		Weighted Average
0.520		22.61% Pervious Area
1.780		77.39% Impervious Area

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

Subcatchment PR-3C:



Summary for Subcatchment PR-3D:

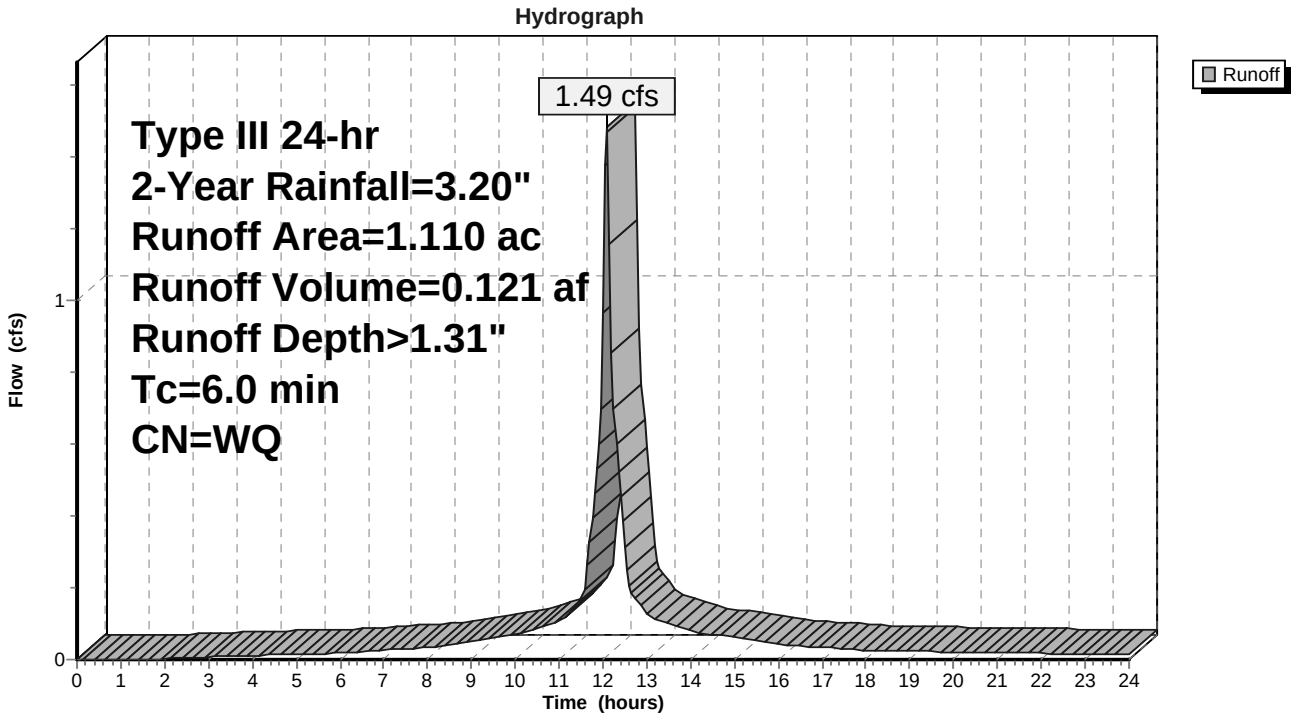
Runoff = 1.49 cfs @ 12.09 hrs, Volume= 0.121 af, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.490	98	Roofs, HSG A
0.620	39	>75% Grass cover, Good, HSG A
1.110		Weighted Average
0.620		55.86% Pervious Area
0.490		44.14% Impervious Area

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

Subcatchment PR-3D:



Summary for Subcatchment PR-3E:

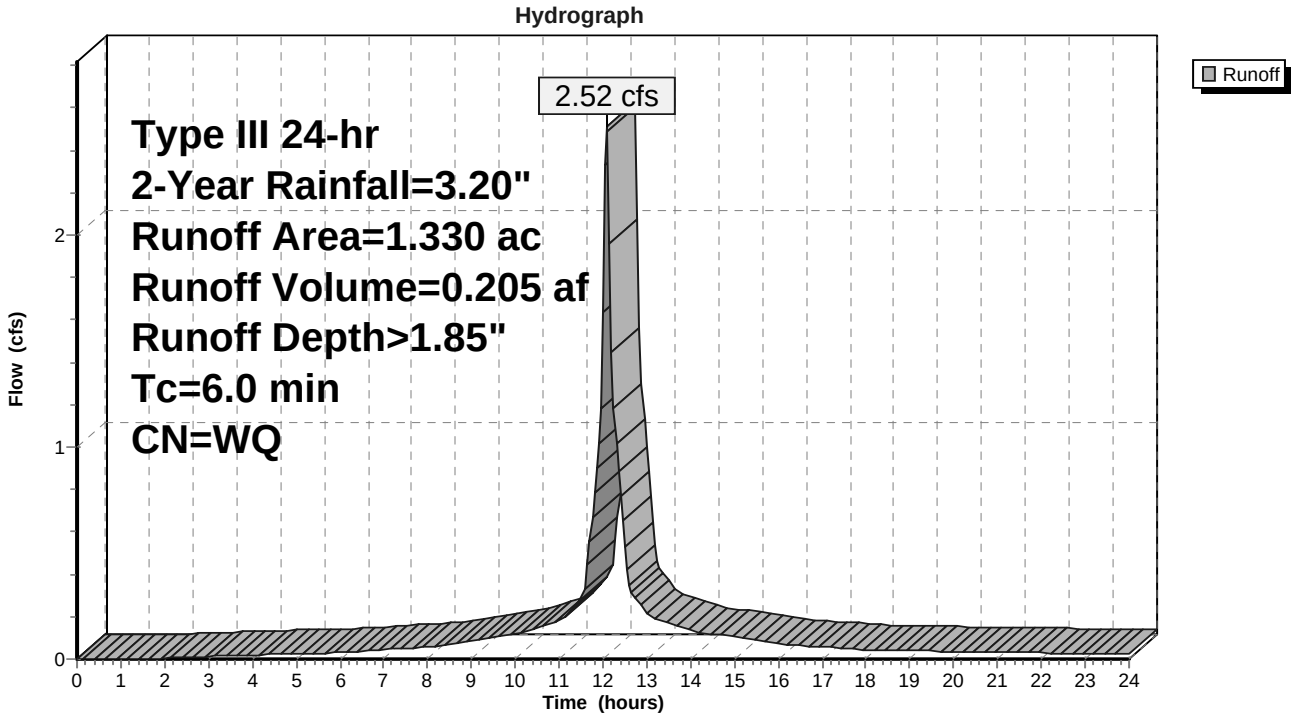
Runoff = 2.52 cfs @ 12.09 hrs, Volume= 0.205 af, Depth> 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.510	98	Paved parking, HSG A
0.320	98	Roofs, HSG A
0.500	39	>75% Grass cover, Good, HSG A
1.330		Weighted Average
0.500		37.59% Pervious Area
0.830		62.41% Impervious Area

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

Subcatchment PR-3E:



Summary for Subcatchment PR-3F:

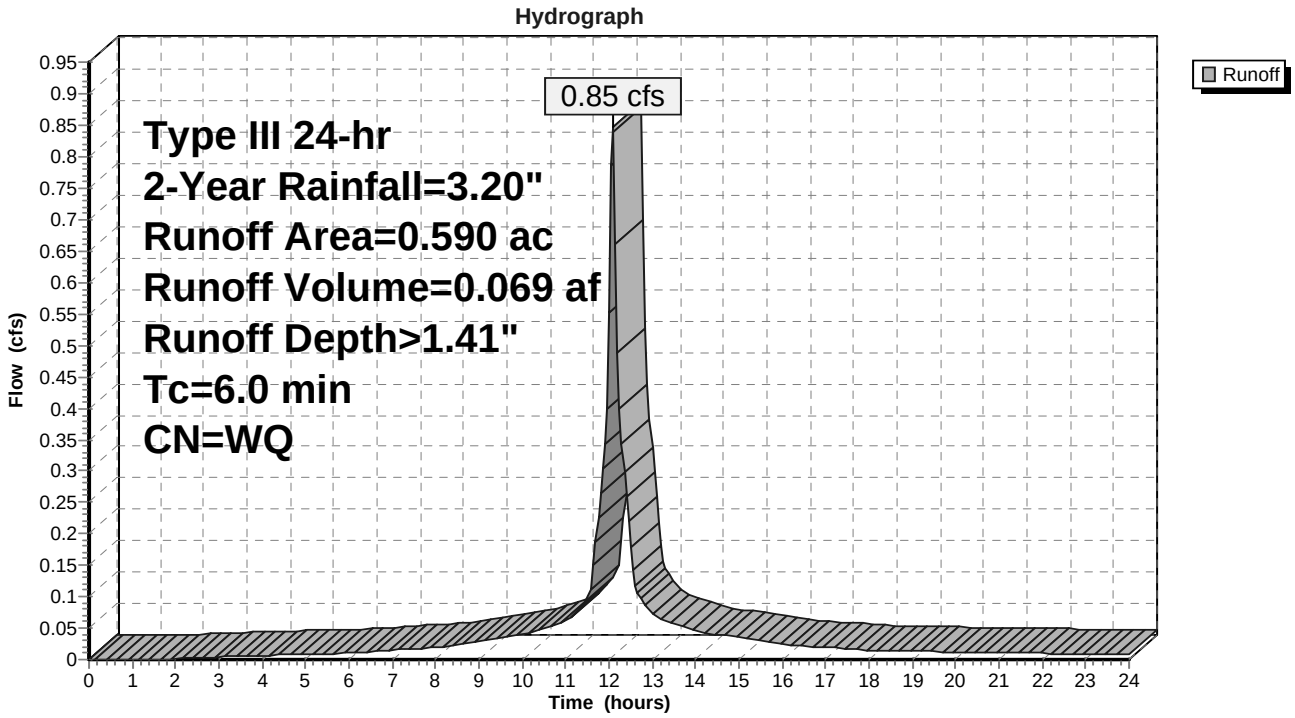
Runoff = 0.85 cfs @ 12.09 hrs, Volume= 0.069 af, Depth> 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.280	98	Roofs, HSG A
0.310	39	>75% Grass cover, Good, HSG A
0.590		Weighted Average
0.310		52.54% Pervious Area
0.280		47.46% Impervious Area

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

Subcatchment PR-3F:



Summary for Subcatchment PR-3G:

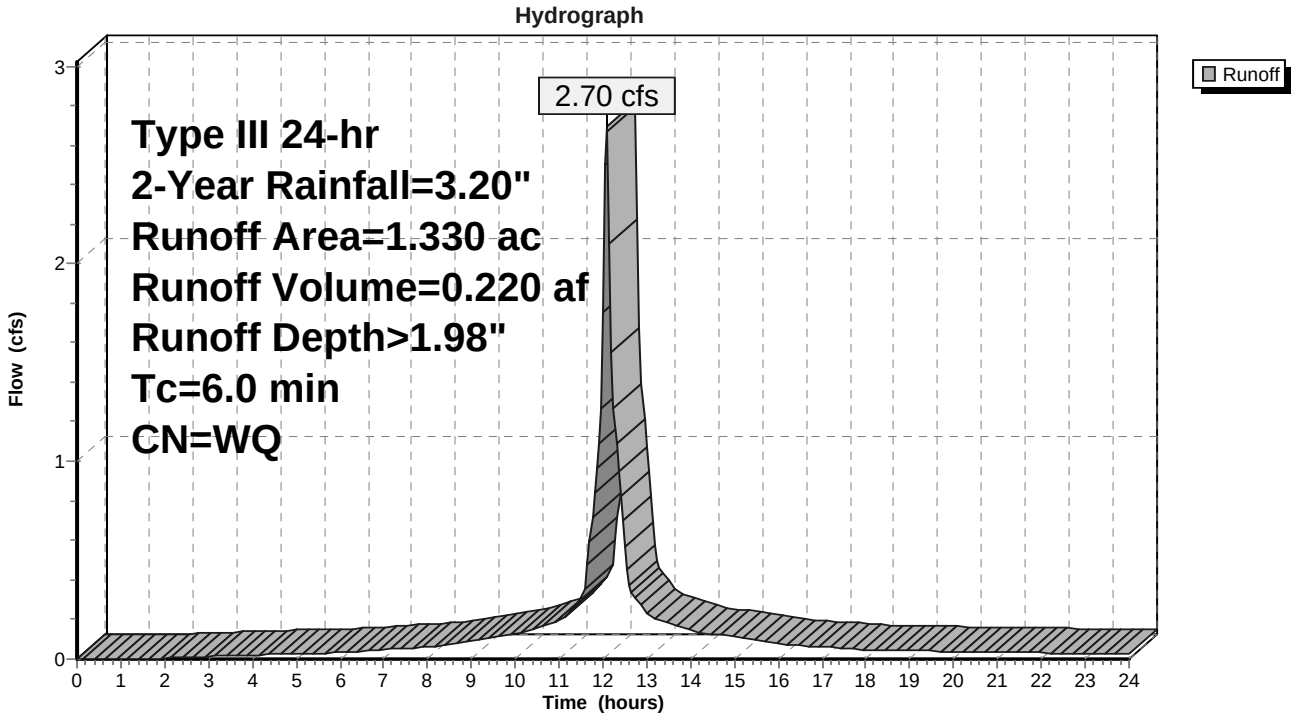
Runoff = 2.70 cfs @ 12.09 hrs, Volume= 0.220 af, Depth> 1.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG A
0.160	98	Roofs, HSG A
0.440	39	>75% Grass cover, Good, HSG A
1.330		Weighted Average
0.440		33.08% Pervious Area
0.890		66.92% Impervious Area

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

Subcatchment PR-3G:



Summary for Subcatchment PR-3H:

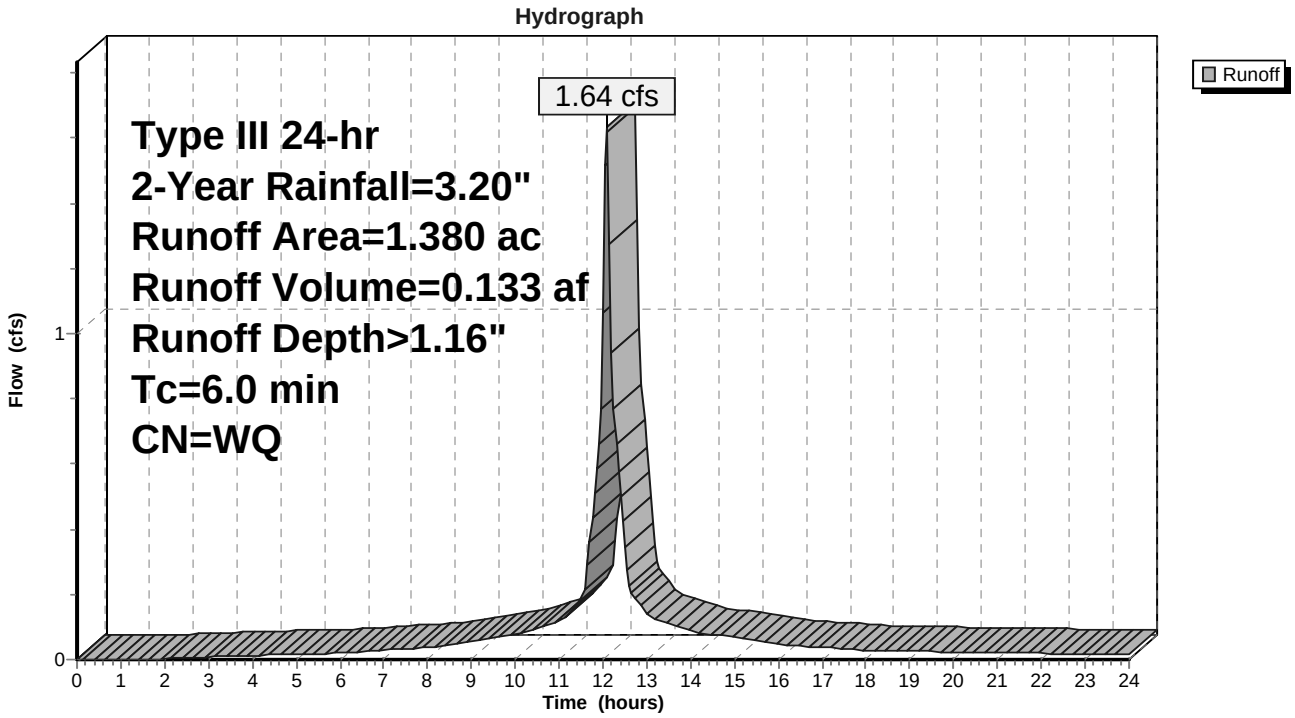
Runoff = 1.64 cfs @ 12.09 hrs, Volume= 0.133 af, Depth> 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.540	98	Roofs, HSG A
0.840	39	>75% Grass cover, Good, HSG A
1.380		Weighted Average
0.840		60.87% Pervious Area
0.540		39.13% Impervious Area

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

Subcatchment PR-3H:



Summary for Subcatchment PR-3I:

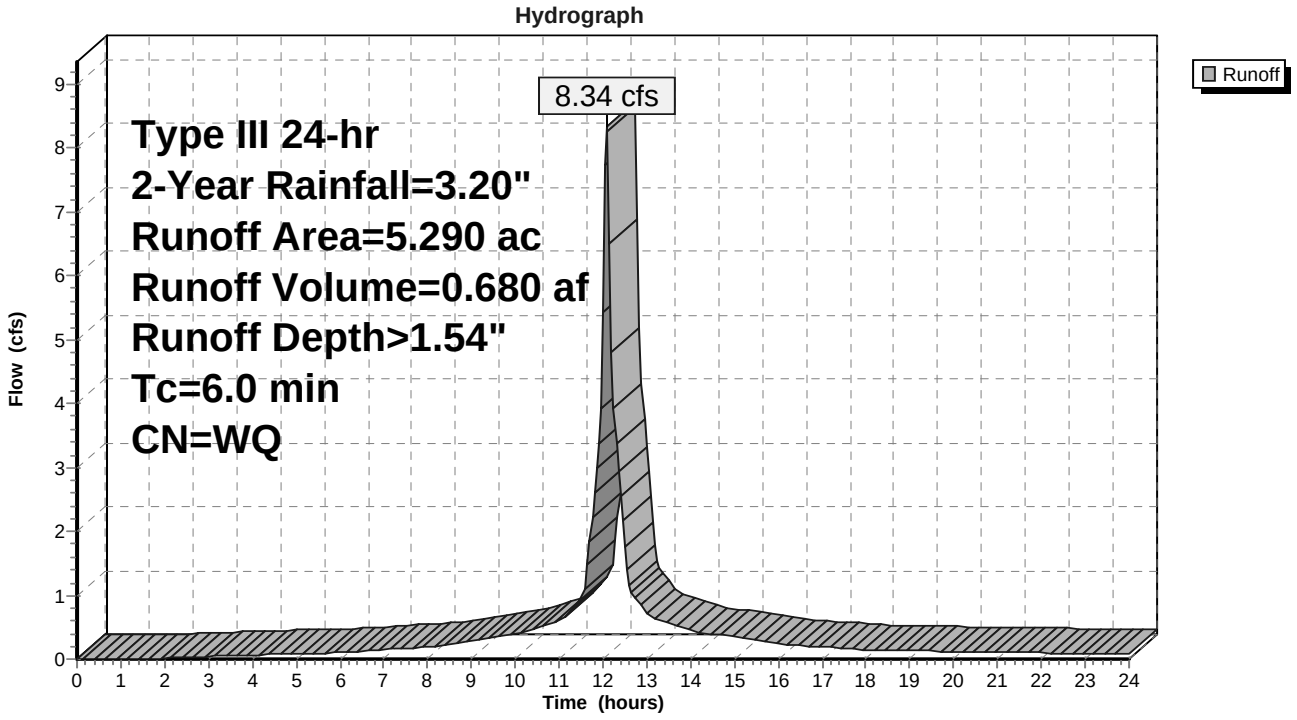
Runoff = 8.34 cfs @ 12.09 hrs, Volume= 0.680 af, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
1.570	98	Paved parking, HSG A
1.180	98	Roofs, HSG A
2.540	39	>75% Grass cover, Good, HSG A
5.290		Weighted Average
2.540		48.02% Pervious Area
2.750		51.98% Impervious Area

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

Subcatchment PR-3I:



Summary for Subcatchment PR-3J:

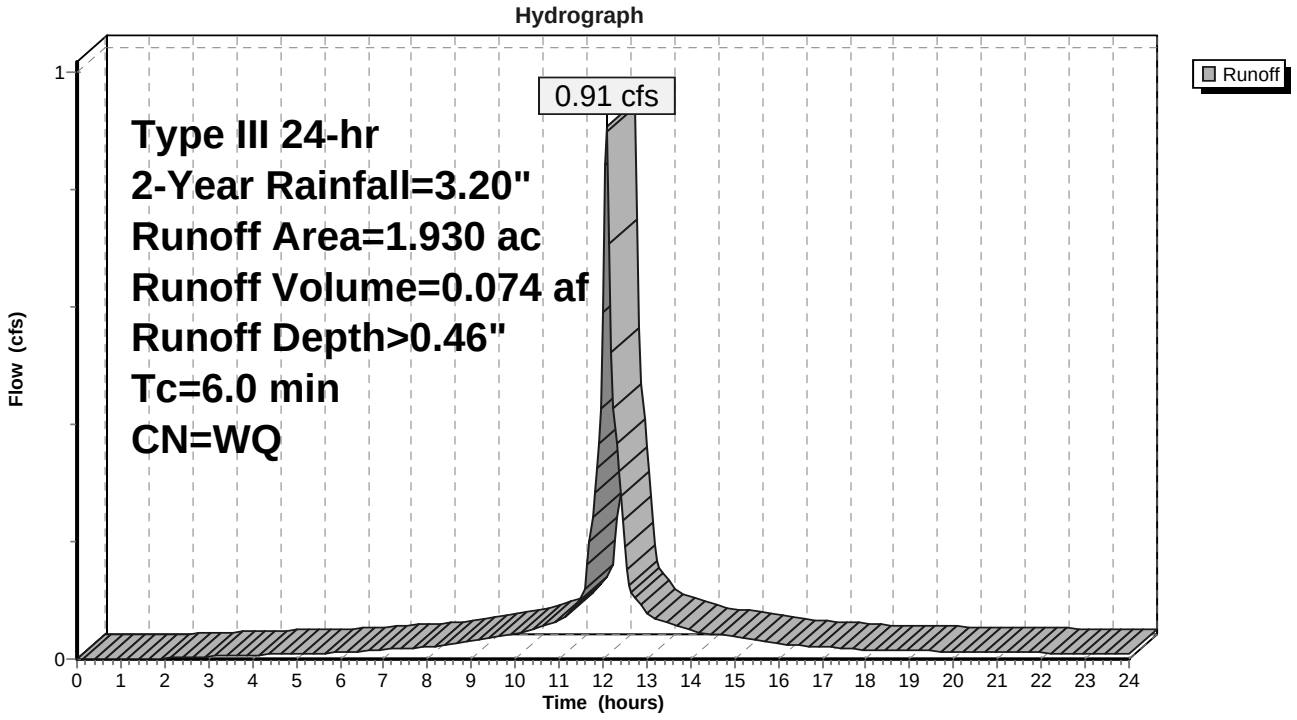
Runoff = 0.91 cfs @ 12.09 hrs, Volume= 0.074 af, Depth> 0.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.300	98	Roofs, HSG A
1.390	39	>75% Grass cover, Good, HSG A
0.240	30	Woods, Good, HSG A
1.930		Weighted Average
1.630		84.46% Pervious Area
0.300		15.54% Impervious Area

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

Subcatchment PR-3J:



Summary for Subcatchment PR-3K:

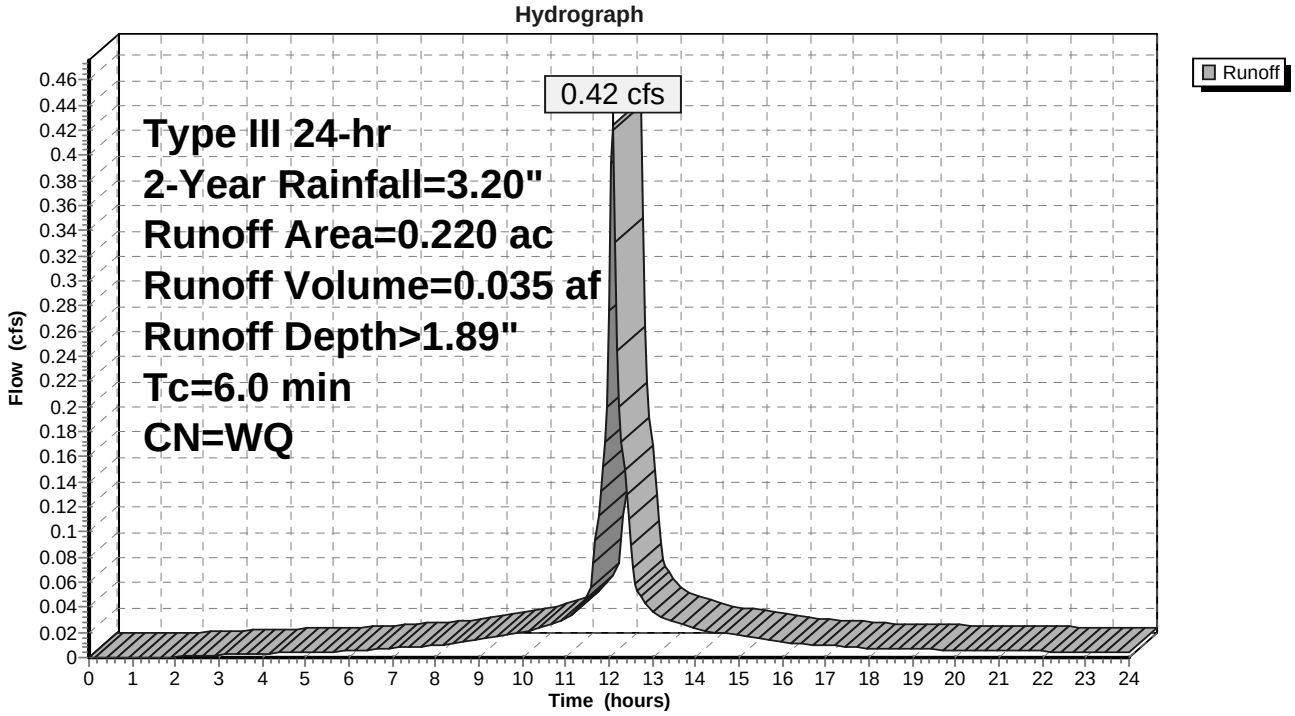
Runoff = 0.42 cfs @ 12.09 hrs, Volume= 0.035 af, Depth> 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.140	98	Roofs, HSG A
0.080	39	>75% Grass cover, Good, HSG A
0.220		Weighted Average
0.080		36.36% Pervious Area
0.140		63.64% Impervious Area

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

Subcatchment PR-3K:



Summary for Subcatchment PR-4:

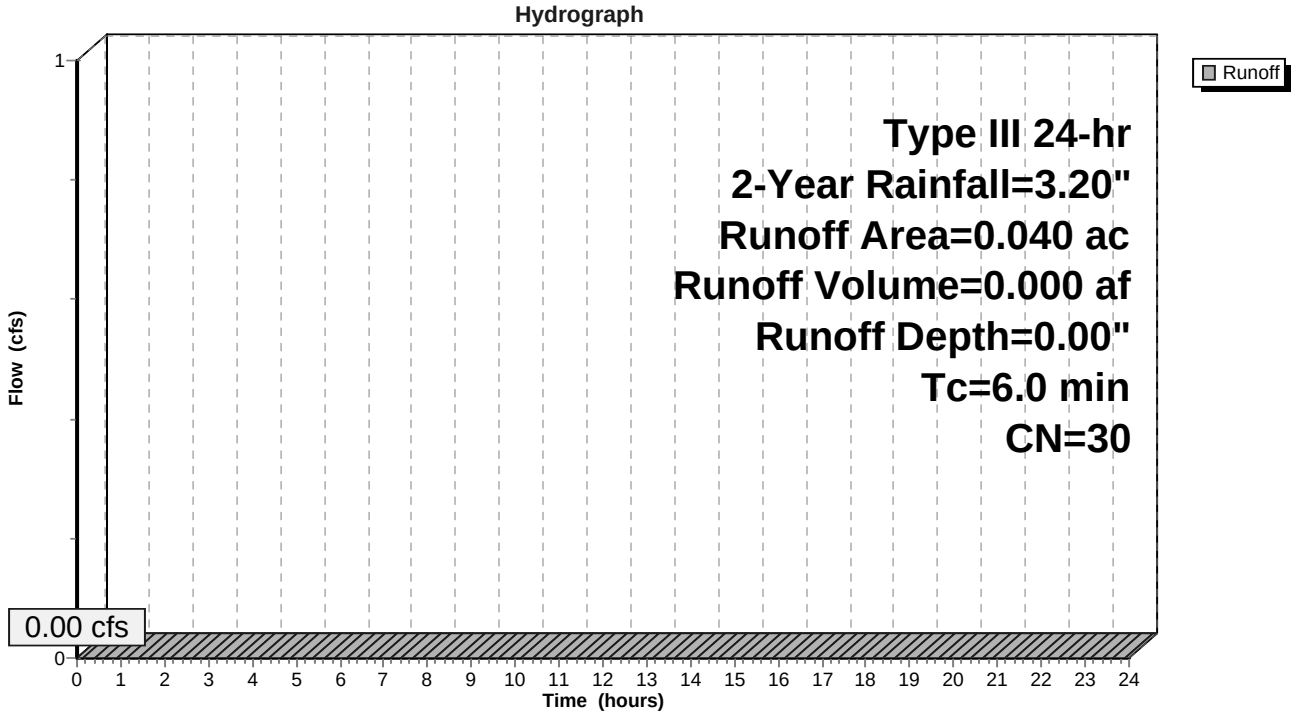
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.040	30	Woods, Good, HSG A
0.040		100.00% Pervious Area

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

Subcatchment PR-4:



Summary for Pond Basin 1:

Inflow Area = 6.360 ac, 29.40% Impervious, Inflow Depth > 0.87" for 2-Year event
Inflow = 5.67 cfs @ 12.09 hrs, Volume= 0.462 af
Outflow = 1.03 cfs @ 12.54 hrs, Volume= 0.462 af, Atten= 82%, Lag= 26.9 min
Discarded = 1.03 cfs @ 12.54 hrs, Volume= 0.462 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 130.86' @ 12.54 hrs Surf.Area= 5,387 sf Storage= 6,412 cf

Plug-Flow detention time= 49.5 min calculated for 0.462 af (100% of inflow)
Center-of-Mass det. time= 49.1 min (805.1 - 756.1)

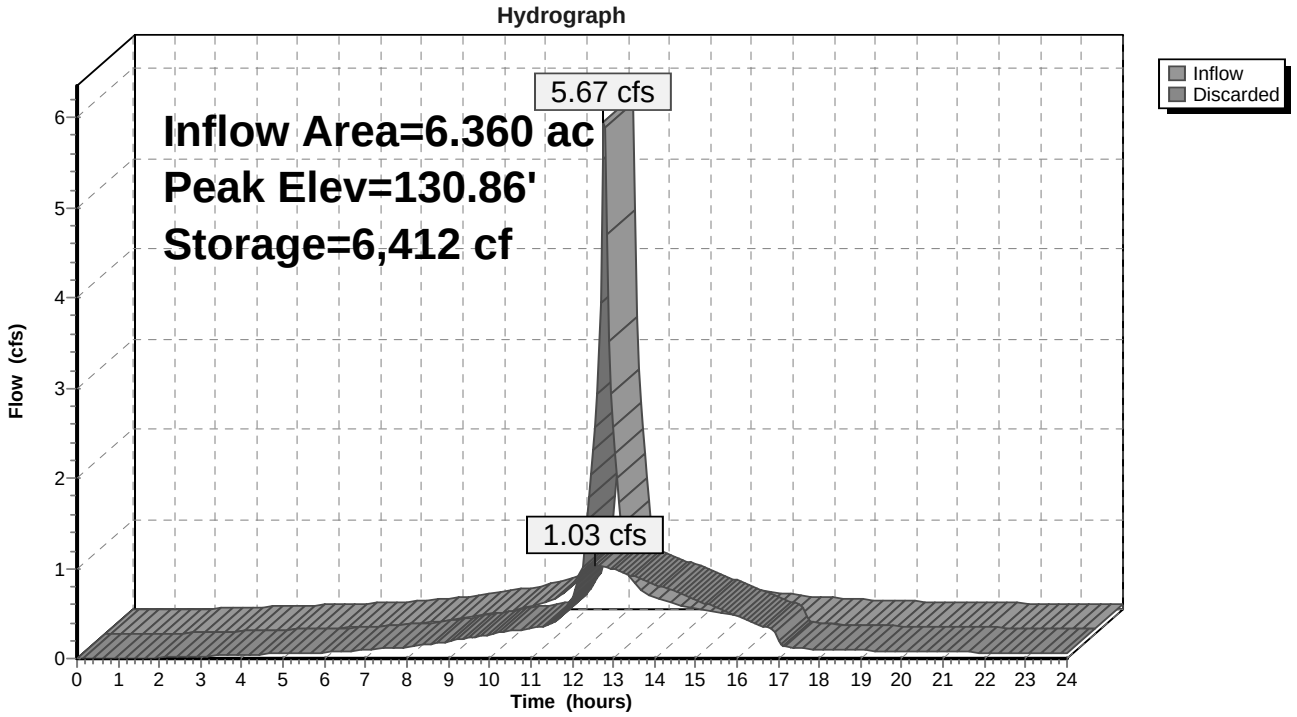
Volume	Invert	Avail.Storage	Storage Description
#1	129.00'	33,592 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
129.00	1,494	0	0
130.00	3,621	2,558	2,558
132.00	7,748	11,369	13,927
134.00	11,917	19,665	33,592

Device	Routing	Invert	Outlet Devices
#1	Discarded	129.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=1.03 cfs @ 12.54 hrs HW=130.86' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.03 cfs)

Pond Basin 1:


Hydrograph
Inflow
Discarded
5.67 cfs
1.03 cfs
Inflow Area=6.360 ac
Peak Elev=130.86'
Storage=6,412 cf
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
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

Summary for Pond PP: Porous Pavement

Inflow Area = 1.650 ac, 73.94% Impervious, Inflow Depth > 1.16" for 2-Year event
Inflow = 0.26 cfs @ 21.94 hrs, Volume= 0.160 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

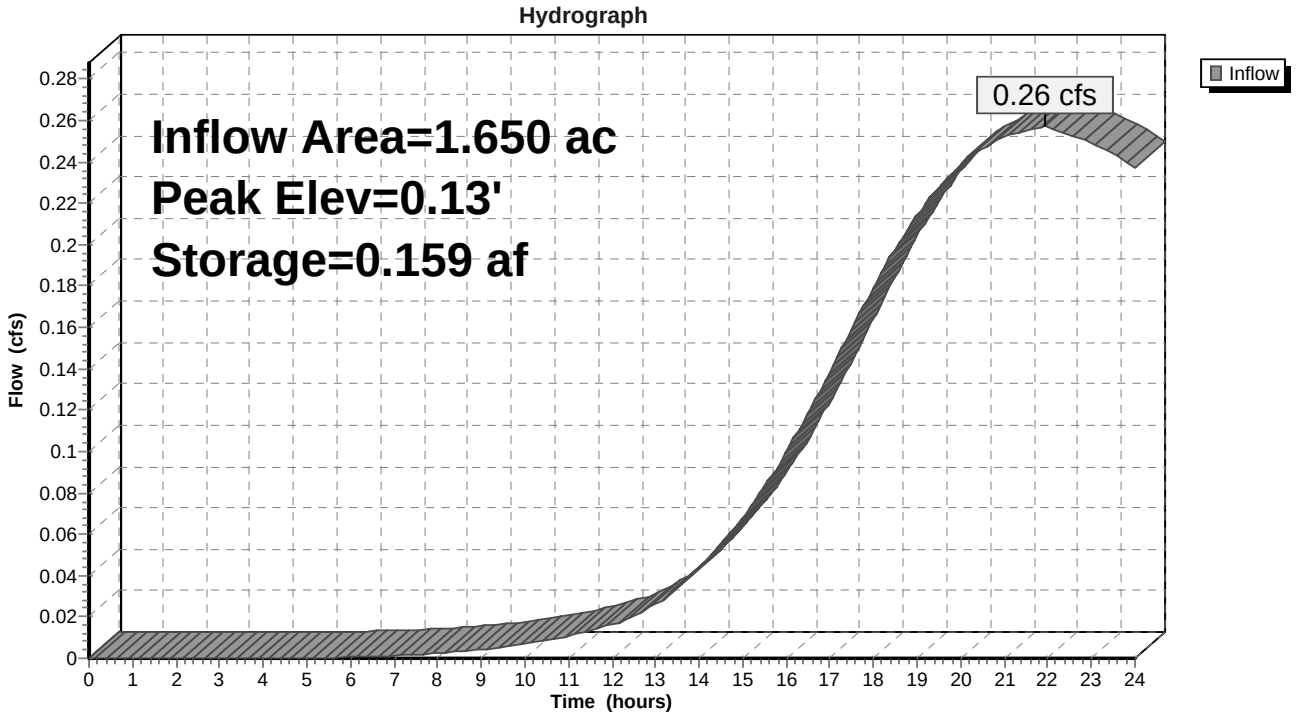
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.13' @ 24.00 hrs Surf.Area= 1.220 ac Storage= 0.159 af

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

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2.952 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
0.00	1.220	0.000	0.000
2.42	1.220	2.952	2.952

Pond PP: Porous Pavement



Summary for Pond SIS-1:

Inflow Area = 1.930 ac, 15.54% Impervious, Inflow Depth > 0.46" for 2-Year event
Inflow = 0.91 cfs @ 12.09 hrs, Volume= 0.074 af
Outflow = 0.52 cfs @ 12.05 hrs, Volume= 0.074 af, Atten= 43%, Lag= 0.0 min
Discarded = 0.52 cfs @ 12.05 hrs, Volume= 0.074 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 163.26' @ 12.21 hrs Surf.Area= 2,705 sf Storage= 210 cf

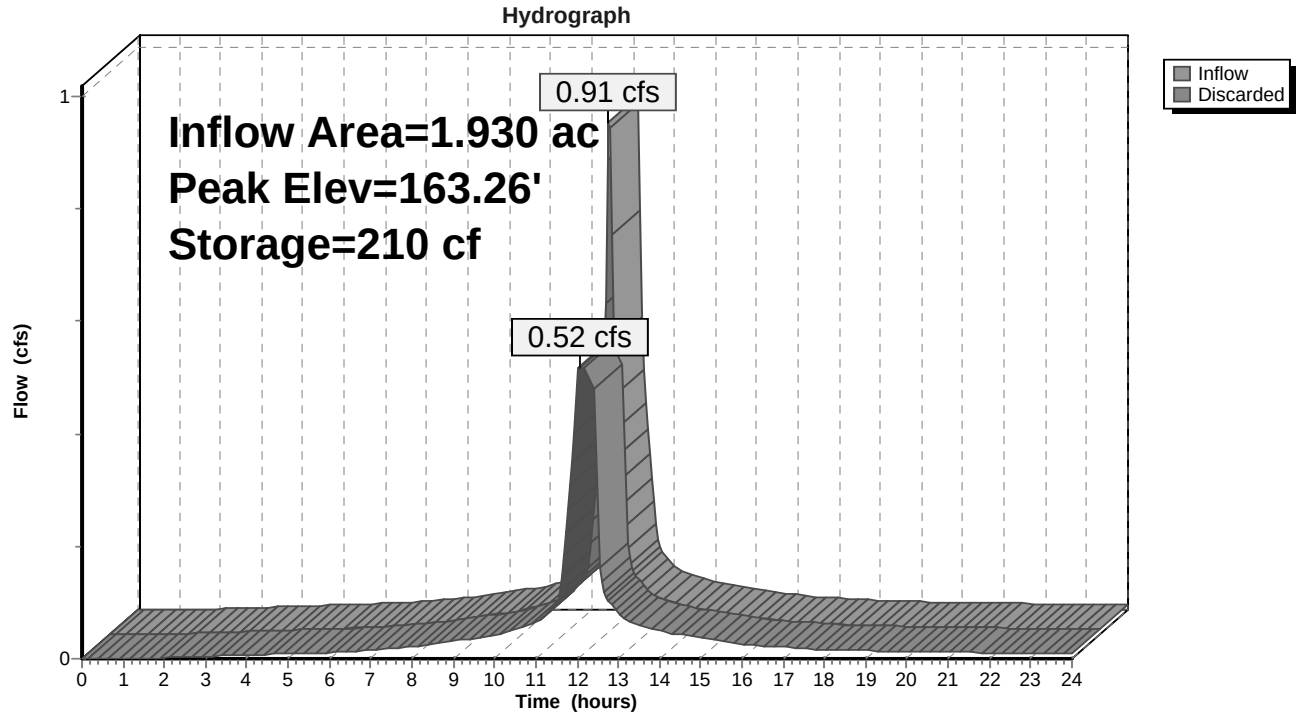
Plug-Flow detention time= 2.2 min calculated for 0.074 af (100% of inflow)
Center-of-Mass det. time= 2.0 min (758.3 - 756.3)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	2,915 cf	**5.00'W x 541.00'L x 5.00'H Prismatoid** 13,525 cf Overall - 3,810 cf Embedded = 9,715 cf x 30.0% Voids
#2	164.00'	3,810 cf	**36.0" Round Pipe Storage** Inside #1 L= 539.0'
		6,724 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	163.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.52 cfs @ 12.05 hrs HW=163.09' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.52 cfs)

Pond SIS-1:



Summary for Pond SIS-10:

Inflow Area = 1.250 ac, 57.60% Impervious, Inflow Depth > 1.71" for 2-Year event
Inflow = 2.18 cfs @ 12.09 hrs, Volume= 0.178 af
Outflow = 0.41 cfs @ 11.70 hrs, Volume= 0.178 af, Atten= 81%, Lag= 0.0 min
Discarded = 0.41 cfs @ 11.70 hrs, Volume= 0.178 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 129.05' @ 12.53 hrs Surf.Area= 2,116 sf Storage= 1,930 cf

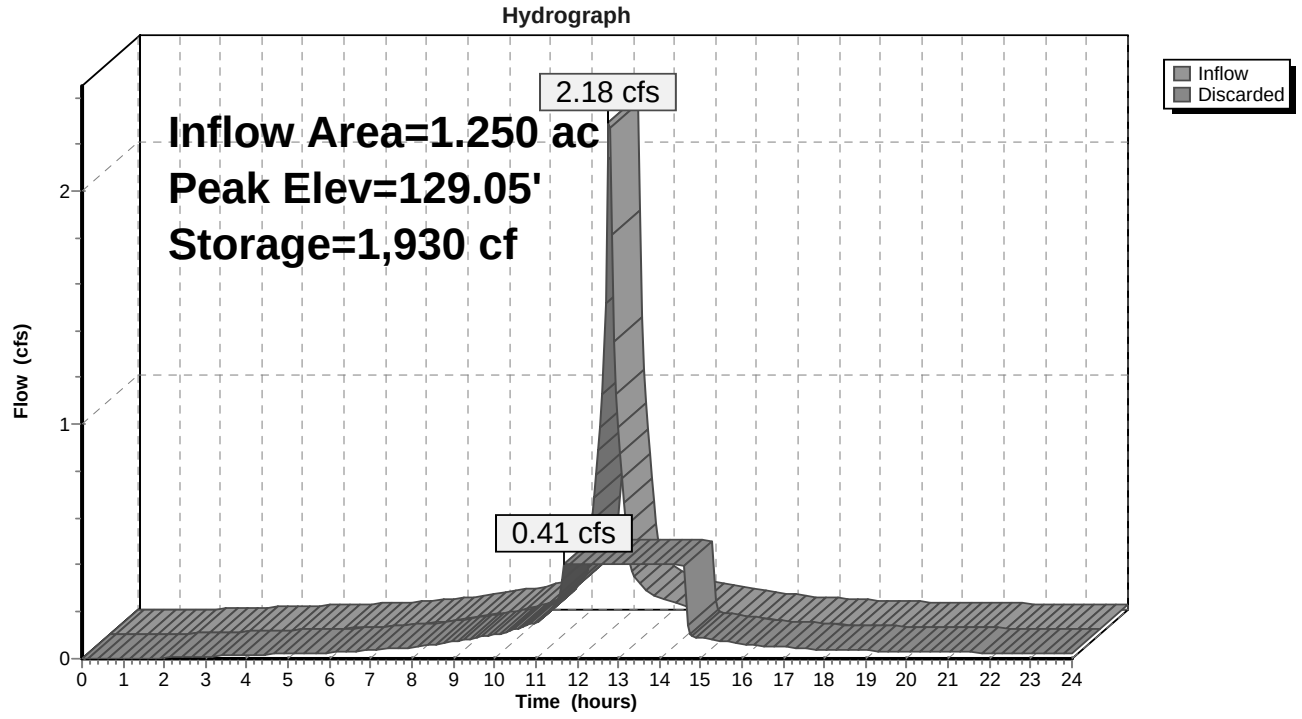
Plug-Flow detention time= 25.7 min calculated for 0.178 af (100% of inflow)
Center-of-Mass det. time= 25.5 min (781.5 - 756.0)

Volume	Invert	Avail.Storage	Storage Description
#1	127.00'	2,788 cf	**46.00'W x 46.00'L x 8.00'H Prismatoid** 16,928 cf Overall - 7,634 cf Embedded = 9,294 cf x 30.0% Voids
#2	128.00'	7,634 cf	**72.0" Round Pipe Storage** Inside #1 L= 270.0'
		10,422 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	127.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.41 cfs @ 11.70 hrs HW=127.08' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.41 cfs)

Pond SIS-10:



Summary for Pond SIS-2:

Inflow Area = 1.380 ac, 39.13% Impervious, Inflow Depth > 1.16" for 2-Year event
Inflow = 1.64 cfs @ 12.09 hrs, Volume= 0.133 af
Outflow = 0.34 cfs @ 11.75 hrs, Volume= 0.133 af, Atten= 79%, Lag= 0.0 min
Discarded = 0.34 cfs @ 11.75 hrs, Volume= 0.133 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 143.33' @ 12.51 hrs Surf.Area= 1,776 sf Storage= 1,343 cf

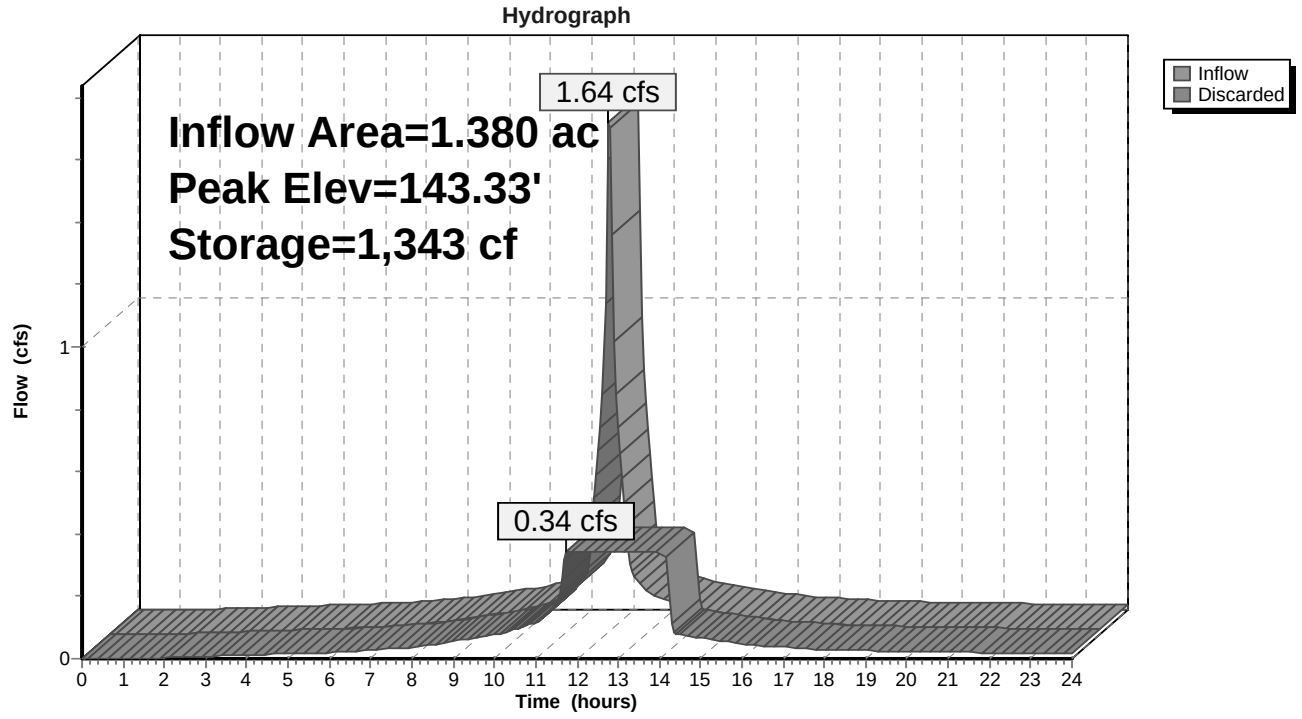
Plug-Flow detention time= 20.6 min calculated for 0.133 af (100% of inflow)
Center-of-Mass det. time= 20.3 min (776.4 - 756.1)

Volume	Invert	Avail.Storage	Storage Description
#1	141.50'	2,396 cf	**8.00'W x 222.00'L x 8.00'H Prismatoid** 14,208 cf Overall - 6,220 cf Embedded = 7,988 cf x 30.0% Voids
#2	142.50'	6,220 cf	**72.0" Round Pipe Storage** Inside #1 L= 220.0'
		8,617 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	141.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.34 cfs @ 11.75 hrs HW=141.60' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.34 cfs)

Pond SIS-2:



Summary for Pond SIS-3:

Inflow Area = 5.290 ac, 51.98% Impervious, Inflow Depth > 1.54" for 2-Year event
Inflow = 8.34 cfs @ 12.09 hrs, Volume= 0.680 af
Outflow = 1.44 cfs @ 11.70 hrs, Volume= 0.679 af, Atten= 83%, Lag= 0.0 min
Discarded = 1.44 cfs @ 11.70 hrs, Volume= 0.679 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 142.50' @ 12.55 hrs Surf.Area= 7,504 sf Storage= 7,769 cf

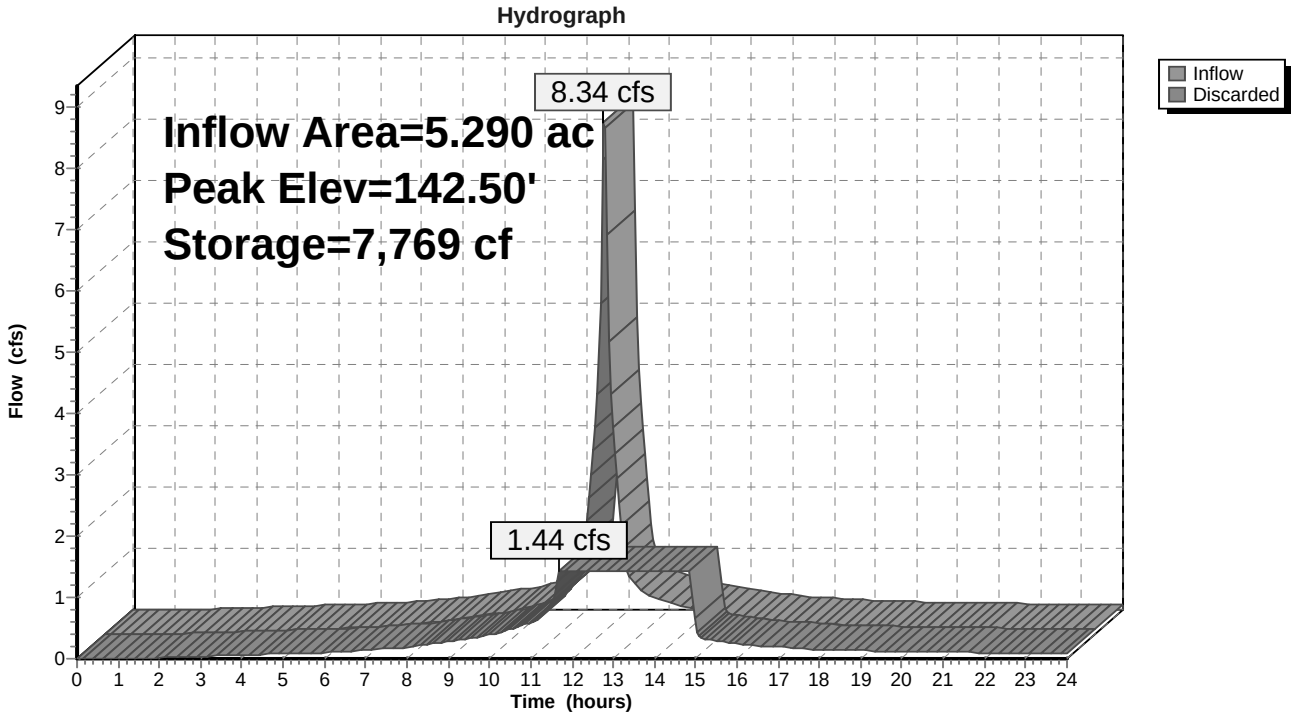
Plug-Flow detention time= 30.3 min calculated for 0.679 af (100% of inflow)
Center-of-Mass det. time= 30.0 min (786.1 - 756.0)

Volume	Invert	Avail.Storage	Storage Description
#1	140.50'	13,291 cf	**56.00'W x 134.00'L x 8.00'H Prismatoid** 60,032 cf Overall - 26,804 cf Embedded = 33,228 cf x 40.0% Voids
#2	141.50'	26,804 cf	**72.0" Round Pipe Storage** Inside #1 L= 948.0'
		40,095 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=1.44 cfs @ 11.70 hrs HW=140.59' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.44 cfs)

Pond SIS-3:



Summary for Pond SIS-4:

Inflow Area = 1.330 ac, 66.92% Impervious, Inflow Depth > 1.98" for 2-Year event
Inflow = 2.70 cfs @ 12.09 hrs, Volume= 0.220 af
Outflow = 0.44 cfs @ 11.70 hrs, Volume= 0.220 af, Atten= 84%, Lag= 0.0 min
Discarded = 0.44 cfs @ 11.70 hrs, Volume= 0.220 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 147.12' @ 12.56 hrs Surf.Area= 2,304 sf Storage= 2,590 cf

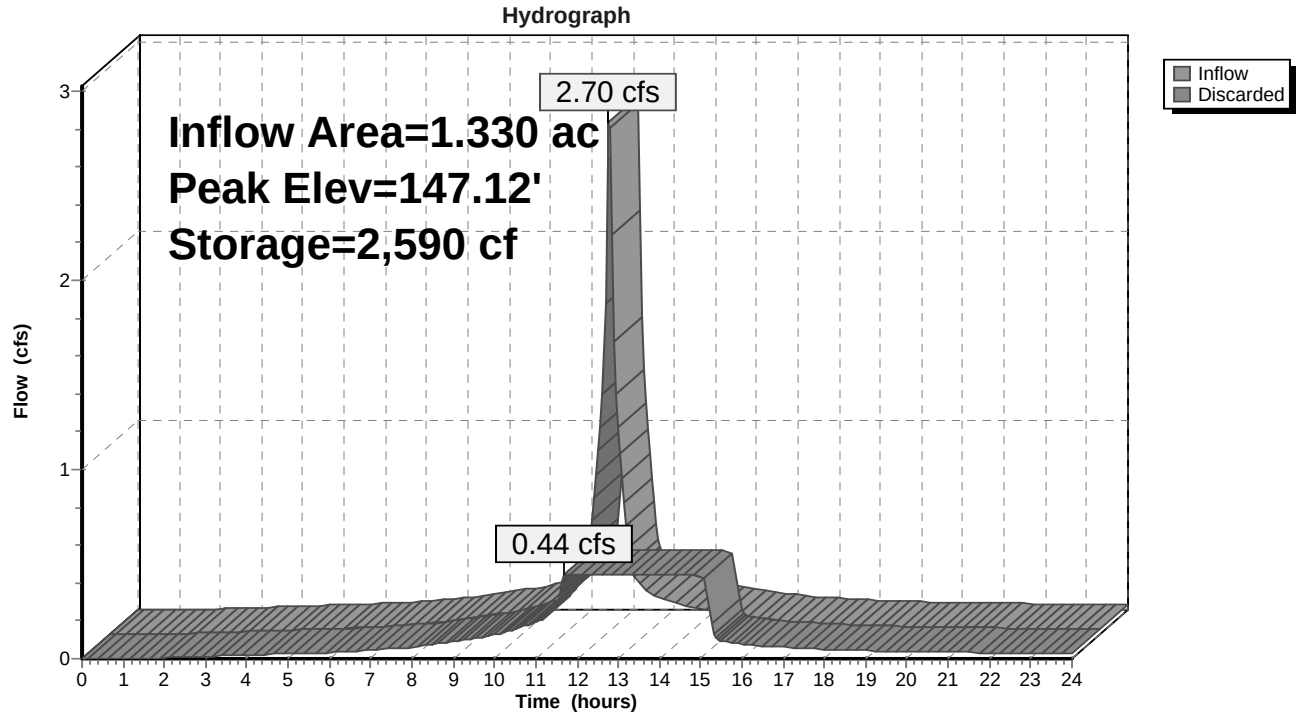
Plug-Flow detention time= 33.6 min calculated for 0.219 af (100% of inflow)
Center-of-Mass det. time= 33.2 min (789.2 - 756.0)

Volume	Invert	Avail.Storage	Storage Description
#1	145.00'	4,116 cf	**16.00'W x 144.00'L x 8.00'H Prismatoid** 18,432 cf Overall - 8,143 cf Embedded = 10,289 cf x 40.0% Voids
#2	146.00'	8,143 cf	**72.0" Round Pipe Storage** Inside #1 L= 288.0'
		12,259 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	145.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.44 cfs @ 11.70 hrs HW=145.10' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.44 cfs)

Pond SIS-4:



Summary for Pond SIS-5:

Inflow Area = 0.590 ac, 47.46% Impervious, Inflow Depth > 1.41" for 2-Year event
Inflow = 0.85 cfs @ 12.09 hrs, Volume= 0.069 af
Outflow = 0.17 cfs @ 11.75 hrs, Volume= 0.069 af, Atten= 81%, Lag= 0.0 min
Discarded = 0.17 cfs @ 11.75 hrs, Volume= 0.069 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 138.96' @ 12.52 hrs Surf.Area= 864 sf Storage= 727 cf

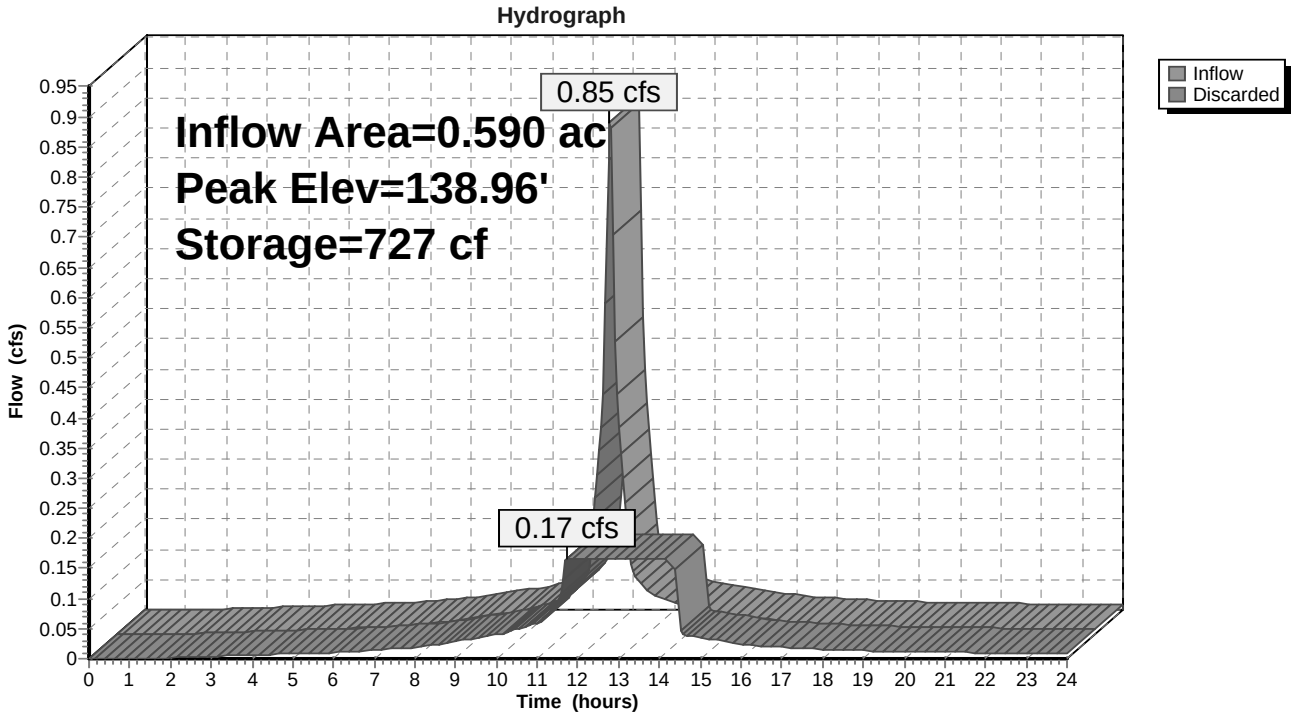
Plug-Flow detention time= 23.3 min calculated for 0.069 af (100% of inflow)
Center-of-Mass det. time= 23.1 min (779.1 - 756.0)

Volume	Invert	Avail.Storage	Storage Description
#1	137.00'	1,158 cf	**16.00'W x 54.00'L x 8.00'H Prismatoid** 6,912 cf Overall - 3,054 cf Embedded = 3,858 cf x 30.0% Voids
#2	138.00'	3,054 cf	**72.0" Round Pipe Storage** Inside #1 L= 108.0'
		4,211 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	137.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.17 cfs @ 11.75 hrs HW=137.11' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.17 cfs)

Pond SIS-5:



Summary for Pond SIS-6:

Inflow Area = 1.330 ac, 62.41% Impervious, Inflow Depth > 1.85" for 2-Year event
Inflow = 2.52 cfs @ 12.09 hrs, Volume= 0.205 af
Outflow = 0.33 cfs @ 11.65 hrs, Volume= 0.205 af, Atten= 87%, Lag= 0.0 min
Discarded = 0.33 cfs @ 11.65 hrs, Volume= 0.205 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 134.91' @ 12.62 hrs Surf.Area= 1,728 sf Storage= 2,703 cf

Plug-Flow detention time= 51.1 min calculated for 0.205 af (100% of inflow)
Center-of-Mass det. time= 50.6 min (806.6 - 756.0)

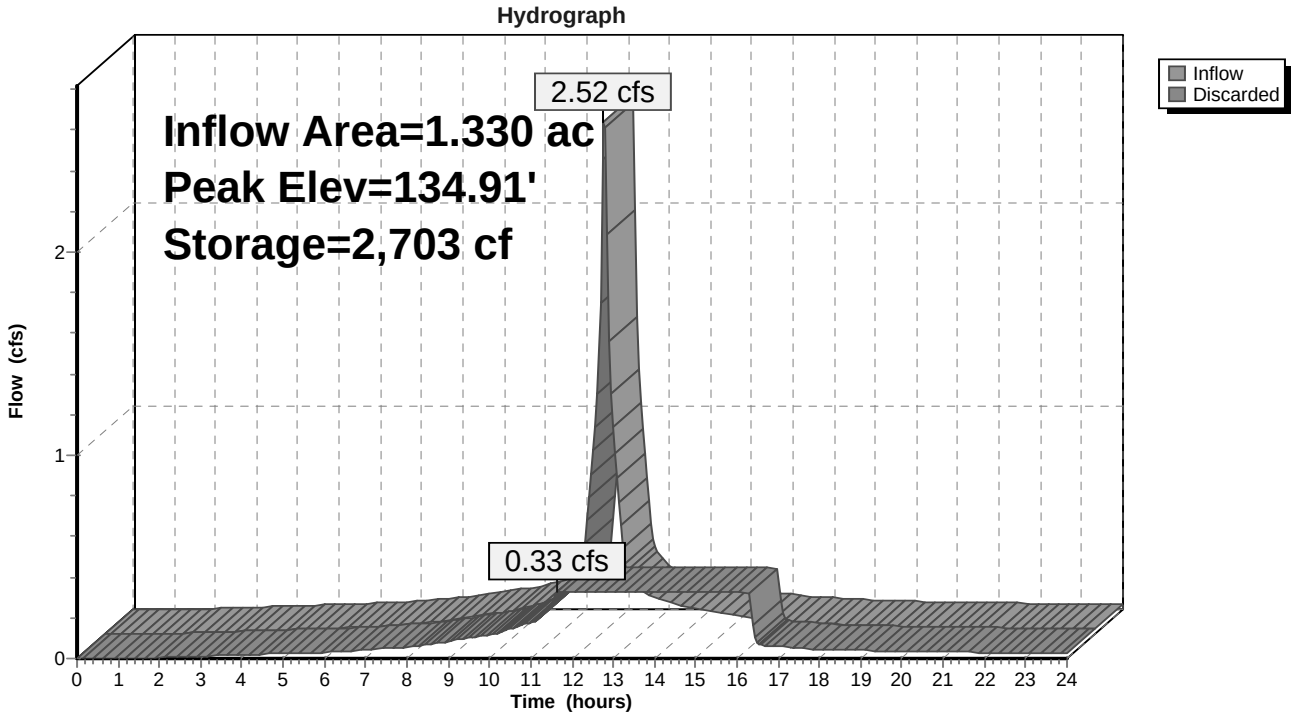
Volume	Invert	Avail.Storage	Storage Description
#1	132.00'	2,281 cf	**32.00'W x 54.00'L x 8.00'H Prismatoid** 13,824 cf Overall - 6,220 cf Embedded = 7,604 cf x 30.0% Voids
#2	133.00'	6,220 cf	**72.0" Round Pipe Storage** Inside #1 L= 220.0'
#3	142.00'	4,855 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		13,356 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
142.00	0	0	0
144.00	1,185	1,185	1,185
146.00	2,485	3,670	4,855

Device	Routing	Invert	Outlet Devices
#1	Discarded	132.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.33 cfs @ 11.65 hrs HW=132.16' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.33 cfs)

Pond SIS-6:


Hydrograph
Inflow
Discarded
2.52 cfs
0.33 cfs
Inflow Area=1.330 ac
Peak Elev=134.91'
Storage=2,703 cf
Flow (cfs)
0
1
2
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

Summary for Pond SIS-7:

Inflow Area = 1.110 ac, 44.14% Impervious, Inflow Depth > 1.31" for 2-Year event
Inflow = 1.49 cfs @ 12.09 hrs, Volume= 0.121 af
Outflow = 0.29 cfs @ 11.75 hrs, Volume= 0.121 af, Atten= 81%, Lag= 0.0 min
Discarded = 0.29 cfs @ 11.75 hrs, Volume= 0.121 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 133.48' @ 12.52 hrs Surf.Area= 1,496 sf Storage= 1,281 cf

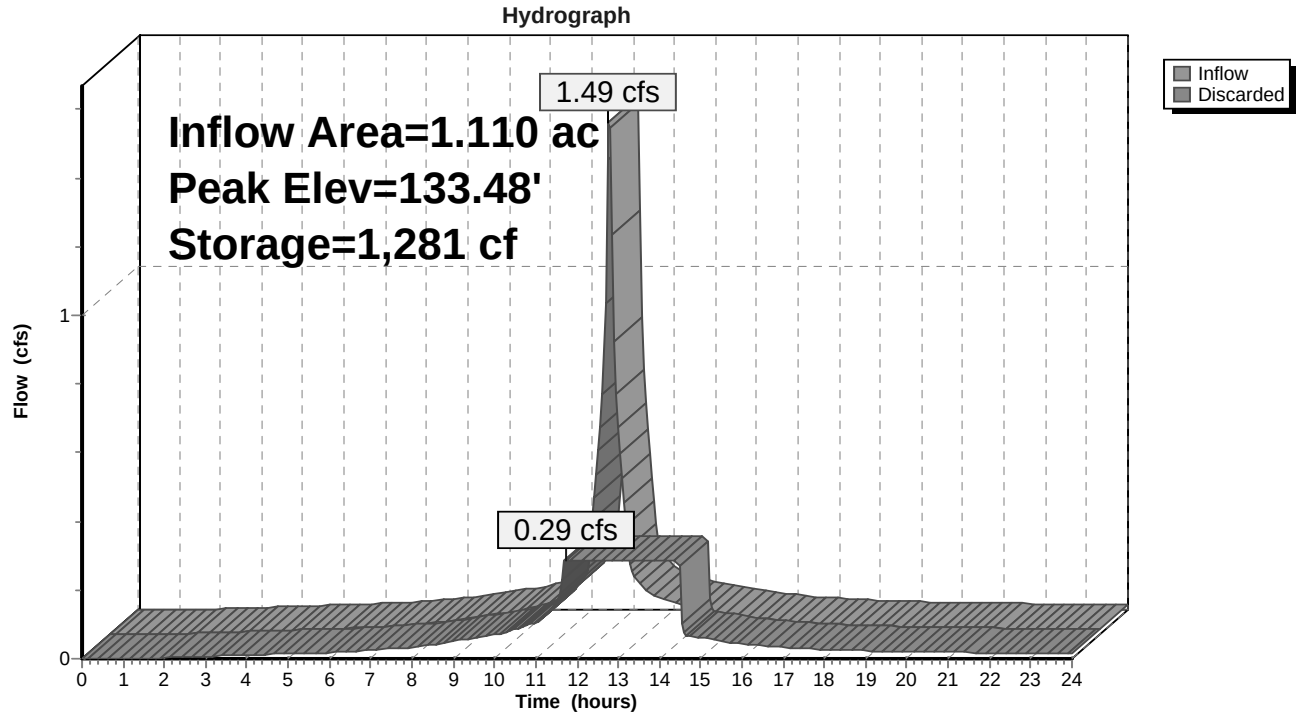
Plug-Flow detention time= 23.8 min calculated for 0.121 af (100% of inflow)
Center-of-Mass det. time= 23.6 min (779.6 - 756.1)

Volume	Invert	Avail.Storage	Storage Description
#1	131.50'	2,021 cf	**8.00'W x 187.00'L x 8.00'H Prismatoid** 11,968 cf Overall - 5,231 cf Embedded = 6,737 cf x 30.0% Voids
#2	132.50'	5,231 cf	**72.0" Round Pipe Storage** Inside #1 L= 185.0'
		7,252 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	131.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.29 cfs @ 11.75 hrs HW=131.61' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.29 cfs)

Pond SIS-7:



Summary for Pond SIS-8:

Inflow Area = 0.220 ac, 63.64% Impervious, Inflow Depth > 1.89" for 2-Year event
Inflow = 0.42 cfs @ 12.09 hrs, Volume= 0.035 af
Outflow = 0.14 cfs @ 11.85 hrs, Volume= 0.035 af, Atten= 67%, Lag= 0.0 min
Discarded = 0.14 cfs @ 11.85 hrs, Volume= 0.035 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 128.01' @ 12.37 hrs Surf.Area= 732 sf Storage= 222 cf

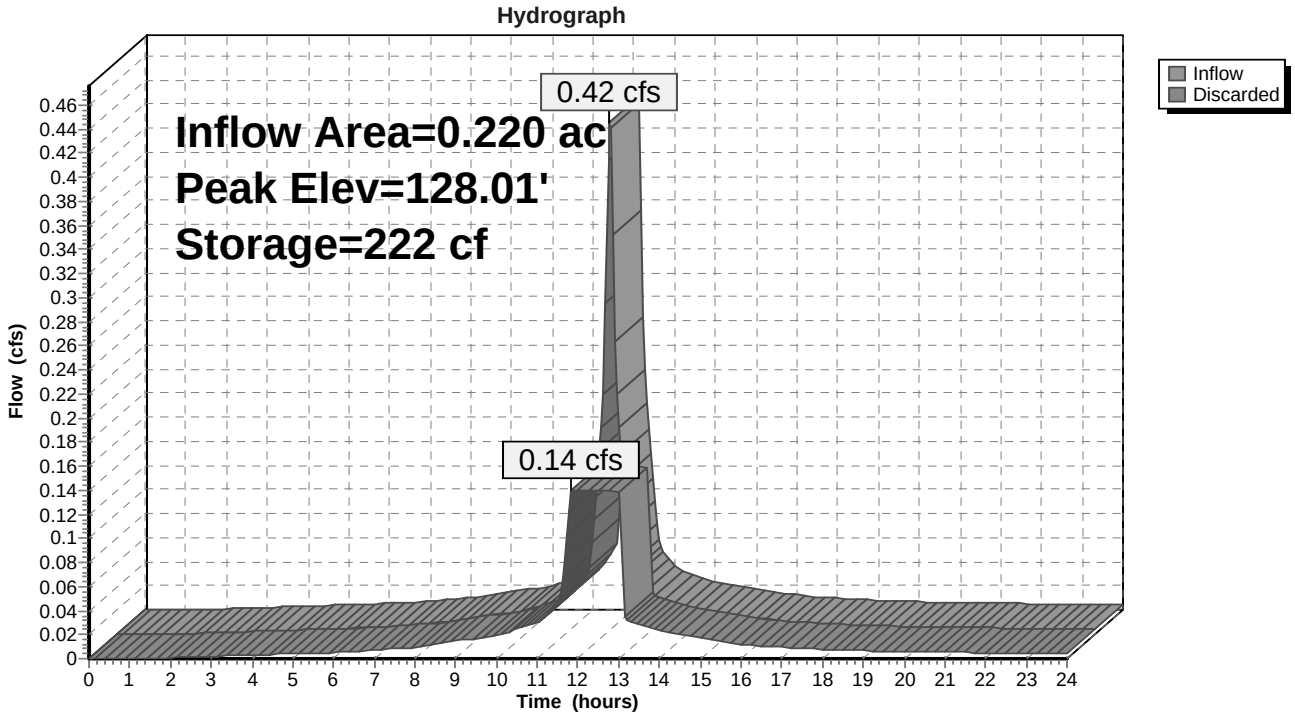
Plug-Flow detention time= 7.4 min calculated for 0.035 af (100% of inflow)
Center-of-Mass det. time= 7.3 min (763.3 - 756.0)

Volume	Invert	Avail.Storage	Storage Description
#1	127.00'	865 cf	**6.00'W x 122.00'L x 6.00'H Prismatoid** 4,392 cf Overall - 1,508 cf Embedded = 2,884 cf x 30.0% Voids
#2	128.00'	1,508 cf	**48.0" Round Pipe Storage** Inside #1 L= 120.0'
		2,373 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	127.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.14 cfs @ 11.85 hrs HW=127.06' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.14 cfs)

Pond SIS-8:



Summary for Pond SIS-9:

Inflow Area = 2.300 ac, 77.39% Impervious, Inflow Depth > 2.30" for 2-Year event
Inflow = 5.40 cfs @ 12.09 hrs, Volume= 0.440 af
Outflow = 0.91 cfs @ 11.70 hrs, Volume= 0.440 af, Atten= 83%, Lag= 0.0 min
Discarded = 0.91 cfs @ 11.70 hrs, Volume= 0.440 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 128.25' @ 12.55 hrs Surf.Area= 4,761 sf Storage= 5,054 cf

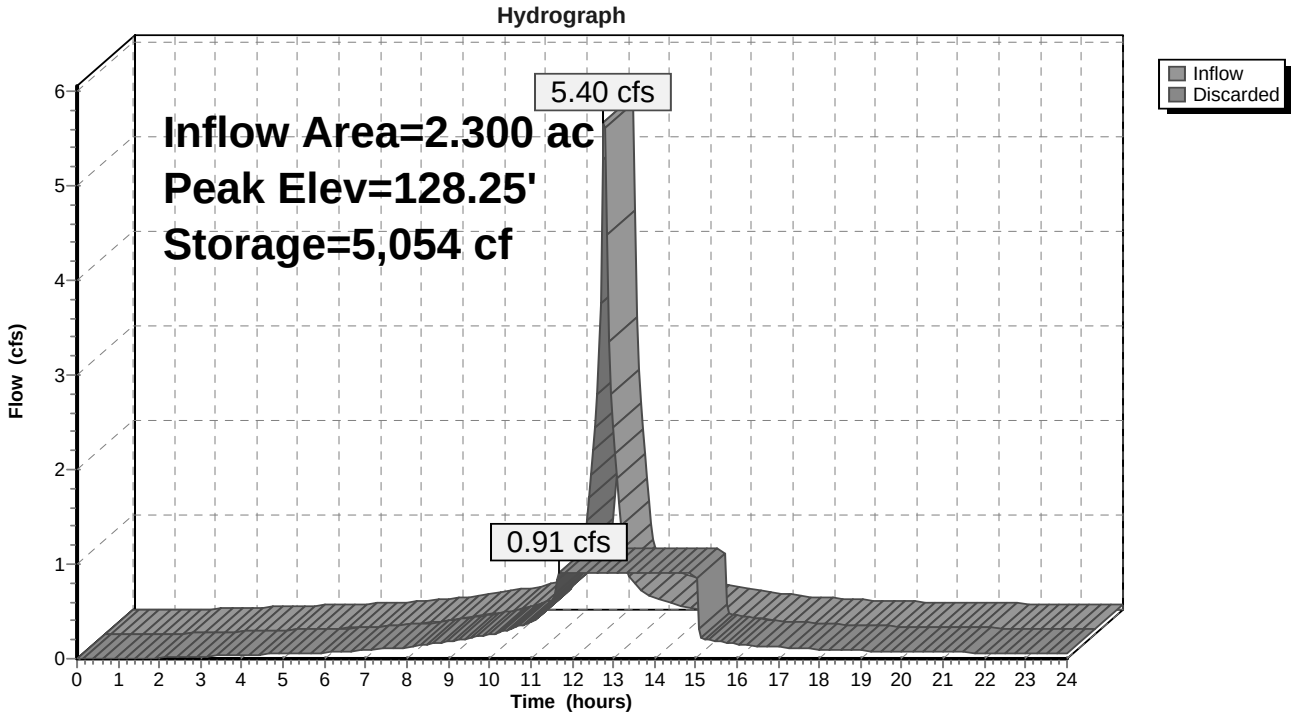
Plug-Flow detention time= 30.9 min calculated for 0.440 af (100% of inflow)
Center-of-Mass det. time= 30.6 min (786.6 - 756.0)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	6,184 cf	**69.00'W x 69.00'L x 8.00'H Prismatoid** 38,088 cf Overall - 17,474 cf Embedded = 20,614 cf x 30.0% Voids
#2	127.00'	17,474 cf	**72.0" Round Pipe Storage** Inside #1 L= 618.0'
		23,658 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	126.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.91 cfs @ 11.70 hrs HW=126.10' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.91 cfs)

Pond SIS-9:

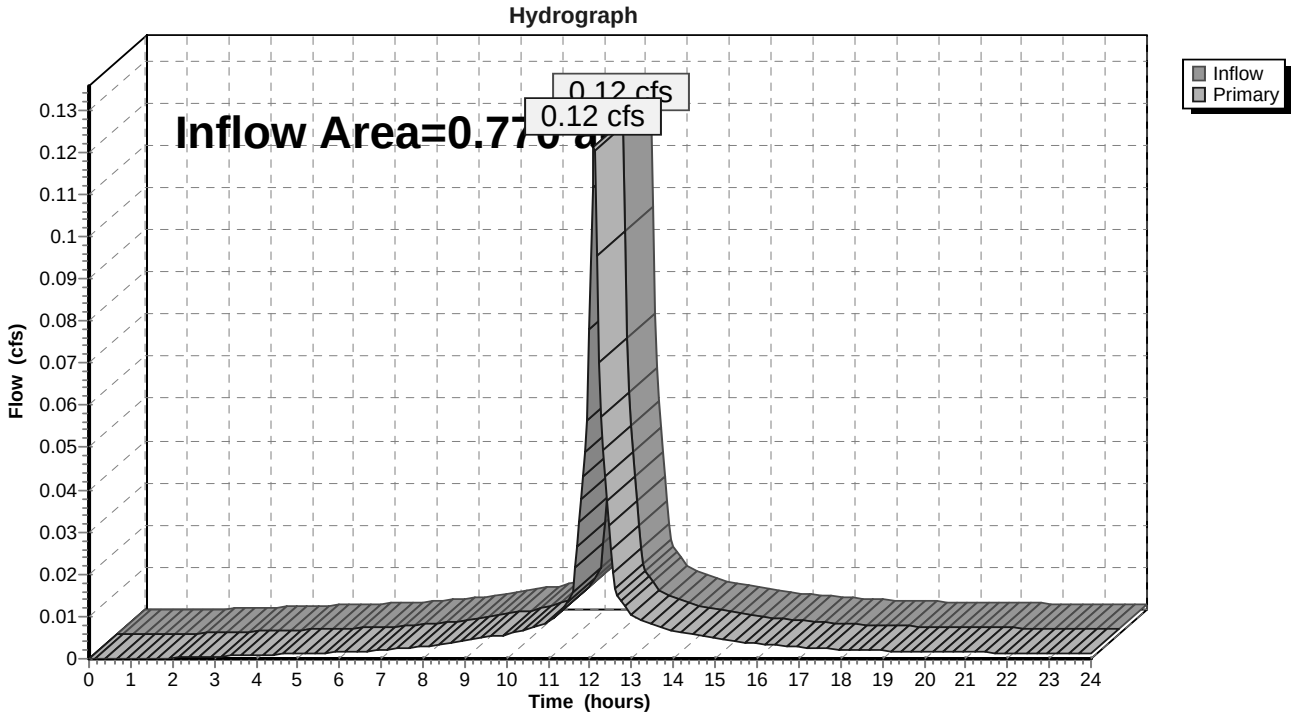


Summary for Link POA-1:

Inflow Area = 0.770 ac, 5.19% Impervious, Inflow Depth > 0.15" for 2-Year event
Inflow = 0.12 cfs @ 12.09 hrs, Volume= 0.010 af
Primary = 0.12 cfs @ 12.09 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-1:

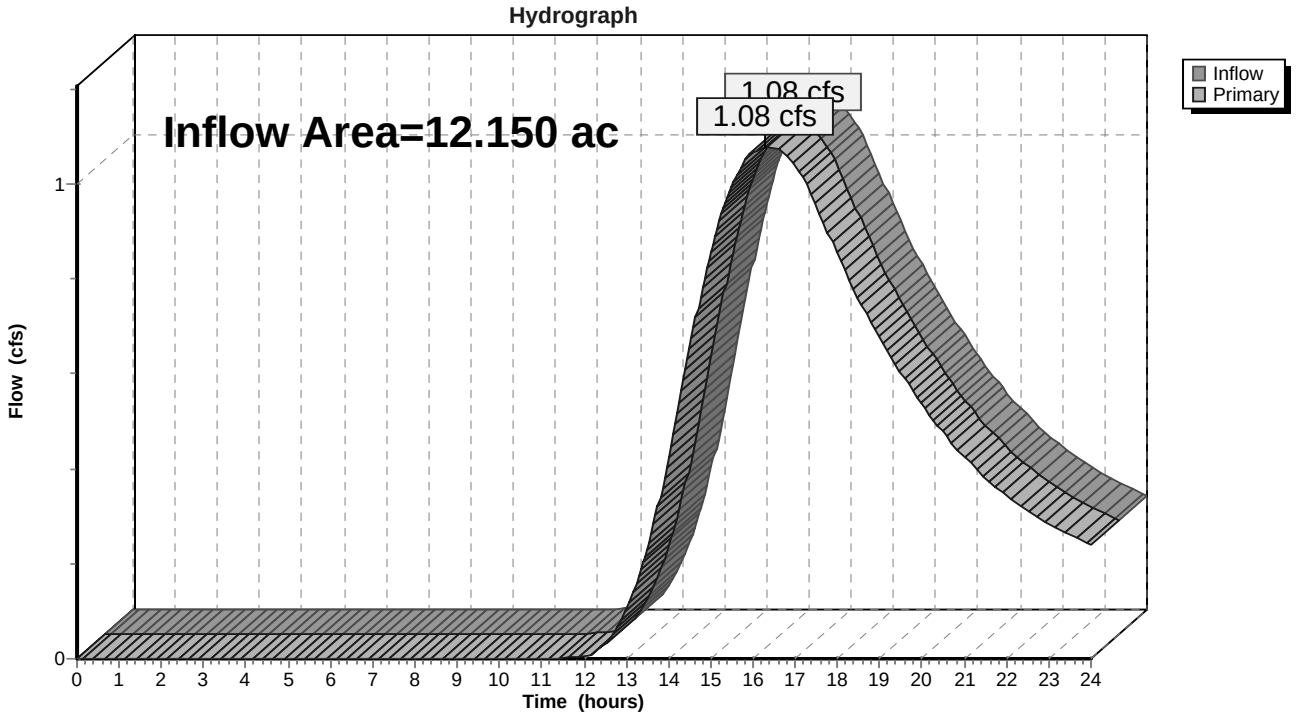


Summary for Link POA-2:

Inflow Area = 12.150 ac, 0.00% Impervious, Inflow Depth > 0.55" for 2-Year event
Inflow = 1.08 cfs @ 16.27 hrs, Volume= 0.557 af
Primary = 1.08 cfs @ 16.27 hrs, Volume= 0.557 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-2:

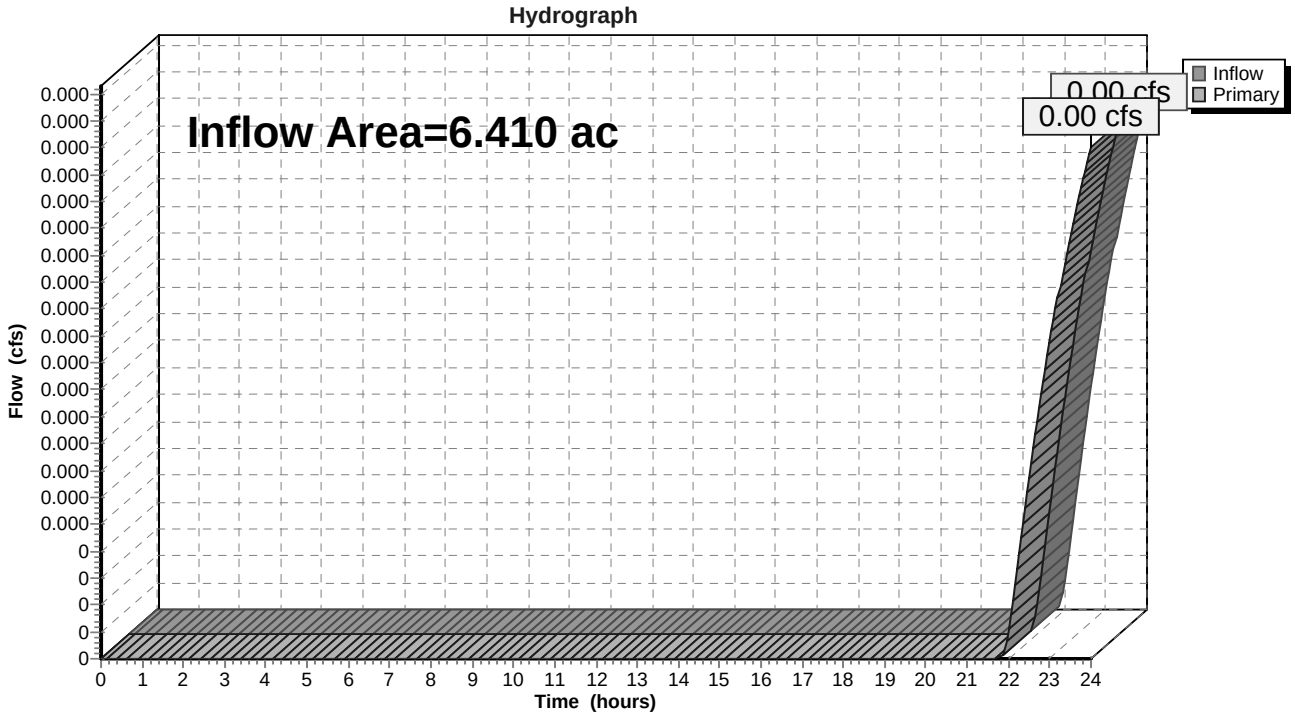


Summary for Link POA-3:

Inflow Area = 6.410 ac, 0.00% Impervious, Inflow Depth > 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-3:

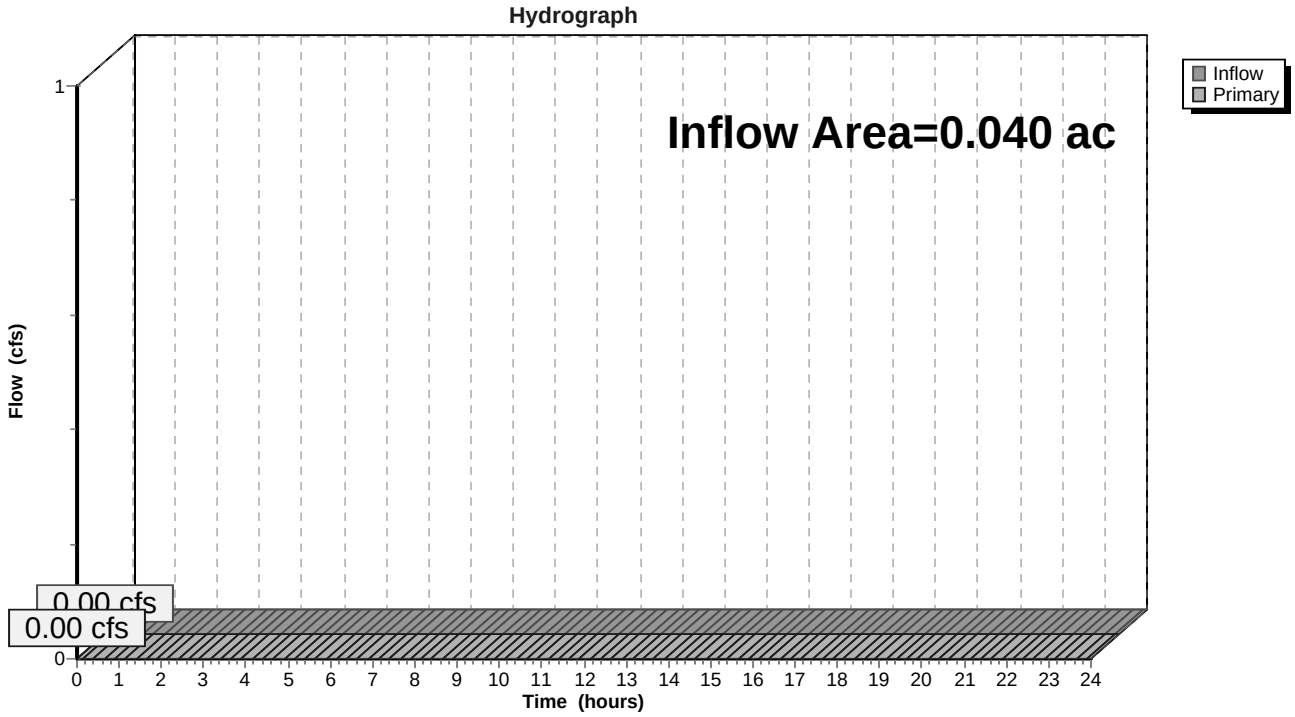


Summary for Link POA-4:

Inflow Area = 0.040 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-4:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1A: Runoff Area=0.500 ac 0.00% Impervious Runoff Depth>0.00"
Flow Length=557' Tc=11.7 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment PR-1B: Runoff Area=0.270 ac 14.81% Impervious Runoff Depth>0.68"
Flow Length=188' Tc=6.1 min CN=WQ Runoff=0.18 cfs 0.015 af

Subcatchment PR-1C: Runoff Area=6.360 ac 29.40% Impervious Runoff Depth>1.41"
Tc=6.0 min CN=WQ Runoff=8.57 cfs 0.749 af

Subcatchment PR-1D: Runoff Area=1.650 ac 73.94% Impervious Runoff Depth>1.82"
Tc=790.0 min CN=WQ Runoff=0.40 cfs 0.250 af

Subcatchment PR-2: Runoff Area=12.150 ac 0.00% Impervious Runoff Depth>1.13"
Flow Length=2,069' Tc=304.8 min CN=WQ Runoff=2.26 cfs 1.148 af

Subcatchment PR-3A: Runoff Area=6.410 ac 0.00% Impervious Runoff Depth>0.08"
Flow Length=1,024' Tc=14.9 min CN=WQ Runoff=0.07 cfs 0.045 af

Subcatchment PR-3B: Runoff Area=1.250 ac 57.60% Impervious Runoff Depth>2.70"
Tc=6.0 min CN=WQ Runoff=3.30 cfs 0.281 af

Subcatchment PR-3C: Runoff Area=2.300 ac 77.39% Impervious Runoff Depth>3.57"
Tc=6.0 min CN=WQ Runoff=8.16 cfs 0.683 af

Subcatchment PR-3D: Runoff Area=1.110 ac 44.14% Impervious Runoff Depth>2.10"
Tc=6.0 min CN=WQ Runoff=2.25 cfs 0.195 af

Subcatchment PR-3E: Runoff Area=1.330 ac 62.41% Impervious Runoff Depth>2.91"
Tc=6.0 min CN=WQ Runoff=3.80 cfs 0.322 af

Subcatchment PR-3F: Runoff Area=0.590 ac 47.46% Impervious Runoff Depth>2.25"
Tc=6.0 min CN=WQ Runoff=1.28 cfs 0.111 af

Subcatchment PR-3G: Runoff Area=1.330 ac 66.92% Impervious Runoff Depth>3.11"
Tc=6.0 min CN=WQ Runoff=4.08 cfs 0.344 af

Subcatchment PR-3H: Runoff Area=1.380 ac 39.13% Impervious Runoff Depth>1.88"
Tc=6.0 min CN=WQ Runoff=2.47 cfs 0.216 af

Subcatchment PR-3I: Runoff Area=5.290 ac 51.98% Impervious Runoff Depth>2.45"
Tc=6.0 min CN=WQ Runoff=12.60 cfs 1.079 af

Subcatchment PR-3J: Runoff Area=1.930 ac 15.54% Impervious Runoff Depth>0.82"
Tc=6.0 min CN=WQ Runoff=1.37 cfs 0.133 af

Subcatchment PR-3K: Runoff Area=0.220 ac 63.64% Impervious Runoff Depth>2.96"
Tc=6.0 min CN=WQ Runoff=0.64 cfs 0.054 af

Subcatchment PR-4: Runoff Area=0.040 ac 0.00% Impervious Runoff Depth>0.00"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.000 af

Pond Basin 1: Peak Elev=131.59' Storage=10,912 cf Inflow=8.57 cfs 0.749 af
Outflow=1.32 cfs 0.748 af

Pond PP: Porous Pavement Peak Elev=0.20' Storage=0.249 af Inflow=0.40 cfs 0.250 af
Outflow=0.00 cfs 0.000 af

Pond SIS-1: Peak Elev=163.74' Storage=601 cf Inflow=1.37 cfs 0.133 af
Outflow=0.52 cfs 0.133 af

Pond SIS-10: Peak Elev=130.10' Storage=3,626 cf Inflow=3.30 cfs 0.281 af
Outflow=0.41 cfs 0.281 af

Pond SIS-2: Peak Elev=144.30' Storage=2,592 cf Inflow=2.47 cfs 0.216 af
Outflow=0.34 cfs 0.216 af

Pond SIS-3: Peak Elev=143.61' Storage=14,377 cf Inflow=12.60 cfs 1.079 af
Outflow=1.44 cfs 1.079 af

Pond SIS-4: Peak Elev=148.29' Storage=4,752 cf Inflow=4.08 cfs 0.344 af
Outflow=0.44 cfs 0.344 af

Pond SIS-5: Peak Elev=139.97' Storage=1,381 cf Inflow=1.28 cfs 0.111 af
Outflow=0.17 cfs 0.111 af

Pond SIS-6: Peak Elev=136.45' Storage=4,896 cf Inflow=3.80 cfs 0.322 af
Outflow=0.33 cfs 0.322 af

Pond SIS-7: Peak Elev=134.51' Storage=2,430 cf Inflow=2.25 cfs 0.195 af
Outflow=0.29 cfs 0.194 af

Pond SIS-8: Peak Elev=128.71' Storage=504 cf Inflow=0.64 cfs 0.054 af
Outflow=0.14 cfs 0.054 af

Pond SIS-9: Peak Elev=129.37' Storage=9,323 cf Inflow=8.16 cfs 0.683 af
Outflow=0.91 cfs 0.683 af

Link POA-1: Inflow=0.18 cfs 0.015 af
Primary=0.18 cfs 0.015 af

Link POA-2: Inflow=2.26 cfs 1.148 af
Primary=2.26 cfs 1.148 af

Link POA-3: Inflow=0.07 cfs 0.045 af
Primary=0.07 cfs 0.045 af

Link POA-4: Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 44.110 ac Runoff Volume = 5.625 af Average Runoff Depth = 1.53"
73.14% Pervious = 32.260 ac 26.86% Impervious = 11.850 ac

Summary for Subcatchment PR-1A:

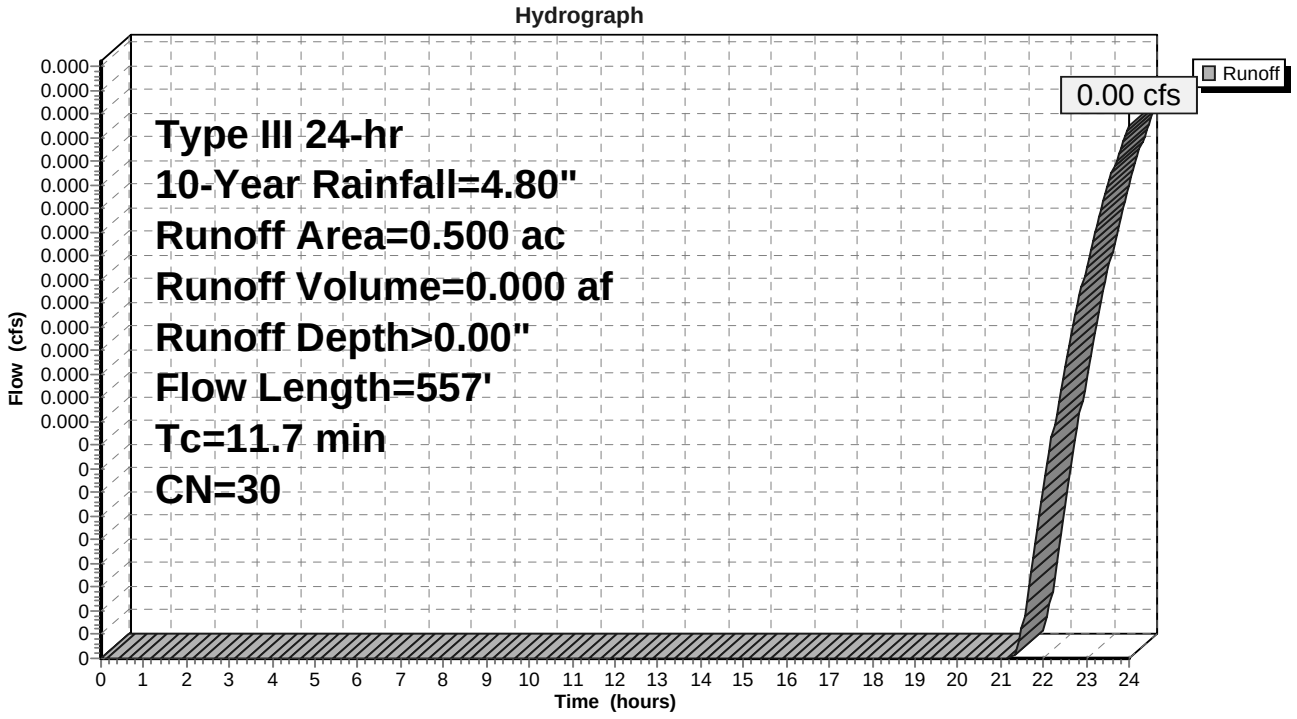
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.500	30	Woods, Good, HSG A
0.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.2400	0.10		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
1.0	73	0.2400	1.22		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.5	434	0.0370	2.89		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
11.7	557	Total			

Subcatchment PR-1A:



Summary for Subcatchment PR-1B:

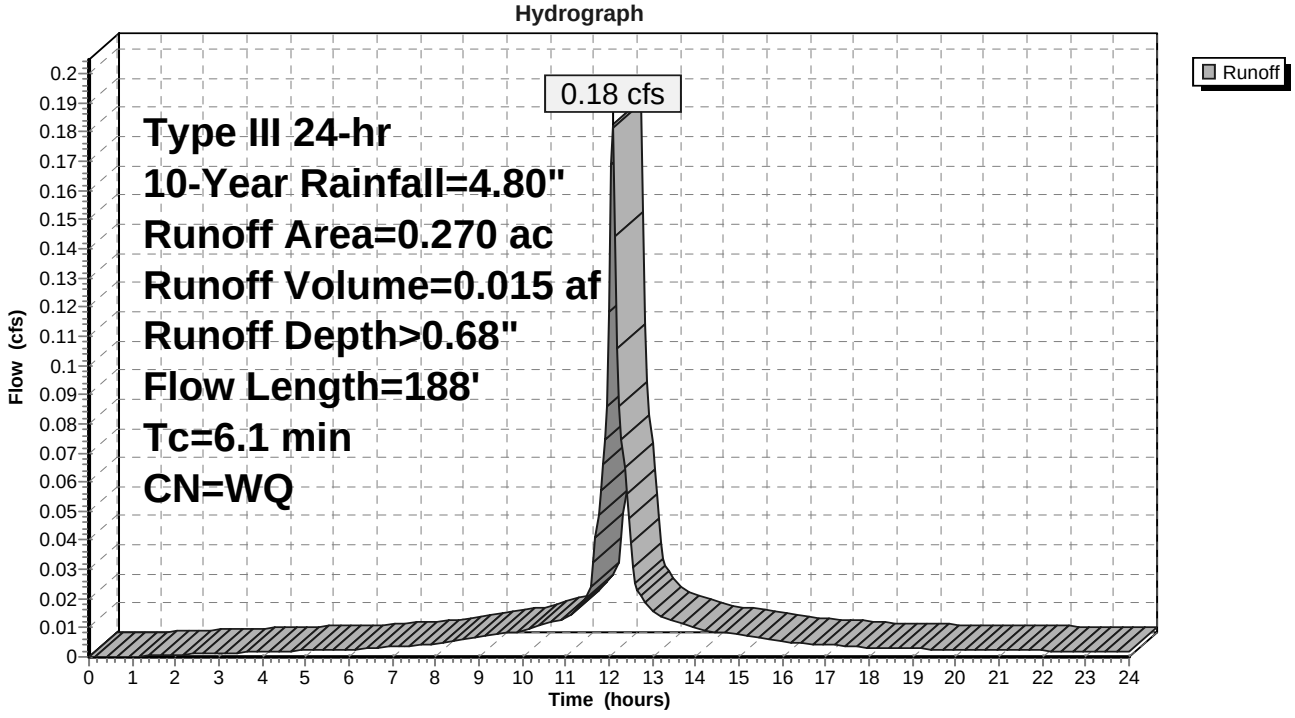
Runoff = 0.18 cfs @ 12.09 hrs, Volume= 0.015 af, Depth> 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.040	98	Paved parking, HSG A
0.230	30	Woods, Good, HSG A
0.270		Weighted Average
0.230		85.19% Pervious Area
0.040		14.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	44	0.1600	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
1.1	144	0.1040	2.26		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.1	188	Total			

Subcatchment PR-1B:



Summary for Subcatchment PR-1C:

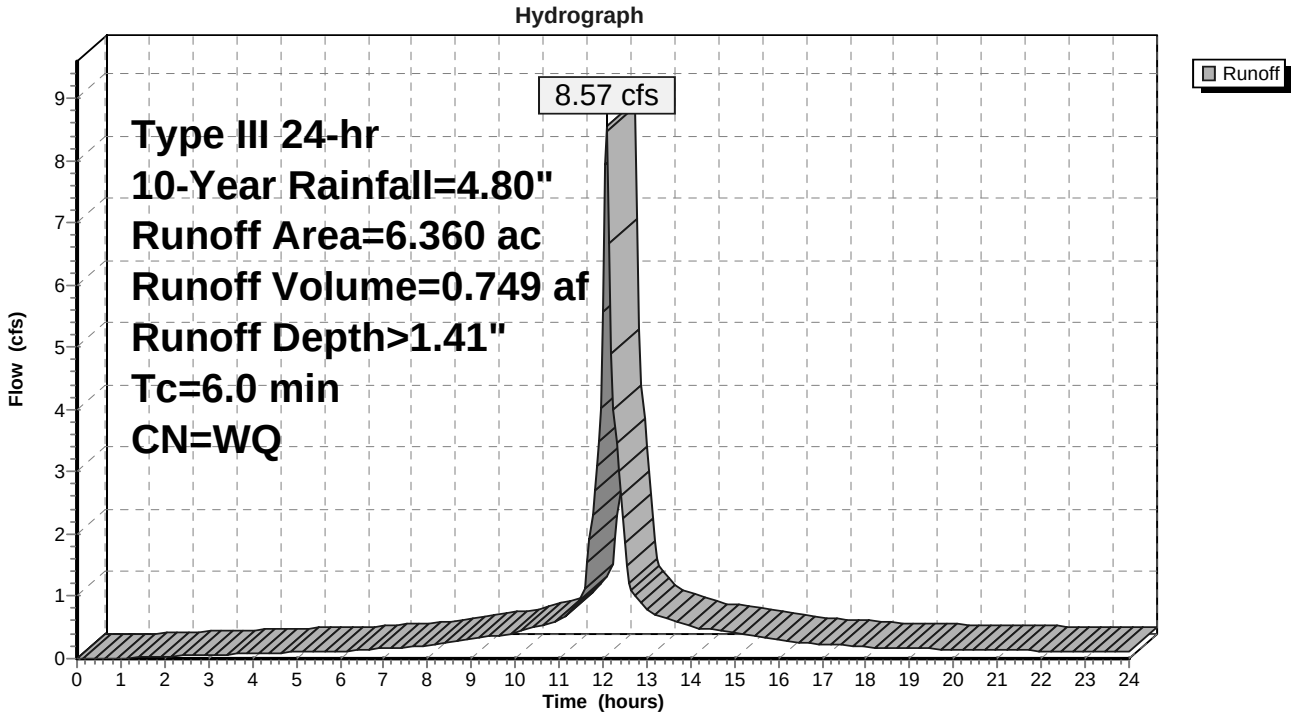
Runoff = 8.57 cfs @ 12.09 hrs, Volume= 0.749 af, Depth> 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.940	98	Paved parking, HSG A
0.750	98	Roofs, HSG A
2.580	39	>75% Grass cover, Good, HSG A
0.660	35	Brush, Fair, HSG A
1.250	30	Woods, Good, HSG A
0.180	98	Water Surface, HSG A
6.360		Weighted Average
4.490		70.60% Pervious Area
1.870		29.40% Impervious Area

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

Subcatchment PR-1C:



Summary for Subcatchment PR-1D:

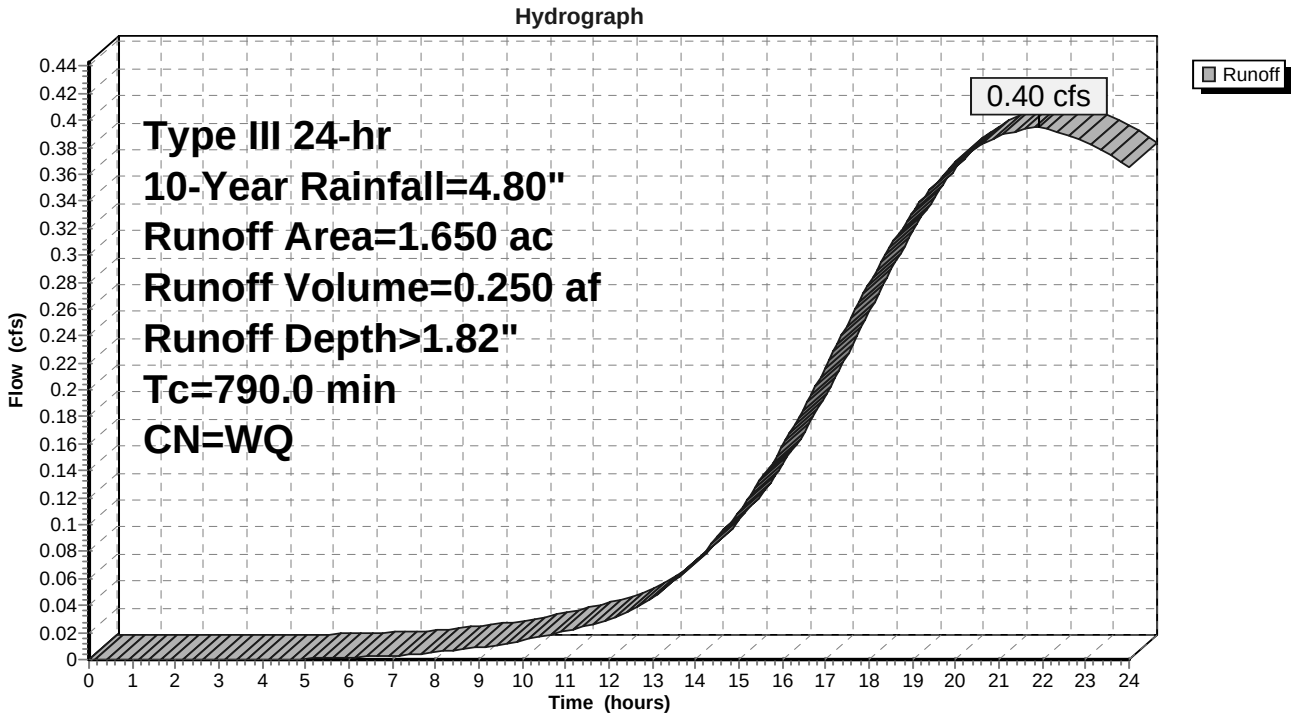
Runoff = 0.40 cfs @ 21.94 hrs, Volume= 0.250 af, Depth> 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (ac)	CN	Description
*	1.220	98	Porous Pavement, HSG A
	0.430	39	>75% Grass cover, Good, HSG A
	1.650		Weighted Average
	0.430		26.06% Pervious Area
	1.220		73.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
790.0					**Direct Entry, Per Hydrocad porous pavement design guidance**

Subcatchment PR-1D:



Summary for Subcatchment PR-2:

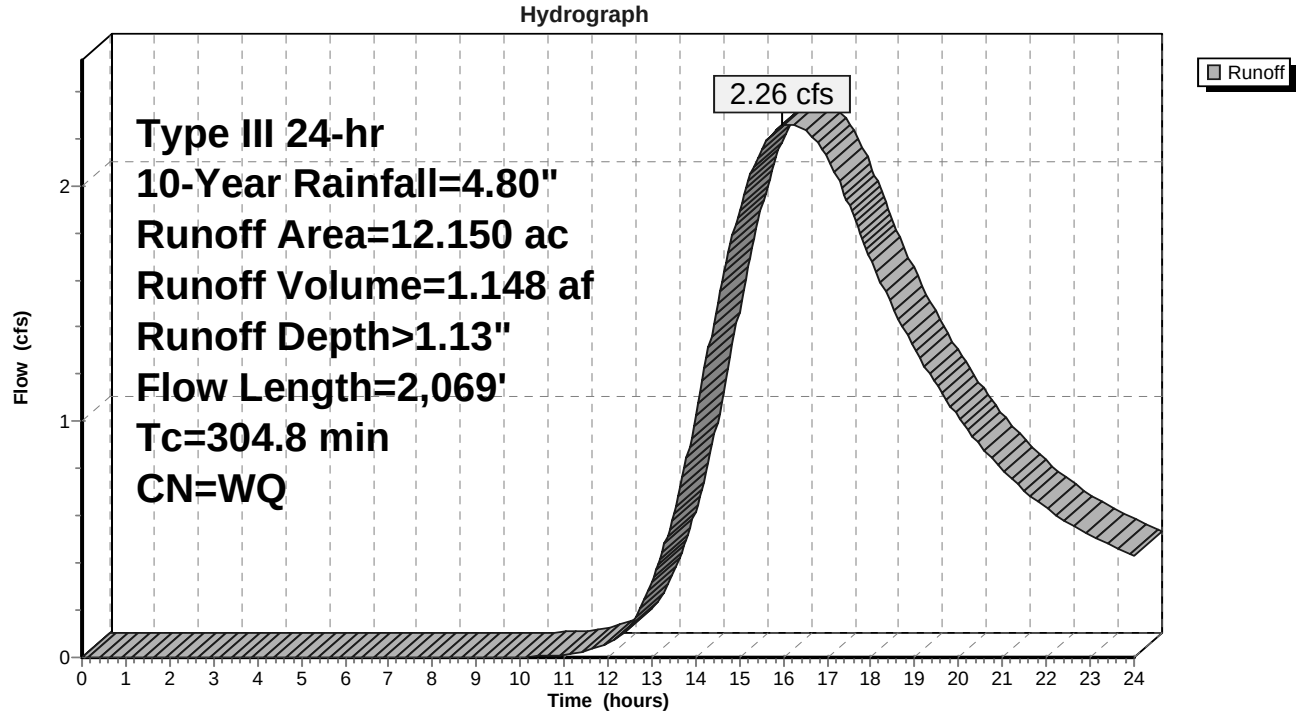
Runoff = 2.26 cfs @ 15.97 hrs, Volume= 1.148 af, Depth> 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (ac)	CN	Description
	5.920	30	Woods, Good, HSG A
*	6.230	77	Wetland
	12.150		Weighted Average
	12.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	50	0.0500	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
2.1	242	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
287.3	1,777	0.0017	0.10		**Shallow Concentrated Flow, Wetland** Forest w/Heavy Litter Kv= 2.5 fps
304.8	2,069	Total			

Subcatchment PR-2:



Summary for Subcatchment PR-3A:

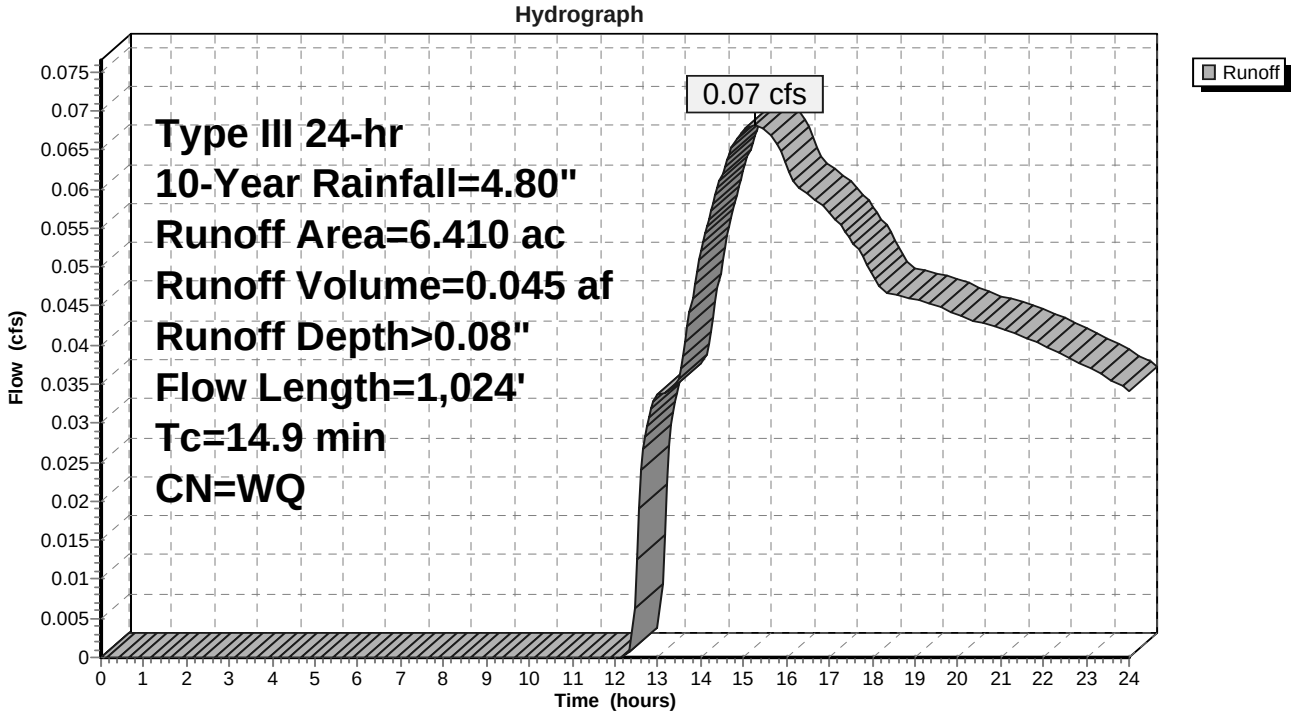
Runoff = 0.07 cfs @ 15.27 hrs, Volume= 0.045 af, Depth> 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
1.620	39	>75% Grass cover, Good, HSG A
4.790	35	Brush, Fair, HSG A
6.410		Weighted Average
6.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	252	0.1350	1.84		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.2	672	0.0100	1.00		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
1.4	100	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.9	1,024	Total			

Subcatchment PR-3A:



Summary for Subcatchment PR-3B:

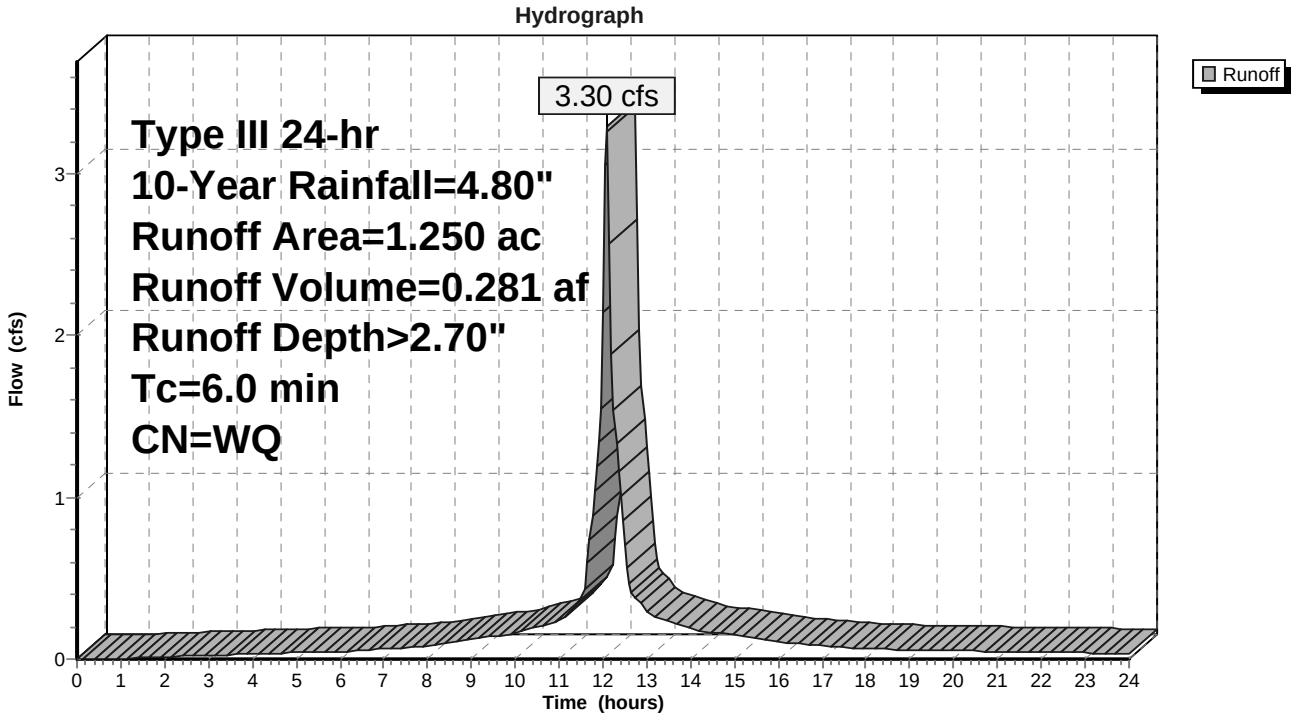
Runoff = 3.30 cfs @ 12.09 hrs, Volume= 0.281 af, Depth> 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG A
0.410	98	Roofs, HSG A
0.530	39	>75% Grass cover, Good, HSG A
1.250		Weighted Average
0.530		42.40% Pervious Area
0.720		57.60% Impervious Area

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

Subcatchment PR-3B:



Summary for Subcatchment PR-3C:

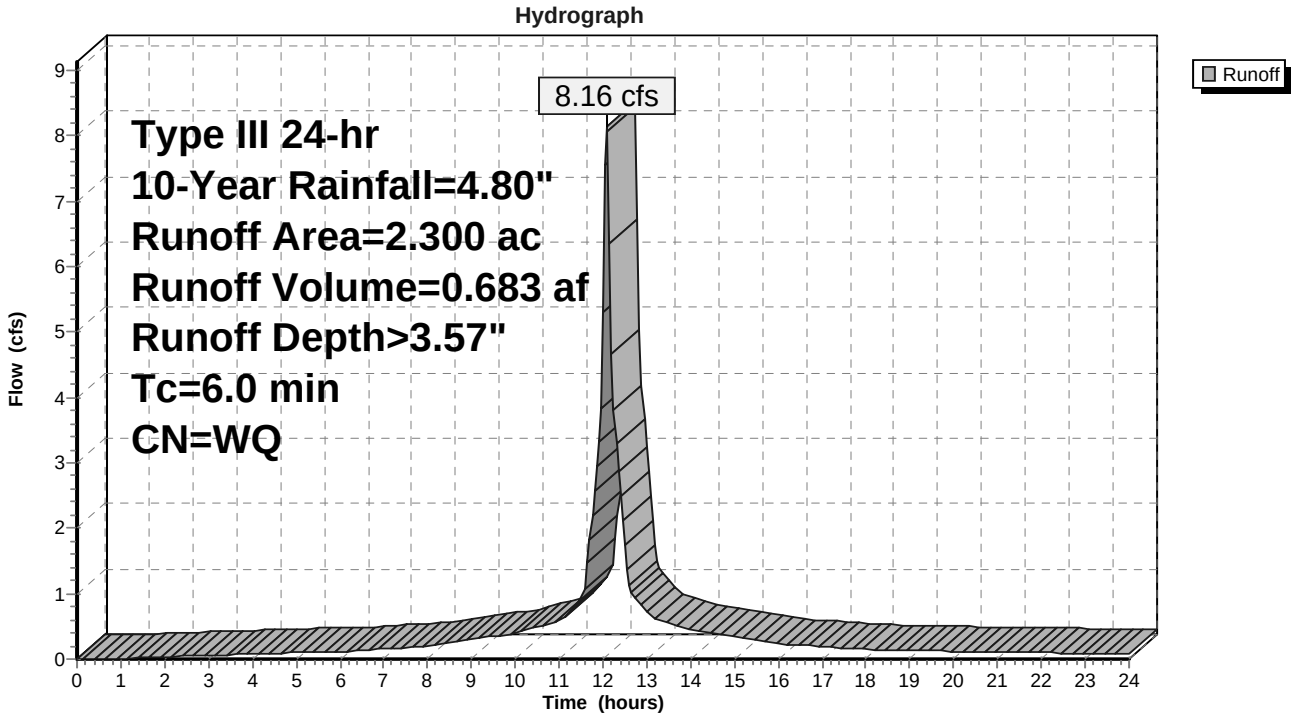
Runoff = 8.16 cfs @ 12.09 hrs, Volume= 0.683 af, Depth> 3.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
1.120	98	Paved parking, HSG A
0.660	98	Roofs, HSG A
0.520	39	>75% Grass cover, Good, HSG A
2.300		Weighted Average
0.520		22.61% Pervious Area
1.780		77.39% Impervious Area

