SITE ENGINEERING REPORT

154 Broad Street, 0 Greyrock Place and 172 Greyrock Place
Stamford, CT

Prepared For

RMS Companies
c/o Ted Milone, Redniss & Mead, Inc.

Prepared by

Redniss & Mead, Inc.
22 First Street
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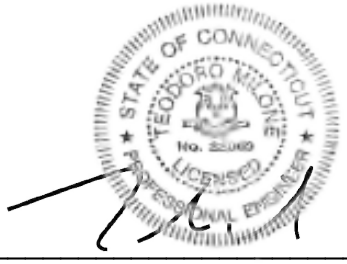
Issued on
April 9, 2021



Ted Milone, P.E., LEED AP BD+C
CT Lic. No. 22563

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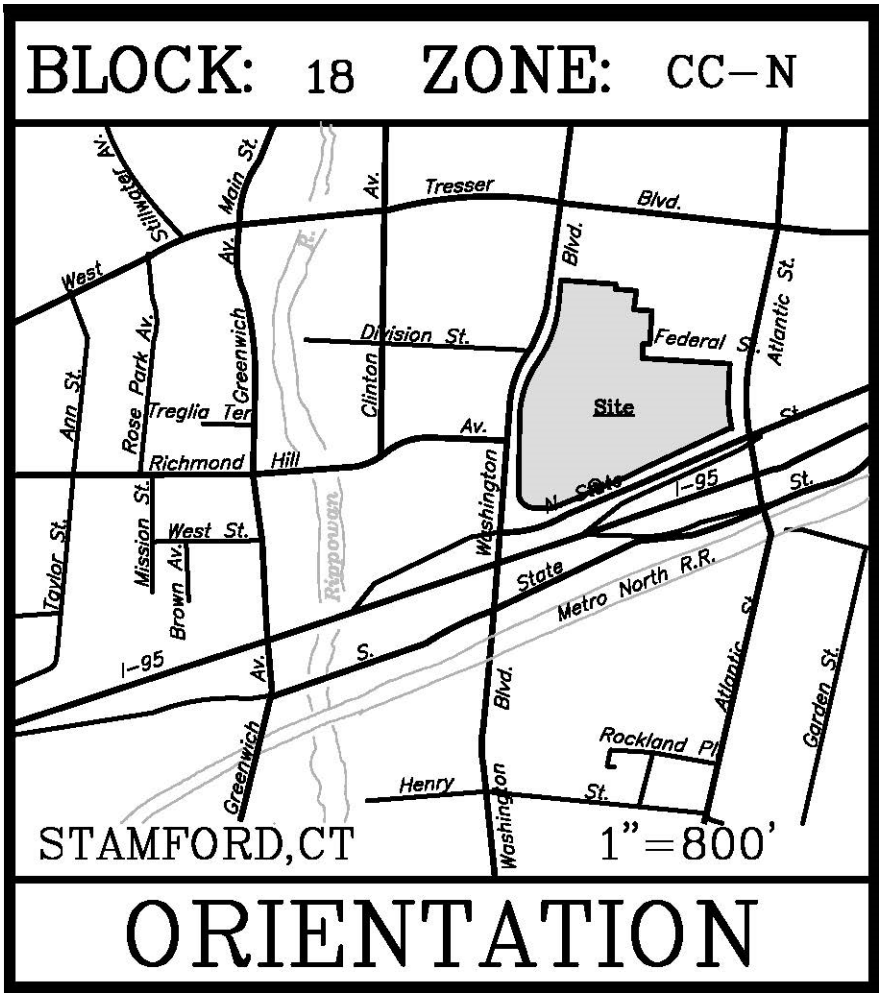
Appendices


BLOCK: 18 ZONE: CC–N
Stillwater Av.
Main St.
Av.
Tresser
Blvd.
West
Av.
Blvd.
Atlantic St.
Division St.
Federal St.
Ann St.
Rose Park Av.
Greenwich
Clinton
Site
Treglia Ter
Av.
St.
Richmond Hill
Washington
N. State
I–95
St.
Mission St.
West St.
Taylor St.
Brown Av.
Rippowam
State
Metro North R.R.
I–95
Av.
S.
Blvd.
Atlantic St.
Garden St.
Rockland Pl
Greenwich
Henry
St.
Washington
STAMFORD,CT
1"=800'
ORIENTATION

Narrative

Project Description:

The applicant, RMS Companies, is the contract purchaser of 3 contiguous properties located on 154 Broad Street, 0 Greyrock Place and 172 Greyrock Place, in Stamford, CT seeking Zoning Board approval to construct a 6-story mixed-use multi-family apartment building. The properties total 1.29± acres within the C-G zoning district. Reference is made to site drawings prepared by this office, dated April 9, 2021.

Existing Conditions:

The parcels were developed up to at least 1985 with single family residences, detached garages, driveways and the Boys and Girls Club Facility located at the northwest corner of the intersection of Greyrock Place and Broad Street. The properties with mainly impervious coverage within the downtown urban setting were removed between 1985 and 1990. Refer to the Aerial Comparison exhibit found in Appendix A.

Currently the property is developed with a surface parking lot, accessway to the Hibernian parking lot, remains of a driveway off Broad Street and landscaping. Site elevations range from elevation 17± on the south side of the property to elevation 15.0 ± along the north side with a low-lying area created over the years with the removal of preexisting structures and improper soil compaction. The site has slopes ranging from 1-5%. The property does not lie within the drinking water supply watershed or a regulatory 100-year floodplain as established by the Federal Emergency Management Agency (FEMA) on "Flood Insurance Rate Maps" (FIRM) for Fairfield County, Community No. 09001C0516G, Panel 516 of 626, effective date July 8, 2013 (Appendix A).

Soils

Soil testing, consisting of a series of deep test pits and saturated hydraulic conductivity tests, performed on-site to identify restrictive soil conditions (ledge, groundwater, etc.). A total of 4 deep test pits were performed varying in depth from 7± to 11± with no restrictive layers encountered. A total of 4 saturated hydraulic conductivity tests were conducted to verify that the in-situ soil can adequately infiltrate stormwater. Observed infiltration rates ranged from 11 15/16" per hour to 160" per hour. The USDA Web Soil Survey classifies the on-site soils as hydraulic soil group class D generally associated with very slow infiltration rate and clay like material is inconsistent with the soil testing conducted and the field infiltration rates obtained. Test pit and conductivity test results can be reviewed on site plan sheet SE-5. The location of each test is depicted on site plan sheet SE-2. The location of each test is also depicted on the Proposed LID Map (Appendix B).

Drainage Patterns & Conveyance Systems

There is a drainage system located within the northern portion of the property connecting into an 18" reinforced concrete pipe (RCP) within Greyrock Place via a 15" RCP. The 18" RCP within Greyrock Place flows south towards Broad Street where it intercepts an 18" RCP within Broad Street and continues

flowing in a southerly direction towards Tresser Boulevard via a 24" RCP. Refer to Appendix C for existing and proposed on-site drainage basin maps.

Proposed Conditions:

Methodology, General Design Criteria & Project Classification

The proposed improvements disturbs 56,311± SF of the property and will increase impervious coverage by 41,361± SF when compared to existing site conditions. The additional coverage will increase the volume and peak rates of stormwater runoff without proper on-site mitigation. The proposed development is classified as a redevelopment project with more than ½-acre of disturbance with an increase in impervious coverage of more than 400 SF requiring complying with Standards 1 through 5 of the Stamford Drainage Manual. To comply with Standard 1, this project must provide at least 1" of the Water Quality Volume (WQV) via non-structural practices or infiltration best management practices (BMP's).

The project site is south of the Merritt Parkway, requiring stormwater mitigation to accommodate peak rates of runoff from the 1-year through and including the 50-year design storm. All drainage systems have been designed for Type III, 24-hour storm events. The 24-hour design storm rainfall amounts, and distributions were obtained from the latest NOAA Atlas 14 Point Precipitation Frequency Estimates and storm distributions (Appendix A). As agreed with the City Engineering Bureau on April 8, 2021 the available storage that has occurred on the property since 1985 could be neglected within the analysis with the coverage within the area being lawn and not accounting for the pre-1985 development.

Proposed LID Techniques

Low impact development and site planning techniques were used to the maximum extent practicable given the existing constraints of this site. The site is in an urban area with limited space for LID practices due to setback requirements from existing and proposed buildings. LID techniques include development within areas previously developed, not increasing surface parking areas, limiting the amount of disturbance around the proposed improvements and minimizing impervious surfaces where possible. The limit of disturbance for the proposed development has been set to allow for the proposed development.

Proposed Stormwater Treatment Practices

The design approach chosen to satisfy Standard 1 of the Stamford Drainage Manual is to provide the required water quality volume (1" WQV) via infiltration BMP's. This has been accomplished by proposing subsurface infiltration system consisting of 28 – 5 foot tall Retain-It units located north of the building within the surface parking lot. Stormwater runoff from the proposed building will be captured and treated in the subsurface infiltration system which will then overflow through a 48" pipe connected to a meter structure. The meter structure will then meter the flow at or below existing peak flow rates before discharging into the existing stormwater system within Greyrock Place.

A summary of the Water Quality required and provided by the stormwater practices is provided below:

Standard 1 (Retention and Treatment) Calculations						
Drainage Area ID	Description	Total Area (SF)	Impervious Area (SF)	WQV (CF)	Retention Volume Required	Retention Volume Provided
Design Point - Greyrock Place / Broad Street						
DB-1	Roof & Driveway to Inf#1	47,922	45,595	3,619	3,619	4,107
DB-2	Bypass	8,388	5,533	450	450	-
TOTAL		**56,310**	**51,128**	**4,069**	**4,069**	**4,107**

Infiltration BMP's have been designed in accordance with the requirements of the Stamford Stormwater Manual.

Hydrologic Analysis of Peak Rates of Runoff

Hydrologic models have been prepared utilizing the SCS Runoff Curve Number Method from NRCS TR-55 to analyze the pre- and post-development rainfall runoff rates and volumes. Watershed areas, curve numbers (CN), and times of concentration (TC) were calculated for each contributing watershed. The study area focuses on the subject parcel and is limited to the area of disturbance. The pre-development drainage basin boundaries and the post-development drainage basin boundaries are shown in Appendix C. The results of the HydroCad model used to analyze the pre- and post-development watershed conditions are presented in Appendix D.

A comparison of the pre- and post-development peak discharge rates is provided in the table below.

Peak Flow Rate Comparison (cfs)				
Event	Existing	Proposed	Change	% Change
1-Year	1.46	1.33	-0.13	-8.9%
2-Year	2.00	2.00	0.00	0.0%
5-Year	2.92	2.74	-0.18	-6.2%
10-Year	3.69	3.32	-0.37	-10.0%
25-Year	4.77	4.57	-0.20	-4.2%
50-Year	5.57	5.30	-0.27	-4.8%

Comparison of the peak discharge rates for pre- and post-development watershed conditions demonstrates that the peak rate of runoff from the proposed development will be decreased. Therefore, the proposed development will not adversely impact the downstream or adjacent properties or receiving water bodies or courses.

Compliance with Stormwater Management Standards

The project site will be designed to meet the Stamford Stormwater Management Standards to the maximum extent practicable as summarized below:

Standard 1. Runoff and Pollutant Reduction

A. The runoff and pollutant reduction requirements for this project are to retain 1"of the WQV on-site using Non-Structural Practices or Infiltration BMP's. The proposed Stormwater Treatment Practices includes a subsurface infiltration system which will infiltrate a minimum the required WQV. See "Proposed LID & Stormwater Treatment Practices" for a detailed description of each system, its required WQV and provided storage volume.
B. Not Applicable. Stormwater systems retains 1" WQV.
C. Land disturbance has been maintained to areas previously developed. With proper sediment and erosion controls and permanent stabilization of surfaces the development will not result in future site erosion.
D. Noted
E. The proposed stormwater treatment practices provide a minimum removal rate of 80% of the average annual post-construction load of Total Suspended Solids (TSS) and floatable debris. See TSS removal rate calculations in Appendix E. The interior garage drains will be piped to an oil/grit separator and discharge into the sanitary sewer system. Such design shall be prepared by the plumbing engineer prior to a Building permit request.
F. The proposed development is proposed within areas previously developed which will in turn limit the amount of clearing and grading that will be necessary to employ the development while, minimizing the potential impact of erosive soils on the downstream drainage system. Steep slopes, although not significant on this project, are avoided/outside the limits of construction.

Standard 2. Peak Flow Control

A. Stream channel protection is not required for this project as the subject development does not discharge directly or indirectly into a water body or watercourse.
B. The proposed stormwater system is designed to adequately pass flows leading to, from and through it up to and including the 25-year design storm event as required in section 3.2 of the drainage manual. Refer to the HydroCAD model found in Appendix D.
C. The post-development peak flow rates from the 1-year, 2-year, 5-year, 10-year, 25-year and 50-year, 24-hour storms are controlled to the corresponding pre-development peak discharge rates. Reference is made to the HydroCAD report found in Appendix D.
D. All proposed structural BMP's are equipped with a high-bypass "emergency outlet" (weir manhole) sized to safely pass the post-development peak runoff from the 100-year, 24-hour storm event. Furthermore, the 15" storm pipe connections into the City storm system, have adequate capacity to pass the flow tributary to them in the 100-year storm event. Refer to the pipe conveyance calculations included in Appendix E.

E. The on-site detention will decrease peak rates of runoff for each design storm event resulting in more available capacity within the City system.

Standard 3: Construction Erosion and Sediment Control

A. Site plan sheet SE-4 depicts erosion control measures to be implemented to control construction related impacts. Sediment and erosion controls such as silt fencing, stone tracking pads at construction zone entrance/exit points, hay bale & insert catch basin protection, and tree protection are proposed.

Standard 4: Operation and Maintenance

A. A Standard City of Stamford Drainage Maintenance Agreement will be executed with the Environmental Protection Board. A draft maintenance agreement has been prepared and is included in Appendix G.
B. The construction plans will include notes describing the long-term maintenance requirements for the site-specific drainage system(s) including routine and non-route inspection and maintenance tasks to be undertaken after construction is completed as well as the schedule for implementing these tasks. This information will be added to the plan set prior to filing for a building permit.

Standard 5: Stormwater Management Report

A. This document and its associated appendices serve as the required Stormwater Management Report.
B. (See below)

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.

SANITARY SEWER SUMMARY

Existing City owned sanitary sewer infrastructure exists within Greyrock Place and Broad Street in Stamford, CT. There is a 6" sanitary main within Greyrock Place which becomes a 12" sewer main closer to Broad Street flowing south. On Broad Street there is a 15" sewer main underneath the sidewalk abutting the development site and also an 8" sewer main both flowing east. The Greyrock Place and Broad Street sewers connect at the intersection and continue flowing south into a 15" RCP towards Tresser Boulevard. Refer to Sanitary Sewer Connection Exhibit in Appendix H for a plan view of the surrounding sanitary sewer system along with the proposed developments connection points.

It is proposed to connect the planned development to the Broad Street sanitary sewer main abutting the subject property. All covered parking areas will be collected via drains and piped into an oil/grit separator prior to discharging into the sanitary sewer system in Summer Street. The oil/grit separator will be the responsibility of the Plumbing Engineer to be designed prior to a Building Permit request.

Under proposed conditions, the developer is seeking permission to construct a 6-story mixed-use building including a total of 228 residential units consisting of 149 one-bedroom units (including junior bedrooms), 79 two-bedroom units, and 7,892± square feet of office space. Using the CT Health Code guidelines, the proposed development would result in a total average daily sewage flow of 47,830 GPD (0.074 cfs). Using a peak factor of 4, the peak sewage flow is 191,320 GPD (0.296 cfs). Refer to Appendix H for proposed sanitary flow calculations.

A visual inspection of this 15" sanitary line under Broad Street was conducted on March 25, 2021 following a rain event the day prior. To determine if the sanitary sewer main can accommodate the development's sewage load, flows within the manhole were observed during peak use hours on March 25, 2021 (7:30am to 9:00am; 11:30am to 1:00pm, and 4:30pm to 6:00pm). Refer to Sanitary Sewer Flow Monitoring in Appendix H for observed depth of flow within the main. The maximum depth found within the 15" pipe on Broad Street was 2.52 inches. The highest depth of flow measured was used to calculate the observed flow rate within the main. The observed flows were doubled in determining the existing flow rates within the main for this analysis. The existing and proposed flow rates along with the proposed remaining pipe capacity are tabulated below.

Structure	Pipe Capacity* (cfs)	Observed Flow (cfs)	Existing Peak Flow** (cfs)	Proposed Peak Flow*** (cfs)	Proposed Pipe Capacity Remaining Under Peak Flow Conditions**** (%)
EX. SAN MH#1	11.91	0.71	1.42	1.72	85.6%

* Based on 15" sanitary main within the Broad Street sloped at 3.4%± per City of Stamford as-built records

**Highest observed flow was doubled for the existing flow rate to be conservative

*** Using peak project flow rate of 0.296 cfs

****Under average flow conditions there will be 87.5% capacity remaining.

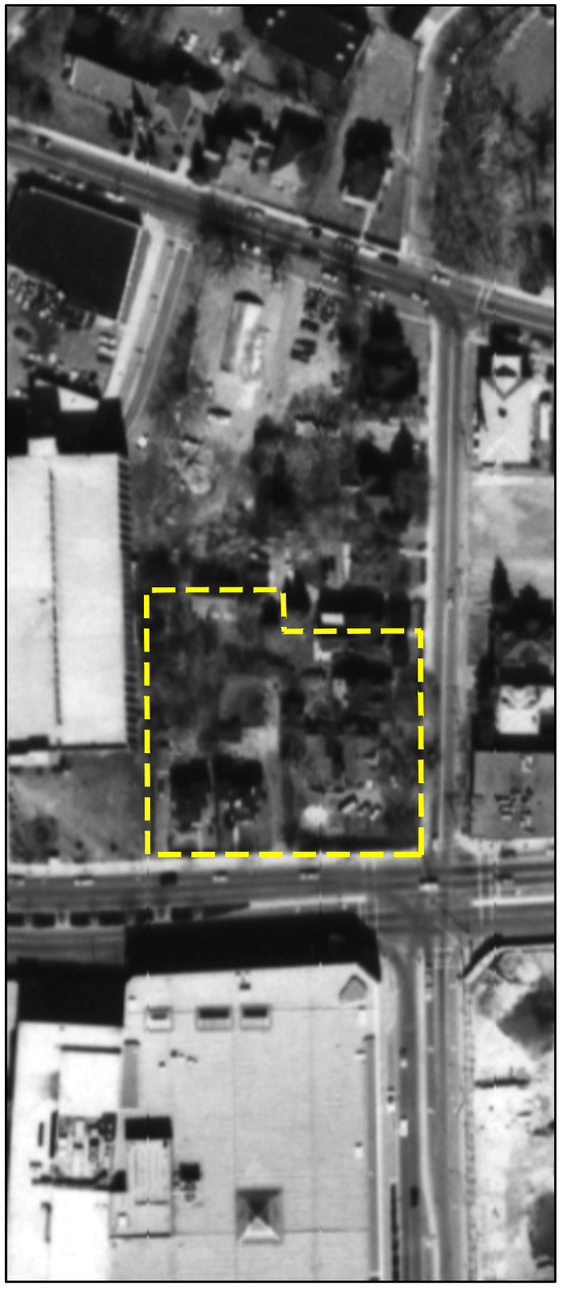
The City of Stamford Water Pollution Control Authority last upgraded the Wastewater Treatment Facility (WWTF) in 2006. The WWTF upgrade was designed for an average daily flow of 24 MGD and a peak average flow of 30 MGD. The current average daily flow usage provided by the Water Pollution Control Authority is 18 MGD (provided by WPCA on November 14, 2013). The WWTF can accommodate an additional sewer capacity of 6 MGD. The project will generate a peak daily flow of 191,320 GPD (or 0.19 MGD). Therefore, the WWTF has more than adequate capacity to accommodate the development.

Based on the above information, it is our opinion the City owned sanitary sewer system has sufficient capacity to accommodate the proposed development, and with proper implementation of the design drawings, the proposed development will not adversely impact the existing sanitary sewer system.

