Stormwater Management Report

Main Street Mixed-Use Development

2283-2389 Main Street, Glastonbury, CT

Prepared For:

Town of Glastonbury
2155 Main Street
Glastonbury, CT 06033

Prepared By:

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TABLE OF CONTENTS

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Main Street Mixed-Use Development

(Schematic Street View Rendering – By Others)

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1 INTRODUCTION

1.1 General Information

The property is situated at 2283-2389 Main Street in downtown Glastonbury, Connecticut (Town Center Zone). It consists of several properties, approximately 4.90 acres of proposed development, and is currently occupied by a mixture of commercial businesses including Brides to Be, Liquid Nirvana, Cycling Concepts, and Daybreak Coffee Roasters. The project proposes a mixed-use of commercial restaurants and residential apartment units which will be elevated on structural pylons. Paved parking will be located beneath the buildings and plaza which will be accessible via multiple elevators and stairwells. The site is bordered to the north by Welles-Turner Memorial Library, to the east by Main Street, wetlands to the west (on and past the property), and Glastonbury Riverfront Park Walk to the south.

Site Location Map

The project was designed utilizing the Town of Glastonbury Zoning Regulations, the 2002 Connecticut Department of Transportation (ConnDOT) Drainage Manual for pipe sizing, the latest Connecticut Guidelines for Soil Erosion and Sediment Control, and the latest Connecticut Department of Energy and Environmental (CT DEEP) Water Quality Manual.

1.2 Project Summary

This project proposes to:

- Selectively demolish the existing buildings and amenities located in the main lot.
- Construct a parking garage, mixed-use building(s), and additional site improvements.
- Provide adequate site drainage and water quality.
- Provide ADA accessibility and parking.
- Construct / Rehabilitate utility connections to the existing buildings and proposed building(s).
- Interconnect the existing businesses located on the subject properties.

The project will disturb approximately 4.90 acres.

1.3 Existing Site Conditions

1.3.1 Topography

Flow from the existing site, and the immediately surrounding lots, to the north and south, drain to a large, wooded wetlands system located west of the proposed development via sheet flow and multiple drainage culverts deriving from the site and Main Street. There is an existing drainage network routed around the existing Liquid Nirvana Building and outlets through a 15" RCP in the wetlands. There is another 36" storm trunkline between Cycling Concepts and Daybreak Coffee Roasters that only takes in drainage from Main Street, which also outlets in the wetlands.

1.3.2 Soils

NRCS soils mapping indicates 4 soil types located within the project limits; defined as:

- 15 – Scarboro Muck – Hydrologic Soil Group A/D
- 36B – Windsor Loamy Sand – Hydrologic Soil Group A
- 236B – Windsor-Urban Land Complex – Hydrologic Soil Group A
- 307 – Urban Land – Hydrologic Soil Group D

1.3.3 On-site and Adjacent Waterbody Information

There is a large wetlands system located on the western portion of the property, that will not be disturbed, and outlets to the Connecticut River. Approximately 50% of the subject properties are located within the wetlands. For purposes of water quality and direct impervious area calculations (DCIA), the subject parcels were only considered from the north, south, and eastern property lines up to the wetland limits. All flow from this site will be discharged to the wetlands and existing drainage patterns from Main Street, entering the wetlands, will be maintained. This portion of the Connecticut River is considered an impaired waterbody for habitat for fish and other aquatic life and wildlife. It is has

not been accessed for drinking water use, but it is classified for fish consumption and recreation. There is only one location in Glastonbury considered an Aquifer Protection Area, per Glastonbury, CT Map (December 23, 2021) and this site is not located near that area, though is upstream the Connecticut River of said area. (approximately 4 miles upstream, direct horizontal distance from site)

1.3.4 Additional Site Considerations

- The site is currently serviced by gravity sewer connections and domestic water service.
- A majority of existing soils have limiting exfiltration characteristics due to being designated as Urban Land per NRCS, a large portion of the site is classified as Scarboro Muck, but is described as Hydrologic Soil Group A/D, with underlying soils being comprised of sandy and gravelly loam.
- The site is not located within a Natural Diversity Database Area, per Glastonbury, CT Map, (June 2024)

2 HYDROLOGY

2.1 Methodology

The analysis to determine peak flows generated from the site was prepared using TR-55 procedures for calculating peak rates of runoff resulting from precipitation events and procedures for developing runoff hydrographs. HydroCAD software was utilized to perform hydrologic computations. Rainfall Frequency Estimates for precipitation frequency, based on National Oceanic and Atmospheric Administration (NOAA) data from 2300+/- Main Street, Glastonbury, CT, were utilized to generate the flows. The following 24-hour, precipitation estimates were utilized:

2-Year	3.10 inches
10-Year	4.88 inches
25-Year	5.99 inches
100-Year	7.70 inches

Design Storm Type: NOAA, 24-hour Type D

Project Type: Demolition, Rehabilitation, and New Construction

2.2 Existing Conditions

2.2.1 Watershed Boundaries and Design Points.

Drainage from the existing site is contained within two (2) watersheds for analysis:

- **Watershed E1 (Flow to Wetlands):** This watershed consists of the majority of the subject property. All flow under existing conditions consists of untreated sheet flow directly into the wetlands or untreated pipe flow from the one (1) existing drainage system on site. This large wetlands system eventually discharges into the Connecticut River. The cover characteristics of the watershed consist of mostly dilapidated concrete, gravel, smaller grass areas, and roofs. There are some portions of wooded areas on site which are located between the impervious surfaces and the wetlands, and there are very minimal landscape features and plantings currently present on site. The soil characteristics of the site consist of Urban Land (HSG D), Scarboro Muck (HSG A/D), and Windsor-Urban Land Complex (HSG A) which makes up a very small percentage of this watershed.

- **Watershed E1A (Flow to Wetlands from Off-Site Improvements):** This watershed consists of the location of off-site improvements that has been included in the scope of this project and also discharges to the wetlands located east of the site. It's cover characteristics include various conditions of existing bituminous pavement, grassed areas, some landscaping, and wooded areas abutting the trail head near the wetlands. The soil characteristics of this watershed consists of mostly Windsor-Urban Land Complex (HSG A) and some small portion of Urban Land (HSG D) and Scarboro Much (HSG (A/D).

  Existing Watershed Data (Existing Cover Characteristics, Existing Watershed Area Map, and Hydrologic Computations) have been included in Appendix A.

2.3 Proposed Conditions

2.3.1 Watershed Boundaries and Design Points

This project proposes to provide water quality in the form of water quality. The large bioretention area (Bioretention Area 1) located on the western portion of the site has adequate storage volume to treat all stormwater on site based on the town of Glastonbury 50% reduction in credit for an existing site containing 40% or more DCIA. Peak flow reduction is met using the individual bioretention area and the proposed dry-wells have not been accounted for peak flow reduction.

Drainage from the proposed site is contained within six (6) watersheds for analysis:

- **Watershed P1-1 (Flow to Bioretention Area 1):** This watershed consists of all flow being discharged into Bioretention Area 1, either by sheet flow through the proposed leak-offs or through pipe flow being collected from the plaza area and in the parking garage. The cover characteristics are a combination of paved driving surfaces, impervious walkways and plaza areas, grassed and landscaped areas, and the large mixed-use building(s). The discharge from the bioretention area will consist of exfiltration and two broad-crested riprap weirs before discharging into the wetlands. All soils in this watershed consists of HSG A/D and D. This bioretention area will provide sufficient water quality volume before being discharged to the wetlands and will be pretreated with 4ft deep sump catch basin before being discharged to the bioretention area.

- **Watershed P1-2 and P1-3 (Flow to Wetlands):** This watershed consists of all flow being discharged into the wetlands through a concentrated pipe flow and curbed leak-offs. The cover characteristics consist of paved driving surfaces, impervious walkways, grassed and landscaped areas, as well as building coverage (Daybreak Coffee and Main Street Office Center, LLC). The system will be treated by a shallow drywell and deep sump catch basins (4ft) and the leak-offs will be treated via a modified riprap stone filter strip followed by a landscaped vegetated buffer strip. All soils in this watershed consists of HSG A/D and D.

- **Watershed P1-4 (Flow to Wetlands):** This watershed consists of sheet flow through curb cut leak-offs that will be treated via a modified riprap stone filter strip before discharging into the wetlands. It's cover characteristics consists of paved driving surfaces, grassed, and landscaped areas. It's soil characteristics consists of all HSG A/D and D.

- **Watershed P1-5 (Direct Flow to Wetlands):** This watershed consists of the small strip located between the wetlands and Bioretention Area 1. It consists of all wooded areas directly sheet flowing into the wetlands and will be mostly undisturbed throughout construction only including minimal grading, the entire watershed is comprised of Scarboro Muck, HDG A/D.

- **Watershed P1-6 (Offsite Improvements Flow to Wetlands):** This watershed consists of a small portion located outside of the main development (parking garage, building(s), and plaza area). The proposed work in this area will include a rehabilitated parking area for the trail-head and driveway access to the back (west) of the site. All flow from impervious driving surfaces within this watershed will be treated via two drywells before discharging into the wetlands. These drywells were not accounted for in peak-flow reduction. It's soil characteristics consist mostly of HSG A with small portions of A/D and D soils.

Proposed Watershed Data (Proposed Cover Characteristics, Proposed Watershed Area Map, and Hydrologic Computations) have been included in Appendix B.

2.4 Compliance with Performance Criteria

2.4.1 Compliance with Local Criteria

This project has been designed per the Town of Glastonbury's Stormwater Management Regulations. Furthermore, water quality measures have been provided for the proposed development, where no such measures are in place today.

2.4.2 Compliance with Connecticut Stormwater Quality Manual

2.4.2.1 Standard 1 – Runoff Volume Reduction

The method of analysis for this stormwater management system is providing site specific peak runoff volume reduction for the 2, 10, 25, or 100-year Type NOAA, 24-hr Type D storm.

Low impact development practices have been implemented throughout this stormwater management design utilizing a series of treatment practices to remove temporarily suspended solids from the discharge location. Under existing conditions there are no structural stormwater appurtenances, this includes anything regarding the treatment of site discharge. The proposed site will greatly reduce or remove the possibility of any watercourse impairment being generated by this property. LID practices that are being used on this site to improve the quality of discharged stormwater include:

- Catch Basin Sumps and Deep Sumps – These structures are located upstream of the water quality treatment basin and drywells and will act as pre-treatment, removing larger debris and floatable prior to entering the separator. This will allow reduced maintenance of the treatment basin and reduced routine maintenance of the storm drainage system.
- Water Quality Volume Storage and Infiltration – Since this site is currently over 40% directly connected impervious, we are storing over 50% of the total required volume in Bioretention Area 1. (Per 'Notice to Engineer Regarding Water Quality Volume and MS4 Permit Tracking Requirements' – Town of Glastonbury) This storage volume will allow for temporary suspended solids and pollutants to be filtered out of the stormwater before being discharged to the wetlands.

Peak Flow Comparison

Peak flows at the off-site analysis point are as follows:

Watershed	Storm Event (NOAA Type D)	Discharge Existing (cfs)	Discharge Proposed (cfs)	Δ (%)
Total Site	2-year	10.32	3.11	69.86%
	10-year	18.38	17.36	5.55%
	25-year	23.44	23.16	1.19%
	100-year	31.24	31.24	0.00%

As shown, total site peak flows will be reduced or maintained under proposed conditions for all design storms.

2.4.2.2 Standard 2 – Stormwater Runoff Quantity Control

See Peak Flow Comparison above.

3 HYDRAULICS

The intent of the hydraulic analysis is to ensure that proposed on-site drainage facilities are designed to accommodate and safely convey runoff produced up to and including the 10-year storm event.

3.1 Compliance with Performance Criteria

The site has been designed with a series of structural drainage facilities, including ten (10) catch basins, two (2) concrete area drains, three (3) drywells, four (4) flared ends with outlet protection, and two (2) broad-crested riprap weirs. This drainage system has been designed to remove stormwater from all driving surfaces and divert it through the water quality basins, drywells, and stone / vegetated filter strips. The drainage system has been designed to safely convey flows up to and including the 10-year design storm event. The proposed pipes are designed with sufficient capacity to maintain the hydraulic grade line below proposed grade during a 10-year storm.

3.1.1 Compliance with Local Criteria

The proposed storm sewer system has been designed in compliance with Town of Glastonbury Drainage Regulations.

3.1.2 Compliance with State Criteria

The proposed storm sewer system has been designed in compliance with the State of Connecticut's Drainage Regulations per the 2002 ConnDOT Drainage Manual. (latest revisions)

Computations for the hydraulic analysis and outlet protection can be viewed in Appendix C.

4 WATER QUALITY

4.1 Methodology

The project has been designed to address both short-term and long-term stormwater quality. Short term (during construction) water quality has been provided in the form of erosion control measures and long-term (post construction) water quality has been provided through the use of primary and secondary treatment practices. Erosion control has been designed per the latest Connecticut Erosion Control Guidelines and long-term stormwater quality has been designed per the latest CT DEEP Stormwater Quality Manual.

4.2 Compliance with Performance Criteria

4.2.1 Compliance with Local Criteria

We have provided water quality for the entire proposed drainage network in the form of water quality volume, provided by Bioretention Area 1. Additional water quality for areas not discharging into the bioretention area will be treated with a combination of drywells, stone filter strips, and vegetated filter strips.

4.2.2 Compliance with Connecticut Stormwater Quality Manual

4.2.2.1 Standard 1 – Pollutant Reduction

Long Term Stormwater Quality

The project was designed with guidance from the latest Connecticut Stormwater Quality Manual. The intent of the design is to provide a "stormwater treatment train," where stormwater quality is achieved through a series of treatment measures. Harmful pollutants, such as sediment, pathogens, organic material, hydrocarbons, metals, synthetic organic chemicals, and/or deicing compounds are typically carried by the low-flow storms. Many of these pollutants are associated with vehicular operation and therefore key areas of on-site treatment include parking lots and access drives. Additionally, rooftops are a concern as a result of atmospheric ambient accumulation. Since pollutants typically attach themselves to solid particles, treatment practices are designed to remove suspended solids.

The treatment train for this site includes:

- Source Control and Pollution Prevention
- Drive and parking lot sweeping
- Storm drainage system maintenance

Primary Treatment Practices

- Drywells: These structures are designed to provide additional water quality volume as well as treat stormwater via infiltration, absorption, filtering, and bacterial degradation.
- Deep Sump Catch Basins: These structures function as pre-treatment devices to alleviate some function of the down-stream treatment practices.
- Bioretention: This storage volume will allow for temporary suspended solids and pollutants to be filtered out of the stormwater before being discharged to the wetlands.

Computations for Water Quality can be viewed in Appendix D.

5 SOIL EROSION AND SEDIMENT CONTROL

5.1 Methodology

The proposed soil erosion and sediment controls have been designed in accordance with local regulations, the Connecticut Guidelines for Soil Erosion and Sediment Control, and the requirements of the CTDEEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, as applicable. The proposed design considers the specific site characteristics of the site and anticipated construction activities. See the plan set for location and design of proposed short term soil erosion and sediment control measures to be used throughout construction.

Short Term Erosion Control

The proposed erosion and sedimentation controls consider the specific characteristics of the site and the anticipated construction activities. They have been designed in accordance with the latest CT DEEP Guidelines for Soil Erosion and Sediment Control.

Construction Entrances

Construction entrances will be utilized to remove sediment from construction vehicle tires and prevent it from being tracked onto adjoining paved roadway areas.

Erosion Control Barriers

Prior to any construction activity, hay bales, silt fence, or combination hay bale/silt fence barriers will be placed at the downgradient limits of construction and adjacent to the wetlands. Throughout construction, additional barriers will be installed as necessary at the toe of slopes equal to or in excess of 15 feet. These barriers will be inspected once every seven calendar days and within 24 hours after every rainfall generating a discharge and replaced as necessary. Collected silt will be removed when one-half the barrier height is reached.

Temporary Seeding

Temporary Seeding will be utilized on portions where the phasing and sequencing require an initial disturbance followed by an extended period of inactivity that is greater than 30 days but less than 1 year. Temporary seeding will be conducted within 7 days after the suspension of grading work in disturbed areas where the suspension of work is expected to be more than 30 days but less than 1 year.

Soil Stabilization- Mulches

Structural (non-living) soil stabilization will be utilized to protect the soil surface on a temporary basis without the intention of promoting plant growth. When grading of the disturbed area will be suspended for a period of 30 or more consecutive days, but less than 5 months, disturbed areas will be stabilized within 7 days of the suspension of grading through the use of mulch, non-bituminous tackifiers, erosion control netting, or other approved materials appropriate for use as a temporary soil protector. For surfaces that are not to be reworked within 5 months but will be reworked within 1 year, use temporary seeding, seeding-type mulch (hay, straw, or cellulose fiber) or when slopes are less than 3:1, wood chips, bark chips or shredded bark.

Temporary Filter Inserts

Temporary Filter Inserts will be placed in each existing catch basin and yard drains prior to the start of construction, and in each new catch basin or yard drain during construction. These devices will be removed upon final site stabilization. Filter inserts will be inspected once every seven (7) calendar days and within 24 hours after every rainfall generating a discharge. Replacement of the inserts will be as often as necessary to maintain function of the drainage structure and prevent excessive ponding due to clogged fabric. Ripped or otherwise damaged inserts will be replaced immediately.

Stockpile Management

The topsoil stockpiles which will be idle for at least 30 days will be stabilized with temporary seed and mulch no later than 7 days from the last use. Small stockpiles may be covered with impervious tarps or erosion control matting in lieu of seeding and mulching.

A geotextile silt fence or hay bale barrier will be installed around the stockpile area approximately 10 feet from the proposed toe of the slope.

6 OPERATION AND MAINTENANCE

6.1 Inspection Frequency and Criteria

Maintenance and operation will be provided as follows.

During Construction

- **Dust Control:** Moisten disturbed soil areas with water periodically, or use a non-asphaltic soil tacifier to minimize dust.
- **Temporary Soil Protection:** Inspect seeded areas weekly and within 24 hours after a storm generating a discharge.
- **Catch Basin Filter Inserts:** Inspect the fabric at least once a week and within 24 hours after the end of a storm generating a discharge. Check the fabric for structural soundness (i.e. tears), proper anchoring/alignment within the grate and ability to drain runoff (i.e. percent of clogging by sediment). Remove the sediment every week, or sooner if ponding is excessive. Each time the sediment is removed, replace the section of fabric removed with a new section. Do not remove the sediment and reuse the same section of fabric.
- **Hay Bale/ Silt Fence Barrier:** Inspect the barrier at least once a week and within 24 hours after the end of a storm generating a discharge. For dewatering operations, inspect frequently before, during and after pumping operations. Remove the sediment deposits when the depth reaches one half the barrier's height. Repair or replace a barrier within 24 hours of observed failure. Maintain the barrier until the contributing disturbed area is stabilized.
- **Construction Entrance/Exit Pad:** Maintain the pad in a condition that will prevent tracking and washing of sediment onto paved surfaces. Place additional clean gravel on top of gravel that has become silted, or remove the silted gravel and replace the gravel to the depth removed with clean gravel, as conditions warrant. Remove immediately all sediment spilled, dropped, washed or tracked onto paved surfaces. Roads adjacent to the construction site shall be cleaned at the end of each day by hand sweeping or sweeper truck.
- **Existing Catch Basins and Sumps:** Inspect the filter baskets as specified above. After final removal of the filter baskets at the end of construction, clean the sump of all silt and debris.
- **New Catch Basins and Sumps:** As new catch basins are constructed, a sediment trap shall be installed in the unit and a sediment barrier installed around the grate. Inspect the

trap and barrier weekly and within 24 hours after a storm generating a discharge. After stabilization of the drainage area entering the catch basin, remove the trap and barrier and clean the basin sump of all silt and debris.