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

Subcatchment PR-3C:



Summary for Subcatchment PR-3D:

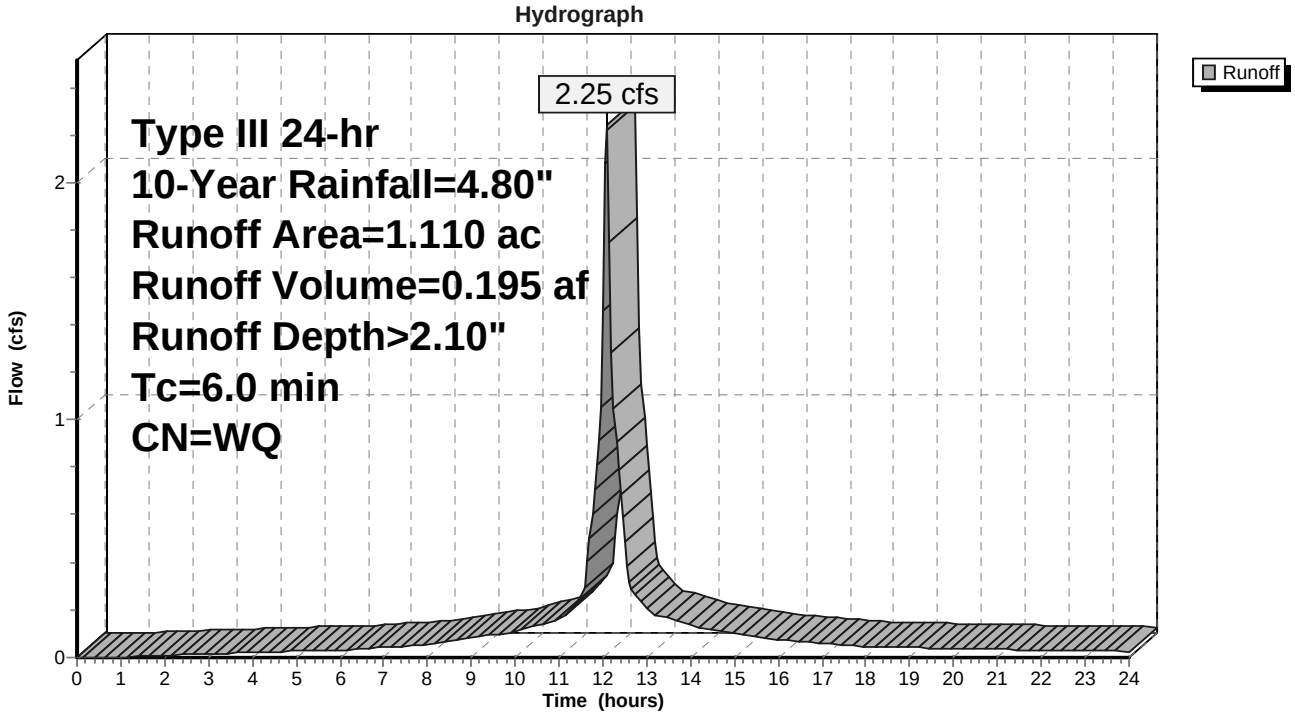
Runoff = 2.25 cfs @ 12.09 hrs, Volume= 0.195 af, Depth> 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.490	98	Roofs, HSG A
0.620	39	>75% Grass cover, Good, HSG A
1.110		Weighted Average
0.620		55.86% Pervious Area
0.490		44.14% Impervious Area

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

Subcatchment PR-3D:



Summary for Subcatchment PR-3E:

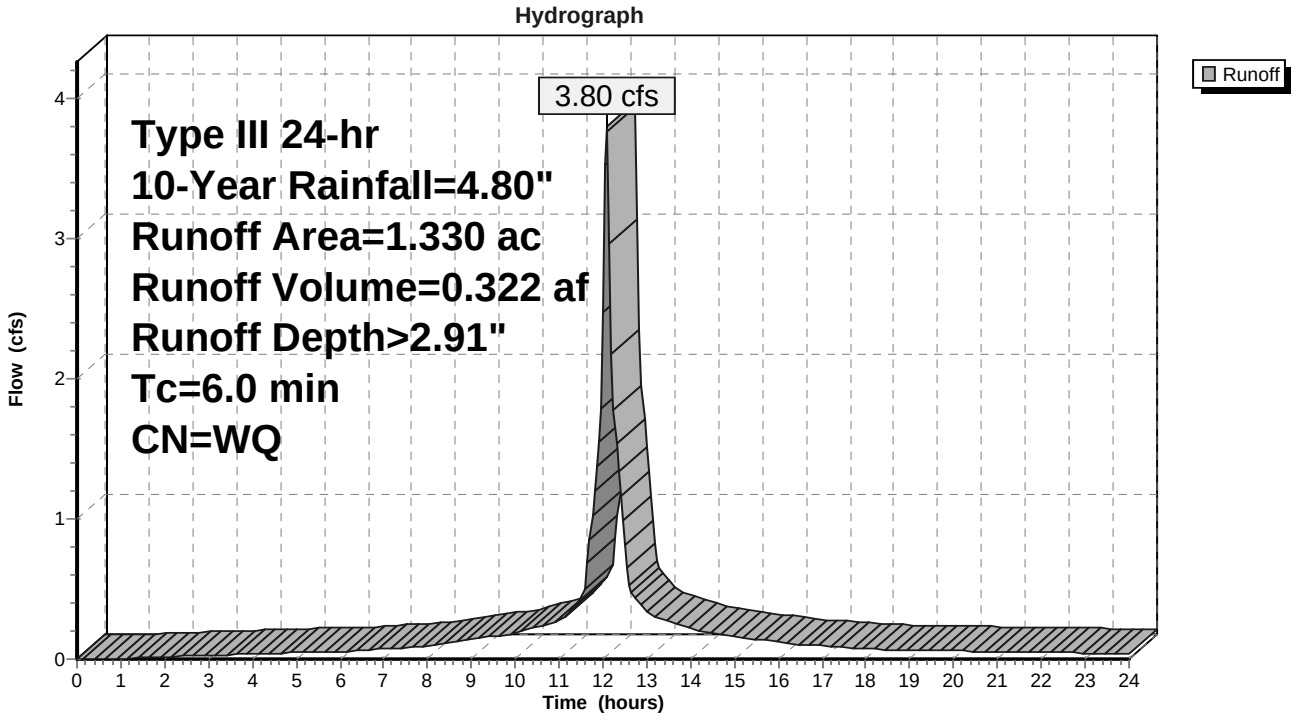
Runoff = 3.80 cfs @ 12.09 hrs, Volume= 0.322 af, Depth> 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.510	98	Paved parking, HSG A
0.320	98	Roofs, HSG A
0.500	39	>75% Grass cover, Good, HSG A
1.330		Weighted Average
0.500		37.59% Pervious Area
0.830		62.41% Impervious Area

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

Subcatchment PR-3E:



Summary for Subcatchment PR-3F:

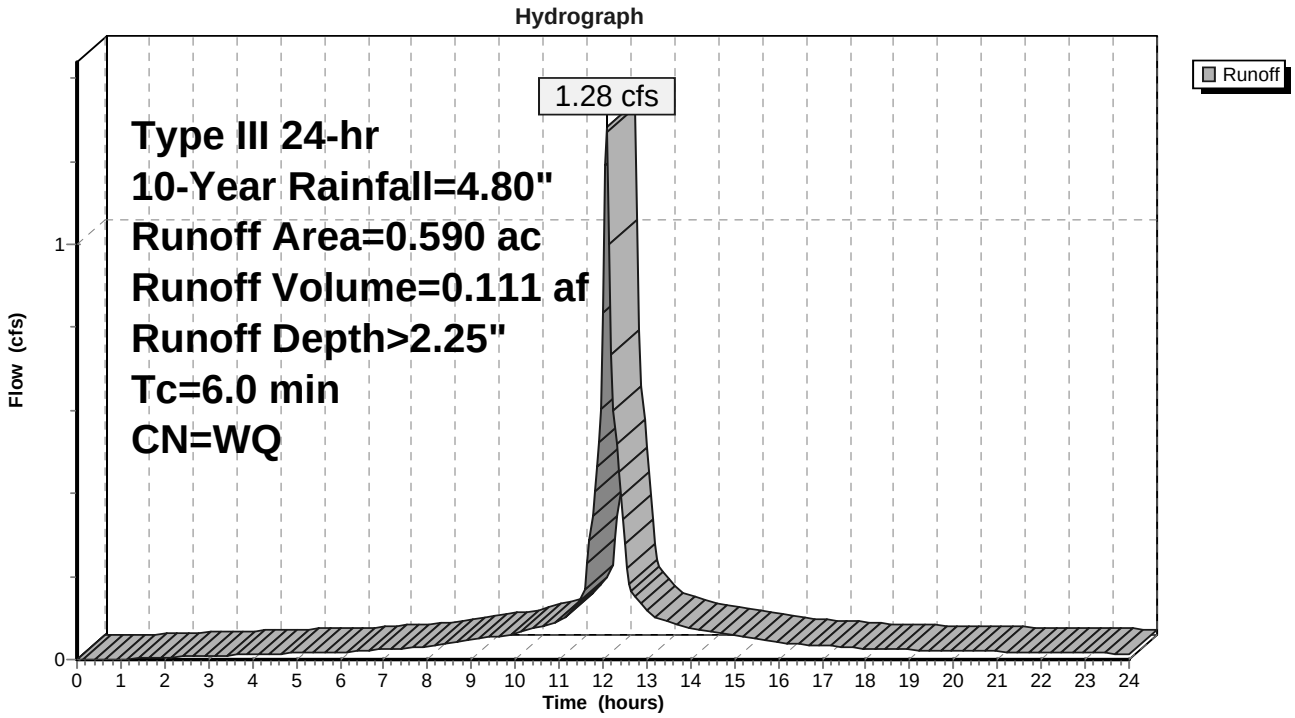
Runoff = 1.28 cfs @ 12.09 hrs, Volume= 0.111 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.280	98	Roofs, HSG A
0.310	39	>75% Grass cover, Good, HSG A
0.590		Weighted Average
0.310		52.54% Pervious Area
0.280		47.46% Impervious Area

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

Subcatchment PR-3F:



Summary for Subcatchment PR-3G:

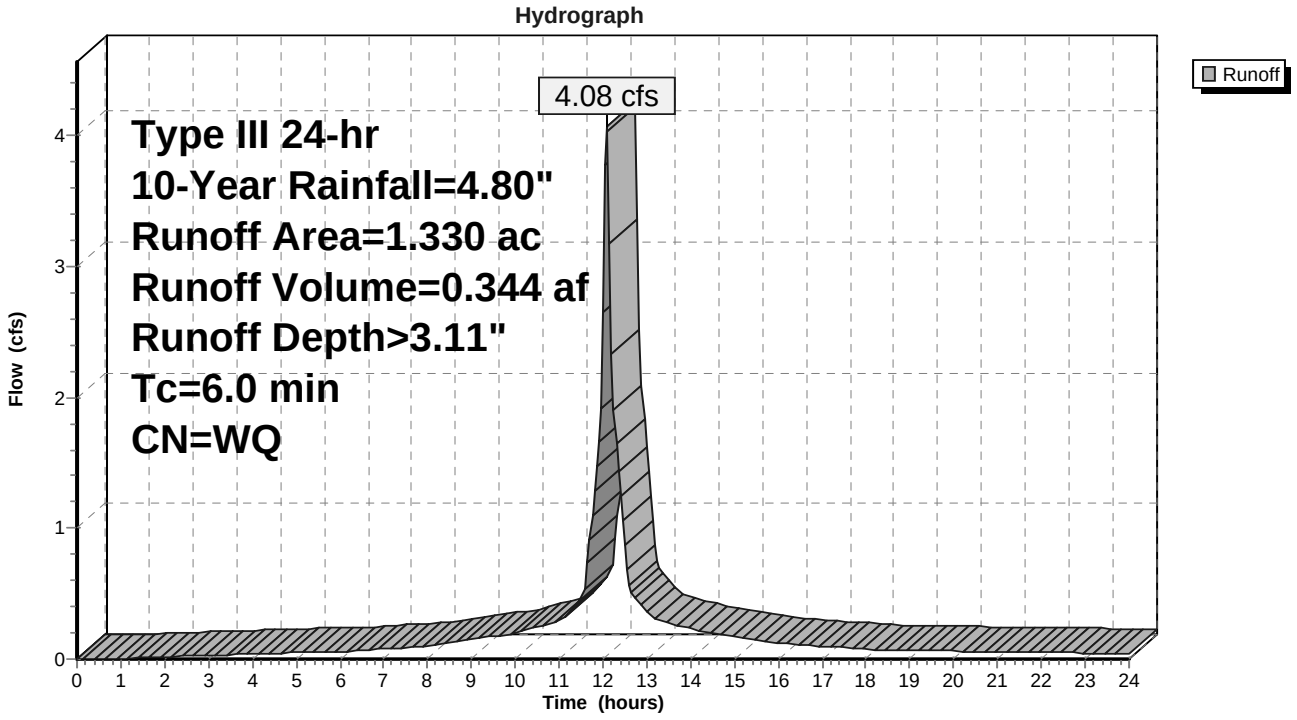
Runoff = 4.08 cfs @ 12.09 hrs, Volume= 0.344 af, Depth> 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG A
0.160	98	Roofs, HSG A
0.440	39	>75% Grass cover, Good, HSG A
1.330		Weighted Average
0.440		33.08% Pervious Area
0.890		66.92% Impervious Area

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

Subcatchment PR-3G:



Summary for Subcatchment PR-3H:

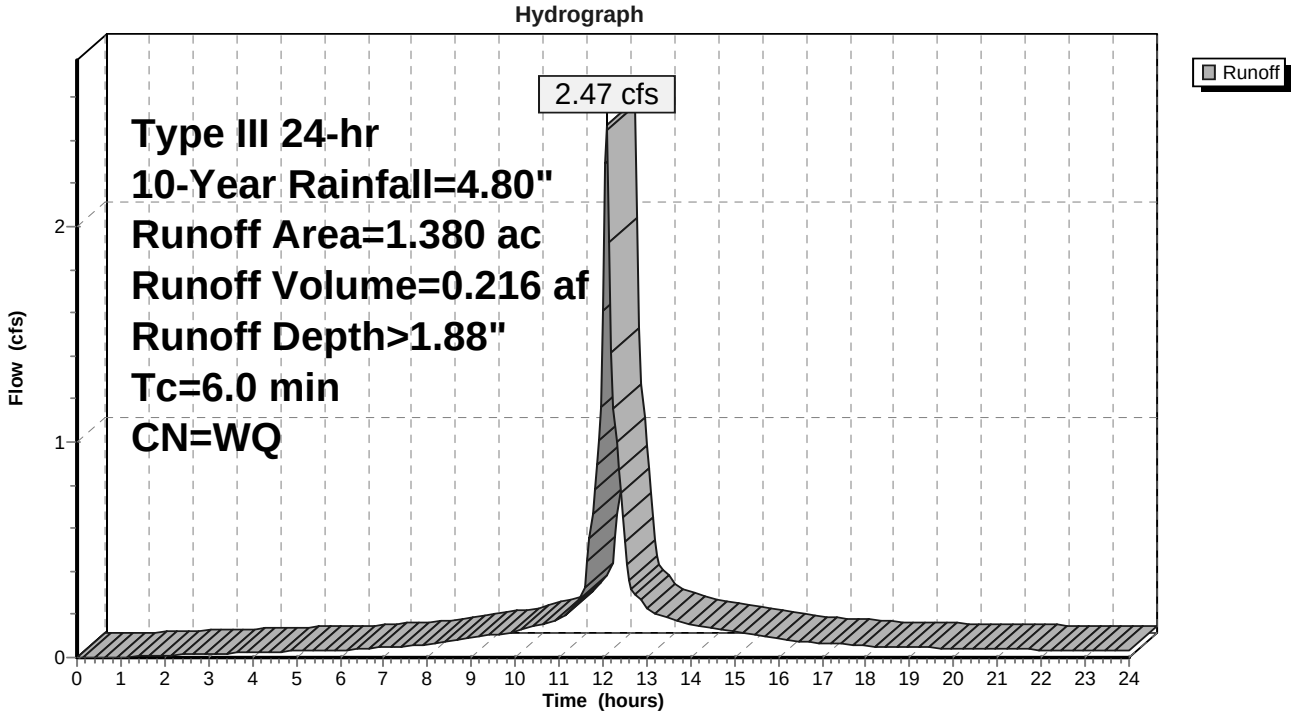
Runoff = 2.47 cfs @ 12.09 hrs, Volume= 0.216 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.540	98	Roofs, HSG A
0.840	39	>75% Grass cover, Good, HSG A
1.380		Weighted Average
0.840		60.87% Pervious Area
0.540		39.13% Impervious Area

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

Subcatchment PR-3H:



Summary for Subcatchment PR-3I:

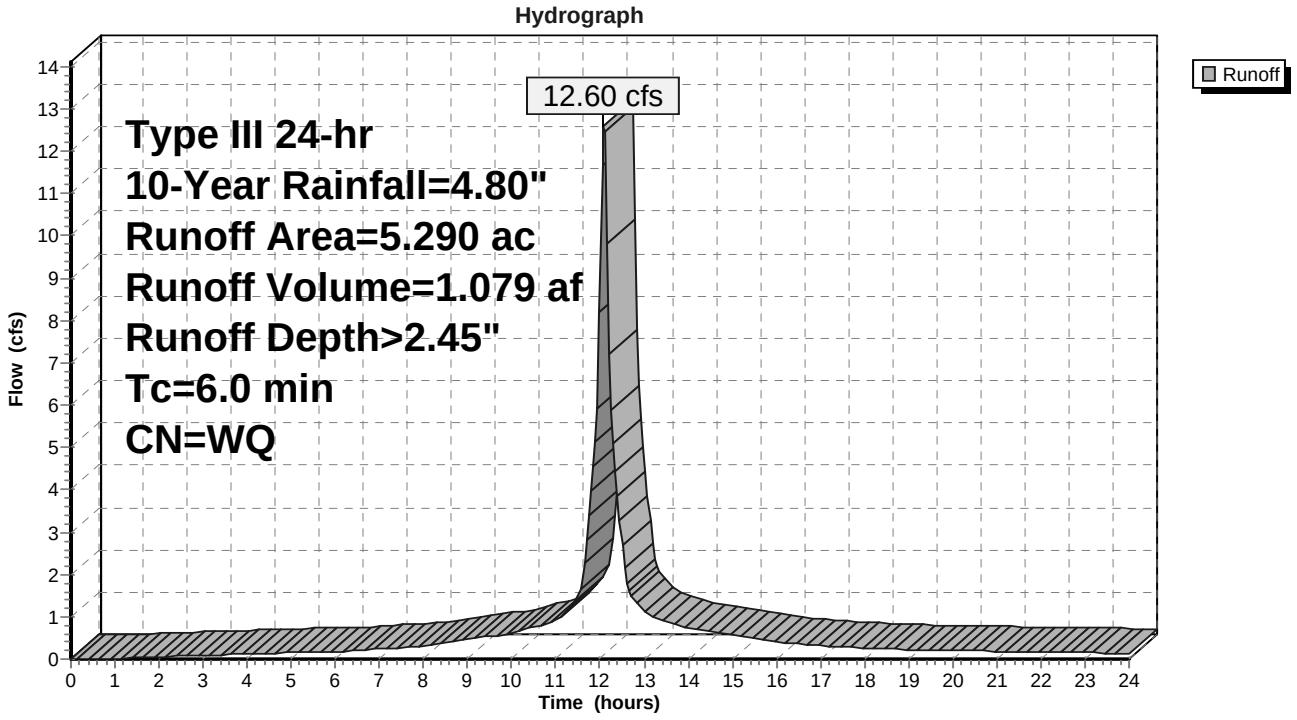
Runoff = 12.60 cfs @ 12.09 hrs, Volume= 1.079 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
1.570	98	Paved parking, HSG A
1.180	98	Roofs, HSG A
2.540	39	>75% Grass cover, Good, HSG A
5.290		Weighted Average
2.540		48.02% Pervious Area
2.750		51.98% Impervious Area

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

Subcatchment PR-3I:



Summary for Subcatchment PR-3J:

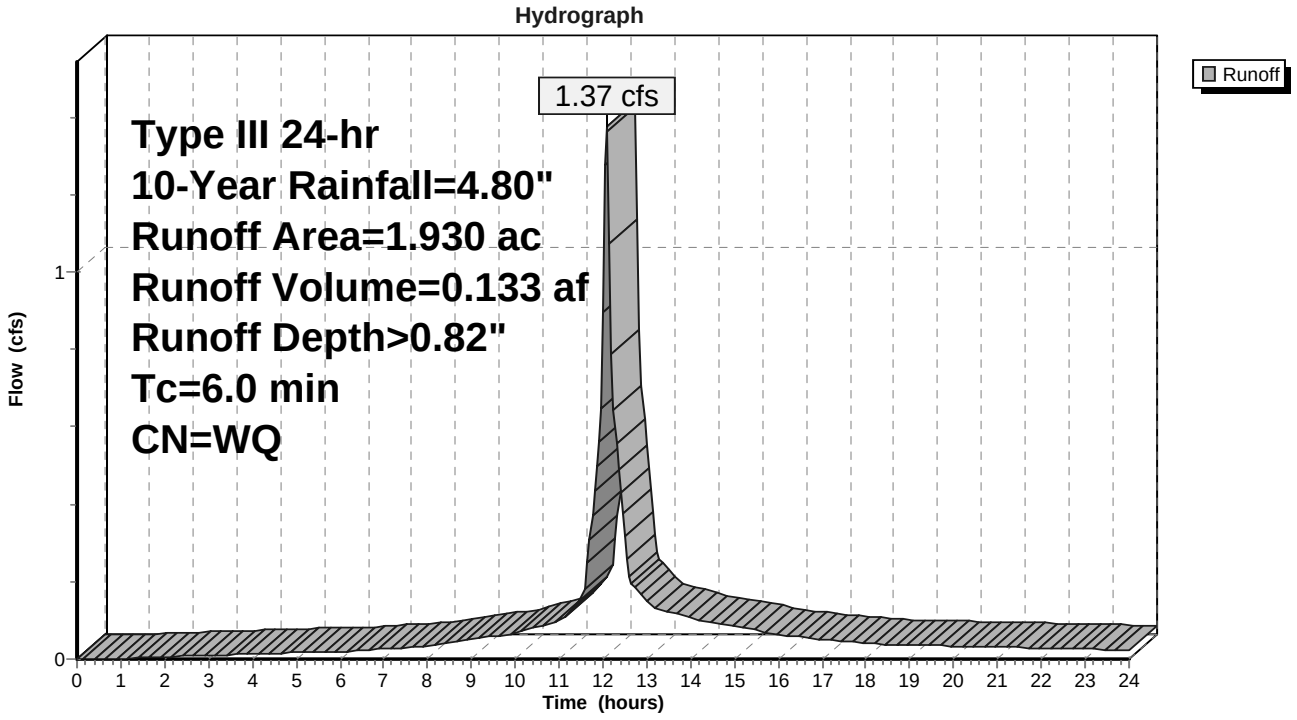
Runoff = 1.37 cfs @ 12.09 hrs, Volume= 0.133 af, Depth> 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.300	98	Roofs, HSG A
1.390	39	>75% Grass cover, Good, HSG A
0.240	30	Woods, Good, HSG A
1.930		Weighted Average
1.630		84.46% Pervious Area
0.300		15.54% Impervious Area

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

Subcatchment PR-3J:



Summary for Subcatchment PR-3K:

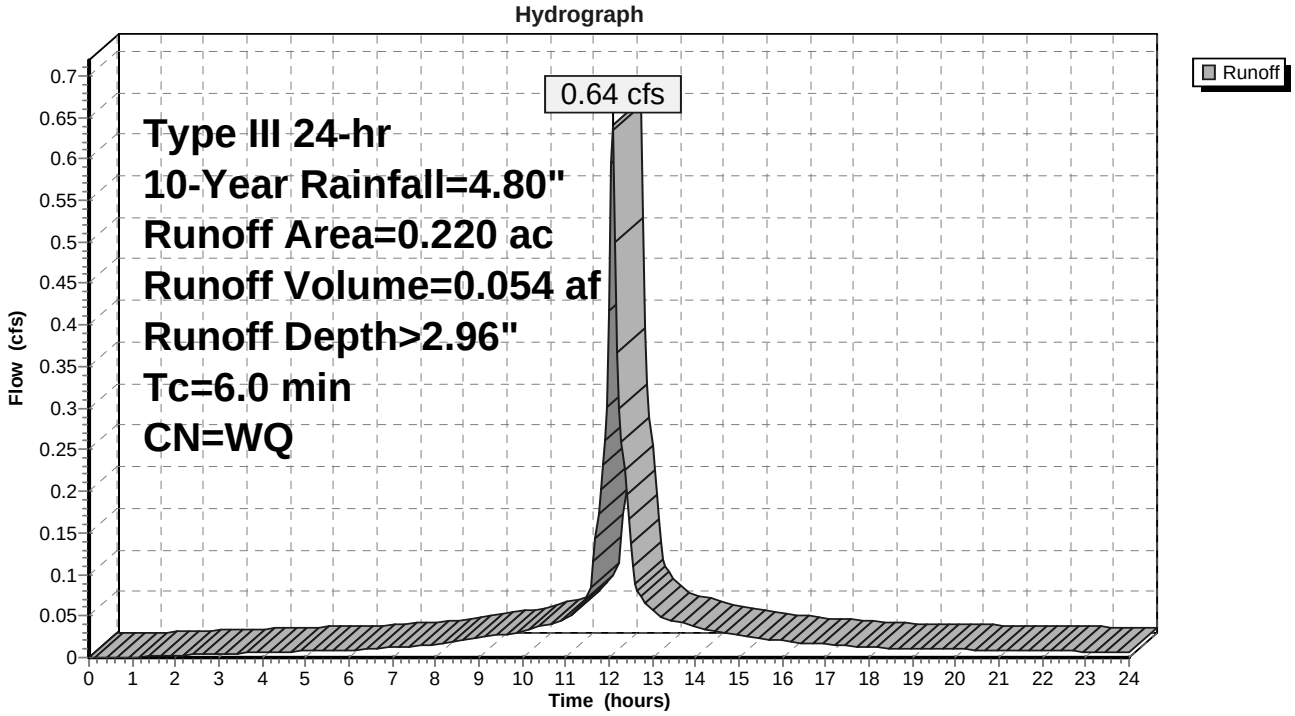
Runoff = 0.64 cfs @ 12.09 hrs, Volume= 0.054 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.140	98	Roofs, HSG A
0.080	39	>75% Grass cover, Good, HSG A
0.220		Weighted Average
0.080		36.36% Pervious Area
0.140		63.64% Impervious Area

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

Subcatchment PR-3K:



Summary for Subcatchment PR-4:

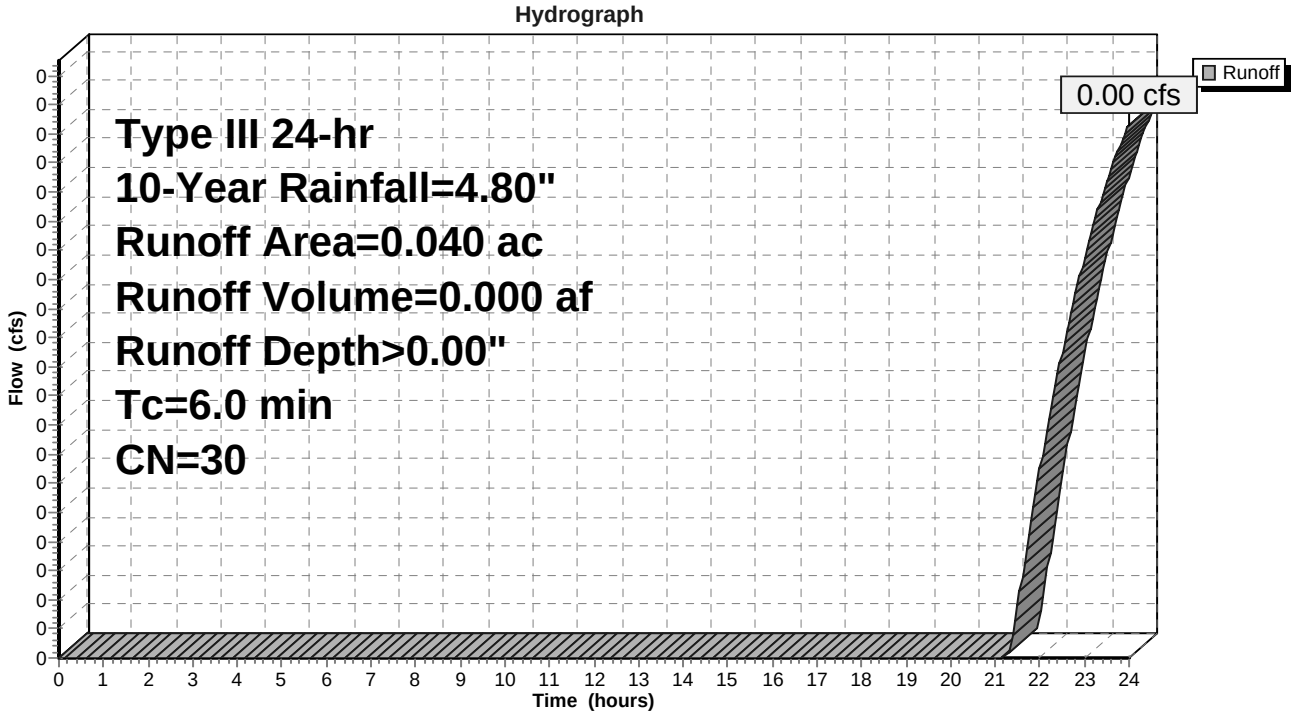
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.040	30	Woods, Good, HSG A
0.040		100.00% Pervious Area

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

Subcatchment PR-4:



Summary for Pond Basin 1:

Inflow Area = 6.360 ac, 29.40% Impervious, Inflow Depth > 1.41" for 10-Year event
Inflow = 8.57 cfs @ 12.09 hrs, Volume= 0.749 af
Outflow = 1.32 cfs @ 12.58 hrs, Volume= 0.748 af, Atten= 85%, Lag= 29.8 min
Discarded = 1.32 cfs @ 12.58 hrs, Volume= 0.748 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 131.59' @ 12.58 hrs Surf.Area= 6,898 sf Storage= 10,912 cf

Plug-Flow detention time= 71.8 min calculated for 0.748 af (100% of inflow)
Center-of-Mass det. time= 71.3 min (834.0 - 762.7)

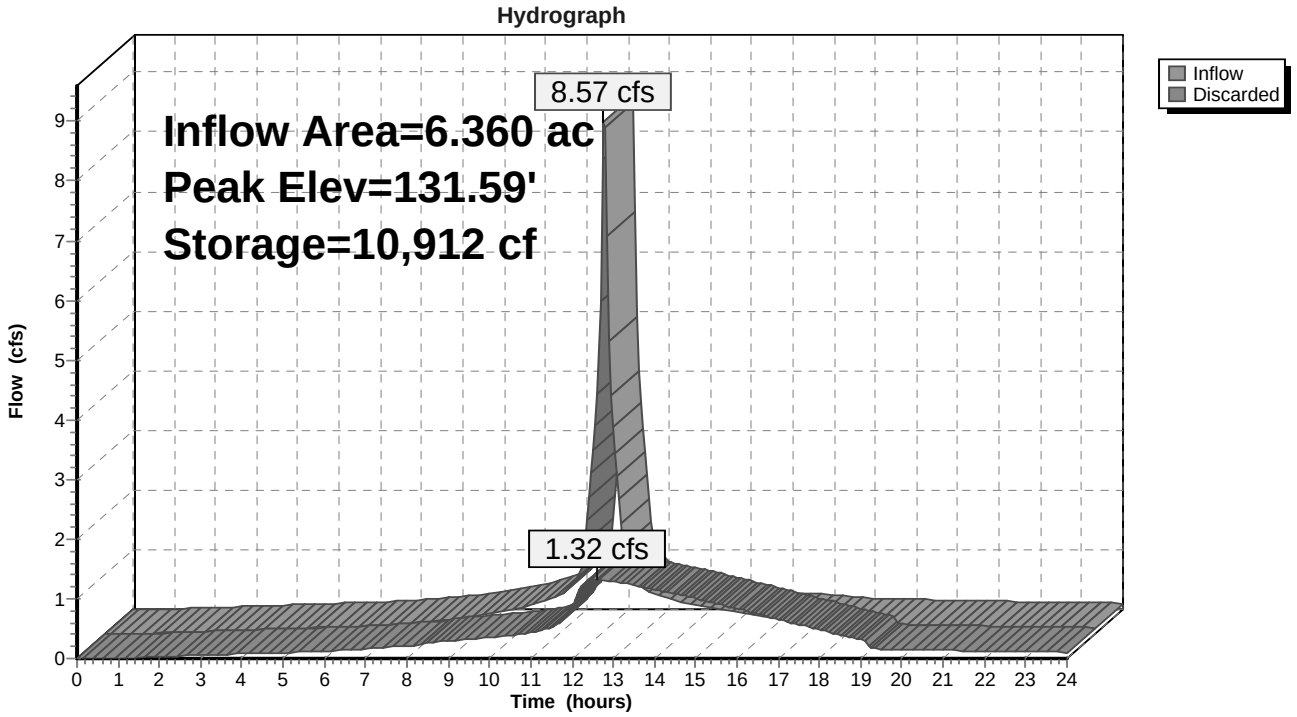
Volume	Invert	Avail.Storage	Storage Description
#1	129.00'	33,592 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
129.00	1,494	0	0
130.00	3,621	2,558	2,558
132.00	7,748	11,369	13,927
134.00	11,917	19,665	33,592

Device	Routing	Invert	Outlet Devices
#1	Discarded	129.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=1.32 cfs @ 12.58 hrs HW=131.59' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.32 cfs)

Pond Basin 1:


Hydrograph
Inflow
Discarded
8.57 cfs
1.32 cfs
Inflow Area=6.360 ac
Peak Elev=131.59'
Storage=10,912 cf
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9
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

Summary for Pond PP: Porous Pavement

Inflow Area = 1.650 ac, 73.94% Impervious, Inflow Depth > 1.82" for 10-Year event
Inflow = 0.40 cfs @ 21.94 hrs, Volume= 0.250 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

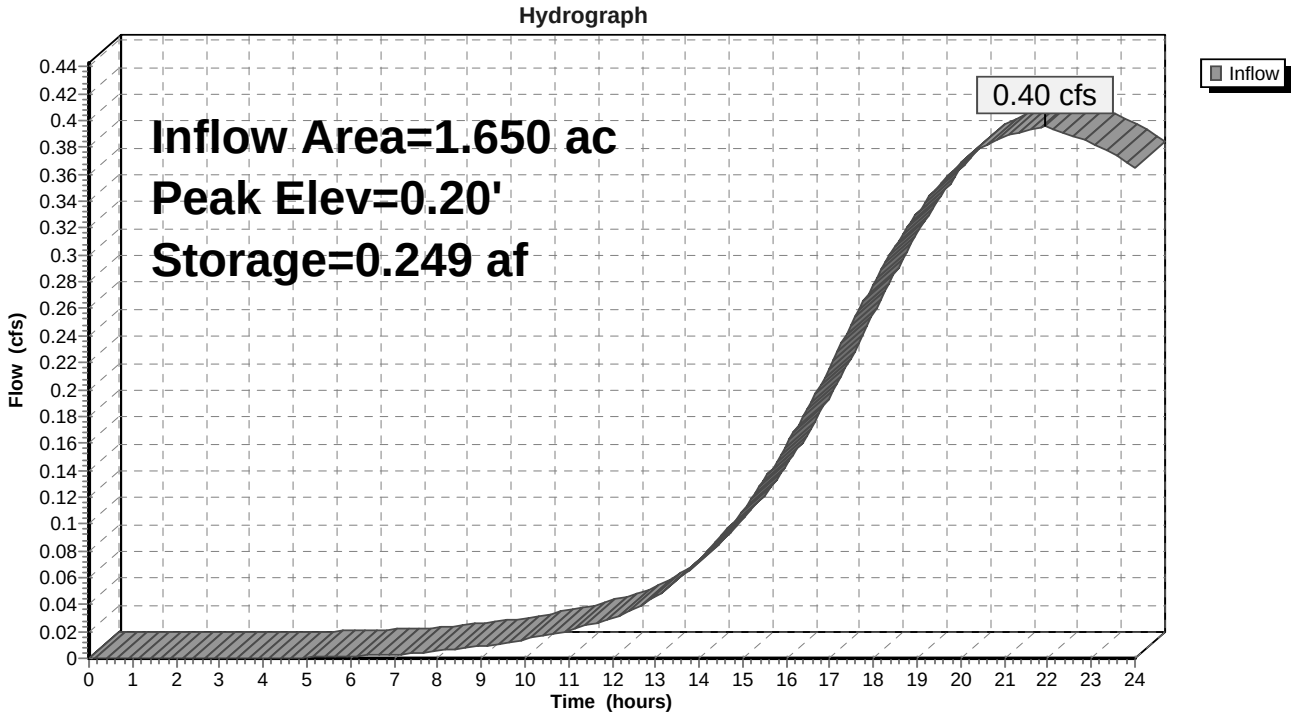
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.20' @ 24.00 hrs Surf.Area= 1.220 ac Storage= 0.249 af

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

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2.952 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
0.00	1.220	0.000	0.000
2.42	1.220	2.952	2.952

Pond PP: Porous Pavement



Summary for Pond SIS-1:

Inflow Area = 1.930 ac, 15.54% Impervious, Inflow Depth > 0.82" for 10-Year event
Inflow = 1.37 cfs @ 12.09 hrs, Volume= 0.133 af
Outflow = 0.52 cfs @ 11.90 hrs, Volume= 0.133 af, Atten= 62%, Lag= 0.0 min
Discarded = 0.52 cfs @ 11.90 hrs, Volume= 0.133 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 163.74' @ 12.33 hrs Surf.Area= 2,705 sf Storage= 601 cf

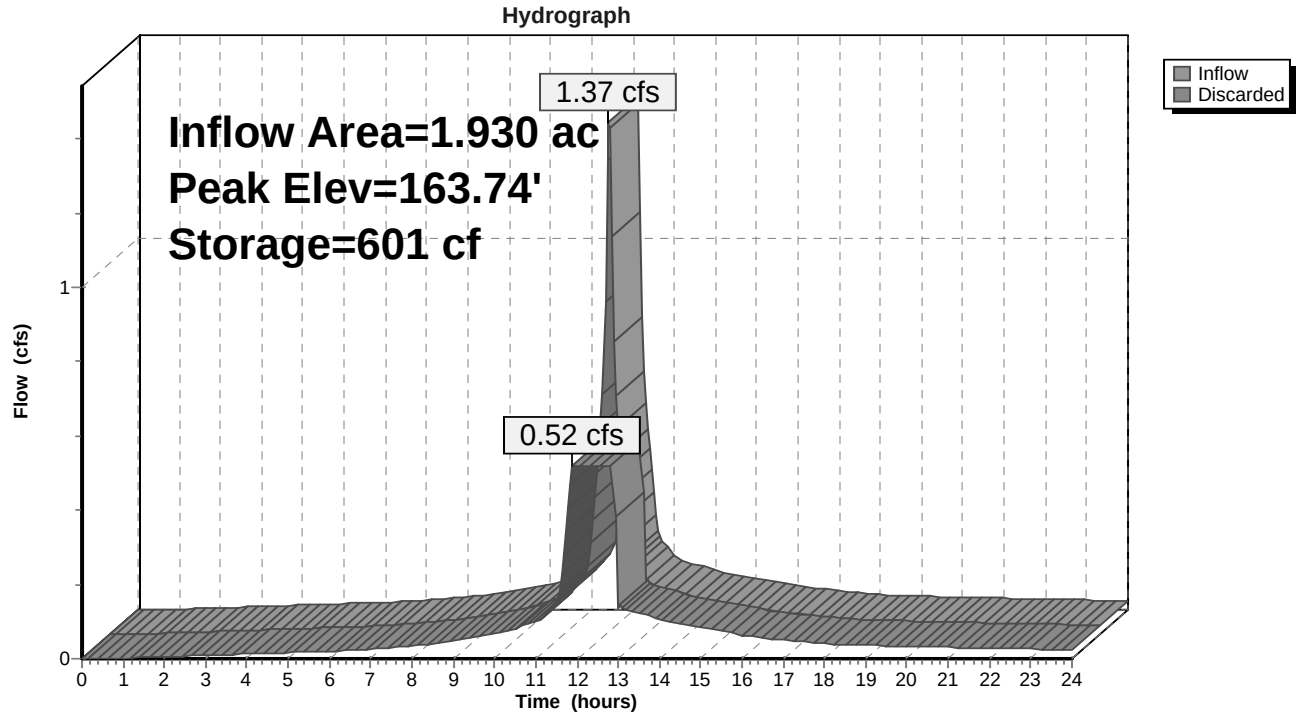
Plug-Flow detention time= 4.8 min calculated for 0.132 af (100% of inflow)
Center-of-Mass det. time= 4.6 min (791.7 - 787.1)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	2,915 cf	**5.00'W x 541.00'L x 5.00'H Prismatoid** 13,525 cf Overall - 3,810 cf Embedded = 9,715 cf x 30.0% Voids
#2	164.00'	3,810 cf	**36.0" Round Pipe Storage** Inside #1 L= 539.0'
		6,724 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	163.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.52 cfs @ 11.90 hrs HW=163.05' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.52 cfs)

Pond SIS-1:



Summary for Pond SIS-10:

Inflow Area = 1.250 ac, 57.60% Impervious, Inflow Depth > 2.70" for 10-Year event
Inflow = 3.30 cfs @ 12.09 hrs, Volume= 0.281 af
Outflow = 0.41 cfs @ 11.60 hrs, Volume= 0.281 af, Atten= 88%, Lag= 0.0 min
Discarded = 0.41 cfs @ 11.60 hrs, Volume= 0.281 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 130.10' @ 12.67 hrs Surf.Area= 2,116 sf Storage= 3,626 cf

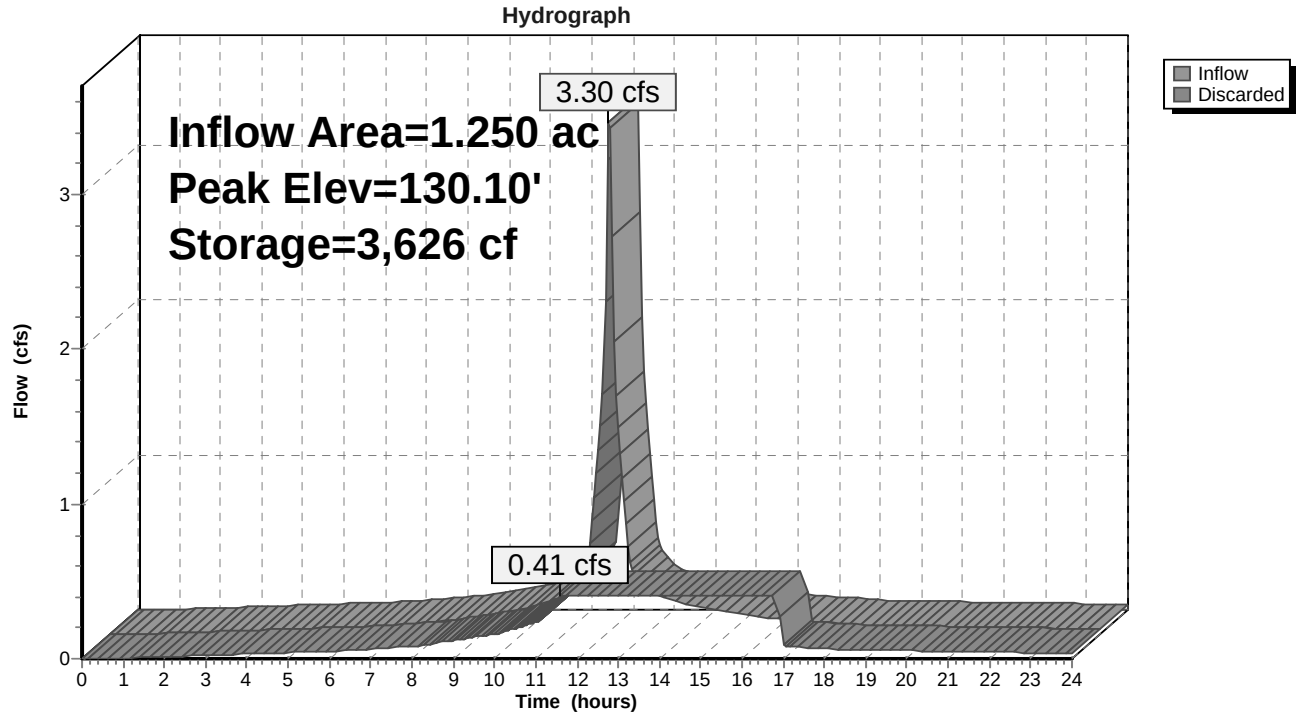
Plug-Flow detention time= 55.6 min calculated for 0.281 af (100% of inflow)
Center-of-Mass det. time= 55.4 min (810.7 - 755.3)

Volume	Invert	Avail.Storage	Storage Description
#1	127.00'	2,788 cf	**46.00'W x 46.00'L x 8.00'H Prismatoid** 16,928 cf Overall - 7,634 cf Embedded = 9,294 cf x 30.0% Voids
#2	128.00'	7,634 cf	**72.0" Round Pipe Storage** Inside #1 L= 270.0'
		10,422 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	127.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.41 cfs @ 11.60 hrs HW=127.09' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.41 cfs)

Pond SIS-10:



Summary for Pond SIS-2:

Inflow Area = 1.380 ac, 39.13% Impervious, Inflow Depth > 1.88" for 10-Year event
Inflow = 2.47 cfs @ 12.09 hrs, Volume= 0.216 af
Outflow = 0.34 cfs @ 11.65 hrs, Volume= 0.216 af, Atten= 86%, Lag= 0.0 min
Discarded = 0.34 cfs @ 11.65 hrs, Volume= 0.216 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 144.30' @ 12.62 hrs Surf.Area= 1,776 sf Storage= 2,592 cf

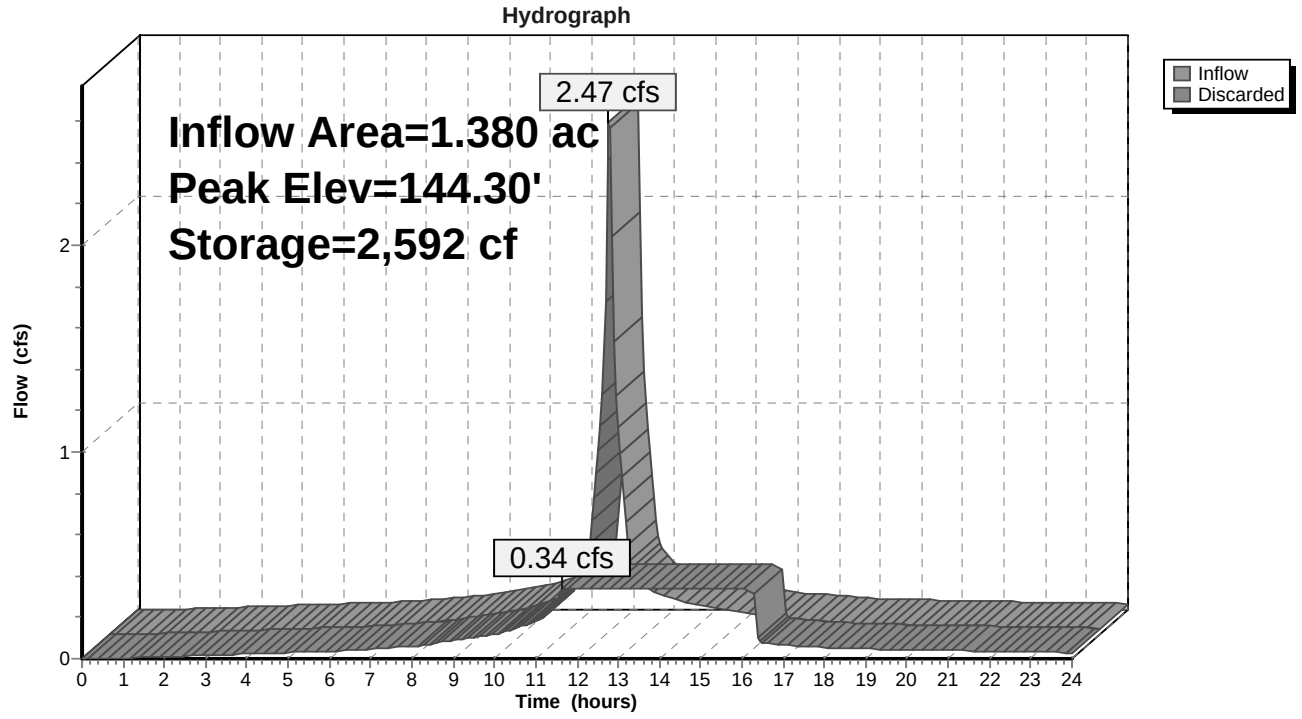
Plug-Flow detention time= 45.6 min calculated for 0.216 af (100% of inflow)
Center-of-Mass det. time= 45.3 min (807.9 - 762.6)

Volume	Invert	Avail.Storage	Storage Description
#1	141.50'	2,396 cf	**8.00'W x 222.00'L x 8.00'H Prismatoid** 14,208 cf Overall - 6,220 cf Embedded = 7,988 cf x 30.0% Voids
#2	142.50'	6,220 cf	**72.0" Round Pipe Storage** Inside #1 L= 220.0'
		8,617 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	141.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.34 cfs @ 11.65 hrs HW=141.60' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.34 cfs)

Pond SIS-2:



Summary for Pond SIS-3:

Inflow Area = 5.290 ac, 51.98% Impervious, Inflow Depth > 2.45" for 10-Year event
Inflow = 12.60 cfs @ 12.09 hrs, Volume= 1.079 af
Outflow = 1.44 cfs @ 11.55 hrs, Volume= 1.079 af, Atten= 89%, Lag= 0.0 min
Discarded = 1.44 cfs @ 11.55 hrs, Volume= 1.079 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 143.61' @ 12.75 hrs Surf.Area= 7,504 sf Storage= 14,377 cf

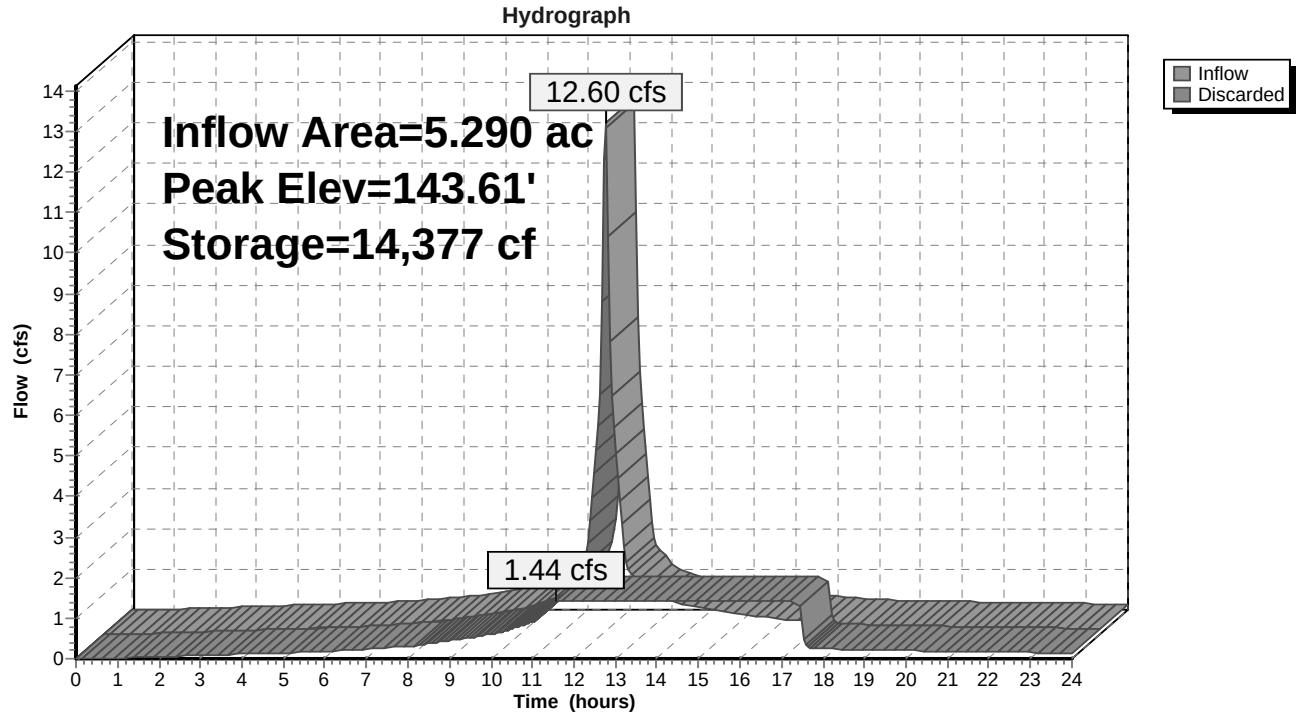
Plug-Flow detention time= 64.8 min calculated for 1.076 af (100% of inflow)
Center-of-Mass det. time= 64.4 min (821.3 - 757.0)

Volume	Invert	Avail.Storage	Storage Description
#1	140.50'	13,291 cf	**56.00'W x 134.00'L x 8.00'H Prismatoid** 60,032 cf Overall - 26,804 cf Embedded = 33,228 cf x 40.0% Voids
#2	141.50'	26,804 cf	**72.0" Round Pipe Storage** Inside #1 L= 948.0'
		40,095 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=1.44 cfs @ 11.55 hrs HW=140.58' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.44 cfs)

Pond SIS-3:



Summary for Pond SIS-4:

Inflow Area = 1.330 ac, 66.92% Impervious, Inflow Depth > 3.11" for 10-Year event
Inflow = 4.08 cfs @ 12.09 hrs, Volume= 0.344 af
Outflow = 0.44 cfs @ 11.50 hrs, Volume= 0.344 af, Atten= 89%, Lag= 0.0 min
Discarded = 0.44 cfs @ 11.50 hrs, Volume= 0.344 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 148.29' @ 12.79 hrs Surf.Area= 2,304 sf Storage= 4,752 cf

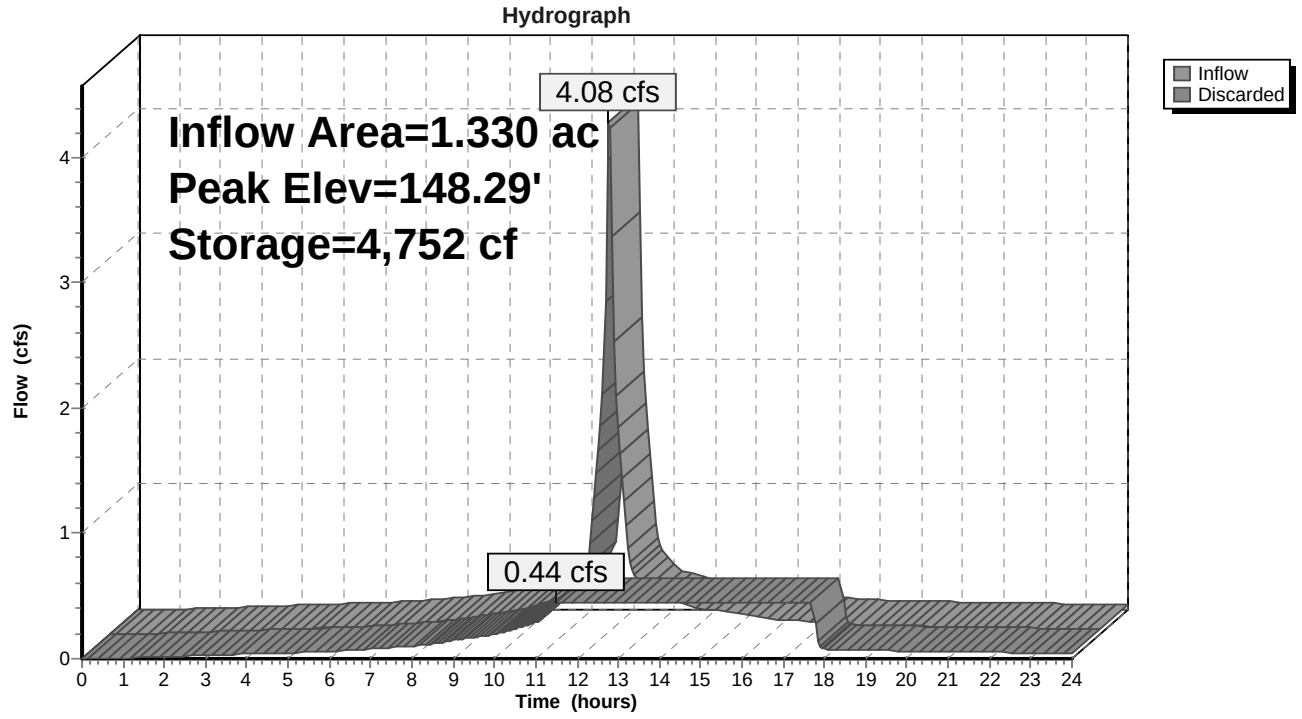
Plug-Flow detention time= 70.7 min calculated for 0.343 af (100% of inflow)
Center-of-Mass det. time= 70.3 min (823.3 - 753.0)

Volume	Invert	Avail.Storage	Storage Description
#1	145.00'	4,116 cf	**16.00'W x 144.00'L x 8.00'H Prismatoid** 18,432 cf Overall - 8,143 cf Embedded = 10,289 cf x 40.0% Voids
#2	146.00'	8,143 cf	**72.0" Round Pipe Storage** Inside #1 L= 288.0'
		12,259 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	145.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.44 cfs @ 11.50 hrs HW=145.08' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.44 cfs)

Pond SIS-4:



Summary for Pond SIS-5:

Inflow Area = 0.590 ac, 47.46% Impervious, Inflow Depth > 2.25" for 10-Year event
Inflow = 1.28 cfs @ 12.09 hrs, Volume= 0.111 af
Outflow = 0.17 cfs @ 11.60 hrs, Volume= 0.111 af, Atten= 87%, Lag= 0.0 min
Discarded = 0.17 cfs @ 11.60 hrs, Volume= 0.111 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 139.97' @ 12.65 hrs Surf.Area= 864 sf Storage= 1,381 cf

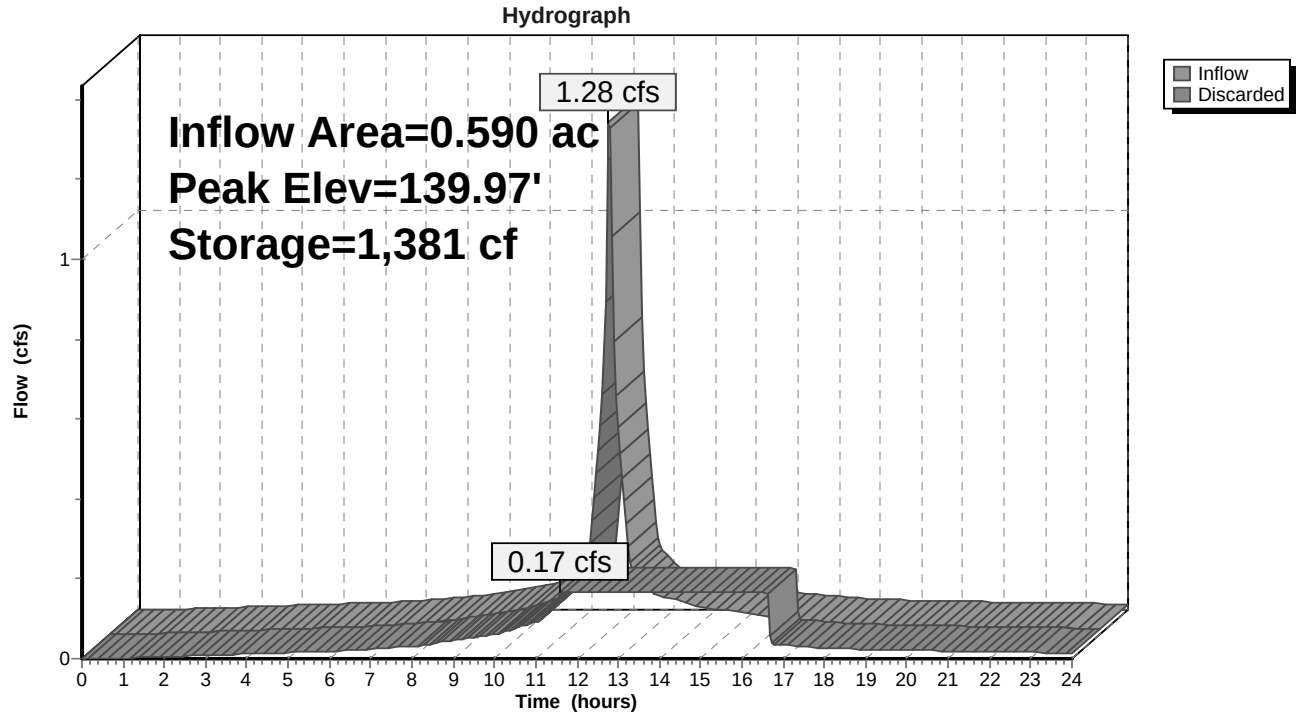
Plug-Flow detention time= 51.1 min calculated for 0.111 af (100% of inflow)
Center-of-Mass det. time= 50.8 min (809.5 - 758.7)

Volume	Invert	Avail.Storage	Storage Description
#1	137.00'	1,158 cf	**16.00'W x 54.00'L x 8.00'H Prismatoid** 6,912 cf Overall - 3,054 cf Embedded = 3,858 cf x 30.0% Voids
#2	138.00'	3,054 cf	**72.0" Round Pipe Storage** Inside #1 L= 108.0'
		4,211 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	137.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.17 cfs @ 11.60 hrs HW=137.08' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.17 cfs)

Pond SIS-5:



Summary for Pond SIS-6:

Inflow Area = 1.330 ac, 62.41% Impervious, Inflow Depth > 2.91" for 10-Year event
Inflow = 3.80 cfs @ 12.09 hrs, Volume= 0.322 af
Outflow = 0.33 cfs @ 11.30 hrs, Volume= 0.322 af, Atten= 91%, Lag= 0.0 min
Discarded = 0.33 cfs @ 11.30 hrs, Volume= 0.322 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 136.45' @ 13.02 hrs Surf.Area= 1,728 sf Storage= 4,896 cf

Plug-Flow detention time= 105.5 min calculated for 0.322 af (100% of inflow)
Center-of-Mass det. time= 105.1 min (859.1 - 754.0)

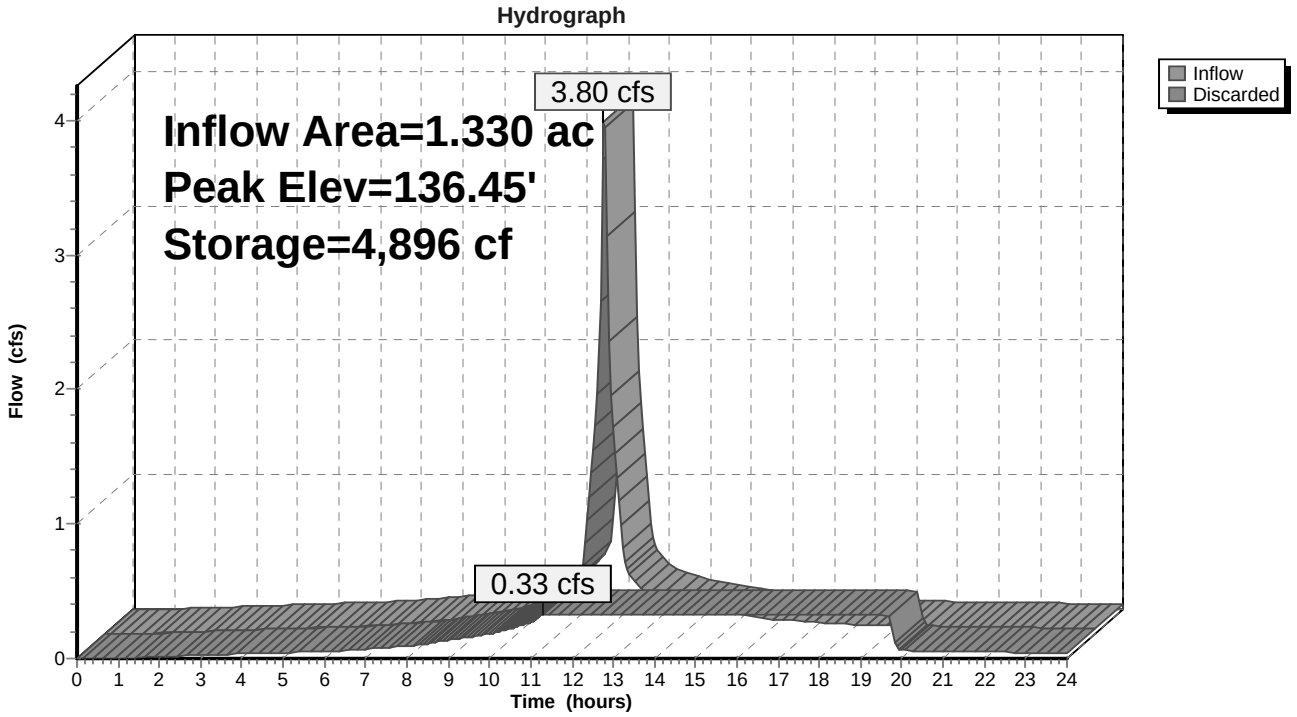
Volume	Invert	Avail.Storage	Storage Description
#1	132.00'	2,281 cf	**32.00'W x 54.00'L x 8.00'H Prismatoid** 13,824 cf Overall - 6,220 cf Embedded = 7,604 cf x 30.0% Voids
#2	133.00'	6,220 cf	**72.0" Round Pipe Storage** Inside #1 L= 220.0'
#3	142.00'	4,855 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		13,356 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
142.00	0	0	0
144.00	1,185	1,185	1,185
146.00	2,485	3,670	4,855

Device	Routing	Invert	Outlet Devices
#1	Discarded	132.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.33 cfs @ 11.30 hrs HW=132.15' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.33 cfs)

Pond SIS-6:


Hydrograph
Inflow
Discarded
3.80 cfs
0.33 cfs
Inflow Area=1.330 ac
Peak Elev=136.45'
Storage=4,896 cf
Flow (cfs)
Time (hours)
0
1
2
3
4
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

Summary for Pond SIS-7:

Inflow Area = 1.110 ac, 44.14% Impervious, Inflow Depth > 2.10" for 10-Year event
Inflow = 2.25 cfs @ 12.09 hrs, Volume= 0.195 af
Outflow = 0.29 cfs @ 11.60 hrs, Volume= 0.194 af, Atten= 87%, Lag= 0.0 min
Discarded = 0.29 cfs @ 11.60 hrs, Volume= 0.194 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 134.51' @ 12.66 hrs Surf.Area= 1,496 sf Storage= 2,430 cf

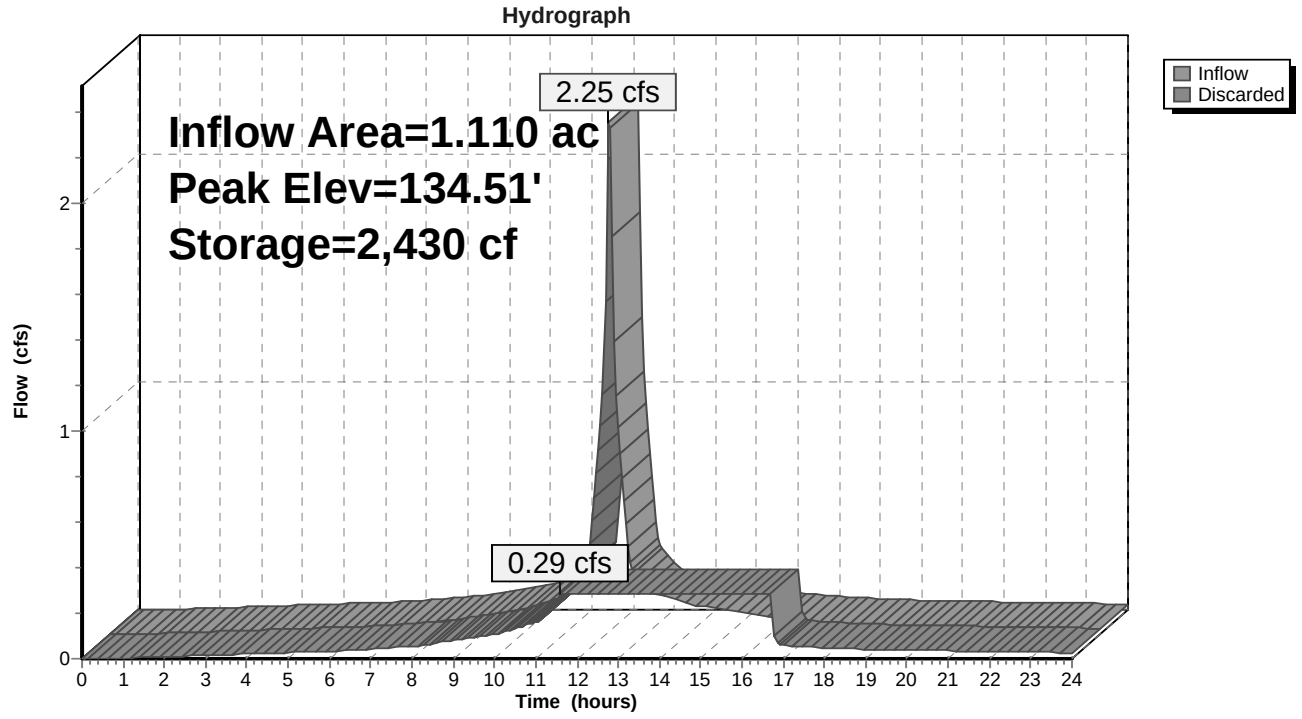
Plug-Flow detention time= 52.3 min calculated for 0.194 af (100% of inflow)
Center-of-Mass det. time= 52.0 min (812.0 - 760.1)

Volume	Invert	Avail.Storage	Storage Description
#1	131.50'	2,021 cf	**8.00'W x 187.00'L x 8.00'H Prismatoid** 11,968 cf Overall - 5,231 cf Embedded = 6,737 cf x 30.0% Voids
#2	132.50'	5,231 cf	**72.0" Round Pipe Storage** Inside #1 L= 185.0'
		7,252 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	131.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.29 cfs @ 11.60 hrs HW=131.58' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.29 cfs)

Pond SIS-7:



Summary for Pond SIS-8:

Inflow Area = 0.220 ac, 63.64% Impervious, Inflow Depth > 2.96" for 10-Year event
Inflow = 0.64 cfs @ 12.09 hrs, Volume= 0.054 af
Outflow = 0.14 cfs @ 11.75 hrs, Volume= 0.054 af, Atten= 78%, Lag= 0.0 min
Discarded = 0.14 cfs @ 11.75 hrs, Volume= 0.054 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 128.71' @ 12.50 hrs Surf.Area= 732 sf Storage= 504 cf

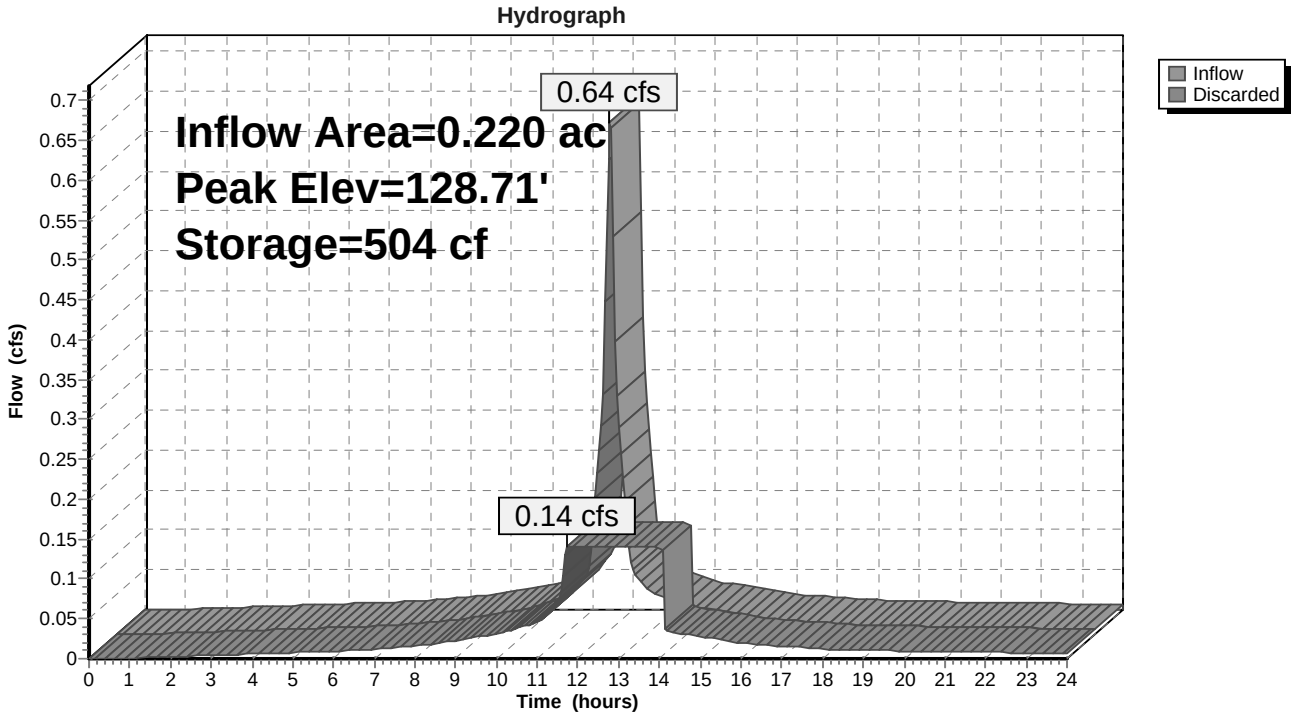
Plug-Flow detention time= 17.7 min calculated for 0.054 af (100% of inflow)
Center-of-Mass det. time= 17.5 min (771.3 - 753.7)

Volume	Invert	Avail.Storage	Storage Description
#1	127.00'	865 cf	**6.00'W x 122.00'L x 6.00'H Prismatoid** 4,392 cf Overall - 1,508 cf Embedded = 2,884 cf x 30.0% Voids
#2	128.00'	1,508 cf	**48.0" Round Pipe Storage** Inside #1 L= 120.0'
		2,373 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	127.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.14 cfs @ 11.75 hrs HW=127.07' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.14 cfs)

Pond SIS-8:



Summary for Pond SIS-9:

Inflow Area = 2.300 ac, 77.39% Impervious, Inflow Depth > 3.57" for 10-Year event
Inflow = 8.16 cfs @ 12.09 hrs, Volume= 0.683 af
Outflow = 0.91 cfs @ 11.55 hrs, Volume= 0.683 af, Atten= 89%, Lag= 0.0 min
Discarded = 0.91 cfs @ 11.55 hrs, Volume= 0.683 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 129.37' @ 12.75 hrs Surf.Area= 4,761 sf Storage= 9,323 cf

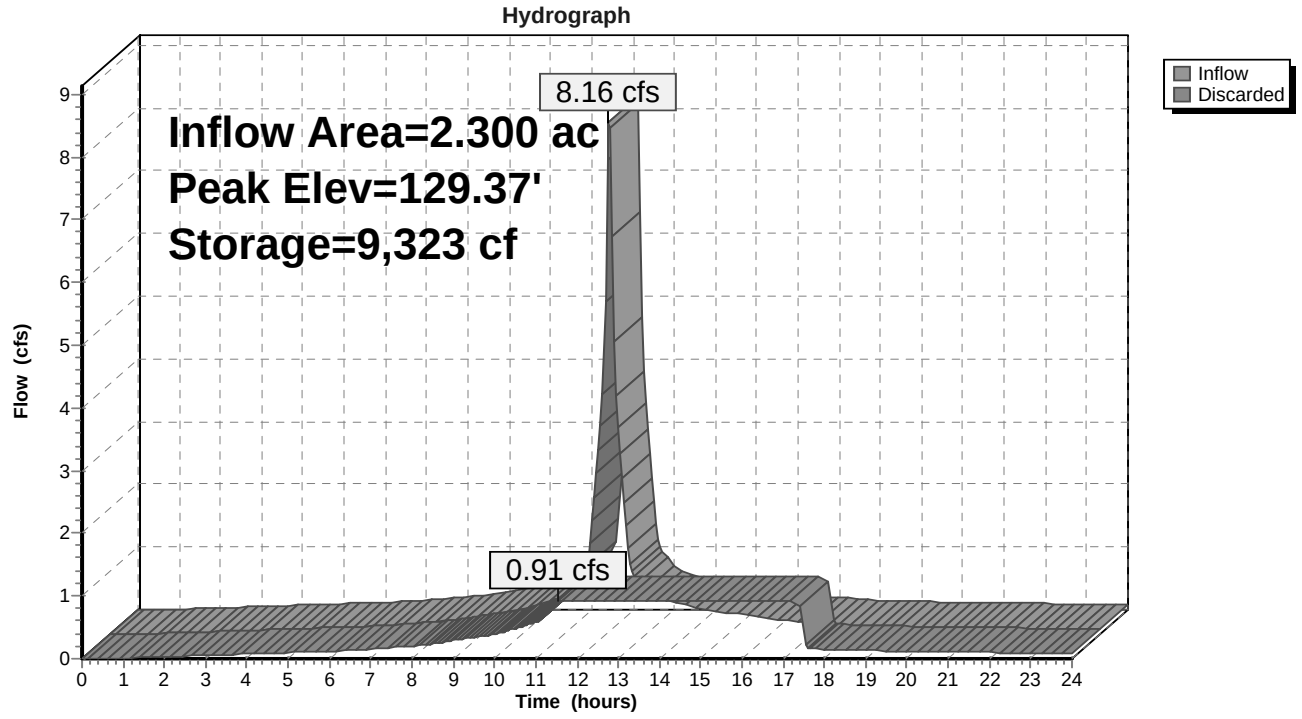
Plug-Flow detention time= 65.7 min calculated for 0.682 af (100% of inflow)
Center-of-Mass det. time= 65.4 min (816.5 - 751.1)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	6,184 cf	**69.00'W x 69.00'L x 8.00'H Prismatoid** 38,088 cf Overall - 17,474 cf Embedded = 20,614 cf x 30.0% Voids
#2	127.00'	17,474 cf	**72.0" Round Pipe Storage** Inside #1 L= 618.0'
		23,658 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	126.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.91 cfs @ 11.55 hrs HW=126.09' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.91 cfs)

Pond SIS-9:

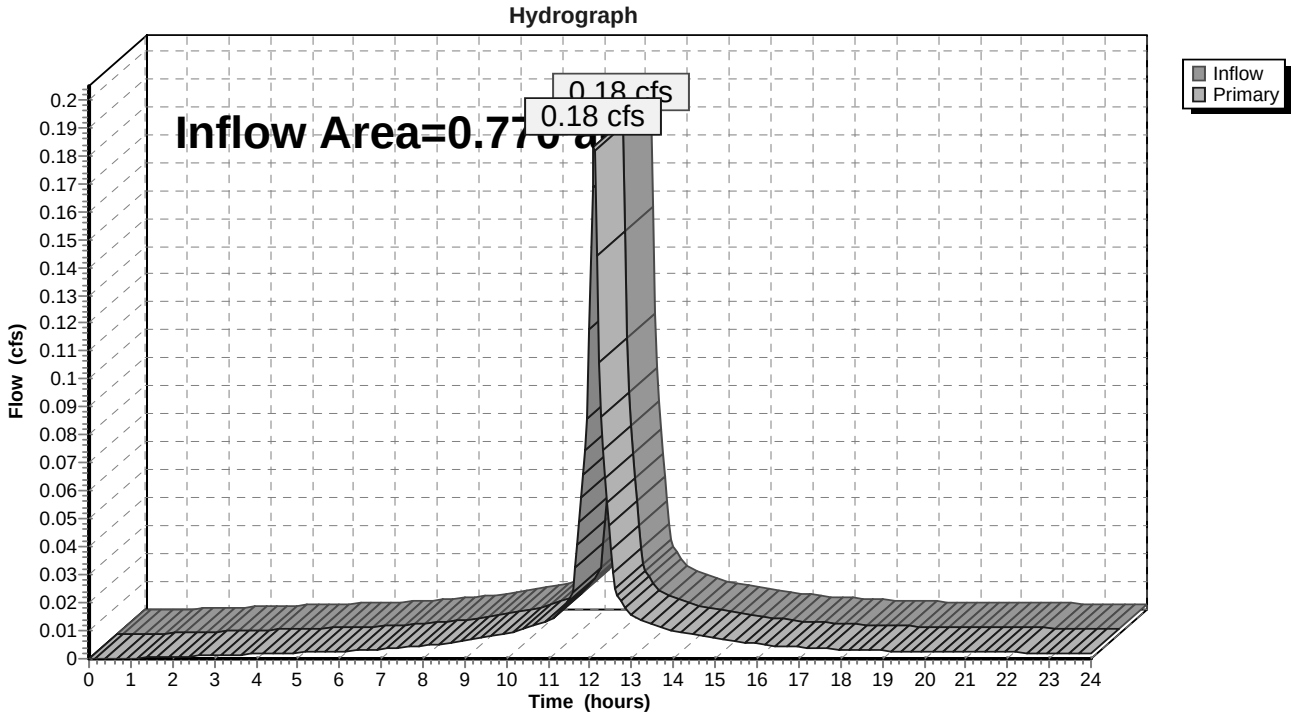


Summary for Link POA-1:

Inflow Area = 0.770 ac, 5.19% Impervious, Inflow Depth > 0.24" for 10-Year event
Inflow = 0.18 cfs @ 12.09 hrs, Volume= 0.015 af
Primary = 0.18 cfs @ 12.09 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-1:

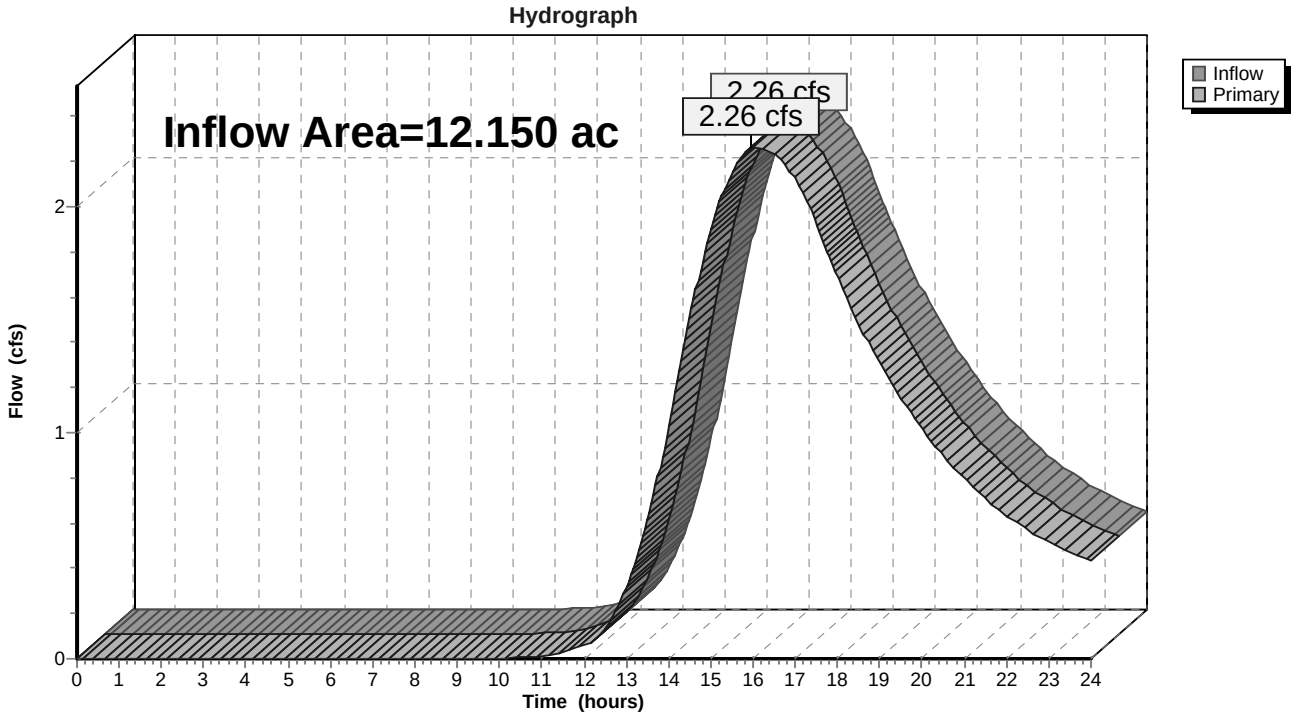


Summary for Link POA-2:

Inflow Area = 12.150 ac, 0.00% Impervious, Inflow Depth > 1.13" for 10-Year event
Inflow = 2.26 cfs @ 15.97 hrs, Volume= 1.148 af
Primary = 2.26 cfs @ 15.97 hrs, Volume= 1.148 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-2:

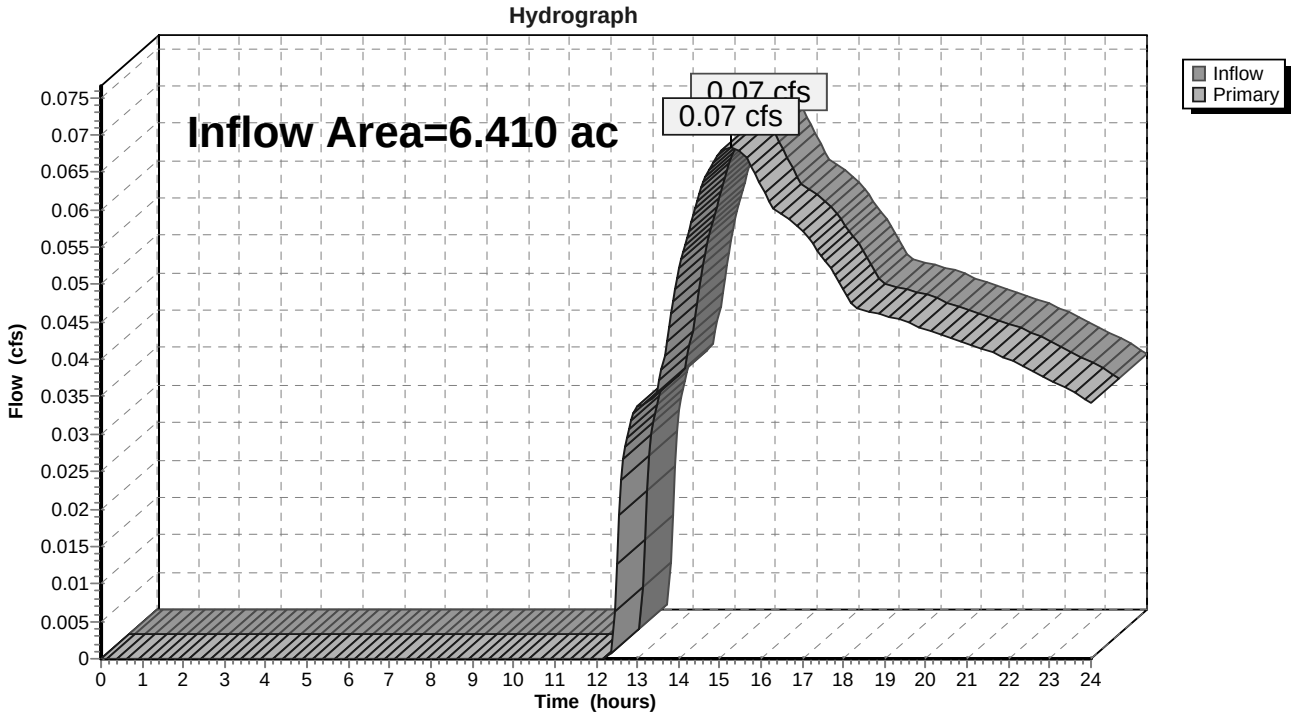


Summary for Link POA-3:

Inflow Area = 6.410 ac, 0.00% Impervious, Inflow Depth > 0.08" for 10-Year event
Inflow = 0.07 cfs @ 15.27 hrs, Volume= 0.045 af
Primary = 0.07 cfs @ 15.27 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-3:

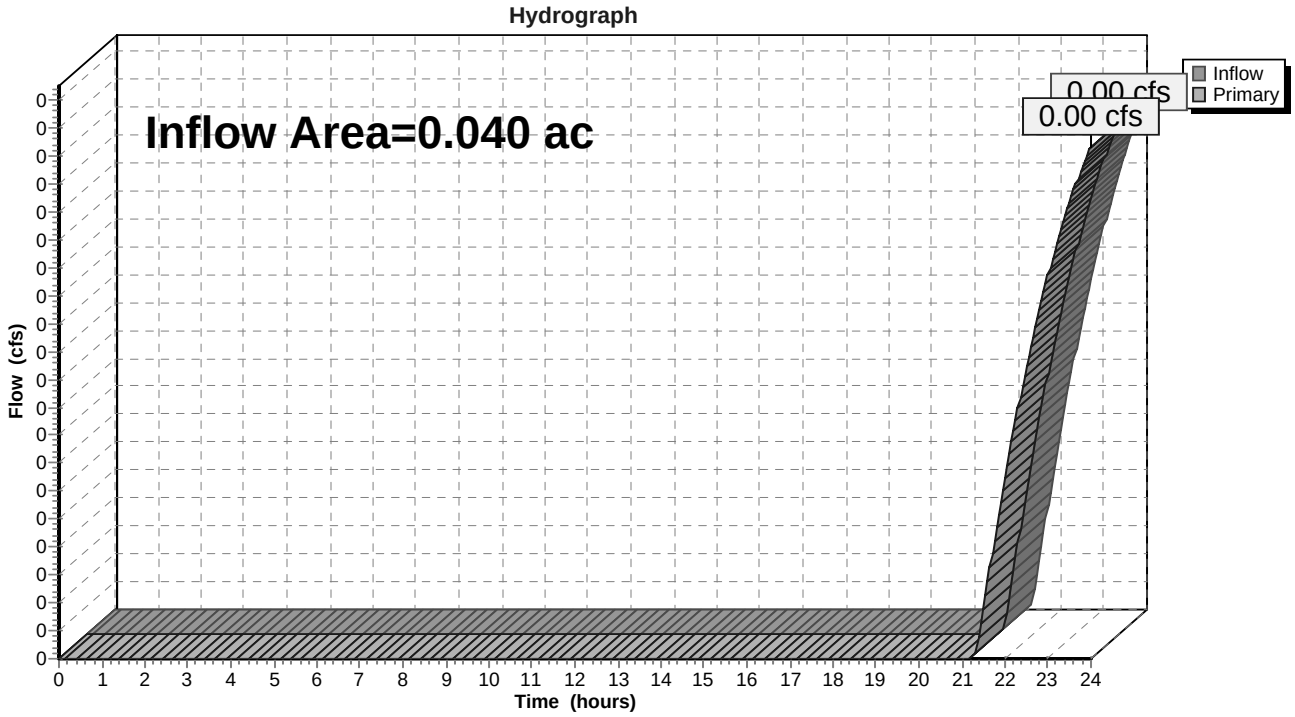


Summary for Link POA-4:

Inflow Area = 0.040 ac, 0.00% Impervious, Inflow Depth > 0.00" for 10-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-4:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1A: Runoff Area=0.500 ac 0.00% Impervious Runoff Depth>0.07"
Flow Length=557' Tc=11.7 min CN=30 Runoff=0.00 cfs 0.003 af

Subcatchment PR-1B: Runoff Area=0.270 ac 14.81% Impervious Runoff Depth>0.91"
Flow Length=188' Tc=6.1 min CN=WQ Runoff=0.23 cfs 0.021 af

Subcatchment PR-1C: Runoff Area=6.360 ac 29.40% Impervious Runoff Depth>1.91"
Tc=6.0 min CN=WQ Runoff=10.81 cfs 1.014 af

Subcatchment PR-1D: Runoff Area=1.650 ac 73.94% Impervious Runoff Depth>2.33"
Tc=790.0 min CN=WQ Runoff=0.50 cfs 0.321 af

Subcatchment PR-2: Runoff Area=12.150 ac 0.00% Impervious Runoff Depth>1.64"
Flow Length=2,069' Tc=304.8 min CN=WQ Runoff=3.24 cfs 1.657 af

Subcatchment PR-3A: Runoff Area=6.410 ac 0.00% Impervious Runoff Depth>0.30"
Flow Length=1,024' Tc=14.9 min CN=WQ Runoff=0.44 cfs 0.159 af

Subcatchment PR-3B: Runoff Area=1.250 ac 57.60% Impervious Runoff Depth>3.51"
Tc=6.0 min CN=WQ Runoff=4.15 cfs 0.365 af

Subcatchment PR-3C: Runoff Area=2.300 ac 77.39% Impervious Runoff Depth>4.56"
Tc=6.0 min CN=WQ Runoff=10.23 cfs 0.873 af

Subcatchment PR-3D: Runoff Area=1.110 ac 44.14% Impervious Runoff Depth>2.79"
Tc=6.0 min CN=WQ Runoff=2.83 cfs 0.258 af

Subcatchment PR-3E: Runoff Area=1.330 ac 62.41% Impervious Runoff Depth>3.76"
Tc=6.0 min CN=WQ Runoff=4.78 cfs 0.417 af

Subcatchment PR-3F: Runoff Area=0.590 ac 47.46% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=WQ Runoff=1.62 cfs 0.146 af

Subcatchment PR-3G: Runoff Area=1.330 ac 66.92% Impervious Runoff Depth>4.00"
Tc=6.0 min CN=WQ Runoff=5.12 cfs 0.443 af

Subcatchment PR-3H: Runoff Area=1.380 ac 39.13% Impervious Runoff Depth>2.52"
Tc=6.0 min CN=WQ Runoff=3.12 cfs 0.290 af

Subcatchment PR-3I: Runoff Area=5.290 ac 51.98% Impervious Runoff Depth>3.21"
Tc=6.0 min CN=WQ Runoff=15.86 cfs 1.414 af

Subcatchment PR-3J: Runoff Area=1.930 ac 15.54% Impervious Runoff Depth>1.22"
Tc=6.0 min CN=WQ Runoff=1.76 cfs 0.197 af

Subcatchment PR-3K: Runoff Area=0.220 ac 63.64% Impervious Runoff Depth>3.83"
Tc=6.0 min CN=WQ Runoff=0.81 cfs 0.070 af

Subcatchment PR-4: Runoff Area=0.040 ac 0.00% Impervious Runoff Depth>0.07"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.000 af

Pond Basin 1: Peak Elev=132.15' Storage=15,109 cf Inflow=10.81 cfs 1.014 af
Outflow=1.54 cfs 1.013 af

Pond PP: Porous Pavement Peak Elev=0.26' Storage=0.320 af Inflow=0.50 cfs 0.321 af
Outflow=0.00 cfs 0.000 af

Pond SIS-1: Peak Elev=164.35' Storage=1,268 cf Inflow=1.76 cfs 0.197 af
Outflow=0.52 cfs 0.197 af

Pond SIS-10: Peak Elev=130.99' Storage=5,190 cf Inflow=4.15 cfs 0.365 af
Outflow=0.41 cfs 0.365 af

Pond SIS-2: Peak Elev=145.19' Storage=3,854 cf Inflow=3.12 cfs 0.290 af
Outflow=0.34 cfs 0.290 af

Pond SIS-3: Peak Elev=144.61' Storage=20,756 cf Inflow=15.86 cfs 1.414 af
Outflow=1.44 cfs 1.413 af

Pond SIS-4: Peak Elev=149.30' Storage=6,721 cf Inflow=5.12 cfs 0.443 af
Outflow=0.44 cfs 0.443 af

Pond SIS-5: Peak Elev=140.87' Storage=2,012 cf Inflow=1.62 cfs 0.146 af
Outflow=0.17 cfs 0.146 af

Pond SIS-6: Peak Elev=137.98' Storage=6,964 cf Inflow=4.78 cfs 0.417 af
Outflow=0.33 cfs 0.417 af

Pond SIS-7: Peak Elev=135.45' Storage=3,567 cf Inflow=2.83 cfs 0.258 af
Outflow=0.29 cfs 0.258 af

Pond SIS-8: Peak Elev=129.21' Storage=755 cf Inflow=0.81 cfs 0.070 af
Outflow=0.14 cfs 0.070 af

Pond SIS-9: Peak Elev=130.31' Storage=13,080 cf Inflow=10.23 cfs 0.873 af
Outflow=0.91 cfs 0.873 af

Link POA-1: Inflow=0.23 cfs 0.024 af
Primary=0.23 cfs 0.024 af

Link POA-2: Inflow=3.24 cfs 1.657 af
Primary=3.24 cfs 1.657 af

Link POA-3: Inflow=0.44 cfs 0.159 af
Primary=0.44 cfs 0.159 af

Link POA-4: Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 44.110 ac Runoff Volume = 7.648 af Average Runoff Depth = 2.08"
73.14% Pervious = 32.260 ac 26.86% Impervious = 11.850 ac

Summary for Subcatchment PR-1A:

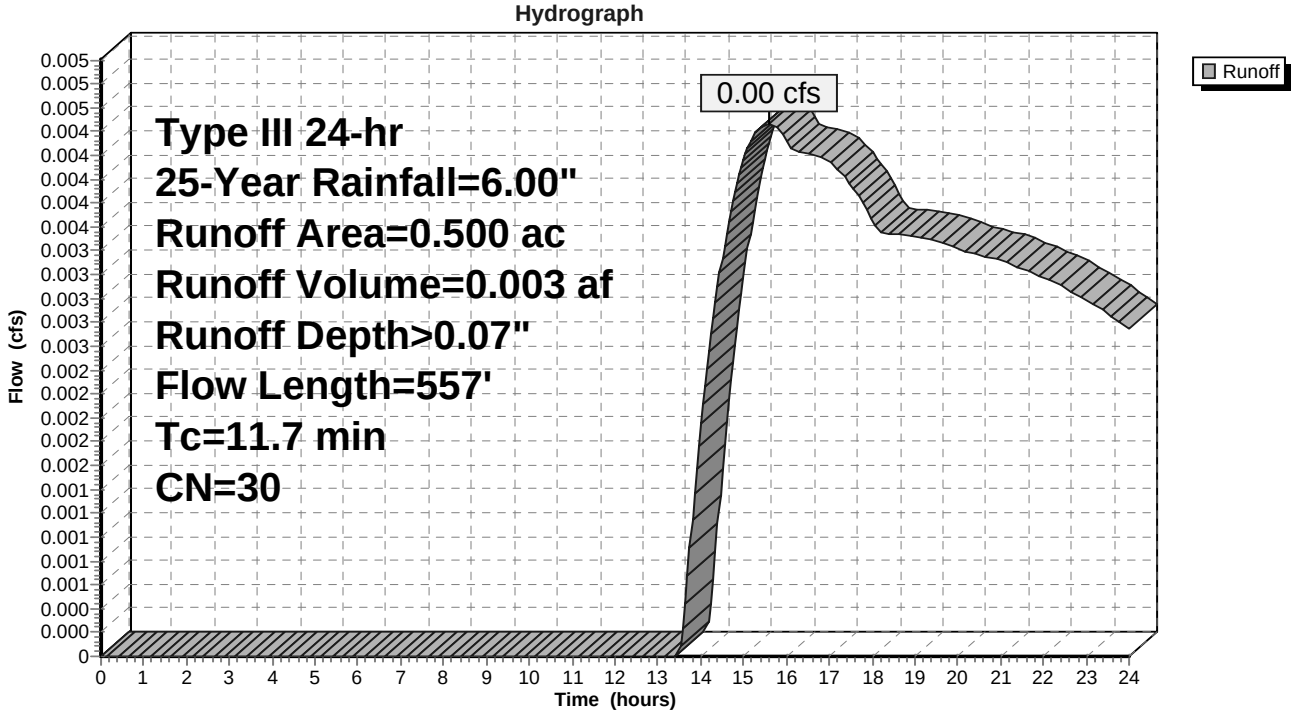
Runoff = 0.00 cfs @ 15.59 hrs, Volume= 0.003 af, Depth> 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.500	30	Woods, Good, HSG A
0.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.2400	0.10		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
1.0	73	0.2400	1.22		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.5	434	0.0370	2.89		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
11.7	557	Total			

Subcatchment PR-1A:



Summary for Subcatchment PR-1B:

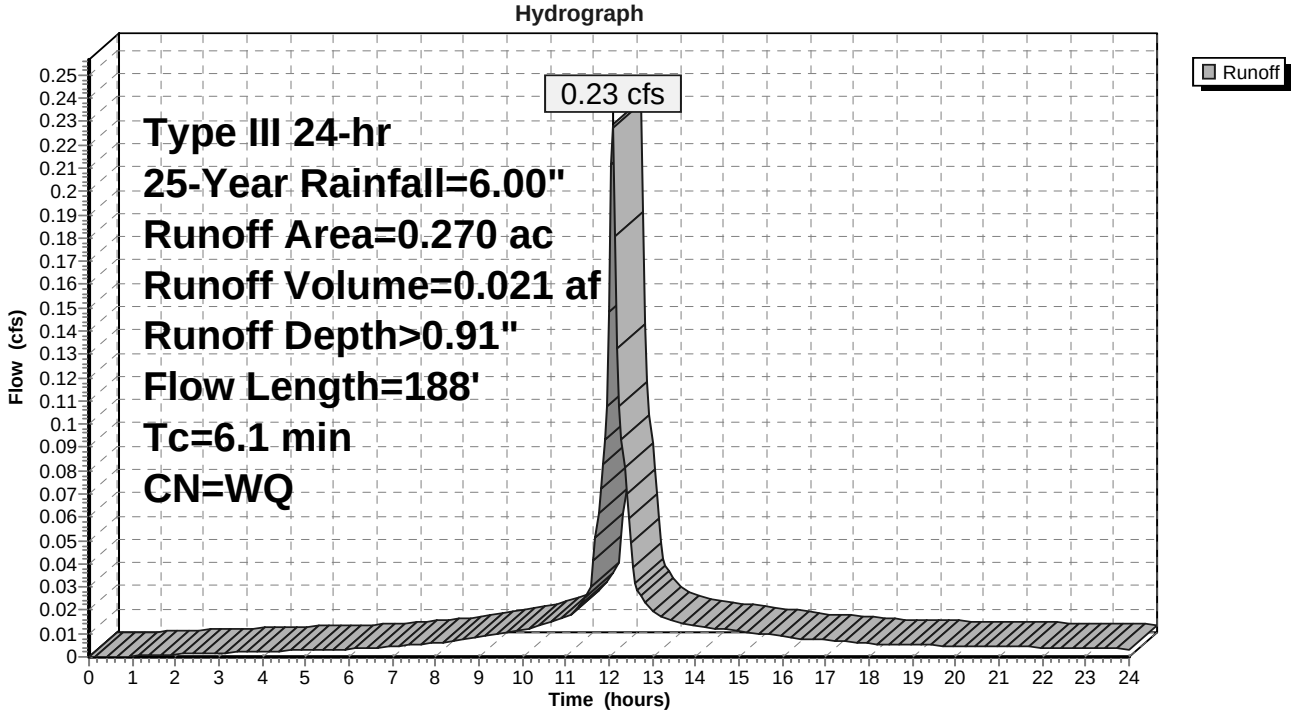
Runoff = 0.23 cfs @ 12.09 hrs, Volume= 0.021 af, Depth> 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.040	98	Paved parking, HSG A
0.230	30	Woods, Good, HSG A
0.270		Weighted Average
0.230		85.19% Pervious Area
0.040		14.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	44	0.1600	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
1.1	144	0.1040	2.26		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.1	188	Total			

Subcatchment PR-1B:



Summary for Subcatchment PR-1C:

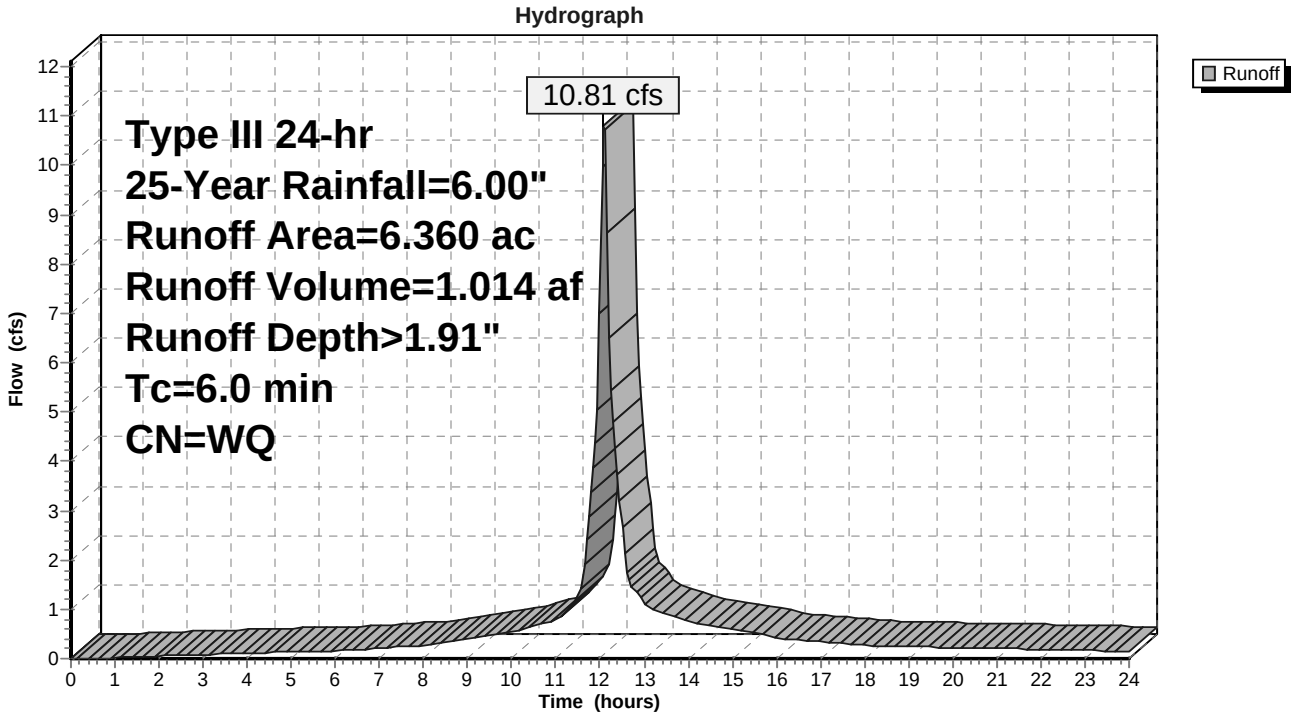
Runoff = 10.81 cfs @ 12.09 hrs, Volume= 1.014 af, Depth> 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.940	98	Paved parking, HSG A
0.750	98	Roofs, HSG A
2.580	39	>75% Grass cover, Good, HSG A
0.660	35	Brush, Fair, HSG A
1.250	30	Woods, Good, HSG A
0.180	98	Water Surface, HSG A
6.360		Weighted Average
4.490		70.60% Pervious Area
1.870		29.40% Impervious Area

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

Subcatchment PR-1C:



Summary for Subcatchment PR-1D:

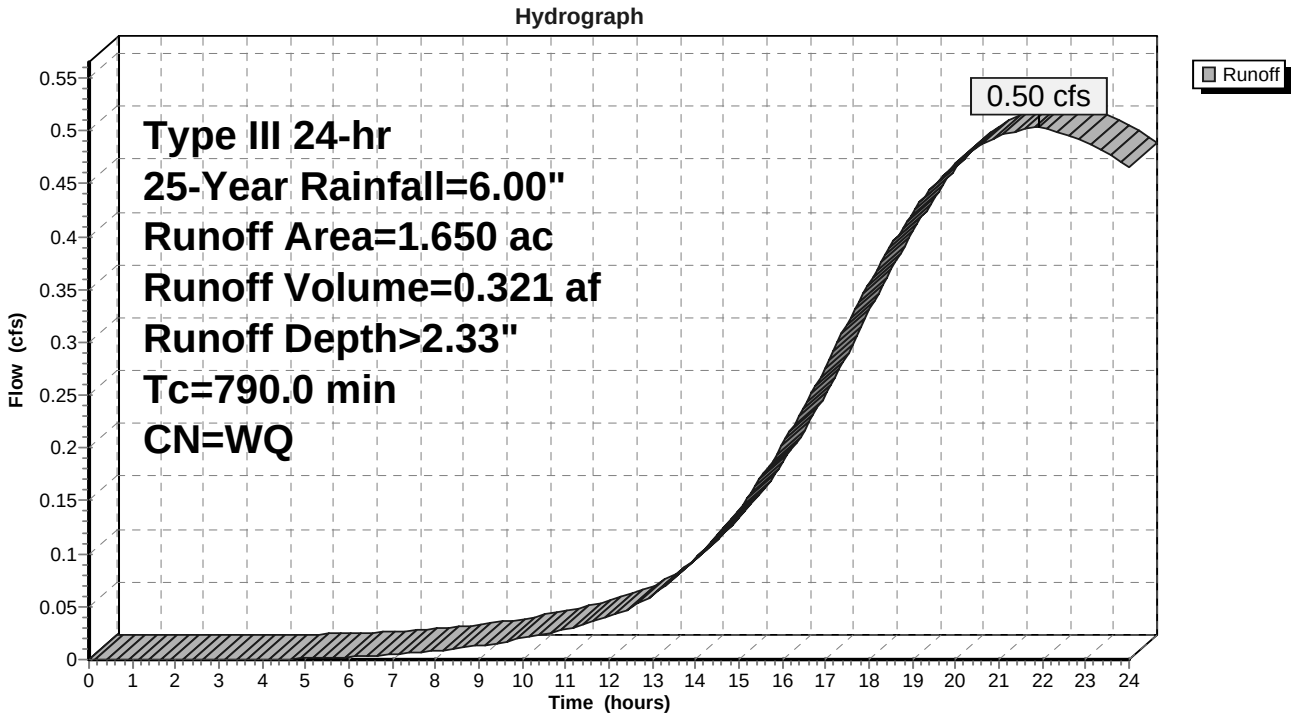
Runoff = 0.50 cfs @ 21.94 hrs, Volume= 0.321 af, Depth> 2.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (ac)	CN	Description
*	1.220	98	Porous Pavement, HSG A
	0.430	39	>75% Grass cover, Good, HSG A
	1.650		Weighted Average
	0.430		26.06% Pervious Area
	1.220		73.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
790.0					**Direct Entry, Per Hydrocad porous pavement design guidance**

Subcatchment PR-1D:



Summary for Subcatchment PR-2:

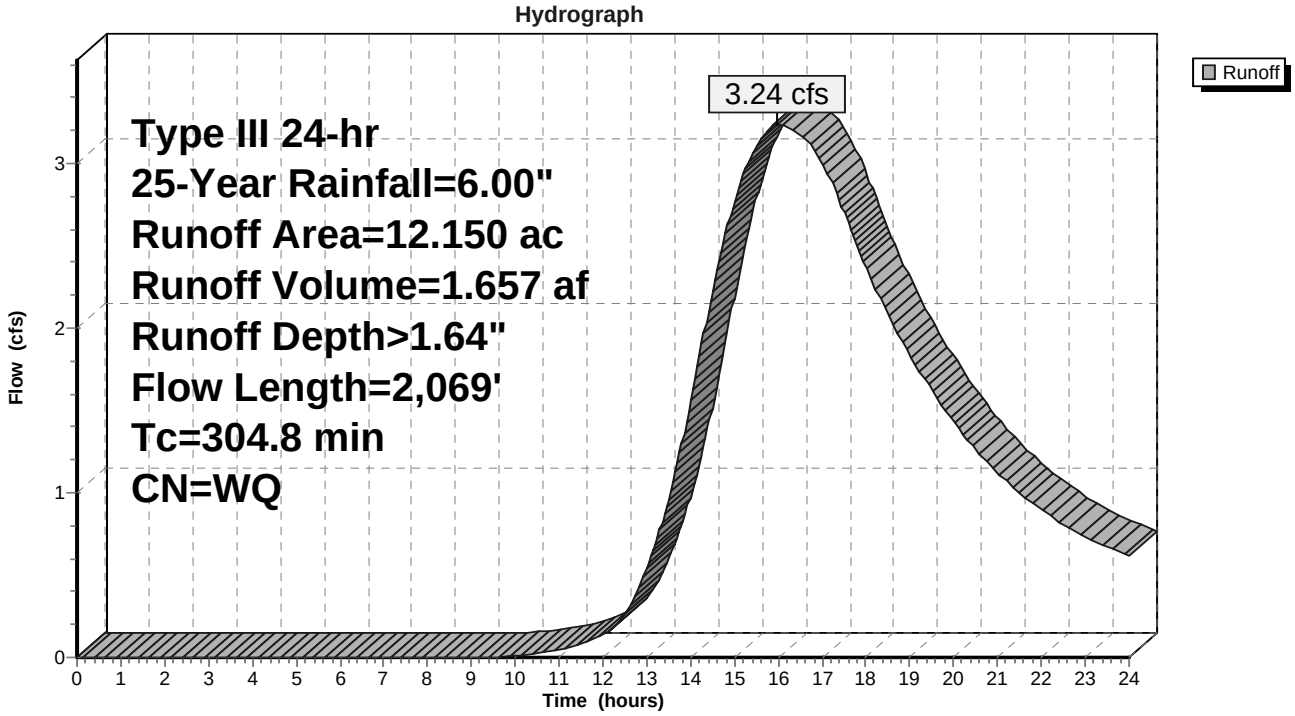
Runoff = 3.24 cfs @ 15.95 hrs, Volume= 1.657 af, Depth> 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (ac)	CN	Description
	5.920	30	Woods, Good, HSG A
*	6.230	77	Wetland
	12.150		Weighted Average
	12.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	50	0.0500	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
2.1	242	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
287.3	1,777	0.0017	0.10		**Shallow Concentrated Flow, Wetland** Forest w/Heavy Litter Kv= 2.5 fps
304.8	2,069	Total			

Subcatchment PR-2:



Summary for Subcatchment PR-3A:

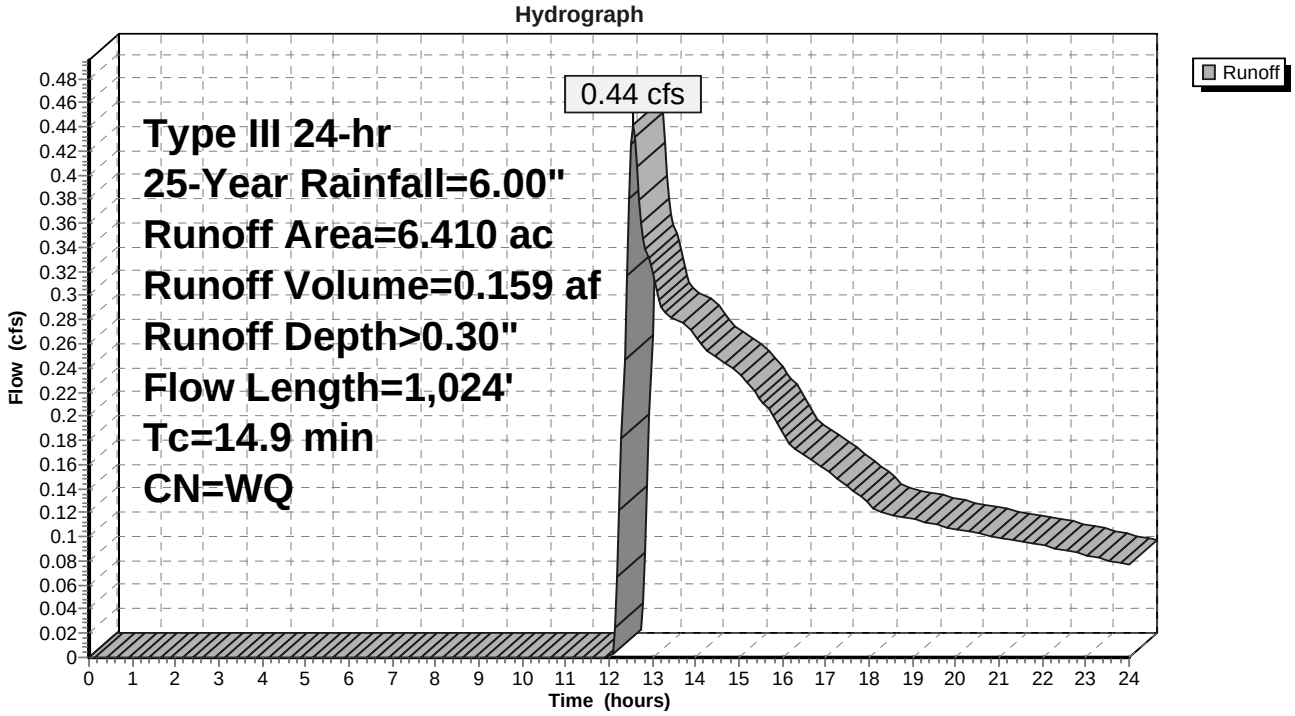
Runoff = 0.44 cfs @ 12.56 hrs, Volume= 0.159 af, Depth> 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
1.620	39	>75% Grass cover, Good, HSG A
4.790	35	Brush, Fair, HSG A
6.410		Weighted Average
6.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	252	0.1350	1.84		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.2	672	0.0100	1.00		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
1.4	100	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.9	1,024	Total			

Subcatchment PR-3A:



Summary for Subcatchment PR-3B:

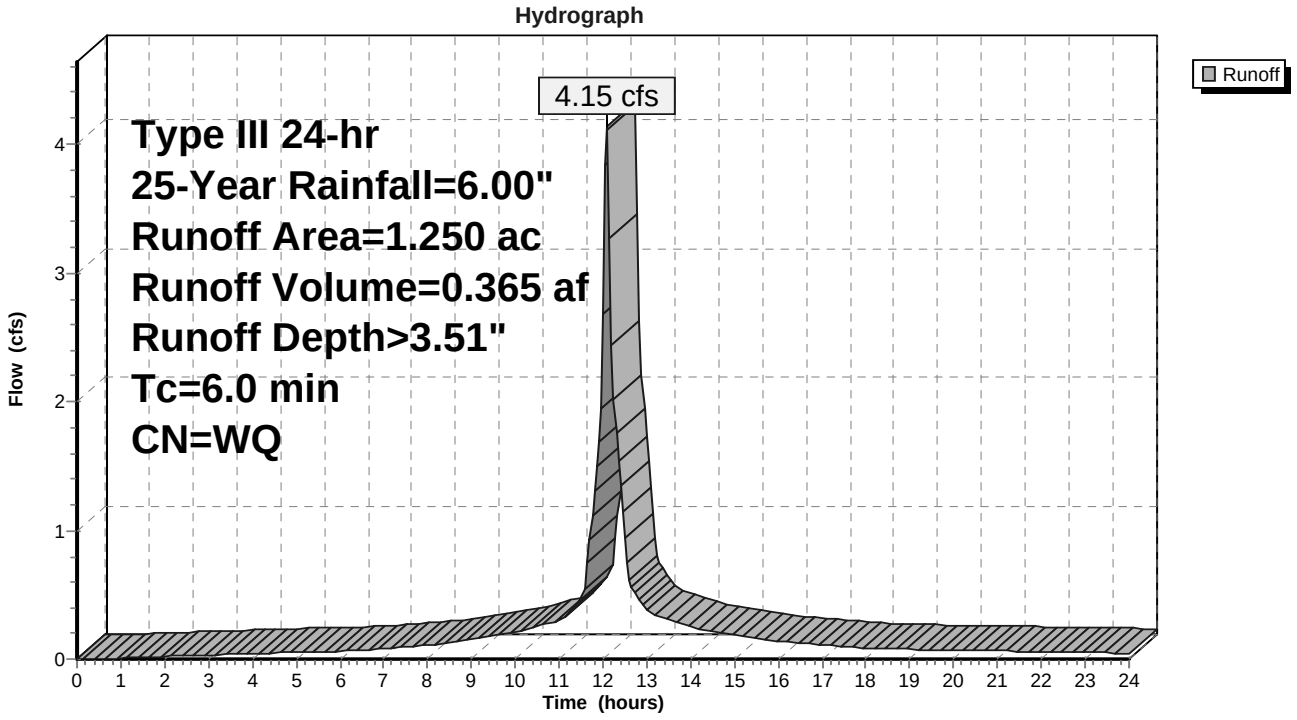
Runoff = 4.15 cfs @ 12.09 hrs, Volume= 0.365 af, Depth> 3.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG A
0.410	98	Roofs, HSG A
0.530	39	>75% Grass cover, Good, HSG A
1.250		Weighted Average
0.530		42.40% Pervious Area
0.720		57.60% Impervious Area

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

Subcatchment PR-3B:



Summary for Subcatchment PR-3C:

