STORM WATER MANAGEMENT PLAN

FOR

344 N Broadway

Upper Nyack, NY

DATE ISSUED: January 25, 2024

PREPARED FOR:

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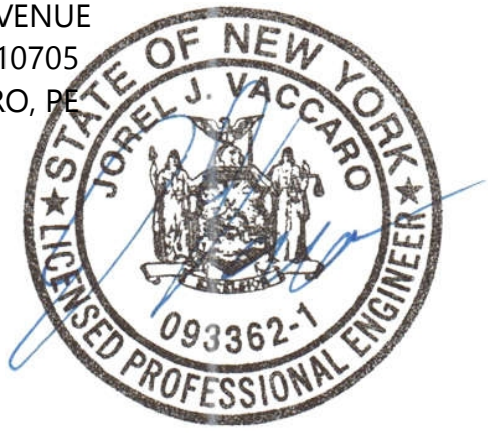

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I. Introduction

A new addition is proposed at the above-referenced address. The existing dwelling is to remain and the developed lot and building use as single-family residence is to continue. The use of the site is single family residential, which is within the applicable zoning requirements of the area. New construction includes the addition a garage and second floor covered terrace over an area of existing paved driveway area, which is to be removed. The full amount of new roof area to be added is **356** square feet (360 sf has been assumed for calculation). The total gross lot area is **55,669** square feet.

A new subsurface stormwater management system has been designed for the proposed development to mitigate runoff and maintain peak volume flow rates and capacities below those of pre-existing condition flow. The system is designed to fully retain storm water conveyed to the system from the areas for a 25-year storm, and attenuate and adequately manage the site runoff for a 100-year storm. Since existing and proposed areas are both comprised of impervious coverage, it is concluded that any reduction to storm flow rate will reduce outflow of proposed conditions to below pre-existing condition runoff.

New roof leaders will convey runoff to a new cultec unit to accommodate all runoff. Overflow runoff will be conveyed to an adjacent watercourse; flow will be conveyed to overland sheet flow and stabilized at the overflow discharge pipe.

II. Site Conditions

An existing single-family home and driveway is present on-site. Existing dwelling and driveway are to remain.

Hydraulic Soil Group **C**, based on United States Geological Survey data, has been assumed for this analysis. To note: The analyzed area is comprised completely of existing and proposed impervious surface, so soil group does not impact runoff calculation. An on-site soil percolation

test will be performed immediately prior to construction to verify a minimum rate **of 0.5 inches per hour,** which has been assumed for these calculations.

Area summaries for pre- and post-development can be found in Appendix **I** of this report.

III. Proposed Actions

The proposed site plan involves no increase of impervious area. **346** square feet of impervious pavement is being converted to roof area. However, a point discharge will be created due to conveyance of roof runoff into gutters and leaders. The storm water runoff will be managed by subsurface storm water retention system. The existing site hydrology and topography will remain largely unchanged. Existing and proposed site topography conveys runoff toward the *front, east* of the property, toward North Broadway.

A subsurface Cultec storm water retention system was selected for the storm water retention system. The system will consist of **one (1)** prefabricated Cultec Recharger units, model **R150**. The system is comprised of both Cultec units and surrounding gravel, and will provide a storage volume of approximately **80.3** cubic feet.

The required volume was calculated based on the impervious surface contributing runoff to the storm system, and the minimum system size of one unit, which was determined to be adequate to retain up to the 25-year storm assuming the minimum-required infiltration rate. The design requirement to retain storm water to be released below the peak pre-development runoff rate has been achieved by inspection, as the pre-construction condition of the surface was already impervious pavement. The system capacity accommodates runoff from all proposed impervious surfaces. System sizing, volume, and flow calculations are based on proposed site surface areas which can be found in **Appendix I**.

Proposed best management practices and mitigation measures include the minimization of pollutants and silt runoff. Runoff resulting from proposed impervious surfaces is not proposed to be directly connected to the municipal storm sewer system. Outlets from the drainage system

shall be equipped with splash pads and dispersion erosion protection to reduce flow velocity and induce sheet flow.

IV. HydroCAD Analysis and System Design

A HydroCAD analysis has been performed to evaluate the proposed, post-development conditions (**Appendix II**). The runoff volume and peak flow rates for the 25- and 100-year design storms have been calculated and summaries are attached. The 25-year storm is comprised of a rainfall depth of **6.35** inches, and the 100-year storm is comprised of a 24-hour rainfall depth of **9.00** inches, based on USDA Natural Resources Conservation Service (NRCS) data for Rockland County.

The system fully retains the 25-year flow, as demonstrated by the calculation. Inflow runoff from the impervious surface area is **0.05** cfs, and will be reduced to **0** cfs. For the 100-year storm, peak flow out of the system for these storms has been maintained below pre-development runoff conditions, which is assumed to be the runoff rate in the calculation prior to the retention facility. This flow is **0.08** cfs. The system has been designed to adequately manage storm water flow due to the 100-year storm without surcharging the system, and reduce the outflow to **0.06** cfs.

The effects of replaced impervious area on stormwater runoff volumes were analyzed using the sub-catchment area method. This method involves establishing an area of interest for which the stormwater runoff is estimated to flow from on the proposed lot. In this instance, this area is comprised of both the area of proposed roof coverage only. This established area of interest is then further broken down by permeability into sub-areas. A curve number is assigned to each sub-area corresponding to the ability of the soil and surface condition to accept stormwater infiltration. This area of interest is transposed onto the existing site plan and used in direct comparison with the proposed work. After calculation and HydroCAD analysis, the results provide an accurate understanding of the expected increase in stormwater runoff anticipated from proposed impervious areas.

The proposed roof sub-catchment area **(Appendix I)** has been specified as impervious coverage with a curve number (CN) of **98.**for both the pre and post development conditions (pavement area converted to roof). Peak pre-development runoff rates have been determined to be **0.05** and **0.08** cubic feet per second for the pre-development conditions under the 25- and 100-year storm, respectively.

Post-development sub-catchment areas **(Appendix I)** include impervious roof (CN= 98) and impervious pavement and wall surface (CN= 98). The storage system will release stored storm water through infiltration, with an incorporated overflow to release water through an outlet pipe. The management system will restrict peak post-development runoff to **0.0** and **0.06** cubic feet per second for the post-development conditions under the 25- and 100-year storm, respectively.

V. Erosion Control and Site Protection

Erosion and sediment control during construction will be implemented. Erosion control measures have been detailed and are included in the drawing package. A reinforced silt fence is proposed down-slope and alongside-slopes of all proposed site disturbances. The silt fence will be mounted on woven wire fence. Hay bales will be provided down-slope for added reinforcement. A silt fence detail and installation notes have been provided.

Site disturbance will be minimized and existing development vegetation will be vigorously maintained.

Tree protection is to be provided for all on site trees to remain within the extents of construction. The assumed area of construction does not include any existing trees. If the contractor needs to enlarge the extents of construction for any reason, and existing trees are

encompassed, they are to be protected as per the details. Tree protection details have been provided in the drawing package.

