

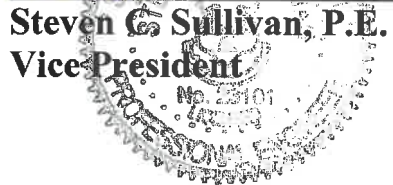
DRAINAGE REPORT
FOR
SHARP HILL SQUARE

Prepared for
200 DANBURY ROAD, LLC
198 & 200 DANBURY ROAD
WILTON, CT

January 6, 2020



CCA, LLC
40 Old New Milford Road
Brookfield, CT


Steven C. Sullivan, P.E.
Vice President


INDEX

GENERAL

PROJECT DESCRIPTION.....	1
SITE DESCRIPTION.....	1
SOILS.....	2
DESIGN OBJECTIVES.....	3
DESIGN CRITERIA.....	3
DRAINAGE NARRATIVE.....	3
DRAINAGE SYSTEM DESCRIPTION.....	4
CONCLUSION.....	5

APPENDIX

- FEMA FIRMETTE
- NRCS WEB SOIL SURVEY
- NOAA ATLAS 14 PRECIPITATION DATA
- LONG TERM MAINTENANCE PROCEDURES
- DEEPHOLE TEST RESULTS
- SOIL PERMEABILITY TEST RESULTS
- HYDROCAD PRE & POST DEVELOPMENT DRAINAGE CALCULATIONS-DA#1
- HYDROCAD PRE & POST DEVELOPMENT DRAINAGE CALCULATIONS-DA#2
- HYDRAFLOW STORM SEWERS PIPE SIZING CALCULATIONS
- WATER QUALITY FLOW/VOLUME CALCULATIONS
- GROUNDWATER RECHARGE VOLUME CALCULATIONS
- PRE-DEVELOPMENT DRAINAGE AREA MAP
- POST-DEVELOPMENT DRAINAGE AREA MAP
- CATCH BASIN DRAINAGE AREA MAP

GENERAL

A. DEVELOPMENT DESCRIPTION:

This project consists of the construction of a Mixed Use Development at the corner of Danbury Road and Sharp Hill Road. Three buildings, with associated parking, are proposed for this site. One building, the Raymond Morehouse House, is an existing historic structure to be relocated and restored for adaptive reuse within the DRB District. The First Floor will have an area of 1,422 square feet to be designated as Retail Space. The Second Floor will have one (1) Residential Apartment with an area of 1,251 square feet.

Proposed Building A will have First Floor with a total area of 11,366 square feet, of which 3,800 square feet is to be designated as Retail Space and 7,566 square feet is to be designated as Office. The Upper Level will have an area of 11,762 square feet for twelve (12) Residential Apartments and the Attic Level will have an area of 10,198 square feet for ten (10) Residential Apartments. All levels may be accessed by an elevator from the Garage Level below.

Proposed Building B will have a First Floor with a total area of 3,456 square feet to be designated as Retail Space. The Second Floor will have an area of 3,452 square feet for three (3) Residential Apartments.

There are one hundred three (103) parking spaces proposed, six (6) of which are handicapped accessible. A total of one hundred three (103) are required. Thirty (30) spaces, including two (2) handicapped accessible are located in the Garage Level of Building A which is open to the east. The remaining seventy-three (73) spaces, four (4) of which are handicapped accessible, are located on site.

Vehicle access is via one (1) proposed curb cut off of Danbury Road and another one (1) proposed curb cut off of Sharp Hill Road. A refuse area on a concrete pad with a 6' high fence and swing gate and a 12'x 30' loading area is proposed in the northeast corner of the property. Included, as integral parts of the development, are associated site facilities and amenities, such as driveways, parking areas, storm drainage system, utilities, and landscaping, etc. Please refer to site development plans for additional information.

B. SITE DESCRIPTION:

The site is located on the east side of Danbury Road and the south side of Sharp Hill Road. Boundaries of the site are as follows:

Northerly: Sharp Hill Road and Private Property – Single Family Residence and a Cemetery on the north side of Sharp Hill Road.

Easterly: Private Property – Single Family Residence.
Southerly: Commercial use.
Westerly: Danbury Road and Commercial use on the west side of Danbury Road.

The parcel presently consists of a 2.574 acre lot which is located in the DRB Design Retail Business District zone and is owned by the applicant. The proposed use is for three Mixed Use buildings, each with ground floor Retail or Office space and second floor Apartments. There are several existing structures, one of which is an existing historic structure to be relocated and restored on the same site for adaptive reuse. The remaining existing structure and associated pavements are to be demolished. An existing sanitary sewer line, storm line, and water line is located along Danbury Road.

The front portion of the property drains toward Danbury Road and the remaining portion drains to the east toward a wetland area. The grade at the northeast corner of the site slopes steeply from the edge of Sharp Hill Road towards the existing wetland. The grades at the southeast corner and east side of the property slope from the property line in a northerly and westerly direction toward the existing wetland.

Existing deciduous trees line the south property edge and a mix of deciduous and evergreen trees line the northeast property corner. Several deciduous trees, as well as a line of evergreen trees exist in the interior of the site. The existing wetlands is wooded second growth deciduous with a few larger deciduous trees.

SOILS

According to the survey, there is an existing wetland on the site. Soil data has been compiled using the Natural Resources Conservation Service (NRCS) soil survey. The soil survey indicated a Haven soil with a hydrological soil grouping (HSG) of B. Also, wetlands are located in the eastern part of the site with a Ridgebury wetland soil. The wetlands were delineated by Mary Jaehnig, Certified Soil Scientist.

STORMWATER MANAGEMENT

DESIGN OBJECTIVES:

The storm water management is accomplished by integrating the following functions:

1. Provide a storm water collection system consisting of catch basins and culverts.
2. Provide storm water quality measures in order to reduce pollutant loadings and minimize development impacts through the use of catch basin sumps, hydrodynamic separator and detention/retention galleries. The hydrodynamic separators will be designed to remove a minimum of 80% total suspended solids.
3. Provide a storm water detention system to attenuate the increase in peak flows.

DESIGN CRITERIA:

Design Storms:

Hydrodynamic Separator	Water Quality Flow
In-street piping system	25-year
Detention Galleries #1	2, 10, 25-year
Detention Galleries #2	2, 10, 25, 50-year (CONNDOT)

Note: All piping drainage has been designed utilizing the NOAA Atlas 14 precipitation data for the site. The detention basin system was designed utilizing the SCS TR-20 method with NOAA Atlas 14 precipitation data for the site.

DRAINAGE NARRATIVE:

The existing drainage patterns consist of two watersheds, DA#1 and DA#2 and are shown on the attached Drainage Area Maps.

Drainage Area #1:

This area drains to the east toward an existing wetland and is approximately 3.22 acres. It contains existing buildings, paved parking/driveway areas, lawn and wooded areas. A portion of the drainage area is an offsite single family zone. An existing Town storm drainage system crosses the site, collecting stormwater from Sharp Hill Road and overflow from the wetland. In the post development scenario, the drainage area changes due to the proposed grading for the site. The drainage area is 3.10 acres and contains the proposed building A, paved parking/driveway areas, lawn and wooded areas. We have provided two underground Cultec gallery detention systems to attenuate the peak flows and retain the water quality and

groundwater recharge volume of stormwater.

Drainage Area #2:

This area drains to the east toward a Danbury Road and the CONNDOT drainage system. It is approximately 0.78 acres. It contains existing buildings, paved parking/driveway areas and lawn areas. In the post development scenario, the drainage area changes due to the proposed grading for the site. The drainage area is 0.91 acres and contains the proposed building B, Raymond Morehouse, paved parking/driveway areas and lawn areas. We have provided one underground Cultec gallery detention systems to attenuate the peak flows and retain the water quality and groundwater recharge volume of stormwater.

DRAINAGE SYSTEM DESCRIPTION:

In order to accomplish the above a series of catch basins are proposed to collect storm water along gutters and at low points in the site. The culverts are appropriately sized to convey the runoff for a 25-year storm event using accepted hydraulic design supported by computer analysis. The stormwater quality treatment train consists of catch basin sumps, hydrodynamic separator and infiltration galleries. The catch basin sumps provide the first treatment of the runoff by capturing the coarse sediments within the runoff.

HYDRODYNAMIC SEPARATORS:

The hydrodynamic separators are designed to remove many of the pollutants associated with parking area runoff including sand, silt, metals, and oils. Hydrodynamic separators are considered acceptable “best management practices” or BMP’s by the Connecticut DEEP and are frequently part of an engineered storm water management plan. The hydrodynamic separators and catch basins also significantly reduce the maintenance requirements to the underground detention system by removing the majority of sand and silt.

DETENTION SYSTEM DESCRIPTIONS:

The project storm drainage system is designed to maintain the existing flow patterns and reduce peak flows to levels below existing flow rates. This is accomplished by constructing three underground detention systems with approximately 1,947 l.f. of Cultec galleries. Due to the well-draining soils, recharging stormwater is feasible. Therefore, detention systems East, West and #2 have incorporated a crushed stone base to allow for the retention of the water quality and groundwater recharge volumes of stormwater. We used half of the average field soil permeability test rates for our design exfiltration rates. The total pre-development flows were determined. Post-development flows were analyzed. The volume of flow to the detention system was hydraulically calculated. Water enters the detention systems from several hydrodynamic separators.

The detention systems outlet controls consist of orifice/pipe culverts to attenuate the peak flows before discharging down gradient. Detention system East utilizes an 8” orifice cap, detention system West utilizes a 3” orifice cap and detention system #2 utilizes a 10” orifice cap.

SUMMARY OF PEAK FLOWS DA#1:

Design Storm	Pre-Development (c.f.s.)	Post-Development (c.f.s.)
2 Year	1.83	1.50
10 Year	4.01	3.52
25 Year	5.01	5.00

SUMMARY OF PEAK FLOWS DA#2:

Design Storm	Pre-Development (c.f.s.)	Post-Development (c.f.s.)
2 Year	1.50	1.30
10 Year	2.99	2.57
25 Year	3.96	3.24
50 Year	4.68	3.77

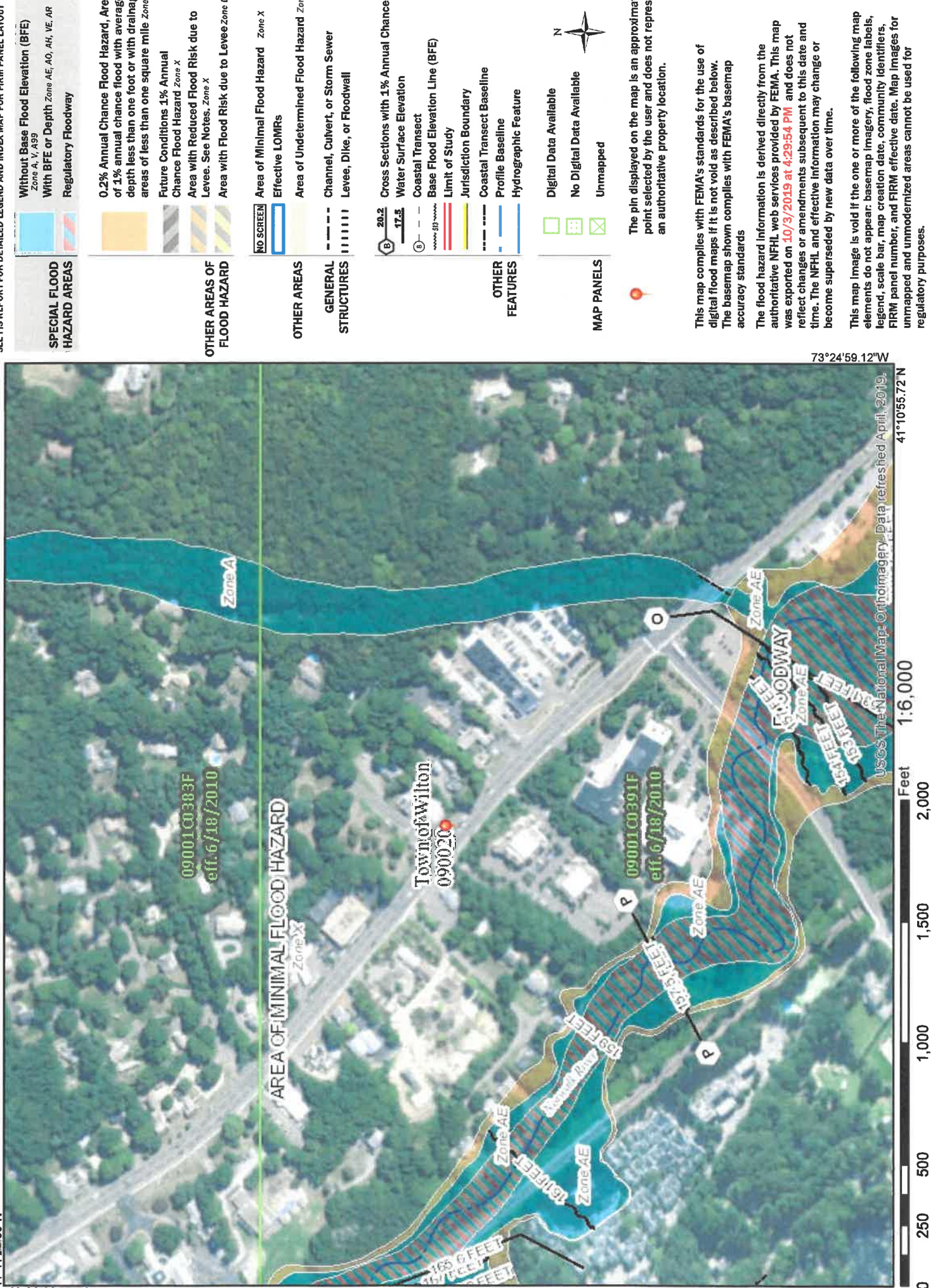
CONCLUSION:

The development meets the design criteria and provides a comprehensive stormwater management plan that incorporates best management practices to reduce impacts and protect the environment. Based upon the analysis performed, CCA believes that through implementation of the recommended engineered stormwater management system and periodic maintenance, the proposed development will not adversely impact down gradient properties.

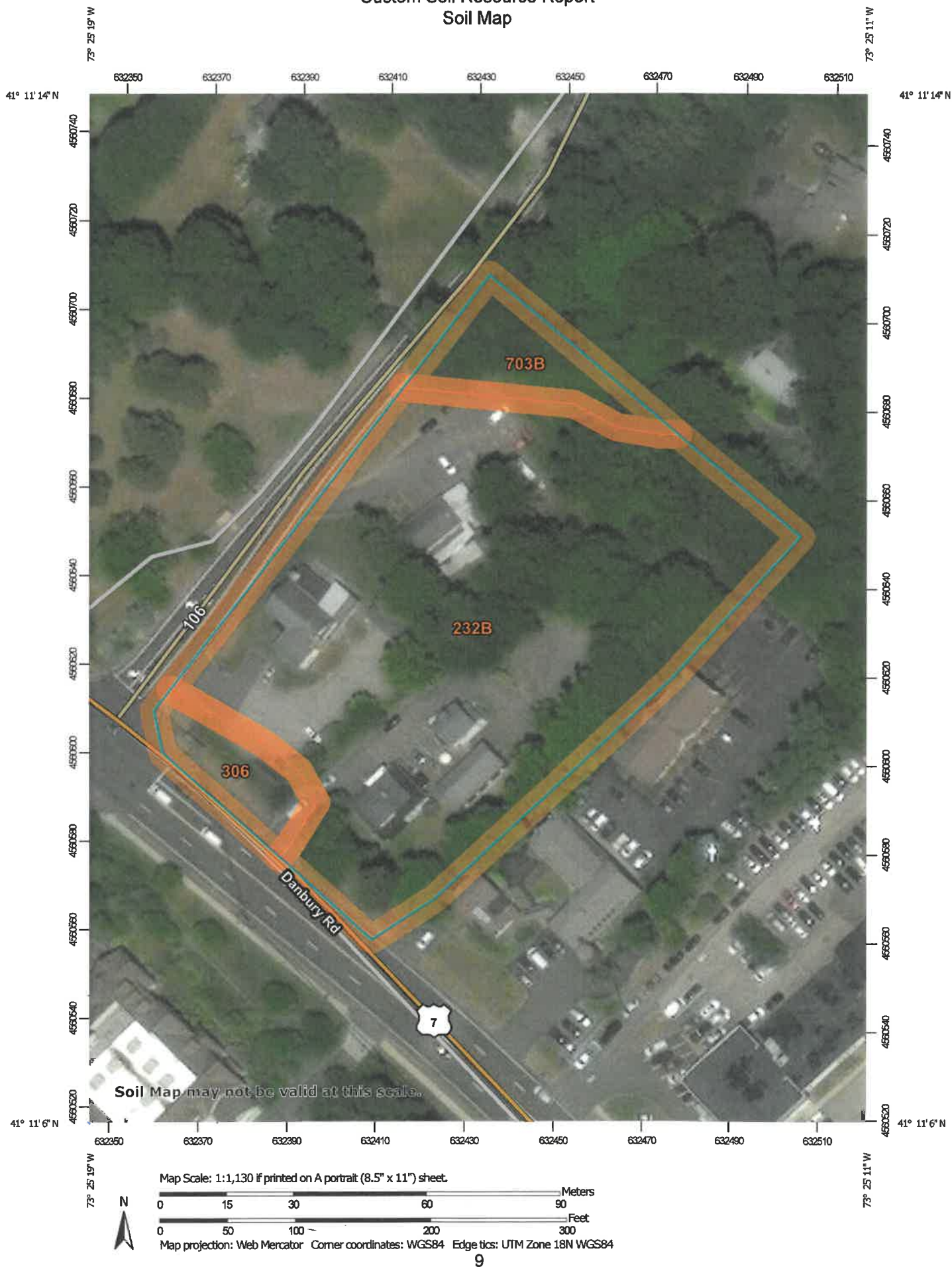
APPENDIX

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

Legend



Custom Soil Resource Report Soil Map



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
232B	Haven-Urban land complex, 0 to 8 percent slopes	2.4	86.6%
306	Udorthents-Urban land complex	0.2	5.7%
703B	Haven silt loam, 3 to 8 percent slopes	0.2	7.7%
Totals for Area of Interest		2.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The



NOAA Atlas 14, Volume 10, Version 3
 Location name: Wilton, Connecticut, USA*
 Latitude: 41.1858°, Longitude: -73.4213°
 Elevation: 164.67 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.364 (0.283–0.462)	0.424 (0.330–0.539)	0.522 (0.404–0.666)	0.604 (0.465–0.773)	0.716 (0.533–0.949)	0.801 (0.585–1.08)	0.889 (0.627–1.24)	0.982 (0.662–1.40)	1.11 (0.720–1.63)	1.21 (0.767–1.81)
10-min	0.516 (0.401–0.655)	0.601 (0.467–0.764)	0.740 (0.573–0.943)	0.855 (0.658–1.10)	1.01 (0.755–1.35)	1.14 (0.827–1.53)	1.26 (0.889–1.75)	1.39 (0.937–1.98)	1.57 (1.02–2.31)	1.72 (1.09–2.57)
15-min	0.607 (0.472–0.770)	0.707 (0.549–0.898)	0.871 (0.674–1.11)	1.01 (0.775–1.29)	1.19 (0.888–1.58)	1.34 (0.973–1.80)	1.48 (1.05–2.06)	1.64 (1.10–2.33)	1.85 (1.20–2.72)	2.02 (1.28–3.02)
30-min	0.848 (0.659–1.08)	0.986 (0.766–1.25)	1.21 (0.938–1.54)	1.40 (1.08–1.79)	1.66 (1.23–2.19)	1.86 (1.35–2.50)	2.06 (1.45–2.84)	2.26 (1.52–3.22)	2.54 (1.65–3.73)	2.75 (1.74–4.11)
60-min	1.09 (0.847–1.38)	1.26 (0.983–1.61)	1.55 (1.20–1.98)	1.79 (1.38–2.30)	2.12 (1.58–2.81)	2.38 (1.73–3.19)	2.63 (1.85–3.63)	2.89 (1.95–4.11)	3.22 (2.09–4.73)	3.47 (2.20–5.20)
2-hr	1.40 (1.09–1.76)	1.65 (1.29–2.08)	2.05 (1.60–2.60)	2.39 (1.85–3.04)	2.86 (2.14–3.77)	3.21 (2.35–4.31)	3.57 (2.54–4.95)	3.97 (2.68–5.62)	4.53 (2.95–6.61)	4.98 (3.16–7.40)
3-hr	1.60 (1.26–2.01)	1.90 (1.49–2.39)	2.39 (1.87–3.02)	2.80 (2.17–3.55)	3.36 (2.53–4.42)	3.78 (2.78–5.07)	4.22 (3.02–5.85)	4.72 (3.19–6.66)	5.43 (3.54–7.90)	6.02 (3.83–8.91)
6-hr	2.02 (1.59–2.52)	2.41 (1.90–3.01)	3.06 (2.40–3.83)	3.59 (2.81–4.52)	4.33 (3.28–5.67)	4.88 (3.62–6.52)	5.47 (3.94–7.56)	6.15 (4.18–8.62)	7.14 (4.66–10.3)	7.96 (5.08–11.7)
12-hr	2.49 (1.98–3.09)	2.99 (2.38–3.71)	3.81 (3.02–4.74)	4.49 (3.53–5.61)	5.43 (4.13–7.06)	6.12 (4.57–8.13)	6.87 (4.98–9.44)	7.73 (5.27–10.8)	9.00 (5.90–12.9)	10.1 (6.44–14.7)
24-hr	2.92 (2.33–3.59)	3.54 (2.83–4.36)	4.56 (3.63–5.64)	5.41 (4.28–6.72)	6.57 (5.04–8.51)	7.44 (5.59–9.83)	8.37 (6.11–11.5)	9.47 (6.48–13.1)	11.1 (7.31–15.9)	12.5 (8.03–18.2)
2-day	3.24 (2.61–3.96)	4.01 (3.22–4.90)	5.26 (4.21–6.45)	6.30 (5.01–7.77)	7.73 (5.96–9.97)	8.78 (6.64–11.6)	9.93 (7.31–13.6)	11.3 (7.78–15.6)	13.5 (8.88–19.1)	15.3 (9.86–22.1)
3-day	3.50 (2.82–4.26)	4.34 (3.50–5.29)	5.71 (4.59–6.98)	6.86 (5.48–8.42)	8.43 (6.52–10.8)	9.59 (7.27–12.6)	10.8 (8.02–14.8)	12.4 (8.53–17.0)	14.8 (9.75–20.9)	16.8 (10.8–24.1)
4-day	3.74 (3.03–4.54)	4.63 (3.75–5.63)	6.08 (4.90–7.42)	7.29 (5.84–8.93)	8.95 (6.94–11.5)	10.2 (7.74–13.3)	11.5 (8.52–15.6)	13.1 (9.05–17.9)	15.6 (10.3–22.0)	17.7 (11.5–25.4)
7-day	4.46 (3.63–5.39)	5.43 (4.42–6.56)	7.02 (5.68–8.51)	8.33 (6.71–10.1)	10.1 (7.89–12.9)	11.5 (8.75–14.9)	12.9 (9.57–17.4)	14.6 (10.1–19.9)	17.2 (11.4–24.1)	19.4 (12.6–27.6)
10-day	5.17 (4.22–6.22)	6.19 (5.05–7.45)	7.86 (6.39–9.49)	9.25 (7.47–11.2)	11.2 (8.70–14.1)	12.6 (9.59–16.2)	14.1 (10.4–18.8)	15.8 (11.0–21.4)	18.4 (12.2–25.7)	20.5 (13.3–29.1)
20-day	7.30 (6.00–8.73)	8.45 (6.94–10.1)	10.3 (8.45–12.4)	11.9 (9.66–14.3)	14.0 (11.0–17.5)	15.7 (12.0–19.9)	17.3 (12.8–22.7)	19.1 (13.4–25.7)	21.6 (14.4–29.9)	23.6 (15.3–33.2)
30-day	9.07 (7.49–10.8)	10.3 (8.49–12.3)	12.3 (10.1–14.7)	14.0 (11.4–16.8)	16.3 (12.8–20.2)	18.1 (13.8–22.8)	19.9 (14.6–25.8)	21.7 (15.2–29.0)	24.1 (16.2–33.2)	26.0 (16.9–36.5)
45-day	11.3 (9.33–13.3)	12.6 (10.4–14.9)	14.8 (12.2–17.6)	16.6 (13.6–19.9)	19.1 (15.0–23.5)	21.1 (16.1–26.4)	23.0 (16.9–29.5)	24.8 (17.5–33.0)	27.2 (18.3–37.3)	29.0 (18.9–40.5)
60-day	13.1 (10.9–15.5)	14.5 (12.0–17.2)	16.8 (13.9–20.0)	18.8 (15.4–22.4)	21.4 (16.9–26.3)	23.5 (18.0–29.3)	25.5 (18.8–32.6)	27.4 (19.3–36.3)	29.8 (20.1–40.7)	31.5 (20.6–43.9)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
 Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
 Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)



NOAA Atlas 14, Volume 10, Version 3
 Location name: Wilton, Connecticut, USA*
 Latitude: 41.1858°, Longitude: -73.4213°
 Elevation: 164.67 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.37 (3.40–5.54)	5.09 (3.96–6.47)	6.26 (4.85–7.99)	7.25 (5.58–9.28)	8.59 (6.40–11.4)	9.61 (7.02–13.0)	10.7 (7.52–14.8)	11.8 (7.94–16.8)	13.3 (8.64–19.6)	14.5 (9.20–21.8)
10-min	3.10 (2.41–3.93)	3.61 (2.80–4.58)	4.44 (3.44–5.66)	5.13 (3.95–6.57)	6.08 (4.53–8.07)	6.81 (4.96–9.19)	7.55 (5.33–10.5)	8.35 (5.62–11.9)	9.44 (6.12–13.9)	10.3 (6.52–15.4)
15-min	2.43 (1.89–3.08)	2.83 (2.20–3.59)	3.48 (2.70–4.43)	4.02 (3.10–5.15)	4.77 (3.55–6.33)	5.34 (3.89–7.21)	5.92 (4.18–8.24)	6.55 (4.41–9.33)	7.40 (4.80–10.9)	8.08 (5.11–12.1)
30-min	1.70 (1.32–2.15)	1.97 (1.53–2.51)	2.42 (1.88–3.09)	2.80 (2.15–3.58)	3.31 (2.46–4.39)	3.71 (2.70–4.99)	4.11 (2.89–5.69)	4.52 (3.05–6.44)	5.07 (3.29–7.45)	5.49 (3.48–8.22)
60-min	1.09 (0.847–1.38)	1.26 (0.983–1.61)	1.55 (1.20–1.98)	1.79 (1.38–2.30)	2.12 (1.58–2.81)	2.38 (1.73–3.19)	2.63 (1.85–3.63)	2.89 (1.95–4.11)	3.22 (2.09–4.73)	3.47 (2.20–5.20)
2-hr	0.698 (0.546–0.880)	0.822 (0.642–1.04)	1.03 (0.799–1.30)	1.20 (0.925–1.52)	1.43 (1.07–1.88)	1.60 (1.18–2.15)	1.79 (1.27–2.47)	1.99 (1.34–2.81)	2.26 (1.47–3.31)	2.49 (1.58–3.70)
3-hr	0.534 (0.419–0.670)	0.634 (0.497–0.796)	0.797 (0.623–1.00)	0.932 (0.724–1.18)	1.12 (0.841–1.47)	1.26 (0.927–1.69)	1.41 (1.00–1.95)	1.57 (1.06–2.22)	1.81 (1.18–2.63)	2.00 (1.27–2.97)
6-hr	0.337 (0.266–0.420)	0.403 (0.318–0.503)	0.511 (0.401–0.640)	0.600 (0.469–0.755)	0.723 (0.548–0.948)	0.816 (0.605–1.09)	0.913 (0.658–1.26)	1.03 (0.698–1.44)	1.19 (0.779–1.72)	1.33 (0.848–1.96)
12-hr	0.207 (0.164–0.256)	0.248 (0.197–0.308)	0.316 (0.250–0.393)	0.373 (0.293–0.466)	0.450 (0.343–0.586)	0.508 (0.379–0.675)	0.570 (0.413–0.783)	0.642 (0.438–0.894)	0.747 (0.490–1.07)	0.835 (0.534–1.22)
24-hr	0.122 (0.097–0.150)	0.148 (0.118–0.182)	0.190 (0.151–0.235)	0.225 (0.178–0.280)	0.274 (0.210–0.355)	0.310 (0.233–0.410)	0.349 (0.255–0.478)	0.395 (0.270–0.546)	0.463 (0.305–0.661)	0.521 (0.334–0.757)
2-day	0.068 (0.054–0.083)	0.083 (0.067–0.102)	0.110 (0.088–0.134)	0.131 (0.104–0.162)	0.161 (0.124–0.208)	0.183 (0.138–0.241)	0.207 (0.152–0.283)	0.236 (0.162–0.325)	0.281 (0.185–0.398)	0.319 (0.205–0.460)
3-day	0.049 (0.039–0.059)	0.060 (0.049–0.073)	0.079 (0.064–0.097)	0.095 (0.076–0.117)	0.117 (0.091–0.150)	0.133 (0.101–0.175)	0.151 (0.111–0.206)	0.172 (0.118–0.236)	0.205 (0.135–0.290)	0.233 (0.151–0.335)
4-day	0.039 (0.032–0.047)	0.048 (0.039–0.059)	0.063 (0.051–0.077)	0.076 (0.061–0.093)	0.093 (0.072–0.119)	0.106 (0.081–0.139)	0.120 (0.089–0.163)	0.137 (0.094–0.187)	0.163 (0.108–0.229)	0.185 (0.119–0.265)
7-day	0.027 (0.022–0.032)	0.032 (0.026–0.039)	0.042 (0.034–0.051)	0.050 (0.040–0.060)	0.060 (0.047–0.077)	0.068 (0.052–0.089)	0.077 (0.057–0.104)	0.087 (0.060–0.118)	0.102 (0.068–0.143)	0.115 (0.075–0.164)
10-day	0.022 (0.018–0.026)	0.026 (0.021–0.031)	0.033 (0.027–0.040)	0.039 (0.031–0.047)	0.046 (0.036–0.059)	0.052 (0.040–0.068)	0.059 (0.043–0.078)	0.066 (0.046–0.089)	0.077 (0.051–0.107)	0.086 (0.055–0.121)
20-day	0.015 (0.013–0.018)	0.018 (0.014–0.021)	0.022 (0.018–0.026)	0.025 (0.020–0.030)	0.029 (0.023–0.036)	0.033 (0.025–0.041)	0.036 (0.027–0.047)	0.040 (0.028–0.053)	0.045 (0.030–0.062)	0.049 (0.032–0.069)
30-day	0.013 (0.010–0.015)	0.014 (0.012–0.017)	0.017 (0.014–0.020)	0.019 (0.016–0.023)	0.023 (0.018–0.028)	0.025 (0.019–0.032)	0.028 (0.020–0.036)	0.030 (0.021–0.040)	0.034 (0.022–0.046)	0.036 (0.024–0.051)
45-day	0.010 (0.009–0.012)	0.012 (0.010–0.014)	0.014 (0.011–0.016)	0.015 (0.013–0.018)	0.018 (0.014–0.022)	0.019 (0.015–0.024)	0.021 (0.016–0.027)	0.023 (0.016–0.031)	0.025 (0.017–0.035)	0.027 (0.018–0.038)
60-day	0.009 (0.008–0.011)	0.010 (0.008–0.012)	0.012 (0.010–0.014)	0.013 (0.011–0.016)	0.015 (0.012–0.018)	0.016 (0.013–0.020)	0.018 (0.013–0.023)	0.019 (0.013–0.025)	0.021 (0.014–0.028)	0.022 (0.014–0.031)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
 Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
 Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

LONG TERM MAINTENANCE PROCEDURES

Sharp Hill Square Wilton, Connecticut

Inspection of the stormwater management system shall generally be performed on a semi-annual basis. More frequent inspections shall occur if sediment levels are deemed to be excessive after major storm events and after any type of spill.

The inspector shall keep a permanent log of inspections including date of inspection, any noted sediment levels, accumulation of oils, notation of any irregularities, name of contractor, etc. An annual report shall be submitted to the Town indicating the conditions observed and any measures taken to repair or refresh irregularities.

CATCH BASINS:

- After the site has been stabilized, monthly monitoring shall occur for the first year of a new installation. After the first year, semi-annual inspections shall generally be performed.
- It is best to schedule maintenance based on the solids collected in the sump. Optimally, the structure should be cleaned when the sump is half full.
- Maintenance is best achieved with a vacuum truck.

The requirements for disposal of materials removed from the basins are similar to that of any other BMP. Disposal should be by a Connecticut licensed waste management company and discharged to a Connecticut DEEP approved location.

SWEEPING:

All parking areas, sidewalks and driveways and other impervious surfaces (except roofs) are swept clean of sand, litter and any other possible pollutants at least twice a year as described below, and at other times as may be necessary.

- Once between November 14 and December 15 (i.e., after leaf fall)
- Once during the month of April (i.e., after snow melt)

HYDRODYNAMIC SEPARATORS:

Inspection of the hydrodynamic separator units shall generally be performed on a semi-annual basis. More frequent inspections shall occur if sediment levels are deemed to be excessive after major storm events and after any type of spill.

Maintenance of the hydrodynamic separator type units is performed using vacuum and/or pumping trucks. This industry is a well-established sector of the service industry that cleans tanks, sewers and catch basins. The use of a vacuum or pumping truck and hose will allow maintenance personnel to pump the unit while the truck is parked on the paved parking lot, thereby not disturbing the adjacent areas.

The hydrodynamic separator unit is sized based on the appropriate guidelines provided in the technical documentation. A CONTECH Hydrodynamic separator was selected. An equivalent may be substituted. Based on this data approximately 15% of the total sediment capacity will be utilized per year. Therefore the unit should be cleaned each year. It is suggested that the cleaning take place in the spring of each year. Based on the accumulated sediment levels the cleaning and monitoring schedule may be adjusted accordingly but not less than once per year.

The requirements for disposal of materials removed from the unit are similar to that of any other BMP. Disposal should be by a Connecticut licensed waste management company and discharged to a Connecticut DEEP approved location.

CULTEC RECHARGERS:

Visit www.cultec.com for the manufacturer's maintenance guidelines and schedules.

