# STORMWATER MANAGEMENT REPORT

Prepared for:

# SAFSTOR REAL ESTATE CO, LLC

Block 507.14, Lot 65.01 471 Elizabeth Avenue

Franklin Township Somerset County, New Jersey

Prepared by:



N.J. Certificate of Authorization 24GA28161700

30 Independence Boulevard Warren, NJ 07059 908-668-8300

BENJ File No. J200933

David F. Wisotsky, P.E. New Jersey Professional Engineer License No. 42951

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# 1. Introduction

The subject property is located at 471 Elizabeth Avenue in Franklin Township, Somerset County, New Jersey. The property is identified as Block 507.14, Lot 65.01 on the Franklin Township tax maps and is a total of 4.816 acres in size and will hereafter be referred to as "the site". The site is bordered to the northeast by an active adult community and New Brunswick Road beyond; to the northwest by Elizabeth Avenue and vacant wooded area beyond; to the southwest by a wooded area and residential uses beyond; and to the southeast by a wooded area and residential uses beyond; A tax map and aerial map is included at the beginning of Appendix C for reference.

The site is currently partially developed within the B-I (Business District) Zone. One 1,060 square foot residential house currently exists on the property along Elizabeth Avenue with a 959 square foot detached garage and asphalt driveway. Beyond the detached garage is a 2,666 square foot industrial building with a gravel parking area. A gravel driveway also exists along Elizabeth Avenue which leads to multiple man-made material piles. The undeveloped portions of the lot are wooded or grassed areas. An existing underground septic field is located on the site to handle sewage from the residential house. A proposed stormwater management system will convey the runoff from the proposed development and impervious areas.

This report summarizes the design objectives, methodology, and calculations for the conveyance, detention, treatment and discharge of stormwater runoff leaving the site and is meant to accompany the Site Plan documents prepared by Bohler Engineering. Pre-development and post-development conditions are examined for stormwater quantity analysis, water quality analysis, groundwater recharge, soil erosion and sediment control, and low impact development based on the *NJDEP Stormwater Management Regulations* of March 2020.

# 2. Pre-Development Site Conditions

The site contains a total area of 4.816 acres. The studied watershed area is a total of 4.816 acres in size and consists of two unique drainage areas: Existing Drainage Area #1 and Existing Drainage Area #2, which are described in more detail below. In the pre-development condition, the site is partially developed with a few buildings, asphalt and gravel driveways and gravel parking area. Undeveloped land consists of grass and wooded areas. Currently, the runoff generated on site outfalls to Block 507.17, Lot 236 along the southeast property line via overland flow and ultimately flows southeast to a tributary of the Raritan River. The Existing Drainage Area Map in Appendix C illustrates the limits of each existing drainage area and how they relate to the existing site conditions.

# 2.1 Point of Analysis 1

Existing Drainage Area #1 flows to point of analysis #1 located near the south property corner. The Existing Drainage Area Map in Appendix C illustrates the identified point of analysis and how it relates to the existing topography on the site.

# 2.1.1 Existing Drainage Area #1

Located on the southwest area of the site, Existing Drainage Area #1 contains 4.088 acres of land, of which 0.238 acres are impervious surface, and includes a residential house, detached garage, asphalt driveway and a portion of the gravel parking area. The topography of the area slopes from north to south from a maximum elevation of approximately 87.30 to a minimum elevation of approximately 70.60 with slopes ranging from 1% to 45%, including the manmade material piles currently on site. A CN value of 98 and 74 were used for impervious and pervious areas, respectively, with a calculated time of concentration of 12.4 minutes. The runoff from Existing Drainage Area #1 flows through the site to Block 507.17, lot 236 in both the existing and proposed conditions and will be accounted for in the proposed stormwater management design. Existing Drainage Area #1 discharges to Point of Analysis 1.

# 2.2 Point of Analysis 2

Existing Drainage Area #2 flows to point of analysis #2 located near the east property corner. The Existing Drainage Area Map in Appendix C illustrates the identified point of analysis and how it relates to the existing topography on the site.

### 2.2.1 Existing Drainage Area #2

The remainder of the area of study in the pre-development condition is contained within Existing Drainage Area #2, which contains 0.728 acres of land, of which 0.129 acres are impervious surface, and includes most of the industrial building and a portion of the asphalt driveway and a portion of the gravel parking area. The topography of the area slopes from north to south from a maximum elevation of approximately 84.30 to a minimum elevation of approximately 74.20 with slopes ranging from 1% to 45%, including the man-made material piles currently on site. A CN value of 98 and 74 were used for impervious and pervious areas, respectively, with a calculated time of concentration of 3.0 minutes. The runoff from Existing Drainage Area #2 flows from north to south and ultimately discharges to Point of Analysis 1.

# 2.3 **Pre-Development Flow Summary**

DATA	EXISTING DRAINAGE AREA #1	EXISTING DRAINAGE AREA #2		
Area (acres)	4.088	0.728		
Impervious (acres)	0.238	0.129		
Tc (min)	12.4	3.0		
2 Yr. Flow (CFS)	5.61	2.00		
10 Yr. Flow (CFS)	11.74	3.44		
100 Yr. Flow (CFS)	24.93	6.29		

#### **TABLE 2.1**

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# 3. Post-Development Site Conditions

The post-development condition for the site includes the construction of one, three story selfstorage building with associated parking, driveways, sidewalks, utility infrastructure, stormwater conveyance, aboveground and underground detention facilities, and other site improvements. The proposed site is designed in a manner that generally maintains the existing drainage patterns. The studied watershed area in the post-development condition contains the same 4.816 acre area that was studied in the pre-development condition and consists of four unique drainage areas: Proposed Drainage Area #1A, #1B, #1c and #2, which are described in more detail below.

A proposed stormwater conveyance system will collect the runoff from the proposed buildings and impervious areas via inlets, manholes, and stormwater piping and redirect it to the proposed bioretention basins on the site. The construction of the proposed improvements will occupy approximately 3.73 acres of land and will create approximately 1.47 acres of impervious coverage on the site in the post-development condition. The Proposed Drainage Area Map in Appendix C illustrates the limits of each proposed drainage area and how they relate to the proposed site conditions

# 3.1 Point of Analysis 1

The Proposed Drainage Area #1A, #1B and #1C in the post development condition flows to the same point of analysis identified in the existing condition, located near the south property corner. As noted above, the Proposed Drainage Area Map in Appendix C illustrates the identified point of analysis and how it relates to the proposed topography on the site.

# 3.1.1 Proposed Drainage Area #1A

Proposed Drainage Area #1A consists of approximately 2.245 acres of land, of which 1.357 acres are impervious surface, and includes the proposed selfstorage building, parking areas, sidewalks, stormwater and utility infrastructure. The drainage area also contains grass, landscape and wooded areas. A CN value of 98 and 74 were used for impervious and pervious areas, respectively, with a calculated time of concentration of 10.7 minutes for pervious surfaces. The runoff from Proposed Drainage Area #1A is routed to bioretention basins #1 and #2 and ultimately flows to Block 507.17, Lot 236 and Point of Analysis 1. The routing of the runoff from Proposed Drainage Area #1A is depicted on the Inlet Area Map in Appendix C.

The proposed peak runoff rates for Proposed Drainage Area #1A are analyzed at Point of Analysis 1. The flows tributary to Point of Analysis 1 from Proposed Drainage Area #1 meets the stormwater management criteria set forth in NJAC § 7:8-5.4(a)3.iii. Post-development peak runoff rates for the 2-, 10-, and 100-year storm events for flows tributary to Point of Analysis 1 meet or exceed the

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50, 75 and 80 percent reductions, respectively, of the pre-development peak runoff rates. Refer to Section 3.3 for a comparison of pre-development flows to the post-development flows routed through proposed bioretention. Refer to Sections 2.2 and 3.3 for pre-development and post-development flows, respectively.

### 3.1.2 Proposed Drainage Area #1B

Proposed Drainage Area #1B consists of approximately 0.342 acres of land, of which 0.147 acres are impervious surface, and includes a loading area, driveway, sidewalk and the bioretention basin #3. The drainage area also contains grass, landscape and wooded areas. A CN value of 98 and 74 were used for impervious and pervious areas, respectively, with a calculated time of concentration of 20.8 minutes for pervious surfaces. The runoff from Proposed Drainage Area #1B is routed to bioretention basins #3 and ultimately flows to Block 507.17, Lot 236 and Point of Analysis 1. The routing of the runoff from Proposed Drainage Area #1B is depicted on the Inlet Area Map in Appendix C.

The proposed peak runoff rates for Proposed Drainage Area #1B are analyzed at Point of Analysis 1. The flows tributary to Point of Analysis 1 from Proposed Drainage Area #1 meets the stormwater management criteria set forth in NJAC § 7:8-5.4(a)3.iii. Post-development peak runoff rates for the 2-, 10-, and 100-year storm events for flows tributary to Point of Analysis 1 meet or exceed the 50, 75 and 80 percent reductions, respectively, of the pre-development peak runoff rates. Refer to Section 3.3 for a comparison of pre-development flows to the post-development flows routed through proposed bioretention. Refer to Sections 2.2 and 3.3 for pre-development and post-development flows, respectively.

# 3.1.3 Proposed Drainage Area #1C

Proposed Drainage Area #1C consists of approximately 1.404 acres of land, of which 0.053 acres are impervious surface which includes the grass paver fire access lane. The drainage area also contains grass, landscape and wooded areas. A CN value of 98 and 74 were used for impervious and pervious areas, respectively, with a calculated time of concentration of 13.9 minutes for pervious surfaces. The runoff from Proposed Drainage Area #1C is routed to the existing wetlands and ultimately flows to Block 507.17, Lot 236 and Point of Analysis 1. The routing of the runoff from Proposed Drainage Area #1C is depicted on the Inlet Area Map in Appendix C.

The proposed peak runoff rates for Proposed Drainage Area #1C are analyzed at Point of Analysis 1. The flows tributary to Point of Analysis 1 from Proposed Drainage Area #1 meets the stormwater management criteria set forth in NJAC

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§ 7:8-5.4(a)3.iii. Post-development peak runoff rates for the 2-, 10-, and 100year storm events for flows tributary to Point of Analysis 1 meet or exceed the 50, 75 and 80 percent reductions, respectively, of the pre-development peak runoff rates. Refer to Section 3.3 for a comparison of pre-development flows to the post-development flows routed through proposed bioretention. Refer to Sections 2.2 and 3.3 for pre-development and post-development flows, respectively.

# 3.2 Point of Analysis 2

The Proposed Drainage Area #2 in the post development condition flows to the same point of analysis identified in the existing condition, located near the east property corner. As noted above, the Proposed Drainage Area Map in Appendix C illustrates the identified point of analysis and how it relates to the proposed topography on the site.

# 3.2.1 Proposed Drainage Area #2

Proposed Drainage Area #2 consists of approximately 0.826 acres of land, with no impervious surface, and includes grass, landscape and wooded areas as well as the proposed septic field. A CN value of 98 and 74 were used for impervious and pervious areas, respectively, with a calculated time of concentration of 12.2 minutes for pervious surfaces. The runoff from Proposed Drainage Area #2 is routed to the existing wetlands area which ultimately flows to Block 507.17, Lot 236 and Point of Analysis 2. The routing of the runoff from Proposed Drainage Area #2 is Area #2 is depicted on the Proposed Drainage Area Map in Appendix C.

The proposed peak runoff rates for Proposed Drainage Area #2 are analyzed at Point of Analysis 2. The flows tributary to Point of Analysis 2 from Proposed Drainage Area #2 meets the stormwater management criteria set forth in NJAC § 7:8-5.4(a)3.iii. Post-development peak runoff rates for the 2-, 10-, and 100-year storm events for flows tributary to Point of Analysis 1 meet or exceed the 50, 75 and 80 percent reductions, respectively, of the pre-development peak runoff rates. Refer to Section 3.3 for a comparison of pre-development flows to the post-development flows. Refer to Sections 2.2 and 3.3 for pre-development and post-development flows, respectively.

# 3.3 Proposed Structural Stormwater Management Strategies

The four drainage areas in the post development condition flow to the same points of analysis identified in the existing condition. Two of the drainage areas, Proposed

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Drainage Areas #1A and #1B, flows through the proposed on-site stormwater management system, which is described in more detail below.

# 3.3.1 Bio-Retention Systems

As part of the stormwater management design of the proposed site, two bio-retention systems are proposed to capture water from impervious areas. The bio-retention systems meet the minimum requirements outlined in the *New Jersey Stormwater Best Management Practices Manual* by providing 24 inches of soil bed depth, an underdrain system, containment and treatment of the entire Water Quality Design Storm volume, a storage depth of 12 inches maximum in a flat-bottom system and 1 foot minimum of separation between the bottom of the bio-retention basin and the seasonal high ground water table for underdrain systems. The proposed bio-retention systems achieve 80% TSS removal.

DESIGN PARAMETERS						
TSS Removal Rate	Depth of Soil Bed	Vegetation				
80%	18 inches	Terrestrial Forested Community				
80%	24 inches	Site-Tolerant Grasses				
90%	24 inches	Terrestrial Forested Community				
Storage Volume	Entire Water Quality Design Storm Volume					
Minimum Density of Vegetation	85%					
Appropriate Species Selection	See Chapter 7 of the NJ Stormwater Best Management Practices Manual					
Maximum Design Storm Drain Time	72 Hours, Using Slowest Design Permeability Rate					
Permeability Rate Factor of Safety	2					
Minimum Subsoil Design Permeability Rate	0.5 inches/hour (Under-drain proposed)					
Soil Testing Requirements	Must be consistent with Manage	Appendix E of the NJ Stormwater Best ement Practices Manual				

### **TABLE 3.2.1**

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#### 3.3.2 Emergency Spillways

The emergency spillways associated with the proposed basins have been designed to pass a design storm that is equivalent to the 100-year storm plus 50%. At least one foot of freeboard is provided above the peak water elevation while the emergency spillway is operating.

# 3.4 **Post-Development Flow Summary**

#### TABLE 3.3

	Proposed	Proposed
	Drainage	Drainage
	Area #1	Area #2
Area (acres)	3.980	0.836
Impervious (acres)	1.527	0.000
Tc (min)	10.7, 20.8 & 13.9	12.2
2 yr. Flow (cfs)	2.43	0.91
10 yr. Flow (cfs)	6.30	2.10
100 yr. Flow (cfs)	19.24	4.76

#### PROPOSED FLOW SUMMARY

#### EXISTING/PROPOSED FLOW SUMMARY (DRAINAGE AREA 1)

	Existing Drainage Area 1	Total Flows Requiring Reductions (cfs)	Required Reductions	Maximum Allowable Flow to Point of Analysis 1	Total Proposed Flows to Point of Analysis 1
2 yr. Flow (cfs)	5.61	5.61	50%	2.81	2.43
10 yr. Flow (cfs)	11.74	11.74	25%	8.81	6.30
100 yr. Flow (cfs)	24.93	24.93	20%	19.94	19.24

#### EXISTING/PROPOSED FLOW SUMMARY (DRAINAGE AREA 2)

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	Existing Drainage Area 2	Total Flows Requiring Reductions (cfs)	Required Reductions	Maximum Allowable Flow to Point of Analysis 2	Total Proposed Flows to Point of Analysis 2	
2 yr. Flow (cfs)	2.00	2.00	50%	1.00	0.91	
10 yr. Flow (cfs)	3.44	3.44	25%	2.58	2.10	
100 yr. Flow (cfs)	6.29	6.29	20%	5.03	4.76	

# 4. Stormwater Management Design Methodology

In accordance with the NJDEP Stormwater Management Regulations, the proposed development must meet the requirements, if appropriate, for stormwater quantity reductions, water quality, groundwater recharge, soil erosion and sediment control, and low impact development. The following sections describe how each of the above items are addressed on site in the post-development condition.

# 4.1 Stormwater Quantity Controls

The Assessment of stormwater quantity has been based upon the Soil Conservation Service Method (SCS) Unit Hydrograph as described in Technical Release Number 55 (TR55), "Urban Hydrology for Small Watersheds". Theoretical storms are modeled with the 24-Hour SCS Unit Dimensionless Hydrograph using the NOAA Atlas 14 Type C rainfall distribution and recurrence intervals of 2, 10, and 100 years. Hydrograph creation and routings are accomplished using the *HydroCAD* Version 10.00 program by HydroCAD Software Solutions, LLC. The following techniques from the *NJDEP Stormwater Management Regulations* is being applied to each drainage area as noted in section 3.3:

- NJAC § 7:8-5.4(a)3.i states for stormwater runoff leaving the site, post-development runoff hydrographs for the 2-, 10-, and 100-year storms do not exceed, at any point in time, the pre-development runoff hydrographs for the same storm events. The above section of the NJAC will be applied to drainage areas that, under proposed conditions, will remain unchanged or have a net decrease in impervious coverage.
- 2. NJAC § 7:8-5.4(a)3.iii states the post-development peak runoff rates for the 2-, 10-, and 100-year storm events are 50, 75, and 80 percent, respectively, of the pre-development peak runoff rates. The above section of the NJAC will be applied to drainage areas that are impacted by the proposed development and flow to a detention or retention system.

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The project's proposed stormwater management facilities for stormwater peak flow attenuation will consist of three bioretention basins (bioretention basin #1, #2 and #3) addressing the drainage areas outlined in Section 3 of this report. The study requires the establishment of a point of analysis, as indicated in Section 2. Existing and proposed CN and Tc calculations, as well as existing and proposed hydrographs are provided in Appendix A. The information below describes the methodology in which the stormwater calculations were procured.

### 4.1.1 Site Soils

Site soil information has been obtained from the USDA Natural Resources Conservation Service (NRCS) web soil survey database, last revised in 2015. The major soil types present on site include Penn Silt Loam, which is a somewhat poorly drained soil with 2 to 6 percent slopes. Penn soils are classified as Hydrologic Soil Group Type C soils; therefore, values used in the CN and time of concentration calculations are associated with Type C soils. For areas where the calculated time of concentration is less than 6 minutes, the calculated time was used. For impervious area, an assumed time of concentration of 6 minutes was used.

# 4.1.2 Rainfall Data

Rainfall data used in the stormwater calculations of this report are obtained from several different sources based on the latest NJDEP stormwater regulations. The Water Quality storm event is based on the NJDEP BMP Manual Chapter 5 definition of having a total rainfall depth of 1.25 inches and a total duration of two (2) hours. Twenty-four-hour rainfall frequency data in Somerset County for all other storms is obtained from the NOAA Atlas 14, Volume 2, Precipitation-Frequency Atlas of the United States, updated in 2006 and listed in the table below:

TABLE 4	4.1
---------	-----

Event (year)	1	2	5	10	25	50	100
Rainfall (in)	2.76	3.34	4.25	5.01	6.15	7.13	8.21

#### 4.1.3 Pipe Sizing

Calculations for sizing the stormwater pipe networks associated with the proposed stormwater management conveyance system can be found in

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Appendix B of this report. The Rational Method has been used to size the storm piping for the 25-year storm event. The calculations are conservatively based on a time of concentration of 6 minutes to any inlet. An Inlet Area Map is included in Appendix C.

# 4.2 Water Quality Controls

Water quality analysis is based on the requirements of NJAC § 7:8-5.5, which requires 80% TSS removal of post-development runoff from new impervious areas before discharging the runoff. Additionally, 50% TSS removal in post-development runoff from replaced impervious areas must be achieved prior to discharging the runoff. Three bioretention basins are used in the proposed condition that achieves 80% TSS removal which have been designed according to standards in Chapter 9.1 of the latest *New Jersey Stormwater Best Management Practices Manual.* 

# 4.3 Groundwater Recharge

Per the Geotechnical Report, the subject site has poor permeability test rate of < 1 inches/hour. Also, the subsurface geology of the site includes karst topography. Introducing groundwater recharge to the site, could have a negative impact on the subsurface geology. Due to the conditions described above, no groundwater recharge is proposed as part of the stormwater management facilities on site.

# 4.4 Soil Erosion and Sediment Control

The Soil Erosion and Sediment Control plans and details are included within the Site Plan documents prepared by Bohler Engineering and must be followed throughout construction. Silt fences, stabilized construction entrances, a temporary stockpile and inlet filters are proposed during construction. It is noted that stormwater from the site during construction will discharge to Block 507.17, Lot 236 and the existing Raritan River tributary therefore, the offsite stability is considered stable. This report and the Site Plan documents prepared by Bohler Engineering are being submitted to the Somerset-Union Soil Conservation District for approval.

# 4.5 Low-Impact Development and Non-Structural Stormwater Management Facilities

In accordance with the NJDEP regulations and the latest *New Jersey Stormwater Best Management Practices Manual*, several non-structural stormwater management strategies have been incorporated into the design of the site and are listed below:

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### 4.5.1 Vegetation and Landscaping

A comprehensive Landscape Plan has been incorporated into the design of the proposed improvements on the site that provides low maintenance landscaping. The use of lawn areas has been minimized where applicable and fertilizers and pesticides are to be used sparingly.

# 4.5.1.1 Native Ground Cover

Native plants including ground cover, shrubs and trees instead of turf grass have been proposed as part of the landscape design for the site. The native plantings will also require little or no irrigation once they are established.

### 4.5.2 Minimize Land Disturbance

The proposed design of the site incorporates the preservation of existing vegetative areas that will remain undisturbed. The undisturbed areas will be protected during construction and will have easements and/or deed restrictions established as required by other NJDEP regulations and permits to ensure these areas remain undisturbed in the future

### 4.5.3 Impervious Area Management

Impervious areas are the primary source of additional runoff in the postdevelopment site condition. The sections below describe the measures that have been taken in the proposed site design to minimize the amount of impervious proposed on site

# 4.5.3.1 Streets, Sidewalks, and Parking, Driveway Areas

As part of the proposed site design, the minimum allowable parking and drive aisle sizes, in accordance with local ordinances, are used in lieu of larger stalls and aisles to reduce the amount of impervious surface in the post-development condition.

#### 4.5.4 Preventative Source Controls

The proposed development complies with this strategy by providing dumpster areas. Additionally, floatable and total suspended solids are routinely eliminated using two bio-detention basins between the last inlet in the pipe network and the above and underground ground basins, thereby intercepting floating debris

# 5. Conclusions

As demonstrated in the above sections, the stormwater management plan for the proposed development meets the *NJDEP Stormwater Management Regulations* of March 2020, and addresses the requirements for stormwater quantity reductions, water quality, groundwater recharge, soil erosion and sediment control, and low impact development. As a result of the design calculations contained herein, Bohler Engineering anticipates that the stormwater design will not have a negative impact to surrounding areas.

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# A. PRE- vs. POST-DEVELOPMENT HYDROGRAPHS

- Water Quality Storm Event
- ♦ 2-Year Storm Event
- ◆ 10-Year Storm Event
- 100-Year Storm Event



# **Project Notes**

Rainfall events imported from "NRCS-Rain.txt" for 6602 NJ Burlington-C Rainfall events imported from "NRCS-Rain.txt" for 6602 NJ Burlington-C

# Area Listing (all nodes)

Area	CN	Description
(sq-ft)		(subcatchment-numbers)
216,139	74	>75% Grass cover, Good, HSG C (2E, 2P, 4E, 4P, 6P, 8P, 9P)
40,897	96	Gravel surface, HSG C (2E, 4E, 5P)
41,084	98	Paved parking, HSG C (1E, 1P, 3E, 5P, 7P)
350	98	Unconnected pavement, HSG C (3P)
40,947	98	Unconnected roofs, HSG C (1E, 3E, 3P)
72,991	70	Woods, Good, HSG C (2E, 4E, 6P, 8P, 9P)
7,150	72	Woods/grass comb., Good, HSG C (2E, 2P, 4E)
419,558	80	TOTAL AREA

# Soil Listing (all nodes)

Area	Soil	Subcatchment
(sq-ft)	Group	Numbers
0	HSG A	
0	HSG B	
419,558	HSG C	1E, 1P, 2E, 2P, 3E, 3P, 4E, 4P, 5P, 6P, 7P, 8P, 9P
0	HSG D	
0	Other	
419,558		TOTAL AREA

# Pre vs Post

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HSG-A	HSG-B	HSG-C	HSG-D	Other	Total	Ground	Su
(sq-ft)	(sq-ft)	(sq-ft)	(sq-ft)	(sq-ft)	(sq-ft)	Cover	Nu
 0	0	216,139	0	0	216,139	>75% Grass	
						cover, Good	
0	0	40,897	0	0	40,897	Gravel surface	
0	0	41,084	0	0	41,084	Paved parking	
0	0	350	0	0	350	Unconnected	
						pavement	
0	0	40,947	0	0	40,947	Unconnected	
						roofs	
0	0	72,991	0	0	72,991	Woods, Good	
0	0	7,150	0	0	7,150	Woods/grass	
						comb., Good	
0	0	419,558	0	0	419,558	TOTAL AREA	

Ground Covers (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	2P	0.00	0.00	255.0	0.0050	0.013	15.0	0.0	0.0
2	B1	73.00	72.85	10.0	0.0150	0.013	24.0	0.0	0.0
3	B2	73.00	72.06	47.0	0.0200	0.011	15.0	0.0	0.0
4	B3	77.48	77.00	96.0	0.0050	0.013	15.0	0.0	0.0

# Pipe Listing (all nodes)

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1E: Impervious	Runoff Area=10,351 sf 100.00% Impervious Runoff Depth=1.03" Tc=12.4 min CN=0/98 Runoff=0.57 cfs 892 cf
Subcatchment1P: Impervious	Runoff Area=23,576 sf 100.00% Impervious Runoff Depth=1.03" Tc=10.7 min CN=0/98 Runoff=1.36 cfs 2,033 cf
Subcatchment2E: Pervious	Runoff Area=167,702 sf 0.00% Impervious Runoff Depth=0.10" Flow Length=630' Tc=12.4 min CN=76/0 Runoff=0.70 cfs 1,415 cf
Subcatchment2P: Pervious	Runoff Area=24,672 sf 0.00% Impervious Runoff Depth=0.07" Flow Length=426' Tc=10.7 min CN=74/0 Runoff=0.07 cfs 152 cf
Subcatchment3E: Impervious	Runoff Area=5,641 sf 100.00% Impervious Runoff Depth=1.03" Tc=6.0 min CN=0/98 Runoff=0.38 cfs 486 cf
Subcatchment3P: Roof Area	Runoff Area=35,418 sf 100.00% Impervious Runoff Depth=1.03" Tc=10.7 min CN=0/98 Runoff=2.05 cfs 3,054 cf
Subcatchment4E: Pervious	Runoff Area=26,085 sf 0.00% Impervious Runoff Depth=0.37" Flow Length=393' Tc=6.0 min CN=87/0 Runoff=0.66 cfs 804 cf
Subcatchment4P: Pervious	Runoff Area=13,613 sf 0.00% Impervious Runoff Depth=0.07" Tc=10.7 min CN=74/0 Runoff=0.04 cfs 84 cf
Subcatchment 5P: Impervious	Runoff Area=5,021 sf 97.63% Impervious Runoff Depth=1.03" Tc=20.8 min CN=96/98 Runoff=0.21 cfs 431 cf
Subcatchment 6P: Pervious	Runoff Area=6,701 sf 0.00% Impervious Runoff Depth=0.06" Flow Length=172' Tc=20.8 min CN=73/0 Runoff=0.01 cfs 35 cf
Subcatchment7P: Impervious	Runoff Area=2,493 sf 100.00% Impervious Runoff Depth=1.03" Tc=13.9 min CN=0/98 Runoff=0.13 cfs 215 cf
Subcatchment8P: Pervious	Runoff Area=61,889 sf 0.00% Impervious Runoff Depth=0.05" Flow Length=409' Tc=13.9 min CN=72/0 Runoff=0.10 cfs 264 cf
Subcatchment9P: Pervious	Runoff Area=36,396 sf 0.00% Impervious Runoff Depth=0.06" Flow Length=471' Tc=12.2 min CN=73/0 Runoff=0.08 cfs 188 cf
Pond B1: Bioretention Basin 1	Peak Elev=77.51' Storage=2,184 cf Inflow=1.39 cfs 2,184 cf Outflow=0.00 cfs 0 cf
Pond B2: Bioretention Basin 2	Peak Elev=76.94' Storage=3,137 cf Inflow=2.06 cfs 3,137 cf Outflow=0.00 cfs 0 cf
Pond B3: Bioretention Basin 3	Peak Elev=80.73' Storage=466 cf Inflow=0.22 cfs 466 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf

Link 5E: EDA 1	Inflow=1.15 cfs 2,308 cf Primary=1.15 cfs 2,308 cf
Link 6E: EDA 2	Inflow=1.03 cfs 1,291 cf Primary=1.03 cfs 1,291 cf
Link 7E: EDA	Inflow=1.82 cfs  3,598 cf Primary=1.82 cfs  3,598 cf
Link 10P: PDA 1A	Inflow=0.00 cfs 0 cf Primary=0.00 cfs 0 cf
Link 11P: PDA 1B	Inflow=0.00 cfs 0 cf Primary=0.00 cfs 0 cf
Link 12P: PDA 1C	Inflow=0.19 cfs 479 cf Primary=0.19 cfs 479 cf
Link 13P: PDA 1	Inflow=0.19 cfs 479 cf Primary=0.19 cfs 479 cf
Link 14P: PDA 2	Inflow=0.08 cfs 188 cf Primary=0.08 cfs 188 cf
Link 15P: PDA	Inflow=0.27 cfs 666 cf Primary=0.27 cfs 666 cf

# Total Runoff Area = 419,558 sf Runoff Volume = 10,052 cf Average Runoff Depth = 0.29" 80.36% Pervious = 337,177 sf 19.64% Impervious = 82,381 sf

### Summary for Subcatchment 1E: Impervious

Runoff = 0.57 cfs @ 1.17 hrs, Volume= 892 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"



# Summary for Subcatchment 1P: Impervious

2,033 cf, Depth= 1.03" Runoff 1.36 cfs @ 1.15 hrs, Volume= =

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

Ar	ea (sf)	CN [	Description		
2	23,576	98 F	Paved park	ing, HSG C	
2	23,576	<b>98</b> 1	00.00% In	npervious A	Nrea
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7					Direct Entry, Tc
			Si	ubcatchm	nent 1P: Impervious
				Hydrog	graph
1.36	Cfs				
					NJ DEP 2-hr
					WO Rainfall=1 25"
					$\mathbf{D}_{\text{upoff}} = 22576 \text{ of}$
1-*		·	· _ ± _ ± _ L _ L _ L . I I I I I I I I	-      -             	
~					Runoff Volume=2,033 cf
, (cfs					Runoff Depth=1.03"
Nol-					Tc=10.7 min
					CN=0/98
-					
-					
0- <del> 1.</del> 0	2468	10 12 14 1	6 18 20 22 24	26 28 30 32 34	36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
				ilme	e (nours)

# **Summary for Subcatchment 2E: Pervious**

Runoff = 0.70 cfs @ 1.28 hrs, Volume= 1,415 cf, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

A	rea (sf)	CN D	Description					
	24,589	96 G	96 Gravel surface, HSG C					
	36,591	70 V	Voods, Go	od, HSG C				
1	05,816	74 >	75% Gras	s cover, Go	ood, HSG C			
	706	72 V	Voods/gras	ss comb., G	Good, HSG C			
1	67,702	76 V	Veighted A	verage				
1	67,702	76 1	00.00% Pe	ervious Are	а			
Тс	Length	Slope	Velocity	Capacity	Description			
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)				
0.3	27	0.0490	1.55		Sheet Flow, A-B			
					Smooth surfaces n= 0.011 P2= 3.36"			
8.8	73	0.0130	0.14		Sheet Flow, B-C			
					Grass: Short n= 0.150 P2= 3.36"			
0.4	54	0.0180	2.16		Shallow Concentrated Flow, C-D			
					Unpaved Kv= 16.1 fps			
1.2	207	0.0340	2.97		Shallow Concentrated Flow, D-E			
					Unpaved Kv= 16.1 fps			
0.5	59	0.0170	2.10		Shallow Concentrated Flow, E-F			
					Unpaved Kv= 16.1 fps			
0.2	43	0.0470	3.49		Shallow Concentrated Flow, F-G			
					Unpaved Kv= 16.1 tps			
1.0	167	0.0280	2.69		Shallow Concentrated Flow, G-H			
					Unpaved Kv= 16.1 tps			
12.4	630	Total						

# Subcatchment 2E: Pervious



# **Summary for Subcatchment 2P: Pervious**

Runoff = 0.07 cfs @ 1.28 hrs, Volume= 152 cf, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

A	rea (sf)	CN E	Description					
	22,852	74 >	4 >75% Grass cover, Good, HSG C					
	1,820	72 V	Voods/gras	ss comb., G	Good, HSG C			
	24,672	74 V	74 Weighted Average					
	24,672	74 1	00.00% Pe	ervious Are	а			
-				<b>o</b>				
	Length	Slope	Velocity	Capacity	Description			
(min)	(feet)	(ft/ft)	(ft/sec)	(CfS)				
9.2	100	0.0222	0.18		Sheet Flow, A-B			
					Grass: Short n= 0.150 P2= 3.36"			
0.1	23	0.0730	4.35		Shallow Concentrated Flow, B-C			
					Unpaved Kv= 16.1 fps			
0.3	48	0.0210	2.94		Shallow Concentrated Flow, C-D			
					Paved Kv= 20.3 fps			
1.1	255	0.0050	3.72	4.57	Pipe Channel, D-E			
					15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'			
					n= 0.013 Concrete pipe, bends & connections			
10.7	426	Total						

#### Subcatchment 2P: Pervious



# Summary for Subcatchment 3E: Impervious

Runoff = 0.38 cfs @ 1.09 hrs, Volume= 486 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

A	rea (sf)	CN	Description				
	2,580	98	Unconnecte	ed roofs, HS	SG C		
	3,061	98	Paved park	ing, HSG C	C		
	5,641	98	Weighted A	verage			
	5,641	98	100.00% In	100.00% Impervious Area			
Tc	Length	Slop	e Velocity	Capacity	Description		
(min)	(feet)	(ft/f	t) (ft/sec)	(cfs)			
3.0					Direct Entry, Tc		
3.0	0	Total,	Increased t	o minimum	n Tc = 6.0 min		

### Subcatchment 3E: Impervious





# Summary for Subcatchment 3P: Roof Area

Runoff = 2.05 cfs @ 1.15 hrs, Volume= 3,054 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"



# **Summary for Subcatchment 4E: Pervious**

Runoff = 0.66 cfs @ 1.13 hrs, Volume= 804 cf, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

 A	rea (sf)	CN E	Description					
	164	70 V	70 Woods, Good, HSG C					
	16,189	96 C	96 Gravel surface, HSG C					
	5,108	74 >	74 >75% Grass cover, Good, HSG C					
	4,624	72 V	Voods/gras	ss comb., G	Good, HSG C			
	26,085	87 V	Veighted A	verage				
	26,085	87 1	00.00% Pe	ervious Are	a			
Tc	Length	Slope	Velocity	Capacity	Description			
 (min)	(feet)	(ft/ft)	(ft/sec)	(cfs)				
1.3	100	0.0160	1.29		Sheet Flow, A-B			
					Smooth surfaces n= 0.011 P2= 3.36"			
0.6	97	0.0200	2.87		Shallow Concentrated Flow, B-C			
	4				Paved Kv= 20.3 fps			
1.0	1/5	0.0330	2.92		Shallow Concentrated Flow, C-D			
0.4	40	0 0000	0.44		Unpaved Kv= 16.1 fps			
0.1	13	0.0230	2.44		Shallow Concentrated Flow, D-E			
0.0	0	0 0 4 9 0	2 5 2		Onpaved KV= 16.1 lps Shellow Concentrated Flow F F			
0.0	8	0.0480	3.53		Shallow Concentrated Flow, E-F			
3.0	393	I otal, I	ncreased t	o minimum	I c = 6.0 min			

# Subcatchment 4E: Pervious



# **Summary for Subcatchment 4P: Pervious**

Runoff = 0.04 cfs @ 1.28 hrs, Volume= 84 cf, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

Area (sf)	CN	Description						
13,613	74	>75% Gras	>75% Grass cover, Good, HSG C					
13,613	74	100.00% Pe	ervious Are	а				
Tc Lengtl (min) (feet	h Slop :) (ft/	be Velocity ft) (ft/sec)	Capacity (cfs)	Description				
10.7				Direct Entry, Tc				

### Subcatchment 4P: Pervious



# Summary for Subcatchment 5P: Impervious

Runoff = 0.21 cfs @ 1.28 hrs, Volume= 431 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

A	rea (sf)	CN	Description				
	4,902	98	Paved park	ing, HSG C			
	119	96	Gravel surfa	ace, HSG C			
	5,021	98	Weighted A	verage			
	119	96	2.37% Pervious Area				
	4,902	98	97.63% Impervious Area				
Tc (min)	Length (feet)	Slop (ft/t	e Velocity t) (ft/sec)	Capacity (cfs)	Description		
20.8					Direct Entry, Tc		

# Subcatchment 5P: Impervious




### **Summary for Subcatchment 6P: Pervious**

Runoff = 0.01 cfs @ 1.47 hrs, Volume= 35 cf, Depth= 0.06"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

A	rea (sf)	CN	Description		
	4,509	74	>75% Gras	s cover, Go	bod, HSG C
	2,192	70	Woods, Go	od, HSG C	
	6,701	73	Weighted A	verage	
	6,701	73	100.00% P	ervious Are	а
Тс	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
20.4	104	0.0230	0.08		Sheet Flow, A-B
					Woods: Light underbrush n= 0.400 P2= 3.36"
0.3	57	0.0230	3.08		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
0.1	11	0.0200	2.28		Shallow Concentrated Flow, C-D
					Unpaved Kv= 16.1 fps
20.8	172	Total			

### Subcatchment 6P: Pervious



### Summary for Subcatchment 7P: Impervious

Runoff = 0.13 cfs @ 1.19 hrs, Volume= 215 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

Ar	ea (sf)	CN	Description				
	2,493	98	Paved park	ing, HSG C	,		
	2,493	98	100.00% In	npervious A	rea		
Tc (min)	Length (feet)	Slope (ft/ft	e Velocity ) (ft/sec)	Capacity (cfs)	Description		
13.9					Direct Entry,	Тс	
			Si	ubcatchm	nent 7P: Impe	ervious	



#### **Summary for Subcatchment 8P: Pervious**

Runoff = 0.10 cfs @ 1.37 hrs, Volume= 264 cf, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

A	rea (sf)	CN [	Description		
	28,675	70 V	Voods, Go	od, HSG C	
	33,214	74 >	>75% Gras	s cover, Go	ood, HSG C
	61,889	72 V	Veighted A	verage	
	61,889	72 1	100.00% Pe	ervious Are	а
Tc	Length	Slope	Velocity	Capacity	Description
<u>(min)</u>	(feet)	(ft/ft)	(ft/sec)	(cfs)	
2.8	36	0.0560	0.21		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.36"
4.3	51	0.0390	0.20		Sheet Flow, B-C
					Grass: Short n= 0.150 P2= 3.36"
0.3	25	0.0800	1.41		Shallow Concentrated Flow, C-D
					Woodland Kv= 5.0 fps
6.5	297	0.0230	0.76		Shallow Concentrated Flow, D-E
					Woodland Kv= 5.0 fps
13.9	409	Total			

#### Subcatchment 8P: Pervious



#### **Summary for Subcatchment 9P: Pervious**

Runoff = 0.08 cfs @ 1.32 hrs, Volume= 188 cf, Depth= 0.06"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NJ DEP 2-hr WQ Rainfall=1.25"

Area (sf) CN Description		
5,369 70 Woods, Good,	, HSG C	
<u>31,027 74 &gt;75% Grass c</u>	cover, Go	od, HSG C
36,396 73 Weighted Ave	rage	
36,396 73 100.00% Perv	vious Area	a
Tc Length Slope Velocity C	Capacity	Description
(min) (feet) (ft/ft) (ft/sec)	(cfs)	
9.8 100 0.0190 0.17		Sheet Flow, A-B
		Grass: Short n= 0.150 P2= 3.36"
0.7 102 0.0240 2.49		Shallow Concentrated Flow, B-C
		Unpaved Kv= 16.1 fps
0.8 128 0.0310 2.83		Shallow Concentrated Flow, C-D
		Unpaved Kv= 16.1 fps
0.8 120 0.0250 2.55		Shallow Concentrated Flow, D-E
		Unpaved Kv= 16.1 fps
0.1 21 0.0310 2.83		Shallow Concentrated Flow, E-F
		Unpaved Kv= 16.1 fps

#### 12.2 471 Total

#### Subcatchment 9P: Pervious



### Summary for Pond B1: Bioretention Basin 1

[92] Warning: Device #2 is above defined storage

Inflow Area	a =	48,248 sf,	48.86% Impervious,	Inflow Depth = 0.54"	for WQ event
Inflow	=	1.39 cfs @	1.16 hrs, Volume=	2,184 cf	
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atter	n= 100%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 77.51' @ 2.65 hrs Surf.Area= 2,466 sf Storage= 2,184 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow) Center-of-Mass det. time= (not calculated: no outflow)

Volume	Inve	rt Avail.Sto	rage Storage	Description		
#1	76.5	0' 4,93	38 cf Custom	Stage Data (Coni	<b>c)</b> Listed below (Red	alc)
Elevatio	on S	Surf.Area	Inc.Store	Cum.Store	Wet.Area	
	əl) - 0	(sq-it)			<u>(sq-it)</u>	
76.5	50	1,883	0	0	1,883	
77.5	50	2,461	2,166	2,166	2,484	
78.5	50	3,096	2,772	4,938	3,146	
Device	Routing	Invert	Outlet Devices	6		
#1	Primary	73.00'	24.0" Round	CMP_Round 24"		
	ý		L= 10.0' CMF Inlet / Outlet Ir n= 0.013 Con	P, projecting, no he nvert= 73.00' / 72.8 crete pipe, bends	adwall, Ke= 0.900 5' S= 0.0150 '/' C & connections, Flov	c= 0.900 w Area= 3.14 sf
#2	Device 1	78.50'	<b>10.0' long x 1</b> Head (feet) 0. 2.50 3.00	1.0' breadth Broad 20 0.40 0.60 0.8	<b>I-Crested Rectang</b> 0 1.00 1.20 1.40	u <b>lar Weir</b> 1.60 1.80 2.00
			Coef. (English 3.30 3.31 3.3	) 2.69 2.72 2.75 2	2.85 2.98 3.08 3.	20 3.28 3.31
#3	Device 1	78.15'	<b>42.0" x 42.0"</b> C= 0.600 in 4 Limited to wei	Horiz. Orifice/Gra 2.0" x 42.0" Grate r flow at low heads	<b>te</b> (100% open area)	
Primary	OutFlow	Max=0.00 cfs @	0.00 hrs HW	=76.50' (Free Dis	charge)	

