FRENCH & PARRELLO ASSOCIATES

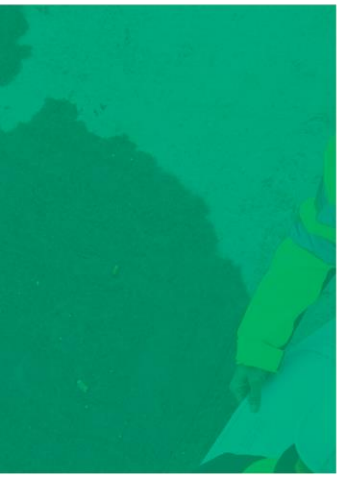
ENGINEERING AND CONSULTING **SINCE 1974**

Stormwater Management Report

for

Bulk Yard 35

Borough of Sayreville,
Middlesex County, New Jersey



Prepared for:

Brian Burlew
Bulk Yard 35 Landscape & Masonry Supply
2069 Highway 35
South Amboy, NJ 08879

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Jelena Balorad-Barone, PE
NJ License No. 44465

June 2, 2023| FPA No. 18937.001
Last Revised December 18, 2023

1800 Route 34, Suite 101, Wall Township, NJ 07719

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FPA

1.0 INTRODUCTION

This report contains the stormwater management calculations demonstrating compliance with the requirements of the Stormwater Management Rules at N.J.A.C. 7:8 for the existing Bulk Yard 35 Landscape & Masonry Supply on Block 428, Lots 1, 2, and 2.01. The project consists of the removal of an existing single family dwelling, the construction of a new 2,250 sf pole barn and the relocation of decorative stone bins. The improvements include new parking spaces, stormwater management and landscaping.

2.0 BASIS OF ENGINEERING ANALYSIS

The stormwater management systems, including collection and conveyance structures, groundwater recharge, water quality, and detention measures (BMP'S) have been designed in accordance with the provisions outlined in N.J.A.C. 7:8 New Jersey Stormwater Management Rules and the Sayreville Stormwater Control Ordinance. The New Jersey Best Management Practices Manual dated April 2004 and last updated March 2021 was used for technical guidance to comply with the above regulations.

The soils map located in Appendix A, published by Natural Resources Conservation Service Web Soil Survey, National Cooperative Soil Survey, was used to obtain the required soil information for the project, including soil types and hydrologic soil groups. A subsurface soil assessment was performed to obtain site specific information to determine the seasonal high water table and on-site soil permeability conditions. Refer to the report entitled "Results of Subsurface Exploration, Permeability Testing & Geotechnical Assessment" dated April 26, 2023 prepared by French and Parrello Associates for documentation.

The calculation of the stormwater runoff rates and volumes were performed utilizing the procedures outlined in the New Jersey Best Management Practices Manual. The PondPack Connect Edition Update 2 Computer Program developed by the Haested Methods was used to generate the runoff hydrographs and hydrologic model for project site. Peak discharges, run-off volumes, and hydrographs were computed for the 2, 10 and 100-year storm events utilizing the USDA Natural Resources Conservation Service (NRCS) methodology, as found in the NRCS National Engineering Handbook, Part 630-Hydrology. The NOAA Type D, 24-hour rainfall distribution, and 24-hour rainfall frequency data for Middlesex County, New Jersey published in August 2012 by NRCS were used in the computations. Runoff calculations and precipitation losses were calculated using the NRCS Curve Numbers (CNs), based upon the present and proposed watershed conditions. Times of Concentration (TC) were based upon estimates of overland, shallow concentrated, and open channel flow utilizing methods presented in Chapter 15 of the NEH, Part 630-Hydrology.

The rainfall distribution for the NJDEP Water Quality Design Storm (1.25 inches of rain falling nonuniformly in a 2-hour storm event), as shown on Table 5-2 of the New Jersey Stormwater Best Management Practices Manual was used to compute the peak runoff rate and runoff volume for this storm.

3.0 EXISTING CONDITIONS

The subject property consists of 1.977 acres and is located in the Borough of Sayreville, Middlesex County, New Jersey. The property is known as Block 428, Lots 1,2, and 2.01. The site currently contains a 1 story shop and storage area, a 2 ½ story frame dwelling, a frame garage, and 18 material storage bins. The property fronts on New Jersey State Highway Route 35 to the northeast, residential lots to the south, preserved land to the southeast and commercial property to the northwest. Stormwater drains to an existing underground basin to the southern edge of the site, where it discharges to a rip rap apron at the southern corner.

The existing basin was shown on the plans entitled "Site Plan for Applied Landscape Technologies" prepared by James E. Cleary & Associates, Inc. dated July 2000, last revised July 25, 2001. The existing basin was approved for 44.8% impervious surface on the property. The site was further developed over the years and together with the proposed development increases the impervious area to 81.6% of the site. The proposed stormwater management system controls the stormwater to meet the peak runoff from the approved conditions.

The following table summarizes the approved conditions, peak runoff rates and establishes the allowable proposed conditions peak runoff rates. Since a stormwater management report for the original design in 2000 is not available, calculations were performed using above referenced plans to determine the "existing and allowable" conditions, based on the approved plans. The peak flow reductions were applied to the area that was previously approved as pervious and converted to impervious. The total approved peak runoff is presented in Table 3.1 Column B. The portion of peak runoff to be reduced is the approved peak runoff for the pervious area that was approved that is proposed impervious and presented in Table 3.1 Column C. The Reduction required (Column D) is only applied to the portion of peak runoff from the area of the proposed building (Column C).

The following table summarizes the existing conditions, peak runoff rates and establishes the allowable proposed conditions peak runoff rates in accordance with N.J.A.C. 7:8 New Jersey Stormwater Management Rules. The formula describes how the allowable peak runoff rates were calculated to incorporate areas with and without required reductions. Detailed calculations are presented in Appendix B of this report.

Allowable Proposed Conditions Runoff	=	Portion of Approved Peak Runoff with no Required Reduction	+	Peak Flow generated by Portion of Project to be disturbed	*	Required Reduction per Storm event
F	=	E	+	C	*	D

Table 3.1

Summary of Present Conditions Peak Runoff Rates POA-A					
A	**B**	**C**	**D**	**E**	**F**
Storm Frequency	**Total Approved Peak Runoff (cfs)**	**Portion of Peak Runoff to be Reduced**	**Required Reduction**	**Portion of Peak runoff with no required reduction**	**Allowable Proposed Conditions Runoff (cfs)**
2-Year	2.70	0.31	50%	2.70-0.31=2.31	2.31+(0.50*0.31) = **2.55**
10-Year	5.22	1.15	75%	5.22-1.15=4.07	4.07+(0.75*1.15) **= 4.93**
25-Year	7.16	--	---	**---**	**7.21**
100-Year	10.98	3.32	80%	10.98-3.32=7.66	7.66+ (0.80*3.32) = **10.32**

4.0 PROPOSED CONDITIONS

The proposed stormwater management facility for the site consists of a subsurface infiltration basin to address the water quantity reductions and water quality requirements. The infiltration basin includes 224 linear feet of 902 HD Recharger units by Cultec to manage the 2, 10, and 100-year storm events. The existing basin will be maintained.

5.0 COMPLIANCE

5.1 Groundwater Recharge

N.J.A.C. 7:8 New Jersey Stormwater Management Rules requires that the proposed project maintain the present conditions average annual groundwater recharge volume for the site. The

project site is located in a Metropolitan Planning Area (PA 1) and is therefore considered an urban redevelopment area and groundwater recharge is not required.

5.2 Water Quality

N.J.A.C. 7:8 New Jersey Stormwater Management Rules requires that an 80% reduction of total suspended solids (TSS) must be achieved if the net increase in regulated motor vehicle surface is more than 0.25 acres. There were 0.172 acres of motor vehicle surface approved in 2000. The current proposal is for a total of 0.615 acres of motor vehicle surface. The net increase in motor vehicle surface is 0.443 acres. Therefore, water quality must be addressed. 80% TSS removal will be achieved through the infiltration basin. A manufactured treatment device at the inflow to the basin is proposed to provide pre-treatment. The proposed peak flow rate for the water quality storm routed through the manufactured treatment device is 1.68 cfs. The manufactured treatment device selected for the pre-treatment has a max allowable treated flow rate of 1.93 cfs. This will treat 0.483 acres of motor vehicle surface. The second inflow location is roof runoff, and not required to be treated for TSS. Therefore, the project complies with the Water Quality requirements of N.J.A.C. 7:8 New Jersey Stormwater Management Rules. Water quality calculations and manufactured treatment device specifications are located in Appendix C of this report.

5.3 Water Quantity

For this project, the peak runoff rates for the 2-year, 10-year, and 100-year storm events were compared to the approved site plan conditions. The proposed stormwater management facilities consist of subsurface infiltration basin with Cultec Recharger 902 HD to manage the control and reductions of the 2, 10, and 100-year storm events.

The basin routing summary and the overall peak runoff rate reductions for the site are shown in the following tables:

Table 5.1

Subsurface Infiltration Basin Routing Summary			
Storm Frequency	**Peak Inflow (cfs)**	**Peak Outflow (cfs)**	**Maximum Water Surface Elevation (ft)**
2-Year Storm	2.42	0.25	104.21
10-Year Storm	3.91	1.35	105.01
25-Year Storm	4.98	1.86	105.72
100-Year Storm	6.96	2.70	107.36

Table 5.2

Comparison of Present Conditions vs. Proposed Conditions Peak Runoff Rates			
Storm Frequency	**Maximum Allowable Proposed Conditions Peak Runoff Rate (From Table 3.1) (cfs)**	**Proposed Conditions Peak Runoff Rate (cfs)**	
2-Year Storm	2.55	1.82	OK
10-Year Storm	4.93	4.82	OK
25-Year Storm	7.16	6.63	OK
100-Year Storm	10.32	9.87	OK

Detailed computations are presented in Appendix C of this report.

5.4 Groundwater Mounding

A groundwater Mounding analysis was performed in accordance with Chapter 13 of the New Jersey Stormwater Best Management Practices Manual, to assess hydraulic impacts of infiltration on the groundwater table. Refer to the report entitled “Results of Subsurface Exploration, Permeability

Testing & Geotechnical Assessment" dated April 26, 2023, prepared by French and Parrello Associates for documentation of the infiltration rate and depth of the seasonal high water table.

Table 5.3

Summary of Groundwater Mounding Parameters	
Seasonal High Water Table Elevation	96
Bottom of Basin Elevation	102
Design Recharge Rate	1.85
Basin Recharge Area	1,777
Volume Recharged	1,908

$$\text{Duration of Infiltration Period (hours)} = \frac{Recharge\ Volume\ (CF) * 12\ \frac{in}{ft}}{Infiltration\ Area\ (SF) * Infiltration\ Rate\ \frac{in}{hr}}$$

Table 5.4

Summary of Groundwater Mounding Analysis	
Duration of Infiltration Period	6.96
Groundwater Mounding Height	3.74
Top of Mound Elevation	96+3.74 = **99.74** < 102

Refer to Appendix F for detailed Groundwater Mounding Calculations.

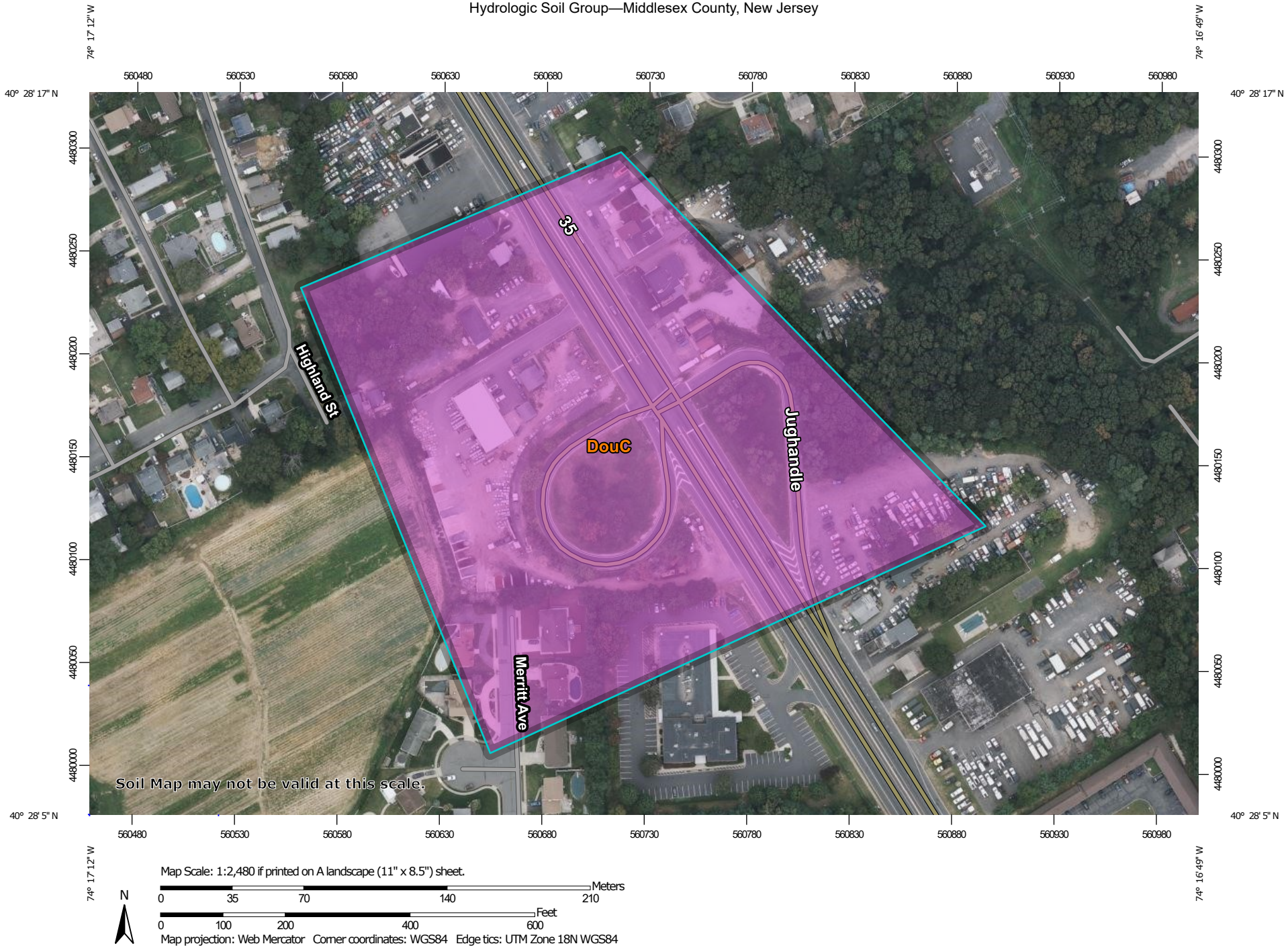
5.5 Soil Erosion and Sediment Control

Per the Standards for Soil Erosion and Sediment Control in New Jersey, the proposed conditions were analyzed for off-site stability. Proposed development routes the outflow to a new inlet structure next to an existing outlet structure with riprap. The overflow will flow through a new proposed scour hole around the inlet bubbler structure. The scour hole is sized conservatively, assuming that the inlet pipe into the structure is the diameter of the outlet pipe. The scour hole dimensions are 15 feet long, 12.5 feet wide, with a 15" depth.

6.0 CONCLUSION

The proposed development has been designed with a subsurface infiltration basin to comply with the Borough of Sayreville stormwater management requirements and the N.J.A.C. 7:8 - New Jersey Stormwater Management Rules.

Appendix A
Supporting Documents



Map Scale: 1:2,480 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil 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 1:24,000.

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: Middlesex County, New Jersey
Survey Area Data: Version 18, Aug 30, 2022

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DouC	Downer-Urban land complex, 5 to 10 percent slopes	A	13.0	100.0%
Totals for Area of Interest			**13.0**	**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

NEW JERSEY 24 HOUR RAINFALL FREQUENCY DATA

Rainfall amounts in Inches

County	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Atlantic	2.72	3.31	4.30	5.16	6.46	7.61	8.90
Bergen	2.75	3.34	4.27	5.07	6.28	7.32	8.47
Burlington	2.77	3.36	4.34	5.18	6.45	7.56	8.81
Camden	2.73	3.31	4.25	5.06	6.28	7.34	8.52
Cape May	2.67	3.25	4.22	5.07	6.34	7.47	8.73
Cumberland	2.69	3.27	4.25	5.09	6.37	7.49	8.76
Essex	2.85	3.44	4.40	5.22	6.44	7.49	8.66
Gloucester	2.71	3.29	4.24	5.05	6.29	7.36	8.55
Hudson	2.73	3.31	4.23	5.02	6.19	7.20	8.31
Hunterdon	2.80	3.38	4.26	5.00	6.09	7.02	8.03
Mercer	2.74	3.31	4.23	5.01	6.19	7.20	8.33
Middlesex	2.76	3.35	4.30	5.12	6.36	7.43	8.63
Monmouth	2.79	3.38	4.38	5.23	6.53	7.66	8.94
Morris	2.94	3.54	4.47	5.24	6.37	7.32	8.35
Ocean	2.81	3.42	4.45	5.33	6.68	7.87	9.20
Passaic	2.87	3.47	4.42	5.23	6.43	7.47	8.62
Salem	2.69	3.26	4.20	5.00	6.22	7.28	8.45
Somerset	2.76	3.34	4.25	5.01	6.15	7.13	8.21
Sussex	2.68	3.22	4.02	4.70	5.72	6.60	7.58
Union	2.80	3.39	4.35	5.17	6.42	7.49	8.69
Warren	2.78	3.34	4.18	4.89	5.93	6.83	7.82

Notes: The average point rainfall amounts listed above were developed from data contained in NOAA Atlas 14 Volume 2.

Point rainfall estimates for specific locations may be obtained from the Precipitation Frequency Data Server located at http://www.nws.noaa.gov/ohd/hdsc/

For most hydrologic design procedures, the rainfall amounts listed above may be rounded to the nearest tenth of an inch.