Appendix I – Existing & Proposed Subcatchment Surface Areas

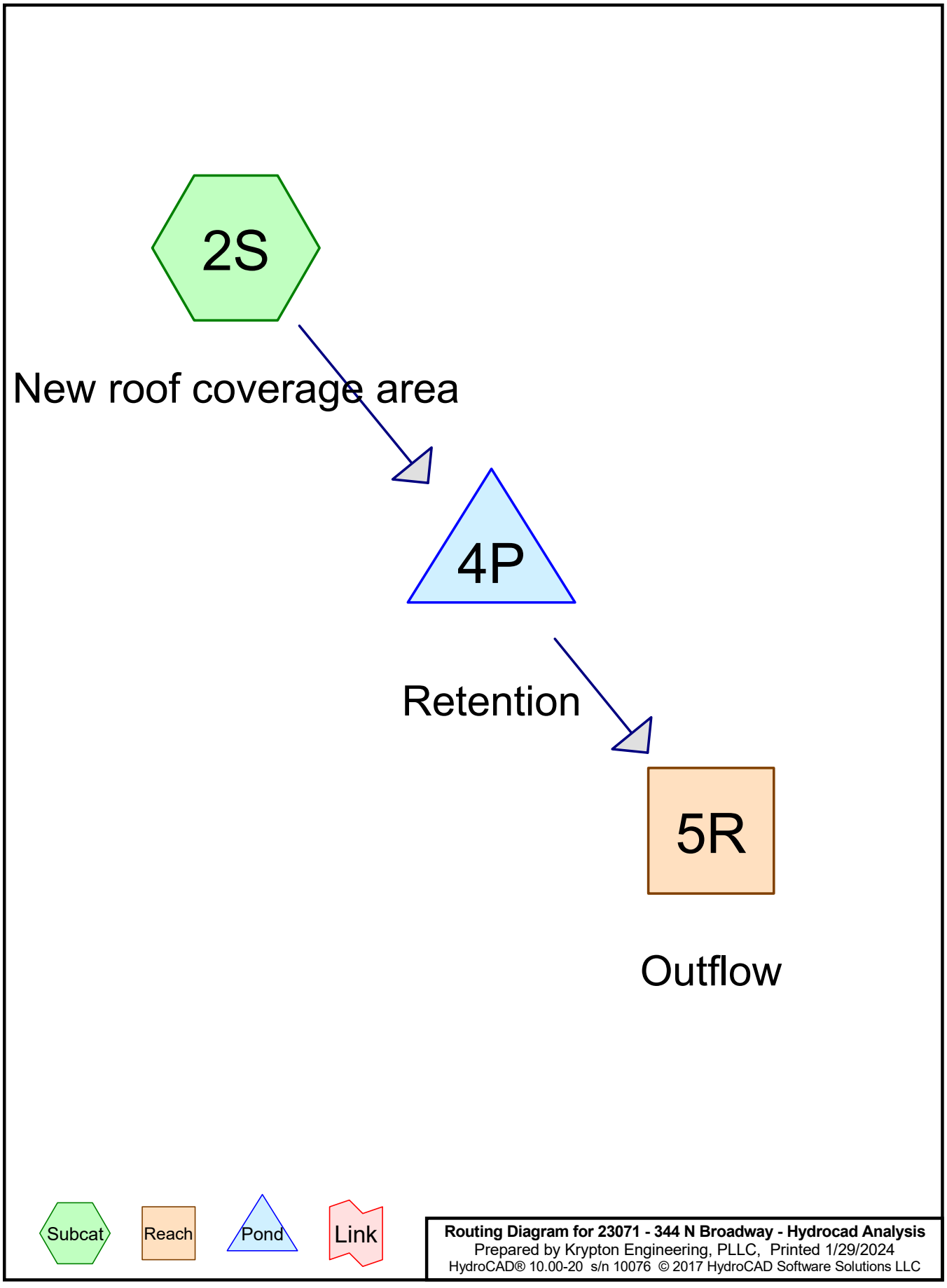
Pre-development existing conditions:

Existing Driveway: 346 sf (curve number: 98)

Proposed

Building Roof Footprint: 346 sf (curve number: 98)

Appendix II – HydroCAD Analysis



Routing Diagram for 23071 - 344 N Broadway - Hydrocad Analysis
Prepared by Krypton Engineering, PLLC, Printed 1/29/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.008	98	Roofs, HSG D (2S)

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.008	HSG D	2S
0.000	Other	

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.008	0.000	0.008	Roofs	2S

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	4P	2.85	2.00	10.0	0.0850	0.013	6.0	0.0	0.0

Time span=0.00-28.00 hrs, dt=0.03 hrs, 934 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: New roof coverage area Runoff Area=360 sf 100.00% Impervious Runoff Depth=6.11"
Tc=5.0 min CN=98 Runoff=0.05 cfs 0.004 af

Reach 5R: Outflow Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 4P: Retention Peak Elev=2.86' Storage=0.002 af Inflow=0.05 cfs 0.004 af
Discarded=0.01 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.004 af

Summary for Subcatchment 2S: New roof coverage area

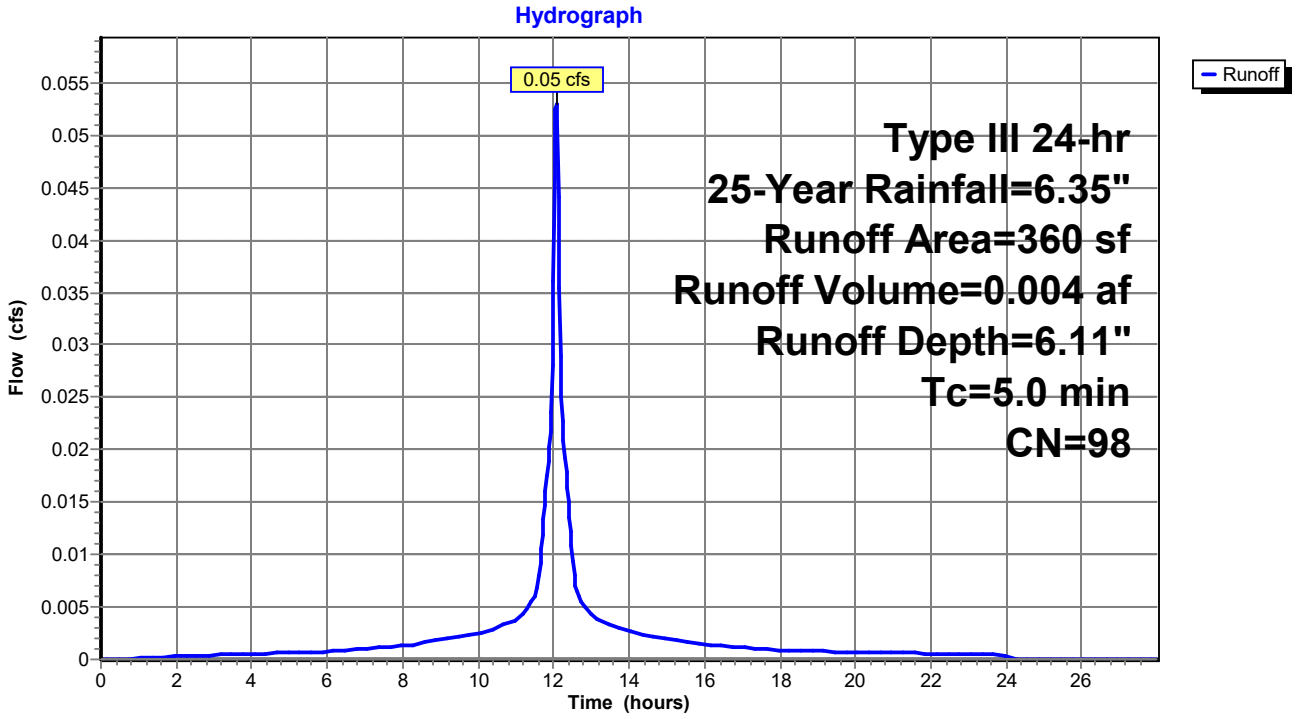
Runoff = 0.05 cfs @ 12.07 hrs, Volume= 0.004 af, Depth= 6.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.99 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=6.35"

Area (sf)	CN	Description
360	98	Roofs, HSG D
360		100.00% Impervious Area

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

Subcatchment 2S: New roof coverage area

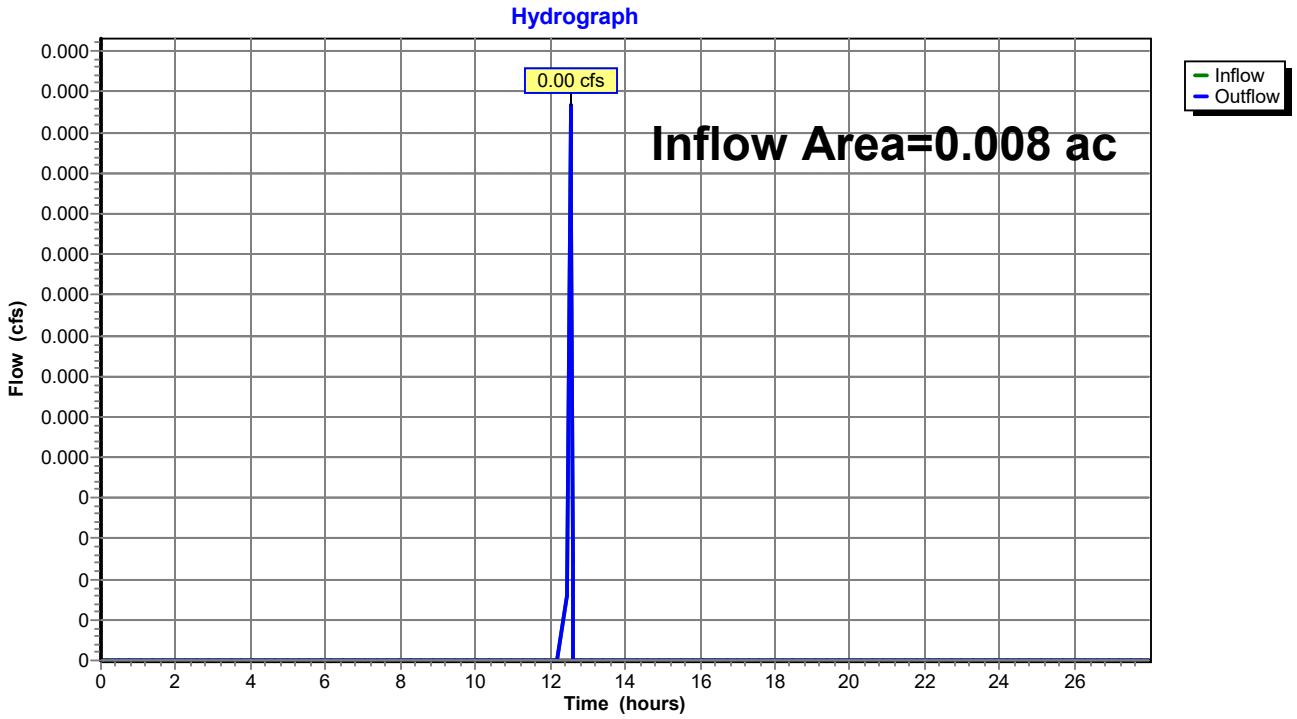


Summary for Reach 5R: Outflow

Inflow Area = 0.008 ac,100.00% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 12.55 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 12.55 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.99 hrs, dt= 0.03 hrs