- **Temporary Stockpiles:** Inspect temporary stockpiles at the end of each workday to ensure that tarps are in place and secured. Temporary stockpiles that are expected to be inactive for more than 30 days should be temporarily seeded (see above).
- **Temporary Sediment Traps:** Inspect monthly and within 24 hours after a storm generating a discharge. Sediment and oil shall be removed when the storage volume is reduced by one half, or at least every 6 months during construction.

After Construction

- **Parking Lot and Site Cleanup:** Inspect on a regular basis not to exceed weekly for litter and debris.
- **Parking Lot and Driveway Sweeping:** At least twice a year, with the first occurring as soon as possible after snowmelt and the second not less than 90 days following the first.
- **Catch Basins, Sumps and Drywells:** Maintenance includes removal of trash from the grate and the sump, as well as sediment from the sump. They shall be inspected semi-annually and cleaned when the sump is one half full of sediment. One of the inspections shall be after the snow and ice removal season is over, and prior to the spring rainfall events. If the sumps is filled more than half-filled with sediment at the semi-annual inspections, they shall be inspected quarterly.
- **Landscaped Areas:** Inspect semi-annually for erosion or dying vegetation. Repair and stabilize any bare or eroded areas and replace vegetation as soon as possible.
- **Bioretention Area and Riprap Weirs:** Inspect several times during the first few months to ensure that seed mix / grass cover is established. Inspection semi-annually and after major rain events for the first year. Inspect annually after the first year. Trash should be removed as accumulated. Sediment build-up should be removed when it is dry and at a depth of four inches. Grass should be reseeded if the side or bottom slopes exhibit erosion. Grass should be mowed once per month and should be cut to leave at least two inches of height. The seed mix should be mowed 2-3 times per year. Mowing should not occur when the ground is soft, to avoid ruts.

APPENDIX A

Existing Watershed Data

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HB NITKIN

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MAIN STREET COMMERCIAL REDEVELOPMENT

GLASTONBURY, CT

2283-2389 MAIN STREET

DATE:	REVISION:

STATE OF CONNECTICUT
WILLIAM G. WALTER
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO.: 70607.00
SCALE: AS NOTED
DATE: 07/26/2024

DRAWN BY: GSL
CHECKED BY: WGW

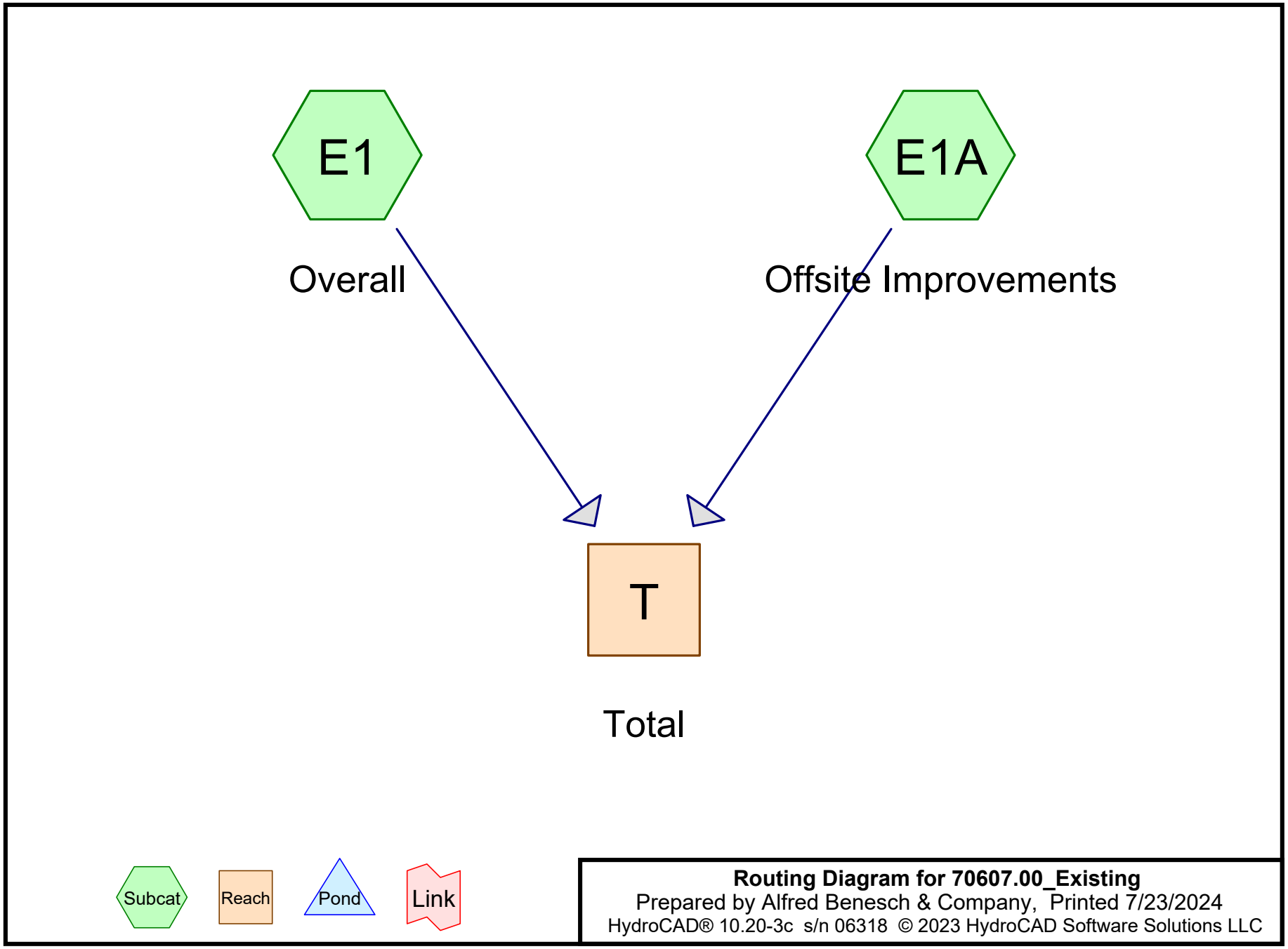
EXISTING WATERSHED AREA MAP

DRAWING NO.:

EWAM

Proposed Watershed Cover Characteristics
HB Nitkin Mix-Use Development - Glastonbury, CT
Project # 70607.00

Watershed	Watershed Description	Grass A	Grass D	Woods A	Woods D	Gravel A	Gravel D	Impervious	Total Area (ac)	CN	Tc (min)
E1	Overall	0.11	0.43	0.15	0.01	0.17	0.13	3.27	4.27	91	7.8
E1A	Southern Area	0.15	0.03	0.13	0.01	0.04	-	0.27	0.62	67	6.9
Total / Weighted =									4.90	88	



Routing Diagram for 70607.00_Existing
Prepared by Alfred Benesch & Company, Printed 7/23/2024

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.260	0.000	0.000	0.460	0.000	0.720	>75% Grass cover, Good	E1, E1A
0.210	0.000	0.000	0.130	0.000	0.340	Gravel roads	E1, E1A
0.000	0.000	0.000	3.540	0.000	3.540	Paved parking	E1, E1A
0.280	0.000	0.000	0.020	0.000	0.300	Woods, Good	E1, E1A
0.750	**0.000**	**0.000**	**4.150**	**0.000**	**4.900**	**TOTAL AREA**	

Summary for Subcatchment E1: Overall

Runoff = 9.90 cfs @ 12.15 hrs, Volume= 0.770 af, Depth= 2.16"
Routed to Reach T : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.10"

Area (ac)	CN	Description
3.270	98	Paved parking, HSG D
0.430	80	>75% Grass cover, Good, HSG D
0.110	39	>75% Grass cover, Good, HSG A
0.150	30	Woods, Good, HSG A
0.010	77	Woods, Good, HSG D
0.170	76	Gravel roads, HSG A
0.130	91	Gravel roads, HSG D
4.270	91	Weighted Average
1.000		23.42% Pervious Area
3.270		76.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0500	0.24		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.10"
0.9	184	0.0489	3.56		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
7.8	284	Total			

Summary for Subcatchment E1A: Offsite Improvements

Runoff = 0.39 cfs @ 12.15 hrs, Volume= 0.033 af, Depth= 0.64"
Routed to Reach T : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.150	39	>75% Grass cover, Good, HSG A
0.030	80	>75% Grass cover, Good, HSG D
0.130	30	Woods, Good, HSG A
0.010	77	Woods, Good, HSG D
0.040	76	Gravel roads, HSG A
0.270	98	Paved parking, HSG D
0.630	67	Weighted Average
0.360		57.14% Pervious Area
0.270		42.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	90	0.0560	0.25		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.10"
0.3	48	0.0210	2.94		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.5	105	0.0570	3.84		**Shallow Concentrated Flow, CD** Unpaved Kv= 16.1 fps
6.9	243	Total			

Summary for Reach T: Total

Inflow Area = 4.900 ac, 72.24% Impervious, Inflow Depth = 1.97" for 2-Year event
Inflow = 10.30 cfs @ 12.15 hrs, Volume= 0.804 af
Outflow = 10.30 cfs @ 12.15 hrs, Volume= 0.804 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Subcatchment E1: Overall

Runoff = 17.12 cfs @ 12.15 hrs, Volume= 1.376 af, Depth= 3.87"
Routed to Reach T : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=4.88"

Area (ac)	CN	Description
3.270	98	Paved parking, HSG D
0.430	80	>75% Grass cover, Good, HSG D
0.110	39	>75% Grass cover, Good, HSG A
0.150	30	Woods, Good, HSG A
0.010	77	Woods, Good, HSG D
0.170	76	Gravel roads, HSG A
0.130	91	Gravel roads, HSG D
4.270	91	Weighted Average
1.000		23.42% Pervious Area
3.270		76.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0500	0.24		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.10"
0.9	184	0.0489	3.56		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
7.8	284	Total			

Summary for Subcatchment E1A: Offsite Improvements

Runoff = 1.21 cfs @ 12.14 hrs, Volume= 0.090 af, Depth= 1.72"
Routed to Reach T : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=4.88"

Area (ac)	CN	Description
0.150	39	>75% Grass cover, Good, HSG A
0.030	80	>75% Grass cover, Good, HSG D
0.130	30	Woods, Good, HSG A
0.010	77	Woods, Good, HSG D
0.040	76	Gravel roads, HSG A
0.270	98	Paved parking, HSG D
0.630	67	Weighted Average
0.360		57.14% Pervious Area
0.270		42.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	90	0.0560	0.25		**Sheet Flow, AB**
					Grass: Short n= 0.150 P2= 3.10"
0.3	48	0.0210	2.94		**Shallow Concentrated Flow, BC**
					Paved Kv= 20.3 fps
0.5	105	0.0570	3.84		**Shallow Concentrated Flow, CD**
					Unpaved Kv= 16.1 fps
6.9	243	Total			

Summary for Reach T: Total

Inflow Area = 4.900 ac, 72.24% Impervious, Inflow Depth = 3.59" for 10-Year event
Inflow = 18.34 cfs @ 12.15 hrs, Volume= 1.466 af
Outflow = 18.34 cfs @ 12.15 hrs, Volume= 1.466 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Subcatchment E1: Overall

Runoff = 21.58 cfs @ 12.15 hrs, Volume= 1.760 af, Depth= 4.95"
Routed to Reach T : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=5.99"

Area (ac)	CN	Description
3.270	98	Paved parking, HSG D
0.430	80	>75% Grass cover, Good, HSG D
0.110	39	>75% Grass cover, Good, HSG A
0.150	30	Woods, Good, HSG A
0.010	77	Woods, Good, HSG D
0.170	76	Gravel roads, HSG A
0.130	91	Gravel roads, HSG D
4.270	91	Weighted Average
1.000		23.42% Pervious Area
3.270		76.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0500	0.24		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.10"
0.9	184	0.0489	3.56		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
7.8	284	Total			

Summary for Subcatchment E1A: Offsite Improvements

Runoff = 1.81 cfs @ 12.14 hrs, Volume= 0.132 af, Depth= 2.52"
Routed to Reach T : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=5.99"

Area (ac)	CN	Description
0.150	39	>75% Grass cover, Good, HSG A
0.030	80	>75% Grass cover, Good, HSG D
0.130	30	Woods, Good, HSG A
0.010	77	Woods, Good, HSG D
0.040	76	Gravel roads, HSG A
0.270	98	Paved parking, HSG D
0.630	67	Weighted Average
0.360		57.14% Pervious Area
0.270		42.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	90	0.0560	0.25		**Sheet Flow, AB**
					Grass: Short n= 0.150 P2= 3.10"
0.3	48	0.0210	2.94		**Shallow Concentrated Flow, BC**
					Paved Kv= 20.3 fps
0.5	105	0.0570	3.84		**Shallow Concentrated Flow, CD**
					Unpaved Kv= 16.1 fps
6.9	243	Total			

Summary for Reach T: Total

Inflow Area = 4.900 ac, 72.24% Impervious, Inflow Depth = 4.64" for 25-Year event
Inflow = 23.39 cfs @ 12.15 hrs, Volume= 1.893 af
Outflow = 23.39 cfs @ 12.15 hrs, Volume= 1.893 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Subcatchment E1: Overall

Runoff = 28.39 cfs @ 12.15 hrs, Volume= 2.359 af, Depth= 6.63"
Routed to Reach T : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=7.70"

Area (ac)	CN	Description
3.270	98	Paved parking, HSG D
0.430	80	>75% Grass cover, Good, HSG D
0.110	39	>75% Grass cover, Good, HSG A
0.150	30	Woods, Good, HSG A
0.010	77	Woods, Good, HSG D
0.170	76	Gravel roads, HSG A
0.130	91	Gravel roads, HSG D
4.270	91	Weighted Average
1.000		23.42% Pervious Area
3.270		76.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0500	0.24		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.10"
0.9	184	0.0489	3.56		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
7.8	284	Total			

Summary for Subcatchment E1A: Offsite Improvements

Runoff = 2.78 cfs @ 12.14 hrs, Volume= 0.203 af, Depth= 3.87"
Routed to Reach T : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=7.70"

Area (ac)	CN	Description
0.150	39	>75% Grass cover, Good, HSG A
0.030	80	>75% Grass cover, Good, HSG D
0.130	30	Woods, Good, HSG A
0.010	77	Woods, Good, HSG D
0.040	76	Gravel roads, HSG A
0.270	98	Paved parking, HSG D
0.630	67	Weighted Average
0.360		57.14% Pervious Area
0.270		42.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	90	0.0560	0.25		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.10"
0.3	48	0.0210	2.94		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.5	105	0.0570	3.84		**Shallow Concentrated Flow, CD** Unpaved Kv= 16.1 fps
6.9	243	Total			

Summary for Reach T: Total

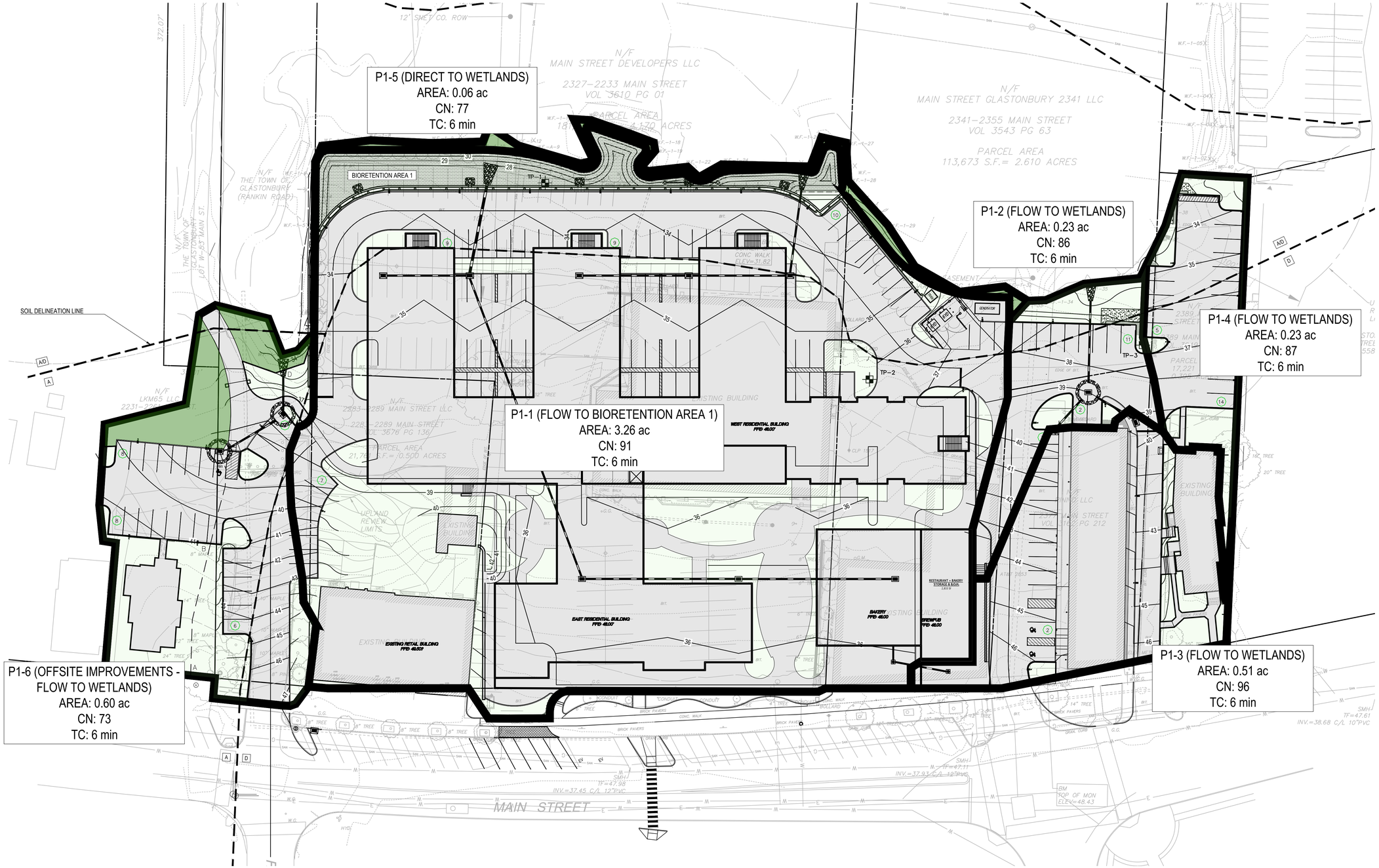
Inflow Area = 4.900 ac, 72.24% Impervious, Inflow Depth = 6.27" for 100-Year event
Inflow = 31.17 cfs @ 12.15 hrs, Volume= 2.562 af
Outflow = 31.17 cfs @ 12.15 hrs, Volume= 2.562 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