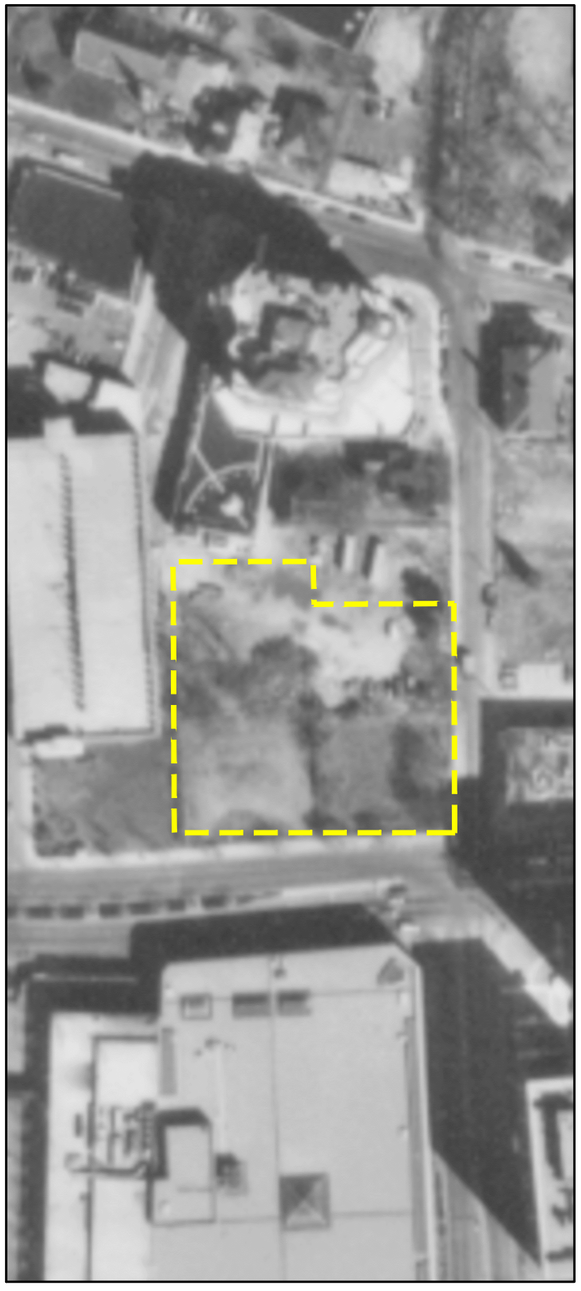
Appendix A

Aerial Comparison Exhibit
FEMA Flood Insurance Map
USGS Quadrangle Map – Site Vicinity Map
City of Stamford Rainfall Intensity – Duration Curves
NOAA Atlas 14 Volume 10 – Precipitation Frequency
NRCS Websoil Survey

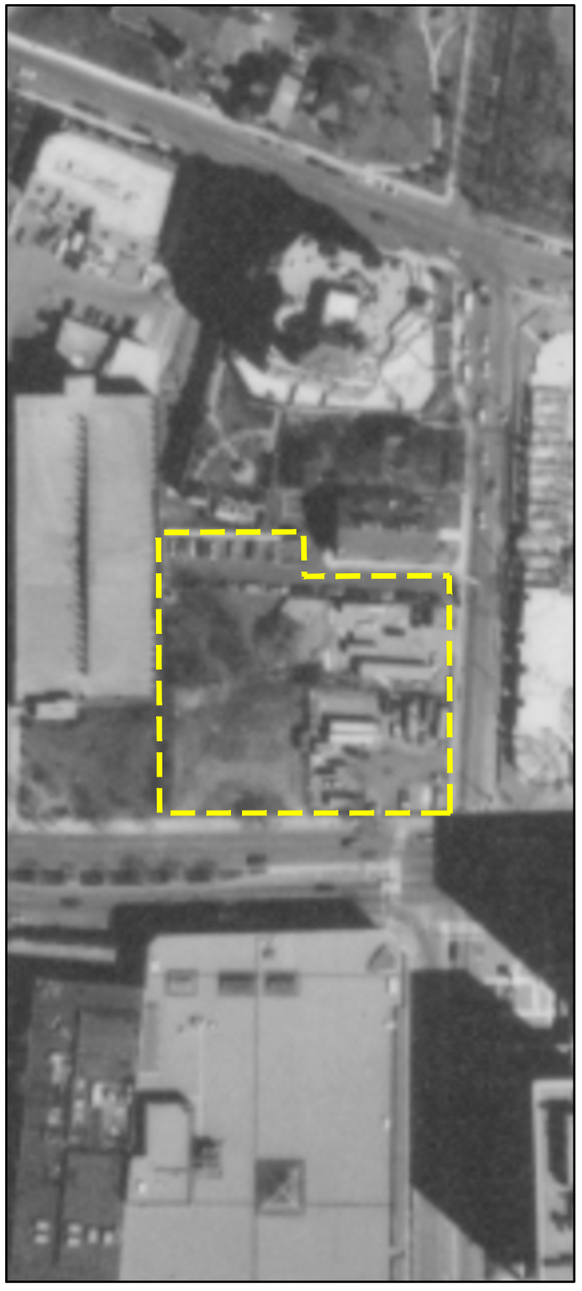
1985



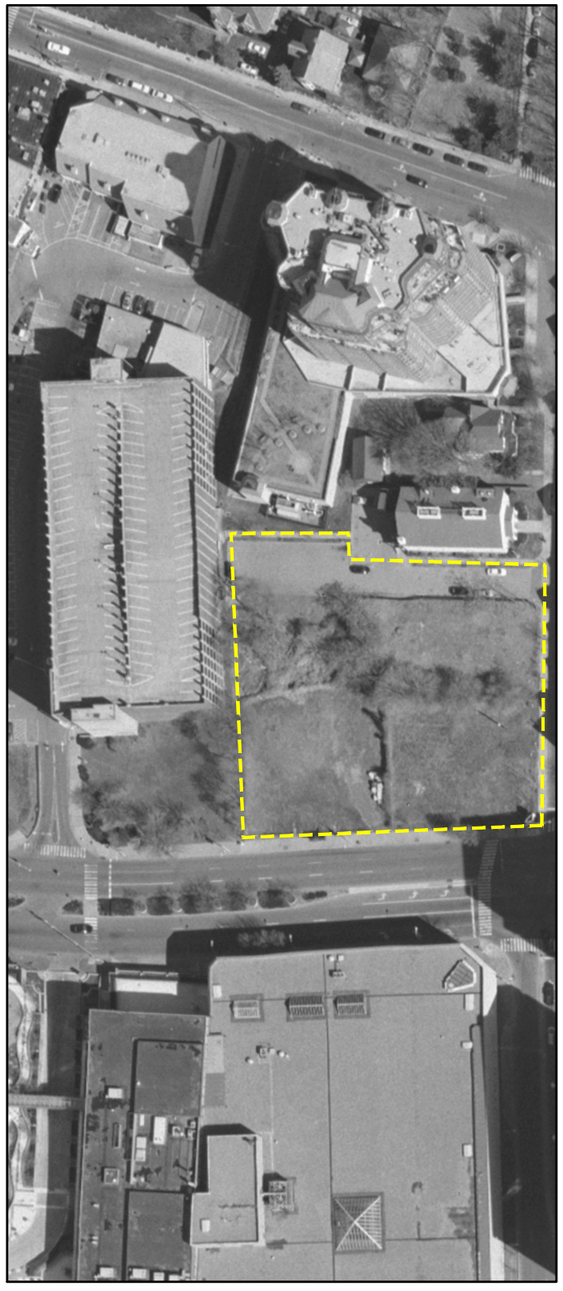
1990



1996



2004

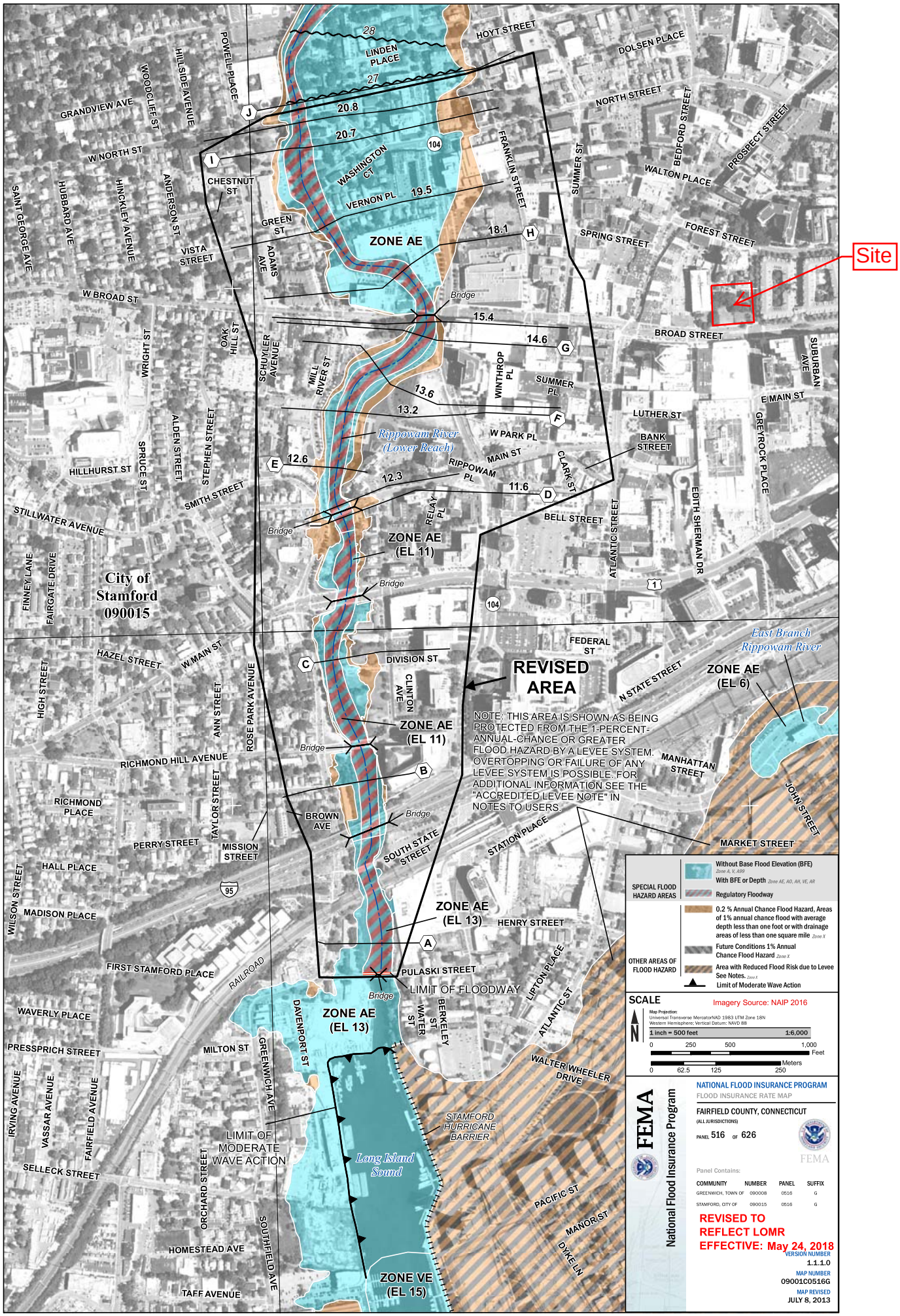


AERIAL COMPARISON

0 GREYROCK PLACE, 172 GREYROCK PLACE, & 154 BROAD STREET
STAMFORD, CT

COMM. NO.:	DATE:
5450	3/25/2021
	SCALE: N.T.S.

REDNISS & MEAD


Site
ZONE AE
ZONE AE (EL 11)
ZONE AE (EL 13)
ZONE AE (EL 6)
ZONE VE (EL 15)
REVISED AREA
NOTE: THIS AREA IS SHOWN AS BEING PROTECTED FROM THE 1-PERCENT-ANNUAL-CHANCE OR GREATER FLOOD HAZARD BY A LEVEE SYSTEM. OVERTOPPING OR FAILURE OF ANY LEVEE SYSTEM IS POSSIBLE. FOR ADDITIONAL INFORMATION SEE THE "ACCREDITED LEVEE NOTE" IN NOTES TO USERS.
City of Stamford 090015
Rippowam River (Lower Reach)
East Branch Rippowam River
Long Island Sound
STAMFORD HURRICANE BARRIER
LIMIT OF MODERATE WAVE ACTION
LIMIT OF FLOODWAY
Bridge
28
27
20.8
20.7
19.5
18.1
15.4
14.6
13.6
13.2
12.6
12.3
11.6
HOYT STREET
LINDEN PLACE
DOLSEN PLACE
NORTH STREET
BEDFORD STREET
PROSPECT STREET
WALTON PLACE
FRANKLIN STREET
SUMMER ST
SPRING STREET
FOREST STREET
WASHINGTON CT
VERNON PL
CHESTNUT ST
GREEN ST
ADAMS AVE
VISTA STREET
ANDERSON ST
HINCKLEY AVENUE
HUBBARD AVE
SAINT GEORGE AVE
GRANDVIEW AVE
WOODCLIFF ST
HILLSIDE AVENUE
POWELL PLACE
W NORTH ST
W BROAD ST
BROAD STREET
SUBURBAN AVE
E MAIN ST
GREYROCK PLACE
LUTHER ST
BANK STREET
CLARK ST
EDITH SHERMAN DR
ATLANTIC STREET
BELL STREET
RELAY PL
RIPPOWAM PL
MAIN ST
W PARK PL
WINTHROP PL
SUMMER PL
MILL RIVER ST
SCHUYLER AVENUE
OAK HILL ST
WRIGHT ST
ALDEN STREET
STEPHEN STREET
SPRUCE ST
HILLHURST ST
SMITH STREET
STILLWATER AVENUE
FINNEY LANE
FAIRGATE DRIVE
HAZEL STREET
W MAIN ST
HIGH STREET
ANN STREET
ROSE PARK AVENUE
CLINTON AVE
DIVISION ST
FEDERAL ST
N STATE STREET
MANHATTAN STREET
JOHN STREET
MARKET STREET
STATION PLACE
RICHMOND HILL AVENUE
RICHMOND PLACE
TAYLOR STREET
MISSION STREET
PERRY STREET
BROWN AVE
SOUTH STATE STREET
HALL PLACE
MADISON PLACE
WILSON STREET
FIRST STAMFORD PLACE
RAILROAD
HENRY STREET
PULASKI STREET
LIPTON PLACE
ATLANTIC ST
WATER ST
BERKELEY
DAVENPORT ST
GREENWICH AVE
MILTON ST
WAVERLY PLACE
PRESSPRICH STREET
IRVING AVENUE
VASSAR AVENUE
FAIRFIELD AVENUE
SELLECK STREET
ORCHARD STREET
SOUTHFIELD AVE
HOMESTEAD AVE
TAFF AVENUE
WALTER WHEELER DRIVE
PACIFIC ST
MANOR ST
DYKE LN
SPECIAL FLOOD HAZARD AREAS
Without Base Flood Elevation (BFE)
With BFE or Depth
Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD
0.2 % Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile
Future Conditions 1% Annual Chance Flood Hazard
Area with Reduced Flood Risk due to Levee See Notes.
Limit of Moderate Wave Action
SCALE
Imagery Source: NAIP 2016
1 inch = 500 feet
1:6,000
Feet
Meters
FEMA
National Flood Insurance Program
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP
FAIRFIELD COUNTY, CONNECTICUT
(ALL JURISDICTIONS)
PANEL 516 OF 626
Panel Contains:
COMMUNITY NUMBER PANEL SUFFIX
GREENWICH, TOWN OF 090008 0516 G
STAMFORD, CITY OF 090015 0516 G
REVISED TO REFLECT LOMR
EFFECTIVE: May 24, 2018
VERSION NUMBER 1.1.1.0
MAP NUMBER 09001C0516G
MAP REVISED JULY 8, 2013

NOAA Atlas 14, Volume 10, Version 3
Location name: Stamford, Connecticut, USA*
Latitude: 41.049°, Longitude: -73.5416°
Elevation: 21.59 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	**0.365** (0.281-0.465)	**0.425** (0.327-0.542)	**0.524** (0.402-0.671)	**0.605** (0.462-0.779)	**0.718** (0.531-0.954)	**0.803** (0.582-1.09)	**0.891** (0.628-1.24)	**0.987** (0.663-1.40)	**1.12** (0.726-1.64)	**1.23** (0.778-1.83)
10-min	**0.517** (0.398-0.659)	**0.602** (0.463-0.768)	**0.741** (0.569-0.948)	**0.857** (0.654-1.10)	**1.02** (0.752-1.35)	**1.14** (0.825-1.54)	**1.26** (0.889-1.76)	**1.40** (0.940-1.99)	**1.59** (1.03-2.33)	**1.74** (1.10-2.59)
15-min	**0.608** (0.468-0.775)	**0.708** (0.545-0.904)	**0.872** (0.669-1.12)	**1.01** (0.770-1.30)	**1.20** (0.885-1.59)	**1.34** (0.970-1.81)	**1.49** (1.05-2.07)	**1.65** (1.11-2.34)	**1.87** (1.21-2.74)	**2.05** (1.30-3.05)
30-min	**0.850** (0.655-1.08)	**0.992** (0.763-1.26)	**1.22** (0.938-1.57)	**1.42** (1.08-1.82)	**1.68** (1.24-2.23)	**1.88** (1.36-2.54)	**2.09** (1.47-2.90)	**2.31** (1.55-3.28)	**2.61** (1.69-3.82)	**2.85** (1.80-4.24)
60-min	**1.09** (0.841-1.39)	**1.27** (0.981-1.63)	**1.57** (1.21-2.01)	**1.82** (1.39-2.34)	**2.16** (1.60-2.87)	**2.42** (1.75-3.27)	**2.69** (1.89-3.73)	**2.97** (1.99-4.22)	**3.35** (2.17-4.90)	**3.64** (2.31-5.43)
2-hr	**1.42** (1.10-1.79)	**1.67** (1.29-2.11)	**2.07** (1.60-2.64)	**2.41** (1.85-3.08)	**2.88** (2.14-3.81)	**3.24** (2.36-4.35)	**3.60** (2.55-4.98)	**4.00** (2.70-5.65)	**4.55** (2.96-6.62)	**4.99** (3.17-7.39)
3-hr	**1.63** (1.27-2.06)	**1.93** (1.50-2.44)	**2.42** (1.87-3.06)	**2.82** (2.17-3.59)	**3.37** (2.52-4.45)	**3.79** (2.78-5.09)	**4.23** (3.01-5.84)	**4.71** (3.18-6.63)	**5.39** (3.51-7.81)	**5.94** (3.78-8.75)
6-hr	**2.06** (1.61-2.58)	**2.44** (1.91-3.07)	**3.08** (2.40-3.88)	**3.61** (2.80-4.56)	**4.34** (3.26-5.69)	**4.88** (3.60-6.52)	**5.46** (3.91-7.51)	**6.11** (4.14-8.54)	**7.03** (4.59-10.1)	**7.80** (4.97-11.4)
12-hr	**2.53** (1.99-3.15)	**3.03** (2.38-3.77)	**3.84** (3.01-4.80)	**4.51** (3.52-5.66)	**5.44** (4.11-7.09)	**6.13** (4.54-8.14)	**6.86** (4.95-9.41)	**7.71** (5.25-10.7)	**8.93** (5.85-12.8)	**9.95** (6.37-14.5)
24-hr	**2.96** (2.35-3.66)	**3.58** (2.84-4.43)	**4.60** (3.63-5.71)	**5.44** (4.27-6.79)	**6.60** (5.02-8.57)	**7.47** (5.57-9.87)	**8.39** (6.09-11.5)	**9.48** (6.47-13.1)	**11.1** (7.29-15.8)	**12.5** (7.99-18.0)
2-day	**3.31** (2.64-4.06)	**4.07** (3.24-5.00)	**5.31** (4.22-6.55)	**6.34** (5.01-7.86)	**7.76** (5.95-10.0)	**8.82** (6.63-11.6)	**9.95** (7.29-13.6)	**11.3** (7.76-15.5)	**13.4** (8.84-18.9)	**15.2** (9.78-21.8)
3-day	**3.57** (2.86-4.37)	**4.40** (3.53-5.40)	**5.77** (4.60-7.09)	**6.90** (5.47-8.51)	**8.45** (6.50-10.9)	**9.60** (7.24-12.6)	**10.8** (7.97-14.8)	**12.4** (8.49-16.9)	**14.7** (9.67-20.6)	**16.6** (10.7-23.8)
4-day	**3.83** (3.07-4.67)	**4.70** (3.77-5.75)	**6.13** (4.91-7.52)	**7.32** (5.82-9.02)	**8.96** (6.91-11.5)	**10.2** (7.69-13.3)	**11.5** (8.45-15.6)	**13.1** (8.99-17.8)	**15.5** (10.2-21.7)	**17.5** (11.3-25.0)
7-day	**4.56** (3.68-5.54)	**5.51** (4.44-6.70)	**7.06** (5.68-8.61)	**8.35** (6.67-10.2)	**10.1** (7.83-12.9)	**11.5** (8.68-14.9)	**12.9** (9.48-17.3)	**14.5** (10.0-19.7)	**17.0** (11.3-23.8)	**19.2** (12.4-27.2)
10-day	**5.28** (4.28-6.39)	**6.28** (5.08-7.60)	**7.91** (6.38-9.61)	**9.27** (7.43-11.3)	**11.1** (8.63-14.1)	**12.5** (9.51-16.2)	**14.0** (10.3-18.7)	**15.7** (10.9-21.2)	**18.2** (12.1-25.3)	**20.3** (13.2-28.7)
20-day	**7.44** (6.07-8.94)	**8.56** (6.98-10.3)	**10.4** (8.44-12.5)	**11.9** (9.62-14.4)	**14.0** (10.9-17.5)	**15.6** (11.9-19.9)	**17.2** (12.7-22.6)	**19.0** (13.2-25.4)	**21.4** (14.3-29.5)	**23.3** (15.2-32.7)
30-day	**9.23** (7.56-11.0)	**10.4** (8.54-12.5)	**12.4** (10.1-14.9)	**14.1** (11.4-17.0)	**16.3** (12.7-20.3)	**18.1** (13.7-22.8)	**19.8** (14.5-25.7)	**21.6** (15.1-28.8)	**24.0** (16.1-32.9)	**25.8** (16.8-36.0)
45-day	**11.4** (9.40-13.6)	**12.8** (10.5-15.2)	**14.9** (12.2-17.8)	**16.7** (13.6-20.1)	**19.2** (15.0-23.7)	**21.1** (16.1-26.4)	**22.9** (16.8-29.5)	**24.8** (17.4-32.8)	**27.1** (18.2-37.0)	**28.8** (18.8-40.0)
60-day	**13.3** (10.9-15.8)	**14.7** (12.1-17.5)	**17.0** (13.9-20.2)	**18.9** (15.4-22.6)	**21.5** (16.8-26.4)	**23.5** (18.0-29.4)	**25.5** (18.7-32.6)	**27.4** (19.2-36.2)	**29.7** (20.0-40.4)	**31.4** (20.5-43.5)

