

DRAINAGE SUMMARY REPORT

For

**65 Stanton Lane
Stamford, Connecticut**

Prepared For

Jessica Domiziano

November 9, 2023



A handwritten signature in blue ink that reads "Leonard C. D'Andrea".

Leonard C. D'Andrea, PE
CT License No. 14869

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Introduction & LID Techniques

1.1. Project Narrative

The applicant is proposing improvements to the subject property. The proposed improvements will include the construction of additions to the existing dwelling and expansion of the existing driveway. Improvements also include the installation of a storm drainage system, site grading, and associated landscaping.

For a depiction of existing conditions and the proposed development refer to a development plan set entitled "Final Site Plan Review Set, Proposed Additions, Location 65 Stanton Lane, Stamford, Connecticut, prepared for Jessica Domiziano" as prepared by Rocco V. D'Andrea, Inc.

The subject parcel is approximately 26,950 square feet in size and is located approximately 325 feet east of the intersection of Stanton Lane and Skyview Drive. The proposed additions of the parcel will increase the impervious coverage by approximately 1,120 square feet. Refer to Appendix "C" for a depiction of the proposed stormwater BMPs and drainage calculations.

This proposed project will conform to all applicable Town stormwater management standards to the maximum extent practicable. Refer to Appendix "A" for a narrative detailing the projects compliance with each stormwater management standard.

1.2. Land Use Regulations

The subject parcel is located in the "R-20" zone. All applicable zoning setbacks and regulations will be adhered to. There are wetlands located on the property, Refer to "Soil Report" dated 4/3/17 by Steven Danzer, PhD & Associates LLC for more information.

1.3. Site Inventory & Evaluation

The site consists of an existing asphalt driveway, a dwelling, a wooden deck, stone patios, a pool and spa, and a concrete pool deck. The topography of the site exhibits slopes from south to north with flows discharging onto the wetlands along the northern property line. Existing drainage patterns will generally be maintained under post-construction conditions.

Refer to Exhibit "C" for the USDA soil delineation map and hydraulic soil group ratings for the site. Refer to the Development Plan for the test pit locations and Appendix "G" for the soil test results forms.

1.4. Development Envelope

Due to the size, layout, topography of the property and scope of work proposed, the development envelope will encompass approximately 80% of the site. Sediment and erosion controls will be installed around the proposed development envelope prior to the start of construction to minimize the impact to the surrounding areas.

1.5. LID Control Strategies

In the watershed analysis of existing and proposed conditions, the site has been divided into various sub-drainage areas discharging to various POCs, “points of concern.” The analysis is limited to the subject parcel. Refer to Exhibits “A” and “B” for a depiction of the existing and proposed conditions drainage areas and flow paths. Refer to Appendices “D” and “E” for the existing and proposed HydroCAD Analysis.

Conformance to the standards for water quality, TSS removal, and runoff volume reduction will be achieved through the construction of the proposed BMPs. The runoff peak flow reduction standard has been met for all storms up to the 25-year storm to all points of concern. Refer to the HydroCAD Summary Table at the end of this introduction for a comparison of existing and proposed condition stormwater runoff volumes and flow rates to all points of concern.

2. Structural BMPs

2.1. Water Quality Volume and TSS Removal

Refer to Appendix “C” for Water Quality Volume calculations. The proposed BMPs will provide adequate storage to retain and infiltrate the water quality volume of the contributing runoff from the proposed impervious improvements.

Retention of the Water Quality Volume from newly constructed impervious areas will provide the minimum 80% removal of total suspended solids (TSS), which exceeds Town standards. Refer to Appendix “C” for TSS removal calculations.

This volume will be retained and infiltrated by the proposed stormwater systems. Refer to Appendix “C” for 72-Hour Drawdown Calculations.

2.2. Runoff Reduction Volume

The proposed development will not result in an increase in runoff volume from the site for the 1-year storm event towards all points of concern, as compared to existing conditions. Refer to Appendix “C” for Runoff Reduction Volume Calculations.

2.3. Groundwater Recharge Volume

The groundwater recharge standard has been satisfied through the stormwater infiltration capabilities of the proposed systems. Refer to Appendix “C” for Groundwater Recharge Volume Calculations.

2.4. Peak Runoff Attenuation

The proposed development will decrease peak runoff flow rates to less than pre-construction conditions to all points of concern. Refer to Appendices “D” and “E”. The decrease in peak runoff flow rates meets the standard of reduction for all storms up to the 25-year storm.

3. Conclusion

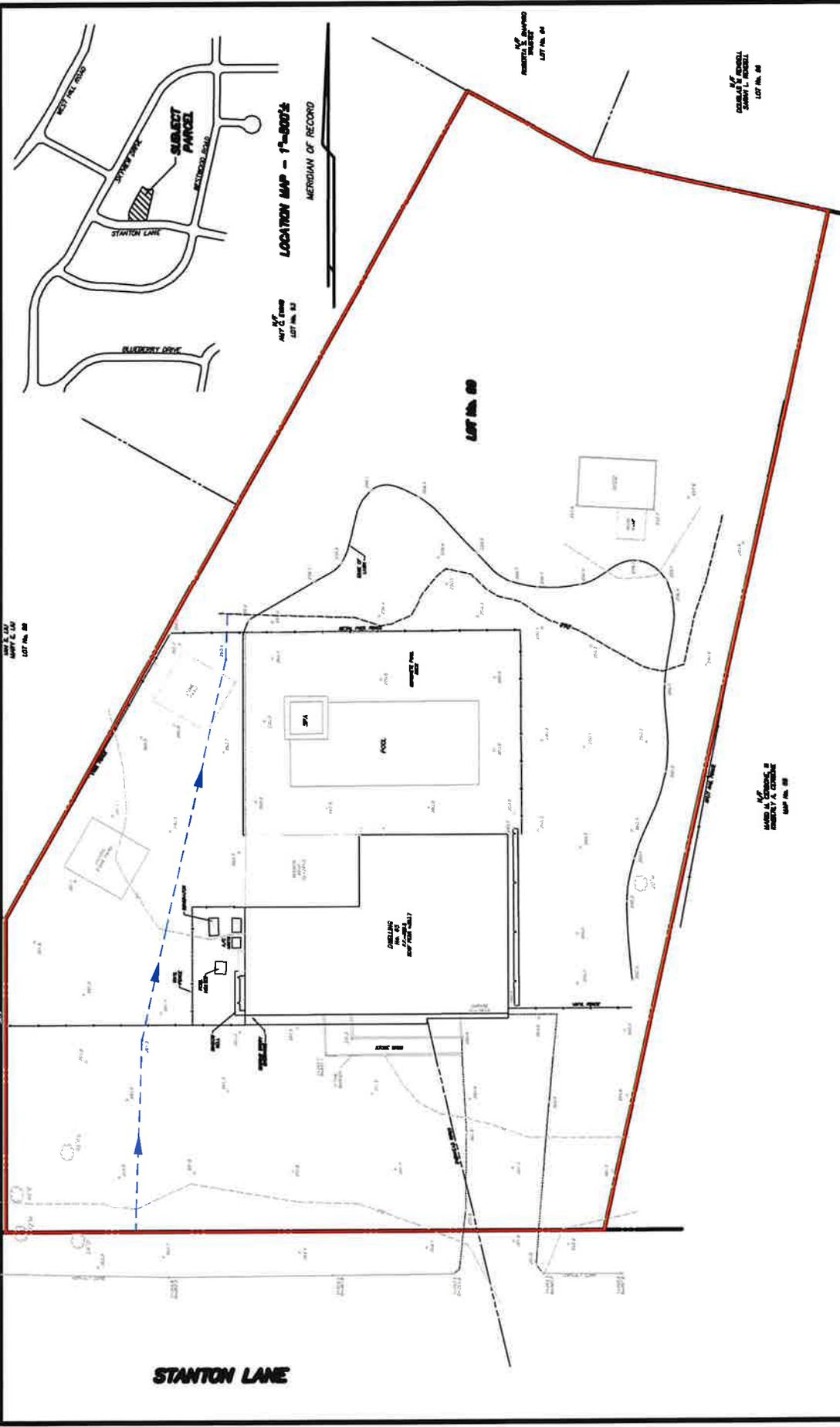
The proposed improvements to the subject parcel will increase the impervious coverage on the site and thus increase the volume and peak rate of runoff generated during a storm event. However, with the use of the proposed BMPs and site grading there will be a reduction in stormwater runoff volume and flow rates to all points of concern.

The proposed development will meet the water quality volume, TSS removal, runoff reduction volume, and groundwater recharge volume standards of the Town of Greenwich Drainage Manual to the maximum extent practicable. The proposed development incorporates pre-treatment and attenuation of runoff to the maximum extent practicable. If the development is constructed as depicted on the proposed plans, there will be no adverse impacts to adjoining properties, the subject parcel, or the town drainage system, due to the proposed improvements.

		Peak Flows (q)				Runoff Volume (V)			
		q _{ex} (ft ³ /s)	q _p (ft ³ /s)	Δq (ft ³ /s)	%Δq (ft ³ /s)	v _{ex} (ft ³ /s)	v _p (ft ³ /s)	ΔV (ft ³ /s)	%ΔV (ft ³ /s)
POC A	1 Year Storm	0.67	0.56	-0.11	-16%	2,745	2,569	-176	-6%
	2 Year Storm	0.94	0.92	-0.02	-2%	3,833	3,673	-160	-4%
	5 Year Storm	1.42	1.38	-0.04	-3%	5,765	5,625	-140	-2%
	10 Year Storm	1.76	1.70	-0.06	-3%	7,174	7,044	-130	-2%
	25 Year Storm	2.11	2.03	-0.08	-4%	8,614	8,494	-120	-1%
	50 Year Storm	2.46	2.37	-0.09	-4%	10,077	9,965	-112	-1%
	100 Year Storm	2.86	2.75	-0.11	-4%	11,770	11,667	-103	-1%

Table 1: Comparison of Existing and Proposed Peak Flow Rates and Volumes for all Point of Concerns.