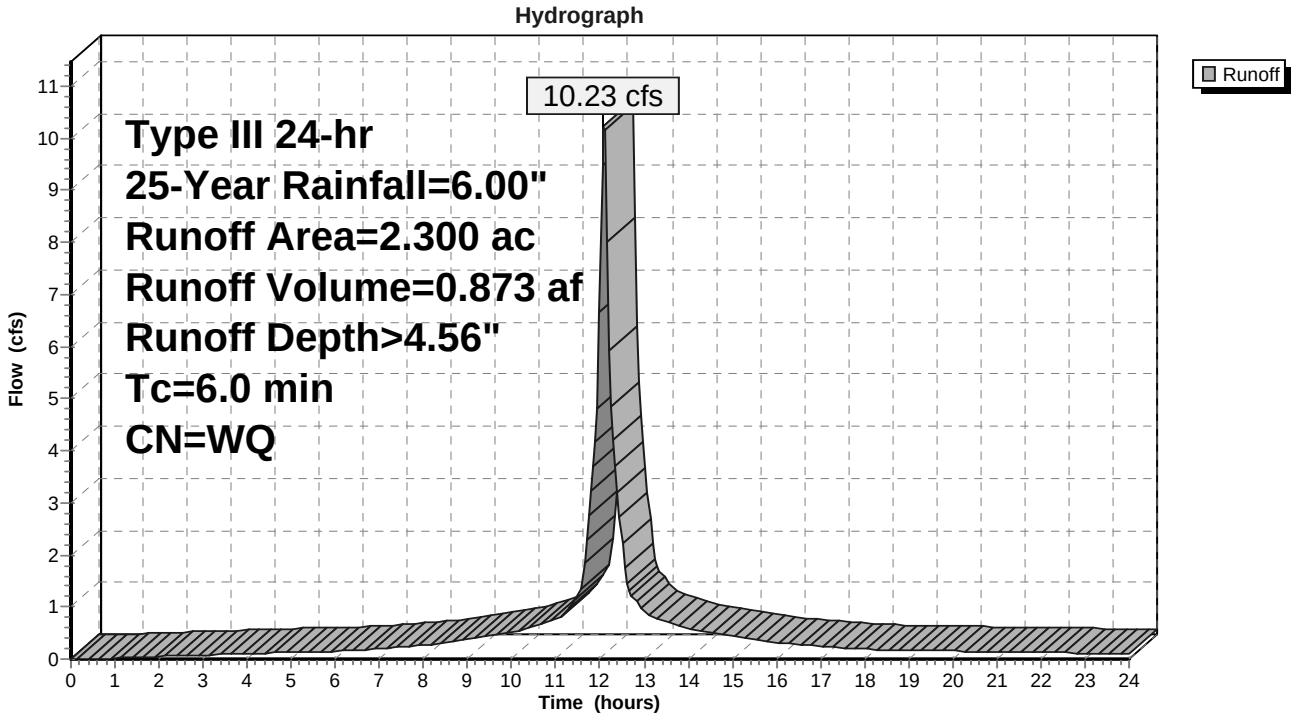
Runoff = 10.23 cfs @ 12.09 hrs, Volume= 0.873 af, Depth> 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
1.120	98	Paved parking, HSG A
0.660	98	Roofs, HSG A
0.520	39	>75% Grass cover, Good, HSG A
2.300		Weighted Average
0.520		22.61% Pervious Area
1.780		77.39% Impervious Area

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

Subcatchment PR-3C:



Summary for Subcatchment PR-3D:

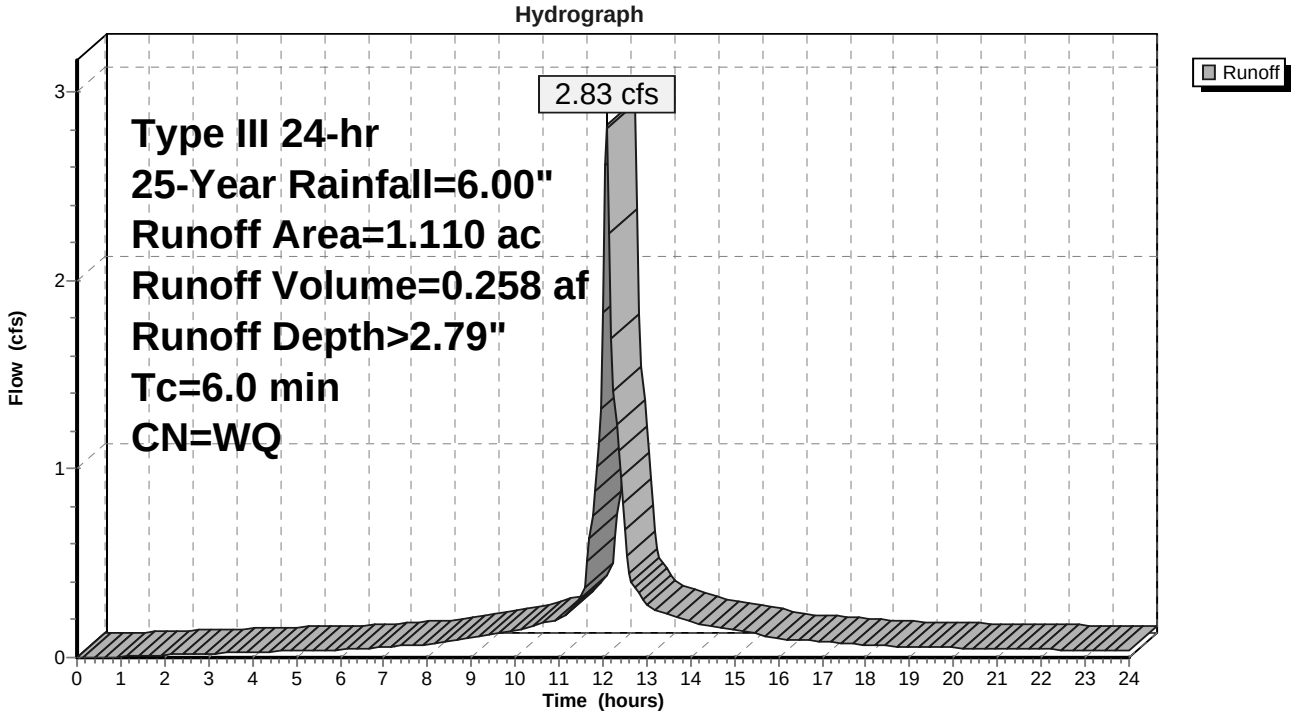
Runoff = 2.83 cfs @ 12.09 hrs, Volume= 0.258 af, Depth> 2.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.490	98	Roofs, HSG A
0.620	39	>75% Grass cover, Good, HSG A
1.110		Weighted Average
0.620		55.86% Pervious Area
0.490		44.14% Impervious Area

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

Subcatchment PR-3D:



Summary for Subcatchment PR-3E:

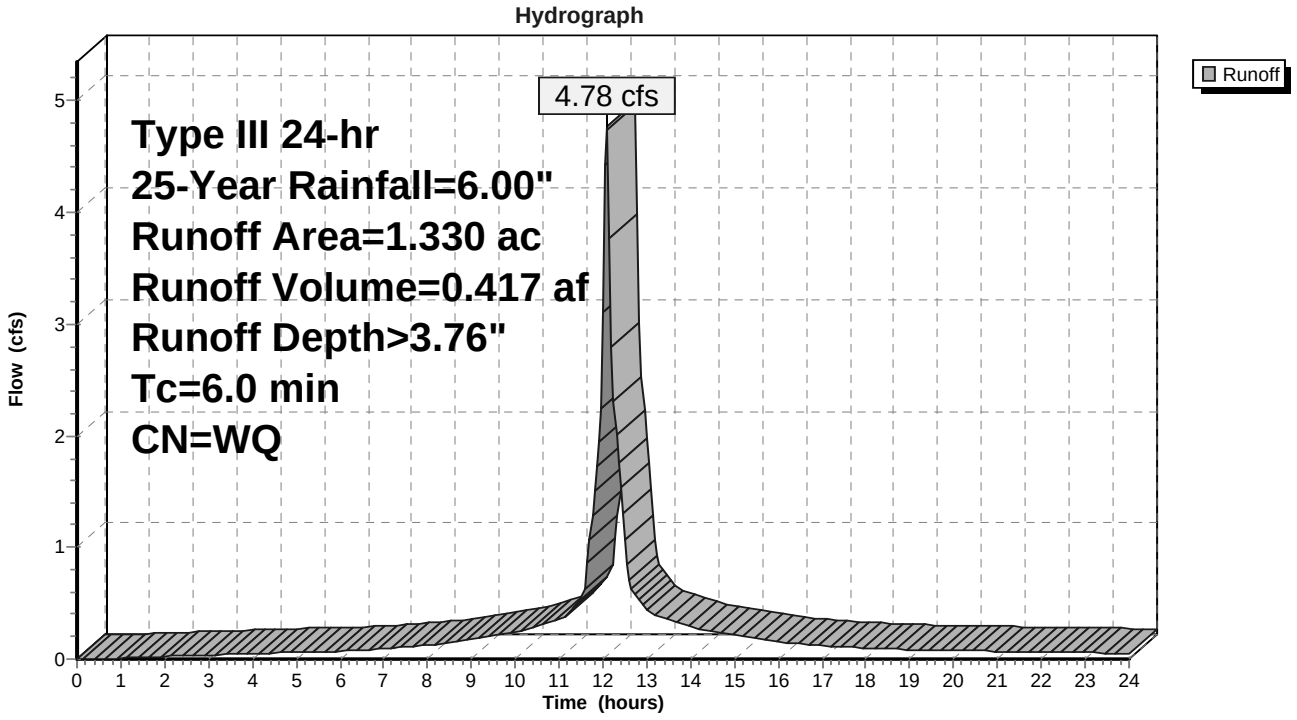
Runoff = 4.78 cfs @ 12.09 hrs, Volume= 0.417 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.510	98	Paved parking, HSG A
0.320	98	Roofs, HSG A
0.500	39	>75% Grass cover, Good, HSG A
1.330		Weighted Average
0.500		37.59% Pervious Area
0.830		62.41% Impervious Area

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

Subcatchment PR-3E:



Summary for Subcatchment PR-3F:

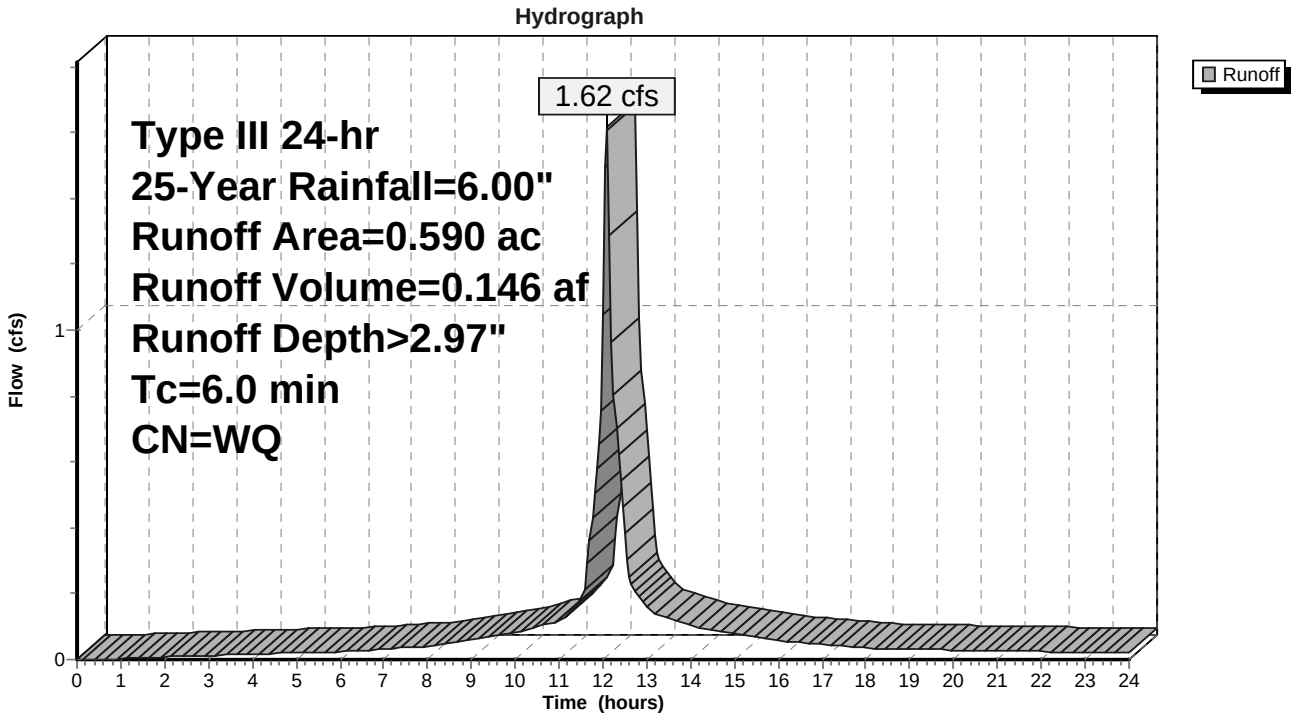
Runoff = 1.62 cfs @ 12.09 hrs, Volume= 0.146 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.280	98	Roofs, HSG A
0.310	39	>75% Grass cover, Good, HSG A
0.590		Weighted Average
0.310		52.54% Pervious Area
0.280		47.46% Impervious Area

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

Subcatchment PR-3F:



Summary for Subcatchment PR-3G:

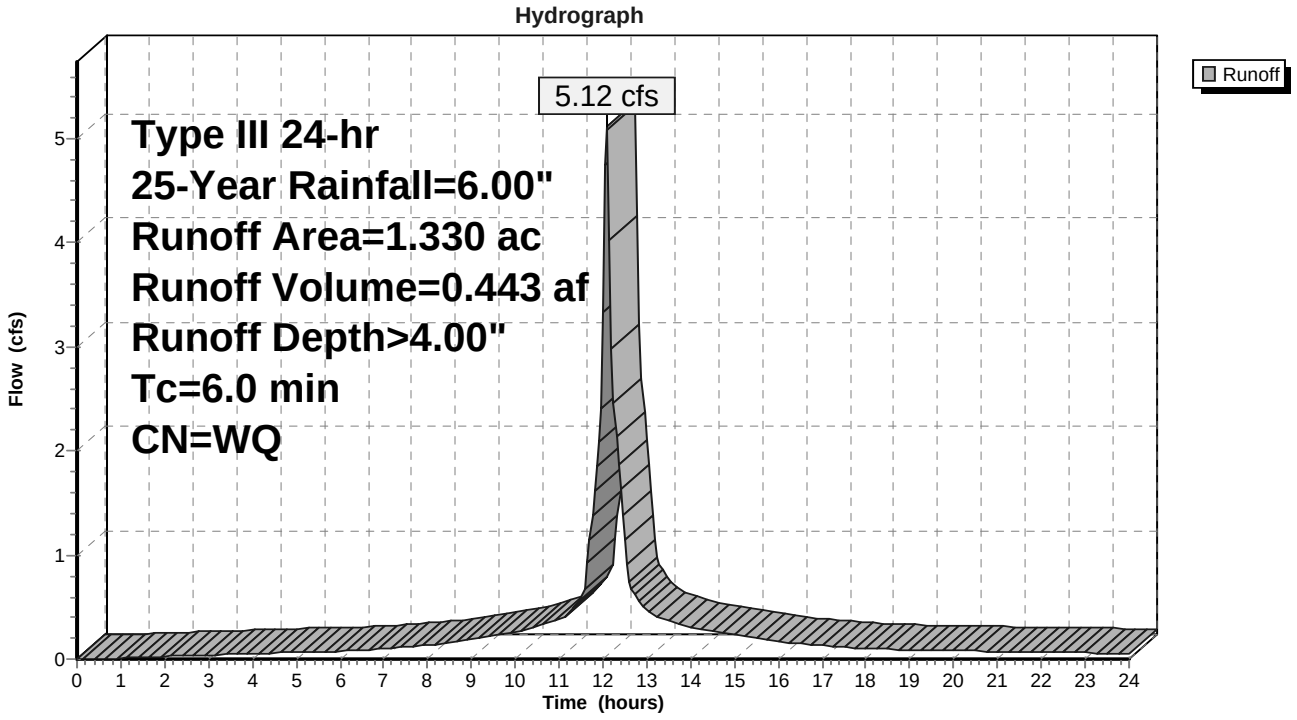
Runoff = 5.12 cfs @ 12.09 hrs, Volume= 0.443 af, Depth> 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG A
0.160	98	Roofs, HSG A
0.440	39	>75% Grass cover, Good, HSG A
1.330		Weighted Average
0.440		33.08% Pervious Area
0.890		66.92% Impervious Area

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

Subcatchment PR-3G:



Summary for Subcatchment PR-3H:

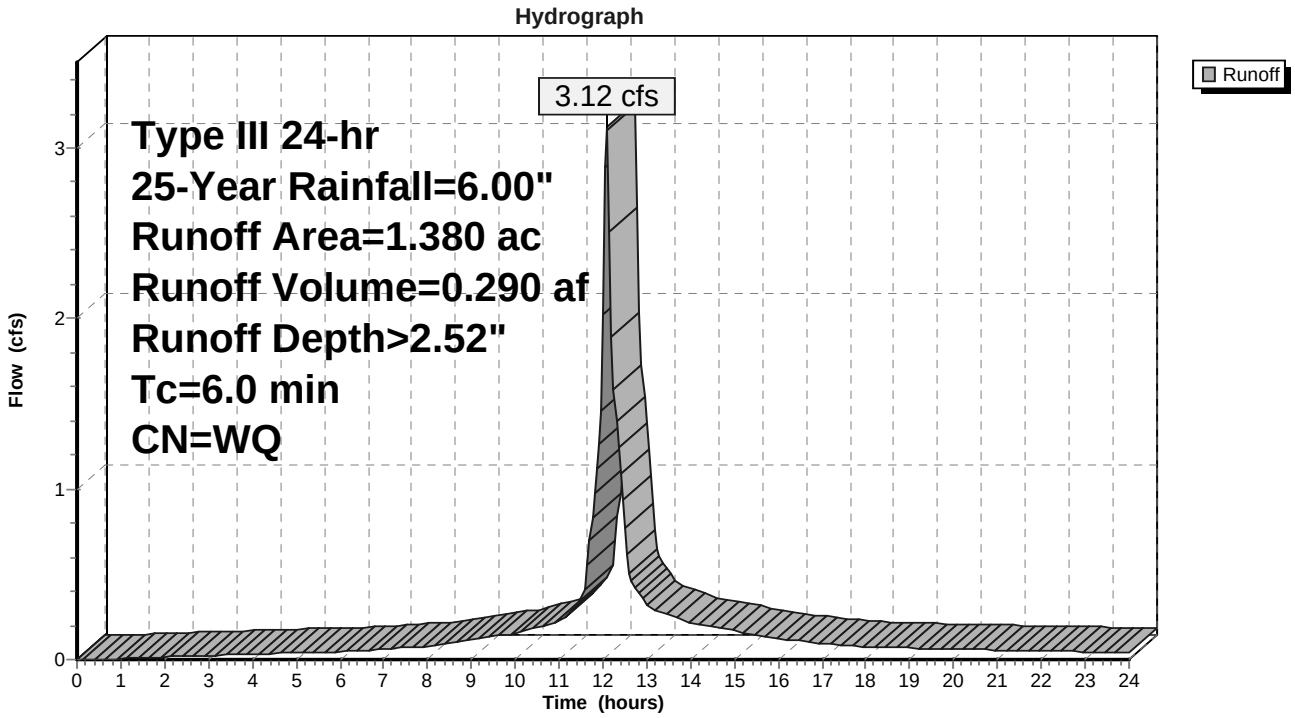
Runoff = 3.12 cfs @ 12.09 hrs, Volume= 0.290 af, Depth> 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.540	98	Roofs, HSG A
0.840	39	>75% Grass cover, Good, HSG A
1.380		Weighted Average
0.840		60.87% Pervious Area
0.540		39.13% Impervious Area

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

Subcatchment PR-3H:



Summary for Subcatchment PR-3I:

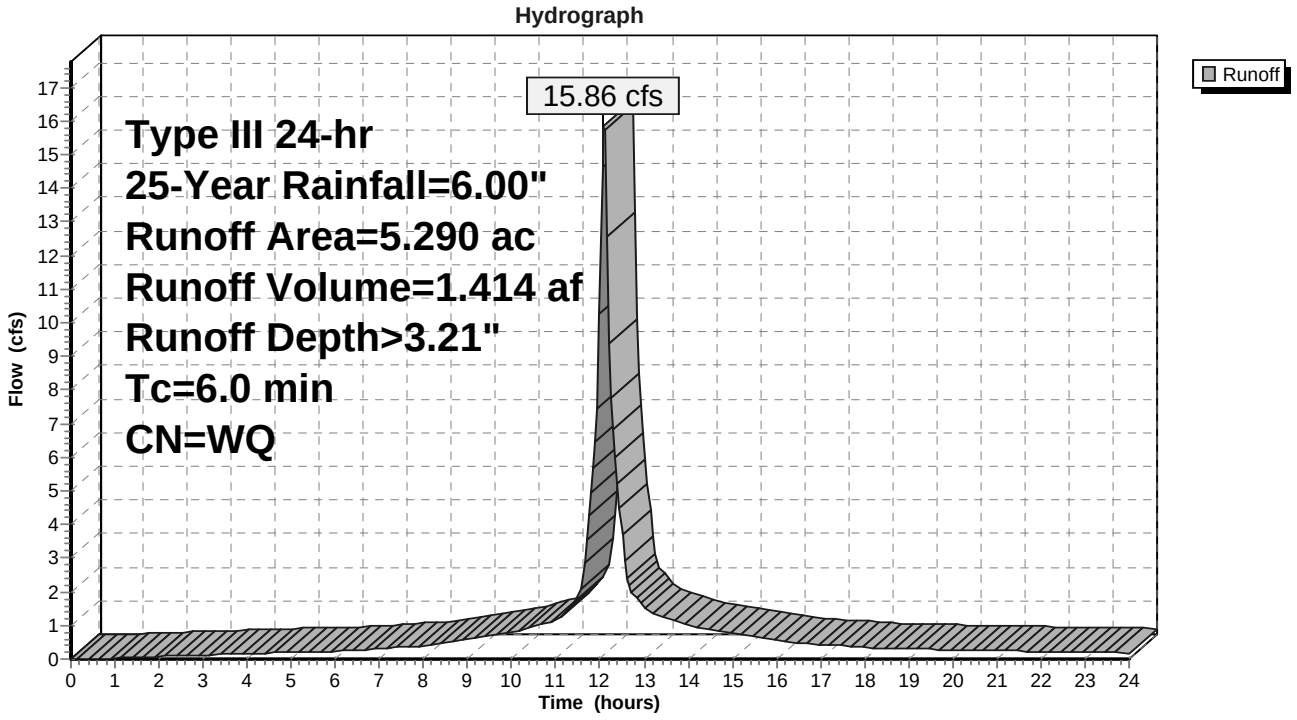
Runoff = 15.86 cfs @ 12.09 hrs, Volume= 1.414 af, Depth> 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
1.570	98	Paved parking, HSG A
1.180	98	Roofs, HSG A
2.540	39	>75% Grass cover, Good, HSG A
5.290		Weighted Average
2.540		48.02% Pervious Area
2.750		51.98% Impervious Area

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

Subcatchment PR-3I:



Summary for Subcatchment PR-3J:

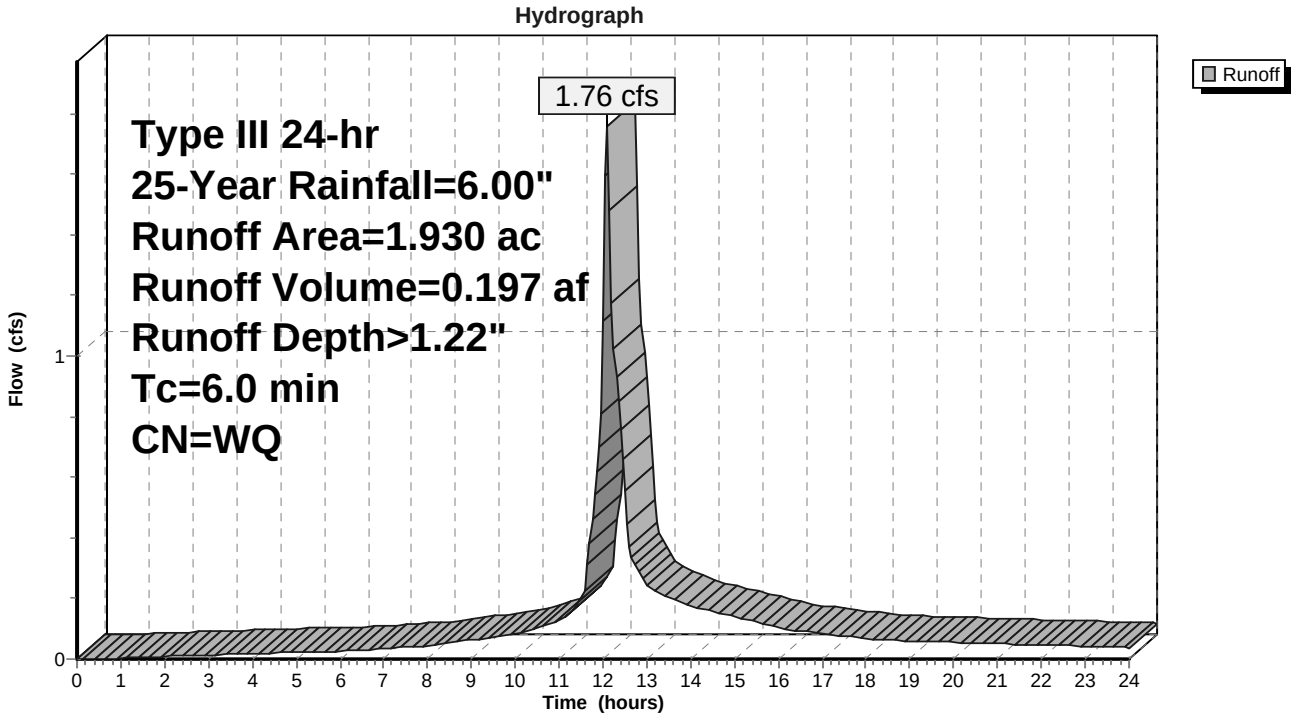
Runoff = 1.76 cfs @ 12.09 hrs, Volume= 0.197 af, Depth> 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.300	98	Roofs, HSG A
1.390	39	>75% Grass cover, Good, HSG A
0.240	30	Woods, Good, HSG A
1.930		Weighted Average
1.630		84.46% Pervious Area
0.300		15.54% Impervious Area

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

Subcatchment PR-3J:



Summary for Subcatchment PR-3K:

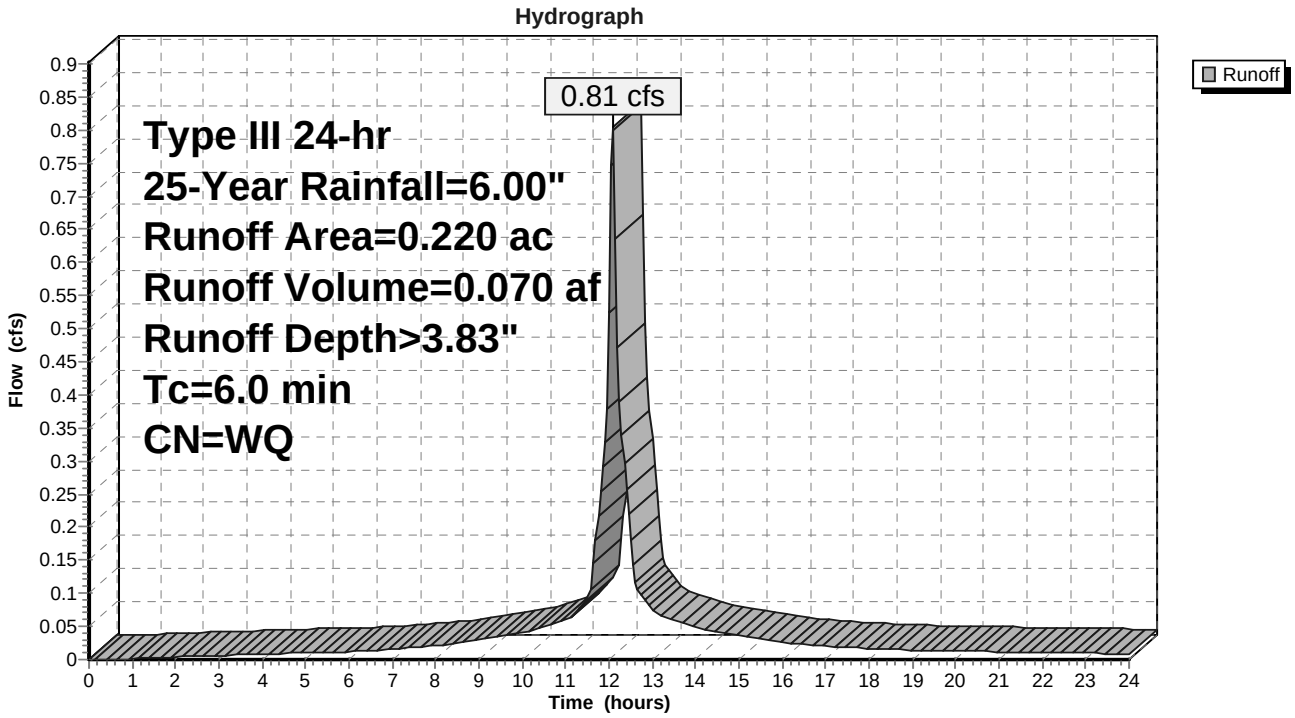
Runoff = 0.81 cfs @ 12.09 hrs, Volume= 0.070 af, Depth> 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.140	98	Roofs, HSG A
0.080	39	>75% Grass cover, Good, HSG A
0.220		Weighted Average
0.080		36.36% Pervious Area
0.140		63.64% Impervious Area

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

Subcatchment PR-3K:



Summary for Subcatchment PR-4:

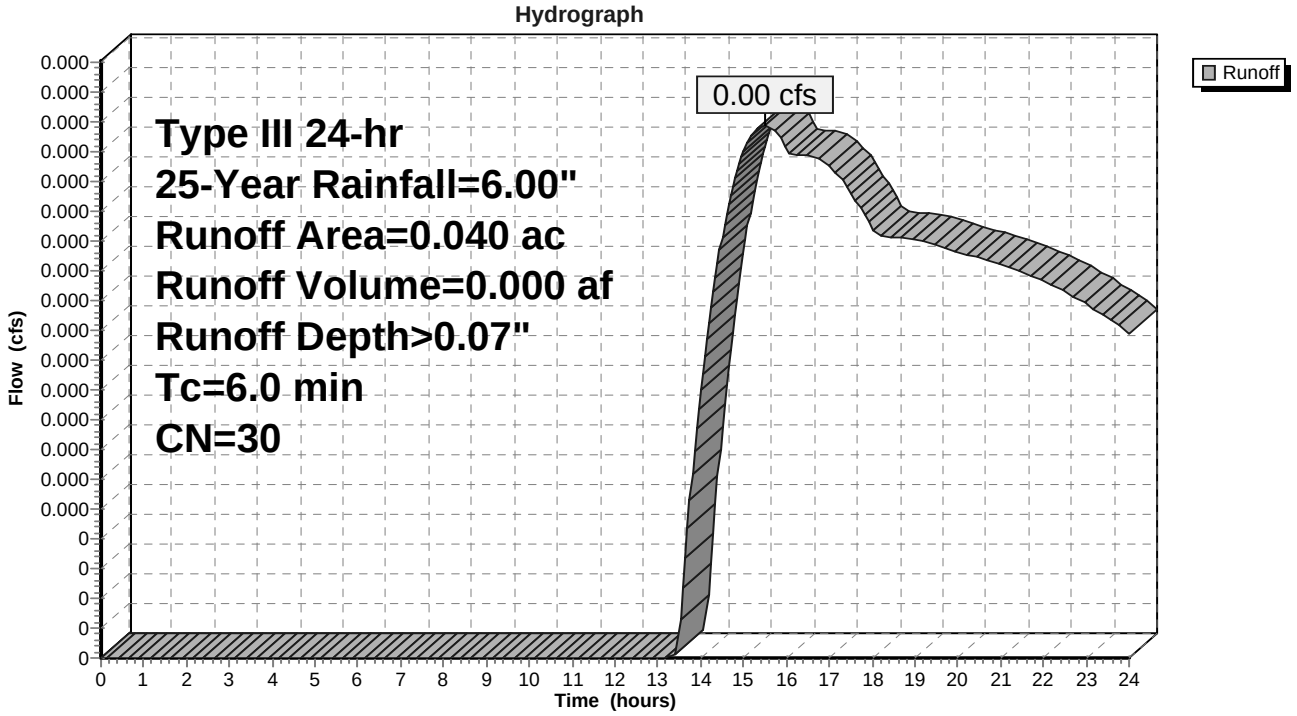
Runoff = 0.00 cfs @ 15.50 hrs, Volume= 0.000 af, Depth> 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.040	30	Woods, Good, HSG A
0.040		100.00% Pervious Area

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

Subcatchment PR-4:



Summary for Pond Basin 1:

Inflow Area = 6.360 ac, 29.40% Impervious, Inflow Depth > 1.91" for 25-Year event
Inflow = 10.81 cfs @ 12.09 hrs, Volume= 1.014 af
Outflow = 1.54 cfs @ 12.67 hrs, Volume= 1.013 af, Atten= 86%, Lag= 35.1 min
Discarded = 1.54 cfs @ 12.67 hrs, Volume= 1.013 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 132.15' @ 12.67 hrs Surf.Area= 8,060 sf Storage= 15,109 cf

Plug-Flow detention time= 91.6 min calculated for 1.013 af (100% of inflow)
Center-of-Mass det. time= 91.0 min (862.2 - 771.1)

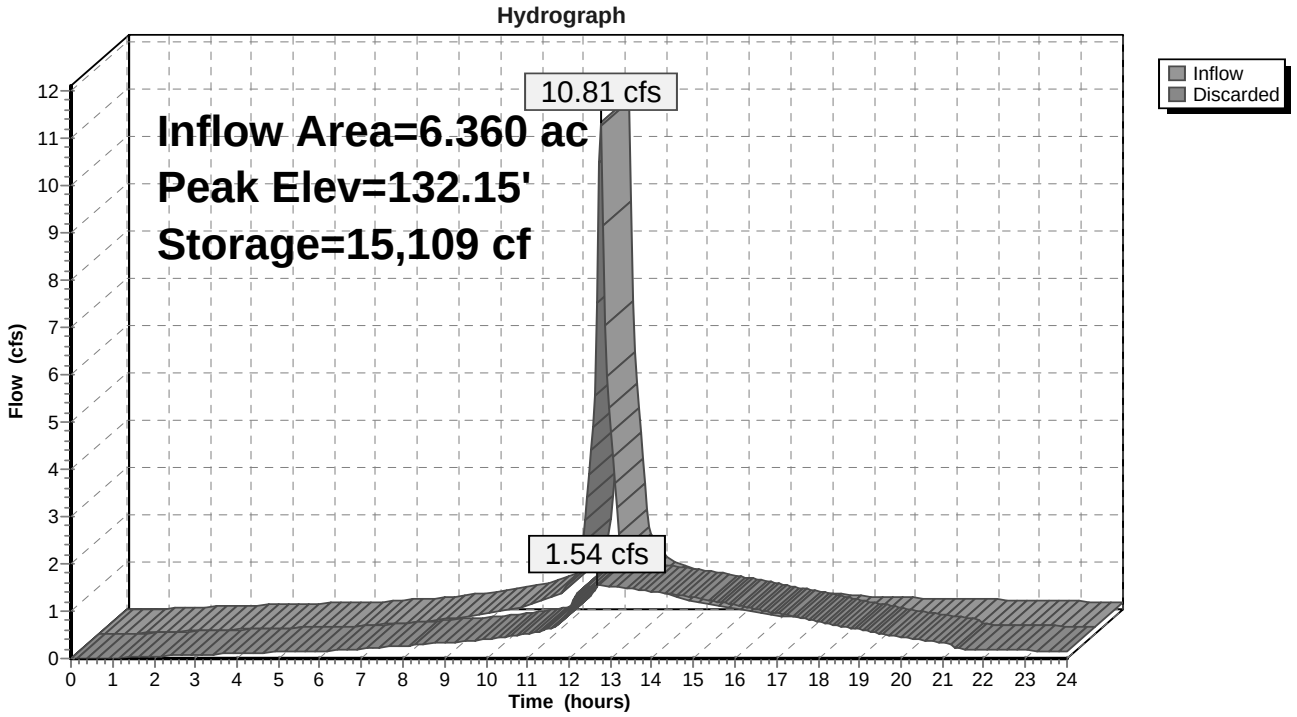
Volume	Invert	Avail.Storage	Storage Description
#1	129.00'	33,592 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
129.00	1,494	0	0
130.00	3,621	2,558	2,558
132.00	7,748	11,369	13,927
134.00	11,917	19,665	33,592

Device	Routing	Invert	Outlet Devices
#1	Discarded	129.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=1.54 cfs @ 12.67 hrs HW=132.15' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.54 cfs)

Pond Basin 1:


Hydrograph
Inflow
Discarded
10.81 cfs
1.54 cfs
Inflow Area=6.360 ac
Peak Elev=132.15'
Storage=15,109 cf
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12
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

Summary for Pond PP: Porous Pavement

Inflow Area = 1.650 ac, 73.94% Impervious, Inflow Depth > 2.33" for 25-Year event
Inflow = 0.50 cfs @ 21.94 hrs, Volume= 0.321 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

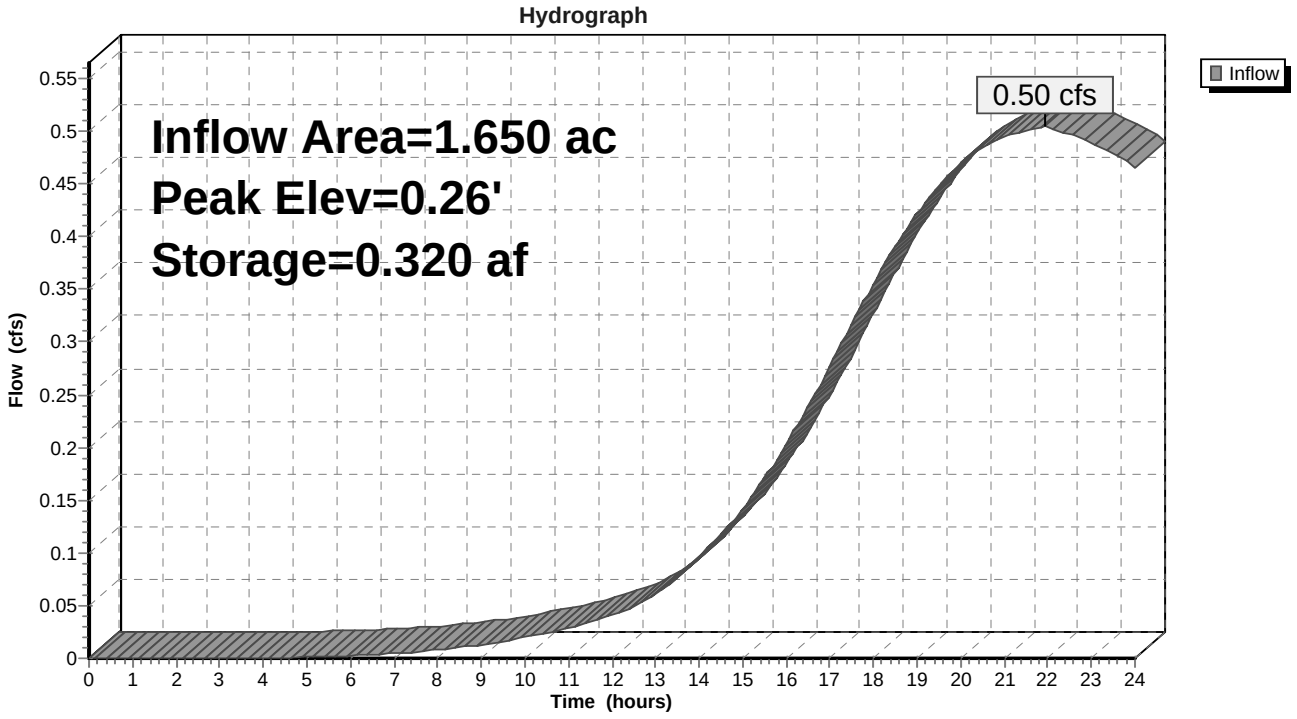
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.26' @ 24.00 hrs Surf.Area= 1.220 ac Storage= 0.320 af

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

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2.952 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
0.00	1.220	0.000	0.000
2.42	1.220	2.952	2.952

Pond PP: Porous Pavement



Summary for Pond SIS-1:

Inflow Area = 1.930 ac, 15.54% Impervious, Inflow Depth > 1.22" for 25-Year event
Inflow = 1.76 cfs @ 12.09 hrs, Volume= 0.197 af
Outflow = 0.52 cfs @ 11.85 hrs, Volume= 0.197 af, Atten= 71%, Lag= 0.0 min
Discarded = 0.52 cfs @ 11.85 hrs, Volume= 0.197 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 164.35' @ 12.52 hrs Surf.Area= 2,705 sf Storage= 1,268 cf

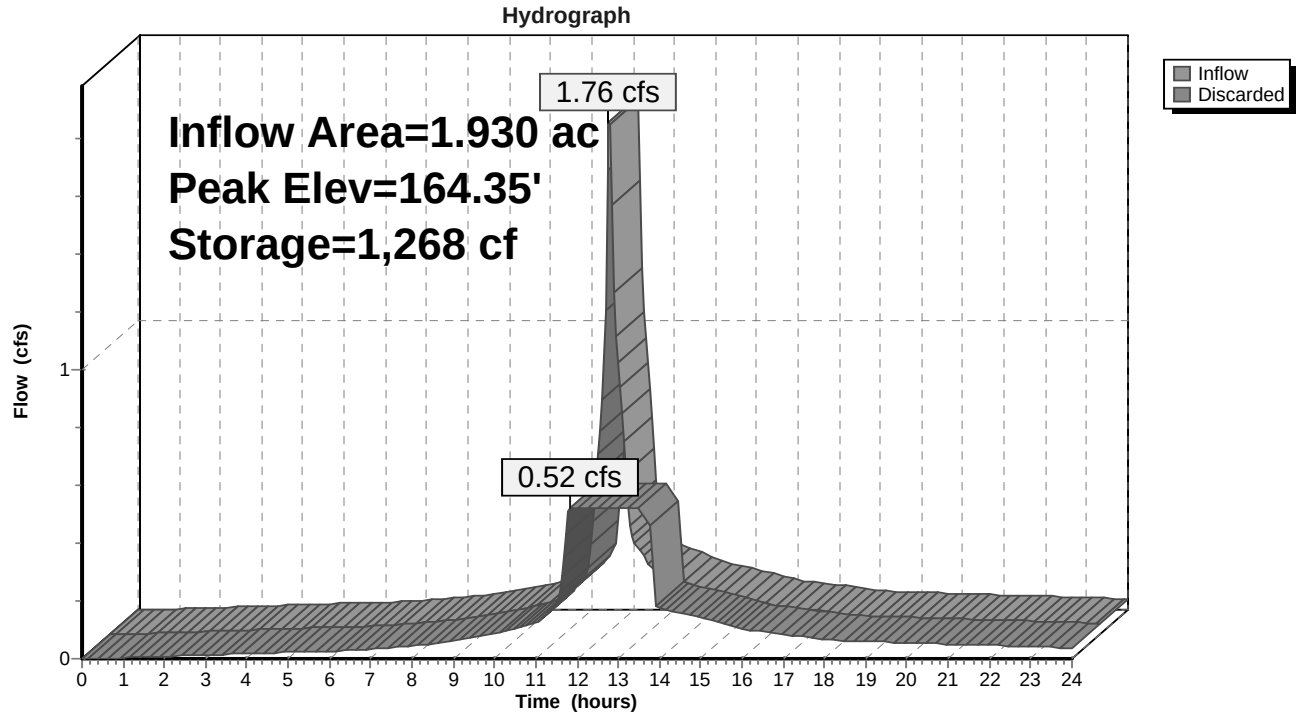
Plug-Flow detention time= 10.8 min calculated for 0.197 af (100% of inflow)
Center-of-Mass det. time= 10.6 min (813.9 - 803.3)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	2,915 cf	**5.00'W x 541.00'L x 5.00'H Prismatoid** 13,525 cf Overall - 3,810 cf Embedded = 9,715 cf x 30.0% Voids
#2	164.00'	3,810 cf	**36.0" Round Pipe Storage** Inside #1 L= 539.0'
		6,724 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	163.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.52 cfs @ 11.85 hrs HW=163.06' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.52 cfs)

Pond SIS-1:



Summary for Pond SIS-10:

Inflow Area = 1.250 ac, 57.60% Impervious, Inflow Depth > 3.51" for 25-Year event
Inflow = 4.15 cfs @ 12.09 hrs, Volume= 0.365 af
Outflow = 0.41 cfs @ 11.40 hrs, Volume= 0.365 af, Atten= 90%, Lag= 0.0 min
Discarded = 0.41 cfs @ 11.40 hrs, Volume= 0.365 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 130.99' @ 12.97 hrs Surf.Area= 2,116 sf Storage= 5,190 cf

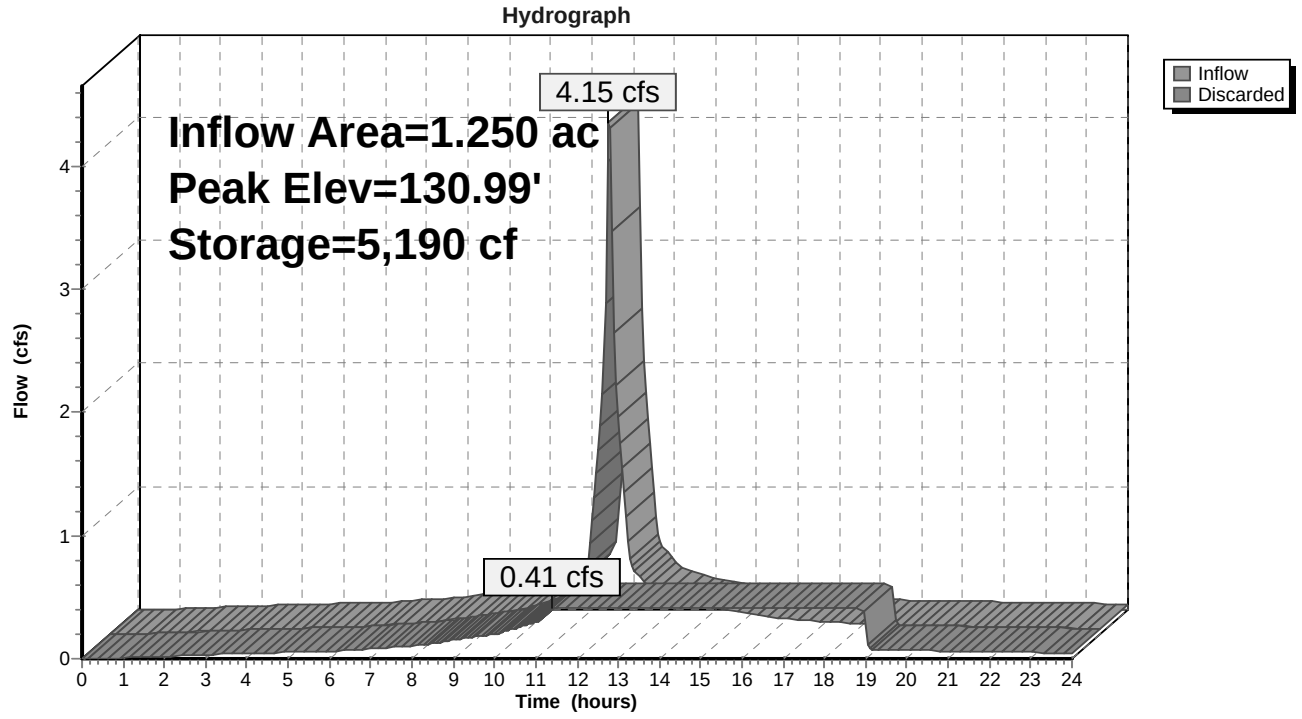
Plug-Flow detention time= 88.6 min calculated for 0.364 af (100% of inflow)
Center-of-Mass det. time= 88.1 min (844.4 - 756.2)

Volume	Invert	Avail.Storage	Storage Description
#1	127.00'	2,788 cf	**46.00'W x 46.00'L x 8.00'H Prismatoid** 16,928 cf Overall - 7,634 cf Embedded = 9,294 cf x 30.0% Voids
#2	128.00'	7,634 cf	**72.0" Round Pipe Storage** Inside #1 L= 270.0'
		10,422 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	127.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.41 cfs @ 11.40 hrs HW=127.09' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.41 cfs)

Pond SIS-10:



Summary for Pond SIS-2:

Inflow Area = 1.380 ac, 39.13% Impervious, Inflow Depth > 2.52" for 25-Year event
Inflow = 3.12 cfs @ 12.09 hrs, Volume= 0.290 af
Outflow = 0.34 cfs @ 11.50 hrs, Volume= 0.290 af, Atten= 89%, Lag= 0.0 min
Discarded = 0.34 cfs @ 11.50 hrs, Volume= 0.290 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 145.19' @ 12.97 hrs Surf.Area= 1,776 sf Storage= 3,854 cf

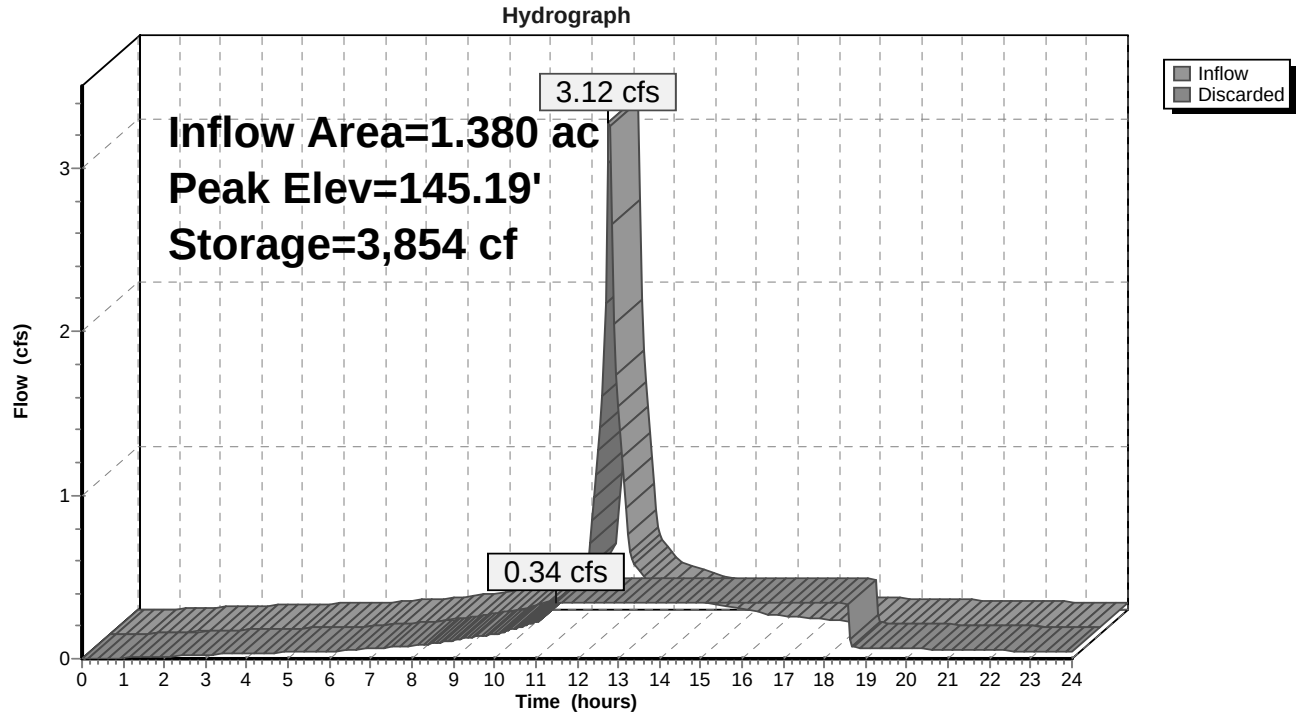
Plug-Flow detention time= 78.1 min calculated for 0.290 af (100% of inflow)
Center-of-Mass det. time= 77.7 min (845.4 - 767.6)

Volume	Invert	Avail.Storage	Storage Description
#1	141.50'	2,396 cf	**8.00'W x 222.00'L x 8.00'H Prismatoid** 14,208 cf Overall - 6,220 cf Embedded = 7,988 cf x 30.0% Voids
#2	142.50'	6,220 cf	**72.0" Round Pipe Storage** Inside #1 L= 220.0'
		8,617 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	141.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.34 cfs @ 11.50 hrs HW=141.58' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.34 cfs)

Pond SIS-2:



Summary for Pond SIS-3:

Inflow Area = 5.290 ac, 51.98% Impervious, Inflow Depth > 3.21" for 25-Year event
Inflow = 15.86 cfs @ 12.09 hrs, Volume= 1.414 af
Outflow = 1.44 cfs @ 11.30 hrs, Volume= 1.413 af, Atten= 91%, Lag= 0.0 min
Discarded = 1.44 cfs @ 11.30 hrs, Volume= 1.413 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 144.61' @ 13.07 hrs Surf.Area= 7,504 sf Storage= 20,756 cf

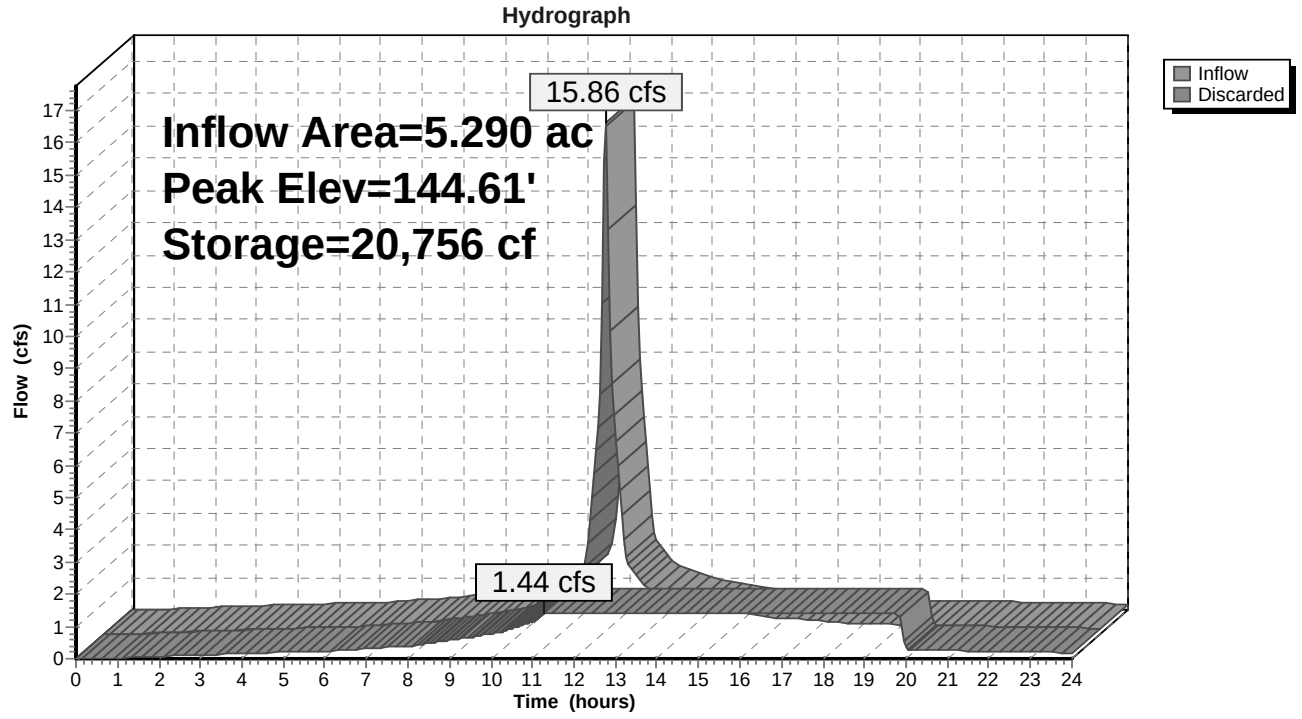
Plug-Flow detention time= 103.9 min calculated for 1.413 af (100% of inflow)
Center-of-Mass det. time= 103.6 min (862.5 - 758.9)

Volume	Invert	Avail.Storage	Storage Description
#1	140.50'	13,291 cf	**56.00'W x 134.00'L x 8.00'H Prismatoid** 60,032 cf Overall - 26,804 cf Embedded = 33,228 cf x 40.0% Voids
#2	141.50'	26,804 cf	**72.0" Round Pipe Storage** Inside #1 L= 948.0'
		40,095 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=1.44 cfs @ 11.30 hrs HW=140.58' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.44 cfs)

Pond SIS-3:



Summary for Pond SIS-4:

Inflow Area = 1.330 ac, 66.92% Impervious, Inflow Depth > 4.00" for 25-Year event
Inflow = 5.12 cfs @ 12.09 hrs, Volume= 0.443 af
Outflow = 0.44 cfs @ 11.25 hrs, Volume= 0.443 af, Atten= 91%, Lag= 0.0 min
Discarded = 0.44 cfs @ 11.25 hrs, Volume= 0.443 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 149.30' @ 13.06 hrs Surf.Area= 2,304 sf Storage= 6,721 cf

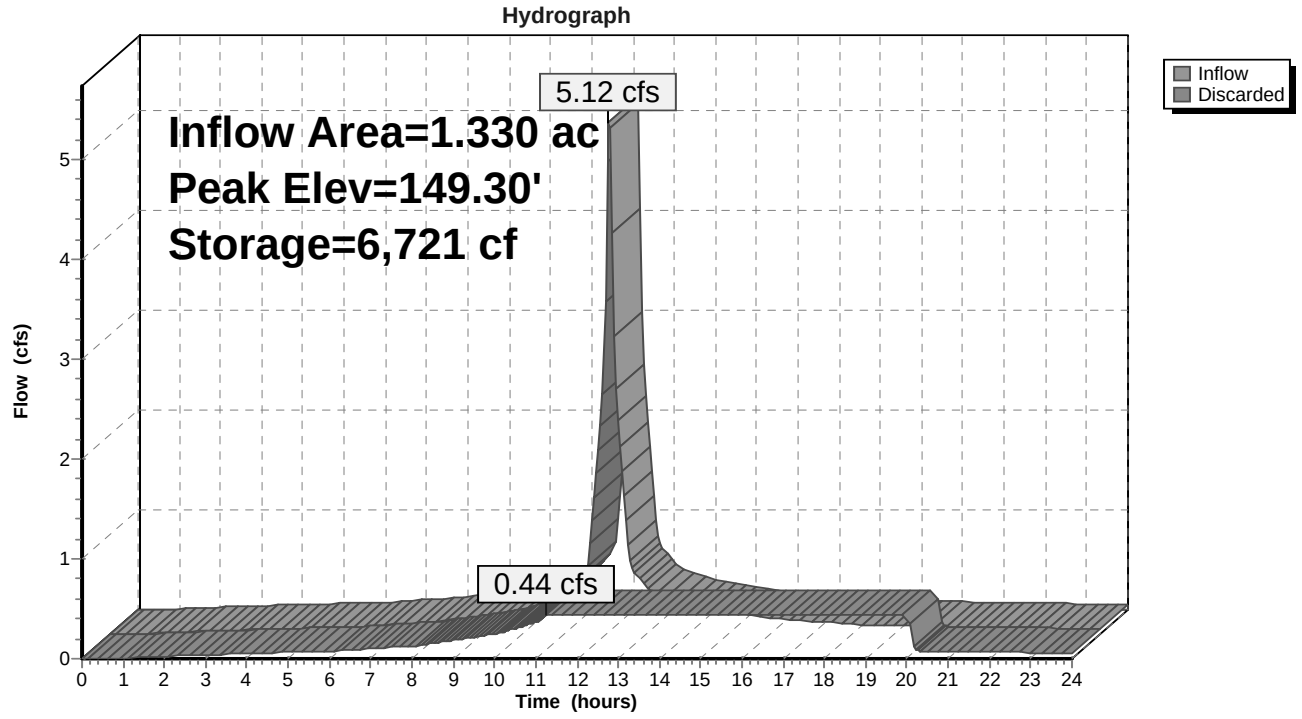
Plug-Flow detention time= 109.3 min calculated for 0.442 af (100% of inflow)
Center-of-Mass det. time= 108.8 min (861.3 - 752.6)

Volume	Invert	Avail.Storage	Storage Description
#1	145.00'	4,116 cf	**16.00'W x 144.00'L x 8.00'H Prismatoid** 18,432 cf Overall - 8,143 cf Embedded = 10,289 cf x 40.0% Voids
#2	146.00'	8,143 cf	**72.0" Round Pipe Storage** Inside #1 L= 288.0'
		12,259 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	145.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.44 cfs @ 11.25 hrs HW=145.08' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.44 cfs)

Pond SIS-4:



Summary for Pond SIS-5:

Inflow Area = 0.590 ac, 47.46% Impervious, Inflow Depth > 2.97" for 25-Year event
Inflow = 1.62 cfs @ 12.09 hrs, Volume= 0.146 af
Outflow = 0.17 cfs @ 11.45 hrs, Volume= 0.146 af, Atten= 90%, Lag= 0.0 min
Discarded = 0.17 cfs @ 11.45 hrs, Volume= 0.146 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 140.87' @ 12.97 hrs Surf.Area= 864 sf Storage= 2,012 cf

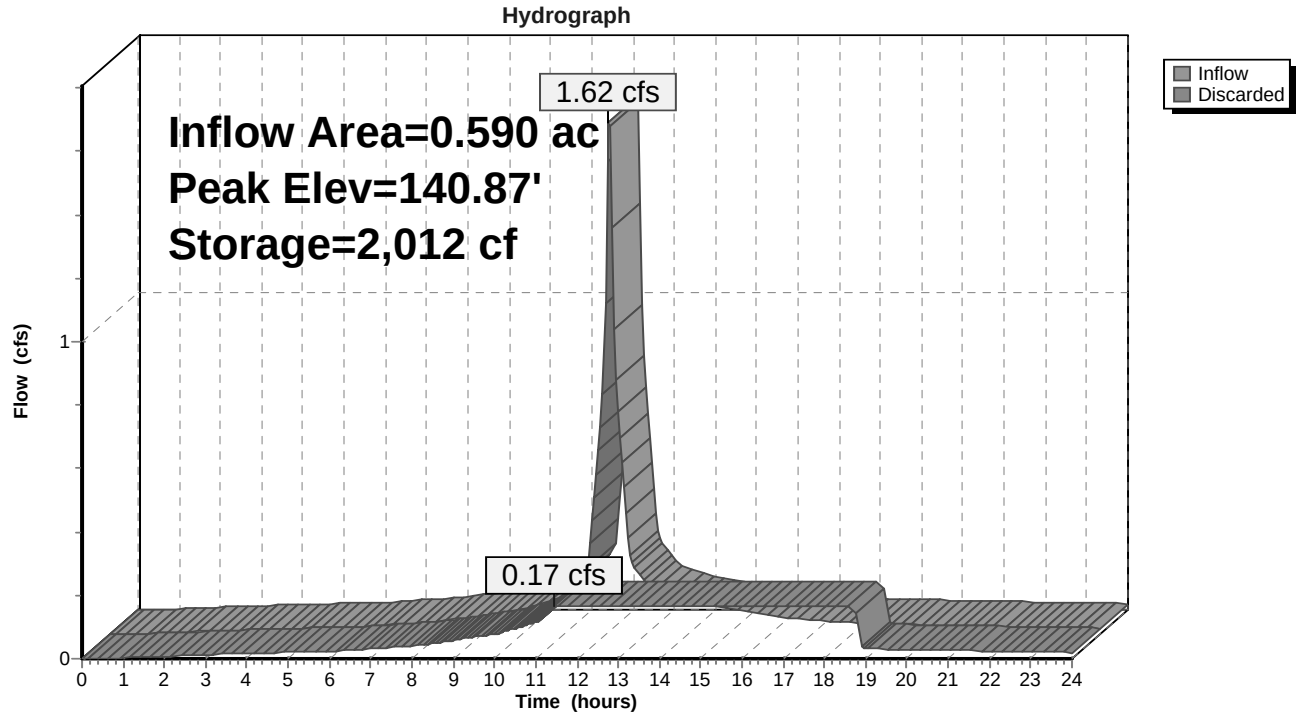
Plug-Flow detention time= 84.1 min calculated for 0.145 af (100% of inflow)
Center-of-Mass det. time= 83.7 min (845.2 - 761.6)

Volume	Invert	Avail.Storage	Storage Description
#1	137.00'	1,158 cf	**16.00'W x 54.00'L x 8.00'H Prismatoid** 6,912 cf Overall - 3,054 cf Embedded = 3,858 cf x 30.0% Voids
#2	138.00'	3,054 cf	**72.0" Round Pipe Storage** Inside #1 L= 108.0'
		4,211 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	137.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.17 cfs @ 11.45 hrs HW=137.09' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.17 cfs)

Pond SIS-5:



Summary for Pond SIS-6:

Inflow Area = 1.330 ac, 62.41% Impervious, Inflow Depth > 3.76" for 25-Year event
Inflow = 4.78 cfs @ 12.09 hrs, Volume= 0.417 af
Outflow = 0.33 cfs @ 10.95 hrs, Volume= 0.417 af, Atten= 93%, Lag= 0.0 min
Discarded = 0.33 cfs @ 10.95 hrs, Volume= 0.417 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 137.98' @ 13.65 hrs Surf.Area= 1,728 sf Storage= 6,964 cf

Plug-Flow detention time= 163.4 min calculated for 0.416 af (100% of inflow)
Center-of-Mass det. time= 162.6 min (916.8 - 754.2)

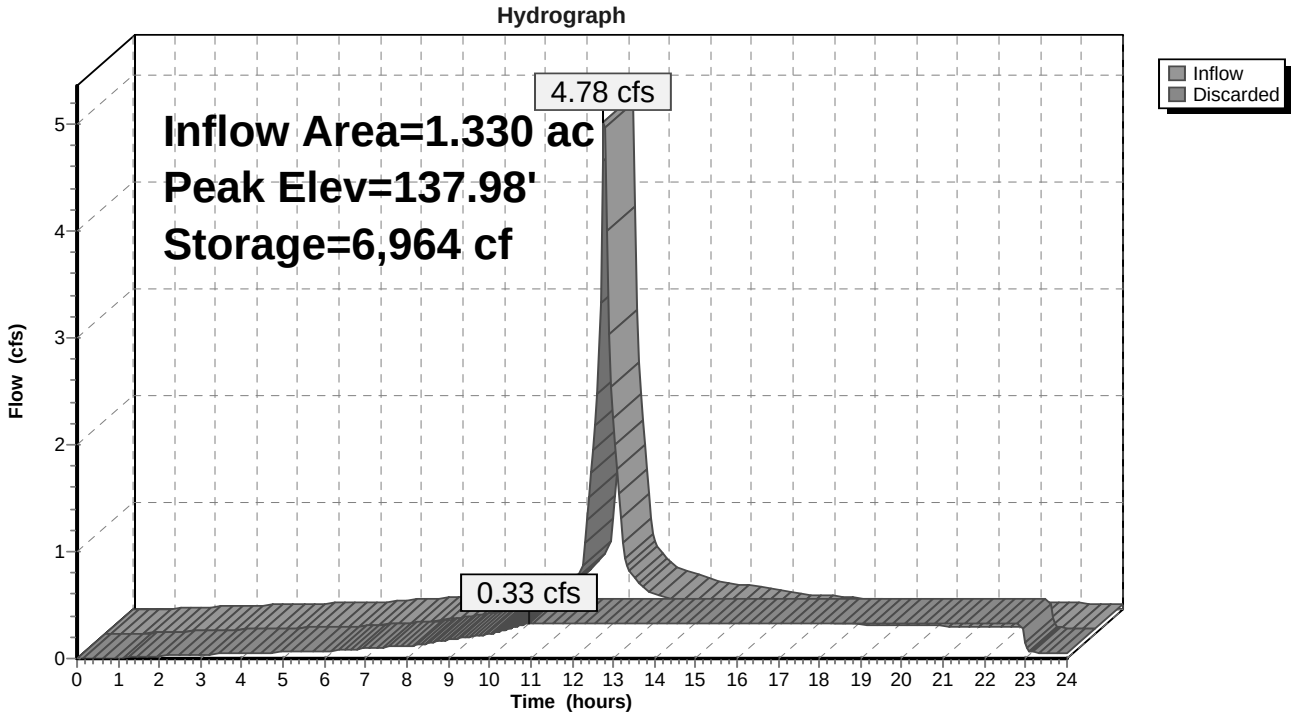
Volume	Invert	Avail.Storage	Storage Description
#1	132.00'	2,281 cf	**32.00'W x 54.00'L x 8.00'H Prismatoid** 13,824 cf Overall - 6,220 cf Embedded = 7,604 cf x 30.0% Voids
#2	133.00'	6,220 cf	**72.0" Round Pipe Storage** Inside #1 L= 220.0'
#3	142.00'	4,855 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		13,356 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
142.00	0	0	0
144.00	1,185	1,185	1,185
146.00	2,485	3,670	4,855

Device	Routing	Invert	Outlet Devices
#1	Discarded	132.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.33 cfs @ 10.95 hrs HW=132.14' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.33 cfs)

Pond SIS-6:


Hydrograph
Inflow
Discarded
4.78 cfs
0.33 cfs
Inflow Area=1.330 ac
Peak Elev=137.98'
Storage=6,964 cf
Flow (cfs)
Time (hours)
0 1 2 3 4 5
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

Summary for Pond SIS-7:

Inflow Area = 1.110 ac, 44.14% Impervious, Inflow Depth > 2.79" for 25-Year event
Inflow = 2.83 cfs @ 12.09 hrs, Volume= 0.258 af
Outflow = 0.29 cfs @ 11.40 hrs, Volume= 0.258 af, Atten= 90%, Lag= 0.0 min
Discarded = 0.29 cfs @ 11.40 hrs, Volume= 0.258 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 135.45' @ 13.00 hrs Surf.Area= 1,496 sf Storage= 3,567 cf

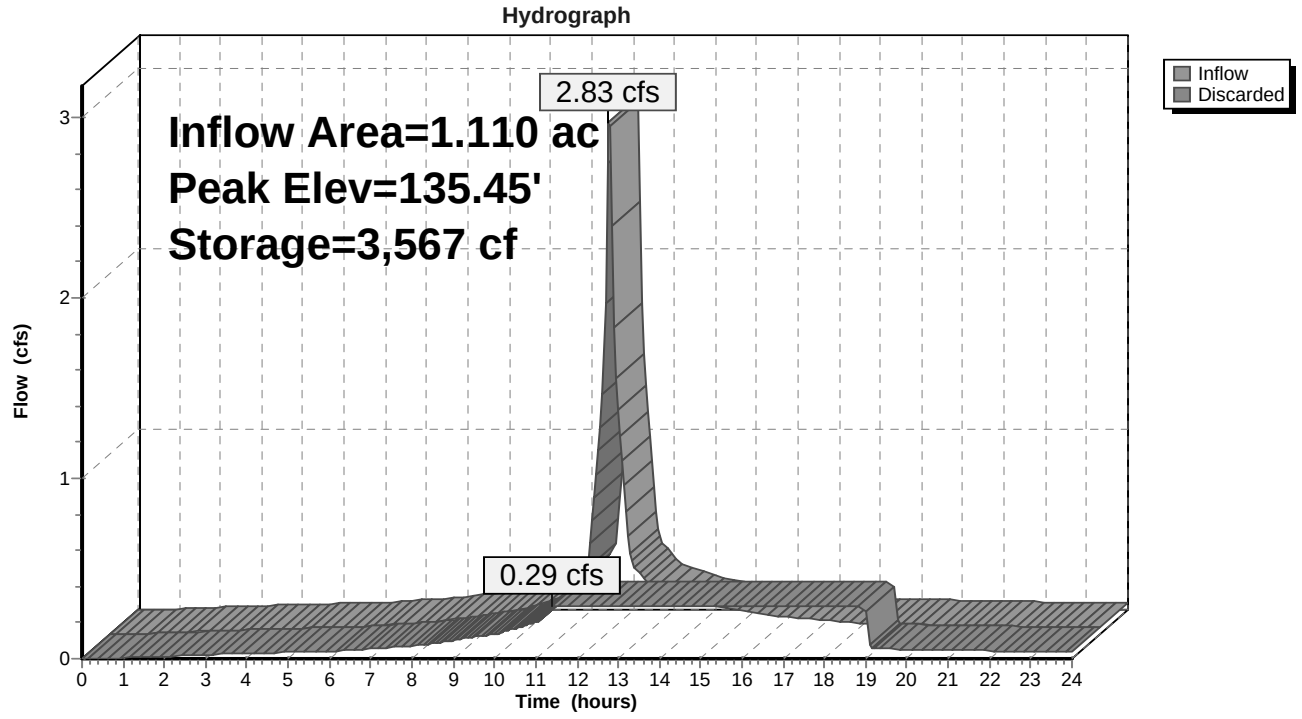
Plug-Flow detention time= 87.0 min calculated for 0.258 af (100% of inflow)
Center-of-Mass det. time= 86.7 min (850.5 - 763.7)

Volume	Invert	Avail.Storage	Storage Description
#1	131.50'	2,021 cf	**8.00'W x 187.00'L x 8.00'H Prismatoid** 11,968 cf Overall - 5,231 cf Embedded = 6,737 cf x 30.0% Voids
#2	132.50'	5,231 cf	**72.0" Round Pipe Storage** Inside #1 L= 185.0'
		7,252 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	131.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.29 cfs @ 11.40 hrs HW=131.58' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.29 cfs)

Pond SIS-7:



Summary for Pond SIS-8:

Inflow Area = 0.220 ac, 63.64% Impervious, Inflow Depth > 3.83" for 25-Year event
Inflow = 0.81 cfs @ 12.09 hrs, Volume= 0.070 af
Outflow = 0.14 cfs @ 11.70 hrs, Volume= 0.070 af, Atten= 83%, Lag= 0.0 min
Discarded = 0.14 cfs @ 11.70 hrs, Volume= 0.070 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 129.21' @ 12.56 hrs Surf.Area= 732 sf Storage= 755 cf

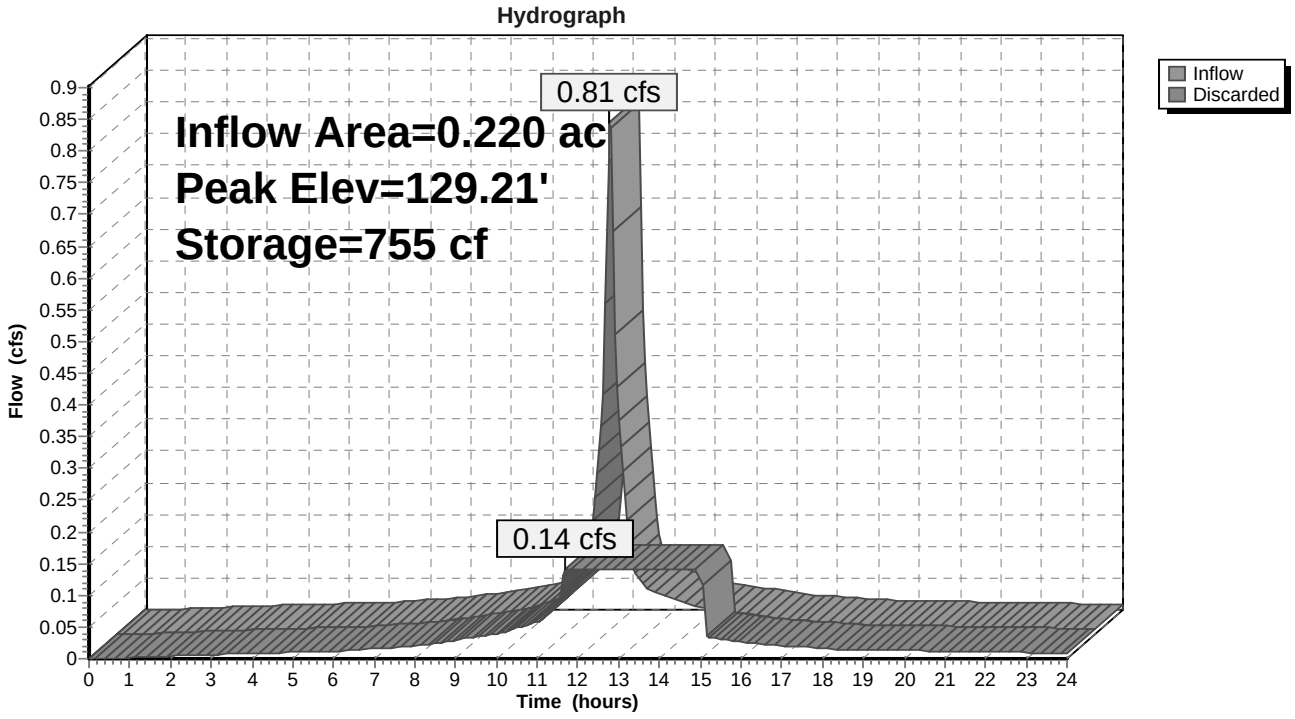
Plug-Flow detention time= 29.0 min calculated for 0.070 af (100% of inflow)
Center-of-Mass det. time= 28.7 min (782.5 - 753.8)

Volume	Invert	Avail.Storage	Storage Description
#1	127.00'	865 cf	**6.00'W x 122.00'L x 6.00'H Prismatoid** 4,392 cf Overall - 1,508 cf Embedded = 2,884 cf x 30.0% Voids
#2	128.00'	1,508 cf	**48.0" Round Pipe Storage** Inside #1 L= 120.0'
		2,373 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	127.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.14 cfs @ 11.70 hrs HW=127.08' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.14 cfs)

Pond SIS-8:



Summary for Pond SIS-9:

Inflow Area = 2.300 ac, 77.39% Impervious, Inflow Depth > 4.56" for 25-Year event
Inflow = 10.23 cfs @ 12.09 hrs, Volume= 0.873 af
Outflow = 0.91 cfs @ 11.30 hrs, Volume= 0.873 af, Atten= 91%, Lag= 0.0 min
Discarded = 0.91 cfs @ 11.30 hrs, Volume= 0.873 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 130.31' @ 13.00 hrs Surf.Area= 4,761 sf Storage= 13,080 cf

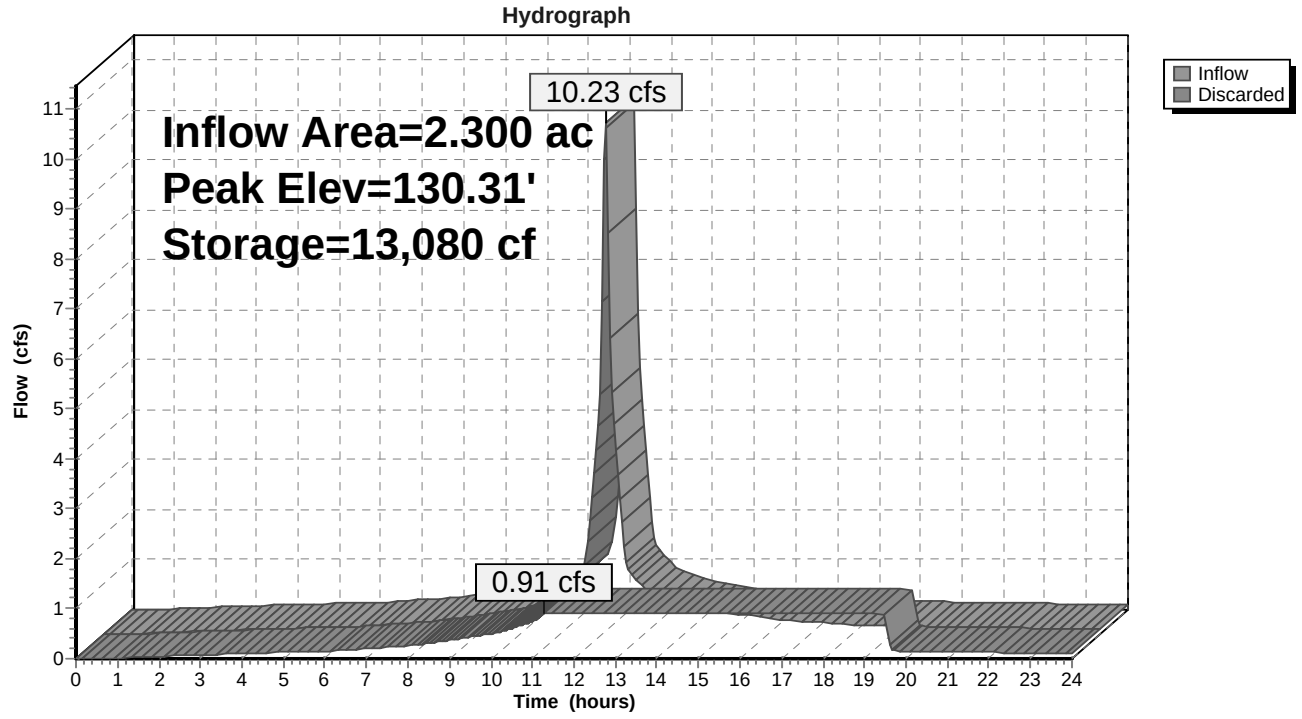
Plug-Flow detention time= 100.3 min calculated for 0.871 af (100% of inflow)
Center-of-Mass det. time= 99.8 min (849.3 - 749.4)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	6,184 cf	**69.00'W x 69.00'L x 8.00'H Prismatoid** 38,088 cf Overall - 17,474 cf Embedded = 20,614 cf x 30.0% Voids
#2	127.00'	17,474 cf	**72.0" Round Pipe Storage** Inside #1 L= 618.0'
		23,658 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	126.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.91 cfs @ 11.30 hrs HW=126.08' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.91 cfs)

Pond SIS-9:

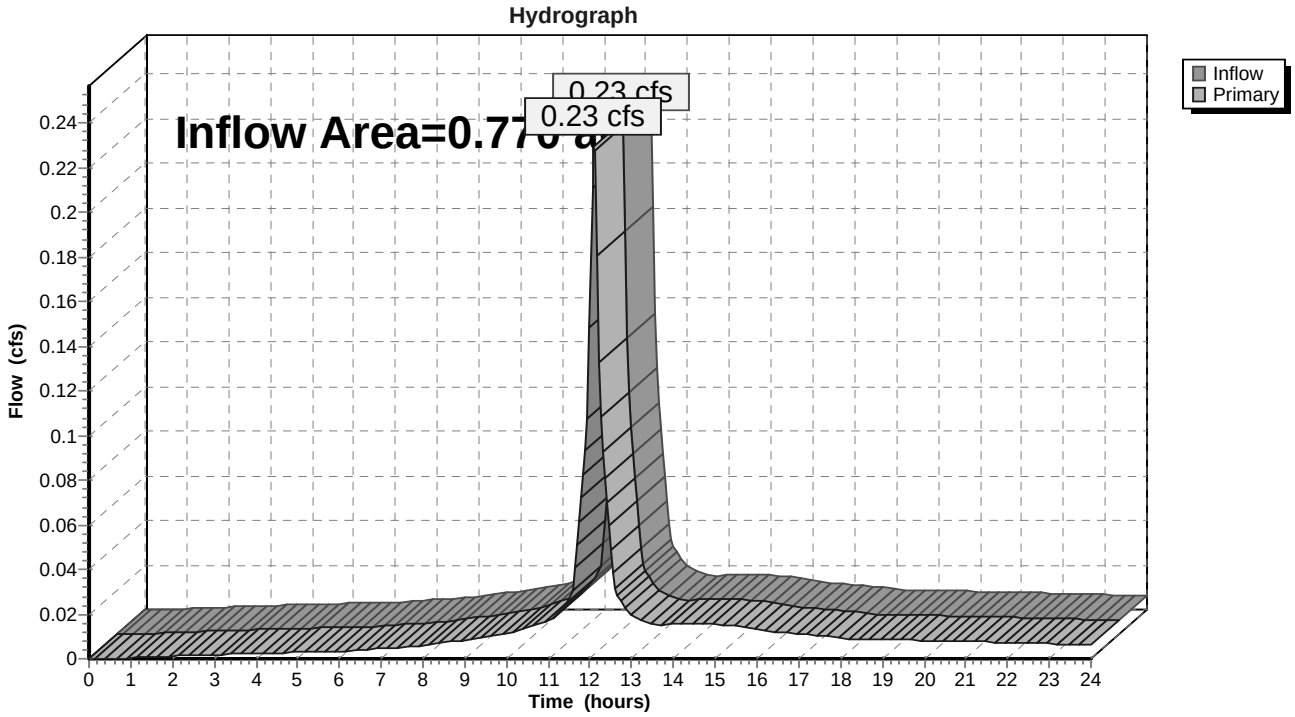


Summary for Link POA-1:

Inflow Area = 0.770 ac, 5.19% Impervious, Inflow Depth > 0.37" for 25-Year event
Inflow = 0.23 cfs @ 12.09 hrs, Volume= 0.024 af
Primary = 0.23 cfs @ 12.09 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-1:

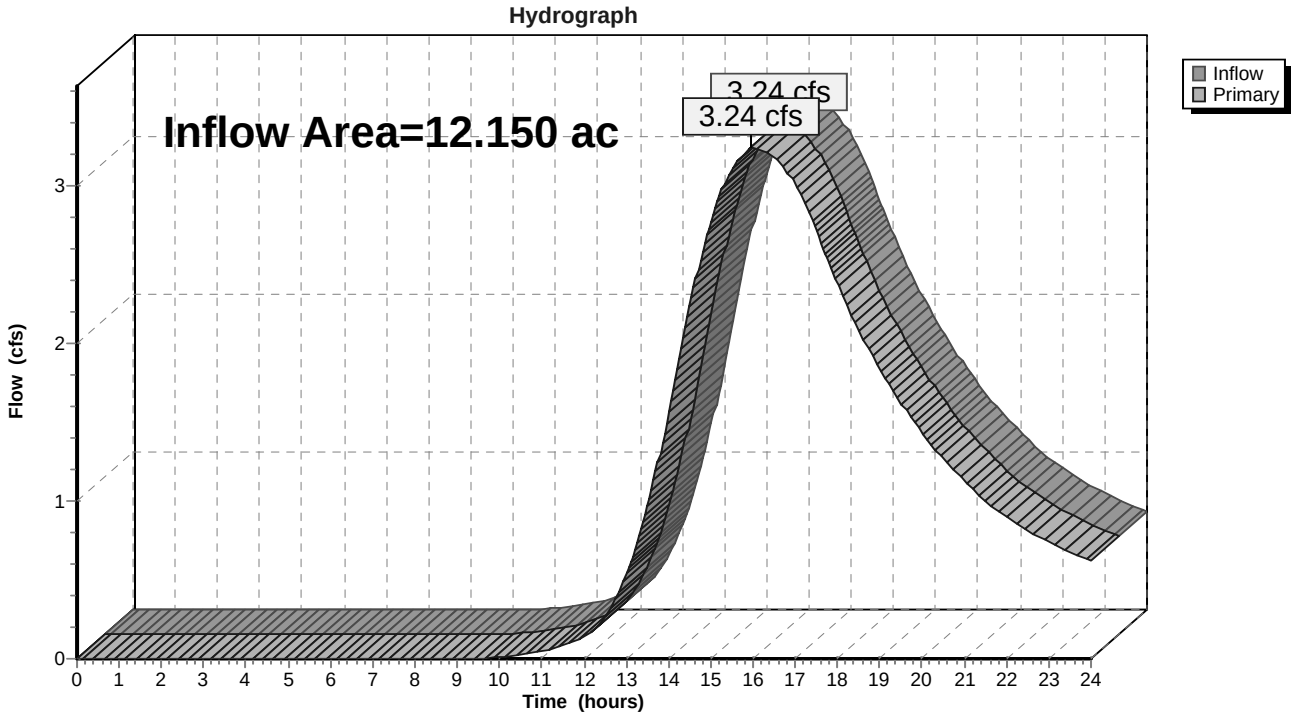


Summary for Link POA-2:

Inflow Area = 12.150 ac, 0.00% Impervious, Inflow Depth > 1.64" for 25-Year event
Inflow = 3.24 cfs @ 15.95 hrs, Volume= 1.657 af
Primary = 3.24 cfs @ 15.95 hrs, Volume= 1.657 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-2:

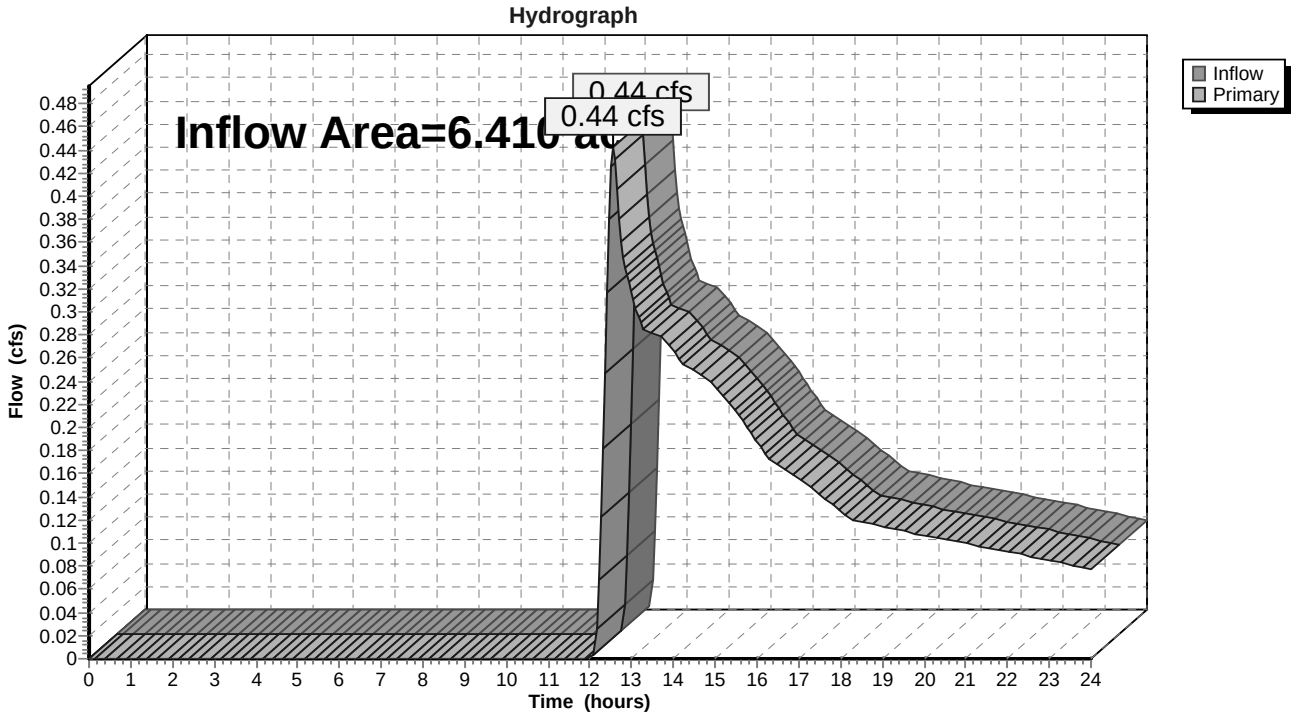


Summary for Link POA-3:

Inflow Area = 6.410 ac, 0.00% Impervious, Inflow Depth > 0.30" for 25-Year event
Inflow = 0.44 cfs @ 12.56 hrs, Volume= 0.159 af
Primary = 0.44 cfs @ 12.56 hrs, Volume= 0.159 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-3:

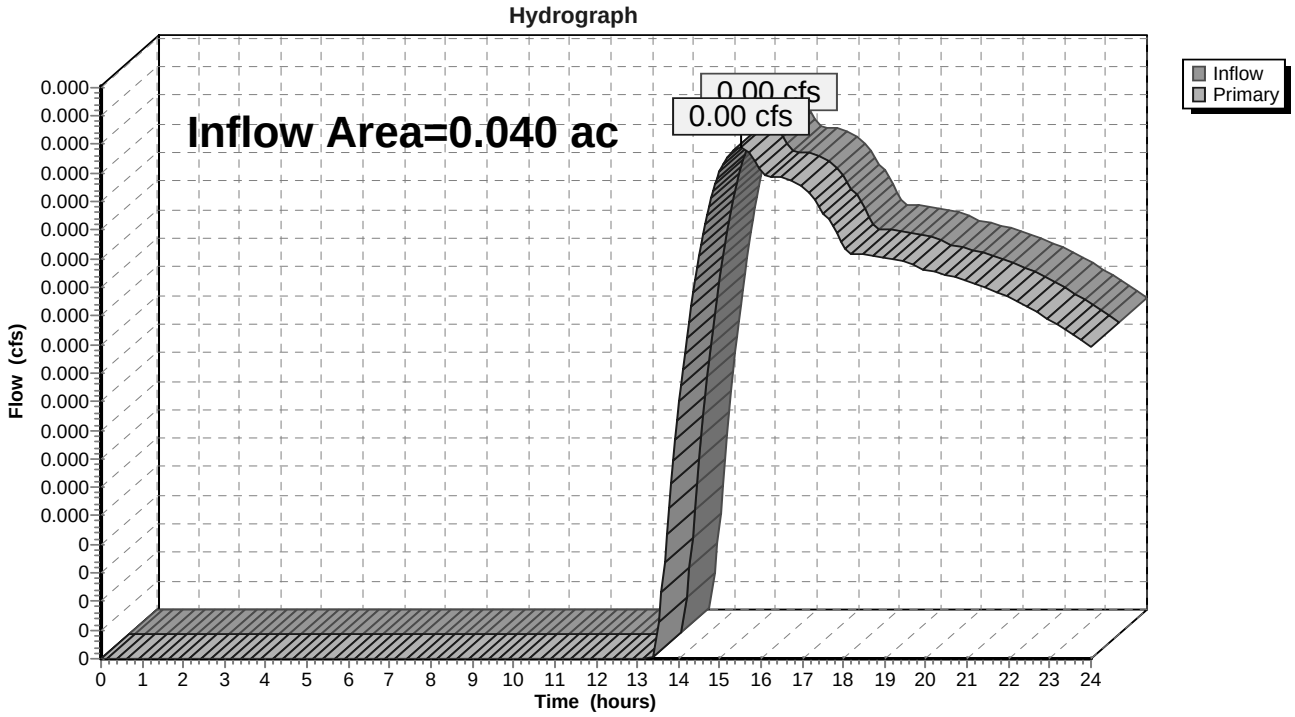


Summary for Link POA-4:

Inflow Area = 0.040 ac, 0.00% Impervious, Inflow Depth > 0.07" for 25-Year event
Inflow = 0.00 cfs @ 15.50 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 15.50 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-4:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1A: Runoff Area=0.500 ac 0.00% Impervious Runoff Depth>0.56"
Flow Length=557' Tc=11.7 min CN=30 Runoff=0.10 cfs 0.024 af

Subcatchment PR-1B: Runoff Area=0.270 ac 14.81% Impervious Runoff Depth>1.72"
Flow Length=188' Tc=6.1 min CN=WQ Runoff=0.33 cfs 0.039 af

Subcatchment PR-1C: Runoff Area=6.360 ac 29.40% Impervious Runoff Depth>3.25"
Tc=6.0 min CN=WQ Runoff=18.69 cfs 1.721 af

Subcatchment PR-1D: Runoff Area=1.650 ac 73.94% Impervious Runoff Depth>3.49"
Tc=790.0 min CN=WQ Runoff=0.75 cfs 0.480 af

Subcatchment PR-2: Runoff Area=12.150 ac 0.00% Impervious Runoff Depth>2.95"
Flow Length=2,069' Tc=304.8 min CN=WQ Runoff=5.72 cfs 2.982 af

Subcatchment PR-3A: Runoff Area=6.410 ac 0.00% Impervious Runoff Depth>1.11"
Flow Length=1,024' Tc=14.9 min CN=WQ Runoff=3.83 cfs 0.594 af

Subcatchment PR-3B: Runoff Area=1.250 ac 57.60% Impervious Runoff Depth>5.41"
Tc=6.0 min CN=WQ Runoff=6.53 cfs 0.564 af

Subcatchment PR-3C: Runoff Area=2.300 ac 77.39% Impervious Runoff Depth>6.79"
Tc=6.0 min CN=WQ Runoff=15.26 cfs 1.301 af

Subcatchment PR-3D: Runoff Area=1.110 ac 44.14% Impervious Runoff Depth>4.48"
Tc=6.0 min CN=WQ Runoff=4.74 cfs 0.414 af

Subcatchment PR-3E: Runoff Area=1.330 ac 62.41% Impervious Runoff Depth>5.75"
Tc=6.0 min CN=WQ Runoff=7.40 cfs 0.637 af

Subcatchment PR-3F: Runoff Area=0.590 ac 47.46% Impervious Runoff Depth>4.71"
Tc=6.0 min CN=WQ Runoff=2.66 cfs 0.232 af

Subcatchment PR-3G: Runoff Area=1.330 ac 66.92% Impervious Runoff Depth>6.06"
Tc=6.0 min CN=WQ Runoff=7.83 cfs 0.672 af

Subcatchment PR-3H: Runoff Area=1.380 ac 39.13% Impervious Runoff Depth>4.13"
Tc=6.0 min CN=WQ Runoff=5.40 cfs 0.475 af

Subcatchment PR-3I: Runoff Area=5.290 ac 51.98% Impervious Runoff Depth>5.02"
Tc=6.0 min CN=WQ Runoff=25.52 cfs 2.214 af

Subcatchment PR-3J: Runoff Area=1.930 ac 15.54% Impervious Runoff Depth>2.39"
Tc=6.0 min CN=WQ Runoff=4.07 cfs 0.384 af

Subcatchment PR-3K: Runoff Area=0.220 ac 63.64% Impervious Runoff Depth>5.83"
Tc=6.0 min CN=WQ Runoff=1.24 cfs 0.107 af

Subcatchment PR-4: Runoff Area=0.040 ac 0.00% Impervious Runoff Depth>0.57"
Tc=6.0 min CN=30 Runoff=0.01 cfs 0.002 af

Pond Basin 1: Peak Elev=133.52' Storage=28,158 cf Inflow=18.69 cfs 1.721 af
Outflow=2.09 cfs 1.698 af

Pond PP: Porous Pavement Peak Elev=0.39' Storage=0.478 af Inflow=0.75 cfs 0.480 af
Outflow=0.00 cfs 0.000 af

Pond SIS-1: Peak Elev=166.11' Storage=4,537 cf Inflow=4.07 cfs 0.384 af
Outflow=0.52 cfs 0.384 af

Pond SIS-10: Peak Elev=133.94' Storage=9,744 cf Inflow=6.53 cfs 0.564 af
Outflow=0.41 cfs 0.547 af

Pond SIS-2: Peak Elev=148.57' Storage=8,124 cf Inflow=5.40 cfs 0.475 af
Outflow=0.34 cfs 0.449 af

Pond SIS-3: Peak Elev=148.50' Storage=40,095 cf Inflow=25.52 cfs 2.214 af
Outflow=1.44 cfs 1.965 af

Pond SIS-4: Peak Elev=152.94' Storage=12,203 cf Inflow=7.83 cfs 0.672 af
Outflow=0.44 cfs 0.609 af

Pond SIS-5: Peak Elev=144.12' Storage=3,983 cf Inflow=2.66 cfs 0.232 af
Outflow=0.17 cfs 0.221 af

Pond SIS-6: Peak Elev=144.95' Storage=11,110 cf Inflow=7.40 cfs 0.637 af
Outflow=0.68 cfs 0.568 af

Pond SIS-7: Peak Elev=139.44' Storage=7,225 cf Inflow=4.74 cfs 0.414 af
Outflow=0.29 cfs 0.384 af

Pond SIS-8: Peak Elev=130.41' Storage=1,413 cf Inflow=1.24 cfs 0.107 af
Outflow=0.14 cfs 0.107 af

Pond SIS-9: Peak Elev=133.56' Storage=23,028 cf Inflow=15.26 cfs 1.301 af
Outflow=0.91 cfs 1.252 af

Link POA-1: Inflow=0.33 cfs 0.062 af
Primary=0.33 cfs 0.062 af

Link POA-2: Inflow=5.72 cfs 2.982 af
Primary=5.72 cfs 2.982 af

Link POA-3: Inflow=3.83 cfs 0.594 af
Primary=3.83 cfs 0.594 af

Link POA-4: Inflow=0.01 cfs 0.002 af
Primary=0.01 cfs 0.002 af

Total Runoff Area = 44.110 ac Runoff Volume = 12.841 af Average Runoff Depth = 3.49"
73.14% Pervious = 32.260 ac 26.86% Impervious = 11.850 ac

Summary for Subcatchment PR-1A:

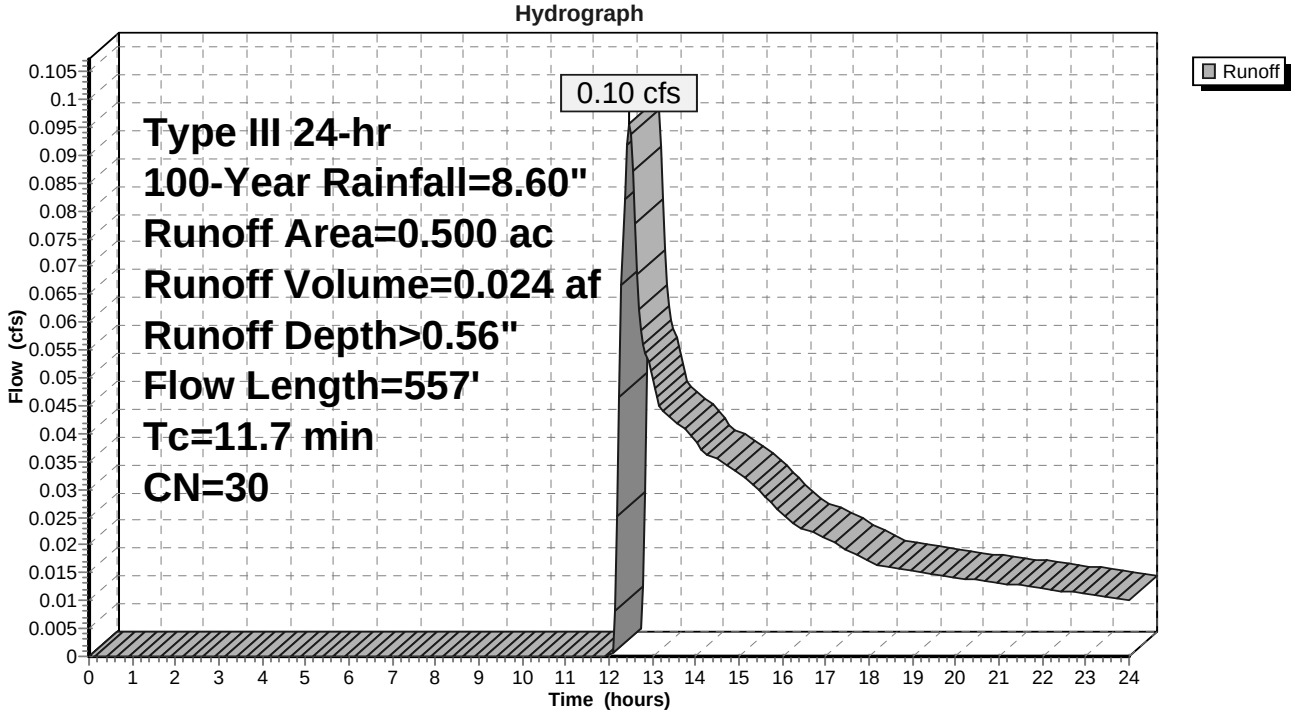
Runoff = 0.10 cfs @ 12.46 hrs, Volume= 0.024 af, Depth> 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.500	30	Woods, Good, HSG A
0.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.2400	0.10		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
1.0	73	0.2400	1.22		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.5	434	0.0370	2.89		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
11.7	557	Total			

Subcatchment PR-1A:



Summary for Subcatchment PR-1B:

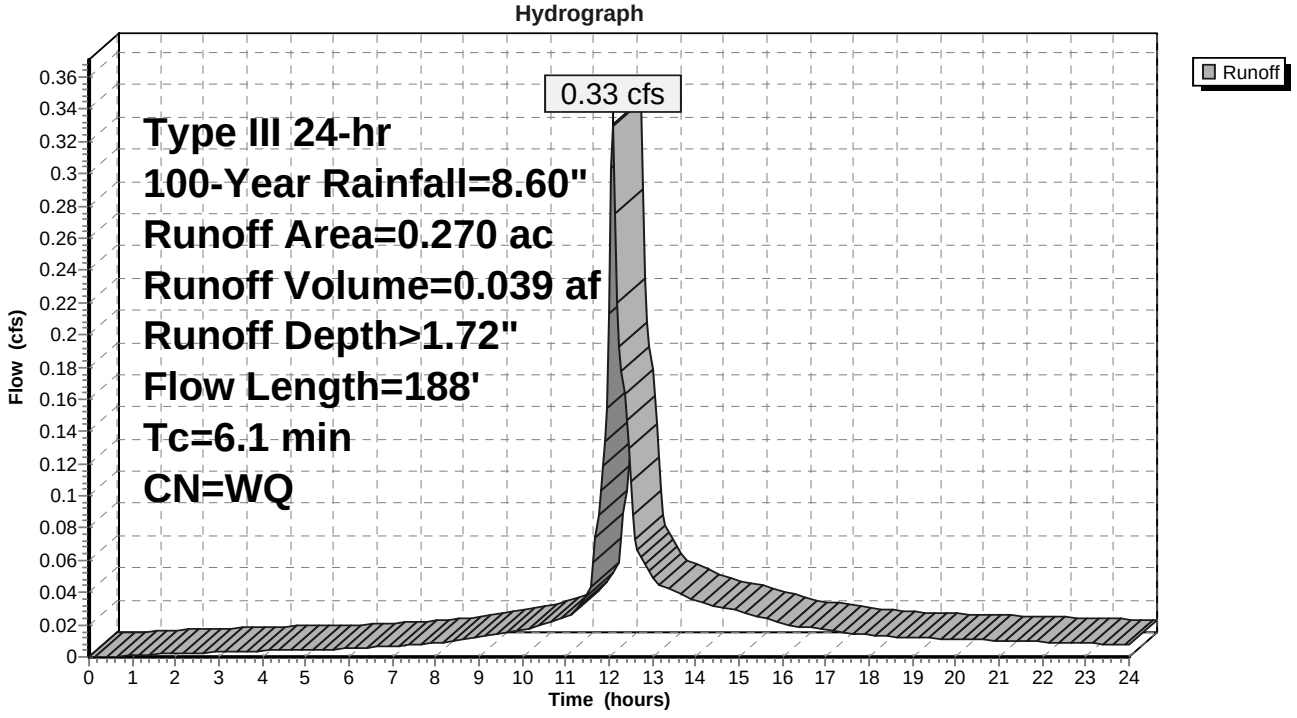
Runoff = 0.33 cfs @ 12.09 hrs, Volume= 0.039 af, Depth> 1.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.040	98	Paved parking, HSG A
0.230	30	Woods, Good, HSG A
0.270		Weighted Average
0.230		85.19% Pervious Area
0.040		14.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	44	0.1600	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
1.1	144	0.1040	2.26		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.1	188	Total			

Subcatchment PR-1B:



Summary for Subcatchment PR-1C:

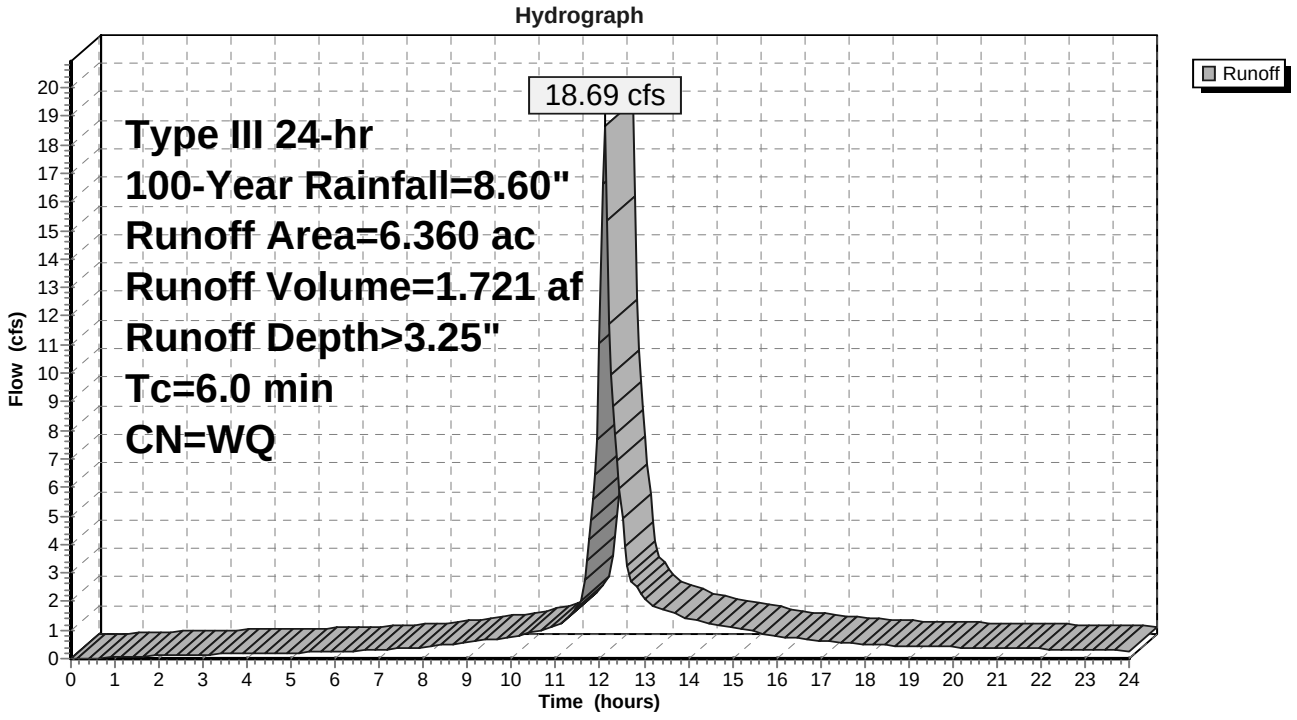
Runoff = 18.69 cfs @ 12.09 hrs, Volume= 1.721 af, Depth> 3.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.940	98	Paved parking, HSG A
0.750	98	Roofs, HSG A
2.580	39	>75% Grass cover, Good, HSG A
0.660	35	Brush, Fair, HSG A
1.250	30	Woods, Good, HSG A
0.180	98	Water Surface, HSG A
6.360		Weighted Average
4.490		70.60% Pervious Area
1.870		29.40% Impervious Area

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

Subcatchment PR-1C:



Summary for Subcatchment PR-1D:

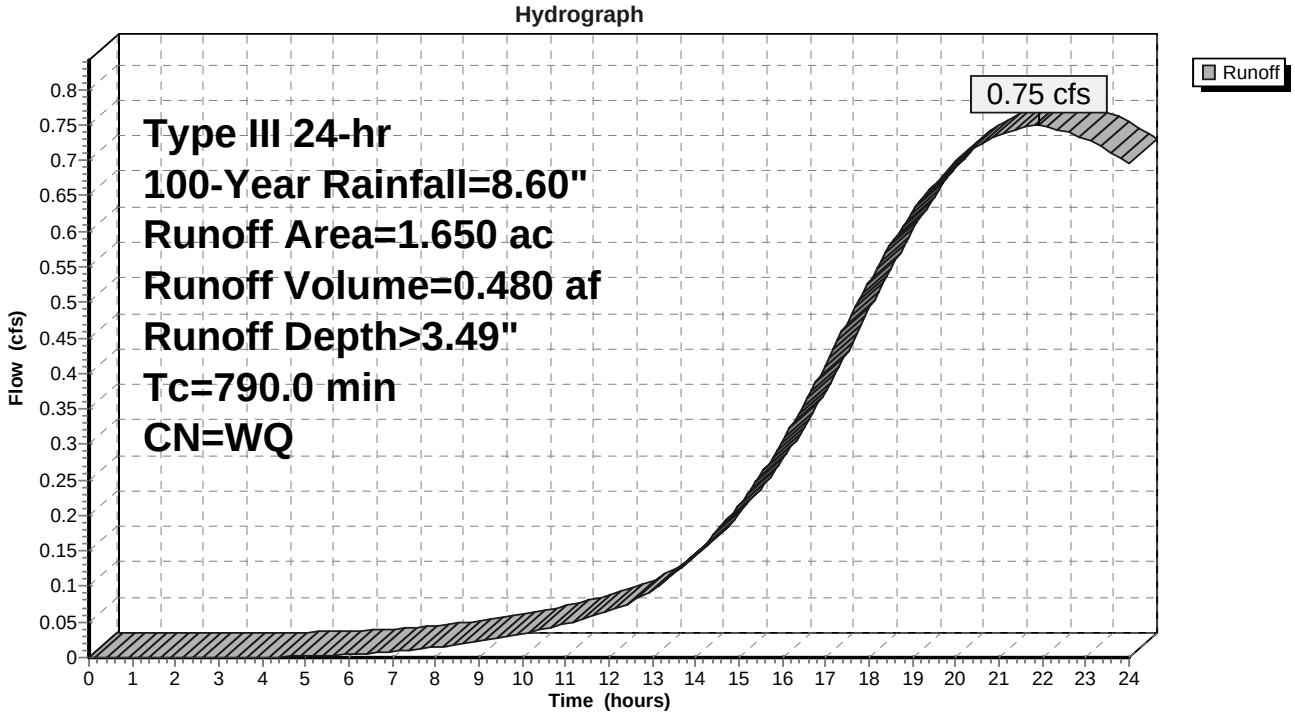
Runoff = 0.75 cfs @ 21.94 hrs, Volume= 0.480 af, Depth> 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (ac)	CN	Description
*	1.220	98	Porous Pavement, HSG A
	0.430	39	>75% Grass cover, Good, HSG A
	1.650		Weighted Average
	0.430		26.06% Pervious Area
	1.220		73.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
790.0					**Direct Entry, Per Hydrocad porous pavement design guidance**

Subcatchment PR-1D:



Summary for Subcatchment PR-2:

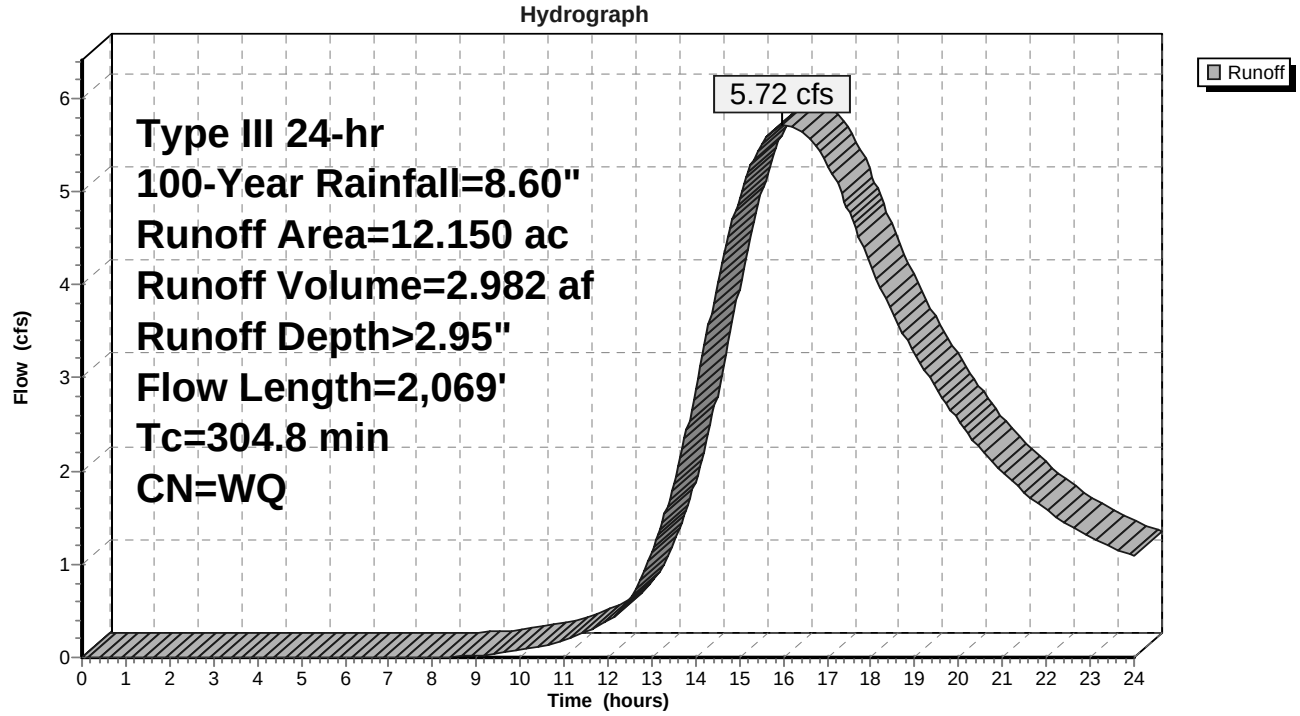
Runoff = 5.72 cfs @ 15.95 hrs, Volume= 2.982 af, Depth> 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (ac)	CN	Description
	5.920	30	Woods, Good, HSG A
*	6.230	77	Wetland
	12.150		Weighted Average
	12.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	50	0.0500	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.00"
2.1	242	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
287.3	1,777	0.0017	0.10		**Shallow Concentrated Flow, Wetland** Forest w/Heavy Litter Kv= 2.5 fps
304.8	2,069	Total			

Subcatchment PR-2:



Summary for Subcatchment PR-3A:

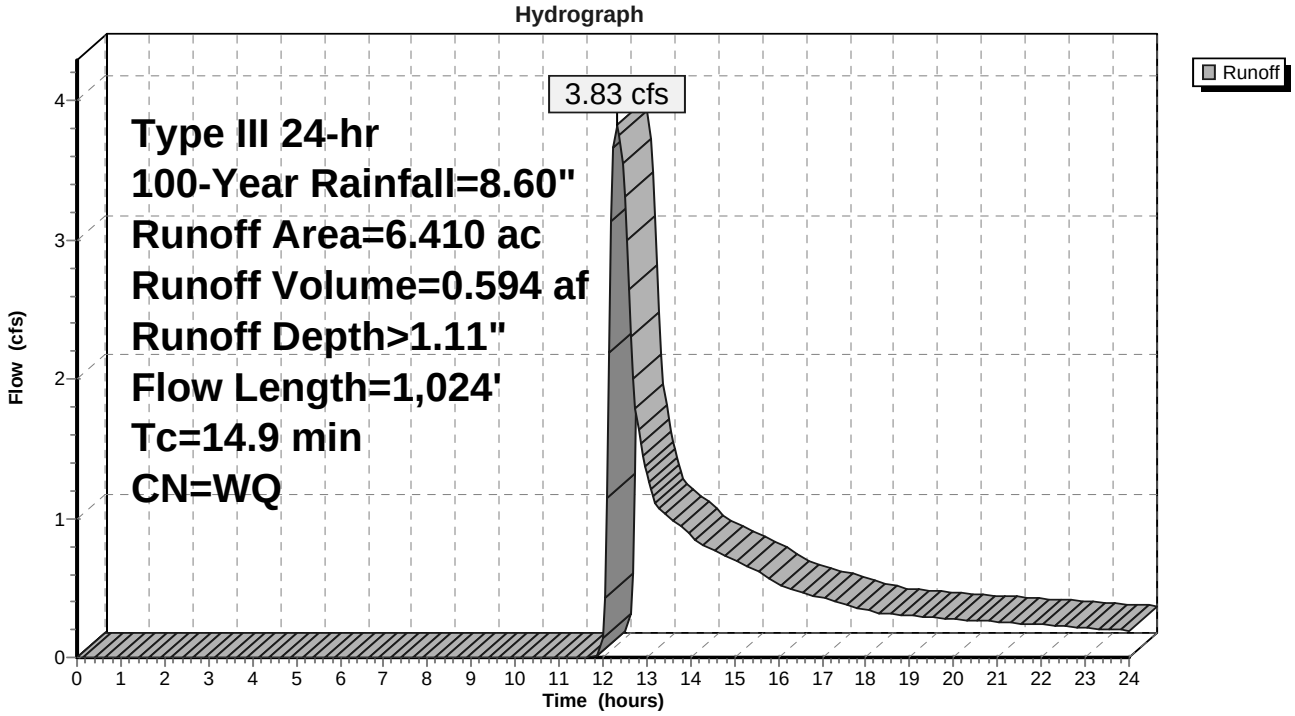
Runoff = 3.83 cfs @ 12.32 hrs, Volume= 0.594 af, Depth> 1.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
1.620	39	>75% Grass cover, Good, HSG A
4.790	35	Brush, Fair, HSG A
6.410		Weighted Average
6.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	252	0.1350	1.84		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.2	672	0.0100	1.00		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
1.4	100	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.9	1,024	Total			

Subcatchment PR-3A:



Summary for Subcatchment PR-3B:

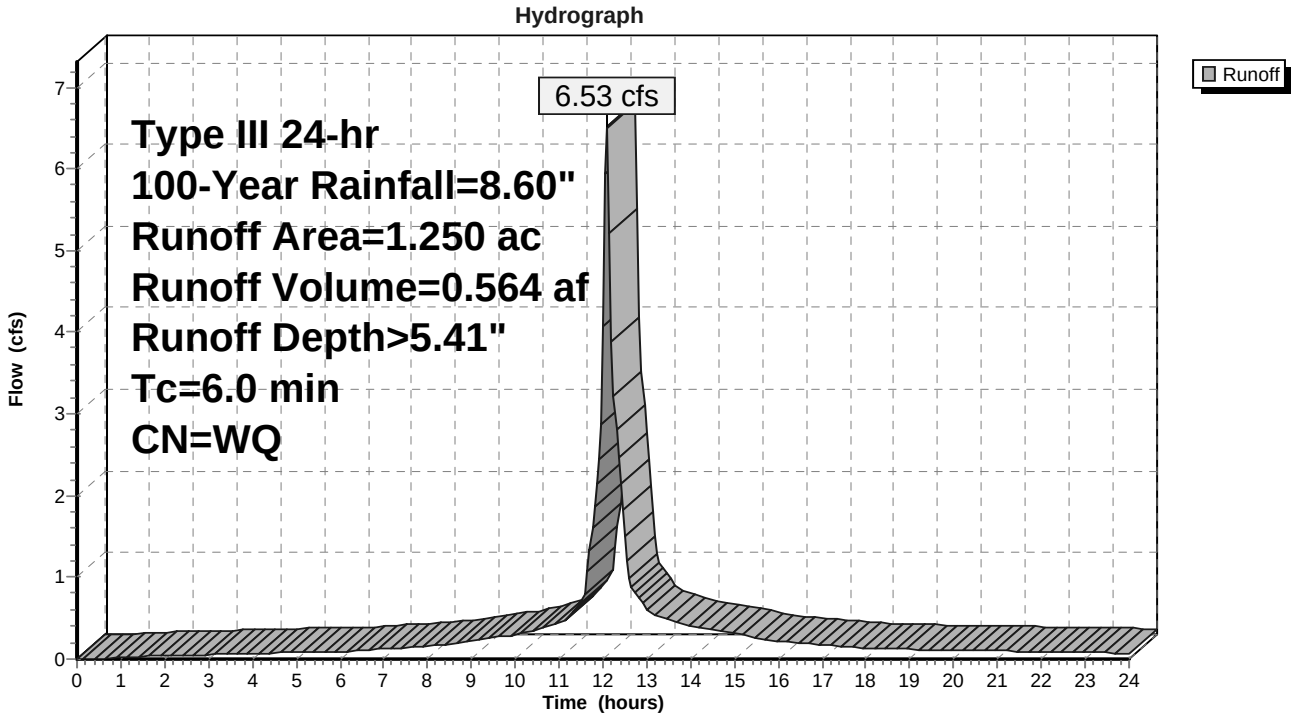
Runoff = 6.53 cfs @ 12.09 hrs, Volume= 0.564 af, Depth> 5.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG A
0.410	98	Roofs, HSG A
0.530	39	>75% Grass cover, Good, HSG A
1.250		Weighted Average
0.530		42.40% Pervious Area
0.720		57.60% Impervious Area

