SITE ENGINEERING REPORT

Oak Park Living Community
0 Ursula Place
Stamford, CT

Prepared For
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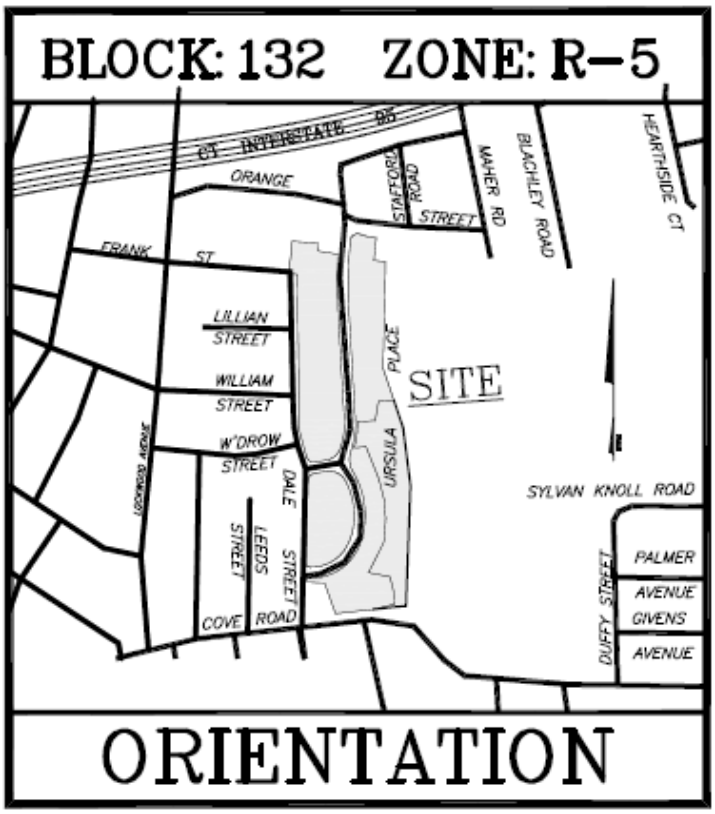

BLOCK: 132 ZONE: R-5
CT INTERSTATE 95
ORANGE
STAFFORD ROAD
STREET
MAHER RD
BLACHLEY ROAD
HEARTHSIDE CT
FRANK ST
LILLIAN STREET
WILLIAM STREET
W'DROW STREET
LOCKWOOD AVENUE
DALE STREET
LEEDS STREET
COVE ROAD
PLACE
SITE
URSULA
SYLVAN KNOLL ROAD
PALMER AVENUE
GIVENS AVENUE
DUFFY STREET
ORIENTATION

Narrative

Project Description:

The Stamford Housing Authority (owner/applicant), d/b/a Charter Oak Communities (COC), is planning to redevelop the existing living community known as Oak Park in the Cove neighborhood of Stamford. The site, including the Ursula Park Townhomes also owned and operated by COC consists of 14.6 acres of land, divided among four separate parcels of land on either side of Ursula Place. The Site is in Master Plan Category 3 (Residential – Low Density Multifamily) and the R-5 (Multiple Family Medium Density Design) Zoning District. The proposed redevelopment will completely revitalize this community by replacing all 27 existing apartment buildings with new, larger and more attractive apartment buildings. The redevelopment will also include a number of new on-site parking locations to meet the required unit to parking space ratio. The site is serviced by public water & sewers.

Existing Conditions:

The property is currently developed with 27 garden style townhouse buildings, containing a total of 166 apartment units, originally constructed between 1947 and 1955 (post-world war II). Various small-scale surface parking lots are scattered throughout the property to provide tenant parking and there are networks of concrete sidewalks linking the apartment buildings to the parking areas and/or on-street parking. The property is adjacent to Chelsea Piers to the east, a dense residential neighborhood to the west, Cove Road to the South and Orange Street to the north. Existing landscaping includes 200+ trees, many of which are mature oak trees (hence the name Oak Park) shrubs, maintained lawn areas, numerous exposed ledge/rock outcroppings & a sloped wooded area on the far east side of the land. The northern half of the property (north of the cut through from Ursula to Dale Street) is sloped from east (el. 44±) to west (el. 18±). There are three significant pockets of exposed ledge behind the buildings fronting on Ursula Place to the east and Dale Street to the west. The southern half of the property (south of the cut through) is gently sloped from east (el. 24±) to west (el. 16±). The property does not lie within a drinking water supply watershed. The property does not lie within a FEMA designated Flood Hazard Area.

Drainage Patterns & Conveyance System – 48" Storm Sewer

Runoff from the entire site drains to an existing 48" reinforced concrete storm sewer within Dale Street. This 48" drain enters the southerly portion of the project site and runs parallel to the west side of the southerly parking lot before connecting into the Cove Road storm drain system. The pipe continues south from Cove Road through the rear yards of private properties on Van Buskirk Ave, crossing East Ave and eventually outleting into an existing tidal pond within Cummings Park. We have studied the watershed area tributary to this pipe through a careful review of City storm sewer maps, CTDOT maps, field inspections, available State & local G.I.S. data and discussions with City staff responsible for maintaining the storm sewer system. We have determined the watershed area to be 181 acres of land which is tributary to a point within the system located at the intersection of Lawn Ave & Helen Place north of Interstate 95 (I-95) and route 1. This report breaks the watershed into four basins as follows:

1. North Basin: 40.6± acres of land north of route 1, zoned R-5/R-6 with an assumed impervious coverage of 65%, consistent with 1/8-acre zone development (per TR-55).
2. Route 1 Basin: 11± acres of land, zoned C-B with an assumed impervious coverage of 85%, consistent with urban commercial zone development (per TR-55).
3. South Basin: 61± acres of land south of I-95, zoned R-5 with an assumed impervious coverage of 65%, consistent with 1/8-acre zone development (per TR-55) and includes the subject property.
4. East Basin: 68.7± acres of land, zoned M-D, R-5 and R-7.5. The east basin is tributary to the 48" storm sewer downstream of the subject property and the selected study point for this report.

The watershed and basin boundary delineation are provided in Appendix B of this report. Discussions with City employees and neighboring property owners indicate that the 48" storm drain periodically backs up, flooding areas on and off-site. A hydraulic grade line study of the 48" storm sewer was prepared to evaluate the pipes capacity vs the contributing watershed. The study analyzes the pipe from the northern end of Dale Street to the point where the pipe crossed the southern property line of the subject property. This analysis utilizes StormCAD, a hydraulic modeling software from Bentley Systems, to model the pipe. The model results show that the 48" pipe exiting the site towards Cove Road can carry a flowrate of 61.65 cfs vs. a flowrate of 287.76 cfs in a 25-year storm event; 4.66 times the capacity of the pipe. Detailed results and the catchment area map can be found in appendix D of this report. The analysis utilizes a tailwater of 7.42 consistent with mean-high water in Stamford Harbor and includes the North, Route 1 and South Basins. The East Basin is excluded because its connection to the system is downstream of the study point. We ran an analysis of the 1-year storm event as well, which produced a flowrate of 140.87 cfs; 2.3 times the pipe capacity. Given the fact that the pipe capacity cannot accommodate the 1-year storm event under existing conditions, the proposed stormwater management design will aim to reduce both peak rates of runoff and runoff volume in all studied storm events up to and including the 100-year event, in an effort to help reduce the flow rate and volume of water the subject property contributes to the 48" storm drain.

Soils

The USDA Natural Resources Conservation Service's Web Soil Survey indicates the soils on the subject parcel to be primarily Urban Land within Hydrologic Soils Groups B & D. B-type soils generally covering the southern half of the property and D-type soils covering the northern half. Soil testing, consisting of a series of deep test pits were performed on-site to identify any sub-grade restrictive soil conditions (mottling, groundwater & ledge) and to confirm the hydrologic soil classification. A total of 24 deep test pits were performed. Given the testing results, we have determined the site soils to be consistent with the NRCS results. Shallow ledge was found in many of the northern testing locations as expected given its D-type classification. There were locations in this area with enough soil depth to accommodate infiltration, pending field verified infiltration rates. The southern half of the site yielded better results, particularly in the southwest area where predominantly sandy material was found. Ledge was rarely encountered in the southern areas of the property. Hydraulic conductivity tests will be performed in the northern locations where infiltration practices are proposed to confirm the infiltration rate of the receiving soil. Test pit results can be reviewed on site plan sheet SE-6. The location of each

test is depicted on site plan sheet SE-2(a/b) and SE-3(a/b) as well as on the Proposed LID Map (Appendix C).

Proposed Conditions:

The project includes the construction of 27 new townhouse-style buildings (3 to 7 units per building) along Dale and Ursula and one 26-unit apartment building along Cove Road. There will be one less unit under proposed conditions (166 units) than currently exists (167 units). There are five surface parking lots proposed throughout the site along with connecting sidewalks and a playground space. The project will result in 37,694 sq.ft. of additional impervious coverage compared to current site coverage. The increase in coverage is attributed to larger units footprints to accommodate modern living standards and additional on-site parking necessary to achieve the target unit to parking space ratio. Total site disturbance is expected to be 461,000 sq.ft., however the project will be constructed in three separate phases, so the actual area disturbed at any point will be significantly less.

Stormwater Management System & Project Classification

The proposed development is classified as a non-linear redevelopment project with existing directly connected impervious area less than 40%. As such, the proposed stormwater management design must comply with Standards 1 through 5 of the Stamford Drainage Manual. To comply with Standard 1, this project must provide 100% Water Quality Volume (WQV) via non-structural practices OR infiltration best management practices (BMP's). 100% WQV for this project equates to 19,952.5 cu.ft. (See DCIA worksheet in Appendix F). The design approach chosen is to provide the required water quality volume (WQV) using seven infiltration BMP's (see "Proposed Stormwater Treatment Practices").

Methodology & General Design Criteria

All drainage systems have been designed for Type III, 24-hour storm events. The project site is south of the Merritt Parkway and therefore is required to adequately accommodate peak runoff for all storms up to and including the 50-year design storm. The 24-hour design storm rainfall amounts and drainage distributions were obtained from the latest NOAA Atlas 14 Point Precipitation Frequency Estimates and storm distributions (Appendix A).

Proposed LID Techniques

Low impact development and site planning techniques were used to the maximum extent practicable given the existing constraints of this site and the scope of the proposed work. Non-structural LID techniques include development only within areas of the site already developed, limiting the amount of disturbance around the proposed improvements, and reducing the amount of land disturbed at any given time through a phased construction approach. The limit of disturbance for the proposed development has been set to allow for the proposed development, while aiming to minimize impact to adjacent trees and vegetation. The site currently has 221 existing trees (8" dbh min.). The project design team has worked closely with an Arborist from Almstead Tree & Shrub Care to evaluate the health of all existing trees as well as the impact of the proposed development on these trees. The provided development will result in the removal of 72 trees, 36 of which have been recommended for removal given poor health irrespective of the site plan. The proposed landscaping plan indicates 128 new trees, resulting in an additional 56 trees vs current conditions. Although often overlooked, trees provide a passive means of reducing runoff

volume, which is especially important given the capacity concerns of the receiving storm main. An inventory of each existing tree was prepared by Almstead and is included in Appendix I. The proposed grading has been designed to mimic the existing, adjacent site areas and avoids any steep slopes.

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 via seven water quality/infiltration BMP's and one detention BMP. Each BMP is described in detail below.

- **Surface Basin #1**: located in the southwest area of the property within the "egg" shaped parcel. Given the presence of sandy material and a deep restrictive soil layer in this location, this area will be re-graded to create a large & shallow depression. The surface treatment will be maintained lawn and is intended to be used as an open space for tenants to use recreationally when not raining. This system will collect, treat and infiltrate stormwater runoff generated from the nearby parking lot & townhouse roofs as well as the parking lot and three buildings across Ursula to the east. 34,645 sq.ft. of impervious coverage is tributary to this system. The BMP is designed to store 15,270± cu.ft. of stormwater, exceeding the required retention volume 2,995± cu.ft.
- **Surface Basin #2**: located west of the apartment building to the south. This location is currently a parking lot that acts as a poorly design detention basin given the bowl-like topography. Under proposed conditions, the parking lot will be removed, and the area will be treated as manicured lawn. The bowl topography of the area will be maintained in order to accommodate 18,670 sq.ft. of impervious coverage directed to it from the apartment building roof and parking lot. The basin will have a catch basin at the bottom (as it does today), with an 8" outlet pipe that connects to the 48" storm main. The 8" pipe will help meter stormwater exiting the basin, most effectively in the 10-year through 100-year storm events. Given that the area has historically been used as a parking lot, we are anticipated over-compacted soils and therefore are utilizing this system purely as a means of controlling peak rates of runoff. It should be noted that this location has developed a reputation for being a place for "after hours" gatherings. Initial reactions to the proposed change of use from a parking lot to a stormwater feature have been very positive, both from the housing authority, current tenants and the surrounding community.
- **Cultec #1**: located just north of the cut through from Ursula Place to Dale Street. It will consist of eight (8) Cultec C-100HD units to collect, treat and infiltrate stormwater runoff generated from the roof of 6-unit townhouse to the south totaling 3,264 sq.ft. of impervious coverage. The BMP is designed to store 289± cu.ft. of stormwater, exceeding the required retention volume 259± cu.ft.
- **Cultec #2**: located west of the apartment building parking lot. It will consist of three (3) Cultec R-280HD units to collect, treat and infiltrate stormwater runoff generated from the roof of 6-unit townhouse to the north totaling 3,264 sq.ft. of impervious coverage. The BMP is designed to store 278± cu.ft. of stormwater, exceeding the required retention volume 259± cu.ft.
- **Porous Asphalt #1**: located in the northern parking lot between Dale and Ursula. The northwest parking aisle will be finished with porous asphalt material with a crushed stone base. The footprint of

the asphalt and crushed stone base is 1,782 sq.ft. This BMP will accept, treat and infiltrate stormwater runoff generated from the northern half of the parking lot and two townhouse roofs to the east totaling 12,568 sq.ft. of impervious coverage. The BMP is designed to store 1,057± cu.ft. of stormwater, exceeding the required retention volume 1,016± cu.ft.

- **Porous Asphalt #2**: located in the northern parking lot between Dale and Ursula. The southwest parking aisles will be finished with porous asphalt material with a crushed stone base. The footprint of the asphalt and crushed stone base is 1,788 sq.ft. This BMP will accept and treat stormwater runoff generated from the southern half of the parking lot and a portion of two townhouse roofs to the east totaling 13,510 sq.ft. of impervious coverage. The BMP is designed to treat 1,294± cu.ft. of stormwater, exceeding the required treatment volume 1,095± cu.ft. This system is designed to be lined and under-drained due to the presence of ledge, therefore only water quality treatment is provided.
- **Porous Asphalt #3**: located in the small parking lot just north of the cut through from Ursula Place to Dale Street. The parking aisles will be finished with porous asphalt material with a connected crushed stone base beneath the porous material and the adjacent asphalt drive aisle. The footprint of the crushed stone base is 2,011 sq.ft. This BMP will accept, treat and infiltrate stormwater runoff generated from the the parking lot and the townhouse roof to the north totaling 5,170 sq.ft. of impervious coverage. The BMP is designed to store 1,055± cu.ft. of stormwater, exceeding the required retention volume 430± cu.ft.
- **Raingarden**: located in the northwestern corner of the property. The raingarden will provide 30 inches of bioretention soil mix to filter and infiltrate the receiving stormwater. This BMP will accept, treat and infiltrate stormwater runoff generated from the reconfigured parking lot to the east and the townhouse roof to the southeast totaling 7,488 sq.ft. of impervious coverage. The BMP is designed to store 1,213± cu.ft. of stormwater, exceeding the required retention volume 645± cu.ft.

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 pre-development drainage basin boundaries and the post-development drainage basin boundaries are shown in Appendix B. The selected study point for this analysis is the 48" storm sewer main exiting the property at the southern property line adjacent to Cove Road. Given the size of the studied watershed (112.13 acres), all off-site areas utilize an assumed percent impervious coverage dictated by the predominant land-use in the area. As previously noted, the North and South Basin off-site areas assume 65% impervious cover and the Route 1 basin off-site area assume 85% impervious cover. The results of the HydroCAD model used to analyze the pre- and post-development watershed conditions are presented in Appendix E. A comparison of the pre- and post-development peak discharge rates and volumes is provided in the tables below.

	48" Main Cove Road Peak Flow (cfs)			
Return Period (Years)	Ex	Pr	Change	% Change
1	145.25	144.2	-1.05	-0.72%
2	188.00	186.2	-1.80	-0.96%
5	258.04	255.04	-3.00	-1.16%
10	316.92	312.02	-4.90	-1.55%
25	396.95	389.29	-7.66	-1.93%
50	456.01	450.77	-5.24	-1.15%
100	519.62	513.88	-5.74	-1.10%

	48" Main Cove Road Runoff Volume (cu.ft.)			
Return Period (Years)	Ex	Pr	Change	% Change
1	764,401	759,472	-4,929	-0.64%
2	994,958	987,012	-7,946	-0.80%
5	1,380,436	1,367,876	-12,560	-0.91%
10	1,710,707	1,698,240	-12,467	-0.73%
25	2,166,654	2,154,237	-12,417	-0.57%
50	2,507,263	2,494,850	-12,413	-0.50%
100	2,877,296	2,864,874	-12,422	-0.43%

Comparison of the peak discharge rates for pre- and post-development watershed conditions demonstrates that both the peak rate of runoff and the runoff volume to the study point will be decreased for all studied storm events through the 100-year design storm, exceeding the requirement of control through the 50-year design storm. Reference is also made to Appendix D which includes information on calculations of water quality volume, conveyance calculations, 72-hour drawdown times and the existing conditions hydraulic grade line analysis of the 48" storm pipe to the study point.

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.

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 19,952.5 cu.ft. of stormwater (100% of the WQV) on-site using Non-Structural Practices or Infiltration BMP's. The proposed Stormwater Treatment Practice (subsurface infiltration & water quality treatment) provide 19,162 cu.ft. of infiltration storage and 1,294 cu.ft. of treatment, totaling 20,456 cu.ft. See "Proposed Conditions" for a detailed description of the system, its required WQV and provided storage volume.
B. The provided retention volume, 19,162 cu.ft., represents 96.0% of the required retention volume 19,952.5 cu.ft. Given the widespread presence of shallow ledge in the northern half of the property, we elected to provide an additional 1,294 cu.ft. of water quality treatment through the use of a lined porous asphalt system (Porous Asphalt #2). As previously noted, the project proposes to add 128 new trees, resulting in an increase of 58 trees when factoring in tree removal. Although not quantifiable by the stormwater manual, the increased tree count does provide runoff volume reduction/retention which should be considered.
C. The proposed development has been designed to minimize site disturbance and overall impact on the site by limiting the footprint of construction activities to the extent practical. It is proposed to delineate all construction activities with silt fence and install haybales & inlet filters at all functional/active drainage inlets effected by the construction. Furthermore, a comprehensive tree preservation plan has been provided by the project Landscape Architect to ensure existing trees to remain will survive the construction process.
D. Noted
E. TSS removal rates are provided in Appendix D of this report.
F. Non-structural Low Impact Development (LID) approaches implemented for this project include "increasing site tree count and vegetative cover" and "avoiding the disturbance of steep slopes".

Standard 2: Peak Flow Control

A. Stream channel protection is not proposed for this project as the subject development does not discharge 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 100-year design storm event exceeding the requirements defined in section 3 of the drainage manual. Refer to the HydroCAD model found in Appendix E. Refer to Conveyance Calculation Worksheet found in Appendix D.
C. The post-development peak flow rates from the 1-year, 2-year, 5-year, 10-year, 25-year,50-year, and 100-year 24-hour storms are controlled to the corresponding pre-development peak discharge rates. Reference is made to the HydroCAD report found in Appendix E.

D. Emergency Outlets have been designed to adequately pass the post-development flow from the 100-year, 24-hour storm event in a controlled manor as demonstrated in the HydroCAD model found in Appendix E. Outlet protection calculations, where applicable, are provided in Appendix D.
E. Noted

Standard 3: Construction Erosion and Sediment Control

A. Site plan sheet SE-4(a/b) depicts erosion control measures to be implemented to control construction related impacts. Sediment and erosion controls such as silt fencing, silt sack area drain protection, and haybale outlet protection are proposed. Furthermore, the project will be split into three separate phases, which limits the amount of site disturbance at any given point during construction.

Standard 4: Operation and Maintenance

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

Standard 5: Stormwater Management Report

A. This document and its associated appendices serve as the required Stormwater Management Report.
B. 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 Analysis – Dale Street 10" Tile Sewer

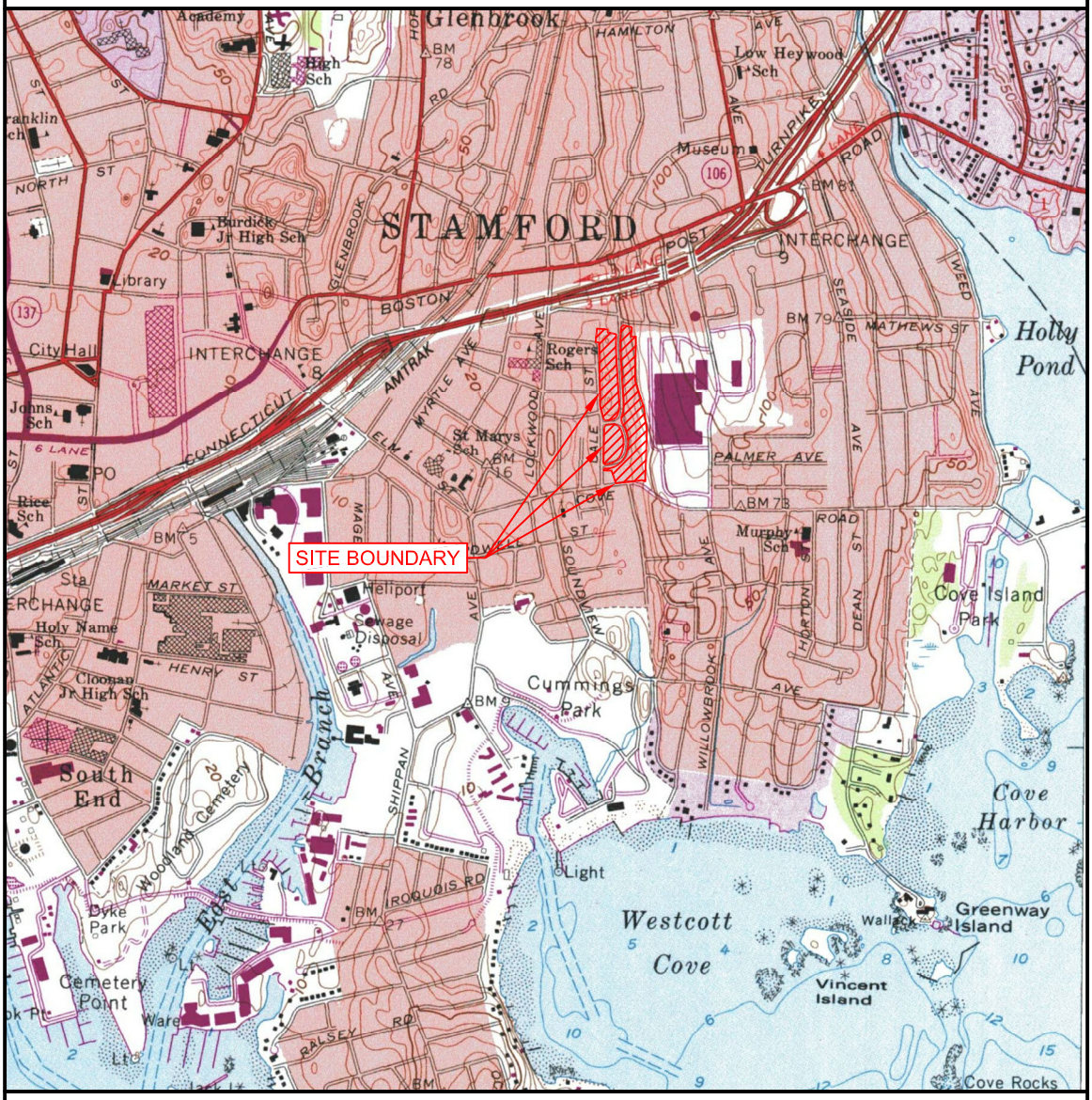
Under this proposal, the developer is seeking permission to reconstruct 166 apartment units to replace 167 existing units. The new unit program results in an additional 9 bedrooms when compared to the current unit program. Under CT Health Code guidelines, the existing daily sewage flow from Oak Park is 51,900 GPD. The current proposal would result in a total average daily sewage flow of 53,055 GPD. This includes 255 GPD for the office, security & communal space (20 GPD per 200 SF of office space) and 52,800 GPD for the residential units (at 150 GPD per bedroom); an increase of 1,155 GPD or .002 cfs. Using a peak flow factor of 4, the proposed peak sewage flow is 212,220 GPD which equates to 0.40 cfs.

The entire development's sewer system ties into a 10" tile sanitary sewer main within Dale Street which flows south to Cove Road, west Soundview Avenue, south to McMullen Avenue and ultimately connects into the 48" sewer main taking it to the wastewater treatment plant on Magee Avenue. City of Stamford record sanitary sewer mapping indicates that the 10" sanitary sewer within Dale Street is sloped at 0.23%. The pipe has a carrying capacity of 1.05 cfs. The proposed peak sewage flow, 0.33 cfs, represents 31.4% of the 10" pipe capacity. We believe the receiving sanitary sewer main has capacity to accommodate the proposed development given the anticipated flow data provided above. Refer to Appendix H for a detailed breakdown of the existing & proposed anticipated flow rates as well as the sewer main pipe capacity calculation.

Appendix A

USGS Quadrangle Map – Site Vicinity Map
NOAA Atlas 14 Volume 10 – Point Precipitation Frequency Estimates
USDA NRCS Web Soil Survey – Hydrologic Soil Group Classification

NAME: STAMFORD – NO.: 113
SCALE: 1"=2000'



USGS TOPOGRAPHIC QUADRANGLE MAP

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COMM. NO.:	DATE:
3448	5/31/22
	SCALE: 1"=2000'

NOAA Atlas 14, Volume 10, Version 3
Location name: Stamford, Connecticut, USA*
Latitude: 41.051°, Longitude: -73.5188°
Elevation: 14.83 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.364 (0.283-0.463)	0.425 (0.329-0.540)	0.524 (0.404-0.667)	0.606 (0.465-0.777)	0.718 (0.534-0.953)	0.804 (0.585-1.09)	0.892 (0.630-1.24)	0.988 (0.665-1.41)	1.12 (0.727-1.65)	1.23 (0.779-1.84)
10-min	0.516 (0.400-0.655)	0.602 (0.466-0.765)	0.742 (0.573-0.945)	0.858 (0.659-1.10)	1.02 (0.757-1.35)	1.14 (0.830-1.54)	1.26 (0.893-1.76)	1.40 (0.943-2.00)	1.59 (1.03-2.34)	1.74 (1.10-2.61)
15-min	0.607 (0.471-0.771)	0.708 (0.548-0.900)	0.873 (0.674-1.11)	1.01 (0.775-1.29)	1.20 (0.890-1.59)	1.34 (0.975-1.81)	1.49 (1.05-2.07)	1.65 (1.11-2.35)	1.87 (1.21-2.75)	2.05 (1.30-3.07)
30-min	0.849 (0.658-1.08)	0.991 (0.767-1.26)	1.22 (0.945-1.56)	1.42 (1.09-1.81)	1.68 (1.25-2.23)	1.88 (1.37-2.54)	2.09 (1.47-2.90)	2.31 (1.55-3.29)	2.61 (1.69-3.83)	2.85 (1.80-4.26)
60-min	1.09 (0.846-1.39)	1.27 (0.986-1.62)	1.57 (1.21-2.00)	1.82 (1.40-2.33)	2.16 (1.61-2.87)	2.42 (1.76-3.27)	2.69 (1.89-3.73)	2.97 (2.00-4.22)	3.35 (2.17-4.92)	3.65 (2.31-5.45)
2-hr	1.41 (1.10-1.78)	1.66 (1.30-2.10)	2.07 (1.61-2.63)	2.42 (1.87-3.07)	2.89 (2.16-3.81)	3.25 (2.38-4.36)	3.62 (2.57-5.01)	4.02 (2.72-5.69)	4.58 (2.98-6.68)	5.03 (3.19-7.47)
3-hr	1.62 (1.27-2.04)	1.92 (1.51-2.42)	2.42 (1.88-3.05)	2.82 (2.19-3.58)	3.38 (2.54-4.45)	3.81 (2.80-5.10)	4.25 (3.03-5.87)	4.74 (3.21-6.68)	5.43 (3.54-7.90)	5.99 (3.81-8.87)
6-hr	2.04 (1.61-2.55)	2.44 (1.92-3.05)	3.08 (2.42-3.86)	3.61 (2.82-4.55)	4.35 (3.28-5.69)	4.90 (3.62-6.53)	5.48 (3.93-7.55)	6.13 (4.17-8.59)	7.08 (4.63-10.2)	7.86 (5.01-11.5)
12-hr	2.52 (2.00-3.13)	3.02 (2.39-3.75)	3.83 (3.03-4.77)	4.51 (3.54-5.64)	5.43 (4.13-7.07)	6.13 (4.56-8.13)	6.87 (4.97-9.42)	7.71 (5.26-10.7)	8.95 (5.87-12.8)	9.98 (6.39-14.6)
24-hr	2.95 (2.35-3.63)	3.57 (2.85-4.40)	4.58 (3.64-5.67)	5.43 (4.29-6.75)	6.59 (5.04-8.53)	7.45 (5.59-9.84)	8.38 (6.11-11.5)	9.46 (6.48-13.1)	11.1 (7.29-15.8)	12.4 (7.99-18.0)
2-day	3.28 (2.64-4.02)	4.05 (3.25-4.96)	5.29 (4.23-6.50)	6.33 (5.03-7.81)	7.75 (5.97-9.99)	8.80 (6.65-11.6)	9.94 (7.31-13.6)	11.3 (7.77-15.6)	13.4 (8.84-19.0)	15.2 (9.77-21.9)
3-day	3.54 (2.86-4.32)	4.38 (3.53-5.34)	5.74 (4.61-7.03)	6.87 (5.49-8.45)	8.43 (6.52-10.8)	9.59 (7.27-12.6)	10.8 (7.99-14.8)	12.3 (8.50-16.9)	14.6 (9.68-20.7)	16.6 (10.7-23.8)
4-day	3.79 (3.07-4.61)	4.67 (3.78-5.68)	6.11 (4.92-7.46)	7.30 (5.84-8.95)	8.94 (6.93-11.5)	10.2 (7.71-13.3)	11.5 (8.47-15.6)	13.1 (9.01-17.8)	15.5 (10.2-21.8)	17.5 (11.3-25.1)
7-day	4.52 (3.68-5.46)	5.47 (4.45-6.62)	7.03 (5.69-8.53)	8.32 (6.69-10.1)	10.1 (7.86-12.8)	11.4 (8.70-14.8)	12.8 (9.49-17.3)	14.5 (10.1-19.7)	17.0 (11.3-23.8)	19.1 (12.4-27.2)
10-day	5.23 (4.27-6.30)	6.23 (5.08-7.51)	7.87 (6.39-9.52)	9.22 (7.45-11.2)	11.1 (8.65-14.0)	12.5 (9.52-16.1)	14.0 (10.3-18.6)	15.7 (10.9-21.2)	18.2 (12.1-25.3)	20.3 (13.2-28.8)
20-day	7.37 (6.06-8.82)	8.49 (6.98-10.2)	10.3 (8.45-12.4)	11.9 (9.64-14.3)	14.0 (10.9-17.4)	15.5 (11.9-19.8)	17.2 (12.7-22.5)	18.9 (13.2-25.4)	21.4 (14.3-29.5)	23.3 (15.2-32.8)
30-day	9.15 (7.55-10.9)	10.4 (8.54-12.4)	12.3 (10.1-14.8)	14.0 (11.4-16.8)	16.3 (12.8-20.2)	18.0 (13.8-22.7)	19.8 (14.5-25.6)	21.5 (15.1-28.7)	23.9 (16.0-32.9)	25.7 (16.7-36.0)
45-day	11.3 (9.40-13.5)	12.7 (10.5-15.0)	14.8 (12.2-17.7)	16.6 (13.6-19.9)	19.1 (15.0-23.5)	21.0 (16.1-26.3)	22.9 (16.8-29.4)	24.7 (17.4-32.8)	27.0 (18.2-37.0)	28.7 (18.7-40.1)
60-day	13.2 (10.9-15.6)	14.6 (12.1-17.3)	16.9 (13.9-20.0)	18.8 (15.4-22.4)	21.4 (16.8-26.2)	23.4 (18.0-29.2)	25.4 (18.7-32.4)	27.3 (19.2-36.1)	29.6 (20.0-40.4)	31.3 (20.4-43.5)

[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

PDS-based depth-duration-frequency (DDF) curves
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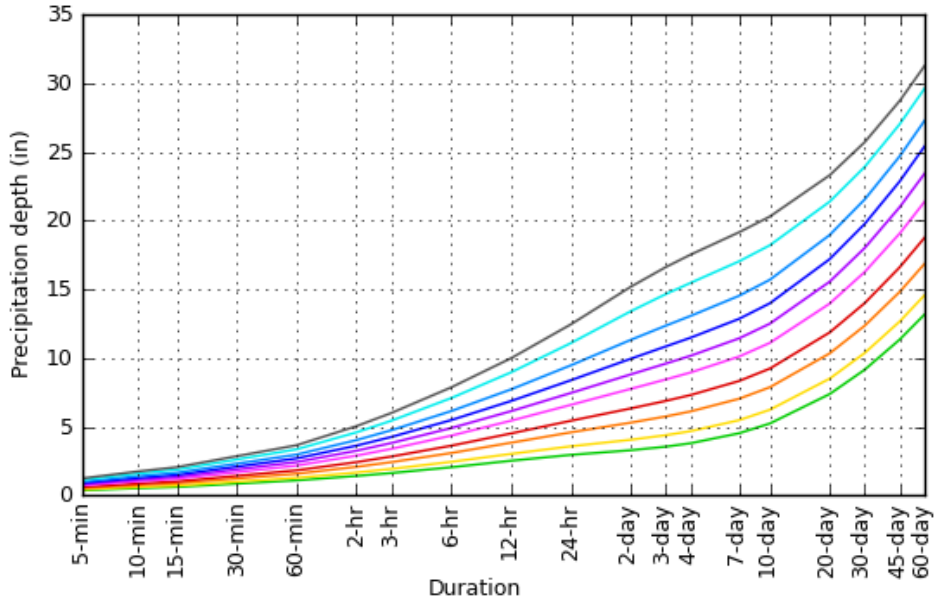

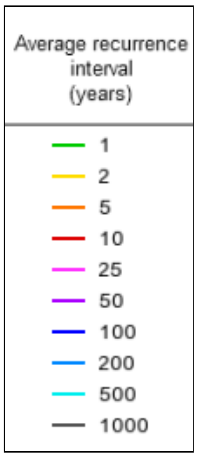

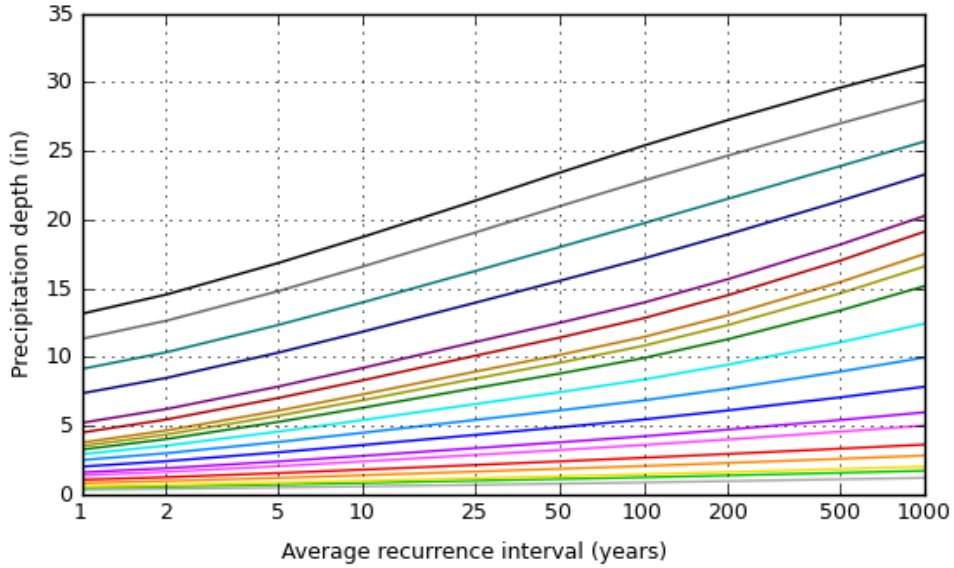

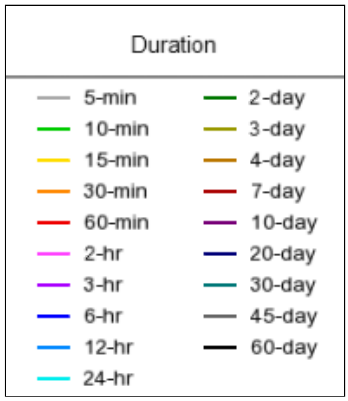

NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Fri Apr 29 13:40:19 2022

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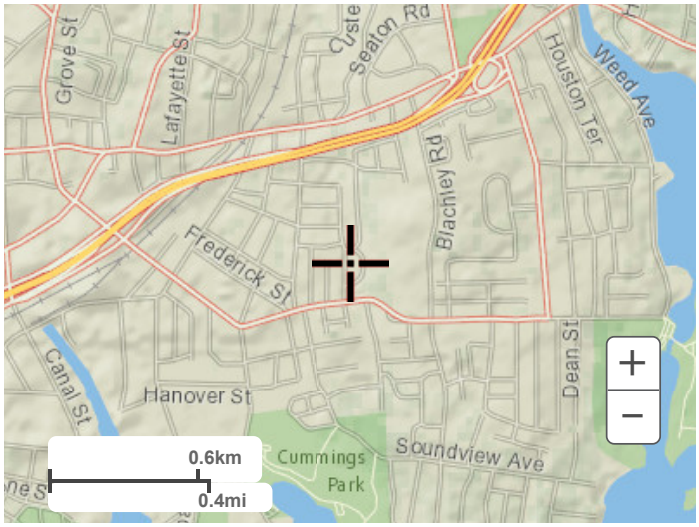
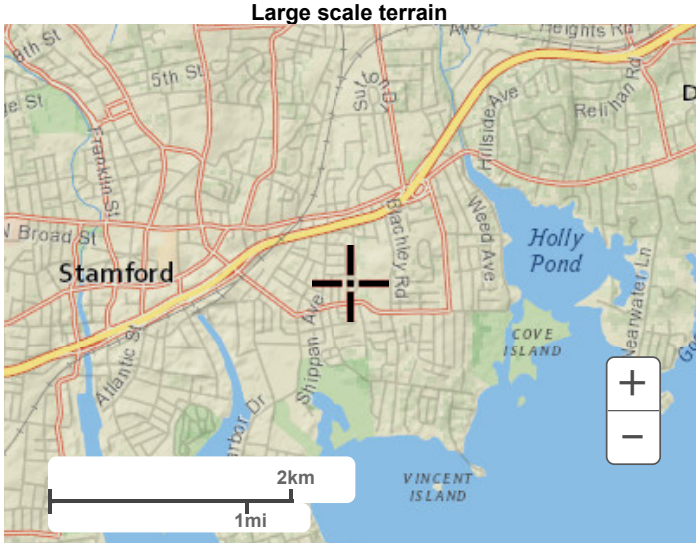
Maps & aerials

