Pustola & Associates
CONSULTING ENGINEERS, LLC
(203) 729-6675 • Fax (203) 720-2816

Licensed Professional Engineers
New York & Connecticut

185 Meadow Street
Naugatuck, Connecticut 06770

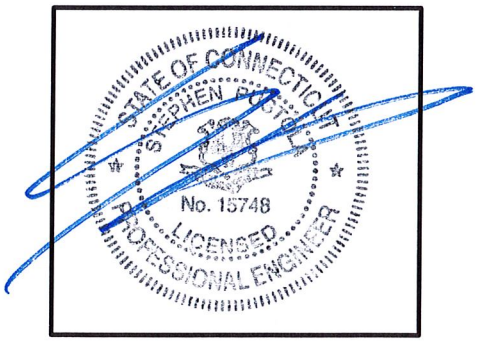
DRAINAGE REPORT:
1 Cannondale Way

Prepared For

iPark Norwalk, LLC
485 West Putnam Ave.
Greenwich, CT, 06830

Summary & Sign Off:

Based on the calculations and results of this report, the stormwater drainage design is in substantial compliance with the 2004 Connecticut Stormwater Quality Manual.



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REPORT SUMMARY

Pustola & Associates
CONSULTING ENGINEERS, LLC
(203) 729-6675 • Fax (203) 720-2816
Licensed Professional Engineers
New York & Connecticut
185 Meadow Street
Naugatuck, Connecticut 06770

Updated May 15, 2023 Job No. 19020.00

Client:	iPark Norwalk, LLC
Individual:	Mrs. Lynne Ward
Address:	485 West Putnam Ave.
City/State/Zip:	Greenwich, CT, 06830
Phone/Fax:	(203)-661-0055
Email:	lward@nationalresources.com

Project Summary:

The proposed development seeks to install a 28,000 square foot footprint hotel in the existing parking lot located at the iPark Facility, located at 1 Cannondale Way, Wilton, CT. The proposed building is located in the AE flood zone adjacent to the Norwalk River. The floodwater displacement caused by this installation is compensated through cuts in the existing grade at the surrounding areas of the building (see sheet SV-1). The proposed development is also adjacent to the 100' setback from the Norwalk River. The proposed design has taken care to keep excavation to a minimum in this area, with work within the setback area being limited to the installation of a biofiltration stormwater island (rain garden) and re-configuration and re-paving of the existing parking lot.

In addition to maintaining the pervious area and existing infiltration capacity of the site, The goals of the stormwater design were as follows:

1. Reduce the flooding occurring on site – Flooding of the existing parking lot has been noted on-site during storms. This observation is reflected in the stormwater calculations, which show system backups at storm intensities of 10 years and greater.
2. Infiltrate the runoff from the proposed roof – We were initially directed to infiltrate the full volume of runoff from the roof for a 1 year storm event. The current design exceeds this objective, and can infiltrate approximately 70% of the volume of a 10 year storm from the rooftop. An overflow outlet is provided at this new infiltration system, which is routed to the proposed vortech system for treatment before being discharged.

Stormwater Site Improvements:

The stormwater management system was designed using the 2004 Connecticut Stormwater Quality Manual, with rainfall values based on NOAA PPFE (point precipitation frequency estimates) from Wilton, CT.

The proposed layout reduces the impervious area of the site by approximately 0.09 acres. The proposed stormwater system will replace several existing biofiltration trenches with two new systems and add a new stormwater infiltration system to infiltrate runoff from the roof. The total area available for stormwater infiltration has been increased from 0.16 acres to 0.227 acres. The hydraulic conductivity of 1.1 in/hr was determined via percolation tests in and around the area proposed for the infiltration system.

A new Vortech chamber is proposed to treat runoff from the parking lot, as well as the overflow discharge from the proposed infiltration chamber. As designed, the proposed stormwater system will route all stormwater discharge through either a biofiltration trench and / or a vortech chamber. The proposed stormwater system will make use of the existing discharge points along the Norwalk River, limiting the site excavation and disturbance within the 100' setback around the Norwalk River.

Stormwater Discharge Summary

Due to the increase in infiltration capacity and re-configuration of the existing stormwater system, the volume of stormwater runoff is decreased for each design storm event (1, 10, 25, 100 year storms and 90% design storm). Total runoff volume reductions are listed in the attached report's DISCHARGE SUMMARY.

According to calculations based on the existing system as well as field observations, the existing site experiences stormwater system backups and on-site flooding with storms of 10 year intensity and greater. The proposed system will reduce these backups to storms with a greater than 25 year intensity. As a result of this greater efficiency, the flow rates for the 10, 25, and 100 year storms are increased as the site is able to drain more effectively, while reducing overall stormwater volume discharge for these events by 31%, 29 %, and 21% respectively.

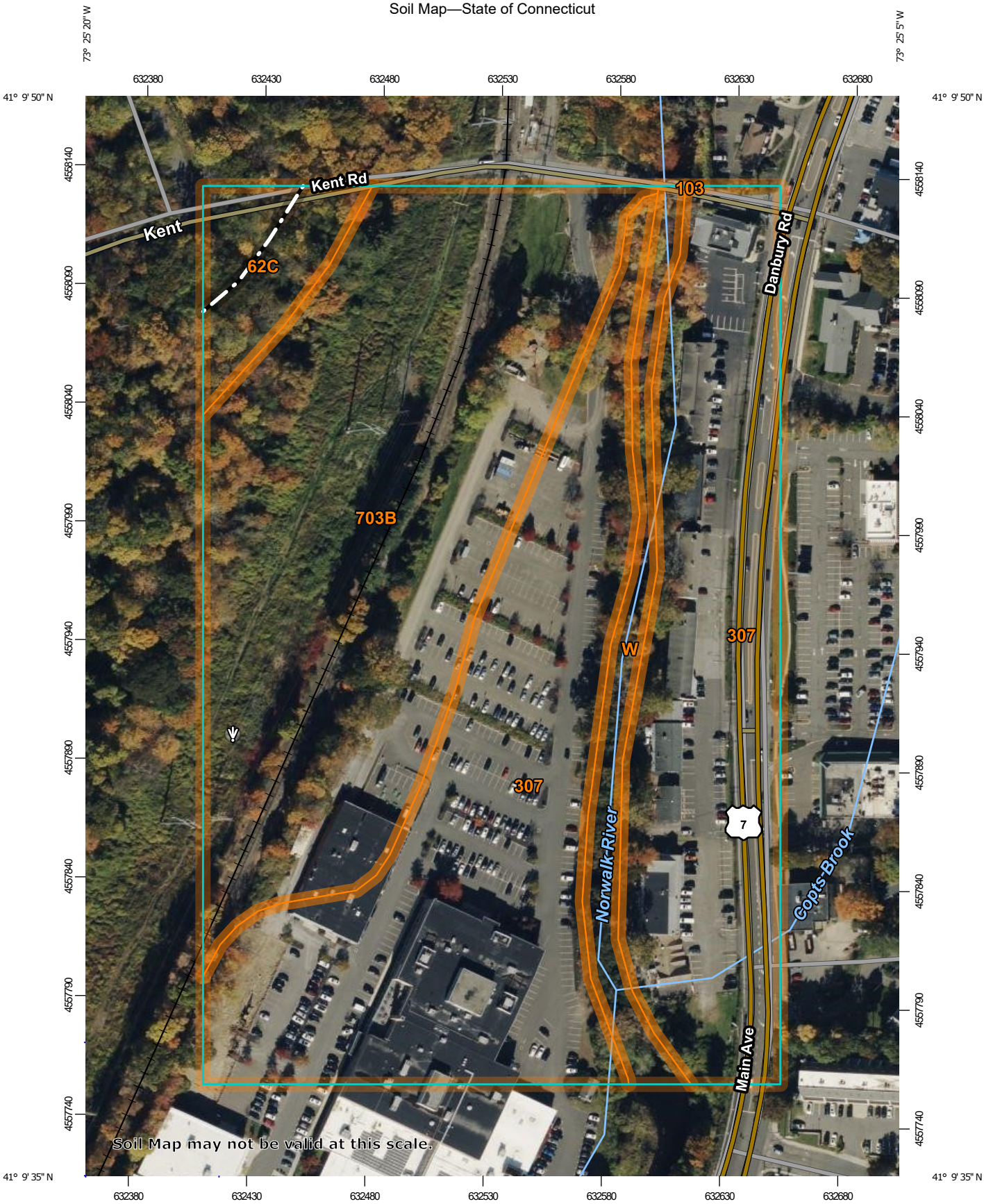
Thank you

Kyle Pustola

Kyle Pustola, P.E.

Pustola & Associates
CONSULTING ENGINEERS, LLC
(203) 729-6675 • Fax (203) 720-2816
Licensed Professional Engineers
New York & Connecticut
185 Meadow Street
Naugatuck, Connecticut 06770

SOIL MAPS



Map Scale: 1:2,220 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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 21, 2022—Oct 27, 2022

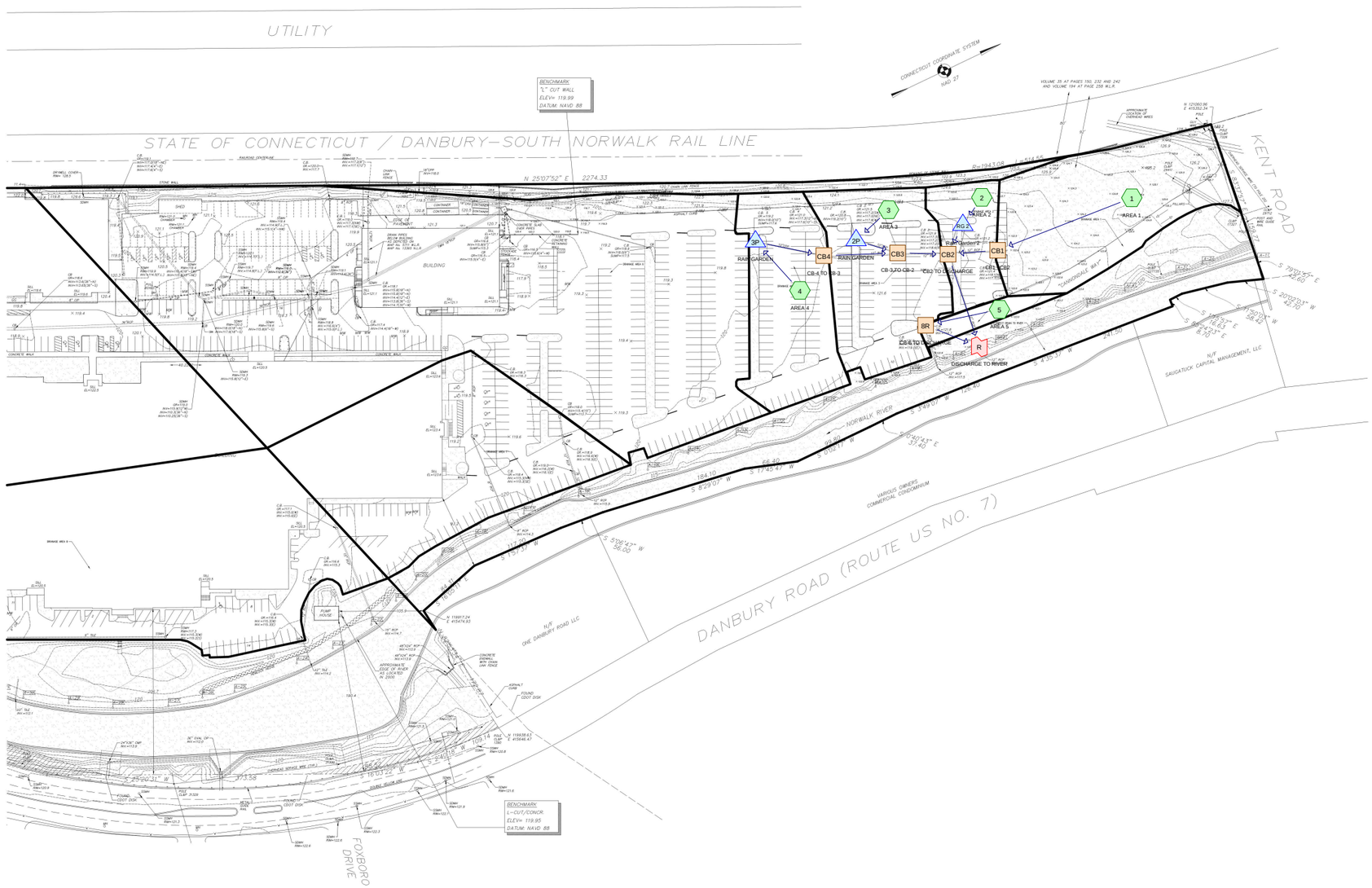
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
62C	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony	1.0	4.2%
103	Rippowam fine sandy loam	0.0	0.0%
307	Urban land	12.0	52.4%
703B	Haven silt loam, 3 to 8 percent slopes	8.8	38.3%
W	Water	1.2	5.1%
Totals for Area of Interest		**22.9**	**100.0%**

Pustola & Associates
CONSULTING ENGINEERS, LLC
(203) 729-6675 • Fax (203) 720-2816
Licensed Professional Engineers
New York & Connecticut
185 Meadow Street
Naugatuck, Connecticut 06770

PRE-DEVELOPMENT WATERSHED MAPS



Subcat

Reach

Pond

Link

Routing Diagram for HOTEL - PRE

Prepared by Pustola & Associates Consulting Engineers, LLC, Printed 2/2/2020
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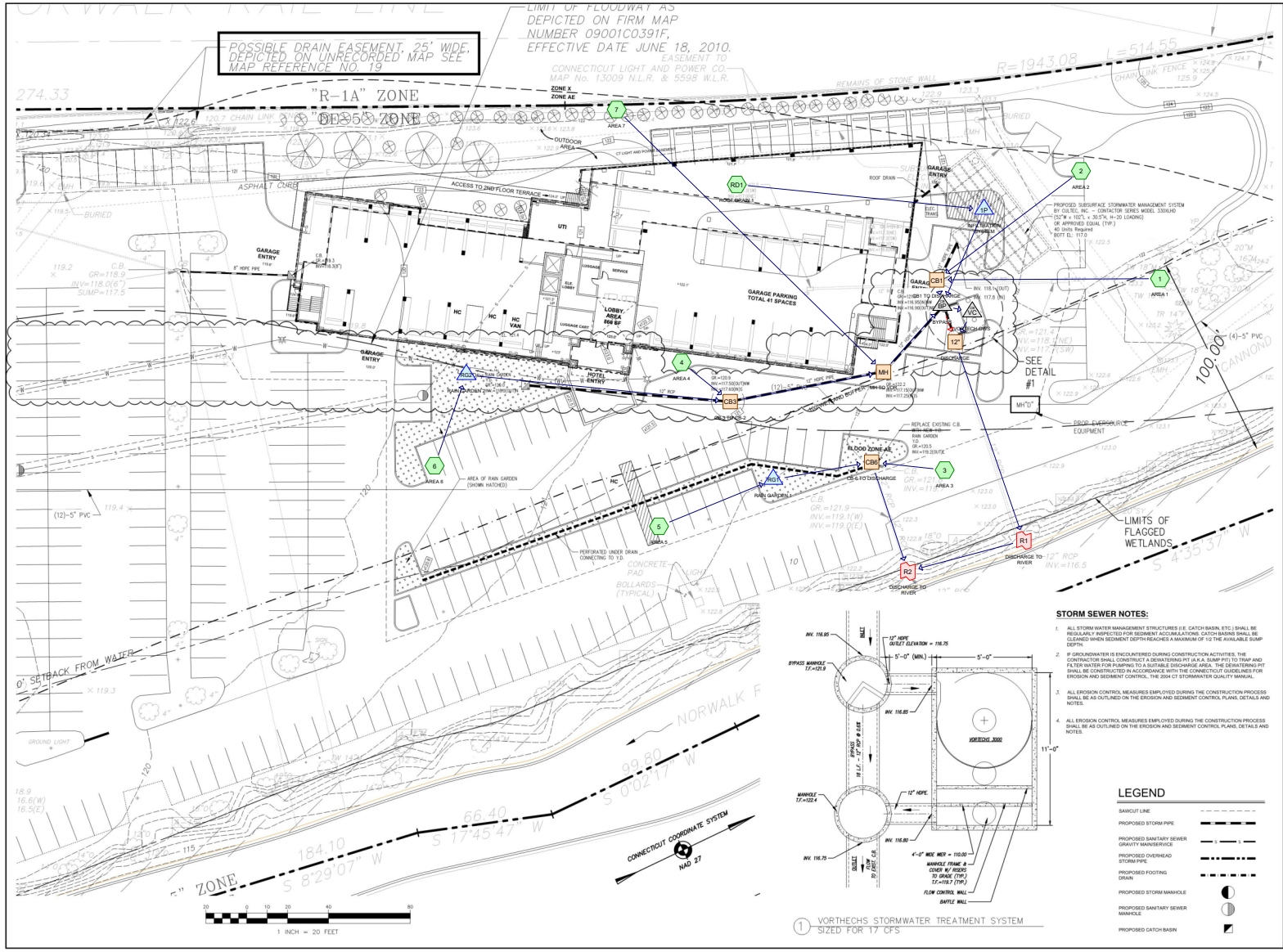
Pustola & Associates
CONSULTING ENGINEERS, LLC
(203) 729-6675 • Fax (203) 720-2816
Licensed Professional Engineers
New York & Connecticut
185 Meadow Street
Naugatuck, Connecticut 06770

POST DEVELOPMENT WATERSHED MAPS



① VORTECHS STORMWATER TREATMENT SYSTEM SIZED FOR 17 CFS

STORM SEWER NOTES:

1. ALL STORM WATER MANAGEMENT STRUCTURES (I.E. CATCH BASIN, ETC.) SHALL BE REGULARLY INSPECTED FOR SEDIMENT ACCUMULATIONS. CATCH BASINS SHALL BE CLEANED WHEN SEDIMENT DEPTH REACHES A MAXIMUM OF 1/2 THE AVAILABLE SUMP DEPTH.
2. IF GROUNDWATER IS ENCOUNTERED DURING CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL CONSTRUCT A DEWATERING PIT (A.K.A. SUMP PIT) TO TRAP AND FILTER WATER FOR PUMPING TO A SUITABLE DISCHARGE AREA. THE DEWATERING PIT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CONNECTICUT GUIDELINES FOR EROSION AND SEDIMENT CONTROL, THE 2004 CT STORMWATER QUALITY MANUAL.
3. ALL EROSION CONTROL MEASURES EMPLOYED DURING THE CONSTRUCTION PROCESS SHALL BE AS OUTLINED ON THE EROSION AND SEDIMENT CONTROL PLANS, DETAILS AND NOTES.
4. ALL EROSION CONTROL MEASURES EMPLOYED DURING THE CONSTRUCTION PROCESS SHALL BE AS OUTLINED ON THE EROSION AND SEDIMENT CONTROL PLANS, DETAILS AND NOTES.

LEGEND

- SAWCUT LINE
- PROPOSED STORM PIPE
- PROPOSED SANITARY SEWER GRAVITY MAIN/SERVICE
- PROPOSED OVERHEAD STORM PIPE
- PROPOSED FOOTING DRAIN
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED CATCH BASIN

REVISIONS

REV	DESCRIPTION	DATE
2	REVISED PER CCD'S COMMENTS	05/09/2023
1	REVISED PER COMMENTS	04/06/2023

CONSULTANTS

Pustola & Associates CONSULTING ENGINEERS, LLC
Licensed Professionals
1465 Westfield Street
(203) 729-0675
Design and Construction Services
Naugatuck, Connecticut 06770
Fax (203) 729-2816
www.pustola.com

PROPOSED HOTEL
1 CANNONDALE WAY
WILTON, CT
PREPARED FOR
i PARK NORWALK II LLC.

