

ENGINEERING SUMMARY REPORT

**FOR
“WINGS ARENA”**

**LOCATED AT
50 BARRY PLACE
STAMFORD, CONNECTICUT**

**PREPARED FOR
WINGS REAL ESTATE HOLDINGS, LLC**

December 15, 2022



Derek E. Daunais, PE
CT License No. 22861

21VP_DSR_1

LAND PLANNERS • ENGINEERS • SURVEYORS

Applicant / Site Information:

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Site Information:

50 Barry Place
Block 35, Tax Account #003-1399
Existing / Proposed Zone: M-G Zoning District
Existing / Proposed Use: Commercial

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Introduction:

The applicant for the proposed arena development project, to be located at 50 Barry Place in Stamford, Connecticut, is proposing improvements to the subject property, proposed Parcel "B". The purpose of this report is to summarize the stormwater treatment improvements for the site as part of the proposed commercial redevelopment for Parcel "B". Proposed Parcel "B" is part of a proposed two-lot subdivision of an existing larger, 11.7733-acre, property that consists of 23 & 50 Barry Place. This property is located along the western side of Barry Place, just south of the intersection with Melrose Avenue. Parcel "B" will be bordered by proposed Parcel "A" to the south and west, Metro-North railroad to the north and commercial properties to the east. Parcel "B" is located in the M-G zoning district and will have a total area of 2.6018 acres. The parcel is located outside all Flood Hazard Areas (refer to Exhibit D).

The proposed improvements will include the removal of all existing buildings, site features, and pavement on Parcel "B" and the construction of a new commercial arena building. Also included as part of the development would be attendant improvements such as the construction of new bituminous concrete driveways and parking lot areas with curbing, retaining walls, sidewalks, installation of a stormwater collection, retention and conveyance system, installation of various underground utilities, and the implementation of a planting plan. The existing driveway entrance to the site is proposed to remain and to be repaved. Refer to the Site Plan Review Set, prepared by D'Andrea Surveying & Engineering, P.C. for a depiction of existing conditions and the proposed site improvements.

The proposed development of Parcel "B" will slightly increase the total amount of impervious coverage from 91,662 square feet (S.F.) (or 80.9%) to 92,234 S.F. (or 81.4%), which is an increase of approximately 572 S.F. or (0.6%), as compared to existing conditions. A proposed storm drainage system, including catch basins with deep sumps and traps, cyclonic hydrodynamic oil/grit removal treatment systems, and subsurface retention/infiltration systems, will be installed to treat Water Quality Flow (WQF), infiltrate a minimum of the half Water Quality Flow (WQF), and reduce both peak flow discharge rates and runoff volume to off-site areas, as compared to existing conditions. There are currently no stormwater retention or infiltration treatment measures on the site. Drainage patterns and discharge points will be similar as under existing conditions.

The on-site watershed 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 peak stormwater runoff flow rates for the 1-year to 100-year storm events, using the National Resources Conservation Services (NRCS) method.

Existing Conditions:

Currently, proposed Parcel "B" supports a commercial building, an accessory pump house building, and bituminous concrete access driveway and large parking lot areas. There is a small lawn/vegetated brush area to the southeast of the existing building. Stormwater runoff from the majority of the site (Drainage Area DA-1) is collected by an on-site storm drainage system and routed through a recently upgraded storm drainage system, Point of Concern (POC) "A", that runs

through proposed Parcel "A". This storm drainage system is used to convey and discharge stormwater runoff into a riprap plunge pool at the western border of Parcel "A" toward the Innis Arden Golf Club property. The outflow from the riprap plunge pool then flows into an off-site stream channel that directs the runoff into a nearby irrigation pond located on the Innis Arden Golf Club property. There is also a small portion of the site (Drainage Area DA-2) that discharges stormwater runoff onto the adjacent commercial property, POC "B". Refer to Exhibit "A" for a depiction of existing conditions stormwater runoff flow patterns and watershed areas.

The existing, recently upgraded, storm drainage system that runs through Parcel "A" contains an off-line hydrodynamic oil/grit separator stormwater treatment system. This system was sized to treat the stormwater runoff from the majority of the entire property prior to subdivision, including the portion of the property that contains all of proposed Parcel "B". Refer to a previously submitted report entitled "Drainage Summary Report for Storm Drainage Improvements Located at 23-50 Barry Place, Stamford, Connecticut," prepared for Barry Place Ventures, LLC, revised May 5, 2016, as prepared by D'Andrea Surveying & Engineering, P.C.

Proposed Conditions:

Under proposed conditions, drainage patterns and discharge points will be similar as under existing conditions for Parcel "B". However, storm drainage treatment and retention facilities have been proposed to help control and treat stormwater runoff before it is discharged off-site. The proposed drainage analysis includes the division of Parcel "B" into five different sub-watershed area discharging to two points of concern. Refer to Exhibit "B" for a depiction of proposed conditions stormwater runoff flow patterns and watershed areas.

DA-1 will consist of the majority of the entry driveway along the southern portion of Parcel "B". The majority of this area will consist of a paved driveway surface, similar as under existing conditions. Stormwater runoff from this area will be collected by deep sump catch basins and discharged into the existing storm drainage system (POC A) that runs through this area. The collected stormwater runoff will be routed through the existing hydrodynamic oil/grit separator stormwater treatment system located on proposed Parcel "A" prior to discharging off-site toward the Innis Arden Gold Club property.

DA-2 will consist of a very small lawn/planted area in a corner of the property to the south of the proposed arena building. Stormwater runoff from this area will flow overland toward the adjoining commercial property (POC B) in a similar manner as under existing conditions.

The remainder of the site, including the proposed arena building, all of the proposed parking areas, and the majority of the proposed driveway has been divided into three sub-watershed area, DA-3A, DA-3B, and DA-3C. The stormwater runoff from these three drainage areas will first be collected by the proposed storm drainage system, including deep sump catch basins in the parking lot areas. The collected runoff will then be routed through new hydrodynamic oil/grit separator stormwater treatment systems and discharged into a subsurface retention/infiltration system. These retention/infiltration systems have been designed to retain a minimum of the half water quality volume from their contributing watershed areas. Refer to Appendix "A" for half water quality volume calculations and retention system stage-storage data.

The overflow from these systems will be routed into the existing on-site storm drainage system (POC A) that runs through Parcel "A" and discharges toward the Innis Arden Golf Club.

The proposed cyclonic hydrodynamic oil/grit removal treatment systems will be designed to treat a minimum of the water quality flow rate from their contributing watershed areas.

The bottoms of the proposed subsurface retention/infiltration systems have been designed to be set a minimum of 1-foot above any underlying restrictive layer in accordance with the City of Stamford Drainage Manual standards. 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 majority of the on-site soil group as Urban Land with a hydrologic soil group rating of D. Refer to Exhibit "C" for the NRCS soil delineation map and hydrologic soil group rating. However, on-site test borings were performed, which have characterized the soils in the areas of the proposed retention/infiltration systems as predominately sand and silt with some gravel, which generally have good infiltration characteristics. The boring logs have also determined the depth to bedrock and found no groundwater in the area within the test boring limits. Additional deep test pits and hydraulic conductivity tests will be performed in the areas of the proposed retention systems prior to installation to verify the infiltration rates of the existing soils and if any seasonal high-groundwater (or mottling) is evident. The results of this additional testing will be submitted to the City for review.

Based on the HydroCAD model, both the volume and peak rate of stormwater runoff exiting the site will be decreased for all storm events to POC A and B. Refer to Appendix "B" for a summary and comparison of the peak flow and volume discharge from the subject property for both existing and proposed conditions. In addition to reducing the peak flows, infiltrating half the Water Quality Volume from the proposed improvements will help pretreat stormwater runoff from the proposed asphalt parking lot and building 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 "Sedimentation and Erosion Control Plan," prepared by D'Andrea Surveying & Engineering, P.C. 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.

Narrative of Impacts to State Drainage Facilities

The Metro-North railroad right-of-way lies adjacent to the northern property line of the proposed development. There are no proposed direct stormwater runoff connections from the proposed development to the railroad right-of-way from any of the proposed building or driveway improvements.

Under existing conditions, none of the stormwater runoff from the property flows toward or is discharged onto the railroad right-of-way. Under proposed conditions, there will continue to be no proposed stormwater runoff from any portion of the property that flows toward or is discharged onto the railroad right-of-way. Instead, surface runoff from the property flows in a

southwesterly direction away from the railroad right-of-way. Therefore, there will be no adverse impacts to any existing storm drainage systems that may lie within the railroad right-of-way, as a result of the proposed development.

There are no existing drainage rights or easements recorded between the subject property and the contiguous State property.

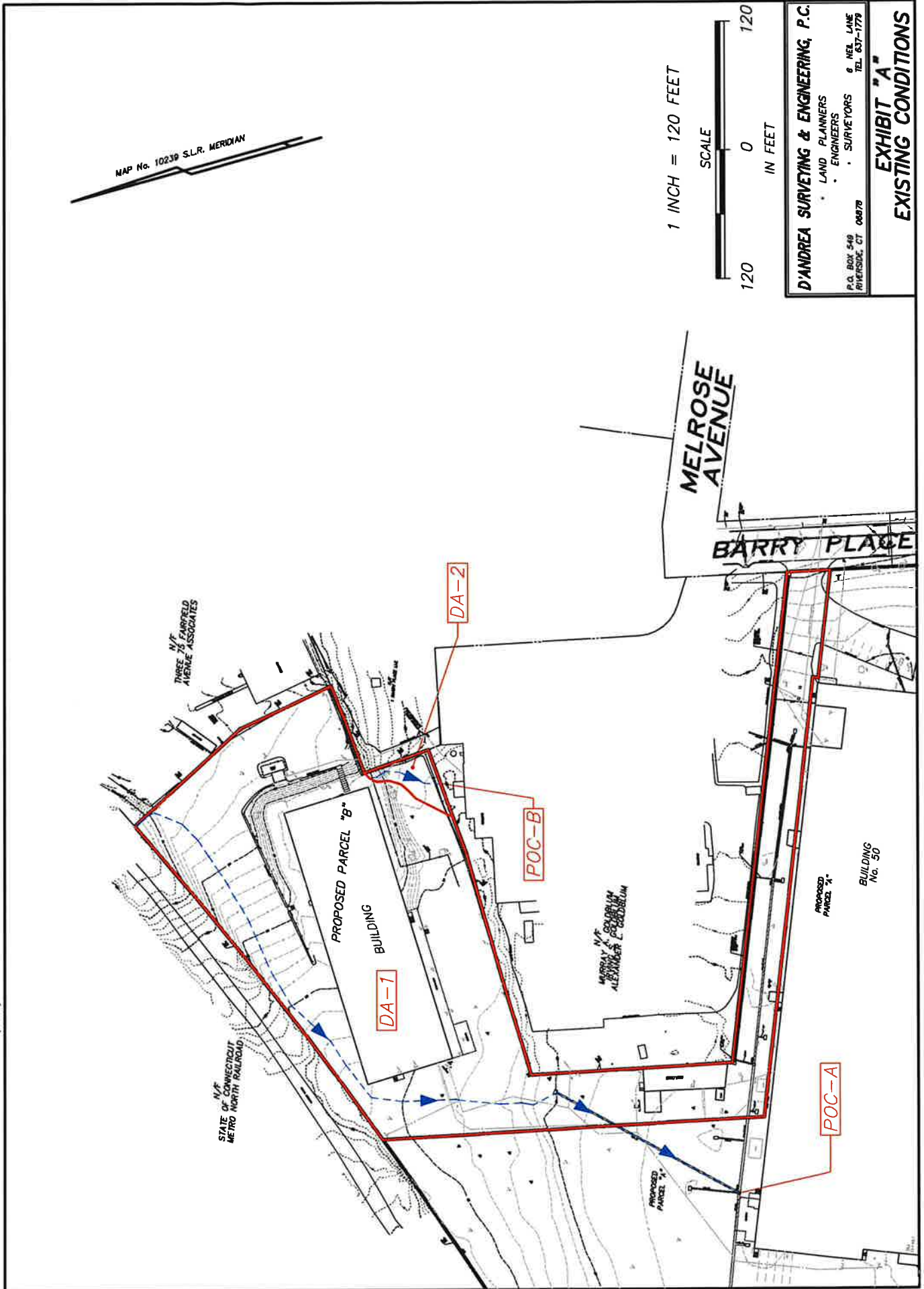
Conclusion

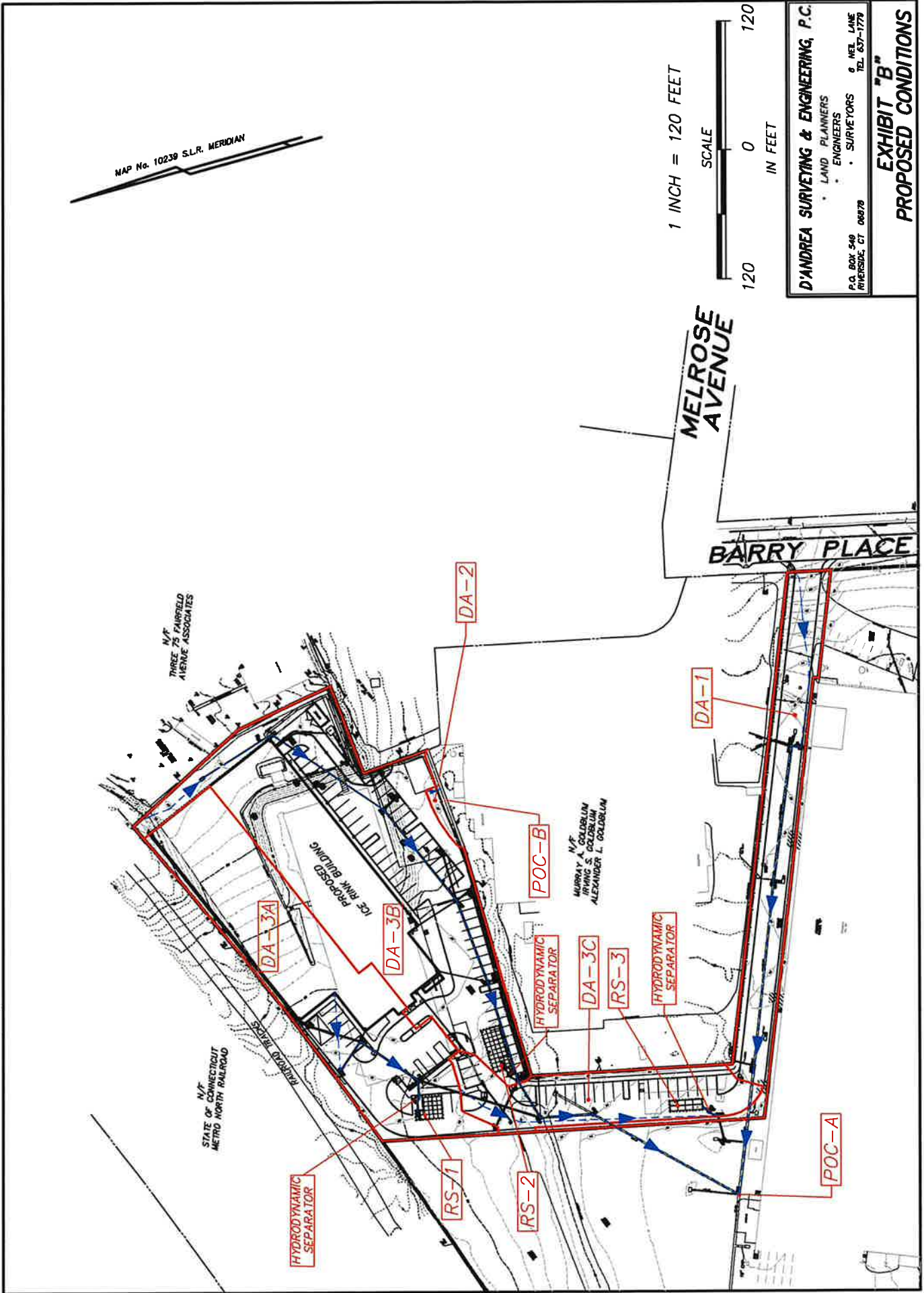
The proposed improvements have been designed to provide water quality treatment measures that will both mitigate stormwater runoff from the site and reduce runoff volumes and peak flow rates, as compared to existing conditions.

