



Hudson Engineering, LLC.

336 Winfield Avenue
Jersey City, NJ, 07305
O: (201) 589-0906
www.hudsoneng.com
info@hudsoneng.com

Project: 124 Glenwood Development

Project #: SUG01P021

Subject: Stormwater Management Report

Date: 10/26/2022

Prepared by: Jordan Cecinini, PE

NJ License #: 24GE05496800



1 Introduction

Hudson Engineering, LLC (HE) was engaged by SMS Home Improvement to prepare a stormwater management system in accordance with the Jersey City Stormwater Control Ordinance for improvements at 124 Glenwood Avenue, Jersey City, NJ 07306 (Block:13204 Lot:56).

The existing site consists of a 2-1/2 story dwelling, slate paver walkways, concrete porch, and concrete stairs. The lot is 3,589.6 square feet (SF) with the coverage breakdown shown in Table 1-1.

Table 1-1: Existing Lot Coverage

Coverage	Area (SF)
Building Coverage	726.7
Impervious Coverage	748.4
<i>Total Impervious (Building + Impervious)</i>	<i>1,475.1</i>
Pervious Coverage (Lawn Areas)	2,114.5

The proposed improvements include the demolition of the existing building and walkways and ground up construction of a new four-story dwelling and associated site improvements. The site improvements include replacement of slate paver walkways, and concrete porch and new landscaping including shrubs and grasses planter. The proposed lot coverage is described in Table 1-2.

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Table 1-2: Proposed Lot Coverage

Coverage	Area (SF)
Building Coverage	1,706.1
Impervious Coverage	862.1
<i>Total Impervious (Building + Impervious)</i>	<i>2,568.2</i>
Pervious Coverage (Lawn/Landscaping Areas)	1,021.4

As shown in Table 1-1 and Table 1-2, the Project will result in an increase in impervious coverage of 1,093.1 SF. Per the Jersey City Stormwater Control Ordinance – Article VI, Section 345-74, a Minor Development is any project that results in the replacement or disturbance of 1,000 SF, but less than 5,000 SF of regulated impervious surface. As such, this Project is defined as a Minor Development. This report demonstrates compliance with the Jersey City Stormwater Ordinance.

2 Stormwater Management Design

Per Article VI, Section 345-74.6, for each square foot of impervious surface, 0.6 gallons of stormwater shall be retained on-site using green infrastructure practices.

Stormwater to be retained (Gallons) = Impervious Surface (SF) × 0.6

*Stormwater to be retained (Gallons) = 2,568.2 SF × 0.6 = **1,540 gallons***

2.1 Storage Volume of Bioretention Rain Garden

The stormwater management system will be a bioretention rain garden that will capture and detain runoff generated by the building rooftop and a portion of the concrete walkway. The drainage areas are summarized below:

- Rooftop Drainage Area = 1,706 Square Feet
- Concrete Walkway Drainage Area = 200 Square Feet

The bioretention rain garden has the following parameters:

- Footprint: 340 Square Feet
- Storage Depth: 7 inches
- Berm Slope: 3 to 1 minimum

The bioretention rain garden has available storage to capture 1.60 inches of rain over 2 hours. This provides a system that can conservatively handle the NJDEP Water Quality Storm (1.25 inches of rain over 2 hours).

Since measured data is not available, a conservative soil permeability rate of 0.5 inch per hour was used to perform a modelling analysis in HydroCAD. A summary of the results from the model are provided below:

- **Total Volume Captured by Rain Garden: 219 CF or 1,638 Gallons**
 - Rooftop: 196 CF or 1,466 Gallons
 - Walkway: 23 CF or 172 Gallons

Therefore, the bioretention rain garden retains 1,638 gallons of stormwater on-site; exceeding the requirement of 1,541 gallons. Refer to Attachment A for HydroCAD Report.

2.2 Design Considerations

2.2.1 Underdrain

The bioretention rain garden has been designed with an underdrain to mitigate concerns with ponding and if unfavorable permeability rates are discovered during construction.