Reach 5R: Outflow



Summary for Pond 4P: Retention

Inflow Area = 0.008 ac,100.00% Impervious, Inflow Depth = 6.11" for 25-Year event
Inflow = 0.05 cfs @ 12.07 hrs, Volume= 0.004 af
Outflow = 0.01 cfs @ 12.55 hrs, Volume= 0.004 af, Atten= 85%, Lag= 28.9 min
Discarded = 0.01 cfs @ 12.55 hrs, Volume= 0.004 af
Primary = 0.00 cfs @ 12.55 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-27.99 hrs, dt= 0.03 hrs / 2
Peak Elev= 2.86' @ 12.55 hrs Surf.Area= 0.001 ac Storage= 0.002 af

Plug-Flow detention time= 128.8 min calculated for 0.004 af (100% of inflow)
Center-of-Mass det. time= 128.7 min (872.1 - 743.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.50'	0.001 af	**4.75'W x 13.00'L x 2.54'H Field A** 0.004 af Overall - 0.001 af Embedded = 0.003 af x 40.0% Voids
#2A	1.00'	0.001 af	**Cultec R-150XLHD** Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 1 rows
		0.002 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	2.85'	**6.0" Round Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 2.85' / 2.00' S= 0.0850 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.20 sf
#2	Discarded	0.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.25'

Discarded OutFlow Max=0.01 cfs @ 12.55 hrs HW=2.85' (Free Discharge)
↑**2=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 12.55 hrs HW=2.85' (Free Discharge)
↑**1=Culvert** (Inlet Controls 0.00 cfs @ 0.24 fps)

Pond 4P: Retention - Chamber Wizard Field A

Chamber Model = Cultec R-150XLHD (Cultec Recharger® 150XLHD)
Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf
Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap
Row Length Adjustment= +0.75' x 2.65 sf x 1 rows

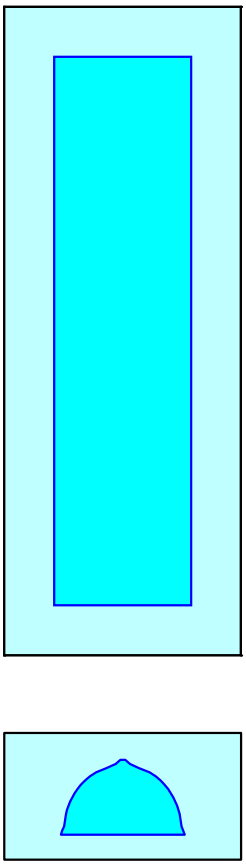
1 Chambers/Row x 10.25' Long +0.75' Row Adjustment = 11.00' Row Length +12.0" End Stone x 2 = 13.00' Base Length
1 Rows x 33.0" Wide + 12.0" Side Stone x 2 = 4.75' Base Width
6.0" Base + 18.5" Chamber Height + 6.0" Cover = 2.54' Field Height

1 Chambers x 27.2 cf +0.75' Row Adjustment x 2.65 sf x 1 Rows = 29.1 cf Chamber Storage

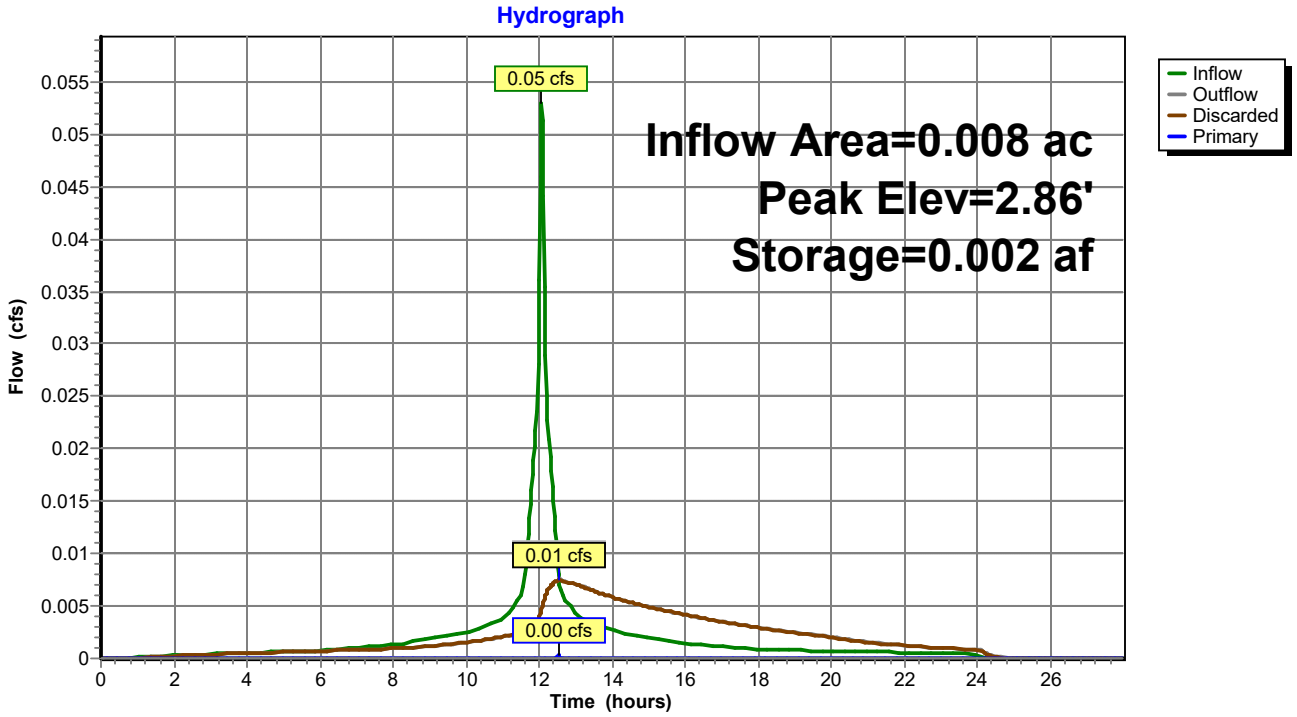
156.9 cf Field - 29.1 cf Chambers = 127.8 cf Stone x 40.0% Voids = 51.1 cf Stone Storage

Chamber Storage + Stone Storage = 80.3 cf = 0.002 af
Overall Storage Efficiency = 51.1%
Overall System Size = 13.00' x 4.75' x 2.54'

1 Chambers
5.8 cy Field
4.7 cy Stone



Pond 4P: Retention



Time span=0.00-28.00 hrs, dt=0.03 hrs, 934 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: New roof coverage area Runoff Area=360 sf 100.00% Impervious Runoff Depth=8.76"
Tc=5.0 min CN=98 Runoff=0.08 cfs 0.006 af

Reach 5R: Outflow Inflow=0.06 cfs 0.001 af
Outflow=0.06 cfs 0.001 af

Pond 4P: Retention Peak Elev=2.99' Storage=0.002 af Inflow=0.08 cfs 0.006 af
Discarded=0.01 cfs 0.005 af Primary=0.06 cfs 0.001 af Outflow=0.07 cfs 0.006 af