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

Exhibits "A" & "B"

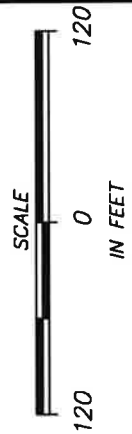
Watershed Maps
Existing & Proposed Conditions





MAP No. 10239 S.L.R. MERIDIAN

1 INCH = 120 FEET



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EXHIBIT "B"
PROPOSED CONDITIONS

Exhibit "C"

**NRCS Soil Map &
Hydraulic Soil Group Rating**

Hydrologic Soil Group—State of Connecticut
(23-50 Barry Place, Stamford, CT)



Soil Map may not be valid at this scale.

Map Scale: 1:2,540 if printed on A landscape (11" x 8.5") sheet

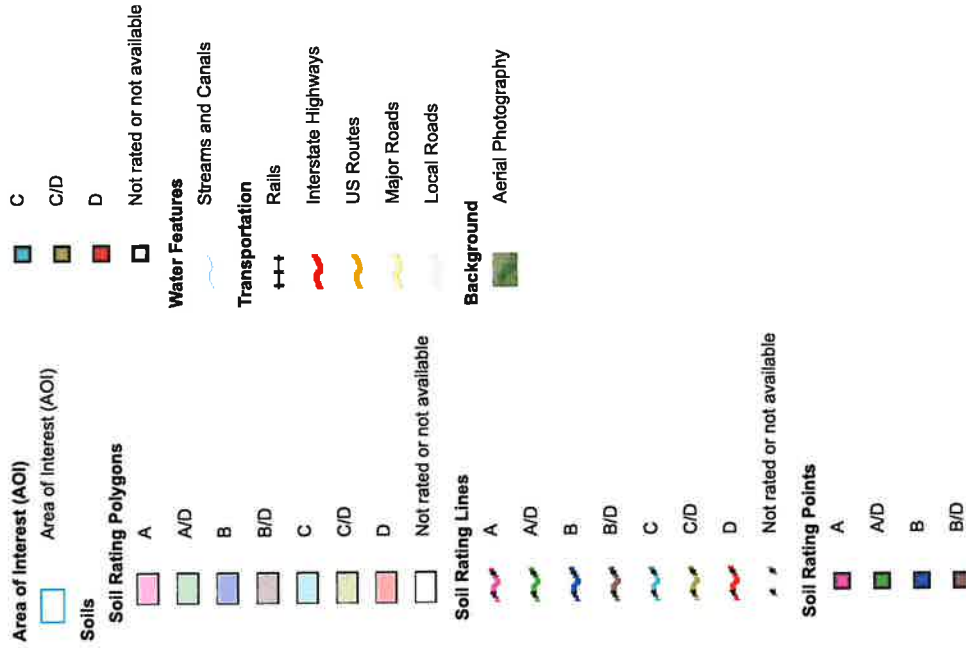
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84



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 22, Sep 12, 2022

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
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	B	0.6	4.9%
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	D	1.4	11.1%
284B	Paxton-Urban land complex, 3 to 8 percent slopes	C	0.1	0.6%
306	Udorthents-Urban land complex	B	0.6	4.3%
307	Urban land	D	10.2	79.1%
Totals for Area of Interest			12.9	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°33'37"W 41°2'20"N



Legend

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

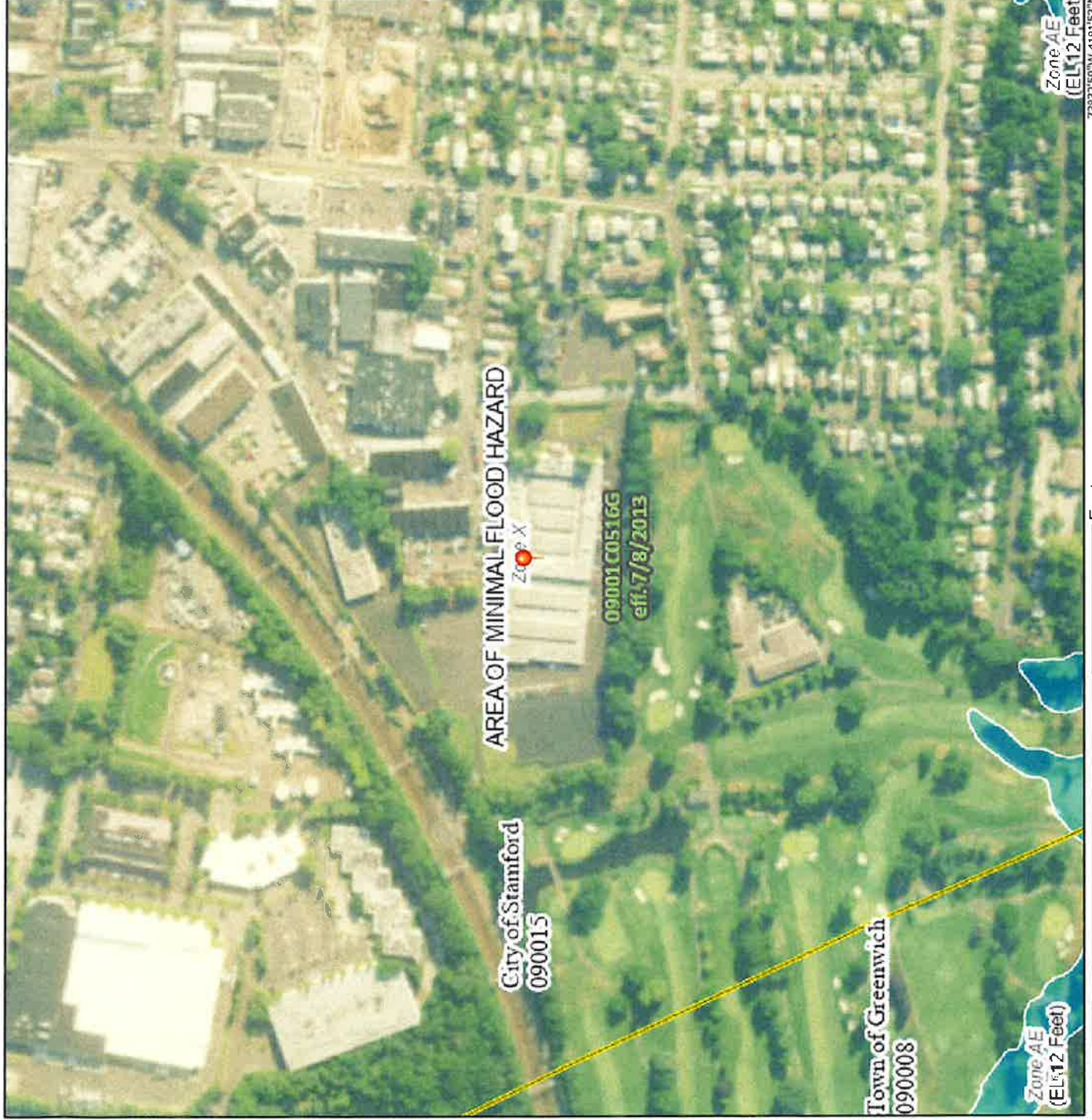
SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) <i>Zone AE, V, A99</i>	With BFE or Depth <i>Zone AE, AD, AH, VE, AR</i>	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Area of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>	Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>	Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
OTHER AREAS	Area with Flood Risk due to Levee <i>Zone D</i>	Area of Minimal Flood Hazard <i>Zone X</i>	Effective LOMRS
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer	Levee, Dike, or Floodwall	
OTHER FEATURES	Cross Sections with 1% Annual Chance Water Surface Elevation 20.2 17.5	Coastal Transect	Base Flood Elevation Line (BFE)
		Limit of Study	Jurisdiction Boundary
		Coastal Transect Baseline	Profile Baseline
		Hydrographic Feature	
MAP PANELS	Digital Data Available	No Digital Data Available	Unmapped

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 11/29/2022 at 5:09 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 unmoldernized areas cannot be used for regulatory purposes.



73°33'59"W 41°1'53"N

Zone AE (EL12 Feet)

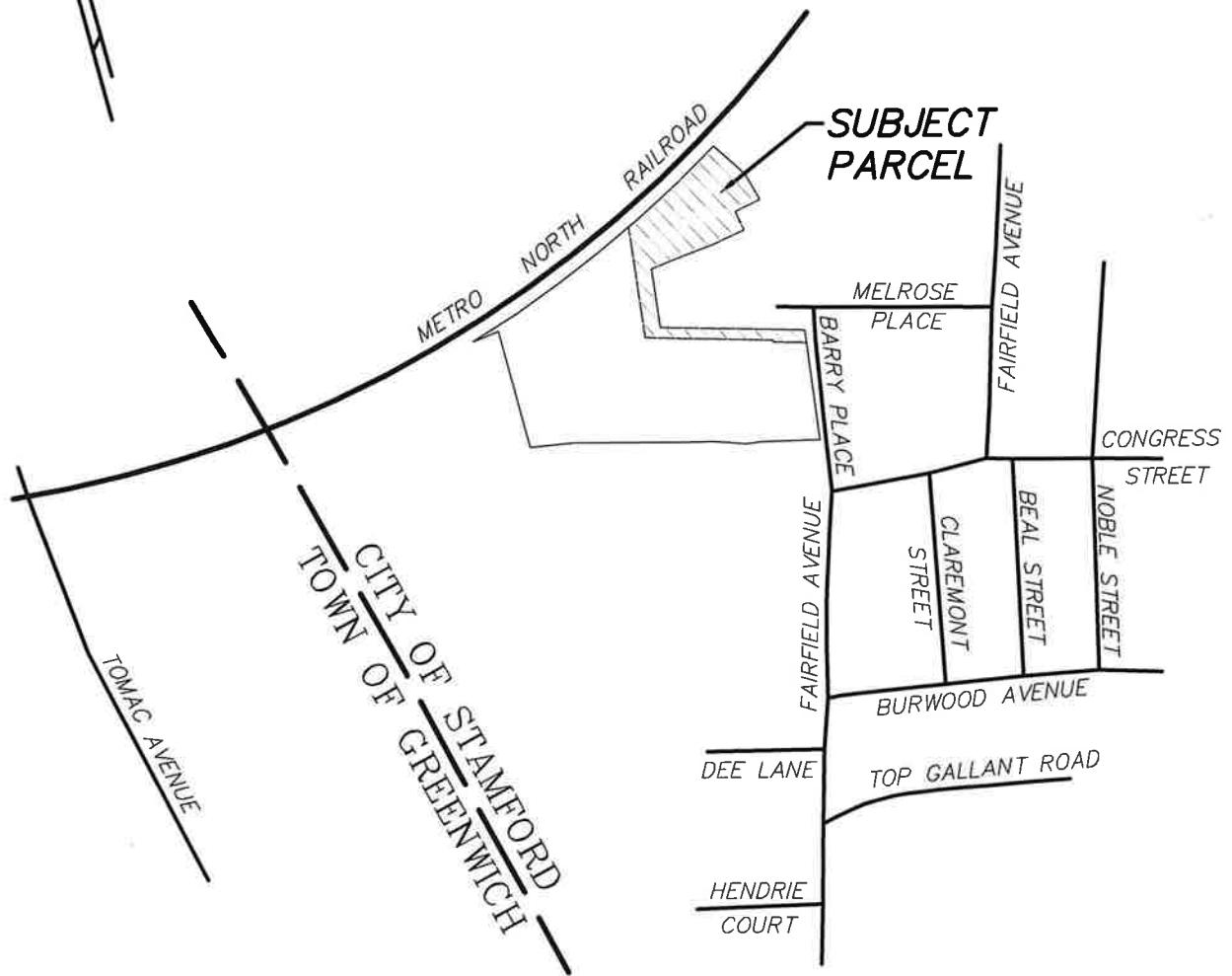
Zone AE (EL12 Feet)

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Exhibit "E"
Site Vicinity Map

MAP No. 10239 S.L.R. MERIDIAN



LOCATION MAP - 1"=600'±

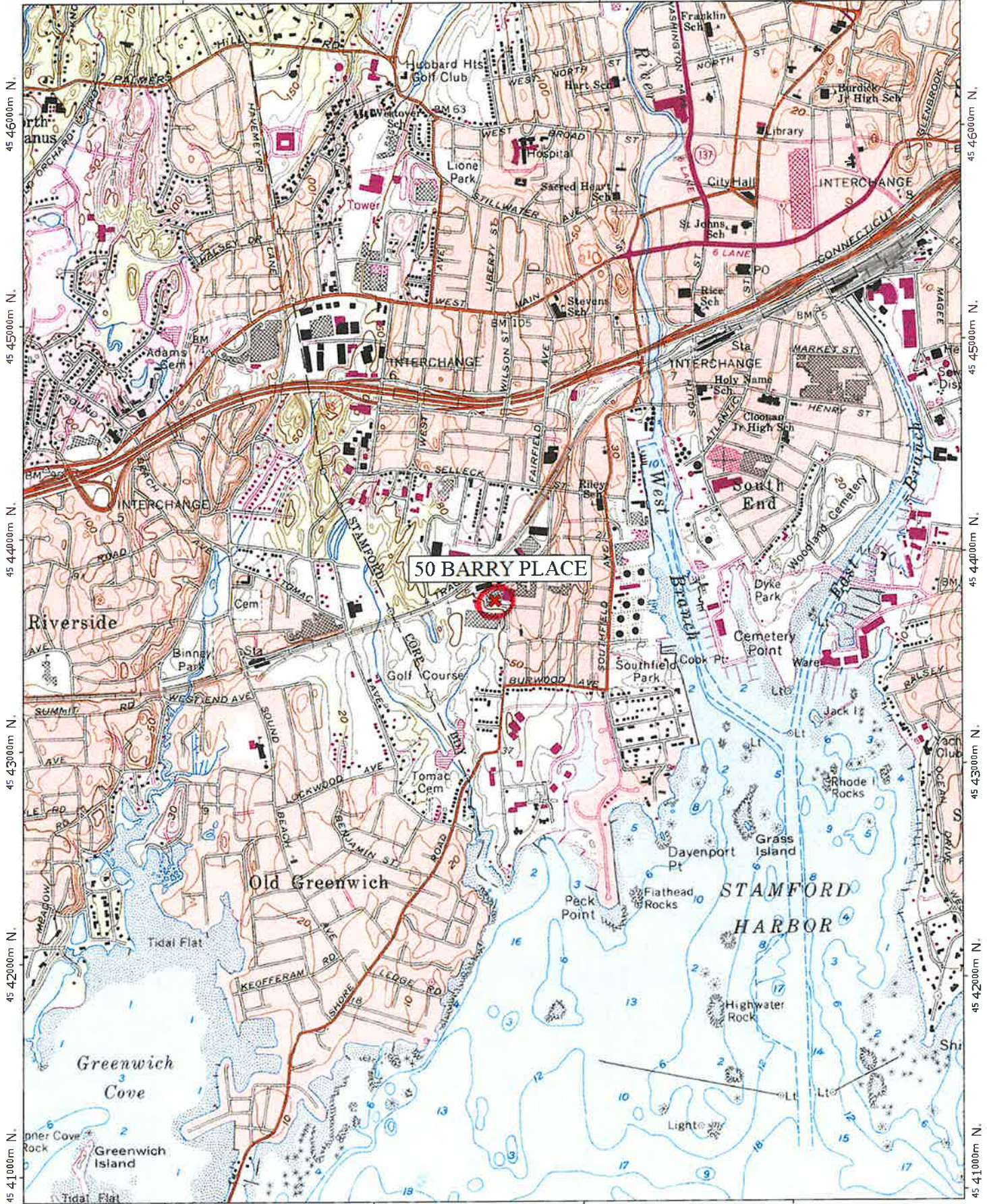
Exhibit "F"

USGS Topographic Quad Map

620000m E.

