STORMWATER POLLUTION PREVENTION PLAN

For the:

Mirabito Convenience Store

2877 E. Main Street

(NYS Route 69)

Parish, NY 13131

Prepared for:

Mirabito Holdings, Inc.

49 Court Street

Binghamton, NY 13901

Prepared by:

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Project No. 22-2214

April 2023

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EXECUTIVE SUMMARY

A. Purpose

The following Stormwater Pollution Prevention Plan (SWPPP) has been developed to control stormwater runoff and pollutants from a site during and after construction activities. The objective of this SWPPP is to comply with the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-20-001) by planning and implementing standard design practices.

B. Project Description

The proposed project will redevelop and expand the existing Mirabito gas station/convenience store on the south side of NYS Route 69 in the Village of Parish, Oswego County, NY. The project includes approximately 2.8 acres, including the existing Mirabito store and the acquired parcel to the west. The proposed project consists of a single-story, ±6.450 square-foot (sf) building consisting of a convenience store with a gasoline/diesel fueling island and an attached coffee/donut shop with a drive-thru. The project will include associated asphalt parking and driveways, concrete sidewalks, a dumpster enclosure, and stormwater mitigation facilities. Access to the site will be provided by two full access driveways on NYS Route 69.

C. Stormwater Practices

Stormwater practices are categorized as either temporary construction measures or permanent operation measures. The temporary measures that will be used on this site for erosion and sediment control include (but are not limited to): stabilized construction entrance, silt fencing, and temporary sediment basins. The permanent stormwater practices to be installed are three bioretention filters, an above ground infiltration basin, and an above ground grass-lined detention basin. These best management practices will provide water quality, runoff reduction, and storage for quantity control. All practices, both the temporary construction measures and the permanent operation measures, have been designed in accordance with the established standards.

D. Water Quality Treatment

The water quality volume treatment characteristics are summarized below. The entire water quality descriptions and calculations are further detailed in Section III.E and F.

Water Quality Volume	
Required WQv (ac-ft)	**Total Provided WQv (ac-ft)**
0.047	0.172

E. Runoff Reduction Volume (RRv)

The NYSDEC regulation requires all construction projects that disturb greater than one acre of land to provide runoff reduction through the implementation of green infrastructure practices. Runoff reduction volume for this project is achieved using bioretention areas and the infiltration basin. This volume is summarized below and further detailed in Section III.D, E, and F.

Runoff Reduction Volume	
Required RRv (ac-ft)	**Total Provided RRv (ac-ft)**
0.043	0.114

F. Stormwater Quantity

The impacts to stormwater runoff quantity (i.e. peak flows) will be mitigated in the aboveground grass-lined detention basin, temporary storage within the bioretention filters, and the above-ground infiltration basin located on the site. The detention basin will be constructed with sufficient volume to store additional runoff from the site and discharge it in a controlled manner. The chart below summarizes the stormwater discharges from the site and is further detailed in Section III.G and H.

	Existing Peak Runoff Rate (cfs)	**Proposed Peak Runoff Rate (cfs)**
	Existing Reach	Proposed Reach
1-Year Storm	0.4	0.4
10-Year Storm	3.1	1.7
100-Year Storm	10.4	5.3

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Section I. SCOPE

A. PURPOSE

Napierala Consulting, Professional Engineer, P.C., has prepared this Stormwater Pollution Prevention Plan (SWPPP) in compliance with the New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) Construction General Permit governing stormwater discharges during construction. The contractor's participation and adherence to this plan is mandatory. Non-compliance with the plan is subject to various remedies including, without limitation, monetary set-offs, withholding payments, reimbursement for costs, expenses (including reasonable attorney's fees), fines and civil penalties incurred and/or liquidated damages. This section provides a descriptive explanation of the Stormwater Pollution Prevention Plan and required contractor participation.

B. SPDES GENERAL PERMIT GP-0-20-001

Regulations enacted by the New York State Department of Environmental Conservation require permitting for the discharge of stormwater from construction activities on sites where an area of one acre or more of soil disturbance is proposed. To comply with these regulations, the developer of the site must request coverage under the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-20-001). In order to obtain coverage under the General Permit a Stormwater Pollution Prevention Plan (SWPPP) for the site must be prepared following the requirements of the New York State Stormwater Management Design Manual and the New York State Standards and Specifications for Erosion and Sediment Control.

The NOI, the SWPPP, and any amendments to the SWPPP, as well as any reports required by the SPDES General Permit for Stormwater Discharges from Construction Activity, must also be submitted concurrently to the local governing body and any other authorized agency having jurisdiction or regulatory control over the construction project.

C. RESPONSIBILITIES OF THE OWNER

The owner/operator shall identify the contractor(s) and subcontractor(s) that will be responsible for installing, constructing, repairing, replacing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP. The owner/operator shall identify the contractor(s) and subcontractor(s) that will be responsible for constructing the post-construction stormwater management practices included in the SWPPP. The owner/operator shall have each of the contractors and subcontractors identify at least one person from their company that will be responsible for implementation of the SWPPP. The owner/operator shall ensure that at least one trained contractor is on site on a daily basis when soil disturbance activities are being performed. The owner/operator shall have a qualified inspector conduct site inspections.

D. RESPONSIBILITIES OF THE CONTRACTOR

The contractor shall manage the discharge of stormwater from the site in accordance with the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity. The owner shall be responsible for conducting the stormwater management practices in accordance with the permit. The contractor shall be responsible for providing qualified inspectors to conduct the inspections required by the SWPPP. The contractor shall be responsible for any enforcement action taken or imposed by federal, state, or local agencies, including the cost of fines, construction delays, and remedial actions resulting from the contractor's failure to comply with the permit provisions. It shall be the responsibility of the contractor to make any changes to the SWPPP necessary when the contractor or any of his subcontractors elects to use borrow or fill or material storage sites, either contiguous to or remote from the construction site, when such sites are used solely for this construction site. Such sites are considered to be part of the construction site covered by the permit and this SWPPP. Off-site borrow, fill, or material storage sites which are used for multiple construction projects are not subject to this requirement, unless specifically required by state or local jurisdictional entity regulations. The contractor should consider this requirement in negotiating with earthwork subcontractors, since the choice of an off-site borrow, fill, or material storage site may impact their duty to implement, make changes to, and perform inspections required by the SWPPP for the site.

The SWPPP shall provide forms for both the general contractor and subcontractor(s) identifying the company name, business address and telephone number along with the responsible person for the contractor and all subcontractors' who will implement the measures identified in the SWPPP. **The general contractor shall sign the "General Contractor's Certification" and all subcontractors shall sign the "Subcontractor's Certification",** verifying they have been instructed on how to comply with and fully understand the requirements of the NYSDEC and SWPPP. **This certification must be signed, by a fully qualified individual on behalf of each entity, prior to the beginning of any construction activities and shall be filed in the projects SWPPP.**

The SWPPP is meant to be a working document that shall be maintained at the site of the construction activities at all times throughout the project, shall be readily available upon request by the operator's personnel or NYSDEC or any other agency with regulatory authority over storm water issues, and shall be kept on-site until the site complies with the Final Stabilization section of this document. **A sign or other notice must be posted near the main entrance of the construction site which contains a completed NOI, the location of the SWPPP and the name and phone number of a contact person responsible for scheduling SWPPP viewing times, and any other state specific requirements.**

E. NOTICE OF INTENT

The operator has petitioned the NYSDEC for the stormwater discharges during construction at this site to be covered by the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity. A **Notice of Intent** (NOI) to be covered under this permit has been filed by the operator. The signatory on the NOI must sign all documents (i.e., inspection reports) associated with the SWPPP. If the signatory chooses not to sign all documents, he/she must designate a duly authorized representative to sign all relevant documents. This designation must be made in writing and be included in the SWPPP. The duly authorized representative may be either a named individual or any individual occupying a named position. Additionally, the written designation must be submitted to the NYSDEC.

F. STORMWATER INSPECTIONS

1. Inspection Procedures

Inspections of the erosion control practices are required every seven days by a qualified professional. All inspections will continue until the site complies with the final stabilization section of this document. **Weekly Inspections must be conducted by a "Qualified Professional". "Qualified Professional" means a person knowledgeable in the principles and practice of erosion and sediment controls, such as a licensed Professional Engineer (PE), Certified Professional in Erosion and Sediment Control (CPESC), or soil scientist.** Each inspection must be followed up by a report documenting the inspector's findings and request the required maintenance and/or repair for the erosion and sedimentation control measures. It is imperative that the contractor documents the inspection and maintenance of all erosion and sedimentation control measures as soon as possible after the inspection and/or maintenance have been completed. These records are used to prove that the required inspection and maintenance were performed. The records shall be placed in the SWPPP. In addition to inspection and maintenance reports, records should be kept of the construction activities that occur on the site. The operator shall post at the site, in a publicly-accessible location, a summary of the site inspection activities on a monthly basis.

2. Record Keeping

The operator shall also prepare a written summary of its status with respect to compliance with this general permit at a minimum frequency of every three months during which coverage under the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity exists. The summary should address the status of achieving each component of the SWPPP. The reports shall be signed by the signatory of the NOI or a duly-authorized person and be retained at the construction site.

The contractor shall retain copies of the SWPPP, all reports and data for a minimum of five (5) years after the project. The following list identifies the required inspection and maintenance documentation that must be maintained by the contractor under this SWPPP.

- Inspection Report
- Stabilization Schedule
- Implementation Schedule
- Status Report

G. SWPPP MODIFICATIONS

The inspection report should also identify if any revisions to the SWPPP are warranted due to unexpected conditions. The SWPPP is meant to be a dynamic working guide that is to be kept current and amended whenever:

- The NYSDEC provides notification that the SWPPP does not comply with the minimum permit requirements.
- The design, construction, operation, or maintenance of the site changes in a way which significantly affects the potential for the discharge of pollutants or when the plan proves to be ineffective in eliminating or significantly minimizing pollutant discharges
- Within seven (7) calendar days of knowledge of a reportable release.

Any such changes to the SWPPP must be made in writing within seven (7) days of the date such modification or amendment is made. The contractor's failure to monitor or report deficiencies to the operator will result in the contractor being liable for fines and construction delays resulting from any federal, state, or local agency enforcement action.

H. FINAL STABILIZATION AND TERMINATION OF PERMIT COVERAGE

A site can be considered stabilized when all soil disturbing activities have been completed and a uniform perennial vegetative cover with a density of 80% over the unpaved areas and areas not covered by permanent structures has been established or equivalent permanent stabilization measures have been established and the facility no longer discharges stormwater associated with construction activities, and a **Notice of Termination** (NOT) form has been filed by the operator(s) with the NYSDEC. Prior to filing of the Notice of Termination, the operator shall have the qualified professional perform a final site inspection. The qualified professional shall certify that the site has undergone final stabilization using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fence) not needed for long-term erosion control have been removed. The filing of the NOT terminates coverage under the General Permit and terminates the contractor's responsibility to implement the SWPPP, but the requirements of the SWPPP, including periodic inspections, must be continued until the NOT is filed. Upon achieving this milestone, the contractor shall also submit "Final Stabilization Certification/Termination Checklist". Final payment and/or the release of any retainer will be withheld until all provisions of the SWPPP have been submitted, completed and accepted by the operator.

Section II. SITE DESCRIPTION

A. PROJECT NAME AND LOCATION

Mirabito Convenience Store
2877 E. Main Street (NYS Route 69)
Village of Parish, Oswego County, NY

UTM Coordinates from NYSDEC Interactive Map: E: 409369; N: 4806346
NYSDEC Region 7

Figure 1 shows the project location on a street map and Figure 2 shows an aerial image of the project site in its existing condition.

B. OWNER/OPERATOR NAME AND ADDRESS

Mirabito Holdings, Inc.
49 Court Street
Binghamton, NY 13902
Contact: Brett Hughes
Phone: 315-725-3781

Figure 1: Site Location Map

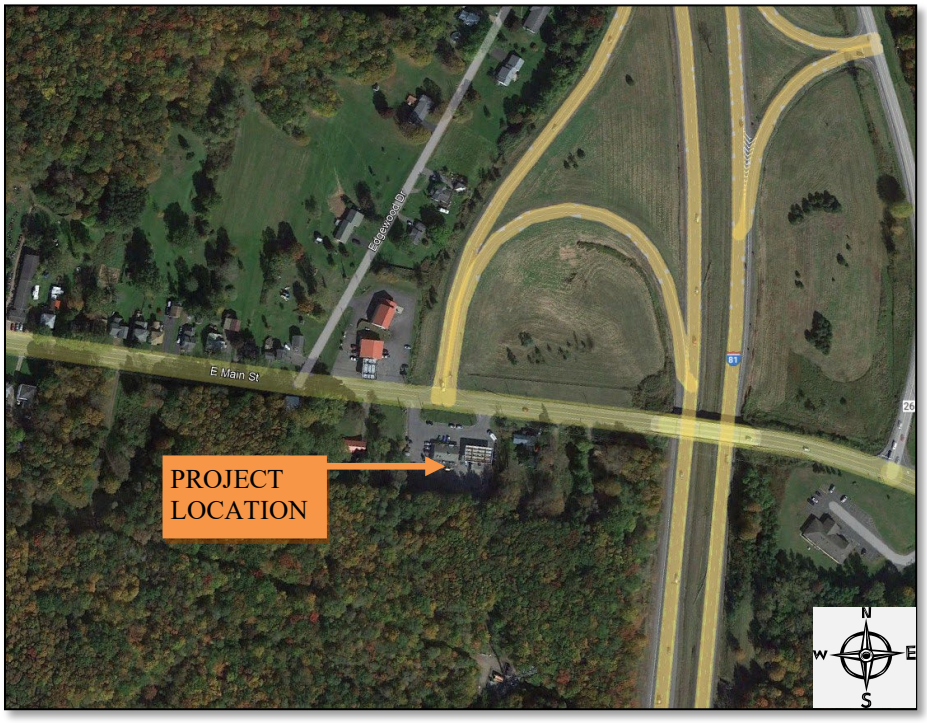


Figure 2: Proposed Site Aerial Image - Google Earth

C. PROJECT DESCRIPTION

The proposed project will redevelop and expand the existing Mirabito gas station/convenience store on the south side of NYS Route 69 in the Village of Parish, Oswego County, NY. The project site includes approximately 2.8 acres, including the existing Mirabito store and the acquired parcel to the west. The proposed project consists of a single-story, ±6,450 square-foot convenience store with a drive-thru coffee/donut shop, a gasoline/diesel fueling island, and a vehicle e-charging station. The project will include associated asphalt parking and driveways, concrete sidewalks, a dumpster enclosure, and stormwater management facilities. Access to the site will be provided by two full access driveways on NYS Route 69.

D. RECEIVING WATERS

Runoff from the project site generally flows to the north towards a roadside drainage ditch along NYS Route 69. From the drainage ditch, stormwater drains to the northwest, where it is routed through a 24 culvert that runs north beneath NYS Route 69, eventually flowing into North Branch Little Salmon River. The NYS DEC Environmental Resource Mapper shows that no DEC or Federally regulated wetlands are within the general vicinity of the project site. This project site is not within a regulated MS4 (Municipal Separate Storm Sewer System) nor a Watershed Improvement Strategy area. Figure 3 shows the project site location in relation to local streams/rivers and MS4 municipality boundaries using the NYS Stormwater Interactive Mapper. Figure 4 shows the project site location in relation to federal and state listed wetlands or environmental check zone boundaries using the NYSDEC Environmental Resource Mapper.

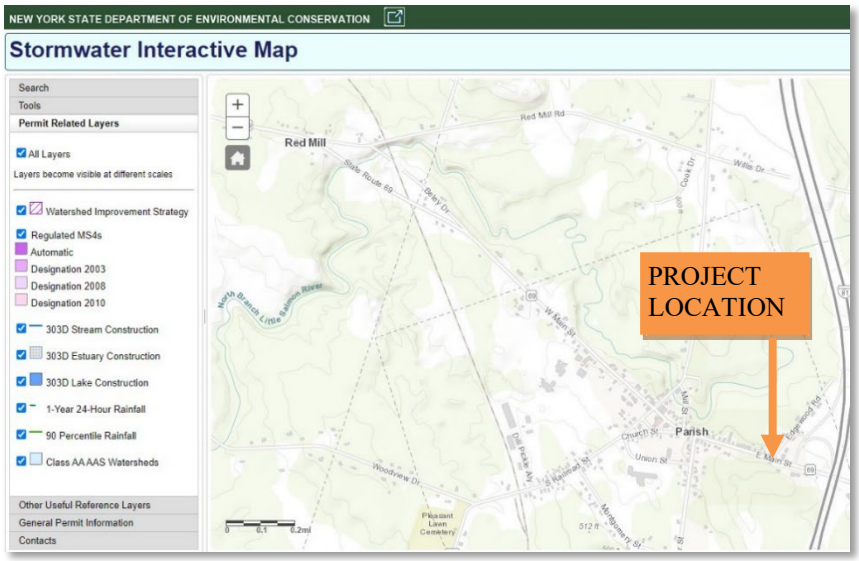


Figure 3: NYSDEC Stormwater Interactive Map

E. ENDANGERED OR THREATENED SPECIES

The NYS DEC Environmental Resource Mapper does not identify the site as containing any rare significant natural communities and is not within the check zone for rare plants or animals as seen in Figure 4.

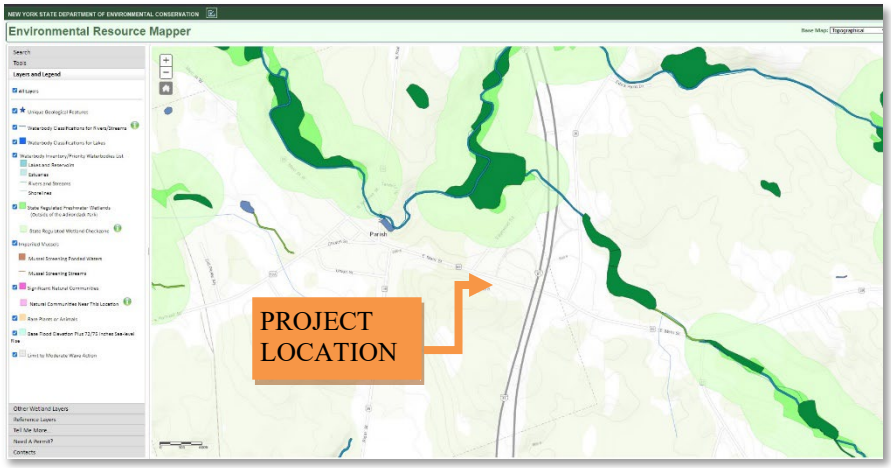


Figure 4: NYS DEC Environmental Resource Mapper

F. FEDERAL AND STATE HISTORIC PRESERVATION

The SPDES (State Pollutant Discharge Elimination System) GP-0-20-001 requires that the discharge from construction activities shall not influence properties listed as or eligible for listing on the State or National Register of Historic Places. Figure 5 shows the SHPO (State Historic Preservation) map which indicates the project is not within an archeological check zone (gray bubble).

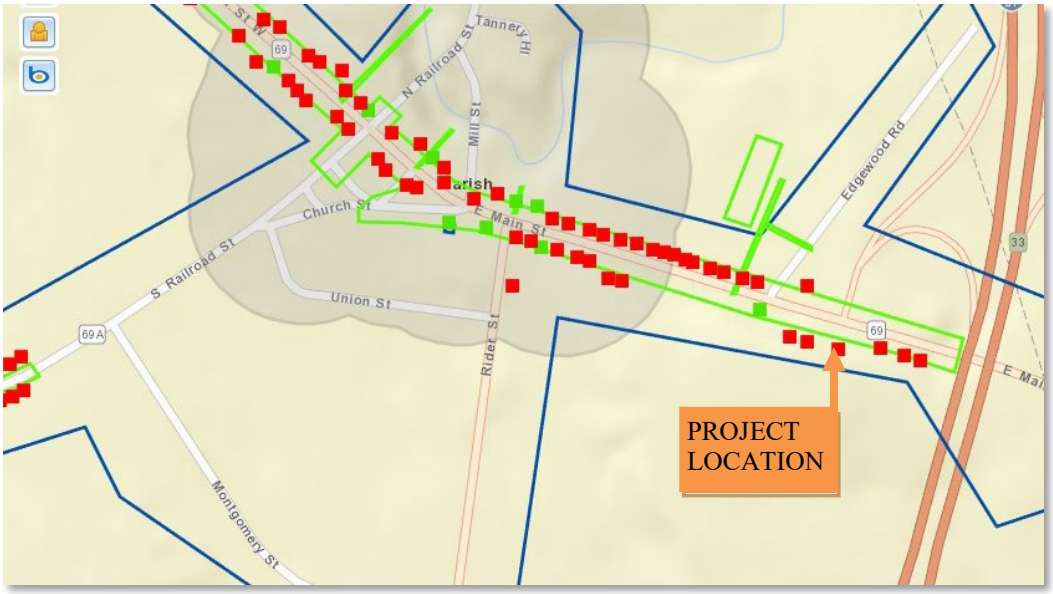


Figure 5: State Historic Preservation Office Map

Section III. STORMWATER MANAGEMENT

A. METHODOLOGY

1. Hydrologic Conditions

The peak runoff rates for the site were calculated for the existing and proposed hydrologic conditions using HydroCAD software. The HydroCAD program uses the standard SCS TR-55 Curve Number Method for calculation of the time of concentration, composite curve number, and peak runoff rates for the drainage area(s) based on input by the user. The input data was taken from soil maps, detailed topographic and utility survey information, rainfall distribution maps, and aerial images. The required Water Quality Volume (WQ_v) was calculated in accordance with the New York State Stormwater Management Design Manual. The Channel Protection Volume (Cp_v) was calculated based on the release of the 1-year storm runoff volume over a 24-hour period. The hydrologic conditions are used to assess the impacts to the runoff characteristics and to design appropriate measures to mitigate these impacts. The NYS SPDES General Permit for Stormwater Discharges from Construction Activity requires that a stormwater mitigation system meet the following five design criteria.

- Water Quality Volume (WQ_V): As a redevelopment project with an increase in impervious area, the system must capture and treat 25% of the existing disturbed impervious area annual runoff volume, and 100% of newly proposed impervious surface annual runoff volume.
- Runoff Reduction Volume (RR_V): The system must apply green infrastructure techniques and Stormwater Management Practices to replicate pre-development hydrology.
- Channel Protection Volume (CP_V): The system must provide 24-hour extended detention of the runoff from the one-year, 24-hour rainfall event.
- Overbank Flood ($Q_{P\ 10}$): The system must attenuation of the post-development 10-year, 24-hour peak discharge rate to predevelopment levels.
- Extreme Flood ($Q_{P\ 100}$): The system must attenuation of the post-development 100-year, 24-hour peak discharge rate to predevelopment levels.

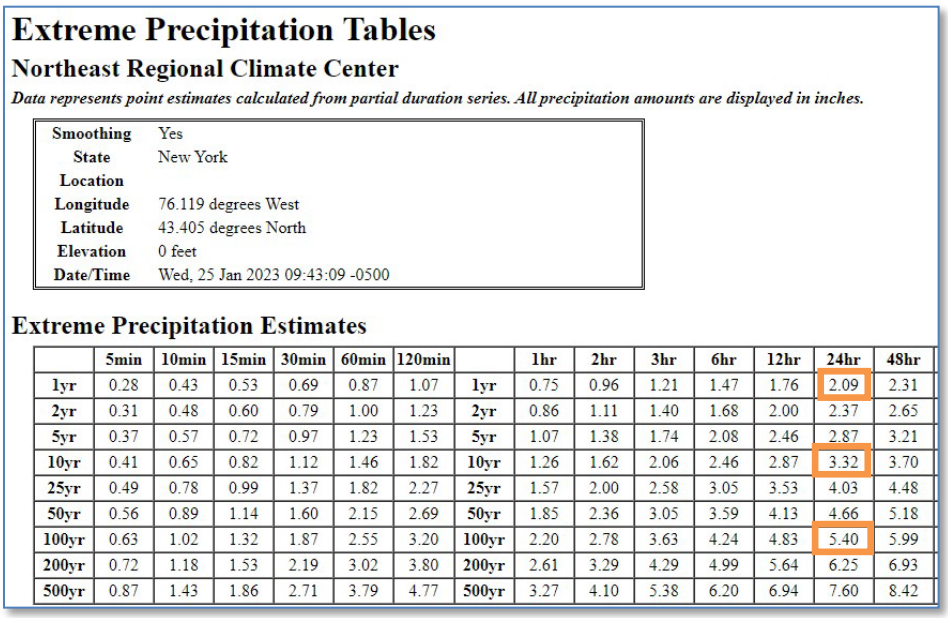
As previously discussed in this report, this project is classified as a redevelopment with an increase in total impervious surfaces. According to Chapter 9 of the New York State Stormwater Management Design Manual, a redevelopment project with an increase in impervious area may achieve the water quality treatment requirement by accommodating a minimum of 25% of the WQV from the existing, disturbed impervious area and 100% of any additional proposed impervious surfaces captured and treated through the implementation of standard Stormwater Management Practices (SMPs). Additionally, meeting RRV sizing criteria is not required for the redevelopment activity portion of a project.

2. Rainfall Information

The following table shows the rainfall values used in the design of the stormwater mitigation basin. These values are taken from rainfall distribution maps provided by the Northeast Regional Climate Center and the New York State Stormwater Management Design Manual, which can be seen on the following page. These values are applied to a Type II 24-hour rainfall distribution in the modeling of the watersheds using the HydroCAD program.

Table 1: Rainfall Information

Precipitation Event	Rainfall (in)
90% Rainfall (WQ_v)	1.0
1-Yr, 24-Hr (Cp_v)	2.09
10-Yr, 24-Hr (Q_p)	3.32
100-Yr, 24-Hr (Q_f)	5.40



Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New York
Location	
Longitude	76.119 degrees West
Latitude	43.405 degrees North
Elevation	0 feet
Date/Time	Wed, 25 Jan 2023 09:43:09 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr
1yr	0.28	0.43	0.53	0.69	0.87	1.07	**1yr**	0.75	0.96	1.21	1.47	1.76	2.09	2.31
2yr	0.31	0.48	0.60	0.79	1.00	1.23	**2yr**	0.86	1.11	1.40	1.68	2.00	2.37	2.65
5yr	0.37	0.57	0.72	0.97	1.23	1.53	**5yr**	1.07	1.38	1.74	2.08	2.46	2.87	3.21
10yr	0.41	0.65	0.82	1.12	1.46	1.82	**10yr**	1.26	1.62	2.06	2.46	2.87	3.32	3.70
25yr	0.49	0.78	0.99	1.37	1.82	2.27	**25yr**	1.57	2.00	2.58	3.05	3.53	4.03	4.48
50yr	0.56	0.89	1.14	1.60	2.15	2.69	**50yr**	1.85	2.36	3.05	3.59	4.13	4.66	5.18
100yr	0.63	1.02	1.32	1.87	2.55	3.20	**100yr**	2.20	2.78	3.63	4.24	4.83	5.40	5.99
200yr	0.72	1.18	1.53	2.19	3.02	3.80	**200yr**	2.61	3.29	4.29	4.99	5.64	6.25	6.93
500yr	0.87	1.43	1.86	2.71	3.79	4.77	**500yr**	3.27	4.10	5.38	6.20	6.94	7.60	8.42

Figure 6: Northeast Regional Climate Center Design Storms

3. Soil Information

The majority of the soils within the project site area consist of Worth very fine sandy loam and Alton gravelly fine sandy loam which are classified as Hydrologic Soil Group B and A, respectively. This indicates that the site should have high transmissive soils if undeveloped. The NRCS Soil Survey Map is shown in Figure 7 below and the soil descriptions can be reviewed in Appendix A.

Figure 7: Project Site NRCS Soil Survey Map

B. EXISTING CONDITIONS

The existing project area consists of mixed brush, woodland, grass. and impervious areas from both the existing convenience store/pump island and neighboring homes to the east and west of the project site. The 4.9-acre drainage area for the project site was analyzed and separated into two separate drainage areas (EX-DA-1 & EX-DA-2) that are both ultimately tributary to a 24" NYSDOT culvert located in the NYS Route 69 drainage ditch near the northwest of the project site. Peak runoff rates for pre and post-development conditions were analyzed at a point of study located at the inlet to the 24" culvert within the NYS Route 69 drainage ditch. In existing conditions, the project site has approximately 0.89 acres of total impervious area consisting of the existing building, pump island, driveways, sidewalks, and parking areas. The following tables and summaries provide a detailed overview of the existing hydrologic conditions of the project site and surrounding areas. The following tables and summaries detail the existing drainage conditions for the project site. All drainage calculations used for the existing condition analysis can be found within the existing condition HydroCAD report included within Appendix B. Figure 8, detailing the existing conditions drainage map, has been included at the end of this section.

EX-DA-1, totaling 3.3 acres, encompasses the project site, drainage from NYS Route 69, and portions of the neighboring properties to the west and south. Landcover within this model consists of grassy areas, woodlands, and impervious areas from the existing structure, driveways, and roadways. Slopes vary greatly for this drainage area, with runoff generally flowing to the north into the roadside drainage ditch along NYS Route 69.

Table 2: Existing Drainage Area 1 Hydrologic Conditions

Area (ac)	CN	Description
1.000	98	Paved parking, HSG A
1.100	39	>75% Grass cover, Good, HSG A
1.200	61	>75% Grass cover, Good, HSG B
3.300	65	Weighted Average
2.300		69.70% Pervious Area
1.000		30.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0700	0.11		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.37"
2.3	220	0.1000	1.58		**Shallow Concentrated Flow, Shallow Conc. Flow** Woodland Kv= 5.0 fps
0.5	188	0.0180	6.45	19.34	**Channel Flow, Roadside ditch** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.022 Earth, clean & straight
17.9	508	Total			

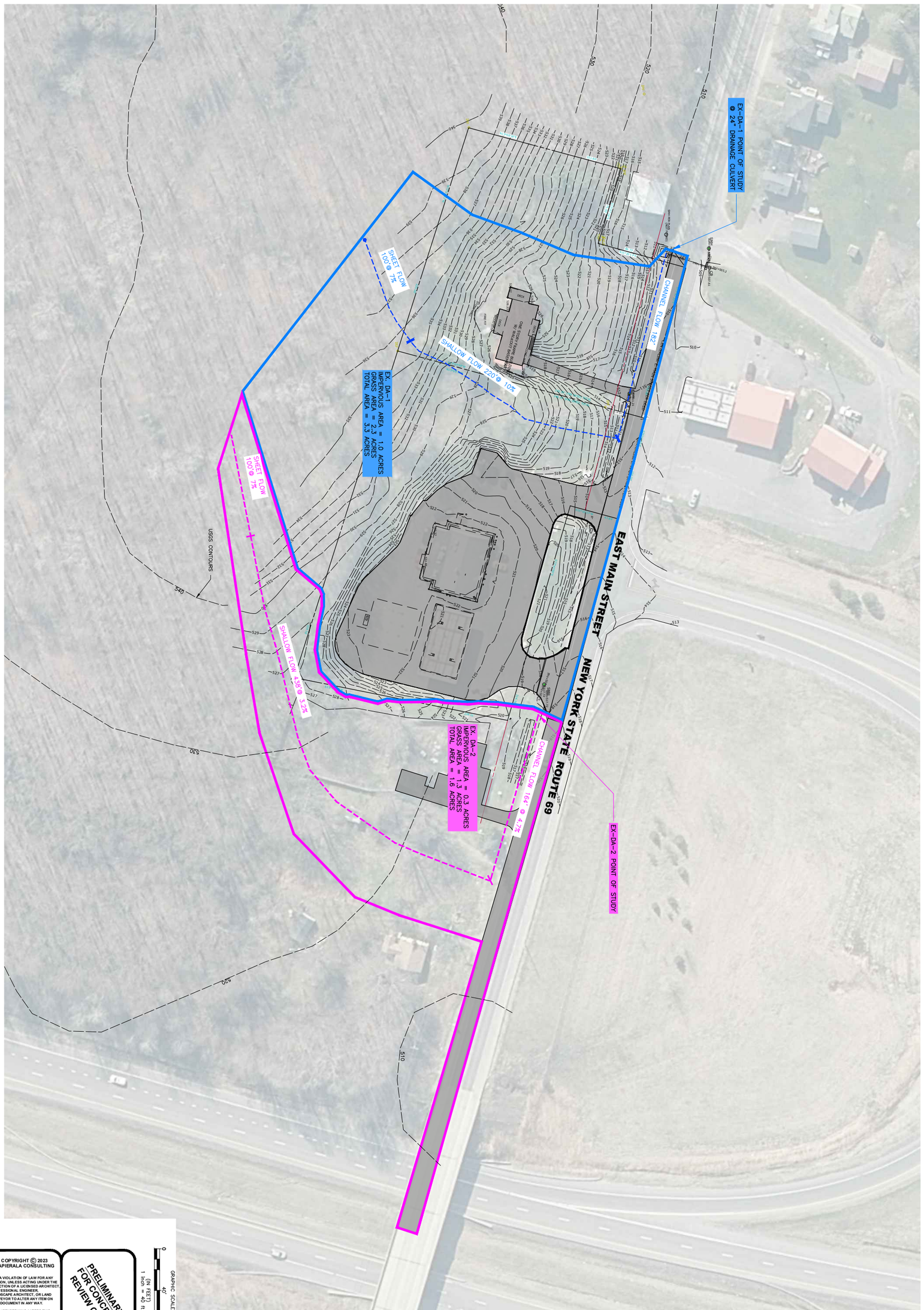
EX-DA-2, totaling 1.6 acres, encompasses the upstream off-site runoff from NYS Route 69 and the uphill areas to the south and east of the project site. Landcover within this model includes a mixture of woodlands, grass, and impervious areas from a residential home and NYS Route 69. Slopes vary greatly across this drainage area, with runoff generally flowing to the north towards the NYSDOT drainage ditch along NYS Route 69.

Table 3: Existing Drainage Area 2 Hydrologic Conditions

Area (ac)	CN	Description
0.300	98	Paved parking, HSG B
1.300	61	>75% Grass cover, Good, HSG B
1.600	68	Weighted Average
1.300		81.25% Pervious Area
0.300		18.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0700	0.11		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.37"
8.2	438	0.0320	0.89		**Shallow Concentrated Flow, Shallow Conc. Flow** Woodland Kv= 5.0 fps
0.3	164	0.0470	10.42	31.25	**Channel Flow, Roadside Ditch** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.022 Earth, clean & straight
23.6	702	Total			

Figure 8 on the following page summarizes the hydrology of the existing condition watershed.



PRELIMINARY FOR CONCEPT REVIEW ONLY

PLAN SEAL BY:
MATTHEW R. NAPIERALA, P.E.
NYS REGISTRATION # 098733

GRAPHIC SCALE
0 40' 80'
1 inch = 40 ft.

SHEET
EX-DA

PROJECT NO.
22-2114

DATE
07 APR 2023

SCALE
1"=40'

PREPARED BY:
NAPIERALA CONSULTING
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NO.	REVISION/ISSUE	DATE

SHEET TITLE:

FIGURE 8:
EXISTING DRAINAGE MAP

PROJECT TITLE:
MIRABITO ENERGY PRODUCTS
2877 E. MAIN STREET (ROUTE 69)
VILLAGE OF PARISH — OSWEGO COUNTY, NY

PREPARED FOR:
MIRABITO ENERGY PRODUCTS
PO BOX 5306
49 COURT STREET
BINGHAMTON, NY 13901

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C. PROPOSED CONDITIONS

The proposed project will redevelop and expand the existing Mirabito gas station/convenience store on the south side of NYS Route 69 in the Village of Parish, Oswego County, NY. The project site includes approximately 2.8 acres, encompassing the existing Mirabito store and the acquired parcel to the west. The proposed project consists of a single-story, ±6,450 sf building consisting of a convenience store with a gasoline/diesel fueling island and an attached coffee/donut shop with a drive-thru. The project will include associated asphalt parking and driveways, concrete sidewalks, a dumpster enclosure, necessary utility connections, and stormwater mitigation facilities. Access to the site will be provided by two full access driveways on NYS Route 69. The proposed impervious area totals approximately 52,700 sf (1.21 acres), increasing the site's total impervious area by 0.32 acres compared to existing conditions. Impervious area for the project site will consist of the rooftop area for the new convenience store and the associated asphalt surfaces. Remaining disturbed areas will be utilized as a balance of green space, landscaping, and stormwater management areas. Stormwater management practices proposed for the project include three bioretention filters, an aboveground grass-lined detention basin, and an aboveground infiltration basin. The stormwater mitigation area will collect and treat runoff in order to meet the objectives of the SPDES General Permit for Stormwater Discharges from Construction Activity and local regulations.

The stormwater management system includes several management practices to capture, treat and control the release of runoff from the site. Runoff from the impervious areas, both rooftop and asphalt, will be directed to practices to provide infiltration/runoff reduction, water quality treatment and water quantity storage. The following stormwater management practices will be constructed:

- Bioretention Areas: Bioretention filters are considered a standard stormwater management practice with runoff reduction capacity to decrease stormwater quantity and improve water quality (NYSDEC Stormwater Management Design Manual, p. 5-97)[1]. The filters collect runoff from rainfall events, temporarily store it, and filter it through the root structure of the plants and the planting soil media. Through the plants' uptake of runoff and the filtering through the soil media, the amount of runoff the site generates is reduced and the remaining runoff from these frequent, but less intense, rainfall events is treated to remove pollutants such as suspended solids and phosphorus. The runoff in excess of the water quality event (the 90th-percentile rain event) will discharge to the downstream detention basin.
- Detention Basin: The detention basin will collect runoff from the more intense but less frequent rainfall events and temporarily store and released in a controlled manner such that the peak rates of runoff to the downstream design points will not be adversely impacted.
- Infiltration Basin: The infiltration basin will capture and temporarily store the tributary water quality volume within a low depression, before it is infiltrated into the ground.

In proposed conditions, overall PRO-DA-1 was separated into three drainage areas (PRO-DA-1A, B, and C). In order to properly design the water quality SMPs proposed for the west portion of the project site, PRO-DA-1C was further divided into three sub catchments, PRO-DA-1C.1, 2, and 3. With proposed SMPs on the project site now capturing runoff upstream of the NYS Route 69 drainage ditch, PRO-DA-2 was expanded to include the drainage ditch. The following pages provide summaries and hydrologic conditions tables of each drainage area/sub catchment. Figure 9, detailing the overall proposed drainage conditions drainage map, has been included at the end of this section. The proposed condition HydroCAD report has been included within Appendix C.

[1] The "biogeochemical process" in terms of stormwater management is the pathway by which water is recycled through plant material where the plant can consume it or return it to the atmosphere through evapotranspiration.

PRO-DA-1A is one of the redevelopment areas totaling 1.5 acres, and encompasses the impervious area from the proposed building's rooftop. The associated impervious surfaces that make up the east side of the project site, and the green space along the east portion of the property and the uphill areas to the south of property. All runoff captured within PRO-DA-1A will be routed through the proposed infiltration basin located adjacent to the east property line. A high flow, secondary outlet structure has been provided within the proposed infiltration basin for the intense rainfall events, and discharges directly to the roadside drainage ditch via a 6" culvert.

Table 4: Proposed Drainage Area 1A Hydrologic Conditions

Area (ac)	CN	Description
0.400	98	Paved parking, HSG B
0.300	61	>75% Grass cover, Good, HSG B
0.800	39	>75% Grass cover, Good, HSG A
1.500	59	Weighted Average
1.100		73.33% Pervious Area
0.400		26.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	80	0.0500	0.09		**Sheet Flow, SHEET FLOW** Woods: Light underbrush n= 0.400 P2= 2.37"
0.8	387	0.0240	8.34	26.68	**Channel Flow, VEGETATED SWALE** Area= 3.2 sf Perim= 4.5' r= 0.71' n= 0.022 Earth, clean & straight
0.1	60	0.0660	10.85	45.55	**Channel Flow, VEGETATED SWALE** Area= 4.2 sf Perim= 8.5' r= 0.49' n= 0.022 Earth, clean & straight
0.1	114	0.0400	17.00	204.01	**Channel Flow, VEGETATED SWALE** Area= 12.0 sf Perim= 8.5' r= 1.41' n= 0.022 Earth, clean & straight
15.5	641	Total			

PRO-DA-1B, totaling 0.2 acres, is the other redevelopment area that encompasses the impervious areas and minimal green space directly tributary to Bioretention Filter-3 (BF-3). Runoff in this area drains to the north, where it sheet flows into BF-3. After passing through the BF-3, the treated stormwater is then discharged through an outlet structure into a 6" culvert into the drainage ditch along NYS Route 69.

Table 5: Proposed Drainage Area 1B Hydrologic Conditions

Area (ac)	CN	Description
0.140	98	Paved parking, HSG B
0.060	61	>75% Grass cover, Good, HSG B
0.200	87	Weighted Average
0.060		30.00% Pervious Area
0.140		70.00% Impervious Area

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

PRO-DA-1C.1, totaling 0.8 acres, encompasses the majority of the asphalt area on the west side of the project site, the fuel pump island, the green space located north of the proposed retaining wall, and the undeveloped southwest corner of the property. This sub drainage area's runoff sheet flows to proposed Bioretention Filter-1 (BF-1) adjacent to the project site's western edge of pavement. After capturing and treating runoff, BF-1 discharges collected stormwater to the north into the proposed above-ground grass lined detention basin.

Table 6: Proposed Drainage Area 1C.1 Hydrologic Conditions

Area (ac)	CN	Description
0.500	98	Paved parking, HSG A
0.300	39	>75% Grass cover, Good, HSG A
0.800	76	Weighted Average
0.300		37.50% Pervious Area
0.500		62.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	70	0.0470	0.09		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.37"
2.1	30	0.3000	0.23		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.37"
0.2	70	0.2000	6.71		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
15.6	170	Total			

PRO-DA-1C.2, totaling 0.2 acres, encompasses the 0.1 acres of impervious surface and 0.1 acres of green space directly northeast of the proposed new building. This sub drainage area's runoff sheet flows to Bioretention Filter-2 (BF-2). After capturing and treating tributary runoff, BF-2 discharges the collected stormwater directly into the proposed above-ground grass lined detention basin to the north.

Table 7: Proposed Drainage Area 1C.2 Hydrologic Conditions

Area (ac)	CN	Description
0.100	98	Paved parking, HSG A
0.100	39	>75% Grass cover, Good, HSG A
0.200	69	Weighted Average
0.100		50.00% Pervious Area
0.100		50.00% Impervious Area

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

PRO-DA-1C.3, totaling 0.2 acres, encompasses the land cover that is immediately tributary to the proposed detention basin. This subdrainage areas land cover consists of 0.16 acres of grassy areas and approximately 0.04 acres of driveway adjacent to the detention basin. Two catch basins capture surface runoff from this impervious area and discharge directly into the detention basin. The remaining green space sheet flows into the detention basin.

Table 8: Proposed Drainage Area 1C.3 Hydrologic Conditions

Area (ac)	CN	Description
0.040	98	Paved parking, HSG A
0.160	39	>75% Grass cover, Good, HSG A
0.200	51	Weighted Average
0.160		80.00% Pervious Area
0.040		20.00% Impervious Area

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

PRO-DA-2, totaling 2.0 acres, encompasses the adjacent property to the east of the project site, uphill areas to the southeast of the project site, and the drainage along NYS Route 69. The drainage area is made up approximately 05 acres of impervious surface from NYS Route 69 and 1.5 acres of green space. In proposed conditions, PRO-DA-2 was expanded to the roadside ditch along the frontage of the project site as proposed SMPs now capture water that previously would sheet flow into the drainage ditch.

