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Project: 124 Glenwood Development

Project #: SUG01P021

Subject: Stormwater Management Report

Date: 6/14/2023

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.

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Table 1-2: Proposed Lot Coverage

Coverage	Area (SF)
Building Coverage	1,706.1
Impervious Coverage	1,002.1
<i>Total Impervious (Building + Impervious)</i>	<i>2,708.2</i>
Pervious Coverage (Lawn/Landscaping Areas)	881.6

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.

$$\text{Stormwater to be retained (Gallons)} = \text{Impervious Surface (SF)} \times 0.6$$

$$\text{Stormwater to be retained (Gallons)} = 2,708.2 \text{ SF} \times 0.6 = \mathbf{1,625 \text{ gallons}}$$

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 = 286 Square Feet

The bioretention rain garden has the following parameters:

- Footprint: 340 Square Feet
- Storage Depth: 7 inches
- Berm Slope: 2 to 1 minimum

The bioretention rain garden has available storage to capture 1.55 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: 221 CF or 1,654 Gallons**
 - Rooftop: 189 CF or 1,414 Gallons
 - Walkway: 32 CF or 240 Gallons

Therefore, the bioretention rain garden retains 1,654 gallons of stormwater on-site; exceeding the requirement of 1,625 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 of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Web Soil Survey, the SHWT is greater than 6.5 feet below ground surface (refer to Attachment A). The base of the proposed rain garden will provide 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 Civil Site Plan (sheet C01). As described in Section 2 of this report, a rain garden will be installed to capture and detain stormwater runoff from the new building's rooftop and a portion of the concrete walkways that are north of the grade break. The rain garden will have an overflow that will convey any excess stormwater into a new storm lateral within the building's plumbing and ultimately discharge to the combined sewer system within Glenwood Avenue.

An underdrain will be installed in the rain garden to mitigate issues with ponding if existing subgrade permeability rates are unfavorable. Based on available SHWT data, the proposed rain garden will meet the minimum 1-foot separation requirement.

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

Refer to Civil Site Plan (sheet C01).

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

Refer to Civil Site Plan (sheet C01) and Architectural Drawing Z101.

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

Refer to Attachment C. The property owner will be responsible for maintenance activities.

3.5 Calculations Demonstrating Compliance with Retention Standard

Refer to Section 2 of this Report and Attachment B.

A. USDA NRCS Depth to Water Table

Depth to Water Table—Hudson County, New Jersey
(124 Glenwood Avenue)



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200
-  Not rated or not available

Soil Rating Lines

-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200
-  Not rated or not available

Soil Rating Points

-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200

 Not rated or not available

Water Features

 Streams and Canals

Transportation

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

Background

 Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Hudson County, New Jersey
Survey Area Data: Version 12, Aug 29, 2022

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

Date(s) aerial images were photographed: Aug 25, 2014—Sep 27, 2014

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.

Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
UREOLB	Urban land, eolian substratum, 0 to 8 percent slopes	>200	0.2	100.0%
Totals for Area of Interest			0.2	100.0%

Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

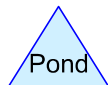
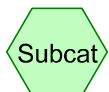
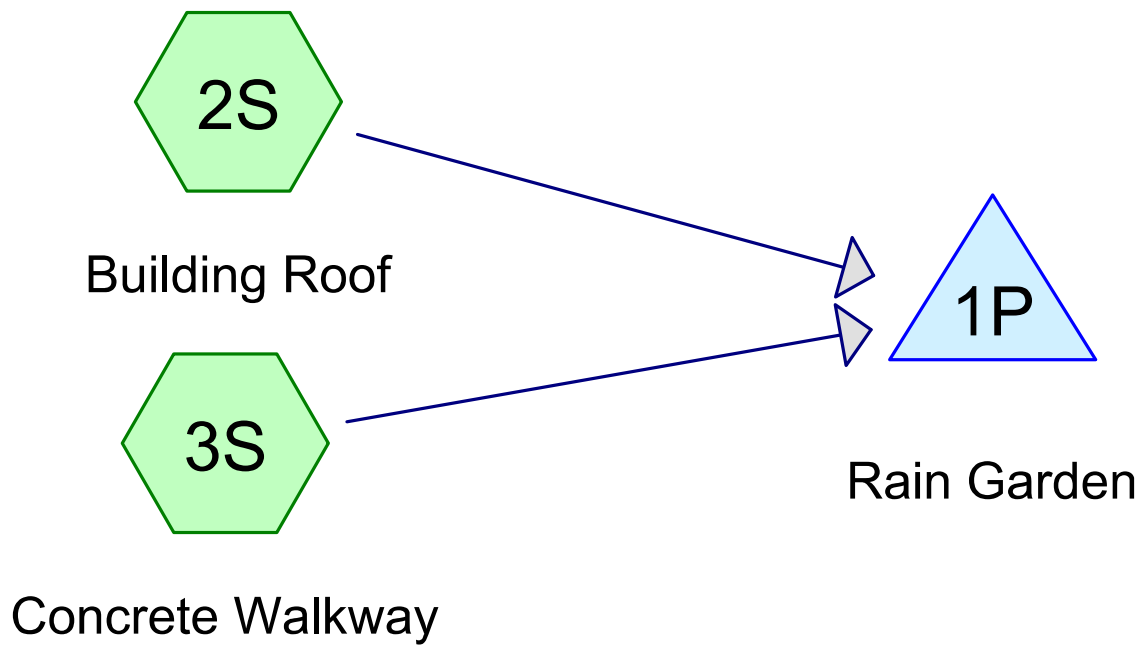
Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

B. HydroCAD Report



124 Glenwood Ave-Calcs

Prepared by Hudson Eng.

Printed 10/30/2022

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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	1.55	2

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
1,992	98	(2S, 3S)
1,992	98	TOTAL AREA

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124 Glenwood Avenue
NJ DEP 2-hr Custom Rainfall=1.55"

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Summary for Subcatchment 2S: Building Roof

Runoff = 0.14 cfs @ 1.09 hrs, Volume= 189 cf, Depth= 1.33"
Routed to Pond 1P : Rain Garden

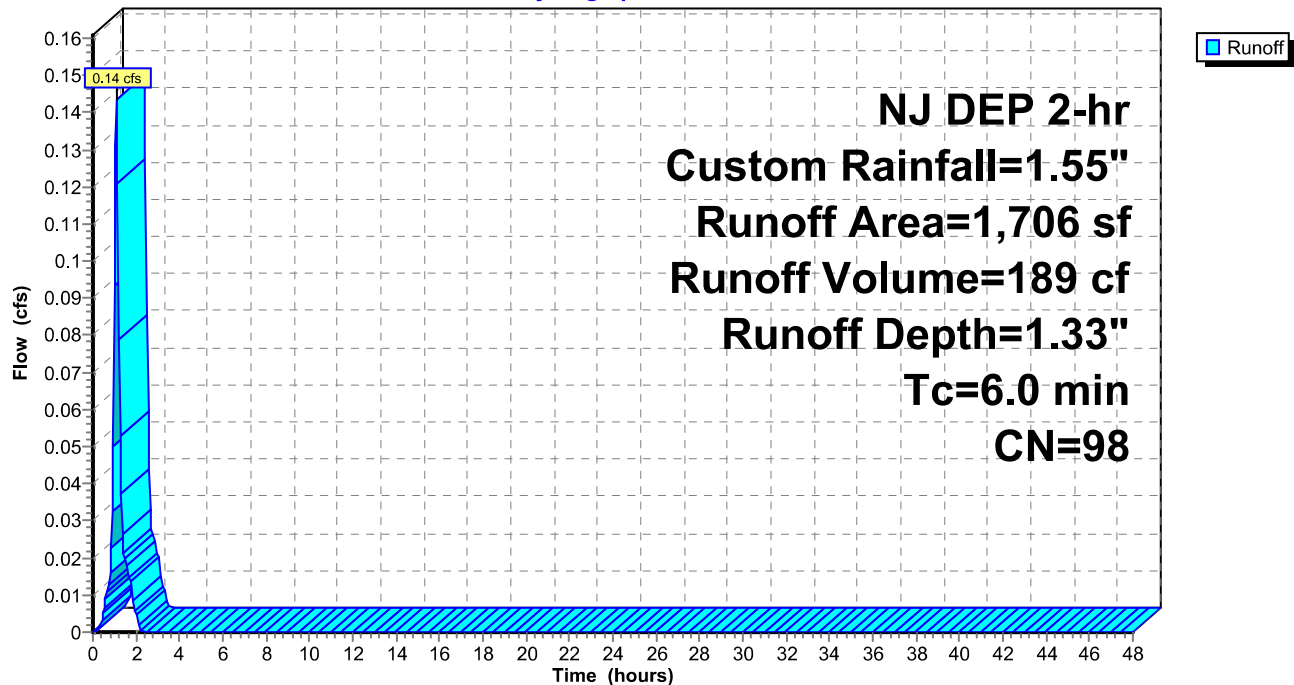
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr Custom Rainfall=1.55"

