

**PROJECT NARRATIVE  
and  
STORMWATER  
MANAGEMENT  
REPORT**

**For**

**Residences At Oaklawn Ave**

**Oaklawn Avenue  
Cranston, Rhode Island  
Assessor's Plat 17-3, Lot 670**

*prepared for:*

**Amalgamated Financial Equities I, LLC  
1414 Atwood Avenue  
Johnston, Rhode Island 02919**

*prepared by:*



**GAROFALO**

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**May 15, 2023  
(Revised: December 1, 2023)**

**PN 7006-00**



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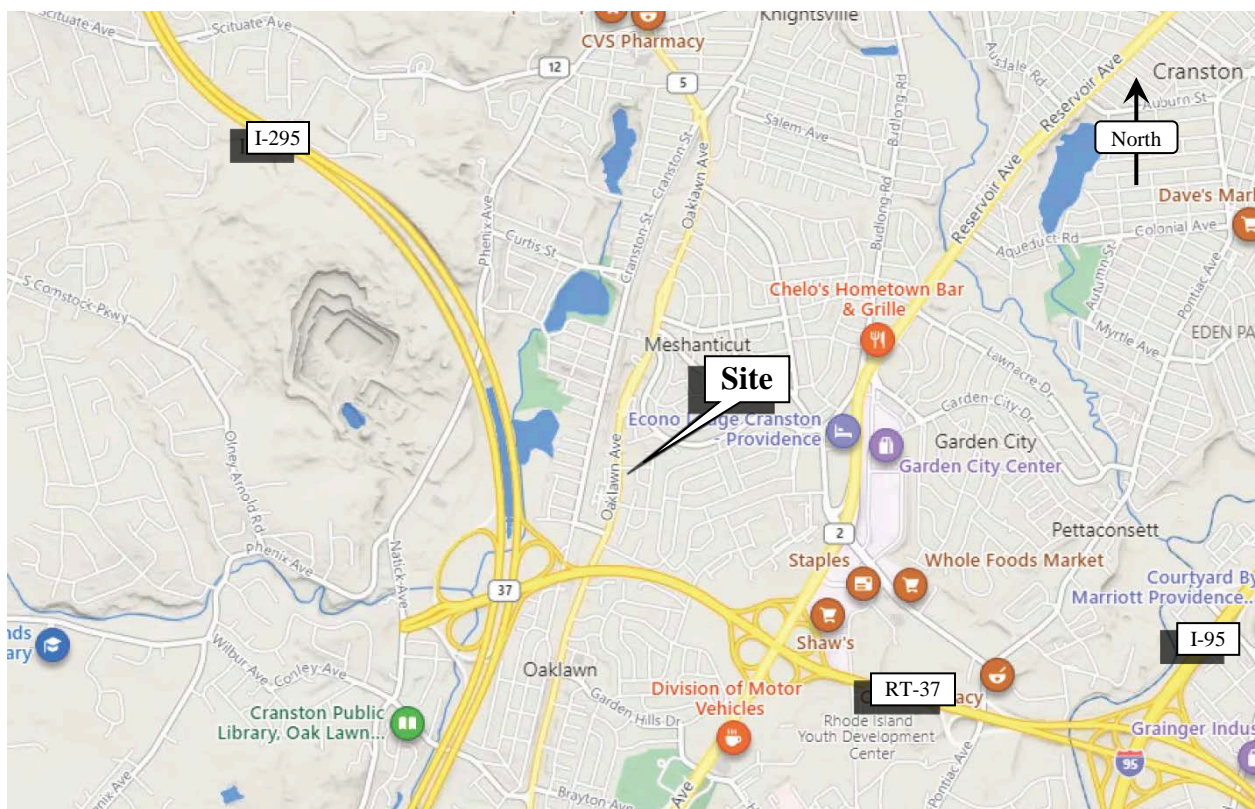
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## ***I. PROJECT SUMMARY***

Garofalo and Associates, Inc. has prepared this Project Narrative and Stormwater Management Report to outline drainage requirements for a proposed development at an undeveloped property along Oaklawn Avenue, and outline the calculations and methodology used to design a proposed stormwater management system to comply with the City of Cranston Stormwater Ordinance and the current edition of the *RI Stormwater Design and Installations Standards Manual (RISDISM)*.

The 0.80-acre property is contained within a single watershed and is situated along Oaklawn Avenue. The property is identified as the City of Cranston Tax Assessor’s Plat 17-3, Lot 670. Oaklawn Avenue abuts the site to the east, residential properties abut the site to the north and south, and the Washington Secondary Bike Path abuts the site to the west.



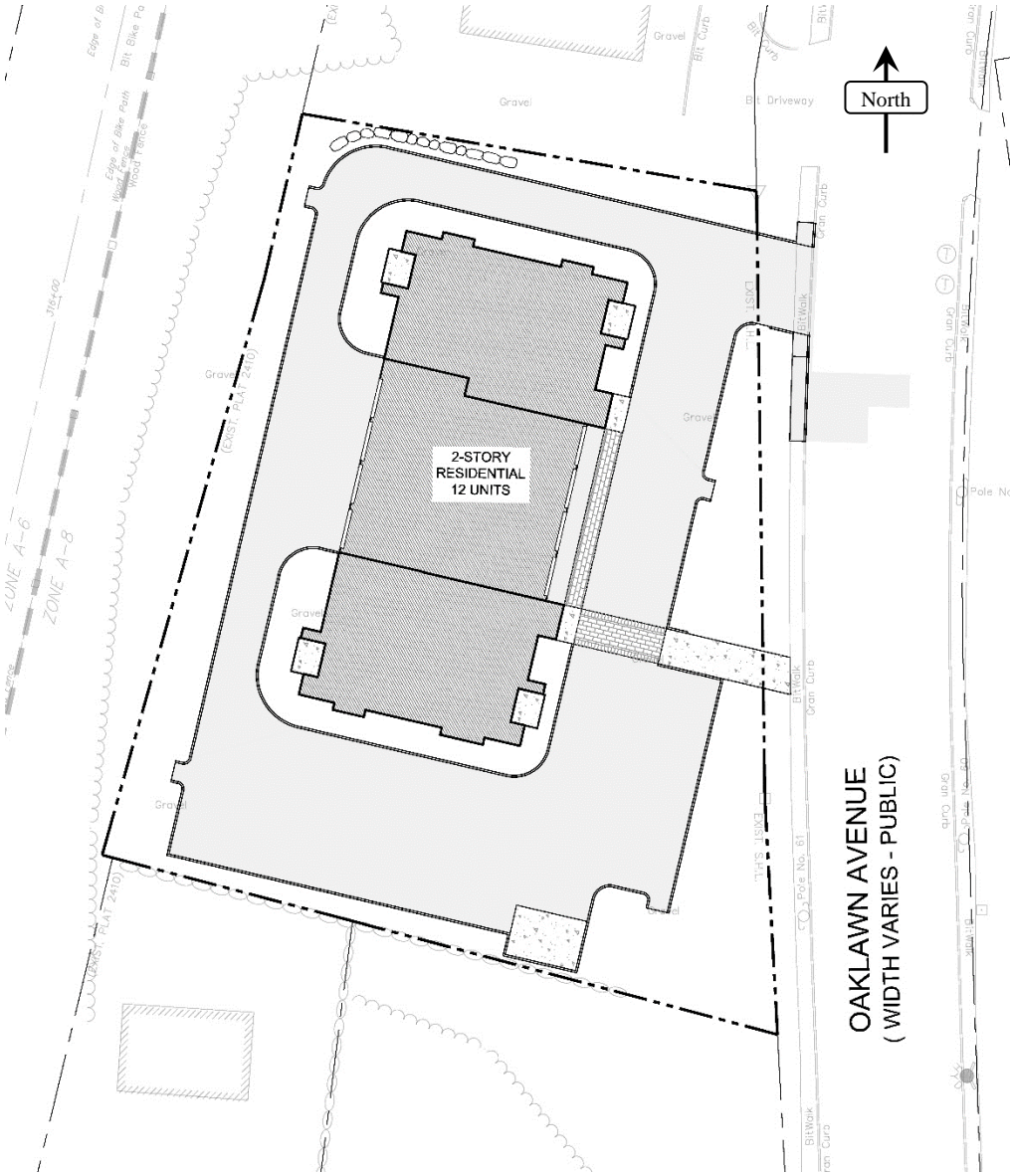
**Figure 1. Locus Map**

The proposed development primarily involves the construction of a two-story multi-unit residential building within the center of the site, as well as associated pedestrian walkways, landscaping, and other site



amenities. Access will be provided through a single entrance along Oaklawn Ave on the northern side of the property.

Stormwater treatment and runoff control facilities are proposed along the eastern and western sides of the property. The permanent stormwater management measures proposed will fully mitigate the impacts to stormwater runoff from the proposed project, and will comply with the City of Cranston Stormwater Ordinances and the Stormwater Management Standard and Performance Criteria of the RI Stormwater Design and Installation Standards Manual (RISDISM).



**Figure 2. Development Schematic**





## ***I. SITE CONDITIONS***

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### **2.1 Site Characteristics**

The site is located along Oaklawn Avenue within a residential district of Cranston, RI. The site is currently undeveloped and is entirely pervious. Stormwater generally flows west over mild grades toward the Washington Secondary Bike Path.



*Figure 3. Aerial Image*



## 2.2 Soils

The *Soil Survey of Rhode Island* prepared by the US Department of Agriculture, Soil Conservation Service depicts the underlying soils of the site to be comprised entirely of Merrimac-Urban land complex. The Hydrologic Soil Group classifications for Merrimac -Urban land complex is ‘A.’ Soil evaluations performed on-site are provided in Appendix D.

Map Unit Symbol	Map Unit Name	Hydrologic Soil Group
MU	Merrimac-Urban land complex	A

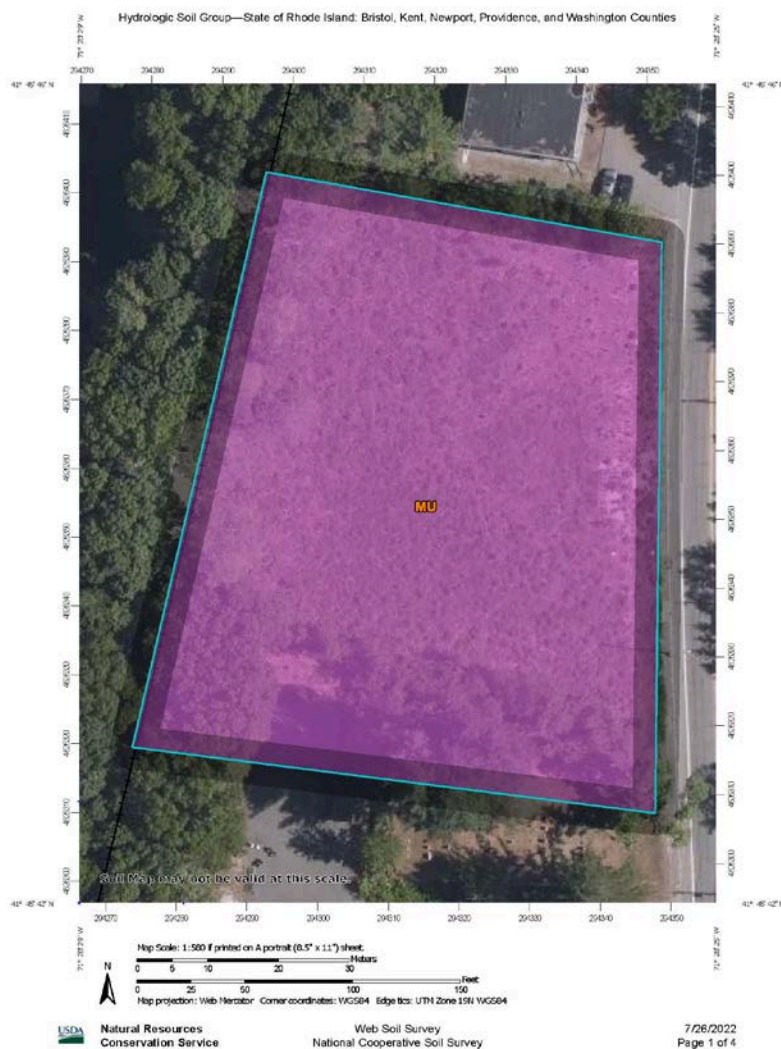


Figure 4. NRCS Soils Map





### 2.3 FEMA

The project area is located within Zone "X" (areas outside the 0.2% annual floodplain) as shown on F.E.M.A. Flood Insurance Rate Map for the City of Cranston, Providence County, Rhode Island, Community Panel No. 44007C0313H having an effective date of October 2, 2015.

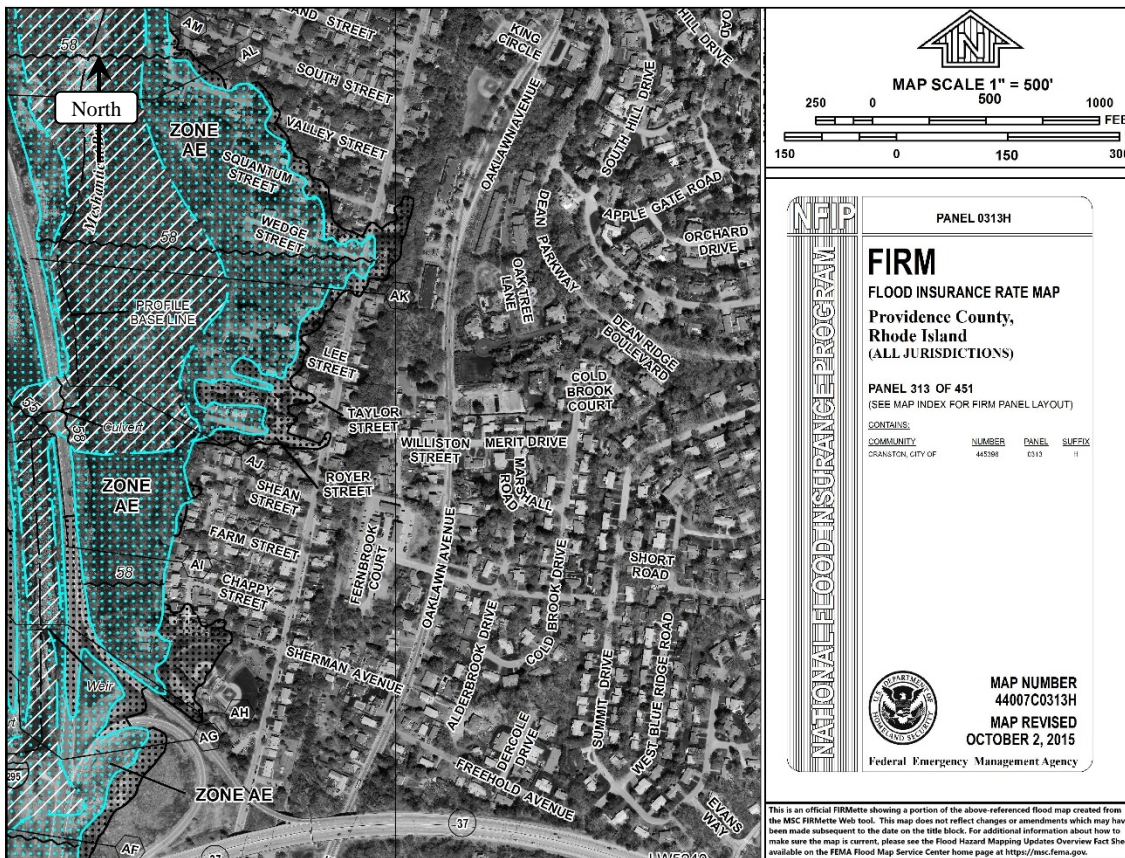


Figure 5. FEMA Flood Map

### 2.4 Natural Resource Inventory

The project site is not documented by the Rhode Island Natural Heritage Survey or the Rhode Island Department of Environmental Management (RIDEM) Geographic Information System (GIS) Mapping as being within a natural heritage area.



### ***III. DRAINAGE ANALYSIS***

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#### **3.1 Methodology**

The project's stormwater management system has been designed to mitigate the impacts of stormwater runoff generated by the proposed site and comply with the development standards and performance criteria of the City of Cranston and the RISDISM using low-impact development (LID) techniques and best management practices (BMP's). The runoff from the proposed development has been reviewed for impact using one design point representing an existing wooded area immediately west of the site. This wooded area lies between the site and the Washington Secondary Bike Path. A comparative pre-development vs. post-development hydrologic analysis was performed for the 1-, 2-, 10-, 25- and 100-year storm events utilizing HydroCAD software.

#### **3.2 Existing Conditions**

The existing conditions analysis for the project includes one (1) sub-watershed area to account for stormwater flow generated by the existing site.

*EWS-1:* This existing sub-watershed includes the entire existing property. The property is entirely pervious and is comprised of small shrubs and grassed areas. Stormwater primarily flows westerly and northerly across the site over mild grades. However, a large portion of the northerly flow enters a swale immediately north of the property that directs flow to the existing drainage system west of the property, which ultimately flows to the west. Small areas along the eastern and southern site perimeters also drain in small volumes east toward Oaklawn Avenue and abutting property immediately to the south, respectively. Therefore, the wooded area immediately west of the site is considered the design point for analysis.

#### **3.3 Proposed Conditions**

The project will maintain existing drainage patterns while addressing the requirements of the RISDISM. Specifically, the developed site will address water quality treatment and peak flow attenuation by directing stormwater flow into a series of surface and sub-surface BMPs. The proposed site conditions have been analyzed using five (5) sub-watersheds for a complete accounting of stormwater flow entering the proposed BMP systems and leaving the development.





*PWS-1A:* This sub-watershed includes the rooftop of the proposed residential building. This sub-watershed is entirely impervious. The proposed roof drain system will collect and convey stormwater into a subsurface infiltration system (BMP-1) located immediately west of the building.

*PWS-1B & 1C:* These proposed sub-watershed areas includes the northwestern and southwestern site areas, respectively. Together, these areas are 56-percent impervious. Stormwater flows over mild grades within these paved areas into a subsurface infiltration system (BMP-1) located immediately west of the building.