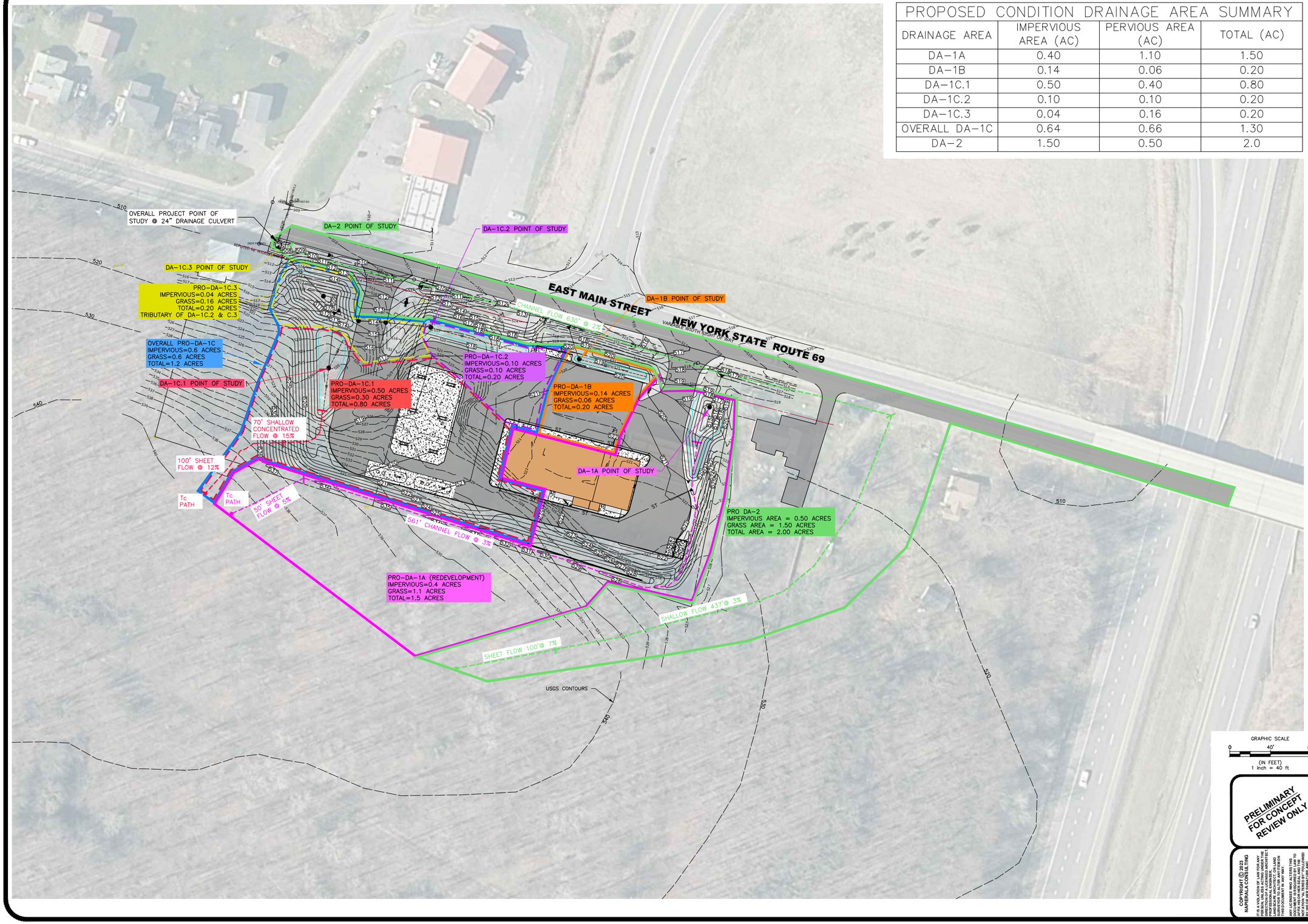
Table 9: Proposed Drainage Area 2 Hydrologic Conditions

Area (ac)	CN	Description
0.500	98	Paved parking, HSG B
1.500	61	>75% Grass cover, Good, HSG B
2.000	70	Weighted Average
1.500		75.00% Pervious Area
0.500		25.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0700	0.11		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 2.37"
8.2	438	0.0320	0.89		**Shallow Concentrated Flow, Shallow Conc. Flow** Woodland Kv= 5.0 fps
1.5	630	0.0200	6.80	20.39	**Channel Flow, Roadside Ditch** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.022 Earth, clean & straight
24.8	1,168	Total			

Figure 9 on the following page summarizes the hydrology of the proposed condition watershed.

PROPOSED CONDITION DRAINAGE AREA SUMMARY			
DRAINAGE AREA	IMPERVIOUS AREA (AC)	PERVIOUS AREA (AC)	TOTAL (AC)
DA–1A	0.40	1.10	1.50
DA–1B	0.14	0.06	0.20
DA–1C.1	0.50	0.40	0.80
DA–1C.2	0.10	0.10	0.20
DA–1C.3	0.04	0.16	0.20
OVERALL DA–1C	0.64	0.66	1.30
DA–2	1.50	0.50	2.0



GRAPHIC SCALE
0 40' 80'
(IN FEET)
1 inch = 40 ft

PRELIMINARY FOR CONCEPT REVIEW ONLY

PREPARED BY: MATTHEW R. NAPIERALA, P.E. NYS REGISTRATION # 087733

SHEET: PRO-DA

PROJECT NO.: 22-2114
DATE: 07 APR 2023
SCALE: 1"=40'

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NO.	REVISION/ISSUE	DATE

SHEET TITLE:
FIGURE 9:
PROPOSED DRAINAGE MAP

PROJECT TITLE:
MIRABITO ENERGY PRODUCTS
2877 E. MAIN STREET (ROUTE 69)
VILLAGE OF PARISH — OSWEGO COUNTY, NY

PREPARED FOR:
MIRABITO ENERGY PRODUCTS
PO BOX 5308
49 CORTLAND ST.
BINGHAMTON, NY 13901

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D. RUNOFF REDUCTION VOLUME (RRV) REQUIRED

The NYSDEC implemented regulations effective March 1, 2011 that requires all construction projects that disturb greater than one acre of land to provide runoff reduction through the implementation of green infrastructure practices. The goal of the runoff reduction volume criteria is to implement stormwater management practices and green infrastructure techniques to replicate pre-development hydrology. The NYS Stormwater Management Design Manual provides the acceptable green planning techniques and green infrastructure techniques to meet the runoff reduction volume criteria. The following narrative and calculations detail the implementation of the planning and infrastructure techniques on the site to achieve the minimum runoff reduction volume. The narrative follows the Design Manual, Chapter 5.

Planning

Plan to preserve, avoid, and minimize:	Applicable	Not Applicable
i. Preserve undisturbed, natural buffer, and critical environmental areas.	☐	☒
ii. Employ open space, conservation, and clustering site design techniques.	☐	☒
iii. Avoid developing in environmentally sensitive areas: floodplain, steep slopes, habitat, ecosystems, bedrock, wetlands, shorelines, shallow groundwater, impervious soils and unstable soils.	☐	☒
iv. Minimize impervious surfaces: building footprints, parking, roads, sidewalks, and driveways.	☐	☒
v. Minimize clearing and grading	☒	☐

Discussion:

i. The project does not have any critical environmental areas.

ii. Open space is used in projects on tracts of land where the development can be concentrated in a portion of the site while maintaining large portions of undisturbed land. Open space design for this type of development is not applicable.

iii. The project does not have any critical environmental areas.

iv. The NYS Stormwater Design Manual discusses building footprint reduction in terms of building multiple floors to achieve the same, or comparable, square footage as a single-floor footprint. Reducing the footprint by locating any services on anything other than a single floor is not feasible for this project.

v. The proposed grading plan for the project minimizes the amount of grading to the maximum extent practicable. Grade requirements for a functional site, including slopes to meet the Americans with Disabilities Act and owner requirements were taken into account during the design phase. The off-grading was designed utilizing a retaining wall to catch up to the existing grade in the shortest distance possible (i.e., minimize off-grading), while still meeting acceptable standards for slope stabilization and erosion control.

1. **Minimum Runoff Reduction Volume (Rr_v) Requirements**

RR_V only required for new impervious area

Existing Impervious Area = 0.89 acres

Total Proposed Impervious Area = 1.25 acres

Calculate required runoff reduction volume (when 100% of WQ_V reduction cannot be achieved)

Calculate minimum required Runoff Reduction Volume (RR_v) for DA-1using:

$$RR_v = \frac{P \cdot Rv \cdot S \cdot A_I}{12}$$

A_I = total impervious area

S = 0.55 (A Soils), 0.40 (B Soils), 0.30 (C Soils), 0.20 (D Soils), or weighted HSG average in drainage area

A Soils=20% of area (0.25 acres), B Soils=80% of area (1.00 acre),

$S = \frac{(0.25)(0.55)}{1.25} + \frac{(1.00)(0.40)}{1.25}$, S=0.43

$$RR_v = \frac{1.0(0.95)(0.43)(1.25)}{12}$$

Required Minimum RR_v = 0.043 ac·ft (1,854 cf)

E. WATER QUALITY VOLUME (WQv) REQUIRED:

Calculate required Water Quality Volume (WQ_V) for proposed redevelopment.

Strategy:

Treat 25% of the existing impervious area with proposed water quality SMPs.

Treat 100% of the new impervious area with a proposed water quality SMPs.

1. **Calculate Water Quality Volume for the existing disturbed impervious area:**

Calculate the water quality volume (WQv):

$$\mathbf{WQ_v = \frac{PR_vA}{12}}$$

90-th Percentile Rainfall (P) = 1.0 inch

WQ_V Drainage Area (A) = 2.97 acres

Existing Impervious Area (A_I) = 0.89 acres

$$R_v = 0.05 + 0.9\left(\frac{A_I}{A}\right)$$

$$R_v = 0.05 + 0.9\left(\frac{0.89}{2.97}\right)$$

$R_V = 0.320$

$$WQ_v = \frac{(1.0)(0.320)(2.97)}{12}$$

Pre-Redevelopment WQ_v = 0.079 ac·ft

2. **Calculate Water Quality Volume for the proposed conditions:**

$$\mathbf{WQ_v = \frac{PR_vA}{12}}$$

90-th Percentile Rainfall (P) = 1.0 inch

WQ_V Drainage Area (A) = 2.97 acres

Proposed Total Impervious Area (A_I) = 1.25

$$R_v = 0.05 + 0.9\left(\frac{A_I}{A}\right)$$

$$R_v = 0.05 + 0.9\left(\frac{1.25}{2.97}\right)$$

$R_V = 0.429$

$$WQ_v = \frac{(1.0)(0.429)(2.97)}{12}$$

Post-Redevelopment WQ_v = 0.106 ac·ft

3. **Calculate Required Water Quality Volume for the redevelopment:**

$$\mathbf{Req.\ WQ_v = 0.25(Pre\ Redev.WQ_v) + (Post\ Redev.WQ_v - Pre\ Redev.WQ_v)}$$

Pre-Redevelopment WQ_V = 0.079 acre·ft

Post-Redevelopment WQ_V = 0.106 acre·ft

$$Req.WQ_v = 0.25(0.079) + (0.106 - 0.079)$$

Required WQ_v = 0.047 ac·ft (2,047 cf)

F. WATER QUALITY VOLUME (WQV) AND RUNOFF REDUCTION VOLUME RR_V PROVIDED

The project includes the construction of multiple bioretention filters and an infiltration basin strategically located throughout the site in order to collect stormwater runoff from the impervious surfaces. The filters capture runoff near the source to enhance the reduction of stormwater runoff.

Due to the nature of the development being a gas station, this drainage areas inclusive of the refueling island are designated as a "hotspot". The NYSDEC Stormwater Design Manual does not allow infiltration within hotspots, unless two additional redundant pretreatment methods are proposed upstream of the infiltration practice. Due to site limitations restricting the available space for redundant pretreatment practices, the sites proposed grading separates the west drainage area inclusive of the hot spot from the eastern drainage area tributary to the proposed infiltration basin. Additionally, the bioretention filters and detention basin proposed within the western drainage area inclusive of the hotspot are to be wrapped with an impermeable layer in order to prevent infiltration from occurring.

1. **Calculate Provided Water Quality Volume (WQ_V) & Runoff Reduction Volume (RR_V) for each Best Management Practice (calculations have been included within Appendix D).**

Bioretention Filter-1 (BF-1) (Tributary Area: PRO-DA-1C.1):

Drainage Area Tributary to BF-1 (A) = 0.80 acres

Impervious Area Tributary to BF-1 (A_I) = 0.50 acres

R_V = 0.613

Water Quality Volume:

WQ_V Required = 0.041 ac·ft

A_f Provided = 1,415 ft^2

WQ_V provided = 0.045 ac·ft (1,981 ft^3)

Allowable Runoff Reduction Volume:

A Soils: $RR_V = 0.55 \cdot WQ_V$

RR_V provided = 0.025 ac·ft (1,078 ft^3)

Bioretention Filter-2 (BF-2) (Tributary Area: PRO-DA-1C.2):

Drainage Area Tributary to BF-2 (A) = 0.20 acres

Impervious Area Tributary to BF-2 (A_I) = 0.10 acres

R_V = 0.500

Water Quality Volume:

WQ_V Required = 0.008 ac·ft

A_f Provided = 878 ft^2

WQ_V provided = 0.028 ac·ft (1,229 ft^3)

Allowable Runoff Reduction Volume:

B Soils: $RR_V = 0.40 \cdot WQ_V$

RR_V provided = 0.011 ac·ft (492 ft^3)

Bioretention Filter-3 (BF-3) (Tributary Area: PRO-DA-1B):

Drainage Area Tributary to BF-3 (A) = 0.20 acres

Impervious Area Tributary to BF-3 (A_I) = 0.14 acres

R_V = 0.680

Water Quality Volume:

WQ_V Required = 0.011 ac·ft

A_f Provided = 437 ft^2

WQ_V provided = 0.035 ac·ft (1,530 ft^3)

Allowable Runoff Reduction Volume:

B Soils: $RR_V = 0.40 \cdot WQ_V$

RR_V provided = 0.014 ac·ft (612 ft^3)

Infiltration Basin (Tributary Area: PRO-DA-1A):

Pretreatment of 50% of the WQ_V being treated by the infiltration basin will be provided by a combination of a grass filter strip and vegetated swale upstream of the infiltration basin that will route runoff directly into the basin.

Drainage Area Tributary to Infiltration Basin (A) = 1.50 acres

Impervious Area Tributary to Infiltration Basin (A_I) = 0.14 acres

R_V = 0.290

Water Quality Volume:

WQ_V Required = 0.036 ac·ft

WQ_V provided is the incremental storage between 515.0 and 518.5 within the proposed infiltration basin.

Infiltration Basin				
Elevation	**Contour Area**	**Incremental Volume**	**Accumulative Volume**	**Accumulative Volume**
(ft)	**(ft^2)**	**(ft^3)**	**(ft^3)**	**(acre-feet)**
515	182	0	0	0.000
516	457	229	229	0.005
517	861	659	888	0.020
518	1,393	1,127	2,015	0.046
518.5	1,715	777	2,792	0.064

WQ_V Provided = 0.064 ac·ft (2,792 ft^3) provided between the elevations of 515.0 and 518.5

Allowable Runoff Reduction Volume:

For Infiltration Basins: $RR_V = 1.00 \cdot WQ_V$ because 100% of the WQ_V is infiltrating into the ground.

RR_V provided = 0.064 ac·ft (2,792 ft^3)

2. **Total Provided WQ_V and RR_V:**

Best Management Practice	Water Quality Volume (WQ_V) Provided (ac·ft)	Runoff Reduction Volume (RR_V) Provided (ac·ft)
Bioretention Filter-1 (BF-1)	0.045	0.025
Bioretention Filter-2 (BF-2)	0.028	0.011
Bioretention Filter-3 (BF-3)	0.035	0.014
Infiltration Basin	0.064	0.064
Total	**0.172**	**0.114**

Total Provided WQ_V = 0.172 ac·ft (7,7532 ft^3) > 0.047 ac·ft required WQ_V

Total Provided RR_V = 0.114 ac·ft (4,974 ft^3) > 0.043 ac·ft Required RR_V

G. CHANNEL PROTECTION VOLUME (CPV)

The channel protection volume requirement for redevelopment projects with an increase in impervious area is a two-pronged approach. Chapter 9 of the Design Manual states that 24-hour detention of the 1-year storm is not required for redevelopment projects if the hydrology and hydraulic analysis for the project site shows that the post-construction 1-year, 24-hour discharge rate and velocity are less than or equal to the pre-construction discharge rate (p. 9-4). Additionally, the stormwater management system must provide 24-hour detention of runoff from the increase in impervious area during the one-year rain event.

The table below summarizes the existing and proposed condition peak flow results from the hydrology and hydraulic analysis. Complete HydroCAD calculations are presented in Appendix B and C, respectively.

Table 10: Peak Flow Rates, 1-Year 24-Hour Rainfall Event (2.09")

Design Point	Existing Condition Peak Rate of Runoff	Total Proposed Condition Peak Rate of Runoff
Point of Study	0.4 cfs	0.4 cfs

Given existing concerns raised by the Village of Parish regarding drainage problems within this area, CP_V was still evaluated for this project. The storage volume requirement for the 24-hour detention of the runoff from the one-year rainfall event is calculated using the volumetric method. The NYS Stormwater Design Manual methodology for determining the storage volume (see Appendix B.1 of the Design Manual) is discussed below.

PRO-DA-1A

$$\mathbf{V_S = (\frac{V_s}{V_R})(Q_d)(A)/12}$$

A = 1.50 acres

CN = 59

t_c = 15.5 mins

I_a = 1.390

$P_{1\text{-}Year}$ = 2.09”

$$\frac{I_a}{P} = 0.665$$

Using I_a/P and T_c, q_u = 100 csm/in (TR-55, Exhibit 4-II)

Using q_u and T = 24 hr, q_o/q_i = 0.160 (Design Manual, Figure B.1)

Using formula 2.1.16 (Design Manual, Appendix B.1), calculate V_s/V_r

$$\frac{V_s}{V_r} = 0.492$$

HydroCAD provides the PRO-DA-1C volume of runoff ($Q_dA/12$) = 0.004 ac·ft

$$V_S = (\frac{V_s}{V_R})(Q_d)(A)/12$$

$$V_S = (0.492)(0.008)$$

V_S = 0.0039 ac·ft (170 ft^3) Required CP_V Storage

The entirety of the CP_V is stored between the elevations of 515.0 and 518.5 and will be infiltrated into the ground, meeting requirements.

PRO-DA-1B

$$\mathbf{V_S = (\frac{V_s}{V_R})(Q_d)(A)/12}$$

A = 0.20 acres

CN = 69

t_c = 6.0 mins

I_a = 0.899

$P_{1\text{-}Year}$ = 2.09”

$$\frac{I_a}{P} = 0.430$$

Using I_a/P and T_c, q_u = 760 csm/in (TR-55, Exhibit 4-II)

Using q_u and T = 24 hr, q_o/q_i = 0.030 (Design Manual, Figure B.1)

Using formula 2.1.16 (Design Manual, Appendix B.1), calculate V_s/V_r

$$\frac{V_s}{V_r} = 0.641$$

HydroCAD provides the PRO-DA-1C volume of runoff ($Q_dA/12$) = 0.004 ac·ft

$$V_S = (\frac{V_s}{V_R})(Q_d)(A)/12$$

$$V_S = (0.641)(0.004)$$

V_S = 0.0026 ac·ft (112 ft^3)

$$\textbf{Required } Cp_v = V_{S\ \text{Required}} - \sum RR_{V\ \text{Provided in PRO-DA-1B}}$$

$$\text{Required } Cp_v = 0.0026 ac \cdot ft - 0.014\ ac \cdot ft$$

$$\textbf{Required } Cp_v = \mathbf{0.000\ ac \cdot ft,}$$

The provided RR_V within PRO-DA-1B is higher than the required CP_V, so providing CP_V is not required within PRO-DA-1B.

PRO-DA-1C

$$V_S = (\frac{V_s}{V_R})(Q_d)(A)/12$$

A = 1.20 acres

CN = 72 (weighted average of for total PRO-DA-1C)

t_c = 15.6 mins

I_a = 0.778

$P_{1\text{-}Year}$ = 2.09”

$$\frac{I_a}{P} = 0.372$$

Using I_a/P and T_c, q_u = 135 csm/in (TR-55, Exhibit 4-II)

Using q_u and T = 24 hr, q_o/q_i = 0.012 (Design Manual, Figure B.1)

Using formula 2.1.16 (Design Manual, Appendix B.1), calculate V_s/V_r

$$\frac{V_s}{V_r} = 0.665$$

HydroCAD provides the PRO-DA-1C volume of runoff ($Q_dA/12$) = 0.035 ac·ft

$$V_S = (\frac{V_s}{V_R})(Q_d)(A)/12$$

$$V_S = (0.665)(0.035)$$

V_S = 0.023 ac·ft (1,014 ft^3)

$$\textbf{Required } Cp_v = V_{S\ \text{Required}} - \sum RR_{V\ \text{Provided in PRO-DA-1C}}$$

$$\text{Required } Cp_v = 0.023\ ac \cdot ft - 0.036\ ac \cdot ft$$

$$\textbf{Required } Cp_v = \mathbf{0.000\ ac \cdot ft,}$$

The provided RR_V within PRO-DA-1C is higher than the required CP_V, so providing CP_V is not required within PRO-DA-1C.

H. PEAK FLOW MITIGATION (Q_{p10} and Q_{p100})

The remaining two requirements of the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity are that the stormwater system cannot discharge runoff from the site during the 10-year and 100-year, 24-hour rainfall events at rates higher than the existing condition peak rates of runoff during the correlating rainfall events. To meet these requirements, the underground stormwater chamber system will act as a detention basin that capture the runoff, temporarily store it, and release the runoff in a controlled manner to the existing drainage ditch such that the proposed project will not adversely impact the downstream areas. The following tables summarize the HydroCAD results for the 10-year and 100-year rainfall events.

Table 11: Peak Flow Rates for 10-Year & 100-Year Rainfall Events

	Existing Peak Runoff Rate (cfs)	**Proposed Peak Runoff Rate (cfs)**
10-Year Storm	3.1	1.7
100-Year Storm	10.4	5.3

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
508.00	36	0	0
509.00	196	116	116
510.00	460	328	444
511.00	809	635	1,079
512.00	1,232	1,021	2,099
513.00	1,724	1,478	3,577
513.40	1,951	735	4,312
514.00	2,296	1,274	5,586

Device	Routing	Invert	Outlet Devices
#1	Primary	508.00'	**12.0" Round Culvert** L= 39.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 508.00' / 507.80' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	512.40'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	508.00'	**3.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	510.00'	**5.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#5	Secondary	513.40'	**11.5' long + 0.3 '/' SideZ x 5.3' breadth Broad-Crested Rectangular Weir** 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 5.00 5.50 Coef. (English) 2.35 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.73 2.78 2.87

Primary OutFlow Max=1.0 cfs @ 12.38 hrs HW=511.05' (Free Discharge)
└─**1=Culvert** (Passes 1.0 cfs of 4.8 cfs potential flow)
  ├─**2=Grate** (Controls 0.0 cfs)
  ├─**3=Orifice** (Orifice Controls 0.4 cfs @ 8.24 fps)
  └─**4=Orifice** (Orifice Controls 0.6 cfs @ 4.42 fps)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=508.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Figure 10: Proposed Detention Basin Summary

Section IV. CONTROLS

A. EROSION AND SEDIMENT CONTROLS

Prior to the commencement of construction, the operator will identify the contractor(s) and subcontractor(s) that will implement each erosion and sediment control measure identified in this SWPPP. All contractors and subcontractors identified in the SWPPP must sign a copy of the certification statement in Part III.E. of the NYS DEC SPDES General Permit for Stormwater Discharges from Construction Activities in accordance with Part V.H. of the SPDES General Permit.

1. Stabilization Practices (Permanent)

   Permanent stabilization practices for this site include:

   a. Land clearing activities shall be done only in areas where earthwork will be performed and shall progress as earthwork is needed.
   b. Permanent seeding and planting of all unpaved areas.

2. Stabilization Practices (Temporary) Temporary stabilization practices for this site include:

   a. Temporary seeding and planting of all unpaved areas when construction activity has ceased, or will cease, in an area for 14 days. Seeding mixtures and application rates are listed in the erosion and sediment control notes on the plans.
   b. Mulching exposed areas. Mulching rates are listed in the erosion and sediment control notes on the plan sheet C-15.
   c. Frequent watering to minimize wind erosion during construction.

3. Structural Practices (Permanent)Permanent structural practices for this site include:

   a. Bioretention Areas. Bioretention filters are considered a standard stormwater management practice with runoff reduction capacity to decrease stormwater quantity and improve water quality.
   b. Land grading. Land grading is the reshaping of the existing land surface in accordance with a plan as determined by the engineering survey and layout. The purpose of a land grading specification is to provide erosion control and vegetative establishment on areas where the existing land is to be reshaped according to the plan.

4. Structural Practices (Temporary)

   Temporary structural practices for this site include:

   a. Silt fence. Silt fence is a temporary barrier of geotextile fabric installed on the contours across from a slope used to intercept sediment laden runoff from small drainage areas of disturbed soil. The purpose of silt fence is to reduce runoff velocity and effect deposition of transported sediment load.
   b. Stabilized construction entrance/exit. A stabilized construction entrance/exit is a stabilized pad of aggregate underlain with geotextile located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk, or parking area. The purpose of the stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights-of-way or streets

      1. Aggregate size: Use a matrix of one to four-inch stone, or reclaimed or recycled equivalent
      2. Thickness: Not less than six inches
      3. Width: 24-foot minimum
      4. Length: As required, but not less than 50 feet
      5. Geotextile: To be placed over the entire area to be covered with aggregate. Piping of surface water under entrance shall be provided as necessary.

c. Sediment trap. The detention basin will be used as a sediment trap during construction. The sediment basin will have a riprap outlet sediment trap in place of the emergency spillway. Upon completion of construction, the sediment basin will be cleaned of all sediment buildup and the basin shall be finalized per plans.
d. Concrete washout area. A temporary excavated or above ground lined constructed pit where concrete truck mixers and equipment can be washed after their loads have been discharged to prevent highly alkaline runoff from entering storm drainage systems or leaching into the soil.

    1. The washout facility is sized to contain solids, wash water and rainfall. The maximum size shall be eight feet by eight feet at the bottom and two feet deep. If excavated, then the side slopes shall be 2:1 (horizontal to vertical).
    2. The facility shall be located a minimum of 100 feet from drainage swales, storm drain inlets, wetlands, streams, and other surface waters. Surface waters shall be prevented from entering the structure except got the access road. Appropriate access shall be provided with a gravel access road sloped down to the structure. Signs shall be placed to direct drivers to the facility after their load is discharged.
    3. All washout facilities will be lined to prevent leaching of liquids into the ground. The liner shall be plastic sheeting with a minimum thickness of 10 mils with no holes or tears, and anchored beyond the top of the pit with an earthen berm, sand bags, stone, or other structural appurtenance except at the access point.

5. Sequence of Major Activities

The contractor will be responsible for implementing the above listed erosion and sediment control practices. The contractor may designate these tasks to certain subcontractors as is seen fit, but the ultimate responsibility for implementing these controls and ensuring their proper function remains with the contractor. The order of activities shall be as follows:

a. Conduct a preconstruction meeting with all involved parties
b. Delineate boundaries of disturbance as per the layout and grading plans
c. Construct construction entrance at the location shown on the erosion and sediment control plan
d. Install silt fence in locations shown on grading plans
e. Establish staging areas on the project site
f. Excavate detention basin, to be used as a temporary sediment basin, and install overflow spillway
g. Remove topsoil, stockpile and stabilize
h. Rough grade site including swales and provide temporary stabilization when idle for more than 7 days
i. Building foundation excavation
j. Compact gravel along driveways and parking areas
k. Utility installations.
l. Install concrete washout, complete concrete site work.
m. Complete final grading of the site
n. Restore all compacted soils in accordance with section 5.1.6 of the NYS Stormwater Design Manual
o. Provide final stabilization and landscaping of new area
p. Site Paving
q. Provide final stabilization of disturbed areas via seeding mulching
r. Remove any deposited sediment from within the temporary sediment basin
s. Construct bioretention basins, infiltration basin, and outlet controls upon upstream stabilization
t. Remove all temporary stabilization control practices

Disturbed areas of the site where construction activity has ceased for more than seven (7) days shall be temporarily seeded and mulched. The Erosion & Sediment Control plan is shown in Appendix E.

B. INSPECTION AND MAINTENANCE REQUIREMENTS

Best management practices, both construction and operational, must be inspected and maintained on a routine basis to ensure continued compliance with the NYS SPDES General Permit for Stormwater Discharges from Construction Activity. The contractor is responsible for inspecting the erosion and sediment control practices, the operator/owner is responsible for providing a qualified professional, as defined in the SPDES General Permit, to perform the required weekly inspections of the construction site from the time earth-disturbing activities begin until final stabilization is achieved, and the Notice of Termination is filed. The contractor will obtain copies of all local and state regulations that are applicable to stormwater management, erosion control, and pollution minimization at this job site and will comply fully with such regulations. The contractor will submit written evidence of such compliance if requested by the operator or any agent of a regulatory body. The contractor will comply with all conditions of the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity, including the conditions related to maintaining the SWPPP and evidence of compliance with the SWPPP at the job site and allowing regulatory personnel access to the job site and to records to determine compliance.

C. CONSTRUCTION MAINTENANCE/INSPECTION PROCEDURES

The operator shall maintain a record of all inspection reports in a site logbook. The logbook shall be maintained on site and be made available to the permitting authority upon request. Prior to the commencement of construction, the operator shall certify in the site logbook that the SWPPP, prepared in accordance with Part III.D. of the NYS DEC SPDES General Permit for Discharges from Construction Activities, meets all Federal, State and local erosion and sediment control requirements. The operator shall post at the site, in a publicly accessible location, a summary of the site inspection activities monthly. The following inspection and maintenance practices will be used to maintain erosion and sediment controls and stabilization measures.

1. Inspection and Maintenance Practices
    a. Inspections shall occur once every seven calendar days.
    b. At a minimum, the qualified inspector shall inspect all erosion and sediment control practices to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved final stabilization, all points of discharge to natural surface waterbodies located within or immediately adjacent to the property boundaries of the construction site, and all points of discharge from the construction site.
    c. The qualified inspector shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:
        i. Date and time of inspection;
        ii. Name and title of person(s) performing inspection;
        iii. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;
        iv. A description of the condition of the runoff at all points of discharge from the construction site. This shall include identification of any discharges of sediment from the construction site. Include discharges from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;
        v. A description of the condition of all natural surface water bodies located within, or immediately adjacent to, the property boundaries of the construction site which receive runoff from disturbed areas. This shall include identification of any discharges of sediment to the surface water body;
        vi. Identification of all erosion and sediment control practices that need repair or maintenance;
        vii. Identification of all erosion and sediment control practices that were not installed or are not functioning as designed and need to be reinstalled or replaced;

viii. Description and sketch of areas that are disturbed at the time of the inspection and areas that have been stabilized (temporarily and/or final) since the last inspection;
ix. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards;
x. Corrective action(s) that must be taken to install, repair, replace, or maintain erosion and sediment control practices; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s); and
xi. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The qualified inspector shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven (7) calendar days of the date of the inspection. The qualified inspector shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The qualified inspector shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven (7) calendar days of that inspection.

d. Within one business day of the completion of an inspection, the qualified inspector shall notify the owner or operator and appropriate contractor or subcontractor of any corrective actions that need to be taken. The contractor or subcontractor shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.
e. All inspection reports shall be signed by the qualified inspector. The inspection reports shall be maintained on the site.
f. Erosion and Sediment Control Inspection/Maintenance
i. Silt Fence: Silt fence shall be inspected for depth of sediment, tears, etc., to see if the fabric is securely attached to the fence posts, and to see that the fence posts are securely in the ground. Built up sediment will be removed from silt fence when it has reached one-third the height of the fence.
ii. Stabilized Construction Entrance/Exit: The entrance shall be maintained in a condition which will prevent tracking of sediment onto public rights-of-way. This may require periodic top dressing with additional aggregate. All sediment spilled, dropped, or washed onto public rights-of-way must be removed immediately. When necessary, wheels must be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with aggregate, which drains into an approved sediment-trapping device. All sediment shall be prevented from entering storm drains, ditches, or water courses.
iii. Seeding: Temporary and permanent seeding and all other stabilization measures will be inspected for bare spots, washouts, and healthy growth.

2. Inspection and Maintenance Report Forms

- Once installation of any required or optional erosion control device or measure has been implemented, at least twice every seven calendar days a Qualified Professional shall inspect each practice. The inspector shall use the forms found in this SWPPP to inventory and report the condition of each measure to assist in maintaining the erosion and sediment control measures in good working order.

- These report forms shall become an integral part of the SWPPP and shall be made readily accessible to governmental inspection officials, the operator's engineer, and the operator for review upon request during visits to the project site. In addition, copies of the reports shall be provided to any of these persons upon requires, via mail or facsimile transmission. Inspection and maintenance report forms are to be maintained by the permittee for three years following the final stabilization of the site.

- The operator shall also prepare a written summary of its status with respect to compliance with the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity at a minimum frequency of every three months during which coverage under the SPDES General Permit exists. The summary should address the status of achieving each component of the SWPPP. The reports shall be signed by the signatory of the NOI or a duly authorized person and be retained at the construction site.

1. Other Record Keeping Requirements

   The contractor shall keep the following records related to construction activities at the site:

   - Dates when major grading activities occur and the areas which were graded.
   - Dates and details concerning the installation of structural controls.
   - Dates when construction activities cease in an area.
   - Dates when an area is stabilized, either temporarily or permanently.
   - Dates of rainfall and the amount of rainfall.
   - Dates and descriptions of the character and amount of any spills of hazardous materials.
   - Records of reports filed with regulatory agencies if reportable quantities of hazardous materials are spilled.

D. OPERATION MAINTENANCE AND INSPECTION PROCEDURES

Long-term maintenance of the stormwater mitigation basins and swales will be the responsibility of the owner and/or the tenant. The maintenance and inspection check lists have been included in Appendix F.

1. Embankments and emergency spillways will be inspected annually and after major storm events. Items to be inspected include:
   a. Vegetation and ground cover is adequate to prevent erosion.
   b. No embankment erosion has occurred.
   c. No animal burrows into embankments.
   d. No unauthorized planting.
   e. No cracking, bulging or sliding of dam.
   f. Emergency spillway is in good condition, free of silt buildup and debris.
   g. No leaks or seepage is occurring on downstream face.
   h. All slope protection and riprap is intact and no failure has occurred.

2. Bioretention basins will be inspected monthly and after major storm events. Items to be inspected include:
   a. Debris and undesirable vegetative growth shall be removed.
   b. Sediment depth shall be noted. Sediment shall be removed prior to reaching 50% of the design depth.
   c. No visible pollution within basins.

3. Grass lined swales shall be inspected and maintained as follows:
   a. All channels are free of debris on monthly basis.
   b. No visible evidence of erosion.
   c. Mowing shall be performed as needed. Inspect to ensure minimum mowing depth has not been exceeded.
   d. Dewatering of swales between storms. Inspect monthly or as necessary.
   e. Inspect swales for sediment deposition annually and clean as necessary.

Section V. MATERIALS MANAGEMENT PLAN

A. MATERIALS COVERED

The following materials or substances are expected to be present onsite during construction:

Concrete/Additives/Wastes	Cleaning Solvents
Detergents	Petroleum Based Products
Paints/Solvents	Pesticides
Acids	Solid and Construction Wastes
Sanitary Wastes	Soil Stabilization Additives

B. MATERIAL MANAGEMENT PRACTICES

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff. The job site superintendent will be responsible for ensuring that these procedures are followed.

1. Good Housekeeping

   The following good housekeeping practices will be followed onsite during the construction project.

   a. An effort will be made to store only enough products required to do the job.
   b. All materials stored onsite will be stored in a neat, orderly manner and, if possible, under a roof or in a containment area. At a minimum, all containers will be stored with their lids on when not in use. Drip pans shall be provided under all dispensers.
   c. Products will be kept in their original containers with the original manufacturer's label in legible condition.
   d. Substances will not be mixed with one another unless recommended by the manufacturer.
   e. Whenever possible, all of a product will be used up before disposing of the container.
   f. Manufacturer's recommendations for proper use and disposal will be followed.
   g. The job site superintendent will be responsible for daily inspections to ensure proper use and disposal of materials.

2. Hazardous Products

These practices will be used to reduce the risks associated with hazardous materials. Material Safety Data Sheets (MSDS's) for each substance with hazardous properties that is used on the job site will be obtained and used for the proper management of potential wastes that may result from these products. An MSDS will be posted in the immediate area where such product is stored and/or used and another copy of each MSDS will be maintained in the SWPPP file at the job site construction trailer office. Each employee who must handle a substance with hazardous properties will be instructed on the use of MSDS sheets and the specific information in the applicable MSDS for the product he/she is using, particularly regarding spill control techniques.

a. Products will be kept in original containers with the original labels in legible condition.
b. Original labels and material safety data sheets (MSDS's) will be procured and used for each material.
c. If surplus product must be disposed of, manufacturer's or local/state/federal recommended methods for proper disposal will be followed.

3. Hazardous Waste

All hazardous waste materials will be disposed of by the contractor in the manner specified by local, state, and/or federal regulations and by the manufacturer of such products. Site personnel will be instructed in these practices by the job site superintendent, who will also be responsible for seeing that these practices are followed.

4. Product Specific Practices

The following product specific practices will be followed on the job site.

a. Petroleum Products
   All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers, which are clearly labeled. Any petroleum storage tanks used onsite will have a dike or berm containment structure constructed around it to contain any spills, which may occur. Drip pans shall be provided for all dispensers. Any asphalt substances used onsite will be applied per the manufacturer's recommendations.

b. Fertilizers
   Due to the onsite public water supply that will be constructed as part of this project, the use of fertilizers is not allowed without the written authorization of the operator. Authorization will be based on the specific product's possible contaminants and impacts to the groundwater.

c. Paints, Paint Solvents, and Cleaning Solvents
   All containers will be tightly sealed and stored when not in use. Excess paint and solvents will not be discharged to the storm sewer system but will be properly disposed of per manufacturer's instructions or state and federal regulations.

5. Concrete Wastes

   Concrete trucks will be allowed to wash out or discharge surplus concrete or drum wash water on the site, but only in either (1) specifically designated area which has been prepared to prevent contact between the concrete and/or washout and stormwater which will be discharged from the site or (2) in locations where waste concrete can be poured into forms to make riprap or other useful concrete products.

   The hardened residue from the concrete washout areas will be disposed of in the same manner as other non-hazardous construction waste materials or may be broken up and used on site as deemed appropriate by the contractor. The job site superintendent will be responsible for seeing that these procedures are followed.

   All concrete washout areas will be in an area where the likelihood of the area contributing to storm water discharges is negligible. If required, additional BMPs must be implemented to prevent concrete wastes from contributing to storm water discharges.

6. Solid and Construction Wastes

   All waste materials will be collected and stored in a securely lidded metal dumpster rented from a local waste management company which must be a solid waste management company licensed to do business in New York State. The dumpster will comply with all local and state solid waste management regulations.

   All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied a minimum of twice per week or more often if necessary, and the trash will be hauled to a landfill approved by New York State. No construction waste materials will be buried on site. All personnel will be instructed regarding the correct procedures for waste disposal.

   All waste dumpsters and roll-off containers will be in an area where the likelihood of the containers contributing to storm water discharges is negligible. If required, additional BMPs must be implemented, such as sandbags around the base, to prevent wastes from contributing to storm water discharges.

7. Sanitary Wastes

   All sanitary waste will be collected from the portable units a minimum of three times per week by a licensed portable facility provider in complete compliance with local and state regulation.

   All sanitary waste units will be in an area where the likelihood of the unit contributing to storm water discharges is negligible. If required, additional BMPs must be implemented, such as sandbags around the base, to prevent wastes from contributing to storm water discharges.

Section VI. SPILL PREVENTION AND RESPONSE PROCEDURES

The contractor will train all personnel in the proper handling and cleanup of spilled materials. No spilled hazardous materials or hazardous wastes will be allowed to come in contact with storm water discharges. If such contact occurs, the storm water discharge will be contained on site until appropriate measures in compliance with state and federal regulations are taken to dispose of such contaminated storm water. It shall be the responsibility of the job site superintendent to properly train all personnel in spill prevention and clean up procedures.

In order to minimize the potential for a spill of hazardous materials to come into contact with storm water, the following steps will be implemented:

1. All materials with hazardous properties (such as pesticides, petroleum products, fertilizers, detergents, construction chemicals, acids, paints, paint solvents, cleaning solvents, additives for soil stabilization, concrete curing compounds and additives, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.
2. The minimum practical quantity of all such materials will be kept on the job site.
3. A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided at the storage site.
4. Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.

In the event of a spill, the following procedures should be followed

1. All spills will be cleaned up immediately after discovery.
2. The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with the hazardous substances.
3. The project manager and the Engineer of Record will be notified immediately.
4. Spills of toxic or hazardous materials will be reported to the appropriate federal, state, and/or local government agency, regardless of the size of the spill. Spills of amounts that exceed Reportable Quantities of certain substances specifically mentioned in federal regulations (40 CFR 110, 40 CFR 117, and 40 CFR 302) must be immediately reported to the NYSDEC 24-Hour Spill Hotline at **1-800-457-7362.**
4. If the spill exceeds a Reportable Quantity, the SWPPP must be modified within seven (7) calendar days of knowledge of the discharge to provide a description of the release, the circumstances leading to the release, and the date of the release. The plans must identify measures to prevent the recurrence of such releases and to respond to such releases.

The job site superintendent will be the spill prevention and response coordinator. He will designate the individuals who will receive spill prevention and response training. These individuals will each become responsible for a particular phase of prevention and response. The names of these personnel will be posted in the material storage area and in the office trailer onsite.

Section VII. CONTROL OF NON-STORMWATER DISCHARGES

Certain types of discharges are allowable under the NYS-DEC SPDES General Permit for Stormwater Discharges from Construction Activity, and it is the intent of this SWPPP to allow such discharges. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come in contact with the water prior to or after its discharge. The control measures, which have been outlined previously in this SWPPP, will be strictly followed to ensure that no contamination of these non-stormwater discharges takes place. The following non-storm water discharges are allowed by the NYS-DEC and may occur at the job site:

1. Discharges from firefighting activities
2. Fire hydrant flushing
3. Waters to which cleansers or other components have not been added that are used to wash vehicles or control dust
4. Routine external building wash down which does not use detergents
5. Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used
6. Air conditioning condensate
7. Springs
8. Foundation or footing drains where flows are not contaminated with process materials such as solvents.

Section VIII. CERTIFICATION AND NOTIFICATION

The New York State Department of Environmental Conservation requires that the operator and the contractor make certifications of knowledge of the contents of this SWPPP and agreement to follow the SWPPP. The terms of the General Permit also require that each contractor sign the SWPPP plan, thereby making them co-permittees and acknowledging their responsibility for certain operational aspects of the plan. These certifications should be signed before the contractor begins activities and should be filed with the site's SWPPP at the jobsite.