	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



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NJ DEP 2-hr Custom Rainfall=1.55"

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Summary for Subcatchment 3S: Concrete Walkway

Runoff = 0.02 cfs @ 1.09 hrs, Volume= 32 cf, Depth= 1.33"
Routed to Pond 1P : Rain Garden

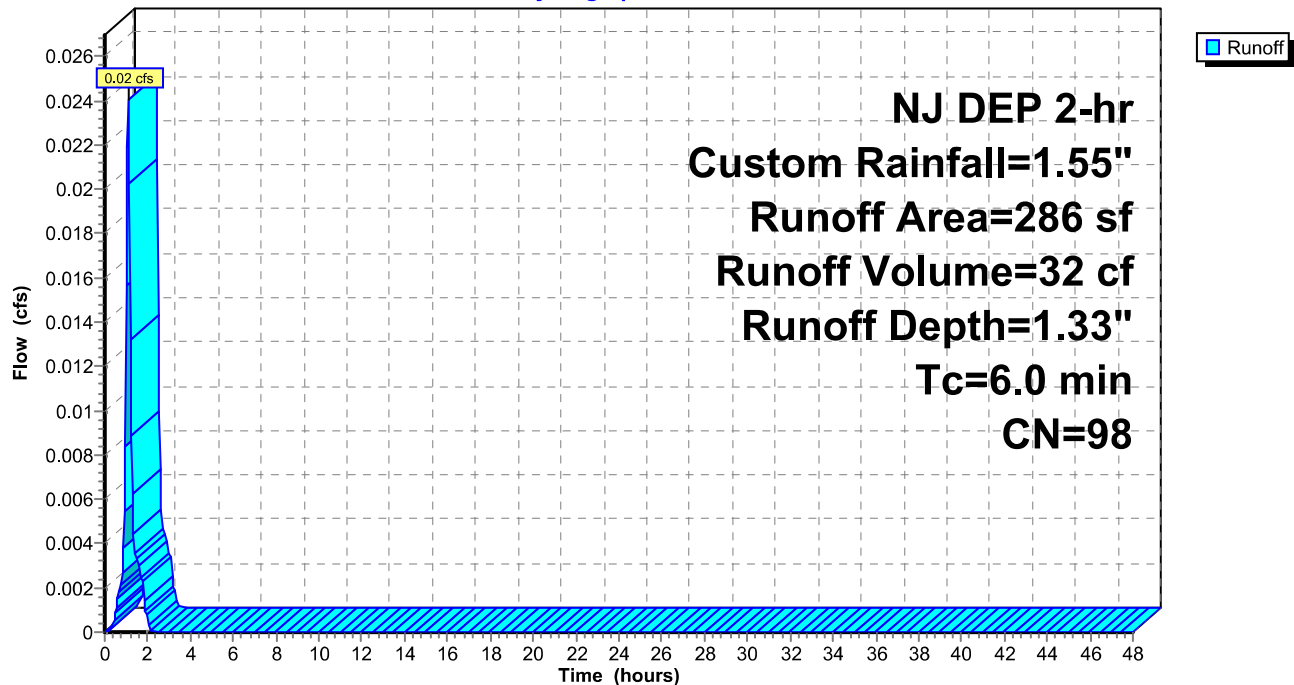
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr Custom Rainfall=1.55"