SITE UTILITY & GRADING PLAN

DATE: 07/12/2019
SCALE: 1"=20'
PROJECT NO.: 170102.02
CHECKED BY:

SU-1

Subcat | Reach | Pond | Link

Routing Diagram for HOTEL - POST - 5.8.2023

Prepared by Pustola & Associates Consulting Engineers LLC, Printed 5/11/2023

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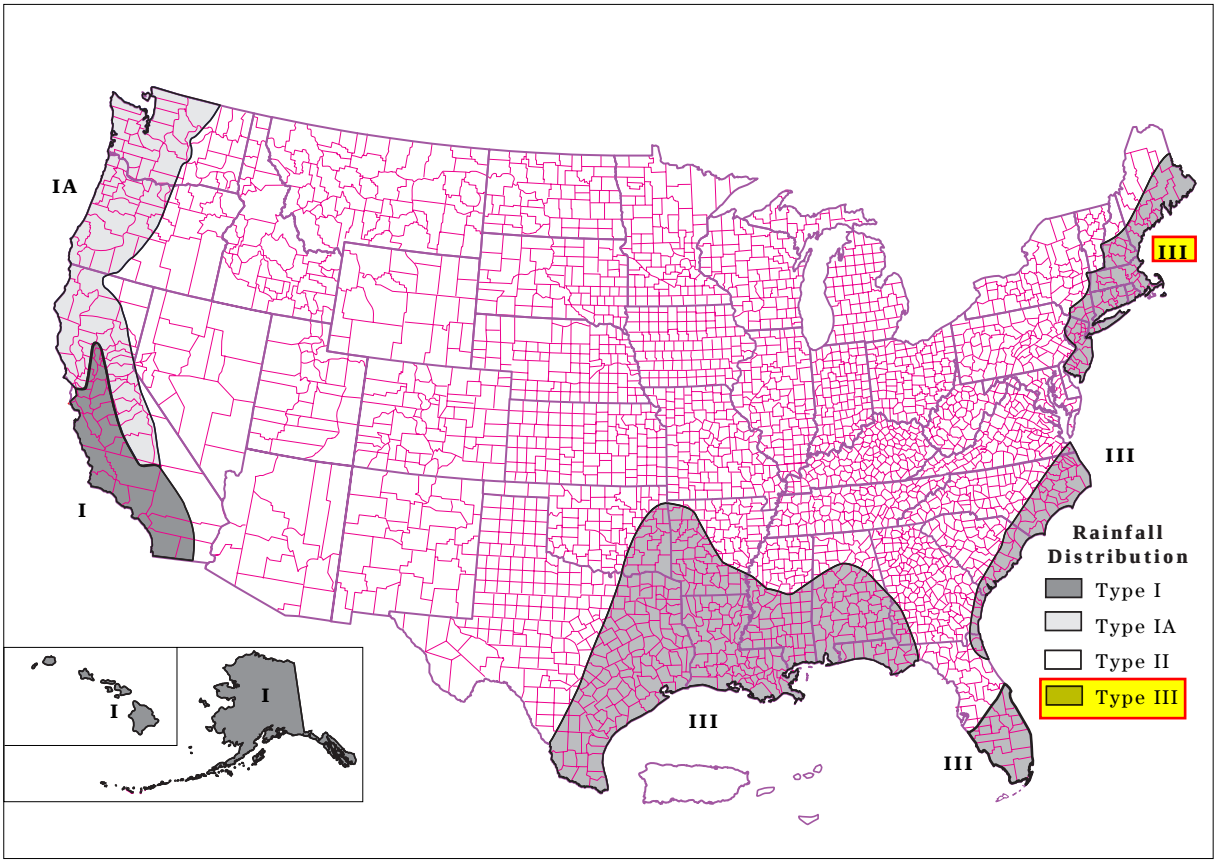
Pustola & Associates
CONSULTING ENGINEERS, LLC
(203) 729-6675 • Fax (203) 720-2816
Licensed Professional Engineers
New York & Connecticut
185 Meadow Street
Naugatuck, Connecticut 06770

DESIGN STORMS

Figure B-2 Approximate geographic boundaries for NRCS (SCS) rainfall distributions



Rainfall data sources

This section lists the most current 24-hour rainfall data published by the National Weather Service (NWS) for various parts of the country. Because NWS Technical Paper 40 (TP-40) is out of print, the 24-hour rainfall maps for areas east of the 105th meridian are included here as figures B-3 through B-8. For the area generally west of the 105th meridian, TP-40 has been superseded by NOAA Atlas 2, the Precipitation-Frequency Atlas of the Western United States, published by the National Ocean and Atmospheric Administration.

East of 105th meridian

Hershfield, D.M. 1961. Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 40. Washington, DC. 155 p.

West of 105th meridian

Miller, J.F., R.H. Frederick, and R.J. Tracey. 1973. Precipitation-frequency atlas of the Western United States. Vol. I Montana; Vol. II, Wyoming; Vol III, Colorado; Vol. IV, New Mexico; Vol V, Idaho; Vol. VI, Utah; Vol. VII, Nevada; Vol. VIII, Arizona; Vol. IX, Washington; Vol. X, Oregon; Vol. XI, California. U.S. Dept. of Commerce, National Weather Service, NOAA Atlas 2. Silver Spring, MD.

Alaska

Miller, John F. 1963. Probable maximum precipitation and rainfall-frequency data for Alaska for areas to 400 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. of Commerce, Weather Bur. Tech. Pap. No. 47. Washington, DC. 69 p.

Hawaii

Weather Bureau. 1962. Rainfall-frequency atlas of the Hawaiian Islands for areas to 200 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 43. Washington, DC. 60 p.

Puerto Rico and Virgin Islands

Weather Bureau. 1961. Generalized estimates of probable maximum precipitation and rainfall-frequency data for Puerto Rico and Virgin Islands for areas to 400 square miles, durations to 24 hours, and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 42. Washington, DC. 94 P.

NOAA Atlas 14, Volume 10, Version 3
Location name: Wilton, Connecticut, USA*
Latitude: 41.1616°, Longitude: -73.4205°
Elevation: m/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	0.366 (0.288-0.461)	0.426 (0.334-0.537)	0.524 (0.411-0.663)	0.605 (0.470-0.769)	0.716 (0.538-0.945)	0.801 (0.588-1.08)	0.888 (0.630-1.23)	0.981 (0.663-1.40)	1.11 (0.720-1.63)	1.21 (0.766-1.82)
10-min	0.518 (0.407-0.653)	0.603 (0.473-0.760)	0.741 (0.580-0.939)	0.856 (0.666-1.09)	1.01 (0.762-1.34)	1.14 (0.833-1.53)	1.26 (0.893-1.75)	1.39 (0.939-1.98)	1.57 (1.02-2.32)	1.71 (1.08-2.58)
15-min	0.610 (0.479-0.768)	0.709 (0.557-0.894)	0.872 (0.683-1.10)	1.01 (0.784-1.28)	1.19 (0.896-1.58)	1.34 (0.979-1.79)	1.48 (1.05-2.05)	1.64 (1.11-2.33)	1.85 (1.20-2.72)	2.02 (1.28-3.03)
30-min	0.849 (0.668-1.07)	0.987 (0.775-1.25)	1.21 (0.949-1.53)	1.40 (1.09-1.78)	1.66 (1.24-2.18)	1.86 (1.36-2.49)	2.05 (1.45-2.84)	2.26 (1.53-3.22)	2.53 (1.65-3.73)	2.74 (1.74-4.12)
60-min	1.09 (0.856-1.37)	1.26 (0.994-1.60)	1.55 (1.22-1.97)	1.79 (1.39-2.28)	2.12 (1.59-2.79)	2.38 (1.74-3.18)	2.63 (1.86-3.62)	2.88 (1.95-4.11)	3.22 (2.09-4.74)	3.47 (2.19-5.21)
2-hr	1.39 (1.10-1.74)	1.64 (1.30-2.06)	2.05 (1.62-2.58)	2.40 (1.88-3.03)	2.87 (2.16-3.76)	3.22 (2.38-4.31)	3.59 (2.57-4.96)	3.99 (2.71-5.66)	4.55 (2.96-6.66)	5.00 (3.17-7.46)
3-hr	1.60 (1.27-1.99)	1.90 (1.51-2.37)	2.39 (1.89-3.00)	2.81 (2.20-3.53)	3.37 (2.56-4.42)	3.80 (2.82-5.08)	4.24 (3.05-5.87)	4.74 (3.22-6.70)	5.46 (3.56-7.97)	6.05 (3.85-8.99)
6-hr	2.01 (1.61-2.49)	2.41 (1.92-2.98)	3.06 (2.43-3.80)	3.60 (2.85-4.50)	4.34 (3.32-5.66)	4.90 (3.66-6.52)	5.49 (3.98-7.58)	6.17 (4.21-8.66)	7.16 (4.69-10.4)	7.99 (5.10-11.8)
12-hr	2.48 (2.00-3.06)	2.99 (2.40-3.68)	3.80 (3.05-4.70)	4.48 (3.57-5.57)	5.42 (4.16-7.02)	6.12 (4.60-8.10)	6.86 (5.00-9.42)	7.72 (5.29-10.8)	8.99 (5.90-12.9)	10.0 (6.43-14.7)
24-hr	2.90 (2.35-3.54)	3.52 (2.85-4.30)	4.53 (3.65-5.56)	5.38 (4.30-6.63)	6.53 (5.05-8.42)	7.40 (5.60-9.74)	8.32 (6.11-11.4)	9.41 (6.47-13.0)	11.0 (7.27-15.8)	12.4 (7.97-18.1)
2-day	3.19 (2.60-3.87)	3.95 (3.21-4.80)	5.19 (4.21-6.33)	6.22 (5.01-7.62)	7.64 (5.95-9.81)	8.69 (6.62-11.4)	9.82 (7.28-13.4)	11.2 (7.72-15.4)	13.3 (8.80-19.0)	15.1 (9.75-21.9)
3-day	3.42 (2.80-4.13)	4.25 (3.47-5.14)	5.62 (4.57-6.82)	6.75 (5.45-8.23)	8.30 (6.49-10.6)	9.45 (7.23-12.4)	10.7 (7.96-14.6)	12.2 (8.45-16.8)	14.6 (9.64-20.6)	16.6 (10.7-23.9)
4-day	3.65 (2.99-4.39)	4.53 (3.71-5.46)	5.96 (4.87-7.22)	7.16 (5.80-8.71)	8.80 (6.89-11.2)	10.0 (7.68-13.1)	11.3 (8.43-15.4)	12.9 (8.95-17.7)	15.4 (10.2-21.7)	17.5 (11.3-25.1)
7-day	4.32 (3.56-5.18)	5.28 (4.35-6.33)	6.84 (5.61-8.24)	8.14 (6.63-9.85)	9.93 (7.80-12.6)	11.3 (8.64-14.5)	12.7 (9.43-17.0)	14.4 (9.98-19.5)	16.9 (11.2-23.7)	19.0 (12.3-27.2)
10-day	5.00 (4.13-5.96)	6.00 (4.96-7.17)	7.65 (6.29-9.17)	9.01 (7.37-10.9)	10.9 (8.57-13.7)	12.3 (9.45-15.8)	13.8 (10.2-18.3)	15.5 (10.8-21.0)	18.0 (12.0-25.2)	20.1 (13.0-28.6)
20-day	7.04 (5.86-8.35)	8.16 (6.79-9.69)	10.0 (8.29-11.9)	11.5 (9.49-13.8)	13.6 (10.8-17.0)	15.2 (11.7-19.3)	16.9 (12.5-22.1)	18.6 (13.1-25.0)	21.1 (14.1-29.2)	23.0 (14.9-32.5)
30-day	8.74 (7.31-10.3)	9.96 (8.31-11.8)	11.9 (9.93-14.2)	13.6 (11.2-16.2)	15.9 (12.6-19.6)	17.6 (13.6-22.1)	19.4 (14.3-25.1)	21.2 (14.9-28.3)	23.5 (15.8-32.5)	25.3 (16.5-35.7)
45-day	10.9 (9.12-12.8)	12.2 (10.2-14.3)	14.3 (12.0-16.9)	16.1 (13.4-19.1)	18.6 (14.8-22.8)	20.5 (15.8-25.6)	22.4 (16.6-28.7)	24.2 (17.1-32.2)	26.6 (17.9-36.5)	28.3 (18.5-39.7)
60-day	12.6 (10.6-14.8)	14.0 (11.8-16.5)	16.3 (13.7-19.2)	18.2 (15.1-21.6)	20.8 (16.6-25.4)	22.9 (17.7-28.4)	24.8 (18.4-31.7)	26.7 (18.9-35.4)	29.1 (19.6-39.8)	30.7 (20.1-43.0)

[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
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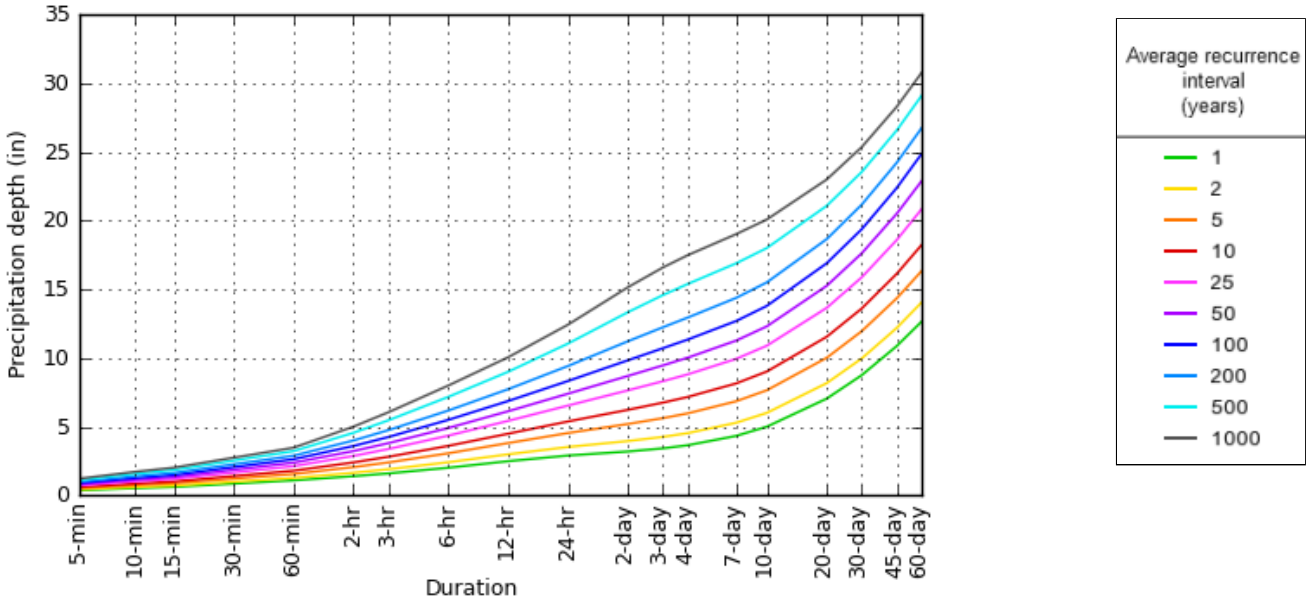

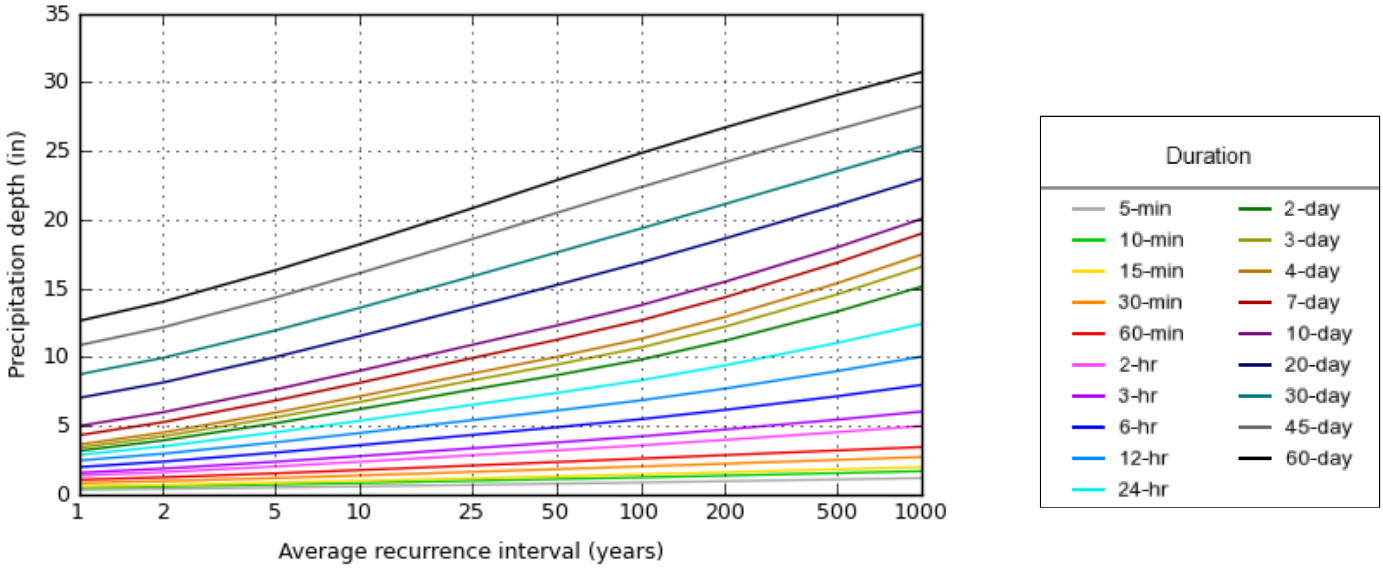

NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Wed Apr 26 19:34:19 2023

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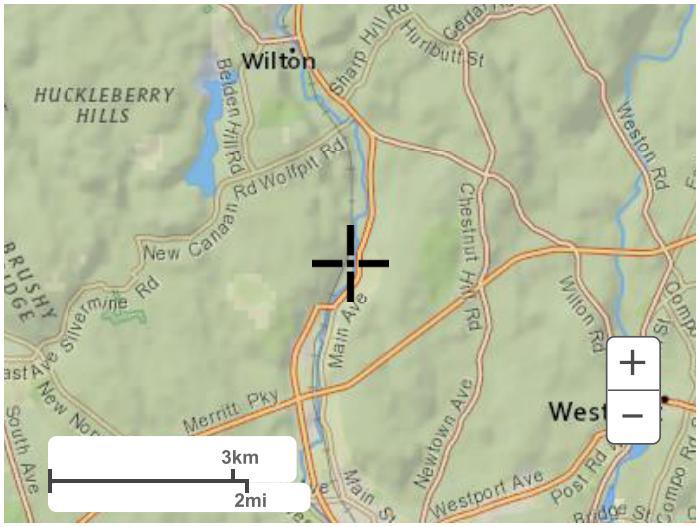
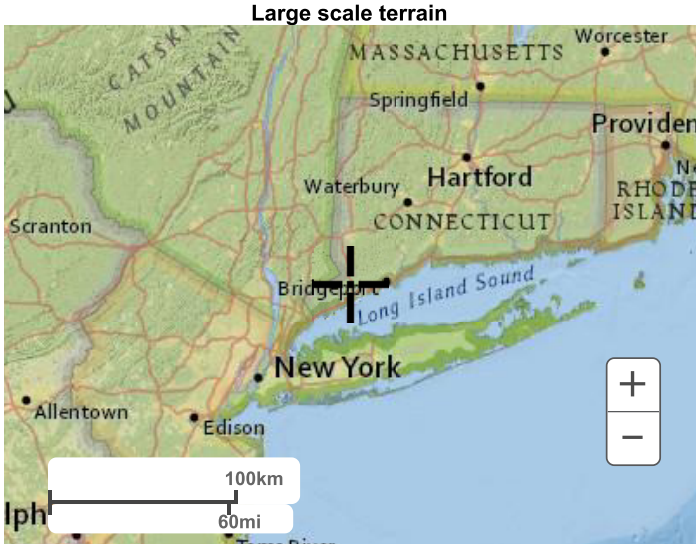
Maps & aerials

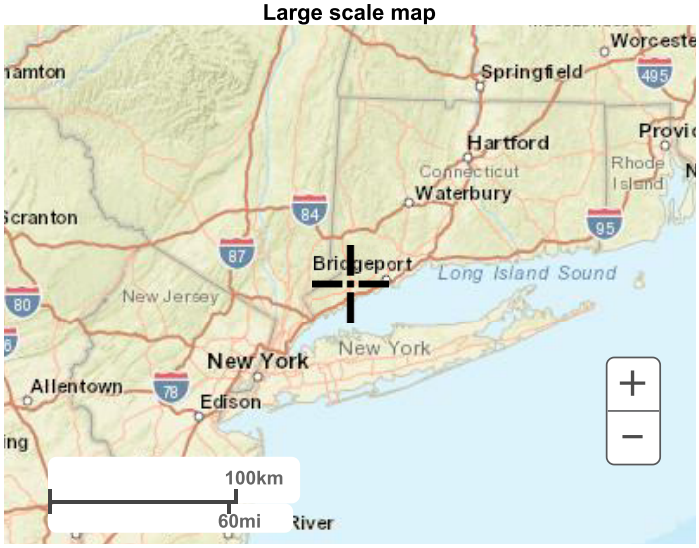
Small scale terrain



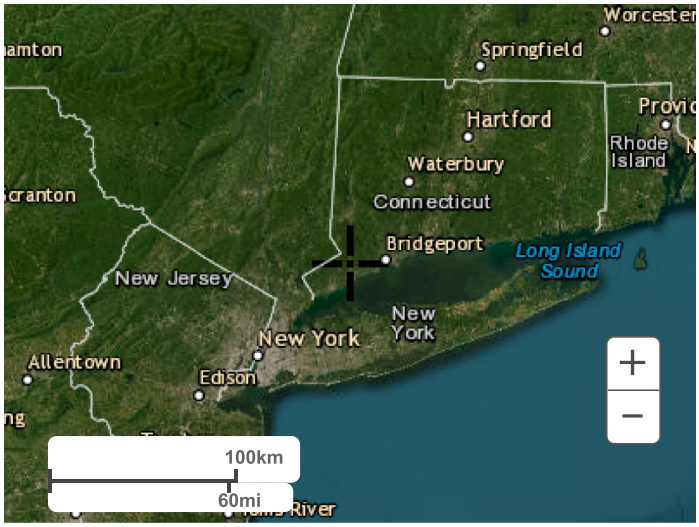
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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Licensed Professional Engineers
New York & Connecticut
185 Meadow Street
Naugatuck, Connecticut 06770