Appendix B

Present Conditions Calculations

FRENCH & PARRELLO ASSOCIATES

TELEPHONE : (732) 312-9800
FAX : (732) 312-9801

1800 ROUTE 34, SUITE 101
WALL, NEW JERSEY 07719

PROJECT NUMBER:	18937.001		
PROJECT NAME:		Bulk Yard 35	
CALCULATED BY:	KN	DATE:	4/7/2023
CHECKED BY:		DATE:	
REVISED BY:		DATE:	

TIME OF CONCENTRATION CALCULATOR

DRAINAGE AREA NAME:	Approved Drainage Area 1 Impe	DRAINAGE AREA NOTATION:	

Sheet Flow: Segment 1

Surface Type:	Smooth surface (concrete, asphalt, gravel, or bare soil)	
Slope of land surface, S:	0.034	ft/ft
n-value (from Table 15-1):	0.011	---
Limiting Length of flow, *l*:	100.0	ft
2-year, 24 hours rainfall, P_2:	3.350	in
Travel time, T_t:	1.0	minutes

calculations for sheet flow based upon Equation 15-8 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{0.007(n l)^{0.8}}{(P_2)^{0.5} S^{0.4}} \quad \text{(Eq 15-8)}$$

Shallow Concentrated Flow: Segment 2

Surface Type:	Pavement and small upland gullies	
Flow length, l:	400	ft
Slope of land surface, S:	0.032	ft/ft
n-value (from Table 15-3):	0.025	---
Average velocity, V:	3.636	ft/s
Travel time, T_t:	1.8	minutes

calculations for shallow concentrated flow based upon Equation 15-1 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{l}{3{,}600V} \quad \text{(Eq 15-1)}$$

Total Time of Concentration:	3	minutes	user input

FRENCH & PARRELLO ASSOCIATES

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PROJECT NUMBER:	18937.001		
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CALCULATED BY:	KN	DATE:	4/7/2023
CHECKED BY:		DATE:	
REVISED BY:		DATE:	

TIME OF CONCENTRATION CALCULATOR

DRAINAGE AREA NAME:	Approved Drainage Area 1 Pervi	DRAINAGE AREA NOTATION:	

Sheet Flow: Segment 1

Surface Type:	Grass: Short-grass prairie	
Slope of land surface, S:	0.032	ft/ft
n-value (from Table 15-1):	0.15	---
Limiting Length of flow, *l*:	100.0	ft
2-year, 24 hours rainfall, P_2:	3.350	in
Travel time, T_t:	7.9	minutes

calculations for sheet flow based upon Equation 15-8 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{0.007(n l)^{0.8}}{(P_2)^{0.5} S^{0.4}} \quad \text{(Eq 15-8)}$$

Shallow Concentrated Flow: Segment 2

Surface Type:	Grassed waterways	
Flow length, l:	272	ft
Slope of land surface, S:	0.032	ft/ft
n-value (from Table 15-3):	0.05	---
Average velocity, V:	2.886	ft/s
Travel time, T_t:	1.6	minutes

calculations for shallow concentrated flow based upon Equation 15-1 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{l}{3{,}600V} \quad \text{(Eq 15-1)}$$

Total Time of Concentration:	9	minutes	user input

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CHECKED BY:		DATE:	
REVISED BY:		DATE:	

TIME OF CONCENTRATION CALCULATOR

DRAINAGE AREA NAME:	DA 1 TO BASIN PERVIOUS	DRAINAGE AREA NOTATION:	

Sheet Flow: Segment 1

Surface Type:	Grass: Short-grass prairie	
Slope of land surface, S:	0.130	ft/ft
n-value (from Table 15-1):	0.15	---
Limiting Length of flow, *l*:	23.0	ft
2-year, 24 hours rainfall, P_2:	3.350	in
Travel time, T_t:	1.4	minutes

calculations for sheet flow based upon Equation 15-8 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{0.007(n l)^{0.8}}{(P_2)^{0.5} S^{0.4}} \quad \text{(Eq 15-8)}$$

Sheet Flow: Segment 2

Surface Type:	Smooth surface (concrete, asphalt, gravel, or bare soil)	
Slope of land surface, S:	0.033	ft/ft
n-value (from Table 15-1):	0.011	---
Limiting Length of flow, *l*:	100.0	ft
2-year, 24 hours rainfall, P_2:	3.350	in
Travel time, T_t:	1.0	minutes

calculations for shallow concentrated flow based upon Equation 15-1 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{l}{3{,}600V} \quad \text{(Eq 15-1)}$$

Total Time of Concentration:	2	minutes	user input

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CHECKED BY:		DATE:	
REVISED BY:		DATE:	

TIME OF CONCENTRATION CALCULATOR

DRAINAGE AREA NAME:	DA 1 TO BASIN BUILDING	DRAINAGE AREA NOTATION:	

Sheet Flow: Segment 1

Surface Type:	Smooth surface (concrete, asphalt, gravel, or bare soil)	
Slope of land surface, S:	0.167	ft/ft
n-value (from Table 15-1):	0.011	---
Limiting Length of flow, *l*:	100.0	ft
2-year, 24 hours rainfall, P_2:	3.350	in
Travel time, T_t:	0.5	minutes

calculations for sheet flow based upon Equation 15-8 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{0.007(n l)^{0.8}}{(P_2)^{0.5} S^{0.4}} \quad \text{(Eq 15-8)}$$

Open Channel Flow:

Hydraulic Length:	45	ft
Slope:	0.010	ft/ft
Manning's n:	0.012	---
Flow Area:	0.128	ft^2
Wetted Perimeter:	0.91	ft
Velocity:	3.36	fps
Travel time, T_t:	0.2	minutes

Total Time of Concentration:	1	minutes	user input

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REVISED BY:		DATE:	

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DRAINAGE AREA NAME:	DA 1 TO BASIN IMPERVIOUS	DRAINAGE AREA NOTATION:	

Sheet Flow: Segment 1

Surface Type:	Smooth surface (concrete, asphalt, gravel, or bare soil)	
Slope of land surface, S:	0.015	ft/ft
n-value (from Table 15-1):	0.011	---
Limiting Length of flow, *l*:	100.0	ft
2-year, 24 hours rainfall, P_2:	3.350	in
Travel time, T_t:	1.3	minutes

calculations for sheet flow based upon Equation 15-8 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{0.007(n l)^{0.8}}{(P_2)^{0.5} S^{0.4}} \quad \text{(Eq 15-8)}$$

Shallow Concentrated Flow: Segment 2

Surface Type:	Pavement and small upland gullies	
Flow length, l:	70	ft
Slope of land surface, S:	0.0330	ft/ft
n-value (from Table 15-3):	0.025	---
Average velocity, V:	3.693	ft/s
Travel time, T_t:	0.3	minutes

calculations for shallow concentrated flow based upon Equation 15-1 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{l}{3{,}600V} \quad \text{(Eq 15-1)}$$

Total Time of Concentration:	2	minutes	user input

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REVISED BY:		DATE:	

TIME OF CONCENTRATION CALCULATOR

DRAINAGE AREA NAME:	DA 1 BASIN BYPASS PERVIOUS	DRAINAGE AREA NOTATION:	

Sheet Flow: Segment 1

Surface Type:	Grass: Short-grass prairie	
Slope of land surface, S:	0.028	ft/ft
n-value (from Table 15-1):	0.15	---
Limiting Length of flow, *l*:	100.0	ft
2-year, 24 hours rainfall, P_2:	3.350	in
Travel time, T_t:	8.4	minutes

calculations for sheet flow based upon Equation 15-8 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{0.007(n l)^{0.8}}{(P_2)^{0.5} S^{0.4}} \quad \text{(Eq 15-8)}$$

Shallow Concentrated Flow: Segment 2

Surface Type:	Grassed waterways	
Flow length, l:	300	ft
Slope of land surface, S:	0.028	ft/ft
n-value (from Table 15-3):	0.05	---
Average velocity, V:	2.700	ft/s
Travel time, T_t:	1.9	minutes

calculations for shallow concentrated flow based upon Equation 15-1 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{l}{3{,}600V} \quad \text{(Eq 15-1)}$$

Total Time of Concentration:	10	minutes	user input

FRENCH & PARRELLO ASSOCIATES

TELEPHONE : (732) 312-9800
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1800 ROUTE 34, SUITE 101
WALL, NEW JERSEY 07719

PROJECT NUMBER:	18937.001		
PROJECT NAME:		Bulk Yard 35	
CALCULATED BY:	KN	DATE:	4/7/2023
CHECKED BY:		DATE:	
REVISED BY:		DATE:	

TIME OF CONCENTRATION CALCULATOR

DRAINAGE AREA NAME:	DA 1 TO BASIN BYPASS IMPERVI	DRAINAGE AREA NOTATION:	

Sheet Flow: Segment 1

Surface Type:	Smooth surface (concrete, asphalt, gravel, or bare soil)	
Slope of land surface, S:	0.027	ft/ft
n-value (from Table 15-1):	0.011	---
Limiting Length of flow, *l*:	100.0	ft
2-year, 24 hours rainfall, P_2:	3.350	in
Travel time, T_t:	1.0	minutes

calculations for sheet flow based upon Equation 15-8 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{0.007(n l)^{0.8}}{(P_2)^{0.5} S^{0.4}} \quad \text{(Eq 15-8)}$$

Shallow Concentrated Flow: Segment 2

Surface Type:	Pavement and small upland gullies	
Flow length, l:	302	ft
Slope of land surface, S:	0.027	ft/ft
n-value (from Table 15-3):	0.025	---
Average velocity, V:	3.340	ft/s
Travel time, T_t:	1.5	minutes

calculations for shallow concentrated flow based upon Equation 15-1 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{l}{3{,}600V} \quad \text{(Eq 15-1)}$$

Total Time of Concentration:	3	minutes	user input

Project Summary	
Title	Bulk Yard 35
Engineer	Kiera Nissen
Company	French and Parrello Associates
Date	4/5/2023

Notes	APPROVED CONDITIONS CALCULATIONS

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Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
DA1-approved imp	Pre-Development 2 year	2	6,842.000	726.000	2.09
DA1-approved imp	Pre-Development 10 year	10	10,719.000	726.000	3.22
DA1-approved imp	Pre-Development 25 year	25	13,438.000	726.000	4.00
DA1-approved imp	Pre-Development 100 year	100	18,417.000	726.000	5.44
da approved perv	Pre-Development 2 year	2	3,226.000	729.000	0.78
da approved perv	Pre-Development 10 year	10	8,386.000	729.000	2.35
da approved perv	Pre-Development 25 year	25	12,704.000	729.000	3.64
da approved perv	Pre-Development 100 year	100	21,503.000	729.000	6.21

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
O-1	Pre-Development 2 year	2	10,068.000	726.000	2.70
O-1	Pre-Development 10 year	10	19,105.000	726.000	5.22
O-1	Pre-Development 25 year	25	26,142.000	726.000	7.16
O-1	Pre-Development 100 year	100	39,920.000	727.000	10.98

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,440.000 min
Depth	3.35 in
Time of Concentration (Composite)	9.000 min
Area (User Defined)	59,399.000 ft²

Computational Time Increment	1.200 min
Time to Peak (Computed)	729.600 min
Flow (Peak, Computed)	0.78 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	0.78 ft³/s

Drainage Area	
SCS CN (Composite)	64.531
Area (User Defined)	59,399.000 ft²
Maximum Retention (Pervious)	5.50 in
Maximum Retention (Pervious, 20 percent)	1.10 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.65 in
Runoff Volume (Pervious)	3,236.742 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3,226.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.000 min
Computational Time Increment	1.200 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	10.30 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.000 min
Unit receding limb, Tr	24.000 min
Total unit time, Tb	30.000 min

Storm Event	NOAA-D (5.12 in)
Return Event	10 years
Duration	1,440.000 min
Depth	5.12 in
Time of Concentration (Composite)	9.000 min
Area (User Defined)	59,399.000 ft²

Computational Time Increment	1.200 min
Time to Peak (Computed)	728.400 min
Flow (Peak, Computed)	2.36 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	2.35 ft³/s

Drainage Area	
SCS CN (Composite)	64.531
Area (User Defined)	59,399.000 ft²
Maximum Retention (Pervious)	5.50 in
Maximum Retention (Pervious, 20 percent)	1.10 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.70 in
Runoff Volume (Pervious)	8,408.236 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	8,386.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.000 min
Computational Time Increment	1.200 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	10.30 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.000 min
Unit receding limb, Tr	24.000 min
Total unit time, Tb	30.000 min

Storm Event	NOAA-D (6.36 in)
Return Event	25 years
Duration	1,440.000 min
Depth	6.36 in
Time of Concentration (Composite)	9.000 min
Area (User Defined)	59,399.000 ft²

Computational Time Increment	1.200 min
Time to Peak (Computed)	728.400 min
Flow (Peak, Computed)	3.66 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	3.64 ft³/s

Drainage Area	
SCS CN (Composite)	64.531
Area (User Defined)	59,399.000 ft²
Maximum Retention (Pervious)	5.50 in
Maximum Retention (Pervious, 20 percent)	1.10 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.57 in
Runoff Volume (Pervious)	12,734.921 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	12,704.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.000 min
Computational Time Increment	1.200 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	10.30 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.000 min
Unit receding limb, Tr	24.000 min
Total unit time, Tb	30.000 min

Storm Event	NOAA-D (8.63 in)
Return Event	100 years
Duration	1,440.000 min
Depth	8.63 in
Time of Concentration (Composite)	9.000 min
Area (User Defined)	59,399.000 ft²

Computational Time Increment	1.200 min
Time to Peak (Computed)	728.400 min
Flow (Peak, Computed)	6.27 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	6.21 ft³/s

Drainage Area	
SCS CN (Composite)	64.531
Area (User Defined)	59,399.000 ft²
Maximum Retention (Pervious)	5.50 in
Maximum Retention (Pervious, 20 percent)	1.10 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.35 in
Runoff Volume (Pervious)	21,548.921 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	21,503.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.000 min
Computational Time Increment	1.200 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	10.30 ft³/s

Subsection: Unit Hydrograph Summary
Label: da approved perv
Scenario: Pre-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.000 min
Unit receding limb, Tr	24.000 min
Total unit time, Tb	30.000 min

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,440.000 min
Depth	3.35 in
Time of Concentration (Composite)	3.000 min
Area (User Defined)	26,354.000 ft²

Computational Time Increment	0.400 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	2.09 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	2.09 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	26,354.000 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.12 in
Runoff Volume (Pervious)	6,845.354 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	6,842.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	3.000 min
Computational Time Increment	0.400 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.71 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	2.000 min
Unit receding limb, Tr	8.000 min
Total unit time, Tb	10.000 min

Storm Event	NOAA-D (5.12 in)
Return Event	10 years
Duration	1,440.000 min
Depth	5.12 in
Time of Concentration (Composite)	3.000 min
Area (User Defined)	26,354.000 ft²

Computational Time Increment	0.400 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	3.22 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	3.22 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	26,354.000 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.88 in
Runoff Volume (Pervious)	10,723.848 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	10,719.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	3.000 min
Computational Time Increment	0.400 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.71 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	2.000 min
Unit receding limb, Tr	8.000 min
Total unit time, Tb	10.000 min

Storm Event	NOAA-D (6.36 in)
Return Event	25 years
Duration	1,440.000 min
Depth	6.36 in
Time of Concentration (Composite)	3.000 min
Area (User Defined)	26,354.000 ft²

Computational Time Increment	0.400 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	4.00 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	4.00 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	26,354.000 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.12 in
Runoff Volume (Pervious)	13,443.805 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	13,438.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	3.000 min
Computational Time Increment	0.400 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.71 ft³/s

Subsection: Unit Hydrograph Summary
Label: DA1-approved imp
Scenario: Pre-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	2.000 min
Unit receding limb, Tr	8.000 min
Total unit time, Tb	10.000 min

Storm Event	NOAA-D (8.63 in)
Return Event	100 years
Duration	1,440.000 min
Depth	8.63 in
Time of Concentration (Composite)	3.000 min
Area (User Defined)	26,354.000 ft²

Computational Time Increment	0.400 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	5.44 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	5.44 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	26,354.000 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	8.39 in
Runoff Volume (Pervious)	18,425.483 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	18,417.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	3.000 min
Computational Time Increment	0.400 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.71 ft³/s

Subsection: Unit Hydrograph Summary
Label: DA1-approved imp
Scenario: Pre-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	2.000 min
Unit receding limb, Tr	8.000 min
Total unit time, Tb	10.000 min

Subsection: Addition Summary
Label: O-1
Scenario: Pre-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	da approved perv
<Catchment to Outflow Node>	DA1-approved imp

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	da approved perv	3,225.864	729.000	0.78
Flow (From)	DA1-approved imp	6,842.150	726.000	2.09
Flow (In)	O-1	10,068.014	726.000	2.70

Subsection: Addition Summary
Label: O-1
Scenario: Pre-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.12 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	da approved perv
<Catchment to Outflow Node>	DA1-approved imp

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	da approved perv	8,385.944	729.000	2.35
Flow (From)	DA1-approved imp	10,718.940	726.000	3.22
Flow (In)	O-1	19,104.884	726.000	5.22

Subsection: Addition Summary
Label: O-1
Scenario: Pre-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	da approved perv
<Catchment to Outflow Node>	DA1-approved imp

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	da approved perv	12,704.233	729.000	3.64
Flow (From)	DA1-approved imp	13,437.704	726.000	4.00
Flow (In)	O-1	26,141.937	726.000	7.16

Subsection: Addition Summary
Label: O-1
Scenario: Pre-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	da approved perv
<Catchment to Outflow Node>	DA1-approved imp

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	da approved perv	21,502.628	729.000	6.21
Flow (From)	DA1-approved imp	18,417.202	726.000	5.44
Flow (In)	O-1	39,919.830	727.000	10.98

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Appendix C

Proposed Conditions Calculations

Project Summary	
Title	Bulk Yard 35
Engineer	Kiera Nissen
Company	French and Parrello Associates
Date	12/20/2023

Notes	Proposed Calculations

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Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
To Pavement-imp	Post-Development 2 year	2	5,864.000	726.000	1.80
To Pavement-imp	Post-Development 10 year	10	9,187.000	725.000	2.77
To Pavement-imp	Post-Development 25 year	25	11,517.000	725.000	3.45
To Pavement-imp	Post-Development 100 year	100	15,785.000	725.000	4.69
To pavement-pervious	Post-Development 2 year	2	581.000	726.000	0.21
To pavement-pervious	Post-Development 10 year	10	1,390.000	726.000	0.52
To pavement-pervious	Post-Development 25 year	25	2,045.000	726.000	0.76
To pavement-pervious	Post-Development 100 year	100	3,353.000	726.000	1.22
da 1 basin bypass pervious	Post-Development 2 year	2	4,710.000	729.000	1.27
da 1 basin bypass pervious	Post-Development 10 year	10	9,990.000	729.000	2.77
da 1 basin bypass pervious	Post-Development 25 year	25	14,066.000	729.000	3.89
da 1 basin bypass pervious	Post-Development 100 year	100	21,956.000	729.000	6.01
Building	Post-Development 2 year	2	1,313.000	726.000	0.41
Building	Post-Development 10 year	10	2,057.000	726.000	0.62
Building	Post-Development 25 year	25	2,579.000	726.000	0.77
Building	Post-Development 100 year	100	3,534.000	726.000	1.05
basin bypass impervious	Post-Development 2 year	2	2,197.000	726.000	0.67
basin bypass impervious	Post-Development 10 year	10	3,443.000	726.000	1.03
basin bypass impervious	Post-Development 25 year	25	4,316.000	726.000	1.29
basin bypass impervious	Post-Development 100 year	100	5,915.000	726.000	1.75

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
O-1	Post-Development 2 year	2	8,112.000	727.000	1.82

Subsection: Master Network Summary

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
O-1	Post-Development 10 year	10	17,871.000	727.000	4.82
O-1	Post-Development 25 year	25	25,405.000	727.000	6.63
O-1	Post-Development 100 year	100	40,157.000	727.000	9.87

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
Infiltration Basin (IN)	Post-Development 2 year	2	7,759.000	726.000	2.42	(N/A)	(N/A)
Infiltration Basin (OUT)	Post-Development 2 year	2	1,205.000	751.000	0.25	104.21	2,628.000
Infiltration Basin (IN)	Post-Development 10 year	10	12,634.000	726.000	3.91	(N/A)	(N/A)
Infiltration Basin (OUT)	Post-Development 10 year	10	4,438.000	730.000	1.35	105.01	3,729.000
Infiltration Basin (IN)	Post-Development 25 year	25	16,141.000	726.000	4.98	(N/A)	(N/A)
Infiltration Basin (OUT)	Post-Development 25 year	25	7,024.000	729.000	1.86	105.72	4,635.000
Infiltration Basin (IN)	Post-Development 100 year	100	22,673.000	726.000	6.96	(N/A)	(N/A)
Infiltration Basin (OUT)	Post-Development 100 year	100	12,286.000	729.000	2.70	107.36	6,106.000

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,500.000 min
Depth	3.35 in
Time of Concentration (Composite)	3.000 min
Area (User Defined)	8,460.000 ft²

Computational Time Increment	0.400 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	0.67 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	0.67 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	8,460.000 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.12 in
Runoff Volume (Pervious)	2,197.454 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2,197.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	3.000 min
Computational Time Increment	0.400 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	4.40 ft³/s

Subsection: Unit Hydrograph Summary
Label: basin bypass impervious
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	2.000 min
Unit receding limb, Tr	8.000 min
Total unit time, Tb	10.000 min

Storm Event	NOAA-D (5.12 in)
Return Event	10 years
Duration	1,500.000 min
Depth	5.12 in
Time of Concentration (Composite)	3.000 min
Area (User Defined)	8,460.000 ft²

Computational Time Increment	0.400 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	1.03 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	1.03 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	8,460.000 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.88 in
Runoff Volume (Pervious)	3,442.504 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3,443.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	3.000 min
Computational Time Increment	0.400 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	4.40 ft³/s

Subsection: Unit Hydrograph Summary
Label: basin bypass impervious
Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.12 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	2.000 min
Unit receding limb, Tr	8.000 min
Total unit time, Tb	10.000 min

Storm Event	NOAA-D (6.36 in)
Return Event	25 years
Duration	1,500.000 min
Depth	6.36 in
Time of Concentration (Composite)	3.000 min
Area (User Defined)	8,460.000 ft²

Computational Time Increment	0.400 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	1.29 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	1.29 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	8,460.000 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.12 in
Runoff Volume (Pervious)	4,315.648 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	4,316.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	3.000 min
Computational Time Increment	0.400 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	4.40 ft³/s

Subsection: Unit Hydrograph Summary
Label: basin bypass impervious
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	2.000 min
Unit receding limb, Tr	8.000 min
Total unit time, Tb	10.000 min

