

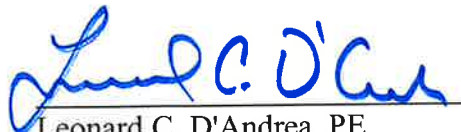
DRAINAGE SUMMARY REPORT

**FOR
Residential Development**

**LOCATED AT
11 KONANDREAS DRIVE
STAMFORD, CONNECTICUT**

**PREPARED FOR
CHRIS & MICHELLE MORTON**

January 22, 2024



Leonard C. D'Andrea, PE
CT License No. 14869

23OE_DSR_0

LAND PLANNERS • ENGINEERS • SURVEYORS

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Apt. No. 22R
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Engineer: D'Andrea Surveying & Engineering, PC
Leonard C. D'Andrea, PE
6 Neil Lane Riverside, CT 06878
lcd@rvdi.com

Site Information:

11 Konandreas Drive
Map 004, Block 392, Parcel "A"
Current Zone: RA-1 Zoning District
Existing Use: Residential

Introduction

The owner of 11 Konandreas Drive in Stamford, Connecticut is proposing improvements to the subject parcel. The parcel is located on the southeasterly corner of the intersection of Konandreas Drive and Hunting Ridge Road. The parcel totals approximately 1.2328 acres within the RA-1 Zoning District and is located outside all Flood Hazard Areas (refer to Exhibit D for further information).

The site is currently undeveloped and contains mostly lawn, which has been maintained over the years. A wetland system sits to the southwest of the lot and contains a conservation easement which runs along the entirety of the southerly property line. Portions of the conservation easement contain wooded areas with minimal undergrowth along the ground. Stormwater runoff from the easterly portion of the site flows south and east toward the southerly property line, Point of Concern (P.O.C.) "A". The remaining portion of the lot pitches south toward the on-site wetlands where flows exit the property along the southerly property line, P.O.C. "B". Off-site watersheds to the north also contribute to the site and contain a portion of the roadway and the northerly residential lots. Runoff from both off-site watersheds enter the roadway drainage system via catch basins, which route stormwater to the on-site wetland system. Both off-site watersheds to the north were included in this analysis. Refer to the Exhibit "A" for a depiction of existing conditions.

The Soil Survey of Fairfield County, Connecticut, as developed by the United States Department of Agriculture (USDA) and the Soil Conservation Service (SCS) classifies the on-site soil group as Canton and Charlton fine sandy loams with a hydrologic soil group rating of B. Refer to Exhibit C for the NRCS soil delineation map and hydrologic soil group rating.

The proposed dwelling will be set back approximately 70 feet off of Konandreas Drive and will include a new curb-cut for the driveway. Runoff from the proposed improvements will be routed to a proposed detention systems where flows will be treated and tempered. During larger storm events flows will be throttled to a down-gradient level spreader where runoff will revert back to sheet flow entering the southeasterly neighbor's property, P.O.C. "A". Refer to the Site Plan

Review Set, Sheets 1 through 4 of 4, prepared by D'Andrea Surveying & Engineering, PC for a depiction of existing conditions and the proposed site improvements.

Summary

There is no onsite impervious coverage under existing conditions, however, the proposed site improvements will increase the total on-site impervious coverage by approximately 5,235 s.f. The increase in on-site impervious coverage is proposed to be mitigated using a subsurface detention system, in order to maintain the peak rate of runoff during all storm events up to the 50-year storm event, as compared to existing conditions. Existing drainage patterns based on the proposed site grading and improvements will be maintained. Refer to Exhibit "B" for a depiction of proposed conditions.

The on-site drainage basins for existing and proposed conditions were modeled using HydroCAD 10.0 developed by HydroCAD Software Solutions LLC. The software was used to generate stormwater runoff rates for the 1-year to 100-year storm events, using the National Resources Conservation Services (NRCS) method. The drainage model for existing conditions analyzes (2) watersheds; one flowing to the southeasterly neighbor, P.O.C. "A", and one flowing to the southerly neighbor, P.O.C. "B".

The drainage model for proposed conditions analyzes the subject parcel using (3) drainage areas flowing to P.O.C. "A", and (3) drainage areas flowing to P.O.C. "B". Drainage Area A-1 models the easterly lawn portion of the site where surface runoff flows to the southeasterly property corner. Drainage Area A-2 models all of the proposed dwelling where runoff will collect within proposed roof drains and a catch basin before routing runoff to a proposed detention system (DW-1). Drainage Area A-3 contains the proposed driveway and a small portion of up-gradient lawn. Runoff from this area will flow down the driveway before entering a catch basin routed to proposed detention system (DW-1). During larger storm events the detention systems will overflow to a proposed level spreader located at the southeast portion of the lot.

Drainage Area B-1 models on-site runoff from the westerly lawn and wetlands while Drainage Area B-2 consists of the adjacent roadway, and Drainage Area B-3 consists of up-gradient residential properties. Both off-site drainage areas shed runoff to the roadway drainage system which routes and discharges runoff to the on-site wetland system along the southerly property line, P.O.C. "B".

The proposed detention system was designed to retain and infiltrate the water quality volume into the well-drained soils below. Based on the HydroCAD model, the peak rate of runoff discharging to both points of concern will be maintained or decreased for all storm events up to the 50-year event. Refer to Appendix "C" for a summary of the peak flow and volume discharge for the subject property. In addition to maintaining the peak flows, infiltration systems will help remove oils and suspended solids from the proposed asphalt driveway and roof prior to discharging downstream.

During the construction phase of the project, pretreatment of stormwater runoff will be provided by the use of temporary soil and erosion controls as outlined on the Site Plan Review Set prepared by D'Andrea Surveying & Engineering, PC. This includes the stockpiling of excess materials for control of sediment and periodic on-site inspections to ensure that the development of the site remains "tight" and stable throughout the construction phase.

Conclusion

In summary, based on the above information, the proposed improvements are designed in accordance with the City of Stamford Stormwater Drainage Manual and will not adversely impact adjacent or downstream properties or City-owned drainage facilities.

Exhibit A

Existing Conditions Watershed Map

ADJACENT OF RECORD

AREA "B-3"

AREA "B-2"

KONANDREAS DRIVE

AREA "A-1"

AREA "B-1"

PARCEL "A"

GRANITE EASEMENT
10'-0"

LOT 6
LAND BELIEF

POC "B"

POC "A"

HUNTING RIDGE ROAD

ROCCO V. D'ANDREA, INC.

- LAND PLANNERS
- ENGINEERS
- SURVEYORS

P.O. BOX 549
RIVERSIDE, CT 06878

6 NEIL LANE
TEL. 637-1779

EXHIBIT "A"
EXISTING CONDITIONS

1 INCH = 60 FEET

SCALE

60 0 60
IN FEET

2204_DSR_EL_000.DWG (B47)

Exhibit B

Proposed Conditions Watershed Map

230C_DSR_PRO_00.DWG (BAF)

ROCCO V. D'ANDREA, INC.

- LAND PLANNERS
- ENGINEERS
- SURVEYORS

P.O. BOX 549
RIVERSIDE, CT 06878

8 NEIL LANE
TEL. 837-1779

EXHIBIT "B"
PROPOSED CONDITIONS

1 INCH = 60 FEET

SCALE



POC "A"

POC "B"

HUNTING RIDGE ROAD

KONANDREAS DRIVE

MECHAN OF RECORD

AREA "B-3"

AREA "B-2"

AREA "B-1"

AREA "A-3"

AREA "A-2"

AREA "A-1"

PARCEL "A"

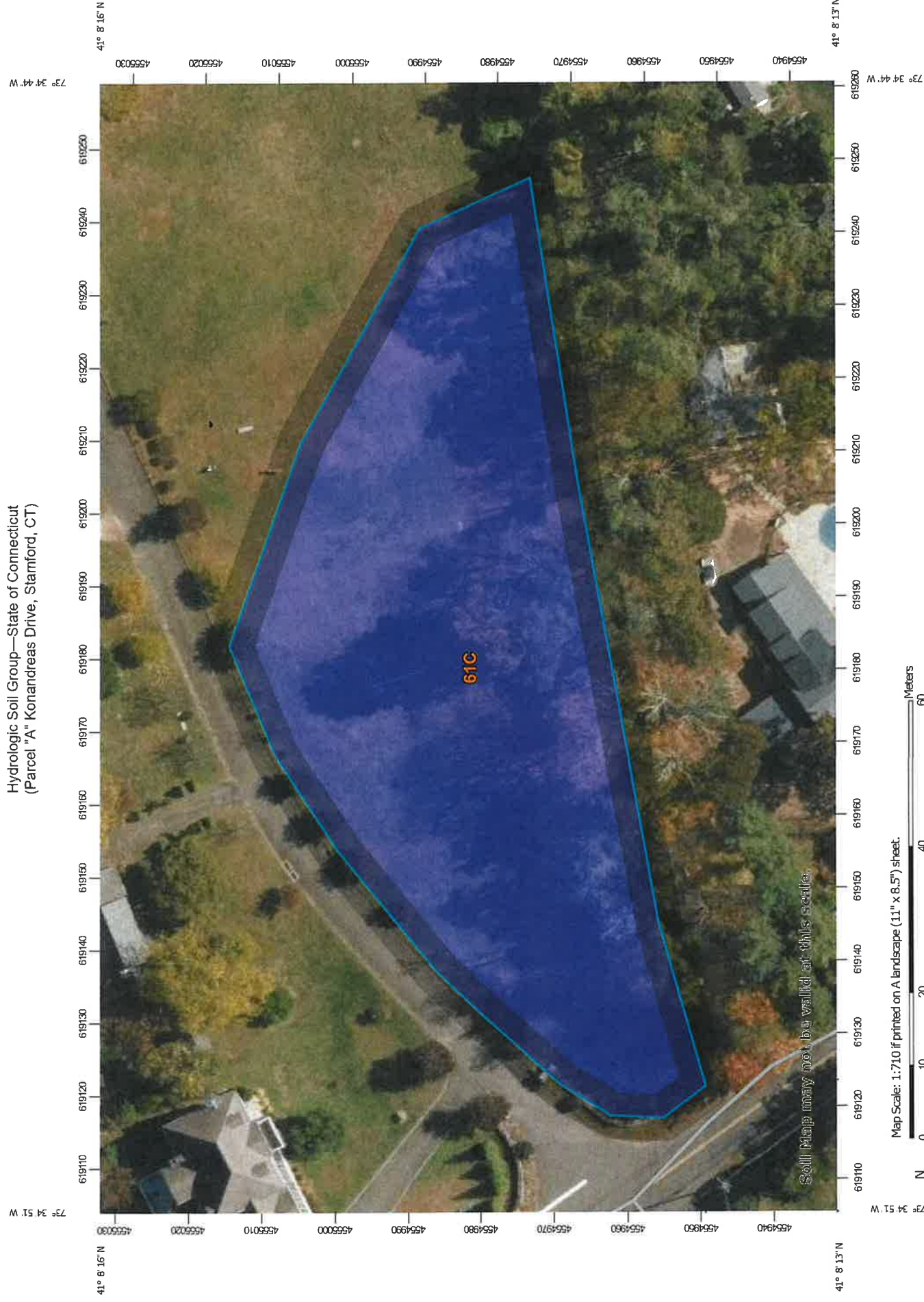
CONCRETE ELEMENT

LOT 6

CONCRETE ELEMENT

Exhibit C
NRCS Soil Map

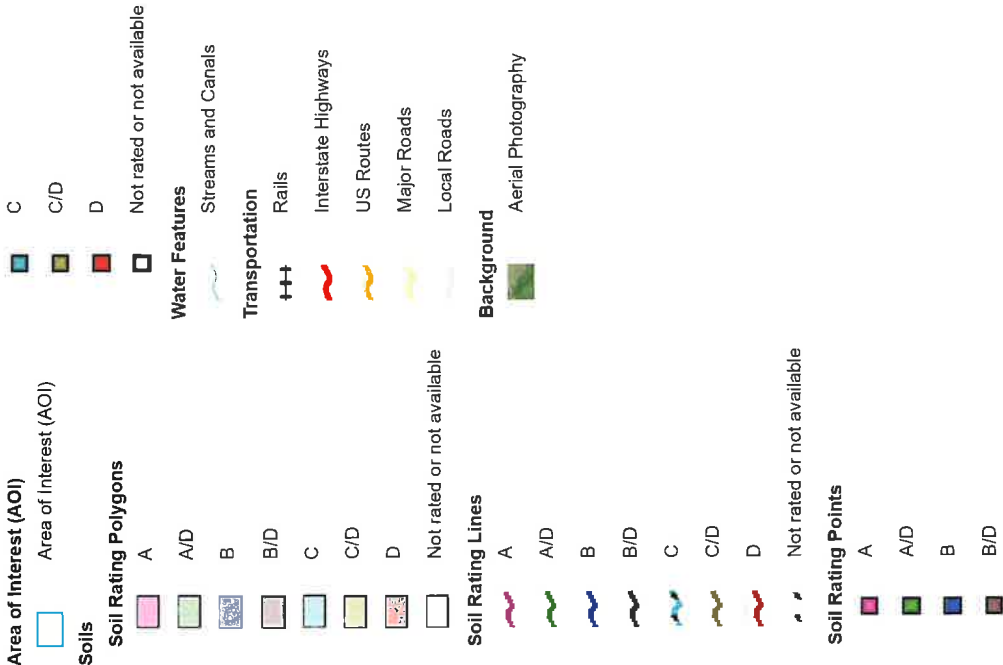
Hydrologic Soil Group—State of Connecticut (Parcel "A" Konandreas Drive, Stamford, CT)



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

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

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

Soil Survey Area: State of Connecticut
Survey Area Data: Version 21, Sep 7, 2021

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

Date(s) aerial images were photographed: Oct 4, 2020—Oct 31, 2020

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
61C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	B	1.1	100.0%
Totals for Area of Interest			1.1	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Exhibit D

FIRM Map

National Flood Hazard Layer FIRMette



73°35'7"W 41°8'29"N

Legend

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

Without Base Flood Elevation (BFE)
Zone A, V, A99

With BFE or Depth *Zone AE, AO, AH, VE, AR*

Regulatory Floodway

0.2% Annual Chance Flood Hazard, Area of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*

Future Conditions 1% Annual Chance Flood Hazard *Zone X*

Area with Reduced Flood Risk due to Levee. See Notes, *Zone X*

Area with Flood Risk due to Levee *Zone D*

NO SCREEN

Area of Minimal Flood Hazard *Zone X*

Effective LOMRS

Area of Undetermined Flood Hazard *Zone*

Channel, Culvert, or Storm Sewer

Levee, Dike, or Floodwall

Cross Sections with 1% Annual Chance Water Surface Elevation

Coastal Tract

Base Flood Elevation Line (BFE)

Limit of Study

Jurisdiction Boundary

Coastal Tract Baseline

Profile Baseline

Hydrographic Feature

Digital Data Available

No Digital Data Available

Unmapped

20.2

17.5

8

20

20.2

17.5

8

20

OTHER

FEATURES

MAP PANELS

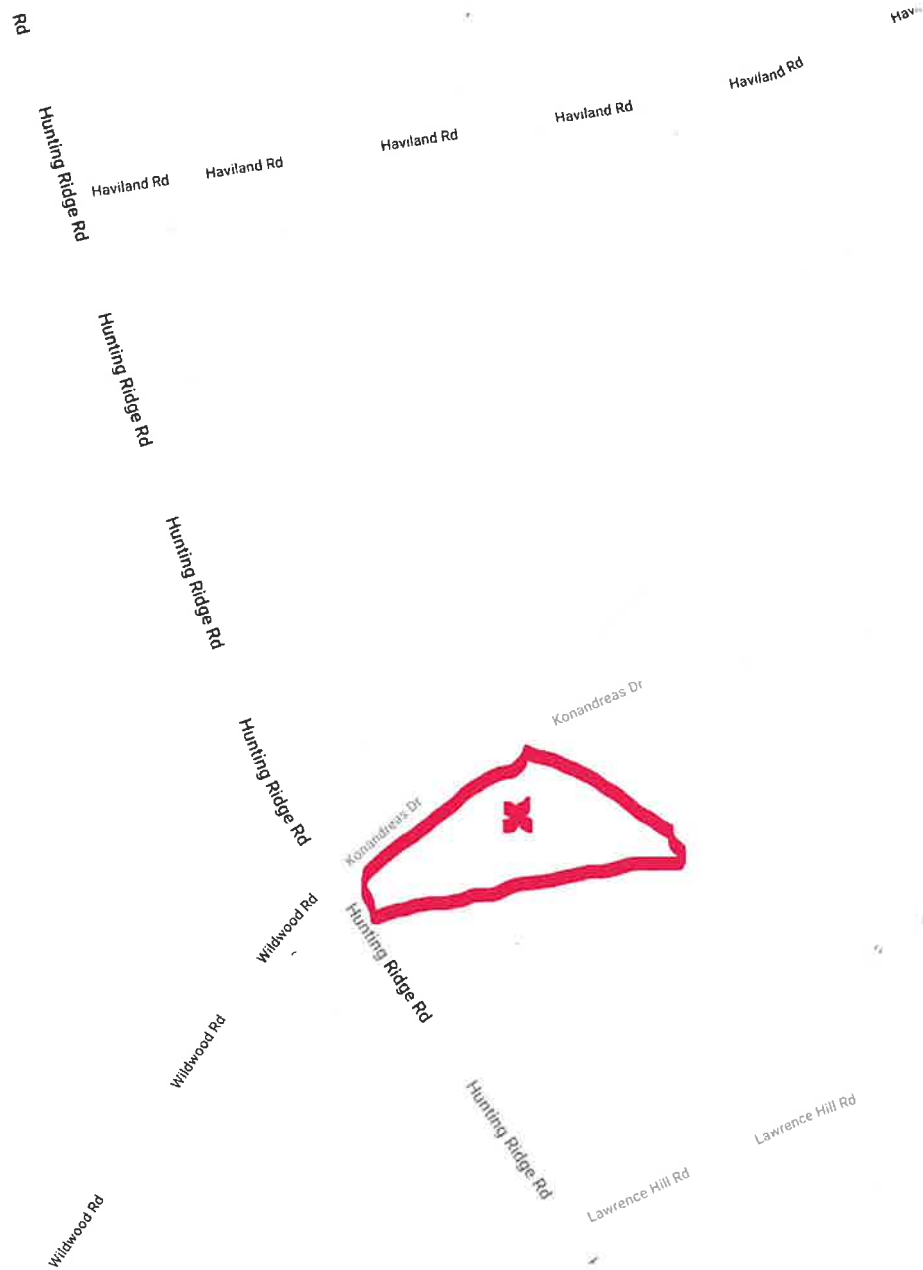
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **2/2/2023 at 6:05 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Exhibit E
Site Vicinity Map