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

Subcatchment PR-3B:



Summary for Subcatchment PR-3C:

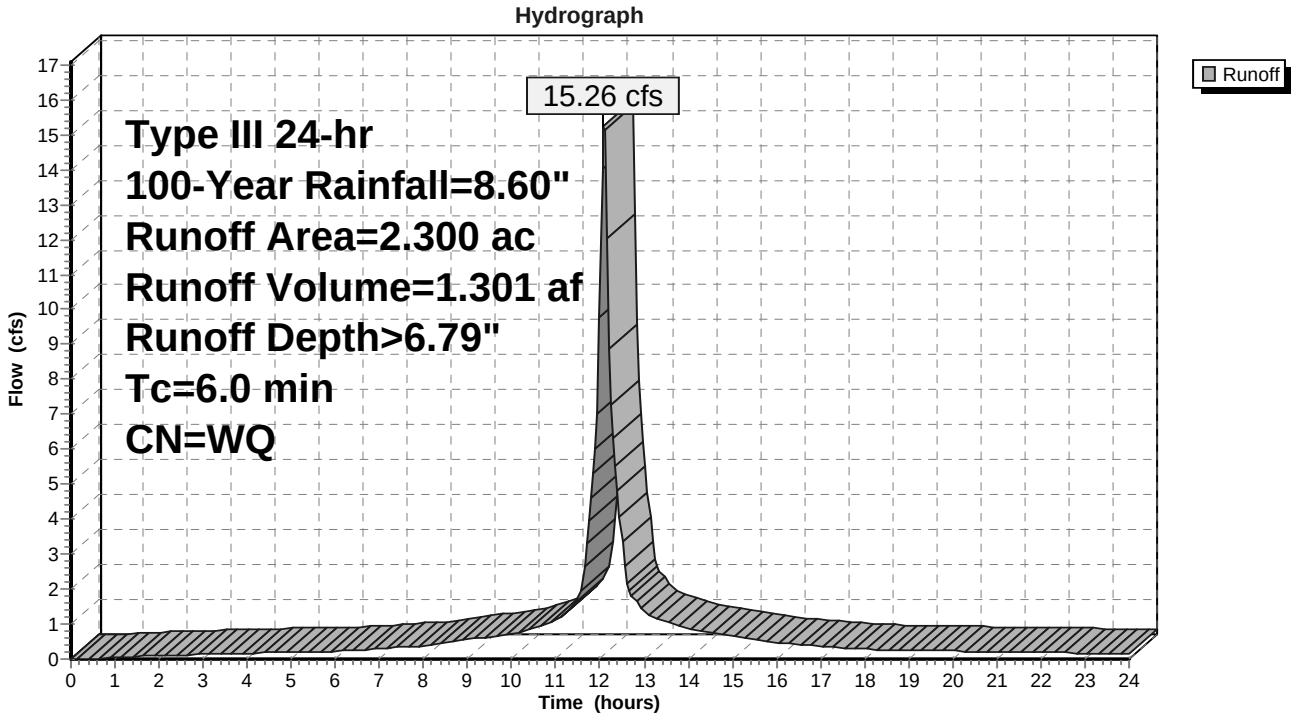
Runoff = 15.26 cfs @ 12.09 hrs, Volume= 1.301 af, Depth> 6.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
1.120	98	Paved parking, HSG A
0.660	98	Roofs, HSG A
0.520	39	>75% Grass cover, Good, HSG A
2.300		Weighted Average
0.520		22.61% Pervious Area
1.780		77.39% Impervious Area

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

Subcatchment PR-3C:



Summary for Subcatchment PR-3D:

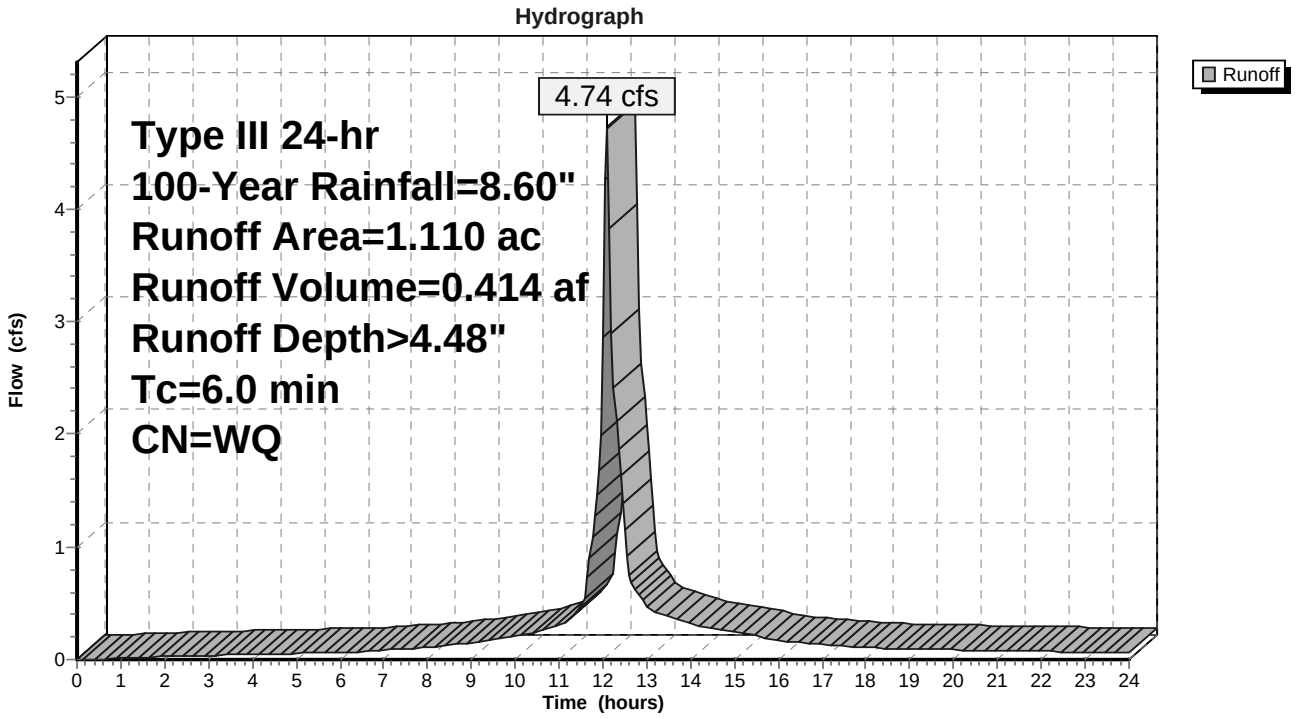
Runoff = 4.74 cfs @ 12.09 hrs, Volume= 0.414 af, Depth> 4.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.490	98	Roofs, HSG A
0.620	39	>75% Grass cover, Good, HSG A
1.110		Weighted Average
0.620		55.86% Pervious Area
0.490		44.14% Impervious Area

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

Subcatchment PR-3D:



Summary for Subcatchment PR-3E:

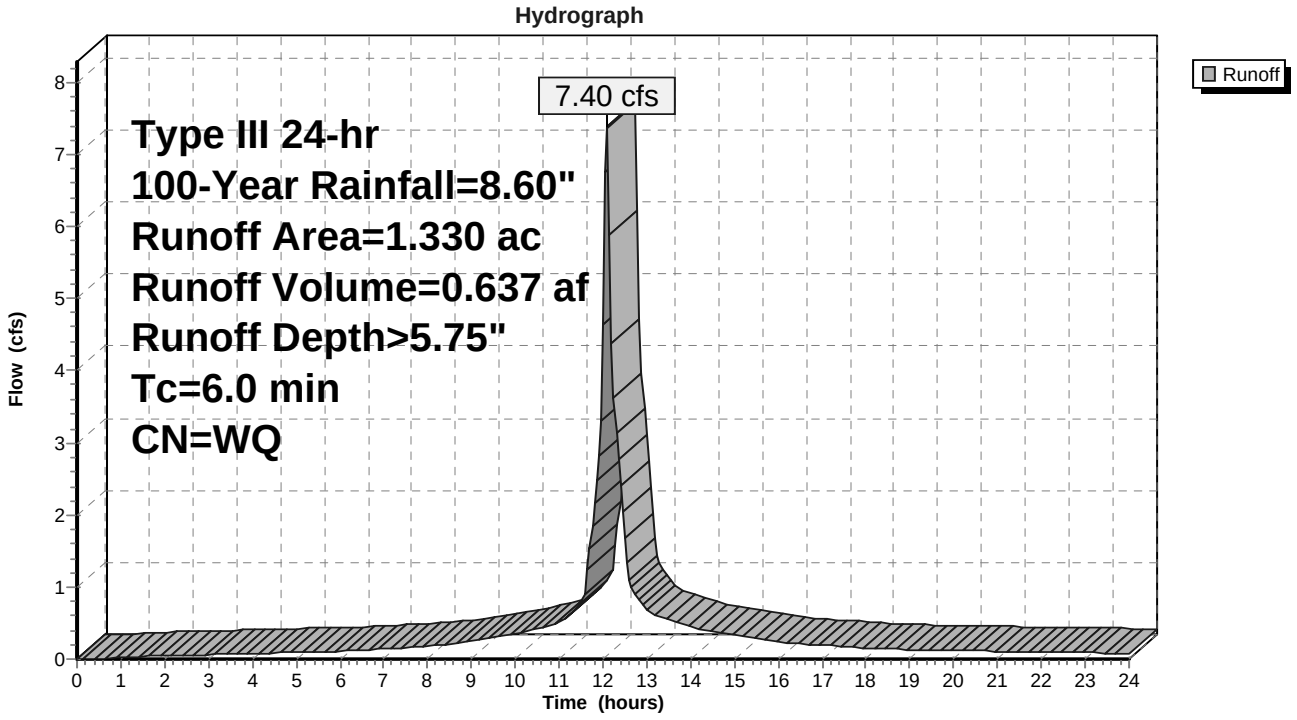
Runoff = 7.40 cfs @ 12.09 hrs, Volume= 0.637 af, Depth> 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.510	98	Paved parking, HSG A
0.320	98	Roofs, HSG A
0.500	39	>75% Grass cover, Good, HSG A
1.330		Weighted Average
0.500		37.59% Pervious Area
0.830		62.41% Impervious Area

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

Subcatchment PR-3E:



Summary for Subcatchment PR-3F:

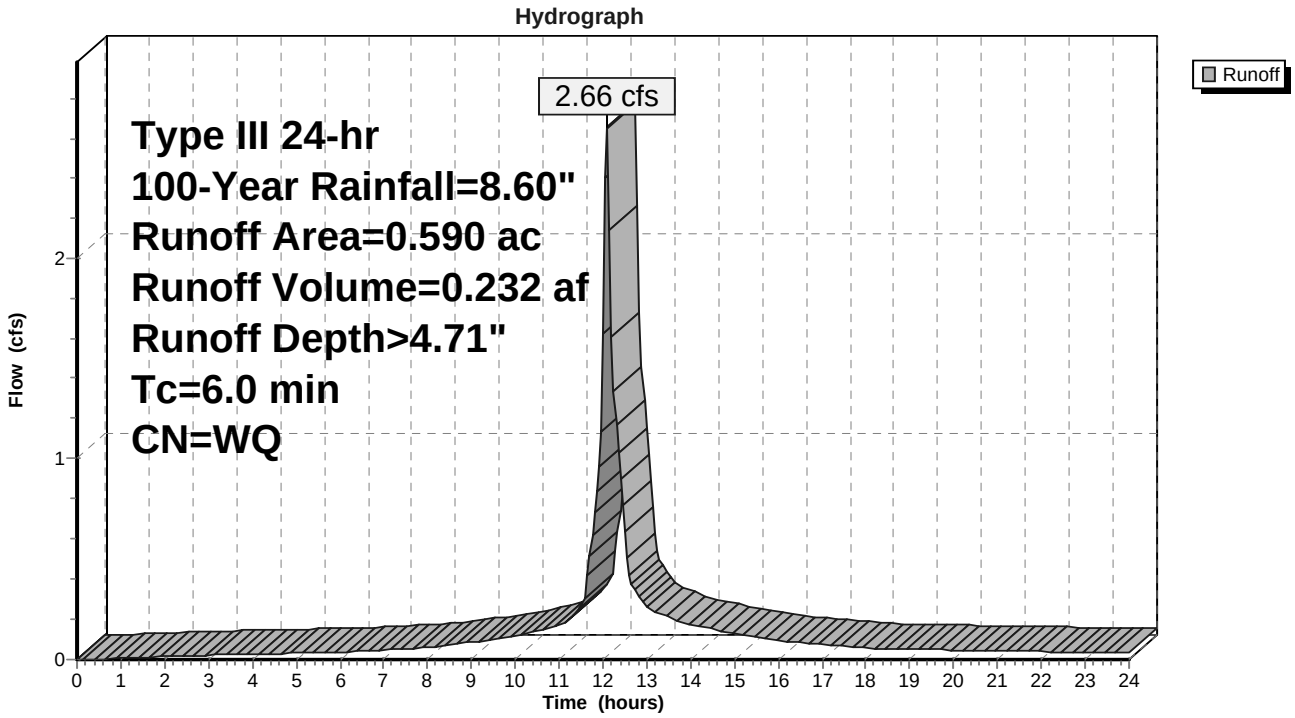
Runoff = 2.66 cfs @ 12.09 hrs, Volume= 0.232 af, Depth> 4.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.280	98	Roofs, HSG A
0.310	39	>75% Grass cover, Good, HSG A
0.590		Weighted Average
0.310		52.54% Pervious Area
0.280		47.46% Impervious Area

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

Subcatchment PR-3F:



Summary for Subcatchment PR-3G:

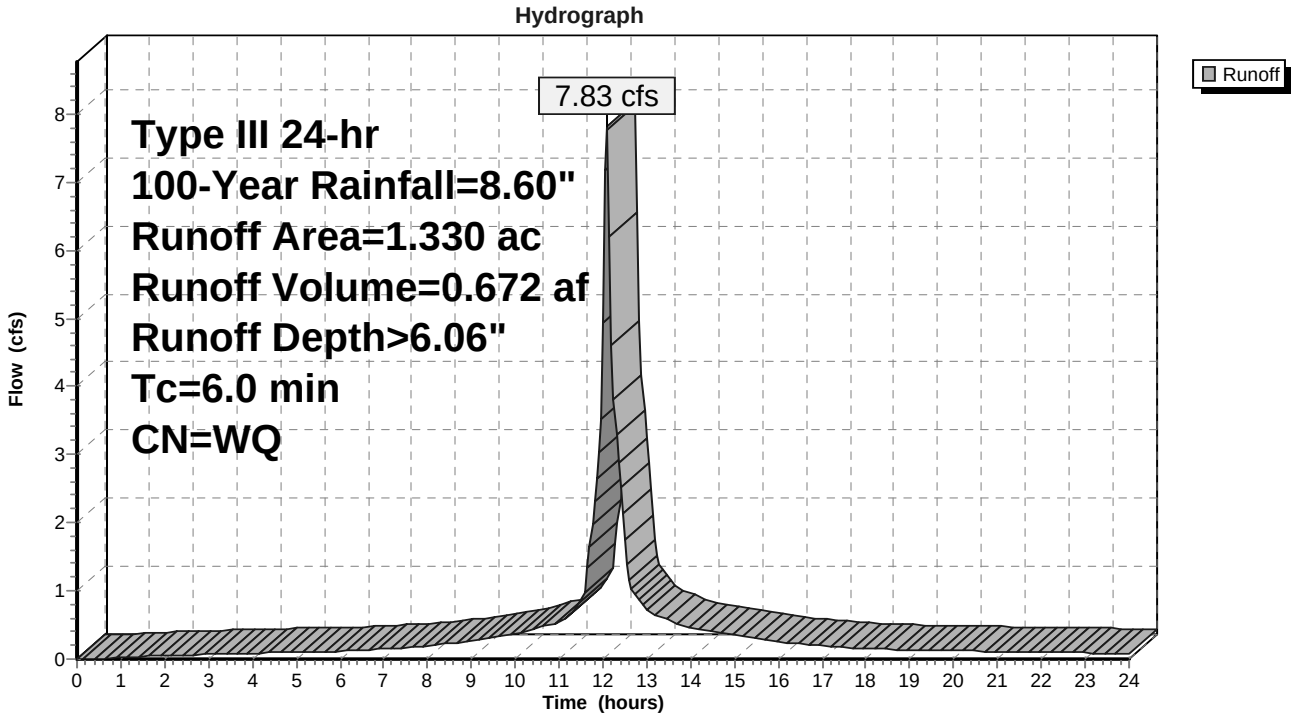
Runoff = 7.83 cfs @ 12.09 hrs, Volume= 0.672 af, Depth> 6.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG A
0.160	98	Roofs, HSG A
0.440	39	>75% Grass cover, Good, HSG A
1.330		Weighted Average
0.440		33.08% Pervious Area
0.890		66.92% Impervious Area

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

Subcatchment PR-3G:



Summary for Subcatchment PR-3H:

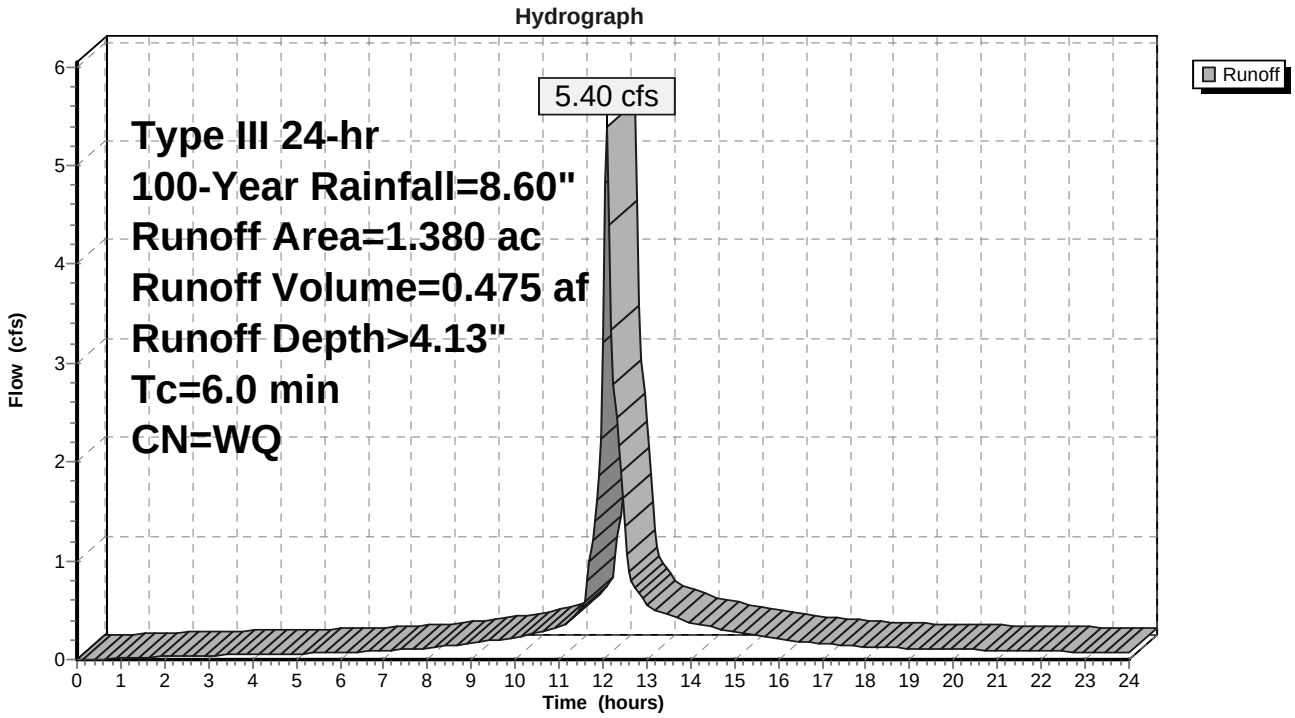
Runoff = 5.40 cfs @ 12.09 hrs, Volume= 0.475 af, Depth> 4.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.540	98	Roofs, HSG A
0.840	39	>75% Grass cover, Good, HSG A
1.380		Weighted Average
0.840		60.87% Pervious Area
0.540		39.13% Impervious Area

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

Subcatchment PR-3H:



Summary for Subcatchment PR-3I:

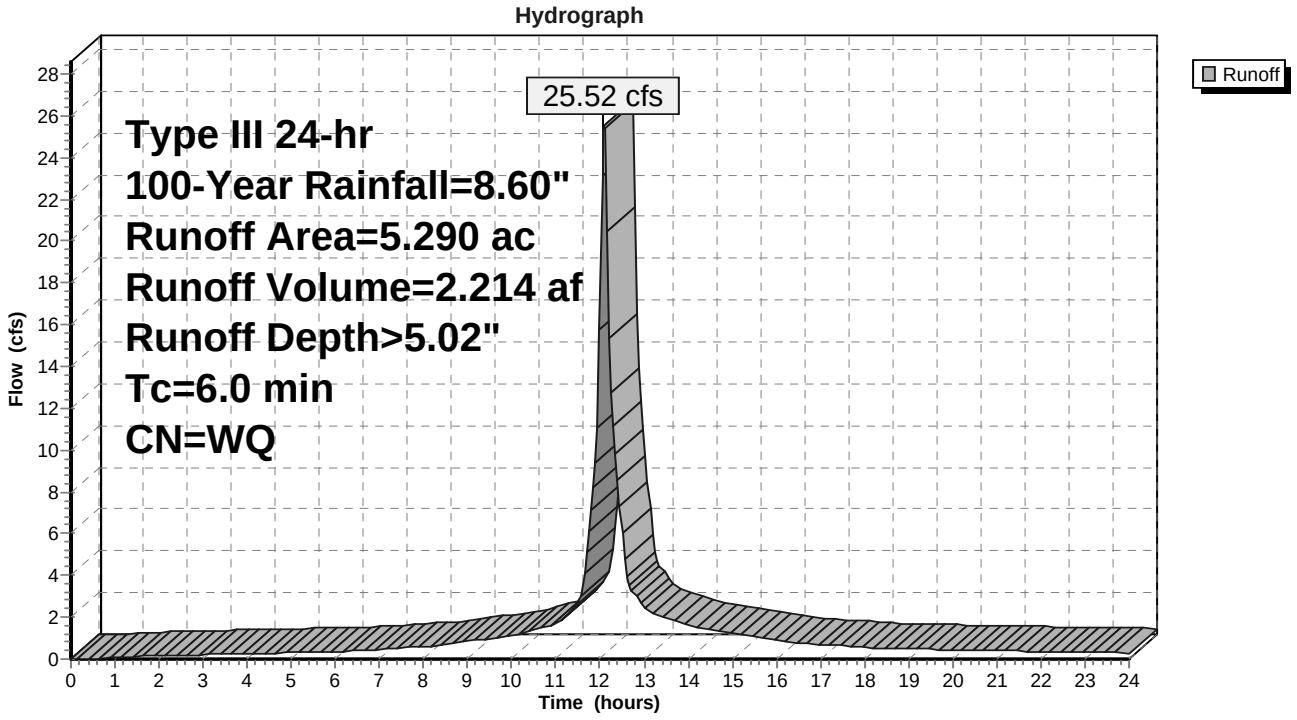
Runoff = 25.52 cfs @ 12.09 hrs, Volume= 2.214 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
1.570	98	Paved parking, HSG A
1.180	98	Roofs, HSG A
2.540	39	>75% Grass cover, Good, HSG A
5.290		Weighted Average
2.540		48.02% Pervious Area
2.750		51.98% Impervious Area

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

Subcatchment PR-3I:



Summary for Subcatchment PR-3J:

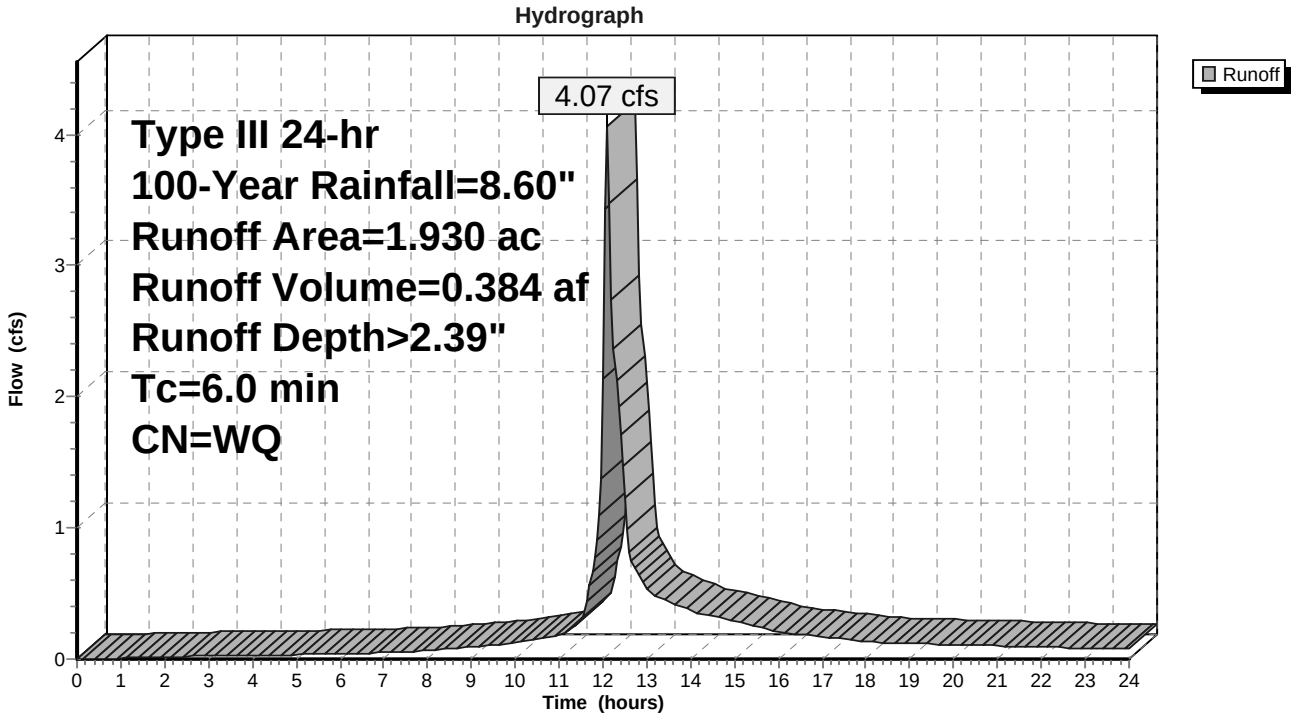
Runoff = 4.07 cfs @ 12.10 hrs, Volume= 0.384 af, Depth> 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.300	98	Roofs, HSG A
1.390	39	>75% Grass cover, Good, HSG A
0.240	30	Woods, Good, HSG A
1.930		Weighted Average
1.630		84.46% Pervious Area
0.300		15.54% Impervious Area

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

Subcatchment PR-3J:



Summary for Subcatchment PR-3K:

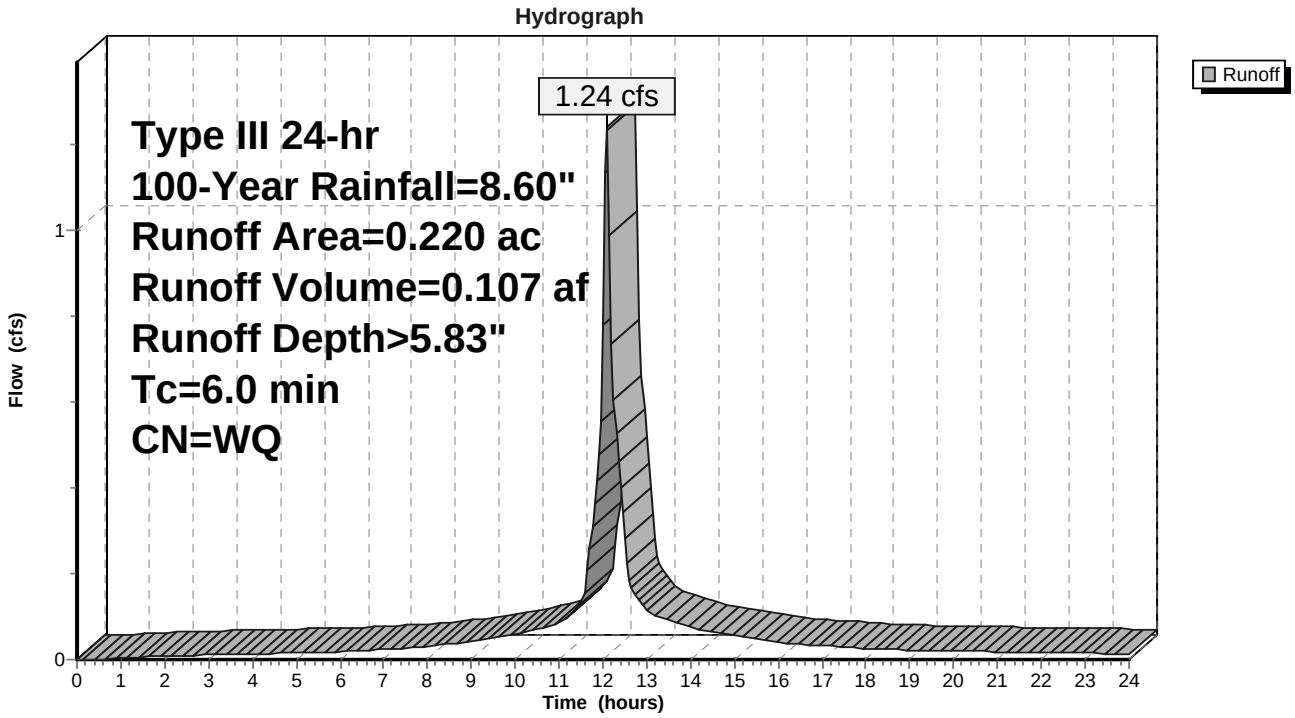
Runoff = 1.24 cfs @ 12.09 hrs, Volume= 0.107 af, Depth> 5.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.140	98	Roofs, HSG A
0.080	39	>75% Grass cover, Good, HSG A
0.220		Weighted Average
0.080		36.36% Pervious Area
0.140		63.64% Impervious Area

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

Subcatchment PR-3K:



Summary for Subcatchment PR-4:

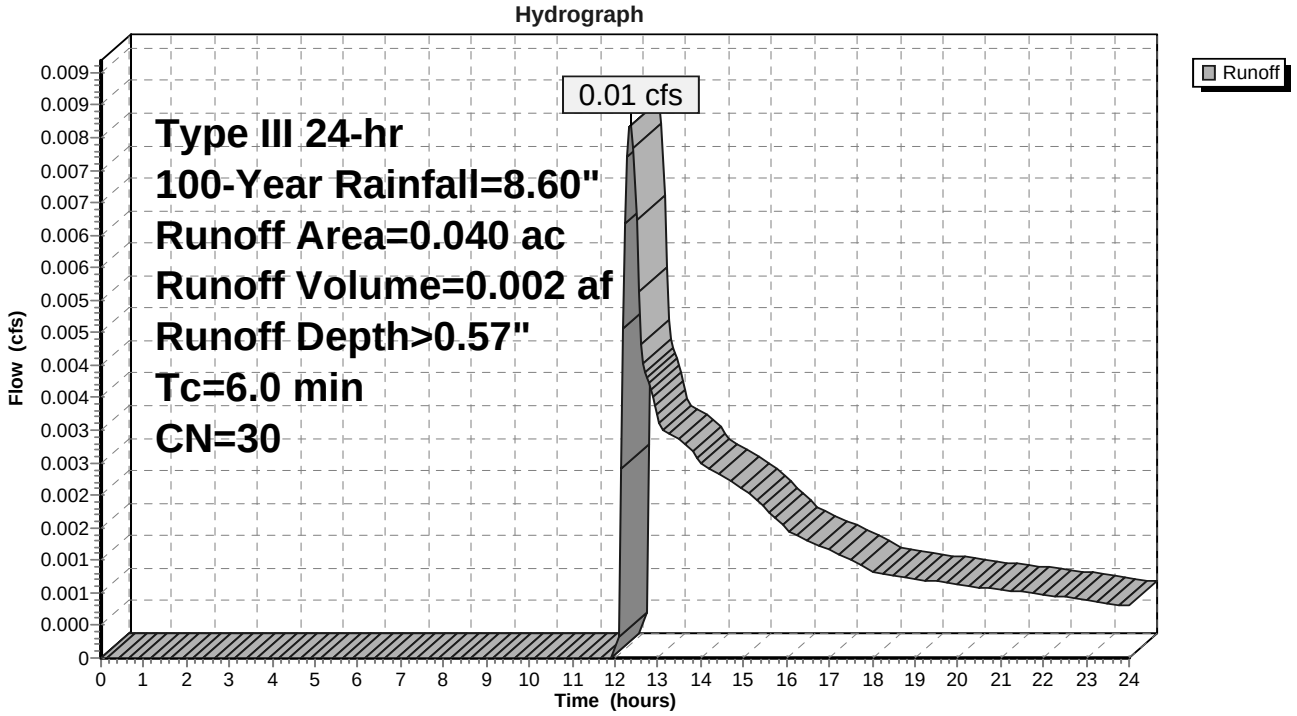
Runoff = 0.01 cfs @ 12.37 hrs, Volume= 0.002 af, Depth> 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.040	30	Woods, Good, HSG A
0.040		100.00% Pervious Area

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

Subcatchment PR-4:



Summary for Pond Basin 1:

Inflow Area = 6.360 ac, 29.40% Impervious, Inflow Depth > 3.25" for 100-Year event
Inflow = 18.69 cfs @ 12.09 hrs, Volume= 1.721 af
Outflow = 2.09 cfs @ 13.01 hrs, Volume= 1.698 af, Atten= 89%, Lag= 55.2 min
Discarded = 2.09 cfs @ 13.01 hrs, Volume= 1.698 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 133.52' @ 13.01 hrs Surf.Area= 10,925 sf Storage= 28,158 cf

Plug-Flow detention time= 143.9 min calculated for 1.695 af (98% of inflow)
Center-of-Mass det. time= 135.1 min (917.6 - 782.5)

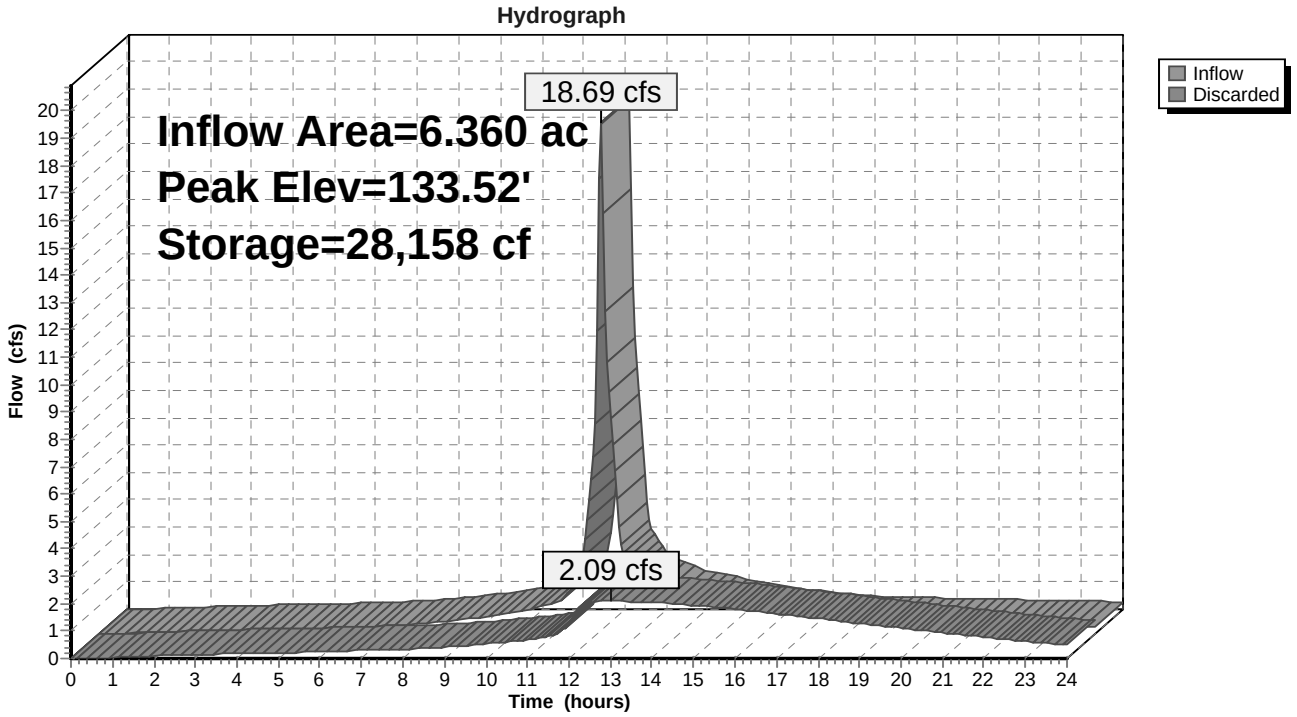
Volume	Invert	Avail.Storage	Storage Description
#1	129.00'	33,592 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
129.00	1,494	0	0
130.00	3,621	2,558	2,558
132.00	7,748	11,369	13,927
134.00	11,917	19,665	33,592

Device	Routing	Invert	Outlet Devices
#1	Discarded	129.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=2.09 cfs @ 13.01 hrs HW=133.52' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.09 cfs)

Pond Basin 1:


Hydrograph
Inflow
Discarded
18.69 cfs
2.09 cfs
Inflow Area=6.360 ac
Peak Elev=133.52'
Storage=28,158 cf
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
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Summary for Pond PP: Porous Pavement

Inflow Area = 1.650 ac, 73.94% Impervious, Inflow Depth > 3.49" for 100-Year event
Inflow = 0.75 cfs @ 21.94 hrs, Volume= 0.480 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

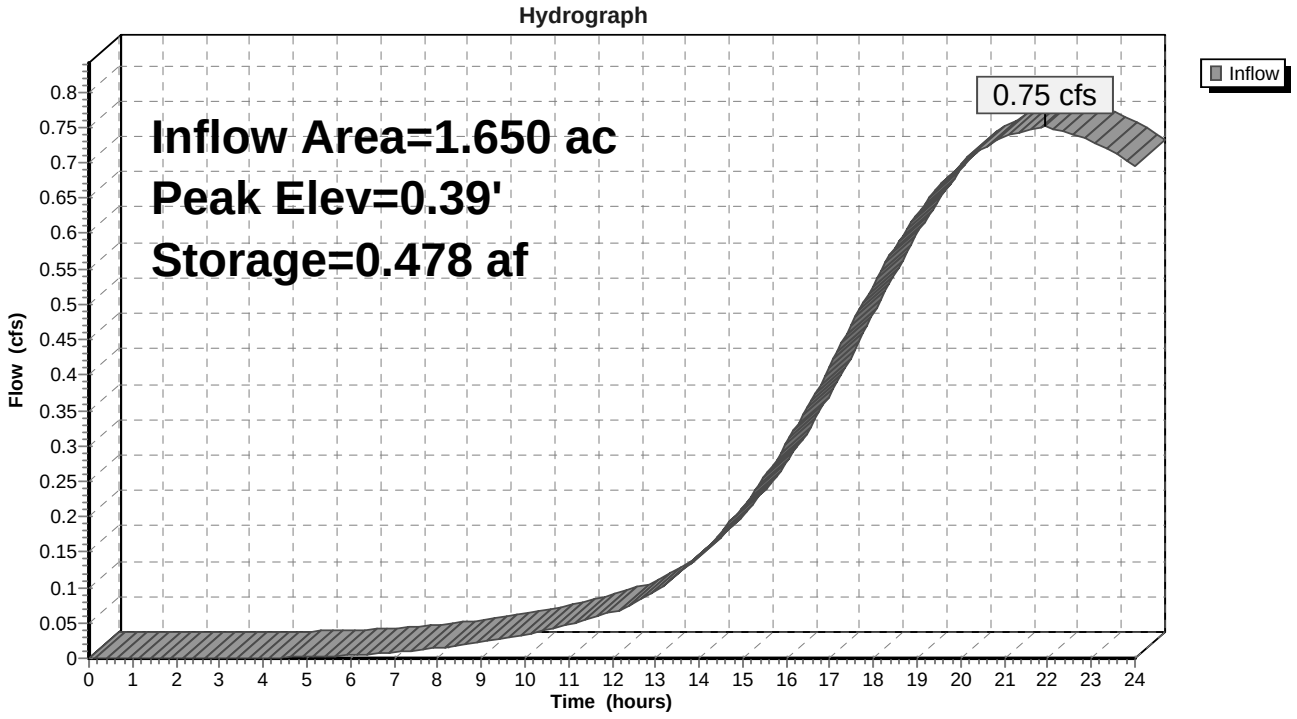
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.39' @ 24.00 hrs Surf.Area= 1.220 ac Storage= 0.478 af

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

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2.952 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
0.00	1.220	0.000	0.000
2.42	1.220	2.952	2.952

Pond PP: Porous Pavement



Summary for Pond SIS-1:

Inflow Area = 1.930 ac, 15.54% Impervious, Inflow Depth > 2.39" for 100-Year event
Inflow = 4.07 cfs @ 12.10 hrs, Volume= 0.384 af
Outflow = 0.52 cfs @ 11.75 hrs, Volume= 0.384 af, Atten= 87%, Lag= 0.0 min
Discarded = 0.52 cfs @ 11.75 hrs, Volume= 0.384 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 166.11' @ 13.05 hrs Surf.Area= 2,705 sf Storage= 4,537 cf

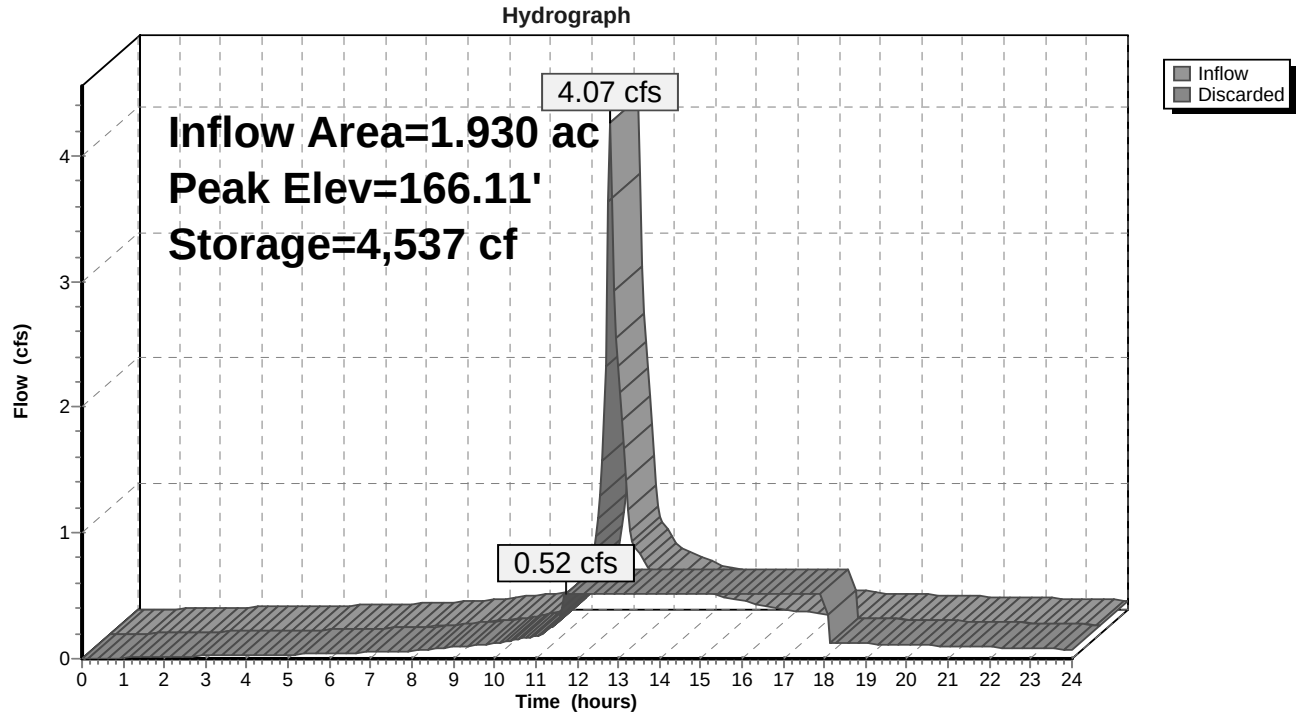
Plug-Flow detention time= 64.9 min calculated for 0.384 af (100% of inflow)
Center-of-Mass det. time= 64.7 min (880.8 - 816.1)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	2,915 cf	**5.00'W x 541.00'L x 5.00'H Prismatoid** 13,525 cf Overall - 3,810 cf Embedded = 9,715 cf x 30.0% Voids
#2	164.00'	3,810 cf	**36.0" Round Pipe Storage** Inside #1 L= 539.0'
		6,724 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	163.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.52 cfs @ 11.75 hrs HW=163.07' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.52 cfs)

Pond SIS-1:



Summary for Pond SIS-10:

Inflow Area = 1.250 ac, 57.60% Impervious, Inflow Depth > 5.41" for 100-Year event
Inflow = 6.53 cfs @ 12.09 hrs, Volume= 0.564 af
Outflow = 0.41 cfs @ 10.85 hrs, Volume= 0.547 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.41 cfs @ 10.85 hrs, Volume= 0.547 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 133.94' @ 13.99 hrs Surf.Area= 2,116 sf Storage= 9,744 cf

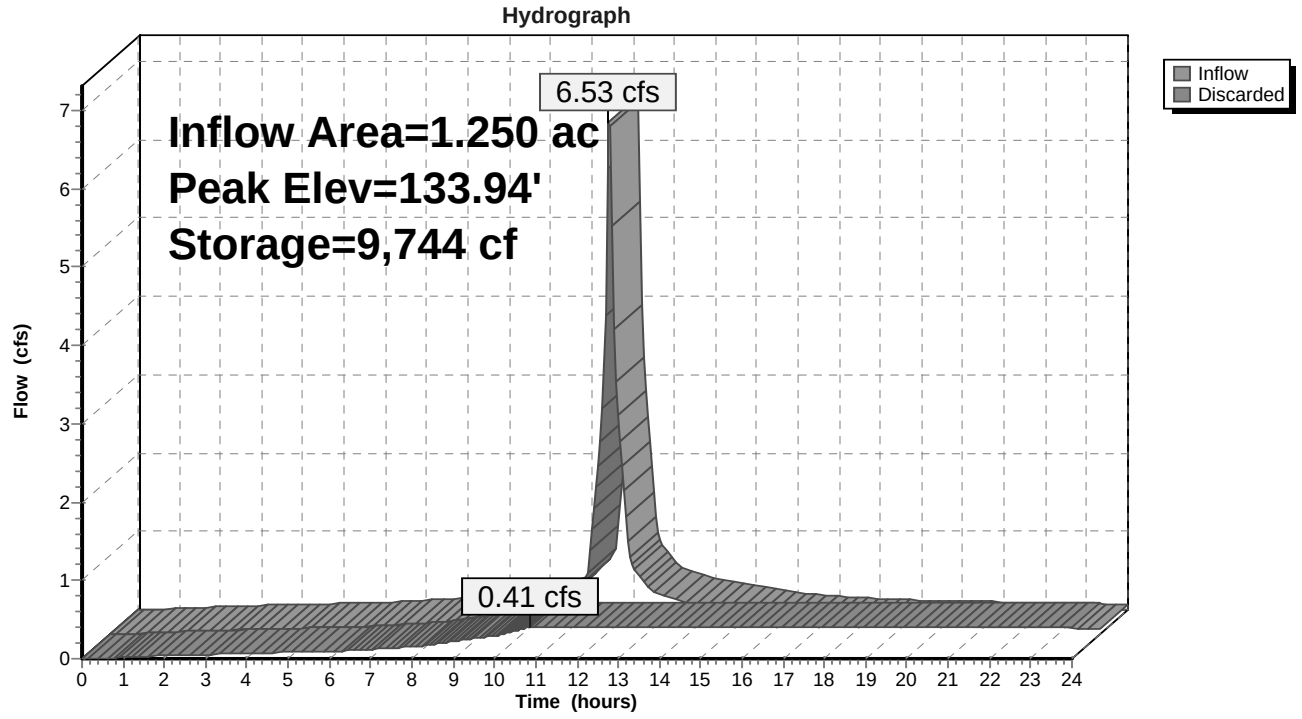
Plug-Flow detention time= 196.1 min calculated for 0.547 af (97% of inflow)
Center-of-Mass det. time= 177.0 min (935.0 - 758.0)

Volume	Invert	Avail.Storage	Storage Description
#1	127.00'	2,788 cf	**46.00'W x 46.00'L x 8.00'H Prismatoid** 16,928 cf Overall - 7,634 cf Embedded = 9,294 cf x 30.0% Voids
#2	128.00'	7,634 cf	**72.0" Round Pipe Storage** Inside #1 L= 270.0'
		10,422 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	127.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.41 cfs @ 10.85 hrs HW=127.08' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.41 cfs)

Pond SIS-10:



Summary for Pond SIS-2:

Inflow Area = 1.380 ac, 39.13% Impervious, Inflow Depth > 4.13" for 100-Year event
Inflow = 5.40 cfs @ 12.09 hrs, Volume= 0.475 af
Outflow = 0.34 cfs @ 11.15 hrs, Volume= 0.449 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.34 cfs @ 11.15 hrs, Volume= 0.449 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 148.57' @ 14.31 hrs Surf.Area= 1,776 sf Storage= 8,124 cf

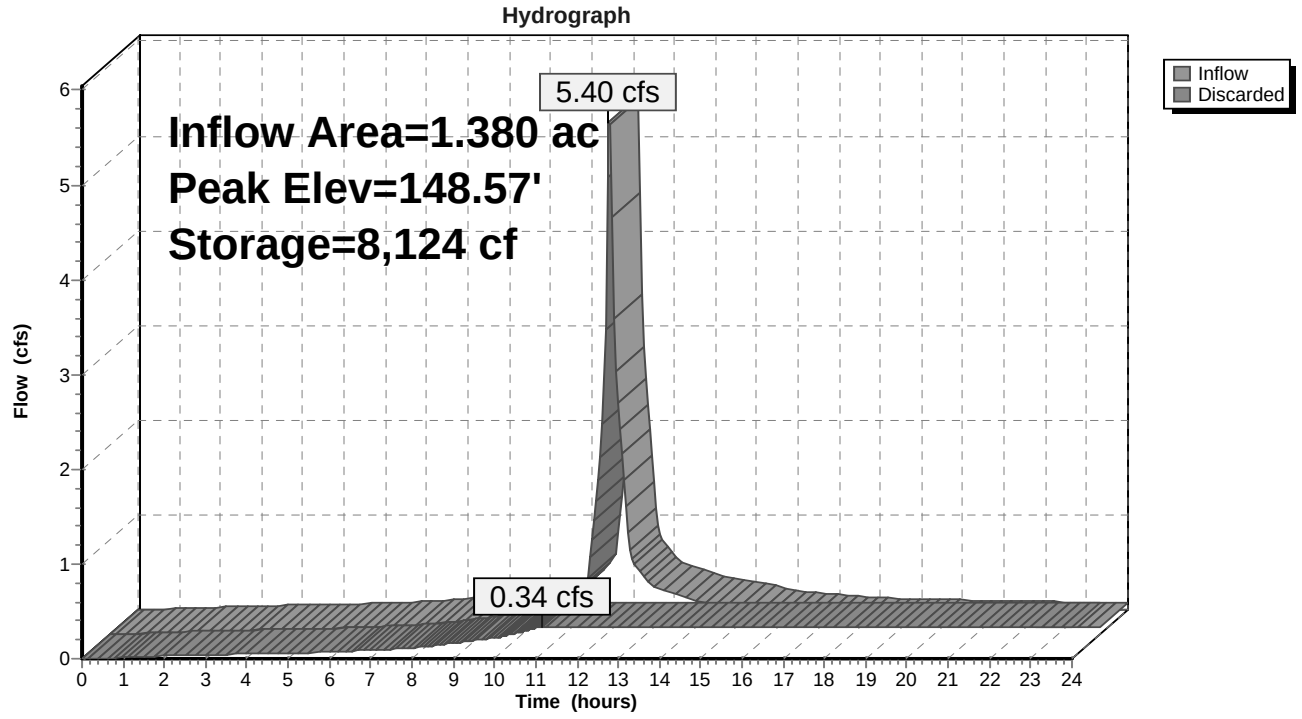
Plug-Flow detention time= 203.0 min calculated for 0.449 af (95% of inflow)
Center-of-Mass det. time= 171.1 min (945.0 - 773.9)

Volume	Invert	Avail.Storage	Storage Description
#1	141.50'	2,396 cf	**8.00'W x 222.00'L x 8.00'H Prismatoid** 14,208 cf Overall - 6,220 cf Embedded = 7,988 cf x 30.0% Voids
#2	142.50'	6,220 cf	**72.0" Round Pipe Storage** Inside #1 L= 220.0'
		8,617 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	141.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.34 cfs @ 11.15 hrs HW=141.59' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.34 cfs)

Pond SIS-2:



Summary for Pond SIS-3:

Inflow Area = 5.290 ac, 51.98% Impervious, Inflow Depth > 5.02" for 100-Year event
Inflow = 25.52 cfs @ 12.09 hrs, Volume= 2.214 af
Outflow = 1.44 cfs @ 10.65 hrs, Volume= 1.965 af, Atten= 94%, Lag= 0.0 min
Discarded = 1.44 cfs @ 10.65 hrs, Volume= 1.965 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 148.50' @ 14.43 hrs Surf.Area= 7,504 sf Storage= 40,095 cf

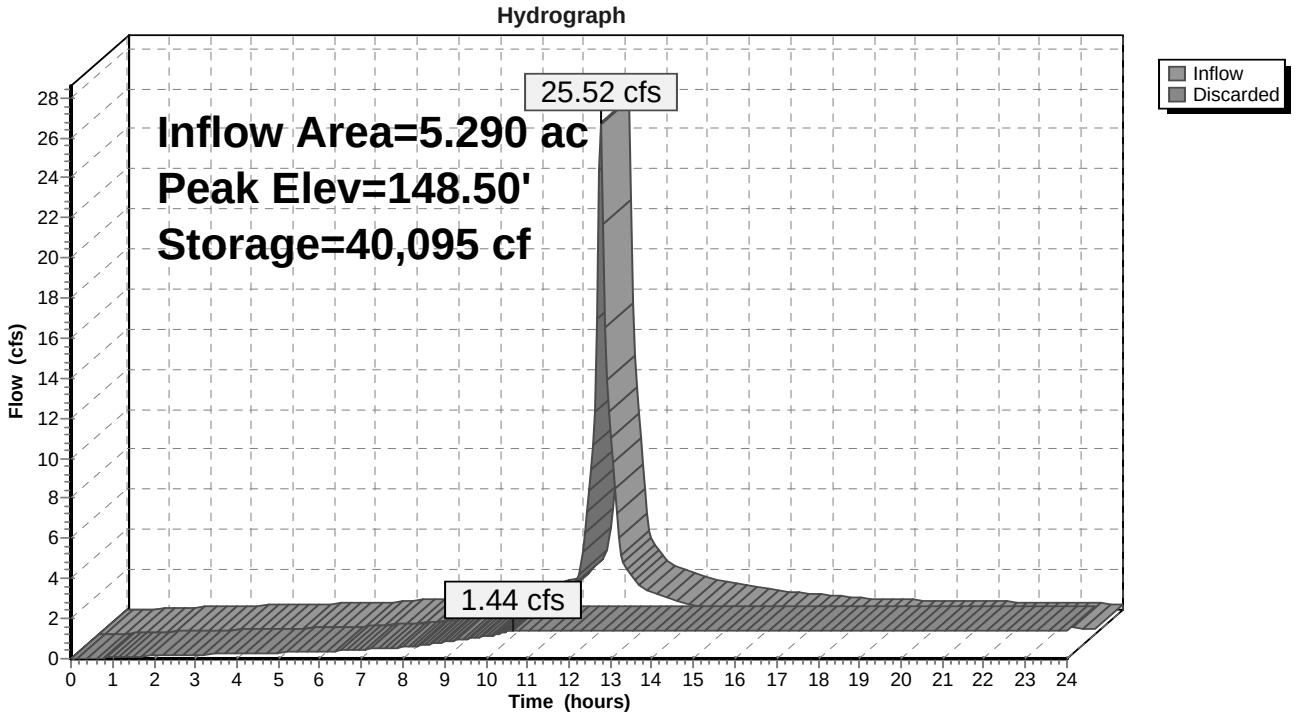
Plug-Flow detention time= 223.2 min calculated for 1.965 af (89% of inflow)
Center-of-Mass det. time= 166.8 min (928.7 - 761.9)

Volume	Invert	Avail.Storage	Storage Description
#1	140.50'	13,291 cf	**56.00'W x 134.00'L x 8.00'H Prismatoid** 60,032 cf Overall - 26,804 cf Embedded = 33,228 cf x 40.0% Voids
#2	141.50'	26,804 cf	**72.0" Round Pipe Storage** Inside #1 L= 948.0'
		40,095 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=1.44 cfs @ 10.65 hrs HW=140.58' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.44 cfs)

Pond SIS-3:



Summary for Pond SIS-4:

Inflow Area = 1.330 ac, 66.92% Impervious, Inflow Depth > 6.06" for 100-Year event
Inflow = 7.83 cfs @ 12.09 hrs, Volume= 0.672 af
Outflow = 0.44 cfs @ 10.55 hrs, Volume= 0.609 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.44 cfs @ 10.55 hrs, Volume= 0.609 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 152.94' @ 14.14 hrs Surf.Area= 2,304 sf Storage= 12,203 cf

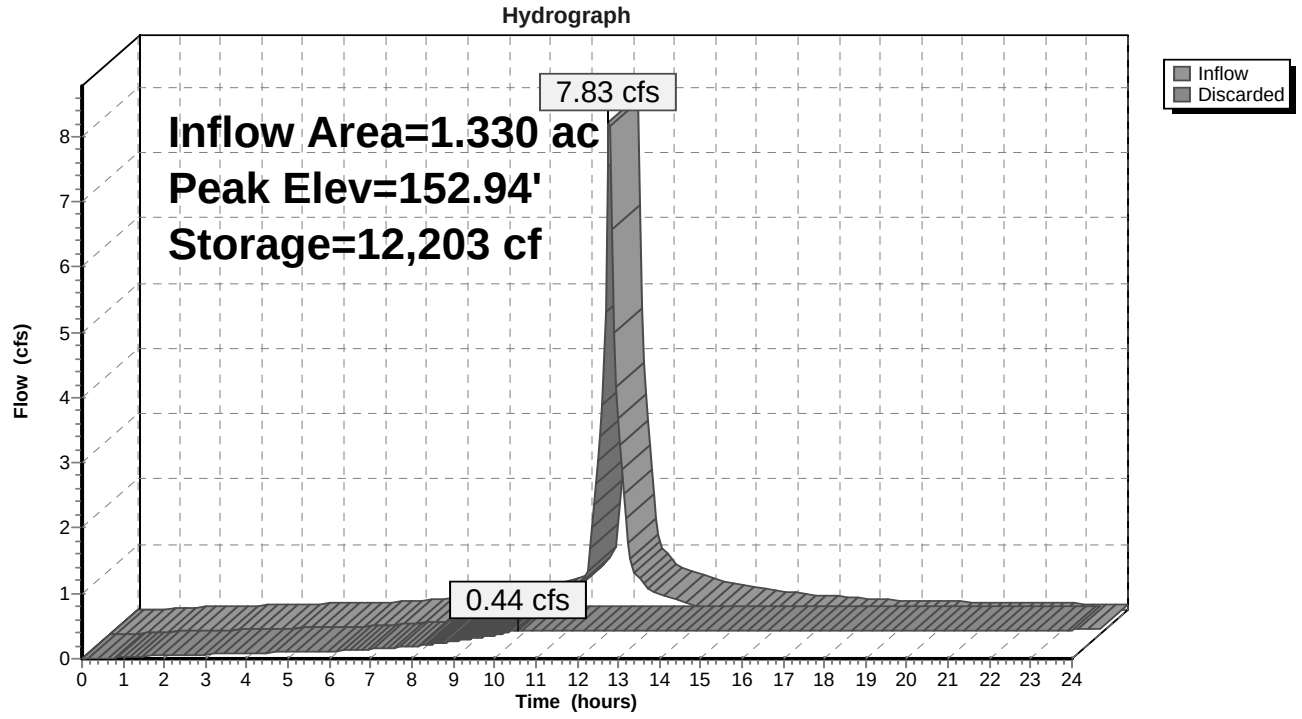
Plug-Flow detention time= 219.9 min calculated for 0.609 af (91% of inflow)
Center-of-Mass det. time= 171.5 min (924.0 - 752.5)

Volume	Invert	Avail.Storage	Storage Description
#1	145.00'	4,116 cf	**16.00'W x 144.00'L x 8.00'H Prismatoid** 18,432 cf Overall - 8,143 cf Embedded = 10,289 cf x 40.0% Voids
#2	146.00'	8,143 cf	**72.0" Round Pipe Storage** Inside #1 L= 288.0'
		12,259 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	145.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.44 cfs @ 10.55 hrs HW=145.08' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.44 cfs)

Pond SIS-4:



Summary for Pond SIS-5:

Inflow Area = 0.590 ac, 47.46% Impervious, Inflow Depth > 4.71" for 100-Year event
Inflow = 2.66 cfs @ 12.09 hrs, Volume= 0.232 af
Outflow = 0.17 cfs @ 10.95 hrs, Volume= 0.221 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.17 cfs @ 10.95 hrs, Volume= 0.221 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 144.12' @ 14.12 hrs Surf.Area= 864 sf Storage= 3,983 cf

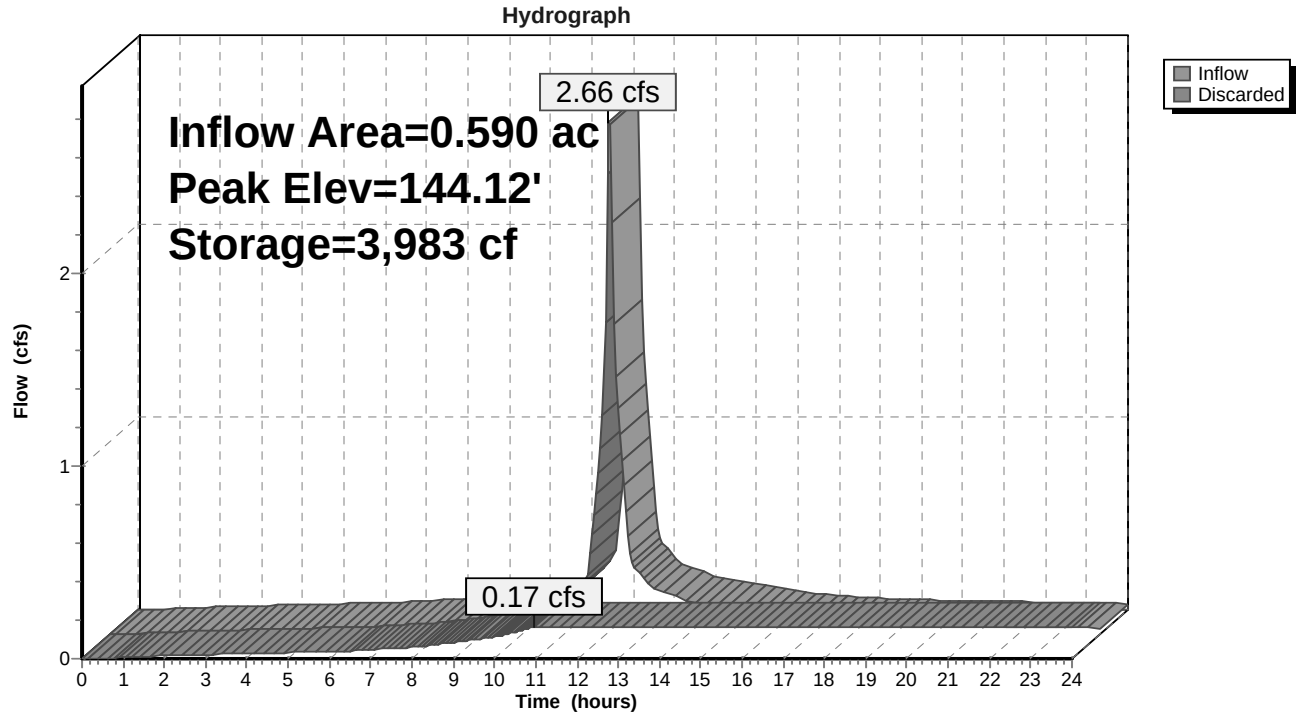
Plug-Flow detention time= 200.6 min calculated for 0.221 af (95% of inflow)
Center-of-Mass det. time= 173.7 min (939.3 - 765.6)

Volume	Invert	Avail.Storage	Storage Description
#1	137.00'	1,158 cf	**16.00'W x 54.00'L x 8.00'H Prismatoid** 6,912 cf Overall - 3,054 cf Embedded = 3,858 cf x 30.0% Voids
#2	138.00'	3,054 cf	**72.0" Round Pipe Storage** Inside #1 L= 108.0'
		4,211 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	137.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.17 cfs @ 10.95 hrs HW=137.08' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.17 cfs)

Pond SIS-5:



Summary for Pond SIS-6:

Inflow Area = 1.330 ac, 62.41% Impervious, Inflow Depth > 5.75" for 100-Year event
Inflow = 7.40 cfs @ 12.09 hrs, Volume= 0.637 af
Outflow = 0.68 cfs @ 13.03 hrs, Volume= 0.568 af, Atten= 91%, Lag= 56.4 min
Discarded = 0.68 cfs @ 13.03 hrs, Volume= 0.568 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 144.95' @ 13.03 hrs Surf.Area= 3,532 sf Storage= 11,110 cf

Plug-Flow detention time= 193.5 min calculated for 0.567 af (89% of inflow)
Center-of-Mass det. time= 139.8 min (894.8 - 755.0)

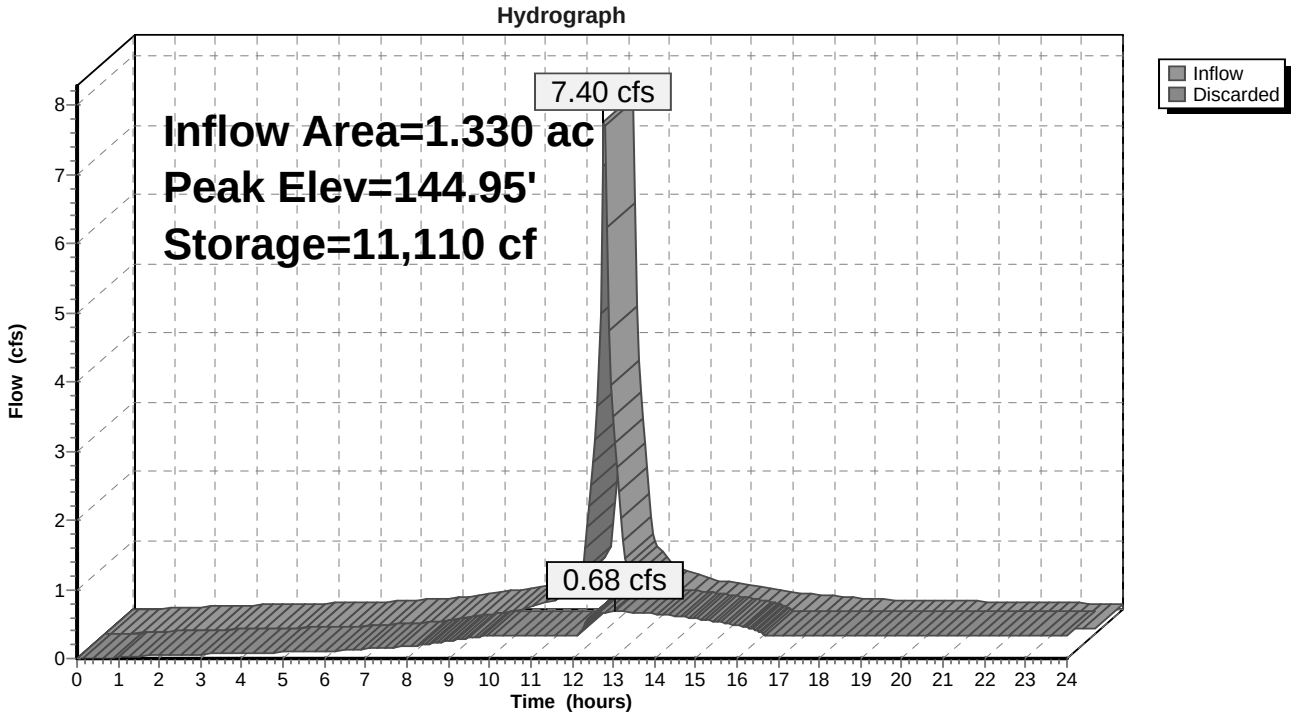
Volume	Invert	Avail.Storage	Storage Description
#1	132.00'	2,281 cf	**32.00'W x 54.00'L x 8.00'H Prismatoid** 13,824 cf Overall - 6,220 cf Embedded = 7,604 cf x 30.0% Voids
#2	133.00'	6,220 cf	**72.0" Round Pipe Storage** Inside #1 L= 220.0'
#3	142.00'	4,855 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		13,356 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
142.00	0	0	0
144.00	1,185	1,185	1,185
146.00	2,485	3,670	4,855

Device	Routing	Invert	Outlet Devices
#1	Discarded	132.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.68 cfs @ 13.03 hrs HW=144.95' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.68 cfs)

Pond SIS-6:


Hydrograph
Inflow Area=1.330 ac
Peak Elev=144.95'
Storage=11,110 cf
7.40 cfs
0.68 cfs
Inflow
Discarded
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

Summary for Pond SIS-7:

Inflow Area = 1.110 ac, 44.14% Impervious, Inflow Depth > 4.48" for 100-Year event
Inflow = 4.74 cfs @ 12.09 hrs, Volume= 0.414 af
Outflow = 0.29 cfs @ 10.95 hrs, Volume= 0.384 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.29 cfs @ 10.95 hrs, Volume= 0.384 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 139.44' @ 14.33 hrs Surf.Area= 1,496 sf Storage= 7,225 cf

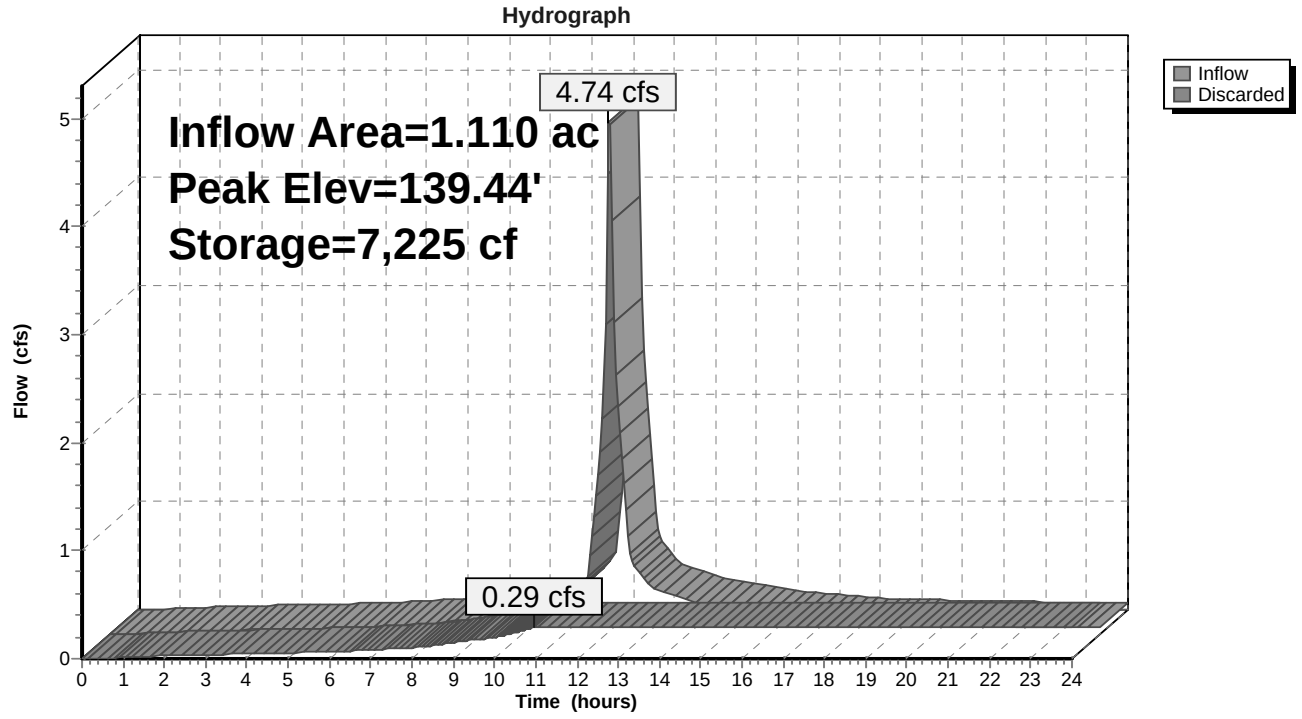
Plug-Flow detention time= 210.6 min calculated for 0.383 af (92% of inflow)
Center-of-Mass det. time= 169.8 min (938.4 - 768.6)

Volume	Invert	Avail.Storage	Storage Description
#1	131.50'	2,021 cf	**8.00'W x 187.00'L x 8.00'H Prismatoid** 11,968 cf Overall - 5,231 cf Embedded = 6,737 cf x 30.0% Voids
#2	132.50'	5,231 cf	**72.0" Round Pipe Storage** Inside #1 L= 185.0'
		7,252 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	131.50'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.29 cfs @ 10.95 hrs HW=131.58' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.29 cfs)

Pond SIS-7:



Summary for Pond SIS-8:

Inflow Area = 0.220 ac, 63.64% Impervious, Inflow Depth > 5.83" for 100-Year event
Inflow = 1.24 cfs @ 12.09 hrs, Volume= 0.107 af
Outflow = 0.14 cfs @ 11.60 hrs, Volume= 0.107 af, Atten= 89%, Lag= 0.0 min
Discarded = 0.14 cfs @ 11.60 hrs, Volume= 0.107 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 130.41' @ 12.82 hrs Surf.Area= 732 sf Storage= 1,413 cf

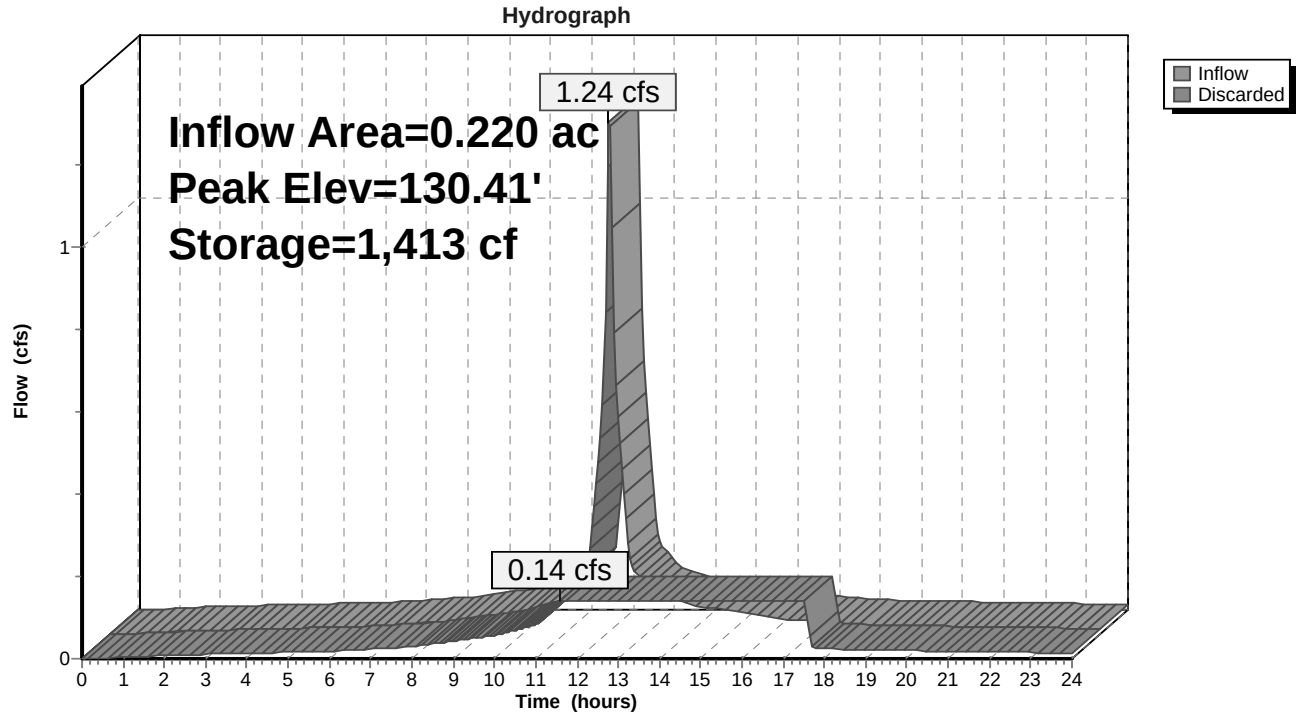
Plug-Flow detention time= 65.4 min calculated for 0.107 af (100% of inflow)
Center-of-Mass det. time= 65.1 min (819.4 - 754.3)

Volume	Invert	Avail.Storage	Storage Description
#1	127.00'	865 cf	**6.00'W x 122.00'L x 6.00'H Prismatoid** 4,392 cf Overall - 1,508 cf Embedded = 2,884 cf x 30.0% Voids
#2	128.00'	1,508 cf	**48.0" Round Pipe Storage** Inside #1 L= 120.0'
		2,373 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	127.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.14 cfs @ 11.60 hrs HW=127.07' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.14 cfs)

Pond SIS-8:



Summary for Pond SIS-9:

Inflow Area = 2.300 ac, 77.39% Impervious, Inflow Depth > 6.79" for 100-Year event
Inflow = 15.26 cfs @ 12.09 hrs, Volume= 1.301 af
Outflow = 0.91 cfs @ 10.60 hrs, Volume= 1.252 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.91 cfs @ 10.60 hrs, Volume= 1.252 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 133.56' @ 13.90 hrs Surf.Area= 4,761 sf Storage= 23,028 cf

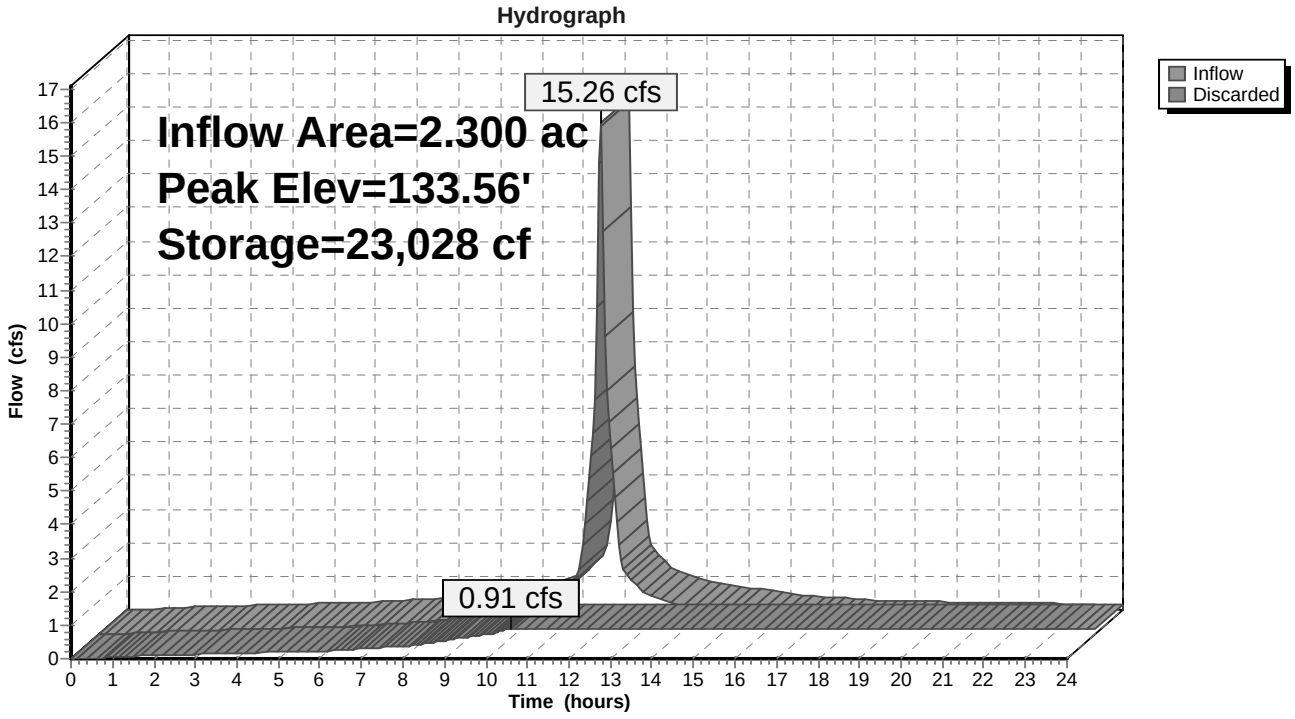
Plug-Flow detention time= 201.9 min calculated for 1.249 af (96% of inflow)
Center-of-Mass det. time= 179.0 min (926.6 - 747.6)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	6,184 cf	**69.00'W x 69.00'L x 8.00'H Prismatoid** 38,088 cf Overall - 17,474 cf Embedded = 20,614 cf x 30.0% Voids
#2	127.00'	17,474 cf	**72.0" Round Pipe Storage** Inside #1 L= 618.0'
		23,658 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	126.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.91 cfs @ 10.60 hrs HW=126.08' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.91 cfs)

Pond SIS-9:

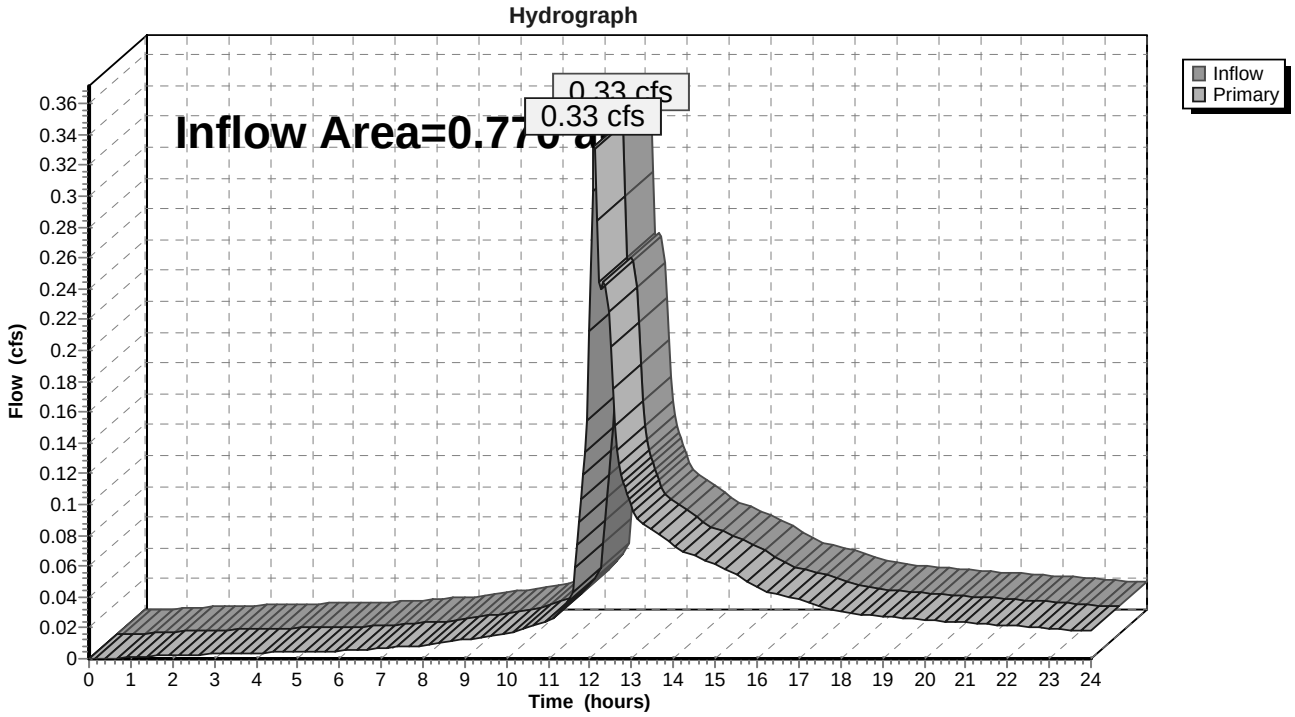


Summary for Link POA-1:

Inflow Area = 0.770 ac, 5.19% Impervious, Inflow Depth > 0.97" for 100-Year event
Inflow = 0.33 cfs @ 12.09 hrs, Volume= 0.062 af
Primary = 0.33 cfs @ 12.09 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-1:

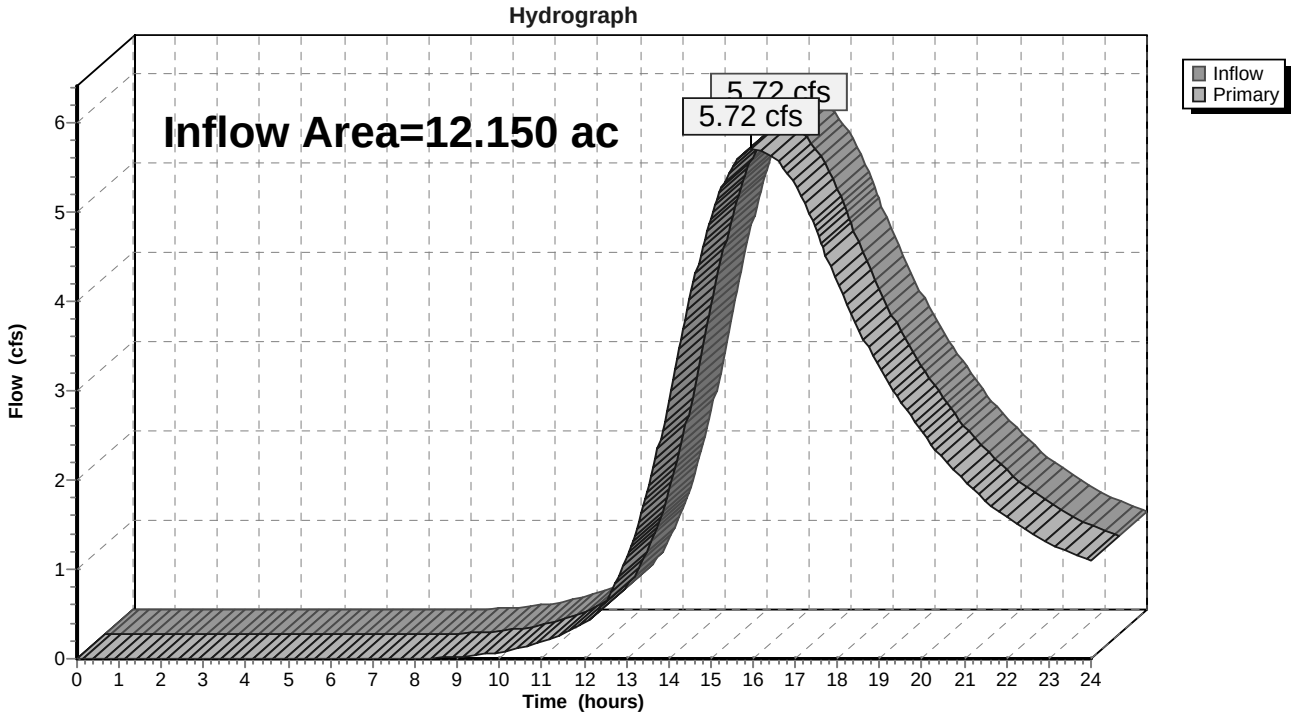


Summary for Link POA-2:

Inflow Area = 12.150 ac, 0.00% Impervious, Inflow Depth > 2.95" for 100-Year event
Inflow = 5.72 cfs @ 15.95 hrs, Volume= 2.982 af
Primary = 5.72 cfs @ 15.95 hrs, Volume= 2.982 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-2:

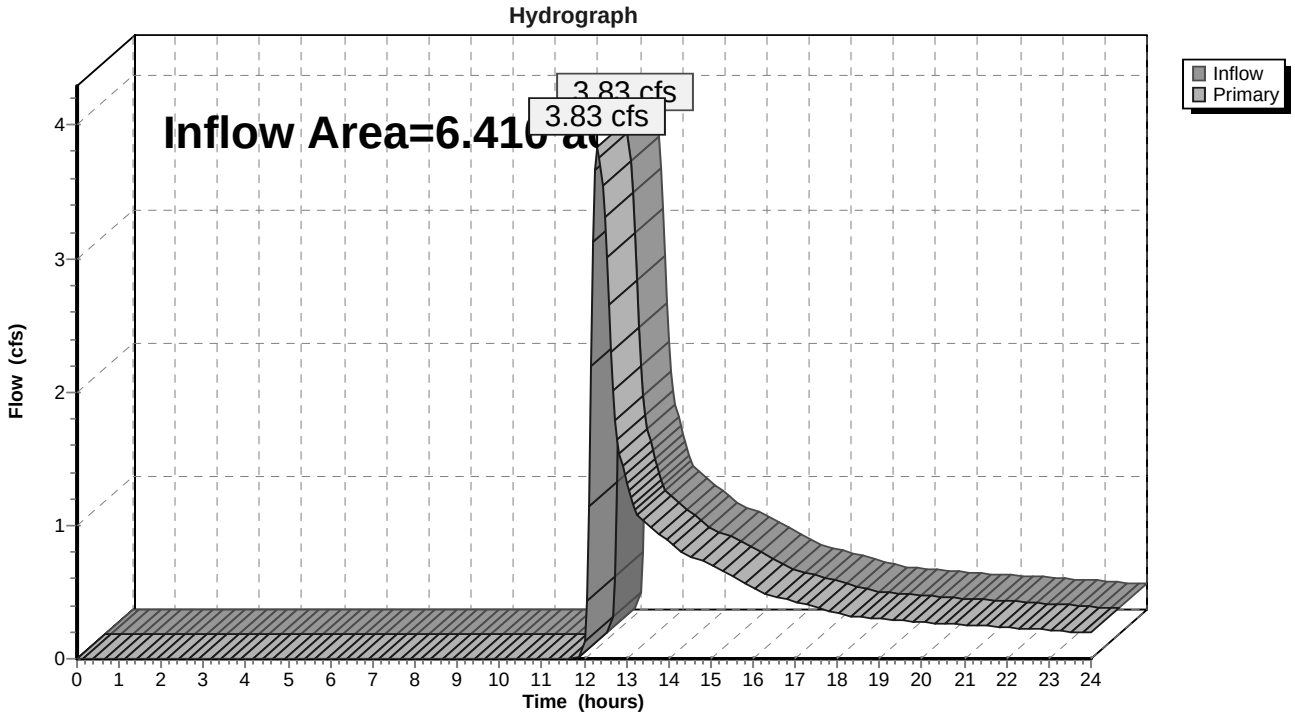


Summary for Link POA-3:

Inflow Area = 6.410 ac, 0.00% Impervious, Inflow Depth > 1.11" for 100-Year event
Inflow = 3.83 cfs @ 12.32 hrs, Volume= 0.594 af
Primary = 3.83 cfs @ 12.32 hrs, Volume= 0.594 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-3:

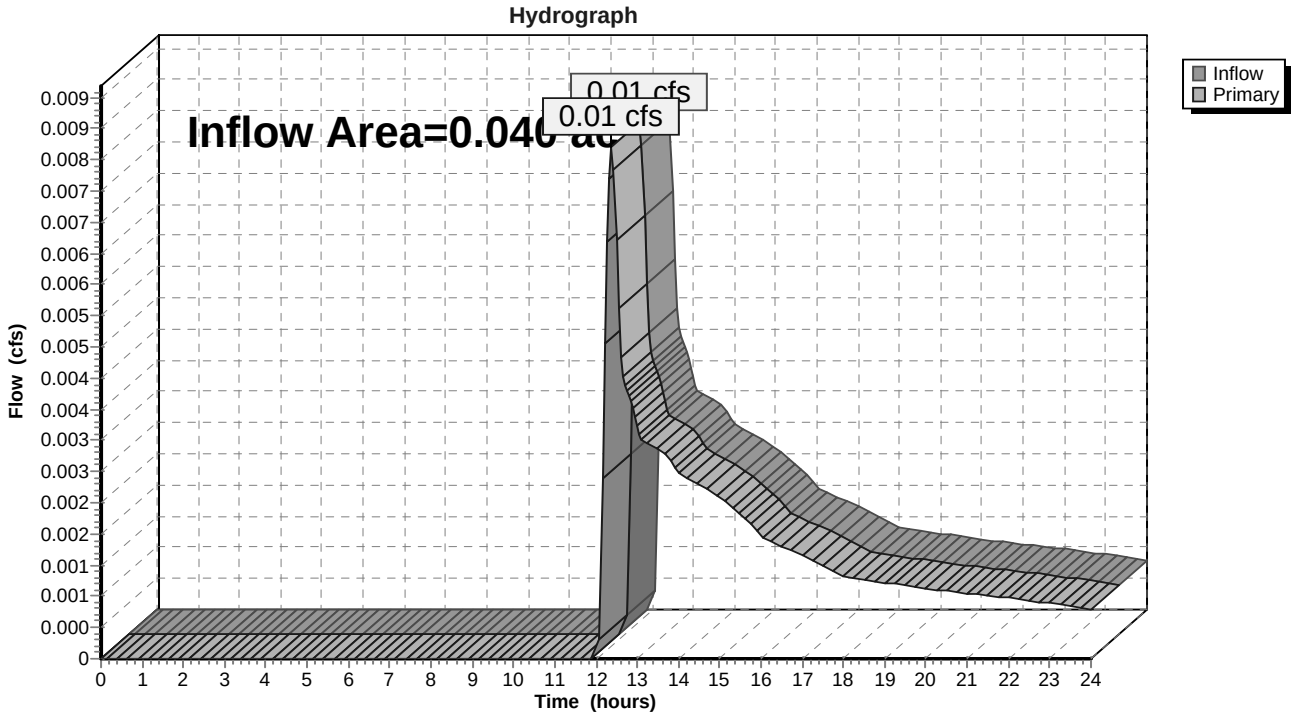


Summary for Link POA-4:

Inflow Area = 0.040 ac, 0.00% Impervious, Inflow Depth > 0.57" for 100-Year event
Inflow = 0.01 cfs @ 12.37 hrs, Volume= 0.002 af
Primary = 0.01 cfs @ 12.37 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link POA-4:



Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Sudbury
Owner Name

278 Old Sudbury Road — C12/0100
Street Address — Map/Lot #

Sudbury — Massachusetts — 01776
City — State — Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS - Middlesex County (Source) 254B (Soil Map Unit)

Merrimac (Soil Name) None (Soil Limitations)

Sand and Gravel, Outwash (Geologic/Parent Material) Kame (Landform)

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 1977/Ward S Motts (Year Published/Source) 1" = 2000' (Publication Scale) QKD (Map Unit)

4. Flood Rate Insurance Map

Above the 500-year flood boundary? ☒ Yes ☐ No
If Yes, continue to #5.

Within the 100-year flood boundary? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No

MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): July/2019 (Month/Year) Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed: None

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-201 | 7/1/2019 (Date) | 8:30 AM (Time) | Sunny (Weather)

1. Location

   Ground Elevation at Surface of Hole: 161.6 feet Latitude/Longitude: 42-25-12 / 71-23-17

   Description of Location: On slope

2. Land Use: Former gravel pit (e.g., woodland, agricultural field, vacant lot, etc.) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 38.5 (Slope (%))

   Brush (Vegetation) | Kame delta (Landform) | FS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from:

Open Water Body	>100 ft	Drainage Way	>100 ft	Wetlands	>100 ft
Property Line	>100 ft	Drinking Water Well	>100 ft	Other	

   (feet)

4. Parent Material: Outwash Unsuitable Materials Present: ☒ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

   Estimated Depth to High Groundwater: N/A inches N/A elevation

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-201

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	A (fill)	10YR3/4				Loamy Sand			Massive	Loose	Fine/Fill
12-60	BW1 (fill)	2.5Y6/3				Loamy Sand			Small Grain	Loose	Fine/Fill
60-156	C1	2.5Y6/3				Sand			Small Grain	Loose	Fine/Med

Additional Notes:

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-202 | 7/1/2019 (Date) | 9:22 AM (Time) | Sunny (Weather)

1. Location

   Ground Elevation at Surface of Hole: 154.7 feet Latitude/Longitude: 42-25-12 / 71-23-16

2. Land Use: Former gravel pit (e.g., woodland, agricultural field, vacant lot, etc.) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 4.8 (Slope (%))

   Brush (Vegetation) | Kame Delta (Landform) | FS (Position on Landscape (SU, SH, BS, FS,

3. Distances from:

Open Water Body	>100 ft feet	Drainage Way	>100 ft feet	Wetlands	>100 ft feet
Property Line	>100 ft feet	Drinking Water Well	>100 ft feet	Other	feet

4. Parent Material: Outwash Unsuitable Materials Present: ☒ Yes ☐ No

   If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

   Estimated Depth to High Groundwater: N/A inches | N/A elevation

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-202

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			
0-66	C1 (fill)	2.5Y6/4				Sand			Massive	V. Friable	Fine/Fill
66-156	C1	2.5Y6/4				Loamy Sand			Massive	V. Friable	Fine/Med

Additional Notes:

Soil sample collected at 156 inches.

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-203 | 7/1/2019 (Date) | 10:00 AM (Time) | Sunny (Weather)

1. Location

   Ground Elevation at Surface of Hole: 158.2 feet Latitude/Longitude: 42-25-13 / 71-23-16

   Description of Location: On slope

2. Land Use: Former gravel pit (e.g., woodland, agricultural field, vacant lot, etc.) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 10.6 (Slope (%))

   Brush (Vegetation) | Kame delta (Landform) | FS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from:

Open Water Body	>100 ft feet	Drainage Way	>100 ft feet	Wetlands	>100 ft feet
Property Line	>100 ft feet	Drinking Water Well	>100 ft feet	Other	feet

4. Parent Material: Outwash Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☐ No If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

   Estimated Depth to High Groundwater: N/A inches N/A elevation

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-203

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			
0-156	C1	2.5Y6/3	42	10YR6/8 10YR5/1	2	Sand			S. Grain	Loose	Fine/ Med

Additional Notes:

Few pockets of fine silt-loam 36 to 42 inches on west side of pit.

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-204 | 7/1/2019 (Date) | 11:00 AM (Time) | Sunny (Weather)

1. Location

   Ground Elevation at Surface of Hole: 158.1 feet Latitude/Longitude: 42-25-14 / 71-23-16

2. Land Use: Former gravel pit (e.g., woodland, agricultural field, vacant lot, etc.) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 7.8 (Slope (%))

   Brush (Vegetation) | Kame Delta (Landform) | FS (Position on Landscape (SU, SH, BS, FS,

3. Distances from:

Open Water Body	>100 ft feet	Drainage Way	>100 ft feet	Wetlands	>100 ft feet
Property Line	>100 ft feet	Drinking Water Well	>100 ft feet	Other	feet

4. Parent Material: Outwash Unsuitable Materials Present: ☒ Yes ☐ No

   If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

   Estimated Depth to High Groundwater: N/A inches | N/A elevation

Commonwealth of Massachusetts
City/Town of Sudbury
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-204

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			
0-60	1C1 (fill)	2.5Y5/3				Loamy Sand			S. Grain	V. Friable	Fine/Fill
60-72	A	2.5Y3/3				Loamy Sand			S. Grain	V. Friable	Fine
72-168	2C1	2.5Y3/3	168	10YR6/8 10YR7/1	<5	Sand			S. Grain	Loose	Medium
168-192	2C2	10YR5/2				Sandy Loam			Massive	V. Friable	Fine

Additional Notes:

Pocket of fine sandy loam at 144 inches.

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-205 | 7/1/2019 (Date) | 12:15 PM (Time) | Sunny (Weather)

1. Location

Ground Elevation at Surface of Hole: 172.9 feet Latitude/Longitude: 42-25-14 / 71-23-16

Description of Location: On slope

2. Land Use: Former gravel pit (e.g., woodland, agricultural field, vacant lot, etc.) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2.6 (Slope (%))

Brush (Vegetation) | Kame delta (Landform) | SU (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from:

Open Water Body	>100 ft feet	Drainage Way	>100 ft feet	Wetlands	>100 ft feet
Property Line	>100 ft feet	Drinking Water Well	>100 ft feet	Other	feet

4. Parent Material: Outwash Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

Estimated Depth to High Groundwater: N/A inches N/A elevation

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-205

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			
0-48	1C1 (fill)	2.5Y5/3				Sand			S. Grain	V. Friable	Fine/Fill
48-168	2C1	2.5Y6/3	166	10YR6/8	<5	Sand			S. Grain	Loose	Fine/Med.

Additional Notes:

Possible mottles at 14 feet.

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-206 | 7/1/2019 (Date) | 1:30 PM (Time) | Sunny (Weather)

1. Location

   Ground Elevation at Surface of Hole: 178.3 feet Latitude/Longitude: 42-25-14 / 71-23-15

2. Land Use: Former gravel pit (e.g., woodland, agricultural field, vacant lot, etc.) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0.0 (Slope (%))

   Brush (Vegetation) | Kame Delta (Landform) | SU (Position on Landscape (SU, SH, BS, FS,

3. Distances from:

Open Water Body	>100 ft feet	Drainage Way	>100 ft feet	Wetlands	>100 ft feet
Property Line	>100 ft feet	Drinking Water Well	>100 ft feet	Other	feet

4. Parent Material: Outwash Unsuitable Materials Present: ☒ Yes ☐ No

   If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

   Estimated Depth to High Groundwater: N/A inches | N/A elevation

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-206

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			
0-48	1C1 (fill)	10YR5/4				Loamy Sand			S. Grain	V. Friable	Fine/Fill
48-96	2C1	10YR4/5				Sand	10	5	S. Grain	Loose	Fine, Med, Coar, Stra
96-156	2C2	10YR6/3	156	10YR6/8	<5	Sand			S. Grain	Loose	Fine

Additional Notes:

Stratified fine/coarse lenses from 48 to 96 inches. Possible mottles at 156 inches.

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-207 | 7/1/2019 (Date) | 2:30 PM (Time) | Sunny (Weather)

1. Location

Ground Elevation at Surface of Hole: 136.4 feet Latitude/Longitude: 42-25-12 / 71-23-15

Description of Location: On slope

2. Land Use: Former gravel pit (e.g., woodland, agricultural field, vacant lot, etc.) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 4.1 (Slope (%))

Brush (Vegetation) | Kame delta (Landform) | TS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from:

Open Water Body	>100 ft feet	Drainage Way	>100 ft feet	Wetlands	>100 ft feet
Property Line	>100 ft feet	Drinking Water Well	>100 ft feet	Other	feet

4. Parent Material: Outwash Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

Estimated Depth to High Groundwater: N/A inches N/A elevation

Commonwealth of Massachusetts
City/Town of Sudbury
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-207

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 (fill)	2.5Y6/4				Sand			S. Grain	loose	Fine/Fill
24-36	A	2.5Y4/3				Loamy Sand			S. Grain	loose	Fine
36-156	2C1	10YR6/2				Sand			S. Grain	loose	Med, Coa, Stratified

Additional Notes:

Possible fill extends to 9 feet on Southern side of pit.

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-208 | 7/2/2019 (Date) | 9:00 AM (Time) | Sunny/Partly Cloudy (Weather)

1. Location

Ground Elevation at Surface of Hole: 158.7 feet Latitude/Longitude: 42-25-13 / 71-23-15

2. Land Use: Former gravel pit (e.g., woodland, agricultural field, vacant lot, etc.) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 25.0 (Slope (%))

Brush (Vegetation) | Kame Delta (Landform) | BS (Position on Landscape (SU, SH, BS, FS,

3. Distances from:

Open Water Body	>100 ft feet	Drainage Way	>100 ft feet	Wetlands	>100 ft feet
Property Line	>100 ft feet	Drinking Water Well	>100 ft feet	Other	feet

4. Parent Material: Outwash Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

Estimated Depth to High Groundwater: N/A inches | N/A elevation

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-208

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			
0-204	A (fill)	10YR3/3				Sandy Loam			Massive	Loose	Rts to 144" Comm/Fill

Additional Notes:

Unsuitable material. No original material observed (all fill).

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-209 | 7/2/2019 (Date) | 9:30 AM (Time) | Sunny/Partly Cloudy (Weather)

1. Location

   Ground Elevation at Surface of Hole: 152.5 feet Latitude/Longitude: 42-25-13 / 71-23-15

   Description of Location: On slope

2. Land Use: Former gravel pit (e.g., woodland, agricultural field, vacant lot, etc.) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 11.8 (Slope (%))

   Brush (Vegetation) | Kame delta (Landform) | FS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from:

Open Water Body	>100 ft	Drainage Way	>100 ft	Wetlands	>100 ft
Property Line	>100 ft	Drinking Water Well	>100 ft	Other	

   (feet)

4. Parent Material: Outwash Unsuitable Materials Present: ☒ Yes ☐ No

   If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

   Estimated Depth to High Groundwater: N/A inches N/A elevation

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-209

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			
0-180	A (fill)	10YR3/3				Sandy Loam			Massive	V. Friable	Rts to 120" Fine/Fill
180-192	C1	2.5Y6/3				Sand			S. Grain	V. Friable	Medium

Additional Notes:

Unsuitable due to excessive fill

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-210 | 7/2/2019 (Date) | 11:00 AM (Time) | Sunny/Partly Cloudy (Weather)

1. Location

Ground Elevation at Surface of Hole: 172.1 feet Latitude/Longitude: 42-25-14 / 71-23-15

2. Land Use: Former gravel pit (e.g., woodland, agricultural field, vacant lot, etc.) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 10.4 (Slope (%))

Brush (Vegetation) | Kame Delta (Landform) | SH (Position on Landscape (SU, SH, BS, FS,

3. Distances from:

Open Water Body	>100 ft feet	Drainage Way	>100 ft feet	Wetlands	>100 ft feet
Property Line	>100 ft feet	Drinking Water Well	>100 ft feet	Other	feet

4. Parent Material: Outwash Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

Estimated Depth to High Groundwater: N/A inches | N/A elevation

Commonwealth of Massachusetts
City/Town of Sudbury
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-210

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	Ap	10YR3/2				Loamy Sand			Massive	Friable	Fine
12-30	BW1	10YR6/8				Loamy Sand			Massive	Friable	Fine
30-48	C1	10YR6/4				Loamy Sand			Massive	Firm	Fine
48-60	C2	10YR6/2	60	10YR6/8 10YR6/1	5	Loamy Sand			Massive	Firm	Fine
60-156	C3	10YR5/6				Loamy Sand			Massive	Firm	Fine/Med.

Additional Notes:

Estimated seasonal high water table not based on mottles (55 feet to groundwater in MW-7).

No fill encountered

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-211 | 7/2/2019 (Date) | 12:00 PM (Time) | Sunny/Partly Cloudy (Weather)

1. Location

   Ground Elevation at Surface of Hole: 174.9 feet Latitude/Longitude: 42-25-14 / 71-23-16

   Description of Location: On slope

2. Land Use: Former gravel pit (e.g., woodland, agricultural field, vacant lot, etc.) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 13.5 (Slope (%))

   Brush (Vegetation) | Kame delta (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from:

Open Water Body	>100 ft feet	Drainage Way	>100 ft feet	Wetlands	>100 ft feet
Property Line	>100 ft feet	Drinking Water Well	>100 ft feet	Other	feet

4. Parent Material: Outwash Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

   Estimated Depth to High Groundwater: N/A inches N/A elevation

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-211

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			
0-120	C1	10YR5/4				Sand			S. Grain	Loose	Fine
120-132	C2	10YR5/2				Sand	5		S. Grain	Loose	Fine/Med.

Additional Notes:

No A and B horizons present.

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-212 | 7/2/2019 (Date) | 1:00 PM (Time) | Sunny/Partly Cloudy (Weather)

1. Location

   Ground Elevation at Surface of Hole: 176.1 feet Latitude/Longitude: 42-25-13 / 71-23-17

2. Land Use: Former gravel pit (e.g., woodland, agricultural field, vacant lot, etc.) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 30.3 (Slope (%))

   Brush (Vegetation) | Kame Delta (Landform) | BS (Position on Landscape (SU, SH, BS, FS,

3. Distances from:

Open Water Body	>100 ft feet	Drainage Way	>100 ft feet	Wetlands	>100 ft feet
Property Line	>100 ft feet	Drinking Water Well	>100 ft feet	Other	feet

4. Parent Material: Outwash Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

   Estimated Depth to High Groundwater: N/A inches | N/A elevation

Commonwealth of Massachusetts
City/Town of Sudbury
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-212

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	Ap	10YR3/2				Loamy Sand			S. Grain	Loose	Fine/Med.
24-156	C1	10YR5/4				Sand			S. Grain	V. Friable	Fine/Med.

Additional Notes:

No B horizon present.

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-213 | 7/2/2019 (Date) | 2:00 PM (Time) | Sunny/Partly Cloudy (Weather)

1. Location

   Ground Elevation at Surface of Hole: 190.8 feet Latitude/Longitude: 42-25-12 / 71-23-18

   Description of Location: On slope

2. Land Use: Former gravel pit (e.g., woodland, agricultural field, vacant lot, etc.) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 26.5 (Slope (%))

   Brush (Vegetation) | Kame delta (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from:

Open Water Body	>100 ft feet	Drainage Way	>100 ft feet	Wetlands	>100 ft feet
Property Line	>100 ft feet	Drinking Water Well	>100 ft feet	Other	feet

4. Parent Material: Outwash Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

   Estimated Depth to High Groundwater: N/A inches N/A elevation

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-213

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			
0-14	Ap	10YR3/2				Loamy Sand			S. Grain	V. Friable	Fine/Med.
14-156	C1	10YR5/4				Sand			S. Grain	V. Friable	Fine/Med.

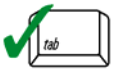
Additional Notes:

No B horizon present.

Commonwealth of Massachusetts
City/Town of Sudbury
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.





A. Site Information

Town of Sudbury
Owner Name

278 Old Sudbury Road
Street Address or Lot #

Sudbury	MA	01776
City/Town	State	Zip Code

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	7/1/2019 Date	10:20 AM Time	7/1/2019 Date	12:27 PM Time
Observation Hole #	PT-203		PT-205	
Depth of Perc	45-63"		33-51"	
Start Pre-Soak	10:20		!2:27	
End Pre-Soak	10:35		12:36	
Time at 12”	10:35			
Time at 9”	10:41		25 gal/9 min	
Time at 6”	10:51			
Time (9”-6”)	10			
Rate (Min./Inch)	4		<2	
	Test Passed: ☒ Test Failed: ☐		Test Passed: ☒ Test Failed: ☐	

Don Provencher
Test Performed By:

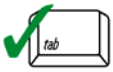
Paul Blain
Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of Sudbury
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.





A. Site Information

Town of Sudbury
Owner Name

278 Old Sudbury Road
Street Address or Lot #

Sudbury	MA	01776
City/Town	State	Zip Code

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	7/2/2019 Date	8:00 AM Time	7/2/2019 Date	11:41 AM Time
Observation Hole #	PT-207		PT-211	
Depth of Perc	30-48"		30-48"	
Start Pre-Soak	8:03		11:41	
End Pre-Soak	8:10		11:56	
Time at 12”	8:10		11:56	
Time at 9”	25 gals / 7 minutes		12:09	
Time at 6”			12:27	
Time (9”-6”)			18	
Rate (Min./Inch)	<2		6	
	Test Passed: ☒ Test Failed: ☐		Test Passed: ☒ Test Failed: ☐	

Don Provencher
Test Performed By:

Paul Blain
Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # _____	Obs. Hole # _____
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☒ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

Acton 158 (Index Well Number) 7/1/2019 (Reading Date)

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

	S_c	S_r	OW_c	OW_{max}	OW_r	S_h
Obs. Hole # _____	N/A	_____	16.85	13.34	5.4	N/A
Obs. Hole # _____	_____	_____	_____	_____	_____	_____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

      ☒ Yes ☐ No

   b. If yes, at what depth was it observed? Upper boundary: 156 inches Lower boundary: 90 inches

   c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Sudbury

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Board of Health Witness

Paul Blain	MassDEP
Name of Board of Health Witness	Board of Health

G. Soil Evaluator Certification

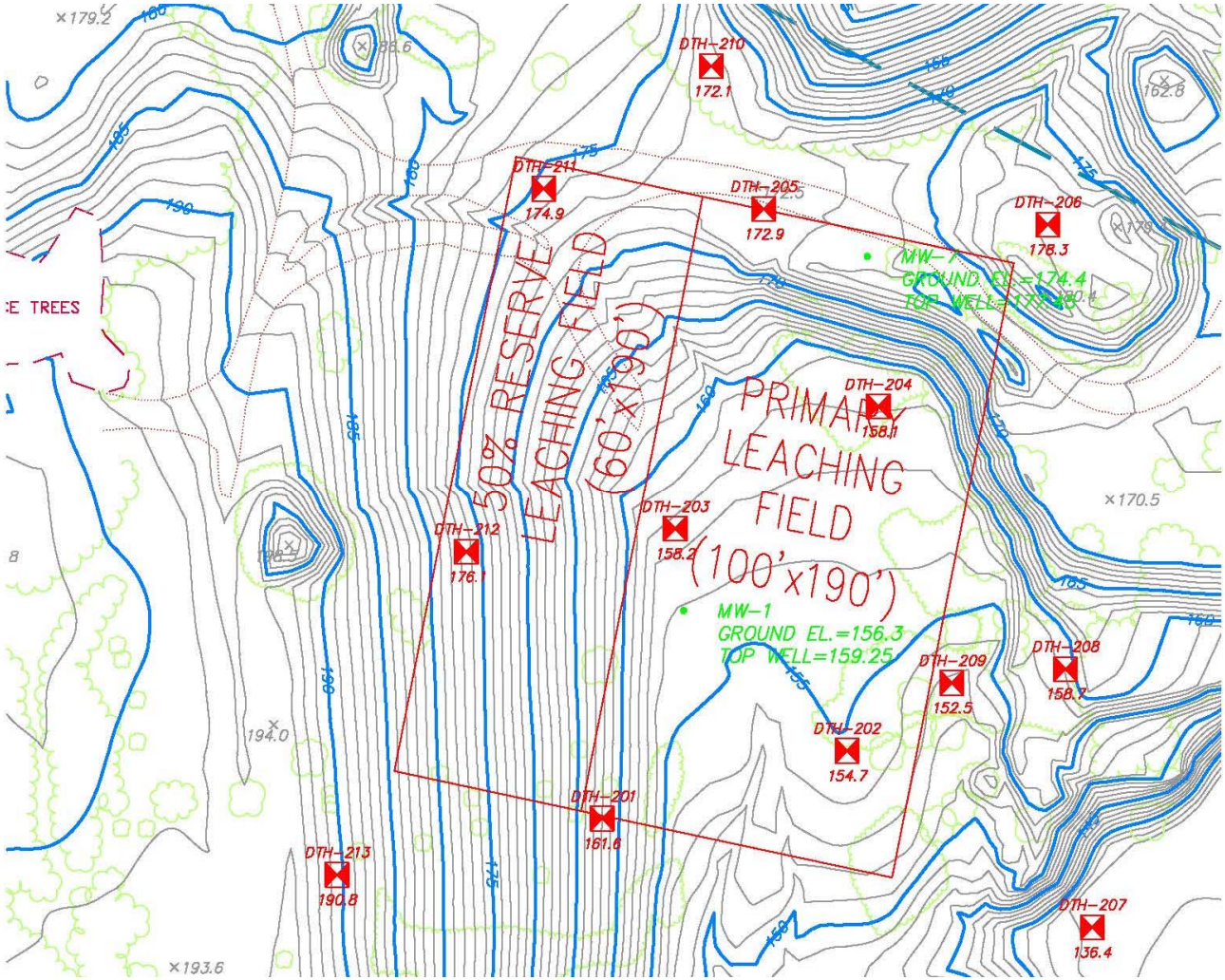
I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

	July 18, 2019
Signature of Soil Evaluator	Date
Donald A. Provencher	6/30/2022
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams

Use this sheet for field diagrams:



HydroCAD® Stormwater Modeling - Since 1986

Modeling Pavement

Standard pavement is usually modeled as a subcatchment with a curve number of 98. You can enter the CN value directly, or select it from the lookup table. The high CN value will cause virtually all of the rainfall to appear as runoff, as determined by the SCS runoff equation.

What about porous pavement?

Before attempting to model porous pavement, you need to evaluate the role of the pavement in your model, and how you expect the pavement to behave. There are three basic scenarios to consider:

1) No surface runoff

Under ideal conditions, porous pavement with a suitable base will accept (infiltrate) many inches of water, so there may be zero "runoff" in the traditional sense. In this case, you actually need to evaluate the "runoff" that is penetrating through the pavement. This requires the use of a high CN value (98) to capture most of the rainfall.

Once intercepted by the pervious surface, the water will take some time to travel through the base layers of the roadway, before ponding in the voids of the stone base. To simulate this behavior:

> (A) Use an extended Tc value to simulate the travel time through the base. This approach has been studied at the UNH Stormwater Center, where a Tc of 790 minutes has produced good predictions of the final discharge from porous pavement with a 41" base (measured above the underdrains). It is believed that a proportional Tc can be used for a smaller base thickness, as long as the layers remain proportional and are in accordance with the UNH specifications.
>
> (B) Route the "runoff" from (A) into a pond which represents storage in base material. Depending on the exact material, voids in the stone can be up to 40%. The "pond" discharge could be through exfiltration into the surrounding soil, and/or specific outlet devices, such as perforated pipe (modeled as a culvert and/or orifice array.)

Using these two steps together will simulate the significant reduction in the peak flow caused by the base material and underdrains.

2) Complete surface runoff

In the worst case, the pavement could be fully blocked with ice or debris, in which case you would be modeling normal surface runoff with a standard CN of 98 and a relatively short Tc, much like standard pavement.

3) Partial runoff

If you expect partial runoff, you'll need to use an appropriate CN value to model the true surface runoff. A suitable CN value may be available from the pavement supplier. However, the value you achieve will depend largely on the base material, so it's important to follow manufacturers recommendations carefully. In some cases, you may be able to estimate a CN value based on the potential maximum retention of the roadway base, as described here.

An alternate for modeling partial runoff would be to use a CN value of 98, and then use a link to apportion the flow between surface runoff and infiltration. This would allow the use of a flow threshold and/or scale factor to determine the point at which some of the rainfall begins to run off the pavement rather than passing through.

Further comments

Porous pavement can be an effective component of stormwater management, as well as providing valuable groundwater recharge. A growing number of agencies are encouraging the use of porous pavement, and are developing standard designs and modeling procedures.

However, actual performance can vary widely depending on the exact construction, maintenance, and climate. When infiltration performance is uncertain, some agencies prefer to design for the "worst case" by treating all pavement as impervious, with a CN value of 98. Unfortunately, this tends to discourage the use of porous pavement in situations where it could still have real benefits. The approach you ultimately select will depend on the exact design and the requirements of the reviewing agency.

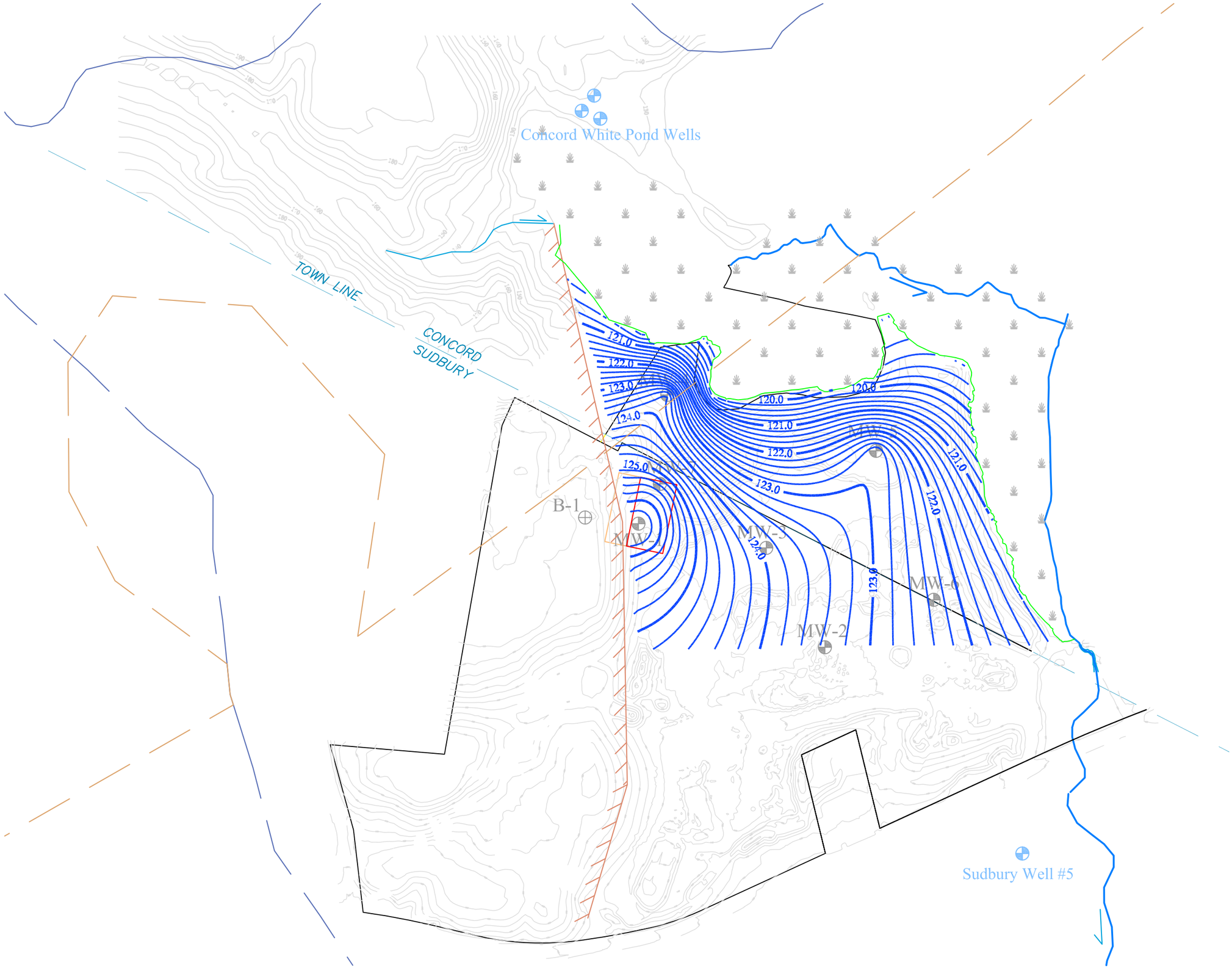
References

UNH Stormwater Center:
- Home page
- Porous pavement fact sheet
- Porous pavement design specifications
- All Publications

National Ready Mixed Concrete Association:
- Pervious Concrete - Overview
- Pervious Concrete - Hydrological Design Considerations
- Hydrologic Design of Pervious Concrete (5 parts)

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Quarry North Road
379 Concord Road
Sudbury, MA 01776

Figure 10. Simulated Mounded Seasonal High Groundwater Contour Elevations, Wastewater Discharge: 80% of 49,755 GPD.