**\_\_1=CMP\_Round 24"** (Passes 0.00 cfs of 18.88 cfs potential flow)

-2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

-3=Orifice/Grate (Controls 0.00 cfs)

## Pond B1: Bioretention Basin 1



## Pond B1: Bioretention Basin 1



## Pond B1: Bioretention Basin 1



## Stage-Discharge for Pond B1: Bioretention Basin 1

Elevation	Primary (cfs)	Elevation	Primary (cfs)	Elevation	Primary (cfs)	Elevation	Primary (cfs)
76 50	0.00	77.03	0.00	77 56	0.00	78.09	0.00
76.50	0.00	77.03	0.00	77.57	0.00	78.00	0.00
76.52	0.00	77.05	0.00	77.58	0.00	78.10	0.00
76.53	0.00	77.06	0.00	77 59	0.00	78.12	0.00
76 54	0.00	77.07	0.00	77 60	0.00	78 13	0.00
76 55	0.00	77.08	0.00	77.61	0.00	78.16	0.00
76.56	0.00	77.09	0.00	77.62	0.00	78.15	0.00
76.57	0.00	77.10	0.00	77.63	0.00	78.16	0.05
76.58	0.00	77.11	0.00	77.64	0.00	78.17	0.13
76.59	0.00	77.12	0.00	77.65	0.00	78.18	0.24
76.60	0.00	77.13	0.00	77.66	0.00	78.19	0.37
76.61	0.00	77.14	0.00	77.67	0.00	78.20	0.51
76.62	0.00	77.15	0.00	77.68	0.00	78.21	0.67
76.63	0.00	77.16	0.00	77.69	0.00	78.22	0.85
76.64	0.00	77.17	0.00	77.70	0.00	78.23	1.04
76.65	0.00	77.18	0.00	77.71	0.00	78.24	1.24
76.66	0.00	77.19	0.00	77.72	0.00	78.25	1.45
76.67	0.00	77.20	0.00	77.73	0.00	78.26	1.67
76.68	0.00	77.21	0.00	77.74	0.00	78.27	1.90
76.69	0.00	77.22	0.00	77.75	0.00	78.28	2.15
76.70	0.00	77.23	0.00	77.76	0.00	78.29	2.40
76.71	0.00	77.24	0.00	11.11	0.00	78.30	2.66
76.72	0.00	77.25	0.00	77.70	0.00	78.31	2.93
70.73	0.00	77.20	0.00	77.80	0.00	70.32	3.21
76.74	0.00	77.28	0.00	77.81	0.00	78.33	3.30
76.76	0.00	77.20	0.00	77.82	0.00	78.35	4 09
76.77	0.00	77.30	0.00	77.83	0.00	78.36	4.41
76.78	0.00	77.31	0.00	77.84	0.00	78.37	4.72
76.79	0.00	77.32	0.00	77.85	0.00	78.38	5.05
76.80	0.00	77.33	0.00	77.86	0.00	78.39	5.38
76.81	0.00	77.34	0.00	77.87	0.00	78.40	5.72
76.82	0.00	77.35	0.00	77.88	0.00	78.41	6.07
76.83	0.00	77.36	0.00	77.89	0.00	78.42	6.42
76.84	0.00	77.37	0.00	77.90	0.00	78.43	6.78
76.85	0.00	77.38	0.00	77.91	0.00	78.44	7.15
76.86	0.00	77.39	0.00	77.92	0.00	78.45	7.52
/6.8/	0.00	77.40	0.00	77.93	0.00	78.46	7.90
76.88	0.00	77.41	0.00	77.94	0.00	78.47	8.29
76.89	0.00	77.42	0.00	77.95	0.00	78.48	8.68
76.90	0.00	77.43	0.00	77.90	0.00	70.49	9.08
76.91	0.00	77.44	0.00	77.97	0.00	70.00	9.40
76.92	0.00	77.45	0.00	77.90	0.00		
76.93	0.00	77.40	0.00	78.00	0.00		
76.94	0.00	77.47	0.00	78.00	0.00		
76.96	0.00	77.40	0.00	78.02	0.00		
76.97	0.00	77.50	0.00	78.03	0.00		
76.98	0.00	77.51	0.00	78.04	0.00		
76.99	0.00	77.52	0.00	78.05	0.00		
77.00	0.00	77.53	0.00	78.06	0.00		
77.01	0.00	77.54	0.00	78.07	0.00		
77.02	0.00	77.55	0.00	78.08	0.00		
				1			

Elevation	Surface	Storage	Elevation	Surface	Storage
(feet)	(sq-ft)	(cubic-feet)	(feet)	(sq-ft)	(cubic-feet)
76.50	1,883	0	77.56	2,497	2,314
76.52	1,894	38	77.58	2,509	2,364
76.54	1,905	76	77.60	2,521	2,415
76.56	1,916	114	77.62	2,533	2,465
76.58	1,926	152	77.64	2,546	2,516
76.60	1,937	191	77.66	2,558	2,567
76.62	1,948	230	77.68	2,570	2,618
76.64	1,959	269	77.70	2,582	2,670
76.66	1,970	308	77.72	2,594	2,722
76.68	1,981	348	77.74	2,607	2,774
76.70	1,992	387	//./6	2,619	2,826
76.72	2,004	427	//./8	2,631	2,878
/6./4	2,015	468	77.80	2,644	2,931
76.76	2,026	508	77.82	2,656	2,984
76.78	2,037	549	77.84	2,669	3,037
76.80	2,048	590	77.86	2,681	3,091
76.82	2,060	631	77.88	2,694	3,145
76.84	2,071	672	77.90	2,706	3,199
76.86	2,082	713	77.92	2,719	3,253
76.88	2,094	755	77.94	2,731	3,307
76.90	2,105	797	77.96	2,744	3,302
70.92	2,110	839	77.98	2,757	3,417
70.94	2,128	882	78.00	2,709	3,472
70.90	2,139	924	70.02	2,702	3,320
70.90	2,101	907	70.04	2,790	3,304
77.00	2,102	1,011	70.00	2,000	3,040
77.02	2,174	1,004	70.00	2,020	3,090
77.04	2,100	1,097	70.10	2,033	3,755
77.00	2,197	1,141	70.12	2,040	3,009
77.00	2,209	1,100	70.14	2,009	3,000
77.10	2,221	1,230	70.10	2,072	3 081
77 1/	2,232	1,274	78.10	2,000	1 030
77.14	2,244	1 364	78.20	2,030	4,000
77.10	2,250	1,004	78.24	2,911	4,037
77.10	2,200	1,405	78.24	2,324	4,130
77.20	2,273	1,400	78.28	2,957	4,214
77 24	2,201	1,500	78.30	2,000	4 332
77.24	2,303	1,540	78.30	2,905	4,302
77.20	2,313	1,535	78.34	2,970	4,052
77.30	2,327	1,000	78.36	2,990	4,401
77 32	2,000	1,000	78.38	3,000	4,511
77.34	2,001	1 780	78.40	3 029	4 632
77.36	2,000	1,700	78.40	3 043	4,002
77 38	2,373	1 875	78.44	3 056	4 753
77 40	2,000	1 022	78.46	3 060	4,700 1 815
77 42	2,400	1 071	78 48	3 083	4,015
77 44	2,712	2 010	78 50	3 096	4,070 1 928
77 46	2,727	2,013	10.00	3,030	7,330
77 48	2,400	2,000			
77 50	2,443	2,110			
77.52	2,473	2,100			
77.54	2,485	2,210			

2,264

## Stage-Area-Storage for Pond B1: Bioretention Basin 1

### Summary for Pond B2: Bioretention Basin 2

[79] Warning: Submerged Pond B1 Primary device # 1 INLET by 3.94'

Inflow Are	a =	97,279 sf,	60.64% Impervious,	Inflow Depth = 0.39"	for WQ event
Inflow	=	2.06 cfs @	1.16 hrs, Volume=	3,137 cf	
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atter	n= 100%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 76.94' @ 2.65 hrs Surf.Area= 7,437 sf Storage= 3,137 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow) Center-of-Mass det. time= (not calculated: no outflow)

Volume	Inve	rt Avail.Sto	rage Storage	Description	
#1	76.50	)' 26,64	17 cf Custom	Stage Data (Pr	rismatic)Listed below (Recalc)
Elevatio	on S	Surf.Area	Inc.Store	Cum.Store	
(tee	et)	(sq-tt)	(cubic-feet)	(cubic-teet)	
76.5	50	6,877	0	0	
77.5	50	8,155	7,516	7,516	
78.5	50	9,522	8,839	16,355	
79.5	50	11,063	10,293	26,647	
Device	Routing	Invert	Outlet Devices	S	
#1	Primary	73.00'	15.0" Round	Culvert	
			L= 47.0° CMI	P, projecting, no overt= 73 00' / 7	) headwall, Ke= 0.900 2 06' S= 0.0200 '/' Cc= 0.900
			n= 0.011 Cor	icrete pipe, strai	ight & clean, Flow Area= 1.23 sf
#2	Device 1	76.94'	6.0" Vert. Ori	fice/Grate X 3.0	<b>0</b> C= 0.600
#3	Device 1	77.78'	4.0' long x 0.	5' breadth Broa	ad-Crested Rectangular Weir
			Head (feet) 0	.20 0.40 0.60	0.80 1.00
			Coef. (English	) 2.80 2.92 3.	08 3.30 3.32
#4	Device 1	79.25'	42.0" x 42.0"	Horiz. Orifice/O	Grate
			C= 0.600 in 4	2.0" x 42.0" Gra	ate (100% open area)
			Limited to wei	r flow at low hea	ads , , ,

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=76.50' (Free Discharge)

-1=Culvert (Passes 0.00 cfs of 7.91 cfs potential flow)

2=Orifice/Grate (Controls 0.00 cfs)

-3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

-4=Orifice/Grate (Controls 0.00 cfs)

Pond B2: Bioretention Basin 2











## Stage-Discharge for Pond B2: Bioretention Basin 2

Elevation	Primary	Elevation	Primary	Elevation	Primary
			(CIS)		
70.50	0.00	77.50	1.73	78.02	10.43
70.52	0.00	77.60	1.//	70.04	10.45
76.54	0.00	77.62	1.02	78.68	10.47
76.58	0.00	77.64	1.00	78.00	10.43
76.60	0.00	77.66	1.00	78.70	10.51
76.62	0.00	77.68	1.99	78.74	10.55
76.64	0.00	77.70	2.03	78.76	10.57
76.66	0.00	77.72	2.06	78.78	10.59
76.68	0.00	77.74	2.10	78.80	10.61
76.70	0.00	77.76	2.14	78.82	10.63
76.72	0.00	77.78	2.18	78.84	10.65
76.74	0.00	77.80	2.25	78.86	10.67
76.76	0.00	77.82	2.34	/8.88	10.69
76.78	0.00	77.84	2.45	78.90	10.71
70.00	0.00	77.00	2.00	70.92	10.73
76.84	0.00	77.00	2.71	78.94	10.75
76.86	0.00	77.92	3.01	78.98	10.77
76.88	0.00	77.94	3.17	79.00	10.82
76.90	0.00	77.96	3.34	79.02	10.84
76.92	0.00	77.98	3.52	79.04	10.86
76.94	0.00	78.00	3.71	79.06	10.88
76.96	0.00	78.02	3.91	79.08	10.90
76.98	0.02	78.04	4.12	79.10	10.92
77.00	0.03	78.06	4.33	79.12	10.94
77.02	0.06	78.08	4.56	/9.14	10.96
77.04	0.09	78.10	4.79	79.16	10.97
77.00	0.13	70.1Z 70.17	5.02 5.27	79.10	10.99
77.00	0.17	70.14	5.27	79.20	11.01
77.10	0.22	78.10	5 78	79.22	11.05
77.14	0.34	78.20	6.05	79.26	11.07
77.16	0.40	78.22	6.32	79.28	11.09
77.18	0.47	78.24	6.61	79.30	11.11
77.20	0.54	78.26	6.90	79.32	11.13
77.22	0.61	78.28	7.20	79.34	11.15
77.24	0.69	78.30	7.51	79.36	11.17
77.26	0.77	78.32	7.83	79.38	11.19
77.28	0.85	78.34	8.15	79.40	11.21
77.30	0.93	78.30	8.48	79.42	11.23
77 34	1.01	78.30	0.02	79.44	11.25
77.36	1.00	78.40	9.54	79.48	11.27
77.38	1.24	78.44	9.92	79.50	11.31
77.40	1.31	78.46	10.26		
77.42	1.37	78.48	10.28		
77.44	1.42	78.50	10.30		
77.46	1.47	78.52	10.32		
77.48	1.53	78.54	10.34		
11.50	1.58	/8.56	10.36		
11.5Z 77.57	1.03	1 0.50 79 60	10.38		
11.04	1.00	10.00	10.40		

Elevation	Surface	Storage	Elevation	Surface	Storage
(feet)	(sq-ft)	(cubic-feet)	(feet)	(sq-ft)	(cubic-feet)
76.50	6,877	0	79.15	10,524	22,869
76.55	6,941	345	79.20	10,601	23,397
76.60	7.005	694	79.25	10.678	23,929
76.65	7.069	1.046	79.30	10.755	24,465
76 70	7 133	1 401	79 35	10,832	25,005
76 75	7 197	1 759	79.40	10,909	25,548
76.80	7 260	2 121	79.45	10,986	26,096
76.85	7,200	2 485	79.50	11 063	26,600
76.00	7 388	2,100	10.00	11,000	20,041
76.00	7,000	3 224			
77.00	7,402	3 508			
77.05	7,580	3 976			
77.10	7,644	4 356			
77.10	7,044	4,330			
77.20	7,700	5 127			
77.25	7,836	5 517			
77.30	7,000	5 011			
77 35	7,000	6 307			
77.40	8 027	6 707			
77.40	8 001	7 110			
77.50	9 155	7,110			
77.50	0,100	7,510			
77.60	0,223	7,920			
77.65	0,292	0,330			
77.05	0,300	0,755			
77.75	0,420 8.407	9,174			
77.80	8 565	9,597			
77.85	8,505	10,024			
77.00	8 702	10,434			
77.05	8 770	11 224			
78.00	0,770	11,324			
78.00	0,039	12 202			
78.05	8,907	12,200			
70.10	0,975	12,000			
70.15	9,044	13,100			
70.20	9,112	13,559			
78.20	9,100	14,017			
70.30	9,249	14,477			
70.33	9,317	14,942			
70.40	9,305	15,409			
70.45	9,404	15,000			
70.00	9,522	10,000			
70.00	9,099	10,000			
70.00	9,070	17,314			
78.05	9,755	18,000			
70.70	9,030	10,290			
10.10 70 00	9,907	10,/03			
10.0U 70 05	9,904 10.061	19,200			
10.00 70 00	10,001	19,102			
10.90	10,130	20,201			
10.90	10,215	20,790			
79.00	10,293	21,308			
79.00	10,370	Z 1,825			
79.10	10,447	22,343			

## Stage-Area-Storage for Pond B2: Bioretention Basin 2

### Summary for Pond B3: Bioretention Basin 3

[92] Warning: Device #2 is above defined storage

Inflow Area	=	11,722 sf,	41.82% Impervious,	Inflow Depth = $0.48$	3" for WQ event
Inflow	=	0.22 cfs @	1.29 hrs, Volume=	466 cf	
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, At	ten= 100%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Secondary	=	0.00 cfs @	0.00 hrs, Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 80.73' @ 3.25 hrs Surf.Area= 832 sf Storage= 466 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow) Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Stor	rage Storage	Description					
#1	79.98'	69	94 cf Custom	Stage Data (Coni	<b>c)</b> Listed below (Reca	ılc)			
Elevatio (fee	on Sui et)	f.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)				
79.9 80.9	98 98	432 995	0 694	0 694	432 1,003				
Device	Routing	Invert	Outlet Devices	S					
#1 #2 #3	Primary Secondary Device 1	77.48' 80.98' 80.74'	<b>15.0" Round</b> L= 96.0' CMI Inlet / Outlet In n= 0.013 Corr <b>15.0' long x</b> Head (feet) 0 2.50 3.00 Coef. (English 3.30 3.31 3.3 <b>42.0" x 42.0"</b>	<b>CMP_Round 15</b> " P, projecting, no he nvert= 77.48' / 77.0 increte pipe, bends ( <b>1.0' breadth Broad</b> .20 0.40 0.60 0.8 () 2.69 2.72 2.75 32 <b>Horiz. Orifice/Gra</b>	eadwall, Ke= 0.900 0' S= 0.0050 '/' Co & connections, Flow <b>I-Crested Rectangu</b> 0 1.00 1.20 1.40 1 2.85 2.98 3.08 3.2 <b>te</b>	≔ 0.900 Area= 1.23 sf l <b>ar Weir</b> .60 1.80 2.00 0 3.28 3.31			
Primary	<ul> <li>#3 Device 1 80.74' 42.0" x 42.0" Horiz. Orifice/Grate C= 0.600 in 42.0" x 42.0" Grate (100% open area) Limited to weir flow at low heads</li> <li>Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=79.98' (Free Discharge) -1=CMP_Round 15" (Passes 0.00 cfs of 6.37 cfs potential flow)</li> </ul>								
Şecond	ary OutFlow	Max=0.00 cf	s @ 0.00 hrs H	HW=79.98' (Free I	Discharge)				

**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B3: Bioretention Basin 3











## Stage-Discharge for Pond B3: Bioretention Basin 3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
79.98	0.00	0.00	0.00	80.51	0.00	0.00	0.00
79.99	0.00	0.00	0.00	80.52	0.00	0.00	0.00
80.00	0.00	0.00	0.00	80.53	0.00	0.00	0.00
80.01	0.00	0.00	0.00	80.54	0.00	0.00	0.00
80.02	0.00	0.00	0.00	80.55	0.00	0.00	0.00
80.03	0.00	0.00	0.00	80.56	0.00	0.00	0.00
80.04	0.00	0.00	0.00	80.57	0.00	0.00	0.00
80.05	0.00	0.00	0.00	80.58	0.00	0.00	0.00
80.06	0.00	0.00	0.00	80.59	0.00	0.00	0.00
80.07	0.00	0.00	0.00	80.60	0.00	0.00	0.00
80.08	0.00	0.00	0.00	80.61	0.00	0.00	0.00
80.09	0.00	0.00	0.00	80.62	0.00	0.00	0.00
80.10	0.00	0.00	0.00	80.63	0.00	0.00	0.00
80.11	0.00	0.00	0.00	80.64	0.00	0.00	0.00
80.12	0.00	0.00	0.00	80.65	0.00	0.00	0.00
80.13	0.00	0.00	0.00	80.66	0.00	0.00	0.00
80.14	0.00	0.00	0.00	80.67	0.00	0.00	0.00
80.15	0.00	0.00	0.00	80.68	0.00	0.00	0.00
80.16	0.00	0.00	0.00	80.69	0.00	0.00	0.00
80.17	0.00	0.00	0.00	80.70	0.00	0.00	0.00
80.18	0.00	0.00	0.00	80.71	0.00	0.00	0.00
80.19	0.00	0.00	0.00	80.72	0.00	0.00	0.00
00.20	0.00	0.00	0.00	00.73	0.00	0.00	0.00
80.22	0.00	0.00	0.00	80.74	0.00	0.00	0.00
80.22	0.00	0.00	0.00	80.76	0.00	0.03	0.00
80.24	0.00	0.00	0.00	80.77	0.10	0.10	0.00
80.25	0.00	0.00	0.00	80.78	0.37	0.37	0.00
80.26	0.00	0.00	0.00	80.79	0.51	0.51	0.00
80.27	0.00	0.00	0.00	80.80	0.67	0.67	0.00
80.28	0.00	0.00	0.00	80.81	0.85	0.85	0.00
80.29	0.00	0.00	0.00	80.82	1.04	1.04	0.00
80.30	0.00	0.00	0.00	80.83	1.24	1.24	0.00
80.31	0.00	0.00	0.00	80.84	1.45	1.45	0.00
80.32	0.00	0.00	0.00	80.85	1.67	1.67	0.00
80.33	0.00	0.00	0.00	80.86	1.90	1.90	0.00
80.34	0.00	0.00	0.00	80.87	2.15	2.15	0.00
80.35	0.00	0.00	0.00	80.88	2.40	2.40	0.00
80.30	0.00	0.00	0.00	80.89	2.00	2.00	0.00
00.37 90.39	0.00	0.00	0.00	80.90	2.93	2.93	0.00
80.30	0.00	0.00	0.00	80.91	3.21	3.21	0.00
80.40	0.00	0.00	0.00	80.93	3 79	3 79	0.00
80.40	0.00	0.00	0.00	80.94	4 09	4 09	0.00
80.42	0.00	0.00	0.00	80.95	4.41	4.41	0.00
80.43	0.00	0.00	0.00	80.96	4.72	4.72	0.00
80.44	0.00	0.00	0.00	80.97	5.05	5.05	0.00
80.45	0.00	0.00	0.00	80.98	5.38	5.38	0.00
80.46	0.00	0.00	0.00				
80.47	0.00	0.00	0.00				
80.48	0.00	0.00	0.00				
80.49	0.00	0.00	0.00				
ðU.5U	0.00	0.00	0.00				

Elevation	Surface	Storage	Elevation	Surface	Storage
(feet)	(sq-ft)	(cubic-feet)	(feet)	(sq-ft)	(cubic-feet)
79.98	432	0	80.51	702	298
79.99	436	4	80.52	707	305
80.00	441	9	80.53	713	312
80.01	446	13	80.54	719	319
80.02	450	18	80.55	725	326
80.03	455	22	80.56	730	333
80.04	459	27	80.57	736	341
80.05	464	31	80.58	742	348
80.06	469	36	80.59	748	355
80.07	473	41	80.60	754	363
80.08	478	45	80.61	760	371
80.09	483	50	80.62	766	378
80.10	487	55	80.63	772	386
80.11	492	60 05	80.64	//8	394
80.12	497	65	80.65	784	401
80.13	50Z	70	80.00	790	409
80.14	507	75	80.67	790	417
00.10 90.16	516	00 85	80.00	002 808	420
80.10	521	00	80.09	814	433
80.18	526	90	80.70	820	441
80.10	520	101	80.72	826	458
80.20	536	101	80.73	833	466
80.20	541	112	80 74	839	400
80.22	546	117	80.75	845	483
80.23	551	123	80.76	851	491
80.24	556	128	80.77	858	500
80.25	561	134	80.78	864	508
80.26	566	139	80.79	870	517
80.27	571	145	80.80	877	526
80.28	577	151	80.81	883	535
80.29	582	157	80.82	889	544
80.30	587	162	80.83	896	552
80.31	592	168	80.84	902	561
80.32	597	174	80.85	909	571
80.33	603	180	80.86	915	580
80.34	608	186	80.87	922	589
80.35	613	192	80.88	928	598
80.36	619	199	80.89	935	607
80.37	624	205	80.90	941	617
80.38	629	211	80.91	948	626
80.39	030	217	80.92	900	030
00.40	640	224	00.93	901	040 655
00.41 90.42	651	230	80.94 80.05	900	665
80.42	657	207	80.95	081	674
80.43	662	243	80.90	901	684
80.44	668	250	80.97	900 905	604 604
80.46	673	263	00.30	335	034
80 47	679	200			
80 48	685	270			
80.49	690	284			

80.50

696

291

## Stage-Area-Storage for Pond B3: Bioretention Basin 3

# Summary for Link 5E: EDA 1

Inflow A	rea =	178,053 sf,	5.81% Impervious,	Inflow Depth = $0.16$ "	for WQ event
Inflow	=	1.15 cfs @	1.24 hrs, Volume=	2,308 cf	
Primary	/ =	1.15 cfs @	1.24 hrs, Volume=	2,308 cf, Atte	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

#### Link 5E: EDA 1



# Summary for Link 6E: EDA 2

Inflow A	Area =	31,726 sf,	17.78% Impervious,	Inflow Depth = 0.49	" for WQ event
Inflow	=	1.03 cfs @	1.12 hrs, Volume=	1,291 cf	
Primary	/ =	1.03 cfs @	1.12 hrs, Volume=	1,291 cf, Att	ten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

# Link 6E: EDA 2



# Summary for Link 7E: EDA

Inflow A	rea =	209,779 sf,	7.62% Impervious,	Inflow Depth = 0.21"	for WQ event
Inflow	=	1.82 cfs @	1.17 hrs, Volume=	3,598 cf	
Primary	=	1.82 cfs @	1.17 hrs, Volume=	3,598 cf, Atte	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

#### Link 7E: EDA



# Summary for Link 10P: PDA 1A

Inflow .	Area	ı =	97,279 sf,	60.64% Impervious,	Inflow Depth = 0.00"	for WQ event
Inflow		=	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Primar	у	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Link 10P: PDA 1A



# Summary for Link 11P: PDA 1B

Inflow A	Area =	•	11,722 sf,	41.82% Impervious,	Inflow Depth = 0.00"	for WQ event
Inflow	=		0.00 cfs @	0.00 hrs, Volume=	0 cf	
Primary	/ =		0.00 cfs @	0.00 hrs, Volume=	0 cf, Atte	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Link 11P: PDA 1B



## Summary for Link 12P: PDA 1C

Inflow /	Area	ı =	64,382 sf,	3.87% Imperviou	s, Inflow Depth =	0.09"	for WQ	event
Inflow		=	0.19 cfs @	1.28 hrs, Volume	= 479 ct	f		
Primary	у	=	0.19 cfs @	1.28 hrs, Volume	= 479 cf	f, Attei	n= 0%, L	.ag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

#### Link 12P: PDA 1C



# Summary for Link 13P: PDA 1

Inflow A	rea =	173,383 sf,	38.29% Impervious,	Inflow Depth = $0.03$ "	for WQ event
Inflow	=	0.19 cfs @	1.28 hrs, Volume=	479 cf	
Primary	=	0.19 cfs @	1.28 hrs, Volume=	479 cf, Atte	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

#### Link 13P: PDA 1



## Summary for Link 14P: PDA 2

Inflow A	Area	ı =		36,396 sf,	0.00% Ir	npervious,	Inflow Depth =	0.0	6" for W	/Q event	
Inflow		=	0	.08 cfs @	1.32 hrs,	Volume=	188 c	f			
Primar	у	=	0	.08 cfs @	1.32 hrs,	Volume=	188 c	f, A	tten= 0%,	Lag= 0.0 ı	min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

#### Link 14P: PDA 2



# Summary for Link 15P: PDA

Inflow A	Area	=	209,779 sf,	31.65% Imp	pervious,	Inflow Depth =	0.04"	for W	Q event	
Inflow		=	0.27 cfs @	1.30 hrs, V	/olume=	666 c	f			
Primary	<b>y</b> :	=	0.27 cfs 🥘	1.30 hrs, V	/olume=	666 c	f, Atter	ו= 0%,	Lag= 0.0 mir	۱

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

#### Link 15P: PDA



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1E: Impervious	Runoff Area=10,351 sf 100.00% Impervious Runoff Depth=3.13" Tc=12.4 min CN=0/98 Runoff=0.68 cfs 2,697 cf
Subcatchment1P: Impervious	Runoff Area=23,576 sf 100.00% Impervious Runoff Depth=3.13" Tc=10.7 min CN=0/98 Runoff=1.61 cfs 6,143 cf
Subcatchment2E: Pervious	Runoff Area=167,702 sf 0.00% Impervious Runoff Depth=1.26" Flow Length=630' Tc=12.4 min CN=76/0 Runoff=4.94 cfs 17,674 cf
Subcatchment2P: Pervious	Runoff Area=24,672 sf 0.00% Impervious Runoff Depth=1.14" Flow Length=426' Tc=10.7 min CN=74/0 Runoff=0.68 cfs 2,353 cf
Subcatchment3E: Impervious	Runoff Area=5,641 sf 100.00% Impervious Runoff Depth=3.13" Tc=6.0 min CN=0/98 Runoff=0.45 cfs 1,470 cf
Subcatchment3P: Roof Area	Runoff Area=35,418 sf 100.00% Impervious Runoff Depth=3.13" Tc=10.7 min CN=0/98 Runoff=2.42 cfs 9,229 cf
Subcatchment4E: Pervious	Runoff Area=26,085 sf 0.00% Impervious Runoff Depth=2.06" Flow Length=393' Tc=6.0 min CN=87/0 Runoff=1.55 cfs 4,471 cf
Subcatchment4P: Pervious	Runoff Area=13,613 sf 0.00% Impervious Runoff Depth=1.14" Tc=10.7 min CN=74/0 Runoff=0.38 cfs 1,298 cf
Subcatchment 5P: Impervious	Runoff Area=5,021 sf 97.63% Impervious Runoff Depth=3.12" Tc=20.8 min CN=96/98 Runoff=0.27 cfs 1,306 cf
Subcatchment6P: Pervious	Runoff Area=6,701 sf 0.00% Impervious Runoff Depth=1.09" Flow Length=172' Tc=20.8 min CN=73/0 Runoff=0.13 cfs 607 cf
Subcatchment7P: Impervious	Runoff Area=2,493 sf 100.00% Impervious Runoff Depth=3.13" Tc=13.9 min CN=0/98 Runoff=0.16 cfs 650 cf
Subcatchment8P: Pervious	Runoff Area=61,889 sf 0.00% Impervious Runoff Depth=1.03" Flow Length=409' Tc=13.9 min CN=72/0 Runoff=1.36 cfs 5,314 cf
Subcatchment9P: Pervious	Runoff Area=36,396 sf 0.00% Impervious Runoff Depth=1.09" Flow Length=471' Tc=12.2 min CN=73/0 Runoff=0.91 cfs 3,296 cf
Pond B1: Bioretention Basin 1	Peak Elev=78.24' Storage=4,156 cf Inflow=2.29 cfs 8,496 cf Outflow=1.24 cfs 4,601 cf
Pond B2: Bioretention Basin 2	Peak Elev=77.37' Storage=6,451 cf Inflow=2.75 cfs 15,128 cf Outflow=1.20 cfs 11,962 cf
Pond B3: Bioretention Basin 3 Primary=	Peak Elev=80.78' Storage=510 cf Inflow=0.40 cfs 1,913 cf 0.40 cfs 1,439 cf Secondary=0.00 cfs 0 cf Outflow=0.40 cfs 1,439 cf

 Pre vs Post
 NOAA

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Link 5E: EDA 1	Inflow=5.61 cfs 20,371 cf Primary=5.61 cfs 20,371 cf
Link 6E: EDA 2	Inflow=2.00 cfs 5,941 cf Primary=2.00 cfs 5,941 cf
Link 7E: EDA	Inflow=6.99 cfs 26,313 cf Primary=6.99 cfs 26,313 cf
Link 10P: PDA 1A	Inflow=1.20 cfs 11,962 cf Primary=1.20 cfs 11,962 cf
Link 11P: PDA 1B	Inflow=0.40 cfs 1,439 cf Primary=0.40 cfs 1,439 cf
Link 12P: PDA 1C	Inflow=1.52 cfs 5,964 cf Primary=1.52 cfs 5,964 cf
Link 13P: PDA 1	Inflow=2.43 cfs 19,365 cf Primary=2.43 cfs 19,365 cf
Link 14P: PDA 2	Inflow=0.91 cfs 3,296 cf Primary=0.91 cfs 3,296 cf
Link 15P: PDA	Inflow=3.25 cfs 22,660 cf Primary=3.25 cfs 22,660 cf

Total Runoff Area = 419,558 sf Runoff Volume = 56,508 cf Average Runoff Depth = 1.62" 80.36% Pervious = 337,177 sf 19.64% Impervious = 82,381 sf

### Summary for Subcatchment 1E: Impervious

Runoff = 0.68 cfs @ 12.20 hrs, Volume= 2,697 cf, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2-Year Rainfall=3.36"



## Summary for Subcatchment 1P: Impervious

Runoff = 1.61 cfs @ 12.18 hrs, Volume= 6,143 cf, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2-Year Rainfall=3.36"

23,576         98         Paved parking, HSG C           23,576         98         100.00% Impervious Area	
23,576 98 100.00% Impervious Area	
TcLengthSlopeVelocityCapacityDescription(min)(feet)(ft/ft)(ft/sec)(cfs)	
10.7 Direct Entry, Tc	
Subcatchment 1P: Impervious	
Hydrograph	
(S) Mu (S) Mu	I
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 Time (hours)	

### **Summary for Subcatchment 2E: Pervious**

Runoff = 4.94 cfs @ 12.21 hrs, Volume= 17,674 cf, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2-Year Rainfall=3.36"

A	rea (sf)	CN D	Description					
24,589		96 G	Gravel surfa	ace, HSG (				
	36,591		Woods, Good, HSG C					
1	05,816	74 >	>75% Grass cover, Good, HSG C					
	706	72 V	Woods/grass comb., Good, HSG C					
1	67,702	76 V	6 Weighted Average					
1	67,702	76 1	00.00% Pe	ervious Are	а			
Тс	Length	Slope	Velocity	Capacity	Description			
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)				
0.3	27	0.0490	1.55		Sheet Flow, A-B			
					Smooth surfaces n= 0.011 P2= 3.36"			
8.8	73	0.0130	0.14		Sheet Flow, B-C			
					Grass: Short n= 0.150 P2= 3.36"			
0.4	54	0.0180	2.16		Shallow Concentrated Flow, C-D			
					Unpaved Kv= 16.1 fps			
1.2	207	0.0340	2.97		Shallow Concentrated Flow, D-E			
					Unpaved Kv= 16.1 fps			
0.5	59	0.0170	2.10		Shallow Concentrated Flow, E-F			
					Unpaved Kv= 16.1 fps			
0.2	43	0.0470	3.49		Shallow Concentrated Flow, F-G			
					Unpaved Kv= 16.1 fps			
1.0	167	0.0280	2.69		Shallow Concentrated Flow, G-H			
					Unpaved Kv= 16.1 tps			
12.4	630	Total						

### Subcatchment 2E: Pervious



### **Summary for Subcatchment 2P: Pervious**

Runoff = 0.68 cfs @ 12.19 hrs, Volume= 2,353 cf, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2-Year Rainfall=3.36"

A	rea (sf)	CN E	Description					
22,852		74 >	75% Gras	s cover, Go	ood, HSG C			
	1,820		Woods/grass comb., Good, HSG C					
24,672		74 V	Weighted Average					
	24,672		4 100.00% Pervious Area					
-				<b>o</b>				
	Length	Slope	Velocity	Capacity	Description			
(min)	(feet)	(ft/ft)	(ft/sec)	(CfS)				
9.2	100	0.0222	0.18		Sheet Flow, A-B			
					Grass: Short n= 0.150 P2= 3.36"			
0.1	23	0.0730	4.35		Shallow Concentrated Flow, B-C			
					Unpaved Kv= 16.1 fps			
0.3	48	0.0210	2.94		Shallow Concentrated Flow, C-D			
					Paved Kv= 20.3 fps			
1.1	255	0.0050	3.72	4.57	Pipe Channel, D-E			
					15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'			
					n= 0.013 Concrete pipe, bends & connections			
10.7	426	Total						

## Subcatchment 2P: Pervious



## Summary for Subcatchment 3E: Impervious

Runoff = 0.45 cfs @ 12.13 hrs, Volume= 1,470 cf, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2-Year Rainfall=3.36"

A	rea (sf)	CN	Description						
	2,580	98 Unconnected roofs, HSG C							
	3,061	98	3 Paved parking, HSG C						
	5,641	98	98 Weighted Average						
	5,641	98 100.00% Impervious Area							
Tc	Length	Slop	e Velocity	Capacity	Description				
(min)	(feet)	(ft/f	t) (ft/sec)	(cfs)					
3.0					Direct Entry, Tc				
3.0	0	Total, Increased to minimum Tc = 6.0 min							

#### Subcatchment 3E: Impervious




#### Summary for Subcatchment 3P: Roof Area

Runoff = 2.42 cfs @ 12.18 hrs, Volume= 9,229 cf, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2-Year Rainfall=3.36"



#### **Summary for Subcatchment 4E: Pervious**

Runoff = 1.55 cfs @ 12.13 hrs, Volume= 4,471 cf, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2-Year Rainfall=3.36"

	A	rea (sf)	CN E	Description		
		164	70 V	Voods, Go	od, HSG C	
		16,189	96 C	Gravel surfa	ace, HSG C	
		5,108	74 >	75% Gras	s cover, Go	ood, HSG C
		4,624	72 V	Voods/gras	ss comb., G	Good, HSG C
		26,085	87 V	Veighted A	verage	
		26,085	87 1	00.00% Pe	ervious Are	a
	Tc	Length	Slope	Velocity	Capacity	Description
(	min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	1.3	100	0.0160	1.29		Sheet Flow, A-B
						Smooth surfaces n= 0.011 P2= 3.36"
	0.6	97	0.0200	2.87		Shallow Concentrated Flow, B-C
						Paved Kv= 20.3 fps
	1.0	175	0.0330	2.92		Shallow Concentrated Flow, C-D
	0.4	40	0 0000	0.44		Unpaved Kv= 16.1 fps
	0.1	13	0.0230	2.44		Shallow Concentrated Flow, D-E
	0.0	0	0 0 4 9 0	2 5 2		Onpaved KV= 16.1 lps Shellow Concentrated Flow F F
	0.0	8	0.0480	3.53		Shallow Concentrated Flow, E-F
			<b>T</b> ( ) )			
	3.0	393	I otal, I	ncreased t	o minimum	1 c = 6.0 min

#### Subcatchment 4E: Pervious



#### **Summary for Subcatchment 4P: Pervious**

Runoff = 0.38 cfs @ 12.19 hrs, Volume= 1,298 cf, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2-Year Rainfall=3.36"

Are	ea (sf)	CN	Description			
1	3,613	74	>75% Gras	s cover, Go	ood, HSG C	
1	3,613	74	100.00% Pe	ervious Are	а	
Tc (min)	Length (feet)	Slope (ft/ft	e Velocity ) (ft/sec)	Capacity (cfs)	Description	
10.7		•	, , , , , , , , , , , , , , , , , , , ,	, <i>i</i>	Direct Entry, Tc	

#### Subcatchment 4P: Pervious



#### Summary for Subcatchment 5P: Impervious

Runoff = 0.27 cfs @ 12.29 hrs, Volume= 1,306 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2-Year Rainfall=3.36"

A	rea (sf)	CN	Description				
	4,902	98	Paved park	ing, HSG C	2		
	119	96	Gravel surfa	ace, HSG C			
	5,021	98	Weighted A	verage			
	119	96	2.37% Pervious Area				
	4,902	98	97.63% Imp	pervious Are	ea		
_		~		•	<b>_</b>		
Tc	Length	Slop	e Velocity	Capacity	Description		
(min)	(feet)	(ft/f	t) (ft/sec)	(cfs)			
20.8					Direct Entry, Tc		

## Subcatchment 5P: Impervious



#### **Summary for Subcatchment 6P: Pervious**

Runoff = 0.13 cfs @ 12.32 hrs, Volume= 607 cf, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2-Year Rainfall=3.36"

A	rea (sf)	CN	Description		
	4,509	74	>75% Gras	s cover, Go	bod, HSG C
	2,192	70	Woods, Go	od, HSG C	
	6,701	73	Weighted A	verage	
	6,701	73	100.00% P	ervious Are	а
Тс	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
20.4	104	0.0230	0.08		Sheet Flow, A-B
					Woods: Light underbrush n= 0.400 P2= 3.36"
0.3	57	0.0230	3.08		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
0.1	11	0.0200	2.28		Shallow Concentrated Flow, C-D
					Unpaved Kv= 16.1 fps
20.8	172	Total			

#### Subcatchment 6P: Pervious



#### Summary for Subcatchment 7P: Impervious

Runoff = 0.16 cfs @ 12.21 hrs, Volume= 650 cf, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2-Year Rainfall=3.36"

Area	a (sf)	CN	Description			
2	2,493	98	Paved park	ing, HSG C	2	
2	2,493 98 100.00% Impervious Area					
Tc L (min)	ength (feet)	Slope (ft/ft	e Velocity ) (ft/sec)	Capacity (cfs)	Description	
13.9	Direct Entry, Tc					
Subcatchment 7P: Impervious						



#### **Summary for Subcatchment 8P: Pervious**

Runoff = 1.36 cfs @ 12.24 hrs, Volume= 5,314 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2-Year Rainfall=3.36"

A	rea (sf)	CN E	Description		
	28,675	70 V	Voods, Goo	od, HSG C	
	33,214	74 >	75% Grass	s cover, Go	ood, HSG C
	61,889	72 V	Veighted A	verage	
	61,889	72 1	00.00% Pe	ervious Are	а
Tc	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
2.8	36	0.0560	0.21		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.36"
4.3	51	0.0390	0.20		Sheet Flow, B-C
					Grass: Short n= 0.150 P2= 3.36"
0.3	25	0.0800	1.41		Shallow Concentrated Flow, C-D
					Woodland Kv= 5.0 fps
6.5	297	0.0230	0.76		Shallow Concentrated Flow, D-E
					Woodland Kv= 5.0 fps
13.9	409	Total			

#### **Subcatchment 8P: Pervious**



#### **Summary for Subcatchment 9P: Pervious**

Runoff = 0.91 cfs @ 12.21 hrs, Volume= 3,296 cf, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 2-Year Rainfall=3.36"

A	rea (sf)	CN E	Description			
	5,369	70 V	Voods, Go	od, HSG C		
	31,027 74 >75% Grass cover, Good, HSG C					
	36,396	73 V	Veighted A	verage		
	36,396	73 1	00.00% Pe	ervious Are	а	
Тс	Lenath	Slope	Velocitv	Capacity	Description	
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)		
9.8	100	0.0190	0.17		Sheet Flow, A-B	
					Grass: Short n= 0.150 P2= 3.36"	
0.7	102	0.0240	2.49		Shallow Concentrated Flow, B-C	
					Unpaved Kv= 16.1 fps	
0.8	128	0.0310	2.83		Shallow Concentrated Flow, C-D	
	400		0		Unpaved Kv= 16.1 tps	
0.8	120	0.0250	2.55		Shallow Concentrated Flow, D-E	
0.4	04	0 0 0 4 0	0.00		Unpaved Kv= 16.1 fps	
0.1	21	0.0310	2.83		Shallow Concentrated Flow, E-F	
					Unpaved NV-10.1 lps	
12.2	471	Total				

#### **Subcatchment 9P: Pervious**



## Summary for Pond B1: Bioretention Basin 1

[92] Warning: Device #2 is above defined storage

Inflow Area	a =	48,248 sf,	48.86% Impervious,	Inflow Depth = $2$	2.11" for	2-Year event
Inflow	=	2.29 cfs @	12.18 hrs, Volume=	8,496 cf		
Outflow	=	1.24 cfs @	12.36 hrs, Volume=	4,601 cf,	Atten= 46	%, Lag= 10.5 min
Primary	=	1.24 cfs @	12.36 hrs, Volume=	4,601 cf		-