APPENDIX B

Proposed Watershed Data

benesch



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MAIN STREET COMMERCIAL REDEVELOPMENT

2283-2389 MAIN STREET
GLASTONBURY, CT

DATE:	REVISION:

STATE OF CONNECTICUT
WILLIAM G. WALTER
LICENSED
PROFESSIONAL ENGINEER

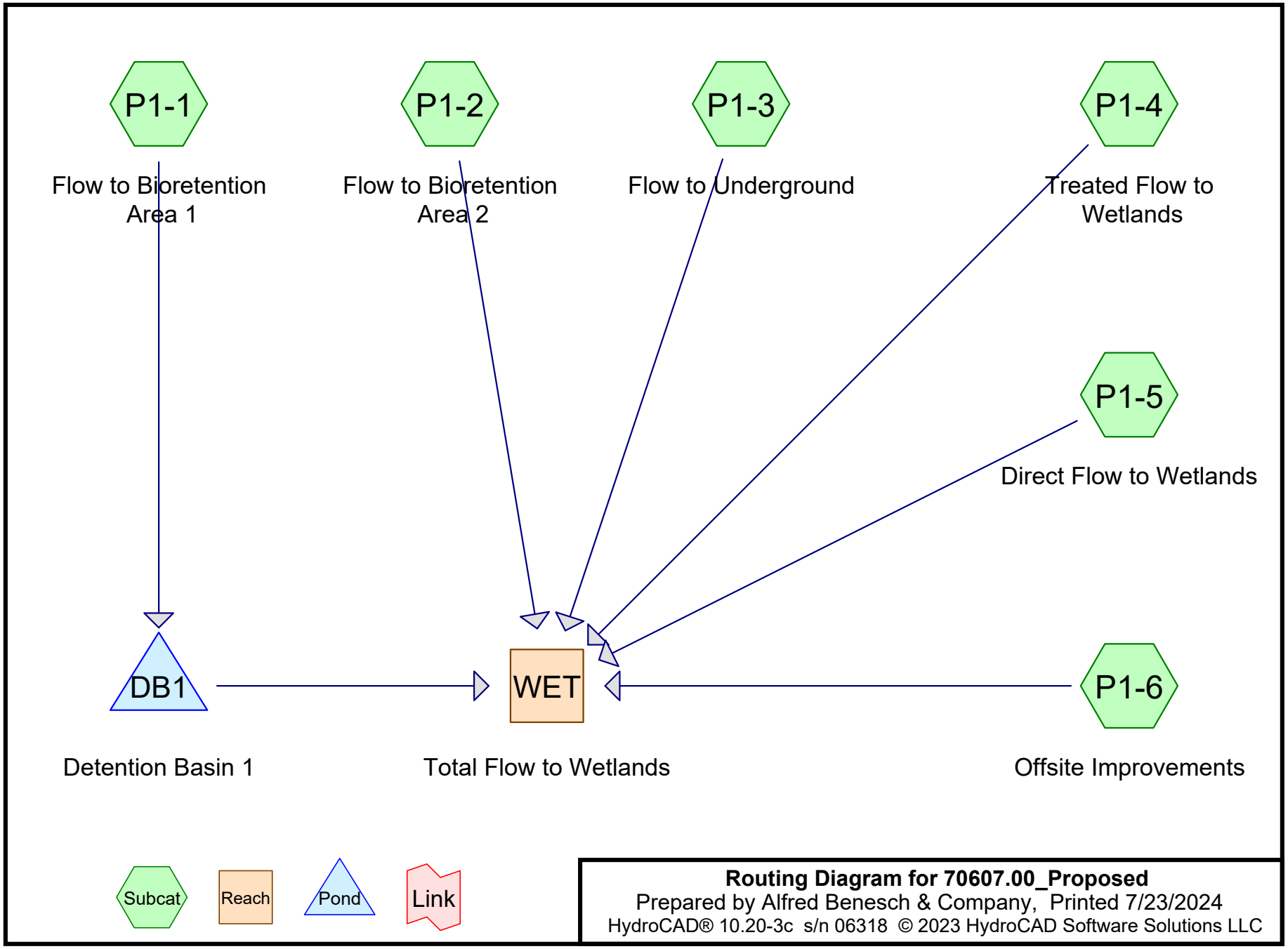
PROJECT NO.: 70607.00
SCALE: AS NOTED
DATE: 07/26/2024
DRAWN BY: GSL
CHECKED BY: WGW

PROPOSED WATERSHED AREA MAP

DRAWING NO.:
PWAM

Proposed Watershed Cover Characteristics
HB Nitkin Mix-Use Development - Glastonbury, CT
Project # 70607.00

Watershed	Watershed Description								Total Area (ac)	CN	Tc (min)
		Grass A	Grass D	Woods A	Woods D	Gravel A	Gravel D	Impervious			
P1-1	Main Lot	0.22	0.44	-	-	0.02	-	2.57	3.26	91	6.0
P1-2	Flows to Bioretention Area 2	0.04	0.02	-	-	-	-	0.17	0.23	86	6.0
P1-3	Additonal Flow to Bioretention Area 2	-	0.04	-	-	-	0.01	0.46	0.51	96	6.0
P1-4	Treated Flow to Wetlands	0.03	0.04	-	-	-	-	0.16	0.23	87	6.0
P1-5	Direct Flow to Wetlands	-	-	0.06	-	-	-	-	0.06	77	6.0
P1-6	Offsite improvements	0.15	0.03	0.08	0.01	0.01	-	0.32	0.60	73	6.0
Total / Weighted =									4.90		


P1-1
Flow to Bioretention Area 1
P1-2
Flow to Bioretention Area 2
P1-3
Flow to Underground
P1-4
Treated Flow to Wetlands
P1-5
Direct Flow to Wetlands
DB1
Detention Basin 1
WET
Total Flow to Wetlands
P1-6
Offsite Improvements
Subcat
Reach
Pond
Link
Routing Diagram for 70607.00_Proposed
Prepared by Alfred Benesch & Company, Printed 7/23/2024
HydroCAD® 10.20-3c s/n 06318 © 2023 HydroCAD Software Solutions LLC

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.440	0.000	0.000	0.570	0.000	1.010	>75% Grass cover, Good	P1-1, P1-2, P1-3, P1-4, P1-6
0.030	0.000	0.000	0.010	0.000	0.040	Gravel roads	P1-1, P1-3, P1-6
0.000	0.000	0.000	3.680	0.000	3.680	Paved parking	P1-1, P1-2, P1-3, P1-4, P1-6
0.080	0.000	0.000	0.070	0.000	0.150	Woods, Good	P1-5, P1-6
0.550	**0.000**	**0.000**	**4.330**	**0.000**	**4.880**	**TOTAL AREA**	

Summary for Subcatchment P1-1: Flow to Bioretention Area 1

Runoff = 8.04 cfs @ 12.13 hrs, Volume= 0.586 af, Depth= 2.16"
Routed to Pond DB1 : Detention Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.440	80	>75% Grass cover, Good, HSG D
2.570	98	Paved parking, HSG D
0.220	39	>75% Grass cover, Good, HSG A
0.020	76	Gravel roads, HSG A
3.250	91	Weighted Average
0.680		20.92% Pervious Area
2.570		79.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-2: Flow to Bioretention Area 2

Runoff = 0.47 cfs @ 12.13 hrs, Volume= 0.034 af, Depth= 1.75"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.020	80	>75% Grass cover, Good, HSG D
0.170	98	Paved parking, HSG D
0.040	39	>75% Grass cover, Good, HSG A
0.230	86	Weighted Average
0.060		26.09% Pervious Area
0.170		73.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-3: Flow to Underground

Runoff = 1.45 cfs @ 12.13 hrs, Volume= 0.113 af, Depth= 2.65"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.040	80	>75% Grass cover, Good, HSG D
0.460	98	Paved parking, HSG D
0.010	91	Gravel roads, HSG D
0.510	96	Weighted Average
0.050		9.80% Pervious Area
0.460		90.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-4: Treated Flow to Wetlands

Runoff = 0.49 cfs @ 12.13 hrs, Volume= 0.035 af, Depth= 1.83"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.040	80	>75% Grass cover, Good, HSG D
0.030	39	>75% Grass cover, Good, HSG A
0.160	98	Paved parking, HSG D
0.230	87	Weighted Average
0.070		30.43% Pervious Area
0.160		69.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-5: Direct Flow to Wetlands

Runoff = 0.08 cfs @ 12.14 hrs, Volume= 0.006 af, Depth= 1.14"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.060	77	Woods, Good, HSG D
0.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min**

Summary for Subcatchment P1-6: Offsite Improvements

Runoff = 0.63 cfs @ 12.14 hrs, Volume= 0.046 af, Depth= 0.92"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.150	39	>75% Grass cover, Good, HSG A
0.030	80	>75% Grass cover, Good, HSG D
0.080	30	Woods, Good, HSG A
0.010	77	Woods, Good, HSG D
0.010	76	Gravel roads, HSG A
0.320	98	Paved parking, HSG D
0.600	73	Weighted Average
0.280		46.67% Pervious Area
0.320		53.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	80	0.0625	0.25		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.10"
0.3	61	0.0328	3.68		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.2	75	0.0200	6.42	5.04	**Pipe Channel, CD** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Concrete pipe, bends & connections
0.2					**Direct Entry, TO MEET MIN**
6.0	216	Total			

Summary for Reach WET: Total Flow to Wetlands

Inflow Area = 4.880 ac, 75.41% Impervious, Inflow Depth = 0.72" for 2-Year event
Inflow = 3.11 cfs @ 12.13 hrs, Volume= 0.292 af
Outflow = 3.11 cfs @ 12.13 hrs, Volume= 0.292 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond DB1: Detention Basin 1

Inflow Area = 3.250 ac, 79.08% Impervious, Inflow Depth = 2.16" for 2-Year event
Inflow = 8.04 cfs @ 12.13 hrs, Volume= 0.586 af
Outflow = 1.50 cfs @ 12.57 hrs, Volume= 0.578 af, Atten= 81%, Lag= 26.3 min
Discarded = 0.47 cfs @ 12.57 hrs, Volume= 0.519 af
Primary = 1.02 cfs @ 12.57 hrs, Volume= 0.060 af
Routed to Reach WET : Total Flow to Wetlands

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 30.85' @ 12.57 hrs Surf.Area= 5,899 sf Storage= 11,168 cf

Plug-Flow detention time= 261.5 min calculated for 0.578 af (99% of inflow)
Center-of-Mass det. time= 253.1 min (1,063.8 - 810.7)

Volume	Invert	Avail.Storage	Storage Description
#1	28.00'	15,278 cf	**Open Storage (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
28.00	2,276	0	0
29.00	3,270	2,773	2,773
30.00	4,609	3,940	6,713
31.00	6,130	5,370	12,082
31.50	6,655	3,196	15,278

Device	Routing	Invert	Outlet Devices
#1	Primary	30.75'	**13.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	31.00'	**10.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#3	Discarded	28.00'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 25.75'

Discarded OutFlow Max=0.47 cfs @ 12.57 hrs HW=30.85' (Free Discharge)
└**3=Exfiltration** (Controls 0.47 cfs)

Primary OutFlow Max=1.01 cfs @ 12.57 hrs HW=30.85' (Free Discharge)
├**1=Broad-Crested Rectangular Weir**(Weir Controls 1.01 cfs @ 0.79 fps)
└**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Subcatchment P1-1: Flow to Bioretention Area 1

Runoff = 13.88 cfs @ 12.13 hrs, Volume= 1.047 af, Depth= 3.87"
Routed to Pond DB1 : Detention Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=4.88"

Area (ac)	CN	Description
0.440	80	>75% Grass cover, Good, HSG D
2.570	98	Paved parking, HSG D
0.220	39	>75% Grass cover, Good, HSG A
0.020	76	Gravel roads, HSG A
3.250	91	Weighted Average
0.680		20.92% Pervious Area
2.570		79.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-2: Flow to Bioretention Area 2

Runoff = 0.88 cfs @ 12.13 hrs, Volume= 0.064 af, Depth= 3.36"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=4.88"

Area (ac)	CN	Description
0.020	80	>75% Grass cover, Good, HSG D
0.170	98	Paved parking, HSG D
0.040	39	>75% Grass cover, Good, HSG A
0.230	86	Weighted Average
0.060		26.09% Pervious Area
0.170		73.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-3: Flow to Underground

Runoff = 2.34 cfs @ 12.13 hrs, Volume= 0.188 af, Depth= 4.41"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=4.88"

Area (ac)	CN	Description
0.040	80	>75% Grass cover, Good, HSG D
0.460	98	Paved parking, HSG D
0.010	91	Gravel roads, HSG D
0.510	96	Weighted Average
0.050		9.80% Pervious Area
0.460		90.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-4: Treated Flow to Wetlands

Runoff = 0.91 cfs @ 12.13 hrs, Volume= 0.066 af, Depth= 3.45"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=4.88"

Area (ac)	CN	Description
0.040	80	>75% Grass cover, Good, HSG D
0.030	39	>75% Grass cover, Good, HSG A
0.160	98	Paved parking, HSG D
0.230	87	Weighted Average
0.070		30.43% Pervious Area
0.160		69.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-5: Direct Flow to Wetlands

Runoff = 0.18 cfs @ 12.13 hrs, Volume= 0.013 af, Depth= 2.52"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=4.88"

Area (ac)	CN	Description
0.060	77	Woods, Good, HSG D
0.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min**

Summary for Subcatchment P1-6: Offsite Improvements

Runoff = 1.55 cfs @ 12.13 hrs, Volume= 0.109 af, Depth= 2.19"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=4.88"

Area (ac)	CN	Description
0.150	39	>75% Grass cover, Good, HSG A
0.030	80	>75% Grass cover, Good, HSG D
0.080	30	Woods, Good, HSG A
0.010	77	Woods, Good, HSG D
0.010	76	Gravel roads, HSG A
0.320	98	Paved parking, HSG D
0.600	73	Weighted Average
0.280		46.67% Pervious Area
0.320		53.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	80	0.0625	0.25		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.10"
0.3	61	0.0328	3.68		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.2	75	0.0200	6.42	5.04	**Pipe Channel, CD** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Concrete pipe, bends & connections
0.2					**Direct Entry, TO MEET MIN**
6.0	216	Total			

Summary for Reach WET: Total Flow to Wetlands

Inflow Area = 4.880 ac, 75.41% Impervious, Inflow Depth = 2.04" for 10-Year event
Inflow = 17.36 cfs @ 12.15 hrs, Volume= 0.829 af
Outflow = 17.36 cfs @ 12.15 hrs, Volume= 0.829 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond DB1: Detention Basin 1

Inflow Area = 3.250 ac, 79.08% Impervious, Inflow Depth = 3.87" for 10-Year event
Inflow = 13.88 cfs @ 12.13 hrs, Volume= 1.047 af
Outflow = 12.42 cfs @ 12.16 hrs, Volume= 1.016 af, Atten= 11%, Lag= 1.9 min
Discarded = 0.53 cfs @ 12.16 hrs, Volume= 0.628 af
Primary = 11.90 cfs @ 12.16 hrs, Volume= 0.389 af
Routed to Reach WET : Total Flow to Wetlands

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 31.19' @ 12.16 hrs Surf.Area= 6,327 sf Storage= 13,251 cf

Plug-Flow detention time= 183.8 min calculated for 1.016 af (97% of inflow)
Center-of-Mass det. time= 166.1 min (959.0 - 792.8)

Volume	Invert	Avail.Storage	Storage Description
#1	28.00'	15,278 cf	**Open Storage (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
28.00	2,276	0	0
29.00	3,270	2,773	2,773
30.00	4,609	3,940	6,713
31.00	6,130	5,370	12,082
31.50	6,655	3,196	15,278

Device	Routing	Invert	Outlet Devices
#1	Primary	30.75'	**13.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	31.00'	**10.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#3	Discarded	28.00'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 25.75'

Discarded OutFlow Max=0.53 cfs @ 12.16 hrs HW=31.19' (Free Discharge)
└**3=Exfiltration** (Controls 0.53 cfs)

Primary OutFlow Max=11.88 cfs @ 12.16 hrs HW=31.19' (Free Discharge)
├**1=Broad-Crested Rectangular Weir**(Weir Controls 9.82 cfs @ 1.73 fps)
└**2=Broad-Crested Rectangular Weir**(Weir Controls 2.06 cfs @ 1.10 fps)

Summary for Subcatchment P1-1: Flow to Bioretention Area 1

Runoff = 17.49 cfs @ 12.13 hrs, Volume= 1.340 af, Depth= 4.95"
Routed to Pond DB1 : Detention Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=5.99"

Area (ac)	CN	Description
0.440	80	>75% Grass cover, Good, HSG D
2.570	98	Paved parking, HSG D
0.220	39	>75% Grass cover, Good, HSG A
0.020	76	Gravel roads, HSG A
3.250	91	Weighted Average
0.680		20.92% Pervious Area
2.570		79.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-2: Flow to Bioretention Area 2

Runoff = 1.14 cfs @ 12.13 hrs, Volume= 0.084 af, Depth= 4.40"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=5.99"

Area (ac)	CN	Description
0.020	80	>75% Grass cover, Good, HSG D
0.170	98	Paved parking, HSG D
0.040	39	>75% Grass cover, Good, HSG A
0.230	86	Weighted Average
0.060		26.09% Pervious Area
0.170		73.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-3: Flow to Underground

Runoff = 2.89 cfs @ 12.13 hrs, Volume= 0.234 af, Depth= 5.52"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=5.99"

Area (ac)	CN	Description
0.040	80	>75% Grass cover, Good, HSG D
0.460	98	Paved parking, HSG D
0.010	91	Gravel roads, HSG D
0.510	96	Weighted Average
0.050		9.80% Pervious Area
0.460		90.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-4: Treated Flow to Wetlands

Runoff = 1.16 cfs @ 12.13 hrs, Volume= 0.086 af, Depth= 4.51"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=5.99"

Area (ac)	CN	Description
0.040	80	>75% Grass cover, Good, HSG D
0.030	39	>75% Grass cover, Good, HSG A
0.160	98	Paved parking, HSG D
0.230	87	Weighted Average
0.070		30.43% Pervious Area
0.160		69.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-5: Direct Flow to Wetlands