Exhibits “A & B”
Existing and Proposed
Watershed Maps

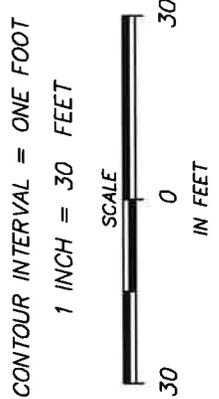


ROCCO V. D'ANDREA, INC.
 LAND PLANNERS
 ENGINEERS
 SURVEYORS

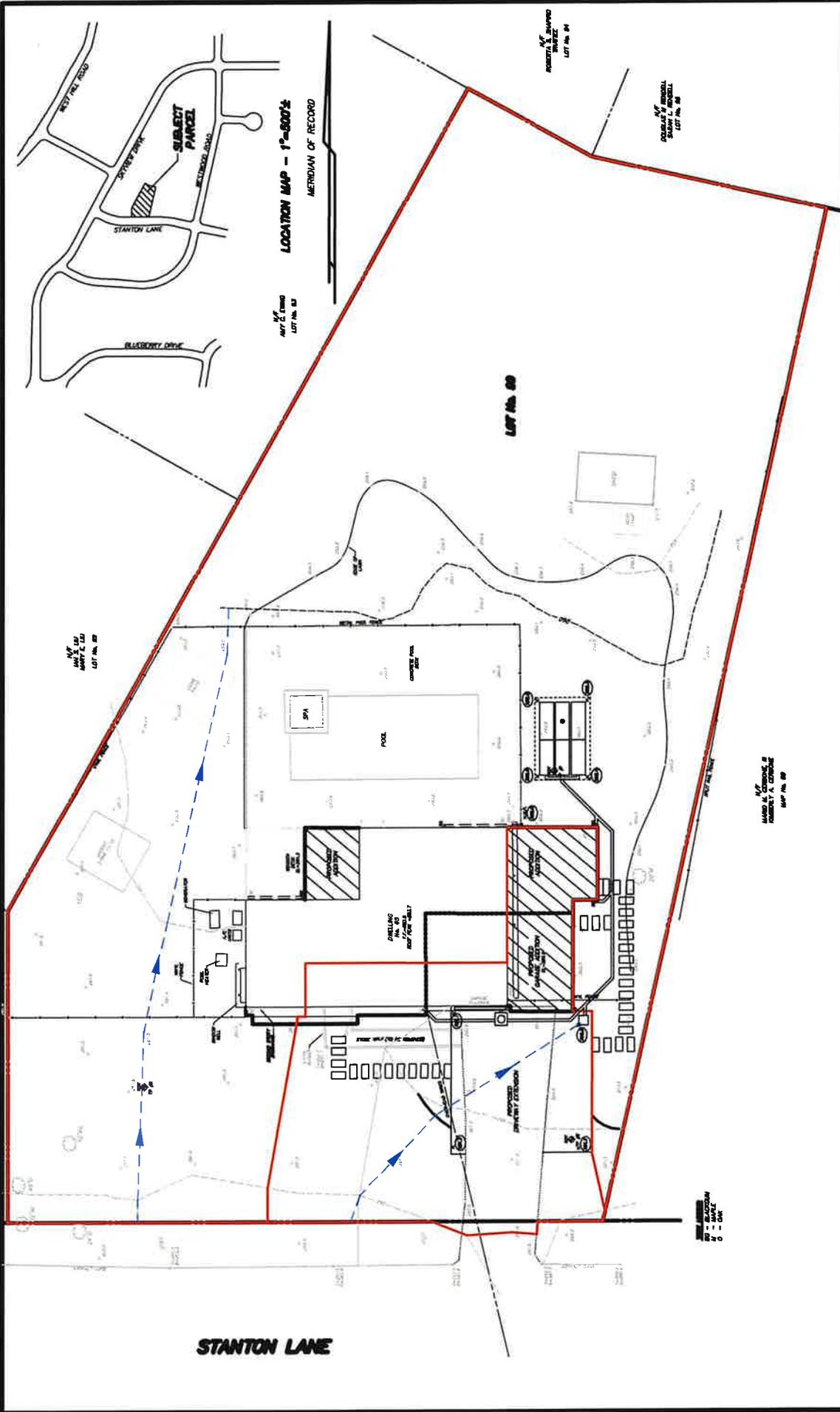
P.O. BOX 549
 RIVERSIDE, CT 06878

6 NEIL LANE
 TEL. 637-1779

EXHIBIT "A"
EXISTING CONDITIONS



STANTON LANE



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 RIVERSIDE, CT 06878

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EXHIBIT "B"
PROPOSED CONDITIONS

CONTOUR INTERVAL = ONE FOOT

1 INCH = 30 FEET

A horizontal graphic scale bar with markings at 0, 30, and 60 feet. The text 'SCALE' is centered above the bar, and 'IN FEET' is written vertically below the bar.

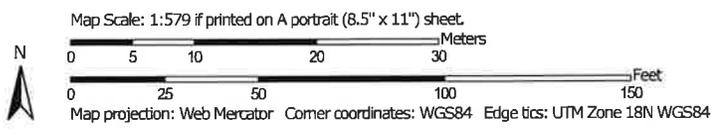
Exhibit “C”

USDA Soil Delineation Map

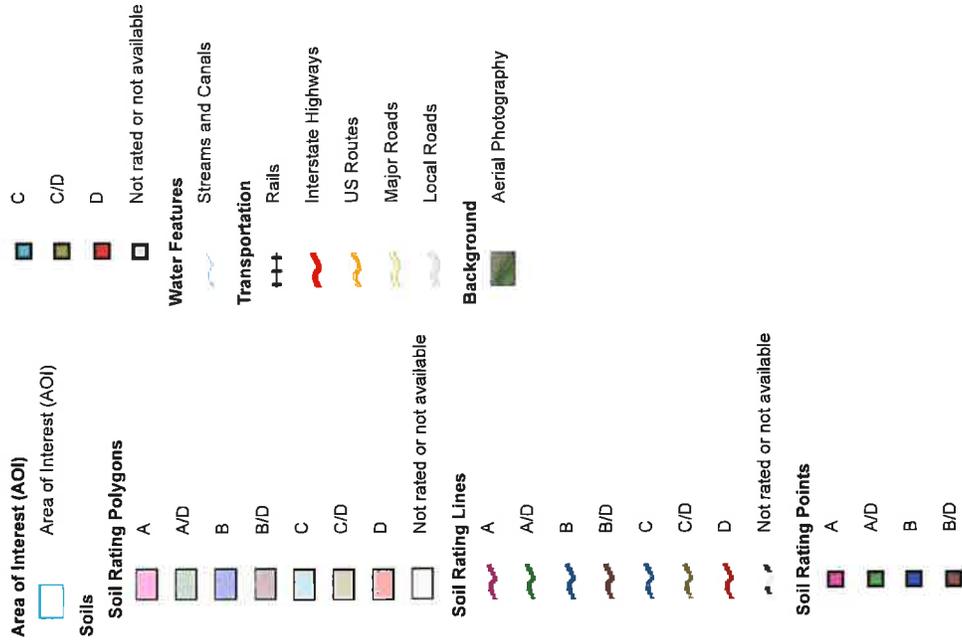
Hydrologic Soil Group—State of Connecticut, Western Part



Soil Map may not be valid at this scale.



MAP LEGEND



MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: State of Connecticut, 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: Oct 21, 2022—Oct 27, 2022

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	D	0.1	6.5%
51B	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	B/D	0.9	93.5%
Totals for Area of Interest			1.0	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Exhibit “D”
Site Vicinity Map

National Flood Hazard Layer FIRMette



39°34'8"W 41°51'1"N

Legend

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

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE)
Zone A, V, A99
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Area of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes, *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS

- NO SCREEN
- Area of Minimal Flood Hazard *Zone X*
- Effective LOMFRs
- Area of Undetermined Flood Hazard *Zone*

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS

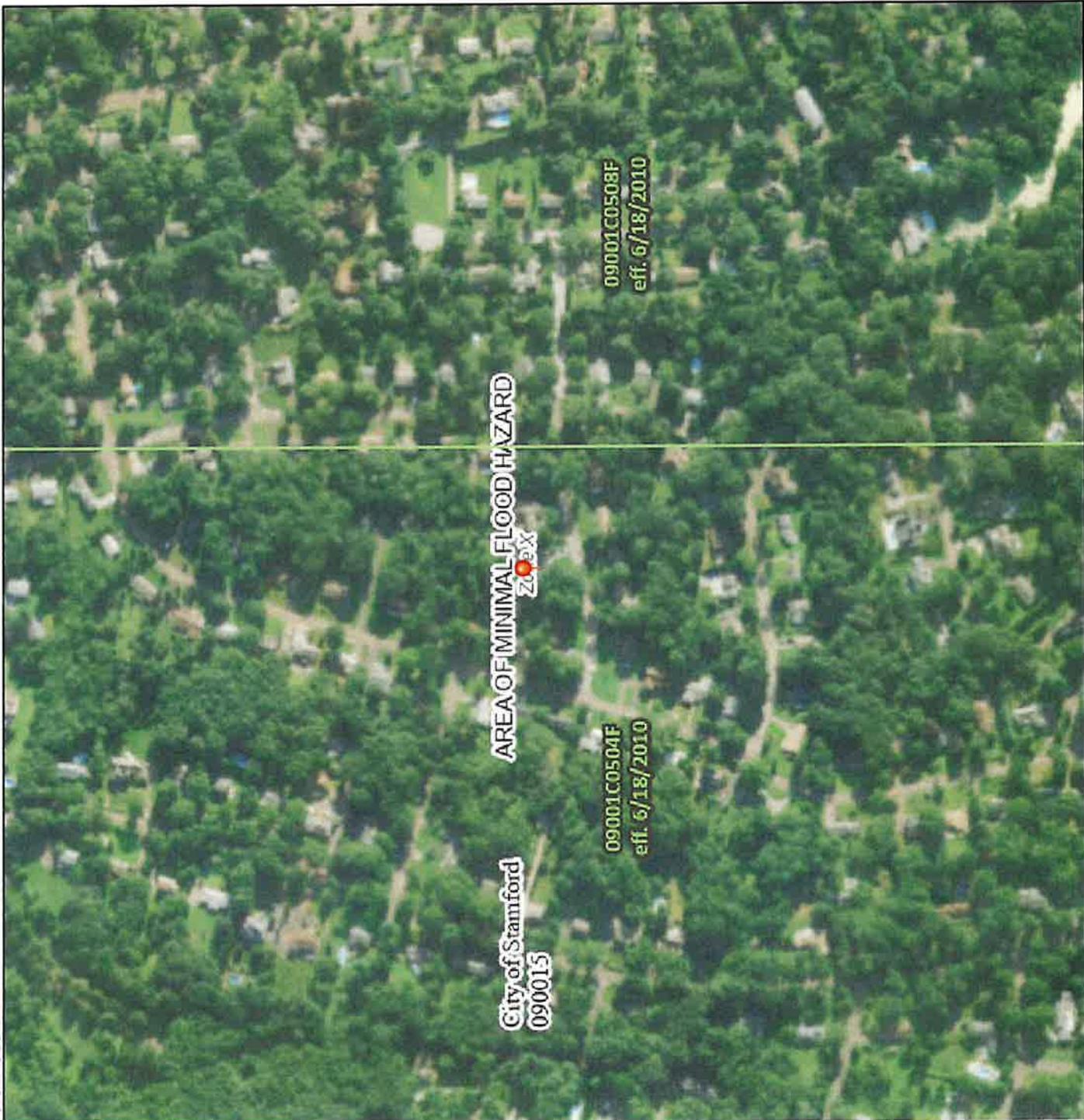
- Digital Data Available
- No Digital Data Available
- Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **11/17/2023 at 3:14 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



73°33'30"W 41°4'33"N

Appendix “A”

**Drainage System
Design Calculations**

Project ID: 23BL_Appendix_A_Drainage_Calcs_00.xlsx

Date: 11/9/2023

Groundwater Recharge Volume

Site Information

Existing Impervious Cover	=	5,756 ft ²
Proposed Impervious Cover	=	6,873 ft ²
Net Increase	=	1,117 ft ²

GRV = F x I

Where:

GRV = Groundwater recharge volume

F = Target depth factor

I = Net increase in impervious area

Soil Type: D

= 0.10 inches

= 1,117 ft²**GRV = 9.3 ft³****Runoff Reduction Volume: POC A**

25-Year Storm Runoff Data at POC

Pre-development runoff volume	=	8,614 ft ³
Post-development runoff volume	=	8,494 ft ³

RRV = V_{post} - V_{pre}

Where:

RRV = Runoff reduction volume

V_{pre} = 25-year pre-development runoff volumeV_{post} = 25-year post-development runoff volume (No BMPs)**RRV = -120 ft³**

Runoff and Pollutant Reduction:

The volume of runoff generated by one inch of rainfall on a site shall be treated based on the results of the DCIA Tracking Spreadsheet, Appendix E:

Water Quality Volume: 1S

Watershed Data

Watershed Area (A)	=	22,925 ft ²
Impervious Cover	=	4,505 ft ²
Pervious Cover	=	18,420 ft ²
% Impervious	=	19.7%
% Pervious	=	80.3%
Impervious Coefficient	=	0.95
Pervious Coefficient	=	0.25
Runoff Coefficient (R)	=	0.39

$$WQV = (1/12) * R * A$$

Where:

R = Runoff Coefficient (R)

A = Watershed Area (A)

$$WQV = 740.4 \text{ ft}^3$$

*Not required based on results of DCIA Flowchart.