WQV CALCULATIONS

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Licensed Professional Engineers 185 Meadow Street
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POST DEVELOPMENT
Water Quality Volume (WQV) Calculations

$$WQv = \frac{P*Rv*A}{12}$$

Watershed Input Data

Watershed Area to be treated (UD (1, 2, 3, and 5) =	1.480	Ac.
Impervious Coverage =	0.610	Ac.
Lawn Coverage (HSG 2) =	0.870	Ac.
% Impervious Cover (I) =	41.216	

Rv = Volumetric Runoff Coefficient = 0.05+0.009 *(I)
Rv = 0.420946

90% Rainfall Event (P)
P = 1.5

WQv = 0.08 Ac-ft

WQv = 3392 cuft

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Naugatuck, Connecticut 06770

DISCHARGE SUMMARY

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1 Year Storm
Runoff Reduction Volume Calculations

Runoff Volume - Pre-development - to River =	0.167	acre-ft
Runoff Volume - Post-development - to River =	0.077	acre-ft
Runoff Volume Delta (Vpost - Vpre) =	-0.09	acre-ft
Runoff Vol. treated by Proposed BMP (Vortech Chamber, VC) =	0.103	acre-ft

1 Year Storm
Runoff Reduction Flow Calculations

Runoff Flow - Pre-development - to River =	1.37	cfs
Runoff Flow - Post-development - to River =	0.6	cfs
Runoff Flow Delta (Qpost - Qpre) =	-0.77	cfs

10 Year Storm
Runoff Reduction Volume Calculations

Runoff Volume - Pre-development - to River =	0.569	acre-ft
Runoff Volume - Post-development - to River =	0.394	acre-ft
Runoff Volume Delta (Vpost - Vpre) =	-0.175	acre-ft
Runoff Vol. treated by Proposed BMP (Vortech Chamber, VC) =	0.357	acre-ft

10 Year Storm
Runoff Reduction Flow Calculations

Runoff Flow - Pre-development - to River =	4.72	cfs
Runoff Flow - Post-development - to River =	5.54	cfs
Runoff Flow Delta (Qpost - Qpre) =	0.82	cfs

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25 Year Storm
Runoff Reduction Volume Calculations

Runoff Volume - Pre-development - to River =	0.793	acre-ft
Runoff Volume - Post-development - to River =	0.562	acre-ft
Runoff Volume Delta (Vpost - Vpre) =	-0.231	acre-ft
Runoff Vol. treated by Proposed BMP (Vortech Chamber, VC) =	0.471	acre-ft

25 Year Storm
Runoff Reduction Flow Calculations

Runoff Flow - Pre-development - to River =	6.35	cfs
Runoff Flow - Post-development - to River =	7.79	cfs
Runoff Flow Delta (Qpost - Qpre) =	1.44	cfs

100 Year Storm
Runoff Reduction Volume Calculations

Runoff Volume - Pre-development - to River =	1.161	acre-ft
Runoff Volume - Post-development - to River =	0.917	acre-ft
Runoff Volume Delta (Vpost - Vpre) =	-0.244	acre-ft
Runoff Vol. treated by Proposed BMP (Vortech Chamber, VC) =	0.662	acre-ft

100 Year Storm
Runoff Reduction Flow Calculations

Runoff Flow - Pre-development - to River =	7.3	cfs
Runoff Flow - Post-development - to River =	9.2	cfs
Runoff Flow Delta (Qpost - Qpre) =	1.9	cfs

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Licensed Professional Engineers 185 Meadow Street
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90% Storm
Runoff Reduction Volume Calculations

Runoff Volume - Pre-development - to River =	0.043	acre-ft
Runoff Volume - Post-development - to River =	0.022	acre-ft
Runoff Volume Delta (Vpost - Vpre) =	-0.021	acre-ft
Runoff Vol. treated by Proposed BMP (Vortech Chamber, VC) =	0.034	acre-ft

90% Storm
Runoff Reduction Flow Calculations

Runoff Flow - Pre-development - to River =	0.57	cfs
Runoff Flow - Post-development - to River =	0.29	cfs
Runoff Flow Delta (Qpost - Qpre) =	-0.28	cfs

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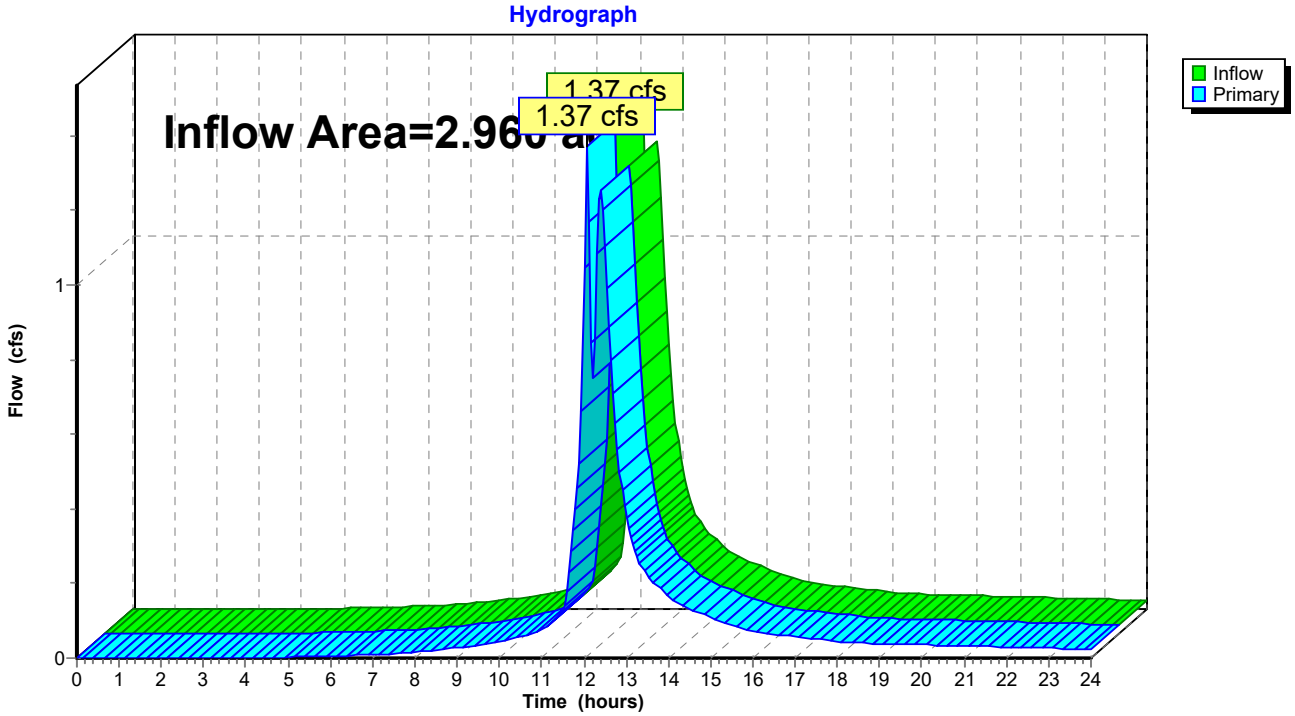
PRE END POINT DISCHARGES

Summary for Link TD: DISCHARGE TO RIVER (TOTAL)

Inflow Area = 2.960 ac, 63.51% Impervious, Inflow Depth > 0.68" for 1-YR event
Inflow = 1.37 cfs @ 12.06 hrs, Volume= 0.167 af
Primary = 1.37 cfs @ 12.06 hrs, Volume= 0.167 af, Atten= 0%, Lag= 0.0 min

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

Link TD: DISCHARGE TO RIVER (TOTAL)

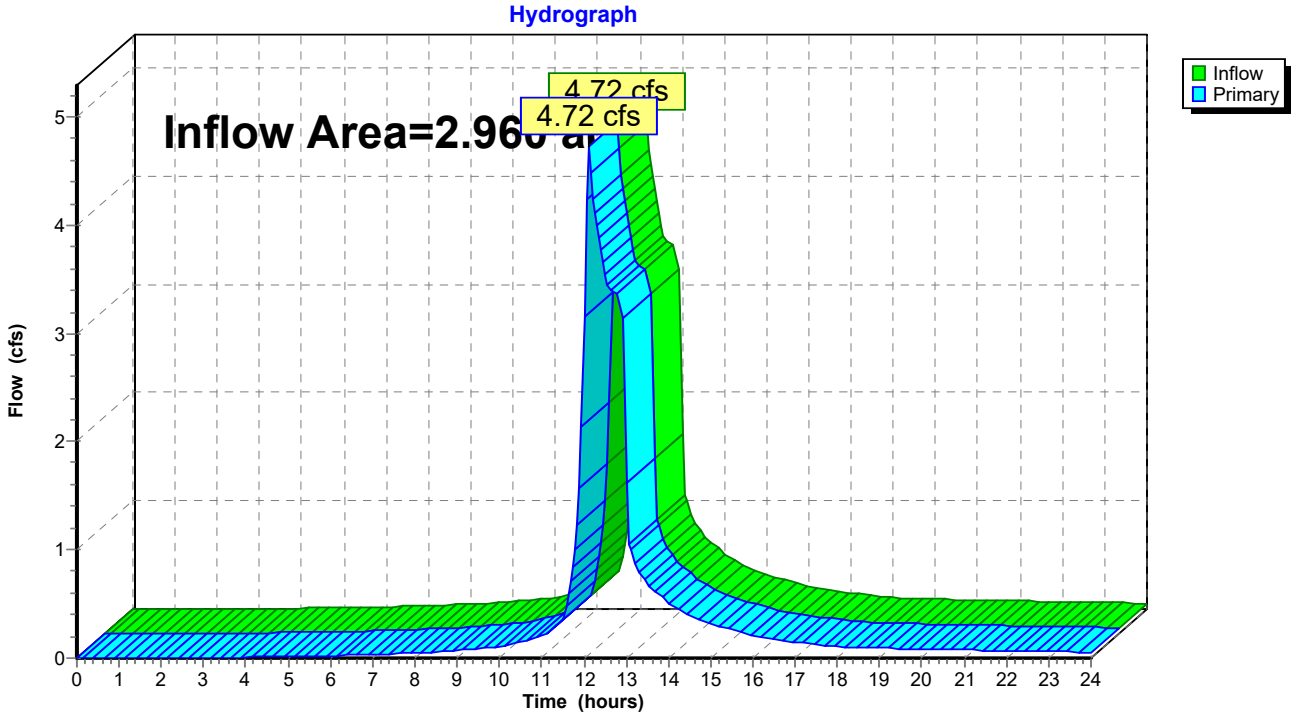


Summary for Link TD: DISCHARGE TO RIVER (TOTAL)

Inflow Area = 2.960 ac, 63.51% Impervious, Inflow Depth > 2.31" for 10-YR event
Inflow = 4.72 cfs @ 12.11 hrs, Volume= 0.569 af
Primary = 4.72 cfs @ 12.11 hrs, Volume= 0.569 af, Atten= 0%, Lag= 0.0 min

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

Link TD: DISCHARGE TO RIVER (TOTAL)

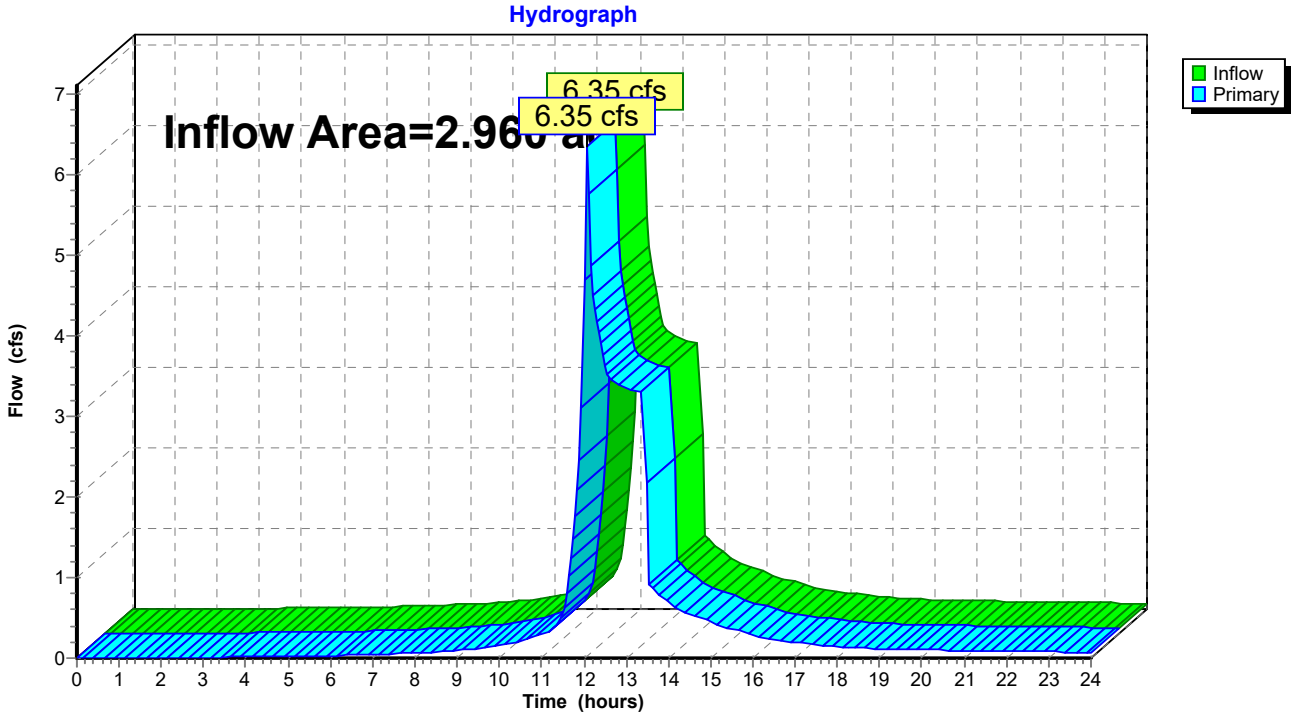


Summary for Link TD: DISCHARGE TO RIVER (TOTAL)

Inflow Area = 2.960 ac, 63.51% Impervious, Inflow Depth > 3.22" for 25-YR event
Inflow = 6.35 cfs @ 12.06 hrs, Volume= 0.793 af
Primary = 6.35 cfs @ 12.06 hrs, Volume= 0.793 af, Atten= 0%, Lag= 0.0 min

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

Link TD: DISCHARGE TO RIVER (TOTAL)

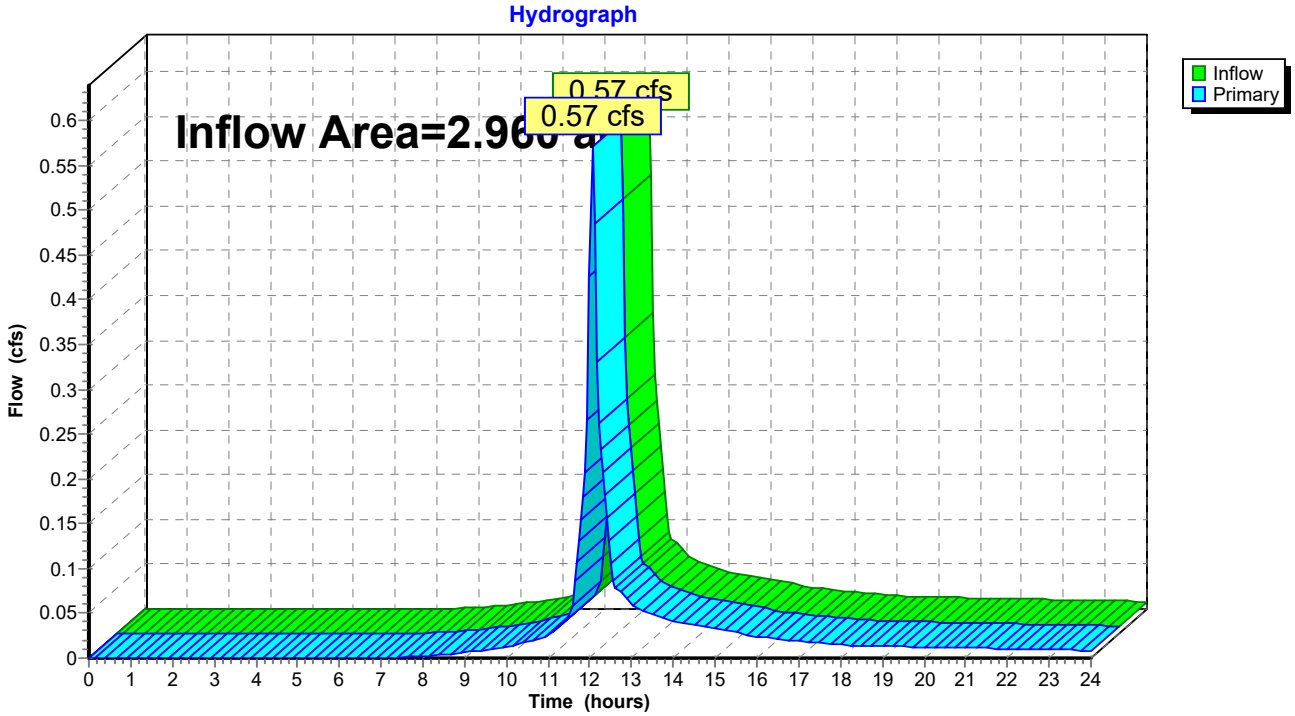


Summary for Link TD: DISCHARGE TO RIVER (TOTAL)

Inflow Area = 2.960 ac, 63.51% Impervious, Inflow Depth > 0.18" for 90TH% event
Inflow = 0.57 cfs @ 12.06 hrs, Volume= 0.043 af
Primary = 0.57 cfs @ 12.06 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

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

Link TD: DISCHARGE TO RIVER (TOTAL)

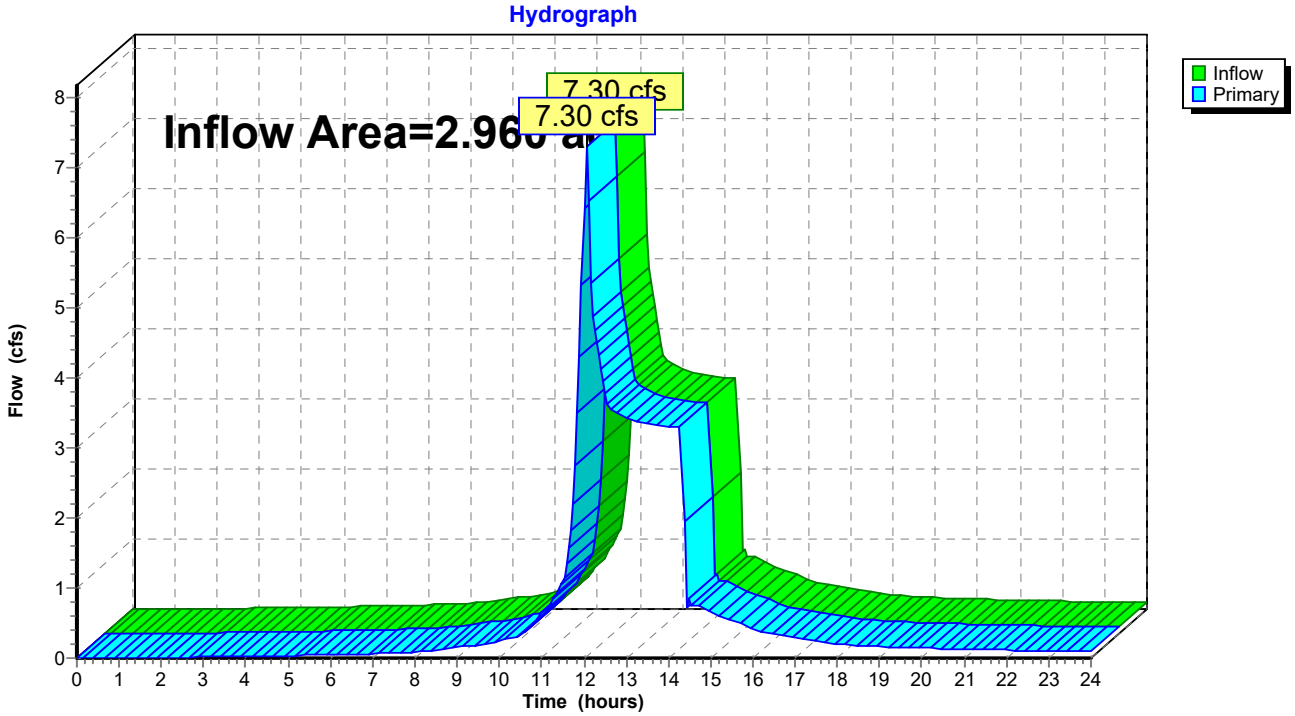


Summary for Link TD: DISCHARGE TO RIVER (TOTAL)