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 78.24' @ 12.36 hrs Surf Area= 2,924 sf Storage= 4,156 cf

Plug-Flow detention time= 247.9 min calculated for 4,598 cf (54% of inflow) Center-of-Mass det. time= 123.7 min ( 913.9 - 790.2 )

Volume	Inver	t Avail.Sto	rage Storage	Description				
#1	76.50	4,93	38 cf Custom	Stage Data (Coni	<b>c)</b> Listed below (Rec	alc)		
Elevatio (fee	on S et)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)			
76.9 77.9 78.9	50 50 50 50	1,883 2,461 3,096	0 2,166 2,772	0 2,166 4,938	1,883 2,484 3,146			
Device	Routing	Invert	Outlet Devices	6				
#1	Primary Device 1	73.00' 78.50'	<b>24.0" Round</b> L= 10.0' CMF Inlet / Outlet Ir n= 0.013 Con <b>10.0' long x</b> 1 Head (feet) 0. 2.50 3.00 Coef. (English 3.30 3.31 3.3	<b>CMP_Round 24</b> P, projecting, no henvert= 73.00' / 72.8 crete pipe, bends <b>1.0' breadth Broad</b> .20 0.40 0.60 0.8 ) 2.69 2.72 2.75	eadwall, Ke= 0.900 35' S= 0.0150 '/' C & connections, Flow <b>d-Crested Rectang</b> 30 1.00 1.20 1.40 2.85 2.98 3.08 3.	c= 0.900 v Area= 3.14 sf u <b>lar Weir</b> 1.60 1.80 2.00 20 3.28 3.31		
#3	Device 1	78.15'	<b>42.0" x 42.0"</b> C= 0.600 in 4 Limited to wei	Horiz. Orifice/Gra 2.0" x 42.0" Grate r flow at low heads	<b>te</b> (100% open area)			
Primary	Primary OutFlow Max=1.21 cfs @ 12.36 hrs HW=78.24' (Free Discharge)							

**CMP\_Round 24**" (Passes 1.21 cfs of 24.59 cfs potential flow) -**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

-3=Orifice/Grate (Weir Controls 1.21 cfs @ 0.97 fps)

## Pond B1: Bioretention Basin 1







## Pond B1: Bioretention Basin 1



## Stage-Discharge for Pond B1: Bioretention Basin 1

Elevation	Primary	Elevation	Primary	Elevation	Primary	Elevation	Primary
(feet)	(cfs)	(feet)	(cfs)	(feet)	(cfs)	(feet)	(cfs)
76.50	0.00	77.03	0.00	77.56	0.00	78.09	0.00
76.51	0.00	77.04	0.00	77.57	0.00	78.10	0.00
76.52	0.00	77.05	0.00	77.58	0.00	78.11	0.00
76.53	0.00	77.06	0.00	77.59	0.00	78.12	0.00
76.54	0.00	77.07	0.00	77.60	0.00	78.13	0.00
76.55	0.00	77.08	0.00	77.61	0.00	78.14	0.00
76.56	0.00	77.09	0.00	77.62	0.00	78.15	0.00
/6.5/	0.00	77.10	0.00	77.63	0.00	/8.16	0.05
76.58	0.00	//.11	0.00	//.64	0.00	/8.1/	0.13
76.59	0.00	77.12	0.00	//.65	0.00	78.18	0.24
76.60	0.00	77.13	0.00		0.00	78.19	0.37
76.61	0.00	77.14	0.00	//.6/	0.00	78.20	0.51
76.62	0.00	77.15	0.00	//.68	0.00	78.21	0.67
76.63	0.00	77.16	0.00	77.69	0.00	78.22	0.85
76.64	0.00	77.17	0.00	77.70	0.00	78.23	1.04
70.00	0.00	77.10	0.00		0.00	78.24	1.24
70.00	0.00	77.19	0.00	11.12	0.00	78.25	1.45
70.07	0.00	77.20	0.00	77.74	0.00	70.20	1.07
70.00	0.00	77.21	0.00	77 75	0.00	70.27	1.90
70.09	0.00	77.22	0.00	77.76	0.00	70.20	2.15
76.70	0.00	77.23	0.00	77 77	0.00	70.29	2.40
76.77	0.00	77.24	0.00	77 78	0.00	78.30	2.00
76.72	0.00	77.25	0.00	77.70	0.00	78.32	2.33
76.74	0.00	77.20	0.00	77.80	0.00	78.33	3 50
76 75	0.00	77.28	0.00	77.81	0.00	78.34	3 79
76.76	0.00	77 29	0.00	77.82	0.00	78.35	4 09
76.77	0.00	77.30	0.00	77.83	0.00	78.36	4.41
76.78	0.00	77.31	0.00	77.84	0.00	78.37	4.72
76.79	0.00	77.32	0.00	77.85	0.00	78.38	5.05
76.80	0.00	77.33	0.00	77.86	0.00	78.39	5.38
76.81	0.00	77.34	0.00	77.87	0.00	78.40	5.72
76.82	0.00	77.35	0.00	77.88	0.00	78.41	6.07
76.83	0.00	77.36	0.00	77.89	0.00	78.42	6.42
76.84	0.00	77.37	0.00	77.90	0.00	78.43	6.78
76.85	0.00	77.38	0.00	77.91	0.00	78.44	7.15
76.86	0.00	77.39	0.00	77.92	0.00	78.45	7.52
76.87	0.00	77.40	0.00	77.93	0.00	78.46	7.90
76.88	0.00	77.41	0.00	77.94	0.00	78.47	8.29
76.89	0.00	77.42	0.00	77.95	0.00	78.48	8.68
76.90	0.00	77.43	0.00	77.96	0.00	78.49	9.08
76.91	0.00	77.44	0.00	77.97	0.00	78.50	9.48
76.92	0.00	77.45	0.00	77.98	0.00		
76.93	0.00	77.46	0.00	77.99	0.00		
76.94	0.00	//.4/	0.00	78.00	0.00		
76.95	0.00	77.48	0.00	/8.01	0.00		
76.96	0.00	77.49	0.00	78.02	0.00		
76.97	0.00	77.50	0.00	78.03	0.00		
10.90 76.00	0.00	(1.3) 77 50	0.00	/ ð.U4 70 05	0.00		
70.99	0.00	11.0Z 77.52	0.00		0.00		
77.00	0.00	77 54	0.00	70.00 78.07	0.00		
77 02	0.00	77 55	0.00	78.07	0.00		
11.02	0.00	11.55	0.00	70.00	0.00		

Elevation	Surface	Storage	Elevation	Surface	Storage
(feet)	(sq-ft)	(cubic-feet)	(feet)	(sq-ft)	(cubic-feet)
76.50	1,883	0	77.56	2,497	2,314
76.52	1,894	38	77.58	2,509	2,364
76.54	1,905	76	77.60	2,521	2,415
76.56	1,916	114	77.62	2,533	2,465
76.58	1,926	152	77.64	2,546	2,516
76.60	1,937	191	77.66	2,558	2,567
76.62	1,948	230	77.68	2,570	2,618
76.64	1,959	269	77.70	2,582	2,670
76.66	1,970	308	77.72	2,594	2,722
76.68	1,981	348	77.74	2,607	2,774
76.70	1,992	387	77.76	2,619	2,826
76.72	2,004	427	77.78	2,631	2,878
76.74	2,015	468	77.80	2,644	2,931
76.76	2,026	508	77.82	2,656	2,984
76.78	2,037	549	77.84	2,669	3,037
76.80	2,048	590	77.86	2,681	3,091
76.82	2,060	631	77.88	2,694	3,145
76.84	2,071	672	77.90	2,706	3,199
76.86	2,082	713	77.92	2,719	3,253
76.88	2,094	755	77.94	2,731	3,307
76.90	2,105	/9/	77.96	2,744	3,362
76.92	2,116	839	77.98	2,757	3,417
76.94	2,128	882	78.00	2,769	3,472
76.96	2,139	924	78.02	2,782	3,528
76.98	2,151	967	78.04	2,795	3,584
77.00	2,162	1,011	78.06	2,808	3,640
77.02	2,174	1,054	78.08	2,820	3,696
77.04	2,180	1,097	78.10	2,833	3,753
77.00	2,197	1,141	78.1Z	2,840	3,809
77.08	2,209	1,185	78.14	2,859	3,800
77.10	2,221	1,230	70.10	2,072	3,924
77 14	2,232	1,274	70.10	2,000	3,901
77.14	2,244	1,319	70.20	2,090	4,039
77.10	2,200	1,304	70.22	2,911	4,097
77.10	2,200	1,409	78.24	2,924	4,130
77.20	2,279	1,400	78.20	2,957	4,214
77.24	2,201	1,500	78.30	2,950	4,273
77.24	2,303	1,540	78.30	2,903	4,332
77.28	2,313	1,535	78.34	2,970	4,002
77.30	2,027	1,000	78.36	2,000	4 511
77 32	2,000	1,000	78.38	3,000	4 571
77.34	2,363	1 780	78.40	3 029	4 632
77.36	2,300	1,700	78.42	3 043	4,002
77.38	2,388	1 875	78.44	3 056	4 753
77.40	2,000	1,070	78.46	3,069	4,700
77 42	2,400	1 971	78.48	3 083	4 876
77 44	2 4 2 4	2 019	78.50	3 096	4 938
77 46	2 436	2,010	, 0.00	0,000	4,000
77.48	2 449	2,000			
77.50	2 461	2 166			
77.52	2.473	2,100			

77.54

2,485

2,264

## Stage-Area-Storage for Pond B1: Bioretention Basin 1

## Summary for Pond B2: Bioretention Basin 2

[79] Warning: Submerged Pond B1 Primary device # 1 INLET by 4.37'

Inflow Area	a =	97,279 sf,	60.64% Impervious,	Inflow Depth = 1	.87" for 2-Year event
Inflow	=	2.75 cfs @	12.20 hrs, Volume=	15,128 cf	
Outflow	=	1.20 cfs @	12.63 hrs, Volume=	11,962 cf,	Atten= 57%, Lag= 25.9 min
Primary	=	1.20 cfs @	12.63 hrs, Volume=	11,962 cf	-

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 77.37' @ 12.63 hrs Surf.Area= 7,986 sf Storage= 6,451 cf

Plug-Flow detention time= 240.9 min calculated for 11,962 cf (79% of inflow) Center-of-Mass det. time= 150.5 min (967.0 - 816.5)

Volume	Inve	ert Avail.Sto	rage Storage	Description	
#1	76.5	0' 26,64	47 cf Custom	Stage Data (Pr	rismatic)Listed below (Recalc)
Elevatio	on	Surf.Area	Inc.Store	Cum.Store	
76.5	50	6,877			
77.5 78.5 70.6	50 50	8,155 9,522 11,063	7,516 8,839 10,203	7,516 16,355 26.647	
Device	Routing	Invert	Outlet Device	20,047 S	
#1	Primary	73.00'	<b>15.0" Round</b> L= 47.0' CM Inlet / Outlet I n= 0.011 Cor	l <b>Culvert</b> P, projecting, no nvert= 73.00' / 7 ncrete pipe, strai	o headwall, Ke= 0.900 '2.06' S= 0.0200 '/' Cc= 0.900 ight & clean, Flow Area= 1.23 sf
#2 #3	Device 1 Device 1	76.94' 77.78'	6.0" Vert. Ori 4.0' long x 0 Head (feet) 0 Coef. (English	fice/Grate X 3.0 .5' breadth Broa 0.20 0.40 0.60 1) 2.80 2.92 3.1	00 C= 0.600 ad-Crested Rectangular Weir 0.80 1.00 08 3.30 3.32
#4	Device 1	79.25'	<b>42.0" x 42.0"</b> C= 0.600 in 4 Limited to we	Horiz. Orifice/C 12.0" x 42.0" Gra ir flow at low hea	Grate ate (100% open area) ads
Primary		Max=1 19 cfs (	@ 12.63 hrs H\	N=77 37' (Free	Discharge)

**Timary OutFlow** Max=1.19 cfs @ 12.63 hrs HW=77.37' (Free Discharge) -**1=Culvert** (Passes 1.19 cfs of 9.02 cfs potential flow)

-2=Orifice/Grate (Orifice Controls 1.19 cfs @ 2.23 fps)

-3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

-4=Orifice/Grate (Controls 0.00 cfs)

## Pond B2: Bioretention Basin 2









## Pond B2: Bioretention Basin 2

## Stage-Discharge for Pond B2: Bioretention Basin 2

Elevation	Primary	Elevation	Primary	Elevation	Primary
(feet)	(cfs)	(feet)	(cfs)	(feet)	(cfs)
76.50	0.00	77.56	1.73	78.62	10.43
76.52	0.00	77.58	1.77	78.64	10.45
76.54	0.00	77.60	1.82	78.66	10.47
76.56	0.00	77.62	1.86	78.68	10.49
76.58	0.00	77.64	1.90	78.70	10.51
76.00	0.00	77.00	1.94	78.72	10.55
76.62	0.00	77.70	2.03	78.74	10.55
76.66	0.00	77.72	2.06	78.78	10.59
76.68	0.00	77.74	2.10	78.80	10.61
76.70	0.00	77.76	2.14	78.82	10.63
76.72	0.00	77.78	2.18	78.84	10.65
76.74	0.00	77.80	2.25	78.86	10.67
76.76	0.00	77.82	2.34	78.88	10.69
76.78	0.00	77.84	2.45	78.90	10.71
76.80	0.00	77.86	2.58	78.92	10.73
76.82	0.00	77.88	2.71	78.94	10.75
70.04	0.00	77.90	2.00 2.01	70.90	10.77
76.88	0.00	77.92	3.01	70.90	10.79
76.00	0.00	77.94	3 34	79.00	10.02
76.92	0.00	77.98	3.52	79.04	10.86
76.94	0.00	78.00	3.71	79.06	10.88
76.96	0.00	78.02	3.91	79.08	10.90
76.98	0.02	78.04	4.12	79.10	10.92
77.00	0.03	78.06	4.33	79.12	10.94
77.02	0.06	78.08	4.56	79.14	10.96
77.04	0.09	78.10	4.79	79.16	10.97
77.06	0.13	78.12	5.02	79.18	10.99
77.00	0.17	70.14	0.27 5.52	79.20	11.01
77.10	0.22	78.10	5.52	79.22	11.05
77.14	0.34	78.20	6.05	79.26	11.00
77.16	0.40	78.22	6.32	79.28	11.09
77.18	0.47	78.24	6.61	79.30	11.11
77.20	0.54	78.26	6.90	79.32	11.13
77.22	0.61	78.28	7.20	79.34	11.15
77.24	0.69	78.30	7.51	79.36	11.17
77.26	0.77	78.32	7.83	79.38	11.19
77.28	0.85	78.34	8.15	79.40	11.21
77.30	0.93	78.30	8.48	79.42	11.23
77.34	1.01	70.30	0.02 0.18	79.44	11.20
77.36	1.03	78.40	9.10	79.40	11.27
77.38	1.24	78.44	9.92	79.50	11.31
77.40	1.31	78.46	10.26		
77.42	1.37	78.48	10.28		
77.44	1.42	78.50	10.30		
77.46	1.47	78.52	10.32		
77.48	1.53	78.54	10.34		
//.50	1.58	/8.56	10.36		
11.52 77 EA	1.63	/ 8.58 79.60	10.38		
(1.54	00.1	10.00	10.40		

$\begin{array}{ c creat } \hline (feet) & (sq-ft) & (cubic-feet) \\ \hline (feet) & (sq-ft) \\ \hline (feet) & (sq-ft) & (cubic-feet) \\ \hline (feet) & (sq-ft) \\ \hline (feet) & (feet) \\ \hline (feet) & (feet) & (feet) \\ \hline (feet) & (feet) & (feet) \\ \hline (feet) & (feet) & (fee$
76.50 $6,877$ $0$ $79.15$ $10,524$ $22,869$ $76.55$ $6,941$ $345$ $79.20$ $10,601$ $23,397$ $76.60$ $7,005$ $694$ $79.25$ $10,678$ $23,929$ $76.65$ $7,069$ $1.046$ $79.30$ $10,755$ $24,465$ $76.70$ $7,133$ $1,401$ $79.35$ $10,832$ $25,005$ $76.75$ $7,197$ $1.759$ $79.40$ $10,909$ $25,548$ $76.80$ $7,260$ $2,121$ $79.45$ $10,986$ $26,096$ $76.85$ $7,324$ $2,485$ $79.50$ $11,063$ $26,647$ $76.90$ $7,388$ $2,853$ $76.95$ $7,452$ $3,224$ $77.00$ $7,516$ $3,598$ $77.05$ $7,580$ $3.976$ $77.15$ $7,708$ $4,740$ $77.25$ $7,836$ $5,517$ $77.72$ $5,127$ $77.25$ $7,836$ $5,517$ $77.30$ $7,899$ $5,911$ $77.55$ $8,223$ $7,925$ $77.60$ $8,027$ $6,707$ $77.45$ $8,091$ $7,110$ $77.55$ $8,223$ $7,925$ $77.66$ $8,360$ $8,755$ $77.70$ $8,428$ $9,174$ $77.90$ $8,702$ $10,887$ $77.96$ $8,907$ $12,208$ $8,338$ $77.85$ $8,633$ $10,454$ $77.90$ $8,702$ $10,887$ $77.95$ $77.90$ $8,702$ $10,887$ $77.95$ $8,770$ $11,324$ $78.10$ $8,975$ $11,645$ $77$
76.55 $6.941$ $345$ $79.20$ $10.601$ $23.397$ $76.60$ $7,005$ $694$ $79.25$ $10.678$ $23.929$ $76.65$ $7.0069$ $1.046$ $79.30$ $10.755$ $24.465$ $76.70$ $7,133$ $1.401$ $79.35$ $10.832$ $25.005$ $76.75$ $7,197$ $1.759$ $79.40$ $10.909$ $25.548$ $76.80$ $7,260$ $2,121$ $79.45$ $10.986$ $26.096$ $76.85$ $7,324$ $2.485$ $79.50$ $11.063$ $26.647$ $76.90$ $7.388$ $2.853$ $79.50$ $11.063$ $26.647$ $76.95$ $7.452$ $3.224$ $77.00$ $7.516$ $3.598$ $77.05$ $7.580$ $3.976$ $77.10$ $7.644$ $4.356$ $77.10$ $7.644$ $4.356$ $77.725$ $7.836$ $5.517$ $77.30$ $7.899$ $5.911$ $77.55$ $8.223$ $7.925$ $77.60$ $8.292$ $8.338$ $77.65$ $8.360$ $8.755$ $77.70$ $8.428$ $9.174$ $77.90$ $8.702$ $10.887$ $77.95$ $8.770$ $11.324$ $78.00$ $8.839$ $11.764$ $78.00$ $8.907$ $12.208$ $78.10$ $8.975$ $78.20$ $77.95$ $8.770$ $11.324$ $78.00$ $8.8907$ $12.208$ $78.15$ $9.044$ $13.106$ $78.20$ $9.112$ $13.559$ $78.25$ $9.180$ $14.017$ $78.30$ $9.249$ $44.477$
76.60 $7.005$ $694$ $79.25$ $10.678$ $23.929$ $76.65$ $7.069$ $1.046$ $79.30$ $10.755$ $24.465$ $76.70$ $7.133$ $1.401$ $79.35$ $10.832$ $25.005$ $76.75$ $7.197$ $1.759$ $79.40$ $10.909$ $25.548$ $76.80$ $7.260$ $2.121$ $79.45$ $10.986$ $26.096$ $76.85$ $7.324$ $2.485$ $79.50$ $11.063$ $26.647$ $76.90$ $7.388$ $2.853$ $76.95$ $7.452$ $3.224$ $77.00$ $7.516$ $3.598$ $77.05$ $7.580$ $3.976$ $77.10$ $7.644$ $4.356$ $77.10$ $7.644$ $4.356$ $77.10$ $7.644$ $4.356$ $777.30$ $7.899$ $5.911$ $77.30$ $7.899$ $5.911$ $77.30$ $7.899$ $5.911$ $77.45$ $8.091$ $7.110$ $7.745$ $8.091$ $7.110$ $77.45$ $8.091$ $7.110$ $7.756$ $8.360$ $8.755$ $77.60$ $8.223$ $7.925$ $77.60$ $8.292$ $8.338$ $77.65$ $8.365$ $10.024$ $77.35$ $8.770$ $1.324$ $78.00$ $8.665$ $10.024$ $77.95$ $8.770$ $1.324$ $78.00$ $8.897$ $12.208$ $8.755$ $78.15$ $9.044$ $13.106$ $78.20$ $9.142$ $13.559$ $78.15$ $9.180$ $14.017$ $78.30$ $9.249$ $14.477$ $14.017$
76.65   7,069   1,046   79.30   10,755   24,465     76.70   7,133   1,401   79.35   10,832   25,005     76.75   7,197   1,759   79.40   10,909   25,548     76.80   7,260   2,121   79.45   10,936   26,096     76.85   7,324   2,485   79.50   11,063   26,647     76.90   7,388   2,823   76.95   7,452   3,224     76.95   7,452   3,224   77.00   7,516   3,598     77.00   7,516   3,598   77.05   7,580   3,976     77.10   7,644   4,356   77.10   7,644   4,356     77.15   7,708   4,740   77.20   7,772   5,127     77.55   7,863   5,517   77.30   7,899   5,911     77.55   7,963   6,307   7   7.45   8,091   7,110     77.55   8,223   7,925   7.760   8,292   8,338   7     77.55   8,497   9,597   77.780   8,
76.70 $7,133$ $1,401$ $79.35$ $10,832$ $25,005$ $76.75$ $7,197$ $1,759$ $79.40$ $10,909$ $25,548$ $76.80$ $7,260$ $2,121$ $79.45$ $10,986$ $26,096$ $76.85$ $7,324$ $2,485$ $79.50$ $11,063$ $26,647$ $76.90$ $7,388$ $2,853$ $79.50$ $11,063$ $26,647$ $76.95$ $7,452$ $3,224$ $77.00$ $7,516$ $3,598$ $77.05$ $7,580$ $3,976$ $77.10$ $7,644$ $4,356$ $77.10$ $7,644$ $4,356$ $77.725$ $7,786$ $5,517$ $77.20$ $7,772$ $5,127$ $77.725$ $7,786$ $5,517$ $77.30$ $7,899$ $5,911$ $77.55$ $8,091$ $7,110$ $77.40$ $8,027$ $6,707$ $77.45$ $8,091$ $7,110$ $77.55$ $8,223$ $7,925$ $77.60$ $8,292$ $8,338$ $77.65$ $8,263$ $10,454$ $77.90$ $8,702$ $10,887$ $77.90$ $8,702$ $10,887$ $77.95$ $8,770$ $11,324$ $78.00$ $8,397$ $12,208$ $72,208$ $78.15$ $9,044$ $13,106$ $78.20$ $9,112$ $13,559$ $78.15$ $9,044$ $13,106$ $78.30$ $9,249$ $14,477$ $77.976$ $77.976$
76.75 $7,197$ $1,759$ $79.40$ $10,909$ $25,548$ $76.80$ $7,260$ $2,121$ $79.45$ $10,986$ $26,096$ $76.85$ $7,324$ $2,485$ $79.50$ $11,063$ $26,647$ $76.90$ $7,388$ $2,853$ $76.95$ $7,452$ $3,224$ $77.00$ $7,516$ $3,598$ $77.05$ $7,580$ $3,976$ $77.10$ $7,644$ $4,356$ $77.15$ $7,708$ $4,740$ $77.20$ $7,772$ $5,127$ $77.30$ $7,899$ $5,911$ $77.30$ $7,899$ $5,911$ $77.55$ $8,223$ $7,925$ $77.60$ $8,155$ $7,516$ $7,516$ $7,516$ $77.55$ $8,223$ $7,925$ $77.60$ $8,292$ $8,360$ $8,755$ $77.70$ $8,428$ $9,174$ $77.75$ $8,665$ $10,024$ $77.85$ $8,663$ $77.95$ $8,770$ $11,324$ $78.00$ $8,397$ $77.95$ $8,770$ $11,324$ $78.00$ $8,975$ $77.95$ $8,770$ $11,324$ $78.00$ $8,975$ $78.15$ $9,044$ $13,106$ $78.20$ $9,112$ $13,559$ $78.25$ $9,180$ $14,017$ $78.30$ $9,249$ $14,477$
76.80 $7,260$ $2,121$ $79.45$ $10,986$ $26,096$ $76.85$ $7,324$ $2,485$ $79.50$ $11,063$ $26,647$ $76.90$ $7,388$ $2,853$ $76.95$ $7,452$ $3,224$ $77.00$ $7,516$ $3,598$ $77.05$ $7,580$ $3.976$ $77.15$ $7,708$ $4,740$ $77.20$ $7,772$ $5,127$ $77.25$ $7,836$ $5,517$ $77.30$ $7,899$ $5,911$ $77.30$ $7,899$ $5,911$ $77.55$ $8,223$ $7,925$ $77.60$ $8,155$ $7,516$ $7,755$ $8,223$ $7,925$ $77.60$ $8,292$ $8,338$ $77.65$ $8,360$ $8,755$ $77.70$ $8,428$ $9,174$ $77.75$ $8,497$ $9,597$ $77.80$ $8,565$ $10,024$ $77.80$ $8,565$ $10,024$ $77.95$ $8,770$ $11,324$ $78.00$ $8,339$ $11,764$ $78.00$ $8,339$ $11,764$ $78.20$ $9,112$ $13,559$ $78.10$ $8,975$ $12,208$ $78.10$ $8,975$ $12,208$ $78.10$ $8,975$ $12,655$ $78.15$ $9,044$ $13,106$ $78.20$ $9,112$ $13,559$ $78.25$ $9,180$ $14,477$
76.85   7,324   2,485   79.50   11,063   26,647     76.90   7,388   2,853   79.50   11,063   26,647     76.95   7,452   3,224   77.00   7,516   3,598     77.00   7,516   3,598   77.05   7,580   3,976     77.10   7,644   4,356   77.15   7,708   4,740     77.20   7,772   5,127   77.30   7,899   5,911     77.30   7,899   5,911   77.55   8,223   7,925     77.60   8,027   6,707   7,745   8,091   7,110     77.55   8,223   7,925   77.60   8,292   8,338     77.65   8,360   8,755   77.70   8,487   9,597     77.80   8,565   10,024   77.85   8,633   10,454     77.90   8,702   10,887   77.95   8,770   11,324     78.00   8,839   11,764   78.00   8,839   11,764     78.10   8,975   12,655   78.15   9,044   13,106
76.90 $7,388$ $2,853$ $76.95$ $7,452$ $3,224$ $77.00$ $7,516$ $3,598$ $77.05$ $7,580$ $3,976$ $77.10$ $7,644$ $4,356$ $77.15$ $7,708$ $4,740$ $77.20$ $7,772$ $5,127$ $77.35$ $7,899$ $5,911$ $77.35$ $7,963$ $6,307$ $77.40$ $8,027$ $6,707$ $77.45$ $8,091$ $7,110$ $77.55$ $8,223$ $7,925$ $77.60$ $8,292$ $8,338$ $77.65$ $8,223$ $7,925$ $77.60$ $8,292$ $8,338$ $77.65$ $8,223$ $7,925$ $77.70$ $8,428$ $9,174$ $77.75$ $8,497$ $9,597$ $77.80$ $8,665$ $10,024$ $77.85$ $8,633$ $10,454$ $77.96$ $8,702$ $10,887$ $77.95$ $8,707$ $11,324$ $78.00$ $8,839$ $11,764$ $78.10$ $8,975$ $12,655$ $78.15$ $9,044$ $13,106$ $78.20$ $9,112$ $13,559$ $78.25$ $9,180$ $14,017$ $78.30$ $9,249$ $14,477$
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77.15 $7,708$ $4,740$ $77.20$ $7,772$ $5,127$ $77.25$ $7,836$ $5,517$ $77.30$ $7,899$ $5,911$ $77.35$ $7,963$ $6,307$ $77.40$ $8,027$ $6,707$ $77.45$ $8,091$ $7,110$ $77.55$ $8,223$ $7,925$ $77.60$ $8,292$ $8,338$ $77.65$ $8,223$ $7,925$ $77.60$ $8,292$ $8,338$ $77.65$ $8,292$ $8,338$ $77.65$ $8,428$ $9,174$ $77.75$ $8,497$ $9,597$ $77.80$ $8,565$ $10,024$ $77.90$ $8,702$ $10,887$ $77.95$ $8,770$ $11,324$ $78.00$ $8,839$ $11,764$ $78.10$ $8,975$ $12,655$ $78.15$ $9,044$ $13,106$ $78.20$ $9,112$ $13,559$ $78.25$ $9,180$ $14,017$ $78.30$ $9,249$ $14,477$
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77.65   8,360   8,755     77.70   8,428   9,174     77.75   8,497   9,597     77.80   8,565   10,024     77.85   8,633   10,454     77.90   8,702   10,887     77.95   8,770   11,324     78.00   8,839   11,764     78.05   8,907   12,208     78.10   8,975   12,655     78.15   9,044   13,106     78.20   9,112   13,559     78.25   9,180   14,017     78.30   9,249   14,477
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77.758,4979,59777.808,56510,02477.858,63310,45477.908,70210,88777.958,77011,32478.008,83911,76478.058,90712,20878.108,97512,65578.159,04413,10678.209,11213,55978.259,18014,01778.309,24914,477
77.80 $8,565$ $10,024$ $77.85$ $8,633$ $10,454$ $77.90$ $8,702$ $10,887$ $77.95$ $8,770$ $11,324$ $78.00$ $8,839$ $11,764$ $78.05$ $8,907$ $12,208$ $78.10$ $8,975$ $12,655$ $78.15$ $9,044$ $13,106$ $78.20$ $9,112$ $13,559$ $78.25$ $9,180$ $14,017$ $78.30$ $9,249$ $14,477$
77.85 $8,633$ $10,454$ $77.90$ $8,702$ $10,887$ $77.95$ $8,770$ $11,324$ $78.00$ $8,839$ $11,764$ $78.05$ $8,907$ $12,208$ $78.10$ $8,975$ $12,655$ $78.15$ $9,044$ $13,106$ $78.20$ $9,112$ $13,559$ $78.25$ $9,180$ $14,017$ $78.30$ $9,249$ $14,477$
77.908,70210,88777.958,77011,32478.008,83911,76478.058,90712,20878.108,97512,65578.159,04413,10678.209,11213,55978.259,18014,01778.309,24914,477
77.95 $8,770$ $11,324$ $78.00$ $8,839$ $11,764$ $78.05$ $8,907$ $12,208$ $78.10$ $8,975$ $12,655$ $78.15$ $9,044$ $13,106$ $78.20$ $9,112$ $13,559$ $78.25$ $9,180$ $14,017$ $78.30$ $9,249$ $14,477$
78.00   8,839   11,764     78.05   8,907   12,208     78.10   8,975   12,655     78.15   9,044   13,106     78.20   9,112   13,559     78.25   9,180   14,017     78.30   9,249   14,477
78.058,90712,20878.108,97512,65578.159,04413,10678.209,11213,55978.259,18014,01778.309,24914,477
78.108,97512,65578.159,04413,10678.209,11213,55978.259,18014,01778.309,24914,477
78.159,04413,10678.209,11213,55978.259,18014,01778.309,24914,477
78.209,11213,55978.259,18014,01778.309,24914,477
78.25 9,180 14,017   78.30 9,249 14,477
78.30 9,249 14,477
78.35 9.317 14.942
78.40 9,385 15,409
78.45 9,454 15,880
78.50 9,522 16,355
78.55 9,599 16,833
78.60 9,676 17,314
78.65 9,753 17,800
78.70 9,830 18,290
78.75 9,907 18,783
78.80 9,984 19,280
78.85 10,061 19,782
78.90 10,138 20,287
78.95 10,215 20,795
79.00 10,293 21,308
79.05 10,370 21,825
79.10 10,447 22,345

## Stage-Area-Storage for Pond B2: Bioretention Basin 2

## Summary for Pond B3: Bioretention Basin 3

[92] Warning: Device #2 is above defined storage

Inflow Area =	11,722 sf,	41.82% Impervious,	Inflow Depth = 1.96	6" for 2-Year event
Inflow =	0.40 cfs @	12.30 hrs, Volume=	1,913 cf	
Outflow =	0.40 cfs @	12.32 hrs, Volume=	1,439 cf, At	tten= 0%, Lag= 1.0 min
Primary =	0.40 cfs @	12.32 hrs, Volume=	1,439 cf	-
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 80.78' @ 12.32 hrs Surf.Area= 865 sf Storage= 510 cf

Plug-Flow detention time= 163.2 min calculated for 1,439 cf (75% of inflow) Center-of-Mass det. time= 68.3 min ( 873.5 - 805.2 )

Volume	Invert	Avail.Stor	rage Storage D	Description					
#1	#1 79.98' 69		4 cf Custom Stage Data (Conic)Listed below (Recalc)						
Elevatio (fee	Elevation Surf.Area		Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)				
79.9 80.9	0.98 432 0.98 995		0 694	0 694	432 1,003				
Device	Routing	Invert	Outlet Devices						
#1	#1 Primary 77.48'		<b>15.0" Round CMP_Round 15"</b> L= 96.0' CMP, projecting, no headwall, Ke= $0.900$ Inlet / Outlet Invert= 77.48' / 77.00' S= $0.0050$ '/' Cc= $0.900$ n= $0.013$ Concrete pipe, bends & connections. Flow Area= 1.23 sf						
#2	2 Secondary 80.98'		<b>15.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32						
#3	Device 1	80.74'	<b>42.0" x 42.0" F</b> C= 0.600 in 42 Limited to weir	<b>x 42.0" Horiz. Orifice/Grate</b> 600 in 42.0" x 42.0" Grate (100% open area) d to weir flow at low heads					
Primary OutFlow Max=0.39 cfs @ 12.32 hrs HW=80.78' (Free Discharge) -1=CMP_Round 15" (Passes 0.39 cfs of 7.63 cfs potential flow) -3=Orifice/Grate (Weir Controls 0.39 cfs @ 0.67 fps)									
Second	Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=79.98' (Free Discharge)								

#### Pond B3: Bioretention Basin 3







## Pond B3: Bioretention Basin 3



## Stage-Discharge for Pond B3: Bioretention Basin 3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary
79.98	0.00	0.00	0.00	80.51	0.00	0.00	0.00
79.99	0.00	0.00	0.00	80.52	0.00	0.00	0.00
80.00	0.00	0.00	0.00	80.53	0.00	0.00	0.00
80.01	0.00	0.00	0.00	80.54	0.00	0.00	0.00
80.02	0.00	0.00	0.00	80.55	0.00	0.00	0.00
80.03	0.00	0.00	0.00	80.56	0.00	0.00	0.00
80.04	0.00	0.00	0.00	80.57	0.00	0.00	0.00
80.05	0.00	0.00	0.00	80.58	0.00	0.00	0.00
80.06	0.00	0.00	0.00	80.59	0.00	0.00	0.00
80.07	0.00	0.00	0.00	80.60	0.00	0.00	0.00
80.08	0.00	0.00	0.00	80.61	0.00	0.00	0.00
80.09	0.00	0.00	0.00	80.62	0.00	0.00	0.00
80.10	0.00	0.00	0.00	80.63	0.00	0.00	0.00
80.11	0.00	0.00	0.00	80.64	0.00	0.00	0.00
80.12	0.00	0.00	0.00	80.65	0.00	0.00	0.00
80.13	0.00	0.00	0.00	80.66	0.00	0.00	0.00
80.14	0.00	0.00	0.00	80.67	0.00	0.00	0.00
80.15	0.00	0.00	0.00	80.68	0.00	0.00	0.00
80.10	0.00	0.00	0.00	80.69	0.00	0.00	0.00
00.17	0.00	0.00	0.00	00.70	0.00	0.00	0.00
00.10 80.10	0.00	0.00	0.00	80.71	0.00	0.00	0.00
80.20	0.00	0.00	0.00	80.72	0.00	0.00	0.00
80.20	0.00	0.00	0.00	80 74	0.00	0.00	0.00
80.22	0.00	0.00	0.00	80.75	0.00	0.00	0.00
80.23	0.00	0.00	0.00	80.76	0.13	0.13	0.00
80.24	0.00	0.00	0.00	80.77	0.24	0.24	0.00
80.25	0.00	0.00	0.00	80.78	0.37	0.37	0.00
80.26	0.00	0.00	0.00	80.79	0.51	0.51	0.00
80.27	0.00	0.00	0.00	80.80	0.67	0.67	0.00
80.28	0.00	0.00	0.00	80.81	0.85	0.85	0.00
80.29	0.00	0.00	0.00	80.82	1.04	1.04	0.00
80.30	0.00	0.00	0.00	80.83	1.24	1.24	0.00
80.31	0.00	0.00	0.00	80.84	1.45	1.45	0.00
80.32	0.00	0.00	0.00	80.85	1.67	1.67	0.00
80.33	0.00	0.00	0.00	80.86	1.90	1.90	0.00
80.34	0.00	0.00	0.00	80.87	2.15	2.15	0.00
80.35	0.00	0.00	0.00	80.88	2.40	2.40	0.00
80.30 80.37	0.00	0.00	0.00	80.09	2.00	2.00	0.00
80.37	0.00	0.00	0.00	80.90	2.93	2.93	0.00
80.30	0.00	0.00	0.00	80.92	3 50	3 50	0.00
80.40	0.00	0.00	0.00	80.93	3 79	3 79	0.00
80.41	0.00	0.00	0.00	80.94	4.09	4.09	0.00
80.42	0.00	0.00	0.00	80.95	4.41	4.41	0.00
80.43	0.00	0.00	0.00	80.96	4.72	4.72	0.00
80.44	0.00	0.00	0.00	80.97	5.05	5.05	0.00
80.45	0.00	0.00	0.00	80.98	5.38	5.38	0.00
80.46	0.00	0.00	0.00				
80.47	0.00	0.00	0.00				
80.48	0.00	0.00	0.00				
80.49	0.00	0.00	0.00				
80.50	0.00	0.00	0.00				

Elevation	Surface	Storage	Elevation	Surface	Storage
(feet)	(sq-ft)	(cubic-feet)	(feet)	(sq-ft)	(cubic-feet)
79.98	432	0	80.51	702	298
79.99	436	4	80.52	707	305
80.00	441	9	80.53	713	312
80.01	446	13	80.54	719	319
80.02	450	18	80.55	725	326
80.03	455	22	80.56	730	333
80.04	459	27	80.57	736	341
80.05	464	31	80.58	742	348
80.06	469	36	80.59	748	355
80.07	473	41	80.60	754	363
80.08	478	45	80.61	760	371
80.09	483	50	80.62	766	378
80.10	487	55	80.63	772	386
80.11	492	60	80.64	778	394
80.12	497	65	80.65	784	401
80.13	502	70	80.66	790	409
80.14	507	75	80.67	796	417
80.15	511	80	80.68	802	425
80.16	516	85	80.69	808	433
80.17	521	90	80.70	814	441
80.18	526	96	80.71	820	450
80.19	531	101	80.72	826	458
80.20	536	106	80.73	833	466
80.21	541	112	80.74	839	474
80.22	546	117	80.75	845	483
80.23	551	123	80.76	851	491
80.24	000 561	128	80.77	808	500
00.20	00 I 566	134	00.70	004	5U0 517
00.20	500	139	00.79	070	517
00.27 90.29	577	140	00.00 90.91	0//	520
80.20	582	151	80.82	880	544
80.29	587	162	80.83	806	552
80.30	507	168	80.84	002	561
80.32	597	174	80.85	902	571
80.33	603	180	80.86	915	580
80.34	608	186	80.87	922	589
80.35	613	192	80.88	928	598
80.36	619	199	80.89	935	607
80.37	624	205	80.90	941	617
80.38	629	211	80.91	948	626
80.39	635	217	80.92	955	636
80.40	640	224	80.93	961	645
80.41	646	230	80.94	968	655
80.42	651	237	80.95	975	665
80.43	657	243	80.96	981	674
80.44	662	250	80.97	988	684
80.45	668	256	80.98	995	694
80.46	673	263			
80.47	679	270			
80.48	685	277			
80.49	690	284			

80.50

696

291

## Stage-Area-Storage for Pond B3: Bioretention Basin 3

# Summary for Link 5E: EDA 1

Inflow /	Area	=	178,053 sf,	5.81% Impervious,	Inflow Depth = 1.37"	for 2-Year event
Inflow		=	5.61 cfs @ 1	12.21 hrs, Volume=	20,371 cf	
Primary	y :	=	5.61 cfs @ 1	12.21 hrs, Volume=	20,371 cf, Atte	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

# 

#### Link 5E: EDA 1

# Summary for Link 6E: EDA 2

Inflow /	Area	=	31,726 sf,	, 17.78% Im	pervious,	Inflow Depth =	2.25"	for 2-`	Year event
Inflow	:	=	2.00 cfs @	12.13 hrs, '	Volume=	5,941 c	f		
Primar	y :	=	2.00 cfs @	12.13 hrs, `	Volume=	5,941 c	f, Atte	n= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

#### Link 6E: EDA 2



# Summary for Link 7E: EDA

Inflow /	Area	=	209,779 sf,	7.62% Impervio	us, Inflow Depth =	1.51"	for 2-Year event
Inflow		=	6.99 cfs @	12.18 hrs, Volume	e= 26,313 cl	f	
Primary	у	=	6.99 cfs @	12.18 hrs, Volume	e= 26,313 cf	f, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

# Link 7E: EDA



# Summary for Link 10P: PDA 1A

Inflow .	Area	=		97,279 sf	,60.64% Ir	mpervious,	Inflow Depth	> 1	.48"	for 2-	Year ever	nt
Inflow		=	1	.20 cfs @	12.63 hrs,	Volume=	11,962	2 cf				
Primar	y	=	1	.20 cfs @	12.63 hrs,	Volume=	11,962	2 cf,	Atten	= 0%,	Lag= 0.0	min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

# Link 10P: PDA 1A



# Summary for Link 11P: PDA 1B

Inflow Ar	ea =	11,722 sf	, 41.82% Impervious,	Inflow Depth = 1.47	" for 2-Year event
Inflow	=	0.40 cfs @	12.32 hrs, Volume=	1,439 cf	
Primary	=	0.40 cfs @	12.32 hrs, Volume=	1,439 cf, At	ten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

## Link 11P: PDA 1B



## Summary for Link 12P: PDA 1C

Inflow .	Area	=	64,382 sf,	3.87% Ir	mpervious,	Inflow Depth =	1.11"	for 2-	Year event	
Inflow		=	1.52 cfs @	12.23 hrs,	Volume=	5,964 cf				
Primar	у	=	1.52 cfs @	12.23 hrs,	Volume=	5,964 cf	, Atten	= 0%,	Lag= 0.0 m	in