Water Quality Volume: 2S

Watershed Data

Watershed Area (A)	=	4,082 ft ²
Impervious Cover	=	2,368 ft ²
Pervious Cover	=	1,714 ft ²
% Impervious	=	58.0%
% Pervious	=	42.0%
Impervious Coefficient	=	0.95
Pervious Coefficient	=	0.25
Runoff Coefficient (R)	=	0.66

$$WQV = (1/12) * R * A$$

Where:

R = Runoff Coefficient (R)

A = Watershed Area (A)

$$WQV = 223.2 \text{ ft}^3$$

*Not required based on results of DCIA Flowchart.

TSS Removal Rates:

Stormwater BMPs shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

Treatment Train #1: Cultec Drywells

$$R = A + B - [(A*B)/100]$$

Where:

R = Total TSS Removal Rate

A = TSS Removal Rate for Retention System #1 = 80 %

B = TSS Removal Rate for Retention System #2 = 0 %

R = 80 % TSS Requirement Satisfied

Drainage Calculations Summary:**Groundwater Recharge Volume Check:**

Groundwater Recharge Volume Required	=	9.3 ft ³	
Total Recharge Storage Provided On Site	=	242 ft ³	GRV Satisfied

Point of Concern: A

Runoff Reduction Volume Required at POC	=	-120 ft ³	
Runoff Storage Provided at POC	=	242 ft ³	RRV Satisfied
Water Quality Volume Required at POC	=	0 ft ³	
Total Storage Provided at POC	=	242 ft ³	WQV Satisfied

Appendix “B”

**HydroCAD Analysis –
Existing Conditions**

Stamford Appendix B Existing

Prepared by (enter your company name here)

HydroCAD® 10.00-24 s/n 10971 © 2018 HydroCAD Software Solutions LLC

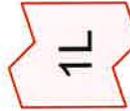
Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
21,202	80.0	>75% Grass cover, Good, HSG D (1S)
795	98.0	Paved parking, HSG D (1S)
2,325	98.0	Roofs, HSG D (1S)
1,904	98.0	Unconnected pavement, HSG D (1S)
732	98.0	Water Surface, HSG D (1S)
26,958	83.8	TOTAL AREA

Stamford



1S



POC A



Summary for Subcatchment 1S: 1S

Runoff = 2.11 cfs @ 12.19 hrs, Volume= 8,614 cf, Depth= 3.83"

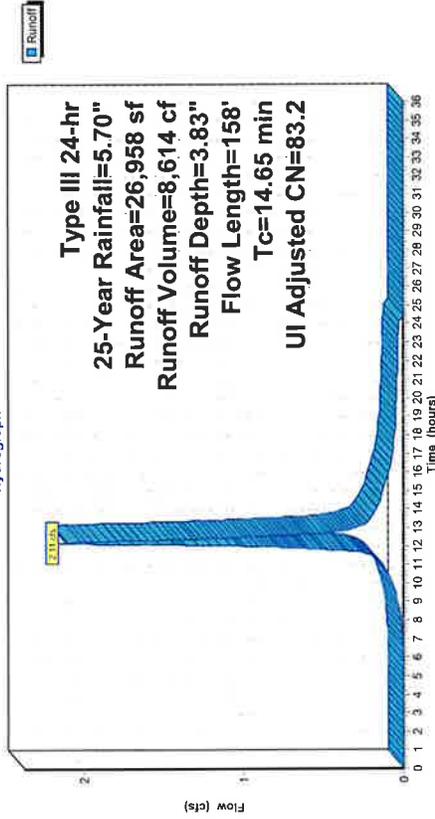
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.70"

Area (sf)	CN	Adj	Description
1,834	98.0		Roofs, HSG D
146	98.0		Unconnected pavement, HSG D
795	98.0		Paved parking, HSG D
732	98.0		Water Surface, HSG D
1,729	98.0		Unconnected pavement, HSG D
29	98.0		Unconnected pavement, HSG D
167	98.0		Roofs, HSG D
168	98.0		Roofs, HSG D
156	98.0		Roofs, HSG D
21,202	80.0		>75% Grass cover, Good, HSG D
26,958	83.8	83.2	Weighted Average, UI Adjusted
21,202			78.65% Pervious Area
5,756			21.35% Impervious Area
1,904			33.08% Unconnected

Tc (min)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.34	100	0.0190	0.12	Sheet Flow, Grass: Dense n= 0.240 P2= 3.30" Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.31	58	0.0431	3.11	
14.65	158	Total		

Subcatchment 1S: 1S

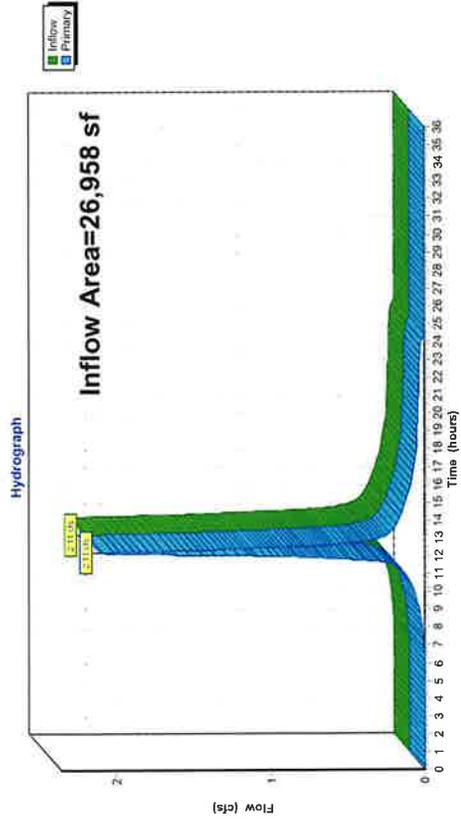
Hydrograph



Summary for Link 1L: POC A

Inflow Area = 26,958 sf, 21.35% Impervious, Inflow Depth = 3.83" for 25-Year event
 Inflow = 2.11 cfs @ 12.19 hrs, Volume= 8,614 cf
 Primary = 2.11 cfs @ 12.19 hrs, Volume= 8,614 cf, Atten= 0%, Lag= 0.0 min
 Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 1L: POC A



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=26,958 sf 21.35% Impervious Runoff Depth=1.22"
 Flow Length=158' Tc=14.65 min UJ Adjusted CN=83.2 Runoff=0.67 cfs 2,745 cf
 Inflow=0.67 cfs 2,745 cf
 Primary=0.67 cfs 2,745 cf

Link 1L: POC A

Summary for Subcatchment 1S: 1S

Runoff = 0.67 cfs @ 12.21 hrs, Volume= 2,745 cf, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Adj	Description
1,834	98.0		Roofs, HSG D
146	98.0		Unconnected pavement, HSG D
795	98.0		Paved parking, HSG D
732	98.0		Water Surface, HSG D
1,729	98.0		Unconnected pavement, HSG D
29	98.0		Unconnected pavement, HSG D
167	98.0		Roofs, HSG D
168	98.0		Roofs, HSG D
156	98.0		Roofs, HSG D
21,202	80.0		>75% Grass cover, Good, HSG D
26,958	83.8	83.2	Weighted Average, UJ Adjusted
21,202			78.65% Pervious Area
5,756			21.35% Impervious Area
1,904			33.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.34	100	0.0190	0.12		Sheet Flow,
0.31	58	0.0431	3.11		Grass: Dense n= 0.240 P2= 3.30" Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
14.65	158	Total			

Summary for Link 1L: POC A

Inflow Area = 26,958 sf, 21.35% Impervious, Inflow Depth = 1.22" for 1-Year event
 Inflow = 0.67 cfs @ 12.21 hrs, Volume= 2,745 cf
 Primary = 0.67 cfs @ 12.21 hrs, Volume= 2,745 cf, Atten= 0%, Lag= 0.0 min
 Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=26,958 sf 21.35% Impervious Runoff Depth=1.71"
 Flow Length=158' Tc=14.65 min UI Adjusted CN=83.2 Runoff=0.94 cfs 3,833 cf
 Inflow=0.94 cfs 3,833 cf
 Primary=0.94 cfs 3,833 cf

Link 1L: POC A

Summary for Subcatchment 1S: 1S

Runoff = 0.94 cfs @ 12.20 hrs, Volume= 3,833 cf, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Adj	Description
1,834	98.0		Roofs, HSG D
146	98.0		Unconnected pavement, HSG D
795	98.0		Paved parking, HSG D
732	98.0		Water Surface, HSG D
1,729	98.0		Unconnected pavement, HSG D
29	98.0		Unconnected pavement, HSG D
167	98.0		Roofs, HSG D
168	98.0		Roofs, HSG D
156	98.0		Roofs, HSG D
21,202	80.0		>75% Grass cover, Good, HSG D
26,958	83.8	83.2	Weighted Average, UI Adjusted
21,202			78.65% Pervious Area
5,756			21.35% Impervious Area
1,904			33.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.34	100	0.0190	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30" Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.31	58	0.0431	3.11		
14.65	158	Total			

Summary for Link 1L: POC A

Inflow Area = 26,958 sf, 21.35% Impervious, Inflow Depth = 1.71" for 2-Year event
 Inflow = 0.94 cfs @ 12.20 hrs, Volume= 3,833 cf
 Primary = 0.94 cfs @ 12.20 hrs, Volume= 3,833 cf, Atten= 0%, Lag= 0.0 min
 Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S
 Runoff Area=26,958 sf 21.35% Impervious Runoff Depth=2.57"
 Flow Length=158' Tc=14.65 min U/Adjusted CN=83.2 Runoff=1.42 cfs 5,765 cf

Inflow=1.42 cfs 5,765 cf
 Primary=1.42 cfs 5,765 cf

Summary for Subcatchment 1S: 1S

Runoff = 1.42 cfs @ 12.20 hrs, Volume= 5,765 cf, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 5-Year Rainfall=4.30"

Link 1L: POC A

Area (sf)	CN	Adj	Description
1,834	98.0		Roofs, HSG D
146	98.0		Unconnected pavement, HSG D
795	98.0		Paved parking, HSG D
732	98.0		Water Surface, HSG D
1,729	98.0		Unconnected pavement, HSG D
29	98.0		Unconnected pavement, HSG D
167	98.0		Roofs, HSG D
168	98.0		Roofs, HSG D
156	98.0		Roofs, HSG D
21,202	80.0		>75% Grass cover, Good, HSG D
26,958	83.8	83.2	Weighted Average, U/ Adjusted
21,202			78.65% Pervious Area
5,756			21.35% Impervious Area
1,904			33.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.34	100	0.0190	0.12		Sheet Flow,
0.31	58	0.0431	3.11		Grass: Dense n= 0.240 P2= 3.30"
					Shallow Concentrated Flow,
					Grassed Waterway Kv= 15.0 fps
14.65	158	Total			

Summary for Link 1L: POC A

Inflow Area = 26,958 sf, 21.35% Impervious, Inflow Depth = 2.57" for 5-Year event
 Inflow = 1.42 cfs @ 12.20 hrs, Volume= 5,765 cf
 Primary = 1.42 cfs @ 12.20 hrs, Volume= 5,765 cf, Atten= 0%, Lag= 0.0 min

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

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS, TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=26,958 sf 21.35% Impervious Runoff Depth=3.19"
 Flow Length=158' Tc=14.65 min UJ Adjusted CN=83.2 Runoff=1.76 cfs 7,174 cf
 Inflow=1.76 cfs 7,174 cf
 Primary=1.76 cfs 7,174 cf

Link 1L: POC A

Summary for Subcatchment 1S: 1S

Runoff = 1.76 cfs @ 12.20 hrs, Volume= 7,174 cf, Depth= 3.19"

Runoff by SCS, TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Year Rainfall=5.00"

Area (sf)	CN	Adj	Description
1,834	98.0		Roofs, HSG D
146	98.0		Unconnected pavement, HSG D
795	98.0		Paved parking, HSG D
732	98.0		Water Surface, HSG D
1,729	98.0		Unconnected pavement, HSG D
29	98.0		Unconnected pavement, HSG D
167	98.0		Roofs, HSG D
168	98.0		Roofs, HSG D
156	98.0		Roofs, HSG D
21,202	80.0		>75% Grass cover, Good, HSG D
26,958	83.8	83.2	Weighted Average, UJ Adjusted
21,202			78.65% Pervious Area
5,756			21.35% Impervious Area
1,904			33.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.34	100	0.0190	0.12		Sheet Flow,
0.31	58	0.0431	3.11		Grass: Dense n= 0.240 P2= 3.30" Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
14.65	158				Total