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APPENDIX A: SOIL DESCRIPTIONS

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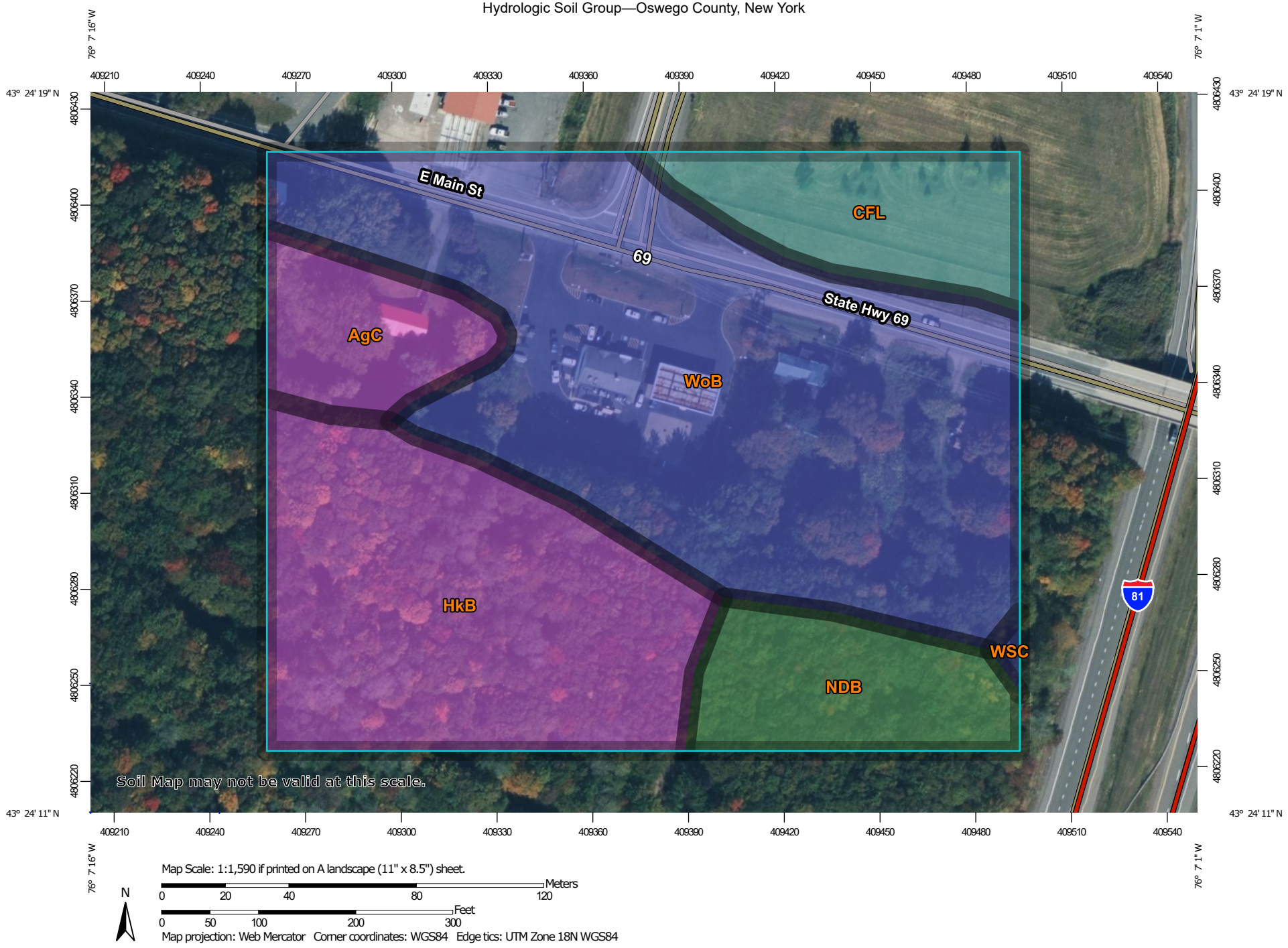

Map Scale: 1:1,590 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil 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 1:15,800.

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: Oswego County, New York
Survey Area Data: Version 23, Sep 10, 2022

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

Date(s) aerial images were photographed: Jul 19, 2020—Nov 5, 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
AgC	Alton gravelly fine sandy loam, rolling	A	0.8	6.8%
CFL	Cut and fill land	C	1.0	8.9%
HkB	Hinckley gravelly loamy sand, 3 to 8 percent slopes	A	2.9	26.8%
NDB	Naumburg-Duane complex, gently sloping	A/D	1.0	9.1%
WoB	Worth very fine sandy loam, 3 to 8 percent slopes, stony	B	5.3	48.0%
WSC	Worth and Empeyville soils, 8 to 15 percent slopes, very stony	B	0.0	0.3%
Totals for Area of Interest			**11.0**	**100.0%**

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

APPENDIX B: HYDRO CAD – EXISTING CONDITIONS

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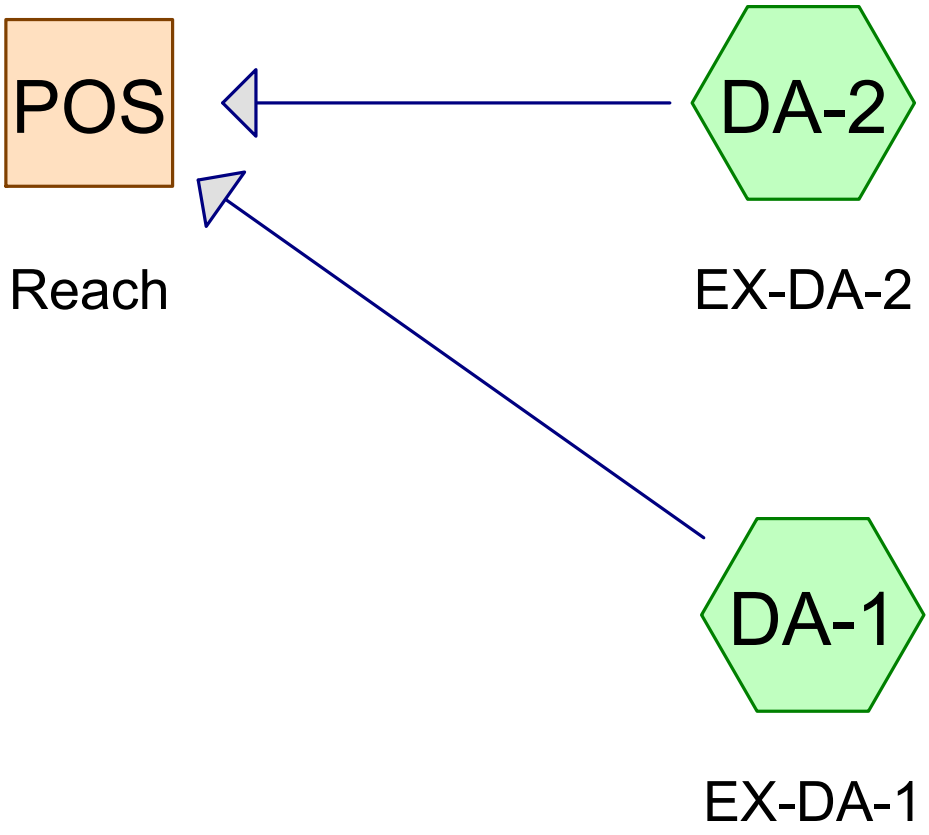


Subcat Reach Pond Link

Routing Diagram for EX-DA
Prepared by Napierala Consulting , Printed 4/7/2023

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.100	HSG A	DA-1
2.800	HSG B	DA-1, DA-2
0.000	HSG C	
0.000	HSG D	
0.000	Other	
4.900		**TOTAL AREA**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 DA-1: EX-DA-1 Runoff Area=3.300 ac 30.30% Impervious Runoff Depth>0.13"
Flow Length=508' Tc=17.9 min CN=65 Runoff=0.2 cfs 0.036 af

Subcatchment DA-2: EX-DA-2 Runoff Area=1.600 ac 18.75% Impervious Runoff Depth>0.19"
Flow Length=702' Tc=23.6 min CN=68 Runoff=0.2 cfs 0.025 af

Reach POS: Reach Inflow=0.4 cfs 0.061 af
Outflow=0.4 cfs 0.061 af

Total Runoff Area = 4.900 ac Runoff Volume = 0.061 af Average Runoff Depth = 0.15"
73.47% Pervious = 3.600 ac 26.53% Impervious = 1.300 ac

Summary for Subcatchment DA-1: EX-DA-1

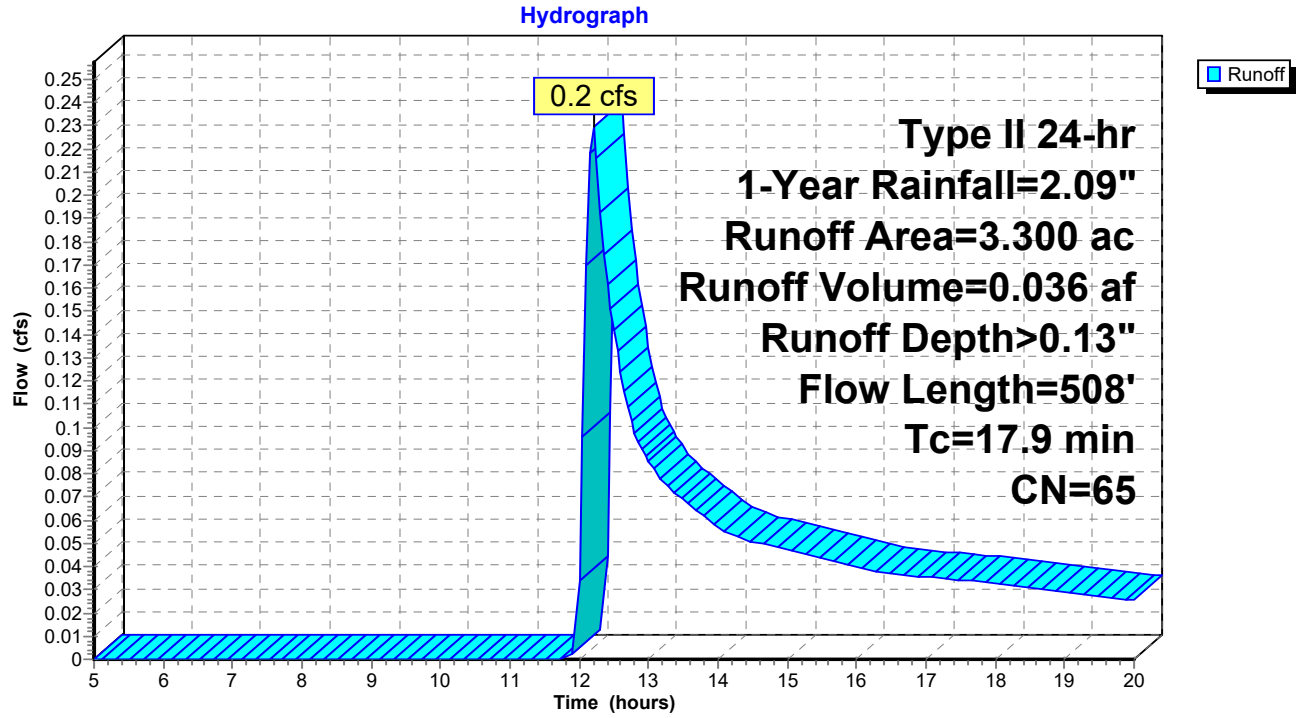
Runoff = 0.2 cfs @ 12.20 hrs, Volume= 0.036 af, Depth> 0.13"
Routed to Reach POS : Reach

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.09"

Area (ac)	CN	Description
1.000	98	Paved parking, HSG A
1.100	39	>75% Grass cover, Good, HSG A
1.200	61	>75% Grass cover, Good, HSG B
3.300	65	Weighted Average
2.300		69.70% Pervious Area
1.000		30.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0700	0.11		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.37"
2.3	220	0.1000	1.58		**Shallow Concentrated Flow, Shallow Conc. Flow** Woodland Kv= 5.0 fps
0.5	188	0.0180	6.45	19.34	**Channel Flow, Roadside ditch** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.022 Earth, clean & straight
17.9	508	Total			

Subcatchment DA-1: EX-DA-1



Summary for Subcatchment DA-2: EX-DA-2

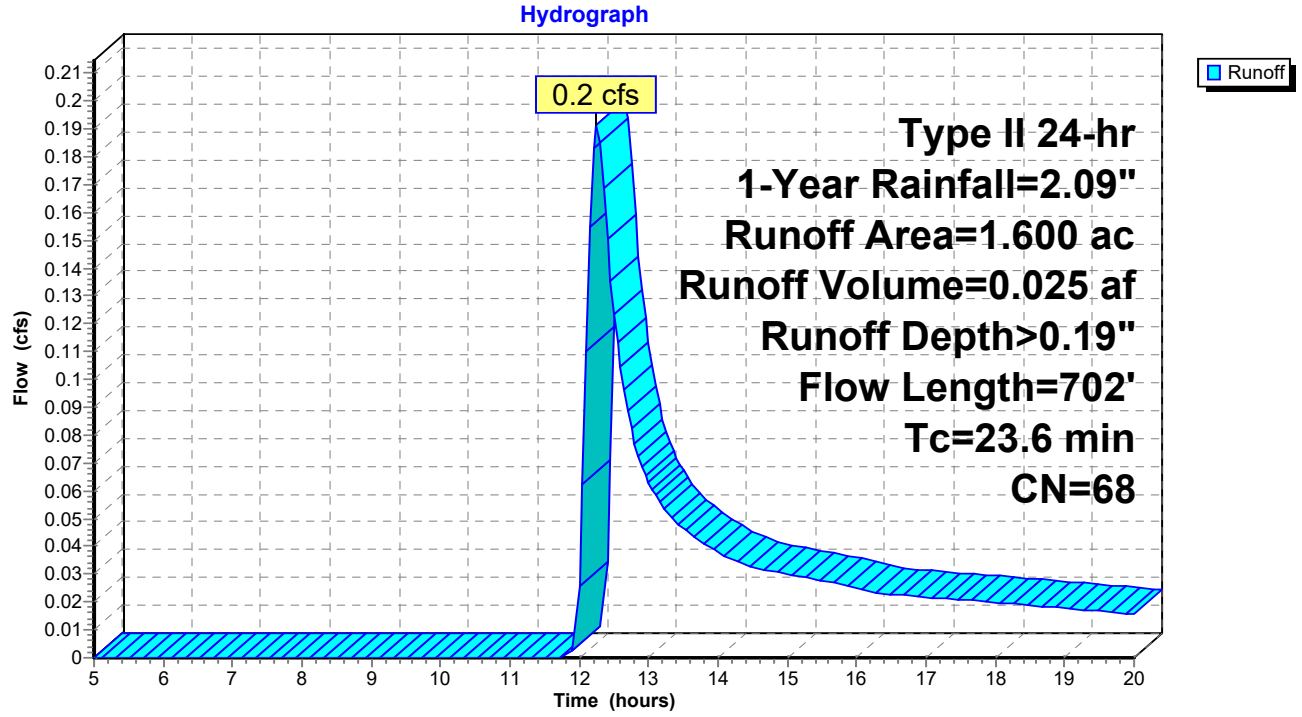
Runoff = 0.2 cfs @ 12.25 hrs, Volume= 0.025 af, Depth> 0.19"
Routed to Reach POS : Reach

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.09"

Area (ac)	CN	Description
0.300	98	Paved parking, HSG B
1.300	61	>75% Grass cover, Good, HSG B
1.600	68	Weighted Average
1.300		81.25% Pervious Area
0.300		18.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0700	0.11		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.37"
8.2	438	0.0320	0.89		**Shallow Concentrated Flow, Shallow Conc. Flow** Woodland Kv= 5.0 fps
0.3	164	0.0470	10.42	31.25	**Channel Flow, Roadside Ditch** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.022 Earth, clean & straight
23.6	702	Total			

Subcatchment DA-2: EX-DA-2



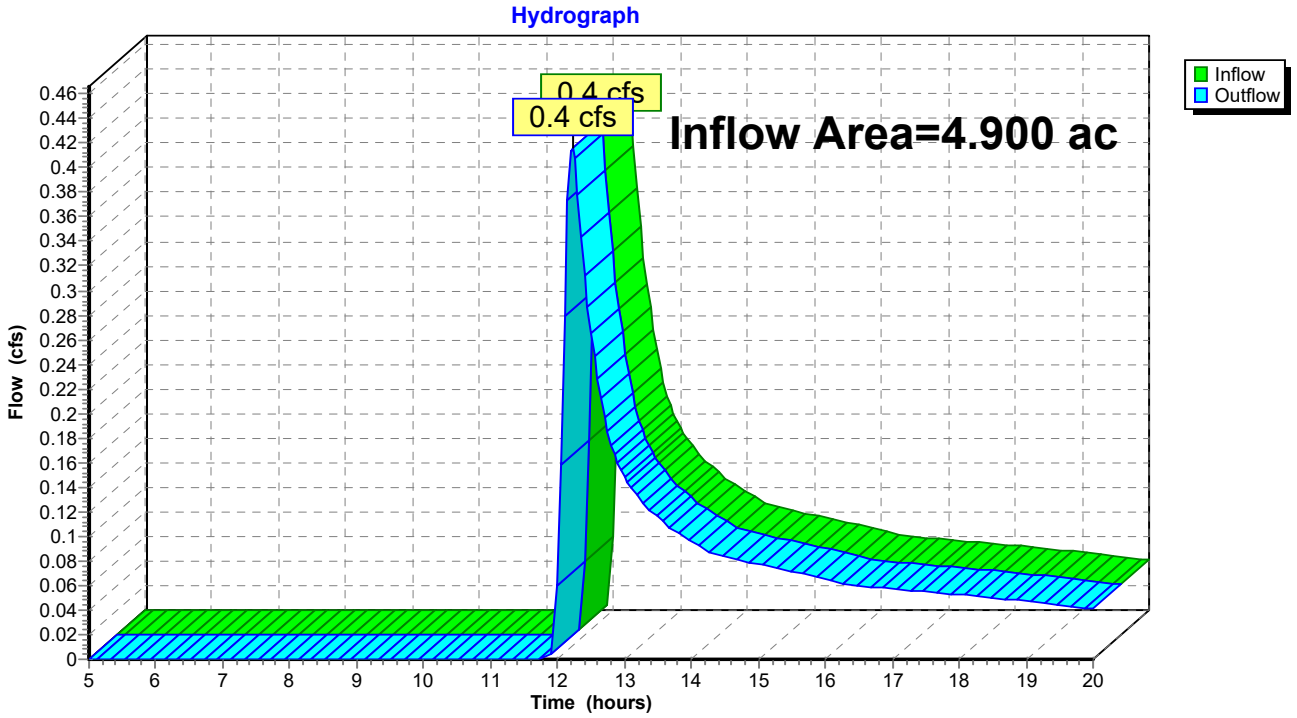
Summary for Reach POS: Reach

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.900 ac, 26.53% Impervious, Inflow Depth > 0.15" for 1-Year event
Inflow = 0.4 cfs @ 12.22 hrs, Volume= 0.061 af
Outflow = 0.4 cfs @ 12.22 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach POS: Reach



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 DA-1: EX-DA-1 Runoff Area=3.300 ac 30.30% Impervious Runoff Depth>0.58"
Flow Length=508' Tc=17.9 min CN=65 Runoff=2.1 cfs 0.158 af

Subcatchment DA-2: EX-DA-2 Runoff Area=1.600 ac 18.75% Impervious Runoff Depth>0.70"
Flow Length=702' Tc=23.6 min CN=68 Runoff=1.1 cfs 0.094 af

Reach POS: Reach Inflow=3.1 cfs 0.252 af
Outflow=3.1 cfs 0.252 af

Total Runoff Area = 4.900 ac Runoff Volume = 0.252 af Average Runoff Depth = 0.62"
73.47% Pervious = 3.600 ac 26.53% Impervious = 1.300 ac

Summary for Subcatchment DA-1: EX-DA-1

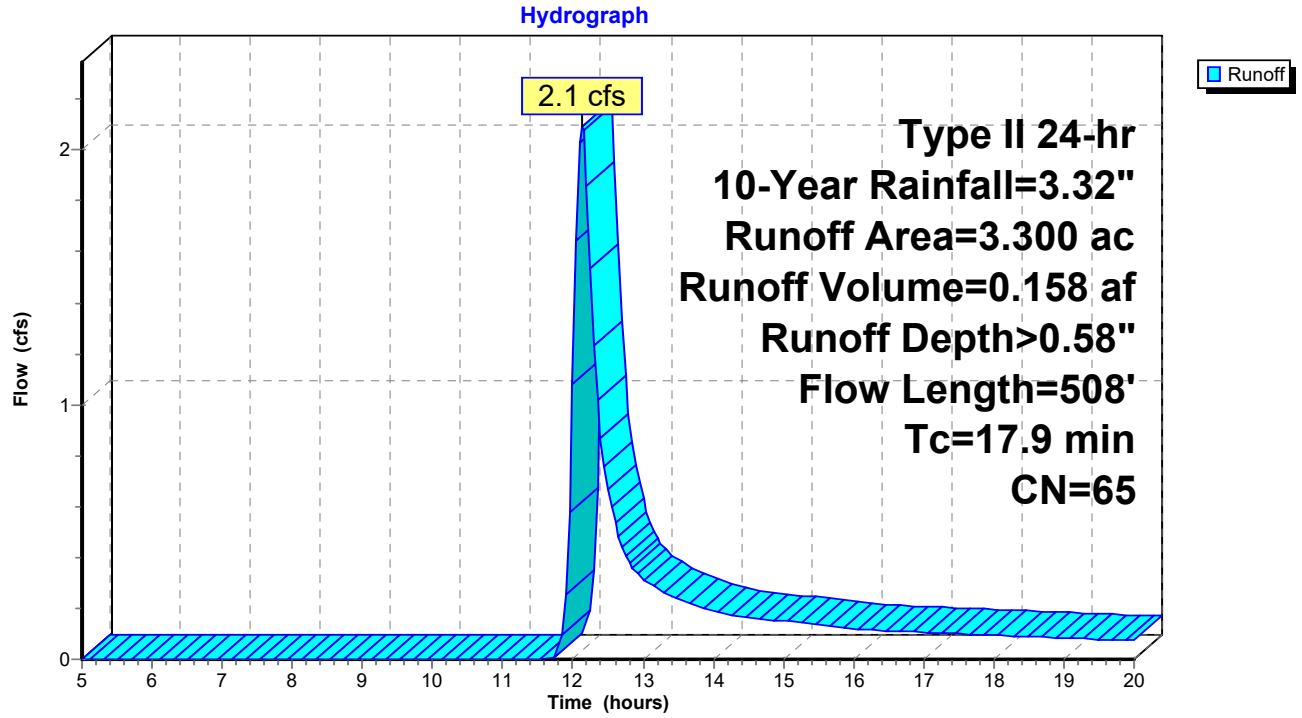
Runoff = 2.1 cfs @ 12.13 hrs, Volume= 0.158 af, Depth> 0.58"
Routed to Reach POS : Reach

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.32"

Area (ac)	CN	Description
1.000	98	Paved parking, HSG A
1.100	39	>75% Grass cover, Good, HSG A
1.200	61	>75% Grass cover, Good, HSG B
3.300	65	Weighted Average
2.300		69.70% Pervious Area
1.000		30.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0700	0.11		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.37"
2.3	220	0.1000	1.58		**Shallow Concentrated Flow, Shallow Conc. Flow** Woodland Kv= 5.0 fps
0.5	188	0.0180	6.45	19.34	**Channel Flow, Roadside ditch** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.022 Earth, clean & straight
17.9	508	Total			

Subcatchment DA-1: EX-DA-1



Summary for Subcatchment DA-2: EX-DA-2

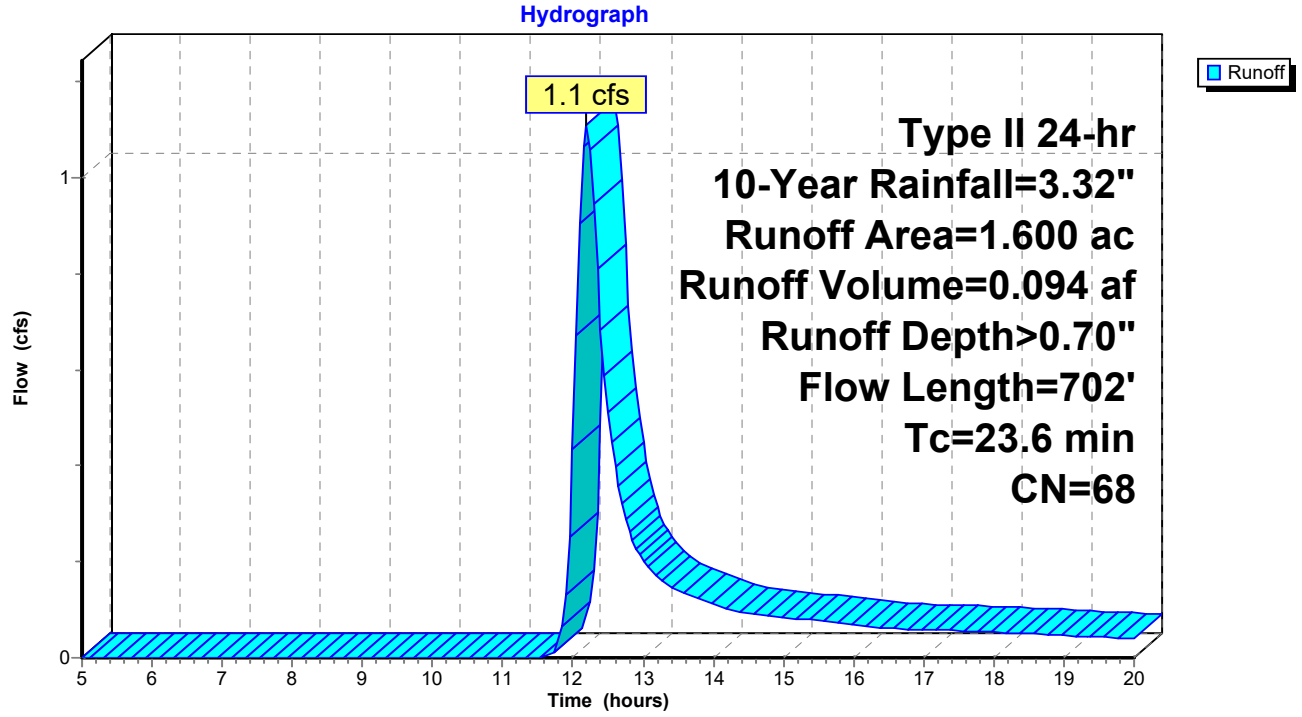
Runoff = 1.1 cfs @ 12.20 hrs, Volume= 0.094 af, Depth> 0.70"
Routed to Reach POS : Reach

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.32"

Area (ac)	CN	Description
0.300	98	Paved parking, HSG B
1.300	61	>75% Grass cover, Good, HSG B
1.600	68	Weighted Average
1.300		81.25% Pervious Area
0.300		18.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0700	0.11		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.37"
8.2	438	0.0320	0.89		**Shallow Concentrated Flow, Shallow Conc. Flow** Woodland Kv= 5.0 fps
0.3	164	0.0470	10.42	31.25	**Channel Flow, Roadside Ditch** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.022 Earth, clean & straight
23.6	702	Total			

Subcatchment DA-2: EX-DA-2



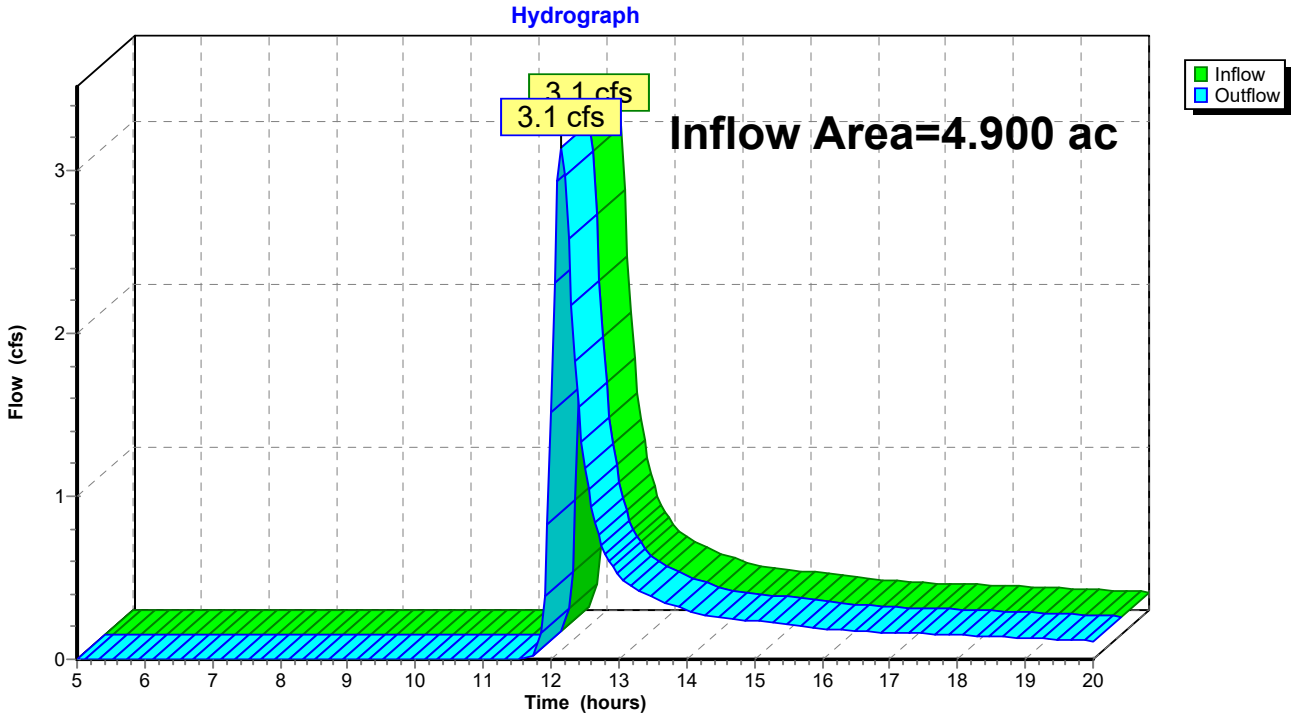
Summary for Reach POS: Reach

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.900 ac, 26.53% Impervious, Inflow Depth > 0.62" for 10-Year event
Inflow = 3.1 cfs @ 12.15 hrs, Volume= 0.252 af
Outflow = 3.1 cfs @ 12.15 hrs, Volume= 0.252 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach POS: Reach



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 DA-1: EX-DA-1 Runoff Area=3.300 ac 30.30% Impervious Runoff Depth>1.74"
Flow Length=508' Tc=17.9 min CN=65 Runoff=7.2 cfs 0.477 af

Subcatchment DA-2: EX-DA-2 Runoff Area=1.600 ac 18.75% Impervious Runoff Depth>1.96"
Flow Length=702' Tc=23.6 min CN=68 Runoff=3.4 cfs 0.262 af

Reach POS: Reach Inflow=10.4 cfs 0.739 af
Outflow=10.4 cfs 0.739 af

Total Runoff Area = 4.900 ac Runoff Volume = 0.739 af Average Runoff Depth = 1.81"
73.47% Pervious = 3.600 ac 26.53% Impervious = 1.300 ac

Summary for Subcatchment DA-1: EX-DA-1

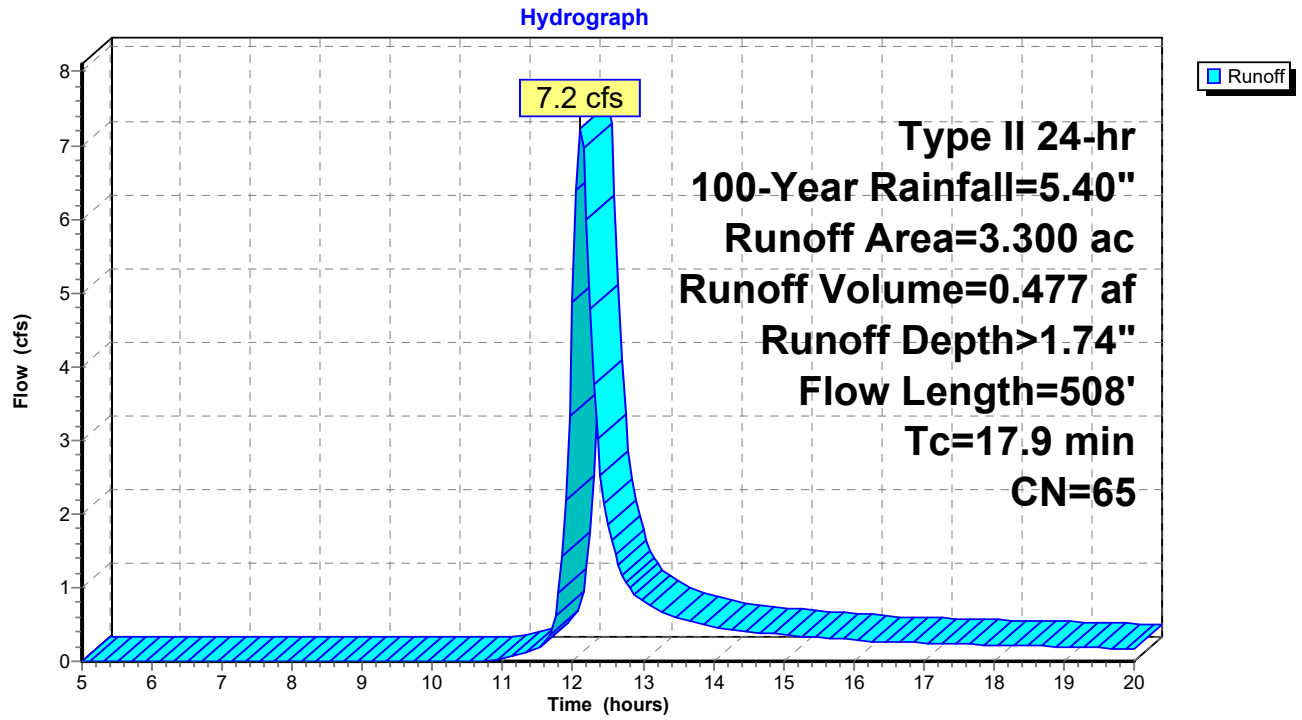
Runoff = 7.2 cfs @ 12.11 hrs, Volume= 0.477 af, Depth> 1.74"
Routed to Reach POS : Reach

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.40"

Area (ac)	CN	Description
1.000	98	Paved parking, HSG A
1.100	39	>75% Grass cover, Good, HSG A
1.200	61	>75% Grass cover, Good, HSG B
3.300	65	Weighted Average
2.300		69.70% Pervious Area
1.000		30.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0700	0.11		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.37"
2.3	220	0.1000	1.58		**Shallow Concentrated Flow, Shallow Conc. Flow** Woodland Kv= 5.0 fps
0.5	188	0.0180	6.45	19.34	**Channel Flow, Roadside ditch** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.022 Earth, clean & straight
17.9	508	Total			

Subcatchment DA-1: EX-DA-1



Summary for Subcatchment DA-2: EX-DA-2

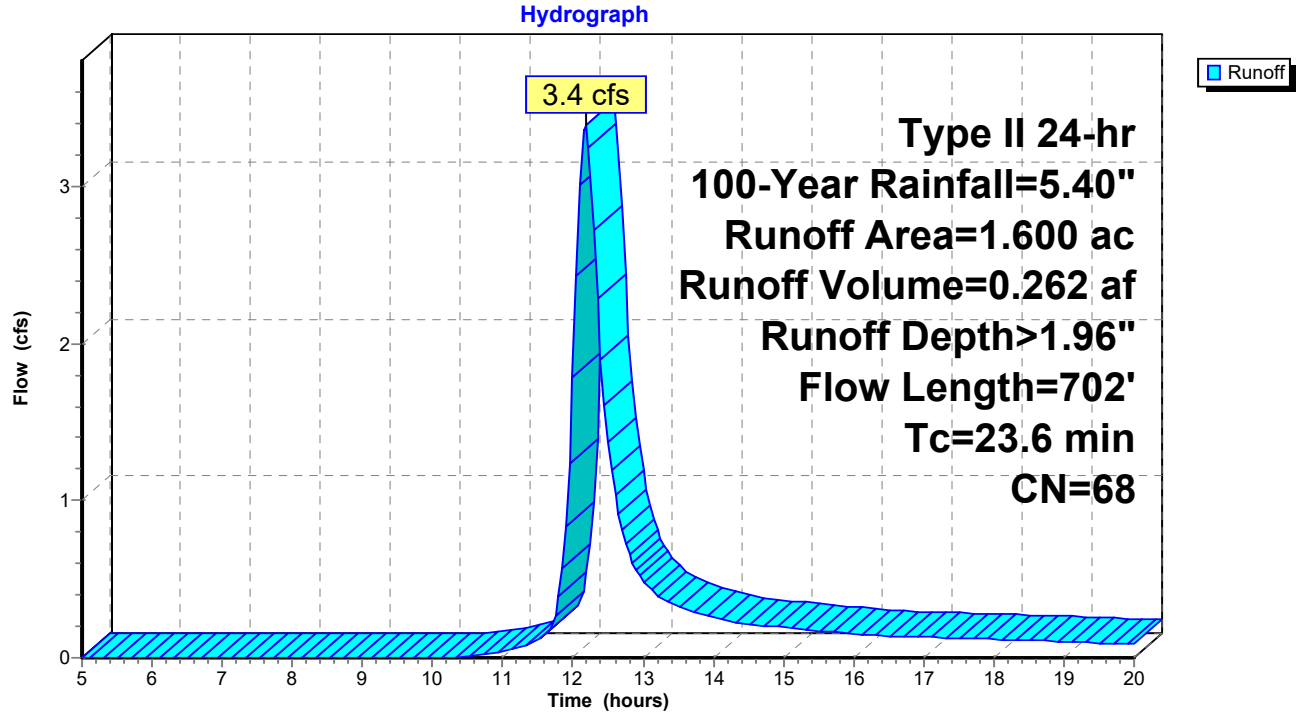
Runoff = 3.4 cfs @ 12.18 hrs, Volume= 0.262 af, Depth> 1.96"
Routed to Reach POS : Reach

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.40"

Area (ac)	CN	Description
0.300	98	Paved parking, HSG B
1.300	61	>75% Grass cover, Good, HSG B
1.600	68	Weighted Average
1.300		81.25% Pervious Area
0.300		18.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0700	0.11		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.37"
8.2	438	0.0320	0.89		**Shallow Concentrated Flow, Shallow Conc. Flow** Woodland Kv= 5.0 fps
0.3	164	0.0470	10.42	31.25	**Channel Flow, Roadside Ditch** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.022 Earth, clean & straight
23.6	702	Total			

Subcatchment DA-2: EX-DA-2



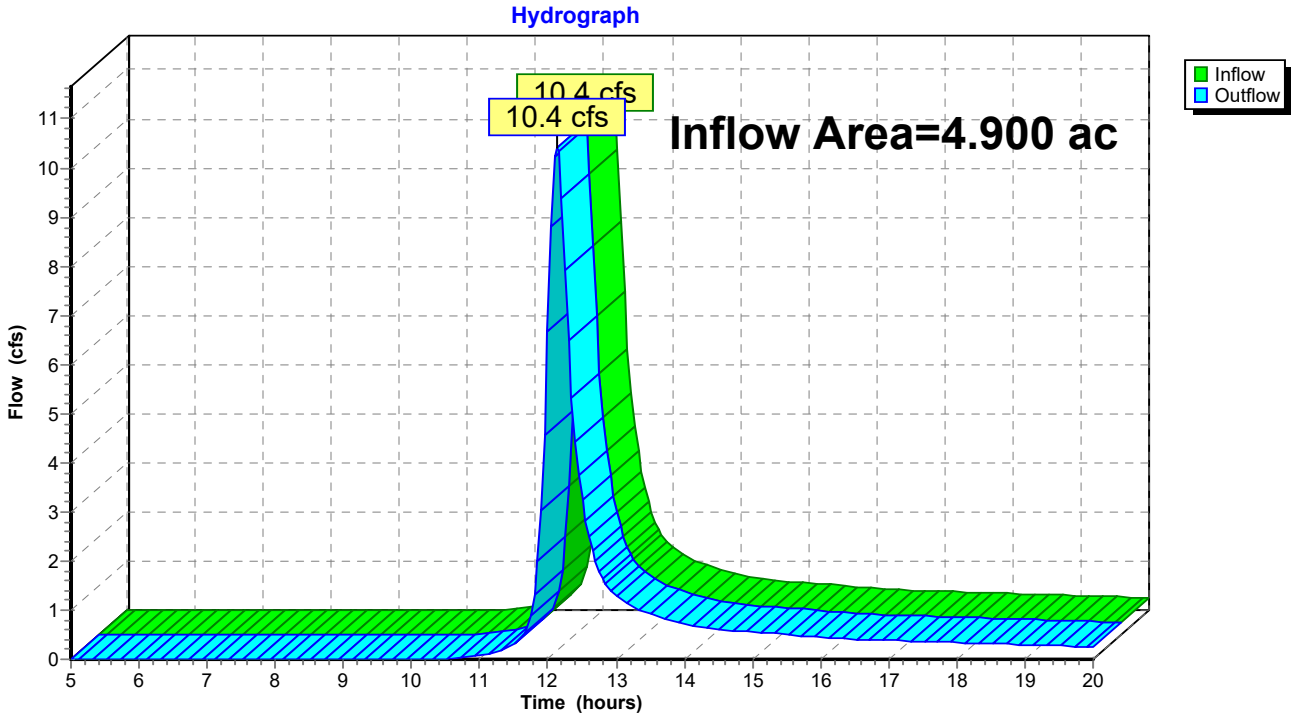
Summary for Reach POS: Reach

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.900 ac, 26.53% Impervious, Inflow Depth > 1.81" for 100-Year event
Inflow = 10.4 cfs @ 12.13 hrs, Volume= 0.739 af
Outflow = 10.4 cfs @ 12.13 hrs, Volume= 0.739 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach POS: Reach