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

# Link 12P: PDA 1C



# Summary for Link 13P: PDA 1

Inflow A	rea =	173,383 sf,	38.29% Impervious,	Inflow Depth = 1.34"	for 2-Year event
Inflow	=	2.43 cfs @	12.30 hrs, Volume=	19,365 cf	
Primary	=	2.43 cfs @	12.30 hrs, Volume=	19,365 cf, Atte	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

# Link 13P: PDA 1



# Summary for Link 14P: PDA 2

Inflow A	Area =	=	36,396 sf,	0.00% Im	npervious,	Inflow Depth =	1.09"	for 2-	Year event
Inflow	=		0.91 cfs @	12.21 hrs,	Volume=	3,296 c	f		
Primary	/ =		0.91 cfs @	12.21 hrs,	Volume=	3,296 c	f, Atter	า= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

#### Link 14P: PDA 2



# Summary for Link 15P: PDA

Inflow /	Area :	=	209,779 sf,	31.65% In	npervious,	Inflow Depth =	1.30"	for 2-	Year event
Inflow	=	=	3.25 cfs @	12.26 hrs,	Volume=	22,660 cf			
Primary	y =	=	3.25 cfs @	12.26 hrs,	Volume=	22,660 cf	, Atten	= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

#### Link 15P: PDA



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1E: Impervious	Runoff Area=10,351 sf 100.00% Impervious Runoff Depth=4.94" Tc=12.4 min CN=0/98 Runoff=1.05 cfs 4,264 cf
Subcatchment1P: Impervious	Runoff Area=23,576 sf 100.00% Impervious Runoff Depth=4.94" Tc=10.7 min CN=0/98 Runoff=2.50 cfs 9,711 cf
Subcatchment2E: Pervious	Runoff Area=167,702 sf 0.00% Impervious Runoff Depth=2.68" Flow Length=630' Tc=12.4 min CN=76/0 Runoff=10.69 cfs 37,517 cf
Subcatchment2P: Pervious	Runoff Area=24,672 sf 0.00% Impervious Runoff Depth=2.51" Flow Length=426' Tc=10.7 min CN=74/0 Runoff=1.54 cfs 5,158 cf
Subcatchment3E: Impervious	Runoff Area=5,641 sf 100.00% Impervious Runoff Depth=4.94" Tc=6.0 min CN=0/98 Runoff=0.69 cfs 2,324 cf
Subcatchment3P: Roof Area	Runoff Area=35,418 sf 100.00% Impervious Runoff Depth=4.94" Tc=10.7 min CN=0/98 Runoff=3.76 cfs 14,589 cf
Subcatchment4E: Pervious	Runoff Area=26,085 sf 0.00% Impervious Runoff Depth=3.74" Flow Length=393' Tc=6.0 min CN=87/0 Runoff=2.75 cfs 8,124 cf
Subcatchment4P: Pervious	Runoff Area=13,613 sf 0.00% Impervious Runoff Depth=2.51" Tc=10.7 min CN=74/0 Runoff=0.85 cfs 2,846 cf
Subcatchment5P: Impervious	Runoff Area=5,021 sf 97.63% Impervious Runoff Depth=4.94" Tc=20.8 min CN=96/98 Runoff=0.41 cfs 2,066 cf
Subcatchment6P: Pervious	Runoff Area=6,701 sf 0.00% Impervious Runoff Depth=2.42" Flow Length=172' Tc=20.8 min CN=73/0 Runoff=0.31 cfs 1,353 cf
Subcatchment7P: Impervious	Runoff Area=2,493 sf 100.00% Impervious Runoff Depth=4.94" Tc=13.9 min CN=0/98 Runoff=0.24 cfs 1,027 cf
Subcatchment8P: Pervious	Runoff Area=61,889 sf 0.00% Impervious Runoff Depth=2.34" Flow Length=409' Tc=13.9 min CN=72/0 Runoff=3.24 cfs 12,055 cf
Subcatchment9P: Pervious	Runoff Area=36,396 sf 0.00% Impervious Runoff Depth=2.42" Flow Length=471' Tc=12.2 min CN=73/0 Runoff=2.10 cfs 7,347 cf
Pond B1: Bioretention Basin 1	Peak Elev=78.34' Storage=4,464 cf Inflow=4.04 cfs 14,869 cf Outflow=3.92 cfs 10,974 cf
Pond B2: Bioretention Basin 2	Peak Elev=77.94' Storage=11,272 cf Inflow=8.46 cfs 28,409 cf Outflow=3.21 cfs 25,242 cf
Pond B3: Bioretention Basin 3 Primary	Peak Elev=80.80' Storage=528 cf Inflow=0.72 cfs 3,419 cf =0.72 cfs 2,944 cf Secondary=0.00 cfs 0 cf Outflow=0.72 cfs 2,944 cf

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Link 5E: EDA 1	Inflow=11.74 cfs 41,781 cf Primary=11.74 cfs 41,781 cf
Link 6E: EDA 2	Inflow=3.44 cfs 10,447 cf Primary=3.44 cfs 10,447 cf
Link 7E: EDA	Inflow=14.14 cfs 52,228 cf Primary=14.14 cfs 52,228 cf
Link 10P: PDA 1A	Inflow=3.21 cfs 25,242 cf Primary=3.21 cfs 25,242 cf
Link 11P: PDA 1B	Inflow=0.72 cfs 2,944 cf Primary=0.72 cfs 2,944 cf
Link 12P: PDA 1C	Inflow=3.50 cfs 13,082 cf Primary=3.50 cfs 13,082 cf
Link 13P: PDA 1	Inflow=6.33 cfs 41,268 cf Primary=6.33 cfs 41,268 cf
Link 14P: PDA 2	Inflow=2.10 cfs 7,347 cf Primary=2.10 cfs 7,347 cf
Link 15P: PDA	Inflow=8.20 cfs 48,616 cf Primary=8.20 cfs 48,616 cf

Total Runoff Area = 419,558 sf Runoff Volume = 108,380 cf Average Runoff Depth = 3.10" 80.36% Pervious = 337,177 sf 19.64% Impervious = 82,381 sf

#### Summary for Subcatchment 1E: Impervious

Runoff = 1.05 cfs @ 12.20 hrs, Volume= 4,264 cf, Depth= 4.94"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10-Year Rainfall=5.18"


# Summary for Subcatchment 1P: Impervious

Runoff = 2.50 cfs @ 12.18 hrs, Volume= 9,711 cf, Depth= 4.94"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10-Year Rainfall=5.18"

Area (sf) CN Description							
23,576 98 Paved parking, HSG C							
23,576 98 100.00% Impervio	us Area						
Tc Length Slope Velocity Capa (min) (feet) (ft/ft) (ft/sec) (d	city Description cfs)						
10.7	Direct Entry, Tc						
Subcate	chment 1P: Impervious						
н	ydrograph						
2.50 cfs	NOAA 24-hr C 10-Year Rainfall=5.18" Runoff Area=23,576 sf Runoff Volume=9,711 cf Runoff Depth=4.94" Tc=10.7 min						
	<b>CN=0/98</b>						
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30	32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 Time (hours)						

#### **Summary for Subcatchment 2E: Pervious**

Runoff = 10.69 cfs @ 12.20 hrs, Volume= 37,517 cf, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10-Year Rainfall=5.18"

A	rea (sf)	CN D	Description						
	24,589	96 G	96 Gravel surface, HSG C						
	36,591	70 V	Voods, Go	od, HSG C					
1	05,816	74 >	75% Gras	s cover, Go	ood, HSG C				
	706	72 V	Voods/gras	ss comb., G	Good, HSG C				
1	67,702	76 V	Veighted A	verage					
1	67,702	76 1	00.00% Pe	ervious Are	а				
Тс	Length	Slope	Velocity	Capacity	Description				
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
0.3	27	0.0490	1.55		Sheet Flow, A-B				
					Smooth surfaces n= 0.011 P2= 3.36"				
8.8	73	0.0130	0.14		Sheet Flow, B-C				
					Grass: Short n= 0.150 P2= 3.36"				
0.4	54	0.0180	2.16		Shallow Concentrated Flow, C-D				
					Unpaved Kv= 16.1 fps				
1.2	207	0.0340	2.97		Shallow Concentrated Flow, D-E				
					Unpaved Kv= 16.1 fps				
0.5	59	0.0170	2.10		Shallow Concentrated Flow, E-F				
					Unpaved Kv= 16.1 fps				
0.2	43	0.0470	3.49		Shallow Concentrated Flow, F-G				
					Unpaved Kv= 16.1 tps				
1.0	167	0.0280	2.69		Shallow Concentrated Flow, G-H				
					Unpaved Kv= 16.1 tps				
12.4	630	Total							

Subcatchment 2E: Pervious



# **Summary for Subcatchment 2P: Pervious**

Runoff = 1.54 cfs @ 12.19 hrs, Volume= 5,158 cf, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10-Year Rainfall=5.18"

A	rea (sf)	CN [	Description						
	22,852	74 >	74 >75% Grass cover, Good, HSG C						
	1,820	72 \	Noods/gras	ss comb., G	Good, HSG C				
	24,672	74 \	Neighted A	verage					
	24,672	74 ´	100.00% Pe	ervious Are	a				
_									
Tc	Length	Slope	Velocity	Capacity	Description				
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
9.2	100	0.0222	0.18		Sheet Flow, A-B				
					Grass: Short n= 0.150 P2= 3.36"				
0.1	23	0.0730	4.35		Shallow Concentrated Flow, B-C				
					Unpaved Kv= 16.1 fps				
0.3	48	0.0210	2.94		Shallow Concentrated Flow, C-D				
					Paved Kv= 20.3 fps				
1.1	255	0.0050	3.72	4.57	Pipe Channel, D-E				
					15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'				
					n= 0.013 Concrete pipe, bends & connections				
10 7	126	Total							

10.7 426 Total

#### Subcatchment 2P: Pervious



# Summary for Subcatchment 3E: Impervious

Runoff = 0.69 cfs @ 12.13 hrs, Volume= 2,324 cf, Depth= 4.94"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10-Year Rainfall=5.18"

A	rea (sf)	CN	Description						
	2,580	98	Unconnecte	ed roofs, HS	SG C				
	3,061	98	Paved park	ing, HSG C					
	5,641	98	Weighted A	verage					
	5,641	98	100.00% Im	100.00% Impervious Area					
Tc	Length	Slop	e Velocity	Capacity	Description				
(min)	(feet)	(ft/f	t) (ft/sec)	(cfs)					
3.0					Direct Entry, Tc				
3.0	0	Total	Increased t	o minimum	n Tc = 6.0 min				

## Subcatchment 3E: Impervious





# Summary for Subcatchment 3P: Roof Area

Runoff = 3.76 cfs @ 12.18 hrs, Volume= 14,589 cf, Depth= 4.94"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10-Year Rainfall=5.18"



#### **Summary for Subcatchment 4E: Pervious**

Runoff = 2.75 cfs @ 12.13 hrs, Volume= 8,124 cf, Depth= 3.74"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10-Year Rainfall=5.18"

	A	rea (sf)	CN [	Description		
		164	70 V	Voods, Go	od, HSG C	
		16,189	96 C	Gravel surfa	ace, HSG C	
		5,108	74 >	75% Gras	s cover, Go	ood, HSG C
		4,624	72 V	Voods/gras	ss comb., G	Good, HSG C
		26,085	87 V	Veighted A	verage	
		26,085	87 1	00.00% Pe	ervious Are	a
	Tc	Length	Slope	Velocity	Capacity	Description
(	min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	1.3	100	0.0160	1.29		Sheet Flow, A-B
						Smooth surfaces n= 0.011 P2= 3.36"
	0.6	97	0.0200	2.87		Shallow Concentrated Flow, B-C
	4.0					Paved Kv= 20.3 fps
	1.0	175	0.0330	2.92		Shallow Concentrated Flow, C-D
	0.4	40	0 0000	0.44		Unpaved Kv= 16.1 fps
	0.1	13	0.0230	2.44		Shallow Concentrated Flow, D-E
	0.0	0	0 0 4 9 0	2 5 2		Onpaved KV= 16.1 lps Shellow Concentrated Flow F F
	0.0	0	0.0400	3.55		Shallow Concentrated Flow, E-F
	0.0	0.000	<b>T</b> ( ) (			
	3.0	393	i otal, i	ncreased t	o minimum	1 C = 6.0 min

#### Subcatchment 4E: Pervious



# **Summary for Subcatchment 4P: Pervious**

Runoff = 0.85 cfs @ 12.19 hrs, Volume= 2,846 cf, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10-Year Rainfall=5.18"

Ar	ea (sf)	CN	Description						
	13,613	74	>75% Grass	>75% Grass cover, Good, HSG C					
	13,613	74	100.00% Pe	ervious Are	а				
Tc (min)	Length	Slope	e Velocity	Capacity	Description				
10.7	(leet)	(וו/וו	.) (II/Sec)	(CIS)	Direct Entry, Tc				
					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				

#### Subcatchment 4P: Pervious



## Summary for Subcatchment 5P: Impervious

Runoff = 0.41 cfs @ 12.29 hrs, Volume= 2,066 cf, Depth= 4.94"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10-Year Rainfall=5.18"

A	rea (sf)	CN	Description				
	4,902	98	Paved park	ing, HSG C	2		
	119	96	Gravel surfa	ace, HSG C			
	5,021	98	Weighted A	verage			
	119	96	2.37% Pervious Area				
	4,902	98	97.63% Impervious Area				
_		~		•	<b>_</b>		
Tc	Length	Slop	e Velocity	Capacity	Description		
(min)	(feet)	(ft/f	t) (ft/sec)	(cfs)			
20.8					Direct Entry, Tc		

# Subcatchment 5P: Impervious



## **Summary for Subcatchment 6P: Pervious**

Runoff = 0.31 cfs @ 12.31 hrs, Volume= 1,353 cf, Depth= 2.42"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10-Year Rainfall=5.18"

A	rea (sf)	CN	Description		
	4,509	74	>75% Gras	s cover, Go	bod, HSG C
	2,192	70	Woods, Go	od, HSG C	
	6,701	73	Weighted A	verage	
	6,701	73	100.00% P	ervious Are	а
Тс	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
20.4	104	0.0230	0.08		Sheet Flow, A-B
					Woods: Light underbrush n= 0.400 P2= 3.36"
0.3	57	0.0230	3.08		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
0.1	11	0.0200	2.28		Shallow Concentrated Flow, C-D
					Unpaved Kv= 16.1 fps
20.8	172	Total			

#### Subcatchment 6P: Pervious



# Summary for Subcatchment 7P: Impervious

Runoff = 0.24 cfs @ 12.21 hrs, Volume= 1,027 cf, Depth= 4.94"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10-Year Rainfall=5.18"

Ar	rea (sf)	CN	Description						
	2,493	98	Paved park	Paved parking, HSG C					
	2,493	98	98 100.00% Impervious Area						
Tc (min)	Length (feet)	Slope Velocity Capacity Description (ft/ft) (ft/sec) (cfs)							
13.9					Direct Entry, Tc				
Subcatchment 7P: Impervious									



# **Summary for Subcatchment 8P: Pervious**

Runoff = 3.24 cfs @ 12.23 hrs, Volume= 12,055 cf, Depth= 2.34"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10-Year Rainfall=5.18"

A	vrea (sf)	CN [	Description		
	28,675	70 \	Noods, Go	od, HSG C	
	33,214	74 >	>75% Gras	s cover, Go	ood, HSG C
	61,889	72 \	Neighted A	verage	
	61,889	72 1	100.00% Pe	ervious Are	а
_					
TC	Length	Slope	Velocity	Capacity	Description
<u>(min)</u>	(feet)	(ft/ft)	(ft/sec)	(cfs)	
2.8	36	0.0560	0.21		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.36"
4.3	51	0.0390	0.20		Sheet Flow, B-C
					Grass: Short n= 0.150 P2= 3.36"
0.3	25	0.0800	1.41		Shallow Concentrated Flow, C-D
					Woodland Kv= 5.0 fps
6.5	297	0.0230	0.76		Shallow Concentrated Flow, D-E
					Woodland Kv= 5.0 fps
13.9	409	Total			

#### Subcatchment 8P: Pervious



## **Summary for Subcatchment 9P: Pervious**

Runoff = 2.10 cfs @ 12.20 hrs, Volume= 7,347 cf, Depth= 2.42"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 10-Year Rainfall=5.18"

A	rea (sf)	CN E	Description					
	5,369	70 V	70 Woods, Good, HSG C					
	31,027	74 >	75% Gras	s cover, Go	ood, HSG C			
	36,396	73 V	Veighted A	verage				
	36,396	73 1	00.00% Pe	ervious Are	а			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description			
9.8	100	0.0190	0.17		Sheet Flow, A-B			
0.7	102	0 0240	2 / 9		Grass: Short n= 0.150 P2= 3.36" Shallow Concentrated Flow B-C			
0.7	102	0.0240	2.40		Unpaved Kv= 16.1 fps			
0.8	128	0.0310	2.83		Shallow Concentrated Flow, C-D			
					Unpaved Kv= 16.1 fps			
0.8	120	0.0250	2.55		Shallow Concentrated Flow, D-E			
0.1	21	0.0310	2.83		Shallow Concentrated Flow E-F			
0.1	21	0.0010	2.00		Unpaved Kv= 16.1 fps			
12.2	471	Total			· · ·			

#### Subcatchment 9P: Pervious



# Summary for Pond B1: Bioretention Basin 1

[92] Warning: Device #2 is above defined storage

Inflow Area	a =	48,248 sf,	48.86% Impervious,	Inflow Depth = 3	.70" for 10-Year event
Inflow	=	4.04 cfs @	12.18 hrs, Volume=	14,869 cf	
Outflow	=	3.92 cfs @	12.21 hrs, Volume=	10,974 cf,	Atten= 3%, Lag= 1.6 min
Primary	=	3.92 cfs @	12.21 hrs, Volume=	10,974 cf	-

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 78.34' @ 12.21 hrs Surf.Area= 2,992 sf Storage= 4,464 cf

Plug-Flow detention time= 169.1 min calculated for 10,966 cf (74% of inflow) Center-of-Mass det. time= 74.7 min (858.8 - 784.1)

Volume	Inver	t Avail.Sto	rage Storage	Description			
#1	76.50	4,93	38 cf Custom	Stage Data (Coni	<b>c)</b> Listed below (Re	calc)	
Elevatio	on S	Surf.Area	Inc.Store	Cum.Store	Wet.Area		
	=()	(SQ-IL)			<u>(Sq-II)</u>		
70.3	50	1,883	0	0	1,883		
78.5	50 50	3,096	2,100	4,938	2,484 3,146		
Device	Routing	Invert	Outlet Devices	6			
#1	Primary	73.00'	24.0" Round	CMP_Round 24"			
			L= 10.0' CMF Inlet / Outlet Ir n= 0.013 Con	P, projecting, no he overt= 73.00' / 72.8 crete pipe, bends	adwall, Ke= 0.900 5' S= 0.0150 '/' 0 & connections, Flo	Cc= 0.900 w Area= 3.14 sf	
#2	Device 1	78.50'	<b>10.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80			ular Weir 1.60 1.80 2.00	
			Coef. (English 3.30 3.31 3.3	) 2.69 2.72 2.75	2.85 2.98 3.08 3	.20 3.28 3.31	
#3	Device 1	78.15'	<b>42.0" x 42.0"</b> C= 0.600 in 4 Limited to wei	Horiz. Orifice/Gra 2.0" x 42.0" Grate r flow at low heads	<b>te</b> (100% open area)		
Primary OutFlow Max=3.86 cfs @ 12.21 hrs HW=78.34' (Free Discharge)							

-1=CMP\_Round 24" (Passes 3.86 cfs of 24.89 cfs potential flow)

2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

-3=Orifice/Grate (Weir Controls 3.86 cfs @ 1.43 fps)

# Pond B1: Bioretention Basin 1







# Pond B1: Bioretention Basin 1



# Stage-Discharge for Pond B1: Bioretention Basin 1

(leet)     (leet)<	0.00 0.00 0.00 0.00 0.00 0.00 0.00
76.50     0.00     77.03     0.00     77.50     0.00     78.09       76.51     0.00     77.04     0.00     77.57     0.00     78.10       76.52     0.00     77.05     0.00     77.58     0.00     78.11       76.53     0.00     77.06     0.00     77.59     0.00     78.12	0.00 0.00 0.00 0.00 0.00 0.00 0.00
76.52     0.00     77.05     0.00     77.58     0.00     78.11       76.53     0.00     77.06     0.00     77.59     0.00     78.12	0.00 0.00 0.00 0.00 0.00 0.00
76.53     0.00     77.06     0.00     77.59     0.00     78.12	0.00 0.00 0.00 0.00 0.00
	0.00 0.00 0.00 0.00
	0.00
76.54 0.00 77.08 0.00 77.61 0.00 78.14	0.00
	0.00
76.57 0.00 77.10 0.00 77.63 0.00 78.16	0.05
76.58 0.00 77.11 0.00 77.64 0.00 78.17	0.00
76.59 0.00 77.12 0.00 77.65 0.00 78.18	0.24
76.60 0.00 77.13 0.00 77.66 0.00 78.19	0.37
76.61 0.00 77.14 0.00 77.67 0.00 78.20	0.51
76.62 0.00 77.15 0.00 77.68 0.00 78.21	0.67
76.63 0.00 77.16 0.00 77.69 0.00 78.22	0.85
76.64 0.00 77.17 0.00 77.70 0.00 78.23	1.04
76.65 0.00 77.18 0.00 77.71 0.00 78.24	1.24
76.66 0.00 77.19 0.00 77.72 0.00 78.25	1.45
76.67 0.00 77.20 0.00 77.73 0.00 78.26	1.67
76.68 0.00 77.21 0.00 77.74 0.00 78.27	1.90
76.69 0.00 77.22 0.00 77.75 0.00 78.28	2.15
76.70 0.00 77.23 0.00 77.76 0.00 78.29	2.40
76.71 0.00 77.24 0.00 77.77 0.00 78.30	2.66
76.72 0.00 77.25 0.00 77.78 0.00 78.31	2.93
76.73 0.00 77.26 0.00 77.79 0.00 78.32	3.21
76.74 0.00 77.27 0.00 77.80 0.00 78.33	3.50
76.75 0.00 77.28 0.00 77.81 0.00 78.34	3.79
76.76 0.00 77.29 0.00 77.82 0.00 78.35	4.09
76.77 0.00 77.30 0.00 77.83 0.00 78.36	4.41
76.78 0.00 77.31 0.00 77.84 0.00 78.37	4.72
76.79 0.00 77.32 0.00 77.85 0.00 78.38	5.05
	5.38
	5.72
	0.07
	6.79
76.85 0.00 77.38 0.00 77.90 0.00 78.44	0.70
76.86 0.00 77.30 0.00 77.97 0.00 78.45	7.13
76.87 0.00 77.40 0.00 77.93 0.00 78.46	7.90
76.88 0.00 77.41 0.00 77.94 0.00 78.47	8 29
76.89 0.00 77.42 0.00 77.95 0.00 78.48	8.68
76.90 0.00 77.43 0.00 77.96 0.00 78.49	9.08
76.91 0.00 77.44 0.00 77.97 0.00 78.50	9.48
76.92 0.00 77.45 0.00 77.98 0.00	
76.93 0.00 77.46 0.00 77.99 0.00	
76.94 0.00 77.47 0.00 78.00 0.00	
76.95 0.00 77.48 0.00 78.01 0.00	
76.96 0.00 77.49 0.00 78.02 0.00	
76.97 0.00 77.50 0.00 78.03 0.00	
76.98 0.00 77.51 0.00 78.04 0.00	
76.99 0.00 77.52 0.00 78.05 0.00	
77.00 0.00 77.53 0.00 78.06 0.00	
//.01 0.00 77.54 0.00 78.07 0.00	
(1.02 0.00 (1.55 0.00 (8.08 0.00 )	

Elevation	Surface	Storage	Elevation	Surface	Storage
(feet)	(sq-ft)	(cubic-feet)	(feet)	(sq-ft)	(cubic-feet)
76.50	1,883	0	77.56	2,497	2,314
76.52	1,894	38	77.58	2,509	2,364
76.54	1,905	76	77.60	2,521	2,415
76.56	1,916	114	77.62	2,533	2,465
76.58	1,926	152	77.64	2,546	2,516
76.60	1,937	191	77.66	2,558	2,567
76.62	1,948	230	77.68	2,570	2,618
76.64	1,959	269	77.70	2,582	2,670
76.66	1,970	308	77.72	2,594	2,722
76.68	1,981	348	77.74	2,607	2,774
76.70	1,992	387	77.76	2,619	2,826
76.72	2,004	427	77.78	2,631	2,878
76.74	2,015	468	77.80	2,644	2,931
76.76	2,026	508	77.82	2,656	2,984
76.78	2,037	549	77.84	2,669	3,037
76.80	2,048	590	77.86	2,681	3,091
76.82	2,060	631	77.88	2,694	3,145
76.84	2,071	672	77.90	2,706	3,199
76.86	2,082	713	77.92	2,719	3,253
76.88	2,094	755	77.94	2,731	3,307
76.90	2,105	797	77.96	2,744	3,362
76.92	2,116	839	77.98	2,757	3,417
76.94	2,128	882	78.00	2,769	3,472
76.96	2,139	924	78.02	2,782	3,528
76.98	2,151	967	78.04	2,795	3,584
77.00	2,162	1,011	78.06	2,808	3,640
77.02	2,174	1,054	78.08	2,820	3,696
77.04	2,180	1,097	78.10	2,833	3,753
77.00	2,197	1,141	78.12	2,840	3,809
77.08	2,209	1,185	78.14	2,859	3,800
77.10	2,221	1,230	70.10	2,072	3,924
77.14	2,232	1,274	70.10	2,000	3,901
77.14	2,244	1,319	70.20	2,090	4,039
77.10	2,200	1,304	79.22	2,911	4,097
77.10	2,200	1,409	78.24	2,924	4,150
77.20	2,273	1,400	78.20	2,957	4,214
77.24	2,231	1,500	78.30	2,950	4,273
77.24	2,000	1,540	78.30	2,905	4,002
77.28	2,010	1,000	78.34	2,070	4,002
77.30	2,327	1,000	78.36	3,003	4 511
77.32	2,000	1,000	78.38	3,005	4 571
77.34	2,001	1 780	78.40	3 029	4 632
77.36	2,000	1 827	78.42	3 043	4 692
77.38	2,388	1 875	78 44	3 056	4 753
77 40	2 400	1,923	78 46	3 069	4 815
77.42	2.412	1,971	78.48	3.083	4,876
77.44	2.424	2.019	78.50	3.096	4.938
77.46	2.436	2.068		-,	.,
77.48	2.449	2.116			
77.50	2,461	2.166			
77.52	2,473	2,215			
77.54	2,485	2,264			

2,264

# Stage-Area-Storage for Pond B1: Bioretention Basin 1

# Summary for Pond B2: Bioretention Basin 2

Printed 5/14/2021

[79] Warning: Submerged Pond B1 Primary device # 1 INLET by 4.94'

Inflow Are	ea =	97,279 sf, 60.64% Impervious,	Inflow Depth = 3.50" fo	r 10-Year event
Inflow	=	8.46 cfs @ 12.19 hrs, Volume=	28,409 cf	
Outflow	=	3.21 cfs @ 12.45 hrs, Volume=	25,242 cf, Atten= 6	62%, Lag= 15.4 min
Primary	=	3.21 cfs @ 12.45 hrs, Volume=	25,242 cf	-

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 77.94' @ 12.45 hrs Surf.Area= 8,762 sf Storage= 11,272 cf

Plug-Flow detention time= 163.2 min calculated for 25,242 cf (89% of inflow) Center-of-Mass det. time= 106.6 min ( 909.3 - 802.7 )

Volume	Inve	ert Avail.Sto	rage Storage	Description			
#1	76.5	0' 26,64	47 cf Custom	i Stage Data (Pi	rismatic)Listed below (Recalc)		
Elevatio	on	Surf.Area	Inc.Store	Cum.Store			
(fee	et)	(sq-ft)	(cubic-feet)	(cubic-feet)			
76.5	50	6,877	0	0			
77.5	50	8,155	7,516	7,516			
78.5	50	9,522	8,839	16,355			
79.5	50	11,063	10,293	26,647			
Device	Routing	Invert	Outlet Device	S			
#1	Primary	73.00'	<b>15.0" Round</b> L= 47.0' CM Inlet / Outlet I n= 0.011 Cor	l <b>Culvert</b> P, projecting, no nvert= 73.00' / 7 ncrete pipe, strai	headwall, Ke= 0.900 2.06' S= 0.0200 '/' Cc= 0.900 ght & clean, Flow Area= 1.23 sf		
#2	Device 1	76.94'	6.0" Vert. Ori	fice/Grate X 3.0	<b>0</b> C= 0.600		
#3	Device 1	77.78'	<b>4.0' long x 0</b> Head (feet) 0 Coef. (English	<b>4.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32			
#4	Device 1	79.25'	<b>42.0" x 42.0"</b> C= 0.600 in 4 Limited to we	Horiz. Orifice/O 42.0" x 42.0" Gra ir flow at low hea	<b>Grate</b> ate (100% open area) ads		
Primary	OutFlow	Max=3.21 cfs (	2) 12.45 hrs HV	N=77.94' (Free	Discharge)		

**1=Culvert** (Passes 3.21 cfs of 9.69 cfs potential flow)

-2=Orifice/Grate (Orifice Controls 2.46 cfs @ 4.18 fps)

-3=Broad-Crested Rectangular Weir (Weir Controls 0.74 cfs @ 1.13 fps)

-4=Orifice/Grate (Controls 0.00 cfs)

Pond B2: Bioretention Basin 2









# Pond B2: Bioretention Basin 2

#### Elevation Primary Elevation Elevation Primary Primary (feet) (cfs) (feet) (cfs) (feet) (cfs) 76.50 0.00 77.56 1.73 78.62 10.43 77.58 76.52 0.00 1.77 78.64 10.45 76.54 0.00 77.60 1.82 78.66 10.47 76.56 0.00 77.62 1.86 78.68 10.49 76.58 0.00 77.64 1.90 78.70 10.51 76.60 0.00 77.66 1.94 78.72 10.53 76.62 0.00 77.68 1.99 78.74 10.55 76.64 0.00 77.70 2.03 78.76 10.57 76.66 0.00 77.72 2.06 78.78 10.59 76.68 0.00 77.74 2.10 78.80 10.61 76.70 77.76 2.14 10.63 0.00 78.82 76.72 0.00 77.78 2.18 78.84 10.65 76.74 0.00 77.80 2.25 78.86 10.67 76.76 0.00 77.82 2.34 78.88 10.69 76.78 0.00 77.84 2.45 78.90 10.71 76.80 77.86 2.58 78.92 10.73 0.00 76.82 0.00 77.88 2.71 78.94 10.75 76.84 0.00 77.90 2.86 78.96 10.77 76.86 0.00 77.92 3.01 78.98 10.79 76.88 0.00 77.94 3.17 79.00 10.82 76.90 0.00 77.96 3.34 79.02 10.84 76.92 0.00 77.98 3.52 79.04 10.86 76.94 0.00 78.00 3.71 79.06 10.88 3.91 76.96 0.00 78.02 79.08 10.90 76.98 0.02 78.04 4.12 79.10 10.92 4.33 77.00 0.03 78.06 79.12 10.94 0.06 78.08 4.56 79.14 10.96 77.02 77.04 0.09 78.10 4.79 79.16 10.97 77.06 0.13 78.12 5.02 79.18 10.99 77.08 0.17 78.14 5.27 79.20 11.01 79.22 77.10 0.22 78.16 5.52 11.03 77.12 0.28 78.18 5.78 79.24 11.05 77.14 79.26 78.20 6.05 11.07 0.34 77.16 0.40 78.22 6.32 79.28 11.09 77.18 78.24 79.30 11.11 0.47 6.61 77.20 78.26 0.54 6.90 79.32 11.13 77.22 0.61 78.28 7.20 79.34 11.15 77.24 78.30 7.51 79.36 0.69 11.17 77.26 0.77 78.32 7.83 79.38 11.19 78.34 77.28 0.85 8.15 79.40 11.21 78.36 77.30 11.23 0.93 8.48 79.42 77.32 78.38 11.25 1.01 8.82 79.44 77.34 78.40 9.18 79.46 11.27 1.09 77.36 9.54 1.17 78.42 79.48 11.29 77.38 1.24 78.44 9.92 79.50 11.31 77.40 1.31 78.46 10.26 77.42 78.48 10.28 1.37 77.44 1.42 78.50 10.30 77.46 1.47 78.52 10.32 78.54 10.34 77.48 1.53

77.50

77.52

77.54

1.58

1.63

1.68

78.56

78.58

78.60

10.36

10.38

10.40

#### Stage-Discharge for Pond B2: Bioretention Basin 2

.

Elevation	Surface	Storage	Elevation	Surface	Storage
(feet)	(sq-ft)	(cubic-feet)	(feet)	(sq-ft)	(cubic-feet)
76.50	6,877	0	79.15	10,524	22,869
76.55	6,941	345	79.20	10,601	23,397
76.60	7,005	694	79.25	10,678	23,929
76.65	7,069	1,046	79.30	10,755	24,465
76.70	7,133	1,401	79.35	10,832	25,005
76.75	7,197	1,759	79.40	10,909	25,548
76.80	7,260	2,121	79.45	10,986	26,096
76.85	7,324	2,485	79.50	11,063	26,647
76.90	7,388	2,853			
76.95	7,452	3,224			
77.00	7,516	3,598			
77.05	7,580	3,976			
77.10	7,644	4,356			
77.15	7,708	4,740			
77.20	7,772	5,127			
77.25	7,836	5,517			
77.30	7,899	5,911			
77.35	7,963	6,307			
77.40	8,027	6,707			
77.45	8,091	7,110			
77.50	8,155	7,516			
77.55	8,223	7,925			
77.60	8,292	8,338			
77.65	8,360	8,755			
77.70	8,428	9,174			
77.75	8,497	9,597			
77.80	8,565	10,024			
77.85	8,633	10,454			
77.90	8,702	10,887			
77.95	8,770	11,324			
78.00	8,839	11,764			
78.05	8,907	12,208			
78.10	8,975	12,655			
78.15	9,044	13,106			
78.20	9,112	13,559			
78.25	9,180	14,017			
78.30	9,249	14,477			
78.35	9,317	14,942			
78.40	9,385	15,409			
78.45	9,454	15,880			
78.50	9,522	16,355			
78.55	9,599	16,833			
78.60	9,676	17,314			
78.65	9,753	17,800			
78.70	9,830	18,290			
78.75	9,907	18,783			
78.80	9,984	19,280			
78.85	10,061	19,782			
78.90	10,138	20,287			
78.95	10,215	20,795			
79.00	10,293	21,308			
79.05	10,370	21,825			
79.10	10,447	22,345			

# Stage-Area-Storage for Pond B2: Bioretention Basin 2

# Summary for Pond B3: Bioretention Basin 3

[92] Warning: Device #2 is above defined storage

Inflow Area =	11,722 sf, 41.82% Impervious,	Inflow Depth = 3.50"	for 10-Year event
Inflow =	0.72 cfs @ 12.30 hrs, Volume=	3,419 cf	
Outflow =	0.72 cfs @ 12.32 hrs, Volume=	2,944 cf, Atten=	= 0%, Lag= 0.8 min
Primary =	0.72 cfs @ 12.32 hrs, Volume=	2,944 cf	-
Secondary =	0.00 cfs @ 0.00 hrs, Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 80.80' @ 12.32 hrs Surf.Area= 878 sf Storage= 528 cf

Plug-Flow detention time= 114.2 min calculated for 2,942 cf (86% of inflow) Center-of-Mass det. time= 48.3 min (847.4 - 799.1)

Volume	Invert	Avail.Sto	rage Storage D	escription				
#1	79.98'	69	94 cf Custom S	stage Data (Coni	<b>c)</b> Listed below (Rec	alc)		
Elevatio (fee	on Surf	Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)			
79.9 80.9	98 98	432 995	0 694	0 694	432 1,003			
Device	Routing	Invert	Outlet Devices					
#1	Primary Secondary	77.48' 80.98'	<b>15.0" Round C</b> L= 96.0' CMP, Inlet / Outlet Inv n= 0.013 Conc <b>15.0' long x 1</b> .0 Head (feet) 0.2	<b>CMP_Round 15</b> " projecting, no he rert= 77.48' / 77.0 rete pipe, bends <b>0' breadth Broad</b> 0 0.40 0.60 0.8	eadwall, Ke= 0.900 0' S= 0.0050 '/' C & connections, Flov <b>I-Crested Rectang</b> 0 1.00 1.20 1.40	c= 0.900 v Area= 1.23 sf <b>Jlar Weir</b> 1.60 1.80 2.00		
#3	Device 1	80.74'	2.50 3.00 Coef. (English) 3.30 3.31 3.32 <b>42.0" x 42.0" H</b> C= 0.600 in 42 Limited to weir f	2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3. 3.30 3.31 3.32 <b>42.0" x 42.0" Horiz. Orifice/Grate</b> C= 0.600 in 42.0" x 42.0" Grate (100% open area) Limited to weir flow at low heads		20 3.28 3.31		
Primary OutFlow Max=0.71 cfs @ 12.32 hrs HW=80.80' (Free Discharge) 1=CMP_Round 15" (Passes 0.71 cfs of 7.66 cfs potential flow) 3=Orifice/Grate (Weir Controls 0.71 cfs @ 0.82 fps)								
Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=79.98' (Free Discharge)								









# Pond B3: Bioretention Basin 3



# Stage-Discharge for Pond B3: Bioretention Basin 3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
79.98	0.00	0.00	0.00	80.51	0.00	0.00	0.00
79.99	0.00	0.00	0.00	80.52	0.00	0.00	0.00
80.00	0.00	0.00	0.00	80.53	0.00	0.00	0.00
80.01	0.00	0.00	0.00	80.54	0.00	0.00	0.00
80.02	0.00	0.00	0.00	80.55	0.00	0.00	0.00
80.03	0.00	0.00	0.00	80.56	0.00	0.00	0.00
80.04	0.00	0.00	0.00	80.57	0.00	0.00	0.00
80.05	0.00	0.00	0.00	80.58	0.00	0.00	0.00
80.06	0.00	0.00	0.00	80.59	0.00	0.00	0.00
80.07	0.00	0.00	0.00	80.60	0.00	0.00	0.00
80.08	0.00	0.00	0.00	80.61	0.00	0.00	0.00
80.09	0.00	0.00	0.00	80.62	0.00	0.00	0.00
80.10	0.00	0.00	0.00	80.63	0.00	0.00	0.00
80.11	0.00	0.00	0.00	80.64	0.00	0.00	0.00
80.12	0.00	0.00	0.00	80.65	0.00	0.00	0.00
80.13	0.00	0.00	0.00	80.00	0.00	0.00	0.00
00.14 90.15	0.00	0.00	0.00	00.07	0.00	0.00	0.00
80.15	0.00	0.00	0.00	80.00 80.60	0.00	0.00	0.00
80.10	0.00	0.00	0.00	80.09	0.00	0.00	0.00
80.17	0.00	0.00	0.00	80.70	0.00	0.00	0.00
80.19	0.00	0.00	0.00	80.72	0.00	0.00	0.00
80.20	0.00	0.00	0.00	80.73	0.00	0.00	0.00
80.21	0.00	0.00	0.00	80.74	0.00	0.00	0.00
80.22	0.00	0.00	0.00	80.75	0.05	0.05	0.00
80.23	0.00	0.00	0.00	80.76	0.13	0.13	0.00
80.24	0.00	0.00	0.00	80.77	0.24	0.24	0.00
80.25	0.00	0.00	0.00	80.78	0.37	0.37	0.00
80.26	0.00	0.00	0.00	80.79	0.51	0.51	0.00
80.27	0.00	0.00	0.00	80.80	0.67	0.67	0.00
80.28	0.00	0.00	0.00	80.81	0.85	0.85	0.00
80.29	0.00	0.00	0.00	80.82	1.04	1.04	0.00
80.30	0.00	0.00	0.00	80.83	1.24	1.24	0.00
80.31	0.00	0.00	0.00	80.84	1.45	1.45	0.00
00.32	0.00	0.00	0.00	C0.00	1.07	1.07	0.00
80.33	0.00	0.00	0.00	80.80	1.90	1.90	0.00
80.35	0.00	0.00	0.00	80.88	2.15	2.15	0.00
80.36	0.00	0.00	0.00	80.89	2.40	2.40	0.00
80.37	0.00	0.00	0.00	80.90	2.00	2.00	0.00
80.38	0.00	0.00	0.00	80.91	3.21	3.21	0.00
80.39	0.00	0.00	0.00	80.92	3.50	3.50	0.00
80.40	0.00	0.00	0.00	80.93	3.79	3.79	0.00
80.41	0.00	0.00	0.00	80.94	4.09	4.09	0.00
80.42	0.00	0.00	0.00	80.95	4.41	4.41	0.00
80.43	0.00	0.00	0.00	80.96	4.72	4.72	0.00
80.44	0.00	0.00	0.00	80.97	5.05	5.05	0.00
80.45	0.00	0.00	0.00	80.98	5.38	5.38	0.00
80.46	0.00	0.00	0.00				
80.47	0.00	0.00	0.00				
00.40	0.00	0.00	0.00				
00.49 80 50	0.00	0.00	0.00				
00.00	0.00	0.00	0.00				

Elevation	Surface	Storage	Elevation	Surface	Storage
(feet)	(sq-ft)	(cubic-feet)	(feet)	(sq-ft)	(cubic-feet)
79.98	432	0	80.51	702	298
79.99	436	4	80.52	707	305
80.00	441	9	80.53	713	312
80.01	446	13	80.54	719	319
80.02	450	18	80.55	725	326
80.03	455	22	80.56	730	333
80.04	459	27	80.57	736	341
80.05	404	31	80.58	742	348
80.00	409	30	80.09	740	300
80.07	473	41	80.00	760	303
80.00	483	40 50	80.62	766	378
80.10	487	55	80.63	772	386
80.11	492	60 60	80.64	778	394
80.12	497	65	80.65	784	401
80.13	502	70	80.66	790	409
80.14	507	75	80.67	796	417
80.15	511	80	80.68	802	425
80.16	516	85	80.69	808	433
80.17	521	90	80.70	814	441
80.18	526	96	80.71	820	450
80.19	531	101	80.72	826	458
80.20	536	106	80.73	833	466
80.21	541	112	80.74	839	474
80.22	546	117	80.75	845	483
80.23	551	123	80.76	851	491
80.24	556	128	80.77	858	500
00.20 80.26	566	104	00.70 80.70	004 970	506 517
80.20	571	139	80.79	970	526
80.27	577	140	80.80	883	520
80.20	582	157	80.82	889	544
80.30	587	167	80.83	896	552
80.31	592	168	80.84	902	561
80.32	597	174	80.85	909	571
80.33	603	180	80.86	915	580
80.34	608	186	80.87	922	589
80.35	613	192	80.88	928	598
80.36	619	199	80.89	935	607
80.37	624	205	80.90	941	617
80.38	629	211	80.91	948	626
80.39	635	217	80.92	955	636
80.40	640	224	80.93	961	645
80.41	646	230	80.94	968	655
80.42	651	237	80.95	975	665
80.43	657	243	80.96	981	674
80.44	662	250	80.97	988	684
80.45	668	256	80.98	995	694
00.40	0/3	203			
00.47 20.40	0/9	270			
00.40 80 10	600 600	211 281			
00.43	0.50	204			