Inflow Area = 2.960 ac, 63.51% Impervious, Inflow Depth > 4.71" for 100-YR event
Inflow = 7.30 cfs @ 12.05 hrs, Volume= 1.161 af
Primary = 7.30 cfs @ 12.05 hrs, Volume= 1.161 af, Atten= 0%, Lag= 0.0 min

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

Link TD: DISCHARGE TO RIVER (TOTAL)



Pustola & Associates
CONSULTING ENGINEERS, LLC
(203) 729-6675 • Fax (203) 720-2816
Licensed Professional Engineers
New York & Connecticut
185 Meadow Street
Naugatuck, Connecticut 06770

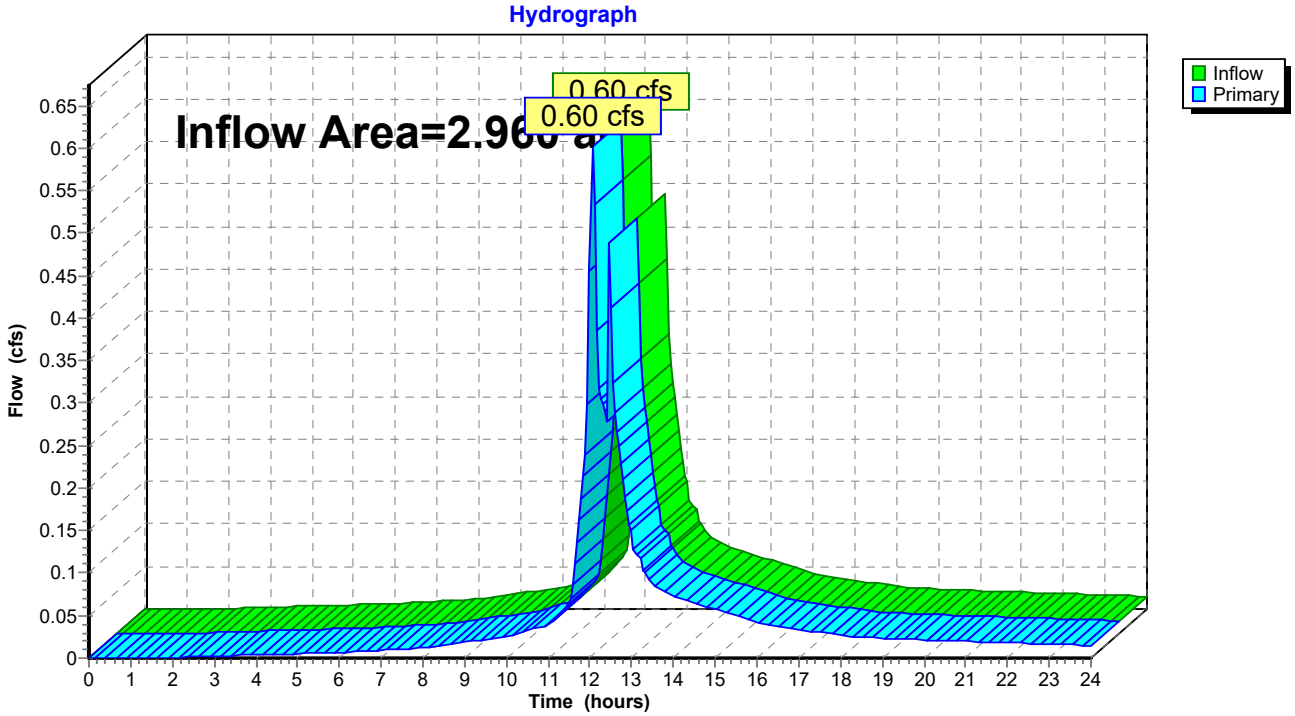
POST END POINT DISCHARGES

Summary for Link R2: DISCHARGE TO RIVER

Inflow Area = 2.960 ac, 60.47% Impervious, Inflow Depth > 0.31" for 1-YR event
Inflow = 0.60 cfs @ 12.06 hrs, Volume= 0.077 af
Primary = 0.60 cfs @ 12.06 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

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

Link R2: DISCHARGE TO RIVER

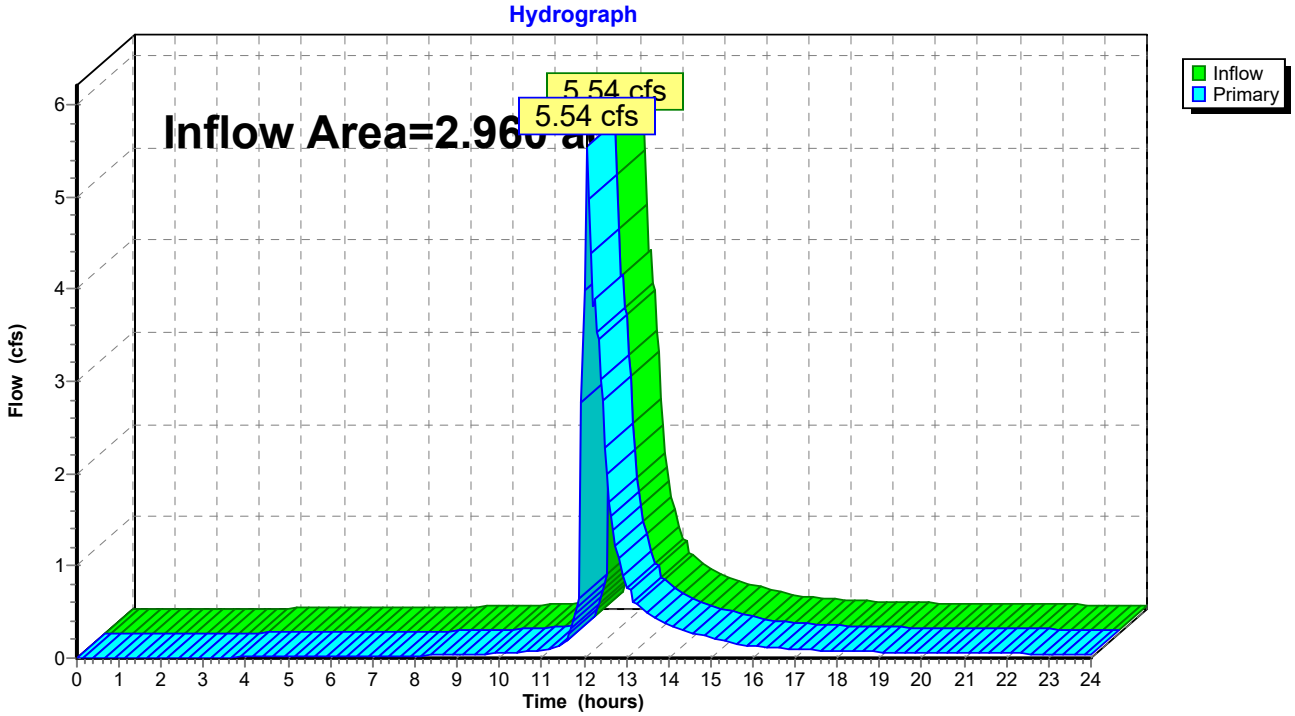


Summary for Link R2: DISCHARGE TO RIVER

Inflow Area = 2.960 ac, 60.47% Impervious, Inflow Depth > 1.60" for 10-YR event
Inflow = 5.54 cfs @ 12.06 hrs, Volume= 0.394 af
Primary = 5.54 cfs @ 12.06 hrs, Volume= 0.394 af, Atten= 0%, Lag= 0.0 min

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

Link R2: DISCHARGE TO RIVER

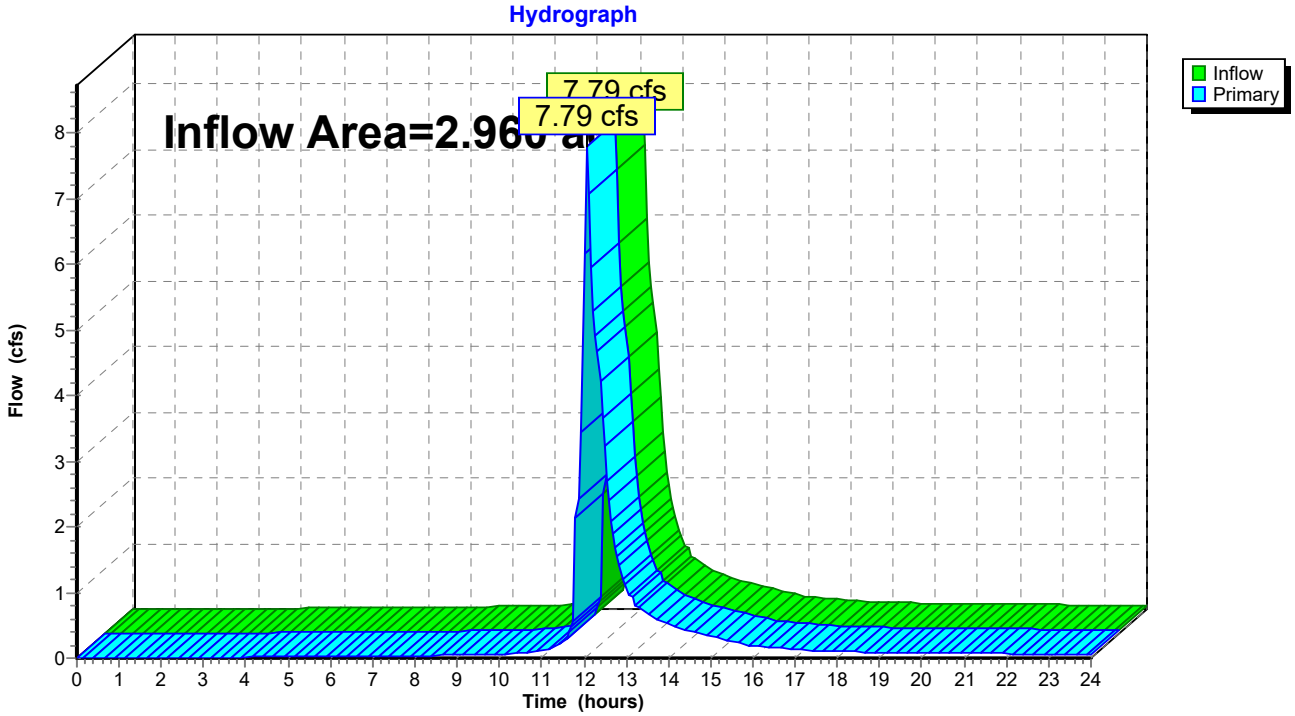


Summary for Link R2: DISCHARGE TO RIVER

Inflow Area = 2.960 ac, 60.47% Impervious, Inflow Depth > 2.28" for 25-YR event
Inflow = 7.79 cfs @ 12.06 hrs, Volume= 0.562 af
Primary = 7.79 cfs @ 12.06 hrs, Volume= 0.562 af, Atten= 0%, Lag= 0.0 min

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

Link R2: DISCHARGE TO RIVER

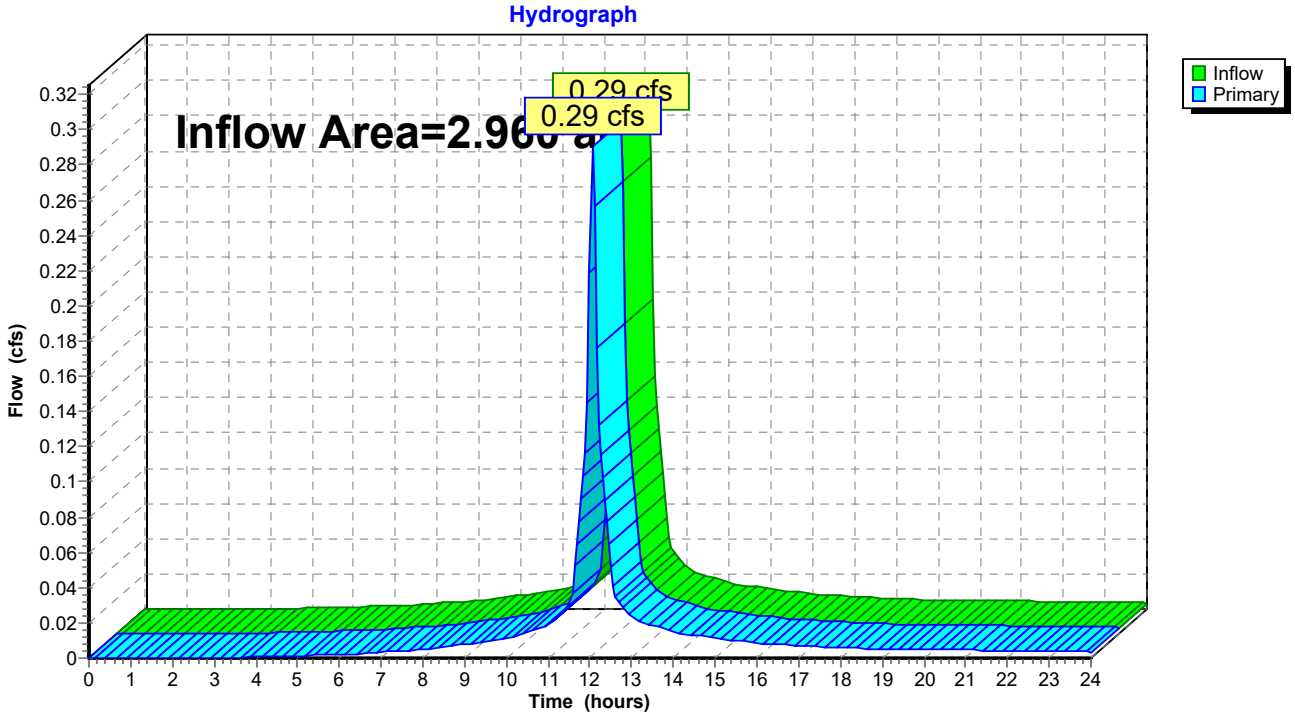


Summary for Link R2: DISCHARGE TO RIVER

Inflow Area = 2.960 ac, 60.47% Impervious, Inflow Depth > 0.09" for 90TH% event
Inflow = 0.29 cfs @ 12.06 hrs, Volume= 0.022 af
Primary = 0.29 cfs @ 12.06 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min

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

Link R2: DISCHARGE TO RIVER

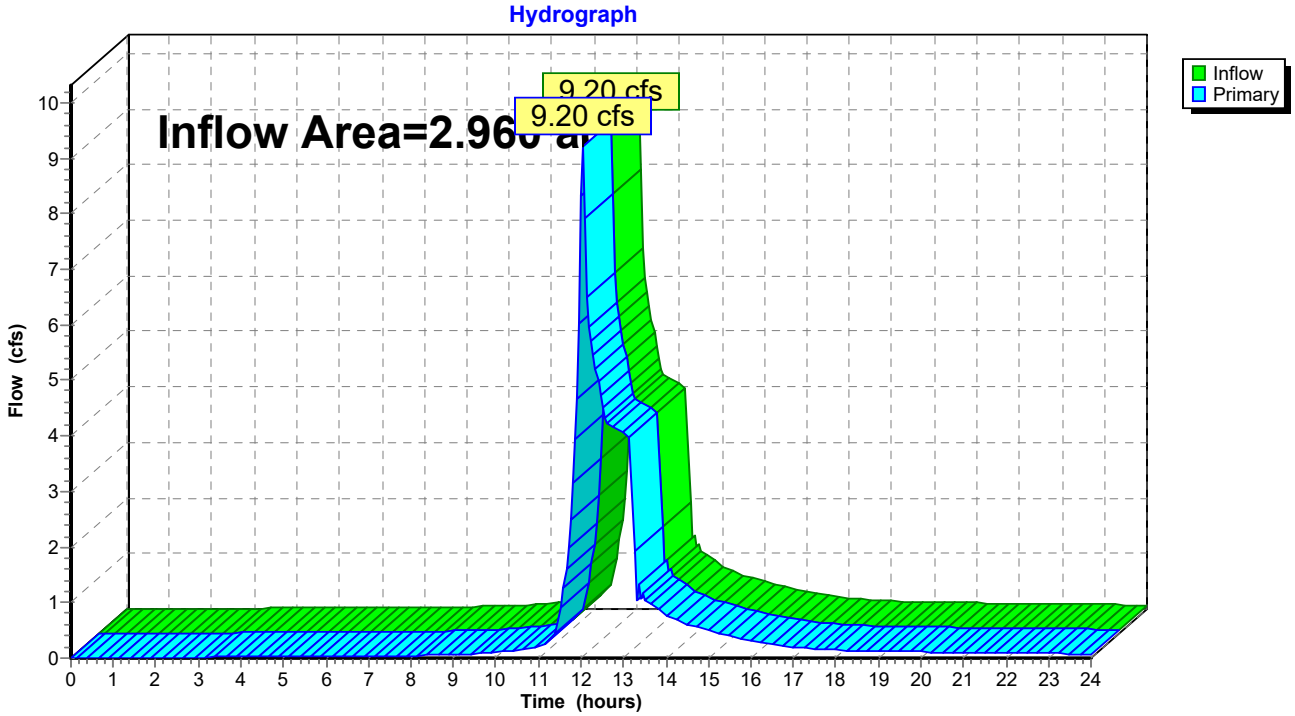


Summary for Link R2: DISCHARGE TO RIVER

Inflow Area = 2.960 ac, 60.47% Impervious, Inflow Depth > 3.72" for 100-YR event
Inflow = 9.20 cfs @ 12.05 hrs, Volume= 0.917 af
Primary = 9.20 cfs @ 12.05 hrs, Volume= 0.917 af, Atten= 0%, Lag= 0.0 min

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

Link R2: DISCHARGE TO RIVER



Pustola & Associates
CONSULTING ENGINEERS, LLC
(203) 729-6675 • Fax (203) 720-2816
Licensed Professional Engineers
New York & Connecticut
185 Meadow Street
Naugatuck, Connecticut 06770

PROPOSED VORTECH SYSTEM

Summary for Pond BP: BYPASS

Inflow Area =	2.300 ac,	51.30% Impervious,	Inflow Depth >	0.54"	for 1-YR event
Inflow =	0.91 cfs @	12.07 hrs,	Volume=	0.103 af	
Outflow =	0.91 cfs @	12.07 hrs,	Volume=	0.103 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.91 cfs @	12.07 hrs,	Volume=	0.103 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