LEGEND:

306 Groundwater Elevation Contours. Interval = 0.2 foot.

Groundwater Monitoring Well Locations.

NOTES:

1. Groundwater contour data are calculated and interpreted as described in the text.
2. Treated wastewater discharge = 80% of 49,755 gallons per day.
3. Total SAS footprint = 19,000 square feet.
4. Groundwater contours are presented for the purposes of this report only.

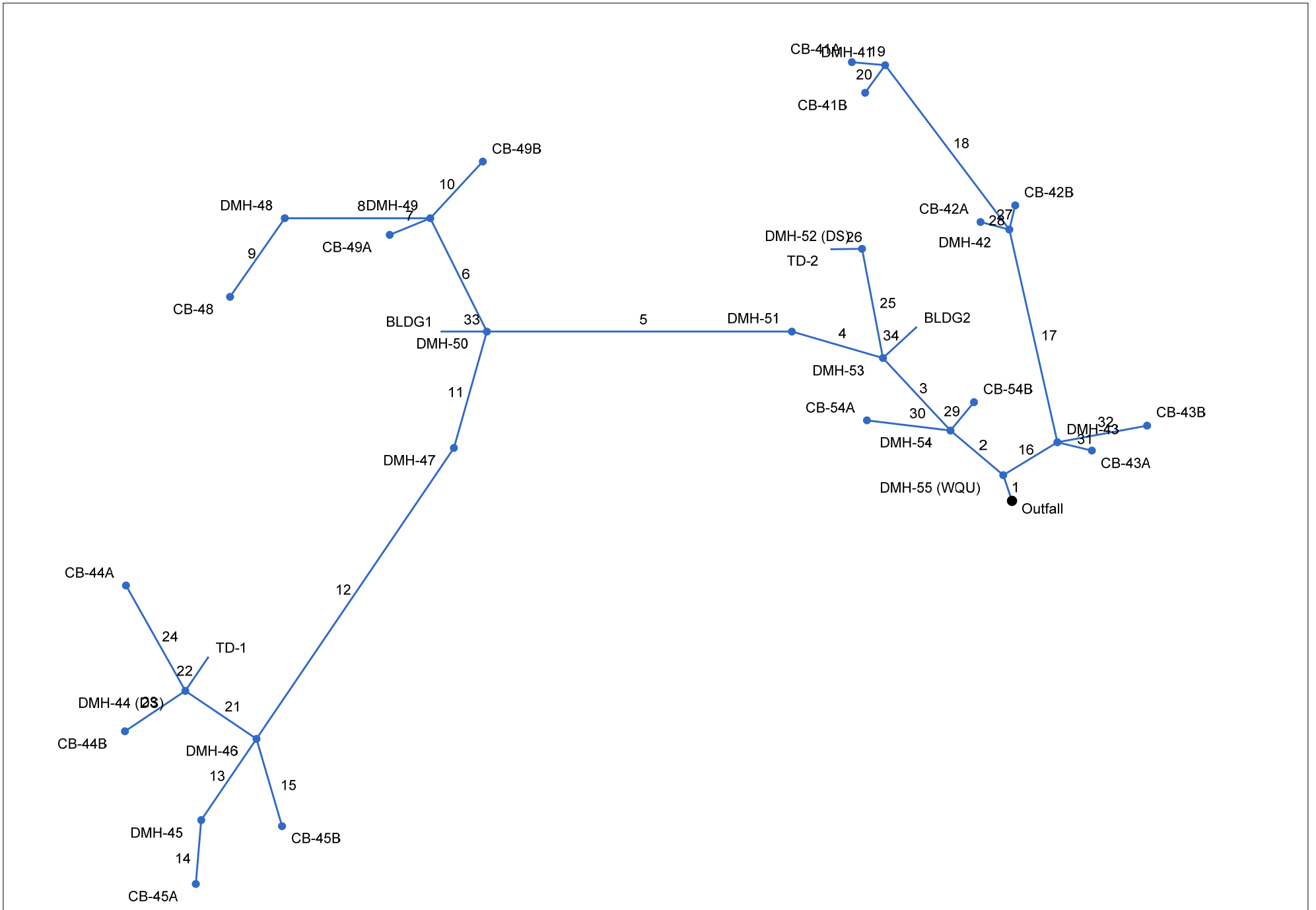
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Scale in feet

Project No. GHC#19004
Drafted SWS Checked
Date 07/18/19 Rev 07/22/19
Base Map: CAD files obtained from Client and Lidar Topography.

GeoHydroCycle, Inc.

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: System-1Basin.stm	Number of lines: 34	Date: 3/9/2020

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	17.806	-108.769	MH	0.00	0.00	0.00	6.0	129.00	0.56	129.10	24	Cir	0.012	0.98	135.11	DMH-55 TO FES-1
2	1	45.701	-30.800	MH	0.00	0.00	0.00	6.0	132.11	8.01	135.77	24	Cir	0.012	1.00	147.10	DMH-54 TO DMH-55
3	2	65.389	6.628	MH	0.00	0.00	0.00	6.0	138.48	0.49	138.80	24	Cir	0.012	1.00	148.95	DMH-53 TO DMH-54
4	3	62.596	-30.716	MH	0.00	0.00	0.00	6.0	138.90	0.50	139.21	18	Cir	0.012	0.33	151.14	DMH-51 TO DMH-53
5	4	201.063	-16.342	MH	0.00	0.00	0.00	6.0	139.31	0.50	140.32	18	Cir	0.012	0.97	156.05	DMH-50 TO DMH-51
6	5	83.711	63.545	MH	0.00	0.00	0.00	6.0	143.32	8.00	150.02	12	Cir	0.012	1.00	157.66	DMH-49 TO DMH-50
7	6	28.935	-85.888	Grate	0.00	0.16	0.90	6.0	153.02	3.80	154.12	12	Cir	0.012	1.00	157.12	CB-49A TO DMH-49
8	6	95.930	-63.545	MH	0.00	0.00	0.00	6.0	151.10	0.50	151.58	12	Cir	0.012	0.85	158.50	DMH-48 TO DMH-49
9	8	63.255	-55.257	Grate	0.00	0.59	0.50	6.0	151.68	0.51	152.00	12	Cir	0.012	1.00	155.00	CB-48 TO DMH-48
10	6	51.023	69.215	Grate	0.00	0.09	0.50	6.0	150.12	0.74	150.50	12	Cir	0.012	1.00	153.50	CB-49B TO DMH-49
11	5	80.110	-74.284	MH	0.00	0.00	0.00	6.0	140.42	0.50	140.82	18	Cir	0.012	0.37	157.42	DMH-47 TO DMH-50
12	11	232.324	18.357	MH	0.00	0.00	0.00	6.0	140.92	0.50	142.08	18	Cir	0.012	1.00	154.20	DMH-46 TO DMH-47
13	12	65.000	0.000	MH	0.00	0.00	0.00	6.0	145.08	0.57	145.45	12	Cir	0.012	0.54	151.34	DMH-45 TO DMH-46
14	13	42.306	-29.244	Grate	0.00	0.40	0.90	6.0	145.55	0.50	145.76	12	Cir	0.012	1.00	148.76	CB-45A TO DMH-45
15	12	60.102	-50.351	Grate	0.00	0.50	0.50	6.0	145.08	7.35	149.50	12	Cir	0.012	1.00	152.50	CB-45B TO DMH-45
16	1	41.786	77.406	MH	0.00	0.00	0.00	6.0	129.60	0.48	129.80	18	Cir	0.012	0.96	134.28	DMH-43 TO DMH-55
17	16	144.319	-71.318	MH	0.00	0.00	0.00	6.0	131.40	5.16	138.84	12	Cir	0.012	0.91	141.98	DMH-42 TO DMH-43
18	17	136.178	-24.266	MH	0.00	0.00	0.00	6.0	138.94	3.31	143.45	12	Cir	0.012	1.00	146.55	DMH-41 TO DMH-42
19	18	22.028	-47.796	Grate	0.00	0.22	0.90	6.0	143.55	0.73	143.71	12	Cir	0.012	1.00	146.71	CB-41A TO DMH-41
20	18	22.480	-107.051	Grate	0.00	0.20	0.90	6.0	143.55	0.76	143.72	12	Cir	0.012	1.00	146.72	CB-41B TO DMH-41
21	12	56.663	90.000	MH	0.00	0.00	0.00	6.0	142.18	0.49	142.46	18	Cir	0.012	1.00	147.50	DMH-44 TO DMH-46
22	21	26.661	89.999	Grate	0.00	0.50	0.40	6.0	143.17	5.63	144.67	12	Cir	0.012	1.00	146.85	TD-1 TO DMH-44
23	21	47.911	-67.939	Grate	0.00	0.70	0.40	6.0	143.17	5.38	145.75	12	Cir	0.012	1.00	148.75	CB-44B TO DMH-44

Project File: System-1Basin.stm | Number of lines: 34 | Date: 3/9/2020

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
24	21	79.991	26.644	Grate	0.00	0.51	0.40	6.0	142.56	1.26	143.57	12	Cir	0.012	1.00	155.00	CB-44A TO DMH-44
25	3	73.513	32.134	MH	0.00	0.00	0.00	6.0	139.43	0.50	139.80	12	Cir	0.012	0.99	144.44	DMH-52 TO DMH-53
26	25	20.218	-79.242	Grate	0.00	0.17	0.90	6.0	139.90	0.49	140.00	12	Cir	0.012	1.00	143.90	TD-2 TO DMH-52
27	17	19.647	-62.415	Grate	0.00	0.19	0.70	6.0	138.94	4.43	139.81	12	Cir	0.012	1.00	142.81	CB-42A TO DMH-42
28	17	16.537	26.196	Grate	0.00	0.03	0.90	6.0	138.94	3.08	139.45	12	Cir	0.012	1.00	142.45	CB-42B TO DMH-42
29	2	24.356	89.043	Grate	0.00	0.76	0.90	6.0	138.77	2.92	139.48	12	Cir	0.012	1.00	146.43	CB-54B TO DMH-54
30	2	55.485	-33.529	Grate	0.00	0.54	0.40	6.0	138.77	4.47	141.25	12	Cir	0.012	1.00	149.75	CB-54A TO DMH-54
31	16	23.397	44.946	Grate	0.00	0.25	0.70	6.0	130.28	0.51	130.40	12	Cir	0.012	1.00	133.40	CB-43A TO DMH-43
32	16	60.157	20.693	Grate	0.00	0.39	0.70	6.0	130.02	0.50	130.32	12	Cir	0.012	1.00	133.32	CB-43B TO DMH-43
33	5	30.000	0.000	None	0.00	0.40	0.90	6.0	154.00	3.33	155.00	12	Cir	0.012	1.00	158.00	BLDG1
34	3	30.000	90.000	None	0.00	0.40	0.90	6.0	140.00	3.33	141.00	12	Cir	0.012	1.00	152.00	BLDG2

Project File: System-1Basin.stm | Number of lines: 34 | Date: 3/9/2020

My Report

Line No.	Line ID	Flow Rate (cfs)	Line Length (ft)	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Q Byp (cfs)	Byp Ln No	Minor Loss (ft)	HGL Jnct (ft)	DnStm Ln No	Junct Type
1	DMH-55 TO FES-1	23.89	17.806	129.00	129.10	0.56	132.15	132.32	....	n/a	0.88	133.20	Outfall	MH
2	DMH-54 TO DMH-55	18.78	45.701	132.11	135.77	8.01	133.20	137.33	....	n/a	n/a	137.33	1	MH
3	DMH-53 TO DMH-54	14.15	65.389	138.48	138.80	0.49	139.87	140.19	....	n/a	0.58	140.76	2	MH
4	DMH-51 TO DMH-53	11.49	62.596	138.90	139.21	0.50	140.76	141.40	....	n/a	0.22	141.62	3	MH
5	DMH-50 TO DMH-51	11.71	201.063	139.31	140.32	0.50	141.62	143.75	....	n/a	0.66	144.41	4	MH
6	DMH-49 TO DMH-50	2.69	83.711	143.32	150.02	8.00	144.41	150.72 j	....	n/a	n/a	150.72	5	MH
7	CB-49A TO DMH-49	0.89	28.935	153.02	154.12	3.80	153.25	154.51	0.10	29	n/a	154.51	6	Grate
8	DMH-48 TO DMH-49	1.78	95.930	151.10	151.58	0.50	151.69	152.17	....	n/a	0.18	152.35	6	MH
9	CB-48 TO DMH-48	1.81	63.255	151.68	152.00	0.51	152.35	152.58	0.00	Sag	0.23	152.81	8	Grate
10	CB-49B TO DMH-49	0.28	51.023	150.12	150.50	0.74	150.72	150.72	0.00	Sag	n/a	150.72	6	Grate
11	DMH-47 TO DMH-50	7.27	80.110	140.42	140.82	0.50	144.41	144.74	....	n/a	0.10	144.84	5	MH
12	DMH-46 TO DMH-47	7.54	232.324	140.92	142.08	0.50	144.84	145.86	....	n/a	0.28	146.14	11	MH
13	DMH-45 TO DMH-46	2.19	65.000	145.08	145.45	0.57	146.14	146.32	....	n/a	0.08	146.40	12	MH
14	CB-45A TO DMH-45	2.21	42.306	145.55	145.76	0.50	146.40	146.51	0.00	Offsite	0.19	146.70	13	Grate
15	CB-45B TO DMH-45	1.54	60.102	145.08	149.50	7.35	146.14	150.03 j	0.00	Sag	n/a	150.03	12	Grate
16	DMH-43 TO DMH-55	5.59	41.786	129.60	129.80	0.48	133.20	133.30	....	n/a	0.15	133.45	1	MH
17	DMH-42 TO DMH-43	3.13	144.319	131.40	138.84	5.16	133.45	139.60 j	....	n/a	n/a	139.60	16	MH
18	DMH-41 TO DMH-42	2.30	136.178	138.94	143.45	3.31	139.60	144.10 j	....	n/a	n/a	144.10	17	MH
19	CB-41A TO DMH-41	1.22	22.028	143.55	143.71	0.73	144.10	144.18 j	0.00	Offsite	n/a	144.18	18	Grate
20	CB-41B TO DMH-41	1.11	22.480	143.55	143.72	0.76	144.10	144.16 j	0.18	27	n/a	144.16	18	Grate
21	DMH-44 TO DMH-46	4.06	56.663	142.18	142.46	0.49	146.14	146.21	....	n/a	0.08	146.29	12	MH
22	TD-1 TO DMH-44	1.23	26.661	143.17	144.67	5.63	146.29	146.32	0.00	Sag	0.04	146.36	21	Grate
23	CB-44B TO DMH-44	1.72	47.911	143.17	145.75	5.38	146.29	146.33	0.00	Sag	0.21	146.54	21	Grate

Project File: System-1Basin.stm | Number of lines: 34 | Date: 3/9/2020

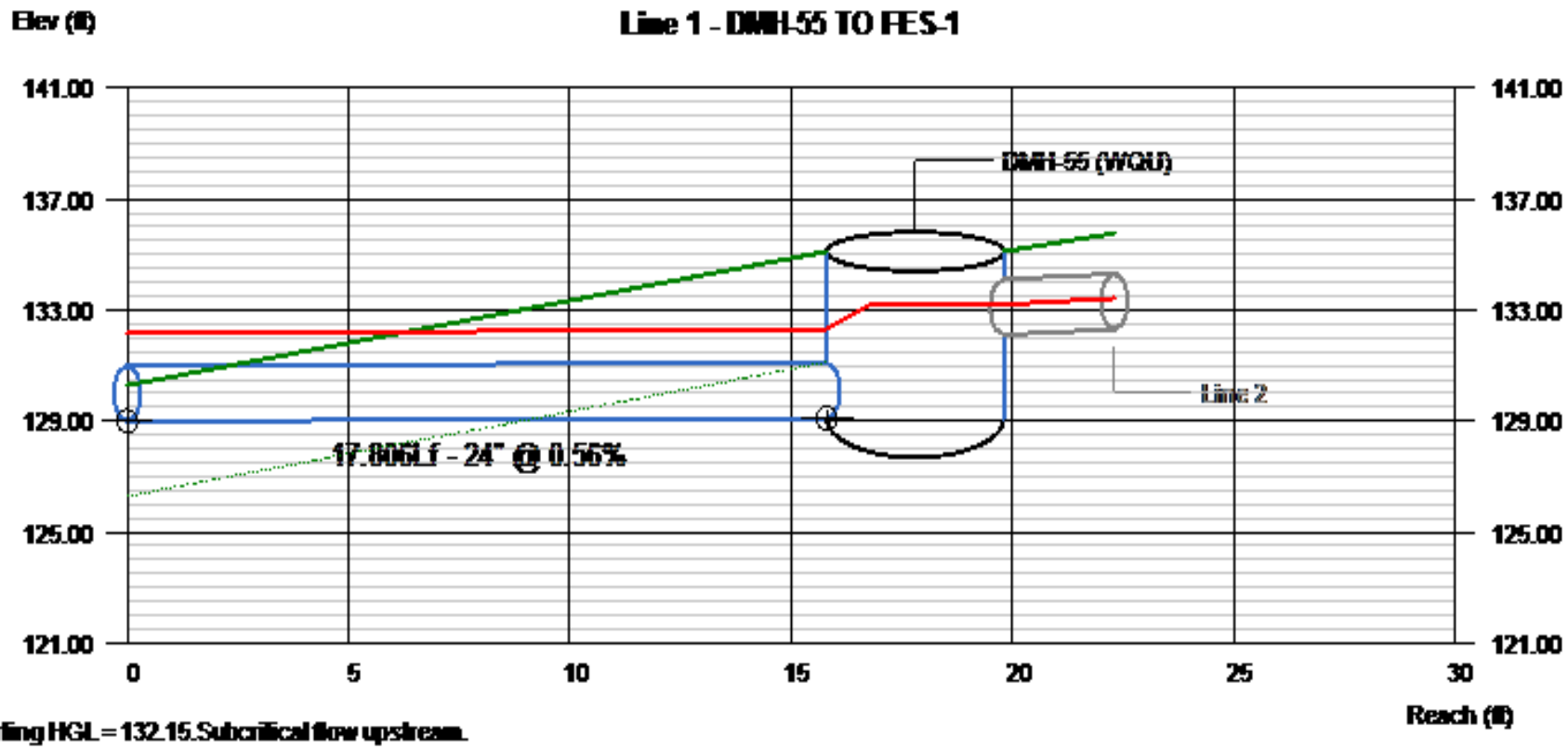
NOTES: ** Critical depth

My Report

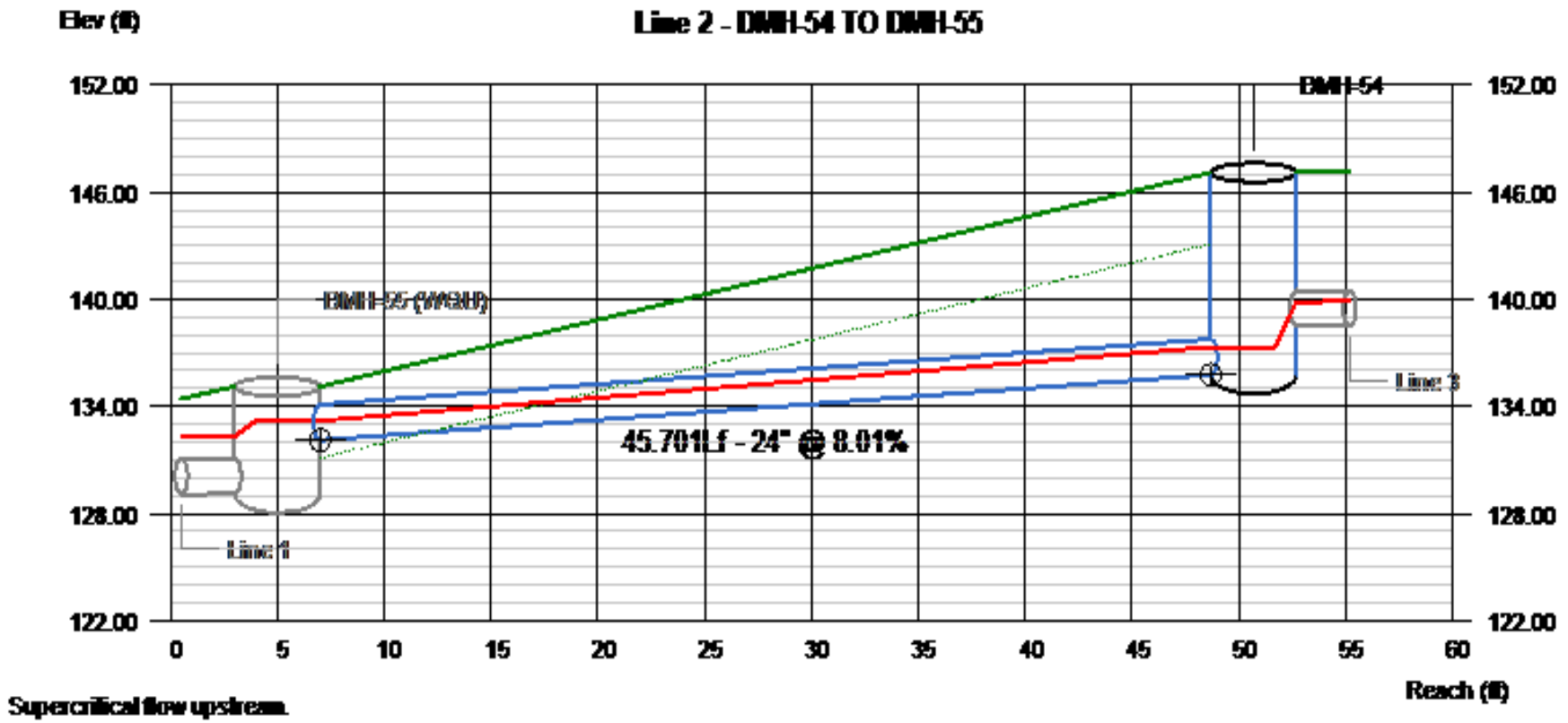
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24	CB-44A TO DMH-44	1.25	79.991	142.56	143.57	1.26	146.29	146.38	0.00	Sag	0.04	146.42	21	Grate
25	DMH-52 TO DMH-53	0.93	73.513	139.43	139.80	0.50	140.76	140.80	....	n/a	0.02	140.82	3	MH
26	TD-2 TO DMH-52	0.94	20.218	139.90	140.00	0.49	140.82	140.41	0.00	Sag	n/a	140.41	25	Grate
27	CB-42A TO DMH-42	0.82	19.647	138.94	139.81	4.43	139.60	140.19 j	0.05	31	n/a	140.19	17	Grate
28	CB-42B TO DMH-42	0.17	16.537	138.94	139.45	3.08	139.60	139.62 j	0.00	32	n/a	139.62	17	Grate
29	CB-54B TO DMH-54	4.21	24.356	138.77	139.48	2.92	139.35	140.34	0.00	Sag	n/a	140.34	2	Grate
30	CB-54A TO DMH-54	1.33	55.485	138.77	141.25	4.47	139.04	141.74	0.00	Sag	0.19	141.74	2	Grate
31	CB-43A TO DMH-43	1.08	23.397	130.28	130.40	0.51	133.45	133.47	0.00	Offsite	0.03	133.50	16	Grate
32	CB-43B TO DMH-43	1.68	60.157	130.02	130.32	0.50	133.45	133.57	0.00	Offsite	0.07	133.64	16	Grate
33	BLDG1	2.21	30.000	154.00	155.00	3.33	154.39	155.64	....	n/a	n/a	155.64	5	None
34	BLDG2	2.21	30.000	140.00	141.00	3.33	140.76	141.64 j	....	n/a	n/a	141.64	3	None

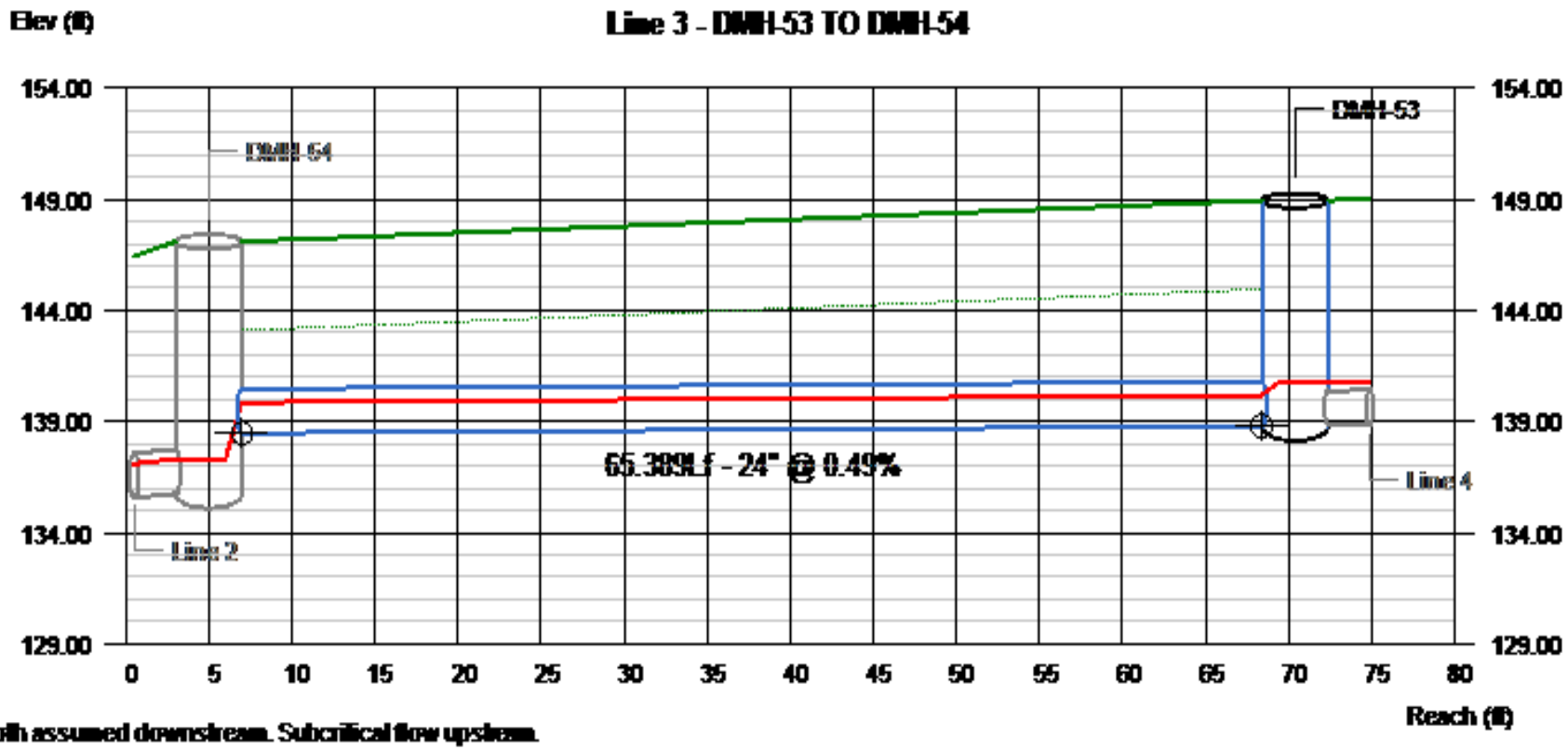
Project File: System-1Basin.stm | Number of lines: 34 | Date: 3/9/2020

NOTES: ** Critical depth

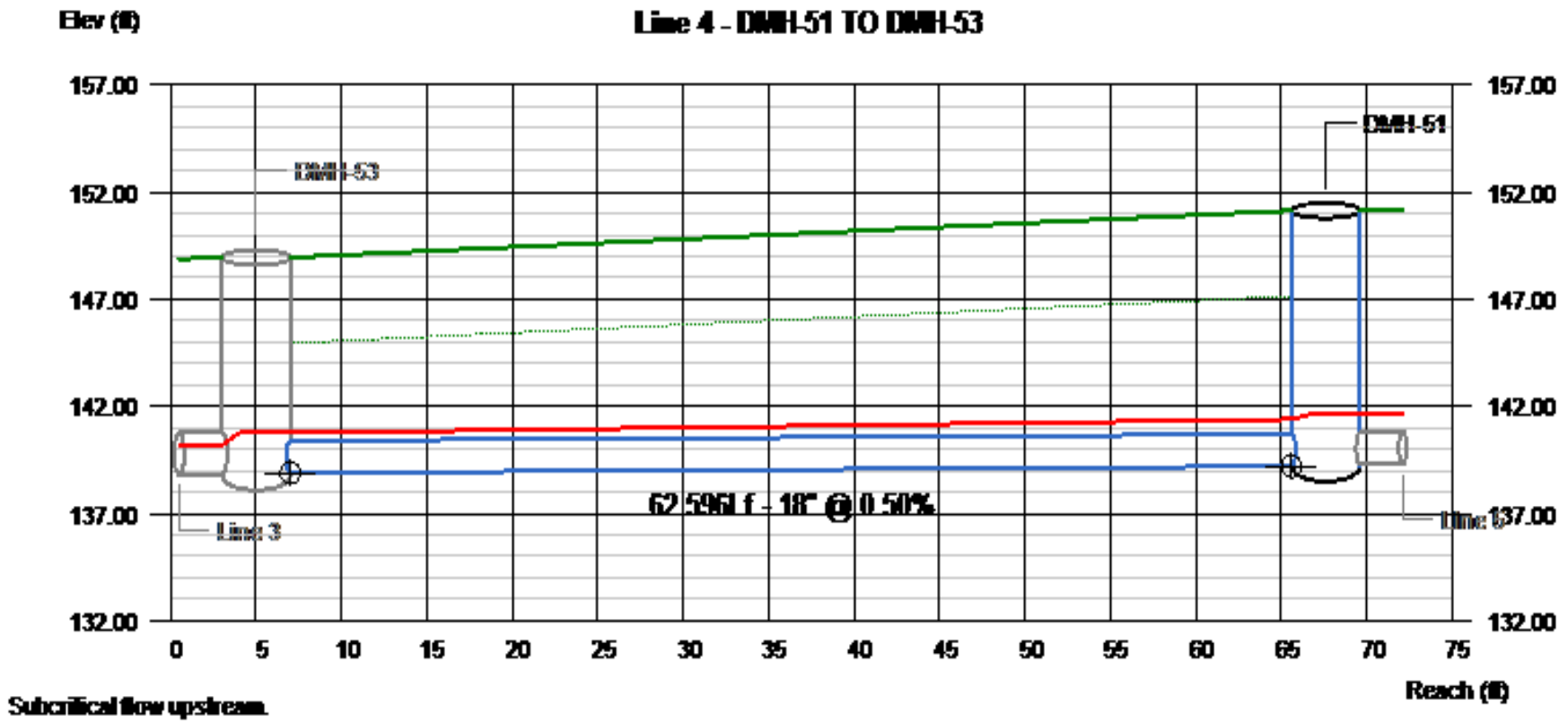


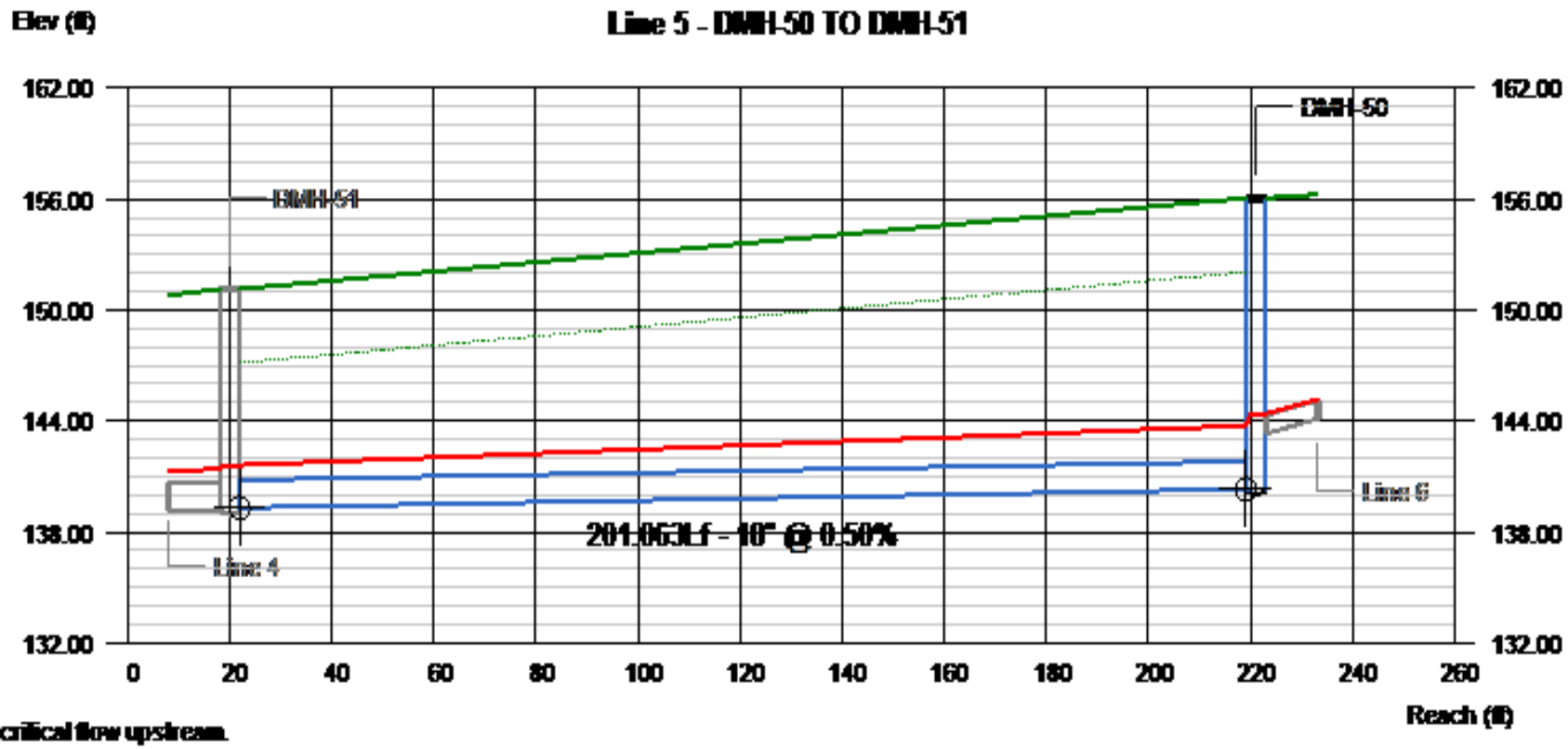
Starting HGL = 132.15. Subcritical flow upstream.


Elev (ft)
Line 2 - DMH-54 TO DMH-55
152.00
146.00
140.00
134.00
128.00
122.00
DMH-54
DMH-55 (WSH)
Line 3
45.701Lf - 24" @ 8.01%
Line 1
0
5
10
15
20
25
30
35
40
45
50
55
60
Reach (ft)
Supercritical flow upstream.

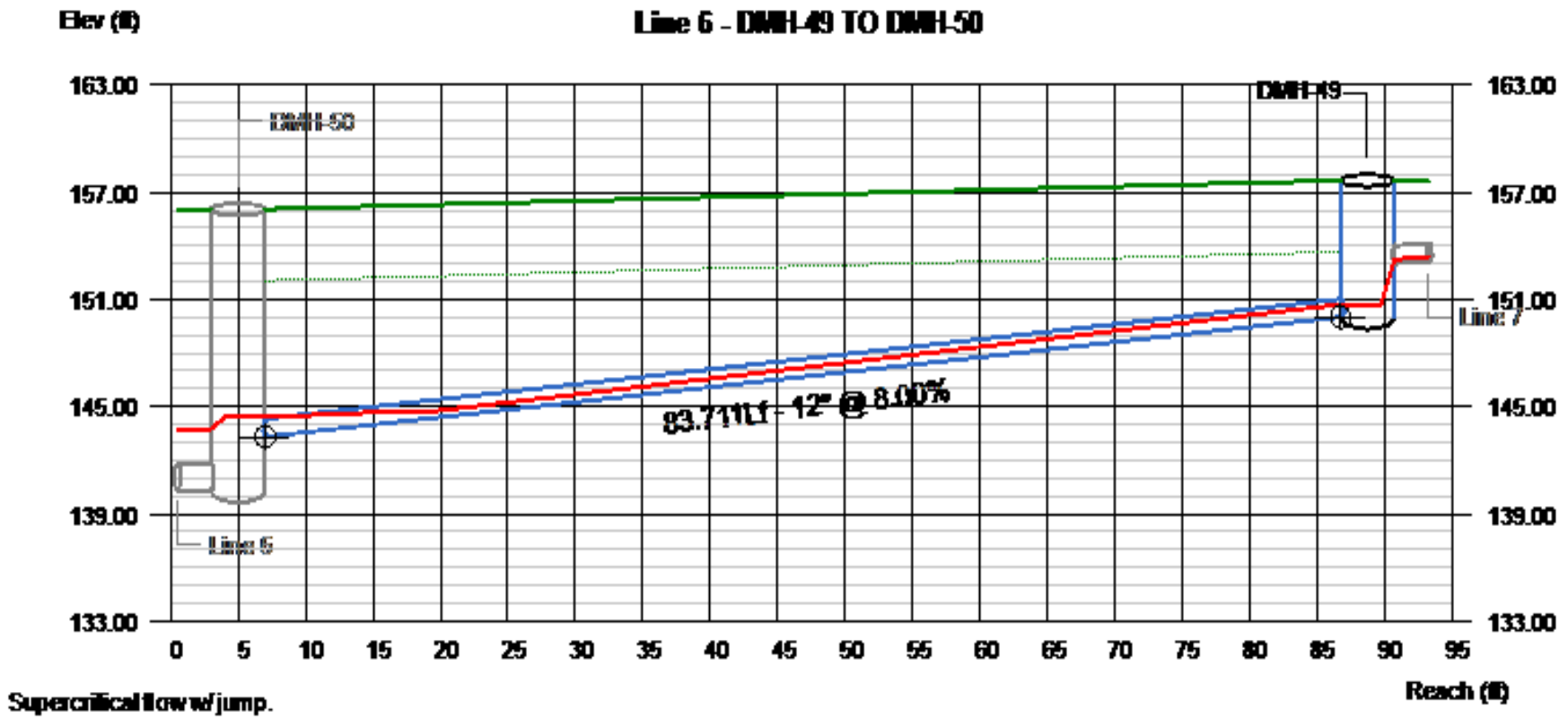


depth assumed downstream. Subcritical flow upstream.

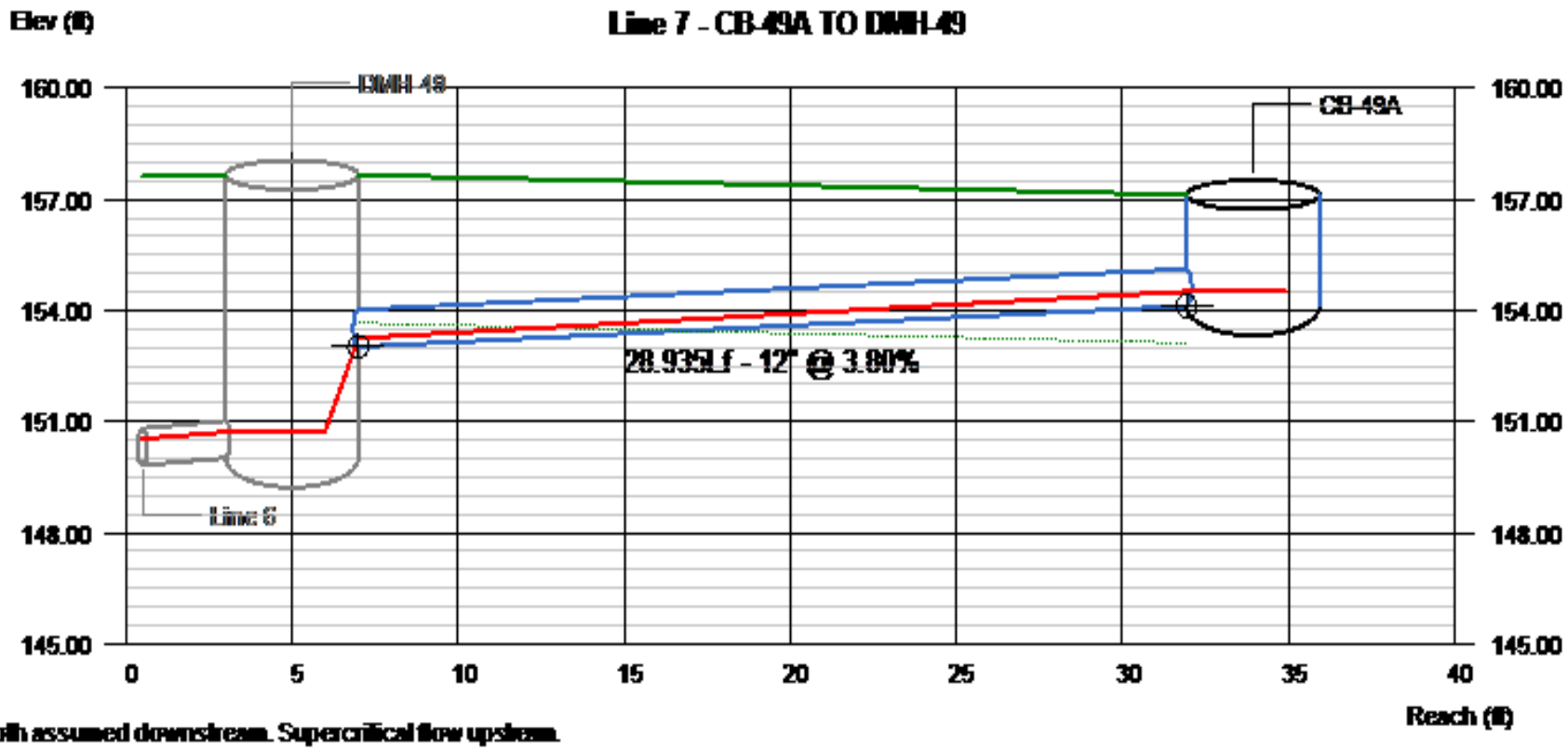

Elev (ft)
Line 4 - DMH-51 TO DMH-53
157.00
152.00
147.00
142.00
137.00
132.00
DMH-53
DMH-51
Line: 3
62.596 lf - 18" @ 0.50%
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
Reach (ft)
Subcritical flow upstream.



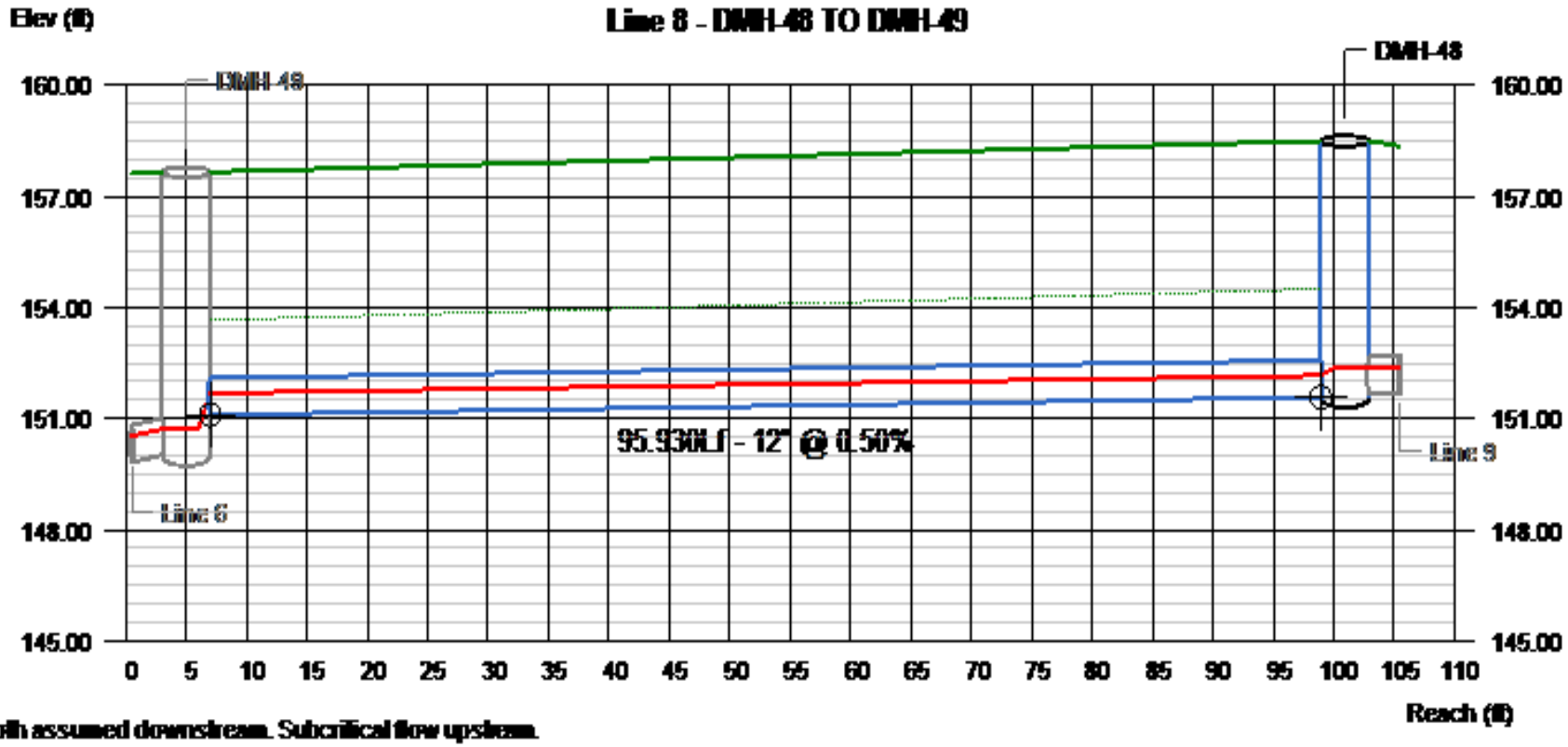
Subcritical flow upstream.



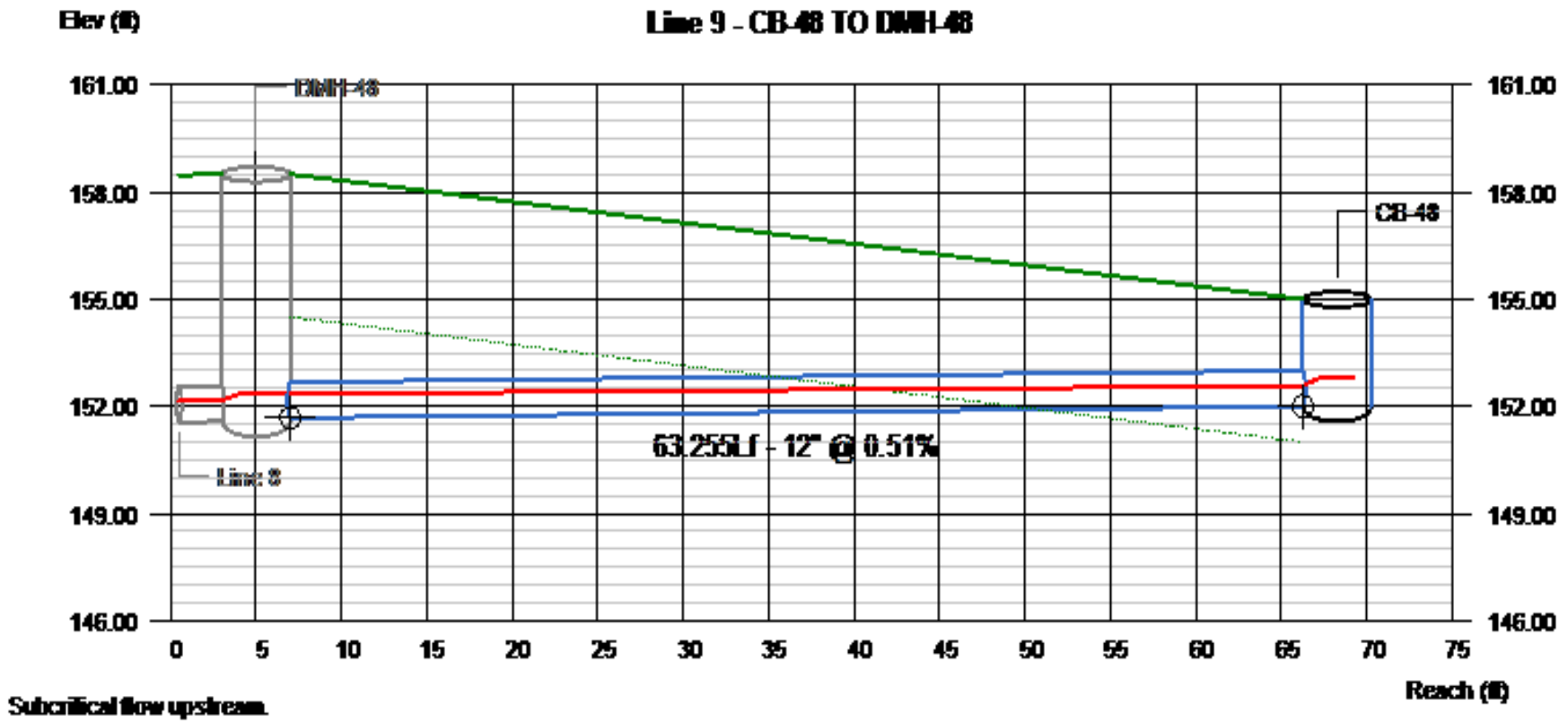
Supercritical flow w/jump.

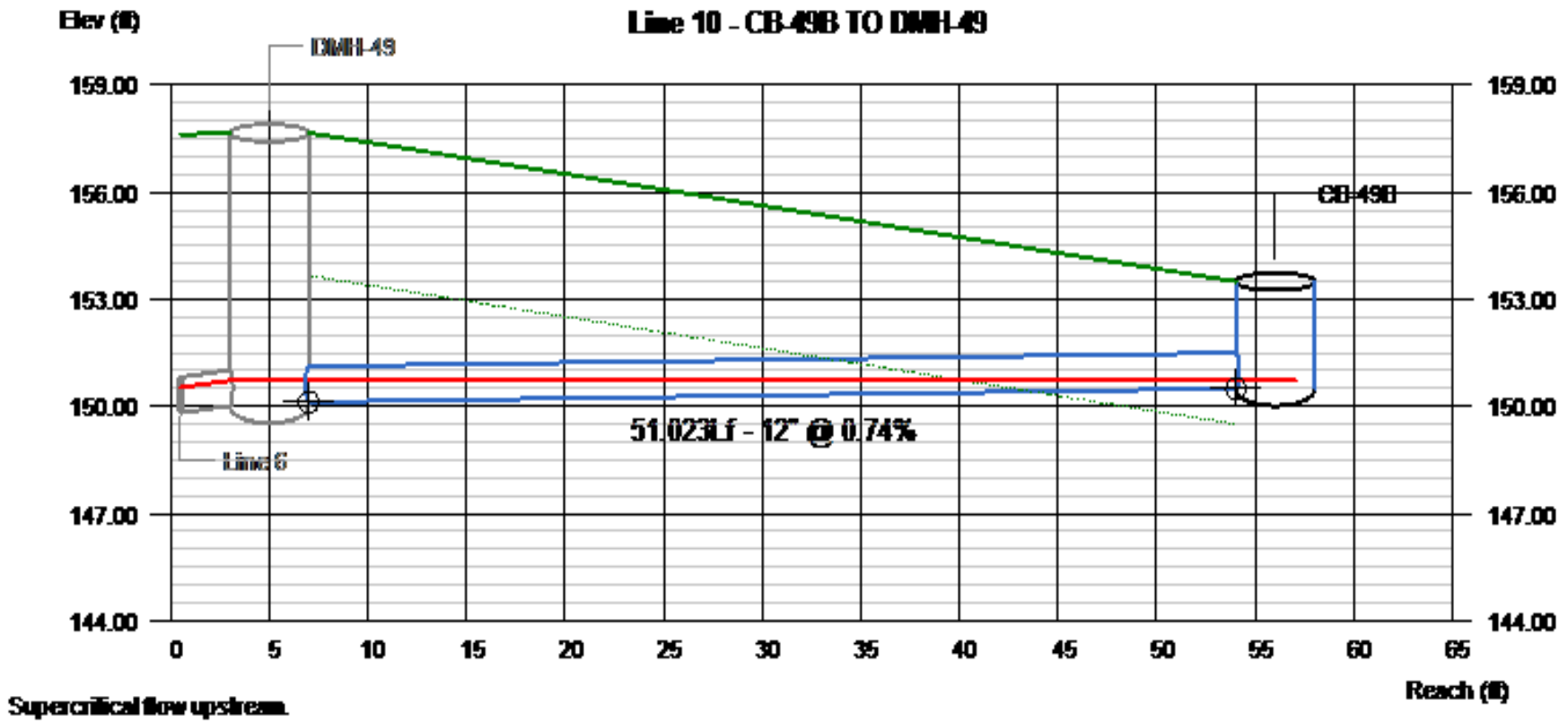


depth assumed downstream. Supercritical flow upstream.

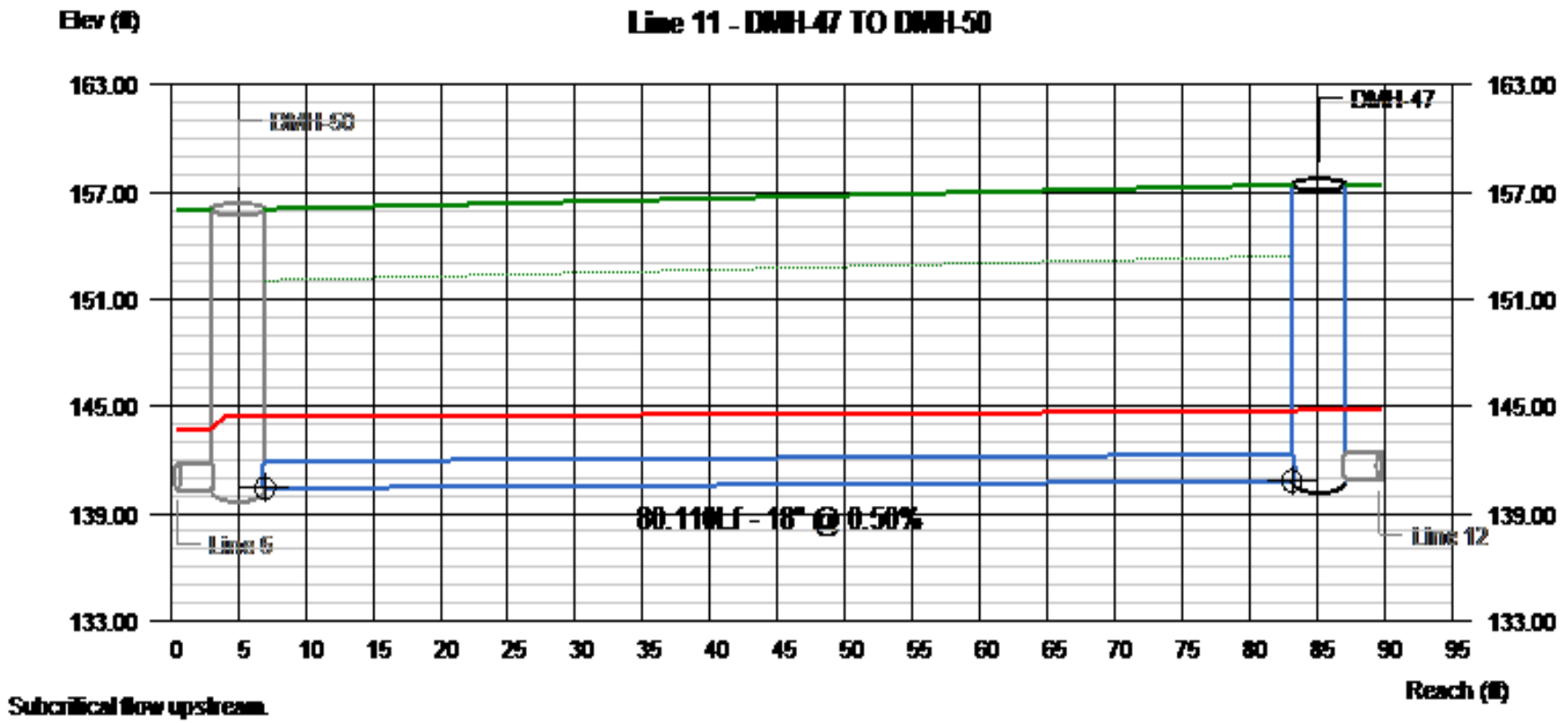


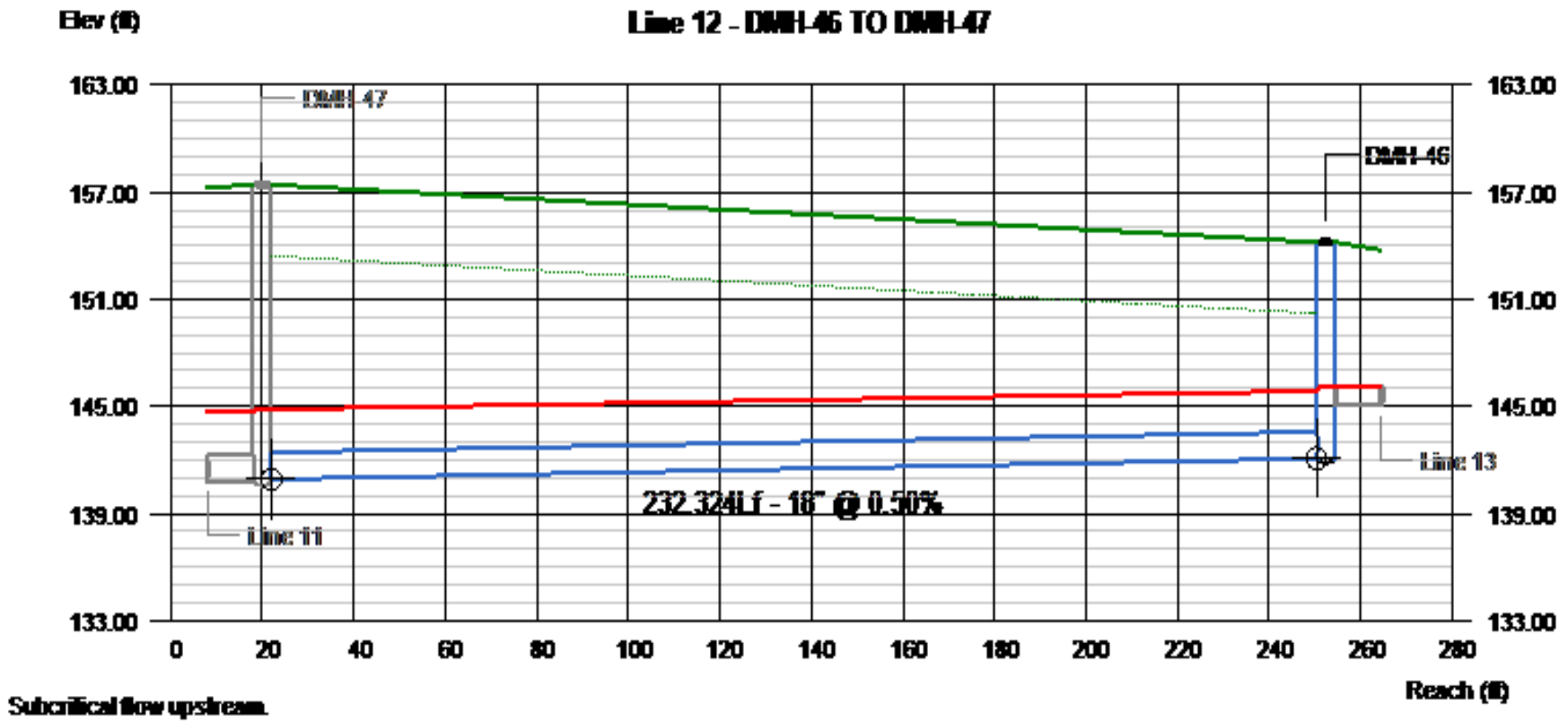
depth assumed downstream. Subcritical flow upstream.

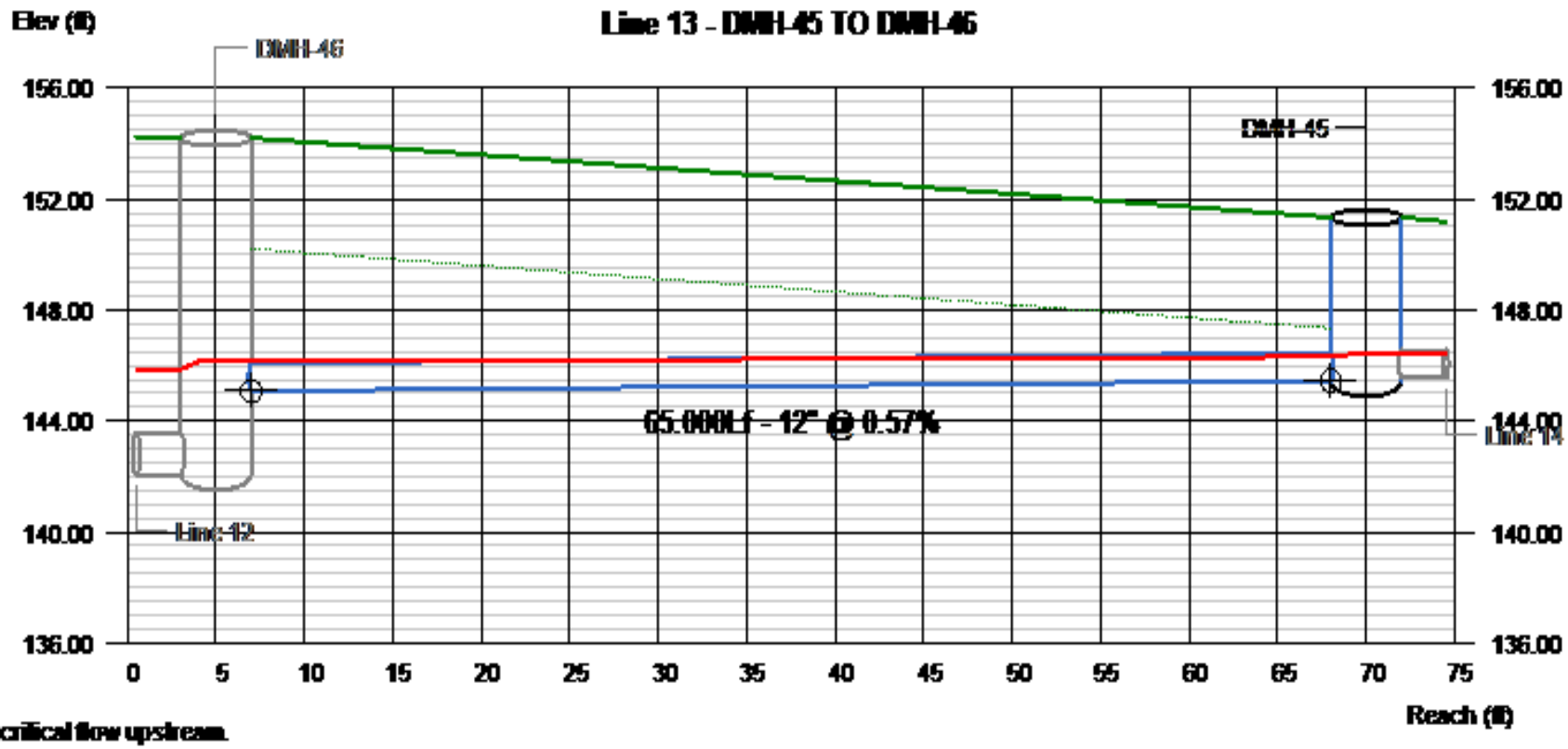

Elev (ft)
Line 9 - CB-48 TO DMH-48
161.00
158.00
155.00
152.00
149.00
146.00
DMH-48
CB-48
Line: 8
63.25Lf - 12" @ 0.51%
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
Reach (ft)
Subcritical flow upstream.

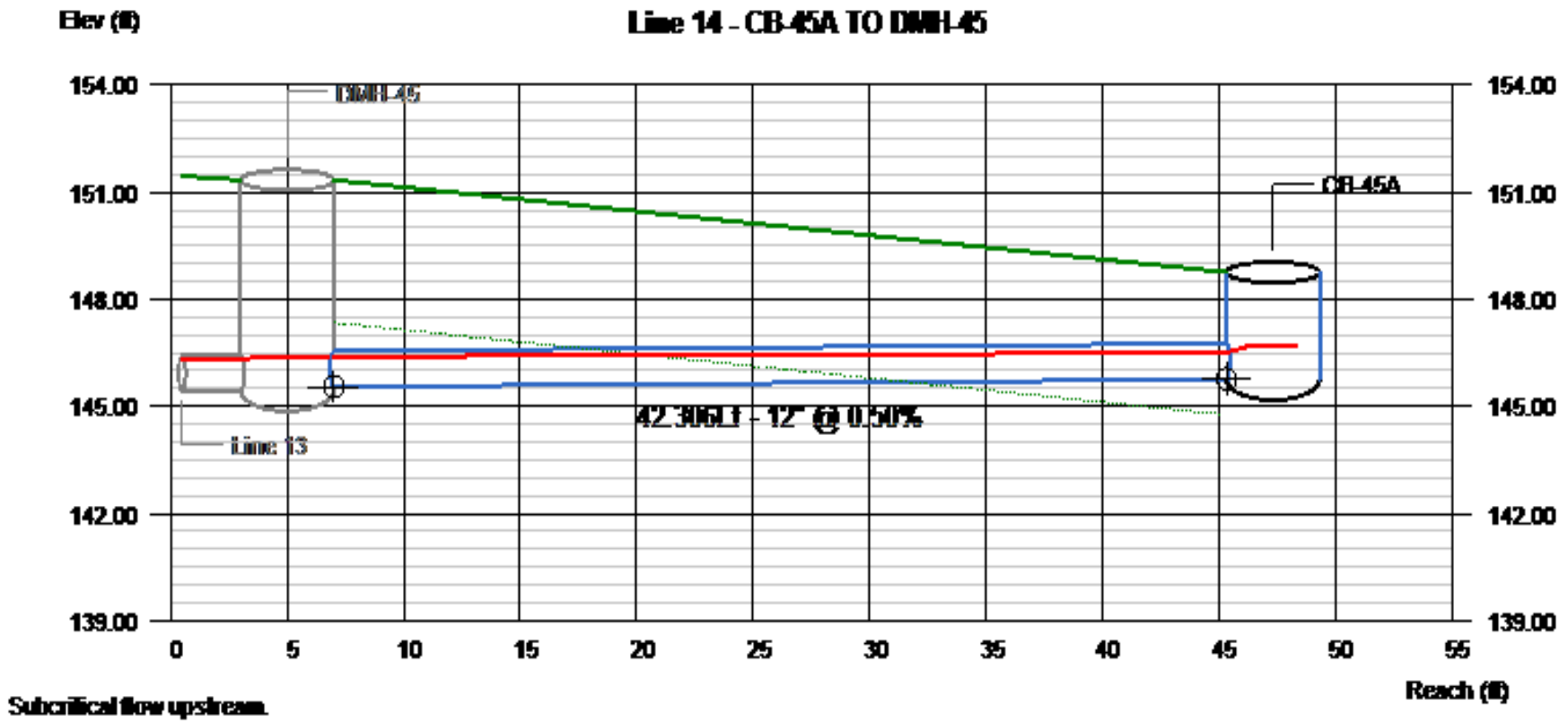


Supercritical flow upstream.

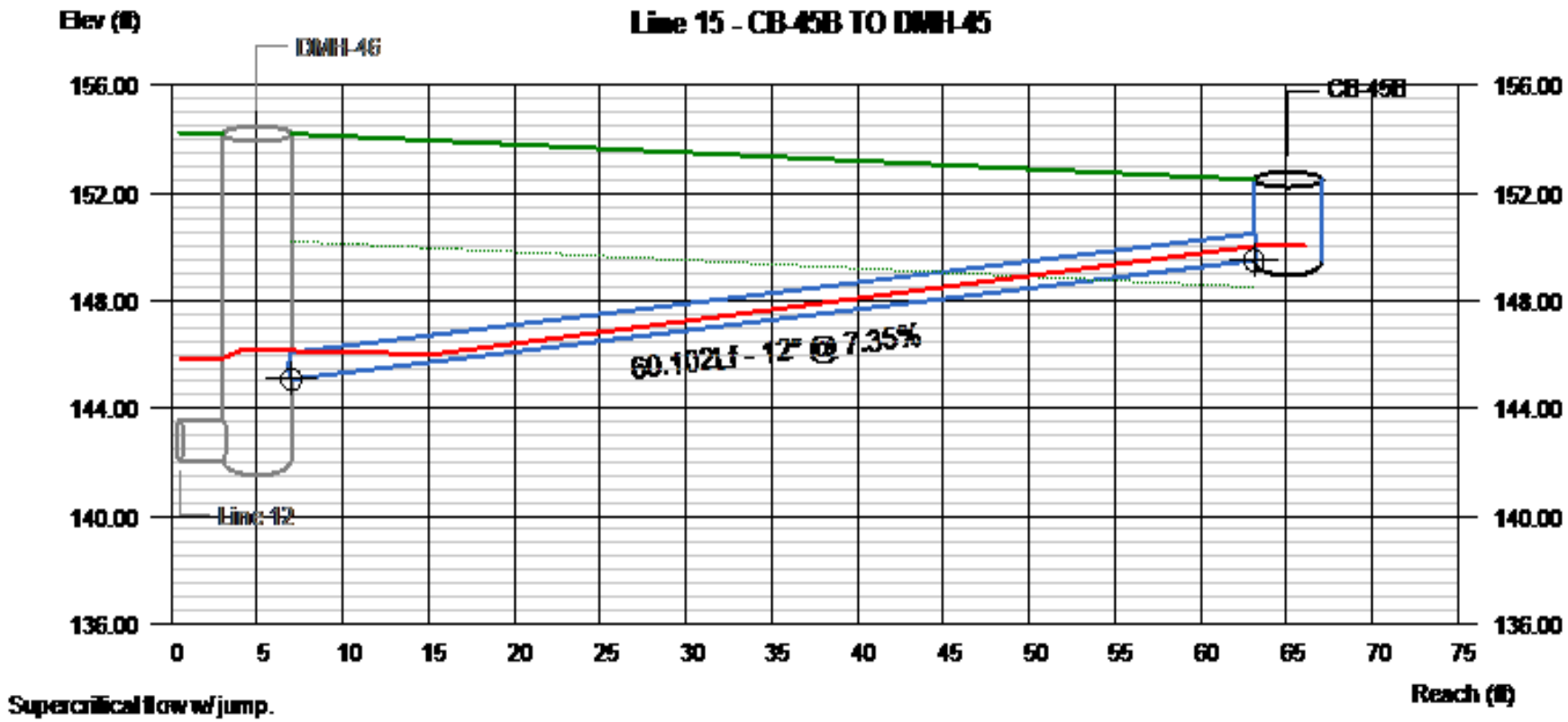

Elev (ft)
Line 11 - DMH-47 TO DMH-50
163.00
157.00
151.00
145.00
139.00
133.00
DMH-50
DMH-47
Line 6
Line 12
80.11@Lf - 18" @ 0.50%
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
Reach (ft)
Subcritical flow upstream.


Elev (ft)
Line 12 - DMH-46 TO DMH-47
163.00
157.00
151.00
145.00
139.00
133.00
DMH-47
DMH-46
Line: 13
Line: 11
232.324Lf - 18" @ 0.50%
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
Reach (ft)
Subcritical flow upstream.

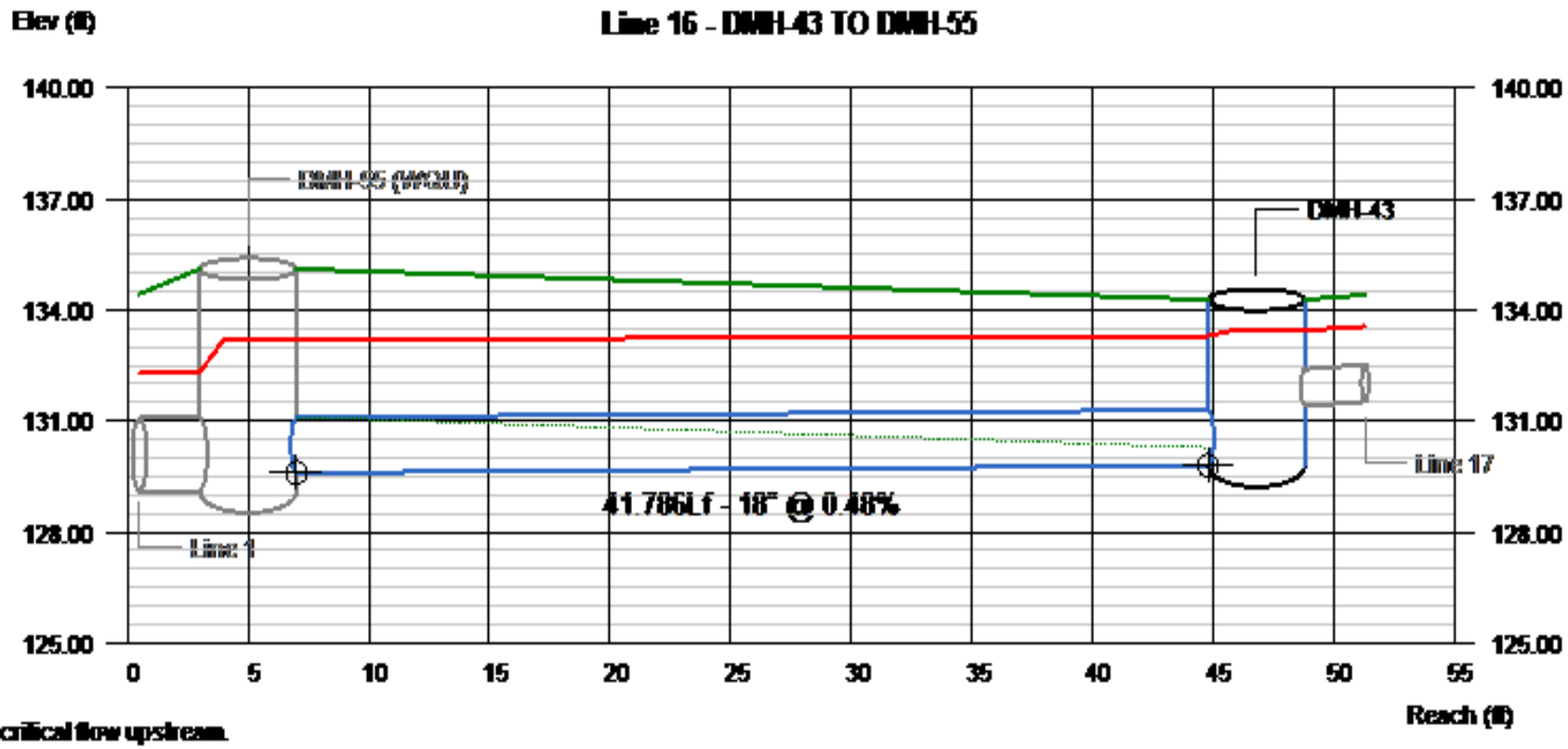

Elev (ft)
Line 13 - DMH-45 TO DMH-46
DMH-46
DMH-45
156.00
152.00
148.00
144.00
140.00
136.00
65.000Lf - 12" @ 0.57%
Line: 14
Line: 12
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
Reach (ft)
Subcritical flow upstream.



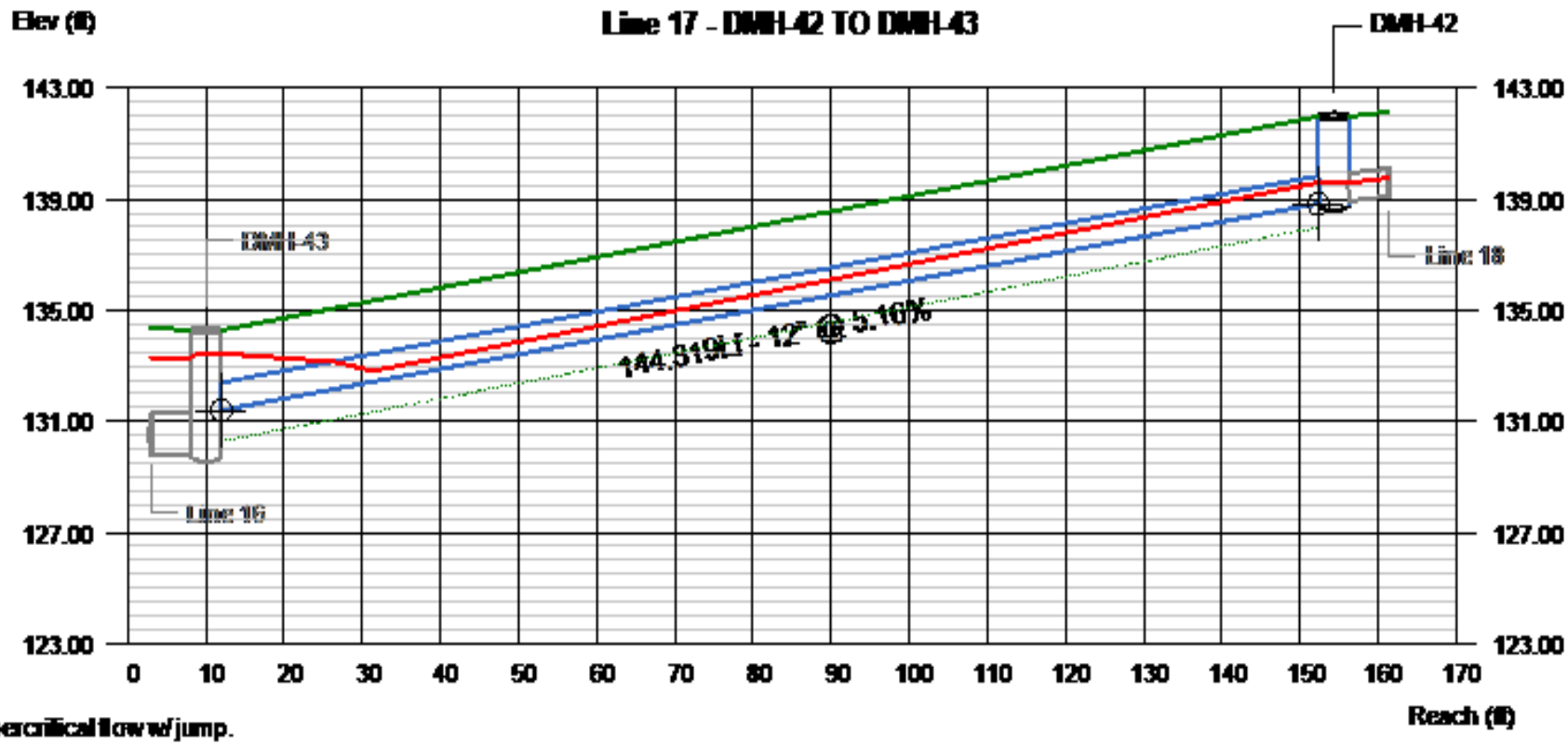
Subcritical flow upstream.



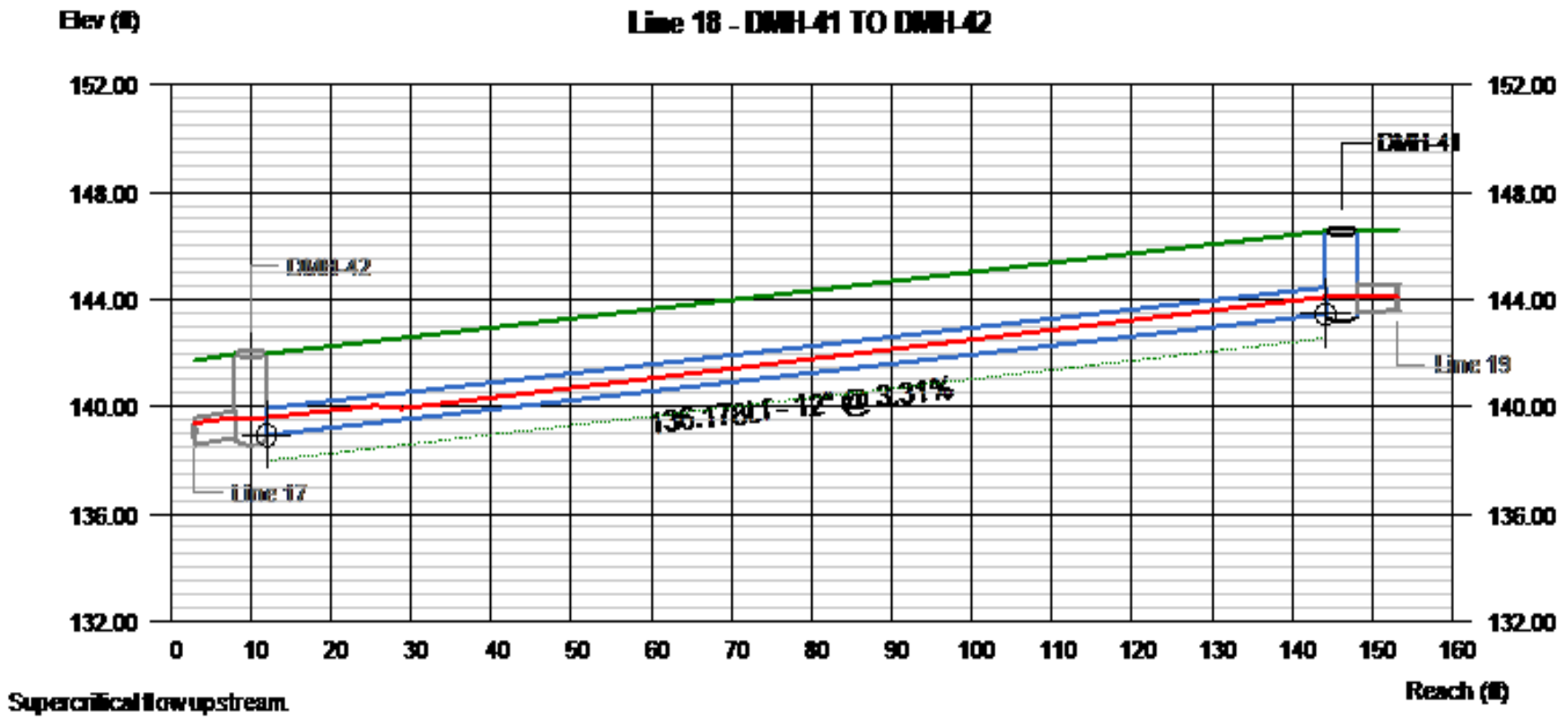
Supercritical flow w/jump.

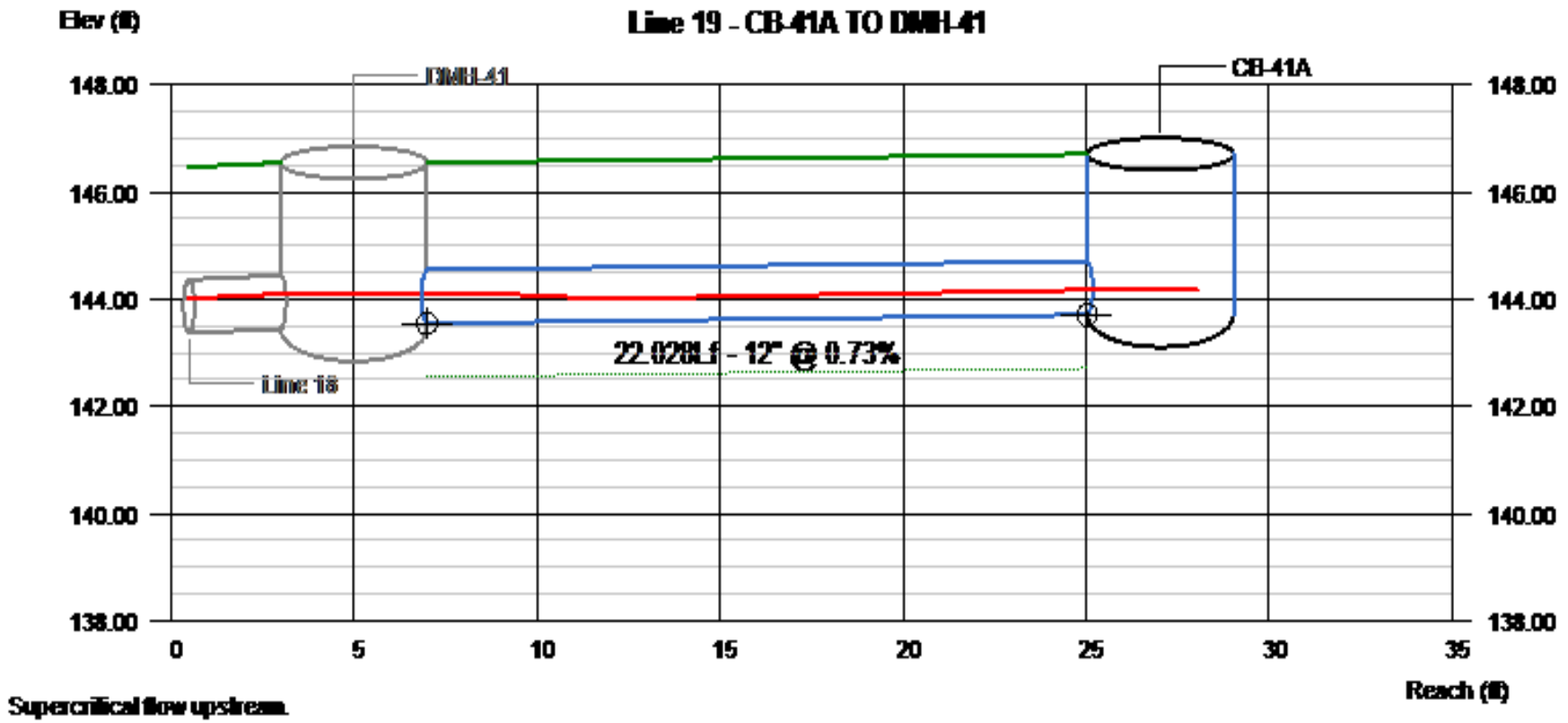


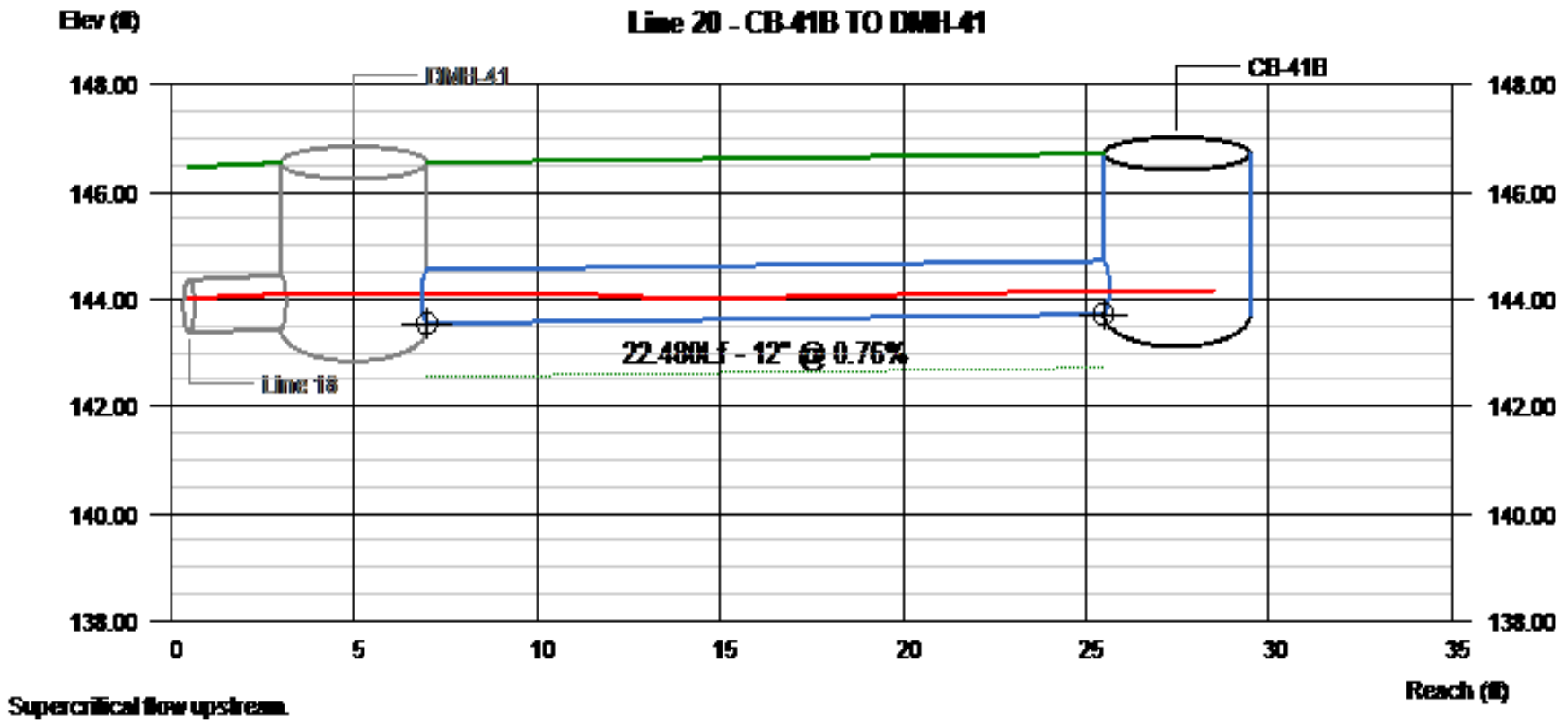
Subcritical flow upstream.

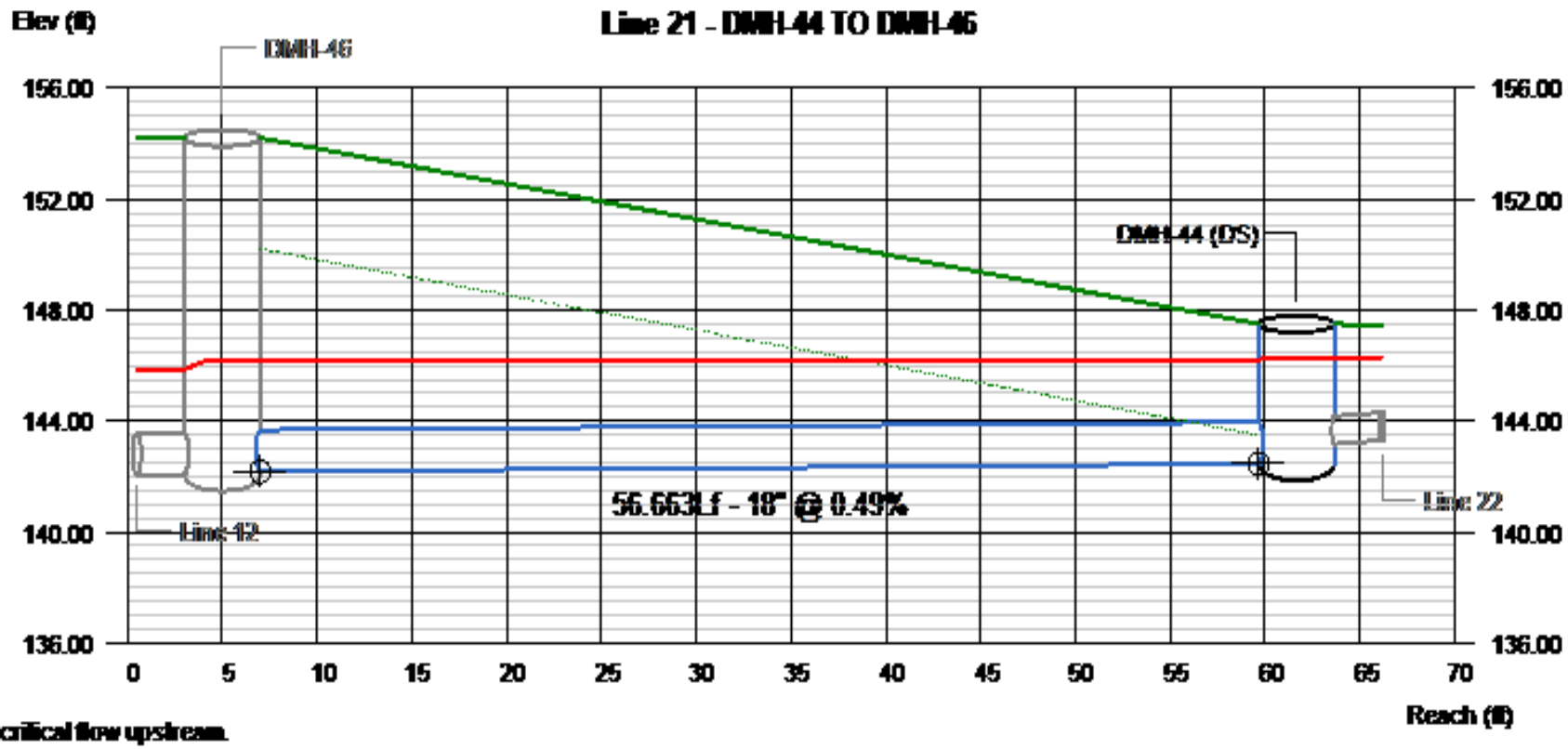


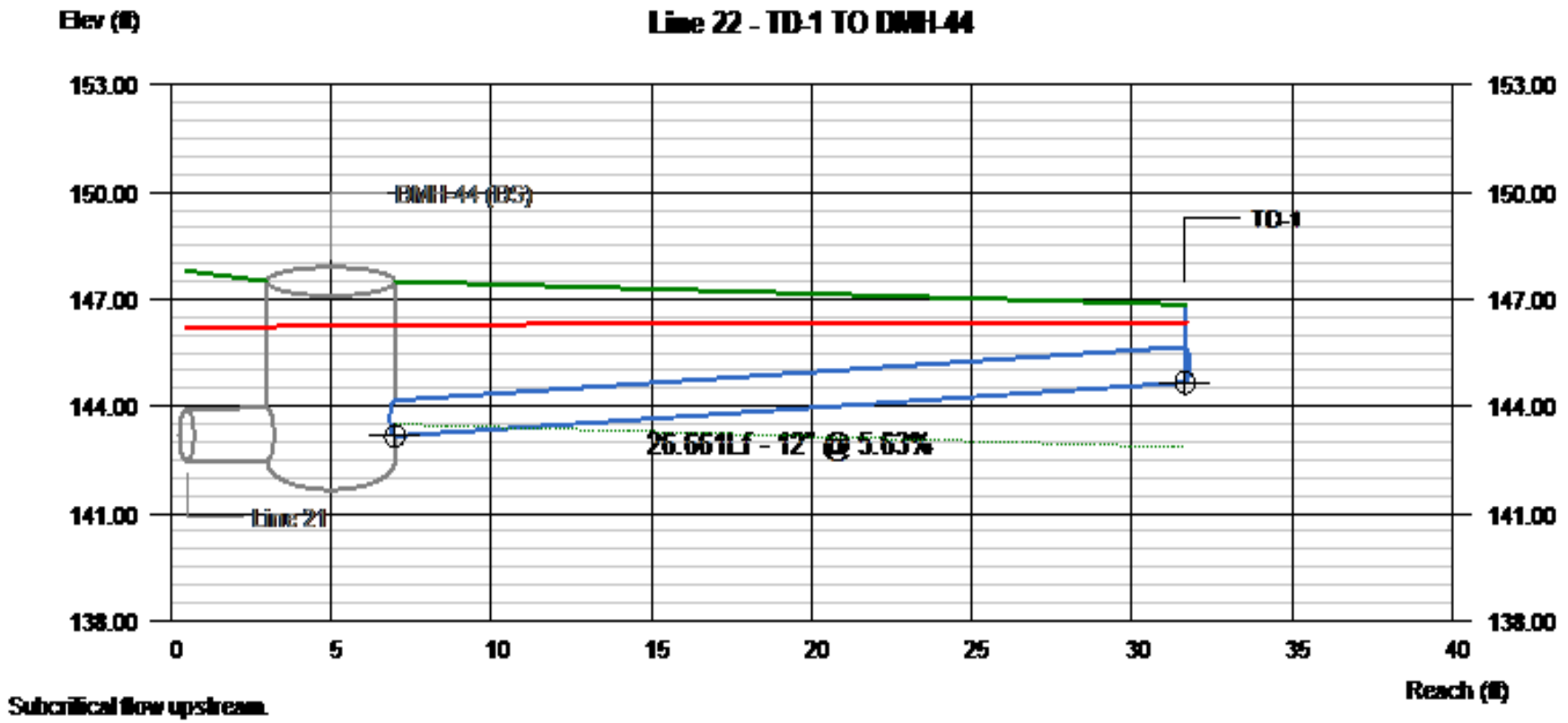
Supercritical flow w/jump.


Elev (ft)
Line 18 - DMH-41 TO DMH-42
152.00
148.00
144.00
140.00
136.00
132.00
DMH-41
DMH-42
Line 19
Line 17
136.17ft - 12" @ 3.31%
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
Reach (ft)
Supercritical flow upstream.

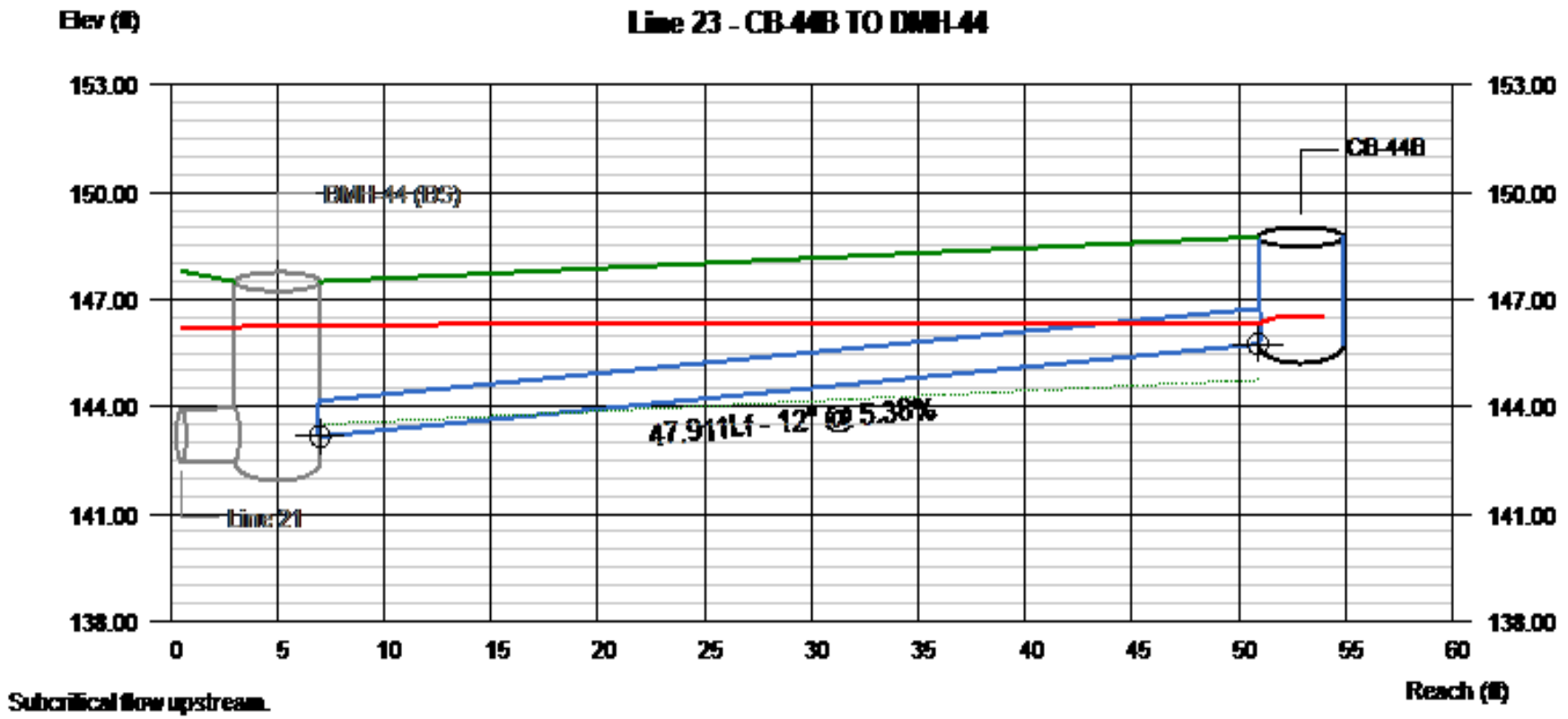

Elev (ft)
Line 19 - CB-41A TO DMH-41
DMH-41
CB-41A
148.00
146.00
144.00
142.00
140.00
138.00
22.028ft - 12" @ 0.73%
Line 18
0
5
10
15
20
25
30
35
Reach (ft)
Supercritical flow upstream.

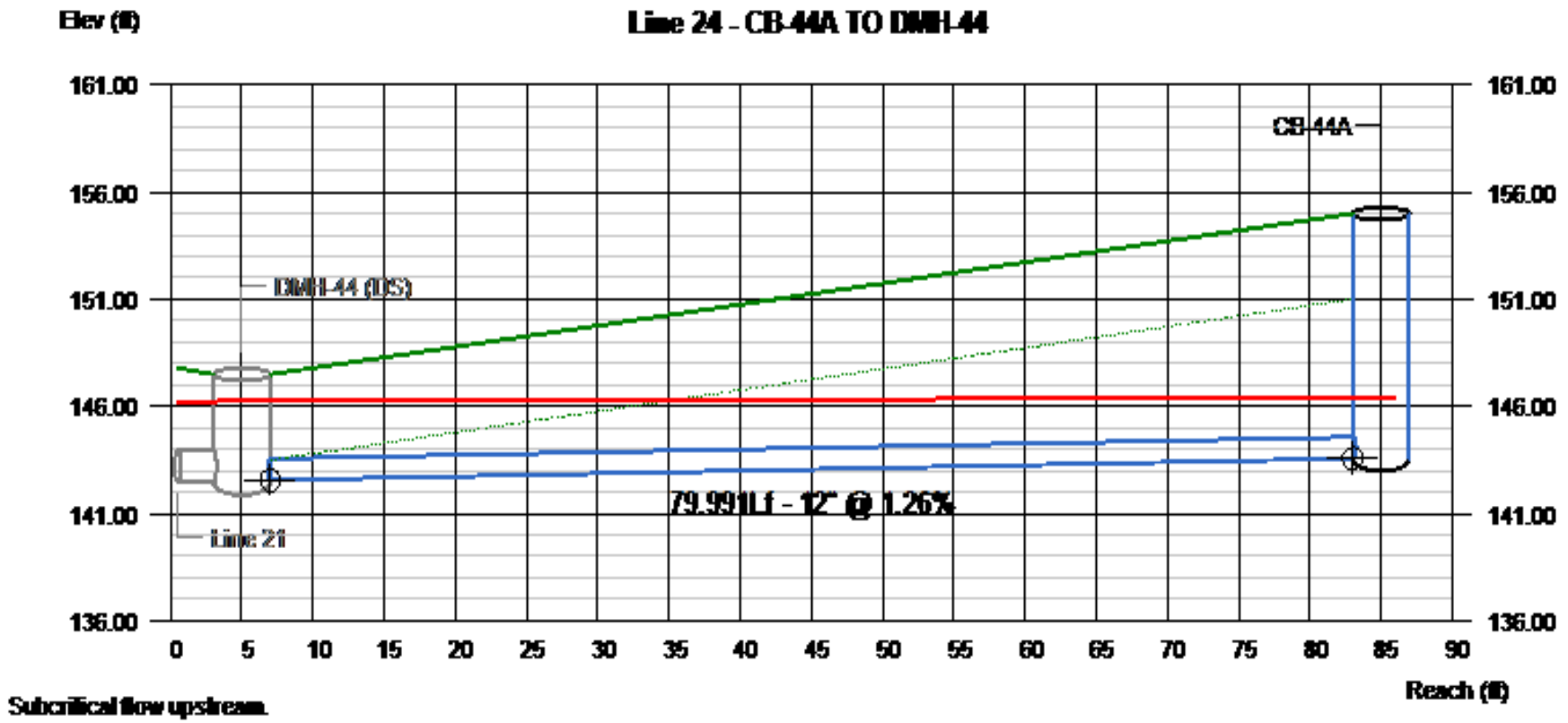

Elev (ft)
Line 20 - CB-41B TO DMH-41
DMH-41
CB-41B
148.00
146.00
144.00
142.00
140.00
138.00
22.48LF - 12" @ 0.76%
Line 18
0
5
10
15
20
25
30
35
Reach (ft)
Supercritical flow upstream.


Line 21 - DMH-44 TO DMH-46
Elev (ft)
DMH-46
DMH-44 (DS)
156.00
152.00
148.00
144.00
140.00
136.00
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
Reach (ft)
56.663 f - 18" @ 0.49%
Line 12
Line 22
Subcritical flow upstream.

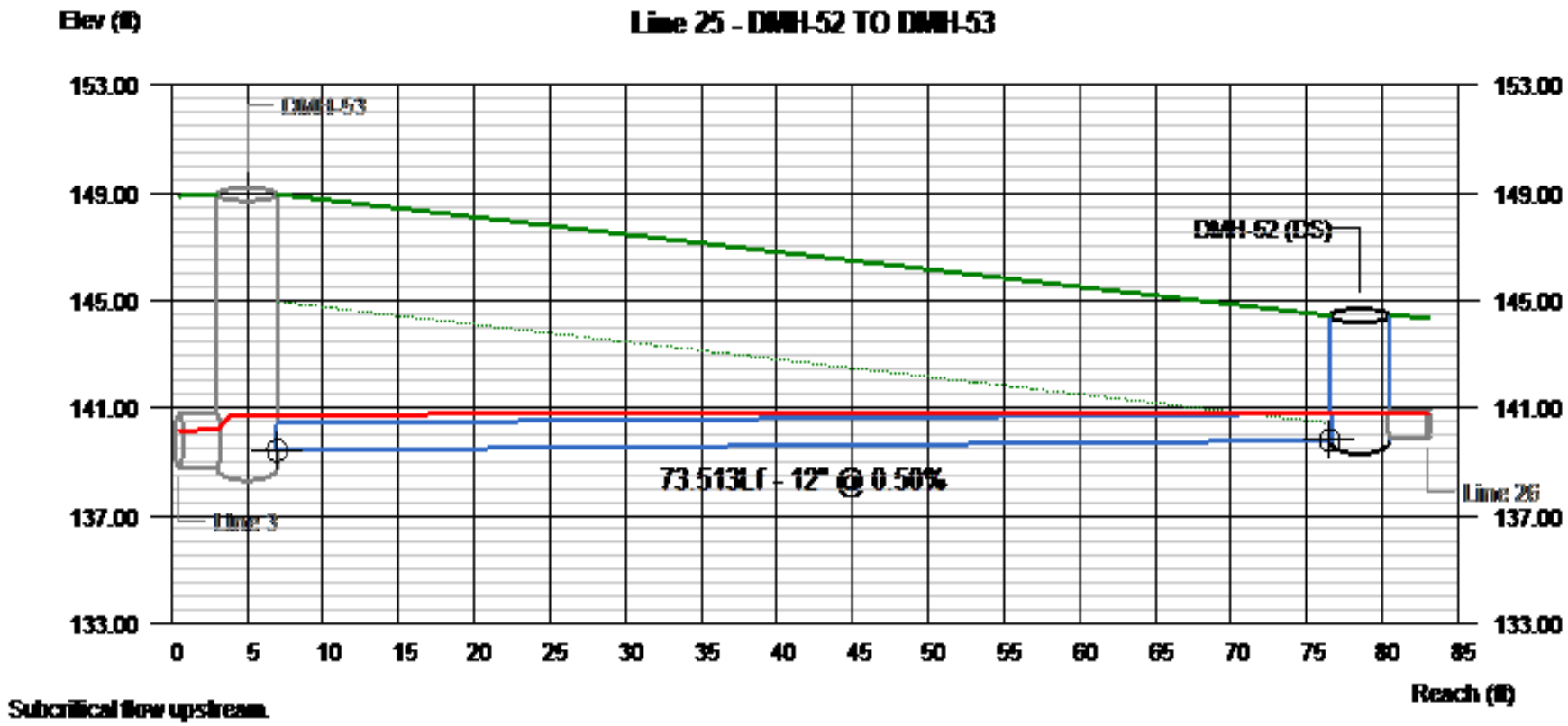


Subcritical flow upstream.

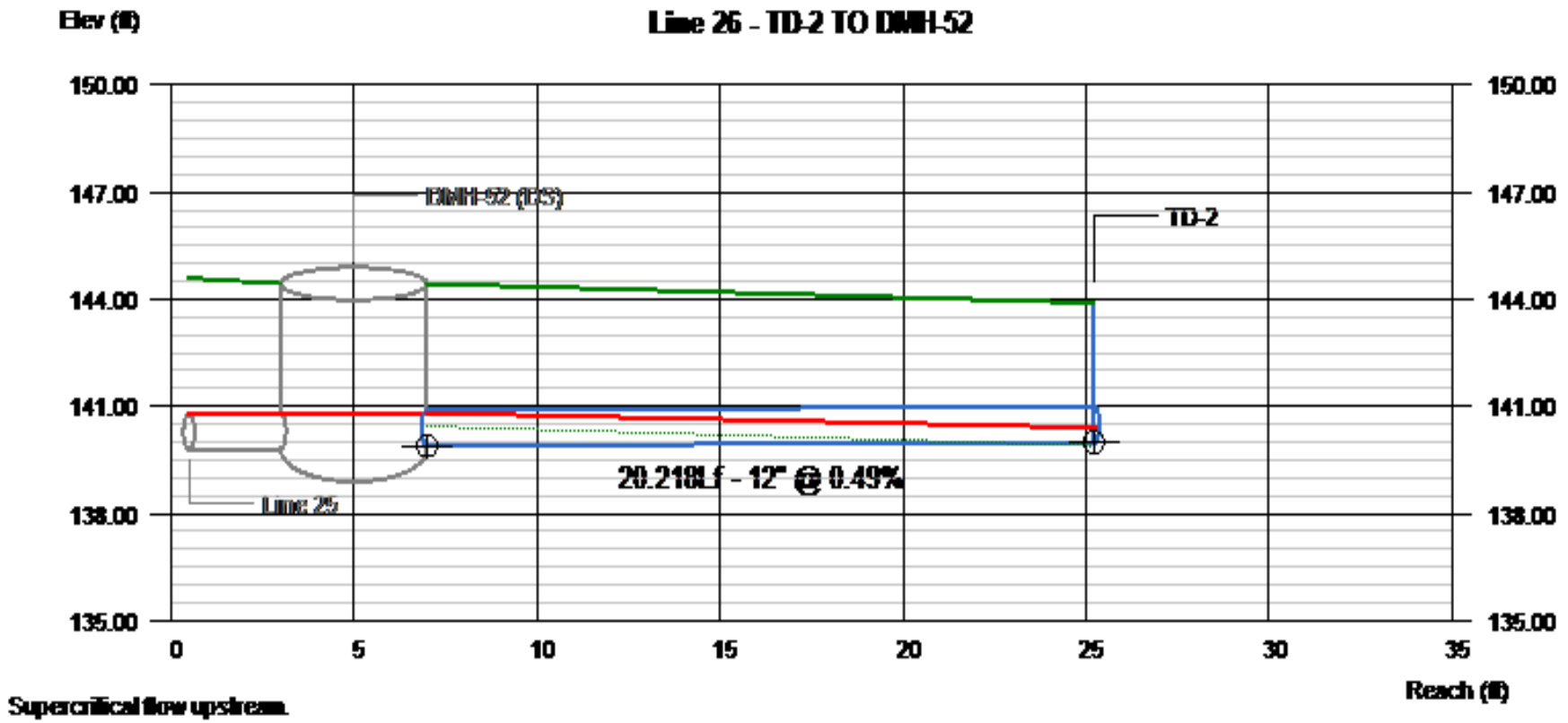

Elev (ft)
Line 23 - CB-448 TO DMH-44
153.00
150.00
147.00
144.00
141.00
138.00
0
5
10
15
20
25
30
35
40
45
50
55
60
Reach (ft)
CB-448
DMH-44 (BS)
47.911Lf - 12" @ 5.36%
Line: 21
Subcritical flow upstream.



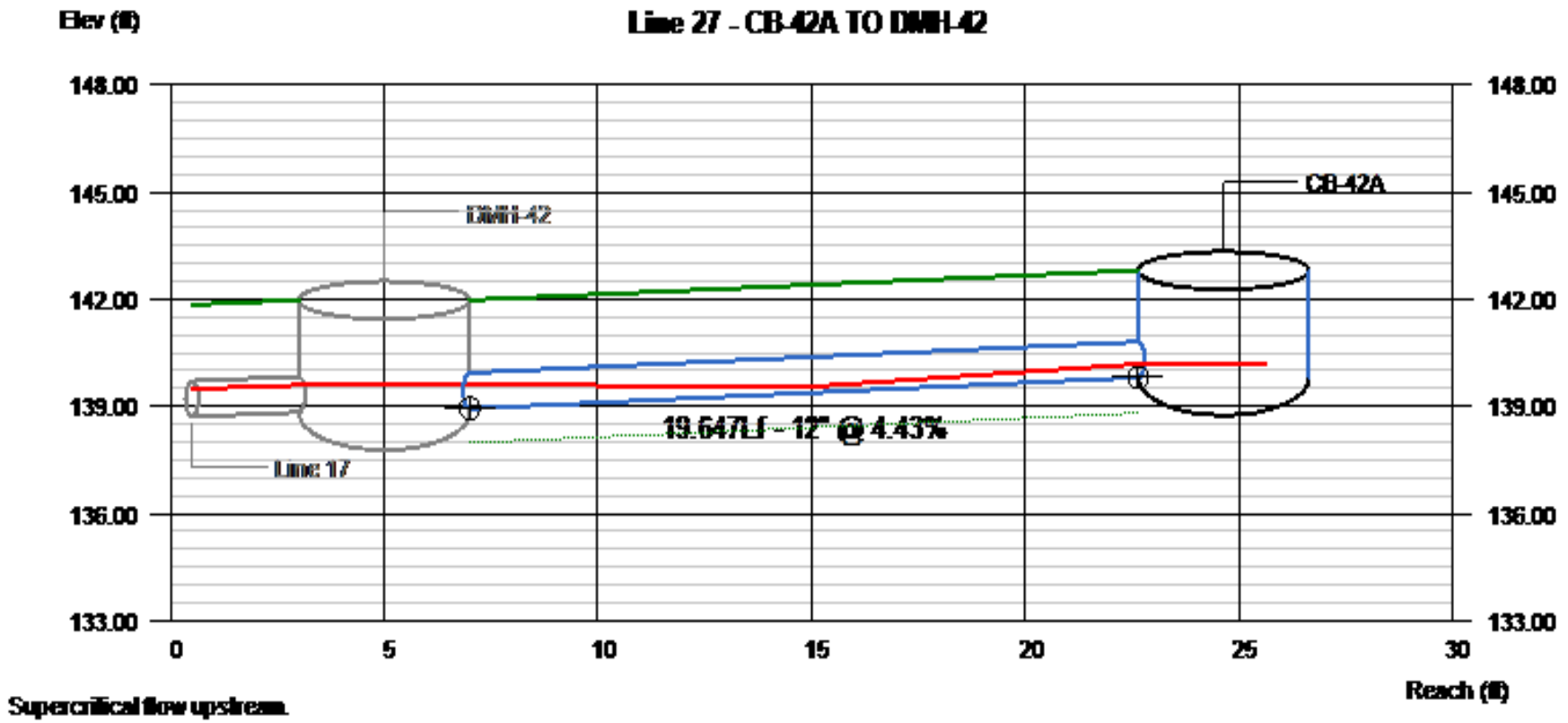
Subcritical flow upstream.



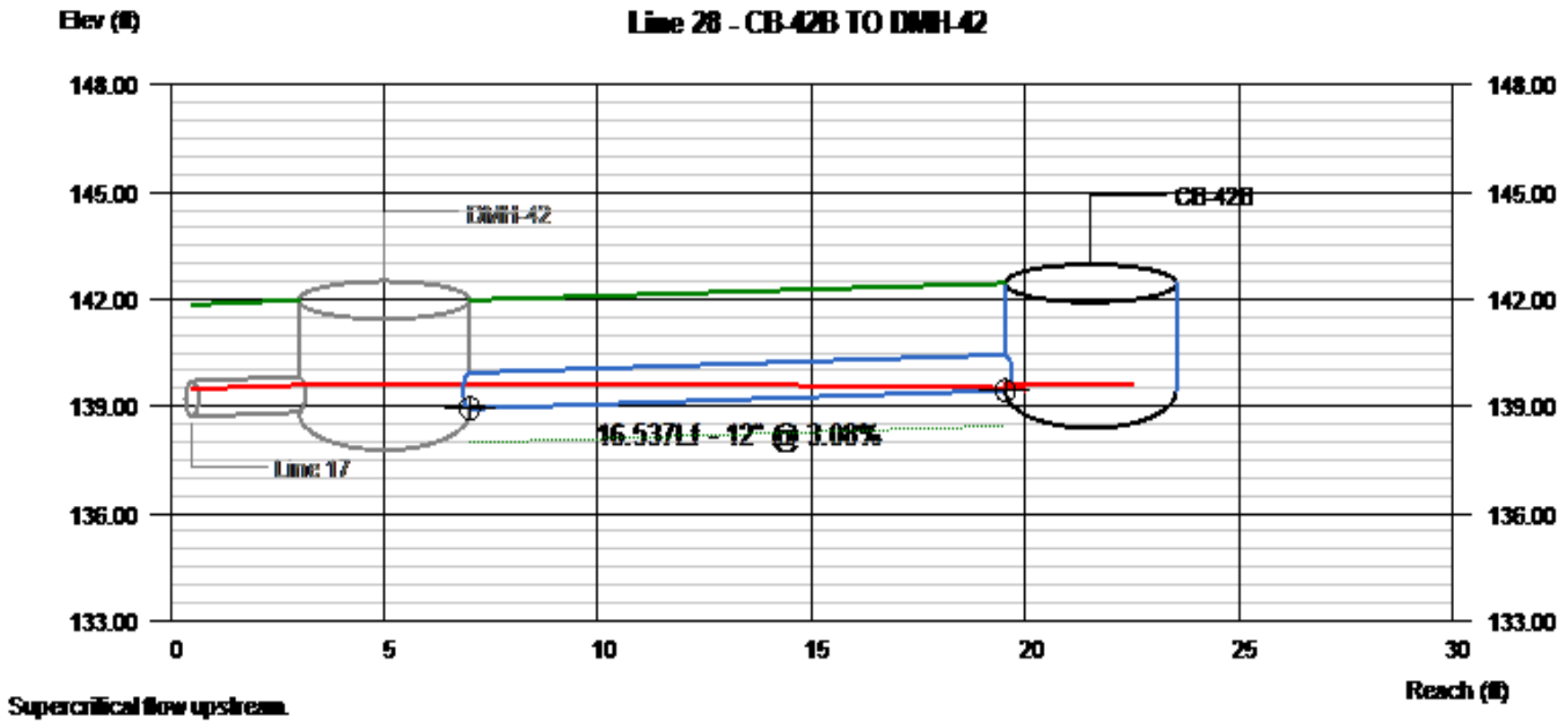
Subcritical flow upstream.



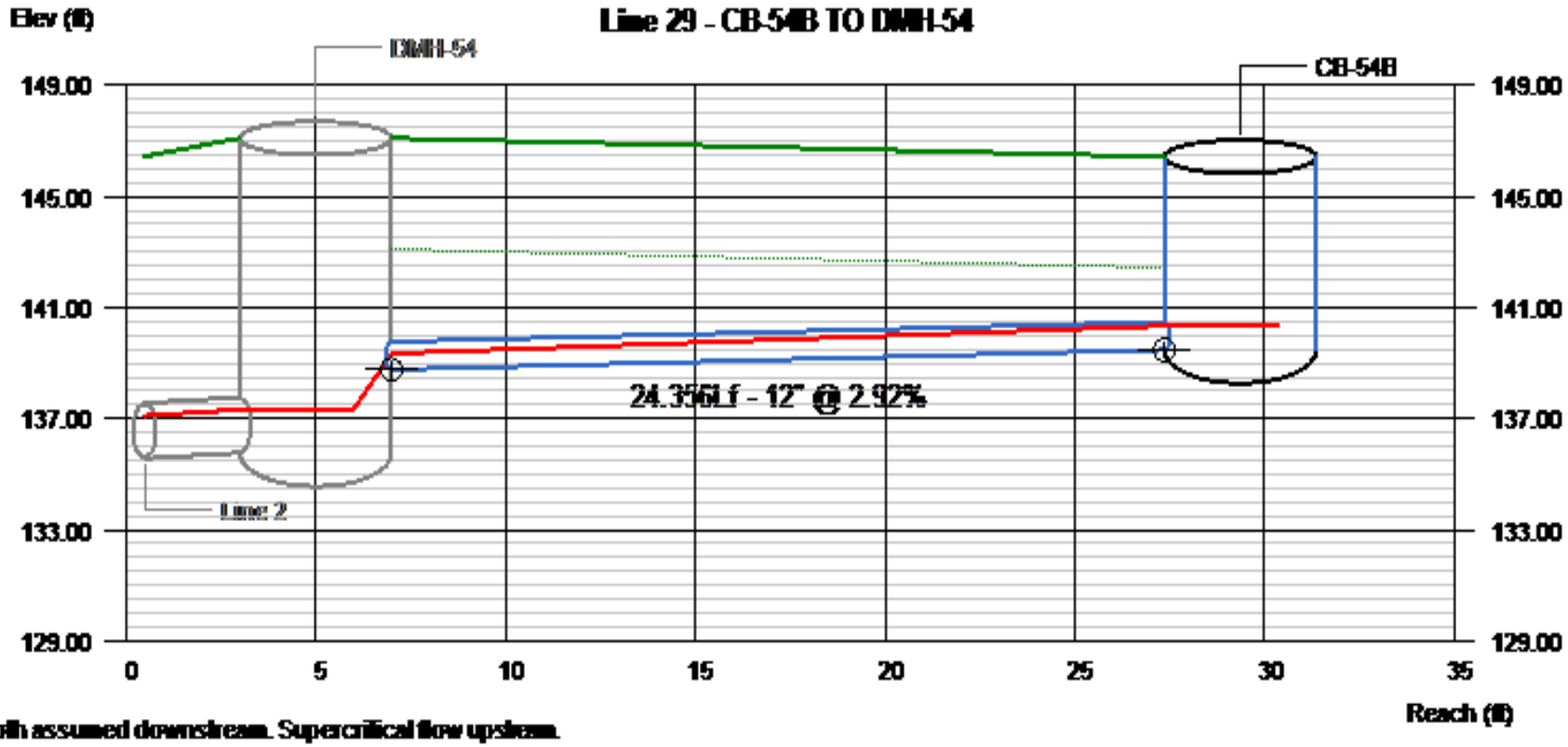
Supercritical flow upstream.