APPENDIX C: HYDRO CAD – PROPOSED CONDITIONS

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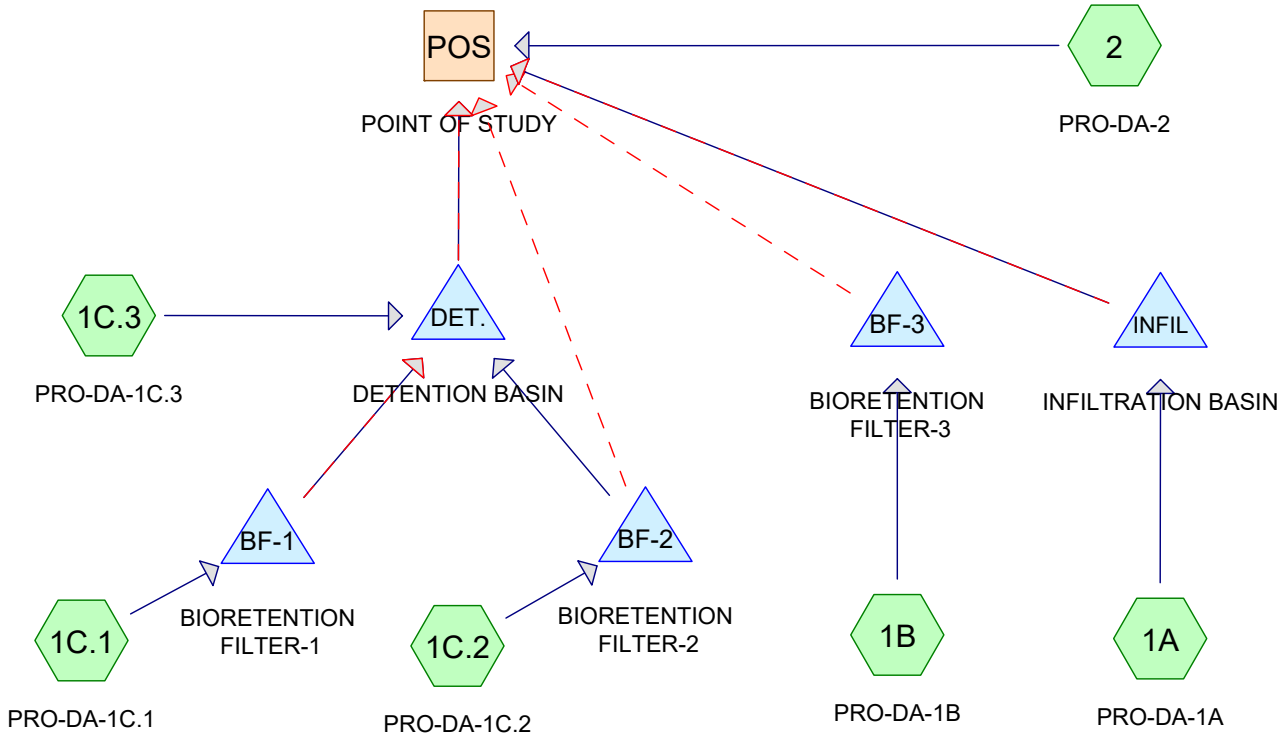


Subcat Reach Pond Link

Routing Diagram for PRO-DA
Prepared by Napierala Consulting , Printed 4/7/2023

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.000	HSG A	1A, 1C.1, 1C.2, 1C.3
2.900	HSG B	1A, 1B, 2
0.000	HSG C	
0.000	HSG D	
0.000	Other	
4.900		**TOTAL AREA**

Time span=3.00-26.00 hrs, dt=0.05 hrs, 461 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 1A: PRO-DA-1A Runoff Area=1.500 ac 26.67% Impervious Runoff Depth=0.06"
Flow Length=641' Tc=15.5 min CN=59 Runoff=0.0 cfs 0.008 af

Subcatchment 1B: PRO-DA-1B Runoff Area=0.200 ac 70.00% Impervious Runoff Depth=0.98"
Tc=6.0 min CN=87 Runoff=0.3 cfs 0.016 af

Subcatchment 1C.1: PRO-DA-1C.1 Runoff Area=0.800 ac 62.50% Impervious Runoff Depth=0.46"
Flow Length=170' Tc=15.6 min CN=76 Runoff=0.4 cfs 0.031 af

Subcatchment 1C.2: PRO-DA-1C.2 Runoff Area=0.200 ac 50.00% Impervious Runoff Depth=0.25"
Tc=6.0 min CN=69 Runoff=0.1 cfs 0.004 af

Subcatchment 1C.3: PRO-DA-1C.3 Runoff Area=0.200 ac 20.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=51 Runoff=0.0 cfs 0.000 af

Subcatchment 2: PRO-DA-2 Runoff Area=2.000 ac 25.00% Impervious Runoff Depth=0.28"
Flow Length=1,168' Tc=24.8 min CN=70 Runoff=0.3 cfs 0.046 af

Reach POS: POINT OF STUDY Inflow=0.4 cfs 0.081 af
Outflow=0.4 cfs 0.081 af

Pond BF-1: BIORETENTIONFILTER-1 Peak Elev=512.51' Storage=402 cf Inflow=0.4 cfs 0.031 af
Primary=0.1 cfs 0.031 af Secondary=0.0 cfs 0.000 af Outflow=0.1 cfs 0.031 af

Pond BF-2: BIORETENTIONFILTER-2 Peak Elev=513.77' Storage=25 cf Inflow=0.1 cfs 0.004 af
Primary=0.0 cfs 0.004 af Secondary=0.0 cfs 0.000 af Outflow=0.0 cfs 0.004 af

Pond BF-3: BIORETENTIONFILTER-3 Peak Elev=518.10' Storage=315 cf Inflow=0.3 cfs 0.016 af
Primary=0.0 cfs 0.016 af Secondary=0.0 cfs 0.000 af Outflow=0.0 cfs 0.016 af

Pond DET.: DETENTION BASIN Peak Elev=508.26' Storage=15 cf Inflow=0.1 cfs 0.035 af
Primary=0.1 cfs 0.035 af Secondary=0.0 cfs 0.000 af Outflow=0.1 cfs 0.035 af

Pond INFIL: INFILTRATION BASIN Peak Elev=515.27' Storage=62 cf Inflow=0.0 cfs 0.008 af
Discarded=0.0 cfs 0.008 af Primary=0.0 cfs 0.000 af Secondary=0.0 cfs 0.000 af Outflow=0.0 cfs 0.008 af

Total Runoff Area = 4.900 ac Runoff Volume = 0.105 af Average Runoff Depth = 0.26"
65.71% Pervious = 3.220 ac 34.29% Impervious = 1.680 ac

Summary for Subcatchment 1A: PRO-DA-1A

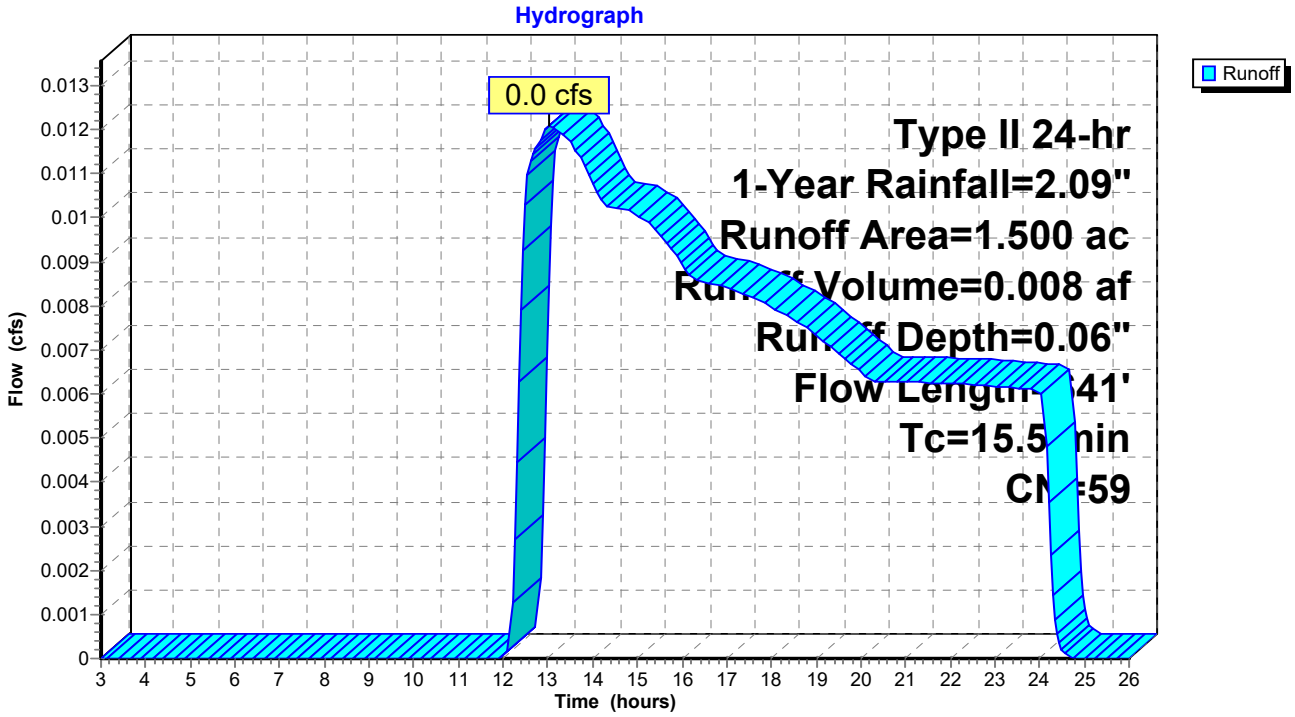
Runoff = 0.0 cfs @ 13.03 hrs, Volume= 0.008 af, Depth= 0.06"
Routed to Pond INFIL : INFILTRATION BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.09"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG B
0.300	61	>75% Grass cover, Good, HSG B
0.800	39	>75% Grass cover, Good, HSG A
1.500	59	Weighted Average
1.100		73.33% Pervious Area
0.400		26.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	80	0.0500	0.09		**Sheet Flow, SHEET FLOW** Woods: Light underbrush n= 0.400 P2= 2.37"
0.8	387	0.0240	8.34	26.68	**Channel Flow, VEGETATED SWALE** Area= 3.2 sf Perim= 4.5' r= 0.71' n= 0.022 Earth, clean & straight
0.1	60	0.0660	10.85	45.55	**Channel Flow, VEGETATED SWALE** Area= 4.2 sf Perim= 8.5' r= 0.49' n= 0.022 Earth, clean & straight
0.1	114	0.0400	17.00	204.01	**Channel Flow, VEGETATED SWALE** Area= 12.0 sf Perim= 8.5' r= 1.41' n= 0.022 Earth, clean & straight
15.5	641	Total			

Subcatchment 1A: PRO-DA-1A



Summary for Subcatchment 1B: PRO-DA-1B

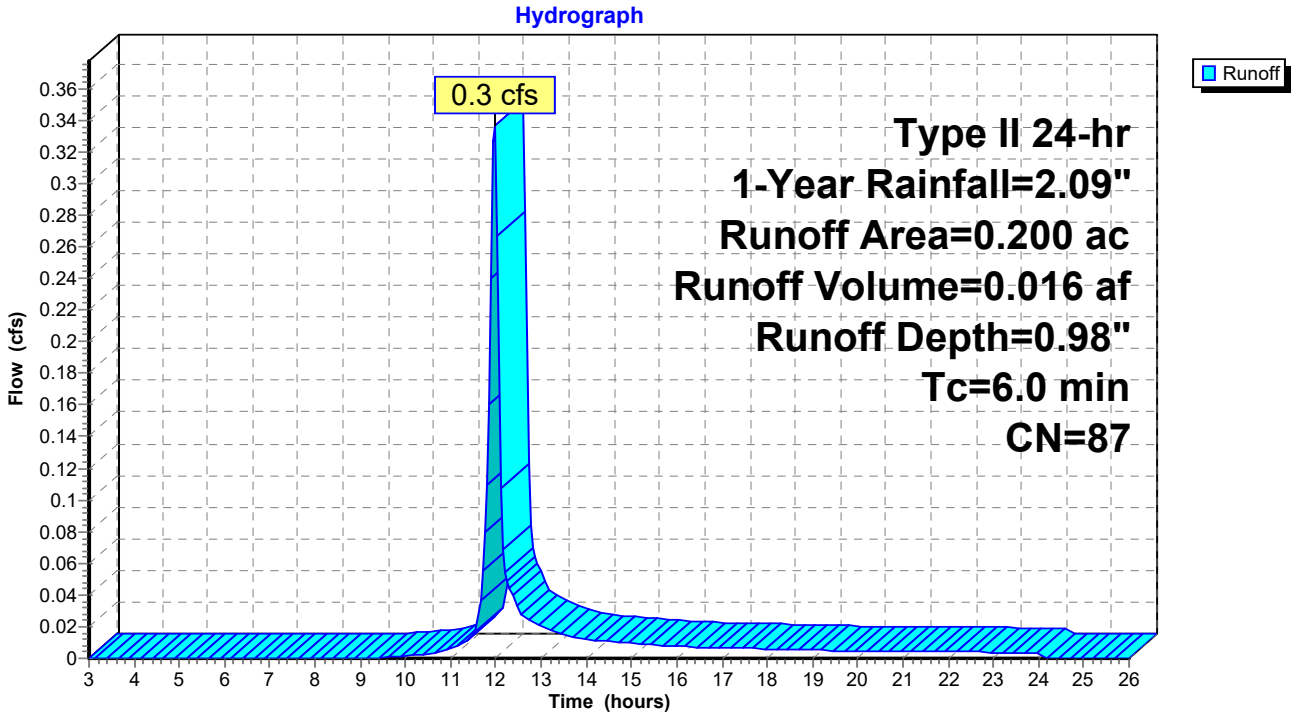
Runoff = 0.3 cfs @ 11.97 hrs, Volume= 0.016 af, Depth= 0.98"
Routed to Pond BF-3 : BIORETENTION FILTER-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.09"

Area (ac)	CN	Description
0.140	98	Paved parking, HSG B
0.060	61	>75% Grass cover, Good, HSG B
0.200	87	Weighted Average
0.060		30.00% Pervious Area
0.140		70.00% Impervious Area

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

Subcatchment 1B: PRO-DA-1B



Summary for Subcatchment 1C.1: PRO-DA-1C.1

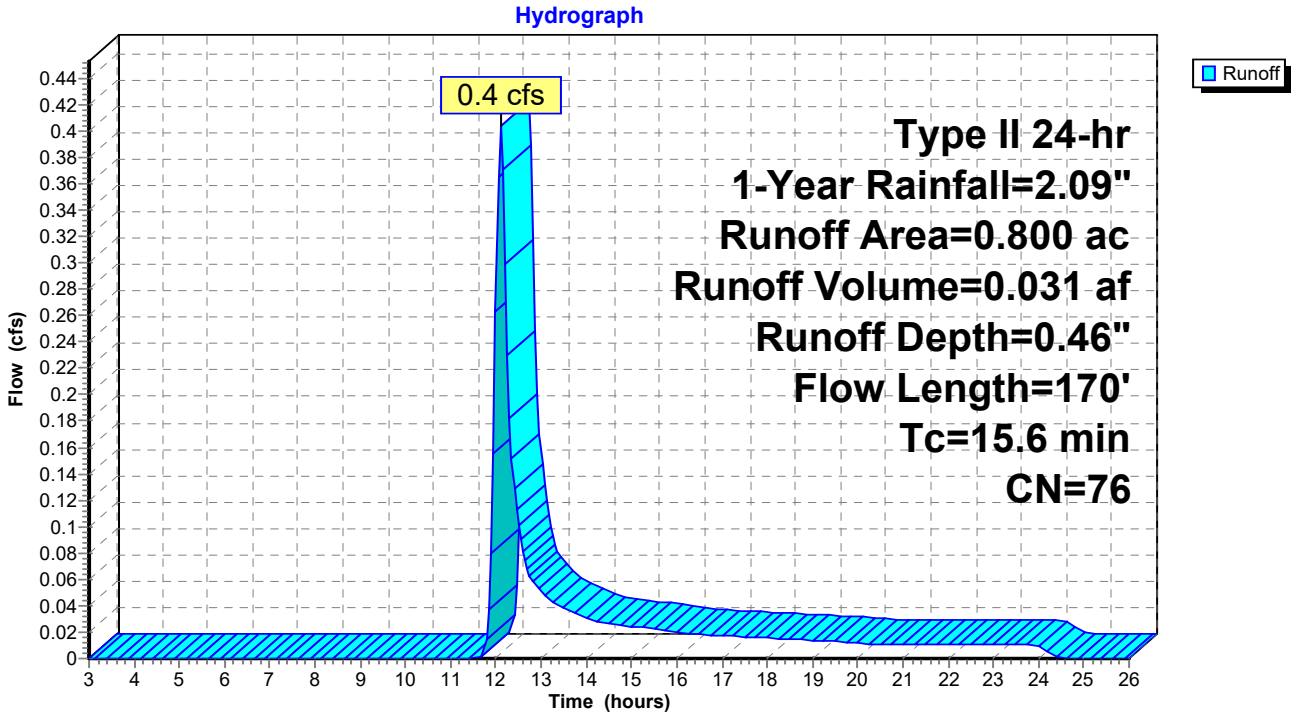
Runoff = 0.4 cfs @ 12.10 hrs, Volume= 0.031 af, Depth= 0.46"
Routed to Pond BF-1 : BIORETENTION FILTER-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.09"

Area (ac)	CN	Description
0.500	98	Paved parking, HSG A
0.300	39	>75% Grass cover, Good, HSG A
0.800	76	Weighted Average
0.300		37.50% Pervious Area
0.500		62.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	70	0.0470	0.09		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.37"
2.1	30	0.3000	0.23		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.37"
0.2	70	0.2000	6.71		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
15.6	170	Total			

Subcatchment 1C.1: PRO-DA-1C.1



Summary for Subcatchment 1C.2: PRO-DA-1C.2

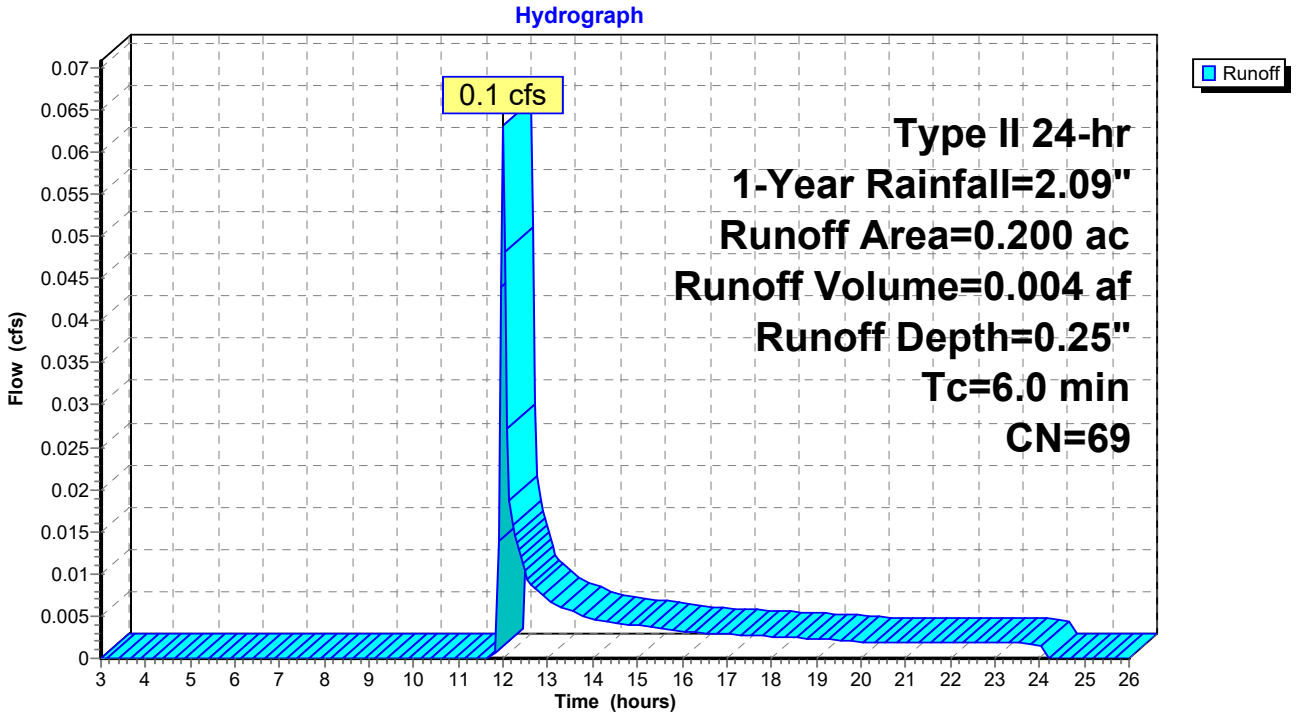
Runoff = 0.1 cfs @ 12.00 hrs, Volume= 0.004 af, Depth= 0.25"
Routed to Pond BF-2 : BIORETENTION FILTER-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.09"

Area (ac)	CN	Description
0.100	98	Paved parking, HSG A
0.100	39	>75% Grass cover, Good, HSG A
0.200	69	Weighted Average
0.100		50.00% Pervious Area
0.100		50.00% Impervious Area

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

Subcatchment 1C.2: PRO-DA-1C.2



Summary for Subcatchment 1C.3: PRO-DA-1C.3

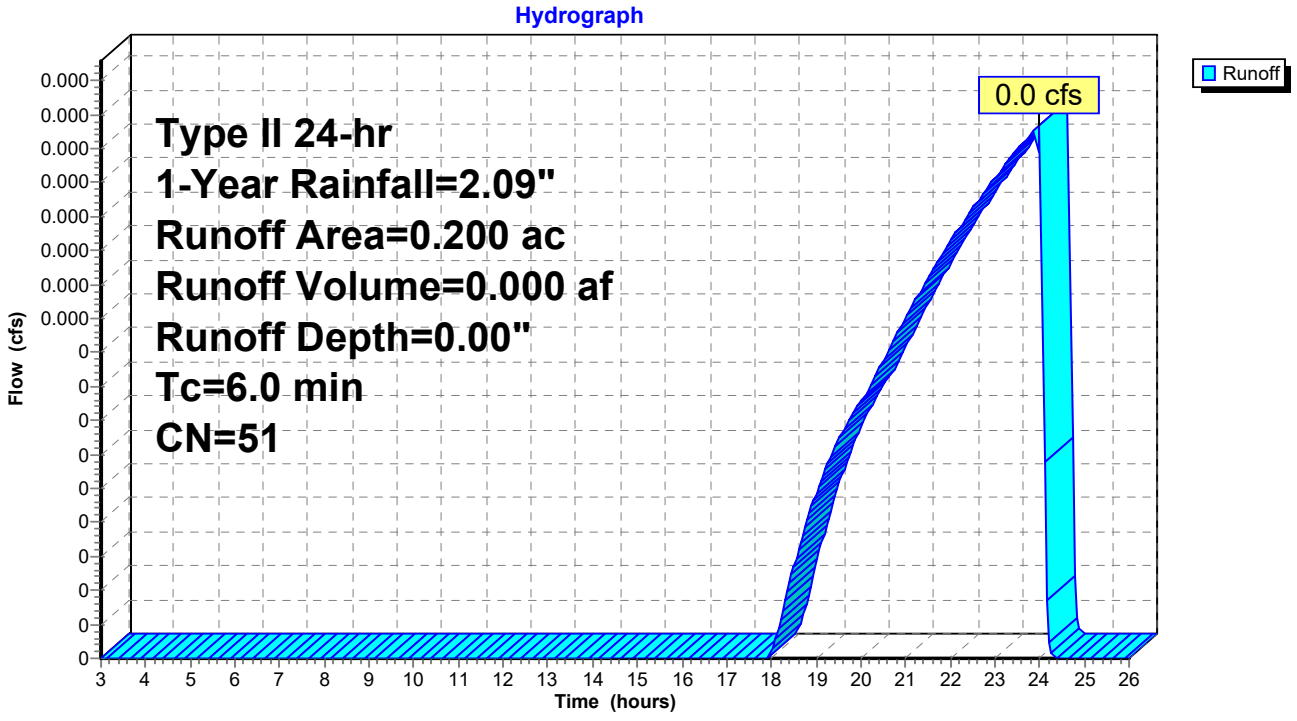
Runoff = 0.0 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond DET. : DETENTION BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.09"

Area (ac)	CN	Description
0.040	98	Paved parking, HSG A
0.160	39	>75% Grass cover, Good, HSG A
0.200	51	Weighted Average
0.160		80.00% Pervious Area
0.040		20.00% Impervious Area

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

Subcatchment 1C.3: PRO-DA-1C.3



Summary for Subcatchment 2: PRO-DA-2

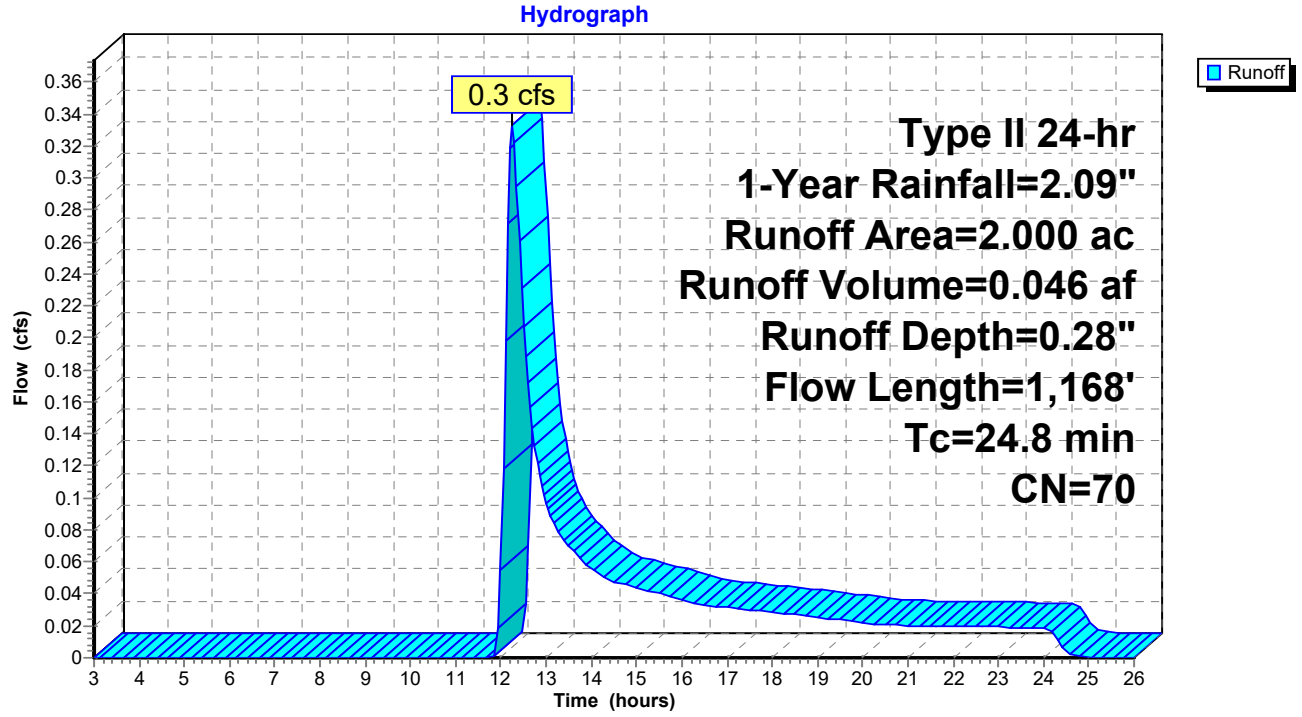
Runoff = 0.3 cfs @ 12.25 hrs, Volume= 0.046 af, Depth= 0.28"
Routed to Reach POS : POINT OF STUDY

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.09"

Area (ac)	CN	Description
0.500	98	Paved parking, HSG B
1.500	61	>75% Grass cover, Good, HSG B
2.000	70	Weighted Average
1.500		75.00% Pervious Area
0.500		25.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0700	0.11		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 2.37"
8.2	438	0.0320	0.89		**Shallow Concentrated Flow, Shallow Conc. Flow** Woodland Kv= 5.0 fps
1.5	630	0.0200	6.80	20.39	**Channel Flow, Roadside Ditch** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.022 Earth, clean & straight
24.8	1,168	Total			

Subcatchment 2: PRO-DA-2



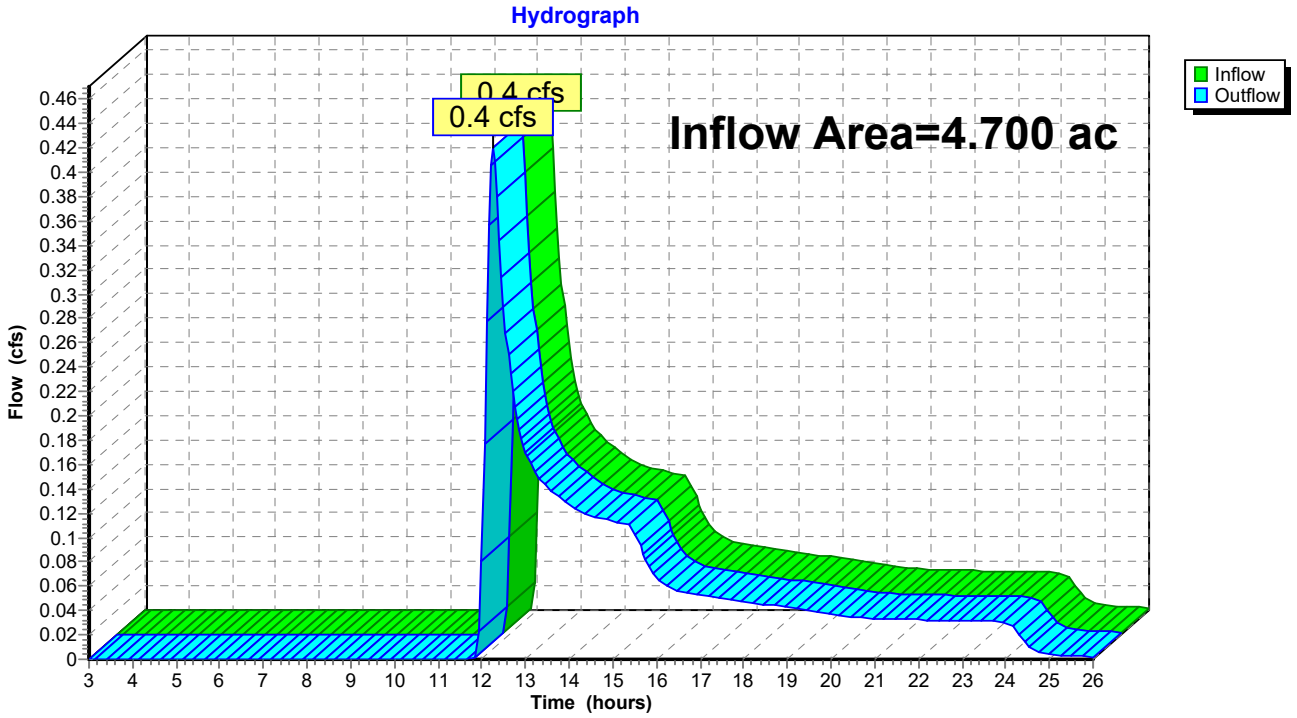
Summary for Reach POS: POINT OF STUDY

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.700 ac, 32.77% Impervious, Inflow Depth > 0.21" for 1-Year event
Inflow = 0.4 cfs @ 12.25 hrs, Volume= 0.081 af
Outflow = 0.4 cfs @ 12.25 hrs, Volume= 0.081 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs

Reach POS: POINT OF STUDY



Summary for Pond BF-1: BIORETENTION FILTER-1

Inflow Area = 0.800 ac, 62.50% Impervious, Inflow Depth = 0.46" for 1-Year event
Inflow = 0.4 cfs @ 12.10 hrs, Volume= 0.031 af
Outflow = 0.1 cfs @ 12.05 hrs, Volume= 0.031 af, Atten= 84%, Lag= 0.0 min
Primary = 0.1 cfs @ 12.05 hrs, Volume= 0.031 af
Routed to Pond DET. : DETENTION BASIN
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Pond DET. : DETENTION BASIN

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 512.51' @ 12.72 hrs Surf.Area= 1,415 sf Storage= 402 cf

Plug-Flow detention time= 61.0 min calculated for 0.030 af (99% of inflow)
Center-of-Mass det. time= 57.4 min (948.9 - 891.5)

Volume	Invert	Avail.Storage	Storage Description
#1	511.80'	3,609 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

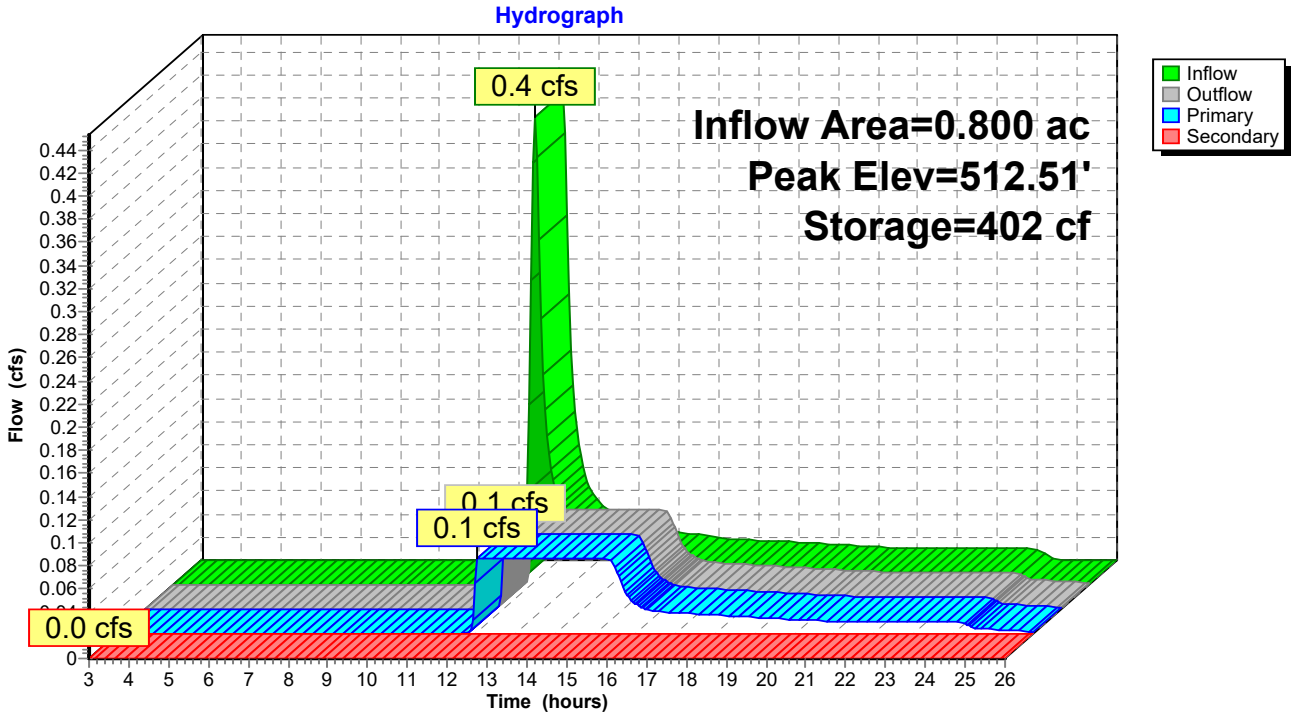
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
511.80	1,415	0.0	0	0
512.80	1,415	40.0	566	566
515.30	1,415	20.0	708	1,273
516.00	1,868	100.0	1,149	2,423
516.20	10,000	100.0	1,187	3,609

Device	Routing	Invert	Outlet Devices
#1	Device 3	511.80'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	516.10'	**7.9' long + 0.3 '/' SideZ x 5.5' breadth Broad-Crested Rectangular Weir** 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 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86
#3	Primary	511.80'	**12.0" Round Culvert** L= 50.4' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 511.80' / 511.60' S= 0.0040 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	515.80'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.1 cfs @ 12.05 hrs HW=512.01' (Free Discharge)
└**3=Culvert** (Passes 0.1 cfs of 0.1 cfs potential flow)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)
└**4=Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=511.80' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond BF-1: BIORETENTION FILTER-1



Summary for Pond BF-2: BIORETENTION FILTER-2

Inflow Area = 0.200 ac, 50.00% Impervious, Inflow Depth = 0.25" for 1-Year event
Inflow = 0.1 cfs @ 12.00 hrs, Volume= 0.004 af
Outflow = 0.0 cfs @ 12.12 hrs, Volume= 0.004 af, Atten= 61%, Lag= 7.1 min
Primary = 0.0 cfs @ 12.12 hrs, Volume= 0.004 af
Routed to Pond DET. : DETENTION BASIN
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 513.77' @ 12.12 hrs Surf.Area= 878 sf Storage= 25 cf

Plug-Flow detention time= 28.2 min calculated for 0.004 af (100% of inflow)
Center-of-Mass det. time= 27.8 min (951.8 - 924.0)

Volume	Invert	Avail.Storage	Storage Description
#1	513.70'	3,676 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

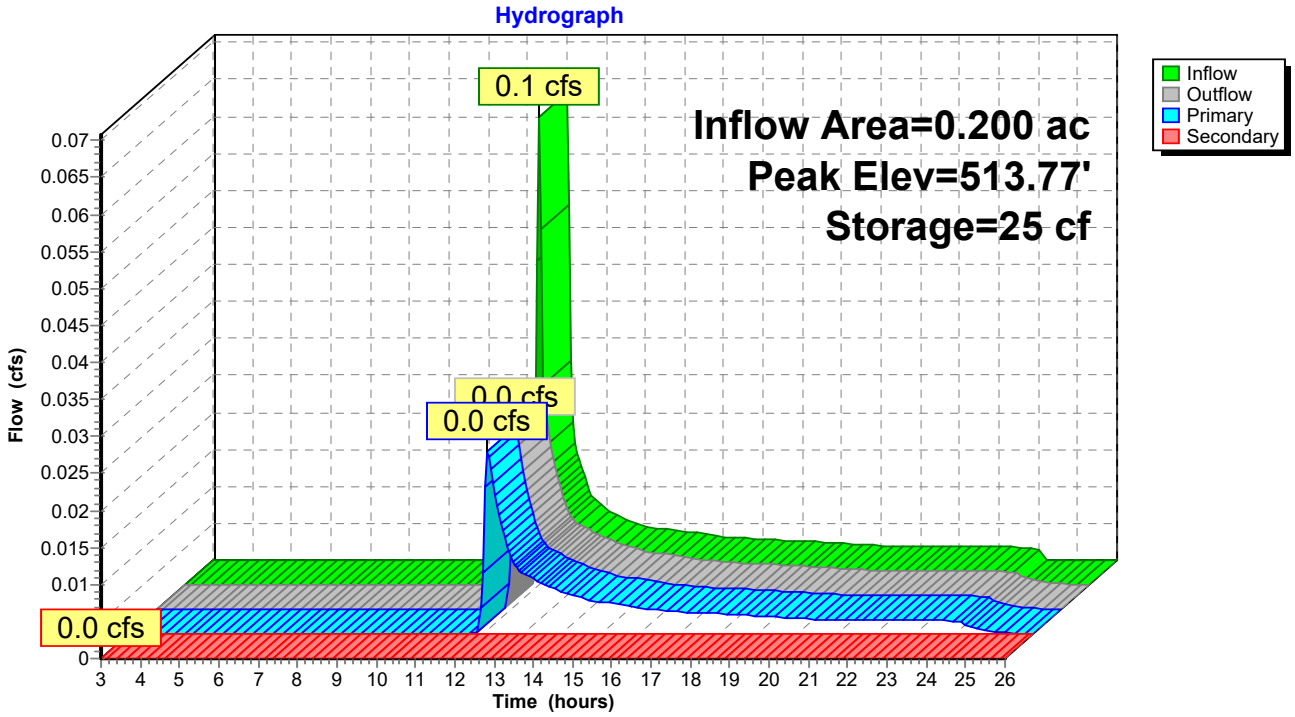
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
513.70	878	0.0	0	0
514.70	878	40.0	351	351
517.20	437	20.0	329	680
517.50	1,076	100.0	227	907
518.00	10,000	100.0	2,769	3,676

Device	Routing	Invert	Outlet Devices
#1	Device 3	513.70'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	517.80'	**31.0' long + 0.3 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Primary	513.70'	**12.0" Round Culvert** L= 70.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 513.70' / 511.50' S= 0.0314 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	517.70'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 12.12 hrs HW=513.77' (Free Discharge)
└**3=Culvert** (Inlet Controls 0.0 cfs @ 0.91 fps)
  ├**1=Exfiltration** (Passes 0.0 cfs of 0.0 cfs potential flow)
  └**4=Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=513.70' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond BF-2: BIORETENTION FILTER-2



Summary for Pond BF-3: BIORETENTION FILTER-3

Inflow Area = 0.200 ac, 70.00% Impervious, Inflow Depth = 0.98" for 1-Year event
Inflow = 0.3 cfs @ 11.97 hrs, Volume= 0.016 af
Outflow = 0.0 cfs @ 11.70 hrs, Volume= 0.016 af, Atten= 94%, Lag= 0.0 min
Primary = 0.0 cfs @ 11.70 hrs, Volume= 0.016 af
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 518.10' @ 12.97 hrs Surf.Area= 437 sf Storage= 315 cf

Plug-Flow detention time= 141.9 min calculated for 0.016 af (100% of inflow)
Center-of-Mass det. time= 141.8 min (976.8 - 835.0)

Volume	Invert	Avail.Storage	Storage Description
#1	515.50'	3,340 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

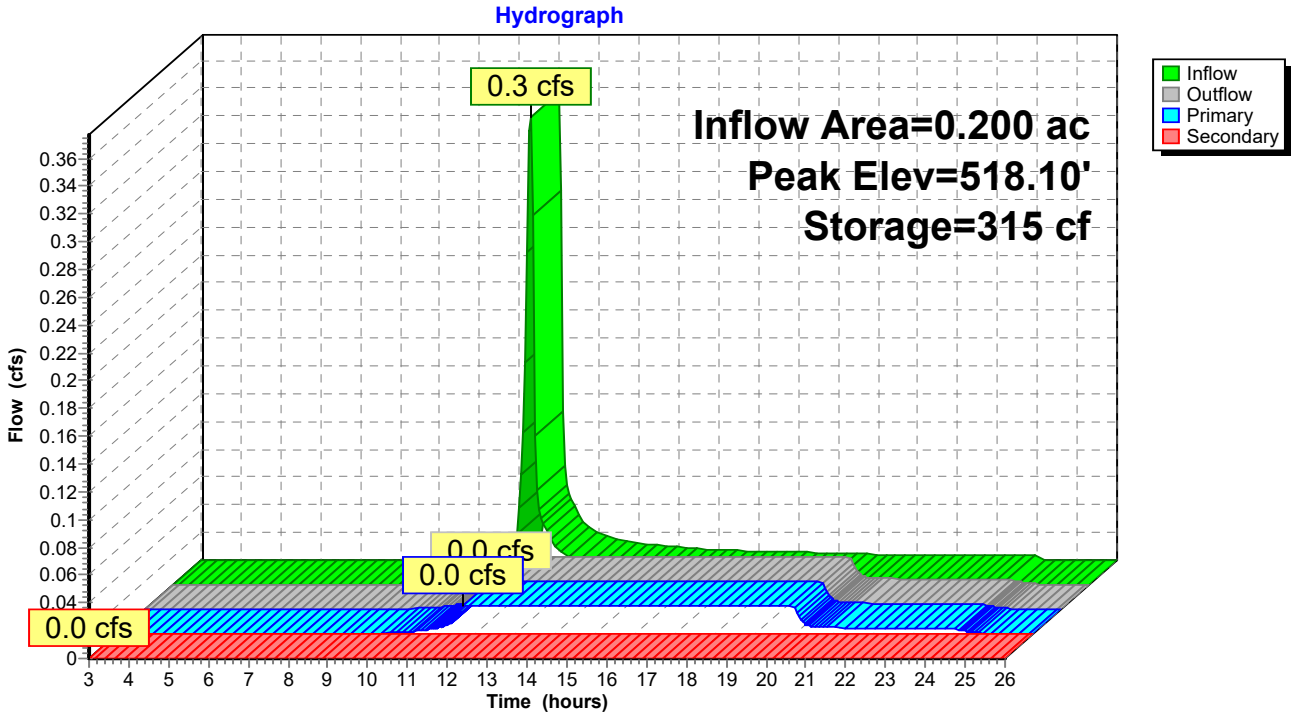
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
515.50	437	0.0	0	0
516.50	437	40.0	175	175
519.00	437	20.0	219	393
519.50	674	100.0	278	671
520.00	10,000	100.0	2,669	3,340