80.50

696

291

# Stage-Area-Storage for Pond B3: Bioretention Basin 3

# Summary for Link 5E: EDA 1

Inflow A	Area	=	178,053 sf,	5.81% Impervious,	Inflow Depth = 2.82"	for 10-Year event
Inflow	:	=	11.74 cfs @	12.20 hrs, Volume=	41,781 cf	
Primary	y :	=	11.74 cfs @	12.20 hrs, Volume=	41,781 cf, Atte	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

#### Link 5E: EDA 1



# Summary for Link 6E: EDA 2

Inflow A	rea =	31,726 sf, 17.78% Impervious,	Inflow Depth = 3.95"	for 10-Year event
Inflow	=	3.44 cfs @ 12.13 hrs, Volume=	10,447 cf	
Primary	=	3.44 cfs @ 12.13 hrs, Volume=	10,447 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



#### Link 6E: EDA 2

# Summary for Link 7E: EDA

Inflow A	Area =	209,779 sf,	7.62% Impervious,	Inflow Depth = 2.99"	for 10-Year event
Inflow	=	14.14 cfs @	12.18 hrs, Volume=	52,228 cf	
Primary	/ =	14.14 cfs @	12.18 hrs, Volume=	52,228 cf, Atte	en= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

# Link 7E: EDA



# Summary for Link 10P: PDA 1A

Inflow /	Area	=	97,279 sf,	60.64% Impervious,	Inflow Depth = 3.1	1" for 10-Year event
Inflow	:	=	3.21 cfs @	12.45 hrs, Volume=	25,242 cf	
Primary	y :	=	3.21 cfs @	12.45 hrs, Volume=	25,242 cf, At	tten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

# Link 10P: PDA 1A



# Summary for Link 11P: PDA 1B

Inflow A	Area =	•	11,722 sf	, 41.82% Ir	npervious,	Inflow Depth =	3.01	" for 10	-Year event
Inflow	=		0.72 cfs @	12.32 hrs,	Volume=	2,944 c	f		
Primary	/ =		0.72 cfs @	12.32 hrs,	Volume=	2,944 c	f, Att	en= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



# Link 11P: PDA 1B

# Summary for Link 12P: PDA 1C

Inflow A	Area	a =	64,382	sf,	3.87% Ir	npervious,	Inflow Depth =	2.44"	for 10	)-Year event
Inflow		=	3.50 cfs	@ 12	2.22 hrs,	Volume=	13,082 c	f		
Primar	y	=	3.50 cfs	ā 12	2.22 hrs,	Volume=	13,082 c	f, Atte	n= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

#### Link 12P: PDA 1C



# Summary for Link 13P: PDA 1

Inflow Ar	rea =	173,383 sf,	38.29% Impervious,	Inflow Depth = 2.86"	for 10-Year event
Inflow	=	6.33 cfs @	12.29 hrs, Volume=	41,268 cf	
Primary	=	6.33 cfs @	12.29 hrs, Volume=	41,268 cf, Atte	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

# Hydrograph Inflow Primary 6.33 cfs 6.33 cfs 7 Inflow Area=173,383 sf 6 5-Flow (cfs) 4 3-2-1 0 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 Time (hours)

#### Link 13P: PDA 1
# Summary for Link 14P: PDA 2

Inflow A	Area =	:	36,396 sf,	0.00% Imp	pervious,	Inflow Depth =	2.42"	for 10	-Year event
Inflow	=		2.10 cfs @	12.20 hrs, V	/olume=	7,347 c	f		
Primary	/ =		2.10 cfs @	12.20 hrs, V	/olume=	7,347 c	f, Atter	า= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

#### Link 14P: PDA 2



# Summary for Link 15P: PDA

Inflow A	rea =	209,779 sf, 31.65% Impervious,	Inflow Depth = 2.78"	for 10-Year event
Inflow	=	8.20 cfs @ 12.25 hrs, Volume=	48,616 cf	
Primary	=	8.20 cfs @ 12.25 hrs, Volume=	48,616 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

#### Link 15P: PDA



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1E: Impervious	Runoff Area=10,351 sf 100.00% Impervious Runoff Depth=8.57" Tc=12.4 min CN=0/98 Runoff=1.79 cfs 7,392 cf
Subcatchment1P: Impervious	Runoff Area=23,576 sf 100.00% Impervious Runoff Depth=8.57" Tc=10.7 min CN=0/98 Runoff=4.27 cfs 16,837 cf
Subcatchment2E: Pervious	Runoff Area=167,702 sf 0.00% Impervious Runoff Depth=5.90" Flow Length=630' Tc=12.4 min CN=76/0 Runoff=23.14 cfs 82,456 cf
Subcatchment2P: Pervious	Runoff Area=24,672 sf 0.00% Impervious Runoff Depth=5.66" Flow Length=426' Tc=10.7 min CN=74/0 Runoff=3.44 cfs 11,629 cf
Subcatchment3E: Impervious	Runoff Area=5,641 sf 100.00% Impervious Runoff Depth=8.57" Tc=6.0 min CN=0/98 Runoff=1.18 cfs 4,028 cf
Subcatchment3P: Roof Area	Runoff Area=35,418 sf 100.00% Impervious Runoff Depth=8.57" Tc=10.7 min CN=0/98 Runoff=6.41 cfs 25,294 cf
Subcatchment4E: Pervious	Runoff Area=26,085 sf 0.00% Impervious Runoff Depth=7.24" Flow Length=393' Tc=6.0 min CN=87/0 Runoff=5.11 cfs 15,738 cf
Subcatchment4P: Pervious	Runoff Area=13,613 sf 0.00% Impervious Runoff Depth=5.66" Tc=10.7 min CN=74/0 Runoff=1.90 cfs 6,416 cf
Subcatchment5P: Impervious	Runoff Area=5,021 sf 97.63% Impervious Runoff Depth=8.56" Tc=20.8 min CN=96/98 Runoff=0.71 cfs 3,583 cf
Subcatchment6P: Pervious	Runoff Area=6,701 sf 0.00% Impervious Runoff Depth=5.53" Flow Length=172' Tc=20.8 min CN=73/0 Runoff=0.70 cfs 3,090 cf
Subcatchment7P: Impervious	Runoff Area=2,493 sf 100.00% Impervious Runoff Depth=8.57" Tc=13.9 min CN=0/98 Runoff=0.41 cfs 1,780 cf
Subcatchment8P: Pervious	Runoff Area=61,889 sf 0.00% Impervious Runoff Depth=5.41" Flow Length=409' Tc=13.9 min CN=72/0 Runoff=7.54 cfs 27,912 cf
Subcatchment9P: Pervious	Runoff Area=36,396 sf 0.00% Impervious Runoff Depth=5.53" Flow Length=471' Tc=12.2 min CN=73/0 Runoff=4.76 cfs 16,785 cf
Pond B1: Bioretention Basin 1	Peak Elev=78.45' Storage=4,786 cf Inflow=7.70 cfs 28,466 cf Outflow=7.55 cfs 24,571 cf
Pond B2: Bioretention Basin 2	Peak Elev=78.50' Storage=16,324 cf Inflow=15.77 cfs 56,281 cf Outflow=10.31 cfs 53,114 cf
Pond B3: Bioretention Basin 3 Primary	Peak Elev=80.84' Storage=560 cf Inflow=1.41 cfs 6,674 cf =1.41 cfs 6,199 cf Secondary=0.00 cfs 0 cf Outflow=1.41 cfs 6,199 cf

 Pre vs Post
 NOAA 24

 Prepared by {enter your company name here}
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NOAA 24-hr C 100-Year Rainfall=8.81" Printed 5/14/2021

Link 5E: EDA 1	Inflow=24.93 cfs 89,848 cf
	Primary=24.93 cfs 89,848 cf
Link 6E: EDA 2	Inflow=6.29 cfs 19,767 cf
	Primary=6.29 cfs 19,767 cf
Link 7E: EDA	Inflow=29 37 cfs 109 615 cf
	Primary=29.37 cfs 109,615 cf
	1 mary=29.57 cr3 109,013 cr
Link 10P: PDA 1A	Inflow=10.31 cfs 53,114 cf
	Primary=10.31 cfs 53,114 cf
Link 11P: PDA 1B	Inflow=1.41 cfs 6,199 cf
	Primary=1.41 cfs 6,199 cf
Link 12P: PDA 1C	Inflow=7.95 cfs 29,692 cf
	Primary=7.95 cfs 29,692 cf
Link 13P. DDA 1	Inflow=19.24 cfs. 89.005 cf
	Primary=19.24 cfs 89,005 cf
	1 mary 10.24 013 00,000 01
Link 14P: PDA 2	Inflow=4.76 cfs 16.785 cf
	Primary=4.76 cfs 16,785 cf
Link 15P: PDA	Inflow=23.53 cfs 105,790 cf
	Primary=23.53 cfs 105,790 cf
$T_{1} = \{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0$	

Total Runoff Area = 419,558 sf Runoff Volume = 222,941 cf Average Runoff Depth = 6.38" 80.36% Pervious = 337,177 sf 19.64% Impervious = 82,381 sf

#### Summary for Subcatchment 1E: Impervious

Runoff = 1.79 cfs @ 12.20 hrs, Volume= 7,392 cf, Depth= 8.57"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100-Year Rainfall=8.81"



Flow (cfs)

2

# Summary for Subcatchment 1P: Impervious

Runoff = 4.27 cfs @ 12.18 hrs, Volume= 16,837 cf, Depth= 8.57"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100-Year Rainfall=8.81"

Area (sf)	CN	Description					
23,576	98	Paved park	ing, HSG C	2	_		
23,576	98	100.00% Im	npervious A	Area			
Tc Length (min) (feet)	Slop (ft/f	e Velocity t) (ft/sec)	Capacity (cfs)	Description			
10.7				Direct Entry, Tc			
Subcatchment 1P: Impervious							
	4.27 c	fs		NOAA 24-hr C 100-Year Rainfall=8.81"			
				Runoff Area=23 576 sf			

Runoff Volume=16,837 cf

Runoff Depth=8.57"

Tc=10.7 min

CN=0/98



#### **Summary for Subcatchment 2E: Pervious**

Runoff = 23.14 cfs @ 12.20 hrs, Volume= 82,456 cf, Depth= 5.90"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100-Year Rainfall=8.81"

A	rea (sf)	CN D	Description						
	24,589 96 Gravel surface, HSG C								
36,591 70 Woods, Good, HSG C									
1	05,816	74 >	75% Gras	s cover, Go	ood, HSG C				
	706	72 V	Voods/gras	ss comb., G	Good, HSG C				
1	67,702	76 V	Veighted A	verage					
1	67,702	76 1	00.00% Pe	ervious Are	а				
Тс	Length	Slope	Velocity	Capacity	Description				
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
0.3	27	0.0490	1.55		Sheet Flow, A-B				
					Smooth surfaces n= 0.011 P2= 3.36"				
8.8	73	0.0130	0.14		Sheet Flow, B-C				
					Grass: Short n= 0.150 P2= 3.36"				
0.4	54	0.0180	2.16		Shallow Concentrated Flow, C-D				
					Unpaved Kv= 16.1 fps				
1.2	207	0.0340	2.97		Shallow Concentrated Flow, D-E				
					Unpaved Kv= 16.1 fps				
0.5	59	0.0170	2.10		Shallow Concentrated Flow, E-F				
					Unpaved Kv= 16.1 fps				
0.2	43	0.0470	3.49		Shallow Concentrated Flow, F-G				
					Unpaved Kv= 16.1 tps				
1.0	167	0.0280	2.69		Shallow Concentrated Flow, G-H				
					Unpaved Kv= 16.1 tps				
12.4	630	Total							

#### Subcatchment 2E: Pervious



## **Summary for Subcatchment 2P: Pervious**

Runoff = 3.44 cfs @ 12.18 hrs, Volume= 11,629 cf, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100-Year Rainfall=8.81"

A	rea (sf)	CN [	Description							
	22,852	74 >	>75% Gras	s cover, Go	ood, HSG C					
	1,820	72 \	72 Woods/grass comb., Good, HSG C							
	24,672	74 \	Neighted A	verage						
	24,672	74 ´	100.00% Pe	ervious Are	a					
_										
Tc	Length	Slope	Velocity	Capacity	Description					
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)						
9.2	100	0.0222	0.18		Sheet Flow, A-B					
					Grass: Short n= 0.150 P2= 3.36"					
0.1	23	0.0730	4.35		Shallow Concentrated Flow, B-C					
					Unpaved Kv= 16.1 fps					
0.3	48	0.0210	2.94		Shallow Concentrated Flow, C-D					
					Paved Kv= 20.3 fps					
1.1	255	0.0050	3.72	4.57	Pipe Channel, D-E					
					15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'					
					n= 0.013 Concrete pipe, bends & connections					
10 7	126	Total								

10.7 426 Total

#### Subcatchment 2P: Pervious



## Summary for Subcatchment 3E: Impervious

Runoff = 1.18 cfs @ 12.13 hrs, Volume= 4,028 cf, Depth= 8.57"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100-Year Rainfall=8.81"

Ar	rea (sf)	CN Description					
	2,580	98 Unconnected roofs, HSG C					
	3,061	98 Paved parking, HSG C					
	5,641	98 Weighted Average					
	5,641	98 100.00% Impervious Area					
Tc (min)	Length Slope Velocity Capacity Description (feet) (ft/ft) (ft/sec) (cfs)						
3.0		Direct Entry, Tc					
3.0	0 Total, Increased to minimum Tc = 6.0 min						
Subcatchment 3E: Impervious							



0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 Time (hours)

#### Summary for Subcatchment 3P: Roof Area

Runoff = 6.41 cfs @ 12.18 hrs, Volume= 25,294 cf, Depth= 8.57"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100-Year Rainfall=8.81"



#### **Summary for Subcatchment 4E: Pervious**

Runoff = 5.11 cfs @ 12.13 hrs, Volume= 15,738 cf, Depth= 7.24"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100-Year Rainfall=8.81"

	A	rea (sf)	CN E	Description							
		164	70 V	70 Woods, Good, HSG C							
		16,189	96 C	Gravel surfa	ace, HSG C						
		5,108	74 >	75% Gras	s cover, Go	ood, HSG C					
		4,624	72 V	Voods/gras	ss comb., G	Good, HSG C					
		26,085	87 V	Veighted A	verage						
		26,085	87 1	00.00% Pe	ervious Are	a					
	Tc	Length	Slope	Velocity	Capacity	Description					
(	min)	(feet)	(ft/ft)	(ft/sec)	(cfs)						
	1.3	100	0.0160	1.29		Sheet Flow, A-B					
						Smooth surfaces n= 0.011 P2= 3.36"					
	0.6	97	0.0200	2.87		Shallow Concentrated Flow, B-C					
						Paved Kv= 20.3 fps					
	1.0	175	0.0330	2.92		Shallow Concentrated Flow, C-D					
	0.4	40	0 0000	0.44		Unpaved Kv= 16.1 fps					
	0.1	13	0.0230	2.44		Shallow Concentrated Flow, D-E					
	0.0	0	0 0 4 9 0	2 5 2		Onpaved KV= 16.1 lps Shellow Concentrated Flow F F					
	0.0	8	0.0480	3.53		Shallow Concentrated Flow, E-F					
			<b>T</b> ( ) )								
	3.0	393	I otal, I	ncreased t	o minimum	1 c = 6.0 min					

Subcatchment 4E: Pervious



#### **Summary for Subcatchment 4P: Pervious**

Runoff = 1.90 cfs @ 12.18 hrs, Volume= 6,416 cf, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100-Year Rainfall=8.81"



#### Summary for Subcatchment 5P: Impervious

Runoff = 0.71 cfs @ 12.29 hrs, Volume= 3,583 cf, Depth= 8.56"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100-Year Rainfall=8.81"

A	rea (sf)	CN	Description					
	4,902	98	Paved park	ing, HSG C				
	119	96	Gravel surfa	ace, HSG C	2			
	5,021							
	119	96	2.37% Pervious Area					
	4,902	98	3 97.63% Impervious Area					
т.	1	01		0	Description			
IC	Length	Slop	e velocity	Capacity	Description			
(min)	(feet)	(ft/f	t) (ft/sec)	(cfs)				
20.8					Direct Entry, Tc			

# Subcatchment 5P: Impervious



# Summary for Subcatchment 6P: Pervious

Runoff = 0.70 cfs @ 12.30 hrs, Volume= 3,090 cf, Depth= 5.53"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100-Year Rainfall=8.81"

A	rea (sf)	CN	Description							
	4,509	74	74 >75% Grass cover, Good, HSG C							
	2,192	70	Woods, Go	od, HSG C						
	6,701	73	Weighted A	verage						
	6,701	73	100.00% Pe	ervious Are	a					
Тс	Length	Slope	Velocity	Capacity	Description					
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)						
20.4	104	0.0230	0.08		Sheet Flow, A-B					
					Woods: Light underbrush n= 0.400 P2= 3.36"					
0.3	57	0.0230	3.08		Shallow Concentrated Flow, B-C					
					Paved Kv= 20.3 fps					
0.1	11	0.0200	2.28		Shallow Concentrated Flow, C-D					
					Unpaved Kv= 16.1 fps					
20.8	172	Total								

## Subcatchment 6P: Pervious



## Summary for Subcatchment 7P: Impervious

Runoff = 0.41 cfs @ 12.21 hrs, Volume= 1,780 cf, Depth= 8.57"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100-Year Rainfall=8.81"

A	rea (sf)	CN	Description					
	2,493	98	Paved park	Paved parking, HSG C				
	2,493	98 100.00% Impervious Area						
Tc (min)	Length (feet)	Slop (ft/f	e Velocity t) (ft/sec)	Capacity (cfs)	Description			
13.9					Direct Entry, Tc			

# Subcatchment 7P: Impervious



## **Summary for Subcatchment 8P: Pervious**

Runoff = 7.54 cfs @ 12.22 hrs, Volume= 27,912 cf, Depth= 5.41"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100-Year Rainfall=8.81"

A	rea (sf)	CN [	Description		
	28,675	70 V	Voods, Go	od, HSG C	
	33,214	74 >	-75% Gras	s cover, Go	ood, HSG C
	61,889	72 V	Veighted A	verage	
	61,889	72 1	00.00% Pe	ervious Are	a
_					
Tc	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
2.8	36	0.0560	0.21		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.36"
4.3	51	0.0390	0.20		Sheet Flow, B-C
					Grass: Short n= 0.150 P2= 3.36"
0.3	25	0.0800	1.41		Shallow Concentrated Flow, C-D
					Woodland Kv= 5.0 fps
6.5	297	0.0230	0.76		Shallow Concentrated Flow, D-E
					Woodland Kv= 5.0 fps
13.9	409	Total			

#### Subcatchment 8P: Pervious



#### **Summary for Subcatchment 9P: Pervious**

Runoff = 4.76 cfs @ 12.20 hrs, Volume= 16,785 cf, Depth= 5.53"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs NOAA 24-hr C 100-Year Rainfall=8.81"

A	rea (sf)	CN E	Description		
	5,369	70 V	Voods, Go	od, HSG C	
	31,027	74 >	-75% Gras	s cover, Go	ood, HSG C
	36,396	73 V	Veighted A	verage	
	36,396	73 1	100.00% Pe	ervious Are	а
_					
Tc	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
9.8	100	0.0190	0.17		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.36"
0.7	102	0.0240	2.49		Shallow Concentrated Flow, B-C
					Unpaved Kv= 16.1 fps
0.8	128	0.0310	2.83		Shallow Concentrated Flow, C-D
					Unpaved Kv= 16.1 fps
0.8	120	0.0250	2.55		Shallow Concentrated Flow, D-E
					Unpaved Kv= 16.1 fps
0.1	21	0.0310	2.83		Shallow Concentrated Flow, E-F
					Unpaved Kv= 16.1 fps
12.2	471	Total			

# Subcatchment 9P: Pervious

#### Hydrograph Runoff 4.76 cfs 5 NOAA 24-hr C 100-Year Rainfall=8.81" 4 Runoff Area=36,396 sf Runoff Volume=16,785 cf Runoff Depth=5.53" 3-Flow (cfs) Flow Length=471 Tc=12.2 min 2-CN=73/0 1 0 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 Time (hours)

# Summary for Pond B1: Bioretention Basin 1

[92] Warning: Device #2 is above defined storage

Inflow Ar	rea =	48,248 sf, 48.86% Impervious,	Inflow Depth = 7.08" for 10	0-Year event
Inflow	=	7.70 cfs @ 12.18 hrs, Volume=	28,466 cf	
Outflow	=	7.55 cfs @ 12.20 hrs, Volume=	24,571 cf, Atten= 2%,	Lag= 1.4 min
Primary	=	7.55 cfs @ 12.20 hrs, Volume=	24,571 cf	-

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 78.45' @ 12.20 hrs Surf Area= 3,063 sf Storage= 4,786 cf

Plug-Flow detention time= 117.1 min calculated for 24,554 cf (86% of inflow) Center-of-Mass det. time= 52.5 min (828.0 - 775.5)

Volume	Invert	t Avail.Sto	rage Storage	Description		
#1	76.50	' 4,93	38 cf Custom	Stage Data (Coni	<b>c)</b> Listed below (Re	ecalc)
Elevatio	on S	urf.Area	Inc.Store	Cum.Store	Wet.Area	
(fee	et)	(sq-ft)	(cubic-feet)	(cubic-feet)	(sq-ft)	
76.5	50	1,883	0	0	1,883	
77.5	50	2,461	2,166	2,166	2,484	
78.5	50	3,096	2,772	4,938	3,146	
Device	Routing	Invert	Outlet Devices	3		
#1	Primary	73.00'	<b>24.0" Round</b> L= 10.0' CMF Inlet / Outlet Ir n= 0.013 Con	<b>CMP_Round 24</b> " P, projecting, no he overt= 73.00' / 72.8 crete pipe, bends	adwall, Ke= 0.900 5' S= 0.0150 '/' & connections, Flo	) Cc= 0.900 ow Area= 3.14 sf
#2	Device 1	78.50'	<b>10.0' long x</b> 1 Head (feet) 0. 2.50 3.00 Coef. (English	<ul> <li><b>.0' breadth Broad</b></li> <li>20 0.40 0.60 0.8</li> <li>) 2.69 2.72 2.75</li> </ul>	I-Crested Rectang           0         1.00         1.20         1.40           2.85         2.98         3.08         3	<b>gular Weir</b> 1.60 1.80 2.00 3.20 3.28 3.31
#3	Device 1	78.15'	<b>42.0" x 42.0"</b> C= 0.600 in 4 Limited to wei	Horiz. Orifice/Gra 2.0" x 42.0" Grate flow at low heads	<b>te</b> (100% open area)	
Primary OutFlow Max=7.50 cfs @ 12.20 hrs HW=78.45' (Free Discharge)						

**-CMP\_Round 24"** (Passes 7.50 cfs of 25.19 cfs potential flow) **-2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

-3=Orifice/Grate (Weir Controls 7.50 cfs @ 1.79 fps)









# Pond B1: Bioretention Basin 1



## Stage-Discharge for Pond B1: Bioretention Basin 1

Elevation (feet)	Primary (cfs)	Elevation	Primary (cfs)	Elevation	Primary (cfs)	Elevation	Primary (cfs)
76 50	0.00	77.03	0.00	77 56	0.00	78.09	0.00
76.51	0.00	77.00	0.00	77.57	0.00	78.00	0.00
76.52	0.00	77.05	0.00	77.58	0.00	78.10	0.00
76.53	0.00	77.06	0.00	77 59	0.00	78.12	0.00
76.54	0.00	77.00	0.00	77.60	0.00	78.12	0.00
76.55	0.00	77.08	0.00	77.61	0.00	78.10	0.00
76.56	0.00	77.00	0.00	77.62	0.00	78.15	0.00
76.57	0.00	77.10	0.00	77.63	0.00	78.16	0.05
76.58	0.00	77 11	0.00	77.64	0.00	78.10	0.00
76 59	0.00	77 12	0.00	77 65	0.00	78 18	0.24
76.60	0.00	77.13	0.00	77.66	0.00	78.19	0.37
76.61	0.00	77.14	0.00	77.67	0.00	78.20	0.51
76 62	0.00	77 15	0.00	77.68	0.00	78 21	0.67
76.63	0.00	77 16	0.00	77 69	0.00	78.22	0.85
76.64	0.00	77.17	0.00	77.70	0.00	78.23	1.04
76.65	0.00	77.18	0.00	77.71	0.00	78.24	1.24
76.66	0.00	77.19	0.00	77.72	0.00	78.25	1.45
76.67	0.00	77.20	0.00	77.73	0.00	78.26	1.67
76.68	0.00	77.21	0.00	77.74	0.00	78.27	1.90
76.69	0.00	77.22	0.00	77.75	0.00	78.28	2.15
76.70	0.00	77.23	0.00	77.76	0.00	78.29	2.40
76.71	0.00	77.24	0.00	77.77	0.00	78.30	2.66
76.72	0.00	77.25	0.00	77.78	0.00	78.31	2.93
76.73	0.00	77.26	0.00	77.79	0.00	78.32	3.21
76.74	0.00	77.27	0.00	77.80	0.00	78.33	3.50
76.75	0.00	77.28	0.00	77.81	0.00	78.34	3.79
76.76	0.00	77.29	0.00	77.82	0.00	78.35	4.09
76.77	0.00	77.30	0.00	77.83	0.00	78.36	4.41
76.78	0.00	77.31	0.00	77.84	0.00	78.37	4.72
76.79	0.00	77.32	0.00	77.85	0.00	78.38	5.05
76.80	0.00	77.33	0.00	77.86	0.00	78.39	5.38
76.81	0.00	77.34	0.00	77.87	0.00	78.40	5.72
76.82	0.00	77.35	0.00	77.88	0.00	78.41	6.07
76.83	0.00	77.36	0.00	77.89	0.00	78.42	6.42
76.84	0.00	77.37	0.00	77.90	0.00	78.43	6.78
76.85	0.00	77.38	0.00	77.91	0.00	78.44	7.15
76.86	0.00	77.39	0.00	77.92	0.00	78.45	7.52
76.87	0.00	77.40	0.00	77.93	0.00	78.46	7.90
76.88	0.00	77.41	0.00	77.94	0.00	78.47	8.29
76.89	0.00	77.42	0.00	77.95	0.00	78.48	8.68
76.90	0.00	77.43	0.00	77.96	0.00	78.49	9.08
76.91	0.00	//.44	0.00	//.9/	0.00	78.50	9.48
76.92	0.00	77.45	0.00	77.98	0.00		
76.93	0.00	77.46	0.00	77.99	0.00		
76.94	0.00	//.4/	0.00	78.00	0.00		
76.95	0.00	77.48	0.00	78.01	0.00		
76.96	0.00	77.49	0.00	78.02	0.00		
76.97	0.00	77.50	0.00	78.03	0.00		
10.90 76.00	0.00	11.51	0.00	/ ð.U4 70.05	0.00		
10.99	0.00	11.52 77 52	0.00		0.00		
77.00	0.00	11.00 77 51	0.00		0.00		
77 00		77 55	0.00	70.07 72.02	0.00		
11.02	0.00	11.55	0.00	10.00	0.00		

Elevation	Surface	Storage	Elevation	Surface	Storage
(feet)	(sq-ft)	(cubic-feet)	(feet)	(sq-ft)	(cubic-feet)
76.50	1,883	0	77.56	2,497	2,314
76.52	1,894	38	77.58	2,509	2,364
76.54	1,905	76	77.60	2,521	2,415
76.56	1,916	114	77.62	2,533	2,465
76.58	1,926	152	77.64	2,546	2,516
76.60	1,937	191	77.66	2,558	2,567
76.62	1,948	230	77.68	2,570	2,618
76.64	1,959	269	77.70	2,582	2,670
76.66	1,970	308	77.72	2,594	2,722
76.68	1,981	348	77.74	2,607	2,774
76.70	1,992	387	77.76	2,619	2,826
76.72	2,004	427	77.78	2,631	2,878
76.74	2,015	468	77.80	2,644	2,931
76.76	2,026	508	77.82	2,656	2,984
76.78	2,037	549	77.84	2,669	3,037
76.80	2,048	590	77.86	2,681	3,091
76.82	2,060	631	77.88	2,694	3,145
76.84	2,071	672	77.90	2,706	3,199
76.86	2,082	713	77.92	2,719	3,253
76.88	2,094	755	77.94	2,731	3,307
76.90	2,105	797	77.96	2,744	3,362
76.92	2,116	839	77.98	2,757	3,417
76.94	2,128	882	78.00	2,769	3,472
76.96	2,139	924	78.02	2,782	3,528
76.98	2,151	967	78.04	2,795	3,584
77.00	2,162	1,011	78.06	2,808	3,640
77.02	2,174	1,054	78.08	2,820	3,696
77.04	2,186	1,097	78.10	2,833	3,753
77.06	2,197	1,141	78.12	2,846	3,809
77.08	2,209	1,185	78.14	2,859	3,866
77.10	2,221	1,230	78.16	2,872	3,924
77.12	2,232	1,274	78.18	2,885	3,981
77.14	2,244	1,319	78.20	2,898	4,039
77.16	2,256	1,364	78.22	2,911	4,097
77.18	2,268	1,409	78.24	2,924	4,156
77.20	2,279	1,455	78.26	2,937	4,214
77.22	2,291	1,500	78.28	2,950	4,273
77.24	2,303	1,546	78.30	2,963	4,332
77.26	2,315	1,593	78.32	2,976	4,392
77.28	2,327	1,639	78.34	2,990	4,451
77.30	2,339	1,686	78.36	3,003	4,511
77.32	2,351	1,732	78.38	3,016	4,571
77.34	2,363	1,780	78.40	3,029	4,632
77.36	2,375	1,827	78.42	3,043	4,692
77.38	2,388	1,875	78.44	3,056	4,753
77.40	2,400	1,923	78.46	3,069	4,815
77.42	2,412	1,971	78.48	3,083	4,876
77.44	2,424	2,019	78.50	3,096	4,938
77.46	2,436	2,068			
77.48	2,449	2,116			
77.50	2,461	2,166			
77.52	2.473	2.215			

77.54

2,485

2,264

## Stage-Area-Storage for Pond B1: Bioretention Basin 1

## Summary for Pond B2: Bioretention Basin 2

[81] Warning: Exceeded Pond B1 by 0.12' @ 12.35 hrs

Inflow Are	a =	97,279 sf, 60.64% Impervious, Inflow Depth = 6.94" for 100-Year event
Inflow	=	15.77 cfs @ 12.19 hrs, Volume= 56,281 cf
Outflow	=	10.31 cfs @ 12.32 hrs, Volume= 53,114 cf, Atten= 35%, Lag= 7.8 min
Primary	=	10.31 cfs @ 12.32 hrs, Volume= 53,114 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 78.50' @ 12.31 hrs Surf.Area= 9,518 sf Storage= 16,324 cf

Plug-Flow detention time= 105.9 min calculated for 53,077 cf (94% of inflow) Center-of-Mass det. time= 75.0 min (864.8 - 789.8)

Volume	Inve	rt Avail.Sto	orage Storage	Description	
#1	76.5	0' 26,6	47 cf Custom	n Stage Data (Pr	rismatic)Listed below (Recalc)
Elevatio	on	Surf.Area	Inc.Store	Cum.Store	
(fee	et)	(sq-ft)	(cubic-feet)	(cubic-feet)	
76.5	50	6,877	0	0	
77.5	50	8,155	7,516	7,516	
78.5	50	9,522	8,839	16,355	
79.5	50	11,063	10,293	26,647	
Device	Routing	Invert	Outlet Device	s	
#1	Primary	73.00'	<b>15.0" Round</b> L= 47.0' CM Inlet / Outlet I n= 0.011 Con	<b>I Culvert</b> P, projecting, no nvert= 73.00' / 7 ncrete pipe, strai	headwall, Ke= 0.900 2.06' S= 0.0200 '/' Cc= 0.900 ight & clean, Flow Area= 1.23 sf
#2	Device 1	76.94'	6.0" Vert. Or	ifice/Grate X 3.0	<b>0</b> C= 0.600
#3	Device 1	77.78'	<b>4.0' long x 0</b> Head (feet) 0 Coef. (English	<b>.5' breadth Bro</b> a 0.20 0.40 0.60 h) 2.80 2.92 3.1	ad-Crested Rectangular Weir 0.80 1.00 08 3.30 3.32
#4	Device 1	79.25'	<b>42.0" x 42.0"</b> C= 0.600 in 4 Limited to we	Horiz. Orifice/O 42.0" x 42.0" Gra ir flow at low hea	<b>Grate</b> ate (100% open area) ads
Primary	OutFlow	Max=10.29 cfs	@ 12.32 hrs +	IW=78.49' (Fre	e Discharge)

-1=Culvert (Inlet Controls 10.29 cfs @ 8.38 fps)

-2=Orifice/Grate (Passes < 3.23 cfs potential flow)

-3=Broad-Crested Rectangular Weir (Passes < 7.66 cfs potential flow)

-4=Orifice/Grate (Controls 0.00 cfs)

Pond B2: Bioretention Basin 2











# Stage-Discharge for Pond B2: Bioretention Basin 2

Elevation	Primary	Elevation	Primary	Elevation	Primary
(feet)	(cfs)	(feet)	(cts)	(feet)	(cts)
76.50	0.00	77.50	1.73	78.62	10.43
70.52	0.00	77.60	1.//	70.04	10.45
76.54	0.00	77.60	1.02	78.68	10.47
76.58	0.00	77.64	1.00	78.00	10.49
76.60	0.00	77.66	1.90	78.70	10.51
76.62	0.00	77.68	1.99	78.72	10.55
76.64	0.00	77.70	2.03	78.76	10.57
76.66	0.00	77.72	2.06	78.78	10.59
76.68	0.00	77.74	2.10	78.80	10.61
76.70	0.00	77.76	2.14	78.82	10.63
76.72	0.00	77.78	2.18	78.84	10.65
76.74	0.00	77.80	2.25	78.86	10.67
76.76	0.00	77.82	2.34	78.88	10.69
76.78	0.00	77.84	2.45	78.90	10.71
76.80	0.00	77.80	2.58	78.92	10.73
70.02	0.00	77.00	2.71	70.94	10.75
76.86	0.00	77.90	2.00	78.90	10.77
76.88	0.00	77.92	3 17	79.00	10.73
76.90	0.00	77.96	3 34	79.00	10.84
76.92	0.00	77.98	3.52	79.04	10.86
76.94	0.00	78.00	3.71	79.06	10.88
76.96	0.00	78.02	3.91	79.08	10.90
76.98	0.02	78.04	4.12	79.10	10.92
77.00	0.03	78.06	4.33	79.12	10.94
77.02	0.06	78.08	4.56	79.14	10.96
77.04	0.09	78.10	4.79	79.16	10.97
77.06	0.13	78.12	5.02	/9.18	10.99
77.08	0.17	78.14	5.27	79.20	11.01
77.10	0.22	70.10	0.02 5.79	79.22	11.03
77 14	0.20	78.10	6.05	79.24	11.03
77.14	0.40	78.20	6.32	79.20	11.07
77.18	0.47	78.24	6.61	79.30	11.11
77.20	0.54	78.26	6.90	79.32	11.13
77.22	0.61	78.28	7.20	79.34	11.15
77.24	0.69	78.30	7.51	79.36	11.17
77.26	0.77	78.32	7.83	79.38	11.19
77.28	0.85	78.34	8.15	79.40	11.21
77.30	0.93	78.36	8.48	79.42	11.23
77.32	1.01	78.38	8.82	79.44	11.25
77.34	1.09	78.40	9.18	79.40	11.27
77 38	1.17	78.42	9.04	79.40	11.29
77.40	1.24	78.46	10.26	75.50	11.51
77 42	1.01	78.48	10.20		
77.44	1.42	78.50	10.30		
77.46	1.47	78.52	10.32		
77.48	1.53	78.54	10.34		
77.50	1.58	78.56	10.36		
77.52	1.63	78.58	10.38		
11.54	1.68	78.60	10.40		
				•	

Elevation	Surface	Storage	Elevation	Surface	Storage
(feet)	(sq-ft)	(cubic-teet)	(feet)	(sq-π)	(cubic-teet)
76.50	6,877	0	79.15	10,524	22,869
76.55	6,941	345	79.20	10,601	23,397
76.60	7,005	694	79.25	10,678	23,929
76.65	7.069	1.046	79.30	10,755	24,465
76 70	7 133	1 401	79 35	10 832	25 005
76 75	7 197	1 759	79.40	10,000	25 548
76.80	7,107	2 121	70.40	10,000	26,040
76.00	7,200	2,121	70.50	11 063	20,030
70.00	7,324	2,400	79.50	11,005	20,047
70.90	7,300	2,003			
76.95	7,452	3,224			
77.00	7,516	3,598			
77.05	7,580	3,976			
//.10	7,644	4,356			
77.15	7,708	4,740			
77.20	7,772	5,127			
77.25	7,836	5,517			
77.30	7,899	5,911			
77.35	7,963	6,307			
77.40	8,027	6,707			
77.45	8,091	7,110			
77.50	8,155	7,516			
77.55	8.223	7.925			
77.60	8.292	8.338			
77.65	8,360	8,755			
77 70	8 4 2 8	9 174			
77 75	8 4 9 7	9,597			
77.80	8 565	10 024			
77.85	8 633	10,024			
77.90	8 702	10,434			
77.05	8 770	11 32/			
78.00	8 830	11,524			
70.00	0,039	10,704			
70.00	0,907	12,200			
70.10	0,975	12,000			
70.10	9,044	13,100			
78.20	9,112	13,559			
78.25	9,180	14,017			
78.30	9,249	14,477			
78.35	9,317	14,942			
78.40	9,385	15,409			
78.45	9,454	15,880			
78.50	9,522	16,355			
78.55	9,599	16,833			
78.60	9,676	17,314			
78.65	9,753	17,800			
78.70	9,830	18,290			
78.75	9,907	18,783			
78.80	9,984	19,280			
78.85	10,061	19,782			
78.90	10,138	20,287			
78.95	10,215	20,795			
79.00	10,293	21,308			
79.05	10,370	21,825			
79.10	10,447	22,345			
-	,	,- ,			

# Stage-Area-Storage for Pond B2: Bioretention Basin 2

# Summary for Pond B3: Bioretention Basin 3

[92] Warning: Device #2 is above defined storage

Inflow Area =	11,722 sf, 41.82% Impervious,	Inflow Depth = 6.83" for 100-Year event
Inflow =	1.41 cfs @ 12.30 hrs, Volume=	6,674 cf
Outflow =	1.41 cfs @ 12.31 hrs, Volume=	6,199 cf, Atten= 0%, Lag= 0.7 min
Primary =	1.41 cfs @ 12.31 hrs, Volume=	6,199 cf
Secondary =	0.00 cfs @ 0.00 hrs, Volume=	0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 80.84' @ 12.31 hrs Surf.Area= 901 sf Storage= 560 cf

Plug-Flow detention time= 73.0 min calculated for 6,195 cf (93% of inflow) Center-of-Mass det. time= 33.5 min ( 823.5 - 790.1 )

Volume	Invert	Avail.Sto	rage Storage D	escription				
#1	79.98'	69	94 cf Custom S	Stage Data (Coni	<b>c)</b> Listed below (Re	calc)		
Elevatio (fee	on Surf	Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)			
79.9 80.9	98 98	432 995	0 694	0 694	432 1,003			
Device	Routing	Invert	Outlet Devices					
#1	Primary	77.48'	<b>15.0" Round (</b> L= 96.0' CMP Inlet / Outlet Inv n= 0.013 Cond	CMP_Round 15" , projecting, no he /ert= 77.48' / 77.0 rete pipe, bends (	adwall, Ke= 0.900 0' S= 0.0050 '/' 0 & connections, Flo	c= 0.900 w Area= 1.23 sf		
#2	Secondary	80.98'	<b>15.0' long x 1.</b> Head (feet) 0.2 2.50 3.00 Coef. (English) 3.30 3.31 3.32	<b>0' breadth Broad</b> 20 0.40 0.60 0.8 2.69 2.72 2.75	I-Crested Rectang 0 1.00 1.20 1.40 2.85 2.98 3.08 3	<b>ular Weir</b> 1.60 1.80 2.00 .20 3.28 3.31		
#3	Device 1	80.74'	<b>42.0" x 42.0" F</b> C= 0.600 in 42 Limited to weir	loriz. Orifice/Gra .0" x 42.0" Grate flow at low heads	<b>te</b> (100% open area)			
Primary OutFlow Max=1.39 cfs @ 12.31 hrs HW=80.84' (Free Discharge) -1=CMP_Round 15" (Passes 1.39 cfs of 7.71 cfs potential flow) -3=Orifice/Grate (Weir Controls 1.39 cfs @ 1.02 fps)								
Second	econdary OutFlow Max=0.00 cfs @ 0.00 hrs HW=79.98' (Free Discharge)							

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Pond B3: Bioretention Basin 3