*PWS-2A & 2B:* These proposed sub-watershed areas include the northeastern and southeastern site areas, respectively. Together, these areas are 62-percent impervious. Stormwater flows over mild grades within these paved areas into paved waterways that discharge to the proposed bioretention basin (BMP-2). An overflow structure within BMP-3 discharges west and ties into BMP-1 (described above).

### 3.4 Runoff Summary

The following is a comparison summary of the peak discharge rates and total discharge volumes for the existing and proposed site. Runoff rates and volumes from the property toward Design Point 1 have been reduced during the 1-, 2-, 10-, 25- and 100-year storm events. See *Appendix A Checklist: Table 5-1 'Hydraulic Analysis Summary'* under separate cover.

	Peak Discharge Rate (cfs)				
	1-Year (Type III 24-hour)	2-Year (Type III 24-hour)	10-Year (Type III 24-hour)	25-Year (Type III 24-hour)	100-Year (Type III 24-hour)
<b>Design Point 1</b>					
Existing Runoff	0.00	0.00	0.02	0.15	0.84
Proposed Runoff	0.00	0.00	0.00	0.00	0.00
$\Delta Q$	-0.00	-0.00	-0.02	-0.15	-0.84

	Total Discharge Volume (cf)				
	1-Year (Type III 24-hour)	2-Year (Type III 24-hour)	10-Year (Type III 24-hour)	25-Year (Type III 24-hour)	100-Year (Type III 24-hour)
<b>Design Point 1</b>					
Existing Runoff	0	5	522	1,374	4,237
Proposed Runoff	0	0	0	0	0
$\Delta Q$	-0	-5	-522	-1,374	-4,237

*Table 1. Watershed Runoff Summary*



### **3.5 Water Quality**

The design proposes a system of BMPs consisting of subsurface infiltration chambers (BMP-1) and bioretention (BMP-2) to meet the water quality treatment requirements of the development standard. See Appendix C for HydroCAD analysis and Appendix D for the RIDEM Water Quality Volume Calculation Worksheet and BMP Sizing Spreadsheet.



**IV. STORMWATER STANDARDS:**

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The proposed development has been designed to meet all of the minimum standards identified in the RISDISM through utilization of filtration and infiltration practices with maintenance planning.

**4.1 Standard 1: LID Planning and Design Strategies**

LID site planning and design strategies must be used to the maximum extent practicable.

Standard Met – LID site planning and strategies have been employed to the maximum extent possible.

**4.2 Standard 2: Groundwater Recharge**

Stormwater must be recharged within the same sub-watershed to maintain base flow at pre-development recharge levels to the maximum extent practicable.

Standard Met – Recharge will be provided on-site through the proposed system of BMPs. The project has a soil recharge factor of 0.60 (Hydrologic Soil Group ‘A’)

Design Point 1

Total Impervious Site Coverage:	23,842 SF
Required Recharge Volume:	$(23,842 \text{ SF} \times 0.60 / 12 \text{ in./ft}) = 1,192 \text{ CF}$
Provided Recharge Volume (BMP-1)	6,016 CF
Provided Recharge Volume (BMP-2)	<u>883 CF +</u>
<b>TOTAL</b>	<b>6,899 CF &gt; 1,192 CF</b>

(See Appendix C for water quality storage volumes provided within BMPs)



### 4.3 Standard 3: Water Quality

Stormwater runoff must be treated prior to discharge.

***Standard Met*** – Water quality treatment will be provided on-site through the proposed system of BMPs.

**Design Point 1**

Total Impervious Site Coverage:	23,842 SF
Required Water Quality Treatment Volume:	(23,842 SF / 12 in./ft) = 1,987 CF
Provided Water Quality Treatment Volume (BMP-1)	6,016 CF
Provided Water Quality Treatment Volume (BMP-2)	<u>883 CF</u> +
<b>TOTAL</b>	<b>6,899 CF &gt; 1,987 CF</b>

(See Appendix C for water quality storage volumes provided within BMPs, and Appendix D for *RIDEM Water Quality Volume Calculation Worksheet*)

### 4.4 Standard 4: Conveyance and Natural Channel Protection

This standard is designed to prevent erosive flow within natural channels and drainage ways.

***Standard Met*** – The post-development 1-year, 24-Hour Type III runoff volume is completely retained within the proposed system of BMPs (see Table-1 Watershed Runoff Summary).

### 4.5 Standard 5: Overbank Flood Protection

Downstream overbank flood protection must be provided by attenuating the post-development peak discharge rate to the pre-development levels for the 10-year and 100-year, Type III design storm events

***Standard Met*** – Post-development peak discharge rates have been mitigated within the proposed subsurface infiltration and surface filtration systems and brought below pre-development levels during the 10-year and 100-year Type III storm events (see Table-1 Watershed Runoff Summary).

### 4.6 Standard 6: Redevelopment and Infill Projects

For redevelopment sites with 40% or more existing impervious surface coverage and infill sites, only Standards 2, 3, and 7-11 must be addressed.

***Standard Not Met*** – Total existing impervious surface coverage is < 40% of the total site size.





#### **4.7 Standard 7: Pollution Prevention**

All development sites require the use of source control and pollution prevention measures to minimize the impact that the land use may have on stormwater runoff quality.

*Standard Met* – A Soil Erosion and Sediment Control (SESC) Plan has been prepared for the project and stormwater measures are proposed that comply with the Standard.

#### **4.8 Standard 8: Land Uses with Higher Potential Pollutant Loads**

Stormwater discharges from land uses with higher potential pollutant loads (LUHPPLs) require the use of specific source control and pollution prevention measures and the specific stormwater BMPs approved for such use.

*Standard Not Applicable* – No LUHPPLs on site.

#### **4.9 Standard 9: Illicit Discharges**

All illicit discharges to stormwater management systems are prohibited, including discharges from OWTS, sub-drains and French drains near any OWTS that does not meet the State’s OWTS Rules.

*Standard Met* – There are no known illicit discharges at the site and none are proposed as part of this project.

#### **4.10 Standard 10: Construction and Erosion Sedimentation Control**

Erosion and sedimentation control practices must be utilized during the construction phase as well as during any land disturbing activities

*Standard Met* - Soil Erosion and Sediment Control Practices will be employed to avoid and minimize impacts to the existing stormwater systems. Detailed notes are included in the plans as well as within an Erosion and Sediment Control Report to ensure effective implementation of erosion and sedimentation controls.

#### **4.11 Standard 11: Stormwater Management System Operation and Maintenance**

The stormwater management system, including all structural stormwater controls and conveyances, must have an operation and maintenance plan to ensure that it continues to function as designed.



**Standard Met** - A long-term Stormwater Operation and Maintenance Plan has been prepared for the development in accordance with the Manual, and is provided as a separate document.



## ***V. CONCLUSION***

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This project has been designed to mitigate water quality impacts and runoff control from the proposed development. Water quality treatment for all proposed development areas is provided in accordance with the development standards of the *State of Rhode Island Stormwater Design and Installation Standards Manual*. Best Management Practices will be employed to control temporary discharges associated with construction activities in accordance with the standards outlined in the *Rhode Island Soil and Erosion Sediment Control Handbook*.

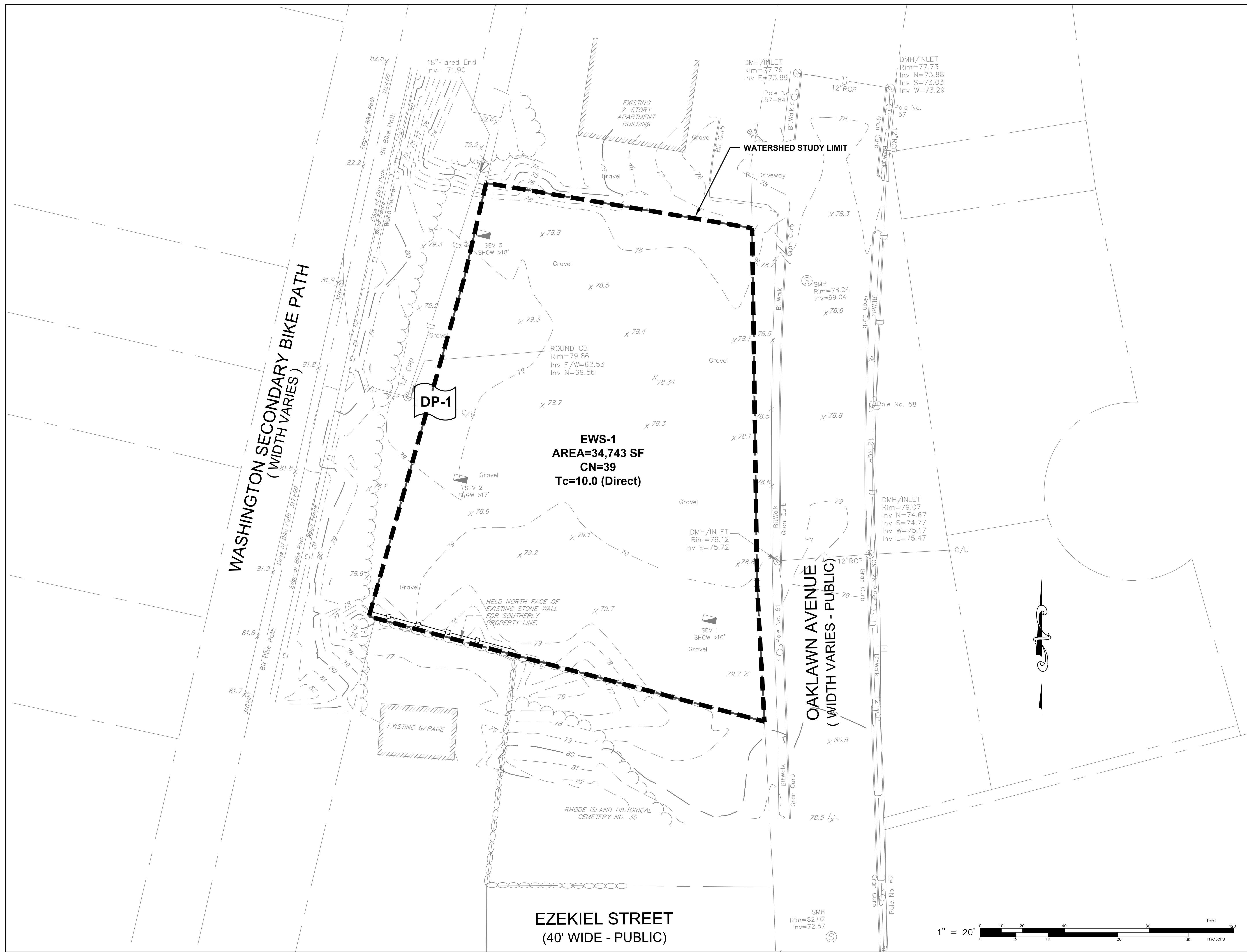


**Appendix A**  
**Watershed Maps**



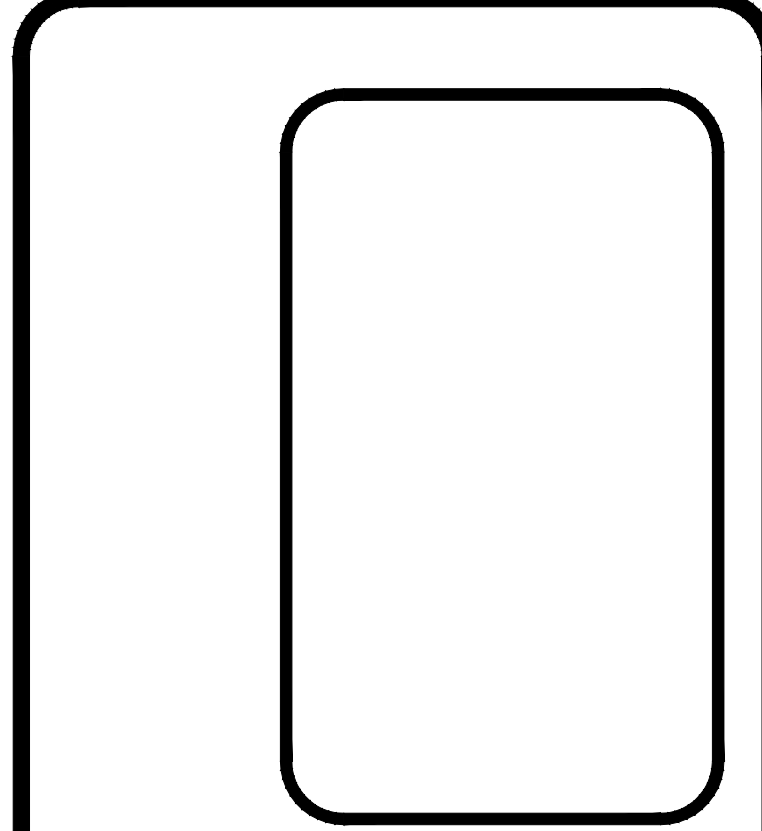


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**EXISTING CONDITIONS  
WATERSHED MAP**  
FOR  
A.P. 17-3 LOT 670  
SITUATED ON  
OAKLAWN AVENUE  
CRANSTON, RHODE ISLAND  
PREPARED FOR  
AMALGAMATED FINANCIAL  
EQUITIES I LLC

NO.	REVISION	BY	DATE



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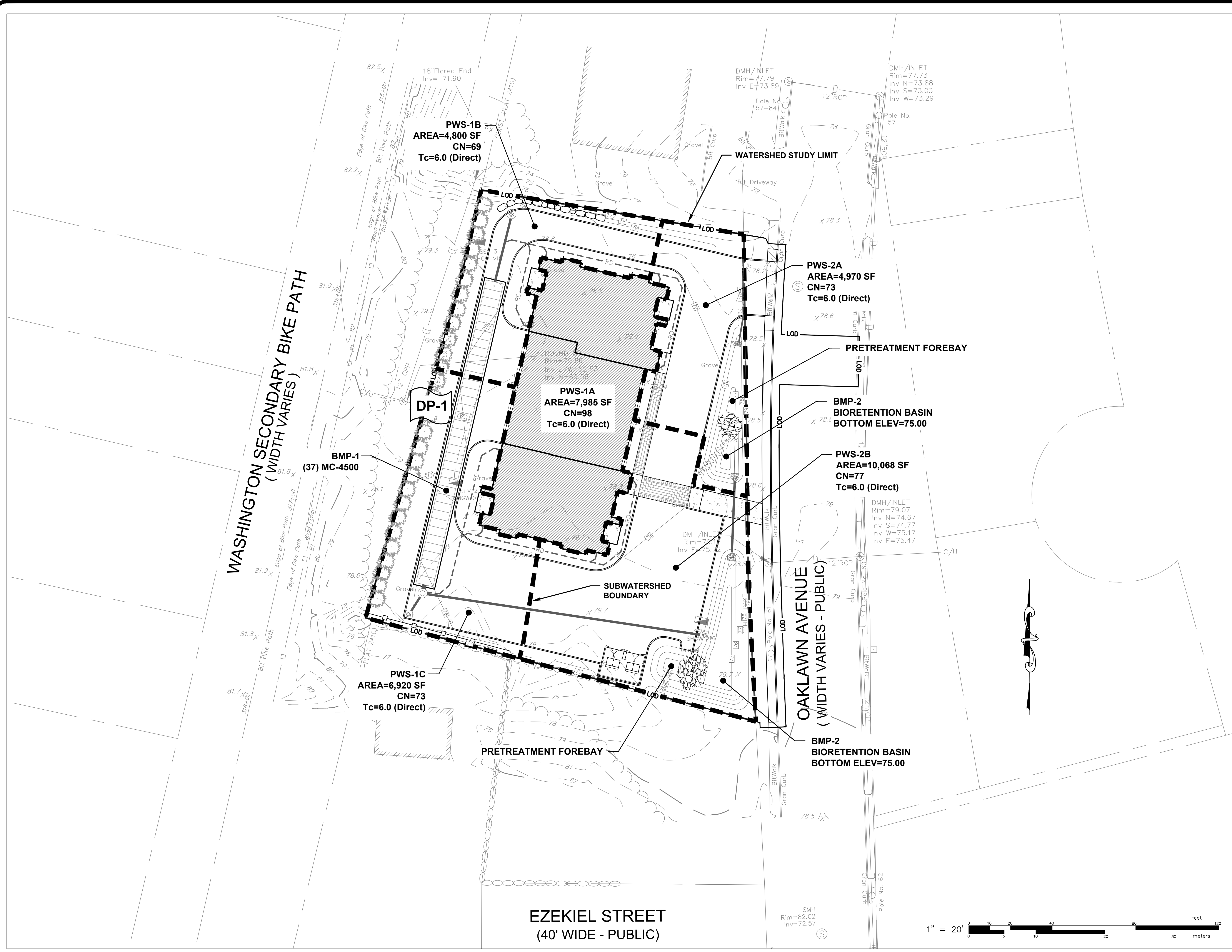
Garofalo & Associates ©  
These drawings are the property of  
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project at this site and are not to  
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JOB NO. 7006-00	DRAWN BY R.A.S.
DWG. NO. 7394-00-EWS.dwg	CHECK BY S.H.H.
SCALE: AS SHOWN	APPROVED S.B.G.
	DATE: APRIL, 2023

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1 OF 2 SHEETS



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**PROPOSED CONDITIONS  
WATERSHED MAP**  
FOR  
A.P. 17-3 LOT 670  
SITUATED ON  
OAKLAWN AVENUE  
CRANSTON, RHODE ISLAND  
PREPARED FOR  
AMALGAMATED FINANCIAL  
EQUITIES I LLC

NO.	REVISION	BY	DATE
1	RIDEM COMMENT REVISIONS	R.A.S.	8/7/23
2	RIDOT COMMENT REVISIONS	R.A.S.	8/18/23
3	RIDOT COMMENT REVISIONS	R.A.S.	10/23/23
4	RIDEM COMMENT REVISIONS	R.A.S.	11/07/23
5	RIDOT COMMENT REVISIONS	R.A.S.	12/01/23