Appendix A
Stormwater Calculations

Name: Chris & Michelle Morton
 Address: 11 Konandreas Drive, Stamford, CT
 Date: January 22, 2024

□ **Water Quality Volume (Area A-2 > DW-1)**

Watershed Data (Area 2)

Watershed Area	=	3,012 ft^2
Impervious Cover	=	3,012 ft^2
Lawn Cover	=	0 ft^2

$$WQV = \frac{1in}{12\frac{in}{ft}} RA$$

Where:

WQV	=	Water quality volume	
R	=	Site cover runoff coefficient	= $R_v I(\%I) + R_v T(\%T)$
$R_v I$	=	Runoff coefficient for impervious	= 0.95
$R_v T$	=	Runoff coefficient for lawn	= 0.20 (HSG B)
%I	=	Percent of site as impervious cover	= 1.00 (decimal)
%T	=	Percent of site in lawn	= 0.00 (decimal)
A	=	Watershed area	= 3,012 ft^2

$$R = 0.95(1.00) + 0.20(0.00) = 0.95$$

$$WQV = \frac{1}{12} (0.95)(3,012) = 238.5 ft^3$$

$$WQV = 238.5 ft^3$$

□ **Water Quality Volume (Area A-3 > DW-2)**

Watershed Data (Area 3)

Watershed Area	=	2,461 ft^2
Impervious Cover	=	2,050 ft^2
Lawn Cover	=	411 ft^2

$$WQV = \frac{1in}{12\frac{in}{ft}} RA$$

Where:

WQV	=	Water quality volume	
R	=	Site cover runoff coefficient	= $R_v I(\%I) + R_v T(\%T)$
$R_v I$	=	Runoff coefficient for impervious	= 0.95
$R_v T$	=	Runoff coefficient for lawn	= 0.20 (HSG B)
%I	=	Percent of site as impervious cover	= 0.83 (decimal)
%T	=	Percent of site in lawn	= 0.17 (decimal)
A	=	Watershed area	= 2,461 ft^2

$$R = 0.95(0.83) + 0.20(0.17) = 0.823$$

$$WQV = \frac{1}{12} (0.823)(2,461) = 168.8 ft^3$$

$$WQV = 168.8 ft^3$$

□ **Proposed BMPs**

Drywell System (DW-1)

The proposed drywell system was designed to retain runoff from each area to meet WQV requirements. Refer to the end of this section for a structure rating table for each drywell system.

$$\text{Total Storage Volume DW-1 (Bottom to outlet)} = 1,440 \text{ ft}^3$$

□ **BMP Drawdown Calculations**

According to the NRCS Web Soil Survey and the information provided in Exhibit "C", the proposed drainage system lies within a mapped area of HSG-B soils. Deep test holes performed on site revealed well-drained sandy loam, therefore no Borehole Infiltration tests were required.

Drywell (DW-1):

$$t_{\text{drawdown}} = \frac{DV}{kA}$$

Where:

DV	=	Design Volume	=	1,440	ft ³
k	=	Infiltration Rate	=	1.02	in/hr
A	=	Bottom Area	=	792	ft ²

$$t_{\text{drawdown}} = \frac{1,440}{(1.02)(1/12)(792)} = 21.4 \text{ hr}$$

Drywell will drawdown in 21.4 hrs.

230E_Pro_0

Prepared by RVDI

HydroCAD® 10.00-26 s/n 07357 © 2020 HydroCAD Software Solutions LLC

Type III 24-hr 100-Year Rainfall=8.45"

Printed 1/24/2024

Stage-Area-Storage for Pond 7P: DW-1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
385.00	0	387.60	1,491
385.05	16	387.65	1,515
385.10	32	387.70	1,538
385.15	48	387.75	1,561
385.20	63	387.80	1,582
385.25	79	387.85	1,602
385.30	95	387.90	1,621
385.35	111	387.95	1,638
385.40	127	388.00	1,655
385.45	143	388.05	1,675
385.50	158	388.10	1,694
385.55	193	388.15	1,714
385.60	228	388.20	1,734
385.65	262	388.25	1,754
385.70	296	388.30	1,774
385.75	331	388.35	1,793
385.80	365	388.40	1,813
385.85	399	388.45	1,833
385.90	433	388.50	1,853
385.95	467	388.55	1,870
386.00	501	388.60	1,874
386.05	535	388.65	1,878
386.10	569	388.70	1,882
386.15	603	388.75	1,886
386.20	636	388.80	1,890
386.25	669	388.85	1,894
386.30	703	388.90	1,898
386.35	736	388.95	1,902
386.40	769	389.00	1,906
386.45	802		
386.50	834		
386.55	867		
386.60	900		
386.65	933		
386.70	965		
386.75	997		
386.80	1,029		
386.85	1,061		
386.90	1,092		
386.95	1,123		
387.00	1,154		
387.05	1,184		
387.10	1,214		
387.15	1,244		
387.20	1,273		
387.25	1,302		
387.30	1,331		
387.35	1,359		
387.40	1,386		
387.45	1,413		
387.50	1,440		
387.55	1,466		

OUTLET



NOAA Atlas 14, Volume 10, Version 3
Location name: Stamford, Connecticut, USA*
Latitude: 41.1373°, Longitude: -73.5806°
Elevation: 391.02 ft**
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

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 (0.276-0.468)	0.423 (0.321-0.546)	0.520 (0.393-0.672)	0.601 (0.452-0.779)	0.713 (0.521-0.952)	0.797 (0.572-1.08)	0.884 (0.617-1.23)	0.978 (0.655-1.39)	1.11 (0.717-1.61)	1.21 (0.768-1.79)
10-min	0.516 (0.391-0.664)	0.600 (0.454-0.773)	0.738 (0.557-0.953)	0.852 (0.640-1.11)	1.01 (0.738-1.35)	1.13 (0.810-1.53)	1.25 (0.875-1.74)	1.39 (0.928-1.96)	1.57 (1.02-2.28)	1.72 (1.09-2.54)
15-min	0.606 (0.460-0.781)	0.706 (0.535-0.909)	0.869 (0.656-1.12)	1.00 (0.753-1.30)	1.19 (0.868-1.59)	1.33 (0.952-1.80)	1.47 (1.03-2.05)	1.63 (1.09-2.31)	1.85 (1.20-2.69)	2.02 (1.28-2.98)
30-min	0.855 (0.648-1.10)	0.992 (0.752-1.28)	1.22 (0.919-1.57)	1.40 (1.05-1.82)	1.66 (1.21-2.22)	1.86 (1.33-2.51)	2.06 (1.43-2.85)	2.27 (1.52-3.21)	2.56 (1.66-3.72)	2.79 (1.77-4.11)
60-min	1.10 (0.837-1.42)	1.28 (0.969-1.65)	1.57 (1.18-2.02)	1.81 (1.36-2.34)	2.13 (1.56-2.84)	2.38 (1.71-3.22)	2.64 (1.84-3.66)	2.91 (1.94-4.11)	3.27 (2.12-4.75)	3.56 (2.25-5.24)
2-hr	1.43 (1.09-1.83)	1.67 (1.27-2.14)	2.07 (1.57-2.65)	2.40 (1.81-3.09)	2.85 (2.09-3.78)	3.19 (2.30-4.30)	3.54 (2.49-4.90)	3.93 (2.64-5.52)	4.46 (2.90-6.44)	4.89 (3.11-7.17)
3-hr	1.65 (1.26-2.10)	1.94 (1.48-2.47)	2.41 (1.84-3.08)	2.80 (2.13-3.60)	3.34 (2.47-4.42)	3.75 (2.72-5.04)	4.18 (2.94-5.76)	4.64 (3.13-6.51)	5.30 (3.45-7.62)	5.84 (3.71-8.52)
6-hr	2.08 (1.61-2.64)	2.47 (1.90-3.12)	3.09 (2.37-3.93)	3.61 (2.76-4.60)	4.33 (3.21-5.69)	4.86 (3.54-6.50)	5.43 (3.85-7.46)	6.06 (4.09-8.44)	6.97 (4.54-9.95)	7.71 (4.92-11.2)
12-hr	2.58 (2.00-3.24)	3.07 (2.38-3.87)	3.88 (3.00-4.89)	4.55 (3.49-5.76)	5.47 (4.08-7.15)	6.16 (4.51-8.18)	6.88 (4.92-9.42)	7.71 (5.23-10.7)	8.91 (5.83-12.6)	9.91 (6.34-14.3)
24-hr	3.04 (2.37-3.80)	3.66 (2.86-4.57)	4.67 (3.63-5.85)	5.51 (4.26-6.93)	6.67 (5.01-8.68)	7.53 (5.56-9.97)	8.45 (6.09-11.5)	9.53 (6.48-13.1)	11.1 (7.29-15.7)	12.5 (7.99-17.8)
2-day	3.42 (2.69-4.24)	4.18 (3.28-5.18)	5.41 (4.24-6.73)	6.44 (5.01-8.04)	7.85 (5.95-10.2)	8.90 (6.62-11.7)	10.0 (7.29-13.7)	11.4 (7.78-15.6)	13.5 (8.86-18.9)	15.2 (9.81-21.6)
3-day	3.70 (2.92-4.57)	4.53 (3.57-5.60)	5.88 (4.62-7.29)	7.01 (5.48-8.72)	8.56 (6.50-11.1)	9.70 (7.24-12.8)	10.9 (7.98-14.9)	12.4 (8.51-16.9)	14.7 (9.71-20.6)	16.7 (10.8-23.6)
4-day	3.97 (3.14-4.89)	4.84 (3.83-5.97)	6.27 (4.94-7.75)	7.46 (5.84-9.25)	9.09 (6.93-11.7)	10.3 (7.71-13.5)	11.6 (8.48-15.7)	13.2 (9.04-17.9)	15.6 (10.3-21.7)	17.7 (11.4-24.9)
7-day	4.74 (3.77-5.81)	5.70 (4.53-6.99)	7.27 (5.75-8.93)	8.57 (6.74-10.6)	10.4 (7.92-13.2)	11.7 (8.77-15.2)	13.1 (9.59-17.6)	14.8 (10.2-20.0)	17.3 (11.5-24.0)	19.5 (12.6-27.4)
10-day	5.50 (4.39-6.71)	6.51 (5.19-7.95)	8.17 (6.49-10.00)	9.54 (7.54-11.7)	11.4 (8.76-14.5)	12.8 (9.65-16.6)	14.4 (10.5-19.1)	16.1 (11.1-21.6)	18.6 (12.4-25.7)	20.8 (13.5-29.1)
20-day	7.76 (6.24-9.40)	8.90 (7.15-10.8)	10.8 (8.62-13.1)	12.3 (9.80-15.0)	14.5 (11.1-18.2)	16.1 (12.1-20.5)	17.7 (12.9-23.2)	19.5 (13.6-26.0)	22.0 (14.7-30.1)	24.0 (15.6-33.3)
30-day	9.61 (7.76-11.6)	10.8 (8.74-13.1)	12.9 (10.3-15.6)	14.5 (11.6-17.7)	16.9 (13.0-21.0)	18.6 (14.0-23.6)	20.4 (14.8-26.4)	22.2 (15.5-29.5)	24.6 (16.5-33.5)	26.5 (17.3-36.6)
45-day	11.9 (9.63-14.3)	13.2 (10.7-15.9)	15.4 (12.4-18.6)	17.2 (13.8-20.9)	19.8 (15.3-24.5)	21.7 (16.4-27.3)	23.6 (17.2-30.3)	25.5 (17.8-33.6)	27.9 (18.7-37.7)	29.6 (19.3-40.8)
60-day	13.8 (11.2-16.5)	15.2 (12.3-18.2)	17.5 (14.2-21.1)	19.5 (15.6-23.5)	22.1 (17.1-27.3)	24.2 (18.3-30.3)	26.2 (19.1-33.5)	28.2 (19.7-37.1)	30.6 (20.5-41.3)	32.2 (21.1-44.3)
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.										

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PF graphical

Appendix B
HydroCAD Summary Table

HYDROCAD SUMMARY TABLES

Storm Frequency Event	POC "A" (Southeasterly property corner)				
	Flow/Volume	Existing	Proposed	Δ	Δ (%)
1 Year	q (ft ³ /s)	0.15	0.15	0.00	0.0%
	v (ft ³)	927	896	-31.00	-3.3%
2 Year	q (ft ³ /s)	0.36	0.35	-0.01	-2.8%
	v (ac ft)	1,579	1,523	-56	-3.5%
5 Year	q (ft ³ /s)	0.77	0.74	-0.03	-3.9%
	v (ac ft)	2,877	3,182	305	10.6%
10 Year	q (ft ³ /s)	1.17	1.12	-0.05	-4.3%
	v (ac ft)	4,129	4,761	632	15.3%
25 Year	q (ft ³ /s)	1.77	1.74	-0.03	-1.7%
	v (ac ft)	6,049	7,125	1,076	17.8%
50 Year	q (ft ³ /s)	2.26	2.25	-0.01	-0.4%
	v (ac ft)	7,583	8,985	1,402	18.5%
100 Year	q (ft ³ /s)	2.79	3.28	0.49	17.6%
	v (ac ft)	9,306	11,053	1,747	18.8%

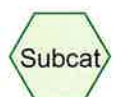
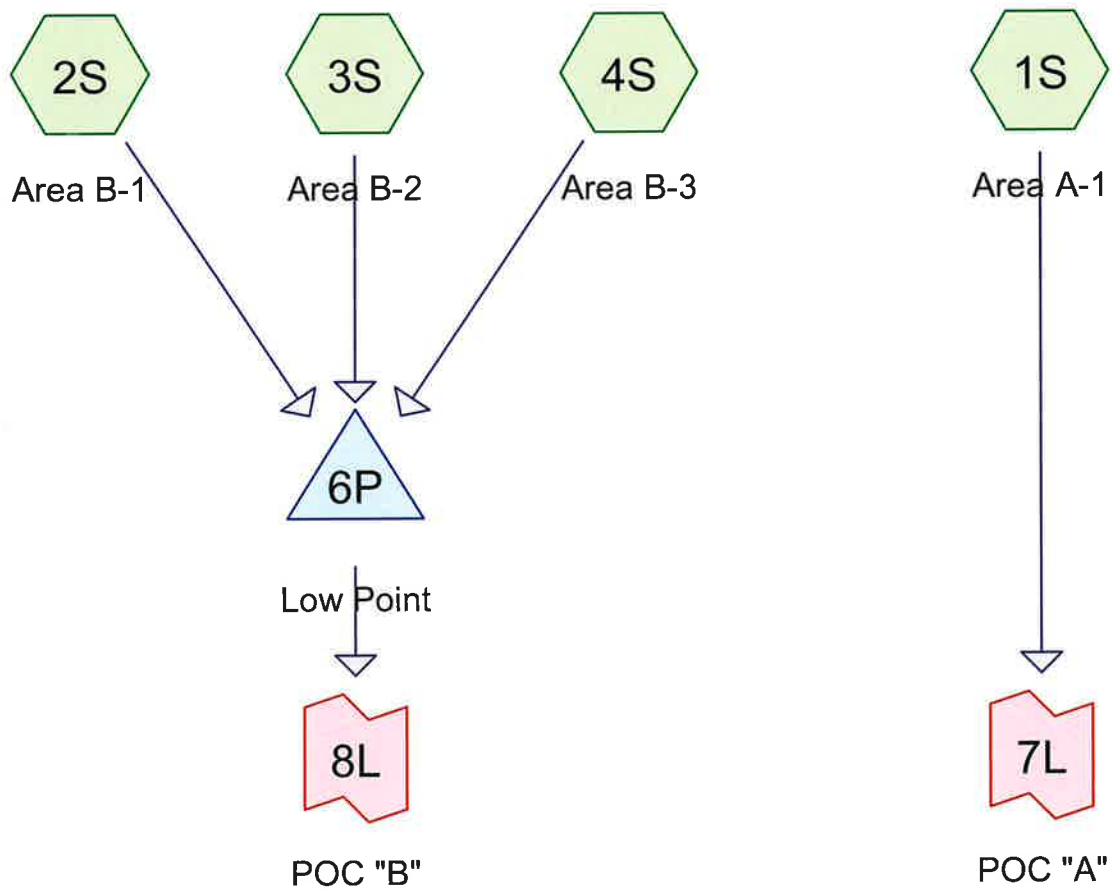
Table 1: Comparison of Existing and Proposed Peak Flow Rates and Volumes for POC "A".