Summary for Subcatchment 2S: New roof coverage area

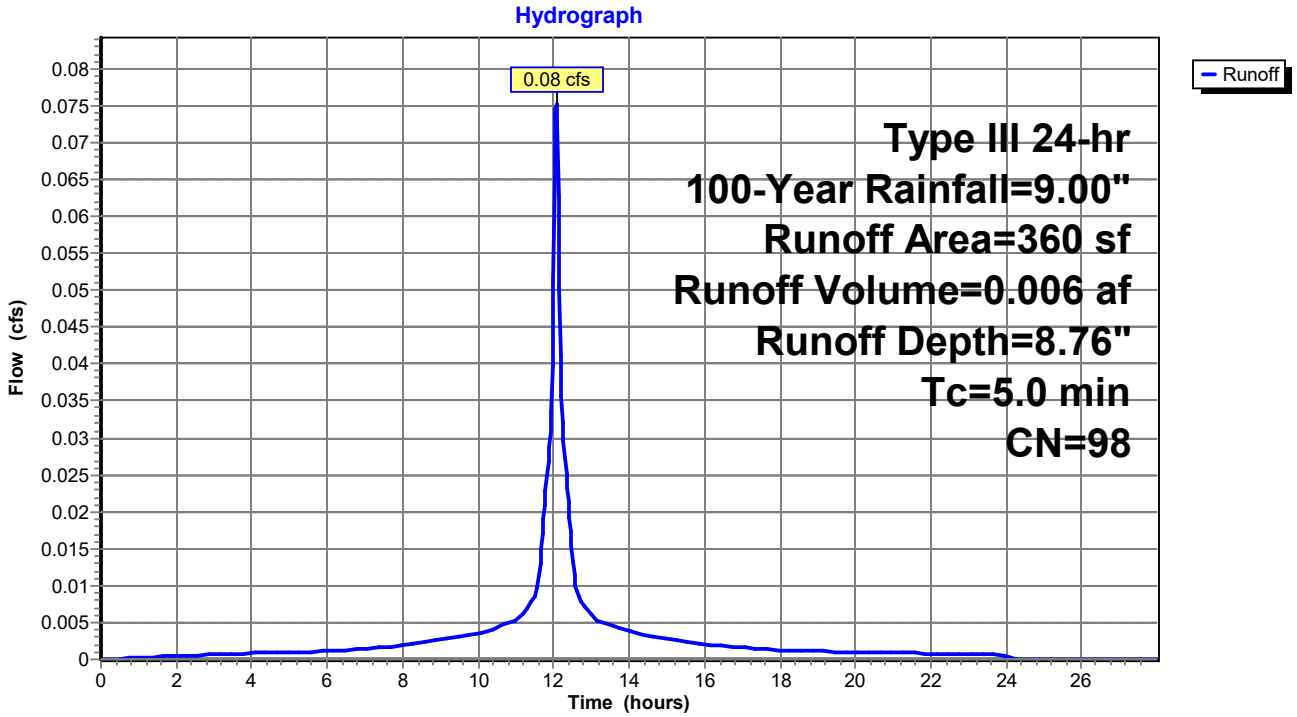
Runoff = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af, Depth= 8.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.99 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=9.00"

Area (sf)	CN	Description
360	98	Roofs, HSG D
360		100.00% Impervious Area

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

Subcatchment 2S: New roof coverage area

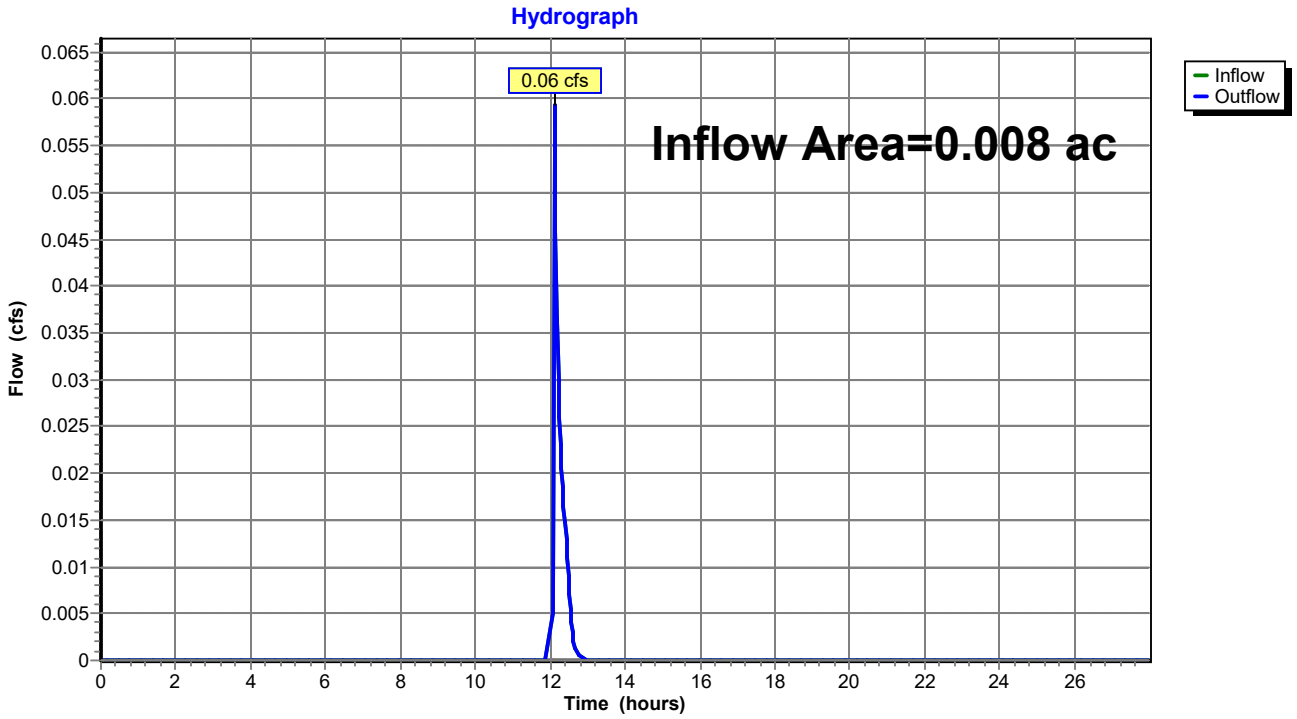


Summary for Reach 5R: Outflow

Inflow Area = 0.008 ac,100.00% Impervious, Inflow Depth = 1.31" for 100-Year event
Inflow = 0.06 cfs @ 12.13 hrs, Volume= 0.001 af
Outflow = 0.06 cfs @ 12.13 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.99 hrs, dt= 0.03 hrs

Reach 5R: Outflow



Summary for Pond 4P: Retention

Inflow Area = 0.008 ac,100.00% Impervious, Inflow Depth = 8.76" for 100-Year event
Inflow = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af
Outflow = 0.07 cfs @ 12.13 hrs, Volume= 0.006 af, Atten= 11%, Lag= 3.5 min
Discarded = 0.01 cfs @ 12.13 hrs, Volume= 0.005 af
Primary = 0.06 cfs @ 12.13 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.00-27.99 hrs, dt= 0.03 hrs / 2
Peak Elev= 2.99' @ 12.13 hrs Surf.Area= 0.001 ac Storage= 0.002 af

Plug-Flow detention time= 114.7 min calculated for 0.006 af (100% of inflow)
Center-of-Mass det. time= 113.6 min (852.5 - 738.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.50'	0.001 af	**4.75'W x 13.00'L x 2.54'H Field A** 0.004 af Overall - 0.001 af Embedded = 0.003 af x 40.0% Voids
#2A	1.00'	0.001 af	**Cultec R-150XLHD** Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 1 rows
		0.002 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	2.85'	**6.0" Round Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 2.85' / 2.00' S= 0.0850 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.20 sf
#2	Discarded	0.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.25'

Discarded OutFlow Max=0.01 cfs @ 12.13 hrs HW=2.98' (Free Discharge)
↑**2=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.05 cfs @ 12.13 hrs HW=2.98' (Free Discharge)
↑**1=Culvert** (Inlet Controls 0.05 cfs @ 1.25 fps)

Pond 4P: Retention - Chamber Wizard Field A

Chamber Model = Cultec R-150XLHD (Cultec Recharger® 150XLHD)
Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf
Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap
Row Length Adjustment= +0.75' x 2.65 sf x 1 rows

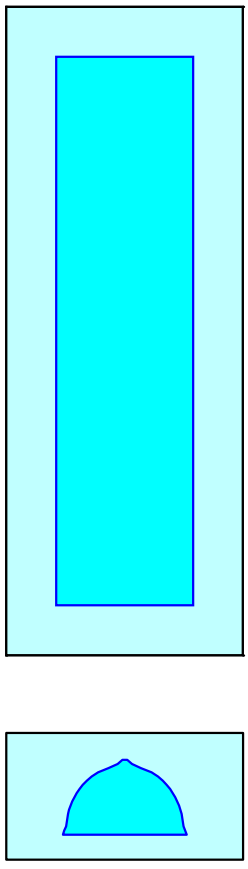
1 Chambers/Row x 10.25' Long +0.75' Row Adjustment = 11.00' Row Length +12.0" End Stone x 2 = 13.00' Base Length
1 Rows x 33.0" Wide + 12.0" Side Stone x 2 = 4.75' Base Width
6.0" Base + 18.5" Chamber Height + 6.0" Cover = 2.54' Field Height