50 Barry Place, Stamford - USGS Quad Map 113
621000m E. 622000m E.

WGS84 Zone 18T 623000m E.



45 46000m N.
45 45000m N.
45 44000m N.
45 43000m N.
45 42000m N.
45 41000m N.

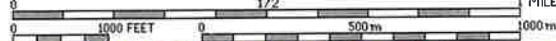
45 46000m N.
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45 42000m N.
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620000m E.

621000m E.

622000m E.

WGS84 Zone 18T 623000m E.



Map created with TOPO!® ©2002 National Geographic (www.nationalgeographic.com topo)

Exhibit "G"

Rainfall Depths and Intensity



NOAA Atlas 14, Volume 10, Version 3
 Location name: **Stamford, Connecticut, USA***
 Latitude: **41.0351°**, Longitude: **-73.555°**
 Elevation: **43.61 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 & aerials](#)

PF tabular

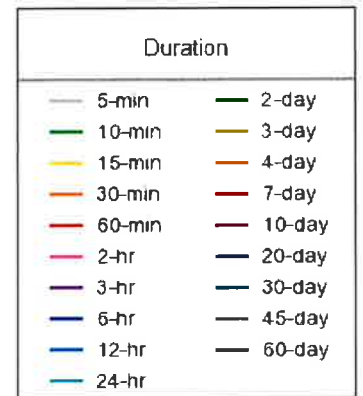
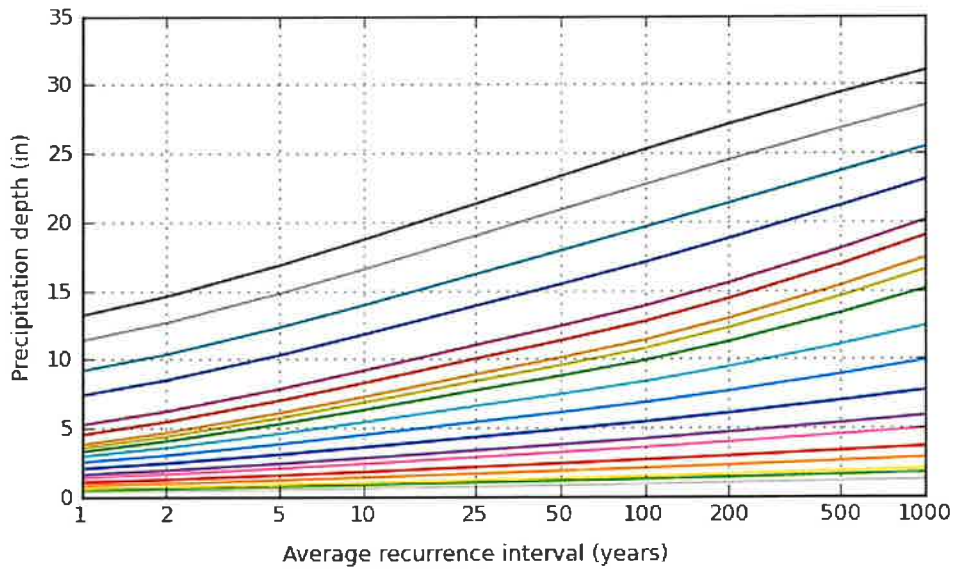
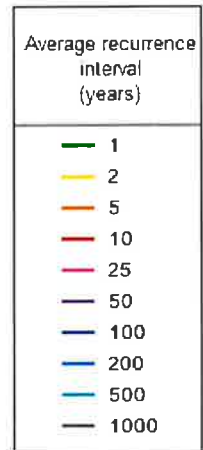
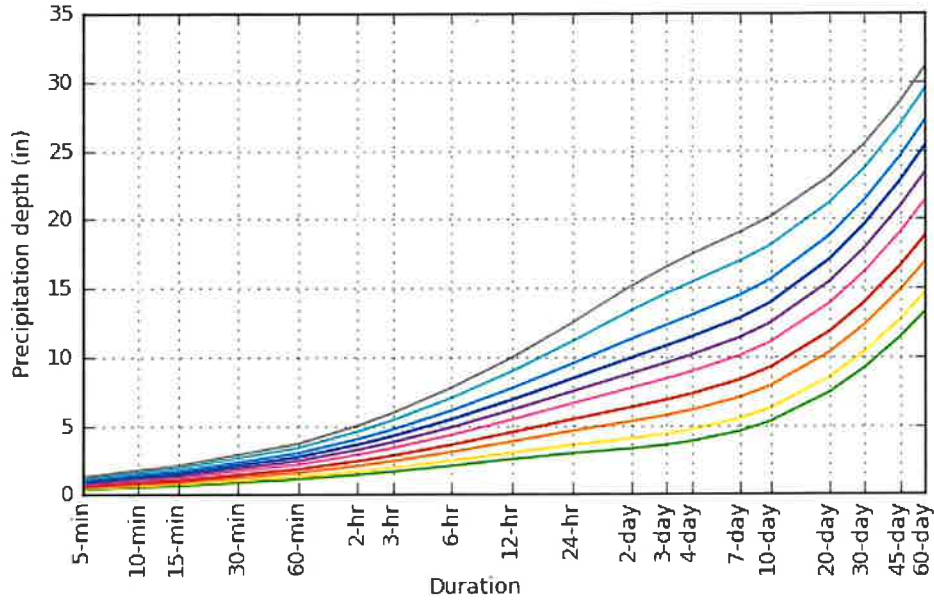
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.364 (0.280-0.466)	0.425 (0.326-0.545)	0.525 (0.401-0.674)	0.607 (0.462-0.783)	0.721 (0.532-0.961)	0.807 (0.584-1.10)	0.896 (0.630-1.25)	0.993 (0.666-1.41)	1.13 (0.731-1.65)	1.24 (0.783-1.84)
10-min	0.516 (0.396-0.661)	0.602 (0.462-0.772)	0.743 (0.568-0.955)	0.860 (0.654-1.11)	1.02 (0.754-1.36)	1.14 (0.828-1.55)	1.27 (0.893-1.77)	1.41 (0.944-2.00)	1.60 (1.03-2.34)	1.75 (1.11-2.61)
15-min	0.607 (0.466-0.777)	0.709 (0.544-0.908)	0.875 (0.670-1.12)	1.01 (0.770-1.31)	1.20 (0.887-1.60)	1.35 (0.973-1.82)	1.49 (1.05-2.08)	1.66 (1.11-2.36)	1.88 (1.22-2.76)	2.06 (1.31-3.07)
30-min	0.849 (0.652-1.09)	0.992 (0.761-1.27)	1.23 (0.937-1.57)	1.42 (1.08-1.83)	1.69 (1.24-2.25)	1.89 (1.37-2.56)	2.10 (1.47-2.92)	2.32 (1.56-3.30)	2.63 (1.70-3.84)	2.87 (1.81-4.27)
60-min	1.09 (0.838-1.40)	1.27 (0.978-1.63)	1.58 (1.21-2.02)	1.83 (1.39-2.36)	2.17 (1.60-2.89)	2.43 (1.76-3.29)	2.70 (1.89-3.75)	2.98 (2.00-4.24)	3.37 (2.18-4.93)	3.67 (2.32-5.46)
2-hr	1.42 (1.10-1.80)	1.67 (1.29-2.12)	2.08 (1.60-2.65)	2.42 (1.85-3.10)	2.88 (2.14-3.82)	3.24 (2.35-4.36)	3.60 (2.54-4.99)	4.00 (2.69-5.65)	4.55 (2.95-6.61)	4.98 (3.16-7.37)
3-hr	1.64 (1.27-2.07)	1.93 (1.50-2.45)	2.42 (1.87-3.07)	2.82 (2.16-3.60)	3.37 (2.51-4.45)	3.79 (2.76-5.09)	4.22 (2.99-5.84)	4.70 (3.17-6.62)	5.37 (3.49-7.78)	5.91 (3.76-8.70)
6-hr	2.06 (1.61-2.59)	2.44 (1.91-3.08)	3.08 (2.39-3.89)	3.60 (2.78-4.57)	4.33 (3.24-5.69)	4.87 (3.58-6.51)	5.44 (3.88-7.50)	6.08 (4.12-8.51)	7.00 (4.57-10.1)	7.75 (4.94-11.3)
12-hr	2.52 (1.98-3.16)	3.02 (2.37-3.78)	3.83 (2.99-4.80)	4.50 (3.49-5.67)	5.42 (4.09-7.09)	6.11 (4.52-8.14)	6.85 (4.92-9.40)	7.68 (5.23-10.7)	8.90 (5.83-12.7)	9.91 (6.35-14.4)
24-hr	2.94 (2.32-3.66)	3.56 (2.81-4.43)	4.58 (3.60-5.71)	5.42 (4.24-6.79)	6.58 (4.99-8.56)	7.44 (5.54-9.86)	8.36 (6.06-11.5)	9.45 (6.45-13.1)	11.1 (7.27-15.7)	12.4 (7.97-17.9)
2-day	3.29 (2.61-4.06)	4.05 (3.21-5.00)	5.28 (4.18-6.55)	6.31 (4.96-7.85)	7.72 (5.90-10.0)	8.77 (6.57-11.6)	9.90 (7.24-13.6)	11.3 (7.72-15.5)	13.3 (8.79-18.9)	15.1 (9.74-21.7)
3-day	3.56 (2.84-4.37)	4.38 (3.49-5.40)	5.74 (4.55-7.08)	6.86 (5.41-8.50)	8.40 (6.44-10.8)	9.54 (7.17-12.6)	10.8 (7.91-14.7)	12.3 (8.42-16.8)	14.6 (9.61-20.5)	16.5 (10.7-23.6)
4-day	3.81 (3.05-4.67)	4.68 (3.74-5.74)	6.10 (4.85-7.51)	7.28 (5.76-9.00)	8.90 (6.83-11.5)	10.1 (7.61-13.3)	11.4 (8.38-15.5)	13.0 (8.92-17.7)	15.4 (10.2-21.6)	17.4 (11.2-24.8)
7-day	4.54 (3.64-5.53)	5.48 (4.39-6.69)	7.01 (5.61-8.59)	8.29 (6.59-10.2)	10.0 (7.74-12.8)	11.4 (8.57-14.8)	12.8 (9.37-17.2)	14.4 (9.94-19.6)	16.9 (11.2-23.6)	19.0 (12.3-26.9)
10-day	5.25 (4.23-6.38)	6.23 (5.02-7.59)	7.85 (6.30-9.58)	9.19 (7.33-11.3)	11.0 (8.52-14.0)	12.4 (9.38-16.1)	13.9 (10.2-18.5)	15.6 (10.8-21.0)	18.1 (12.0-25.1)	20.1 (13.0-28.4)
20-day	7.39 (5.99-8.93)	8.50 (6.88-10.3)	10.3 (8.32-12.5)	11.8 (9.47-14.4)	13.9 (10.7-17.4)	15.4 (11.7-19.7)	17.1 (12.5-22.4)	18.8 (13.1-25.2)	21.2 (14.1-29.2)	23.1 (15.0-32.3)
30-day	9.17 (7.46-11.0)	10.4 (8.43-12.5)	12.3 (9.98-14.9)	13.9 (11.2-16.9)	16.2 (12.5-20.2)	17.9 (13.5-22.7)	19.6 (14.3-25.5)	21.4 (14.9-28.5)	23.7 (15.9-32.5)	25.5 (16.6-35.5)
45-day	11.4 (9.29-13.6)	12.7 (10.3-15.2)	14.8 (12.0-17.8)	16.5 (13.4-20.0)	19.0 (14.8-23.5)	20.9 (15.8-26.2)	22.7 (16.6-29.2)	24.5 (17.2-32.5)	26.8 (18.0-36.6)	28.5 (18.6-39.6)
60-day	13.2 (10.8-15.8)	14.6 (11.9-17.4)	16.8 (13.7-20.2)	18.7 (15.2-22.5)	21.3 (16.6-26.3)	23.3 (17.7-29.2)	25.3 (18.5-32.4)	27.1 (19.0-35.9)	29.4 (19.8-40.0)	31.0 (20.3-43.0)

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

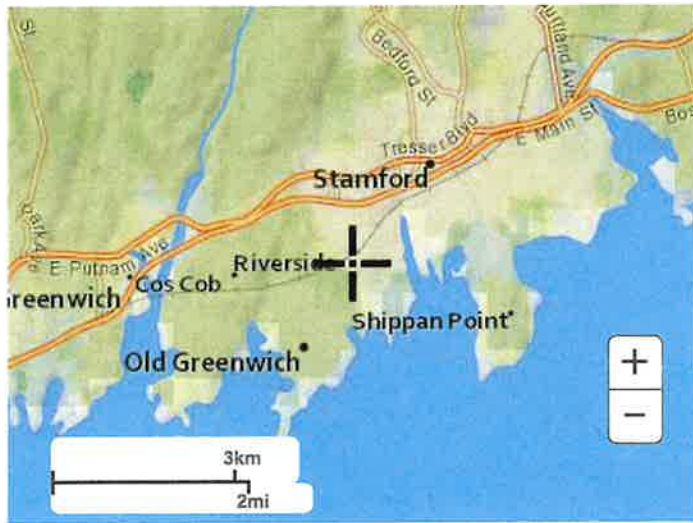
PDS-based depth-duration-frequency (DDF) curves
 Latitude: 41.0351°, Longitude: -73.5550°



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Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



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1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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Appendix "A"
Stormwater Calculations

□ **Water Quality Volume (WQV) Calculations**

$$WQV = \left(\frac{1 \text{ in}}{12 \frac{\text{in}}{\text{ft}}} \right) RA$$

Where,

R= Volumetric Runoff Coefficient = 0.05+0.009I

I= Percent Impervious Coverage

A= Watershed Area (sf)

Drainage Area	Total Area (sf)	Impervious Coverage		R (Runoff Coefficient)	½ WQV (cf)
		Area (sf)	% Coverage		
Pr. Area #3A	32,196	28,462	88.4	0.846	1,134.9
Pr. Area #3B	48,758	39,329	80.7	0.776	1,576.5
Pr. Area #3C	13,083	10,801	82.6	0.793	432.3

Pr. Area #3A: The ½ WQV for this drainage area will be collected and infiltrated by Retention System #1. The storage volume of Retention System #1 below the 15” high-overflow outlet orifice is approximately 1,362 cubic feet. Refer to attached Stage-Area Storage Table for RS-1.

Pr. Area #3B: The ½ WQV for this drainage area will be collected and infiltrated by Retention System #2. The storage volume of Retention System #2 below the 15” high-overflow outlet orifice is approximately 2,166 cubic feet. Refer to attached Stage-Area Storage Table for RS-2.

Pr. Area #3C: The ½ WQV for this drainage area will be collected and infiltrated by Retention System #3. The storage volume of Retention System #3 below the 12” high-overflow outlet orifice is approximately 686 cubic feet. Refer to attached Stage-Area Storage Table for RS-3.

Infiltration System Drawdown Calculations

Name: Wings Real Estate Holdings, LLC
Address: 50 Barry Place, Stamford, Connecticut
Project: Wings Arena
Date: December 15, 2022

□ Drawdown Calculations

According to the NRCS Web Soil Survey in Exhibit "C", the majority of the site lies within a mapped area of HSG-D soils. The following drawdown calculations are based on the soils observed in each test boring in the vicinity of the respective best management practice. The test borings predominately consisted of sand and silt with some gravel. A Rawls Infiltration Rate of 0.52 (in/hr) (Loam) was used as a conservative estimate in these calculations.