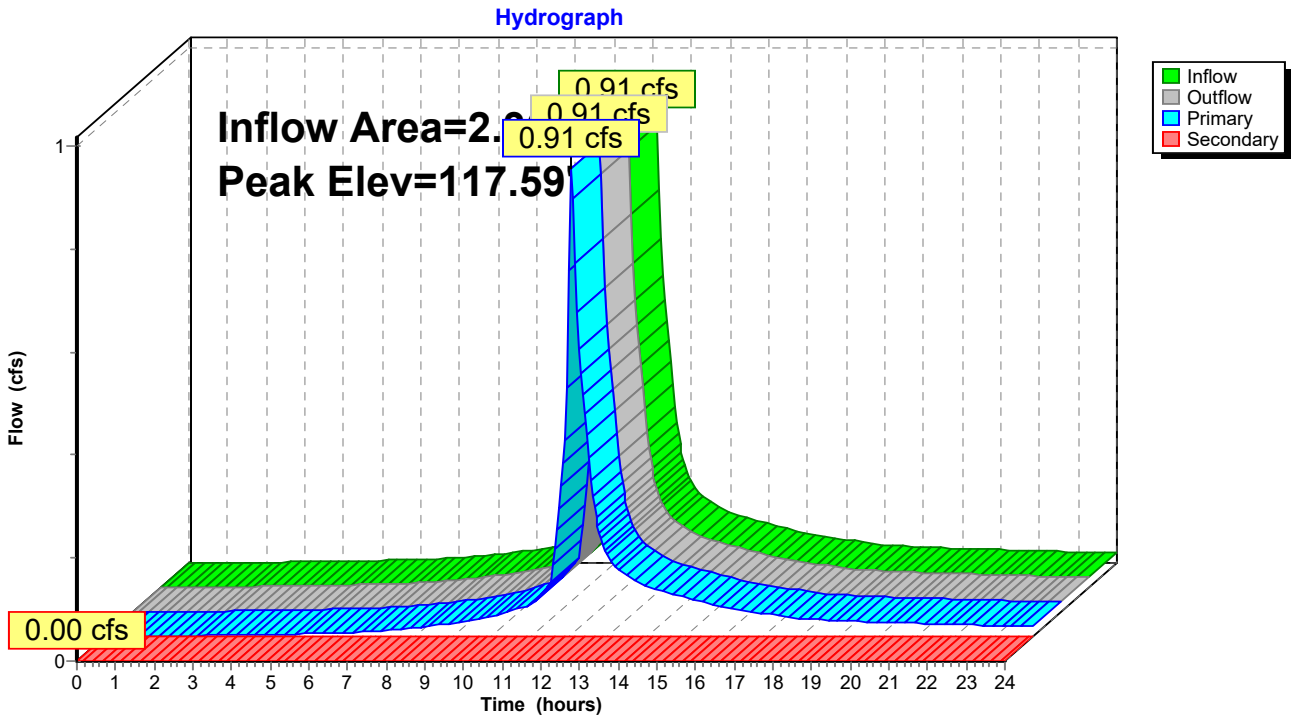
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 117.59' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices	
#1	Primary	117.10'	**12.0" Vert. Orifice/Grate**	C= 0.600
#2	Secondary	118.00'	**12.0" Vert. Orifice/Grate**	C= 0.600

Primary OutFlow Max=0.88 cfs @ 12.07 hrs HW=117.58' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.88 cfs @ 2.36 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=117.10' (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond BP: BYPASS



Summary for Pond BP: BYPASS

Inflow Area =	2.300 ac,	51.30% Impervious,	Inflow Depth >	1.89"	for 10-YR event
Inflow =	3.43 cfs @	12.12 hrs,	Volume=	0.362 af	
Outflow =	3.43 cfs @	12.12 hrs,	Volume=	0.362 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.12 cfs @	12.12 hrs,	Volume=	0.357 af	
Secondary =	0.31 cfs @	12.12 hrs,	Volume=	0.005 af	

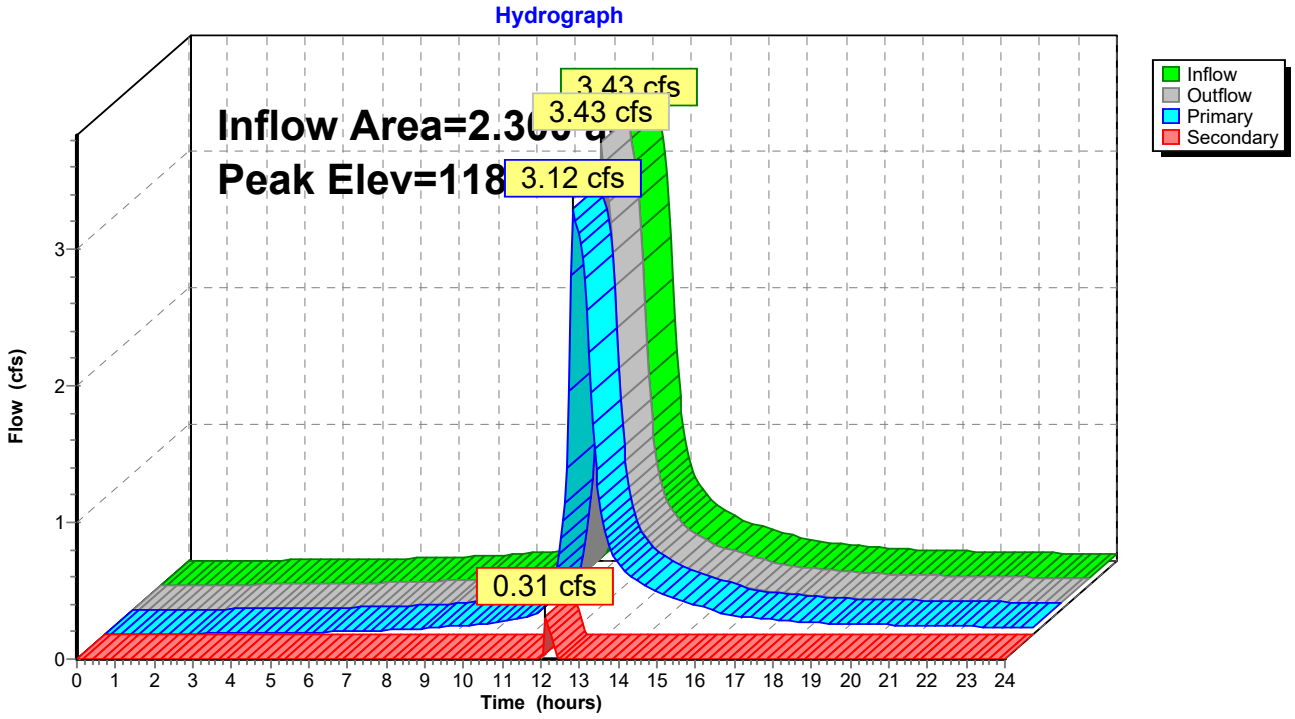
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 118.28' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices	
#1	Primary	117.10'	**12.0" Vert. Orifice/Grate**	C= 0.600
#2	Secondary	118.00'	**12.0" Vert. Orifice/Grate**	C= 0.600

Primary OutFlow Max=3.06 cfs @ 12.12 hrs HW=118.26' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 3.06 cfs @ 3.90 fps)

Secondary OutFlow Max=0.27 cfs @ 12.12 hrs HW=118.26' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.27 cfs @ 1.72 fps)

Pond BP: BYPASS



Summary for Pond BP: BYPASS

Inflow Area =	2.300 ac,	51.30% Impervious,	Inflow Depth >	2.60"	for 25-YR event
Inflow =	5.20 cfs @	12.10 hrs,	Volume=	0.499 af	
Outflow =	5.20 cfs @	12.10 hrs,	Volume=	0.499 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.82 cfs @	12.10 hrs,	Volume=	0.471 af	
Secondary =	1.37 cfs @	12.10 hrs,	Volume=	0.028 af	

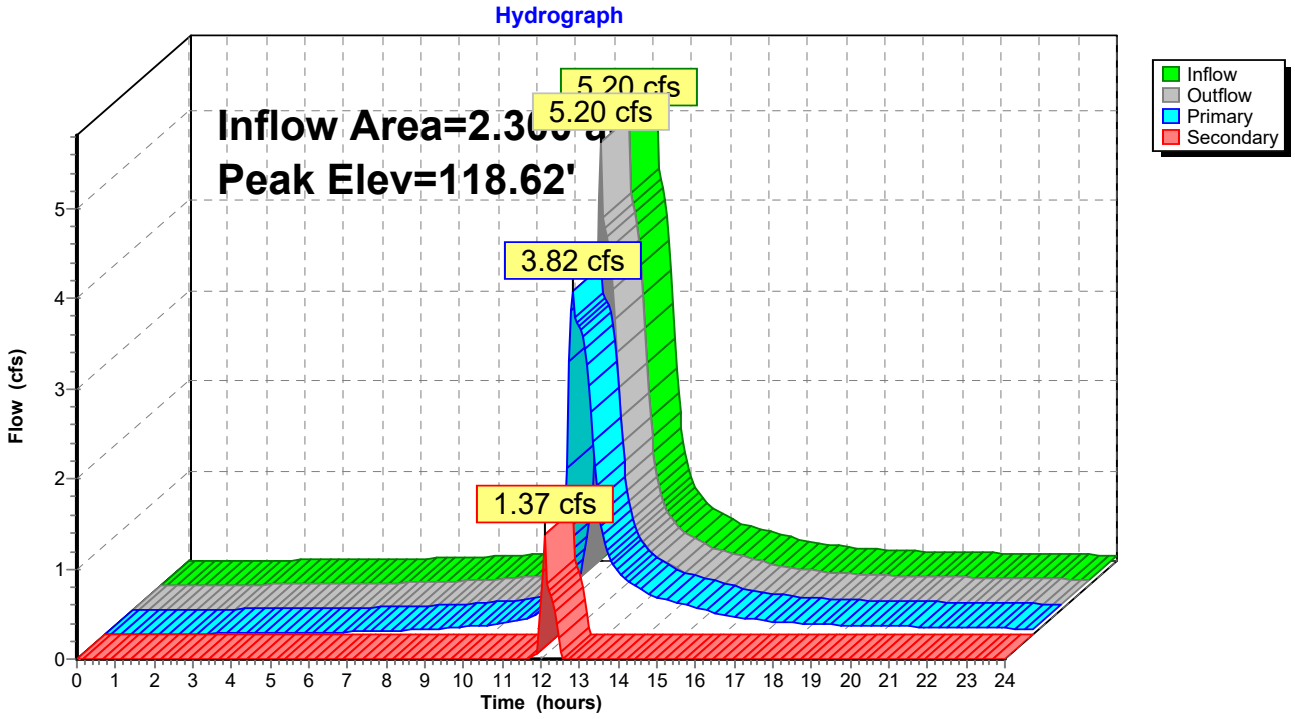
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 118.62' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices	
#1	Primary	117.10'	**12.0" Vert. Orifice/Grate**	C= 0.600
#2	Secondary	118.00'	**12.0" Vert. Orifice/Grate**	C= 0.600

Primary OutFlow Max=3.80 cfs @ 12.10 hrs HW=118.61' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 3.80 cfs @ 4.84 fps)

Secondary OutFlow Max=1.34 cfs @ 12.10 hrs HW=118.61' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 1.34 cfs @ 2.66 fps)

Pond BP: BYPASS



Summary for Pond BP: BYPASS

Inflow Area =	2.300 ac,	51.30% Impervious,	Inflow Depth >	0.18"	for 90TH% event
Inflow =	0.40 cfs @	12.06 hrs,	Volume=	0.034 af	
Outflow =	0.40 cfs @	12.06 hrs,	Volume=	0.034 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.40 cfs @	12.06 hrs,	Volume=	0.034 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

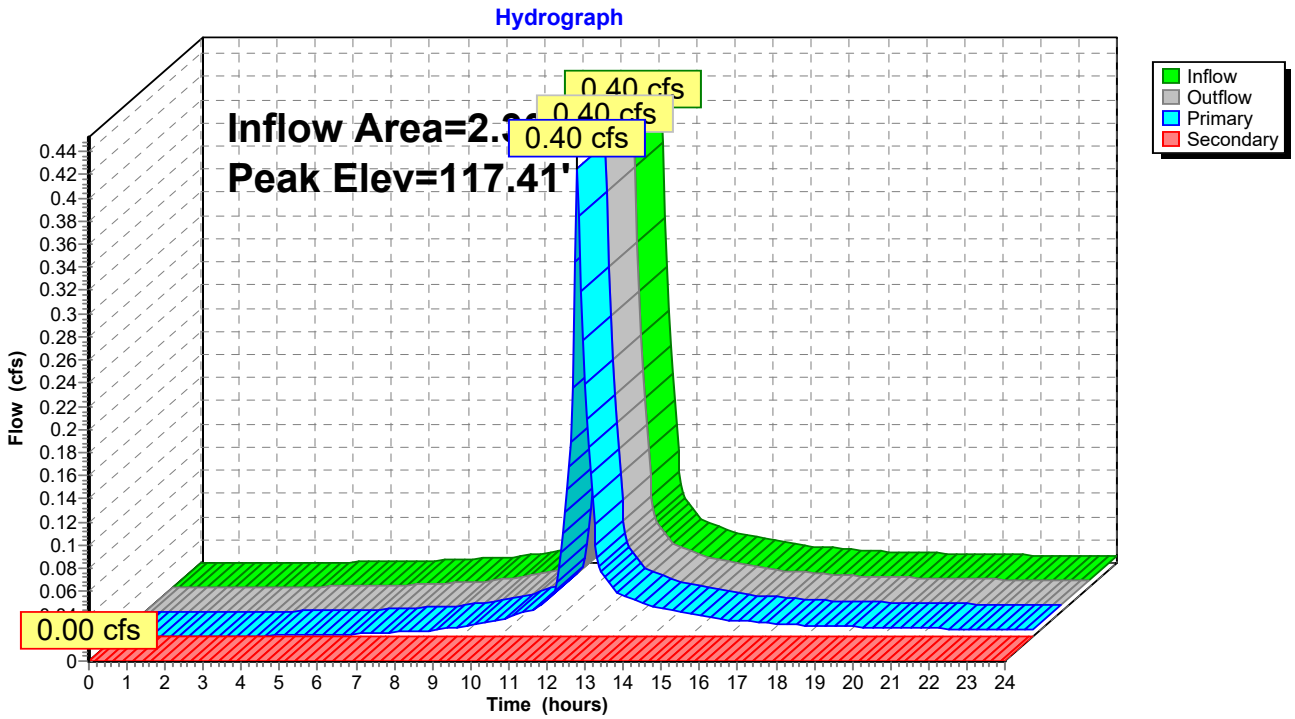
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 117.41' @ 12.06 hrs

Device	Routing	Invert	Outlet Devices	
#1	Primary	117.10'	**12.0" Vert. Orifice/Grate**	C= 0.600
#2	Secondary	118.00'	**12.0" Vert. Orifice/Grate**	C= 0.600

Primary OutFlow Max=0.40 cfs @ 12.06 hrs HW=117.41' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.40 cfs @ 1.90 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=117.10' (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond BP: BYPASS



Summary for Pond BP: BYPASS

Inflow Area =	2.300 ac,	51.30% Impervious,	Inflow Depth >	3.99"	for 100-YR event
Inflow =	10.23 cfs @	12.06 hrs,	Volume=	0.764 af	
Outflow =	10.23 cfs @	12.06 hrs,	Volume=	0.764 af,	Atten= 0%, Lag= 0.0 min
Primary =	5.74 cfs @	12.06 hrs,	Volume=	0.662 af	
Secondary =	4.49 cfs @	12.06 hrs,	Volume=	0.102 af	

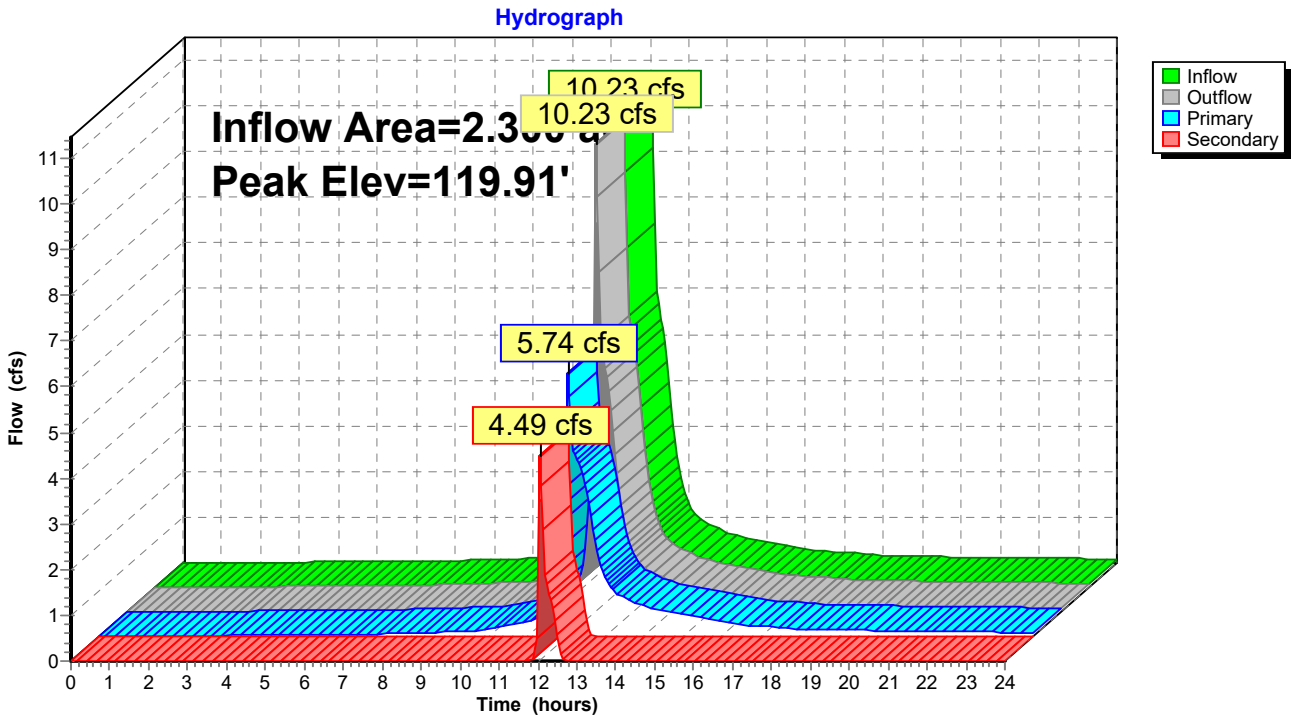
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 119.91' @ 12.05 hrs

Device	Routing	Invert	Outlet Devices	
#1	Primary	117.10'	**12.0" Vert. Orifice/Grate**	C= 0.600
#2	Secondary	118.00'	**12.0" Vert. Orifice/Grate**	C= 0.600

Primary OutFlow Max=5.69 cfs @ 12.06 hrs HW=119.86' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 5.69 cfs @ 7.24 fps)

Secondary OutFlow Max=4.41 cfs @ 12.06 hrs HW=119.86' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 4.41 cfs @ 5.62 fps)

Pond BP: BYPASS



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CONSULTING ENGINEERS, LLC
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Licensed Professional Engineers
New York & Connecticut
185 Meadow Street
Naugatuck, Connecticut 06770

CONTECH INFILTRATION PERFORMANCE

Summary for Pond 1P: INFILTRATION SYSTEM

Inflow Area =	0.580 ac,100.00% Impervious, Inflow Depth > 2.67" for 1-YR event			
Inflow =	1.76 cfs @ 12.05 hrs, Volume=	0.129 af		
Outflow =	0.10 cfs @ 13.70 hrs, Volume=	0.110 af, Atten= 95%, Lag= 99.4 min		
Discarded =	0.10 cfs @ 13.70 hrs, Volume=	0.110 af		
Primary =	0.00 cfs @ 0.00 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 118.55' @ 13.70 hrs Surf.Area= 0.048 ac Storage= 0.061 af

Plug-Flow detention time= 246.6 min calculated for 0.110 af (86% of inflow)
Center-of-Mass det. time= 183.6 min (939.1 - 755.5)

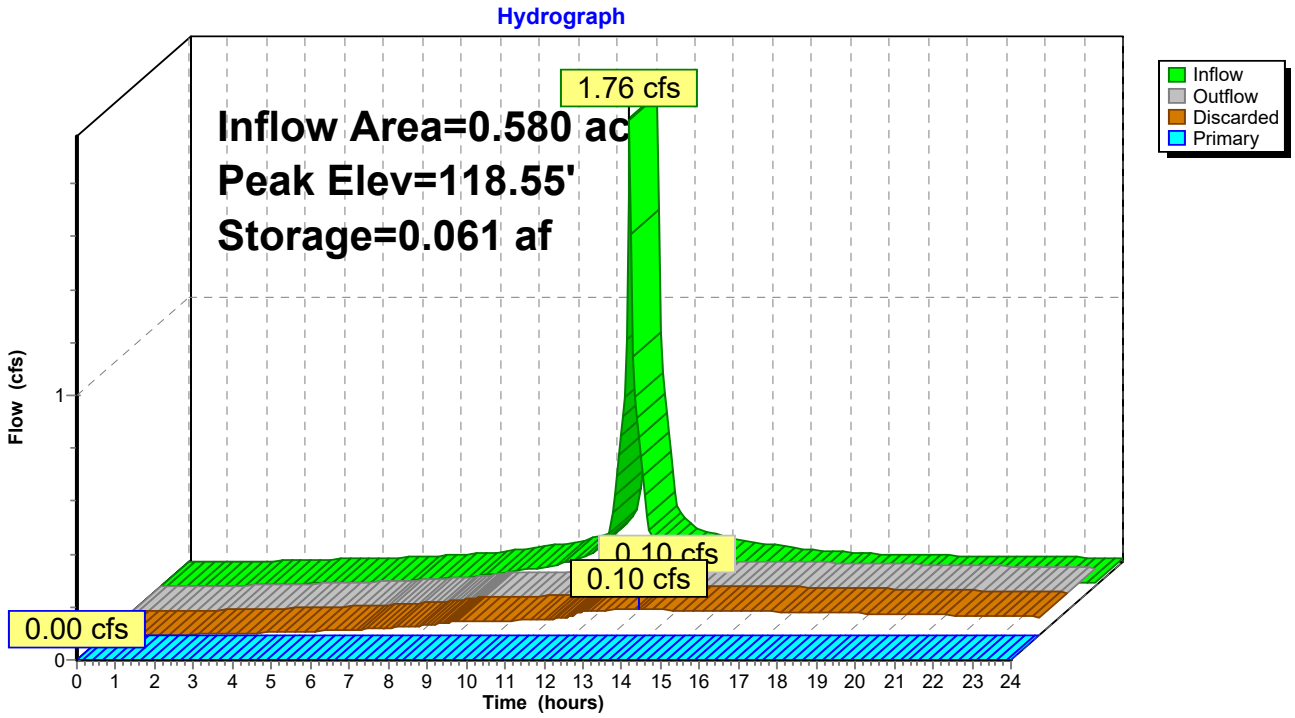
Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	0.048 af	**63.00'W x 33.00'L x 3.54'H Gravel** 0.169 af Overall - 0.049 af Embedded = 0.120 af x 40.0% Voids
#2	117.00'	0.049 af	**Cultec R-330XLHD** x 40 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.097 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	**1.100 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 114.00'
#2	Primary	118.83'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.10 cfs @ 13.70 hrs HW=118.55' (Free Discharge)
└─**1=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=116.50' (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: INFILTRATION SYSTEM