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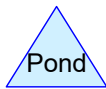
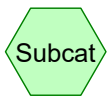
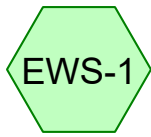
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SHEET  
**2**  
2 OF 2 SHEETS

**Appendix B**  
**Stormwater Analysis**  
**Existing Conditions**





**Routing Diagram for 7006-00 HydroCAD Analysis**  
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## 7006-00 HydroCAD Analysis

Type III 24-hr 1.2-Inch Rainfall=1.20"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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

### Subcatchment EWS-1:

Runoff Area=34,743 sf 0.00% Impervious Runoff Depth=0.00"  
Tc=10.0 min CN=39/0 Runoff=0.00 cfs 0 cf

### Link EX-DP-1:

Inflow=0.00 cfs 0 cf  
Primary=0.00 cfs 0 cf

**Total Runoff Area = 34,743 sf Runoff Volume = 0 cf Average Runoff Depth = 0.00"**  
**100.00% Pervious = 34,743 sf 0.00% Impervious = 0 sf**

**7006-00 HydroCAD Analysis**

Type III 24-hr 1.2-Inch Rainfall=1.20"

Prepared by Garofalo & Associates, Inc

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**Summary for Subcatchment EWS-1:**

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"  
Routed to Link EX-DP-1 :

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1.2-Inch Rainfall=1.20"

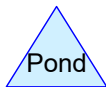
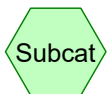
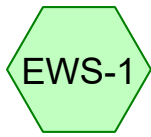
Area (sf)	CN	Description
34,743	39	Pasture/grassland/range, Good, HSG A
34,743	39	100.00% Pervious Area

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

**Summary for Link EX-DP-1:**

Inflow Area = 34,743 sf, 0.00% Impervious, Inflow Depth = 0.00" for 1.2-Inch event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



**Routing Diagram for 7006-00 HydroCAD Analysis**  
Prepared by Garofalo & Associates, Inc, Printed 5/1/2023  
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# 7006-00 HydroCAD Analysis

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## Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type III 24-hr		Default	24.00	1	2.70	2
2	2-Year	Type III 24-hr		Default	24.00	1	3.30	2
3	10-Year	Type III 24-hr		Default	24.00	1	4.90	2
4	25-Year	Type III 24-hr		Default	24.00	1	6.10	2
5	100-Year	Type III 24-hr		Default	24.00	1	8.70	2

**7006-00 HydroCAD Analysis**

Type III 24-hr 1-Year Rainfall=2.70"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment EWS-1:**

Runoff Area=34,743 sf 0.00% Impervious Runoff Depth=0.00"  
Tc=10.0 min CN=39 Runoff=0.00 cfs 0 cf

**Link EX-DP-1:**

Inflow=0.00 cfs 0 cf  
Primary=0.00 cfs 0 cf

**Total Runoff Area = 34,743 sf Runoff Volume = 0 cf Average Runoff Depth = 0.00"**  
**100.00% Pervious = 34,743 sf 0.00% Impervious = 0 sf**

**7006-00 HydroCAD Analysis**

Type III 24-hr 1-Year Rainfall=2.70"

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**Summary for Subcatchment EWS-1:**

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"  
Routed to Link EX-DP-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
34,743	39	Pasture/grassland/range, Good, HSG A
34,743	39	100.00% Pervious Area

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

**Summary for Link EX-DP-1:**

Inflow Area = 34,743 sf, 0.00% Impervious, Inflow Depth = 0.00" for 1-Year event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

**7006-00 HydroCAD Analysis**

Type III 24-hr 2-Year Rainfall=3.30"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment EWS-1:**

Runoff Area=34,743 sf 0.00% Impervious Runoff Depth=0.00"  
Tc=10.0 min CN=39 Runoff=0.00 cfs 5 cf

**Link EX-DP-1:**

Inflow=0.00 cfs 5 cf  
Primary=0.00 cfs 5 cf

**Total Runoff Area = 34,743 sf Runoff Volume = 5 cf Average Runoff Depth = 0.00"**  
**100.00% Pervious = 34,743 sf 0.00% Impervious = 0 sf**



**7006-00 HydroCAD Analysis**

Type III 24-hr 2-Year Rainfall=3.30"

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**Summary for Subcatchment EWS-1:**

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 5 cf, Depth= 0.00"  
Routed to Link EX-DP-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Description
34,743	39	Pasture/grassland/range, Good, HSG A
34,743	39	100.00% Pervious Area

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

**Summary for Link EX-DP-1:**

Inflow Area = 34,743 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event  
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 5 cf  
Primary = 0.00 cfs @ 24.00 hrs, Volume= 5 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

**7006-00 HydroCAD Analysis**

Type III 24-hr 10-Year Rainfall=4.90"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment EWS-1:**

Runoff Area=34,743 sf 0.00% Impervious Runoff Depth=0.18"  
Tc=10.0 min CN=39 Runoff=0.02 cfs 522 cf

**Link EX-DP-1:**

Inflow=0.02 cfs 522 cf  
Primary=0.02 cfs 522 cf

**Total Runoff Area = 34,743 sf Runoff Volume = 522 cf Average Runoff Depth = 0.18"**  
**100.00% Pervious = 34,743 sf 0.00% Impervious = 0 sf**

## 7006-00 HydroCAD Analysis

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Type III 24-hr 10-Year Rainfall=4.90"

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### Summary for Subcatchment EWS-1:

Runoff = 0.02 cfs @ 12.92 hrs, Volume= 522 cf, Depth= 0.18"  
Routed to Link EX-DP-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
34,743	39	Pasture/grassland/range, Good, HSG A
34,743	39	100.00% Pervious Area

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

### Summary for Link EX-DP-1:

Inflow Area = 34,743 sf, 0.00% Impervious, Inflow Depth = 0.18" for 10-Year event  
Inflow = 0.02 cfs @ 12.92 hrs, Volume= 522 cf  
Primary = 0.02 cfs @ 12.92 hrs, Volume= 522 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

## 7006-00 HydroCAD Analysis

Type III 24-hr 25-Year Rainfall=6.10"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

### Subcatchment EWS-1:

Runoff Area=34,743 sf 0.00% Impervious Runoff Depth=0.47"  
Tc=10.0 min CN=39 Runoff=0.15 cfs 1,374 cf

### Link EX-DP-1:

Inflow=0.15 cfs 1,374 cf  
Primary=0.15 cfs 1,374 cf

**Total Runoff Area = 34,743 sf Runoff Volume = 1,374 cf Average Runoff Depth = 0.47"**  
**100.00% Pervious = 34,743 sf 0.00% Impervious = 0 sf**

**7006-00 HydroCAD Analysis**

Type III 24-hr 25-Year Rainfall=6.10"

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**Summary for Subcatchment EWS-1:**

Runoff = 0.15 cfs @ 12.40 hrs, Volume= 1,374 cf, Depth= 0.47"  
Routed to Link EX-DP-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=6.10"

Area (sf)	CN	Description
34,743	39	Pasture/grassland/range, Good, HSG A
34,743	39	100.00% Pervious Area

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

**Summary for Link EX-DP-1:**

Inflow Area = 34,743 sf, 0.00% Impervious, Inflow Depth = 0.47" for 25-Year event  
Inflow = 0.15 cfs @ 12.40 hrs, Volume= 1,374 cf  
Primary = 0.15 cfs @ 12.40 hrs, Volume= 1,374 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

## 7006-00 HydroCAD Analysis

Type III 24-hr 100-Year Rainfall=8.70"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

### Subcatchment EWS-1:

Runoff Area=34,743 sf 0.00% Impervious Runoff Depth=1.46"  
Tc=10.0 min CN=39 Runoff=0.84 cfs 4,237 cf

### Link EX-DP-1:

Inflow=0.84 cfs 4,237 cf  
Primary=0.84 cfs 4,237 cf

**Total Runoff Area = 34,743 sf Runoff Volume = 4,237 cf Average Runoff Depth = 1.46"**  
**100.00% Pervious = 34,743 sf 0.00% Impervious = 0 sf**

**7006-00 HydroCAD Analysis**

Type III 24-hr 100-Year Rainfall=8.70"

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**Summary for Subcatchment EWS-1:**

Runoff = 0.84 cfs @ 12.18 hrs, Volume= 4,237 cf, Depth= 1.46"  
Routed to Link EX-DP-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
34,743	39	Pasture/grassland/range, Good, HSG A
34,743	39	100.00% Pervious Area

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

**Summary for Link EX-DP-1:**

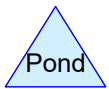
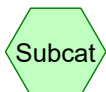
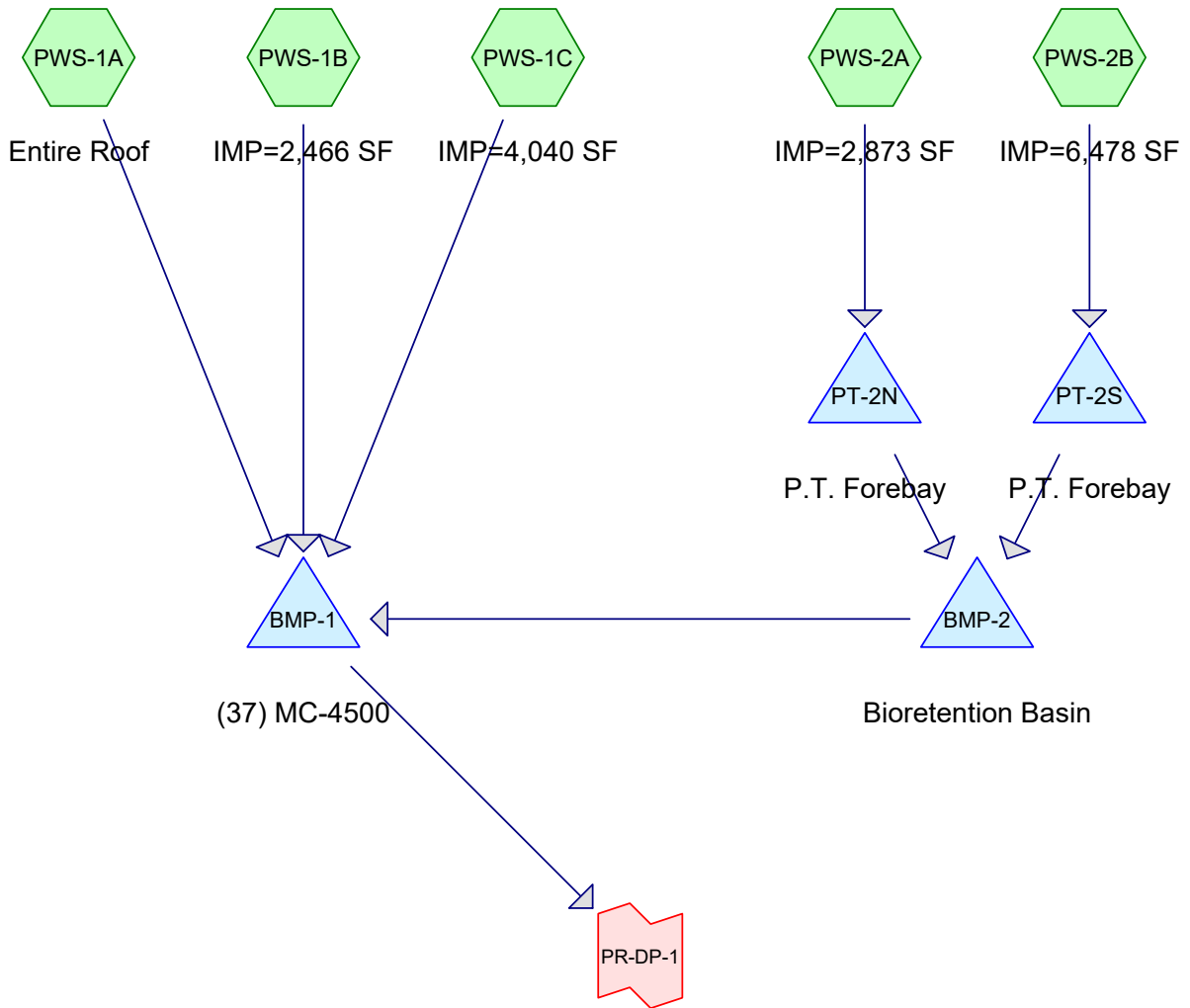
Inflow Area = 34,743 sf, 0.00% Impervious, Inflow Depth = 1.46" for 100-Year event  
Inflow = 0.84 cfs @ 12.18 hrs, Volume= 4,237 cf  
Primary = 0.84 cfs @ 12.18 hrs, Volume= 4,237 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

**Appendix C**  
**Stormwater Analysis**  
**Proposed Conditions**







# 7006-00 HydroCAD Analysis

Type III 24-hr 1.2-Inch Rainfall=1.20"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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

<b>Subcatchment PWS-1A: Entire Roof</b>	Runoff Area=7,985 sf 100.00% Impervious Runoff Depth=0.99" Tc=6.0 min CN=0/98 Runoff=0.20 cfs 656 cf
<b>Subcatchment PWS-1B: IMP=2,466 SF</b>	Runoff Area=4,800 sf 51.38% Impervious Runoff Depth=0.51" Tc=6.0 min CN=39/98 Runoff=0.06 cfs 203 cf
<b>Subcatchment PWS-1C: IMP=4,040 SF</b>	Runoff Area=6,920 sf 58.38% Impervious Runoff Depth=0.58" Tc=6.0 min CN=39/98 Runoff=0.10 cfs 332 cf
<b>Subcatchment PWS-2A: IMP=2,873 SF</b>	Runoff Area=4,970 sf 57.81% Impervious Runoff Depth=0.57" Tc=6.0 min CN=39/98 Runoff=0.07 cfs 236 cf
<b>Subcatchment PWS-2B: IMP=6,478 SF</b>	Runoff Area=10,068 sf 64.34% Impervious Runoff Depth=0.63" Tc=6.0 min CN=39/98 Runoff=0.16 cfs 532 cf
<b>Pond BMP-1: (37) MC-4500</b>	Peak Elev=68.40' Storage=303 cf Inflow=0.36 cfs 1,190 cf Discarded=0.08 cfs 1,190 cf Primary=0.00 cfs 0 cf Outflow=0.08 cfs 1,190 cf
<b>Pond BMP-2: Bioretention Basin</b>	Peak Elev=74.78' Storage=151 cf Inflow=0.28 cfs 454 cf Discarded=0.02 cfs 453 cf Primary=0.00 cfs 0 cf Outflow=0.02 cfs 453 cf
<b>Pond PT-2N: P.T. Forebay</b>	Peak Elev=77.99' Storage=168 cf Inflow=0.07 cfs 236 cf Outflow=0.01 cfs 69 cf
<b>Pond PT-2S: P.T. Forebay</b>	Peak Elev=77.53' Storage=210 cf Inflow=0.16 cfs 532 cf Outflow=0.28 cfs 385 cf
<b>Link PR-DP-1:</b>	Inflow=0.00 cfs 0 cf Primary=0.00 cfs 0 cf

**Total Runoff Area = 34,743 sf Runoff Volume = 1,958 cf Average Runoff Depth = 0.68"**  
**31.38% Pervious = 10,901 sf 68.62% Impervious = 23,842 sf**

**7006-00 HydroCAD Analysis**

Type III 24-hr 1.2-Inch Rainfall=1.20"

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**Summary for Subcatchment PWS-1A: Entire Roof**

Runoff = 0.20 cfs @ 12.09 hrs, Volume= 656 cf, Depth= 0.99"  
 Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
7,985	98	Roofs, HSG A
7,985	98	100.00% Impervious Area

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

**Summary for Subcatchment PWS-1B: IMP=2,466 SF**

Runoff = 0.06 cfs @ 12.09 hrs, Volume= 203 cf, Depth= 0.51"  
 Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
2,466	98	Paved parking, HSG A
2,334	39	>75% Grass cover, Good, HSG A
4,800	69	Weighted Average
2,334	39	48.63% Pervious Area
2,466	98	51.38% Impervious Area

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

**Summary for Subcatchment PWS-1C: IMP=4,040 SF**

Runoff = 0.10 cfs @ 12.09 hrs, Volume= 332 cf, Depth= 0.58"  
 Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
4,040	98	Paved parking, HSG A
2,880	39	>75% Grass cover, Good, HSG A
6,920	73	Weighted Average
2,880	39	41.62% Pervious Area
4,040	98	58.38% Impervious Area

**7006-00 HydroCAD Analysis**

Type III 24-hr 1.2-Inch Rainfall=1.20"

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

**Summary for Subcatchment PWS-2A: IMP=2,873 SF**

Runoff = 0.07 cfs @ 12.09 hrs, Volume= 236 cf, Depth= 0.57"  
 Routed to Pond PT-2N : P.T. Forebay

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
2,873	98	Paved parking, HSG A
2,097	39	>75% Grass cover, Good, HSG A
4,970	73	Weighted Average
2,097	39	42.19% Pervious Area
2,873	98	57.81% Impervious Area

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

**Summary for Subcatchment PWS-2B: IMP=6,478 SF**

Runoff = 0.16 cfs @ 12.09 hrs, Volume= 532 cf, Depth= 0.63"  
 Routed to Pond PT-2S : P.T. Forebay

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
6,478	98	Paved parking, HSG A
3,590	39	>75% Grass cover, Good, HSG A
10,068	77	Weighted Average
3,590	39	35.66% Pervious Area
6,478	98	64.34% Impervious Area

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

**Summary for Pond BMP-1: (37) MC-4500**

Inflow Area = 34,743 sf, 68.62% Impervious, Inflow Depth = 0.41" for 1.2-Inch event  
 Inflow = 0.36 cfs @ 12.09 hrs, Volume= 1,190 cf  
 Outflow = 0.08 cfs @ 11.85 hrs, Volume= 1,190 cf, Atten= 78%, Lag= 0.0 min  
 Discarded = 0.08 cfs @ 11.85 hrs, Volume= 1,190 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Link PR-DP-1 :

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Type III 24-hr 1.2-Inch Rainfall=1.20"

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Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3  
 Peak Elev= 68.40' @ 12.50 hrs Surf.Area= 1,406 sf Storage= 303 cf