1 Chambers x 27.2 cf +0.75' Row Adjustment x 2.65 sf x 1 Rows = 29.1 cf Chamber Storage

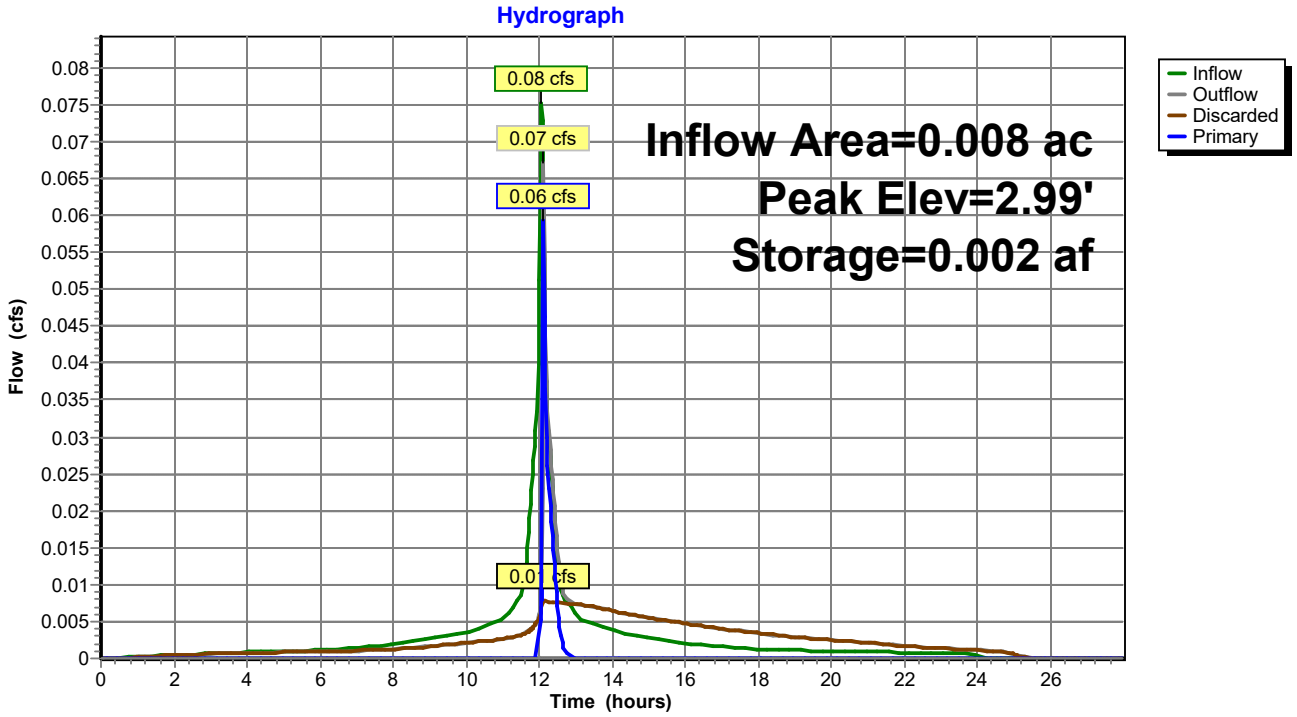
156.9 cf Field - 29.1 cf Chambers = 127.8 cf Stone x 40.0% Voids = 51.1 cf Stone Storage

Chamber Storage + Stone Storage = 80.3 cf = 0.002 af
Overall Storage Efficiency = 51.1%
Overall System Size = 13.00' x 4.75' x 2.54'

1 Chambers
5.8 cy Field
4.7 cy Stone



Pond 4P: Retention



Time span=0.00-28.00 hrs, dt=0.03 hrs, 934 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: New roof coverage area Runoff Area=360 sf 100.00% Impervious Runoff Depth=6.11"
Tc=5.0 min CN=98 Runoff=0.05 cfs 0.004 af

Reach 5R: Outflow Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 4P: Retention Peak Elev=2.86' Storage=0.002 af Inflow=0.05 cfs 0.004 af
Discarded=0.01 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.004 af

Summary for Subcatchment 2S: New roof coverage area

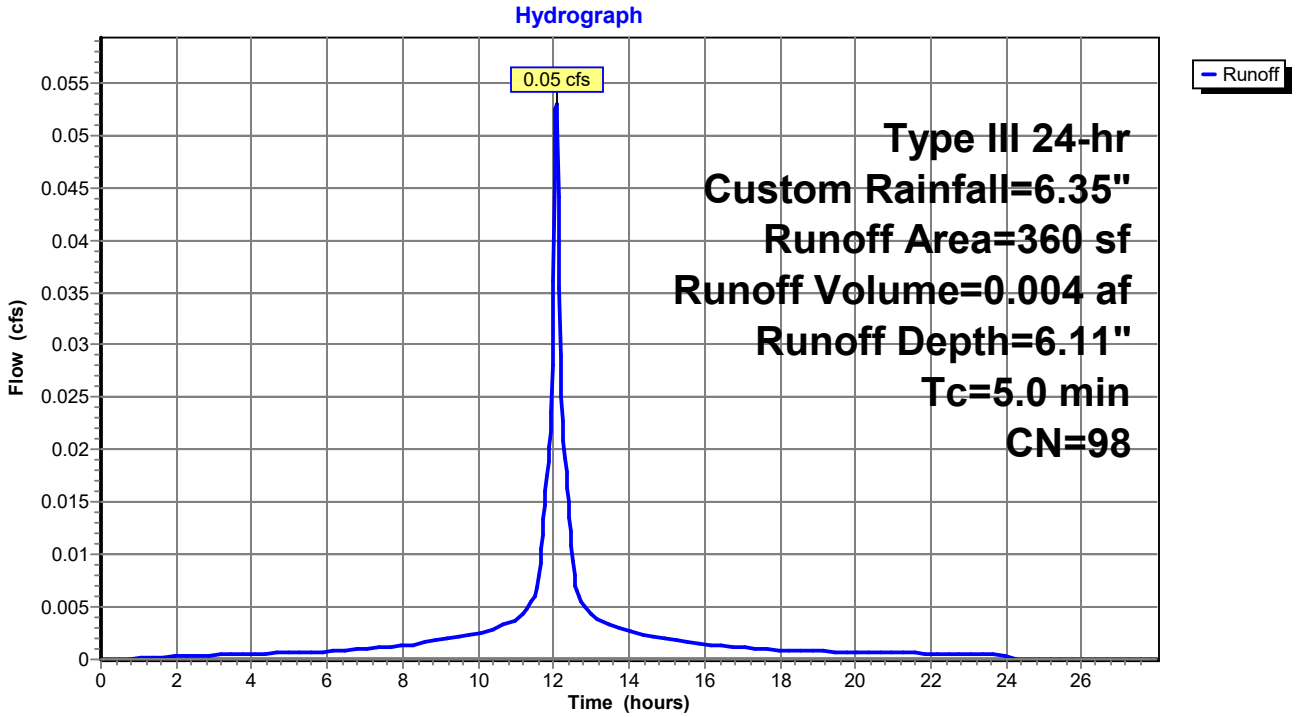
Runoff = 0.05 cfs @ 12.07 hrs, Volume= 0.004 af, Depth= 6.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.99 hrs, dt= 0.03 hrs
Type III 24-hr Custom Rainfall=6.35"