Runoff = 0.24 cfs @ 12.13 hrs, Volume= 0.017 af, Depth= 3.47"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=5.99"

Area (ac)	CN	Description
0.060	77	Woods, Good, HSG D
0.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min**

Summary for Subcatchment P1-6: Offsite Improvements

Runoff = 2.18 cfs @ 12.13 hrs, Volume= 0.154 af, Depth= 3.08"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=5.99"

Area (ac)	CN	Description
0.150	39	>75% Grass cover, Good, HSG A
0.030	80	>75% Grass cover, Good, HSG D
0.080	30	Woods, Good, HSG A
0.010	77	Woods, Good, HSG D
0.010	76	Gravel roads, HSG A
0.320	98	Paved parking, HSG D
0.600	73	Weighted Average
0.280		46.67% Pervious Area
0.320		53.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	80	0.0625	0.25		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.10"
0.3	61	0.0328	3.68		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.2	75	0.0200	6.42	5.04	**Pipe Channel, CD** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Concrete pipe, bends & connections
0.2					**Direct Entry, TO MEET MIN**
6.0	216	Total			

Summary for Reach WET: Total Flow to Wetlands

Inflow Area = 4.880 ac, 75.41% Impervious, Inflow Depth = 2.93" for 25-Year event
Inflow = 23.16 cfs @ 12.14 hrs, Volume= 1.192 af
Outflow = 23.16 cfs @ 12.14 hrs, Volume= 1.192 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond DB1: Detention Basin 1

Inflow Area = 3.250 ac, 79.08% Impervious, Inflow Depth = 4.95" for 25-Year event
Inflow = 17.49 cfs @ 12.13 hrs, Volume= 1.340 af
Outflow = 16.36 cfs @ 12.15 hrs, Volume= 1.297 af, Atten= 6%, Lag= 1.4 min
Discarded = 0.54 cfs @ 12.15 hrs, Volume= 0.682 af
Primary = 15.83 cfs @ 12.15 hrs, Volume= 0.615 af
Routed to Reach WET : Total Flow to Wetlands

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 31.26' @ 12.15 hrs Surf.Area= 6,404 sf Storage= 13,719 cf

Plug-Flow detention time= 158.2 min calculated for 1.297 af (97% of inflow)
Center-of-Mass det. time= 138.8 min (924.4 - 785.5)

Volume	Invert	Avail.Storage	Storage Description
#1	28.00'	15,278 cf	**Open Storage (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
28.00	2,276	0	0
29.00	3,270	2,773	2,773
30.00	4,609	3,940	6,713
31.00	6,130	5,370	12,082
31.50	6,655	3,196	15,278

Device	Routing	Invert	Outlet Devices
#1	Primary	30.75'	**13.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	31.00'	**10.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#3	Discarded	28.00'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 25.75'

Discarded OutFlow Max=0.54 cfs @ 12.15 hrs HW=31.26' (Free Discharge)
└**3=Exfiltration** (Controls 0.54 cfs)

Primary OutFlow Max=15.79 cfs @ 12.15 hrs HW=31.26' (Free Discharge)
├**1=Broad-Crested Rectangular Weir**(Weir Controls 12.38 cfs @ 1.87 fps)
└**2=Broad-Crested Rectangular Weir**(Weir Controls 3.41 cfs @ 1.31 fps)

Summary for Subcatchment P1-1: Flow to Bioretention Area 1

Runoff = 23.00 cfs @ 12.13 hrs, Volume= 1.795 af, Depth= 6.63"
Routed to Pond DB1 : Detention Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=7.70"

Area (ac)	CN	Description
0.440	80	>75% Grass cover, Good, HSG D
2.570	98	Paved parking, HSG D
0.220	39	>75% Grass cover, Good, HSG A
0.020	76	Gravel roads, HSG A
3.250	91	Weighted Average
0.680		20.92% Pervious Area
2.570		79.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-2: Flow to Bioretention Area 2

Runoff = 1.54 cfs @ 12.13 hrs, Volume= 0.116 af, Depth= 6.04"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=7.70"

Area (ac)	CN	Description
0.020	80	>75% Grass cover, Good, HSG D
0.170	98	Paved parking, HSG D
0.040	39	>75% Grass cover, Good, HSG A
0.230	86	Weighted Average
0.060		26.09% Pervious Area
0.170		73.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-3: Flow to Underground

Runoff = 3.73 cfs @ 12.13 hrs, Volume= 0.307 af, Depth= 7.22"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=7.70"

Area (ac)	CN	Description
0.040	80	>75% Grass cover, Good, HSG D
0.460	98	Paved parking, HSG D
0.010	91	Gravel roads, HSG D
0.510	96	Weighted Average
0.050		9.80% Pervious Area
0.460		90.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-4: Treated Flow to Wetlands

Runoff = 1.56 cfs @ 12.13 hrs, Volume= 0.118 af, Depth= 6.16"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=7.70"

Area (ac)	CN	Description
0.040	80	>75% Grass cover, Good, HSG D
0.030	39	>75% Grass cover, Good, HSG A
0.160	98	Paved parking, HSG D
0.230	87	Weighted Average
0.070		30.43% Pervious Area
0.160		69.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min.**

Summary for Subcatchment P1-5: Direct Flow to Wetlands

Runoff = 0.35 cfs @ 12.13 hrs, Volume= 0.025 af, Depth= 5.00"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=7.70"

Area (ac)	CN	Description
0.060	77	Woods, Good, HSG D
0.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct to Meet Min**

Summary for Subcatchment P1-6: Offsite Improvements

Runoff = 3.19 cfs @ 12.13 hrs, Volume= 0.227 af, Depth= 4.55"
Routed to Reach WET : Total Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=7.70"

Area (ac)	CN	Description
0.150	39	>75% Grass cover, Good, HSG A
0.030	80	>75% Grass cover, Good, HSG D
0.080	30	Woods, Good, HSG A
0.010	77	Woods, Good, HSG D
0.010	76	Gravel roads, HSG A
0.320	98	Paved parking, HSG D
0.600	73	Weighted Average
0.280		46.67% Pervious Area
0.320		53.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	80	0.0625	0.25		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.10"
0.3	61	0.0328	3.68		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
0.2	75	0.0200	6.42	5.04	**Pipe Channel, CD** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Concrete pipe, bends & connections
0.2					**Direct Entry, TO MEET MIN**
6.0	216	Total			

Summary for Reach WET: Total Flow to Wetlands

Inflow Area = 4.880 ac, 75.41% Impervious, Inflow Depth = 4.37" for 100-Year event
Inflow = 31.24 cfs @ 12.14 hrs, Volume= 1.778 af
Outflow = 31.24 cfs @ 12.14 hrs, Volume= 1.778 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond DB1: Detention Basin 1

Inflow Area = 3.250 ac, 79.08% Impervious, Inflow Depth = 6.63" for 100-Year event
Inflow = 23.00 cfs @ 12.13 hrs, Volume= 1.795 af
Outflow = 21.74 cfs @ 12.15 hrs, Volume= 1.737 af, Atten= 5%, Lag= 1.3 min
Discarded = 0.55 cfs @ 12.15 hrs, Volume= 0.752 af
Primary = 21.19 cfs @ 12.15 hrs, Volume= 0.985 af
Routed to Reach WET : Total Flow to Wetlands

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 31.35' @ 12.15 hrs Surf.Area= 6,498 sf Storage= 14,297 cf

Plug-Flow detention time= 132.4 min calculated for 1.737 af (97% of inflow)
Center-of-Mass det. time= 112.4 min (889.7 - 777.3)

Volume	Invert	Avail.Storage	Storage Description
#1	28.00'	15,278 cf	**Open Storage (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
28.00	2,276	0	0
29.00	3,270	2,773	2,773
30.00	4,609	3,940	6,713
31.00	6,130	5,370	12,082
31.50	6,655	3,196	15,278

Device	Routing	Invert	Outlet Devices
#1	Primary	30.75'	**13.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	31.00'	**10.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#3	Discarded	28.00'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 25.75'

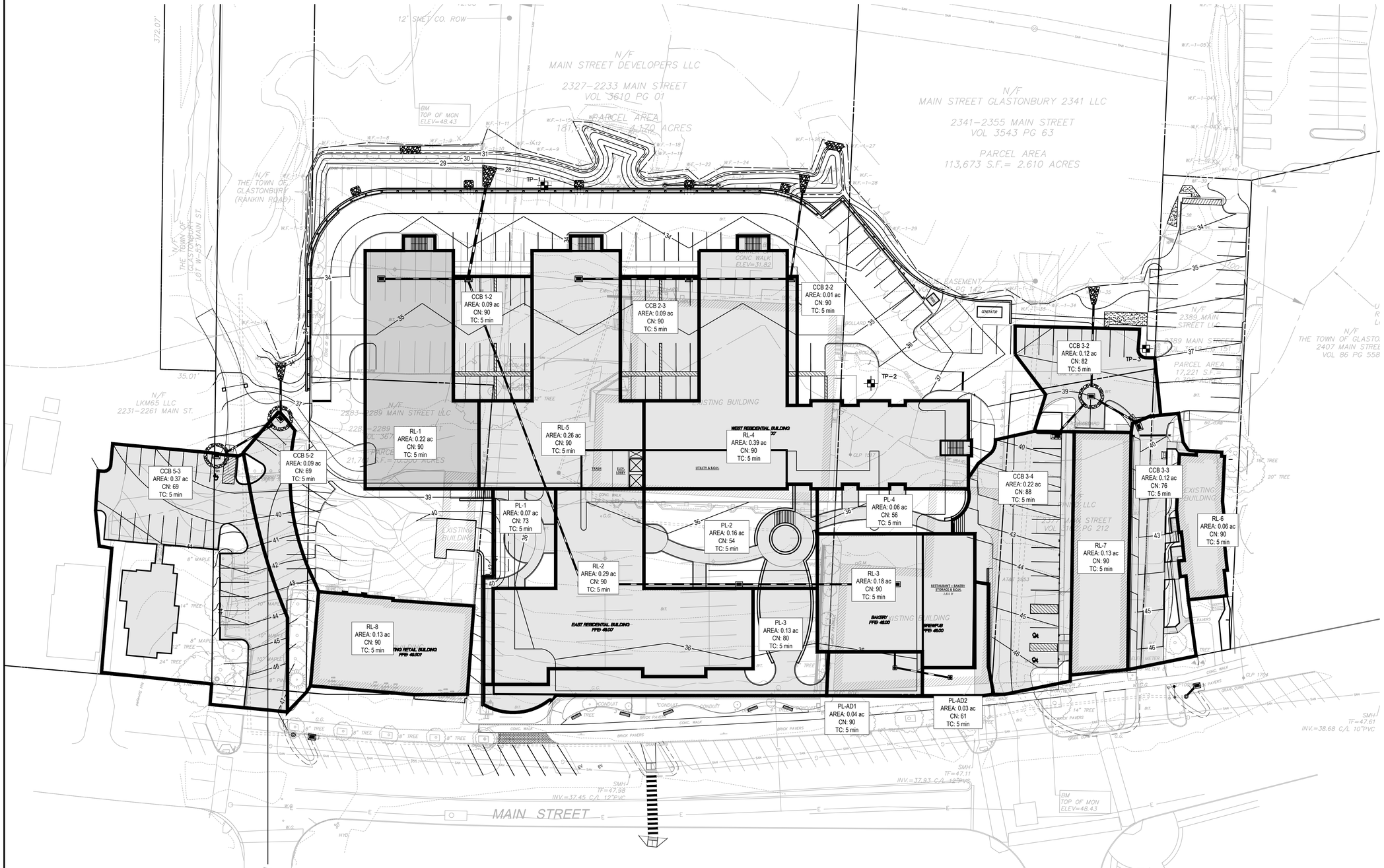
Discarded OutFlow Max=0.55 cfs @ 12.15 hrs HW=31.35' (Free Discharge)
└**3=Exfiltration** (Controls 0.55 cfs)

Primary OutFlow Max=21.16 cfs @ 12.15 hrs HW=31.35' (Free Discharge)
├**1=Broad-Crested Rectangular Weir**(Weir Controls 15.79 cfs @ 2.02 fps)
└**2=Broad-Crested Rectangular Weir**(Weir Controls 5.38 cfs @ 1.53 fps)

APPENDIX C

Hydraulic Analysis

benesch



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MAIN STREET COMMERCIAL REDEVELOPMENT

2283-2389 MAIN STREET

GLASTONBURY, CT

DATE:	REVISION:

STATE OF CONNECTICUT
WILLIAM G. WALTER
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO.: 70607.00
SCALE: AS NOTED
DATE: 07/26/2024

DRAWN BY: GSL
CHECKED BY: WGW

CATCHMENT AREA MAP

DRAWING NO.:

CAM

C-Values
Commercial Redevelopment
Glastonbury, CT

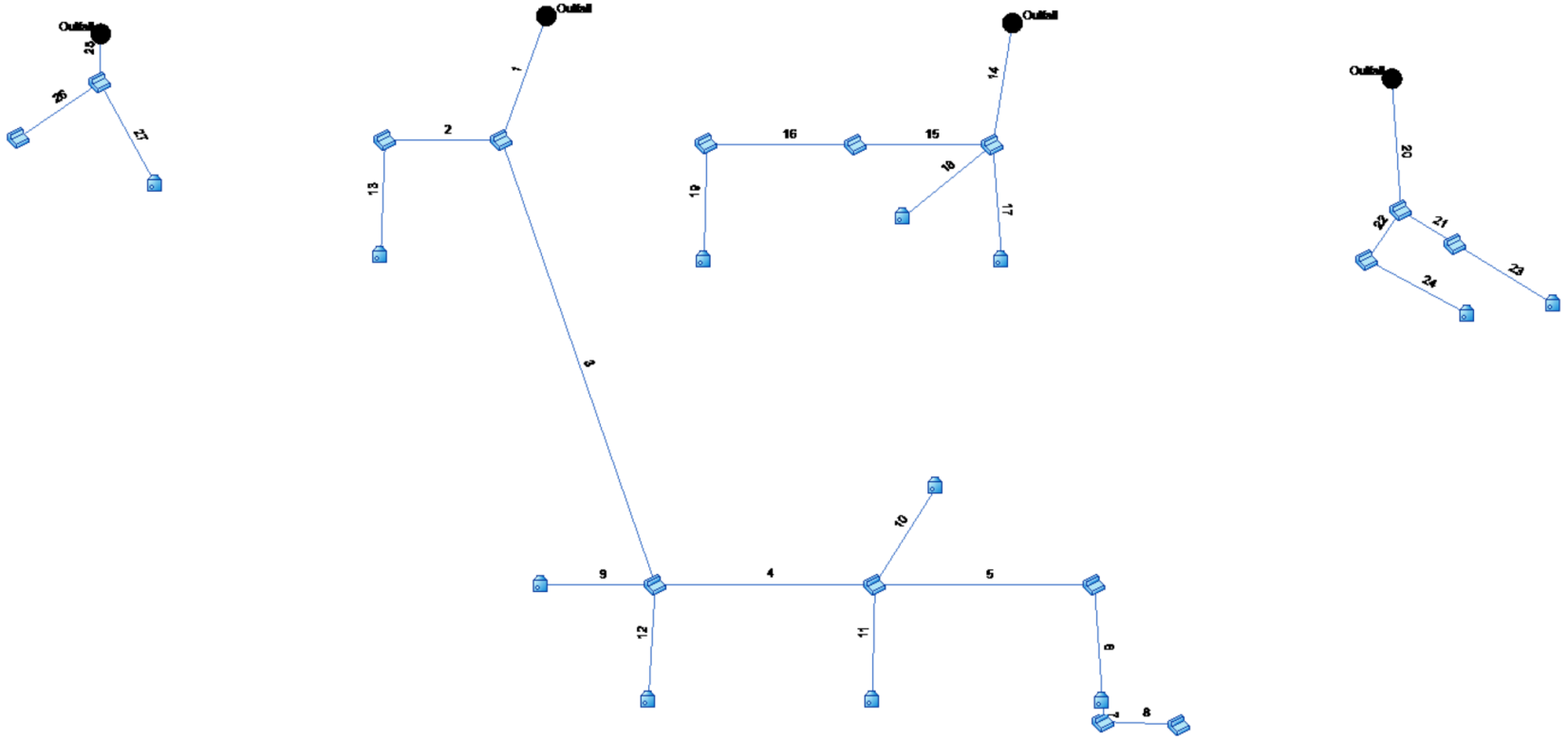
7/18/2024

Job Number: 70607.00 **RC**

Drainage Areas

BASIN	TOTAL (AC.)	IMPERVIOUS (AC.)	PERVIOUS (AC.)	C-Value	Tc (Min.)	SYSTEM	BASIN DESCRIPTION
CCB 1-2	0.09	0.09	0.00	0.90	5.00	#1	SOLO
ROOF LEADER 1	0.22	0.22	0.00	0.90	5.00		TO CCB 1-3
ROOF LEADER 2	0.29	0.29	0.00	0.90	5.00		TO CLCB 1-4
PLAZA 1	0.07	0.05	0.02	0.73	5.00		TO CLCB 1-4
PLAZA 2	0.16	0.06	0.10	0.54	5.00		TO CLCB 1-5
PLAZA 3	0.13	0.11	0.02	0.80	5.00		TO CLCB 1-5
ROOF LEADER 3	0.18	0.18	0.00	0.90	5.00		TO CLCB 1-6
PLAZA - AD 1	0.04	0.04	0.00	0.90	5.00		TO CLCB 1-6
PLAZA - AD 2	0.03	0.02	0.01	0.61	5.00		TO CLCB 1-6
CCB 2-2	0.01	0.01	0.00	0.90	5.00	#2	SOLO
ROOF LEADER 4	0.39	0.39	0.00	0.90	5.00		TO CCB 2-2
PLAZA 4	0.06	0.03	0.03	0.56	5.00		TO CCB 2-2
CCB 2-3	0.09	0.09	0.00	0.90	5.00		SOLO
ROOF LEADER 5	0.26	0.26	0.00	0.90	5.00		TO CCB 2-4
CCB 3-2	0.12	0.10	0.01	0.82	5.00	#3	SOLO
CCB3-3	0.12	0.09	0.03	0.76	5.00		SOLO
ROOF LEADER 6	0.06	0.06	0.00	0.90	5.00		TO CCB 3-3
CCB 3-4	0.22	0.21	0.01	0.88	5.00		SOLO
ROOF LEADER 7	0.13	0.13	0.00	0.90	5.00		TO CCB 3-4
CCB 4-2	0.21	0.16	0.05	0.76	5.00	#4	SOLO
CCB 5-2	0.09	0.06	0.03	0.69	5.00	#5	SOLO
CCB 5-3	0.37	0.24	0.13	0.69	5.00		SOLO
ROOF LEADER 8	0.13	0.13	0.00	0.90	5.00		TO CCB 5-2
TOTAL	1.66	1.40	0.26	0.81	5.00		