□ Retention System #1

$$Time_{drawdown} = \frac{DV}{(K)(A)}$$

DV	= Design Volume	=	1,362 ft ³
K	= Infiltration Rate	=	0.52 in/hr
A	= Bottom Area	=	476 ft ²

$$Time_{drawdown} = \frac{1,362 \text{ ft}^3}{(0.52 \text{ in/hr})(\frac{1 \text{ ft}}{12 \text{ in}})(476 \text{ ft}^2)} = 66.0 \text{ hrs}$$

The proposed Rain Garden will draw down within 66.0 hours.

□ Retention System #2

$$Time_{drawdown} = \frac{DV}{(K)(A)}$$

DV	= Design Volume	=	2,166 ft ³
K	= Infiltration Rate	=	0.52 in/hr
A	= Bottom Area	=	756 ft ²

$$Time_{drawdown} = \frac{2,166 \text{ ft}^3}{(0.52 \text{ in/hr})(\frac{1 \text{ ft}}{12 \text{ in}})(756 \text{ ft}^2)} = 66.1 \text{ hrs}$$

The proposed Rain Garden will draw down within 66.1 hours.

Infiltration System Drawdown Calculations (Continued)

Name: Wings Real Estate Holdings, LLC
Address: 50 Barry Place, Stamford, Connecticut
Project: Wings Arena
Date: December 15, 2022

□ Retention System #3

$$Time_{drawdown} = \frac{DV}{(K)(A)}$$

DV = Design Volume	=	686 ft^3
K = Infiltration Rate	=	0.52 in/hr
A = Bottom Area	=	352 ft^2

$$Time_{drawdown} = \frac{686 \text{ ft}^3}{(0.52 \text{ in/hr})(\frac{1 \text{ ft}}{12 \text{ in}})(352 \text{ ft}^2)} = 45.0 \text{ hrs}$$

The proposed Rain Garden retention volume will drawdown within 45.0 hours.

Stage-Area-Storage for Pond 6P: RS-1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
42.50	0	44.58	673	46.66	1,396
42.54	8	44.62	688	46.70	1,399
42.58	16	44.66	702	46.74	1,402
42.62	25	44.70	717	46.78	1,404
42.66	33	44.74	731	46.82	1,407
42.70	41	44.78	746	46.86	1,410
42.74	49	44.82	760	46.90	1,412
42.78	57	44.86	774	46.94	1,415
42.82	65	44.90	789	46.98	1,418
42.86	74	44.94	803	47.02	1,420
42.90	82	44.98	818	47.06	1,422
42.94	90	45.02	832	47.10	1,424
42.98	98	45.06	847	47.14	1,426
43.02	109	45.10	861	47.18	1,428
43.06	123	45.14	875	47.22	1,430
43.10	137	45.18	890	47.26	1,433
43.14	151	45.22	904	47.30	1,435
43.18	165	45.26	919	47.34	1,437
43.22	180	45.30	933	47.38	1,439
43.26	194	45.34	947	47.42	1,441
43.30	209	45.38	962	47.46	1,443
43.34	223	45.42	976	47.50	1,445
43.38	238	45.46	990	47.54	1,447
43.42	252	45.50	1,005	47.58	1,449
43.46	267	45.54	1,019	47.62	1,451
43.50	282	45.58	1,034	47.66	1,453
43.54	296	45.62	1,048	47.70	1,455
43.58	311	45.66	1,062	47.74	1,457
43.62	325	45.70	1,077	47.78	1,459
43.66	340	45.74	1,091	47.82	1,461
43.70	354	45.78	1,105	47.86	1,463
43.74	369	45.82	1,120	47.90	1,465
43.78	383	45.86	1,134	47.94	1,467
43.82	398	45.90	1,148	47.98	1,469
43.86	412	45.94	1,162	48.02	1,471
43.90	427	45.98	1,177	48.06	1,473
43.94	442	46.02	1,191	48.10	1,475
43.98	456	46.06	1,205	48.14	1,477
44.02	471	46.10	1,220	48.18	1,480
44.06	485	46.14	1,234	48.22	1,482
44.10	500	46.18	1,248	48.26	1,484
44.14	514	46.22	1,263	48.30	1,486
44.18	529	46.26	1,277		
44.22	543	46.30	1,291		
44.26	558	46.34	1,305		
44.30	572	46.38	1,320		
44.34	587	46.42	1,334		
44.38	601	46.46	1,348		
44.42	616	<u>46.50</u>	<u>1,362</u>		
44.46	630	46.54	1,377		
44.50	644	46.58	1,391		
44.54	659	46.62	1,394		

← HIGH-OVERFLOW
OUTLET

Stage-Area-Storage for Pond 7P: RS-2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
41.00	0	46.20	2,371
41.10	33	46.30	2,379
41.20	66	46.40	2,388
41.30	99	46.50	2,396
41.40	132	46.60	2,404
41.50	165	46.70	2,412
41.60	222	46.80	2,421
41.70	280	46.90	2,429
41.80	338	47.00	2,437
41.90	398	47.10	2,445
42.00	458	47.20	2,453
42.10	517	47.30	2,462
42.20	577	47.40	2,470
42.30	636	47.50	2,478
42.40	696	47.60	2,486
42.50	755	47.70	2,495
42.60	814	47.80	2,503
42.70	874	47.90	2,511
42.80	933	48.00	2,519
42.90	992		
43.00	1,051		
43.10	1,110		
43.20	1,169		
43.30	1,228		
43.40	1,287		
43.50	1,346		
43.60	1,405		
43.70	1,464		
43.80	1,523		
43.90	1,581		
44.00	1,640		
44.10	1,699		
44.20	1,757		
44.30	1,816		
44.40	1,874		
44.50	1,933		
44.60	1,991		
44.70	2,050		
44.80	2,108		
<u>44.90</u>	<u>2,166</u>		
45.00	2,225		
45.10	2,273		
45.20	2,283		
45.30	2,293		
45.40	2,303		
45.50	2,314		
45.60	2,322		
45.70	2,330		
45.80	2,338		
45.90	2,346		
46.00	2,355		
46.10	2,363		

← HIGH-OVERFLOW
OUTLET

Stage-Area-Storage for Pond 8P: RS-3

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
36.30	0	38.90	616
36.35	7	38.95	626
36.40	14	39.00	636
36.45	21	39.05	645
36.50	28	39.10	654
36.55	35	39.15	663
36.60	42	39.20	671
36.65	49	39.25	679
36.70	56	<u>39.30</u>	<u>686</u>
36.75	63	39.35	693
36.80	70	39.40	700
36.85	84	39.45	707
36.90	98	39.50	714
36.95	112	39.55	721
37.00	126	39.60	728
37.05	140	39.65	735
37.10	154	39.70	742
37.15	168	39.75	749
37.20	182	39.80	756
37.25	196	39.85	764
37.30	210	39.90	766
37.35	224	39.95	767
37.40	237	40.00	769
37.45	251	40.05	771
37.50	265	40.10	773
37.55	278	40.15	774
37.60	292	40.20	776
37.65	305	40.25	778
37.70	319	40.30	780
37.75	332		
37.80	346		
37.85	359		
37.90	372		
37.95	386		
38.00	399		
38.05	412		
38.10	425		
38.15	438		
38.20	451		
38.25	464		
38.30	476		
38.35	489		
38.40	501		
38.45	513		
38.50	525		
38.55	537		
38.60	549		
38.65	561		
38.70	572		
38.75	583		
38.80	594		
38.85	605		

← HIGH-OVERFLOW
OUTLET

Appendix "B"

**HydroCAD Summary Table
Existing & Proposed Conditions**

Name: Wings Real Estate Holdings, LLC
Address: 50 Barry Place Stamford, CT
Project: Wings Arena

HYDROCAD SUMMARY TABLE

Storm Frequency	Flow/Volume	Existing	Proposed	Δ	Δ (%)
1 Year	q (ft ³ /s)	6.85	6.79	-0.06	-1%
	v (ft ³)	21,262	16,849	-4,413	-21%
2 Year	q (ft ³ /s)	8.54	8.49	-0.05	-1%
	v (ft ³)	26,846	22,461	-4,385	-16%
5 Year	q (ft ³ /s)	11.3	11.29	-0.01	0%
	v (ft ³)	36,121	36,121	-4,325	-12%
10 Year	q (ft ³ /s)	13.56	13.56	0.00	0%
	v (ft ³)	43,808	39,541	-4,267	-10%
25 Year	q (ft ³ /s)	16.65	16.65	0.00	0%
	v (ft ³)	54,464	50,284	-4,180	-8%
50 Year	q (ft ³ /s)	18.93	18.93	0.00	0%
	v (ft ³)	62,384	58,273	-4,111	-7%
100 Year	q (ft ³ /s)	21.37	21.37	-0.02	0%
	v (ft ³)	70,868	66,833	-4,035	-6%

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

Storm Frequency	Flow/Volume	Existing	Proposed	Δ	Δ (%)
1 Year	q (ft ³ /s)	0.02	0.02	-0.00	0%
	v (ft ³)	115	65	-50	-43%
2 Year	q (ft ³ /s)	0.04	0.03	-0.01	-25%
	v (ft ³)	176	96	-80	-45%
5 Year	q (ft ³ /s)	0.07	0.05	-0.02	-29%
	v (ft ³)	292	153	-139	-48%
10 Year	q (ft ³ /s)	0.09	0.07	-0.02	-22%
	v (ft ³)	397	203	-194	-49%
25 Year	q (ft ³ /s)	0.13	0.09	-0.04	-31%
	v (ft ³)	552	276	-276	-50%
50 Year	q (ft ³ /s)	0.16	0.11	-0.05	-31%
	v (ft ³)	672	332	-340	-51%
100 Year	q (ft ³ /s)	0.19	0.13	-0.06	-32%
	v (ft ³)	805	394	-411	-51%

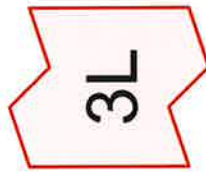
Table 1: Comparison of Existing and Proposed Peak Flow Rates and Volumes for POC "B".

Appendix “C”

HydroCAD Analysis - Existing Conditions



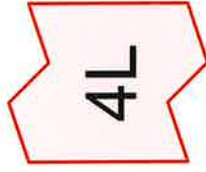
DA-1



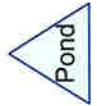
POC A



DA-2



POC B



Routing Diagram for 22HQ_Ex-0

Prepared by RVDI, Printed 12/21/2022

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
15,908	74	>75% Grass cover, Good, HSG C (1S, 2S)
91,662	98	Paved parking, HSG C (1S)
5,765	70	Woods, Good, HSG C (1S, 2S)
113,335	93	TOTAL AREA

22HQ_Ex-0

Prepared by RVDI

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Type III 24-hr 1-Year Rainfall=2.94"

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Page 2

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1

Runoff Area=111,312 sf 82.35% Impervious Runoff Depth=2.29"
 Tc=5.0 min CN=94 Runoff=6.85 cfs 21,262 cf

Subcatchment 2S: DA-2

Runoff Area=2,023 sf 0.00% Impervious Runoff Depth=0.68"
 Flow Length=64' Tc=16.5 min CN=70 Runoff=0.02 cfs 115 cf

Link 3L: POC A

Inflow=6.85 cfs 21,262 cf
 Primary=6.85 cfs 21,262 cf

Link 4L: POC B

Inflow=0.02 cfs 115 cf
 Primary=0.02 cfs 115 cf

Total Runoff Area = 113,335 sf Runoff Volume = 21,376 cf Average Runoff Depth = 2.26"
19.12% Pervious = 21,673 sf 80.88% Impervious = 91,662 sf

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1

Runoff Area=111,312 sf 82.35% Impervious Runoff Depth=2.89"
 Tc=5.0 min CN=94 Runoff=8.54 cfs 26,846 cf

Subcatchment 2S: DA-2

Runoff Area=2,023 sf 0.00% Impervious Runoff Depth=1.05"
 Flow Length=64' Tc=16.5 min CN=70 Runoff=0.04 cfs 176 cf

Link 3L: POC A

Inflow=8.54 cfs 26,846 cf
 Primary=8.54 cfs 26,846 cf

Link 4L: POC B

Inflow=0.04 cfs 176 cf
 Primary=0.04 cfs 176 cf

Total Runoff Area = 113,335 sf Runoff Volume = 27,022 cf Average Runoff Depth = 2.86"
19.12% Pervious = 21,673 sf 80.88% Impervious = 91,662 sf

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1

Runoff Area=111,312 sf 82.35% Impervious Runoff Depth=3.89"
 Tc=5.0 min CN=94 Runoff=11.30 cfs 36,121 cf

Subcatchment 2S: DA-2

Runoff Area=2,023 sf 0.00% Impervious Runoff Depth=1.73"
 Flow Length=64' Tc=16.5 min CN=70 Runoff=0.07 cfs 292 cf

Link 3L: POC A

Inflow=11.30 cfs 36,121 cf
 Primary=11.30 cfs 36,121 cf

Link 4L: POC B

Inflow=0.07 cfs 292 cf
 Primary=0.07 cfs 292 cf

Total Runoff Area = 113,335 sf Runoff Volume = 36,413 cf Average Runoff Depth = 3.86"
19.12% Pervious = 21,673 sf 80.88% Impervious = 91,662 sf

22HQ_Ex-0

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Type III 24-hr 10-Year Rainfall=5.42"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1

Runoff Area=111,312 sf 82.35% Impervious Runoff Depth=4.72"
 Tc=5.0 min CN=94 Runoff=13.56 cfs 43,808 cf

Subcatchment 2S: DA-2

Runoff Area=2,023 sf 0.00% Impervious Runoff Depth=2.35"
 Flow Length=64' Tc=16.5 min CN=70 Runoff=0.09 cfs 397 cf

Link 3L: POC A

Inflow=13.56 cfs 43,808 cf
 Primary=13.56 cfs 43,808 cf

Link 4L: POC B

Inflow=0.09 cfs 397 cf
 Primary=0.09 cfs 397 cf

Total Runoff Area = 113,335 sf Runoff Volume = 44,205 cf Average Runoff Depth = 4.68"
19.12% Pervious = 21,673 sf 80.88% Impervious = 91,662 sf

22HQ_Ex-0

Prepared by RVDI

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Type III 24-hr 25-Year Rainfall=6.58"

Printed 12/21/2022

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1

Runoff Area=111,312 sf 82.35% Impervious Runoff Depth=5.87"
 Tc=5.0 min CN=94 Runoff=16.65 cfs 54,464 cf

Subcatchment 2S: DA-2

Runoff Area=2,023 sf 0.00% Impervious Runoff Depth=3.27"
 Flow Length=64' Tc=16.5 min CN=70 Runoff=0.13 cfs 552 cf

Link 3L: POC A

Inflow=16.65 cfs 54,464 cf
 Primary=16.65 cfs 54,464 cf

Link 4L: POC B

Inflow=0.13 cfs 552 cf
 Primary=0.13 cfs 552 cf

Total Runoff Area = 113,335 sf Runoff Volume = 55,016 cf Average Runoff Depth = 5.83"
19.12% Pervious = 21,673 sf 80.88% Impervious = 91,662 sf

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1

Runoff Area=111,312 sf 82.35% Impervious Runoff Depth=6.73"
 Tc=5.0 min CN=94 Runoff=18.93 cfs 62,384 cf

Subcatchment 2S: DA-2

Runoff Area=2,023 sf 0.00% Impervious Runoff Depth=3.99"
 Flow Length=64' Tc=16.5 min CN=70 Runoff=0.16 cfs 672 cf