Summary for Pond 1P: INFILTRATION SYSTEM

Inflow Area = 0.580 ac,100.00% Impervious, Inflow Depth > 5.14" for 10-YR event
Inflow = 3.31 cfs @ 12.05 hrs, Volume= 0.249 af
Outflow = 1.40 cfs @ 12.20 hrs, Volume= 0.210 af, Atten= 58%, Lag= 9.0 min
Discarded = 0.12 cfs @ 12.20 hrs, Volume= 0.137 af
Primary = 1.28 cfs @ 12.20 hrs, Volume= 0.072 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 119.74' @ 12.20 hrs Surf.Area= 0.048 ac Storage= 0.091 af

Plug-Flow detention time= 170.4 min calculated for 0.209 af (84% of inflow)
Center-of-Mass det. time= 104.2 min (848.0 - 743.8)

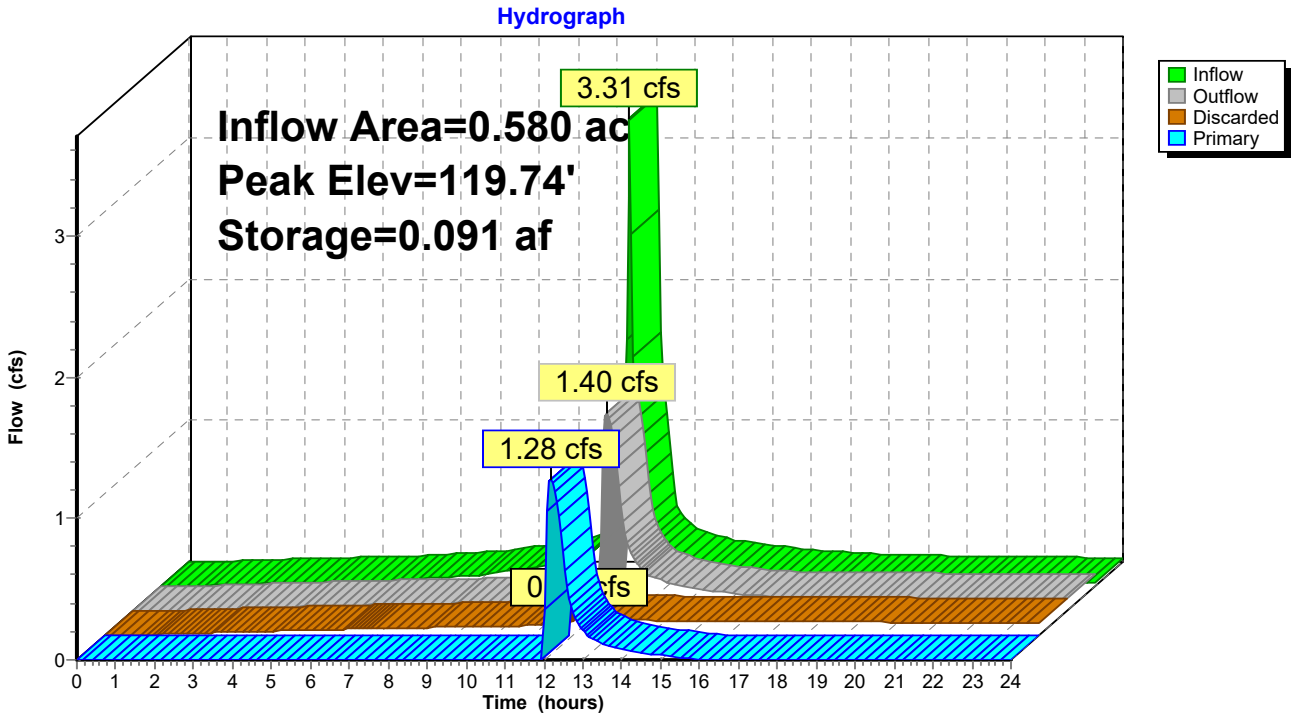
Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	0.048 af	**63.00'W x 33.00'L x 3.54'H Gravel** 0.169 af Overall - 0.049 af Embedded = 0.120 af x 40.0% Voids
#2	117.00'	0.049 af	**Cultec R-330XLHD** x 40 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.097 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	**1.100 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 114.00'
#2	Primary	118.83'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.12 cfs @ 12.20 hrs HW=119.74' (Free Discharge)
└**1=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=1.28 cfs @ 12.20 hrs HW=119.74' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 1.28 cfs @ 3.66 fps)

Pond 1P: INFILTRATION SYSTEM



Summary for Pond 1P: INFILTRATION SYSTEM

Inflow Area =	0.580 ac,100.00% Impervious, Inflow Depth > 6.29" for 25-YR event			
Inflow =	4.02 cfs @	12.05 hrs, Volume=	0.304 af	
Outflow =	2.25 cfs @	12.10 hrs, Volume=	0.252 af, Atten= 44%, Lag= 3.4 min	
Discarded =	0.14 cfs @	12.10 hrs, Volume=	0.144 af	
Primary =	2.11 cfs @	12.10 hrs, Volume=	0.108 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 120.73' @ 12.10 hrs Surf.Area= 0.048 ac Storage= 0.097 af

Plug-Flow detention time= 158.8 min calculated for 0.252 af (83% of inflow)
Center-of-Mass det. time= 88.3 min (829.2 - 740.9)

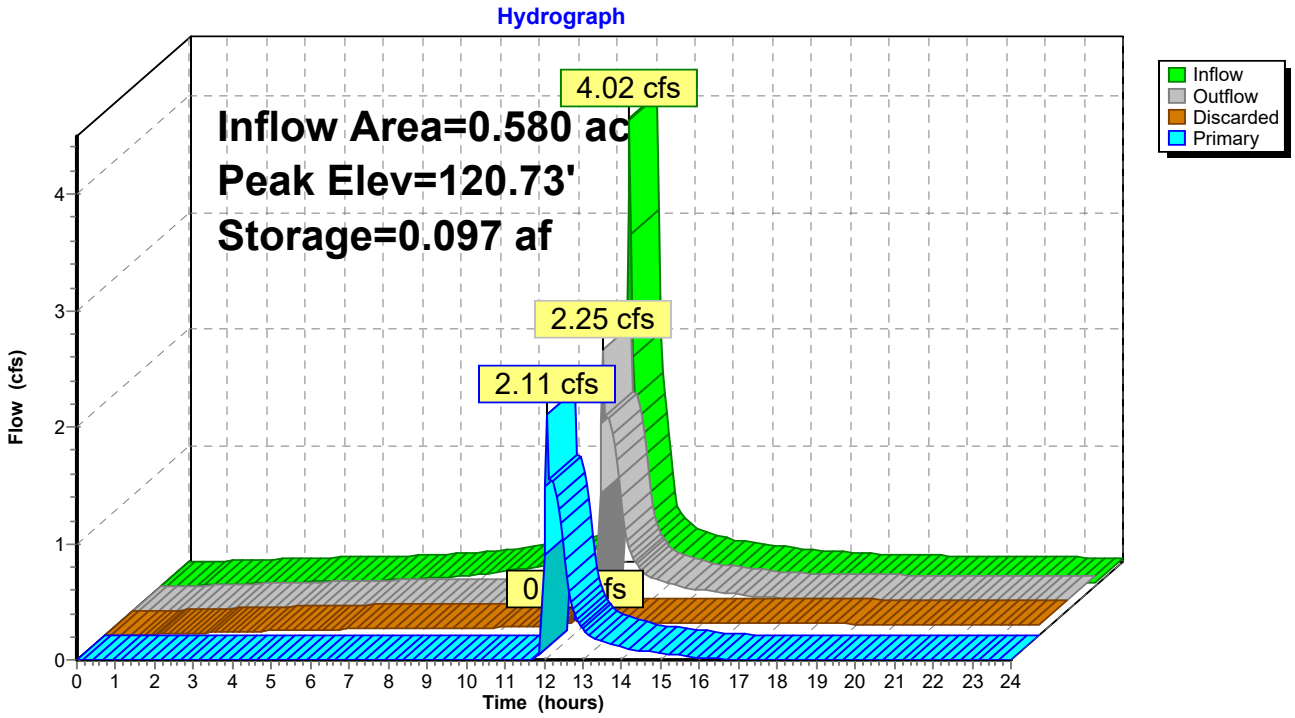
Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	0.048 af	**63.00'W x 33.00'L x 3.54'H Gravel** 0.169 af Overall - 0.049 af Embedded = 0.120 af x 40.0% Voids
#2	117.00'	0.049 af	**Cultec R-330XLHD** x 40 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.097 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	**1.100 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 114.00'
#2	Primary	118.83'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.14 cfs @ 12.10 hrs HW=120.72' (Free Discharge)
└**1=Exfiltration** (Controls 0.14 cfs)

Primary OutFlow Max=2.09 cfs @ 12.10 hrs HW=120.72' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 2.09 cfs @ 6.00 fps)

Pond 1P: INFILTRATION SYSTEM



Summary for Pond 1P: INFILTRATION SYSTEM

Inflow Area =	0.580 ac,100.00% Impervious, Inflow Depth > 1.28" for 90TH% event				
Inflow =	0.88 cfs @	12.05 hrs,	Volume=	0.062 af	
Outflow =	0.07 cfs @	12.92 hrs,	Volume=	0.062 af,	Atten= 92%, Lag= 52.2 min
Discarded =	0.07 cfs @	12.92 hrs,	Volume=	0.062 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 117.43' @ 12.92 hrs Surf.Area= 0.048 ac Storage= 0.024 af

Plug-Flow detention time= 120.9 min calculated for 0.062 af (100% of inflow)
Center-of-Mass det. time= 119.9 min (892.2 - 772.3)

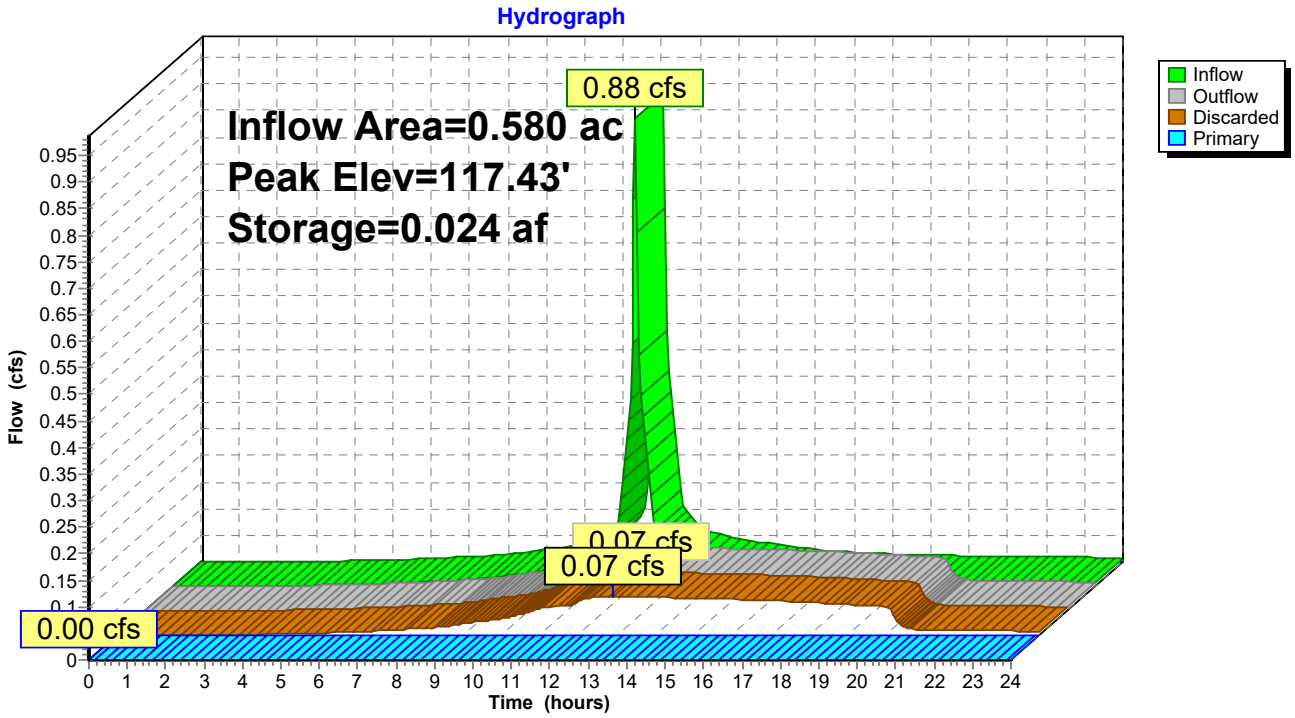
Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	0.048 af	**63.00'W x 33.00'L x 3.54'H Gravel** 0.169 af Overall - 0.049 af Embedded = 0.120 af x 40.0% Voids
#2	117.00'	0.049 af	**Cultec R-330XLHD** x 40 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.097 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	**1.100 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 114.00'
#2	Primary	118.83'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.07 cfs @ 12.92 hrs HW=117.43' (Free Discharge)
└─**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=116.50' (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: INFILTRATION SYSTEM



Summary for Pond 1P: INFILTRATION SYSTEM

Inflow Area = 0.580 ac,100.00% Impervious, Inflow Depth > 8.08" for 100-YR event
Inflow = 5.13 cfs @ 12.05 hrs, Volume= 0.390 af
Outflow = 6.22 cfs @ 12.05 hrs, Volume= 0.360 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.37 cfs @ 12.05 hrs, Volume= 0.156 af
Primary = 5.86 cfs @ 12.05 hrs, Volume= 0.204 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 131.30' @ 12.05 hrs Surf.Area= 0.048 ac Storage= 0.097 af

Plug-Flow detention time= 105.0 min calculated for 0.359 af (92% of inflow)
Center-of-Mass det. time= 63.5 min (801.3 - 737.7)

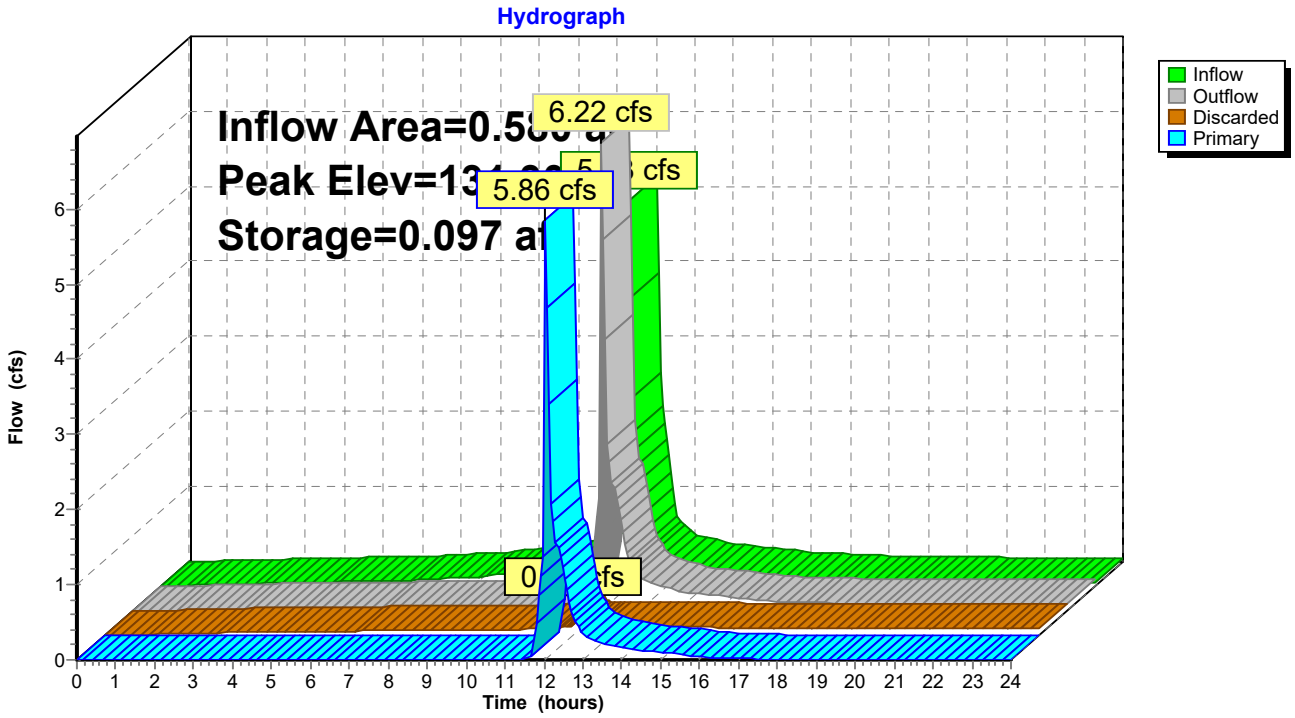
Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	0.048 af	**63.00'W x 33.00'L x 3.54'H Gravel** 0.169 af Overall - 0.049 af Embedded = 0.120 af x 40.0% Voids
#2	117.00'	0.049 af	**Cultec R-330XLHD** x 40 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.097 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	**1.100 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 114.00'
#2	Primary	118.83'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.36 cfs @ 12.05 hrs HW=131.00' (Free Discharge)
└**1=Exfiltration** (Controls 0.36 cfs)

Primary OutFlow Max=5.78 cfs @ 12.05 hrs HW=130.97' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 5.78 cfs @ 16.55 fps)

Pond 1P: INFILTRATION SYSTEM



Pustola & Associates
CONSULTING ENGINEERS, LLC
(203) 729-6675 • Fax (203) 720-2816
Licensed Professional Engineers
New York & Connecticut
185 Meadow Street
Naugatuck, Connecticut 06770

CONTECH SYSTEM SPECFICATIONS

CULTEC Recharger® 330XLHD Stormwater Chamber

The Recharger® 330XLHD is a 30.5" (775 mm) tall, high capacity chamber. Typically when using this model, fewer chambers are required resulting in less labor and a smaller installation area. The Recharger® 330XLHD has the side portal internal manifold feature. HVLV® FC-24 Feed Connectors are inserted into the side portals to create the internal manifold.

Size (L x W x H)	8.5' x 52" x 30.5" 2.59 m x 1321 mm x 775 mm
Installed Length	7' 2.13 m
Length Adjustment per Run	1.50' 0.46 m
Chamber Storage	7.46 ft^3/ft 0.69 m^3/m 52.21 ft^3/unit 1.48 m^3/unit
Min. Installed Storage	11.32 ft^3/ft 1.05 m^3/m 79.26 ft^3/unit 2.24 m^3/unit
Min. Area Required	33.83 ft^2 3.14 m^2
Chamber Weight	73.0 lbs 33.11 kg
Shipping	30 chambers/skid 2,335 lbs/skid 10 skids/48' flatbed
Min. Center-to-Center Spacing	4.83' 1.47 m
Max. Allowable Cover	12' 3.66 m
Max. Inlet Opening in End Wall	24" HDPE, PVC 600 mm HDPE, PVC
Max. Allowable O.D. in Side Portal	10" HDPE, 12" PVC 250 mm HDPE, 300 mm PVC
Compatible Feed Connector	HVLV FC-24 Feed Connector

Calculations are based on installed chamber length.
All above values are nominal.
Min. installed storage includes 6" (152 mm) stone base, 6" (152 mm) stone above crown of chamber and typical stone surround at 58" (1473 mm) center-to-center spacing.