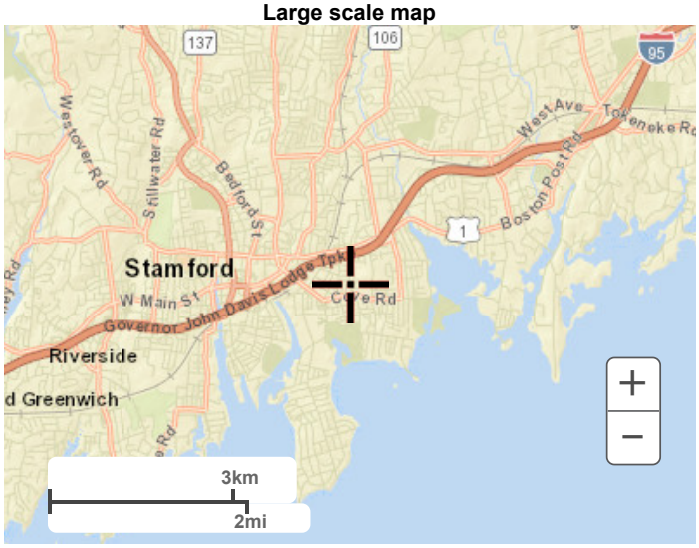
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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

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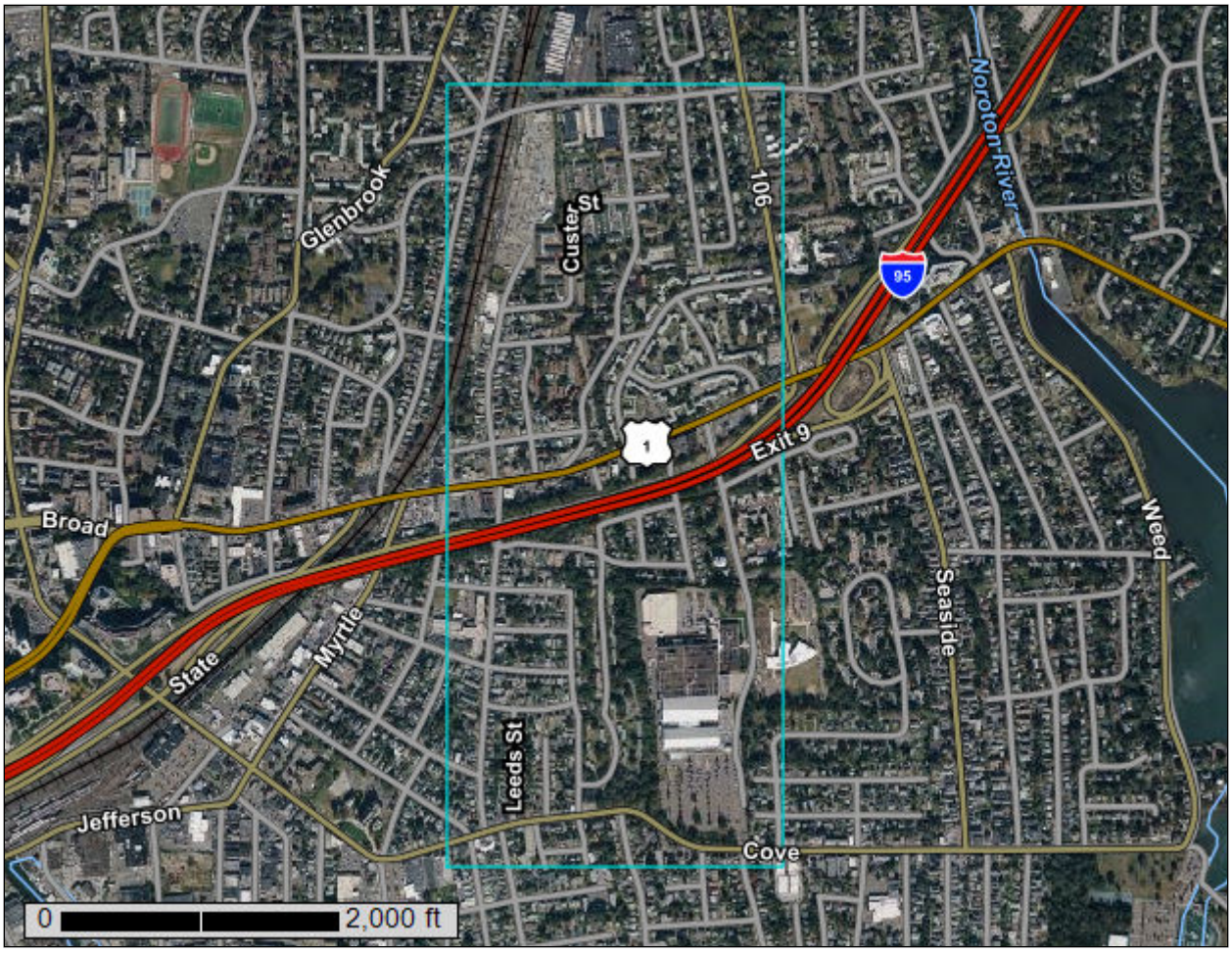
United States Department of Agriculture

NRCS

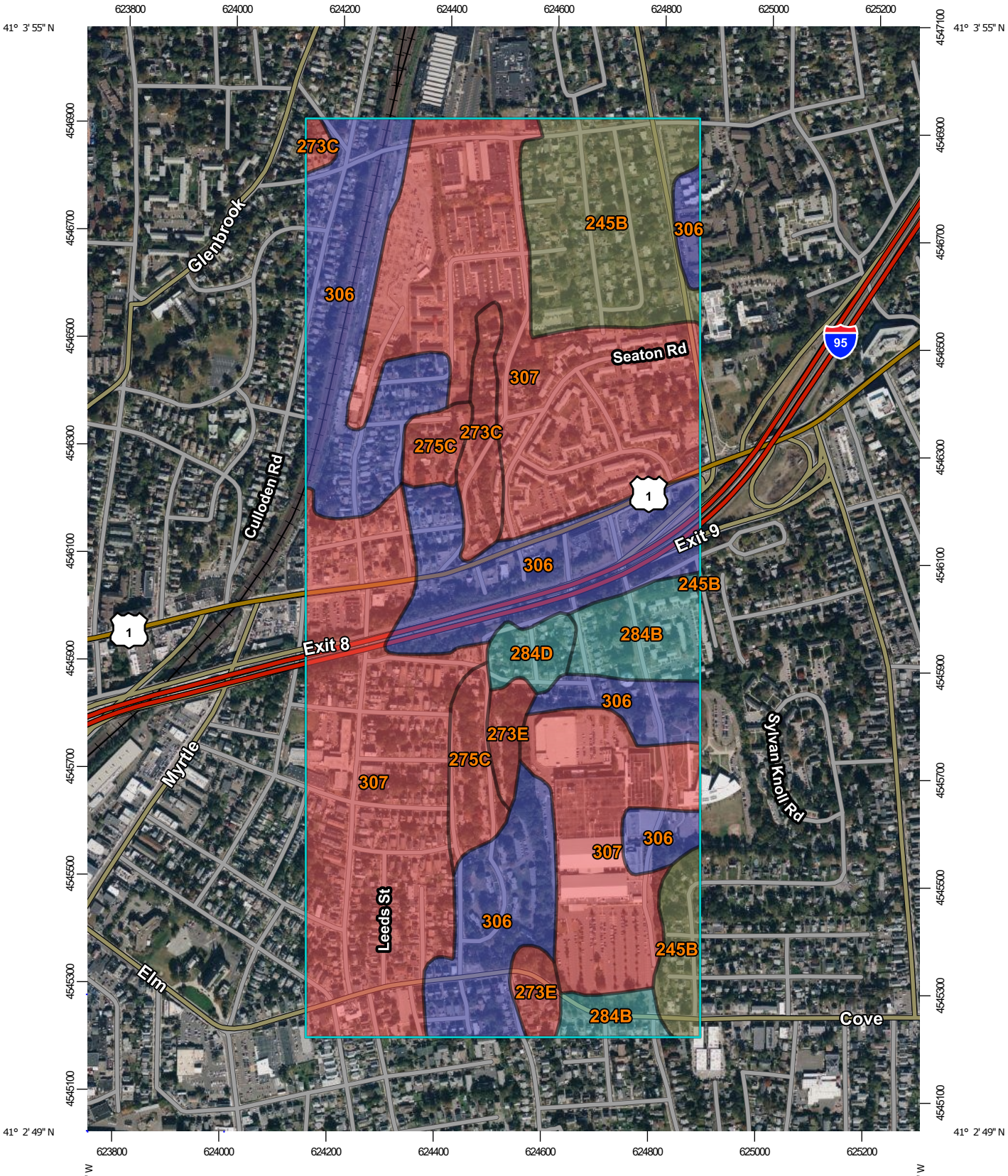
Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for State of Connecticut



February 18, 2022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73° 30' 32" W
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625200
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4546700
4546500
4546300
4546100
4545900
4545700
4545500
4545300
4545100
273C
245B
306
Glenbrook
307
Seaton Rd
275C
Culloden Rd
95
1
Exit 9
284B
Exit 8
284D
273E
Myrtle
Sylvan Knoll Rd
Leeds St
Elm
Cove
Map Scale: 1:10,000 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 100 200 400 600
Feet
0 450 900 1800 2700
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Date(s) aerial images were photographed: Oct 8, 2020—Oct 14, 2020

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
245B	Woodbridge-Urban land complex, 0 to 8 percent slopes	C/D	35.0	11.2%
273C	Urban land-Charlton-Chatfield complex, rocky, 3 to 15 percent slopes	D	7.8	2.5%
273E	Urban land-Charlton-Chatfield complex, rocky, 15 to 45 percent slopes	D	6.5	2.1%
275C	Urban land-Chatfield complex, rocky, 3 to 15 percent slopes	D	10.6	3.4%
284B	Paxton-Urban land complex, 3 to 8 percent slopes	C	13.7	4.4%
284D	Paxton-Urban land complex, 15 to 25 percent slopes	C	4.4	1.4%
306	Udorthents-Urban land complex	B	86.8	27.8%
307	Urban land	D	147.1	47.2%
Totals for Area of Interest			**311.9**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

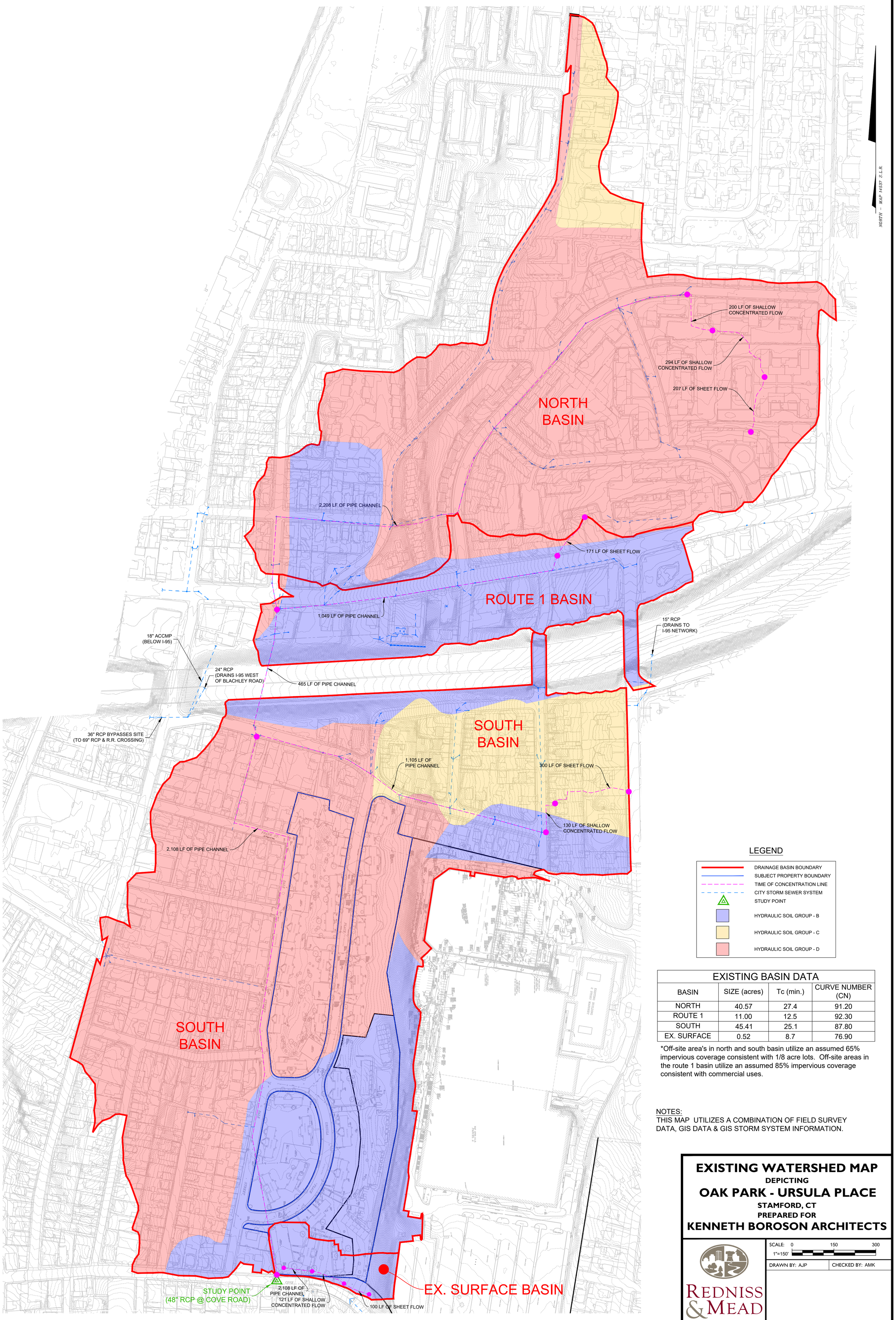
United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix B

Existing Watershed Map
Proposed Watershed Map



LEGEND

- DRAINAGE BASIN BOUNDARY
- SUBJECT PROPERTY BOUNDARY
- TIME OF CONCENTRATION LINE
- CITY STORM SEWER SYSTEM
- STUDY POINT
- HYDRAULIC SOIL GROUP - B
- HYDRAULIC SOIL GROUP - C
- HYDRAULIC SOIL GROUP - D

EXISTING BASIN DATA

BASIN	SIZE (acres)	Tc (min.)	CURVE NUMBER (CN)
NORTH	40.57	27.4	91.20
ROUTE 1	11.00	12.5	92.30
SOUTH	45.41	25.1	87.80
EX. SURFACE	0.52	8.7	76.90

*Off-site area's in north and south basin utilize an assumed 65% impervious coverage consistent with 1/8 acre lots. Off-site areas in the route 1 basin utilize an assumed 85% impervious coverage consistent with commercial uses.

NOTES:
THIS MAP UTILIZES A COMBINATION OF FIELD SURVEY DATA, GIS DATA & GIS STORM SYSTEM INFORMATION.

EXISTING WATERSHED MAP

DEPICTING

OAK PARK - URSULA PLACE

STAMFORD, CT

PREPARED FOR

KENNETH BOROSON ARCHITECTS

SCALE: 0 150 300
1"=150'

DRAWN BY: AJP | CHECKED BY: AMK

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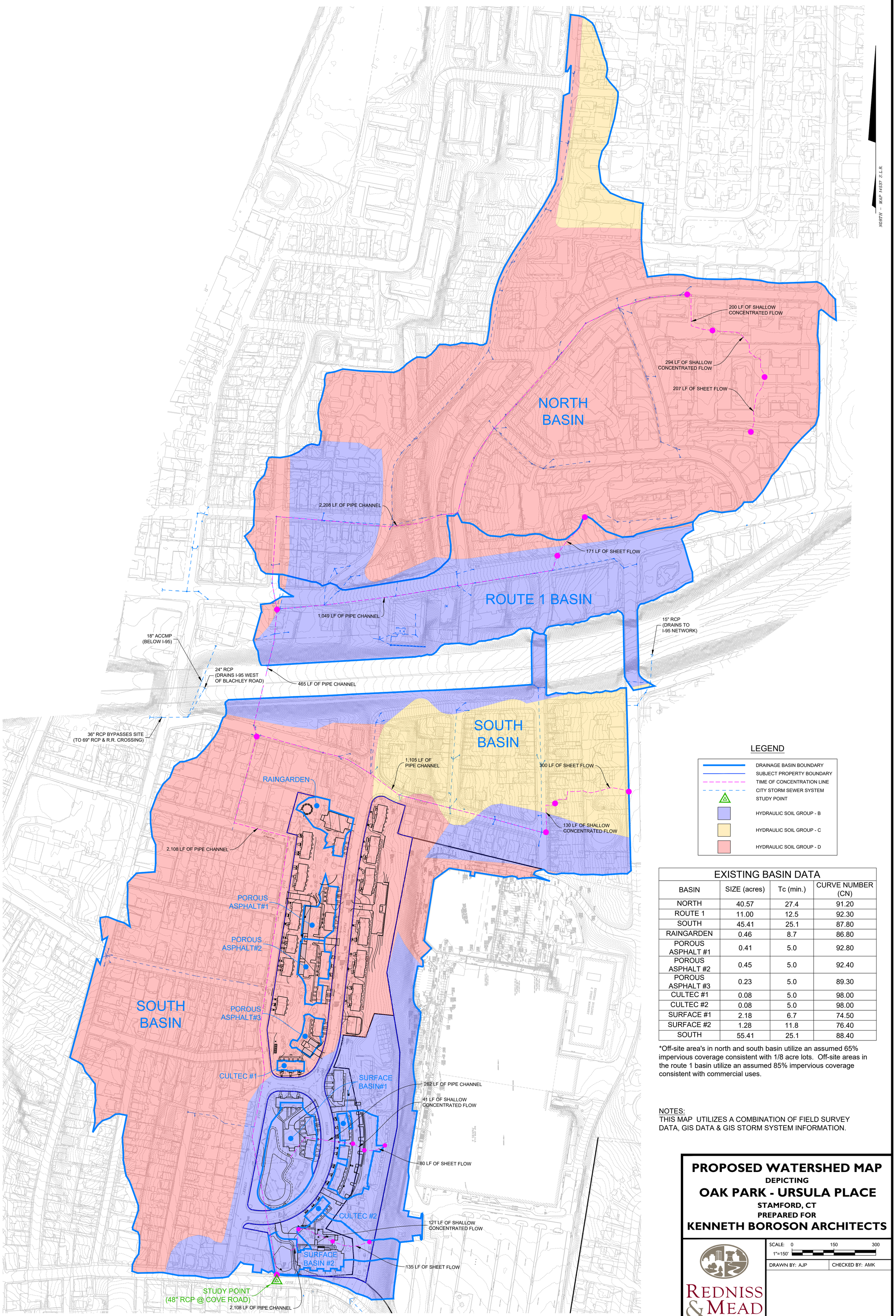

EXISTING BASIN DATA

BASIN	SIZE (acres)	Tc (min.)	CURVE NUMBER (CN)
NORTH	40.57	27.4	91.20
ROUTE 1	11.00	12.5	92.30
SOUTH	45.41	25.1	87.80
RAINGARDEN	0.46	8.7	86.80
POROUS ASPHALT #1	0.41	5.0	92.80
POROUS ASPHALT #2	0.45	5.0	92.40
POROUS ASPHALT #3	0.23	5.0	89.30
CULTEC #1	0.08	5.0	98.00
CULTEC #2	0.08	5.0	98.00
SURFACE #1	2.18	6.7	74.50
SURFACE #2	1.28	11.8	76.40
SOUTH	55.41	25.1	88.40

*Off-site area's in north and south basin utilize an assumed 65% impervious coverage consistent with 1/8 acre lots. Off-site areas in the route 1 basin utilize an assumed 85% impervious coverage consistent with commercial uses.

NOTES:
THIS MAP UTILIZES A COMBINATION OF FIELD SURVEY DATA, GIS DATA & GIS STORM SYSTEM INFORMATION.

PROPOSED WATERSHED MAP
DEPICTING
OAK PARK - URSULA PLACE
STAMFORD, CT
PREPARED FOR
KENNETH BOROSON ARCHITECTS

SCALE: 1"=150' (0, 150, 300)

DRAWN BY: AJP | CHECKED BY: AMK

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

LID Map

NORTH

NORTH - SOIL TYPE D PER NRCS WEB SOIL SURVEY.

SOUTH - SOIL TYPE B PER NRCS WEB SOIL SURVEY.

BMP WATERSHED #1
TOTAL AREA = 19,953 SF
IMPERVIOUS AREA = 7,488 SF

BMP #1 (RG#1)
TOTAL AREA = 1,250 SF
WQV PROVIDED = 1,213 CF

BMP WATERSHED #2
TOTAL AREA = 17,621 SF
IMPERVIOUS AREA = 12,568 SF

BMP #2 (PA#1)
TOTAL AREA = 1,784 SF
WQV PROVIDED = 1,057 CF

BMP WATERSHED #3
TOTAL AREA = 19,543 SF
IMPERVIOUS AREA = 13,510 SF

BMP #3 (PA#2)
TOTAL AREA = 1,789 SF
WQV PROVIDED = 1,300 CF

BMP WATERSHED #4
TOTAL AREA = 10,036 SF
IMPERVIOUS AREA = 5,710 SF

BMP #4 (PA#3)
TOTAL AREA = 2,016 SF
WQV PROVIDED = 1,055 CF

BMP #5 (CS#1)
TOTAL AREA = 276 SF
WQV PROVIDED = 289 CF

BMP WATERSHED #5
TOTAL AREA = 3,264 SF
IMPERVIOUS AREA = 3,264 SF

BMP WATERSHED #6
TOTAL AREA = 95,126 SF
IMPERVIOUS AREA = 34,645 SF

BMP WATERSHED #7
TOTAL AREA = 3,264 SF
IMPERVIOUS AREA = 3,264 SF

BMP #7 (CS#2)
TOTAL AREA = 154 SF
WQV PROVIDED = 278 CF

BMP #6 (SIB#1)
TOTAL AREA = 23,562 SF
WQV PROVIDED = 15,270 CF

SUMMARY TABLE			
TOTAL LOT AREA	637,321 SF (14.63 ACRES)	TOTAL DISTURBED AREA	461,000 SF (10.58 ACRES)
PRE-DEVELOPMENT IMPERVIOUS	192,833 SF	POST-DEVELOPMENT IMPERVIOUS	230,627 SF
REQUIRED RETENTION/ TREATMENT VOLUME	19,952.5 CF	PROVIDED RETENTION/ TREATMENT VOLUME	20,462 CF
PRE-DEVELOPMENT DCIA	192,833 SF	POST-DEVELOPMENT DCIA	132,048 SF
DIFFERENCE IN DCIA		-60,785 SF	

LEGEND

- LIMIT OF DISTURBANCE
- WATERSHED TO BMP
- TEST PIT LOCATION — TP#X
- PROPOSED BMP
- PROPOSED BUILDING
- IMPERVIOUS AREA
- PERVIOUS AREA (LAWN)

LOW IMPACT DEVELOPMENT PLAN

OAK PARK

STAMFORD, CT

REDNISS & MEAD

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COMM. NO.: 7338

DATE: 06/01/2022

SCALE: 1" = 120'

6/1/2022 10:26 AM H:\Jobfiles\17000\7300\7338\dwg\7338 Master - Site Plan Drainage.dwg

Appendix D

Water Quality Volume Calculations
Hydraulic Grade Line Analysis – Dale Street 48" Storm Sewer
72-Hour Drawdown Calculations
Conveyance Calculations
Outlet Protection Calculations

Water Quality Volume Calculations

Project: *Oak Park Housing Development*	**Project #:** *7338*	**Date:** *5/30/2022*
Location: *Ursula Place, Stamford, CT 06905*	**By:** *AJP*	**Checked:** *AMK*

Proposed Surface Basins #1 & #2

Surface Basin #1 WQV

Area=	2.184	acres
Impervious Area=	0.795	acres
I=	0.364	[a]
R=	0.378	[b]
WQV=	0.069	ac. ft. [c]

WQV=	**2,994.73**	**ft.^{3}**
WQV PROVIDED=	**15,270.00**	**ft.^{3}** [d]

[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] WQV provided by BMP Volume Calculations for Porous Pavement (454 ft^3) below the overflow weir outlet (Elevation = 20.90)

Surface Basin #2 WQV

Area=	1.276	acres
Impervious Area=	0.429	acres
I=	0.336	[a]
R=	0.352	[b]
WQV=	0.037	ac. ft. [c]

WQV=	**1,631.88**	**ft.^{3}**
WQV PROVIDED=	**-**	**ft.^{3}** [d]

Detention/Peak Flow Attenuation Only

[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] WQV provided by BMP Volume Calculations for Cultec System (266 ft^3) below the high overflow outlet (Elevation = 18.80)

Water Quality Volume Calculations

Project: *Oak Park Housing Development*	**Project #:** *7338*	**Date:** *5/30/2022*
Location: *Ursula Place, Stamford, CT 06905*	**By:** *AJP*	**Checked:** *AMK*

Proposed Porous Asphalt #1 & #2 Basin

Porous Asphalt #1 WQV

Area=	0.405	acres
Impervious Area=	0.289	acres
I=	0.713	[a]
R=	0.692	[b]
WQV=	0.023	ac. ft. [c]

WQV=	**1,016.02**	**ft.^{3}**
WQV PROVIDED=	**1,057.00**	**ft.^{3}** [d]

[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] WQV provided by BMP Volume Calculations for Porous Pavement (1,187 ft^3) below the high overflow outlet (Elevation = 23.50)

Porous Asphalt #2 WQV

Area=	0.449	acres
Impervious Area=	0.310	acres
I=	0.691	[a]
R=	0.672	[b]
WQV=	0.025	ac. ft. [c]

WQV=	**1,094.68**	**ft.^{3}**
WQV PROVIDED=	**1,294.00**	**ft.^{3}** [d]

[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] WQV provided by BMP Volume Calculations for Porous Pavement (953 ft^3) below the high overflow outlet (Elevation = 23.00)

Water Quality Volume Calculations

Project: *Oak Park Housing Development*	**Project #:** *7338*	**Date:** *5/30/2022*
Location: *Ursula Place, Stamford, CT 06905*	**By:** *AJP*	**Checked:** *AMK*

Proposed Porous Asphalt #3 Basin

Porous Asphalt #3 WQV

Area=	0.230	acres
Impervious Area=	0.119	acres
I=	0.515	[a]
R=	0.514	[b]
WQV=	0.010	ac. ft. [c]

WQV=	**429.57**	**ft.^{3}**
WQV PROVIDED=	**1,055.00**	**ft.^{3}** [d]

[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] WQV provided by BMP Volume Calculations for Rain Garden (1,019 ft^3) below the high overflow outlet (Elevation = 20.50)

Water Quality Volume Calculations

Project: *Oak Park Housing Development*	**Project #:** *7338*	**Date:** *5/30/2022*
Location: *Ursula Place, Stamford, CT 06905*	**By:** *AJP*	**Checked:** *AMK*

Proposed Raingarden Basin

Raingarden Basin WQV

Area=	0.458	acres
Impervious Area=	0.172	acres
I=	0.375	[a]
R=	0.388	[b]
WQV=	0.015	ac. ft. [c]

WQV=	**644.74**	**ft.^{3}**
WQV PROVIDED=	**1,213.00**	**ft.^{3}** [d]

[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] WQV provided by BMP Volume Calculations for Rain Garden (1,019 ft^3) below the high overflow outlet (Elevation = 20.50)

Water Quality Volume Calculations

Project: *Oak Park Housing Development*	**Project #:** *7338*	**Date:** *5/30/2022*
Location: *Ursula Place, Stamford, CT 06905*	**By:** *AJP*	**Checked:** *AMK*

Proposed Cultec #1 Basin

Cultec #1 WQV

Area=	0.075	acres
Impervious Area=	0.075	acres
I=	1.000	[a]
R=	0.950	[b]
WQV=	0.006	ac. ft. [c]

WQV=	**258.40**	**ft.^{3}**
WQV PROVIDED=	**289.00**	**ft.^{3}** [d]

[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] WQV provided by BMP Volume Calculations for Cultec System (175 ft^3) below the high overflow outlet (Elevation = 18.10)

Water Quality Volume Calculations

Project: *Oak Park Housing Development*	**Project #:** *7338*	**Date:** *5/30/2022*
Location: *Ursula Place, Stamford, CT 06905*	**By:** *AJP*	**Checked:** *AMK*

Proposed Cultec #2 Basin

Cultec #2 WQV

Area=	0.075	acres
Impervious Area=	0.075	acres
I=	1.000	[a]
R=	0.950	[b]
WQV=	0.006	ac. ft. [c]

WQV=	**258.40**	**ft.^{3}**
WQV PROVIDED=	**278.00**	**ft.^{3}** [d]

[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] WQV provided by BMP Volume Calculations for Cultec System (175 ft^3) below the high overflow outlet (Elevation = 18.10)

Stage-Area-Storage for Pond CUL1: Cultec #1

Elevation (feet)	Storage (cubic-feet)
17.75	0
17.80	6
17.85	11
17.90	17
17.95	22
18.00	28
18.05	33
18.10	39
18.15	44
18.20	50
18.25	55
18.30	66
18.35	76
18.40	86
18.45	96
18.50	106
18.55	116
18.60	126
18.65	135
18.70	145
18.75	155
18.80	164
18.85	173
18.90	182
18.95	191
19.00	199
19.05	207
19.10	215
19.15	222
19.20	228
19.25	234
19.30	239
19.35	245
19.40	250
19.45	256
19.50	262
19.55	267
19.60	273
19.65	278
19.70	284
19.75	289
19.80	**294**
19.85	294
19.90	294
19.95	294
20.00	294
20.05	294
20.10	294
20.15	294
20.20	294
20.25	294

Storage @ el.19.75=289 cu.ft.

Stage-Area-Storage for Pond CUL2: Cultec #2

Elevation (feet)	Storage (cubic-feet)
14.00	0
14.05	3
14.10	6
14.15	9
14.20	13
14.25	16
14.30	19
14.35	22
14.40	25
14.45	28
14.50	31
14.55	37
14.60	43
14.65	48
14.70	54
14.75	60
14.80	65
14.85	71
14.90	76
14.95	82
15.00	87
15.05	93
15.10	98
15.15	104
15.20	109
15.25	115
15.30	120
15.35	125
15.40	131
15.45	136
15.50	141
15.55	147
15.60	152
15.65	157
15.70	162
15.75	167
15.80	172
15.85	177
15.90	182
15.95	187
16.00	192
16.05	197
16.10	202
16.15	206
16.20	211
16.25	216
16.30	220
16.35	224
16.40	229
16.45	233
16.50	236
16.55	240
16.60	243
16.65	247
16.70	250
16.75	253
16.80	256
16.85	259
16.90	263
16.95	266
17.00	269
17.05	272
17.10	275
17.15	278
17.20	**281**
17.25	**282**
17.30	282
17.35	282
17.40	282
17.45	282
17.50	282
17.55	282
17.60	282
17.65	282

Storage @ el.17.15=278 cu.ft.

Stage-Area-Storage for Pond PA1: Porous Asphalt #1

Elevation (feet)	Storage (cubic-feet)
21.72	0
21.77	1
21.82	2
21.87	5
21.92	10
21.97	15
22.02	21
22.07	29
22.12	38
22.17	48
22.22	59
22.27	72
22.32	86
22.37	100
22.42	116
22.47	134
22.52	152
22.57	172
22.62	192
22.67	214
22.72	238
22.77	262
22.82	287
22.87	314
22.92	342
22.97	371
23.02	402
23.07	433
23.12	466
23.17	500
23.22	535
23.27	570
23.32	604
23.37	637
23.42	668
23.47	699
23.52	729
23.57	758
23.62	787
23.67	818
23.72	851
23.77	884
23.82	919
23.87	956
23.92	994
23.97	1,033
24.02	1,073
24.07	1,117
24.12	1,164
24.17	1,214
24.22	1,268
24.27	1,326
24.32	1,386
24.37	1,451
24.42	1,518
24.47	1,589
24.52	1,637
24.57	1,644
24.62	1,649
24.67	1,654
24.72	1,658
24.77	1,660
24.82	**1,662**

Storage @ el. 24=1,057 cu.ft.

Stage-Area-Storage for Pond PA2: Porous Asphalt #2

Elevation (feet)	Storage (cubic-feet)
21.16	0
21.21	36
21.26	72
21.31	107
21.36	143
21.41	179
21.46	215
21.51	250
21.56	286
21.61	322
21.66	358
21.71	393
21.76	429
21.81	465
21.86	501
21.91	536
21.96	572
22.01	608
22.06	644
22.11	679
22.16	715
22.21	751
22.26	787
22.31	822
22.36	858
22.41	894
22.46	930
22.51	966
22.56	1,001
22.61	1,037
22.66	1,073
22.71	1,108
22.76	1,142
22.81	1,176
22.86	1,208
22.91	1,240
22.96	1,271
23.01	1,300
23.06	1,332
23.11	1,366
23.16	1,402
23.21	1,441
23.26	1,483
23.31	1,527
23.36	1,574
23.41	1,624
23.46	1,676
23.51	1,723
23.56	1,743
23.61	1,761
23.66	1,779
23.71	1,796
23.76	1,811
23.81	1,826
23.86	1,840
23.91	1,853
23.96	1,865
24.01	1,876
24.06	1,886
24.11	1,895
24.16	1,904
24.21	1,911
24.26	1,918
24.31	1,923
24.36	1,928
24.41	1,931
24.46	1,934
24.51	1,936
24.56	**1,937**

Storage @ el. 23=1,294 cu.ft.

Stage-Area-Storage for Pond PA3: Porous Asphalt #3

Elevation (feet)	Storage (cubic-feet)
20.00	0
20.05	40
20.10	80
20.15	121
20.20	161
20.25	201
20.30	241
20.35	282
20.40	322
20.45	362
20.50	402
20.55	442
20.60	483
20.65	523
20.70	563
20.75	603
20.80	644
20.85	684
20.90	724
20.95	764
21.00	804
21.05	845
21.10	885
21.15	922
21.20	955
21.25	985
21.30	1,012
21.35	1,035
21.40	1,055
21.45	1,075
21.50	1,100
21.55	1,129
21.60	1,163
21.65	1,201
21.70	1,245
21.75	1,297
21.80	1,357
21.85	1,424
21.90	**1,500**
21.95	1,500

Storage @ el. 21.40=1,055 cu.ft.

Stage-Area-Storage for Pond RG1: Raingarden

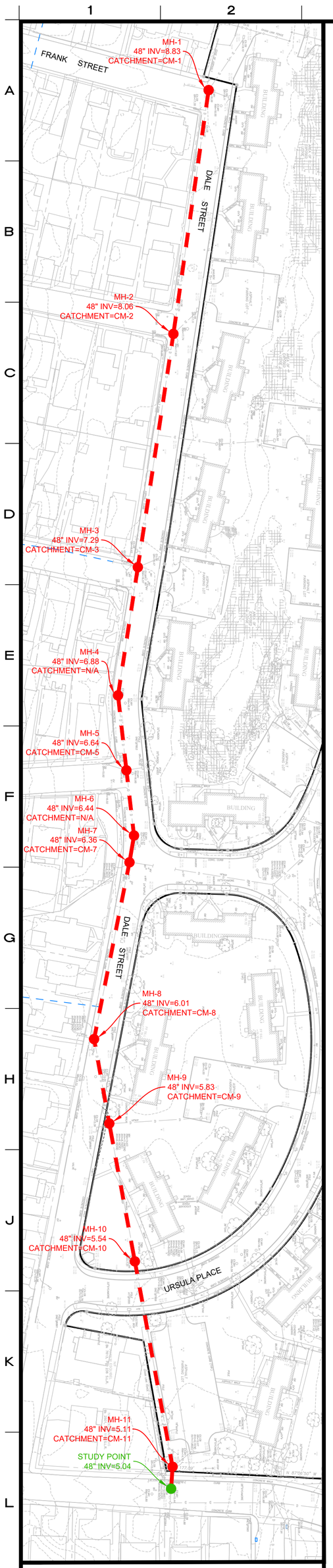
Elevation (feet)	Storage (cubic-feet)
16.75	0
16.80	11
16.85	23
16.90	34
16.95	45
17.00	56
17.05	68
17.10	79
17.15	90
17.20	101
17.25	113
17.30	124
17.35	135
17.40	146
17.45	157
17.50	169
17.55	180
17.60	191
17.65	202
17.70	214
17.75	225
17.80	236
17.85	248
17.90	259
17.95	270
18.00	281
18.05	293
18.10	304
18.15	315
18.20	326
18.25	338
18.30	349
18.35	360
18.40	371
18.45	382
18.50	394
18.55	405
18.60	416
18.65	427
18.70	439
18.75	450
18.80	461
18.85	473
18.90	484
18.95	495
19.00	506
19.05	518
19.10	529
19.15	540
19.20	551
19.25	563
19.30	600
19.35	639
19.40	679
19.45	719
19.50	760
19.55	802
19.60	844
19.65	887
19.70	932
19.75	977
19.80	1,022
19.85	1,069
19.90	1,116
19.95	1,164
20.00	1,213
20.05	1,263
20.10	1,314
20.15	1,366
20.20	1,420
20.25	1,475
20.30	1,532
20.35	1,590
20.40	1,649
20.45	1,709
20.50	**1,771**

Storage @ el. 20=1,213 cu.ft.