Plug-Flow detention time= 25.6 min calculated for 1,188 cf (100% of inflow)  
 Center-of-Mass det. time= 25.6 min ( 807.6 - 782.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	67.75'	696 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) x 37 2,109 cf Overall x 33.0% Voids
#2	69.25'	1,830 cf	<b>STONE (Prismatic)</b> Listed below (Recalc) x 37 9,491 cf Overall - 3,945 cf Embedded = 5,545 cf x 33.0% Voids
#3	70.00'	3,945 cf	<b>StormTech MC-4500 @ 4.03' L</b> x 37 Inside #2 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.6 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
		6,471 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.75	38	0	0
69.25	38	57	57

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.25	38	0	0
76.00	38	257	257

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.75'	<b>2.410 in/hr Exfiltration over Surface area</b>
#2	Primary	77.40'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.08 cfs @ 11.85 hrs HW=67.85' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.08 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=67.75' (Free Discharge)  
 ↑2=Orifice/Grate ( Controls 0.00 cfs)

## Summary for Pond BMP-2: Bioretention Basin

Inflow Area = 15,038 sf, 62.18% Impervious, Inflow Depth = 0.36" for 1.2-Inch event  
 Inflow = 0.28 cfs @ 12.12 hrs, Volume= 454 cf  
 Outflow = 0.02 cfs @ 12.10 hrs, Volume= 453 cf, Atten= 91%, Lag= 0.0 min  
 Discarded = 0.02 cfs @ 12.10 hrs, Volume= 453 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Pond BMP-1 : (37) MC-4500

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 74.78' @ 12.61 hrs Surf.Area= 425 sf Storage= 151 cf

Plug-Flow detention time= 52.6 min calculated for 452 cf (100% of inflow)  
 Center-of-Mass det. time= 51.1 min ( 920.9 - 869.8 )

**7006-00 HydroCAD Analysis**

Type III 24-hr 1.2-Inch Rainfall=1.20"

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Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	170 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 850 cf Overall x 20.0% Voids
#2	75.00'	3,188 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		3,358 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	425	0	0
75.00	425	850	850

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	425	0	0
78.00	1,700	3,188	3,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	73.00'	<b>2.410 in/hr Exfiltration over Surface area</b>
#2	Primary	74.00'	<b>12.0" Round Culvert</b> L= 132.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 74.00' / 73.20' S= 0.0061 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	77.90'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.02 cfs @ 12.10 hrs HW=73.23' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=73.00' (Free Discharge)  
 ↑2=Culvert ( Controls 0.00 cfs)  
 ↑3=Orifice/Grate ( Controls 0.00 cfs)

**Summary for Pond PT-2N: P.T. Forebay**

Inflow Area = 4,970 sf, 57.81% Impervious, Inflow Depth = 0.57" for 1.2-Inch event  
 Inflow = 0.07 cfs @ 12.09 hrs, Volume= 236 cf  
 Outflow = 0.01 cfs @ 13.25 hrs, Volume= 69 cf, Atten= 92%, Lag= 69.7 min  
 Primary = 0.01 cfs @ 13.25 hrs, Volume= 69 cf  
 Routed to Pond BMP-2 : Bioretention Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 77.99' @ 13.25 hrs Surf.Area= 298 sf Storage= 168 cf

Plug-Flow detention time= 377.3 min calculated for 69 cf (29% of inflow)  
 Center-of-Mass det. time= 221.8 min ( 1,003.8 - 782.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	170 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)



**7006-00 HydroCAD Analysis**

Type III 24-hr 1.2-Inch Rainfall=1.20"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	40	0	0
78.00	300	170	170

Device	Routing	Invert	Outlet Devices
#1	Primary	77.99'	<b>12.0' long x 3.0' 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 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

**Primary OutFlow** Max=0.00 cfs @ 13.25 hrs HW=77.99' (Free Discharge)  
 ↳1=**Broad-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.10 fps)

**Summary for Pond PT-2S: P.T. Forebay**

Inflow Area = 10,068 sf, 64.34% Impervious, Inflow Depth = 0.63" for 1.2-Inch event  
 Inflow = 0.16 cfs @ 12.09 hrs, Volume= 532 cf  
 Outflow = 0.28 cfs @ 12.12 hrs, Volume= 385 cf, Atten= 0%, Lag= 1.9 min  
 Primary = 0.28 cfs @ 12.12 hrs, Volume= 385 cf  
 Routed to Pond BMP-2 : Bioretention Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 77.53' @ 12.12 hrs Surf.Area= 235 sf Storage= 210 cf

Plug-Flow detention time= 151.2 min calculated for 385 cf (72% of inflow)  
 Center-of-Mass det. time= 63.8 min ( 845.8 - 782.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	210 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	45	0	0
77.50	235	210	210

Device	Routing	Invert	Outlet Devices
#1	Primary	77.49'	<b>18.0' long x 3.0' 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 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

**Primary OutFlow** Max=0.24 cfs @ 12.12 hrs HW=77.52' (Free Discharge)  
 ↳1=**Broad-Crested Rectangular Weir** (Weir Controls 0.24 cfs @ 0.43 fps)

## 7006-00 HydroCAD Analysis

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Type III 24-hr 1.2-Inch Rainfall=1.20"

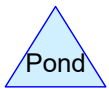
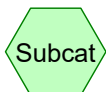
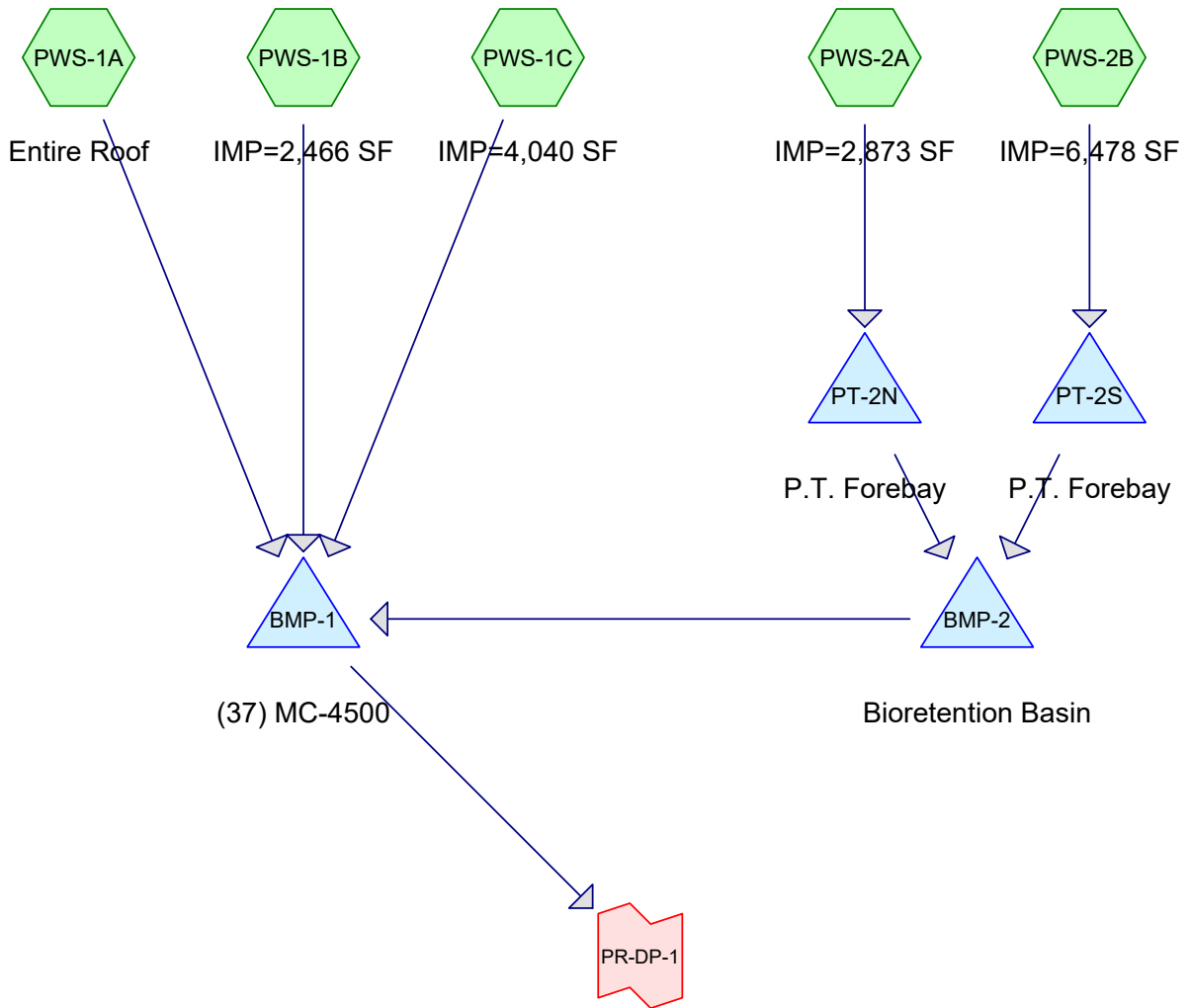
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### Summary for Link PR-DP-1:

Inflow Area = 34,743 sf, 68.62% Impervious, Inflow Depth = 0.00" for 1.2-Inch event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



**Routing Diagram for 7006-00 HydroCAD Analysis**  
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### Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type III 24-hr		Default	24.00	1	2.70	2
2	2-Year	Type III 24-hr		Default	24.00	1	3.30	2
3	10-Year	Type III 24-hr		Default	24.00	1	4.90	2
4	25-Year	Type III 24-hr		Default	24.00	1	6.10	2
5	100-Year	Type III 24-hr		Default	24.00	1	8.70	2

**7006-00 HydroCAD Analysis**

Type III 24-hr 1-Year Rainfall=2.70"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment PWS-1A: Entire Roof</b>	Runoff Area=7,985 sf 100.00% Impervious Runoff Depth=2.47" Tc=6.0 min CN=98 Runoff=0.47 cfs 1,643 cf
<b>Subcatchment PWS-1B: IMP=2,466 SF</b>	Runoff Area=4,800 sf 51.38% Impervious Runoff Depth=0.52" Tc=6.0 min CN=69 Runoff=0.05 cfs 206 cf
<b>Subcatchment PWS-1C: IMP=4,040 SF</b>	Runoff Area=6,920 sf 58.38% Impervious Runoff Depth=0.68" Tc=6.0 min CN=73 Runoff=0.11 cfs 392 cf
<b>Subcatchment PWS-2A: IMP=2,873 SF</b>	Runoff Area=4,970 sf 57.81% Impervious Runoff Depth=0.68" Tc=6.0 min CN=73 Runoff=0.08 cfs 281 cf
<b>Subcatchment PWS-2B: IMP=6,478 SF</b>	Runoff Area=10,068 sf 64.34% Impervious Runoff Depth=0.87" Tc=6.0 min CN=77 Runoff=0.22 cfs 729 cf
<b>Pond BMP-1: (37) MC-4500</b>	Peak Elev=69.22' Storage=683 cf Inflow=0.63 cfs 2,241 cf Discarded=0.11 cfs 2,241 cf Primary=0.00 cfs 0 cf Outflow=0.11 cfs 2,241 cf
<b>Pond BMP-2: Bioretention Basin</b>	Peak Elev=74.44' Storage=123 cf Inflow=0.16 cfs 654 cf Discarded=0.02 cfs 653 cf Primary=0.00 cfs 0 cf Outflow=0.02 cfs 653 cf
<b>Pond PT-2N: P.T. Forebay</b>	Peak Elev=77.99' Storage=168 cf Inflow=0.08 cfs 281 cf Outflow=0.01 cfs 114 cf
<b>Pond PT-2S: P.T. Forebay</b>	Peak Elev=77.51' Storage=210 cf Inflow=0.22 cfs 729 cf Outflow=0.16 cfs 539 cf
<b>Link PR-DP-1:</b>	Inflow=0.00 cfs 0 cf Primary=0.00 cfs 0 cf

**Total Runoff Area = 34,743 sf Runoff Volume = 3,251 cf Average Runoff Depth = 1.12"**  
**31.38% Pervious = 10,901 sf 68.62% Impervious = 23,842 sf**

**7006-00 HydroCAD Analysis**

Type III 24-hr 1-Year Rainfall=2.70"

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**Summary for Subcatchment PWS-1A: Entire Roof**

Runoff = 0.47 cfs @ 12.09 hrs, Volume= 1,643 cf, Depth= 2.47"  
Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
7,985	98	Roofs, HSG A
7,985	98	100.00% Impervious Area

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

**Summary for Subcatchment PWS-1B: IMP=2,466 SF**

Runoff = 0.05 cfs @ 12.11 hrs, Volume= 206 cf, Depth= 0.52"  
Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
2,466	98	Paved parking, HSG A
2,334	39	>75% Grass cover, Good, HSG A
4,800	69	Weighted Average
2,334	39	48.63% Pervious Area
2,466	98	51.38% Impervious Area

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

**Summary for Subcatchment PWS-1C: IMP=4,040 SF**

Runoff = 0.11 cfs @ 12.10 hrs, Volume= 392 cf, Depth= 0.68"  
Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
4,040	98	Paved parking, HSG A
2,880	39	>75% Grass cover, Good, HSG A
6,920	73	Weighted Average
2,880	39	41.62% Pervious Area
4,040	98	58.38% Impervious Area

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Type III 24-hr 1-Year Rainfall=2.70"

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

**Summary for Subcatchment PWS-2A: IMP=2,873 SF**

Runoff = 0.08 cfs @ 12.10 hrs, Volume= 281 cf, Depth= 0.68"  
 Routed to Pond PT-2N : P.T. Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
2,873	98	Paved parking, HSG A
2,097	39	>75% Grass cover, Good, HSG A
4,970	73	Weighted Average
2,097	39	42.19% Pervious Area
2,873	98	57.81% Impervious Area

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

**Summary for Subcatchment PWS-2B: IMP=6,478 SF**

Runoff = 0.22 cfs @ 12.10 hrs, Volume= 729 cf, Depth= 0.87"  
 Routed to Pond PT-2S : P.T. Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
6,478	98	Paved parking, HSG A
3,590	39	>75% Grass cover, Good, HSG A
10,068	77	Weighted Average
3,590	39	35.66% Pervious Area
6,478	98	64.34% Impervious Area

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

**Summary for Pond BMP-1: (37) MC-4500**

Inflow Area = 34,743 sf, 68.62% Impervious, Inflow Depth = 0.77" for 1-Year event  
 Inflow = 0.63 cfs @ 12.09 hrs, Volume= 2,241 cf  
 Outflow = 0.11 cfs @ 12.57 hrs, Volume= 2,241 cf, Atten= 82%, Lag= 28.8 min  
 Discarded = 0.11 cfs @ 12.57 hrs, Volume= 2,241 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Link PR-DP-1 :

# 7006-00 HydroCAD Analysis

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Type III 24-hr 1-Year Rainfall=2.70"

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Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3  
 Peak Elev= 69.22' @ 12.57 hrs Surf.Area= 1,406 sf Storage= 683 cf

Plug-Flow detention time= 62.0 min calculated for 2,238 cf (100% of inflow)  
 Center-of-Mass det. time= 62.0 min ( 854.9 - 793.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	67.75'	696 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) x 37 2,109 cf Overall x 33.0% Voids
#2	69.25'	1,830 cf	<b>STONE (Prismatic)</b> Listed below (Recalc) x 37 9,491 cf Overall - 3,945 cf Embedded = 5,545 cf x 33.0% Voids
#3	70.00'	3,945 cf	<b>StormTech MC-4500 @ 4.03' L</b> x 37 Inside #2 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.6 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
		6,471 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.75	38	0	0
69.25	38	57	57

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.25	38	0	0
76.00	38	257	257

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.75'	<b>2.410 in/hr Exfiltration over Surface area</b>
#2	Primary	77.40'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.08 cfs @ 12.57 hrs HW=69.22' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.08 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=67.75' (Free Discharge)  
 ↑2=Orifice/Grate ( Controls 0.00 cfs)

## Summary for Pond BMP-2: Bioretention Basin

Inflow Area = 15,038 sf, 62.18% Impervious, Inflow Depth = 0.52" for 1-Year event  
 Inflow = 0.16 cfs @ 12.27 hrs, Volume= 654 cf  
 Outflow = 0.02 cfs @ 12.25 hrs, Volume= 653 cf, Atten= 85%, Lag= 0.0 min  
 Discarded = 0.02 cfs @ 12.25 hrs, Volume= 653 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Pond BMP-1 : (37) MC-4500

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 74.44' @ 13.29 hrs Surf.Area= 425 sf Storage= 123 cf

Plug-Flow detention time= 48.5 min calculated for 653 cf (100% of inflow)  
 Center-of-Mass det. time= 48.2 min ( 988.9 - 940.7 )



**7006-00 HydroCAD Analysis**

Type III 24-hr 1-Year Rainfall=2.70"

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Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	170 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 850 cf Overall x 20.0% Voids
#2	75.00'	3,188 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		3,358 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	425	0	0
75.00	425	850	850

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	425	0	0
78.00	1,700	3,188	3,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	73.00'	<b>2.410 in/hr Exfiltration over Surface area</b>
#2	Primary	74.00'	<b>12.0" Round Culvert</b> L= 132.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 74.00' / 73.20' S= 0.0061 ' S= 0.0061 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	77.90'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.02 cfs @ 12.25 hrs HW=73.12' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=73.00' (Free Discharge)  
 ↑2=Culvert ( Controls 0.00 cfs)  
 ↑3=Orifice/Grate ( Controls 0.00 cfs)

**Summary for Pond PT-2N: P.T. Forebay**

Inflow Area = 4,970 sf, 57.81% Impervious, Inflow Depth = 0.68" for 1-Year event  
 Inflow = 0.08 cfs @ 12.10 hrs, Volume= 281 cf  
 Outflow = 0.01 cfs @ 14.17 hrs, Volume= 114 cf, Atten= 91%, Lag= 123.7 min  
 Primary = 0.01 cfs @ 14.17 hrs, Volume= 114 cf  
 Routed to Pond BMP-2 : Bioretention Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 77.99' @ 14.17 hrs Surf.Area= 298 sf Storage= 168 cf