Storm Frequency Event	POC "B" (Southerly property line)				
	Flow/Volume	Existing	Proposed	Δ	Δ (%)
1 Year	q (ft ³ /s)	0.66	0.63	-0.03	-4.5%
	v (ft ³)	3,421	3,289	-132	-3.9%
2 Year	q (ft ³ /s)	1.22	1.16	-0.06	-4.9%
	v (ac ft)	5,427	5,203	-224	-4.1%
5 Year	q (ft ³ /s)	2.31	2.19	-0.12	-5.2%
	v (ac ft)	9,267	8,858	-409	-4.4%
10 Year	q (ft ³ /s)	3.33	3.15	-0.18	-5.4%
	v (ac ft)	12,869	12,282	-587	-4.6%
25 Year	q (ft ³ /s)	4.87	4.59	-0.28	-5.7%
	v (ac ft)	18,292	17,431	-861	-4.7%
50 Year	q (ft ³ /s)	6.08	5.73	-0.35	-5.8%
	v (ac ft)	22,568	21,489	-1,079	-4.8%
100 Year	q (ft ³ /s)	7.41	6.98	-0.43	-5.8%
	v (ac ft)	27,331	26,006	-1,325	-4.8%

Table 2: Comparison of Existing and Proposed Peak Flow Rates and Volumes for POC "B".

Appendix C

HydroCAD Model – Existing and Proposed Conditions



Subcat



Reach



Pond



Link

Routing Diagram for 23OE_Ex_0

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
91,356	61.0	>75% Grass cover, Good, HSG B (1S, 2S, 4S)
3,976	98.0	Paved parking, HSG B (3S)
4,831	98.0	Roofs, HSG B (4S)
7,264	60.0	Woods, Fair, HSG B (1S, 2S)
107,427	64.0	TOTAL AREA

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Type III 24-hr 25-Year Rainfall=6.67"

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Summary for Subcatchment 1S: Area A-1

Runoff = 1.77 cfs @ 12.12 hrs, Volume= 6,049 cf, Depth> 2.45"

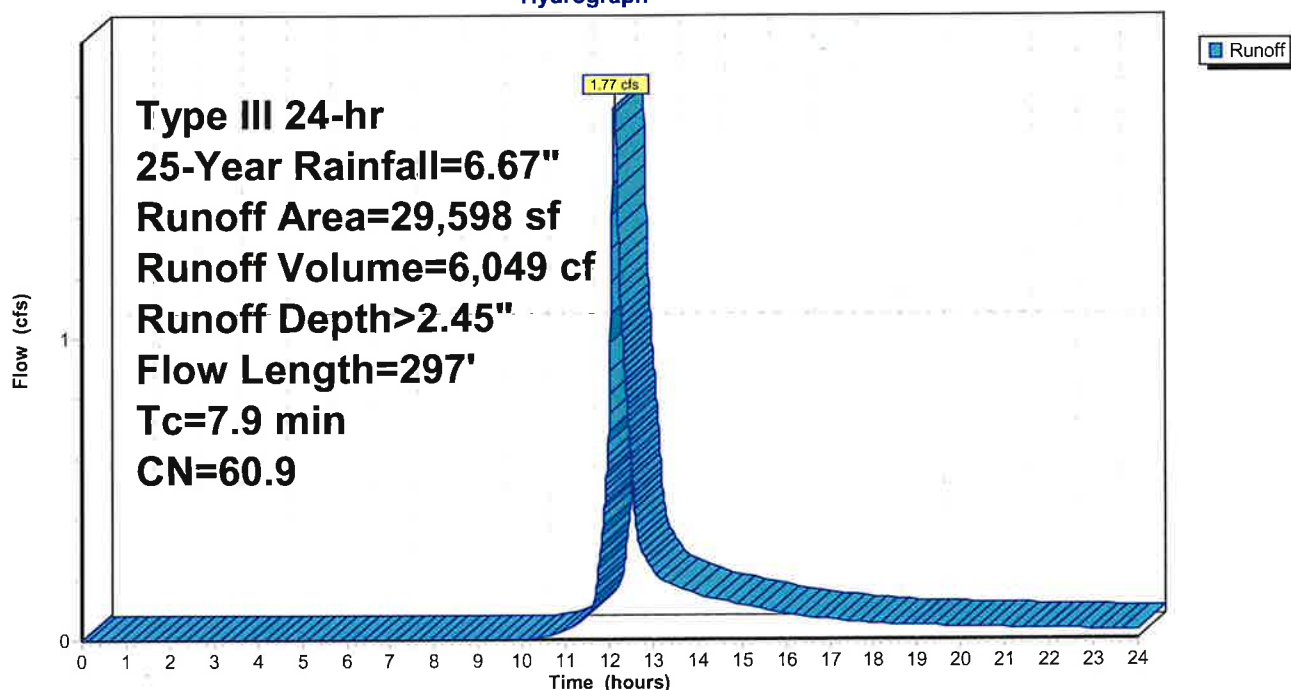
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.67"

Area (sf)	CN	Description
27,482	61.0	>75% Grass cover, Good, HSG B
2,116	60.0	Woods, Fair, HSG B
29,598	60.9	Weighted Average
29,598		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0900	0.23		Sheet Flow, Grass: Dense n= 0.240 P2= 3.66"
0.3	81	0.0620	4.01		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	116	0.1290	5.78		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.9	297	Total			

Subcatchment 1S: Area A-1

Hydrograph



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Summary for Subcatchment 2S: Area B-1

Runoff = 1.63 cfs @ 12.14 hrs, Volume= 5,900 cf, Depth> 2.44"

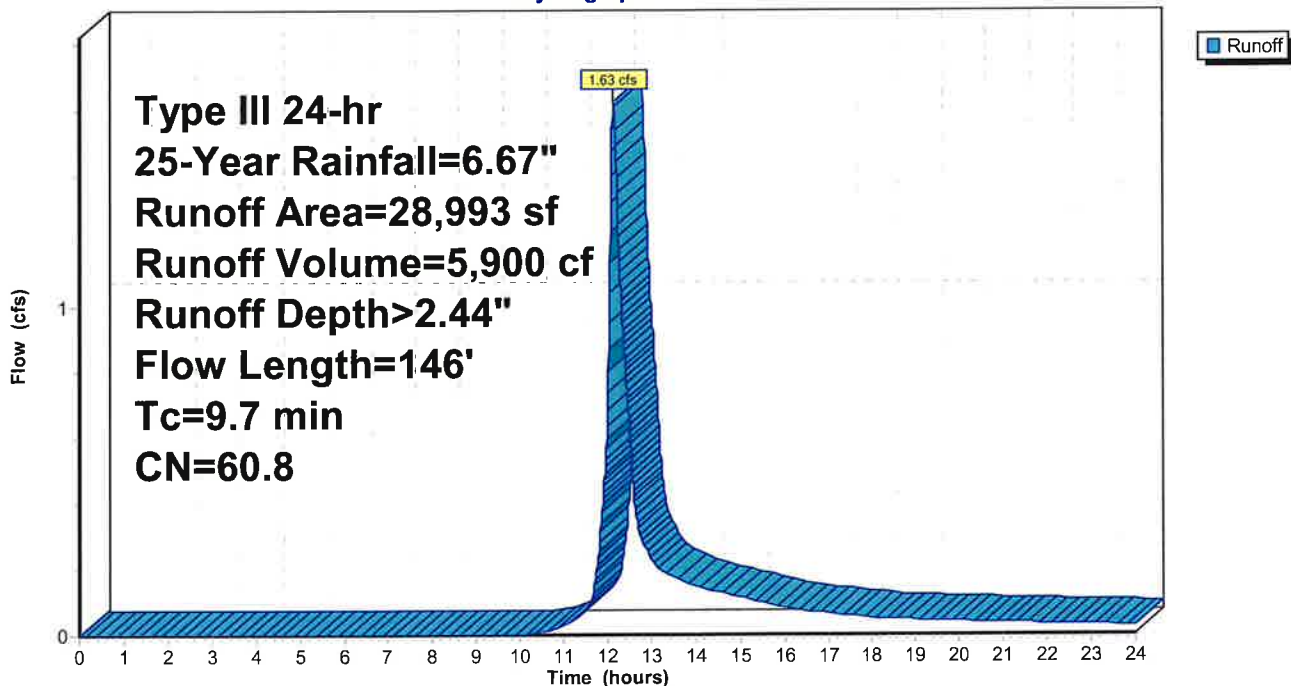
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.67"

Area (sf)	CN	Description
23,845	61.0	>75% Grass cover, Good, HSG B
5,148	60.0	Woods, Fair, HSG B
28,993	60.8	Weighted Average
28,993		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.0470	0.18		Sheet Flow, Grass: Dense n= 0.240 P2= 3.66"
0.2	46	0.0540	3.74		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
9.7	146	Total			

Subcatchment 2S: Area B-1

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.67"

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Summary for Subcatchment 3S: Area B-2

Runoff = 0.70 cfs @ 12.02 hrs, Volume= 2,131 cf, Depth> 6.43"

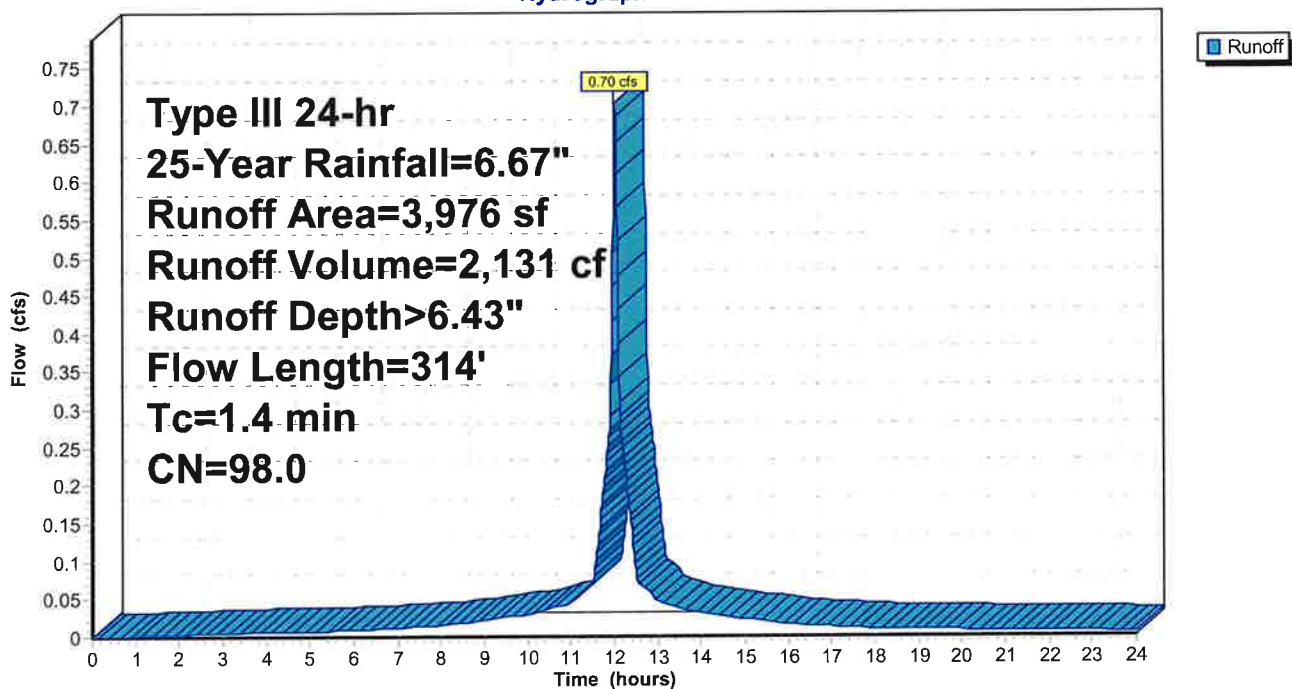
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.67"

Area (sf)	CN	Description
3,976	98.0	Paved parking, HSG B
3,976		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	51	0.0330	1.57		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.66"
0.5	128	0.0390	4.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	113	0.0080	4.80	3.77	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
0.0	22	0.0360	10.17	7.99	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
1.4	314	Total			

Subcatchment 3S: Area B-2

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.67"

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Summary for Subcatchment 4S: Area B-3

Runoff = 2.97 cfs @ 12.14 hrs, Volume= 10,629 cf, Depth> 2.84"

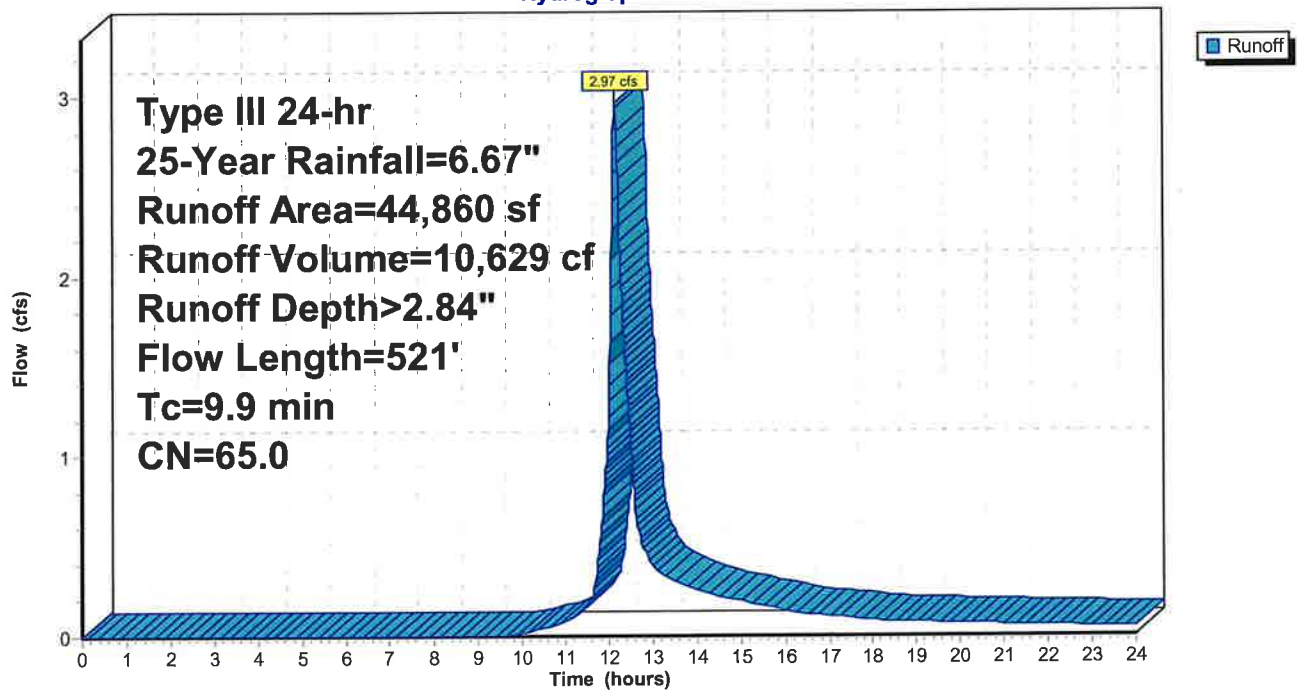
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.67"

Area (sf)	CN	Description
4,831	98.0	Roofs, HSG B
40,029	61.0	>75% Grass cover, Good, HSG B
44,860	65.0	Weighted Average
40,029		89.23% Pervious Area
4,831		10.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.0670	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.66"
0.2	48	0.0580	3.88		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0180	2.16		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	134	0.0780	4.50		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	38	0.0290	3.46		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.0	10	0.0170	6.99	5.49	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
0.4	113	0.0080	4.80	3.77	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
0.0	22	0.0360	10.17	7.99	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
9.9	521	Total			