Stage-Area-Storage for Pond SB1: Surface Basin #1

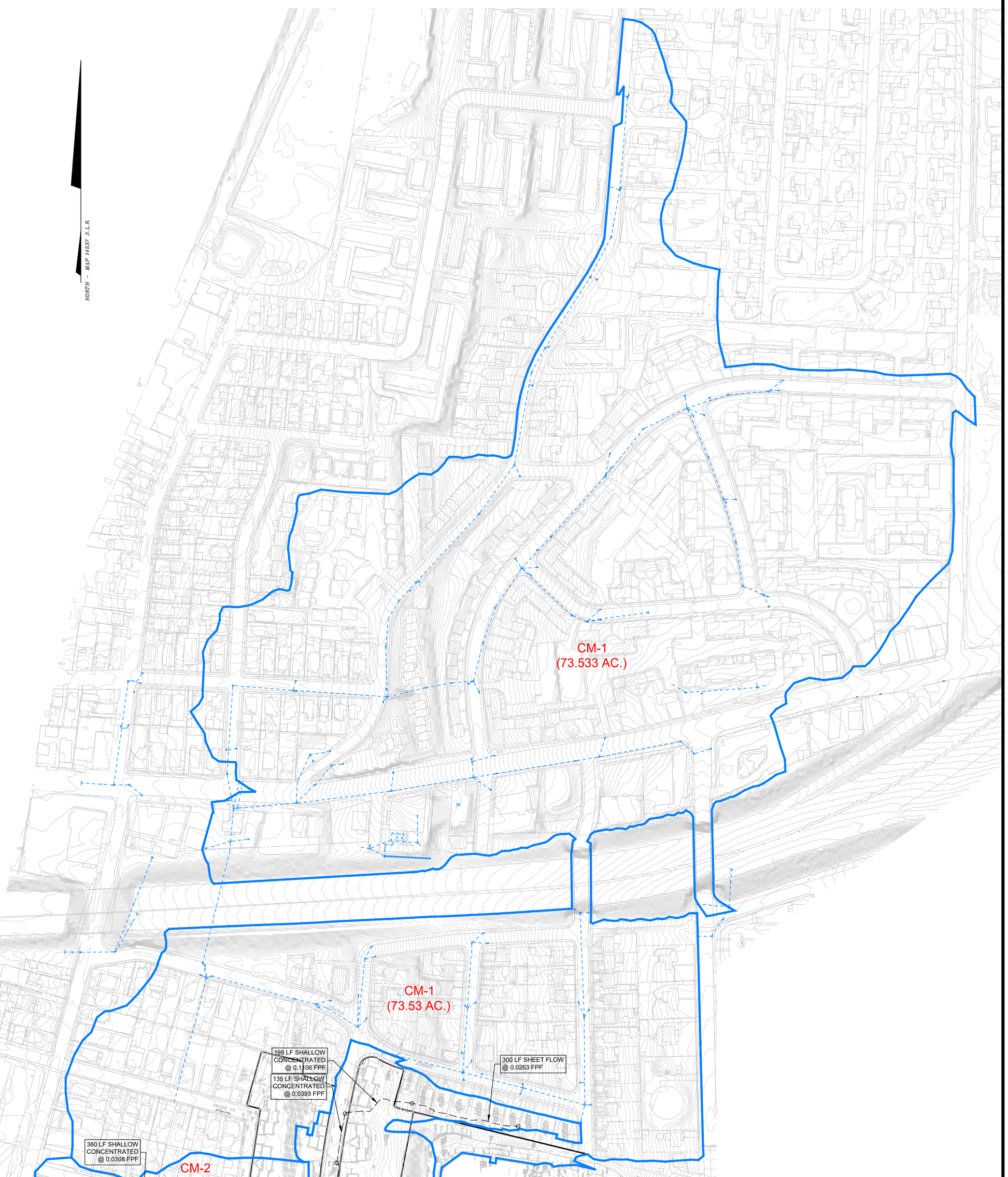
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
14.83	4,937	0
14.88	6,079	275
14.93	7,221	608
14.98	8,363	998
15.03	9,137	1,439
15.08	9,664	1,909
15.13	10,192	2,405
15.18	10,720	2,928
15.23	11,247	3,477
15.28	11,775	4,053
15.33	12,302	4,655
15.38	12,830	5,283
15.43	13,358	5,938
15.48	13,885	6,619
15.53	14,413	7,326
15.58	14,941	8,060
15.63	15,468	8,820
15.68	15,996	9,607
15.73	16,524	10,420
15.78	17,051	11,259
15.83	17,579	12,125
15.88	18,107	13,017
15.93	18,634	13,936
15.98	19,162	14,880
16.03	19,876	15,855
16.08	20,713	16,869
16.13	21,551	17,926
16.18	22,389	19,024
16.23	**23,227**	**20,165**

Storage @ El. 16 = 15,270 cu.ft.



48" STORM MAIN - DALE STREET
SCALE: 1"=80'

NORTH – MAP 14537 S.L.R.



EXISTING CATCHMENT MAP
48" STORM SEWER
DEPICTING
OAK PARK - URSLA PLACE
STAMFORD, CT
PREPARED FOR
KENNETH BOROSON ARCHITECTS

SCALE: 1"=150' 0 150 300

DRAWN BY: AJP | CHECKED BY: AMK

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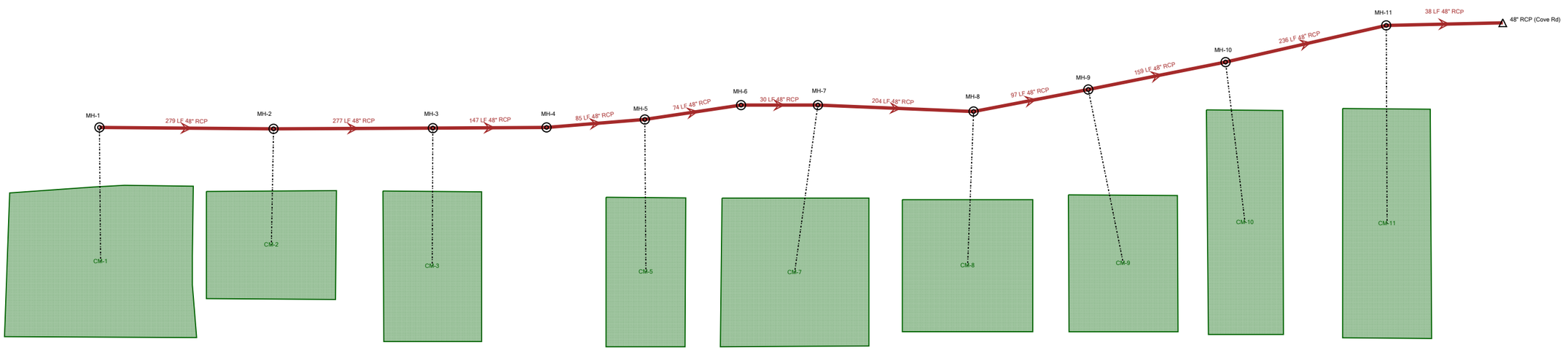
22 First Street | Stamford, CT 06905
Tel: 203.327.0500 | Fax: 203.357.1118
www.rednissmead.com

Scenario: Base



FlexTable: Catchment Table

Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (hours)	Flow (Total Out) (cfs)	Catchment Intensity (in/h)	Notes
CM-1	MH-1	73.532	0.742	0.457	197.87	3.598	Weighted Impervious=68% (85% business zone, 65% residential zone)
CM-2	MH-2	3.407	0.723	0.347	10.49	4.227	
CM-3	MH-3	7.186	0.723	0.402	20.47	3.911	
CM-5	MH-5	2.835	0.723	0.238	10.25	4.966	
CM-8	MH-8	5.358	0.723	0.265	18.32	4.694	
CM-9	MH-9	4.002	0.723	0.267	13.65	4.683	
CM-7	MH-7	10.586	0.723	0.248	37.06	4.807	
CM-10	MH-10	3.289	0.723	0.188	13.80	5.761	
CM-11	MH-11	1.939	0.723	0.167	8.63	6.110	

FlexTable: Conduit Table

Label	Start Node	Stop Node	Elevation Ground (Start) (ft)	Invert (Start) (ft)	Hydraulic Grade Line (In) (ft)	Elevation Ground (Stop) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (Out) (ft)	Diameter (in)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Section Type	Manning's n	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)
38 LF 48" RCP	MH-11	48" RCP (Cove Rd)	14.70	5.11	10.55	15.44	5.04	9.00	48.0	38.0	0.002	Circle	0.013	287.76	22.90	3.96	61.65	466.8
97 LF 48" RCP	MH-8	MH-9	14.21	6.01	17.99	14.63	5.83	14.63	48.0	97.0	0.002	Circle	0.013	267.19	21.26	8.80	61.87	431.8
204 LF 48" RCP	MH-7	MH-8	16.89	6.36	20.62	14.21	6.01	14.21	48.0	204.0	0.002	Circle	0.013	254.70	20.27	8.20	59.50	428.1
30 LF 48" RCP	MH-6	MH-7	17.14	6.44	17.64	16.89	6.36	16.89	48.0	30.0	0.003	Circle	0.013	227.78	18.13	10.53	74.17	307.1
74 LF 48" RCP	MH-5	MH-6	16.80	6.64	19.01	17.14	6.44	17.14	48.0	74.0	0.003	Circle	0.013	228.20	18.16	10.70	74.67	305.6
85 LF 48" RCP	MH-4	MH-5	16.54	6.88	18.82	16.80	6.64	16.80	48.0	85.0	0.003	Circle	0.013	221.40	17.62	10.16	76.32	290.1
147 LF 48" RCP	MH-3	MH-4	16.10	7.29	20.06	16.54	6.88	16.54	48.0	147.0	0.003	Circle	0.013	222.23	17.68	9.66	75.86	293.0
277 LF 48" RCP	MH-2	MH-3	17.63	8.06	21.55	16.10	7.29	16.10	48.0	267.0	0.003	Circle	0.013	205.18	16.33	8.81	77.13	266.0
279 LF 48" RCP	MH-1	MH-2	18.26	8.83	22.92	17.63	8.06	17.63	48.0	279.0	0.003	Circle	0.013	197.87	15.75	9.57	75.46	262.2
159 LF 48" RCP	MH-9	MH-10	14.63	5.83	21.85	15.94	5.54	15.94	48.0	159.0	0.002	Circle	0.013	276.81	22.03	10.40	61.34	451.2
236 LF 48" RCP	MH-10	MH-11	15.94	5.54	19.79	14.70	5.11	10.55	48.0	236.0	0.002	Circle	0.013	284.23	22.62	5.44	61.31	463.6

FlexTable: Manhole Table

Label	Elevation (Rim) (ft)	Hydraulic Grade Line (In) (ft)	Elevation (Invert Out) (ft)	Hydraulic Grade Line (Out) (ft)	Flow (Known) (cfs)	Flow (Total Out) (cfs)	Notes
MH-10	15.94	15.94	5.54	15.94	0.00	284.23	
MH-9	14.63	14.63	5.83	14.63	0.00	276.81	
MH-1	18.26	18.26	8.83	18.26	0.00	197.87	
MH-2	17.63	17.63	8.06	17.63	0.00	205.18	
MH-3	16.10	16.10	7.29	16.10	0.00	222.23	
MH-4	16.54	16.54	6.88	16.54	0.00	221.40	
MH-5	16.80	16.80	6.64	16.80	0.00	228.20	
MH-6	17.14	17.14	6.44	17.14	0.00	227.78	
MH-7	16.89	16.89	6.36	16.89	0.00	254.70	
MH-8	14.21	14.21	6.01	14.21	0.00	267.19	
MH-11	14.70	10.55	5.11	10.55	0.00	287.76	

FlexTable: Outfall Table

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Hydraulic Grade (ft)	Elevation (User Defined Tailwater) (ft)	Notes
48" RCP (Cove Rd)	15.44	5.04	9.00	7.42	Mean High Water

72-Hour Draw Down Calculations

Project: *Oak Park Housing Development*	**Project #:** *7338*	**Date:** *5/30/2022*
Location: *Ursula Place, Stamford, CT*	**By:** *AJP*	**Checked:** *AMK*

Surface Basin #1 Draw Down Calculation

Surface Basin #1		
Surface Area of Infiltration System (SA)	4,937	ft^2
Volume of Storage of Infiltration System (VS)	15,270	ft^3
Infiltration Rate (IR)	1.02	in/hr^c
Theoretical Water Column Height	37.12	in^a
Time of Draw Down	**36.39**	**hr^b**

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

[b] Time of Draw Down = WCH/IR

[c] Infiltration Rate (IR) Taken From Stamford Drainage Manuel Table 5-1 Default Infiltration Rates for HSG A and B Soils (Sandy Loam B Type - 1.02 in/hr)

72-Hour Draw Down Calculations

Project: *Oak Park Housing Development*	**Project #:** *7338*	**Date:** *5/30/2022*
Location: *Ursula Place, Stamford, CT*	**By:** *AJP*	**Checked:** *AMK*

Porous Asphalt #1 Draw Down Calculation

Porous Asphalt #1		
Surface Area of Infiltration System (SA)	1,782	ft^2
Volume of Storage of Infiltration System (VS)	1,057	ft^3
Infiltration Rate (IR)	0.27	in/hr^c
Theoretical Water Column Height	7.12	in^a
Time of Draw Down	**26.36**	**hr^b**

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

[b] Time of Draw Down = WCH/IR

[c] Infiltration Rate (IR) Taken From Greenwich Drainage Manuel Table B-2 Default Infiltration Rates (Silt Loam C Type - 0.27 in/hr)

72-Hour Draw Down Calculations

Project: *Oak Park Housing Development*	**Project #:** *7338*	**Date:** *5/30/2022*
Location: *Ursula Place, Stamford, CT*	**By:** *AJP*	**Checked:** *AMK*

Porous Asphalt #3 Draw Down Calculation

Porous Asphalt #3		
Surface Area of Infiltration System (SA)	2,011	ft^2
Volume of Storage of Infiltration System (VS)	1,055	ft^3
Infiltration Rate (IR)	0.27	in/hr^c
Theoretical Water Column Height	6.30	in^a
Time of Draw Down	**23.32**	**hr^b**

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

[b] Time of Draw Down = WCH/IR

[c] Infiltration Rate (IR) Taken From Greenwich Drainage Manuel Table B-2 Default Infiltration Rates (Silt Loam C Type - 0.27 in/hr)

72-Hour Draw Down Calculations

Project: *Oak Park Housing Development*	**Project #:** *7338*	**Date:** *5/30/2022*
Location: *Ursula Place, Stamford, CT*	**By:** *AJP*	**Checked:** *AMK*

Raingarden Draw Down Calculation

Raingarden		
Surface Area of Infiltration System (SA)	750	ft^2
Volume of Storage of Infiltration System (VS)	1,213	ft^3
Infiltration Rate (IR)	0.52	in/hr^c
Theoretical Water Column Height	19.41	in^a
Time of Draw Down	**37.32**	**hr^b**

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

[b] Time of Draw Down = WCH/IR

[c] Infiltration Rate (IR) Taken From Greenwich Drainage Manuel Table B-2 Default Infiltration Rates (Loam B Type - 0.52 in/hr)

72-Hour Draw Down Calculations

Project: *Oak Park Housing Development*	**Project #:** *7338*	**Date:** *5/30/2022*
Location: *Ursula Place, Stamford, CT*	**By:** *AJP*	**Checked:** *AMK*

Cultec #1 Draw Down Calculation

Cultec #1		
Surface Area of Infiltration System (SA)	276	ft^2
Volume of Storage of Infiltration System (VS)	289	ft^3
Infiltration Rate (IR)	0.27	in/hr^c
Theoretical Water Column Height	12.57	in^a
Time of Draw Down	**46.54**	**hr^b**

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

[b] Time of Draw Down = WCH/IR

[c] Infiltration Rate (IR) Taken From Greenwich Drainage Manuel Table B-2 Default Infiltration Rates (Silt Loam C Type - 0.27 in/hr)

72-Hour Draw Down Calculations

Project: *Oak Park Housing Development*	**Project #:** *7338*	**Date:** *5/30/2022*
Location: *Ursula Place, Stamford, CT*	**By:** *AJP*	**Checked:** *AMK*

Cultec #2 Draw Down Calculation

Cultec #2		
Surface Area of Infiltration System (SA)	157	ft^2
Volume of Storage of Infiltration System (VS)	278	ft^3
Infiltration Rate (IR)	0.52	in/hr^c
Theoretical Water Column Height	21.25	in^a
Time of Draw Down	**40.86**	**hr^b**

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

[b] Time of Draw Down = WCH/IR

[c] Infiltration Rate (IR) Taken From Greenwich Drainage Manuel Table B-2 Default Infiltration Rates (Loam B Type - 0.52 in/hr)

HYDRAULIC DATA FOR RATIONAL METHOD

Project:	*Oak Park Commons*	**Project #:**	*7338*	**Date:**	*6/1/2022*
Location:	*Ursula Place, Stamford, CT*	**By:**	*AJP*	**Checked:**	*AMK*

Description

Conveyance Calculations for 50 Year Storm Event

Typical Roof Piping from 1/2 roof of 4-unit building

Basin Description				Drainage Path						
Acres	C	Description	AC	Length (ft)	ΔH	Slope (%)	Description	Time (min)	50yr. Rainfall Intensity (in/hr)	Q = ACI (cfs)
0.02	0.95	Impervious	0.02							
0.00	0.30	Pervious	0.00							
0.02		**Total**	**0.02**					**5**	**9.62**	**0.23**

Q in system (cfs)	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
0.23	6	Varies	0.011	PVC	0.020	0.94	24.3%

Typical Roof Piping from 1/2 roof of 6-unit building

Basin Description				Drainage Path						
Acres	C	Description	AC	Length (ft)	ΔH	Slope (%)	Description	Time (min)	50yr. Rainfall Intensity (in/hr)	Q = ACI (cfs)
0.04	0.95	Impervious	0.04							
0.00	0.30	Pervious	0.00							
0.04		**Total**	**0.04**					**16.5**	**9.62**	**0.34**

Q in system (cfs)	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
0.34	6	Varies	0.011	PVC	0.020	0.94	36.4%

Typical Roof Piping from 1/2 roof of 7-unit building

Basin Description				Drainage Path						
Acres	C	Description	AC	Length (ft)	ΔH	Slope (%)	Description	Time (min)	50yr. Rainfall Intensity (in/hr)	Q = ACI (cfs)
0.04	0.95	Impervious	0.04							
0.00	0.30	Pervious	0.00							
0.04		**Total**	**0.04**					**16.5**	**9.62**	**0.40**

Q in system (cfs)	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
0.40	6	Varies	0.011	PVC	0.020	0.94	42.5%

Pipe from MH#3 TO MH #4

Basin Description				Drainage Path						
Acres	C	Description	AC	Length (ft)	ΔH	Slope (%)	Description	Time (min)	50yr. Rainfall Intensity (in/hr)	Q = ACI (cfs)
0.498	0.95	Impervious	0.47							
0.407	0.30	Pervious	0.12							
0.91		**Total**	**0.60**					**16.5**	**9.62**	**5.73**

Q in system (cfs)	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
5.73	12	70	0.012	RCP	0.006	3.00	191.0%

*Note: Twin 12" pipes allow for the system to convey up to 200% of flow

Pipe from MH#5 to OUTLET

Basin Description				Drainage Path						
Acres	C	Description	AC	Length (ft)	ΔH	Slope (%)	Description	Time (min)	50yr. Rainfall Intensity (in/hr)	Q = ACI (cfs)
0.395	0.95	Impervious	0.38							
0.188	0.30	Pervious	0.06							
0.58		**Total**	**0.43**					**16.5**	**9.62**	**4.15**

Q in system (cfs)	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
9.88	15	75	0.011	PVC	0.005	5.41	182.5%

*Note: Twin 15" pipes allow for the system to convey up to 200% of flow

HYDRAULIC DATA FOR RATIONAL METHOD

Project:	*Oak Park Commons*	**Project #:**	*7338*	**Date:**	*6/1/2022*
Location:	*Ursula Place, Stamford, CT*	**By:**	*AJP*	**Checked:**	*AMK*

Description

Conveyance Calculations for 50 Year Storm Event

Pipe from North Roof to MH#8

Basin Description				Drainage Path						
Acres	C	Description	AC	Length (ft)	ΔH	Slope (%)	Description	Time (min)	50yr. Rainfall Intensity (in/hr)	Q = ACI (cfs)
0.07	0.95	Impervious	0.07							
0.00	0.30	Pervious	0.00							
0.07		**Total**	**0.07**					**5**	**9.62**	**0.68**

Q in system (cfs)	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
0.68	8	233	0.011	PVC	0.018	1.92	35.6%

Pipe from South Roof to MH#8

Basin Description				Drainage Path						
Acres	C	Description	AC	Length (ft)	ΔH	Slope (%)	Description	Time (min)	50yr. Rainfall Intensity (in/hr)	Q = ACI (cfs)
0.07	0.95	Impervious	0.07							
0.00	0.30	Pervious	0.00							
0.07		**Total**	**0.07**					**5**	**8.62**	**0.61**

Q in system (cfs)	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
0.61	8	237	0.011	PVC	0.015	1.75	35.0%

Pipe from CB#8 to MH#8

Basin Description				Drainage Path						
Acres	C	Description	AC	Length (ft)	ΔH	Slope (%)	Description	Time (min)	100yr. Rainfall Intensity (in/hr)	Q = ACI (cfs)
										3.35

Q in system (cfs)	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
3.35	10	68	0.011	PVC	0.050	5.81	57.7%

Note: 100 Year flow taken from Outflow of Pond PA1 in the HydroCAD Report

Pipe from MH#8 to MH#9

Basin Description				Drainage Path						
Acres	C	Description	AC	Length (ft)	ΔH	Slope (%)	Description	Time (min)	50yr. Rainfall Intensity (in/hr)	Q = ACI (cfs)

Q in system (cfs)	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
4.65	12	81	0.011	PVC	0.020	5.97	77.9%

Note: Includes flow from CB#8, North and South Roof

Pipe from MH#11 to Rip Rap

Basin Description				Drainage Path						
Acres	C	Description	AC	Length (ft)	ΔH	Slope (%)	Description	Time (min)	50yr. Rainfall Intensity (in/hr)	Q = ACI (cfs)
0.111	0.95	Impervious	0.11							
0.084	0.30	Pervious	0.03							
0.19		**Total**	**0.13**					**16.5**	**9.62**	**1.26**

Q in system (cfs)	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
1.26	8	65	0.011	PVC	0.044	3.00	41.8%

HYDRAULIC DATA FOR RATIONAL METHOD

Project:	*Oak Park Commons*	**Project #:**	*7338*	**Date:**	*6/1/2022*
Location:	*Ursula Place, Stamford, CT*	**By:**	*AJP*	**Checked:**	*AMK*

Description

Conveyance Calculations for 50 Year Storm Event

Pipe from MH#12 to EX.MH

Basin Description				Drainage Path						
Acres	C	Description	AC	Length (ft)	ΔH	Slope (%)	Description	Time (min)	50yr. Rainfall Intensity (in/hr)	Q = ACI (cfs)
0.31	0.95	Impervious	0.30							
0.03	0.30	Pervious	0.01							
0.34		**Total**	**0.31**					**5**	**9.62**	**2.94**

Q in system (cfs)	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
2.94	12	65	0.011	PVC	0.030	7.31	40.2%

Pipe from JB#1 to MH#13

Basin Description				Drainage Path						
Acres	C	Description	AC	Length (ft)	ΔH	Slope (%)	Description	Time (min)	50yr. Rainfall Intensity (in/hr)	Q = ACI (cfs)
0.07	0.95	Impervious	0.07							
0.00	0.30	Pervious	0.00							
0.07		**Total**	**0.07**					**5**	**9.62**	**0.68**

Q in system (cfs)	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
0.68	6	65	0.011	PVC	0.050	1.49	46.1%

Pipe from MH#7 to SB#2

Basin Description				Drainage Path						
Acres	C	Description	AC	Length (ft)	ΔH	Slope (%)	Description	Time (min)	50yr. Rainfall Intensity (in/hr)	Q = ACI (cfs)
0.43	0.95	Impervious	0.41							
0.85	0.30	Pervious	0.25							
1.28		**Total**	**0.66**					**5**	**9.62**	**6.35**

Q in system (cfs)	Pipe Size (in)	Pipe Length (ft)	Roughness coefficient	Material	Slope (ft/ft)	Q_{full} (cfs)	Q_{system} / Q_{full} (%)
6.35	15	15	0.011	PVC	0.010	7.65	83.0%

RIPRAP SIZING

Project: *Oak Park Development*	**Project #:** *7338*	**Date:** *6/1/2022*
Location: *Ursula Place, Stamford, CT*	**By:** *AMK*	**Checked:** *AMK*

Porous Asphalt #2 Rip-Rap Discharge Pad

Downstream channel	No
Tail Water (TW)	TW < 0.5 Rp
RipRap Type	A

Velocity	6.63 fps
Discharge (Q)	1.3 cfs [d]
Pipe Diameter	4 in
Pipe Diameter (R_p)	0 ft
Inside Diameter (S_p)	0 ft
Length (L_a)	5 ft[a]
Riprap Specification	Modified [b]
Start Width (W1)	1.0 ft[c]
End Width (W2)	4.5 ft

[a] From Table 11-12.1 from Page 11.13-7 and Table 11-13.1 from Page 11.13.9 of the Connecticut Department of Transportation Drainage Manual

[b] From Table 11.11 on Page 11.13-2 of the Connecticut Department of Transportation Drainage Manual

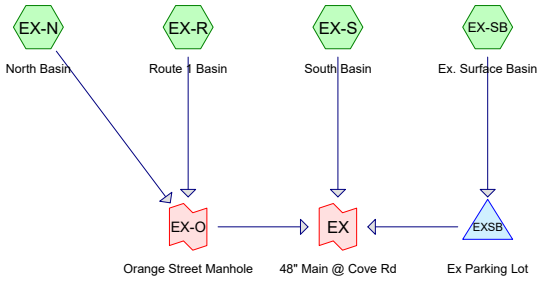
[c] W1=3Sp and W2=3Sp + 0.7La from Equation 11.33 from Page 11.13.3 of the Connecticut Department of Transportation Drainage Manual

[d] 1.3 cfs flowrate from project HydroCAD model, pond PA2 4" underdrain outlet, 100-Yr storm.

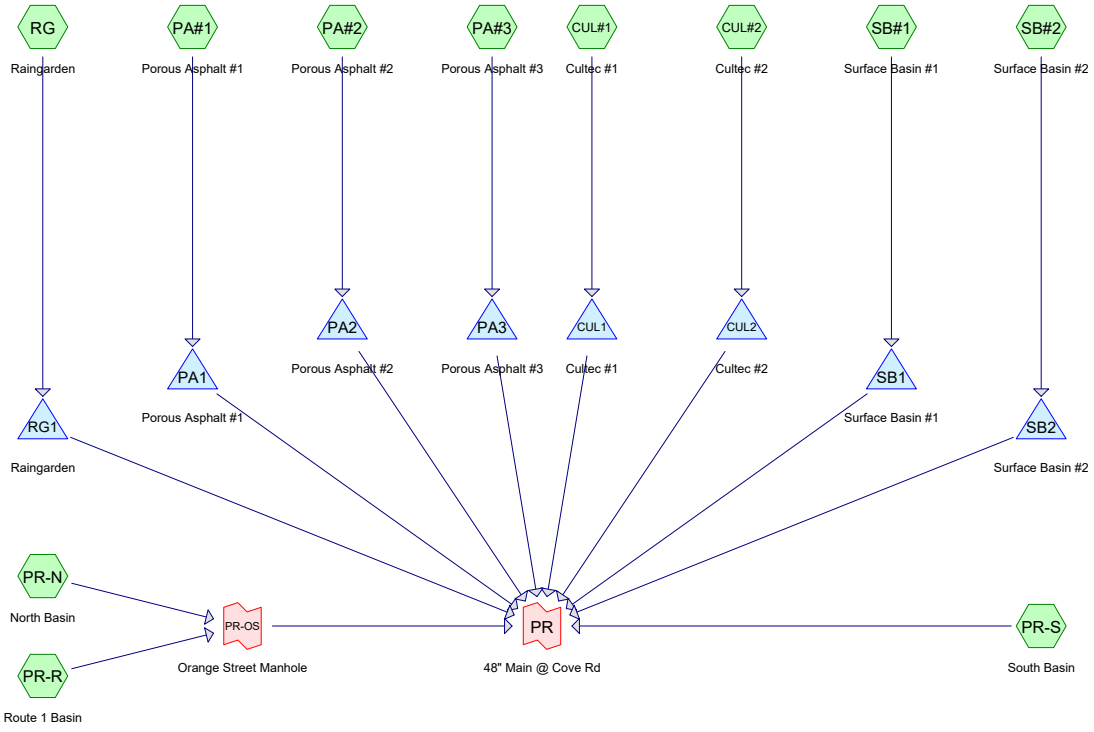
Appendix E

HydroCAD Report

EXISTING ONSITE DRAINAGE BASINS



PROPOSED ONSITE DRAINAGE BASINS



Subcat Reach Pond Link

Routing Diagram for 7338 HydroCAD - FSP Model
Prepared by {enter your company name here}, Printed 6/1/2022

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 CUL#1: Cultec #1 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>2.72"
Tc=5.0 min CN=98.00 Runoff=0.22 cfs 739 cf

Subcatchment CUL#2: Cultec #2 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>2.72"
Tc=5.0 min CN=98.00 Runoff=0.22 cfs 739 cf

Subcatchment EX-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>2.03"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=56.66 cfs 299,585 cf

Subcatchment EX-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>2.14"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=21.97 cfs 85,395 cf

Subcatchment EX-S: South Basin Runoff Area=2,567,066 sf 56.98% Impervious Runoff Depth>1.75"
Flow Length=3,643' Tc=25.1 min CN=87.75 Runoff=74.24 cfs 373,350 cf

Subcatchment EX-SB: Ex. Surface Basin Runoff Area=70,859 sf 42.98% Impervious Runoff Depth>1.03"
Flow Length=323' Tc=8.7 min CN=76.89 Runoff=1.72 cfs 6,071 cf

Subcatchment PA#1: Porous Asphalt #1 Runoff Area=17,621 sf 71.32% Impervious Runoff Depth>2.19"
Tc=5.0 min CN=92.84 Runoff=1.05 cfs 3,215 cf

Subcatchment PA#2: Porous Asphalt #2 Runoff Area=19,543 sf 69.13% Impervious Runoff Depth>2.15"
Tc=5.0 min CN=92.44 Runoff=1.15 cfs 3,505 cf

Subcatchment PA#3: Porous Asphalt #3 Runoff Area=10,037 sf 51.51% Impervious Runoff Depth>1.88"
Tc=5.0 min CN=89.27 Runoff=0.52 cfs 1,569 cf

Subcatchment PR-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>2.03"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=56.66 cfs 299,585 cf

Subcatchment PR-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>2.14"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=21.97 cfs 85,395 cf

Subcatchment PR-S: South Basin Runoff Area=2,413,525 sf 58.80% Impervious Runoff Depth>1.80"
Flow Length=3,643' Tc=25.1 min CN=88.39 Runoff=71.77 cfs 361,265 cf

Subcatchment RG: Raingarden Runoff Area=19,953 sf 37.53% Impervious Runoff Depth>1.68"
Tc=5.0 min CN=86.76 Runoff=0.93 cfs 2,786 cf

Subcatchment SB#1: Surface Basin #1 Runoff Area=95,126 sf 36.42% Impervious Runoff Depth>0.90"
Flow Length=383' Tc=6.7 min CN=74.48 Runoff=2.10 cfs 7,131 cf

Subcatchment SB#2: Surface Basin #2 Runoff Area=55,592 sf 41.57% Impervious Runoff Depth>1.00"
Flow Length=356' Tc=11.8 min CN=76.37 Runoff=1.18 cfs 4,626 cf

Pond CUL1: Cultec #1 Peak Elev=19.76' Storage=290 cf Inflow=0.22 cfs 739 cf
Outflow=0.22 cfs 449 cf

Pond CUL2: Cultec #2 Peak Elev=17.16' Storage=279 cf Inflow=0.22 cfs 739 cf
Outflow=0.22 cfs 457 cf

Pond EXSB: Ex Parking Lot Peak Elev=12.10' Storage=0 cf Inflow=1.72 cfs 6,071 cf
Outflow=1.72 cfs 6,071 cf

Pond PA1: Porous Asphalt #1 Peak Elev=24.02' Storage=1,074 cf Inflow=1.05 cfs 3,215 cf
Outflow=1.05 cfs 2,156 cf

Pond PA2: Porous Asphalt #2 Peak Elev=21.93' Storage=549 cf Inflow=1.15 cfs 3,505 cf
Outflow=0.68 cfs 3,463 cf

Pond PA3: Porous Asphalt #3 Peak Elev=21.44' Storage=1,069 cf Inflow=0.52 cfs 1,569 cf
Outflow=0.04 cfs 508 cf

Pond RG1: Raingarden Peak Elev=20.06' Storage=1,270 cf Inflow=0.93 cfs 2,786 cf
Outflow=0.35 cfs 1,570 cf

Pond SB1: Surface Basin #1 Peak Elev=15.52' Storage=7,131 cf Inflow=2.10 cfs 7,131 cf
Outflow=0.00 cfs 0 cf

Pond SB2: Surface Basin #2 Peak Elev=14.02' Storage=104 cf Inflow=1.18 cfs 4,626 cf
Outflow=1.15 cfs 4,624 cf

Link EX: 48" Main @ Cove Rd Inflow=145.25 cfs 764,401 cf
Primary=145.25 cfs 764,401 cf

Link EX-O: Orange Street Manhole Inflow=70.30 cfs 384,979 cf
Primary=70.30 cfs 384,979 cf

Link PR: 48" Main @ Cove Rd Inflow=144.20 cfs 759,472 cf
Primary=144.20 cfs 759,472 cf

Link PR-OS: Orange Street Manhole Inflow=70.30 cfs 384,979 cf
Primary=70.30 cfs 384,979 cf

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 CUL#1: Cultec #1 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>3.33"
Tc=5.0 min CN=98.00 Runoff=0.27 cfs 907 cf

Subcatchment CUL#2: Cultec #2 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>3.33"
Tc=5.0 min CN=98.00 Runoff=0.27 cfs 907 cf

Subcatchment EX-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>2.62"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=72.23 cfs 385,320 cf

Subcatchment EX-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>2.73"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=27.75 cfs 108,991 cf

Subcatchment EX-S: South Basin Runoff Area=2,567,066 sf 56.98% Impervious Runoff Depth>2.30"
Flow Length=3,643' Tc=25.1 min CN=87.75 Runoff=97.42 cfs 491,953 cf

Subcatchment EX-SB: Ex. Surface Basin Runoff Area=70,859 sf 42.98% Impervious Runoff Depth>1.47"
Flow Length=323' Tc=8.7 min CN=76.89 Runoff=2.52 cfs 8,694 cf

Subcatchment PA#1: Porous Asphalt #1 Runoff Area=17,621 sf 71.32% Impervious Runoff Depth>2.78"
Tc=5.0 min CN=92.84 Runoff=1.32 cfs 4,089 cf

Subcatchment PA#2: Porous Asphalt #2 Runoff Area=19,543 sf 69.13% Impervious Runoff Depth>2.74"
Tc=5.0 min CN=92.44 Runoff=1.45 cfs 4,470 cf

Subcatchment PA#3: Porous Asphalt #3 Runoff Area=10,037 sf 51.51% Impervious Runoff Depth>2.44"
Tc=5.0 min CN=89.27 Runoff=0.68 cfs 2,045 cf

Subcatchment PR-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>2.62"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=72.23 cfs 385,320 cf

Subcatchment PR-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>2.73"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=27.75 cfs 108,991 cf

Subcatchment PR-S: South Basin Runoff Area=2,413,525 sf 58.80% Impervious Runoff Depth>2.36"
Flow Length=3,643' Tc=25.1 min CN=88.39 Runoff=93.66 cfs 473,888 cf

Subcatchment RG: Raingarden Runoff Area=19,953 sf 37.53% Impervious Runoff Depth>2.22"
Tc=5.0 min CN=86.76 Runoff=1.23 cfs 3,696 cf

Subcatchment SB#1: Surface Basin #1 Runoff Area=95,126 sf 36.42% Impervious Runoff Depth>1.32"
Flow Length=383' Tc=6.7 min CN=74.48 Runoff=3.19 cfs 10,436 cf

Subcatchment SB#2: Surface Basin #2 Runoff Area=55,592 sf 41.57% Impervious Runoff Depth>1.44"
Flow Length=356' Tc=11.8 min CN=76.37 Runoff=1.74 cfs 6,656 cf

Pond CUL1: Cultec #1 Peak Elev=19.76' Storage=290 cf Inflow=0.27 cfs 907 cf
Outflow=0.27 cfs 619 cf

Pond CUL2: Cultec #2 Peak Elev=17.16' Storage=279 cf Inflow=0.27 cfs 907 cf
Outflow=0.27 cfs 626 cf

Pond EXSB: Ex Parking Lot Peak Elev=12.12' Storage=1 cf Inflow=2.52 cfs 8,694 cf
Outflow=2.52 cfs 8,694 cf

Pond PA1: Porous Asphalt #1 Peak Elev=24.03' Storage=1,078 cf Inflow=1.32 cfs 4,089 cf
Outflow=1.31 cfs 3,031 cf

Pond PA2: Porous Asphalt #2 Peak Elev=22.14' Storage=702 cf Inflow=1.45 cfs 4,470 cf
Outflow=0.81 cfs 4,422 cf

Pond PA3: Porous Asphalt #3 Peak Elev=21.48' Storage=1,089 cf Inflow=0.68 cfs 2,045 cf
Outflow=0.21 cfs 983 cf

Pond RG1: Raingarden Peak Elev=20.11' Storage=1,326 cf Inflow=1.23 cfs 3,696 cf
Outflow=0.93 cfs 2,479 cf

Pond SB1: Surface Basin #1 Peak Elev=15.73' Storage=10,434 cf Inflow=3.19 cfs 10,436 cf
Outflow=0.00 cfs 0 cf

Pond SB2: Surface Basin #2 Peak Elev=14.03' Storage=156 cf Inflow=1.74 cfs 6,656 cf
Outflow=1.70 cfs 6,653 cf

Link EX: 48" Main @ Cove Rd Inflow=188.00 cfs 994,958 cf
Primary=188.00 cfs 994,958 cf

Link EX-O: Orange Street Manhole Inflow=89.46 cfs 494,311 cf
Primary=89.46 cfs 494,311 cf

Link PR: 48" Main @ Cove Rd Inflow=186.20 cfs 987,012 cf
Primary=186.20 cfs 987,012 cf

Link PR-OS: Orange Street Manhole Inflow=89.46 cfs 494,311 cf
Primary=89.46 cfs 494,311 cf

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 CUL#1: Cultec #1 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>4.34"
Tc=5.0 min CN=98.00 Runoff=0.35 cfs 1,181 cf

Subcatchment CUL#2: Cultec #2 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>4.34"
Tc=5.0 min CN=98.00 Runoff=0.35 cfs 1,181 cf

Subcatchment EX-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>3.58"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=97.57 cfs 527,590 cf

Subcatchment EX-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>3.71"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=37.10 cfs 147,998 cf

Subcatchment EX-S: South Basin Runoff Area=2,567,066 sf 56.98% Impervious Runoff Depth>3.23"
Flow Length=3,643' Tc=25.1 min CN=87.75 Runoff=135.60 cfs 691,489 cf

Subcatchment EX-SB: Ex. Surface Basin Runoff Area=70,859 sf 42.98% Impervious Runoff Depth>2.26"
Flow Length=323' Tc=8.7 min CN=76.89 Runoff=3.93 cfs 13,360 cf

Subcatchment PA#1: Porous Asphalt #1 Runoff Area=17,621 sf 71.32% Impervious Runoff Depth>3.77"
Tc=5.0 min CN=92.84 Runoff=1.75 cfs 5,530 cf

Subcatchment PA#2: Porous Asphalt #2 Runoff Area=19,543 sf 69.13% Impervious Runoff Depth>3.72"
Tc=5.0 min CN=92.44 Runoff=1.93 cfs 6,064 cf

Subcatchment PA#3: Porous Asphalt #3 Runoff Area=10,037 sf 51.51% Impervious Runoff Depth>3.40"
Tc=5.0 min CN=89.27 Runoff=0.93 cfs 2,840 cf

Subcatchment PR-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>3.58"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=97.57 cfs 527,590 cf