2.2.2 Overflow

The system has been designed with a draintech overflow for storm events that exceed 1.60 inches in depth. The overflow is connected to the building plumbing and will discharge to the combined sewer within Glenwood Avenue.

2.2.3 Seasonal High-Water Table (SHWT)

Per Table 4-2 in the Jersey City Stormwater Control Ordinance, the SHWT must be 1 foot below the base of the system when an underdrain is included. Based on available data from the United States Geologic Survey (USGS) National Water Information Mapper, the closest well site shows a SHWT of approximately 4 feet below ground surface. The base of the proposed rain garden is approximately 2 feet below ground surface, as such, there is sufficient separation from the SHWT.

2.3 Soil Erosion and Sediment Control

This project disturbs less than 5,000 square feet of soil; therefore, a Soil Erosion and Sediment Control Plan Certification from Hudson-Essex-Passaic Soil Conservation District is not required.

Silt fence will be installed around the entire site during construction for sediment control. Additionally, inlet sediment control devices will be installed in any catch basins within Glenwood Avenue that are downstream of the project site.

3 Compliance with Article VI, Section 347-74

3.1 Article VI, Section 347-74.14.C.3: Project Description and Site Plan

Refer to Section 2 of this Report and the Civil Site Plan (sheet C01).

3.2 Article VI, Section 347-74.14.C.4: Land Use Planning and Source Control Plan

Refer to Civil Site Plan.

3.3 Article VI, Section 347-74.14.C.5: Stormwater Management Facilities Map

Refer to Civil Site Plan and Architectural Drawing Z101.

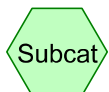
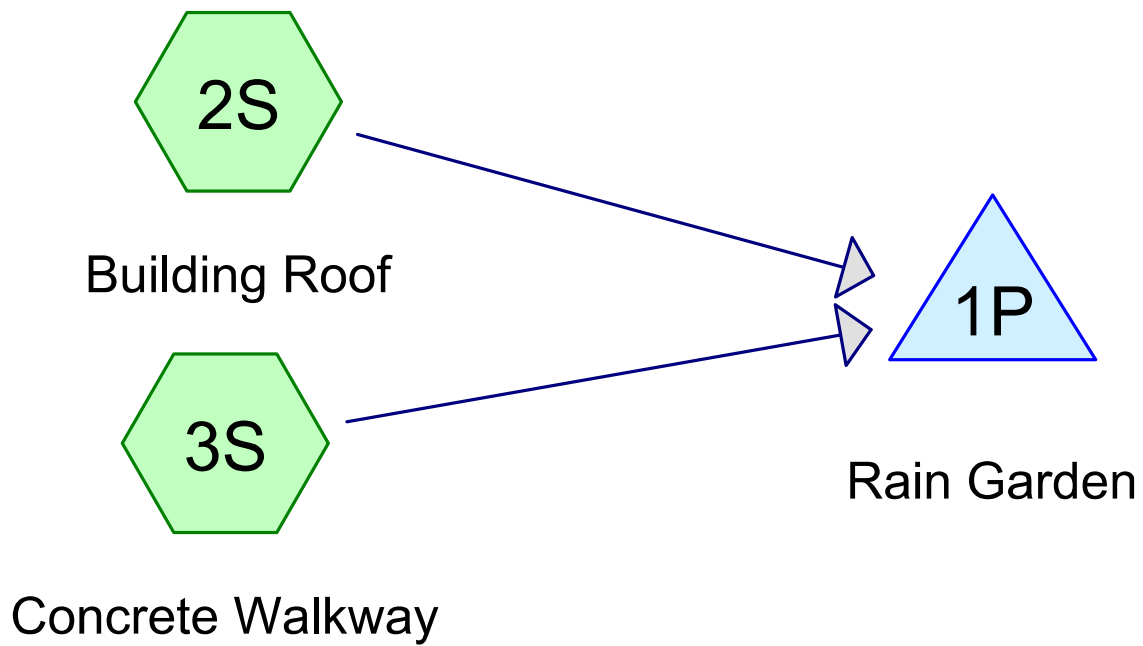
3.4 Article VI, Section 347-74.14.C.7: Maintenance and Repair Plan

Refer to Attachment B.