Link 3L: POC A

Inflow=18.93 cfs 62,384 cf
 Primary=18.93 cfs 62,384 cf

Link 4L: POC B

Inflow=0.16 cfs 672 cf
 Primary=0.16 cfs 672 cf

Total Runoff Area = 113,335 sf Runoff Volume = 63,056 cf Average Runoff Depth = 6.68"
19.12% Pervious = 21,673 sf 80.88% Impervious = 91,662 sf

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1

Runoff Area=111,312 sf 82.35% Impervious Runoff Depth=7.64"
 Tc=5.0 min CN=94 Runoff=21.37 cfs 70,868 cf

Subcatchment 2S: DA-2

Runoff Area=2,023 sf 0.00% Impervious Runoff Depth=4.78"
 Flow Length=64' Tc=16.5 min CN=70 Runoff=0.19 cfs 805 cf

Link 3L: POC A

Inflow=21.37 cfs 70,868 cf
 Primary=21.37 cfs 70,868 cf

Link 4L: POC B

Inflow=0.19 cfs 805 cf
 Primary=0.19 cfs 805 cf

Total Runoff Area = 113,335 sf Runoff Volume = 71,673 cf Average Runoff Depth = 7.59"
19.12% Pervious = 21,673 sf 80.88% Impervious = 91,662 sf

Summary for Subcatchment 1S: DA-1

Runoff = 16.65 cfs @ 12.07 hrs, Volume= 54,464 cf, Depth= 5.87"

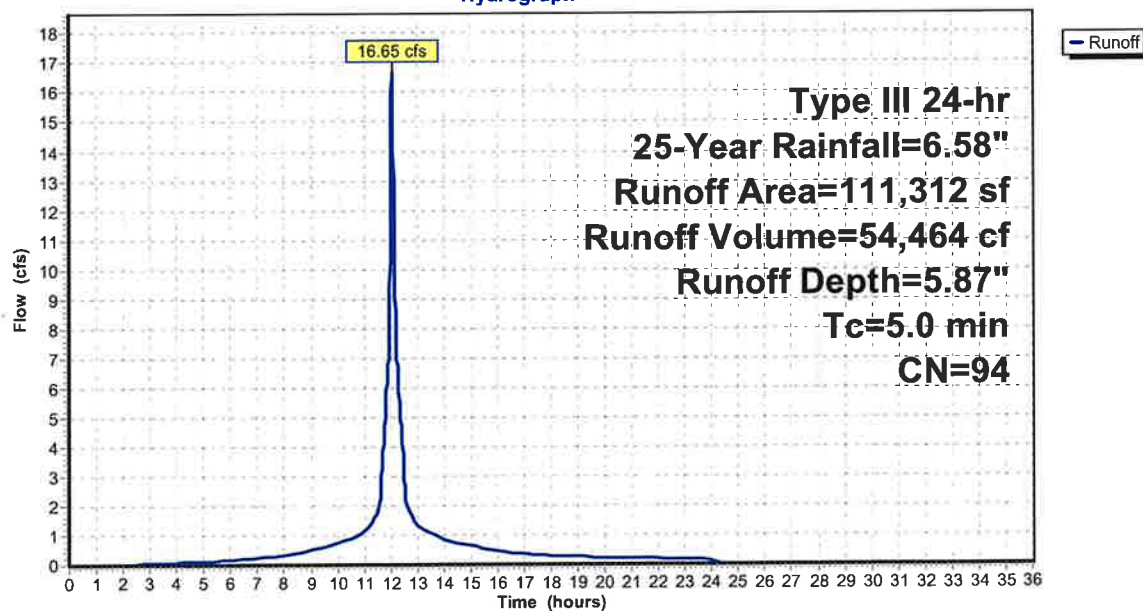
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=6.58"

Area (sf)	CN	Description
91,662	98	Paved parking, HSG C
15,878	74	>75% Grass cover, Good, HSG C
3,772	70	Woods, Good, HSG C
111,312	94	Weighted Average
19,650		17.65% Pervious Area
91,662		82.35% Impervious Area

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

Subcatchment 1S: DA-1

Hydrograph



Summary for Subcatchment 2S: DA-2

Runoff = 0.13 cfs @ 12.23 hrs, Volume= 552 cf, Depth= 3.27"

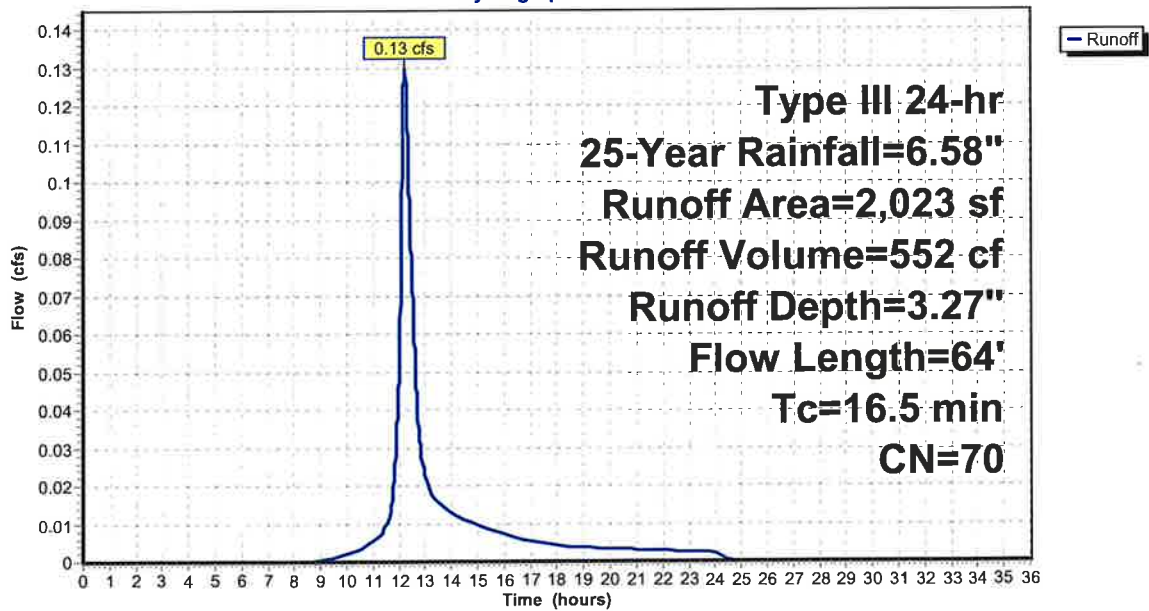
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=6.58"

Area (sf)	CN	Description
30	74	>75% Grass cover, Good, HSG C
1,993	70	Woods, Good, HSG C
2,023	70	Weighted Average
2,023		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	14	0.3200	0.10		Sheet Flow, 1
					Woods: Dense underbrush n= 0.800 P2= 3.56"
14.1	50	0.0500	0.06		Sheet Flow, 2
					Woods: Dense underbrush n= 0.800 P2= 3.56"
16.5	64	Total			

Subcatchment 2S: DA-2

Hydrograph



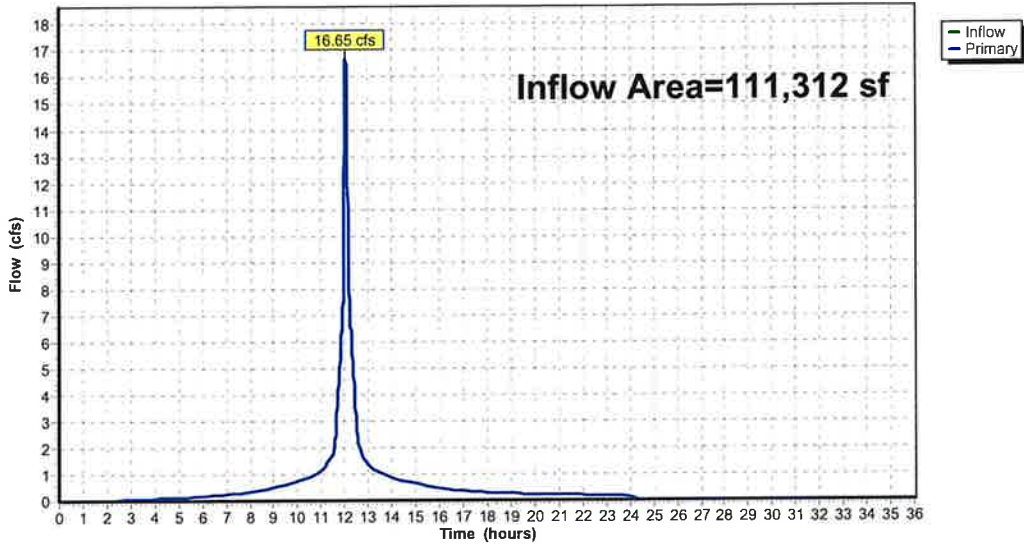
Summary for Link 3L: POC A

Inflow Area = 111,312 sf, 82.35% Impervious, Inflow Depth = 5.87" for 25-Year event
 Inflow = 16.65 cfs @ 12.07 hrs, Volume= 54,464 cf
 Primary = 16.65 cfs @ 12.07 hrs, Volume= 54,464 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 3L: POC A

Hydrograph



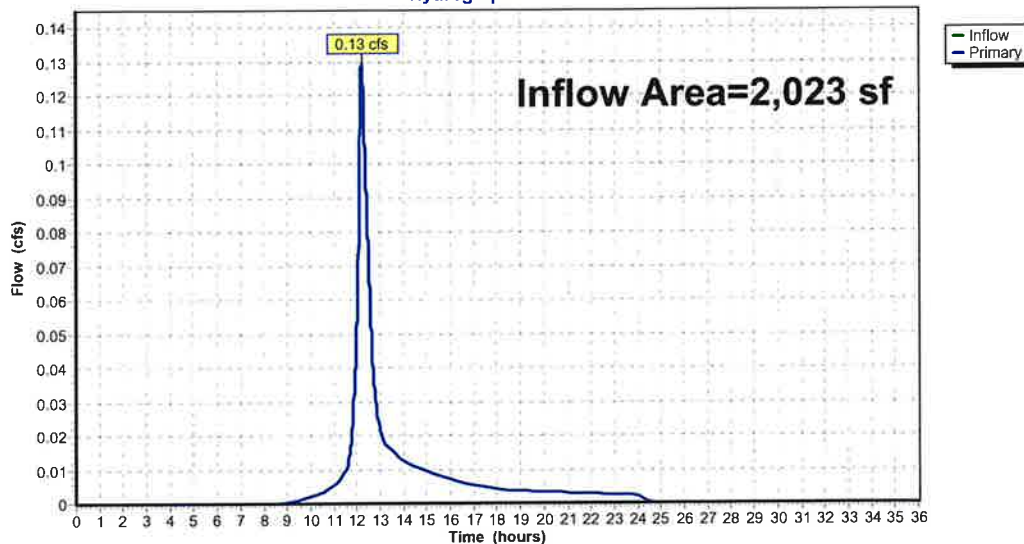
Summary for Link 4L: POC B

Inflow Area = 2,023 sf, 0.00% Impervious, Inflow Depth = 3.27" for 25-Year event
 Inflow = 0.13 cfs @ 12.23 hrs, Volume= 552 cf
 Primary = 0.13 cfs @ 12.23 hrs, Volume= 552 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

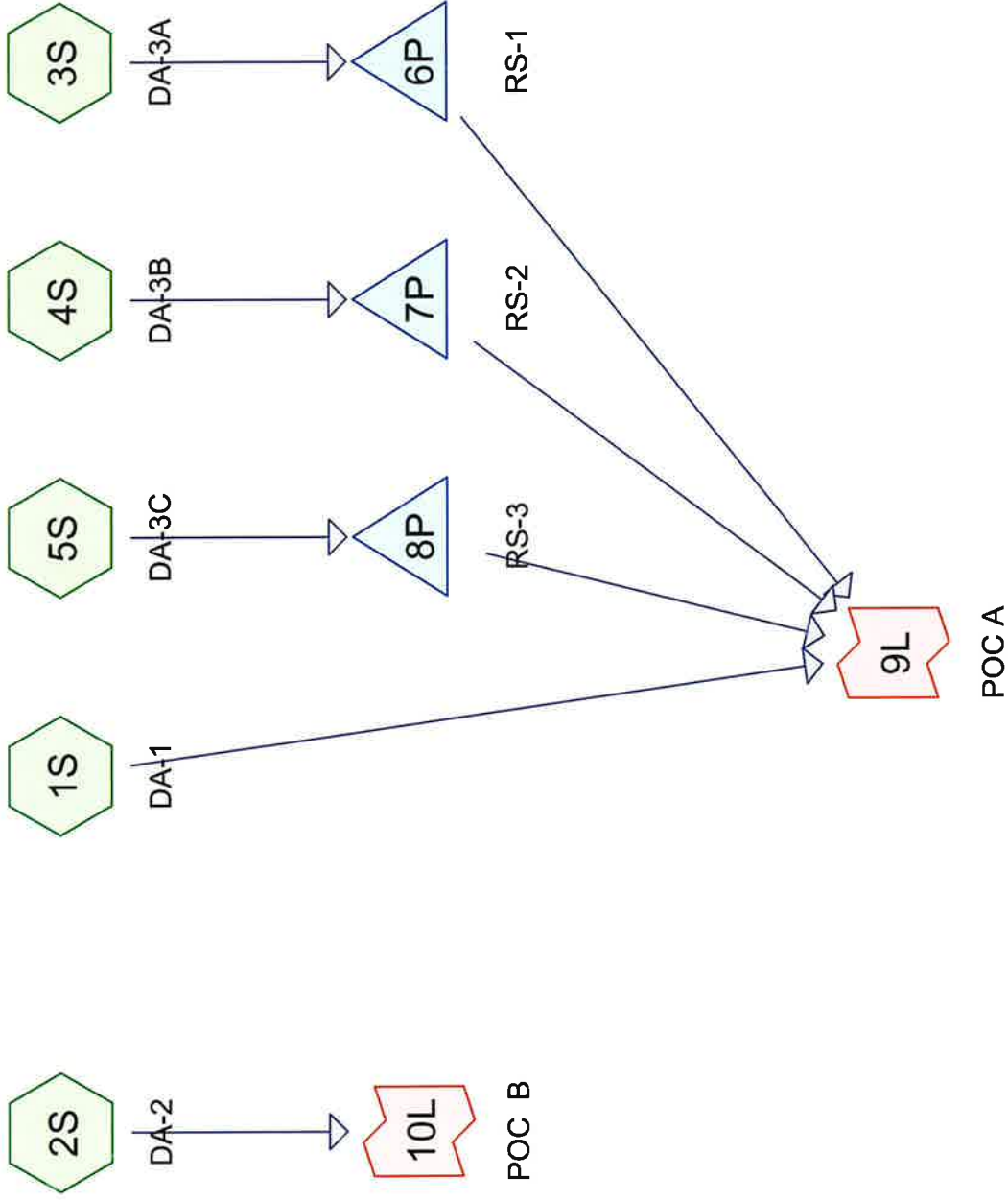
Link 4L: POC B

Hydrograph

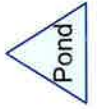


Appendix "D"

**HydroCAD Analysis -
Proposed Conditions**



Link



Pond



Reach



Subcat

Routing Diagram for 22HQ_Pr-1

Prepared by RVDI, Printed 12/21/2022

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
21,101	74	>75% Grass cover, Good, HSG C (1S, 2S, 3S, 4S, 5S)
92,234	98	Paved parking, HSG C (1S, 3S, 4S, 5S)
113,335	94	TOTAL AREA