Summary for Link 1L: POC A

Inflow Area = 26,958 sf, 21.35% Impervious, Inflow Depth = 3.19" for 10-Year event
 Inflow = 1.76 cfs @ 12.20 hrs, Volume= 7,174 cf
 Primary = 1.76 cfs @ 12.20 hrs, Volume= 7,174 cf, Atten= 0%, Lag= 0.0 min
 Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=26,958 sf 21.35% Impervious Runoff Depth=3.83"
 Flow Length=158' Tc=14.65 min UJ Adjusted CN=83.2 Runoff=2.11 cfs 8,614 cf
 Inflow=2.11 cfs 8,614 cf
 Primary=2.11 cfs 8,614 cf

Link 1L: POC A

Summary for Subcatchment 1S: 1S

Runoff = 2.11 cfs @ 12.19 hrs, Volume= 8,614 cf, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.70"

Area (sf)	CN	Adj	Description
1,834	98.0		Roofs, HSG D
146	98.0		Unconnected pavement, HSG D
795	98.0		Paved parking, HSG D
732	98.0		Water Surface, HSG D
1,729	98.0		Unconnected pavement, HSG D
29	98.0		Unconnected pavement, HSG D
167	98.0		Roofs, HSG D
168	98.0		Roofs, HSG D
156	98.0		Roofs, HSG D
21,202	80.0		>75% Grass cover, Good, HSG D
26,958	83.8	83.2	Weighted Average, UJ Adjusted
21,202			78.65% Pervious Area
5,756			21.35% Impervious Area
1,904			33.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.34	100	0.0190	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30" Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.31	58	0.0431	3.11		
14.65	158	Total			

Summary for Link 1L: POC A

Inflow Area = 26,958 sf, 21.35% Impervious, Inflow Depth = 3.83" for 25-Year event
 Inflow = 2.11 cfs @ 12.19 hrs, Volume= 8,614 cf
 Primary = 2.11 cfs @ 12.19 hrs, Volume= 8,614 cf, Atten= 0%, Lag= 0.0 min
 Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=26,958 sf 21.35% Impervious Runoff Depth=4.49"
 Flow Length=158' Tc=14.65 min UI Adjusted CN=83.2 Runoff=2.46 cfs 10,077 cf
 Inflow=2.46 cfs 10,077 cf
 Primary=2.46 cfs 10,077 cf

Link 1L: POC A

Summary for Subcatchment 1S: 1S

Runoff = 2.46 cfs @ 12.19 hrs, Volume= 10,077 cf, Depth= 4.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50-Year Rainfall=6.40"

Area (sf)	CN	Adj	Description
1,834	98.0		Roofs, HSG D
146	98.0		Unconnected pavement, HSG D
795	98.0		Paved parking, HSG D
732	98.0		Water Surface, HSG D
1,729	98.0		Unconnected pavement, HSG D
29	98.0		Unconnected pavement, HSG D
167	98.0		Roofs, HSG D
168	98.0		Roofs, HSG D
156	98.0		Roofs, HSG D
21,202	80.0		>75% Grass cover, Good, HSG D
26,958	83.8	83.2	Weighted Average, UI Adjusted
21,202			78.65% Pervious Area
5,756			21.35% Impervious Area
1,904			33.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.34	100	0.0190	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
0.31	58	0.0431	3.11		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
14.65	158	Total			

Summary for Link 1L: POC A

Inflow Area = 26,958 sf, 21.35% Impervious, Inflow Depth = 4.49" for 50-Year event
 Inflow = 2.46 cfs @ 12.19 hrs, Volume= 10,077 cf
 Primary = 2.46 cfs @ 12.19 hrs, Volume= 10,077 cf, Atten= 0%, Lag= 0.0 min
 Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 1S: 1S

Runoff = 2.86 cfs @ 12.19 hrs, Volume= 11,770 cf, Depth= 5.24"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=7.20"

Area (sf)	CN	Adj	Description
1,834	98.0		Roofs, HSG D
146	98.0		Unconnected pavement, HSG D
795	98.0		Paved parking, HSG D
732	98.0		Water Surface, HSG D
1,729	98.0		Unconnected pavement, HSG D
29	98.0		Unconnected pavement, HSG D
167	98.0		Roofs, HSG D
168	98.0		Roofs, HSG D
156	98.0		Roofs, HSG D
21,202	80.0		>75% Grass cover, Good, HSG D
26,958	83.8	83.2	Weighted Average, UJ Adjusted
21,202			78.65% Pervious Area
5,756			21.35% Impervious Area
1,904			33.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.34	100	0.0190	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
0.31	58	0.0431	3.11		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
14.65	158	Total			

Summary for Link 1L: POC A

Inflow Area = 26,958 sf, 21.35% Impervious, Inflow Depth = 5.24" for 100-Year event
 Inflow = 2.86 cfs @ 12.19 hrs, Volume= 11,770 cf
 Primary = 2.86 cfs @ 12.19 hrs, Volume= 11,770 cf, Atten= 0%, Lag= 0.0 min
 Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 1L: POC A

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method
 Inflow=2.86 cfs 11,770 cf
 Primary=2.86 cfs 11,770 cf

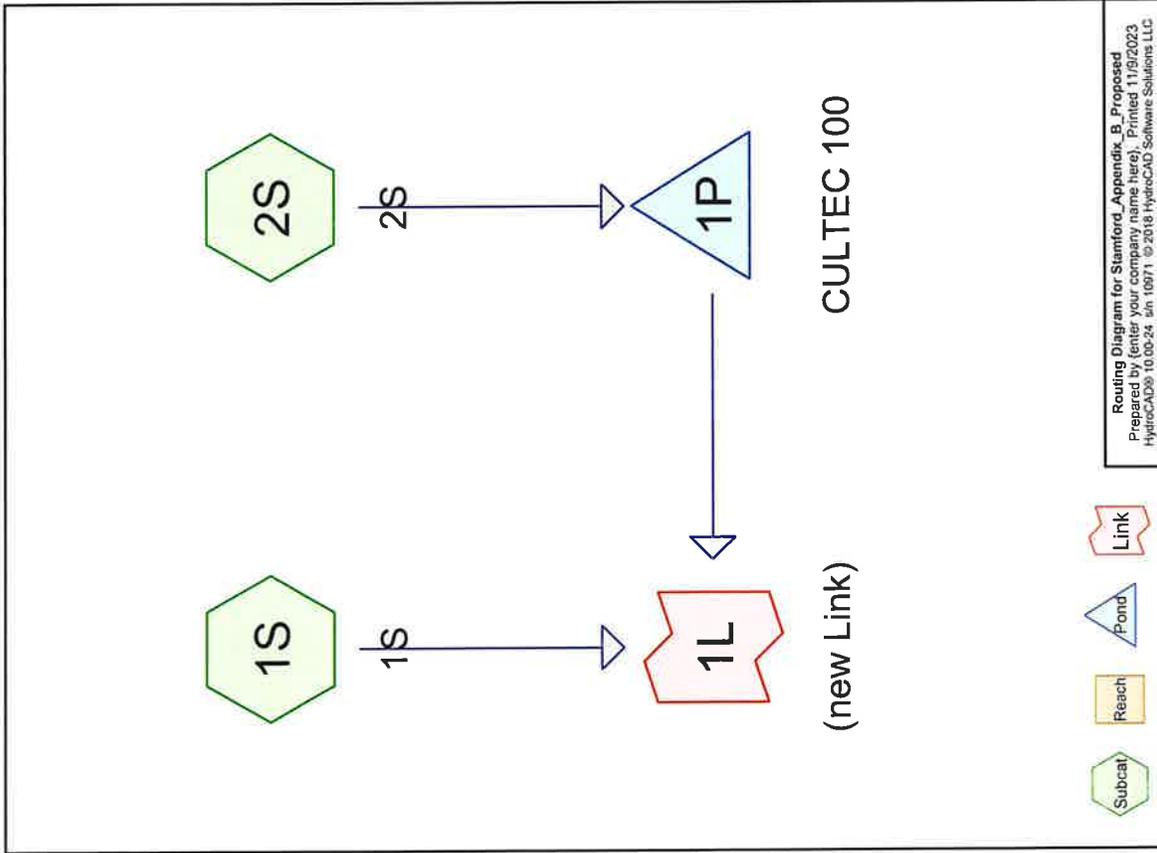
Subcatchment 1S: 1S
 Runoff Area=26,958 sf, 21.35% Impervious, Runoff Depth=5.24"
 Flow Length=158' Tc=14.65 min UJ Adjusted CN=83.2 Runoff=2.86 cfs 11,770 cf

Appendix “C”

HydroCAD Analysis – Proposed Conditions

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
20,134	80.0	>75% Grass cover, Good, HSG D (1S, 2S)
1,180	98.0	Paved parking, HSG D (2S)
2,853	98.0	Roofs, HSG D (1S, 2S)
2,108	98.0	Unconnected pavement, HSG D (1S, 2S)
732	98.0	Water Surface, HSG D (1S)
27,007	84.6	TOTAL AREA



Summary for Subcatchment 1S: 1S

Runoff = 1.77 cfs @ 12.20 hrs, Volume= 7,227 cf, Depth= 3.78"

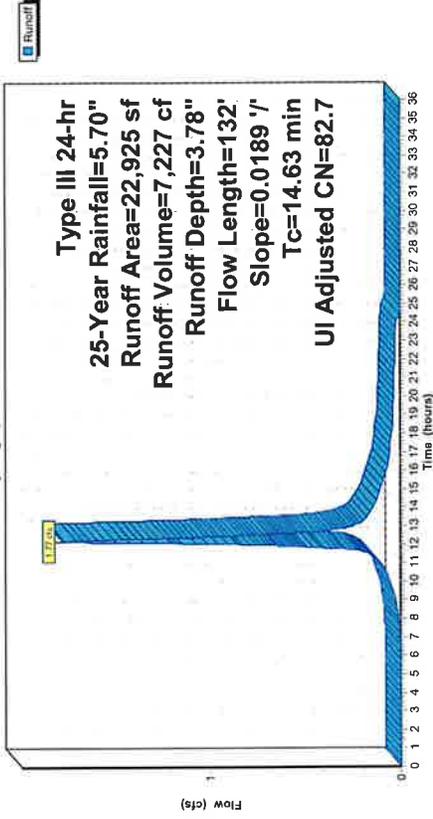
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.70"

Area (sf)	CN	Adj	Description
1,556	98.0		Roofs, HSG D
167	98.0		Roofs, HSG D
1,729	98.0		Unconnected pavement, HSG D
732	98.0		Water Surface, HSG D
133	98.0		Unconnected pavement, HSG D
18,420	80.0		>75% Grass cover, Good, HSG D
188	98.0		Unconnected pavement, HSG D
22,925	83.5	82.7	Weighted Average, UI Adjusted
18,420			80.35% Pervious Area
4,505			19.65% Impervious Area
2,050			45.50% Unconnected

Tc (min)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.37	100	0.0189	0.12	Sheet Flow,
0.26	32	0.0189	2.06	Grass: Dense n= 0.240 P2= 3.30" Shallow Concentrated Flow,
14.63	132	Total		Grassed Waterway Kv= 15.0 fps

Subcatchment 1S: 1S

Hydrograph



Summary for Subcatchment 2S: 2S

Runoff = 0.50 cfs @ 12.07 hrs, Volume= 1,564 cf, Depth= 4.60"