Subcatchment 4S: Area B-3

Hydrograph



Summary for Pond 6P: Low Point

Inflow Area = 77,829 sf, 11.32% Impervious, Inflow Depth > 2.88" for 25-Year event
 Inflow = 4.87 cfs @ 12.14 hrs, Volume= 18,659 cf
 Outflow = 4.87 cfs @ 12.15 hrs, Volume= 18,292 cf, Atten= 0%, Lag= 0.3 min
 Primary = 4.87 cfs @ 12.15 hrs, Volume= 18,292 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 386.59' @ 12.15 hrs Surf.Area= 1,435 sf Storage= 481 cf

Plug-Flow detention time= 19.7 min calculated for 18,284 cf (98% of inflow)
 Center-of-Mass det. time= 8.5 min (846.0 - 837.5)

Volume	Invert	Avail.Storage	Storage Description
#1	385.80'	1,268 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

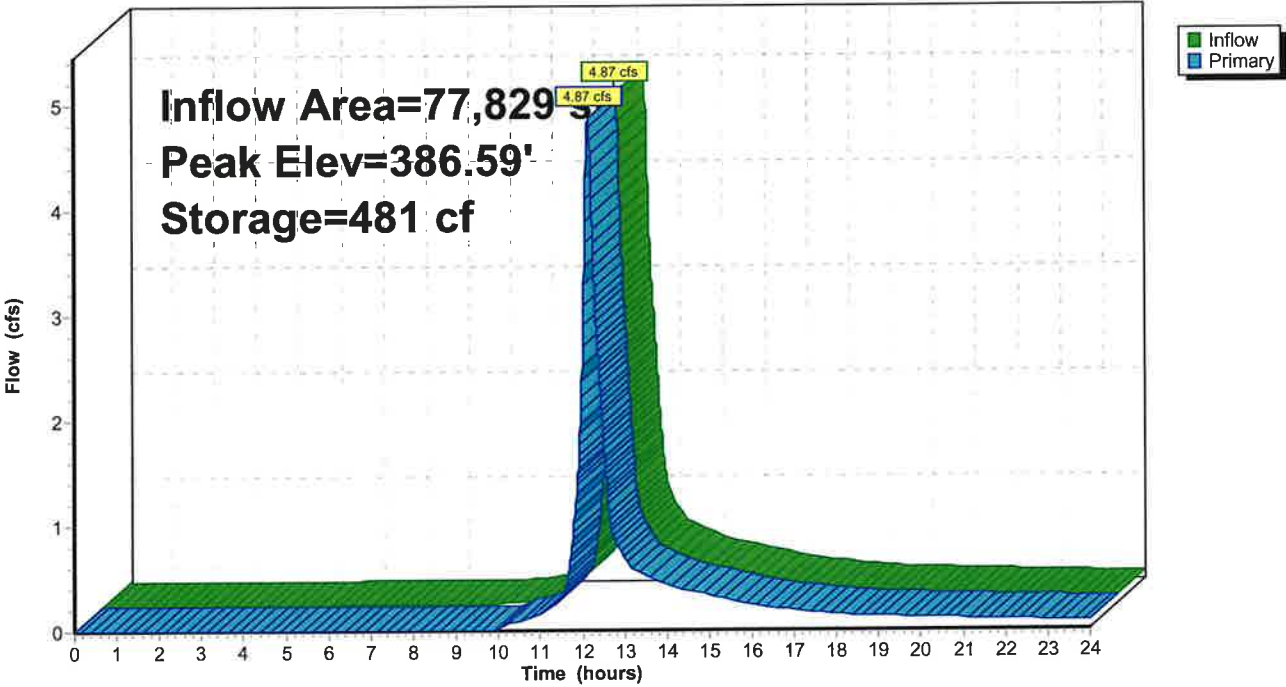
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
385.80	10	0	0
386.00	157	17	17
386.50	1,217	344	360
387.00	2,413	908	1,268

Device	Routing	Invert	Outlet Devices
#1	Primary	386.50'	50.0' long (Profile 9) Broad-Crested Rectangular Weir Head (feet) 1.97 2.46 2.95 3.94 4.92 Coef. (English) 3.55 3.55 3.57 3.60 3.66

Primary OutFlow Max=4.86 cfs @ 12.15 hrs HW=386.59' TW=0.00' (Dynamic Tailwater)
 1=Broad-Crested Rectangular Weir (Weir Controls 4.86 cfs @ 1.07 fps)

Pond 6P: Low Point

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.67"

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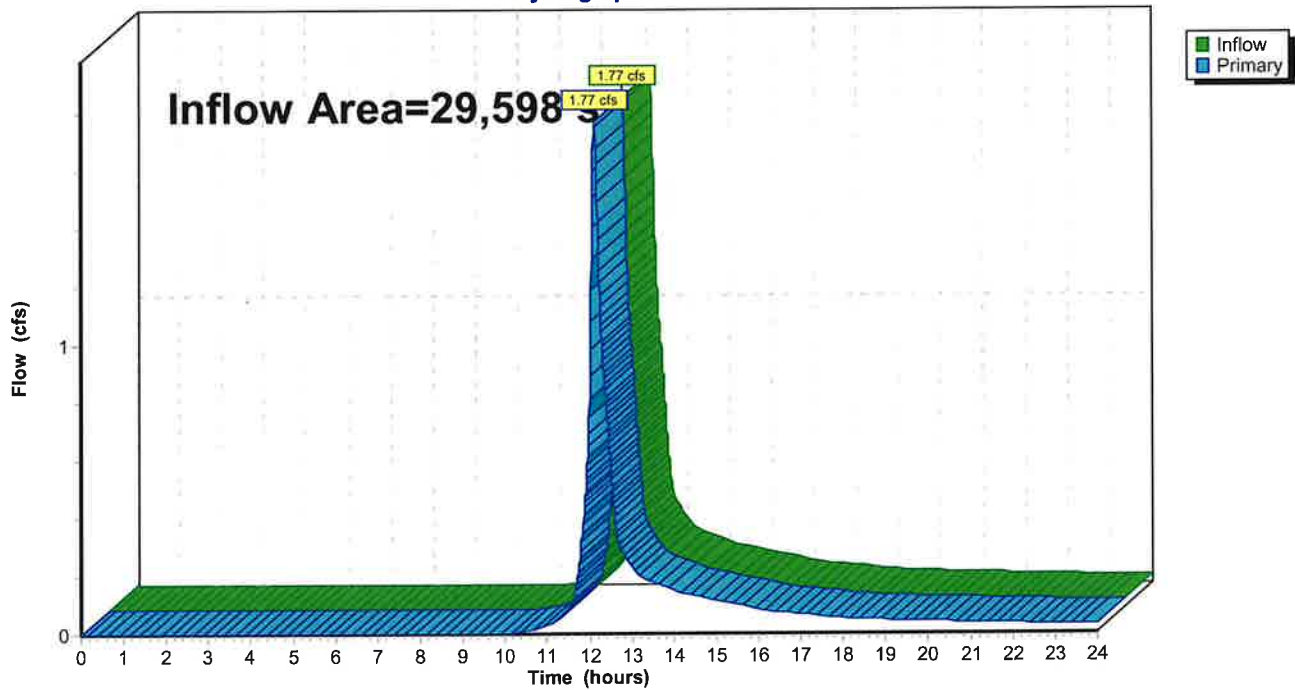
Summary for Link 7L: POC "A"

Inflow Area = 29,598 sf, 0.00% Impervious, Inflow Depth > 2.45" for 25-Year event
Inflow = 1.77 cfs @ 12.12 hrs, Volume= 6,049 cf
Primary = 1.77 cfs @ 12.12 hrs, Volume= 6,049 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 7L: POC "A"

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.67"

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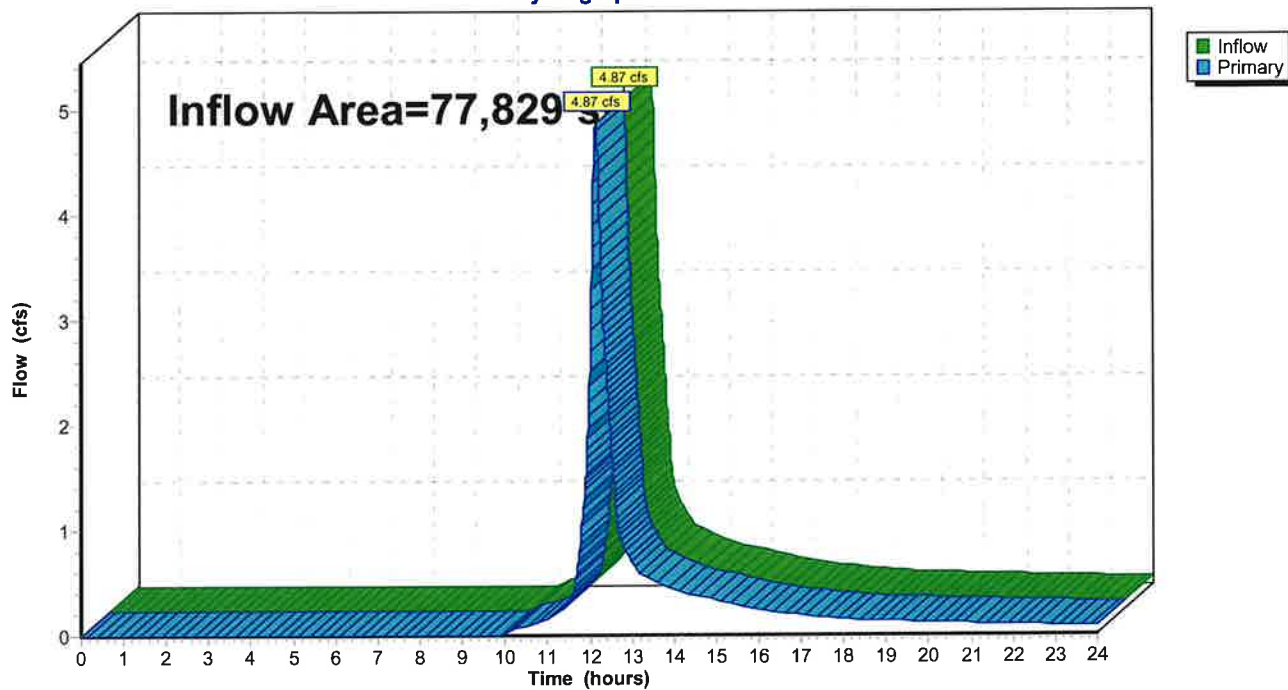
Summary for Link 8L: POC "B"

Inflow Area = 77,829 sf, 11.32% Impervious, Inflow Depth > 2.82" for 25-Year event
Inflow = 4.87 cfs @ 12.15 hrs, Volume= 18,292 cf
Primary = 4.87 cfs @ 12.15 hrs, Volume= 18,292 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 8L: POC "B"

Hydrograph



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Type III 24-hr 1-Year Rainfall=3.04"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Area A-1Runoff Area=29,598 sf 0.00% Impervious Runoff Depth>0.38"
Flow Length=297' Tc=7.9 min CN=60.9 Runoff=0.15 cfs 927 cf**Subcatchment 2S: Area B-1**Runoff Area=28,993 sf 0.00% Impervious Runoff Depth>0.37"
Flow Length=146' Tc=9.7 min CN=60.8 Runoff=0.14 cfs 900 cf**Subcatchment 3S: Area B-2**Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>2.81"
Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.32 cfs 930 cf**Subcatchment 4S: Area B-3**Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>0.52"
Flow Length=521' Tc=9.9 min CN=65.0 Runoff=0.41 cfs 1,954 cf**Pond 6P: Low Point**Peak Elev=386.52' Storage=390 cf Inflow=0.66 cfs 3,784 cf
Outflow=0.66 cfs 3,421 cf**Link 7L: POC "A"**Inflow=0.15 cfs 927 cf
Primary=0.15 cfs 927 cf**Link 8L: POC "B"**Inflow=0.66 cfs 3,421 cf
Primary=0.66 cfs 3,421 cf**Total Runoff Area = 107,427 sf Runoff Volume = 4,711 cf Average Runoff Depth = 0.53"**
91.80% Pervious = 98,620 sf 8.20% Impervious = 8,807 sf

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Type III 24-hr 2-Year Rainfall=3.66"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Area A-1Runoff Area=29,598 sf 0.00% Impervious Runoff Depth>0.64"
Flow Length=297' Tc=7.9 min CN=60.9 Runoff=0.36 cfs 1,579 cf**Subcatchment 2S: Area B-1**Runoff Area=28,993 sf 0.00% Impervious Runoff Depth>0.64"
Flow Length=146' Tc=9.7 min CN=60.8 Runoff=0.32 cfs 1,535 cf**Subcatchment 3S: Area B-2**Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>3.43"
Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.38 cfs 1,135 cf**Subcatchment 4S: Area B-3**Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>0.83"
Flow Length=521' Tc=9.9 min CN=65.0 Runoff=0.75 cfs 3,121 cf**Pond 6P: Low Point**Peak Elev=386.54' Storage=406 cf Inflow=1.22 cfs 5,791 cf
Outflow=1.22 cfs 5,427 cf**Link 7L: POC "A"**Inflow=0.36 cfs 1,579 cf
Primary=0.36 cfs 1,579 cf**Link 8L: POC "B"**Inflow=1.22 cfs 5,427 cf
Primary=1.22 cfs 5,427 cf**Total Runoff Area = 107,427 sf Runoff Volume = 7,369 cf Average Runoff Depth = 0.82"**
91.80% Pervious = 98,620 sf 8.20% Impervious = 8,807 sf

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Type III 24-hr 5-Year Rainfall=4.67"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Area A-1Runoff Area=29,598 sf 0.00% Impervious Runoff Depth>1.17"
Flow Length=297' Tc=7.9 min CN=60.9 Runoff=0.77 cfs 2,877 cf**Subcatchment 2S: Area B-1**Runoff Area=28,993 sf 0.00% Impervious Runoff Depth>1.16"
Flow Length=146' Tc=9.7 min CN=60.8 Runoff=0.70 cfs 2,801 cf**Subcatchment 3S: Area B-2**Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>4.43"
Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.49 cfs 1,469 cf**Subcatchment 4S: Area B-3**Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>1.43"
Flow Length=521' Tc=9.9 min CN=65.0 Runoff=1.42 cfs 5,362 cf**Pond 6P: Low Point**Peak Elev=386.56' Storage=431 cf Inflow=2.31 cfs 9,632 cf
Outflow=2.31 cfs 9,267 cf**Link 7L: POC "A"**Inflow=0.77 cfs 2,877 cf
Primary=0.77 cfs 2,877 cf**Link 8L: POC "B"**Inflow=2.31 cfs 9,267 cf
Primary=2.31 cfs 9,267 cf**Total Runoff Area = 107,427 sf Runoff Volume = 12,509 cf Average Runoff Depth = 1.40"**
91.80% Pervious = 98,620 sf 8.20% Impervious = 8,807 sf

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Type III 24-hr 10-Year Rainfall=5.51"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Area A-1Runoff Area=29,598 sf 0.00% Impervious Runoff Depth>1.67"
Flow Length=297' Tc=7.9 min CN=60.9 Runoff=1.17 cfs 4,129 cf**Subcatchment 2S: Area B-1**Runoff Area=28,993 sf 0.00% Impervious Runoff Depth>1.67"
Flow Length=146' Tc=9.7 min CN=60.8 Runoff=1.07 cfs 4,024 cf**Subcatchment 3S: Area B-2**Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>5.27"
Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.58 cfs 1,747 cf**Subcatchment 4S: Area B-3**Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>2.00"
Flow Length=521' Tc=9.9 min CN=65.0 Runoff=2.04 cfs 7,465 cf**Pond 6P: Low Point**Peak Elev=386.57' Storage=452 cf Inflow=3.33 cfs 13,235 cf
Outflow=3.33 cfs 12,869 cf**Link 7L: POC "A"**Inflow=1.17 cfs 4,129 cf
Primary=1.17 cfs 4,129 cf**Link 8L: POC "B"**Inflow=3.33 cfs 12,869 cf
Primary=3.33 cfs 12,869 cf**Total Runoff Area = 107,427 sf Runoff Volume = 17,364 cf Average Runoff Depth = 1.94"**
91.80% Pervious = 98,620 sf 8.20% Impervious = 8,807 sf