Plug-Flow detention time= 332.5 min calculated for 114 cf (41% of inflow)  
 Center-of-Mass det. time= 186.9 min ( 1,064.3 - 877.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	170 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

**7006-00 HydroCAD Analysis**

Type III 24-hr 1-Year Rainfall=2.70"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	40	0	0
78.00	300	170	170

Device	Routing	Invert	Outlet Devices
#1	Primary	77.99'	<b>12.0' long x 3.0' 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 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

**Primary OutFlow** Max=0.00 cfs @ 14.17 hrs HW=77.99' (Free Discharge)  
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.12 fps)

**Summary for Pond PT-2S: P.T. Forebay**

Inflow Area = 10,068 sf, 64.34% Impervious, Inflow Depth = 0.87" for 1-Year event  
 Inflow = 0.22 cfs @ 12.10 hrs, Volume= 729 cf  
 Outflow = 0.16 cfs @ 12.27 hrs, Volume= 539 cf, Atten= 28%, Lag= 10.2 min  
 Primary = 0.16 cfs @ 12.27 hrs, Volume= 539 cf  
 Routed to Pond BMP-2 : Bioretention Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 77.51' @ 12.25 hrs Surf.Area= 235 sf Storage= 210 cf

Plug-Flow detention time= 147.5 min calculated for 538 cf (74% of inflow)  
 Center-of-Mass det. time= 51.9 min ( 914.5 - 862.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	210 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	45	0	0
77.50	235	210	210

Device	Routing	Invert	Outlet Devices
#1	Primary	77.49'	<b>18.0' long x 3.0' 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 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

**Primary OutFlow** Max=0.13 cfs @ 12.27 hrs HW=77.51' (Free Discharge)  
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 0.13 cfs @ 0.35 fps)

## 7006-00 HydroCAD Analysis

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Type III 24-hr 1-Year Rainfall=2.70"

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### Summary for Link PR-DP-1:

Inflow Area = 34,743 sf, 68.62% Impervious, Inflow Depth = 0.00" for 1-Year event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

**7006-00 HydroCAD Analysis**

Type III 24-hr 2-Year Rainfall=3.30"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment PWS-1A: Entire Roof</b>	Runoff Area=7,985 sf 100.00% Impervious Runoff Depth=3.07" Tc=6.0 min CN=98 Runoff=0.57 cfs 2,041 cf
<b>Subcatchment PWS-1B: IMP=2,466 SF</b>	Runoff Area=4,800 sf 51.38% Impervious Runoff Depth=0.84" Tc=6.0 min CN=69 Runoff=0.09 cfs 335 cf
<b>Subcatchment PWS-1C: IMP=4,040 SF</b>	Runoff Area=6,920 sf 58.38% Impervious Runoff Depth=1.05" Tc=6.0 min CN=73 Runoff=0.18 cfs 604 cf
<b>Subcatchment PWS-2A: IMP=2,873 SF</b>	Runoff Area=4,970 sf 57.81% Impervious Runoff Depth=1.05" Tc=6.0 min CN=73 Runoff=0.13 cfs 434 cf
<b>Subcatchment PWS-2B: IMP=6,478 SF</b>	Runoff Area=10,068 sf 64.34% Impervious Runoff Depth=1.28" Tc=6.0 min CN=77 Runoff=0.33 cfs 1,077 cf
<b>Pond BMP-1: (37) MC-4500</b>	Peak Elev=69.72' Storage=912 cf Inflow=0.85 cfs 2,979 cf Discarded=0.16 cfs 2,981 cf Primary=0.00 cfs 0 cf Outflow=0.16 cfs 2,981 cf
<b>Pond BMP-2: Bioretention Basin</b>	Peak Elev=75.59' Storage=494 cf Inflow=0.60 cfs 1,373 cf Discarded=0.06 cfs 1,371 cf Primary=0.00 cfs 0 cf Outflow=0.06 cfs 1,371 cf
<b>Pond PT-2N: P.T. Forebay</b>	Peak Elev=78.01' Storage=170 cf Inflow=0.13 cfs 434 cf Outflow=0.05 cfs 268 cf
<b>Pond PT-2S: P.T. Forebay</b>	Peak Elev=77.54' Storage=210 cf Inflow=0.33 cfs 1,077 cf Outflow=0.60 cfs 1,105 cf
<b>Link PR-DP-1:</b>	Inflow=0.00 cfs 0 cf Primary=0.00 cfs 0 cf

**Total Runoff Area = 34,743 sf Runoff Volume = 4,490 cf Average Runoff Depth = 1.55"**  
**31.38% Pervious = 10,901 sf 68.62% Impervious = 23,842 sf**

**7006-00 HydroCAD Analysis**

Type III 24-hr 2-Year Rainfall=3.30"

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**Summary for Subcatchment PWS-1A: Entire Roof**

Runoff = 0.57 cfs @ 12.09 hrs, Volume= 2,041 cf, Depth= 3.07"  
Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Description
7,985	98	Roofs, HSG A
7,985	98	100.00% Impervious Area

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

**Summary for Subcatchment PWS-1B: IMP=2,466 SF**

Runoff = 0.09 cfs @ 12.10 hrs, Volume= 335 cf, Depth= 0.84"  
Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Description
2,466	98	Paved parking, HSG A
2,334	39	>75% Grass cover, Good, HSG A
4,800	69	Weighted Average
2,334	39	48.63% Pervious Area
2,466	98	51.38% Impervious Area

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

**Summary for Subcatchment PWS-1C: IMP=4,040 SF**

Runoff = 0.18 cfs @ 12.10 hrs, Volume= 604 cf, Depth= 1.05"  
Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Description
4,040	98	Paved parking, HSG A
2,880	39	>75% Grass cover, Good, HSG A
6,920	73	Weighted Average
2,880	39	41.62% Pervious Area
4,040	98	58.38% Impervious Area

**7006-00 HydroCAD Analysis**

Type III 24-hr 2-Year Rainfall=3.30"

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

**Summary for Subcatchment PWS-2A: IMP=2,873 SF**

Runoff = 0.13 cfs @ 12.10 hrs, Volume= 434 cf, Depth= 1.05"  
 Routed to Pond PT-2N : P.T. Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Description
2,873	98	Paved parking, HSG A
2,097	39	>75% Grass cover, Good, HSG A
4,970	73	Weighted Average
2,097	39	42.19% Pervious Area
2,873	98	57.81% Impervious Area

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

**Summary for Subcatchment PWS-2B: IMP=6,478 SF**

Runoff = 0.33 cfs @ 12.10 hrs, Volume= 1,077 cf, Depth= 1.28"  
 Routed to Pond PT-2S : P.T. Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Description
6,478	98	Paved parking, HSG A
3,590	39	>75% Grass cover, Good, HSG A
10,068	77	Weighted Average
3,590	39	35.66% Pervious Area
6,478	98	64.34% Impervious Area

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

**Summary for Pond BMP-1: (37) MC-4500**

Inflow Area = 34,743 sf, 68.62% Impervious, Inflow Depth = 1.03" for 2-Year event  
 Inflow = 0.85 cfs @ 12.09 hrs, Volume= 2,979 cf  
 Outflow = 0.16 cfs @ 12.20 hrs, Volume= 2,981 cf, Atten= 81%, Lag= 6.5 min  
 Discarded = 0.16 cfs @ 12.20 hrs, Volume= 2,981 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Link PR-DP-1 :

**7006-00 HydroCAD Analysis**

Type III 24-hr 2-Year Rainfall=3.30"

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Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3  
 Peak Elev= 69.72' @ 12.56 hrs Surf.Area= 2,812 sf Storage= 912 cf

Plug-Flow detention time= 63.1 min calculated for 2,976 cf (100% of inflow)  
 Center-of-Mass det. time= 63.3 min ( 854.5 - 791.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	67.75'	696 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) x 37 2,109 cf Overall x 33.0% Voids
#2	69.25'	1,830 cf	<b>STONE (Prismatic)</b> Listed below (Recalc) x 37 9,491 cf Overall - 3,945 cf Embedded = 5,545 cf x 33.0% Voids
#3	70.00'	3,945 cf	<b>StormTech MC-4500 @ 4.03' L</b> x 37 Inside #2 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.6 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
		6,471 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.75	38	0	0
69.25	38	57	57

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.25	38	0	0
76.00	38	257	257

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.75'	<b>2.410 in/hr Exfiltration over Surface area</b>
#2	Primary	77.40'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.16 cfs @ 12.20 hrs HW=69.28' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.16 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=67.75' (Free Discharge)  
 ↑2=Orifice/Grate ( Controls 0.00 cfs)

**Summary for Pond BMP-2: Bioretention Basin**

Inflow Area = 15,038 sf, 62.18% Impervious, Inflow Depth = 1.10" for 2-Year event  
 Inflow = 0.60 cfs @ 12.12 hrs, Volume= 1,373 cf  
 Outflow = 0.06 cfs @ 12.91 hrs, Volume= 1,371 cf, Atten= 90%, Lag= 47.6 min  
 Discarded = 0.06 cfs @ 12.91 hrs, Volume= 1,371 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Pond BMP-1 : (37) MC-4500

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 75.59' @ 12.91 hrs Surf.Area= 1,100 sf Storage= 494 cf

Plug-Flow detention time= 90.4 min calculated for 1,369 cf (100% of inflow)  
 Center-of-Mass det. time= 89.5 min ( 962.2 - 872.8 )

**7006-00 HydroCAD Analysis**

Type III 24-hr 2-Year Rainfall=3.30"

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Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	170 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 850 cf Overall x 20.0% Voids
#2	75.00'	3,188 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		3,358 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	425	0	0
75.00	425	850	850

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	425	0	0
78.00	1,700	3,188	3,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	73.00'	<b>2.410 in/hr Exfiltration over Surface area</b>
#2	Primary	74.00'	<b>12.0" Round Culvert</b> L= 132.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 74.00' / 73.20' S= 0.0061 ' S= 0.0061 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	77.90'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.06 cfs @ 12.91 hrs HW=75.59' (Free Discharge)  
 ↳ **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=73.00' (Free Discharge)  
 ↳ **2=Culvert** ( Controls 0.00 cfs)  
 ↳ **3=Orifice/Grate** ( Controls 0.00 cfs)

**Summary for Pond PT-2N: P.T. Forebay**

Inflow Area = 4,970 sf, 57.81% Impervious, Inflow Depth = 1.05" for 2-Year event  
 Inflow = 0.13 cfs @ 12.10 hrs, Volume= 434 cf  
 Outflow = 0.05 cfs @ 12.47 hrs, Volume= 268 cf, Atten= 58%, Lag= 22.0 min  
 Primary = 0.05 cfs @ 12.47 hrs, Volume= 268 cf  
 Routed to Pond BMP-2 : Bioretention Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 78.01' @ 12.47 hrs Surf.Area= 300 sf Storage= 170 cf

Plug-Flow detention time= 206.0 min calculated for 268 cf (62% of inflow)  
 Center-of-Mass det. time= 87.7 min ( 951.1 - 863.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	170 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)



**7006-00 HydroCAD Analysis**

Type III 24-hr 2-Year Rainfall=3.30"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	40	0	0
78.00	300	170	170

Device	Routing	Invert	Outlet Devices
#1	Primary	77.99'	<b>12.0' long x 3.0' 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 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

**Primary OutFlow** Max=0.05 cfs @ 12.47 hrs HW=78.00' (Free Discharge)  
 ↳1=**Broad-Crested Rectangular Weir** (Weir Controls 0.05 cfs @ 0.28 fps)

**Summary for Pond PT-2S: P.T. Forebay**

Inflow Area = 10,068 sf, 64.34% Impervious, Inflow Depth = 1.28" for 2-Year event  
 Inflow = 0.33 cfs @ 12.10 hrs, Volume= 1,077 cf  
 Outflow = 0.60 cfs @ 12.12 hrs, Volume= 1,105 cf, Atten= 0%, Lag= 1.4 min  
 Primary = 0.60 cfs @ 12.12 hrs, Volume= 1,105 cf  
 Routed to Pond BMP-2 : Bioretention Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 77.54' @ 12.10 hrs Surf.Area= 235 sf Storage= 210 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 3.1 min ( 853.8 - 850.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	210 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	45	0	0
77.50	235	210	210

Device	Routing	Invert	Outlet Devices
#1	Primary	77.49'	<b>18.0' long x 3.0' 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 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

**Primary OutFlow** Max=0.53 cfs @ 12.12 hrs HW=77.54' (Free Discharge)  
 ↳1=**Broad-Crested Rectangular Weir** (Weir Controls 0.53 cfs @ 0.56 fps)

## 7006-00 HydroCAD Analysis

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Type III 24-hr 2-Year Rainfall=3.30"

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### Summary for Link PR-DP-1:

Inflow Area = 34,743 sf, 68.62% Impervious, Inflow Depth = 0.00" for 2-Year event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

**7006-00 HydroCAD Analysis**

Type III 24-hr 10-Year Rainfall=4.90"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment PWS-1A: Entire Roof</b>	Runoff Area=7,985 sf 100.00% Impervious Runoff Depth=4.66" Tc=6.0 min CN=98 Runoff=0.86 cfs 3,103 cf
<b>Subcatchment PWS-1B: IMP=2,466 SF</b>	Runoff Area=4,800 sf 51.38% Impervious Runoff Depth=1.89" Tc=6.0 min CN=69 Runoff=0.23 cfs 754 cf
<b>Subcatchment PWS-1C: IMP=4,040 SF</b>	Runoff Area=6,920 sf 58.38% Impervious Runoff Depth=2.20" Tc=6.0 min CN=73 Runoff=0.40 cfs 1,270 cf
<b>Subcatchment PWS-2A: IMP=2,873 SF</b>	Runoff Area=4,970 sf 57.81% Impervious Runoff Depth=2.20" Tc=6.0 min CN=73 Runoff=0.29 cfs 912 cf
<b>Subcatchment PWS-2B: IMP=6,478 SF</b>	Runoff Area=10,068 sf 64.34% Impervious Runoff Depth=2.54" Tc=6.0 min CN=77 Runoff=0.67 cfs 2,131 cf
<b>Pond BMP-1: (37) MC-4500</b>	Peak Elev=70.74' Storage=1,934 cf Inflow=1.49 cfs 5,127 cf Discarded=0.16 cfs 5,127 cf Primary=0.00 cfs 0 cf Outflow=0.16 cfs 5,127 cf
<b>Pond BMP-2: Bioretention Basin</b>	Peak Elev=76.55' Storage=1,342 cf Inflow=1.07 cfs 2,863 cf Discarded=0.08 cfs 2,864 cf Primary=0.00 cfs 0 cf Outflow=0.08 cfs 2,864 cf
<b>Pond PT-2N: P.T. Forebay</b>	Peak Elev=78.05' Storage=170 cf Inflow=0.29 cfs 912 cf Outflow=0.40 cfs 947 cf
<b>Pond PT-2S: P.T. Forebay</b>	Peak Elev=77.55' Storage=210 cf Inflow=0.67 cfs 2,131 cf Outflow=0.67 cfs 1,916 cf
<b>Link PR-DP-1:</b>	Inflow=0.00 cfs 0 cf Primary=0.00 cfs 0 cf

**Total Runoff Area = 34,743 sf Runoff Volume = 8,170 cf Average Runoff Depth = 2.82"**  
**31.38% Pervious = 10,901 sf 68.62% Impervious = 23,842 sf**

# 7006-00 HydroCAD Analysis

Type III 24-hr 10-Year Rainfall=4.90"

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## Summary for Subcatchment PWS-1A: Entire Roof

Runoff = 0.86 cfs @ 12.09 hrs, Volume= 3,103 cf, Depth= 4.66"  
Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
7,985	98	Roofs, HSG A
7,985	98	100.00% Impervious Area

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

## Summary for Subcatchment PWS-1B: IMP=2,466 SF

Runoff = 0.23 cfs @ 12.10 hrs, Volume= 754 cf, Depth= 1.89"  
Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
2,466	98	Paved parking, HSG A
2,334	39	>75% Grass cover, Good, HSG A
4,800	69	Weighted Average
2,334	39	48.63% Pervious Area
2,466	98	51.38% Impervious Area

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

## Summary for Subcatchment PWS-1C: IMP=4,040 SF

Runoff = 0.40 cfs @ 12.10 hrs, Volume= 1,270 cf, Depth= 2.20"  
Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
4,040	98	Paved parking, HSG A
2,880	39	>75% Grass cover, Good, HSG A
6,920	73	Weighted Average
2,880	39	41.62% Pervious Area
4,040	98	58.38% Impervious Area

**7006-00 HydroCAD Analysis**

Type III 24-hr 10-Year Rainfall=4.90"

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

**Summary for Subcatchment PWS-2A: IMP=2,873 SF**

Runoff = 0.29 cfs @ 12.10 hrs, Volume= 912 cf, Depth= 2.20"  
 Routed to Pond PT-2N : P.T. Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
2,873	98	Paved parking, HSG A
2,097	39	>75% Grass cover, Good, HSG A
4,970	73	Weighted Average
2,097	39	42.19% Pervious Area
2,873	98	57.81% Impervious Area

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

**Summary for Subcatchment PWS-2B: IMP=6,478 SF**

Runoff = 0.67 cfs @ 12.09 hrs, Volume= 2,131 cf, Depth= 2.54"  
 Routed to Pond PT-2S : P.T. Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
6,478	98	Paved parking, HSG A
3,590	39	>75% Grass cover, Good, HSG A
10,068	77	Weighted Average
3,590	39	35.66% Pervious Area
6,478	98	64.34% Impervious Area

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

**Summary for Pond BMP-1: (37) MC-4500**

Inflow Area = 34,743 sf, 68.62% Impervious, Inflow Depth = 1.77" for 10-Year event  
 Inflow = 1.49 cfs @ 12.09 hrs, Volume= 5,127 cf  
 Outflow = 0.16 cfs @ 12.05 hrs, Volume= 5,127 cf, Atten= 89%, Lag= 0.0 min  
 Discarded = 0.16 cfs @ 12.05 hrs, Volume= 5,127 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Link PR-DP-1 :

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Type III 24-hr 10-Year Rainfall=4.90"

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Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3  
 Peak Elev= 70.74' @ 12.92 hrs Surf.Area= 2,812 sf Storage= 1,934 cf