[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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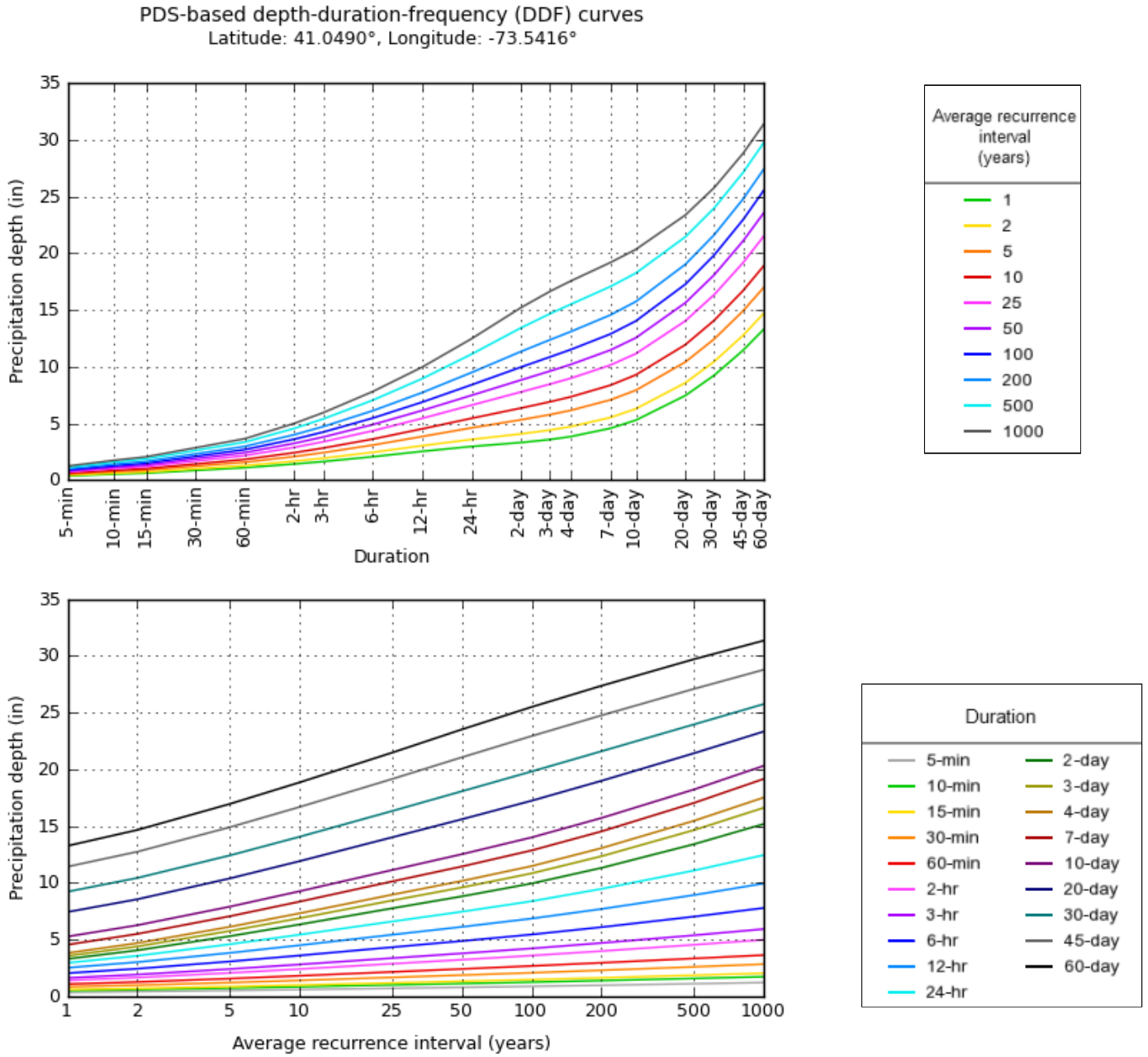
PF graphical



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Created (GMT): Fri Sep 18 15:09:07 2020

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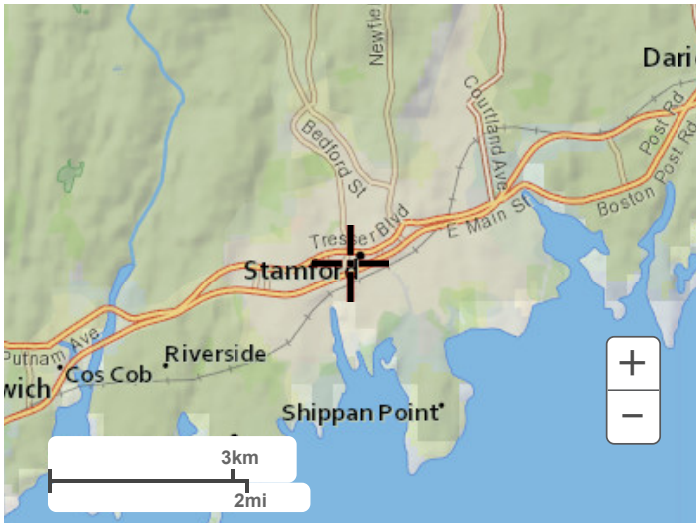
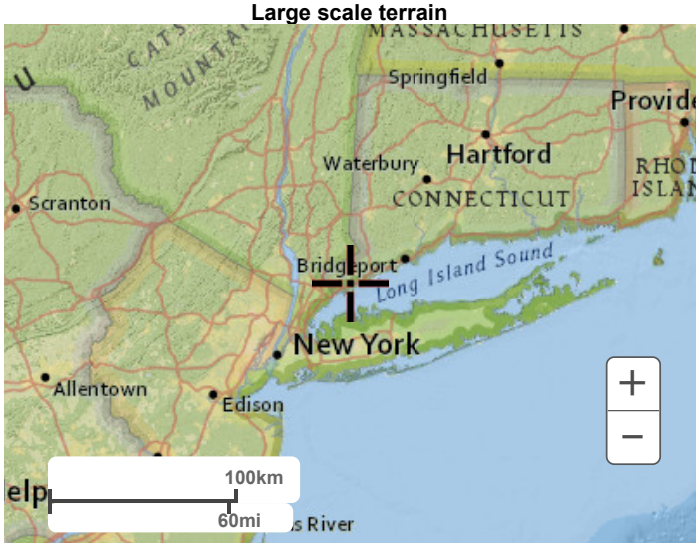
Maps & aerials

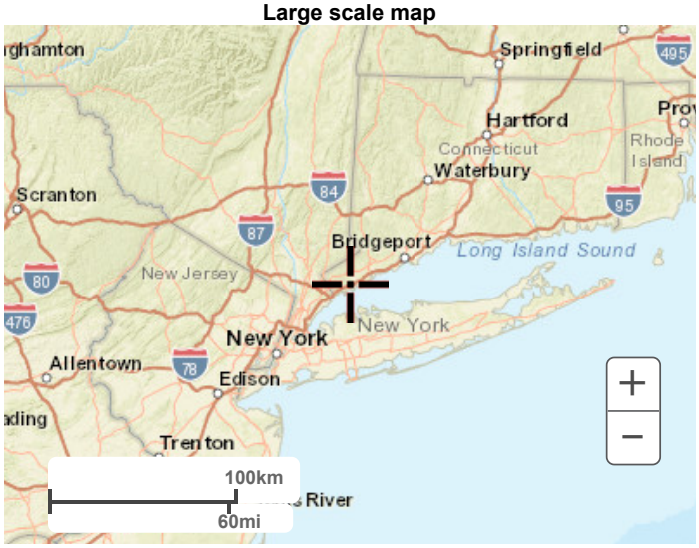
Small scale terrain



Large scale terrain

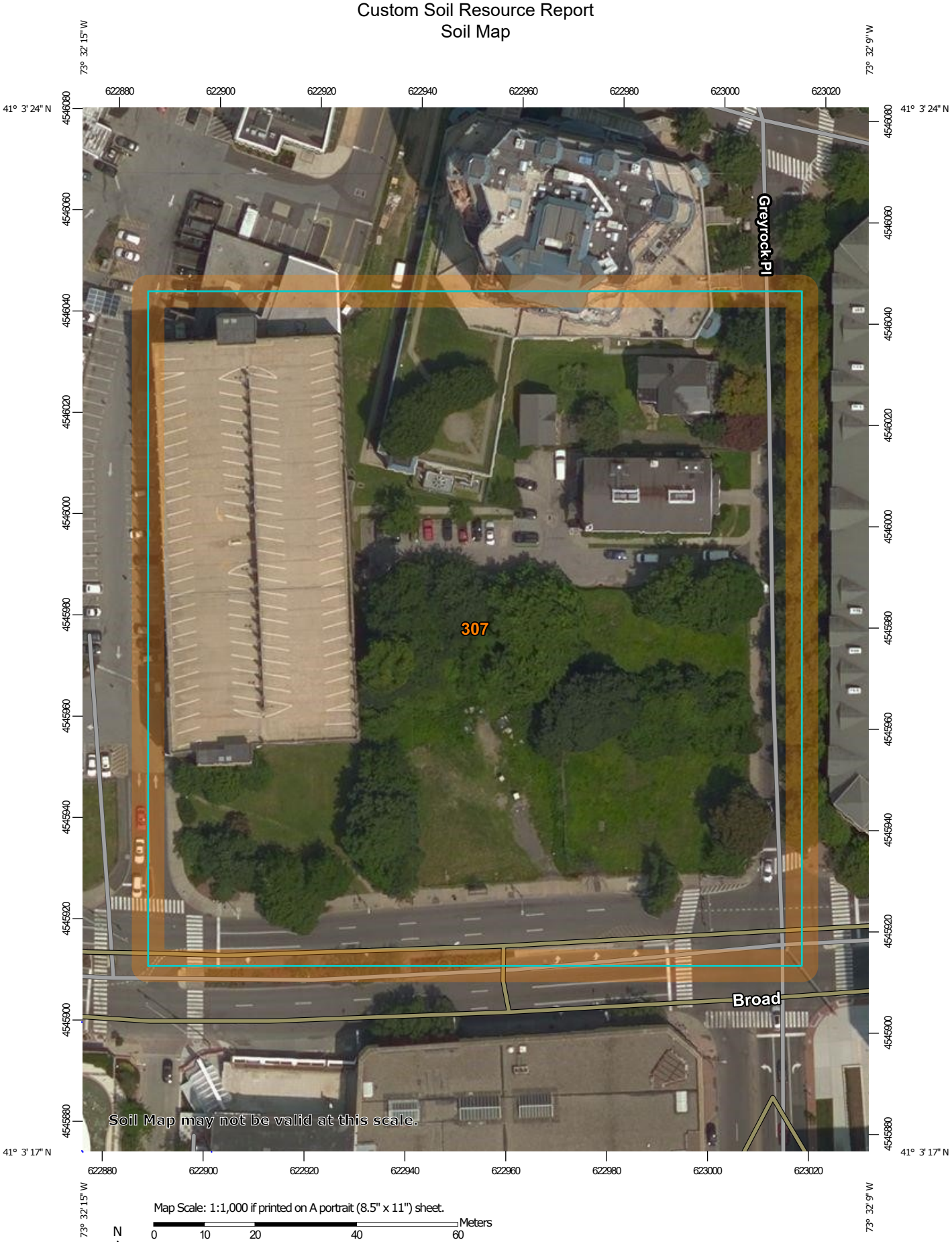


Large scale map



Large scale aerial

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,000 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 45 90 180 270

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
307	Urban land	4.3	100.0%
Totals for Area of Interest		**4.3**	**100.0%**

Map Unit Descriptions

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

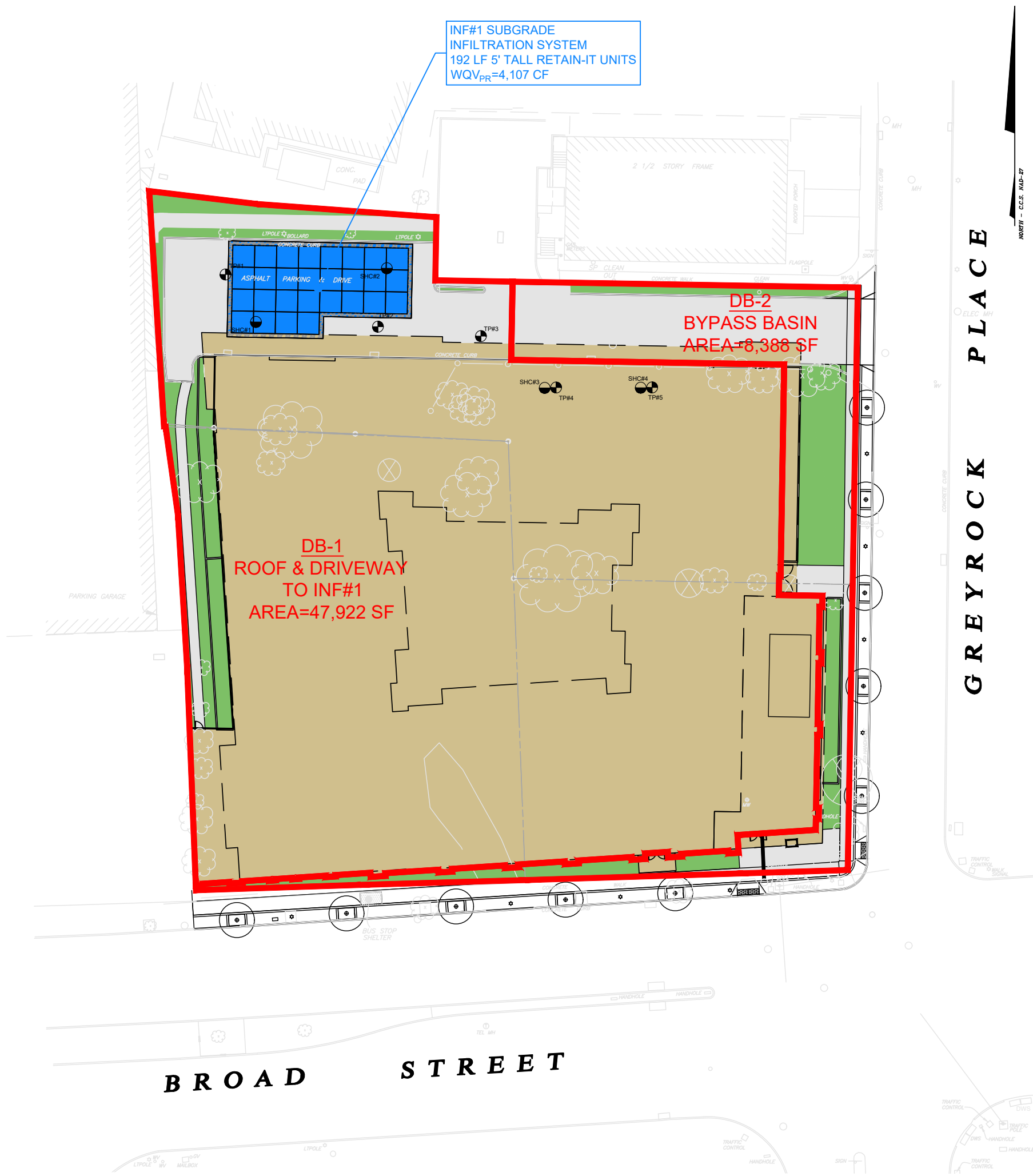
An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Appendix B

LID Review Map



LEGEND:

- BUILDINGS
- ASPHALT PARKING & DRIVES
- LAWN
- STORMWATER BMP
- MATURE TREE (8-IN DBH OR GREATER)
- TEST PIT
- INFILTRATION TEST

LID SUMMARY TABLE

Drainage Area ID	Total Area (SF)	Impervious Area	% Impervious	WQV (CF)	Retention Volume Required	Retention Volume Provided
Design Point - Greyrock Place / Broad Street						
DB-1	47,922.0	45,595.0	95%	3,619.3	3,619.3	4,107.0
DB-2	8,388.0	5,533.0	66%	449.9	449.9	-
TOTAL	**56,310.0**	**51,128.0**	**91%**	**4,069.2**	**4,069.2**	**4,107.0**

LID REVIEW MAP

154 BROAD STREET, 0 & 172 GREYROCK PLACE
STAMFORD, CT

REDNISS & MEAD
LAND SURVEYING
CIVIL ENGINEERING
PLANNING & ZONING CONSULTING
PERMITTING
22 First Street | Stamford, CT 06905
Tel: 203.327.0500 | Fax: 203.357.1118
www.rednissmead.com

COMM. NO.:	DATE:
5450H	04/09/2021
	SCALE: 1"=40'

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Appendix C

Existing On-Site Drainage Basin Map
Proposed On-Site Drainage Basin Map

EXISTING DRAINAGE BASINS						
Drainage Area ID	Total Area (SF)	Impervious Area (SF)	CN	TC	Runoff Volume (CF)*	Runoff (CFS)*
DB-1	56,310.0	9,767.0	83	19.4	16,772	3.69
TOTAL	**56,310.0**	**9,767.0**			**16,772**	**3.69**

*10-YEAR STORM EVENT, PRIOR TO STORAGE / TREATMENT

EXISTING DRAINAGE BASIN MAP
GREYROCK PLACE
STAMFORD, CT

REDNISS & MEAD
LAND SURVEYING
CIVIL ENGINEERING
PLANNING & ZONING CONSULTING
PERMITTING
22 First Street | Stamford, CT 06905
Tel: 203.327.0500 | Fax: 203.357.1118
www.rednissmead.com

COMM. NO.:	DATE:
5450	04/09/2021
	SCALE: 1"=40'

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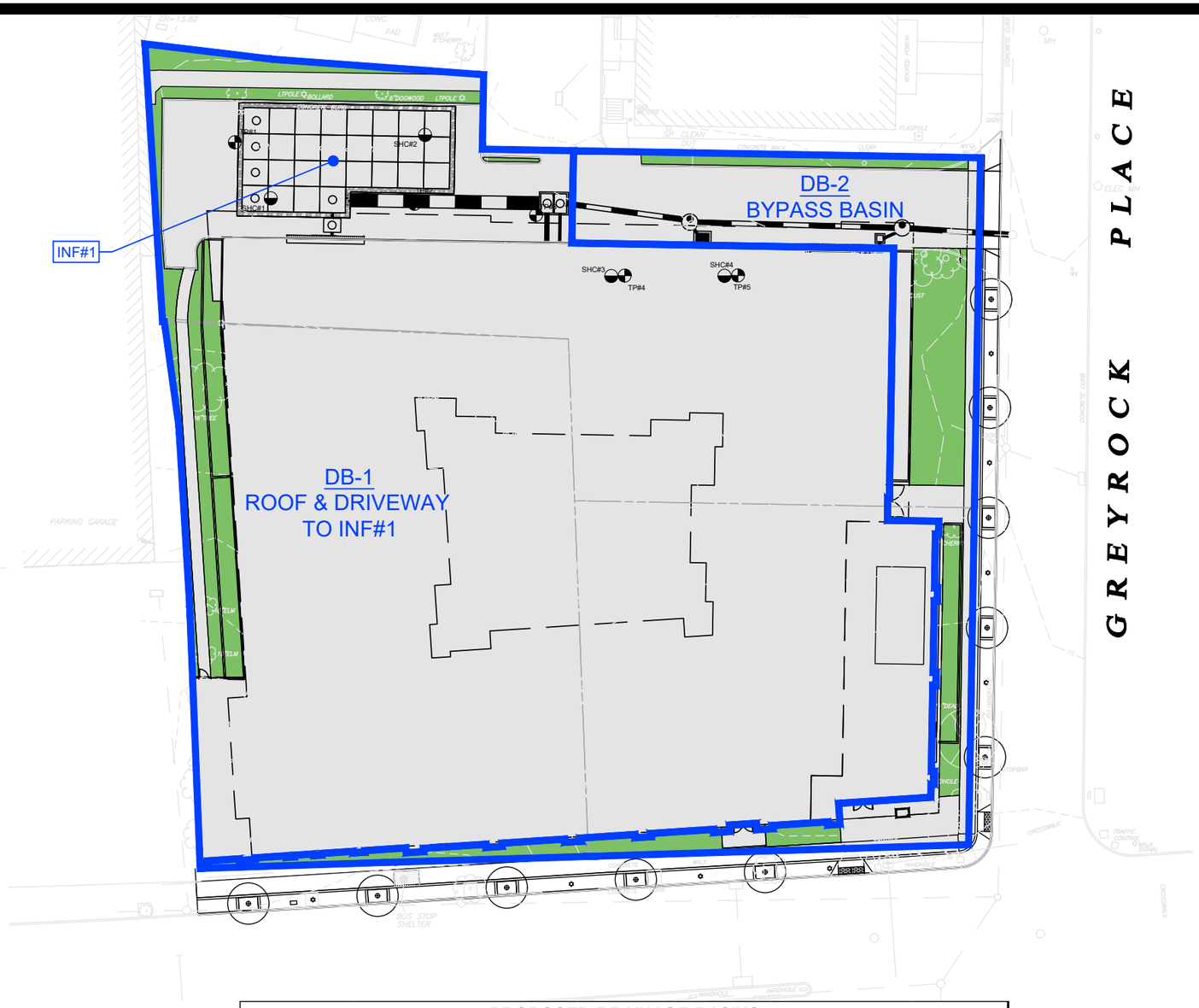