Storm Event	NOAA-D (8.63 in)
Return Event	100 years
Duration	1,500.000 min
Depth	8.63 in
Time of Concentration (Composite)	3.000 min
Area (User Defined)	8,460.000 ft²

Computational Time Increment	0.400 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	1.75 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	1.75 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	8,460.000 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	8.39 in
Runoff Volume (Pervious)	5,914.836 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	5,915.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	3.000 min
Computational Time Increment	0.400 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	4.40 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	2.000 min
Unit receding limb, Tr	8.000 min
Total unit time, Tb	10.000 min

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,500.000 min
Depth	3.35 in
Time of Concentration (Composite)	1.000 min
Area (User Defined)	5,055.120 ft²

Computational Time Increment	0.133 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	0.41 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	0.41 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	5,055.120 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.12 in
Runoff Volume (Pervious)	1,313.047 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,313.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	1.000 min
Computational Time Increment	0.133 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.89 ft³/s

Subsection: Unit Hydrograph Summary
Label: Building
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.667 min
Unit receding limb, Tr	2.667 min
Total unit time, Tb	3.333 min

Storm Event	NOAA-D (5.12 in)
Return Event	10 years
Duration	1,500.000 min
Depth	5.12 in
Time of Concentration (Composite)	1.000 min
Area (User Defined)	5,055.120 ft²

Computational Time Increment	0.133 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	0.62 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	0.62 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	5,055.120 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.88 in
Runoff Volume (Pervious)	2,057.005 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2,057.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	1.000 min
Computational Time Increment	0.133 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.89 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.667 min
Unit receding limb, Tr	2.667 min
Total unit time, Tb	3.333 min

Storm Event	NOAA-D (6.36 in)
Return Event	25 years
Duration	1,500.000 min
Depth	6.36 in
Time of Concentration (Composite)	1.000 min
Area (User Defined)	5,055.120 ft²

Computational Time Increment	0.133 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	0.77 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	0.77 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	5,055.120 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.12 in
Runoff Volume (Pervious)	2,578.737 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2,579.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	1.000 min
Computational Time Increment	0.133 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.89 ft³/s

Subsection: Unit Hydrograph Summary
Label: Building
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.667 min
Unit receding limb, Tr	2.667 min
Total unit time, Tb	3.333 min

Storm Event	NOAA-D (8.63 in)
Return Event	100 years
Duration	1,500.000 min
Depth	8.63 in
Time of Concentration (Composite)	1.000 min
Area (User Defined)	5,055.120 ft²

Computational Time Increment	0.133 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	1.05 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	1.05 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	5,055.120 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	8.39 in
Runoff Volume (Pervious)	3,534.303 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3,534.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	1.000 min
Computational Time Increment	0.133 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.89 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.667 min
Unit receding limb, Tr	2.667 min
Total unit time, Tb	3.333 min

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,500.000 min
Depth	3.35 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	46,716.000 ft²

Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	1.28 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	1.27 ft³/s

Drainage Area	
SCS CN (Composite)	75.219
Area (User Defined)	46,716.000 ft²
Maximum Retention (Pervious)	3.29 in
Maximum Retention (Pervious, 20 percent)	0.66 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.21 in
Runoff Volume (Pervious)	4,710.112 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	4,710.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.29 ft³/s

Subsection: Unit Hydrograph Summary
Label: da 1 basin bypass pervious
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Storm Event	NOAA-D (5.12 in)
Return Event	10 years
Duration	1,500.000 min
Depth	5.12 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	46,716.000 ft²

Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	2.78 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	2.77 ft³/s

Drainage Area	
SCS CN (Composite)	75.219
Area (User Defined)	46,716.000 ft²
Maximum Retention (Pervious)	3.29 in
Maximum Retention (Pervious, 20 percent)	0.66 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.57 in
Runoff Volume (Pervious)	9,989.636 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	9,990.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.29 ft³/s

Subsection: Unit Hydrograph Summary
Label: da 1 basin bypass pervious
Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.12 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Storm Event	NOAA-D (6.36 in)
Return Event	25 years
Duration	1,500.000 min
Depth	6.36 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	46,716.000 ft²

Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	3.91 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	3.89 ft³/s

Drainage Area	
SCS CN (Composite)	75.219
Area (User Defined)	46,716.000 ft²
Maximum Retention (Pervious)	3.29 in
Maximum Retention (Pervious, 20 percent)	0.66 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.61 in
Runoff Volume (Pervious)	14,065.940 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	14,066.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.29 ft³/s

Subsection: Unit Hydrograph Summary
Label: da 1 basin bypass pervious
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Storm Event	NOAA-D (8.63 in)
Return Event	100 years
Duration	1,500.000 min
Depth	8.63 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	46,716.000 ft²

Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	6.03 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	6.01 ft³/s

Drainage Area	
SCS CN (Composite)	75.219
Area (User Defined)	46,716.000 ft²
Maximum Retention (Pervious)	3.29 in
Maximum Retention (Pervious, 20 percent)	0.66 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.64 in
Runoff Volume (Pervious)	21,956.569 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	21,956.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.29 ft³/s

Subsection: Unit Hydrograph Summary
Label: da 1 basin bypass pervious
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,500.000 min
Depth	3.35 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	22,578.000 ft²

Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	1.81 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	1.80 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	22,578.000 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.12 in
Runoff Volume (Pervious)	5,864.551 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	5,864.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	17.62 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Storm Event	NOAA-D (5.12 in)
Return Event	10 years
Duration	1,500.000 min
Depth	5.12 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	22,578.000 ft²

Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	2.78 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	2.77 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	22,578.000 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.88 in
Runoff Volume (Pervious)	9,187.336 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	9,187.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	17.62 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: To Pavement-imp
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Storm Event	NOAA-D (6.36 in)
Return Event	25 years
Duration	1,500.000 min
Depth	6.36 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	22,578.000 ft²

Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	3.46 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	3.45 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	22,578.000 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.12 in
Runoff Volume (Pervious)	11,517.576 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	11,517.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	17.62 ft³/s

Subsection: Unit Hydrograph Summary
Label: To Pavement-imp
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: To Pavement-imp
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

Storm Event	NOAA-D (8.63 in)
Return Event	100 years
Duration	1,500.000 min
Depth	8.63 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	22,578.000 ft²

Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	4.70 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	4.69 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	22,578.000 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	8.39 in
Runoff Volume (Pervious)	15,785.481 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	15,785.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	17.62 ft³/s

Subsection: Unit Hydrograph Summary
Label: To Pavement-imp
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,500.000 min
Depth	3.35 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	8,352.000 ft²

Computational Time Increment	0.267 min
Time to Peak (Computed)	726.133 min
Flow (Peak, Computed)	0.21 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	0.21 ft³/s

Drainage Area	
SCS CN (Composite)	68.402
Area (User Defined)	8,352.000 ft²
Maximum Retention (Pervious)	4.62 in
Maximum Retention (Pervious, 20 percent)	0.92 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.84 in
Runoff Volume (Pervious)	581.462 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	581.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	6.52 ft³/s

Subsection: Unit Hydrograph Summary
Label: To pavement-pervious
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Storm Event	NOAA-D (5.12 in)
Return Event	10 years
Duration	1,500.000 min
Depth	5.12 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	8,352.000 ft²

Computational Time Increment	0.267 min
Time to Peak (Computed)	726.133 min
Flow (Peak, Computed)	0.52 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	0.52 ft³/s

Drainage Area	
SCS CN (Composite)	68.402
Area (User Defined)	8,352.000 ft²
Maximum Retention (Pervious)	4.62 in
Maximum Retention (Pervious, 20 percent)	0.92 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.00 in
Runoff Volume (Pervious)	1,390.137 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,390.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	6.52 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: To pavement-pervious
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Storm Event	NOAA-D (6.36 in)
Return Event	25 years
Duration	1,500.000 min
Depth	6.36 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	8,352.000 ft²

Computational Time Increment	0.267 min
Time to Peak (Computed)	726.133 min
Flow (Peak, Computed)	0.76 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	0.76 ft³/s

Drainage Area	
SCS CN (Composite)	68.402
Area (User Defined)	8,352.000 ft²
Maximum Retention (Pervious)	4.62 in
Maximum Retention (Pervious, 20 percent)	0.92 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.94 in
Runoff Volume (Pervious)	2,045.423 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2,045.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	6.52 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Storm Event	NOAA-D (8.63 in)
Return Event	100 years
Duration	1,500.000 min
Depth	8.63 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	8,352.000 ft²

Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	1.22 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	1.22 ft³/s

Drainage Area	
SCS CN (Composite)	68.402
Area (User Defined)	8,352.000 ft²
Maximum Retention (Pervious)	4.62 in
Maximum Retention (Pervious, 20 percent)	0.92 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.82 in
Runoff Volume (Pervious)	3,353.326 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3,353.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	6.52 ft³/s

Subsection: Unit Hydrograph Summary
Label: To pavement-pervious
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	basin bypass impervious
Outlet-1	Infiltration Basin
<Catchment to Outflow Node>	da 1 basin bypass pervious

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (min)	Flow (Peak) (ft^3/s)
Flow (From)	basin bypass impervious	2,197.453	726.000	0.67
Flow (From)	Outlet-1	1,204.692	751.000	0.25
Flow (From)	da 1 basin bypass pervious	4,710.081	729.000	1.27
Flow (In)	O-1	8,112.226	727.000	1.82

Subsection: Addition Summary
Label: O-1
Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.12 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	basin bypass impervious
Outlet-1	Infiltration Basin
<Catchment to Outflow Node>	da 1 basin bypass pervious

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (min)	Flow (Peak) (ft^3/s)
Flow (From)	basin bypass impervious	3,442.502	726.000	1.03
Flow (From)	Outlet-1	4,438.478	730.000	1.35
Flow (From)	da 1 basin bypass pervious	9,989.561	729.000	2.77
Flow (In)	O-1	17,870.541	727.000	4.82

Subsection: Addition Summary
Label: O-1
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	basin bypass impervious
Outlet-1	Infiltration Basin
<Catchment to Outflow Node>	da 1 basin bypass pervious

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (min)	Flow (Peak) (ft^3/s)
Flow (From)	basin bypass impervious	4,315.645	726.000	1.29
Flow (From)	Outlet-1	7,023.716	729.000	1.86
Flow (From)	da 1 basin bypass pervious	14,065.839	729.000	3.89
Flow (In)	O-1	25,405.200	727.000	6.63

Subsection: Addition Summary
Label: O-1
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	basin bypass impervious
Outlet-1	Infiltration Basin
<Catchment to Outflow Node>	da 1 basin bypass pervious

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (min)	Flow (Peak) (ft^3/s)
Flow (From)	basin bypass impervious	5,914.832	726.000	1.75
Flow (From)	Outlet-1	12,286.066	729.000	2.70
Flow (From)	da 1 basin bypass pervious	21,956.410	729.000	6.01
Flow (In)	O-1	40,157.309	727.000	9.87

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	102.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	107.60 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	TW	103.70	107.60
Orifice-Circular	Orifice - 2	Forward	TW	104.00	107.60
Rectangular Weir	Weir - 1	Forward	TW	107.45	107.60
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	103.70 ft
Orifice Diameter	3.0 in
Orifice Coefficient	0.600

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	107.45 ft
Weir Length	3.00 ft
Weir Coefficient	3.30 (ft^0.5)/s

Structure ID: Orifice - 2 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	104.00 ft
Orifice Diameter	7.0 in
Orifice Coefficient	0.600

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
102.00	0.00	(N/A)	0.00
102.10	0.00	(N/A)	0.00
102.20	0.00	(N/A)	0.00
102.30	0.00	(N/A)	0.00
102.40	0.00	(N/A)	0.00
102.50	0.00	(N/A)	0.00
102.60	0.00	(N/A)	0.00
102.70	0.00	(N/A)	0.00
102.80	0.00	(N/A)	0.00
102.90	0.00	(N/A)	0.00
103.00	0.00	(N/A)	0.00
103.10	0.00	(N/A)	0.00
103.20	0.00	(N/A)	0.00
103.30	0.00	(N/A)	0.00
103.40	0.00	(N/A)	0.00
103.50	0.00	(N/A)	0.00
103.60	0.00	(N/A)	0.00
103.70	0.00	(N/A)	0.00
103.80	0.02	(N/A)	0.00
103.90	0.06	(N/A)	0.00
104.00	0.10	(N/A)	0.00
104.10	0.12	(N/A)	0.00
104.20	0.14	(N/A)	0.00
104.30	0.16	(N/A)	0.00
104.40	0.18	(N/A)	0.00
104.50	0.19	(N/A)	0.00
104.60	0.21	(N/A)	0.00
104.70	0.22	(N/A)	0.00
104.80	0.23	(N/A)	0.00
104.90	0.24	(N/A)	0.00
105.00	0.26	(N/A)	0.00
105.10	0.27	(N/A)	0.00
105.20	0.28	(N/A)	0.00
105.30	0.29	(N/A)	0.00
105.40	0.30	(N/A)	0.00
105.50	0.31	(N/A)	0.00
105.60	0.31	(N/A)	0.00
105.70	0.32	(N/A)	0.00

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
105.80	0.33	(N/A)	0.00
105.90	0.34	(N/A)	0.00
106.00	0.35	(N/A)	0.00
106.10	0.36	(N/A)	0.00
106.20	0.36	(N/A)	0.00
106.30	0.37	(N/A)	0.00
106.40	0.38	(N/A)	0.00
106.50	0.39	(N/A)	0.00
106.60	0.39	(N/A)	0.00
106.70	0.40	(N/A)	0.00
106.80	0.41	(N/A)	0.00
106.90	0.41	(N/A)	0.00
107.00	0.42	(N/A)	0.00
107.10	0.43	(N/A)	0.00
107.20	0.43	(N/A)	0.00
107.30	0.44	(N/A)	0.00
107.40	0.45	(N/A)	0.00
107.45	0.45	(N/A)	0.00
107.50	0.45	(N/A)	0.00
107.60	0.46	(N/A)	0.00

Computation Messages
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages
Upstream HW & DNstream TW < Inv.El
CRIT.DEPTH CONTROL
Vh= .026ft Dcr= .074ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .059ft Dcr= .141ft
CRIT.DEPTH Hev= .00ft
H =.18
H =.28
H =.38
H =.48
H =.58
H =.68
H =.78
H =.88
H =.98
H =1.08
H =1.18
H =1.28
H =1.38
H =1.48
H =1.58
H =1.68
H =1.78
H =1.88
H =1.98
H =2.08
H =2.18
H =2.28
H =2.38
H =2.48
H =2.58
H =2.68
H =2.78
H =2.88
H =2.98
H =3.08
H =3.18
H =3.28
H =3.38

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages
H =3.48
H =3.58
H =3.63
H =3.68
H =3.78

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
102.00	0.00	(N/A)	0.00
102.10	0.00	(N/A)	0.00
102.20	0.00	(N/A)	0.00
102.30	0.00	(N/A)	0.00
102.40	0.00	(N/A)	0.00
102.50	0.00	(N/A)	0.00
102.60	0.00	(N/A)	0.00
102.70	0.00	(N/A)	0.00
102.80	0.00	(N/A)	0.00
102.90	0.00	(N/A)	0.00
103.00	0.00	(N/A)	0.00
103.10	0.00	(N/A)	0.00
103.20	0.00	(N/A)	0.00
103.30	0.00	(N/A)	0.00
103.40	0.00	(N/A)	0.00
103.50	0.00	(N/A)	0.00
103.60	0.00	(N/A)	0.00
103.70	0.00	(N/A)	0.00
103.80	0.00	(N/A)	0.00
103.90	0.00	(N/A)	0.00
104.00	0.00	(N/A)	0.00
104.10	0.00	(N/A)	0.00
104.20	0.00	(N/A)	0.00
104.30	0.00	(N/A)	0.00
104.40	0.00	(N/A)	0.00
104.50	0.00	(N/A)	0.00
104.60	0.00	(N/A)	0.00
104.70	0.00	(N/A)	0.00
104.80	0.00	(N/A)	0.00
104.90	0.00	(N/A)	0.00
105.00	0.00	(N/A)	0.00
105.10	0.00	(N/A)	0.00
105.20	0.00	(N/A)	0.00
105.30	0.00	(N/A)	0.00
105.40	0.00	(N/A)	0.00
105.50	0.00	(N/A)	0.00
105.60	0.00	(N/A)	0.00
105.70	0.00	(N/A)	0.00

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
105.80	0.00	(N/A)	0.00
105.90	0.00	(N/A)	0.00
106.00	0.00	(N/A)	0.00
106.10	0.00	(N/A)	0.00
106.20	0.00	(N/A)	0.00
106.30	0.00	(N/A)	0.00
106.40	0.00	(N/A)	0.00
106.50	0.00	(N/A)	0.00
106.60	0.00	(N/A)	0.00
106.70	0.00	(N/A)	0.00
106.80	0.00	(N/A)	0.00
106.90	0.00	(N/A)	0.00
107.00	0.00	(N/A)	0.00
107.10	0.00	(N/A)	0.00
107.20	0.00	(N/A)	0.00
107.30	0.00	(N/A)	0.00
107.40	0.00	(N/A)	0.00
107.45	0.00	(N/A)	0.00
107.50	0.11	(N/A)	0.00
107.60	0.58	(N/A)	0.00

Computation Messages
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
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HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
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HW & TW below Inv.El.=107.450
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HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
HW & TW below Inv.El.=107.450
H=.00; Htw=.00; Qfree=.00;
H=.05; Htw=.00; Qfree=.11;
H=.15; Htw=.00; Qfree=.58;

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
102.00	0.00	(N/A)	0.00
102.10	0.00	(N/A)	0.00
102.20	0.00	(N/A)	0.00
102.30	0.00	(N/A)	0.00
102.40	0.00	(N/A)	0.00
102.50	0.00	(N/A)	0.00
102.60	0.00	(N/A)	0.00
102.70	0.00	(N/A)	0.00
102.80	0.00	(N/A)	0.00
102.90	0.00	(N/A)	0.00
103.00	0.00	(N/A)	0.00
103.10	0.00	(N/A)	0.00
103.20	0.00	(N/A)	0.00
103.30	0.00	(N/A)	0.00
103.40	0.00	(N/A)	0.00
103.50	0.00	(N/A)	0.00
103.60	0.00	(N/A)	0.00
103.70	0.00	(N/A)	0.00
103.80	0.00	(N/A)	0.00
103.90	0.00	(N/A)	0.00
104.00	0.00	(N/A)	0.00
104.10	0.03	(N/A)	0.00
104.20	0.10	(N/A)	0.00
104.30	0.21	(N/A)	0.00
104.40	0.35	(N/A)	0.00
104.50	0.52	(N/A)	0.00
104.60	0.71	(N/A)	0.00
104.70	0.82	(N/A)	0.00
104.80	0.92	(N/A)	0.00
104.90	1.00	(N/A)	0.00
105.00	1.08	(N/A)	0.00
105.10	1.16	(N/A)	0.00
105.20	1.23	(N/A)	0.00
105.30	1.29	(N/A)	0.00
105.40	1.35	(N/A)	0.00
105.50	1.41	(N/A)	0.00
105.60	1.47	(N/A)	0.00
105.70	1.53	(N/A)	0.00

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
105.80	1.58	(N/A)	0.00
105.90	1.63	(N/A)	0.00
106.00	1.68	(N/A)	0.00
106.10	1.73	(N/A)	0.00
106.20	1.78	(N/A)	0.00
106.30	1.82	(N/A)	0.00
106.40	1.87	(N/A)	0.00
106.50	1.91	(N/A)	0.00
106.60	1.95	(N/A)	0.00
106.70	2.00	(N/A)	0.00
106.80	2.04	(N/A)	0.00
106.90	2.08	(N/A)	0.00
107.00	2.12	(N/A)	0.00
107.10	2.16	(N/A)	0.00
107.20	2.19	(N/A)	0.00
107.30	2.23	(N/A)	0.00
107.40	2.27	(N/A)	0.00
107.45	2.29	(N/A)	0.00
107.50	2.30	(N/A)	0.00
107.60	2.34	(N/A)	0.00

Computation Messages
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages
HW & TW below invert
HW & TW below invert
HW & TW below invert
Upstream HW & DNstream TW < Inv.El
CRIT.DEPTH CONTROL Vh= .025ft Dcr= .075ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .052ft Dcr= .148ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .081ft Dcr= .219ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .112ft Dcr= .288ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .148ft Dcr= .352ft
CRIT.DEPTH Hev= .00ft
H =.31
H =.41
H =.51
H =.61
H =.71
H =.81
H =.91
H =1.01
H =1.11
H =1.21
H =1.31
H =1.41
H =1.51
H =1.61
H =1.71
H =1.81
H =1.91
H =2.01
H =2.11
H =2.21
H =2.31
H =2.41