## Stage-Discharge for Pond B3: Bioretention Basin 3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
79.98	0.00	0.00	0.00	80.51	0.00	0.00	0.00
79.99	0.00	0.00	0.00	80.52	0.00	0.00	0.00
80.00	0.00	0.00	0.00	80.53	0.00	0.00	0.00
80.01	0.00	0.00	0.00	80.54	0.00	0.00	0.00
80.02	0.00	0.00	0.00	80.55	0.00	0.00	0.00
80.03	0.00	0.00	0.00	80.56	0.00	0.00	0.00
80.04	0.00	0.00	0.00	80.57	0.00	0.00	0.00
80.05	0.00	0.00	0.00	80.58	0.00	0.00	0.00
80.06	0.00	0.00	0.00	80.59	0.00	0.00	0.00
80.07	0.00	0.00	0.00	80.60	0.00	0.00	0.00
80.08	0.00	0.00	0.00	80.61	0.00	0.00	0.00
80.09	0.00	0.00	0.00	80.62	0.00	0.00	0.00
80.10	0.00	0.00	0.00	80.63	0.00	0.00	0.00
80.11	0.00	0.00	0.00	80.64	0.00	0.00	0.00
80.12	0.00	0.00	0.00	80.65	0.00	0.00	0.00
80.13	0.00	0.00	0.00	80.66	0.00	0.00	0.00
80.14	0.00	0.00	0.00	80.67	0.00	0.00	0.00
80.15	0.00	0.00	0.00	80.68	0.00	0.00	0.00
80.16	0.00	0.00	0.00	80.69	0.00	0.00	0.00
80.17	0.00	0.00	0.00	80.70	0.00	0.00	0.00
80.18	0.00	0.00	0.00	80.71	0.00	0.00	0.00
80.19	0.00	0.00	0.00	80.72	0.00	0.00	0.00
80.20	0.00	0.00	0.00	80.73	0.00	0.00	0.00
00.21 80.22	0.00	0.00	0.00	80.74 80.75	0.00	0.00	0.00
80.22	0.00	0.00	0.00	80.75	0.05	0.03	0.00
80.23	0.00	0.00	0.00	80.77	0.13	0.13	0.00
80.25	0.00	0.00	0.00	80.78	0.24	0.37	0.00
80.26	0.00	0.00	0.00	80.79	0.51	0.51	0.00
80.27	0.00	0.00	0.00	80.80	0.67	0.67	0.00
80.28	0.00	0.00	0.00	80.81	0.85	0.85	0.00
80.29	0.00	0.00	0.00	80.82	1.04	1.04	0.00
80.30	0.00	0.00	0.00	80.83	1.24	1.24	0.00
80.31	0.00	0.00	0.00	80.84	1.45	1.45	0.00
80.32	0.00	0.00	0.00	80.85	1.67	1.67	0.00
80.33	0.00	0.00	0.00	80.86	1.90	1.90	0.00
80.34	0.00	0.00	0.00	80.87	2.15	2.15	0.00
80.35	0.00	0.00	0.00	80.88	2.40	2.40	0.00
80.36	0.00	0.00	0.00	80.89	2.66	2.66	0.00
80.37	0.00	0.00	0.00	80.90	2.93	2.93	0.00
80.30	0.00	0.00	0.00	80.91	3.21	3.21	0.00
80.40	0.00	0.00	0.00	80.92	3 70	3.30	0.00
80.40	0.00	0.00	0.00	80.94	4 09	4 09	0.00
80.42	0.00	0.00	0.00	80.95	4.41	4.41	0.00
80.43	0.00	0.00	0.00	80.96	4.72	4.72	0.00
80.44	0.00	0.00	0.00	80.97	5.05	5.05	0.00
80.45	0.00	0.00	0.00	80.98	5.38	5.38	0.00
80.46	0.00	0.00	0.00				
80.47	0.00	0.00	0.00				
80.48	0.00	0.00	0.00				
80.49	0.00	0.00	0.00				
80.50	0.00	0.00	0.00				

Elevation	Surface	Storage	Elevation	Surface	Storage
(feet)	(sq-ft)	(cubic-feet)	(feet)	(sq-ft)	(cubic-feet)
79.98	432	0	80.51	702	298
79.99	436	4	80.52	707	305
80.00	441	9	80.53	713	312
80.01	446	13	80.54	719	319
80.02	450	18	80.55	725	326
80.03	455	22	80.56	730	333
80.04	459	27	80.57	736	341
80.05	464	31	80.58	742	348
80.06	469	36	80.59	748	355
80.07	473	41	80.60	754	303
80.08	4/8	45 50	80.61	760	371
00.09 90.10	403	50 55	00.02	700	3/0
80.10 80.11	407	55 60	80.03	778	300
80.11	492	65	80.65	784	394 701
80.12	502	70	80.66	704	401
80.14	507	75	80.67	796	403
80.15	511	80	80.68	802	425
80.16	516	85	80.69	808	433
80.17	521	90	80.70	814	441
80.18	526	96	80.71	820	450
80.19	531	101	80.72	826	458
80.20	536	106	80.73	833	466
80.21	541	112	80.74	839	474
80.22	546	117	80.75	845	483
80.23	551	123	80.76	851	491
80.24	556	128	80.77	858	500
80.25	561	134	80.78	864	508
80.26	566	139	80.79	870	517
80.27	5/1	145	80.80	877	526
80.28	5//	151	80.81	883	535
00.29	00Z	107	00.02	009	552
80.30	507	102	80.84	090	561
80.32	592	100	80.85	902 000	571
80.33	603	180	80.86	915	580
80.34	608	186	80.87	922	589
80.35	613	192	80.88	928	598
80.36	619	199	80.89	935	607
80.37	624	205	80.90	941	617
80.38	629	211	80.91	948	626
80.39	635	217	80.92	955	636
80.40	640	224	80.93	961	645
80.41	646	230	80.94	968	655
80.42	651	237	80.95	975	665
80.43	657	243	80.96	981	674
80.44	662	250	80.97	988	684
80.45	668	256	80.98	995	694
80.46	6/3	263			
δU.47	6/9	270			
80.48 80.40	600	211			
00.49 80 50	606	∠04 201			
00.00	090	291			

291

## Stage-Area-Storage for Pond B3: Bioretention Basin 3

# Summary for Link 5E: EDA 1

Inflow A	Area =	178,053 sf,	5.81% Impervi	ious,	Inflow Depth =	6.06"	for 10	0-Year event
Inflow	=	24.93 cfs @	12.20 hrs, Volur	me=	89,848 c	f		
Primary	/ =	24.93 cfs @	12.20 hrs, Volur	me=	89,848 c	f, Atte	en= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



# Summary for Link 6E: EDA 2

Inflow A	rea =	31,726 sf, 17.78% Impervious,	Inflow Depth = 7.48"	for 100-Year event
Inflow	=	6.29 cfs @ 12.13 hrs, Volume=	19,767 cf	
Primary	=	6.29 cfs @ 12.13 hrs, Volume=	19,767 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



#### Link 6E: EDA 2
# Summary for Link 7E: EDA

Inflow A	Area	=	209,779 sf,	7.62% Ir	npervious,	Inflow Depth =	6.27	for 100-Year event
Inflow	:	=	29.37 cfs @	12.18 hrs,	Volume=	109,615 c	f	
Primary	y :	=	29.37 cfs @	12.18 hrs,	Volume=	109,615 c	f, Att	en= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

## Link 7E: EDA



# Summary for Link 10P: PDA 1A

Inflow .	Area =	=	97,279 sf	60.64% Imper	vious,	Inflow Depth =	6.55	" for 10	0-Year event
Inflow	=	=	10.31 cfs @	12.32 hrs, Volu	ume=	53,114 c	f		
Primar	y =	=	10.31 cfs @	12.32 hrs, Volu	ume=	53,114 c	f, Att	en= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

## Link 10P: PDA 1A



# Summary for Link 11P: PDA 1B

Inflow Ar	rea =	11,722 sf, 41.82% Impervious,	Inflow Depth = 6.35"	for 100-Year event
Inflow	=	1.41 cfs @ 12.31 hrs, Volume=	6,199 cf	
Primary	=	1.41 cfs @ 12.31 hrs, Volume=	6,199 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



## Link 11P: PDA 1B

# Summary for Link 12P: PDA 1C

Inflow A	Area =	=	64,382 sf,	3.87% In	npervious,	Inflow Depth =	5.53"	for 100-Year event
Inflow	=	:	7.95 cfs @	12.22 hrs,	Volume=	29,692 c	f	
Primary	y =		7.95 cfs @	12.22 hrs,	Volume=	29,692 c	f, Atte	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

# Hydrograph Inflow Primary 7 95 cfs 7.95 cfs Inflow Area=64,382 sf 8 7-6 5 Flow (cfs) 4-3-2-1 0-0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 Time (hours)

## Link 12P: PDA 1C

# Summary for Link 13P: PDA 1

Inflow .	Area =	173,383 sf, 38.29% Impervious,	Inflow Depth = 6.16"	for 100-Year event
Inflow	=	19.24 cfs @ 12.26 hrs, Volume=	89,005 cf	
Primar	y =	19.24 cfs @ 12.26 hrs, Volume=	89,005 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

## Link 13P: PDA 1



# Summary for Link 14P: PDA 2

Inflow /	Area	ı =		36,396 sf	, 0.00% Ir	mpervious,	Inflow Depth =	5.5	3" for 10	0-Year event
Inflow		=	4	.76 cfs @	12.20 hrs,	Volume=	16,785 0	cf		
Primar	у	=	4	.76 cfs @	12.20 hrs,	Volume=	16,785 (	cf, A	tten= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

## Link 14P: PDA 2



# Summary for Link 15P: PDA

Inflow A	rea =	209,779 sf,	31.65% Impervious,	Inflow Depth = $6.05$ "	for 100-Year event
Inflow	=	23.53 cfs @	12.25 hrs, Volume=	105,790 cf	
Primary	=	23.53 cfs @	12.25 hrs, Volume=	105,790 cf, Atte	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

## Link 15P: PDA



# **B. DESIGN CALCULATIONS**

- Emergency Spillway
- Rip Rap
  - **Rip Rap #100**
  - **Rip Rap #400**
- Scour Hole
- Basin Drain Time
- Pipe Sizing
- NJDEP Nonstructural Strategies Points System (NSPS)
- Low Impact Development Checklist
- Geotechnical Report



Line#	∮ Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
	2P	0.00	0.00	255.0	0.0050	0.013	15.0	0.0	0.0
2	2 B1	73.00	72.85	10.0	0.0150	0.013	24.0	0.0	0.0
3	B2	73.00	72.06	47.0	0.0200	0.011	15.0	0.0	0.0
2	H B3	77.48	77.00	96.0	0.0050	0.013	15.0	0.0	0.0

# Pipe Listing (all nodes)

# Printed 5/17/2021

# Summary for Pond B1: Bioretention Basin 1

[92] Warning: Device #2 is above defined storage

Inflow Area =	48,248 sf, 48.86% Impervious,	Inflow Depth = 7.08" for 100-Year event
Inflow =	7.70 cfs @ 12.18 hrs, Volume=	28,466 cf
Outflow =	7.55 cfs @ 12.20 hrs, Volume=	24,571 cf, Atten= 2%, Lag= 1.4 min
Primary =	7.55 cfs @ 12.20 hrs, Volume=	24,571 cf
Secondary =	0.00 cfs @ 0.00 hrs, Volume=	0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 78.45' @ 12.20 hrs Surf.Area= 3,063 sf Storage= 4,786 cf

Plug-Flow detention time= 117.1 min calculated for 24,554 cf (86% of inflow) Center-of-Mass det. time= 52.5 min (828.0 - 775.5)

Volume	Invert	Avail.Sto	rage Storage	Description			
#1	76.50'	4,93	38 cf Custom	Stage Data (Con	<b>ic)</b> Listed below (Reca	llc)	
Elevatio (fee	on Su et)	rf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)		
76.5 77.5 78.5	50 50 50	1,883 2,461 3,096	0 2,166 2,772	0 2,166 4,938	1,883 2,484 3,146		
Device	Routing	Invert	Outlet Devices	5			
#1	Primary	73.00'	<b>24.0" Round</b> L= 10.0' CMI Inlet / Outlet In n= 0.013 Con	<b>CMP_Round 24</b> P, projecting, no he nvert= 73.00' / 72.8 acrete pipe, bends	" eadwall, Ke= 0.900 85' S= 0.0150 '/' Cc & connections, Flow	= 0.900 Area= 3.14 sf	
#2	Secondary	78.50'	<b>10.0' long x</b> Head (feet) 0 2.50 3.00 3.5 Coef. (English 2.65 2.67 2.6	5.0' breadth Broad .20 0.40 0.60 0.8 50 4.00 4.50 5.00 ) 2.34 2.50 2.70 56 2.68 2.70 2.74	<b>d-Crested Rectangu</b> 30 1.00 1.20 1.40 1 0 5.50 2.68 2.68 2.66 2.6 1 2.79 2.88	l <b>ar Weir</b> .60 1.80 2.00 5 2.65 2.65	
#3	Device 1	78.15'	<b>42.0" x 42.0"</b> C= 0.600 in 4 Limited to wei	Horiz. Orifice/Gra 2.0" x 42.0" Grate r flow at low heads	ate (100% open area)		
Primary	Primary OutFlow Max=7.50 cfs @ 12.20 brs_HW=78.45' (Free Discharge)						

imary OutFlow Max=7.50 cfs @ 12.20 hrs HW=78.45' (Free Discharge)
1=CMP\_Round 24" (Passes 7.50 cfs of 25.19 cfs potential flow)
3=Orifice/Grate (Weir Controls 7.50 cfs @ 1.79 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=76.50' (Free Discharge) -2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)









# Summary for Pond B2: Bioretention Basin 2

[81] Warning: Exceeded Pond B1 by 0.12' @ 12.35 hrs

Inflow Area =	97,279 sf, 60.64% Impervious	, Inflow Depth = 6.94" for 100-Year event
Inflow =	15.77 cfs @ 12.19 hrs, Volume=	56,281 cf
Outflow =	10.31 cfs @ 12.32 hrs, Volume=	53,114 cf, Atten= 35%, Lag= 7.8 min
Primary =	10.31 cfs @ 12.32 hrs, Volume=	53,114 cf
Secondary =	0.00 cfs @ 0.00 hrs, Volume=	0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 78.50' @ 12.31 hrs Surf.Area= 9,518 sf Storage= 16,324 cf

Plug-Flow detention time= 105.9 min calculated for 53,077 cf (94% of inflow) Center-of-Mass det. time= 75.0 min (864.8 - 789.8)

Volume	Invert	Avail.Sto	rage Storag	e Description				
#1	76.50'	26,64	47 cf Custo	m Stage Data (Pr	rismatic)Listed below (Recalc)			
Elevatio (fee	on Su et)	rf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)				
76.5	50	6,877	0	0				
77.5	50	8,155	7,516	7,516				
78.5	50	9,522	8,839	16,355				
79.5	50	11,063	10,293	26,647				
Device	Routing	Invert	Outlet Devic	es				
#1	Primary	73.00'	<b>15.0" Roun</b> L= 47.0' CM Inlet / Outlet n= 0.011 Co	d <b>Culvert</b> MP, projecting, no Invert= 73.00' / 7 oncrete pipe, strai	headwall, Ke= 0.900 2.06' S= 0.0200 '/' Cc= 0.900 ight & clean, Flow Area= 1.23 sf			
#2	Device 1	76.94'	6.0" Vert. O	rifice/Grate X 3.0	C = 0.600			
#3	Device 1	77.78'	<b>4.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef (English) 2.80 2.92 3.08 3.30 3.32					
#4	Device 1	79.25'	<b>42.0" x 42.0</b> C= 0.600 in Limited to w	<b>Horiz. Orifice/G</b> 42.0" x 42.0" Gra eir flow at low hea	<b>Grate</b> ate (100% open area) ads			
#5	Secondary	78.50'	<b>30.0' long &gt;</b> Head (feet) Coef. (Englis	<b>x 10.0' breadth B</b> 0.20 0.40 0.60 sh) 2.49 2.56 2.	road-Crested Rectangular Weir 0.80 1.00 1.20 1.40 1.60 70 2.69 2.68 2.69 2.67 2.64			
Primary 1=Cu -2= -3= -4=	Primary OutFlow Max=10.29 cfs @ 12.32 hrs HW=78.49' (Free Discharge)     1=Culvert (Inlet Controls 10.29 cfs @ 8.38 fps)     2=Orifice/Grate (Passes < 3.23 cfs potential flow)							

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=76.50' (Free Discharge) 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs) Pond B2: Bioretention Basin 2







# Summary for Pond B3: Bioretention Basin 3

[92] Warning: Device #2 is above defined storage

Inflow Area =	11,722 sf, 41.82% Impervious,	Inflow Depth = 6.83" for 100-Year event
Inflow =	1.41 cfs @ 12.30 hrs, Volume=	6,674 cf
Outflow =	1.41 cfs @ 12.31 hrs, Volume=	6,199 cf, Atten= 0%, Lag= 0.7 min
Primary =	1.41 cfs @ 12.31 hrs, Volume=	6,199 cf
Secondary =	0.00 cfs @ 0.00 hrs, Volume=	0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 80.84' @ 12.31 hrs Surf.Area= 901 sf Storage= 560 cf

Plug-Flow detention time= 73.0 min calculated for 6,195 cf (93% of inflow) Center-of-Mass det. time= 33.5 min (823.5 - 790.1)

Volume	Invert	Avail.Sto	rage Storage D	escription				
#1	79.98'	69	94 cf Custom S	4 cf Custom Stage Data (Conic)Listed below (Recalc)				
Elevatio (fee	on Surf et) (	.Area sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)			
79.9 80.9	98 98	432 995	0 694	0 694	432 1,003			
Device	Routing	Invert	Outlet Devices					
#1	Primary	77.48'	<b>15.0" Round C</b> L= 96.0' CMP, Inlet / Outlet Inv n= 0.013 Conc	CMP_Round 15" projecting, no he vert= 77.48' / 77.0 rete pipe, bends	adwall, Ke= 0.900 0' S= 0.0050 '/' C & connections, Flo	c= 0.900 w Area= 1.23 sf		
#2	Secondary	80.98'	<b>15.0' long x 1.</b> Head (feet) 0.2 2.50 3.00 Coef. (English) 3.30 3.31 3.32	<b>0' breadth Broad</b> 0 0.40 0.60 0.8 2.69 2.72 2.75	<b>I-Crested Rectang</b> 0     1.00     1.20     1.40       2.85     2.98     3.08     3.	ular Weir 1.60 1.80 2.00 20 3.28 3.31		
#3	Device 1	80.74'	<b>42.0" x 42.0" H</b> C= 0.600 in 42 Limited to weir	o <b>riz. Orifice/Gra</b> .0" x 42.0" Grate flow at low heads	<b>te</b> (100% open area)			
Primary OutFlow Max=1.39 cfs @ 12.31 hrs HW=80.84' (Free Discharge) 								
Second	ary OutFlow Notested F	/lax=0.00 cf <b>Rectangula</b>	s @ 0.00 hrs H\ <b>r Weir</b> ( Controls	V=79.98' (Free I 0.00 cfs)	Discharge)			

Pond B3: Bioretention Basin 3









(908) 668-8300

Date:	5/14/2021
Project:	SAFStor
Project No:	J200933

Calculated By: CR Checked By: KM

### **Conduit Outlet Protection Calculations**

#### Rip Rap Pad # 1

Design Parameters:		
Design Storm Flow for 25 Year, Q	8.55	cfs
Vertical Dimension of Outlet Pipe, D <sub>o</sub>	15	in
Horizontal Dimension of Outlet Pipe, $W_o$	15	in
Tailwater Depth, <i>TW</i> <sup>1</sup>	0.87	ft

#### **Apron Dimension Calculations:**

Unit Dicharge,  $q = Q/W_o = 6.84$  cfs per foot

• Case I: TW < 1/2 D

Apron Length, $L_a = \frac{1.8q}{2 p_a \frac{1/2}{2}} + 7D_o =$	L <sub>a</sub> =
$\begin{array}{l} D_{o} \\ Width, W_{1} = 3W_{o} = \\ Width, W_{o} = 3W_{o} + L_{o} = \end{array}$	$W_1 = W_2 =$
	→



19 ft

6 ft

12 ft

or

or

or

• Case II:  $TW \ge 1/2 D_o$ 

Apron Length,  $L_a = \frac{3q}{D_o^{1/2}} = 18.35 \text{ ft}$ Width,  $W_1 = 3W_o = 3.75 \text{ ft}$ Width,  $W_2 = 3W_o + 0.4L_a = 11.09 \text{ ft}$ 



<u>Rip Rap Stone Size Calculations:</u> Median Stone,  $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 3.56 in 6 in

#### Notes:

- 1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
- 2. The side slopes shall be 2:1 or flatter.
- 3. The bottom grade shall be 0.0% (level).
- 4. There shall be no overfall at the end of the apron or at the end of the culvert.
- 5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d<sub>50</sub>. The largest stone size in the mixture shall be 1.5 times the d<sub>50</sub> size. The rip-rap shall be reasonably well graded.
- 6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
- 7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
- 8. No bends or curves at the intersection of the conduit and apron will be permitted.

#### Footnote:

- 1. Tailwater depth shall be the 2 year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use TW = 0.2D<sub>a</sub>.
- 2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to  $1/4 W_o$ .



(908) 668-8300

Date:	5/14/2021
Project:	SAFStor
Project No:	J200933

Calculated By: <u>CR</u> Checked By: <u>KM</u>

11 ft

6 ft

9 ft

### **Conduit Outlet Protection Calculations**

Rip Rap Pad # 2

Design Parameters:		
Design Storm Flow for 25 Year, Q	4.95	cfs
Vertical Dimension of Outlet Pipe, D <sub>o</sub>	15	in
Horizontal Dimension of Outlet Pipe, $W_o$	15	in
Tailwater Depth, <i>TW</i> <sup>1</sup>	0.80	ft

#### Apron Dimension Calculations:

Unit Dicharge,  $q = Q/W_o = 3.96$  cfs per foot

• Case I: TW < 1/2 D<sub>o</sub>

Apron Length, $L_a = \frac{1.8q}{2} + 7D_o =$	L <sub>a</sub> =
Width, $W_1 = 3W_0 =$ Width, $W_2 = 3W_0 + L_2 =$	$W_1 = W_2 =$
← L <sub>a</sub>	-



• Case II:  $TW \ge 1/2 D_o$ 



#### Rip Rap Stone Size Calculations:

o Rap Otorie Oize Oale	ulations.				
Median Stone, $d_{50}$ = .	0.02 <i>q</i> <sup>1.33</sup> TW	=	1.87 in	<b>d</b> <sub>50</sub> =	6 in

#### Notes:

- 1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
- 2. The side slopes shall be 2:1 or flatter.
- 3. The bottom grade shall be 0.0% (level).
- 4. There shall be no overfall at the end of the apron or at the end of the culvert.
- 5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as  $d_{50}$ . The largest stone size in the mixture shall be 1.5 times the  $d_{50}$  size. The rip-rap shall be reasonably well graded.
- 6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
- 7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
- 8. No bends or curves at the intersection of the conduit and apron will be permitted.

#### Footnote:

- 1. Tailwater depth shall be the 2 year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use TW = 0.2D\_o.
- 2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to  $1/4 W_o$ .



35 Technology Drive, Warren, NJ 07059 (908) 668-8300

Date:	5/14/2021
Project:	SAFStor
Project No:	J200933

Calculated By: CR Checked By: KM

# **Conduit Outlet Protection Calculations**

Scour Hole # 200

Design Parameters:	
Design Storm Flow for 25 Year, Q	11.38 cfs
Vertical Dimension of Outlet Pipe, D <sub>o</sub>	18 in
Horizontal Dimension of Outlet Pipe, $W_o$	18 in
Tailwater Depth, <i>TW</i> <sup>1</sup>	0.87 ft
Scour Hole Depth, $y (1/2 D_o \text{ or } D_o) \dots \dots$	<mark>9</mark> in
Annen Dimension Coloulationer	
Apron Dimension Calculations.	
Minimum Bottom Width, $W_1 = 2W_0$ $W_1 = W_1$	3.00 ft
Minimum Bottom Length, $L_1 = 3D_0 \dots \dots$	4.50 ft
Minimum Top Width (max side slope of 3:1), $W_2$ $W_2$ =	7.50 ft
Minimum Top Length (max side slope of 3:1), $L_2$ $L_2$ =	9.00 ft

#### **Rip Rap Stone Size Calculations:**

Unit Dicharge,  $q = Q/D_0 = 7.59$  cfs per foot

• Case I:  $y = 1/2 D_0$ 

Median Stone, $d_{50}$ =	$\frac{0.0125 q^{1.33}}{TW} =$	2.55 in	Therefore, use	d50 =	6 in
Apron Thickness, TH =	$2 \times d_{50}$ with filter fa	abric		TH =	12 in

• Case II: y = D<sub>o</sub>

0.0082 q<sup>1.33</sup> Median Stone, d<sub>50</sub> =

Apron Thickness,  $TH = 2 \times d_{50}$  with filter fabric .....

. . .



#### Notes:

- 1. The side slopes shall be 3:1 or flatter.
- 2. The bottom grade shall be 0.0% (level).
- 3. There shall be no overfall at the end of the apron or at the end of the culvert.
- 4. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d<sub>50</sub>. The largest stone size in the mixture shall be 1.5 times the d<sub>50</sub> size. The rip-rap shall be reasonably well graded.
- 5. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
- 6. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
- 7. Where the scour hole is to be placed within an existing or proposed waterway:
  - a. The scour hole sidewalls should be eliminated to maintain a smooth hydraulic line along the waterway bottom to avoid inviting turbulent flow from a sudden depression in the waterway.
  - b. If the flow in the waterway is greater than the flow from the proposed outlet, the rip-rap used to construct the scour hole should be sized based on the greater flow value according to the standard rip-rap.

#### Footnote:

1. Tailwater depth shall be the 2 year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use TW = 0.2D<sub>n</sub>.

# Hydrograph for Pond B1: Bioretention Basin 1

Time	Inflow	Storage	Elevation	Primary
(hours)	(cfs)	(cubic-feet)	(feet)	(cfs)
0.00	0.00	0	76.50	0.00
2.50	0.04	187	76.60	0.00
5.00	0.07	693	76.85	0.00
7.50	0.11	1,431	77.19	0.00
10.00	0.27	2,937	77.80	0.00
12.50	2.24	4,310	78.29	2.47
15.00	0.29	3,994	78.18	0.30
17.50	0.18	3,964	78.17	0.18
20.00	0.13	3,950	78.17	0.13
22.50	0.11	3,943	78.17	0.11
25.00	0.00	3,895	78.15	0.00
27.50	0.00	3,895	78.15	0.00
30.00	0.00	3,895	78.15	0.00
32.50	0.00	3,895	78.15	0.00
35.00	0.00	3,895	78.15	0.00
37.50	0.00	3,895	78.15	0.00
40.00	0.00	3,895	78.15	0.00
42.50	0.00	3,895	78.15	0.00
45.00	0.00	3,895	78.15	0.00
47.50	0.00	3,895	78.15	0.00
50.00	0.00	3,895	78.15	0.00
52.50	0.00	3,895	78.15	0.00
55.00	0.00	3,895	78.15	0.00
57.50	0.00	3,895	78.15	0.00
60.00	0.00	3,895	78.15	0.00
62.50	0.00	3,895	78.15	0.00
65.00	0.00	3,895	78.15	0.00
67.50	0.00	3,895	78.15	0.00
70.00	0.00	3,895	78.15	0.00

Basin Drain	l ime = 25 -
12.50 = 12.5	hours

# Hydrograph for Pond B2: Bioretention Basin 2

Time	Inflow	Storage	Elevation	Primary
(hours)	(cfs)	(cubic-feet)	(feet)	(cfs)
0.00	0.00	0	76.50	0.00
2.50	0.07	281	76.54	0.00
5.00	0.10	1,042	76.65	0.00
7.50	0.16	2,124	76.80	0.00
10.00	0.33	3,965	77.05	0.11
12.50	4.84	14,639	78.32	7.79
15.00	0.60	5,900	77.30	0.92
17.50	0.36	4,853	77.16	0.41
20.00	0.27	4,547	77.12	0.29
22.50	0.23	4,411	77.11	0.24
25.00	0.00	3,935	77.04	0.10
27.50	0.00	3,505	76.99	0.02
30.00	0.00	3,374	76.97	0.01
32.50	0.00	3,303	76.96	0.01
35.00	0.00	3,262	76.96	0.00
37.50	0.00	3,239	76.95	0.00
40.00	0.00	3,226	76.95	0.00
42.50	0.00	3,218	76.95	0.00
45.00	0.00	3,210	76.95	0.00
47.50	0.00	3,204	76.95	0.00
50.00	0.00	3,198	76.95	0.00
52.50	0.00	3,192	76.95	0.00
55.00	0.00	3,188	76.95	0.00
57.50	0.00	3,184	76.94	0.00
60.00	0.00	3,180	76.94	0.00
62.50	0.00	3,177	76.94	0.00
65.00	0.00	3,174	76.94	0.00
67.50	0.00	3,171	76.94	0.00
70.00	0.00	3,169	76.94	0.00

Basin Drain Time = 35 - 12.5
= 22.5 hours

# Hydrograph for Pond B3: Bioretention Basin 3

Time	Inflow	Storage	Elevation	Outflow	Primary	Secondary	
(hours)	(cfs)	(cubic-feet)	(feet)	(cfs)	(cfs)	(cfs)	
0.00	0.00	0	79.98	0.00	0.00	0.00	
2.50	0.01	34	80.06	0.00	0.00	0.00	
5.00	0.01	139	80.26	0.00	0.00	0.00	
7.50	0.02	289	80.50	0.00	0.00	0.00	
10.00	0.06	484	80.75	0.05	0.05	0.00	_
12.50	0.91	539	80.82	0.95	0.95	0.00	
15.00	0.07	486	80.75	0.08	0.08	0.00	
17.50	0.04	483	80.75	0.04	0.04	0.00	
20.00	0.03	480	80.75	0.03	0.03	0.00	
22.50	0.03	479	80.75	0.03	0.03	0.00	
25.00	0.00	474	80.74	0.00	0.00	0.00	Basin Drain Time = $25 - 12.5$
27.50	0.00	474	80.74	0.00	0.00	0.00	= 12.5 hours
30.00	0.00	474	80.74	0.00	0.00	0.00	
32.50	0.00	474	80.74	0.00	0.00	0.00	
35.00	0.00	474	80.74	0.00	0.00	0.00	
37.50	0.00	474	80.74	0.00	0.00	0.00	
40.00	0.00	474	80.74	0.00	0.00	0.00	
42.50	0.00	474	80.74	0.00	0.00	0.00	
45.00	0.00	474	80.74	0.00	0.00	0.00	
47.50	0.00	474	80.74	0.00	0.00	0.00	
50.00	0.00	474	80.74	0.00	0.00	0.00	
52.50	0.00	474	80.74	0.00	0.00	0.00	
55.00	0.00	474	80.74	0.00	0.00	0.00	
57.50	0.00	474	80.74	0.00	0.00	0.00	
60.00	0.00	474	80.74	0.00	0.00	0.00	
62.50	0.00	474	80.74	0.00	0.00	0.00	
65.00	0.00	474	80.74	0.00	0.00	0.00	
67.50	0.00	474	80.74	0.00	0.00	0.00	
70.00	0.00	474	80.74	0.00	0.00	0.00	

# Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



# **Storm Sewer Tabulation**

| า        | Len  | Drng A  | rea  
  | Rnoff   | Area x   
  | С  | Тс  
   |   | Rain  
   
   | Total  | Сар  | Vel   | Pipe  
   |  | Invert Ele   | ev  
   | HGL Ele  | v   | Grnd / Ri  | m Elev  | Line ID   |
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| To       |  | Incr  | Total  
  | coen  | Incr   
  | Total  | Inlet   
   | Syst  | (1)   
   
   | now  | Tun  |   | Size  
   | Slope  | Dn   | Up  
   | Dn   | Up  | Dn   | Up  |   |
| LIII¢    | (ft)   | (ac)  | (ac)   
  | (C)   |  
  |  | (min)   
   | (min)   | (in/hr)   
   
   | (cfs)  | (cfs)  | (ft/s)  | (in)  
   | (%)  | (ft)   | (ft)  
   | (ft)   | (ft)  | (ft)   | (ft)  |   |
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   |  |   |  |   |   |
| End      | 9.000  | 0.00  | 0.82   
  | 0.00  | 0.00   
  | 0.80   | 6.0   
   | 7.7   | 7.0   
   
   | 5.64   | 11.38  | 4.98  | 18  
   | 1.00   | 76.50  | 76.59   
   | 77.42  | 77.51   | 78.44  | 81.34   | HW 200 - MH 210   |
| 1        | 130.861  | 0.11  | 0.41   
  | 0.98  | 0.11   
  | 0.40   | 6.0   
   | 7.1   | 7.2   
   
   | 2.89   | 11.38  | 3.46  | 18  
   | 1.00   | 76.69  | 78.00   
   | 77.51  | 78.65   | 81.34  | 82.19   | MH 210 - MH 220   |
| 2        | 93.240   | 0.10  | 0.30   
  | 0.98  | 0.10   
  | 0.29   | 6.0   
   | 6.6   | 7.3   
   
   | 2.15   | 8.08   | 3.67  | 18  
   | 0.50   | 78.10  | 78.57   
   | 78.65  | 79.12   | 82.19  | 82.70   | MH 220 - CO 230   |
| 3        | 60.000   | 0.10  | 0.20   
  | 0.98  | 0.10   
  | 0.20   | 6.0   
   | 6.3   | 7.4   
   
   | 1.45   | 8.04   | 2.85  | 18  
   | 0.50   | 78.57  | 78.87   
   | 79.12  | 79.32   | 82.70  | 82.95   | CO 230 - MH 240   |
| 4        | 46.756   | 0.10  | 0.10   
  | 0.98  | 0.10   
  | 0.10   | 6.0   
   | 6.0   | 7.5   
   
   | 0.73   | 4.91   | 2.82  | 15  
   | 0.49   | 79.12  | 79.35   
   | 79.45  | 79.68   | 82.95  | 82.82   | MH 240 - MH 250   |
| 1        | 45.577   | 0.11  | 0.41   
  | 0.98  | 0.11   
  | 0.40   | 6.0   
   | 7.1   | 7.2   
   
   | 2.88   | 7.03   | 4.28  | 15  
   | 1.01   | 76.84  | 77.30   
   | 77.51  | 77.98   | 81.34  | 80.44   | MH 210 - MH 260   |
| 6        | 93.240   | 0.10  | 0.30   
  | 0.98  | 0.10   
  | 0.29   | 6.0   
   | 6.7   | 7.3   
   
   | 2.14   | 6.99   | 3.82  | 15  
   | 1.00   | 77.40  | 78.33   
   | 77.98  | 78.91   | 80.44  | 82.01   | MH 260 - CO 270   |
| 7        | 60.000   | 0.10  | 0.20   
  | 0.98  | 0.10   
  | 0.20   | 6.0   
   | 6.4   | 7.4   
   
   | 1.44   | 7.00   | 3.34  | 15  
   | 1.00   | 78.43  | 79.03   
   | 78.91  | 79.51   | 82.01  | 82.22   | CO 270 - CO 280   |
| 8        | 62.997   | 0.10  | 0.10   
  | 0.98  | 0.10   
  | 0.10   | 6.0   
   | 6.0   | 7.5   
   
   | 0.73   | 7.00   | 2.57  | 15  
   | 1.00   | 79.13  | 79.76   
   | 79.51  | 80.09   | 82.22  | 82.57   | CO 280 - MH 290   |
| End      | 13.939   | 0.19  | 1.02   
  | 0.93  | 0.18   
  | 0.88   | 6.0   
   | 7.4   | 7.1   
   
   | 6.26   | 8.06   | 4.99  | 18  
   | 0.50   | 76.50  | 76.57   
   | 77.51  | 77.56   | 78.44  | 80.28   | HW 300 - IN 310   |
| 10       | 126.269  | 0.18  | 0.83   
  | 0.90  | 0.16   
  | 0.70   | 6.0   
   | 6.9   | 7.2   
   
   | 5.09   | 8.04   | 4.55  | 18  
   | 0.50   | 76.67  | 77.30   
   | 77.62  | 78.17   | 80.28  | 81.24   | IN 310 - IN 320   |
| 11       | 114.634  | 0.29  | 0.65   
  | 0.80  | 0.23   
  | 0.54   | 6.0   
   | 6.5   | 7.4   
   
   | 3.98   | 4.93   | 4.47  | 15  
   | 0.50   | 77.55  | 78.12   
   | 78.40  | 78.97   | 81.24  | 81.90   | IN 320 - IN 330   |
| 12       | 35.240   | 0.00  | 0.36   
  | 0.98  | 0.00   
  | 0.31   | 6.0   
   | 6.3   | 7.4   
   
   | 2.29   | 5.00   | 3.21  | 15  
   | 0.51   | 78.22  | 78.40   
   | 79.09  | 79.00   | 81.90  | 82.86   | IN 330 - MH 340   |
| 13       | 66.170   | 0.36  | 0.36   
  | 0.86  | 0.31   
  | 0.31   | 6.0   
   | 6.0   | 7.5   
   
   | 2.32   | 4.94   | 3.94  | 15  
   | 0.50   | 78.50  | 78.83   
   | 79.10  | 79.44   | 82.86  | 81.76   | MH 340 - IN 350   |
| End      | 95.713   | 0.00  | 0.00   
  | 0.00  | 0.00   
  | 0.00   | 6.0   
   | 6.0   | 0.0   
   
   | 0.96   | 4.95   | 3.02  | 15  
   | 0.50   | 77.00  | 77.48   
   | 77.38  | 77.86   | 78.39  | 80.41   | FES 400 - OS 410  |
| End      | 14.058   | 0.00  | 0.00   
  | 0.98  | 0.00   
  | 0.00   | 6.0   
   | 6.1   | 0.0   
   
   | 5.74   | 8.55   | 6.04  | 15  
   | 1.49   | 72.20  | 72.41   
   | 73.05  | 73.38   | 74.48  | 76.57   | HW 100 - MH 110   |
| 16       | 32.859   | 0.00  | 0.00   
  | 0.00  | 0.00   
  | 0.00   | 6.0   
   | 6.0   | 0.0   
   
   | 5.74   | 8.54   | 5.96  | 15  
   | 1.49   | 72.51  | 73.00   
   | 73.38  | 73.97   | 76.57  | 77.00   | MH 110 - OS 120   |
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|          | Tone<br>End<br>1<br>2<br>3<br>4<br>1<br>6<br>7<br>8<br>End<br>10<br>11<br>12<br>13<br>End<br>10<br>11<br>12<br>13<br>End<br>16 | Len     Len     Len     Cine   9.000     1   130.861     2   93.240     3   60.000     4   45.577     6   93.240     7   60.000     8   62.997     End   13.939     10   126.269     11   114.634     12   35.240     13   66.170     End   13.939     10   126.269     11   14.058     16   32.859     I6   32.859     I6   32.859 | Len   Drng A     Tone   Incr     Incr   Incr     Incr <td>Len     Drng J       Incr     Total<br/>(ac)       Incr     Total<br/>(ac)       End     9.000     0.000     0.82       Incr     30.86     0.11     0.41       Incr     0.301     0.301     0.301       Incr     0.301     0.32     0.31     0.31       Incr     0.301     0.31     0.31     0.31       Incr     0.300     0.101     0.41     0.30       Incr     0.310     0.31     0.31     0.31       Incr     114.634     0.30     0.30     0.31       Incr     32.859     0.30     0.30     0.31       Incr     32.859     0.30     0.30     0.31       Increr     Unerer     Unerer</td> <td>Image     Drng Jern     Reading       Incr     Total     Reading       Incr     Total     Reading       Incr     Incr</td> <td>Len     Drng Area     Reneff     Area verto       Incr     Total     Incr     State     Incr     State     Incr     State     Incr     State     Incr     State     Incr     State     Incr     Incr&lt;</td> <td>Image: basic strainProperty strainArea strainImage: basic strain<!--</td--><td>Image: Properties to the series of the se</td><td>nnnrnnn<th< td=""><td>nendpropertyReportArea × Urrproperty</td><td>Areal<br/>TeneBrone<br/>IncArea × IncReine<br/>IncArea × 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### NJDEP Nonstructural Strategies Points System (NSPS)

Version: January 31, 2006

Note: Input Values in Yellow Cells Only

Project:	J200933 (SafStor)	
Date:	May 14, 2021	
User:		
Notes:		

### Step 1 - Provide Basic Major Development Site Information

A. Specify Total Area in Acres of Development Site Described in	Steps 2 and 3	=	4.8	Acres							
3. Specify by Percent the Various Planning Areas Located within the Development Site:											
State Plan Planning Area:	PA-1	PA-2	PA-3	PA-4	PA-4B	PA-5	Total % Area				
Percent of Each Planning Area within Site:		100.0%					100.0%				

Note: See User's Guide for Equivalent Zones within Designated Centers and the NJ Meadowlands, Pinelands, and Highlands Districts

## Step 2 - Describe Existing or Pre-Developed Site Conditions

#### A. Specify Existing Land Use/Land Cover Descriptions and Areas:

	Specify Land Use/Land Cover in Acres for Each HSG										
Site						Use/Cover					
Segment	Land Use/Land Cover Description	HSG A	HSG B	HSG C	HSG D	Subtotals		Points			
1	Wetlands and Undisturbed Stream Buffers			0.2		0.2		13			
2	Lawn and Open Space			1.6		1.6		78			
3	Brush and Shrub					0.0		0			
4	Meadow, Pasture, Grassland, or Range					0.0		0			
5	Row Crop					0.0		0			
6	Small Grain and Legumes					0.0		0			
7	Woods - Indigenous			1.7		1.7		115			
8	Woods - Planted					0.0		0			
9	Woods and Grass Combination					0.0		0			
10	Ponds, Lakes, and Other Open Water					0.0		0			
11	Gravel and Dirt			0.9		0.9		27			
12	Porous and Permeable Paving					0.0		0			
13	Directly Connected Impervious			0.4		0.4		0			
14	Unconnected Impervious with Small D/S Pervious					0.0		0			
15	Unconnected Impervious with Large D/S Pervious					0.0		0			
							-				
	HSG Subtotals (Acres):	0.0	0.0	4.8	0.0		Total Area:	4.8			

0.0%

100.0%

0.0%

0.0%

HSG Subtotals (Acres): HSG Subtotals (%):

Total Area: Total % Area: <u>4.8</u> 100.0%

Points Subtotal:

234

Total Existing Site Points:

234

## Step 3 - Describe Proposed or Post-Developed Site Conditions

#### A. Specify Proposed Land Use/Land Cover Descriptions and Areas:

-

#### Specify Land Use/Land Cover in Acres for Each HSG

Site						Use/Cover		
Segment	Land Use/Land Cover Description	HSG A	HSG B	HSG C	HSG D	Subtotals		Points
1	Wetlands and Undisturbed Stream Buffers			0.2		0.2	1 [	13
2	Lawn and Open Space			2.3		2.3	1	109
3	Brush and Shrub					0.0	1	0
4	Meadow, Pasture, Grassland, or Range					0.0	1	0
5	Row Crop					0.0	1	0
6	Small Grain and Legumes					0.0	1 [	0
7	Woods - Indigenous			0.9		0.9	1 [	58
8	Woods - Planted					0.0	] [	0
9	Woods and Grass Combination					0.0	1 [	0
10	Ponds, Lakes, and Other Open Water					0.0	1 [	0
11	Gravel and Dirt					0.0	1 [	0
12	Porous and Permeable Paving					0.0	] [	0
13	Directly Connected Impervious			1.5		1.5	1 [	0
14	Unconnected Impervious with Small D/S Pervious					0.0	] [	0
15	Unconnected Impervious with Large D/S Pervious					0.0	] [	0
						-		
	HSG Subtotals (Acres):	0.0	0.0	4.8	0.0		Total Area:	4.8

0.0%

100.0%

0.0%

0.0%

HSG Subtotals (Acres): HSG Subtotals (%): Total Area: Total % Area: 4.8 100.0%

Points Subtotal:

180

### B. Compare Proposed Impervious Coverage with Maximum Allowable Impervious Coverage:

	Total Directly Connected Impervious Coverage = Total Unconnected Impervious Coverage with Small D/S Pervious = Total Unconnected Impervious Coverage with Large D/S Pervious = Total Site Impervious Coverage = Effective Site Impervious Coverage = Specify Source of Maximum Allowable Impervious Coverage:	32% 0% 0% 32% 32% None	% of Site % of Site % of Site % of Site % of Site (None or Table)		
				Points Subtotal:	0
C. Compare	Proposed Site Disturbance with Maximum Allowable Site Disturbance:				
	Total Proposed Site Disturbance = Maximum Allowable Site Disturbance by Municipal Ordinance =	30% 60%	% of Site % of Site	Points Subtotal:	23
D. Describe	Proposed Runoff Conveyance System:				
	Total Length of Runoff Conveyance System = Length of Vegetated Runoff Conveyance System = % of Total Runoff Conveyance System That is Vegetated =	0%	Feet Feet		
				Points Subtotal:	0
E. Resident	ial Lot Clustering:				
	Percent of Total Site Area that will be Clustered = Minimum Standard Lot Size as Per Zoning (Note: 1/2 Acre or Greater) = Maximum Proposed Cluster Lot Size (Note:1/4 Acre or Less) = Percent of Clustered Portion of Site to be Preserved as Vegetated Open Space =		% of Site Acres Acres % of Clustered Site Portio	on	
				Points Subtotal:	0

#### F. Will the Following be Utilized to Minimize Soil Compaction?

Proposed Lawn Areas will be Graded with Lightweight Construction Equipment:Yes(Yes or No)Percent of Proposed Lawn Areas to be Graded with Such Equipment:100%% of Lawn Areas

#### G. Are Any of the Following Stormwater Management Standards Met Using Only Nonstructural Strategies and Measures?

Groundwater Recharge Standards (NJAC 7:8-5.4-a-2):	No	(Yes or No)
Stormwater Runoff Quality Standards (NJAC 7:8-5.5):	Yes	(Yes or No)
Stormwater Runoff Quantity Standards (NJAC 7:8-5.4-a-3):	No	(Yes or No)

Note: If the Answers to All Three Questions at G Above are "Yes", Adequate Nonstructural Measures have been Utilized.