DEEP HOLE & PERCOLATION TEST RESULTS
PREPARED FOR
198 – 200 DANBURY ROAD

DEEP HOLE 1

0-36" MISCELLANEOUS FILL
36-43" ORIGINAL TOPSOIL
43-66" ORANGE BROWN FINE SILTY SANDY LOAM
66-80" TAN FINE SAND
NO WATER
NO LEDGE
NO REDOX
NO ROOTS

DEEP HOLE 2

0-42" MISCELLANEOUS FILL
42-51" ORIGINAL TOPSOIL
51-82" ORANGE BROWN FINE SILTY SANDY LOAM
NO WATER
NO LEDGE
NO REDOX
ROOTS @ 72"

DEEP HOLE 3

0-44" MISCELLANEOUS FILL
44-52" ORIGINAL TOPSOIL
52-68" ORANGE BROWN FINE SILTY SANDY LOAM
68-101" TAN FINE SAND
NO WATER
NO LEDGE
NO REDOX
ROOTS @ 82"

DEEP HOLE 4

0-39" MISCELLANEOUS FILL
39-46" ORIGINAL TOPSOIL
46-65" ORANGE BROWN FINE SILTY SANDY LOAM
65-95" TAN FINE SAND
NO WATER
NO LEDGE
NO REDOX
ROOTS @ 72"

DEEP HOLE & PERCOLATION TEST RESULTS
PREPARED FOR
198 – 200 DANBURY ROAD

DEEP HOLE 5

0-7" TOPSOIL
7-91" TAN COURSE SAND SMALL STONE, MEDIUM STONE
BANK RUN
NO WATER
NO LEDGE
NO REDOX
ROOTS @ 73"

DEEP HOLE 6

0-39" MISCELLANEOUS FILL
39-46" ORIGINAL TOPSOIL
46-84" TAN FINE SANDY SILT
NO WATER
NO LEDGE
REDOX @ 46"
NO ROOTS

DEEP HOLE 7

0-18" TOPSOIL
18-96" BROWN FINE SAND
NO WATER
NO LEDGE
REDOX @ 46"
ROOTS @ 28"

DEEP HOLE 8

0-15" TOPSOIL
15-37" ORANGE BROWN FINE SILTY SANDY LOAM
37-91" BROWN FINE SAND & SILT
NO WATER
NO LEDGE
REDOX @ 54"
ROOTS @ 48"

DEEP HOLE & PERCOLATION TEST RESULTS
PREPARED FOR
198 – 200 DANBURY ROAD

DEEP HOLE 9

0-4" GRAVEL
4-9" TOPSOIL
9-19" ORANGE BROWN FINE SILTY SANDY LOAM
19-88" BROWN FINE SAND
NO WATER
NO LEDGE
NO REDOX
ROOTS @ 54"

DEEP HOLE 10

0-8" TOPSOIL
8-84" TAN FINE SAND
NO WATER
NO LEDGE
NO REDOX
ROOTS @ 84"

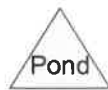
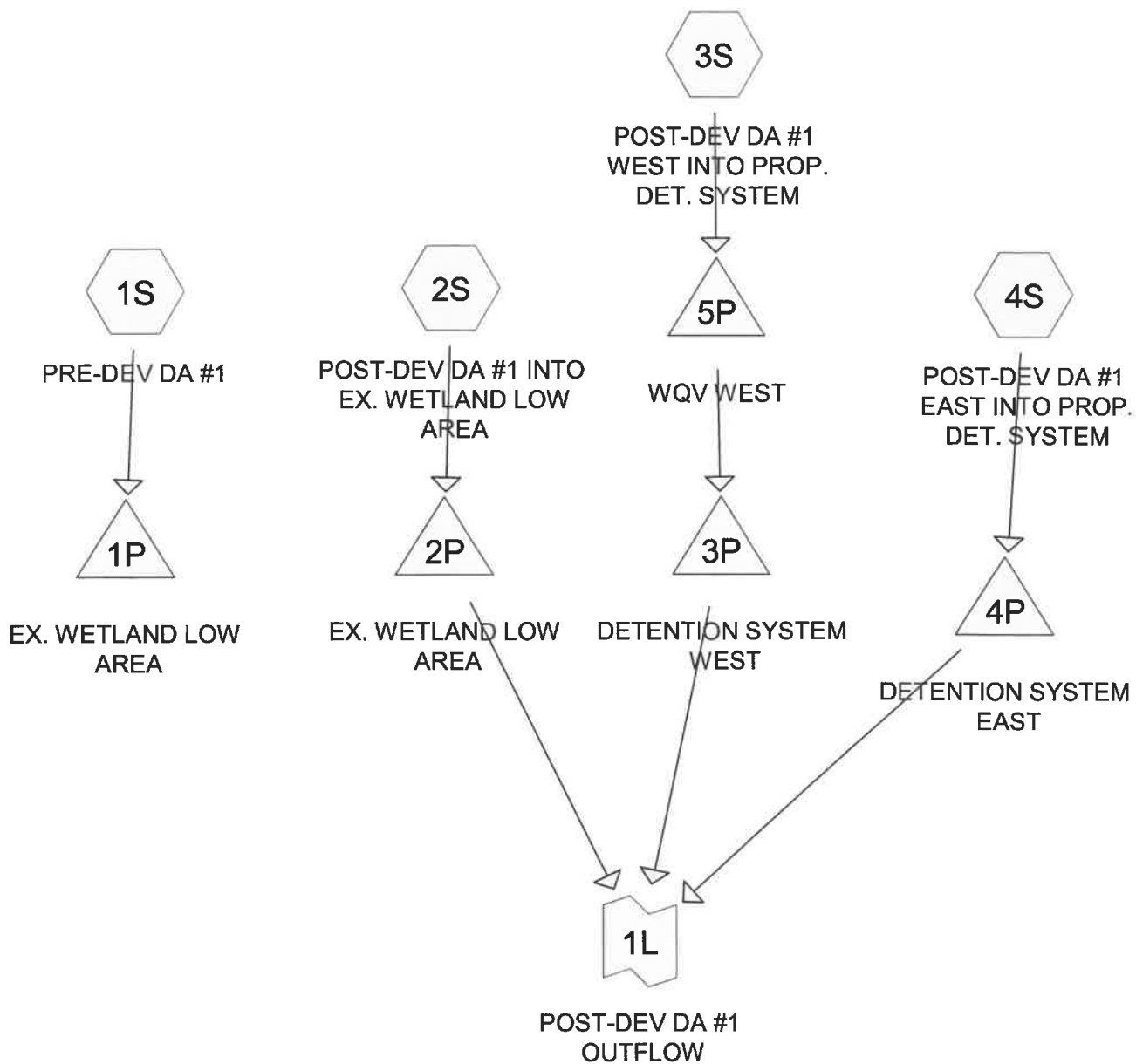
DEEP HOLE 11

0-17" TOPSOIL
17-60" ORANGE BROWN FINE SILTY SANDY LOAM
60-87" BROWN SILTY SANDY LOAM, MEDIUM COBBLES
NO WATER
NO LEDGE
NO REDOX
ROOTS @ 70"

198-200 Danbury Road													
Wilton, Connecticut													
Permeability Test Results, 10-15-19													
Detention System East													
TEST HOLE	DEPTH INCHES	TUBE NUMBER	SAMPLE LENGTH FEET	TIME MINUTES	H.1-H.2 FEET	H.1 FEET	H.2 FEET	H.1+H.2 FEET	K FT/DAY	K FT/HR	K IN./HR		
6	46"	18	0.1300	10.00	0.01	0.95	0.94	1.89	0.20	0.01	0.1		
6	50"	39	0.1000	5.00	0.01	0.95	0.94	1.89	0.30	0.01	0.2		
7	44"	20	0.1200	2.00	0.04	0.95	0.91	1.86	3.72	0.15	1.9		
7	56"	4	0.1200	1.00	0.20	0.95	0.75	1.70	40.66	1.69	20.3		
8	46"	56	0.1200	5.00	0.01	0.97	0.96	1.93	0.36	0.01	0.2		
8	48"	52	0.1200	5.00	0.04	0.98	0.94	1.92	1.44	0.06	0.7		
8	64"	88	0.0900	5.00	0.02	0.95	0.93	1.88	0.55	0.02	0.3		
8	66"	35	0.1200	5.00	0.03	0.95	0.92	1.87	1.11	0.05	0.6		
									Average K		3.0		
									Design K		1.5		

198-200 Danbury Road													
Wilton, Connecticut													
Permeability Test Results, 10-15-19													
Detention System West													
TEST HOLE	DEPTH INCHES	TUBE NUMBER	SAMPLE LENGTH FEET	TIME MINUTES	H.1-H.2 FEET	H.1 FEET	H.2 FEET	H.1+H.2 FEET	K FT/DAY	K FT/HR	K IN./HR		
9	46	86	0.1800	1.00	0.29	0.94	0.65	1.59	94.55	3.94	47.3		
9	50"	31	0.1500	1.00	0.07	0.95	0.88	1.83	16.52	0.69	8.3		
10	62"	93	0.0700	1.00	0.30	0.95	0.65	1.60	37.80	1.58	18.9		
11	70"	69	0.1800	5.00	0.10	0.96	0.86	1.82	5.70	0.24	2.8		
11	72"	1	0.1200	5.00	0.05	0.96	0.91	1.87	1.85	0.08	0.9		
										Average K	15.6		
										Design K	5.0		

198-200 Danbury Road													
Wilton, Connecticut													
Permeability Test Results, 10-15-19													
Detention System #2													
TEST HOLE	DEPTH INCHES	TUBE NUMBER	SAMPLE LENGTH FEET	TIME MINUTES	H.1-H.2 FEET	H.1 FEET	H.2 FEET	H.1+H.2 FEET	K		K		
									FT/DAY	FT/HR	FT/HR	IN./HR	
1	72"	27	0.1300	1.00	0.10	0.96	0.86	1.82	20.57	0.86			10.3
1	74"	9	0.1200	1.00	0.10	0.96	0.86	1.82	18.99	0.79			9.5
2	65"	19	0.1100	5.00	0.01	0.95	0.94	1.89	0.34	0.01			0.2
2	72"	36	0.0900	2.00	0.02	0.97	0.95	1.92	1.35	0.06			0.7
3	60"	60	0.1200	2.00	0.04	0.96	0.92	1.88	3.68	0.15			1.8
3	62"	42	0.1200	5.00	0.01	0.95	0.94	1.89	0.37	0.02			0.2
3	70"	63	0.1200	2.00	0.01	0.95	0.94	1.89	0.91	0.04			0.5
3	73"	47	0.1200	2.00	0.04	0.95	0.91	1.86	3.72	0.15			1.9
4	80"	76	0.1500	1.00	0.04	0.96	0.92	1.88	9.19	0.38			4.6
5	41"	62	0.2000	1.00	0.33	0.95	0.62	1.57	121.07	5.04			60.5
5	46"	79	0.2000	1.00	0.04	0.95	0.91	1.86	12.39	0.52			6.2
										Average K			8.8
										Design K			4.4



Routing Diagram for PRE-POST-ANALYSIS

Prepared by {enter your company name here}, Printed 1/6/2020
HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 2

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: PRE-DEV DA #1 Runoff Area=3.220 ac 23.17% Impervious Runoff Depth=1.07"
Flow Length=243' Tc=20.3 min CN=70.7 Runoff=2.51 cfs 0.288 af

Subcatchment 2S: POST-DEV DA #1 INTO Runoff Area=2.000 ac 14.30% Impervious Runoff Depth=0.87"
Flow Length=243' Tc=20.3 min CN=66.9 Runoff=1.19 cfs 0.145 af

Subcatchment 3S: POST-DEV DA #1 WEST Runoff Area=0.380 ac 94.74% Impervious Runoff Depth=3.10"
Tc=5.0 min CN=96.1 Runoff=1.32 cfs 0.098 af

Subcatchment 4S: POST-DEV DA #1 EAST Runoff Area=0.720 ac 77.78% Impervious Runoff Depth=2.47"
Tc=5.0 min CN=89.8 Runoff=2.13 cfs 0.148 af

Pond 1P: EX. WETLAND LOW AREA Peak Elev=155.77' Storage=1,712 cf Inflow=2.51 cfs 0.288 af
Outflow=1.83 cfs 0.288 af

Pond 2P: EX. WETLAND LOW AREA Peak Elev=155.55' Storage=801 cf Inflow=1.19 cfs 0.145 af
Outflow=0.88 cfs 0.145 af

Pond 3P: DETENTION SYSTEM WEST Peak Elev=161.99' Storage=0.016 af Inflow=1.52 cfs 0.029 af
Outflow=0.18 cfs 0.029 af

Pond 4P: DETENTION SYSTEM EAST Peak Elev=155.80' Storage=0.046 af Inflow=2.13 cfs 0.148 af
Discarded=0.13 cfs 0.108 af Primary=0.46 cfs 0.040 af Outflow=0.60 cfs 0.148 af

Pond 5P: WQV WEST Peak Elev=165.75' Storage=0.021 af Inflow=1.32 cfs 0.098 af
Discarded=0.06 cfs 0.069 af Primary=1.52 cfs 0.029 af Outflow=1.57 cfs 0.098 af

Link 1L: POST-DEV DA #1 OUTFLOW Inflow=1.50 cfs 0.214 af
Primary=1.50 cfs 0.214 af

Total Runoff Area = 6.320 ac Runoff Volume = 0.678 af Average Runoff Depth = 1.29"
69.11% Pervious = 4.368 ac 30.89% Impervious = 1.952 ac

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 3

Summary for Subcatchment 1S: PRE-DEV DA #1

Runoff = 2.51 cfs @ 12.30 hrs, Volume= 0.288 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 year Rainfall=3.54"

Area (ac)	CN	Description
0.320	55.0	Woods, Good, HSG B
0.200	77.0	Woods, Good, HSG D
0.730	61.0	>75% Grass cover, Good, HSG B
0.340	98.0	Paved parking, HSG B
0.120	98.0	Roofs, HSG B
0.080	96.0	Gravel surface, HSG B
1.430	68.0	1 acre lots, 20% imp, HSG B
3.220	70.7	Weighted Average
2.474		76.83% Pervious Area
0.746		23.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0260	0.09		Sheet Flow, Sheet Flow
					Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	143	0.0200	2.28		Shallow Concentrated Flow, Shallow
					Unpaved Kv= 16.1 fps
20.3	243	Total			

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

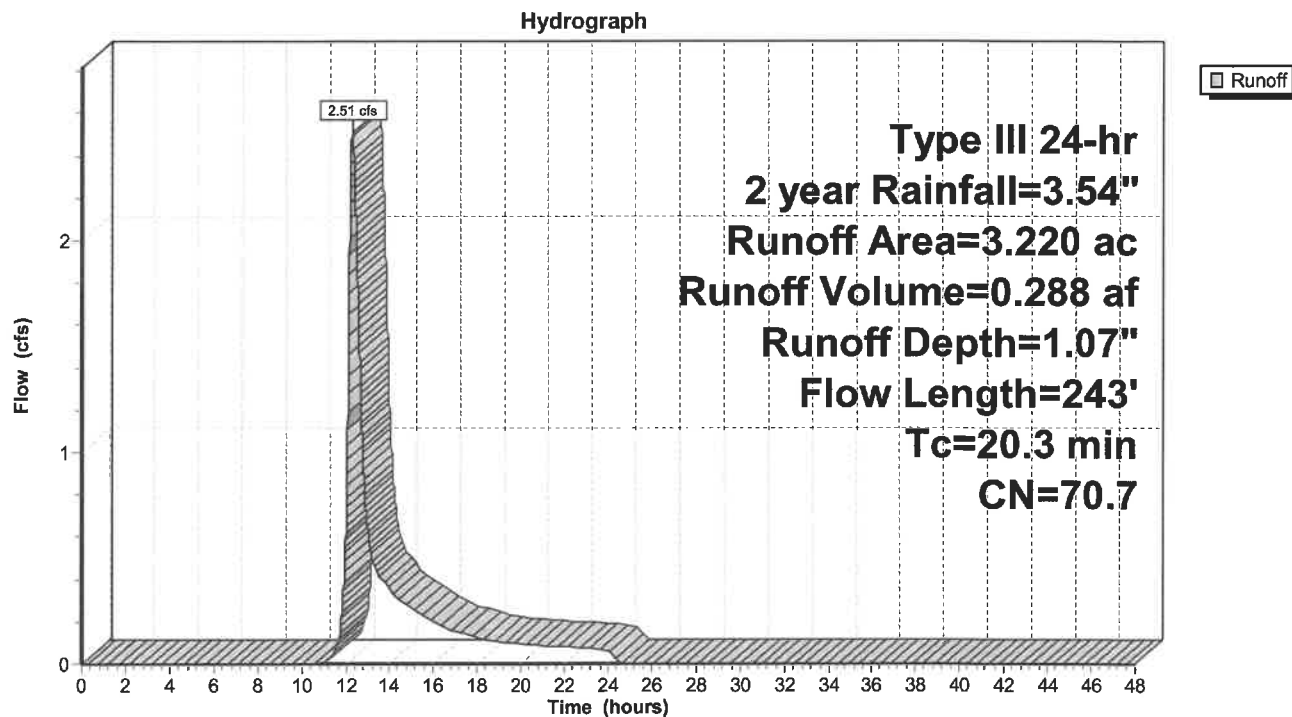
PRE & POST DEVELOPMENT DA #1

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 4

Subcatchment 1S: PRE-DEV DA #1



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 5

Summary for Subcatchment 2S: POST-DEV DA #1 INTO EX. WETLAND LOW AREA

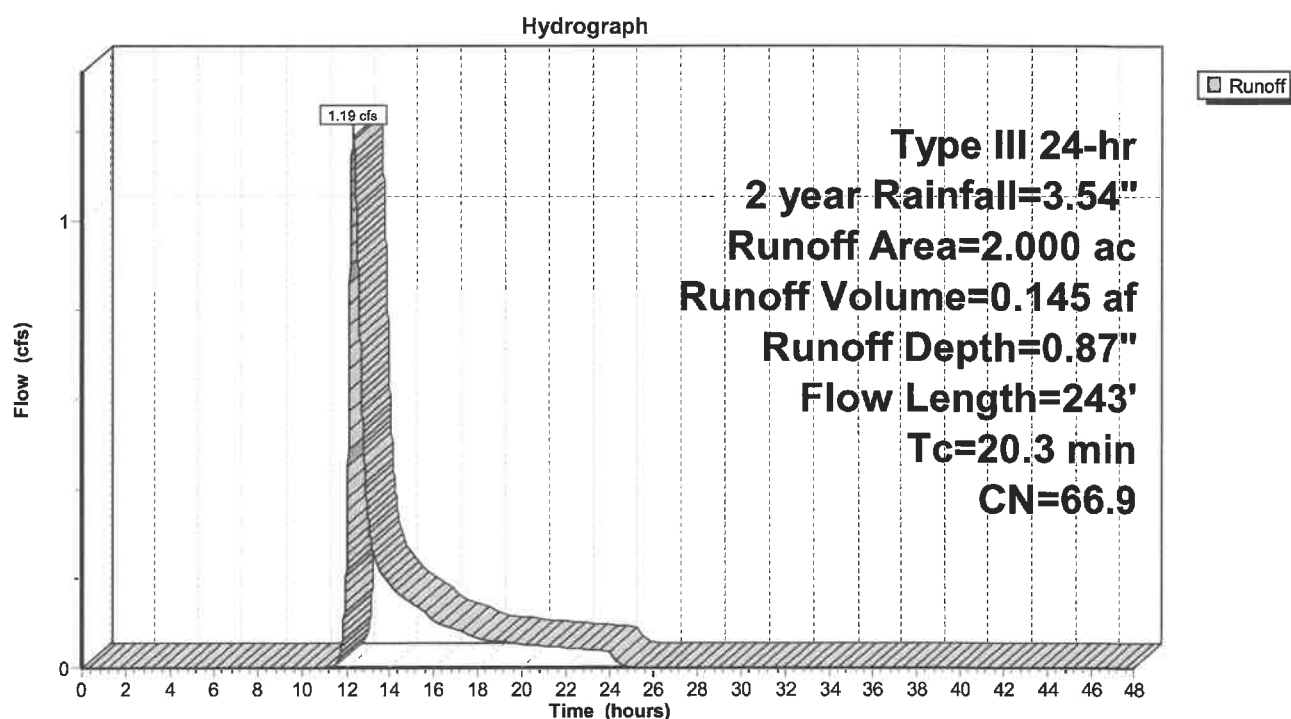
Runoff = 1.19 cfs @ 12.32 hrs, Volume= 0.145 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 year Rainfall=3.54"

Area (ac)	CN	Description
0.240	55.0	Woods, Good, HSG B
0.200	77.0	Woods, Good, HSG D
1.430	68.0	1 acre lots, 20% imp, HSG B
0.130	61.0	>75% Grass cover, Good, HSG B
2.000	66.9	Weighted Average
1.714		85.70% Pervious Area
0.286		14.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0260	0.09		Sheet Flow, Sheet Flow
					Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	143	0.0200	2.28		Shallow Concentrated Flow, Shallow
					Unpaved Kv= 16.1 fps
20.3	243	Total			

Subcatchment 2S: POST-DEV DA #1 INTO EX. WETLAND LOW AREA



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 6

Summary for Subcatchment 3S: POST-DEV DA #1 WEST INTO PROP. DET. SYSTEM

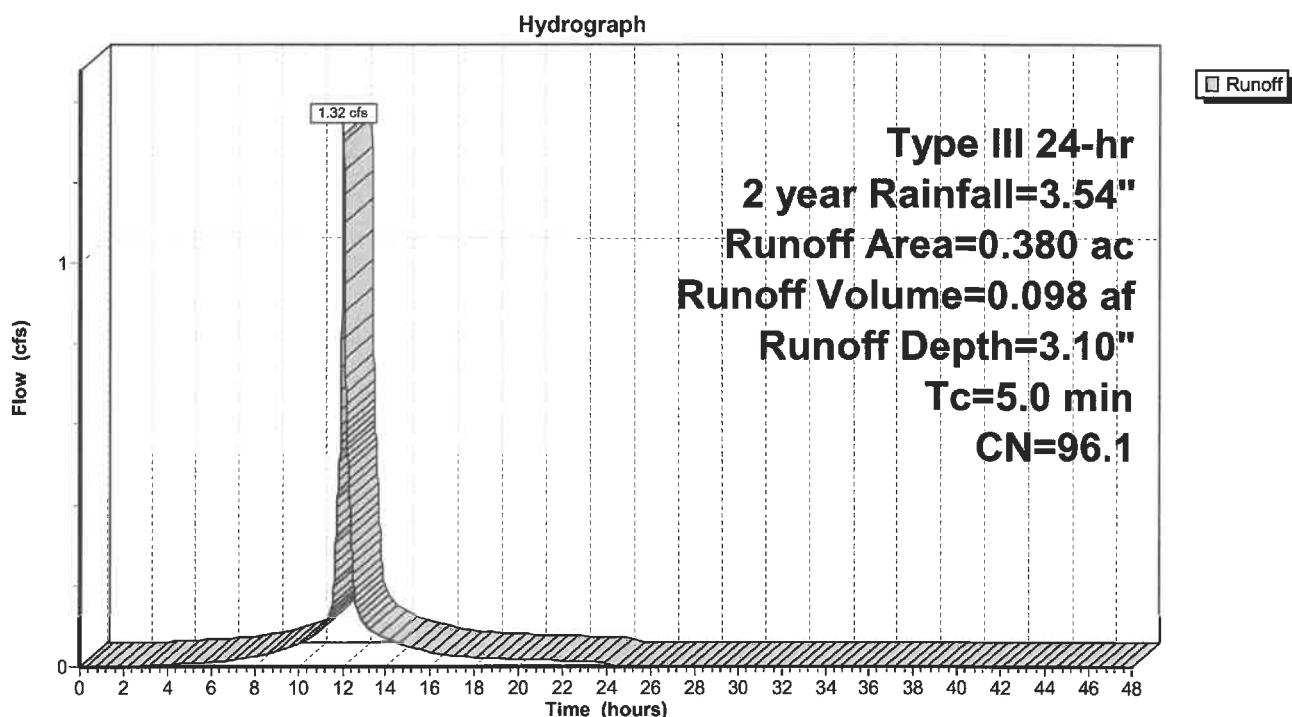
Runoff = 1.32 cfs @ 12.07 hrs, Volume= 0.098 af, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 year Rainfall=3.54"

Area (ac)	CN	Description
0.120	98.0	Roofs, HSG B
0.240	98.0	Paved parking, HSG B
0.020	61.0	>75% Grass cover, Good, HSG B
0.380	96.1	Weighted Average
0.020		5.26% Pervious Area
0.360		94.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 3S: POST-DEV DA #1 WEST INTO PROP. DET. SYSTEM



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 7

Summary for Subcatchment 4S: POST-DEV DA #1 EAST INTO PROP. DET. SYSTEM

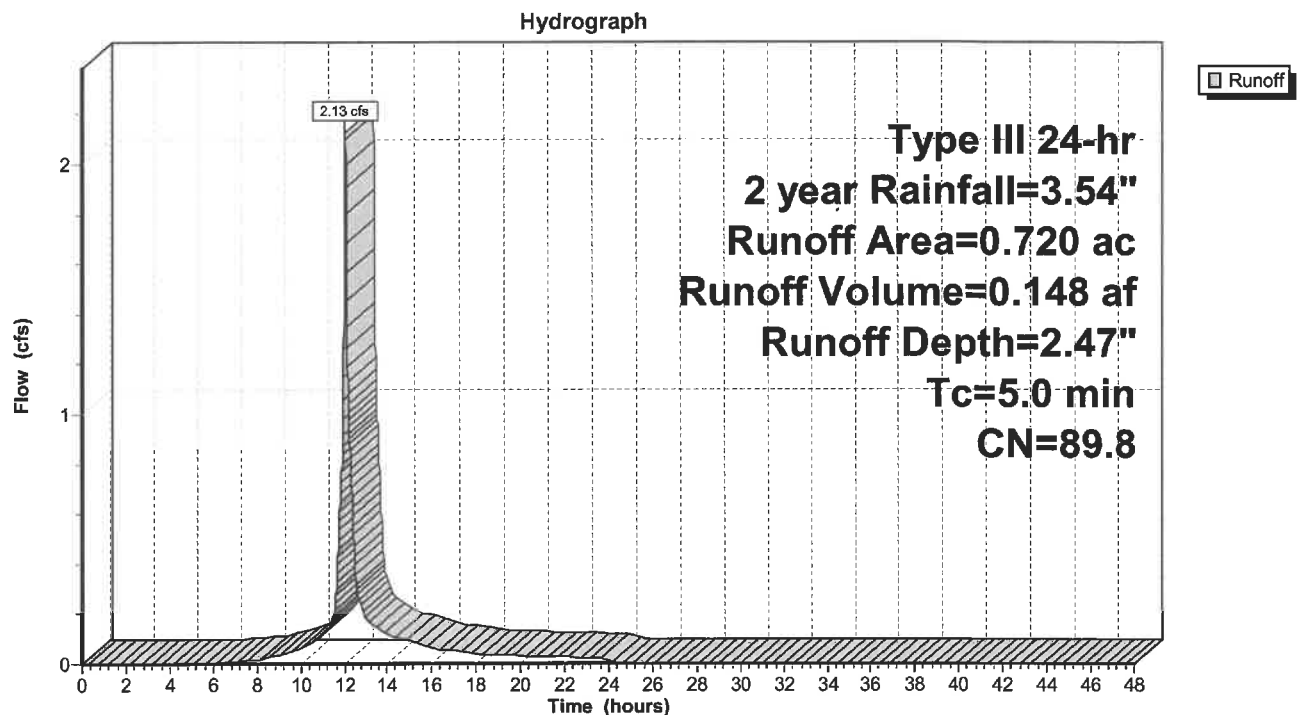
Runoff = 2.13 cfs @ 12.07 hrs, Volume= 0.148 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 year Rainfall=3.54"

Area (ac)	CN	Description
0.170	98.0	Roofs, HSG B
0.390	98.0	Paved parking, HSG B
0.160	61.0	>75% Grass cover, Good, HSG B
0.720	89.8	Weighted Average
0.160		22.22% Pervious Area
0.560		77.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 4S: POST-DEV DA #1 EAST INTO PROP. DET. SYSTEM



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 8

Summary for Pond 1P: EX. WETLAND LOW AREA

Inflow Area = 3.220 ac, 23.17% Impervious, Inflow Depth = 1.07" for 2 year event
Inflow = 2.51 cfs @ 12.30 hrs, Volume= 0.288 af
Outflow = 1.83 cfs @ 12.54 hrs, Volume= 0.288 af, Atten= 27%, Lag= 14.0 min
Primary = 1.83 cfs @ 12.54 hrs, Volume= 0.288 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 155.77' @ 12.54 hrs Surf.Area= 4,952 sf Storage= 1,712 cf

Plug-Flow detention time= 16.0 min calculated for 0.288 af (100% of inflow)

Center-of-Mass det. time= 16.0 min (895.5 - 879.5)

Volume	Invert	Avail.Storage	Storage Description
#1	155.11'	33,667 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
155.11	223	0	0
156.00	6,583	3,029	3,029
158.00	24,055	30,638	33,667

Device	Routing	Invert	Outlet Devices
#1	Primary	155.11'	15.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=1.83 cfs @ 12.54 hrs HW=155.77' (Free Discharge)

↑ **1=Orifice/Grate** (Orifice Controls 1.83 cfs @ 2.77 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

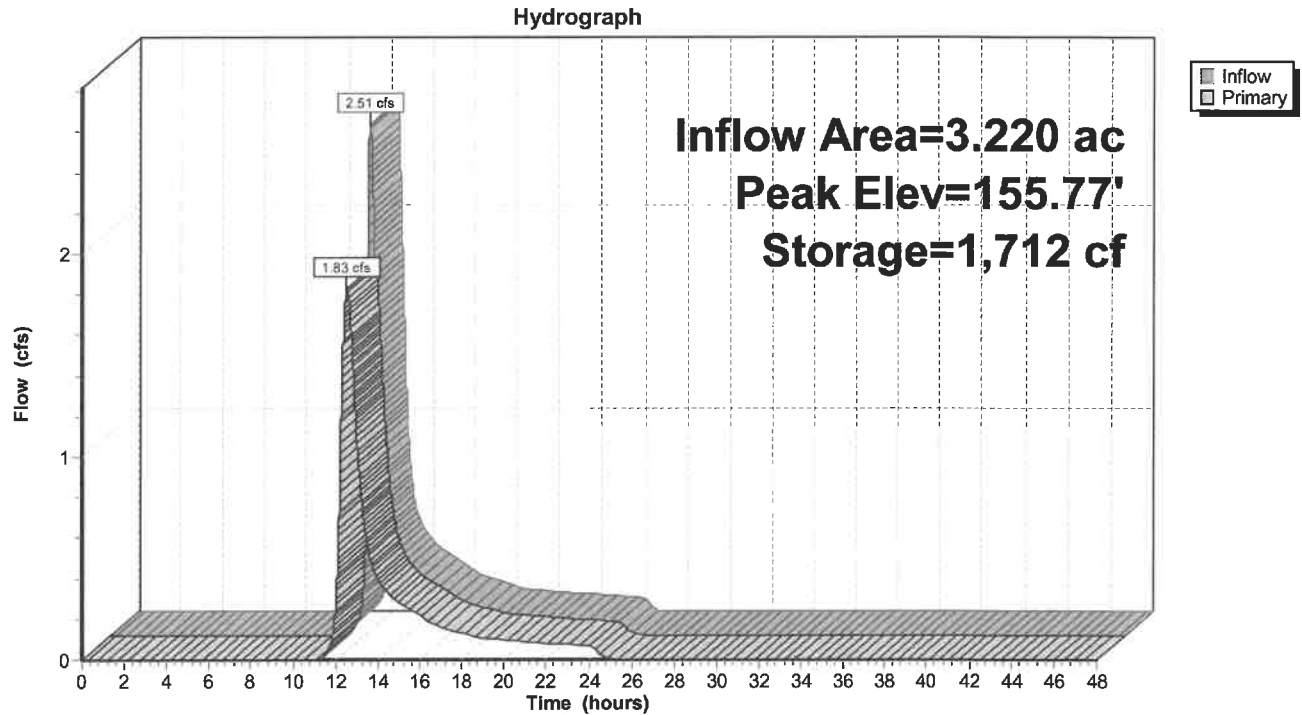
HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 9

Pond 1P: EX. WETLAND LOW AREA



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 10

Summary for Pond 2P: EX. WETLAND LOW AREA

Inflow Area = 2.000 ac, 14.30% Impervious, Inflow Depth = 0.87" for 2 year event
Inflow = 1.19 cfs @ 12.32 hrs, Volume= 0.145 af
Outflow = 0.88 cfs @ 12.55 hrs, Volume= 0.145 af, Atten= 26%, Lag= 13.8 min
Primary = 0.88 cfs @ 12.55 hrs, Volume= 0.145 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 155.55' @ 12.55 hrs Surf.Area= 3,390 sf Storage= 801 cf

Plug-Flow detention time= 16.8 min calculated for 0.145 af (100% of inflow)

Center-of-Mass det. time= 16.7 min (909.0 - 892.3)

Volume	Invert	Avail.Storage	Storage Description
#1	155.11'	33,667 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
155.11	223	0	0
156.00	6,583	3,029	3,029
158.00	24,055	30,638	33,667

Device	Routing	Invert	Outlet Devices
#1	Primary	155.11'	15.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=0.88 cfs @ 12.55 hrs HW=155.55' TW=0.00' (Dynamic Tailwater)

↑ **1=Orifice/Grate** (Orifice Controls 0.88 cfs @ 2.27 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