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1	Runoff Area=18,398 sf 74.15% Impervious Runoff Depth=2.10" Tc=5.0 min CN=92 Runoff=1.06 cfs 3,227 cf
Subcatchment 2S: DA-2	Runoff Area=900 sf 0.00% Impervious Runoff Depth=0.87" Tc=5.0 min CN=74 Runoff=0.02 cfs 65 cf
Subcatchment 3S: DA-3A	Runoff Area=32,196 sf 88.40% Impervious Runoff Depth=2.39" Tc=5.0 min CN=95 Runoff=2.04 cfs 6,415 cf
Subcatchment 4S: DA-3B	Runoff Area=48,758 sf 80.66% Impervious Runoff Depth=2.20" Tc=5.0 min CN=93 Runoff=2.91 cfs 8,926 cf
Subcatchment 5S: DA-3C	Runoff Area=13,083 sf 82.56% Impervious Runoff Depth=2.29" Tc=5.0 min CN=94 Runoff=0.81 cfs 2,499 cf
Pond 6P: RS-1	Peak Elev=47.21' Storage=1,430 cf Inflow=2.04 cfs 6,415 cf 15.0" Round Culvert n=0.013 L=115.0' S=0.0365 '/' Outflow=2.04 cfs 5,052 cf
Pond 7P: RS-2	Peak Elev=45.77' Storage=2,336 cf Inflow=2.91 cfs 8,926 cf 15.0" Round Culvert n=0.013 L=37.0' S=0.0703 '/' Outflow=2.90 cfs 6,758 cf
Pond 8P: RS-3	Peak Elev=39.75' Storage=750 cf Inflow=0.81 cfs 2,499 cf 12.0" Round Culvert n=0.013 L=20.0' S=0.0250 '/' Outflow=0.79 cfs 1,813 cf
Link 9L: POC A	Inflow=6.79 cfs 16,849 cf Primary=6.79 cfs 16,849 cf
Link 10L: POC B	Inflow=0.02 cfs 65 cf Primary=0.02 cfs 65 cf

Total Runoff Area = 113,335 sf Runoff Volume = 21,131 cf Average Runoff Depth = 2.24"
18.62% Pervious = 21,101 sf 81.38% Impervious = 92,234 sf

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1	Runoff Area=18,398 sf 74.15% Impervious Runoff Depth=2.69" Tc=5.0 min CN=92 Runoff=1.34 cfs 4,131 cf
Subcatchment 2S: DA-2	Runoff Area=900 sf 0.00% Impervious Runoff Depth=1.28" Tc=5.0 min CN=74 Runoff=0.03 cfs 96 cf
Subcatchment 3S: DA-3A	Runoff Area=32,196 sf 88.40% Impervious Runoff Depth=3.00" Tc=5.0 min CN=95 Runoff=2.53 cfs 8,044 cf
Subcatchment 4S: DA-3B	Runoff Area=48,758 sf 80.66% Impervious Runoff Depth=2.79" Tc=5.0 min CN=93 Runoff=3.65 cfs 11,348 cf
Subcatchment 5S: DA-3C	Runoff Area=13,083 sf 82.56% Impervious Runoff Depth=2.89" Tc=5.0 min CN=94 Runoff=1.00 cfs 3,155 cf
Pond 6P: RS-1	Peak Elev=47.30' Storage=1,435 cf Inflow=2.53 cfs 8,044 cf 15.0" Round Culvert n=0.013 L=115.0' S=0.0365 '/' Outflow=2.53 cfs 6,681 cf
Pond 7P: RS-2	Peak Elev=45.91' Storage=2,347 cf Inflow=3.65 cfs 11,348 cf 15.0" Round Culvert n=0.013 L=37.0' S=0.0703 '/' Outflow=3.65 cfs 9,180 cf
Pond 8P: RS-3	Peak Elev=39.81' Storage=758 cf Inflow=1.00 cfs 3,155 cf 12.0" Round Culvert n=0.013 L=20.0' S=0.0250 '/' Outflow=0.99 cfs 2,469 cf
Link 9L: POC A	Inflow=8.49 cfs 22,461 cf Primary=8.49 cfs 22,461 cf
Link 10L: POC B	Inflow=0.03 cfs 96 cf Primary=0.03 cfs 96 cf

Total Runoff Area = 113,335 sf Runoff Volume = 26,774 cf Average Runoff Depth = 2.83"
18.62% Pervious = 21,101 sf 81.38% Impervious = 92,234 sf

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1	Runoff Area=18,398 sf 74.15% Impervious Runoff Depth=3.68" Tc=5.0 min CN=92 Runoff=1.80 cfs 5,642 cf
Subcatchment 2S: DA-2	Runoff Area=900 sf 0.00% Impervious Runoff Depth=2.03" Tc=5.0 min CN=74 Runoff=0.05 cfs 153 cf
Subcatchment 3S: DA-3A	Runoff Area=32,196 sf 88.40% Impervious Runoff Depth=4.00" Tc=5.0 min CN=95 Runoff=3.32 cfs 10,742 cf
Subcatchment 4S: DA-3B	Runoff Area=48,758 sf 80.66% Impervious Runoff Depth=3.79" Tc=5.0 min CN=93 Runoff=4.87 cfs 15,384 cf
Subcatchment 5S: DA-3C	Runoff Area=13,083 sf 82.56% Impervious Runoff Depth=3.89" Tc=5.0 min CN=94 Runoff=1.33 cfs 4,246 cf
Pond 6P: RS-1	Peak Elev=47.45' Storage=1,442 cf Inflow=3.32 cfs 10,742 cf 15.0" Round Culvert n=0.013 L=115.0' S=0.0365 '/' Outflow=3.32 cfs 9,379 cf
Pond 7P: RS-2	Peak Elev=46.20' Storage=2,371 cf Inflow=4.87 cfs 15,384 cf 15.0" Round Culvert n=0.013 L=37.0' S=0.0703 '/' Outflow=4.85 cfs 13,216 cf
Pond 8P: RS-3	Peak Elev=39.91' Storage=766 cf Inflow=1.33 cfs 4,246 cf 12.0" Round Culvert n=0.013 L=20.0' S=0.0250 '/' Outflow=1.33 cfs 3,560 cf
Link 9L: POC A	Inflow=11.29 cfs 31,796 cf Primary=11.29 cfs 31,796 cf
Link 10L: POC B	Inflow=0.05 cfs 153 cf Primary=0.05 cfs 153 cf

Total Runoff Area = 113,335 sf Runoff Volume = 36,166 cf Average Runoff Depth = 3.83"
18.62% Pervious = 21,101 sf 81.38% Impervious = 92,234 sf

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1	Runoff Area=18,398 sf 74.15% Impervious Runoff Depth=4.50" Tc=5.0 min CN=92 Runoff=2.18 cfs 6,899 cf
Subcatchment 2S: DA-2	Runoff Area=900 sf 0.00% Impervious Runoff Depth=2.70" Tc=5.0 min CN=74 Runoff=0.07 cfs 203 cf
Subcatchment 3S: DA-3A	Runoff Area=32,196 sf 88.40% Impervious Runoff Depth=4.84" Tc=5.0 min CN=95 Runoff=3.97 cfs 12,975 cf
Subcatchment 4S: DA-3B	Runoff Area=48,758 sf 80.66% Impervious Runoff Depth=4.61" Tc=5.0 min CN=93 Runoff=5.86 cfs 18,735 cf
Subcatchment 5S: DA-3C	Runoff Area=13,083 sf 82.56% Impervious Runoff Depth=4.72" Tc=5.0 min CN=94 Runoff=1.59 cfs 5,149 cf
Pond 6P: RS-1	Peak Elev=47.58' Storage=1,449 cf Inflow=3.97 cfs 12,975 cf 15.0" Round Culvert n=0.013 L=115.0' S=0.0365 ' /' Outflow=3.96 cfs 11,612 cf
Pond 7P: RS-2	Peak Elev=46.50' Storage=2,396 cf Inflow=5.86 cfs 18,735 cf 15.0" Round Culvert n=0.013 L=37.0' S=0.0703 ' /' Outflow=5.83 cfs 16,567 cf
Pond 8P: RS-3	Peak Elev=39.98' Storage=768 cf Inflow=1.59 cfs 5,149 cf 12.0" Round Culvert n=0.013 L=20.0' S=0.0250 ' /' Outflow=1.59 cfs 4,463 cf
Link 9L: POC A	Inflow=13.56 cfs 39,541 cf Primary=13.56 cfs 39,541 cf
Link 10L: POC B	Inflow=0.07 cfs 203 cf Primary=0.07 cfs 203 cf

Total Runoff Area = 113,335 sf Runoff Volume = 43,960 cf Average Runoff Depth = 4.65"
18.62% Pervious = 21,101 sf 81.38% Impervious = 92,234 sf

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1	Runoff Area=18,398 sf 74.15% Impervious Runoff Depth=5.64" Tc=5.0 min CN=92 Runoff=2.70 cfs 8,648 cf
Subcatchment 2S: DA-2	Runoff Area=900 sf 0.00% Impervious Runoff Depth=3.68" Tc=5.0 min CN=74 Runoff=0.09 cfs 276 cf
Subcatchment 3S: DA-3A	Runoff Area=32,196 sf 88.40% Impervious Runoff Depth=5.99" Tc=5.0 min CN=95 Runoff=4.86 cfs 16,066 cf
Subcatchment 4S: DA-3B	Runoff Area=48,758 sf 80.66% Impervious Runoff Depth=5.76" Tc=5.0 min CN=93 Runoff=7.22 cfs 23,386 cf
Subcatchment 5S: DA-3C	Runoff Area=13,083 sf 82.56% Impervious Runoff Depth=5.87" Tc=5.0 min CN=94 Runoff=1.96 cfs 6,401 cf
Pond 6P: RS-1	Peak Elev=47.80' Storage=1,460 cf Inflow=4.86 cfs 16,066 cf 15.0" Round Culvert n=0.013 L=115.0' S=0.0365 ' /' Outflow=4.85 cfs 14,703 cf
Pond 7P: RS-2	Peak Elev=47.00' Storage=2,437 cf Inflow=7.22 cfs 23,386 cf 15.0" Round Culvert n=0.013 L=37.0' S=0.0703 ' /' Outflow=7.17 cfs 21,218 cf
Pond 8P: RS-3	Peak Elev=40.07' Storage=772 cf Inflow=1.96 cfs 6,401 cf 12.0" Round Culvert n=0.013 L=20.0' S=0.0250 ' /' Outflow=1.96 cfs 5,715 cf
Link 9L: POC A	Inflow=16.65 cfs 50,284 cf Primary=16.65 cfs 50,284 cf
Link 10L: POC B	Inflow=0.09 cfs 276 cf Primary=0.09 cfs 276 cf

Total Runoff Area = 113,335 sf Runoff Volume = 54,777 cf Average Runoff Depth = 5.80"
18.62% Pervious = 21,101 sf 81.38% Impervious = 92,234 sf

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1	Runoff Area=18,398 sf 74.15% Impervious Runoff Depth=6.49" Tc=5.0 min CN=92 Runoff=3.08 cfs 9,949 cf
Subcatchment 2S: DA-2	Runoff Area=900 sf 0.00% Impervious Runoff Depth=4.43" Tc=5.0 min CN=74 Runoff=0.11 cfs 332 cf
Subcatchment 3S: DA-3A	Runoff Area=32,196 sf 88.40% Impervious Runoff Depth=6.84" Tc=5.0 min CN=95 Runoff=5.51 cfs 18,362 cf
Subcatchment 4S: DA-3B	Runoff Area=48,758 sf 80.66% Impervious Runoff Depth=6.61" Tc=5.0 min CN=93 Runoff=8.23 cfs 26,846 cf
Subcatchment 5S: DA-3C	Runoff Area=13,083 sf 82.56% Impervious Runoff Depth=6.73" Tc=5.0 min CN=94 Runoff=2.23 cfs 7,332 cf
Pond 6P: RS-1	Peak Elev=47.99' Storage=1,470 cf Inflow=5.51 cfs 18,362 cf 15.0" Round Culvert n=0.013 L=115.0' S=0.0365 ' Outflow=5.50 cfs 16,999 cf
Pond 7P: RS-2	Peak Elev=47.43' Storage=2,472 cf Inflow=8.23 cfs 26,846 cf 15.0" Round Culvert n=0.013 L=37.0' S=0.0703 ' Outflow=8.15 cfs 24,678 cf
Pond 8P: RS-3	Peak Elev=40.15' Storage=774 cf Inflow=2.23 cfs 7,332 cf 12.0" Round Culvert n=0.013 L=20.0' S=0.0250 ' Outflow=2.22 cfs 6,646 cf
Link 9L: POC A	Inflow=18.93 cfs 58,273 cf Primary=18.93 cfs 58,273 cf
Link 10L: POC B	Inflow=0.11 cfs 332 cf Primary=0.11 cfs 332 cf

Total Runoff Area = 113,335 sf Runoff Volume = 62,822 cf Average Runoff Depth = 6.65"
18.62% Pervious = 21,101 sf 81.38% Impervious = 92,234 sf

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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: DA-1	Runoff Area=18,398 sf 74.15% Impervious Runoff Depth=7.40" Tc=5.0 min CN=92 Runoff=3.48 cfs 11,345 cf
Subcatchment 2S: DA-2	Runoff Area=900 sf 0.00% Impervious Runoff Depth=5.25" Tc=5.0 min CN=74 Runoff=0.13 cfs 394 cf
Subcatchment 3S: DA-3A	Runoff Area=32,196 sf 88.40% Impervious Runoff Depth=7.76" Tc=5.0 min CN=95 Runoff=6.22 cfs 20,820 cf
Subcatchment 4S: DA-3B	Runoff Area=48,758 sf 80.66% Impervious Runoff Depth=7.52" Tc=5.0 min CN=93 Runoff=9.30 cfs 30,555 cf
Subcatchment 5S: DA-3C	Runoff Area=13,083 sf 82.56% Impervious Runoff Depth=7.64" Tc=5.0 min CN=94 Runoff=2.51 cfs 8,329 cf
Pond 6P: RS-1	Peak Elev=48.23' Storage=1,482 cf Inflow=6.22 cfs 20,820 cf 15.0" Round Culvert n=0.013 L=115.0' S=0.0365 ' Outflow=6.20 cfs 19,457 cf
Pond 7P: RS-2	Peak Elev=47.95' Storage=2,515 cf Inflow=9.30 cfs 30,555 cf 15.0" Round Culvert n=0.013 L=37.0' S=0.0703 ' Outflow=9.19 cfs 28,387 cf
Pond 8P: RS-3	Peak Elev=40.23' Storage=777 cf Inflow=2.51 cfs 8,329 cf 12.0" Round Culvert n=0.013 L=20.0' S=0.0250 ' Outflow=2.51 cfs 7,644 cf
Link 9L: POC A	Inflow=21.35 cfs 66,833 cf Primary=21.35 cfs 66,833 cf
Link 10L: POC B	Inflow=0.13 cfs 394 cf Primary=0.13 cfs 394 cf

Total Runoff Area = 113,335 sf Runoff Volume = 71,444 cf Average Runoff Depth = 7.56"
18.62% Pervious = 21,101 sf 81.38% Impervious = 92,234 sf

Summary for Subcatchment 1S: DA-1

Runoff = 2.70 cfs @ 12.07 hrs, Volume= 8,648 cf, Depth= 5.64"