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Type III 24-hr 25-Year Rainfall=6.67"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Area A-1Runoff Area=29,598 sf 0.00% Impervious Runoff Depth>2.45"
Flow Length=297' Tc=7.9 min CN=60.9 Runoff=1.77 cfs 6,049 cf**Subcatchment 2S: Area B-1**Runoff Area=28,993 sf 0.00% Impervious Runoff Depth>2.44"
Flow Length=146' Tc=9.7 min CN=60.8 Runoff=1.63 cfs 5,900 cf**Subcatchment 3S: Area B-2**Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>6.43"
Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.70 cfs 2,131 cf**Subcatchment 4S: Area B-3**Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>2.84"
Flow Length=521' Tc=9.9 min CN=65.0 Runoff=2.97 cfs 10,629 cf**Pond 6P: Low Point**Peak Elev=386.59' Storage=481 cf Inflow=4.87 cfs 18,659 cf
Outflow=4.87 cfs 18,292 cf**Link 7L: POC "A"**Inflow=1.77 cfs 6,049 cf
Primary=1.77 cfs 6,049 cf**Link 8L: POC "B"**Inflow=4.87 cfs 18,292 cf
Primary=4.87 cfs 18,292 cf**Total Runoff Area = 107,427 sf Runoff Volume = 24,707 cf Average Runoff Depth = 2.76"**
91.80% Pervious = 98,620 sf 8.20% Impervious = 8,807 sf

23OE_Ex_0

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Type III 24-hr 50-Year Rainfall=7.53"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Area A-1Runoff Area=29,598 sf 0.00% Impervious Runoff Depth>3.07"
Flow Length=297' Tc=7.9 min CN=60.9 Runoff=2.26 cfs 7,583 cf**Subcatchment 2S: Area B-1**Runoff Area=28,993 sf 0.00% Impervious Runoff Depth>3.06"
Flow Length=146' Tc=9.7 min CN=60.8 Runoff=2.07 cfs 7,399 cf**Subcatchment 3S: Area B-2**Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>7.29"
Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.79 cfs 2,415 cf**Subcatchment 4S: Area B-3**Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>3.51"
Flow Length=521' Tc=9.9 min CN=65.0 Runoff=3.69 cfs 13,122 cf**Pond 6P: Low Point**Peak Elev=386.61' Storage=502 cf Inflow=6.08 cfs 22,936 cf
Outflow=6.08 cfs 22,568 cf**Link 7L: POC "A"**Inflow=2.26 cfs 7,583 cf
Primary=2.26 cfs 7,583 cf**Link 8L: POC "B"**Inflow=6.08 cfs 22,568 cf
Primary=6.08 cfs 22,568 cf**Total Runoff Area = 107,427 sf Runoff Volume = 30,519 cf Average Runoff Depth = 3.41"**
91.80% Pervious = 98,620 sf 8.20% Impervious = 8,807 sf

23OE_Ex_0

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Type III 24-hr 100-Year Rainfall=8.45"

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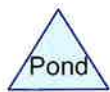
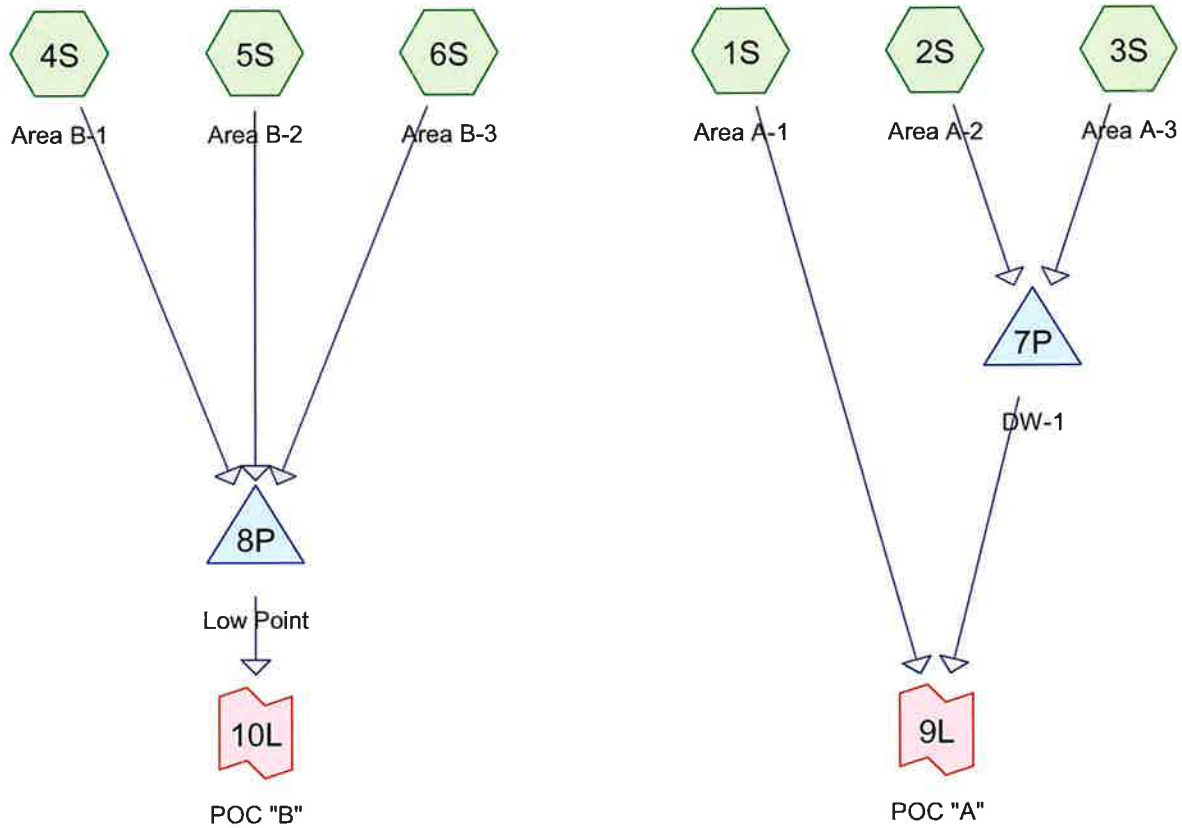
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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points

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: Area A-1Runoff Area=29,598 sf 0.00% Impervious Runoff Depth>3.77"
Flow Length=297' Tc=7.9 min CN=60.9 Runoff=2.79 cfs 9,306 cf**Subcatchment 2S: Area B-1**Runoff Area=28,993 sf 0.00% Impervious Runoff Depth>3.76"
Flow Length=146' Tc=9.7 min CN=60.8 Runoff=2.56 cfs 9,084 cf**Subcatchment 3S: Area B-2**Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>8.21"
Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.89 cfs 2,720 cf**Subcatchment 4S: Area B-3**Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>4.25"
Flow Length=521' Tc=9.9 min CN=65.0 Runoff=4.50 cfs 15,896 cf**Pond 6P: Low Point**Peak Elev=386.62' Storage=524 cf Inflow=7.42 cfs 27,700 cf
Outflow=7.41 cfs 27,331 cf**Link 7L: POC "A"**Inflow=2.79 cfs 9,306 cf
Primary=2.79 cfs 9,306 cf**Link 8L: POC "B"**Inflow=7.41 cfs 27,331 cf
Primary=7.41 cfs 27,331 cf**Total Runoff Area = 107,427 sf Runoff Volume = 37,006 cf Average Runoff Depth = 4.13"**
91.80% Pervious = 98,620 sf 8.20% Impervious = 8,807 sf



Routing Diagram for 23OE_Pro_0

Prepared by RVDI, Printed 1/23/2024

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
86,123	61.0	>75% Grass cover, Good, HSG B (1S, 3S, 4S, 6S)
6,026	98.0	Paved parking, HSG B (3S, 5S)
7,843	98.0	Roofs, HSG B (2S, 6S)
173	98.0	Unconnected pavement, HSG B (1S)
7,264	60.0	Woods, Fair, HSG B (1S, 4S)
107,429	65.8	TOTAL AREA

Summary for Subcatchment 1S: Area A-1

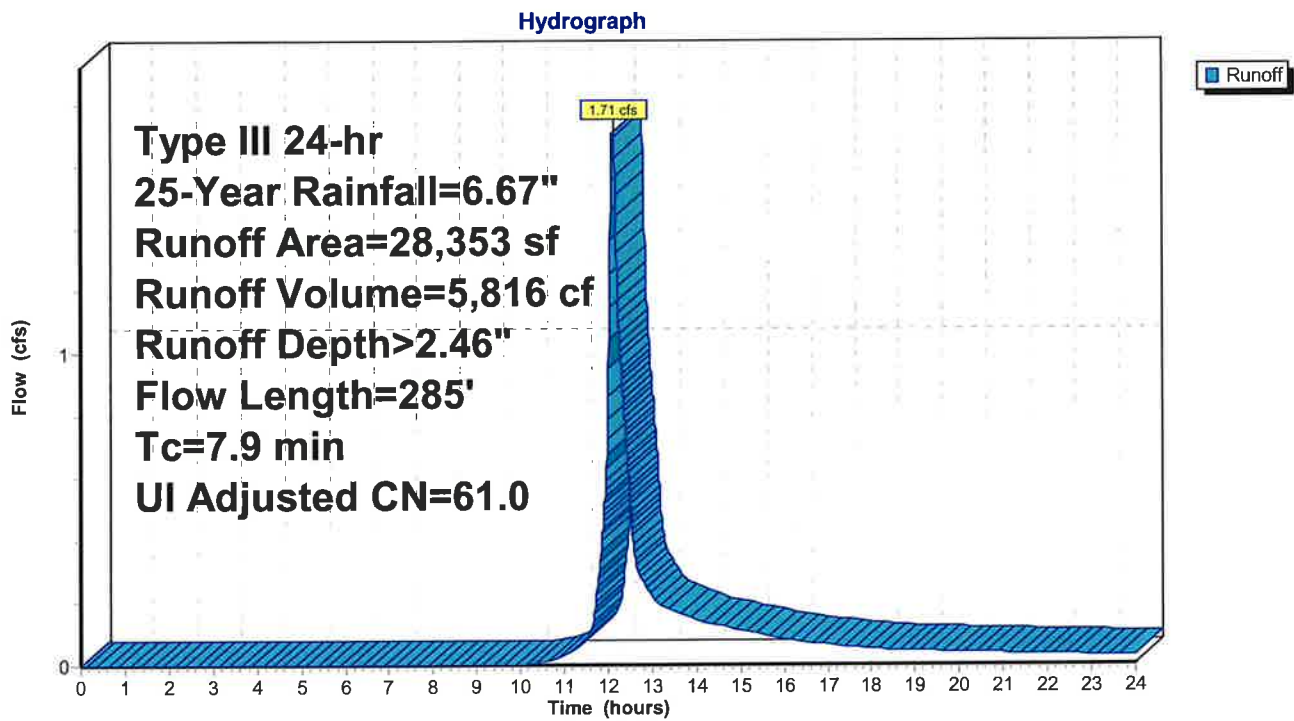
Runoff = 1.71 cfs @ 12.12 hrs, Volume= 5,816 cf, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.67"

Area (sf)	CN	Adj	Description
173	98.0		Unconnected pavement, HSG B
26,064	61.0		>75% Grass cover, Good, HSG B
2,116	60.0		Woods, Fair, HSG B
28,353	61.2	61.0	Weighted Average, UI Adjusted
28,180			99.39% Pervious Area
173			0.61% Impervious Area
173			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	73	0.0820	0.21		Sheet Flow, Grass: Dense n= 0.240 P2= 3.66"
1.2	11	0.0910	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.66"
0.5	74	0.0270	2.65		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.1	48	0.1880	6.98		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	79	0.1270	5.74		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.9	285	Total			

Subcatchment 1S: Area A-1



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Type III 24-hr 25-Year Rainfall=6.67"

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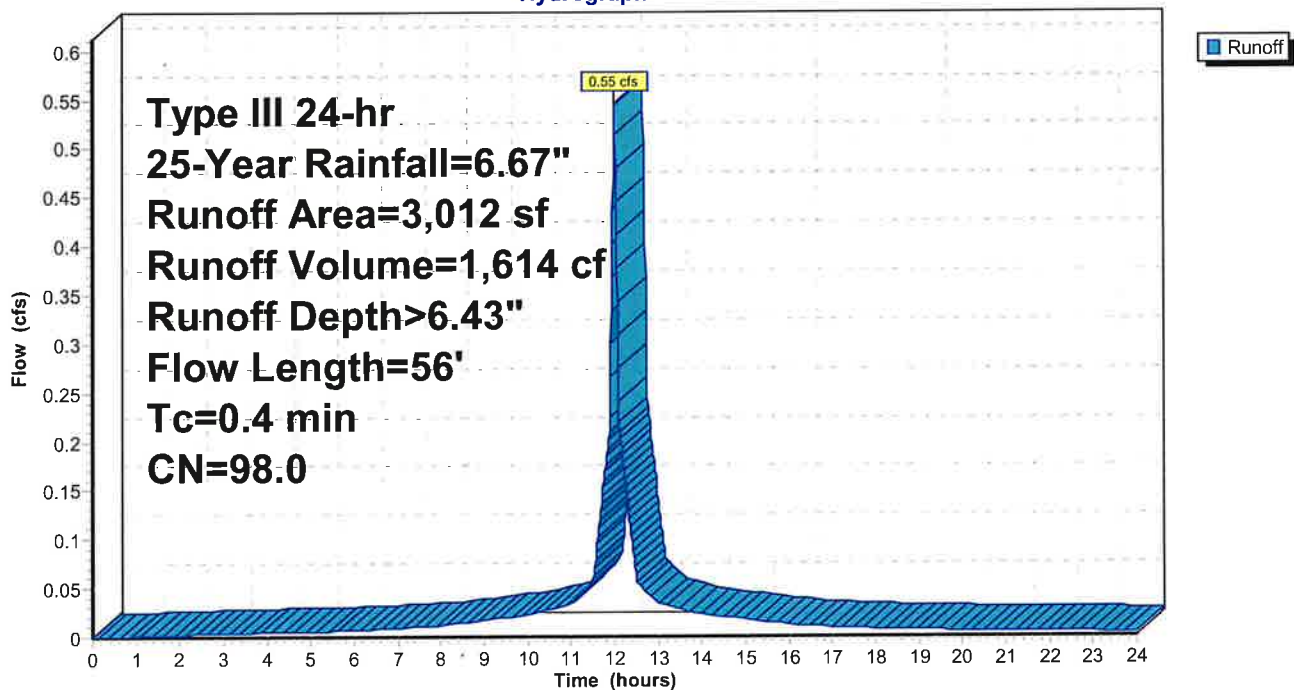
Summary for Subcatchment 2S: Area A-2

Runoff = 0.55 cfs @ 12.01 hrs, Volume= 1,614 cf, Depth> 6.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.67"

Area (sf)	CN	Description
3,012	98.0	Roofs, HSG B
3,012		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	19	0.4500	3.67		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.66"
0.3	37	0.0050	1.82	0.16	Pipe Channel, 4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08' n= 0.011
0.4	56	Total			

Subcatchment 2S: Area A-2**Hydrograph**

Summary for Subcatchment 3S: Area A-3

Runoff = 0.42 cfs @ 12.01 hrs, Volume= 1,170 cf, Depth> 5.71"

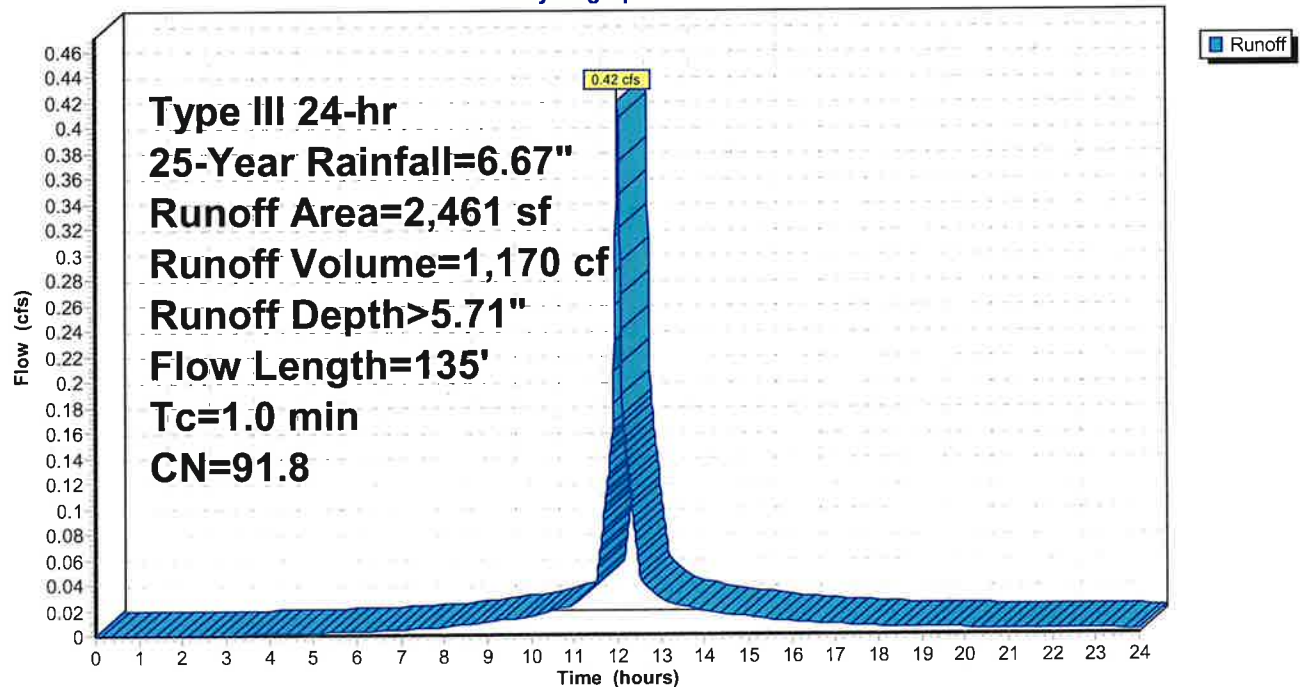
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.67"