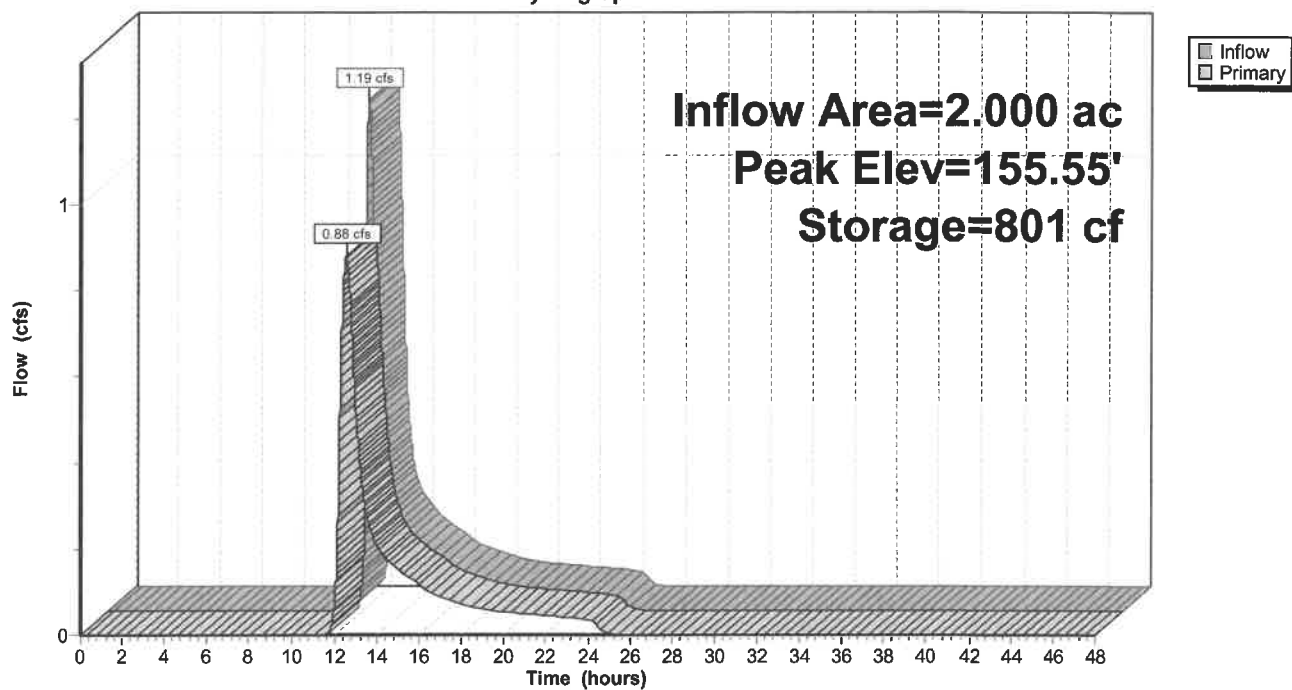
Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 11

Pond 2P: EX. WETLAND LOW AREA

Hydrograph



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 12

Summary for Pond 3P: DETENTION SYSTEM WEST

Inflow Area = 0.380 ac, 94.74% Impervious, Inflow Depth = 0.91" for 2 year event
Inflow = 1.52 cfs @ 12.06 hrs, Volume= 0.029 af
Outflow = 0.18 cfs @ 12.55 hrs, Volume= 0.029 af, Atten= 88%, Lag= 29.2 min
Primary = 0.18 cfs @ 12.55 hrs, Volume= 0.029 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 161.99' @ 12.55 hrs Surf.Area= 0.044 ac Storage= 0.016 af

Plug-Flow detention time= 58.4 min calculated for 0.029 af (100% of inflow)
Center-of-Mass det. time= 58.2 min (804.2 - 746.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	161.30'	0.035 af	14.75'W x 129.00'L x 3.21'H Field A 0.140 af Overall - 0.053 af Embedded = 0.087 af x 40.0% Voids
#2A	161.80'	0.053 af	Cultec R-280HD x 54 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 3 rows
		0.088 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	161.30'	3.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=0.18 cfs @ 12.55 hrs HW=161.99' TW=0.00' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Orifice Controls 0.18 cfs @ 3.62 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

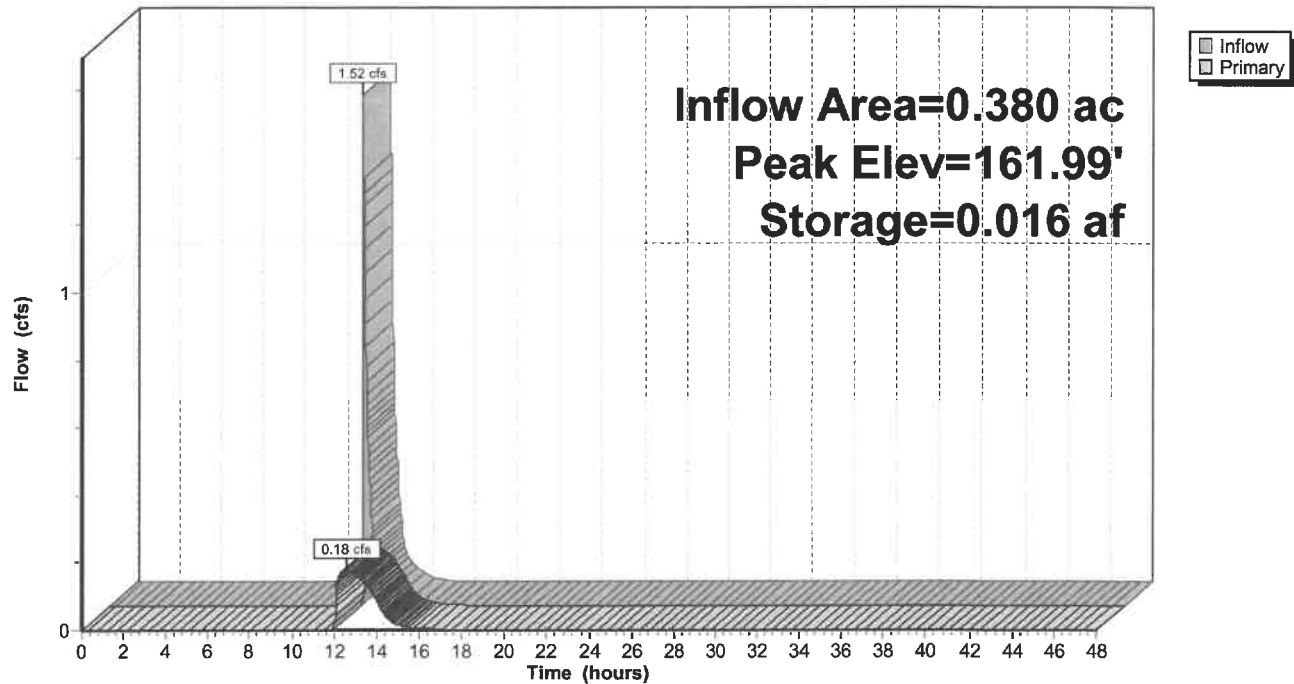
Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 13

Pond 3P: DETENTION SYSTEM WEST

Hydrograph



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 14

Summary for Pond 4P: DETENTION SYSTEM EAST

Inflow Area = 0.720 ac, 77.78% Impervious, Inflow Depth = 2.47" for 2 year event
Inflow = 2.13 cfs @ 12.07 hrs, Volume= 0.148 af
Outflow = 0.60 cfs @ 12.41 hrs, Volume= 0.148 af, Atten= 72%, Lag= 20.4 min
Discarded = 0.13 cfs @ 11.43 hrs, Volume= 0.108 af
Primary = 0.46 cfs @ 12.41 hrs, Volume= 0.040 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 155.80' @ 12.41 hrs Surf.Area= 0.088 ac Storage= 0.046 af

Plug-Flow detention time= 57.3 min calculated for 0.148 af (100% of inflow)
Center-of-Mass det. time= 57.3 min (860.3 - 803.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	154.90'	0.053 af	25.00'W x 152.50'L x 2.04'H Field A 0.179 af Overall - 0.045 af Embedded = 0.134 af x 40.0% Voids
#2A	155.40'	0.045 af	Cultec C-100HD x 140 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 7 rows
		0.098 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	154.90'	1.500 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	155.40'	8.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.13 cfs @ 11.43 hrs HW=154.92' (Free Discharge)
↑ **1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.46 cfs @ 12.41 hrs HW=155.80' TW=0.00' (Dynamic Tailwater)
↑ **2=Orifice/Grate** (Orifice Controls 0.46 cfs @ 2.14 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

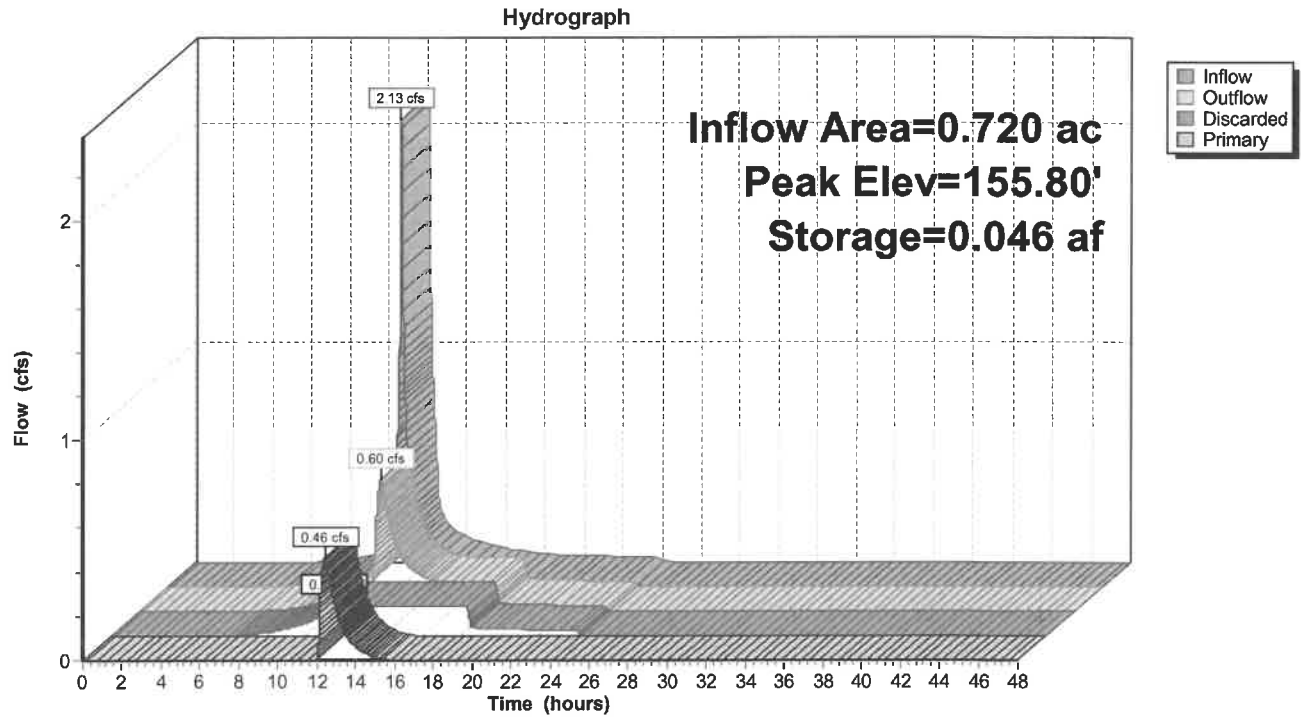
PRE & POST DEVELOPMENT DA #1

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 15

Pond 4P: DETENTION SYSTEM EAST



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 16

Summary for Pond 5P: WQV WEST

Inflow Area = 0.380 ac, 94.74% Impervious, Inflow Depth = 3.10" for 2 year event
Inflow = 1.32 cfs @ 12.07 hrs, Volume= 0.098 af
Outflow = 1.57 cfs @ 12.06 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.06 cfs @ 12.04 hrs, Volume= 0.069 af
Primary = 1.52 cfs @ 12.06 hrs, Volume= 0.029 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 165.75' @ 12.06 hrs Surf.Area= 0.011 ac Storage= 0.021 af

Plug-Flow detention time= 90.9 min calculated for 0.098 af (100% of inflow)
Center-of-Mass det. time= 90.9 min (860.5 - 769.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	161.30'	0.010 af	5.92'W x 80.00'L x 3.21'H Field A 0.035 af Overall - 0.011 af Embedded = 0.024 af x 40.0% Voids
#2A	161.80'	0.011 af	Cultec R-280HD x 11 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
#3	164.20'	0.001 af	3.00'D x 4.80'H Vertical Cone/Cylinder
		0.021 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	161.30'	5.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	164.20'	8.0" Round Culvert L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.20' / 164.10' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.06 cfs @ 12.04 hrs HW=164.27' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=1.35 cfs @ 12.06 hrs HW=165.57' TW=161.36' (Dynamic Tailwater)

↑ **2=Culvert** (Inlet Controls 1.35 cfs @ 3.88 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

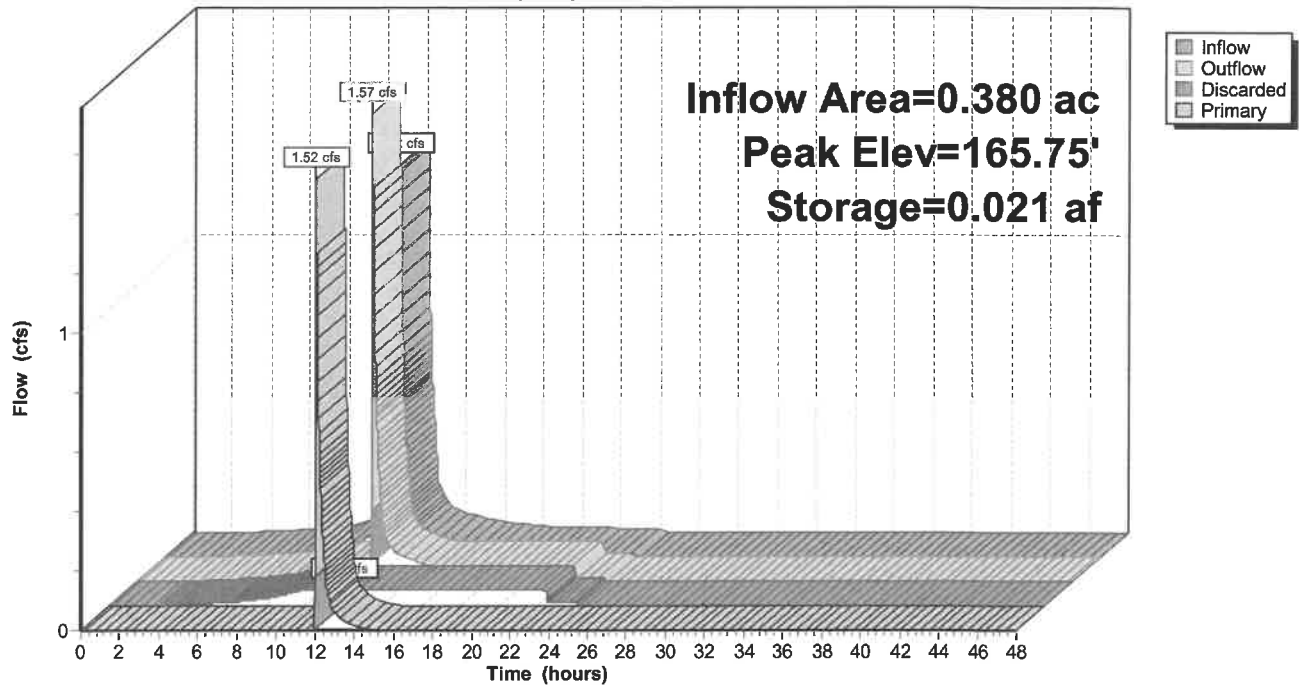
Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 17

Pond 5P: WQV WEST

Hydrograph



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

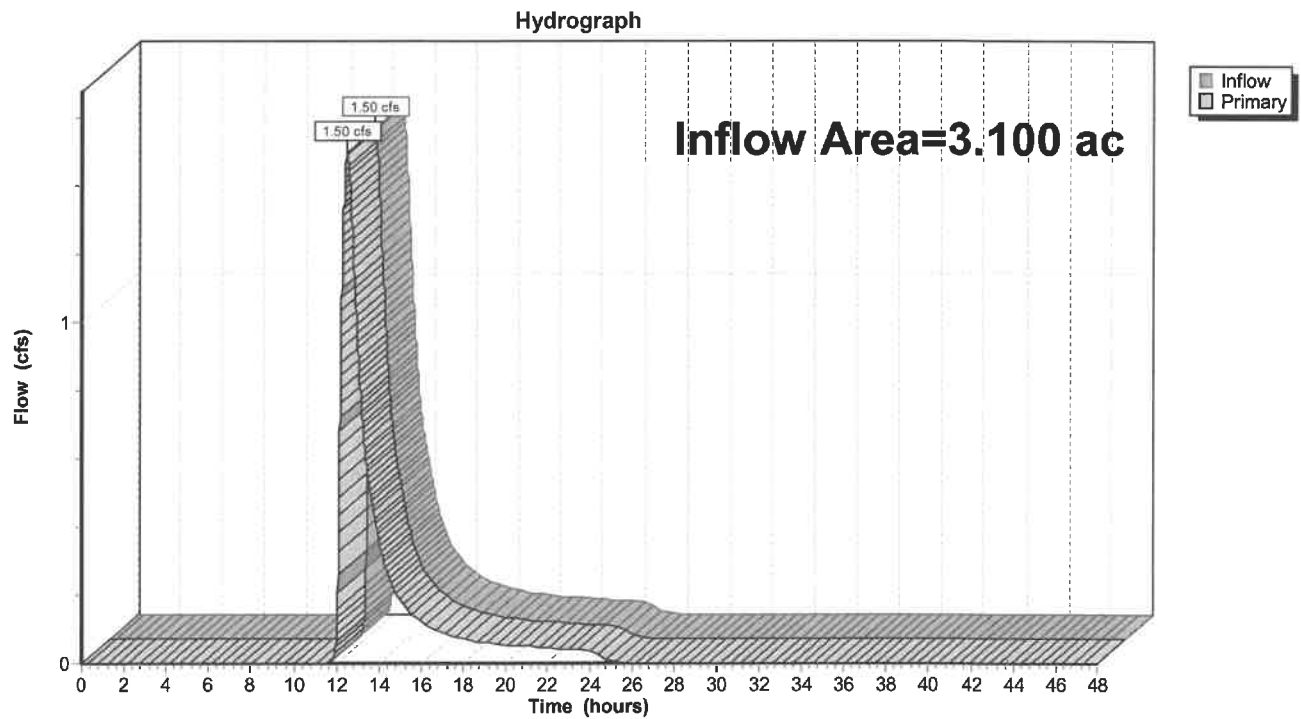
Page 18

Summary for Link 1L: POST-DEV DA #1 OUTFLOW

Inflow Area = 3.100 ac, 38.90% Impervious, Inflow Depth = 0.83" for 2 year event
Inflow = 1.50 cfs @ 12.50 hrs, Volume= 0.214 af
Primary = 1.50 cfs @ 12.50 hrs, Volume= 0.214 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 1L: POST-DEV DA #1 OUTFLOW



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 19

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: PRE-DEV DA #1 Runoff Area=3.220 ac 23.17% Impervious Runoff Depth=2.41"
Flow Length=243' Tc=20.3 min CN=70.7 Runoff=6.01 cfs 0.645 af

Subcatchment 2S: POST-DEV DA #1 INTO Runoff Area=2.000 ac 14.30% Impervious Runoff Depth=2.09"
Flow Length=243' Tc=20.3 min CN=66.9 Runoff=3.18 cfs 0.348 af

Subcatchment 3S: POST-DEV DA #1 WEST Runoff Area=0.380 ac 94.74% Impervious Runoff Depth=4.95"
Tc=5.0 min CN=96.1 Runoff=2.06 cfs 0.157 af

Subcatchment 4S: POST-DEV DA #1 EAST Runoff Area=0.720 ac 77.78% Impervious Runoff Depth=4.25"
Tc=5.0 min CN=89.8 Runoff=3.57 cfs 0.255 af

Pond 1P: EX. WETLAND LOW AREA Peak Elev=156.19' Storage=4,467 cf Inflow=6.01 cfs 0.645 af
Outflow=4.01 cfs 0.645 af

Pond 2P: EX. WETLAND LOW AREA Peak Elev=155.86' Storage=2,193 cf Inflow=3.18 cfs 0.348 af
Outflow=2.28 cfs 0.348 af

Pond 3P: DETENTION SYSTEM WEST Peak Elev=162.74' Storage=0.043 af Inflow=2.00 cfs 0.072 af
Outflow=0.27 cfs 0.072 af

Pond 4P: DETENTION SYSTEM EAST Peak Elev=156.24' Storage=0.073 af Inflow=3.57 cfs 0.255 af
Discarded=0.13 cfs 0.143 af Primary=1.20 cfs 0.112 af Outflow=1.33 cfs 0.255 af

Pond 5P: WQV WEST Peak Elev=166.80' Storage=0.021 af Inflow=2.06 cfs 0.157 af
Discarded=0.06 cfs 0.085 af Primary=2.00 cfs 0.072 af Outflow=2.05 cfs 0.157 af

Link 1L: POST-DEV DA #1 OUTFLOW Inflow=3.65 cfs 0.532 af
Primary=3.65 cfs 0.532 af

Total Runoff Area = 6.320 ac Runoff Volume = 1.405 af Average Runoff Depth = 2.67"
69.11% Pervious = 4.368 ac 30.89% Impervious = 1.952 ac

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 20

Summary for Subcatchment 1S: PRE-DEV DA #1

Runoff = 6.01 cfs @ 12.29 hrs, Volume= 0.645 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 year Rainfall=5.41"

Area (ac)	CN	Description
0.320	55.0	Woods, Good, HSG B
0.200	77.0	Woods, Good, HSG D
0.730	61.0	>75% Grass cover, Good, HSG B
0.340	98.0	Paved parking, HSG B
0.120	98.0	Roofs, HSG B
0.080	96.0	Gravel surface, HSG B
1.430	68.0	1 acre lots, 20% imp, HSG B
3.220	70.7	Weighted Average
2.474		76.83% Pervious Area
0.746		23.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0260	0.09		Sheet Flow, Sheet Flow
					Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	143	0.0200	2.28		Shallow Concentrated Flow, Shallow
					Unpaved Kv= 16.1 fps
20.3	243	Total			

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

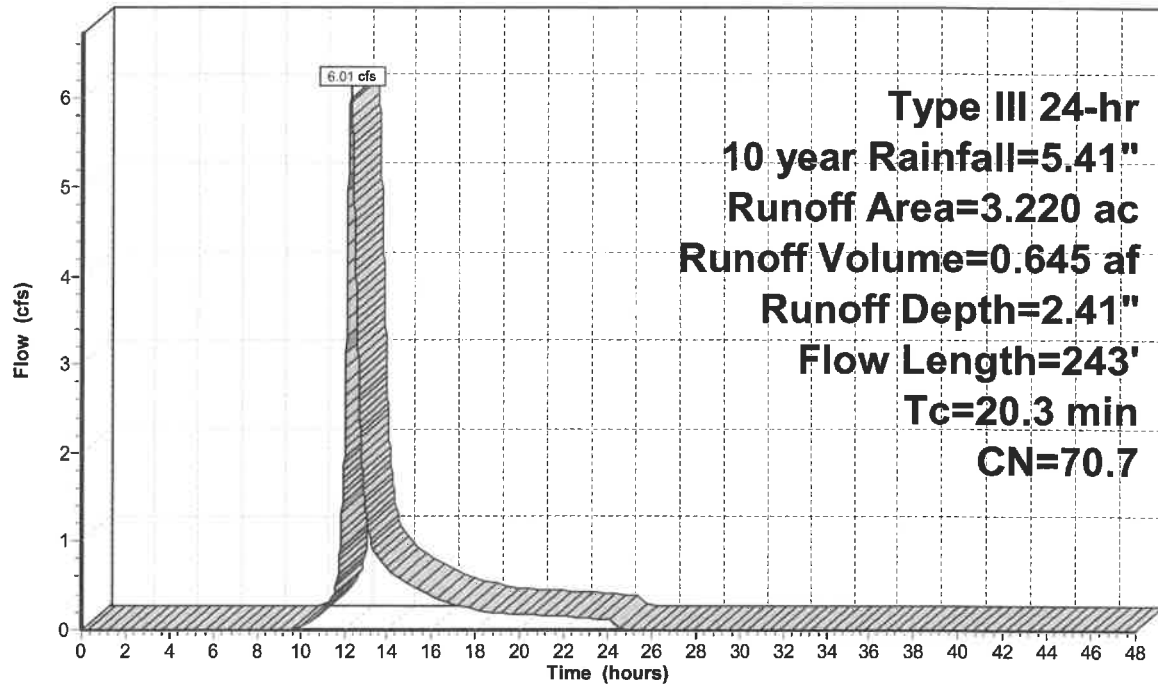
PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 21

Subcatchment 1S: PRE-DEV DA #1

Hydrograph



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 22

Summary for Subcatchment 2S: POST-DEV DA #1 INTO EX. WETLAND LOW AREA

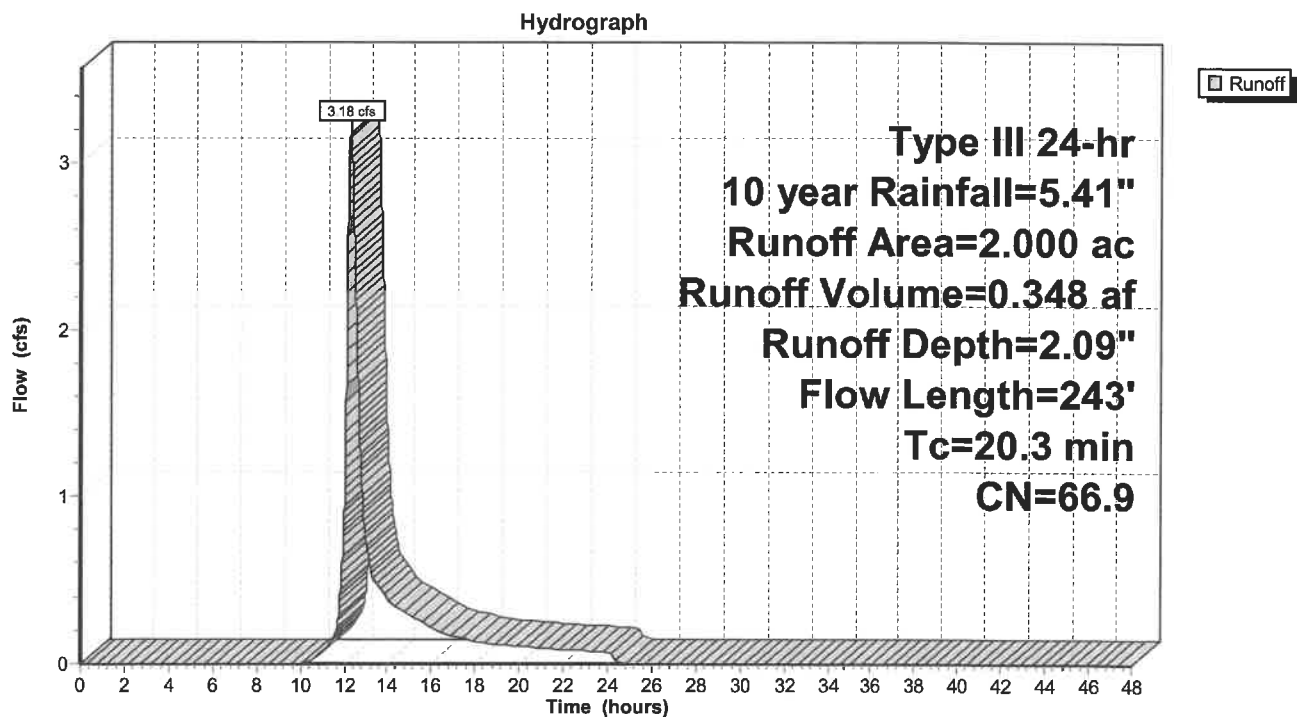
Runoff = 3.18 cfs @ 12.29 hrs, Volume= 0.348 af, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 year Rainfall=5.41"

Area (ac)	CN	Description
0.240	55.0	Woods, Good, HSG B
0.200	77.0	Woods, Good, HSG D
1.430	68.0	1 acre lots, 20% imp, HSG B
0.130	61.0	>75% Grass cover, Good, HSG B
2.000	66.9	Weighted Average
1.714		85.70% Pervious Area
0.286		14.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0260	0.09		Sheet Flow, Sheet Flow Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	143	0.0200	2.28		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
20.3	243	Total			

Subcatchment 2S: POST-DEV DA #1 INTO EX. WETLAND LOW AREA



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 23

Summary for Subcatchment 3S: POST-DEV DA #1 WEST INTO PROP. DET. SYSTEM

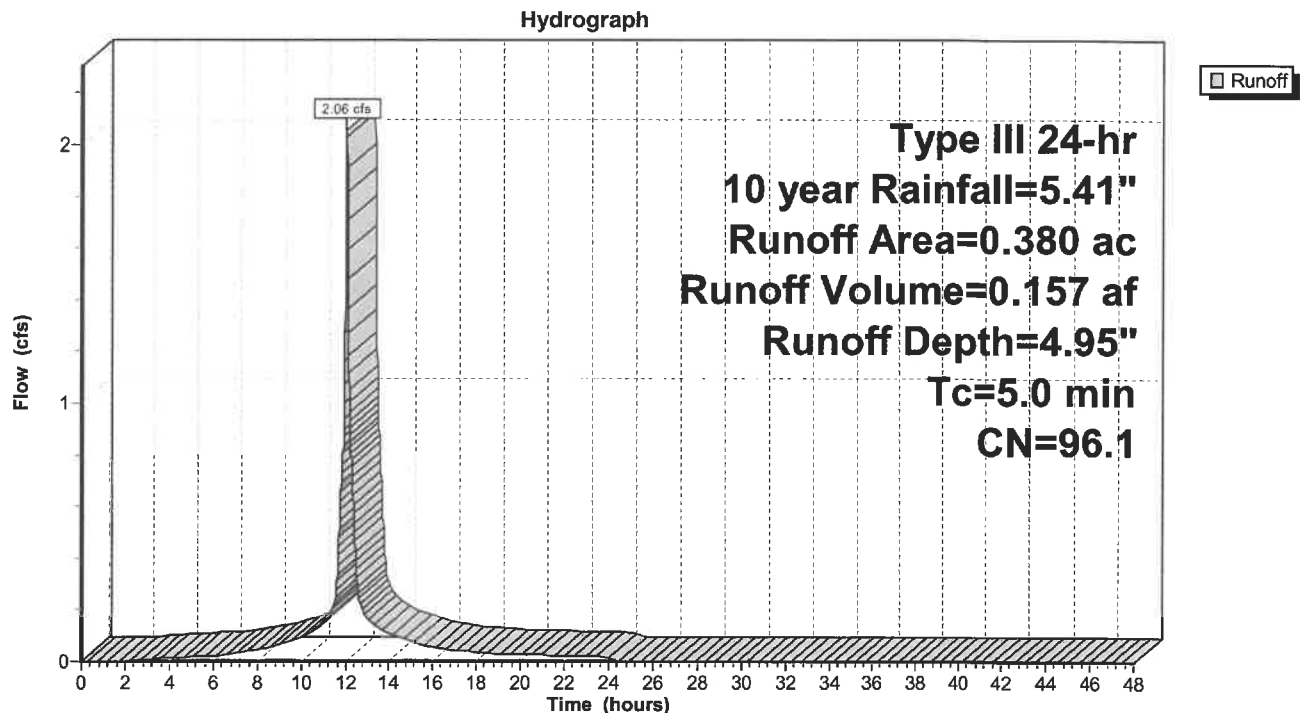
Runoff = 2.06 cfs @ 12.07 hrs, Volume= 0.157 af, Depth= 4.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 year Rainfall=5.41"

Area (ac)	CN	Description
0.120	98.0	Roofs, HSG B
0.240	98.0	Paved parking, HSG B
0.020	61.0	>75% Grass cover, Good, HSG B
0.380	96.1	Weighted Average
0.020		5.26% Pervious Area
0.360		94.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 3S: POST-DEV DA #1 WEST INTO PROP. DET. SYSTEM



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 24

Summary for Subcatchment 4S: POST-DEV DA #1 EAST INTO PROP. DET. SYSTEM

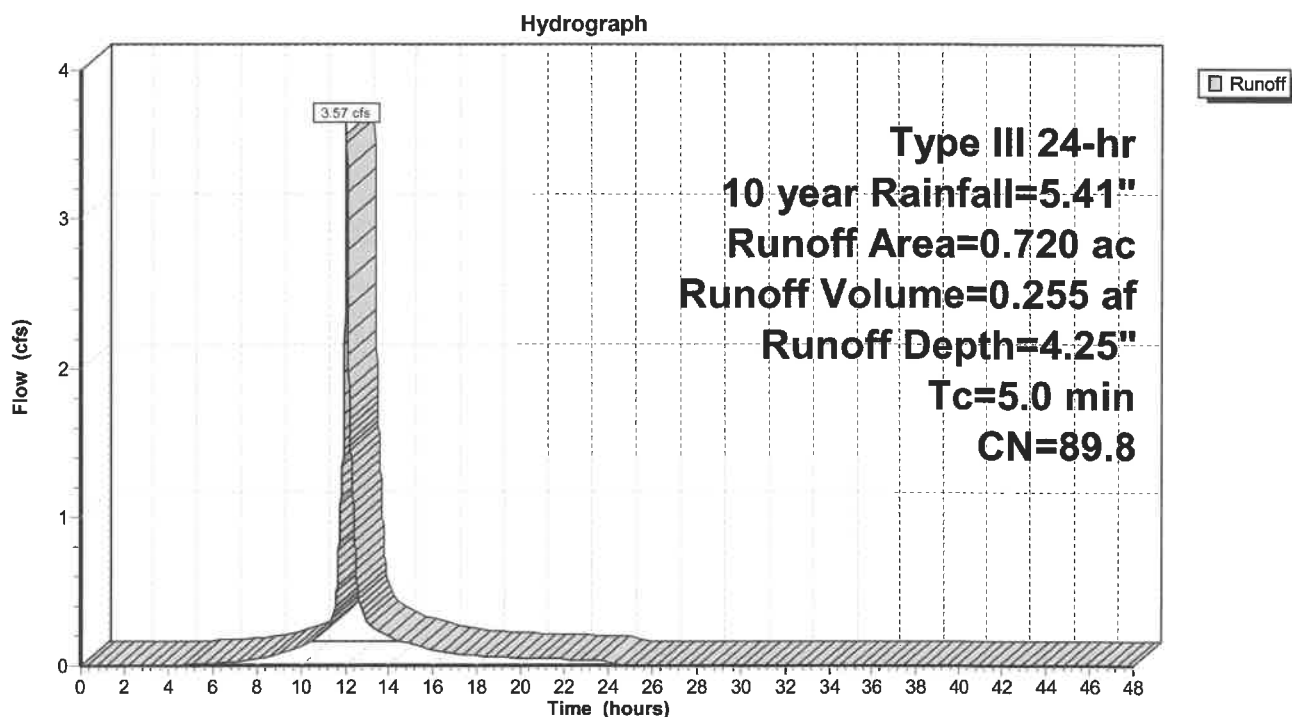
Runoff = 3.57 cfs @ 12.07 hrs, Volume= 0.255 af, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 year Rainfall=5.41"