3.5 Calculations Demonstrating Compliance with Retention Standard

Refer to Section 2 of this Report.

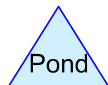
A. HydroCAD Report



Subcat



Reach



Pond



Link

Routing Diagram for 124 Glenwood Ave-Calcs

Prepared by HydroCAD SAMPLER 1-800-927-7246 www.hydrocad.net, Printed 10/26/2022
HydroCAD® 10.20-2d Sampler s/n S16266 © 2021 HydroCAD Software Solutions LLC

124 Glenwood Ave-Calcs

Prepared by HydroCAD SAMPLER 1-800-927-7246 www.hydrocad.net
HydroCAD® 10.20-2d Sampler s/n S16266 © 2021 HydroCAD Software Solutions LLC

Printed 10/26/2022

Page 2

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	Custom	NJ DEP 2-hr		Default	2.00	1	1.60	2

124 Glenwood Ave-Calcs

Prepared by HydroCAD SAMPLER 1-800-927-7246 www.hydrocad.net
HydroCAD® 10.20-2d Sampler s/n S16266 © 2021 HydroCAD Software Solutions LLC

Printed 10/26/2022

Page 3

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
1,906	98	(2S, 3S)
1,906	98	TOTAL AREA

124 Glenwood Ave-Calcs

NJ DEP 2-hr Custom Rainfall=1.60"

Prepared by HydroCAD SAMPLER 1-800-927-7246 www.hydrocad.net

Printed 10/26/2022

HydroCAD® 10.20-2d Sampler s/n S16266 © 2021 HydroCAD Software Solutions LLC

Page 4

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: Building Roof

Runoff Area=1,706 sf 100.00% Impervious Runoff Depth=1.38"
Tc=6.0 min CN=98 Runoff=0.15 cfs 196 cf

Subcatchment3S: Concrete Walkway

Runoff Area=200 sf 100.00% Impervious Runoff Depth=1.38"
Tc=6.0 min CN=98 Runoff=0.02 cfs 23 cf

Pond 1P: Rain Garden

Peak Elev=108.90' Storage=201 cf Inflow=0.17 cfs 219 cf
Discarded=0.00 cfs 219 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 219 cf

Total Runoff Area = 1,906 sf Runoff Volume = 219 cf Average Runoff Depth = 1.38"
0.00% Pervious = 0 sf 100.00% Impervious = 1,906 sf

124 Glenwood Ave-Calcs

NJ DEP 2-hr Custom Rainfall=1.60"

Prepared by HydroCAD SAMPLER 1-800-927-7246 www.hydrocad.net

Printed 10/26/2022

HydroCAD® 10.20-2d Sampler s/n S16266 © 2021 HydroCAD Software Solutions LLC

Page 5

Summary for Subcatchment 2S: Building Roof

Runoff = 0.15 cfs @ 1.09 hrs, Volume= 196 cf, Depth= 1.38"
Routed to Pond 1P : Rain Garden