	Total Proposed Site Points:	294
	Ratio of Proposed to Existing Site Points: Required Site Points Ratio:	126% 88%
Nonstructural Point System Results:	Proposed Nonstructural Measures are Adequate	

Points Subtotal:

Points Subtotal:

23

68

# New Jersey Stormwater Best Management Practices Manual

February 2004

# APPENDIX A

# Low Impact Development Checklist

# A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

According to the NJDEP Stormwater Management Rules at N.J.A.C. 7:8, the groundwater recharge, stormwater quality, and stormwater quantity standards established by the Rules for major land development projects must be met by incorporating nine specific nonstructural stormwater management strategies into the project's design to the maximum extent practicable.

To accomplish this, the Rules require an applicant seeking land development approval from a regulatory board or agency to identify those nonstructural strategies that have been incorporated into the project's design. In addition, if an applicant contends that it is not feasible to incorporate any of the specific strategies into the project's design, particularly for engineering, environmental, or safety reasons, the Rules further require that the applicant provide a basis for that contention.

This checklist has been prepared to assist applicants, site designers, and regulatory boards and agencies in ensuring that the nonstructural stormwater management requirements of the Rules are met. It provides an applicant with a means to identify both the nonstructural strategies incorporated into the development's design and the specific low impact development BMPs (LID-BMPs) that have been used to do so. It can also help an applicant explain the engineering, environmental, and/or safety reasons that a specific nonstructural strategy could not be incorporated into the development's design.

The checklist can also assist municipalities and other land development review agencies in the development of specific requirements for both nonstructural strategies and LID-BMPs in zoning and/or land use ordinances and regulations. As such, where requirements consistent with the Rules have been adopted, they may supersede this checklist.

Finally, the checklist can be used during a pre-design meeting between an applicant and pertinent review personnel to discuss local nonstructural strategies and LID-BMPs requirements in order to optimize the development's nonstructural stormwater management design.

Since this checklist is intended to promote the use of nonstructural stormwater management strategies and provide guidance in their incorporation in land development projects, municipalities are permitted to revise it as necessary to meet the goals and objectives of their specific stormwater management program and plan within the limits of N.J.A.C. 7:8.

# Low Impact Development Checklist

# A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

Municipality:	
County:	Date:
Review board or agency:	
Proposed land development name:	
Lot(s):	Block(s):
Project or application number:	
Applicant's name:	
Applicant's address:	
Telephone:	Fax:
Email address:	
Designer's name:	
Designer's address:	
~	
Telephone:	Fax:
Email address:	

# Part 1: Description of Nonstructural Approach to Site Design

In narrative form, provide an overall description of the nonstructural stormwater management approach and strategies incorporated into the proposed site's design. Attach additional pages as necessary. Details of each nonstructural strategy are provided in Part 3 below.



# Part 2: Review of Local Stormwater Management Regulations

Title and date of stormwater management regulations used in development design:

Do regulations include nonstructural requir	ements? Yes:	No:
If yes, briefly describe:		
, · · ,		
List LID-BMPs prohibited by local regulation	ns:	
Pre-design meeting held? Yes:	Date:	No:
Meeting held with:		
Pre-design site walk held? Yes:	Date:	No:
Site walk held with:		
Other agencies with stormwater review juris	sdiction:	
Name:		
Required approval:		
Name:		
Required approval:		
Name:		
Required approval:		

# Part 3: Nonstructural Strategies and LID-BMPs in Design

# 3.1 Vegetation and Landscaping

Effective management of both existing and proposed site vegetation can reduce a development's adverse impacts on groundwater recharges and runoff quality and quantity. This section of the checklist helps identify the vegetation and landscaping strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to help maintain existing recharge rates and/or minimize or prevent increases in runoff quantity and pollutant loading.

А.	Has an inventory of existing sit	te vegetation bee	n performed? Ye	s:	_ No:
	If yes, was this inventory a fact	or in the site's la	yout and design?	Yes:	_ No:
B.	Does the site design utilize any	of the following	g nonstructural LI	D-BMPs?	
	Preservation of natural areas?	Yes:	No:	If yes, specify %	of site:
	Native ground cover?	Yes:	No:	If yes, specify %	of site:
	Vegetated buffers?	Yes:	No:	If yes, specify %	of site:
C.	Do the land development regu	lations require tl	nese nonstructura	l LID-BMPs?	
	Preservation of natural areas?	Yes:	No:	If yes, specify %	of site:
	Native ground cover?	Yes:	No:	If yes, specify %	of site:
	Vegetated buffers?	Yes:	No:	If yes, specify %	of site:
D.	If vegetated filter strips or buff	ers are utilized, s	specify their funct	ions:	
	Reduce runoff volume increase	es through lower	runoff coefficient	:: Yes:	_ No:
	Reduce runoff pollutant loads	through runoff t	reatment:	Yes:	_ No:
	Maintain groundwater recharge	e by preserving 1	natural areas:	Yes:	No:

## 3.2 Minimize Land Disturbance

Minimizing land disturbance is a nonstructural LID-BMP that can be applied during both the development's construction and post-construction phases. This section of the checklist helps identify those land disturbance strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to minimize land disturbance and the resultant change in the site's hydrologic character.

А.	Have inventories of existing site soils and slopes been performed?	Yes:	No:
	If yes, were these inventories factors in the site's layout and design?	Yes:	No:
В.	Does the development's design utilize any of the following nonstruc	ctural LID-BMPs?	
	Restrict permanent site disturbance by land owners?	Yes:	No:
	If yes, how:		
	Restrict temporary site disturbance during construction?	Yes:	No:
	If yes, how:		
	Consider soils and slopes in selecting disturbance limits?	Yes:	No:
	If yes, how:		
C.	Specify percentage of site to be cleared:	_ Regraded:	
D.	Specify percentage of cleared areas done so for buildings:		
	For driveways and parking: For roady	vays:	

what other prac	ctical measures if any ca	in be taken to achieve this?	the HSG percenta	ges in F and G ab
recharge rates a what other prac	and reduce runoff volu ctical measures if any ca	ume increases. In light of an be taken to achieve this?	the HSG percenta	ges in F and G ab
Locating site of disturbance wi recharge rates a	disturbance within are thin areas with greater and reduce runoff volu	as with less permeable permeable soils (HSG A ume increases. In light of	soils (HSG C an and B) can help the HSG percenta	d D) and minimiz maintain groundw ges in F and G ab
Specify percen HSG A:	tage of each HSG that v	vill be permanently disturb	ed: HSG D:	
c			1	
HSG A:	HSG B:	HSG C:	HSG D:	
### 3.3 Impervious Area Management

New impervious surfaces at a development site can have the greatest adverse effect on groundwater recharge and stormwater quality and quantity. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into a proposed development's design to comprehensively manage the extent and impacts of new impervious surfaces.

A. Specify impervious cover at site: Existing: \_\_\_\_\_ Proposed: \_\_\_\_\_

B. Specify maximum site impervious coverage allowed by regulations:

C. Compare proposed street cartway widths with those required by regulations:

Type of Street	Proposed Cartway Width (feet)	Required Cartway Width (feet)
Residential access – low intensity		
Residential access – medium intensity		
Residential access – high intensity with parking		
Residential access – high intensity without parking		
Neighborhood		
Minor collector – low intensity without parking		
Minor collector – with one parking lane		
Minor collector – with two parking lanes		
Minor collector – without parking		
Major collector		

D. Compare proposed parking space dimensions with those required by regulations:

Proposed: \_\_\_\_\_ Regulations: \_\_\_\_\_

E. Compare proposed number of parking spaces with those required by regulations:

Proposed: \_\_\_\_\_ Regulations: \_\_\_\_\_

F.	Specify percentage of total site impervio	us cover created by buildings:	
	By driveways and parking:	By roadways:	
6	****1 1 1/ . 1		
G.	What design criteria and/or site changes	s would be required to reduce the perc	entages in F above?
H.	Specify percentage of total impervious a	rea that will be unconnected:	
	Total site: Buildings:	Driveways and parking:	Roads:
I.	Specify percentage of total impervious a	rea that will be porous:	
	Total site: Buildings:	Driveways and parking:	Roads:
T		(	
J.	Specify percentage of total building roof	area that will be vegetated:	
K.	Specify percentage of total parking area	located beneath buildings:	
L.	Specify percentage of total parking locat	ed within multi-level parking deck:	

### 3.4 Time of Concentration Modifications

Decreasing a site's time of concentration (Tc) can lead directly to increased site runoff rates which, in turn, can create new and/or aggravate existing erosion and flooding problems downstream. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to effectively minimize such Tc decreases.

When reviewing Tc modification strategies, it is important to remember that a drainage area's Tc should reflect the general conditions throughout the area. As a result, Tc modifications must generally be applied throughout a drainage area, not just along a specific Tc route.

A. Specify percentage of site's total stormwater conveyance system length that will be:

Storm sewer: \_\_\_\_\_\_ Vegetated swale: \_\_\_\_\_\_ Natural channel: \_\_\_\_\_

Stormwater management facility: \_\_\_\_\_ Other: \_\_\_\_\_

Note: the total length of the stormwater conveyance system should be measured from the site's downstream property line to the downstream limit of sheet flow at the system's headwaters.

B. What design criteria and/or site changes would be required to reduce the storm sewer percentages and increase the vegetated swale and natural channel percentages in A above?

C. In conveyance system subareas that have overland or sheet flow over impervious surfaces or turf grass, what practical and effective site changes can be made to:

Decrease overland flow slope: \_\_\_\_\_

Increase overland flow roughness: \_\_\_\_\_

### **3.5 Preventative Source Controls**

The most effective way to address water quality concerns is by pollution prevention. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to reduce the exposure of pollutants to prevent their release into the stormwater runoff.

A. Trash Receptacles

	Specify the number of trash receptacl	es provided:										
	Specify the spacing between the trash	receptacles:										
	Compare trash receptacles proposed	with those required by	y regulations:									
	Proposed:	Regulations:										
В.	Pet Waste Stations											
	Specify the number of pet waste stations provided:											
	Specify the spacing between the pet w											
	Compare pet waste stations proposed											
	Proposed:	Regulations:										
C.	Inlets, Trash Racks, and Other Device Specify percentage of total inlets that	es that Prevent Dischar comply with the NJPI	rge of Large Trash and E DES storm drain inlet cri	Debris iteria:								
D.	Maintenance											
	Specify the frequency of the following	g maintenance activitie	es:									
	Street sweeping: Proposed:	·	Regulations:									
	Litter collection: Proposed:		Regulations:									
	Identify other stormwater manageme debris:	ent measures on the s	site that prevent discha	rge of large trash and								

E. Prevention and Containment of Spills

Identify locations where pollutants are located on the from being exposed to stormwater runoff:	ne site, and the features that prevent these pollutants
Pollutant:	Location:
Feature utilized to prevent pollutant exposure, harm	ful accumulation, or contain spills:
Pollutant:	Location:
Feature utilized to prevent pollutant exposure, harm	ful accumulation, or contain spills:
Pollutant:	Location:
Feature utilized to prevent pollutant exposure, harm	ful accumulation, or contain spills:
Pollutant:	Location:
Feature utilized to prevent pollutant exposure, harm	ful accumulation, or contain spills:
Pollutant:	Location:

# Part 4: Compliance with Nonstructural Requirements of NJDEP Stormwater Management Rules

1. Based upon the checklist responses above, indicate which nonstructural strategies have been incorporated into the proposed development's design in accordance with N.J.A.C. 7:8-5.3(b):

No.	Nonstructural Strategy	Yes	No
1.	Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.		
2.	Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces.		
3.	Maximize the protection of natural drainage features and vegetation.		
4.	Minimize the decrease in the pre-construction time of concentration.		
5.	Minimize land disturbance including clearing and grading.		
6.	Minimize soil compaction.		
7.	Provide low maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers, and pesticides.		
8.	Provide vegetated open-channel conveyance systems discharge into and through stable vegetated areas.		
9.	Provide preventative source controls.		

2. For those strategies that have not been incorporated into the proposed development's design, provide engineering, environmental, and/or safety reasons. Attached additional pages as necessary.



March 4, 2021

via email

#### SAFSTOR REAL ESTATE CO, LLC c/o W&A ENGINEERING 355 Oneta Street Suite D100

Athens, Georgia 30601

Attention: Mr. Jim Burtt Project Manager

### Regarding: SWM AREA EVALUATION & ON-SITE WASTEWATER MANAGEMENT EVALUATION SERVICES PROPOSED SELF-STORAGE FACILITY 471 ELIZABETH AVENUE FRANKLIN TOWNSHIP, SOMERSET COUNTY, NEW JERSEY WHITESTONE PROJECT NO.: GJ2117698.000

Dear Mr. Burtt:

Whitestone Associates, Inc. (Whitestone) has completed a stormwater management (SWM) area evaluation and on-site wastewater management evaluation services at the above-referenced site. The results of the evaluation presented below are based on the soil conditions disclosed by the profile pits performed during Whitestone's February 2021 field investigation.

### 1.0 **PROJECT DESCRIPTION**

The subject property located at 471 Elizabeth Avenue in Franklin Township, Somerset County, New Jersey currently consists of an undeveloped lot. Based on the January 18, 2021 *Conceptual Grading, Drainage & Utility Plan* prepared by Bohler Engineering NJ, LLC (Bohler), the proposed development will include construction of a three-story, self-storage facility with new pavements, landscaping, SWM area, septic area, and utilities. The SWM facility will be located within the southern portion of the site. The septic area preliminarily is anticipated to be located within the eastern portion of the site. Final details regarding the type, bottom elevation, and size of the proposed SWM/septic facilities have not been established at the time of this report.

### 2.0 FIELD EXPLORATION

Whitestone's scope of services consisted of conducting an engineering evaluation of the subsurface conditions disclosed by nine profile pits (identified as SPP-1A, SPP-2A, SPP-3 through SPP-6, and offsets SPP-3A, SPP-4A, and SPP-5A). The subsurface tests extended to depths ranging from approximately five feet below ground surface (fbgs) to 8.5 fbgs. The subsurface tests were located in the field using normal taping procedures and estimated right angles from existing features and are presumed

		Other Office Locations:		
CHALFONT, PA 215.712.2700	Southborough, MA	ROCKY HILL, CT	WALL, NJ	PHILADELPHIA, PA
	508.485.0755	860.726.7889	732.592.2101	215.848.2323



to be accurate within a few feet. Upon completion, the test locations were backfilled to existing surface levels using soils generated during excavation of the test pits. Soil profile pits and associated infiltration testing performed for the proposed septic system were witnessed by a representative of the Franklin Township Health Department.

### 3.0 SWM AREA TEST RESULTS

**General:** The SWM area investigation included four profile pits (identified as SPP-4, SPP-5, and associated offsets SPP-4A and SPP-5A for basin flood testing) performed within the anticipated location of the SWM area. The test locations are shown on the *Test Location Plan* included as Figure 1. Details of the subsurface materials encountered are presented on the *Records of Subsurface Exploration* presented in Appendix A.

**Estimated Seasonal High Groundwater Levels:** The methods used in determining the estimated seasonal high groundwater (ESHGW) level include evaluating the soil morphology within a test location and identifying irregular spots or blotches of different colors or minerals unlike that of the surrounding soils (mottles). Mottling is the result of the oxidation of minerals within a soil structure as a water level slowly fluctuates.

Groundwater and indications of seasonal high groundwater levels were encountered within the profile pits performed at the depths/elevations indicated in the *Records of Subsurface Exploration*. Groundwater conditions likely will fluctuate seasonally and following periods of precipitation.

**Infiltration Testing:** Basin flood tests were conducted within the weathered rock/bedrock strata encountered at profile pits SPP-4A and SPP-5A. The basin flood tests performed within the profile pits were conducted in general accordance with the *New Jersey Stormwater Best Management Practices Manual* (BMP Manual). The results of the in-situ testing indicated that basin flood tests did not drain the required 12 inches within 24 hours of filling. Therefore, per the BMP Manual, the limiting zone is considered to be a massive rock substratum and a infiltration rate cannot be assigned. Detailed in-situ infiltration test results are available in Appendix C.

Additionally, representative samples within profile pits SPP-4 and SPP-5 were subjected to tube permeameter analysis as detailed in *New Jersey Stormwater Best Practices Manual*. Laboratory tube permeameter testing resulted in a infiltration rate of less than 0.2 iph. Individual tube permeameter test results are provided in Appendix B.

### 4.0 SEPTIC AREA TEST RESULTS

**General:** The septic area investigation included four profile pits (identified as SPP-1A, SPP-2A, SPP-3 and associated offset SPP-3A for basin flood testing) performed within the potential locations of the septic disposal bed areas. The test locations are shown on the *Test Location Plan* included as Figure 1. Details of the subsurface materials encountered are presented on the *Records of Subsurface Exploration* presented in Appendix A.

**Estimated Seasonal High Groundwater Levels:** Groundwater and indications of seasonal high groundwater levels were encountered within the profile pits performed at the depths/elevations indicated in the *Records of Subsurface Exploration*. Groundwater conditions likely will fluctuate seasonally and following periods of precipitation.



**Infiltration Testing:** A pit-bailing test was conducted within the weathered rock strata encountered at profile pit SPP-2A at a depth of approximately eight fbgs. The pit-bailing test was conducted in general accordance with the *Standards for Individual Subsurface Sewage Disposal Systems (N.J.A.C. 7:9A)* and was witnessed by a Township of Franklin Health Department representative. The results of the pit-bailing test indicated a permeability rate (K) of approximately 3.4 inches per hour.

Additionally, a basin flood test was conducted at profile pit SPP-3A and tube permeameter testing was conducted at profile pit SPP-3. The basin flood test was conducted within the weathered rock strata encountered within SPP-3A. The basin flood test was conducted in general accordance with the *Standards for Individual Subsurface Sewage Disposal Systems (N.J.A.C. 7:9A)*. The results of the in-situ testing indicated that basin flood test did not drain the required 12 inches within 24 hours of filling. Therefore, the limiting zone is considered to be a massive rock substratum and a permeability rate cannot be assigned. Detailed in-situ permeability test results are available in Appendix C. The laboratory tube permeameter testing conducted for SPP-3 resulted in a permeability rate of less than 0.2 iph. Individual tube permeameter test results are provided in Appendix B.

### 5.0 CLOSING

Whitestone appreciates the opportunity to be of service to SAFStor Real Estate Co, LLC and W&A Engineering and trusts that this information will be helpful for evaluating the proposed development of this property. Please contact us at (908) 668-7777 to further discuss these findings.

Sincerely,

WHITESTONE ASSOCIATES, INC.

Mudar Khantamr, P.E. Project Manager

MK/pwd L:\Job Folders\2021\2117698GJ\Reports and Submittals\17698 SWM&Septic.docx Enclosures Copy: Kyle McKenna, P.E., Bohler Engineering NJ, LLC Laurence W. Keller, P.E., Whitestone Associates, Inc.

Kevin A. Feath, P.E. Associate



# **FIGURE 1 Test Location Plan**



ch. Ecilders/ 2021/ 21176086. |/ Drawines. and. Plans/ 6 12117608. 000

DRAWING TITLE       DRAWING TITLE         IEST LOCATION PLAN       IEST LOCATION PLAN         TEST LOCATION PLAN       MHITESTON PLAN         TEST LOCATION PLAN       MHITESTON PLAN         CLIENT:       SAFSTOR REAL ESTATE CO, ILC         ROPOSED SELF-STORAGE FACILITY       ASSOCIATES, INC.         ROPOSED SELF-STORAGE FACILITY       30 INDEPENDENCE BOULEVARD, SUITE 250, WARREN, NJ 07059         ATT LIZABETH AVENUE       ODB 6.64 7777	- 5, LLC			_	
Propertiants       CLENT:         CLENT:       CLENT:         SAFSTOR REAL ESTATE CO, LLC       ASSOCIATES, INC.         Environmental & Geotechnical Engineers & Consultants       Proposed Self-STORAGE FACILITY         Roposed Self-STORAGE FACILITY       30 IN DEPENDENCE BOULEVARD, SUITE 250, WARREN, NJ 07059	3/3/2 SCALE: 1" =	DESIGNED BY: GR DATE:	PROJECT #:	DRAWING TITLE: TEST LOCATION PLAN	<b>MHITESTONE</b>
Image       Image <th< th=""><th>60'</th><th></th><th>211769</th><th>CLIENT: SAFSTOR REAL ESTATE CO, LLC</th><th>ASSOCIATES, INC.</th></th<>	60'		211769	CLIENT: SAFSTOR REAL ESTATE CO, LLC	ASSOCIATES, INC.
	1	PROJ. MGR.: KAF FIGURE:	8.000	PROJECT: PROPOSED SELF-STORAGE FACILITY 471 ELIZABETH AVENUE	Environmental & Geotechnical Engineers & Consultants 30 INDEPENDENCE BOULEVARD, SUITE 250, WARREN, NJ 07059 908 668 7777 WHITESTONEASCOCCOM

LEGEND

SOIL PROFILE PIT LOCATION

PIT BAIL TEST LOCATION

SUBJECT PROPERTY BOUNDARY

REFERENCE

THIS PLAN IS BASED ON A JANUARY 18, 2021 CONCEPTUAL GRADING, DRAINAGE & UTILITY PLAN PREPARED BY BOHLER ENGINEERING NJ, LLC & ALL SITE LOCATIONS ARE APPROXIMATE.



# **APPENDIX A Records of Subsurface Exploration**



Soil Profile Pit No.: SPP-1A

Project:	Proposed	Self-Stora	ne Facili	tv				WAI	Project No.		G.12117698 000		
Location:	471 Elizal	beth Avenu	e: Frank	in Townsh	ip. Somerset Cou	untv. New Jersev			Client	:	SAFStor Real F	state Co. LLC	
Surface Eleva	ation: +	77.0	feet		Date Started	2/8/2021	Water	Depth	Elevation	1	Estimat	ed Seasonal High	
Termination I	Depth:	8.5	feet bas		Date Complet	red: 2/8/2021	(fee	et bgs)	(feet)	•	Groundwat	er Depth   Elevatio	on
Proposed Lo	cation:	Septic		-	Logged By:		During:	6.0	710	V	(	feet bgs)   (feet)	•
Excavating M	lethod:	Test Pit F	xcavation	n	Contractor:	INR	At Completion:		<u></u>	- 	At Completion:	40   730	
Test Method:	iotnou.	Visual Ob	servation	<u>ו</u>	Rig Type:	PC88MR	24 Hours:		۱ <u> </u>	-	, a completion	1.0 1 10.0	-
		vioual ob			rug Type:				·	- *	l		
SAMPLE	INFORM	ATION	DE	EPTH	HORIZON		DESCRIPTION C	F MAT	ERIALS			REMARKS	3
Depth (feet)	Number	Туре	1	feet			(Classifi	cation)					
			0.0										
				0 - 3	FILL	30" Asphalt Millings						-	
			_	_									
			1.0										
												Water Seeping in All	
0 - 3			_									Sidewalls 2"/10 Minut	tes
			2.0										
			_										
			3.0										
				3 - 6	RESIDUAL	Reddish-Brown (5YR	5/4) CLAY LOAM; 10% Gravel	; Moderat	te, Medium B	locky	Structure; Moist to	4	
			_			Wet; Friable; No Roc	ots; >15MM Mottling Starting at	4.0 fbgs;	Clear Bound	ary .,	,		
			40										
			4.0	-								Mottling @	
2 6												4.0 fbgs to 8.5 fbgs	
3-0			5.0										
			5.0	-									
												Water Sitting on Wea	athered
			6.0	6 8 5	WEATHERED	Dark Reddich Brown	(5VP 4/3) Eractured WEATHE		I E: Strong (	Correc	Structure: Moist:	Rock	
				0-0.5	ROCK	Very Hard; No Roots	; Mottling; Clear Boundary		LL, Strong, (	JUai 50	ou detaile, moist,		
			7.0	-									
6 - 8.5													
			8.0	-									
						Soil Profile Pit SPP-1	A Terminated at a Depth of 8.5	Feet Bel	ow Ground S	urface	Due to Refusal on		
			9.0	-		vveathered Rock/Bec	lrock						
			40.0	1									
			10.0	-									
				1									
			11.0	4									
				1									
			12.0	4									
				1									
			13.0	4									
			-										
			14.0	4									
			-	1									
			15.0										
			1									1	



Soil Profile Pit No.: SPP-2A

<b>L</b> .	_	a	_									
Project:	Proposed	Self-Stora	ge Facilit	ty				WAI P	roject No.		GJ2117698.000	
Location:	471 Elizal	beth Avenu	ıe; Frank	lin Townsh	ip, Somerset Co	unty, New Jersey			Client		SAFStor Real E	state Co, LLC
Surface Eleva	ation: ±	77.0	feet		Date Started:	Date Started: 2/6/2021 Water Depth   Elevation Estimate				ted Seasonal High		
Termination	Depth:	8.0	feet bgs	6	Date Complet	ed: 2/6/2021	(fe	et bgs)	(feet)		Groundwa	ter Depth   Elevation
Proposed Lo	cation:	Septic			Logged By:	CN	During:	5.5	71.5	$\mathbf{\Lambda}$		(feet bgs)   (feet)
Excavating N	lethod:	Test Pit E	xcavatior	า	Contractor:	LNR	At Completion:			$\nabla$	At Completion:	4.0   73.0
Test Method:		Visual Ob	servation	1	Rig Type:	PC88MR	24 Hours:			Ŧ		
SAMPLE	INFORM	ATION	DF	EPTH			DESCRIPTION					
Donth (foot)	Number	Tuno		faat	HORIZON		(Classifi	ication)	ERIALS			REMARKS
Deptil (leet)	Number	Type		leel				,				
			0.0									
				0 - 2	FILL	24" Asphalt Millings						
												Water Seeping in All
0 - 2			1.0									Sidewalls 2"/10 Minutes
												0.0 agai 0.5 of agai 0.0
				1								
			2.0	2 5 5	DECIDITAL	Poddioh Brown /CVD 5/11 2		J. Mad *	Medium P	lock	Ctructure: M-1-1-1	4
				2 - 5.5	RESIDUAL	Reddisn-Brown (5YR 5/4) С Wet; Friable; No Roots; >15	EAT LOAN; 10% Grave	s; Noderat ; Clear Bo	e, iviedium B undary	юску	Suucture; Moist to	
									-			
			3.0	-								
2 - 5.5			4.0									
			4.0									Mottling @ 4.0 fbas
			5.0									
			5.0									Water Sitting on Weathered
												Rock
			6.0	5.5 - 8	WEATHERED ROCK	Dark Reddish-Brown (5YR 4 Very Hard: No Roots: No M	4/3) Fractured WEATHE	RED SHA	LE; Strong, C	Coarse	e Structure; Moist;	
				1	1.001		calling, creat boundary					
			_									
5.5 - 8			7.0									
				4								
			8.0									
						Soil Profile Pit SPP-2A Terr	ninated at a Depth of 8.0	0 Feet Belo	w Ground S	urface	Due to Refusal on	SPP-2A Used for Pit Bail
			-									1051 (FD-1)
			9.0									
			-									
			10.0									
			11.0	-								
			12.0									
			12.0									
			_									
			13.0									
			_									
			14.0									
			15.0									
				1								



Soil Profile Pit No.: SPP-3

Project:	Proposed	Self-Stora	de Facilit	tv		WAI Project No.: G.12117698 000	
Location:	471 Elizat	beth Avenu	ie; Frank	lin Townsh	ip, Somerset Co	Inty, New Jersey Client: SAFStor Real Esta	te Co, LLC
Surface Eleva	ation: ±	77.0	feet		Date Started:	2/6/2021 Water Depth   Elevation Estimated	Seasonal High
Termination	Depth:	6.0	- feet bgs	3	Date Comple	ed: 2/6/2021 (feet bgs)   (feet) Groundwater	Depth   Elevation
Proposed Lo	cation:	Septic	-		Logged By:	CN During: 4.0   73.0 T (fee	et bgs)   (feet)
Excavating N	lethod:	Test Pit Ex	xcavatior	า	Contractor:	LNR At Completion:   👽 At Completion:	3.8   73.2
Test Method:		Visual Obs	servation	1	Rig Type:	PC88MR 24 Hours:   👽	
SAMPLE	INFORM	ΔΤΙΟΝ	DF	-ртн			
		_			HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Туре	1	feet		(ondoinioution)	
			0.0				
				0 - 2.5	FILL	30" Asphalt Millings	
			-				
			1.0				
0 - 2.5							
			2.0				
			2.0				
			3.0	2.5 - 4	RESIDUAL	Reddish-Brown (5YR 5/4) CLAY LOAM; 10% Gravel; Moderate, Medium Blocky Structure; Wet; Friable: No Roots; >15MM Mottling at 3.8 fbos: Clear Boundary	ad/Tubes Taken @
25-1	S-1	BAG				,,	6.0 fbgs
2.5 - 4	0-1	DAG		_			Natas Citting on Weathard
			4.0			v F	Rock
				4 - 7	WEATHERED	Dark Reddish-Brown (5YR 4/3) Fractured WEATHERED SHALE; Strong, Coarse Structure; Moist;	
					RUCK	Very Hard, No Roots, Mottling, Clear Boundary	
4 - 6			5.0				
			6.0			Sail Brafile Dit SED 3 Terminated at a Danth of 6.0 East Balaw Cround Surface Due to Bafued on	
						Weathered Rock/Bedrock	
			7.0				
			_				
			8.0				
			-	-			
			9.0				
			10.0				
			11.0				
			11.0				
			_				
			12.0				
			—				
			-	-			
			13.0				
			14.0				
			-				
			15.0	-			



Soil Profile Pit No.: SPP-3A

Project:	Proposed	Self-Stora	de Facili	tv					WAL	Project No		G.I2117698 000	
Location:	471 Eliza	beth Avenu	e: Frank	lin Townsh	ip. Somerset Co	untv. New Jerse	v			Clien	 t:	SAFStor Real Es	tate Co. LLC
Surface Eleva	ation: ±	77.0	feet		Date Started:	2/6/2021	5	Wat	er Depth	Elevatio	n	Estimate	ed Seasonal High
Termination	Depth:	6.0	feet bas	6	Date Complet	ted: 2/6/2021		(	feet bgs)	(feet)		Groundwat	er Depth   Elevation
Proposed Lo	cation:	Septic	-		Logged By:	CN		During:	4.0	73.0	$\mathbf{\Lambda}$	(1	eet bgs)   (feet)
Excavating N	lethod:	Test Pit Ex	xcavatio	n	Contractor:	LNR		At Completion:				At Completion:	3.8   73.2
Test Method:		Visual Obs	servatior	ı	Rig Type:	PC88MR		24 Hours:			Ŧ		
SAMDIE				сотц							_		
SAWFLE				-F IN	HORIZON			DESCRIPTION	OF MAT	ERIALS			REMARKS
Depth (feet)	Number	Туре		feet				(Class	incation)				
			0.0										
				0 - 2.5	FILL	30" Asphalt Millin	gs						
			-	-									
			1.0										
0 - 2.5													
			-										
			2.0	-									
			3.0	2.5 - 4	RESIDUAL	Reddish-Brown (	5YR 5/4) CL	AY LOAM; 10% Gra	vel; Modera	te, Medium I	Blocky	Structure; Wet;	Bag/Tubes Takan
05 4	6.4	DAC.		1		1 Habie, NO ROOLS	, ~ 131VIIVI IVI	ouning at 5.0 ibys; C		ч <b>у</b>			3.0 fbgs
2.5 - 4	5-1	BAG	_	4									Weter Ott
			4.0										Water Sitting on Weathered Rock
				4 - 7	WEATHERED	Dark Reddish-Bro	own (5YR 4/	3) Fractured WEATH	HERED SHA	LE; Strong,	Coarse	e Structure; Moist;	
			-	-	ROCK	Very Hard; No Ro	oots; Mottling	g; Clear Boundary					
1-6			5.0										
4 - 0													
			6.0									<u> </u>	
						Weathered Rock	P-3A Termi /Bedrock	nated at a Depth of	6.0 Feet Bel	low Ground	Surface	Due to Refusal on	
			7.0										
			7.0	-									
			_										
			8.0										
			-	-									
			9.0										
				1									
			-	-									
			10.0	4									
			-										
			11.0	-									
			_										
			12.0										
				1									
			-	4									
			13.0										
				1									
			-	4									
			14.0	4									
			-	1									
			15.0	4									



Soil Profile Pit No.: SPP-4

Broiset	Dranger	Solf Ct	ao Ez -:!!	<b>+</b> 17								
Project:	A71 Eline	Self-Stora	ye Facili	lin Tourst	in Somarcat C-	wai Project no.: GJ211/698.000						
Surface Elect	4/ I Elizal		foot	un rownsh	IP, Somerset Col	2/6/2021 Water Depth L Elevation Estimate	die CO, LLC					
Surrace Eleva	auon: ±	10.0	foot here		Date Started:	te Completed: 2/6/2021 (feet bgs)   (feet) Croundwat						
Proposed Lo	Depth:	Dropood		5	Loggod By	ogged By: CN During: NF L V						
Excavating M	lothod		VIVI	0	Contractor	$\frac{\nabla N}{ N } = \frac{\nabla V}{ N } = \frac{ V }{ V } = $	30   72 0					
Test Method:	lethou.		servation	<u>,</u>	Rig Type:	PC88MR 24 Hours: / V Completion.	<u> </u>					
rest method.		Visual Ob.	Servation	1	Rig Type.							
SAMPLE	INFORM	IATION	DE	EPTH	HORIZON	DESCRIPTION OF MATERIALS	REMARKS					
Depth (feet)	Number	Туре	1	feet		(Classification)						
			0.0									
				0 - 1	FILL	12" to 18" Asphalt Millings						
0 - 1			_	-								
			1.0									
				1 - 2	TOPSOIL	6" to 12" Topsoil						
1 - 2			-	-								
			2.0									
				2 - 4	GLACIAL	Reddish-Brown (5YR 5/4) CLAY LOAM; 10% Gravel; Moderate, Medium Blocky Structure; Wet;	Tubes/Bags Taken @					
				-	DEFUSITS	n namo, ouory, no noolo, - ionnin molunny al olo ings, olean doundary	2.0 1095					
2 - 4	S-1	BAG	3.0	1								
							>15MM Mottling 3.0 fbas to 6.0 fbas					
			-	1								
			4.0	4.0								
				4 - 6	ROCK	Dark Reddish-Brown (5YR 4/3) Fractured WEATHERED SHALE; Strong, Coarse Structure; Moist; Very Hard; No Roots; Mottling						
				1								
4 - 6			5.0	-								
			6.0									
			0.0			Soil Profile Pit SPP-4 Terminated at a Depth of 6.0 Feet Below Ground Surface Due to Refusal on						
						Weathered Rock/Bedrock						
			7.0									
				1								
			_									
			8.0									
				1								
			-	4								
			9.0									
				1								
			-	-								
			10.0	1								
			-	1								
			11.0	4								
				1								
			12.0	-								
			13.0									
			13.0	-								
			_									
			14.0									
				1								
			_	1								
			15.0									
				1								



Soil Profile Pit No.: SPP-4A

Project:	Proposed	Self-Stora	ge Facility		WAI Project No.: GJ2117698.000						
Location:	471 Eliza	beth Avenu	ie; Franklin Tow	nship, Somerset Co	unty, New Jersey Client: SAFStor Real Est	ate Co, LLC					
Surface Elev	ation: ±	75.0	feet	Date Started	2/6/2021 Water Depth   Elevation Estimate	d Seasonal High					
Termination	Depth:	6.0	feet bgs	Date Comple	ted: 2/6/2021 (feet bgs)   (feet) Groundwate	r Depth   Elevation					
Proposed Lo	cation:	Proposed	SWM	Logged By:	.ogged By: <u>CN</u> During: <u>NE  </u>						
Excavating N	lethod:	Test Pit E	xcavation	Contractor:	$\underline{LNR} \qquad \qquad At Completion: \qquad  \qquad \underline{\bigtriangledown} \qquad At Completion: \qquad  \qquad \underline{\bigtriangledown} \qquad At Completion: \qquad  \qquad \mathbf{At Completion:} \qquad \mathbf{At Completion:} \qquad  \qquad \mathbf{At Completion:} \qquad  \qquad \mathbf{At Completion:} \qquad At C$	3.0   72.0					
Test Method:	:	Visual Ob	servation	Rig Type:	<u>PC88MR</u> 24 Hours:   ▼						
SAMPLE	INFORM	IATION	DEPTH	HORIZON	DESCRIPTION OF MATERIALS	REMARKS					
Depth (feet)	Number	Туре	feet		(Classification)						
			0.0								
			0 - 1	I FILL	12" to 18" Asphalt Millings						
0 - 1											
			1.0								
			1 - 2	2 TOPSOIL	6" to 12" Topsoil						
1 - 2			-								
	I		2.0								
			2 - 4	+ GLACIAL DEPOSITS	readisn-brown (5YR 5/4) CLAY LUAM; 10% Gravel; Moderate, Medium Blocky Structure; Wet; Friable; Sticky; No Roots; >15MM Mottling at 3.0 fbgs; Clear Boundary	Tupes/Bags Taken @ 2.0 fbgs					
						-					
2 - 4	S-1	BAG	3.0			>15MM Mottling					
						3.0 fbgs to 6.0 fbgs					
			4.0								
	1		4 - 6	6 WEATHERED	Dark Reddish-Brown (5YR 4/3) Fractured WEATHERED SHALE; Strong, Coarse Structure; Moist;						
				ROCK	Very Hard; No Roots; Mottling						
			5.0								
4 - 6											
			_								
			6.0								
					Soil Profile Pit SPP-4A Terminated at a Depth of 6.0 Feet Below Ground Surface Due to Refusal on Weathered Rock/Bedrock						
			7.0								
			° 0								
			0.0								
			9.0								
			$  \neg$								
			_								
			10.0								
			-								
			11.0								
			12.0								
			13.0								
			14.0								
			-								
			15.0								
L											



Soil Profile Pit No.: SPP-5

	_	a	_								
Project:	Proposed	Self-Stora	ge Facili	ity				WAI Pro	oject No.:	GJ2117698.00	0
Location:	471 Elizal	beth Avenu	ie; Frank	din Townsh	ip, Somerset Co	unty, New Jersey			Client:	SAFStor Real I	Estate Co, LLC
Surface Eleva	ation: ±	74.5	feet		Date Started:	2/6/2021	Water D	Depth   E	Elevation	Estima	ated Seasonal High
Termination I	Depth:	5.0	feet bgs	S	Date Complet	ted: 2/6/2021	(feet	er ogs)   (	(Teet)	Groundw	ater Depth   Elevation
Proposed Lo	cation:	SWM			Logged By:	CN	During:	NE	7	/	(reet bgs)   (feet)
Excavating M	lethod:	Test Pit E	xcavatio	n	Contractor:	LNR	At Completion:			At Completion	a: <u>2.5   72.0</u>
Test Method:		Visual Ob	servatior	า	Rig Type:	PC88MR	24 Hours:	<u> </u>	1	?	
SAMPLE	INFORM	ATION	DE	EPTH			DESCRIPTION OF	F MATER	RIALS		DEMARKS
Depth (feet)	Number	Type		feet	HURIZUN		REWARNS				
,											
			0.0	0 1 5	EUI	19" Apphalt Millinga					_
				0 - 1.5	FILL	To Asphan Minings					
0-15			-								
5 1.5			1.0	4							
			1	1.5 - 3	RESIDUAL	Reddish-Brown (5YR 5/4) CL	AY LOAM; 10% Gravel;	; Moderate, I	Medium Block	y Structure; Moist;	
			2.0	4		Friable; Sticky; No Roots; >1	5MM Mottling @ 2.5 fbgs	ıs; Clear Bou	undary		Tubes/Bag Taken @ 2.0 fbgs
1.5 - 3	S-1	BAG									2.0 1098
				1							Mottling from
			3.0	2 5		Dark Raddiah Brown (SVD 4)	2) Erectured M/EATHER		Strong Or	a Structure Maint	2.5 fbgs to 5.0 fbgs
				3-5	ROCK	Very Hard; No Roots; Mottline	טן דרמכנטרפס WEATHER	KED SHALE;	; strong, Coai	se Structure; Moist;	
				1			-				
3 - 5			4.0	4							
			-	1							
			5.0				ated at a Depth of 5 6 5	ant Delaw C	Second Oracle	Due te D-firl	
						Son Prome Pit SPP-5 Termin Weathered Rock/Bedrock	ated at a Depth of 5.0 Fe	eet below G	siouna Surfac	e Due to Refusal on	
			-	1							
			6.0	4							
			-	1							
			7.0	4							
			-	1							
			8.0	4							
			-	1							
			9.0								
			-	4							
			10.0								
			-	-							
			11.0								
			-	-							
			12.0								
			-	4							
			13.0								
			-								
			14.0								
				]							
				4							
			15.0								
				]							