Area (ac)	CN	Description
0.170	98.0	Roofs, HSG B
0.390	98.0	Paved parking, HSG B
0.160	61.0	>75% Grass cover, Good, HSG B
0.720	89.8	Weighted Average
0.160		22.22% Pervious Area
0.560		77.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 4S: POST-DEV DA #1 EAST INTO PROP. DET. SYSTEM



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 25

Summary for Pond 1P: EX. WETLAND LOW AREA

Inflow Area = 3.220 ac, 23.17% Impervious, Inflow Depth = 2.41" for 10 year event
Inflow = 6.01 cfs @ 12.29 hrs, Volume= 0.645 af
Outflow = 4.01 cfs @ 12.54 hrs, Volume= 0.645 af, Atten= 33%, Lag= 14.8 min
Primary = 4.01 cfs @ 12.54 hrs, Volume= 0.645 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 156.19' @ 12.54 hrs Surf.Area= 8,275 sf Storage= 4,467 cf

Plug-Flow detention time= 16.6 min calculated for 0.645 af (100% of inflow)
Center-of-Mass det. time= 16.4 min (871.5 - 855.0)

Volume	Invert	Avail.Storage	Storage Description
#1	155.11'	33,667 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
155.11	223	0	0
156.00	6,583	3,029	3,029
158.00	24,055	30,638	33,667

Device	Routing	Invert	Outlet Devices
#1	Primary	155.11'	15.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=4.01 cfs @ 12.54 hrs HW=156.19' (Free Discharge)

↑1=Orifice/Grate (Orifice Controls 4.01 cfs @ 3.54 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

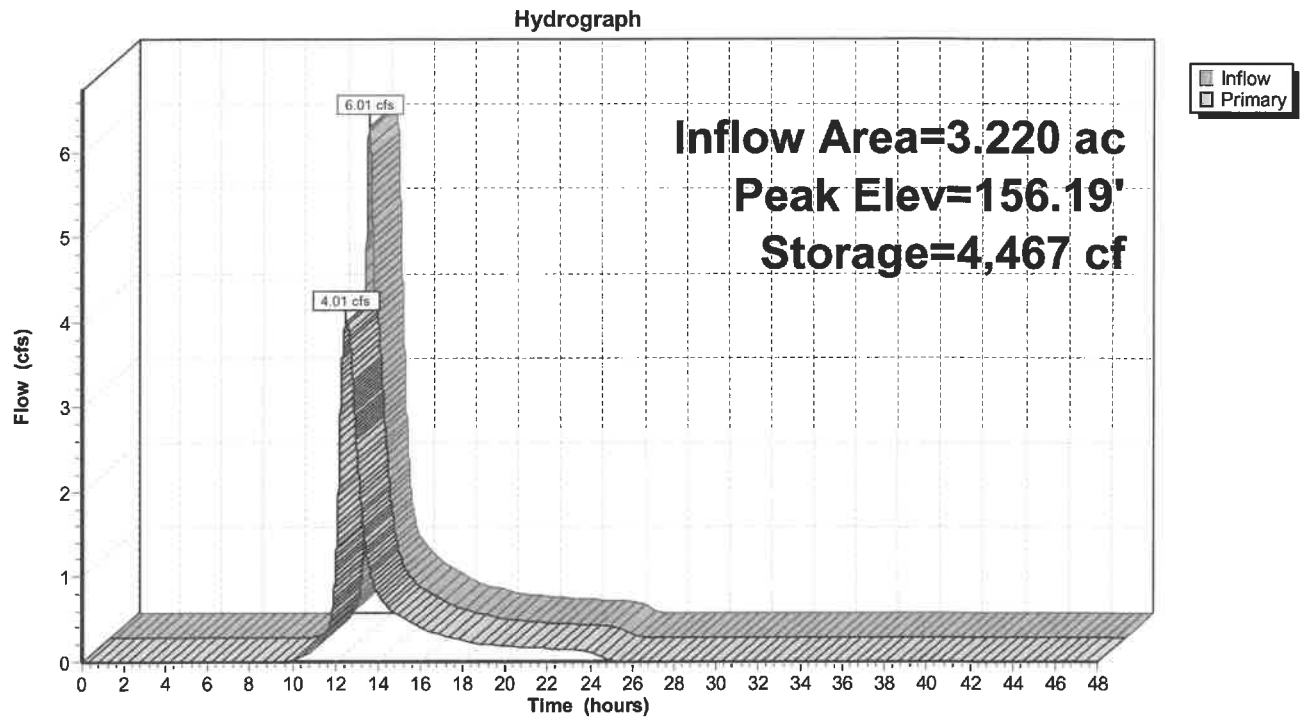
HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 26

Pond 1P: EX. WETLAND LOW AREA



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 27

Summary for Pond 2P: EX. WETLAND LOW AREA

Inflow Area = 2.000 ac, 14.30% Impervious, Inflow Depth = 2.09" for 10 year event
Inflow = 3.18 cfs @ 12.29 hrs, Volume= 0.348 af
Outflow = 2.28 cfs @ 12.52 hrs, Volume= 0.348 af, Atten= 28%, Lag= 13.5 min
Primary = 2.28 cfs @ 12.52 hrs, Volume= 0.348 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 155.86' @ 12.52 hrs Surf.Area= 5,603 sf Storage= 2,193 cf

Plug-Flow detention time= 16.1 min calculated for 0.348 af (100% of inflow)
Center-of-Mass det. time= 16.0 min (880.5 - 864.5)

Volume	Invert	Avail.Storage	Storage Description
#1	155.11'	33,667 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
155.11	223	0	0
156.00	6,583	3,029	3,029
158.00	24,055	30,638	33,667
Device	Routing	Invert	Outlet Devices
#1	Primary	155.11'	15.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=2.28 cfs @ 12.52 hrs HW=155.86' TW=0.00' (Dynamic Tailwater)
↑ **1=Orifice/Grate** (Orifice Controls 2.28 cfs @ 2.95 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

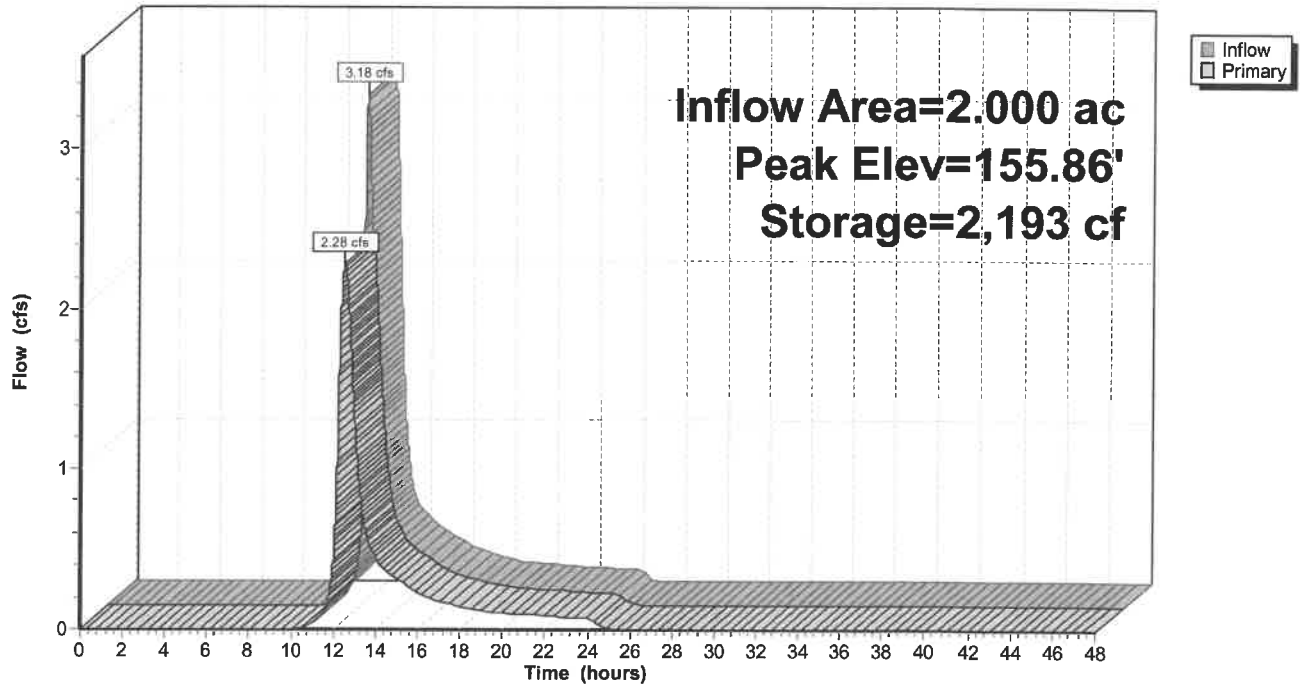
PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 28

Pond 2P: EX. WETLAND LOW AREA

Hydrograph



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 29

Summary for Pond 3P: DETENTION SYSTEM WEST

Inflow Area = 0.380 ac, 94.74% Impervious, Inflow Depth = 2.28" for 10 year event
Inflow = 2.00 cfs @ 12.07 hrs, Volume= 0.072 af
Outflow = 0.27 cfs @ 12.53 hrs, Volume= 0.072 af, Atten= 86%, Lag= 27.5 min
Primary = 0.27 cfs @ 12.53 hrs, Volume= 0.072 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 162.74' @ 12.53 hrs Surf.Area= 0.044 ac Storage= 0.043 af

Plug-Flow detention time= 86.3 min calculated for 0.072 af (100% of inflow)
Center-of-Mass det. time= 86.5 min (833.7 - 747.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	161.30'	0.035 af	14.75'W x 129.00'L x 3.21'H Field A 0.140 af Overall - 0.053 af Embedded = 0.087 af x 40.0% Voids
#2A	161.80'	0.053 af	Cultec R-280HD x 54 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 3 rows
		0.088 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	161.30'	3.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=0.27 cfs @ 12.53 hrs HW=162.74' TW=0.00' (Dynamic Tailwater)
↑ **1=Orifice/Grate** (Orifice Controls 0.27 cfs @ 5.52 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

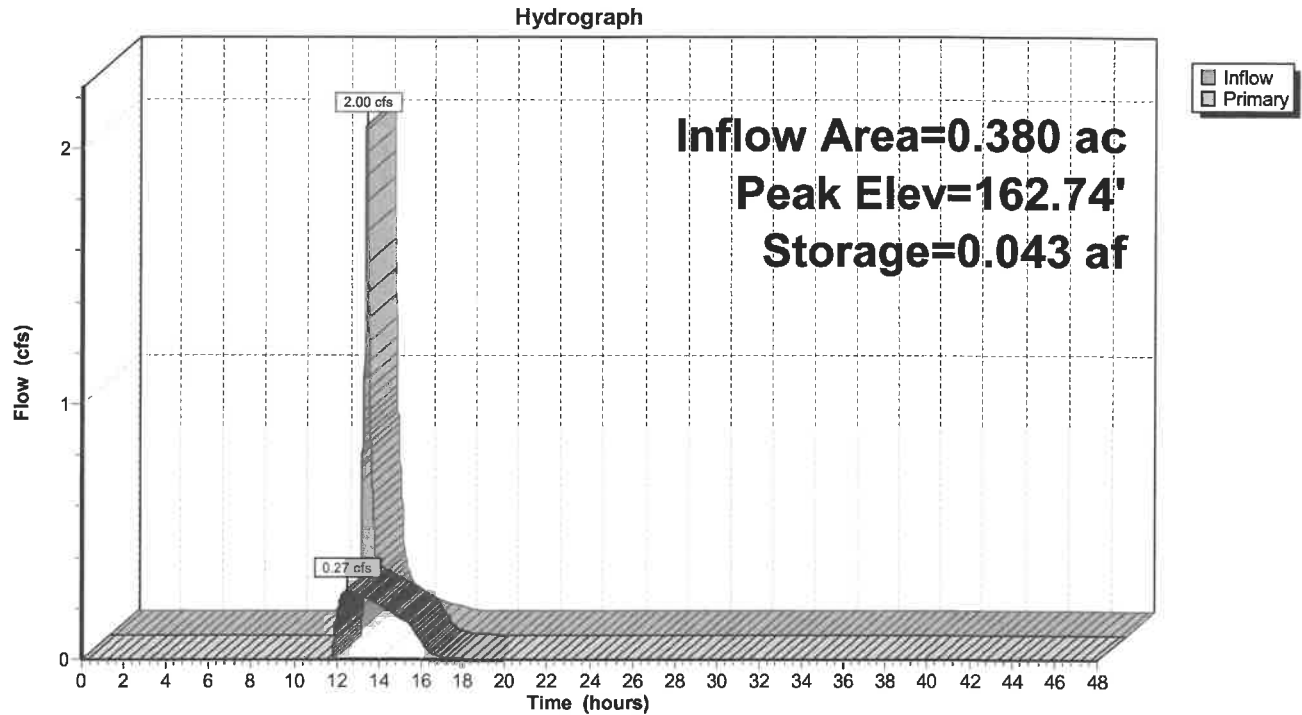
HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 30

Pond 3P: DETENTION SYSTEM WEST



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 31

Summary for Pond 4P: DETENTION SYSTEM EAST

Inflow Area = 0.720 ac, 77.78% Impervious, Inflow Depth = 4.25" for 10 year event
Inflow = 3.57 cfs @ 12.07 hrs, Volume= 0.255 af
Outflow = 1.33 cfs @ 12.30 hrs, Volume= 0.255 af, Atten= 63%, Lag= 13.8 min
Discarded = 0.13 cfs @ 10.49 hrs, Volume= 0.143 af
Primary = 1.20 cfs @ 12.30 hrs, Volume= 0.112 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 156.24' @ 12.30 hrs Surf.Area= 0.088 ac Storage= 0.073 af

Plug-Flow detention time= 52.2 min calculated for 0.255 af (100% of inflow)
Center-of-Mass det. time= 52.2 min (840.1 - 787.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	154.90'	0.053 af	25.00'W x 152.50'L x 2.04'H Field A 0.179 af Overall - 0.045 af Embedded = 0.134 af x 40.0% Voids
#2A	155.40'	0.045 af	Cultec C-100HD x 140 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 7 rows
		0.098 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	154.90'	1.500 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	155.40'	8.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.13 cfs @ 10.49 hrs HW=154.92' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=1.20 cfs @ 12.30 hrs HW=156.24' TW=0.00' (Dynamic Tailwater)

↑**2=Orifice/Grate** (Orifice Controls 1.20 cfs @ 3.44 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

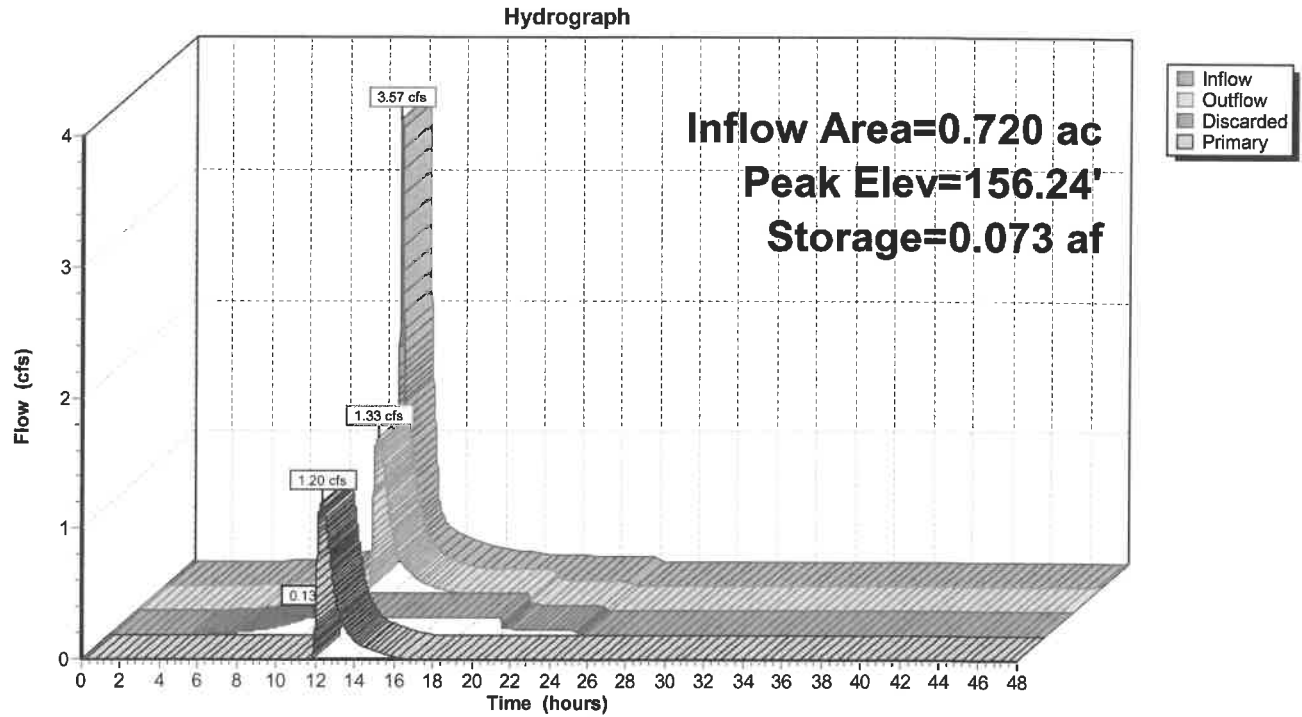
HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 32

Pond 4P: DETENTION SYSTEM EAST



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 33

Summary for Pond 5P: WQV WEST

Inflow Area = 0.380 ac, 94.74% Impervious, Inflow Depth = 4.95" for 10 year event
Inflow = 2.06 cfs @ 12.07 hrs, Volume= 0.157 af
Outflow = 2.05 cfs @ 12.07 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.06 cfs @ 11.78 hrs, Volume= 0.085 af
Primary = 2.00 cfs @ 12.07 hrs, Volume= 0.072 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 166.80' @ 12.07 hrs Surf.Area= 0.011 ac Storage= 0.021 af

Plug-Flow detention time= 76.7 min calculated for 0.157 af (100% of inflow)
Center-of-Mass det. time= 76.7 min (835.7 - 759.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	161.30'	0.010 af	5.92'W x 80.00'L x 3.21'H Field A 0.035 af Overall - 0.011 af Embedded = 0.024 af x 40.0% Voids
#2A	161.80'	0.011 af	Cultec R-280HD x 11 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
#3	164.20'	0.001 af	3.00'D x 4.80'H Vertical Cone/Cylinder
		0.021 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	161.30'	5.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	164.20'	8.0" Round Culvert L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.20' / 164.10' S= 0.0100 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.06 cfs @ 11.78 hrs HW=164.22' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=1.99 cfs @ 12.07 hrs HW=166.79' TW=162.13' (Dynamic Tailwater)

↑ **2=Culvert** (Inlet Controls 1.99 cfs @ 5.71 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

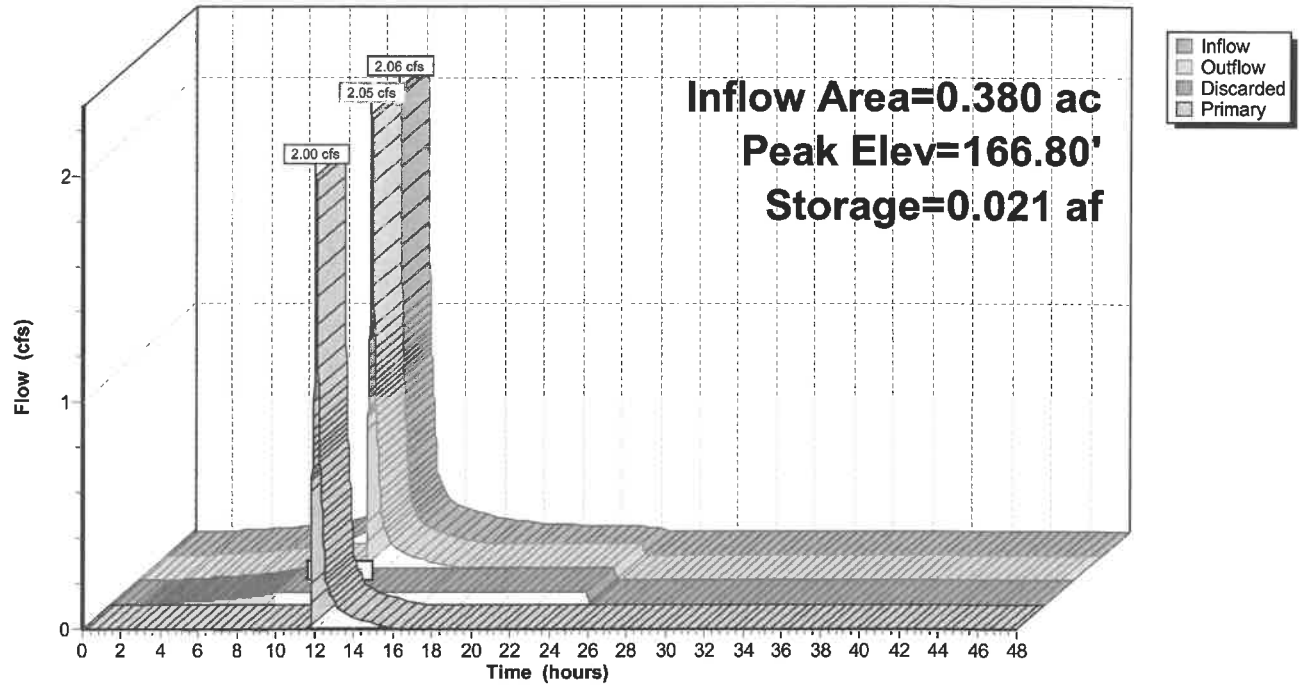
PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 34

Pond 5P: WQV WEST

Hydrograph



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

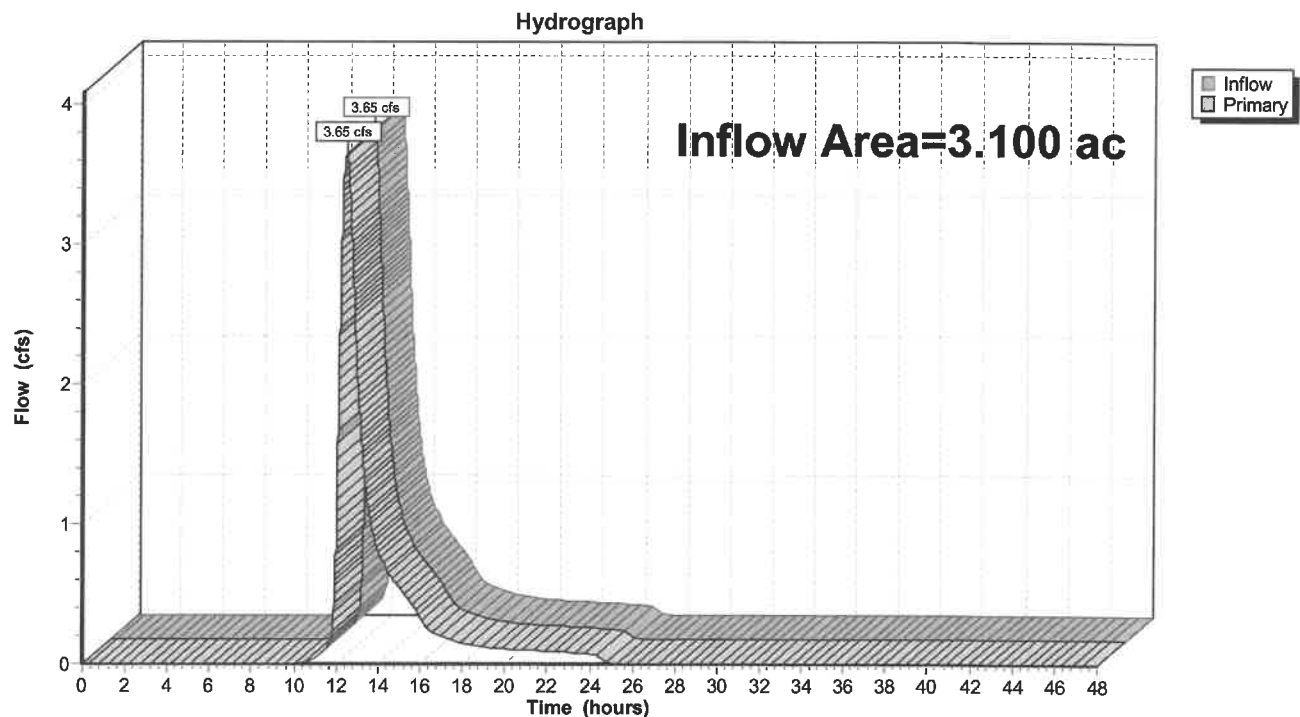
Page 35

Summary for Link 1L: POST-DEV DA #1 OUTFLOW

Inflow Area = 3.100 ac, 38.90% Impervious, Inflow Depth = 2.06" for 10 year event
Inflow = 3.65 cfs @ 12.47 hrs, Volume= 0.532 af
Primary = 3.65 cfs @ 12.47 hrs, Volume= 0.532 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 1L: POST-DEV DA #1 OUTFLOW



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 36

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: PRE-DEV DA #1 Runoff Area=3.220 ac 23.17% Impervious Runoff Depth=3.33"
Flow Length=243' Tc=20.3 min CN=70.7 Runoff=8.42 cfs 0.895 af

Subcatchment 2S: POST-DEV DA #1 INTO Runoff Area=2.000 ac 14.30% Impervious Runoff Depth=2.96"
Flow Length=243' Tc=20.3 min CN=66.9 Runoff=4.60 cfs 0.493 af

Subcatchment 3S: POST-DEV DA #1 WEST Runoff Area=0.380 ac 94.74% Impervious Runoff Depth=6.11"
Tc=5.0 min CN=96.1 Runoff=2.51 cfs 0.193 af

Subcatchment 4S: POST-DEV DA #1 EAST Runoff Area=0.720 ac 77.78% Impervious Runoff Depth=5.38"
Tc=5.0 min CN=89.8 Runoff=4.46 cfs 0.323 af

Pond 1P: EX. WETLAND LOW AREA Peak Elev=156.45' Storage=6,914 cf Inflow=8.42 cfs 0.895 af
Outflow=5.01 cfs 0.895 af

Pond 2P: EX. WETLAND LOW AREA Peak Elev=156.04' Storage=3,275 cf Inflow=4.60 cfs 0.493 af
Outflow=3.20 cfs 0.493 af

Pond 3P: DETENTION SYSTEM WEST Peak Elev=163.26' Storage=0.060 af Inflow=2.45 cfs 0.101 af
Outflow=0.32 cfs 0.101 af

Pond 4P: DETENTION SYSTEM EAST Peak Elev=156.71' Storage=0.090 af Inflow=4.46 cfs 0.323 af
Discarded=0.13 cfs 0.160 af Primary=1.66 cfs 0.163 af Outflow=1.79 cfs 0.323 af

Pond 5P: WQV WEST Peak Elev=167.94' Storage=0.021 af Inflow=2.51 cfs 0.193 af
Discarded=0.06 cfs 0.092 af Primary=2.45 cfs 0.101 af Outflow=2.51 cfs 0.193 af

Link 1L: POST-DEV DA #1 OUTFLOW Inflow=5.00 cfs 0.757 af
Primary=5.00 cfs 0.757 af

Total Runoff Area = 6.320 ac Runoff Volume = 1.904 af Average Runoff Depth = 3.61"
69.11% Pervious = 4.368 ac 30.89% Impervious = 1.952 ac

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1

Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 37

Summary for Subcatchment 1S: PRE-DEV DA #1

Runoff = 8.42 cfs @ 12.29 hrs, Volume= 0.895 af, Depth= 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 year Rainfall=6.57"

Area (ac)	CN	Description
0.320	55.0	Woods, Good, HSG B
0.200	77.0	Woods, Good, HSG D
0.730	61.0	>75% Grass cover, Good, HSG B
0.340	98.0	Paved parking, HSG B
0.120	98.0	Roofs, HSG B
0.080	96.0	Gravel surface, HSG B
1.430	68.0	1 acre lots, 20% imp, HSG B
3.220	70.7	Weighted Average
2.474		76.83% Pervious Area
0.746		23.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0260	0.09		Sheet Flow, Sheet Flow
					Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	143	0.0200	2.28		Shallow Concentrated Flow, Shallow
					Unpaved Kv= 16.1 fps
20.3	243	Total			

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

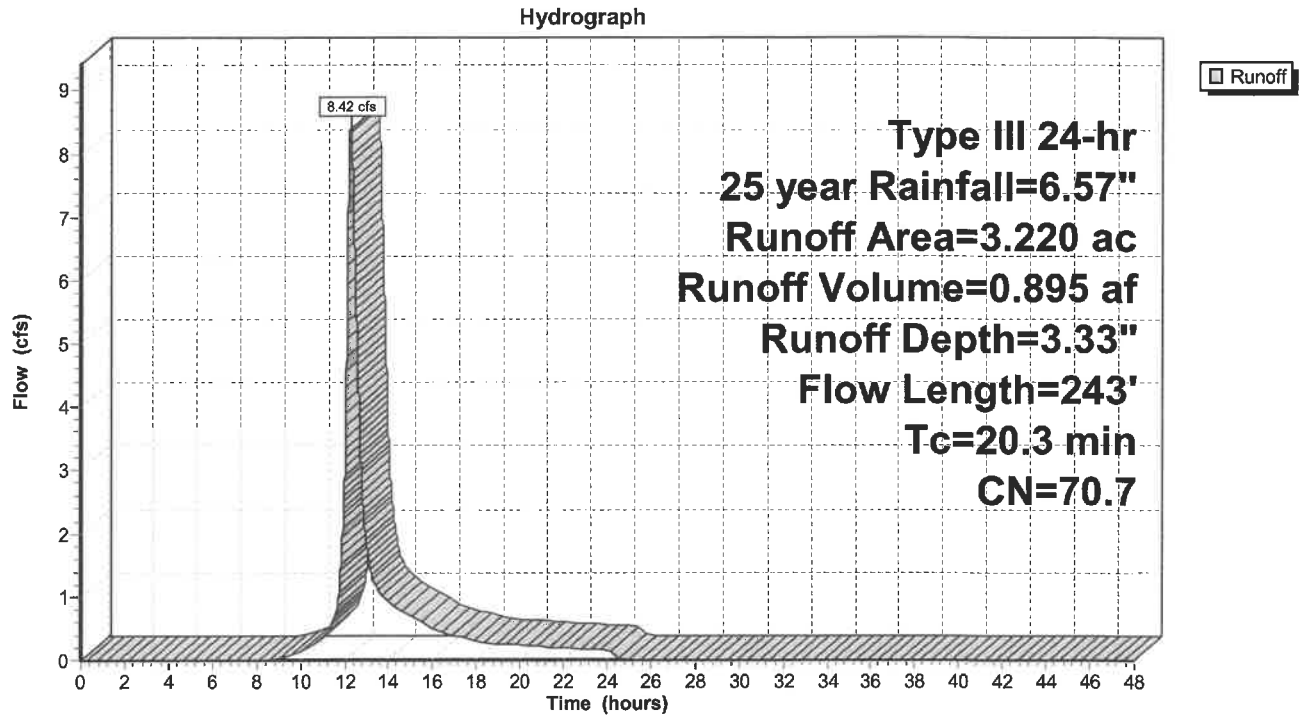
HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 38

Subcatchment 1S: PRE-DEV DA #1



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 39

Summary for Subcatchment 2S: POST-DEV DA #1 INTO EX. WETLAND LOW AREA

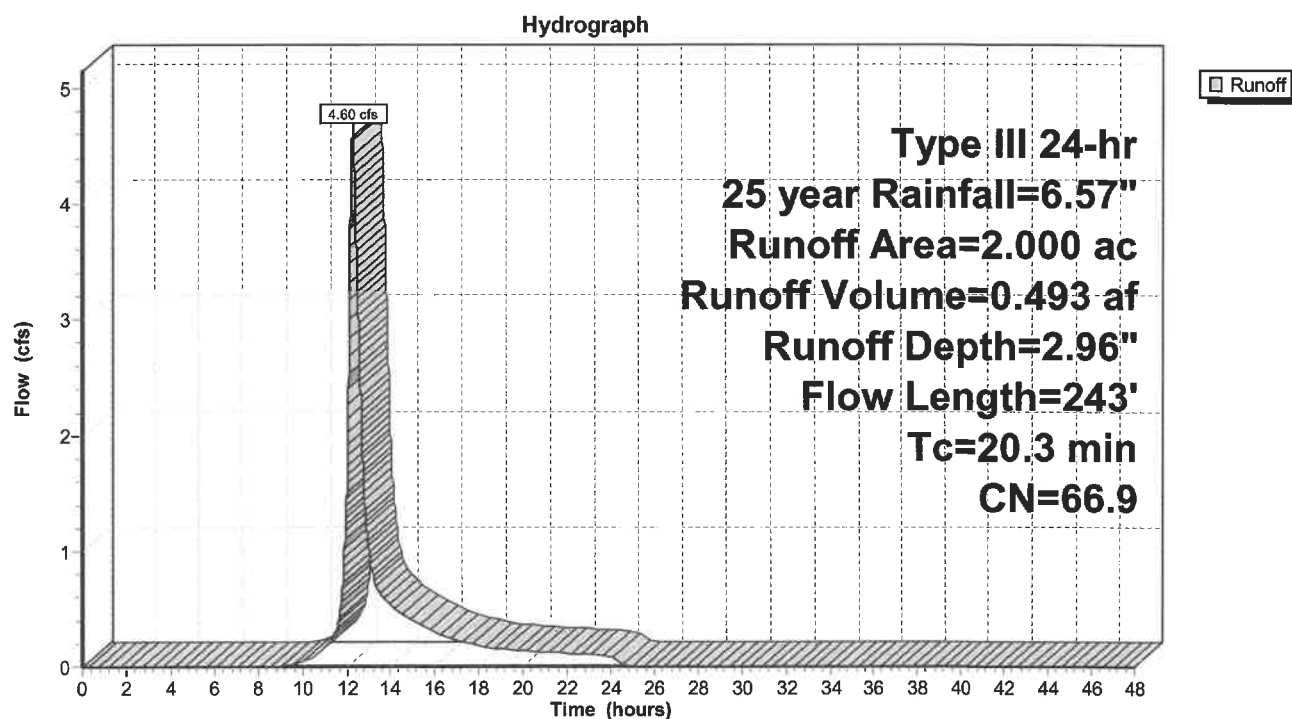
Runoff = 4.60 cfs @ 12.29 hrs, Volume= 0.493 af, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 year Rainfall=6.57"