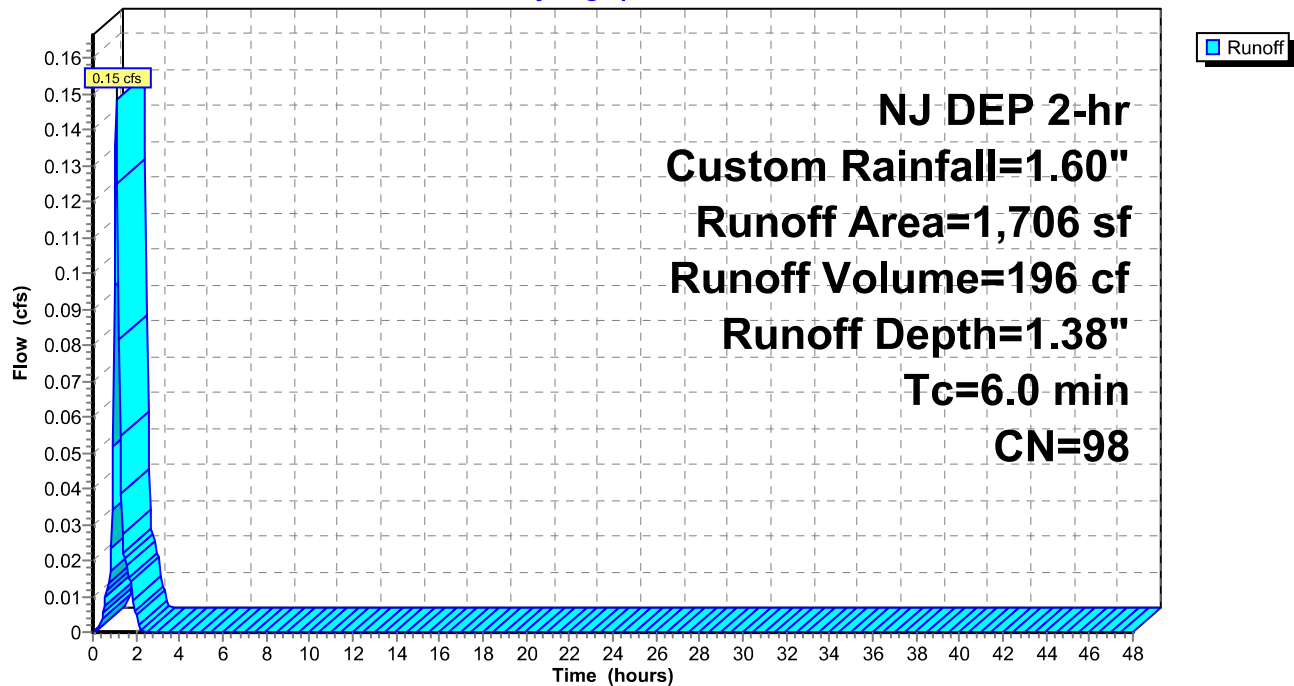
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr Custom Rainfall=1.60"

	Area (sf)	CN	Description
*	1,706	98	
	1,706		100.00% Impervious Area

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

Subcatchment 2S: Building Roof

Hydrograph



124 Glenwood Ave-Calcs

NJ DEP 2-hr Custom Rainfall=1.60"

Prepared by HydroCAD SAMPLER 1-800-927-7246 www.hydrocad.net

Printed 10/26/2022

HydroCAD® 10.20-2d Sampler s/n S16266 © 2021 HydroCAD Software Solutions LLC

Page 6

Summary for Subcatchment 3S: Concrete Walkway

Runoff = 0.02 cfs @ 1.09 hrs, Volume= 23 cf, Depth= 1.38"
Routed to Pond 1P : Rain Garden