	Area (sf)	CN	Description
*	286	98	
	286		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



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124 Glenwood Avenue
NJ DEP 2-hr Custom Rainfall=1.55"

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Summary for Pond 1P: Rain Garden

Inflow Area = 1,992 sf, 100.00% Impervious, Inflow Depth = 1.33" for Custom event
 Inflow = 0.17 cfs @ 1.09 hrs, Volume= 221 cf
 Outflow = 0.00 cfs @ 2.07 hrs, Volume= 221 cf, Atten= 98%, Lag= 58.5 min
 Discarded = 0.00 cfs @ 2.07 hrs, Volume= 221 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= 64.90' @ 2.07 hrs Surf.Area= 316 sf Storage= 203 cf

Plug-Flow detention time= 590.5 min calculated for 220 cf (100% of inflow)
 Center-of-Mass det. time= 591.3 min (661.0 - 69.7)

Volume	Invert	Avail.Storage	Storage Description
#1	63.17'	234 cf	Custom Stage Data (Prismatic) listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
63.17	193	0.0	0	0
64.17	193	35.0	68	68
64.42	193	25.0	12	80
65.00	340	100.0	155	234

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.17'	0.500 in/hr Exfiltration over Surface area
#2	Primary	61.65'	4.0" Round Outlet Pipe to CSS L= 169.0' Ke= 0.500 Inlet / Outlet Invert= 61.65' / 50.00' S= 0.0689 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#3	Device 2	64.92'	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=64.90' (Free Discharge)

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

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=63.17' (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

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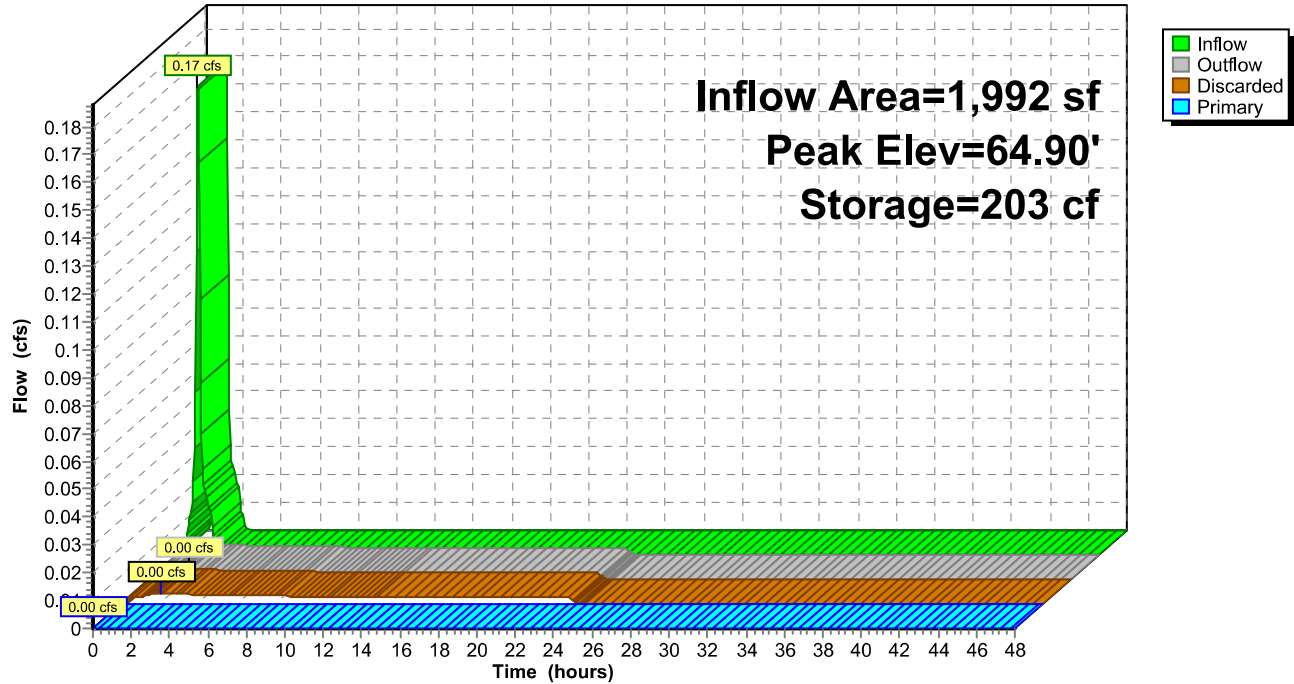
124 Glenwood Avenue
NJ DEP 2-hr Custom Rainfall=1.55"