Subcatchment PR-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>3.71"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=37.10 cfs 147,998 cf

Subcatchment PR-S: South Basin Runoff Area=2,413,525 sf 58.80% Impervious Runoff Depth>3.30"
Flow Length=3,643' Tc=25.1 min CN=88.39 Runoff=129.60 cfs 662,848 cf

Subcatchment RG: Raingarden Runoff Area=19,953 sf 37.53% Impervious Runoff Depth>3.15"
Tc=5.0 min CN=86.76 Runoff=1.73 cfs 5,234 cf

Subcatchment SB#1: Surface Basin #1 Runoff Area=95,126 sf 36.42% Impervious Runoff Depth>2.07"
Flow Length=383' Tc=6.7 min CN=74.48 Runoff=5.14 cfs 16,401 cf

Subcatchment SB#2: Surface Basin #2 Runoff Area=55,592 sf 41.57% Impervious Runoff Depth>2.22"
Flow Length=356' Tc=11.8 min CN=76.37 Runoff=2.74 cfs 10,277 cf

Pond CUL1: Cultec #1 Peak Elev=19.76' Storage=291 cf Inflow=0.35 cfs 1,181 cf
Outflow=0.35 cfs 891 cf

Pond CUL2: Cultec #2 Peak Elev=17.16' Storage=279 cf Inflow=0.35 cfs 1,181 cf
Outflow=0.35 cfs 902 cf

Pond EXSB: Ex Parking Lot Peak Elev=12.15' Storage=1 cf Inflow=3.93 cfs 13,360 cf
Outflow=3.93 cfs 13,360 cf

Pond PA1: Porous Asphalt #1 Peak Elev=24.03' Storage=1,086 cf Inflow=1.75 cfs 5,530 cf
Outflow=1.75 cfs 4,474 cf

Pond PA2: Porous Asphalt #2 Peak Elev=22.52' Storage=976 cf Inflow=1.93 cfs 6,064 cf
Outflow=1.00 cfs 6,010 cf

Pond PA3: Porous Asphalt #3 Peak Elev=21.55' Storage=1,131 cf Inflow=0.93 cfs 2,840 cf
Outflow=0.75 cfs 1,777 cf

Pond RG1: Raingarden Peak Elev=20.17' Storage=1,383 cf Inflow=1.73 cfs 5,234 cf
Outflow=1.67 cfs 4,015 cf

Pond SB1: Surface Basin #1 Peak Elev=16.00' Storage=15,315 cf Inflow=5.14 cfs 16,401 cf
Outflow=0.09 cfs 1,098 cf

Pond SB2: Surface Basin #2 Peak Elev=14.08' Storage=385 cf Inflow=2.74 cfs 10,277 cf
Outflow=2.22 cfs 10,273 cf

Link EX: 48" Main @ Cove Rd Inflow=258.04 cfs 1,380,436 cf
Primary=258.04 cfs 1,380,436 cf

Link EX-O: Orange Street Manhole Inflow=120.58 cfs 675,588 cf
Primary=120.58 cfs 675,588 cf

Link PR: 48" Main @ Cove Rd Inflow=255.04 cfs 1,367,876 cf
Primary=255.04 cfs 1,367,876 cf

Link PR-OS: Orange Street Manhole Inflow=120.58 cfs 675,588 cf
Primary=120.58 cfs 675,588 cf

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 CUL#1: Cultec #1 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>5.19"
Tc=5.0 min CN=98.00 Runoff=0.41 cfs 1,411 cf

Subcatchment CUL#2: Cultec #2 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>5.19"
Tc=5.0 min CN=98.00 Runoff=0.41 cfs 1,411 cf

Subcatchment EX-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>4.40"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=118.77 cfs 648,824 cf

Subcatchment EX-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>4.54"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=44.91 cfs 181,148 cf

Subcatchment EX-S: South Basin Runoff Area=2,567,066 sf 56.98% Impervious Runoff Depth>4.04"
Flow Length=3,643' Tc=25.1 min CN=87.75 Runoff=167.73 cfs 863,191 cf

Subcatchment EX-SB: Ex. Surface Basin Runoff Area=70,859 sf 42.98% Impervious Runoff Depth>2.97"
Flow Length=323' Tc=8.7 min CN=76.89 Runoff=5.17 cfs 17,545 cf

Subcatchment PA#1: Porous Asphalt #1 Runoff Area=17,621 sf 71.32% Impervious Runoff Depth>4.60"
Tc=5.0 min CN=92.84 Runoff=2.12 cfs 6,754 cf

Subcatchment PA#2: Porous Asphalt #2 Runoff Area=19,543 sf 69.13% Impervious Runoff Depth>4.56"
Tc=5.0 min CN=92.44 Runoff=2.34 cfs 7,419 cf

Subcatchment PA#3: Porous Asphalt #3 Runoff Area=10,037 sf 51.51% Impervious Runoff Depth>4.21"
Tc=5.0 min CN=89.27 Runoff=1.14 cfs 3,522 cf

Subcatchment PR-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>4.40"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=118.77 cfs 648,824 cf

Subcatchment PR-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>4.54"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=44.91 cfs 181,148 cf

Subcatchment PR-S: South Basin Runoff Area=2,413,525 sf 58.80% Impervious Runoff Depth>4.10"
Flow Length=3,643' Tc=25.1 min CN=88.39 Runoff=159.85 cfs 825,132 cf

Subcatchment RG: Raingarden Runoff Area=19,953 sf 37.53% Impervious Runoff Depth>3.95"
Tc=5.0 min CN=86.76 Runoff=2.15 cfs 6,561 cf

Subcatchment SB#1: Surface Basin #1 Runoff Area=95,126 sf 36.42% Impervious Runoff Depth>2.75"
Flow Length=383' Tc=6.7 min CN=74.48 Runoff=6.88 cfs 21,810 cf

Subcatchment SB#2: Surface Basin #2 Runoff Area=55,592 sf 41.57% Impervious Runoff Depth>2.92"
Flow Length=356' Tc=11.8 min CN=76.37 Runoff=3.62 cfs 13,532 cf

Pond CUL1: Cultec #1 Peak Elev=19.77' Storage=291 cf Inflow=0.41 cfs 1,411 cf
Outflow=0.41 cfs 1,122 cf

Pond CUL2: Cultec #2 Peak Elev=17.17' Storage=279 cf Inflow=0.41 cfs 1,411 cf
Outflow=0.41 cfs 1,133 cf

Pond EXSB: Ex Parking Lot Peak Elev=12.21' Storage=4 cf Inflow=5.17 cfs 17,545 cf
Outflow=5.17 cfs 17,545 cf

Pond PA1: Porous Asphalt #1 Peak Elev=24.04' Storage=1,092 cf Inflow=2.12 cfs 6,754 cf
Outflow=2.11 cfs 5,698 cf

Pond PA2: Porous Asphalt #2 Peak Elev=22.89' Storage=1,224 cf Inflow=2.34 cfs 7,419 cf
Outflow=1.15 cfs 7,359 cf

Pond PA3: Porous Asphalt #3 Peak Elev=21.59' Storage=1,156 cf Inflow=1.14 cfs 3,522 cf
Outflow=1.10 cfs 2,458 cf

Pond RG1: Raingarden Peak Elev=20.19' Storage=1,411 cf Inflow=2.15 cfs 6,561 cf
Outflow=2.09 cfs 5,341 cf

Pond SB1: Surface Basin #1 Peak Elev=16.01' Storage=15,459 cf Inflow=6.88 cfs 21,810 cf
Outflow=0.42 cfs 6,499 cf

Pond SB2: Surface Basin #2 Peak Elev=14.21' Storage=987 cf Inflow=3.62 cfs 13,532 cf
Outflow=2.30 cfs 13,528 cf

Link EX: 48" Main @ Cove Rd Inflow=316.92 cfs 1,710,707 cf
Primary=316.92 cfs 1,710,707 cf

Link EX-O: Orange Street Manhole Inflow=146.61 cfs 829,972 cf
Primary=146.61 cfs 829,972 cf

Link PR: 48" Main @ Cove Rd Inflow=312.02 cfs 1,698,240 cf
Primary=312.02 cfs 1,698,240 cf

Link PR-OS: Orange Street Manhole Inflow=146.61 cfs 829,972 cf
Primary=146.61 cfs 829,972 cf

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 CUL#1: Cultec #1 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>6.35"
Tc=5.0 min CN=98.00 Runoff=0.50 cfs 1,726 cf

Subcatchment CUL#2: Cultec #2 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>6.35"
Tc=5.0 min CN=98.00 Runoff=0.50 cfs 1,726 cf

Subcatchment EX-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>5.54"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=147.52 cfs 815,579 cf

Subcatchment EX-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>5.68"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=55.51 cfs 226,666 cf

Subcatchment EX-S: South Basin Runoff Area=2,567,066 sf 56.98% Impervious Runoff Depth>5.15"
Flow Length=3,643' Tc=25.1 min CN=87.75 Runoff=211.66 cfs 1,100,900 cf

Subcatchment EX-SB: Ex. Surface Basin Runoff Area=70,859 sf 42.98% Impervious Runoff Depth>3.98"
Flow Length=323' Tc=8.7 min CN=76.89 Runoff=6.92 cfs 23,508 cf

Subcatchment PA#1: Porous Asphalt #1 Runoff Area=17,621 sf 71.32% Impervious Runoff Depth>5.74"
Tc=5.0 min CN=92.84 Runoff=2.61 cfs 8,433 cf

Subcatchment PA#2: Porous Asphalt #2 Runoff Area=19,543 sf 69.13% Impervious Runoff Depth>5.70"
Tc=5.0 min CN=92.44 Runoff=2.88 cfs 9,278 cf

Subcatchment PA#3: Porous Asphalt #3 Runoff Area=10,037 sf 51.51% Impervious Runoff Depth>5.33"
Tc=5.0 min CN=89.27 Runoff=1.42 cfs 4,462 cf

Subcatchment PR-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>5.54"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=147.52 cfs 815,579 cf

Subcatchment PR-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>5.68"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=55.51 cfs 226,666 cf

Subcatchment PR-S: South Basin Runoff Area=2,413,525 sf 58.80% Impervious Runoff Depth>5.22"
Flow Length=3,643' Tc=25.1 min CN=88.39 Runoff=201.05 cfs 1,049,508 cf

Subcatchment RG: Raingarden Runoff Area=19,953 sf 37.53% Impervious Runoff Depth>5.05"
Tc=5.0 min CN=86.76 Runoff=2.72 cfs 8,402 cf

Subcatchment SB#1: Surface Basin #1 Runoff Area=95,126 sf 36.42% Impervious Runoff Depth>3.73"
Flow Length=383' Tc=6.7 min CN=74.48 Runoff=9.34 cfs 29,582 cf

Subcatchment SB#2: Surface Basin #2 Runoff Area=55,592 sf 41.57% Impervious Runoff Depth>3.92"
Flow Length=356' Tc=11.8 min CN=76.37 Runoff=4.86 cfs 18,180 cf

Pond CUL1: Cultec #1 Peak Elev=19.77' Storage=291 cf Inflow=0.50 cfs 1,726 cf
Outflow=0.50 cfs 1,437 cf

Pond CUL2: Cultec #2	Peak Elev=17.17' Storage=279 cf Inflow=0.50 cfs 1,726 cf Outflow=0.50 cfs 1,449 cf
Pond EXSB: Ex Parking Lot	Peak Elev=12.31' Storage=11 cf Inflow=6.92 cfs 23,508 cf Outflow=6.92 cfs 23,508 cf
Pond PA1: Porous Asphalt #1	Peak Elev=24.05' Storage=1,101 cf Inflow=2.61 cfs 8,433 cf Outflow=2.60 cfs 7,377 cf
Pond PA2: Porous Asphalt #2	Peak Elev=23.18' Storage=1,420 cf Inflow=2.88 cfs 9,278 cf Outflow=2.07 cfs 9,212 cf
Pond PA3: Porous Asphalt #3	Peak Elev=21.62' Storage=1,176 cf Inflow=1.42 cfs 4,462 cf Outflow=1.38 cfs 3,398 cf
Pond RG1: Raingarden	Peak Elev=20.22' Storage=1,447 cf Inflow=2.72 cfs 8,402 cf Outflow=2.65 cfs 7,180 cf
Pond SB1: Surface Basin #1	Peak Elev=16.03' Storage=15,812 cf Inflow=9.34 cfs 29,582 cf Outflow=1.89 cfs 14,258 cf
Pond SB2: Surface Basin #2	Peak Elev=14.44' Storage=2,137 cf Inflow=4.86 cfs 18,180 cf Outflow=2.44 cfs 18,174 cf
Link EX: 48" Main @ Cove Rd	Inflow=396.95 cfs 2,166,654 cf Primary=396.95 cfs 2,166,654 cf
Link EX-O: Orange Street Manhole	Inflow=181.92 cfs 1,042,245 cf Primary=181.92 cfs 1,042,245 cf
Link PR: 48" Main @ Cove Rd	Inflow=389.29 cfs 2,154,237 cf Primary=389.29 cfs 2,154,237 cf
Link PR-OS: Orange Street Manhole	Inflow=181.92 cfs 1,042,245 cf Primary=181.92 cfs 1,042,245 cf

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 CUL#1: Cultec #1 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>7.21"
Tc=5.0 min CN=98.00 Runoff=0.57 cfs 1,960 cf

Subcatchment CUL#2: Cultec #2 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>7.21"
Tc=5.0 min CN=98.00 Runoff=0.57 cfs 1,960 cf

Subcatchment EX-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>6.38"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=168.72 cfs 939,842 cf

Subcatchment EX-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>6.53"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=63.32 cfs 260,546 cf

Subcatchment EX-S: South Basin Runoff Area=2,567,066 sf 56.98% Impervious Runoff Depth>5.98"
Flow Length=3,643' Tc=25.1 min CN=87.75 Runoff=244.06 cfs 1,278,812 cf

Subcatchment EX-SB: Ex. Surface Basin Runoff Area=70,859 sf 42.98% Impervious Runoff Depth>4.75"
Flow Length=323' Tc=8.7 min CN=76.89 Runoff=8.23 cfs 28,063 cf

Subcatchment PA#1: Porous Asphalt #1 Runoff Area=17,621 sf 71.32% Impervious Runoff Depth>6.59"
Tc=5.0 min CN=92.84 Runoff=2.97 cfs 9,682 cf

Subcatchment PA#2: Porous Asphalt #2 Runoff Area=19,543 sf 69.13% Impervious Runoff Depth>6.55"
Tc=5.0 min CN=92.44 Runoff=3.29 cfs 10,662 cf

Subcatchment PA#3: Porous Asphalt #3 Runoff Area=10,037 sf 51.51% Impervious Runoff Depth>6.17"
Tc=5.0 min CN=89.27 Runoff=1.63 cfs 5,165 cf

Subcatchment PR-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>6.38"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=168.72 cfs 939,842 cf

Subcatchment PR-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>6.53"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=63.32 cfs 260,546 cf

Subcatchment PR-S: South Basin Runoff Area=2,413,525 sf 58.80% Impervious Runoff Depth>6.05"
Flow Length=3,643' Tc=25.1 min CN=88.39 Runoff=231.45 cfs 1,217,291 cf

Subcatchment RG: Raingarden Runoff Area=19,953 sf 37.53% Impervious Runoff Depth>5.88"
Tc=5.0 min CN=86.76 Runoff=3.14 cfs 9,782 cf

Subcatchment SB#1: Surface Basin #1 Runoff Area=95,126 sf 36.42% Impervious Runoff Depth>4.48"
Flow Length=383' Tc=6.7 min CN=74.48 Runoff=11.20 cfs 35,551 cf

Subcatchment SB#2: Surface Basin #2 Runoff Area=55,592 sf 41.57% Impervious Runoff Depth>4.69"
Flow Length=356' Tc=11.8 min CN=76.37 Runoff=5.80 cfs 21,733 cf

Pond CUL1: Cultec #1 Peak Elev=19.77' Storage=292 cf Inflow=0.57 cfs 1,960 cf
Outflow=0.57 cfs 1,671 cf

Pond CUL2: Cultec #2	Peak Elev=17.17' Storage=280 cf Inflow=0.57 cfs 1,960 cf Outflow=0.57 cfs 1,682 cf
Pond EXSB: Ex Parking Lot	Peak Elev=12.42' Storage=23 cf Inflow=8.23 cfs 28,063 cf Outflow=8.23 cfs 28,063 cf
Pond PA1: Porous Asphalt #1	Peak Elev=24.06' Storage=1,107 cf Inflow=2.97 cfs 9,682 cf Outflow=2.96 cfs 8,625 cf
Pond PA2: Porous Asphalt #2	Peak Elev=23.25' Storage=1,477 cf Inflow=3.29 cfs 10,662 cf Outflow=2.79 cfs 10,591 cf
Pond PA3: Porous Asphalt #3	Peak Elev=21.64' Storage=1,190 cf Inflow=1.63 cfs 5,165 cf Outflow=1.58 cfs 4,100 cf
Pond RG1: Raingarden	Peak Elev=20.25' Storage=1,471 cf Inflow=3.14 cfs 9,782 cf Outflow=3.07 cfs 8,559 cf
Pond SB1: Surface Basin #1	Peak Elev=16.05' Storage=16,268 cf Inflow=11.20 cfs 35,551 cf Outflow=4.54 cfs 20,218 cf
Pond SB2: Surface Basin #2	Peak Elev=14.62' Storage=3,156 cf Inflow=5.80 cfs 21,733 cf Outflow=2.54 cfs 21,726 cf
Link EX: 48" Main @ Cove Rd	Inflow=456.01 cfs 2,507,263 cf Primary=456.01 cfs 2,507,263 cf
Link EX-O: Orange Street Manhole	Inflow=207.95 cfs 1,200,388 cf Primary=207.95 cfs 1,200,388 cf
Link PR: 48" Main @ Cove Rd	Inflow=450.77 cfs 2,494,850 cf Primary=450.77 cfs 2,494,850 cf
Link PR-OS: Orange Street Manhole	Inflow=207.95 cfs 1,200,388 cf Primary=207.95 cfs 1,200,388 cf

Summary for Subcatchment CUL#1: Cultec #1

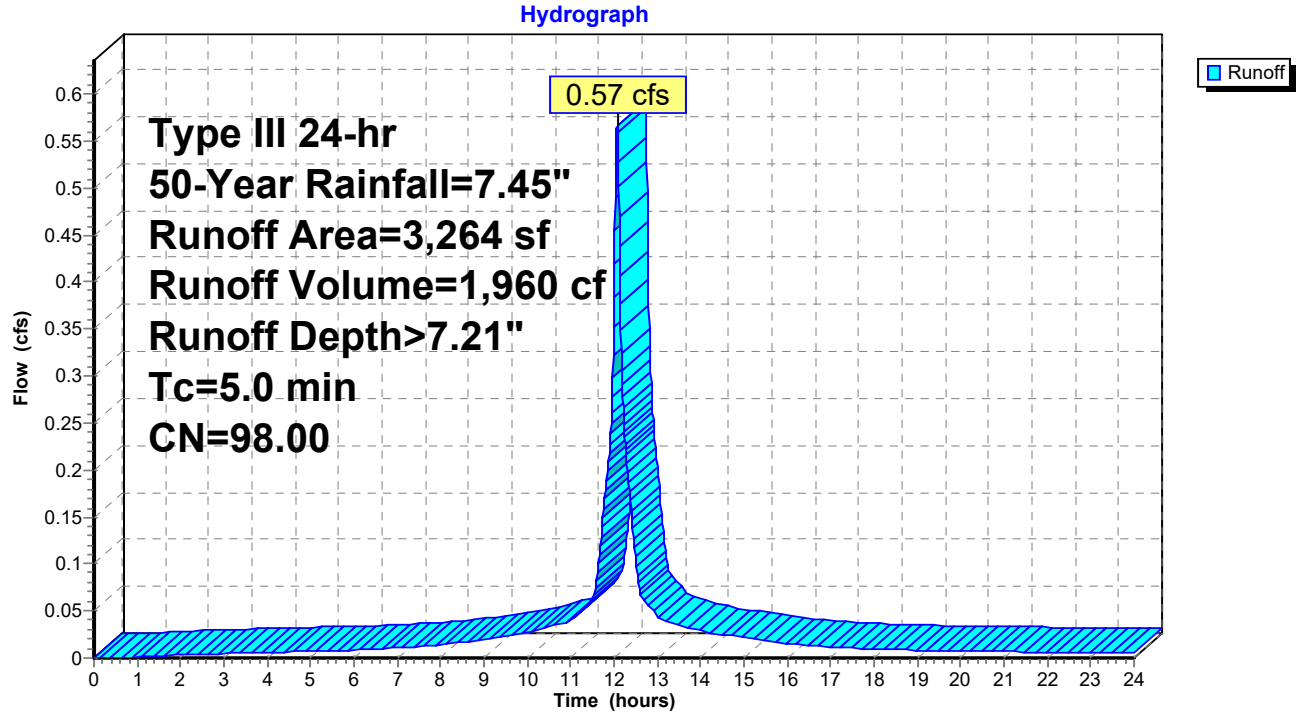
Runoff = 0.57 cfs @ 12.07 hrs, Volume= 1,960 cf, Depth> 7.21"

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 50-Year Rainfall=7.45"

	Area (sf)	CN	Description
*	3,264	98.00	Impervious
	3,264		100.00% Impervious Area

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

Subcatchment CUL#1: Cultec #1



Summary for Subcatchment CUL#2: Cultec #2

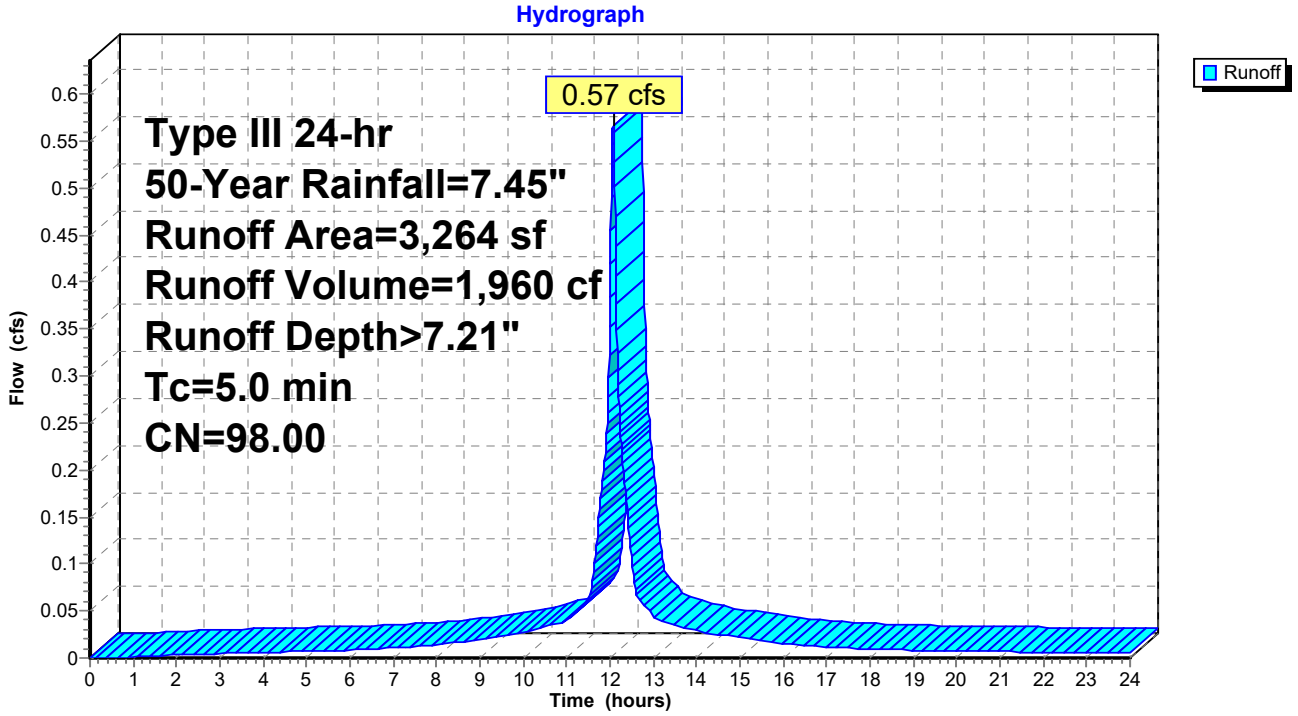
Runoff = 0.57 cfs @ 12.07 hrs, Volume= 1,960 cf, Depth> 7.21"

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 50-Year Rainfall=7.45"

	Area (sf)	CN	Description
*	3,264	98.00	Impervious
	3,264		100.00% Impervious Area

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

Subcatchment CUL#2: Cultec #2



Summary for Subcatchment EX-N: North Basin

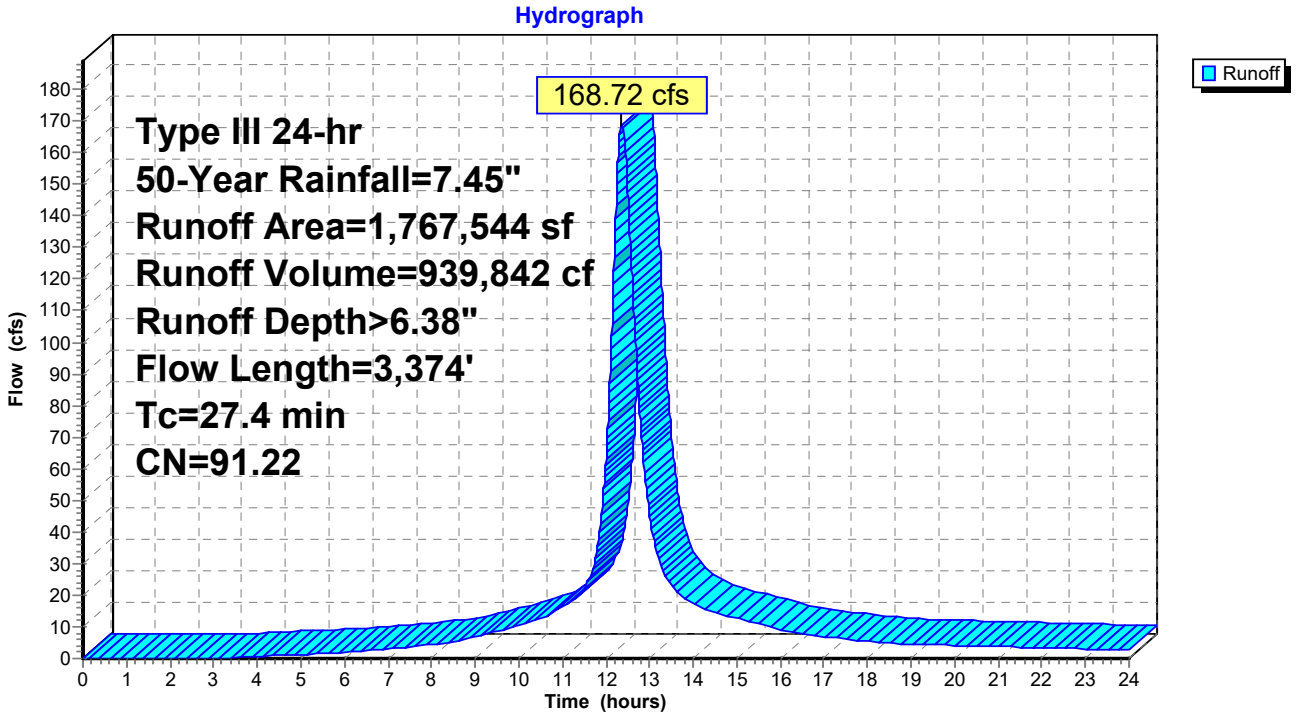
Runoff = 168.72 cfs @ 12.36 hrs, Volume= 939,842 cf, Depth> 6.38"

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 50-Year Rainfall=7.45"

Area (sf)	CN	Description
166,879	85.00	1/8 acre lots, 65% imp, HSG B
106,473	90.00	1/8 acre lots, 65% imp, HSG C
1,494,192	92.00	1/8 acre lots, 65% imp, HSG D
1,767,544	91.22	Weighted Average
618,640		35.00% Pervious Area
1,148,904		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	207	0.0217	0.21		**Sheet Flow, 207 LF Sheet Flow** Grass: Short n= 0.150 P2= 3.45"
5.7	294	0.0153	0.87		**Shallow Concentrated Flow, 294 LF Shallow Concentrated** Short Grass Pasture Kv= 7.0 fps
0.9	200	0.0350	3.80		**Shallow Concentrated Flow, 200 LF Shallow Concentrated** Paved Kv= 20.3 fps
3.4	2,208	0.0310	10.95	13.44	**Pipe Channel, 2,208 LF of 15" RCP** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
1.1	465	0.0150	7.28	91.48	**Pipe Channel, 465 LF of 48" Corrugated Metal** 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.025 Corrugated metal
27.4	3,374	Total			

Subcatchment EX-N: North Basin



Summary for Subcatchment EX-R: Route 1 Basin

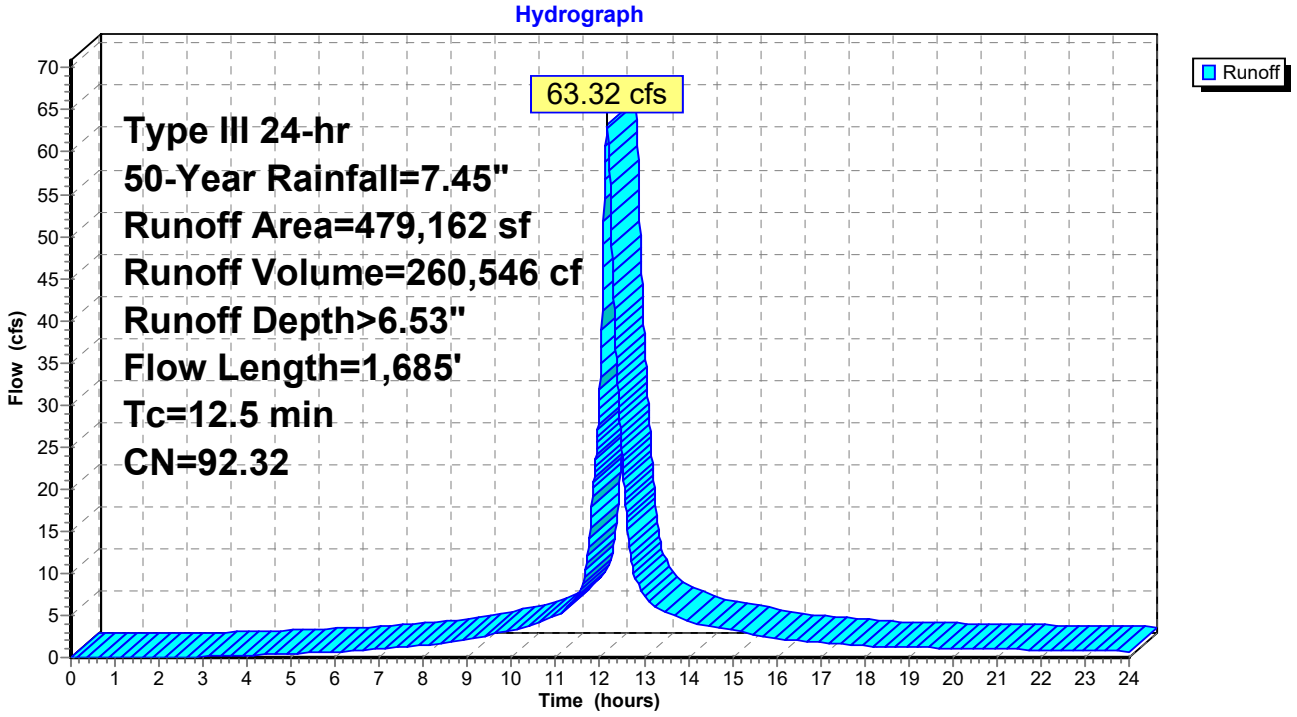
Runoff = 63.32 cfs @ 12.16 hrs, Volume= 260,546 cf, Depth> 6.53"

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 50-Year Rainfall=7.45"

Area (sf)	CN	Description
428,232	92.00	Urban commercial, 85% imp, HSG B
962	94.00	Urban commercial, 85% imp, HSG C
49,968	95.00	Urban commercial, 85% imp, HSG D
479,162	92.32	Weighted Average
71,874		15.00% Pervious Area
407,288		85.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	171	0.0468	0.28		**Sheet Flow, 171 LF** Grass: Short n= 0.150 P2= 3.45"
1.1	1,049	0.0705	16.52	20.27	**Pipe Channel, 1,049 LF of 15" RCP** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
1.1	465	0.0150	7.28	91.48	**Pipe Channel, 465 LF of 48" Corrugated Metal** 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.025 Corrugated metal
12.5	1,685	Total			

Subcatchment EX-R: Route 1 Basin



Summary for Subcatchment EX-S: South Basin

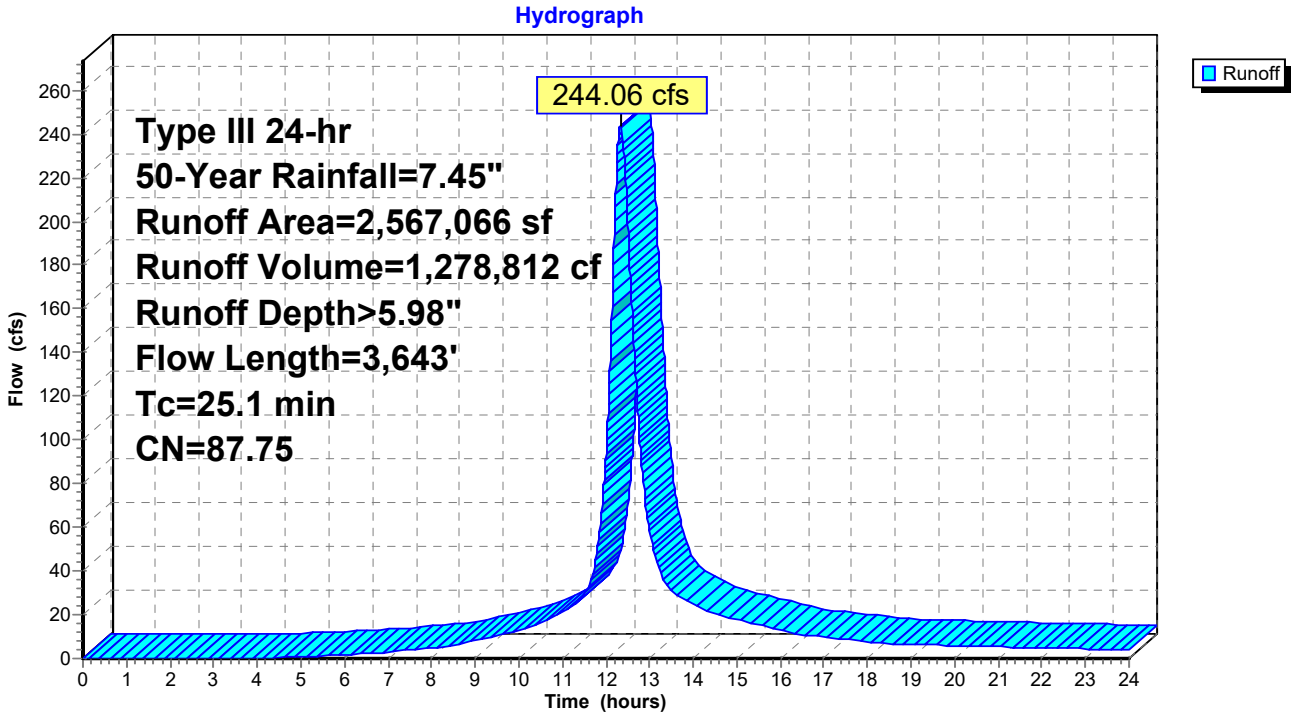
Runoff = 244.06 cfs @ 12.33 hrs, Volume= 1,278,812 cf, Depth> 5.98"

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 50-Year Rainfall=7.45"

	Area (sf)	CN	Description
	417,678	85.00	1/8 acre lots, 65% imp, HSG B
	356,916	90.00	1/8 acre lots, 65% imp, HSG C
	1,203,283	92.00	1/8 acre lots, 65% imp, HSG D
*	177,153	98.00	Impervious
	178,006	61.00	>75% Grass cover, Good, HSG B
	234,030	80.00	>75% Grass cover, Good, HSG D
	2,567,066	87.75	Weighted Average
	1,104,293		43.02% Pervious Area
	1,462,773		56.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	300	0.0766	0.26		**Sheet Flow, 300 LF Sheet Flow** Grass: Dense n= 0.240 P2= 3.45"
0.6	130	0.0308	3.56		**Shallow Concentrated Flow, 130 LF** Paved Kv= 20.3 fps
1.0	1,105	0.0715	19.25	60.49	**Pipe Channel, 1,105 of 24" Tile Pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Clay tile
4.2	2,108	0.0038	8.33	104.65	**Pipe Channel, 2,108 LF of 48" RCP** 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.011 Concrete pipe, straight & clean
25.1	3,643	Total			

Subcatchment EX-S: South Basin



Summary for Subcatchment EX-SB: Ex. Surface Basin

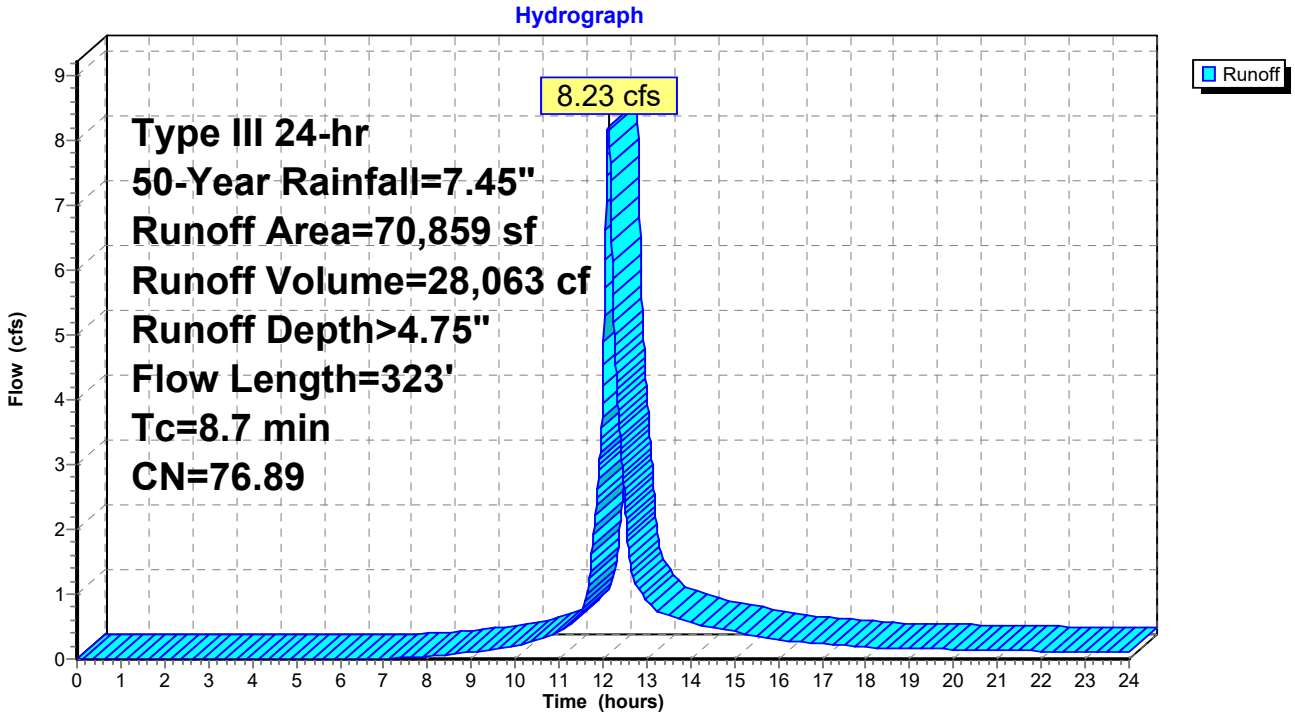
Runoff = 8.23 cfs @ 12.12 hrs, Volume= 28,063 cf, Depth> 4.75"