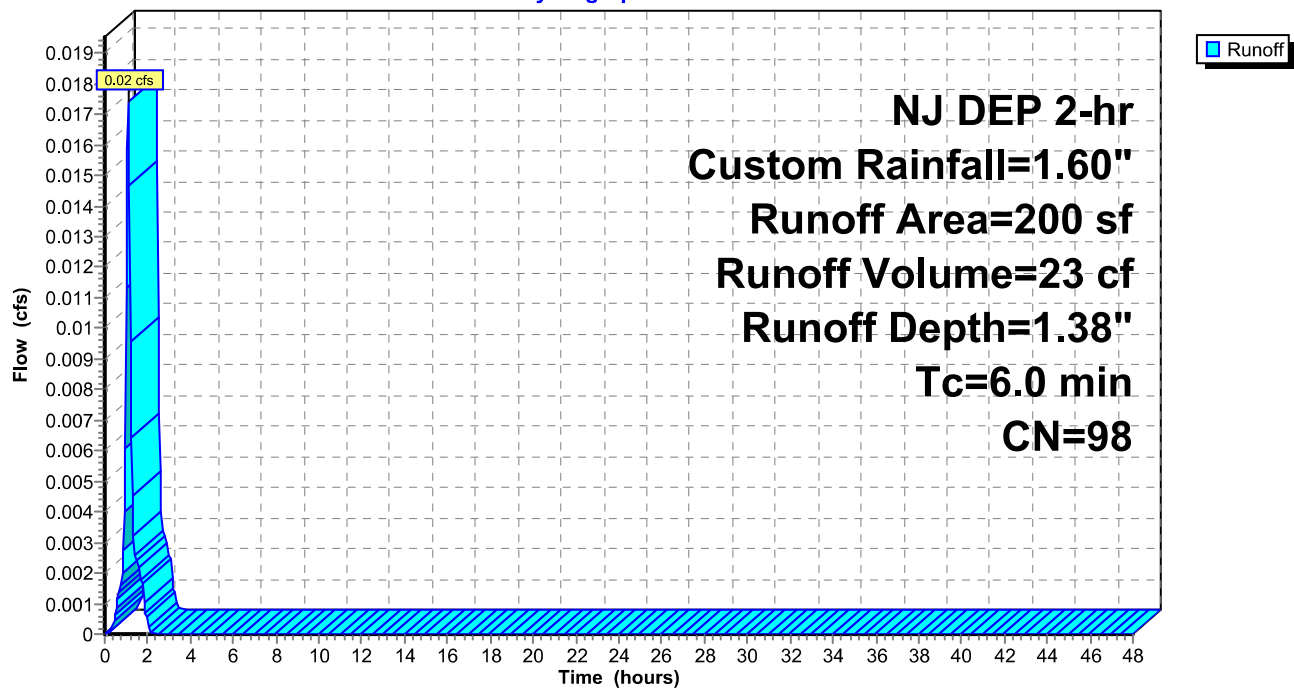
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr Custom Rainfall=1.60"

	Area (sf)	CN	Description
*	200	98	
	200		100.00% Impervious Area

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

Subcatchment 3S: Concrete Walkway

Hydrograph



124 Glenwood Ave-Calcs

NJ DEP 2-hr Custom Rainfall=1.60"

Prepared by HydroCAD SAMPLER 1-800-927-7246 www.hydrocad.net

Printed 10/26/2022

HydroCAD® 10.20-2d Sampler s/n S16266 © 2021 HydroCAD Software Solutions LLC

Page 7

Summary for Pond 1P: Rain Garden

Inflow Area = 1,906 sf, 100.00% Impervious, Inflow Depth = 1.38" for Custom event
 Inflow = 0.17 cfs @ 1.09 hrs, Volume= 219 cf
 Outflow = 0.00 cfs @ 2.07 hrs, Volume= 219 cf, Atten= 98%, Lag= 58.5 min
 Discarded = 0.00 cfs @ 2.07 hrs, Volume= 219 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 108.90' @ 2.07 hrs Surf.Area= 314 sf Storage= 201 cf

Plug-Flow detention time= 587.7 min calculated for 219 cf (100% of inflow)
 Center-of-Mass det. time= 588.4 min (658.1 - 69.6)

Volume	Invert	Avail.Storage	Storage Description	
#1	107.17'	234 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
107.17	193	0.0	0	0
108.17	193	35.0	68	68
108.42	193	25.0	12	80
109.00	340	100.0	155	234

Device	Routing	Invert	Outlet Devices
#1	Discarded	107.17'	0.500 in/hr Exfiltration over Surface area
#2	Primary	105.65'	4.0" Round Outlet Pipe to CSS L= 169.0' Ke= 0.500 Inlet / Outlet Invert= 105.65' / 88.00' S= 0.1044 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#3	Device 2	108.92'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 2.07 hrs HW=108.90' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=107.17' (Free Discharge)

↑ **2=Outlet Pipe to CSS** (Passes 0.00 cfs of 0.49 cfs potential flow)

↑ **3=Orifice/Grate** (Controls 0.00 cfs)