Device	Routing	Invert	Outlet Devices
#1	Device 3	515.50'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	519.70'	**5.0' long + 0.3 '/' SideZ x 9.0' breadth Broad-Crested Rectangular Weir** 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 5.00 5.50 Coef. (English) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67 2.69
#3	Primary	515.50'	**6.0" Round Culvert** L= 30.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 515.50' / 515.00' S= 0.0167 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf
#4	Device 3	519.50'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 11.70 hrs HW=515.61' (Free Discharge)
└**3=Culvert** (Passes 0.0 cfs of 0.0 cfs potential flow)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)
└**4=Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=515.50' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond BF-3: BIORETENTION FILTER-3



Summary for Pond DET.: DETENTION BASIN

Inflow Area = 1.200 ac, 53.33% Impervious, Inflow Depth > 0.35" for 1-Year event
Inflow = 0.1 cfs @ 12.12 hrs, Volume= 0.035 af
Outflow = 0.1 cfs @ 12.22 hrs, Volume= 0.035 af, Atten= 3%, Lag= 6.2 min
Primary = 0.1 cfs @ 12.22 hrs, Volume= 0.035 af
Routed to Reach POS : POINT OF STUDY
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 508.26' @ 12.22 hrs Surf.Area= 78 sf Storage= 15 cf

Plug-Flow detention time= 3.2 min calculated for 0.035 af (100% of inflow)
Center-of-Mass det. time= 2.9 min (952.6 - 949.7)

Volume	Invert	Avail.Storage	Storage Description
#1	508.00'	5,586 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

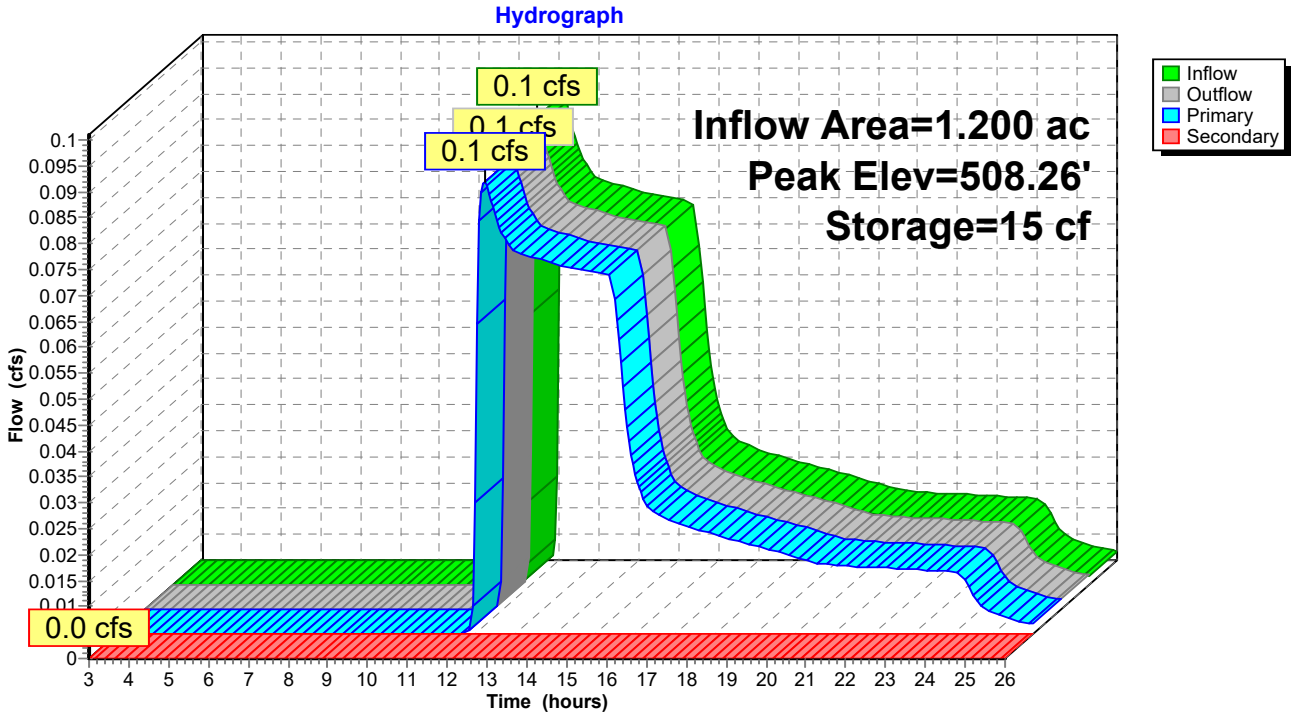
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
508.00	36	0	0
509.00	196	116	116
510.00	460	328	444
511.00	809	635	1,079
512.00	1,232	1,021	2,099
513.00	1,724	1,478	3,577
513.40	1,951	735	4,312
514.00	2,296	1,274	5,586

Device	Routing	Invert	Outlet Devices
#1	Primary	508.00'	**12.0" Round Culvert** L= 39.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 508.00' / 507.80' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	512.40'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	508.00'	**3.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	510.00'	**5.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#5	Secondary	513.40'	**10.0' long + 0.3 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** 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 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.1 cfs @ 12.22 hrs HW=508.26' (Free Discharge)
└─**1=Culvert** (Passes 0.1 cfs of 0.2 cfs potential flow)
  └─**2=Grate** (Controls 0.0 cfs)
  └─**3=Orifice** (Orifice Controls 0.1 cfs @ 1.77 fps)
  └─**4=Orifice** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=508.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond DET.: DETENTION BASIN



Summary for Pond INFIL: INFILTRATION BASIN

Inflow Area = 1.500 ac, 26.67% Impervious, Inflow Depth = 0.06" for 1-Year event
Inflow = 0.0 cfs @ 13.03 hrs, Volume= 0.008 af
Outflow = 0.0 cfs @ 16.25 hrs, Volume= 0.008 af, Atten= 29%, Lag= 193.0 min
Discarded = 0.0 cfs @ 16.25 hrs, Volume= 0.008 af
Primary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 515.27' @ 16.25 hrs Surf.Area= 124 sf Storage= 62 cf

Plug-Flow detention time= 112.4 min calculated for 0.008 af (94% of inflow)
Center-of-Mass det. time= 90.9 min (1,141.2 - 1,050.3)

Volume	Invert	Avail.Storage	Storage Description
#1	515.00'	7,820 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
515.00	0	0	0
516.00	457	229	229
517.00	861	659	888
518.00	1,393	1,127	2,015
518.50	1,715	777	2,792
519.00	18,400	5,029	7,820

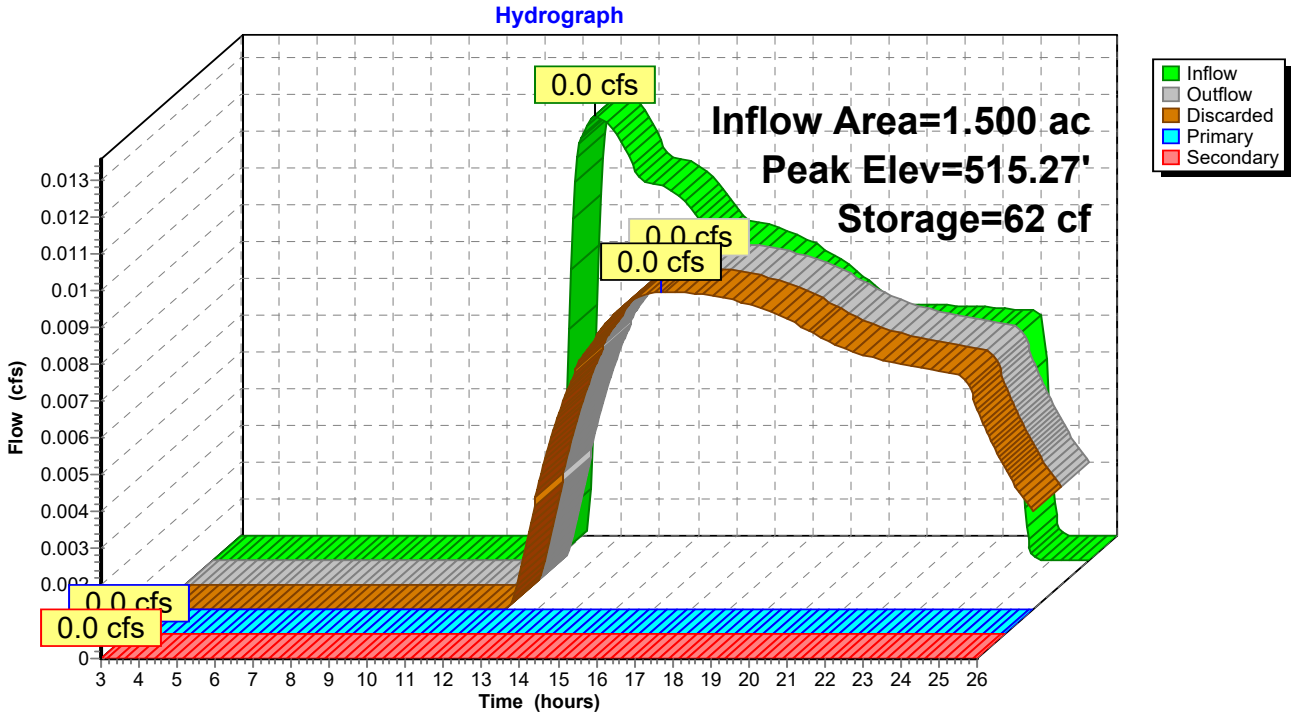
Device	Routing	Invert	Outlet Devices
#1	Discarded	515.00'	**3.000 in/hr Exfiltration over Surface area**
#2	Secondary	518.60'	**6.5' long + 0.3 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Primary	517.30'	**12.0" Round Culvert** L= 29.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 517.30' / 516.90' S= 0.0138 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	518.50'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 16.25 hrs HW=515.27' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 3.00 hrs HW=515.00' (Free Discharge)
└**3=Culvert** (Controls 0.0 cfs)
└**4=Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=515.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond INFIL: INFILTRATION BASIN



Time span=3.00-26.00 hrs, dt=0.05 hrs, 461 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 1A: PRO-DA-1A Runoff Area=1.500 ac 26.67% Impervious Runoff Depth=0.42"
Flow Length=641' Tc=15.5 min CN=59 Runoff=0.5 cfs 0.052 af

Subcatchment 1B: PRO-DA-1B Runoff Area=0.200 ac 70.00% Impervious Runoff Depth=2.02"
Tc=6.0 min CN=87 Runoff=0.7 cfs 0.034 af

Subcatchment 1C.1: PRO-DA-1C.1 Runoff Area=0.800 ac 62.50% Impervious Runoff Depth=1.24"
Flow Length=170' Tc=15.6 min CN=76 Runoff=1.2 cfs 0.082 af

Subcatchment 1C.2: PRO-DA-1C.2 Runoff Area=0.200 ac 50.00% Impervious Runoff Depth=0.85"
Tc=6.0 min CN=69 Runoff=0.3 cfs 0.014 af

Subcatchment 1C.3: PRO-DA-1C.3 Runoff Area=0.200 ac 20.00% Impervious Runoff Depth=0.18"
Tc=6.0 min CN=51 Runoff=0.0 cfs 0.003 af

Subcatchment 2: PRO-DA-2 Runoff Area=2.000 ac 25.00% Impervious Runoff Depth=0.90"
Flow Length=1,168' Tc=24.8 min CN=70 Runoff=1.6 cfs 0.150 af

Reach POS: POINT OF STUDY Inflow=1.7 cfs 0.248 af
Outflow=1.7 cfs 0.248 af

Pond BF-1: BIORETENTIONFILTER-1 Peak Elev=515.62' Storage=1,756 cf Inflow=1.2 cfs 0.082 af
Primary=0.1 cfs 0.081 af Secondary=0.0 cfs 0.000 af Outflow=0.1 cfs 0.081 af

Pond BF-2: BIORETENTIONFILTER-2 Peak Elev=514.21' Storage=180 cf Inflow=0.3 cfs 0.014 af
Primary=0.0 cfs 0.014 af Secondary=0.0 cfs 0.000 af Outflow=0.0 cfs 0.014 af

Pond BF-3: BIORETENTIONFILTER-3 Peak Elev=519.51' Storage=678 cf Inflow=0.7 cfs 0.034 af
Primary=0.1 cfs 0.033 af Secondary=0.0 cfs 0.000 af Outflow=0.1 cfs 0.033 af

Pond DET.: DETENTION BASIN Peak Elev=508.38' Storage=26 cf Inflow=0.1 cfs 0.098 af
Primary=0.1 cfs 0.098 af Secondary=0.0 cfs 0.000 af Outflow=0.1 cfs 0.098 af

Pond INFIL: INFILTRATION BASIN Peak Elev=516.83' Storage=776 cf Inflow=0.5 cfs 0.052 af
Discarded=0.1 cfs 0.050 af Primary=0.0 cfs 0.000 af Secondary=0.0 cfs 0.000 af Outflow=0.1 cfs 0.050 af

Total Runoff Area = 4.900 ac Runoff Volume = 0.335 af Average Runoff Depth = 0.82"
65.71% Pervious = 3.220 ac 34.29% Impervious = 1.680 ac

Summary for Subcatchment 1A: PRO-DA-1A

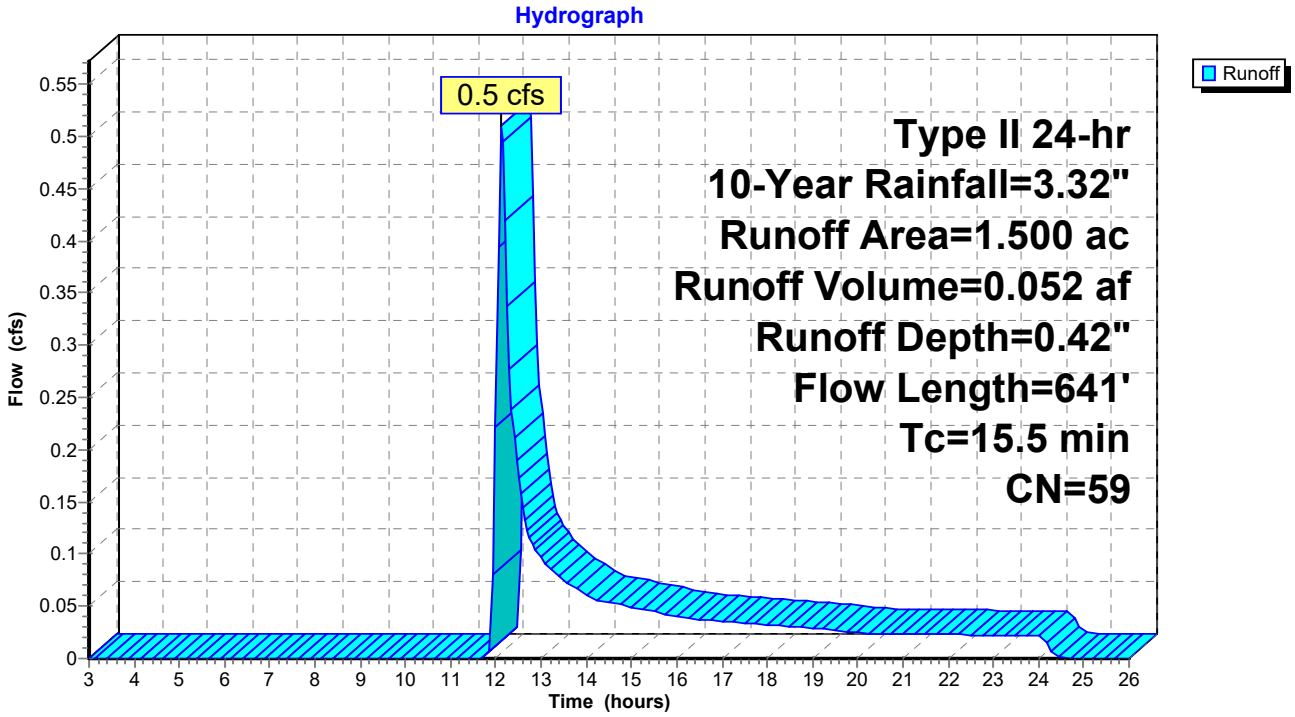
Runoff = 0.5 cfs @ 12.12 hrs, Volume= 0.052 af, Depth= 0.42"
Routed to Pond INFIL : INFILTRATION BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.32"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG B
0.300	61	>75% Grass cover, Good, HSG B
0.800	39	>75% Grass cover, Good, HSG A
1.500	59	Weighted Average
1.100		73.33% Pervious Area
0.400		26.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	80	0.0500	0.09		**Sheet Flow, SHEET FLOW** Woods: Light underbrush n= 0.400 P2= 2.37"
0.8	387	0.0240	8.34	26.68	**Channel Flow, VEGETATED SWALE** Area= 3.2 sf Perim= 4.5' r= 0.71' n= 0.022 Earth, clean & straight
0.1	60	0.0660	10.85	45.55	**Channel Flow, VEGETATED SWALE** Area= 4.2 sf Perim= 8.5' r= 0.49' n= 0.022 Earth, clean & straight
0.1	114	0.0400	17.00	204.01	**Channel Flow, VEGETATED SWALE** Area= 12.0 sf Perim= 8.5' r= 1.41' n= 0.022 Earth, clean & straight
15.5	641	Total			

Subcatchment 1A: PRO-DA-1A



Summary for Subcatchment 1B: PRO-DA-1B

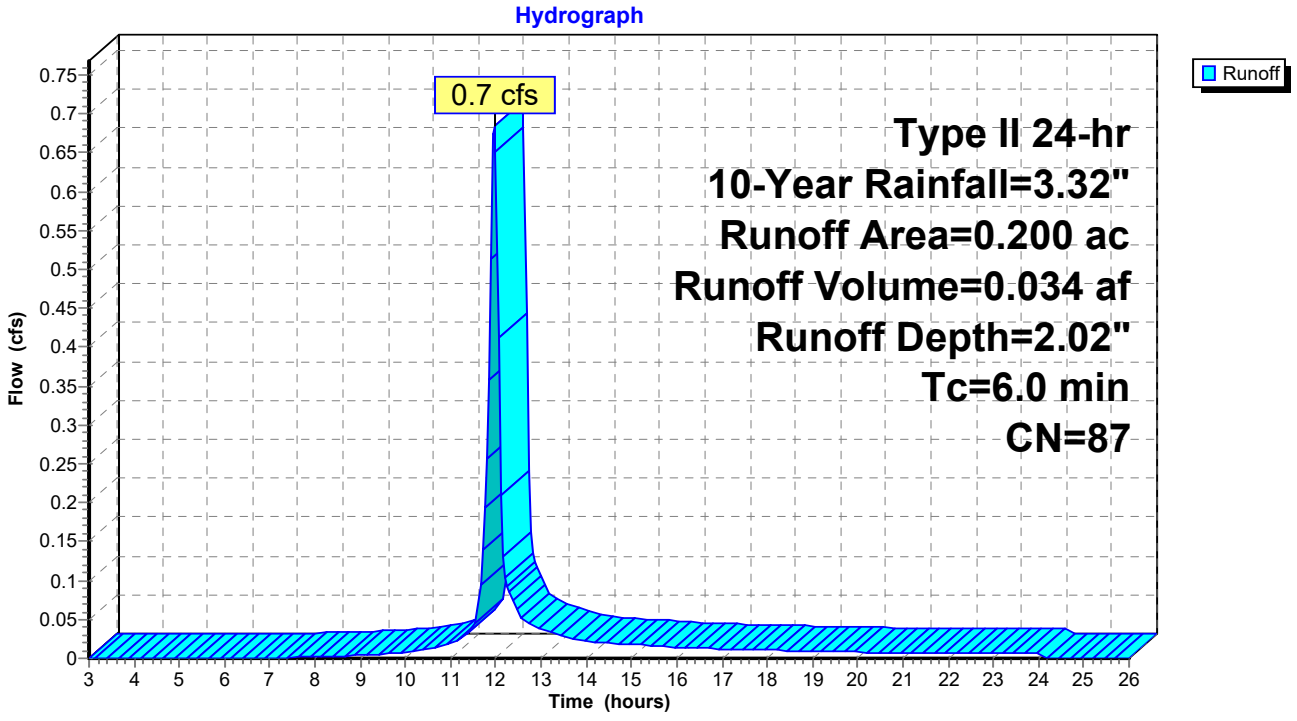
Runoff = 0.7 cfs @ 11.97 hrs, Volume= 0.034 af, Depth= 2.02"
Routed to Pond BF-3 : BIORETENTION FILTER-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.32"

Area (ac)	CN	Description
0.140	98	Paved parking, HSG B
0.060	61	>75% Grass cover, Good, HSG B
0.200	87	Weighted Average
0.060		30.00% Pervious Area
0.140		70.00% Impervious Area

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

Subcatchment 1B: PRO-DA-1B



Summary for Subcatchment 1C.1: PRO-DA-1C.1

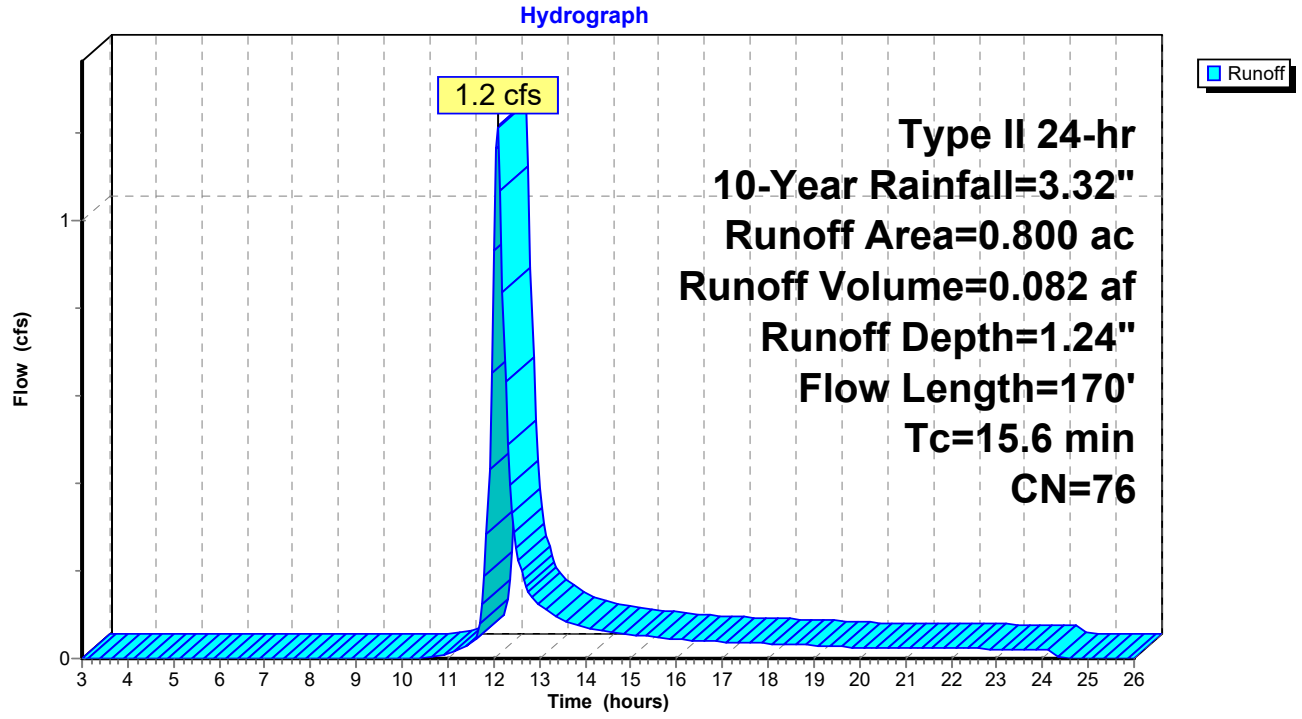
Runoff = 1.2 cfs @ 12.09 hrs, Volume= 0.082 af, Depth= 1.24"
Routed to Pond BF-1 : BIORETENTION FILTER-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.32"

Area (ac)	CN	Description
0.500	98	Paved parking, HSG A
0.300	39	>75% Grass cover, Good, HSG A
0.800	76	Weighted Average
0.300		37.50% Pervious Area
0.500		62.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	70	0.0470	0.09		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.37"
2.1	30	0.3000	0.23		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.37"
0.2	70	0.2000	6.71		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
15.6	170	Total			

Subcatchment 1C.1: PRO-DA-1C.1



Summary for Subcatchment 1C.2: PRO-DA-1C.2

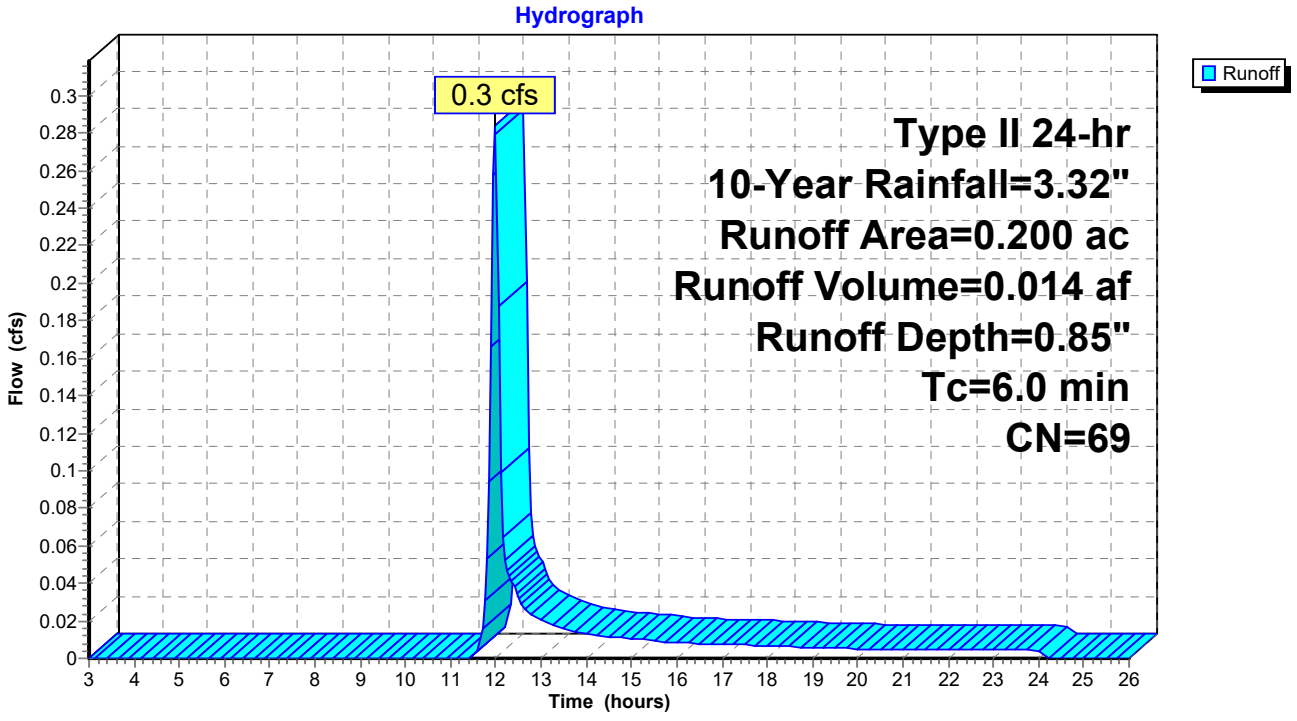
Runoff = 0.3 cfs @ 11.98 hrs, Volume= 0.014 af, Depth= 0.85"
Routed to Pond BF-2 : BIORETENTION FILTER-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.32"

Area (ac)	CN	Description
0.100	98	Paved parking, HSG A
0.100	39	>75% Grass cover, Good, HSG A
0.200	69	Weighted Average
0.100		50.00% Pervious Area
0.100		50.00% Impervious Area

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

Subcatchment 1C.2: PRO-DA-1C.2



Summary for Subcatchment 1C.3: PRO-DA-1C.3

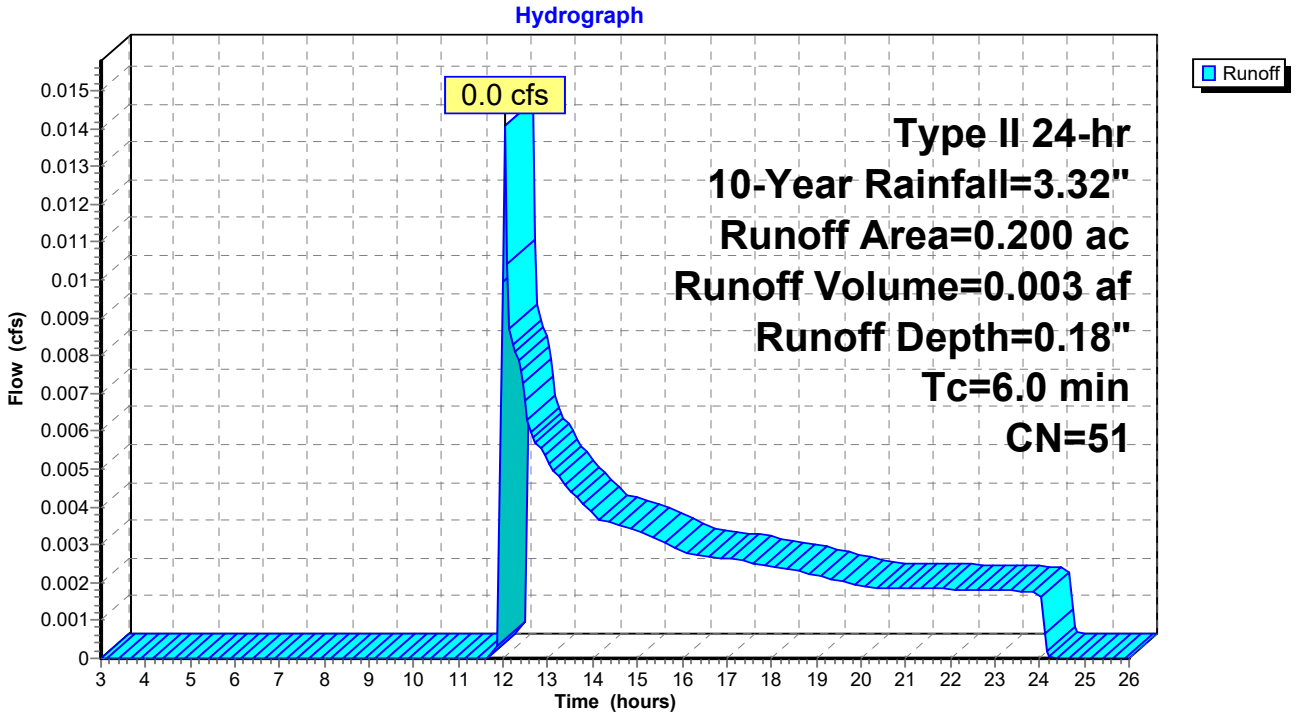
Runoff = 0.0 cfs @ 12.05 hrs, Volume= 0.003 af, Depth= 0.18"
Routed to Pond DET. : DETENTION BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.32"

Area (ac)	CN	Description
0.040	98	Paved parking, HSG A
0.160	39	>75% Grass cover, Good, HSG A
0.200	51	Weighted Average
0.160		80.00% Pervious Area
0.040		20.00% Impervious Area

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

Subcatchment 1C.3: PRO-DA-1C.3



Summary for Subcatchment 2: PRO-DA-2

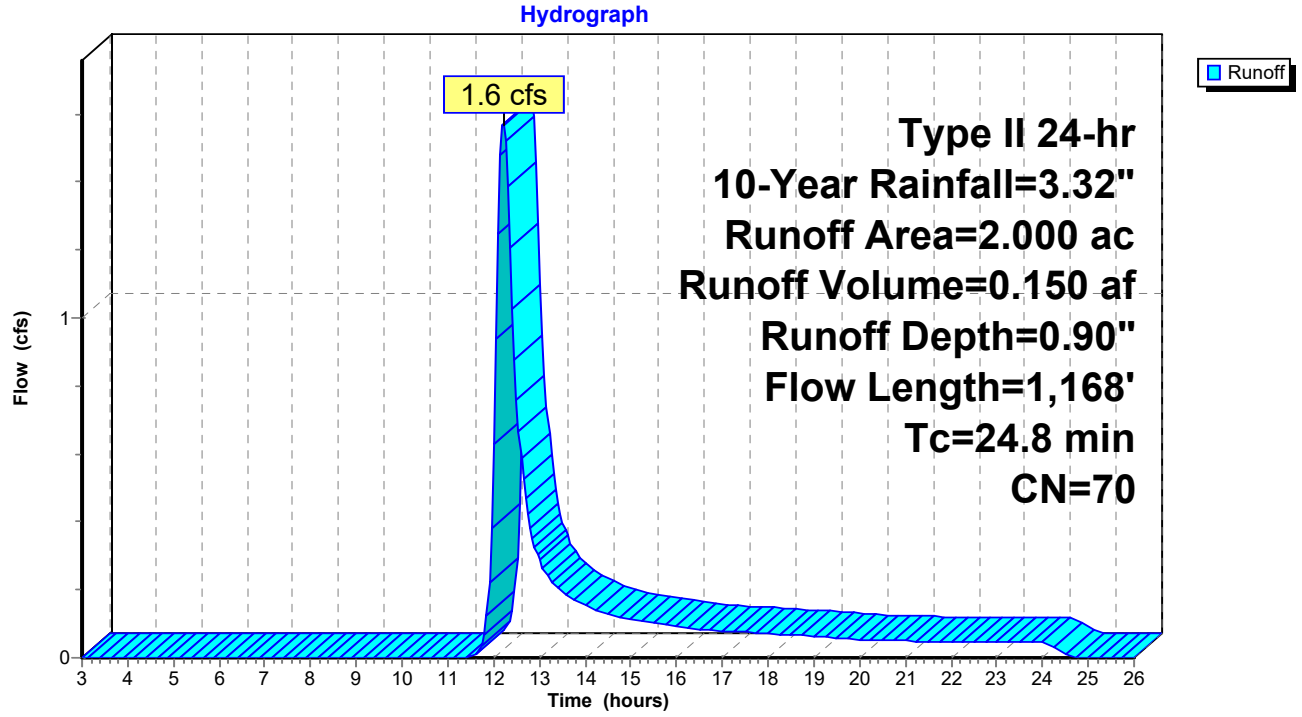
Runoff = 1.6 cfs @ 12.21 hrs, Volume= 0.150 af, Depth= 0.90"
Routed to Reach POS : POINT OF STUDY

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.32"

Area (ac)	CN	Description
0.500	98	Paved parking, HSG B
1.500	61	>75% Grass cover, Good, HSG B
2.000	70	Weighted Average
1.500		75.00% Pervious Area
0.500		25.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0700	0.11		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 2.37"
8.2	438	0.0320	0.89		**Shallow Concentrated Flow, Shallow Conc. Flow** Woodland Kv= 5.0 fps
1.5	630	0.0200	6.80	20.39	**Channel Flow, Roadside Ditch** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.022 Earth, clean & straight
24.8	1,168	Total			

Subcatchment 2: PRO-DA-2



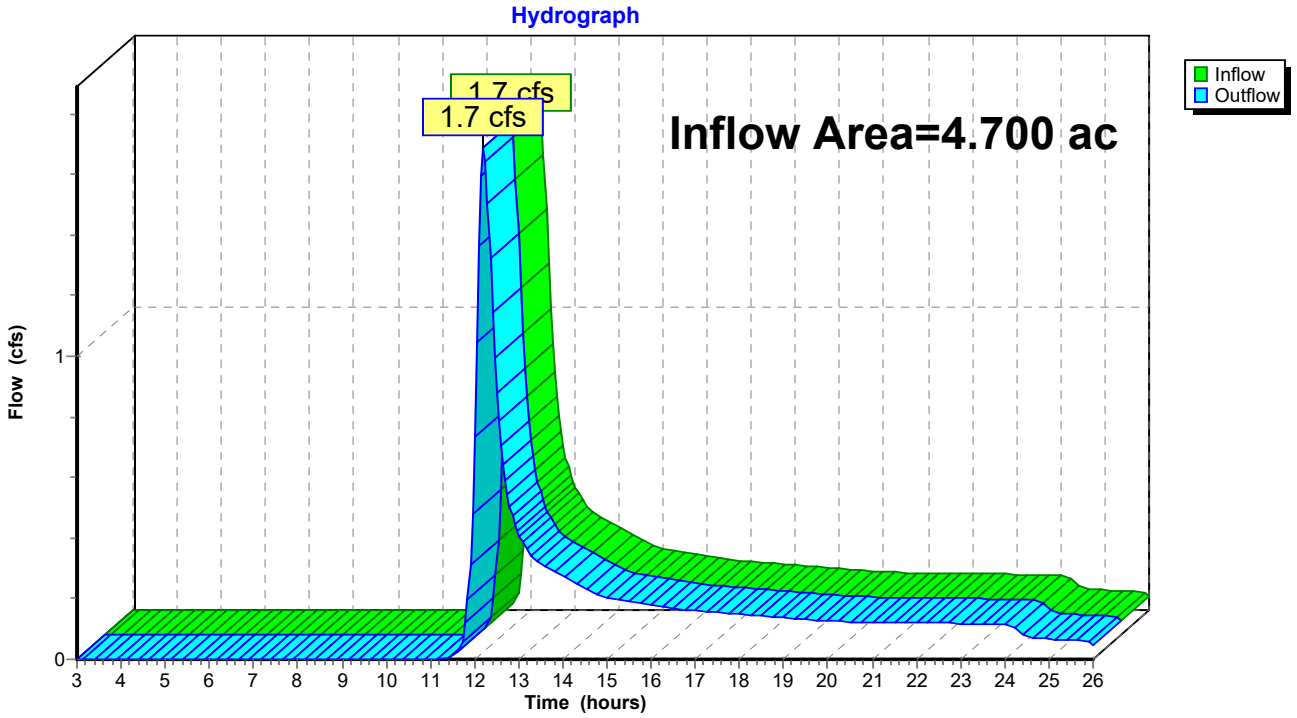
Summary for Reach POS: POINT OF STUDY

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.700 ac, 32.77% Impervious, Inflow Depth > 0.63" for 10-Year event
Inflow = 1.7 cfs @ 12.21 hrs, Volume= 0.248 af
Outflow = 1.7 cfs @ 12.21 hrs, Volume= 0.248 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs

Reach POS: POINT OF STUDY



Summary for Pond BF-1: BIORETENTION FILTER-1

Inflow Area = 0.800 ac, 62.50% Impervious, Inflow Depth = 1.24" for 10-Year event
Inflow = 1.2 cfs @ 12.09 hrs, Volume= 0.082 af
Outflow = 0.1 cfs @ 13.88 hrs, Volume= 0.081 af, Atten= 94%, Lag= 107.3 min
Primary = 0.1 cfs @ 13.88 hrs, Volume= 0.081 af
Routed to Pond DET. : DETENTION BASIN
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Pond DET. : DETENTION BASIN

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 515.62' @ 13.88 hrs Surf.Area= 1,621 sf Storage= 1,756 cf

Plug-Flow detention time= 270.0 min calculated for 0.081 af (98% of inflow)
Center-of-Mass det. time= 259.8 min (1,118.7 - 859.0)

Volume	Invert	Avail.Storage	Storage Description
#1	511.80'	3,609 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

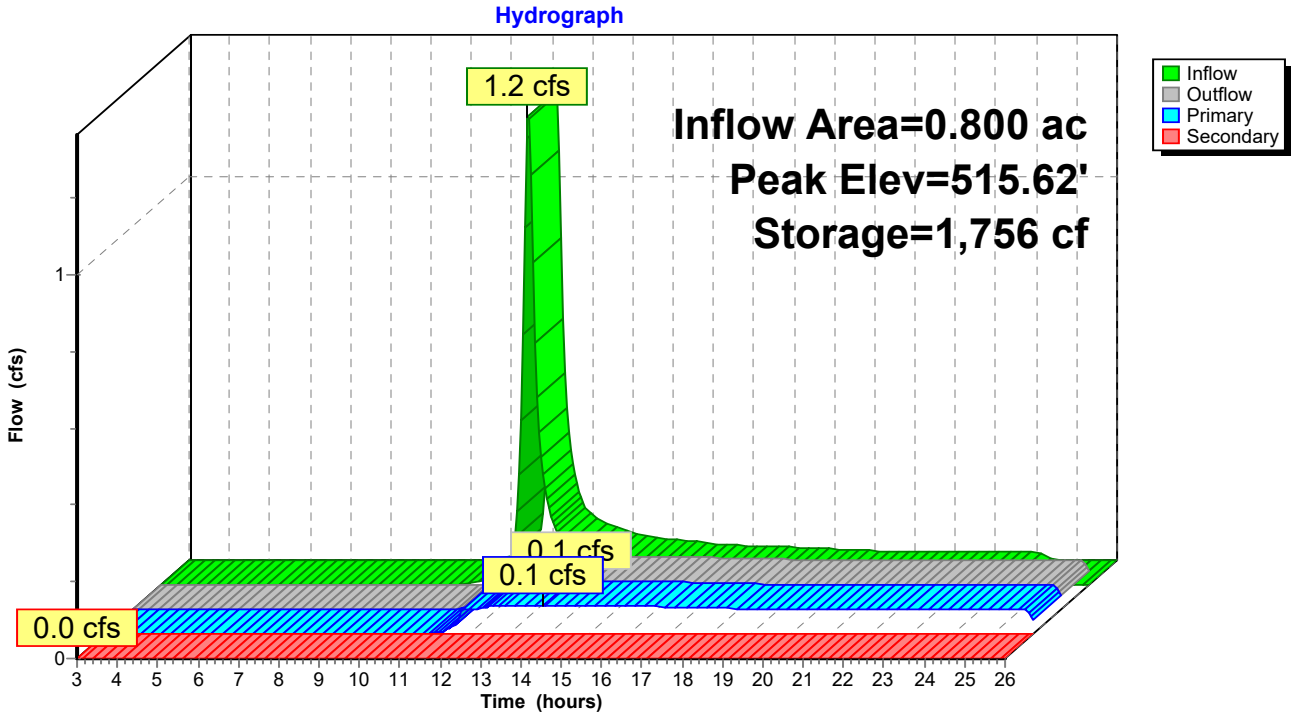
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
511.80	1,415	0.0	0	0
512.80	1,415	40.0	566	566
515.30	1,415	20.0	708	1,273
516.00	1,868	100.0	1,149	2,423
516.20	10,000	100.0	1,187	3,609

Device	Routing	Invert	Outlet Devices
#1	Device 3	511.80'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	516.10'	**7.9' long + 0.3 '/' SideZ x 5.5' breadth Broad-Crested Rectangular Weir** 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 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86
#3	Primary	511.80'	**12.0" Round Culvert** L= 50.4' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 511.80' / 511.60' S= 0.0040 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	515.80'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.1 cfs @ 13.88 hrs HW=515.62' (Free Discharge)
└**3=Culvert** (Passes 0.1 cfs of 6.5 cfs potential flow)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)
└**4=Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=511.80' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond BF-1: BIORETENTION FILTER-1



Summary for Pond BF-2: BIORETENTION FILTER-2

Inflow Area = 0.200 ac, 50.00% Impervious, Inflow Depth = 0.85" for 10-Year event
Inflow = 0.3 cfs @ 11.98 hrs, Volume= 0.014 af
Outflow = 0.0 cfs @ 11.95 hrs, Volume= 0.014 af, Atten= 86%, Lag= 0.0 min
Primary = 0.0 cfs @ 11.95 hrs, Volume= 0.014 af
Routed to Pond DET. : DETENTION BASIN
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 514.21' @ 12.35 hrs Surf.Area= 878 sf Storage= 180 cf