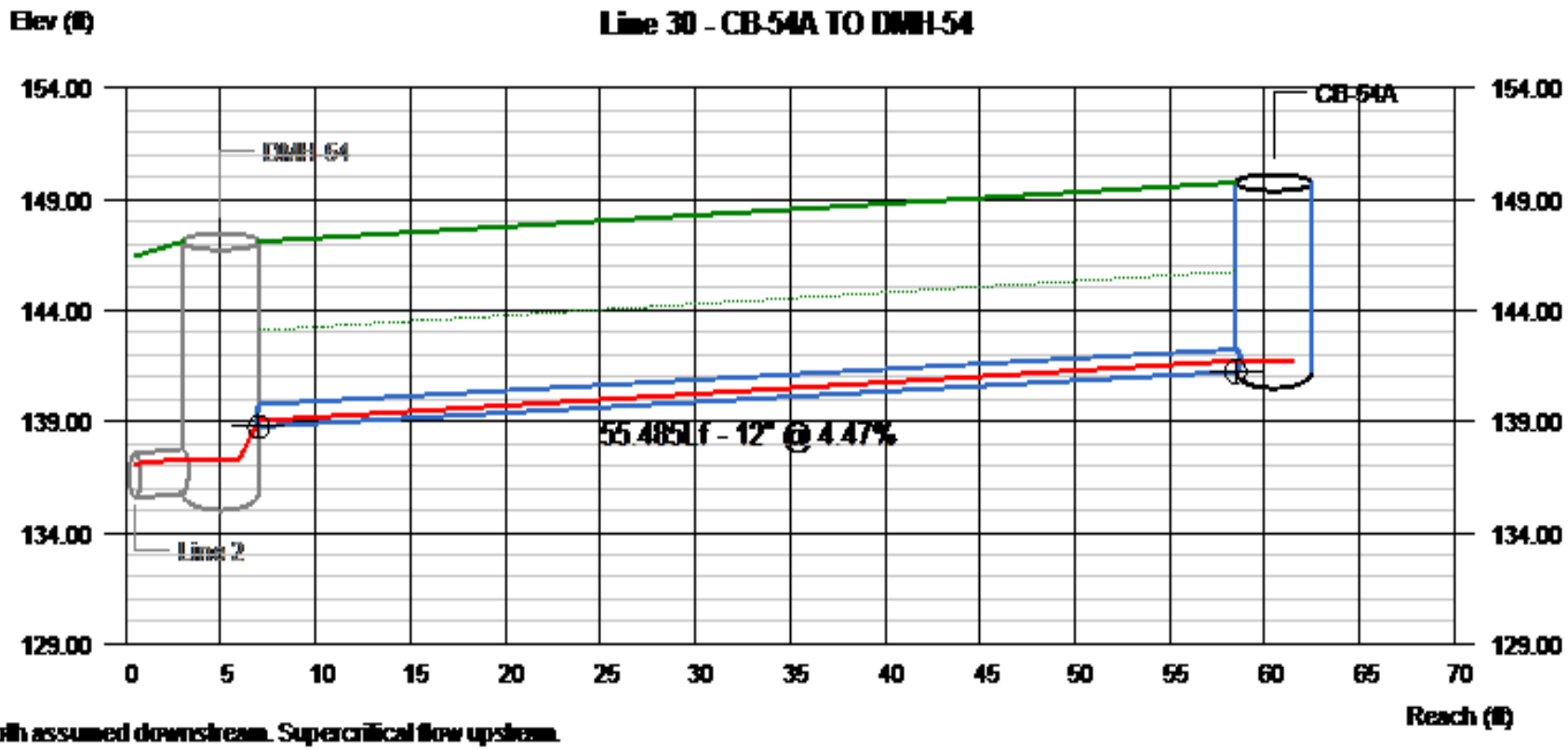
Supercritical flow upstream.



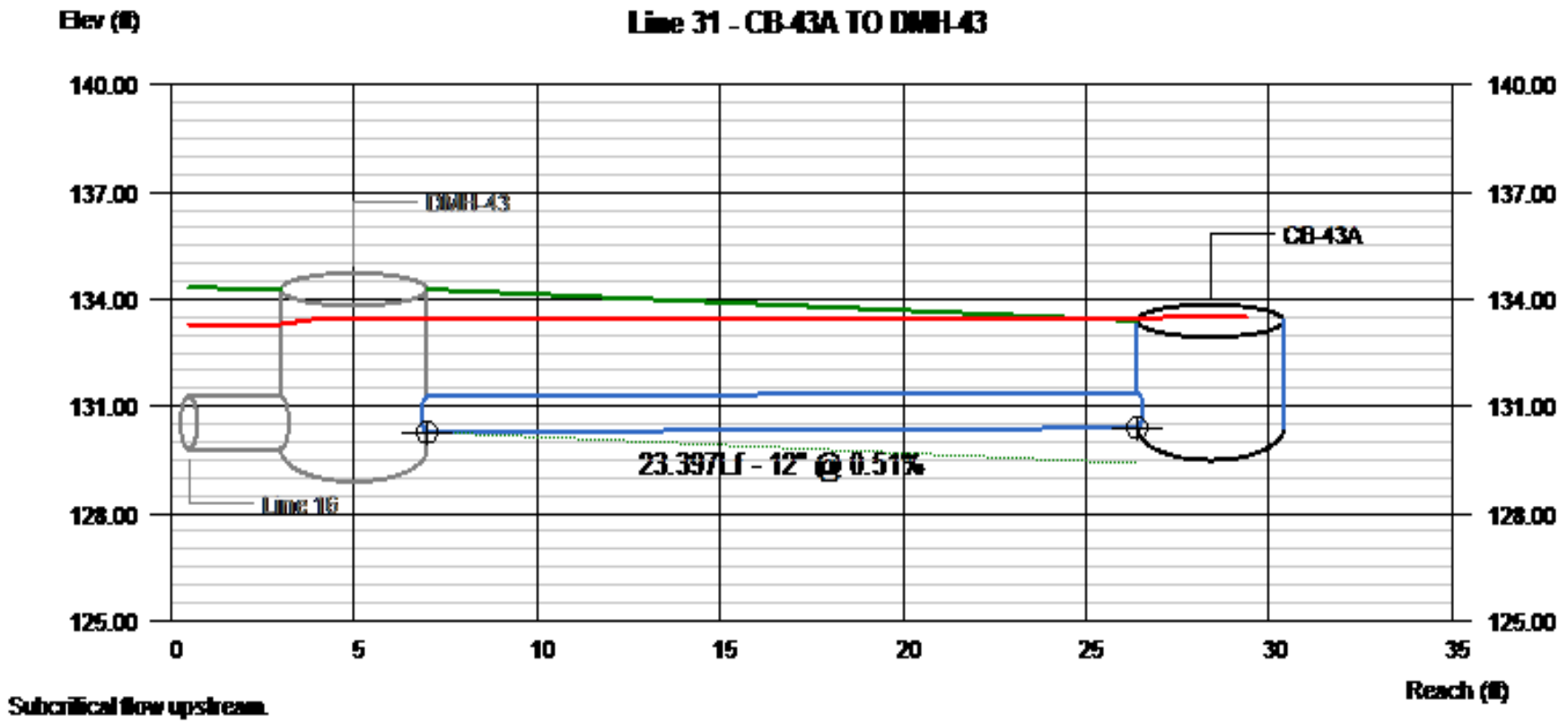
Supercritical flow upstream.



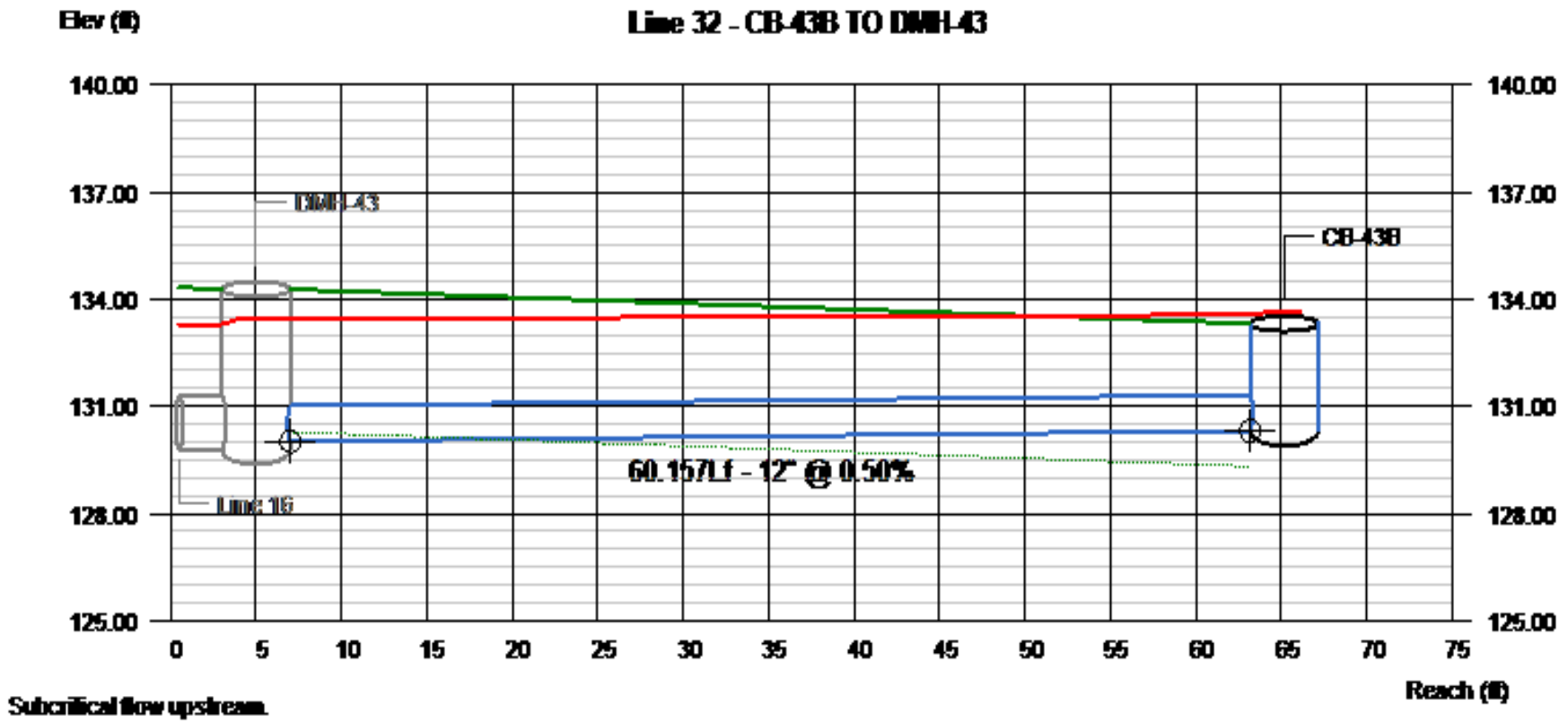
depth assumed downstream. Supercritical flow upstream.

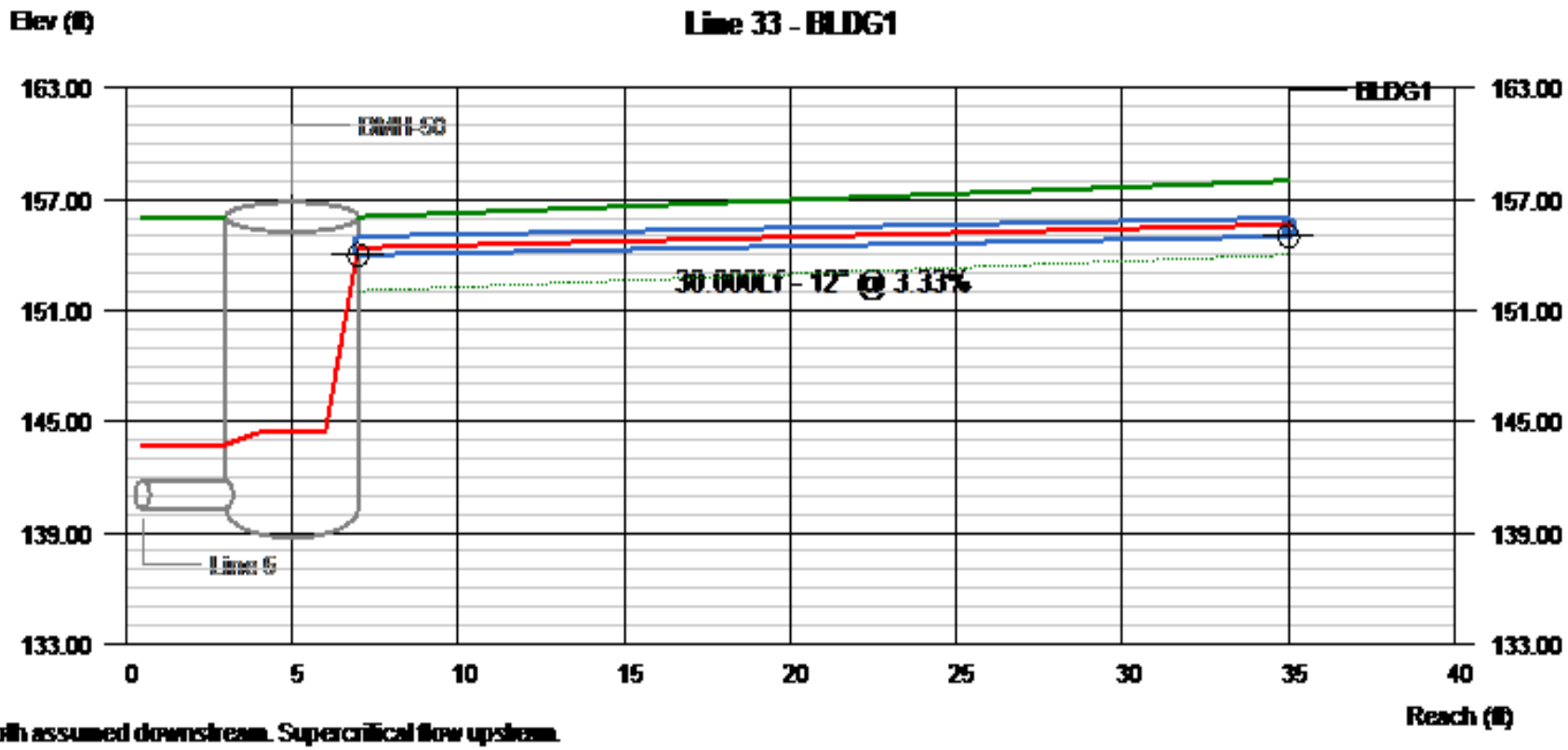


depth assumed downstream. Supercritical flow upstream.

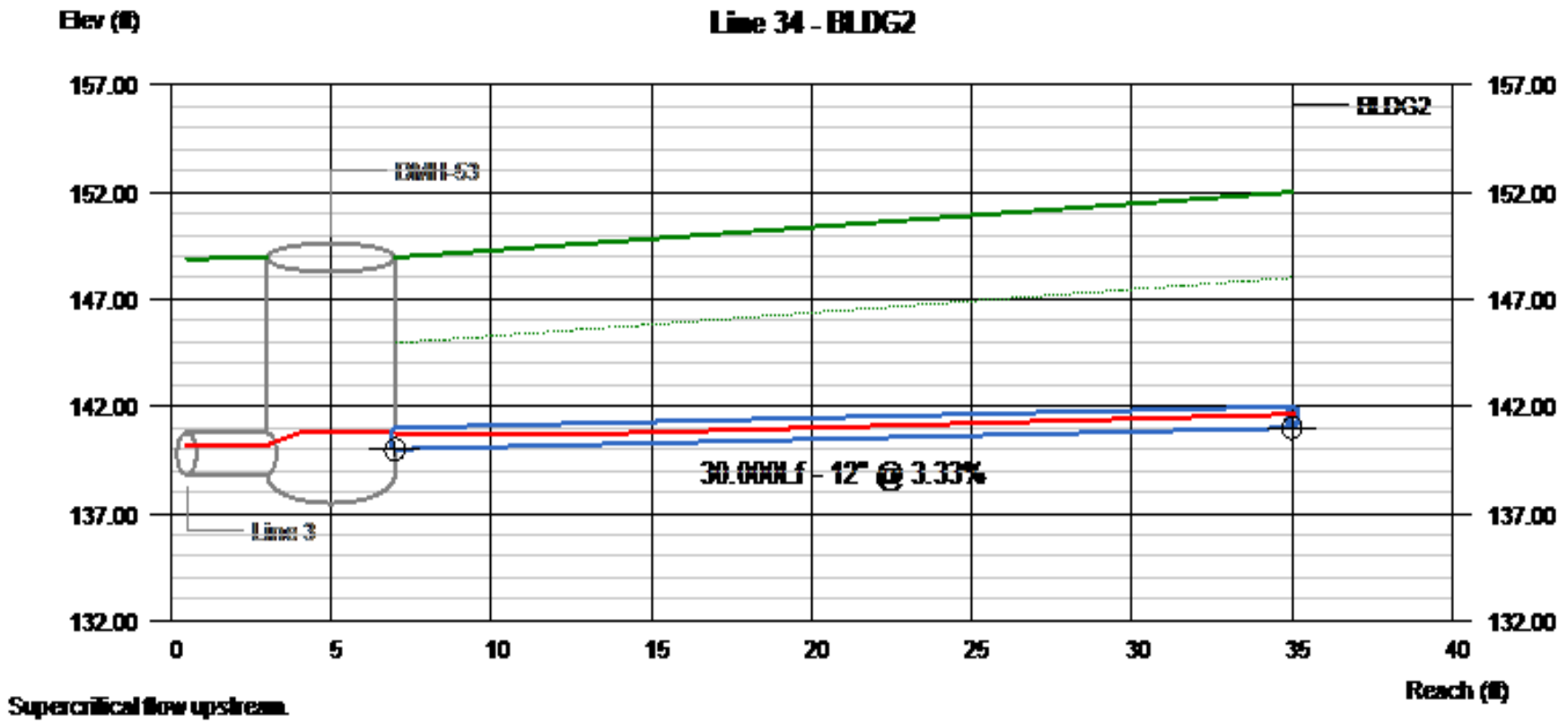


Subcritical flow upstream.


Elev (ft)
Line 32 - CB-43B TO DMH-43
140.00
137.00
134.00
131.00
128.00
125.00
DMH-43
CB-43B
Line 16
60.157Lf - 12" @ 0.50%
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
Reach (ft)
Subcritical flow upstream.

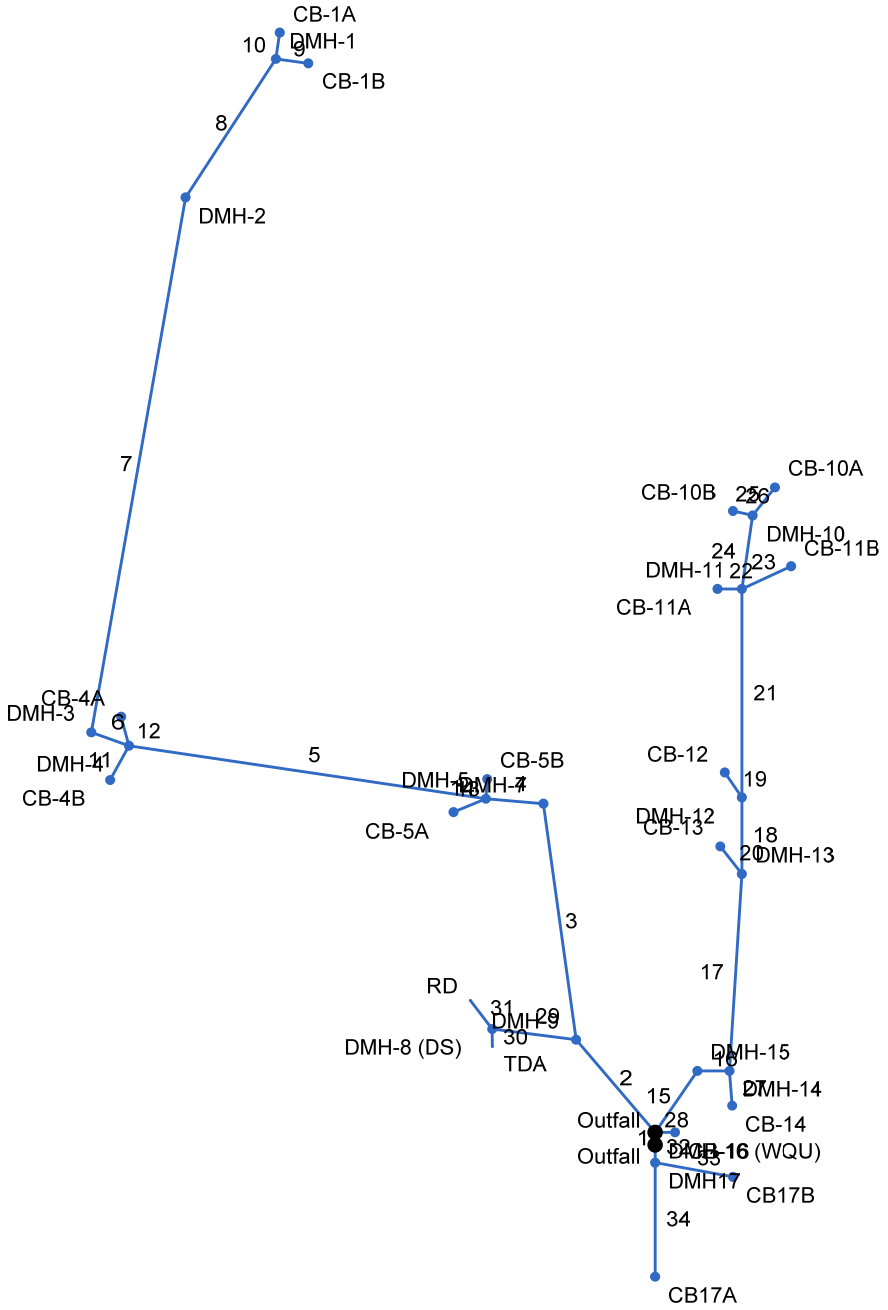


depth assumed downstream. Supercritical flow upstream.



Supercritical flow upstream.

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: System-3SIS.stm	Number of lines: 34	Date: 3/9/2020

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	7.007	-90.000	MH	0.00	0.00	0.00	6.0	145.50	7.42	146.02	18	Cir	0.012	1.00	157.24	DMH-16 TO SIS-3
2	1	68.345	-40.284	MH	0.00	0.00	0.00	6.0	146.27	0.50	146.61	18	Cir	0.012	0.72	157.53	DMH-9 TO DMH-16
3	2	133.683	32.429	MH	0.00	0.00	0.00	6.0	149.61	2.12	152.45	18	Cir	0.012	0.98	159.82	DMH-7 TO DMH-9
4	3	32.290	-77.320	MH	0.00	0.00	0.00	6.0	155.45	1.08	155.80	18	Cir	0.012	1.00	160.68	DMH-5 TO DMH-7
5	4	201.708	3.663	MH	0.00	0.00	0.00	6.0	156.50	4.47	165.51	12	Cir	0.012	0.95	170.09	DMH-4 TO DMH-5
6	5	22.374	11.386	MH	0.00	0.00	0.00	6.0	165.74	6.57	167.21	12	Cir	0.012	0.99	170.31	DMH-3 TO DMH-4
7	6	304.850	80.072	MH	0.00	0.00	0.00	6.0	167.31	1.67	172.39	12	Cir	0.012	0.45	177.65	DMH-2 TO DMH-3
8	7	92.583	23.121	MH	0.00	0.00	0.00	6.0	172.49	0.51	172.96	12	Cir	0.012	0.92	176.39	DMH-1 TO DMH-2
9	8	18.304	64.410	Grate	0.00	0.22	0.90	6.0	173.39	1.42	173.65	12	Cir	0.012	1.00	176.65	CB-1B TO DMH-1
10	8	14.837	-24.950	Grate	0.00	0.31	0.90	6.0	173.06	0.47	173.13	12	Cir	0.012	1.00	176.13	CB-1A TO DMH-1
11	5	21.878	-69.617	Grate	0.00	0.21	0.90	6.0	165.98	2.47	166.52	12	Cir	0.012	1.00	170.62	CB-4B TO DMH-4
12	5	16.770	66.405	Grate	0.00	0.57	0.90	6.0	165.61	6.44	166.69	12	Cir	0.012	1.00	170.86	CB-4A TO DMH-4
13	4	19.597	-27.537	Grate	0.00	0.28	0.90	6.0	156.57	2.65	157.09	12	Cir	0.012	1.00	161.19	CB-5A TO DMH-5
14	4	11.101	89.059	Grate	0.00	0.32	0.90	6.0	156.30	1.08	156.42	12	Cir	0.012	1.00	160.52	CB-5B TO DMH-5
15	1	41.930	34.270	MH	0.00	0.00	0.00	6.0	149.02	3.29	150.40	18	Cir	0.012	0.86	155.48	DMH-15 TO DMH-16
16	15	17.917	56.030	MH	0.00	0.00	0.00	6.0	150.50	0.56	150.60	18	Cir	0.012	1.00	155.28	DMH-14 TO DMH-15
17	16	110.850	-86.694	MH	0.00	0.00	0.00	6.0	150.70	0.50	151.25	18	Cir	0.012	0.71	157.20	DMH-13 TO DMH-14
18	17	42.820	-3.607	MH	0.00	0.00	0.00	6.0	151.35	0.58	151.60	18	Cir	0.012	0.62	157.73	DMH-12 TO DMH-13
19	18	16.972	-34.415	Grate	0.00	0.22	0.90	6.0	154.87	0.47	154.95	12	Cir	0.012	1.00	157.95	CB-12 TO DMH-12
20	17	19.625	-41.589	Grate	0.00	0.10	0.90	6.0	154.20	3.52	154.89	12	Cir	0.012	1.00	157.89	CB-13 TO DMH-13
21	18	117.159	0.000	MH	0.00	0.00	0.00	6.0	151.70	0.47	152.25	18	Cir	0.012	1.00	156.83	DMH-11 TO DMH-12
22	21	13.648	-90.000	Grate	0.00	0.78	0.40	6.0	153.83	3.00	154.24	12	Cir	0.012	1.00	157.24	CB-11A TO DMH-11
23	21	30.240	65.490	Grate	0.00	0.31	0.90	6.0	153.35	0.50	153.50	12	Cir	0.012	1.00	156.50	CB-11B TO DMH-11

Project File: System-3SIS.stm | Number of lines: 34 | Date: 3/9/2020

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
24	21	41.584	8.296	MH	0.00	0.00	0.00	6.0	152.35	0.60	152.60	18	Cir	0.012	1.00	156.44	DMH-10 TO DMH-11
25	24	20.197	29.925	Grate	0.00	0.44	0.90	6.0	153.32	0.50	153.42	12	Cir	0.012	1.00	156.42	CB-10A TO DMH-10
26	24	11.289	-85.431	Grate	0.00	0.66	0.40	6.0	153.13	0.53	153.19	12	Cir	0.012	1.00	156.19	CB-10B TO DMH-10
27	16	19.561	85.192	Grate	0.00	0.40	0.90	6.0	151.76	0.51	151.86	12	Cir	0.012	1.00	154.86	CB-14 TO DMH-14
28	1	11.134	90.002	Grate	0.00	0.19	0.90	6.0	149.02	7.99	149.91	12	Cir	0.012	1.00	157.02	CB-16 TO DMH-16
29	2	47.269	-42.387	MH	0.00	0.00	0.00	6.0	146.71	0.51	146.95	18	Cir	0.012	1.00	149.60	DMH-8 TO DMH-9
30	29	9.825	-97.619	None	0.00	0.28	0.90	6.0	146.95	0.51	147.00	12	Cir	0.012	1.00	149.35	TD-A TO DMH-8
31	29	20.000	45.000	None	0.00	0.40	0.90	6.0	147.05	4.75	148.00	12	Cir	0.012	1.00	149.50	RDA-DMH8
32	End	16.840	90.000	MH	0.00	0.00	0.00	6.0	145.50	9.98	147.18	12	Cir	0.012	0.99	160.02	DMH17-SIS3
33	32	44.268	-79.310	Grate	0.00	0.10	0.90	6.0	150.18	8.00	153.72	12	Cir	0.012	1.00	155.33	CB17B-DMH17
34	32	64.087	0.000	Grate	0.00	0.06	0.90	6.0	150.18	7.36	154.90	12	Cir	0.012	1.00	159.09	CB17A-DMH17

My Report

Line No.	Line ID	Flow Rate (cfs)	Line Length (ft)	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Q Byp (cfs)	Byp Ln No	Minor Loss (ft)	HGL Jnct (ft)	DnStm Ln No	Junct Type	
1	DMH-16 TO SIS-3	23.70	7.007	145.50	146.02	7.42	146.48	147.50	....	n/a	2.81	147.50	Outfall	MH	
2	DMH-9 TO DMH-16	12.63	68.345	146.27	146.61	0.50	147.77	148.61	....	n/a	0.57	149.19	1	MH	
3	DMH-7 TO DMH-9	9.48	133.683	149.61	152.45	2.12	150.42	153.64	....	n/a	n/a	153.64	2	MH	
4	DMH-5 TO DMH-7	9.51	32.290	155.45	155.80	1.08	156.47	156.99	....	n/a	0.62	156.99	3	MH	
5	DMH-4 TO DMH-5	6.63	201.708	156.50	165.51	4.47	157.18	166.48	....	n/a	1.07	166.48	4	MH	
6	DMH-3 TO DMH-4	2.69	22.374	165.74	167.21	6.57	166.48	167.91 j	....	n/a	n/a	167.91	5	MH	
7	DMH-2 TO DMH-3	2.86	304.850	167.31	172.39	1.67	167.91	173.11	....	n/a	0.15	173.11	6	MH	
8	DMH-1 TO DMH-2	2.91	92.583	172.49	172.96	0.51	173.38	173.85	....	n/a	0.22	174.07	7	MH	
9	CB-1B TO DMH-1	1.22	18.304	173.39	173.65	1.42	174.07	174.12 j	0.00	Sag	n/a	174.12	8	Grate	
10	CB-1A TO DMH-1	1.72	14.837	173.06	173.13	0.47	174.07	174.10	0.00	Sag	0.08	174.17	8	Grate	
11	CB-4B TO DMH-4	1.16	21.878	165.98	166.52	2.47	166.48	166.97 j	0.20	13	n/a	166.97	5	Grate	
12	CB-4A TO DMH-4	3.16	16.770	165.61	166.69	6.44	166.48	167.45 j	1.21	14	n/a	167.45	5	Grate	
13	CB-5A TO DMH-5	1.55	19.597	156.57	157.09	2.65	156.99	157.62	0.45	30	n/a	157.62	4	Grate	
14	CB-5B TO DMH-5	1.77	11.101	156.30	156.42	1.08	156.99	156.99 j	1.12	19	n/a	156.99	4	Grate	
15	DMH-15 TO DMH-16	10.98	41.930	149.02	150.40	3.29	149.80	151.67	....	n/a	n/a	151.67	1	MH	
16	DMH-14 TO DMH-15	11.01	17.917	150.50	150.60	0.56	152.00	152.17	....	n/a	0.60	152.77	15	MH	
17	DMH-13 TO DMH-14	9.06	110.850	150.70	151.25	0.50	152.77	153.47	....	n/a	0.29	153.76	16	MH	
18	DMH-12 TO DMH-13	8.58	42.820	151.35	151.60	0.58	153.76	154.01	....	n/a	0.23	154.24	17	MH	
19	CB-12 TO DMH-12	1.22	16.972	154.87	154.95	0.47	155.35	155.43	0.00	Sag	0.17	155.60	18	Grate	
20	CB-13 TO DMH-13	0.55	19.625	154.20	154.89	3.52	154.39	155.20	0.03	27	0.11	155.20	17	Grate	
21	DMH-11 TO DMH-12	7.56	117.159	151.70	152.25	0.47	154.24	154.75	....	n/a	0.28	155.04	18	MH	
22	CB-11A TO DMH-11	1.92	13.648	153.83	154.24	3.00	155.04	155.04	0.00	Sag	0.13	155.16	21	Grate	
23	CB-11B TO DMH-11	1.72	30.240	153.35	153.50	0.50	155.04	155.10	0.44	Offsite	0.07	155.17	21	Grate	

Project File: System-3SIS.stm | Number of lines: 34 | Date: 3/9/2020

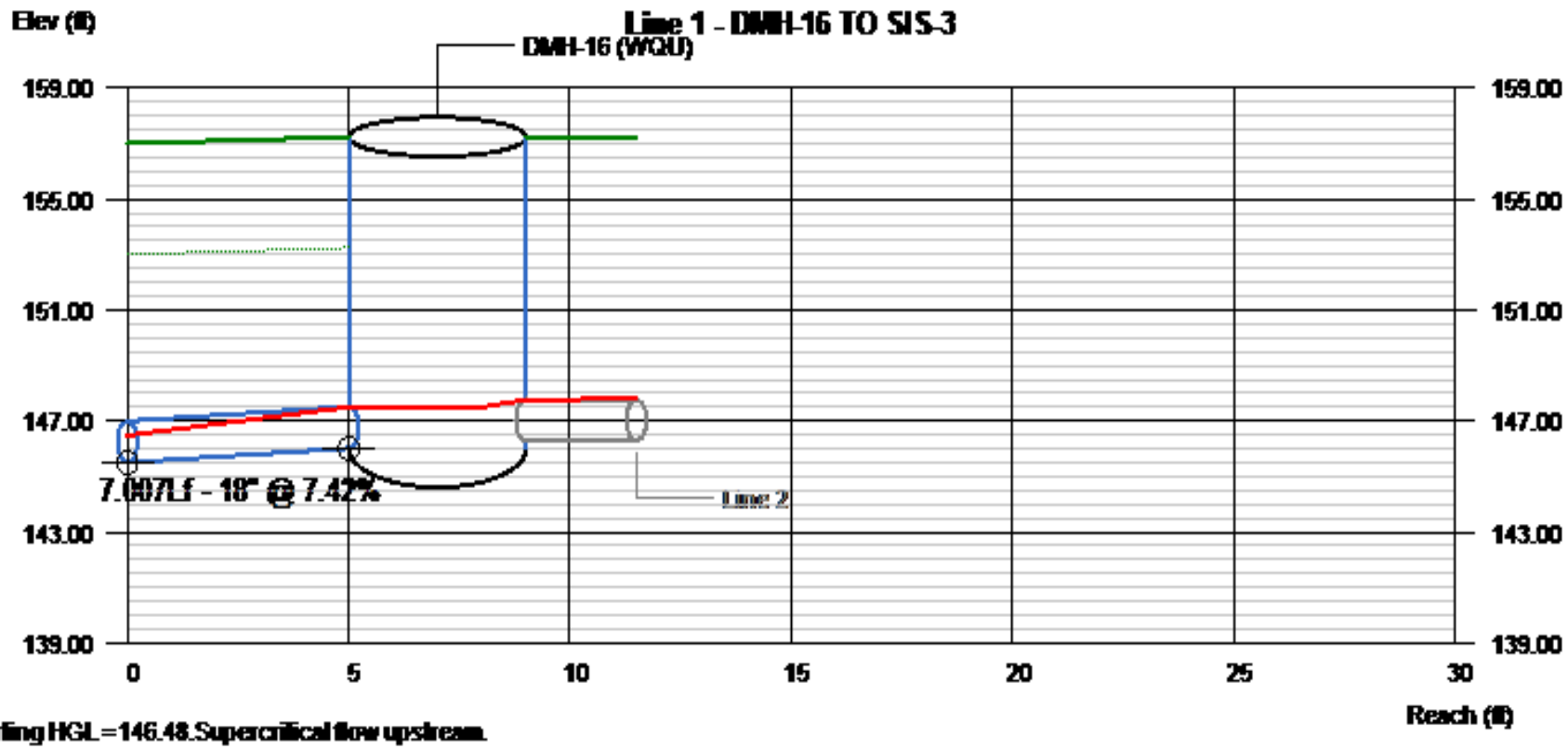
NOTES: ** Critical depth

My Report

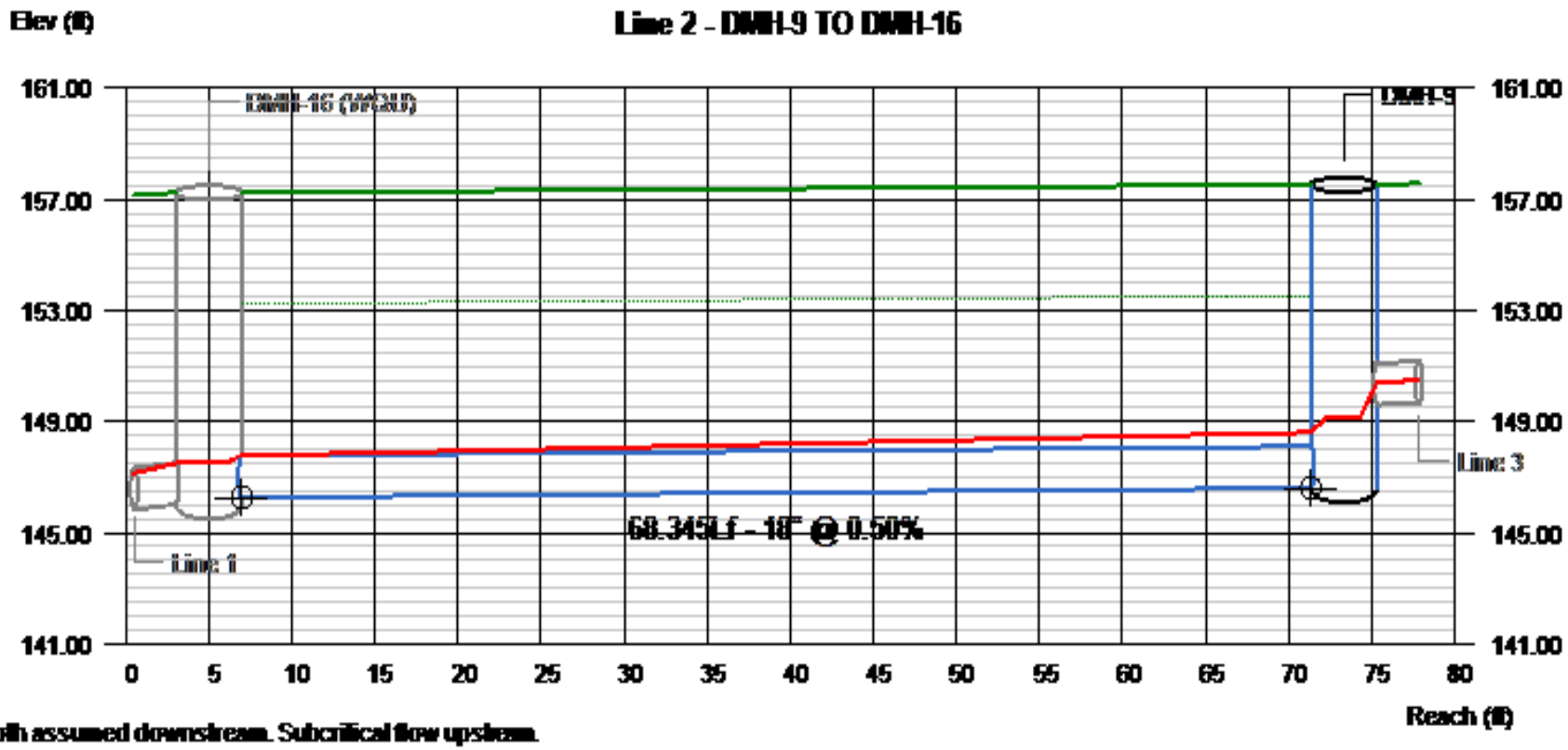
Line No.	Line ID	Flow Rate (cfs)	Line Length (ft)	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Q Byp (cfs)	Byp Ln No	Minor Loss (ft)	HGL Jnct (ft)	DnStm Ln No	Junct Type
24	DMH-10 TO DMH-11	4.04	41.584	152.35	152.60	0.60	155.04	155.09	....	n/a	0.08	155.17	21	MH
25	CB-10A TO DMH-10	2.44	20.197	153.32	153.42	0.50	155.17	155.25	0.00	Sag	0.15	155.40	24	Grate
26	CB-10B TO DMH-10	1.62	11.289	153.13	153.19	0.53	155.17	155.19	0.00	Sag	0.07	155.26	24	Grate
27	CB-14 TO DMH-14	2.21	19.561	151.76	151.86	0.51	152.77	152.83	0.00	Sag	0.13	152.96	16	Grate
28	CB-16 TO DMH-16	1.05	11.134	149.02	149.91	7.99	149.23	150.34	0.17	27	n/a	150.34	1	Grate
29	DMH-8 TO DMH-9	3.74	47.269	146.71	146.95	0.51	149.19	149.24	....	n/a	0.07	149.31	2	MH
30	TD-A TO DMH-8	1.55	9.825	146.95	147.00	0.51	149.31	149.32	....	n/a	0.06	149.38	29	None
31	RDA-DMH8	2.21	20.000	147.05	148.00	4.75	149.31	149.37	....	n/a	0.12	149.50	29	None
32	DMH17-SIS3	0.80	16.840	145.50	147.18	9.98	145.67	147.55	....	n/a	n/a	147.55	Outfall	MH
33	CB17B-DMH17	0.55	44.268	150.18	153.72	8.00	150.33	154.03	0.03	27	0.11	154.03	32	Grate
34	CB17A-DMH17	0.33	64.087	150.18	154.90	7.36	150.30	155.14	0.00	Offsite	n/a	155.14	32	Grate

Project File: System-3SIS.stm | Number of lines: 34 | Date: 3/9/2020

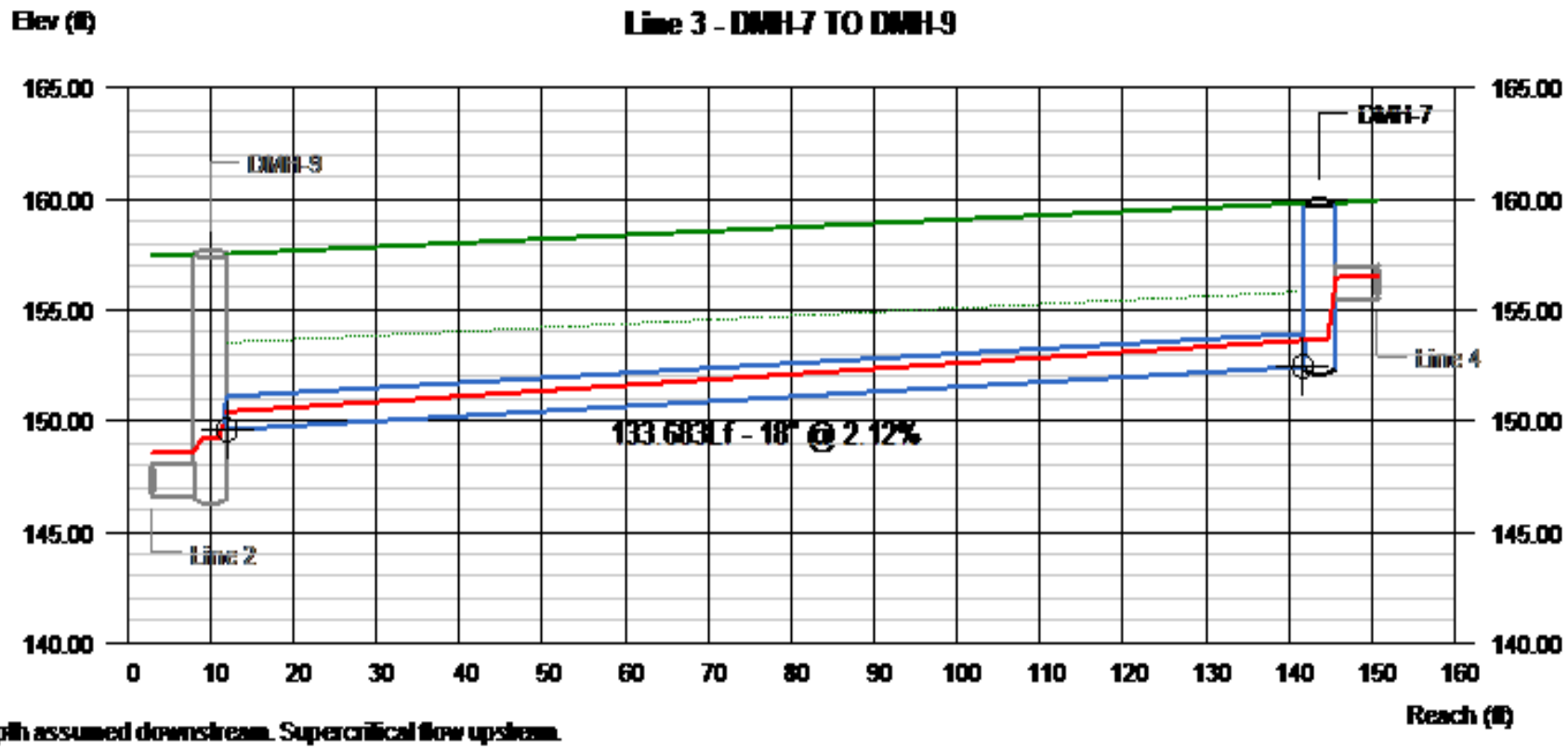
NOTES: ** Critical depth



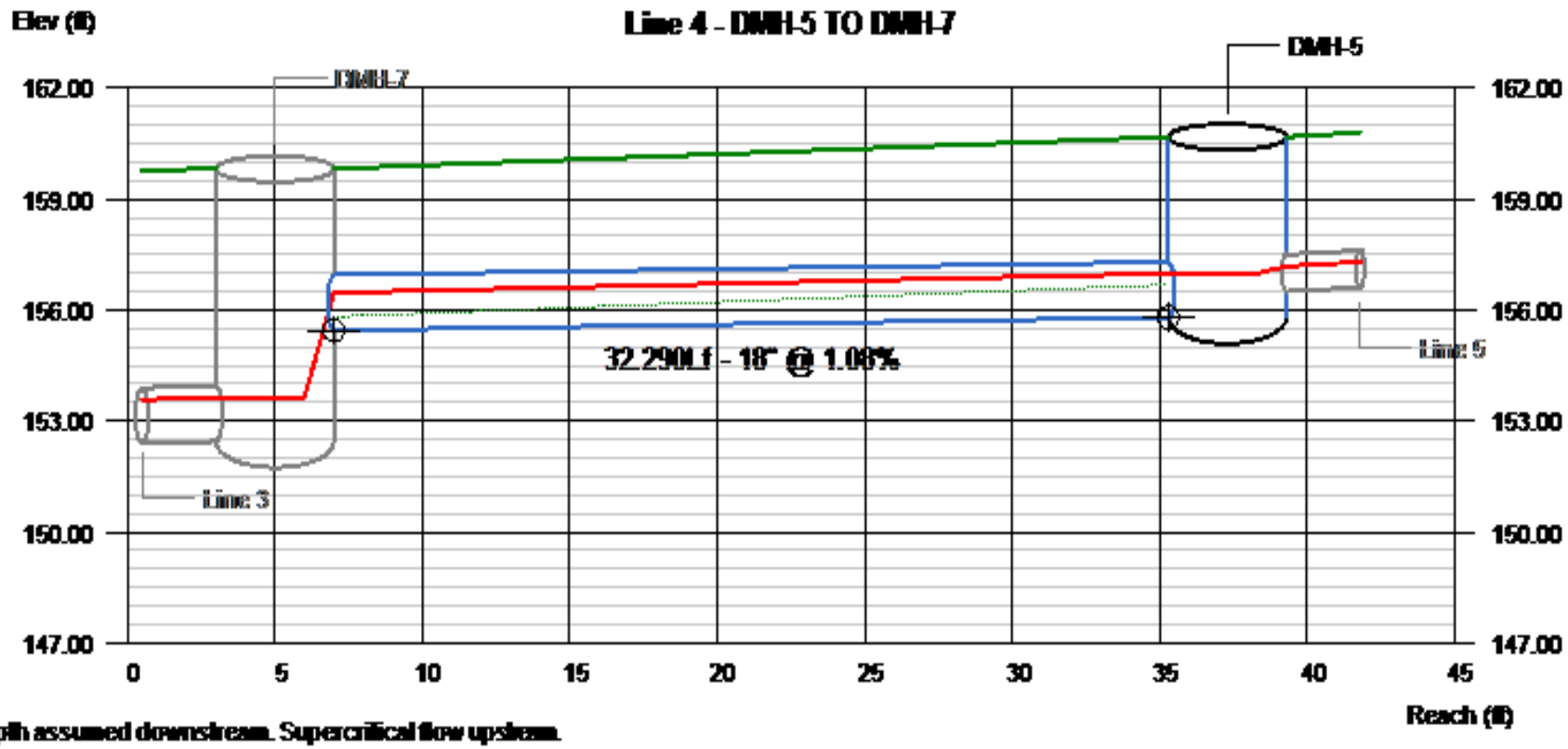
Starting HGL = 146.48. Supercritical flow upstream.



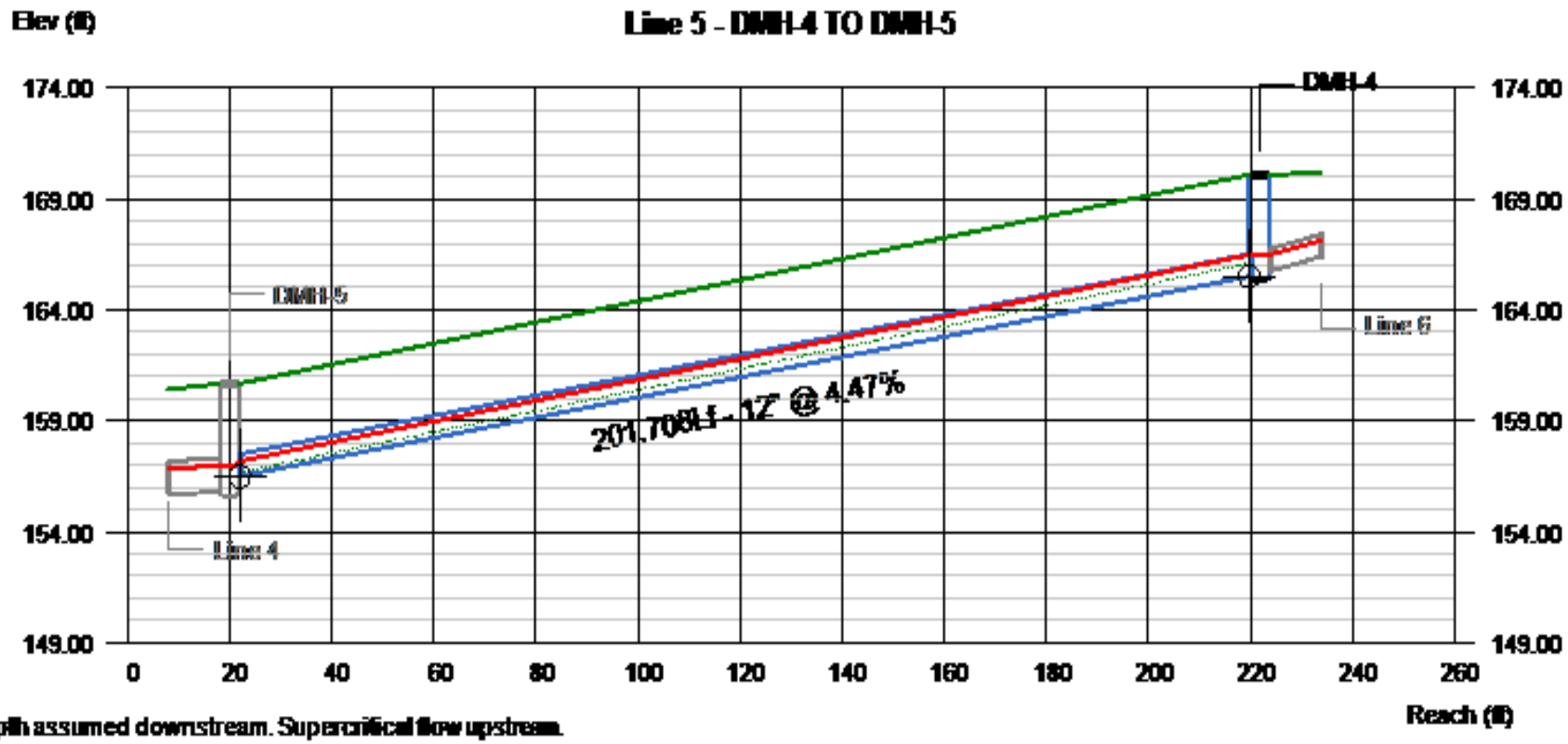
depth assumed downstream. Subcritical flow upstream.



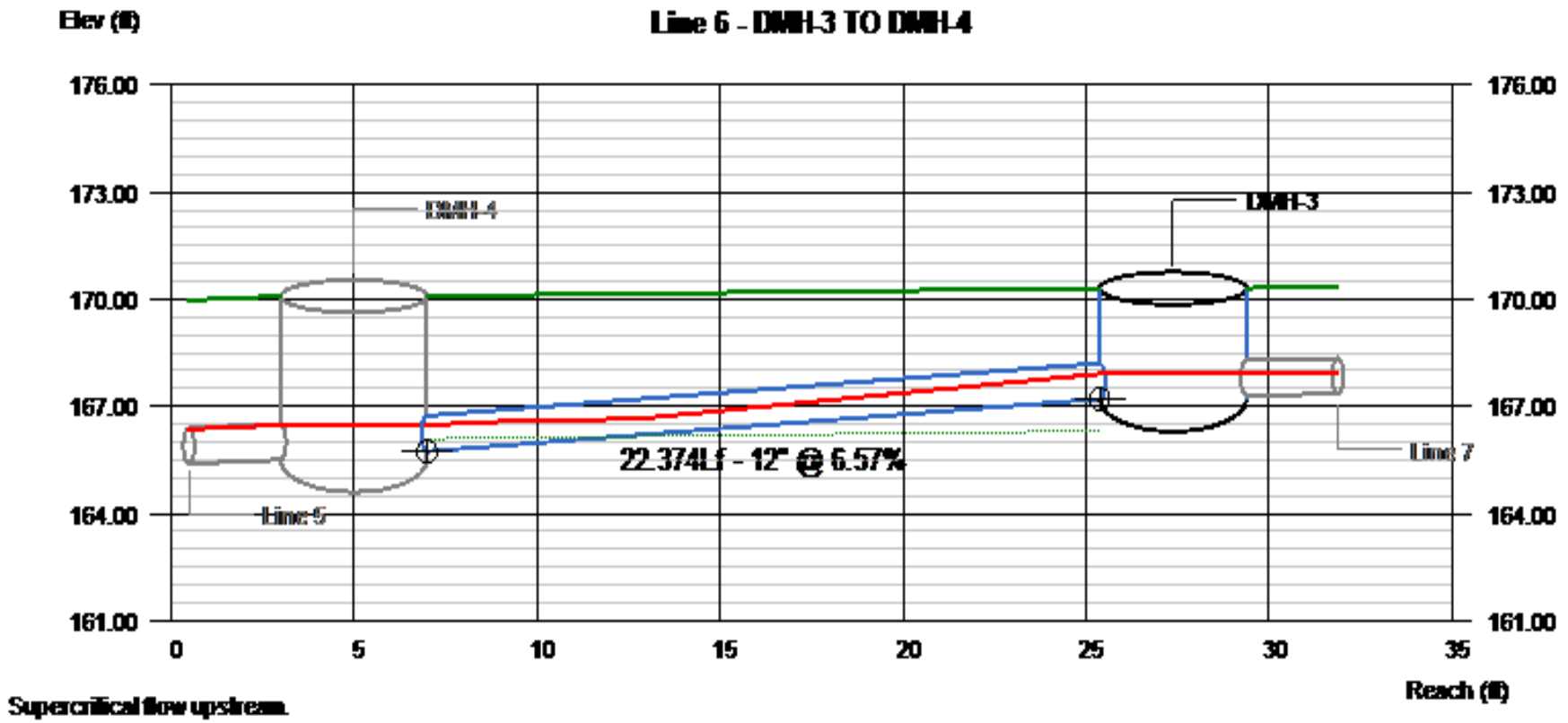
depth assumed downstream. Supercritical flow upstream.

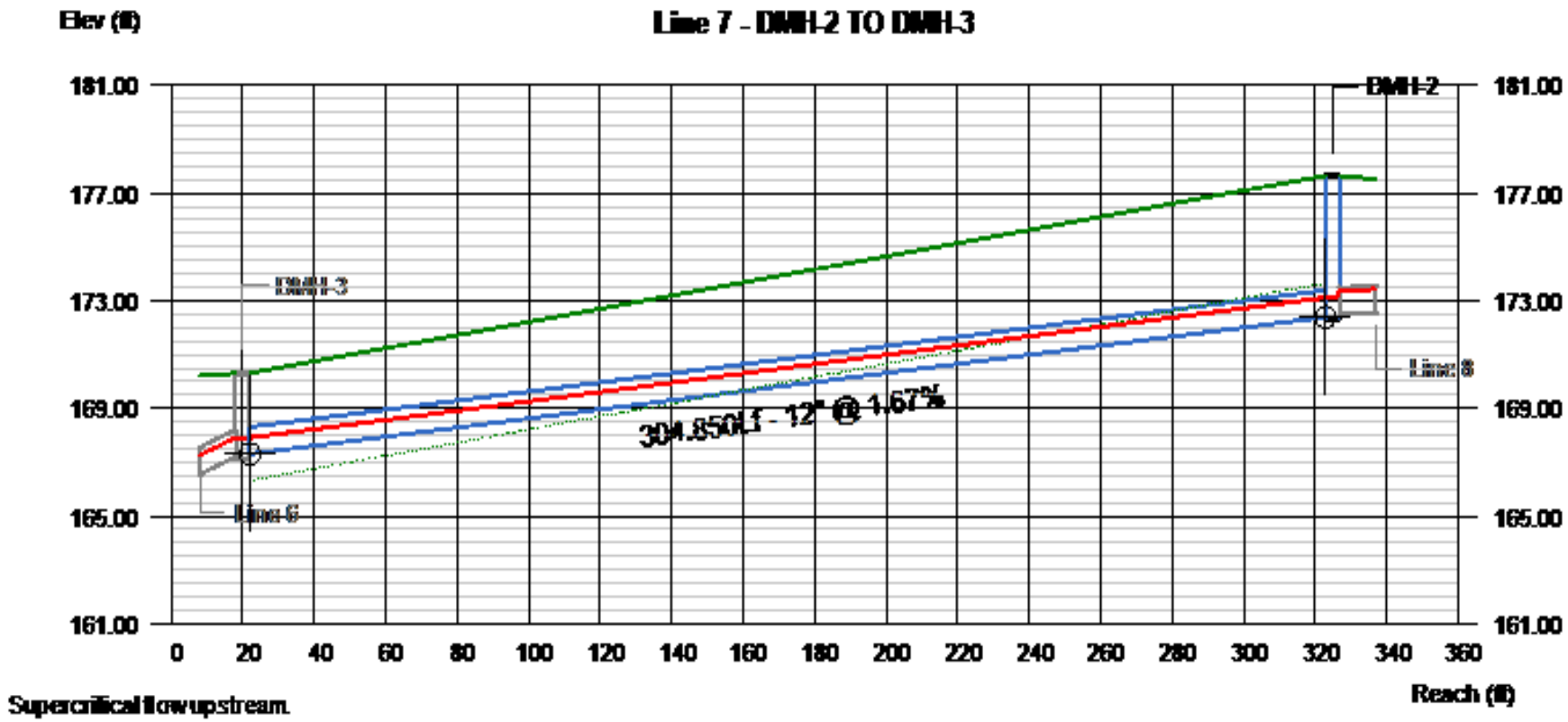


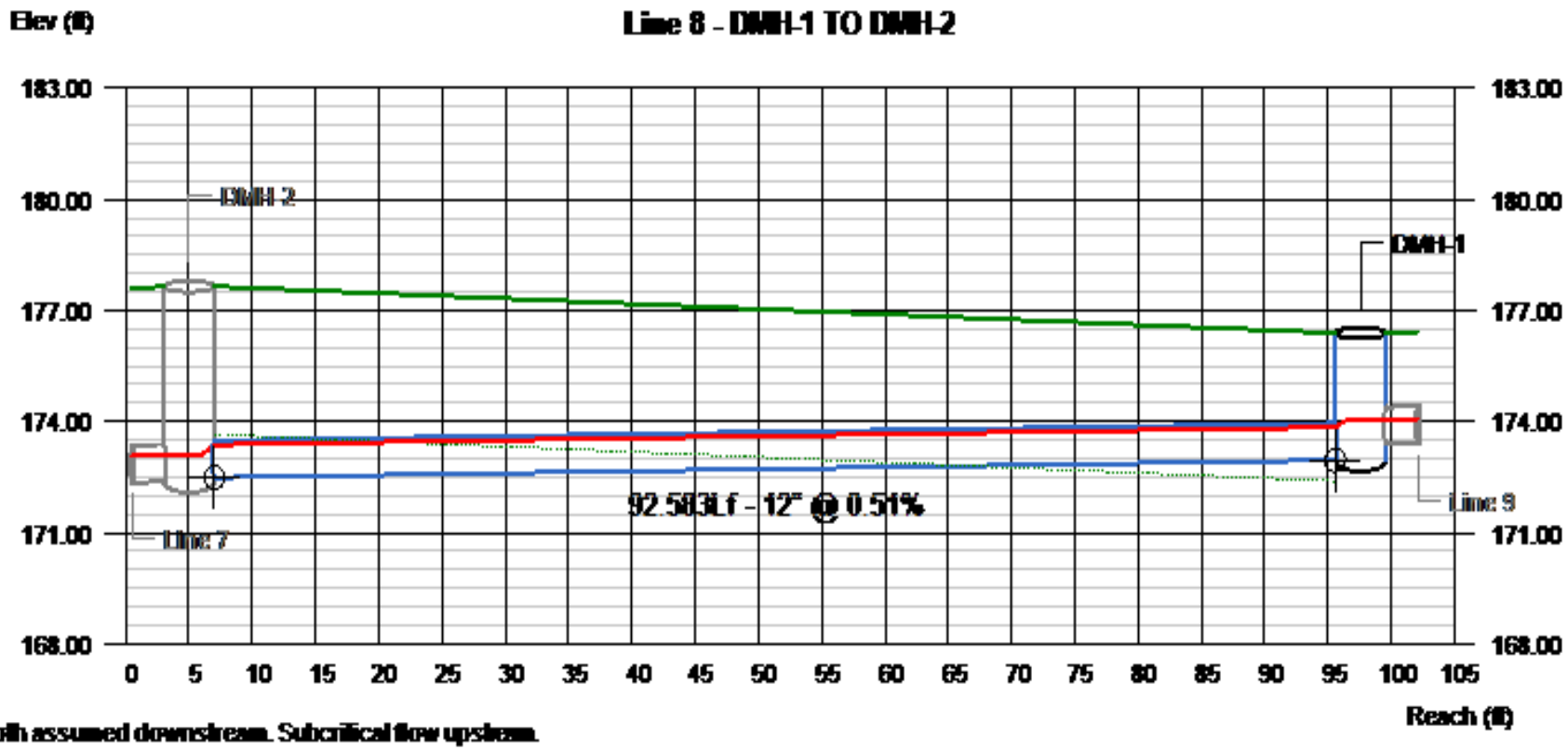
depth assumed downstream. Supercritical flow upstream.



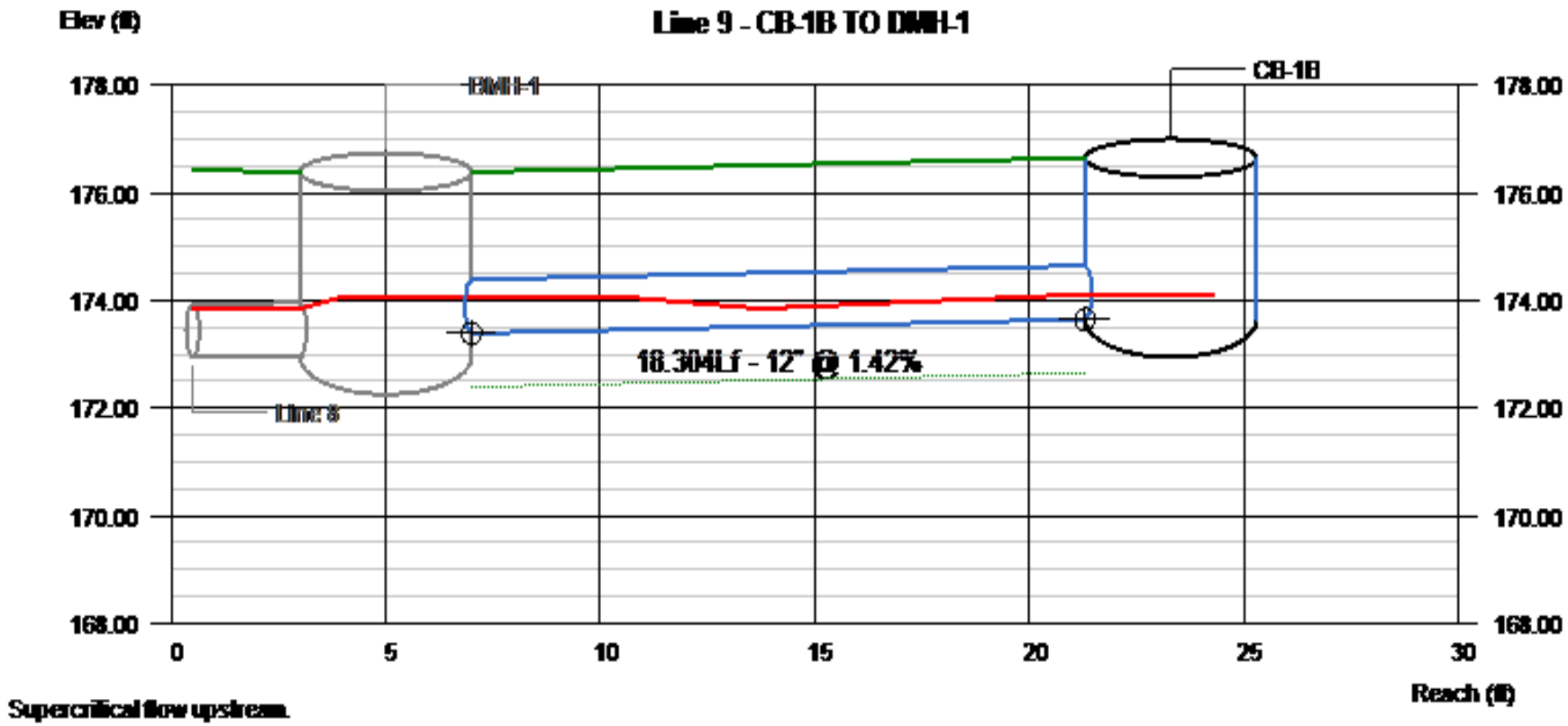
depth assumed downstream. Supercritical flow upstream.


Elev (ft)
Line 6 - DMH-3 TO DMH-4
176.00
173.00
170.00
167.00
164.00
161.00
DMH-4
DMH-3
Line 5
Line 7
22.374Lf - 12" @ 6.57%
0
5
10
15
20
25
30
35
Reach (ft)
Supercritical flow upstream.

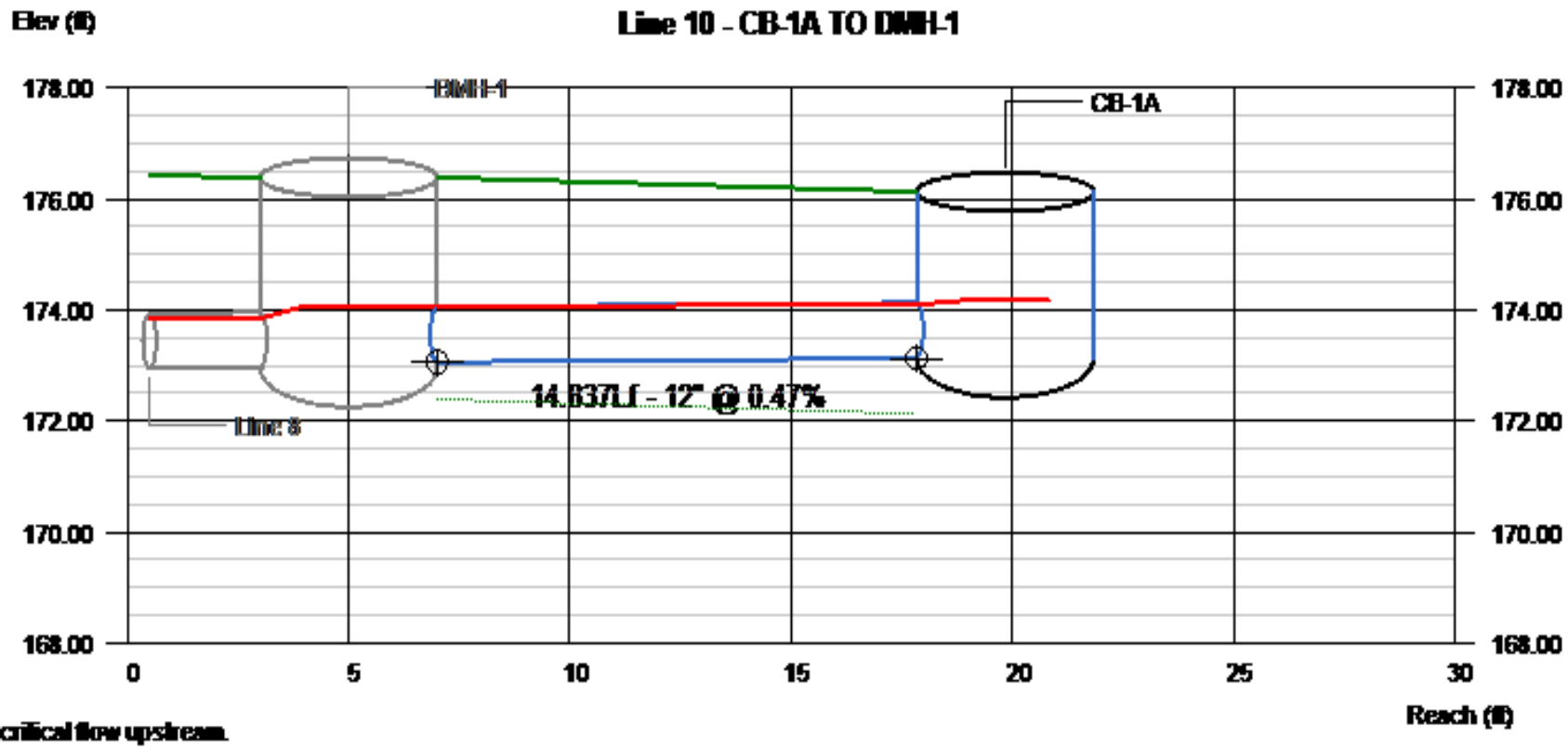

Elev (ft)
Line 7 - DMH-2 TO DMH-3
181.00
177.00
173.00
169.00
165.00
161.00
DMH-2
DMH-3
Line 8
Line 6
304.850 ft - 12" @ 1.67%
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
Reach (ft)
Supercritical flow upstream.



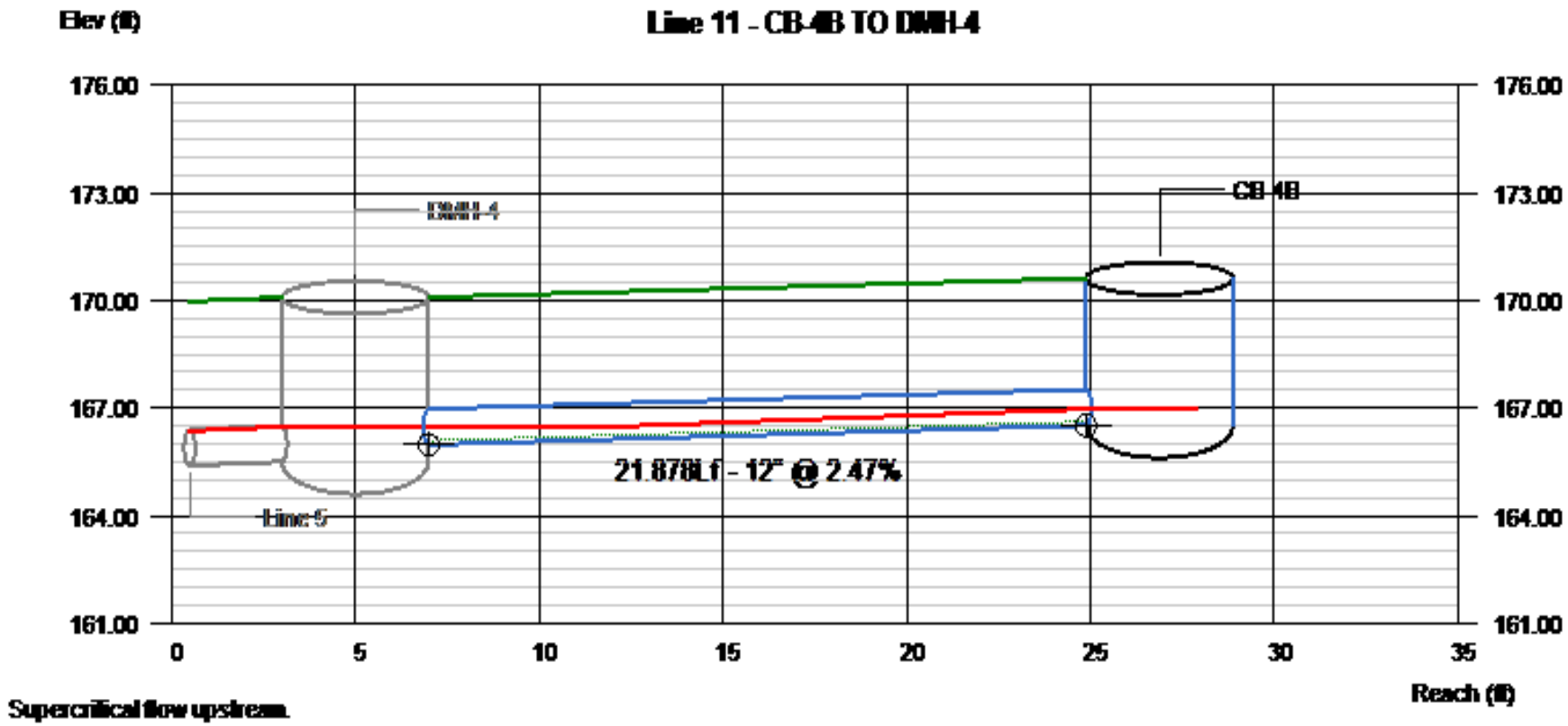
depth assumed downstream. Subcritical flow upstream.



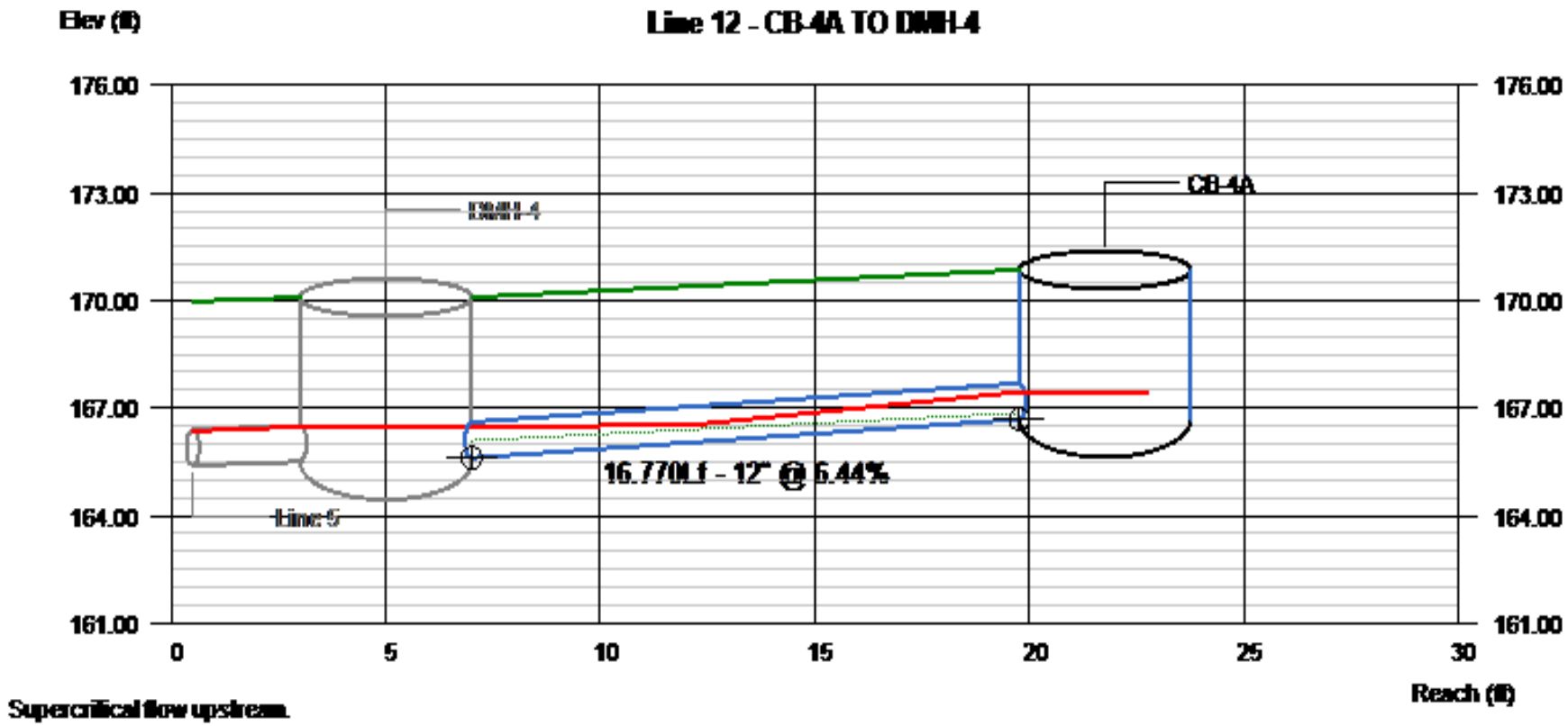
Supercritical flow upstream.

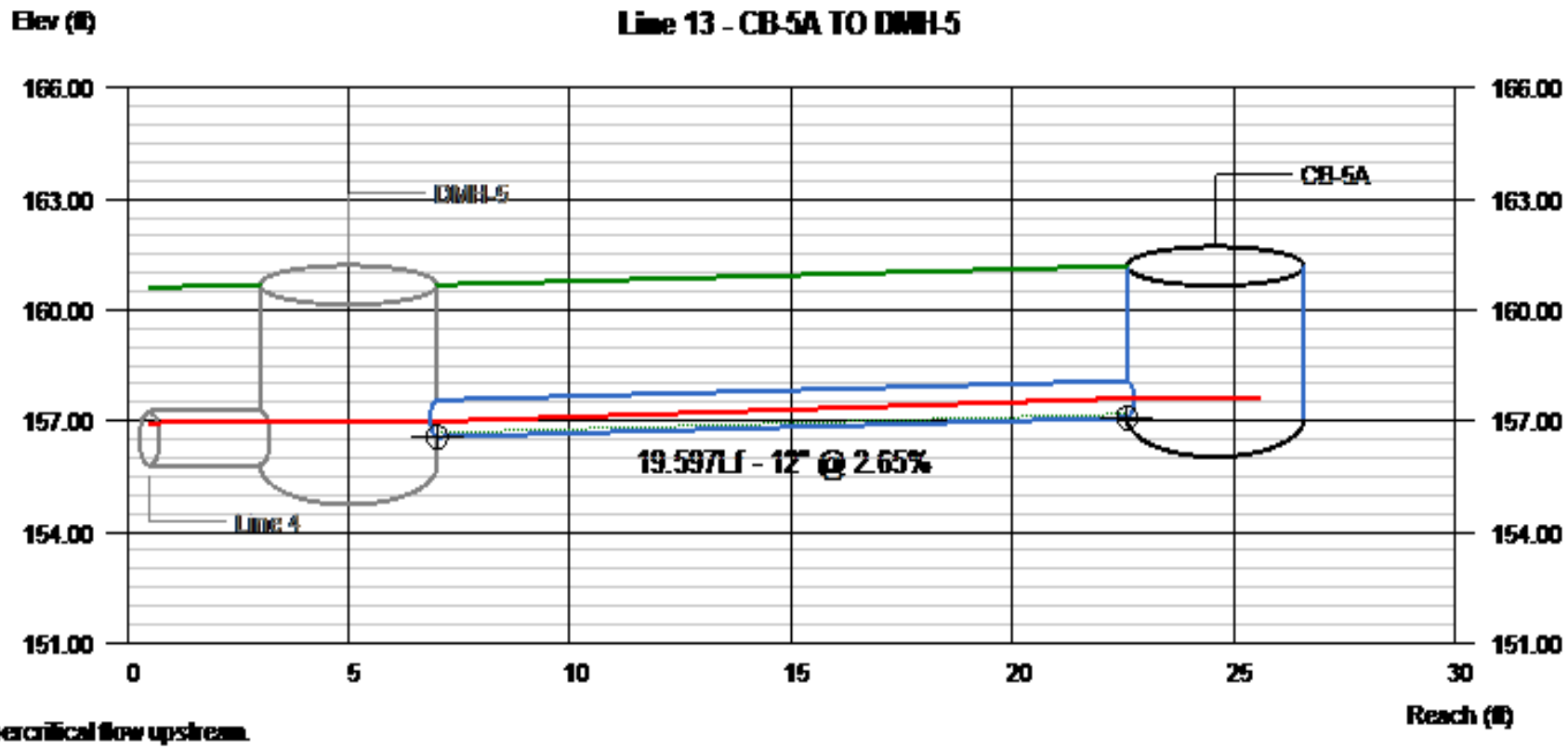


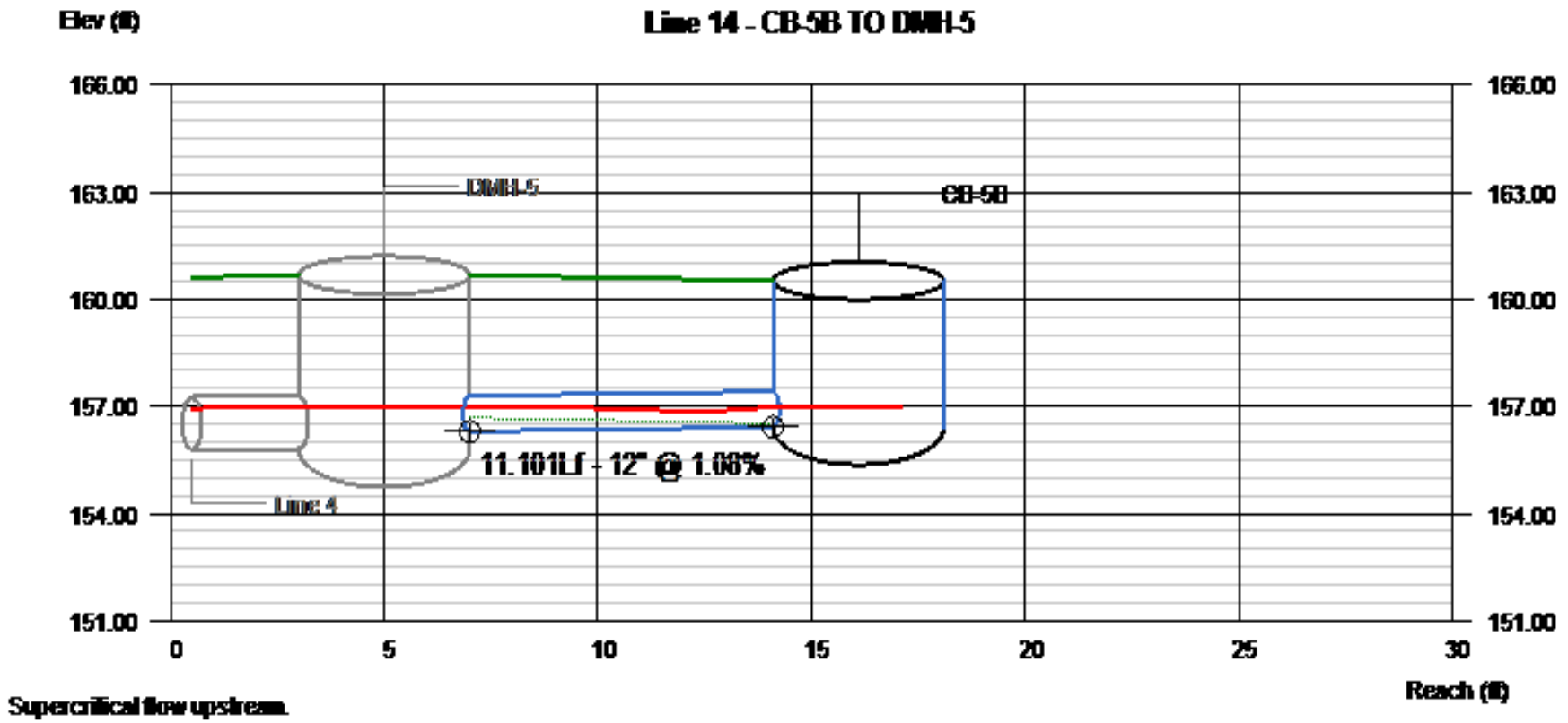
Subcritical flow upstream.



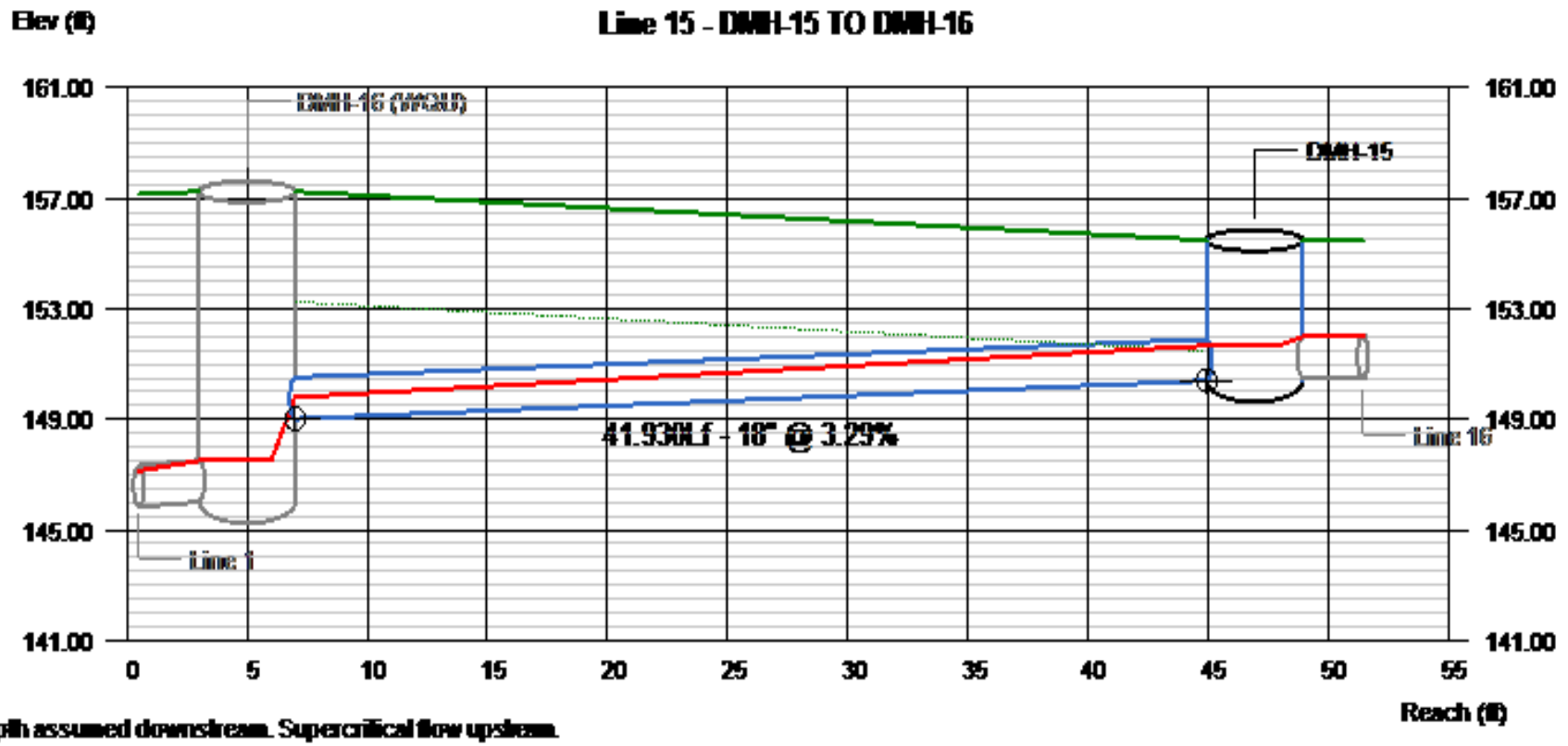
Supercritical flow upstream.


Elev (ft)
Line 12 - CB-4A TO DMH-4
176.00
173.00
170.00
167.00
164.00
161.00
0
5
10
15
20
25
30
Reach (ft)
CB-4A
DMH-4
Line: 5
16.77@1.1 - 12" @ 6.44%
Supercritical flow upstream.

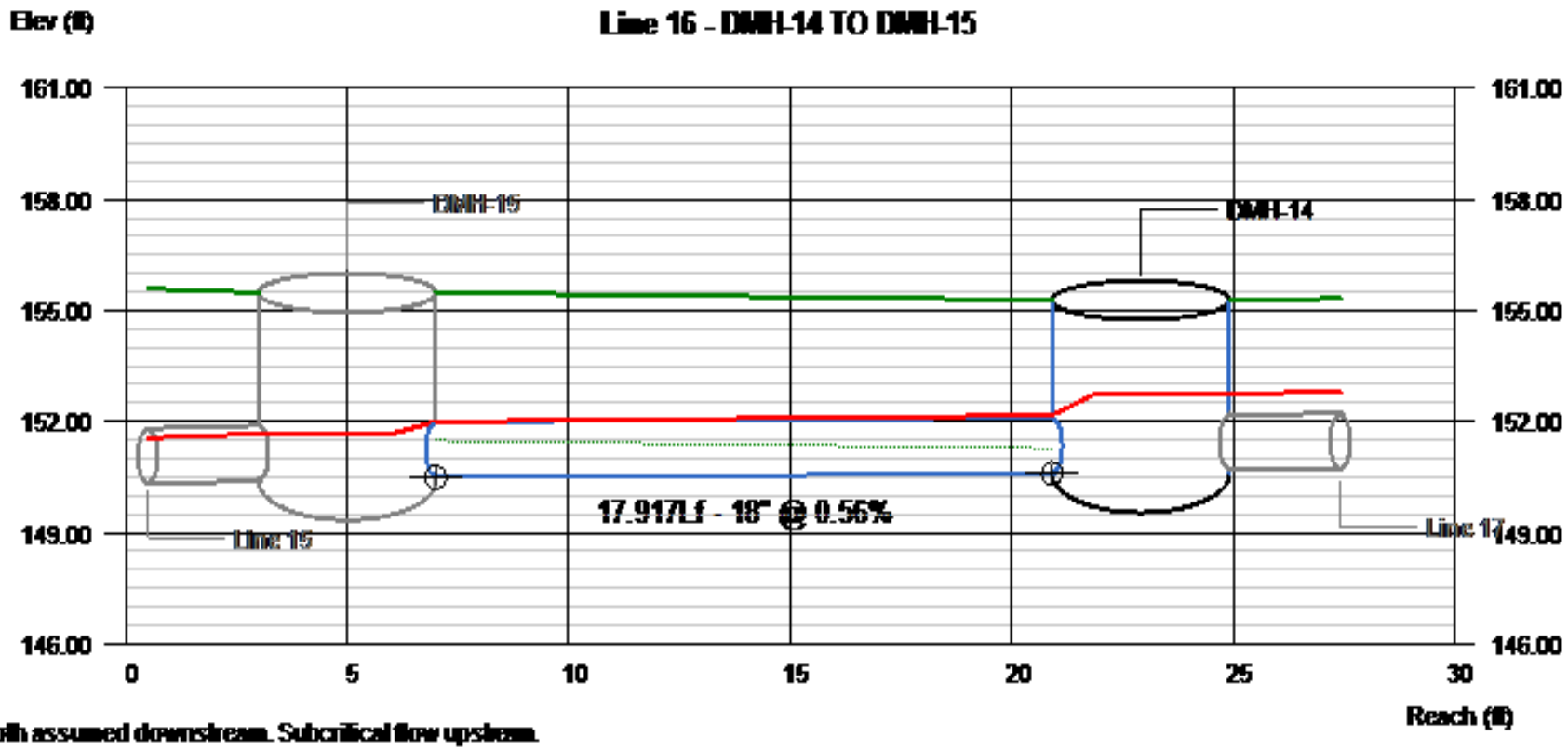

Elev (ft)
Line 13 - CB-5A TO DMH-5
166.00
163.00
160.00
157.00
154.00
151.00
0
5
10
15
20
25
30
Reach (ft)
DMH-5
CB-5A
Line 4
19.597Lf - 12" @ 2.65%
Supercritical flow upstream.



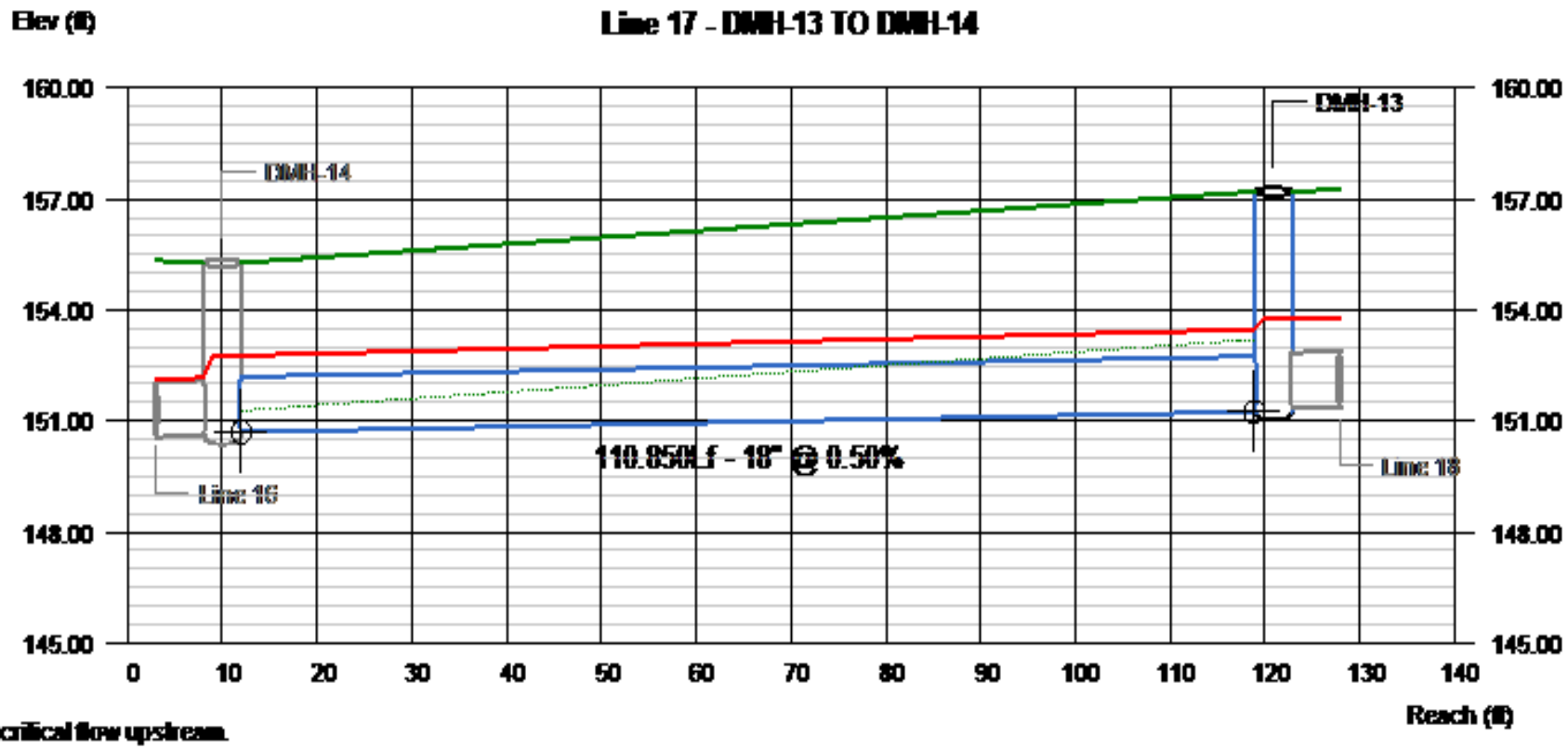
Supercritical flow upstream.

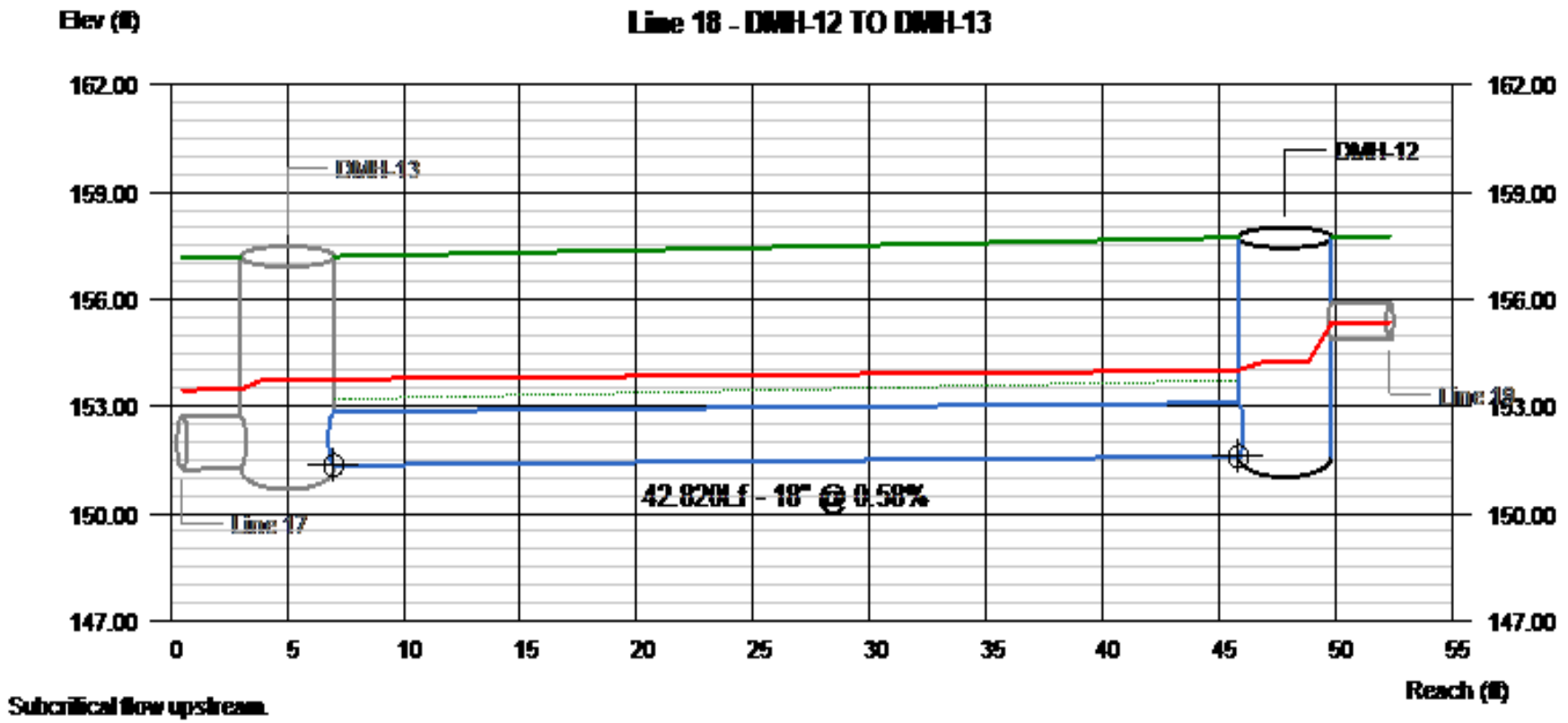


depth assumed downstream. Supercritical flow upstream.

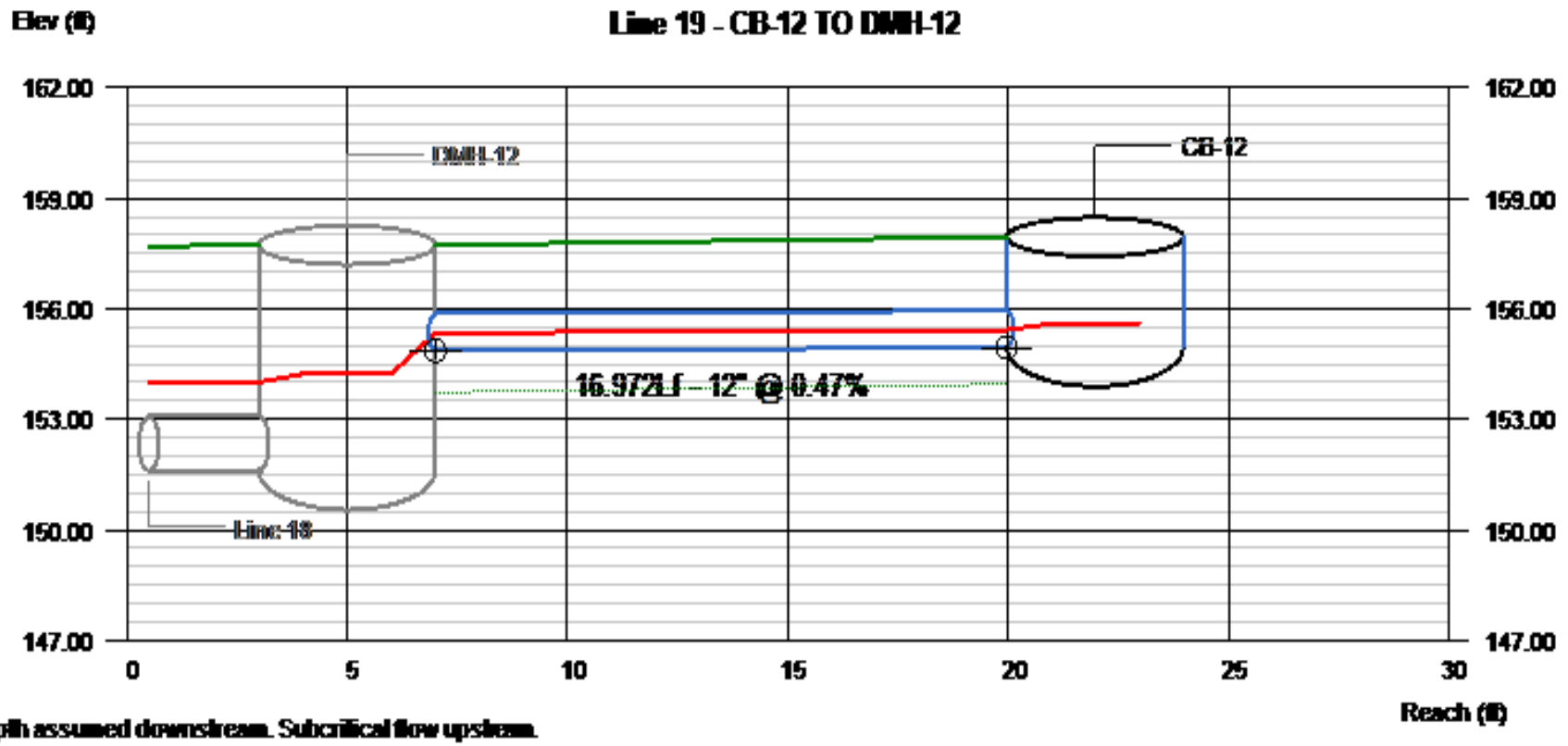


depth assumed downstream. Subcritical flow upstream.

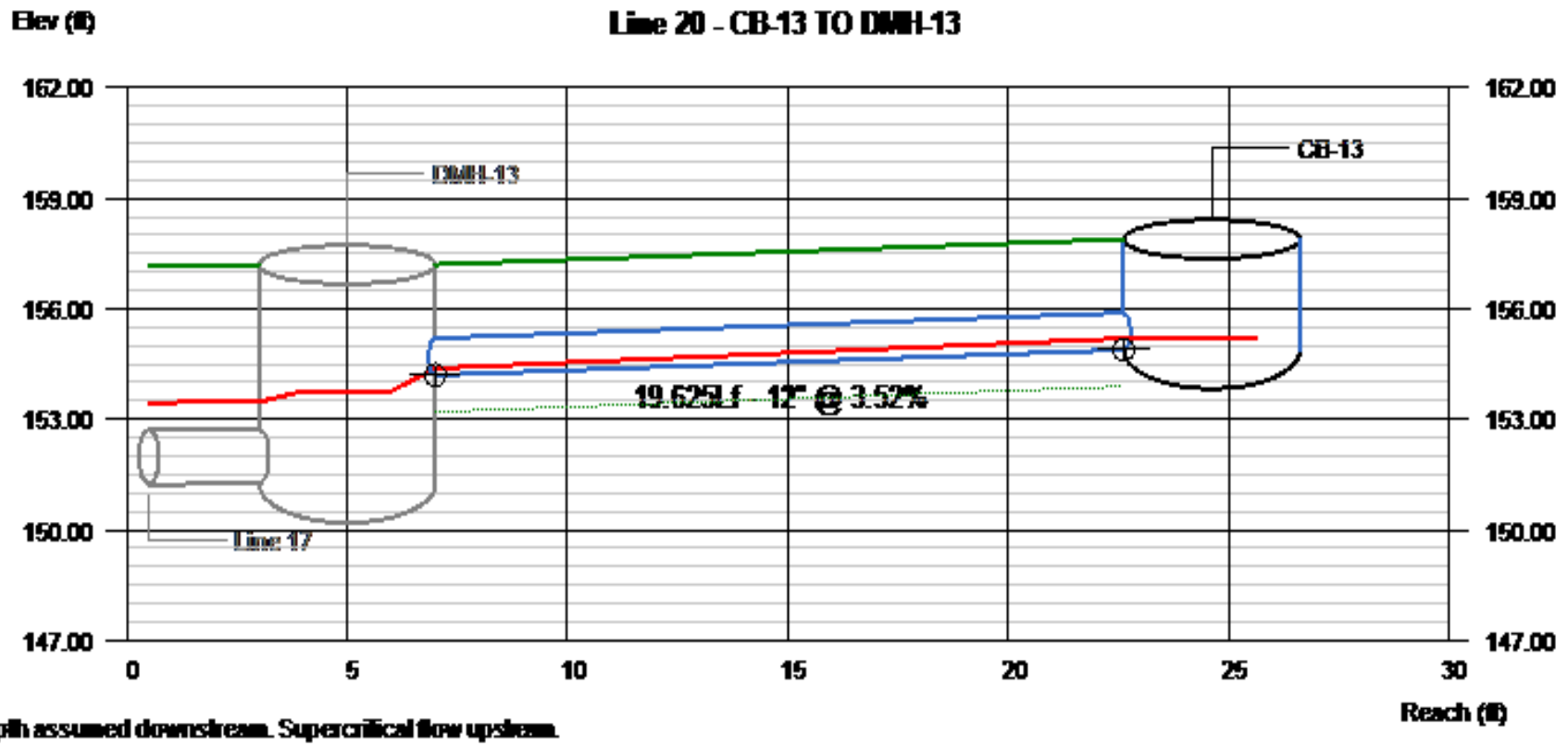

Elev (ft)
Line 17 - DMH-13 TO DMH-14
160.00
157.00
154.00
151.00
148.00
145.00
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
Reach (ft)
DMH-14
DMH-13
Line: 16
Line: 18
110.850Lf - 18" @ 0.50%
Subcritical flow upstream.



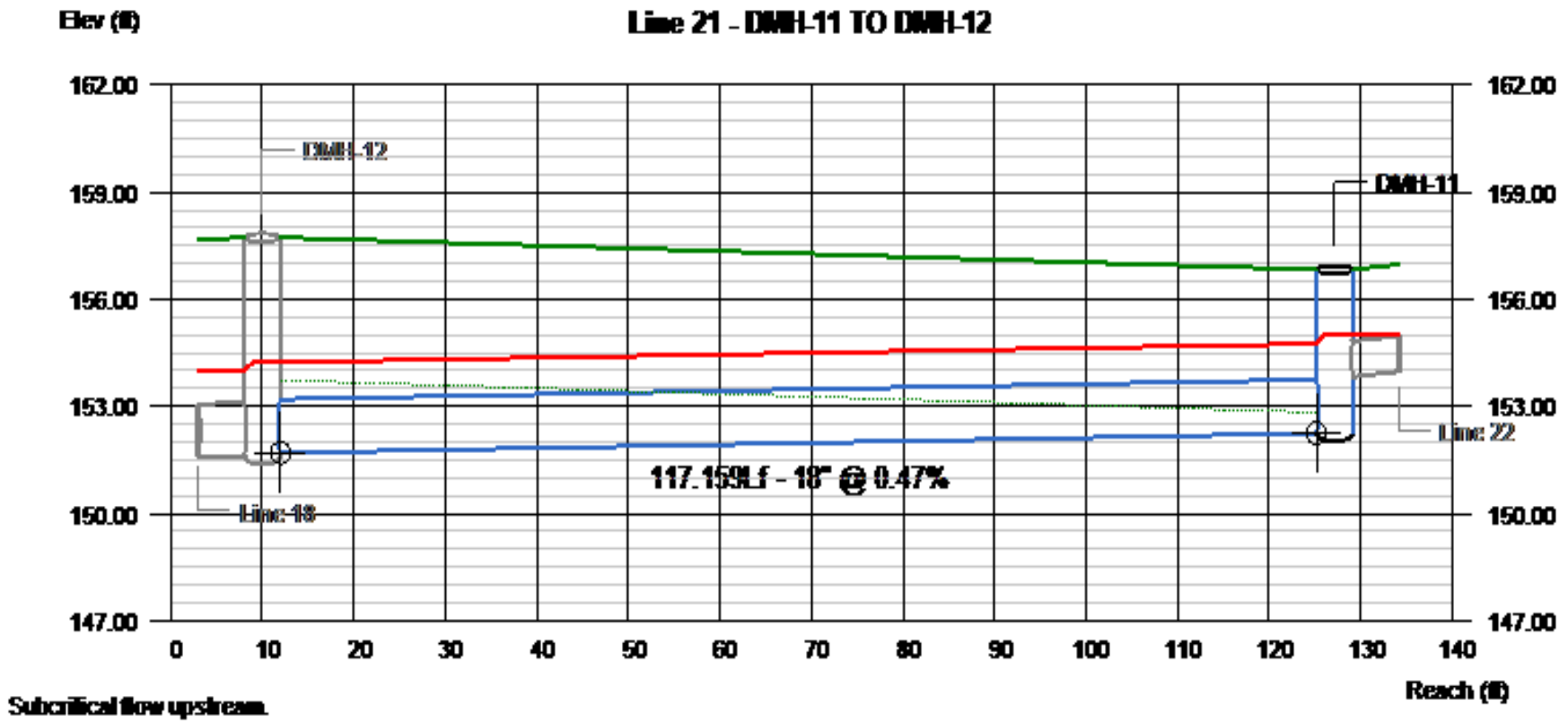
Subcritical flow upstream.

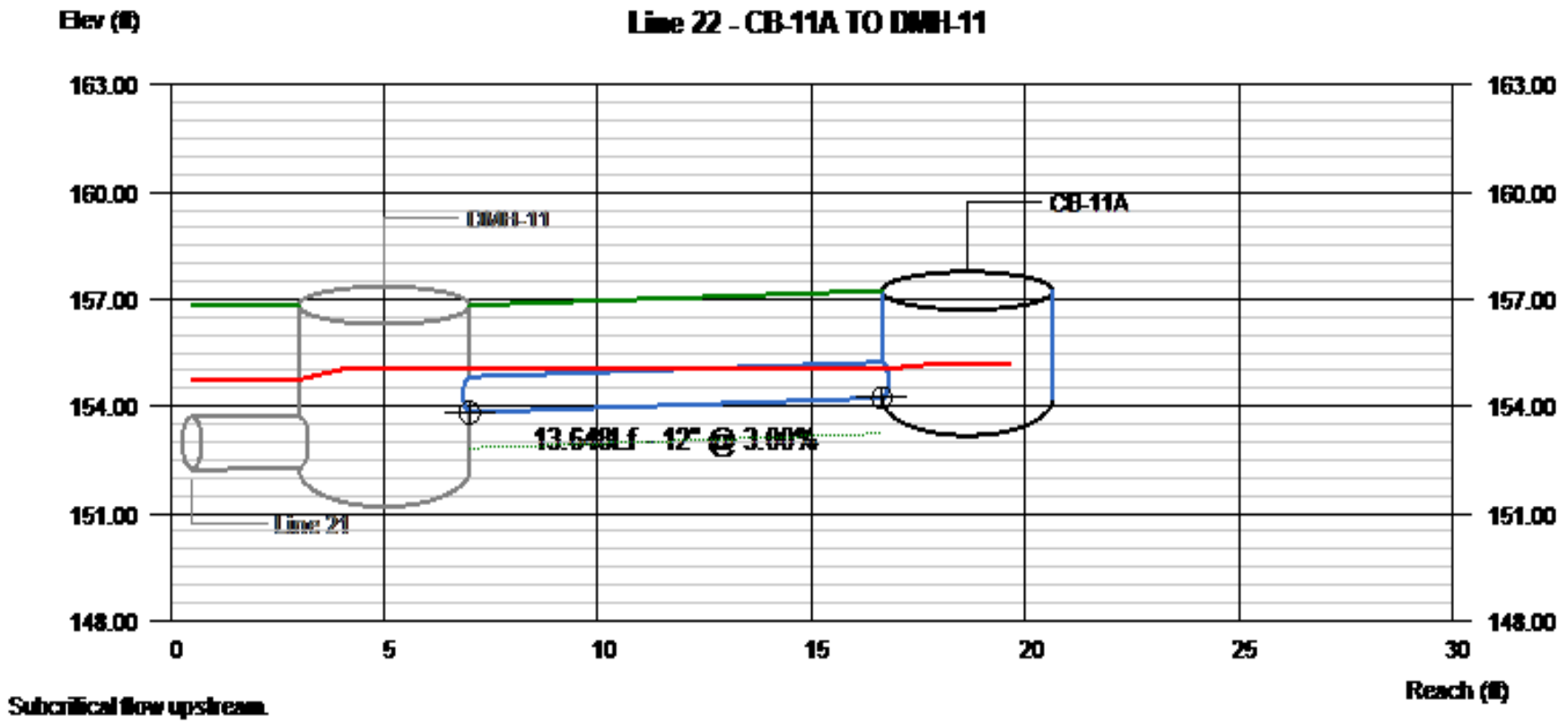


depth assumed downstream. Subcritical flow upstream.

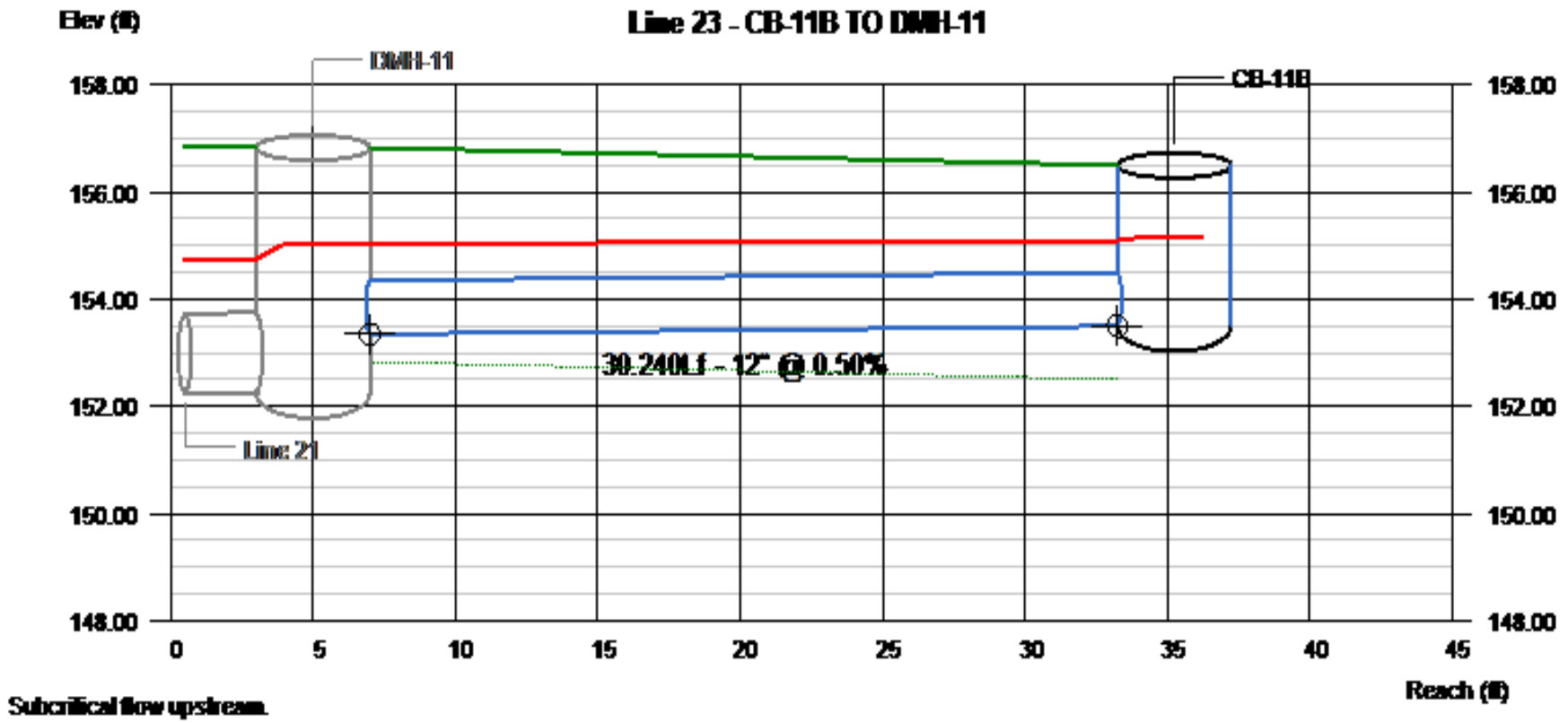


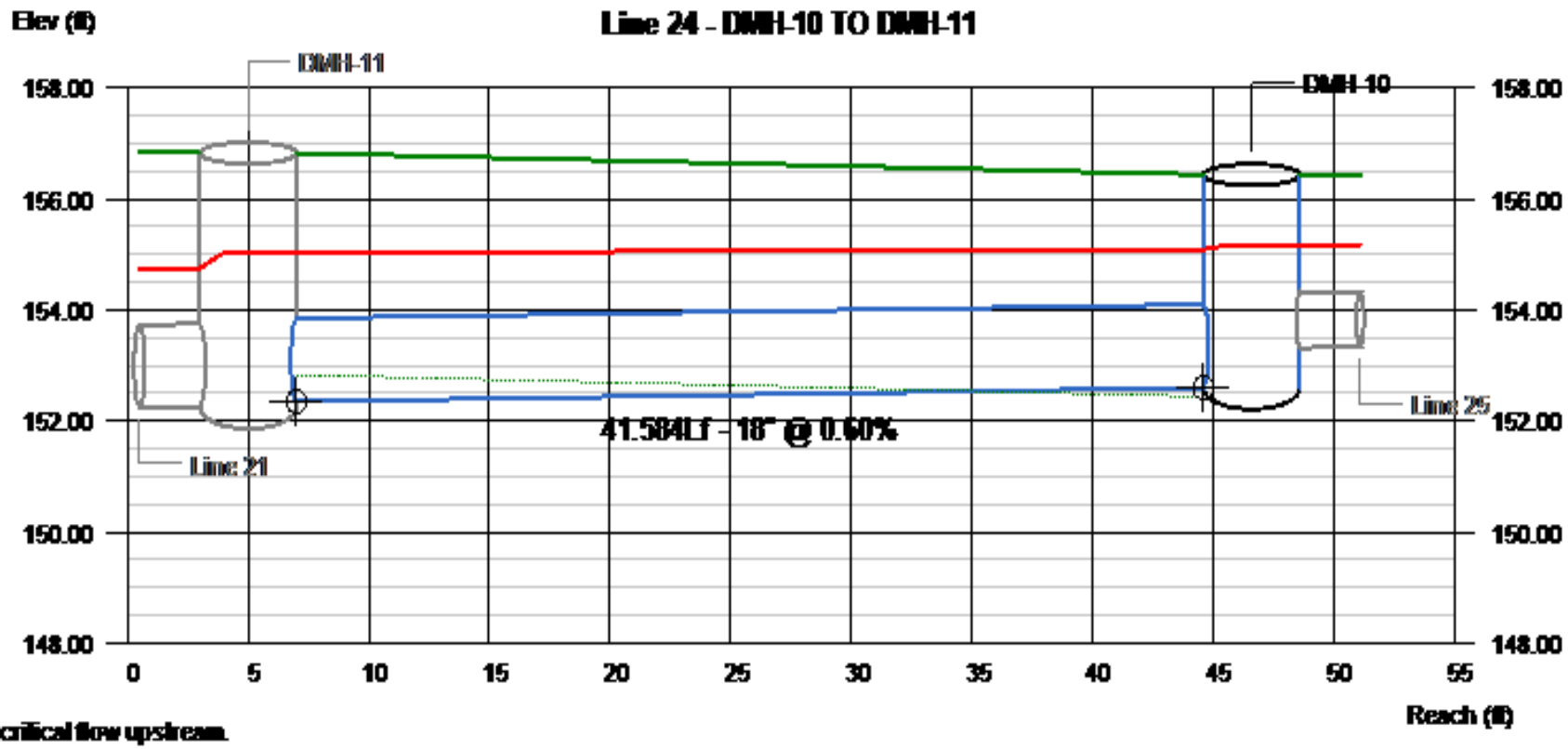
depth assumed downstream. Supercritical flow upstream.