124 Glenwood Ave-Calcs

NJ DEP 2-hr Custom Rainfall=1.60"

Prepared by HydroCAD SAMPLER 1-800-927-7246 www.hydrocad.net

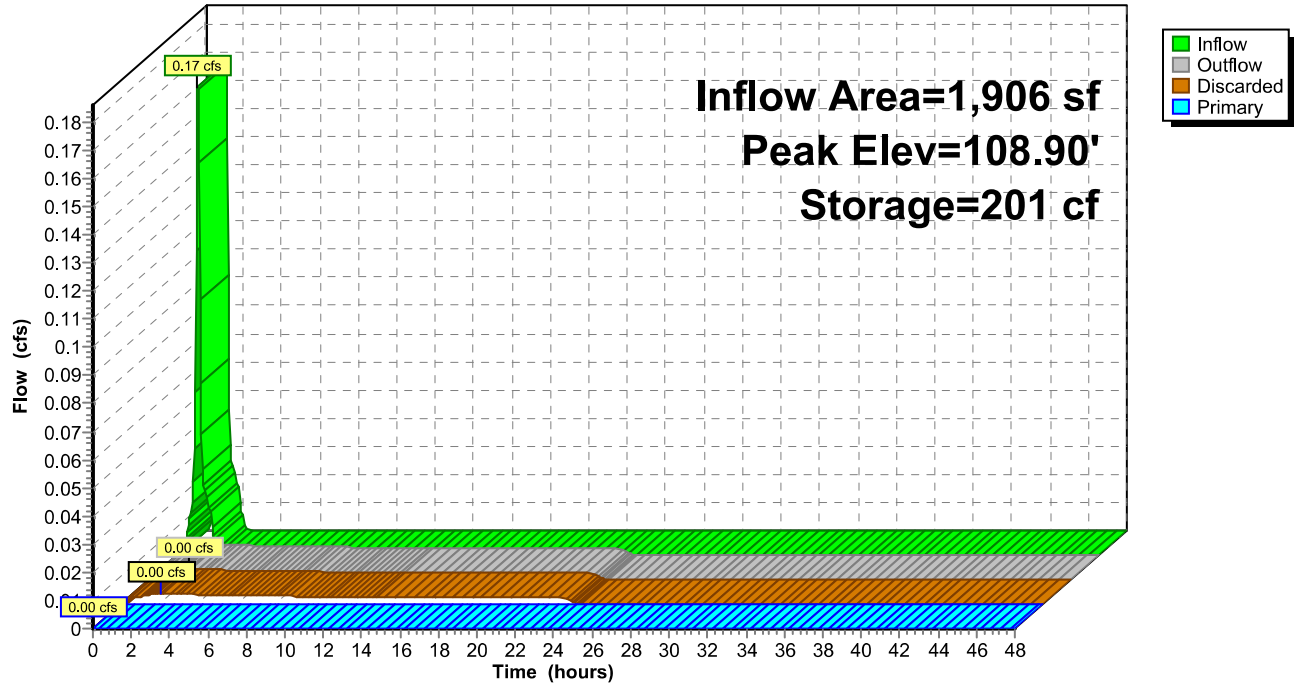
Printed 10/26/2022

HydroCAD® 10.20-2d Sampler s/n S16266 © 2021 HydroCAD Software Solutions LLC

Page 8

Pond 1P: Rain Garden

Hydrograph



124 Glenwood Ave-Calcs

NJ DEP 2-hr Custom Rainfall=1.60"

Prepared by HydroCAD SAMPLER 1-800-927-7246 www.hydrocad.net

Printed 10/26/2022

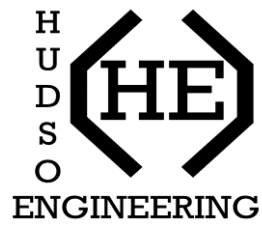
HydroCAD® 10.20-2d Sampler s/n S16266 © 2021 HydroCAD Software Solutions LLC