Area (sf)	CN	Description
360	98	Roofs, HSG D
360		100.00% Impervious Area

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

Subcatchment 2S: New roof coverage area

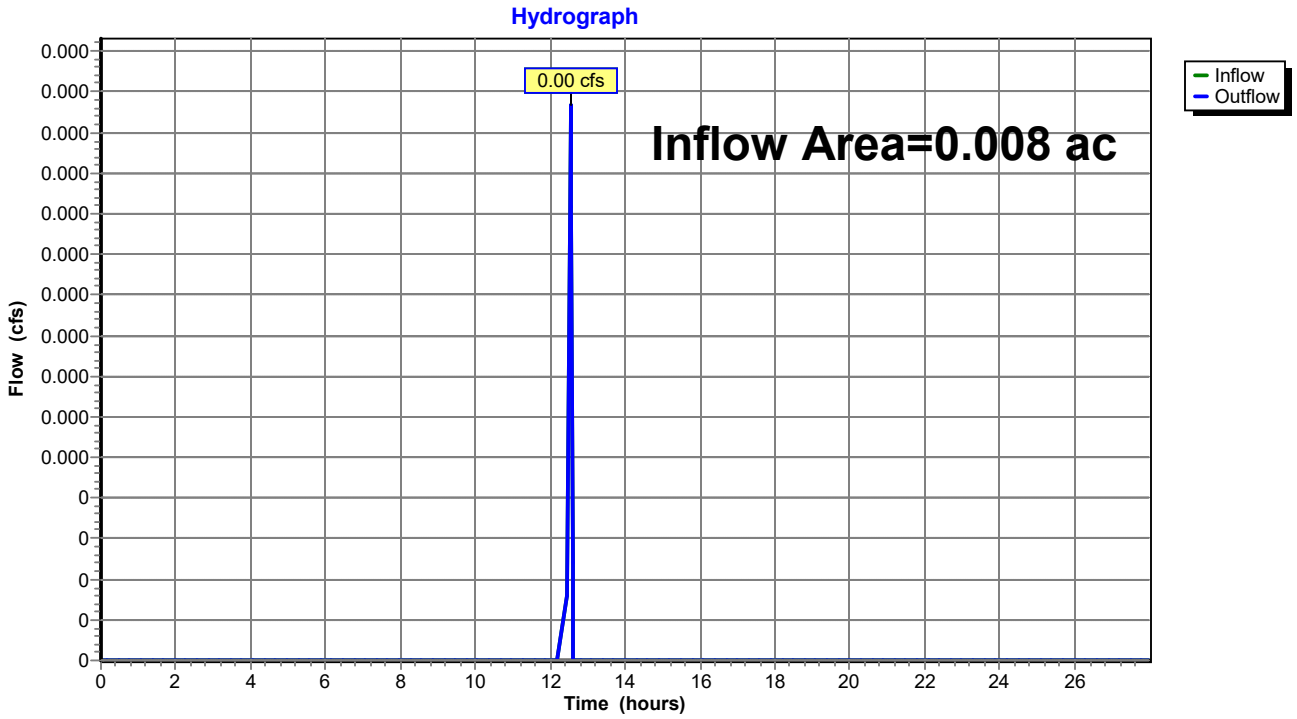


Summary for Reach 5R: Outflow

Inflow Area = 0.008 ac,100.00% Impervious, Inflow Depth = 0.00" for Custom event
Inflow = 0.00 cfs @ 12.55 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 12.55 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.99 hrs, dt= 0.03 hrs

Reach 5R: Outflow



Summary for Pond 4P: Retention

Inflow Area = 0.008 ac,100.00% Impervious, Inflow Depth = 6.11" for Custom event
Inflow = 0.05 cfs @ 12.07 hrs, Volume= 0.004 af
Outflow = 0.01 cfs @ 12.55 hrs, Volume= 0.004 af, Atten= 85%, Lag= 28.9 min
Discarded = 0.01 cfs @ 12.55 hrs, Volume= 0.004 af
Primary = 0.00 cfs @ 12.55 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-27.99 hrs, dt= 0.03 hrs / 2
Peak Elev= 2.86' @ 12.55 hrs Surf.Area= 0.001 ac Storage= 0.002 af

Plug-Flow detention time= 128.8 min calculated for 0.004 af (100% of inflow)
Center-of-Mass det. time= 128.7 min (872.1 - 743.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.50'	0.001 af	**4.75'W x 13.00'L x 2.54'H Field A** 0.004 af Overall - 0.001 af Embedded = 0.003 af x 40.0% Voids
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		0.002 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	2.85'	**6.0" Round Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 2.85' / 2.00' S= 0.0850 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.20 sf
#2	Discarded	0.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.25'

Discarded OutFlow Max=0.01 cfs @ 12.55 hrs HW=2.85' (Free Discharge)
↑**2=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 12.55 hrs HW=2.85' (Free Discharge)
↑**1=Culvert** (Inlet Controls 0.00 cfs @ 0.24 fps)

Pond 4P: Retention - Chamber Wizard Field A

Chamber Model = Cultec R-150XLHD (Cultec Recharger® 150XLHD)
Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf
Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap
Row Length Adjustment= +0.75' x 2.65 sf x 1 rows

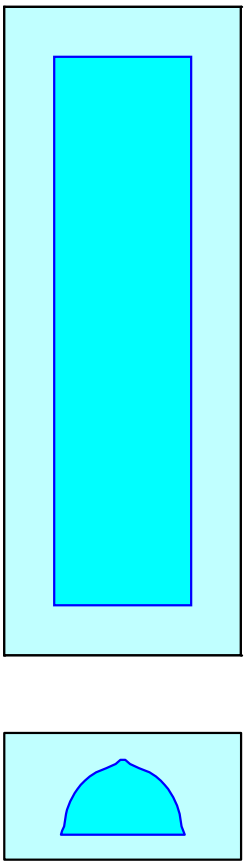
1 Chambers/Row x 10.25' Long +0.75' Row Adjustment = 11.00' Row Length +12.0" End Stone x 2 = 13.00' Base Length
1 Rows x 33.0" Wide + 12.0" Side Stone x 2 = 4.75' Base Width
6.0" Base + 18.5" Chamber Height + 6.0" Cover = 2.54' Field Height

1 Chambers x 27.2 cf +0.75' Row Adjustment x 2.65 sf x 1 Rows = 29.1 cf Chamber Storage

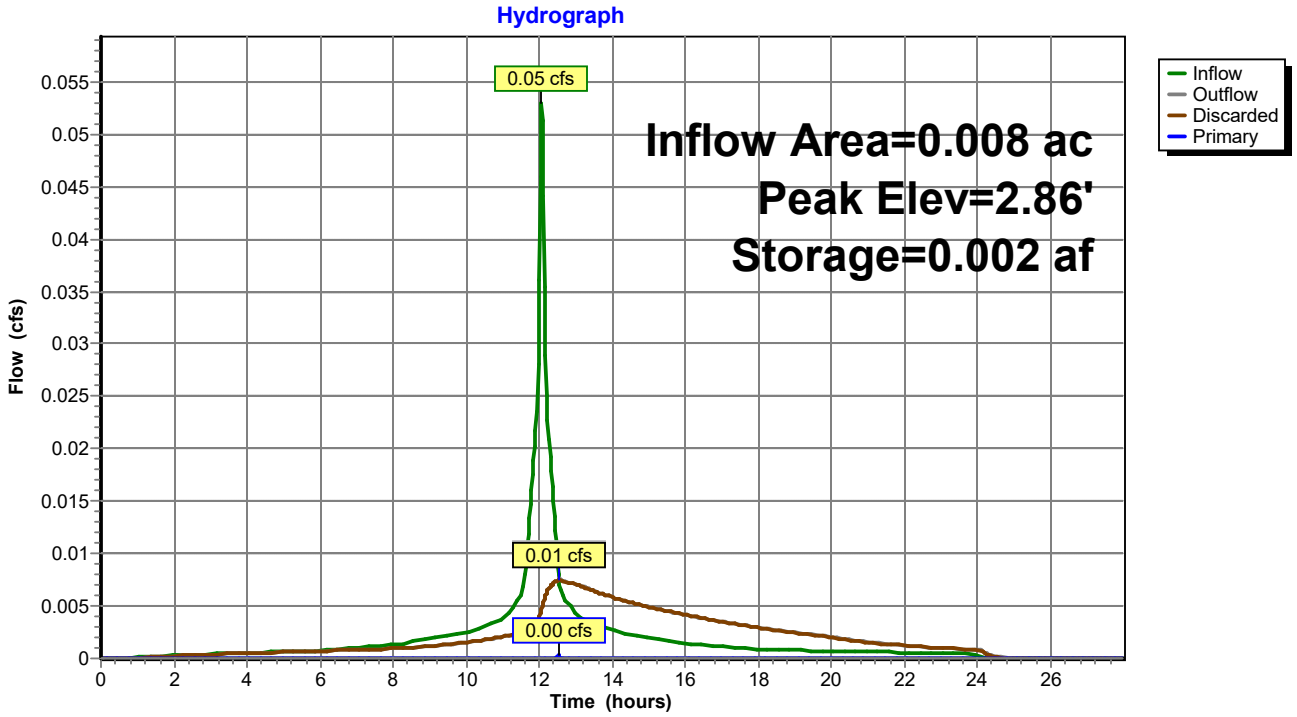
156.9 cf Field - 29.1 cf Chambers = 127.8 cf Stone x 40.0% Voids = 51.1 cf Stone Storage

Chamber Storage + Stone Storage = 80.3 cf = 0.002 af
Overall Storage Efficiency = 51.1%
Overall System Size = 13.00' x 4.75' x 2.54'