PROPOSED DRAINAGE BASINS						
Drainage Area ID	Total Area (SF)	Impervious Area (SF)	CN	TC	Runoff Volume (CF)*	Runoff (CFS)*
DB-1	47,922.0	45,595.0	97	5	20,355	6.04
DB-2	8,388.0	5,533.0	92	5	3,147	1.00
TOTAL	**56,310.0**	**51,128.0**			**23,502**	**7.04**

*10-YEAR STORM EVENT, PRIOR TO STORAGE / TREATMENT

PROPOSED DRAINAGE BASIN MAP

GREYROCK PLACE

STAMFORD, CT

REDNISS & MEAD
LAND SURVEYING
CIVIL ENGINEERING
PLANNING & ZONING CONSULTING
PERMITTING
22 First Street | Stamford, CT 06905
Tel: 203.327.0500 | Fax: 203.357.1118
www.rednissmead.com

COMM. NO.:	DATE:
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	SCALE: 1"=40'

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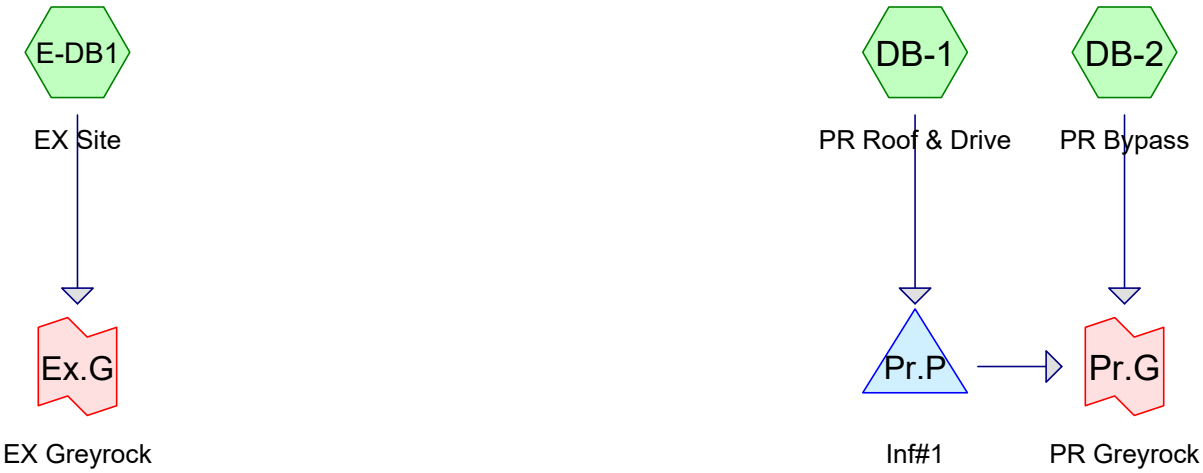
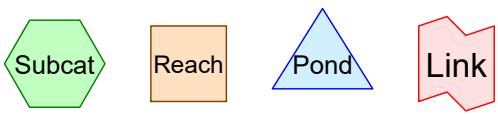
Appendix D

HydroCAD Report

EXISTING

PROPOSED





Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DB-1: PR Roof & Drive Runoff Area=47,922 sf 95.14% Impervious Runoff Depth>2.63"
Tc=5.0 min CN=97 Runoff=3.22 cfs 10,505 cf

Subcatchment DB-2: PR Bypass Runoff Area=8,388 sf 65.96% Impervious Runoff Depth>2.11"
Tc=5.0 min CN=92 Runoff=0.49 cfs 1,475 cf

Subcatchment E-DB1: EX Site Runoff Area=56,310 sf 17.35% Impervious Runoff Depth>1.42"
Flow Length=135' Slope=0.0340 '/' Tc=19.4 min CN=83 Runoff=1.46 cfs 6,647 cf

Pond Pr.P: Inf#1 Peak Elev=9.21' Storage=5,475 cf Inflow=3.22 cfs 10,505 cf
Outflow=1.14 cfs 6,229 cf

Link Ex.G: EX Greyrock Inflow=1.46 cfs 6,647 cf
Primary=1.46 cfs 6,647 cf

Link Pr.G: PR Greyrock Inflow=1.33 cfs 7,704 cf
Primary=1.33 cfs 7,704 cf

Total Runoff Area = 112,620 sf Runoff Volume = 18,627 cf Average Runoff Depth = 1.98"
45.93% Pervious = 51,725 sf 54.07% Impervious = 60,895 sf

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DB-1: PR Roof & Drive Runoff Area=47,922 sf 95.14% Impervious Runoff Depth>3.25"
Tc=5.0 min CN=97 Runoff=3.93 cfs 12,962 cf

Subcatchment DB-2: PR Bypass Runoff Area=8,388 sf 65.96% Impervious Runoff Depth>2.70"
Tc=5.0 min CN=92 Runoff=0.61 cfs 1,887 cf

Subcatchment E-DB1: EX Site Runoff Area=56,310 sf 17.35% Impervious Runoff Depth>1.93"
Flow Length=135' Slope=0.0340 '/' Tc=19.4 min CN=83 Runoff=2.00 cfs 9,046 cf

Pond Pr.P: Inf#1 Peak Elev=9.61' Storage=6,235 cf Inflow=3.93 cfs 12,962 cf
Outflow=1.65 cfs 8,664 cf

Link Ex.G: EX Greyrock Inflow=2.00 cfs 9,046 cf
Primary=2.00 cfs 9,046 cf

Link Pr.G: PR Greyrock Inflow=2.00 cfs 10,550 cf
Primary=2.00 cfs 10,550 cf

Total Runoff Area = 112,620 sf Runoff Volume = 23,894 cf Average Runoff Depth = 2.55"
45.93% Pervious = 51,725 sf 54.07% Impervious = 60,895 sf

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DB-1: PR Roof & Drive Runoff Area=47,922 sf 95.14% Impervious Runoff Depth>4.26"
Tc=5.0 min CN=97 Runoff=5.09 cfs 17,013 cf

Subcatchment DB-2: PR Bypass Runoff Area=8,388 sf 65.96% Impervious Runoff Depth>3.68"
Tc=5.0 min CN=92 Runoff=0.82 cfs 2,575 cf

Subcatchment E-DB1: EX Site Runoff Area=56,310 sf 17.35% Impervious Runoff Depth>2.82"
Flow Length=135' Slope=0.0340 '/' Tc=19.4 min CN=83 Runoff=2.92 cfs 13,210 cf

Pond Pr.P: Inf#1 Peak Elev=10.20' Storage=7,342 cf Inflow=5.09 cfs 17,013 cf
Outflow=2.20 cfs 12,690 cf

Link Ex.G: EX Greyrock Inflow=2.92 cfs 13,210 cf
Primary=2.92 cfs 13,210 cf

Link Pr.G: PR Greyrock Inflow=2.74 cfs 15,264 cf
Primary=2.74 cfs 15,264 cf

Total Runoff Area = 112,620 sf Runoff Volume = 32,798 cf Average Runoff Depth = 3.49"
45.93% Pervious = 51,725 sf 54.07% Impervious = 60,895 sf

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DB-1: PR Roof & Drive Runoff Area=47,922 sf 95.14% Impervious Runoff Depth>5.10"
Tc=5.0 min CN=97 Runoff=6.04 cfs 20,355 cf

Subcatchment DB-2: PR Bypass Runoff Area=8,388 sf 65.96% Impervious Runoff Depth>4.50"
Tc=5.0 min CN=92 Runoff=1.00 cfs 3,147 cf

Subcatchment E-DB1: EX Site Runoff Area=56,310 sf 17.35% Impervious Runoff Depth>3.57"
Flow Length=135' Slope=0.0340 '/' Tc=19.4 min CN=83 Runoff=3.69 cfs 16,772 cf

Pond Pr.P: Inf#1 Peak Elev=10.57' Storage=8,030 cf Inflow=6.04 cfs 20,355 cf
Outflow=2.80 cfs 16,014 cf

Link Ex.G: EX Greyrock Inflow=3.69 cfs 16,772 cf
Primary=3.69 cfs 16,772 cf

Link Pr.G: PR Greyrock Inflow=3.32 cfs 19,162 cf
Primary=3.32 cfs 19,162 cf

Total Runoff Area = 112,620 sf Runoff Volume = 40,274 cf Average Runoff Depth = 4.29"
45.93% Pervious = 51,725 sf 54.07% Impervious = 60,895 sf

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DB-1: PR Roof & Drive Runoff Area=47,922 sf 95.14% Impervious Runoff Depth>6.25"
Tc=5.0 min CN=97 Runoff=7.35 cfs 24,974 cf

Subcatchment DB-2: PR Bypass Runoff Area=8,388 sf 65.96% Impervious Runoff Depth>5.64"
Tc=5.0 min CN=92 Runoff=1.23 cfs 3,943 cf

Subcatchment E-DB1: EX Site Runoff Area=56,310 sf 17.35% Impervious Runoff Depth>4.65"
Flow Length=135' Slope=0.0340 '/' Tc=19.4 min CN=83 Runoff=4.77 cfs 21,814 cf

Pond Pr.P: Inf#1 Peak Elev=10.98' Storage=8,744 cf Inflow=7.35 cfs 24,974 cf
Outflow=3.82 cfs 20,610 cf

Link Ex.G: EX Greyrock Inflow=4.77 cfs 21,814 cf
Primary=4.77 cfs 21,814 cf

Link Pr.G: PR Greyrock Inflow=4.57 cfs 24,554 cf
Primary=4.57 cfs 24,554 cf

Total Runoff Area = 112,620 sf Runoff Volume = 50,732 cf Average Runoff Depth = 5.41"
45.93% Pervious = 51,725 sf 54.07% Impervious = 60,895 sf

Summary for Subcatchment DB-1: PR Roof & Drive

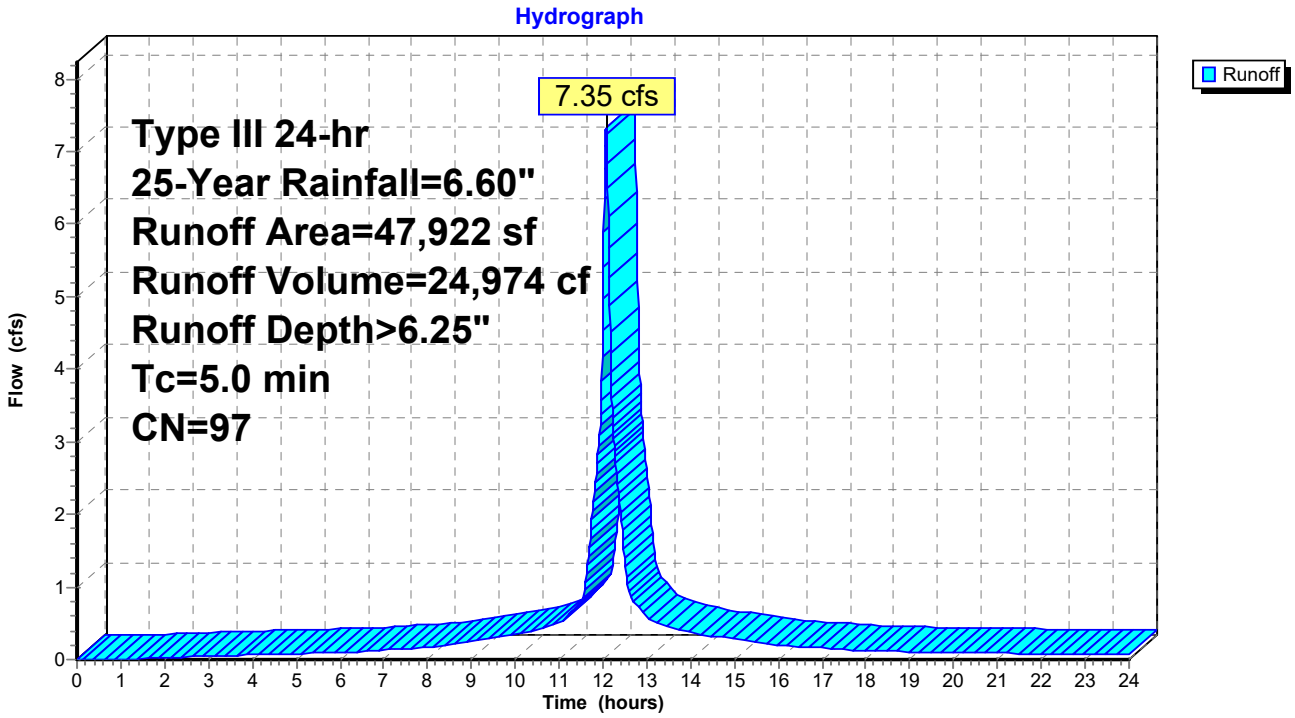
Runoff = 7.35 cfs @ 12.07 hrs, Volume= 24,974 cf, Depth> 6.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.60"

	Area (sf)	CN	Description
	2,327	80	>75% Grass cover, Good, HSG D
*	45,595	98	Impervious
	47,922	97	Weighted Average
	2,327		4.86% Pervious Area
	45,595		95.14% Impervious Area

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

Subcatchment DB-1: PR Roof & Drive



Summary for Subcatchment DB-2: PR Bypass

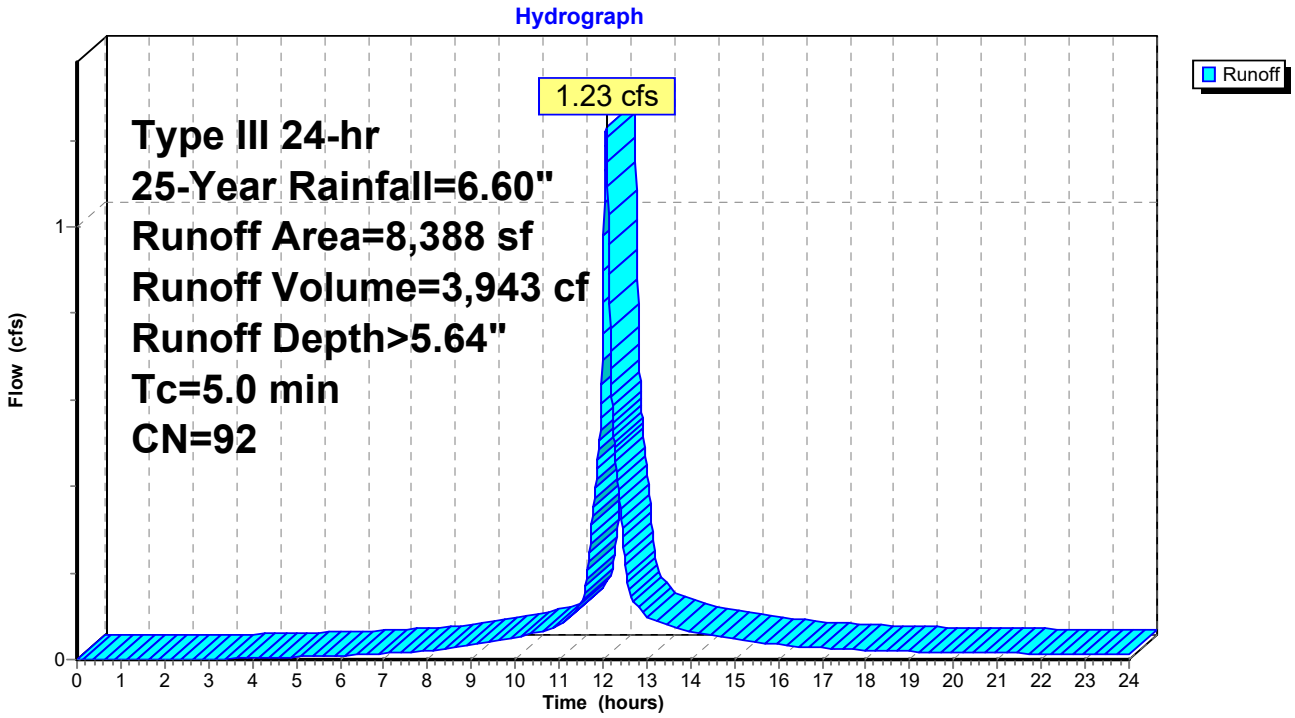
Runoff = 1.23 cfs @ 12.07 hrs, Volume= 3,943 cf, Depth> 5.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.60"

	Area (sf)	CN	Description
	2,855	80	>75% Grass cover, Good, HSG D
*	5,533	98	Impervious
	8,388	92	Weighted Average
	2,855		34.04% Pervious Area
	5,533		65.96% Impervious Area

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

Subcatchment DB-2: PR Bypass



Summary for Subcatchment E-DB1: EX Site

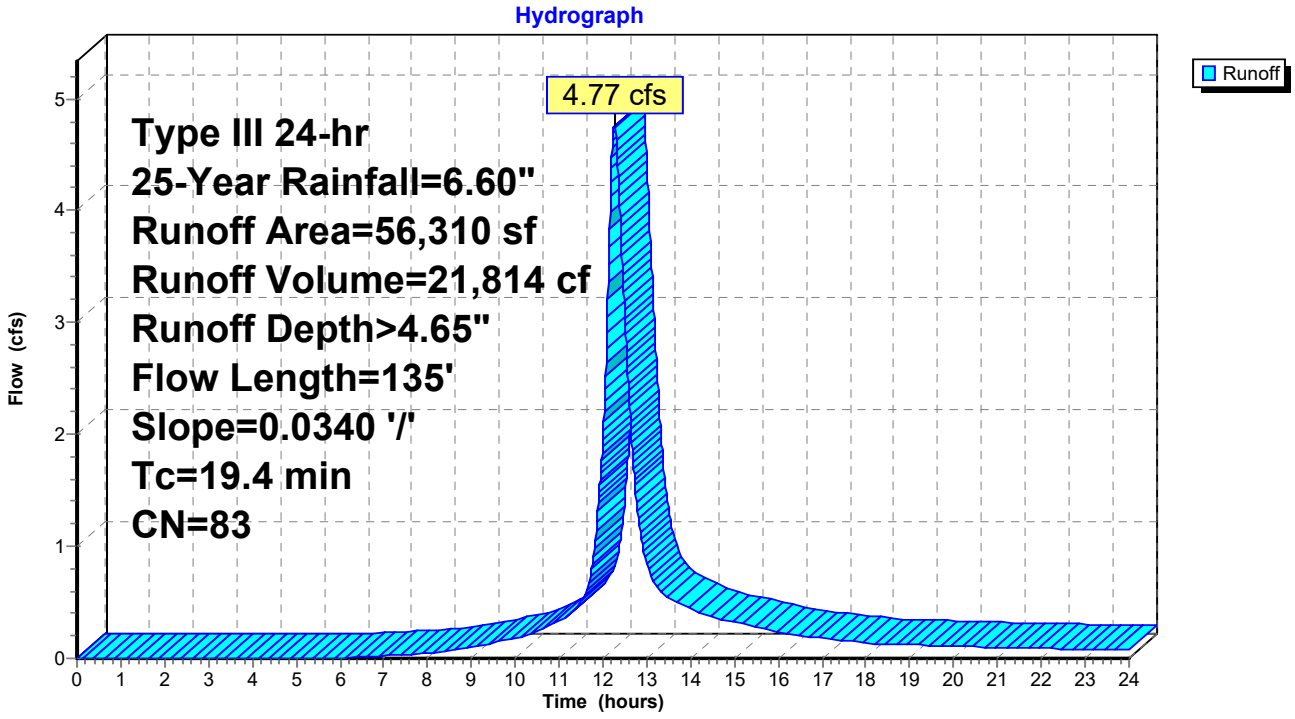
Runoff = 4.77 cfs @ 12.26 hrs, Volume= 21,814 cf, Depth> 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.60"