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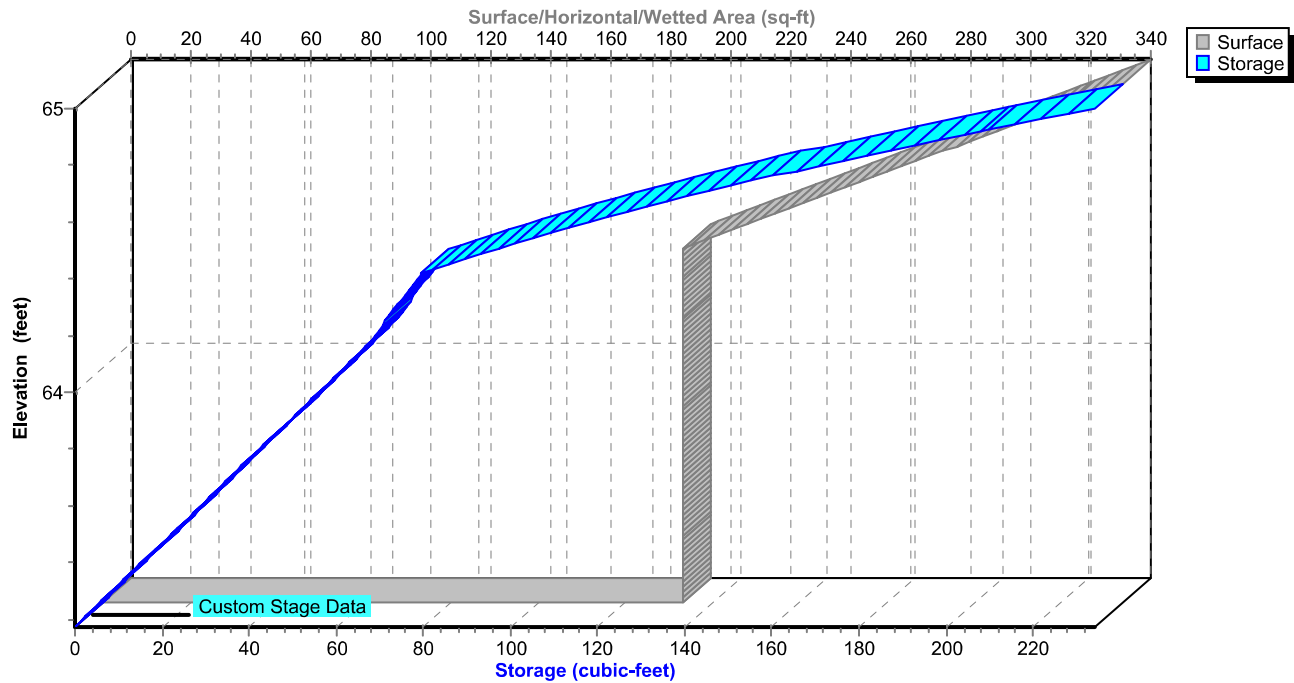
Pond 1P: Rain Garden

Hydrograph

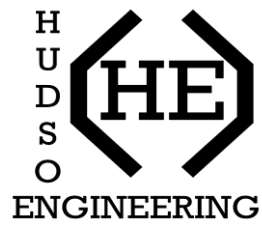


Pond 1P: Rain Garden

Stage-Area-Storage



C. Bioretention Rain Garden Maintenance Plan



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.