1 Chambers
5.8 cy Field
4.7 cy Stone



Pond 4P: Retention



Appendix III – USDA Soil Survey

Soil Map—Rockland County, New York
(344 N broadway)

73° 55' 12" W — 73° 55' 1" W

41° 6' 16" N — 41° 6' 11" N

590680 590700 590720 590740 590760 590780 590800 590820 590840 590860 590880 590900 590920

4550910 4550890 4550870 4550850 4550830 4550810 4550790

Map Scale: 1:698 if printed on B landscape (17" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 30 60 120 180

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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: Rockland County, New York
Survey Area Data: Version 21, Sep 6, 2023

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

Date(s) aerial images were photographed: Oct 21, 2022—Oct 27, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
WeB	Wethersfield gravelly silt loam, 3 to 8 percent slopes	1.6	27.5%
WeC	Wethersfield gravelly silt loam, 8 to 15 percent slopes	4.2	72.5%
Totals for Area of Interest		**5.8**	**100.0%**

Rockland County, New York

WeC—Wethersfield gravelly silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9v5m
Elevation: 20 to 690 feet
Mean annual precipitation: 47 to 50 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Wethersfield

Setting

Landform: Till plains, hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy acid till derived mainly from reddish sandstone, shale, and conglomerate, with some basalt

Typical profile

H1 - 0 to 13 inches: gravelly silt loam
H2 - 13 to 22 inches: gravelly loam
H3 - 22 to 60 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 38 inches to densic material
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F145XY012CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton
Percent of map unit: 5 percent
Hydric soil rating: No

Riverhead
Percent of map unit: 5 percent
Hydric soil rating: No

Cheshire
Percent of map unit: 5 percent
Hydric soil rating: No

Wallington
Percent of map unit: 3 percent
Hydric soil rating: No

Yalesville
Percent of map unit: 2 percent
Hydric soil rating: No

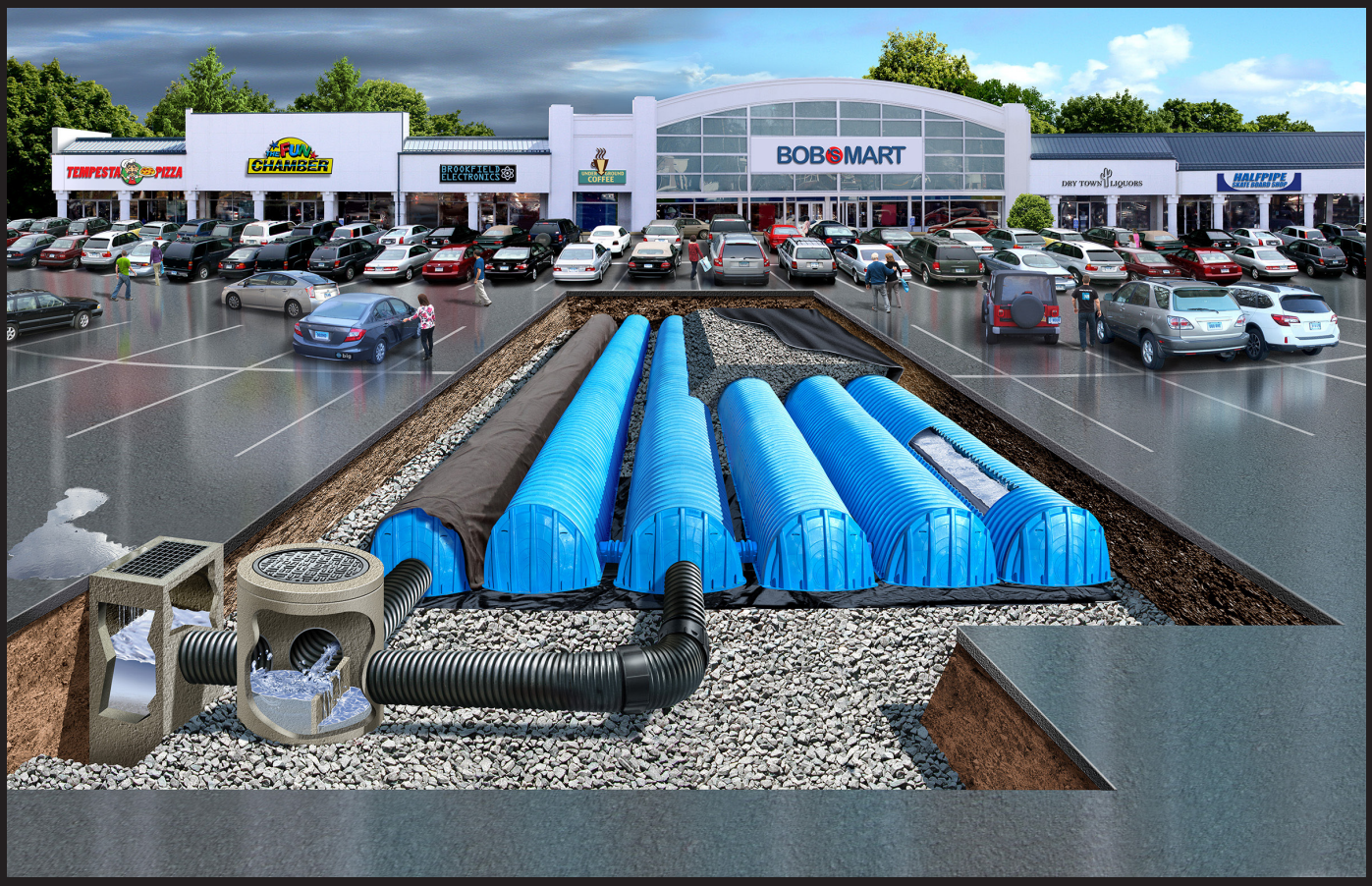
Data Source Information

Soil Survey Area: Rockland County, New York
Survey Area Data: Version 21, Sep 6, 2023

Appendix IV – Cultec system maintenance documentation

CONTACTOR® & RECHARGER®

STORMWATER MANAGEMENT SOLUTIONS



OPERATION & MAINTENANCE GUIDELINES

FOR CULTEC STORMWATER MANAGEMENT SYSTEMS

CULTEC®

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Brookfield, Connecticut 06804 USA
www.cultec.com

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Actual designs may vary.

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Contact Information:
For general information on our other products and services, please contact our offices within the United States at (800)428-5832, (203)775-4416 ext. 202, or e-mail us at custservice@cultec.com.

For technical support, please call (203)775-4416 ext. 203 or e-mail tech@cultec.com.

Visit www.cultec.com/downloads.html for Product Downloads and CAD details.

Doc ID: CLT057 01-20
January 2020

These instructions are for single-layer traffic applications only. For multi-layer applications, contact CULTEC.
All illustrations and photos shown herein are examples of typical situations. Be sure to follow the engineer's drawings.
Actual designs may vary.

This manual contains guidelines recommended by CULTEC, Inc. and may be used in conjunction with, but not to supersede, local regulations or regulatory authorities. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Introduction

The CULTEC Subsurface Stormwater Management System is a high-density polyethylene (HDPE) chamber system arranged in parallel rows surrounded by washed stone. The CULTEC chambers create arch-shaped voids within the washed stone to provide stormwater detention, retention, infiltration, and reclamation. Filter fabric is placed between the native soil and stone interface to prevent the intrusion of fines into the system. In order to minimize the amount of sediment which may enter the CULTEC system, a sediment collection device (stormwater pretreatment device) is recommended upstream from the CULTEC chamber system. Examples of pretreatment devices include, but are not limited to, an appropriately sized catch basin with sump, pretreatment catchment device, oil grit separator, or baffled distribution box. Manufactured pretreatment devices may also be used in accordance with CULTEC chambers. Installation, operation, and maintenance of these devices shall be in accordance with manufacturer's recommendations. Almost all of the sediment entering the stormwater management system will be collected within the pretreatment device.

Best Management Practices allow for the maintenance of the preliminary collection systems prior to feeding the CULTEC chambers. The pretreatment structures shall be inspected for any debris that will restrict inlet flow rates. Outfall structures, if any, such as outlet control must also be inspected for any obstructions that would restrict outlet flow rates. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Operation and Maintenance Requirements

I. Operation

CULTEC stormwater management systems shall be operated to receive only stormwater run-off in accordance with applicable local regulations. CULTEC subsurface stormwater management chambers operate at peak performance when installed in series with pretreatment. Pretreatment of suspended solids is superior to treatment of solids once they have been introduced into the system. The use of pretreatment is adequate as long as the structure is maintained and the site remains stable with finished impervious surfaces such as parking lots, walkways, and pervious areas are properly maintained. If there is to be an unstable condition, such as improvements to buildings or parking areas, all proper silt control measures shall be implemented according to local regulations.