Area (sf)	CN	Description
2,050	98.0	Paved parking, HSG B
411	61.0	>75% Grass cover, Good, HSG B
2,461	91.8	Weighted Average
411		16.70% Pervious Area
2,050		83.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	66	0.0500	1.95		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.66"
0.3	50	0.0260	3.27		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	19	0.0100	3.38	0.66	Pipe Channel, 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.011
1.0	135	Total			

Subcatchment 3S: Area A-3

Hydrograph



Summary for Subcatchment 4S: Area B-1

Runoff = 1.36 cfs @ 12.15 hrs, Volume= 5,039 cf, Depth> 2.44"

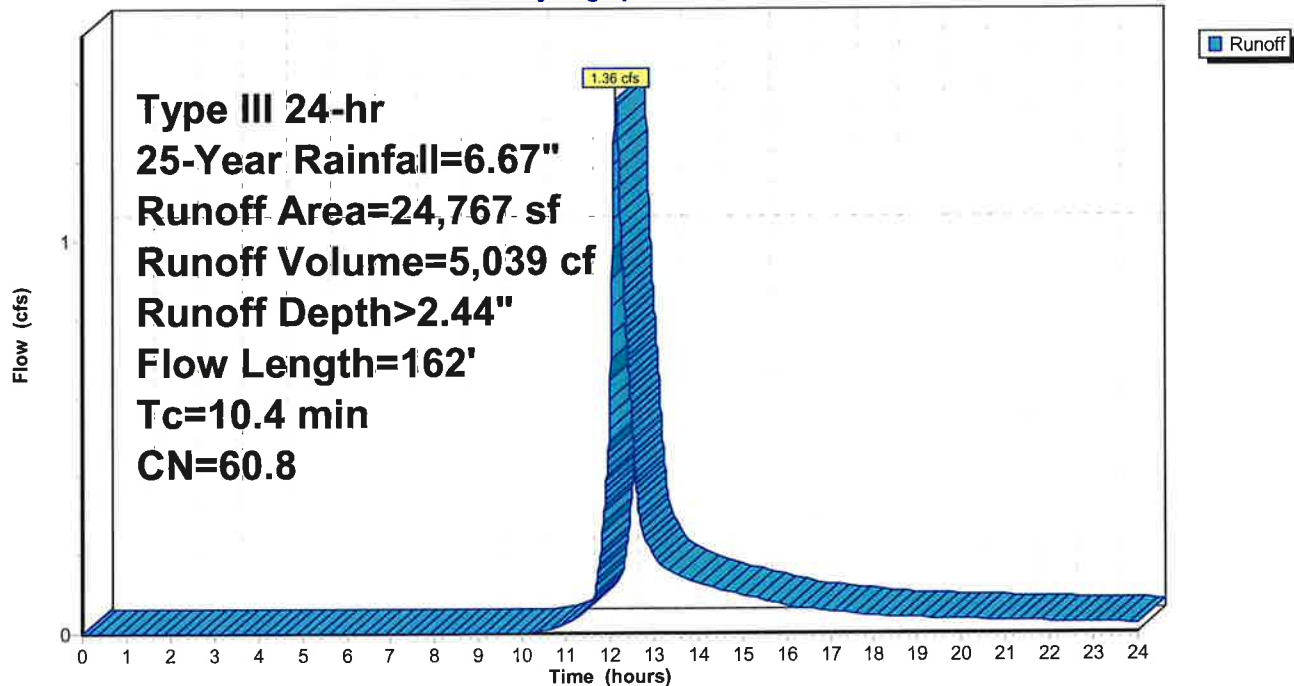
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.67"

Area (sf)	CN	Description
19,619	61.0	>75% Grass cover, Good, HSG B
5,148	60.0	Woods, Fair, HSG B
24,767	60.8	Weighted Average
24,767		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0400	0.16		Sheet Flow, Grass: Dense n= 0.240 P2= 3.66"
0.3	62	0.0520	3.67		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.4	162	Total			

Subcatchment 4S: Area B-1

Hydrograph



Summary for Subcatchment 5S: Area B-2

Runoff = 0.70 cfs @ 12.02 hrs, Volume= 2,131 cf, Depth> 6.43"

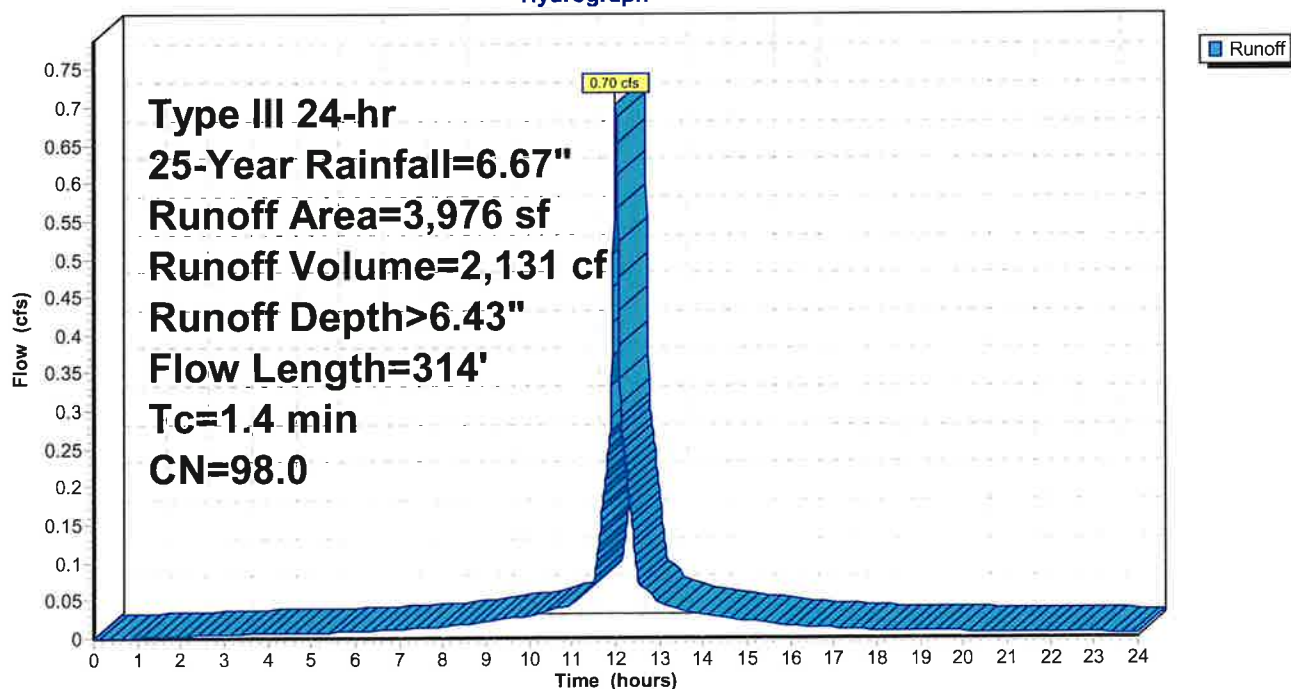
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.67"

Area (sf)	CN	Description
3,976	98.0	Paved parking, HSG B
3,976		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	51	0.0330	1.57		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.66"
0.5	128	0.0390	4.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	113	0.0080	4.80	3.77	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
0.0	22	0.0360	10.17	7.99	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
1.4	314	Total			

Subcatchment 5S: Area B-2

Hydrograph



Summary for Subcatchment 6S: Area B-3

Runoff = 2.97 cfs @ 12.14 hrs, Volume= 10,629 cf, Depth> 2.84"

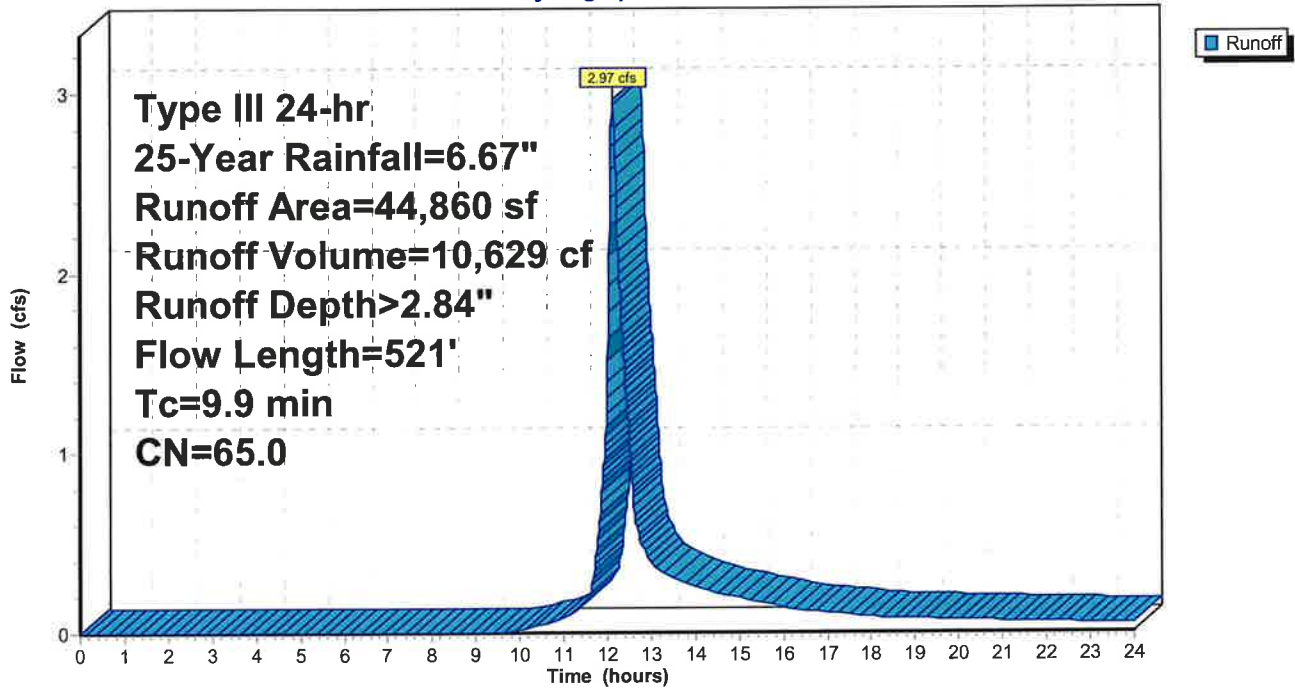
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.67"

Area (sf)	CN	Description
4,831	98.0	Roofs, HSG B
40,029	61.0	>75% Grass cover, Good, HSG B
44,860	65.0	Weighted Average
40,029		89.23% Pervious Area
4,831		10.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.0670	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.66"
0.2	48	0.0580	3.88		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0180	2.16		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	134	0.0780	4.50		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	38	0.0290	3.46		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.0	10	0.0170	6.99	5.49	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
0.4	113	0.0080	4.80	3.77	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
0.0	22	0.0360	10.17	7.99	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
9.9	521	Total			

Subcatchment 6S: Area B-3

Hydrograph



Summary for Pond 7P: DW-1

Inflow Area = 5,473 sf, 92.49% Impervious, Inflow Depth > 6.10" for 25-Year event
 Inflow = 0.96 cfs @ 12.01 hrs, Volume= 2,784 cf
 Outflow = 0.09 cfs @ 12.63 hrs, Volume= 1,309 cf, Atten= 91%, Lag= 37.4 min
 Primary = 0.09 cfs @ 12.63 hrs, Volume= 1,309 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 388.32' @ 12.63 hrs Surf.Area= 1,587 sf Storage= 1,780 cf

Plug-Flow detention time= 304.2 min calculated for 1,309 cf (47% of inflow)
 Center-of-Mass det. time= 172.4 min (924.2 - 751.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	385.00'	653 cf	32.33'W x 24.50'L x 3.54'H Field A 2,806 cf Overall - 1,174 cf Embedded = 1,632 cf x 40.0% Voids
#2A	385.50'	1,174 cf	Cultec R-330XLHD x 21 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 7 rows
#3	388.00'	80 cf	26.50'W x 30.00'L x 1.00'H Prismaoid 795 cf Overall x 10.0% Voids
		1,906 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	387.50'	6.0" Round Culvert L= 190.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 387.50' / 371.00' S= 0.0868 ' / Cc= 0.900 n= 0.011, Flow Area= 0.20 sf
#2	Device 1	387.50'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	388.50'	6.0" Horiz. Overflow C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.09 cfs @ 12.63 hrs HW=388.32' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.09 cfs of 0.71 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.09 cfs @ 4.12 fps)
 3=Overflow (Controls 0.00 cfs)

Pond 7P: DW-1 - Chamber Wizard Field A**Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)**

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 7 rows

3 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 22.50' Row Length +12.0" End Stone x 2 = 24.50' Base Length

7 Rows x 52.0" Wide + 12.0" Side Stone x 2 = 32.33' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

21 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 7 Rows = 1,173.5 cf Chamber Storage

2,805.6 cf Field - 1,173.5 cf Chambers = 1,632.1 cf Stone x 40.0% Voids = 652.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,826.4 cf = 0.042 af

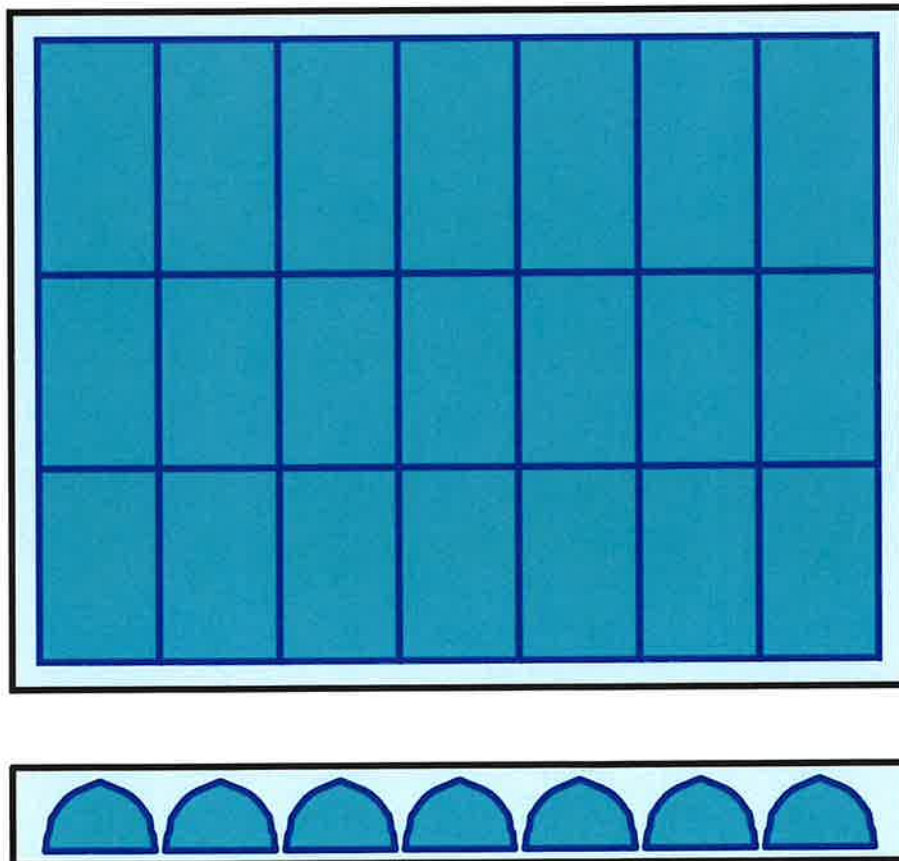
Overall Storage Efficiency = 65.1%

Overall System Size = 24.50' x 32.33' x 3.54'