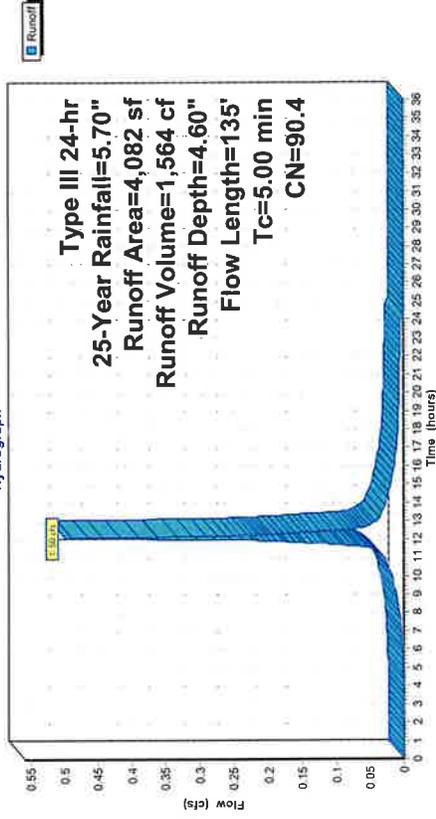
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.70"

Area (sf)	CN	Description
1,180	98.0	Paved parking, HSG D
1,130	98.0	Roofs, HSG D
1,714	80.0	>75% Grass cover, Good, HSG D
58	98.0	Unconnected pavement, HSG D
4,082	90.4	Weighted Average
1,714		41.99% Pervious Area
2,368		58.01% Impervious Area
58		2.45% Unconnected

Tc (min)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.06	33	0.0485	0.14	Sheet Flow , Grass: Dense n= 0.240 P2= 3.30"
0.23	32	0.0125	2.27	Shallow Concentrated Flow , Paved Kv= 20.3 fps
0.24	70	0.0200	4.78	Pipe Channel , 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.011 PVC, smooth interior
4.53	135	Total	Increased to minimum	Tc = 5.00 min

Subcatchment 2S: 2S

Hydrograph



Summary for Pond 1P: CULTEC 100

[93] Warning: Storage range exceeded by 0.06'
 [87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 4,082 sf, 58.01% Impervious, Inflow Depth = 4.60" for 25-Year event
 Inflow = 0.50 cfs @ 12.07 hrs, Volume= 1,564 cf
 Outflow = 0.50 cfs @ 12.07 hrs, Volume= 1,266 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.50 cfs @ 12.07 hrs, Volume= 1,266 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 260.56' @ 12.07 hrs Surf.Area= 252 sf Storage= 299 cf

Plug-Flow detention time= 118.8 min calculated for 1,266 cf (81% of inflow)
 Center-of-Mass det. time= 45.7 min (829.6 - 784.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	257.00'	132 cf	11.67'W x 17.50'L x 2.04'H Field A 417 cf Overall - 87 cf Embedded = 330 cf x 40.0% Voids
#2A	257.50'	87 cf	Cultec C-100HD x 6 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 3 rows
#3	260.40'	1 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#4	258.30'	79 cf	4.00'D x 2.10'H Vertical Cone/Cylinder x 3 299 cf Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
260.40	10	0	0
260.50	10	1	1

Device #1	Routing Primary	Invert 260.40'	Outlet Devices
			4.0" Horiz. Orifice/Grate X 3.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.50 cfs @ 12.07 hrs HW=260.56' TW=0.00' (Dynamic Tailwater)
 1-1=Orifice/Grate (Orifice Controls 0.50 cfs @ 1.91 fps)

Pond 1P: CULTEC 100 - Chamber Wizard Field A

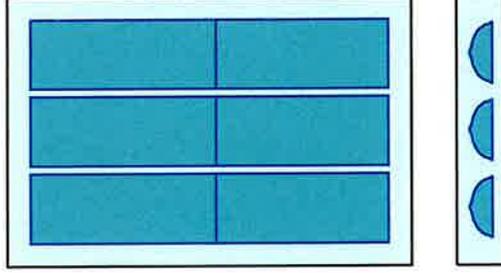
Chamber Model = Cultec C-100HD (Cultec Contactor@ 100HD)
 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
 Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
 Row Length Adjustment= +0.50' x 1.86 sf x 3 rows
 36.0" Wide + 4.0" Spacing = 40.0" C-C Row Spacing

2 Chambers/Row x 7.50' Long +0.50' Row Adjustment = 15.50' Row Length +12.0" End Stone x 2 = 17.50' Base Length
 3 Rows x 36.0" Wide + 4.0" Spacing x 2 + 12.0" Side Stone x 2 = 11.67' Base Width
 6.0" Base + 12.5" Chamber Height + 6.0" Cover = 2.04' Field Height

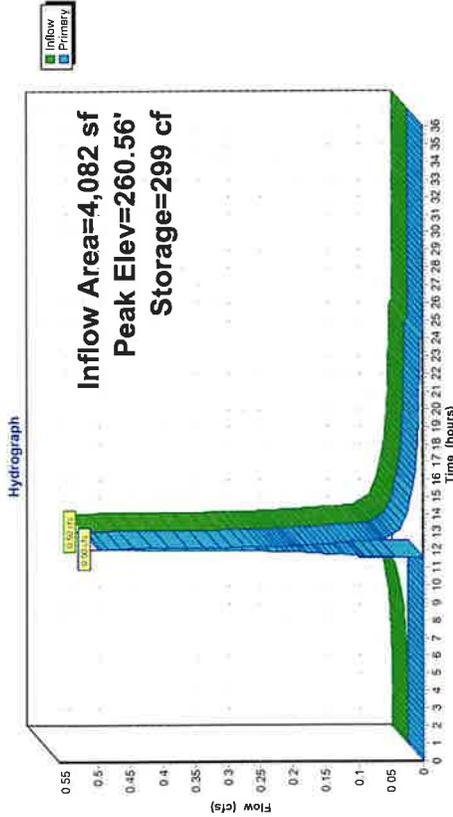
6 Chambers x 14.0 cf +0.50' Row Adjustment x 1.86 sf x 3 Rows = 86.6 cf Chamber Storage
 416.8 cf Field - 86.6 cf Chambers = 330.3 cf Stone x 40.0% Voids = 132.1 cf Stone Storage

Chamber Storage + Stone Storage = 218.7 cf = 0.005 af
 Overall Storage Efficiency = 52.5%
 Overall System Size = 17.50' x 11.67' x 2.04'

6 Chambers
 15.4 cy Field
 12.2 cy Stone



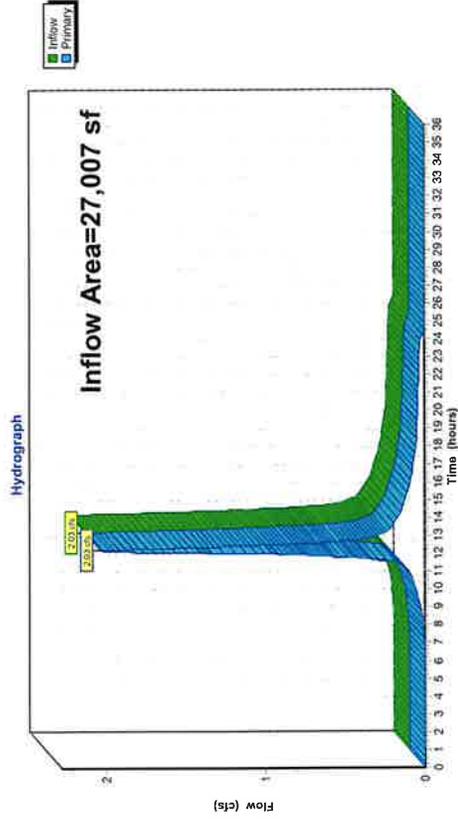
Pond 1P: CULTEC 100



Summary for Link 1L: (new Link)

Inflow Area = 27,007 sf, 25.45% Impervious, Inflow Depth = 3.77" for 25-Year event
 Inflow = 2.03 cfs @ 12.18 hrs, Volume= 8,494 cf
 Primary = 2.03 cfs @ 12.18 hrs, Volume= 8,494 cf, Atten= 0%, Lag= 0.0 min
 Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 1L: (new Link)



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=22,925 sf 19.65% Impervious Runoff Depth=1.19"
 Flow Length=132' Slope=0.0189 7' Tc=14.63 min UI Adjusted CN=82.7 Runoff=0.55 cfs 2,274 cf

Subcatchment 2S: 2S Runoff Area=4,082 sf 58.01% Impervious Runoff Depth=1.74"
 Flow Length=135' Tc=5.00 min CN=90.4 Runoff=0.20 cfs 593 cf

Pond 1P: CULTTEC 100 Peak Elev=260.44' Storage=298 cf Inflow=0.20 cfs 593 cf
 Outflow=0.09 cfs 295 cf

Link 1L: (new Link) Inflow=0.56 cfs 2,569 cf
 Primary=0.56 cfs 2,569 cf

Summary for Subcatchment 1S: 1S

Runoff = 0.55 cfs @ 12.21 hrs, Volume= 2,274 cf, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Adj	Description
1,556	98.0		Roofs, HSG D
167	98.0		Roofs, HSG D
1,729	98.0		Unconnected pavement, HSG D
732	98.0		Water Surface, HSG D
133	98.0		Unconnected pavement, HSG D
18,420	80.0		>75% Grass cover, Good, HSG D
188	98.0		Unconnected pavement, HSG D
22,925	83.5	82.7	Weighted Average, UI Adjusted
18,420			80.35% Pervious Area
4,505			19.65% Impervious Area
2,050			45.50% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.37	100	0.0189	0.12		Sheet Flow,
0.26	32	0.0189	2.06		Grass: Dense n= 0.240 P2= 3.30"
14.63	132	Total			Shallow Concentrated Flow,
					Grassed Waterway Kv= 15.0 fps

Summary for Subcatchment 2S: 2S

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 593 cf, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
1,180	98.0	Paved parking, HSG D
1,130	98.0	Roofs, HSG D
1,714	80.0	>75% Grass cover, Good, HSG D
58	98.0	Unconnected pavement, HSG D
4,082	90.4	Weighted Average
1,714		41.99% Pervious Area
2,368		58.01% Impervious Area
58		2.45% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.06	33	0.0485	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
0.23	32	0.0125	2.27		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.24	70	0.0200	4.78	0.94	Pipe Channel, 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13" n= 0.011 PVC, smooth interior
4.53	135	Total, Increased to minimum Tc = 5.00 min			

Summary for Pond 1P: CULTEC 100

Inflow Area = 4,082 sf, 58.01% Impervious, Inflow Depth = 1.74" for 1-Year event
 Inflow = 0.20 cfs @ 12.07 hrs, Volume= 593 cf
 Outflow = 0.09 cfs @ 12.31 hrs, Volume= 295 cf, Atten= 52%, Lag= 14.2 min
 Primary = 0.09 cfs @ 12.31 hrs, Volume= 295 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 260.44' @ 12.31 hrs Surf.Area= 252 sf Storage= 298 cf

Plug-Flow detention time= 227.5 min calculated for 295 cf (50% of inflow)
 Center-of-Mass det. time= 114.2 min (925.1 - 810.9)

Volume	Invert	Avail.Storage	Storage	Description
#1A	257.00'	132 cf	11.67'W x 17.50'L x 2.04'H	Field A 417 cf Overall - 87 cf Embedded = 330 cf x 40.0% Voids
#2A	257.50'	87 cf	Cultec C-100HD x 6	Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 3 rows
#3	260.40'	1 cf	Custom Stage Data (Prismatic)	Listed below (Recalc)
#4	258.30'	79 cf	4.00'D x 2.10'H	Vertical Cone/Cylinder x 3 299 cf Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
260.40	10	0	0
260.50	10	1	1

Device Routing Invert. Outlet Devices

#1 Primary 260.40' **4.0" Horiz. Orifice/Grate X 3.00** C= 0.600
 Limited to weir flow at low heads

Primary Outflow Max=0.09 cfs @ 12.31 hrs HW=260.44' TW=0.00' (Dynamic Tailwater)
L-1=Orifice/Grate (Weir Controls 0.09 cfs @ 0.68 fps)