Plug-Flow detention time= 41.1 min calculated for 0.014 af (100% of inflow)
Center-of-Mass det. time= 40.8 min (914.2 - 873.4)

Volume	Invert	Avail.Storage	Storage Description
#1	513.70'	3,676 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

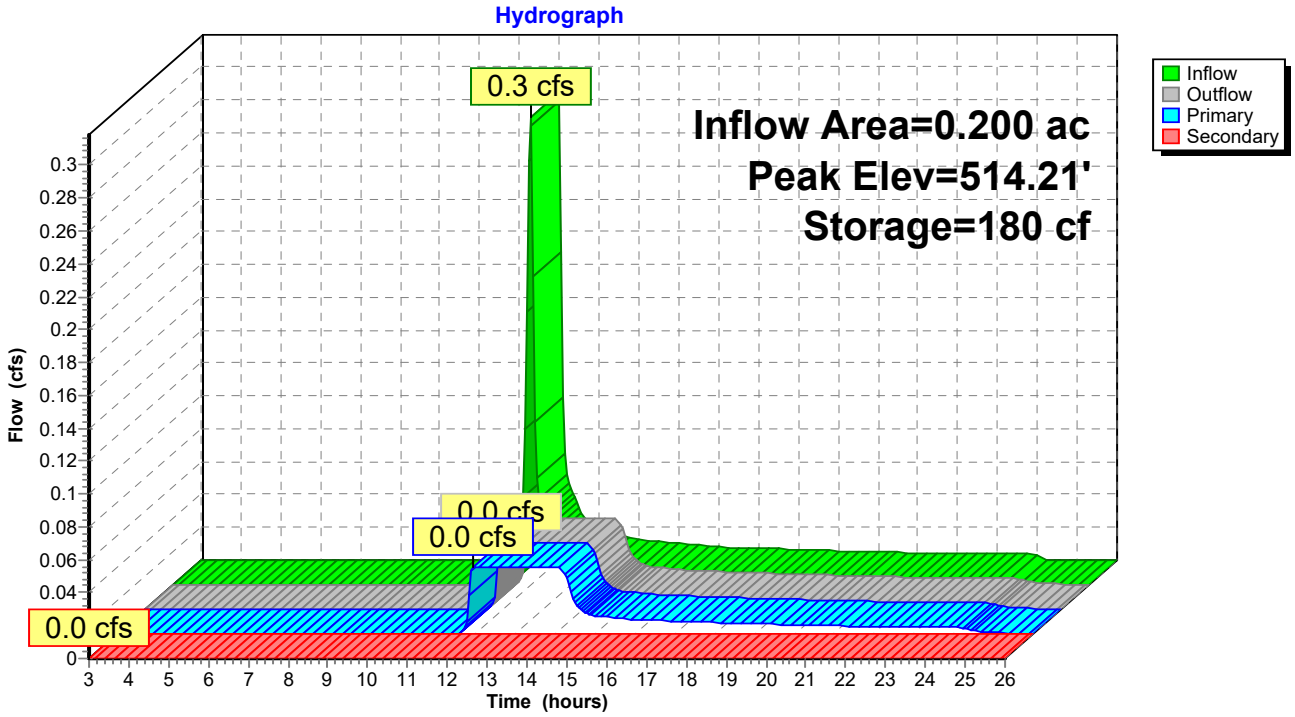
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
513.70	878	0.0	0	0
514.70	878	40.0	351	351
517.20	437	20.0	329	680
517.50	1,076	100.0	227	907
518.00	10,000	100.0	2,769	3,676

Device	Routing	Invert	Outlet Devices
#1	Device 3	513.70'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	517.80'	**31.0' long + 0.3 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Primary	513.70'	**12.0" Round Culvert** L= 70.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 513.70' / 511.50' S= 0.0314 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	517.70'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 11.95 hrs HW=513.91' (Free Discharge)
└**3=Culvert** (Passes 0.0 cfs of 0.2 cfs potential flow)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)
└**4=Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=513.70' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond BF-2: BIORETENTION FILTER-2



Summary for Pond BF-3: BIORETENTION FILTER-3

Inflow Area = 0.200 ac, 70.00% Impervious, Inflow Depth = 2.02" for 10-Year event
Inflow = 0.7 cfs @ 11.97 hrs, Volume= 0.034 af
Outflow = 0.1 cfs @ 12.40 hrs, Volume= 0.033 af, Atten= 89%, Lag= 25.8 min
Primary = 0.1 cfs @ 12.40 hrs, Volume= 0.033 af
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 519.51' @ 12.40 hrs Surf.Area= 842 sf Storage= 678 cf

Plug-Flow detention time= 247.0 min calculated for 0.032 af (96% of inflow)
Center-of-Mass det. time= 226.9 min (1,041.2 - 814.2)

Volume	Invert	Avail.Storage	Storage Description
#1	515.50'	3,340 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

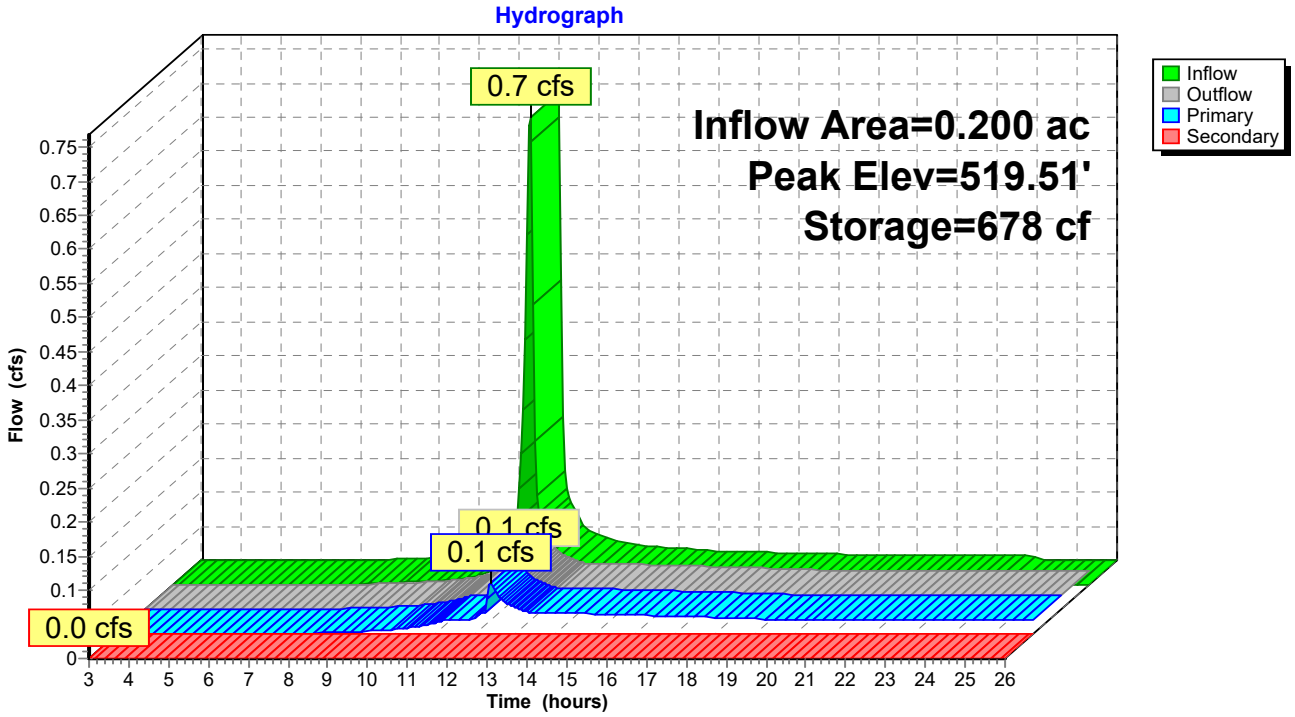
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
515.50	437	0.0	0	0
516.50	437	40.0	175	175
519.00	437	20.0	219	393
519.50	674	100.0	278	671
520.00	10,000	100.0	2,669	3,340

Device	Routing	Invert	Outlet Devices
#1	Device 3	515.50'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	519.70'	**5.0' long + 0.3 '/' SideZ x 9.0' breadth Broad-Crested Rectangular Weir** 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 5.00 5.50 Coef. (English) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67 2.69
#3	Primary	515.50'	**6.0" Round Culvert** L= 30.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 515.50' / 515.00' S= 0.0167 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf
#4	Device 3	519.50'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.1 cfs @ 12.40 hrs HW=519.51' (Free Discharge)
└**3=Culvert** (Passes 0.1 cfs of 1.7 cfs potential flow)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)
└**4=Grate** (Weir Controls 0.0 cfs @ 0.31 fps)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=515.50' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond BF-3: BIORETENTION FILTER-3



Summary for Pond DET.: DETENTION BASIN

Inflow Area = 1.200 ac, 53.33% Impervious, Inflow Depth > 0.98" for 10-Year event
Inflow = 0.1 cfs @ 12.05 hrs, Volume= 0.098 af
Outflow = 0.1 cfs @ 13.49 hrs, Volume= 0.098 af, Atten= 0%, Lag= 86.3 min
Primary = 0.1 cfs @ 13.49 hrs, Volume= 0.098 af
Routed to Reach POS : POINT OF STUDY
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 508.38' @ 13.49 hrs Surf.Area= 97 sf Storage= 26 cf

Plug-Flow detention time= 2.9 min calculated for 0.098 af (100% of inflow)
Center-of-Mass det. time= 2.2 min (1,087.5 - 1,085.4)

Volume	Invert	Avail.Storage	Storage Description
#1	508.00'	5,586 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

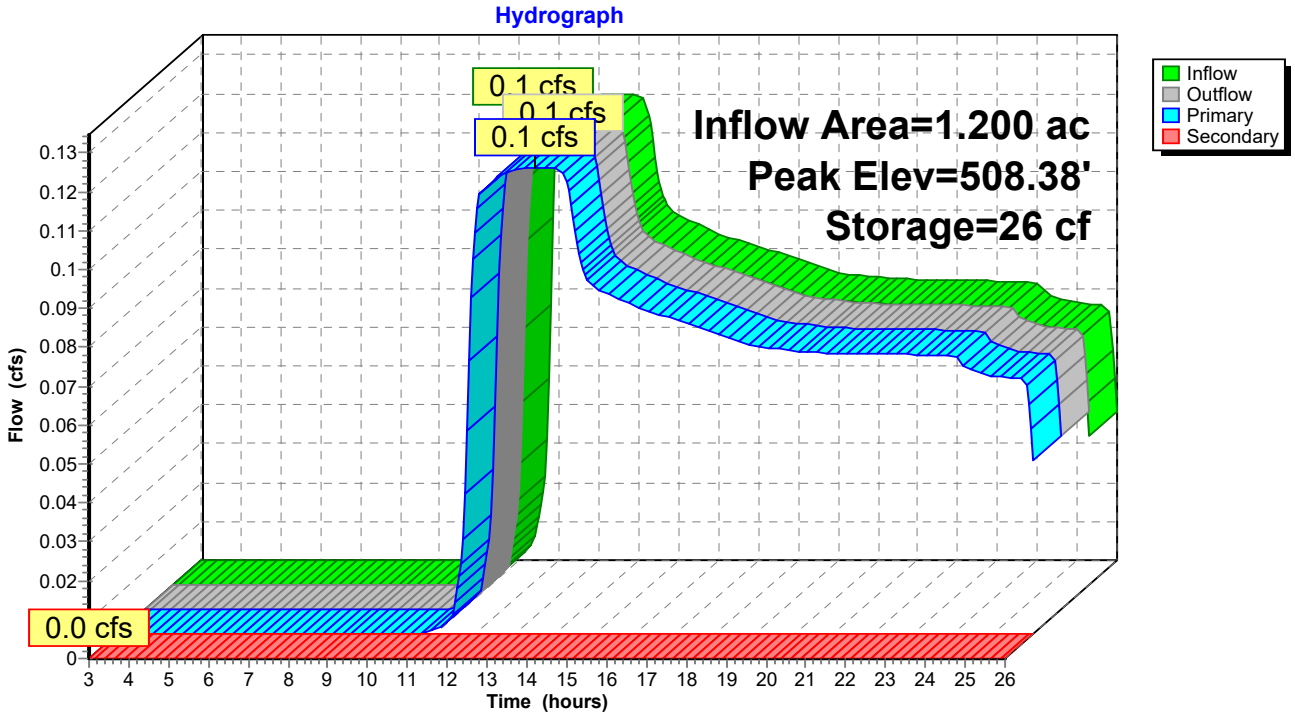
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
508.00	36	0	0
509.00	196	116	116
510.00	460	328	444
511.00	809	635	1,079
512.00	1,232	1,021	2,099
513.00	1,724	1,478	3,577
513.40	1,951	735	4,312
514.00	2,296	1,274	5,586

Device	Routing	Invert	Outlet Devices
#1	Primary	508.00'	**12.0" Round Culvert** L= 39.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 508.00' / 507.80' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	512.40'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	508.00'	**3.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	510.00'	**5.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#5	Secondary	513.40'	**10.0' long + 0.3 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** 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 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.1 cfs @ 13.49 hrs HW=508.38' (Free Discharge)
└**1=Culvert** (Passes 0.1 cfs of 0.4 cfs potential flow)
  └**2=Grate** (Controls 0.0 cfs)
  └**3=Orifice** (Orifice Controls 0.1 cfs @ 2.45 fps)
  └**4=Orifice** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=508.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond DET.: DETENTION BASIN



Summary for Pond INFIL: INFILTRATION BASIN

Inflow Area = 1.500 ac, 26.67% Impervious, Inflow Depth = 0.42" for 10-Year event
Inflow = 0.5 cfs @ 12.12 hrs, Volume= 0.052 af
Outflow = 0.1 cfs @ 14.30 hrs, Volume= 0.050 af, Atten= 89%, Lag= 130.8 min
Discarded = 0.1 cfs @ 14.30 hrs, Volume= 0.050 af
Primary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 516.83' @ 14.30 hrs Surf.Area= 792 sf Storage= 776 cf

Plug-Flow detention time= 190.4 min calculated for 0.050 af (95% of inflow)
Center-of-Mass det. time= 165.7 min (1,094.5 - 928.8)

Volume	Invert	Avail.Storage	Storage Description
#1	515.00'	7,820 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
515.00	0	0	0
516.00	457	229	229
517.00	861	659	888
518.00	1,393	1,127	2,015
518.50	1,715	777	2,792
519.00	18,400	5,029	7,820

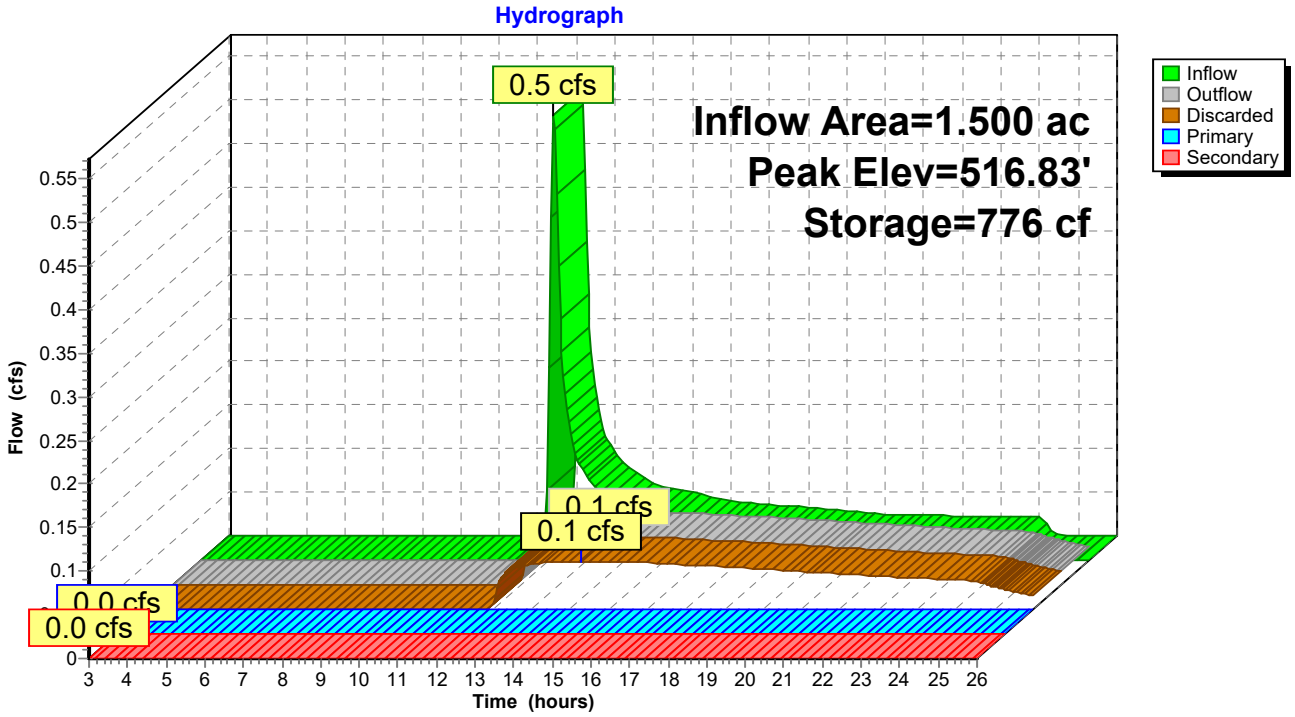
Device	Routing	Invert	Outlet Devices
#1	Discarded	515.00'	**3.000 in/hr Exfiltration over Surface area**
#2	Secondary	518.60'	**6.5' long + 0.3 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Primary	517.30'	**12.0" Round Culvert** L= 29.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 517.30' / 516.90' S= 0.0138 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	518.50'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.1 cfs @ 14.30 hrs HW=516.83' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.0 cfs @ 3.00 hrs HW=515.00' (Free Discharge)
└**3=Culvert** (Controls 0.0 cfs)
└**4=Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=515.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond INFIL: INFILTRATION BASIN



Time span=3.00-26.00 hrs, dt=0.05 hrs, 461 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 1A: PRO-DA-1A Runoff Area=1.500 ac 26.67% Impervious Runoff Depth=1.47"
Flow Length=641' Tc=15.5 min CN=59 Runoff=2.6 cfs 0.183 af

Subcatchment 1B: PRO-DA-1B Runoff Area=0.200 ac 70.00% Impervious Runoff Depth=3.95"
Tc=6.0 min CN=87 Runoff=1.3 cfs 0.066 af

Subcatchment 1C.1: PRO-DA-1C.1 Runoff Area=0.800 ac 62.50% Impervious Runoff Depth=2.87"
Flow Length=170' Tc=15.6 min CN=76 Runoff=2.9 cfs 0.191 af

Subcatchment 1C.2: PRO-DA-1C.2 Runoff Area=0.200 ac 50.00% Impervious Runoff Depth=2.25"
Tc=6.0 min CN=69 Runoff=0.8 cfs 0.038 af

Subcatchment 1C.3: PRO-DA-1C.3 Runoff Area=0.200 ac 20.00% Impervious Runoff Depth=0.92"
Tc=6.0 min CN=51 Runoff=0.3 cfs 0.015 af

Subcatchment 2: PRO-DA-2 Runoff Area=2.000 ac 25.00% Impervious Runoff Depth=2.34"
Flow Length=1,168' Tc=24.8 min CN=70 Runoff=4.5 cfs 0.390 af

Reach POS: POINT OF STUDY Inflow=5.3 cfs 0.631 af
Outflow=5.3 cfs 0.631 af

Pond BF-1: BIORETENTIONFILTER-1 Peak Elev=516.00' Storage=2,419 cf Inflow=2.9 cfs 0.191 af
Primary=2.4 cfs 0.168 af Secondary=0.0 cfs 0.000 af Outflow=2.4 cfs 0.168 af

Pond BF-2: BIORETENTIONFILTER-2 Peak Elev=517.38' Storage=792 cf Inflow=0.8 cfs 0.038 af
Primary=0.0 cfs 0.037 af Secondary=0.0 cfs 0.000 af Outflow=0.0 cfs 0.037 af

Pond BF-3: BIORETENTIONFILTER-3 Peak Elev=519.61' Storage=852 cf Inflow=1.3 cfs 0.066 af
Primary=1.1 cfs 0.060 af Secondary=0.0 cfs 0.000 af Outflow=1.1 cfs 0.060 af

Pond DET.: DETENTION BASIN Peak Elev=511.06' Storage=1,125 cf Inflow=2.5 cfs 0.221 af
Primary=1.0 cfs 0.221 af Secondary=0.0 cfs 0.000 af Outflow=1.0 cfs 0.221 af

Pond INFIL: INFILTRATION BASIN Peak Elev=518.54' Storage=3,165 cf Inflow=2.6 cfs 0.183 af
Discarded=0.2 cfs 0.134 af Primary=0.2 cfs 0.021 af Secondary=0.0 cfs 0.000 af Outflow=0.4 cfs 0.155 af

Total Runoff Area = 4.900 ac Runoff Volume = 0.883 af Average Runoff Depth = 2.16"
65.71% Pervious = 3.220 ac 34.29% Impervious = 1.680 ac

Summary for Subcatchment 1A: PRO-DA-1A

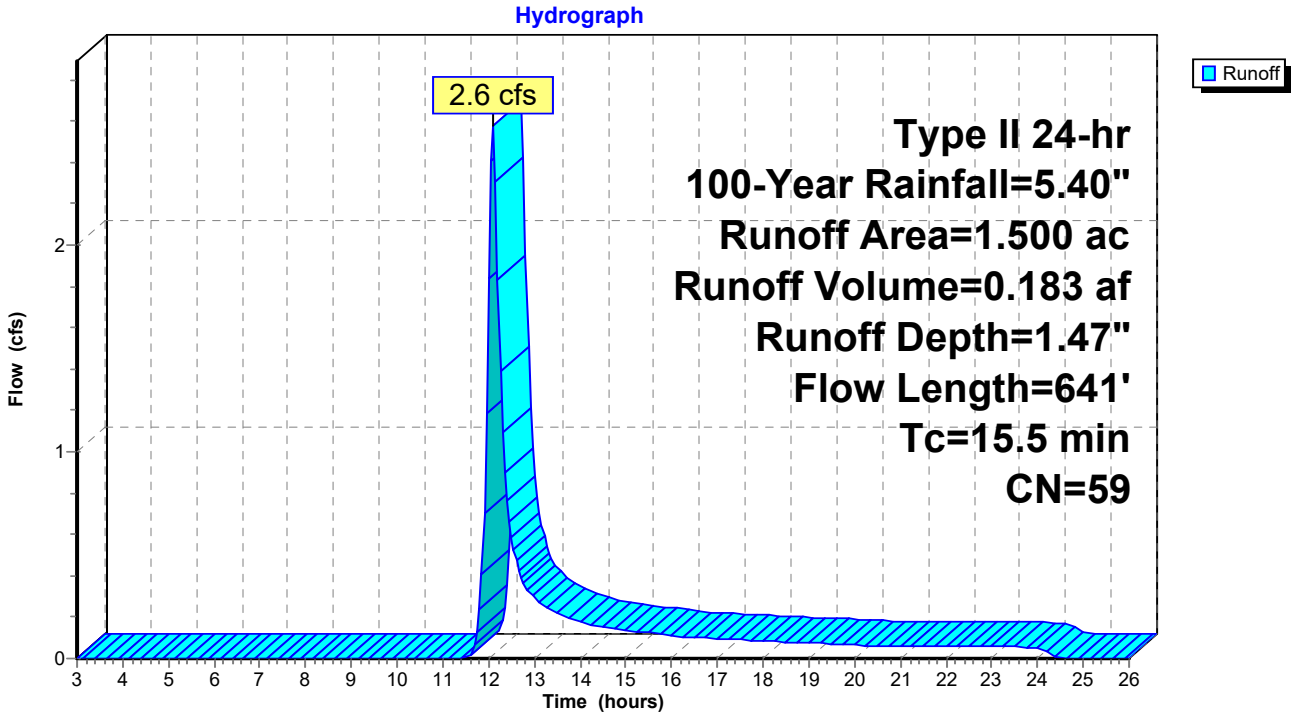
Runoff = 2.6 cfs @ 12.09 hrs, Volume= 0.183 af, Depth= 1.47"
Routed to Pond INFIL : INFILTRATION BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.40"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG B
0.300	61	>75% Grass cover, Good, HSG B
0.800	39	>75% Grass cover, Good, HSG A
1.500	59	Weighted Average
1.100		73.33% Pervious Area
0.400		26.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	80	0.0500	0.09		**Sheet Flow, SHEET FLOW** Woods: Light underbrush n= 0.400 P2= 2.37"
0.8	387	0.0240	8.34	26.68	**Channel Flow, VEGETATED SWALE** Area= 3.2 sf Perim= 4.5' r= 0.71' n= 0.022 Earth, clean & straight
0.1	60	0.0660	10.85	45.55	**Channel Flow, VEGETATED SWALE** Area= 4.2 sf Perim= 8.5' r= 0.49' n= 0.022 Earth, clean & straight
0.1	114	0.0400	17.00	204.01	**Channel Flow, VEGETATED SWALE** Area= 12.0 sf Perim= 8.5' r= 1.41' n= 0.022 Earth, clean & straight
15.5	641	Total			

Subcatchment 1A: PRO-DA-1A



Summary for Subcatchment 1B: PRO-DA-1B

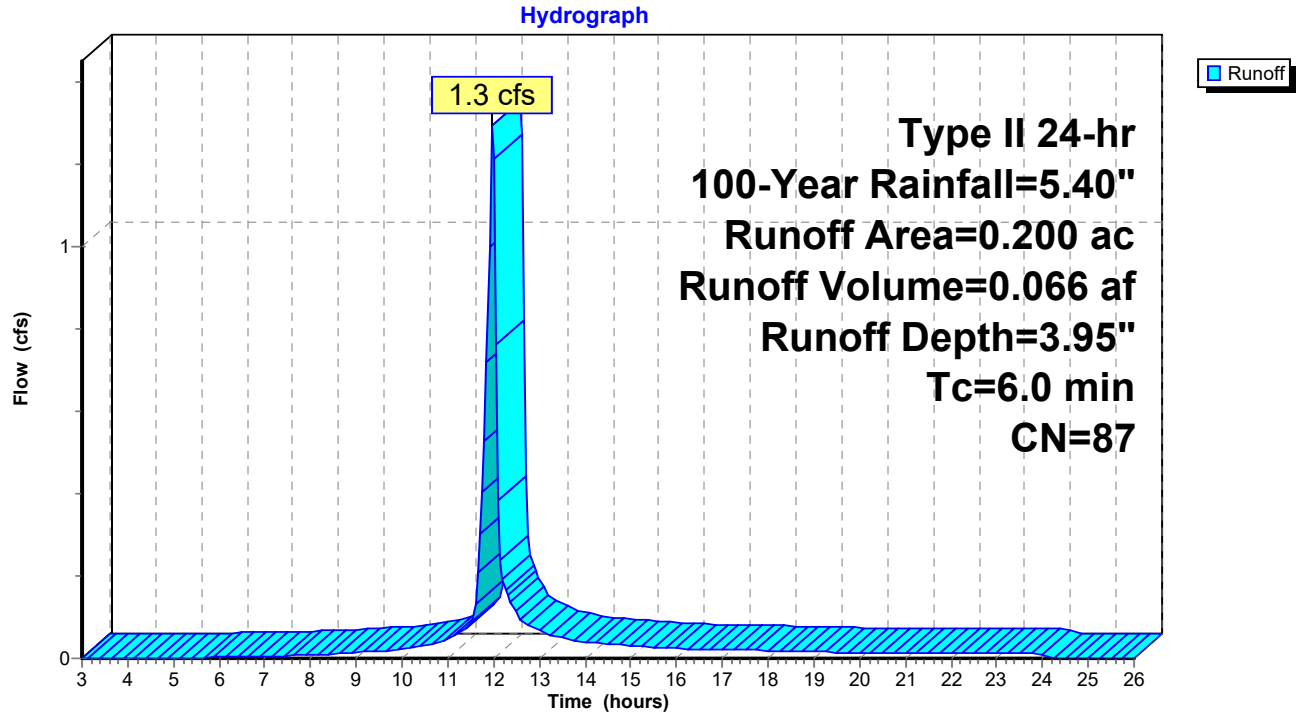
Runoff = 1.3 cfs @ 11.97 hrs, Volume= 0.066 af, Depth= 3.95"
Routed to Pond BF-3 : BIORETENTION FILTER-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.40"

Area (ac)	CN	Description
0.140	98	Paved parking, HSG B
0.060	61	>75% Grass cover, Good, HSG B
0.200	87	Weighted Average
0.060		30.00% Pervious Area
0.140		70.00% Impervious Area

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

Subcatchment 1B: PRO-DA-1B



Summary for Subcatchment 1C.1: PRO-DA-1C.1

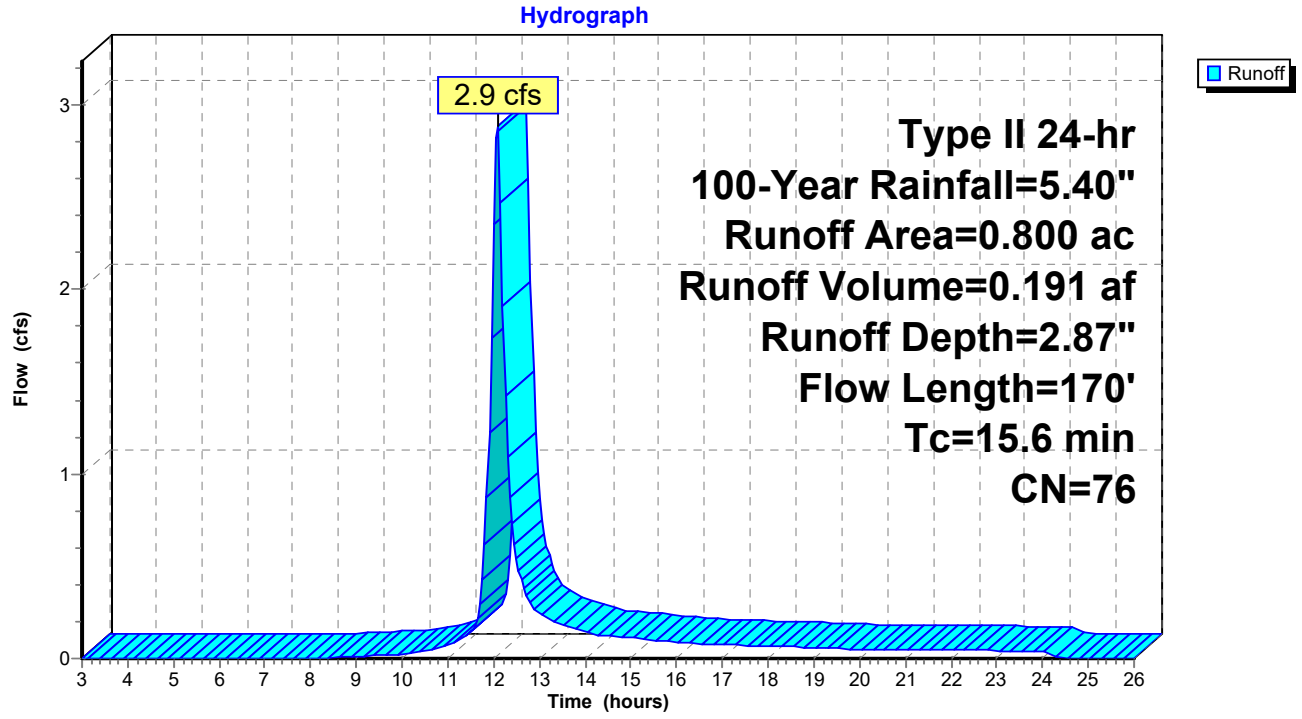
Runoff = 2.9 cfs @ 12.08 hrs, Volume= 0.191 af, Depth= 2.87"
Routed to Pond BF-1 : BIORETENTION FILTER-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.40"

Area (ac)	CN	Description
0.500	98	Paved parking, HSG A
0.300	39	>75% Grass cover, Good, HSG A
0.800	76	Weighted Average
0.300		37.50% Pervious Area
0.500		62.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	70	0.0470	0.09		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.37"
2.1	30	0.3000	0.23		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.37"
0.2	70	0.2000	6.71		**Shallow Concentrated Flow, SCF** Grassed Waterway Kv= 15.0 fps
15.6	170	Total			

Subcatchment 1C.1: PRO-DA-1C.1



Summary for Subcatchment 1C.2: PRO-DA-1C.2

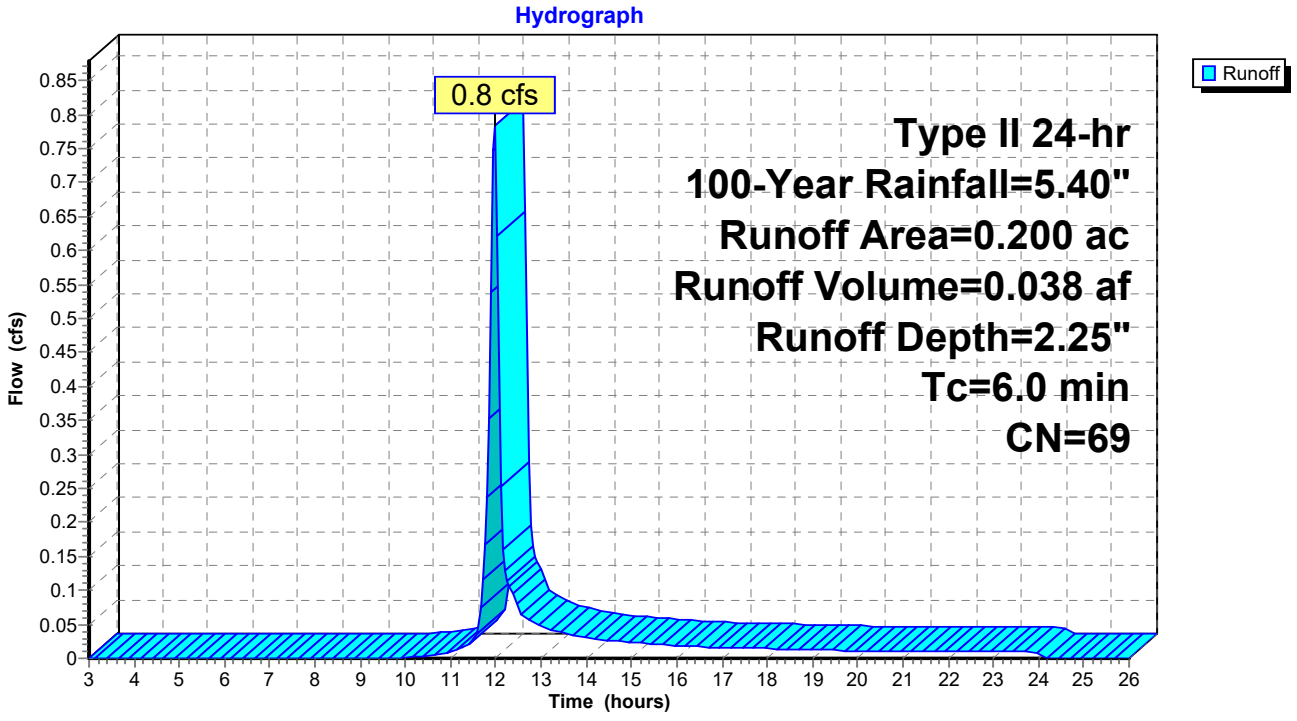
Runoff = 0.8 cfs @ 11.98 hrs, Volume= 0.038 af, Depth= 2.25"
Routed to Pond BF-2 : BIORETENTION FILTER-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.40"

Area (ac)	CN	Description
0.100	98	Paved parking, HSG A
0.100	39	>75% Grass cover, Good, HSG A
0.200	69	Weighted Average
0.100		50.00% Pervious Area
0.100		50.00% Impervious Area

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

Subcatchment 1C.2: PRO-DA-1C.2



Summary for Subcatchment 1C.3: PRO-DA-1C.3

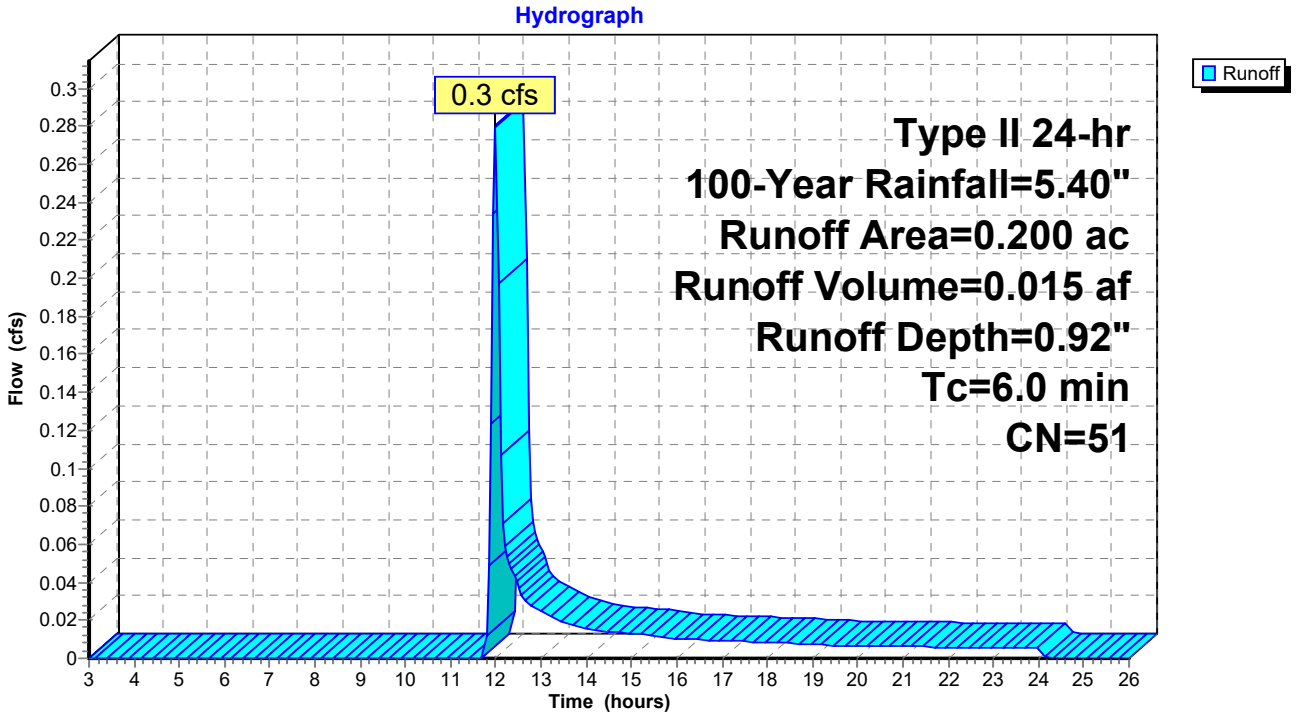
Runoff = 0.3 cfs @ 11.99 hrs, Volume= 0.015 af, Depth= 0.92"
Routed to Pond DET. : DETENTION BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.40"

Area (ac)	CN	Description
0.040	98	Paved parking, HSG A
0.160	39	>75% Grass cover, Good, HSG A
0.200	51	Weighted Average
0.160		80.00% Pervious Area
0.040		20.00% Impervious Area

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

Subcatchment 1C.3: PRO-DA-1C.3



Summary for Subcatchment 2: PRO-DA-2

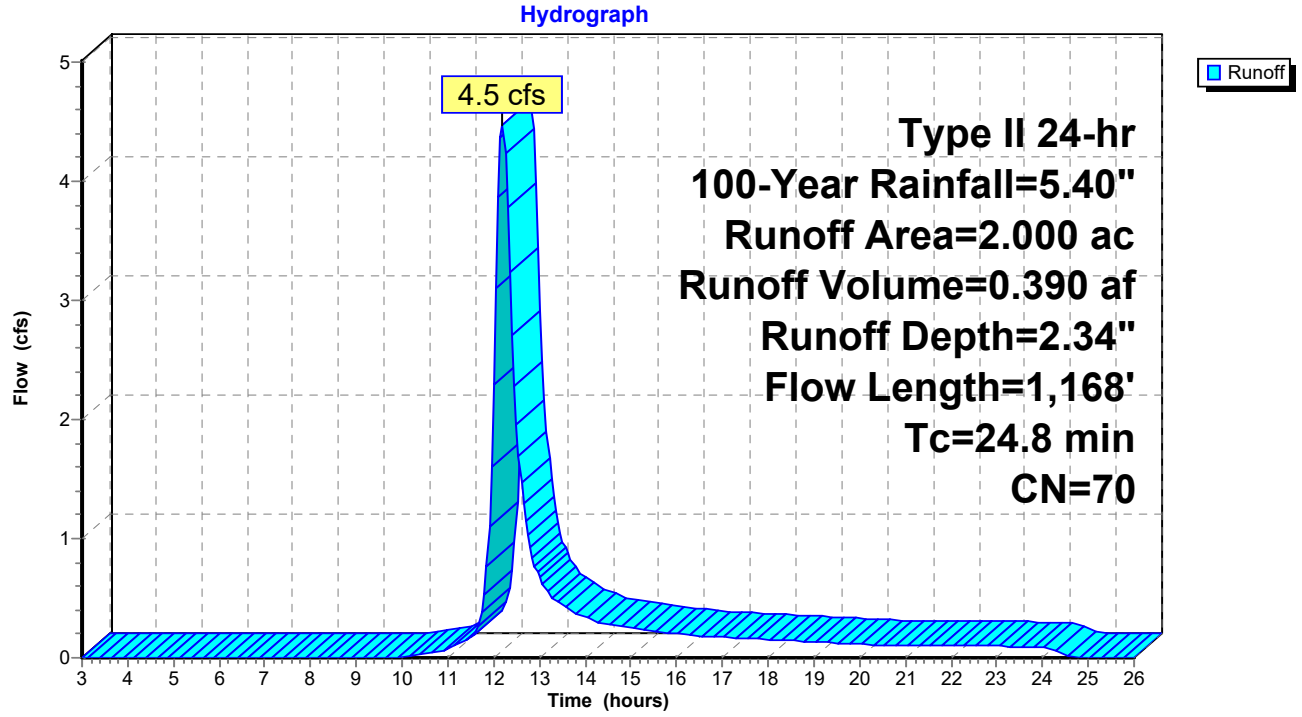
Runoff = 4.5 cfs @ 12.19 hrs, Volume= 0.390 af, Depth= 2.34"
Routed to Reach POS : POINT OF STUDY

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.40"

Area (ac)	CN	Description
0.500	98	Paved parking, HSG B
1.500	61	>75% Grass cover, Good, HSG B
2.000	70	Weighted Average
1.500		75.00% Pervious Area
0.500		25.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0700	0.11		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 2.37"
8.2	438	0.0320	0.89		**Shallow Concentrated Flow, Shallow Conc. Flow** Woodland Kv= 5.0 fps
1.5	630	0.0200	6.80	20.39	**Channel Flow, Roadside Ditch** Area= 3.0 sf Perim= 5.0' r= 0.60' n= 0.022 Earth, clean & straight
24.8	1,168	Total			