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages
H =2.51
H =2.61
H =2.71
H =2.81
H =2.91
H =3.01
H =3.11
H =3.16
H =3.21
H =3.31

Subsection: Composite Rating Curve
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
102.00	0.00	(N/A)	0.00
102.10	0.00	(N/A)	0.00
102.20	0.00	(N/A)	0.00
102.30	0.00	(N/A)	0.00
102.40	0.00	(N/A)	0.00
102.50	0.00	(N/A)	0.00
102.60	0.00	(N/A)	0.00
102.70	0.00	(N/A)	0.00
102.80	0.00	(N/A)	0.00
102.90	0.00	(N/A)	0.00
103.00	0.00	(N/A)	0.00
103.10	0.00	(N/A)	0.00
103.20	0.00	(N/A)	0.00
103.30	0.00	(N/A)	0.00
103.40	0.00	(N/A)	0.00
103.50	0.00	(N/A)	0.00
103.60	0.00	(N/A)	0.00
103.70	0.00	(N/A)	0.00
103.80	0.02	(N/A)	0.00
103.90	0.06	(N/A)	0.00
104.00	0.10	(N/A)	0.00
104.10	0.15	(N/A)	0.00
104.20	0.24	(N/A)	0.00
104.30	0.37	(N/A)	0.00
104.40	0.53	(N/A)	0.00
104.50	0.72	(N/A)	0.00
104.60	0.92	(N/A)	0.00
104.70	1.04	(N/A)	0.00
104.80	1.15	(N/A)	0.00
104.90	1.25	(N/A)	0.00
105.00	1.34	(N/A)	0.00
105.10	1.42	(N/A)	0.00
105.20	1.50	(N/A)	0.00
105.30	1.58	(N/A)	0.00
105.40	1.65	(N/A)	0.00
105.50	1.72	(N/A)	0.00
105.60	1.79	(N/A)	0.00
105.70	1.85	(N/A)	0.00
105.80	1.91	(N/A)	0.00
105.90	1.97	(N/A)	0.00
106.00	2.03	(N/A)	0.00
106.10	2.09	(N/A)	0.00
106.20	2.14	(N/A)	0.00
106.30	2.19	(N/A)	0.00

Subsection: Composite Rating Curve
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)	Contributing Structures
106.40	2.25	(N/A)	0.00	None Contributing
106.50	2.30	(N/A)	0.00	None Contributing
106.60	2.35	(N/A)	0.00	None Contributing
106.70	2.40	(N/A)	0.00	None Contributing
106.80	2.44	(N/A)	0.00	None Contributing
106.90	2.49	(N/A)	0.00	None Contributing
107.00	2.54	(N/A)	0.00	None Contributing
107.10	2.58	(N/A)	0.00	None Contributing
107.20	2.63	(N/A)	0.00	None Contributing
107.30	2.67	(N/A)	0.00	None Contributing
107.40	2.71	(N/A)	0.00	None Contributing
107.45	2.74	(N/A)	0.00	None Contributing
107.50	2.87	(N/A)	0.00	None Contributing
107.60	3.37	(N/A)	0.00	None Contributing
				None Contributing
				None Contributing
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				None Contributing
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				None Contributing
				None Contributing
				Orifice - 1
				Orifice - 1
				Orifice - 1
				Orifice - 1 + Orifice - 2
				Orifice - 1 + Orifice - 2
				Orifice - 1 + Orifice - 2
				Orifice - 1 + Orifice - 2
				Orifice - 1 + Orifice - 2
				Orifice - 1 + Orifice - 2
				Orifice - 1 + Orifice - 2
				Orifice - 1 + Orifice - 2

Composite Outflow Summary

Contributing Structures
Orifice - 1 + Orifice - 2
Orifice - 1 + Orifice - 2
Orifice - 1 + Orifice - 2
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Orifice - 1 + Orifice - 2 + Weir - 1
Orifice - 1 + Orifice - 2 + Weir - 1

Subsection: Level Pool Pond Routing Summary
Label: Infiltration Basin (IN)
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	0.12 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	102.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	2.42 ft³/s	Time to Peak (Flow, In)	726.000 min
Infiltration (Peak)	0.12 ft³/s	Time to Peak (Infiltration)	640.000 min
Flow (Peak Outlet)	0.25 ft³/s	Time to Peak (Flow, Outlet)	751.000 min

Elevation (Water Surface, Peak)	104.21 ft
Volume (Peak)	2,627.902 ft³

Mass Balance (ft³)	
Volume (Initial)	0.000 ft³
Volume (Total Inflow)	7,759.000 ft³
Volume (Total Infiltration)	6,554.000 ft³
Volume (Total Outlet Outflow)	1,205.000 ft³
Volume (Retained)	0.000 ft³
Volume (Unrouted)	0.000 ft³
Error (Mass Balance)	0.001 %

Subsection: Level Pool Pond Routing Summary
Label: Infiltration Basin (IN)
Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.12 in)

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	0.12 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	102.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	3.91 ft³/s	Time to Peak (Flow, In)	726.000 min
Infiltration (Peak)	0.12 ft³/s	Time to Peak (Infiltration)	575.000 min
Flow (Peak Outlet)	1.35 ft³/s	Time to Peak (Flow, Outlet)	730.000 min

Elevation (Water Surface, Peak)	105.01 ft
Volume (Peak)	3,729.425 ft³

Mass Balance (ft³)	
Volume (Initial)	0.000 ft³
Volume (Total Inflow)	12,634.000 ft³
Volume (Total Infiltration)	8,161.000 ft³
Volume (Total Outlet Outflow)	4,438.000 ft³
Volume (Retained)	35.000 ft³
Volume (Unrouted)	0.000 ft³
Error (Mass Balance)	0.000 %

Subsection: Level Pool Pond Routing Summary
Label: Infiltration Basin (IN)
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	0.12 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	102.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	4.98 ft³/s	Time to Peak (Flow, In)	726.000 min
Infiltration (Peak)	0.12 ft³/s	Time to Peak (Infiltration)	538.000 min
Flow (Peak Outlet)	1.86 ft³/s	Time to Peak (Flow, Outlet)	729.000 min

Elevation (Water Surface, Peak)	105.72 ft
Volume (Peak)	4,634.558 ft³

Mass Balance (ft³)	
Volume (Initial)	0.000 ft³
Volume (Total Inflow)	16,141.000 ft³
Volume (Total Infiltration)	8,623.000 ft³
Volume (Total Outlet Outflow)	7,024.000 ft³
Volume (Retained)	495.000 ft³
Volume (Unrouted)	0.000 ft³
Error (Mass Balance)	0.000 %

Subsection: Level Pool Pond Routing Summary
Label: Infiltration Basin (IN)
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.63 in)

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	0.12 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	102.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	6.96 ft³/s	Time to Peak (Flow, In)	726.000 min
Infiltration (Peak)	0.12 ft³/s	Time to Peak (Infiltration)	434.000 min
Flow (Peak Outlet)	2.70 ft³/s	Time to Peak (Flow, Outlet)	729.000 min

Elevation (Water Surface, Peak)	107.36 ft
Volume (Peak)	6,105.527 ft³

Mass Balance (ft³)	
Volume (Initial)	0.000 ft³
Volume (Total Inflow)	22,673.000 ft³
Volume (Total Infiltration)	9,258.000 ft³
Volume (Total Outlet Outflow)	12,286.000 ft³
Volume (Retained)	1,128.000 ft³
Volume (Unrouted)	0.000 ft³
Error (Mass Balance)	0.000 %

Subsection: Pond Routed Hydrograph (total out) Return Event: 2 years
Label: Infiltration Basin (OUT) Storm Event: NOAA-D (3.35 in)
Scenario: Post-Development 2 year

Peak Discharge	0.25 ft³/s
Time to Peak	751.000 min
Hydrograph Volume	1,204.637 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
725.000	0.00	0.01	0.04	0.07	0.08
730.000	0.09	0.11	0.12	0.13	0.14
735.000	0.15	0.17	0.18	0.19	0.20
740.000	0.21	0.22	0.22	0.23	0.23
745.000	0.23	0.24	0.24	0.24	0.25
750.000	0.25	0.25	0.25	0.25	0.25
755.000	0.25	0.24	0.24	0.24	0.24
760.000	0.24	0.23	0.23	0.23	0.23
765.000	0.22	0.22	0.22	0.22	0.21
770.000	0.21	0.21	0.20	0.20	0.20
775.000	0.20	0.19	0.19	0.19	0.18
780.000	0.18	0.18	0.17	0.17	0.17
785.000	0.16	0.16	0.16	0.16	0.15
790.000	0.15	0.15	0.15	0.14	0.14
795.000	0.14	0.14	0.14	0.14	0.13
800.000	0.13	0.13	0.13	0.13	0.12
805.000	0.12	0.12	0.12	0.12	0.11
810.000	0.11	0.11	0.11	0.11	0.10
815.000	0.10	0.10	0.10	0.10	0.10
820.000	0.09	0.09	0.09	0.09	0.09
825.000	0.09	0.09	0.08	0.08	0.08
830.000	0.08	0.08	0.08	0.08	0.07
835.000	0.07	0.07	0.07	0.07	0.07
840.000	0.07	0.07	0.06	0.06	0.06
845.000	0.06	0.06	0.06	0.06	0.06
850.000	0.05	0.05	0.05	0.05	0.05
855.000	0.05	0.05	0.05	0.05	0.05
860.000	0.04	0.04	0.04	0.04	0.04
865.000	0.04	0.04	0.04	0.04	0.04
870.000	0.03	0.03	0.03	0.03	0.03
875.000	0.03	0.03	0.03	0.03	0.03
880.000	0.03	0.02	0.02	0.02	0.02
885.000	0.02	0.02	0.02	0.02	0.02
890.000	0.02	0.02	0.02	0.02	0.01
895.000	0.01	0.01	0.01	0.01	0.01
900.000	0.01	0.01	0.01	0.01	0.01
905.000	0.01	0.01	0.01	0.01	0.01
910.000	0.01	0.01	0.01	0.01	0.01
915.000	0.01	0.01	0.01	0.01	0.01

Subsection: Pond Routed Hydrograph (total out) Return Event: 2 years
Label: Infiltration Basin (OUT) Storm Event: NOAA-D (3.35 in)
Scenario: Post-Development 2 year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
920.000	0.01	0.01	0.01	0.00	0.00
925.000	0.00	0.00	0.00	0.00	0.00
930.000	0.00	0.00	0.00	0.00	0.00
935.000	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Pond Routed Hydrograph (total out) Return Event: 10 years
Label: Infiltration Basin (OUT) Storm Event: NOAA-D (5.12 in)
Scenario: Post-Development 10 year

Peak Discharge	1.35 ft³/s
Time to Peak	730.000 min
Hydrograph Volume	4,438.371 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
714.000	0.00	0.01	0.02	0.06	0.09
719.000	0.14	0.21	0.31	0.48	0.71
724.000	0.95	1.09	1.21	1.30	1.34
729.000	1.35	1.35	1.35	1.34	1.34
734.000	1.33	1.31	1.29	1.28	1.26
739.000	1.25	1.22	1.20	1.17	1.15
744.000	1.12	1.10	1.08	1.05	1.03
749.000	1.01	0.99	0.96	0.94	0.90
754.000	0.86	0.82	0.78	0.75	0.72
759.000	0.69	0.67	0.64	0.62	0.60
764.000	0.58	0.56	0.54	0.53	0.51
769.000	0.50	0.49	0.47	0.46	0.45
774.000	0.44	0.43	0.42	0.40	0.39
779.000	0.38	0.37	0.37	0.36	0.35
784.000	0.34	0.34	0.33	0.32	0.31
789.000	0.31	0.30	0.29	0.29	0.28
794.000	0.28	0.27	0.26	0.26	0.25
799.000	0.25	0.24	0.24	0.24	0.23
804.000	0.23	0.22	0.22	0.22	0.21
809.000	0.21	0.21	0.20	0.20	0.19
814.000	0.19	0.19	0.18	0.18	0.18
819.000	0.17	0.17	0.17	0.16	0.16
824.000	0.16	0.15	0.15	0.15	0.15
829.000	0.15	0.14	0.14	0.14	0.14
834.000	0.14	0.14	0.14	0.13	0.13
839.000	0.13	0.13	0.13	0.13	0.13
844.000	0.13	0.12	0.12	0.12	0.12
849.000	0.12	0.12	0.12	0.11	0.11
854.000	0.11	0.11	0.11	0.11	0.11
859.000	0.11	0.10	0.10	0.10	0.10
864.000	0.10	0.10	0.10	0.10	0.10
869.000	0.09	0.09	0.09	0.09	0.09
874.000	0.09	0.09	0.09	0.09	0.09
879.000	0.08	0.08	0.08	0.08	0.08
884.000	0.08	0.08	0.08	0.08	0.08
889.000	0.07	0.07	0.07	0.07	0.07
894.000	0.07	0.07	0.07	0.07	0.06
899.000	0.06	0.06	0.06	0.06	0.06
904.000	0.06	0.06	0.06	0.06	0.05

Subsection: Pond Routed Hydrograph (total out) Return Event: 10 years
Label: Infiltration Basin (OUT) Storm Event: NOAA-D (5.12 in)
Scenario: Post-Development 10 year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
909.000	0.05	0.05	0.05	0.05	0.05
914.000	0.05	0.05	0.05	0.05	0.05
919.000	0.05	0.04	0.04	0.04	0.04
924.000	0.04	0.04	0.04	0.04	0.04
929.000	0.04	0.04	0.04	0.04	0.04
934.000	0.03	0.03	0.03	0.03	0.03
939.000	0.03	0.03	0.03	0.03	0.03
944.000	0.03	0.03	0.03	0.03	0.03
949.000	0.02	0.02	0.02	0.02	0.02
954.000	0.02	0.02	0.02	0.02	0.02
959.000	0.02	0.02	0.02	0.02	0.02
964.000	0.02	0.02	0.02	0.02	0.02
969.000	0.01	0.01	0.01	0.01	0.01
974.000	0.01	0.01	0.01	0.01	0.01
979.000	0.01	0.01	0.01	0.01	0.01
984.000	0.01	0.01	0.01	0.01	0.01
989.000	0.01	0.01	0.01	0.01	0.01
994.000	0.01	0.01	0.01	0.01	0.01
999.000	0.01	0.01	0.01	0.01	0.01
1,004.000	0.01	0.01	0.01	0.01	0.01
1,009.000	0.01	0.01	0.01	0.01	0.01
1,014.000	0.01	0.01	0.00	0.00	0.00
1,019.000	0.00	0.00	0.00	0.00	0.00
1,024.000	0.00	0.00	0.00	0.00	0.00
1,029.000	0.00	0.00	0.00	0.00	0.00

Subsection: Pond Routed Hydrograph (total out) Return Event: 25 years
Label: Infiltration Basin (OUT) Storm Event: NOAA-D (6.36 in)
Scenario: Post-Development 25 year

Peak Discharge	1.86 ft³/s
Time to Peak	729.000 min
Hydrograph Volume	7,023.601 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
702.000	0.00	0.00	0.01	0.01	0.03
707.000	0.05	0.07	0.08	0.11	0.14
712.000	0.18	0.24	0.31	0.39	0.51
717.000	0.67	0.84	0.97	1.07	1.16
722.000	1.28	1.40	1.52	1.63	1.74
727.000	1.82	1.86	1.86	1.86	1.85
732.000	1.85	1.84	1.82	1.80	1.78
737.000	1.76	1.75	1.73	1.70	1.67
742.000	1.65	1.62	1.59	1.57	1.54
747.000	1.51	1.49	1.46	1.44	1.41
752.000	1.38	1.35	1.32	1.29	1.26
757.000	1.23	1.20	1.17	1.14	1.11
762.000	1.08	1.05	1.02	0.99	0.96
767.000	0.94	0.90	0.86	0.82	0.79
772.000	0.75	0.72	0.70	0.67	0.65
777.000	0.63	0.60	0.58	0.57	0.55
782.000	0.53	0.51	0.50	0.49	0.47
787.000	0.46	0.45	0.44	0.42	0.41
792.000	0.40	0.39	0.38	0.38	0.37
797.000	0.36	0.35	0.35	0.34	0.33
802.000	0.33	0.32	0.31	0.31	0.30
807.000	0.29	0.29	0.28	0.28	0.27
812.000	0.27	0.26	0.25	0.25	0.24
817.000	0.24	0.24	0.23	0.23	0.23
822.000	0.22	0.22	0.22	0.21	0.21
827.000	0.21	0.20	0.20	0.20	0.20
832.000	0.19	0.19	0.19	0.19	0.18
837.000	0.18	0.18	0.18	0.17	0.17
842.000	0.17	0.17	0.17	0.16	0.16
847.000	0.16	0.16	0.16	0.15	0.15
852.000	0.15	0.15	0.15	0.15	0.15
857.000	0.14	0.14	0.14	0.14	0.14
862.000	0.14	0.14	0.14	0.14	0.13
867.000	0.13	0.13	0.13	0.13	0.13
872.000	0.13	0.13	0.13	0.12	0.12
877.000	0.12	0.12	0.12	0.12	0.12
882.000	0.12	0.12	0.11	0.11	0.11
887.000	0.11	0.11	0.11	0.11	0.11
892.000	0.11	0.10	0.10	0.10	0.10

Subsection: Pond Routed Hydrograph (total out) Return Event: 25 years
Label: Infiltration Basin (OUT) Storm Event: NOAA-D (6.36 in)
Scenario: Post-Development 25 year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
897.000	0.10	0.10	0.10	0.10	0.10
902.000	0.09	0.09	0.09	0.09	0.09
907.000	0.09	0.09	0.09	0.09	0.08
912.000	0.08	0.08	0.08	0.08	0.08
917.000	0.08	0.08	0.08	0.08	0.08
922.000	0.07	0.07	0.07	0.07	0.07
927.000	0.07	0.07	0.07	0.07	0.07
932.000	0.07	0.07	0.07	0.06	0.06
937.000	0.06	0.06	0.06	0.06	0.06
942.000	0.06	0.06	0.06	0.06	0.06
947.000	0.06	0.06	0.05	0.05	0.05
952.000	0.05	0.05	0.05	0.05	0.05
957.000	0.05	0.05	0.05	0.05	0.05
962.000	0.05	0.05	0.05	0.05	0.04
967.000	0.04	0.04	0.04	0.04	0.04
972.000	0.04	0.04	0.04	0.04	0.04
977.000	0.04	0.04	0.04	0.04	0.04
982.000	0.04	0.04	0.04	0.03	0.03
987.000	0.03	0.03	0.03	0.03	0.03
992.000	0.03	0.03	0.03	0.03	0.03
997.000	0.03	0.03	0.03	0.03	0.03
1,002.000	0.03	0.03	0.03	0.03	0.02
1,007.000	0.02	0.02	0.02	0.02	0.02
1,012.000	0.02	0.02	0.02	0.02	0.02
1,017.000	0.02	0.02	0.02	0.02	0.02
1,022.000	0.02	0.02	0.02	0.02	0.02
1,027.000	0.02	0.02	0.02	0.02	0.01
1,032.000	0.01	0.01	0.01	0.01	0.01
1,037.000	0.01	0.01	0.01	0.01	0.01
1,042.000	0.01	0.01	0.01	0.01	0.01
1,047.000	0.01	0.01	0.01	0.01	0.01
1,052.000	0.01	0.01	0.01	0.01	0.01
1,057.000	0.01	0.01	0.01	0.01	0.01
1,062.000	0.01	0.01	0.01	0.01	0.01
1,067.000	0.01	0.01	0.01	0.01	0.01
1,072.000	0.01	0.01	0.01	0.01	0.01
1,077.000	0.01	0.01	0.01	0.01	0.00
1,082.000	0.00	0.00	0.00	0.00	0.00
1,087.000	0.00	0.00	0.00	0.00	0.00
1,092.000	0.00	0.00	0.00	0.00	0.00
1,097.000	0.00	0.00	(N/A)	(N/A)	(N/A)

Subsection: Pond Routed Hydrograph (total out) Return Event: 100 years
Label: Infiltration Basin (OUT) Storm Event: NOAA-D (8.63 in)
Scenario: Post-Development 100 year