Summary for Link 1L: (new Link)

Inflow Area = 27,007 sf, 25.45% Impervious, Inflow Depth = 1.14" for 1-Year event
 Inflow = 0.56 cfs @ 12.31 hrs, Volume= 2,569 cf
 Primary = 0.56 cfs @ 12.31 hrs, Volume= 2,569 cf, Atten= 0%, Lag= 0.0 min
 Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Runoff = 0.79 cfs @ 12.21 hrs, Volume= 3,190 cf, Depth= 1.67"

Subcatchment 1S: 1S
 Flow Length=132' Slope=0.0189 1' Runoff Area=22,925 sf 19.65% Impervious Runoff Depth=1.67"
 Tc=14.63 min UJ Adjusted CN=82.7 Runoff=0.79 cfs 3,190 cf

Subcatchment 2S: 2S
 Runoff Area=4,082 sf 58.01% Impervious Runoff Depth=2.30"
 Flow Length=135' Tc=5.00 min CN=90.4 Runoff=0.26 cfs 782 cf

Pond 1P: CULTEC 100
 Peak Elev=260.49' Storage=299 cf Inflow=0.26 cfs 782 cf
 Outflow=0.28 cfs 484 cf

Link 1L: (new Link)
 Inflow=0.92 cfs 3,673 cf
 Primary=0.92 cfs 3,673 cf

Summary for Subcatchment 1S: 1S

Area (sf)	CN	Adj	Description
1,566	98.0		Roofs, HSG D
167	98.0		Roofs, HSG D
1,729	98.0		Unconnected pavement, HSG D
732	98.0		Water Surface, HSG D
133	98.0		Unconnected pavement, HSG D
18,420	80.0		>75% Grass cover, Good, HSG D
188	98.0		Unconnected pavement, HSG D
22,925	83.5	82.7	Weighted Average, UJ Adjusted
18,420			80.35% Pervious Area
4,505			19.65% Impervious Area
2,050			45.50% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.37	100	0.0189	0.12		Sheet Flow,
0.26	32	0.0189	2.06		Grass: Dense n= 0.240 P2= 3.30" Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
14.63	132	Total			

Summary for Subcatchment 2S: 2S

Runoff = 0.26 cfs @ 12.07 hrs, Volume= 782 cf, Depth= 2.30"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Description
1,180	98.0	Paved parking, HSG D
1,130	98.0	Roofs, HSG D
1,714	80.0	>75% Grass cover, Good, HSG D
58	98.0	Unconnected pavement, HSG D
4,082	90.4	Weighted Average
1,714		41.99% Pervious Area
2,368		58.01% Impervious Area
58		2.45% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.06	33	0.0485	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
0.23	32	0.0125	2.27		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.24	70	0.0200	4.78	0.94	Pipe Channel, 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.011 PVC, smooth interior
4.53	135	Total, Increased to minimum Tc = 5.00 min			

Summary for Pond 1P: CULTEC 100

Inflow Area = 4,082 sf, 58.01% Impervious, Inflow Depth = 2.30" for 2-Year event
 Inflow = 0.26 cfs @ 12.07 hrs, Volume= 782 cf
 Outflow = 0.28 cfs @ 12.10 hrs, Volume= 484 cf, Atten= 0%, Lag= 1.8 min
 Primary = 0.28 cfs @ 12.10 hrs, Volume= 484 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 260.49' @ 12.10 hrs Surf.Area= 252 sf Storage= 299 cf

Plug-Flow detention time= 179.1 min calculated for 484 cf (62% of inflow)
 Center-of-Mass det. time= 77.0 min (880.1 - 803.1)

Volume	Invert	Avail. Storage	Storage Description
#1A	257.00'	132 cf	11.67'W x 17.50'L x 2.04'H Field A 417 cf Overall - 87 cf Embedded = 330 cf x 40.0% Voids
#2A	257.50'	87 cf	Cultec C-100HD x 6 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 3 rows
#3	260.40'	1 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#4	258.30'	79 cf	4.00'D x 2.10'H Vertical Cone/Cylinder x 3
		299 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf. Area (sq-ft)	Inc. Store (cubic-feet)	Cum. Store (cubic-feet)
260.40	10	0	0
260.50	10	1	1

Device	Routing	Invert	Outlet Devices
#1	Primary	260.40'	4.0" Horiz. Orifice/Grate X 3.00 C= 0.600 Limited to weir flow at low heads

Primary Outflow Max=0.25 cfs @ 12.10 hrs HW=260.48' TW=0.00' (Dynamic Tailwater)
1-1=Orifice/Grate (Weir Controls 0.25 cfs @ 0.95 fps)

Summary for Link 1L: (new Link)

Inflow Area = 27,007 sf, 25.45% Impervious, Inflow Depth = 1.63" for 2-Year event
 Inflow = 0.92 cfs @ 12.18 hrs, Volume= 3,673 cf
 Primary = 0.92 cfs @ 12.18 hrs, Volume= 3,673 cf, Atten= 0%, Lag= 0.0 min
 Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=22,925 sf 19.65% Impervious Runoff Depth=2.52"
 Flow Length=132' Slope=0.0189 1' Tc=14.63 min UI Adjusted CN=82.7 Runoff=1.19 cfs 4,819 cf

Subcatchment 2S: 2S Runoff Area=4,082 sf 58.01% Impervious Runoff Depth=3.24"
 Flow Length=135' Tc=5.00 min CN=90.4 Runoff=0.36 cfs 1,104 cf

Pond 1P: CULTTEC 100 Peak Elev=260.51' Storage=299 cf Inflow=0.36 cfs 1,104 cf
 Outflow=0.36 cfs 806 cf

Link 1L: (new Link) Inflow=1.38 cfs 5,625 cf
 Primary=1.38 cfs 5,625 cf

Summary for Subcatchment 1S: 1S

Runoff = 1.19 cfs @ 12.20 hrs, Volume= 4,819 cf, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 5-Year Rainfall=4.30"

Area (sf)	CN	Adj	Description
1,556	98.0		Roofs, HSG D
167	98.0		Roofs, HSG D
1,729	98.0		Unconnected pavement, HSG D
732	98.0		Water Surface, HSG D
133	98.0		Unconnected pavement, HSG D
18,420	80.0		>75% Grass cover, Good, HSG D
188	98.0		Unconnected pavement, HSG D
22,925	83.5	82.7	Weighted Average, UI Adjusted
18,420			80.35% Pervious Area
4,505			19.65% Impervious Area
2,050			45.50% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.37	100	0.0189	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30" Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.26	32	0.0189	2.06		
14.63	132	Total			

Summary for Subcatchment 2S: 2S

Runoff = 0.36 cfs @ 12.07 hrs, Volume= 1,104 cf, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 5-Year Rainfall=4.30"

Area (sf)	CN	Description
1,180	98.0	Paved parking, HSG D
1,130	98.0	Roofs, HSG D
1,714	80.0	>75% Grass cover, Good, HSG D
58	98.0	Unconnected pavement, HSG D
4,082	90.4	Weighted Average
1,714		41.99% Pervious Area
2,368		58.01% Impervious Area
58		2.45% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.06	33	0.0485	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30" Shallow Concentrated Flow, Paved Kv= 20.3'fps
0.23	32	0.0125	2.27		Pipe Channel, 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13" n= 0.011 PVC, smooth interior
0.24	70	0.0200	4.78	0.94	
4.53	135	Total, Increased to minimum Tc = 5.00 min			

Summary for Pond 1P: CULTEC 100

Inflow Area = 4,082 sf, 58.01% Impervious, Inflow Depth = 3.24" for 5-Year event
 Inflow = 0.36 cfs @ 12.07 hrs, Volume= 1,104 cf
 Outflow = 0.36 cfs @ 12.07 hrs, Volume= 806 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.36 cfs @ 12.07 hrs, Volume= 806 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 260.51' @ 12.07 hrs Surf.Area= 252 sf Storage= 299 cf

Plug-Flow detention time= 143.6 min calculated for 806 cf (73% of inflow)
 Center-of-Mass det. time= 55.7 min (849.2 - 793.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	257.00'	132 cf	11.67'W x 17.50'L x 2.04'H Field A 417 cf Overall - 87 cf Embedded = 330 cf x 40.0% Voids
#2A	257.50'	87 cf	Cultec C-100HD x 6 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 3 rows
#3	260.40'	1 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#4	258.30'	79 cf	4.00'D x 2.10'H Vertical Cone/Cylinder x 3 299 cf Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
260.40	10	0	0
260.50	10	1	1

Device	Routing	Invert	Outlet Devices
#1	Primary	260.40'	4.0" Horiz. Orifice/Grate X 3.00 C= 0.600 Limited to weir flow at low heads

Primary Outflow Max=0.36 cfs @ 12.07 hrs HW=260.51' TW=0.00' (Dynamic Tailwater)
 C=Orifice/Grate (Weir Controls 0.36 cfs @ 1.07 fps)

Summary for Link 1L: (new Link)

Inflow Area = 27,007 sf, 25.45% Impervious, Inflow Depth = 2.50" for 5-Year event
 Inflow = 1.38 cfs @ 12.18 hrs, Volume= 5,625 cf
 Primary = 1.38 cfs @ 12.18 hrs, Volume= 5,625 cf, Atten= 0%, Lag= 0.0 min
 Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dj=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=22,925 sf 19.65% Impervious Runoff Depth=3.15"
 Flow Length=132' Slope=0.0189 1' Tc=14.63 min UJ Adjusted CN=82.7 Runoff=1.48 cfs 6,009 cf

Subcatchment 2S: 2S Runoff Area=4,082 sf 58.01% Impervious Runoff Depth=3.92"
 Flow Length=135' Tc=5.00 min CN=90.4 Runoff=0.43 cfs 1,333 cf

Pond 1P: CULTTEC 100 Peak Elev=260.52' Storage=299 cf Inflow=0.43 cfs 1,333 cf
 Outflow=0.43 cfs 1,035 cf

Link 1L: (new Link) Inflow=1.70 cfs 7,044 cf
 Primary=1.70 cfs 7,044 cf

Summary for Subcatchment 1S: 1S

Runoff = 1.48 cfs @ 12.20 hrs, Volume= 6,009 cf, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Year Rainfall=5.00"

Area (sf)	CN	Adj	Description
1,556	98.0		Roofs, HSG D
167	98.0		Roofs, HSG D
1,729	98.0		Unconnected pavement, HSG D
732	98.0		Water Surface, HSG D
133	98.0		Unconnected pavement, HSG D
18,420	80.0		>75% Grass cover, Good, HSG D
188	98.0		Unconnected pavement, HSG D
22,925	83.5	82.7	Weighted Average, UJ Adjusted
18,420			80.35% Pervious Area
4,505			19.65% Impervious Area
2,050			45.50% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.37	100	0.0189	0.12		Sheet Flow,
0.26	32	0.0189	2.06		Grass: Dense n= 0.240 P2= 3.30" Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
14.63	132	Total			

Summary for Subcatchment 2S: 2S

Runoff = 0.43 cfs @ 12.07 hrs, Volume= 1,333 cf, Depth= 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Year Rainfall=5.00"

Area (sf)	CN	Description
1,180	98.0	Paved parking, HSG D
1,130	98.0	Roofs, HSG D
1,714	80.0	>75% Grass cover, Good, HSG D
58	98.0	Unconnected pavement, HSG D
4,082	90.4	Weighted Average
1,714		41.99% Pervious Area
2,368		58.01% Impervious Area
58		2.45% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.06	33	0.0485	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
0.23	32	0.0125	2.27		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.24	70	0.0200	4.78	0.94	Pipe Channel, 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13" n= 0.011 PVC, smooth interior
4.53	135	Total, Increased to minimum Tc = 5.00 min			