Subcatchment 2: PRO-DA-2



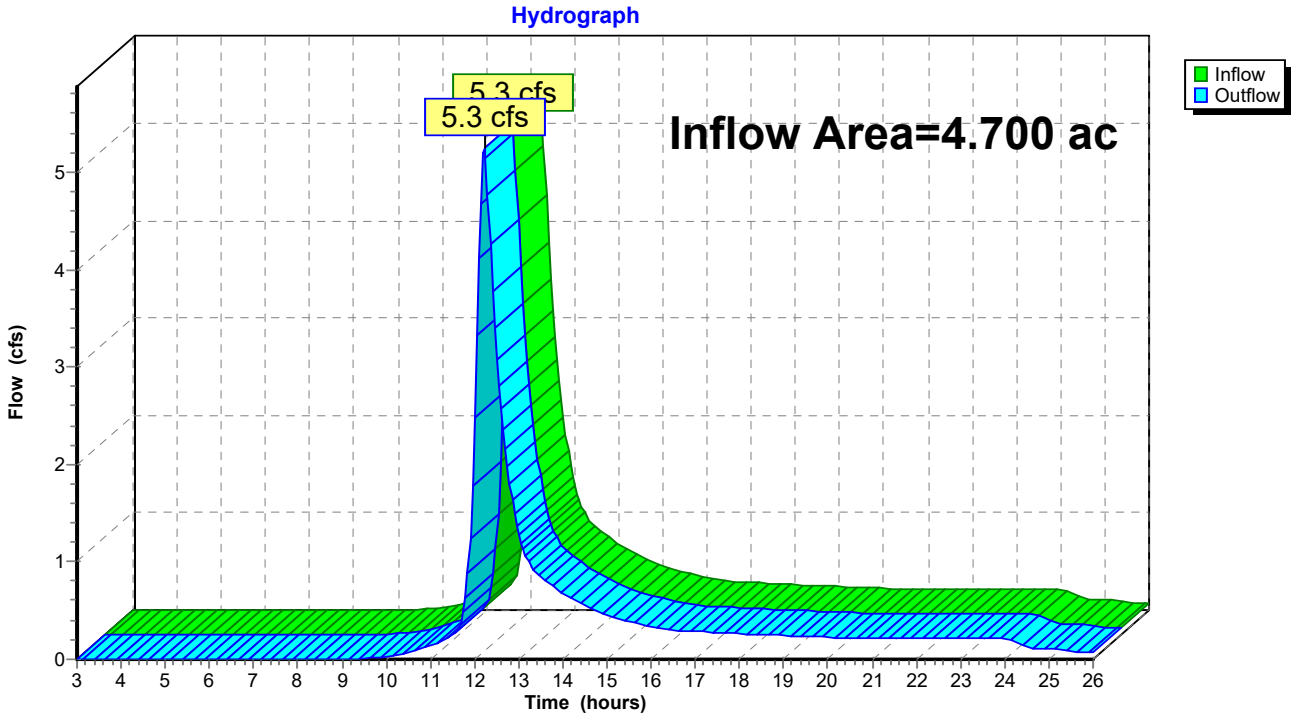
Summary for Reach POS: POINT OF STUDY

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.700 ac, 32.77% Impervious, Inflow Depth > 1.61" for 100-Year event
Inflow = 5.3 cfs @ 12.22 hrs, Volume= 0.631 af
Outflow = 5.3 cfs @ 12.22 hrs, Volume= 0.631 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs

Reach POS: POINT OF STUDY



Summary for Pond BF-1: BIORETENTION FILTER-1

Inflow Area = 0.800 ac, 62.50% Impervious, Inflow Depth = 2.87" for 100-Year event
Inflow = 2.9 cfs @ 12.08 hrs, Volume= 0.191 af
Outflow = 2.4 cfs @ 12.17 hrs, Volume= 0.168 af, Atten= 18%, Lag= 5.6 min
Primary = 2.4 cfs @ 12.17 hrs, Volume= 0.168 af
Routed to Pond DET. : DETENTION BASIN
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Pond DET. : DETENTION BASIN

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 516.00' @ 12.17 hrs Surf.Area= 1,867 sf Storage= 2,419 cf

Plug-Flow detention time= 171.1 min calculated for 0.168 af (88% of inflow)
Center-of-Mass det. time= 112.8 min (947.3 - 834.5)

Volume	Invert	Avail.Storage	Storage Description
#1	511.80'	3,609 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

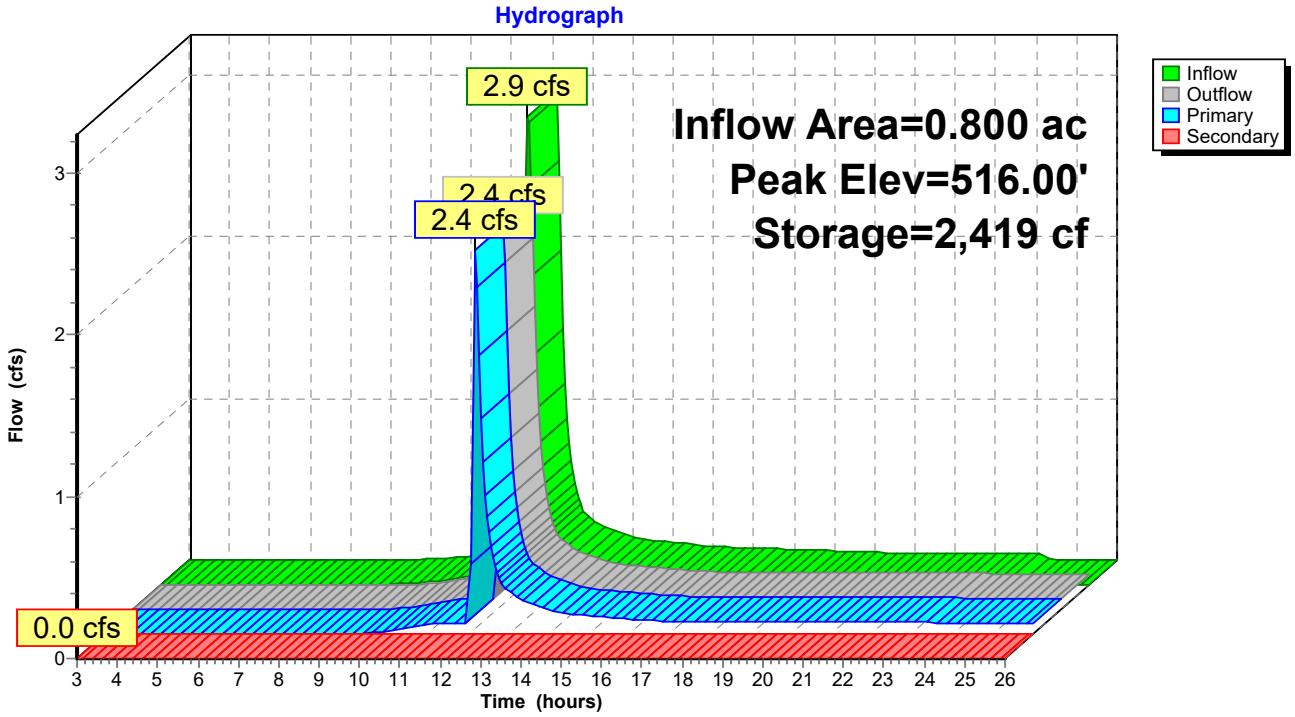
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
511.80	1,415	0.0	0	0
512.80	1,415	40.0	566	566
515.30	1,415	20.0	708	1,273
516.00	1,868	100.0	1,149	2,423
516.20	10,000	100.0	1,187	3,609

Device	Routing	Invert	Outlet Devices
#1	Device 3	511.80'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	516.10'	**7.9' long + 0.3 '/' SideZ x 5.5' breadth Broad-Crested Rectangular Weir** 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 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86
#3	Primary	511.80'	**12.0" Round Culvert** L= 50.4' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 511.80' / 511.60' S= 0.0040 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	515.80'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.2 cfs @ 12.17 hrs HW=515.99' (Free Discharge)
└**3=Culvert** (Passes 2.2 cfs of 6.9 cfs potential flow)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)
└**4=Grate** (Weir Controls 2.1 cfs @ 1.41 fps)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=511.80' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond BF-1: BIORETENTION FILTER-1



Summary for Pond BF-2: BIORETENTION FILTER-2

Inflow Area = 0.200 ac, 50.00% Impervious, Inflow Depth = 2.25" for 100-Year event
Inflow = 0.8 cfs @ 11.98 hrs, Volume= 0.038 af
Outflow = 0.0 cfs @ 11.75 hrs, Volume= 0.037 af, Atten= 95%, Lag= 0.0 min
Primary = 0.0 cfs @ 11.75 hrs, Volume= 0.037 af
Routed to Pond DET. : DETENTION BASIN
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 517.38' @ 13.43 hrs Surf.Area= 818 sf Storage= 792 cf

Plug-Flow detention time= 278.0 min calculated for 0.037 af (99% of inflow)
Center-of-Mass det. time= 275.8 min (1,118.6 - 842.7)

Volume	Invert	Avail.Storage	Storage Description
#1	513.70'	3,676 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

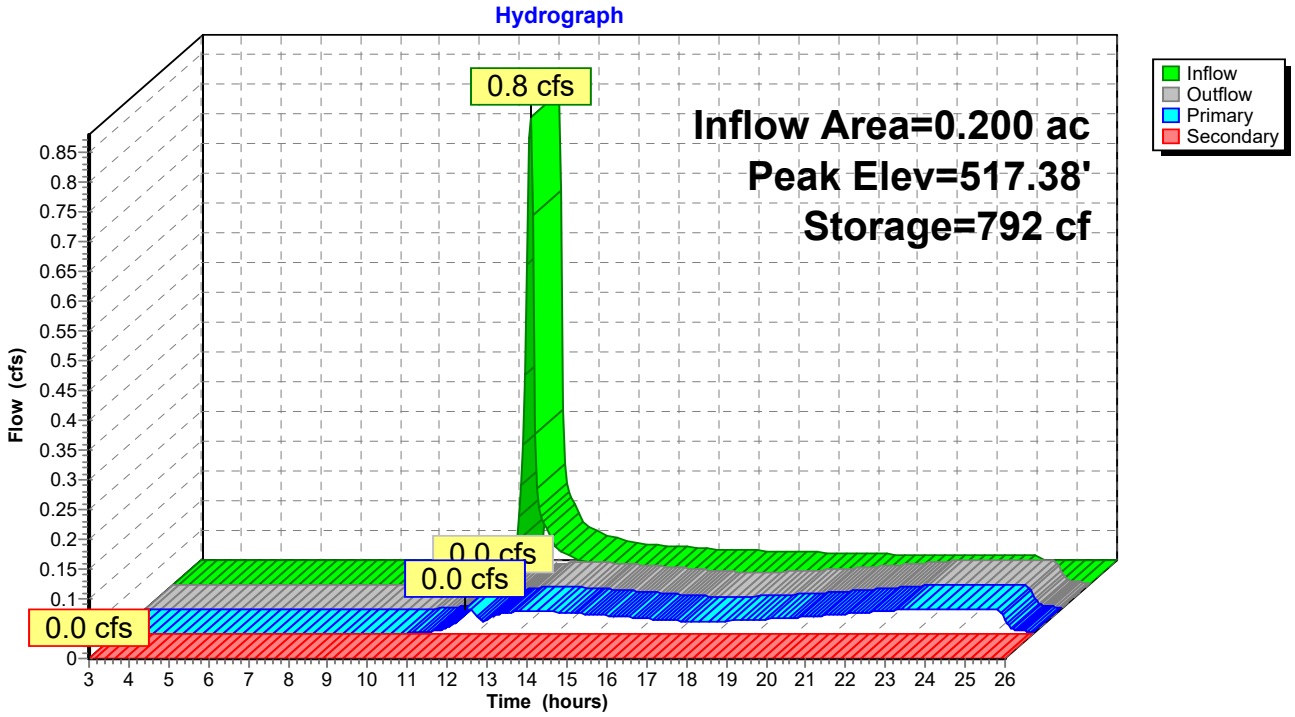
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
513.70	878	0.0	0	0
514.70	878	40.0	351	351
517.20	437	20.0	329	680
517.50	1,076	100.0	227	907
518.00	10,000	100.0	2,769	3,676

Device	Routing	Invert	Outlet Devices
#1	Device 3	513.70'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	517.80'	**31.0' long + 0.3 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Primary	513.70'	**12.0" Round Culvert** L= 70.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 513.70' / 511.50' S= 0.0314 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	517.70'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 11.75 hrs HW=513.87' (Free Discharge)
└**3=Culvert** (Passes 0.0 cfs of 0.1 cfs potential flow)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)
└**4=Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=513.70' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond BF-2: BIORETENTION FILTER-2



Summary for Pond BF-3: BIORETENTION FILTER-3

Inflow Area = 0.200 ac, 70.00% Impervious, Inflow Depth = 3.95" for 100-Year event
Inflow = 1.3 cfs @ 11.97 hrs, Volume= 0.066 af
Outflow = 1.1 cfs @ 12.02 hrs, Volume= 0.060 af, Atten= 19%, Lag= 3.3 min
Primary = 1.1 cfs @ 12.02 hrs, Volume= 0.060 af
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 519.61' @ 12.02 hrs Surf.Area= 2,681 sf Storage= 852 cf

Plug-Flow detention time= 152.8 min calculated for 0.060 af (92% of inflow)
Center-of-Mass det. time= 110.4 min (905.7 - 795.3)

Volume	Invert	Avail.Storage	Storage Description
#1	515.50'	3,340 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

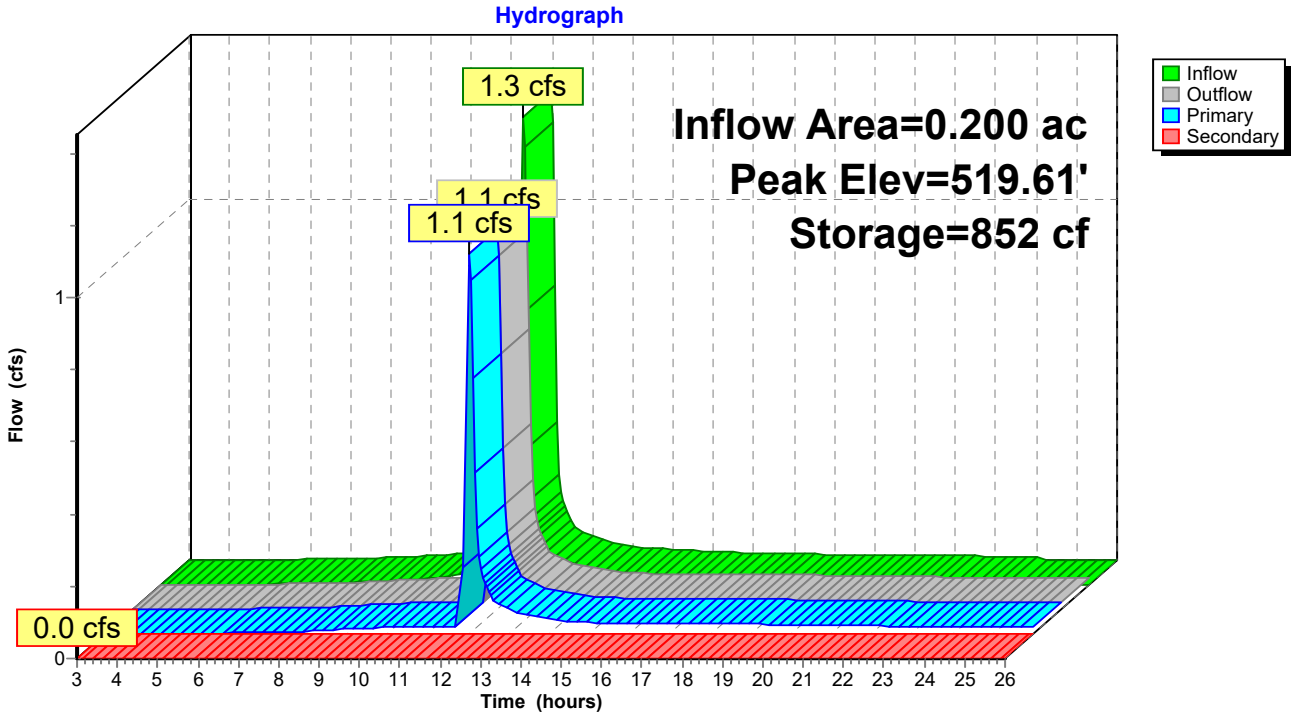
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
515.50	437	0.0	0	0
516.50	437	40.0	175	175
519.00	437	20.0	219	393
519.50	674	100.0	278	671
520.00	10,000	100.0	2,669	3,340

Device	Routing	Invert	Outlet Devices
#1	Device 3	515.50'	**2.000 in/hr Exfiltration over Surface area**
#2	Secondary	519.70'	**5.0' long + 0.3 '/' SideZ x 9.0' breadth Broad-Crested Rectangular Weir** 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 5.00 5.50 Coef. (English) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67 2.69
#3	Primary	515.50'	**6.0" Round Culvert** L= 30.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 515.50' / 515.00' S= 0.0167 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf
#4	Device 3	519.50'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.0 cfs @ 12.02 hrs HW=519.60' (Free Discharge)
└**3=Culvert** (Passes 1.0 cfs of 1.7 cfs potential flow)
  └**1=Exfiltration** (Exfiltration Controls 0.1 cfs)
  └**4=Grate** (Weir Controls 0.9 cfs @ 1.05 fps)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=515.50' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond BF-3: BIORETENTION FILTER-3



Summary for Pond DET.: DETENTION BASIN

Inflow Area = 1.200 ac, 53.33% Impervious, Inflow Depth > 2.21" for 100-Year event
Inflow = 2.5 cfs @ 12.17 hrs, Volume= 0.221 af
Outflow = 1.0 cfs @ 12.38 hrs, Volume= 0.221 af, Atten= 59%, Lag= 12.7 min
Primary = 1.0 cfs @ 12.38 hrs, Volume= 0.221 af
Routed to Reach POS : POINT OF STUDY
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 511.06' @ 12.38 hrs Surf.Area= 833 sf Storage= 1,125 cf

Plug-Flow detention time= 10.0 min calculated for 0.221 af (100% of inflow)
Center-of-Mass det. time= 9.3 min (982.3 - 972.9)

Volume	Invert	Avail.Storage	Storage Description
#1	508.00'	5,586 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

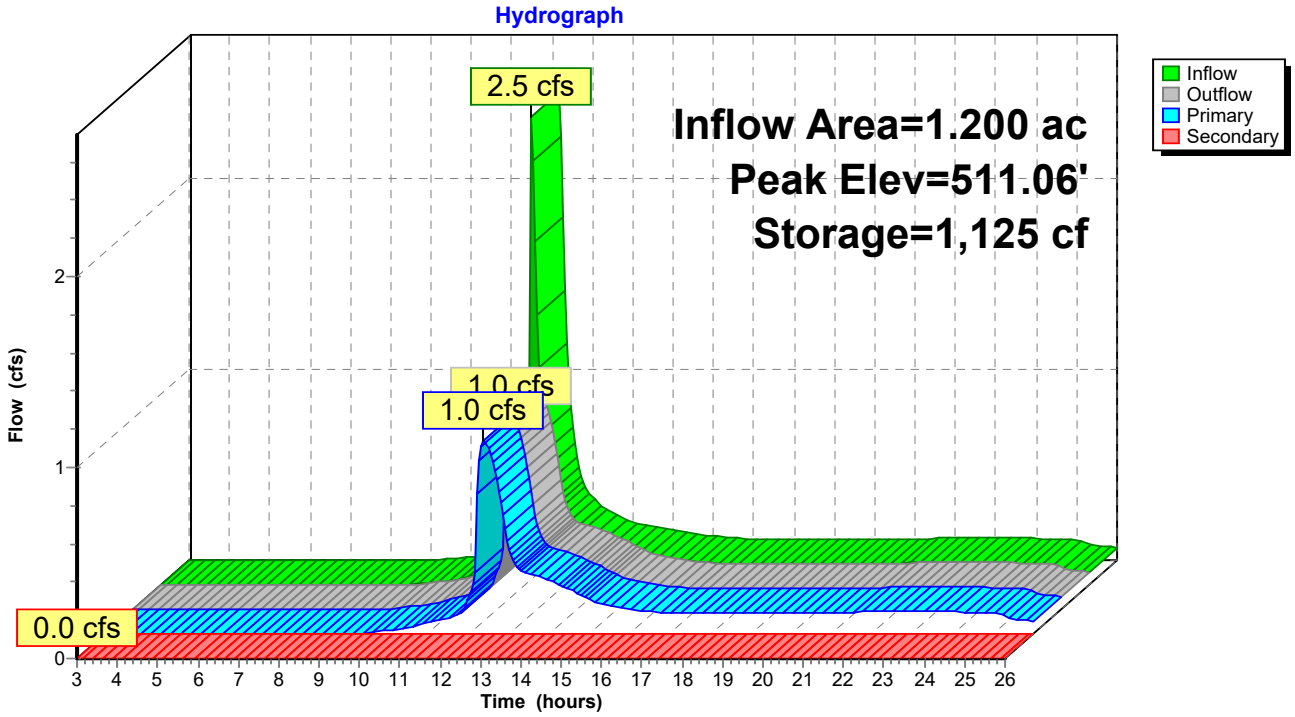
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
508.00	36	0	0
509.00	196	116	116
510.00	460	328	444
511.00	809	635	1,079
512.00	1,232	1,021	2,099
513.00	1,724	1,478	3,577
513.40	1,951	735	4,312
514.00	2,296	1,274	5,586

Device	Routing	Invert	Outlet Devices
#1	Primary	508.00'	**12.0" Round Culvert** L= 39.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 508.00' / 507.80' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	512.40'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	508.00'	**3.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	510.00'	**5.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#5	Secondary	513.40'	**10.0' long + 0.3 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** 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 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.0 cfs @ 12.38 hrs HW=511.05' (Free Discharge)
└**1=Culvert** (Passes 1.0 cfs of 4.8 cfs potential flow)
└**2=Grate** (Controls 0.0 cfs)
└**3=Orifice** (Orifice Controls 0.4 cfs @ 8.24 fps)
└**4=Orifice** (Orifice Controls 0.6 cfs @ 4.42 fps)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=508.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond DET.: DETENTION BASIN



Summary for Pond INFIL: INFILTRATION BASIN

Inflow Area = 1.500 ac, 26.67% Impervious, Inflow Depth = 1.47" for 100-Year event
Inflow = 2.6 cfs @ 12.09 hrs, Volume= 0.183 af
Outflow = 0.4 cfs @ 12.67 hrs, Volume= 0.155 af, Atten= 84%, Lag= 34.5 min
Discarded = 0.2 cfs @ 12.67 hrs, Volume= 0.134 af
Primary = 0.2 cfs @ 12.67 hrs, Volume= 0.021 af
Routed to Reach POS : POINT OF STUDY
Secondary = 0.0 cfs @ 3.00 hrs, Volume= 0.000 af
Routed to Reach POS : POINT OF STUDY

Routing by Stor-Ind method, Time Span= 3.00-26.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 518.54' @ 12.67 hrs Surf.Area= 2,953 sf Storage= 3,165 cf

Plug-Flow detention time= 244.0 min calculated for 0.155 af (84% of inflow)
Center-of-Mass det. time= 170.2 min (1,048.6 - 878.4)

Volume	Invert	Avail.Storage	Storage Description
#1	515.00'	7,820 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
515.00	0	0	0
516.00	457	229	229
517.00	861	659	888
518.00	1,393	1,127	2,015
518.50	1,715	777	2,792
519.00	18,400	5,029	7,820

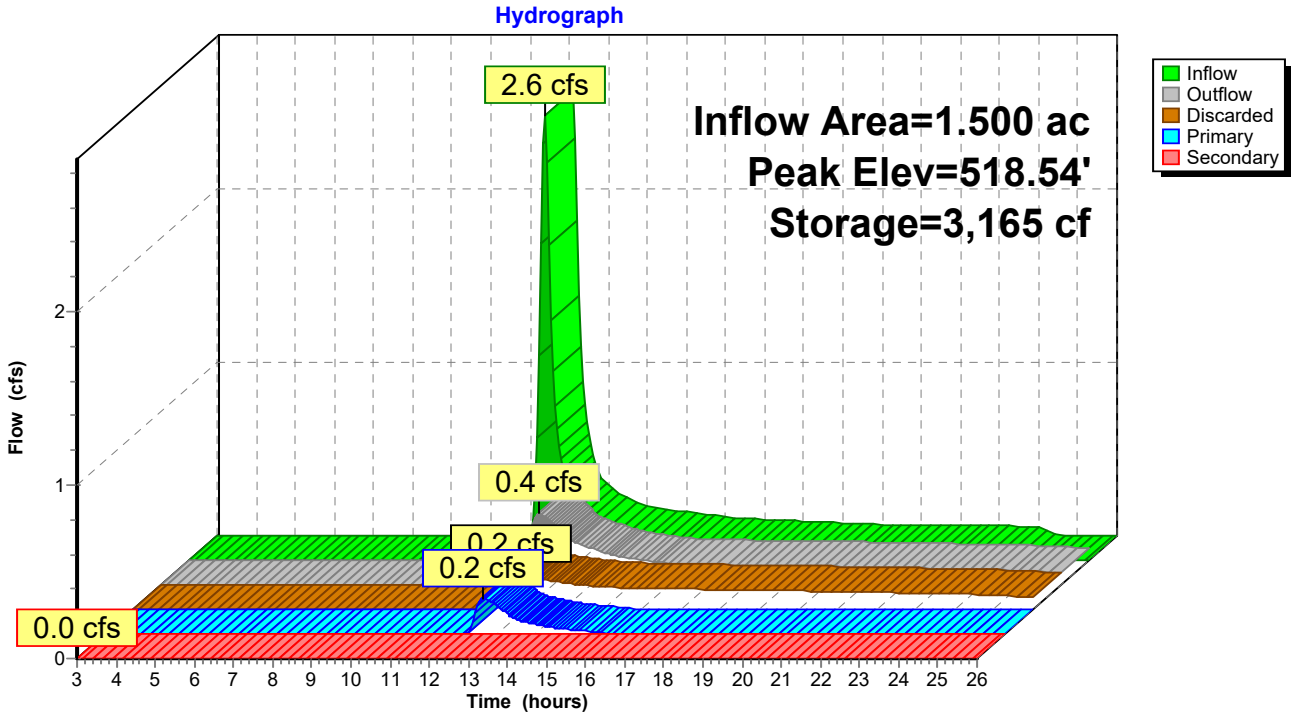
Device	Routing	Invert	Outlet Devices
#1	Discarded	515.00'	**3.000 in/hr Exfiltration over Surface area**
#2	Secondary	518.60'	**6.5' long + 0.3 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Primary	517.30'	**12.0" Round Culvert** L= 29.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 517.30' / 516.90' S= 0.0138 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	518.50'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.2 cfs @ 12.67 hrs HW=518.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.2 cfs)

Primary OutFlow Max=0.2 cfs @ 12.67 hrs HW=518.54' (Free Discharge)
└**3=Culvert** (Passes 0.2 cfs of 3.2 cfs potential flow)
└**4=Grate** (Weir Controls 0.2 cfs @ 0.63 fps)

Secondary OutFlow Max=0.0 cfs @ 3.00 hrs HW=515.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond INFIL: INFILTRATION BASIN



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APPENDIX D: BEST MANAGEMENT PRACTICE DESIGN CALCULATIONS

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Bioretention Filter-1 (BF-1)

Bioretention Filter WQ_V Provided from Filter Area Equation

Calculate required WQ_V for tributary area (before redevelopment adjustments)

Drainage Area Tributary to Practice (A) = 0.80 acres

Impervious Areas (A_I) = 0.50 acres

$$R_v = 0.05 + 0.9\left(\frac{0.50\text{ ac}}{0.80\text{ ac}}\right)$$

$R_v = 0.613$

$$WQ_v = \frac{(P)(Rv)(A)}{12}$$

$$WQ_v = \frac{1.0 \cdot 0.613 \cdot 0.80\text{ ac}}{12}$$

$$\mathbf{WQ_v = 0.041\ ac \cdot ft\ \ (1{,}786\ ft^3)}$$

Bioretention Filter WQ_V Provided from Filter Area Equation

$$A_f = \frac{(WQ_v)(d_f)}{(k)(h_f + d_f)(t_f)}$$

Where,

A_f = Area of the filter (ft^2) (Providing 1,415 ft^2)

WQ_v = Water Quality Volume (ft^3)

d_f = depth of the bioretention soil media (2.5 feet as required in NYS Design Manual)

k = coefficient of permeability (0.5 ft/day per NYS Design Manual)

h_f = average height of water above the filter bed (0.25 ft)

t_f = design filter bed drain time (2 days per NYS Design Manual)

$$WQ_v = \frac{(A_f)(k)(h_f + d_f)(t_f)(d_f)}{(d_f)}$$

$$WQ_v = \frac{(1{,}415\text{ ft}^2)\left(0.5\ \frac{\text{ft}}{\text{day}}\right)(0.5\text{ ft} + 2.5\text{ ft})(2\text{ days})}{2.5\text{ ft}}$$

$$WQ_v = \frac{4{,}952.5}{2.5\text{ ft}}$$

WQ_V Provided = 1,981 ft^3 (0.45 ac-ft)

Bioretention Filter-2 (BF-2)

Calculate required WQ_V for tributary area (before redevelopment WQ_V adjustments)

Drainage Area Tributary to Practice (A) = 0.20 acres

Impervious Areas (A_I) = 0.10 acres

$$R_v = 0.05 + 0.9\left(\frac{0.10\ ac}{0.20\ ac}\right)$$

$R_v = 0.50$

$$WQ_v = \frac{1.0\ \cdot\ 0.50\ \cdot 0.20\ ac}{12}$$

$$\mathbf{WQ_v = 0.008\ ac \cdot ft\ \ (363\ ft^3)}$$

Bioretention Filter WQ_V Provided from Filter Area Equation

$$A_f = \frac{(WQ_v)(d_f)}{(k)(h_f + d_f)(t_f)}$$

Where,

A_f = Area of the filter (ft^2) (Providing 878 ft^2)
WQ_v = Water Quality Volume (ft^3)
d_f = depth of the bioretention soil media (2.5 feet as required in NYS Design Manual)
k = coefficient of permeability (0.5 ft/day per NYS Design Manual)
h_f = average height of water above the filter bed (0.25 ft)
t_f = design filter bed drain time (2 days per NYS Design Manual)

$$WQ_v = \frac{(A_f)(k)(h_f + d_f)(t_f)(d_f)}{(d_f)}$$

$$WQ_v = \frac{(878\ ft^2)\left(0.5\ \frac{ft}{day}\right)(0.5\ ft + 2.5\ ft)(2\ days)}{2.5\ ft}$$

WQ_V Provided = 1,229 ft^3 (0.028 ac-ft)

Bioretention Filter-3 (BF-3)

Calculate required WQ_V for tributary area (before redevelopment WQ_V adjustments)

Drainage Area Tributary to Practice (A) = 0.20 acres

Impervious Areas (A_I) = 0.14 acres

$$R_v = 0.05 + 0.9\left(\frac{0.14\ ac}{0.20\ ac}\right)$$

$R_v = 0.680$

$$WQ_v = \frac{1.0\ \cdot\ 0.680\ \cdot 0.20\ ac}{12}$$

$$\mathbf{WQ_v = 0.011\ ac \cdot ft\ \ (494\ ft^3)}$$

Bioretention Filter WQ_V Provided from Filter Area Equation

$$A_f = \frac{(WQ_v)(d_f)}{(k)(h_f + d_f)(t_f)}$$

Where,

A_f = Area of the filter (ft^2) (Providing 437 ft^2)
WQ_v = Water Quality Volume (ft^3)
d_f = depth of the bioretention soil media (2.5 feet as required in NYS Design Manual)
k = coefficient of permeability (0.5 ft/day per NYS Design Manual)
h_f = average height of water above the filter bed (0.25 ft)
t_f = design filter bed drain time (2 days per NYS Design Manual)

$$WQ_v = \frac{(A_f)(k)(h_f + d_f)(t_f)(d_f)}{(d_f)}$$

$$WQ_v = \frac{(437\ ft^2)\left(0.5\ \frac{ft}{day}\right)(0.5\ ft + 2.5\ ft)(2\ days)}{2.5\ ft}$$

WQ_V Provided = 1,530 ft^3 (0.035 ac-ft)

Infiltration Basin

Calculate required WQ_V for tributary area (before redevelopment WQ_V adjustments)

Drainage Area Tributary to Practice (A) = 1.50 acres

Impervious Areas (A_I) = 0.40 acres

$$R_v = 0.05 + 0.9\left(\frac{0.40\ \text{ac}}{1.50\ \text{ac}}\right)$$

$R_v = 0.290$

$$WQ_v = \frac{1.0 \cdot 0.290 \cdot 1.50\ \text{ac}}{12}$$

$$\mathbf{WQ_v = 0.036\ ac \cdot ft\ \ (1{,}579\ ft^3)}$$

The WQ_V will be stored between the elevations of 515.0 and 518.5 and will be entirely infiltrated within the basin.

APPENDIX E: EROSION & SEDIMENT CONTROL DETAILS AND STORMWATER MANAGEMENT PLAN

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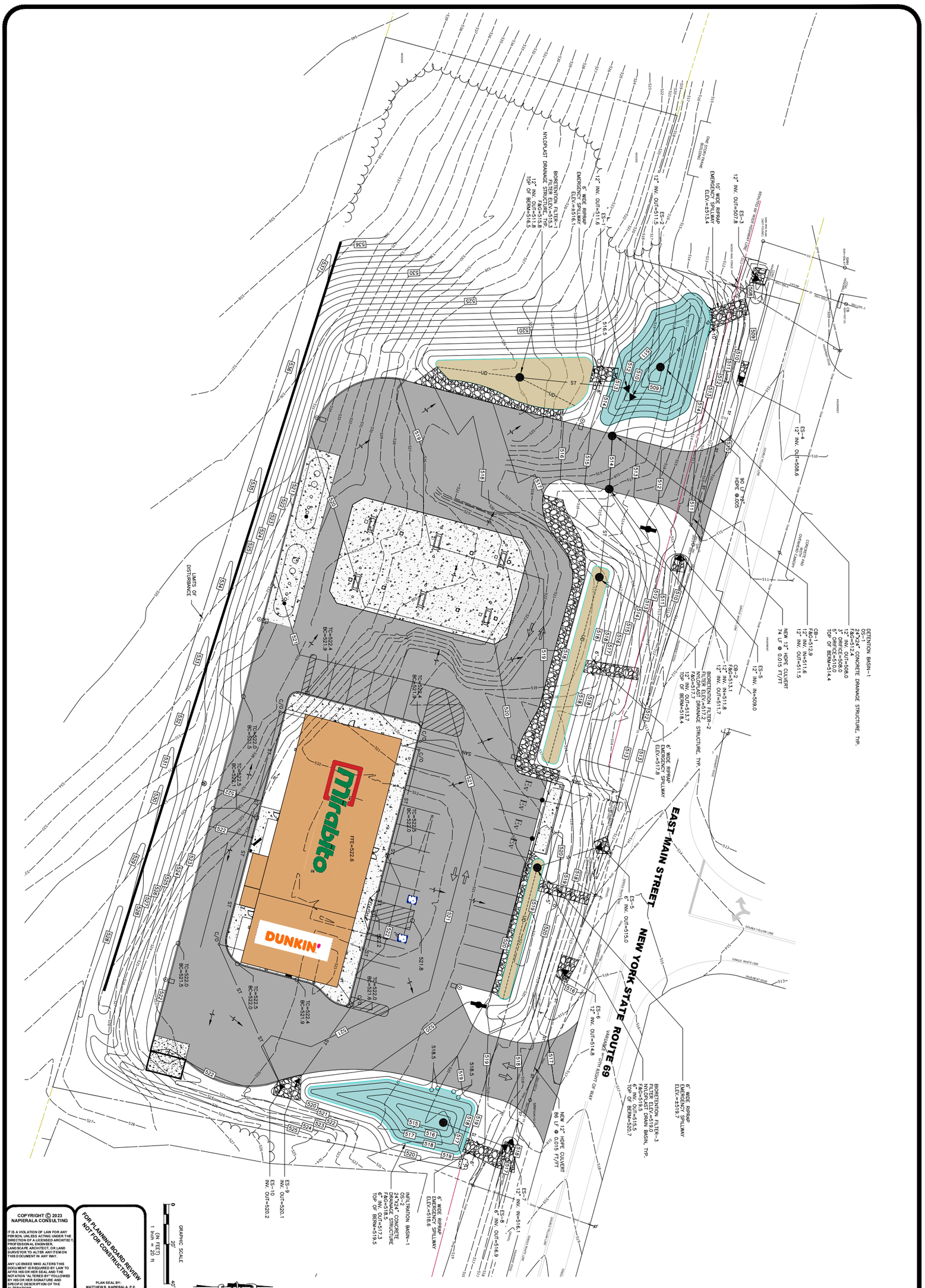

FOR PLANNING BOARD REVIEW
NOT FOR CONSTRUCTION

PLAN SEAL BY:
MATTHEW R. NAPIERALA, P.E.
NYS REGISTRATION # 068733

GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft
0
20'
40'

SHEET
C-4

PROJECT NO.
22-2114

DATE
07 APR 2023

SCALE
1"=20'

PREPARED BY:
NAPIERALA CONSULTING
PROFESSIONAL ENGINEER, P.C.
SITE • DESIGN • ENGINEERING
110 FAYETTE STREET
MANLIUS, NEW YORK 13104
email: MNAP@NAPCON.COM
PH: (315) 682-5580 FAX: (315) 682-5544

NO.	REVISION/ISSUE	DATE

SHEET TITLE:
GRADING PLAN

PROJECT TITLE:
MIRABITO ENERGY PRODUCTS
2877 E. MAIN STREET (ROUTE 69)
VILLAGE OF PARISH
OSWEGO COUNTY, NY

PREPARED FOR:
MIRABITO ENERGY PRODUCTS
PO BOX 5306
49 COURT STREET
BINGHAMTON, NY 13901

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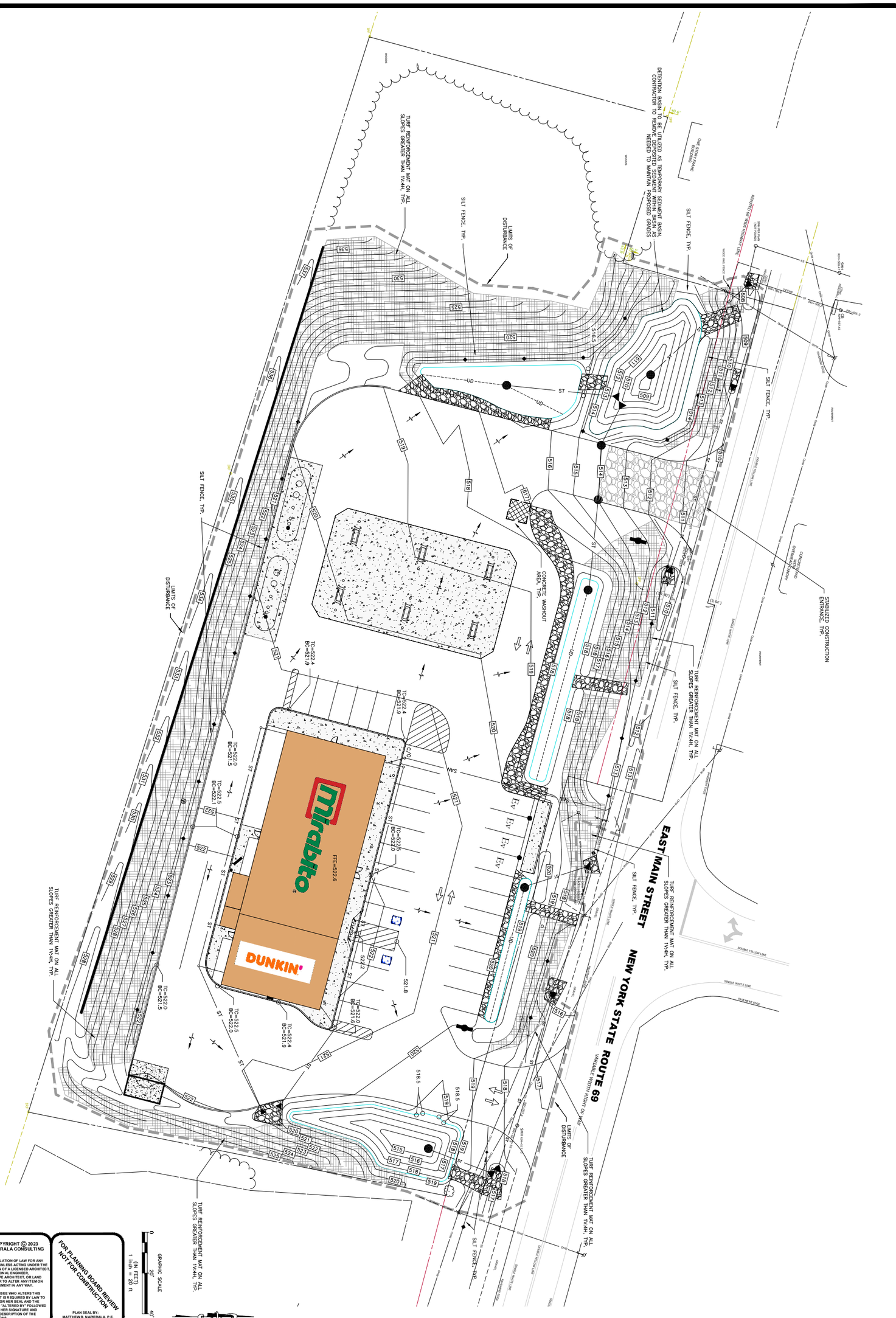

FOR PLANNING BOARD REVIEW
NOT FOR CONSTRUCTION

PLAN SEAL BY:
MATTHEW R. NAPIERALA, P.E.
NYS REGISTRATION # 068723

GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft
0
20'
40'

SHEET
C-5

PROJECT NO.
22-2114

DATE
07 APR 2023

SCALE
1"=20'

PREPARED BY:
NAPIERALA CONSULTING
PROFESSIONAL ENGINEER, P.C.
SITE • DESIGN • ENGINEERING
110 FAYETTE STREET
MANLIUS, NEW YORK 13104
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NO.	REVISION/ISSUE	DATE

SHEET TITLE:
EROSION AND SEDIMENT CONTROL PLAN

PROJECT TITLE:
MIRABITO ENERGY PRODUCTS
2877 E. MAIN STREET (ROUTE 69)
VILLAGE OF PARISH — OSWEGO COUNTY, NY

PREPARED FOR:
MIRABITO ENERGY PRODUCTS
PO BOX 5306
49 COURT STREET
BINGHAMTON, NY 13901

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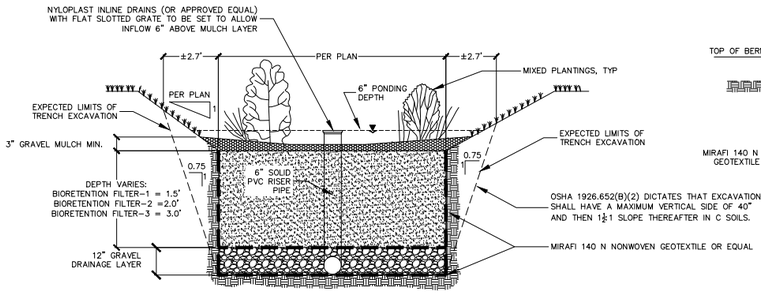
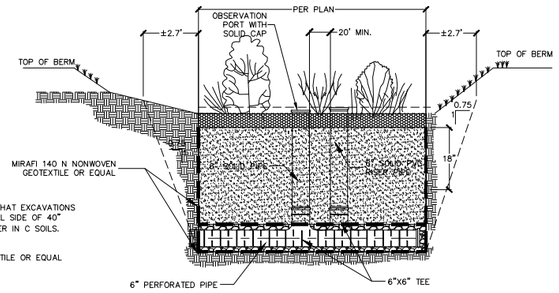


PROFILE VIEW SECTION A-A



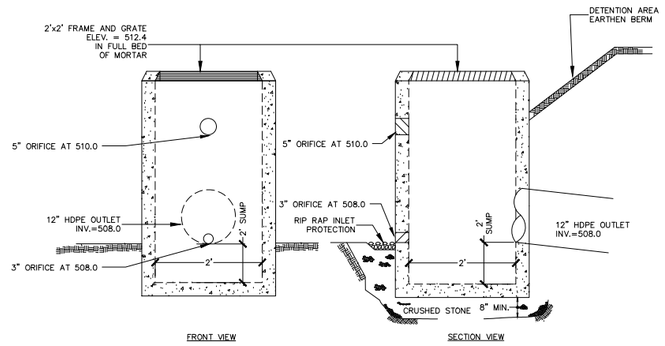
PROFILE VIEW SECTION B-B

BIORETENTION NOTES:

1. BIORETENTION FILTERS TRIBUTARY TO THE HOT SPOT DRAINAGE AREA (BF-1 & BF-2 WITHIN PRO-DA-1C) MUST TO BE LINED WITH AN IMPERMEABLE LINER TO PREVENT GROUND INFILTRATION.
2. PLANTING SOIL MEDIA SHALL BE:
   A.) 85% TO 88% COARSE TO MEDIUM SAND
   B.) 12%-15% LEAF COMPOST OR TOPSOIL
3. PEA GRAVEL MULCH CONFORMING TO ASTM D 448 No. 6.
4. UNDERDRAIN GRAVEL TO BE AASHTO M-43 No. 67, 0.25" TO 0.75".
5. GEOTEXTILE FILTER FABRIC (SEPARATION LAYER):
   ASTM D-751 (PUNCTURE STRENGTH – 125 LB)
   ASTM D-1117 (MULLEN BURST STRENGTH – 400 PSI)
   ASTM D-1682 (TENSILE STRENGTH – 300 LB)
   SIZE – 0.08" THICK; EQUIVALENT OPENING SIZE OF #80 SIEVE
6. COMPACT WITH WATER-FILLED HAND ROLLER. COMPACTION TO BE FIRM BUT EASY (UTILIZE PENCIL TEST).
7. ENGINEER TO TEST IN PLACE COMPACTION AND INFILTRATION OF PLANTING SOIL.
8. ENGINEER TO PERFORM INSPECTION OF BIORETENTION PLANTING SOIL IMMEDIATELY FOLLOWING PLACEMENT AND PERFORM AN IN PLACE PERCOLATION TEST TO CONFIRM THAT THE IN PLACE MATERIAL PERCOLATES AT A RATE FASTER THAN 10 MIN/INCH.