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 50-Year Rainfall=7.45"

	Area (sf)	CN	Description
*	15,680	98.00	Impervious
	32,452	61.00	>75% Grass cover, Good, HSG B
	22,727	85.00	1/8 acre lots, 65% imp, HSG B
	70,859	76.89	Weighted Average
	40,406		57.02% Pervious Area
	30,453		42.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	100	0.0900	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.45"
1.0	121	0.0801	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	102	0.0315	8.05	6.32	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
8.7	323	Total			

Subcatchment EX-SB: Ex. Surface Basin



Summary for Subcatchment PA#1: Porous Asphalt #1

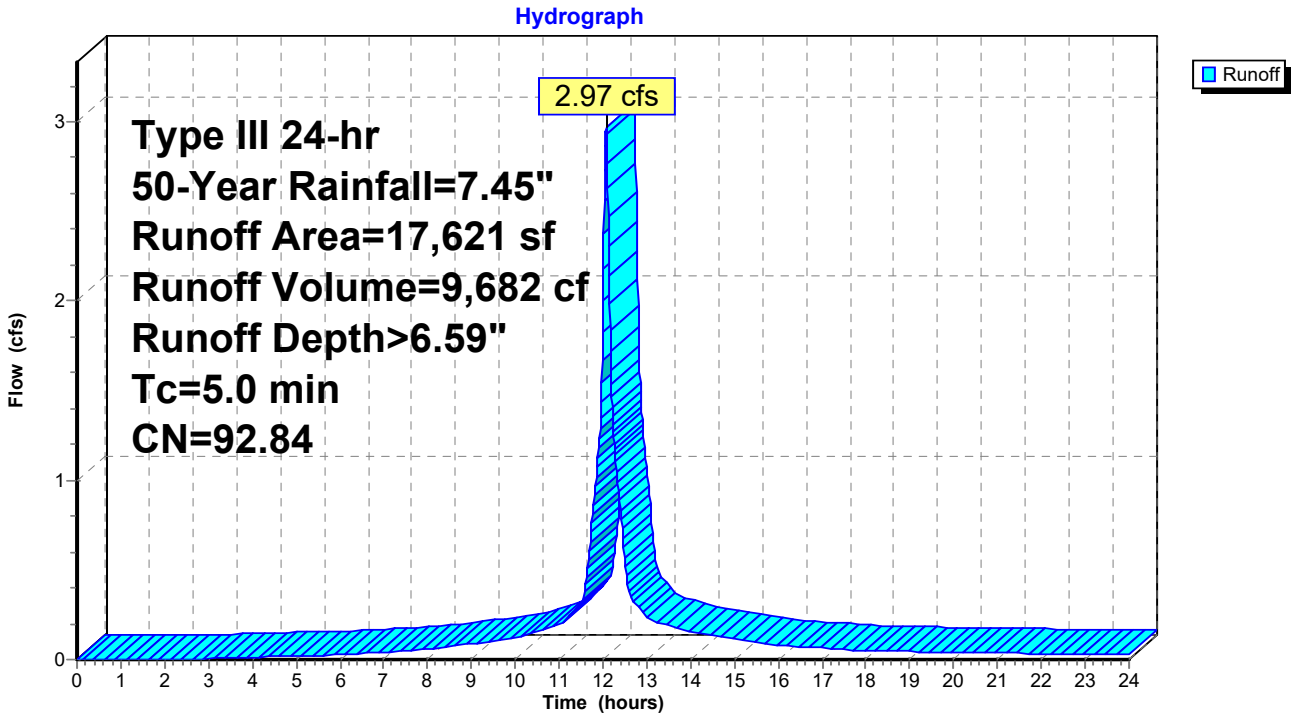
Runoff = 2.97 cfs @ 12.07 hrs, Volume= 9,682 cf, Depth> 6.59"

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 50-Year Rainfall=7.45"

	Area (sf)	CN	Description
*	12,568	98.00	Impervious
	5,053	80.00	>75% Grass cover, Good, HSG D
	17,621	92.84	Weighted Average
	5,053		28.68% Pervious Area
	12,568		71.32% Impervious Area

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

Subcatchment PA#1: Porous Asphalt #1



Summary for Subcatchment PA#2: Porous Asphalt #2

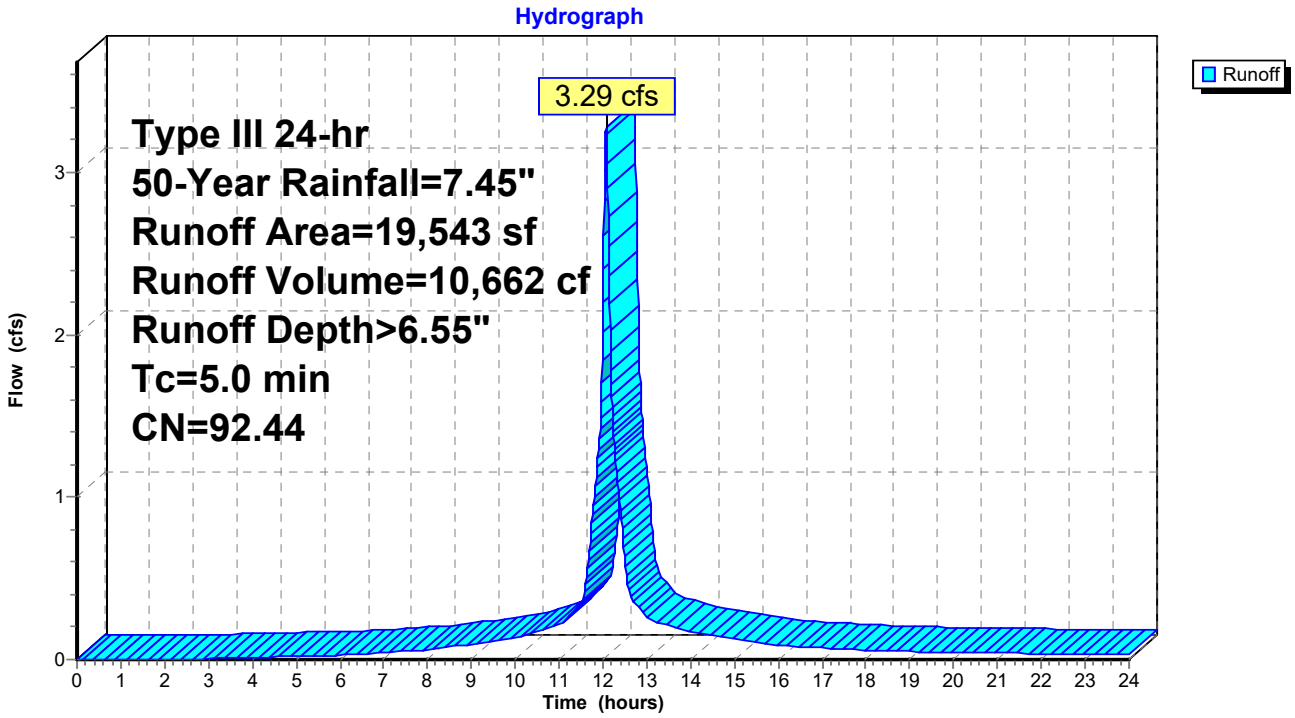
Runoff = 3.29 cfs @ 12.07 hrs, Volume= 10,662 cf, Depth> 6.55"

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 50-Year Rainfall=7.45"

	Area (sf)	CN	Description
*	13,510	98.00	Impervious
	6,033	80.00	>75% Grass cover, Good, HSG D
	19,543	92.44	Weighted Average
	6,033		30.87% Pervious Area
	13,510		69.13% Impervious Area

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

Subcatchment PA#2: Porous Asphalt #2



Summary for Subcatchment PA#3: Porous Asphalt #3

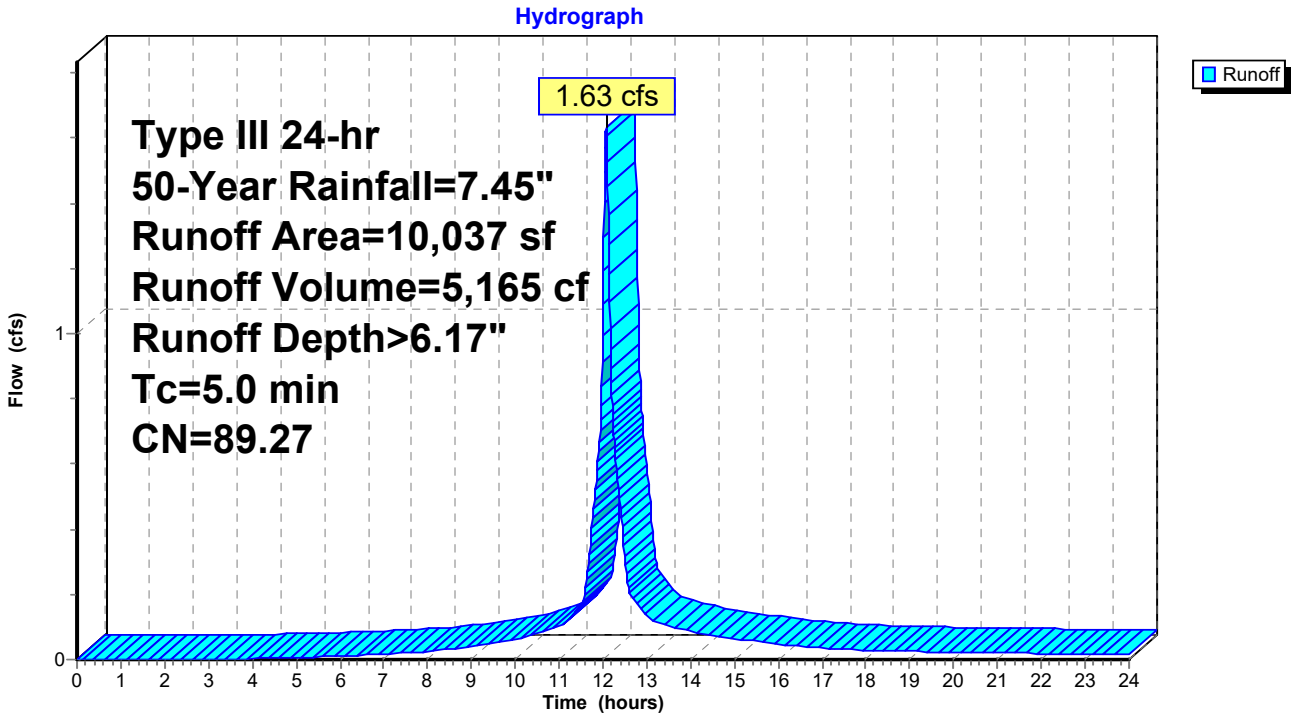
Runoff = 1.63 cfs @ 12.07 hrs, Volume= 5,165 cf, Depth> 6.17"

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 50-Year Rainfall=7.45"

	Area (sf)	CN	Description
*	5,170	98.00	Impervious
	4,867	80.00	>75% Grass cover, Good, HSG D
	10,037	89.27	Weighted Average
	4,867		48.49% Pervious Area
	5,170		51.51% Impervious Area

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

Subcatchment PA#3: Porous Asphalt #3



Summary for Subcatchment PR-N: North Basin

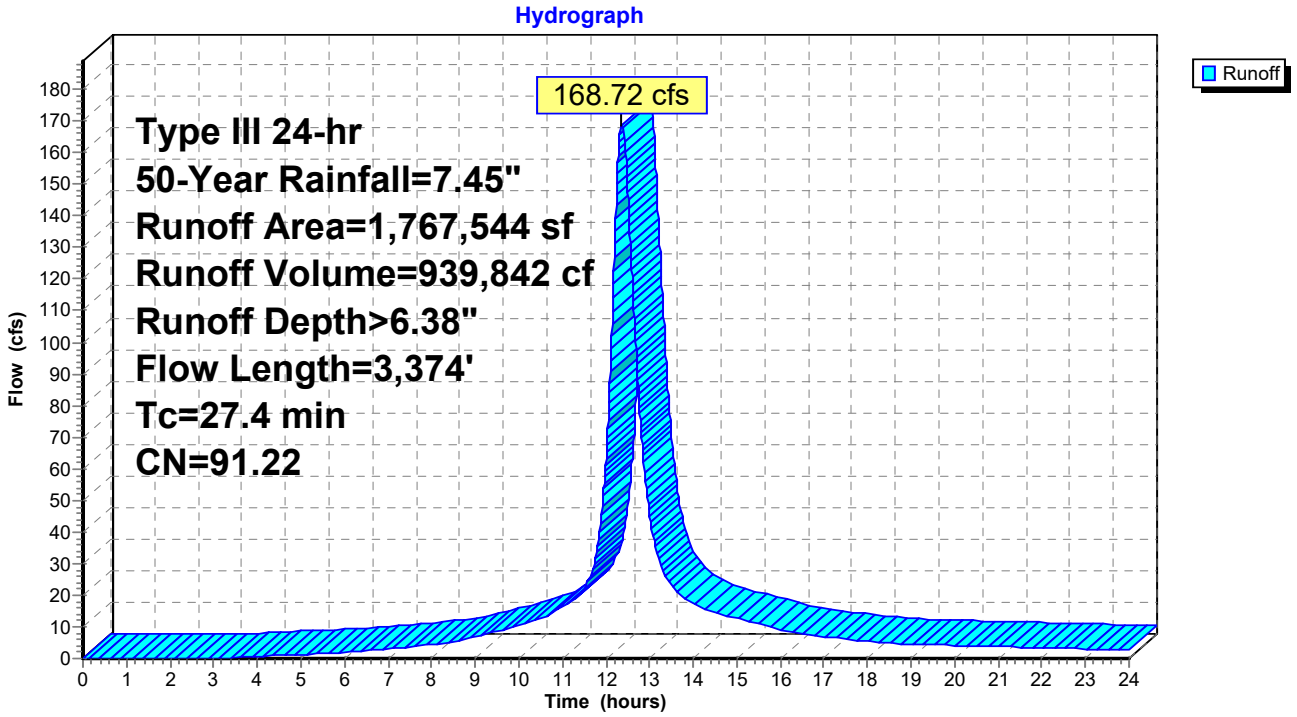
Runoff = 168.72 cfs @ 12.36 hrs, Volume= 939,842 cf, Depth> 6.38"

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 50-Year Rainfall=7.45"

Area (sf)	CN	Description
166,879	85.00	1/8 acre lots, 65% imp, HSG B
106,473	90.00	1/8 acre lots, 65% imp, HSG C
1,494,192	92.00	1/8 acre lots, 65% imp, HSG D
1,767,544	91.22	Weighted Average
618,640		35.00% Pervious Area
1,148,904		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	207	0.0217	0.21		**Sheet Flow, 207 LF Sheet Flow** Grass: Short n= 0.150 P2= 3.45"
5.7	294	0.0153	0.87		**Shallow Concentrated Flow, 294 LF Shallow Concentrated** Short Grass Pasture Kv= 7.0 fps
0.9	200	0.0350	3.80		**Shallow Concentrated Flow, 200 LF Shallow Concentrated** Paved Kv= 20.3 fps
3.4	2,208	0.0310	10.95	13.44	**Pipe Channel, 2,208 LF of 15" RCP** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
1.1	465	0.0150	7.28	91.48	**Pipe Channel, 465 LF of 48" Corrugated Metal** 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.025 Corrugated metal
27.4	3,374	Total			

Subcatchment PR-N: North Basin



Summary for Subcatchment PR-R: Route 1 Basin

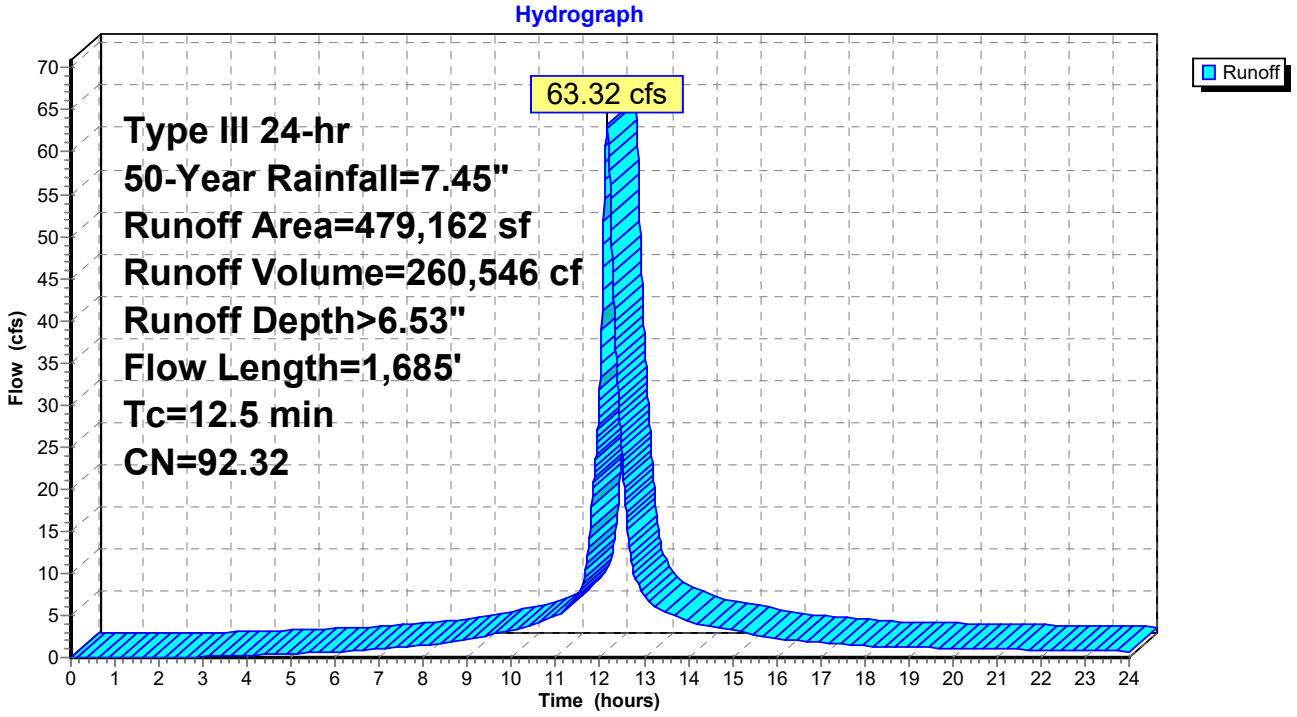
Runoff = 63.32 cfs @ 12.16 hrs, Volume= 260,546 cf, Depth> 6.53"

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 50-Year Rainfall=7.45"

Area (sf)	CN	Description
428,232	92.00	Urban commercial, 85% imp, HSG B
962	94.00	Urban commercial, 85% imp, HSG C
49,968	95.00	Urban commercial, 85% imp, HSG D
479,162	92.32	Weighted Average
71,874		15.00% Pervious Area
407,288		85.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	171	0.0468	0.28		**Sheet Flow, 171 LF** Grass: Short n= 0.150 P2= 3.45"
1.1	1,049	0.0705	16.52	20.27	**Pipe Channel, 1,049 LF of 15" RCP** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
1.1	465	0.0150	7.28	91.48	**Pipe Channel, 465 LF of 48" Corrugated Metal** 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.025 Corrugated metal
12.5	1,685	Total			

Subcatchment PR-R: Route 1 Basin



Summary for Subcatchment PR-S: South Basin

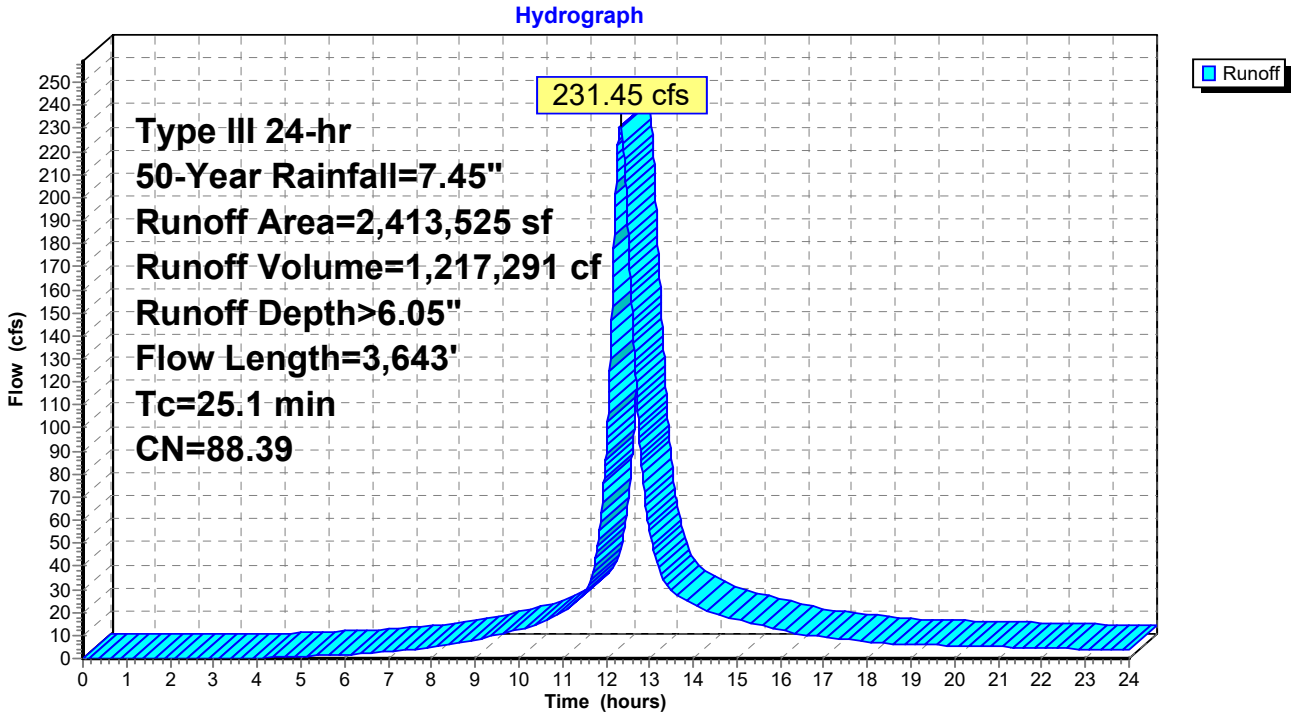
Runoff = 231.45 cfs @ 12.33 hrs, Volume= 1,217,291 cf, Depth> 6.05"

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 50-Year Rainfall=7.45"

	Area (sf)	CN	Description
	420,132	85.00	1/8 acre lots, 65% imp, HSG B
	356,916	90.00	1/8 acre lots, 65% imp, HSG C
	1,203,283	92.00	1/8 acre lots, 65% imp, HSG D
*	132,048	98.00	Impervious
*	183,599	80.00	Onsite >75% Grass cover, Good, HSG D
*	117,547	61.00	Onsite >75% Grass cover, Good, HSG B
	2,413,525	88.39	Weighted Average
	994,262		41.20% Pervious Area
	1,419,263		58.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	300	0.0766	0.26		**Sheet Flow, 300 LF Sheet Flow** Grass: Dense n= 0.240 P2= 3.45"
0.6	130	0.0308	3.56		**Shallow Concentrated Flow, 130 LF** Paved Kv= 20.3 fps
1.0	1,105	0.0715	19.25	60.49	**Pipe Channel, 1,105 of 24" Tile Pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Clay tile
4.2	2,108	0.0038	8.33	104.65	**Pipe Channel, 2,108 LF of 48" RCP** 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.011 Concrete pipe, straight & clean
25.1	3,643	Total			

Subcatchment PR-S: South Basin



Summary for Subcatchment RG: Raingarden

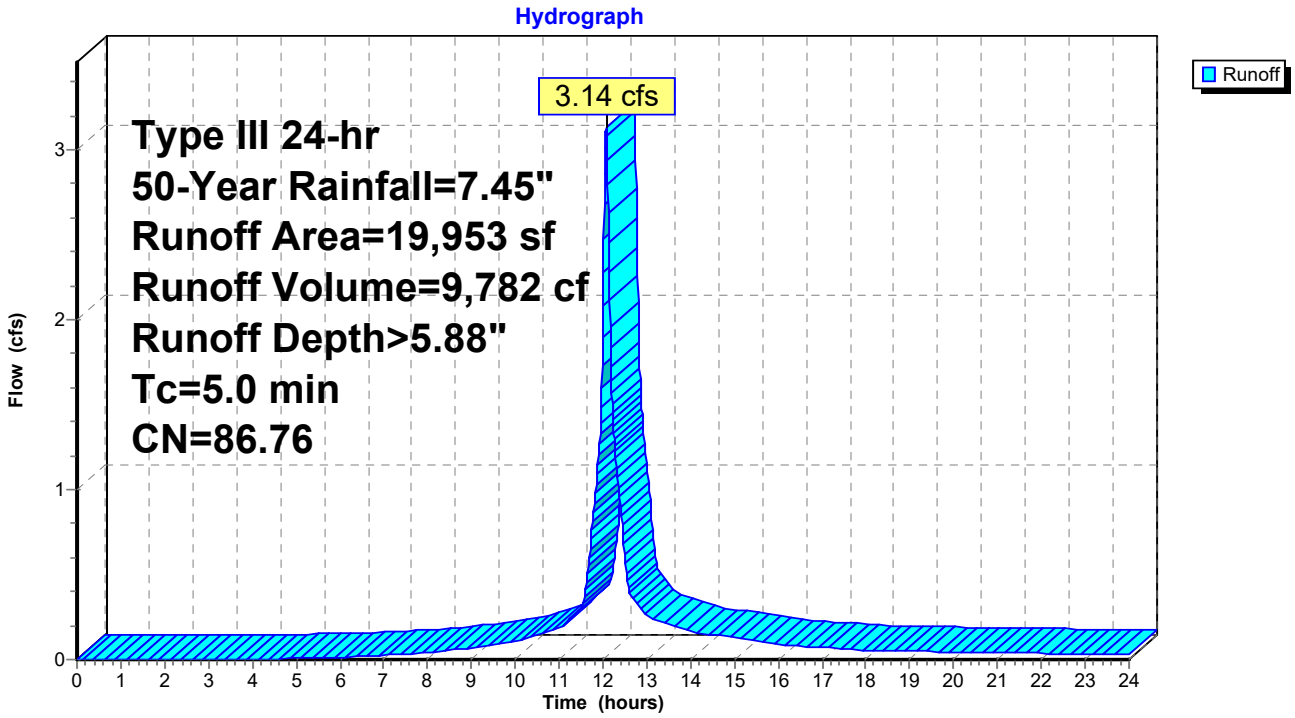
Runoff = 3.14 cfs @ 12.07 hrs, Volume= 9,782 cf, Depth> 5.88"

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 50-Year Rainfall=7.45"

	Area (sf)	CN	Description
*	7,488	98.00	Impervious
	12,465	80.00	>75% Grass cover, Good, HSG D
	19,953	86.76	Weighted Average
	12,465		62.47% Pervious Area
	7,488		37.53% Impervious Area

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

Subcatchment RG: Raingarden



Summary for Subcatchment SB#1: Surface Basin #1

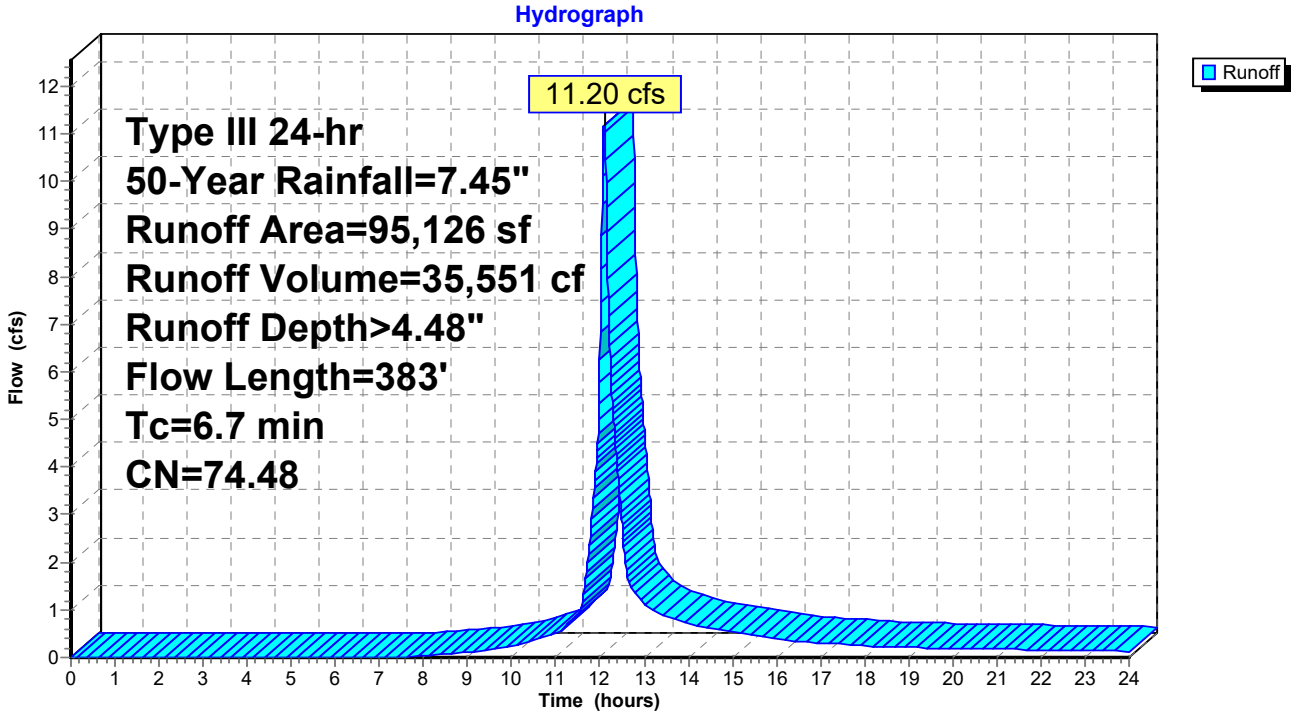
Runoff = 11.20 cfs @ 12.10 hrs, Volume= 35,551 cf, Depth> 4.48"

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 50-Year Rainfall=7.45"

	Area (sf)	CN	Description
*	34,645	98.00	Impervious
	60,481	61.00	>75% Grass cover, Good, HSG B
	95,126	74.48	Weighted Average
	60,481		63.58% Pervious Area
	34,645		36.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	80	0.1250	0.24		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.45"
0.2	41	0.0330	3.69		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	262	0.0050	4.40	5.40	**Pipe Channel, CB TO SB#1** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
6.7	383	Total			

Subcatchment SB#1: Surface Basin #1



Summary for Subcatchment SB#2: Surface Basin #2

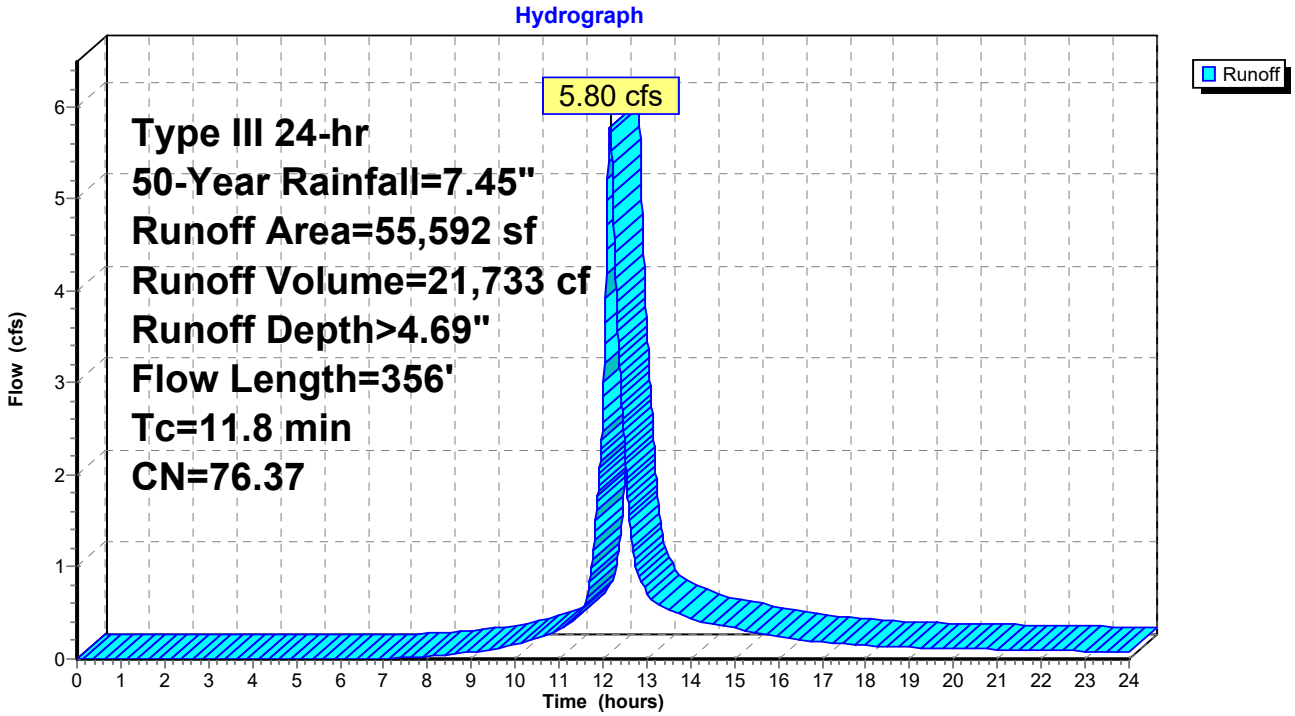
Runoff = 5.80 cfs @ 12.16 hrs, Volume= 21,733 cf, Depth> 4.69"

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 50-Year Rainfall=7.45"

	Area (sf)	CN	Description
*	18,670	98.00	Impervious
	30,094	61.00	>75% Grass cover, Good, HSG B
	6,828	85.00	1/8 acre lots, 65% imp, HSG B
	55,592	76.37	Weighted Average
	32,484		58.43% Pervious Area
	23,108		41.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	135	0.0650	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.45"
0.7	132	0.0230	3.08		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.2	89	0.0150	6.57	5.16	**Pipe Channel, CB TO SB#2** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
11.8	356	Total			

Subcatchment SB#2: Surface Basin #2



Summary for Pond CUL1: Cultec #1

Inflow Area = 3,264 sf,100.00% Impervious, Inflow Depth > 7.21" for 50-Year event
Inflow = 0.57 cfs @ 12.07 hrs, Volume= 1,960 cf
Outflow = 0.57 cfs @ 12.07 hrs, Volume= 1,671 cf, Atten= 0%, Lag= 0.1 min
Primary = 0.57 cfs @ 12.07 hrs, Volume= 1,671 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 19.77' @ 12.07 hrs Surf.Area= 276 sf Storage= 292 cf

Plug-Flow detention time= 121.6 min calculated for 1,670 cf (85% of inflow)
Center-of-Mass det. time= 57.2 min (797.9 - 740.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	17.75'	180 cf	**8.50'W x 32.50'L x 2.04'H Field A** 564 cf Overall - 114 cf Embedded = 450 cf x 40.0% Voids
#2A	18.25'	114 cf	**Cultec C-100HD** x 8 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 2 rows
		294 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	19.75'	**Grate CF#2815** Head (feet) 0.00 0.08 0.17 0.25 0.33 0.42 0.50 Disch. (cfs) 0.000 2.000 2.750 3.500 3.920 4.330 4.660

Primary OutFlow Max=0.57 cfs @ 12.07 hrs HW=19.77' (Free Discharge)
↑—**1=Grate CF#2815** (Custom Controls 0.57 cfs)

Pond CUL1: Cultec #1 - Chamber Wizard Field A

Chamber Model = Cultec C-100HD (Cultec Contactor® 100HD)
Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
Row Length Adjustment= +0.50' x 1.86 sf x 2 rows

36.0" Wide + 6.0" Spacing = 42.0" C-C Row Spacing

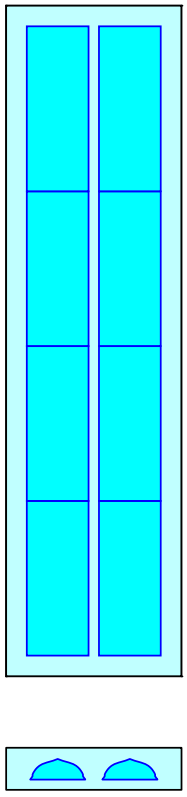
4 Chambers/Row x 7.50' Long +0.50' Row Adjustment = 30.50' Row Length +12.0" End Stone x 2 = 32.50' Base Length
2 Rows x 36.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.50' Base Width
6.0" Base + 12.5" Chamber Height + 6.0" Cover = 2.04' Field Height