Summary for Pond 1P: CULTEC 100

Inflow Area = 4,082 sf, 58.01% Impervious, Inflow Depth = 3.92" for 10-Year event
 Inflow = 0.43 cfs @ 12.07 hrs, Volume= 1,333 cf
 Outflow = 0.43 cfs @ 12.07 hrs, Volume= 1,035 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.43 cfs @ 12.07 hrs, Volume= 1,035 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 260.52' @ 12.07 hrs Surf.Area= 252 sf Storage= 299 cf

Plug-Flow detention times= 129.4 min calculated for 1,035 cf (78% of inflow)
 Center-of-Mass det. times= 49.5 min (837.7 - 788.3)

Volume	Invert	Avail.Storage	Storage	Description
#1A	257.00'	132 cf	11.67'W x 17.50'L x 2.04'H	Field A 417 cf Overall - 87 cf Embedded = 330 cf x 40.0% Voids
#2A	257.50'	87 cf	Cultec C-100HD x 6	Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 3 rows
#3	260.40'	1 cf	Custom Stage Data (Prismatic)	Listed below (Recalc)
#4	258.30'	79 cf	4.00'D x 2.10'H	Vertical Cone/Cylinder x 3 299 cf Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
260.40	10	0	0
260.50	10	1	1

Device	Routing	Invert	Outlet Devices
#1	Primary	260.40'	4.0" Horiz. Orifice/Grate X 3.00 C= 0.600 Limited to weir flow at low heads

Primary Outflow Max=0.43 cfs @ 12.07 hrs HW=260.52' TW=0.00' (Dynamic Tailwater)
1-1=Orifice/Grate (Weir Controls 0.43 cfs @ 1.13 fps)

Summary for Link 1L: (new Link)

Inflow Area = 27,007 sf, 25.45% Impervious, Inflow Depth = 3.13" for 10-Year event
 Inflow = 1.70 cfs @ 12.18 hrs, Volume= 7,044 cf
 Primary = 1.70 cfs @ 12.18 hrs, Volume= 7,044 cf, Atten= 0%, Lag= 0.0 min

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

Time span=0.00-36.00 hrs, d=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=22,925 sf 19.65% Impervious Runoff Depth=3.78"
 Flow Length=132' Slope=0.0189 1' Tc=14.63 min UJ Adjusted CN=82.7 Runoff=1.77 cfs 7,227 cf

Subcatchment 2S: 2S Runoff Area=4,082 sf 58.01% Impervious Runoff Depth=4.60"
 Flow Length=135' Tc=5.00 min CN=90.4 Runoff=0.50 cfs 1,564 cf

Pond 1P: CULTEC 100 Peak Elev=260.56' Storage=299 cf Inflow=0.50 cfs 1,564 cf
 Outflow=0.50 cfs 1,266 cf

Link 1L: (new Link) Inflow=2.03 cfs 8,494 cf
 Primary=2.03 cfs 8,494 cf

Summary for Subcatchment 1S: 1S

Runoff = 1.77 cfs @ 12.20 hrs, Volume= 7,227 cf, Depth= 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.70"

Area (sf)	CN	Adj	Description
1,556	98.0		Roofs, HSG D
167	98.0		Roofs, HSG D
1,729	98.0		Unconnected pavement, HSG D
732	98.0		Water Surface, HSG D
133	98.0		Unconnected pavement, HSG D
18,420	80.0		>75% Grass cover, Good, HSG D
188	98.0		Unconnected pavement, HSG D
22,925	83.5	82.7	Weighted Average, UJ Adjusted
18,420			80.35% Pervious Area
4,505			19.65% Impervious Area
2,050			45.50% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.37	100	0.0189	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30" Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.26	32	0.0189	2.06		
14.63	132	Total			

Summary for Subcatchment 2S: 2S

Runoff = 0.50 cfs @ 12.07 hrs, Volume= 1,564 cf, Depth= 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.70"

Area (sf)	CN	Description
1,180	98.0	Paved parking, HSG D
1,130	98.0	Roofs, HSG D
1,714	80.0	>75% Grass cover, Good, HSG D
58	98.0	Unconnected pavement, HSG D
4,082	90.4	Weighted Average
1,714		41.99% Pervious Area
2,368		56.01% Impervious Area
58		2.45% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.06	33	0.0485	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
0.23	32	0.0125	2.27		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.24	70	0.0200	4.78	0.94	Pipe Channel, 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.011 PVC, smooth interior
4.53	135	Total, Increased to minimum Tc = 5.00 min			

Summary for Pond 1P: CULTEC 100

Inflow Area = 4,082 sf, 58.01% Impervious, Inflow Depth = 4.60" for 25-Year event
 Inflow = 0.50 cfs @ 12.07 hrs, Volume= 1,564 cf
 Outflow = 0.50 cfs @ 12.07 hrs, Volume= 1,266 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.50 cfs @ 12.07 hrs, Volume= 1,266 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 260.56' @ 12.07 hrs Surf.Area= 252 sf Storage= 299 cf

Plug-Flow detention times= 118.8 min calculated for 1,266 cf (81% of inflow)
 Center-of-Mass det. time= 45.7 min (829.6 - 784.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	257.00'	132 cf	11.67'W x 17.50'L x 2.04'H Field A 417 cf Overall - 87 cf Embedded = 330 cf x 40.0% Voids
#2A	257.50'	87 cf	Cultec C-100HD x 6 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 3 rows
#3	260.40'	1 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#4	258.30'	79 cf	4.00'D x 2.10'H Vertical Cone/Cylinder x 3
		299 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
260.40	10	0	0
260.50	10	1	1

Device	Routing	Invert	Outlet Devices
#1	Primary	260.40'	4.0" Horiz. Orifice/Grate X 3.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.50 cfs @ 12.07 hrs HW=260.56' TW=0.00' (Dynamic Tailwater)
L-1=Orifice/Grate (Orifice Controls 0.50 cfs @ 1.91 fps)

Summary for Link 1L: (new Link)

Inflow Area = 27,007 sf, 25.45% Impervious, Inflow Depth = 3.77" for 25-Year event
 Inflow = 2.03 cfs @ 12.18 hrs, Volume= 8,494 cf
 Primary = 2.03 cfs @ 12.18 hrs, Volume= 8,494 cf, Atten= 0%, Lag= 0.0 min

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

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=22,925 sf 19.65% Impervious Runoff Depth=4.43"
 Flow Length=132' Slope=0.0189 1' Tc=14.63 min UI Adjusted CN=82.7 Runoff=2.07 cfs 8,466 cf

Subcatchment 2S: 2S Runoff Area=4,082 sf 58.01% Impervious Runoff Depth=5.28"
 Flow Length=135' Tc=5.00 min CN=90.4 Runoff=0.57 cfs 1,796 cf

Pond 1P: CULTTEC 100 Peak Elev=260.60' Storage=299 cf Inflow=0.57 cfs 1,796 cf
 Outflow=0.57 cfs 1,499 cf

Link 1L: (new Link) Inflow=2.37 cfs 9,965 cf
 Primary=2.37 cfs 9,965 cf

Summary for Subcatchment 1S: 1S

Runoff = 2.07 cfs @ 12.20 hrs, Volume= 8,466 cf, Depth= 4.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50-Year Rainfall=6.40"

Area (sf)	CN	Adj	Description
1,556	98.0		Roofs, HSG D
167	98.0		Roofs, HSG D
1,729	98.0		Unconnected pavement, HSG D
732	98.0		Water Surface, HSG D
133	98.0		Unconnected pavement, HSG D
18,420	80.0		>75% Grass cover, Good, HSG D
188	98.0		Unconnected pavement, HSG D
22,925	83.5	82.7	Weighted Average, UI Adjusted
18,420			80.35% Pervious Area
4,505			19.65% Impervious Area
2,050			45.50% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.37	100	0.0189	0.12		Sheet Flow,
0.26	32	0.0189	2.06		Grass: Dense n= 0.240 P2= 3.30" Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
14.63	132	Total			

Summary for Subcatchment 2S: 2S

Runoff = 0.57 cfs @ 12.07 hrs, Volume= 1,796 cf, Depth= 5.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50-Year Rainfall=6.40"

Area (sf)	CN	Description
1,180	98.0	Paved parking, HSG D
1,130	98.0	Roofs, HSG D
1,714	80.0	>75% Grass cover, Good, HSG D
58	98.0	Unconnected pavement, HSG D
4,082	90.4	Weighted Average
1,714		41.99% Pervious Area
2,368		58.01% Impervious Area
58		2.45% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.06	33	0.0485	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
0.23	32	0.0125	2.27		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.24	70	0.0200	4.78	0.94	Pipe Channel, 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13" n= 0.011 PVC, smooth interior
4.53	135	Total, Increased to minimum Tc= 5.00 min			

Summary for Pond 1P: CULTEC 100

Inflow Area = 4,082 sf, 58.01% Impervious, Inflow Depth = 5.28" for 50-Year event
 Inflow = 0.57 cfs @ 12.07 hrs, Volume= 1,796 cf
 Outflow = 0.57 cfs @ 12.07 hrs, Volume= 1,499 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.57 cfs @ 12.07 hrs, Volume= 1,499 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 260.60' @ 12.07 hrs Surf.Area= 252 sf Storage= 299 cf

Plug-Flow detention time= 110.6 min calculated for 1,499 cf (83% of inflow)
 Center-of-Mass det. time= 42.9 min (823.3 - 780.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	257.00'	132 cf	11.67'W x 17.50'L x 2.04'H Field A 417 cf Overall - 87 cf Embedded = 330 cf x 40.0% Voids
#2A	257.50'	87 cf	Cultec C-100HD x 6 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 3 rows Custom Stage Data (Prismatic) Listed below (Recalc)
#3	260.40'	1 cf	4.00'D x 2.10'H Vertical Cone/Cylinder x 3
#4	258.30'	79 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
260.40	10	0	0
260.50	10	1	1

Device	Routing	Invert	Outlet Devices
#1	Primary	260.40'	4.0" Horiz. Orifice/Grate X 3.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.57 cfs @ 12.07 hrs HW=260.60' TW=0.00' (Dynamic Tailwater)
1-Orifice/Grate (Orifice Controls 0.57 cfs @ 2.17 fps)

Summary for Link 1L: (new Link)

Inflow Area = 27,007 sf, 25.45% Impervious, Inflow Depth = 4.43" for 50-Year event
 Inflow = 2.37 cfs @ 12.18 hrs, Volume= 9,965 cf
 Primary = 2.37 cfs @ 12.18 hrs, Volume= 9,965 cf, Atten= 0%, Lag= 0.0 min
 Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Runoff = 2.40 cfs @ 12.20 hrs, Volume= 9,901 cf, Depth= 5.18"
 Summary for Subcatchment 1S: 1S

Subcatchment 1S: 1S
 Flow Length=132' Slope=0.0189 1' Tc=14.63 min UI Adjusted CN=82.7 Runoff=2.40 cfs 9,901 cf
 Runoff Area=22,925 sf 19.65% Impervious Runoff Depth=5.18"
 Flow Length=135' Tc=5.00 min CN=90.4 Runoff=0.65 cfs 2,063 cf

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span=0.00-36.00 hrs, dt=0.01 hrs
 Type III 24-hr 100-Year Rainfall=7.20"

Subcatchment 2S: 2S
 Runoff Area=4,082 sf 58.01% Impervious Runoff Depth=6.07"
 Flow Length=135' Tc=5.00 min CN=90.4 Runoff=0.65 cfs 2,063 cf
 Peak Elev=260.66' Storage=299 cf Inflow=0.65 cfs 2,063 cf
 Outflow=0.65 cfs 1,766 cf
 Inflow=2.75 cfs 11,667 cf
 Primary=2.75 cfs 11,667 cf