	Area (sf)	CN	Description
	46,543	80	>75% Grass cover, Good, HSG D
*	9,767	98	Impervious
	56,310	83	Weighted Average
	46,543		82.65% Pervious Area
	9,767		17.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	135	0.0340	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
5.0					**Direct Entry,**
19.4	135	Total			

Subcatchment E-DB1: EX Site



Summary for Pond Pr.P: Inf#1

Inflow Area = 47,922 sf, 95.14% Impervious, Inflow Depth > 6.25" for 25-Year event
Inflow = 7.35 cfs @ 12.07 hrs, Volume= 24,974 cf
Outflow = 3.82 cfs @ 12.19 hrs, Volume= 20,610 cf, Atten= 48%, Lag= 7.1 min
Primary = 3.82 cfs @ 12.19 hrs, Volume= 20,610 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 10.98' @ 12.19 hrs Surf.Area= 2,117 sf Storage= 8,744 cf

Plug-Flow detention time= 148.1 min calculated for 20,610 cf (83% of inflow)
Center-of-Mass det. time= 77.2 min (825.5 - 748.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	5.85'	461 cf	**24.00'W x 64.00'L x 6.42'H Field A** 9,856 cf Overall - 8,704 cf Embedded = 1,152 cf x 40.0% Voids
#2A	6.60'	6,762 cf	**retain_it retain_it 5.0'** x 24 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 3 Rows adjusted for 228.6 cf perimeter wall
#3	6.60'	754 cf	**48.0" Round Pipe Storage** L= 60.0' S= 0.0100 '/'
#4	5.85'	683 cf	**Stone Perimeter (Prismatic)**Listed below (Recalc) 1,708 cf Overall x 40.0% Voids
#5B	5.85'	77 cf	**8.00'W x 32.00'L x 6.42'H Field B** 1,643 cf Overall - 1,451 cf Embedded = 192 cf x 40.0% Voids
#6B	6.60'	1,061 cf	**retain_it retain_it 5.0'** x 4 Inside #5 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 1 Rows adjusted for 103.9 cf perimeter wall
		9,798 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5.85	297	0	0
11.60	297	1,708	1,708

Device	Routing	Invert	Outlet Devices
#1	Primary	8.50'	**8.5" Vert. Orifice/Grate** C= 0.600
#2	Primary	10.25'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	11.35'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=3.82 cfs @ 12.19 hrs HW=10.98' (Free Discharge)
- **1=Orifice/Grate** (Orifice Controls 2.76 cfs @ 7.01 fps)
- **2=Orifice/Grate** (Orifice Controls 1.05 cfs @ 3.01 fps)
- **3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pr.P: Inf#1 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 5.0' (retain-it®)
Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf
Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf
3 Rows adjusted for 228.6 cf perimeter wall

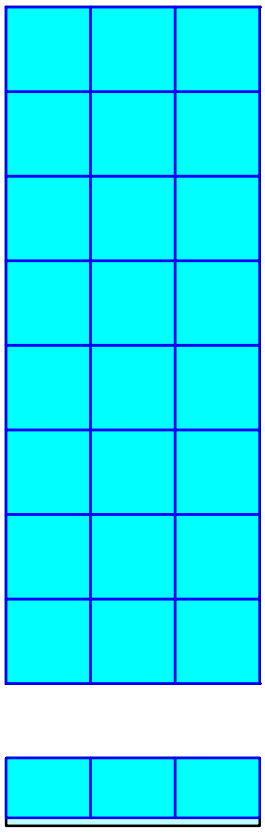
8 Chambers/Row x 8.00' Long = 64.00' Row Length
3 Rows x 96.0" Wide = 24.00' Base Width
9.0" Base + 68.0" Chamber Height = 6.42' Field Height

10.4 cf Sidewall x 8 x 2 + 10.4 cf Endwall x 3 x 2 = 228.6 cf Perimeter Wall
24 Chambers x 291.3 cf - 228.6 cf Perimeter wall = 6,762.1 cf Chamber Storage
24 Chambers x 362.7 cf = 8,704.0 cf Displacement

9,856.0 cf Field - 8,704.0 cf Chambers = 1,152.0 cf Stone x 40.0% Voids = 460.8 cf Stone Storage

Chamber Storage + Stone Storage = 7,222.9 cf = 0.166 af
Overall Storage Efficiency = 73.3%
Overall System Size = 64.00' x 24.00' x 6.42'

24 Chambers
365.0 cy Field
42.7 cy Stone



Pond Pr.P: Inf#1 - Chamber Wizard Field B

Chamber Model = retain_it retain_it 5.0' (retain-it®)
Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf
Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf
1 Rows adjusted for 103.9 cf perimeter wall

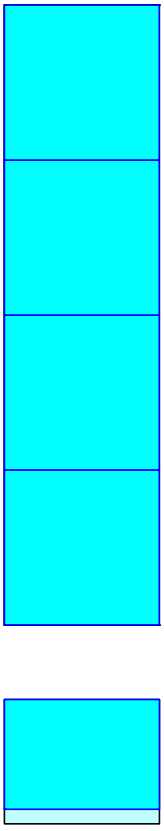
4 Chambers/Row x 8.00' Long = 32.00' Row Length
1 Rows x 96.0" Wide = 8.00' Base Width
9.0" Base + 68.0" Chamber Height = 6.42' Field Height

10.4 cf Sidewall x 4 x 2 + 10.4 cf Endwall x 1 x 2 = 103.9 cf Perimeter Wall
4 Chambers x 291.3 cf - 103.9 cf Perimeter wall = 1,061.2 cf Chamber Storage
4 Chambers x 362.7 cf = 1,450.7 cf Displacement

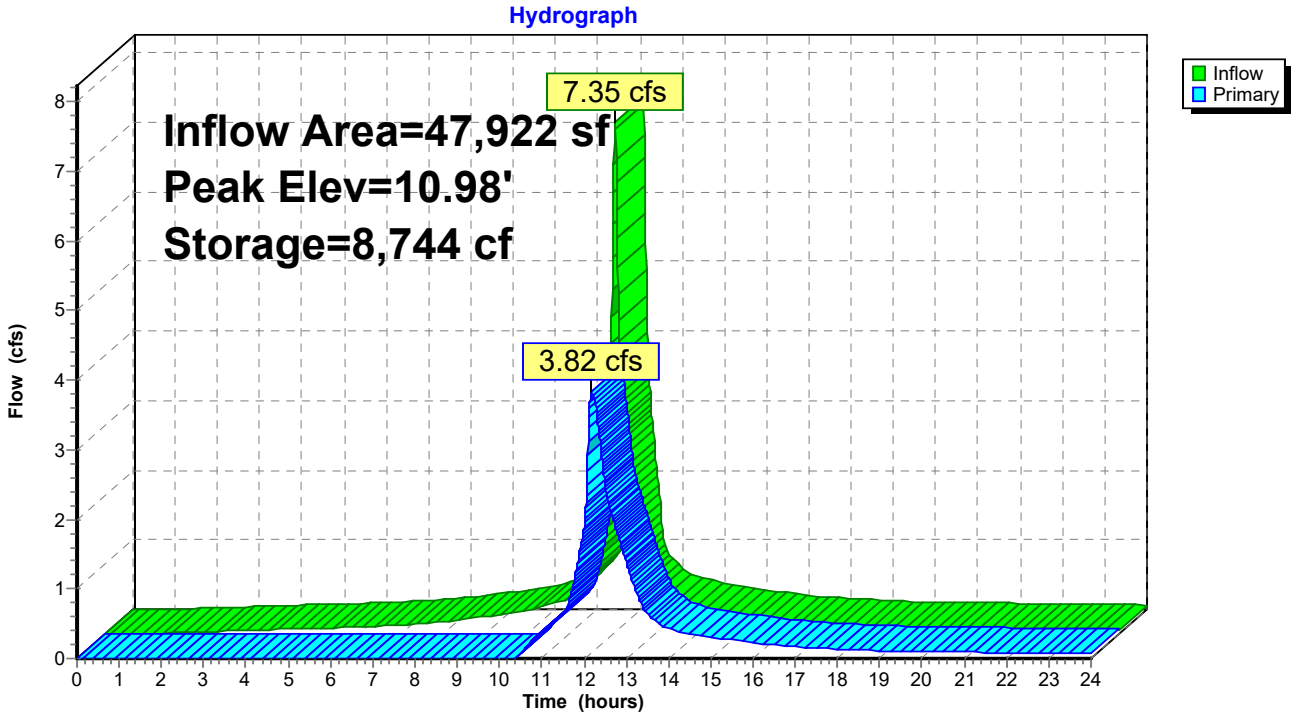
1,642.7 cf Field - 1,450.7 cf Chambers = 192.0 cf Stone x 40.0% Voids = 76.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,138.0 cf = 0.026 af
Overall Storage Efficiency = 69.3%
Overall System Size = 32.00' x 8.00' x 6.42'

4 Chambers
60.8 cy Field
7.1 cy Stone



Pond Pr.P: Inf#1



Stage-Area-Storage for Pond Pr.P: Inf#1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
5.85	0	6.91	1,154	7.97	3,096
5.87	17	6.93	1,189	7.99	3,134
5.89	33	6.95	1,223	8.01	3,172
5.91	50	6.97	1,258	8.03	3,210
5.93	67	6.99	1,293	8.05	3,248
5.95	84	7.01	1,328	8.07	3,286
5.97	100	7.03	1,363	8.09	3,324
5.99	117	7.05	1,398	8.11	3,362
6.01	134	7.07	1,434	8.13	3,400
6.03	150	7.09	1,469	8.15	3,438
6.05	167	7.11	1,505	8.17	3,476
6.07	184	7.13	1,540	8.19	3,514
6.09	201	7.15	1,576	8.21	3,552
6.11	217	7.17	1,612	8.23	3,591
6.13	234	7.19	1,648	8.25	3,629
6.15	251	7.21	1,684	8.27	3,667
6.17	267	7.23	1,720	8.29	3,705
6.19	284	7.25	1,756	8.31	3,743
6.21	301	7.27	1,792	8.33	3,782
6.23	318	7.29	1,829	8.35	3,820
6.25	334	7.31	1,865	8.37	3,858
6.27	351	7.33	1,902	8.39	3,897
6.29	368	7.35	1,938	8.41	3,935
6.31	384	7.37	1,975	8.43	3,973
6.33	401	7.39	2,012	8.45	4,011
6.35	418	7.41	2,048	8.47	4,050
6.37	435	7.43	2,085	8.49	4,088
6.39	451	7.45	2,122	8.51	4,126
6.41	468	7.47	2,159	8.53	4,165
6.43	485	7.49	2,196	8.55	4,203
6.45	501	7.51	2,233	8.57	4,242
6.47	518	7.53	2,270	8.59	4,280
6.49	535	7.55	2,307	8.61	4,318
6.51	551	7.57	2,344	8.63	4,357
6.53	568	7.59	2,382	8.65	4,395
6.55	585	7.61	2,419	8.67	4,434
6.57	602	7.63	2,456	8.69	4,472
6.59	618	7.65	2,494	8.71	4,510
6.61	644	7.67	2,531	8.73	4,549
6.63	677	7.69	2,569	8.75	4,587
6.65	711	7.71	2,606	8.77	4,626
6.67	745	7.73	2,643	8.79	4,664
6.69	778	7.75	2,681	8.81	4,703
6.71	812	7.77	2,719	8.83	4,741
6.73	846	7.79	2,756	8.85	4,780
6.75	880	7.81	2,794	8.87	4,818
6.77	914	7.83	2,832	8.89	4,856
6.79	948	7.85	2,869	8.91	4,895
6.81	982	7.87	2,907	8.93	4,933
6.83	1,017	7.89	2,945	8.95	4,972
6.85	1,051	7.91	2,983	8.97	5,010
6.87	1,085	7.93	3,020	8.99	5,049
6.89	1,120	7.95	3,058	9.01	5,087

Stage-Area-Storage for Pond Pr.P: Inf#1 (continued)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
9.03	5,126	10.09	7,145	11.15	9,040
9.05	5,164	10.11	7,183	11.17	9,074
9.07	5,202	10.13	7,220	11.19	9,108
9.09	5,241	10.15	7,258	11.21	9,141
9.11	5,279	10.17	7,295	11.23	9,175
9.13	5,318	10.19	7,332	11.25	9,209
9.15	5,356	10.21	7,370	11.27	9,242
9.17	5,395	10.23	7,407	11.29	9,276
9.19	5,433	10.25	7,444	11.31	9,310
9.21	5,471	10.27	7,481	11.33	9,344
9.23	5,510	10.29	7,518	11.35	9,377
9.25	5,548	10.31	7,555	11.37	9,411
9.27	5,587	10.33	7,592	11.39	9,445
9.29	5,625	10.35	7,629	11.41	9,478
9.31	5,663	10.37	7,666	11.43	9,512
9.33	5,702	10.39	7,703	11.45	9,546
9.35	5,740	10.41	7,740	11.47	9,579
9.37	5,778	10.43	7,777	11.49	9,613
9.39	5,817	10.45	7,813	11.51	9,647
9.41	5,855	10.47	7,850	11.53	9,680
9.43	5,893	10.49	7,886	11.55	9,714
9.45	5,931	10.51	7,923	11.57	9,748
9.47	5,970	10.53	7,959	11.59	9,781
9.49	6,008	10.55	7,995	11.61	9,798
9.51	6,046	10.57	8,032	11.63	9,798
9.53	6,084	10.59	8,068	11.65	9,798
9.55	6,123	10.61	8,104	11.67	9,798
9.57	6,161	10.63	8,140	11.69	9,798
9.59	6,199	10.65	8,176	11.71	9,798
9.61	6,237	10.67	8,211	11.73	9,798
9.63	6,275	10.69	8,247	11.75	9,798
9.65	6,313	10.71	8,282	11.77	9,798
9.67	6,351	10.73	8,318	11.79	9,798
9.69	6,389	10.75	8,353	11.81	9,798
9.71	6,427	10.77	8,388	11.83	9,798
9.73	6,465	10.79	8,423	11.85	9,798
9.75	6,503	10.81	8,458	11.87	9,798
9.77	6,541	10.83	8,493	11.89	9,798
9.79	6,579	10.85	8,528	11.91	9,798
9.81	6,617	10.87	8,563	11.93	9,798
9.83	6,655	10.89	8,597	11.95	9,798
9.85	6,693	10.91	8,632	11.97	9,798
9.87	6,731	10.93	8,666	11.99	9,798
9.89	6,769	10.95	8,701	12.01	9,798
9.91	6,807	10.97	8,735	12.03	9,798
9.93	6,844	10.99	8,769	12.05	9,798
9.95	6,882	11.01	8,803	12.07	9,798
9.97	6,920	11.03	8,837	12.09	9,798
9.99	6,957	11.05	8,871	12.11	9,798
10.01	6,995	11.07	8,905	12.13	9,798
10.03	7,033	11.09	8,939	12.15	9,798
10.05	7,070	11.11	8,973	12.17	9,798
10.07	7,108	11.13	9,007	12.19	9,798

Stage-Area-Storage for Pond Pr.P: Inf#1 (continued)

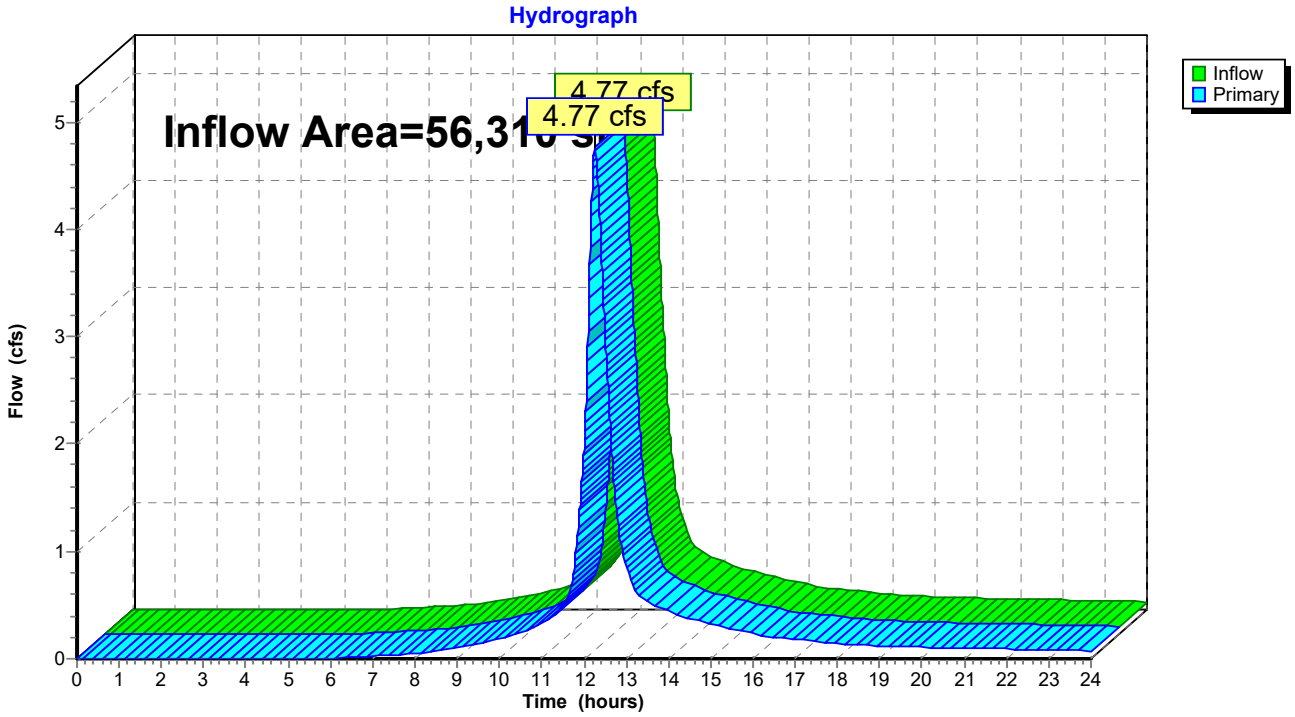
Elevation (feet)	Storage (cubic-feet)
12.21	9,798
12.23	9,798
12.25	9,798
12.27	**9,798**

Summary for Link Ex.G: EX Greyrock

Inflow Area = 56,310 sf, 17.35% Impervious, Inflow Depth > 4.65" for 25-Year event
Inflow = 4.77 cfs @ 12.26 hrs, Volume= 21,814 cf
Primary = 4.77 cfs @ 12.26 hrs, Volume= 21,814 cf, Atten= 0%, Lag= 0.0 min

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

Link Ex.G: EX Greyrock

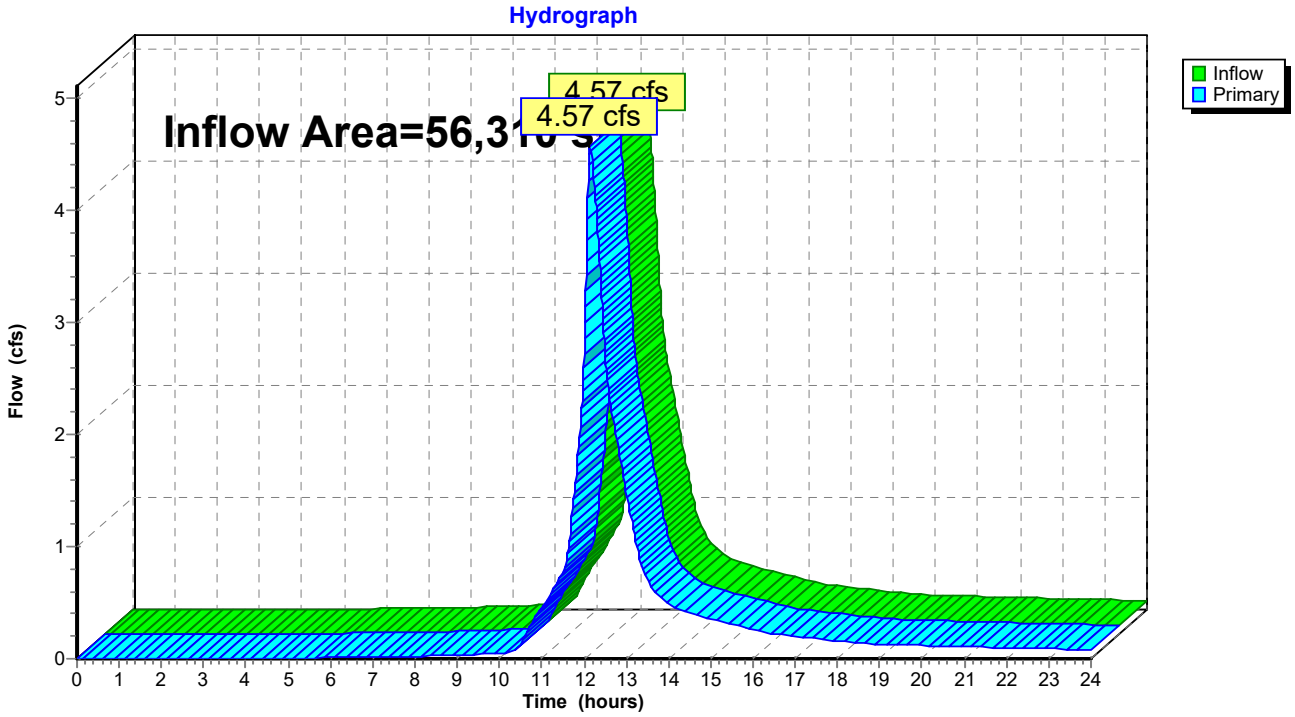


Summary for Link Pr.G: PR Greyrock

Inflow Area = 56,310 sf, 90.80% Impervious, Inflow Depth > 5.23" for 25-Year event
Inflow = 4.57 cfs @ 12.14 hrs, Volume= 24,554 cf
Primary = 4.57 cfs @ 12.14 hrs, Volume= 24,554 cf, Atten= 0%, Lag= 0.0 min