Peak Discharge	2.70 ft³/s
Time to Peak	729.000 min
Hydrograph Volume	12,285.835 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
672.000	0.00	0.00	0.01	0.01	0.01
677.000	0.02	0.03	0.04	0.05	0.06
682.000	0.07	0.08	0.09	0.10	0.11
687.000	0.13	0.14	0.15	0.17	0.20
692.000	0.22	0.26	0.30	0.34	0.38
697.000	0.42	0.46	0.51	0.55	0.59
702.000	0.63	0.67	0.72	0.79	0.85
707.000	0.91	0.95	0.99	1.04	1.09
712.000	1.14	1.19	1.23	1.28	1.36
717.000	1.45	1.53	1.61	1.69	1.78
722.000	1.89	2.03	2.17	2.32	2.49
727.000	2.62	2.69	2.70	2.69	2.68
732.000	2.67	2.65	2.62	2.59	2.55
737.000	2.52	2.49	2.45	2.41	2.36
742.000	2.32	2.28	2.24	2.21	2.18
747.000	2.15	2.12	2.09	2.06	2.03
752.000	1.99	1.96	1.93	1.89	1.86
757.000	1.83	1.79	1.76	1.73	1.70
762.000	1.67	1.63	1.60	1.57	1.54
767.000	1.51	1.48	1.45	1.42	1.39
772.000	1.36	1.33	1.30	1.27	1.24
777.000	1.21	1.18	1.16	1.13	1.10
782.000	1.07	1.04	1.01	0.98	0.96
787.000	0.93	0.89	0.85	0.81	0.78
792.000	0.75	0.72	0.69	0.67	0.65
797.000	0.63	0.61	0.59	0.57	0.55
802.000	0.54	0.52	0.51	0.50	0.48
807.000	0.47	0.46	0.45	0.44	0.43
812.000	0.42	0.41	0.40	0.39	0.38
817.000	0.37	0.36	0.36	0.35	0.35
822.000	0.34	0.34	0.33	0.32	0.32
827.000	0.32	0.31	0.31	0.30	0.30
832.000	0.29	0.29	0.29	0.28	0.28
837.000	0.28	0.27	0.27	0.27	0.26
842.000	0.26	0.26	0.25	0.25	0.25
847.000	0.25	0.24	0.24	0.24	0.24
852.000	0.24	0.23	0.23	0.23	0.23
857.000	0.23	0.22	0.22	0.22	0.22
862.000	0.22	0.21	0.21	0.21	0.21

Subsection: Pond Routed Hydrograph (total out) Return Event: 100 years
Label: Infiltration Basin (OUT) Storm Event: NOAA-D (8.63 in)
Scenario: Post-Development 100 year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
867.000	0.21	0.21	0.20	0.20	0.20
872.000	0.20	0.20	0.19	0.19	0.19
877.000	0.19	0.19	0.19	0.18	0.18
882.000	0.18	0.18	0.18	0.17	0.17
887.000	0.17	0.17	0.17	0.17	0.16
892.000	0.16	0.16	0.16	0.16	0.15
897.000	0.15	0.15	0.15	0.15	0.15
902.000	0.15	0.15	0.14	0.14	0.14
907.000	0.14	0.14	0.14	0.14	0.14
912.000	0.14	0.13	0.13	0.13	0.13
917.000	0.13	0.13	0.13	0.13	0.13
922.000	0.13	0.13	0.12	0.12	0.12
927.000	0.12	0.12	0.12	0.12	0.12
932.000	0.12	0.12	0.12	0.12	0.11
937.000	0.11	0.11	0.11	0.11	0.11
942.000	0.11	0.11	0.11	0.11	0.11
947.000	0.11	0.11	0.10	0.10	0.10
952.000	0.10	0.10	0.10	0.10	0.10
957.000	0.10	0.10	0.10	0.10	0.10
962.000	0.10	0.10	0.09	0.09	0.09
967.000	0.09	0.09	0.09	0.09	0.09
972.000	0.09	0.09	0.09	0.09	0.09
977.000	0.09	0.09	0.09	0.09	0.09
982.000	0.08	0.08	0.08	0.08	0.08
987.000	0.08	0.08	0.08	0.08	0.08
992.000	0.08	0.08	0.08	0.08	0.08
997.000	0.08	0.08	0.08	0.07	0.07
1,002.000	0.07	0.07	0.07	0.07	0.07
1,007.000	0.07	0.07	0.07	0.07	0.07
1,012.000	0.07	0.07	0.07	0.07	0.07
1,017.000	0.07	0.07	0.06	0.06	0.06
1,022.000	0.06	0.06	0.06	0.06	0.06
1,027.000	0.06	0.06	0.06	0.06	0.06
1,032.000	0.06	0.06	0.06	0.06	0.06
1,037.000	0.06	0.05	0.05	0.05	0.05
1,042.000	0.05	0.05	0.05	0.05	0.05
1,047.000	0.05	0.05	0.05	0.05	0.05
1,052.000	0.05	0.05	0.05	0.05	0.05
1,057.000	0.05	0.04	0.04	0.04	0.04
1,062.000	0.04	0.04	0.04	0.04	0.04
1,067.000	0.04	0.04	0.04	0.04	0.04
1,072.000	0.04	0.04	0.04	0.04	0.04
1,077.000	0.04	0.04	0.03	0.03	0.03

Subsection: Pond Routed Hydrograph (total out) Return Event: 100 years
Label: Infiltration Basin (OUT) Storm Event: NOAA-D (8.63 in)
Scenario: Post-Development 100 year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1,082.000	0.03	0.03	0.03	0.03	0.03
1,087.000	0.03	0.03	0.03	0.03	0.03
1,092.000	0.03	0.03	0.03	0.03	0.03
1,097.000	0.03	0.03	0.03	0.02	0.02
1,102.000	0.02	0.02	0.02	0.02	0.02
1,107.000	0.02	0.02	0.02	0.02	0.02
1,112.000	0.02	0.02	0.02	0.02	0.02
1,117.000	0.02	0.02	0.02	0.02	0.02
1,122.000	0.02	0.02	0.02	0.02	0.02
1,127.000	0.02	0.02	0.02	0.02	0.01
1,132.000	0.01	0.01	0.01	0.01	0.01
1,137.000	0.01	0.01	0.01	0.01	0.01
1,142.000	0.01	0.01	0.01	0.01	0.01
1,147.000	0.01	0.01	0.01	0.01	0.01
1,152.000	0.01	0.01	0.01	0.01	0.01
1,157.000	0.01	0.01	0.01	0.01	0.01
1,162.000	0.01	0.01	0.01	0.01	0.01
1,167.000	0.01	0.01	0.01	0.01	0.01
1,172.000	0.01	0.01	0.01	0.01	0.01
1,177.000	0.01	0.01	0.01	0.01	0.01
1,182.000	0.01	0.01	0.01	0.01	0.01
1,187.000	0.01	0.01	0.01	0.01	0.01
1,192.000	0.01	0.01	0.01	0.01	0.01
1,197.000	0.01	0.01	0.01	0.01	0.01
1,202.000	0.01	0.01	0.01	0.01	0.01
1,207.000	0.01	0.01	0.01	0.01	0.01
1,212.000	0.00	0.00	0.00	0.00	0.00
1,217.000	0.00	0.00	0.00	0.00	0.00
1,222.000	0.00	0.00	0.00	0.00	0.00
1,227.000	0.00	0.00	0.00	0.00	0.00
1,232.000	0.00	0.00	0.00	0.00	0.00
1,237.000	0.00	0.00	0.00	0.00	0.00
1,242.000	0.00	0.00	0.00	(N/A)	(N/A)

Index

Summary for Pond 12P: (new Pond)

Volume	Invert	Avail.Storage	Storage Description
#1A	102.00'	2,475 cf	**30.25'W x 58.03'L x 5.75'H Field A** 10,094 cf Overall - 3,906 cf Embedded = 6,188 cf x 40.0% Voids
#2A	102.75'	3,906 cf	**Cultec R-902HD** x 60 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap 60 Chambers in 4 Rows Cap Storage= 2.8 cf x 2 x 4 rows = 22.1 cf
		6,381 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Pond 12P: (new Pond) - Chamber Wizard Field A

Chamber Model = Cultec R-902HD (Cultec Recharger® 902HD)
Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf
Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
Cap Storage= 2.8 cf x 2 x 4 rows = 22.1 cf

78.0" Wide + 9.0" Spacing = 87.0" C-C Row Spacing

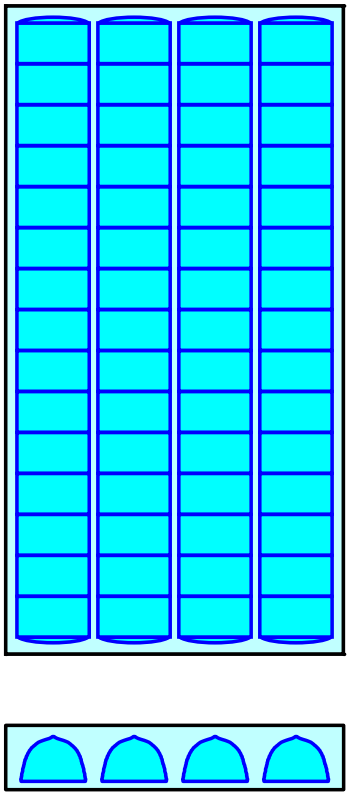
15 Chambers/Row x 3.67' Long +0.52' Cap Length x 2 = 56.03' Row Length +12.0" End Stone x 2 = 58.03' Base Length
4 Rows x 78.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 30.25' Base Width
9.0" Stone Base + 48.0" Chamber Height + 12.0" Stone Cover = 5.75' Field Height

60 Chambers x 64.7 cf + 2.8 cf Cap Volume x 2 x 4 Rows = 3,906.2 cf Chamber Storage

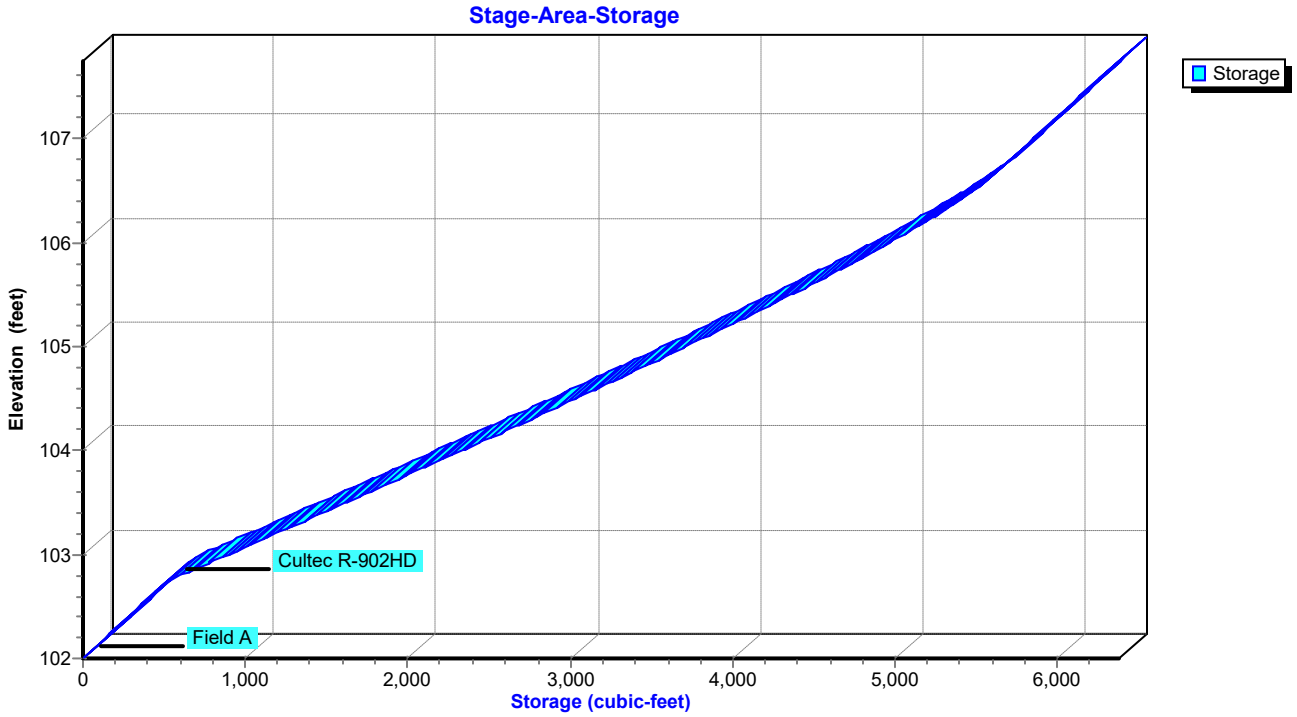
10,094.2 cf Field - 3,906.2 cf Chambers = 6,188.0 cf Stone x 40.0% Voids = 2,475.2 cf Stone Storage

Chamber Storage + Stone Storage = 6,381.4 cf = 0.146 af
Overall Storage Efficiency = 63.2%
Overall System Size = 58.03' x 30.25' x 5.75'

60 Chambers
373.9 cy Field
229.2 cy Stone



Pond 12P: (new Pond)



Stage-Area-Storage for Pond 12P: (new Pond)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
102.00	0	104.60	3,170	107.20	5,995
102.05	35	104.65	3,238	107.25	6,030
102.10	70	104.70	3,307	107.30	6,065
102.15	105	104.75	3,375	107.35	6,100
102.20	140	104.80	3,443	107.40	6,136
102.25	176	104.85	3,510	107.45	6,171
102.30	211	104.90	3,578	107.50	6,206
102.35	246	104.95	3,645	107.55	6,241
102.40	281	105.00	3,712	107.60	6,276
102.45	316	105.05	3,779	107.65	6,311
102.50	351	105.10	3,845	107.70	6,346
102.55	386	105.15	3,911	107.75	**6,381**
102.60	421	105.20	3,977		
102.65	456	105.25	4,042		
102.70	492	105.30	4,108		
102.75	527	105.35	4,172		
102.80	600	105.40	4,236		
102.85	673	105.45	4,300		
102.90	747	105.50	4,364		
102.95	821	105.55	4,427		
103.00	894	105.60	4,489		
103.05	967	105.65	4,551		
103.10	1,040	105.70	4,612		
103.15	1,113	105.75	4,673		
103.20	1,186	105.80	4,733		
103.25	1,259	105.85	4,793		
103.30	1,331	105.90	4,852		
103.35	1,404	105.95	4,910		
103.40	1,476	106.00	4,967		
103.45	1,549	106.05	5,024		
103.50	1,621	106.10	5,080		
103.55	1,693	106.15	5,135		
103.60	1,765	106.20	5,189		
103.65	1,837	106.25	5,242		
103.70	1,908	106.30	5,294		
103.75	1,979	106.35	5,344		
103.80	2,051	106.40	5,393		
103.85	2,122	106.45	5,439		
103.90	2,193	106.50	5,484		
103.95	2,264	106.55	5,526		
104.00	2,335	106.60	5,567		
104.05	2,405	106.65	5,605		
104.10	2,475	106.70	5,643		
104.15	2,545	106.75	5,679		
104.20	2,616	106.80	5,714		
104.25	2,685	106.85	5,749		
104.30	2,755	106.90	5,785		
104.35	2,824	106.95	5,820		
104.40	2,894	107.00	5,855		
104.45	2,963	107.05	5,890		
104.50	3,032	107.10	5,925		
104.55	3,101	107.15	5,960		

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PROJECT NUMBER : 18937
PROJECT NAME : BULK YARD 35
CALCULATED BY : KN DATE: 5/26/2023
CHECKED BY : DATE:
REVISED BY : DATE:

CONDUIT OUTLET PROTECTION WORKSHEET

STRUCTURE NUMBER	Q25 (CFS)	Do (INCH)	q=Q/Do	TW OR 0.2 D0 (Ft)*	FOR Y = 1/2 Do	FOR Y = Do	U S E : Y = 1/2 Do					
					D50=(0.0125/Tw) * q^1.33	D50=(0.0082/Tw) * q^1.33	Y, In.	d50, IN.	THICKNESS		L, FT.	W, FT.
Inlet 11	2.49	30	1.00	0.50	0.3	0.2	15.0	1.0	2.0	With Filter Fabric	15.00	12.50
					FOR Y=0.5*Do d50=(0.0125/Tw) * q^1.33	FOR Y=Do d50=(0.0082/Tw) * q^1.33	D= 3 * d50 WITHOUT FILTER FABRIC D= 2 * d50 WITH FILTER FABRIC					

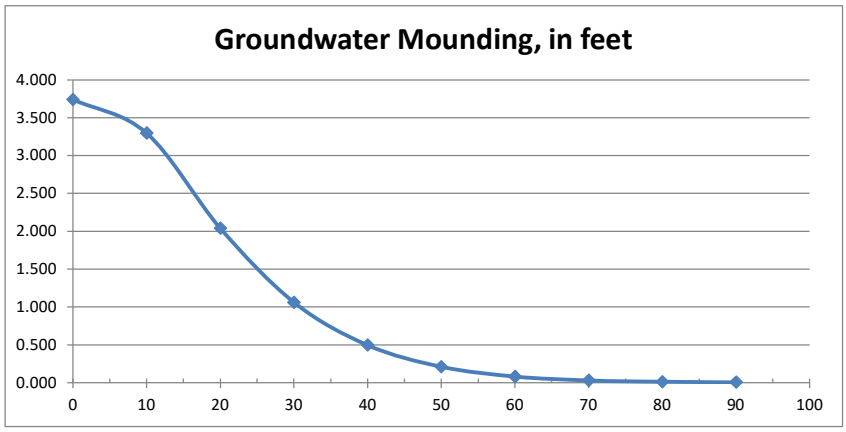
Input Values

1.85	*R*	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
9.25	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
15.125	x	1/2 length of basin (x direction, in feet)
29.015	y	1/2 width of basin (y direction, in feet)
6.96	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

13.739	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
3.739	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
3.739	0
3.297	10
2.041	20
1.060	30
0.495	40
0.209	50
0.081	60
0.029	70
0.011	80
0.005	90

Re-Calculate Now

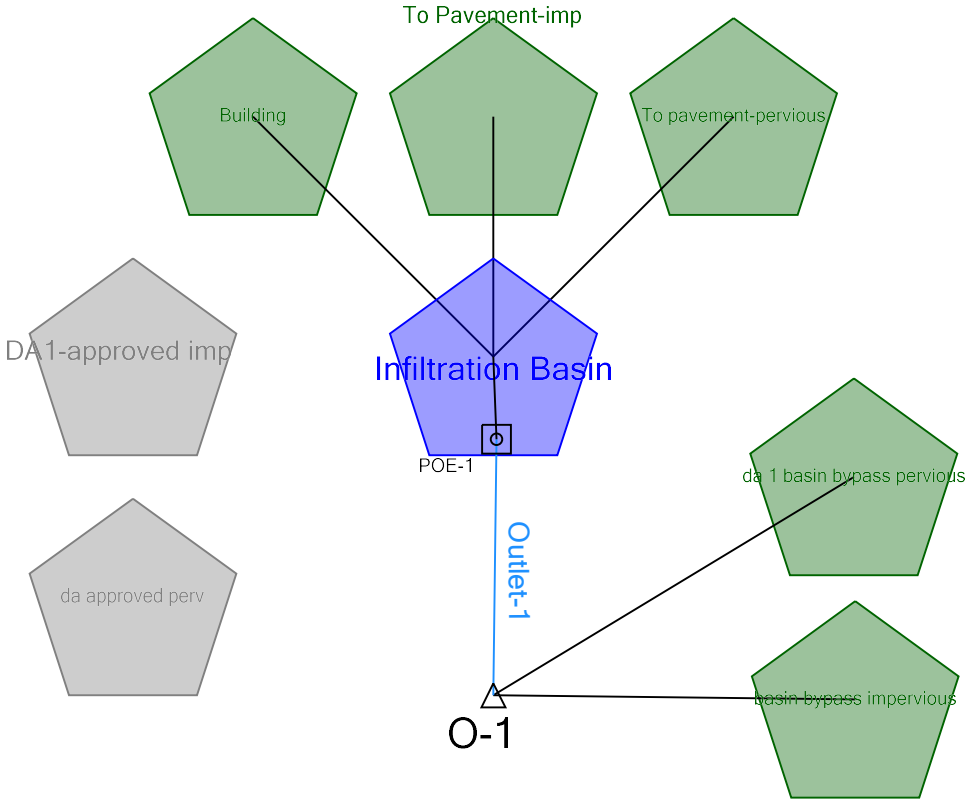


Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Project Summary	
Title	Bulk Yard 35
Engineer	Kiera Nissen
Company	French and Parrello Associates
Date	4/5/2023