Plug-Flow detention time= 108.3 min calculated for 5,119 cf (100% of inflow)  
 Center-of-Mass det. time= 108.1 min ( 894.6 - 786.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	67.75'	696 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) x 37 2,109 cf Overall x 33.0% Voids
#2	69.25'	1,830 cf	<b>STONE (Prismatic)</b> Listed below (Recalc) x 37 9,491 cf Overall - 3,945 cf Embedded = 5,545 cf x 33.0% Voids
#3	70.00'	3,945 cf	<b>StormTech MC-4500 @ 4.03' L</b> x 37 Inside #2 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.6 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
		6,471 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.75	38	0	0
69.25	38	57	57

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.25	38	0	0
76.00	38	257	257

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.75'	<b>2.410 in/hr Exfiltration over Surface area</b>
#2	Primary	77.40'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.16 cfs @ 12.05 hrs HW=69.47' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.16 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=67.75' (Free Discharge)  
 ↑2=Orifice/Grate ( Controls 0.00 cfs)

## Summary for Pond BMP-2: Bioretention Basin

Inflow Area = 15,038 sf, 62.18% Impervious, Inflow Depth = 2.28" for 10-Year event  
 Inflow = 1.07 cfs @ 12.09 hrs, Volume= 2,863 cf  
 Outflow = 0.08 cfs @ 13.32 hrs, Volume= 2,864 cf, Atten= 92%, Lag= 73.4 min  
 Discarded = 0.08 cfs @ 13.32 hrs, Volume= 2,864 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Pond BMP-1 : (37) MC-4500

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 76.55' @ 13.32 hrs Surf.Area= 1,510 sf Storage= 1,342 cf

Plug-Flow detention time= 186.0 min calculated for 2,859 cf (100% of inflow)  
 Center-of-Mass det. time= 186.0 min ( 1,034.2 - 848.2 )

**7006-00 HydroCAD Analysis**

Type III 24-hr 10-Year Rainfall=4.90"

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Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	170 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 850 cf Overall x 20.0% Voids
#2	75.00'	3,188 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		3,358 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	425	0	0
75.00	425	850	850

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	425	0	0
78.00	1,700	3,188	3,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	73.00'	<b>2.410 in/hr Exfiltration over Surface area</b>
#2	Primary	74.00'	<b>12.0" Round Culvert</b> L= 132.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 74.00' / 73.20' S= 0.0061 ' S= 0.0061 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	77.90'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.08 cfs @ 13.32 hrs HW=76.55' (Free Discharge)  
 ↳ **1=Exfiltration** (Exfiltration Controls 0.08 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=73.00' (Free Discharge)  
 ↳ **2=Culvert** ( Controls 0.00 cfs)  
 ↳ **3=Orifice/Grate** ( Controls 0.00 cfs)

**Summary for Pond PT-2N: P.T. Forebay**

Inflow Area = 4,970 sf, 57.81% Impervious, Inflow Depth = 2.20" for 10-Year event  
 Inflow = 0.29 cfs @ 12.10 hrs, Volume= 912 cf  
 Outflow = 0.40 cfs @ 12.10 hrs, Volume= 947 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 0.40 cfs @ 12.10 hrs, Volume= 947 cf  
 Routed to Pond BMP-2 : Bioretention Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 78.05' @ 12.10 hrs Surf.Area= 300 sf Storage= 170 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 4.2 min ( 845.2 - 841.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	170 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

**7006-00 HydroCAD Analysis**

Type III 24-hr 10-Year Rainfall=4.90"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	40	0	0
78.00	300	170	170

Device	Routing	Invert	Outlet Devices
#1	Primary	77.99'	<b>12.0' long x 3.0' 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 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

**Primary OutFlow** Max=0.40 cfs @ 12.10 hrs HW=78.05' (Free Discharge)  
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 0.40 cfs @ 0.58 fps)

**Summary for Pond PT-2S: P.T. Forebay**

Inflow Area = 10,068 sf, 64.34% Impervious, Inflow Depth = 2.54" for 10-Year event  
 Inflow = 0.67 cfs @ 12.09 hrs, Volume= 2,131 cf  
 Outflow = 0.67 cfs @ 12.09 hrs, Volume= 1,916 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 0.67 cfs @ 12.09 hrs, Volume= 1,916 cf  
 Routed to Pond BMP-2 : Bioretention Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 77.55' @ 12.09 hrs Surf.Area= 235 sf Storage= 210 cf

Plug-Flow detention time= 67.4 min calculated for 1,913 cf (90% of inflow)  
 Center-of-Mass det. time= 19.1 min ( 849.7 - 830.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	210 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	45	0	0
77.50	235	210	210

Device	Routing	Invert	Outlet Devices
#1	Primary	77.49'	<b>18.0' long x 3.0' 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 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

**Primary OutFlow** Max=0.66 cfs @ 12.09 hrs HW=77.55' (Free Discharge)  
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 0.66 cfs @ 0.60 fps)



## 7006-00 HydroCAD Analysis

Type III 24-hr 10-Year Rainfall=4.90"

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### Summary for Link PR-DP-1:

Inflow Area = 34,743 sf, 68.62% Impervious, Inflow Depth = 0.00" for 10-Year event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

# 7006-00 HydroCAD Analysis

Type III 24-hr 25-Year Rainfall=6.10"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment PWS-1A: Entire Roof</b>	Runoff Area=7,985 sf 100.00% Impervious Runoff Depth=5.86" Tc=6.0 min CN=98 Runoff=1.07 cfs 3,901 cf
<b>Subcatchment PWS-1B: IMP=2,466 SF</b>	Runoff Area=4,800 sf 51.38% Impervious Runoff Depth=2.79" Tc=6.0 min CN=69 Runoff=0.35 cfs 1,116 cf
<b>Subcatchment PWS-1C: IMP=4,040 SF</b>	Runoff Area=6,920 sf 58.38% Impervious Runoff Depth=3.17" Tc=6.0 min CN=73 Runoff=0.58 cfs 1,829 cf
<b>Subcatchment PWS-2A: IMP=2,873 SF</b>	Runoff Area=4,970 sf 57.81% Impervious Runoff Depth=3.17" Tc=6.0 min CN=73 Runoff=0.42 cfs 1,314 cf
<b>Subcatchment PWS-2B: IMP=6,478 SF</b>	Runoff Area=10,068 sf 64.34% Impervious Runoff Depth=3.57" Tc=6.0 min CN=77 Runoff=0.95 cfs 2,992 cf
<b>Pond BMP-1: (37) MC-4500</b>	Peak Elev=71.56' Storage=2,894 cf Inflow=2.00 cfs 6,846 cf Discarded=0.16 cfs 6,842 cf Primary=0.00 cfs 0 cf Outflow=0.16 cfs 6,842 cf
<b>Pond BMP-2: Bioretention Basin</b>	Peak Elev=76.88' Storage=1,721 cf Inflow=1.29 cfs 3,691 cf Discarded=0.09 cfs 3,690 cf Primary=0.00 cfs 0 cf Outflow=0.09 cfs 3,690 cf
<b>Pond PT-2N: P.T. Forebay</b>	Peak Elev=78.04' Storage=170 cf Inflow=0.42 cfs 1,314 cf Outflow=0.34 cfs 902 cf
<b>Pond PT-2S: P.T. Forebay</b>	Peak Elev=77.57' Storage=210 cf Inflow=0.95 cfs 2,992 cf Outflow=0.95 cfs 2,788 cf
<b>Link PR-DP-1:</b>	Inflow=0.00 cfs 0 cf Primary=0.00 cfs 0 cf

**Total Runoff Area = 34,743 sf Runoff Volume = 11,152 cf Average Runoff Depth = 3.85"**  
**31.38% Pervious = 10,901 sf 68.62% Impervious = 23,842 sf**

**7006-00 HydroCAD Analysis**

Type III 24-hr 25-Year Rainfall=6.10"

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**Summary for Subcatchment PWS-1A: Entire Roof**

Runoff = 1.07 cfs @ 12.09 hrs, Volume= 3,901 cf, Depth= 5.86"  
 Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=6.10"

Area (sf)	CN	Description
7,985	98	Roofs, HSG A
7,985	98	100.00% Impervious Area

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

**Summary for Subcatchment PWS-1B: IMP=2,466 SF**

Runoff = 0.35 cfs @ 12.10 hrs, Volume= 1,116 cf, Depth= 2.79"  
 Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=6.10"

Area (sf)	CN	Description
2,466	98	Paved parking, HSG A
2,334	39	>75% Grass cover, Good, HSG A
4,800	69	Weighted Average
2,334	39	48.63% Pervious Area
2,466	98	51.38% Impervious Area

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

**Summary for Subcatchment PWS-1C: IMP=4,040 SF**

Runoff = 0.58 cfs @ 12.09 hrs, Volume= 1,829 cf, Depth= 3.17"  
 Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=6.10"

Area (sf)	CN	Description
4,040	98	Paved parking, HSG A
2,880	39	>75% Grass cover, Good, HSG A
6,920	73	Weighted Average
2,880	39	41.62% Pervious Area
4,040	98	58.38% Impervious Area

**7006-00 HydroCAD Analysis**

Type III 24-hr 25-Year Rainfall=6.10"

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

**Summary for Subcatchment PWS-2A: IMP=2,873 SF**

Runoff = 0.42 cfs @ 12.09 hrs, Volume= 1,314 cf, Depth= 3.17"  
 Routed to Pond PT-2N : P.T. Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=6.10"

Area (sf)	CN	Description
2,873	98	Paved parking, HSG A
2,097	39	>75% Grass cover, Good, HSG A
4,970	73	Weighted Average
2,097	39	42.19% Pervious Area
2,873	98	57.81% Impervious Area

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

**Summary for Subcatchment PWS-2B: IMP=6,478 SF**

Runoff = 0.95 cfs @ 12.09 hrs, Volume= 2,992 cf, Depth= 3.57"  
 Routed to Pond PT-2S : P.T. Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=6.10"

Area (sf)	CN	Description
6,478	98	Paved parking, HSG A
3,590	39	>75% Grass cover, Good, HSG A
10,068	77	Weighted Average
3,590	39	35.66% Pervious Area
6,478	98	64.34% Impervious Area

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

**Summary for Pond BMP-1: (37) MC-4500**

Inflow Area = 34,743 sf, 68.62% Impervious, Inflow Depth = 2.36" for 25-Year event  
 Inflow = 2.00 cfs @ 12.09 hrs, Volume= 6,846 cf  
 Outflow = 0.16 cfs @ 11.95 hrs, Volume= 6,842 cf, Atten= 92%, Lag= 0.0 min  
 Discarded = 0.16 cfs @ 11.95 hrs, Volume= 6,842 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Link PR-DP-1 :

**7006-00 HydroCAD Analysis**

Type III 24-hr 25-Year Rainfall=6.10"

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Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3  
 Peak Elev= 71.56' @ 13.36 hrs Surf.Area= 2,812 sf Storage= 2,894 cf

Plug-Flow detention time= 166.8 min calculated for 6,830 cf (100% of inflow)  
 Center-of-Mass det. time= 166.2 min ( 949.4 - 783.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	67.75'	696 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) x 37 2,109 cf Overall x 33.0% Voids
#2	69.25'	1,830 cf	<b>STONE (Prismatic)</b> Listed below (Recalc) x 37 9,491 cf Overall - 3,945 cf Embedded = 5,545 cf x 33.0% Voids
#3	70.00'	3,945 cf	<b>StormTech MC-4500 @ 4.03' L</b> x 37 Inside #2 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.6 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
		6,471 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.75	38	0	0
69.25	38	57	57

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.25	38	0	0
76.00	38	257	257

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.75'	<b>2.410 in/hr Exfiltration over Surface area</b>
#2	Primary	77.40'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.16 cfs @ 11.95 hrs HW=69.44' (Free Discharge)  
 ↑**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=67.75' (Free Discharge)  
 ↑**2=Orifice/Grate** ( Controls 0.00 cfs)

**Summary for Pond BMP-2: Bioretention Basin**

Inflow Area = 15,038 sf, 62.18% Impervious, Inflow Depth = 2.94" for 25-Year event  
 Inflow = 1.29 cfs @ 12.09 hrs, Volume= 3,691 cf  
 Outflow = 0.09 cfs @ 13.92 hrs, Volume= 3,690 cf, Atten= 93%, Lag= 109.6 min  
 Discarded = 0.09 cfs @ 13.92 hrs, Volume= 3,690 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Pond BMP-1 : (37) MC-4500

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 76.88' @ 13.92 hrs Surf.Area= 1,649 sf Storage= 1,721 cf

Plug-Flow detention time= 224.1 min calculated for 3,684 cf (100% of inflow)  
 Center-of-Mass det. time= 223.9 min ( 1,072.2 - 848.4 )

**7006-00 HydroCAD Analysis**

Type III 24-hr 25-Year Rainfall=6.10"

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Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	170 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 850 cf Overall x 20.0% Voids
#2	75.00'	3,188 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		3,358 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	425	0	0
75.00	425	850	850

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	425	0	0
78.00	1,700	3,188	3,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	73.00'	<b>2.410 in/hr Exfiltration over Surface area</b>
#2	Primary	74.00'	<b>12.0" Round Culvert</b> L= 132.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 74.00' / 73.20' S= 0.0061 ' S= 0.0061 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	77.90'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.09 cfs @ 13.92 hrs HW=76.88' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.09 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=73.00' (Free Discharge)  
 ↑2=Culvert ( Controls 0.00 cfs)  
 ↑3=Orifice/Grate ( Controls 0.00 cfs)

**Summary for Pond PT-2N: P.T. Forebay**

Inflow Area = 4,970 sf, 57.81% Impervious, Inflow Depth = 3.17" for 25-Year event  
 Inflow = 0.42 cfs @ 12.09 hrs, Volume= 1,314 cf  
 Outflow = 0.34 cfs @ 12.09 hrs, Volume= 902 cf, Atten= 17%, Lag= 0.0 min  
 Primary = 0.34 cfs @ 12.09 hrs, Volume= 902 cf  
 Routed to Pond BMP-2 : Bioretention Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 78.04' @ 12.09 hrs Surf.Area= 300 sf Storage= 170 cf

Plug-Flow detention time= 153.9 min calculated for 902 cf (69% of inflow)  
 Center-of-Mass det. time= 54.7 min ( 885.1 - 830.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	170 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

**7006-00 HydroCAD Analysis**

Type III 24-hr 25-Year Rainfall=6.10"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	40	0	0
78.00	300	170	170

Device	Routing	Invert	Outlet Devices
#1	Primary	77.99'	<b>12.0' long x 3.0' 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 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

**Primary OutFlow** Max=0.34 cfs @ 12.09 hrs HW=78.04' (Free Discharge)  
 ↳1=**Broad-Crested Rectangular Weir** (Weir Controls 0.34 cfs @ 0.55 fps)

**Summary for Pond PT-2S: P.T. Forebay**

Inflow Area = 10,068 sf, 64.34% Impervious, Inflow Depth = 3.57" for 25-Year event  
 Inflow = 0.95 cfs @ 12.09 hrs, Volume= 2,992 cf  
 Outflow = 0.95 cfs @ 12.09 hrs, Volume= 2,788 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 0.95 cfs @ 12.09 hrs, Volume= 2,788 cf  
 Routed to Pond BMP-2 : Bioretention Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 77.57' @ 12.09 hrs Surf.Area= 235 sf Storage= 210 cf

Plug-Flow detention time= 51.2 min calculated for 2,788 cf (93% of inflow)  
 Center-of-Mass det. time= 15.6 min ( 836.5 - 820.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	210 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	45	0	0
77.50	235	210	210

Device	Routing	Invert	Outlet Devices
#1	Primary	77.49'	<b>18.0' long x 3.0' 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 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

**Primary OutFlow** Max=0.93 cfs @ 12.09 hrs HW=77.57' (Free Discharge)  
 ↳1=**Broad-Crested Rectangular Weir** (Weir Controls 0.93 cfs @ 0.67 fps)

**7006-00 HydroCAD Analysis**

Type III 24-hr 25-Year Rainfall=6.10"

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**Summary for Link PR-DP-1:**

Inflow Area = 34,743 sf, 68.62% Impervious, Inflow Depth = 0.00" for 25-Year event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



**7006-00 HydroCAD Analysis**

Type III 24-hr 100-Year Rainfall=8.70"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment PWS-1A: Entire Roof</b>	Runoff Area=7,985 sf 100.00% Impervious Runoff Depth=8.46" Tc=6.0 min CN=98 Runoff=1.53 cfs 5,629 cf
<b>Subcatchment PWS-1B: IMP=2,466 SF</b>	Runoff Area=4,800 sf 51.38% Impervious Runoff Depth=4.95" Tc=6.0 min CN=69 Runoff=0.63 cfs 1,980 cf
<b>Subcatchment PWS-1C: IMP=4,040 SF</b>	Runoff Area=6,920 sf 58.38% Impervious Runoff Depth=5.43" Tc=6.0 min CN=73 Runoff=0.99 cfs 3,134 cf
<b>Subcatchment PWS-2A: IMP=2,873 SF</b>	Runoff Area=4,970 sf 57.81% Impervious Runoff Depth=5.43" Tc=6.0 min CN=73 Runoff=0.71 cfs 2,251 cf
<b>Subcatchment PWS-2B: IMP=6,478 SF</b>	Runoff Area=10,068 sf 64.34% Impervious Runoff Depth=5.92" Tc=6.0 min CN=77 Runoff=1.55 cfs 4,967 cf
<b>Pond BMP-1: (37) MC-4500</b>	Peak Elev=75.22' Storage=6,109 cf Inflow=3.14 cfs 11,409 cf Discarded=0.16 cfs 11,278 cf Primary=0.00 cfs 0 cf Outflow=0.16 cfs 11,278 cf
<b>Pond BMP-2: Bioretention Basin</b>	Peak Elev=77.95' Storage=3,277 cf Inflow=2.26 cfs 6,846 cf Discarded=0.12 cfs 6,113 cf Primary=0.32 cfs 666 cf Outflow=0.44 cfs 6,779 cf
<b>Pond PT-2N: P.T. Forebay</b>	Peak Elev=78.07' Storage=170 cf Inflow=0.71 cfs 2,251 cf Outflow=0.71 cfs 2,087 cf
<b>Pond PT-2S: P.T. Forebay</b>	Peak Elev=77.60' Storage=210 cf Inflow=1.55 cfs 4,967 cf Outflow=1.55 cfs 4,759 cf
<b>Link PR-DP-1:</b>	Inflow=0.00 cfs 0 cf Primary=0.00 cfs 0 cf