8 Chambers x 14.0 cf +0.50' Row Adjustment x 1.86 sf x 2 Rows = 113.6 cf Chamber Storage

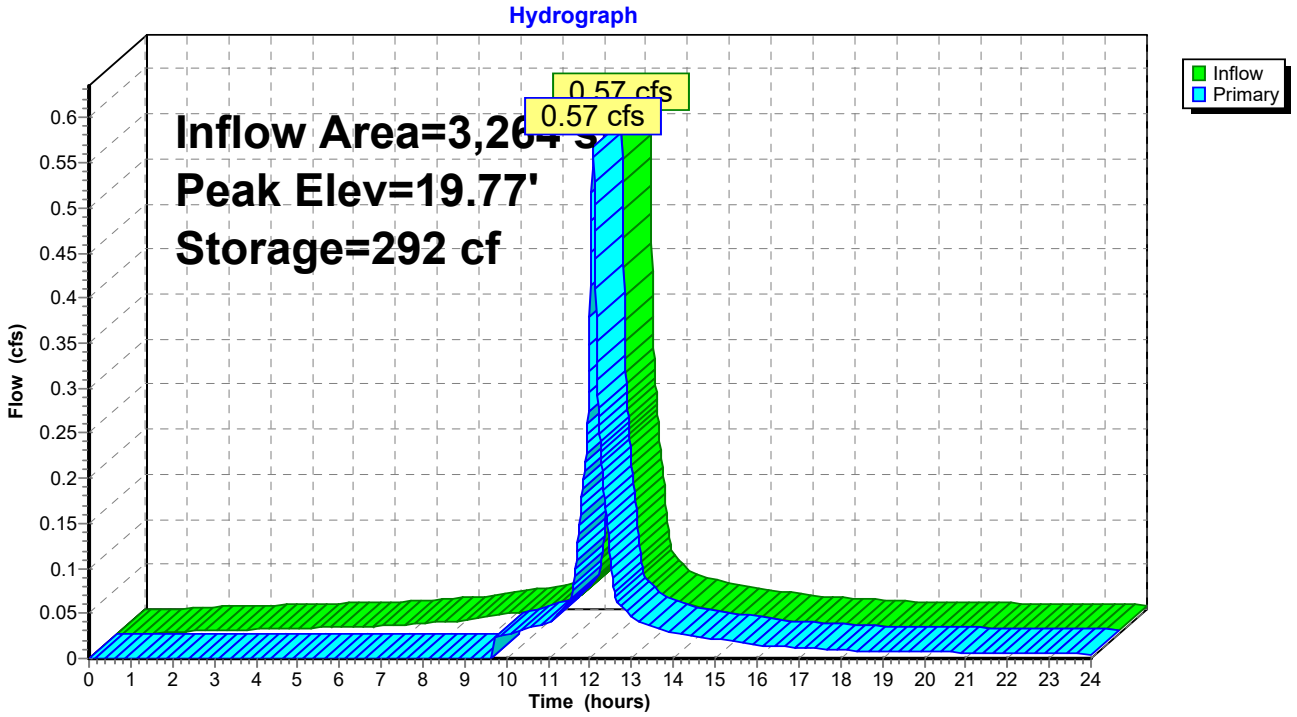
564.0 cf Field - 113.6 cf Chambers = 450.5 cf Stone x 40.0% Voids = 180.2 cf Stone Storage

Chamber Storage + Stone Storage = 293.7 cf = 0.007 af
Overall Storage Efficiency = 52.1%
Overall System Size = 32.50' x 8.50' x 2.04'

8 Chambers
20.9 cy Field
16.7 cy Stone



Pond CUL1: Cultec #1



Stage-Area-Storage for Pond CUL1: Cultec #1

Elevation (feet)	Storage (cubic-feet)
17.75	0
17.80	6
17.85	11
17.90	17
17.95	22
18.00	28
18.05	33
18.10	39
18.15	44
18.20	50
18.25	55
18.30	66
18.35	76
18.40	86
18.45	96
18.50	106
18.55	116
18.60	126
18.65	135
18.70	145
18.75	155
18.80	164
18.85	173
18.90	182
18.95	191
19.00	199
19.05	207
19.10	215
19.15	222
19.20	228
19.25	234
19.30	239
19.35	245
19.40	250
19.45	256
19.50	262
19.55	267
19.60	273
19.65	278
19.70	284
19.75	289
19.80	**294**
19.85	294
19.90	294
19.95	294
20.00	294
20.05	294
20.10	294
20.15	294
20.20	294
20.25	294

Summary for Pond CUL2: Cultec #2

Inflow Area = 3,264 sf,100.00% Impervious, Inflow Depth > 7.21" for 50-Year event
Inflow = 0.57 cfs @ 12.07 hrs, Volume= 1,960 cf
Outflow = 0.57 cfs @ 12.07 hrs, Volume= 1,682 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.57 cfs @ 12.07 hrs, Volume= 1,682 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 17.17' @ 12.07 hrs Surf.Area= 157 sf Storage= 280 cf

Plug-Flow detention time= 118.8 min calculated for 1,682 cf (86% of inflow)
Center-of-Mass det. time= 55.7 min (796.5 - 740.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	14.00'	148 cf	**6.42'W x 24.50'L x 3.21'H Field A** 504 cf Overall - 134 cf Embedded = 371 cf x 40.0% Voids
#2A	14.50'	134 cf	**Cultec R-280HD** x 3 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 1 rows
		282 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	17.15'	**Grate CF#2815** Head (feet) 0.00 0.08 0.17 0.25 0.33 0.42 0.50 Disch. (cfs) 0.000 2.000 2.750 3.500 3.920 4.330 4.660

Primary OutFlow Max=0.57 cfs @ 12.07 hrs HW=17.17' (Free Discharge)
↑—**1=Grate CF#2815** (Custom Controls 0.57 cfs)

Pond CUL2: Cultec #2 - Chamber Wizard Field A

Chamber Model = Cultec R-280HD (Cultec Recharger® 280HD)
Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf
Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap
Row Length Adjustment= +1.00' x 6.07 sf x 1 rows

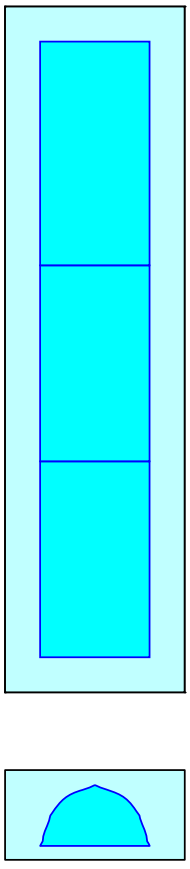
3 Chambers/Row x 7.00' Long +1.00' Row Adjustment = 22.00' Row Length +15.0" End Stone x 2 = 24.50' Base Length
1 Rows x 47.0" Wide + 15.0" Side Stone x 2 = 6.42' Base Width
6.0" Base + 26.5" Chamber Height + 6.0" Cover = 3.21' Field Height

3 Chambers x 42.5 cf +1.00' Row Adjustment x 6.07 sf x 1 Rows = 133.6 cf Chamber Storage

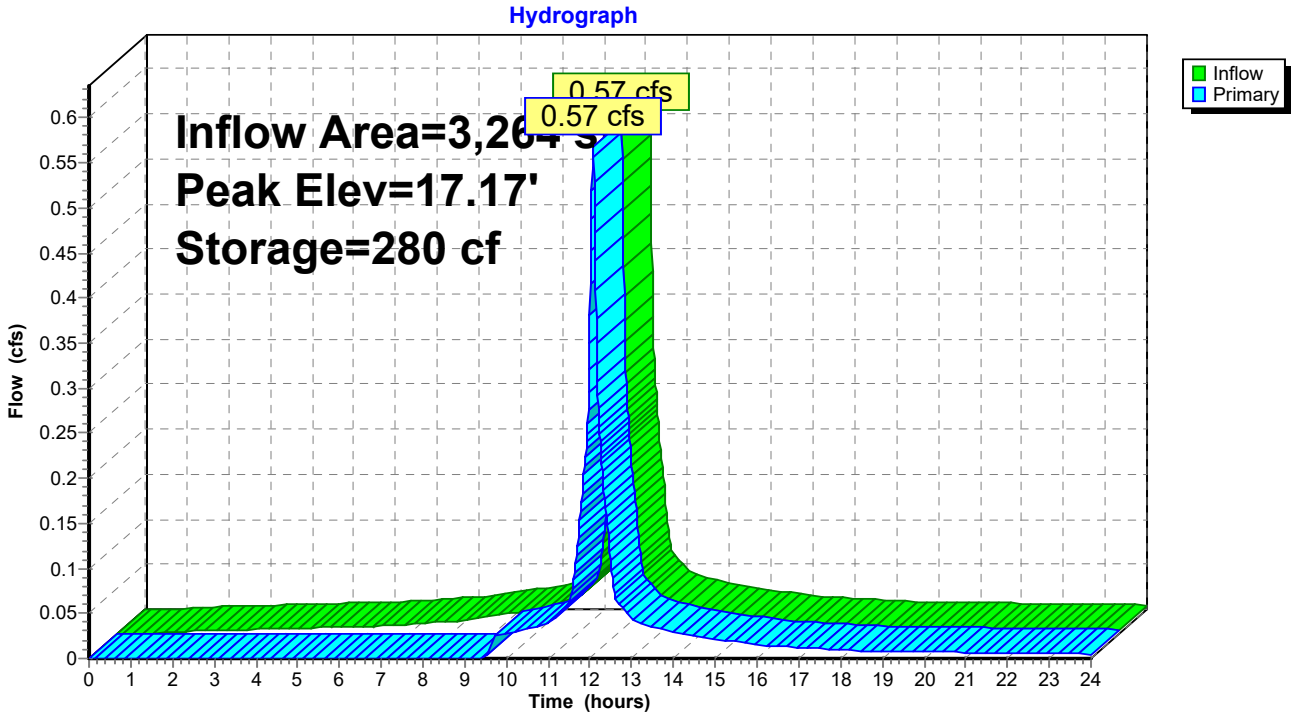
504.4 cf Field - 133.6 cf Chambers = 370.8 cf Stone x 40.0% Voids = 148.3 cf Stone Storage

Chamber Storage + Stone Storage = 281.9 cf = 0.006 af
Overall Storage Efficiency = 55.9%
Overall System Size = 24.50' x 6.42' x 3.21'

3 Chambers
18.7 cy Field
13.7 cy Stone



Pond CUL2: Cultec #2



Stage-Area-Storage for Pond CUL2: Cultec #2

Elevation (feet)	Storage (cubic-feet)
14.00	0
14.05	3
14.10	6
14.15	9
14.20	13
14.25	16
14.30	19
14.35	22
14.40	25
14.45	28
14.50	31
14.55	37
14.60	43
14.65	48
14.70	54
14.75	60
14.80	65
14.85	71
14.90	76
14.95	82
15.00	87
15.05	93
15.10	98
15.15	104
15.20	109
15.25	115
15.30	120
15.35	125
15.40	131
15.45	136
15.50	141
15.55	147
15.60	152
15.65	157
15.70	162
15.75	167
15.80	172
15.85	177
15.90	182
15.95	187
16.00	192
16.05	197
16.10	202
16.15	206
16.20	211
16.25	216
16.30	220
16.35	224
16.40	229
16.45	233
16.50	236
16.55	240
16.60	243
16.65	247
16.70	250
16.75	253
16.80	256
16.85	259
16.90	263
16.95	266
17.00	269
17.05	272
17.10	275
17.15	278
17.20	**281**
17.25	**282**
17.30	282
17.35	282
17.40	282
17.45	282
17.50	282
17.55	282
17.60	282
17.65	282

Summary for Pond EXSB: Ex Parking Lot

Inflow Area = 70,859 sf, 42.98% Impervious, Inflow Depth > 4.75" for 50-Year event
Inflow = 8.23 cfs @ 12.12 hrs, Volume= 28,063 cf
Outflow = 8.23 cfs @ 12.12 hrs, Volume= 28,063 cf, Atten= 0%, Lag= 0.1 min
Primary = 8.23 cfs @ 12.12 hrs, Volume= 28,063 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 12.42' @ 12.12 hrs Surf.Area= 126 sf Storage= 23 cf

Plug-Flow detention time= 0.0 min calculated for 28,063 cf (100% of inflow)
Center-of-Mass det. time= 0.0 min (814.3 - 814.3)

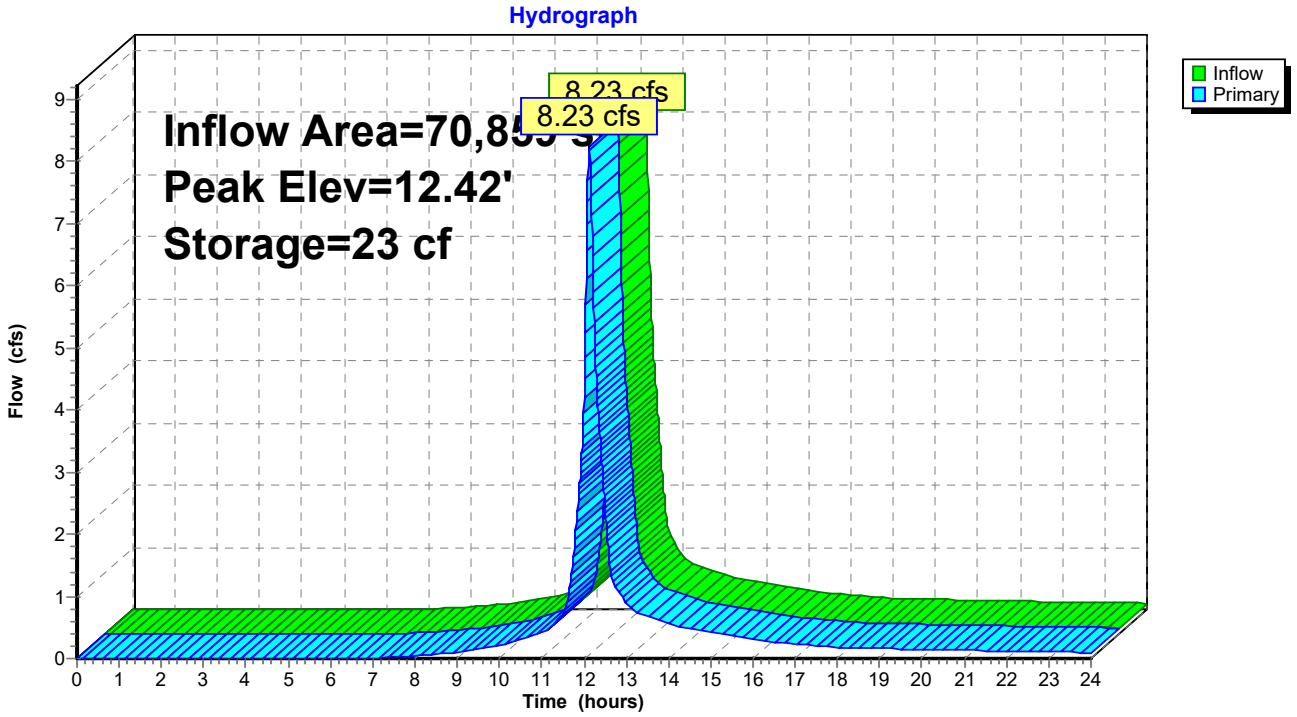
Volume	Invert	Avail.Storage	Storage Description
#1	12.07'	26,089 cf	**Surface Ponding (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.07	4	0	0
12.66	210	63	63
13.00	1,109	224	287
14.00	4,953	3,031	3,318
15.00	10,627	7,790	11,108
16.00	19,335	14,981	26,089

Device	Routing	Invert	Outlet Devices
#1	Primary	12.07'	**Ex. Catch Basin** Head (feet) 0.00 0.08 0.17 0.25 0.33 0.41 0.50 1.00 1.50 Disch. (cfs) 0.000 4.000 5.800 7.000 8.000 9.000 9.800 12.300 13.300
#2	Primary	15.75'	**50.0' long x 10.0' breadth Brink South - Cove Road** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=8.22 cfs @ 12.12 hrs HW=12.42' (Free Discharge)
1=Ex. Catch Basin (Custom Controls 8.22 cfs)
2=Brink South - Cove Road (Controls 0.00 cfs)

Pond EXSB: Ex Parking Lot



Stage-Area-Storage for Pond EXSB: Ex Parking Lot

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
12.07	4	0
12.12	21	1
12.17	39	2
12.22	56	5
12.27	74	8
12.32	91	12
12.37	109	17
12.42	126	23
12.47	144	30
12.52	161	37
12.57	179	46
12.62	196	55
12.67	236	65
12.72	369	80
12.77	501	102
12.82	633	131
12.87	765	166
12.92	897	207
12.97	1,030	255
13.02	1,186	310
13.07	1,378	374
13.12	1,570	448
13.17	1,762	531
13.22	1,955	624
13.27	2,147	727
13.32	2,339	839
13.37	2,531	961
13.42	2,723	1,092
13.47	2,916	1,233
13.52	3,108	1,384
13.57	3,300	1,544
13.62	3,492	1,714
13.67	3,684	1,893
13.72	3,877	2,082
13.77	4,069	2,281
13.82	4,261	2,489
13.87	4,453	2,707
13.92	4,645	2,934
13.97	4,838	3,171
14.02	5,066	3,419
14.07	5,350	3,679
14.12	5,634	3,954
14.17	5,918	4,242
14.22	6,201	4,545
14.27	6,485	4,862
14.32	6,769	5,194
14.37	7,052	5,539
14.42	7,336	5,899
14.47	7,620	6,273
14.52	7,903	6,661
14.57	8,187	7,063
14.62	8,471	7,480
14.67	8,755	7,910
14.72	9,038	8,355
14.77	9,322	8,814
14.82	9,606	9,287
14.87	9,889	9,775
14.92	10,173	10,276
14.97	10,457	10,792
15.02	10,801	11,323
15.07	11,237	11,874
15.12	11,672	12,446
15.17	12,107	13,041
15.22	12,543	13,657
15.27	12,978	14,295
15.32	13,414	14,955
15.37	13,849	15,636
15.42	14,284	16,340
15.47	14,720	17,065
15.52	15,155	17,812
15.57	15,591	18,580
15.62	16,026	19,371
15.67	16,461	20,183
15.72	16,897	21,017
15.77	17,332	21,873
15.82	17,768	22,750
15.87	18,203	23,649
15.92	18,638	24,570
15.97	**19,074**	**25,513**

Summary for Pond PA1: Porous Asphalt #1

Inflow Area = 17,621 sf, 71.32% Impervious, Inflow Depth > 6.59" for 50-Year event
Inflow = 2.97 cfs @ 12.07 hrs, Volume= 9,682 cf
Outflow = 2.96 cfs @ 12.08 hrs, Volume= 8,625 cf, Atten= 0%, Lag= 0.3 min
Primary = 2.96 cfs @ 12.08 hrs, Volume= 8,625 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 24.06' @ 12.08 hrs Surf.Area= 1,414 sf Storage= 1,107 cf

Plug-Flow detention time= 88.5 min calculated for 8,621 cf (89% of inflow)
Center-of-Mass det. time= 36.8 min (803.2 - 766.4)

Volume	Invert	Avail.Storage	Storage Description
#1	21.72'	1,119 cf	**Crushed Stone Base (Prismatic)**Listed below (Recalc) 2,798 cf Overall x 40.0% Voids
#2	23.55'	543 cf	**Surface Ponding (Prismatic)**Listed below (Recalc)
		1,662 cf	Total Available Storage

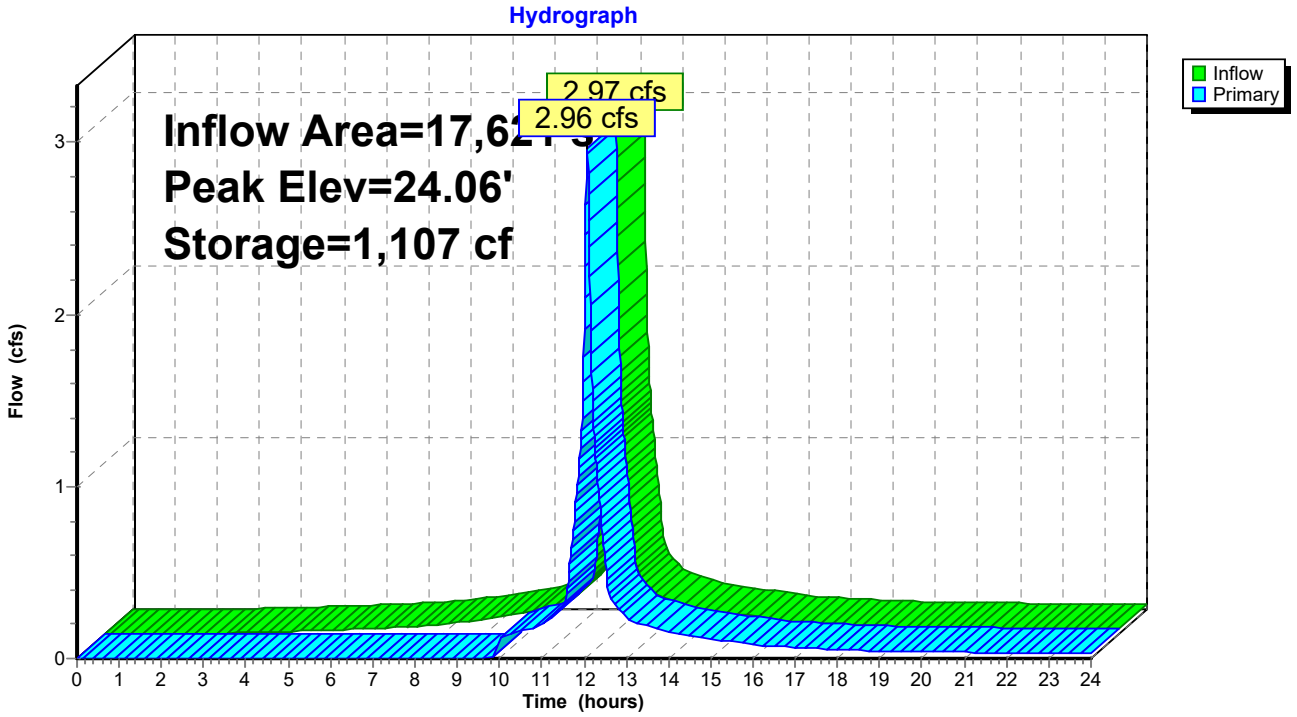
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
21.72	0	0	0
23.22	1,782	1,337	1,337
24.86	0	1,461	2,798

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.55	0	0	0
24.00	437	98	98
24.50	1,341	445	543

Device	Routing	Invert	Outlet Devices
#1	Primary	24.00'	**Catch Basin Overflow** Head (feet) 0.00 0.08 0.17 0.25 0.33 0.41 0.50 Disch. (cfs) 0.000 4.000 5.800 7.000 8.000 9.000 9.800

Primary OutFlow Max=2.96 cfs @ 12.08 hrs HW=24.06' (Free Discharge)
1=Catch Basin Overflow (Custom Controls 2.96 cfs)

Pond PA1: Porous Asphalt #1



Stage-Area-Storage for Pond PA1: Porous Asphalt #1

Elevation (feet)	Storage (cubic-feet)
21.72	0
21.77	1
21.82	2
21.87	5
21.92	10
21.97	15
22.02	21
22.07	29
22.12	38
22.17	48
22.22	59
22.27	72
22.32	86
22.37	100
22.42	116
22.47	134
22.52	152
22.57	172
22.62	192
22.67	214
22.72	238
22.77	262
22.82	287
22.87	314
22.92	342
22.97	371
23.02	402
23.07	433
23.12	466
23.17	500
23.22	535
23.27	570
23.32	604
23.37	637
23.42	668
23.47	699
23.52	729
23.57	758
23.62	787
23.67	818
23.72	851
23.77	884
23.82	919
23.87	956
23.92	994
23.97	1,033
24.02	1,073
24.07	1,117
24.12	1,164
24.17	1,214
24.22	1,268
24.27	1,326
24.32	1,386
24.37	1,451
24.42	1,518
24.47	1,589
24.52	1,637
24.57	1,644
24.62	1,649
24.67	1,654
24.72	1,658
24.77	1,660
24.82	**1,662**

Summary for Pond PA2: Porous Asphalt #2

Inflow Area = 19,543 sf, 69.13% Impervious, Inflow Depth > 6.55" for 50-Year event
Inflow = 3.29 cfs @ 12.07 hrs, Volume= 10,662 cf
Outflow = 2.79 cfs @ 12.12 hrs, Volume= 10,591 cf, Atten= 15%, Lag= 2.8 min
Primary = 2.79 cfs @ 12.12 hrs, Volume= 10,591 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 23.25' @ 12.12 hrs Surf.Area= 1,595 sf Storage= 1,477 cf

Plug-Flow detention time= 18.7 min calculated for 10,591 cf (99% of inflow)
Center-of-Mass det. time= 14.3 min (782.2 - 767.9)

Volume	Invert	Avail.Storage	Storage Description
#1	21.16'	1,759 cf	**Crushed Stone Base (Prismatic)** Listed below (Recalc) 4,398 cf Overall x 40.0% Voids
#2	23.00'	177 cf	**Surface Ponding (Prismatic)** Listed below (Recalc)
		1,937 cf	Total Available Storage

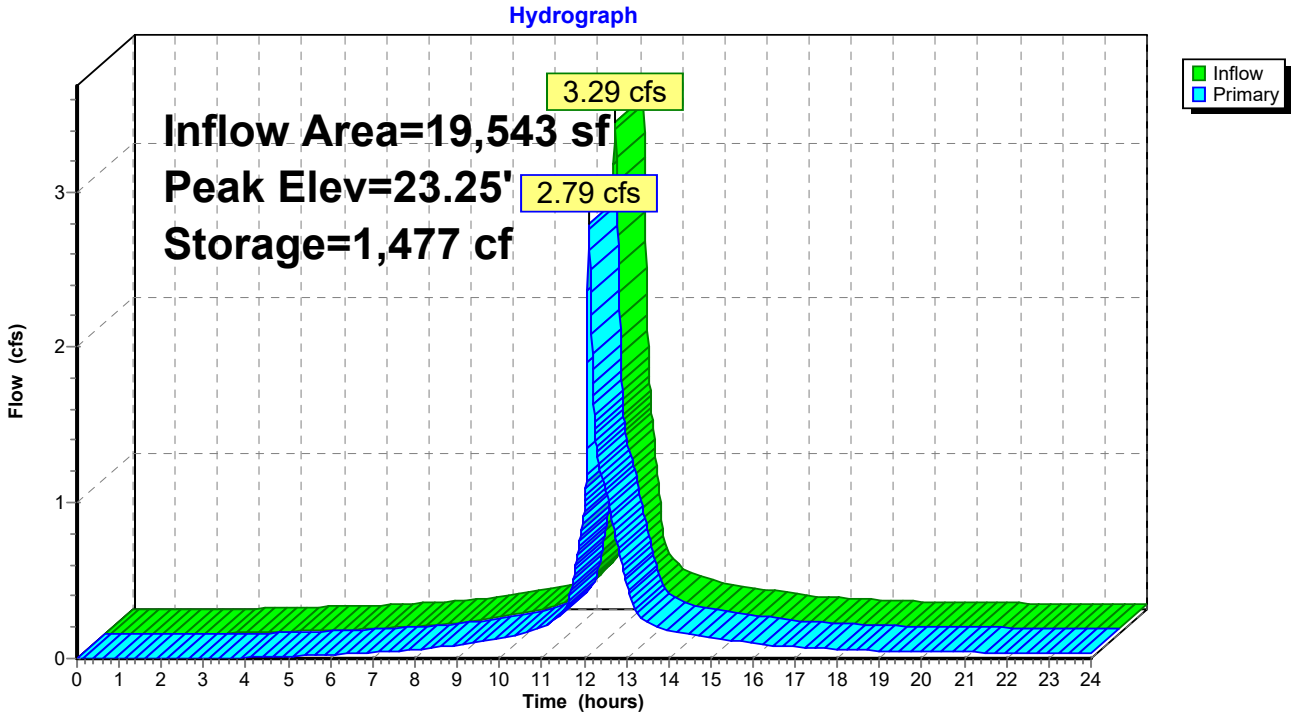
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
21.16	1,788	0	0
22.66	1,788	2,682	2,682
24.58	0	1,716	4,398

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.00	0	0	0
23.50	709	177	177

Device	Routing	Invert	Outlet Devices
#1	Primary	21.16'	**6.0" Round 6" Underdrain** L= 51.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 21.16' / 20.00' S= 0.0227 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#2	Primary	23.00'	**Curb Leak-Off, C= 3.27** Offset (feet) 0.00 0.01 5.00 5.01 Height (feet) 0.50 0.00 0.10 0.50

Primary OutFlow Max=2.78 cfs @ 12.12 hrs HW=23.25' (Free Discharge)
↑—**1=6" Underdrain** (Inlet Controls 1.28 cfs @ 6.54 fps)
└—**2=Curb Leak-Off** (Weir Controls 1.50 cfs @ 1.19 fps)

Pond PA2: Porous Asphalt #2



Stage-Area-Storage for Pond PA2: Porous Asphalt #2

Elevation (feet)	Storage (cubic-feet)
21.16	0
21.21	36
21.26	72
21.31	107
21.36	143
21.41	179
21.46	215
21.51	250
21.56	286
21.61	322
21.66	358
21.71	393
21.76	429
21.81	465
21.86	501
21.91	536
21.96	572
22.01	608
22.06	644
22.11	679
22.16	715
22.21	751
22.26	787
22.31	822
22.36	858
22.41	894
22.46	930
22.51	966
22.56	1,001
22.61	1,037
22.66	1,073
22.71	1,108
22.76	1,142
22.81	1,176
22.86	1,208
22.91	1,240
22.96	1,271
23.01	1,300
23.06	1,332
23.11	1,366
23.16	1,402
23.21	1,441
23.26	1,483
23.31	1,527
23.36	1,574
23.41	1,624
23.46	1,676
23.51	1,723
23.56	1,743
23.61	1,761
23.66	1,779
23.71	1,796
23.76	1,811
23.81	1,826
23.86	1,840
23.91	1,853
23.96	1,865
24.01	1,876
24.06	1,886
24.11	1,895
24.16	1,904
24.21	1,911
24.26	1,918
24.31	1,923
24.36	1,928
24.41	1,931
24.46	1,934
24.51	1,936
24.56	**1,937**

Summary for Pond PA3: Porous Asphalt #3

Inflow Area = 10,037 sf, 51.51% Impervious, Inflow Depth > 6.17" for 50-Year event
Inflow = 1.63 cfs @ 12.07 hrs, Volume= 5,165 cf
Outflow = 1.58 cfs @ 12.09 hrs, Volume= 4,100 cf, Atten= 3%, Lag= 1.1 min
Primary = 1.58 cfs @ 12.09 hrs, Volume= 4,100 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 21.64' @ 12.09 hrs Surf.Area= 835 sf Storage= 1,190 cf

Plug-Flow detention time= 127.8 min calculated for 4,100 cf (79% of inflow)
Center-of-Mass det. time= 51.7 min (830.6 - 779.0)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	1,102 cf	**Crushed Stone Base (Prismatic)** Listed below (Recalc) 2,755 cf Overall x 40.0% Voids
#2	21.40'	398 cf	**Surface Ponding (Prismatic)** Listed below (Recalc)
		1,500 cf	Total Available Storage

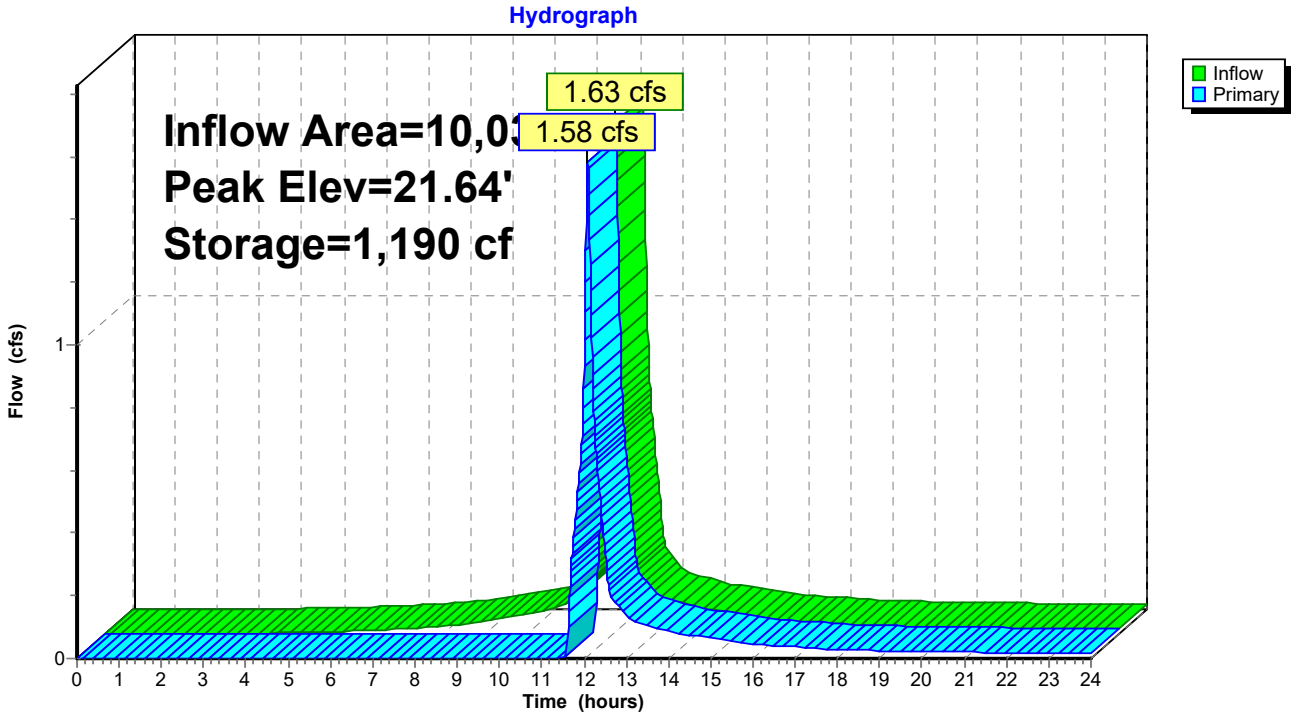
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	2,011	0	0
21.08	2,011	2,172	2,172
21.66	0	583	2,755

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
21.40	0	0	0
21.90	1,592	398	398

Device	Routing	Invert	Outlet Devices
#1	Primary	21.40'	**Curb Leakoff (sw corner, C= 3.27** Offset (feet) 0.00 0.01 5.00 5.01 Height (feet) 0.55 0.05 0.00 0.55

Primary OutFlow Max=1.58 cfs @ 12.09 hrs HW=21.64' (Free Discharge)
↑—**1=Curb Leakoff (sw corner** (Weir Controls 1.58 cfs @ 1.34 fps)

Pond PA3: Porous Asphalt #3



Stage-Area-Storage for Pond PA3: Porous Asphalt #3

Elevation (feet)	Storage (cubic-feet)
20.00	0
20.05	40
20.10	80
20.15	121
20.20	161
20.25	201
20.30	241
20.35	282
20.40	322
20.45	362
20.50	402
20.55	442
20.60	483
20.65	523
20.70	563
20.75	603
20.80	644
20.85	684
20.90	724
20.95	764
21.00	804
21.05	845
21.10	885
21.15	922
21.20	955
21.25	985
21.30	1,012
21.35	1,035
21.40	1,055
21.45	1,075
21.50	1,100
21.55	1,129
21.60	1,163
21.65	1,201
21.70	1,245
21.75	1,297
21.80	1,357
21.85	1,424
21.90	**1,500**
21.95	1,500

Summary for Pond RG1: Raingarden

Inflow Area = 19,953 sf, 37.53% Impervious, Inflow Depth > 5.88" for 50-Year event
Inflow = 3.14 cfs @ 12.07 hrs, Volume= 9,782 cf
Outflow = 3.07 cfs @ 12.09 hrs, Volume= 8,559 cf, Atten= 2%, Lag= 1.0 min
Primary = 3.07 cfs @ 12.09 hrs, Volume= 8,559 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 20.25' @ 12.09 hrs Surf.Area= 1,865 sf Storage= 1,471 cf

Plug-Flow detention time= 91.2 min calculated for 8,559 cf (87% of inflow)
Center-of-Mass det. time= 34.8 min (821.4 - 786.6)

Volume	Invert	Avail.Storage	Storage Description
#1	16.75'	563 cf	**Rain Garden Soil (Prismatic)**Listed below (Recalc)
#2	19.25'	1,209 cf	**Rain Garden Ponding (Prismatic)**Listed below (Recalc)
		1,771 cf	Total Available Storage

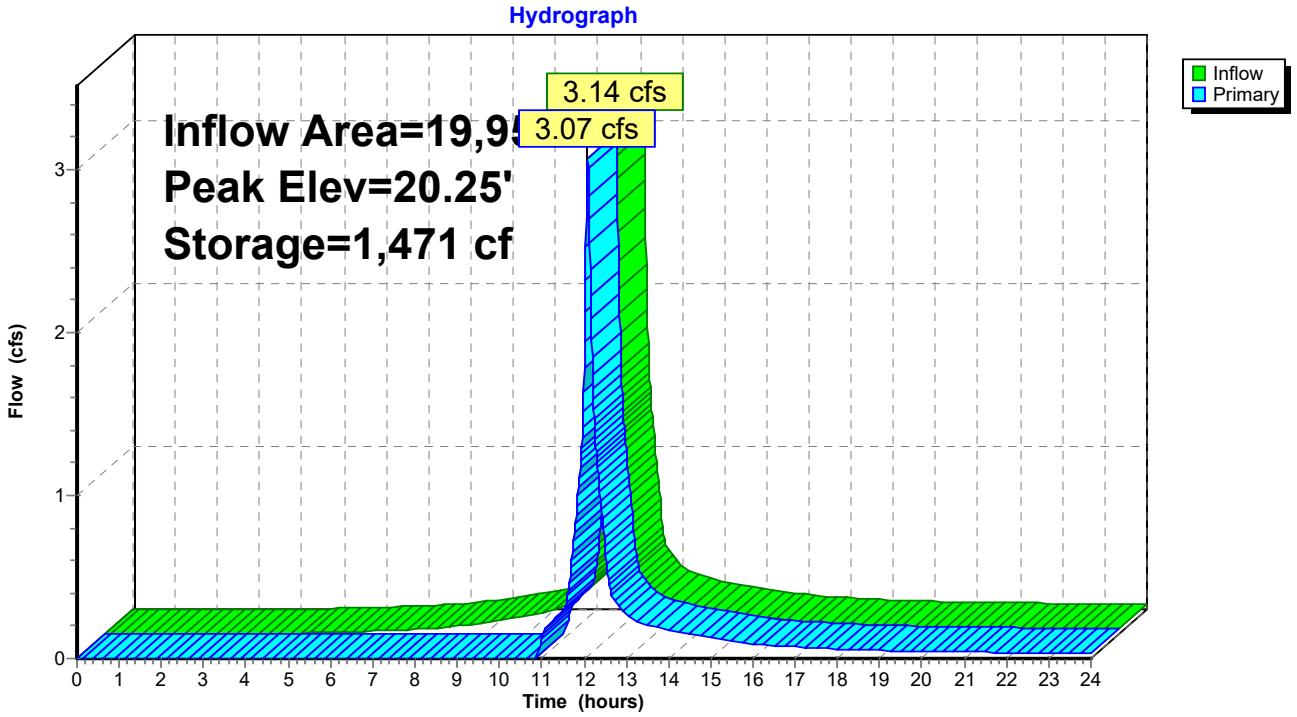
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
16.75	750	0.0	0	0
19.25	750	30.0	563	563

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.25	750	0	0
20.00	984	650	650
20.50	1,250	559	1,209

Device	Routing	Invert	Outlet Devices
#1	Primary	20.00'	**10.0' long x 2.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 Coef. (English) 2.48 2.60 2.60 2.60 2.64 2.65 2.68 2.75 2.74 2.76 2.89 3.05 3.19 3.32

Primary OutFlow Max=3.06 cfs @ 12.09 hrs HW=20.25' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 3.06 cfs @ 1.24 fps)