	Stone Foundation Depth		
	6" 152 mm	12" 305 mm	18" 457 mm
Chamber and Stone Storage Per Chamber	79.26 ft^3 2.24 m^3	86.03 ft^3 2.44 m^3	92.79 ft^3 2.63 m^3
Min. Effective Depth	3.54' 1.08 m	4.04' 1.23 m	4.54' 1.38 m
Stone Required Per Chamber	2.50 yd^3 1.91 m^3	3.13 yd^3 2.39 m^3	3.76 yd^3 2.87 m^3

Calculations are based on installed chamber length.
Includes 6" (305 mm) stone above crown of chamber and typical stone surround at 58"(1473 mm) center-to-center spacing and stone foundation as listed in table.
Stone void calculated at 40%.

Recharger® 330XLHD Bare Chamber Storage Volumes

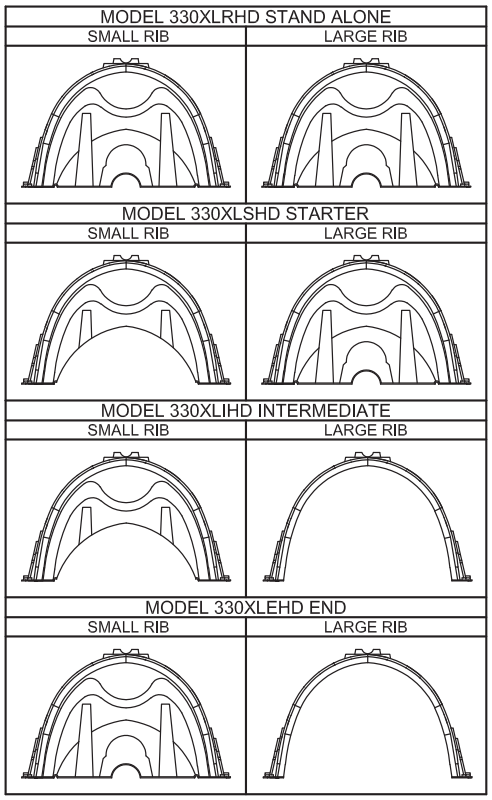
Elevation		Incremental Storage Volume				Cumulative Storage	
in.	mm	ft^3/ft	m^3/m	ft^3	m^3	ft^3	m^3
30.5	775	0.000	0.000	0.000	0.000	52.213	1.479
30	762	0.019	0.002	0.133	0.004	52.213	1.479
29	737	0.051	0.005	0.357	0.010	52.080	1.475
28	711	0.084	0.008	0.588	0.017	51.723	1.465
27	686	0.124	0.012	0.868	0.025	51.135	1.448
26	660	0.150	0.014	1.05	0.030	50.267	1.424
25	635	0.173	0.016	1.211	0.034	49.217	1.394
24	609	0.191	0.018	1.337	0.038	48.006	1.360
23	584	0.207	0.019	1.449	0.041	46.669	1.322
22	559	0.221	0.021	1.547	0.044	45.220	1.281
21	533	0.233	0.022	1.631	0.046	43.673	1.237
20	508	0.244	0.023	1.708	0.048	42.042	1.191
19	483	0.254	0.024	1.778	0.050	40.334	1.142
18	457	0.264	0.025	1.848	0.052	38.556	1.092
17	432	0.271	0.025	1.897	0.054	36.708	1.040
16	406	0.283	0.026	1.981	0.056	34.811	0.986
15	381	0.294	0.027	2.058	0.058	32.830	0.930
14	356	0.296	0.027	2.072	0.059	30.772	0.871
13	330	0.299	0.028	2.093	0.059	28.700	0.813
12	305	0.301	0.028	2.107	0.060	26.607	0.754
11	279	0.303	0.028	2.121	0.060	24.500	0.694
10	254	0.304	0.028	2.128	0.060	22.379	0.634
9	229	0.306	0.028	2.142	0.061	20.251	0.574
8	203	0.313	0.029	2.191	0.062	18.109	0.513
7	178	0.321	0.030	2.247	0.064	15.918	0.451
6	152	0.322	0.030	2.254	0.064	13.671	0.387
5	127	0.323	0.030	2.261	0.064	11.417	0.323
4	102	0.324	0.030	2.268	0.064	9.156	0.259
3	76	0.325	0.030	2.275	0.064	6.888	0.195
2	51	0.327	0.030	2.289	0.065	4.613	0.131
1	25	0.332	0.031	2.324	0.066	2.324	0.066
Total		**7.459**	**0.693**	**52.213**	**1.479**	**52.213**	**1.479**

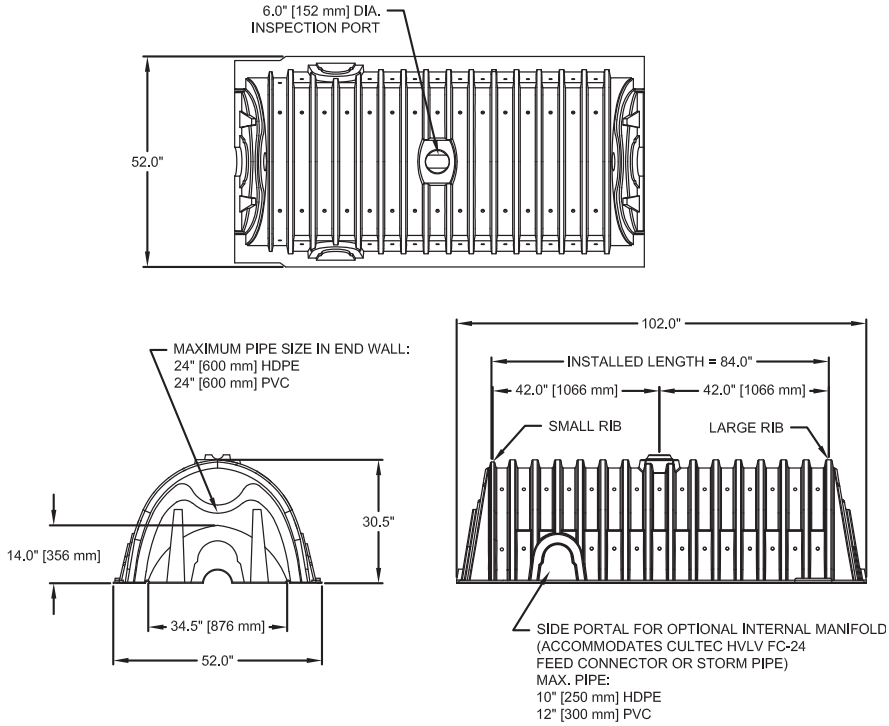
Calculations are based on installed chamber length.

Visit http://cultec.com/downloads/
for Product Downloads and CAD details.

For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.

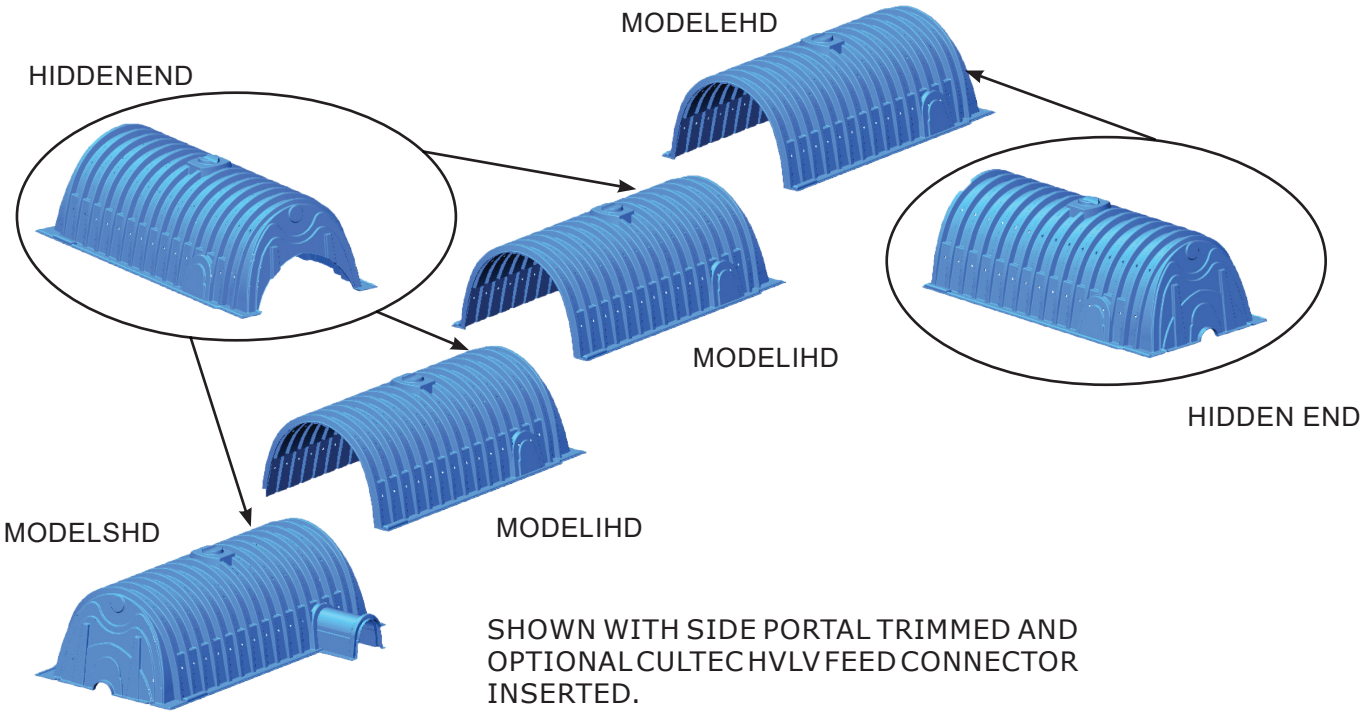
Three View Drawing





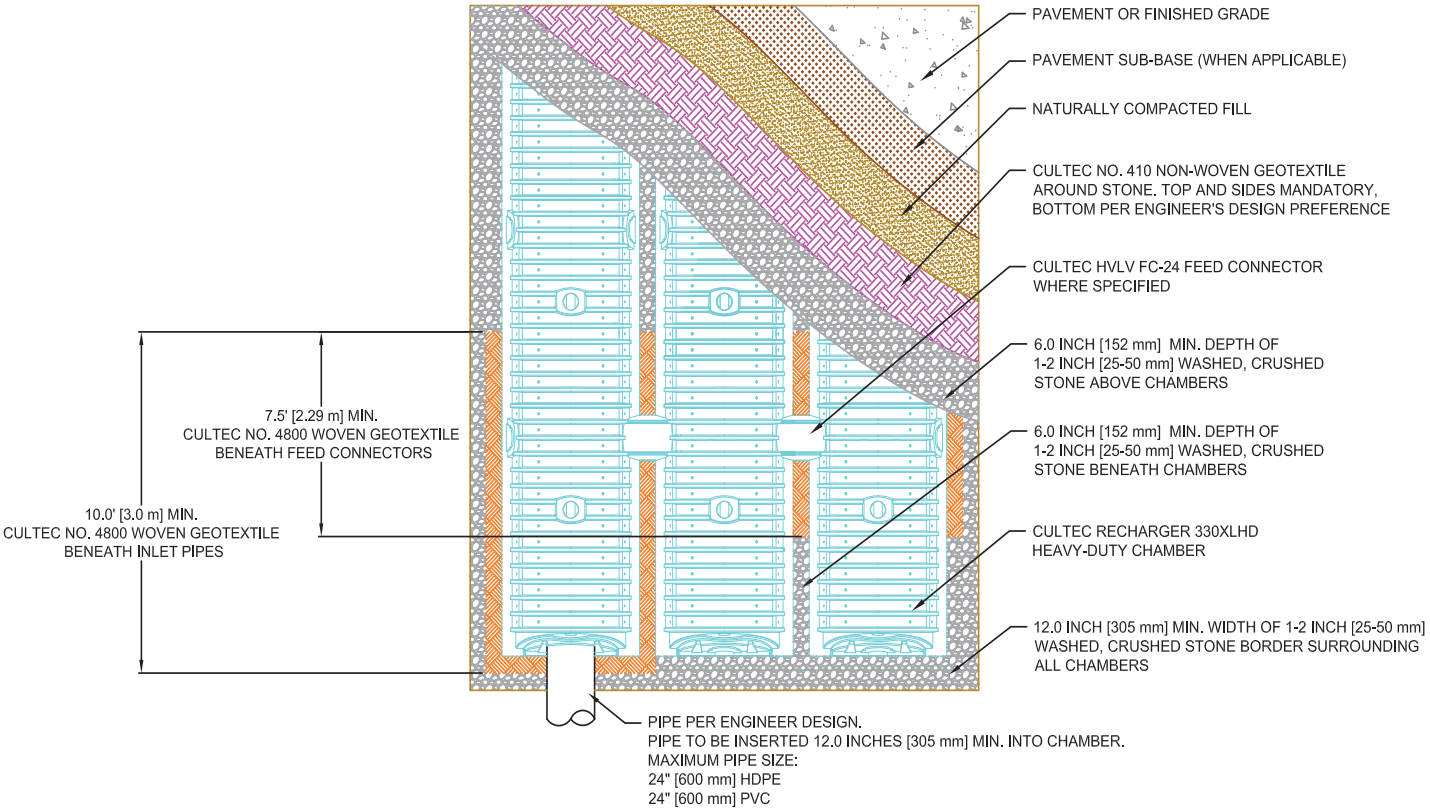
CULTEC RECHARGER 330XLHD CHAMBER STORAGE = 7.459 CF/FT [0.693 m³/m]
INSTALLED LENGTH ADJUSTMENT = 1.5' [0.46 m]
SIDE PORTAL ACCEPTS CULTEC HVLV FC-24 FEED CONNECTOR

Typical Interlock Installation

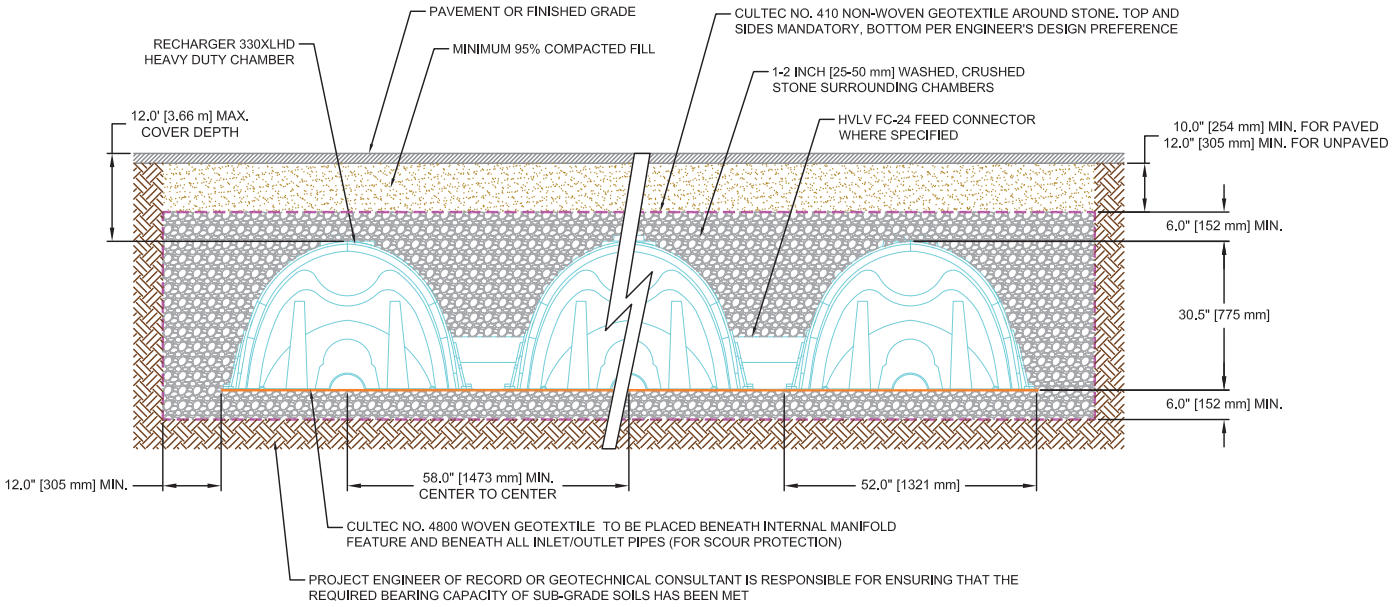


SHOWN WITH SIDE PORTAL TRIMMED AND OPTIONAL CULTEC HVLV FEED CONNECTOR INSERTED.

Plan View Drawing



Typical Cross Section for Traffic Application



Pustola & Associates
CONSULTING ENGINEERS, LLC
(203) 729-6675 • Fax (203) 720-2816
Licensed Professional Engineers
New York & Connecticut
185 Meadow Street
Naugatuck, Connecticut 06770

PERCOLATION TESTING

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL

Principals
Anthony Castillo, PE
Fuad Dahan, PhD, PE, LSRP
Franz W. Laki, PE
John M. Nederfield, PE
Justin M. Protasiewicz, PE
Michael St. Pierre, PE

May 1, 2023 ***via email:*** lcalabria@nationalresources.com

Mrs. Lauren Calabria
National Resources
iPark Norwalk II, LLC.
485 W Putnum Avenue
Greenwich, CT, 06830

RE: Proposed Hotel – Infiltration Testing Summary Letter
1 Cannondale Way
Wilton, CT 06897
SESI Project No. 13021

Dear Mrs. Calabria:

In accordance with our Professional Services Agreement, dated April 19, 2023, we have completed our infiltration testing investigation for the proposed underground stormwater system located in the northern portion of the proposed site development to be constructed at 1 Cannondale Way, Wilton, CT. The investigation consisted of the excavation of three (3) soil profile test pits on April 24, 2023 and the completion of three (3) single ring infiltration tests, tested by a representative of SESI. The approximate locations of the soil profile test pits and infiltration tests are shown on the ***Test Pit Location Plan***, which is included as **Figure 1**.

During the investigation, a representative of SESI observed the excavation of three (3) test pits, TP-1, TP-2, and TP-3, using your subcontracted track excavator, to depths of up to 10.5± feet below the ground surface. The excavations were performed in order to characterize the subsurface conditions and to determine the most hydraulically restrictive soil layer within approximately 4-feet below the bottom of the proposed underground stormwater system. The individual test pit logs, which describe the materials encountered, are presented as **Figures 2 through 4.** A key to soil terminology is included as **Figure 5**.

Once the most hydraulically restrictive soil layer was determined, three (3) infiltration tests were conducted adjacent to each of the soil profile test pits. The results of the infiltration tests (unfactored) and the calculated hydraulic conductivity tests are summarized on the individual test pit logs. The unfactored infiltration test results were greater than 1 in/hr in test pits TP-1, TP-2, and TP-3 at depths of 6.5± feet, 5± feet, and 6± feet below grade, respectively. We recommend that the site civil engineer apply the standard factor of safety to the results for the design.

All fieldwork was performed under the direct technical observation of a representative from SESI Consulting Engineers. Our representative maintained continuous logs of the test pits, coordinated the soil sampling operations in order to develop the required subsurface information and performed the infiltration testing.

All soil samples were taken to our soil's laboratory for classification and geotechnical testing. Laboratory testing consisted of two (2) mechanical grain size analyses, two (2) percent passing sieve No. 200 tests, and two (2) moisture content determinations. The results of the percent passing sieve No. 200 tests and water content determinations are presented on the individual test pit logs. The results of the mechanical grain size analysis are presented on the individual test pit logs and in graphical form as **Figure 6** and **Figure 7.**

GENERALIZED SUBSURFACE CONDITIONS

The following subsurface conditions were encountered in order of increasing depth:

Surface Materials: A layer of topsoil was encountered in test pit TP-1. The topsoil ranged from approximately eight to ten inches in thickness within the limits of the excavation. Test pits TP-2 and TP-3 were performed within the existing pavement area and encountered an approximate 3-inch-thick asphalt layer.

Fill: Beneath the surface materials, a layer of fill was encountered in all test pit locations, except for test pit TP-1, consisting of a layer of brown sand with varied amounts of silt and gravel. The fill encountered during our investigation extended to depths ranging from 0.75± to 2.75± feet below the existing ground surface.

Natural Soils: Beneath the surface materials and fill, where encountered, all three test pits encountered the natural soils to the completion depths of the test pits. The soils generally consisted of sands with varied amounts of silt and gravel with cobbles. This stratum was found to be in a medium dense condition.

Groundwater: Groundwater seepage was not encountered in the soil profile pit excavations; however, mottling was observed in test pits, TP-1, TP-2, and TP-3, at elevations of 114.5±, 113.5±, and 113.5±, respectively. It should be anticipated that the groundwater level will vary by several feet based on the time of year, amount of recent precipitation, and tidal fluctuations from the Norwalk River.