Page 9

Stage-Area-Storage for Pond 1P: Rain Garden

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
107.17	193	0	108.09	193	62
107.19	193	1	108.11	193	63
107.21	193	3	108.13	193	65
107.23	193	4	108.15	193	66
107.25	193	5	108.17	193	68
107.27	193	7	108.19	193	69
107.29	193	8	108.21	193	69
107.31	193	9	108.23	193	70
107.33	193	11	108.25	193	71
107.35	193	12	108.27	193	72
107.37	193	14	108.29	193	73
107.39	193	15	108.31	193	74
107.41	193	16	108.33	193	75
107.43	193	18	108.35	193	76
107.45	193	19	108.37	193	77
107.47	193	20	108.39	193	78
107.49	193	22	108.41	193	79
107.51	193	23	108.43	196	82
107.53	193	24	108.45	201	86
107.55	193	26	108.47	206	90
107.57	193	27	108.49	211	94
107.59	193	28	108.51	216	98
107.61	193	30	108.53	221	102
107.63	193	31	108.55	226	107
107.65	193	32	108.57	231	111
107.67	193	34	108.59	236	116
107.69	193	35	108.61	241	121
107.71	193	36	108.63	246	126
107.73	193	38	108.65	251	131
107.75	193	39	108.67	256	136
107.77	193	41	108.69	261	141
107.79	193	42	108.71	267	146
107.81	193	43	108.73	272	152
107.83	193	45	108.75	277	157
107.85	193	46	108.77	282	163
107.87	193	47	108.79	287	168
107.89	193	49	108.81	292	174
107.91	193	50	108.83	297	180
107.93	193	51	108.85	302	186
107.95	193	53	108.87	307	192
107.97	193	54	108.89	312	198
107.99	193	55	108.91	317	205
108.01	193	57	108.93	322	211
108.03	193	58	108.95	327	217
108.05	193	59	108.97	332	224
108.07	193	61	108.99	337	231

B. Bioretention Rain Garden Maintenance Plan



Prepared:

10/20/2022

Project: 124 Glenwood Avenue Development
Location: 124 Glenwood Avenue, Jersey City, NJ

Rain Garden Maintenance Plan

Item No.	Maintenance Task	Description	Frequency	Additional Notes
1	Watering	Water plants, particularly during dry periods of the first growing season.	Weekly - Monthly	During the first growing season, water plants with 1 inch of water. This should be done weekly during dry periods.
2	Weeding	Remove any unwanted weeds from the rain garden.	Bi-Monthly	Watch out for invasive weed species and remove as soon as possible if identified. Weeding will reduce in frequency as rain garden plants become established.
3	Plant Inspection	Inspect vegetation in rain garden and restore as needed.	Bi-Weekly - Biannually	Plant inspection will reduce in frequency to biannually as rain garden plants become established.
4	Piping and Outlet Inspection	Check the overflow and inspect the cleanout to determine if the pipes are clogged.	Annually	Also, check during storm events and look for signs of the overflow not functioning. If a pipe is clogged, contact a plumber or contractor to jet or vacuum clean through the cleanout or outlet.
5	Inlet Inspection	Inspect stone-lined inlet to maintain proper function.	Annually	Check for scours around inlet stone. Place or rearrange stones as needed to eliminate scours.
6	Remove Excess Sediment	Remove any sediment built up in the rain garden. Sediment will typically build up near inlets and outlets.	Annually	Sediment will typically build up near inlets and outlets. Use a flat head shovel to remove sediment, litter, and debris.
7	Mulching	Add mulch every spring to maintain a three inch mulch layer in the rain garden.	Annually	Triple shredded hardwood mulch with no dye is recommended.
8	Pruning	Prune dead vegetation, deadhead flowers, and cut back tattered or unwieldy plants.	Annually	
9	Replanting	Remove or replace any vegetation that is not thriving.	Annually	
10	Soil Testing	Perform soil testing to maintain proper soil pH.	Three to five years	If pH is less than 5.2, add limestone. If pH is greater than 7 to 8, add iron sulfate and sulfur.