Pond RG1: Raingarden



Stage-Area-Storage for Pond RG1: Raingarden

Elevation (feet)	Storage (cubic-feet)
16.75	0
16.80	11
16.85	23
16.90	34
16.95	45
17.00	56
17.05	68
17.10	79
17.15	90
17.20	101
17.25	113
17.30	124
17.35	135
17.40	146
17.45	157
17.50	169
17.55	180
17.60	191
17.65	202
17.70	214
17.75	225
17.80	236
17.85	248
17.90	259
17.95	270
18.00	281
18.05	293
18.10	304
18.15	315
18.20	326
18.25	338
18.30	349
18.35	360
18.40	371
18.45	382
18.50	394
18.55	405
18.60	416
18.65	427
18.70	439
18.75	450
18.80	461
18.85	473
18.90	484
18.95	495
19.00	506
19.05	518
19.10	529
19.15	540
19.20	551
19.25	563
19.30	600
19.35	639
19.40	679
19.45	719
19.50	760
19.55	802
19.60	844
19.65	887
19.70	932
19.75	977
19.80	1,022
19.85	1,069
19.90	1,116
19.95	1,164
20.00	1,213
20.05	1,263
20.10	1,314
20.15	1,366
20.20	1,420
20.25	1,475
20.30	1,532
20.35	1,590
20.40	1,649
20.45	1,709
20.50	**1,771**

Summary for Pond SB1: Surface Basin #1

Inflow Area = 95,126 sf, 36.42% Impervious, Inflow Depth > 4.48" for 50-Year event
Inflow = 11.20 cfs @ 12.10 hrs, Volume= 35,551 cf
Outflow = 4.54 cfs @ 12.35 hrs, Volume= 20,218 cf, Atten= 59%, Lag= 14.9 min
Primary = 4.54 cfs @ 12.35 hrs, Volume= 20,218 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 16.05' @ 12.35 hrs Surf.Area= 20,221 sf Storage= 16,268 cf

Plug-Flow detention time= 202.4 min calculated for 20,218 cf (57% of inflow)
Center-of-Mass det. time= 94.1 min (912.2 - 818.1)

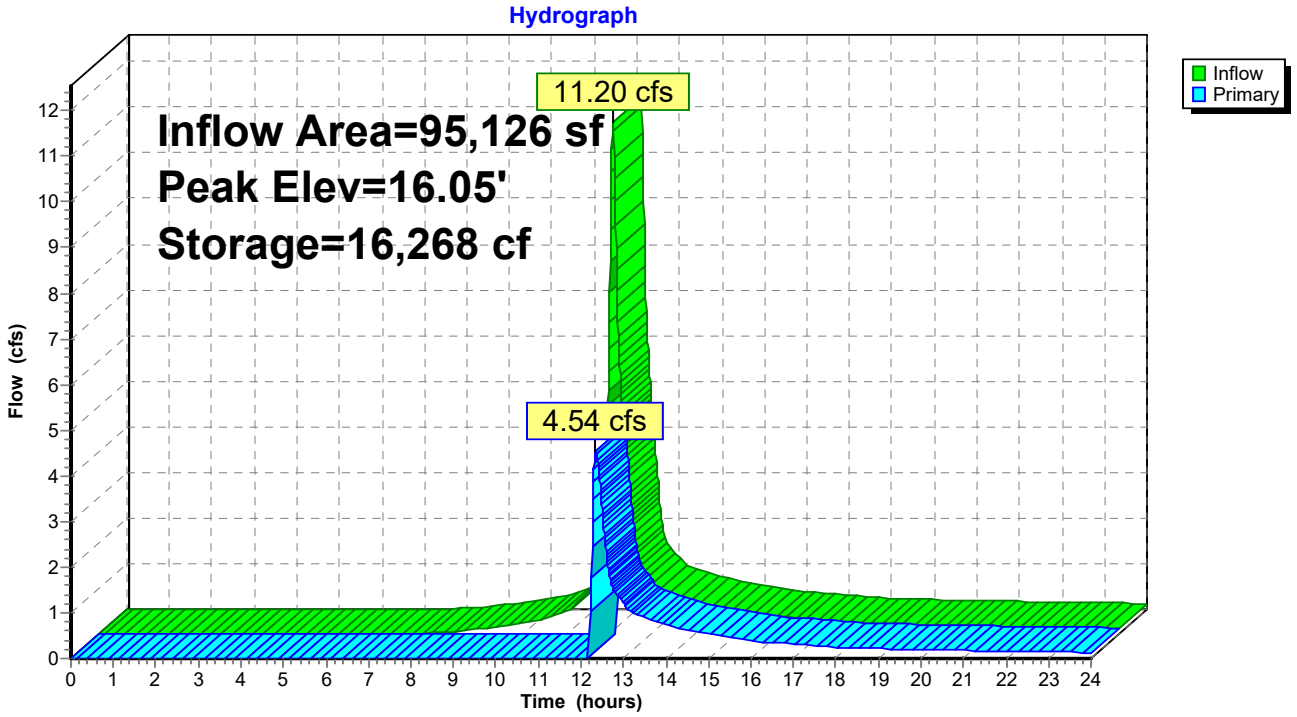
Volume	Invert	Avail.Storage	Storage Description
#1	14.83'	20,633 cf	**Wet Basin (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.83	4,937	0	0
15.00	8,820	1,169	1,169
16.00	19,373	14,097	15,266
16.25	23,562	5,367	20,633

Device	Routing	Invert	Outlet Devices
#1	Primary	16.00'	**160.0' long x 10.0' breadth Overflow Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=4.53 cfs @ 12.35 hrs HW=16.05' (Free Discharge)
↑—**1=Overflow Weir** (Weir Controls 4.53 cfs @ 0.56 fps)

Pond SB1: Surface Basin #1



Stage-Area-Storage for Pond SB1: Surface Basin #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
14.83	4,937	0
14.88	6,079	275
14.93	7,221	608
14.98	8,363	998
15.03	9,137	1,439
15.08	9,664	1,909
15.13	10,192	2,405
15.18	10,720	2,928
15.23	11,247	3,477
15.28	11,775	4,053
15.33	12,302	4,655
15.38	12,830	5,283
15.43	13,358	5,938
15.48	13,885	6,619
15.53	14,413	7,326
15.58	14,941	8,060
15.63	15,468	8,820
15.68	15,996	9,607
15.73	16,524	10,420
15.78	17,051	11,259
15.83	17,579	12,125
15.88	18,107	13,017
15.93	18,634	13,936
15.98	19,162	14,880
16.03	19,876	15,855
16.08	20,713	16,869
16.13	21,551	17,926
16.18	22,389	19,024
16.23	**23,227**	**20,165**

Summary for Pond SB2: Surface Basin #2

Inflow Area = 55,592 sf, 41.57% Impervious, Inflow Depth > 4.69" for 50-Year event
Inflow = 5.80 cfs @ 12.16 hrs, Volume= 21,733 cf
Outflow = 2.54 cfs @ 12.46 hrs, Volume= 21,726 cf, Atten= 56%, Lag= 18.0 min
Primary = 2.54 cfs @ 12.46 hrs, Volume= 21,726 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 14.62' @ 12.46 hrs Surf.Area= 5,683 sf Storage= 3,156 cf

Plug-Flow detention time= 6.8 min calculated for 21,717 cf (100% of inflow)
Center-of-Mass det. time= 6.6 min (824.6 - 818.0)

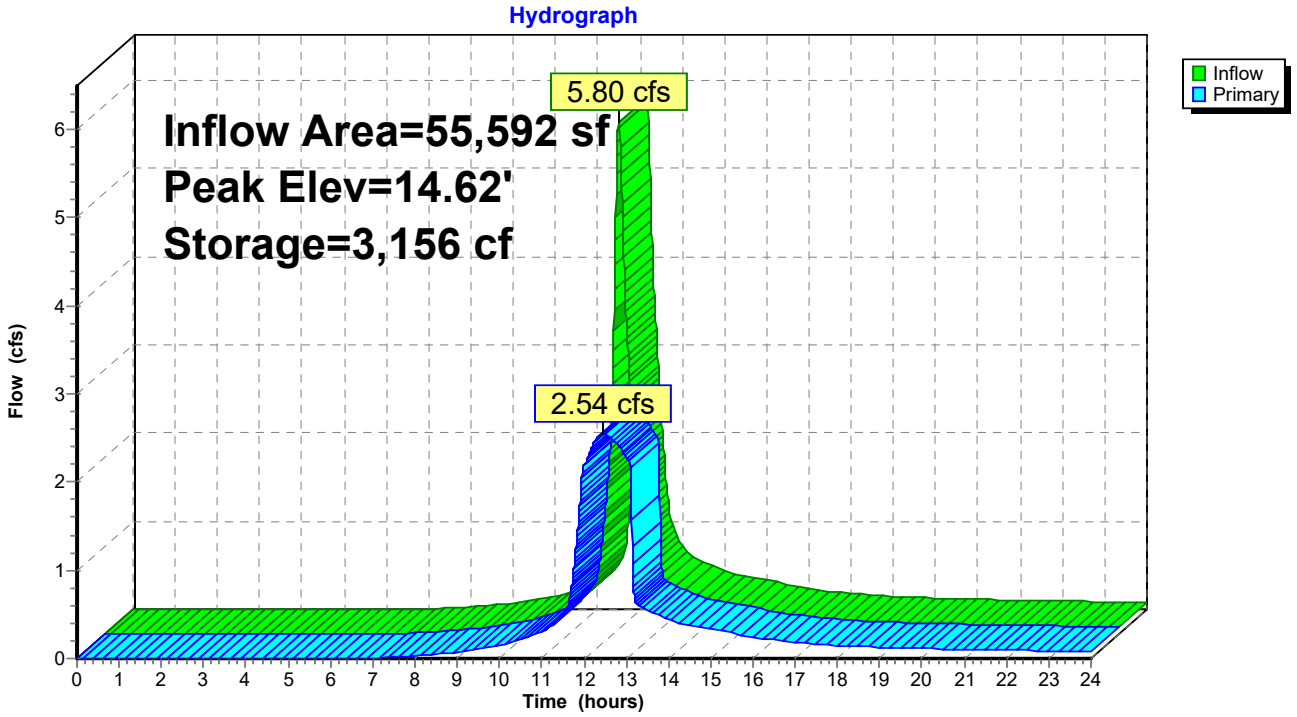
Volume	Invert	Avail.Storage	Storage Description
#1	14.00'	15,037 cf	**Surface Ponding (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.00	4,483	0	0
15.75	7,864	10,804	10,804
16.25	9,071	4,234	15,037

Device	Routing	Invert	Outlet Devices
#1	Primary	15.75'	**50.0' long x 10.0' breadth Brink South - Cove Road** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Device 3	14.00'	**Grate CF#2617** Head (feet) 0.00 0.08 0.17 0.25 0.33 0.41 0.50 1.00 1.50 Disch. (cfs) 0.000 4.000 5.800 7.000 8.000 9.000 9.800 9.800 9.800
#3	Primary	12.00'	**8.0" Round CB#6 To EX.MH** L= 15.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 12.00' / 11.25' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=2.54 cfs @ 12.46 hrs HW=14.62' (Free Discharge)
└─**1=Brink South - Cove Road** (Controls 0.00 cfs)
└─**3=CB#6 To EX.MH** (Inlet Controls 2.54 cfs @ 7.28 fps)
└─**2=Grate CF#2617** (Passes 2.54 cfs of 9.80 cfs potential flow)

Pond SB2: Surface Basin #2



Stage-Area-Storage for Pond SB2: Surface Basin #2

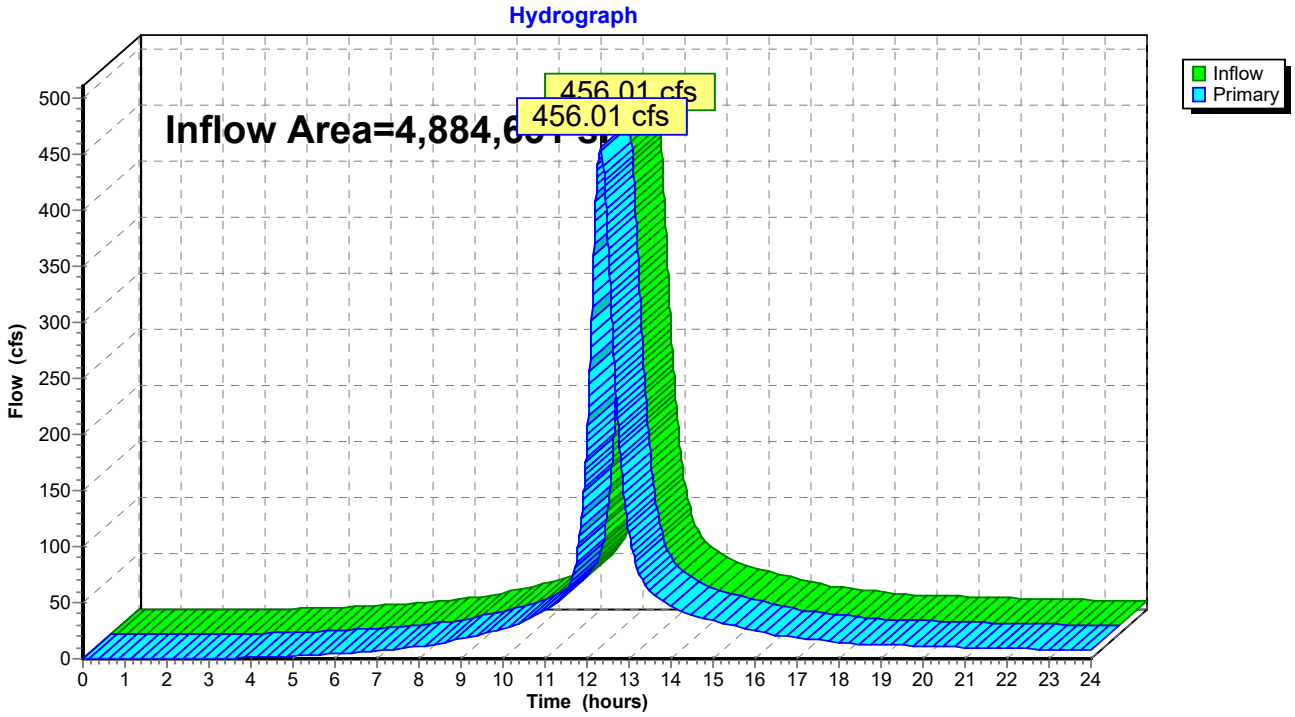
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
14.00	4,483	0
14.05	4,580	227
14.10	4,676	458
14.15	4,773	694
14.20	4,869	935
14.25	4,966	1,181
14.30	5,063	1,432
14.35	5,159	1,687
14.40	5,256	1,948
14.45	5,352	2,213
14.50	5,449	2,483
14.55	5,546	2,758
14.60	5,642	3,038
14.65	5,739	3,322
14.70	5,835	3,611
14.75	5,932	3,906
14.80	6,029	4,205
14.85	6,125	4,508
14.90	6,222	4,817
14.95	6,318	5,131
15.00	6,415	5,449
15.05	6,512	5,772
15.10	6,608	6,100
15.15	6,705	6,433
15.20	6,801	6,771
15.25	6,898	7,113
15.30	6,995	7,460
15.35	7,091	7,813
15.40	7,188	8,170
15.45	7,284	8,531
15.50	7,381	8,898
15.55	7,478	9,269
15.60	7,574	9,646
15.65	7,671	10,027
15.70	7,767	10,413
15.75	7,864	10,804
15.80	7,985	11,200
15.85	8,105	11,602
15.90	8,226	12,010
15.95	8,347	12,425
16.00	8,468	12,845
16.05	8,588	13,271
16.10	8,709	13,704
16.15	8,830	14,142
16.20	8,950	14,587
16.25	**9,071**	**15,037**

Summary for Link EX: 48" Main @ Cove Rd

Inflow Area = 4,884,631 sf, 62.43% Impervious, Inflow Depth > 6.16" for 50-Year event
Inflow = 456.01 cfs @ 12.33 hrs, Volume= 2,507,263 cf
Primary = 456.01 cfs @ 12.33 hrs, Volume= 2,507,263 cf, Atten= 0%, Lag= 0.0 min

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

Link EX: 48" Main @ Cove Rd

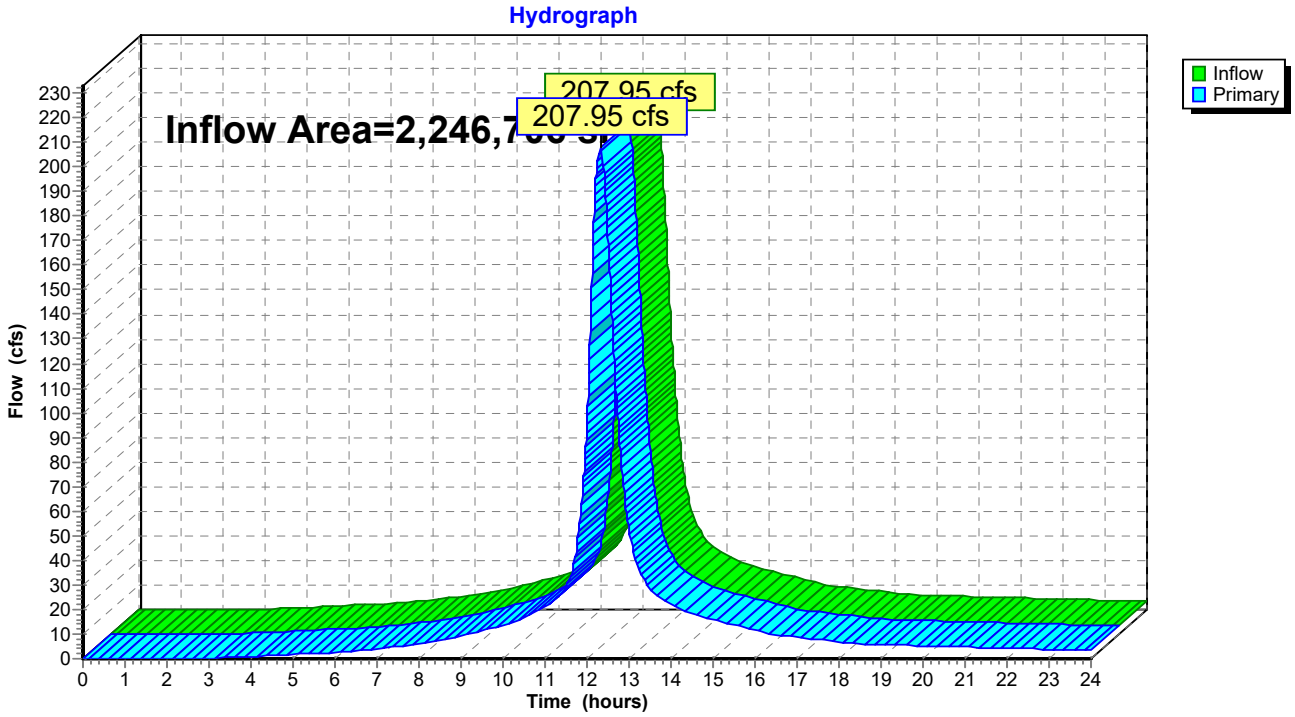


Summary for Link EX-O: Orange Street Manhole

Inflow Area = 2,246,706 sf, 69.27% Impervious, Inflow Depth > 6.41" for 50-Year event
Inflow = 207.95 cfs @ 12.33 hrs, Volume= 1,200,388 cf
Primary = 207.95 cfs @ 12.33 hrs, Volume= 1,200,388 cf, Atten= 0%, Lag= 0.0 min

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

Link EX-O: Orange Street Manhole

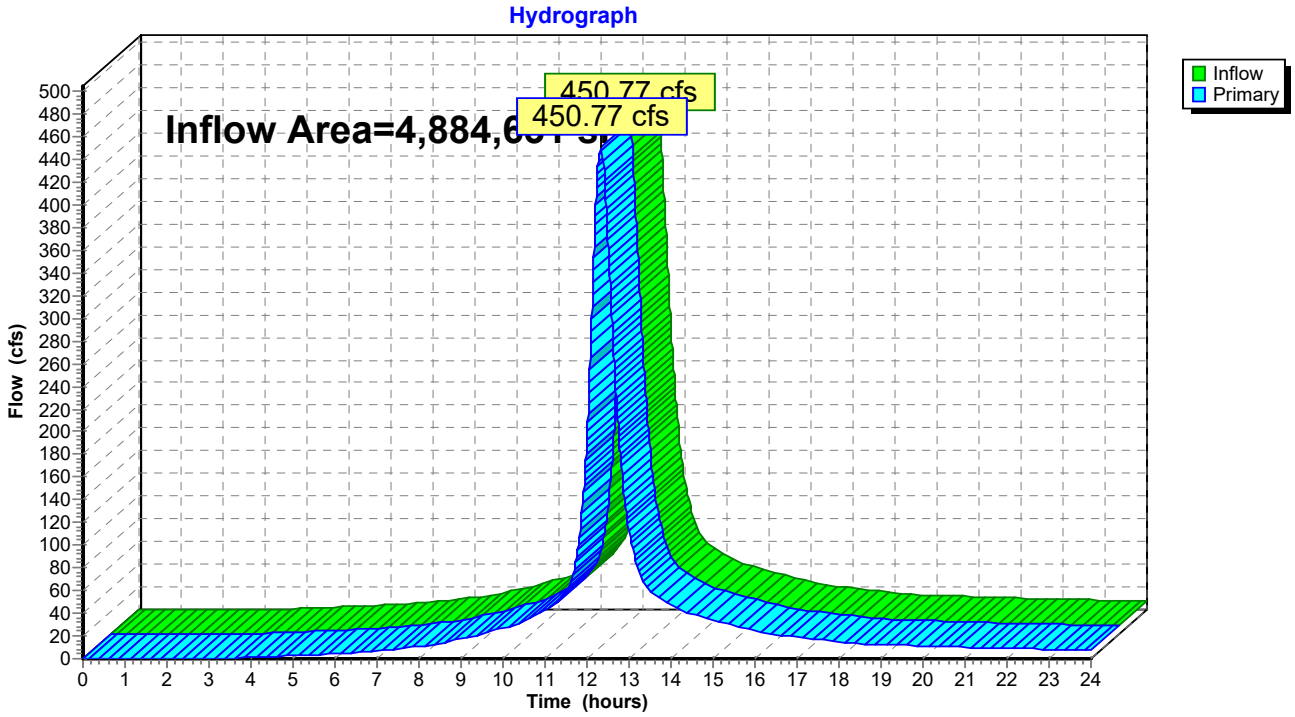


Summary for Link PR: 48" Main @ Cove Rd

Inflow Area = 4,884,631 sf, 63.02% Impervious, Inflow Depth > 6.13" for 50-Year event
Inflow = 450.77 cfs @ 12.33 hrs, Volume= 2,494,850 cf
Primary = 450.77 cfs @ 12.33 hrs, Volume= 2,494,850 cf, Atten= 0%, Lag= 0.0 min

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

Link PR: 48" Main @ Cove Rd

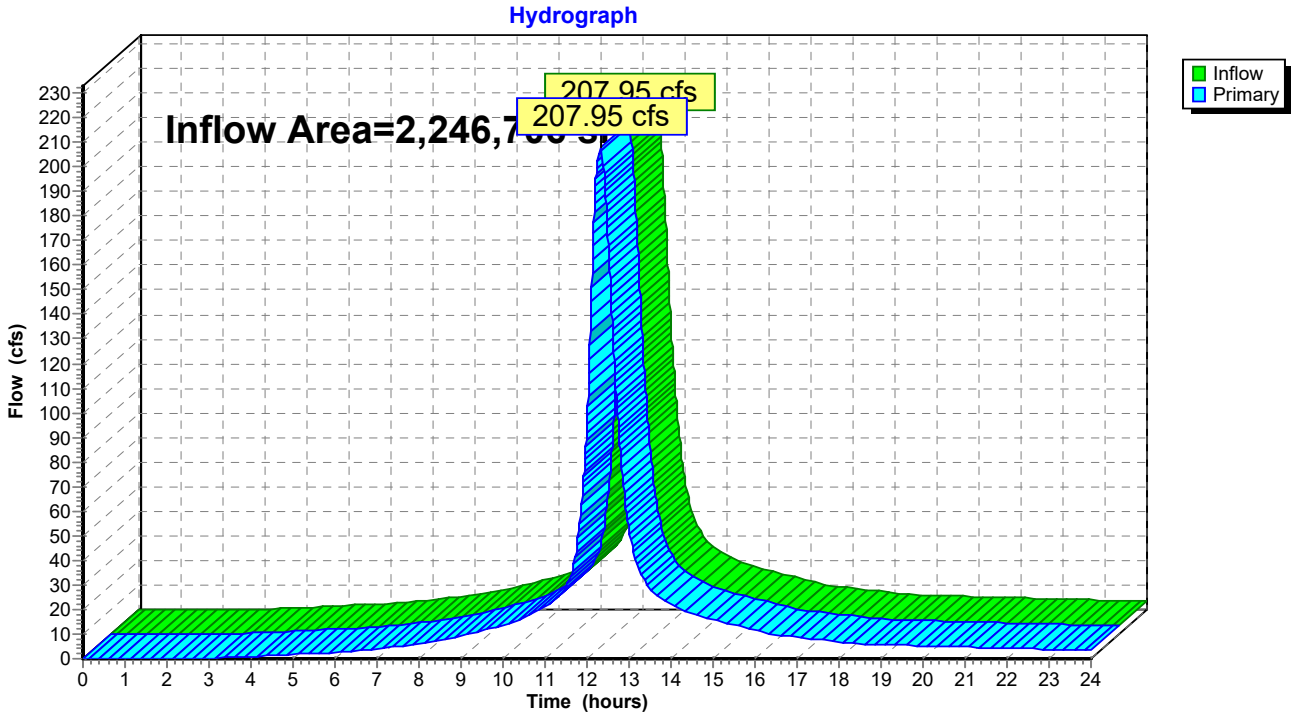


Summary for Link PR-OS: Orange Street Manhole

Inflow Area = 2,246,706 sf, 69.27% Impervious, Inflow Depth > 6.41" for 50-Year event
Inflow = 207.95 cfs @ 12.33 hrs, Volume= 1,200,388 cf
Primary = 207.95 cfs @ 12.33 hrs, Volume= 1,200,388 cf, Atten= 0%, Lag= 0.0 min

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

Link PR-OS: Orange Street Manhole



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 CUL#1: Cultec #1 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>8.13"
Tc=5.0 min CN=98.00 Runoff=0.64 cfs 2,213 cf

Subcatchment CUL#2: Cultec #2 Runoff Area=3,264 sf 100.00% Impervious Runoff Depth>8.13"
Tc=5.0 min CN=98.00 Runoff=0.64 cfs 2,213 cf

Subcatchment EX-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>7.30"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=191.54 cfs 1,074,630 cf

Subcatchment EX-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>7.44"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=71.73 cfs 297,270 cf

Subcatchment EX-S: South Basin Runoff Area=2,567,066 sf 56.98% Impervious Runoff Depth>6.88"
Flow Length=3,643' Tc=25.1 min CN=87.75 Runoff=278.96 cfs 1,472,314 cf

Subcatchment EX-SB: Ex. Surface Basin Runoff Area=70,859 sf 42.98% Impervious Runoff Depth>5.60"
Flow Length=323' Tc=8.7 min CN=76.89 Runoff=9.67 cfs 33,081 cf

Subcatchment PA#1: Porous Asphalt #1 Runoff Area=17,621 sf 71.32% Impervious Runoff Depth>7.52"
Tc=5.0 min CN=92.84 Runoff=3.37 cfs 11,036 cf

Subcatchment PA#2: Porous Asphalt #2 Runoff Area=19,543 sf 69.13% Impervious Runoff Depth>7.47"
Tc=5.0 min CN=92.44 Runoff=3.72 cfs 12,161 cf

Subcatchment PA#3: Porous Asphalt #3 Runoff Area=10,037 sf 51.51% Impervious Runoff Depth>7.09"
Tc=5.0 min CN=89.27 Runoff=1.86 cfs 5,928 cf

Subcatchment PR-N: North Basin Runoff Area=1,767,544 sf 65.00% Impervious Runoff Depth>7.30"
Flow Length=3,374' Tc=27.4 min CN=91.22 Runoff=191.54 cfs 1,074,630 cf

Subcatchment PR-R: Route 1 Basin Runoff Area=479,162 sf 85.00% Impervious Runoff Depth>7.44"
Flow Length=1,685' Tc=12.5 min CN=92.32 Runoff=71.73 cfs 297,270 cf

Subcatchment PR-S: South Basin Runoff Area=2,413,525 sf 58.80% Impervious Runoff Depth>6.96"
Flow Length=3,643' Tc=25.1 min CN=88.39 Runoff=264.20 cfs 1,399,676 cf

Subcatchment RG: Raingarden Runoff Area=19,953 sf 37.53% Impervious Runoff Depth>6.79"
Tc=5.0 min CN=86.76 Runoff=3.60 cfs 11,284 cf

Subcatchment SB#1: Surface Basin #1 Runoff Area=95,126 sf 36.42% Impervious Runoff Depth>5.32"
Flow Length=383' Tc=6.7 min CN=74.48 Runoff=13.24 cfs 42,153 cf

Subcatchment SB#2: Surface Basin #2 Runoff Area=55,592 sf 41.57% Impervious Runoff Depth>5.54"
Flow Length=356' Tc=11.8 min CN=76.37 Runoff=6.82 cfs 25,652 cf

Pond CUL1: Cultec #1 Peak Elev=19.78' Storage=292 cf Inflow=0.64 cfs 2,213 cf
Outflow=0.64 cfs 1,924 cf

Pond CUL2: Cultec #2	Peak Elev=17.18' Storage=280 cf Inflow=0.64 cfs 2,213 cf Outflow=0.64 cfs 1,934 cf
Pond EXSB: Ex Parking Lot	Peak Elev=12.55' Storage=43 cf Inflow=9.67 cfs 33,081 cf Outflow=9.65 cfs 33,081 cf
Pond PA1: Porous Asphalt #1	Peak Elev=24.07' Storage=1,114 cf Inflow=3.37 cfs 11,036 cf Outflow=3.35 cfs 9,978 cf
Pond PA2: Porous Asphalt #2	Peak Elev=23.31' Storage=1,523 cf Inflow=3.72 cfs 12,161 cf Outflow=3.43 cfs 12,086 cf
Pond PA3: Porous Asphalt #3	Peak Elev=21.65' Storage=1,206 cf Inflow=1.86 cfs 5,928 cf Outflow=1.80 cfs 4,863 cf
Pond RG1: Raingarden	Peak Elev=20.27' Storage=1,497 cf Inflow=3.60 cfs 11,284 cf Outflow=3.52 cfs 10,059 cf
Pond SB1: Surface Basin #1	Peak Elev=16.07' Storage=16,732 cf Inflow=13.24 cfs 42,153 cf Outflow=7.95 cfs 26,810 cf
Pond SB2: Surface Basin #2	Peak Elev=14.83' Storage=4,384 cf Inflow=6.82 cfs 25,652 cf Outflow=2.66 cfs 25,644 cf
Link EX: 48" Main @ Cove Rd	Inflow=519.62 cfs 2,877,296 cf Primary=519.62 cfs 2,877,296 cf
Link EX-O: Orange Street Manhole	Inflow=235.99 cfs 1,371,900 cf Primary=235.99 cfs 1,371,900 cf
Link PR: 48" Main @ Cove Rd	Inflow=513.88 cfs 2,864,874 cf Primary=513.88 cfs 2,864,874 cf
Link PR-OS: Orange Street Manhole	Inflow=235.99 cfs 1,371,900 cf Primary=235.99 cfs 1,371,900 cf

Appendix F

DCIA Tracking Spreadsheet
Checklist for Stormwater Management Report

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	Oak Park Development
Project Address	Ursula Place/Dale Street
Project Applicant	Redniss & Mead
Date of Submittal	1-Jun-22
Tax Account Number	002-5974 & 003-8620

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?	637,321	ft^2
3. What is the total area of land disturbance for this project?	461,000	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?	192,833	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?	230,627	ft^2

Part 3: Water Quality Target Total		
Does Standard 1 apply based on information above?	Yes	
Water Quality Volume (WQV)	19952.5	ft^3
Standard 1 requirement	Retain WQV on-site	
Required retention volume	19952.5	ft^3
Provided retention volume for proposed development	20,462.0	ft^3

Part 4: Proposed DCIA Tracking		
Pre-development ***total impervious area***	192,833	ft^2
Current ***DCIA***	192,833	ft^2
Proposed-development ***total impervious area***	230,627	ft^2
Proposed-development ***DCIA*** (after stormwater management)	132,048	ft^2
Net change in ***DCIA*** from pre-development to proposed-development	-60,785	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 June 2022 Engineer's Seal

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

CHECKLISTS

Project Name: Oak Park Living Community Redevelopment

Project Address 0 Ursula Place

Property Owner(s) Housing Authority City of Stamford

Tax Account Number(s) 002-5974 & 003-8620

Engineer's Signature _____ Date: June 1, 2022

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.

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

Checklist for Existing Conditions Plan

I. General Information

X	Site address
X	Orientation, block, zone, City, street name
X	Applicant name and legal address
X	Surveyor name, address, contact information
X	North arrow, bar scale, horizontal and vertical datum
X	24" x 36" sheet size unless otherwise approved
X	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.
X	Drawing scale shall be set at 1" = 20' or 1" = 40' when possible (1"=30' to fit on 24"x36" page size)

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

II. Existing Conditions Plan Elements

X	Show and label all property boundaries with linear bearing / distances and curve information
X	Required zoning setbacks
X	Show and label monument information
X	Show and label at least one permanent benchmark on the parcel with northing, easting and elevation
X	Label adjacent property ownership information
X	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
X	Show spot elevations at low points, high points, and where topography is flatter than 2 percent
X	All buildings and structures (label current use and finished floor elevations)
X	All pavement, parking, driveways, property access points
X	All roadways, streets, and rights-of-way. Label streets as public or private with street name
X	All patios, decks, walkways, sidewalks, curb ramps (both adjacent to and opposite and existing roadways or intersections)
X	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. (Shown to maximum extent possible)
X	Show and label existing conveyance systems (swales, ditches, storm drains) including dimensions, elevations, sizes, slopes, and direction of flow
X	Show and label boundaries of all easements, both public and private, with type, owner, and width
X	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. (No Wetlands on or adjacent)
X	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. (Zone X)
N/A	Show and label any Conservation Easement Areas (No CEA on-site)
N/A	Show and label Connecticut Coastal Jurisdiction Line (CJL) (No CJL on-site)
X	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

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

B. Project Description and Purpose

X	Project description including proposed project elements and anticipated construction schedule

C. Existing Conditions Description

X	Site area, ground cover, vegetation, features (roads, buildings, utilities, etc.)
X	Site topography, slopes, drainage patterns, conveyances systems (swales, storm drains, etc.), stormwater discharge locations
X	Receiving waterbody information including stormwater impairments and TMDL information (See the most recent State of Connecticut Integrated Water Quality Report)
X	Site soils information including soil types, hydrologic soil group, bedrock / outcroppings, groundwater elevation, significant geologic features
X	Provide NRCS Soils Mapping
N/A	Resource protection areas (wetlands, streams, lakes, etc.), buffers, floodplains, floodways (None on-site)

D. Summary of Applicable General Design Criteria

X	Methodology, design storm frequency
X	Hydrologic design criteria
X	Hydraulic design criteria
N/A	Flood hazard areas (Site outside FEMA designated Flood Hazard Area's - Zone X)

	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

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

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F. Summary of LID Site Constraints

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

G. Summary of Proposed Stormwater Treatment Practices

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

H. Summary of Compliance with Standards 1

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

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

X	Description of proposed stormwater management system
X	Pre-development site hydrology with delineation of each watershed area and sub-basin
X	Post-development site hydrology with delineation of each watershed area and sub-basin
X	Comparison table of pre- and post-development hydrology, peak flow, volume, and percent difference
X	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
X	Conveyance protection, emergency outlet sizing
X	Hydraulic grade line summary and tail water elevation used in analysis
X	Construction erosion and sediment control description, Standard 3
X	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

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

K. Stormwater Management Report

X	Signed and stamped by professional engineer licensed in the State of Connecticut
X	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

X	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.
X	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

X	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

N/A	Stream channel protection, Standard 2A
X	Conveyance protection, Standard 2B
X	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)
X	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
X	Detention facilities (outlet structure, stage/storage, freeboard)
X	Emergency outlet sizing, safely pass the 100 year storm, Standard 2D
X	Outlet protection calculations, based on conveyance protection (i.e. riprap, energy dissipater)

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O. Hydrologic and Hydraulic Model, Existing and Proposed

X	Drainage routing diagram
X	Summary
X	Storage pond input

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

	Downstream analysis, Standard 2E

III. Supporting Mapping (as appendix to Project Report)

Q. Pre-Development Drainage Basin Area Mapping

X	11" x 17" or 8.5" x 11" sheet size (24"X36" due to size of watershed)
X	Topography, drainage patterns, drainage area boundaries and sub basins, flow paths, times of concentration
X	Locations of existing stormwater discharges
N/A	Perennial and intermittent streams, wetlands, and floodplain / floodways
X	NRCS soil types, locations, boring locations, infiltration testing locations
X	Vegetation and groundcover
X	Existing roads, buildings, driveways, parking areas, walks, patios, pools and other impervious surfaces, decks and other structures
X	Location, size, type of existing structural stormwater controls, facilities and conveyance systems

R. Post-Development Drainage Basin Area Mapping

X	11" x 17" or 8.5" x 11" sheet size (24"X36" due to size of watershed)
X	Topography, drainage patterns, drainage area boundaries and sub basins, flow paths, times of concentration
X	Locations of proposed stormwater discharges
N/A	Perennial and intermittent streams, wetlands, and floodplain / floodways
X	NRCS soil types, locations, boring locations, infiltration testing locations
X	Vegetation, ground cover and proposed limits of clearing/disturbance
X	Proposed, roads, buildings, driveways, parking areas, walks, patios, pools and other impervious surfaces, decks and other structures
X	Location, size, type of proposed structural stormwater controls, facilities and conveyance systems

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

X	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

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

B. LID Constraints:

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

C. Proposed Stormwater Treatment Measures:

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

D. Site Summary Table:

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

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Checklist for Stormwater Management Plan / Construction Plans

A. General

X	Site orientation, address and legal description
X	Applicant name, legal address, contact information
X	Engineers name, address, contact information
X	North arrow, bar scale, horizontal and vertical datum
X	Drawing scale shall be set at 1"=20' or 1"=40' when possible
X	Stamped by a Licensed Professional Engineer in the State of Connecticut
X	24" x 36" sheet size unless otherwise approved

B. Site Development Plans

X	City of Stamford Standard Notes
X	As required by the Drainage Maintenance Agreement, provide a written narrative describing the nature of the proposed development activity and the program for operation and maintenance of drainage facilities and control measures throughout the life of the project.
X	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
X	All required spot elevations to clearly depict positive pitch
X	Top and bottom elevation of all walls
X	Roads, buildings, driveways, parking areas, walks, patios, pools and other impervious surfaces, and decks and other structures
X	All utilities and easements
X	Location, size, maintenance access, type of proposed structural stormwater controls and facilities with elevations and inverts
X	Location, size, maintenance access, type of proposed non-structural stormwater controls and facilities with elevations and inverts
X	Location, size, type of proposed stormwater infrastructure, inlets, manholes, infiltration and detentions systems, control structures with elevations and inverts
X	Location, size, ownership of stormwater conveyance systems (swales, pipes, etc.) with elevations and inverts
X	Identify roof leaders, curtain drains and foundation drains with elevations and inverts
X	Proposed water quality treatment systems, size and model type
X	Final stabilization measures which may include slope stabilization

C. Erosion and Sedimentation Control Plan

X	Phasing and schedule
X	Construction access and staging and stock pile areas
X	Operation and maintenance of erosion and sedimentation controls
X	Tree protection (Tree Protect Provided by Landscape Architect)
X	Downstream protection such as location of silt fencing
X	Limit of disturbance
X	Construction fencing

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D. Construction Details

X	Standard City of Stamford details
X	Infiltration system details
X	Control structure details
X	Water quality treatment details
X	Infiltration testing results

Checklist for Certificate of Occupancy

	Final Improvement Location Survey
	Stormwater Management Certification Form
	Final DCIA Tracking Worksheet
	Standard City of Stamford Drainage Maintenance Agreement (Agreement Covenant)

Other Certifications at the discretion of the Engineering Bureau and/or EPB

	Wall Certification
	Landscape Certification
	Landscape Maintenance Agreement
	Waiver Covering Storm Sewer Connection
	Waiver Covering Granite Block, Depressed Curb, and Driveway Aprons
	Flood Certification

Appendix G

Draft Operation and Maintenance Agreement

Block _____ .