Area (ac)	CN	Description
0.240	55.0	Woods, Good, HSG B
0.200	77.0	Woods, Good, HSG D
1.430	68.0	1 acre lots, 20% imp, HSG B
0.130	61.0	>75% Grass cover, Good, HSG B
2.000	66.9	Weighted Average
1.714		85.70% Pervious Area
0.286		14.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0260	0.09		Sheet Flow, Sheet Flow
					Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	143	0.0200	2.28		Shallow Concentrated Flow, Shallow
					Unpaved Kv= 16.1 fps
20.3	243	Total			

Subcatchment 2S: POST-DEV DA #1 INTO EX. WETLAND LOW AREA



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 40

Summary for Subcatchment 3S: POST-DEV DA #1 WEST INTO PROP. DET. SYSTEM

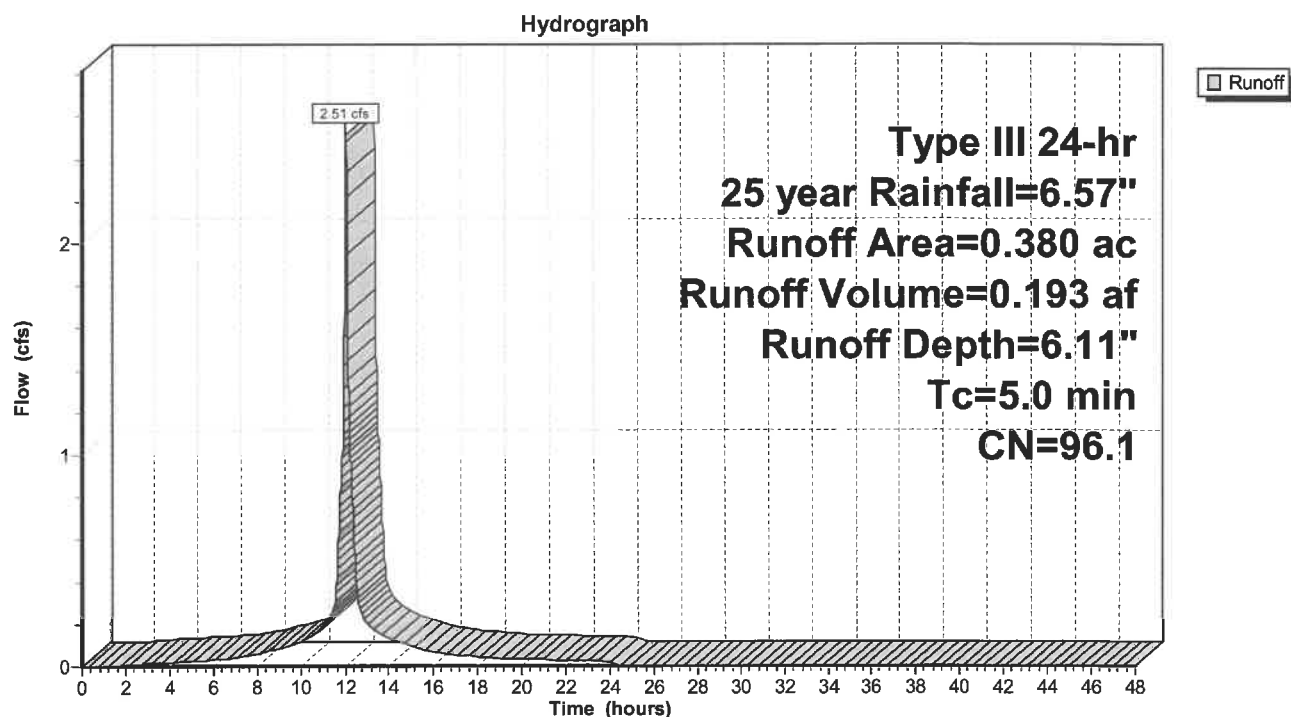
Runoff = 2.51 cfs @ 12.07 hrs, Volume= 0.193 af, Depth= 6.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 year Rainfall=6.57"

Area (ac)	CN	Description
0.120	98.0	Roofs, HSG B
0.240	98.0	Paved parking, HSG B
0.020	61.0	>75% Grass cover, Good, HSG B
0.380	96.1	Weighted Average
0.020		5.26% Pervious Area
0.360		94.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 3S: POST-DEV DA #1 WEST INTO PROP. DET. SYSTEM



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 41

Summary for Subcatchment 4S: POST-DEV DA #1 EAST INTO PROP. DET. SYSTEM

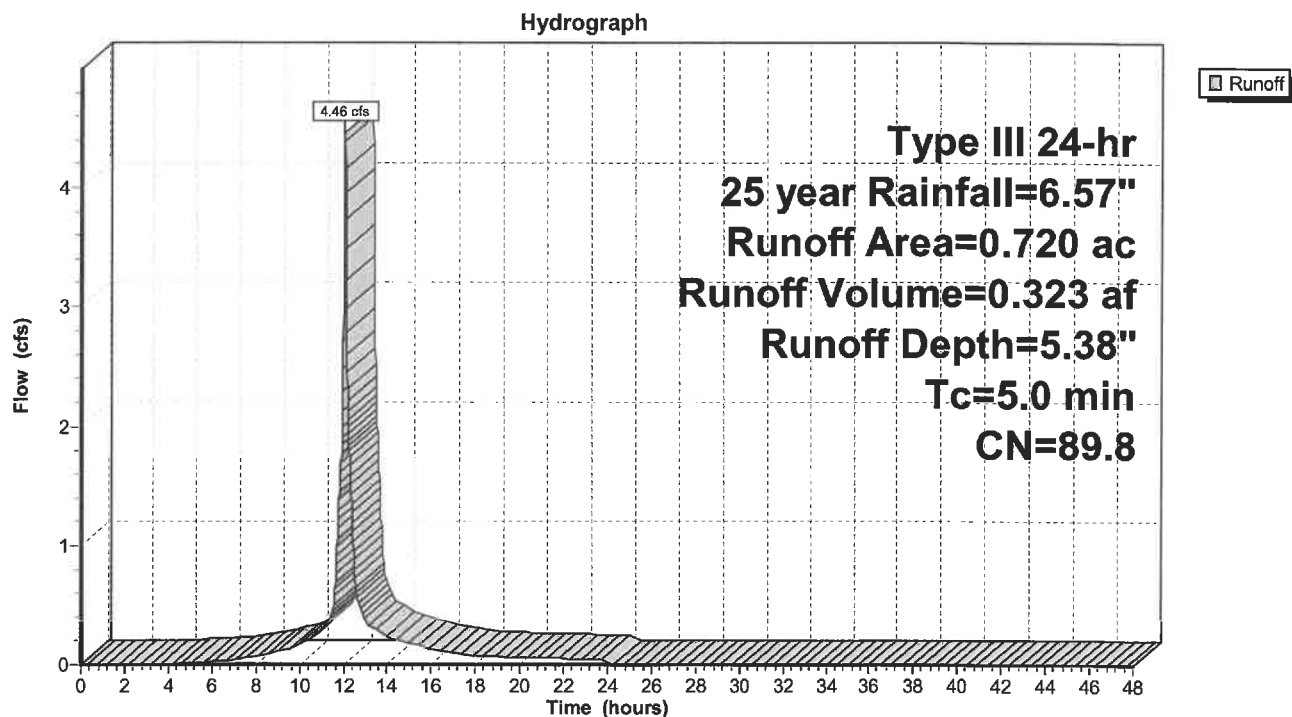
Runoff = 4.46 cfs @ 12.07 hrs, Volume= 0.323 af, Depth= 5.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 year Rainfall=6.57"

Area (ac)	CN	Description
0.170	98.0	Roofs, HSG B
0.390	98.0	Paved parking, HSG B
0.160	61.0	>75% Grass cover, Good, HSG B
0.720	89.8	Weighted Average
0.160		22.22% Pervious Area
0.560		77.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 4S: POST-DEV DA #1 EAST INTO PROP. DET. SYSTEM



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 42

Summary for Pond 1P: EX. WETLAND LOW AREA

Inflow Area = 3.220 ac, 23.17% Impervious, Inflow Depth = 3.33" for 25 year event
Inflow = 8.42 cfs @ 12.29 hrs, Volume= 0.895 af
Outflow = 5.01 cfs @ 12.57 hrs, Volume= 0.895 af, Atten= 40%, Lag= 17.1 min
Primary = 5.01 cfs @ 12.57 hrs, Volume= 0.895 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 156.45' @ 12.57 hrs Surf.Area= 10,546 sf Storage= 6,914 cf

Plug-Flow detention time= 17.6 min calculated for 0.895 af (100% of inflow)
Center-of-Mass det. time= 17.6 min (863.2 - 845.5)

Volume	Invert	Avail.Storage	Storage Description
#1	155.11'	33,667 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
155.11	223	0	0
156.00	6,583	3,029	3,029
158.00	24,055	30,638	33,667

Device	Routing	Invert	Outlet Devices
#1	Primary	155.11'	15.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=5.01 cfs @ 12.57 hrs HW=156.45' (Free Discharge)
↑1=Orifice/Grate (Orifice Controls 5.01 cfs @ 4.08 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

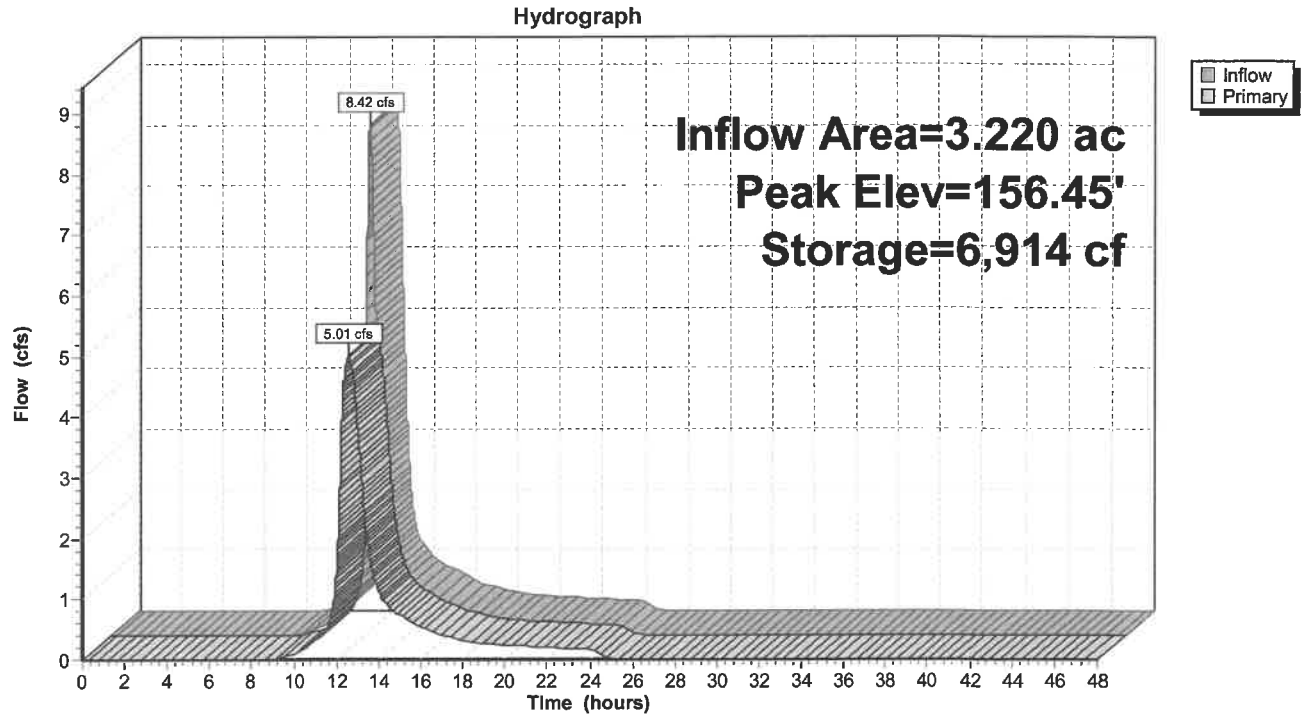
HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 43

Pond 1P: EX. WETLAND LOW AREA



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 44

Summary for Pond 2P: EX. WETLAND LOW AREA

Inflow Area = 2.000 ac, 14.30% Impervious, Inflow Depth = 2.96" for 25 year event
Inflow = 4.60 cfs @ 12.29 hrs, Volume= 0.493 af
Outflow = 3.20 cfs @ 12.52 hrs, Volume= 0.493 af, Atten= 30%, Lag= 13.7 min
Primary = 3.20 cfs @ 12.52 hrs, Volume= 0.493 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 156.04' @ 12.52 hrs Surf.Area= 6,902 sf Storage= 3,275 cf

Plug-Flow detention time= 16.1 min calculated for 0.493 af (100% of inflow)
Center-of-Mass det. time= 16.1 min (870.3 - 854.1)

Volume	Invert	Avail.Storage	Storage Description
#1	155.11'	33,667 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
155.11	223	0	0
156.00	6,583	3,029	3,029
158.00	24,055	30,638	33,667

Device	Routing	Invert	Outlet Devices
#1	Primary	155.11'	15.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=3.20 cfs @ 12.52 hrs HW=156.04' TW=0.00' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Orifice Controls 3.20 cfs @ 3.28 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

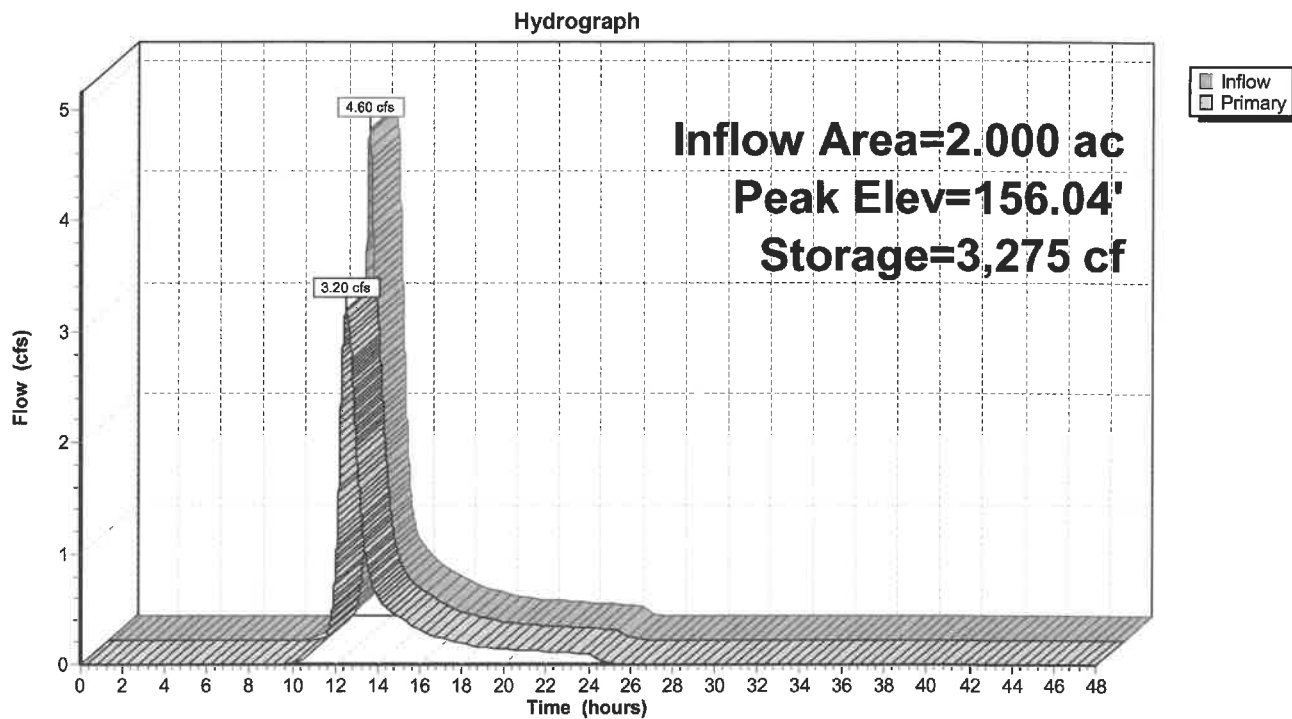
HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 45

Pond 2P: EX. WETLAND LOW AREA



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 46

Summary for Pond 3P: DETENTION SYSTEM WEST

Inflow Area = 0.380 ac, 94.74% Impervious, Inflow Depth = 3.20" for 25 year event
Inflow = 2.45 cfs @ 12.08 hrs, Volume= 0.101 af
Outflow = 0.32 cfs @ 12.54 hrs, Volume= 0.101 af, Atten= 87%, Lag= 28.1 min
Primary = 0.32 cfs @ 12.54 hrs, Volume= 0.101 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 163.26' @ 12.54 hrs Surf.Area= 0.044 ac Storage= 0.060 af

Plug-Flow detention time= 101.1 min calculated for 0.101 af (100% of inflow)
Center-of-Mass det. time= 101.2 min (849.2 - 748.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	161.30'	0.035 af	14.75'W x 129.00'L x 3.21'H Field A 0.140 af Overall - 0.053 af Embedded = 0.087 af x 40.0% Voids
#2A	161.80'	0.053 af	Cultec R-280HD x 54 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 3 rows
		0.088 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	161.30'	3.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=0.32 cfs @ 12.54 hrs HW=163.26' TW=0.00' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Orifice Controls 0.32 cfs @ 6.52 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

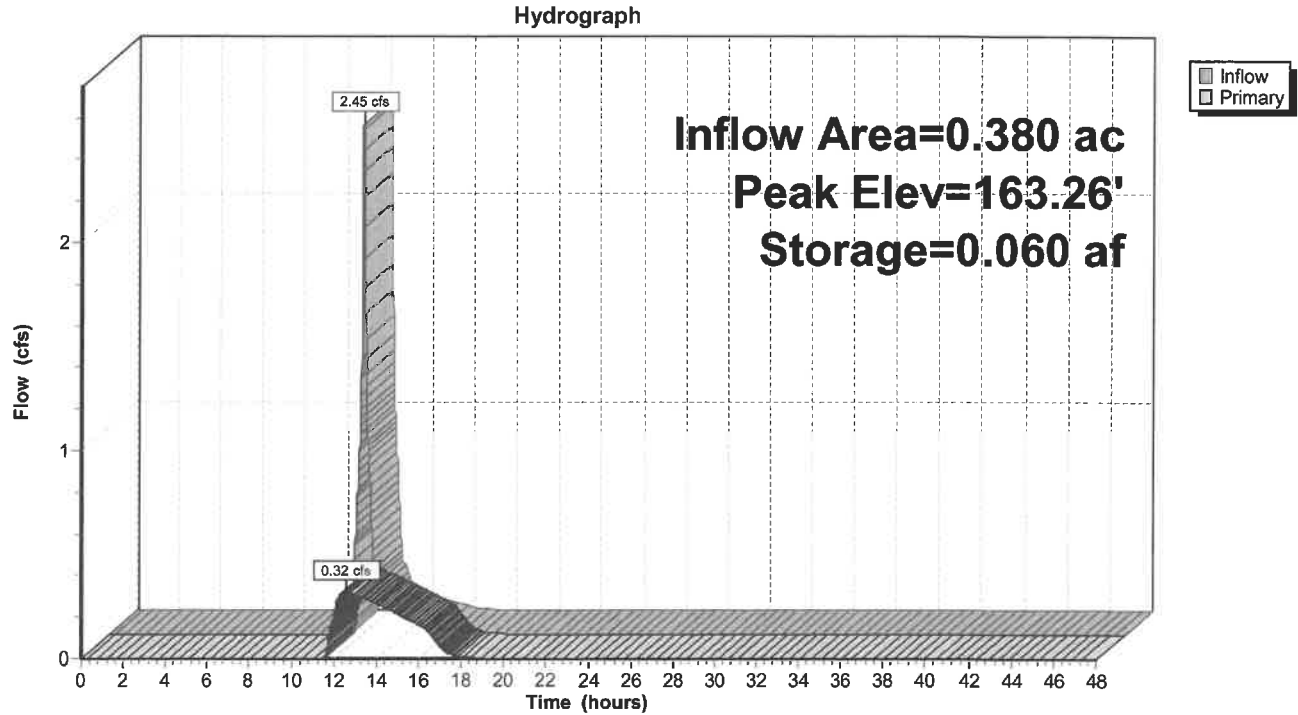
HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 47

Pond 3P: DETENTION SYSTEM WEST



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 48

Summary for Pond 4P: DETENTION SYSTEM EAST

Inflow Area = 0.720 ac, 77.78% Impervious, Inflow Depth = 5.38" for 25 year event
Inflow = 4.46 cfs @ 12.07 hrs, Volume= 0.323 af
Outflow = 1.79 cfs @ 12.27 hrs, Volume= 0.323 af, Atten= 60%, Lag= 11.8 min
Discarded = 0.13 cfs @ 9.85 hrs, Volume= 0.160 af
Primary = 1.66 cfs @ 12.27 hrs, Volume= 0.163 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 156.71' @ 12.27 hrs Surf.Area= 0.088 ac Storage= 0.090 af

Plug-Flow detention time= 51.2 min calculated for 0.323 af (100% of inflow)
Center-of-Mass det. time= 51.2 min (832.8 - 781.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	154.90'	0.053 af	25.00'W x 152.50'L x 2.04'H Field A 0.179 af Overall - 0.045 af Embedded = 0.134 af x 40.0% Voids
#2A	155.40'	0.045 af	Cultec C-100HD x 140 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 7 rows
		0.098 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	154.90'	1.500 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	155.40'	8.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.13 cfs @ 9.85 hrs HW=154.92' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=1.66 cfs @ 12.27 hrs HW=156.71' TW=0.00' (Dynamic Tailwater)
↑**2=Orifice/Grate** (Orifice Controls 1.66 cfs @ 4.76 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

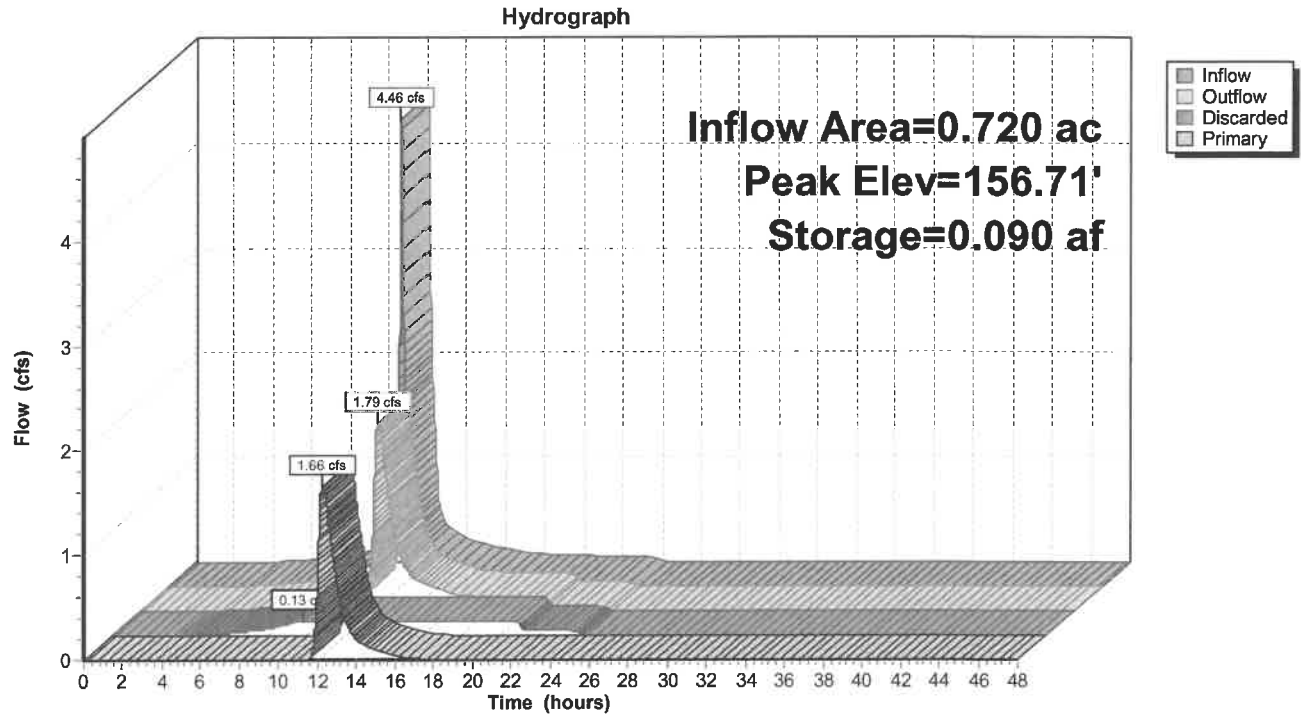
HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 49

Pond 4P: DETENTION SYSTEM EAST



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 50

Summary for Pond 5P: WQV WEST

Inflow Area = 0.380 ac, 94.74% Impervious, Inflow Depth = 6.11" for 25 year event
Inflow = 2.51 cfs @ 12.07 hrs, Volume= 0.193 af
Outflow = 2.51 cfs @ 12.08 hrs, Volume= 0.193 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.06 cfs @ 11.54 hrs, Volume= 0.092 af
Primary = 2.45 cfs @ 12.08 hrs, Volume= 0.101 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 167.94' @ 12.08 hrs Surf.Area= 0.011 ac Storage= 0.021 af

Plug-Flow detention time= 71.8 min calculated for 0.193 af (100% of inflow)
Center-of-Mass det. time= 71.8 min (826.6 - 754.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	161.30'	0.010 af	5.92'W x 80.00'L x 3.21'H Field A 0.035 af Overall - 0.011 af Embedded = 0.024 af x 40.0% Voids
#2A	161.80'	0.011 af	Cultec R-280HD x 11 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
#3	164.20'	0.001 af	3.00'D x 4.80'H Vertical Cone/Cylinder
		0.021 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	161.30'	5.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	164.20'	8.0" Round Culvert L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.20' / 164.10' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.06 cfs @ 11.54 hrs HW=164.22' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=2.44 cfs @ 12.08 hrs HW=167.93' TW=162.45' (Dynamic Tailwater)

↑**2=Culvert** (Inlet Controls 2.44 cfs @ 7.00 fps)

PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

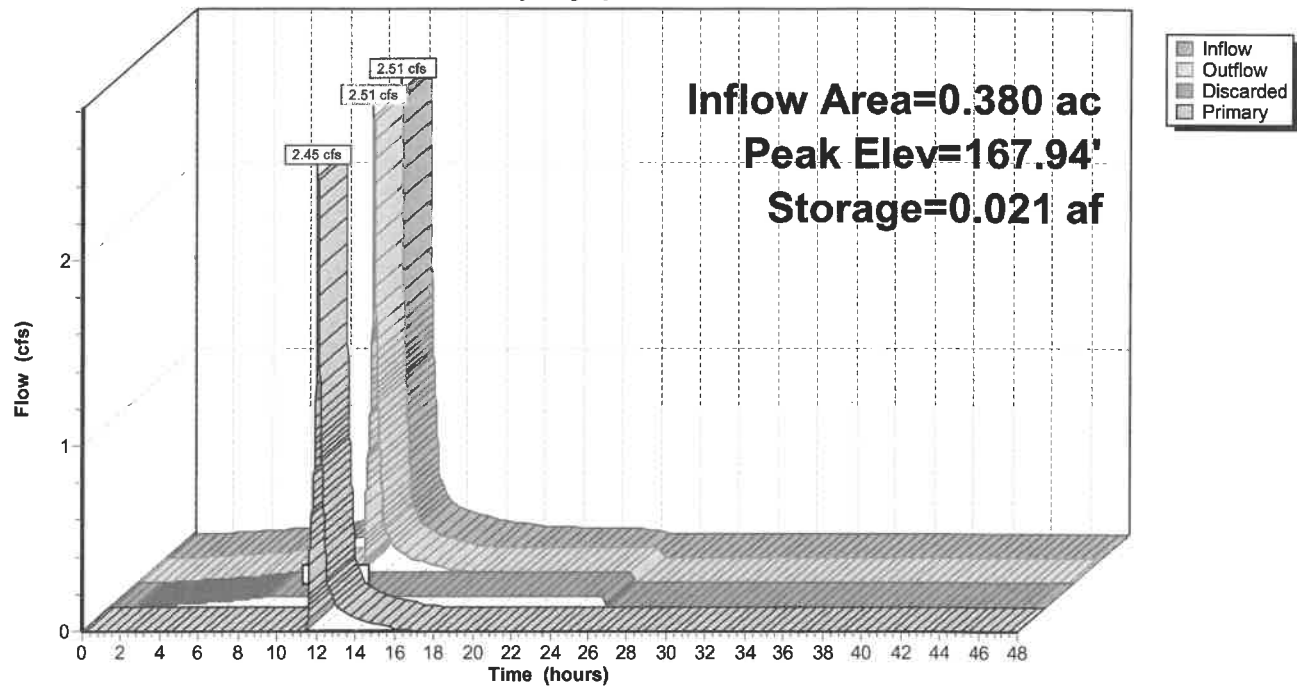
PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 51

Pond 5P: WQV WEST

Hydrograph



PRE-POST-ANALYSIS

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #1
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

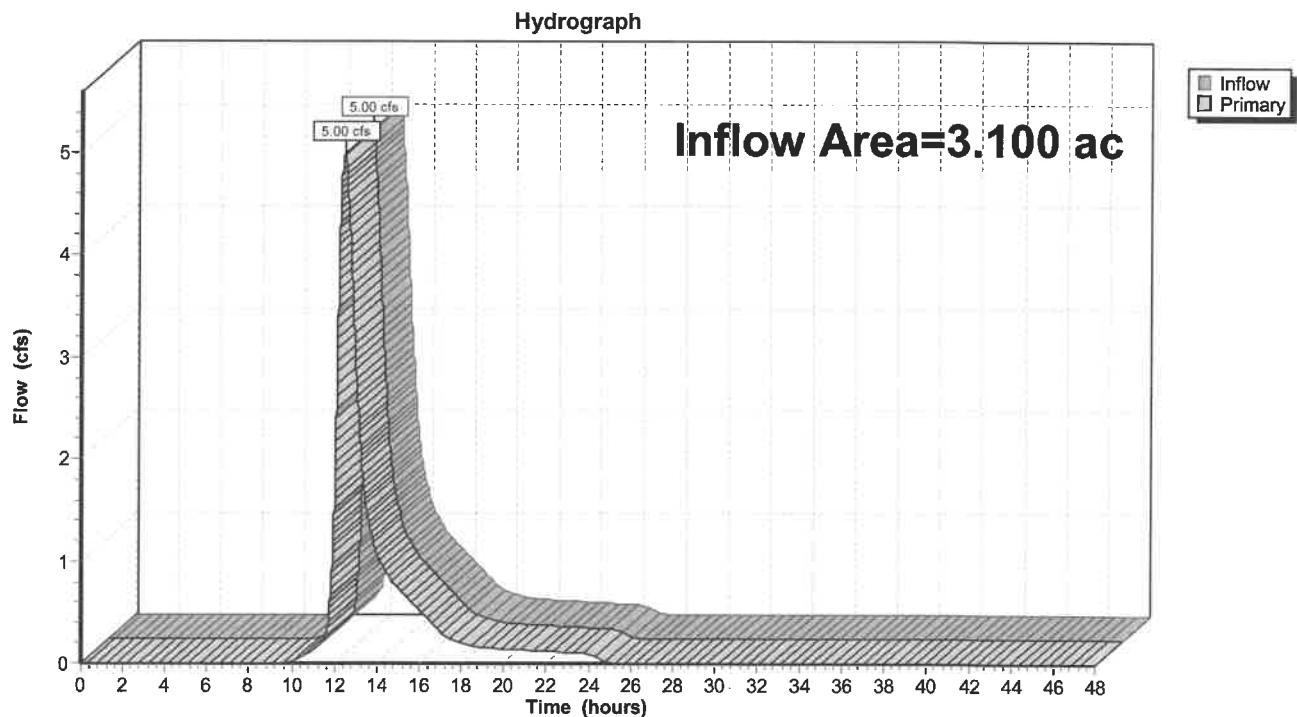
Page 52

Summary for Link 1L: POST-DEV DA #1 OUTFLOW

Inflow Area = 3.100 ac, 38.90% Impervious, Inflow Depth = 2.93" for 25 year event
Inflow = 5.00 cfs @ 12.46 hrs, Volume= 0.757 af
Primary = 5.00 cfs @ 12.46 hrs, Volume= 0.757 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 1L: POST-DEV DA #1 OUTFLOW





PRE-DEV DA #2



POST-DEV DA #2



DETENTION SYSTEM
#2



POST-DEV DA #2
BYPASS



POST-DEV DA#1
OUTFLOW



Subcat



Reach



Pond



Link

Routing Diagram for PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}, Printed 1/6/2020
HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 2

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 5S: PRE-DEV DA #2

Runoff Area=0.780 ac 48.72% Impervious Runoff Depth=1.60"

Tc=5.0 min CN=79.0 Runoff=1.50 cfs 0.104 af

Subcatchment 6S: POST-DEV DA #2

Runoff Area=0.690 ac 79.71% Impervious Runoff Depth=2.53"