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

Link Pr.G: PR Greyrock



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DB-1: PR Roof & Drive Runoff Area=47,922 sf 95.14% Impervious Runoff Depth>7.12"
Tc=5.0 min CN=97 Runoff=8.33 cfs 28,440 cf

Subcatchment DB-2: PR Bypass Runoff Area=8,388 sf 65.96% Impervious Runoff Depth>6.50"
Tc=5.0 min CN=92 Runoff=1.41 cfs 4,543 cf

Subcatchment E-DB1: EX Site Runoff Area=56,310 sf 17.35% Impervious Runoff Depth>5.47"
Flow Length=135' Slope=0.0340 '/' Tc=19.4 min CN=83 Runoff=5.57 cfs 25,661 cf

Pond Pr.P: Inf#1 Peak Elev=11.30' Storage=9,294 cf Inflow=8.33 cfs 28,440 cf
Outflow=4.39 cfs 24,059 cf

Link Ex.G: EX Greyrock Inflow=5.57 cfs 25,661 cf
Primary=5.57 cfs 25,661 cf

Link Pr.G: PR Greyrock Inflow=5.30 cfs 28,602 cf
Primary=5.30 cfs 28,602 cf

Total Runoff Area = 112,620 sf Runoff Volume = 58,645 cf Average Runoff Depth = 6.25"
45.93% Pervious = 51,725 sf 54.07% Impervious = 60,895 sf

Appendix E

Water Quality Volume Calculations
BMP Volume Calculations
Drawdown Calculations
Conveyance Calculations
TSS Removal Calculations
UNH TSS Removal Efficiency

Water Quality Volume Calculations

Project: *0 & 172 Grerock Place, & 154 Broad Street*	**Project #:** *5450H*	**Date:** *4/9/2021*
Location: *Stamford, CT*	**By:** *JTF*	**Checked:** *TM*

Proposed Conditions

Area=	1.293	acres
Impervious Area=	1.174	acres[d]
I=	0.908	[a]
R=	0.867	[b]
WQV=	0.093	ac. ft. [c]

WQV=	**4,069.23**	**ft.^{3}**
WQV Provided =	**4,107.00**	**ft.^{3}**

[a] I=Percent Impervious Coverage

[b] R=0.05+0.009(I); Volumetric runoff Coefficient, Equation taken from 2004 Connecticut Stormwater Quality Manual section 7.4.1

[c] WQV=(1"xRxA)/12; Water Quality Volume, Equation taken from 2004 Connecticut Stormwater Quality Manual section 7.4.1

[d] Any gravel areas are included as impervious area for calculation purposes.

Stage-Area-Storage for Pond Pr.P: Inf#1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
5.85	0	6.91	1,154	7.97	3,096
5.87	17	6.93	1,189	7.99	3,134
5.89	33	6.95	1,223	8.01	3,172
5.91	50	6.97	1,258	8.03	3,210
5.93	67	6.99	1,293	8.05	3,248
5.95	84	7.01	1,328	8.07	3,286
5.97	100	7.03	1,363	8.09	3,324
5.99	117	7.05	1,398	8.11	3,362
6.01	134	7.07	1,434	8.13	3,400
6.03	150	7.09	1,469	8.15	3,438
6.05	167	7.11	1,505	8.17	3,476
6.07	184	7.13	1,540	8.19	3,514
6.09	201	7.15	1,576	8.21	3,552
6.11	217	7.17	1,612	8.23	3,591
6.13	234	7.19	1,648	8.25	3,629
6.15	251	7.21	1,684	8.27	3,667
6.17	267	7.23	1,720	8.29	3,705
6.19	284	7.25	1,756	8.31	3,743
6.21	301	7.27	1,792	8.33	3,782
6.23	318	7.29	1,829	8.35	3,820
6.25	334	7.31	1,865	8.37	3,858
6.27	351	7.33	1,902	8.39	3,897
6.29	368	7.35	1,938	8.41	3,935
6.31	384	7.37	1,975	8.43	3,973
6.33	401	7.39	2,012	8.45	4,011
6.35	418	7.41	2,048	8.47	4,050
6.37	435	7.43	2,085	8.49	4,088
6.39	451	7.45	2,122	8.51	4,126
6.41	468	7.47	2,159	8.53	4,165
6.43	485	7.49	2,196	8.55	4,203
6.45	501	7.51	2,233	8.57	4,242
6.47	518	7.53	2,270	8.59	4,280
6.49	535	7.55	2,307	8.61	4,318
6.51	551	7.57	2,344	8.63	4,357
6.53	568	7.59	2,382	8.65	4,395
6.55	585	7.61	2,419	8.67	4,434
6.57	602	7.63	2,456	8.69	4,472
6.59	618	7.65	2,494	8.71	4,510
6.61	644	7.67	2,531	8.73	4,549
6.63	677	7.69	2,569	8.75	4,587
6.65	711	7.71	2,606	8.77	4,626
6.67	745	7.73	2,643	8.79	4,664
6.69	778	7.75	2,681	8.81	4,703
6.71	812	7.77	2,719	8.83	4,741
6.73	846	7.79	2,756	8.85	4,780
6.75	880	7.81	2,794	8.87	4,818
6.77	914	7.83	2,832	8.89	4,856
6.79	948	7.85	2,869	8.91	4,895
6.81	982	7.87	2,907	8.93	4,933
6.83	1,017	7.89	2,945	8.95	4,972
6.85	1,051	7.91	2,983	8.97	5,010
6.87	1,085	7.93	3,020	8.99	5,049
6.89	1,120	7.95	3,058	9.01	5,087

WQV Provided:
4,107 CF @ 8.50

72-HOUR DRAW DOWN CALCULATION

Project: *0 & 172 Grerock Place, & 154 Broad Street*	**Project #:** *5450H*	**Date:** *4/9/2021*
Location: *Stamford, CT*	**By:** *JTF*	**Checked:** *TM*

Infiltration System

INFIL#1		
Surface Area of Infiltration System (SA)	2,089	ft^2
Volume of Storage of Infiltration System (VS)	4,107	ft^3
Infiltration Rate (IR)	5.94	in/hr^c
Theoretical Water Column Height	23.59	in^a
Time of Draw Down	**3.97**	**hr^b**

[a] Theoretical Water Column Height (WCH) = VS/SA*12

[b] Time of Draw Down = WCH/IR

[c] Infiltration Rate (IR) Taken From The Results of Hydraulic Conductivity Test #1 and reduced by a factor of 2

HYDRAULIC DATA FOR RATIONAL METHOD

Project:	*154 Broad Street, 0 & 172 Greyrock Place*		**Project #:** *5450H*	**Date:**	4/9/2021
Location:	*Stamford, CT*		**By:** *JTF*	**Checked:**	*TM*

100-Year Storm Conveyance Calculations

Pipe Section	Q in system (cfs)*	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
MH#1 to EX.MH in Greyrock	7.12	18	31	0.011	PVC	0.010	12.45	57.2%

*100-Year flow rates obtained from HydroCAD Model

REDNISS & MEAD

CONVEYANCE CALCULATIONS EXHIBIT

GREYROCK PLACE

STAMFORD, CT

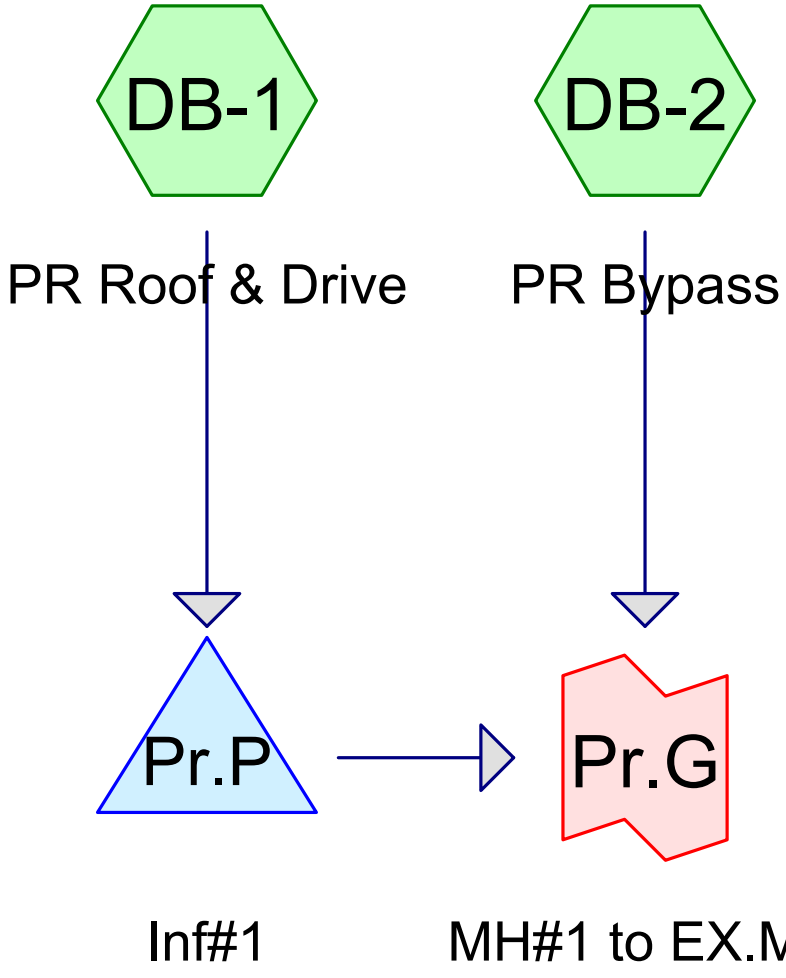
REDNISS & MEAD

LAND SURVEYING
CIVIL ENGINEERING
PLANNING & ZONING CONSULTING
PERMITTING

22 First Street | Stamford, CT 06905
Tel: 203.327.0500 | Fax: 203.357.1118
www.rednissmead.com

COMM. NO.:	DATE:
5450	04/09/2021
	SCALE: 1"=40'

PROPOSED



Subcat Reach Pond Link

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DB-1: PR Roof & Drive Runoff Area=47,922 sf 95.14% Impervious Runoff Depth>8.04"
Tc=5.0 min CN=97 Runoff=9.37 cfs 32,107 cf

Subcatchment DB-2: PR Bypass Runoff Area=9,090 sf 97.39% Impervious Runoff Depth>8.09"
Tc=5.0 min CN=98 Runoff=1.78 cfs 6,127 cf

Pond Pr.P: Inf#1 Peak Elev=11.55' Storage=9,717 cf Inflow=9.37 cfs 32,107 cf
Outflow=5.95 cfs 27,708 cf

Link Pr.G: MH#1 to EX.MH Inflow=7.12 cfs 33,835 cf
Primary=7.12 cfs 33,835 cf

Total Runoff Area = 57,012 sf Runoff Volume = 38,234 cf Average Runoff Depth = 8.05"
4.50% Pervious = 2,564 sf 95.50% Impervious = 54,448 sf

Summary for Subcatchment DB-1: PR Roof & Drive

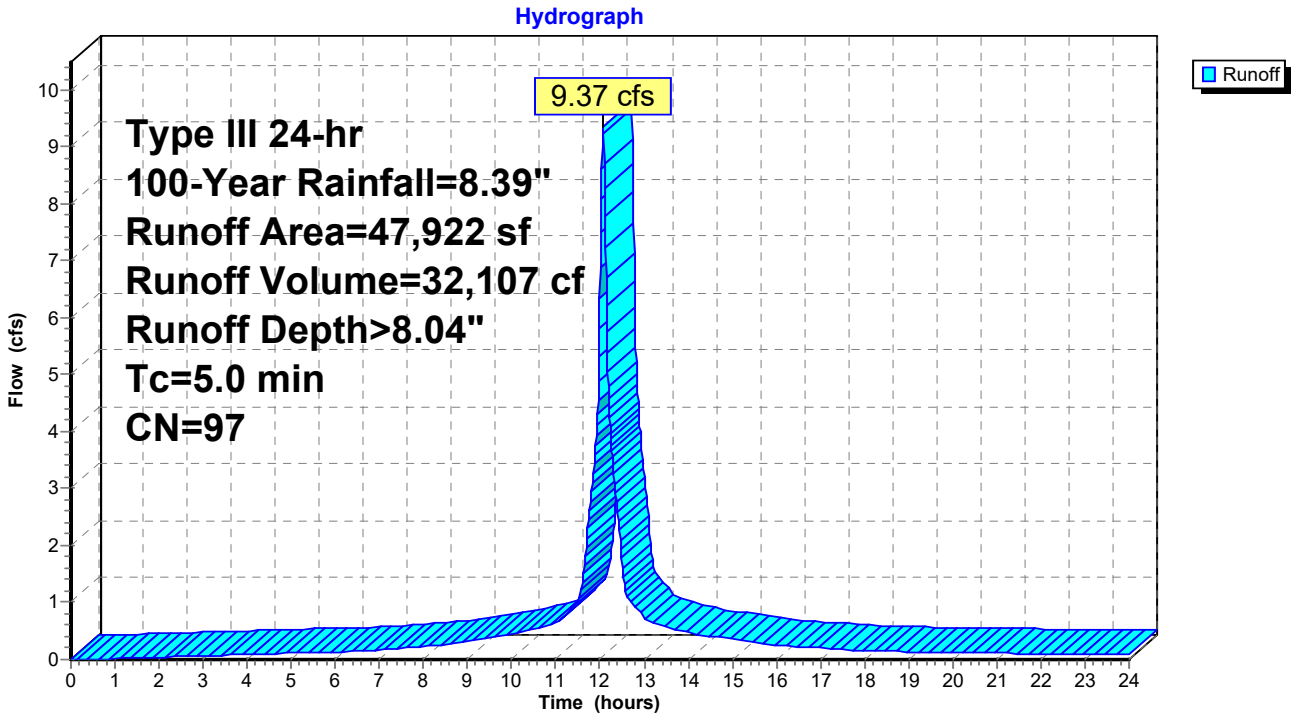
Runoff = 9.37 cfs @ 12.07 hrs, Volume= 32,107 cf, Depth> 8.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.39"

	Area (sf)	CN	Description
	2,327	80	>75% Grass cover, Good, HSG D
*	45,595	98	Impervious
	47,922	97	Weighted Average
	2,327		4.86% Pervious Area
	45,595		95.14% Impervious Area

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

Subcatchment DB-1: PR Roof & Drive



Summary for Subcatchment DB-2: PR Bypass

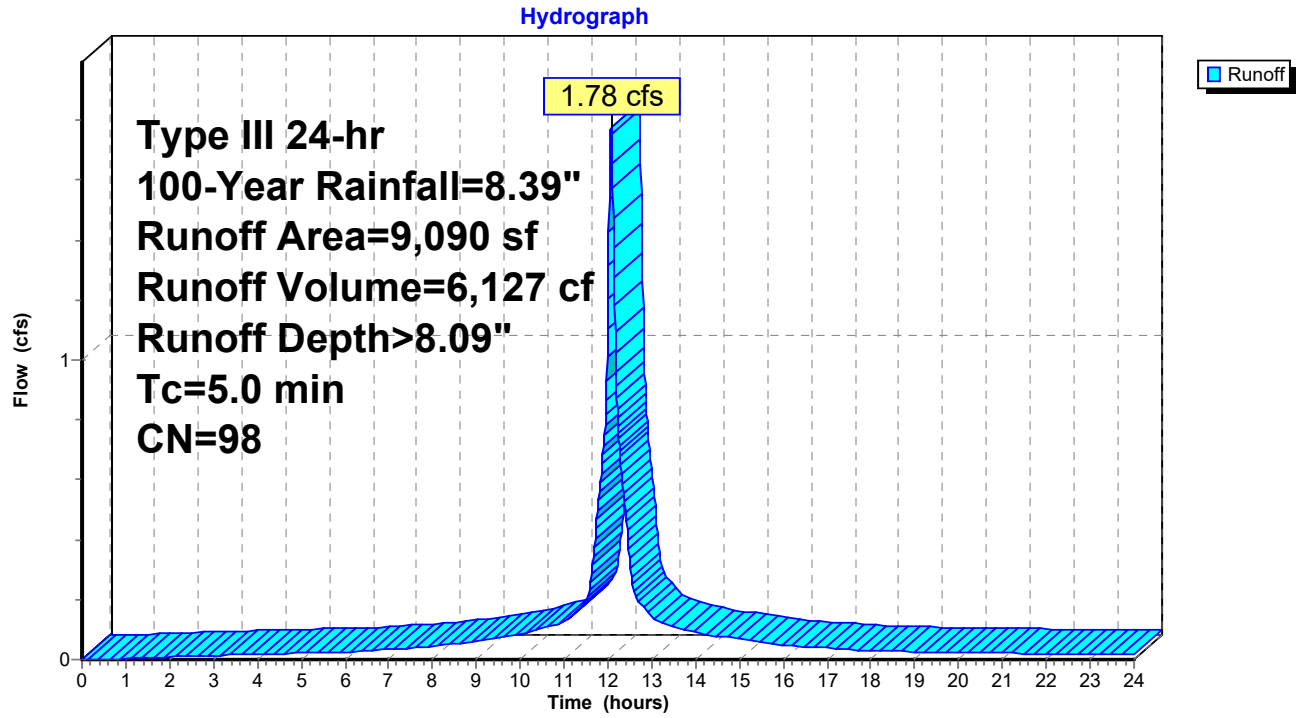
Runoff = 1.78 cfs @ 12.07 hrs, Volume= 6,127 cf, Depth> 8.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.39"

	Area (sf)	CN	Description
	237	80	>75% Grass cover, Good, HSG D
*	8,853	98	Impervious
	9,090	98	Weighted Average
	237		2.61% Pervious Area
	8,853		97.39% Impervious Area

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

Subcatchment DB-2: PR Bypass



Summary for Pond Pr.P: Inf#1

Inflow Area = 47,922 sf, 95.14% Impervious, Inflow Depth > 8.04" for 100-Year event
Inflow = 9.37 cfs @ 12.07 hrs, Volume= 32,107 cf
Outflow = 5.95 cfs @ 12.16 hrs, Volume= 27,708 cf, Atten= 36%, Lag= 5.2 min
Primary = 5.95 cfs @ 12.16 hrs, Volume= 27,708 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 11.55' @ 12.16 hrs Surf.Area= 2,089 sf Storage= 9,717 cf

Plug-Flow detention time= 130.6 min calculated for 27,708 cf (86% of inflow)
Center-of-Mass det. time= 69.3 min (813.6 - 744.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	5.85'	461 cf	**24.00'W x 64.00'L x 6.42'H Field A** 9,856 cf Overall - 8,704 cf Embedded = 1,152 cf x 40.0% Voids
#2A	6.60'	6,762 cf	**retain_it retain_it 5.0'** x 24 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 3 Rows adjusted for 228.6 cf perimeter wall
#3	6.60'	754 cf	**48.0" Round Pipe Storage** L= 60.0' S= 0.0100 '/'
#4	5.85'	683 cf	**Stone Perimeter (Prismatic)**Listed below (Recalc) 1,708 cf Overall x 40.0% Voids
#5B	5.85'	77 cf	**8.00'W x 32.00'L x 6.42'H Field B** 1,643 cf Overall - 1,451 cf Embedded = 192 cf x 40.0% Voids
#6B	6.60'	1,061 cf	**retain_it retain_it 5.0'** x 4 Inside #5 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 1 Rows adjusted for 103.9 cf perimeter wall
		9,798 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5.85	297	0	0
11.60	297	1,708	1,708

Device	Routing	Invert	Outlet Devices
#1	Primary	8.50'	**8.5" Vert. Orifice/Grate** C= 0.600
#2	Primary	10.25'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	11.35'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=5.93 cfs @ 12.16 hrs HW=11.55' (Free Discharge)
- **1=Orifice/Grate** (Orifice Controls 3.12 cfs @ 7.91 fps)
- **2=Orifice/Grate** (Orifice Controls 1.65 cfs @ 4.74 fps)
- **3=Sharp-Crested Rectangular Weir** (Weir Controls 1.16 cfs @ 1.47 fps)

Pond Pr.P: Inf#1 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 5.0' (retain-it®)
Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf
Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf
3 Rows adjusted for 228.6 cf perimeter wall