AGREEMENT COVENANT

AGREEMENT made this____ day of_____by and between Housing Authority City of Stamford of 22 Clinton Ave in the City of Stamford, County of Fairfield and State of Connecticut (hereinafter referred to as "Owner"); 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"), 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 a new Affordable Housing Development (26 townhouses, 1 apartment building) on land owned by it and as more particularly described on Schedule "A" annexed hereto and made of part hereof (hereinafter referred to as the "Property"); and

WHEREAS, certain drainage facilities ("Drainage Facilities"), including but not limited to raingarden, porous asphalt(x3),cultec(x2),surface basin 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 _____Permit No._____issued by the Zoning Board of the City of Stamford (_____) issued

therefore, ("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

(ACKNOWLEDGEMENT ON THE FOLLOWING PAGE)

THE ENVIRONMENTAL PROTECTION BOARD

BY: _____

Gary H. Stone
Its duly authorized Chairman

OWNER

BY: _____

OWNER

BY: _____

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 acknowledge the same to be_____free act and deed, before me.

_____
Commissioner of the Superior Court
or Notary Public

Appendix H

Sanitary Sewer Analysis

Sanitary Sewer Flow Calculations

Project:	Oak Park Housing Development	**Project #:**	7338		
Location:	0 Ursula Place, Stamford, CT 06905	**By:**	AMK	**Date:**	5/31/2022
Description:	Existing Sanitary Flow Calculations	**Checked:**	AMK	**Date:**	5/31/2022

Existing Development Flow To 10" Tile Sewer Pipe (Dale Street to Cove Road)

Building Use Type	Design Flow (GPD) [1 2]	Total Flow (GPD)
Apartment - 1-Bedroom (14 units)	150 [1]	2,100
Apartment - 2-Bedroom (136 units)	300 [1]	40,800
Apartment - 3-Bedroom (15 units)	450 [1]	6,750
Apartment - 5-Bedroom (3 units)	750 [1]	2,250

	GPD	GPM	CFS
Total Existing Average Daily Sanitary Flow	51,900	36.0	0.1
Total Existing Peak Daily Sanitary Flow (Avg x 4)	207,600	144.2	0.4

Proposed Development Flow To 10" Tile Sewer Pipe (Dale Street to Cove Road)

Building Use Type	Design Flow (GPD) [1 2]	Total Flow (GPD)
Apartment - 1-Bedroom (16 units)	150 [1]	2,400
Apartment - 2-Bedroom (114 units)	300 [1]	34,200
Apartment - 3-Bedroom (36 units)	450 [1]	16,200
Office & Communal Space (2,550 sq.f	750 [2]	255

	GPD	GPM	CFS
Total Proposed Average Daily Sanitary Flow	53,055	36.8	0.1
Total Proposed Peak Daily Sanitary Flow (Avg x 4)	212,220	147.4	0.4

Proposed 10" Tile Sewer Pipe (Dale Street to Cove Road) Capacity Analysis

	GPD	GPM	CFS
Maximum Flow Capacity [3]	565,085	392.4	1.05
Proposed Development Flow Contribution	212,220	147.4	0.4

1. Per CT Health Code Technical Standards 2018 section IV - Design Flows. *(150 gpd per bedroom.)*
2. Per CT Health Code Technical Standards 2018 section IV - Design Flows. *(20 gpd per 200 sq.ft.)*
3. Refer to enclosed pipe capacity calculation for maximum flow in 10" sewer pipe on Dale Street.

Mannings Equation - Circular Pipe

Project:	*Oak Park Housing Development*	**Project #:**	*7338*	**Date:**	*5/31/2022*
Location:	*0 Ursula Place, Stamford, CT*	**By:**	*AMK*	**Checked:**	*AMK*

10" Sanitary Pipe - Dale Street

Calculate the maximum flow capacity using Manning's equation.

Pipe material	Vitrified sewer pipe		
Manning's n	0.013		
Pipe diameter, D	0.833 ft		
Area, A	0.54 ft^2	$A = \frac{\pi}{4} D^2$	
Wetted perimeter, P	2.62 ft	$P = \pi D$	
Hydraulic radius, R_h	0.21 ft	$R_h = \frac{A}{P}$	
Slope, S	0.002 ft/ft		
Flow, Q_{full}	**1.05 cfs**	$Q = \frac{1.486}{n} A R_h^{2/3} S^{1/2}$	

Calculate the percent of flow from Development.

Flow, Q	0.293 cfs[1]	
Flow to Flow Full, Q/Q_{full}	**0.279**	**27.9%**

[1] Flow = Peak Flow generated by proposed development (see attached peak flow calculations)

Appendix I

Tree Survey & Arborist Report

ALMSTEAD
TREE, SHRUB & LAWN CARE

547 Hope St
Stamford, CT 06907
Phone (203) 348-4111
Fax (203) 708-0071
www.almstead.com

arbor care plant health care lawn care organic consulting

March 18, 2022

Mr. Andrew M. Kuzmich, P.E.
Project Engineer
Redniss & Mead
22 1st Street
Stamford, CT 06905

Dear Andrew,

Attached please find the requested Tree Survey for Oak Park, Stamford, Connecticut.

The multitude of healthy, mature shade trees potentially formed the basis for an outstanding landscape for the rebuilt community. To take advantage of these assets, careful planning will be needed to preserve and protect root zones and provide necessary pruning maintenance to ensure the safety of buildings and residents.

Unmistakably there are numerous trees that will not and should not survive the rebuild of the community. I welcome the opportunity to assist you with the selection process.

Thank you for entrusting Almstead Tree & Shrub Care. We look forward to working with you on this project in the future.

Best regards,

Jeff Thrasher
CT Arborist #2239
ISA NE-0375A
TRAQ Certified

P.S. A hard copy is in the mail.

3/18/22

TREE SURVEY LEGEND

Condition: The condition rating is based on the trees structure and growing location. Flaws in the main stem or scaffolding limbs and/or root restrictions result in lower condition ratings.

Excellent: Trees with good branch structure and are without cavities that potentially impact the tree and have a rooting area that supports the long-term health and safety of the tree.

Good: Trees with good branch structure that also need pruning remediation to preserve health and safety. In some instances, trees with root issues that are impacting an otherwise structurally sound tree.

Fair: Trees that have structural flaws that require significant remediation or have root issues that could impact the long-term health and safety of the tree.

Poor: Trees with irreparable main stem scaffolding or rooting flaws. Generally, have a removal recommendation.

Maintenance: Maintenance is considered in three time frames (current, mid-term, and long-term). As this is and will be a residential area shade trees should be put on a 3-7 year pruning cycle to maintain public safety.

C = Current needs	***P*** = Prune	***R*** = Remove
M = Mid-term (3-7 years)	***C*** = Cable	
L = Long-term (7+ years)	***B*** = Brace	

Risk: The risk assessment does not incorporate an International Society of Arboriculture Tree Risk Assessment Qualification (TRAQ) matrix. This risk assessment is based on visible structural flaws and known city infrastructure. All street side trees have been given a hazard or potential hazard rating based on their location.

SS = Structurally Sound	PH = Potential Hazard
SI – Structural Issues	H = Existing Hazard

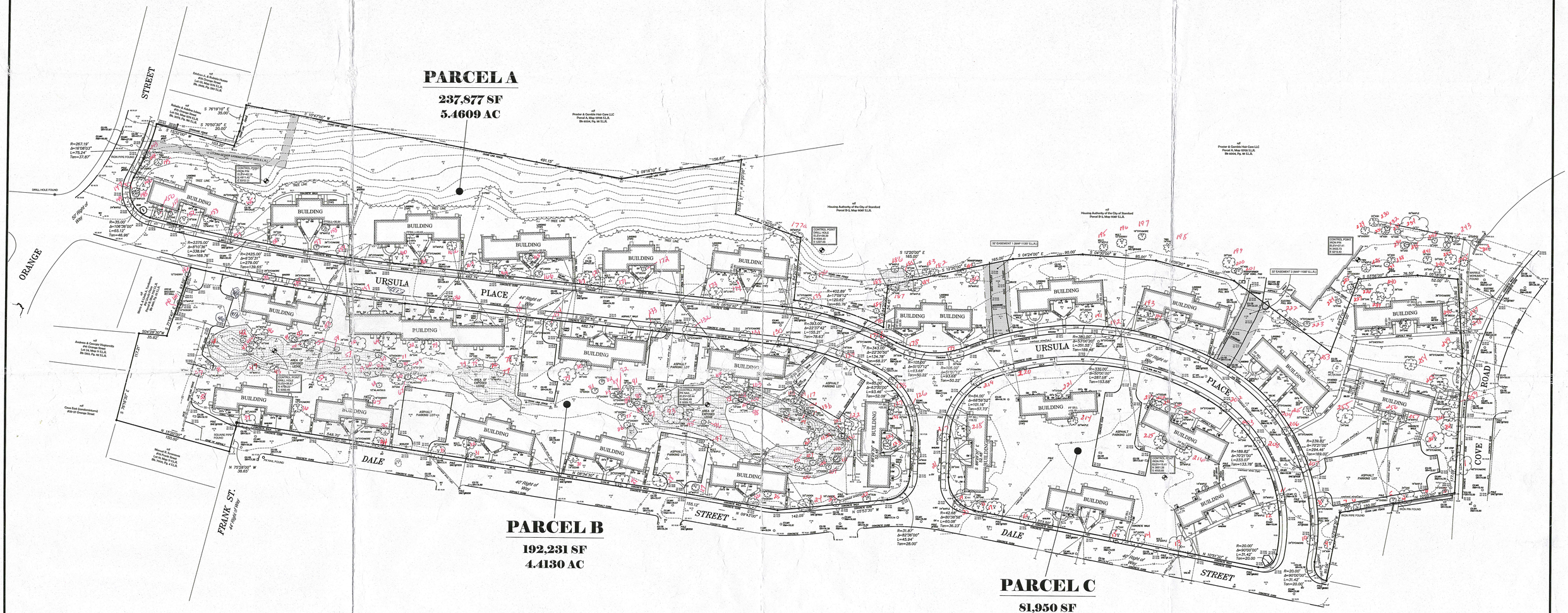

EXHIBIT
DEPICTING
OAK PARK
STAMFORD, CT
PREPARED FOR
RIPPOWAM CORPORATION

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

Scale: 1"=50' (0, 50, 100)
Drawn By: CJP | Checked By: | Date: 04/12/2018

DRAFT 9/20/2018

This document and copies thereof are valid only if they bear the signature and embossed seal of the designated licensed professional. Unauthorized alterations under any declaration hereon null & void.

Sheet No:
PS
Comm. No.: 7338

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#	Variety	Condition	Maintain			Risk	Comments
			C	M	L		
1	No Tree						
2	16" Black Cherry	Fair	*P*	*A*	*P*	PH	Growing at adverse angle, stress fracture in main stem.
3	18" Norway Maple	Good	*P*	*A*	*A*	PH	Unbalanced canopy structure due to light competition.
4	36" Red Oak	Good	*P*	*A*	*H*	SS	Multiple storm break in upper canopy. Recommend reduction pruning for over-weighted leaders.
5	No Tree						
6	No Tree						
7	16" Norway Maple	Good	*P*	*L*	*L*	SS	Canopy structurally sound. Only deadwood pruning required.
8	26" Sycamore	Good	*P*	*L*	*L*	SS	Small cavity in main stem. Deadwood pruning and wire clearing recommended.
9	28" Norway Maple	Good	*P*	*A*	*L*	PH	Canopy overhang of adjacent property and open exposure creating potential hazard.
10	33" Sycamore	Good	*P*	*A*	*A*	SS	Root growth under sidewalk creating tripping hazard. Reduction pruning recommended for left lateral leader.
11	No Tree						
12	20"&20" 2 Leadered Red Maple	Fair	*P&C*	*A*	*H*	PH	Cavities in main stem potentially compromise structural integrity.
13	No Tree						
14	32" Linden	Fair	*P&C*	*H*	*A*	PH	Line clearing has created excessive adventitious growth. Main leaders are overweighted, thinning and reduction pruning recommended.
15	39" Pin Oak	Fair	*P&C*	*A*	*H*	PH	Upper canopy storm damage and cavities as well as overweighted lateral leaders present multiple structural issues.
16	42" Red Oak	Fair	*P*	*H*	*H*	PH	Tree has been over pruned creating adventitious growth and multiple cavities in canopy.
17	35" Ash	Poor	*P&R*	*H*	*H*	PH	Tree has dieback in upper canopy and is currently infested by Emerald Ash Borer.
18	24" Linden	Poor	*R*	*n/a*	*n/a*	H	Tree has a significant cavity at the base of the main stem. Suggest removal.

19	40"&38" 2 Leadered Red Oak	Good	***P&C***	***A***		SS	Canopy is well balanced. Maintenance pruning only needed to preserve the tree.
20	24" Red Maple	Poor	***P or R***	***A***	***A***	PH	Removal or significant reduction recommended to compensate for large cavity in main stem.
21	28" Red Oak	Fair	***P***	***A***	***H***	PH	Leaders are excessively end weighted. Reduction pruning recommended.
22	18" Sweet Gum	Fair	***P***	***L***	***L***	SS	Severe cut hacks have diminished tree like form.
23	20" Linden	Poor	***P or R***	***H***	***H***	PH	Significant cavity the length of the main stem. Multiple breaks in upper canopy.
24	32" Linden	Fair	***P***	***A***	***A***	PH	Line clearing cuts have creative excessive adventitious growth cavities throughout canopy.
25	No Tree						
26	No Tree						
27	No Tree						
28	32" Pin Oak	Fair	***P***	***H***	***H***	SS	Improper pruning has created excessive adventitious growth.
29	32" Sycamore	Fair	***P***	***A***	***A***	PH	Unbalanced canopy. Reduction running of overweighted leader recommended.
30	No Tree						
31	24" Sweet Gum	Fair	***P&R***	***H***	***A***	PH	Line clearance pruning has created extensive adventitious growth and codominant leaders. Roots under sidewalk creating a tripping hazard.
32	No Tree						
33	30" Sycamore	Fair	***P***	***A***	***A***	PH	Reduction pruning recommended for lateral leaders.
34	24" Sycamore	Fair	***P***	***A***	***A***	PH	Line clearing has created lopsided canopy and cavities at the main crotch.
35	18" Black Cherry	Fair	***R or P***	***n/a***	***n/a***	H	Tree growing with excessive lean and significant cavity n the main stem.
36	10"&14" 2 Leadered Sycamore	Fair	***P&B***	***A***	***A***	SI	Low growing tree that is not a hazard but with cavities in main stem. Needs line clearance.
37	No Tree						
38	28" Sycamore	Fair	***P***	***A***	***A***	SI	Cavity in one of the man leaders. Significant dieback in canopy.
39	34" Pin Oak	Excellent	***P***	***A***	***H***	SS	Reduction pruning recommended for leader over street light.

40	12" Ailanthus	Poor	***R***	***n/a***	***n/a***	PH	Dieback canopy and significant root impingement. Recommend Removal.
41	12" Pin Oak	Good	***P***	***L***	***L***	SS	Young tree with root restrictions.
42	10" Red Oak	Good	***P***	***L***	***L***	SI	Growth in ledge rock area and lean to stem could eventually compromise structural integrity.
43	14" Cherry	Poor	***R***	***n/a***	***n/a***	SI	Tree has fallen and is laying on the ground.
44	22" Red Oak	Good	***P***	***L***	***L***	SI	Canopy lopsided due to light competition.
45	20" Pin Oak	Fair	***P or R***	***L***	***L***	PH	Uprooting potential due to lean in stem and root impingement.
46	28" Red Maple	Good	***P***	***A***	***A***	PH	Lean toward current structure and root impingement creates potential hazard.
47	18" Red Oak	Good	***n/a***	***L***	***L***	PH	Main stem pinned against ledge rock. Potential root impingement.
48	26" Red Oak	Good	***P***	***L***	***L***	PH	Root system pinned against ledge rock and 8° lean in main stem
49	16" White Pak	Good	***P***	***L***	***L***	PH	Growing on ledge rock with visible root impingement. 6° lean towards existing building.
50	No Tree						
51	16" Black Cherry	Fair	***R***	***n/a***	***n/a***	SI	Tree growing with 20° lean on ledge rock and cavities in main stem.
52	30" Red Oak	Poor	***R***	***n/a***	***n/a***	H	Significant cavity in Basil root flare. Root impingement from ledge rock.
53	34" Red Oak	Fair	***P***	***H***	***H***	PH	Multiple storm breaks in cavity throughout canopy creating significant structural issues.
54	12" Cherry	Fair	***P***	***L***	***L***	SS	Main leader has been pruned off.
55	38" Red Oak	Excellent	***P***	***H***	***H***	SS	Some deadwood in upper canopy. Weight reduction needed for large lateral leaders.
56	34" White Oak	Good	***P***	***A***	***A***	PH	Significant cavity in main stem. Further testing recommended to ascertain depth of sound wood.
57	15" Ailanthus	Good	***n/a***	***L***	***L***	SI	Soft wooded variety. Prone to storm damage.
58	16"White Oak	Good	***P***	***A***	***A***	SI	Growing with 6° lean toward existing buildings. Evidence of root impingement.
59	16" Ailanthus	Fair	***P***	***L***	***L***	PH	Unbalanced upper canopy overhang over existing building.
60	14" Ailanthus	Fair	***P***	***L***	***L***	SI	Some dieback in upper canopy.
61	10" Ailanthus	Fair	***R***	***n/a***	***n/a***	SI	Significant dieback in canopy, leaning toward existing building.
62	12" Ailanthus	Poor	***R***	***n/a***	***n/a***	H	Tree is dead.

63	Twin 12" Pignut Hickory	Good	*P*	*L*	*L*	SS	This review is of 2 trees approximately 8' apart.
64	32" White Oak	Excellent	*P*	*A*	*A*	SS	Well configured canopy. Deadwood pruning needed.
65	20" Black Cherry	Fair	*P*	*L*	*L*	SI	Significant dieback in second leader. Cavity in main stem.
66	32" Red Oak	Good	*P*	*A*	*H*	SS	Tree is in good health but has been over pruned in the past.
67	16" Ailanthus	Fair	*P*	*L*	*L*	SI	Main stem cavities, lean and root impingement.
68	24" Pin Oak	Good	*P*	*A*	*A*	SS	Tree has been over pruned in the past.
69	8" Cherry	Poor	*R*	*n/a*	*n/a*	SI	Significant main stem cavity.
70	12" Cherry	Poor	*R*	*n/a*	*n/a*	SI	Significant main stem cavity.
71	No Tree						
72	36" Pin Oak	Fair	*P*	*H*	*H*	PH	Significant cavity in main leader terminal. Additional cavities in canopy. Significant remediation needed.
73	No Tree						
74	12" Black Cherry	Good	*P*	*L*	*L*	SI	Tree growing with significant lean and on ledge rock.
75	26" & 24" Twin Red Oak	Good	*P&C*	*A*	*A*	SI	Smaller leader growing with significant lean. Cable and pruning remediation recommended.
76	14" & 8" Twin Black Cherry	Good	*P*	*L*	*L*	SI	Growing with lean in ledge rock area.
77	12" & 12" Twin Norway Maple	Excellent	*P*	*L*	*L*	SS	Location will accommodate future growth.
78	18" & 22" 2 Leadered Sycamore	Good	*P&C*	*L*	*L*	SI	Cable needed to remediate twin leaders.
79	38" Pin Oak	Good	*P*	*H*	*H*	SS	Some reduction along with deadwood pruning needed.
80	38" White Oak	Good	*P*	*A*	*A*	SS	The White Oak and Pin Oak together created a combined whole upper canopy.
81	10" &12" Twin Black Birch	Good	*P*	*L*	*L*	SI	Some structural issues created by ledge rock and lean of main stem.
82	12" Cherry	Good	*P*	*L*	*L*	SI	Small cavity base of main stem.
83	10" White Oak	Good	*P*	*L*	*L*	SS	Tree with excellent long-term potential.
84	12" Black Cherry	Fair	*P*	*L*	*L*	SI	Leaning and unbalanced canopy.
85	14" Black Cherry	Fair	*P*	*L*	*L*	PH	Significant lean, unbalanced canopy, and root impingement.
86	12" Black Cherry	Fair	*P*	*L*	*L*	SI	Growing on ledge rock.
87	24" Red Oak	Fair	*P*	*A*	*A*	PH	Growing with a 20° lean. Growing on ledge rock area.

88	16" Black Cherry	Fair	***R***	***n/a***	***n/a***	PH	Significant lean, growing on ledge rock, main stem cavity.
89	No Tree						
90	No Tree						
91	18" & 20" Two Leadered Red Oak	Good	***P&C***	***A***	***A***	SI	Structural issues can be effectively remediated with high strength cable.
92	No Tree						
93	28" & 20" 2 Leadered Red Oak	Good	***P&C***	***A***	***A***	SI	Structural issues can be effectively remediated with high strength cable.
94	38" Oak	Poor	***R***	***n/a***	***n/a***	H	Decay in basil root flare. This large tree is a significant hazard.
95	24" Red Oak	Fair	***P***	***H***	***H***	PH	Hollow in base of tree and lean of main stem causing wood fractures. Remove or reduce.
96	10" Black Cherry	Poor	***R***	***n/a***	***n/a***	SI	Half of the tree has dieback.
97	Multi-leadered Red Maple	Good	***P***	***A***	***A***	SI	Storm damage in upper canopy.
98	20" Red Oak	Fair	***P***	***A***	***A***	SI	Root impingement from ledge rock and lean in main stem.
99	18" Red Oak	Good	***P***	***A***	***A***	SS	Significant lean in main stem.
100	10" Cherry	Fair	***P***	***L***	***L***	SS	Main leader has been reduced.
101	8" & 10" Twin Pin Oak	Good	***P***	***L***	***H***	SI	Tree is pinned against ledge rock. As it matures it may become hazardous.
102	No Tree						
103	26" Silver Maple	Good	***P***	***L***	***L***	SS	Tree appears to have found firm rooting amid large rock.
104	28" Silver Maple	Good	***P***	***A***	***A***	PH	Girdling roots may cause long term health issues.
105	24" White Oak	Good	***P***	***A***	***A***	SS	Well configured tree appears to have found anchoring in ledge rock.
106	12" Black Cherry	Fair	***P***	***L***	***L***	SI	Tree growing with significant lean in ledge rock area.
107	14" Black Cherry	Fair	***P***	***L***	***L***	SI	Dieback in canopy likely due to root restrictions.
108	12" & 14" Red Oak	Good	***P***	***H***	***H***	PH	Tree growing with lean and anchoring roots compromised by ledge rock.
109	10" Black Cherry	Fair	***P***	***L***	***L***	SI	Dieback in canopy likely die to root restrictions.
110	14" Black Cherry	Fair	***P***	***A***	***A***	SI	Tree growing with significant lean in ledge rock area.
111	No Tree						
112	34" White Oak	Good	***P***	***A***	***A***	SI	Upper canopy can be remediated with reduction pruning.

113a	14" & 12" Twin Red Oak	Fair	***P or R***	***A***	***A***	H	Large cavity in base of the tree. Stress fractures in main stem.
113b	24" Red Oak	Good	***P***	***A***	***A***	SS	Unbalanced canopy but well anchored against hillside.
114	8" White Oak	Good	***P***	***L***	***L***	SS	Young tree with healthy growth.
115	10" Black Cherry	Fair	***P***	***L***	***L***	SS	Dieback in canopy due to root restrictions in ledge rock area.
116	20" Red Oak	Good	***P***	***A***	***H***	PH	Tree growing with 6° lean in ledge rock area.
117	12" Red Oak	Poor	***R***	***n/a***	***n/a***	H	Tree growing with severe lean towards existing building.
118	8" Red Oak	Good	***P***	***L***	***L***	SS	Young tree with balanced canopy.
119	No Tree						
120	22" Red Oak	Good	***P***	***A***	***H***	SI	Some anchoring root issues due to ledge rock.
121	22" Red Oak	Fair	***P***	***A***	***A***	SS	Tree has been over pruned possibly due to proximity to service wires.
122	No Tree						
123	22" Red Oak	Fair	***P***	***A***	***A***	SS	Dieback in upper canopy.
124	12" Black Cherry	Fair	***P***	***L***	***L***	SI	Main stem cavity and dieback in upper canopy.
125	No Tree						
126	28" Pin Oak	Good	***P***	***H***	***H***	SI	Reduction pruning needed for over-weighted leaders.
127	No Tree						
128	20" Sweet Gum	Good	***P***	***A***	***A***	PH	Pruning to contain growth necessary to maintaining safety.
129	20" Sweet Gum	Fair	***P***	***A***	***A***	PH	Root girdling causing dieback in main leader.
130	28" Sycamore	Good	***P***	***A***	***A***	PH	Roots are lifting sidewalk.
131	26" Sycamore	Good	***P***	***A***	***A***	PH	Roots are lifting sidewalk.
132	30" Sycamore	Good	***P***	***A***	***A***	PH	Reduction pruning needed for overweighted leaders.
133	26" Sycamore	Good	***P***	***A***	***A***	PH	Potentially root pruning done during sidewalk repairs.
134	26" Sycamore	Excellent	***P***	***L***	***L***	SS	Deadwood pruning only.
135	24" Pin Oak	Excellent	***P***	***A***	***A***	SS	Canopy thinning needed.
136	24" Sweet Gum	Good	***P***	***A***	***A***	PH	Roots have significantly raised sidewalk.
137a	28" Sycamore	Fair	***P***	***A***	***A***	PH	Significant dieback in canopy. Roots may have been pruned during sidewalk repair.
137b	24" Sycamore	Fair	***P***	***A***	***A***	PH	Main stem cavity increases hazard potential.
138	28" Sycamore	Fair	***P***	***A***	***A***	Ph	Reduction pruning needed to compensate for main stem cavity.
139	28" Sycamore	Poor	***R***	***n/a***	***n/a***	H	Main stem cavity and fractures in wood tissue creates significant hazard.

140	14" Pignut Hickory	Good	***P***	***L***	***L***	SS	Competing Maple roots may compromise tree in the future.
141	14" Norway Maple	Good	***P***	***L***	***L***	SS	Root restrictions may cause health issues in the future.
142	14" Black Cherry	Good	***P***	***L***	***L***	SS	Tree has nice canopy configuration.
143	20" Norway Maple	Fair	***P***	***L***	***L***	PH	Line clearing has resulted in unbalanced canopy. Reduction pruning may be needed in the future.
144	26" Linden	Fair	***P***	***A***	***A***	PH	Unbalanced canopy and upper canopy cavities resulting from line clearing.
145	16 & 14" Twin Red Maple	Fair	***P&C***	***A***	***A***	PH	One sided canopy and lean on both sides creates uprooting potential.
146	28" Red Maple	Poor	***P or R***	***H***	***H***	H	Hazardous pruning cuts made in upper canopy.
147	22" Red Maple	Fair	***P***	***A***	***A***	PH	Overweighted upper canopy requires reduction pruning.
148	22" Red Maple	Fair	***P***	***A***	***A***	PH	Overweighted upper canopy requires reduction pruning.
149	No Tree						
150	18" Sweet Gum	Excellent	***P***	***L***	***L***	SS	Young tree with good canopy configuration.
151	No Tree						
152	20" Sweet Gum	Fair	***P***	***A***	***H***	PH	Main stem cavity will require continuous reduction pruning.
153	No Tree						
154	30" Pin Oak	Good	***P***	***H***	***H***	PH	Over pruning has resulted in heavy adventitious growth and upper canopy cavities.
155	30" Sycamore	Good	***P***	***A***	***A***	PH	Overweighted leaders may require reduction pruning.
156	34" Pin Oak	Fair	***P***	***H***	***H***	PH	Overweighted leaders may require reduction pruning. Has upper canopy cavities.
157	No Tree						
158	No Tree						
159	34" Sycamore	Good	***P***	***A***	***A***	PH	Overweighted leaders will require reduction pruning.
160	30" Sycamore	Fair	***P***	***A***	***A***	PH	Main stem cavity will require remediation pruning in the future.
161	30" Sycamore	Poor	***P or R***	***H***	***H***	PH	Main stem cavity sun scalding on secondary leader has compromised structural integrity of the tree.
162	22" Norway Maple	Good	***P***	***A***	***A***	PH	Potential hazard due to soft wooded tree variety.
163	32" Sweet Gum	Fair	***P***	***H***	***H***	PH	Canopy has been disfigured from line clearing pruning.
164	28" Sycamore	Fair	***P***	***A***	***A***	PH	Reduction pruning needed to balance canopy.
165	No Tree						
166	18" Linden	Fair	***P***	***H***	***H***	PH	Thinning deadwood and reduction pruning needed.

167	28" Sweet Gum	Fair	***P***	***A***	***A***	PH	Thinning deadwood and reduction pruning needed.
168	No Tree						
169	No Tree						
170	20/20/24" 3 Leadered Red Maple	Fair	***P***	***H***	***H***	PH	Over weighted upper canopy requires significant reduction pruning.
171	40" Sycamore	Fair	***P or R***	***H***	***H***	PH	Reduction pruning needed to compensate for main stem cavity.
172	30" Sycamore	Fair	***P***	***A***	***A***	PH	Some thinning and reduction pruning needed to maintain safety.
173	28" Linden	Fair	***P***	***H***	***H***	PH	Early evidence of wood decay in main stem likely due to girdling roots.
174a	22" Pin Oak	Fair	***P***	***A***	***A***	PH	Fair rating due to upper cavity storm damage.
174b	30" Pin Oak	Fair	***P***	***H***	***H***	PH	Multiple overweighted main leaders.
175	32" Sycamore	Poor	***P or R***	***H***	***H***	PH	Large main stem cavity compromises long-term well-being of tree.
176	30" Red Oak	Good	***P & C***	***A***	***A***	SI	Structural issues can be remediated with high strength cables.
177a	12&24" Red Maple	Fair	***P***	***A***	***A***	PH	Fracture in smaller leader, potential hazard to adjacent buildings.
177b	28" Sycamore	Good	***P***	***A***	***A***	PH	Root system lifting sidewalk.
178	30" Sweet Gum	Good	***P***	***A***	***A***	PH	Well configured tree however roots causing problem with sidewalk.
179	28" Sweet Gum	Good	***P***	***A***	***A***	PH	Well configured tree.
180	32" Red Maple	Fair	***P***	***A***	***A***	PH	Fair and PH rating due to need for severe reduction pruning in upper cavity.
181	12" Norway Maple	Fair	***P***	***L***	***L***	SI	Fair and SI rating due to lean and cavity in main stem.
182	20" Norway Maple	Poor	***P or R***	***H***	***H***	H	Lean of stem and significant cavity make this a hazard tree.
183	14" Norway Maple	Poor	***P or R***	***H***	***H***	PH	Tree has multiple cavities and misshapen canopy.
184	30" Red Maple	Fair	***P***	***A***	***A***	PH	Thinning reduction pruning needed in upper canopy.
185	24" Elm	Fair	***P***	***H***	***H***	PH	Some dieback in upper canopy could be due to Dutch Elm Disease
186	16" Norway Maple	Good	***P***	***A***	***H***	SI	Growing location on ledge rock, requires consistent canopy maintenance.
187	18" Red Oak	Fair	***P***	***A***	***A***	PH	Fair and PH rating due to lean in main stem and growth in ledge rock area.
188	No Tree						
189	16" Pine	Excellent	***P***	***L***	***L***	SS	Feather pruning of lateral leaders will preserve canopy.
190	16" Pine	Excellent	***P***	***L***	***L***	SS	Feather pruning of lateral leaders will preserve canopy.
191	No Tree						

192	30" Sycamore	Fair	*P*	*A*	*A*	PH	Reduction pruning needed for overweighted leaders.
193	No Tree						
194	No Tree						
195	Multi Leadered Black Cherry	Good	*P*	*L*	*L*	SS	Light pruning needed to preserve tree.
196	10&14" Black Cherry	Poor	*R*	*n/a*	*n/a*	H	Tree hazard to adjacent property.
197	22" Sycamore	Good	*P*	*L*	*L*	PH	Reduction pruning of leader over adjacent buildings recommended.
198	No Tree						
199	28" Pin Oak	Excellent	*P*	*A*	*A*	SS	Pruning recommended for safety of parking area.
200	18" Ash	Poor	*R*	*n/a*	*n/a*	PH	Tree has been killed by Emerald Ash Borer.
201	24" Mulberry	Fair	*P*	*A*	*A*	PH	Multiple cavities and lean in main stem make this tree a potential hazard.
202	26" Sycamore	Good	*P*	*L*	*L*	PH	Roots are lifting the sidewalk.
203	36" Pin Oak	Good	*P*	*A*	*H*	PH	Roots disrupting sidewalk. Reduction pruning recommended for overweighted leaders.
204	32" Sycamore	Good	*P*	*A*	*A*	PH	Tree has good structure; Roots are disrupting sidewalk.
205	24" Black Cherry	Fair	*P*	*A*	*A*	PH	Tree growing at a 12° angle creating risk of uprooting.
206	22" Sycamore	Good	*P*	*L*	*L*	PH	Tree has a sound branch structure.
207	32" Pin Oak	Good	*P*	*A*	*H*	PH	Tree has well configured canopy and will need some reduction pruning in the future.
208	No Tree						
209	18&22" Silver Maple	Fair	*P*	*A*	*A*	PH	Severe reduction pruning has disfigured canopy. Roots are disrupting entry way.
210	No Tree						
211	24" Pin Oak	Excellent	*P*	*A*	*A*	SS	Tree has a heathy branch structure however is situated very close to existing building structure.
212	No Tree						
213	No Tree						
214	No Tree						
215	34" Pin Oak	Excellent	*P*	*A*	*H*	SS	Well configured tree however proximity to building is disrupting the foundation.

216	Multi Leader Red Maple	Good	*P*	*A*	*A*	PH	Hazard rating due to soft wooded tree variety.
217	22" Sycamore	Poor	*P*	*A*	*A*	PH	Severe line clearance pruning has disfigured tree.
218	No Tree						
219	26" Sycamore	Fair	*P*	*A*	*H*	PH	Diligent pruning needed to compensate for cavities in scaffolding limbs.
220	No Tree						
221	No Tree						
222	No Tree						
223	18" Sycamore	Excellent	*P*	*L*	*L*	SS	Healthy tree with good branch structure.
224	13" White Pine	Fair	*P*	*A*	*A*	PH	Old storm damage has resulted in unbalanced canopy.
225	No Tree						
226	No Tree						
227	No Tree						
228	No Tree						
229	18" Black Cherry	Fair	*P*	*A*	*A*	SI	Woodland growth tree with unbalanced canopy.
230	24" Norway Maple	Fair	*P*	*A*	*A*	SI	Woodland growth tree with unbalanced canopy.
231	20" Norway Maple	Fair	*P*	*A*	*A*	PH	Woodland growth tree with unbalanced canopy.
232	14" Norway Maple	Fair	*P*	*L*	*A*	SI	Woodland area growth tree with overweighted upper canopy.
233	14" Norway Maple	Fair	*P*	*L*	*A*	SI	Woodland area growth tree with overweighted upper canopy.
234	No Tree						
235	12" Norway Maple	Remove	*n/a*	*n/a*	*n/a*	R	Storm damage has removed central leader of tree.
236	18" Ash	Remove	*n/a*	*n/a*	*n/a*	R	Emerald Ash Borer has killed this tree.
237	No Tree						
238	22" Norway Maple	Fair	*P*	*A*	*A*	PH	Lean and unbalanced canopy call for significant reduction pruning.
239	No Tree						
240	30" Red Oak	Fair	*P*	*H*	*H*	PH	Loss of central leader has created misshapen canopy.
241	22" Norway Maple	Fair	*P*	*H*	*H*	PH	Woodland growth has created unbalanced canopy.
242	14" Norway Maple	Poor	*P or R*	*L*	*L*	SI	Storm damaged tree with disfigured canopy.
243	18" Norway Maple	Remove	*n/a*	*n/a*	*n/a*	H	Upper canopy cavity has irrevocably compromised tree.
244	26" Sweet Gum	Good	*P*	*L*	*A*	SI	Reduction pruning may be needed in the future.
245	16" Norway Maple	Fair	*P*	*L*	*A*	SI	Reduction pruning needed to compensate for lean in main stem.
246a	No Tree						

246b	38" Sycamore	Good	***P***	***L***	***L***	SS	Well configured tree. Wire in main crotch needs to be protected.
247	28" Beech	Poor	***P***	***A***	***A***	SI	Tree has main stem cavity and Beech Bark disease.
248	34" Sycamore	Excellent	***P***	***A***	***L***	SS	Some reduction pruning of leaders over building needed.
249	38" Sycamore	Good	***P***	***L***	***L***	SS	Forms single canopy with street side Sycamore.
250	28" Red Oak	Good	***P***	***A***	***A***	SS	Structurally well configured tree. May have root issues in the future.
251	No Tree						
252	28" Horse Chestnut	Good	***P***	***A***	***A***	PH	Some dieback in upper canopy.
253	38" Red Oak	Excellent	***P***	***H***	***H***	SS	Well configured tree. Will need some reduction pruning in the future.
254	26" Red Maple	Fair	***P***	***A***	***A***	PH	Tree has lost center leader. Roots creating a tripping hazard.
255	34" Pin Oak	Excellent	***P***	***A***	***H***	SS	Healthy well configured tree.
256	No Tree						
257	No Tree						
258a	32" Sycamore	Good	***P***	***L***	***L***	SS	Well configured tree.
258b	32" Sycamore	Good	***P***	***L***	***L***	SS	Tree has been impacted with Anthracnose infections.
259	24" Sycamore	Good	***P***	***L***	***L***	SS	Well configured tree.
260	28" Sycamore	Good	***P***	***A***	***A***	SI	Overweighted leaders will need reduction pruning in the future.
261	28" Sycamore	Good	***P***	***A***	***A***	SI	Reduction pruning needed for over weighted leader overhanging Clove Road.
262	28" Sycamore	Good	***P***	***A***	***A***	PH	Reduction pruning needed for over weighted leaders.
263	18" Norway Maple	Poor	***P or R***	***L***	***L***	SI	Significant storm damage has disfigured this tree.

Note: Two Leadered Red Maple located behind building 70-80 (not indicated on map) adding to your assessment because the severe lean in the main stems ae a hazard to the current loc