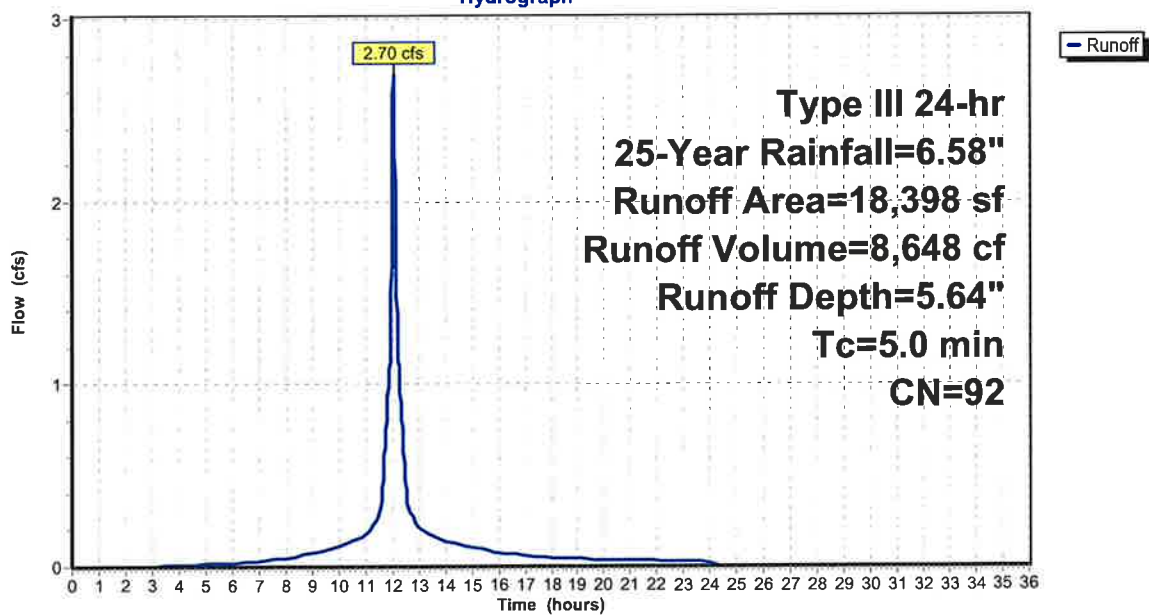
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.58"

Area (sf)	CN	Description
13,642	98	Paved parking, HSG C
4,756	74	>75% Grass cover, Good, HSG C
18,398	92	Weighted Average
4,756		25.85% Pervious Area
13,642		74.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, 1

Subcatchment 1S: DA-1

Hydrograph



Summary for Subcatchment 2S: DA-2

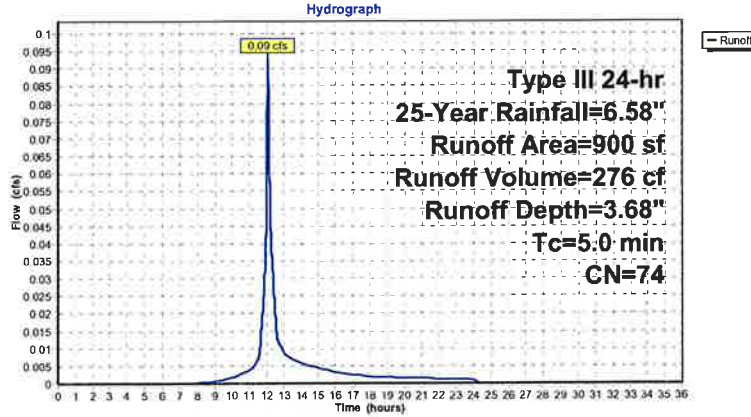
Runoff = 0.09 cfs @ 12.07 hrs, Volume= 276 cf, Depth= 3.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.58"

Area (sf)	CN	Description
900	74	>75% Grass cover, Good, HSG C
900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, 1

Subcatchment 2S: DA-2



Summary for Subcatchment 3S: DA-3A

Runoff = 4.86 cfs @ 12.07 hrs, Volume= 16,066 cf, Depth= 5.99"

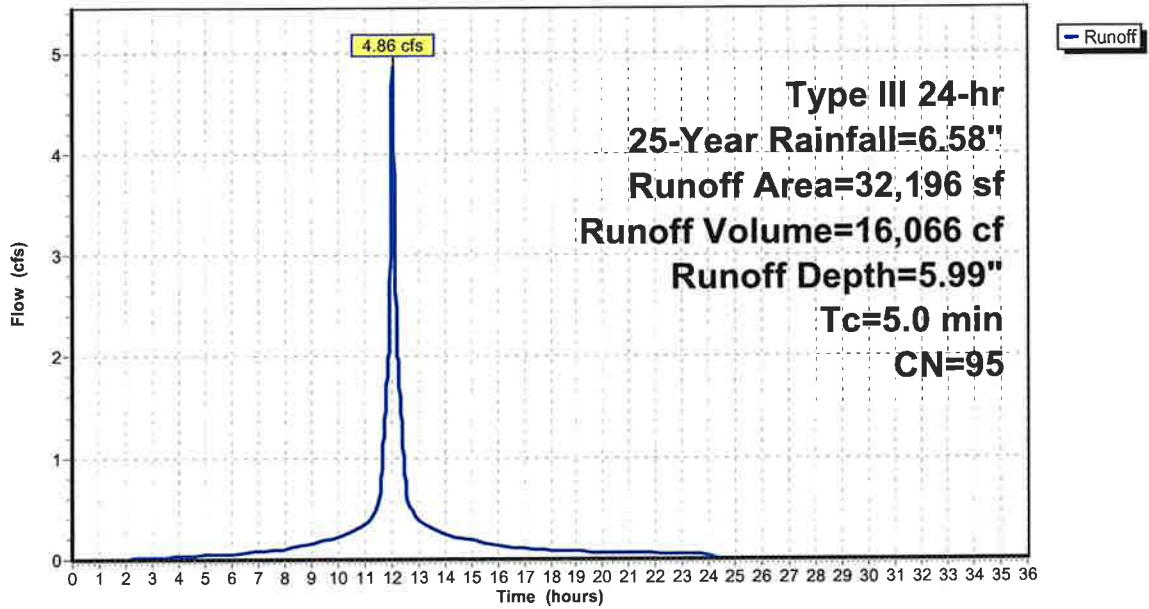
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.58"

Area (sf)	CN	Description
28,462	98	Paved parking, HSG C
3,734	74	>75% Grass cover, Good, HSG C
32,196	95	Weighted Average
3,734		11.60% Pervious Area
28,462		88.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, 1

Subcatchment 3S: DA-3A

Hydrograph



Summary for Subcatchment 4S: DA-3B

Runoff = 7.22 cfs @ 12.07 hrs, Volume= 23,386 cf, Depth= 5.76"

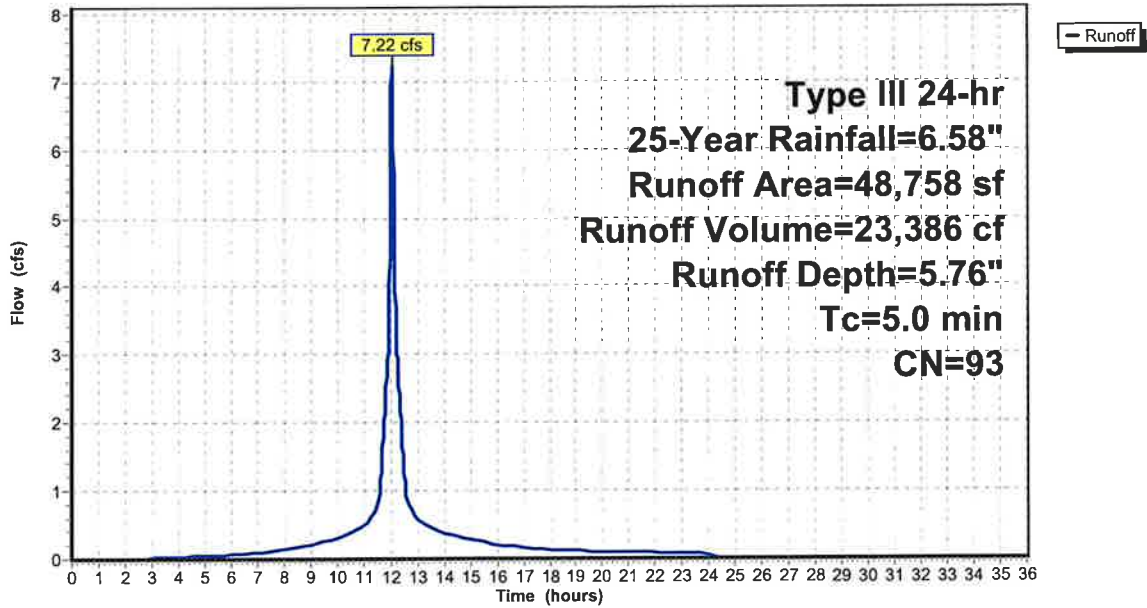
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=6.58"

Area (sf)	CN	Description
39,329	98	Paved parking, HSG C
9,429	74	>75% Grass cover, Good, HSG C
48,758	93	Weighted Average
9,429		19.34% Pervious Area
39,329		80.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, 1

Subcatchment 4S: DA-3B

Hydrograph



Summary for Subcatchment 5S: DA-3C

Runoff = 1.96 cfs @ 12.07 hrs, Volume= 6,401 cf, Depth= 5.87"

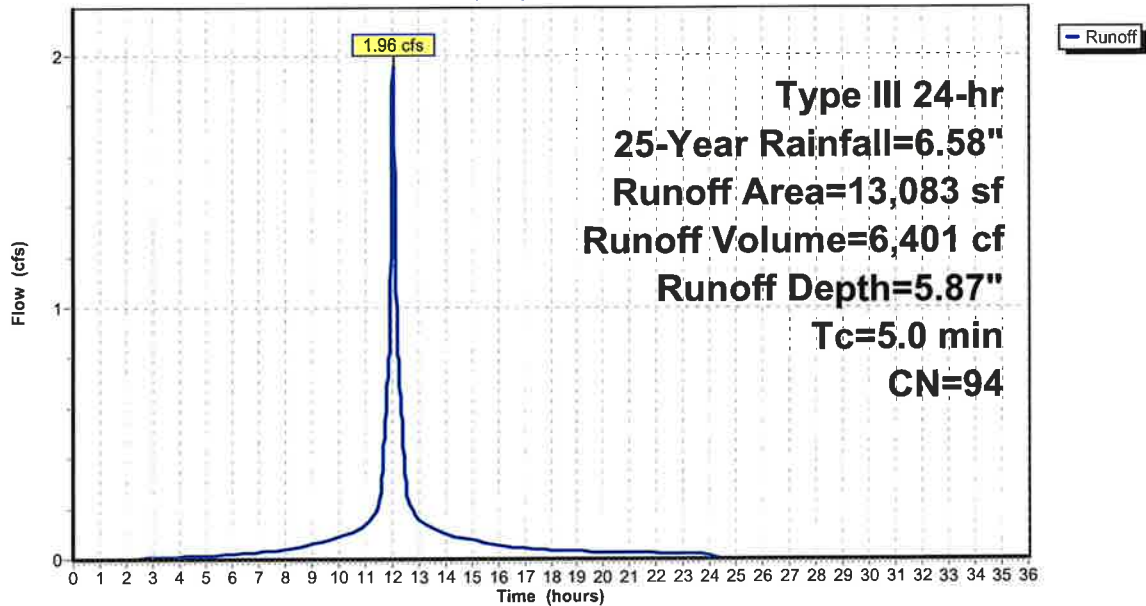
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=6.58"

Area (sf)	CN	Description
10,801	98	Paved parking, HSG C
2,282	74	>75% Grass cover, Good, HSG C
13,083	94	Weighted Average
2,282		17.44% Pervious Area
10,801		82.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, 1

Subcatchment 5S: DA-3C

Hydrograph



Summary for Pond 6P: RS-1

Inflow Area = 32,196 sf, 88.40% Impervious, Inflow Depth = 5.99" for 25-Year event
 Inflow = 4.86 cfs @ 12.07 hrs, Volume= 16,066 cf
 Outflow = 4.85 cfs @ 12.07 hrs, Volume= 14,703 cf, Atten= 0%, Lag= 0.2 min
 Primary = 4.85 cfs @ 12.07 hrs, Volume= 14,703 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 47.80' @ 12.07 hrs Surf.Area= 1,022 sf Storage= 1,460 cf

Plug-Flow detention time= 78.5 min calculated for 14,699 cf (91% of inflow)
 Center-of-Mass det. time= 34.8 min (795.3 - 760.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	42.50'	355 cf	28.40'W x 18.00'L x 4.50'H Field A 2,300 cf Overall - 1,413 cf Embedded = 887 cf x 40.0% Voids
#2A	43.00'	1,064 cf	Concrete Galley 4x4x4 x 24 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50"L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00"L = 58.9 cf 24 Chambers in 6 Rows
#3	47.00'	66 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 664 cf Overall x 10.0% Voids
		1,486 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
47.00	511	0	0
48.30	511	664	664

Device	Routing	Invert	Outlet Devices
#1	Primary	46.50'	15.0" Round Culvert L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.50' / 42.30' S= 0.0365 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=4.84 cfs @ 12.07 hrs HW=47.80' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 4.84 cfs @ 3.94 fps)

Pond 6P: RS-1 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4 (Concrete Galley, UCPI 4x4x4 Galley or equivalent)

Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf

Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf

4 Chambers/Row x 4.00' Long = 16.00' Row Length +12.0" End Stone x 2 = 18.00' Base Length

6 Rows x 52.8" Wide + 12.0" Side Stone x 2 = 28.40' Base Width

6.0" Base + 48.0" Chamber Height = 4.50' Field Height

24 Chambers x 44.3 cf = 1,064.3 cf Chamber Storage

24 Chambers x 58.9 cf = 1,413.0 cf Displacement

2,300.4 cf Field - 1,413.0 cf Chambers = 887.4 cf Stone x 40.0% Voids = 354.9 cf Stone Storage

Chamber Storage + Stone Storage = 1,419.2 cf = 0.033 af

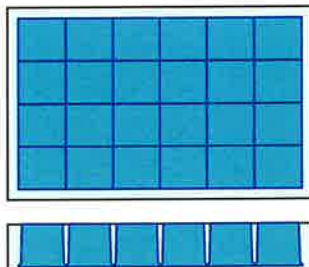
Overall Storage Efficiency = 61.7%

Overall System Size = 18.00' x 28.40' x 4.50'

24 Chambers

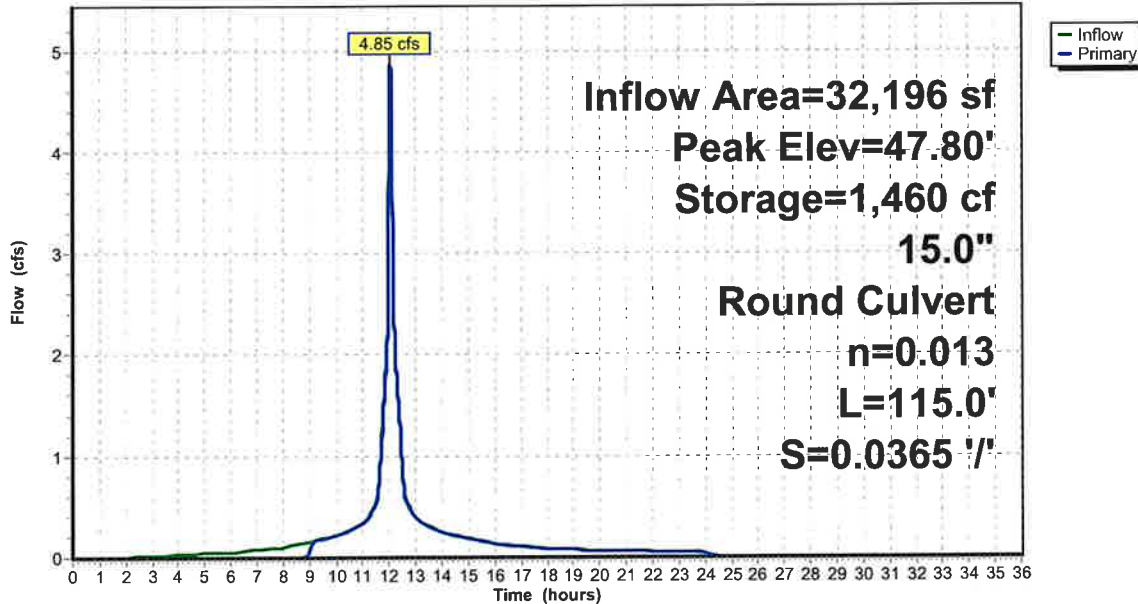
85.2 cy Field

32.9 cy Stone



Pond 6P: RS-1

Hydrograph



Summary for Pond 7P: RS-2

Inflow Area = 48,758 sf, 80.66% Impervious, Inflow Depth = 5.76" for 25-Year event
 Inflow = 7.22 cfs @ 12.07 hrs, Volume= 23,386 cf
 Outflow = 7.17 cfs @ 12.08 hrs, Volume= 21,218 cf, Atten= 1%, Lag= 0.5 min
 Primary = 7.17 cfs @ 12.08 hrs, Volume= 21,218 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 47.00' @ 12.08 hrs Surf.Area= 1,646 sf Storage= 2,437 cf