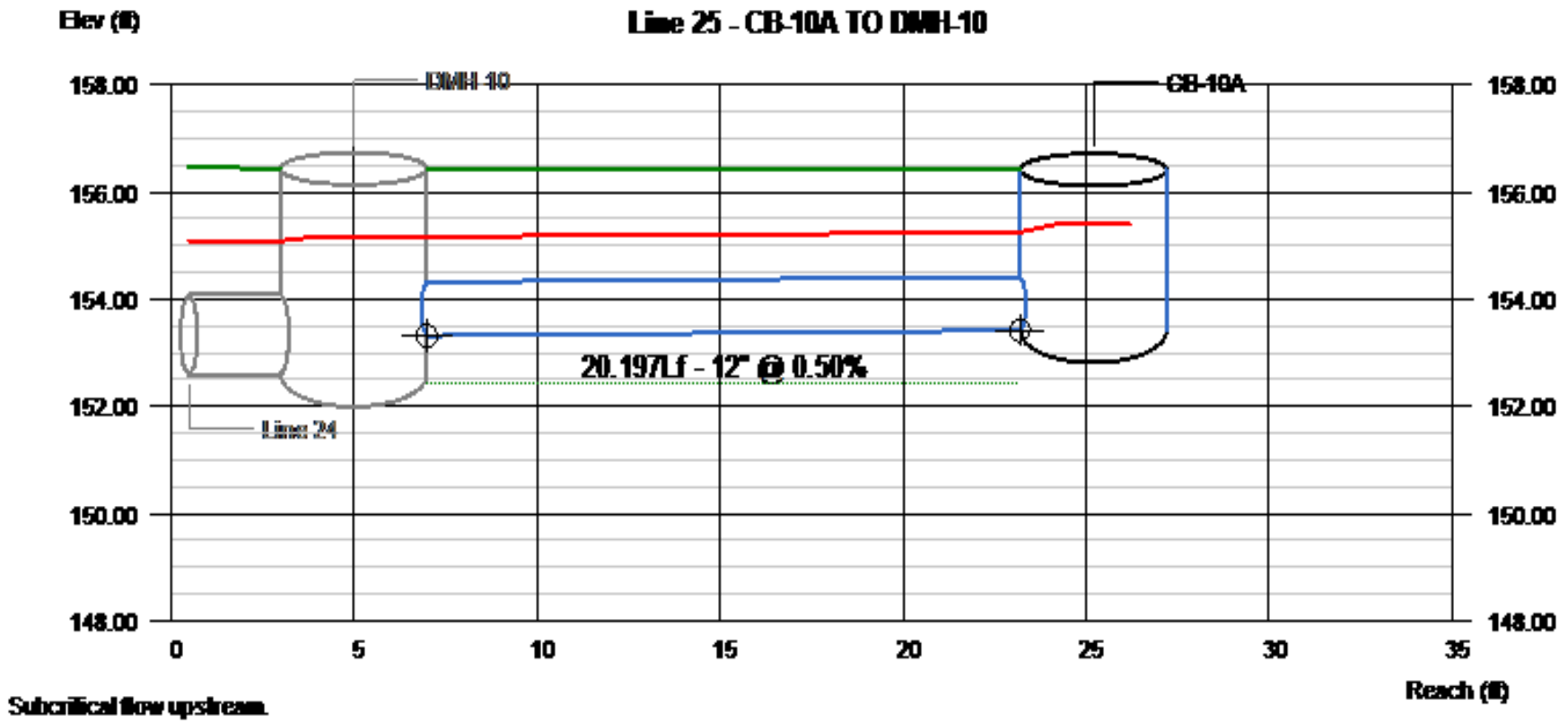

Elev (ft)
Line 21 - DMH-11 TO DMH-12
162.00
159.00
156.00
153.00
150.00
147.00
DMH-12
DMH-11
Line: 22
Line: 18
117.159Lf - 18" @ 0.47%
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
Reach (ft)
Subcritical flow upstream.

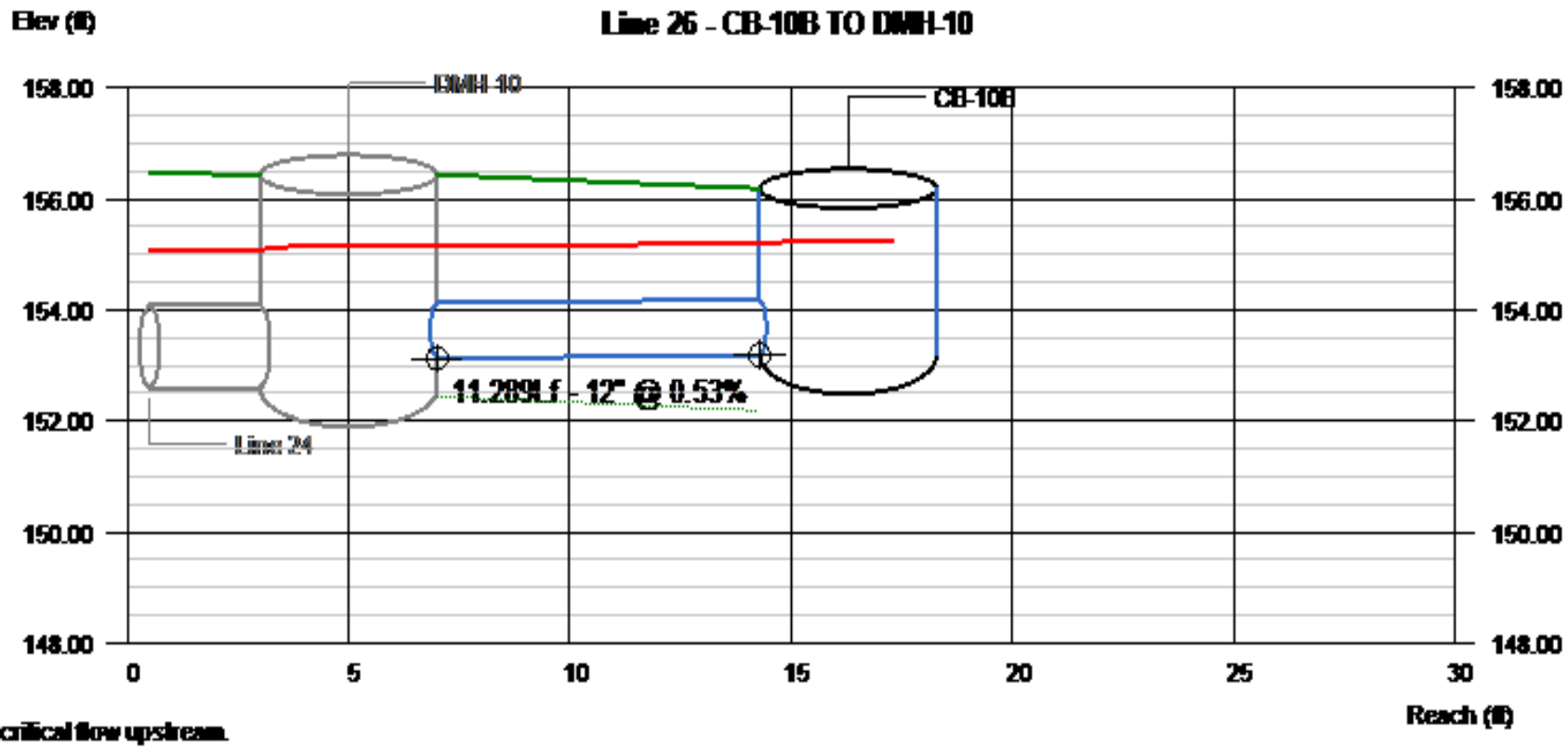


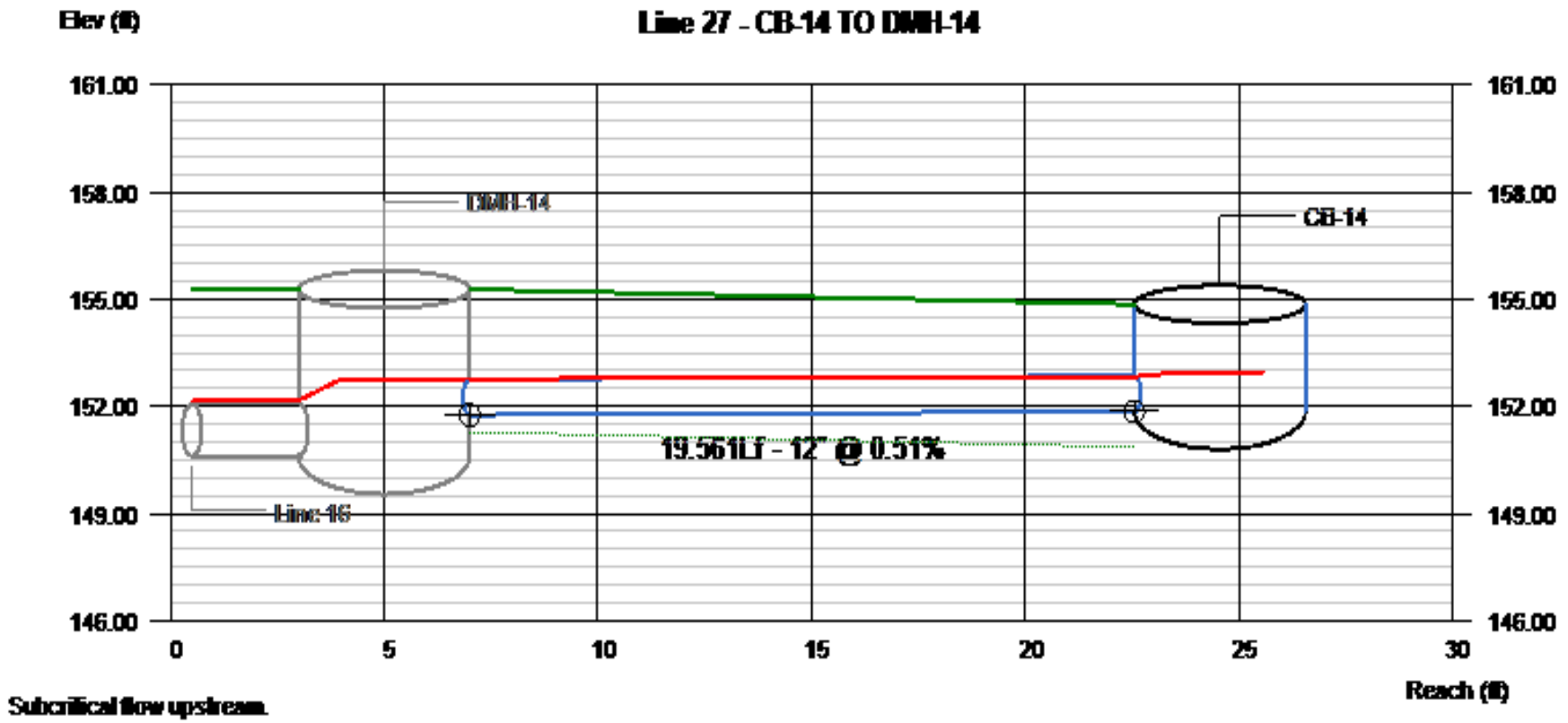
Subcritical flow upstream.


Elev (ft)
Line 23 - CB-11B TO DMH-11
DMH-11
CB-11B
158.00
156.00
154.00
152.00
150.00
148.00
30.240Lf - 12" @ 0.50%
Line: 21
0
5
10
15
20
25
30
35
40
45
Reach (ft)
Subcritical flow upstream.

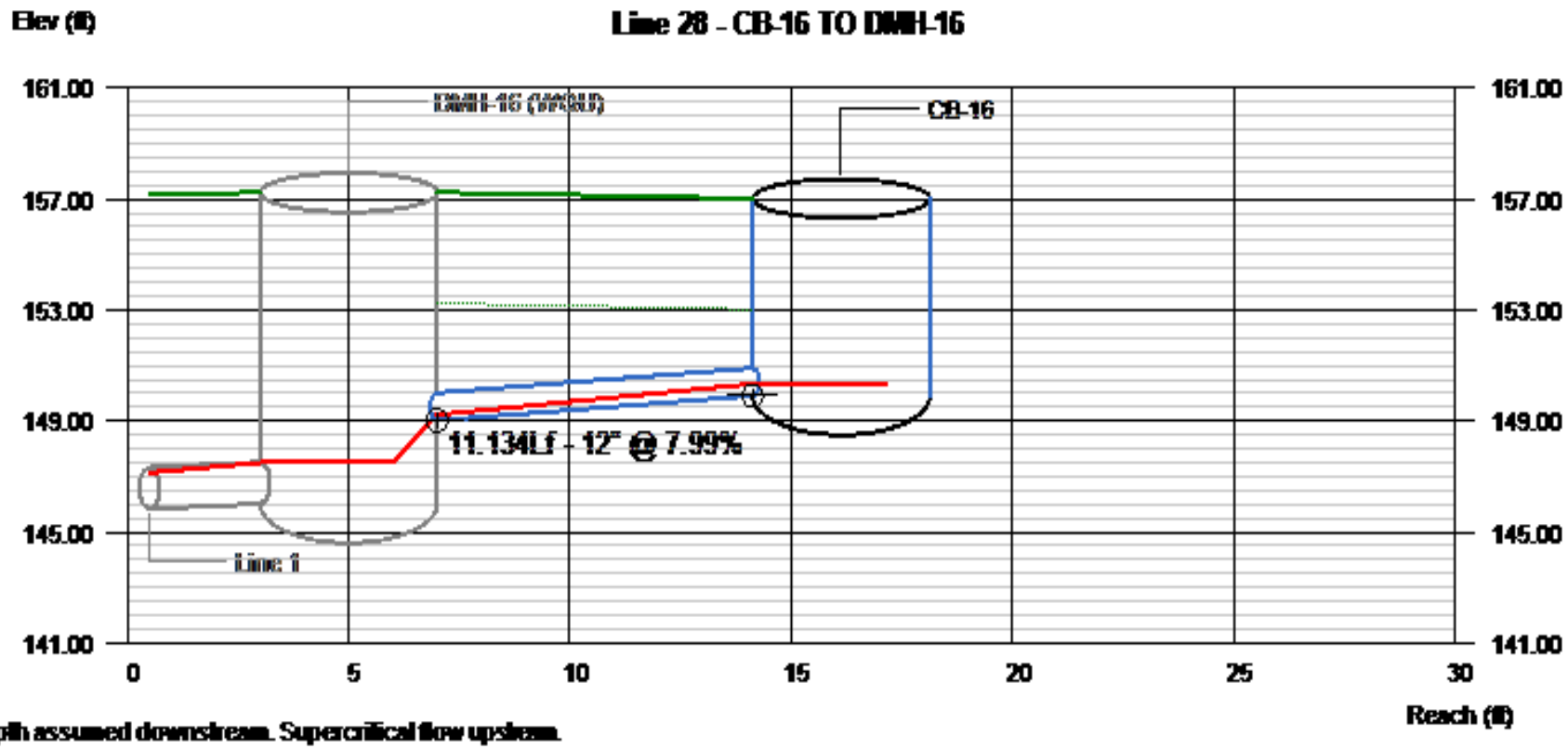

Elev (ft)
Line 24 - DMH-10 TO DMH-11
DMH-11
DMH-10
158.00
156.00
154.00
152.00
150.00
148.00
0
5
10
15
20
25
30
35
40
45
50
55
Line: 21
Line: 25
41.584Lf - 18" @ 0.60%
Reach (ft)
Subcritical flow upstream.


Elev (ft)
Line 25 - CB-10A TO DMH-10
DMH-10
CB-10A
158.00
156.00
154.00
152.00
150.00
148.00
20.197Lf - 12" @ 0.50%
Line 24
0
5
10
15
20
25
30
35
Reach (ft)
Subcritical flow upstream.

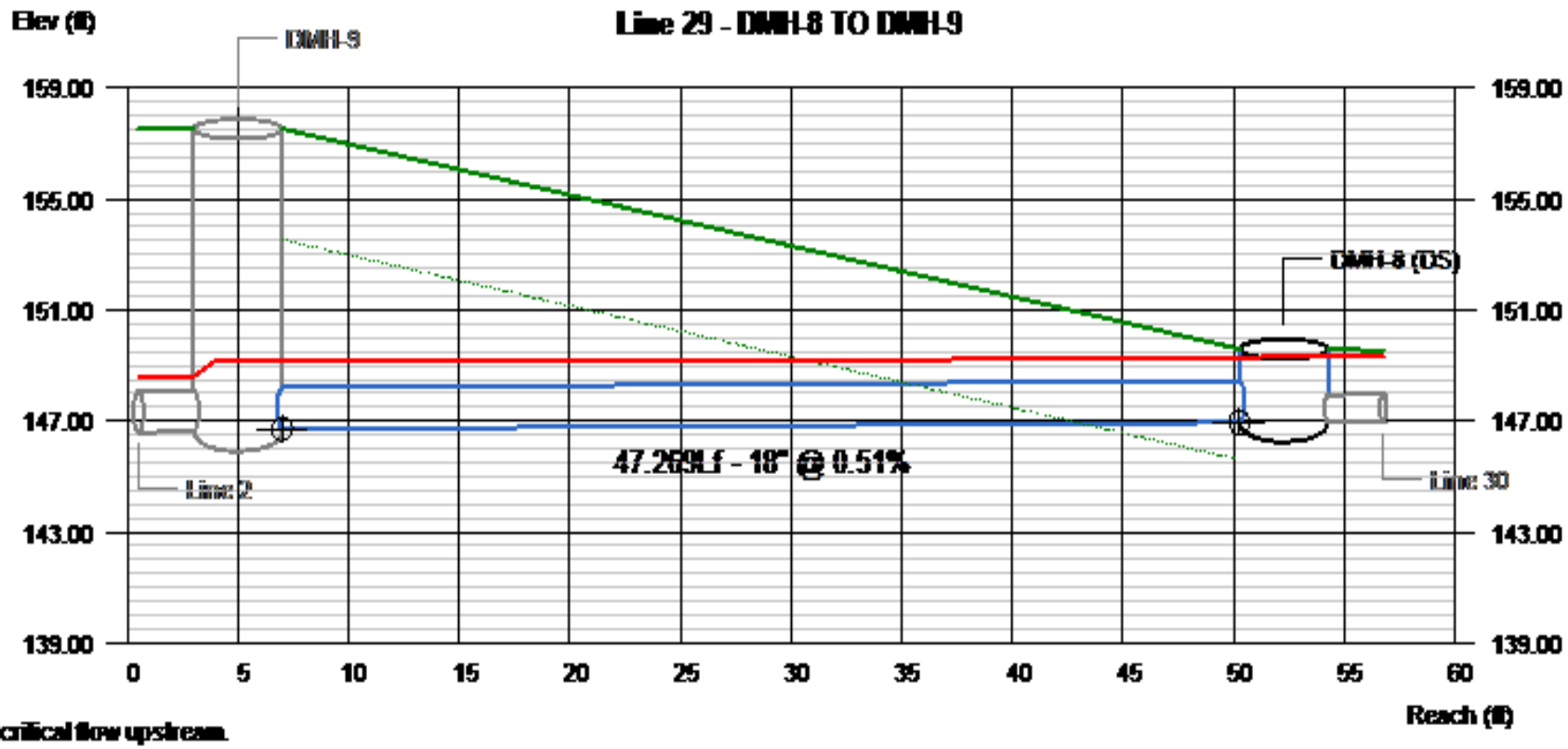

Elev (ft)
Line 26 - CB-10B TO DMH-10
DMH-10
CB-10B
158.00
156.00
154.00
152.00
150.00
148.00
11.28ft - 12" @ 0.53%
Line 24
0
5
10
15
20
25
30
Reach (ft)
Subcritical flow upstream.



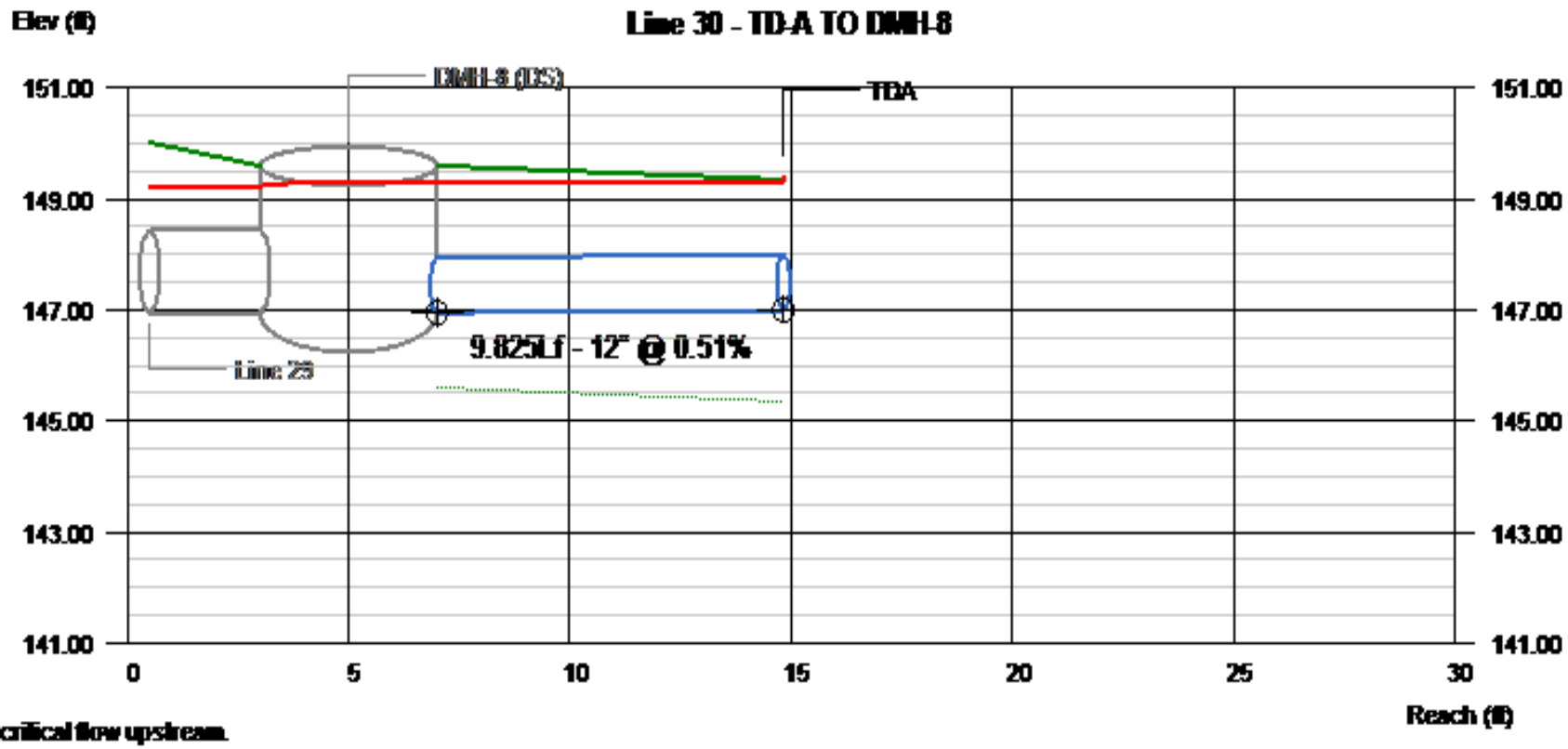
Subcritical flow upstream.



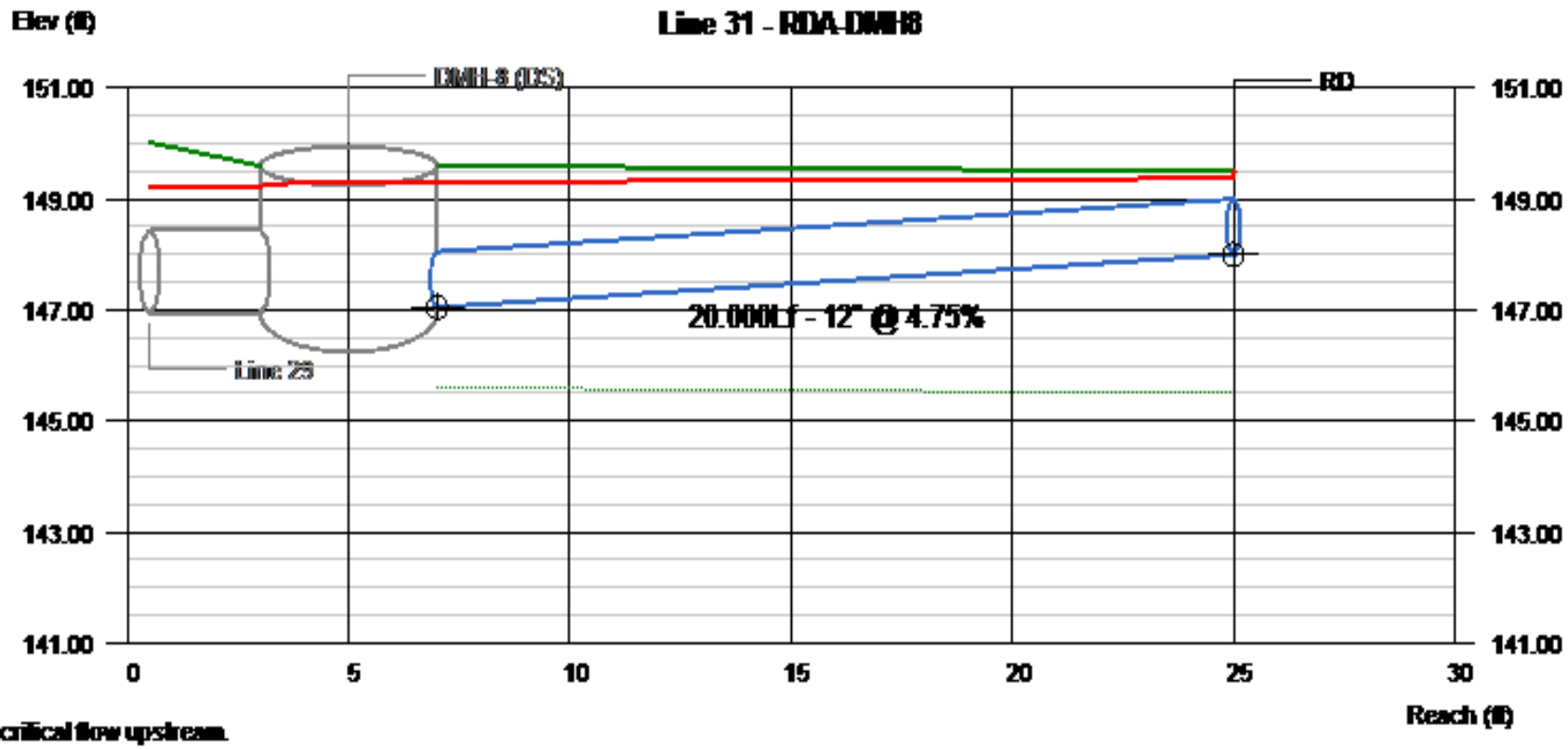
depth assumed downstream. Supercritical flow upstream.

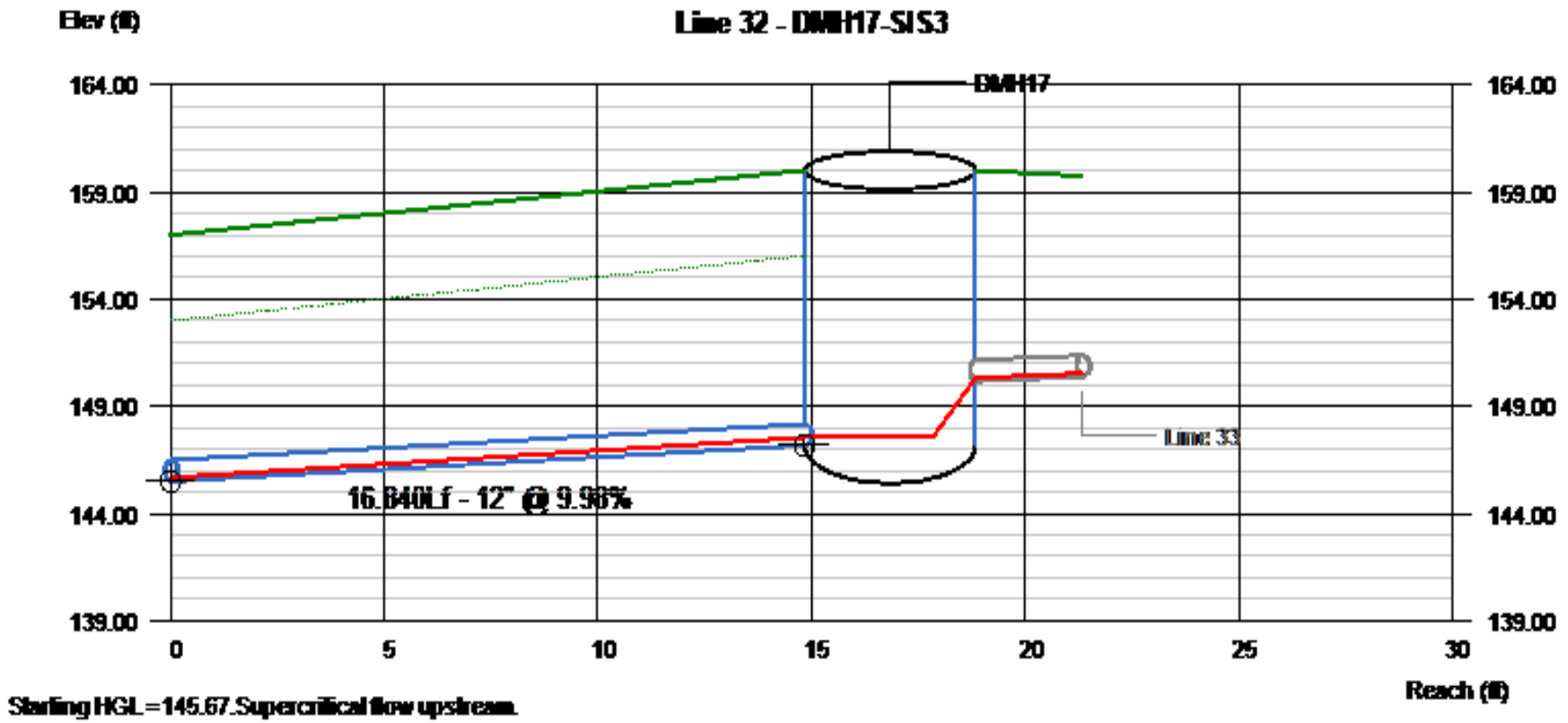


Subcritical flow upstream.

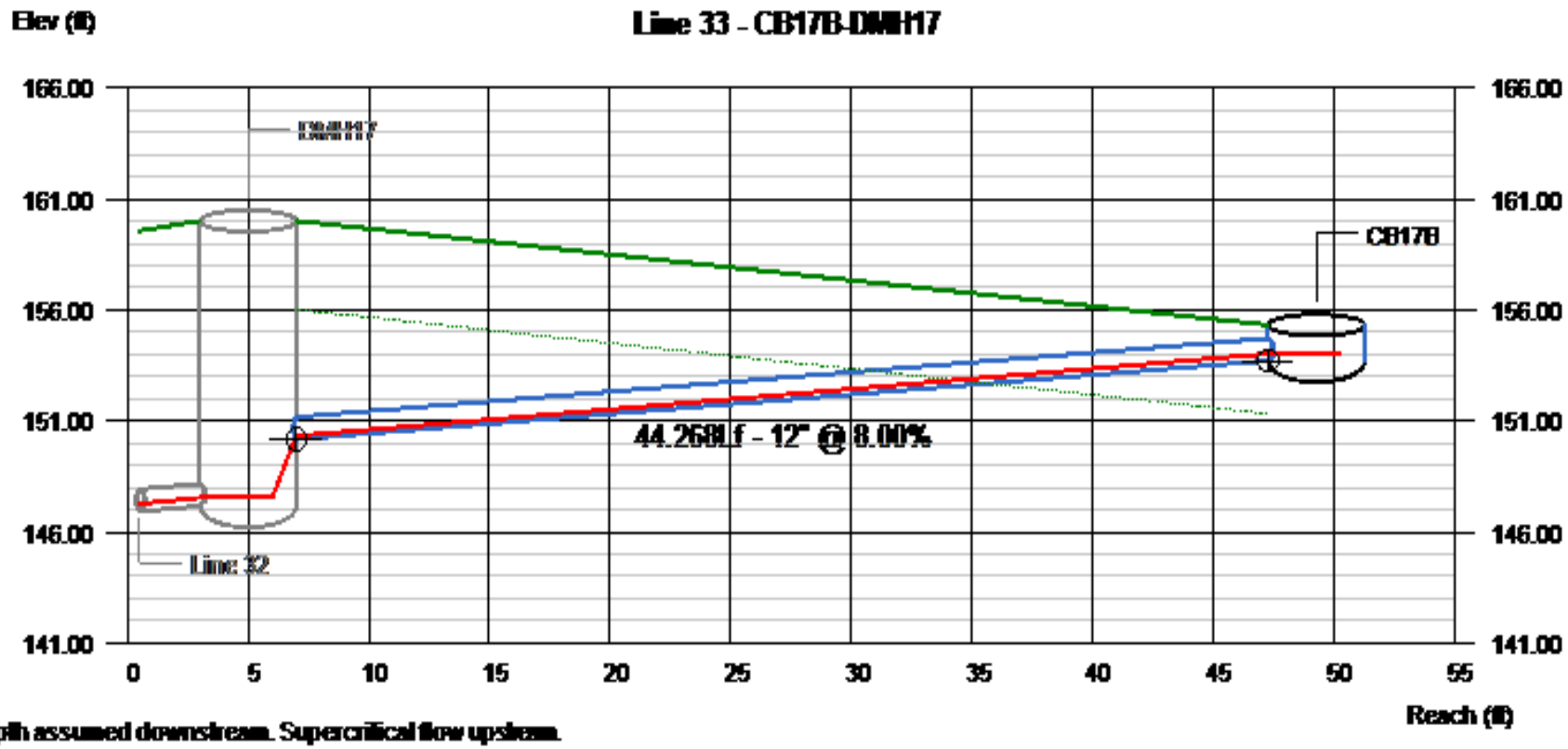


Subcritical flow upstream.

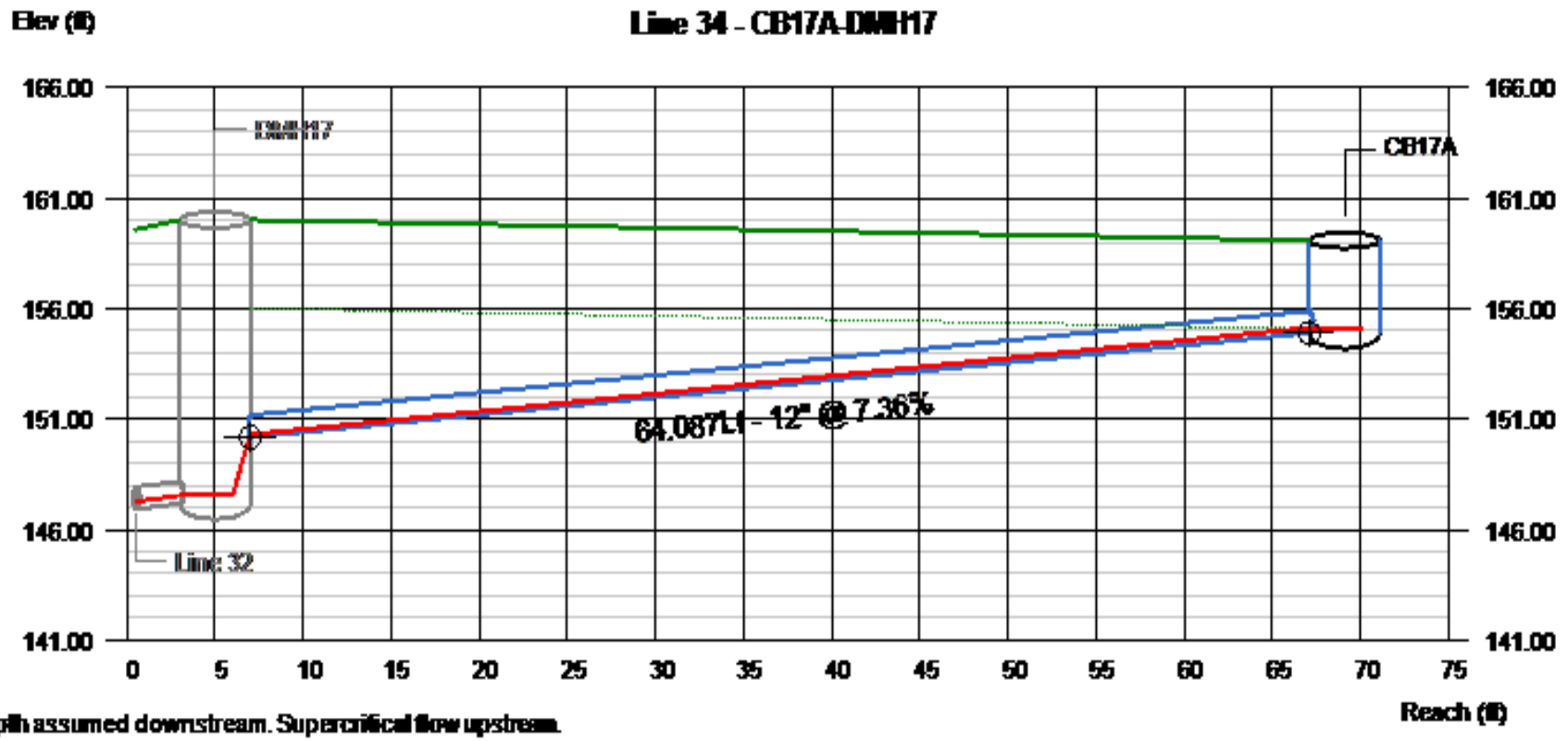

Elev (ft)
Line 31 - RDA-DMH8
DMH-8 (DS)
RD
151.00
149.00
147.00
145.00
143.00
141.00
Line: 25
20.000Lf - 12" @ 4.75%
0
5
10
15
20
25
30
Reach (ft)
Subcritical flow upstream.



Starting HGL=145.67.Supercritical flow upstream.

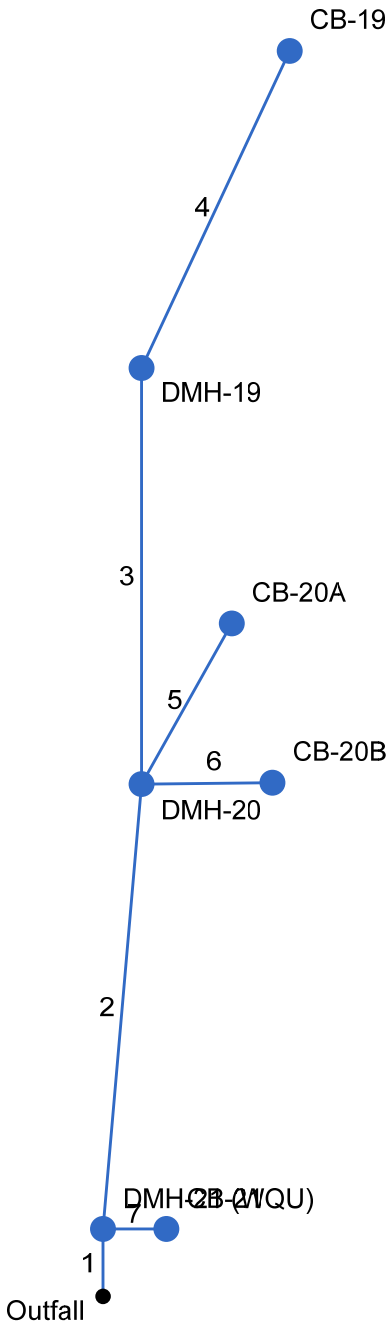


depth assumed downstream. Supercritical flow upstream.



depth assumed downstream. Supercritical flow upstream.

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: Sysyem-4SIS.stm	Number of lines: 7	Date: 3/9/2020

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	11.800	-90.000	MH	0.00	0.00	0.00	6.0	150.00	8.81	151.04	12	Cir	0.012	1.00	155.09	DMH-21 TO SIS-4
2	1	77.689	4.930	MH	0.00	0.00	0.00	6.0	151.29	0.50	151.68	12	Cir	0.012	1.00	156.35	DMH-20 TO DMH-21
3	2	72.734	-4.930	MH	0.00	0.00	0.00	6.0	151.78	0.51	152.15	12	Cir	0.012	0.48	157.75	DMH-19 TO DMH-20
4	3	60.934	25.002	Grate	0.00	0.27	0.50	6.0	152.25	0.49	152.55	12	Cir	0.012	1.00	155.55	CB-19 TO DMH-19
5	2	32.244	24.142	Grate	0.00	0.22	0.90	6.0	151.92	0.84	152.19	12	Cir	0.012	1.00	156.62	CB-20A TO DMH-20
6	2	22.729	83.879	Grate	0.00	0.09	0.90	6.0	151.92	1.58	152.28	12	Cir	0.012	1.00	156.43	CB-20B TO DMH-20
7	1	11.000	90.000	Grate	0.00	0.33	0.90	6.0	151.82	0.45	151.87	12	Cir	0.012	1.00	154.87	CB-21 TO DMH-21

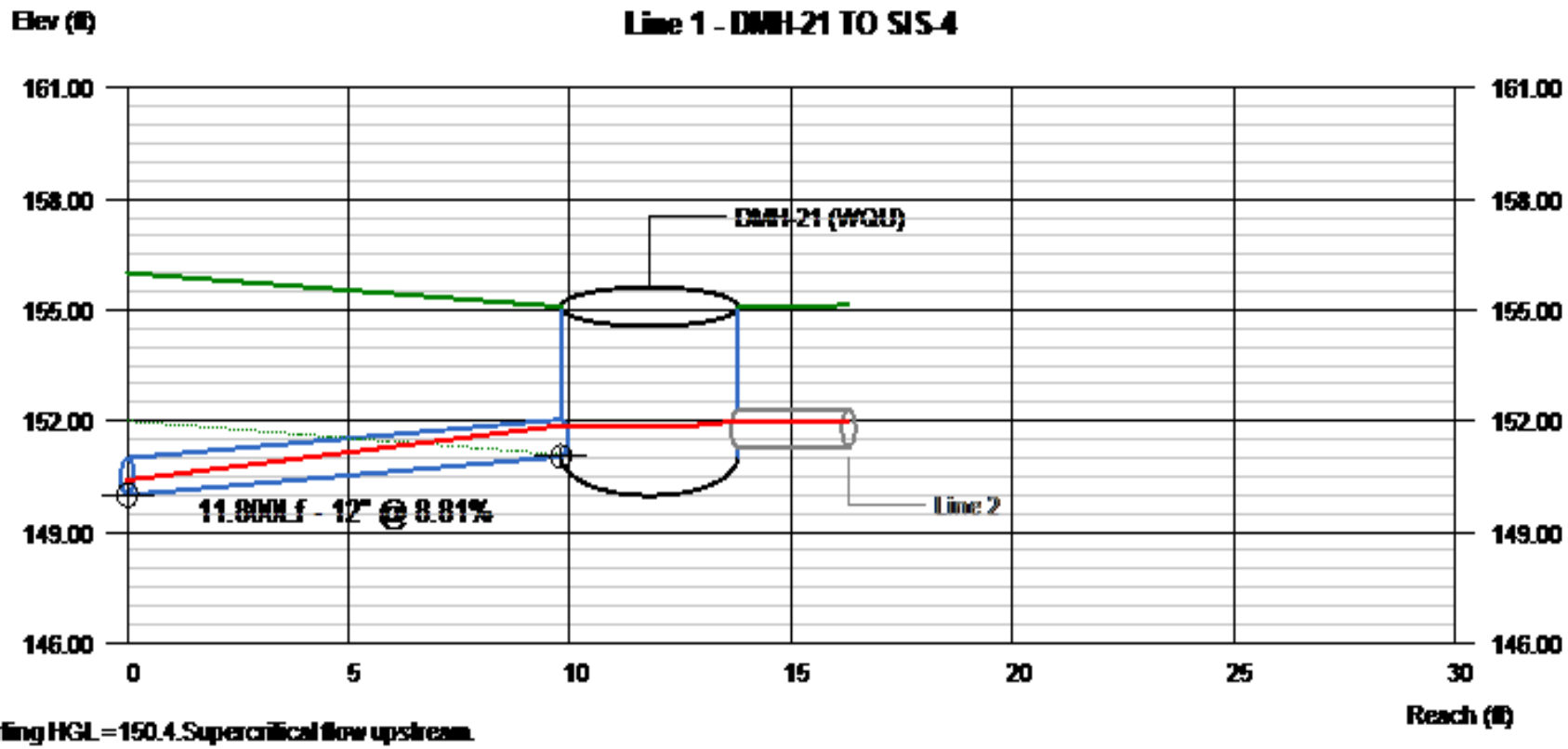
Project File: Sysyem-4SIS.stm | Number of lines: 7 | Date: 3/9/2020

My Report

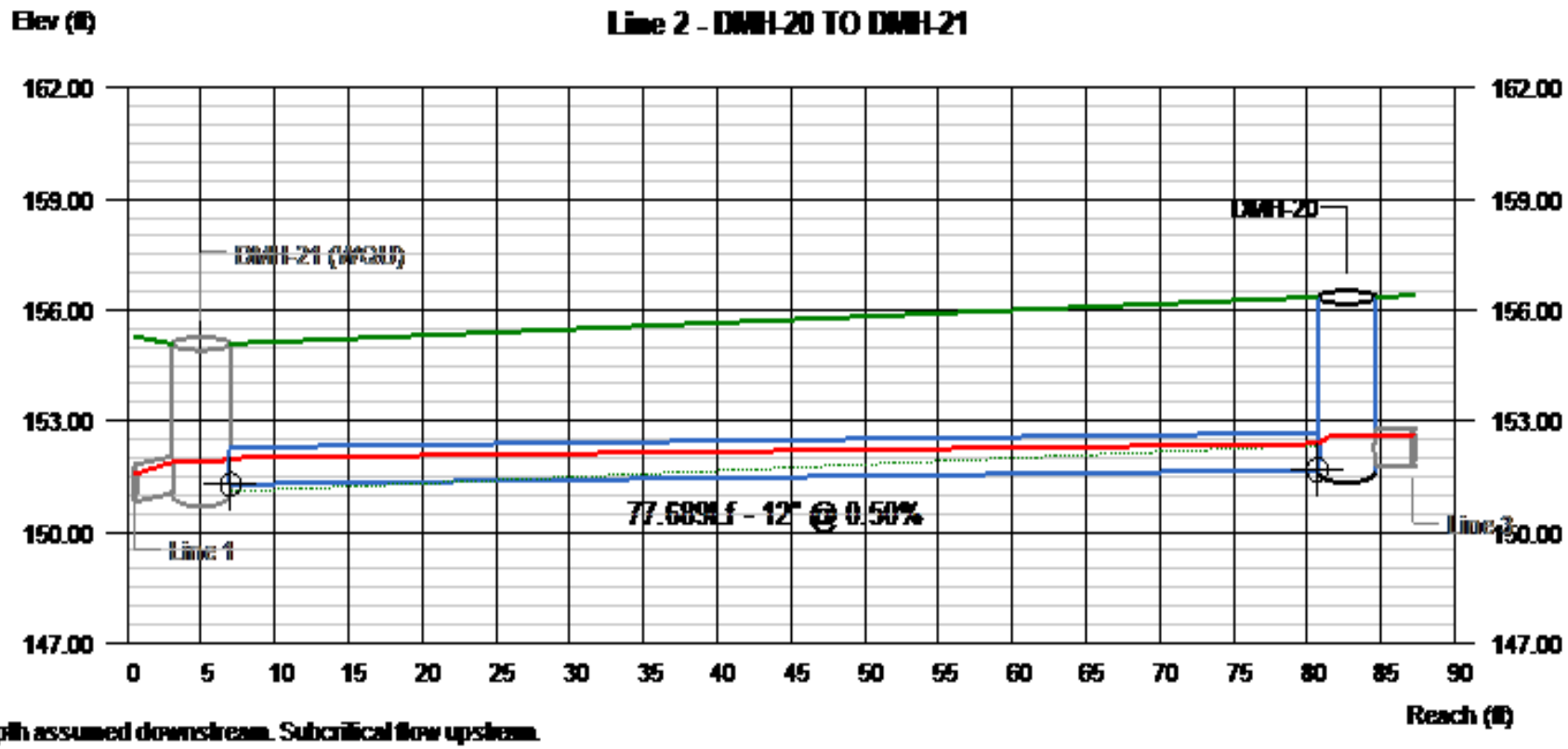
Line No.	Line ID	Flow Rate (cfs)	Line Length (ft)	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Q Byp (cfs)	Byp Ln No	Minor Loss (ft)	HGL Jnct (ft)	DnStm Ln No	Junct Type
1	DMH-21 TO SIS-4	3.93	11.800	150.00	151.04	8.81	150.40	151.88	....	n/a	0.48	151.88	Outfall	MH
2	DMH-20 TO DMH-21	2.33	77.689	151.29	151.68	0.50	152.00	152.39	....	n/a	0.24	152.63	1	MH
3	DMH-19 TO DMH-20	0.80	72.734	151.78	152.15	0.51	152.63	152.52	....	n/a	n/a	152.52	2	MH
4	CB-19 TO DMH-19	0.83	60.934	152.25	152.55	0.49	152.63	152.93	0.00	Sag	n/a	152.93	3	Grate
5	CB-20A TO DMH-20	1.22	32.244	151.92	152.19	0.84	152.63	152.66 j	0.00	Sag	n/a	152.66	2	Grate
6	CB-20B TO DMH-20	0.50	22.729	151.92	152.28	1.58	152.63	152.57 j	0.01	7	n/a	152.57	2	Grate
7	CB-21 TO DMH-21	1.83	11.000	151.82	151.87	0.45	152.44	152.49	0.00	Sag	0.20	152.69	1	Grate

Project File: Sysyem-4SIS.stm | Number of lines: 7 | Date: 3/9/2020

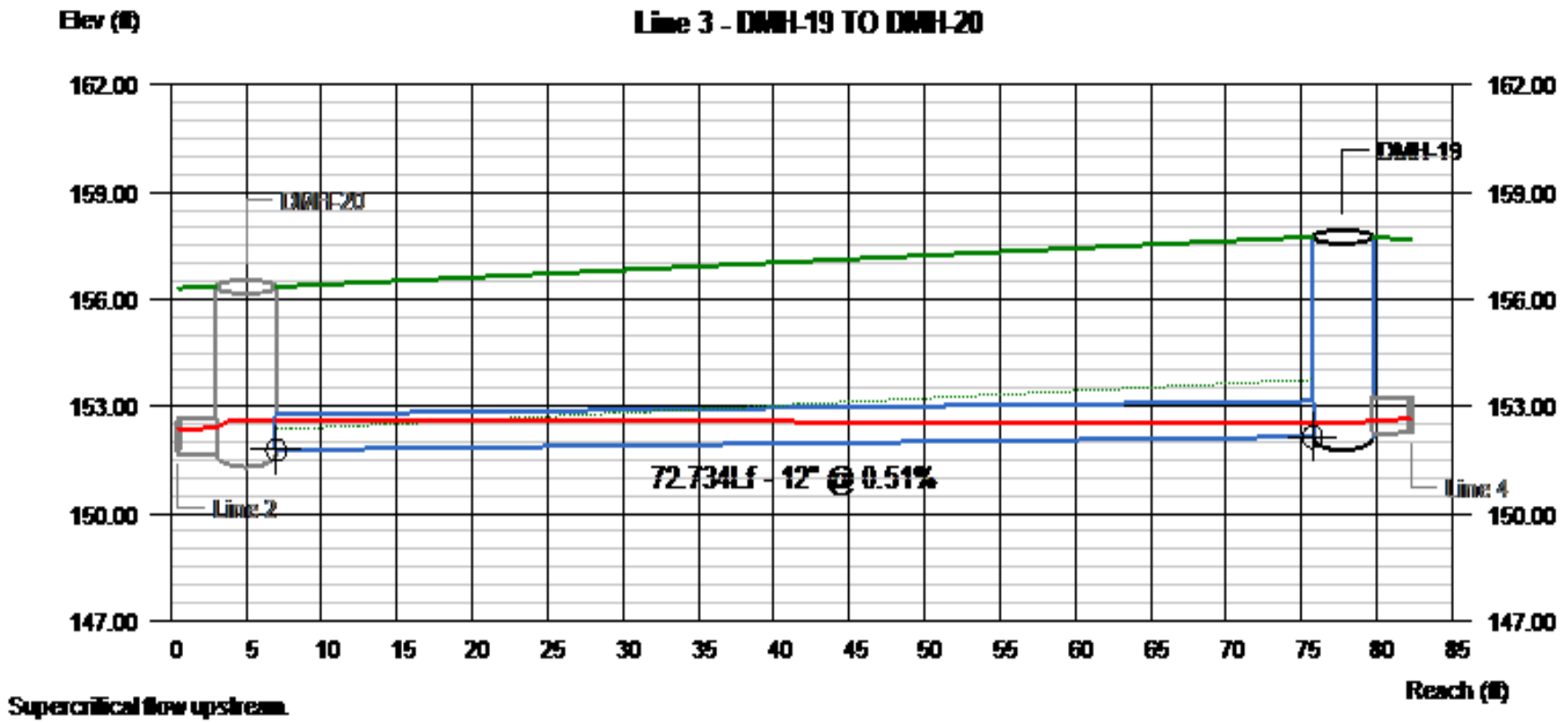
NOTES: ** Critical depth



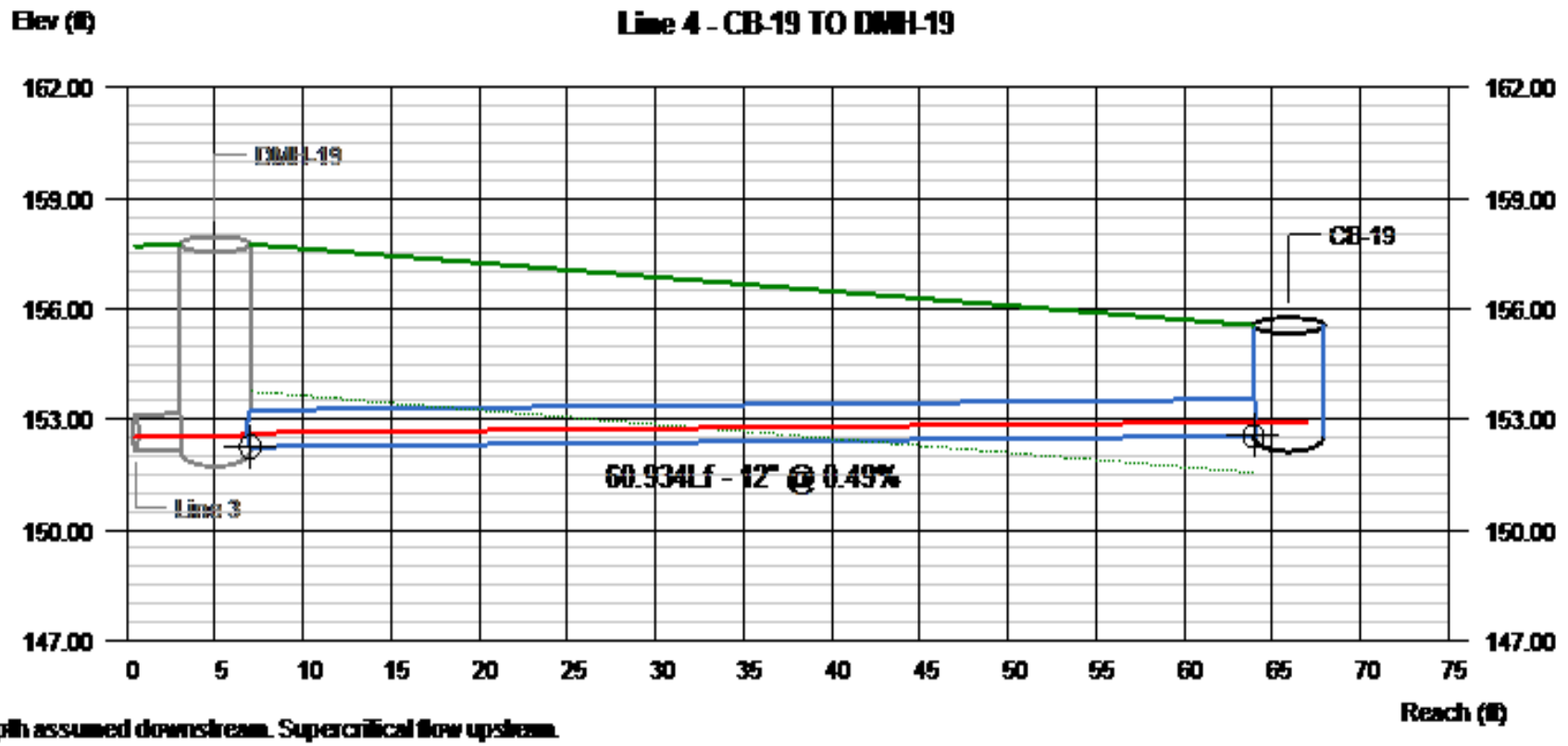
Starting HGL = 150.4. Supercritical flow upstream.



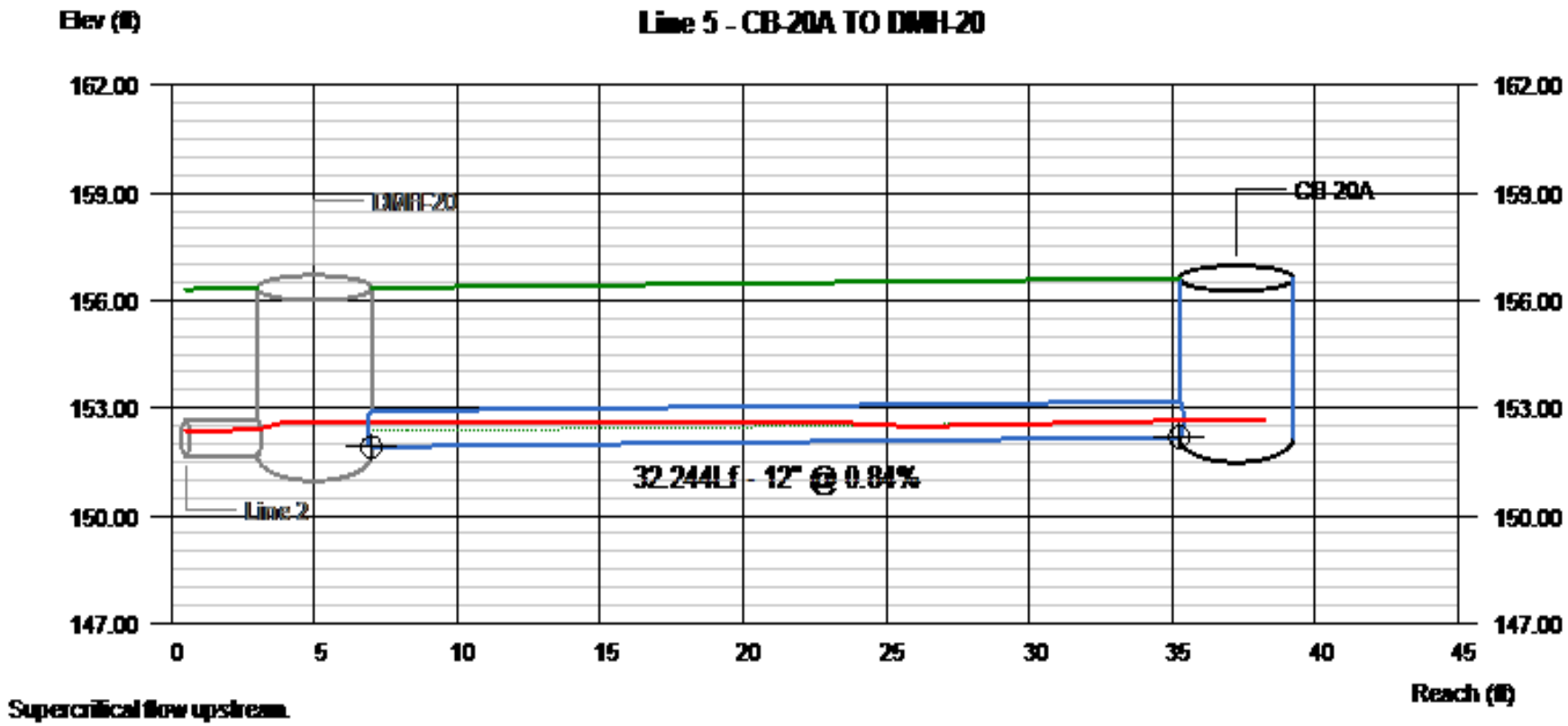
depth assumed downstream. Subcritical flow upstream.

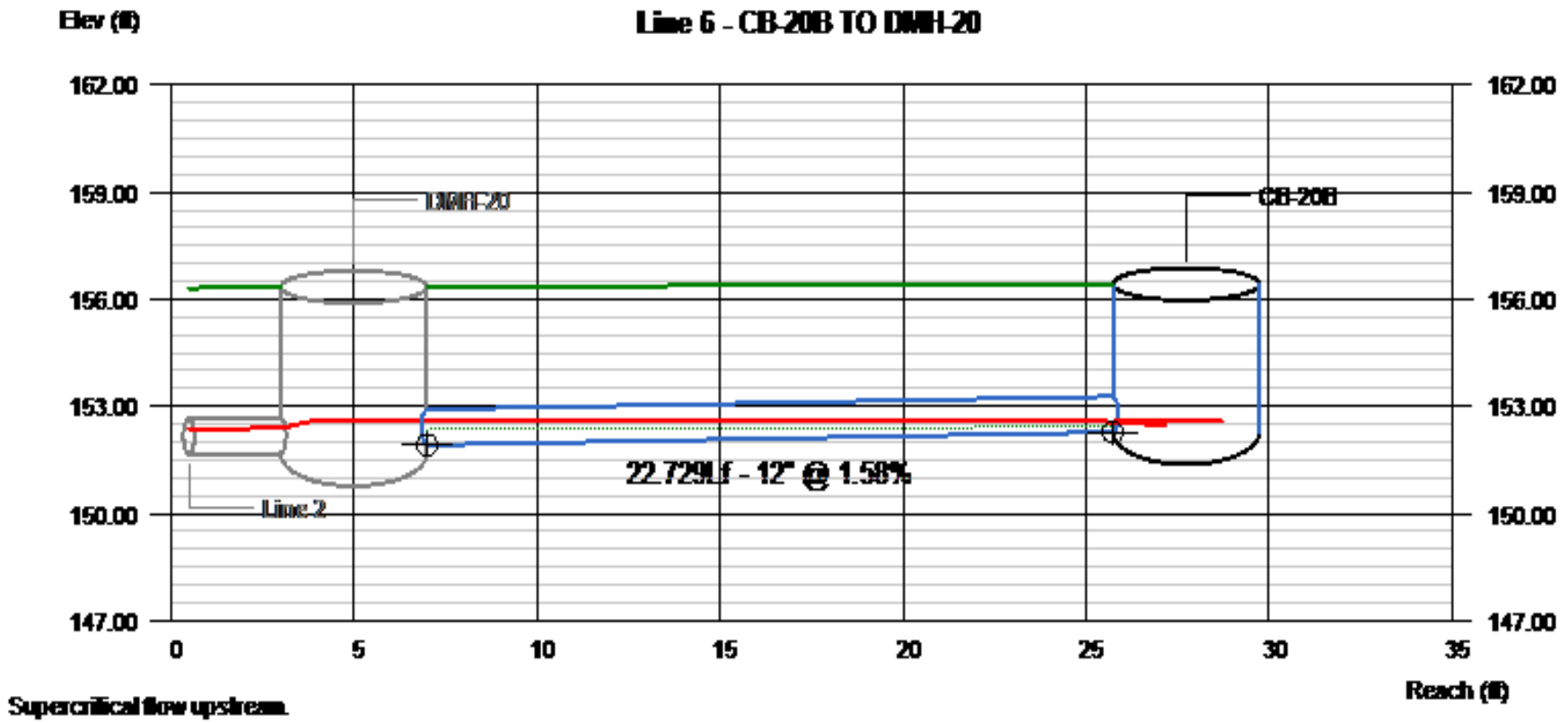


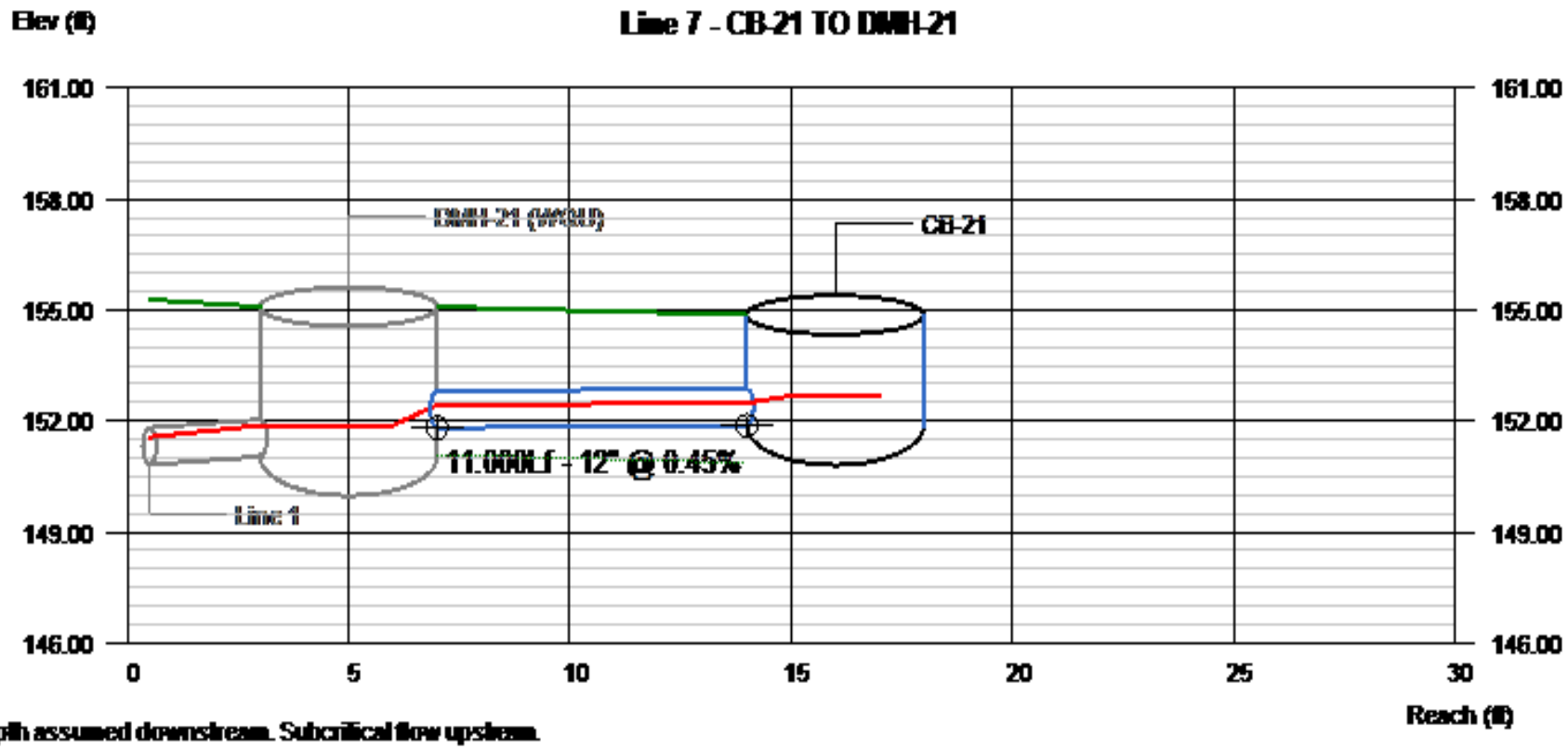
Supercritical flow upstream.



depth assumed downstream. Supercritical flow upstream.

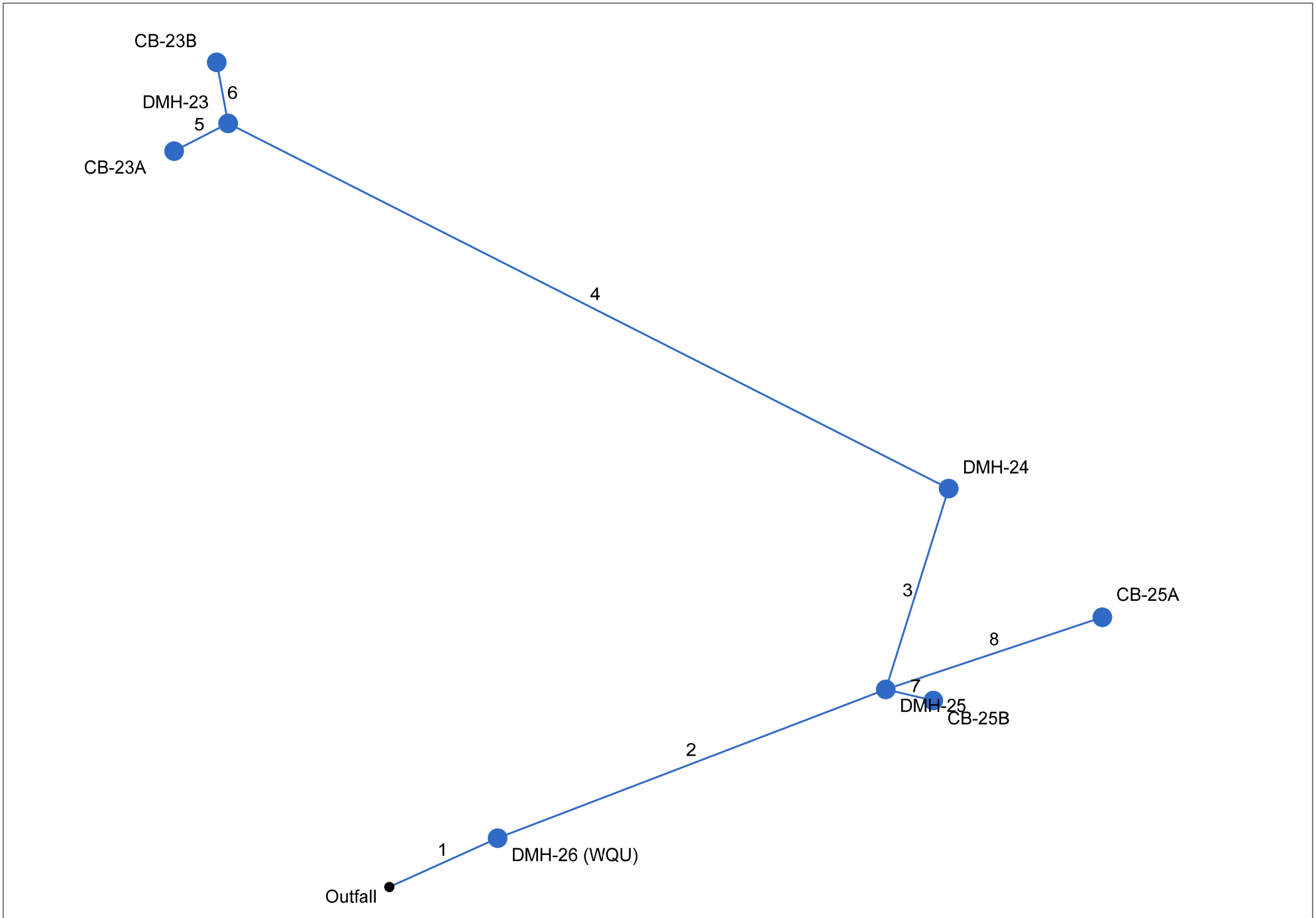

Elev (ft)
Line 5 - CB-20A TO DMH-20
162.00
159.00
156.00
153.00
150.00
147.00
DMH-20
CB-20A
Line 2
32.244Lf - 12" @ 0.84%
0
5
10
15
20
25
30
35
40
45
Reach (ft)
Supercritical flow upstream.


Elev (ft)
Line 6 - CB-20B TO DMH-20
162.00
159.00
156.00
153.00
150.00
147.00
DMH-20
CB-20B
22.729Lf - 12" @ 1.58%
Line 2
0
5
10
15
20
25
30
35
Reach (ft)
Supercritical flow upstream.



depth assumed downstream. Subcritical flow upstream.

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: System-6SIS.stm	Number of lines: 8	Date: 3/9/2020

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	26.766	-24.702	MH	0.00	0.00	0.00	6.0	137.00	8.14	139.18	18	Cir	0.012	0.15	146.17	DMH-26 TO SIS-6
2	1	93.323	3.672	MH	0.00	0.00	0.00	6.0	139.43	0.61	140.00	18	Cir	0.012	0.82	145.12	DMH-25 TO DMH-26
3	2	47.326	-51.616	MH	0.00	0.00	0.00	6.0	140.50	0.51	140.74	12	Cir	0.012	0.99	144.61	DMH-24 TO DMH-25
4	3	181.456	-80.385	MH	0.00	0.00	0.00	6.0	140.84	4.97	149.85	12	Cir	0.012	0.84	153.80	DMH-23 TO DMH-24
5	4	13.634	-53.785	Grate	0.00	0.33	0.90	6.0	149.95	7.99	151.04	12	Cir	0.012	1.00	154.04	CB-23A TO DMH-23
6	4	13.921	52.203	Grate	0.00	0.18	0.90	6.0	149.95	7.97	151.06	12	Cir	0.012	1.00	154.06	CB-23B TO DMH-23
7	2	10.998	35.088	Grate	0.00	0.36	0.90	6.0	140.50	8.00	141.38	12	Cir	0.012	1.00	144.69	CB-25B TO DMH-25
8	2	51.270	2.546	Grate	0.00	0.36	0.90	6.0	140.50	0.51	140.76	12	Cir	0.012	1.00	143.80	CB-25A TO DMH-25

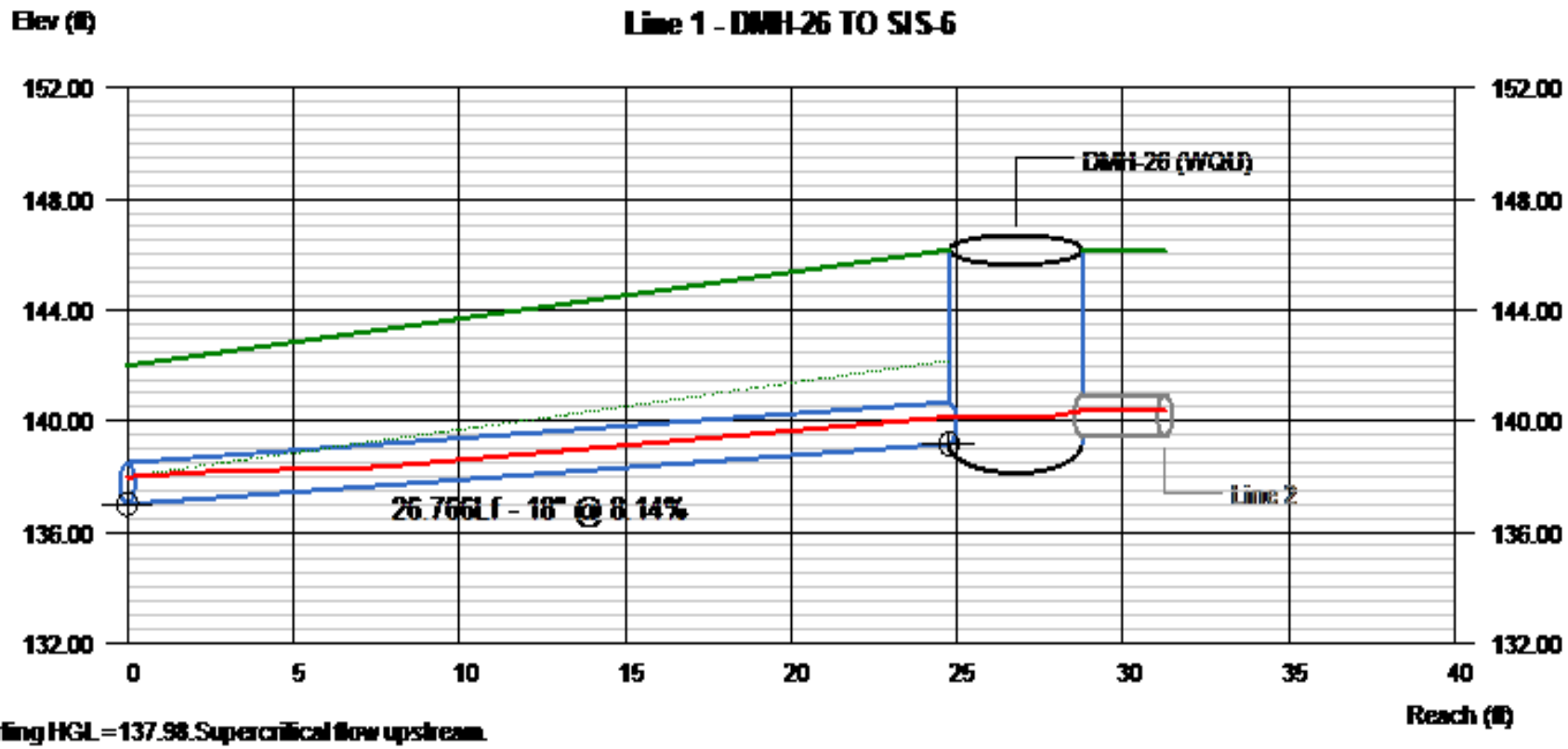
Project File: System-6SIS.stm | Number of lines: 8 | Date: 3/9/2020

My Report

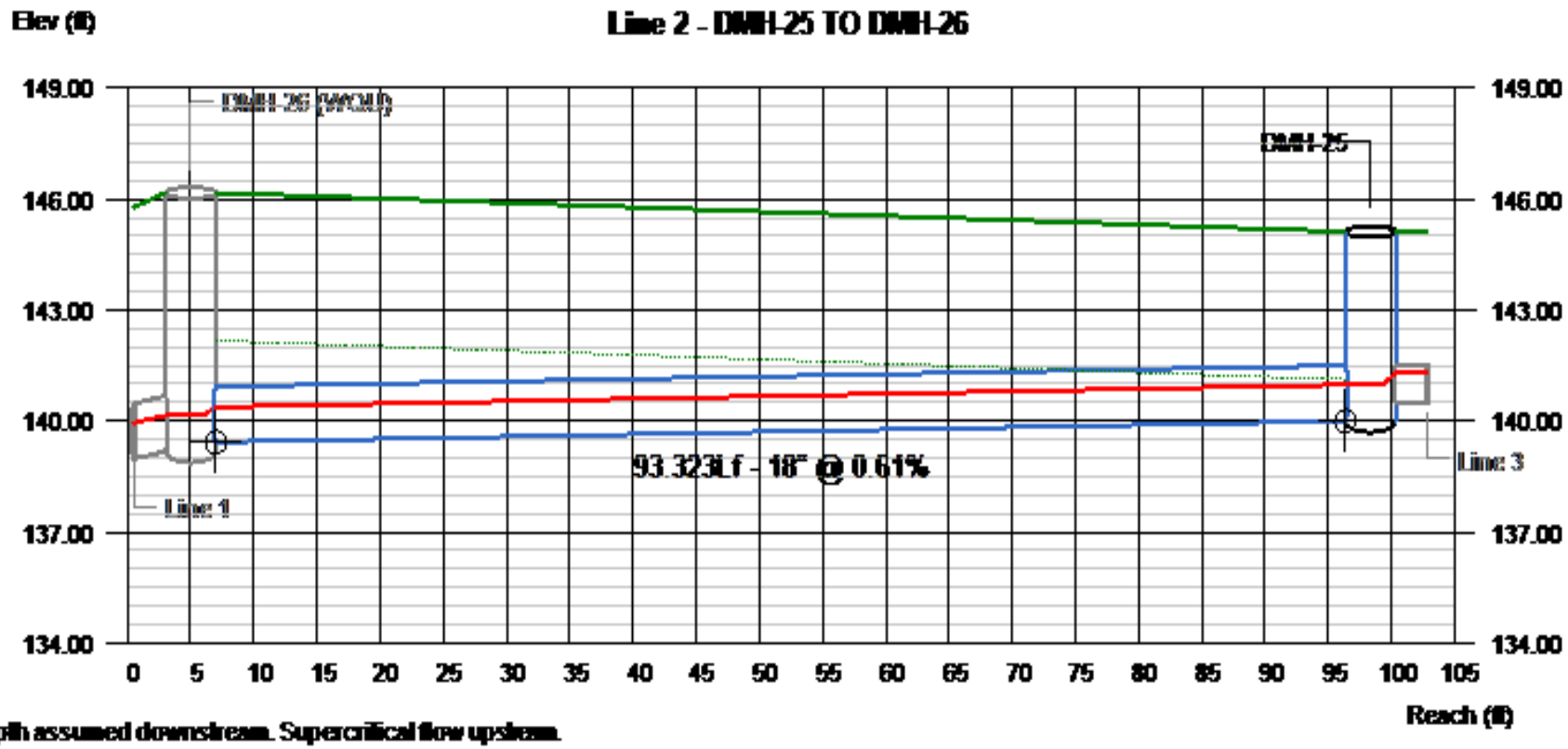
Line No.	Line ID	Flow Rate (cfs)	Line Length (ft)	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Q Byp (cfs)	Byp Ln No	Minor Loss (ft)	HGL Jnct (ft)	DnStm Ln No	Junct Type
1	DMH-26 TO SIS-6	6.34	26.766	137.00	139.18	8.14	137.98	140.15 j	....	n/a	n/a	140.15	Outfall	MH
2	DMH-25 TO DMH-26	6.45	93.323	139.43	140.00	0.61	140.38	140.98	....	n/a	0.35	140.98	1	MH
3	DMH-24 TO DMH-25	2.70	47.326	140.50	140.74	0.51	141.30	141.54	....	n/a	0.24	141.79	2	MH
4	DMH-23 TO DMH-24	2.80	181.456	140.84	149.85	4.97	141.79	150.57 j	....	n/a	n/a	150.57	3	MH
5	CB-23A TO DMH-23	1.83	13.634	149.95	151.04	7.99	150.57	151.62 j	0.31	8	n/a	151.62	4	Grate
6	CB-23B TO DMH-23	1.00	13.921	149.95	151.06	7.97	150.57	151.48 j	0.05	8	n/a	151.48	4	Grate
7	CB-25B TO DMH-25	1.99	10.998	140.50	141.38	8.00	140.98	141.98	0.00	8	0.25	141.98	2	Grate
8	CB-25A TO DMH-25	1.99	51.270	140.50	140.76	0.51	141.13	141.39	0.00	Offsite	0.23	141.62	2	Grate

Project File: System-6SIS.stm | Number of lines: 8 | Date: 3/9/2020

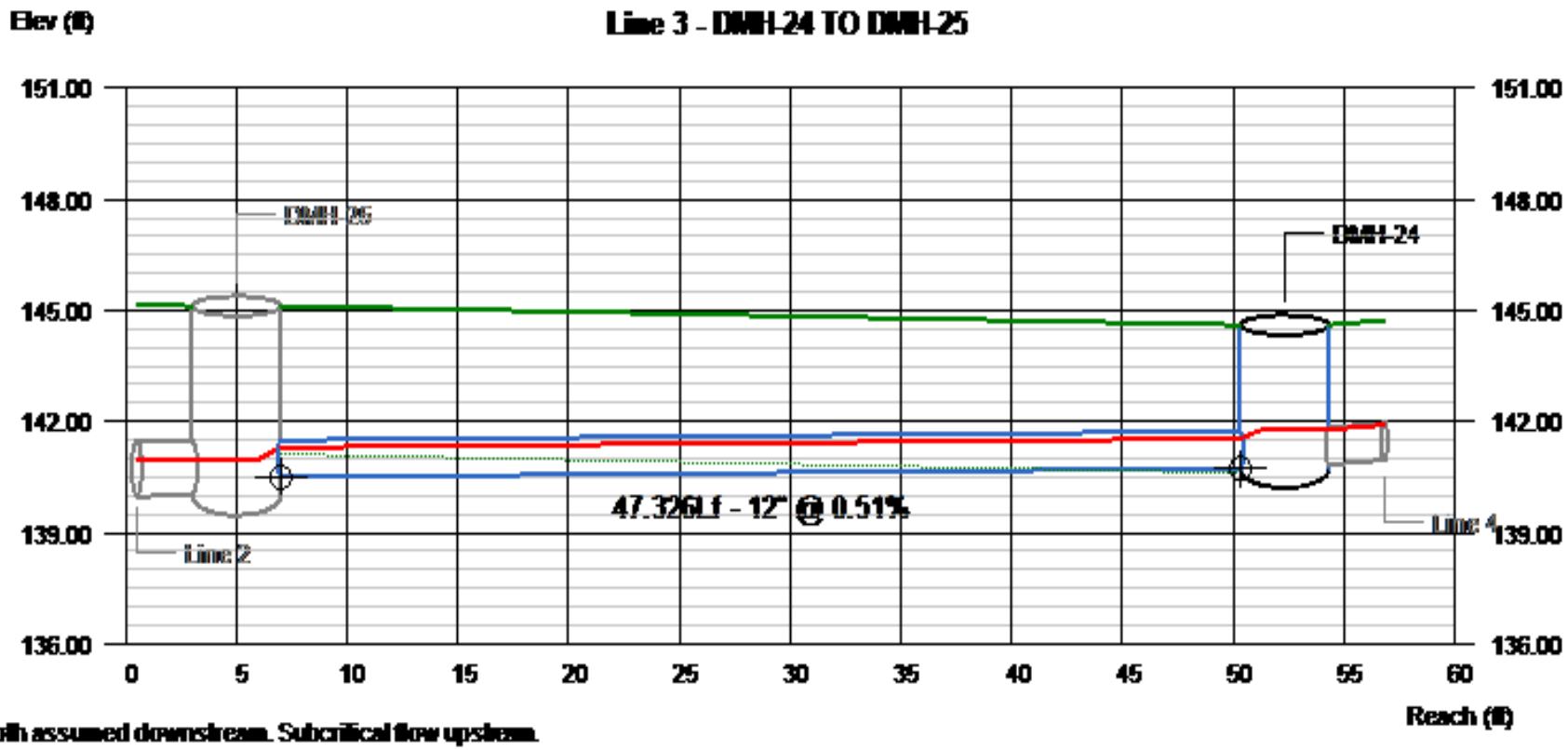
NOTES: ** Critical depth



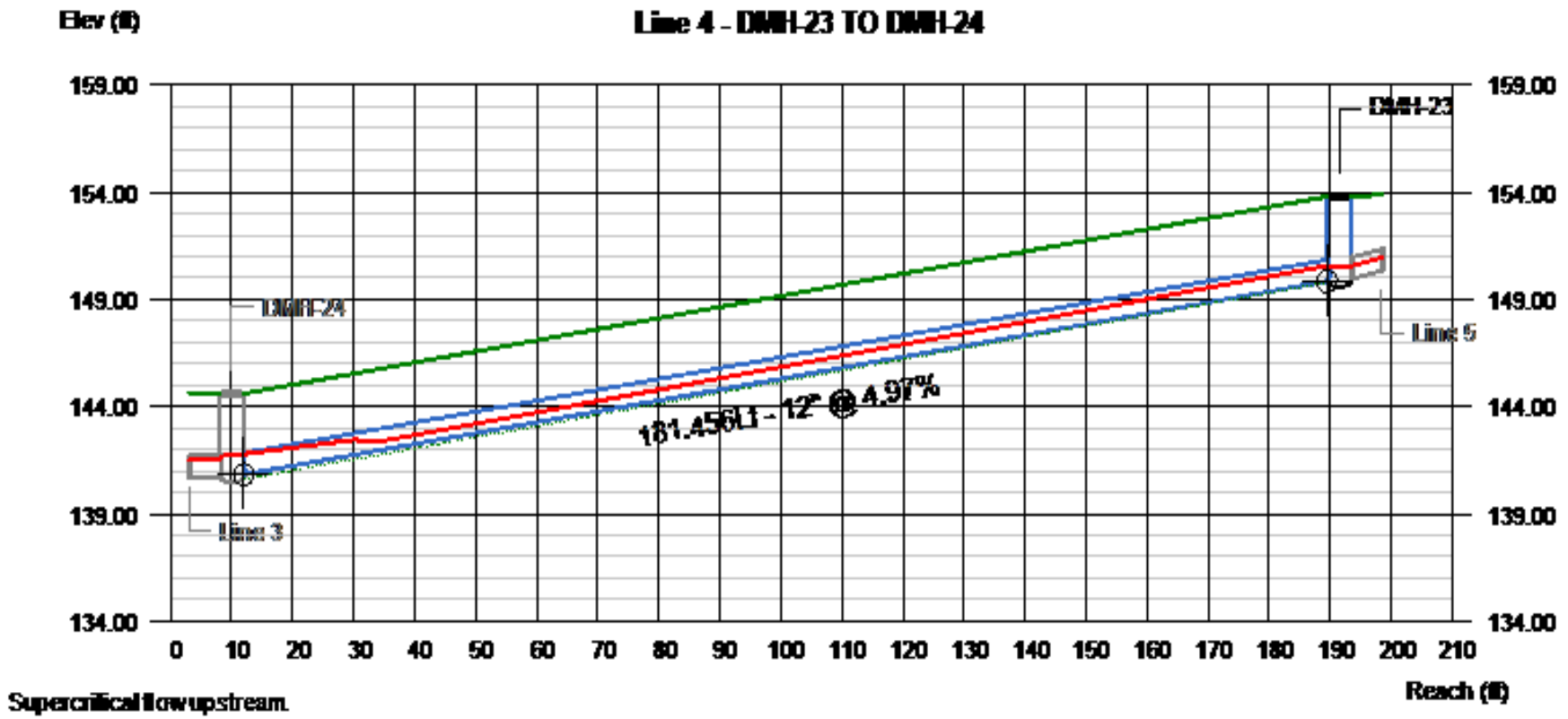
Starting HGL = 137.98. Supercritical flow upstream.

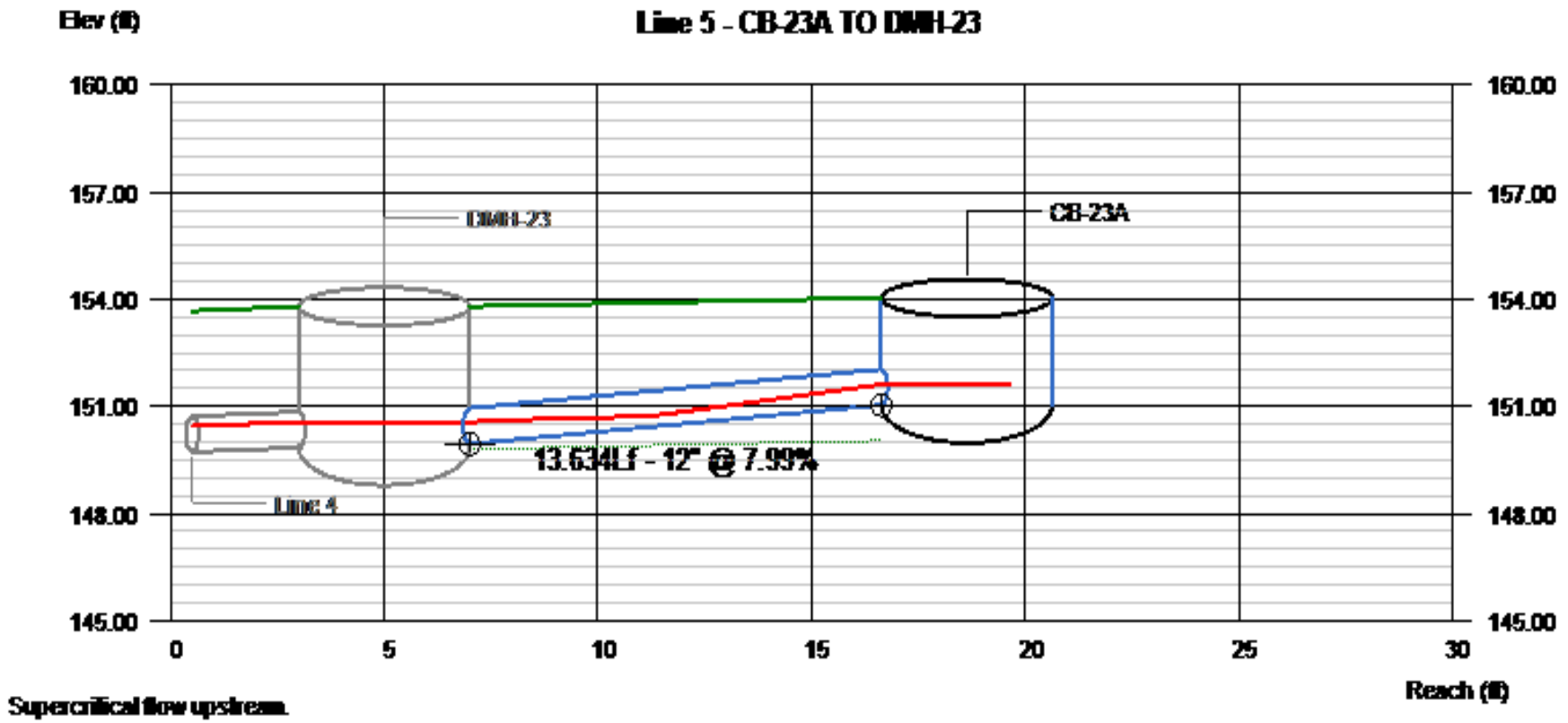


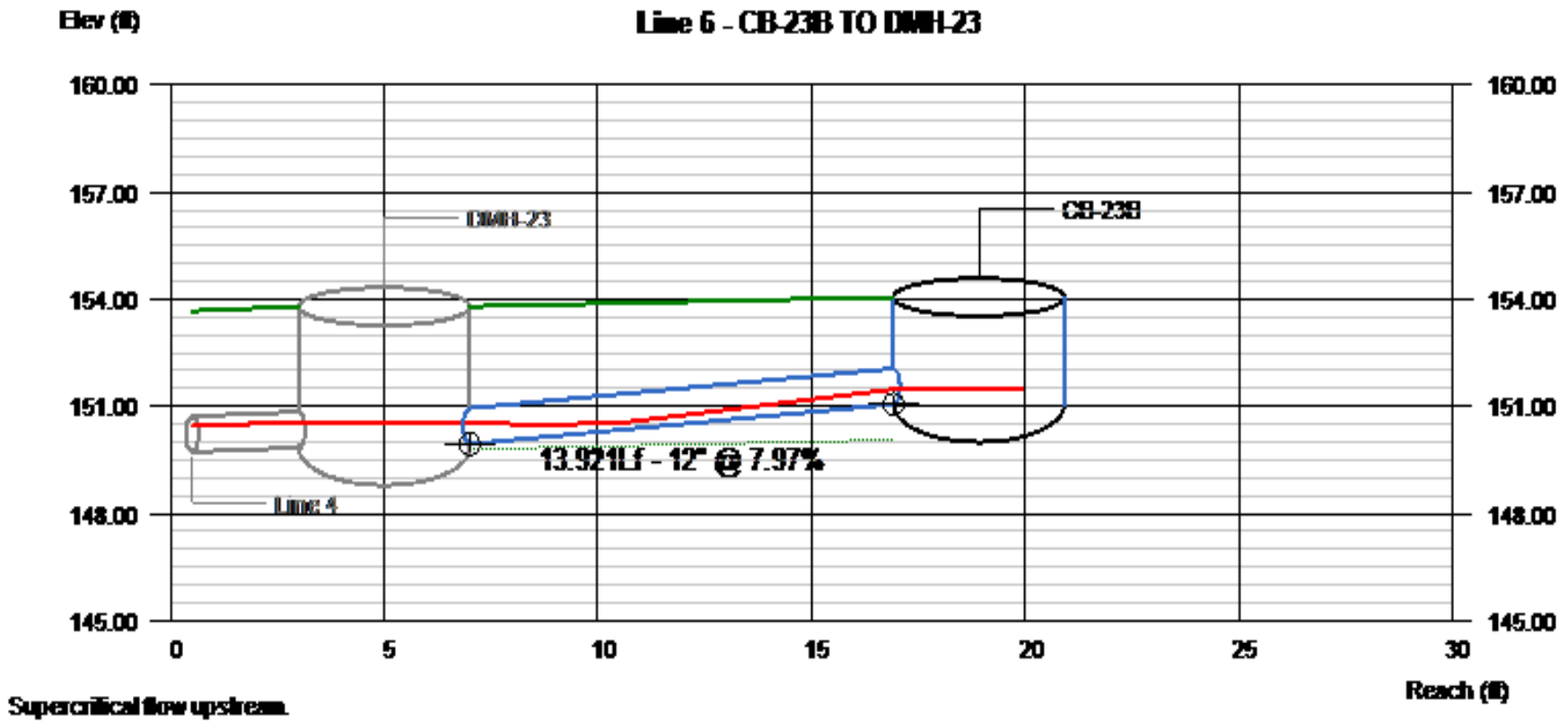
depth assumed downstream. Supercritical flow upstream.



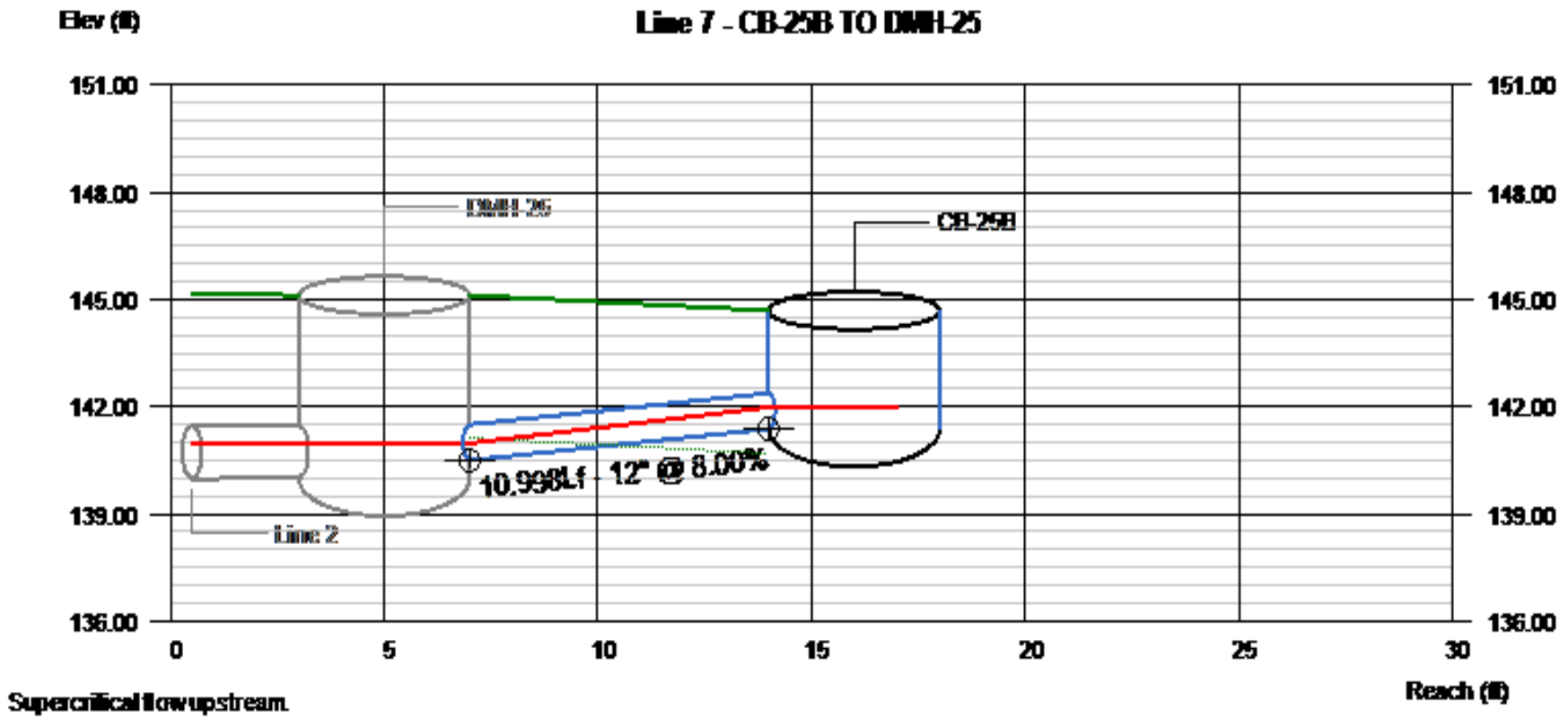
depth assumed downstream. Subcritical flow upstream.

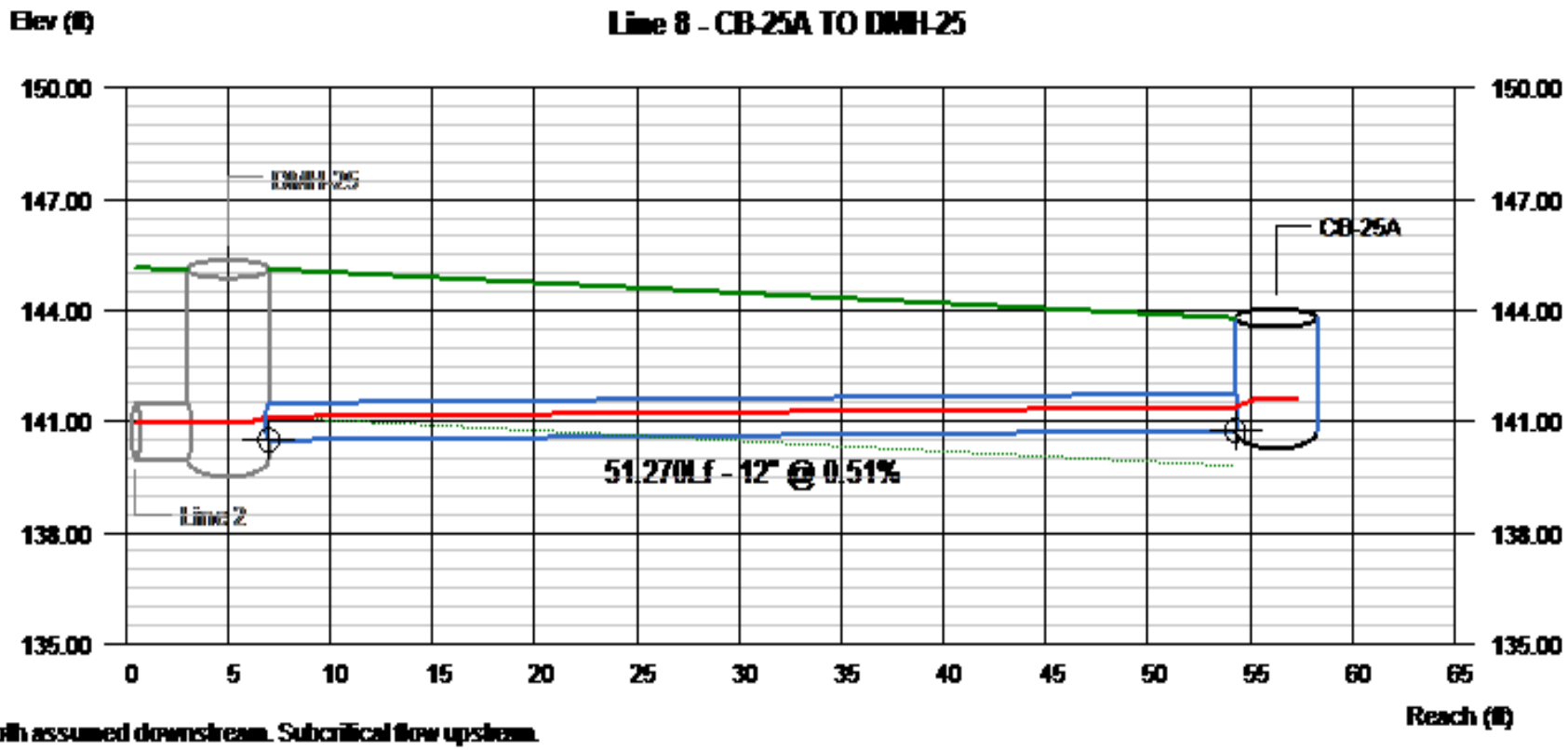

Elev (ft)
Line 4 - DMH-23 TO DMH-24
159.00
154.00
149.00
144.00
139.00
134.00
DMH-23
DMH-24
Line 5
Line 3
181.456LJ - 12" @ 4.97%
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
Supercritical flow upstream.
Reach (ft)


Elev (ft)
Line 5 - CB-23A TO DMH-23
160.00
157.00
154.00
151.00
148.00
145.00
DMH-23
CB-23A
13.634Lf - 12" @ 7.99%
Line 4
0
5
10
15
20
25
30
Reach (ft)
Supercritical flow upstream.



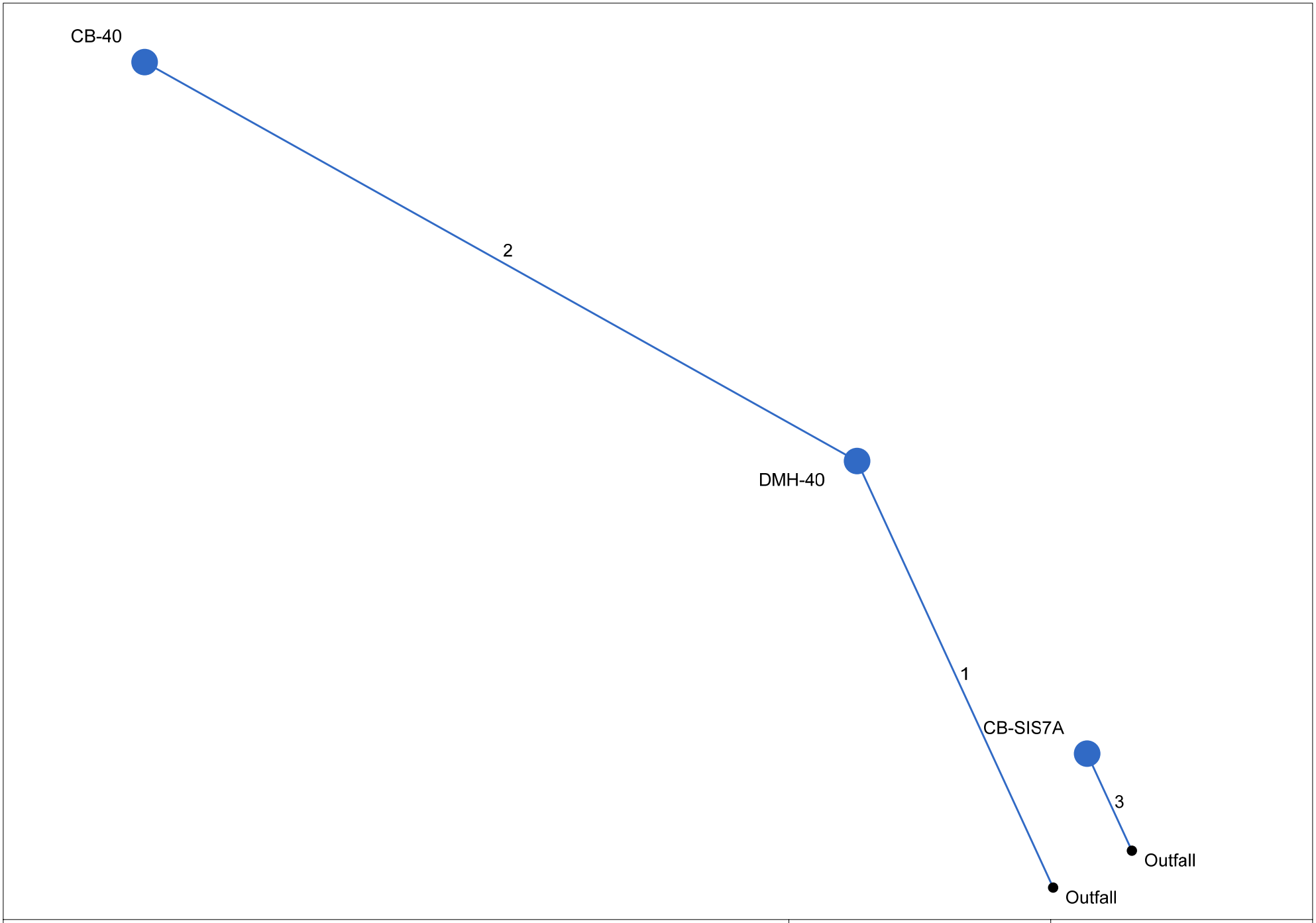
Supercritical flow upstream.


Elev (ft)
Line 7 - CB-25B TO DMH-25
151.00
148.00
145.00
142.00
139.00
136.00
DMH-25
CB-25B
10.998Lf - 12" @ 8.00%
Line 2
0
5
10
15
20
25
30
Reach (ft)
Supercritical flow upstream.



depth assumed downstream. Subcritical flow upstream.

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: System-7SIS.stm	Number of lines: 3	Date: 3/9/2020

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	75.970	-114.702	MH	0.00	0.00	0.00	6.0	136.50	2.50	138.40	12	Cir	0.012	0.64	141.50	DMH-40 TO SIS-7
2	1	132.355	-35.933	Grate	0.00	0.35	0.70	6.0	138.50	4.44	144.37	12	Cir	0.012	1.00	147.37	CB-40 TO DMH-40
3	End	17.357	-114.702	Grate	0.00	0.42	0.70	6.0	136.50	7.55	137.81	12	Cir	0.012	1.00	140.81	CB-SIS7A TO SIS-7

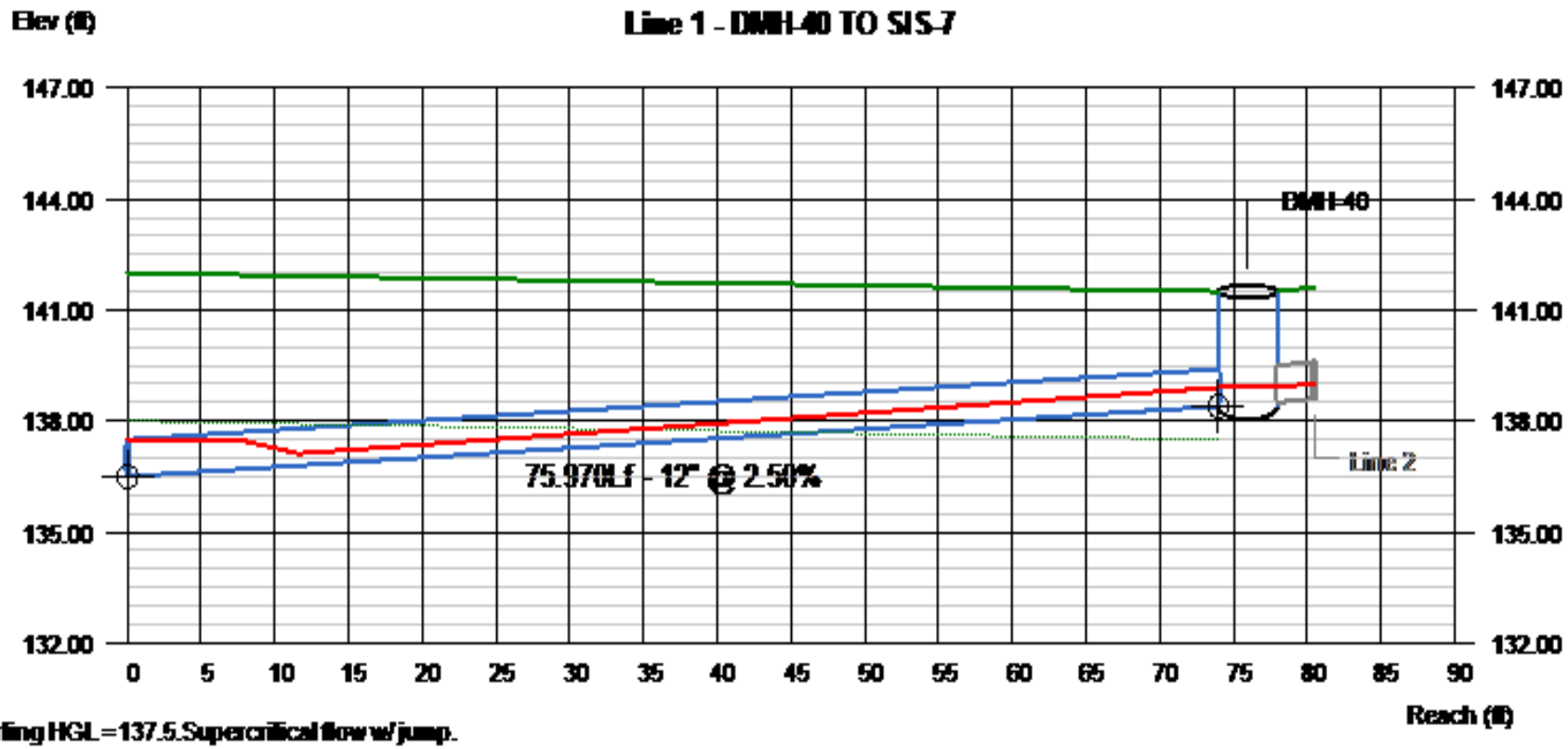
Project File: System-7SIS.stm | Number of lines: 3 | Date: 3/9/2020

My Report

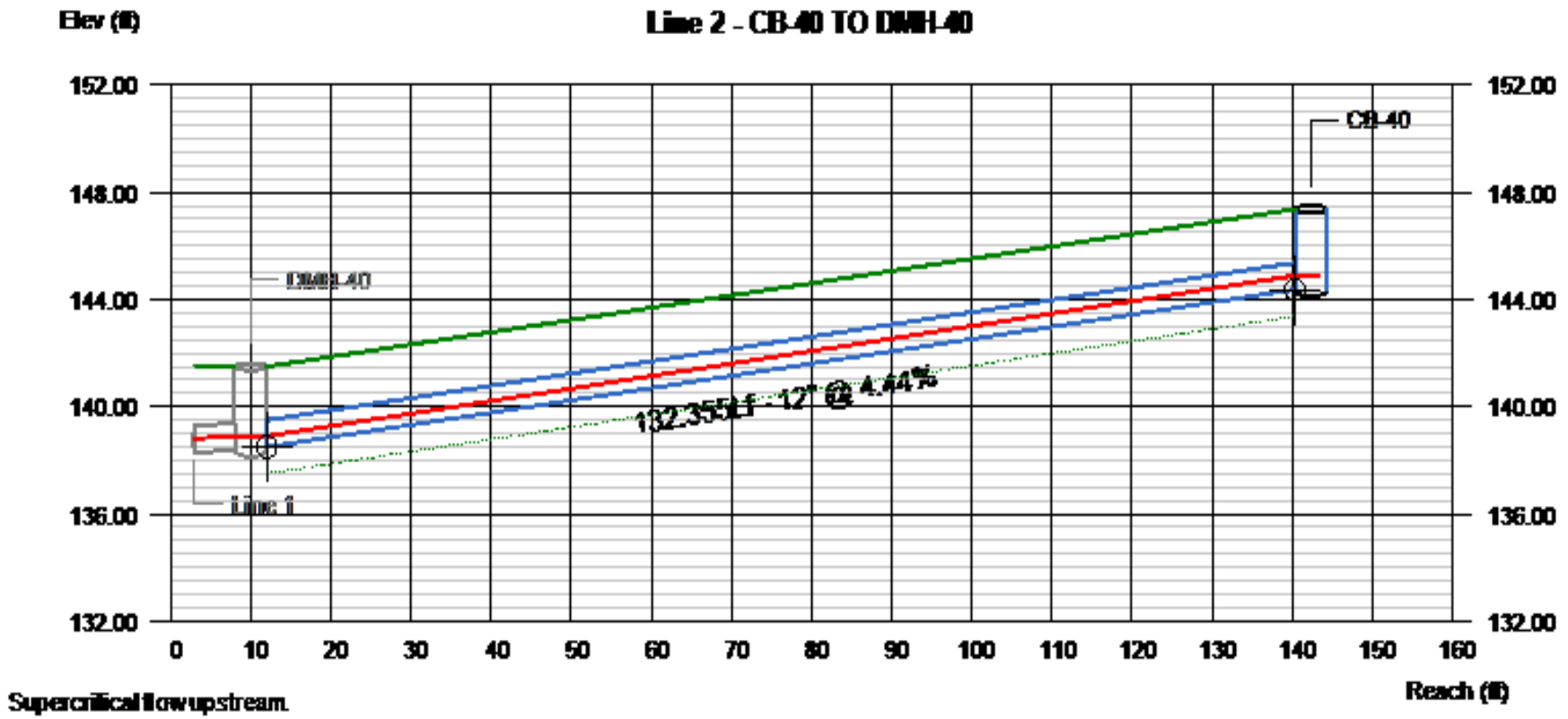
Line No.	Line ID	Flow Rate (cfs)	Line Length (ft)	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Q Byp (cfs)	Byp Ln No	Minor Loss (ft)	HGL Jnct (ft)	DnStm Ln No	Junct Type	
1	DMH-40 TO SIS-7	1.43	75.970	136.50	138.40	2.50	137.50	138.91 j	....	n/a	n/a	138.91	Outfall	MH	
2	CB-40 TO DMH-40	1.51	132.355	138.50	144.37	4.44	138.91	144.89	0.22	3	n/a	144.89	1	Grate	
3	CB-SIS7A TO SIS-7	1.81	17.357	136.50	137.81	7.55	137.50	138.38 j	0.00	Sag	n/a	138.38	Outfall	Grate	

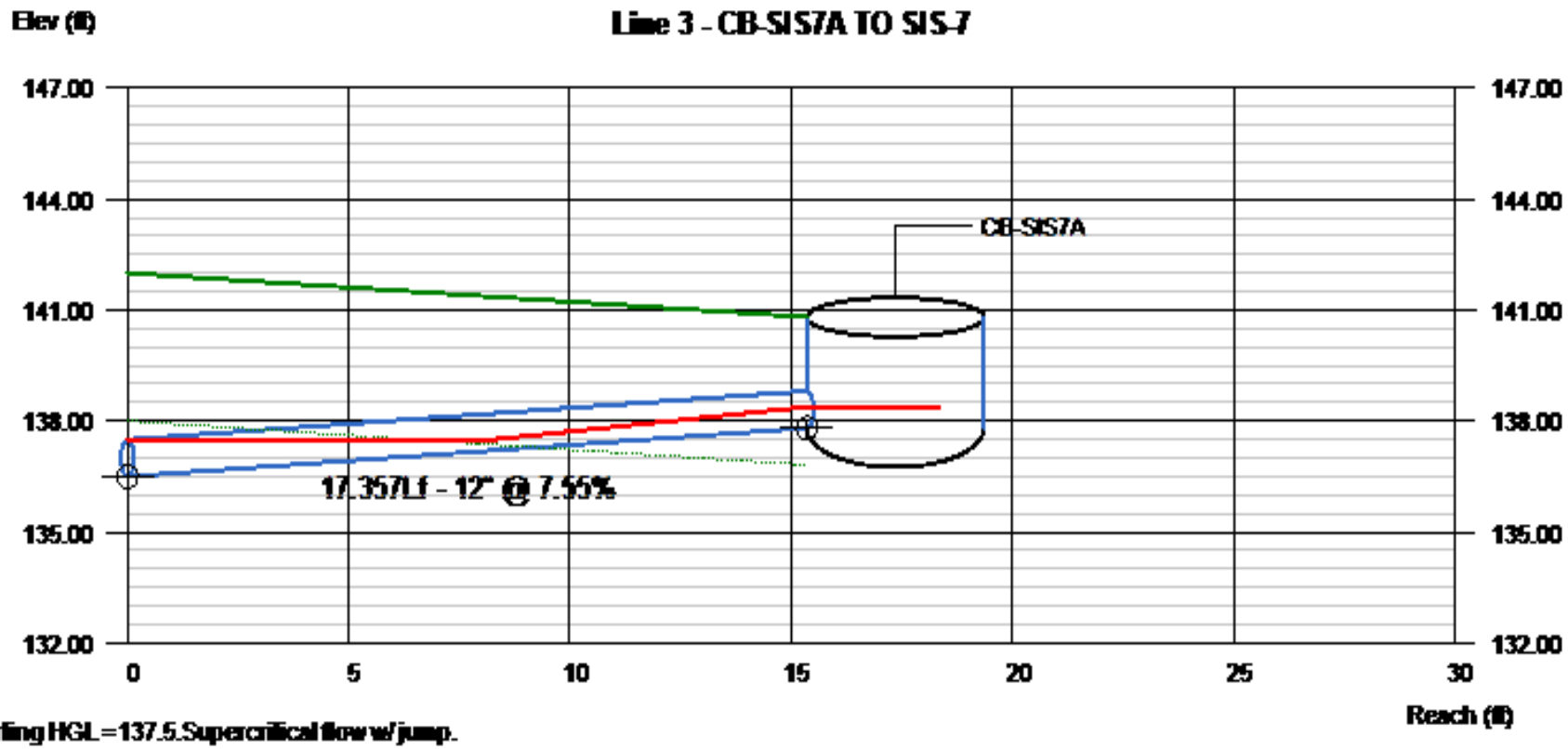
Project File: System-7SIS.stm | Number of lines: 3 | Date: 3/9/2020

NOTES: ** Critical depth



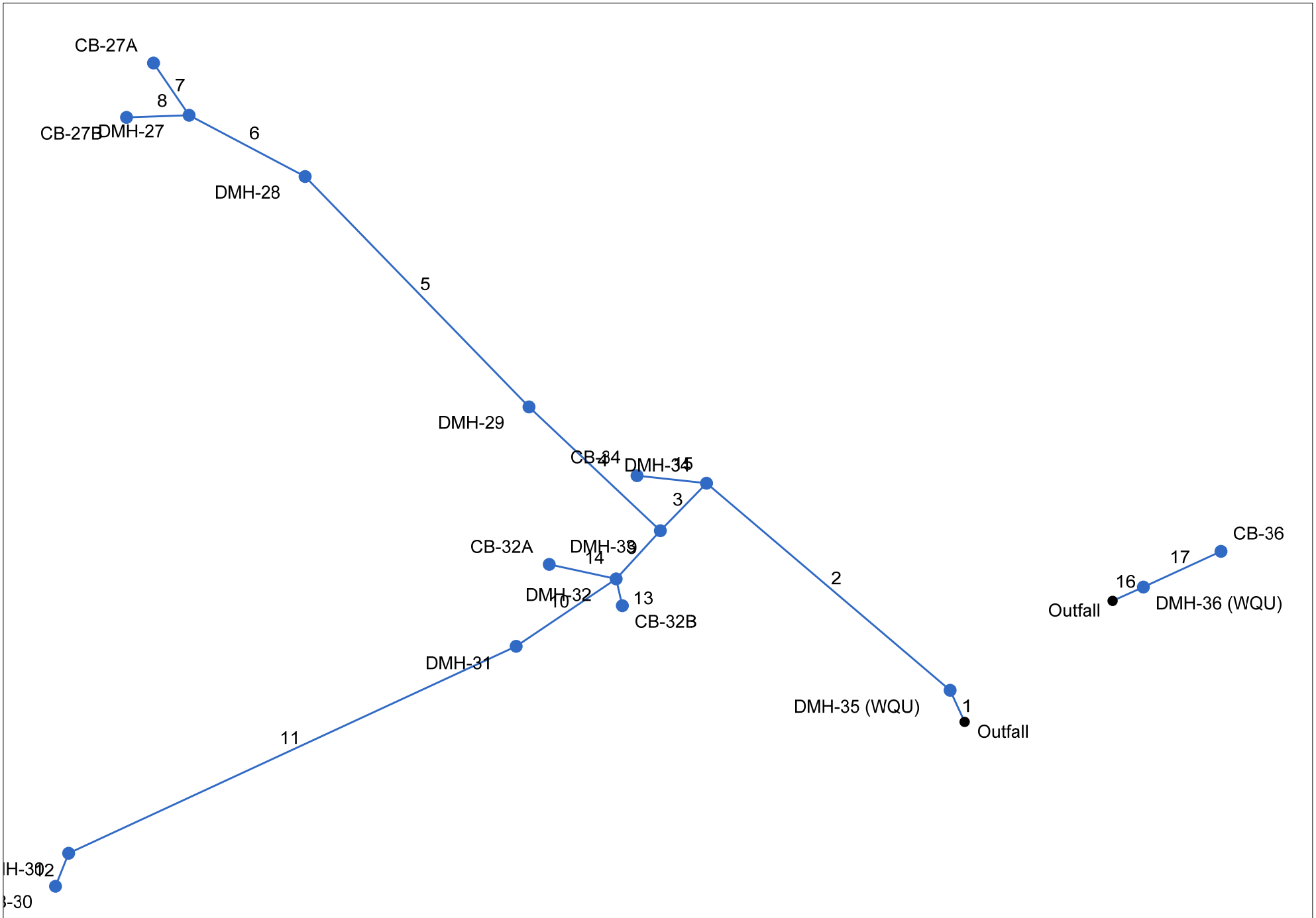
Starting HGL = 137.5. Supercritical flow w/jump.