70607.00 Hydraulic Analysis



Project File: 70607.00 - 2024 Hydraulic Analysis.stm	Number of lines: 27	Date: 7/23/2024

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	57.000	0.09	1.21	0.90	0.08	1.00	5.0	10.7	5.2	5.16	10.11	2.92	18	0.79	28.00	28.45	31.19	31.31	33.00	34.51	CCB1-2
2	1	51.000	0.00	0.22	0.00	0.00	0.20	0.0	5.4	7.2	1.42	3.86	4.06	12	1.00	31.50	32.01	31.92	32.51	34.51	34.51	CCB1-3
3	1	203.000	0.00	0.90	0.00	0.00	0.72	0.0	10.2	5.3	3.83	3.86	4.87	12	1.00	28.95	30.98	31.51	33.51	34.51	35.50	CLCB1-4
4	3	96.000	0.00	0.54	0.00	0.00	0.41	0.0	9.7	5.5	2.22	3.86	2.82	12	1.00	31.03	31.99	34.34	34.66	35.50	35.50	CLCB1-5
5	4	96.000	0.00	0.25	0.00	0.00	0.22	0.0	8.9	5.7	1.23	3.86	1.57	12	1.00	32.04	33.00	34.84	34.94	35.50	35.50	CLCB1-6
6	5	50.000	0.18	0.25	0.90	0.16	0.22	5.0	8.5	5.8	1.26	3.86	3.92	12	1.00	34.75	35.25	35.14	35.72	35.50	40.00	RL-3
7	6	9.000	0.04	0.07	0.90	0.04	0.05	5.0	8.2	5.9	0.32	3.86	2.64	12	1.00	43.58	43.67	43.78	43.90	40.00	48.00	PL-AD1
8	7	33.000	0.03	0.03	0.61	0.02	0.02	5.0	5.0	7.4	0.14	3.86	1.40	12	1.00	43.67	44.00	43.90	44.15	48.00	47.00	PL-AD2
9	3	50.000	0.07	0.07	0.73	0.05	0.05	5.0	5.0	7.4	0.38	3.86	0.48	12	1.00	32.73	33.23	34.34	34.34	35.50	40.00	PL-1
10	4	50.000	0.16	0.16	0.54	0.09	0.09	5.0	5.0	7.4	0.64	3.86	1.05	12	1.00	33.74	34.24	34.84	34.85	35.50	40.00	PL-2
11	4	50.000	0.13	0.13	0.80	0.10	0.10	5.0	5.0	7.4	0.77	3.86	1.26	12	1.00	33.74	34.24	34.84	34.85	35.50	40.00	PL-3
12	3	50.000	0.29	0.29	0.90	0.26	0.26	5.0	5.0	7.4	1.94	3.86	2.47	12	1.00	32.73	33.23	34.34	34.46	35.50	40.00	RL-2
13	2	50.000	0.22	0.22	0.90	0.20	0.20	5.0	5.0	7.4	1.47	3.86	3.67	12	1.00	32.01	32.51	32.51	33.02	34.51	37.00	RL-1
14	End	53.000	0.01	0.81	0.90	0.01	0.71	5.0	7.6	6.2	4.36	4.31	5.56	12	1.25	30.00	30.66	31.19	31.87	33.00	34.10	CCB2-2
15	14	60.000	0.09	0.35	0.90	0.08	0.32	5.0	5.9	6.9	2.19	3.86	2.78	12	1.00	30.71	31.31	32.64	32.83	34.10	34.51	CCB2-3
16	15	65.000	0.00	0.26	0.00	0.00	0.23	0.0	5.4	7.2	1.69	3.86	2.15	12	1.00	31.36	32.01	32.89	33.01	34.51	34.51	CCB2-4
17	14	50.000	0.39	0.39	0.90	0.35	0.35	5.0	5.0	7.4	2.61	3.86	3.32	12	1.00	30.66	31.16	32.64	32.87	34.10	35.00	RL-4
18	14	50.000	0.06	0.06	0.56	0.03	0.03	5.0	5.0	7.4	0.25	3.86	0.32	12	1.00	30.66	31.16	32.64	32.64	34.10	35.00	PL-4
19	16	50.000	0.26	0.26	0.90	0.23	0.23	5.0	5.0	7.4	1.74	3.86	2.68	12	1.00	32.01	32.51	33.12	33.18	34.51	35.00	RL-5
20	End	52.000	0.12	0.65	0.82	0.10	0.55	5.0	7.0	6.4	3.56	6.55	6.88	12	2.88	35.50	37.00	36.03	37.80	36.50	39.00	CCB3-2 DW
21	20	28.000	0.12	0.18	0.76	0.09	0.15	5.0	6.6	6.6	0.95	3.99	2.28	12	1.07	37.00	37.30	37.80	37.71	39.00	39.30	CCB3-3
22	20	26.000	0.22	0.35	0.88	0.19	0.31	5.0	5.8	7.0	2.18	4.14	3.69	12	1.15	37.00	37.30	37.80	37.93	39.00	39.31	CCB3-4

70607.00 Hydraulic Analysis | Number of lines: 27 | Run Date: 7/24/2024

NOTES:Intensity = 37.58 / (Inlet time + 4.00) ^ 0.74; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	21	50.000	0.06	0.06	0.90	0.05	0.05	5.0	5.0	7.4	0.40	3.86	0.52	12	1.00	36.30	36.80	37.71	37.71	39.30	41.00	RL-6
24	22	50.000	0.13	0.13	0.90	0.12	0.12	5.0	5.0	7.4	0.87	3.86	1.11	12	1.00	36.31	36.81	37.93	37.96	39.31	41.00	RL-7
25	End	21.000	0.09	0.59	0.69	0.06	0.43	5.0	5.8	7.0	3.04	3.26	4.71	12	0.71	34.50	34.65	35.27	35.42	37.00	36.70	CCB5-2 DW
26	25	43.000	0.37	0.37	0.69	0.26	0.26	5.0	5.0	7.4	1.90	6.31	3.19	12	2.67	34.70	35.85	35.86	36.44	36.70	38.35	CCB5-3 DW
27	25	50.000	0.13	0.13	0.90	0.12	0.12	5.0	5.0	7.4	0.87	3.86	1.27	12	1.00	34.65	35.15	35.86	35.88	36.70	39.00	RL-8

70607.00 Hydraulic Analysis | Number of lines: 27 | Run Date: 7/24/2024

NOTES:Intensity = 37.58 / (Inlet time + 4.00) ^ 0.74; Return period =Yrs. 10 ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
(1)	(in) (2)	(cfs) (3)	(ft) (4)	(ft) (5)	(ft) (6)	(sqft) (7)	(ft/s) (8)	(ft) (9)	(ft) (10)	(%) (11)	(ft) (12)	(ft) (13)	(ft) (14)	(ft) (15)	(sqft) (16)	(ft/s) (17)	(ft) (18)	(ft) (19)	(%) (20)	(%) (21)	(ft) (22)	(K) (23)	(ft) (24)
1	18	5.16	28.00	31.19	1.50	1.77	2.92	0.13	31.32	0.206	57.000	28.45	31.31	1.50	1.77	2.92	0.13	31.44	0.206	0.206	0.117	1.54	0.20
2	12	1.42	31.50	31.92	0.42*	0.31	4.54	0.20	32.12	0.000	51.000	32.01	32.51	0.50**	0.40	3.58	0.20	32.71	0.000	0.000	n/a	1.50	n/a
3	12	3.83	28.95	31.51	1.00	0.79	4.87	0.37	31.88	0.985	203.000	30.98	33.51	1.00	0.79	4.87	0.37	33.88	0.984	0.985	1.999	2.24	0.83
4	12	2.22	31.03	34.34	1.00	0.79	2.82	0.12	34.46	0.331	96.000	31.99	34.66	1.00	0.79	2.82	0.12	34.78	0.331	0.331	0.317	1.50	0.19
5	12	1.23	32.04	34.84	1.00	0.79	1.57	0.04	34.88	0.102	96.000	33.00	34.94	1.00	0.79	1.57	0.04	34.98	0.102	0.102	0.098	1.50	0.06
6	12	1.26	34.75	35.14	0.39*	0.29	4.40	0.18	35.33	0.000	50.000	35.25	35.72	0.47**	0.37	3.44	0.18	35.91	0.000	0.000	n/a	0.15	0.03
7	12	0.32	43.58	43.78	0.20*	0.11	2.98	0.08	43.86	0.000	9.000	43.67	43.90	0.23**	0.14	2.31	0.08	43.99	0.000	0.000	n/a	1.49	0.12
8	12	0.14	43.67	43.90	0.23	0.07	0.97	0.05	43.96	0.000	33.000	44.00	44.15 j	0.15**	0.07	1.83	0.05	44.20	0.000	0.000	n/a	1.00	n/a
9	12	0.38	32.73	34.34	1.00	0.79	0.48	0.00	34.34	0.010	50.000	33.23	34.34	1.00	0.79	0.48	0.00	34.35	0.010	0.010	0.005	1.00	0.00
10	12	0.64	33.74	34.84	1.00	0.79	0.82	0.01	34.85	0.028	50.000	34.24	34.85	0.61	0.50	1.29	0.03	34.87	0.059	0.044	0.022	1.00	0.03
11	12	0.77	33.74	34.84	1.00	0.79	0.98	0.02	34.86	0.040	50.000	34.24	34.85	0.61	0.50	1.54	0.04	34.89	0.084	0.062	0.031	1.00	0.04
12	12	1.94	32.73	34.34	1.00	0.79	2.47	0.09	34.43	0.253	50.000	33.23	34.46	1.00	0.79	2.47	0.09	34.56	0.253	0.253	0.127	1.00	0.09
13	12	1.47	32.01	32.51	0.50	0.40	3.71	0.20	32.72	0.000	50.000	32.51	33.02	0.51**	0.41	3.62	0.20	33.23	0.000	0.000	n/a	1.00	0.20
14	12	4.36	30.00	31.19	1.00	0.79	5.56	0.48	31.67	1.280	53.000	30.66	31.87	1.00	0.79	5.56	0.48	32.35	1.279	1.280	0.678	1.61	0.77
15	12	2.19	30.71	32.64	1.00	0.79	2.78	0.12	32.76	0.321	60.000	31.31	32.83	1.00	0.79	2.78	0.12	32.95	0.321	0.321	0.193	0.50	0.06
16	12	1.69	31.36	32.89	1.00	0.79	2.15	0.07	32.97	0.192	65.000	32.01	33.01	1.00	0.79	2.15	0.07	33.08	0.187	0.189	0.123	1.50	0.11
17	12	2.61	30.66	32.64	1.00	0.79	3.32	0.17	32.81	0.458	50.000	31.16	32.87	1.00	0.79	3.32	0.17	33.04	0.458	0.458	0.229	1.00	0.17
18	12	0.25	30.66	32.64	1.00	0.79	0.32	0.00	32.64	0.004	50.000	31.16	32.64	1.00	0.79	0.32	0.00	32.64	0.004	0.004	0.002	1.00	0.00
19	12	1.74	32.01	33.12	1.00	0.79	2.22	0.08	33.19	0.203	50.000	32.51	33.18	0.67	0.55	3.14	0.15	33.33	0.333	0.268	0.134	1.00	0.15
20	12	3.56	35.50	36.03	0.53*	0.42	8.51	0.43	36.45	0.000	52.000	37.00	37.80	0.80**	0.68	5.25	0.43	38.23	0.000	0.000	n/a	1.52	0.65
21	12	0.95	37.00	37.80	0.80	0.30	1.41	0.15	37.96	0.000	28.000	37.30	37.71	0.41**	0.30	3.15	0.15	37.86	0.000	0.000	n/a	0.50	n/a

70607.00 Hydraulic Analysis | Number of lines: 27 | Run Date: 7/24/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
(1)	(in) (2)	(cfs) (3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(ft) (12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(K) (23)	(ft) (24)
22	12	2.18	37.00	37.80	0.80	0.52	3.21	0.27	38.08	0.000	26.000	37.30	37.93 j	0.63**	0.52	4.18	0.27	38.20	0.000	0.000	n/a	1.50	n/a
23	12	0.40	36.30	37.71	1.00	0.79	0.51	0.00	37.71	0.011	50.000	36.80	37.71	0.91	0.75	0.53	0.00	37.72	0.009	0.010	0.005	1.00	0.00
24	12	0.87	36.31	37.93	1.00	0.79	1.11	0.02	37.95	0.051	50.000	36.81	37.96	1.00	0.79	1.11	0.02	37.97	0.051	0.051	0.025	1.00	0.02
25	12	3.04	34.50	35.27	0.77*	0.65	4.72	0.35	35.61	0.714	21.000	34.65	35.42	0.77	0.65	4.71	0.35	35.76	0.713	0.713	0.150	1.28	0.44
26	12	1.90	34.70	35.86	1.00	0.48	2.42	0.09	35.95	0.242	43.000	35.85	36.44 j	0.59**	0.48	3.96	0.24	36.68	0.575	0.408	n/a	1.00	n/a
27	12	0.87	34.65	35.86	1.00	0.79	1.11	0.02	35.88	0.051	50.000	35.15	35.88	0.73	0.61	1.42	0.03	35.91	0.066	0.058	0.029	1.00	0.03

70607.00 Hydraulic Analysis | Number of lines: 27 | Run Date: 7/24/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraflow HGL Computation Procedure

General Procedure:

Hydraflow computes the HGL using the Bernoulli energy equation. Manning's equation is used to determine energy losses due to pipe friction. In a standard step, iterative procedure, Hydraflow assumes upstream HGLs until the energy equation balances. If the energy equation cannot balance, supercritical flow exists and critical depth is temporarily assumed at the upstream end. A supercritical flow Profile is then computed using the same procedure in a downstream direction using momentum principles.

Col. 1 The line number being computed. Calculations begin at Line 1 and proceed upstream.

Col. 2 The line size. In the case of non-circular pipes, the line rise is printed above the span.

Col. 3 Total flow rate in the line.

Col. 4 The elevation of the downstream invert.

Col. 5 Elevation of the hydraulic grade line at the downstream end. This is computed as the upstream HGL + Minor loss of this line's downstream line.

Col. 6 The downstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 7 Cross-sectional area of the flow at the downstream end.

Col. 8 The velocity of the flow at the downstream end, (Col. 3 / Col. 7).

Col. 9 Velocity head (Velocity squared / 2g).

Col. 10 The elevation of the energy grade line at the downstream end, HGL + Velocity head, (Col. 5 + Col. 9).

Col. 11 The friction slope at the downstream end (the S or Slope term in Manning's equation).

Col. 12 The line length.

Col. 13 The elevation of the upstream invert.

Col. 14 Elevation of the hydraulic grade line at the upstream end.

Col. 15 The upstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 16 Cross-sectional area of the flow at the upstream end.

Col. 17 The velocity of the flow at the upstream end, (Col. 3 / Col. 16).

Col. 18 Velocity head (Velocity squared / 2g).

Col. 19 The elevation of the energy grade line at the upstream end, HGL + Velocity head, (Col. 14 + Col. 18) .

Col. 20 The friction slope at the upstream end (the S or Slope term in Manning's equation).

Col. 21 The average of the downstream and upstream friction slopes.

Col. 22 Energy loss. Average Sf/100 x Line Length (Col. 21/100 x Col. 12). Equals (EGL upstream - EGL downstream) +/- tolerance.

Col. 23 The junction loss coefficient (K).

Col. 24 Minor loss. (Col. 23 x Col. 18). Is added to upstream HGL and used as the starting HGL for the next upstream line(s).

Outlet Protection
Main Street - Commercial Redevelopment
Project Number: 70607.00

FE 1-1

L = ((3(Q-5))/Sp^1.5)+10		Table 11-13.1			
LENGTH	10.26 (Min Length)	Min Length	=	**12**	ft
W = 3(Sp) OR 3(Sp)+0.4L		Type B Apron	=		Max TW
WIDTH-1	**4.50** WIDTH-2 **9.30**	Outlet Velocity	=		2.92 (ft/s)
		Rip Rap Specification	=		Modified

Q=	5.16
SP=	1.5
L=	12

FE 2-1

L = ((3(Q-5))/Sp^1.5)+10		Table 11-13.1			
LENGTH	8.08 (Min Length)	Min Length	=	**10**	ft
W = 3(Sp) OR 3(Sp)+0.4L		Type B Apron	=		Max TW
WIDTH-1	**3.00** WIDTH-2 **7.00**	Outlet Velocity	=		5.56 (ft/s)
		Rip Rap Specification	=		Modified

Q=	4.36
SP=	1
L=	10

FE 3-1

L = ((3(Q-5))/Sp^1.5)+10		Table 11-13.1			
LENGTH	5.68 (Min Length)	Min Length	=	**10**	ft
W = 3(Sp) OR 3(Sp)+0.4L		Type B Apron	=		Max TW
WIDTH-1	**3.00** WIDTH-2 **7.00**	Outlet Velocity	=		6.88 (ft/s)
		Rip Rap Specification	=		Modified

Q=	3.56
SP=	1
L=	10

FE 5-1

L = ((3(Q-5))/Sp^1.5)+10		Table 11-13.1			
LENGTH	5.68 (Min Length)	Min Length	=	**10**	ft
W = 3(Sp) OR 3(Sp)+0.4L		Type B Apron	=		Max TW
WIDTH-1	**3.00** WIDTH-2 **7.00**	Outlet Velocity	=		4.71 (ft/s)
		Rip Rap Specification	=		Modified

Q=	3.56
SP=	1
L=	10

La = length of apron (ft)
Sp = inside diameter for circular sections or maximum inside pipe span for non-circular sections, m (ft)
Q = pipe (design) discharge, cms (cfs)
TW = tailwater depth, m (ft)
Rp = maximum inside pipe rise, m (ft)
Note: Sp = Rp = inside diamter for circular sections

WIDTH-1 @ Flared End
WIDTH-2 @ Back of Outlet Protection

Rip Rap Specification Table	
0-8 ft/s	Modified
8-10 ft/s	Intermediate
10-14 ft/s	Standard