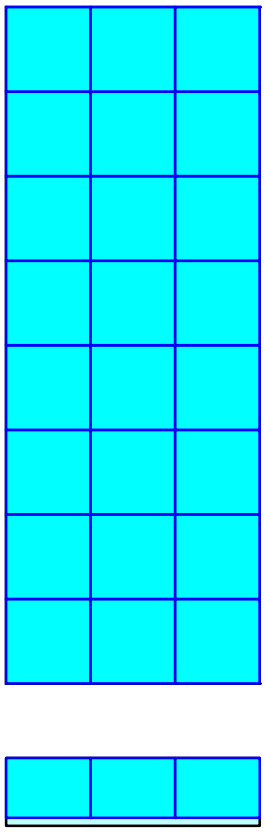
8 Chambers/Row x 8.00' Long = 64.00' Row Length
3 Rows x 96.0" Wide = 24.00' Base Width
9.0" Base + 68.0" Chamber Height = 6.42' Field Height

10.4 cf Sidewall x 8 x 2 + 10.4 cf Endwall x 3 x 2 = 228.6 cf Perimeter Wall
24 Chambers x 291.3 cf - 228.6 cf Perimeter wall = 6,762.1 cf Chamber Storage
24 Chambers x 362.7 cf = 8,704.0 cf Displacement

9,856.0 cf Field - 8,704.0 cf Chambers = 1,152.0 cf Stone x 40.0% Voids = 460.8 cf Stone Storage

Chamber Storage + Stone Storage = 7,222.9 cf = 0.166 af
Overall Storage Efficiency = 73.3%
Overall System Size = 64.00' x 24.00' x 6.42'

24 Chambers
365.0 cy Field
42.7 cy Stone



Pond Pr.P: Inf#1 - Chamber Wizard Field B

Chamber Model = retain_it retain_it 5.0' (retain-it®)
Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf
Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf
1 Rows adjusted for 103.9 cf perimeter wall

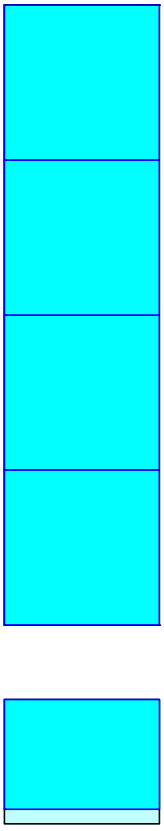
4 Chambers/Row x 8.00' Long = 32.00' Row Length
1 Rows x 96.0" Wide = 8.00' Base Width
9.0" Base + 68.0" Chamber Height = 6.42' Field Height

10.4 cf Sidewall x 4 x 2 + 10.4 cf Endwall x 1 x 2 = 103.9 cf Perimeter Wall
4 Chambers x 291.3 cf - 103.9 cf Perimeter wall = 1,061.2 cf Chamber Storage
4 Chambers x 362.7 cf = 1,450.7 cf Displacement

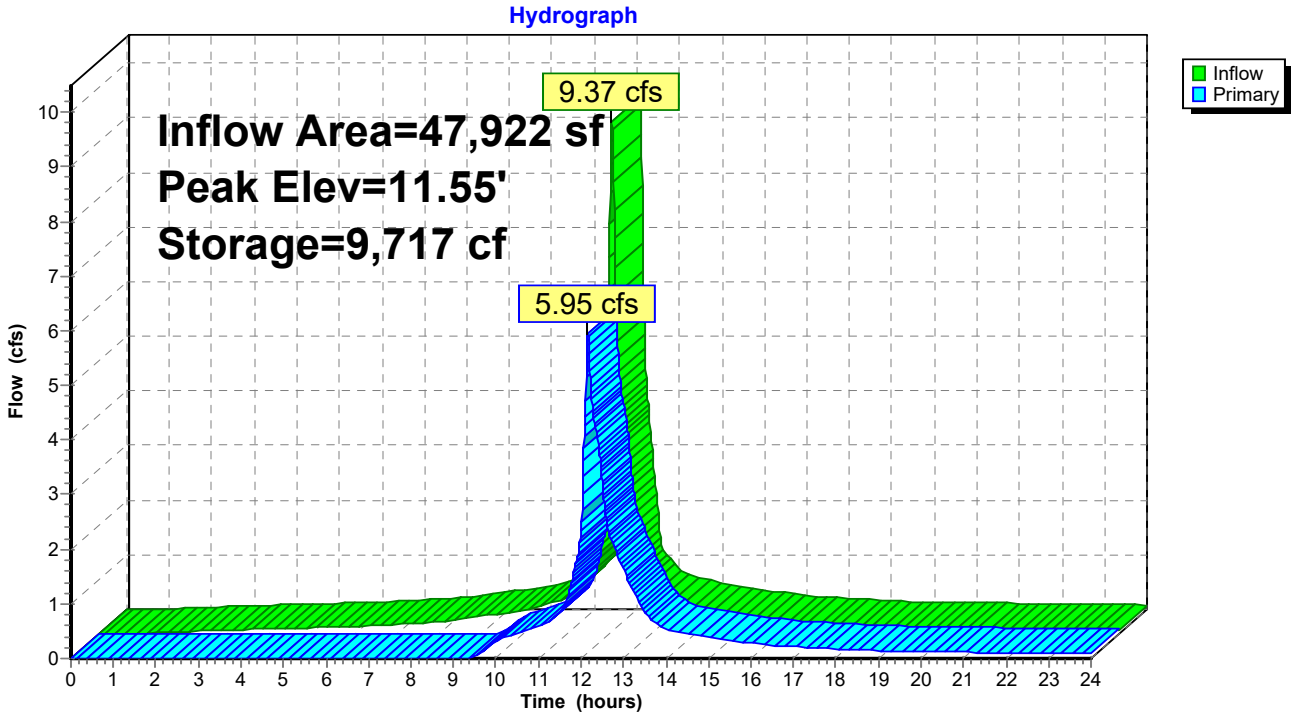
1,642.7 cf Field - 1,450.7 cf Chambers = 192.0 cf Stone x 40.0% Voids = 76.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,138.0 cf = 0.026 af
Overall Storage Efficiency = 69.3%
Overall System Size = 32.00' x 8.00' x 6.42'

4 Chambers
60.8 cy Field
7.1 cy Stone



Pond Pr.P: Inf#1

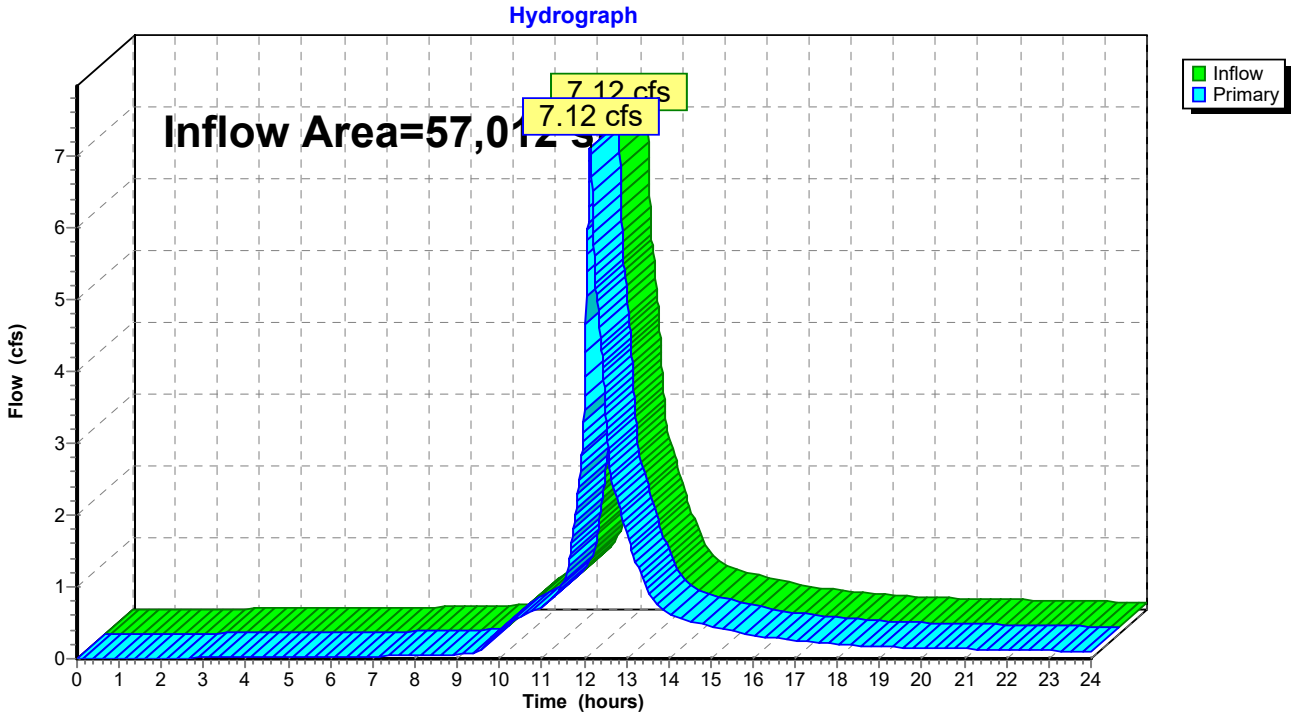


Summary for Link Pr.G: MH#1 to EX.MH

Inflow Area = 57,012 sf, 95.50% Impervious, Inflow Depth > 7.12" for 100-Year event
Inflow = 7.12 cfs @ 12.15 hrs, Volume= 33,835 cf
Primary = 7.12 cfs @ 12.15 hrs, Volume= 33,835 cf, Atten= 0%, Lag= 0.0 min

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

Link Pr.G: MH#1 to EX.MH



Pollutant Reduction Calculations

Project:	*154 Broad Street, 0 & 172 Greyrock Place*	**Project #:**	*5450H*	**Date:**	*4/9/2021*
Location:	*Stamford, CT*	**By:**	*JTF*	**Checked**	*TM*

TSS Removal - Infiltration 1 Basin

	A BMP[a]	B TSS removal Rate	C Starting TSS Load[b]	D Amount Removed (B x C)	E Remaining Load (C - D)
1	Catch Basins with Sumps	25.0% [a]	100.0%	25.0%	75.0%
2	Infiltration Basins & Infiltration Trenches	90.0% [c]	75.0%	67.5%	7.5%

TSS Removal - Bypass Basin

	A BMP[a]	B TSS removal Rate	C Starting TSS Load[b]	D Amount Removed (B x C)	E Remaining Load (C - D)
1	Catch Basins with Sumps	25.0% [a]	100.0%	25.0%	75.0%

[a] Refer to Table 5-6 from February 2014 Town of Greenwich Drainage Manual Section 5.6.3

[b] Equal to the remaining load from the previous BMP

[c] New Hampshire Stormwater Manual "Pollutant Removal Efficiencies for Best Management Practices for Use in Pollutant Loading Analysis" table

Appendix B.
BMP Pollutant Removal Efficiency

Pollutant Removal Efficiencies for Best Management Practices for Use in Pollutant Loading Analysis

Best Management Practice (BMP) removal efficiencies for pollutant loading analysis for total suspended solids (TSS), total nitrogen (TN), and total phosphorus (TP) are presented in the table below. These removal efficiencies were developed by reviewing various literature sources and using best professional judgment based on literature values and general expectation of how values for different BMPS should relate to one another. The intent is to update this information and add BMPs and removal efficiencies for other parameters as more information/data becomes available in the future.

NHDES will consider other BMP removal efficiencies if sufficient documentation is provided.

Please note that all BMPs must be designed in accordance with the specifications in the Alteration of Terrain (AoT) Program Administrative Rules (Env-Wq 1500). If BMPs are not designed in accordance with the AoT Rules, NHDES may require lower removal efficiencies to be used in the analysis.

BMP in Series: When BMPs are placed in series, the BMP with the highest removal efficiency shall be the efficiency used in the model for computing annual loadings. Adding efficiencies together is generally not allowed because removals typically decrease rapidly with decreasing influent concentration and, in the case of primary BMPs (i.e., stormwater ponds, infiltration and filtering practices), pre-treatment is usually part of the design and is therefore, most likely already accounted for in the efficiencies cited for these BMPs.

Pollutant Removal Efficiencies for Best Management Practices for Use in Pollutant Loading Analysis				Values Accepted for Loading Analyses		
BMP Type	**BMP**	**Notes**	**Lit. Ref.**	**TSS**	**TN**	**TP**
Stormwater Ponds	Wet Pond		B, F	70%	35%	45%
	Wet Extended Detention Pond		A, B	80%	55%	68%
	Micropool Extended Detention Pond	TBA				
	Multiple Pond System	TBA				
	Pocket Pond	TBA				
Stormwater Wetlands	Shallow Wetland		A, B, F, I	80%	55%	45%
	Extended Detention Wetland		A, B, F, I	80%	55%	45%
	Pond/Wetland System	TBA				
	Gravel Wetland		H	95%	85%	64%
Infiltration Practices	Infiltration Trench (≥75 ft from surface water)		B, D, I	90%	55%	60%
	Infiltration Trench (<75 ft from surface water)		B, D, I	90%	10%	60%
	Infiltration Basin (≥75 ft from surface water)		A, F, B, D, I	90%	60%	65%
	Infiltration Basin (<75 ft from surface water)		A, F, B, D, I	90%	10%	65%
	Dry Wells			90%	55%	60%
	Drip Edges			90%	55%	60%
Filtering Practices	Aboveground or Underground Sand Filter that infiltrates WQV (≥75 ft from surface water)		A, F, B, D, I	90%	60%	65%
	Aboveground or Underground Sand Filter that infiltrates WQV (<75 ft from surface water)		A, F, B, D, I	90%	10%	65%
	Aboveground or Underground Sand Filter with underdrain		A, I, F, G, H	85%	10%	45%
	Tree Box Filter	TBA				
	Bioretention System		I, G, H	90%	65%	65%
	Permeable Pavement that infiltrates WQV (≥75 ft from surface water)		A, F, B, D, I	90%	60%	65%
	Permeable Pavement that infiltrates WQV (<75 ft from surface water)		A, F, B, D, I	90%	10%	65%
	Permeable Pavement with underdrain		Use TN and TP values for sand filter w/ underdrain and outlet pipe	90%	10%	45%

Pollutant Removal Efficiencies for Best Management Practices for Use in Pollutant Loading Analysis				Values Accepted for Loading Analyses		
BMP Type	**BMP**	**Notes**	**Lit. Ref.**	**TSS**	**TN**	**TP**
Treatment Swales	Flow Through Treatment Swale	TBA				
Vegetated Buffers	Vegetated Buffers		A, B, I	73%	40%	45%
Pre-Treatment Practices	Sediment Forebay	TBA				
	Vegetated Filter Strip		A, B, I	73%	40%	45%
	Vegetated Swale		A, B, C, F, H, I	65%	20%	25%
	Flow-Through Device - Hydrodynamic Separator		A, B, G, H	35%	10%	5%
	Flow-Through Device - ADS Underground Multichamber Water Quality Unit (WQU)		G, H	72%	10%	9%
	Other Flow-Through Devices	TBA				
	Off-line Deep Sump Catch Basin		J, K, L, M	15%	5%	5%

Appendix F

DCIA Tracking Spreadsheet

Directly Connected Impervious Area Tracking Worksheet
City of Stamford Drainage Manual

Note to user: complete all cells of this color *only*

Part 1: General Information	
Project Name	0 & 172 Greyrock Place, & 154 Broad Street
Project Address	0 & 172 Greyrock Place, & 154 Broad Street
Project Applicant	Greyrock Development LLC, c/o Redniss & Mead
Date of Submittal	4/9/2021
Tax Account Number	002-6852, 003-7922, & 004-1972

Part 2: Project Details		
1. What type of development is this? (choose from dropdown)	Redevelopment	
2. What is the total area of the project site?	56,310	ft^2
3. What is the total area of land disturbance for this project?	56,310	ft^2
4. Does project site drain to High Quality Waters, a Direct Waterfront, or within 500 ft. of Tidal Wetlands? (Yes/No)	No	
5. What is the current ***DCIA*** for the site?	9,767	ft^2
6. Will the proposed development increase ***DCIA*** (without consideration of proposed stormwater management)? (Yes/No)	Yes	
7. What is the proposed-development ***total impervious area*** for the site?	51,128	ft^2

Part 3: Water Quality Target Total		
Does Standard 1 apply based on information above?	Yes	
Water Quality Volume (WQV)	4069.2	ft^3
Standard 1 requirement	Retain WQV on-site	
Required retention volume	4069.2	ft^3
Provided retention volume for proposed development	4,553.0	ft^3

Part 4: Proposed DCIA Tracking		
Pre-development ***total impervious area***	9,767	ft^2
Current ***DCIA***	9,767	ft^2
Proposed-development ***total impervious area***	51,128	ft^2
Proposed-development ***DCIA*** (after stormwater management)	5,533	ft^2
Net change in ***DCIA*** from pre-development to proposed-development	-4,234	ft^2

Part 5: Post-Development (As-Built Certified) DCIA Tracking		
Post-development (per as-built) ***total impervious area***		ft^2
Post-development (per as-built) ***DCIA*** (after stormwater management)		ft^2
Net change in ***DCIA*** from pre-development to post-development		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 _____

Appendix G

Operation and Maintenance Agreement

Block _____

AGREEMENT COVENANT

AGREEMENT made this _____ by and between _____ and the **CITY OF STAMFORD,** a municipal corporation lying within the County of Fairfield and State of Connecticut, acting herein by its duly authorized Mayor, David R. Martin (hereinafter referred to as the "City"), and the **ENVIRONMENTAL PROTECTION BOARD OF THE CITY OF STAMFORD,** acting herein by its duly authorized Chairman, Gary H. Stone (hereinafter referred to as the "EPB").

WITNESSETH:

WHEREAS, OWNER has commenced the planning and construction of _____ on a parcel of land owned by them and as more particularly described on Schedule "A", attached hereto and made a part hereof (the "Property").

WHEREAS, certain drainage facilities ("Drainage Facilities"), including but not limited to _____ as more particularly described on Schedule "B" attached (the "Construction Plans") shall be installed in connection with the aforesaid construction and in accordance with the Construction Plans and _____ issued therefore, (the "Permit") and;

WHEREAS, OWNER, the CITY and EPB share a joint concern that the Drainage Facilities be maintained in a functioning condition so as to avoid pollution of surface and groundwaters, flooding and/or improper drainage.

NOW, THEREFORE, in consideration of ten dollars and other good and valuable consideration receipt of which is hereby acknowledged by the OWNER, it is hereby agreed as follows:

1) OWNER shall clean the drainage facilities or cause such facilities to be cleaned by periodic removal of accumulated sediment and debris in a good and workman-like manner, at least two (2) times during every twelve (12) month period, which times shall be in the period between April and June and between October and December and more often as the City may determine to be necessary.

2) OWNER shall sweep, or cause to be swept, garage facilities, driveways and roadway surfaces located on the Property at least once per calendar quarter.

3) OWNER shall utilize only sand or calcium chloride in connection with the de-icing of areas within the Property meaning and intending that road salt (Sodium Chloride) shall not be used for said purpose.

4) OWNER shall repair or replace any defects or defective drainage facilities so as to maintain the drainage facilities, at all times, in a fully functional capacity.

5) OWNER shall file as-built drainage plans with the EPB immediately upon the completion of work. Said plans shall be prepared by a professional engineer/surveyor registered in the State of Connecticut.

6) OWNER grants the CITY and/or EPB, its agents, and employees, the right to enter the Property at all reasonable times upon twenty-four (24) hours notice to the OWNER for the purpose of inspecting the Property to determine if OWNER is complying with the requirements hereunder. A representative of the Owner shall have the right to accompany the City and/or EPB on their inspection of the Property.

7) If, after an inspection is made pursuant to Paragraph Six (6) hereof, the CITY and/or EPB determines that the owner has failed to comply with the aforesaid undertakings, then the CITY and/or EPB shall give written notice of said determination to the then OWNER of the Property which notice shall also specify the said failure. Said notice shall be sent by registered or certified mail to the last known address of said Owner. If the Owner disputes the claim, he shall give written notice thereof to City and/or EPB within ten (10) days of receipt of said notice, and the EPB shall hold a hearing as promptly as possible to decide the merits of the disputed claim. If the claim is not disputed within said ten (10) days, the OWNER shall have thirty (30) days from the receipt of said notice to correct said failure, unless it is impossible to cure said defect within said time, in which case, the necessary repairs shall be immediately commenced and diligently pursued to completion within a reasonable time.

8) If the said failure is not remedied within the time frame herein stated, the CITY and/or EPB may proceed to cure the same and charge the actual cost thereof to the OWNER of the Property.

9) OWNER agrees to reimburse the CITY and/or EPB for reasonable legal fees and court costs if it becomes necessary for the CITY and/or EPB to sue for reimbursement of sums expended by the CITY and/or EPB in performance of OWNER'S obligation.

10) OWNER agrees and covenants to indemnify and save harmless the CITY and the EPB against any and all claims, suits, actions or judgments arising out of the delay in the performance of any of their obligations pursuant to this Agreement.

11) OWNER agrees that this covenant and restriction shall apply to and run with the land. It shall be binding on all future owners, administrators, executors, successors and assigns.