Soil Profile Pit No.: SPP-5A

1					
Project:	Proposed	Self-Stora	ge Facility		WAI Project No.: GJ2117698.000
Location:	471 Elizat	oeth Avenu	ie; Franklin 1	Township, Somerset Co	ounty, New Jersey Client: SAFStor Real Estate Co, LLC
Surface Eleva	ation: ±	74.5	feet	Date Started:	d: 2/6/2021 Water Depth   Elevation Estimated Seasonal High
Termination I	Depth:	5.0	feet bgs	Date Comple	eted: 2/6/2021 (feet bgs)   (feet) Groundwater Depth   Elevation
Proposed Lo	cation:	SWM		Logged By:	CN During: NE   🝸 (feet bgs)   (feet)
Excavating M	lethod:	Test Pit E	xcavation	Contractor:	LNR At Completion:   7 At Completion: 2.5   72.0
Test Method:	-	Visual Ob	servation	Ria Type:	PC88MR 24 Hours:
SAMPLE	INFORM	ATION	DEPT	HORIZON	DESCRIPTION OF MATERIALS DEMARKS
Depth (feet)	Number	Туре	feet	HOMEON	(Classification)
			0.0		10" Apphalt Millings
				J-1.5 FILL	To Asphan minings
0-15					
0 - 1.0			1.0		
				1.5 - 3 RESIDUAL	Reddish-Brown (5YR 5/4) CLAY LOAM; 10% Gravel; Moderate, Medium Blocky Structure; Moist;
			2.0		Friable; Sticky; No Roots; >15MM Mottling @ 2.5 fbgs; Clear Boundary
1.5 - 3	S-1	BAG			2.0 fbgs
			-		Mottling from
			3.0		2.5 fbgs to 5.0 fbgs
				3-5 WEATHERED	Dark Reddish-Brown (5YR 4/3) Fractured WEATHERED SHALE; Strong, Coarse Structure; Moist; Very Hard: No Roots: Mottling
			-	NOUN	
3-5			4.0		
0-0					
			-		
			5.0		
					Soil Profile Pit SPP-5A Terminated at a Depth of 5.0 Feet Below Ground Surface Due to Refusal on
			-		
			6.0		
			-		
			7.0		
			-		
			8.0		
			9.0		
			10.0		
			11.0		
			12.0		
			13.0		
			14.0		
			15.0		



Soil Profile Pit No.: SPP-6

Draigst	Draw	Calf Ot-	ао Г'''	i4. ,					14/4/ -	Dreisst N		0 10117000 00	
Project:	Proposed	Self-Stora	ige ⊢acili	ily din Tauru l	n Comercial C	unter Nierre I			WAI	-roject No	.:	GJ211/698.00	
			ie; ⊢rank	an Iownsh	pets Of a finite	unity, New Je	ersey		• Daw!!	Clien	ι: 	SAFSIOF Real	estate CO, LLC
Surface Eleva	ation: ±	78.5	feet		Date Started:	2/6/20	021	Wate	r Depth	Elevatio	n	Estim	ated Seasonal High
Termination	Depth:	5.0	feet bgs	S	Date Complet	ted: 2/6/20	021	(16	et bys)	(ieel)		Groundw	ater Depth   Elevation
Proposed Lo	cation:	Septic			Logged By:	CN		During:	3.0	75.5	$\mathbf{Y}$		(leet bgs)   (leet)
Excavating N	lethod:	Test Pit E	xcavatio	n	Contractor:	LNR		At Completion:				At Completio	n: <u>3.0</u>   75.5
Test Method:		Visual Ob	servatior	า	Rig Type:	PC88	BMR	24 Hours:			_▼		
SAMPLE	INFORM	ATION	DE	EPTH				DESCRIPTION	ΟΕ ΜΑΤ	FRIALS			
Depth (feet)	Number	Type		feet	HORIZON			(Classif	ication)	)			REMARKS
		, , , , , , , , , , , , , , , , , , ,											
			0.0	0 15	EUL	19" Apphalt N	Villingo						_
				0 - 1.0			viinings						
0-15			<sup>-</sup>										
			1.0	-									
				1.5 - 2.2	TOPSOIL	8" Topsoil							
1.5 - 2.2			2.0	-									
			1 -	2.2 - 3	RESIDUAL	Reddish-Brow	wn (5YR 5/4) Cl	AY LOAM; 10% Grave	el; Modera	te, Medium I	Blocky	Structure; Wet;	Tuboo/Pogo Takan
2.2 - 3	S-1	BAG	3.0	]		Friable; No R	Roots; No Mottlin	ıg; Clear Boundary					2.5 fbgs
			3.0	3-5	WEATHERED	Dark Reddiek	h-Brown (5YR 4	(3) Fractured WFATH	ERED SHA	LE: Strong	Coarse	Structure Moist	
				0.0	ROCK	Very Hard; N	lo Roots; Mottlir	9		, orong,	20000		,
			4.0	]									
3 - 5			4.0	-									Mottling from 3.0 fbas to 5.0 fbas
													0.0 1590 10 0.0 1590
			5.0										
			5.0	-		Soil Profile P	Pit SPP-6 Termir	ated at a Depth of 5.0	Feet Belo	w Ground Si	urface [	Que to Refusal on	1
						Weathered R	Rock/Bedrock	aled at a Deptit of 5.0	I COL DOID				
			0.0	-									
			7.0										
			7.0	-									
			_										
			8.0										
			0.0	-									
			9.0	-									
			_										
			10.0										
			10.0	-									
			_	1									
			11.0										
				-									
			_										
			12.0										
				-									
			_										
			13.0										
				1									
			_	4									
			14.0										
				4									
			_	4									
			15.0										
				1									



# **APPENDIX B Laboratory Test Results**

	Ти	be Permeam		Job Number: GJ2117698.000				
Sample ID:	Profile Pit No.:	SPP-3	Sample No.:	T-1	Depth:	3.0'	Client: Safstor Real Estate Co, LLC	
COUNTY/MUN	IICIPALITY Frankli	n Twp, Somerse	et Co BLOCK		LOT			
1. Test Numbe	r <u>1</u>	_Replicate (lette	er) A	_Date Coll	lected _	2/6/2021		
2. Material Te	sted:	_Fill	Test in N	lative Soil				
3. Type of Sar	nple: X	Undisturbed		Disturbed	d			
4. Sample Din	nensions:	Inside Radius Length of Sam	of Sample Tube, l ple, L, in inches	R, in cm	1.91 3.50			
5. Bulk Densit	y Determination (Distur	bed Samples Or	nly): N/A					
6. Sample We	ight (Wt. Tube Containi	ing Sample-Wt.	of Empty Tube), g	grams	0.00		Wt. of Tube Containing Sample Wt. of Empty Tube	
7. Sample Vol	ume (L x 2.54 cm./inch	x 3.14R2), cc.			101.30			
8. Bulk Densit	y (Sample Wt./Sample	Volume), grams	/cc.		0	> 1.2		
9. Standpipe l	Jsed: X	_No	Yes, Inc	licate Intern	nal Radius, cm	. N/A		
10. Height of \	Vater Level Above Rim	of Test Basin, i	n inches:					
A A	ut the Beginning of Eacl Not the End of Each Test	h Test Interval, H Interval, H2	H1 5.0	0 5				
11. Rate of W	ater Level Drop (Add ad	dditional lines if r	needed):					
	Time, Start of Test Interval, T1	Time End of Interval 1	Test Lengt 2 Interval,	th of Test , T, Minutes	5			
			9	2.00				
			9	6.00				
-			9	2.00	-			
12. Calculation	n of Permeability:	K, (in/hr) = 60	min/hr x r2/R2 x L	(in)/T(min)	x ln (H1/H2)	T=	93.33	
k	(in/hr) = 0.12	Cla	ssification:	К0				
13. Defects in	the Sample (Check ap	propriate items):						
-	None							
-	Soil/Tube Co	ntactl	_arge Gravel		_ Large Roots	8		
-	Dry Soil	Smea	ring	Compac	ction			
-	Other - Speci	fy						

Sample ID:       Profile Pit No:      SPP.3       Sample No:      I	Tube Permeameter Test Data									Job Number: GJ2117698.000
COUNTY/MUNICIPALITY <u>Franklin Twp, Somerset Co</u> BLOCK <u>LOT</u> 1. Test Number <u>1</u> Replicate (letter) <u>B</u> Date Collected <u>246/2021</u> 2. Material Testet: <u>Fill</u> <u>Test in Native Soll</u> 3. Type of Sample: <u>X</u> Undisturbed <u>Disturbed</u> 4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm <u>3.25</u> 5. Bulk Density Determination (Disturbed Samples Only): N/A 6. Sample Volume (1 x 2.54 cm./inch x 3.14R2), cc. <u>94.07</u> 7. Sample Volume (1 x 2.54 cm./inch x 3.14R2), cc. <u>94.07</u> 8. Bulk Density Colleme (1 x 2.54 cm./inch x 3.14R2), cc. <u>94.07</u> 8. Bulk Density Colleme (1 x 2.54 cm./inch x 3.14R2), cc. <u>94.07</u> 8. Bulk Density Colleme (1 x 2.54 cm./inch x 3.14R2), cc. <u>94.07</u> 9. Standpipe Used: <u>X</u> No <u>Yes</u> , Indicate Internal Radius, cm. N/A 10. Height of Water Level Above Rim of Test Basin, in inches: At the Enginning of Test Basin, in inches: At the Enginning of Test Basin, in inches: At the Enginning of Test Basin, in inches: Time. Stant of Test Interval, 11 <u>5.00</u> 4. Time. Stant of Test Interval, 11 <u>5.00</u> 11. Rate of Water Level Drop (Add additional lines if needed): Time. Stant of Test Interval, 12 <u>4.99</u> 12. Calculation of Permeability: K, (in/tr) = 60 min/tr x 12/R2 x L(in)/T(min) x in (H1/H2) T = <u>240.00</u> K (in/tr) = <u>0.00</u> <b>Classification: K0</b> 13. Defects in the Sample (Check appropriate Items): <u>—</u> None <u>—</u> Soli/Tube Contact _Large Gravel _Large Roots <u>—</u> Soli/Tube Contact _Large Gravel _Large Roots <u>—</u> Dy SoilsmearingCompaction Other - Specify	Sample ID:	Profile P	it No.:	SPP-3	Sampl	le No.:	T-1	Depth:	3.0'	Client: Safstor Real Estate Co, LLC
1. Test Number       1       Replicate (letter)       8       Date Collected       2/6/2021         2. Material Testest:	COUNTY/MUN		Franklir	n Twp, Somers	et Co	BLOCK		LOT		-
2. Material Tested: Fill   3. Type of Sample: X   4. Sample Dimensions: Inside Radius of Sample Tube, R, In cm   1.91   2. Bulk Density Determination (Disturbed Samples Only):   6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams   0.00   7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc.   9. Standpipe Used:   X   No   —	1. Test Number	r <u>-</u>	1	Replicate (let	ter)	В	Date Coll	ected	2/6/2021	-
3. Type of Sample:       X       Undisturbed       Disturbed         4. Sample Dimensions:       Inside Radius of Sample Tube, R, in cm       1.91         5. Bulk Density Determination (Disturbed Samples Only): NA       6.       Sample Weight (WL Tube Containing Sample W. of Empty Tube), grams       0.00       WL of Tube Containing Sample         7. Sample Volume (L x 2.54 cm./nch x 3.14R2), cc.       0       > 1.2         9. Standpipe Used:       X       No       Yes, Indicate Internal Radius, cm.       N/A         10. Height of Water Level Above Rm of Test Basin, in inches:       X       No       4.99         11. Height of Water Level Drop (Add additional lines if needod):       Time, Start of Test       Interval, T       5.00         12. Calculation of Permeability:       K. (in/hr) = 60 min/hr x r2/R2 x L(in)T(min) x ln (H1/H2)       T =       240.00         13. Defects in the Sample (Check appropriate items):       K0       K(in/hr) =       0       KI         13. Defects in the Sample Check appropriate items):	2. Material Tes	sted:		Fill		Test in N	ative Soil			
<ul> <li>4. Sample Dimensions: hade Radius of Sample Tube, R, in om 191 Length of Sample L, in inches</li> <li>5. Bulk Denskly Determination (Disturbed Samples Only): N/A</li> <li>6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams</li> <li>0.00</li> <li>94.07</li> <li>7. Sample Volume (L x 2.54 cm./mch x 3.14R2), cc.</li> <li>94.07</li> <li>8. Bulk Denskly (Sample Wt./Sample Volume), grams/cc.</li> <li>0.0</li> <li>&gt; 1.2</li> <li>9. Standpipe Used: XNO</li> <li>Yes, Indicate Internal Radius, cm. N/A</li> <li>10. Height of Water Level Above Rim of Test Basin, in inches:</li> <li>At the Beginning of Each Test Interval, H1</li> <li><u>5.00</u></li> <li>At the End of Each Test Interval, H2</li> <li><u>10.00</u></li> <li>11. Rate of Water Level Drop (Add additional lines if needed):</li> <li>12. Calculation of Permeability: K, (inhr) = 60 minhr x r2/R2 x L(in)T(min) x in (H1/H2) T= 240.00</li> <li>K (inhr) =000</li> <li>Classification: K0</li> <li>13. Defects in the Sample (Check appropriate items):</li> <li>None</li> <li>None</li> <li>Soil/Tube ContaitLarge GravelLarge Roots</li> <li>Or yoliSmarringCompaction</li> <li>OtherCompaction</li> <li>OtherCompaction</li> <li>None</li> </ul>	3. Type of San	nple:	Х	Undisturbed			Disturbed			
<ul> <li>5. Bulk Density Determination (Disturbed Samples Only): N/A</li> <li>6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams0.00</li></ul>	4. Sample Dim	ensions:		Inside Radius Length of Sar	of Sam nple, L,	ple Tube, F in inches	R, in cm	1.91 3.25		
6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams 0.00 Wt. of Tube Containing Sample Wt. of Empty Tube)   7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 94.07   8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0   > 1.2   9. Standpipe Used: X   At the Beginning of Each Test Interval, H1 5.00   At the End of Each Test Interval, H2 5.00   At the End of Each Test Interval, H2 4.99   11. Rate of Water Level Drop (Add additional lines if needed):   Time, Start of Test Interval T   Interval, T1 Time End of Test   Interval, T. 240.00   Interval, T Interval, T, Minutes   12. Calculation of Permeability: K (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x In (H1/H2) T = 240.00 13. Defects in the Sample (Check appropriate items):	5. Bulk Density	y Determinat	ion (Disturt	oed Samples C	Only): N	I/A				
1. Sample Vullar (X 2.54 clininicit X 3.4N2), cc.  2. add  2.	6. Sample Wei	ight (Wt. Tub	e Containii	ng Sample-Wt	of Emp	ty Tube), g	rams	0.00		Wt. of Tube Containing Sample Wt. of Empty Tube
2. Sub Density (Dample VicUlample VicUlample VicUlample, granific  2. Standpipe Used:	8 Bulk Density	uiile (L X 2.5	t /Sample \	(olume) gram	elec			94.07	>12	
0. Height of Water Level Above Rim of Test Basin, in inches:         At the Beginning of Each Test Interval, H1       5.00 	9 Standnine I	lsed.	x	No	5/00.	Yes Ind	icate Intern	al Radius, cr	n N/A	
At the Beginning of Each Test Interval, H15.00   At the End of Each Test Interval, H25.00   11. Rate of Water Level Drop (Add additional lines if needed):   Time, Start of Test Interval T2 Interval, T, Minutes	10 Height of V	Vater Level 4	Above Rim	of Test Basin	in inche	<u>-</u> 100, ind		arradido, or		
Time, Start of Test Interval, T1       Time End of Test Interval, T, Minutes         Interval, T1       Interval T2         Interval, T, Minutes         Image: Start of Test Interval, T1         Interval, T1         Interval, T, Minutes         Image: Start of Test Interval, T1         Interval, T2         Interval, T, Minutes         Image: Start of Test Interval, T1         Interval, T2         Interval, T, Minutes         Image: Start of Test Interval, T2         Image: Start of Test Interval, T1         Image: Start of Test Interval, T1         Image: Start of Test Interval, T1         Image: Start of Test Interval, T1, Minutes         Image: Start of Test Interval, T1, Minutes         Image: Start of Test Interval, T1, Minutes         Image: Start of Test Interval, T2         Image: Start of Test Interval, T1, Minutes         Image: Start of Test Interval, T2         Image: Start of Test Interval, T2         Image: Start of Test Interval, T2	A A	t the Beginn t the End of	ing of Each Each Test	Test Interval, Interval, H2	H1	<u>5.00</u> 4.99	<u>0</u> 9			
240.00         1         1         1         1         1         1         1         1         1         1         1         1         1          1	11. Rate of Wa	ater Level Dr Time, Stari Interv	op (Add ad t of Test al, T1	Time End o Interval	needed of Test T2	): Lengtl Interval,	h of Test T, Minutes			
12. Calculation of Permeability:       K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2)       T = 240.00         K (in/hr) =       0.00       Classification:       K0         13. Defects in the Sample (Check appropriate items):						24	10.00			
<ul> <li>12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T = 240.00</li> <li>K (in/hr) = 0.00 Classification: K0</li> <li>13. Defects in the Sample (Check appropriate items): <ul> <li>None</li> <li>None</li> <li>Soil/Tube ContactLarge GravelLarge Roots</li> <li>Dry SoilSmearingCompaction</li> <li>Other - Specify</li> </ul> </li> </ul>										
K (in/nr) =       0.00       Classification: Ku         13. Defects in the Sample (Check appropriate items):	12. Calculation	n of Permeat	bility:	K, (in/hr) = 60	) min/hr :	x r2/R2 x L	(in)/T(min)	x In (H1/H2)	T= _	240.00
None  Soil/Tube Contact Large Gravel Large Roots  Dry Soil Smearing Compaction  Other - Specify	12 Defects in	$(\ln/nr) =$	(Chook app			ition:	NU			
Soil/Tube ContactLarge Gravel Large Roots Dry SoilSmearing Compaction Other - Specify	15. Delects III	ule Gample	None		).					
Dry SoilSmearing Compaction Other - Specify	-	Soi	il/Tube Cor	itact	Large G	Fravel		Large Root	s	
Other - Specify	-	00	/ Soil	Sme	arina		Compac			
	-	Oth	ner - Specif	0o						

	Tu	be Permea	neter Test Da	Job Number: GJ2117698.000				
Sample ID:	Profile Pit No.:	SPP-4	Sample No.:	T-1	Depth:	2.0'	Client: Safstor Real Estate Co, LLC	
COUNTY/MUN	IICIPALITY Frankli	n Twp, Somer	set Co BLOC	<	LOT			
1. Test Numbe	r <u>1</u>	Replicate (le	tter) A	Date Co	llected	2/6/2021		
2. Material Te	sted:	Fill	Test ir	Native Soil				
3. Type of Sar	nple: X	Undisturbed		Disturbe	d			
4. Sample Din	nensions:	Inside Radiu Length of Sa	s of Sample Tube mple, L, in inche	e, R, in cm s	1.91 3.50			
5. Bulk Densit	y Determination (Distur	bed Samples (	Only): N/A					
6. Sample We	ight (Wt. Tube Containi	ing Sample-Wi	. of Empty Tube)	, grams	0.00		Wt. of Tube Containing Sample Wt. of Empty Tube	
7. Sample Vol		x 3.14R2), cc.	,		101.30			
8. Buik Densit	y (Sample Wt./Sample	volume), gram	IS/CC.			> 1.2		
9. Standpipe l	Jsed: X	_No	Yes, I	ndicate Interi	nal Radius, cm	1. N/A		
10. Height of \	Vater Level Above Rim	of Test Basin,	in inches:					
A A	at the Beginning of Eacl At the End of Each Test	h Test Interval Interval, H2	H1 5	5.00 4.75				
11. Rate of W	ater Level Drop (Add ad	dditional lines i	f needed):					
	Time, Start of Test Interval, T1	Time End Interva	of Test Ler T2 Interv	ngth of Test al, T, Minutes	s			
				72.00				
				73.00				
-				69.00				
12. Calculation	n of Permeability:	K, (in/hr) = 6	) min/hr x r2/R2 :	x L(in)/T(min)	) x ln (H1/H2)	T=	71.33	
٢	C (in/hr) = 0.15	_ c	lassification:	К0				
13. Defects in	the Sample (Check ap	propriate items	»):					
-	None							
-	Soil/Tube Co	ntact	_Large Gravel _		Large Root	S		
-	Dry Soil	Sme	aring	Compa	ction			
-	Other - Speci	fy						

	Tu	be Permear	Job Number: GJ2117698.000				
Sample ID:	Profile Pit No.:	SPP-4	Sample No.	.: <u>T-1</u>	Depth:	2.0'	Client: Safstor Real Estate Co, LLC
COUNTY/MUI	NICIPALITY Frankli	n Twp, Somers	set Co BLO	CK	LOT		
1. Test Numbe	er <u>1</u>	Replicate (let	ter)	B Date Coll	lected	2/6/2021	
2. Material Te	sted:	_Fill	Tes	t in Native Soil			
3. Type of Sa	mple: X	Undisturbed		Disturbed	d		
4. Sample Dir	nensions:	Inside Radius Length of Sar	s of Sample Tu mple, L, in incl	ube, R, in cm hes	1.91 3.25		
5. Bulk Densi	ty Determination (Distur	bed Samples (	Only): N/A				
6. Sample We	eight (Wt. Tube Containi	ing Sample-Wt	. of Empty Tub	oe), grams	0.00		Wt. of Tube Containing Sample Wt. of Empty Tube
7. Sample vo		X 3.14RZ), CC.	- /		94.07		
8. Buik Densi	ty (Sample vvt./Sample	volume), gram	S/CC.	I	<u> </u>	> 1.2	
9. Standpipe			Yes	, indicate intern	ial Radius, cr	n. N/A	
TU. Height of			in inches:	4.50			
	At the End of Each Test	Interval, H2	HI	4.50			
11. Rate of W	ater Level Drop (Add ad	dditional lines if	needed):				
	Time, Start of Test Interval, T1	Time End o Interval	of Test L T2 Inte	∟ength of Test erval, T, Minutes	5		
[				240.00			
_					_		
_					_		
12. Calculatio	n of Permeability:	K, (in/hr) = 60	) min/hr x r2/R	2 x L(in)/T(min)	x In (H1/H2)	T=	240.00
I	< (in/hr) = 0.00	C	lassification:	К0			
13. Defects in	the Sample (Check ap	propriate items	):				
-	None						
	Soil/Tube Co	ntact	Large Gravel		_ Large Roo	ts	
	Dry Soil	Sme	aring	Compac	ction		
	Other - Speci	fy					

Tube Permeameter Test Data									Job Number: GJ2117698.000
Sample ID:	Profile P	it No.:	SPP-5	Sampl	le No.:	T-1	Depth:	3.0'	Client: Safstor Real Estate Co, LLC
COUNTY/MUN		Franklir	n Twp, Somers	et Co	BLOCK		LOT		-
1. Test Number	r <u>–</u>	1	Replicate (let	ter)	Α	Date Coll	ected	2/6/2021	_
2. Material Tes	sted:		Fill		Test in N	ative Soil			
3. Type of San	nple:	Х	Undisturbed			Disturbed	I		
4. Sample Dim	ensions:		Inside Radius Length of Sar	of Sam nple, L,	ple Tube, F in inches	R, in cm	1.91 3.50		
5. Bulk Density	y Determinati	ion (Disturt	ed Samples C	Only): N	I/A				
6. Sample Wei	ight (Wt. Tub	e Containii	ng Sample-Wt.	of Emp	ty Tube), g	rams	0.00		Wt. of Tube Containing Sample Wt. of Empty Tube
8 Bulk Density	(Sample W	t /Sample \	(olume) gram	elec			0	>12	
9 Standnine I	lsed.	x	No	5/00.	Yes Ind	icate Intern	al Radius, cm	> 1.2	
10 Height of V	Vater Level A	hove Rim	of Test Basin	in inche	<u>-</u> 100, ind				
A	t the Beginni t the End of ∣	ing of Each Each Test	i Test Interval, Interval, H2	H1	<u>5.00</u> 4.99	<u>0</u> 9			
11. Rate of Wa	ater Level Dro	op (Add ad	ditional lines if	needed	):				
	Time, Start Interva	t of Test al, T1	Time End o Interval	of Test T2	Lengtl Interval,	h of Test T, Minutes			
F					24	40.00			
_							-		
_							-		
12. Calculation	n of Permeab	ility:	K, (in/hr) = 60	) min/hr :	x r2/R2 x L	(in)/T(min)	 x In (H1/H2)	T=	240.00
К	(in/hr) =	0.00	CI	assifica	tion:	К0			
13. Defects in	the Sample (	Check app	ropriate items	):					
_	11	None							
-	Soi	I/Tube Cor	itact	Large G	Gravel		Large Root	S	
_	Dry	Soil	Smea	aring		Compac	tion		
-	Oth	ner - Specif	у						

Sample ID:       Profile Pit No:      SPP-5       Sample No:      I			Tut	be Permean	neter T	Job Number: GJ2117698.000				
COUNTY/MUNICIPALITYFranklin Twp, Somerset CoBLOCKLOT	Sample ID:	Profile P	it No.:	SPP-5	Sampl	le No.:	T-1	Depth:	3.0'	Client: Safstor Real Estate Co, LLC
1. Test Number       1       Replicate (letter)       B       Date Collected       2/0/2021         2. Material Tested:      FII      Test in Native Soll         3. Type of Sample:       X       Undekutbed      Disturbed         4. Sample Dimensions:       Inside Radius of Sample Tube, R, In cm      125         5. Buk Density Determination (Disturbed Samples Only: NA	COUNTY/MUN		Franklir	n Twp, Somers	et Co	BLOCK		LOT		-
2. Material Tested:FillTest in Native Soil 3. Type of Sample:NUndisturbedDisturbed 4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm225 5. Buik Density Determination (Disturbed Samples Only): N/A 6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams000Vt. of Tube Containing Sample 7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc65.12 8. Buik Density (Sample Volume), gramsicc0 > 1.2 9. Standpipe Used:NoYes, Indicate Internal Radius, cm. N/A 10. Height of Water Level Above Rim of Test Basin, in inches:         At the Beginning of Each Test Interval, H1	1. Test Number	r <u>-</u>	1	Replicate (let	ter)	В	Date Coll	ected	2/6/2021	-
3. Type of Sample:       X       Undisturbed         4. Sample Dimensions:       Inside Raduus of Sample Tube, R, In cm       1.91         Length of Sample, L, In Inches       2.25         5. Bulk Density Determination (Disturbed Samples Only): N/A         6. Sample Weight (WL Tube Containing Sample-WL of Empty Tube), grams       0.00         7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc.       0       > 1.2         9. Standpipe Used:       X       No       Yes, Indicate Internal Radius, cm.       N/A         10. Height of Water Level Above Rm of Test Basin, In Inches:       At the Enginning of Each Test Interval, H1       5.00       At the End of Each Test Interval, H2       4.99         11. Rate of Water Level Above Rm of Test Basin, In Inches:       Interval, T, Minutes       Interval, T, Minutes         12. Catcutation of Permeability:       K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x in (H1/H2)       T = 240.00         12. Catcutation of Permeability:       K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x in (H1/H2)       T = 240.00         13. Defects in the Sample Check appropriate items;       K       I.arge Gravel       Large Gravel        None	2. Material Tes	sted:		Fill		Test in N	ative Soil			
<ul> <li>4. Sample Dimensions: Index Radius of Sample Tube, R, in cm 191 Length of Sample L, in inches</li> <li>5. Bulk Density Determination (Disturbed Samples Only): N/A</li> <li>6. Sample Weight (WI. Tube Containing Sample-WL of Empty Tube), grams 0.00 WL of Tube Containing Sample - WL of Empty Tube).</li> <li>7. Sample Volume (L x 2.54 cm./nch x 3.14R2), cc. 655.12</li> <li>8. Bulk Density (Sample WL/Sample Volume), grams/cc. 0 &gt; 1.2</li> <li>9. Standpipe Used: X not rest Data Data Data Data Data Data Data Da</li></ul>	3. Type of San	nple:	Х	Undisturbed			Disturbed	1		
<ul> <li>5. Bulk Density Determination (Disturbed Samples Only): N/A</li> <li>6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams0.00</li></ul>	4. Sample Dim	ensions:		Inside Radius Length of Sar	of Sam nple, L,	ple Tube, F in inches	R, in cm	1.91 2.25		
6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams 0.00 Wt. of Tube Containing Sample Wt. of Empty Tube)   7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 65.12   8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0   > 1.2   9. Standpipe Used: X   At the Beginning of Each Test Interval, H1 5.00   At the Beginning of Each Test Interval, H2 4.99   11. Rate of Water Level Drop (Add additional lines if needed):   Time, Start of Test   Interval, T1   Interval, T2   Interval, T, Minutes   12. Calculation of Permeability: K (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x in (H1/H2) T = _240.00 13. Defects in the Sample (Check appropriate items):	5. Bulk Density	y Determinat	ion (Disturt	oed Samples C	Only): N	I/A				
1. Sample Vullar (X 2.54 clininicit X 3.14K2), cc.      0, 12	6. Sample Wei	ight (Wt. Tub	e Containir	ng Sample-Wt	of Emp	ty Tube), g	rams	0.00		Wt. of Tube Containing Sample         Wt. of Empty Tube
9. Standpipe Used:	8 Bulk Density	uiiie (E x 2.0	4 cm./inch	(olume) gram	elee			00.12	<u>-</u>	
0. Height of Water Level Above Rim of Test Basin, in inches:         At the Beginning of Each Test Interval, H1       5.00 4. the End of Each Test Interval, H2         11. Rate of Water Level Drop (Add additional lines if needed):         Time, Start of Test       Time End of Test         Interval, T1       Interval, T2         Length of State       240.00         Interval, T1       Interval, T2         Interval, T2       Interval, T, Minutes         Image: State of Permeability:       K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2)       T = _240.00         K (in/hr) =	9 Standnine I	y (Sample W	x	No	5/00.	Yes Ind	icate Intern	al Radius, cr	n N/A	
At the Beginning of Each Test Interval, H1 $\{4.99}$ 11. Rate of Water Level Drop (Add additional lines if needed): Time, Start of Test Interval, T2 Length of Test Interval, T, Minutes 1000000000000000000000000000000000000	10 Height of V	Vater Level A	Above Rim	of Test Basin	in inche	<u>-</u> 100, ind				
11. Rate of Water Level Drop (Add additional lines if needed):         Time, Start of Test Interval, T1       Time End of Test Interval, T, Minutes         11. Rate of Water Level Drop (Add additional lines if needed):         11. Rate of Water Level Drop (Add additional lines if needed):         11. Rate of Water Level Drop (Add additional lines if needed):         11. Rate of Water Level Drop (Add additional lines if needed):         11. Rate of Water Level Drop (Add additional lines if needed):         11. Rate of Water Level Drop (Add additional lines if needed):         11. Interval, T1       Time End of Test Interval, T, Minutes         12. Calculation of Permeability:       K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2)       T =240.00	A	t the Beginn t the End of	ing of Each Each Test	i Test Interval, Interval, H2	H1	5.00	<u>0</u> 9			
240.00         1         1         1         1         1         1         1         1         1         1         1         1         1          1	11. Rate of Wa	ater Level Dr Time, Star Interv	op (Add ad t of Test al, T1	ditional lines if Time End c Interval	needed of Test T2	): Lengt Interval,	h of Test T, Minutes	i		
12. Calculation of Permeability:       K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2)       T = 240.00         K (in/hr) =       0.00       Classification:       K0         13. Defects in the Sample (Check appropriate items):	-					24	40.00			
K (in/hr) =0.00Classification:       K0         13. Defects in the Sample (Check appropriate items):      None        None      Large GravelLarge Roots        Dry SoilSmearingCompaction      Compaction        Other - Specify      Compaction	12 Calculation	of Dermeck	oilit <i>u:</i>	K (in/hr) = 60	min/hr	x r2/P2 x l	(in)/T(min)	x lp (H1/H2)	т-	240.00
13. Defects in the Sample (Check appropriate items):        None        Soil/Tube ContactLarge GravelLarge Roots        Dry SoilSmearingCompaction        Other - Specify		(in/br) -	0.00	r, (iii/iii) – oc	assifica	tion:	(۱۱۱۱) . در ۱۱۱۱)	x III (H I/HZ)		
None     Soil/Tube ContactLarge GravelLarge Roots     Dry SoilSmearingCompaction     Other - Specify	13 Defects in	the Sample	(Check and	oropriate items			110			
Soil/Tube ContactLarge GravelLarge RootsDry SoilSmearingCompactionOther - Specify		and campio	None							
Dry Soil Smearing Compaction Other - Specify	_	So	il/Tube Cor	ntact	Large G	Gravel		Large Roo	ts	
Other - Specify	_	Drv	y Soil	Smea	aring		Compac	tion		
	_	Otł	ner - Specif	 У						



# **APPENDIX C Basin Flood Test Data**



### WHITESTONE A S S O C I A T E S. I N C.

# **BASIN FLOOD TEST DATA**

Client:	SAFStor Real Estate Co, LLC	Basin No.:	SPP-3A	
Project:	Proposed Self-Storage Facility	Date:	2/8/21 - 2/10/21	
Location:	471 Elizabeth Ave., Franklin Twp., NJ	Weather:	Overcast, Light	Snow, 20-35°F
File No.	GJ2117698.000	Field Engineer:	C. Naugle	
Surf. Elev.	± 77.0	Test Depth/Elev.:	5.0	72.0

			Water Level Reading				
Reading No.	Date	Time	Depth (inches)	Water Surface (IBGS)	Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
1	2/8/2021	1:15 PM	12.0	42.0			
2	2/8/2021	3:15 PM	13.0	41.0	1.0	2.0	
3	2/9/2021	8:15 AM	14.0	40.0	2.0	19.0	
4	2/9/2021	10:15 AM	14.0	40.0	2.0	21.0	
5	2/9/2021	12:15 PM	15.0	39.0	3.0	23.0	
6	2/9/2021	1:15 PM	15.0	39.0	3.0	24.0	



### WHITESTONE A S S O C I A T E S. I N C.

# **BASIN FLOOD TEST DATA**

Client:	SAFStor Real Estate Co, LLC	Basin No.:	SPP-4A	
Project:	Proposed Self-Storage Facility	Date:	2/8/21 - 2/10/2 <sup>-</sup>	
Location:	471 Elizabeth Ave., Franklin Twp., NJ	Weather:	Overcast, Light	Snow, 20-35°F
File No.	GJ2117698.000	Field Engineer:	C. Naugle	
Surf. Elev.	± 75.0	Test Depth/Elev.:	4.0	71.0

			Water Level Reading				
Reading No.	Date	Time	Depth (inches)	Water Surface (IBGS)	Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
1	2/8/2021	1:15 PM	12.0	32.0			
2	2/8/2021	3:15 PM	12.0	32.0	0.0	2.0	
3	2/9/2021	8:15 AM	15.5	28.5	3.5	19.0	
4	2/9/2021	10:15 AM	15.5	28.5	3.5	21.0	
5	2/9/2021	12:15 PM	15.5	28.5	3.5	23.0	
6	2/9/2021	1:15 PM	15.5	28.5	3.5	24.0	



### WHITESTONE A S S O C I A T E S. I N C.

# **BASIN FLOOD TEST DATA**

Client:	SAFStor Real Estate Co, LLC	Basin No.:	SPP-5A	
Project:	Proposed Self-Storage Facility	Date:	2/8/21 - 2/10/21	
Location:	471 Elizabeth Ave., Franklin Twp., NJ	Weather:	Overcast, Light Snow, 20-35°	'F
File No.	GJ2117698.000	Field Engineer:	C. Naugle	
Surf. Elev.	± 75.0	Test Depth/Elev.:	4.0 71.0	

			Water Level Reading				
Reading No.	Date	Time	Depth (inches)	Water Surface (IBGS)	Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
1	2/8/2021	1:15 PM	12.0	35.0			
2	2/8/2021	3:15 PM	12.0	35.0	0.0	2.0	
3	2/9/2021	8:15 AM	17.0	30.0	5.0	19.0	
4	2/9/2021	10:15 AM	17.0	30.0	5.0	21.0	
5	2/9/2021	12:15 PM	17.5	29.5	5.5	23.0	
6	2/9/2021	1:15 PM	18.0	29.0	6.0	24.0	



# APPENDIX D Supplemental Information (USCS, Terms & Symbols)



# **UNIFIED SOIL CLASSIFICATION SYSTEM**

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
	GRAVEL AND	CLEAN GRAVELS	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GRAVELLY SOILS	(LITTLE OR NO FINES)	GP	POORLY-GRADED GRAVELS, GRAVEL- SAND MIXTURES, LITTLE OR NO FINES
COARSE GRAINED SOILS	MORE THAN 50% OF COARSE FRACTION	GRAVELS WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	RETAINED ON NO. 4 SIEVE	(APPRECIABLE AMOUNT OF FINES)	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY	CLEAN SAND (LITTLE OR NO	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SOILS	FINES)	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN	MORE THAN 50% OF	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	COARSE FRACTION PASSING NO. 4 SIEVE		SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE	SILTS AND CLAYS	LIQUID LIMITS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
SOILS			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF			МН	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
MATERIAL IS SMALLER THAN NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMITS <u>GREATER</u> THAN 50	СН	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
SIZE			ОН	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
ŀ	HIGHLY ORGANIC SOILS		PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

#### **GRADATION\***

COMPACTNESS\* Sand and/or Gravel

#### 

CONSISTENCY\* Clay and/or Silt

RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT

\* VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.

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CHALFONT, PA	
215.712.2700	

Southborough, MA 508.485.0755

# Other Office Locations:

ROCKY HILL, CT 860.726.7889 WALL, NJ 732.592.2101



# **GEOTECHNICAL TERMS AND SYMBOLS**

### SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

### SOIL PROPERTY SYMBOLS

- N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
- Qu: Unconfined compressive strength, TSF.
- Qp: Penetrometer value, unconfined compressive strength, TSF.
- Mc: Moisture content, %.
- LL: Liquid limit, %.
- PI: Plasticity index, %.
- δd: Natural dry density, PCF.
- •: Apparent groundwater level at time noted after completion of boring.

#### DRILLING AND SAMPLING SYMBOLS

- NE: Not Encountered (Groundwater was not encountered).
- SS: Split-Spoon 1 <sup>3</sup>/<sub>8</sub>" I.D., 2" O.D., except where noted.
- ST: Shelby Tube 3" O.D., except where noted.
- AU: Auger Sample.
- OB: Diamond Bit.
- CB: Carbide Bit
- WS: Washed Sample.

#### RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

<u>Term (Non-Co</u>	<u>hesive Soils)</u>		Standard Per	netratio	on Resistance
Very Loose Loose Medium Dense Dense Very Dense				0-4 4-10 10-3 30-5 Over	4 0 30 50 50
<u>Term (Cohesiv</u>	<u>e Soils)</u>	<u>Qu (TSF)</u>			
Very Soft Soft Firm (Medium) Stiff Very Stiff Hard		0 - 0.25 0.25 - 0.50 0.50 - 1.00 1.00 - 2.00 2.00 - 4.00 4.00+			
PARTICLE SI	ZE				
Boulders Cobbles Gravel	8 in.+ 8 in3 in. 3 in5mm	Coarse Sand Medium Sand Fine Sand	5mm-0.6mm 0.6mm-0.2mm 0.2mm-0.074mm	Silt Clay	0.074mm-0.005mm -0.005mm

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Other Office Locations:							
CHALFONT, PA	SOUTHBOROUGH, MA	ROCKY HILL, CT	WALL, NJ	PHILADELPHIA, PA			
215.712.2700	508.485.0755	860.726.7889	732.592.2101	215.848.2323			

# C. MAPS

- Aerial Map
- Soil Map
- + USGS
- HUC14 Location Map
- Flood Map
- Drainage Area Maps
  - Existing Drainage Area Map
  - Proposed Drainage Area Map
  - Inlet Drainage Area Map


### **Aerial Map**

Source: NearMaps

Date Access: 05/17/2021

## SafStor Real Estate CO, LLC

4/13/2021 NTS

471 Elizabeth Avenue Block 507.14; Lot 65.01	
BENJ# J200933	
Prepared by: CR	Date:
Checked by: KM	Scale:



		A CONTRACTOR	Site	
		KL H.		
		e i		CALL SE
1. 1. A.	14200	0.1.2	ART BEE	7
	al all and	PenB		
		THE REAL PROPERTY OF THE REAL PROPERTY OF	Salar -	Provide Compared Control And
		AND COL		
		ALCO SO		
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Map unit symbol PenB	Map unit name Penn silt loam, 2 to 6 percent slopes	Rating C	Acres in AOI 4.8	Percent of AOI 100.0%

#### **Soils Map**

Source: NRCS Web Soil Survey, 2012

Date Access: 05/17/2021

# SafStor Real Estate CO, LLC

471 Elizabeth Avenue	
Block 507.14; Lot 65.01	
BENJ# J200933	
Prepared by: CR	Date: 4/13/2021
Checked by: KM	Scale: NTS





## SafStor Real Estate CO, LLC

471 Elizabeth Avenue	
Block 507.14; Lot 65.01	
BENJ# J200933	
Prepared by: CR	Date: 4/13/2021
Checked by: KM	Scale: NTS

Township of Franklin, Somerset County, New Jersey

# **BOHLER**//



Source: NJ GeoWeb

Date Access: 05/17/2021

# SafStor Real Estate CO, LLC

471 Elizabeth Avenue		
Block 507.14; Lot 65.01		
BENJ# J200933		
Prepared by: CR	Date: 4/13/2021	
Checked by: KM	Scale: NTS	





#### **FEMA Flood Map**

Source: FEMA FIRM Map #34023C0043F, Date July 6, 2010

Date Access: 05/17/2021

# SafStor Real Estate CO, LLC

471 Elizabeth Avenue		
Block 507.14; Lot 65.01		
BENJ# J200933		
Prepared by: CR Date: 4/13/20		
Checked by: KM Scale: NTS		
BE Prepared by: CR Checked by: KM	ENJ# J200933 Date: 4/13/2021 Scale: NTS	