APPENDIX D

Water Quality Computations

benesch

Water Quality Volume Computations
Commercial Redevelopment
Project # 70607.00

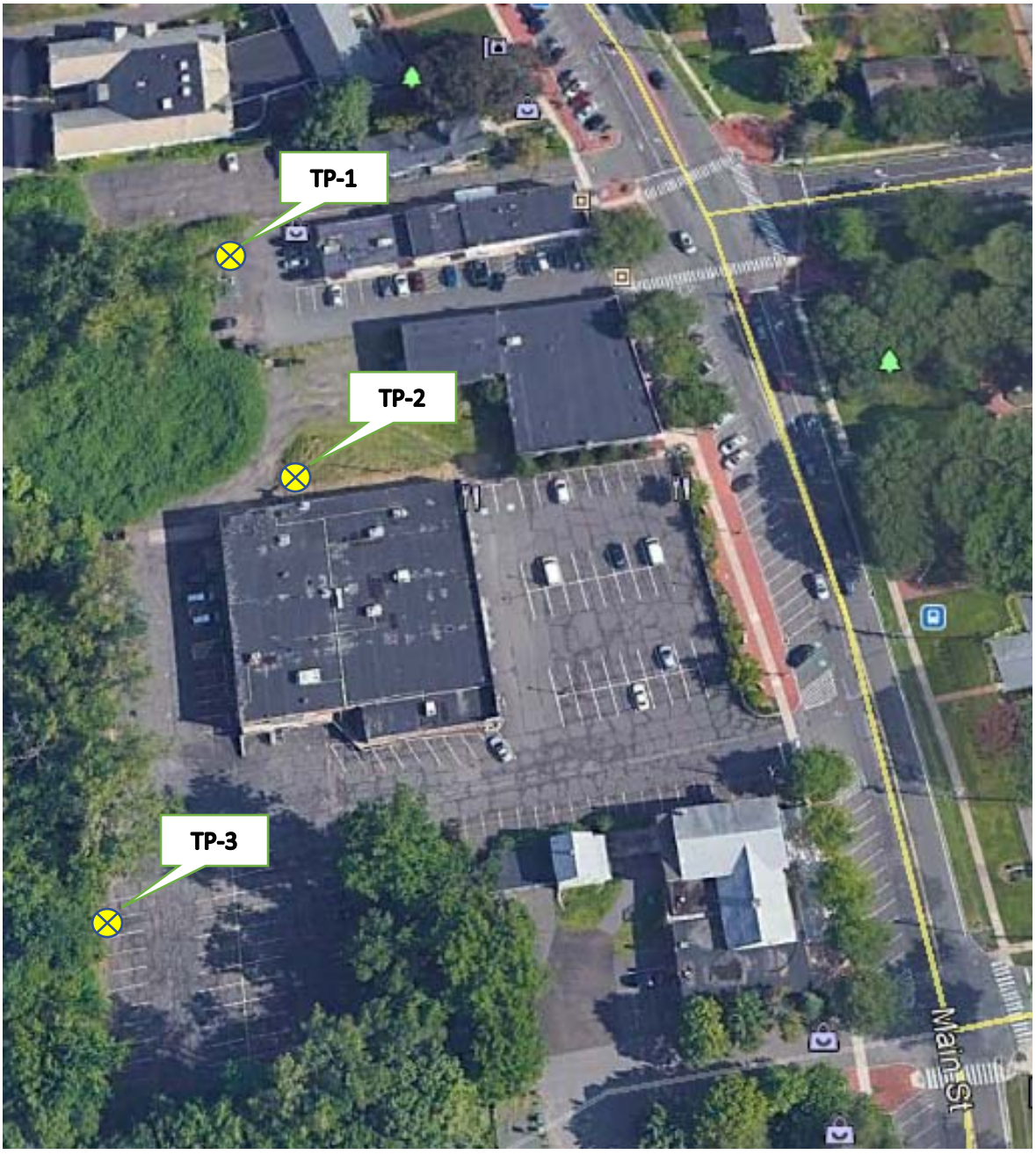
Designation	Description	Total Area (ac)	Total Impervious Area (ac)	Impervious Coverage, I (%)	Volumetric Runoff Coefficient (R) R = 0.05 + 0.009*(I)	WQV (ac-ft, apply 1.3") WQV = (1.3")*(R)*(A)/12	Required WQV (cf)	50% Reduction for Existing >40% DCIA	Provided WQV (cf)
1	Total Site	4.90	3.69	75.30	0.73	0.386	16,827	8,413	10,500
2	Pond 1	3.26	2.57	78.83	0.76	0.268	11,684	5,842	10,500

APPENDIX E

Standpipe Data and Test Pit Evaluation Report

benesch

Test Pit Locations
2289 - 2389 Main Street, Glastonbury, CT



⊗ - Test Pit Location

Stand Pipe	Height Above Ground (in)	3/26/2021		4/2/2021		4/9/2021		4/19/2021		4/23/2021		4/30/2021	
		Depth to Water (in) [Top of Pipe]	Depth to Water (in) [Ground]	Depth to Water (in) [Top of Pipe]	Depth to Water (in) [Ground]	Depth to Water (in) [Top of Pipe]	Depth to Water (in) [Ground]	Depth to Water (in) [Top of Pipe]	Depth to Water (in) [Ground]	Depth to Water (in) [Top of Pipe]	Depth to Water (in) [Ground]	Depth to Water (in) [Top of Pipe]	Depth to Water (in) [Ground]
1 (Daybreak)	21	81	***60***	80	***59***	89.5	***68.5***	82	***61***	83	***62***	-	-
2 (Adjacent Bldg)	17	87 (Dry)	***Dry @ 70"***	87 (Dry)	***Dry @ 70"***	87 (Wet/Mud)	***70***	87	***70***	87	***70***	87	***70***
3 (SW Corner)	21	40	***19***	44	***23***	47	***26***	45.5	***24.5***	45.5	***24.5***	44	***25***

Martin Brogie, Inc.
ENVIRONMENTAL SERVICES

• Environmental Site Investigations
• Building Contaminant Surveys
• Wetlands Consulting
• Remediation Contract Management

May 11, 2021

Will Walter, PE, LEED AP
Senior Project Manager
Alfred Benesch & Company
120 Hebron Avenue, 2nd Floor
Glastonbury, CT 06033

RE: Test Pit Data Findings Report
2333 Main Street
Glastonbury, Connecticut

Dear Mr. Walter:

Martin Brogie, Inc. (MBI) is pleased to submit the following information regarding the soil and groundwater monitoring data acquired from the completion of three test pits and installation and monitoring of groundwater standpipes located in each. The work was completed to evaluate site soil and groundwater conditions to facilitate design of adequate stormwater management facilities.

Site Description

The subject property consists of 4 commercial properties totaling 7.67 acres and located along the west side of Main Street in downtown Glastonbury, Connecticut. The eastern portion of the property contains 5 commercial buildings and associated paved parking and driveway areas as well as lawn and landscaping. The western portion of the property consists of wooded wetlands.

A site location map is provided as Figure 1. An aerial view of the property, including the test pit locations is provided as Figure 2.

28 Arbor Lane
Madison, CT 06443

martinbrogieinc@gmail.com
860-208-0360

Test Pit Excavation

Three test pits were excavated on the site on February 18, 2021 by Avery Construction of Somers, Connecticut using a track-mounted excavator and under the direction of Alfred Benesch & Company of Glastonbury, Connecticut. MBI was onsite to evaluate and describe the test pit findings.

Test Pit #1 was located in the northern portion of the site along the western edge of a gravel parking area located to the rear of 2377 Main Street. Test Pit #2 was located in a grassed area north of the northwest corner of the building located at 2333 Main Street. Test Pit #3 was located along the western edge of the paved parking area located in the southwest portion of the developed area of the site. Test pit locations are shown on Figure 2.

The following test pit observations were made by MBI:

TP#1
0-56": fill material consisting of fine to coarse silty sand mixed with approximately 10% glass, metal fragments, brick and concrete
56-81": light brown to brown, horizontally-bedded, fine to medium sand
Seepage at 81"

TP#2
0-66": fill material consisting of fine to medium silty sand mixed with approximately 15% glass, metal fragments, brick and concrete
Seepage at 66"

TP#3
0-3": asphalt
3-15": processed gravel
15-39": fine to medium silty sand
39-52": Scarboro Muck
52-60": Olive-grey, fine silty sand
Seepage at 39"

Groundwater Depth Measurements

Depth to groundwater was measured at each test pit standpipe in March and April of 2021 by Benesch personnel. The depths at each location on each data collection date are summarized in the table below.

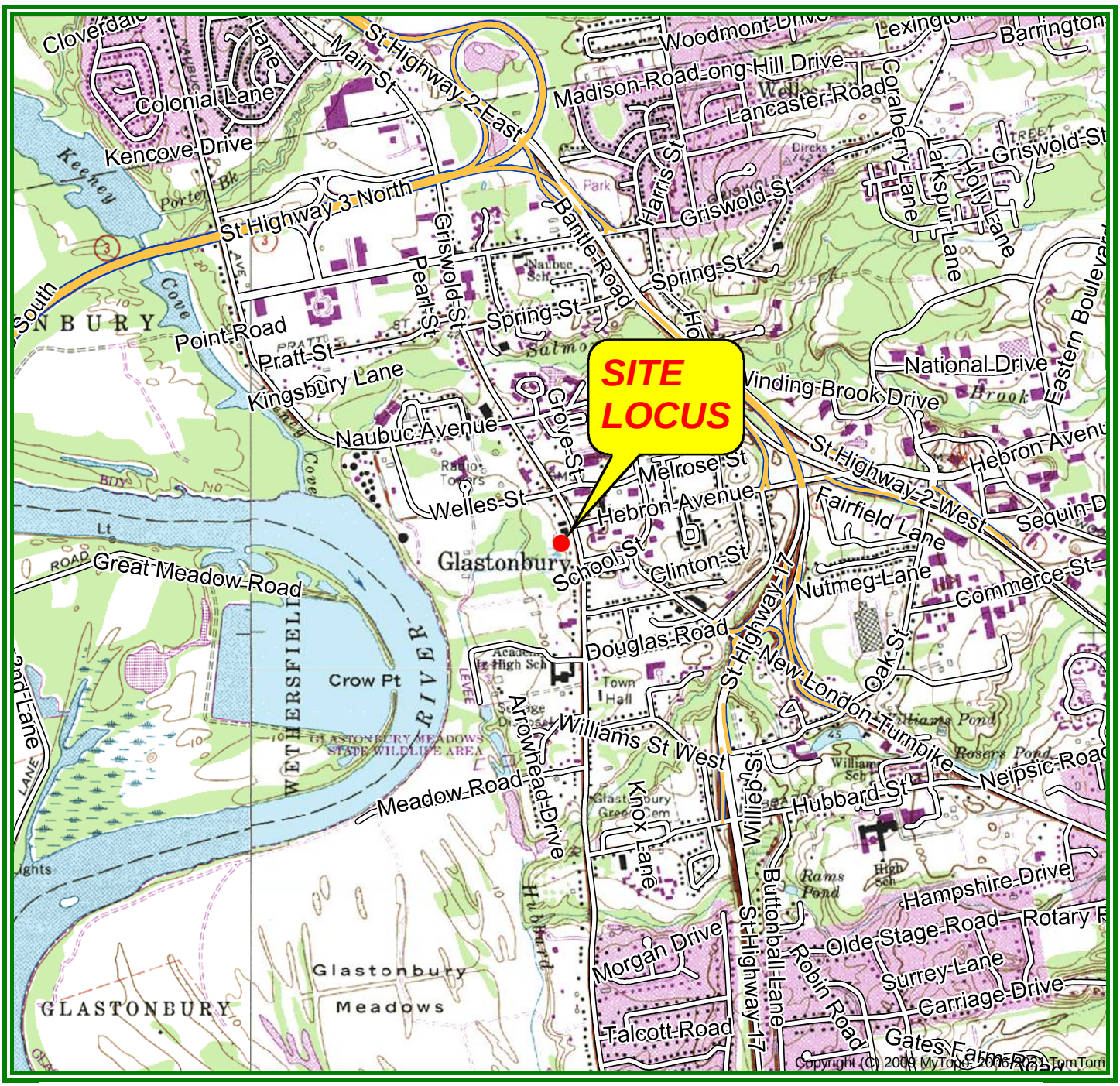
Depth to groundwater from ground surface summary:

Test Pit ID	March 26	April 2	April 9	April 19	April 23	April 30
#1	60”	59”	68.5”	61”	62”	Pipe broken
#2	Dry/ >70”	Dry/>70”	70”	70”	70”	70”
#3	19”	23”	26”	24.5”	24.5”	25”

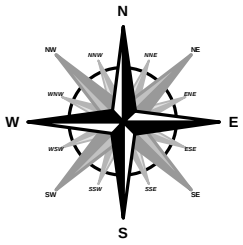
Please contact the undersigned at 860-208-0360 is you have any questions or require further information. Thank you for the opportunity to be of service.

Sincerely,

Martin Brogie, LEP
Soil Scientist



GLASTONBURY Topographic 1964 41072-F5-TF-024 National Geodetic Vertical Datum 1929



SCALE 1:24000

0 1000 2000 3000 4000 5000
FEET

0 1
MILE

Site Coordinates:
041° 42' 41.91" N, 072° 36' 35.14" W

Project:
2333 Main Street

Site Location:
2333 Main Street
Hartford County,
Glastonbury, Connecticut

Martin Brogie, Inc.
ENVIRONMENTAL SERVICES

28 Arbor Lane, Madison, Connecticut 06443
ph: (860) 208-0360
email: martinbrogieinc@gmail.com

Figure 1 - Site Locus Map

– APPROXIMATE PROPERTY BOUNDARY

Martin Brogie, Inc.
ENVIRONMENTAL SERVICES

28 Arbor Lane
Madison, Connecticut 06443
ph: (860) 208-0360
email: martinbrogieinc@gmail.com

Figure 2 - Aerial Site Plan

2333 Main Street

Glastonbury, Hartford County, Connecticut

Project:	2333 Main Street
Drawn by:	KMH
Date:	1/11/21
Scale:	NOT TO SCALE

APPENDIX F

NOAA Rainfall Data

benesch

NOAA Atlas 14, Volume 10, Version 3
Location name: Town of Glastonbury, Connecticut, USA*
Latitude: 41.7121°, Longitude: -72.6091°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.331** (0.263-0.414)	**0.404** (0.321-0.505)	**0.523** (0.414-0.657)	**0.621** (0.488-0.784)	**0.757** (0.575-1.00)	**0.860** (0.637-1.17)	**0.967** (0.694-1.36)	**1.09** (0.736-1.57)	**1.26** (0.818-1.89)	**1.40** (0.886-2.15)
10-min	**0.469** (0.373-0.586)	**0.572** (0.454-0.716)	**0.741** (0.586-0.929)	**0.880** (0.692-1.11)	**1.07** (0.814-1.42)	**1.22** (0.903-1.65)	**1.37** (0.983-1.93)	**1.54** (1.04-2.23)	**1.78** (1.16-2.68)	**1.98** (1.26-3.05)
15-min	**0.552** (0.439-0.689)	**0.673** (0.535-0.842)	**0.871** (0.690-1.09)	**1.04** (0.815-1.31)	**1.26** (0.958-1.67)	**1.43** (1.06-1.94)	**1.61** (1.16-2.27)	**1.81** (1.23-2.62)	**2.10** (1.36-3.16)	**2.33** (1.48-3.58)
30-min	**0.743** (0.590-0.928)	**0.906** (0.719-1.13)	**1.17** (0.927-1.47)	**1.39** (1.10-1.76)	**1.70** (1.29-2.25)	**1.93** (1.43-2.61)	**2.17** (1.56-3.06)	**2.44** (1.65-3.53)	**2.82** (1.83-4.24)	**3.14** (1.99-4.82)
60-min	**0.933** (0.742-1.17)	**1.14** (0.904-1.42)	**1.47** (1.16-1.85)	**1.75** (1.38-2.21)	**2.13** (1.62-2.83)	**2.42** (1.80-3.28)	**2.72** (1.96-3.84)	**3.06** (2.07-4.43)	**3.55** (2.30-5.33)	**3.94** (2.50-6.06)
2-hr	**1.22** (0.978-1.52)	**1.48** (1.18-1.84)	**1.90** (1.52-2.37)	**2.25** (1.78-2.83)	**2.74** (2.09-3.61)	**3.10** (2.32-4.19)	**3.48** (2.52-4.91)	**3.93** (2.67-5.66)	**4.60** (3.00-6.88)	**5.17** (3.28-7.88)
3-hr	**1.41** (1.14-1.75)	**1.71** (1.37-2.12)	**2.19** (1.75-2.73)	**2.60** (2.06-3.24)	**3.15** (2.42-4.14)	**3.56** (2.67-4.80)	**4.00** (2.92-5.64)	**4.53** (3.08-6.49)	**5.33** (3.48-7.93)	**6.01** (3.82-9.14)
6-hr	**1.77** (1.43-2.17)	**2.14** (1.73-2.64)	**2.75** (2.22-3.40)	**3.26** (2.61-4.05)	**3.96** (3.06-5.18)	**4.48** (3.38-6.01)	**5.04** (3.70-7.08)	**5.72** (3.91-8.14)	**6.77** (4.43-10.0)	**7.67** (4.89-11.6)
12-hr	**2.14** (1.74-2.62)	**2.62** (2.13-3.20)	**3.39** (2.74-4.16)	**4.03** (3.24-4.97)	**4.91** (3.82-6.40)	**5.56** (4.23-7.43)	**6.28** (4.64-8.77)	**7.14** (4.90-10.1)	**8.48** (5.57-12.4)	**9.64** (6.17-14.4)
24-hr	**2.50** (2.05-3.03)	**3.10** (2.54-3.76)	**4.07** (3.32-4.96)	**4.88** (3.95-5.98)	**5.99** (4.69-7.77)	**6.81** (5.22-9.06)	**7.70** (5.74-10.8)	**8.84** (6.08-12.4)	**10.6** (7.00-15.5)	**12.2** (7.82-18.1)
2-day	**2.84** (2.35-3.43)	**3.58** (2.95-4.32)	**4.78** (3.92-5.79)	**5.78** (4.71-7.04)	**7.15** (5.64-9.25)	**8.14** (6.30-10.8)	**9.26** (6.99-13.0)	**10.7** (7.41-15.0)	**13.2** (8.69-19.1)	**15.3** (9.86-22.6)
3-day	**3.10** (2.56-3.72)	**3.90** (3.23-4.69)	**5.23** (4.31-6.30)	**6.32** (5.17-7.67)	**7.83** (6.21-10.1)	**8.92** (6.94-11.8)	**10.2** (7.71-14.2)	**11.8** (8.17-16.4)	**14.5** (9.61-21.0)	**17.0** (10.9-25.0)
4-day	**3.31** (2.75-3.96)	**4.17** (3.46-5.00)	**5.57** (4.60-6.70)	**6.74** (5.53-8.15)	**8.34** (6.63-10.7)	**9.50** (7.40-12.6)	**10.8** (8.22-15.1)	**12.6** (8.70-17.4)	**15.5** (10.2-22.2)	**18.1** (11.7-26.5)
7-day	**3.89** (3.25-4.63)	**4.84** (4.04-5.77)	**6.40** (5.31-7.65)	**7.68** (6.34-9.25)	**9.46** (7.55-12.1)	**10.8** (8.40-14.1)	**12.2** (9.28-16.8)	**14.1** (9.81-19.5)	**17.2** (11.4-24.6)	**20.0** (12.9-29.1)
10-day	**4.48** (3.76-5.32)	**5.48** (4.59-6.51)	**7.12** (5.93-8.48)	**8.47** (7.02-10.2)	**10.3** (8.26-13.1)	**11.7** (9.15-15.3)	**13.2** (10.0-18.1)	**15.2** (10.6-20.8)	**18.3** (12.2-26.0)	**21.0** (13.6-30.5)
20-day	**6.44** (5.44-7.58)	**7.50** (6.32-8.84)	**9.23** (7.75-10.9)	**10.7** (8.89-12.7)	**12.6** (10.1-15.8)	**14.1** (11.0-18.1)	**15.7** (11.8-21.0)	**17.6** (12.3-23.9)	**20.4** (13.6-28.8)	**22.8** (14.8-32.8)
30-day	**8.13** (6.89-9.54)	**9.22** (7.80-10.8)	**11.0** (9.27-13.0)	**12.5** (10.4-14.8)	**14.5** (11.6-18.0)	**16.0** (12.5-20.3)	**17.6** (13.2-23.2)	**19.4** (13.7-26.3)	**21.9** (14.7-30.8)	**24.0** (15.6-34.4)
45-day	**10.3** (8.73-12.0)	**11.4** (9.68-13.3)	**13.2** (11.2-15.5)	**14.8** (12.4-17.4)	**16.9** (13.6-20.7)	**18.5** (14.5-23.2)	**20.1** (15.0-26.1)	**21.8** (15.4-29.3)	**24.0** (16.2-33.5)	**25.6** (16.7-36.7)
60-day	**12.0** (10.3-14.0)	**13.2** (11.3-15.4)	**15.1** (12.8-17.7)	**16.7** (14.1-19.7)	**18.9** (15.2-23.1)	**20.6** (16.1-25.7)	**22.3** (16.6-28.6)	**23.8** (16.9-32.0)	**25.8** (17.5-36.0)	**27.2** (17.8-38.8)