**Total Runoff Area = 34,743 sf Runoff Volume = 17,962 cf Average Runoff Depth = 6.20"**  
**31.38% Pervious = 10,901 sf 68.62% Impervious = 23,842 sf**

**7006-00 HydroCAD Analysis**

Type III 24-hr 100-Year Rainfall=8.70"

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**Summary for Subcatchment PWS-1A: Entire Roof**

Runoff = 1.53 cfs @ 12.09 hrs, Volume= 5,629 cf, Depth= 8.46"  
 Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
7,985	98	Roofs, HSG A
7,985	98	100.00% Impervious Area

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

**Summary for Subcatchment PWS-1B: IMP=2,466 SF**

Runoff = 0.63 cfs @ 12.09 hrs, Volume= 1,980 cf, Depth= 4.95"  
 Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
2,466	98	Paved parking, HSG A
2,334	39	>75% Grass cover, Good, HSG A
4,800	69	Weighted Average
2,334	39	48.63% Pervious Area
2,466	98	51.38% Impervious Area

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

**Summary for Subcatchment PWS-1C: IMP=4,040 SF**

Runoff = 0.99 cfs @ 12.09 hrs, Volume= 3,134 cf, Depth= 5.43"  
 Routed to Pond BMP-1 : (37) MC-4500

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
4,040	98	Paved parking, HSG A
2,880	39	>75% Grass cover, Good, HSG A
6,920	73	Weighted Average
2,880	39	41.62% Pervious Area
4,040	98	58.38% Impervious Area

**7006-00 HydroCAD Analysis**

Type III 24-hr 100-Year Rainfall=8.70"

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

**Summary for Subcatchment PWS-2A: IMP=2,873 SF**

Runoff = 0.71 cfs @ 12.09 hrs, Volume= 2,251 cf, Depth= 5.43"  
 Routed to Pond PT-2N : P.T. Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
2,873	98	Paved parking, HSG A
2,097	39	>75% Grass cover, Good, HSG A
4,970	73	Weighted Average
2,097	39	42.19% Pervious Area
2,873	98	57.81% Impervious Area

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

**Summary for Subcatchment PWS-2B: IMP=6,478 SF**

Runoff = 1.55 cfs @ 12.09 hrs, Volume= 4,967 cf, Depth= 5.92"  
 Routed to Pond PT-2S : P.T. Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
6,478	98	Paved parking, HSG A
3,590	39	>75% Grass cover, Good, HSG A
10,068	77	Weighted Average
3,590	39	35.66% Pervious Area
6,478	98	64.34% Impervious Area

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

**Summary for Pond BMP-1: (37) MC-4500**

Inflow Area = 34,743 sf, 68.62% Impervious, Inflow Depth = 3.94" for 100-Year event  
 Inflow = 3.14 cfs @ 12.09 hrs, Volume= 11,409 cf  
 Outflow = 0.16 cfs @ 11.60 hrs, Volume= 11,278 cf, Atten= 95%, Lag= 0.0 min  
 Discarded = 0.16 cfs @ 11.60 hrs, Volume= 11,278 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Link PR-DP-1 :

# 7006-00 HydroCAD Analysis

Type III 24-hr 100-Year Rainfall=8.70"

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Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3  
 Peak Elev= 75.22' @ 14.63 hrs Surf.Area= 2,812 sf Storage= 6,109 cf

Plug-Flow detention time= 360.6 min calculated for 11,259 cf (99% of inflow)  
 Center-of-Mass det. time= 353.3 min ( 1,130.7 - 777.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	67.75'	696 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) x 37 2,109 cf Overall x 33.0% Voids
#2	69.25'	1,830 cf	<b>STONE (Prismatic)</b> Listed below (Recalc) x 37 9,491 cf Overall - 3,945 cf Embedded = 5,545 cf x 33.0% Voids
#3	70.00'	3,945 cf	<b>StormTech MC-4500 @ 4.03' L</b> x 37 Inside #2 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.6 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
		6,471 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.75	38	0	0
69.25	38	57	57

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.25	38	0	0
76.00	38	257	257

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.75'	<b>2.410 in/hr Exfiltration over Surface area</b>
#2	Primary	77.40'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.16 cfs @ 11.60 hrs HW=69.28' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.16 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=67.75' (Free Discharge)  
 ↑2=Orifice/Grate ( Controls 0.00 cfs)

## Summary for Pond BMP-2: Bioretention Basin

Inflow Area = 15,038 sf, 62.18% Impervious, Inflow Depth = 5.46" for 100-Year event  
 Inflow = 2.26 cfs @ 12.09 hrs, Volume= 6,846 cf  
 Outflow = 0.44 cfs @ 12.55 hrs, Volume= 6,779 cf, Atten= 81%, Lag= 27.5 min  
 Discarded = 0.12 cfs @ 12.55 hrs, Volume= 6,113 cf  
 Primary = 0.32 cfs @ 12.55 hrs, Volume= 666 cf  
 Routed to Pond BMP-1 : (37) MC-4500

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 77.95' @ 12.55 hrs Surf.Area= 2,105 sf Storage= 3,277 cf

Plug-Flow detention time= 299.9 min calculated for 6,779 cf (99% of inflow)  
 Center-of-Mass det. time= 293.9 min ( 1,116.9 - 823.0 )

**7006-00 HydroCAD Analysis**

Type III 24-hr 100-Year Rainfall=8.70"

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Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	170 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 850 cf Overall x 20.0% Voids
#2	75.00'	3,188 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		3,358 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	425	0	0
75.00	425	850	850

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	425	0	0
78.00	1,700	3,188	3,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	73.00'	<b>2.410 in/hr Exfiltration over Surface area</b>
#2	Primary	74.00'	<b>12.0" Round Culvert</b> L= 132.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 74.00' / 73.20' S= 0.0061 ' S= 0.0061 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	77.90'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.12 cfs @ 12.55 hrs HW=77.95' (Free Discharge)  
 ↳ **1=Exfiltration** (Exfiltration Controls 0.12 cfs)

**Primary OutFlow** Max=0.32 cfs @ 12.55 hrs HW=77.95' (Free Discharge)  
 ↳ **2=Culvert** (Passes 0.32 cfs of 5.14 cfs potential flow)  
 ↳ **3=Orifice/Grate** (Weir Controls 0.32 cfs @ 0.75 fps)

**Summary for Pond PT-2N: P.T. Forebay**

Inflow Area = 4,970 sf, 57.81% Impervious, Inflow Depth = 5.43" for 100-Year event  
 Inflow = 0.71 cfs @ 12.09 hrs, Volume= 2,251 cf  
 Outflow = 0.71 cfs @ 12.09 hrs, Volume= 2,087 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 0.71 cfs @ 12.09 hrs, Volume= 2,087 cf  
 Routed to Pond BMP-2 : Bioretention Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 78.07' @ 12.09 hrs Surf.Area= 300 sf Storage= 170 cf

Plug-Flow detention time= 55.2 min calculated for 2,083 cf (93% of inflow)  
 Center-of-Mass det. time= 17.9 min ( 832.8 - 815.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	170 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

**7006-00 HydroCAD Analysis**

Type III 24-hr 100-Year Rainfall=8.70"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	40	0	0
78.00	300	170	170

Device	Routing	Invert	Outlet Devices
#1	Primary	77.99'	<b>12.0' long x 3.0' 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 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

**Primary OutFlow** Max=0.69 cfs @ 12.09 hrs HW=78.07' (Free Discharge)  
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 0.69 cfs @ 0.70 fps)

**Summary for Pond PT-2S: P.T. Forebay**

Inflow Area = 10,068 sf, 64.34% Impervious, Inflow Depth = 5.92" for 100-Year event  
 Inflow = 1.55 cfs @ 12.09 hrs, Volume= 4,967 cf  
 Outflow = 1.55 cfs @ 12.09 hrs, Volume= 4,759 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 1.55 cfs @ 12.09 hrs, Volume= 4,759 cf  
 Routed to Pond BMP-2 : Bioretention Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 77.60' @ 12.09 hrs Surf.Area= 235 sf Storage= 210 cf

Plug-Flow detention time= 35.8 min calculated for 4,759 cf (96% of inflow)  
 Center-of-Mass det. time= 12.3 min ( 818.7 - 806.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	210 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	45	0	0
77.50	235	210	210

Device	Routing	Invert	Outlet Devices
#1	Primary	77.49'	<b>18.0' long x 3.0' 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 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

**Primary OutFlow** Max=1.51 cfs @ 12.09 hrs HW=77.60' (Free Discharge)  
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 1.51 cfs @ 0.79 fps)

## 7006-00 HydroCAD Analysis

Type III 24-hr 100-Year Rainfall=8.70"

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### Summary for Link PR-DP-1:

Inflow Area = 34,743 sf, 68.62% Impervious, Inflow Depth = 0.00" for 100-Year event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

**Appendix D**  
**Supporting Documentation**





Version: 4/2015

Project Name **Residences at Oaklawn Ave**Date **April 2023**

## Water Quality Volume Calculation WorkSheet

This worksheet is designed to assist the project engineer with a determination of the required water quality treatment area. The worksheet leads the designer through redevelopment applicability first and then receiving water requirements. This tool is intended to compliment to the Redevelopment Criteria Guidance and the Water Quality Guidance and assist both the designer and the permit application reviewer towards consistent results. Enter information into only the **YELLOW** Boxes.

[Redevelopment Criteria Guidance](#)

[Water Quality Goals "Stormwater Compensation Method"](#)

**Step 1 - Determine which office in OWR you are applying to:** [Application Guidance](#)

**Step 2 - Site Information** value/calculation units

Total Site Area (total area of project parcels)	TSA	0.80	acres
Total Jurisdictional Wetlands and/or floodplain within the above TSA	JW1=	0.00	acres
Existing impervious also within the Jurisdictional Wetlands	-JW2=	0.00	acres
Conservation Land within the TSA	C	0.00	acres
<b>Site Size = (TSA)-(JW1-JW2)-CL</b>	<b>SS=</b>	<b>0.80</b>	acres

**Step 3 - Redevelopment Applicability**

Total Impervious Area (pre-construction)	TIA=	0.00	acres
% Impervious (if ≥40% - redevelopment standard 3.2.6 applies)		<b>0.00</b>	

**REPEAT IF NECESSARY Steps 4, 5 and 6 for EACH Waterbody ID ( RIVER-ID as found in the GIS Map Server)**

**Step 4 - Receiving waterbody information**

<a href="#">Waterbody ID or RIVER ID from GIS Map Server</a>		
Waterbody Name from GIS Map Server		
Name the sub-watersheds (design-points) contributing to this Waterbody ID		
Is this Waterbody Impaired/TMDL for any Phosphorus, Metals or Bacteria?		NO
Is this Waterbody Impaired for Nitrogen?		NO

**Step 5 - Pre-Post Construction Conditions to the Waterbody**

Total Pre-Construction Impervious Surface to this Waterbody ID	0.00	acres
Total Disturbed Existing Impervious (DI)	0.00	acres
Total Post-Construction Impervious to this Waterbody ID	0.55	acres
Net Increased Impervious (NII)	0.55	acres

**Step 6 - Infiltration and BMP information** - Note: Increasing infiltration will likely decrease stormwater treatment area for Metals, Bacteria and Phosphorus

I am proposing to infiltrate this percentage WQv to this WBID	100%	%
I am proposing this number of BMP's	2	#

**RESULTS - Select the Larger Number of the 2 numbers provided**

Applicable Condition	Min Water Quality Treatment Area	Min Treatment w/o WQ consideration
No Impairment or TMDL - New Development	0.55	0.55
No Impairment or TMDL - Redevelopment		
Only Phosphorus, Metals or Bacteria Impairment - New Development		
Only Phosphorus, Metals or Bacteria Impairment - Redevelopment		
Nitrogen Impairment - New Development		
Nitrogen Impairment - Redevelopment		
<b>REQUIRED STORMWATER TREATMENT AREA</b>	<b>0.6</b>	acres

\* Enter the name of the STP (both type and label) which has been designed to treat this particular Rev or Rea.

## BMP-1 (StormTech MC-4500)

This BMP has been sized in accordance with Section 5.3 of the Rhode Island Stormwater Design and Installation Standards Manual, dated March 2015

### 1) Calculate Impervious Area Directed to Subsurface Infiltration System ( $A_{IMP}$ )

Cover Description	Area (S.F.)	(AC)
Total Impervious Area ( $A_{IMP}$ )	14,491	0.33

### 2) Calculated Water Quality Volume ( $WQ_v$ ) in accordance with Section 3.3.3

$$WQ_v = (1" * \text{Impervious Area}) / 12 = 1208 \text{ cf}$$

### 3) System Storage

Chamber Type	MC-4500	
No. of Chambers	37 each	
Storage per Chamber	162.6 cf	Chamber and Stone
Total System Storage	<b>6016.2 cf</b>	

System Storage		$WQ_v$
6,016	>	1,208

\*Storage provided is greater than  $WQ_v$ ; system is adequately sized

## BMP-3 (Bioretention Basin)

This BMP has been sized in accordance with Section 5.5 of the Rhode Island Stormwater Design and Installation Standards Manual, dated March 2015

### 1) Calculate Impervious Area Directed to Bioretention Basin ( $A_{IMP}$ )

Cover Description	Area (S.F.)
Total Impervious Area ( $A_{IMP}$ )	9,351

### 2) Size on the larger of Water Quality Volume or Recharge Volume

a) Calculated Water Quality Volume ( $WQ_v$ ) in accordance with Section 3.3.3

$$WQ_v = (1" * A_{IMP}) / 12 = 779 \text{ cf}$$

b) Calculated Recharge Volume ( $Re_v$ ) in accordance with Section 3.3.2

$$Re_v = (1")(F)(A_{IMP})/12 = 468 \text{ cf}$$

A Hydrologic Soil Group from RI Soil Survey  
 0.60 F (Recharge Factor from Table 3-4 of the RISDISM)  
 9,351 sf  $A_{IMP}$  (Impervious Area)

c) Required Volume ( $V_{REQ}$ )

Size Basin for Water Quality Volume

### 3) Size Sediment Forebay to Store 25% $WQ_v$ in accordance with Section 5.5.3

a) Calculated 25%  $WQ_v$  to be (658 cf) x (0.25) = 195 cf

b)  $Storage_{FOREBAY} = [(A_{BOTTOM} + A_{SPILL})/2] * D_{FOREBAY} = 270 \text{ cf}$

85 sf  $A_{BOTTOM}$  (surface area of bottom of forebay)  
 455 sf  $A_{SPILL}$  (surface area at spillway elevation)  
 1.00 ft  $D_{FOREBAY}$  (depth of forebay)

\*Storage provided is greater than 25%  $WQ_v$ ; forebay is adequately sized

**4) Calculate Minimum Surface Area of Bottom of Forebay ( $A_{MIN,FOREBAY}$ ) in accordance with Section 6.4.1**

a) Surface area of bottom of forebay provided = 85 sf

b)  $A_{MIN,FOREBAY} = 5,750 * [(0.25 * WQ_v) / 86,400 \text{ sec}] =$  **13 sf**  
 195 cf      25%  $WQ_v$  (Water Quality Volume)

**\*Surface area provided is greater than minimum surface area required; forebay is adequately sized**

**5) Calculate Basin  $WQ_v$  Storage in accordance with Section 5.5.4**

a) Calculated Surface Area measured in Autocad

b)  $\text{Storage}_{\text{BASIN}} = [((A_{\text{POND}} + A_{\text{FILTER}}) / 2) * D_{\text{POND}}] + (A_{\text{FILTER}} * df * p) =$  **613 cf**  
 462 sf       $A_{\text{POND}}$  (surface area at ponding depth)  
 0.75 ft       $D_{\text{POND}}$  (depth of ponding)  
 425 sf       $A_{\text{FILTER}}$  (surface area of filter media)  
 2 ft       $df$  (depth of filter bed)  
 0.33       $p$  (porosity of filter bed)

**\*Storage provided will be added to pretreatment storage to meet 75%  $WQ_v$  storage requirement**

**6) Calculate Minimum Surface Area of Bottom of Basin ( $A_{MIN,BASIN}$ ) in accordance with Section 5.5.4**

a) Surface area of filter media provided = 425 sf

b)  $A_{MIN,BASIN} = (WQ_v * df) / (k * ((D_{\text{POND}} / 2) + df) * tf) =$  **38 sf**  
 779 cf       $WQ_v$  (Water Quality Volume)  
 2 feet       $df$  (depth of filter bed)  
 8.7 ft/day       $k$  (coefficient of permeability of filter media)  
 0.75 ft       $D_{\text{POND}}$  (depth of ponding)  
 2 days       $tf$  (drain time)

**\*Surface area provided is greater than minimum surface area required; basin is adequately sized**

**7) Calculate Total Storage Provided in accordance with Section 5.5.4**a) Calculated 75% WQ<sub>v</sub> is 584 cf

$$\text{b) Storage}_{\text{TOTAL}} = (\text{Storage}_{\text{FOREBAY}}) + (\text{Storage}_{\text{BASIN}}) = \mathbf{883 \text{ cf}}$$

270 Storage<sub>FOREBAY</sub>  
613 Storage<sub>BASIN</sub>

**\*Storage provided is greater than 75% WQ<sub>v</sub> therefore, practice is adequately sized**

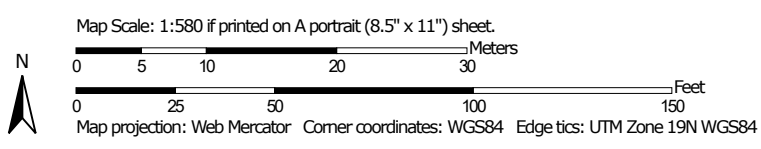
**8) Calculate Drawdown Time (tf<sub>ACTUAL</sub>)**

$$\text{tf}_{\text{ACTUAL}} = (\text{Storage}_{\text{BASIN}}) / (k * A_{\text{FILTER}}) = \mathbf{0.17 \text{ days}}$$

613 cf      Storage<sub>BASIN</sub>  
8.70 ft/day      k (coefficient of permeability)  
425 sf      A<sub>FILTER</sub> (surface area of filter media)


**\*Actual drawdown time is less than 2 days; basin is adequately sized**

Hydrologic Soil Group—State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties



## MAP LEGEND

### Area of Interest (AOI)









 Area of Interest (AOI)

### Soils

#### Soil Rating Polygons





-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

#### Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

#### Soil Rating Points



-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available


### Water Features

 Streams and Canals

### Transportation

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

### Background

 Aerial Photography

## MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties  
 Survey Area Data: Version 21, Sep 3, 2021

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

Date(s) aerial images were photographed: May 24, 2020—Jul 18, 2020

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

## Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
MU	Merrimac-Urban land complex, 0 to 8 percent slopes	A	1.4	100.0%
<b>Totals for Area of Interest</b>			<b>1.4</b>	<b>100.0%</b>

### Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

### Rating Options

*Aggregation Method:* Dominant Condition



*Component Percent Cutoff: None Specified*

*Tie-break Rule: Higher*



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program



Sht 1 of 2

Site Evaluation Form

Part A - Soil Profile Description

Application Number

Property Owner: Amalgamated Financial Equities, LLC

Property Location: Oaklawn Avenue, Cranston

Date of Test Hole: September 13, 2022

Soil Evaluator: Steven Henry

License Number: D40260

Weather: RAIN 70°





Shaded: Yes [ ] No [x] Time: 10 AM

Table with 10 columns: TH Horizon, Depth, Horizon Boundaries (Dist, Topo), Soil Colors (Matrix, Re-Dox Features), Re-Dox (Ab., S., Contr.), Texture, Structure, Consistence, Soil Category. Includes handwritten entries for two soil profiles (TH 1 and TH 2) with various soil types like SL, CL, and 2C.