Elev (ft)
Line 2 - CB-40 TO DMH-40
152.00
148.00
144.00
140.00
136.00
132.00
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
CB-40
DMH-40
Line 1
132.355LF - 12" @ 4.44%
Supercritical flow upstream.
Reach (ft)



Starting HGL=137.5.Supercritical flow w/jump.

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: Sysyem-9SIS.stm	Number of lines: 17	Date: 3/9/2020

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	12.538	-114.702	MH	0.00	0.00	0.00	6.0	131.00	11.17	132.40	18	Cir	0.012	0.48	136.44	DMH-35 TO SIS-9
2	1	115.804	-24.805	MH	0.00	0.00	0.00	6.0	132.50	2.75	135.69	18	Cir	0.012	1.00	139.39	DMH-34 TO DMH-35
3	2	23.933	-86.338	MH	0.00	0.00	0.00	6.0	136.19	0.50	136.31	12	Cir	0.012	1.00	139.95	DMH-33 TO DMH-34
4	3	65.401	89.272	MH	0.00	0.00	0.00	6.0	136.92	1.45	137.87	12	Cir	0.012	0.15	140.97	DMH-29 TO DMH-33
5	4	116.574	2.602	MH	0.00	0.00	0.00	6.0	137.97	4.79	143.55	12	Cir	0.012	0.36	146.65	DMH-28 TO DMH-29
6	5	47.495	-18.078	MH	0.00	0.00	0.00	6.0	143.65	5.90	146.45	12	Cir	0.012	0.55	149.55	DMH-27 TO DMH-28
7	6	22.903	27.808	Grate	0.00	0.39	0.90	6.0	146.55	4.32	147.54	12	Cir	0.012	1.00	150.54	CB-27A TO DMH-27
8	6	22.648	-29.954	Grate	0.00	0.33	0.90	6.0	146.55	4.28	147.52	12	Cir	0.012	1.00	150.52	CB-27B TO DMH-27
9	3	23.752	-1.736	MH	0.00	0.00	0.00	6.0	136.41	0.51	136.53	12	Cir	0.012	0.89	140.08	DMH-32 TO DMH-33
10	9	43.668	13.345	MH	0.00	0.00	0.00	6.0	137.08	2.77	138.29	12	Cir	0.012	0.20	140.72	DMH-31 TO DMH-32
11	10	178.381	9.356	MH	0.00	0.00	0.00	6.0	138.39	1.32	140.75	12	Cir	0.012	0.73	143.85	DMH-30 TO DMH-31
12	11	13.011	-43.589	Grate	0.00	0.08	0.90	6.0	140.78	0.54	140.85	12	Cir	0.012	1.00	143.85	CB-30 TO DMH-30
13	9	10.024	-55.476	Grate	0.00	0.36	0.90	6.0	136.91	0.50	136.96	12	Cir	0.012	1.00	139.96	CB-32B TO DMH-32
14	9	24.775	59.806	Grate	0.00	0.39	0.90	6.0	136.63	0.48	136.75	12	Cir	0.012	1.00	140.10	CB-32A TO DMH-32
15	2	25.278	-33.815	Grate	0.00	0.39	0.90	6.0	136.28	1.86	136.75	12	Cir	0.012	1.00	139.75	CB-34 TO DMH-34
16	End	12.277	-24.702	MH	0.00	0.00	0.00	6.0	131.00	10.18	132.25	12	Cir	0.012	0.15	136.88	DMH-36 TO SIS-9
17	16	30.873	0.000	Grate	0.00	0.18	0.90	6.0	132.50	1.62	133.00	12	Cir	0.012	1.00	136.00	CB-36 TO DMH-36

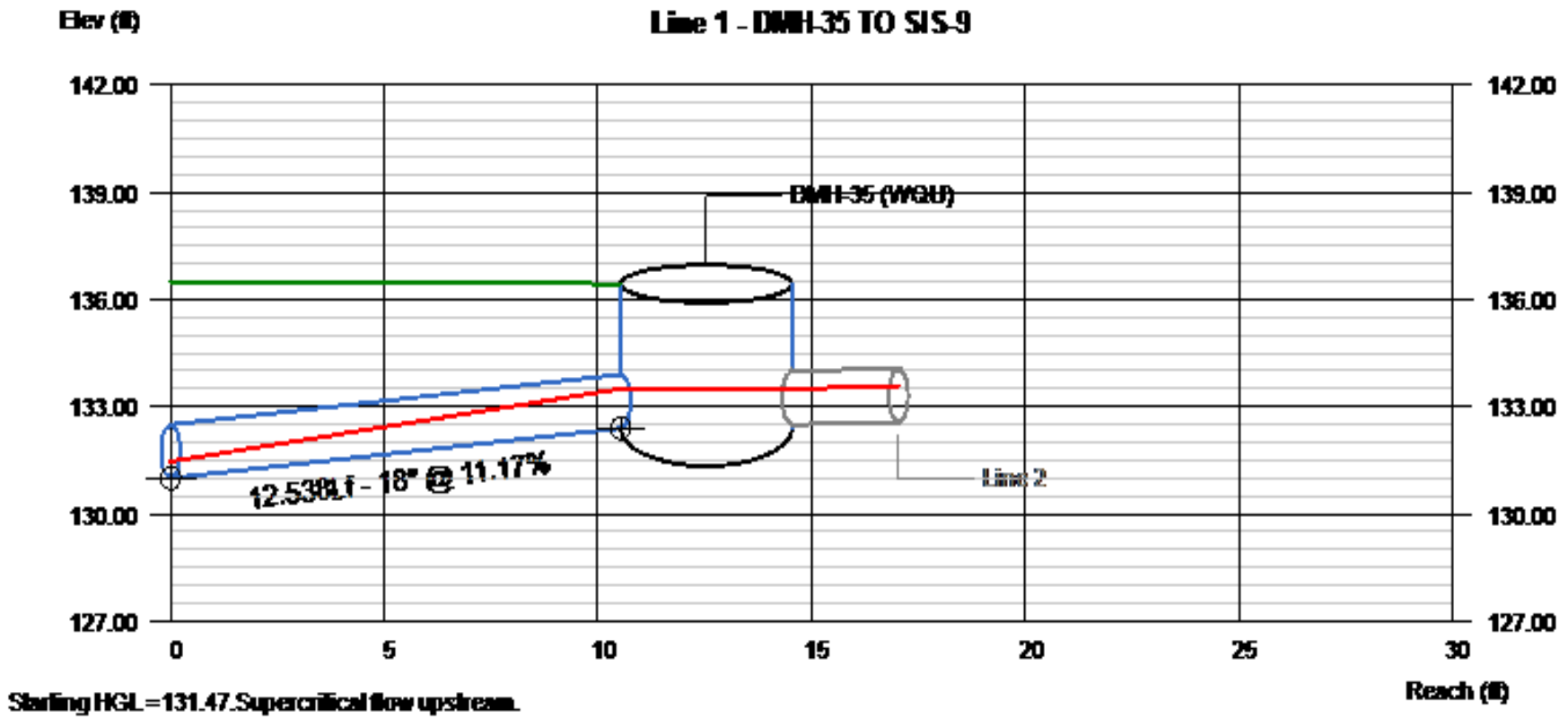
Project File: Sysyem-9SIS.stm | Number of lines: 17 | Date: 3/9/2020

My Report

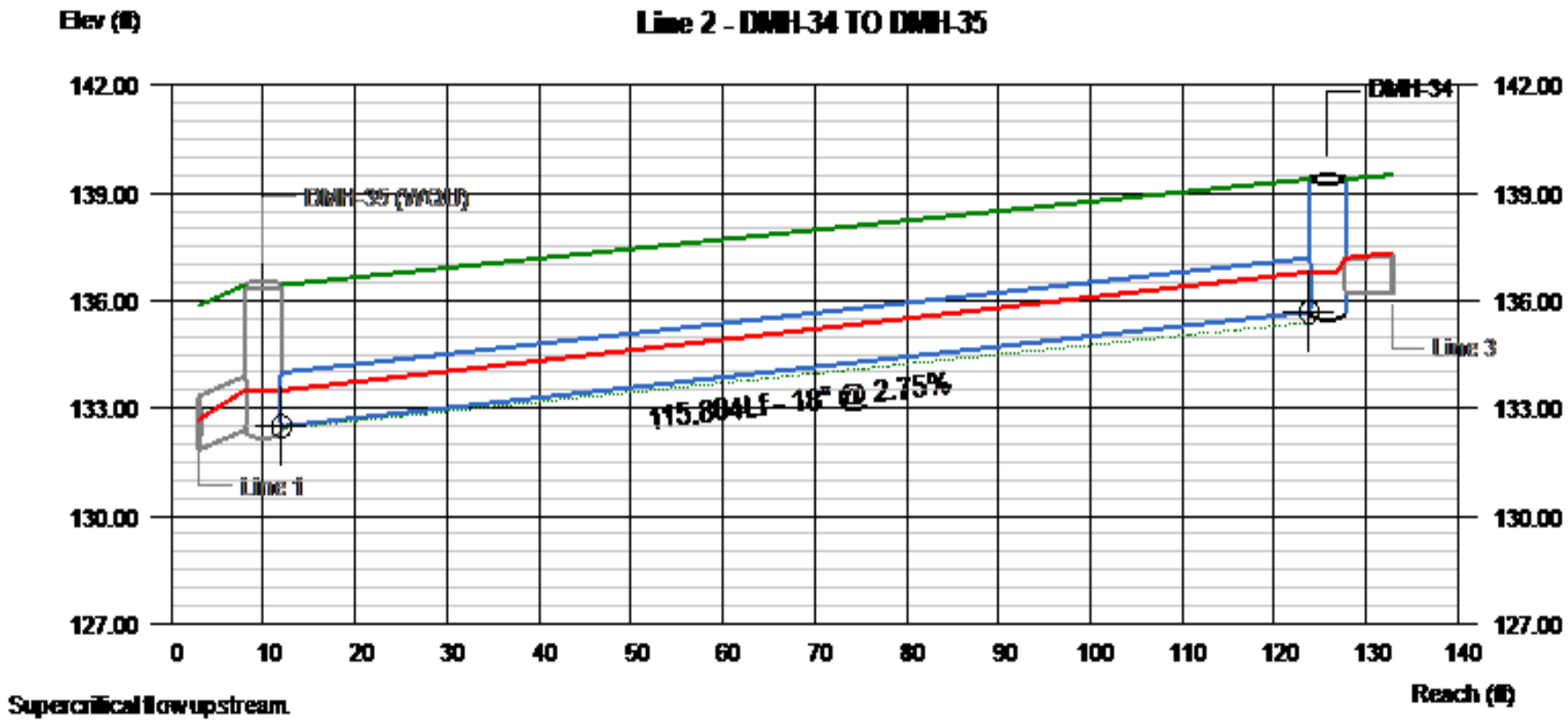
Line No.	Line ID	Flow Rate (cfs)	Line Length (ft)	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Q Byp (cfs)	Byp Ln No	Minor Loss (ft)	HGL Jnct (ft)	DnStm Ln No	Junct Type
1	DMH-35 TO SIS-9	8.11	12.538	131.00	132.40	11.17	131.47	133.50	....	n/a	0.25	133.50	Outfall	MH
2	DMH-34 TO DMH-35	8.20	115.804	132.50	135.69	2.75	133.50	136.80	....	n/a	n/a	136.80	1	MH
3	DMH-33 TO DMH-34	6.56	23.933	136.19	136.31	0.50	137.19	137.88	....	n/a	1.09	138.97	2	MH
4	DMH-29 TO DMH-33	3.86	65.401	136.92	137.87	1.45	138.97	139.62	....	n/a	0.06	139.68	3	MH
5	DMH-28 TO DMH-29	3.93	116.574	137.97	143.55	4.79	139.68	144.39 j	....	n/a	n/a	144.39	4	MH
6	DMH-27 TO DMH-28	3.96	47.495	143.65	146.45	5.90	144.39	147.29	....	n/a	n/a	147.29	5	MH
7	CB-27A TO DMH-27	2.16	22.903	146.55	147.54	4.32	147.29	148.17 j	0.48	15	n/a	148.17	6	Grate
8	CB-27B TO DMH-27	1.83	22.648	146.55	147.52	4.28	147.29	148.10 j	0.34	14	n/a	148.10	6	Grate
9	DMH-32 TO DMH-33	3.52	23.752	136.41	136.53	0.51	138.97	139.17	....	n/a	0.28	139.44	3	MH
10	DMH-31 TO DMH-32	0.36	43.668	137.08	138.29	2.77	139.44	139.45	....	n/a	0.00	139.45	9	MH
11	DMH-30 TO DMH-31	0.44	178.381	138.39	140.75	1.32	139.45	141.02 j	....	n/a	n/a	141.02	10	MH
12	CB-30 TO DMH-30	0.44	13.011	140.78	140.85	0.54	141.05	141.13	0.00	13	n/a	141.13	11	Grate
13	CB-32B TO DMH-32	1.99	10.024	136.91	136.96	0.50	139.44	139.47	0.00	Offsite	0.10	139.57	9	Grate
14	CB-32A TO DMH-32	2.16	24.775	136.63	136.75	0.48	139.44	139.52	0.00	Offsite	0.12	139.64	9	Grate
15	CB-34 TO DMH-34	2.16	25.278	136.28	136.75	1.86	136.80	137.38	0.00	Offsite	0.27	137.38	2	Grate
16	DMH-36 TO SIS-9	0.98	12.277	131.00	132.25	10.18	131.19	132.67	....	n/a	n/a	132.67	Outfall	MH
17	CB-36 TO DMH-36	1.00	30.873	132.50	133.00	1.62	132.81	133.42	0.00	Sag	0.16	133.42	16	Grate

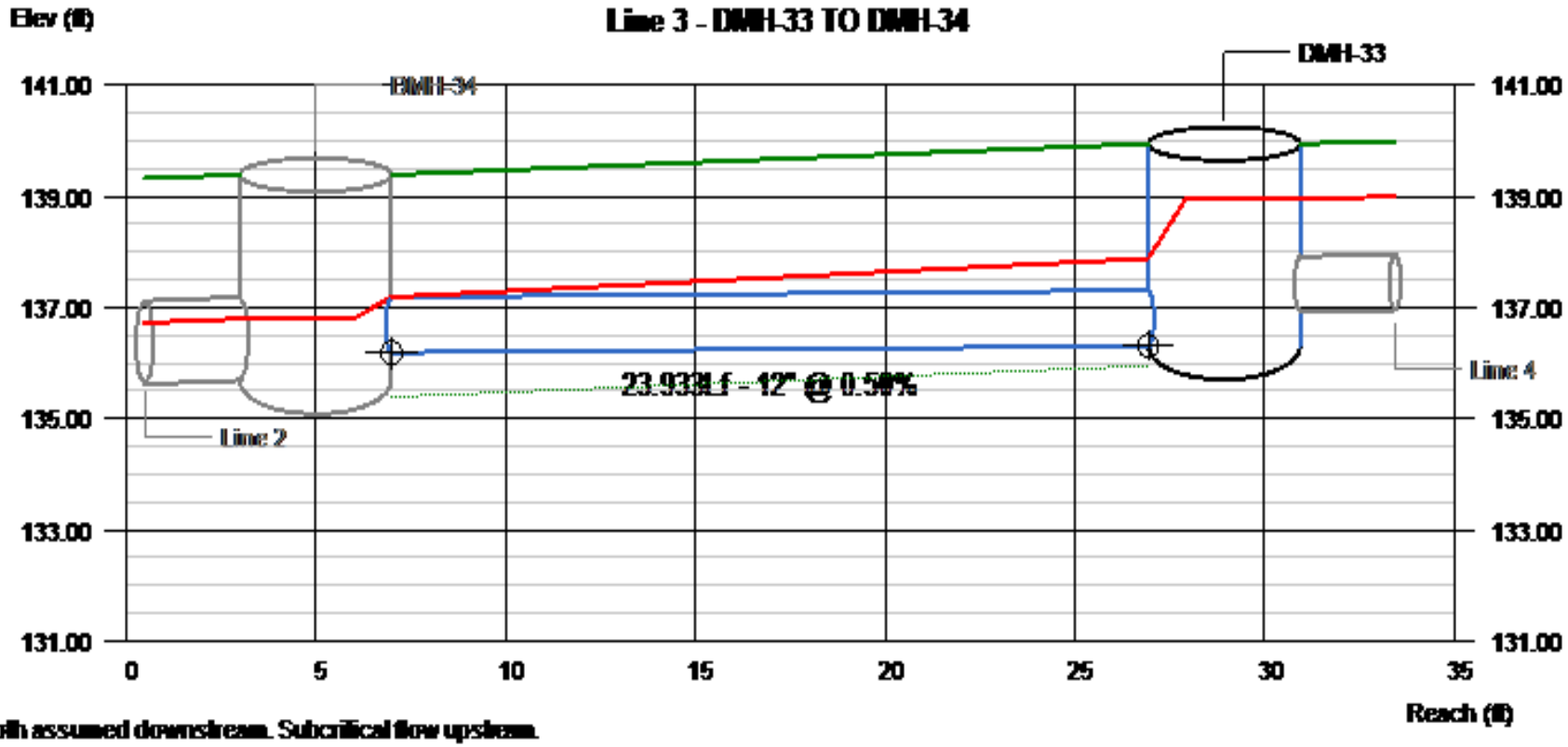
Project File: Sysyem-9SIS.stm | Number of lines: 17 | Date: 3/9/2020

NOTES: ** Critical depth

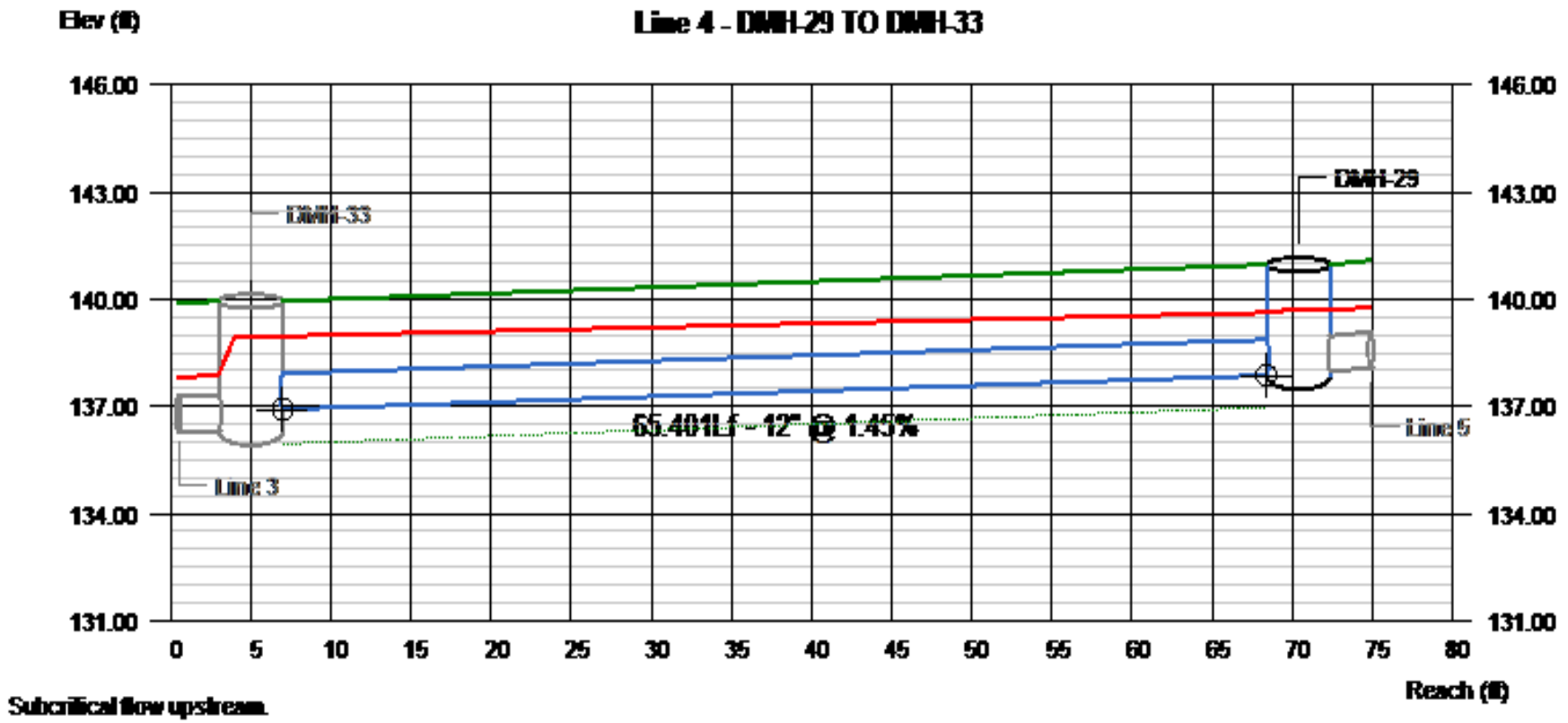


Starting HGL = 131.47. Supercritical flow upstream.

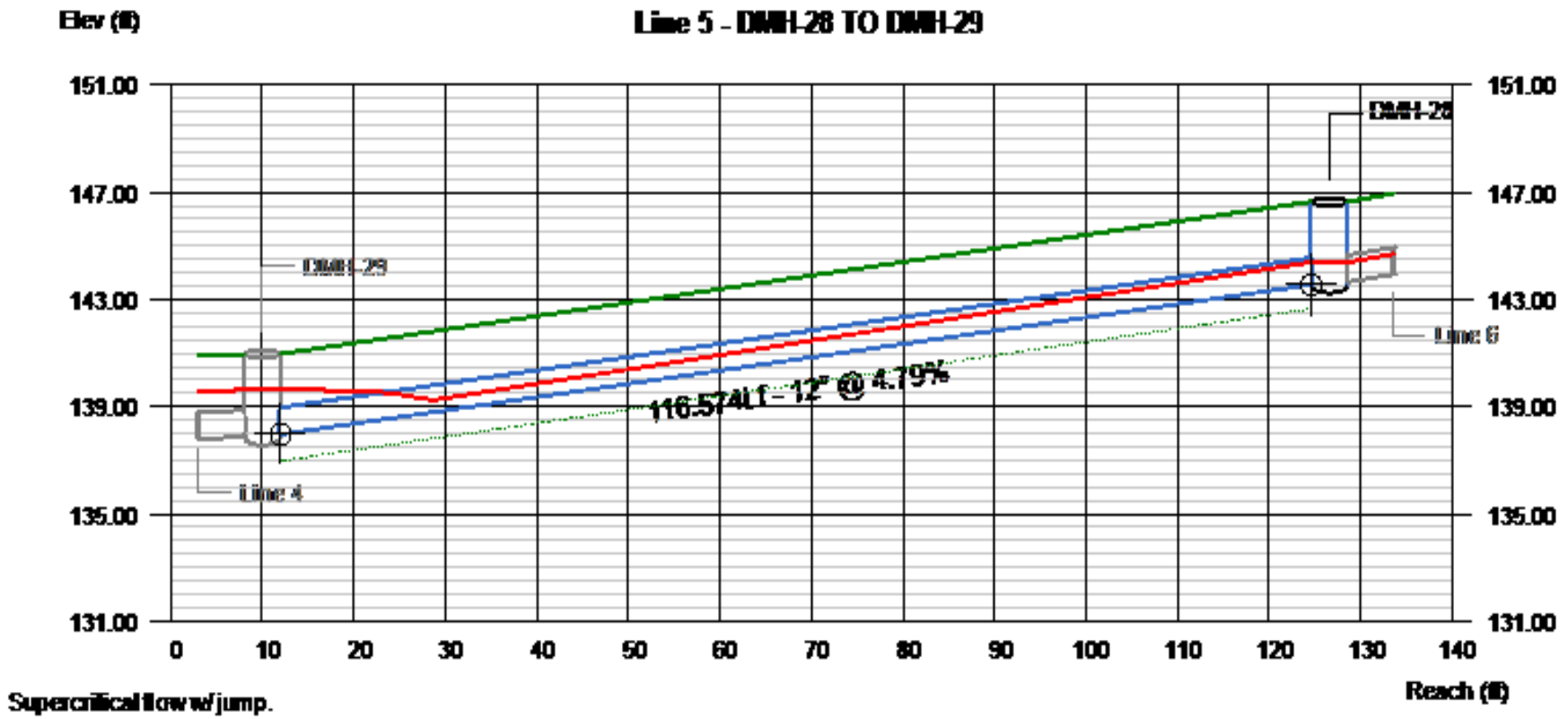

Elev (ft)
Line 2 - DMH-34 TO DMH-35
142.00
139.00
136.00
133.00
130.00
127.00
DMH-34
DMH-35 (MH3D)
Line: 1
Line: 3
115.804LF - 18" @ 2.75%
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
Reach (ft)
Supercritical flow upstream.



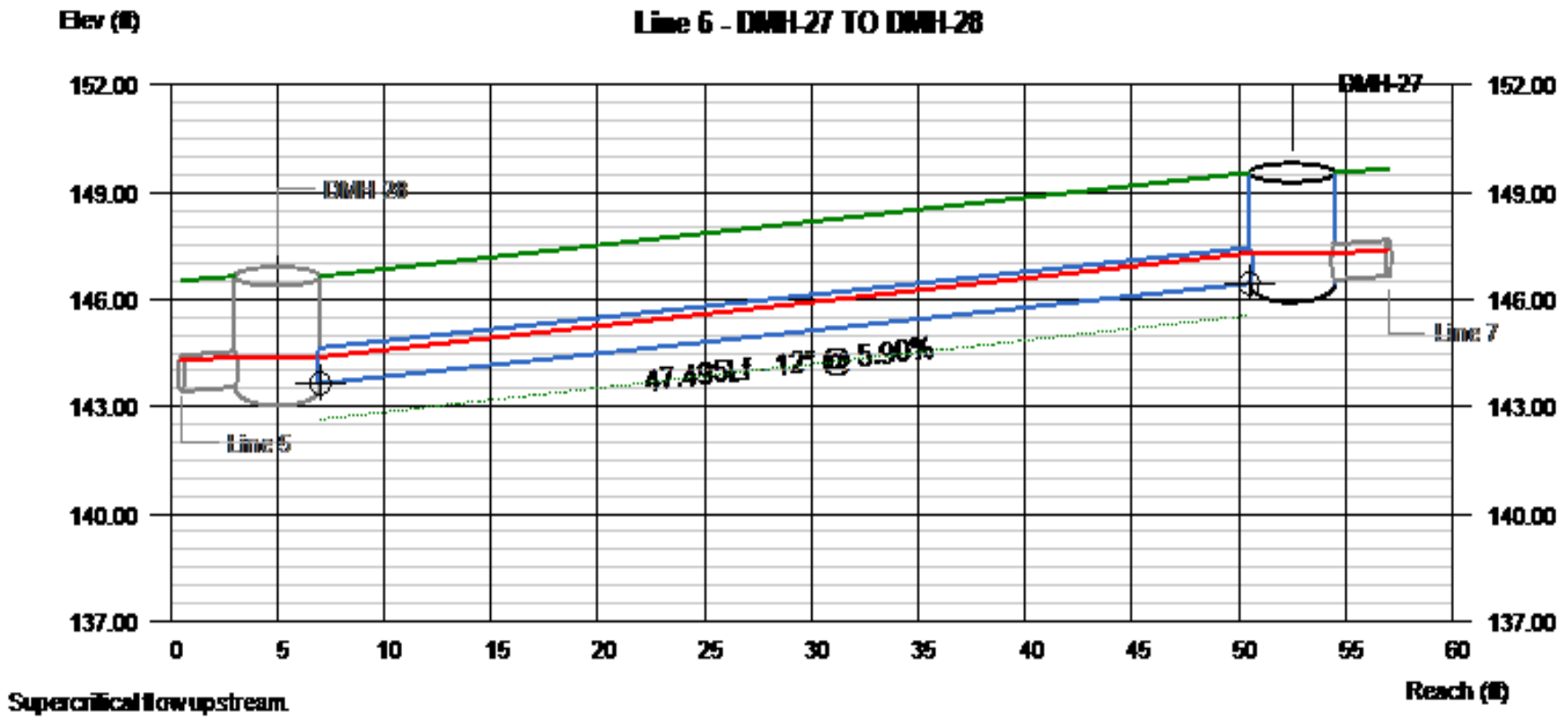
depth assumed downstream. Subcritical flow upstream.

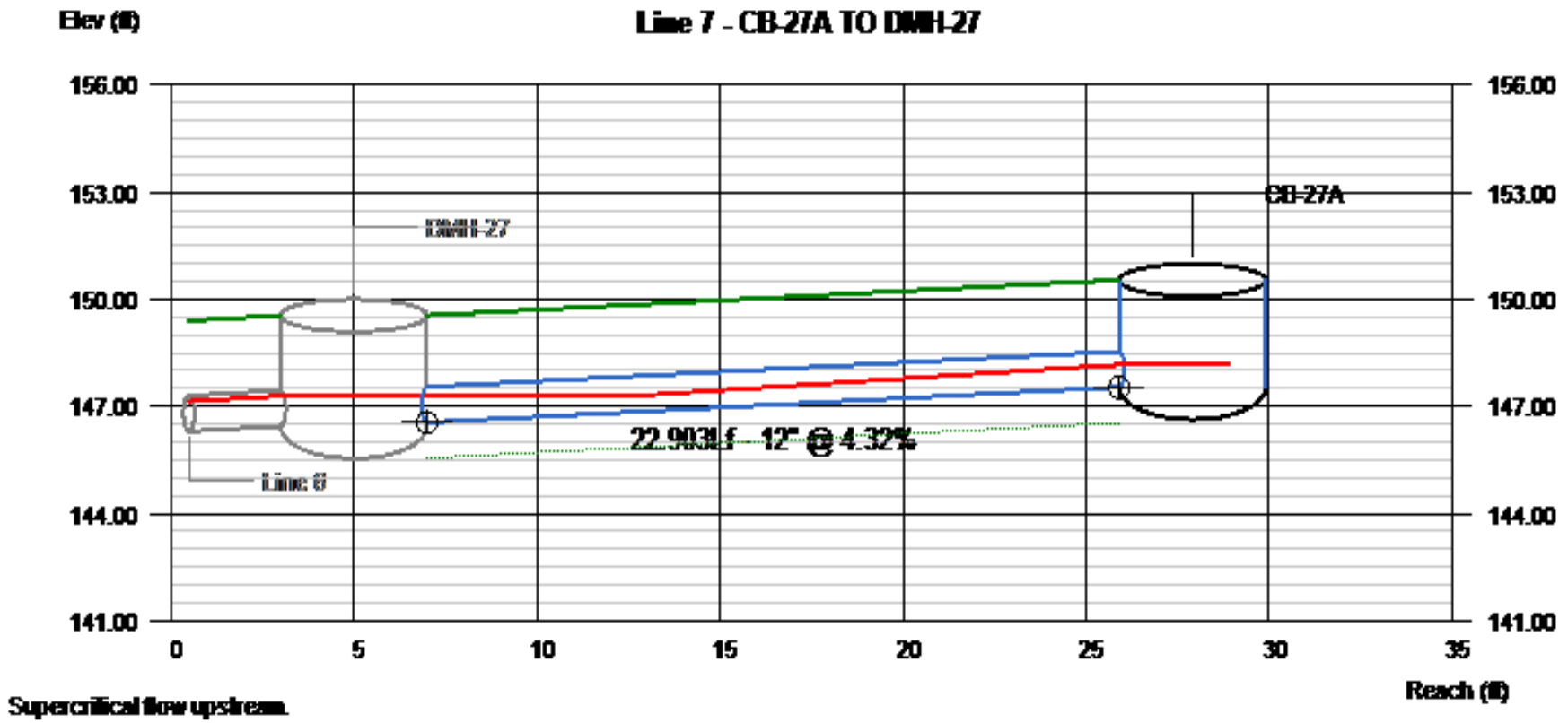


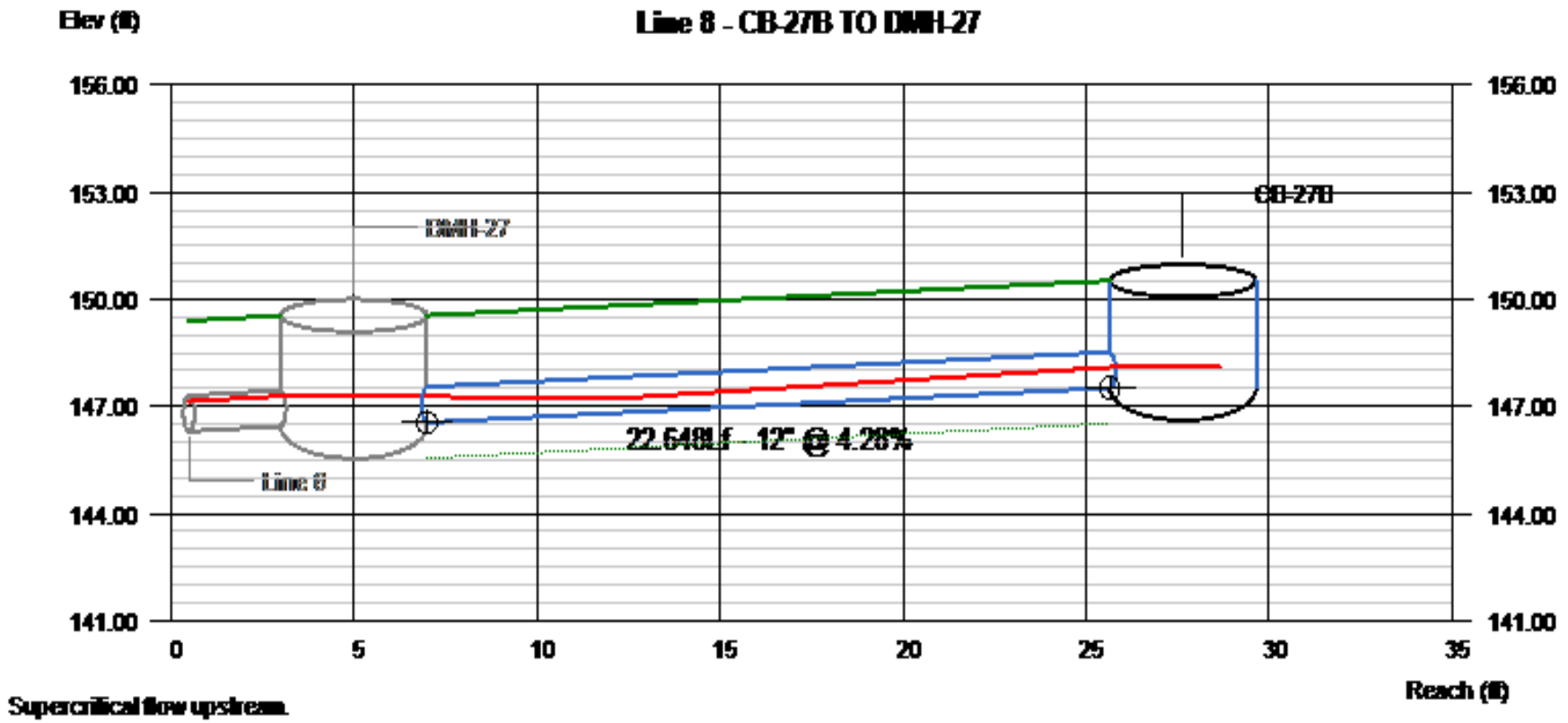
Subcritical flow upstream.

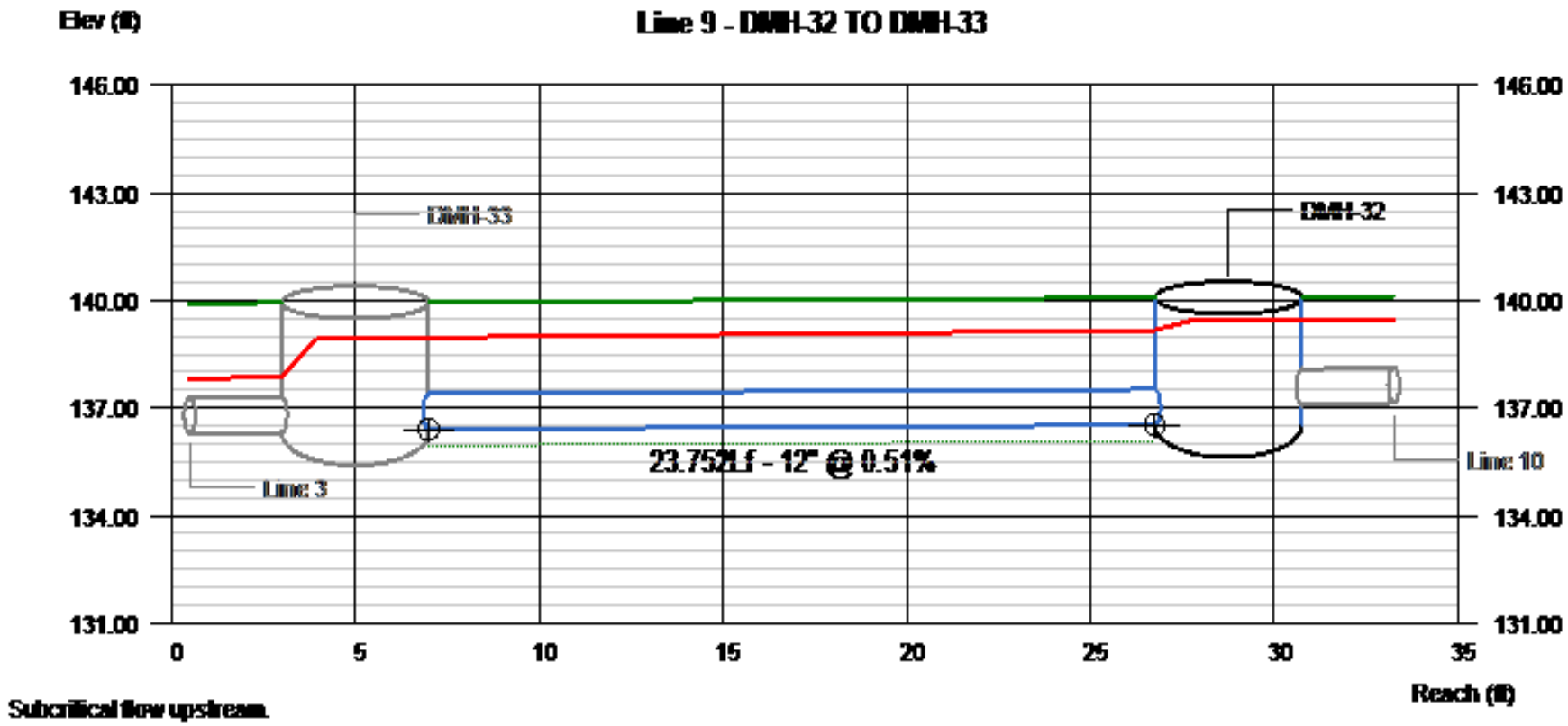


Supercritical flow w/jump.

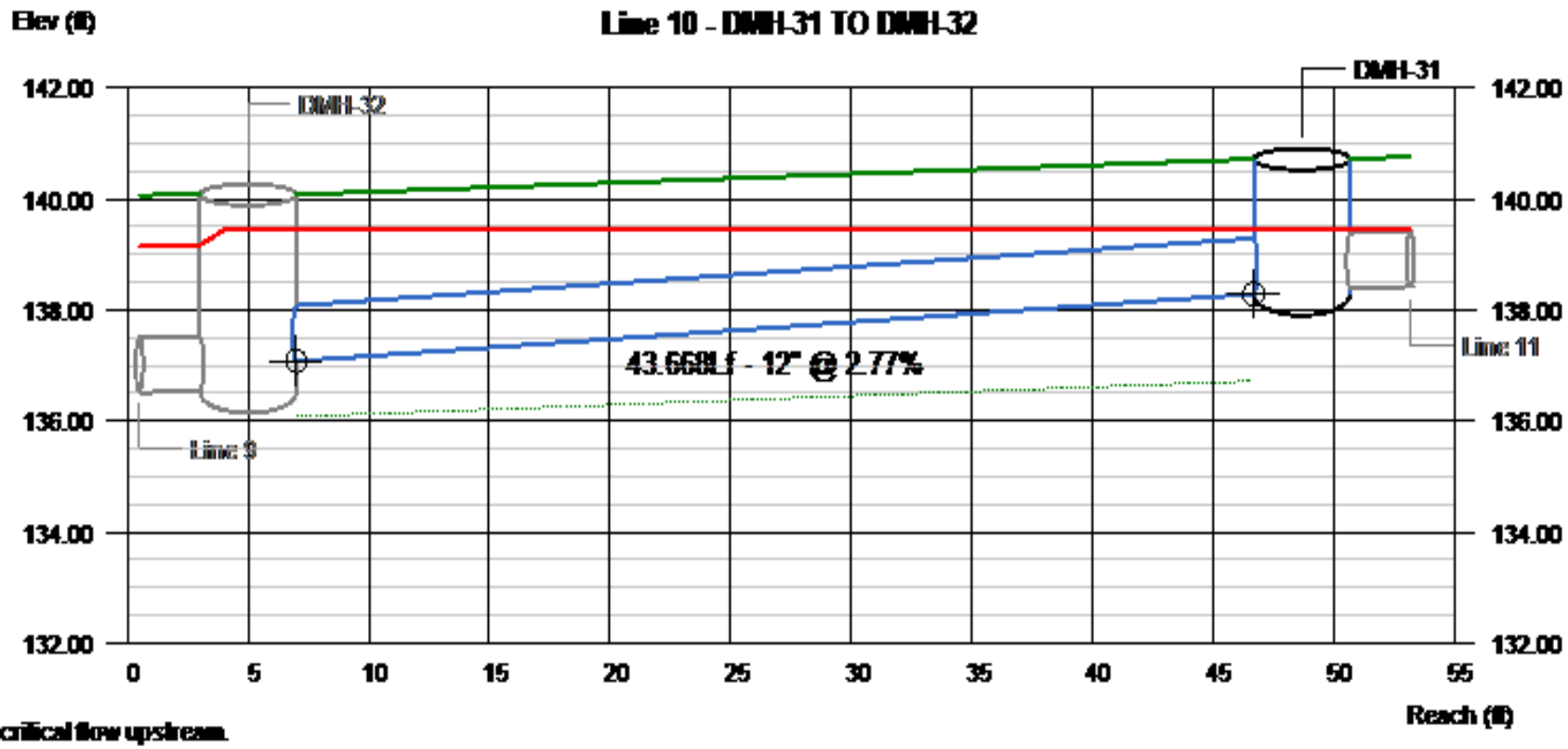

Elev (ft)
Line 6 - DMH-27 TO DMH-28
152.00
149.00
146.00
143.00
140.00
137.00
DMH-27
DMH-28
Line 7
Line 5
47.495LF 12" @ 5.90%
0
5
10
15
20
25
30
35
40
45
50
55
60
Reach (ft)
Supercritical flow upstream

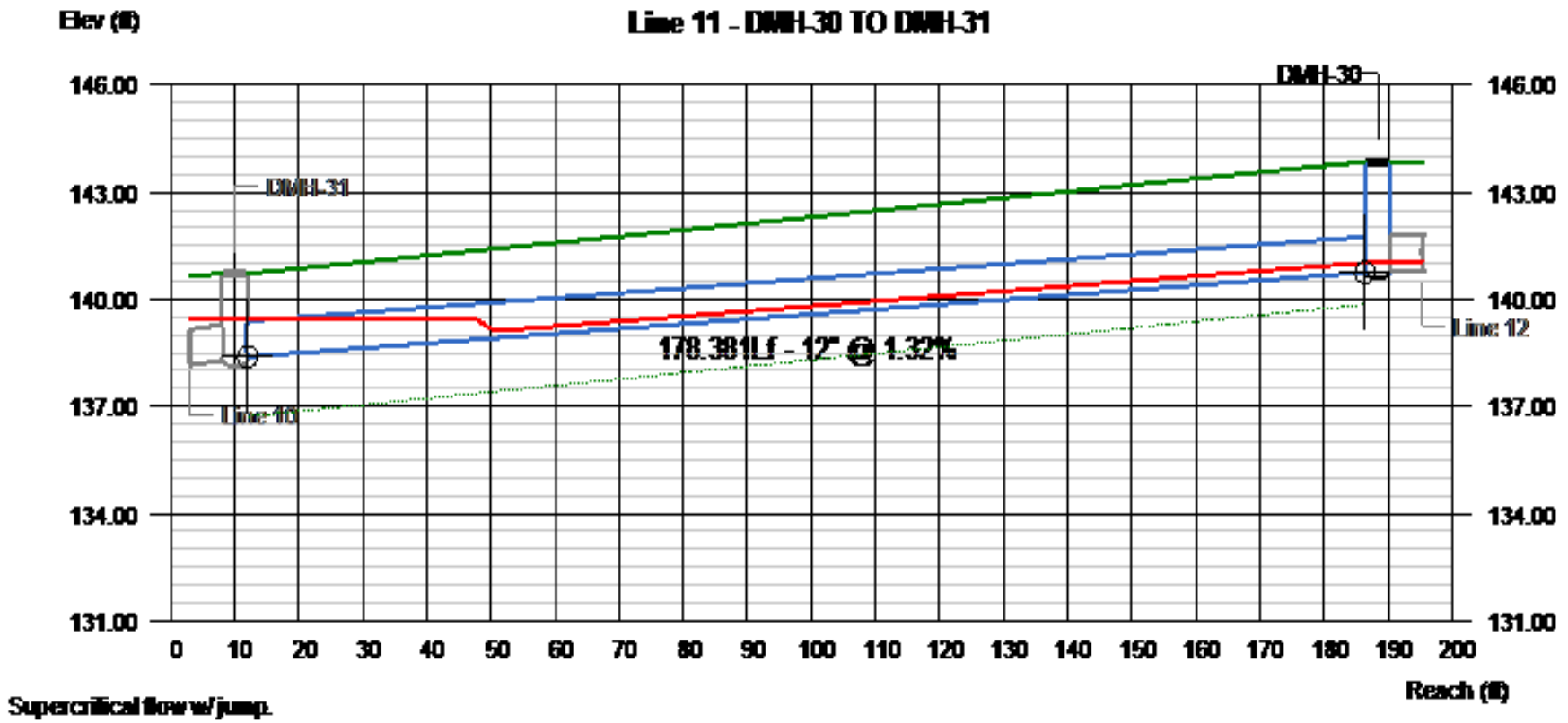

Elev (ft)
Line 7 - CB-27A TO DMH-27
156.00
153.00
150.00
147.00
144.00
141.00
0
5
10
15
20
25
30
35
Reach (ft)
DMH-27
CB-27A
Line: 8
22.90ft 12" @ 4.32%
Supercritical flow upstream.

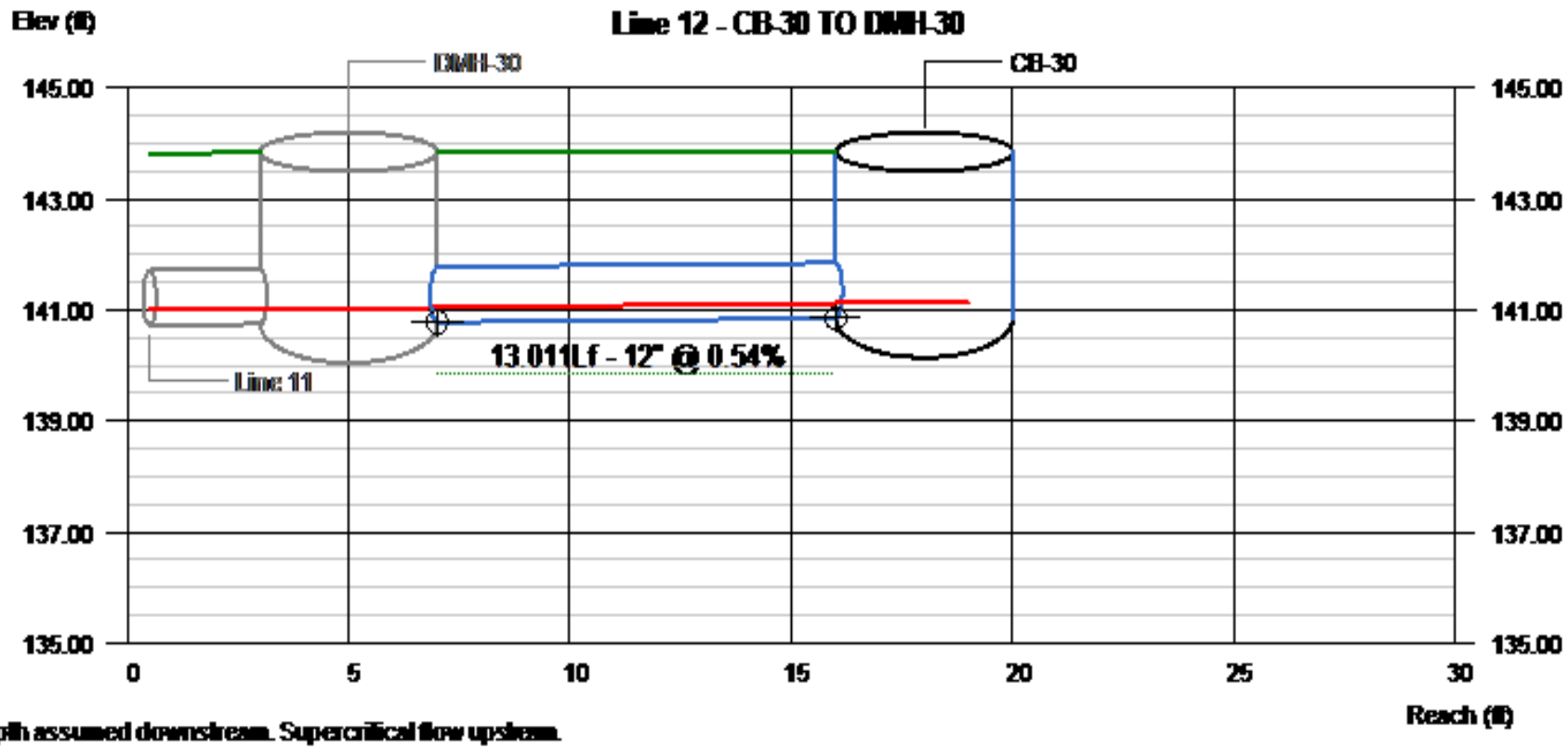

Elev (ft)
Line 8 - CB-27B TO DMH-27
156.00
153.00
150.00
147.00
144.00
141.00
0
5
10
15
20
25
30
35
Reach (ft)
DMH-27
CB-27B
Line 8
22.648 ft - 12" @ 4.28%
Supercritical flow upstream.



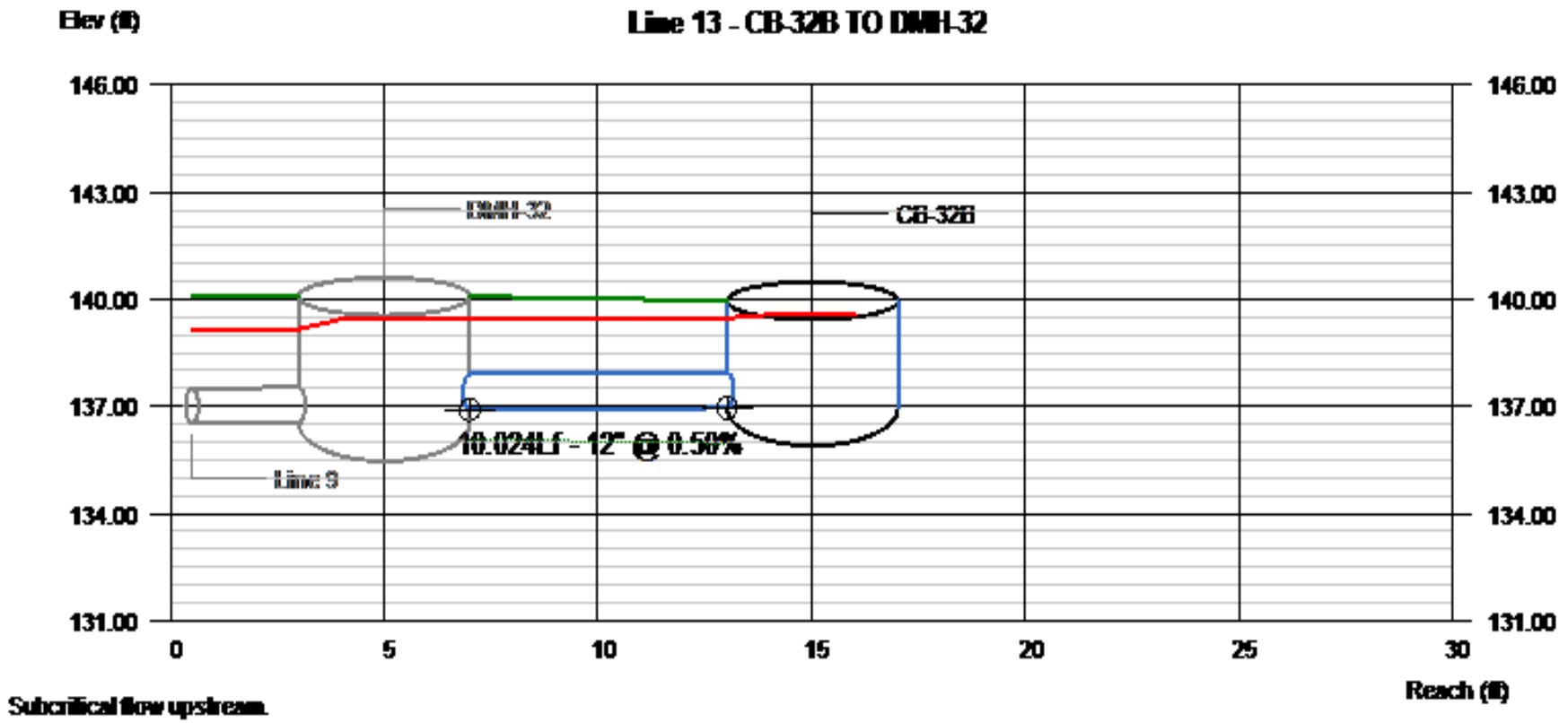
Subcritical flow upstream.

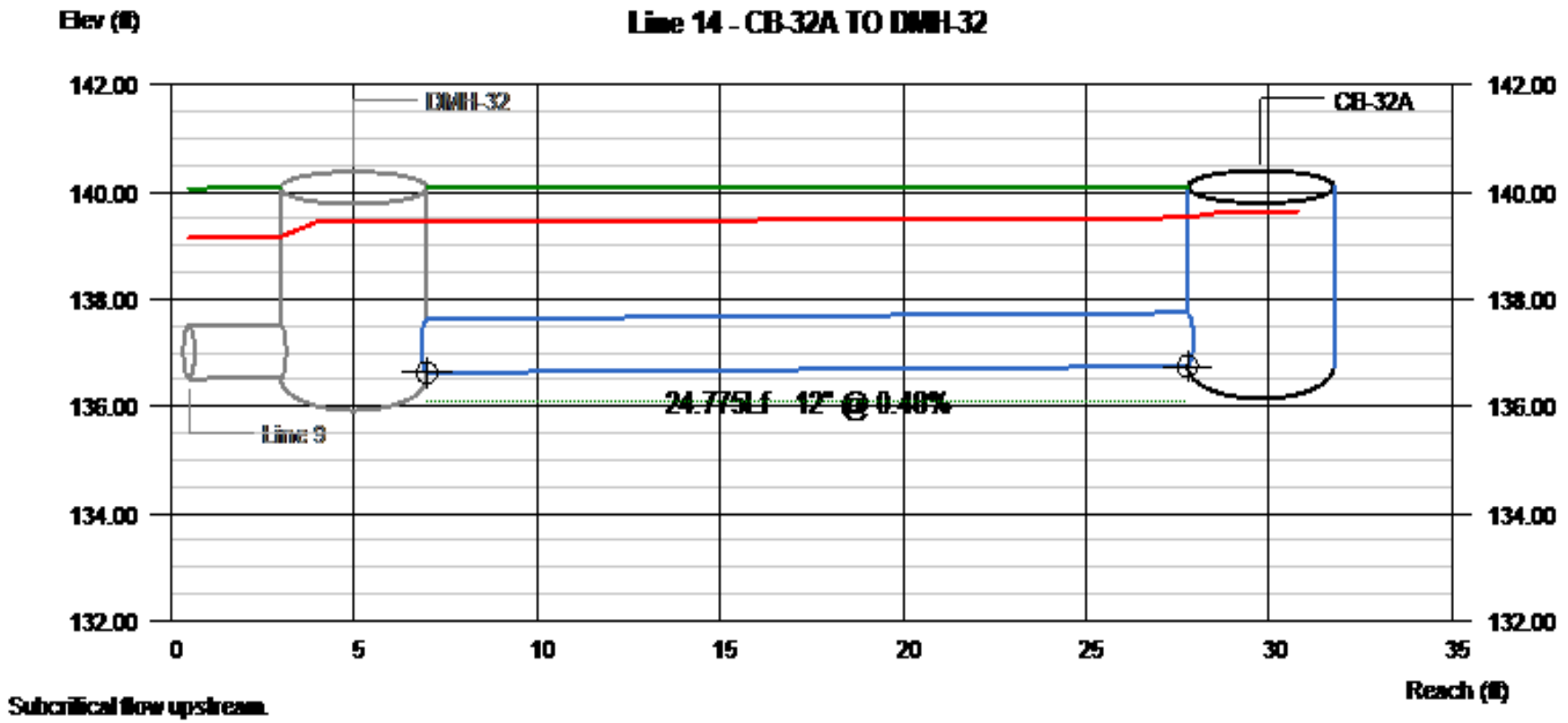

Elev (ft)
Line 10 - DMH-31 TO DMH-32
DMH-31
DMH-32
142.00
140.00
138.00
136.00
134.00
132.00
43.66ft - 12" @ 2.77%
Line: 11
Line: 9
0
5
10
15
20
25
30
35
40
45
50
55
Reach (ft)
Subcritical flow upstream.

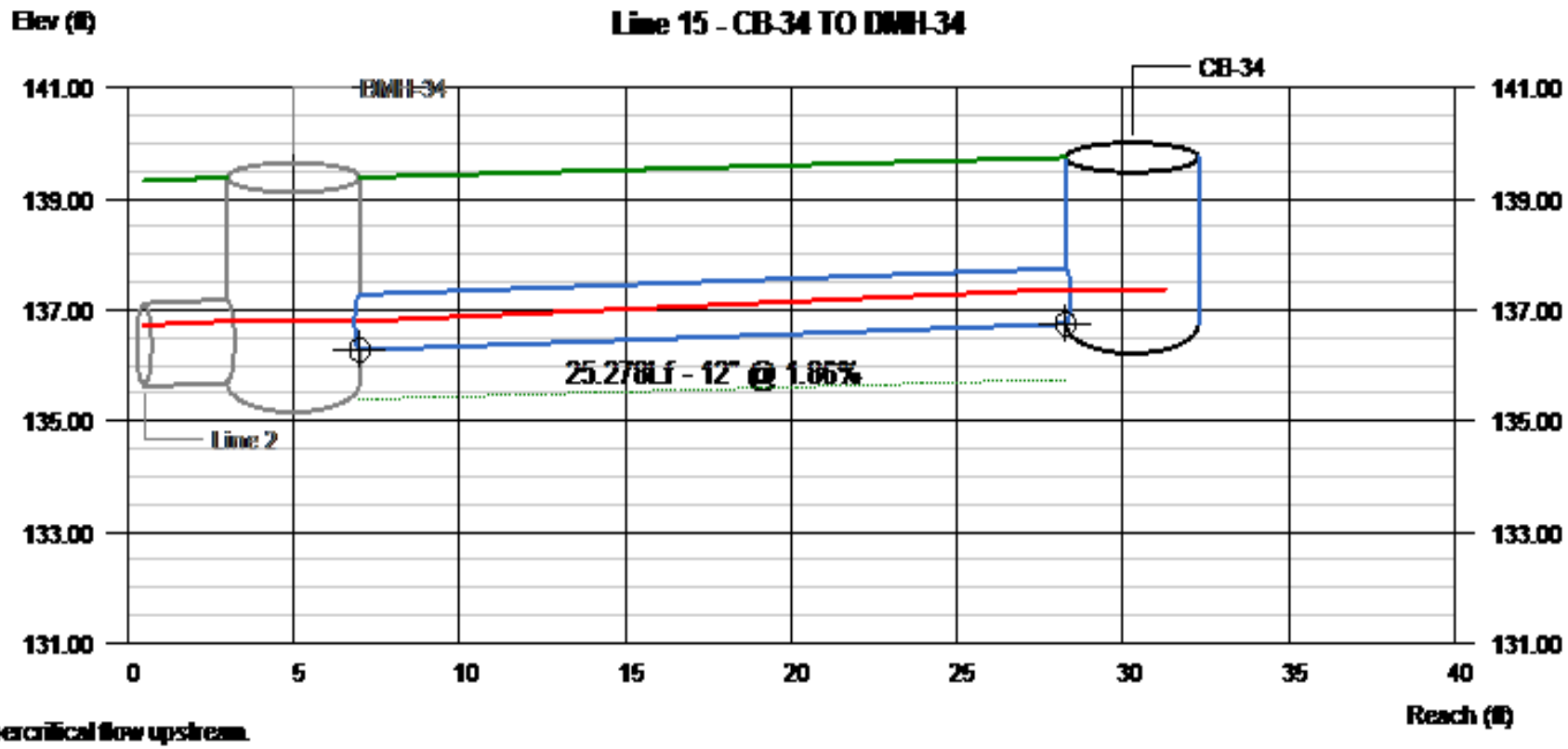

Elev (ft)
Line 11 - DMH-30 TO DMH-31
DMH-30
DMH-31
Line 12
Line 10
178.381Lf - 12" @ 1.32%
146.00
143.00
140.00
137.00
134.00
131.00
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
Reach (ft)
Supercritical flow w/jump.

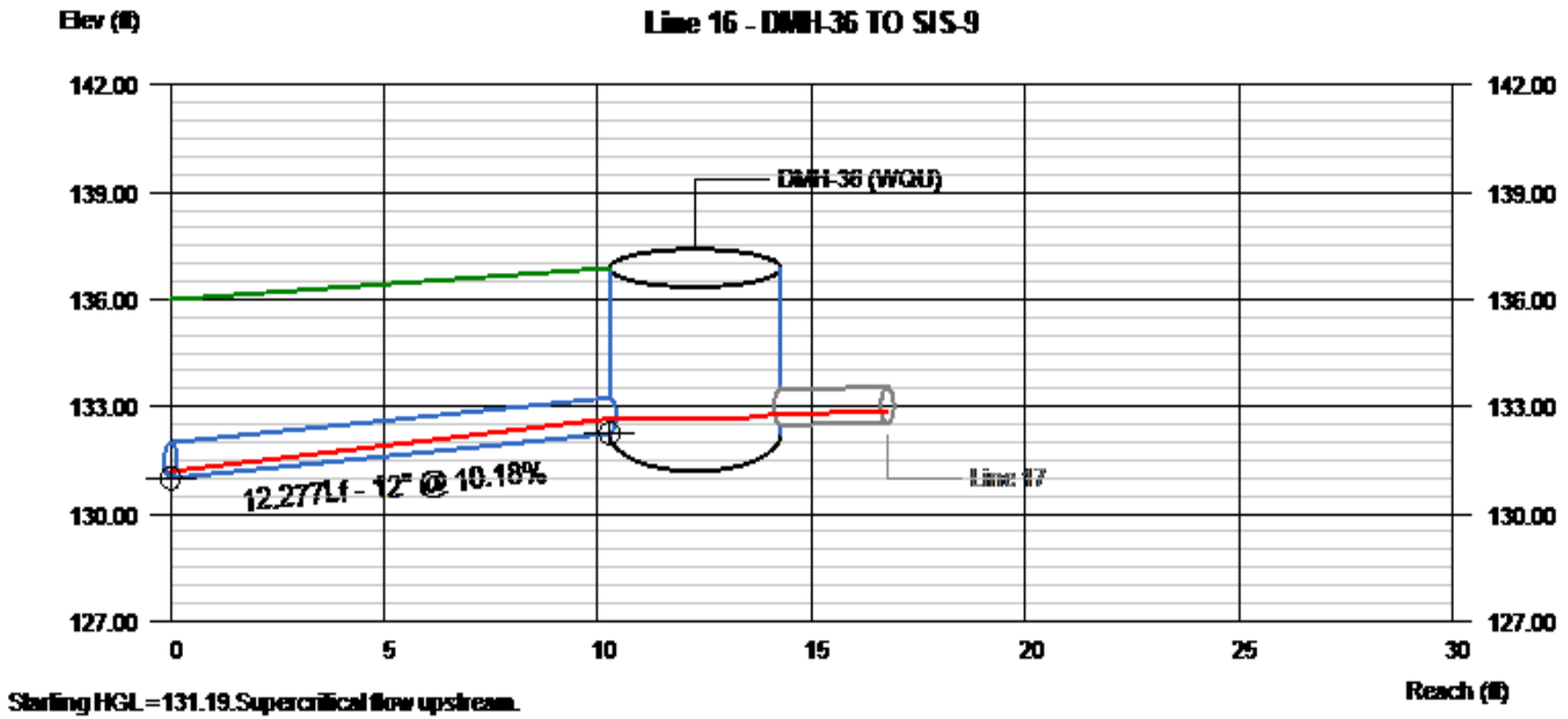


depth assumed downstream. Supercritical flow upstream.

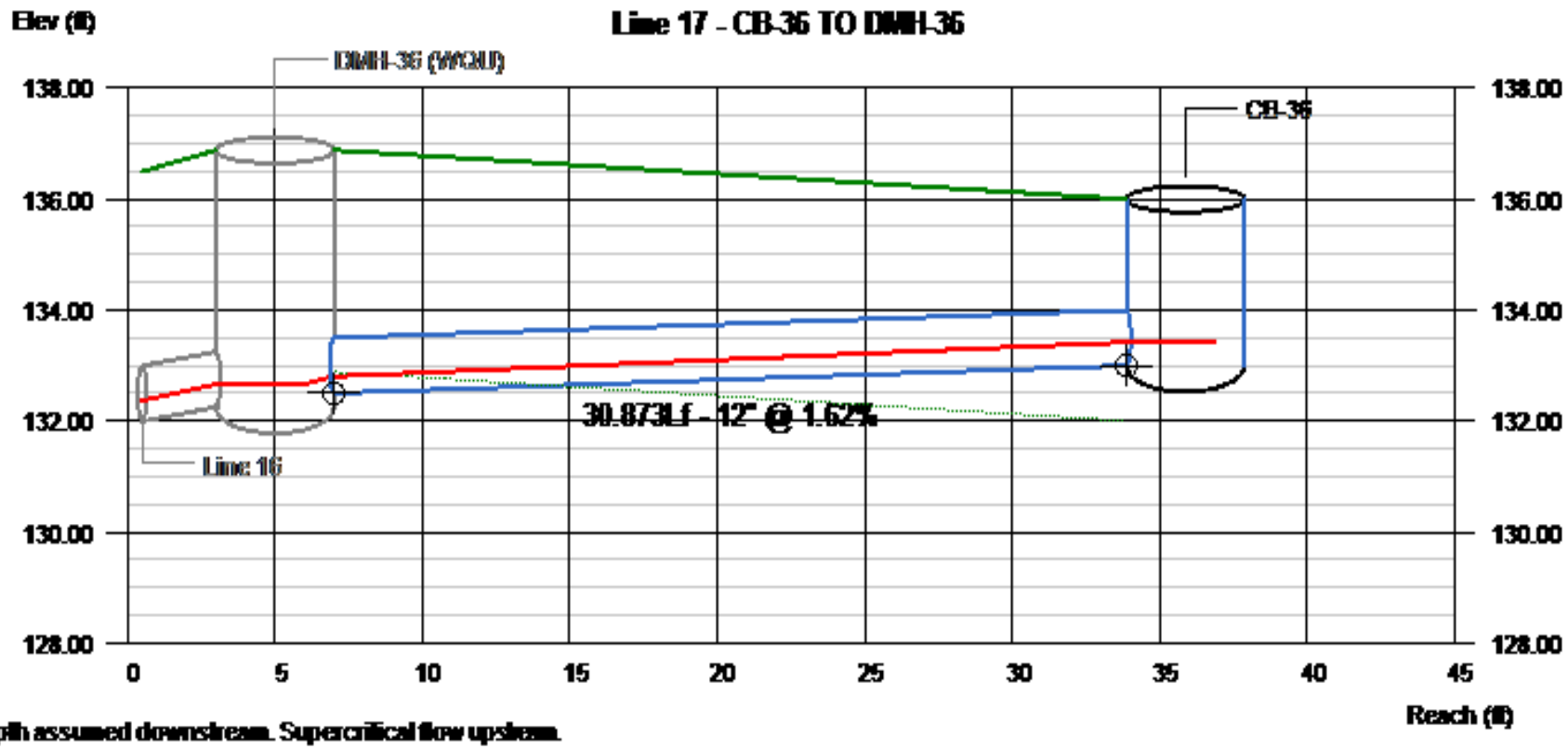

Elev (ft)
Line 13 - CB-328 TO DMH-32
146.00
143.00
140.00
137.00
134.00
131.00
DMH-32
CB-328
10.024Lf - 12" @ 0.50%
Line 9
0
5
10
15
20
25
30
Reach (ft)
Subcritical flow upstream.


Elev (ft)
Line 14 - CB-32A TO DMH-32
142.00
140.00
138.00
136.00
134.00
132.00
DMH-32
CB-32A
Line 9
24.775Lf 12" @ 0.40%
0
5
10
15
20
25
30
35
Reach (ft)
Subcritical flow upstream.


Elev (ft)
Line 15 - CB-34 TO DMH-34
CB-34
DMH-34
141.00
139.00
137.00
135.00
133.00
131.00
25.278Lf - 12" @ 1.86%
Line 2
0
5
10
15
20
25
30
35
40
Reach (ft)
Supercritical flow upstream.

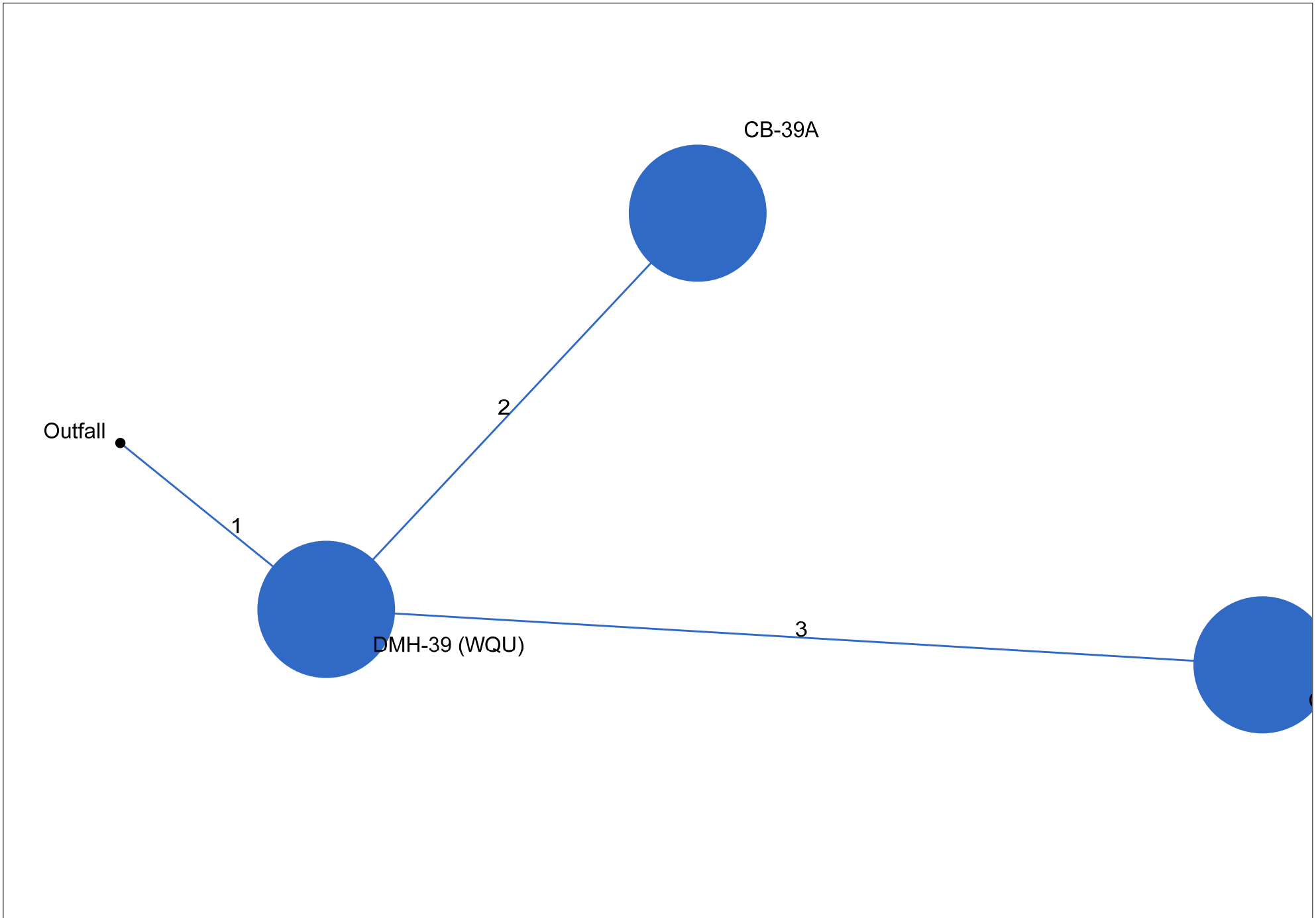


Starting HGL = 131.19. Supercritical flow upstream.



depth assumed downstream. Supercritical flow upstream.

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: Sysyem-10SIS.stm	Number of lines: 3	Date: 3/9/2020

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	8.000	40.778	MH	0.00	0.00	0.00	0.0	129.00	10.00	129.80	12	Cir	0.012	1.00	137.30	DMH-39 TO SIS-10
2	1	16.718	-90.000	Grate	0.00	0.08	0.90	6.0	132.78	1.02	132.95	12	Cir	0.012	1.00	137.05	CB-39A TO DMH-39
3	1	27.631	-37.231	Grate	0.00	0.28	0.90	6.0	132.67	1.01	132.95	12	Cir	0.012	1.00	137.05	CB-39B TO DMH-39

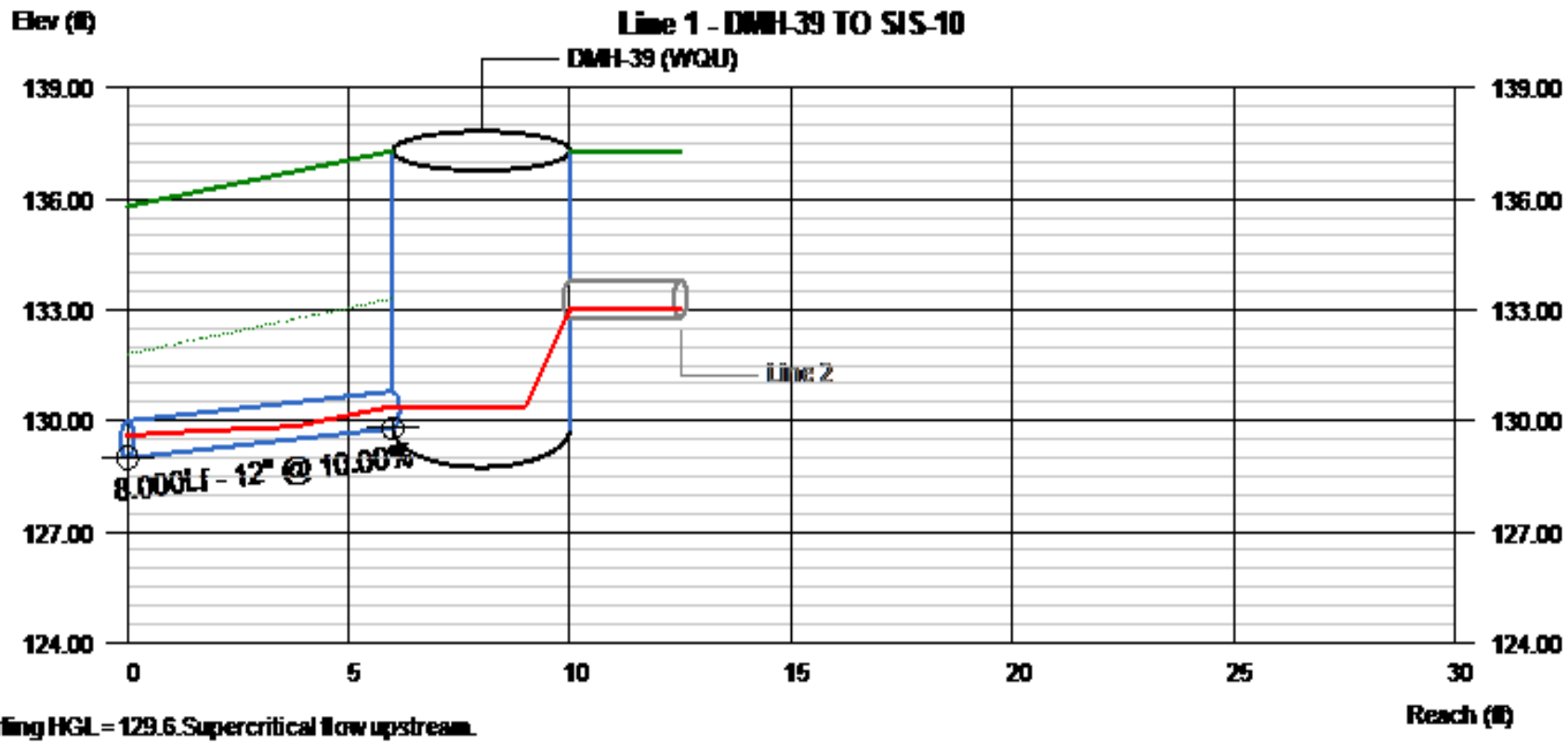
Project File: Sysyem-10SIS.stm | Number of lines: 3 | Date: 3/9/2020

My Report

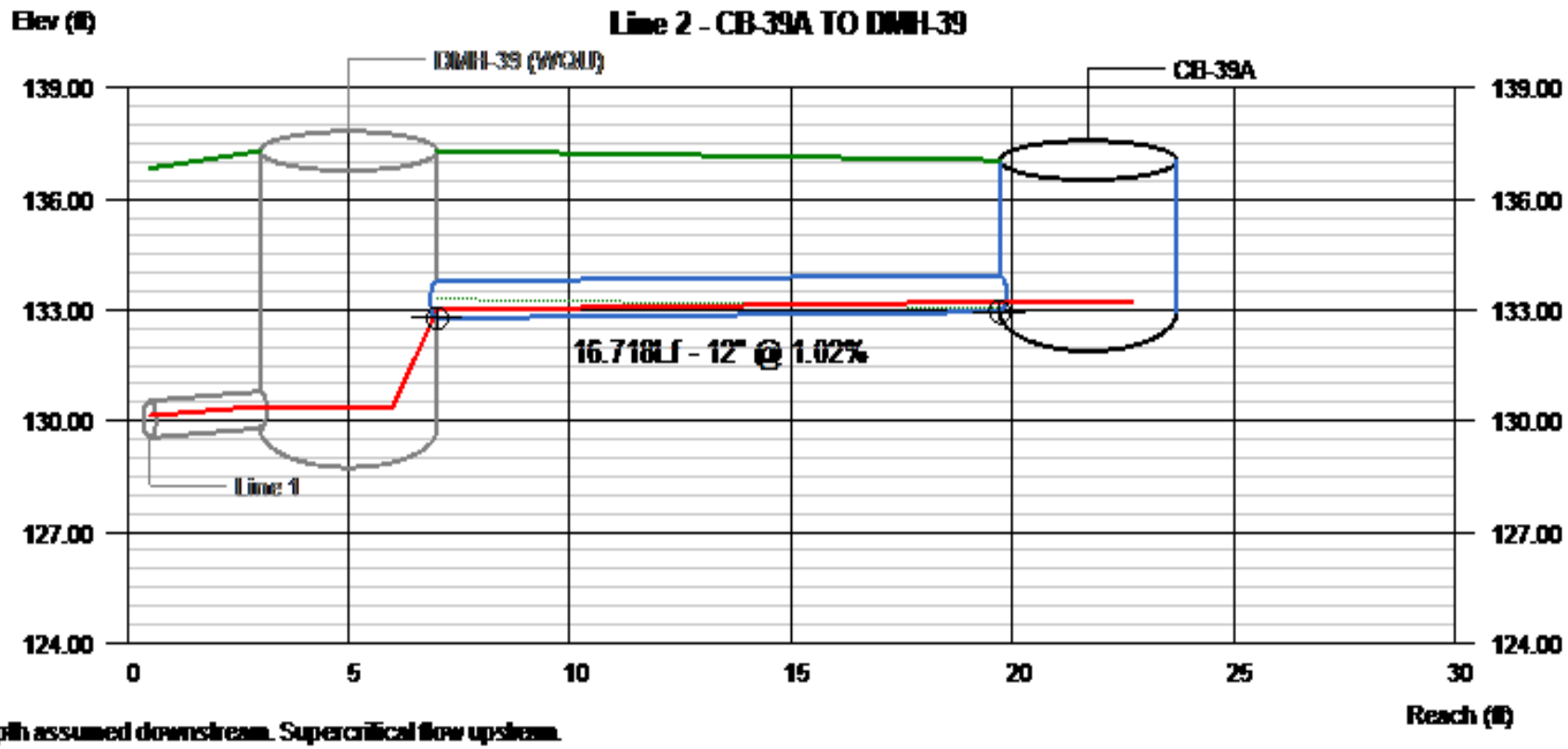
Line No.	Line ID	Flow Rate (cfs)	Line Length (ft)	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Q Byp (cfs)	Byp Ln No	Minor Loss (ft)	HGL Jnct (ft)	DnStm Ln No	Junct Type	
1	DMH-39 TO SIS-10	1.95	8.000	129.00	129.80	10.00	129.60	130.40 j	....	n/a	n/a	130.40	Outfall	MH	
2	CB-39A TO DMH-39	0.44	16.718	132.78	132.95	1.02	133.01	133.23	0.00	Sag	n/a	133.23	1	Grate	
3	CB-39B TO DMH-39	1.55	27.631	132.67	132.95	1.01	133.11	133.48	0.00	Sag	n/a	133.48	1	Grate	

Project File: Sysyem-10SIS.stm | Number of lines: 3 | Date: 3/9/2020

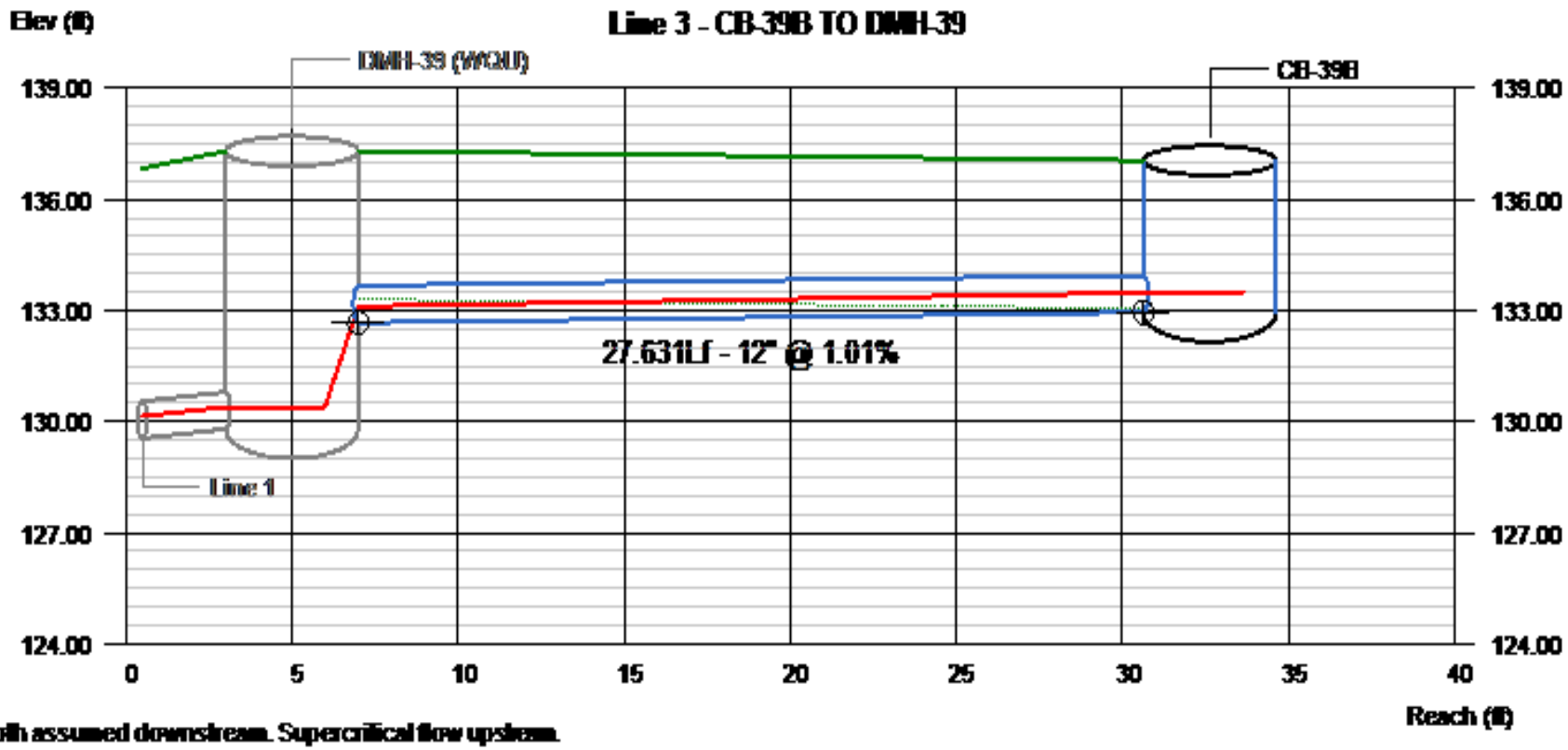
NOTES: ** Critical depth



Starting HGL = 129.6. Supercritical flow upstream.



depth assumed downstream. Supercritical flow upstream.



depth assumed downstream. Supercritical flow upstream.

Project: Cold Brook Crossing
Location: Sudbury, MA
Prepared For: Civil Design Group

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

Q = (qu) (A) (WQV)

where:

Q = flow rate associated with first 1" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
DMH 16	3.18	0.0049640	6.0	0.100	1.00	774.00	3.84
DMH 17	0.07	0.0001140	6.0	0.100	1.00	774.00	0.09
DMH 21	0.49	0.0007657	6.0	0.100	1.00	774.00	0.59
DMH 26	2.13	0.0033298	6.0	0.100	1.00	774.00	2.58
DMH 35	1.50	0.0023459	6.0	0.100	1.00	774.00	1.82
DMH 36	0.14	0.0002177	6.0	0.100	1.00	774.00	0.17
DMH 39	0.21	0.0003322	6.0	0.100	1.00	774.00	0.26
DMH 55	1.39	0.0021723	6.0	0.100	1.00	774.00	1.68

Estimated Net Annual Solids Load Reduction
Based on the Rational Rainfall Method

CONTECH ENGINEERED SOLUTIONS

CASCADE separator™

Cold Brook Crossing
Sudbury, MA
DMH 16

AREA	3.18	acres	CASCADE MODEL	CS-6
WEIGHTED C	0.95			
TC	6.00	minutes	RAINFALL STATION	69

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Hydraulic Loading Rate (gpm/ft2)	Removal Efficiency (%)	Incremental Removal (%)
0.02	10.2%	0.96	100.0	10.2
0.04	9.6%	1.92	100.0	9.6
0.06	9.4%	2.88	100.0	9.4
0.08	7.7%	3.84	100.0	7.7
0.10	8.6%	4.80	100.0	8.6
0.12	6.3%	5.75	100.0	6.3
0.14	4.7%	6.71	100.0	4.7
0.16	4.6%	7.67	100.0	4.6
0.18	3.5%	8.63	100.0	3.5
0.20	4.3%	9.59	100.0	4.3
0.25	8.0%	11.99	100.0	8.0
0.30	5.6%	14.39	98.4	5.5
0.35	4.4%	16.78	96.1	4.2
0.40	2.5%	19.18	93.9	2.4
0.45	2.5%	21.58	91.6	2.3
0.50	1.4%	23.98	89.4	1.2
0.75	5.0%	35.97	78.1	3.9
1.00	1.0%	47.96	66.8	0.7
1.50	0.0%	71.93	44.3	0.0
2.00	0.0%	88.90	26.3	0.0
3.00	0.5%	88.90	17.5	0.1
				97.4
			Removal Efficiency Adjustment[2] =	6.5%
			Predicted % Annual Rainfall Treated =	93.4%
			Predicted Net Annual Load Removal Efficiency =	90.9%

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

COLD BROOK CROSSING
SUDBURY, MA

Area	**0.07 ac**	Unit Site Designation	**DMH 17**
Weighted C	**0.9**	Rainfall Station #	**69**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	9.9
0.04	9.6%	19.8%	0.00	0.00	9.4
0.06	9.4%	29.3%	0.00	0.00	9.2
0.08	7.7%	37.0%	0.01	0.01	7.5
0.10	8.6%	45.6%	0.01	0.01	8.3
0.12	6.3%	51.9%	0.01	0.01	6.1
0.14	4.7%	56.5%	0.01	0.01	4.5
0.16	4.6%	61.2%	0.01	0.01	4.5
0.18	3.5%	64.7%	0.01	0.01	3.4
0.20	4.3%	69.1%	0.01	0.01	4.2
0.25	8.0%	77.1%	0.02	0.02	7.7
0.30	5.6%	82.7%	0.02	0.02	5.4
0.35	4.4%	87.0%	0.02	0.02	4.2
0.40	2.5%	89.5%	0.03	0.03	2.4
0.45	2.5%	92.1%	0.03	0.03	2.4
0.50	1.4%	93.5%	0.03	0.03	1.3
0.75	5.0%	98.5%	0.05	0.05	4.7
1.00	1.0%	99.5%	0.07	0.07	0.9
1.50	0.0%	99.5%	0.10	0.10	0.0
2.00	0.0%	99.5%	0.13	0.13	0.0
3.00	0.5%	100.0%	0.20	0.20	0.4
					96.3
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**89.8%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

COLD BROOK CROSSING
SUDBURY, MA

Area	**0.49 ac**	Unit Site Designation	**DMH 21**
Weighted C	**0.9**	Rainfall Station #	**69**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.01	0.01	9.8
0.04	9.6%	19.8%	0.02	0.02	9.3
0.06	9.4%	29.3%	0.03	0.03	9.0
0.08	7.7%	37.0%	0.04	0.04	7.3
0.10	8.6%	45.6%	0.04	0.04	8.1
0.12	6.3%	51.9%	0.05	0.05	5.9
0.14	4.7%	56.5%	0.06	0.06	4.3
0.16	4.6%	61.2%	0.07	0.07	4.3
0.18	3.5%	64.7%	0.08	0.08	3.3
0.20	4.3%	69.1%	0.09	0.09	4.0
0.25	8.0%	77.1%	0.11	0.11	7.2
0.30	5.6%	82.7%	0.13	0.13	4.9
0.35	4.4%	87.0%	0.15	0.15	3.8
0.40	2.5%	89.5%	0.18	0.18	2.2
0.45	2.5%	92.1%	0.20	0.20	2.1
0.50	1.4%	93.5%	0.22	0.22	1.1
0.75	5.0%	98.5%	0.33	0.33	3.8
1.00	1.0%	99.5%	0.44	0.44	0.7
1.50	0.0%	99.5%	0.66	0.66	0.0
2.00	0.0%	99.5%	0.88	0.88	0.0
3.00	0.5%	100.0%	1.32	1.00	0.1
					91.1
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.4%
				Predicted Net Annual Load Removal Efficiency =	**84.7%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

COLD BROOK CROSSING
SUDBURY, MA

Area	**0.83 ac**	Unit Site Designation	**DMH 26**
Weighted C	**0.9**	Rainfall Station #	**69**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.01	0.01	9.8
0.04	9.6%	19.8%	0.03	0.03	9.2
0.06	9.4%	29.3%	0.04	0.04	8.9
0.08	7.7%	37.0%	0.06	0.06	7.2
0.10	8.6%	45.6%	0.07	0.07	7.9
0.12	6.3%	51.9%	0.09	0.09	5.7
0.14	4.7%	56.5%	0.10	0.10	4.2
0.16	4.6%	61.2%	0.12	0.12	4.1
0.18	3.5%	64.7%	0.13	0.13	3.1
0.20	4.3%	69.1%	0.15	0.15	3.8
0.25	8.0%	77.1%	0.19	0.19	6.8
0.30	5.6%	82.7%	0.22	0.22	4.6
0.35	4.4%	87.0%	0.26	0.26	3.5
0.40	2.5%	89.5%	0.30	0.30	1.9
0.45	2.5%	92.1%	0.34	0.34	1.9
0.50	1.4%	93.5%	0.37	0.37	1.0
0.75	5.0%	98.5%	0.56	0.56	3.0
1.00	1.0%	99.5%	0.75	0.75	0.5
1.50	0.0%	99.5%	1.12	1.00	0.0
2.00	0.0%	99.5%	1.49	1.00	0.0
3.00	0.5%	100.0%	2.24	1.00	0.1
					87.1
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.3%
				Predicted Net Annual Load Removal Efficiency =	**80.6%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Estimated Net Annual Solids Load Reduction
Based on the Rational Rainfall Method

Cold Brook Crossing
Sudbury, MA
DMH 35

AREA	1.50	acres	CASCADE MODEL	CS-4
WEIGHTED C	0.95			
TC	6.00	minutes	RAINFALL STATION	69

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Hydraulic Loading Rate (gpm/ft2)	Removal Efficiency (%)	Incremental Removal (%)
0.02	10.2%	1.02	100.0	10.2
0.04	9.6%	2.04	100.0	9.6
0.06	9.4%	3.05	100.0	9.4
0.08	7.7%	4.07	100.0	7.7
0.10	8.6%	5.09	100.0	8.6
0.12	6.3%	6.11	100.0	6.3
0.14	4.7%	7.13	100.0	4.7
0.16	4.6%	8.14	100.0	4.6
0.18	3.5%	9.16	100.0	3.5
0.20	4.3%	10.18	100.0	4.3
0.25	8.0%	12.72	99.9	8.0
0.30	5.6%	15.27	97.5	5.5
0.35	4.4%	17.81	95.2	4.2
0.40	2.5%	20.36	92.8	2.3
0.45	2.5%	22.90	90.4	2.3
0.50	1.4%	25.45	88.0	1.2
0.75	5.0%	38.17	76.0	3.8
1.00	1.0%	50.90	64.1	0.6
1.50	0.0%	71.43	41.9	0.0
2.00	0.0%	71.43	31.4	0.0
3.00	0.5%	71.43	20.9	0.1
				97.1
			Removal Efficiency Adjustment[2] =	6.5%
			Predicted % Annual Rainfall Treated =	93.3%
			Predicted Net Annual Load Removal Efficiency =	90.6%

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

COLD BROOK CROSSING
SUDBURY, MA

Area	**0.14 ac**	Unit Site Designation	**DMH 36**
Weighted C	**0.9**	Rainfall Station #	**69**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	9.9
0.04	9.6%	19.8%	0.01	0.01	9.3
0.06	9.4%	29.3%	0.01	0.01	9.1
0.08	7.7%	37.0%	0.01	0.01	7.5
0.10	8.6%	45.6%	0.01	0.01	8.3
0.12	6.3%	51.9%	0.02	0.02	6.1
0.14	4.7%	56.5%	0.02	0.02	4.5
0.16	4.6%	61.2%	0.02	0.02	4.4
0.18	3.5%	64.7%	0.02	0.02	3.4
0.20	4.3%	69.1%	0.03	0.03	4.1
0.25	8.0%	77.1%	0.03	0.03	7.6
0.30	5.6%	82.7%	0.04	0.04	5.3
0.35	4.4%	87.0%	0.04	0.04	4.1
0.40	2.5%	89.5%	0.05	0.05	2.4
0.45	2.5%	92.1%	0.06	0.06	2.4
0.50	1.4%	93.5%	0.06	0.06	1.3
0.75	5.0%	98.5%	0.09	0.09	4.6
1.00	1.0%	99.5%	0.13	0.13	0.9
1.50	0.0%	99.5%	0.19	0.19	0.0
2.00	0.0%	99.5%	0.25	0.25	0.0
3.00	0.5%	100.0%	0.38	0.38	0.3
					95.5
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**89.0%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

COLD BROOK CROSSING
SUDBURY, MA

Area	**0.21 ac**	Unit Site Designation	**DMH 39**
Weighted C	**0.9**	Rainfall Station #	**69**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	9.9
0.04	9.6%	19.8%	0.01	0.01	9.3
0.06	9.4%	29.3%	0.01	0.01	9.1
0.08	7.7%	37.0%	0.02	0.02	7.4
0.10	8.6%	45.6%	0.02	0.02	8.2
0.12	6.3%	51.9%	0.02	0.02	6.0
0.14	4.7%	56.5%	0.03	0.03	4.4
0.16	4.6%	61.2%	0.03	0.03	4.4
0.18	3.5%	64.7%	0.03	0.03	3.4
0.20	4.3%	69.1%	0.04	0.04	4.1
0.25	8.0%	77.1%	0.05	0.05	7.5
0.30	5.6%	82.7%	0.06	0.06	5.2
0.35	4.4%	87.0%	0.07	0.07	4.0
0.40	2.5%	89.5%	0.08	0.08	2.3
0.45	2.5%	92.1%	0.09	0.09	2.3
0.50	1.4%	93.5%	0.10	0.10	1.3
0.75	5.0%	98.5%	0.14	0.14	4.4
1.00	1.0%	99.5%	0.19	0.19	0.9
1.50	0.0%	99.5%	0.29	0.29	0.0
2.00	0.0%	99.5%	0.38	0.38	0.0
3.00	0.5%	100.0%	0.57	0.57	0.3
					94.5
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**88.1%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Estimated Net Annual Solids Load Reduction
Based on the Rational Rainfall Method

CONTECH ENGINEERED SOLUTIONS

CASCADE separator™

Cold Brook Crossing
Sudbury, MA
DMH 55

AREA	1.39	acres	CASCADE MODEL	CS-4
WEIGHTED C	0.95			
TC	6.00	minutes	RAINFALL STATION	69

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Hydraulic Loading Rate (gpm/ft2)	Removal Efficiency (%)	Incremental Removal (%)
0.02	10.2%	0.94	100.0	10.2
0.04	9.6%	1.89	100.0	9.6
0.06	9.4%	2.83	100.0	9.4
0.08	7.7%	3.77	100.0	7.7
0.10	8.6%	4.72	100.0	8.6
0.12	6.3%	5.66	100.0	6.3
0.14	4.7%	6.60	100.0	4.7
0.16	4.6%	7.55	100.0	4.6
0.18	3.5%	8.49	100.0	3.5
0.20	4.3%	9.43	100.0	4.3
0.25	8.0%	11.79	100.0	8.0
0.30	5.6%	14.15	98.6	5.5
0.35	4.4%	16.51	96.4	4.2
0.40	2.5%	18.87	94.2	2.4
0.45	2.5%	21.22	91.9	2.3
0.50	1.4%	23.58	89.7	1.2
0.75	5.0%	35.37	78.6	4.0
1.00	1.0%	47.16	67.6	0.7
1.50	0.0%	70.75	45.4	0.0
2.00	0.0%	71.43	33.9	0.0
3.00	0.5%	71.43	22.6	0.1
				97.5
			Removal Efficiency Adjustment[2] =	6.5%
			Predicted % Annual Rainfall Treated =	93.3%
			Predicted Net Annual Load Removal Efficiency =	91.0%

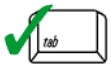
1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

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.

[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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

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.

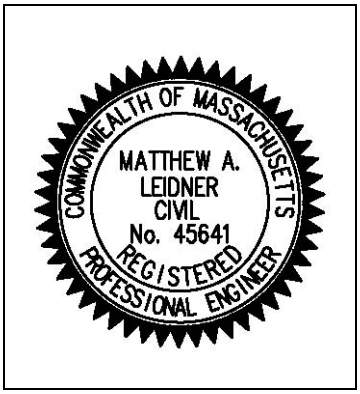
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the 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



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): Porous pavement

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 for Stormwater Report

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.

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

Checklist for Stormwater Report

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 for Stormwater Report

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 for 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.

ILLICIT DISCHARGE STATEMENT

FOR

COLD BROOK CROSSING

NORTH ROAD RESIDENTIAL OVERLAY DISTRICT (NRROD)
& SMART GROWTH OVERLAY DISTRICT (SGOD) PROJECT

NORTH ROAD
SUDBURY, MASSACHUSETTS

DATE: MARCH 11, 2020

Illicit discharges to the stormwater management system are discharges not entirely comprised of stormwater. Discharges to the stormwater management system from the following activities or facilities are permissible: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

There are no known illicit discharges currently at the site nor are any illicit discharges proposed as part of the project. The stormwater management system is *not* intended to convey any illicit discharges and/or pollutants and as such, control measures that are identified within this report shall be strictly adhered to in order to minimize the risk of contamination. Any unknown existing illicit discharges that are discovered as part of the development of the subject site shall be eliminated in accordance with local, state and federal regulations.

OPERATION AND MAINTENANCE PLAN

&

LONG-TERM POLLUTION PREVENTION PLAN

FOR

THE APARTMENTS AT COLD BROOK CROSSING

SMART GROWTH OVERLAY DISTRICT (SGOD) PROJECT

&

COLD BROOK CROSSING

NORTH ROAD RESIDENTIAL OVERLAY DISTRICT (NRROD) PROJECT

NORTH ROAD
SUDBURY, MASSACHUSETTS

PREPARED FOR:

QUARRY NORTH ROAD, LLC
2134 SEVILLA WAY
NAPLES, FL 34109

PREPARED BY:

CIVIL DESIGN GROUP, LLC
21 HIGH STREET, SUITE 207
NORTH ANDOVER, MA 01845

DATE: MARCH 11, 2020

1.0 OPERATION AND MAINTENANCE PLAN

1.1 INTRODUCTION

In accordance with the standards set forth by the Massachusetts Department of Environmental Protection (MADEP) Stormwater Management Policy, Civil Design Group, LLC has prepared the following Operation and Maintenance (O&M) Plan for *The Apartments at Cold Brook Crossing* and *Cold Brook Crossing*.

CONTACT INFORMATION

PROJECT	LANDOWNER & STORMWATER MANAGEMENT SYSTEM OWNER
THE APARTMENTS AT COLD BROOK CROSSING (SGOD RENTAL PROJECT)	Owner: The Apartments at Cold Brook Crossing
	Contact: TBD (interim contact Quarry North Road, LLC)
	Phone: TBD (interim phone 239-571-5500 – Chris Claussen)
COLD BROOK CROSSING (NRROD HOME OWNERSHIP PROJECT)	Owner: Cold Brook Crossing Unit Owner's Association
	Contact: TBD (interim contact Quarry North Road, LLC)
	Phone: TBD (interim phone 239-571-5500 – Chris Claussen)

The owner of each property shall be responsible for the long-term operation and maintenance of the stormwater management system components on their property and shall be responsible for record keeping of inspections, maintenance and repairs of the stormwater management system components on their property. Any time that the ownership changes, the new property owner shall assume all responsibilities for their property as outlined in this O&M plan. The owner of each property shall hire a qualified professional to conduct scheduled inspections and maintain records in accordance with the inspection schedule outline enclosed within this document.

Design Engineer: Civil Design Group, LLC
Address: 21 High Street, Suite 207, North Andover, MA 01845
Office Phone: 978-794-5400
Contact: Matthew Leidner, P.E.

The components of the stormwater management system shall be inspected, monitored and maintained in accordance with the following to ensure that the on-site stormwater management/ best management practice facilities for the project function as intended. Routine inspection and proper maintenance of these individual components is essential to providing the long-term enhancement of both the quality and quantity of the runoff from the site.

The proposed stormwater management best management practices (BMPs) have been designed to collect and convey runoff from developed areas in accordance with the Massachusetts DEP's Stormwater Management Handbook. Using the rational method to determine peak runoff flows, the onsite drainage structures and pipes

are designed for the 25-year storm event. The system consists of deep sump hooded catch basins, trench drains, manholes, water quality units, an infiltration basin, subsurface infiltration systems, and porous pavement.

Street Sweeping

Sweeping of site drives and parking lots constructed of standard impervious asphalt pavement shall be performed twice a year, once in the spring and once in the fall, to reduce the amount of sediment and debris entering the catch basins. More frequent street sweeping is required for porous pavement areas as outlined in further detail below under the "Porous Pavement" section.

Deep Sump Hooded Catch Basins and Deep Sump Hooded Manholes

Stormwater runoff from proposed standard impervious asphalt pavement is directed via curbing and site grading to catch basins with deep sumps and hooded outlets and trench drains. Since trench drains do not contain hoods and sumps, they will be routed through manholes with deep sumps and hooded outlets. These structures are designed to trap and remove sediment and larger particles from the stormwater and improve the performance of subsequent BMP's. The sumps are a minimum of 4' in depth and a routine inspection and cleaning schedule shall be followed to ensure optimal effectiveness.

Inspection Frequency:	Quarterly
Inspection Tools:	Manhole hook; survey rod; sludge judge
Items to Inspect:	Measure sediment in sump using survey rod; visually check for floating debris or trash; visually check for oil and if more than a sheen is present, use sludge judge to measure thickness of layer; visually ensure that hood is in place; visually ensure that grate is in good condition; visually ensure that outlet pipe is unobstructed
Maintenance Threshold(s):	Annually or ≥24" sediment in sump (whichever comes first); discernible layer of oil/hydrocarbons on surface; floating trash
Maintenance Equipment:	Vactor or clamshell for sediment removal; vactor and/or oil sorbent pads for oil/hydrocarbon removal; net for floating debris or trash removal

Trench Drains

Stormwater runoff garage entrances will be directed to trench drains. As noted above, the trench drains will be routed through manholes with deep sumps and hooded outlets to provide treatment. Routine inspection and cleaning of the trench drains will help ensure optimal effectiveness of the downstream manholes.

Inspection Frequency:	Quarterly
Inspection Tools:	Manhole hook; survey rod or ruler
Items to Inspect:	Measure sediment in the trench drain using survey rod or ruler; visually check for debris or trash; visually check for oil; visually ensure that grate is in good condition; visually ensure that outlet pipe is unobstructed
Maintenance Threshold(s):	Annually or if outlet pipe begins to get blocked or appears to be at risk of getting blocked by trash or debris (whichever comes first)
Maintenance Equipment:	Hand shovel to clean

Water Quality Units

Proprietary water quality units are designed to remove heavy particles, floating debris and hydrocarbons from stormwater. Stormwater enters the system where floatables and oils are separated prior to the

clarified stormwater runoff discharging to an outlet pipe. The project design proposes to use the following Contech Engineered Solutions models: Cascade CS-4, Cascade CS-6, and CDS1515-3.

Inspection Frequency:	Quarterly
Inspection Tools:	Manhole hook; survey rod; sludge judge
Items to Inspect:	Measure sediment in sump using survey rod; use sludge judge to measure thickness of oil layer through oil port; visually ensure that insert and weir are in good condition; visually ensure that cover is in good condition
Maintenance Threshold(s):	≥8" sediment and/or a discernible layer of oil/hydrocarbons or as otherwise recommended by the manufacturer
Maintenance Equipment:	Vactor

Infiltration Basin

Basin 1 is designed to treat, detain, and infiltrate stormwater. The side slopes and floor of the basin are vegetated with stone on the lowest portions of the floor to enhance infiltration.

Inspection Frequency:	Quarterly
Inspection Tools:	Ruler or survey rod to measure sediment
Items to Inspect:	Measure any accumulated sediment using a ruler or survey rod; visually inspect for erosion on the side slopes
Maintenance Threshold(s):	≥4" sediment; mow side slopes at least twice annually and remove clippings to avoid clogging of downstream structures; remove weeds, sediment, and other debris from stone routinely throughout the year and replace stone as needed to maintain a clean & neat appearance of the basin floor; repair any noted issues as required
Maintenance Equipment:	Skid steer or similar small machine for removing sediment; shovels for hand removal of sediment in tight areas such as around the outlet control structures; mower/trimmer for mowing (mow at least twice per year and remove clippings)

Subsurface Infiltration Systems (SISs)

Subsurface infiltration systems are designed to infiltrate runoff from the site. These systems are comprised of pipe and stone. The systems are equipped with inspection/cleanout ports to facilitate inspection for standing water and sediment accumulation. There are ten (10) subsurface infiltration systems in total.

Inspection Frequency:	Quarterly
Inspection Tools:	Ruler or survey rod to measure sediment
Items to Inspect:	Measure any accumulated sediment using a ruler or survey rod; inspect for standing water if more than 72 hours have elapsed since the previous rain event.
Maintenance Threshold(s):	≥1" sediment
Maintenance Equipment:	Water jet and vactor

Riprap Apron

Basin 1 includes a riprap apron at the inlet pipe, which is intended to dissipate energy and spread out flow as it enters the basin.

Inspection Frequency:	Quarterly

Inspection Tools:	None (all visual)
Items to Inspect:	Visually ensure that flared end section is intact; visually ensure that riprap stones are intact; visually inspect that pipe is unobstructed
Maintenance Threshold(s):	Trim vegetation around pipe annually to maintain accessibility and visibility for inspection purposes, remove sediment if present, replace any displaced stones
Maintenance Equipment:	Mower/trimmer for trimming vegetation, hand methods or equipment as required for sediment removal and stone replacement

Porous Pavement

Porous pavement is a paved surface with a higher than normal percentage of air voids to allow water to infiltrate directly into the soil and receive water quality treatment. It is used for sidewalks throughout the *Apartments at Cold Brook Crossing* and *Cold Brook Crossing* and for parking lots and drive aisles within the *Apartments at Cold Brook Crossing*. It is also used for the driveway and parking spaces associated with the Waste Water Treatment Facility. Since the pavement itself acts as pretreatment to the stone reservoir below, frequent cleaning and maintenance of the pavement surface is critical to prevent clogging.

Inspection Frequency:	Quarterly
Inspection Tools:	None (all visual)
Items to Inspect:	Inspect the surface for deterioration or spalling; perform at least one of the inspections during a rain event to confirm that the water infiltrates into the pavement surface
Maintenance Threshold(s):	Jet wash porous pavement surfaces twice per year, increasing the frequency if needed to ensure proper functioning of the pavement; clean the surface using vacuum sweeping machines monthly
Maintenance Equipment:	Jet washer, vacuum sweeper
Other Considerations:	No sanding shall be conducted on the porous surface; salt and deicing chemicals shall be used at the minimum acceptable rate to ensure safety; keep adjacent landscaped areas well maintained to prevent soil from being transported onto the pavement; never reseal or repave with impermeable materials

1.2 ILLICIT DISCHARGE STATEMENT

Illicit discharges to the stormwater management system are discharges not entirely comprised of stormwater. Discharges to the stormwater management system from the following activities or facilities are permissible: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

There are no known illicit discharges currently at the site nor are any illicit discharges proposed as part of the project. The stormwater management system is not intended to convey any illicit discharges and or pollutants and as such, control measures that are identified within this report shall be strictly adhered to in order to minimize the risk of contamination. Any unknown existing illicit discharges that are discovered as part of the development of the subject site shall be eliminated in accordance with local, state and federal regulations.

2.0 LONG-TERM POLLUTION PREVENTION PLAN (LTPPP)

The Massachusetts DEP Stormwater Management Handbook requires that a Long-Term Pollution Prevention Plan (LTPPP) be prepared and incorporated as part of the Operation & Maintenance of the Stormwater Management System. The purpose of the LTPPP is to identify potential sources of pollution that may affect the quality of stormwater discharges, and to describe the implementation of practices to reduce the pollutants in stormwater discharges. The following items describe the source control and proper procedures for the LTPPP.

Solid Waste Storage:
There are no proposed exterior (un-covered) solid waste storage areas. Trash and recycling shall be stored either indoors or in closed containers. The unit owners association and apartment management company shall contract with a waste hauling company to service the development on a routine basis.

Street Sweeping
Sweeping of site drives and parking lots constructed of standard impervious asphalt pavement shall be performed twice a year, once in the spring and once in the fall, to reduce the amount of sediment and debris entering the catch basins. More frequent street sweeping is required for porous pavement areas as outlined in Section 1.1. Swept materials shall be disposed of in accordance with applicable local and state requirements.

Deicing and Salt Storage
Deicing methods shall be used in conjunction with snow removal to maintain safe pedestrian and vehicular access. The unit owner's association and apartment management company will be responsible for maintaining roads, driveways, sidewalks and pedestrian access onsite.

This development requires special attention to deicing due to the use of porous pavement and because the site is located in an environmentally sensitive Zone II area. To the extent practicable, snow shall be piled in areas where the snowmelt will receive maximum treatment through the proposed BMPs. No sanding shall be conducted on porous surfaces due to the potential for clogging the pavement voids, but sanding may be used on standard asphalt pavement. Industry standard deicing products may be used on standard pavement and on porous pavement unless specifically restricted by the municipality, but shall be used at the minimum acceptable rate to ensure pedestrian and vehicular safety. Deicing products shall be stored off-site or in a covered location.

Snow Disposal
This development requires special attention to snow removal because the site is located in an environmentally sensitive Zone II area. To the extent practicable, snow shall be piled in areas where the snowmelt will receive maximum treatment through the proposed BMPs. Snow meltwater can filter into the soil, leaving behind sand and debris, which can be removed in the springtime, or run onto surfaces that undergo treatment through the proposed BMPs. Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. In no case shall snow be disposed of or stored in wetlands, streams or other water bodies. If necessary to remove snow from the site, the snow shall be disposed of at an off-site location in accordance with applicable local, state and federal regulations. No snow may be brought into the Zone II from areas outside the Zone II.

Miscellaneous Hazardous Materials
Sources of potential spill hazards within residential developments include items such as vehicle fluids, pesticides, paints, and liquid cleaning products. The majority of the spill hazards would likely occur within buildings and would not enter the stormwater drainage system. Exterior spill hazards, while minimal, have the potential to enter the stormwater drainage system and shall be addressed as follows:

- Spills of branded products such as pesticides and paints shall be remediated using the manufacturers' recommended spill cleanup protocol.
- Vehicle fluids and liquid fuel spill shall be remediated according to the local and state regulations governing fuel spills.
- Any hazardous spills shall be cleaned up immediately after discovery.
- Should a spill occur, this pollution prevention plan should be adjusted to include measures to prevent another spill of a similar nature. A description of the spill, along with the causes and cleanup measures should be included in the updated pollution prevention plan.

Lawn, Garden, and Landscape Management:

Lawn areas shall be maintained and mowed regularly throughout the growing season. Any bare areas of lawn shall be reseeded and plants shall be pruned on an as-needed basis. Trash and debris shall be removed from landscaped and planted areas as-needed. Fertilizers, herbicides and pesticides shall be used within the amounts recommended by the manufacturer. These products shall be stored in containers indoors. Pet waste shall be disposed of properly.

APPENDIX-A

EXAMPLE
OPERATION AND MAINTENANCE
REPORT FORMS

CIVIL DESIGN GROUP, LLC
ENGINEERING. LAND USE. PLANNING. PERMITTING.

21 High Street, Suite 207
North Andover, MA 01845
Tel 978.794.5400
www.cdgengineering.com

QUARTERLY STORMWATER INSPECTION REPORT (1/3)

Site:	Cold Brook Crossing	**Date:**	
Address:	North Road, Sudbury, Massachusetts	**Time:**	
Inspector:		**Weather:**	

CATCH BASINS

Unit #	Sediment (inches)	Oil (inches)	Hood/ Pipes	Grate	Last Cleaned	Attention Recommended

QUARTERLY STORMWATER INSPECTION REPORT (2/3)

Site:	Cold Brook Crossing	**Date:**	
Address:	North Road, Sudbury, Massachusetts	**Time:**	
Inspector:		**Weather:**	

WATER QUALITY UNITS

Unit #	Sediment (inches)	Oil (inches)	Trash	Cover	Last Cleaned	Attention Recommended

INFILTRATION BASIN

Unit #	Notes	Attention Recommended

SUBSURFACE INFILTRATION SYSTEMS

Unit #	Notes	Attention Recommended

QUARTERLY STORMWATER INSPECTION REPORT (3/3)

Site:	Cold Brook Crossing	**Date:**	
Address:	North Road, Sudbury, Massachusetts	**Time:**	
Inspector:		**Weather:**	

RIPRAP APRON

Unit #	Notes	Attention Recommended

POROUS PAVEMENT

Area	Notes	Attention Recommended

APPENDIX-B

CONTECH WATER QUALITY UNIT MAINTENANCE GUIDELINES

CONTECH®
ENGINEERED SOLUTIONS

Cascade Separator™ Inspection and Maintenance Guide



CASCADE
separator™

Maintenance

The Cascade Separator™ system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects sediment and debris will depend upon on-site activities and site pollutant characteristics. For example, unstable soils or heavy winter sanding will cause the sediment storage sump to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall). However, more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment wash-down areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

A visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet chamber, flumes or outlet channel. The inspection should also quantify the accumulation of hydrocarbons, trash and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided in this Inspection and Maintenance Guide.

Access to the Cascade Separator unit is typically achieved through one manhole access cover. The opening allows for inspection and cleanout of the center chamber (cylinder) and sediment storage sump, as well as inspection of the inlet chamber and slanted skirt. For large units, multiple manhole covers allow access to the chambers and sump.

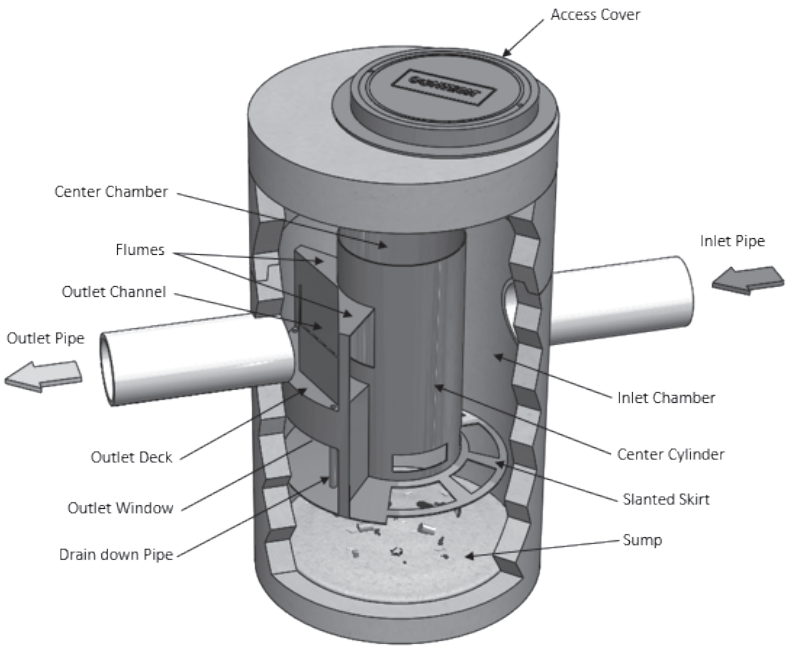
The Cascade Separator system should be cleaned before the level of sediment in the sump reaches the maximum sediment depth and/or when an appreciable level of hydrocarbons and trash has accumulated. If sorbent material is used, it must be replaced when significant discoloration has occurred. Performance may be impacted when maximum sediment storage capacity is exceeded. Contech recommends maintaining the system when sediment level reaches 50% of maximum storage volume. The level of sediment is easily determined by measuring the distance from the system outlet invert (standing water level) to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Finer, silty particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the chart in this document to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the maximum sediment storage.

Cleaning

Cleaning of a Cascade Separator system should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole cover and insert the vacuum tube down through the center chamber and into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The areas outside the center chamber and the slanted skirt should also be washed off if pollutant build-up exists in these areas.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. Then the system should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and to ensure proper safety precautions. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the Cascade Separator system must be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal. If any components are damaged, replacement parts can be ordered from the manufacturer.



Cascade Separator™ Maintenance Indicators and Sediment Storage Capacities

Model Number	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CS-4	4	1.2	1.5	0.5	0.7	0.5
CS-5	5	1.3	1.5	0.5	1.1	0.8
CS-6	6	1.8	1.5	0.5	1.6	1.2
CS-8	8	2.4	1.5	0.5	2.8	2.1
CS-10	10	3.0	1.5	0.5	4.4	3.3
CS-12	12	3.6	1.5	0.5	6.3	4.8

Note: The information in the chart is for standard units. Units may have been designed with non-standard sediment storage depth.



A Cascade Separator unit can be easily cleaned in less than 30 minutes.



A vacuum truck excavates pollutants from the systems.

Cascade Separator™ Inspection & Maintenance Log

Cascade Model:			Location:		
Date	Depth Below Invert to Top of Sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The depth to sediment is determined by taking a measurement from the manhole outlet invert (standing water level) to the top of the sediment pile. Once this measurement is recorded, it should be compared to the chart in the maintenance guide to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the maximum sediment storage. Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

SUPPORT

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

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CDS® Inspection and Maintenance Guide



CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.



CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities



Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

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CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.