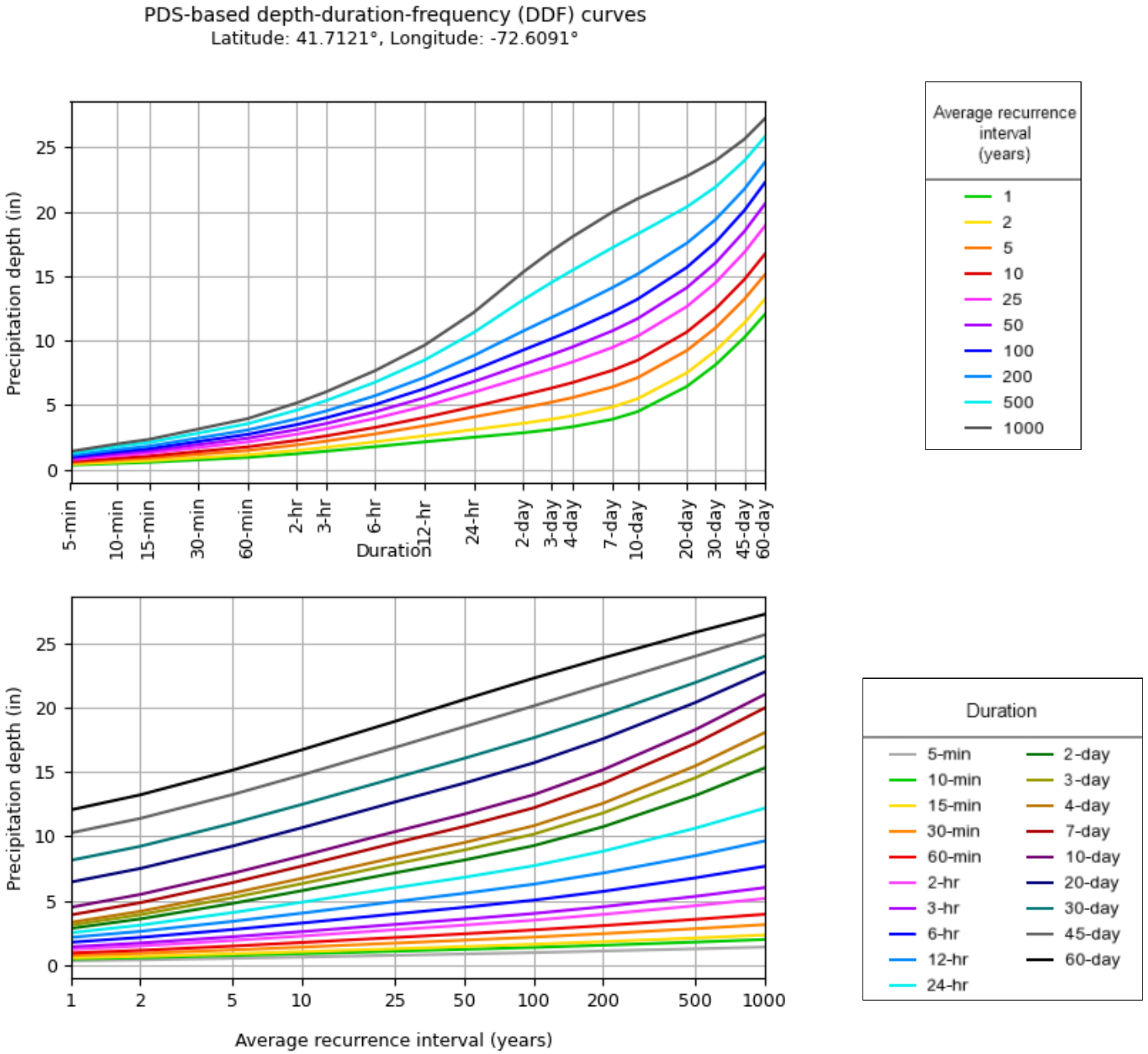
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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.

Back to Top

PF graphical



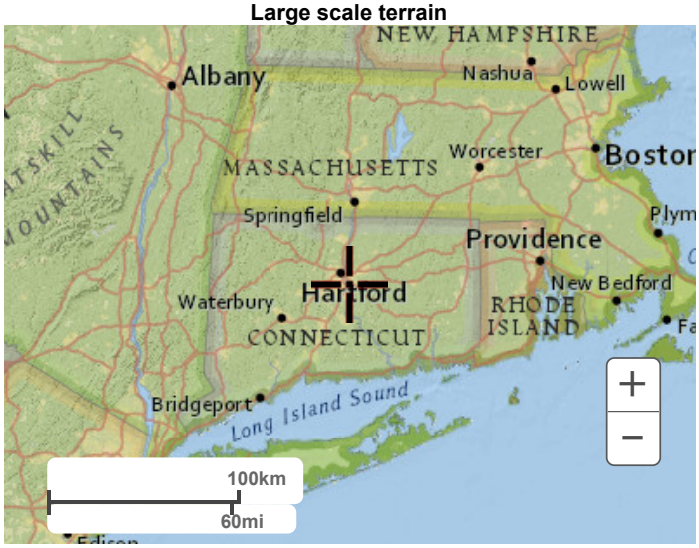
NOAA Atlas 14, Volume 10, Version 3 Created (GMT): Thu Jul 18 16:26:23 2024

Back to Top

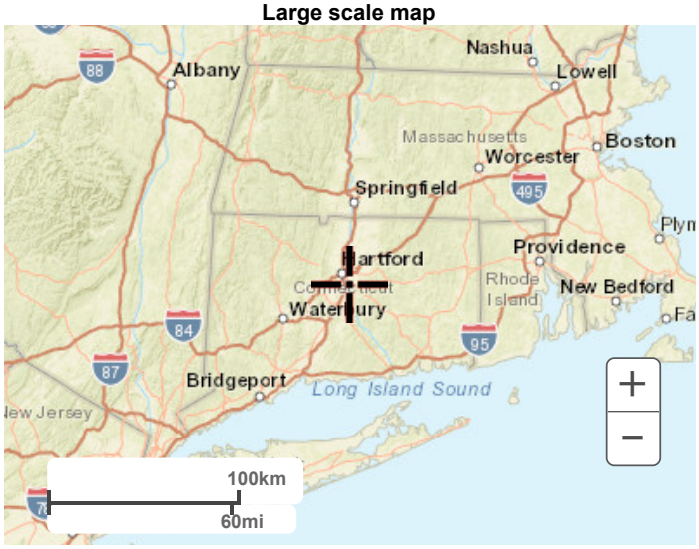
Maps & aerials

Small scale terrain

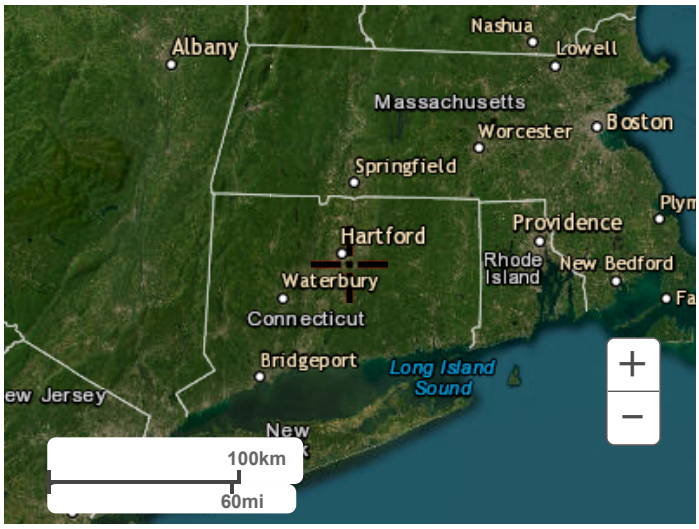
Large scale terrain



Large scale map



Large scale aerial



Back to Top

Could not retrieve elevation data due to Cross-Origin permissions.

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

Disclaimer

NOAA Atlas 14, Volume 10, Version 3
Location name: Town of Glastonbury, Connecticut, USA*
Latitude: 41.7121°, Longitude: -72.6091°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**3.97** (3.16-4.97)	**4.85** (3.85-6.06)	**6.28** (4.97-7.88)	**7.45** (5.86-9.41)	**9.08** (6.90-12.0)	**10.3** (7.64-14.0)	**11.6** (8.33-16.4)	**13.0** (8.83-18.9)	**15.1** (9.82-22.7)	**16.8** (10.6-25.8)
10-min	**2.81** (2.24-3.52)	**3.43** (2.72-4.30)	**4.45** (3.52-5.57)	**5.28** (4.15-6.67)	**6.44** (4.88-8.53)	**7.31** (5.42-9.91)	**8.22** (5.90-11.6)	**9.24** (6.26-13.4)	**10.7** (6.95-16.1)	**11.9** (7.54-18.3)
15-min	**2.21** (1.76-2.76)	**2.69** (2.14-3.37)	**3.48** (2.76-4.38)	**4.14** (3.26-5.23)	**5.05** (3.83-6.69)	**5.73** (4.25-7.78)	**6.45** (4.63-9.10)	**7.25** (4.91-10.5)	**8.40** (5.45-12.6)	**9.34** (5.91-14.3)
30-min	**1.49** (1.18-1.86)	**1.81** (1.44-2.27)	**2.35** (1.85-2.95)	**2.79** (2.19-3.52)	**3.40** (2.58-4.50)	**3.85** (2.86-5.23)	**4.33** (3.11-6.12)	**4.87** (3.30-7.05)	**5.64** (3.67-8.48)	**6.28** (3.97-9.64)
60-min	**0.933** (0.742-1.17)	**1.14** (0.904-1.42)	**1.47** (1.16-1.85)	**1.75** (1.38-2.21)	**2.13** (1.62-2.83)	**2.42** (1.80-3.28)	**2.72** (1.96-3.84)	**3.06** (2.07-4.43)	**3.55** (2.30-5.33)	**3.94** (2.50-6.06)
2-hr	**0.610** (0.489-0.758)	**0.740** (0.591-0.920)	**0.951** (0.757-1.19)	**1.13** (0.891-1.41)	**1.37** (1.04-1.81)	**1.55** (1.16-2.09)	**1.74** (1.26-2.46)	**1.97** (1.34-2.83)	**2.30** (1.50-3.44)	**2.58** (1.64-3.94)
3-hr	**0.470** (0.377-0.581)	**0.569** (0.456-0.704)	**0.730** (0.584-0.907)	**0.864** (0.686-1.08)	**1.05** (0.804-1.38)	**1.18** (0.890-1.60)	**1.33** (0.971-1.88)	**1.51** (1.03-2.16)	**1.78** (1.16-2.64)	**2.00** (1.27-3.04)
6-hr	**0.295** (0.238-0.362)	**0.357** (0.288-0.440)	**0.459** (0.369-0.567)	**0.544** (0.435-0.676)	**0.661** (0.510-0.865)	**0.747** (0.565-1.00)	**0.841** (0.617-1.18)	**0.955** (0.652-1.36)	**1.13** (0.739-1.67)	**1.28** (0.816-1.93)
12-hr	**0.177** (0.144-0.217)	**0.217** (0.176-0.265)	**0.281** (0.227-0.344)	**0.334** (0.269-0.412)	**0.407** (0.316-0.530)	**0.461** (0.351-0.616)	**0.520** (0.384-0.727)	**0.593** (0.406-0.838)	**0.704** (0.462-1.03)	**0.799** (0.511-1.20)
24-hr	**0.104** (0.085-0.126)	**0.129** (0.105-0.156)	**0.169** (0.138-0.206)	**0.203** (0.164-0.249)	**0.249** (0.195-0.323)	**0.283** (0.217-0.377)	**0.321** (0.239-0.448)	**0.368** (0.253-0.517)	**0.442** (0.291-0.645)	**0.507** (0.325-0.755)
2-day	**0.059** (0.048-0.071)	**0.074** (0.061-0.089)	**0.099** (0.081-0.120)	**0.120** (0.098-0.146)	**0.148** (0.117-0.192)	**0.169** (0.131-0.225)	**0.192** (0.145-0.270)	**0.223** (0.154-0.312)	**0.274** (0.180-0.397)	**0.318** (0.205-0.471)
3-day	**0.043** (0.035-0.051)	**0.054** (0.044-0.065)	**0.072** (0.059-0.087)	**0.087** (0.071-0.106)	**0.108** (0.086-0.140)	**0.123** (0.096-0.164)	**0.141** (0.107-0.197)	**0.164** (0.113-0.228)	**0.201** (0.133-0.291)	**0.235** (0.152-0.346)
4-day	**0.034** (0.028-0.041)	**0.043** (0.036-0.052)	**0.058** (0.047-0.069)	**0.070** (0.057-0.084)	**0.086** (0.069-0.111)	**0.098** (0.077-0.131)	**0.112** (0.085-0.157)	**0.130** (0.090-0.181)	**0.161** (0.106-0.231)	**0.188** (0.121-0.275)
7-day	**0.023** (0.019-0.027)	**0.028** (0.024-0.034)	**0.038** (0.031-0.045)	**0.045** (0.037-0.055)	**0.056** (0.044-0.071)	**0.064** (0.050-0.084)	**0.072** (0.055-0.100)	**0.083** (0.058-0.115)	**0.102** (0.068-0.146)	**0.118** (0.076-0.173)
10-day	**0.018** (0.015-0.022)	**0.022** (0.019-0.027)	**0.029** (0.024-0.035)	**0.035** (0.029-0.042)	**0.043** (0.034-0.054)	**0.048** (0.038-0.063)	**0.055** (0.041-0.075)	**0.063** (0.044-0.086)	**0.076** (0.050-0.108)	**0.087** (0.056-0.127)
20-day	**0.013** (0.011-0.015)	**0.015** (0.013-0.018)	**0.019** (0.016-0.022)	**0.022** (0.018-0.026)	**0.026** (0.021-0.032)	**0.029** (0.022-0.037)	**0.032** (0.024-0.043)	**0.036** (0.025-0.049)	**0.042** (0.028-0.059)	**0.047** (0.030-0.068)
30-day	**0.011** (0.009-0.013)	**0.012** (0.010-0.015)	**0.015** (0.012-0.018)	**0.017** (0.014-0.020)	**0.020** (0.016-0.024)	**0.022** (0.017-0.028)	**0.024** (0.018-0.032)	**0.026** (0.019-0.036)	**0.030** (0.020-0.042)	**0.033** (0.021-0.047)
45-day	**0.009** (0.008-0.011)	**0.010** (0.008-0.012)	**0.012** (0.010-0.014)	**0.013** (0.011-0.016)	**0.015** (0.012-0.019)	**0.017** (0.013-0.021)	**0.018** (0.013-0.024)	**0.020** (0.014-0.027)	**0.022** (0.014-0.031)	**0.023** (0.015-0.033)
60-day	**0.008** (0.007-0.009)	**0.009** (0.007-0.010)	**0.010** (0.008-0.012)	**0.011** (0.009-0.013)	**0.013** (0.010-0.016)	**0.014** (0.011-0.017)	**0.015** (0.011-0.019)	**0.016** (0.011-0.022)	**0.017** (0.012-0.024)	**0.018** (0.012-0.026)

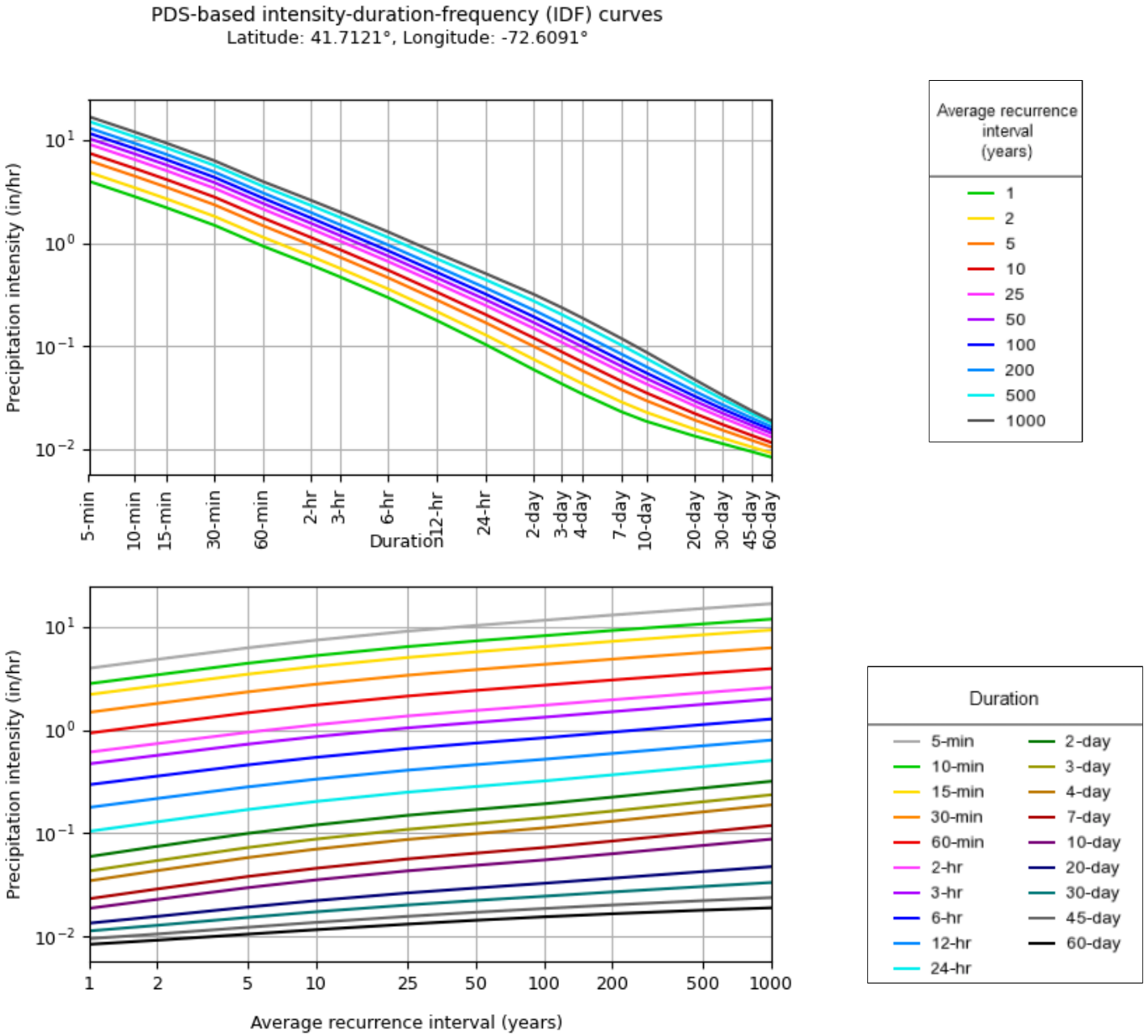
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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.