If you have any questions, please call.

Sincerely,

SESI CONSULTING ENGINEERS

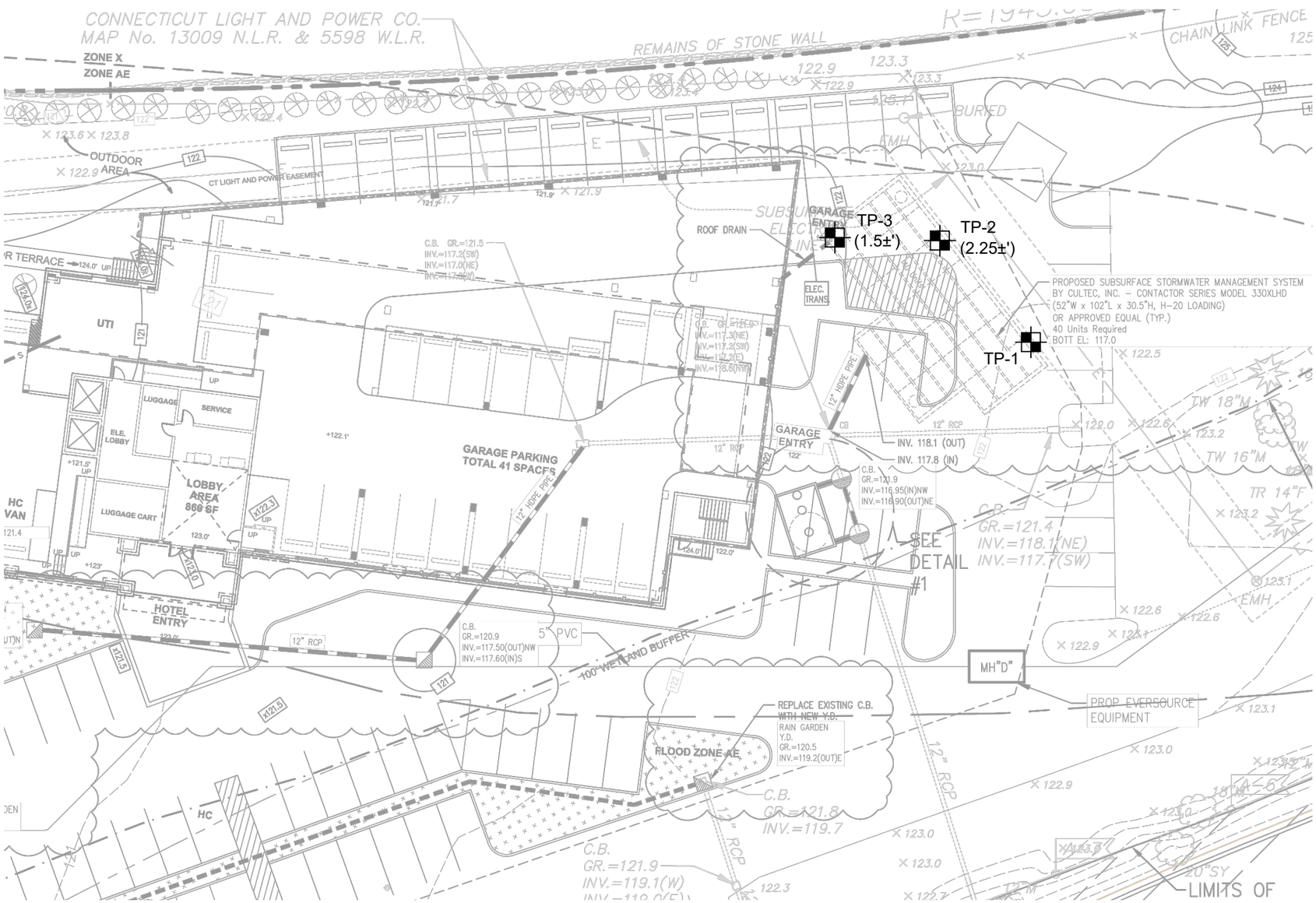
John M. Nederfield, P.E.
Principal

Robert Rains, P.E.
Project Engineer

Attachments:

- Figure 1 – Test Pit Location Plan
- Figure 2 through 4 – Test Pit Logs
- Figure 5 – Key to Soil Terminology
- Figure 6 and 7 – Particle Size Distribution Reports

959 Route 46E Fl. 3 Ste.300
Parsippany, NJ 07054
info@sesi.org
www.sesi.org
phone 973.808.9050
fax 973.808.9099



NOTE:
THIS PLAN IS FOR LOCATING TEST PITS ONLY.
OTHER SITE WORK SHOWN HERE IS NOT INTENDED FOR CONSTRUCTION.

REFERENCE
1. EXISTING CONDITIONS, SITE BOUNDARIES AND TOPOGRAPHY ARE TAKEN FROM "SITE UTILITY & GRADING PLAN" PREPARED BY PUSTOLA & ASSOCIATES, CONSULTING ENGINEERS, LLC, DATED 7/12/2019, LAST REVISED 9/06/2022.

LEGEND:

TP-1 - TEST PIT NUMBER & APPROX. LOCATION

(XX±') - DEPTH TO BOTTOM OF FILL BELOW EXISTING GRADE

SCALE: 1"=30'
0 30 60

dwg by: AW
chk by: RR
scale: AS NOTED
date: 05/01/2023

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

project: 1 CANNONDALE WAY
WILTON, CT. 06897

title: TEST PIT LOCATION PLAN

job no: 13021
drawing no:

FIG-1

PROJECT NO.	13021	**PROJECT**	Proposed Hotel	**TEST PIT NO.**	**TP-1**
LOCATION	Wilton, CT	**APPROX. ELEV.**	±123.5	**INSPECTED BY**	CJK
WATER OBSERVATION	Not Encountered			**DATE EXCAVATED**	4/24/2023

DEPTH FT.	DESCRIPTION / SOIL CLASSIFICATION	RELATIVE DENSITY OR CONSISTENCY
0	Topsoil 8-10"	
1 2	Brown coarse to fine Sand and Silt, some medium to fine Gravel with Root fibers	Medium Dense
3 4	Yellow-brown coarse to fine SAND, some medium to fine Gravel, little Silt with frequent Cobbles	Medium Dense
5 6 7 8 9 10	Yellow-brown coarse to fine SAND, some Silt, some medium to fine Gravel, with occassional Cobbles W.C = 16.6% (-200) = 26.2% Unfactored Infiltration Rate = 4.5 in/hr at 6.5' below grade (Hydraulic Conductivity = 1.5 in/hr) ...Same as above with mottling	Medium Dense
11 12 13 14 15	TEST PIT COMPLETED AT 10.5± FEET BELOW GRADE	

NOTE:

Fig. 2

SESI CONSULTING ENGINEERS

PROJECT NO.	13021	**PROJECT**	Proposed Hotel	**TEST PIT NO.**	**TP-2**
LOCATION	Wilton, CT	**APPROX. ELEV.**	±122	**INSPECTED BY**	CJK
WATER OBSERVATION	Not Encountered			**DATE EXCAVATED**	4/24/2023

DEPTH FT.	DESCRIPTION / SOIL CLASSIFICATION	RELATIVE DENSITY OR CONSISTENCY
0	3" Asphalt	
1 2	Fill: Yellow-brown coarse to fine SAND, some coarse to fine Gravel, little Silt	
3	Dark brown coarse to fine Sand, some Silt, some coarse to fine Gravel, with occassional Cobbles and Root fibers	Medium Dense
4 5	Gray coarse to fine Sand, and Silt, some coarse to fine Gravel W.C = 16.2% (-200) = 35.0% Unfactored Infiltration Rate = 3.26 in/hr at 5' Below Grade (Hydraulic Conductivity = 1.1 in/hr)	Dense
6 7 8	Yellow-brown coarse to fine SAND, some Silt, some medium to fine Gravel …Same as above with mottling	Medium Dense
9	TEST PIT COMPLETED AT ±9 FEET	
10 11 12 13 14 15		

NOTE:

Fig. 3

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PROJECT NO.	13021	**PROJECT**	Proposed Hotel	**TEST PIT NO.**	**TP-3**
LOCATION	Wilton, CT	**APPROX. ELEV.**	±122	**INSPECTED BY**	CJK
WATER OBSERVATION	Not Encountered			**DATE EXCAVATED**	4/24/2023

DEPTH FT.	DESCRIPTION / SOIL CLASSIFICATION	RELATIVE DENSITY OR CONSISTENCY
0	3" Asphalt	
1	Fill: Brown coarse to fine SAND, some Silt, little coarse to fine Gravel	
2	Dark brown coarse to fine Sand, some Silt, little coarse to fine Gravel, with frequent Cobbles and Root fibers	Medium Dense
3	Red-brown coarse to fine SAND, some coarse to fine Gravel, trace Silt	Medium Dense
4	Yellow-brown coarse to fine SAND, some Silt, some medium to fine Gravel	
5		
6	Unfactored Infiltration Rate = 4.0 in/hr at 6' Below Grade	
	(Hydraulic Conductivity =1.3 in/hr)	Dense
7		
8	…Same as above with mottling	
9	TEST PIT COMPLETED AT ±9 FEET	
10		
11		
12		
13		
14		
15		

NOTE:

Fig. 4

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Definitions of Identification Terms for Granular Soils

Our experience has shown that the following field identification system, which is pattered somewhat after the Burmister System, permits a more detailed breakdown of the components within a soil sample than other identification systems allow. It also compels the supervising technician to examine a sample quite closely in order to accurately describe the components within the sample.

Principal Component (All Capitalized)

- GRAVEL More than 50% of the sample by weight is Gravel
- SAND More than 50% of the sample by weight is Sand
- SILT More than 50% of the sample by weight is Silt

Minor Component (Proper Case)

- Gravel Less than 50% of the sample by weight is Gravel
- Sand Less than 50% of the sample by weight is Sand
- Silt Less than 50% of the sample by weight is Silt

Proportion Terms

- and Component ranges from 35% to 50% of the sample by weight
- some Component ranges from 20% to 35% of the sample by weight
- little Component ranges from 10% to 20% of the sample by weight
- trace Component ranges from 0% to 10% of the sample by weight

Size of Soil Components

- Gravel
  - Coarse gravel ranges from 3 inches to 1 inch
  - Medium gravel ranges from 1 inch to 3/8 inch
  - Fine gravel ranges from 3/8 inch to No. 10 sieve
- Sand
  - Coarse sand ranges from No. 10 sieve to No. 30 sieve
  - Medium sand ranges from No. 30 sieve to No. 60 sieve
  - Fine sand ranges from No. 60 sieve to No. 200 sieve
- Silt
  - Material which passes the No. 200 sieve
- Clay
  - Material which passes the No. 200 sieve
  - Exhibits varying degrees of plasticity

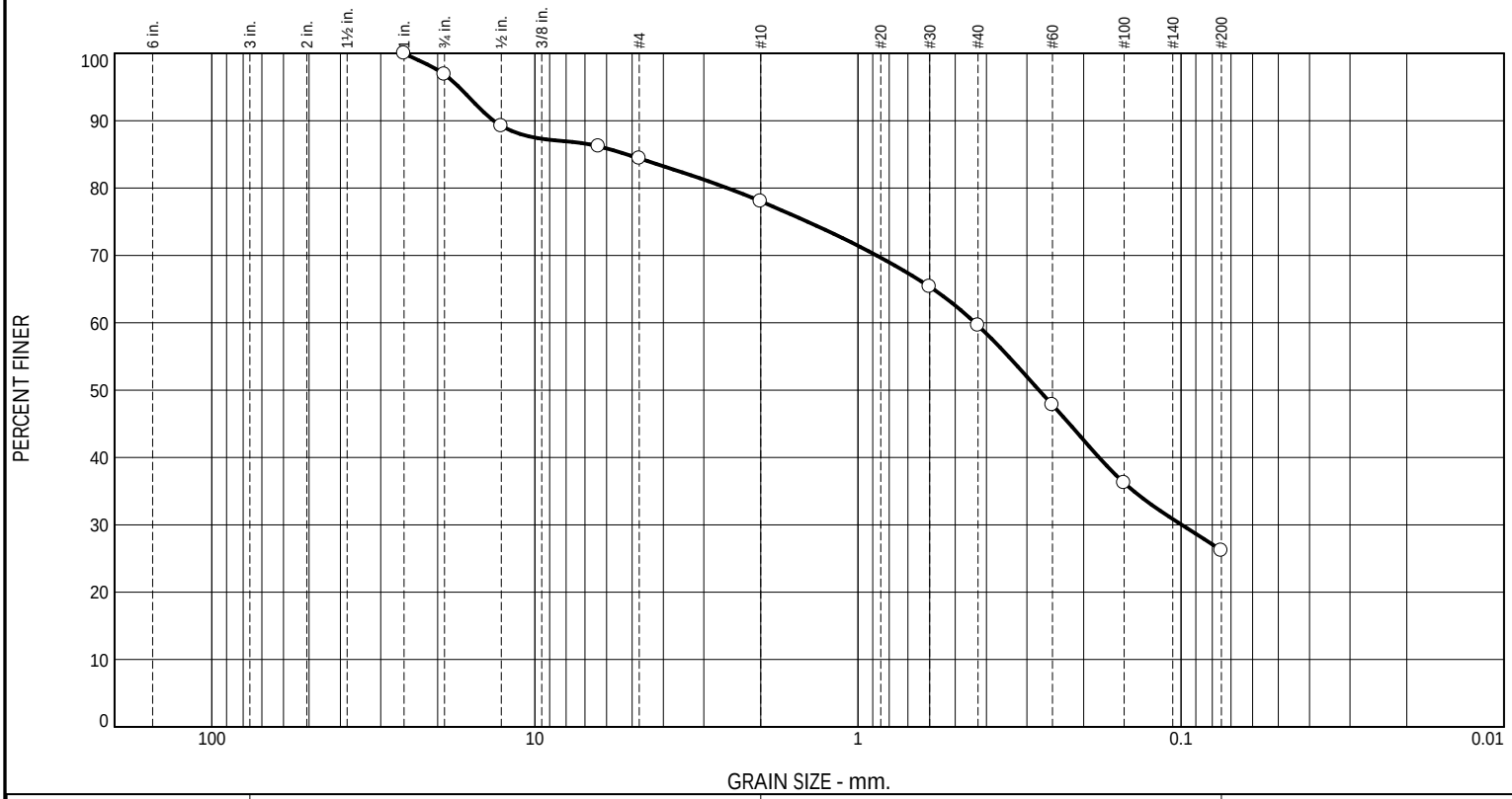
Gradation Designations

- Coarse to fine (c-f) All fractions greater than 10% of the component
- Coarse to medium (c-m) Less than 10% of the component is fine
- Medium to fine (m-f) Less than 10% of the component is coarse
- Coarse (c) Less than 10% of the component is medium and fine
- Medium (m) Less than 10% of the component is coarse and fine
- Fine (f) Less than 10% of the component is coarse and medium

Fig. 5

Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel=**22.0**			% Sand=**51.8**			% Fines
	Coarse	Medium	Fine	Coarse	Medium	Fine	
0.0	0.0	12.7	9.3	12.7	17.5	21.6	26.2

Test Results (ASTM D6913)

Sieve Size or Diam. (**in.**)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
1	100.0			
.75	96.9			
0.5	89.2			
0.25	86.2			
#4	84.4			
#10	78.0			
#30	65.3			
#40	59.6			
#60	47.8			
#100	36.2			
#200	26.2			

* (no specification provided)

Material Description

Yellow-brown coarse to fine SAND, some Silt, some medium to fine Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 13.4214 D_{85}= 5.1953 D_{60}= 0.4340
D_{50}= 0.2752 D_{30}= 0.0995 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Test Remarks

Water Content(%)= 16.6

Location: TP-1
Sample Number: S-1 Depth: 5-10.5 Sample Date: 04/24/2023

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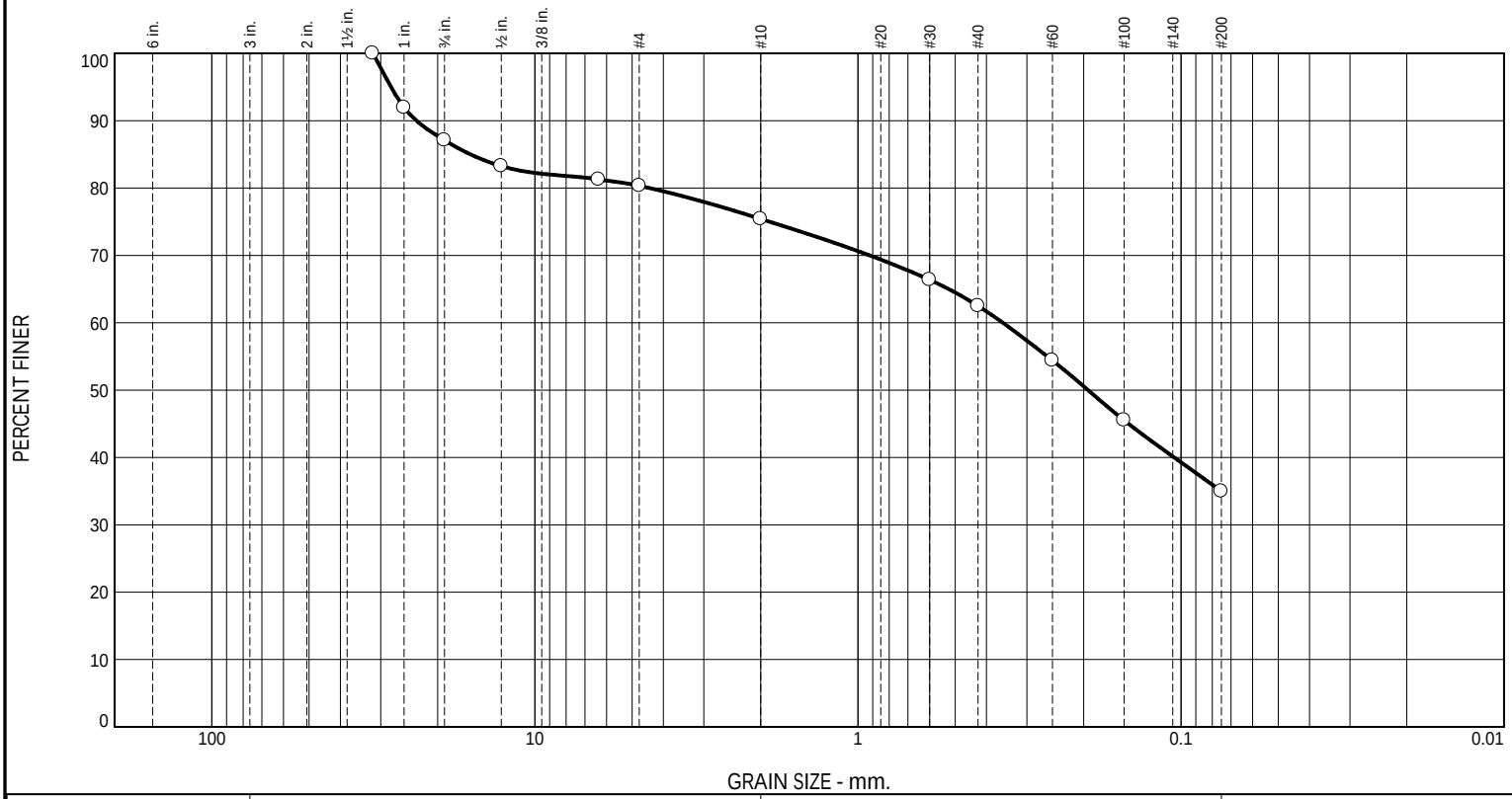
Client: I Park Norwalk II LLC
Project: 2 Cannondale Way
Project No: 13021 Figure 6

Tested By: AV Checked By: MLT

Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel=**24.6**			% Sand=**40.4**			% Fines
	Coarse	Medium	Fine	Coarse	Medium	Fine	
0.0	8.0	9.9	6.7	9.0	12.0	19.4	35.0

Test Results (ASTM D6913)

Sieve Size or Diam. (**in.**)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
1.25	100.0			
1	92.0			
.75	87.1			
0.5	83.3			
0.25	81.3			
#4	80.3			
#10	75.4			
#30	66.4			
#40	62.5			
#60	54.4			
#100	45.5			
#200	35.0			

* (no specification provided)

Material Description

Gray coarse to fine Sand, and Silt, some coarse to fine Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 23.2563 D_{85}= 15.8281 D_{60}= 0.3562
D_{50}= 0.1940 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Test Remarks

Water Content(%)= 16.2

Location: TP-2
Sample Number: S-3 Depth: 4-6 Sample Date: 04/24/2023

SESI CONSULTING ENGINEERS

Client: I Park Norwalk II LLC
Project: 2 Cannondale Way
Project No: 13021 Figure 7

Tested By: AV Checked By: MLT