Notes	Water Quality Storm Calculations



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Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
Building	Water Quality Storm	2	435.000	66.000	0.36
To Pavement-imp	Water Quality Storm	2	2,032.000	66.000	1.67
To pavement-pervious	Water Quality Storm	2	13.000	72.000	0.01
basin bypass impervious	Water Quality Storm	2	660.000	66.000	0.54
da 1 basin bypass pervious	Water Quality Storm	2	479.000	73.000	0.27

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
O-1	Water Quality Storm	2	1,139.000	67.000	0.62

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
Infiltration Basin (IN)	Water Quality Storm	2	2,480.000	66.000	2.03	(N/A)	(N/A)
Infiltration Basin (OUT)	Water Quality Storm	2	0.000	0.000	0.00	103.70	1,905.000

Storm Event	Water Quality Storm
Return Event	2 years
Duration	1,440.000 min
Depth	1.25 in
Time of Concentration (Composite)	3.000 min
Area (User Defined)	7,670.532 ft²

Computational Time Increment	0.400 min
Time to Peak (Computed)	66.000 min
Flow (Peak, Computed)	0.54 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	66.000 min
Flow (Peak Interpolated Output)	0.54 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	7,670.532 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.03 in
Runoff Volume (Pervious)	660.246 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	660.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	3.000 min
Computational Time Increment	0.400 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.99 ft³/s

Subsection: Unit Hydrograph Summary
Label: basin bypass impervious
Scenario: Water Quality Storm

Return Event: 2 years
Storm Event: Water Quality Storm

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	2.000 min
Unit receding limb, Tr	8.000 min
Total unit time, Tb	10.000 min

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: basin bypass impervious Storm Event: Water Quality Storm
Scenario: Water Quality Storm

Storm Event	Water Quality Storm
Return Event	2 years
Duration	1,440.000 min
Depth	1.25 in
Time of Concentration (Composite)	3.000 min
Area (User Defined)	7,670.532 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
21.000	0.00	0.00	0.00	0.01	0.01
26.000	0.01	0.01	0.01	0.02	0.02
31.000	0.02	0.02	0.02	0.03	0.03
36.000	0.03	0.03	0.04	0.04	0.04
41.000	0.04	0.04	0.04	0.04	0.05
46.000	0.05	0.05	0.07	0.08	0.08
51.000	0.09	0.10	0.13	0.15	0.16
56.000	0.17	0.21	0.32	0.42	0.47
61.000	0.50	0.51	0.52	0.53	0.54
66.000	0.54	0.51	0.39	0.29	0.24
71.000	0.22	0.20	0.17	0.14	0.13
76.000	0.12	0.12	0.10	0.08	0.08
81.000	0.07	0.07	0.07	0.07	0.07
86.000	0.07	0.07	0.07	0.07	0.07
91.000	0.07	0.07	0.06	0.06	0.05
96.000	0.05	0.05	0.05	0.05	0.05
101.000	0.05	0.05	0.05	0.05	0.05
106.000	0.05	0.05	0.04	0.03	0.02
111.000	0.02	0.02	0.02	0.02	0.02
116.000	0.02	0.02	0.02	0.02	0.02
121.000	0.02	0.01	0.00	0.00	0.00

Storm Event	Water Quality Storm
Return Event	2 years
Duration	1,440.000 min
Depth	1.25 in
Time of Concentration (Composite)	1.000 min
Area (User Defined)	5,055.120 ft²

Computational Time Increment	0.133 min
Time to Peak (Computed)	66.000 min
Flow (Peak, Computed)	0.36 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	66.000 min
Flow (Peak Interpolated Output)	0.36 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	5,055.120 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.03 in
Runoff Volume (Pervious)	435.123 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	435.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	1.000 min
Computational Time Increment	0.133 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.89 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.667 min
Unit receding limb, Tr	2.667 min
Total unit time, Tb	3.333 min

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: Building Storm Event: Water Quality Storm
Scenario: Water Quality Storm

Storm Event	Water Quality Storm
Return Event	2 years
Duration	1,440.000 min
Depth	1.25 in
Time of Concentration (Composite)	1.000 min
Area (User Defined)	5,055.120 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
20.000	0.00	0.00	0.00	0.00	0.01
25.000	0.01	0.01	0.01	0.01	0.01
30.000	0.01	0.01	0.02	0.02	0.02
35.000	0.02	0.02	0.02	0.03	0.03
40.000	0.03	0.03	0.03	0.03	0.03
45.000	0.03	0.03	0.05	0.06	0.06
50.000	0.06	0.06	0.10	0.11	0.11
55.000	0.12	0.12	0.27	0.33	0.34
60.000	0.34	0.35	0.35	0.35	0.36
65.000	0.36	0.36	0.19	0.14	0.14
70.000	0.14	0.14	0.09	0.08	0.08
75.000	0.08	0.08	0.05	0.05	0.05
80.000	0.05	0.05	0.05	0.05	0.05
85.000	0.05	0.05	0.05	0.05	0.05
90.000	0.05	0.05	0.04	0.03	0.03
95.000	0.03	0.03	0.03	0.03	0.03
100.000	0.03	0.03	0.03	0.03	0.03
105.000	0.03	0.03	0.02	0.01	0.01
110.000	0.01	0.01	0.01	0.01	0.01
115.000	0.01	0.01	0.01	0.01	0.01
120.000	0.01	0.00	0.00	(N/A)	(N/A)

Storm Event	Water Quality Storm
Return Event	2 years
Duration	1,440.000 min
Depth	1.25 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	47,790.000 ft²

Computational Time Increment	1.333 min
Time to Peak (Computed)	73.333 min
Flow (Peak, Computed)	0.28 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	73.000 min
Flow (Peak Interpolated Output)	0.27 ft³/s

Drainage Area	
SCS CN (Composite)	77.230
Area (User Defined)	47,790.000 ft²
Maximum Retention (Pervious)	2.95 in
Maximum Retention (Pervious, 20 percent)	0.59 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.12 in
Runoff Volume (Pervious)	478.961 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	479.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.46 ft³/s

Subsection: Unit Hydrograph Summary
Label: da 1 basin bypass pervious
Scenario: Water Quality Storm

Return Event: 2 years
Storm Event: Water Quality Storm

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: da 1 basin bypass pervious Storm Event: Water Quality Storm
Scenario: Water Quality Storm

Storm Event	Water Quality Storm
Return Event	2 years
Duration	1,440.000 min
Depth	1.25 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	47,790.000 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
61.000	0.00	0.00	0.01	0.02	0.04
66.000	0.08	0.11	0.16	0.20	0.23
71.000	0.26	0.27	0.27	0.27	0.27
76.000	0.25	0.24	0.23	0.22	0.21
81.000	0.19	0.18	0.17	0.16	0.15
86.000	0.14	0.14	0.13	0.13	0.13
91.000	0.13	0.13	0.13	0.12	0.12
96.000	0.12	0.12	0.11	0.11	0.11
101.000	0.11	0.11	0.10	0.10	0.10
106.000	0.10	0.10	0.10	0.10	0.09
111.000	0.09	0.08	0.07	0.06	0.06
116.000	0.05	0.05	0.05	0.04	0.04
121.000	0.04	0.04	0.04	0.03	0.03
126.000	0.02	0.02	0.02	0.01	0.01
131.000	0.01	0.01	0.00	0.00	0.00
136.000	0.00	0.00	0.00	0.00	(N/A)

Storm Event	Water Quality Storm
Return Event	2 years
Duration	1,440.000 min
Depth	1.25 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	23,612.000 ft²

Computational Time Increment	0.267 min
Time to Peak (Computed)	65.867 min
Flow (Peak, Computed)	1.67 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	66.000 min
Flow (Peak Interpolated Output)	1.67 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	23,612.000 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.03 in
Runoff Volume (Pervious)	2,032.418 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2,032.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	18.43 ft³/s

Subsection: Unit Hydrograph Summary
Label: To Pavement-imp
Scenario: Water Quality Storm

Return Event: 2 years
Storm Event: Water Quality Storm

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: To Pavement-imp Storm Event: Water Quality Storm
Scenario: Water Quality Storm

Storm Event	Water Quality Storm
Return Event	2 years
Duration	1,440.000 min
Depth	1.25 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	23,612.000 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
20.000	0.00	0.00	0.01	0.02	0.02
25.000	0.03	0.04	0.04	0.05	0.05
30.000	0.05	0.06	0.07	0.08	0.09
35.000	0.10	0.11	0.11	0.12	0.12
40.000	0.12	0.13	0.13	0.14	0.14
45.000	0.15	0.15	0.18	0.24	0.26
50.000	0.28	0.28	0.35	0.46	0.51
55.000	0.53	0.54	0.80	1.28	1.48
60.000	1.56	1.60	1.62	1.64	1.65
65.000	1.66	1.67	1.40	0.90	0.71
70.000	0.66	0.64	0.57	0.44	0.39
75.000	0.38	0.37	0.33	0.26	0.23
80.000	0.22	0.22	0.22	0.21	0.21
85.000	0.21	0.21	0.21	0.21	0.21
90.000	0.21	0.21	0.20	0.17	0.16
95.000	0.16	0.16	0.16	0.16	0.16
100.000	0.16	0.16	0.16	0.16	0.16
105.000	0.16	0.16	0.13	0.08	0.06
110.000	0.06	0.05	0.05	0.05	0.05
115.000	0.05	0.05	0.05	0.05	0.05
120.000	0.05	0.04	0.01	0.00	0.00
125.000	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Storm Event	Water Quality Storm
Return Event	2 years
Duration	1,440.000 min
Depth	1.25 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	4,066.925 ft²

Computational Time Increment	0.267 min
Time to Peak (Computed)	71.467 min
Flow (Peak, Computed)	0.01 ft³/s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	72.000 min
Flow (Peak Interpolated Output)	0.01 ft³/s

Drainage Area	
SCS CN (Composite)	70.589
Area (User Defined)	4,066.925 ft²
Maximum Retention (Pervious)	4.17 in
Maximum Retention (Pervious, 20 percent)	0.83 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.04 in
Runoff Volume (Pervious)	12.740 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	13.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.17 ft³/s

Subsection: Unit Hydrograph Summary
Label: To pavement-pervious
Scenario: Water Quality Storm

Return Event: 2 years
Storm Event: Water Quality Storm

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: To pavement-pervious Storm Event: Water Quality Storm
Scenario: Water Quality Storm

Storm Event	Water Quality Storm
Return Event	2 years
Duration	1,440.000 min
Depth	1.25 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	4,066.925 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
66.000	0.00	0.00	0.00	0.00	0.01
71.000	0.01	0.01	0.01	0.01	0.01
76.000	0.01	0.01	0.00	0.00	0.00
81.000	0.00	0.00	0.00	0.00	0.00
86.000	0.00	0.00	0.00	0.00	0.00
91.000	0.00	0.00	0.00	0.00	0.00
96.000	0.00	0.00	0.00	0.00	0.00
101.000	0.00	0.00	0.00	0.00	0.00
106.000	0.00	0.00	0.00	0.00	0.00
111.000	0.00	0.00	0.00	0.00	0.00
116.000	0.00	0.00	0.00	0.00	0.00
121.000	0.00	0.00	(N/A)	(N/A)	(N/A)

Subsection: Elevation-Volume-Flow Table (Pond)
Label: Infiltration Basin
Scenario: Water Quality Storm

Return Event: 2 years
Storm Event: Water Quality Storm

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	0.12 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	102.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1.000 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
102.00	0.00	0.000	0.000	0.00	0.00	0.00
102.10	0.00	70.000	0.000	0.12	0.12	2.45
102.20	0.00	140.000	0.000	0.12	0.12	4.79
102.30	0.00	210.500	0.000	0.12	0.12	7.14
102.40	0.00	281.000	0.000	0.12	0.12	9.49
102.50	0.00	351.000	0.000	0.12	0.12	11.82
102.60	0.00	421.000	0.000	0.12	0.12	14.15
102.70	0.00	510.500	0.000	0.12	0.12	17.14
102.80	0.00	600.000	0.000	0.12	0.12	20.12
102.90	0.00	747.000	0.000	0.12	0.12	25.02
103.00	0.00	894.000	0.000	0.12	0.12	29.92
103.10	0.00	1,040.000	0.000	0.12	0.12	34.79
103.20	0.00	1,186.000	0.000	0.12	0.12	39.65
103.30	0.00	1,331.000	0.000	0.12	0.12	44.49
103.40	0.00	1,476.000	0.000	0.12	0.12	49.32
103.50	0.00	1,620.500	0.000	0.12	0.12	54.14
103.60	0.00	1,765.000	0.000	0.12	0.12	58.95
103.70	0.00	1,908.000	0.000	0.12	0.12	63.72
103.80	0.02	2,051.000	0.000	0.12	0.13	68.50
103.90	0.06	2,193.000	0.000	0.12	0.17	73.27
104.00	0.10	2,335.000	0.000	0.12	0.22	78.05
104.10	0.15	2,475.500	0.000	0.12	0.27	82.78
104.20	0.23	2,616.000	0.000	0.12	0.35	87.55
104.30	0.35	2,755.000	0.000	0.12	0.47	92.30
104.40	0.49	2,894.000	0.000	0.12	0.61	97.08
104.50	0.67	3,032.000	0.000	0.12	0.79	101.85
104.60	0.77	3,170.000	0.000	0.12	0.89	106.55
104.70	0.85	3,306.500	0.000	0.12	0.97	111.19
104.80	0.93	3,443.000	0.000	0.12	1.05	115.82

Subsection: Elevation-Volume-Flow Table (Pond)
Label: Infiltration Basin
Scenario: Water Quality Storm

Return Event: 2 years
Storm Event: Water Quality Storm

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
104.90	1.01	3,577.500	0.000	0.12	1.13	120.38
105.00	1.07	3,712.000	0.000	0.12	1.19	124.93
105.10	1.14	3,844.500	0.000	0.12	1.26	129.41
105.20	1.20	3,977.000	0.000	0.12	1.32	133.88
105.30	1.26	4,106.500	0.000	0.12	1.37	138.26
105.40	1.31	4,236.000	0.000	0.12	1.43	142.63
105.50	1.36	4,362.500	0.000	0.12	1.48	146.90
105.60	1.41	4,489.000	0.000	0.12	1.53	151.17
105.70	1.46	4,611.000	0.000	0.12	1.58	155.28
105.80	1.51	4,733.000	0.000	0.12	1.63	159.39
105.90	1.55	4,850.000	0.000	0.12	1.67	163.34
106.00	1.60	4,967.000	0.000	0.12	1.72	167.28
106.10	1.64	5,078.000	0.000	0.12	1.76	171.03
106.20	1.68	5,189.000	0.000	0.12	1.80	174.77
106.30	1.72	5,291.000	0.000	0.12	1.84	178.21
106.40	1.76	5,393.000	0.000	0.12	1.88	181.65
106.50	1.80	5,480.000	0.000	0.12	1.92	184.59
106.60	1.84	5,567.000	0.000	0.12	1.96	187.53
106.70	1.88	5,640.500	0.000	0.12	2.00	190.02
106.80	1.92	5,714.000	0.000	0.12	2.04	192.50
106.90	1.95	5,784.500	0.000	0.12	2.07	194.89
107.00	1.99	5,855.000	0.000	0.12	2.11	197.27
107.10	2.02	5,925.000	0.000	0.12	2.14	199.64
107.20	2.06	5,995.000	0.000	0.12	2.18	202.01
107.30	2.09	6,065.500	0.000	0.12	2.21	204.39
107.40	2.12	6,136.000	0.000	0.12	2.24	206.78
107.45	2.14	6,171.000	0.000	0.12	2.26	207.96
107.50	2.26	6,206.000	0.000	0.12	2.38	209.25
107.60	2.75	6,276.000	0.000	0.12	2.87	212.07

Subsection: Level Pool Pond Routing Summary
Label: Infiltration Basin (IN)
Scenario: Water Quality Storm

Return Event: 2 years
Storm Event: Water Quality Storm

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	0.12 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	102.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	2.03 ft³/s	Time to Peak (Flow, In)	66.000 min
Infiltration (Peak)	0.12 ft³/s	Time to Peak (Infiltration)	45.000 min
Flow (Peak Outlet)	0.00 ft³/s	Time to Peak (Flow, Outlet)	0.000 min

Elevation (Water Surface, Peak)	103.70 ft
Volume (Peak)	1,904.980 ft³

Mass Balance (ft³)	
Volume (Initial)	0.000 ft³
Volume (Total Inflow)	2,480.000 ft³
Volume (Total Infiltration)	2,480.000 ft³
Volume (Total Outlet Outflow)	0.000 ft³
Volume (Retained)	0.000 ft³
Volume (Unrouted)	0.000 ft³
Error (Mass Balance)	0.000 %

Subsection: Pond Infiltration Hydrograph
Label: Infiltration Basin (INF)
Scenario: Water Quality Storm

Return Event: 2 years
Storm Event: Water Quality Storm

Peak Discharge	0.12 ft³/s
Time to Peak	248.000 min
Hydrograph Volume	2,479.339 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
21.000	0.00	0.00	0.00	0.00	0.01
26.000	0.01	0.01	0.02	0.02	0.03
31.000	0.03	0.04	0.04	0.05	0.05
36.000	0.06	0.07	0.08	0.08	0.09
41.000	0.09	0.10	0.11	0.11	0.12
46.000	0.12	0.12	0.12	0.12	0.12
51.000	0.12	0.12	0.12	0.12	0.12
56.000	0.12	0.12	0.12	0.12	0.12
61.000	0.12	0.12	0.12	0.12	0.12
66.000	0.12	0.12	0.12	0.12	0.12
71.000	0.12	0.12	0.12	0.12	0.12
76.000	0.12	0.12	0.12	0.12	0.12
81.000	0.12	0.12	0.12	0.12	0.12
86.000	0.12	0.12	0.12	0.12	0.12
91.000	0.12	0.12	0.12	0.12	0.12
96.000	0.12	0.12	0.12	0.12	0.12
101.000	0.12	0.12	0.12	0.12	0.12
106.000	0.12	0.12	0.12	0.12	0.12
111.000	0.12	0.12	0.12	0.12	0.12
116.000	0.12	0.12	0.12	0.12	0.12
121.000	0.12	0.12	0.12	0.12	0.12
126.000	0.12	0.12	0.12	0.12	0.12
131.000	0.12	0.12	0.12	0.12	0.12
136.000	0.12	0.12	0.12	0.12	0.12
141.000	0.12	0.12	0.12	0.12	0.12
146.000	0.12	0.12	0.12	0.12	0.12
151.000	0.12	0.12	0.12	0.12	0.12
156.000	0.12	0.12	0.12	0.12	0.12
161.000	0.12	0.12	0.12	0.12	0.12
166.000	0.12	0.12	0.12	0.12	0.12
171.000	0.12	0.12	0.12	0.12	0.12
176.000	0.12	0.12	0.12	0.12	0.12
181.000	0.12	0.12	0.12	0.12	0.12
186.000	0.12	0.12	0.12	0.12	0.12
191.000	0.12	0.12	0.12	0.12	0.12
196.000	0.12	0.12	0.12	0.12	0.12
201.000	0.12	0.12	0.12	0.12	0.12
206.000	0.12	0.12	0.12	0.12	0.12
211.000	0.12	0.12	0.12	0.12	0.12

Subsection: Pond Infiltration Hydrograph
Label: Infiltration Basin (INF)
Scenario: Water Quality Storm