21 Chambers

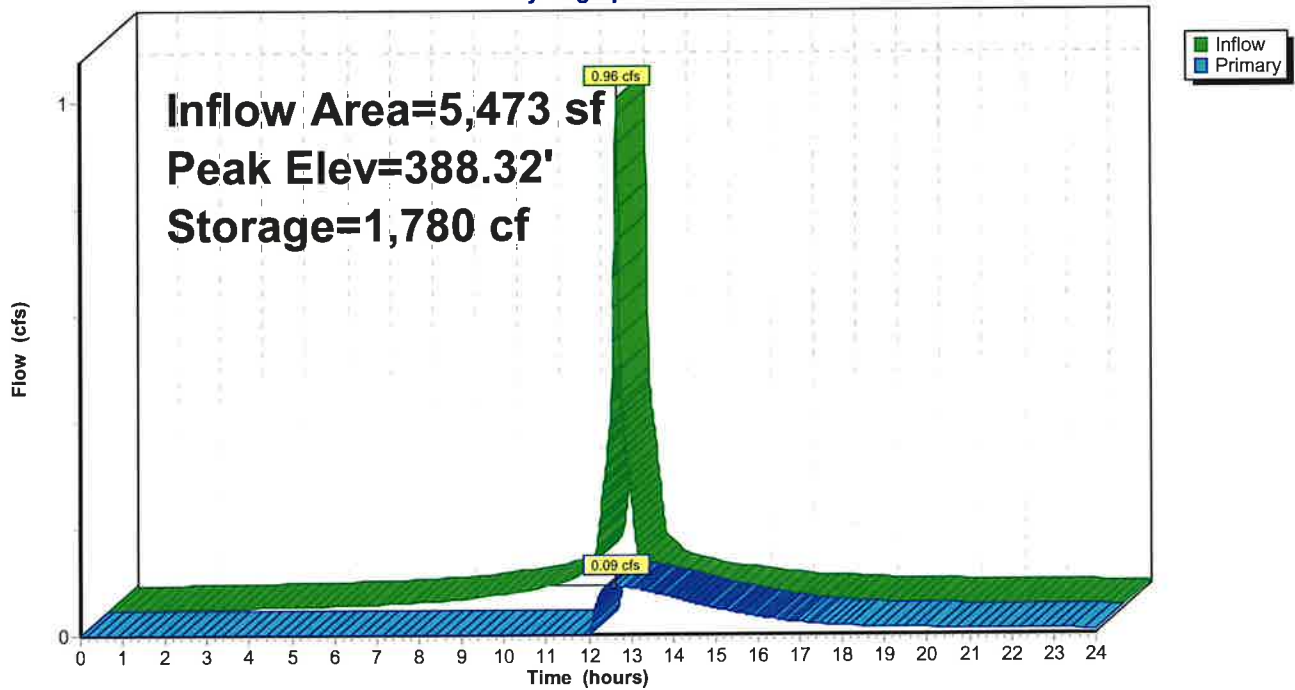
103.9 cy Field

60.4 cy Stone



Pond 7P: DW-1

Hydrograph



Summary for Pond 8P: Low Point

Inflow Area = 73,603 sf, 11.97% Impervious, Inflow Depth > 2.90" for 25-Year event
 Inflow = 4.60 cfs @ 12.14 hrs, Volume= 17,798 cf
 Outflow = 4.59 cfs @ 12.15 hrs, Volume= 17,431 cf, Atten= 0%, Lag= 0.3 min
 Primary = 4.59 cfs @ 12.15 hrs, Volume= 17,431 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 386.59' @ 12.15 hrs Surf.Area= 1,426 sf Storage= 476 cf

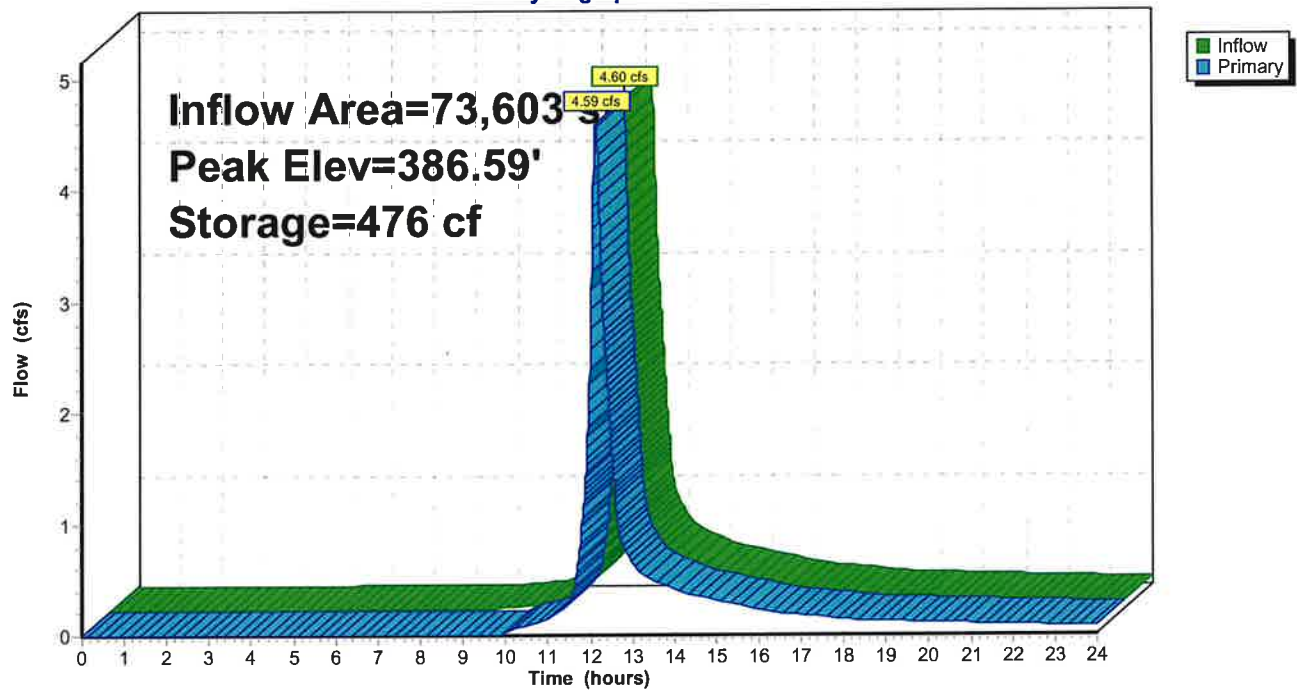
Plug-Flow detention time= 20.6 min calculated for 17,431 cf (98% of inflow)
 Center-of-Mass det. time= 8.8 min (845.6 - 836.8)

Volume	Invert	Avail.Storage	Storage Description
#1	385.80'	1,268 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
385.80	10	0	0
386.00	157	17	17
386.50	1,217	344	360
387.00	2,413	908	1,268

Device	Routing	Invert	Outlet Devices
#1	Primary	386.50'	50.0' long (Profile 9) Broad-Crested Rectangular Weir Head (feet) 1.97 2.46 2.95 3.94 4.92 Coef. (English) 3.55 3.55 3.57 3.60 3.66

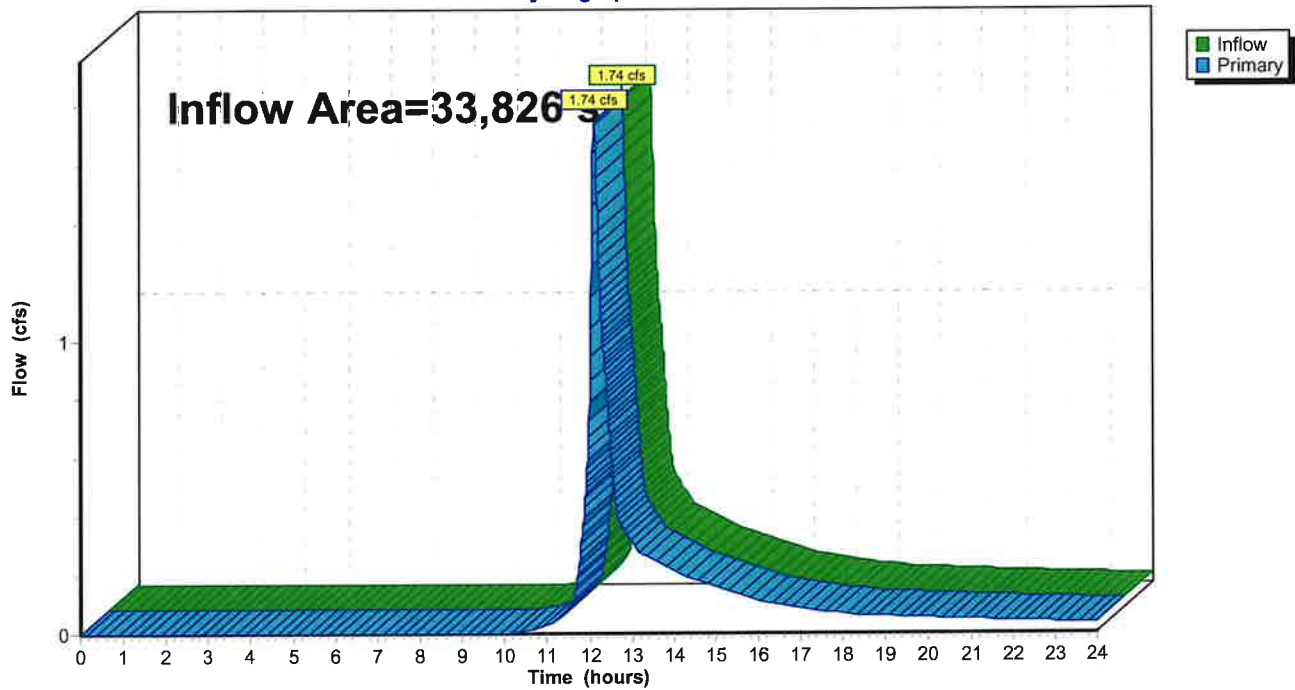
Primary OutFlow Max=4.59 cfs @ 12.15 hrs HW=386.59' TW=0.00' (Dynamic Tailwater)
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 4.59 cfs @ 1.05 fps)

Pond 8P: Low Point**Hydrograph**

Summary for Link 9L: POC "A"

Inflow Area = 33,826 sf, 15.48% Impervious, Inflow Depth > 2.53" for 25-Year event
Inflow = 1.74 cfs @ 12.12 hrs, Volume= 7,125 cf
Primary = 1.74 cfs @ 12.12 hrs, Volume= 7,125 cf, Atten= 0%, Lag= 0.0 min

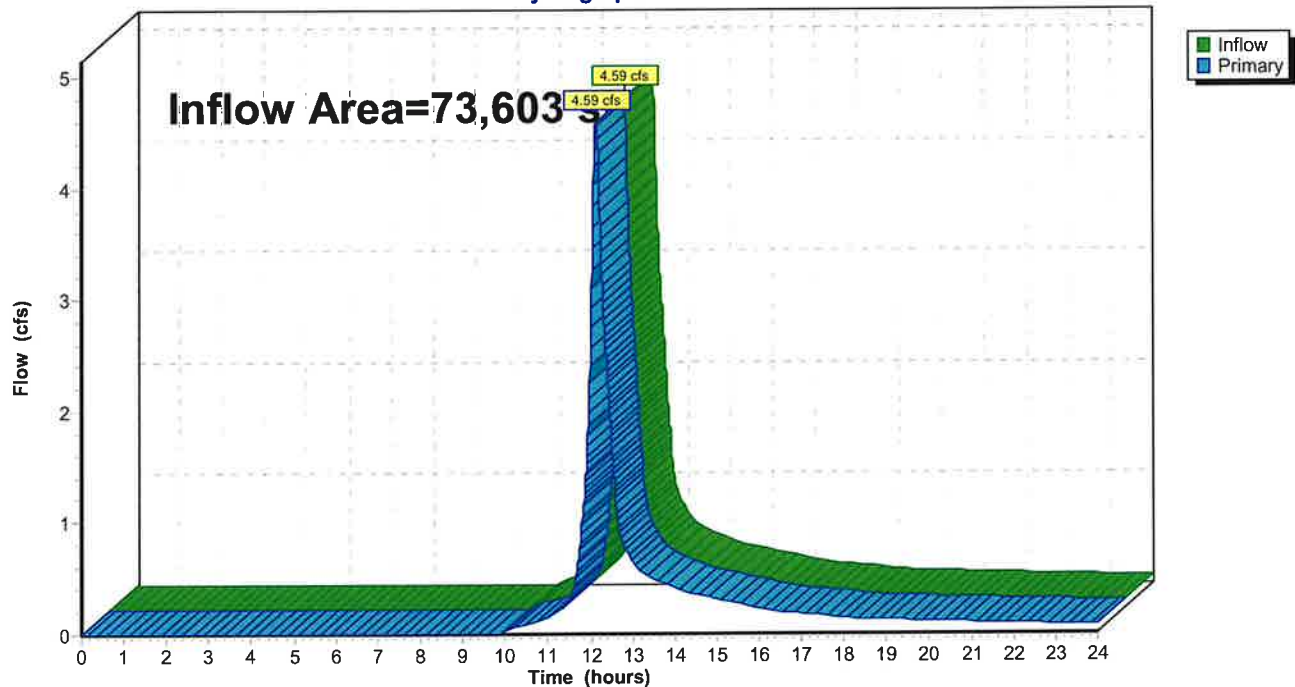
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 9L: POC "A"**Hydrograph**

Summary for Link 10L: POC "B"

Inflow Area = 73,603 sf, 11.97% Impervious, Inflow Depth > 2.84" for 25-Year event
Inflow = 4.59 cfs @ 12.15 hrs, Volume= 17,431 cf
Primary = 4.59 cfs @ 12.15 hrs, Volume= 17,431 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 10L: POC "B"**Hydrograph**

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Area A-1	Runoff Area=28,353 sf 0.61% Impervious Runoff Depth>0.38" Flow Length=285' Tc=7.9 min UI Adjusted CN=61.0 Runoff=0.15 cfs 896 cf
Subcatchment 2S: Area A-2	Runoff Area=3,012 sf 100.00% Impervious Runoff Depth>2.81" Flow Length=56' Tc=0.4 min CN=98.0 Runoff=0.25 cfs 705 cf
Subcatchment 3S: Area A-3	Runoff Area=2,461 sf 83.30% Impervious Runoff Depth>2.18" Flow Length=135' Tc=1.0 min CN=91.8 Runoff=0.17 cfs 447 cf
Subcatchment 4S: Area B-1	Runoff Area=24,767 sf 0.00% Impervious Runoff Depth>0.37" Flow Length=162' Tc=10.4 min CN=60.8 Runoff=0.12 cfs 768 cf
Subcatchment 5S: Area B-2	Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>2.81" Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.32 cfs 930 cf
Subcatchment 6S: Area B-3	Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>0.52" Flow Length=521' Tc=9.9 min CN=65.0 Runoff=0.41 cfs 1,954 cf
Pond 7P: DW-1	Peak Elev=387.00' Storage=1,152 cf Inflow=0.41 cfs 1,152 cf Outflow=0.00 cfs 0 cf
Pond 8P: Low Point	Peak Elev=386.52' Storage=389 cf Inflow=0.64 cfs 3,653 cf Outflow=0.63 cfs 3,289 cf
Link 9L: POC "A"	Inflow=0.15 cfs 896 cf Primary=0.15 cfs 896 cf
Link 10L: POC "B"	Inflow=0.63 cfs 3,289 cf Primary=0.63 cfs 3,289 cf

Total Runoff Area = 107,429 sf Runoff Volume = 5,701 cf Average Runoff Depth = 0.64"
86.93% Pervious = 93,387 sf 13.07% Impervious = 14,042 sf

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Area A-1	Runoff Area=28,353 sf 0.61% Impervious Runoff Depth>0.64" Flow Length=285' Tc=7.9 min UI Adjusted CN=61.0 Runoff=0.35 cfs 1,523 cf
Subcatchment 2S: Area A-2	Runoff Area=3,012 sf 100.00% Impervious Runoff Depth>3.43" Flow Length=56' Tc=0.4 min CN=98.0 Runoff=0.30 cfs 860 cf
Subcatchment 3S: Area A-3	Runoff Area=2,461 sf 83.30% Impervious Runoff Depth>2.77" Flow Length=135' Tc=1.0 min CN=91.8 Runoff=0.21 cfs 568 cf
Subcatchment 4S: Area B-1	Runoff Area=24,767 sf 0.00% Impervious Runoff Depth>0.63" Flow Length=162' Tc=10.4 min CN=60.8 Runoff=0.27 cfs 1,311 cf
Subcatchment 5S: Area B-2	Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>3.43" Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.38 cfs 1,135 cf
Subcatchment 6S: Area B-3	Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>0.83" Flow Length=521' Tc=9.9 min CN=65.0 Runoff=0.75 cfs 3,121 cf
Pond 7P: DW-1	Peak Elev=387.48' Storage=1,428 cf Inflow=0.51 cfs 1,428 cf Outflow=0.00 cfs 0 cf
Pond 8P: Low Point	Peak Elev=386.53' Storage=404 cf Inflow=1.16 cfs 5,567 cf Outflow=1.16 cfs 5,203 cf
Link 9L: POC "A"	Inflow=0.35 cfs 1,523 cf Primary=0.35 cfs 1,523 cf
Link 10L: POC "B"	Inflow=1.16 cfs 5,203 cf Primary=1.16 cfs 5,203 cf