12) The OWNER hereby represents to the CITY and EPB that he/she is the owner, in fee simple, of all of the property described in "Schedule A" attached hereto and made a part hereof.

13) OWNER agrees that this Agreement and restrictive covenant upon execution of the same, shall be recorded on the land records at the OWNER'S expense at the time that a permit is issued for the Property herein and while the OWNER is in title.

14) OWNER agrees not to assert the invalidity of this document.

15) OWNER agrees that nothing herein shall be construed to be a limitation upon the right of the EPB to assert and enforce any rights it may have under federal, state or City statute, ordinance or regulation.

16) This agreement shall be governed by the laws of the State of Connecticut.

IN WITNESS WHEREOF, the said parties hereto have hereunto set their hands and seals, the day and year first above written.

WITNESSED:

_____ **THE CITY OF STAMFORD**

_____ BY: _____
David R. Martin
Its duly authorized Mayor

_____ **THE ENVIRONMENTAL PROTECTION BOARD**

_____ BY: _____
Gary H. Stone
Its duly authorized Chairman

_____ **OWNER**

BY: _____

_____

(Owner's Name)

(Acknowledgement on the Following Page)

STATE OF CONNECTICUT}
} ss: STAMFORD Date: _____
COUNTY OF FAIRFIELD }

Personally appeared David R. Martin, Mayor of the City of Stamford, signer and sealer of the foregoing Instrument, and acknowledged the same to be his free act and deed and the free act and deed of said City, before me.

_____
Commissioner of the Superior
Court or Notary Public

STATE OF CONNECTICUT}
} ss: STAMFORD Date: _____
COUNTY OF FAIRFIELD }

Personally appeared Gary H. Stone, Chairman of the Environmental Protection Board of the City of Stamford, signer and sealer of the foregoing Instrument, and acknowledged the same to be his free act and deed and the free act and deed of said Commission, before me.

_____
Commissioner of the Superior Court
or Notary Public

STATE OF CONNECTICUT}
} ss: STAMFORD Date: _____
COUNTY OF FAIRFIELD }

Personally appeared_____signer and sealer of the foregoing instrument, and acknowledged the same to be_____free act and deed, before me.

_____
Commissioner of the Superior Court
or Notary Public

Appendix H

Sanitary Sewer Flow Monitoring
Sanitary Sewer Analysis
Sanitary Sewer Connection Exhibit

Redniss & Mead

ENGINEERS · SURVEYORS · PLANNERS · WWW.REDNISSMEAD.COM
22 FIRST STREET · STAMFORD, CONNECTICUT 06905 · (203) 327-0500

Sanitary Sewer Flow Monitoring

Project:	*0 & 172 Grerock Place, & 154 Broad Street*	**Project #:**	*5450*		
Location:	*Stamford, CT*	**By:**	*JTF*	**Date:**	3/25/2021
Description:	*Ex. 15" Sanitary Sewer Main in Greyrock Place*	**Checked:**	*TM*	**Date:**	3/25/2021

Pipe Material:	RCP	Area:	1.23 SF	Slope:	0.034 FPF [1]
Manning's n:	0.013	Wetted Perimeter	3.93 ft		
Pipe Diameter:	15 ''	Hydraulic Radius:	0.31 ft	**Pipe Capacity:**	11.91 cfs [2]

		EX. SAN. MH#1					
DATE	TIME	Depth of Ex. San. MH#2 (in)	Depth to San. Flow (in)	Depth of Flow in 15" Sewer Main (in)	Proportional Flow Depth d/D	% Capacity	Measured Flow Rate[3]
03/25/21	7:30 AM	137.52	136.50	1.02	0.07	2%	0.24 cfs
03/25/21	8:00 AM	137.52	136.00	1.52	0.10	3%	0.36 cfs
03/25/21	8:30 AM	137.52	135.13	2.39	0.16	5%	0.60 cfs
03/25/21	9:00 AM	137.52	135.50	2.02	0.13	4%	0.48 cfs
03/25/21	11:30 AM	137.52	135.50	2.02	0.13	4%	0.48 cfs
03/25/21	12:00 PM	137.52	135.56	1.96	0.13	4%	0.48 cfs
03/25/21	12:30 PM	137.52	135.75	1.77	0.12	4%	0.48 cfs
03/25/21	1:00 AM	137.52	135.37	2.15	0.14	5%	0.60 cfs
03/25/21	4:30 PM	137.52	135.50	2.02	0.13	4%	0.48 cfs
03/25/21	5:00 PM	137.52	135.44	2.08	0.14	5%	0.60 cfs
03/25/21	5:30 PM	137.52	135.00	2.52	0.17	6%	**0.71 cfs**
03/25/21	6:00 PM	137.52	135.50	2.02	0.13	4%	0.48 cfs

Notes:

1) Site visits made during peak hours to measure depths of sanitary flow.
2) Existing Sanitary Manhole #1 is located in the sidewalk on the northwest corner of Greyrock Place and Broad Street

[1] Slope per City of Stamford Sanitary Sewer Records, Book 1020 Page 24

[2] Pipe capacity calculated using Manning's equation: $Q = \frac{1.486}{n} A R_h^{2/3} S^{1/2}$

[3] Measured flow rate calculated per Manning's flow rate in a partially full pipe

Sanitary Sewage Analysis

Project:	*0 & 172 Grerock Place, & 154 Broad Street*	**Project #:**	*5450*	**Date:**	*4/9/2021*
Location:	*Stamford, CT*	**By:**	*JTF*	**Checked:**	*TM*

Proposed Sanitary Sewer Flows

Source	Units	# of Bedrooms	Bedrooms	Expected Flow (Gal/bed)	Generated Flows (Gal/Day)	ADF Factor	Peak Generated Flow (Gal/day)	Peak Generated Flows (cfs)
1 Bedroom	149	1	149	150	22,350	4	89,400	0.138
2 Bedroom	79	2	158	150	23,700	4	94,800	0.147
Sub-total:	*228*		*307*		*46,050*		*184,200*	*0.285*

Source	SF	Population (Refer to Note 1)	Design Flow (Gal/Day)	Generated Flows (Gal/Day)	ADF Factor	Peak Generated Flow (Gal/day)	Peak Generated Flows (cfs)
Office	7,892	39	20.00	780.0	4	3,120	0.005
Garage				1,000.0	4	4,000	0.006
Sub-total:				*1,780.0*		*7,120*	*0.011*
Total:				*47,830*	0.0740	*191,320*	*0.296*

Notes:

1. Office (average 200SF gross area/person), per employee at 20 GPD
2. Estimated GPD Sewage Flows obtained from the CT Public Health Code
3. No flow from Amenity spaces are accounted for as tenants will be using amenties
4. Potential garage flow assumes the garage is power washed with non-emulsion cleaning products.

REDNISS & MEAD

NORTH - C.C.S. NAD-27

BROAD STREET

GREYROCK PLACE

CONC. PAD
2 1/2 STORY FRAME
ROOFED PORCH
CONCRETE WALK
LTPOLE
BOLLARD
CONCRETE CURB
GAS METERS
SP CLEAN OUT
FLAGPOLE
SIGN
MH
ELEC. MH
TP#1
SHC#2
ASPHALT PARKING & DRIVE
TP#2
SHC#1
TP#3
DUMPSTERS
SHC#3
TP#4
SHC#4
TP#5
PARKING GARAGE
BUS STOP SHELTER
HANDHOLE
TEL MH
LTPOLE
MAILBOX
GV
WV
TRAFFIC CONTROL
WALK SIGNAL
DWS
TRAFFIC POLE

EXISTING 6" CLAY SANITARY MAIN

EXISTING 12" RCP SANITARY MAIN

DEVELOPMENT 12" SEWER CONNECTION

EX.SAN.MH#1

EXISTING 15" RCP SANITARY SEWER MAIN @ 0.034 FPF PER CITY OF STAMFORD RECORDS

EXISTING 15" RCP SANITARY MAIN

EXISTING 8" SANITARY MAIN

EXISTING 15" RCP SANITARY SEWER MAIN FLOWING SOUTH TOWARDS TRESSER BOULEVARD

SANITARY SEWER CONNECTION EXHIBIT

154 BROAD STREET, 0 & 172 GREYROCK PLACE
STAMFORD, CT

REDNISS & MEAD

LAND SURVEYING
CIVIL ENGINEERING
PLANNING & ZONING CONSULTING
PERMITTING

22 First Street | Stamford, CT 06905
Tel: 203.327.0500 | Fax: 203.357.1118
www.rednissmead.com

COMM. NO.:	DATE:
5450H	04/09/2021
	SCALE: 1"=40'

4/8/2021 2:03 PM G:\JOBFILES\5000\5400\5450\dwg\5450H DBs.dwg

Appendix I

Checklist for Stormwater Management Report

City of Stamford
Engineering Bureau
888 Washington Boulevard, 7th Floor Stamford, CT 06901
Phone 203-977-4189

CHECKLISTS

Project Name: 0 & 172 Greyrock Place, 154 Broad Street

Project Address 0 & 172 Greyrock Place, 154 Broad Street

Property Owner(s) Greyrock Development LLC

Tax Account Number(s) 002-6852, 003-7922, & 004-1972

Engineer's Signature _____ Date: 04/05/2021

All checklists must be completed and submitted. Provide a brief explanation for any items not provided. Check boxes as completed or N/A as not applicable.

✔	**Existing Conditions Plan**
✔	**Stormwater Management Report**
	Stormwater Management Plan / Construction Plan
	Certificate of Occupancy

Checklist for Existing Conditions Plan

I. General Information

✔	Site address
✔	Orientation, block, zone, City, street name
✔	Applicant name and legal address
✔	Surveyor name, address, contact information
✔	North arrow, bar scale, horizontal and vertical datum
✔	24" x 36" sheet size unless otherwise approved
✔	Existing conditions survey shall be prepared in accordance with the Minimum Standards for Surveys and Maps in the State of Connecticut. The class of survey shall be A-2 and T-2 and shall be represented as such on the map. The base map shall be sealed and signed by a Professional Land Surveyor licensed in the State of Connecticut.
✔	Drawing scale shall be set at 1" = 20' or 1" = 40' when possible

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II. Existing Conditions Plan Elements

✔	Show and label all property boundaries with linear bearing / distances and curve information
✔	Required zoning setbacks
✔	Show and label monument information
✔	Show and label at least one permanent benchmark on the parcel with northing, easting and elevation
✔	Label adjacent property ownership information
✔	Existing contours based on NAVD 88 (no exceptions) at 2 foot contour interval or 1 foot contour interval when slope is flatter than 2 percent at a minimum of 20 ft. beyond the property boundaries of the subject parcel
✔	Show spot elevations at low points, high points, and where topography is flatter than 2 percent
✔	All buildings and structures (label current use and finished floor elevations)
✔	All pavement, parking, driveways, property access points
✔	All roadways, streets, and rights-of-way. Label streets as public or private with street name
✔	All patios, decks, walkways, sidewalks, curb ramps (both adjacent to and opposite and existing roadways or intersections)
✔	Show and label (size, material, inverts) all existing utilities (overhead and underground) within the right-of-way and the project site (label ownership) including but not limited to water, gas and electrical services, wells, storm sewers, sanitary sewers and subsurface sewerage disposal systems.
✔	Show and label existing conveyance systems (swales, ditches, storm drains) including dimensions, elevations, sizes, slopes, and direction of flow
✔	Show and label boundaries of all easements, both public and private, with type, owner, and width
✔	Show and label all other existing features and improvements (e.g. light poles, mature trees of 8" (dbh) diameter or greater, vegetation, walls with top and bottom elevations, fences, pavement markings)

III. Resource Areas

N/A		Show and label limits of inland wetlands, tidal wetlands and any associated setbacks.
N/A		Show and label existing natural site features including tree canopy, outcroppings, permanent and intermittent watercourses, waterbodies, streams
N/A		Show and label limits of floodplain and floodway along with FIRM references (Community Number, Panel, Suffix, and Date) including any effective Letters of Map Revision/Amendment, zone designation and elevation.
N/A		Show and label any Conservation Easement Areas
N/A		Show and label Connecticut Coastal Jurisdiction Line (CJL)
N/A		Show and label existing steep slopes (25% and greater)

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Checklist for Stormwater Management Report

I. Project Report

A. Applicant / Site Information

✔	Applicant name, legal address, contact information (email & phone)
✔	Engineers name, legal address, contact information (email & phone)
✔	Site address and legal description
✔	Current / proposed zoning and land use
✔	Site vicinity map (8.5" x 11")

B. Project Description and Purpose

✔	Project description including proposed project elements and anticipated construction schedule

C. Existing Conditions Description

✔	Site area, ground cover, vegetation, features (roads, buildings, utilities, etc.)
✔	Site topography, slopes, drainage patterns, conveyances systems (swales, storm drains, etc.), stormwater discharge locations
✔	Receiving waterbody information including stormwater impairments and TMDL information (See the most recent State of Connecticut Integrated Water Quality Report)
✔	Site soils information including soil types, hydrologic soil group, bedrock / outcroppings, groundwater elevation, significant geologic features
✔	Provide NRCS Soils Mapping
N/A	Resource protection areas (wetlands, streams, lakes, etc.), buffers, floodplains, floodways

D. Summary of Applicable General Design Criteria

✔	Methodology, design storm frequency
✔	Hydrologic design criteria
✔	Hydraulic design criteria
N/A	Flood hazard areas

	Applying under "Lite" Stormwater Management: Skip to Section I (Refer to Flow Chart on page vii of the City of Stamford Stormwater Drainage Manual)

E. Project Type in Accordance with Standard 1 Definitions

✔	Area of disturbance, receiving waterbody classification (High Quality, Tidal Wetlands, Direct Waterfront)
✔	Project type (development, redevelopment, linear development)
✔	Pollutant reduction standard per flowchart Section 2.4

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F. Summary of LID Site Constraints

✔	Description of sensitive areas for protection
✔	Mature tree inventory, which shall include 8-inch (dbh) diameter trees or greater
✔	Steep slopes
✔	Ledge and bedrock depth
✔	Seasonal high groundwater elevation
N/A	Pollutant hotspots
✔	Summary of infiltration rates

G. Summary of Proposed Stormwater Treatment Practices

✔	Proposed LID controls (i.e. minimize impervious, minimize DCIA, minimize disturbance, increase time of concentrations, other LID controls and strategies)
✔	Location, size, types
✔	Design criteria and references
✔	Stormwater treatment practice, drainage area characteristics / details

H. Summary of Compliance with Standards 1

✔	Required pollutant reduction criteria
✔	Provided pollutant reduction (WQV) by stormwater treatment practice
✔	Summary of compliance with Standard 1

I. Summary of Compliance with Standards 2, 3, and 4

✔	Description of proposed stormwater management system
✔	Pre-development site hydrology with delineation of each watershed area and sub-basin
✔	Post-development site hydrology with delineation of each watershed area and sub-basin
✔	Comparison table of pre- and post-development hydrology, peak flow, volume, and percent difference
✔	Summary table of watershed areas and sub-basin areas, time of concentration and runoff coefficients
N/A	Summary table demonstrating the 2-year, 24-hour post development peak flow rate is less than or equal to the lowest of either: - The pre-development 1-year, 24-hour storm peak flow rate - 50 percent of the pre-development 2-year, 24-hour storm peak flow rate
✔	Conveyance protection, emergency outlet sizing
✔	Hydraulic grade line summary and tail water elevation used in analysis
✔	Construction erosion and sediment control description, Standard 3
✔	Operation and Maintenance, maintenance tasks and schedule on construction plans per Standard 4

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J. Summary of Compliance with Applicable Drainage Facility Design Requirements

✔	Description of applicable design requirements and compliance
✔	Description of proposed drainage facilities and compliance

K. Stormwater Management Report

✔	Signed and stamped by professional engineer licensed in the State of Connecticut
✔	Drainage impact statement in accordance with Standard 5B.

II. Supporting Calculations (as appendix to Project Report)

	Applying under "Lite" Stormwater Management: Skip to Section N

L. Water Quality Volume / Water Quality Flow Calculations

✔	Calculations demonstrating the total Water Quality Volume generated by the post-development site and the required retention/treatment volume per Standard 1 in cubic feet.
✔	Calculations demonstrating the total Water Quality Volume retained/treated by each stormwater treatment practice and the total Water Quality Volume generated by the post-development contributing drainage area to each stormwater treatment practice

M. Stormwater Treatment Practice Sizing Calculations

✔	Calculations demonstrating how each stormwater treatment practice has been designed and sized in accordance with the Structural Stormwater BMP Design references in Appendix B. Calculations will vary by stormwater treatment practice, but a minimum, applicants shall provide calculations in accordance with design criteria from the Connecticut Stormwater Quality Manual.

N. Hydrologic and Hydraulic Design Calculations

		Stream channel protection, Standard 2A
	✔	Conveyance protection, Standard 2B
	✔	Peak flow control (1-year, 2-year, 5-year, 10-year, 25-year, and 50-year storms), Standard 2C
N/A		Inlet analysis
N/A		Gutter flow (Site by site basis as requested by Engineering Bureau)
	✔	Storm sewers and culverts (velocities, capacity, hydraulics)
N/A		Hydraulic grade line required when pipe is flowing at full capacity o Provide existing and proposed summary table o Provide existing and proposed mapping, label structures
N/A		Detention facilities (outlet structure, stage/storage, freeboard)
	✔	Emergency outlet sizing, safely pass the 100 year storm, Standard 2D
N/A		Outlet protection calculations, based on conveyance protection (i.e. riprap, energy dissipater)

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O. Hydrologic and Hydraulic Model, Existing and Proposed

✔	Drainage routing diagram
✔	Summary
✔	Storage pond input

P. Downstream analysis (Site by site basis as required by the Engineering Bureau)

N/A		Downstream analysis, Standard 2E

III. Supporting Mapping (as appendix to Project Report)

Q. Pre-Development Drainage Basin Area Mapping

✔	11" x 17" or 8.5" x 11" sheet size
✔	Topography, drainage patterns, drainage area boundaries and sub basins, flow paths, times of concentration
✔	Locations of existing stormwater discharges
N/A	Perennial and intermittent streams, wetlands, and floodplain / floodways
✔	NRCS soil types, locations, boring locations, infiltration testing locations
✔	Vegetation and groundcover
✔	Existing roads, buildings, driveways, parking areas, walks, patios, pools and other impervious surfaces, decks and other structures
✔	Location, size, type of existing structural stormwater controls, facilities and conveyance systems

R. Post-Development Drainage Basin Area Mapping

✔	11" x 17" or 8.5" x 11" sheet size
✔	Topography, drainage patterns, drainage area boundaries and sub basins, flow paths, times of concentration
✔	Locations of proposed stormwater discharges
N/A	Perennial and intermittent streams, wetlands, and floodplain / floodways
✔	NRCS soil types, locations, boring locations, infiltration testing locations
✔	Vegetation, ground cover and proposed limits of clearing/disturbance
✔	Proposed, roads, buildings, driveways, parking areas, walks, patios, pools and other impervious surfaces, decks and other structures
✔	Location, size, type of proposed structural stormwater controls, facilities and conveyance systems

IV. DCIA Tracking Worksheet (as appendix to Project Report)

✔	DCIA Tracking Worksheet (Use form found in Appendix E)

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V. Proposed LID Review Map

	Applying under "Lite" Stormwater Management - Proposed LID Review Map NOT required.

A. General

✔	Site address
✔	Applicant name, legal address, contact information
✔	Engineers name, address, contact information
✔	North arrow, bar scale, horizontal and vertical datum
✔	Drawing scale shall be set at 1"=20' or 1"=40' when possible
✔	Signed and stamped by a Licensed Professional Engineer in the State of Connecticut
✔	11" x 17" or 24" x 36" sheet size unless otherwise approved
✔	Existing and proposed contours based on NAVD 88 at 2 foot contour interval or 1 foot contour interval when slope is flatter than 2 percent
✔	Locations of existing stormwater discharges
✔	Roads, buildings, driveways, parking areas, walks, patios, pools and other impervious surfaces, and decks and other structures
✔	Location, size, ownership of stormwater conveyance systems (swales, pipes, etc.)

B. LID Constraints:

	✔	Boring / test pit locations
	✔	Infiltration testing locations and results
	✔	Vegetation and proposed limits of clearing / disturbance
	✔	NRCS soils mapping
N/A		Steep slopes
N/A		Surface waters / Perennial and intermittent streams
N/A		Resource protection areas and buffers, wetlands, floodplain / floodways
	✔	Existing vegetation and mature trees, which shall include 8-inch (dbh) diameter trees or greater
	✔	Poor soils (HSG C & D)
N/A		Shallow bedrock / ledge
N/A		Seasonal high groundwater elevation
		Other site constraints (e.g. brownfield caps)

C. Proposed Stormwater Treatment Measures:

✔	Location, size, type, limits, and WQV provided by each proposed stormwater treatment practices
✔	Drainage area to each proposed stormwater treatment practice (total area, impervious area, WQV)

D. Site Summary Table:

✔	Total site area, disturbed area, pre- and post-development impervious areas
✔	Required pollutant reduction volume (retention or detention)
✔	Provided pollutant reduction volume (retention or detention)