Plug-Flow detention time= 82.4 min calculated for 21,218 cf (91% of inflow)
 Center-of-Mass det. time= 36.0 min (805.5 - 769.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	41.00'	540 cf	19.60"W x 42.00'L x 4.50'H Field A 3,704 cf Overall - 2,355 cf Embedded = 1,349 cf x 40.0% Voids
#2A	41.50'	1,774 cf	Concrete Galley 4x4x4 x 40 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf 40 Chambers in 4 Rows
#3	45.50'	206 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 2,058 cf Overall x 10.0% Voids
		2,519 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.50	823	0	0
48.00	823	2,058	2,058

Device	Routing	Invert	Outlet Devices
#1	Primary	44.90'	15.0" Round Culvert L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 44.90' / 42.30' S= 0.0703 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=7.17 cfs @ 12.08 hrs HW=47.00' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 7.17 cfs @ 5.84 fps)

Pond 7P: RS-2 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4 (Concrete Galley, UCPI 4x4x4 Galley or equivalent)

Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf
Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf

10 Chambers/Row x 4.00' Long = 40.00' Row Length +12.0" End Stone x 2 = 42.00' Base Length
4 Rows x 52.8" Wide + 12.0" Side Stone x 2 = 19.60' Base Width
6.0" Base + 48.0" Chamber Height = 4.50' Field Height

40 Chambers x 44.3 cf = 1,773.8 cf Chamber Storage
40 Chambers x 58.9 cf = 2,355.1 cf Displacement

3,704.4 cf Field - 2,355.1 cf Chambers = 1,349.3 cf Stone x 40.0% Voids = 539.7 cf Stone Storage

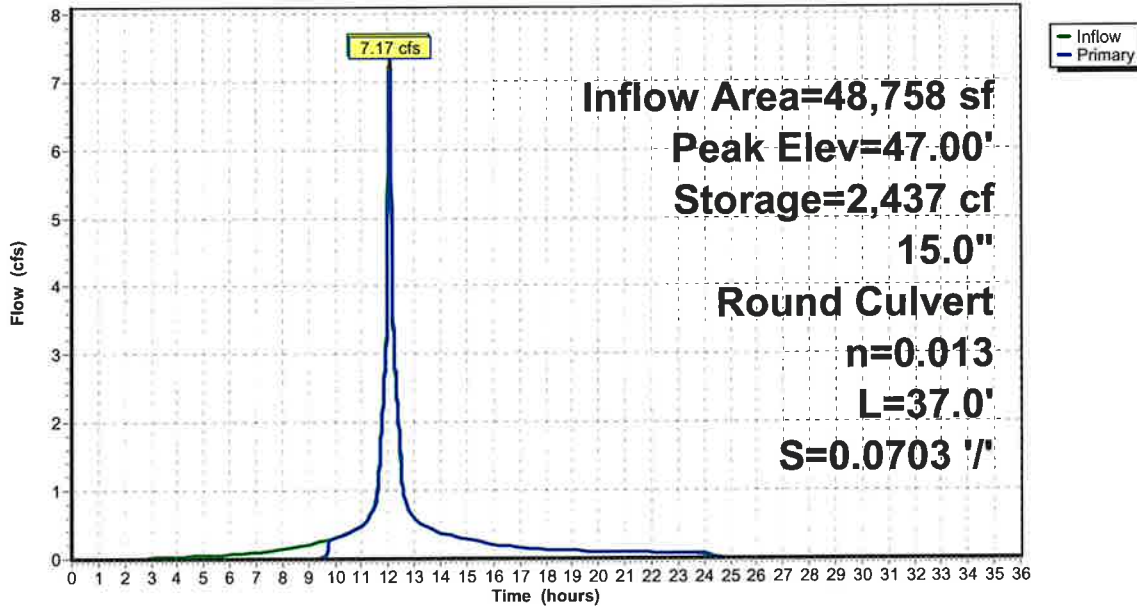
Chamber Storage + Stone Storage = 2,313.5 cf = 0.053 af
Overall Storage Efficiency = 62.5%
Overall System Size = 42.00' x 19.60' x 4.50'

40 Chambers
137.2 cy Field
50.0 cy Stone



Pond 7P: RS-2

Hydrograph



Summary for Pond 8P: RS-3

Inflow Area = 13,083 sf, 82.56% Impervious, Inflow Depth = 5.87" for 25-Year event
 Inflow = 1.96 cfs @ 12.07 hrs, Volume= 6,401 cf
 Outflow = 1.96 cfs @ 12.07 hrs, Volume= 5,715 cf, Atten= 0%, Lag= 0.2 min
 Primary = 1.96 cfs @ 12.07 hrs, Volume= 5,715 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 40.07' @ 12.07 hrs Surf.Area= 703 sf Storage= 772 cf

Plug-Flow detention time= 90.9 min calculated for 5,714 cf (89% of inflow)
 Center-of-Mass det. time= 39.5 min (804.7 - 765.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	36.30'	322 cf	11.17"W x 31.50'L x 3.54'H Field A 1,246 cf Overall - 440 cf Embedded = 806 cf x 40.0% Voids
#2A	36.80'	440 cf	Cultec R-330XLHD x 8 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 2 rows
#3	39.80'	18 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 176 cf Overall x 10.0% Voids
		780 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.80	351	0	0
40.30	351	176	176

Device	Routing	Invert	Outlet Devices
#1	Primary	39.30'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 39.30' / 38.80' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.95 cfs @ 12.07 hrs HW=40.07' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.95 cfs @ 2.99 fps)

Pond 8P: RS-3 - 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 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length

2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width

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

8 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 439.6 cf Chamber Storage

1,245.8 cf Field - 439.6 cf Chambers = 806.2 cf Stone x 40.0% Voids = 322.5 cf Stone Storage

Chamber Storage + Stone Storage = 762.1 cf = 0.017 af

Overall Storage Efficiency = 61.2%

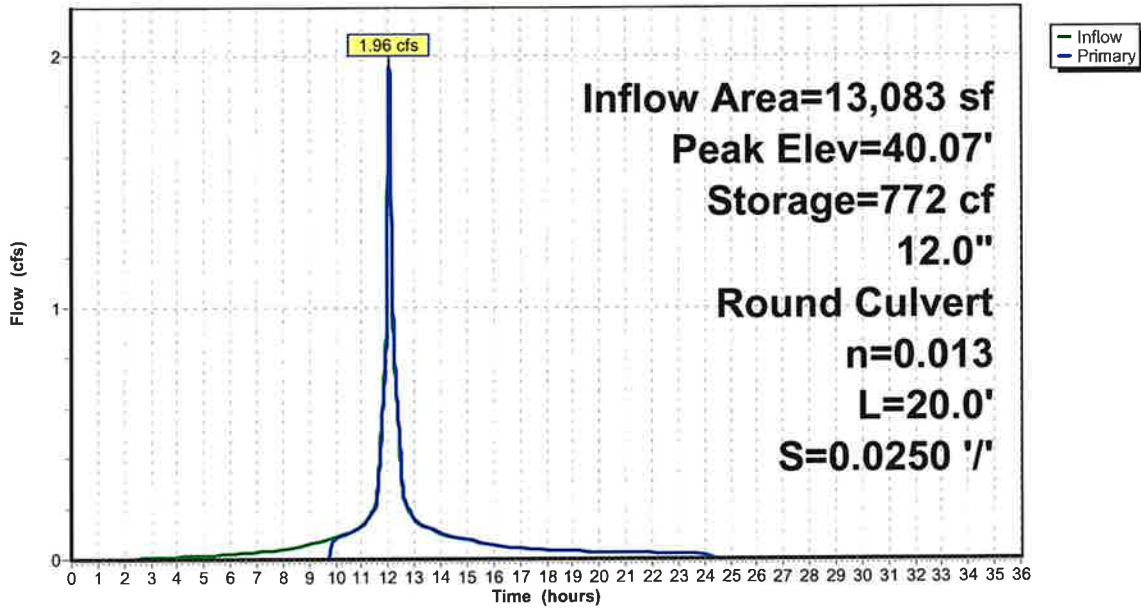
Overall System Size = 31.50' x 11.17' x 3.54'

8 Chambers
46.1 cy Field
29.9 cy Stone



Pond 8P: RS-3

Hydrograph



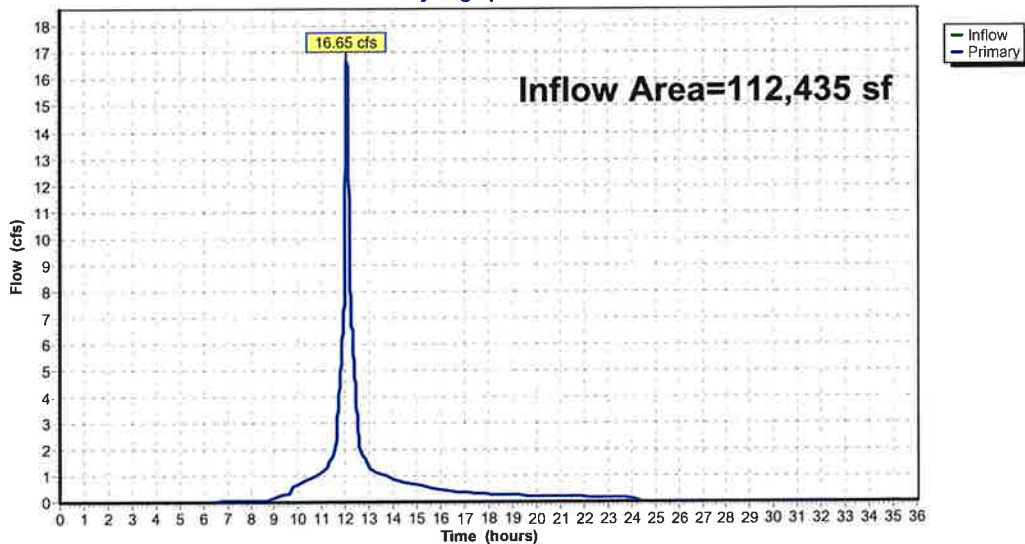
Summary for Link 9L: POC A

Inflow Area = 112,435 sf, 82.03% Impervious, Inflow Depth = 5.37" for 25-Year event
 Inflow = 16.65 cfs @ 12.08 hrs, Volume= 50,284 cf
 Primary = 16.65 cfs @ 12.08 hrs, Volume= 50,284 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 9L: POC A

Hydrograph



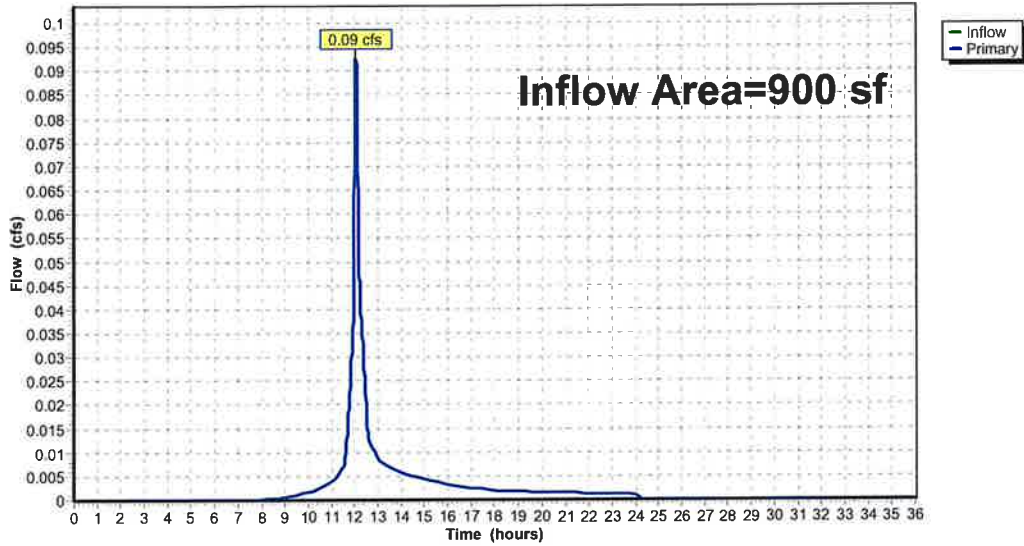
Summary for Link 10L: POC B

Inflow Area = 900 sf, 0.00% Impervious, Inflow Depth = 3.68" for 25-Year event
Inflow = 0.09 cfs @ 12.07 hrs, Volume= 276 cf
Primary = 0.09 cfs @ 12.07 hrs, Volume= 276 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 10L: POC B

Hydrograph



Appendix “E”

DCIA Worksheet

Directly Connected Impervious Area Tracking Worksheet
City of Stamford Drainage Manual



Note to user: complete all cells of this color only, as indicated by section headings

Part 1: General Information (All Projects)

Project Name	Wings Arena
Project Address	50 Barry Place
Project Applicant	Wings Real Estate Holdings, LLC
Title of Plan	Site Grading Plan
Revision Date of Plan	12/15/2022
Tax Account Number	003-1399

Part 2: Project Details (All Projects)

1. What type of development is this? (choose from dropdown)	Redevelopment	
2. What is the total area of the project site?	113,335	ft ²
3. What is the total area of land disturbance for this project?	111,935	ft ²
4. Does project site drain to High Quality Waters, a Direct Waterfront, or within 500 ft. of Tidal Wetlands? (Yes/No)	No	
Does Standard 1 apply based on information above?	Yes	

Part 3: Water Quality Target Total (Only for Standard 1 Projects)

5. What is the <u>current (pre-development) DCIA</u> for the site?	91,662	ft ²
6. Will the proposed development increase DCIA (without consideration of proposed stormwater management)? (Yes/No)	Yes	
7. What is the <u>proposed-development total impervious area</u> for the site?	92,234	ft ²
Water Quality Volume (WQV)	7389.8	ft ³
Standard 1 requirement	Retain 1/2 WQV on-site	
Required retention volume	3694.9	ft ³
Provided retention volume for proposed development	4,214.0	ft ³

Part 4: Proposed DCIA Tracking (Only for Standard 1 Projects)

<u>Pre-development total impervious area</u>	91,662	ft ²
<u>Current DCIA</u>	91,662	ft ²
<u>Proposed-development total impervious area</u>	92,234	ft ²
<u>Proposed-development DCIA</u> (after stormwater management)	13,642	ft ²
<u>Net change in DCIA</u> from <u>current</u> to <u>proposed-development</u>	-78,020	ft ²

Part 5: Post-Development (As-Built Certified) DCIA Tracking (Only for Standard 1 Projects)

<u>Post-development (per as-built) total impervious area</u>		ft ²
<u>Post-development (per as-built) DCIA</u> (after stormwater management)		ft ²
<u>Net change in DCIA</u> from <u>current</u> to <u>post-development</u>		ft ²

Certification Statement

I hereby certify that the information contained in this worksheet is true and correct.

Engineer's Signature _____ Date _____ Engineer's Seal _____