Tc=5.0 min CN=90.5 Runoff=2.08 cfs 0.146 af

Subcatchment 7S: POST-DEV DA #2

Runoff Area=0.220 ac 18.18% Impervious Runoff Depth=0.91"

Tc=5.0 min CN=67.7 Runoff=0.22 cfs 0.017 af

Pond 5P: DETENTION SYSTEM #2

Peak Elev=161.81' Storage=0.026 af Inflow=2.08 cfs 0.146 af

Discarded=0.17 cfs 0.099 af Primary=1.14 cfs 0.047 af Outflow=1.30 cfs 0.146 af

Link 2L: POST-DEV DA#1 OUTFLOW

Inflow=1.30 cfs 0.063 af

Primary=1.30 cfs 0.063 af

Total Runoff Area = 1.690 ac Runoff Volume = 0.266 af Average Runoff Depth = 1.89"

42.60% Pervious = 0.720 ac 57.40% Impervious = 0.970 ac

PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 3

Summary for Subcatchment 5S: PRE-DEV DA #2

Runoff = 1.50 cfs @ 12.08 hrs, Volume= 0.104 af, Depth= 1.60"

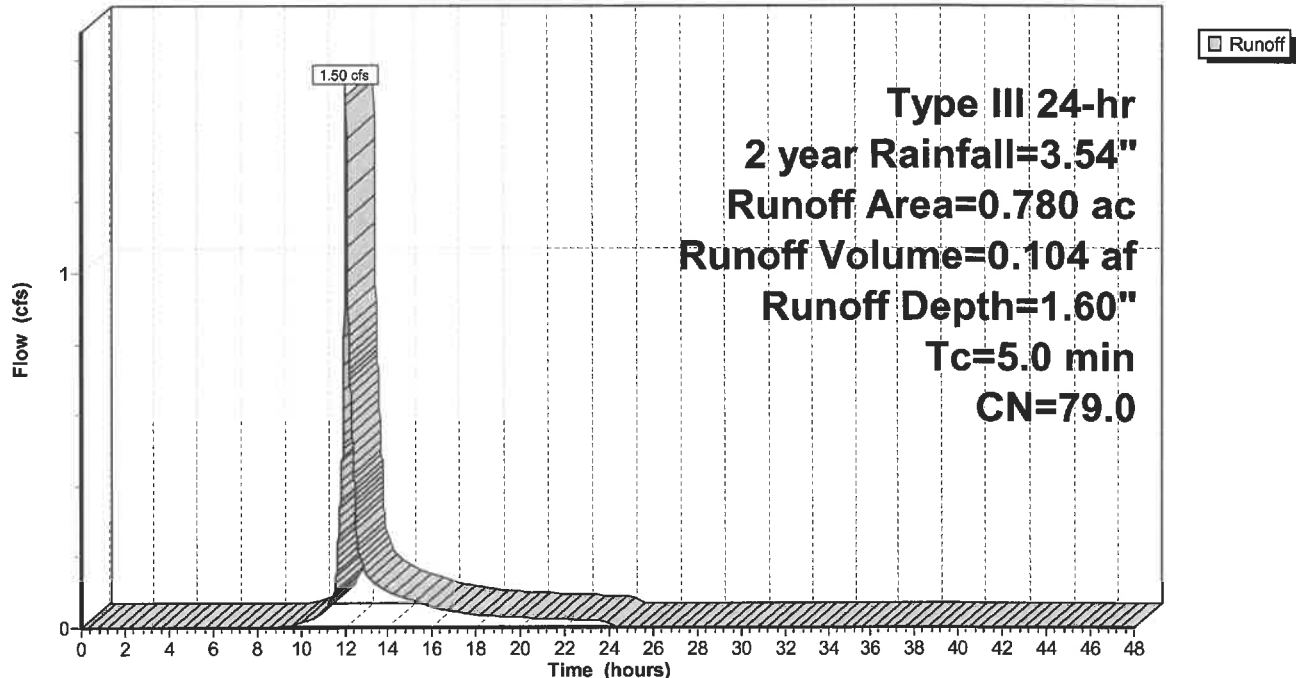
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 year Rainfall=3.54"

Area (ac)	CN	Description
0.400	61.0	>75% Grass cover, Good, HSG B
0.280	98.0	Paved parking, HSG B
0.100	98.0	Roofs, HSG B
0.780	79.0	Weighted Average
0.400		51.28% Pervious Area
0.380		48.72% Impervious Area

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

Subcatchment 5S: PRE-DEV DA #2

Hydrograph



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 4

Summary for Subcatchment 6S: POST-DEV DA #2

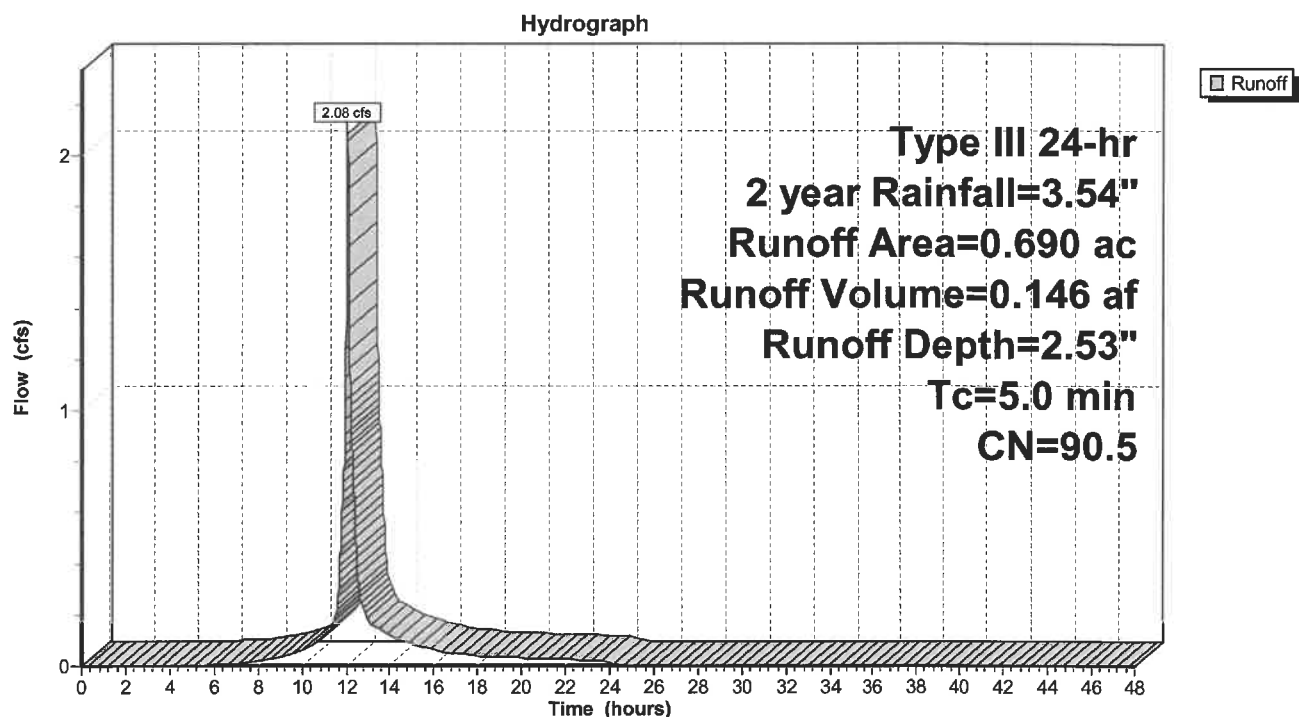
Runoff = 2.08 cfs @ 12.07 hrs, Volume= 0.146 af, Depth= 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 year Rainfall=3.54"

Area (ac)	CN	Description
0.130	98.0	Roofs, HSG B
0.420	98.0	Paved parking, HSG B
0.140	61.0	>75% Grass cover, Good, HSG B
0.690	90.5	Weighted Average
0.140		20.29% Pervious Area
0.550		79.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 6S: POST-DEV DA #2



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 5

Summary for Subcatchment 7S: POST-DEV DA #2 BYPASS

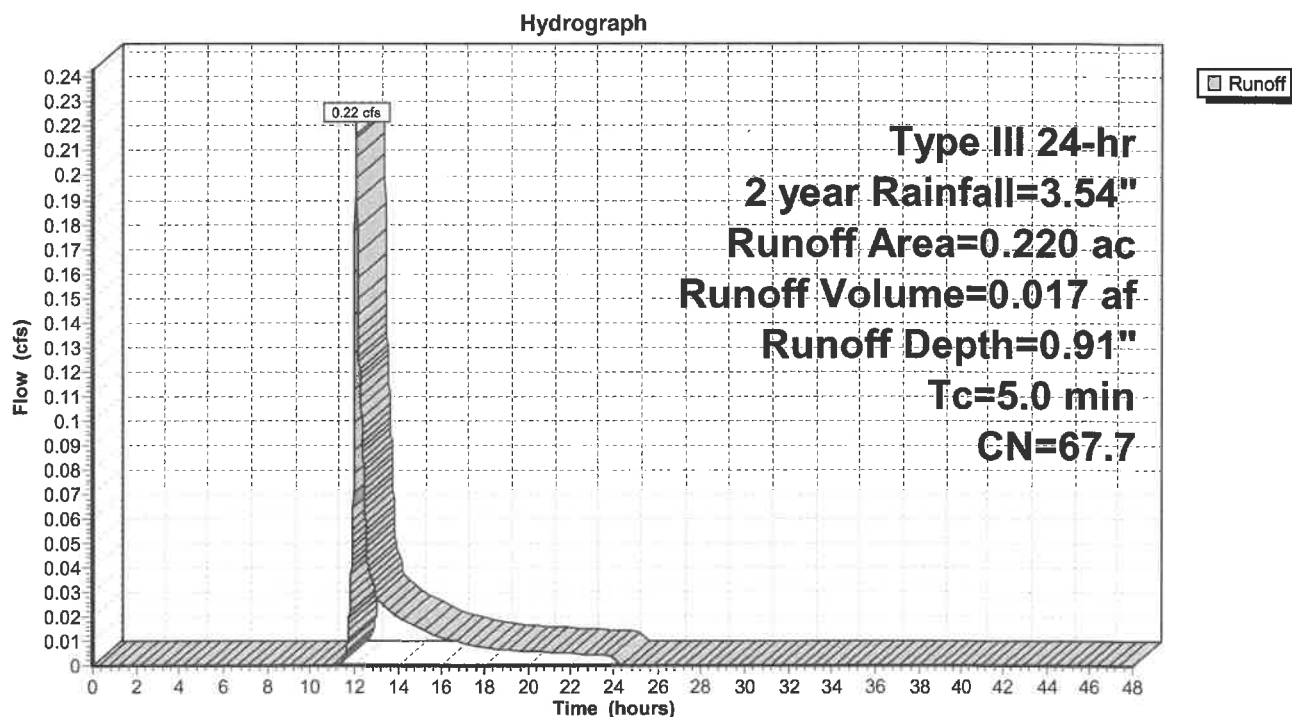
Runoff = 0.22 cfs @ 12.09 hrs, Volume= 0.017 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 year Rainfall=3.54"

Area (ac)	CN	Description
0.040	98.0	Paved parking, HSG B
0.180	61.0	>75% Grass cover, Good, HSG B
0.220	67.7	Weighted Average
0.180		81.82% Pervious Area
0.040		18.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 7S: POST-DEV DA #2 BYPASS



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 6

Summary for Pond 5P: DETENTION SYSTEM #2

Inflow Area = 0.690 ac, 79.71% Impervious, Inflow Depth = 2.53" for 2 year event
Inflow = 2.08 cfs @ 12.07 hrs, Volume= 0.146 af
Outflow = 1.30 cfs @ 12.16 hrs, Volume= 0.146 af, Atten= 38%, Lag= 5.4 min
Discarded = 0.17 cfs @ 11.57 hrs, Volume= 0.099 af
Primary = 1.14 cfs @ 12.16 hrs, Volume= 0.047 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 161.81' @ 12.16 hrs Surf.Area= 0.037 ac Storage= 0.026 af

Plug-Flow detention time= 15.5 min calculated for 0.146 af (100% of inflow)
Center-of-Mass det. time= 15.5 min (815.5 - 800.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	160.70'	0.027 af	14.75'W x 110.61'L x 2.71'H Field A 0.101 af Overall - 0.034 af Embedded = 0.067 af x 40.0% Voids
#2A	161.20'	0.034 af	Cultec R-180 x 68 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
		0.061 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	160.70'	4.400 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	161.20'	10.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.17 cfs @ 11.57 hrs HW=160.73' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=1.13 cfs @ 12.16 hrs HW=161.81' TW=0.00' (Dynamic Tailwater)

↑ **2=Orifice/Grate** (Orifice Controls 1.13 cfs @ 2.66 fps)

PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

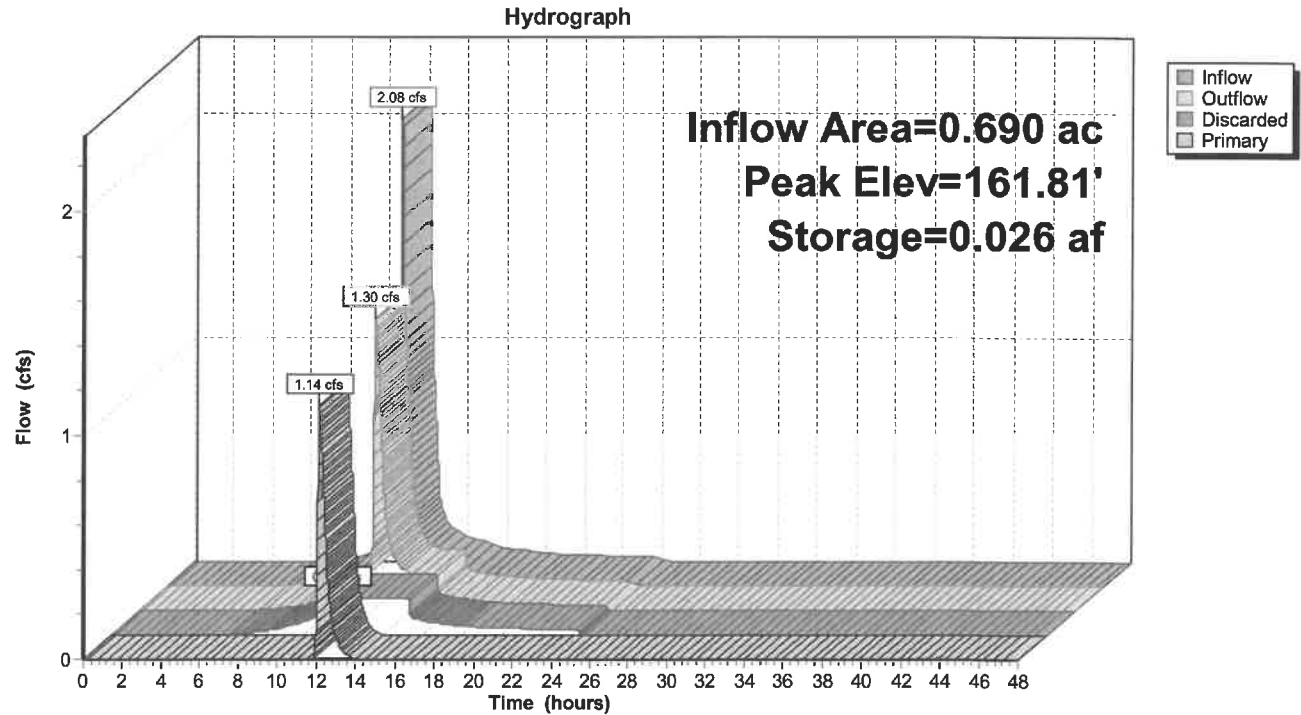
PRE & POST DEVELOPMENT DA #2

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

Page 7

Pond 5P: DETENTION SYSTEM #2



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 2 year Rainfall=3.54"

Printed 1/6/2020

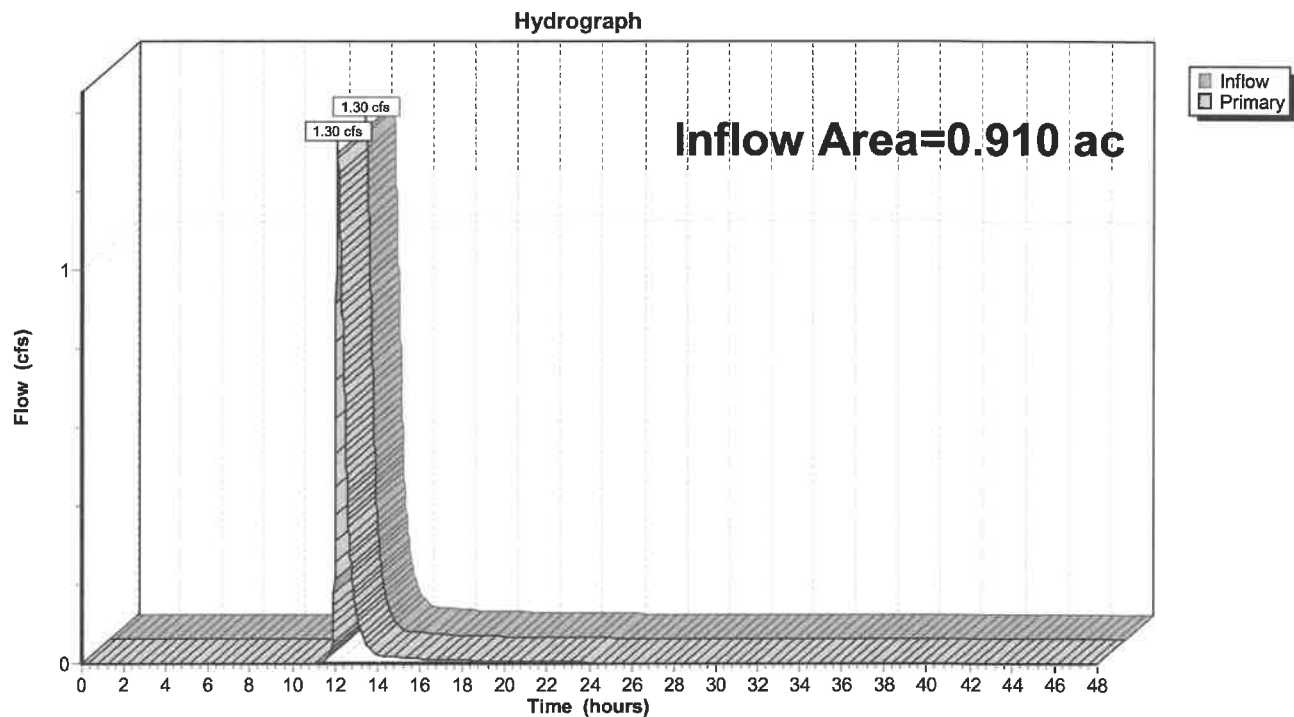
Page 8

Summary for Link 2L: POST-DEV DA#1 OUTFLOW

Inflow Area = 0.910 ac, 64.84% Impervious, Inflow Depth = 0.83" for 2 year event
Inflow = 1.30 cfs @ 12.15 hrs, Volume= 0.063 af
Primary = 1.30 cfs @ 12.15 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 2L: POST-DEV DA#1 OUTFLOW



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 9

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 5S: PRE-DEV DA #2

Runoff Area=0.780 ac 48.72% Impervious Runoff Depth=3.16"

Tc=5.0 min CN=79.0 Runoff=2.99 cfs 0.205 af

Subcatchment 6S: POST-DEV DA #2

Runoff Area=0.690 ac 79.71% Impervious Runoff Depth=4.33"

Tc=5.0 min CN=90.5 Runoff=3.47 cfs 0.249 af

Subcatchment 7S: POST-DEV DA #2

Runoff Area=0.220 ac 18.18% Impervious Runoff Depth=2.15"

Tc=5.0 min CN=67.7 Runoff=0.56 cfs 0.039 af

Pond 5P: DETENTION SYSTEM #2

Peak Elev=162.27' Storage=0.039 af Inflow=3.47 cfs 0.249 af

Discarded=0.17 cfs 0.140 af Primary=2.12 cfs 0.108 af Outflow=2.29 cfs 0.249 af

Link 2L: POST-DEV DA#1 OUTFLOW

Inflow=2.57 cfs 0.148 af

Primary=2.57 cfs 0.148 af

Total Runoff Area = 1.690 ac Runoff Volume = 0.493 af Average Runoff Depth = 3.50"

42.60% Pervious = 0.720 ac 57.40% Impervious = 0.970 ac

PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 10

Summary for Subcatchment 5S: PRE-DEV DA #2

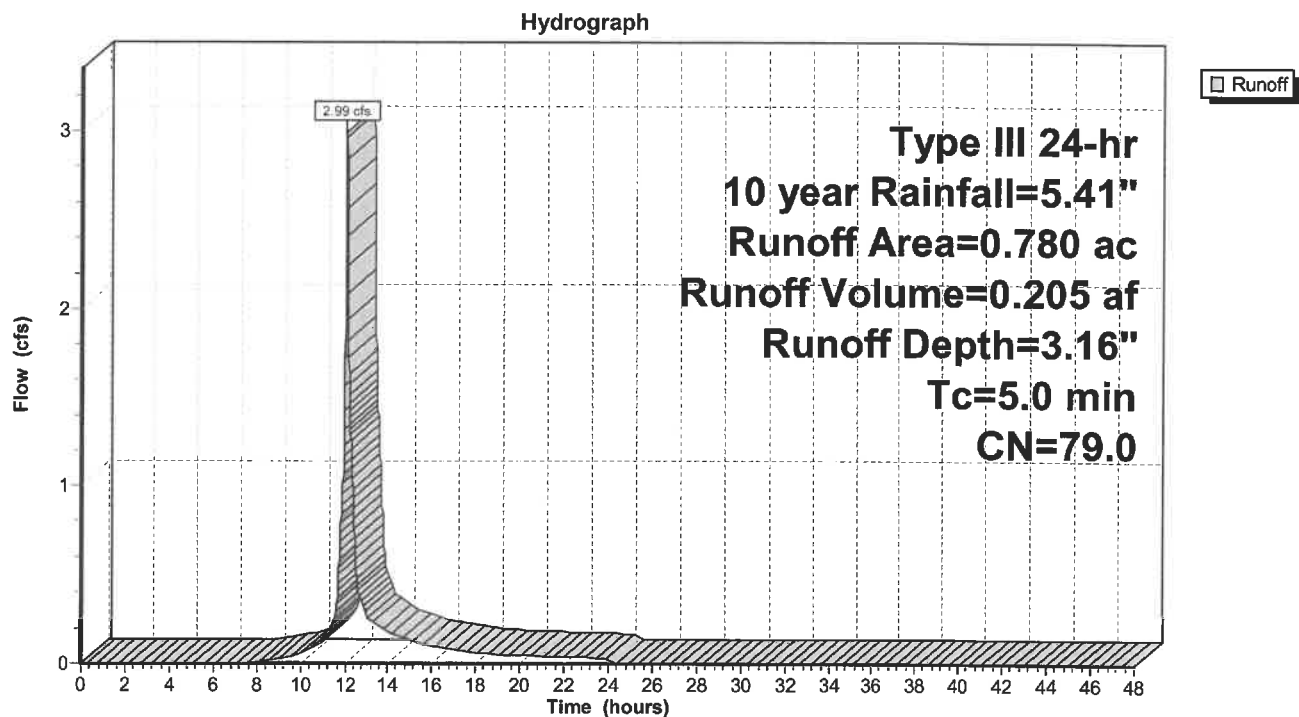
Runoff = 2.99 cfs @ 12.07 hrs, Volume= 0.205 af, Depth= 3.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 year Rainfall=5.41"

Area (ac)	CN	Description
0.400	61.0	>75% Grass cover, Good, HSG B
0.280	98.0	Paved parking, HSG B
0.100	98.0	Roofs, HSG B
0.780	79.0	Weighted Average
0.400		51.28% Pervious Area
0.380		48.72% Impervious Area

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

Subcatchment 5S: PRE-DEV DA #2



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 11

Summary for Subcatchment 6S: POST-DEV DA #2

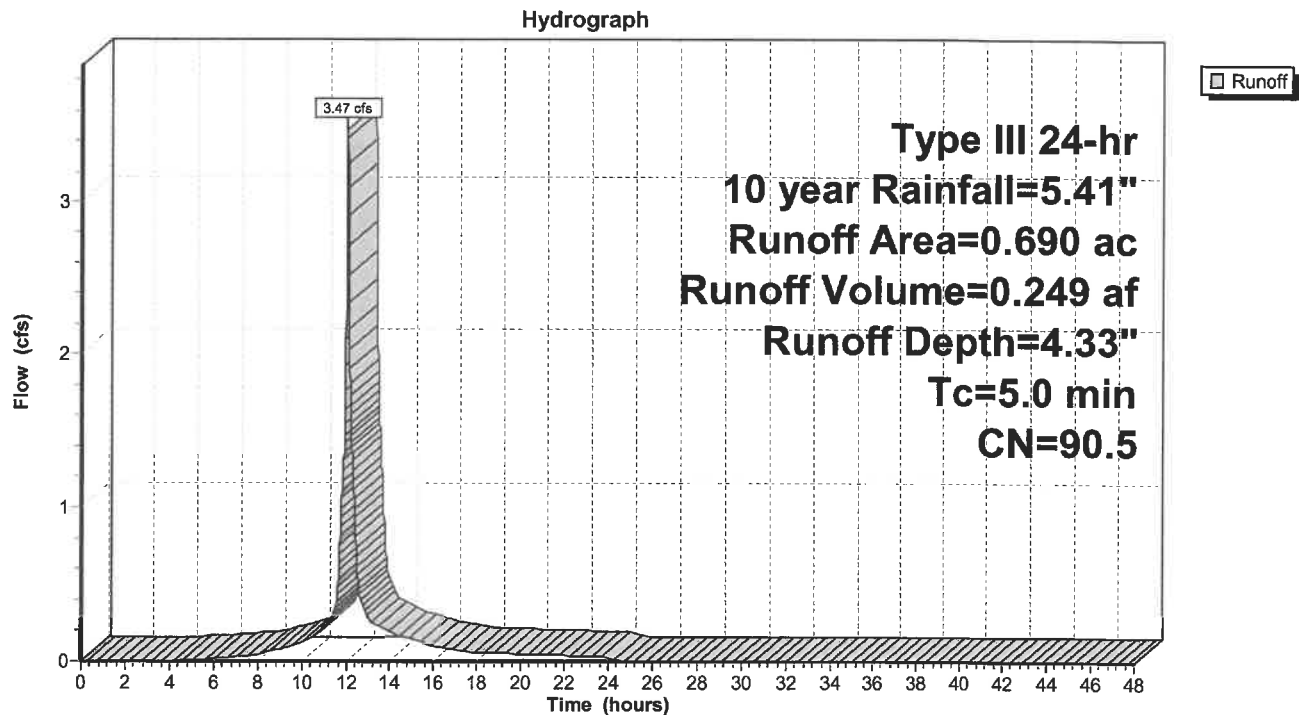
Runoff = 3.47 cfs @ 12.07 hrs, Volume= 0.249 af, Depth= 4.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 year Rainfall=5.41"

Area (ac)	CN	Description
0.130	98.0	Roofs, HSG B
0.420	98.0	Paved parking, HSG B
0.140	61.0	>75% Grass cover, Good, HSG B
0.690	90.5	Weighted Average
0.140		20.29% Pervious Area
0.550		79.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 6S: POST-DEV DA #2



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 12

Summary for Subcatchment 7S: POST-DEV DA #2 BYPASS

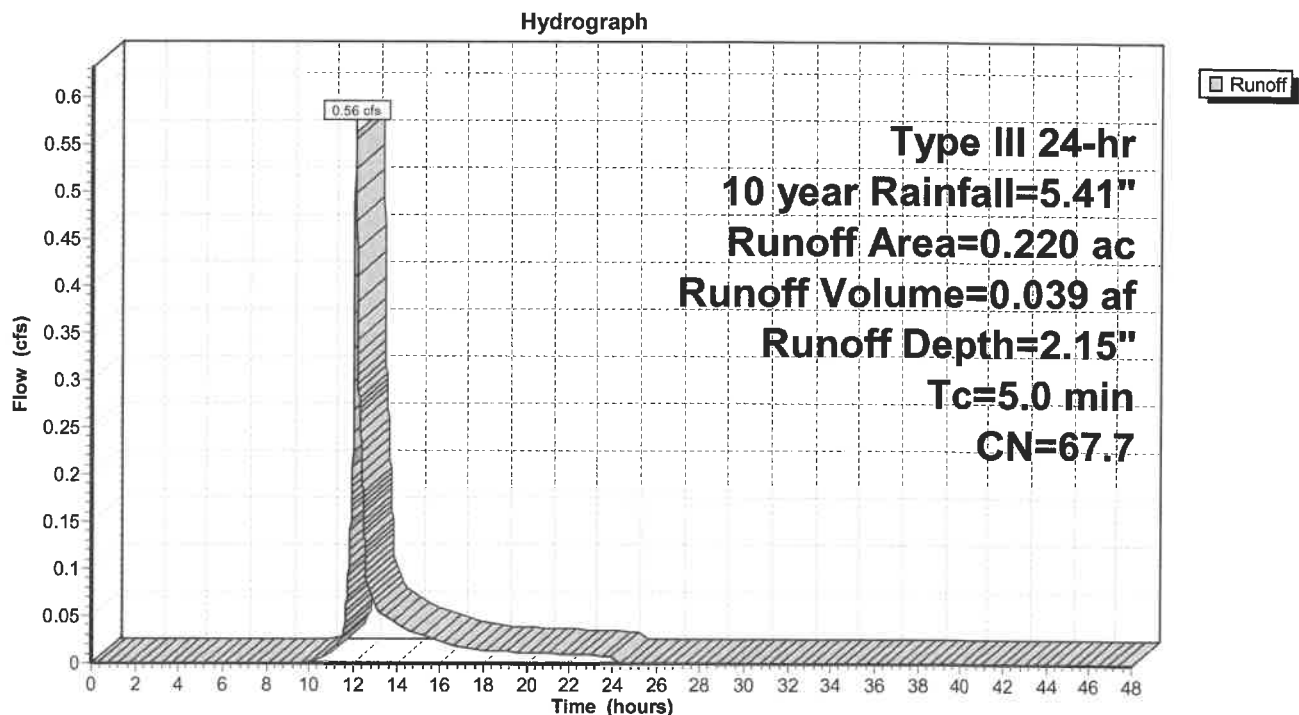
Runoff = 0.56 cfs @ 12.08 hrs, Volume= 0.039 af, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 year Rainfall=5.41"

Area (ac)	CN	Description
0.040	98.0	Paved parking, HSG B
0.180	61.0	>75% Grass cover, Good, HSG B
0.220	67.7	Weighted Average
0.180		81.82% Pervious Area
0.040		18.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 7S: POST-DEV DA #2 BYPASS



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 13

Summary for Pond 5P: DETENTION SYSTEM #2

Inflow Area = 0.690 ac, 79.71% Impervious, Inflow Depth = 4.33" for 10 year event
 Inflow = 3.47 cfs @ 12.07 hrs, Volume= 0.249 af
 Outflow = 2.29 cfs @ 12.15 hrs, Volume= 0.249 af, Atten= 34%, Lag= 4.9 min
 Discarded = 0.17 cfs @ 10.84 hrs, Volume= 0.140 af
 Primary = 2.12 cfs @ 12.15 hrs, Volume= 0.108 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 162.27' @ 12.15 hrs Surf.Area= 0.037 ac Storage= 0.039 af

Plug-Flow detention time= 15.7 min calculated for 0.249 af (100% of inflow)
 Center-of-Mass det. time= 15.7 min (801.0 - 785.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	160.70'	0.027 af	14.75'W x 110.61'L x 2.71'H Field A 0.101 af Overall - 0.034 af Embedded = 0.067 af x 40.0% Voids
#2A	161.20'	0.034 af	Cultec R-180 x 68 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
		0.061 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	160.70'	4.400 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	161.20'	10.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.17 cfs @ 10.84 hrs HW=160.73' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=2.12 cfs @ 12.15 hrs HW=162.27' TW=0.00' (Dynamic Tailwater)
 ↑ **2=Orifice/Grate** (Orifice Controls 2.12 cfs @ 3.89 fps)

PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

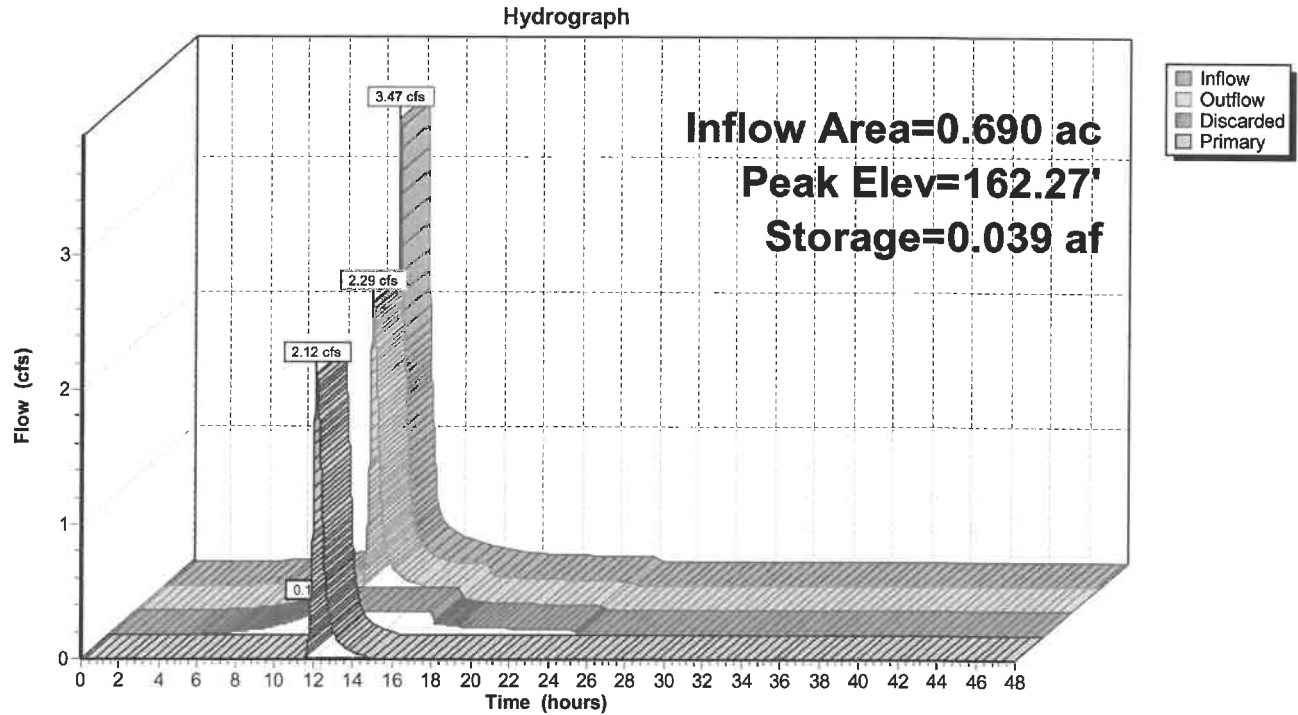
HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2
Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