Return Event: 2 years
Storm Event: Water Quality Storm

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
216.000	0.12	0.12	0.12	0.12	0.12
221.000	0.12	0.12	0.12	0.12	0.12
226.000	0.12	0.12	0.12	0.12	0.12
231.000	0.12	0.12	0.12	0.12	0.12
236.000	0.12	0.12	0.12	0.12	0.12
241.000	0.12	0.12	0.12	0.12	0.12
246.000	0.12	0.12	0.12	0.12	0.12
251.000	0.12	0.12	0.12	0.12	0.12
256.000	0.12	0.12	0.12	0.12	0.12
261.000	0.12	0.12	0.12	0.12	0.12
266.000	0.12	0.12	0.12	0.12	0.12
271.000	0.12	0.12	0.12	0.12	0.12
276.000	0.12	0.12	0.12	0.12	0.12
281.000	0.12	0.12	0.12	0.12	0.12
286.000	0.12	0.12	0.12	0.12	0.12
291.000	0.12	0.12	0.12	0.12	0.12
296.000	0.12	0.12	0.12	0.12	0.12
301.000	0.12	0.12	0.12	0.12	0.12
306.000	0.12	0.12	0.12	0.12	0.12
311.000	0.12	0.12	0.12	0.12	0.12
316.000	0.12	0.12	0.12	0.12	0.12
321.000	0.12	0.12	0.12	0.12	0.12
326.000	0.12	0.12	0.12	0.12	0.12
331.000	0.12	0.12	0.12	0.12	0.12
336.000	0.12	0.12	0.12	0.12	0.12
341.000	0.12	0.12	0.12	0.12	0.12
346.000	0.12	0.12	0.12	0.12	0.12
351.000	0.12	0.12	0.12	0.12	0.12
356.000	0.12	0.12	0.12	0.12	0.12
361.000	0.12	0.12	0.12	0.12	0.12
366.000	0.12	0.12	0.12	0.12	0.12
371.000	0.12	0.12	0.12	0.10	0.09
376.000	0.09	0.08	0.07	0.06	0.06
381.000	0.05	0.05	0.04	0.04	0.03
386.000	0.03	0.03	0.03	0.02	0.02
391.000	0.02	0.02	0.02	0.01	0.01
396.000	0.01	0.01	0.01	0.01	0.01
401.000	0.01	0.01	0.01	0.00	0.00
406.000	0.00	0.00	0.00	0.00	0.00
411.000	0.00	0.00	0.00	0.00	0.00
416.000	0.00	0.00	0.00	0.00	0.00

Subsection: Pond Routed Hydrograph (total out) Return Event: 2 years
Label: Infiltration Basin (OUT) Storm Event: Water Quality Storm
Scenario: Water Quality Storm

Peak Discharge	0.00 ft³/s
Time to Peak	480.000 min
Hydrograph Volume	0.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.00	(N/A)	(N/A)	(N/A)

Subsection: Pond Inflow Summary
Label: Infiltration Basin (IN)
Scenario: Water Quality Storm

Return Event: 2 years
Storm Event: Water Quality Storm

Summary for Hydrograph Addition at 'Infiltration Basin '

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Building
<Catchment to Outflow Node>	To pavement-pervious
<Catchment to Outflow Node>	To Pavement-imp

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (min)	Flow (Peak) (ft^3/s)
Flow (From)	Building	435.010	66.000	0.36
Flow (From)	To pavement-pervious	12.738	72.000	0.01
Flow (From)	To Pavement-imp	2,032.163	66.000	1.67
Flow (In)	Infiltration Basin	2,479.911	66.000	2.03

Subsection: Diverted Hydrograph
Label: Outlet-1
Scenario: Water Quality Storm

Return Event: 2 years
Storm Event: Water Quality Storm

Peak Discharge	0.00 ft³/s
Time to Peak	480.000 min
Hydrograph Volume	0.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.002 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.00	(N/A)	(N/A)	(N/A)

Index

State of New Jersey

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

Division of Water Quality
Bureau of Nonpoint Pollution Control
401 East State Street
P.O. Box 420 Mail Code 401-02B
Trenton, New Jersey 08625-0420
Phone: 609-633-7021 / Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CATHERINE R. McCABE
Commissioner

February 10, 2020

Jeremy Fink, P.E.
Principal Product Development Engineer
Hydro International
94 Hutchins Drive
Portland, ME 04102

Re: MTD Laboratory Certification
Up-Flo® Filter EMC (Extended Maintenance Cartridge)
Off-line Installation

TSS Removal Rate 80%

Dear Mr. Fink:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested a Laboratory Certification for the Up-Flo® Filter EMC.

This project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the afore-mentioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated January 2020) for this device is published online at http://www.njcat.org/uploads/newDocs/NJCATUPFLOFILTERwithEXTMAINTCARTFINAL.pdf.

The NJDEP certifies the use of the Up-Flo® Filter EMC by Hydro International at a TSS removal rate of 80%, when designed, operated and maintained in accordance with the information provided in the Verification Appendix and subject to the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 0.96 gpm/sf of effective filtration treatment area.

2. The Up-Flo® Filter EMC shall be installed using the same configuration as the unit verified by NJCAT and sized in accordance with the criteria specified in item 6 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Up-Flo® Filter EMC, which is attached to this document. However, it is recommended to review the maintenance website at https://www.hydro-int.com/sites/default/files/up-flo_filter_emc_operation_maintenance_manual.pdf for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for an Up-Flo® Filter EMC. After determining the number of filter modules necessary, the corresponding model selection must be appropriate to hold at least that minimum number of filters.

   Example: A 0.25-acre impervious site is to be treated to 80% TSS removal using an Up-Flo® Filter EMC. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

   The selection of configuration for use in the Up-Flo® Filter EMC is based upon both the MTFR and the maximum inflow drainage area. It is necessary to select the configuration using both methods and to rely on the method that results in the larger configuration determined by the two methods.

   Inflow Drainage Area Evaluation:

   The drainage area to the Up-Flo® Filter EMC in this example is 0.25 acres. Based upon the information in Tables 1 and 2 below, the following minimum

configuration is required for an Up-Flo® Filter EMC to treat the impervious area without exceeding the maximum drainage area:

Using Table 2, all vault sizes for the 18", 27", 36" and 48" cartridges would be able to treat runoff without exceeding the maximum allowable drainage area. A minimum of 5, 4, 3, or 2 cartridges for the 18", 27", 36", or 48" cartridge sizes, respectively, would be required to avoid exceeding the maximum allowable drainage area.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was determined based on the following:

time of concentration = 10 minutes
i = 3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
c = 0.99 (runoff coefficient for impervious)
Q = ciA = 0.99 x 3.2x 0.25=0.79 cfs = 0.79 x 448.83 gpm/cfs = 354.58 gpm

Based on a flow rate of 354.58 gpm, the following minimum configurations are required for an Up-Flo® Filter EMC to treat the impervious area without exceeding the MTFR:

For 18" cartridge: 8 x 18.5 ft. vault size with 66 cartridges
For 27" cartridge: 8 x 10 ft. or 6 x 14 ft. vault size with 40 cartridges
For 36" cartridge: 8 x 8 ft. or 6 x 10 ft. vault size with 29 cartridges
For 48" cartridge: 6 x 8 ft. vault size with 21 cartridges

The MTFR evaluation results will be used since that method results in the higher minimum configuration determined by the two methods.

The sizing table corresponding to the available system models are noted in the Design Specifications and Vault Arrangements noted below.

Table 1: Up-Flo® Filter EMC Cartridge Design Specifications

Individual Cartridge Height (inches)	MTFR (gpm)	MTFR (cfs)	Max Drainage Area Per Cartridge (acre)
18	5.40	0.012	0.05
27	8.90	0.020	0.08
36	12.4	0.028	0.12
48	17.0	0.038	0.16

Table 2: Up-Flo® Filter EMC Typical Vault Arrangements*

			18-inch Cartridge			27-inch Cartridge			36-inch Cartridge			48-inch Cartridge		
Vault Size (ft.)	Width (ft.)	Vault Length (ft.)	Max. No. Carts.	MTFR (cfs)	Max Drain Area (ac)	Max. No. Carts.	MTFR (cfs)	Max Drain Area (ac)	No. Carts.	MTFR (cfs)	Max Drain Area (ac)	Max. No. Carts.	MTFR (cfs)	Max Drain Area (ac)
4x4	4	4	6	0.071	0.31	6	0.118	0.51	6	0.165	0.71	6	0.227	0.97
4x6	4	6	11	0.134	0.57	11	0.218	0.93	11	0.303	1.29	11	0.417	1.78
4x8	4	8	15	0.180	0.77	15	0.296	1.27	15	0.412	1.76	15	0.568	2.43
6x6	6	6	17	0.205	0.87	17	0.336	1.44	17	0.468	2.00	15	0.568	2.43
6x8	6	8	24	0.290	1.23	24	0.475	2.03	23	0.633	2.70	23	0.871	3.72
6x10	6	10	31	0.374	1.59	30	0.595	2.54	30	0.827	3.53	28	1.061	4.53
6x12	6	12	38	0.459	1.95	37	0.733	3.13	35	0.965	4.12	34	1.288	5.50
6x14	6	14	45	0.541	2.31	44	0.871	3.72	41	1.130	4.82	39	1.477	6.31
8x8	8	8	32	0.385	1.65	31	0.613	2.62	30	0.827	3.53	29	1.098	4.69
8x10	8	10	41	0.495	2.11	40	0.791	3.38	38	1.047	4.47	36	1.364	5.82
8x13	8	13	55	0.664	2.83	49	0.970	4.14	50	1.377	5.88	46	1.742	7.44
8x14	8	14	59	0.711	3.03	57	1.130	4.82	53	1.459	6.23	49	1.856	7.92
8x15	8	15	63	0.760	3.24	61	1.208	5.15	57	1.571	6.70	53	2.007	8.57
8x18.5	8	18.5	80	0.965	4.12	75	1.484	6.34	70	1.927	8.23	64	2.424	10.35
8x24	8	24	102	1.230	5.25	96	1.900	8.11	87	2.397	10.23	79	2.992	12.77

*-Vault sizes are noted with the maximum number of cartridges.

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

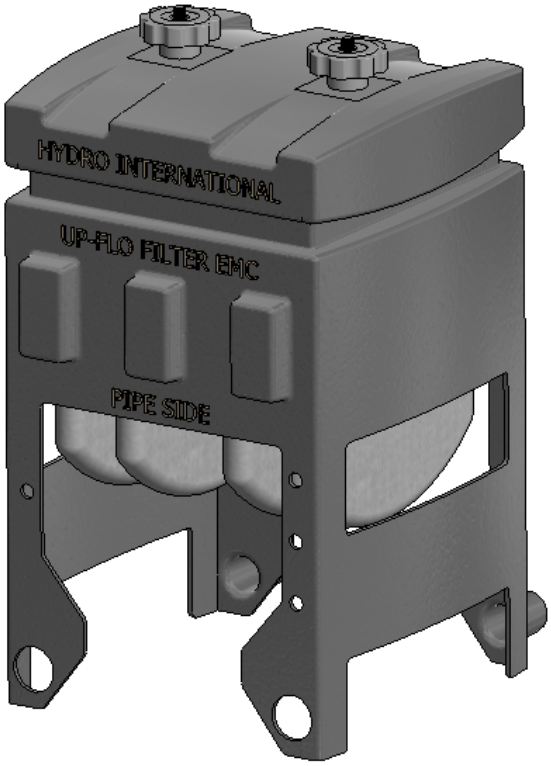
If you have any questions regarding the above information, please contact Anthony Robalik or Minesh Patel of my office at (609) 633-7021.

Sincerely,

Gabriel Mahon, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
James Murphy, NJDEP - BNPC
Anthony Robalik NJDEP – BNPC
Minesh Patel NJDEP – BNPC



Up-Flo Filter® Extended Maintenance Cartridge Operation and Maintenance Manual

October 2019
Rev. A

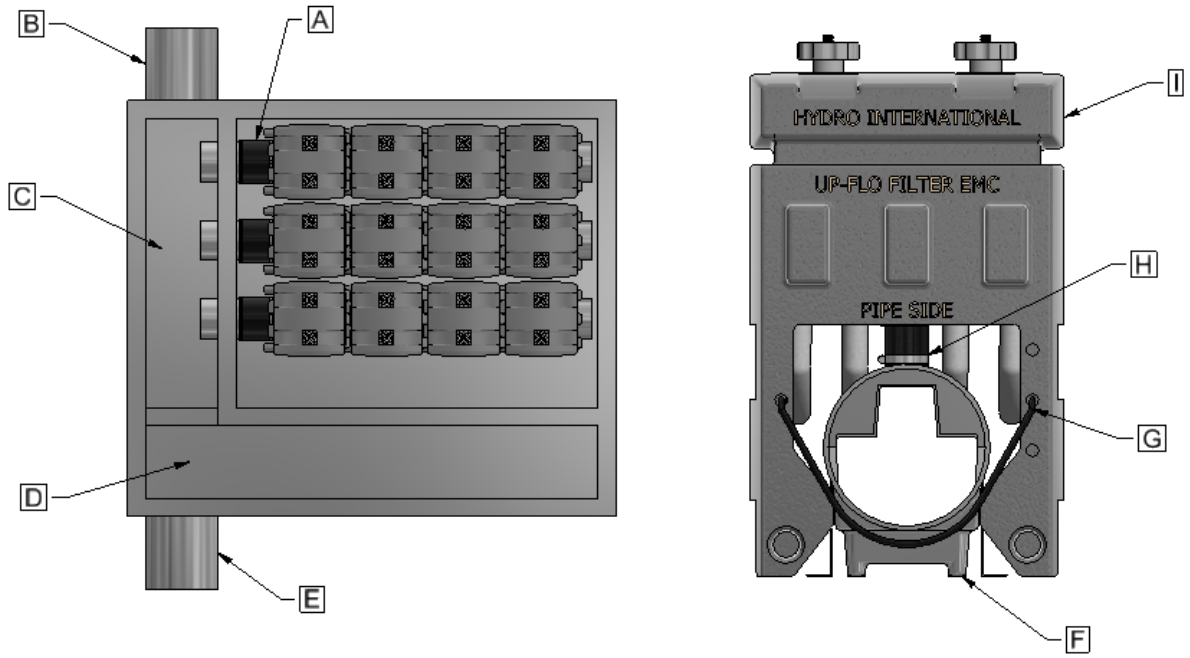
hydro-int.com

Hydro International®

Contents

Overview and Product Description

The Up-Flo® Filter is a modular high-rate stormwater filtration device designed to capture trash, oil, sediment and remove fine pollutants such as particulate metals and nutrients from stormwater runoff. Designed with efficiency, longevity and upkeep in mind, this high performance, low maintenance filter option that offers higher loading rates and longer membrane life for higher quality stormwater for longer periods between servicing. In general, a minimum of two inspections are required per year to monitor sediment and gross pollutant accumulations. In order to achieve an annual TSS removal rate of 80% for the Up-Flo® Filter, the minimum maintenance frequency specified in the maintenance section for replacement of the filter inserts and removal of accumulated sediment from the sump is mandatory.



System Components			
A.	Underdrain Coupling	F.	Underdrain
B.	Outlet Pipe	G.	Cartridge Restraining Cord
C.	Outlet Bay	H.	Cartridge Connection Boot
D.	Inlet Bay	I.	Filter Cartridge
E.	Inlet Pipe		

Figure 1: The Up-Flo® Filter EMC

Operation

Introduction

The Up-Flo® Filter operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirements and is fabricated with durable non-corrosive components. Personnel are not required to operate the unit and maintenance is limited to periodic inspections, sediment and floatables removal and cartridge replacement.

Pollutant Capture

The Up-Flo® Filter is designed to operate as a “treatment train” by incorporating multiple treatment technologies into a single device. Trash and gross debris are removed by sedimentation and screening before they are introduced to the filtration membranes, delaying surface blinding. The Up-Flo® Filter is a wet-sump device. Between storm events, oil and floatables are stored on the water surface separate from the sediment storage volume in the sump.

Best Practices

Good housekeeping upstream of the Up-Flo® Filter can significantly extend maintenance interval. For example, sweeping paved surfaces, collecting leaves and grass trimmings, and protecting bare ground from erosion will reduce loading to the system. The filter cartridges should not be installed until construction activities are complete and site stabilization is effective.

Damage Due to Lack of Maintenance

Delayed maintenance would result in clogged filters. In that situation, an Up-Flo® Filter could go into bypass and there would be no treatment of the incoming stormwater. Replacement of the filter cartridges and removal of sediment from the sump would restore the Up-Flo® Filter to its original treatment efficiency. Establishing and adhering to a regular maintenance schedule ensures optimal performance of the system.

Inspection & Maintenance

Overview

The Up-Flo® Filter protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the proper functioning of the Up-Flo® Filter.

Replacement of filter cartridges must be performed inside the vessel. A vactor truck is required for removal of oils, water, sediment, and to completely pump out the vessel to allow for maintenance inside. If you are not using Hydro International or a trained service provider, you must follow OSHA (or other regional) Confined Space Entry procedures when entering the Up-Flo® vessel.

The minimum required frequency for replacement of the filter cartridges is annually, whereas the minimum required frequency for removal of accumulated sediment from the sump is dependent on the Up-Flo® Filter configuration. Configurations with a larger sediment storage volume per module will require less frequent removal of accumulated sediment. Regardless, whenever sediment depth in the sump is found to be greater than 6 inches (15 cm), sediment removal is required.

Inspection and Maintenance

Routine Inspection

Inspection is a simple process that requires monitoring pollutant accumulations. Maintenance crews should be familiar with the Up-Flo® Filter and its components prior to inspection.

The following instructions are intended for non-Hydro maintenance service providers and/or those intending to maintain their own Up-Flo® Filter:

Routine Inspection Procedures

1. Set up any necessary safety equipment (such as traffic cones) to provide access to the Up-Flo® Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside and to make note of any irregularities.
4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the chamber.
5. Using a sediment probe such as a Sludge-Judge®, measure the depth of sediment that has collected in the sump of the vessel. Maximum sediment depth is 6 inches (15 cm).
6. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or a high standing water level.
7. Securely replace the grate or lid.
8. Remove safety equipment.
9. Contact Hydro International to discuss any irregularities noted during inspection.

Routine Maintenance

The access port located at the top of the manhole or vault provides access to the Up-Flo® vessel for maintenance personnel to enter the vessel and remove and replace filter cartridges. The same access would be used for maintenance personnel working from the surface to vactor out sediment, oil, and water (Figure 2). Unless the Up-Flo® Filter has been installed in a very shallow configuration, it is necessary to have personnel with OSHA Confined Space Entry training performing the maintenance that occurs inside the vessel.

Maintenance intervals are determined from monitoring the Up-Flo® Filter during its first year of operation. Depending on the site, some maintenance activities may have to be performed on a more frequent basis than others.

A vactor truck is normally required for oil removal, removal of sediment from the sump, and to dewater the vessel for replacement of the filter cartridges. All inspection and maintenance activities would be recorded in an Inspection and Maintenance Log.

The access port located at the top of the manhole provides unobstructed access for a vactor hose and/or skimmer pole to be lowered to the base of the sump.

Figure 2: Sediment is removed from the sump with a vactor hose. Confined space entry is not required for this step.

Maintenance Scheduling

- Call Hydro International to order replacement filter cartridges prior to scheduling maintenance.
- Because filter cartridge replacement requires entry into the Up-Flo® chamber, maintenance events should be scheduled during dry weather.
- Filter cartridge replacement should occur immediately after a contaminated spill in the contributing drainage area.

Recommended Equipment

- Safety Equipment (traffic cones, etc.)
- Crow bar to remove grate or lid
- Vactor truck (flexible hose preferred)
- Pressure nozzle attachment
- OSHA Confined Space Entry Equipment
- Replacement Up-Flo® Filter Cartridges (available from Hydro International)
- Hydro International Up-Flo® Filter Maintenance Log
- Screwdriver (flat head)

Surface Maintenance Procedure

1. Set up any necessary safety equipment (such as traffic cones) around the access of the Up-Flo® Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. Once all floatables and oil have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris from the sump floor.

5. Retract the vactor hose from the vessel.
6. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oils, and gross debris removed, and the depth of sediment measured. Note any apparent irregularities such as damaged components or blockages.
7. Securely replace the grate or lid. Remove safety equipment.
8. Dispose of sediment and gross debris following local regulations.
9. Dispose of oil and sump water at a licensed water treatment facility or following local regulations.
10. Contact Hydro International to discuss any irregularities noted during cleanout.

Filter Cartridge Replacement

1. Following OSHA or region specific Confined Space Entry procedures, enter the Up-Flo® Filter Chamber.
2. Starting at the end of the filter cartridge row furthest from the Outlet Bay (Figure 1, Item C) remove each Filter Cartridge (Figure 1, Item I) from the Underdrain (Figure 1, Item A) as described below:
    a. Unfasten Cartridge Restraining Cord (Figure 1, Item G)
    b. Loosen Cartridge Connection Boot (Figure 1, Item H) using flathead screwdriver
    c. Remove Filter Cartridge and transfer to surface.
3. Starting at the end of the Underdrain closest to the Outlet Bay, install new Filter Cartridges, supplied by Hydro International.
    - Orient Filter Cartridge with the labeled “Pipe Side” facing away from the Outlet Bay.
    - Tighten Cartridge Connection Boot using flathead screwdriver
    - Fasten Cartridge Restraining Cord
4. Exit the Up-Flo® Filter chamber and securely replace the grate or lid.
5. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oil and gross debris removed, and the depth of sediment measured. Note the number of filter cartridges replaced. Note any irregularities such as damaged components or blockages.
6. Remove safety equipment.
7. Return spent filter cartridges to Hydro International for refurbishment.
8. Contact Hydro International to discuss any irregularities noted during annual maintenance.