II. Inspection and Maintenance Options

A. The CULTEC system may be equipped with an inspection port located on the inlet row. The inspection port is a circular cast box placed in a rectangular concrete collar. When the lid is removed, a 6-inch (150 mm) pipe with a screw-in plug will be exposed. Remove the plug. This will provide access to the CULTEC Chamber row below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment if any in this row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through an upstream manhole or through the CULTEC StormFilter Unit (or other pretreatment device). CCTV inspection of this row can be deployed through this access port to deter mine if any sediment has accumulated in the inlet row.

B. If the CULTEC bed is not equipped with an inspection port, then access to the inlet row will be through an upstream manhole or the CULTEC StormFilter.

1. Manhole Access
This inspection should only be carried out by persons trained in confined space entry and sewer inspection services. After the manhole cover has been removed a gas detector must be lowered into the manhole to ensure that there are not high concentrations of toxic gases present. The inspector should be lowered into the manhole with the proper safety equipment as per OSHA requirements. The inspector may be able to observe sediment from this location. If this is not possible, the inspector will need to deploy a CCTV robot to permit viewing of the sediment.

2. StormFilter Access
Remove the manhole cover to allow access to the unit. Typically a 30-inch (750 mm) pipe is used as a riser from the StormFilter to the surface. As in the case with manhole access, this access point requires a technician trained in confined space entry with proper gas detection equipment. This individual must be equipped with the proper safety equipment for entry into the StormFilter. The technician will be lowered onto the StormFilter unit. The hatch on the unit must be removed. Inside the unit are two filters which may be removed according to StormFilter maintenance guidelines. Once these filters are removed the inspector can enter the StormFilter unit to launch the CCTV camera robot.

C. The inlet row of the CULTEC system is placed on a polyethylene liner to prevent scouring of the washed stone beneath this row. This also facilitates the flushing of this row with high pressure water through a culvert cleaning nozzle. The nozzle is deployed through a manhole or the StormFilter and extended to the end of the row. The water is turned on and the inlet row is back-flushed into the manhole or StormFilter. This water is to be removed from the manhole or StormFilter using a vacuum truck.

III. Maintenance Guidelines

The following guidelines shall be adhered to for the operation and maintenance of the CULTEC stormwater management system:

A. The owner shall keep a maintenance log which shall include details of any events which would have an effect on the system's operational capacity.

B. The operation and maintenance procedure shall be reviewed periodically and changed to meet site conditions.

C. Maintenance of the stormwater management system shall be performed by qualified workers and shall follow applicable occupational health and safety requirements.

D. Debris removed from the stormwater management system shall be disposed of in accordance with applicable laws and regulations.

IV. Suggested Maintenance Schedules

A. Minor Maintenance
The following suggested schedule shall be followed for routine maintenance during the regular operation of the stormwater system:

Frequency	Action
Monthly in first year	Check inlets and outlets for clogging and remove any debris, as required.
Spring and Fall	Check inlets and outlets for clogging and remove any debris, as required.
One year after commissioning and every third year following	Check inlets and outlets for clogging and remove any debris, as required.

B. Major Maintenance
The following suggested maintenance schedule shall be followed to maintain the performance of the CULTEC stormwater management chambers. Additional work may be necessary due to insufficient performance and other issues that might be found during the inspection of the stormwater management chambers. (See table on next page)

	Frequency	Action
Inlets and Outlets	Every 3 years	• Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
	Spring and Fall	• Check inlet and outlets for clogging and remove any debris as required.
CULTEC Stormwater Chambers	2 years after commissioning	• Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
	9 years after commissioning every 9 years following	• Clean stormwater management chambers and feed connectors of any debris. • Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	45 years after commissioning	• Clean stormwater management chambers and feed connectors of any debris. • Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. • Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. • Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. • Attain the appropriate approvals as required. • Establish a new operation and maintenance schedule.
Surrounding Site	Monthly in 1st year	• Check for depressions in areas over and surrounding the stormwater management system.
	Spring and Fall	• Check for depressions in areas over and surrounding the stormwater management system.
	Yearly	• Confirm that no unauthorized modifications have been performed to the site.

For additional information concerning the maintenance of CULTEC Subsurface Stormwater Management Chambers, please contact CULTEC, Inc. at 1-800-428-5832.

WQMP
Operation & Maintenance (O&M) Plan

Project Name:_____

Prepared for:

Project Name: _____

Address:_____

City, State Zip:_____

Prepared on:

Date:_____

This O&M Plan describes the designated responsible party for implementation of this WQMP, including: operation and maintenance of all the structural BMP(s), conducting the training/educational program and duties, and any other necessary activities. The O&M Plan includes detailed inspection and maintenance requirements for all structural BMPs, including copies of any maintenance contract agreements, manufacturer's maintenance requirements, permits, etc.

8.1.1 Project Information

Project name	
Address	
City, State Zip	
Site size	
List of structural BMPs, number of each	
Other notes	

8.1.2 Responsible Party

The responsible party for implementation of this WQMP is:

Name of Person or HOA Property Manager	
Address	
City, State Zip	
Phone number	
24-Hour Emergency Contact number	
Email	

8.1.3 Record Keeping

Parties responsible for the O&M plan shall retain records for at least 5 years.

All training and educational activities and BMP operation and maintenance shall be documented to verify compliance with this O&M Plan. A sample Training Log and Inspection and Maintenance Log are included in this document.

8.1.4 Electronic Data Submittal

This document along with the Site Plan and Attachments shall be provided in PDF format. AutoCAD files and/or GIS coordinates of BMPs shall also be submitted to the City.

Appendix ____

BMP SITE PLAN

Site plan is preferred on minimum 11” by 17” colored sheets, as long as legible.

BMP OPERATION & MAINTENANCE LOG

Project Name: _____

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

Minor Maintenance

Frequency		Action
Monthly in first year		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Month 1	Date:	
□ Month 2	Date:	
□ Month 3	Date:	
□ Month 4	Date	
□ Month 5	Date:	
□ Month 6	Date:	
□ Month 7	Date:	
□ Month 8	Date:	
□ Month 9	Date:	
□ Month 10	Date:	
□ Month 11	Date:	
□ Month 12	Date:	
Spring and Fall		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
One year after commissioning and every third year following		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Year 1	Date:	
□ Year 4	Date:	
□ Year 7	Date:	
□ Year 10	Date:	
□ Year 13	Date:	
□ Year 16	Date:	
□ Year 19	Date:	
□ Year 22	Date:	

Major Maintenance

	Frequency		Action
Inlets and Outlets	**Every 3 years**		Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
			Notes
	□ Year 1	Date:	
	□ Year 4	Date:	
	□ Year 7	Date:	
	□ Year 10	Date:	
	□ Year 13	Date:	
	□ Year 16	Date:	
	□ Year 19	Date:	
	□ Year 22	Date:	
	Spring and Fall		Check inlet and outlets for clogging and remove any debris, as required.
			Notes
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
CULTEC Stormwater Chambers	**2 years after commissioning**		□ Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. □ Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
			Notes
	□ Year 2	Date:	

Major Maintenance

	Frequency		Action
CULTEC Stormwater Chambers	**9 years after commissioning every 9 years following**		□ Clean stormwater management chambers and feed connectors of any debris. □ Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. □ Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
			Notes
	□ Year 9	Date:	
	□ Year 18	Date:	
	□ Year 27	Date:	
	□ Year 36	Date:	
	45 years after commissioning		□ Clean stormwater management chambers and feed connectors of any debris. □ Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. □ Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. □ Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. □ Attain the appropriate approvals as required. □ Establish a new operation and maintenance schedule.
			Notes
	□ Year 45	Date:	

Major Maintenance

	Frequency		Action
Surrounding Site	**Monthly in 1st year**		□ Check for depressions in areas over and surrounding the stormwater management system.
			Notes
	□ Month 1	Date:	
	□ Month 2	Date:	
	□ Month 3	Date:	
	□ Month 4	Date:	
	□ Month 5	Date:	
	□ Month 6	Date:	
	□ Month 7	Date:	
	□ Month 8	Date:	
	□ Month 9	Date:	
	□ Month 10	Date:	
	□ Month 11	Date:	
	□ Month 12	Date:	
	Spring and Fall		□ Check for depressions in areas over and surrounding the stormwater management system.
			Notes
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	Yearly		□ Confirm that no unauthorized modifications have been performed to the site.
			Notes
	□ Year 1	Date:	
	□ Year 2	Date:	
	□ Year 3	Date:	
	□ Year 4	Date:	
	□ Year 5	Date:	
	□ Year 6	Date:	
	□ Year 7	Date:	

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