Page 14

Pond 5P: DETENTION SYSTEM #2



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 10 year Rainfall=5.41"

Printed 1/6/2020

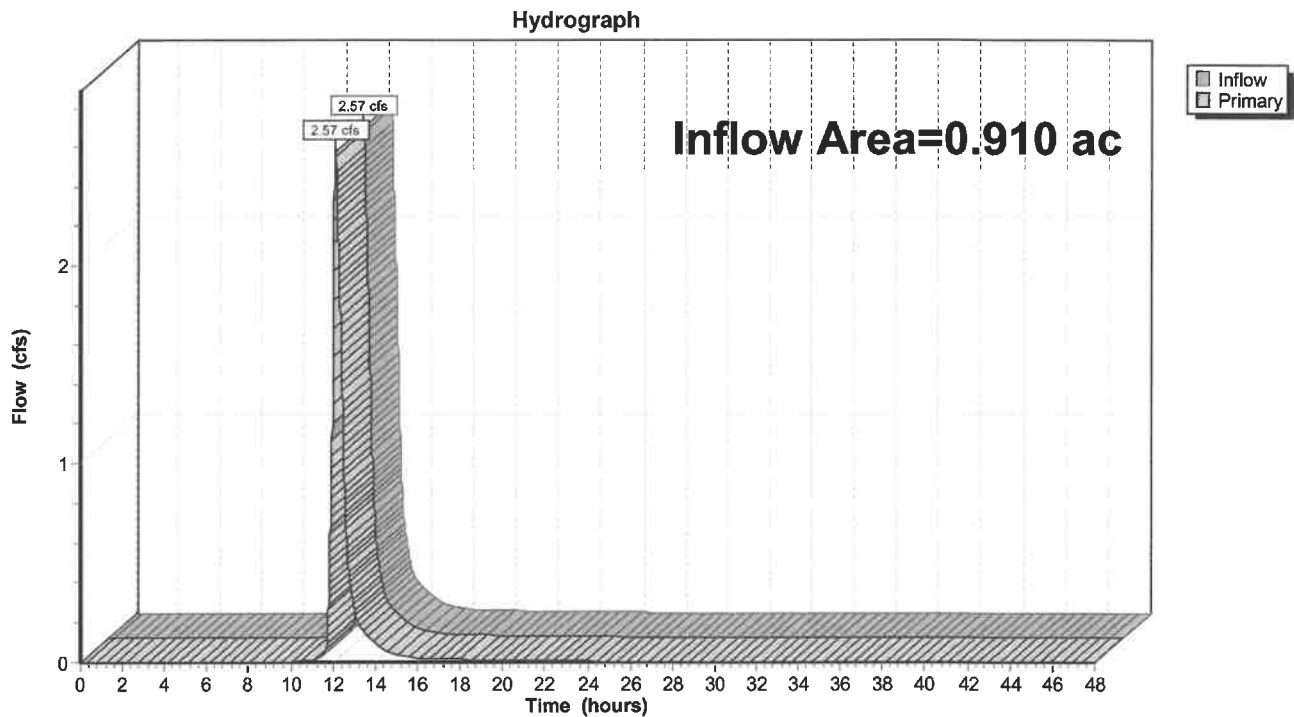
Page 15

Summary for Link 2L: POST-DEV DA#1 OUTFLOW

Inflow Area = 0.910 ac, 64.84% Impervious, Inflow Depth = 1.95" for 10 year event
Inflow = 2.57 cfs @ 12.12 hrs, Volume= 0.148 af
Primary = 2.57 cfs @ 12.12 hrs, Volume= 0.148 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 2L: POST-DEV DA#1 OUTFLOW



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 16

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 5S: PRE-DEV DA #2 Runoff Area=0.780 ac 48.72% Impervious Runoff Depth=4.19"
Tc=5.0 min CN=79.0 Runoff=3.96 cfs 0.273 af

Subcatchment 6S: POST-DEV DA #2 Runoff Area=0.690 ac 79.71% Impervious Runoff Depth=5.46"
Tc=5.0 min CN=90.5 Runoff=4.32 cfs 0.314 af

Subcatchment 7S: POST-DEV DA #2 Runoff Area=0.220 ac 18.18% Impervious Runoff Depth=3.04"
Tc=5.0 min CN=67.7 Runoff=0.81 cfs 0.056 af

Pond 5P: DETENTION SYSTEM #2 Peak Elev=162.60' Storage=0.048 af Inflow=4.32 cfs 0.314 af
Discarded=0.17 cfs 0.161 af Primary=2.61 cfs 0.153 af Outflow=2.78 cfs 0.314 af

Link 2L: POST-DEV DA#1 OUTFLOW Inflow=3.24 cfs 0.209 af
Primary=3.24 cfs 0.209 af

Total Runoff Area = 1.690 ac Runoff Volume = 0.642 af Average Runoff Depth = 4.56"
42.60% Pervious = 0.720 ac 57.40% Impervious = 0.970 ac

PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 17

Summary for Subcatchment 5S: PRE-DEV DA #2

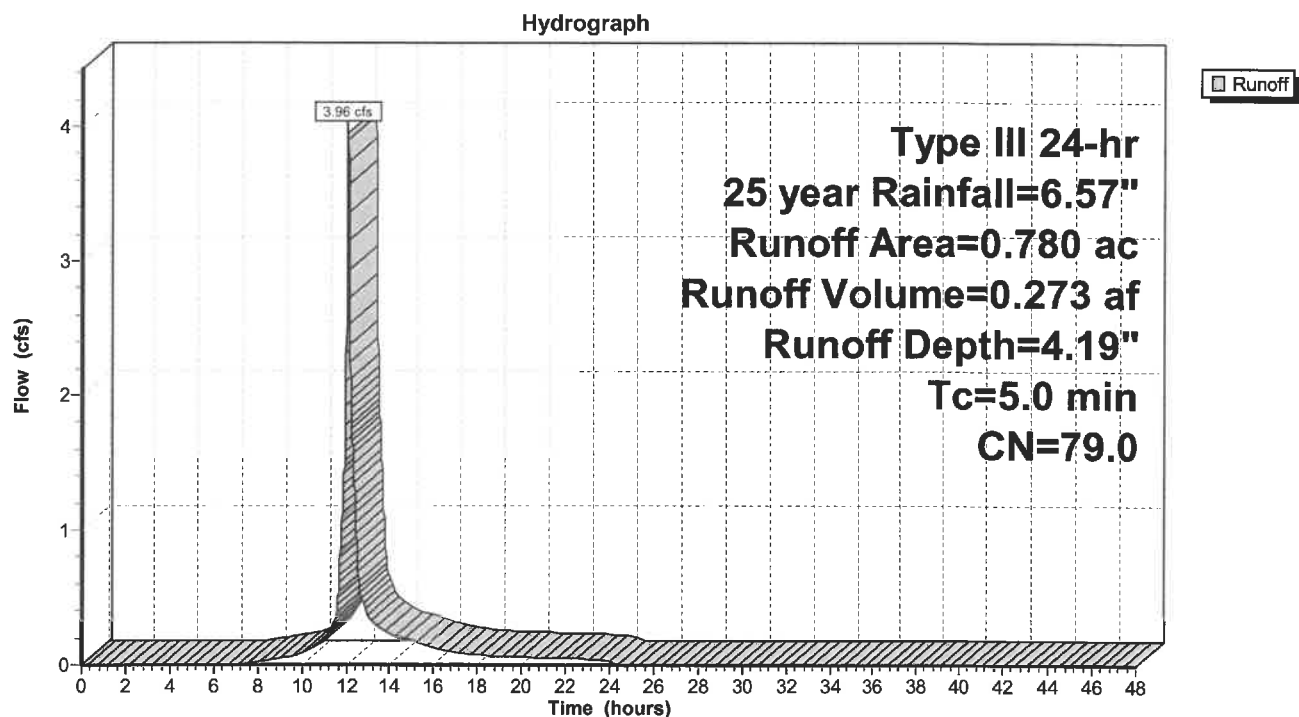
Runoff = 3.96 cfs @ 12.07 hrs, Volume= 0.273 af, Depth= 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 year Rainfall=6.57"

Area (ac)	CN	Description
0.400	61.0	>75% Grass cover, Good, HSG B
0.280	98.0	Paved parking, HSG B
0.100	98.0	Roofs, HSG B
0.780	79.0	Weighted Average
0.400		51.28% Pervious Area
0.380		48.72% Impervious Area

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

Subcatchment 5S: PRE-DEV DA #2



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 18

Summary for Subcatchment 6S: POST-DEV DA #2

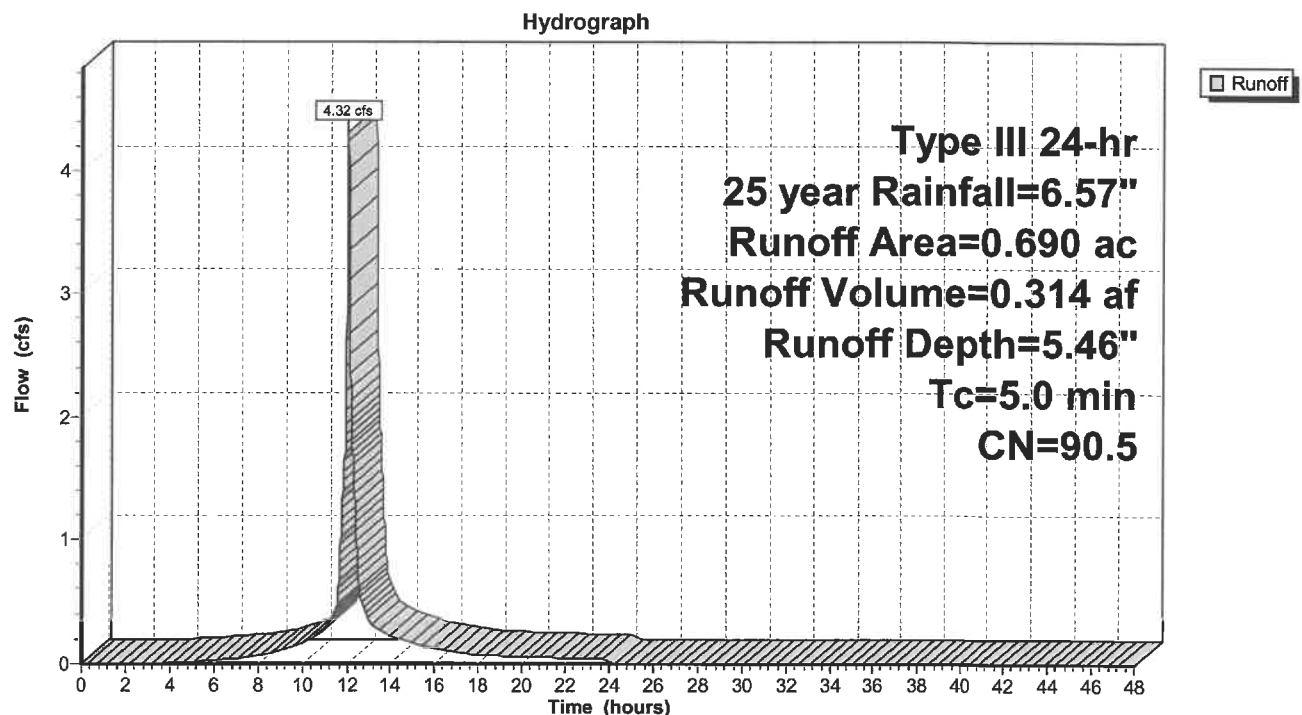
Runoff = 4.32 cfs @ 12.07 hrs, Volume= 0.314 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 year Rainfall=6.57"

Area (ac)	CN	Description
0.130	98.0	Roofs, HSG B
0.420	98.0	Paved parking, HSG B
0.140	61.0	>75% Grass cover, Good, HSG B
0.690	90.5	Weighted Average
0.140		20.29% Pervious Area
0.550		79.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 6S: POST-DEV DA #2



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 19

Summary for Subcatchment 7S: POST-DEV DA #2 BYPASS

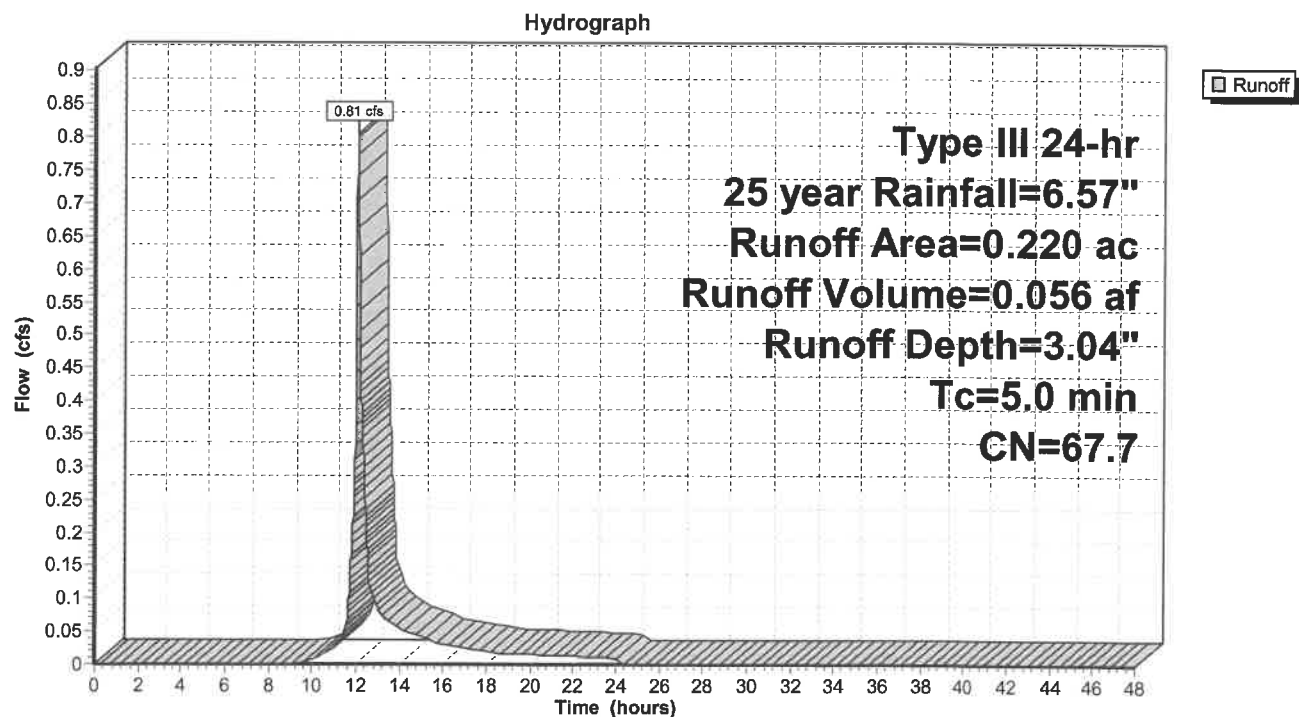
Runoff = 0.81 cfs @ 12.08 hrs, Volume= 0.056 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 year Rainfall=6.57"

Area (ac)	CN	Description
0.040	98.0	Paved parking, HSG B
0.180	61.0	>75% Grass cover, Good, HSG B
0.220	67.7	Weighted Average
0.180		81.82% Pervious Area
0.040		18.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 7S: POST-DEV DA #2 BYPASS



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 20

Summary for Pond 5P: DETENTION SYSTEM #2

Inflow Area = 0.690 ac, 79.71% Impervious, Inflow Depth = 5.46" for 25 year event
 Inflow = 4.32 cfs @ 12.07 hrs, Volume= 0.314 af
 Outflow = 2.78 cfs @ 12.16 hrs, Volume= 0.314 af, Atten= 36%, Lag= 5.1 min
 Discarded = 0.17 cfs @ 10.32 hrs, Volume= 0.161 af
 Primary = 2.61 cfs @ 12.16 hrs, Volume= 0.153 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 162.60' @ 12.16 hrs Surf.Area= 0.037 ac Storage= 0.048 af

Plug-Flow detention time= 16.1 min calculated for 0.314 af (100% of inflow)
 Center-of-Mass det. time= 16.1 min (795.3 - 779.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	160.70'	0.027 af	14.75'W x 110.61'L x 2.71'H Field A 0.101 af Overall - 0.034 af Embedded = 0.067 af x 40.0% Voids
#2A	161.20'	0.034 af	Cultec R-180 x 68 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
		0.061 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	160.70'	4.400 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	161.20'	10.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.17 cfs @ 10.32 hrs HW=160.73' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.17 cfs)**Primary OutFlow** Max=2.61 cfs @ 12.16 hrs HW=162.60' TW=0.00' (Dynamic Tailwater)↑**2=Orifice/Grate** (Orifice Controls 2.61 cfs @ 4.78 fps)

PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

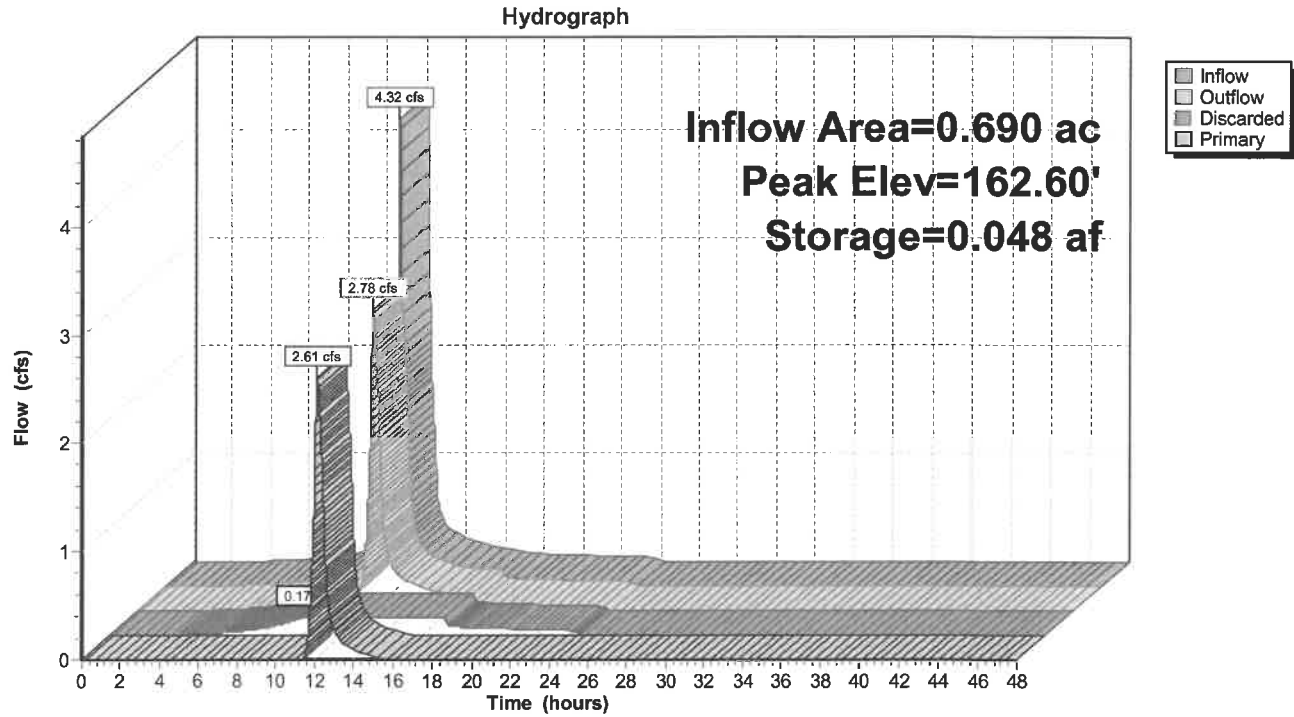
PRE & POST DEVELOPMENT DA #2

Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

Page 21

Pond 5P: DETENTION SYSTEM #2



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2
Type III 24-hr 25 year Rainfall=6.57"

Printed 1/6/2020

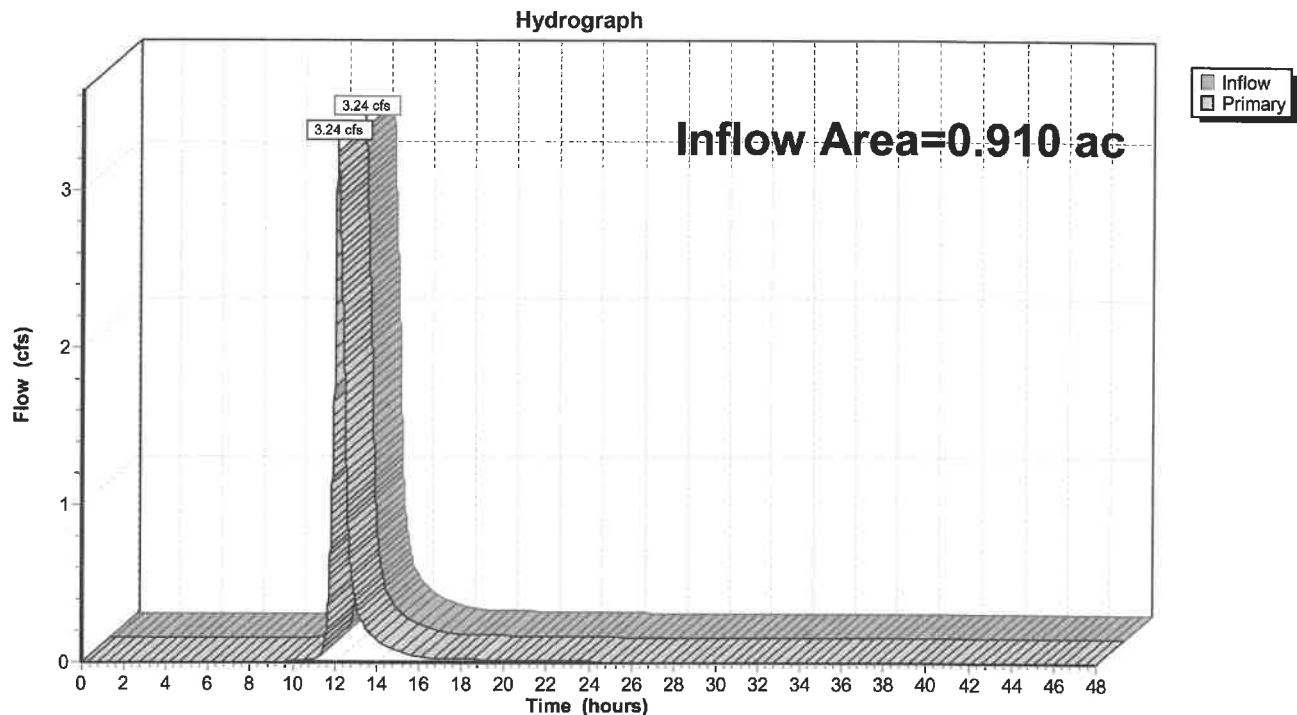
Page 22

Summary for Link 2L: POST-DEV DA#1 OUTFLOW

Inflow Area = 0.910 ac, 64.84% Impervious, Inflow Depth = 2.75" for 25 year event
Inflow = 3.24 cfs @ 12.12 hrs, Volume= 0.209 af
Primary = 3.24 cfs @ 12.12 hrs, Volume= 0.209 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 2L: POST-DEV DA#1 OUTFLOW



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 50 year Rainfall=7.44"

Printed 1/6/2020

Page 23

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 5S: PRE-DEV DA #2

Runoff Area=0.780 ac 48.72% Impervious Runoff Depth=4.99"

Tc=5.0 min CN=79.0 Runoff=4.68 cfs 0.324 af

Subcatchment 6S: POST-DEV DA #2

Runoff Area=0.690 ac 79.71% Impervious Runoff Depth=6.31"

Tc=5.0 min CN=90.5 Runoff=4.95 cfs 0.363 af

Subcatchment 7S: POST-DEV DA #2

Runoff Area=0.220 ac 18.18% Impervious Runoff Depth=3.74"

Tc=5.0 min CN=67.7 Runoff=1.00 cfs 0.069 af

Pond 5P: DETENTION SYSTEM #2

Peak Elev=162.93' Storage=0.054 af Inflow=4.95 cfs 0.363 af

Discarded=0.17 cfs 0.175 af Primary=3.02 cfs 0.188 af Outflow=3.18 cfs 0.363 af

Link 2L: POST-DEV DA#1 OUTFLOW

Inflow=3.77 cfs 0.257 af

Primary=3.77 cfs 0.257 af

Total Runoff Area = 1.690 ac Runoff Volume = 0.756 af Average Runoff Depth = 5.37"

42.60% Pervious = 0.720 ac 57.40% Impervious = 0.970 ac

PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 50 year Rainfall=7.44"

Printed 1/6/2020

Page 24

Summary for Subcatchment 5S: PRE-DEV DA #2

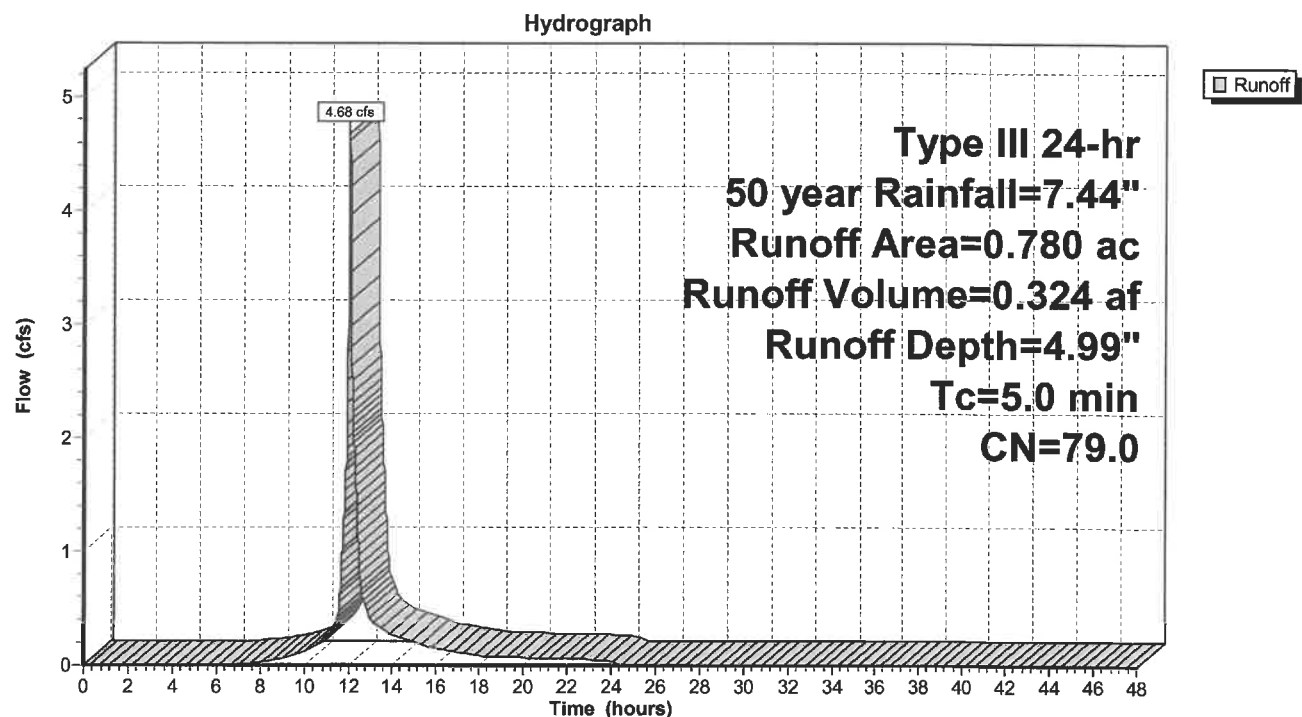
Runoff = 4.68 cfs @ 12.07 hrs, Volume= 0.324 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 year Rainfall=7.44"

Area (ac)	CN	Description
0.400	61.0	>75% Grass cover, Good, HSG B
0.280	98.0	Paved parking, HSG B
0.100	98.0	Roofs, HSG B
0.780	79.0	Weighted Average
0.400		51.28% Pervious Area
0.380		48.72% Impervious Area

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

Subcatchment 5S: PRE-DEV DA #2



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 50 year Rainfall=7.44"

Printed 1/6/2020

Page 25

Summary for Subcatchment 6S: POST-DEV DA #2

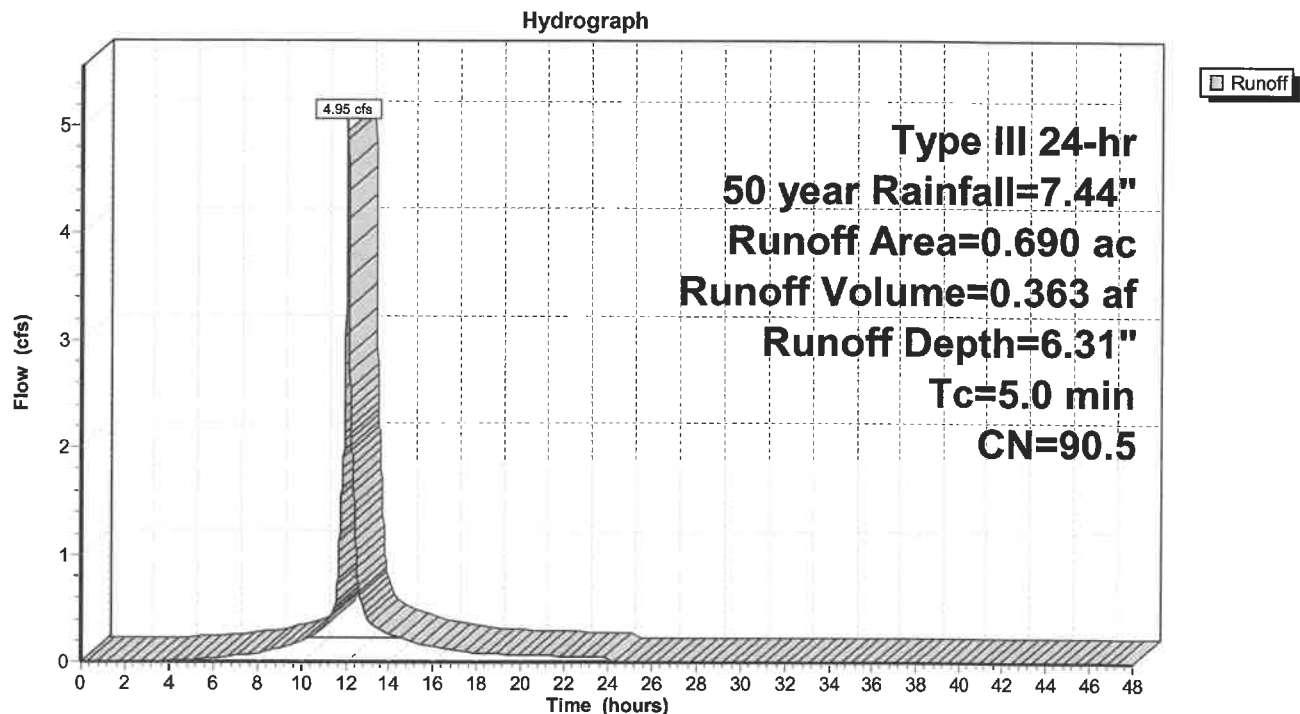
Runoff = 4.95 cfs @ 12.07 hrs, Volume= 0.363 af, Depth= 6.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 year Rainfall=7.44"

Area (ac)	CN	Description
0.130	98.0	Roofs, HSG B
0.420	98.0	Paved parking, HSG B
0.140	61.0	>75% Grass cover, Good, HSG B
0.690	90.5	Weighted Average
0.140		20.29% Pervious Area
0.550		79.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 6S: POST-DEV DA #2



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 50 year Rainfall=7.44"

Printed 1/6/2020

Page 26

Summary for Subcatchment 7S: POST-DEV DA #2 BYPASS

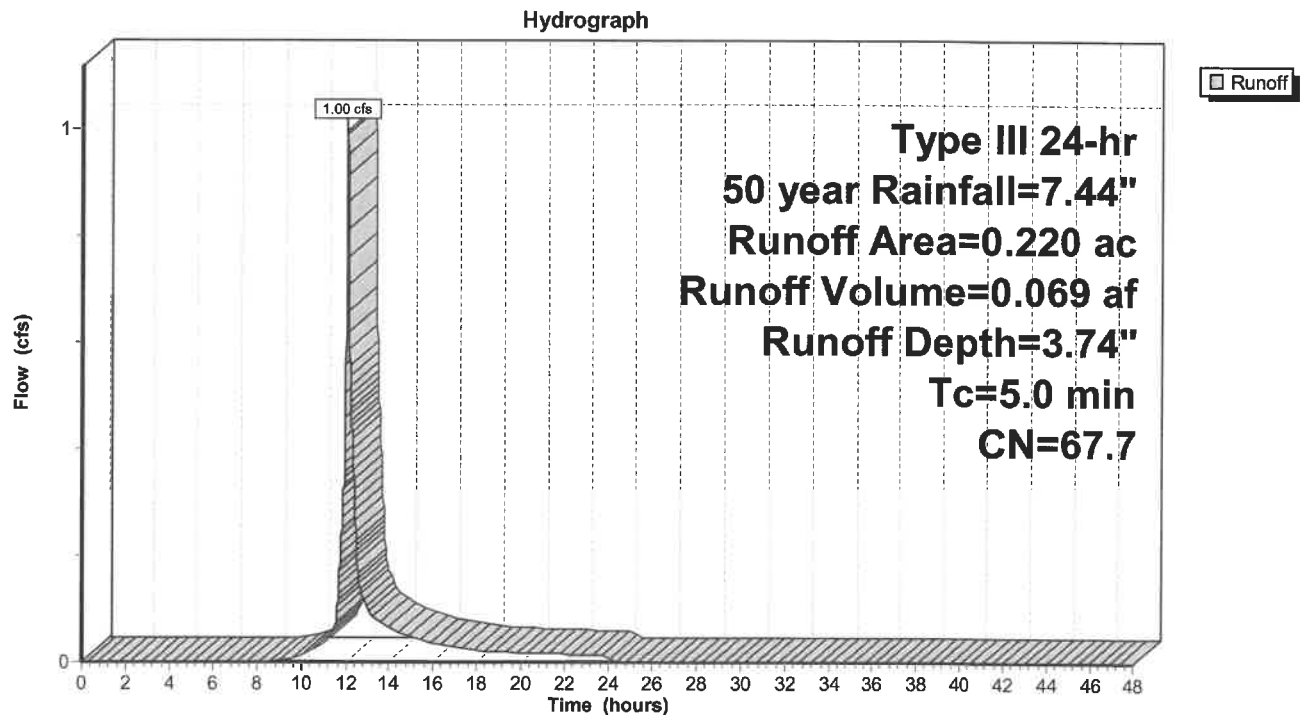
Runoff = 1.00 cfs @ 12.08 hrs, Volume= 0.069 af, Depth= 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 year Rainfall=7.44"