Total Runoff Area = 107,429 sf Runoff Volume = 8,517 cf Average Runoff Depth = 0.95"
86.93% Pervious = 93,387 sf 13.07% Impervious = 14,042 sf

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Area A-1	Runoff Area=28,353 sf 0.61% Impervious Runoff Depth>1.17" Flow Length=285' Tc=7.9 min UI Adjusted CN=61.0 Runoff=0.74 cfs 2,771 cf
Subcatchment 2S: Area A-2	Runoff Area=3,012 sf 100.00% Impervious Runoff Depth>4.43" Flow Length=56' Tc=0.4 min CN=98.0 Runoff=0.38 cfs 1,113 cf
Subcatchment 3S: Area A-3	Runoff Area=2,461 sf 83.30% Impervious Runoff Depth>3.75" Flow Length=135' Tc=1.0 min CN=91.8 Runoff=0.28 cfs 768 cf
Subcatchment 4S: Area B-1	Runoff Area=24,767 sf 0.00% Impervious Runoff Depth>1.16" Flow Length=162' Tc=10.4 min CN=60.8 Runoff=0.59 cfs 2,393 cf
Subcatchment 5S: Area B-2	Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>4.43" Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.49 cfs 1,469 cf
Subcatchment 6S: Area B-3	Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>1.43" Flow Length=521' Tc=9.9 min CN=65.0 Runoff=1.42 cfs 5,362 cf
Pond 7P: DW-1	Peak Elev=387.63' Storage=1,504 cf Inflow=0.66 cfs 1,881 cf Outflow=0.02 cfs 412 cf
Pond 8P: Low Point	Peak Elev=386.55' Storage=429 cf Inflow=2.19 cfs 9,223 cf Outflow=2.19 cfs 8,858 cf
Link 9L: POC "A"	Inflow=0.74 cfs 3,182 cf Primary=0.74 cfs 3,182 cf
Link 10L: POC "B"	Inflow=2.19 cfs 8,858 cf Primary=2.19 cfs 8,858 cf

Total Runoff Area = 107,429 sf Runoff Volume = 13,875 cf Average Runoff Depth = 1.55"
86.93% Pervious = 93,387 sf 13.07% Impervious = 14,042 sf

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Area A-1	Runoff Area=28,353 sf 0.61% Impervious Runoff Depth>1.68" Flow Length=285' Tc=7.9 min UI Adjusted CN=61.0 Runoff=1.12 cfs 3,973 cf
Subcatchment 2S: Area A-2	Runoff Area=3,012 sf 100.00% Impervious Runoff Depth>5.27" Flow Length=56' Tc=0.4 min CN=98.0 Runoff=0.45 cfs 1,323 cf
Subcatchment 3S: Area A-3	Runoff Area=2,461 sf 83.30% Impervious Runoff Depth>4.57" Flow Length=135' Tc=1.0 min CN=91.8 Runoff=0.34 cfs 936 cf
Subcatchment 4S: Area B-1	Runoff Area=24,767 sf 0.00% Impervious Runoff Depth>1.67" Flow Length=162' Tc=10.4 min CN=60.8 Runoff=0.89 cfs 3,437 cf
Subcatchment 5S: Area B-2	Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>5.27" Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.58 cfs 1,747 cf
Subcatchment 6S: Area B-3	Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>2.00" Flow Length=521' Tc=9.9 min CN=65.0 Runoff=2.04 cfs 7,465 cf
Pond 7P: DW-1	Peak Elev=387.76' Storage=1,567 cf Inflow=0.79 cfs 2,260 cf Outflow=0.04 cfs 788 cf
Pond 8P: Low Point	Peak Elev=386.57' Storage=449 cf Inflow=3.15 cfs 12,648 cf Outflow=3.15 cfs 12,282 cf
Link 9L: POC "A"	Inflow=1.12 cfs 4,761 cf Primary=1.12 cfs 4,761 cf
Link 10L: POC "B"	Inflow=3.15 cfs 12,282 cf Primary=3.15 cfs 12,282 cf

Total Runoff Area = 107,429 sf Runoff Volume = 18,881 cf Average Runoff Depth = 2.11"
86.93% Pervious = 93,387 sf 13.07% Impervious = 14,042 sf

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Area A-1	Runoff Area=28,353 sf 0.61% Impervious Runoff Depth>2.46" Flow Length=285' Tc=7.9 min UI Adjusted CN=61.0 Runoff=1.71 cfs 5,816 cf
Subcatchment 2S: Area A-2	Runoff Area=3,012 sf 100.00% Impervious Runoff Depth>6.43" Flow Length=56' Tc=0.4 min CN=98.0 Runoff=0.55 cfs 1,614 cf
Subcatchment 3S: Area A-3	Runoff Area=2,461 sf 83.30% Impervious Runoff Depth>5.71" Flow Length=135' Tc=1.0 min CN=91.8 Runoff=0.42 cfs 1,170 cf
Subcatchment 4S: Area B-1	Runoff Area=24,767 sf 0.00% Impervious Runoff Depth>2.44" Flow Length=162' Tc=10.4 min CN=60.8 Runoff=1.36 cfs 5,039 cf
Subcatchment 5S: Area B-2	Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>6.43" Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.70 cfs 2,131 cf
Subcatchment 6S: Area B-3	Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>2.84" Flow Length=521' Tc=9.9 min CN=65.0 Runoff=2.97 cfs 10,629 cf
Pond 7P: DW-1	Peak Elev=388.32' Storage=1,780 cf Inflow=0.96 cfs 2,784 cf Outflow=0.09 cfs 1,309 cf
Pond 8P: Low Point	Peak Elev=386.59' Storage=476 cf Inflow=4.60 cfs 17,798 cf Outflow=4.59 cfs 17,431 cf
Link 9L: POC "A"	Inflow=1.74 cfs 7,125 cf Primary=1.74 cfs 7,125 cf
Link 10L: POC "B"	Inflow=4.59 cfs 17,431 cf Primary=4.59 cfs 17,431 cf

Total Runoff Area = 107,429 sf Runoff Volume = 26,399 cf Average Runoff Depth = 2.95"
86.93% Pervious = 93,387 sf 13.07% Impervious = 14,042 sf

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Area A-1	Runoff Area=28,353 sf 0.61% Impervious Runoff Depth>3.08" Flow Length=285' Tc=7.9 min UI Adjusted CN=61.0 Runoff=2.17 cfs 7,289 cf
Subcatchment 2S: Area A-2	Runoff Area=3,012 sf 100.00% Impervious Runoff Depth>7.29" Flow Length=56' Tc=0.4 min CN=98.0 Runoff=0.62 cfs 1,830 cf
Subcatchment 3S: Area A-3	Runoff Area=2,461 sf 83.30% Impervious Runoff Depth>6.55" Flow Length=135' Tc=1.0 min CN=91.8 Runoff=0.48 cfs 1,344 cf
Subcatchment 4S: Area B-1	Runoff Area=24,767 sf 0.00% Impervious Runoff Depth>3.06" Flow Length=162' Tc=10.4 min CN=60.8 Runoff=1.73 cfs 6,320 cf
Subcatchment 5S: Area B-2	Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>7.29" Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.79 cfs 2,415 cf
Subcatchment 6S: Area B-3	Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>3.51" Flow Length=521' Tc=9.9 min CN=65.0 Runoff=3.69 cfs 13,122 cf
Pond 7P: DW-1	Peak Elev=388.62' Storage=1,876 cf Inflow=1.09 cfs 3,174 cf Outflow=0.32 cfs 1,696 cf
Pond 8P: Low Point	Peak Elev=386.60' Storage=496 cf Inflow=5.73 cfs 21,857 cf Outflow=5.73 cfs 21,489 cf
Link 9L: POC "A"	Inflow=2.25 cfs 8,985 cf Primary=2.25 cfs 8,985 cf
Link 10L: POC "B"	Inflow=5.73 cfs 21,489 cf Primary=5.73 cfs 21,489 cf

Total Runoff Area = 107,429 sf Runoff Volume = 32,320 cf Average Runoff Depth = 3.61"
86.93% Pervious = 93,387 sf 13.07% Impervious = 14,042 sf

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Area A-1	Runoff Area=28,353 sf 0.61% Impervious Runoff Depth>3.78" Flow Length=285' Tc=7.9 min UI Adjusted CN=61.0 Runoff=2.68 cfs 8,942 cf
Subcatchment 2S: Area A-2	Runoff Area=3,012 sf 100.00% Impervious Runoff Depth>8.21" Flow Length=56' Tc=0.4 min CN=98.0 Runoff=0.69 cfs 2,061 cf
Subcatchment 3S: Area A-3	Runoff Area=2,461 sf 83.30% Impervious Runoff Depth>7.46" Flow Length=135' Tc=1.0 min CN=91.8 Runoff=0.54 cfs 1,531 cf
Subcatchment 4S: Area B-1	Runoff Area=24,767 sf 0.00% Impervious Runoff Depth>3.76" Flow Length=162' Tc=10.4 min CN=60.8 Runoff=2.14 cfs 7,758 cf
Subcatchment 5S: Area B-2	Runoff Area=3,976 sf 100.00% Impervious Runoff Depth>8.21" Flow Length=314' Tc=1.4 min CN=98.0 Runoff=0.89 cfs 2,720 cf
Subcatchment 6S: Area B-3	Runoff Area=44,860 sf 10.77% Impervious Runoff Depth>4.25" Flow Length=521' Tc=9.9 min CN=65.0 Runoff=4.50 cfs 15,896 cf
Pond 7P: DW-1	Peak Elev=388.80' Storage=1,890 cf Inflow=1.23 cfs 3,591 cf Outflow=0.63 cfs 2,111 cf
Pond 8P: Low Point	Peak Elev=386.62' Storage=517 cf Inflow=6.99 cfs 26,375 cf Outflow=6.98 cfs 26,006 cf
Link 9L: POC "A"	Inflow=3.28 cfs 11,053 cf Primary=3.28 cfs 11,053 cf
Link 10L: POC "B"	Inflow=6.98 cfs 26,006 cf Primary=6.98 cfs 26,006 cf

Total Runoff Area = 107,429 sf Runoff Volume = 38,909 cf Average Runoff Depth = 4.35"
86.93% Pervious = 93,387 sf 13.07% Impervious = 14,042 sf

Appendix D
Pipe Conveyance Calculations

Conveyance Capacity

11 Konandreas Drive
Stamford, Connecticut

The conveyance calculations below reflect the pipes receiving the largest flow rates, which will ultimately govern the capacities of the contributing system. Contributing pipes of the same size can be expected to convey smaller flows with adequate capacity. Refer to the Pipe Plan at the end of this section for pipe labels and references.

❑ Proposed 10-Year Storm Peak Flow Rates

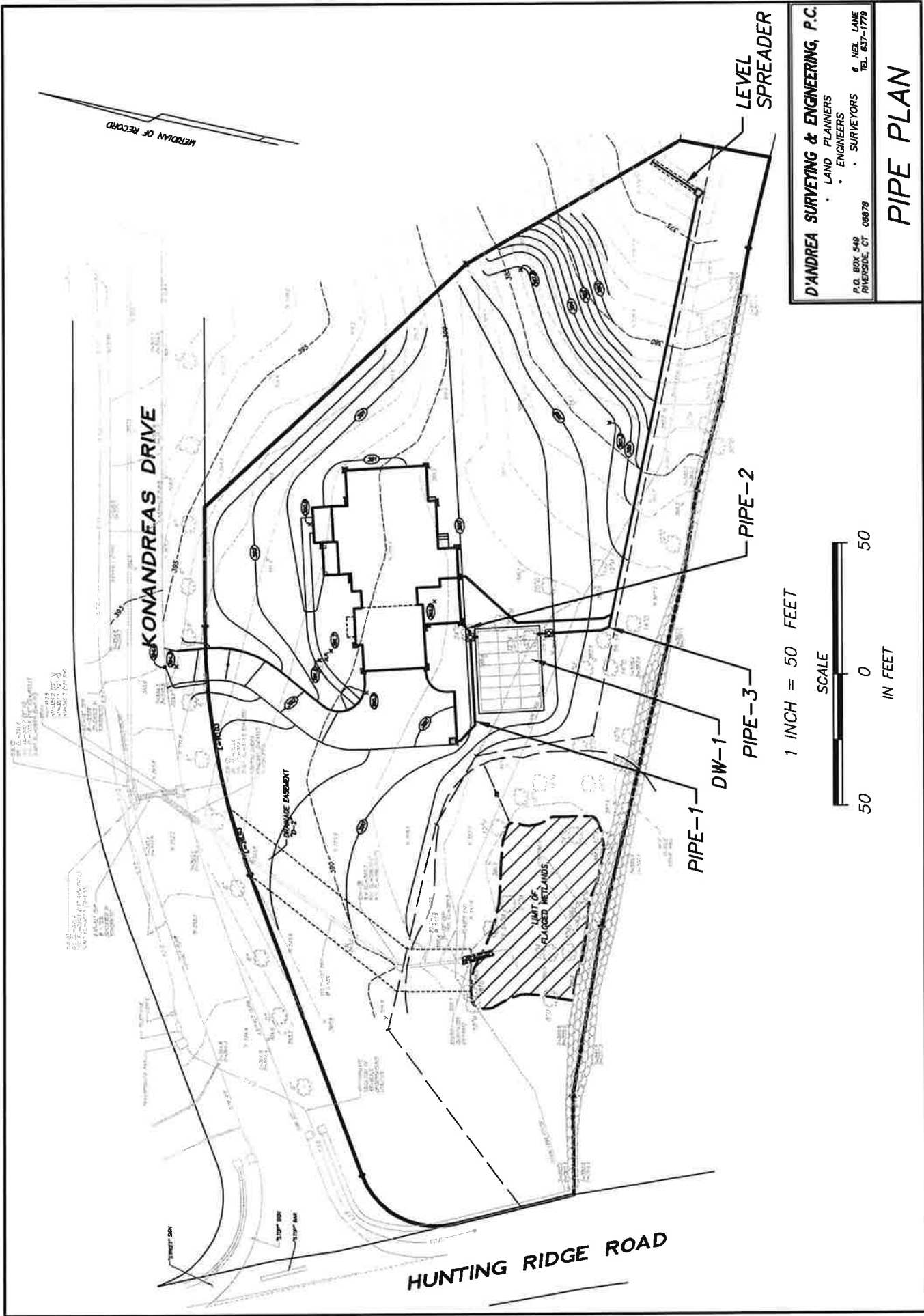
<u>Section ID</u>	<u>Length</u>	<u>Diameter</u>	<u>Material</u>	<u>Slop</u>	<u>Design Flow</u>	<u>Capacity</u>
Pipe 1	42-feet	6-inch	PVC	1.2%	0.34 ft ³ /s	0.73 ft ³ /s*
Pipe 2	5-feet	6-inch	PVC	1.0%	0.45 ft ³ /s	0.66 ft ³ /s*
Pipe 3	190-feet	6-inch	PVC	1.0%	0.04 ft ³ /s	0.66 ft ³ /s*

* Maximum conveyance capacity for proposed pipe sections was calculated using the Manning Equation for full flow conditions.

Level Spreader Design:

Q (100-year) Design = 1.18 CFS

(0.63 cfs) x (13 LF per 1.0 CFS) = 8.2 LF Required, 20 LF Provided



D'ANDREA SURVEYING & ENGINEERING, P.C.
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• ENGINEERS
• SURVEYORS
P.O. BOX 540
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PIPE PLAN

Appendix E
Deep Test Pit Results

SOIL EVALUATION TEST RESULTS

Project Name: Single Family Dwelling
Project Address: 11 Konandreas Drive

Engineering Firm's Name: D'Andrea Surveying & Engineering, PC
Engineer's Name: Bryan A. French

Test Pit or Soil Boring #: 108		Ground Elevation: 388.4
Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
388.4		0
387.6	Topsoil	10
386.7	Orange Brown Silty Loam	20
383.4	Tan Loamy Sand	60

Saturated Hydraulic Conductivity Test Location #:	
Ground Elevation:	
Top Elevation of Proposed Infiltration System:	
Bottom Elevation of Proposed Infiltration System:	
Elevation of Test*:	
Test Method (check one of the following acceptable methods**):	
	Borehole infiltration test (NHDES, 2008)
	Guelph permeameter - ASTM D5126-90 Method
	Falling head permeameter - ASTM D5126-90 Method
	Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
	Amoozegar or Amoozegar (constant head) permeameter - Amoozegar 1992
Attach field data forms for the respective infiltration test method.	
Calculated Saturated Hydraulic Conductivity Rate: _____	

Elevation	Depth in Inches
383.3	Restrictive
383.3	Mottling (Seasonally High Groundwater)
-	Roots
-	Groundwater (Weeping)
-	Ledge

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

TEST CERTIFICATION

I HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE AND CORRECT.

Name of Test Conductor

Signature of Test Conductor

Date