Area (sf)	CN	Adj	Description
1,556	98.0		Roofs, HSG D
167	98.0		Roofs, HSG D
1,729	98.0		Unconnected pavement, HSG D
732	98.0		Water Surface, HSG D
133	98.0		Unconnected pavement, HSG D
18,420	80.0		>75% Grass cover, Good, HSG D
188	98.0		Unconnected pavement, HSG D
22,925	83.5	82.7	Weighted Average, UI Adjusted
18,420			80.35% Pervious Area
4,505			19.65% Impervious Area
2,050			45.50% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.37	100	0.0189	0.12		Sheet Flow,
0.26	32	0.0189	2.06		Grass: Dense n=0.240 P2=3.30" Shallow Concentrated Flow, Grassed Waterway Kv=15.0 fps
14.63	132	Total			

Pond 1P: CULTTEC 100
 Link 1L: (new Link)

Summary for Subcatchment 2S: 2S

Runoff = 0.65 cfs @ 12.07 hrs, Volume= 2,063 cf, Depth= 6.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span=0.00-36.00 hrs, dt=0.01 hrs
 Type III 24-hr 100-Year Rainfall=7.20"

Area (sf)	CN	Description
1,180	98.0	Paved parking, HSG D
1,130	98.0	Roofs, HSG D
1,714	80.0	>75% Grass cover, Good, HSG D
58	98.0	Unconnected pavement, HSG D
4,082	90.4	Weighted Average
1,714		41.99% Pervious Area
2,368		58.01% Impervious Area
58		2.45% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.06	33	0.0485	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
0.23	32	0.0125	2.27		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.24	70	0.0200	4.78	0.94	Pipe Channel, 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.011 PVC, smooth interior
4.53	135	Total, Increased to minimum Tc = 5.00 min			

Summary for Pond 1P: CULTEC 100

Inflow Area = 4,082 sf, 58.01% Impervious, Inflow Depth = 6.07" for 100-Year event
 Inflow = 0.65 cfs @ 12.07 hrs, Volume= 2,063 cf
 Outflow = 0.65 cfs @ 12.07 hrs, Volume= 1,766 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.65 cfs @ 12.07 hrs, Volume= 1,766 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 260.66' @ 12.07 hrs Surf.Area= 252 sf Storage= 299 cf

Plug-Flow detention time= 102.7 min calculated for 1,766 cf (86% of inflow)
 Center-of-Mass det. time= 40.4 min (817.2 - 776.7)

Volume	Invert	Avail. Storage	Storage Description
#1A	257.00'	132 cf	11.67'W x 17.50'L x 2.04'H Field A 417 cf Overall - 87 cf Embedded = 330 cf x 40.0% Voids
#2A	257.50'	87 cf	Cultec C-100HD x 6 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 3 rows Custom Stage Data (Prismatic) Listed below (Recalc)
#3	260.40'	1 cf	4.00'D x 2.10'H Vertical Cone/Cylinder x 3
#4	258.30'	79 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf. Area (sq-ft)	Inc. Store (cubic-feet)	Cum. Store (cubic-feet)
260.40	10	0	0
260.50	10	1	1

Device	Routing	Invert	Outlet Devices
#1	Primary	260.40'	4.0" Horiz. Orifice/Grate X 3.00 C= 0.600 Limited to weir flow at low heads

Primary Outflow Max=0.65 cfs @ 12.07 hrs HW=260.66' TW=0.00' (Dynamic Tailwater)
1-Orifice/Grate (Orifice Controls 0.65 cfs @ 2.47 fps)

Summary for Link 1L: (new Link)

Inflow Area = 27,007 sf, 25.45% Impervious, Inflow Depth = 5.18" for 100-Year event
 Inflow = 2.75 cfs @ 12.18 hrs, Volume= 11,667 cf
 Primary = 2.75 cfs @ 12.18 hrs, Volume= 11,667 cf, Atten= 0%, Lag= 0.0 min

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

Stamford Appendix B Proposed

Type III 24-hr 100-Year Rainfall=7.20"

Prepared by {enter your company name here}

Printed 11/1/2023

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Stage-Area-Storage for Pond 1P: CULTEC 100

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
257.00	0	259.60	268
257.05	4	259.65	270
257.10	8	259.70	271
257.15	12	259.75	273
257.20	16	259.80	275
257.25	20	259.85	277
257.30	25	259.90	279
257.35	29	259.95	281
257.40	33	260.00	283
257.45	37	260.05	285
257.50	41	260.10	287
257.55	49	260.15	288
257.60	56	260.20	290
257.65	64	260.25	292
257.70	71	260.30	294
257.75	79	260.35	296
257.80	86	260.40	298
257.85	94	260.45	298
257.90	101	260.50	299
257.95	108	260.55	299
258.00	115	260.60	299
258.05	122	260.65	299
258.10	129		
258.15	136		
258.20	142		
258.25	149		
258.30	155		
258.35	162		
258.40	169		
258.45	176		
258.50	182		
258.55	188		
258.60	194		
258.65	200		
258.70	206		
258.75	212		
258.80	218		
258.85	224		
258.90	230		
258.95	236		
259.00	242		
259.05	247		
259.10	249		
259.15	251		
259.20	253		
259.25	254		
259.30	256		
259.35	258		
259.40	260		
259.45	262		
259.50	264		
259.55	266		

TOP OF STONE

Appendix “D”

Pipe Conveyance Calculations

Project ID: 23BL Stamford_Appendix_D_Conveyance_&_Outlet_Protection_

Date: 11/9/2023

The following is a summary of the computations performed to design the proposed storm drainage system drain sizes. The proposed watershed flows were taken from the results of the HydroCAD storm drainage analysis performed on the site. Refer to Appendix "C" for HydroCAD model input data, computations, and results. Refer to Exhibit "B" for a depiction of the proposed on-site watershed areas. HydroCAD runoff computations are based on the 25-year design storm frequency event. Culvert conveyance computations are based on the Manning's Equation.

Watershed Analysis Results

Drainage Area	Area (S.F.)	Impervious Area (S.F.)	CN	25-Year Peak Flow Rate (cfs)
1S	22,925	4,505	83.5	1.77
2S	4,082	2,368	90.4	0.50
1P	-	-	-	0.50

Culvert Capacity Summary Table

Maximum pipe capacities were calculated using the Manning equation for full flow conditions. The proposed pipe information, 25-year peak design flows, and corresponding maximum capacities are summarized in the following table. Refer to the Development Plan for pipe and structure locations. All pipes have been sized to convey the flow rates for at least the 25-year design storm frequency event.

Pipe #	Diameter	Roughness	Slope (%)	Contributing	25-Year Peak	Max
1	6	0.011	2.0%	1P	0.50	0.94

Appendix “E”
DCIA Worksheet



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

Part 1: General Information

Project Name	Proposed Additions
Project Address	65 Stanton Lane
Project Applicant	Jessica Domiziano
Date of Submittal	11/9/2023
Tax Account Number	002-3687

Part 2: Project Details

1. What type of development is this? (choose from dropdown)	Redevelopment	
2. What is the total area of the project site?	26,958	ft ²
3. What is the total area of land disturbance for this project?	15,750	ft ²
4. Does project site drain to High Quality Waters, a Direct Waterfront, or within 500 ft. of Tidal Wetlands? (Yes/No)	No	
5. What is the <u>current DCIA</u> for the site?	0	ft ²
6. Will the proposed development increase DCIA (without consideration of proposed stormwater management)? (Yes/No)	Yes	
7. What is the <u>proposed-development total impervious area</u> for the site?	6,873	ft ²

Part 3: Water Quality Target Total

Does Standard 1 apply based on information above?	No, Skip to Part 4	
Water Quality Volume (WQV)	N/A	ft ³
Standard 1 requirement	N/A	
Required treatment/retention volume	N/A	ft ³
Provided treatment/retention volume for proposed development		ft ³

Part 4: Proposed DCIA Tracking

<u>Pre-development total impervious area</u>	5,756	ft ²
<u>Current DCIA</u>	0	ft ²
<u>Proposed-development total impervious area</u>	6,873	ft ²
<u>Proposed-development DCIA</u> (after stormwater management)	0	ft ²
Net change in DCIA from <u>pre-development</u> to <u>proposed-development</u>	0	ft ²

Part 5: Post-Development (As-Built Certified) DCIA Tracking

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

Certification Statement

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

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

Appendix “F”
Soil Results Forms

SOIL EVALUATION TEST RESULTS

Project Name: Proposed Additions Engineering Firm's Name: D'Andrea Surveying & Engineering, P.C.
 Project Address: 65 Stanton Lane Stamford, CT Engineer's Name: Leonard C. D'Andrea

Test Pit or Soil Boring #:	1	Ground Elevation:	260.2
Elevation	260.2	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
	259.4	Topsoil	0
	258.4	Tan Brown Sandy Loam	10
	255.9	Dark Brown Loam with Stones	22
	254.2	Brown Sandy Loam with Stones	52
			72

Saturated Hydraulic Conductivity Test Location #: 1	
Ground Elevation:	260.2
Top Elevation of Proposed Infiltration System:	259.0
Bottom Elevation of Proposed Infiltration System:	257.0
Elevation of Test*:	258.2
Test Method (check one of the following acceptable methods**):	
<input checked="" type="checkbox"/> Borehole infiltration test (NHDES, 2008)	
<input type="checkbox"/> Gueph permeameter - ASTM D5126-90 Method	
<input type="checkbox"/> Falling head permeameter - ASTM D5126-90 Method	
<input type="checkbox"/> Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods	
<input type="checkbox"/> Amoozegar or Amoozegar (constant head) permeameter - Amoozegar 1992	
Attach field data forms for the respective infiltration test method.	
Calculated Saturated Hydraulic Conductivity Rate:	1.21 in/hr

Elevation	Depth in Inches
255.9	Mottling (Seasonally High Groundwater)
254.5	Groundwater
254.2	Ledge

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

TEST CERTIFICATION

I HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE AND CORRECT.

Alexander Ruther
 Name of Test Conductor

 Signature of Test Conductor
 10/16/23
 Date

Soil Evaluation

11/9/2023

Project Name: Proposed Additions
 Project Address: 65 Stanton Lane Stamford, CT

Engineering Firm's Name: D'Andrea Surveying & Engineering, P.C.
 Engineer's Name: Leonard C. D'Andrea

Test Pit or Soil Boring #:		3	Ground Elevation:	261.5
Elevation	Soil Texture (Percent Sand, Silt and Clay)		Depth Range in Inches	
261.5	Topsoil		0	
261.0	Tan Brown Sandy Loam		6	
259.5			24	

Saturated Hydraulic Conductivity Test Location #: _____

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):
 Borehole infiltration test (NHIDES, 2008) _____
 Guelph permeameter - ASTM D5126-90 Method _____
 Falling head permeameter - ASTM D5126-90 Method _____
 Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods _____
 Amoozegar or Amoozegar (constant head) permeameter - Amoozegar 1992 _____

Attach field data forms for the respective infiltration test method. _____

Calculated Saturated Hydraulic Conductivity Rate: _____

Elevation		Depth in Inches
N/A	Mottling (Seasonally High Groundwater)	N/A
N/A	Groundwater	N/A
259.5	Ledge	24

** A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

TEST CERTIFICATION
 I HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE AND CORRECT.

Alexander Ruther
 Name of Test Conductor

Alex Ruther
 Signature of Test Conductor

10/16/23
 Date

Jessica Domiziano
 Address: 65 Stanton Lane Stamford, CT
 Date: November 3, 2023

Notes: Depths are in inches, measures taken from top of pipe.

Borehole Infiltration Test #1: Depth = 24 inches.

Test	Start	Finish	Delta
Hour 1/2	18.00	20.50	2.50
Hour 1	7.25	7.75	0.50
Hour 1-1/2	7.75	8.25	0.50
Hour 2	8.25	9.25	1.00
Hour 2-1/2	9.25	22.25	13.00
Hour 3	11.00	22.50	11.50
Hour 3-1/2	11.00	12.75	1.75
Hour 4	12.75	13.75	1.00
Average Per Hour	-	-	2.42
Field Infiltration Rate = 2.42" per hour			
Divide by 2 (factor of safety)	Design Infiltration Rate = 1.21" per hour		