Up-Flo® Filter Installation Log

SITE REFERENCE NAME OR NUMBER FOR THIS UP-FLO® FILTER LOCATION:	
SITE NAME:	
SITE LOCATIONS:	
OWNER:	**SITE CONTRACTOR:**
CONTACT NAME:	**CONTACT NAME:**
COMPANY NAME:	**COMPANY NAME:**
ADDRESS:	**ADDRESS:**
TELEPHONE:	**TELEPHONE:**
FAX:	**FAX:**

INSTALLATION DATE: _____ /_____/_____

TOTAL NUMBER OF UP-FLO® FILTER CARTRIDGES: _____

Up-Flo® Filter Inspection Log

Site Name: _____

Location: _____

Owner Name: _____

Address: _____ Phone Number:_____

Site Status: _____

Date: _____ Time: _____ Site Conditions*: _____
*(Stable, Under Construction, Needing Maintenance, etc.)

Inspection Frequency Key: A=annual; M=Monthly; S=after major storms

	Inspection Items	Inspection Frequency	Inspected? (Y/N)	Maintenance Needed? (Y/N)	Comments/ Description
Debris Removal	Adjacent area free of debris?				
	Inlets and outlets free of debris?				
	Facility (internally) free of debris?				
Vegetation	Surrounding area fully stabilized?				
	Grass mowed?				
Water retention where required	Water holding chamber(s) at normal pool				
	Evidence of erosion?				
Sediment deposition	Filtration chamber free of sediments?				
	Sedimentation sump not more than 50% full?				
Structural components	Any evidence of structural deterioration?				
	Grates in good condition?				
	Spalling or cracking of structural parts?				
	Outlet/overflow spillway				
Other	Noticeable odors?				
	Any evidence of filter(s) clogging?				
	Evidence of flow bypassing facility?				

Inspector Comments: _____

_____

Overall Condition of Up-Flo® Filter**: Acceptable / Unacceptable

**Acceptable would mean properly functioning; unacceptable would mean damaged or required further maintenance

If any of the above Inspection Items are checked “Yes” for “Maintenance Needed”, list Maintenance actions and their completion dates below or on the Maintenance Log provided on page 11 of the Up-Flo® Filter Operation & Maintenance Manual:

Maintenance Action Needed	Due Date

The next routine inspection is scheduled for approximately: (date) _____

Inspected by: (signature) _____

Inspected by: (printed) _____

Up-Flo® Filter Maintenance Log

Site Name: _____

Location: _____

Owner Name: _____

Address: _____ Phone Number:_____

Site Status: _____

Date: _____ Time: _____ Site Conditions*: _____
*(Stable, Under Construction, Needing Maintenance, etc.)

Estimated volume of oil/floatable trash removed: _____

Sediment depth measured in sump prior to removal: _____

Number of Filter Cartridges replaced: _____

Inspector Comments: _____

_____

Overall Condition of Up-Flo® Filter**: Acceptable / Unacceptable

**Acceptable would mean properly functioning; unacceptable would mean damaged or required further maintenance

Maintained by: (signature) _____

Maintained by: (printed) _____

STORM SEWER DESIGN WORK SHEET

LOCATION		RUNOFF DATA									SEWER DESIGN DATA						
STRUCTURE NUMBER		INCREMENTAL AREA				TIME OF CONCENTRATION					PIPE MATERIAL : HDPE MANNINGS `n' = 0.012						
UPSTREAM	DOWNSTREAM	AREA	WEIGHTED RUNOFF COEFFICIENT	SUBAREA Ac x C	TOTAL AREA	OVERLAND THROUGH AREA, Ta	THROUGH PIPE, Tp	TOTAL Tc OR LONGEST ACCUMULATED Tc	RAINFALL INTENSITY,	RUNOFF PEAK, Q	DIAMETER	LENGTH	SLOPE	CAPACITY AT FULL FLOW, Qf	VELOCITY AT FULL FLOW, Vf	VELOCITY ACTUAL, Va	FLOW TIME THROUGH PIPE
		Ac	C		Ac X C	MIN.	MIN.	MIN.	IN/HR	CFS	INCHES	FEET	%	CFS	FPS	FPS	MIN.
1	2	0.03	0.49	0.01	0.01	1.0		1.0	6.38	0.1	15	54	1.00	6.5	5.3	1.9	0.5
2	4	0.04	0.42	0.02	0.03	1.0	0.5	1.5	6.38	0.2	15	99	1.00	6.5	5.3	2.4	0.7
3	4	0.14	0.99	0.14	0.14	1.0	1.2	2.2	6.38	0.9	15	66	1.00	6.5	5.3	3.8	0.3
4	5	0.12	0.59	0.07	0.24	1.0	1.5	2.5	6.38	1.5	15	89	1.00	6.5	5.3	4.4	0.3
5	7	0.08	0.69	0.06	0.30	1.0	1.8	2.8	6.38	1.9	15	98	1.00	6.5	5.3	4.8	0.3
6	7	0.18	0.85	0.15	0.45	1.0	2.1	3.1	6.38	2.9	15	18	1.00	6.5	5.3	5.4	0.1
7	WQ Device	0.01	0.99	0.01	0.46	1.0	2.2	3.2	6.38	2.9	15	12	1.69	8.4	6.8	6.5	0.0
8	Basin	0.12	0.99	0.10	0.10	1.0	2.2	3.2	6.38	0.6	6	41	1.00	0.6	2.9	3.5	0.2
OCS	9									1.9	15	67	1.00	6.5	5.3	4.8	0.2
9	10									1.9	15	58	1.00	6.5	5.3	4.8	0.2
10	11									1.9	15	31	1.00	6.5	5.3	4.8	0.1

1. SEE CONSTRUCTION PLANS FOR PROFILE INFORMATION
2. ACTUAL DIMENSION FOR PEAK RUNOFF,Q IS Ac-IN/HR, HOWEVER Ac-fT/Hr, HOWEVER 1.008 Ac-ft/hr IS APPROXIMATELY EQUAL TO 1.0 CFS
3. SEE PLANS FOR PIPE AND INLET INFORMATION

PROJECT NAME : Bulk Yard 35

PROJECT NO. : 18937.001

STORM FREQUENCY 25 YEAR

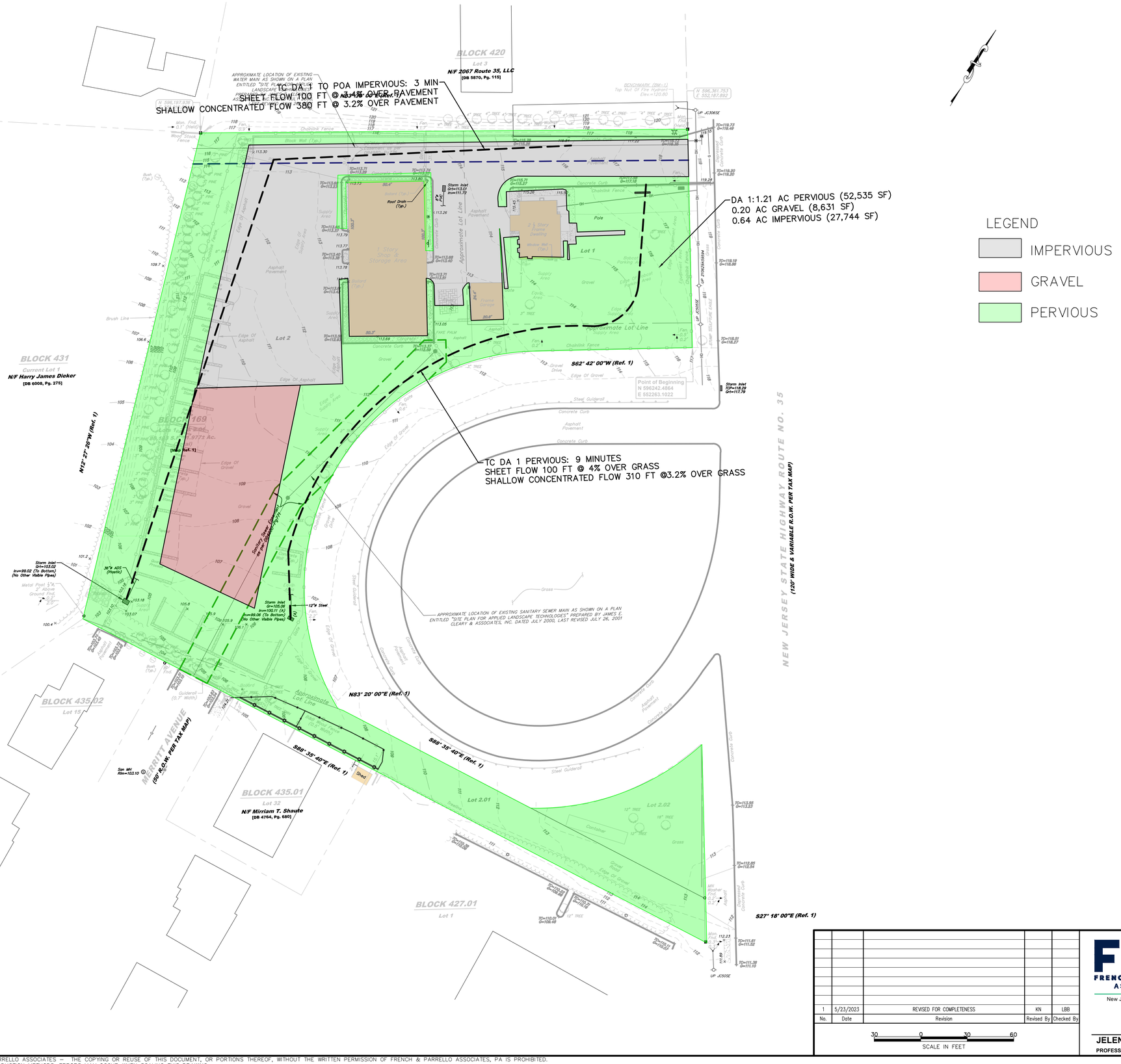
COMPUTED BY : KAN DATE : 12-12-2023

CHECKED BY : DATE :

REVISED BY : DATE :

FRENCH & PARRELLO ASSOCIATES

Appendix D
Drainage Area Maps



No.	Date	Revision	Revised By	Checked By
1	5/23/2023	REVISED FOR COMPLETENESS	KN	LBB

SCALE IN FEET: 30 0 30 60

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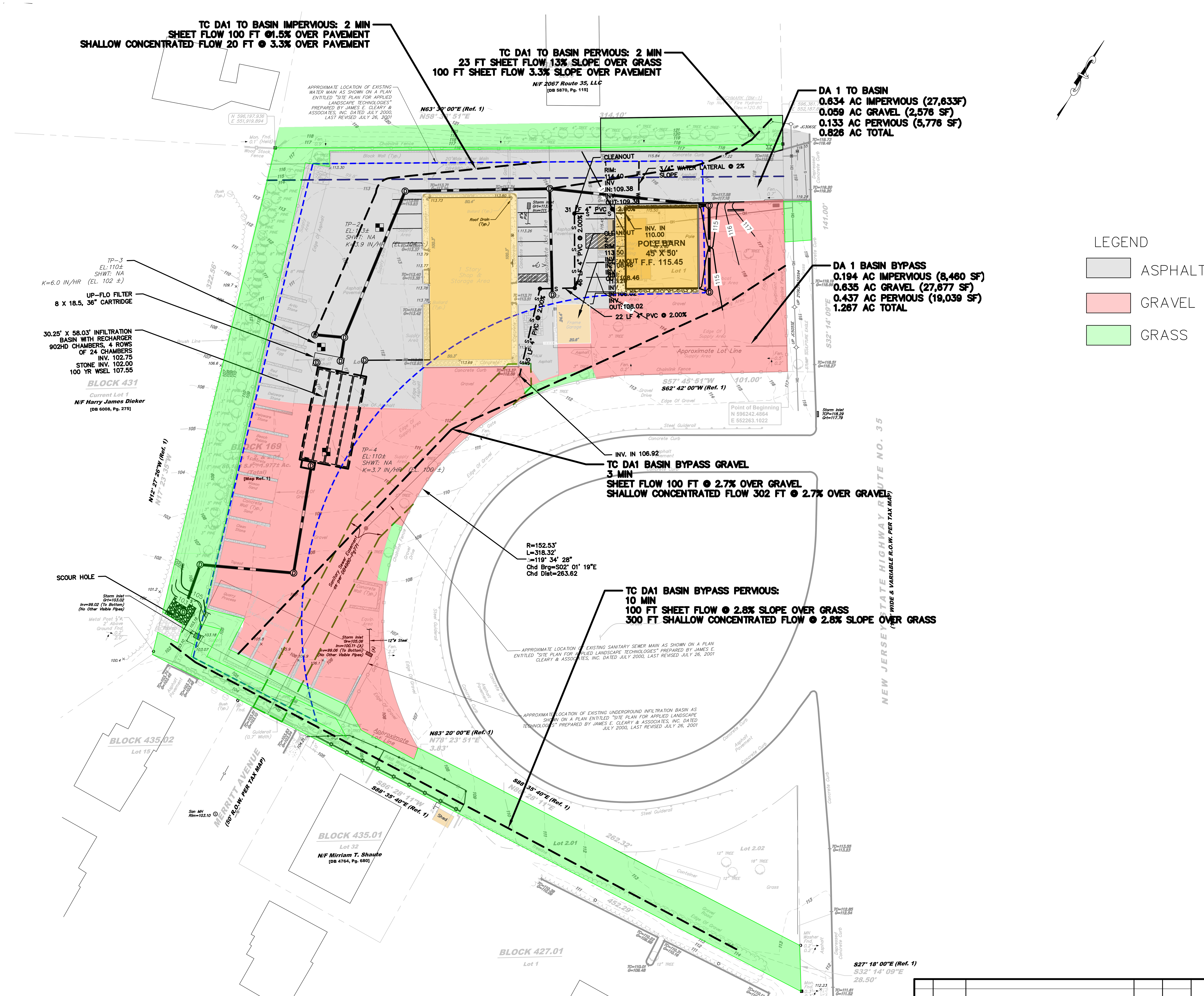
FPAengineers.com

JELENA BALORDA-BARONE, P.E.
PROFESSIONAL ENGINEER, N.J. LIC. No. 44465

EXISTING (APPROVED 2001 PLAN) DRAINAGE AREA MAP
FOR
BULK YARD 35
BLOCK 428, LOTS 1,2, & 2.01
IN
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

DATE:	DESIGNED BY:	SCALE:	PROJECT NUMBER:
1-20-2023	KN	1" = 30'	18937.001
DRAWN BY:	CHECKED BY:	FIELD BOOK	SHEET:
KN	LBB		1 of 1

O:\18K\18900\18937 - Bulk Yard 35\CADD\DWG\18937.001 - DA-2.dwg existing DA map



No.	Date	Revision	Revised By	Checked By
1	5/23/2023	REVISED FOR COMPLETENESS	KN	LBB

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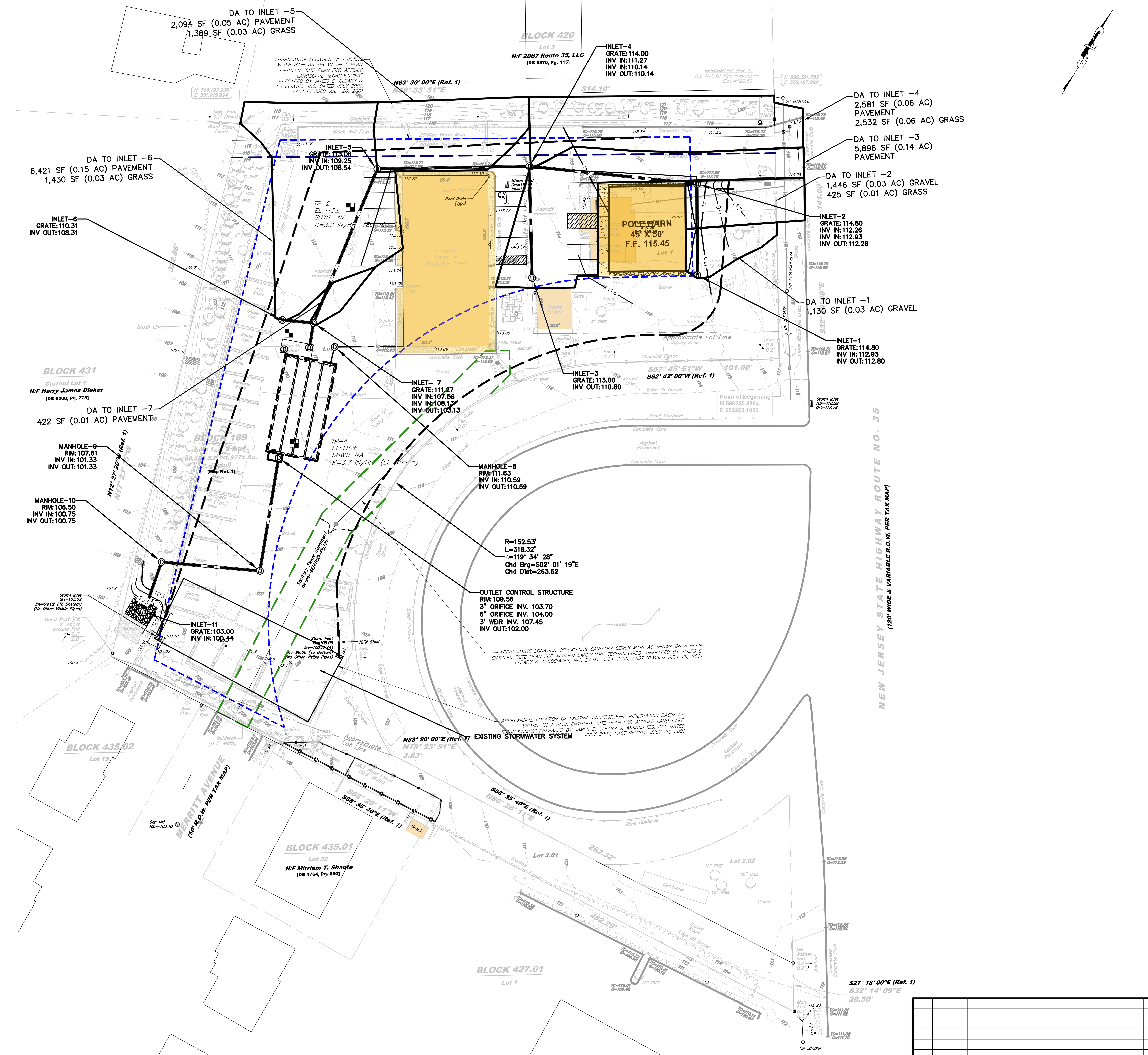
PROPOSED DRAINAGE AREA MAP
FOR
BULK YARD 35
BLOCK 428, LOTS 1,2, & 2.01
IN
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

DATE:	DESIGNED BY:	SCALE:	PROJECT NUMBER:
1-20-2023	KN	1" = 30'	18937.001
DRAWN BY: KN	CHECKED BY: LBB	FIELD BOOK	SHEET: 1 of 1

O:\18K\18900\18937 – Bulk Yard 35\CADD\DWG\18937.001 – DA-2.dwg proposed da



No.	Date	Revision	Revised By	Checked By
1	5/23/2023	REVISED FOR COMPLETENESS	KN	LBB

30 0 30 60
SCALE IN FEET

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INLET DRAINAGE AREA MAP
FOR
BULK YARD 35
BLOCK 428, LOTS 1,2, & 2.01
IN
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

DATE:	DESIGNED BY:	SCALE:	PROJECT NUMBER:
1-20-2023	KN	1" = 30'	18937.001
DRAWN BY:	CHECKED BY:	FIELD BOOK	SHEET:
KN	LBB		1 of 1

O:\18K\18900\18937 - Bulk Yard 35\CADD\DWG\18937.001 - DA-2.dwg inlet da map