Back to Top

PF graphical



NOAA Atlas 14, Volume 10, Version 3

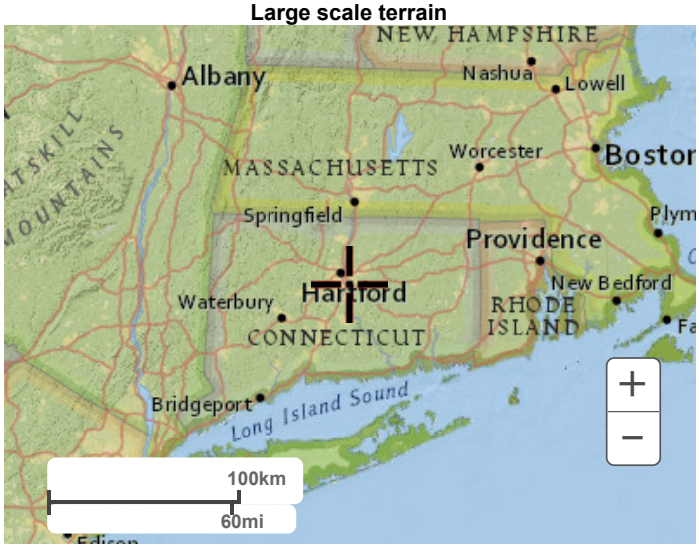
Created (GMT): Thu Jul 18 16:27:26 2024

Back to Top

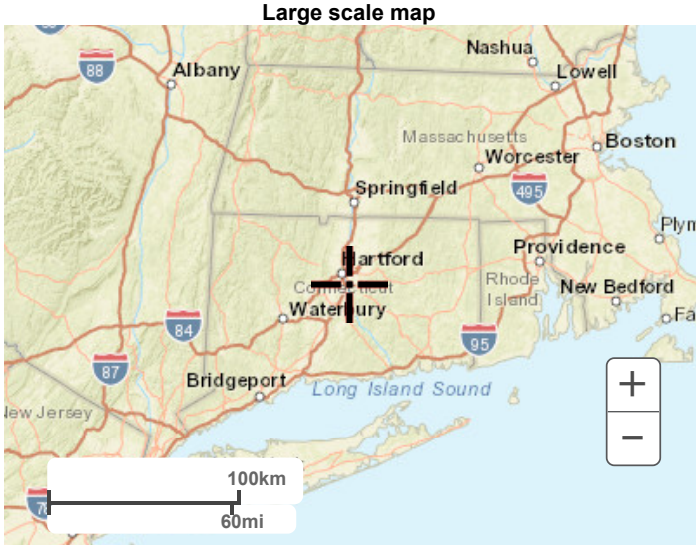
Maps & aerials

Small scale terrain

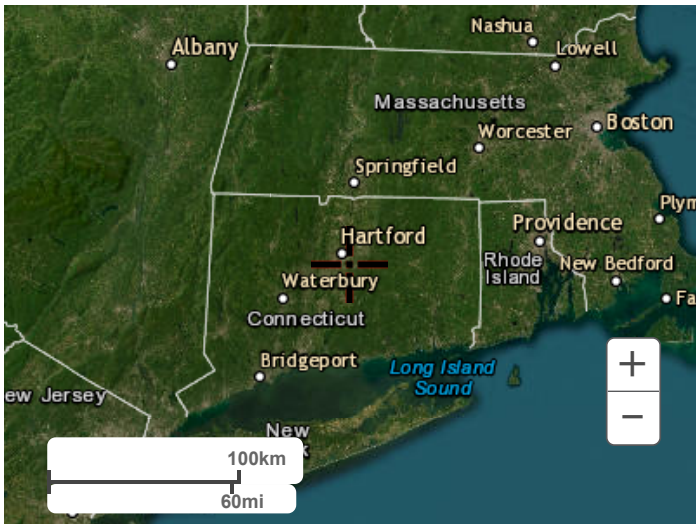
Large scale terrain



Large scale map



Large scale aerial



Back to Top

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National Oceanic and Atmospheric Administration
National Weather Service
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Disclaimer

APPENDIX G

NRCS Soil Survey

benesch

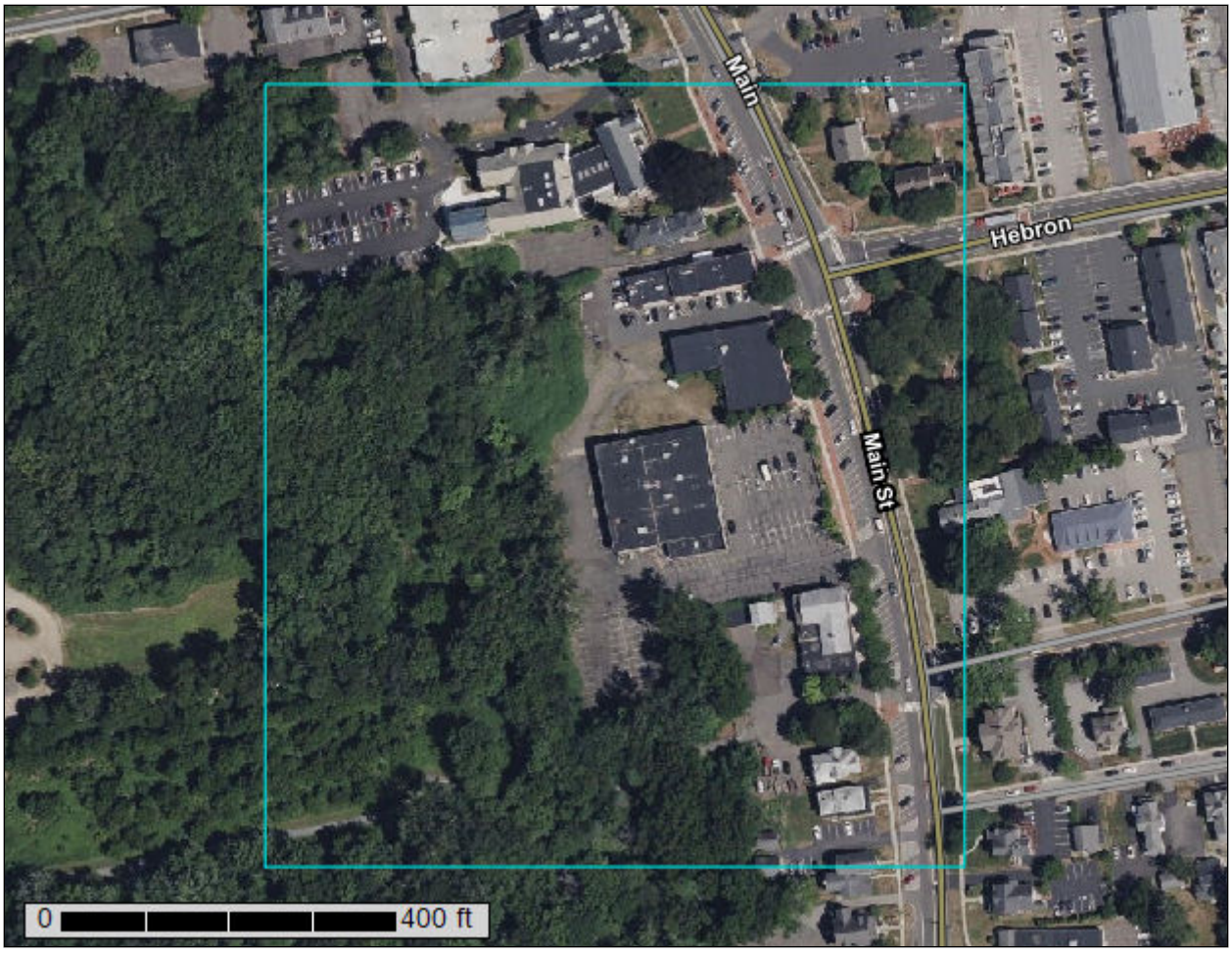
United States Department of Agriculture

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, Western Part



July 19, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,970 if printed on A portrait (8.5" x 11") sheet.

N

0 25 50 100 150 Meters

0 50 100 200 300 Feet

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

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

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

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

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

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

Soil Survey Area: State of Connecticut, Western Part
Survey Area Data: Version 1, Sep 15, 2023

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

Date(s) aerial images were photographed: Jun 14, 2022—Oct 6, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12	Raypol silt loam, 0 to 3 percent slopes	0.7	4.0%
15	Scarboro muck, 0 to 3 percent slopes	4.0	22.3%
29A	Agawam fine sandy loam, 0 to 3 percent slopes	0.2	1.2%
36B	Windsor loamy sand, 3 to 8 percent slopes	0.6	3.2%
236B	Windsor-Urban land complex, 0 to 8 percent slopes	0.8	4.4%
307	Urban land	8.2	45.7%
701A	Ninigret fine sandy loam, 0 to 3 percent slopes	3.5	19.3%
Totals for Area of Interest		**17.9**	**100.0%**

Map Unit Descriptions

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

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

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

components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

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

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

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

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

State of Connecticut, Western Part

12—Raypol silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9ljx
Elevation: 0 to 1,350 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Raypol and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Raypol

Setting

Landform: Drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 8 inches: silt loam
Bg1 - 8 to 12 inches: very fine sandy loam
Bg2 - 12 to 20 inches: silt loam
Bw1 - 20 to 26 inches: silt loam
Bw2 - 26 to 29 inches: very fine sandy loam
2C1 - 29 to 52 inches: stratified very gravelly coarse sand to loamy fine sand
2C2 - 52 to 65 inches: stratified very gravelly coarse sand to loamy fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 28 to 32 inches to abrupt textural change
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 0 to 4 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

Minor Components

Raynham

Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F145XY004CT - Wet Lake Plain
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY031MA - Very Wet Outwash
Hydric soil rating: Yes

Tisbury

Percent of map unit: 5 percent
Landform: Outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY026CT - Moist Silty Outwash
Hydric soil rating: No

Enfield

Percent of map unit: 5 percent
Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F145XY009CT - Well Drained Outwash
Hydric soil rating: No

15—Scarboro muck, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svkt
Elevation: 0 to 1,350 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Scarboro and similar soils: 80 percent

Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Scarboro

Setting

Landform: Outwash terraces, outwash deltas, depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave, linear
Parent material: Sandy glaciofluvial deposits derived from schist and/or gneiss and/or granite

Typical profile

Oa - 0 to 8 inches: muck
A - 8 to 14 inches: mucky fine sandy loam
Cg1 - 14 to 22 inches: sand
Cg2 - 22 to 65 inches: gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (1.42 to 14.17 in/hr)
Depth to water table: About 0 to 2 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Ecological site: F144AY031MA - Very Wet Outwash
Hydric soil rating: Yes

Minor Components

Timakwa

Percent of map unit: 10 percent
Landform: Swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Walpole

Percent of map unit: 8 percent
Landform: Outwash terraces, depressions, outwash plains, depressions, deltas
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave

Across-slope shape: Concave
Hydric soil rating: Yes

Deerfield

Percent of map unit: 2 percent
Landform: Outwash plains, terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

29A—Agawam fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyqw
Elevation: 0 to 1,040 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Agawam and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Agawam

Setting

Landform: Outwash terraces, outwash plains, kame terraces, kames, moraines
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, riser, rise, dip
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

Typical profile

Ap - 0 to 11 inches: fine sandy loam
Bw1 - 11 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C1 - 26 to 39 inches: loamy fine sand
2C2 - 39 to 55 inches: loamy fine sand
2C3 - 55 to 65 inches: loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 15 to 35 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Ninigret

Percent of map unit: 5 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Windsor

Percent of map unit: 4 percent
Landform: Outwash plains, outwash terraces, deltas, dunes
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Walpole

Percent of map unit: 3 percent
Landform: Outwash plains, depressions, outwash terraces, depressions, deltas
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Hinckley

Percent of map unit: 3 percent
Landform: Outwash plains, eskers, kames, deltas
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

36B—Windsor loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svkf
Elevation: 0 to 1,210 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Windsor and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor

Setting

Landform: Outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or schist and/or gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 10 percent
Landform: Eskers
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Deerfield, loamy sand

Percent of map unit: 5 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

236B—Windsor-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2w2wq
Elevation: 0 to 920 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Windsor and similar soils: 45 percent
Urban land: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor

Setting

Landform: Outwash plains, outwash terraces, deltas, dunes
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

A - 0 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand

C - 25 to 65 inches: sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Udorthents

Percent of map unit: 10 percent
Landform: Outwash plains, outwash terraces, deltas, dunes
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Deerfield

Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear

Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Outwash plains, eskers, kames, deltas
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

307—Urban land

Map Unit Setting

National map unit symbol: 9lmh
Elevation: 0 to 2,000 feet
Mean annual precipitation: 43 to 56 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 120 to 185 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Typical profile

H - 0 to 6 inches: material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Unnamed, undisturbed soils

Percent of map unit: 10 percent
Hydric soil rating: No

Udorthents, wet substratum

Percent of map unit: 10 percent
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

701A—Ninigret fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2y07d
Elevation: 0 to 1,260 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 185 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ninigret and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ninigret

Setting

Landform: Outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist and/or phyllite

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C - 26 to 65 inches: loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 18 to 38 inches to strongly contrasting textural stratification
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 16 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D

Ecological site: F144AY026CT - Moist Silty Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Outwash terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Agawam

Percent of map unit: 5 percent
Landform: Outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Tisbury

Percent of map unit: 3 percent
Landform: Outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY026CT - Moist Silty Outwash
Hydric soil rating: No

Raypol

Percent of map unit: 2 percent
Landform: Drainageways
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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

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

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

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

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

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

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

Map Scale: 1:1,970 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 25 50 100 150

Feet
0 50 100 200 300

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.

Warning: Soil Map may not be valid at this scale.

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

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

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

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

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

Soil Survey Area: State of Connecticut, Western Part
Survey Area Data: Version 1, Sep 15, 2023

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

Date(s) aerial images were photographed: Jun 14, 2022—Oct 6, 2022

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
12	Raypol silt loam, 0 to 3 percent slopes	B/D	0.7	4.0%
15	Scarboro muck, 0 to 3 percent slopes	A/D	4.0	22.3%
29A	Agawam fine sandy loam, 0 to 3 percent slopes	B	0.2	1.2%
36B	Windsor loamy sand, 3 to 8 percent slopes	A	0.6	3.2%
236B	Windsor-Urban land complex, 0 to 8 percent slopes	A	0.8	4.4%
307	Urban land	D	8.2	45.7%
701A	Ninigret fine sandy loam, 0 to 3 percent slopes	B/D	3.5	19.3%
Totals for Area of Interest			**17.9**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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APPENDIX H

Grading & Drainage Plan

benesch

TEST PIT RESULTS

TEST PIT 1

0-56" FILL (FINE TO COARSE SILTY SAND)
APPROX. 10% GLASS, METAL FRAGMENTS, BRICK, AND CONCRETE
56-81" FINE TO MEDIUM SAND
SEEPAGE @ 81"
GROUNDWATER @ 61"

TEST PIT 2

0-66" FILL (FINE TO MEDIUM SILTY SAND)
APPROX. 15% GLASS, METAL FRAGMENTS, BRICK, AND CONCRETE.
SEEPAGE @ 66"
GROUNDWATER @ 70"

TEST PIT 3

0-3" ASHPAULT
3-15" PROCESSED GRAVEL
15-39" FINE TO MEDIUM SILTY SAND
39"-52" SCARBORO MUCK
52"-60" OLIVE-GREY, FINE SILTY SAND
SEEPAGE @ 39"
GROUNDWATER @ 24"

STAND PIPE RESULTS (SAME LOCATION AS TEST PITS)

	DEPTH TO GROUNDWATER				
TP ID	3/26/2021	4/2/2021	4/9/2021	4/19/2021	4/23/2021
1	60"	59"	68.5"	61"	62"
2	DRY @ 70"	DRY @ 70"	70"	70"	70"
3	19"	23"	26"	24.5"	24.5"

TOWN OF GLASTONBURY MS4 PERMIT INFORMATION	IMPERVIOUS AREA	DIRECTLY CONNECTED IMPERVIOUS AREA
PRE-DEVELOPMENT	3.54 AC (72.4%)	3.54 AC (72.4%)
POST-DEVELOPMENT	3.69 AC (75.3%)	0.02 AC (0.44%)
PRE-NET CHANGE (+ OR -)	+0.15 AC (2.9%)	-3.52 AC (-71.96%)

Prepared by:

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Prepared for:

HB NITKIN

HB Nitkin Group
230 Mason Street
Greenwich, Connecticut 06830
203-861-9000

MAIN STREET COMMERCIAL REDEVELOPMENT

2283-2389 MAIN STREET

GLASTONBURY, CT

DATE:	REVISION:

STATE OF CONNECTICUT
WILLIAM G. WALKER
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO.: 70607.00
SCALE: AS NOTED
DATE: 07/26/2024

DRAWN BY: GSL
CHECKED BY: WGW

GRADING & DRAINAGE PLAN (LOWER/GRADE LEVEL)

DRAWING NO.:
C3.0

30 0 30 60
1" = 30'