Area (ac)	CN	Description
0.040	98.0	Paved parking, HSG B
0.180	61.0	>75% Grass cover, Good, HSG B
0.220	67.7	Weighted Average
0.180		81.82% Pervious Area
0.040		18.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Sheet Flow

Subcatchment 7S: POST-DEV DA #2 BYPASS



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2

Type III 24-hr 50 year Rainfall=7.44"

Printed 1/6/2020

Page 27

Summary for Pond 5P: DETENTION SYSTEM #2

Inflow Area = 0.690 ac, 79.71% Impervious, Inflow Depth = 6.31" for 50 year event
 Inflow = 4.95 cfs @ 12.07 hrs, Volume= 0.363 af
 Outflow = 3.18 cfs @ 12.16 hrs, Volume= 0.363 af, Atten= 36%, Lag= 5.1 min
 Discarded = 0.17 cfs @ 9.89 hrs, Volume= 0.175 af
 Primary = 3.02 cfs @ 12.16 hrs, Volume= 0.188 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 162.93' @ 12.16 hrs Surf.Area= 0.037 ac Storage= 0.054 af

Plug-Flow detention time= 16.4 min calculated for 0.363 af (100% of inflow)
 Center-of-Mass det. time= 16.4 min (791.8 - 775.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	160.70'	0.027 af	14.75'W x 110.61'L x 2.71'H Field A 0.101 af Overall - 0.034 af Embedded = 0.067 af x 40.0% Voids
#2A	161.20'	0.034 af	Cultec R-180 x 68 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
		0.061 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	160.70'	4.400 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	161.20'	10.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.17 cfs @ 9.89 hrs HW=160.73' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.17 cfs)**Primary OutFlow** Max=3.01 cfs @ 12.16 hrs HW=162.93' TW=0.00' (Dynamic Tailwater)↑**2=Orifice/Grate** (Orifice Controls 3.01 cfs @ 5.53 fps)

PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

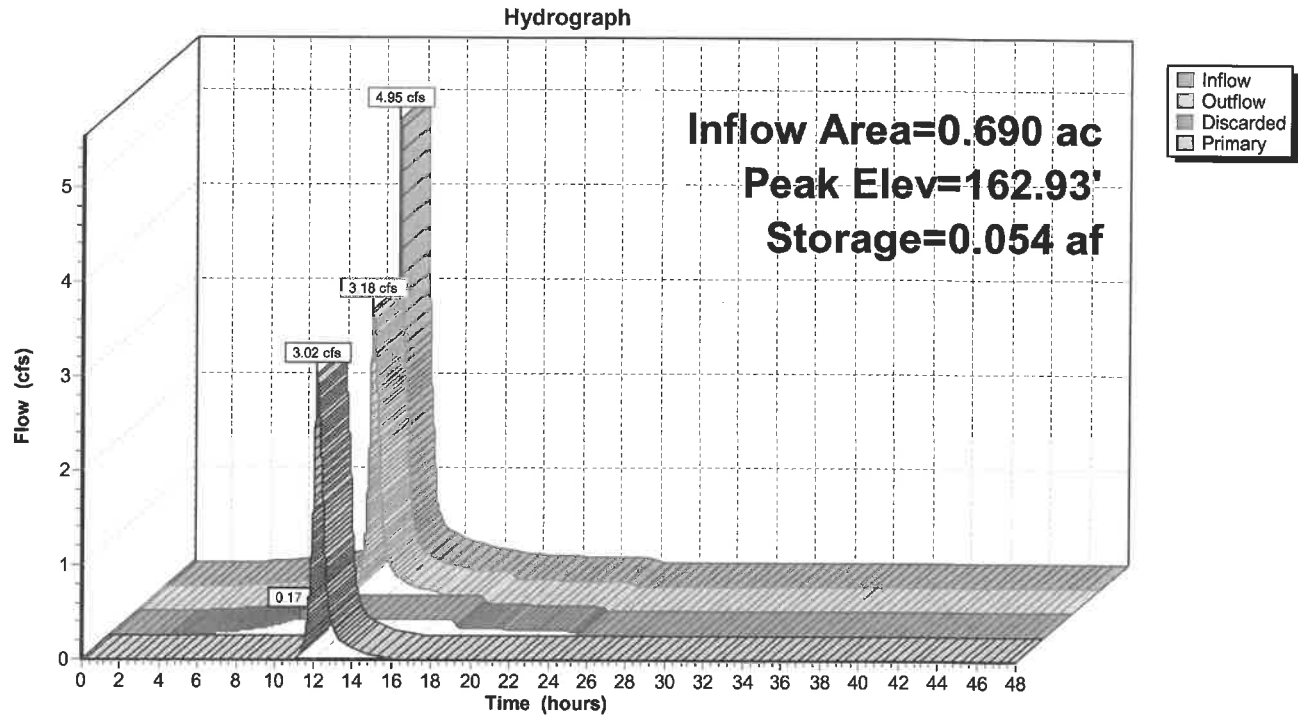
PRE & POST DEVELOPMENT DA #2

Type III 24-hr 50 year Rainfall=7.44"

Printed 1/6/2020

Page 28

Pond 5P: DETENTION SYSTEM #2



PRE-POST-ANALYSIS-DA#2

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 01461 © 2018 HydroCAD Software Solutions LLC

PRE & POST DEVELOPMENT DA #2
Type III 24-hr 50 year Rainfall=7.44"

Printed 1/6/2020

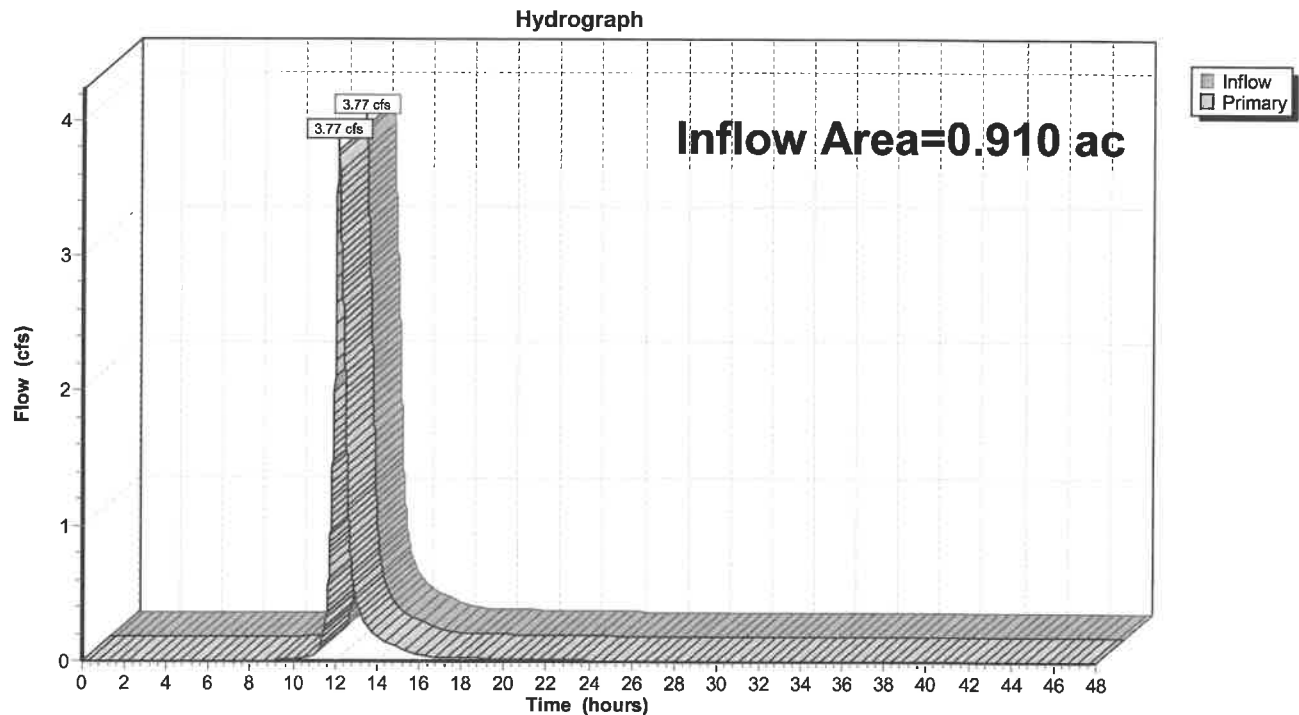
Page 29

Summary for Link 2L: POST-DEV DA#1 OUTFLOW

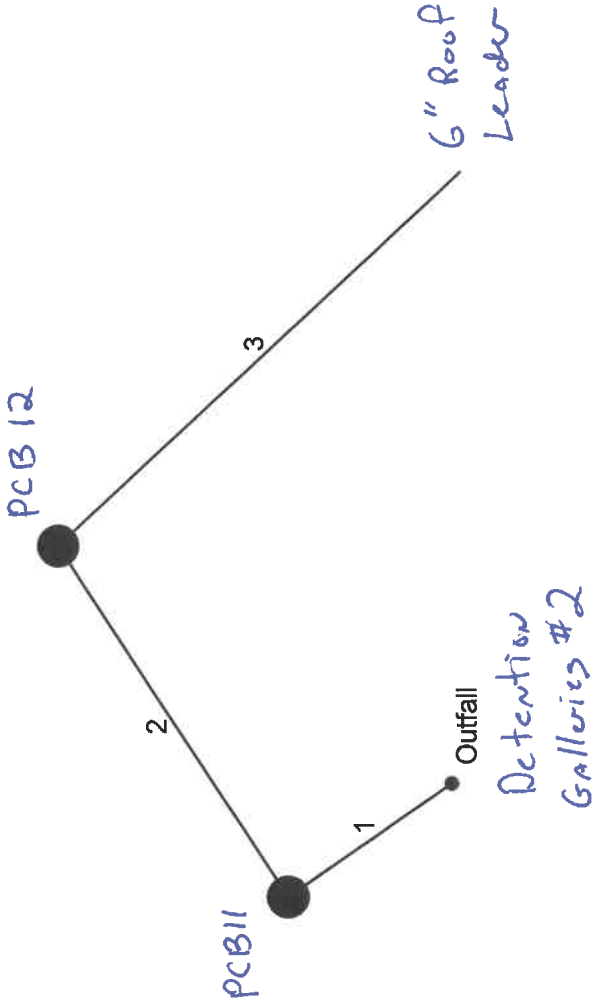
Inflow Area = 0.910 ac, 64.84% Impervious, Inflow Depth = 3.39" for 50 year event
Inflow = 3.77 cfs @ 12.13 hrs, Volume= 0.257 af
Primary = 3.77 cfs @ 12.13 hrs, Volume= 0.257 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 2L: POST-DEV DA#1 OUTFLOW



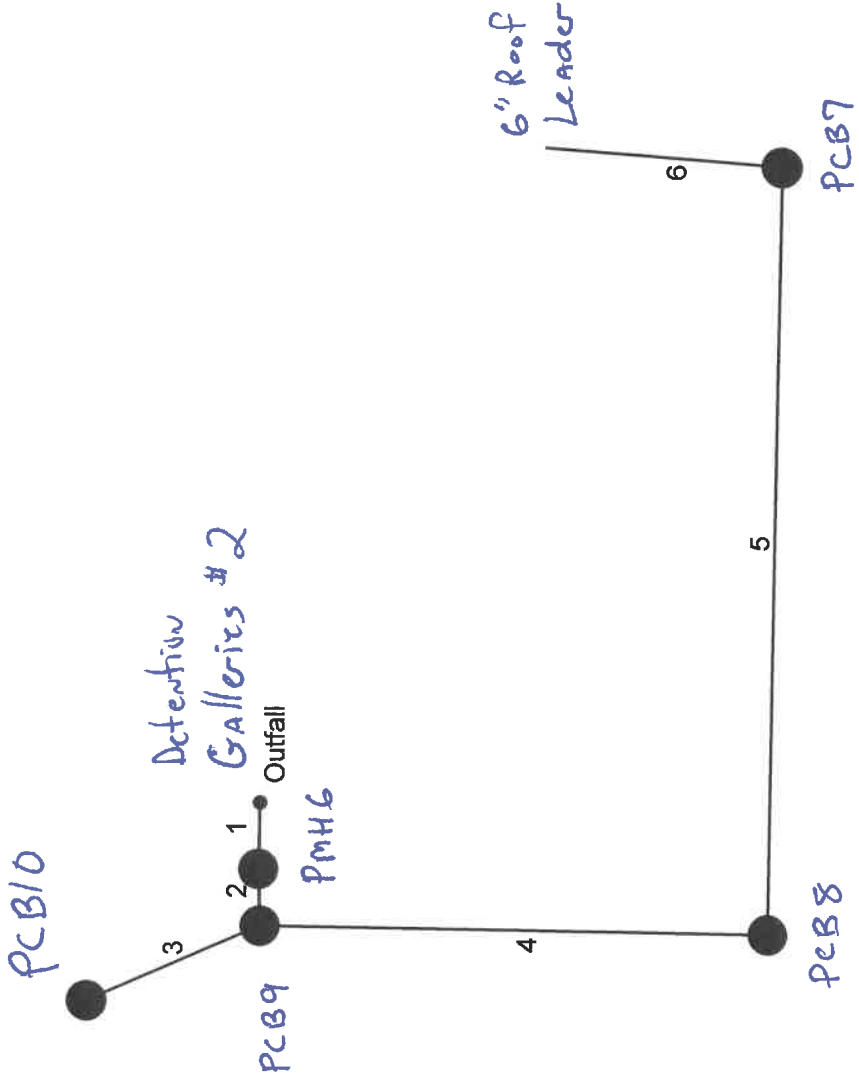
Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Storm Sewer Tabulation

Station		Len (ft)	Drmg Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	20.000	0.09	0.31	0.83	0.07	0.21	5.0	5.5	8.2	1.75	4.73	3.84	12	1.50	163.20	163.50	163.76	164.06	167.20	166.15	PCB11-PMH8
2	1	42.000	0.19	0.22	0.58	0.11	0.14	5.0	5.2	8.4	1.15	3.26	2.72	12	0.71	163.60	163.90	164.26	164.35	166.15	166.40	PCB12-PCB11
3	2	55.000	0.03	0.03	0.90	0.03	0.03	5.0	5.0	8.6	0.23	1.35	3.79	6	4.91	164.40	167.10	164.54	167.34	166.40	169.10	ROOF-PCB12
Project File: PMH8.stm														Number of lines: 3		Run Date: 1/6/2020						
NOTES: Intensity = 38.51 / (Inlet time + 3.60) ^ 0.70; Return period = Yrs. 25 ; c = cir e = ellip b = box																						

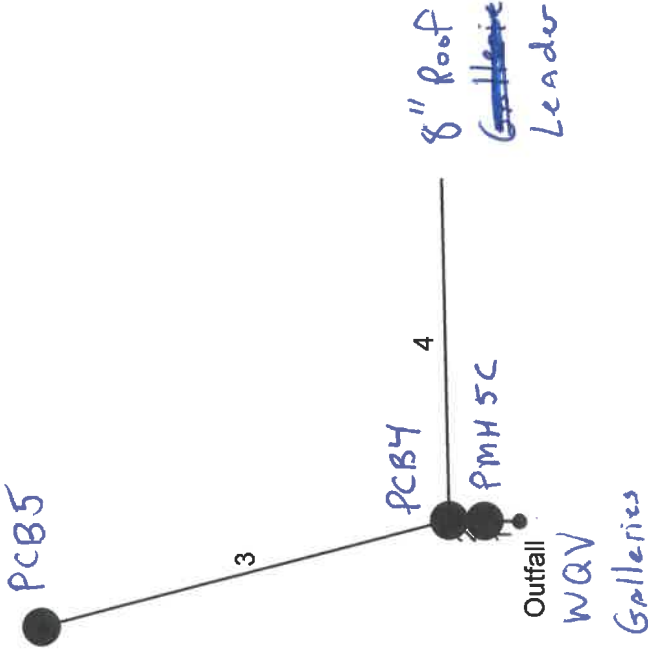
Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	7.000	0.00	0.36	0.00	0.28	5.0	6.0	8.0	2.24	17.25	4.23	12	20.00	161.20	162.60	161.84	163.24	166.50	166.50	PMH6-GAL	
2	1	6.000	0.02	0.36	0.90	0.02	0.28	5.0	5.9	8.0	2.25	4.98	3.80	12	1.67	162.60	162.70	163.39	163.34	166.50	166.30	PCB9-PMH6
3	2	20.000	0.15	0.15	0.74	0.11	0.11	5.0	5.0	8.6	0.95	3.86	2.35	12	1.00	162.80	163.00	163.53	163.41	166.30	165.50	PCB10-PCB9
4	2	54.000	0.05	0.19	0.78	0.04	0.15	5.0	5.6	8.2	1.25	4.39	2.67	12	1.30	162.80	163.50	163.58	163.97	166.30	166.10	PCB8-PCB9
5	4	81.000	0.06	0.14	0.70	0.04	0.11	5.0	5.1	8.5	0.97	3.32	2.73	12	0.74	163.60	164.20	164.13	164.61	166.10	167.20	PCB7-PCB8
6	5	25.000	0.08	0.08	0.90	0.07	0.07	5.0	5.0	8.6	0.62	0.67	3.76	6	1.20	165.00	165.30	165.38	165.70	167.20	167.60	ROOF-PCB7
Project File: PMH6.stm														Number of lines: 6				Run Date: 1/6/2020				
NOTES: Intensity = 38.51 / (Inlet time + 3.60) ^ 0.70; Return period =Yrs. 25 ; c = cir e = ellip b = box																						

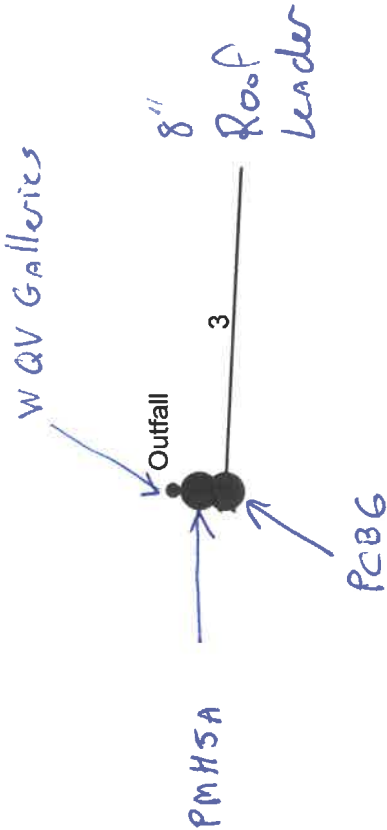
Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID				
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)					
1	End	4.000	0.00	0.24	0.00	0.20	5.0	5.9	8.0	1.63	6.10	3.75	12	2.50	161.80	161.90	162.34	162.44	168.10	168.10	PMH5C-GAL					
2	1	4.000	0.12	0.24	0.85	0.10	0.20	5.0	5.9	8.0	1.63	8.63	6.09	12	5.00	164.70	164.90	164.99	165.44	168.10	168.00	PCB4-PMH5C				
3	2	48.000	0.06	0.06	0.80	0.05	0.05	5.0	5.0	8.6	0.41	1.76	0.86	12	0.21	165.00	165.10	165.64	165.65	168.00	167.60	PCB5-PCB4				
4	2	38.000	0.06	0.06	0.90	0.05	0.05	5.0	5.0	8.6	0.46	1.34	2.09	8	1.05	165.00	165.40	165.63	165.72	168.00	168.60	ROOF-PCB4				
Project File: PMH5C.stm																							Number of lines: 4		Run Date: 1/6/2020	
NOTES: Intensity = 38.51 / (Inlet time + 3.60) ^ 0.70; Return period = Yrs. 25 ; c = cir e = ellip b = box																										

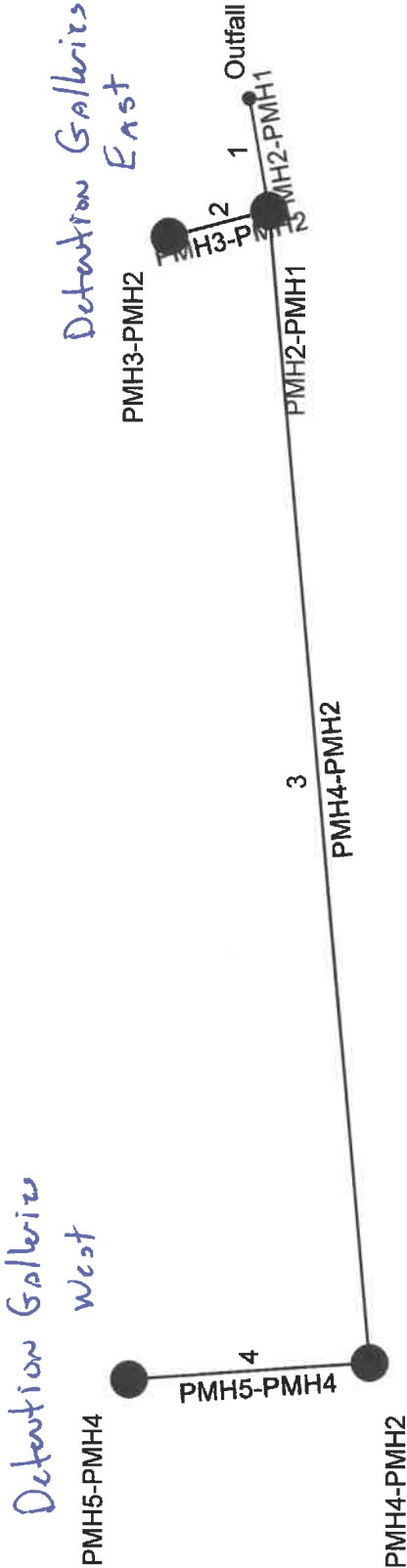
Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr	Total	(C)	Incr	Total	Inlet	Syst	(in/hr)	(cfs)	(cfs)	(ft/s)	Size	Slope	Dn	Up	Dn	Up	Dn	Up	
			(ac)	(ac)				(min)	(min)					(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	3.000	0.00	0.19	0.00	0.00	0.16	0.0	5.2	8.4	1.38	7.04	3.54	12	3.33	161.80	161.90	162.30	162.40	168.10	168.05	PMH5A-GAL
2	1	3.000	0.13	0.19	0.85	0.11	0.16	5.0	5.2	8.4	1.39	2.39	5.78	8	3.33	164.70	164.80	165.06	165.35	168.05	168.00	PCB6-PMH5A
3	2	36.000	0.06	0.06	0.90	0.05	0.05	5.0	5.0	8.6	0.46	1.38	2.72	8	1.11	165.30	165.70	165.64	166.02	168.00	168.60	ROOF-PCB6

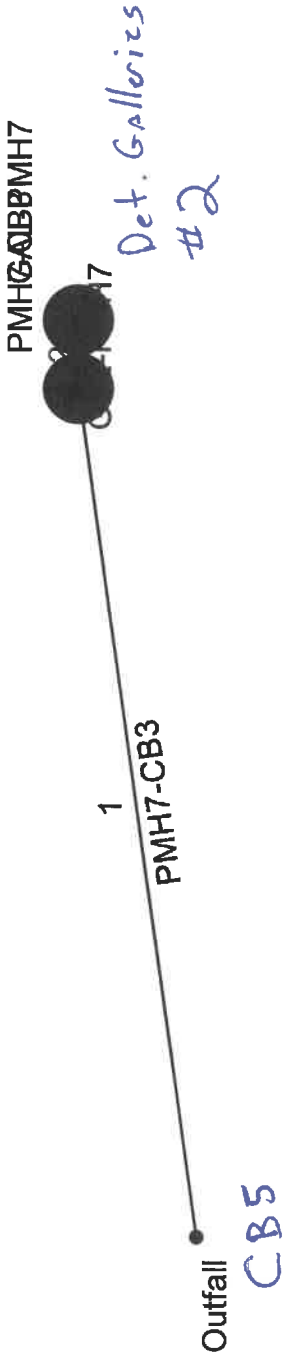
Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Storm Sewer Tabulation

Station Line	To Line	Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
			Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	13.000	0.00	0.00	0.00	0.00	0.00	5.0	0.0	0.0	0.00	0.00	4.03	12	1.54	154.90	155.10	155.50	155.70	0.00	159.70	PMH2-PMH1
2	1	12.000	0.00	0.00	0.00	0.00	0.00	5.0	0.0	0.0	0.00	0.00	3.34	12	1.67	155.20	155.40	155.88	155.95	159.70	159.10	PMH3-PMH2
3	1	132.000	0.00	0.00	0.00	0.00	0.00	5.0	0.0	0.0	0.00	0.00	3.42	6	3.94	155.70	160.90	155.91	161.19	159.70	166.30	PMH4-PMH2
4	3	28.000	0.00	0.00	0.00	0.00	0.00	5.0	0.0	0.0	0.00	0.00	2.91	6	1.07	161.00	161.30	161.26	161.59	166.30	168.60	PMH5-PMH4
Project File: PMH1.stm																					Run Date: 1/6/2020	
NOTES: Intensity = 38.51 / (Inlet time + 3.60) ^ 0.70; Return period = Yrs. 25 ; c = cir e = ellip b = box																					Number of lines: 4	

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	50.000	0.00	0.00	0.00	0.00	0.0	5.0	0.0	0.0	0.00	0.00	5.25	10	2.70	159.35	160.70	160.06	161.41	164.50	166.50	PMH7-CB3
2	1	4.000	0.00	0.00	0.00	0.00	0.0	5.0	0.0	0.0	0.00	0.00	5.34	10	10.00	160.80	161.20	161.49	161.91	166.50	166.30	GAL-PMH7
Project File: CB3.stm															Number of lines: 2				Run Date: 1/6/2020			
NOTES: Intensity = 38.51 / (Inlet time + 3.60) ^ 0.70; Return period = Yrs. 25 ; c = cir e = ellip b = box																						

WATER QUALITY VOLUME / WATER QUALITY FLOW

REFER TO SECTION 7.4.1 OF THE "2004 CONNECTICUT
STORMWATER QUALITY MANUAL"

PROJECT 198-200 DANBURY ROAD

GIVEN: ON-SITE DRAINAGE AREA #1 TO DETENTION EAST=0.72 Ac.

WATER QUALITY VOLUME "WQV"= (1") (R) (A) / 12

"R" = VOLUMETRIC RUNOFF COEFFICIENT = 0.05 + 0.009I

<u>SYMBOL</u>	<u>DESCRIPTION</u>	<u>UNITS</u>	<u>PARAMETER</u>
I	IMPERVIOUS PERCENT	%	77.8
A	SITE AREA	ACRES	0.72
R	VOLUMETRIC RUNOFF COEFF.	N/A	0.75

WATER QUALITY VOLUME COMPUTATION:

WQV	WATER QUALITY VOLUME	AC-FT	0.045
WQV	WATER QUALITY VOLUME	CF	1961

WATER QUALITY FLOW COMPUTATION:

INPUT			
P	DESIGN PRECIPITATION	INCHES	1.0
Q	RUNOFF DEPTH-WATERSHED	INCHES	0.75
CN	WQV RUNOFF CURVE #	N/A	98
Ia/P	INIT. ABSTRACTION (TABLE 4-I)	INCHES	0.041
0.8	TIME OF CONCENTRATION	HOURS	0.083
qu	UNIT PEAK DISCH. (TABLE 4-III)	CSM/INCH	650
WQF	WATER QUALITY FLOW	CFS	0.55

WATER QUALITY VOLUME / WATER QUALITY FLOW

REFER TO SECTION 7.4.1 OF THE "2004 CONNECTICUT
STORMWATER QUALITY MANUAL"

PROJECT 198-200 DANBURY ROAD

GIVEN: ON-SITE DRAINAGE AREA #1 TO DETENTION WEST SYSTEM=0.38 Ac.

WATER QUALITY VOLUME "WQV"= (1")(R) (A) / 12

"R" = VOLUMETRIC RUNOFF COEFFICIENT = 0.05 + 0.009I

<u>SYMBOL</u>	<u>DESCRIPTION</u>	<u>UNITS</u>	<u>PARAMETER</u>
I	IMPERVIOUS PERCENT	%	94.7
A	SITE AREA	ACRES	0.38
R	VOLUMETRIC RUNOFF COEFF.	N/A	0.90

WATER QUALITY VOLUME COMPUTATION:

WQV	WATER QUALITY VOLUME	AC-FT	0.029
WQV	WATER QUALITY VOLUME	CF	1245

WATER QUALITY FLOW COMPUTATION:

INPUT			
P	DESIGN PRECIPITATION	INCHES	1.0
Q	RUNOFF DEPTH-WATERSHED	INCHES	0.90
CN	WQV RUNOFF CURVE #	N/A	99
Ia/P	INIT. ABSTRACTION (TABLE 4-I)	INCHES	0.041
0.8	TIME OF CONCENTRATION	HOURS	0.083
qu	UNIT PEAK DISCH. (TABLE 4-III)	CSM/INCH	650
WQF	WATER QUALITY FLOW	CFS	0.35

WATER QUALITY VOLUME / WATER QUALITY FLOW

REFER TO SECTION 7.4.1 OF THE "2004 CONNECTICUT
STORMWATER QUALITY MANUAL"

PROJECT 198-200 DANBURY ROAD

GIVEN: ON-SITE DRAINAGE AREA #2 TO DETENTION SYSTEM #2=0.069 Ac.

WATER QUALITY VOLUME "WQV"= (1")(R) (A) / 12

"R" = VOLUMETRIC RUNOFF COEFFICIENT = 0.05 + 0.009I

<u>SYMBOL</u>	<u>DESCRIPTION</u>	<u>UNITS</u>	<u>PARAMETER</u>
I	IMPERVIOUS PERCENT	%	81.2
A	SITE AREA	ACRES	0.69
R	VOLUMETRIC RUNOFF COEFF.	N/A	0.78

WATER QUALITY VOLUME COMPUTATION:

WQV	WATER QUALITY VOLUME	AC-FT
WQV	WATER QUALITY VOLUME	CF

0.045

1956

WATER QUALITY FLOW COMPUTATION:

INPUT		
P	DESIGN PRECIPITATION	INCHES
Q	RUNOFF DEPTH-WATERSHED	INCHES
CN	WQV RUNOFF CURVE #	N/A
Ia/P	INIT. ABSTRACTION (TABLE 4-I)	INCHES
0.8	TIME OF CONCENTRATION	HOURS
qu	UNIT PEAK DISCH. (TABLE 4-III)	CSM/INCH
WQF	WATER QUALITY FLOW	CFS

1.0

0.78

98

0.041

0.083

650

0.55

GROUNDWATER RECHARGE VOLUME

REFER TO SECTION 7.5.1 OF THE "2004 CONNECTICUT
STORMWATER QUALITY MANUAL"

PROJECT 198-200 DANBURY ROAD

GIVEN: ON-SITE DRAINAGE AREA #1 = 1.10 Ac.

WATER QUALITY VOLUME "WQV" = $(1") (R) (A) / 12$

"R" = VOLUMETRIC RUNOFF COEFFICIENT = $0.05 + 0.009I$

<u>SYMBOL</u>	<u>DESCRIPTION</u>	<u>UNITS</u>	<u>PARAMETER</u>
Ipre	PRE-DEV IMPERVIOUS PERCENT	N/A	0.267
Ipost	POST-DEV IMPERVIOUS PERCENT	N/A	0.836
I _{net}	NET IMPERVIOUS PERCENT	N/A	0.569
A	SITE AREA	ACRES	1.10
D	GROUNDWATER RECHARGE DEPTH	INCHES	0.25

GROUNDWATER RECHARGE VOLUME:

GRV GROUNDWATER RECHARGE VOLUME AC-FT

0.013

D=TYPE B SOILS = 0.25 INCHES

GROUNDWATER RECHARGE VOLUME

REFER TO SECTION 7.5.1 OF THE "2004 CONNECTICUT
STORMWATER QUALITY MANUAL"

PROJECT 198-200 DANBURY ROAD

GIVEN: ON-SITE DRAINAGE AREA #2 = 0.91 Ac.

WATER QUALITY VOLUME "WQV" = $(1") (R) (A) / 12$

"R" = VOLUMETRIC RUNOFF COEFFICIENT = $0.05 + 0.0091$

<u>SYMBOL</u>	<u>DESCRIPTION</u>	<u>UNITS</u>	<u>PARAMETER</u>
Ipre	PRE-DEV IMPERVIOUS PERCENT	N/A	0.487
Ipost	POST-DEV IMPERVIOUS PERCENT	N/A	0.648
Inet	NET IMPERVIOUS PERCENT	N/A	0.161
A	SITE AREA	ACRES	0.91
D	GROUNDWATER RECHARGE DEPTH	INCHES	0.25

GROUNDWATER RECHARGE VOLUME:

GRV GROUNDWATER RECHARGE VOLUME AC-FT

0.003

D=TYPE B SOILS = 0.25 INCHES