TH 1 Soil Class Total Depth 18'± Impervious/Limiting Layer Depth none (og) GW Seepage Depth none SHWT >16' below grade
TH 2 Soil Class Total Depth 19'6"± Impervious/Limiting Layer Depth none (og) GW Seepage Depth none SHWT >17' below grade

Comments: 15' pipes installed in SEV's 1 & 2

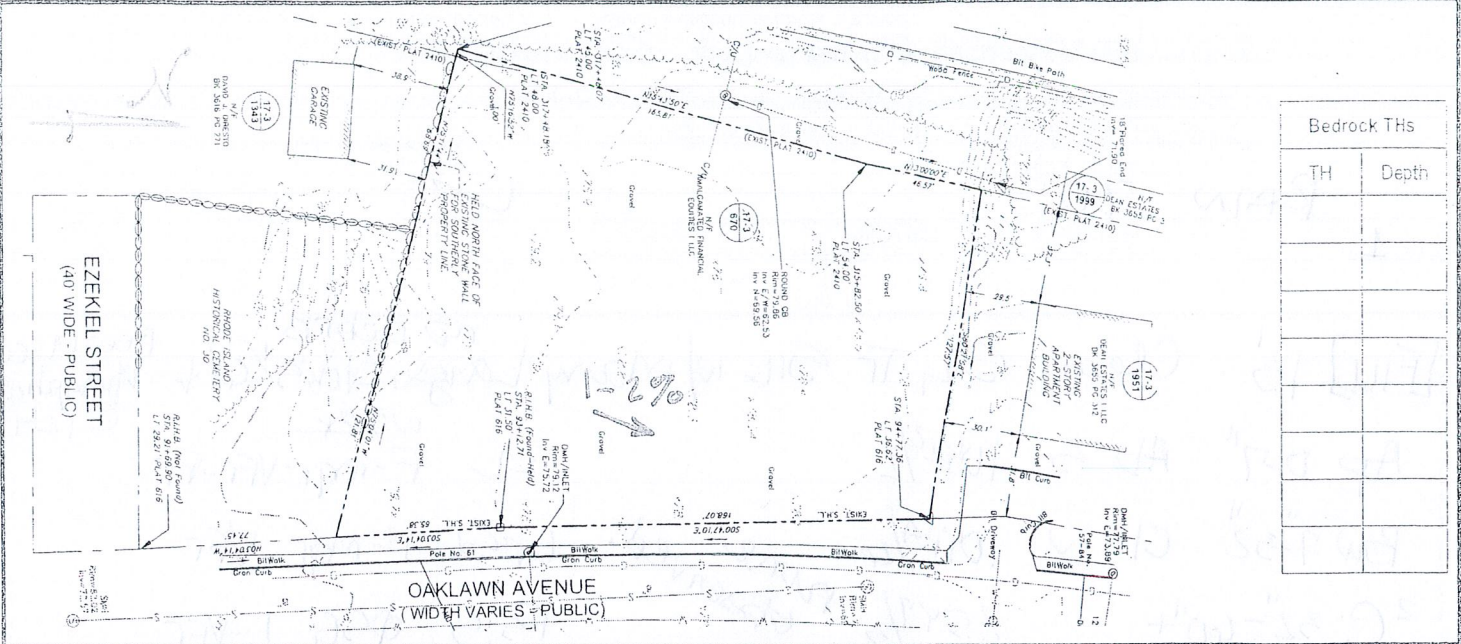


-  Approximate location of test holes
-  Approximate location of bedrock test holes
-  Estimated gradient and direction of slope
-  Approximate direction of due north

Site Evaluation - to be completed by Soil Evaluator or Class II or III Designer

Please use the area below to locate:

1. Test holes and bedrock test holes,
  2. Approximate direction of due north,
  3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object.\*
- \*OFFSETS MUST BE SHOWN



1. Relief and Slope: 1-2% NNE
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes? If yes, locate on above sketch. NO  YES
3. Restrictive Layer or Bedrock within 4' below original ground within 25 feet of test hole? Provide all test hole locations & depths above. NO  YES
4. Presence of existing or proposed private drinking water wells within 200 feet of test holes? If yes, locate on above sketch. NO  YES
5. Public drinking water wells within 500 feet of test holes? If yes, locate on above sketch. NO  YES
6. Is site within the watershed of a public drinking water reservoir or other critical area defined in Rule 6.42? NO  YES
7. Has soil been excavated from or fill deposited on site? If yes, locate on above sketch. Site has been graded & Filled ± 12'-15' NO  YES
8. Site's potential for flooding or ponding: NONE  SLIGHT  MODERATE  SEVERE
9. Landscape position: Foot slope
10. Vegetation: Scrub - Field grasses
11. Indicate approximate location of property lines and roadways.
12. Additional comments, site constraints or additional information regarding site: \_\_\_\_\_

**Certification**  
 The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: [Signature] License # D4026 Part B prepared by: [Signature] License # \_\_\_\_\_

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur  Inconclusive  Disclaim

Unwitnessed Soil Evaluations Decision: Accept  Inconclusive  Disclaim

Wet Season Determination required  Additional Field Review Required

Explanation: \_\_\_\_\_

Signature Authorized Agent \_\_\_\_\_ Date \_\_\_\_\_





STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management  
Office of Water Resources  
Onsite Wastewater Treatment Systems Program



Smt 2 002

Site Evaluation Form

Part A - Soil Profile Description

Application Number \_\_\_\_\_

Property Owner: Amalgamated Financial Equities, LLC

Property Location: Oaklawn Avenue, Cranston

Date of Test Hole: September 13, 2022

Soil Evaluator: Steven Henry License Number: D40260

Weather: Rain 70° Shaded: Yes  No  Time: 10 AM

TH Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox		Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S. Contr.				
[Fill]	16'6"±	clean		no debris SL, Tr SIL					Few Large bldgs > 10"± Wood Slash @ 12"±		
Bw	0-12"±	cl w		10YR4/6				SL, LS	F-mar	Vfr	
2C <sup>1</sup>	12"-26"±	cl w		10YR5/4				LS	Fgr φSG	Vfr-L	
2C <sup>2</sup>	26"-42"±			2.5Y7/3	none observed			S, fs	φSG	L	

TH 3 Soil Class \_\_\_\_\_ Total Depth 20.5'± Impervious/Limiting Layer Depth none (og) GW Seepage Depth none SHWT > 10' below (og) next grade

TH \_\_\_\_\_ Soil Class \_\_\_\_\_ Total Depth \_\_\_\_\_ Impervious/Limiting Layer Depth \_\_\_\_\_ (og) GW Seepage Depth \_\_\_\_\_ SHWT \_\_\_\_\_ (og)

Comments: \_\_\_\_\_



Site Evaluation - to be completed by Soil Evaluator or Class II or III Designer

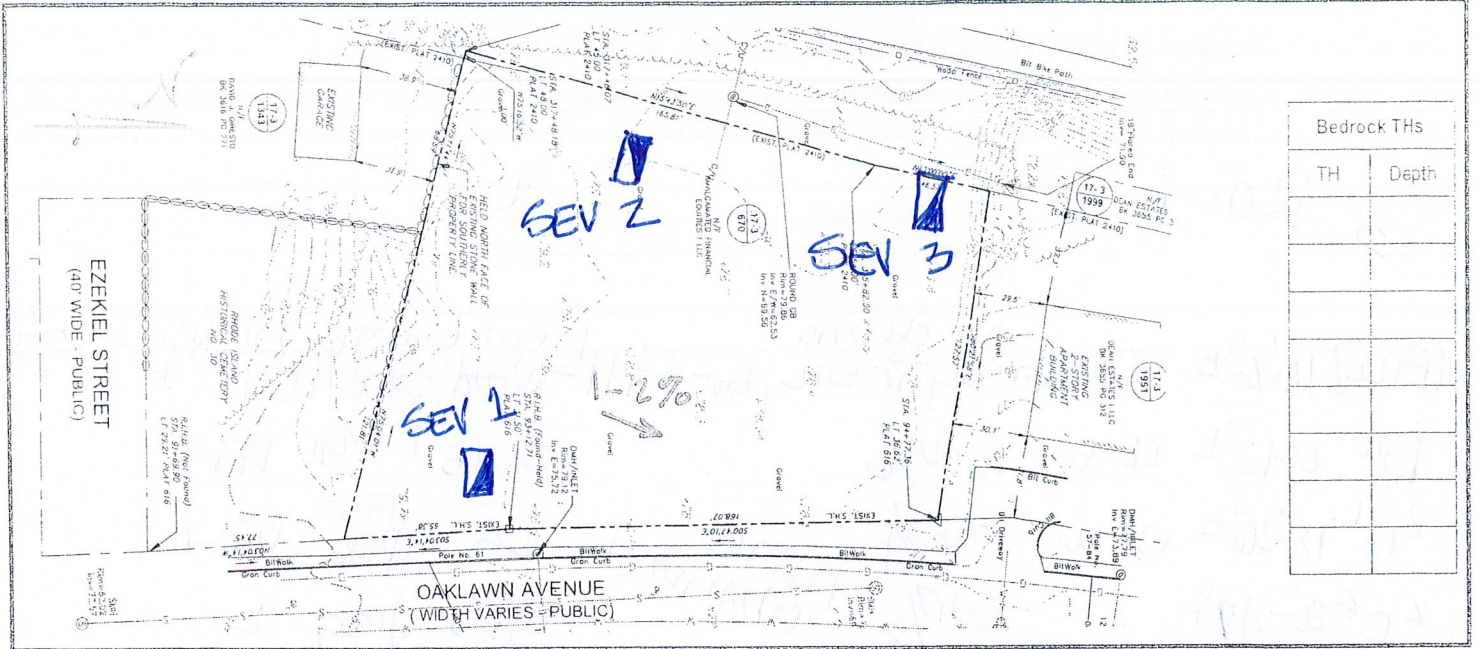
Please use the area below to locate:

1. Test holes and bedrock test holes,
2. Approximate direction of due north,
3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object.\*

\*OFF SETS MUST BE SHOWN

Key:

- Approximate location of test holes
- Approximate location of bedrock test holes
- Estimated gradient and direction of slope
- Approximate direction of due north



1. Relief and Slope: 1-2% NNE
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes? If yes, locate on above sketch. NO  YES
3. Restrictive Layer or Bedrock within 4' below original ground within 25 feet of test hole? Provide all test hole locations & depths above. NO  YES
4. Presence of existing or proposed private drinking water wells within 200 feet of test holes? If yes, locate on above sketch. NO  YES
5. Public drinking water wells within 500 feet of test holes? If yes, locate on above sketch. NO  YES
6. Is site within the watershed of a public drinking water reservoir or other critical area defined in Rule 6.42? NO  YES
7. Has soil been excavated from or fill deposited on site? If yes, locate on above sketch. NO  YES  Site has been graded & filled ± 12'-5"
8. Site's potential for flooding or ponding: NONE  SLIGHT  MODERATE  SEVERE
9. Landscape position: Foot slope
10. Vegetation: Scrub - Field grasses
11. Indicate approximate location of property lines and roadways.
12. Additional comments, site constraints or additional information regarding site: 18" ± - CPP @ west end of excavation low, 8' 0" ± below existing grade

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: [Signature] License # \_\_\_\_\_ Part B prepared by: [Signature] License # \_\_\_\_\_

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur  Inconclusive  Disclaim

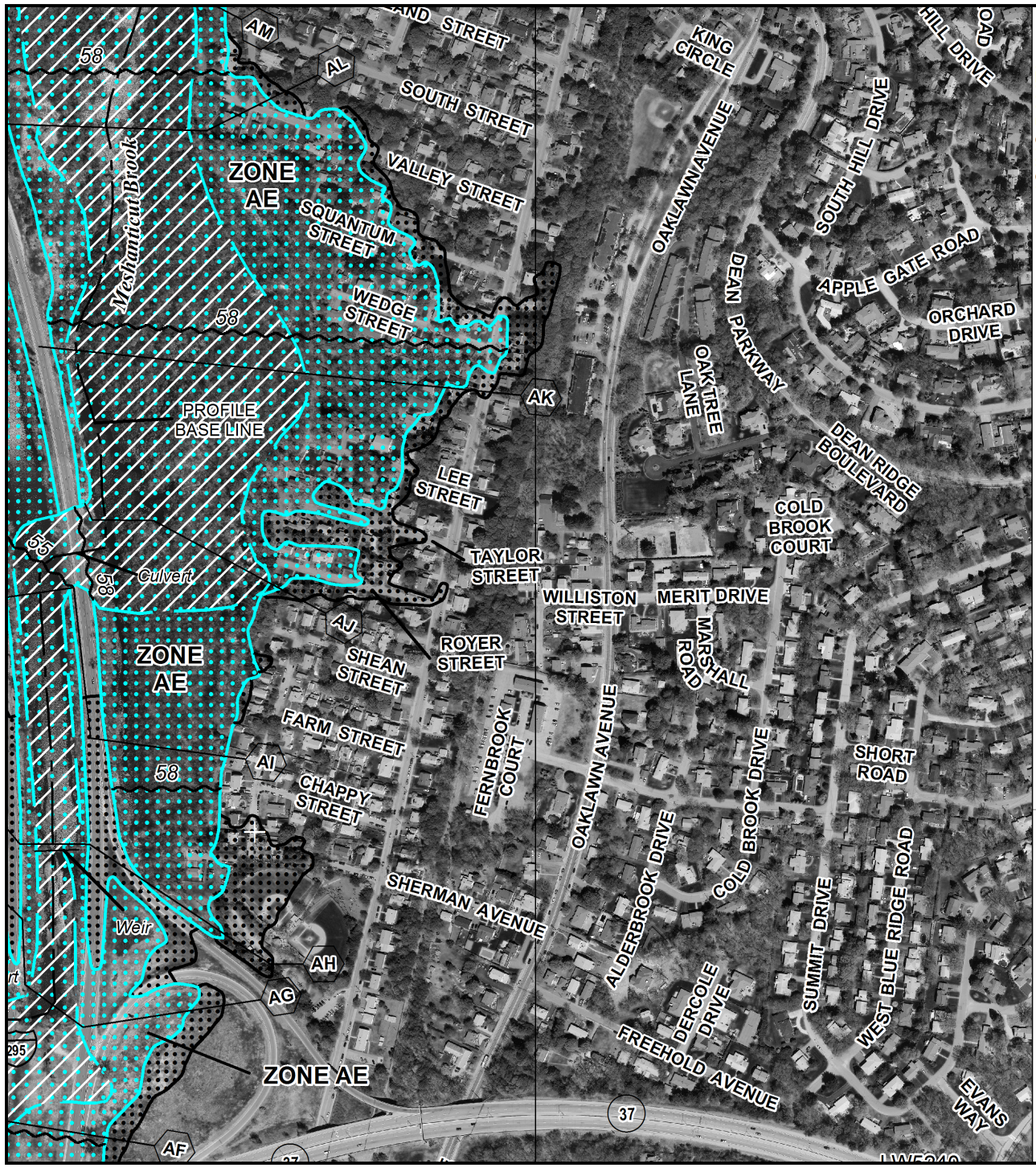
Unwitnessed Soil Evaluations Decision: Accept  Inconclusive  Disclaim

Wet Season Determination required  Additional Field Review Required

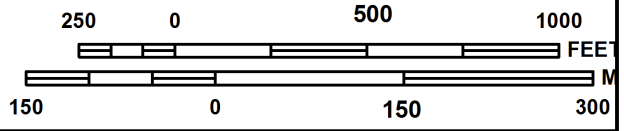
Explanation: \_\_\_\_\_

Signature Authorized Agent \_\_\_\_\_ Date \_\_\_\_\_





MAP SCALE 1" = 500'



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0313H

**FIRM**  
**FLOOD INSURANCE RATE MAP**  
**Providence County,**  
**Rhode Island**  
**(ALL JURISDICTIONS)**

PANEL 313 OF 451  
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CRANSTON, CITY OF	445396	0313	H



MAP NUMBER  
 44007C0313H  
 MAP REVISED  
 OCTOBER 2, 2015

Federal Emergency Management Agency

This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at <https://msc.fema.gov>.