1 / C-10 BIORETENTION FILTER CROSS SECTIONS

SCALE: NTS



2 / C-10 OUTLET CONTROL STRUCTURE (OS-1)

SCALE: NTS

PROJECT TITLE:
MIRABITO ENERGY PRODUCTS
VILLAGE OF PARISH OSWEGO CO., NEW YORK

PREPARED FOR:
MIRABITO ENERGY PRODUCTS
PO BOX 8306
THE METRO CENTER, 1 COURT STREET
BINGHAMTON, NY 13902

SHEET TITLE:
DETAILS

NO.	REVISION/ISSUE	DATE

PREPARED BY:
NAPIERALA CONSULTING
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110 FAYETTE STREET
MANLIUS, NEW YORK 13104
email: MNAP@NAPCON.COM
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PLANS PREPARED BY:
MATTHEW R. NAPIERALA P.E.
NYS REGISTRATION # 085733

PROJECT NO. 22-2114
DATE 07 APR 2023
SCALE AS NOTED

SHEET **C-10**

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EROSION CONTROL NOTES

EROSION AND SEDIMENT CONTROLS

1. STABILIZATION PRACTICES (TEMPORARY)
   a) TEMPORARY SEEDING AND PLANTING OF ALL UNPAVED AREAS WHEN CONSTRUCTION ACTIVITY HAS CEASED, OR WILL CEASE, IN AN AREA FOR 14 DAYS. SEEDING MIXTURES AND APPLICATION RATES ARE LISTED ON SHEET C-2.
   b) MULCHING EXPOSED AREAS.
   c) FREQUENT WATERING TO MINIMIZE WIND EROSION DURING CONSTRUCTION.

2. STABILIZATION PRACTICES (PERMANENT)
   a) LAND CLEARING ACTIVITIES SHALL BE DONE ONLY IN AREAS WHERE EARTHWORK WILL BE PERFORMED AND SHALL PROGRESS AS EARTHWORK IS NEEDED.
   b) PERMANENT SEEDING AND PLANTING OF ALL UNPAVED AREAS.

3. STRUCTURAL MEASURES TEMPORARY
   a. STABILIZED CONSTRUCTION ENTRANCE: AT THE ENTRANCE TO THE ALL DISTURBED AREAS FROM AN EXISTING ROADWAY A STABILIZED CONSTRUCTION ENTRANCE SHALL BE PROVIDED. THE PURPOSE OF THE STABILIZED CONSTRUCTION ENTRANCE IS TO REDUCE OR ELIMINATE THE TRACKING OF SEDIMENT ONTO THE PUBLIC RIGHT-OF-WAY.
   b. SILT FENCE: SILT FENCE SHALL BE INSTALLED AS SHOWN ON THE EROSION CONTROL PLAN . THE FABRIC SHALL MEET THE SPECIFICATIONS NOTED ON THE DETAILS UNLESS OTHERWISE APPROVED BY THE APPROPRIATE EROSION AND SEDIMENT CONTROL PLAN APPROVAL AUTHORITY. SUCH APPROVAL SHALL NOT CONSTITUTE STATEWIDE ACCEPTANCE.
   c. DUST CONTROL: DUST CONTROL IS THE CONTROL OF DUST RESULTING FROM LAND-DISTURBING ACTIVITIES. THE PURPOSE IS TO PREVENT SURFACE AND AIR MOVEMENT OF DUST FROM DISTURBED SOIL SURFACES THAT MAY CAUSE OFF-SITE DAMAGE, HEALTH HAZARDS, AND TRAFFIC SAFETY PROBLEMS.
   d. SEDIMENT TRAP: SEDIMENT TRAP TO BE INSTALLED IN DETENTION BASIN AREA FOR USE DURING CONSTRUCTION. STONE OUTLET SEDIMENT TRAP TO BE INSTALLED AS PER DETAIL TO ELIMINATE SEDIMENT DISCHARGE TO DOWNSTREAM AREAS DURING CONSTRUCTION PHASE.

4. STRUCTURAL PRACTICES (PERMANENT)
   a. ROCK OUTLET PROTECTION: ROCK OUTLET PROTECTION IS A SECTION OF ROCK PROTECTION PLACED AT THE OUTLET END OF CULVERTS, CONDUITS, OR CHANNELS. THE PURPOSE OF THE ROCK OUTLET PROTECTION IS TO REDUCE THE DEPTH, VELOCITY, AND ENERGY OF WATER, SUCH THAT THE FLOW WILL NOT ERODE THE RECEIVING DOWNSTREAM REACH.
   b. REINFORCED SLOPE PROTECTION: A TEMPORARY PROTECTIVE COVERING PLACED ON A PREPARED PLANTING AREA THAT IS ANCHORED IN PLACE BY STAPLES OR OTHER MEANS TO AID IN CONTROLLING EROSION BY ABSORBING RAIN SPLASH ENERGY AND WITHSTAND OVERLAND FLOW AS WELL AS PROVIDE A MICROCLIMATE TO PROTECT AND PROMOTE SEED ESTABLISHMENT.
   c. LAND GRADING: PERMANENT RESHAPING OF THE EXISTING LAND SURFACE BY GRADING IN ACCORDANCE WITH AN ENGINEERING TOPOGRAPHIC PLAN AND SPECIFICATION TO PROVIDE EROSION CONTROL AND VEGETATIVE ESTABLISHMENT ON DISTURBED, RESHAPED AREAS.

5. SEQUENCE OF MAJOR ACTIVITIES
   THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING THE ABOVE LISTED EROSION AND SEDIMENT CONTROL PRACTICES. THE CONTRACTOR MAY DESIGNATE THESE TASKS TO CERTAIN SUBCONTRACTORS AS IS SEEN FIT, BUT THE ULTIMATE RESPONSIBILITY FOR IMPLEMENTING THESE CONTROLS AND ENSURING THEIR PROPER FUNCTION REMAINS WITH THE CONTRACTOR. THE ORDER OF ACTIVITIES WILL BE AS FOLLOWS:
   a) CONDUCT PRECONSTRUCTION MEETING
   b) CONSTRUCT TEMPORARY CONSTRUCTION ENTRANCE/EXIT AT THE LOCATION SHOWN ON THE PLAN.
   c) INSTALL PERIMETER SILT FENCE AND SECURITY CONSTRUCTION FENCE IN THE LOCATIONS SHOWN ON THE PLAN.
   d) ESTABLISH STAGING AREA ON PROJECT SITE
   e) CONSTRUCT TEMPORARY SEDIMENT TRAP
   f) REMOVE TOPSOIL, STOCKPILE AND STABILIZE
   g) SITE GRADING. IMPORT OF FILL MATERIAL TO RAISE SITE TO PROPOSED GRADE (OR SUB-GRADE, AS APPROPRIATE).
   h) BUILDING FOUNDATION EXCAVATION (BUILDING CONSTRUCTION TO CONTINUE CONCURRENTLY WITH REMAINING SITE WORK).
   I) DISTURBED AREAS OF THE SITE WHERE CONSTRUCTION ACTIVITY HAS CEASED FOR MORE THAN 14 DAYS SHALL BE TEMPORARILY SEEDED AND WATERED.
   j) UNDERGROUND UTILITY INSTALLATIONS.
   k) INSTALL FILTER FABRIC DROP INLET PROTECTION AT ALL STORM INLETS.
   l) COMPACT GRAVEL ALONG ALL DRIVE AISLES AND PARKING AREAS
   m) SITE CONCRETE CONSTRUCTION.
   n) FINALIZE PAVEMENT SUBGRADE PREPARATION.
   o) REMOVE INLET PROTECTION NO MORE THAN 24 HOURS PRIOR TO PLACING ASPHALT PAVEMENT.
   p) PAVE AREAS NOTED ON PLAN.
   q) DEEP RIPPING OF NON-PAVED AREAS AS REQUIRED (NON-PAVED AREAS THAT HAVE BEEN COMPACTED DURING CONSTRUCTION VIA CONSTRUCTION TRAFFIC).
   r) FINAL GRADING, SEEDING, AND PLANTING.
   s) CONSTRUCT BIORETENTION BASINS AND OUTLET CONTROLS UPON UPSTREAM STABILIZATION OF SITE
   t) REMOVE SEDIMENT TRAP AND FINALIZE GRADING OF DETENTION BASIN
   u) REMOVE SILT FENCE ONLY AFTER ALL PAVING IS COMPLETE AND EXPOSED SURFACES ARE STABILIZED.

MAINTENANCE/INSPECTION PROCEDURES
THE FOLLOWING INSPECTION AND MAINTENANCE PRACTICES WILL BE USED TO MAINTAIN EROSION AND SEDIMENT CONTROLS AND STABILIZATION MEASURES.

1. ALL CONTROL MEASURES WILL BE INSPECTED AT LEAST TWICE EVERY SEVEN (7) CALENDAR DAYS
2. ALL MEASURES WILL BE MAINTAINED IN GOOD WORKING ORDER; IF REPAIRS OR OTHER EROSION CONTROL MEASURES ARE FOUND TO BE NECESSARY, THEY WILL BE INITIATED WITHIN 24 HOURS OF REPORT.
3. BUILT UP SEDIMENT WILL BE REMOVED FROM SILT FENCE WHEN IT HAS REACHED ONE-THIRD THE HEIGHT OF THE FENCE.
4. SILT FENCES WILL BE INSPECTED FOR DEPTH OF SEDIMENT, TEARS, ETC., TO SEE IF THE FABRIC IS SECURELY ATTACHED TO THE FENCE POSTS, AND TO SEE THAT THE FENCE POSTS ARE SECURELY IN THE GROUND.
5. TEMPORARY AND PERMANENT SEEDING AND ALL OTHER STABILIZATION MEASURES WILL BE INSPECTED FOR BARE SPOTS, WASHOUTS, AND HEALTHY GROWTH.
6. A MAINTENANCE INSPECTION REPORT WILL BE MADE AFTER EACH INSPECTION. COPIES OF THE REPORT FORMS TO BE COMPLETED BY THE INSPECTOR ARE INCLUDED IN THIS SWPPP.
7. THE OPERATOR SHALL HAVE A "QUALIFIED PROFESSIONAL" CONDUCT SITE INSPECTIONS FOLLOWING THE COMMENCEMENT OF CONSTRUCTION. A "QUALIFIED PROFESSIONAL" IS A PERSON KNOWLEDGEABLE IN THE PRINCIPLES AND PRACTICE OF EROSION AND SEDIMENT CONTROLS, SUCH AS A LICENSED PROFESSIONAL ENGINEER, CERTIFIED PROFESSIONAL IN EROSION AND SEDIMENT CONTROL (CPESC), OR SOIL SCIENTIST.
8. DISTURBED AREAS AND MATERIALS STORAGE AREAS WILL BE INSPECTED FOR EVIDENCE OF OR POTENTIAL FOR POLLUTANTS ENTERING STORMWATER SYSTEMS.
9. REPORT TO NYS DEC WITHIN 24 HOURS ANY NONCOMPLIANCE WITH THE SWPPP THAT WILL ENDANGER PUBLIC HEALTH OR THE ENVIRONMENT. FOLLOW UP WITH A WRITTEN REPORT WITHIN 5 DAYS OF THE NONCOMPLIANCE EVENT. THE FOLLOWING EVENTS REQUIRE 24 HOUR REPORTING: A) ANY UNANTICIPATED BYPASS WHICH EXCEEDS ANY EFFLUENT LIMITATION IN THE PERMIT, B) ANY UPSET WHICH EXCEEDS ANY EFFLUENT LIMITATION IN THE PERMIT, AND C) A VIOLATION OF A MAXIMUM DAILY DISCHARGE LIMITATION FOR ANY OF THE POLLUTANTS LISTED BY THE EPA IN THE PERMIT TO BE REPORTED WITHIN 24 HOURS. THE WRITTEN SUBMISSION MUST CONTAIN A DESCRIPTION OF THE NON-COMPLIANCE AND ITS CAUSE; THE PERIOD OF NON-COMPLIANCE, INCLUDING EXACT DATES AND TIMES, AND IF THE NON-COMPLIANCE HAS NOT BEEN CORRECTED, THE ANTICIPATED TIME IT IS EXPECTED TO CONTINUE; AND STEPS TAKEN OR PLANNED TO REDUCE, ELIMINATE, AND PREVENT RECURRENCE OF THE NON-COMPLIANCE.
10. RELEASES OF HAZARDOUS SUBSTANCES OR OIL IN EXCESS OF REPORTABLE QUANTITIES (AS ESTABLISHED UNDER 40 CFR 110, 40 CFR 117 OR 40 CFR 302) MUST BE REPORTED. FORM G-1 PROVIDES FURTHER DETAILS ON THE NOTIFICATION AND REPORTING PROCESS.

INSPECTION AND MAINTENANCE REPORT FORMS
ONCE INSTALLATION OF ANY REQUIRED OR OPTIONAL EROSION CONTROL DEVICE OR MEASURE HAS BEEN IMPLEMENTED, AT LEAST ONCE EVERY SEVEN (7) CALENDAR DAYS AND SHALL BE PERFORMED BY A QUALIFIED PROFESSIONAL. THE FORMS FOUND IN THIS SWPPP SHALL BE USED BY THE INSPECTORS TO INVENTORY AND REPORT THE CONDITION OF EACH MEASURE TO ASSIST IN MAINTAINING THE EROSION AND SEDIMENT CONTROL MEASURES IN GOOD WORKING ORDER.

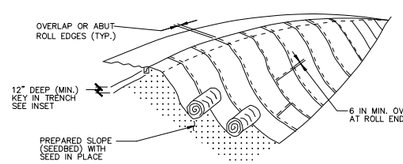
THESE REPORT FORMS SHALL BECOME AN INTEGRAL PART OF THE SWPPP AND SHALL BE MADE READILY ACCESSIBLE TO GOVERNMENTAL INSPECTION OFFICIALS, THE OPERATOR'S ENGINEER, AND THE OPERATOR FOR REVIEW UPON REQUEST DURING VISITS TO THE PROJECT SITE. IN ADDITION, COPIES OF THE REPORTS SHALL BE PROVIDED TO ANY OF THESE PERSONS, UPON REQUEST, VIA MAIL OR FACSIMILE TRANSMISSION. INSPECTION AND MAINTENANCE REPORT FORMS ARE TO BE MAINTAINED BY THE PERMITTEE FOR FIVE YEARS FOLLOWING THE FINAL STABILIZATION OF THE SITE.

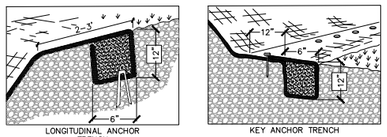
OTHER RECORD-KEEPING REQUIREMENTS
THE CONTRACTOR SHALL KEEP THE FOLLOWING RECORDS RELATED TO CONSTRUCTION ACTIVITIES AT THE SITE:

- DATES WHEN MAJOR GRADING ACTIVITIES OCCUR AND THE AREAS WHICH WERE GRADED
- DATES AND DETAILS CONCERNING THE INSTALLATION OF STRUCTURAL CONTROLS
- DATES WHEN CONSTRUCTION ACTIVITIES CEASE IN AN AREA
- DATES WHEN AN AREAS IS STABILIZED, EITHER TEMPORARILY OR PERMANENTLY
- DATES OF RAINFALL AND THE AMOUNT OF RAINFALL
- DATES AND DESCRIPTIONS OF THE CHARACTER AND AMOUNT OF ANY SPILLS OF HAZARDOUS MATERIALS
- RECORDS OF REPORTS FILED WITH REGULATORY AGENCIES IF REPORTABLE QUANTITIES OF HAZARDOUS MATERIALS SPILLED

EROSION CONTROL NOTES

1. LAND DISTURBING ACTIVITIES SHALL NOT COMMENCE UNTIL APPROVAL TO DO SO HAS BEEN RECEIVED BY GOVERNING AUTHORITIES. THE GENERAL CONTRACTOR SHALL STRICTLY ADHERE TO THE APPROVED SWPPP DRAWINGS DURING CONSTRUCTION OPERATIONS.
2. NO LAND CLEARING OR GRADING SHALL BEGIN UNTIL THE APPROPRIATE EROSION CONTROL MEASURES HAVE BEEN INSTALLED.
3. ALL EXPOSED AREAS SHALL BE SEEDED AS SPECIFIED WITHIN 7 DAYS OF FINAL GRADING.
4. SHOULD CONSTRUCTION STOP FOR LONGER THAN 14 DAYS, THE SITE SHALL BE SEEDED AS SPECIFIED.
5. MAINTAIN EROSION CONTROL MEASURES AFTER EACH RAIN AND AT LEAST ONCE A WEEK.
6. THIS PLAN SHALL NOT BE CONSIDERED ALL INCLUSIVE AS THE GENERAL CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT SEDIMENT FROM LEAVING THE SITE.
7. GENERAL CONTRACTOR SHALL COMPLY WITH ALL STATE AND LOCAL ORDINANCES THAT APPLY.
8. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSTALLED IF DEEMED NECESSARY BY ON SITE INSPECTION.
9. IF INSTALLATION OF STORM DRAINAGE SYSTEM SHOULD BE INTERRUPTED BY WEATHER OR NIGHTFALL, THE PIPE ENDS SHALL BE COVERED WITH FILTER FABRIC.
10. GENERAL CONTRACTOR SHALL BE RESPONSIBLE TO TAKE WHATEVER MEANS NECESSARY TO ESTABLISH PERMANENT SOIL STABILIZATION.
11. ALL WORK TO BE DONE IN STRICT ACCORDANCE WITH THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL.
12. REFER TO THE NYS STANDARDS FOR EROSION AND SEDIMENT CONTROL "BLUEBOOK" FOR ALL EROSION CONTROL PRACTICES TO BE IMPLEMENTED. SPECIFICALLY, REFER TO THE FOLLOWING FIGURES: 3.1, 3.18, 4.8, 5.2, 5.27, 5.30, AND 5.32.

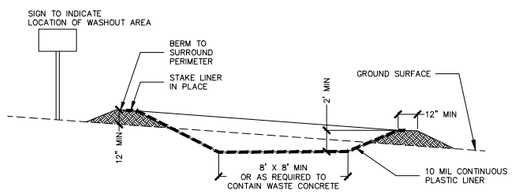




CONSTRUCTION SPECIFICATIONS

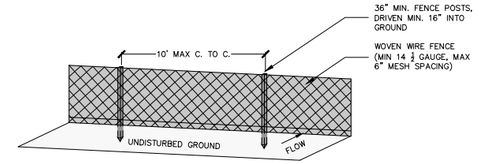
1. USE MATTING THAT HAS A DESIGN VALUE FOR SHEAR STRESS EQUAL TO OR HIGHER THAN THE SHEAR STRESS DESIGNATED ON APPROVED PLANS.
2. USE TEMPORARY SOIL STABILIZATION MATTING MADE OF DEGRADABLE (LASTS 6 MONTHS MINIMUM) NATURAL OR MAN-MADE FIBERS (MOSTLY ORGANIC). MAT MUST HAVE UNIFORM THICKNESS AND DISTRIBUTION OF FIBERS THROUGHOUT AND BE SMOLDER RESISTANT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING AND NON-TOXIC TO VEGETATION AND SEED GERMINATION AND NON-INJURIOUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAXIMUM MESH OPENING OF 2x2 INCHES AND SUFFICIENTLY BONDED OR SEWN ON 2 INCH CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL.
3. SECURE MATTING USING STEEL STAPLES, WOOD STAKES, OR BIODEGRADABLE EQUIVALENT. STAPLES MUST BE "U" OR "I" SHAPED STEEL WIRE HAVING A MINIMUM GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY. "U" SHAPED STAPLES MUST AVERAGE 1 TO 1½ INCHES WIDE AND BE A MINIMUM OF 6 INCHES LONG. "T" SHAPED STAPLES MUST HAVE A MINIMUM 8 INCH MAIN LEG, A MINIMUM 1 INCH SECONDARY LEG, AND A MINIMUM 4 INCH HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12 TO 24 INCHES IN LENGTH, 1x3 INCH IN CROSS SECTION, AND WEDGE SHAPED AT THE BOTTOM.
4. PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREPARATION, AND PERMANENT SEEDING IN ACCORDANCE WITH SPECIFICATIONS. PLACE MATTING WITHIN 48 HOURS OF COMPLETING SEEDING OPERATIONS UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION & SEDIMENT CONTROL PLAN.
5. UNROLL MATTING DOWNSLOPE. LAY MAT SMOOTHLY AND FIRMLY UPON THE SEEDED SURFACE. AVOID STRETCHING THE MATTING.
6. OVERLAP OR ABUT ROLL EDGES PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSLOPE MAT OVERLAPPING ON TOP OF THE DOWNSLOPE MAT.
7. KEY IN THE UPSLOPE END OF MAT 6 INCHES (MINIMUM) BY DIGGING A TRENCH, PLACING THE MATTING ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, AND TAMPING TO SECURE THE MAT END IN THE KEY.
8. STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4 FOOT (MAXIMUM) CENTERS THROUGHOUT AND 2 FOOT (MAXIMUM) CENTERS ALONG SEAMS, JOINTS, AND ROLL ENDS.
9. ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

1 C-11 SLOPE STABILIZATION MATTING
SCALE: NTS



NOTES:
1. CONCRETE WAHSOUT AREA SHALL BE INSTALLED PRIOR TO ANY CONCRETE PLACEMENT ON SITE.
2. CONCRETE WASHOUT OUT AREA SHALL BE LINED WITH A 10 MIL IMPERMEABLE LINER AND STAKED IN PLACE.
3. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE WASHOUT AREA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE LOCATION OF CONCRETE WASHOUT AREA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
4. THE CONCRETE WAHSOUT AREA SHALL BE REPAIRED AND ENLARGED OR CLEANED OUT AS NECESSARY TO MAINTAIN CAPACITY FOR WASTED CONCRETE.
5. AT THE END OF CONSTRUCTION, ALL CONCRETE SHALL BE REMOVED FROM SITE AND DISPOSED OF AT AN ACCEPTED WASTE SITE.
6. WHEN THE CONCRETE WASHOUT AREA IS REMOVED, THE DISTURBED AREA SHALL BE SEEDED AND MULCHED OR OTHERWISE STABILIZED.

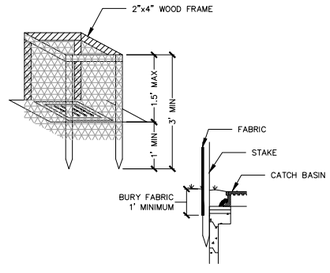
2 C-11 CONCRETE WASHOUT AREA
SCALE: NTS



POSTS:	STEEL, EITHER "T" OR "U" TYPE OR 2" HARDWOOD
FENCE:	WOVEN WIRE, 14 1/2 GAUGE, 6" MAX. MESH OPENING
FILTER CLOTH:	FILTER X., MIRAFI 100X, STABILINKA T140N OR APPROVED EQUAL
PREFABRICATED UNIT:	GEOFAB, ENVIROFENCE, OR APPROVED EQUAL

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
2. FILTER CLOTH IS TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

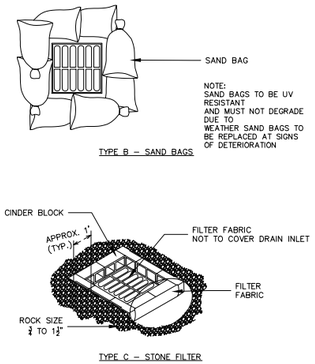
3 C-11 SILT FENCE
SCALE: NTS



TYPE A - SILT FENCE

CONSTRUCTION SPECIFICATIONS

1. FILTER FABRIC SHALL HAVE AN EOS OF 40-85.
2. CUT FABRIC FROM A CONTINUOUS ROLL TO ELIMINATE JOINTS. IF JOINTS ARE NEEDED THEY WILL BE OVERLAPPED TO THE NEXT STAKE.
3. STAKE MATERIALS WILL BE STANDARD 2"x4" WOOD OR EQUIVALENT METAL WITH A MINIMUM LENGTH OF 3 FEET.
4. SPACE STAKES EVENLY AROUND INLET 3 FEET APART AND DRIVE A MINIMUM 18 INCHES DEEP. SPANS GREATER THAN 3 FEET MAY BE BRIDGED WITH THE USE OF WIRE MESH BEHIND THE FILTER FABRIC FOR SUPPORT.
5. FABRIC SHALL BE EMBEDDED 1 FOOT MINIMUM BELOW GROUND AND BACKFILLED. IT SHALL BE SECURELY FASTENED TO THE STAKES AND FRAME.
6. A 2"x4" WOOD FRAME SHALL BE COMPLETED AROUND THE CREST OF THE FABRIC FOR OVER FLOW STABILITY.

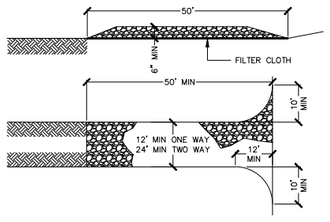


NOTE: SAND BAGS TO BE UV RESISTANT AND MUST NOT DEGRADE DUE TO WEATHER SAND BAGS TO BE REPLACED AT SIGNS OF DETERIORATION

TYPE B - SAND BAGS

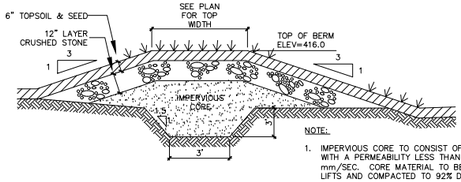
TYPE C - STONE FILTER

4 C-11 INLET PROTECTION - VARIATIONS
SCALE: NTS



1. STONE SIZE - USE 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - NOT LESS THAN 50 FEET.
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - 24 FEET MINIMUM.
5. FILTER CLOTH - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

5 C-11 CONSTRUCTION ENTRANCE
SCALE: NTS



NOTE:
1. IMPERVIOUS CORE TO CONSIST OF A CLAY SOIL WITH A PERMEABILITY LESS THAN 0.0001 mm/SEC. CORE MATERIAL TO BE PLACED IN 6" LIFTS AND COMPACTED TO 92% DENSITY.

6 C-11 BERM CONSTRUCTION SECTION
SCALE: NTS

PROJECT TITLE:
MIRABITO ENERGY PRODUCTS
VILLAGE OF PARISH OSWEGO CO., NEW YORK

PREPARED FOR:
MIRABITO ENERGY PRODUCTS
PO BOX 8306
THE METRO CENTER, 1600 STATE COURT STREET
BINGHAMTON, NY 13902

SHEET TITLE:
DETAILS

NO.	REVISION/ISSUE	DATE

PREPARED BY:
NAPIERALA CONSULTING
PROFESSIONAL ENGINEER, P.C.
SITE • DESIGN • ENGINEERING
110 FAYETTE STREET
MANLIUS, New York 13104
email MNAPIER@NAPCON.COM
PH: (315) 682-5580 FAX: (315) 682-5544

PLANS BY:
MATTHEW R. NAPIERALA, P.E.
NYS REGISTRATION # 085733

PROJECT NO.	DATE	SCALE
22-2114	07 APR 2023	AS NOTED

SHEET
C-11

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APPENDIX F: SWPPP FORMS

Notice of Intent

Notice of Termination

Contractor Forms

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0644089821

NOTICE OF INTENT

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

NYR ☐☐☐☐☐☐
(for DEC use only)

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-0-20-001

All sections must be completed unless otherwise noted. Failure to complete all items may result in this form being returned to you, thereby delaying your coverage under this General Permit. Applicants must read and understand the conditions of the permit and prepare a Stormwater Pollution Prevention Plan prior to submitting this NOI. Applicants are responsible for identifying and obtaining other DEC permits that may be required.

-IMPORTANT-
RETURN THIS FORM TO THE ADDRESS ABOVE

OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)

Owner/Operator Contact Person Last Name (NOT CONSULTANT)

Owner/Operator Contact Person First Name

Owner/Operator Mailing Address

City

State ☐☐ Zip ☐☐☐☐☐ - ☐☐☐☐

Phone (Owner/Operator) ☐☐☐ - ☐☐☐ - ☐☐☐☐

Fax (Owner/Operator) ☐☐☐ - ☐☐☐ - ☐☐☐☐

Email (Owner/Operator)

FED TAX ID ☐☐ - ☐☐☐☐☐☐☐ (not required for individuals)

Project Site Information

Project/Site Name

Street Address (NOT P.O. BOX)

Side of Street
○ **North** ○ **South** ○ **East** ○ **West**

City/Town/Village (THAT ISSUES BUILDING PERMIT)

State N Y Zip - County DEC Region

Name of Nearest Cross Street

Distance to Nearest Cross Street (Feet)

Project In Relation to Cross Street
○ **North** ○ **South** ○ **East** ○ **West**

Tax Map Numbers
Section-Block-Parcel

Tax Map Numbers

1. Provide the Geographic Coordinates for the project site in NYTM Units. To do this you **must** go to the NYSDEC Stormwater Interactive Map on the DEC website at:

www.dec.ny.gov/imsmaps/stormwater/viewer.htm

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located your project site, go to the tool boxes on the top and choose "i"(identify). Then click on the center of your site and a new window containing the X, Y coordinates in UTM will pop up. Transcribe these coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting)

Y Coordinates (Northing) 4

2. What is the nature of this construction project?

○ **New Construction**

○ **Redevelopment with increase in impervious area**

○ **Redevelopment with no increase in impervious area**

3. Select the predominant land use for both pre and post development conditions.
SELECT ONLY ONE CHOICE FOR EACH

Pre-Development Existing Land Use

- ○ FOREST
- ○ PASTURE/OPEN LAND
- ○ CULTIVATED LAND
- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY
- ○ PARKING LOT
- ○ OTHER

Post-Development Future Land Use

- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION — Number of Lots
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ MUNICIPAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY (water, sewer, gas, etc.)
- ○ PARKING LOT
- ○ CLEARING/GRADING ONLY
- ○ DEMOLITION, NO REDEVELOPMENT
- ○ WELL DRILLING ACTIVITY *(Oil, Gas, etc.)
- ○ OTHER

***Note**: for gas well drilling, non-high volume hydraulic fractured wells only

4. In accordance with the larger common plan of development or sale, enter the total project site area; the total area to be disturbed; existing impervious area to be disturbed (for redevelopment activities); and the future impervious area constructed within the disturbed area. (Round to the nearest tenth of an acre.)

Total Site Area	**Total Area To Be Disturbed**	**Existing Impervious Area To Be Disturbed**	**Future Impervious Area Within Disturbed Area**
.	.	.	.

5. Do you plan to disturb more than 5 acres of soil at any one time? ○ **Yes** ○ **No**

6. Indicate the percentage of each Hydrologic Soil Group(HSG) at the site.

A	**B**	**C**	**D**
%	%	%	%

7. Is this a phased project? ○ **Yes** ○ **No**

8. Enter the planned start and end dates of the disturbance activities.

Start Date / / - **End Date** / /

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.

Name

9a. Type of waterbody identified in Question 9?

- ○ Wetland / State Jurisdiction On Site (Answer 9b)
- ○ Wetland / State Jurisdiction Off Site
- ○ Wetland / Federal Jurisdiction On Site (Answer 9b)
- ○ Wetland / Federal Jurisdiction Off Site
- ○ Stream / Creek On Site
- ○ Stream / Creek Off Site
- ○ River On Site
- ○ River Off Site
- ○ Lake On Site
- ○ Lake Off Site
- ○ Other Type On Site
- ○ Other Type Off Site

9b. How was the wetland identified?

- ○ Regulatory Map
- ○ Delineated by Consultant
- ○ Delineated by Army Corps of Engineers
- ○ Other (identify)

10. Has the surface waterbody(ies) in question 9 been identified as a 303(d) segment in Appendix E of GP-0-20-001? ○ **Yes** ○ **No**

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-20-001? ○ **Yes** ○ **No**

12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters? ○ **Yes** ○ **No**
If no, skip question 13.

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey? ○ **Yes** ○ **No**
If Yes, what is the acreage to be disturbed?

.

14. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area? ○ **Yes** ○ **No**

15. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)? ○ **Yes** ○ **No** ○ **Unknown**

16. What is the name of the municipality/entity that owns the separate storm sewer system?

17. Does any runoff from the site enter a sewer classified as a Combined Sewer? ○ **Yes** ○ **No** ○ **Unknown**

18. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law? ○ **Yes** ○ **No**

19. Is this property owned by a state authority, state agency, federal government or local government? ○ **Yes** ○ **No**

20. Is this a remediation project being done under a Department approved work plan? (i.e. CERCLA, RCRA, Voluntary Cleanup Agreement, etc.) ○ **Yes** ○ **No**

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)? ○ **Yes** ○ **No**

22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)? ○ **Yes** ○ **No**
If No, skip questions 23 and 27-39.

23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual? ○ **Yes** ○ **No**

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:

- ○ **Professional Engineer (P.E.)**
- ○ **Soil and Water Conservation District (SWCD)**
- ○ **Registered Landscape Architect (R.L.A)**
- ○ **Certified Professional in Erosion and Sediment Control (CPESC)**
- ○ **Owner/Operator**
- ○ **Other**

SWPPP Preparer

Contact Name (Last, Space, First)

Mailing Address

City

State Zip -

Phone - -

Fax - -

Email

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-20-001. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

First Name **MI**

Last Name

Signature

Date / /

25. Has a construction sequence schedule for the planned management practices been prepared? ○ Yes ○ No

26. Select **all** of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural

- ○ Check Dams
- ○ Construction Road Stabilization
- ○ Dust Control
- ○ Earth Dike
- ○ Level Spreader
- ○ Perimeter Dike/Swale
- ○ Pipe Slope Drain
- ○ Portable Sediment Tank
- ○ Rock Dam
- ○ Sediment Basin
- ○ Sediment Traps
- ○ Silt Fence
- ○ Stabilized Construction Entrance
- ○ Storm Drain Inlet Protection
- ○ Straw/Hay Bale Dike
- ○ Temporary Access Waterway Crossing
- ○ Temporary Stormdrain Diversion
- ○ Temporary Swale
- ○ Turbidity Curtain
- ○ Water bars

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

- ○ Brush Matting
- ○ Dune Stabilization
- ○ Grassed Waterway
- ○ Mulching
- ○ Protecting Vegetation
- ○ Recreation Area Improvement
- ○ Seeding
- ○ Sodding
- ○ Straw/Hay Bale Dike
- ○ Streambank Protection
- ○ Temporary Swale
- ○ Topsoiling
- ○ Vegetating Waterways

Permanent Structural

- ○ Debris Basin
- ○ Diversion
- ○ Grade Stabilization Structure
- ○ Land Grading
- ○ Lined Waterway (Rock)
- ○ Paved Channel (Concrete)
- ○ Paved Flume
- ○ Retaining Wall
- ○ Riprap Slope Protection
- ○ Rock Outlet Protection
- ○ Streambank Protection

Other

Post-construction Stormwater Management Practice (SMP) Requirements

Important: Completion of Questions 27-39 is not required if response to Question 22 is No.

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.

- ○ **Preservation of Undisturbed Areas**
- ○ **Preservation of Buffers**
- ○ **Reduction of Clearing and Grading**
- ○ **Locating Development in Less Sensitive Areas**
- ○ **Roadway Reduction**
- ○ **Sidewalk Reduction**
- ○ **Driveway Reduction**
- ○ **Cul-de-sac Reduction**
- ○ **Building Footprint Reduction**
- ○ **Parking Reduction**

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).

- ○ All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).

- ○ Compacted areas were considered as impervious cover when calculating the **WQv Required**, and the compacted areas were assigned a post-construction Hydrologic Soil Group (HSG) designation that is one level less permeable than existing conditions for the hydrology analysis.

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout).

Total WQv Required

			.			
			.			**acre-feet**

29. Identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity in Table 1 (See Page 9) that were used to reduce the Total WQv Required(#28).

Also, provide in Table 1 the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use Tables 1 and 2 to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

Table 1 - Runoff Reduction (RR) Techniques and Standard Stormwater Management Practices (SMPs)

	Total Contributing Area (acres)		Total Contributing Impervious Area(acres)
RR Techniques (Area Reduction)			
○ Conservation of Natural Areas (RR-1)	___.___	and/or	___.___
○ Sheetflow to Riparian Buffers/Filters Strips (RR-2)	___.___	and/or	___.___
○ Tree Planting/Tree Pit (RR-3)	___.___	and/or	___.___
○ Disconnection of Rooftop Runoff (RR-4)	___.___	and/or	___.___
RR Techniques (Volume Reduction)			
○ Vegetated Swale (RR-5)			___.___
○ Rain Garden (RR-6)			___.___
○ Stormwater Planter (RR-7)			___.___
○ Rain Barrel/Cistern (RR-8)			___.___
○ Porous Pavement (RR-9)			___.___
○ Green Roof (RR-10)			___.___
Standard SMPs with RRv Capacity			
○ Infiltration Trench (I-1)			___.___
○ Infiltration Basin (I-2)			___.___
○ Dry Well (I-3)			___.___
○ Underground Infiltration System (I-4)			___.___
○ Bioretention (F-5)			___.___
○ Dry Swale (O-1)			___.___
Standard SMPs			
○ Micropool Extended Detention (P-1)			___.___
○ Wet Pond (P-2)			___.___
○ Wet Extended Detention (P-3)			___.___
○ Multiple Pond System (P-4)			___.___
○ Pocket Pond (P-5)			___.___
○ Surface Sand Filter (F-1)			___.___
○ Underground Sand Filter (F-2)			___.___
○ Perimeter Sand Filter (F-3)			___.___
○ Organic Filter (F-4)			___.___
○ Shallow Wetland (W-1)			___.___
○ Extended Detention Wetland (W-2)			___.___
○ Pond/Wetland System (W-3)			___.___
○ Pocket Wetland (W-4)			___.___
○ Wet Swale (O-2)			___.___

Table 2 - Alternative SMPs (DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)

Alternative SMP	Total Contributing Impervious Area(acres)
○ **Hydrodynamic**	
○ **Wet Vault**	
○ **Media Filter**	
○ **Other**	

Provide the name and manufacturer of the Alternative SMPs (i.e. proprietary practice(s)) being used for WQv treatment.

Name

Manufacturer

Note: Redevelopment projects which do not use RR techniques, shall use questions 28, 29, 33 and 33a to provide SMPs used, total WQv required and total WQv provided for the project.

30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29.

Total RRv provided

. **acre-feet**

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28).

○ **Yes** ○ **No**

If Yes, go to question 36.
If No, go to question 32.

32. Provide the Minimum RRv required based on HSG.
[Minimum RRv Required = (P)(0.95)(Ai)/12, Ai=(S)(Aic)]

Minimum RRv Required

. **acre-feet**

32a. Is the Total RRv provided (#30) greater than or equal to the Minimum RRv Required (#32)?

○ **Yes** ○ **No**

If Yes, go to question 33.
Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. Identify the Standard SMPs in Table 1 and, if applicable, the Alternative SMPs in Table 2 that were used to treat the remaining total WQv(=Total WQv Required in 28 - Total RRv Provided in 30).

Also, provide in Table 1 and 2 the total impervious area that contributes runoff to each practice selected.

Note: Use Tables 1 and 2 to identify the SMPs used on Redevelopment projects.

33a. Indicate the Total WQv provided (i.e. WQv treated) by the SMPs identified in question #33 and Standard SMPs with RRv Capacity identified in question 29.

WQv Provided

☐☐☐.☐☐☐ **acre-feet**

Note: For the standard SMPs with RRv capacity, the WQv provided by each practice = the WQv calculated using the contributing drainage area to the practice - RRv provided by the practice. (See Table 3.5 in Design Manual)

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a). ☐☐☐.☐☐☐

35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)? ○ **Yes** ○ **No**

If Yes, go to question 36.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

36. Provide the total Channel Protection Storage Volume (CPv) required and provided or select waiver (36a), if applicable.

CPv Required

☐☐☐.☐☐☐ **acre-feet**

CPv Provided

☐☐☐.☐☐☐ **acre-feet**

36a. The need to provide channel protection has been waived because:

○ Site discharges directly to tidal waters or a fifth order or larger stream.

○ Reduction of the total CPv is achieved on site through runoff reduction techniques or infiltration systems.

37. Provide the Overbank Flood (Qp) and Extreme Flood (Qf) control criteria or select waiver (37a), if applicable.

Total Overbank Flood Control Criteria (Qp)

Pre-Development

☐☐☐.☐☐☐ **CFS**

Post-development

☐☐☐.☐☐☐ **CFS**

Total Extreme Flood Control Criteria (Qf)

Pre-Development

☐☐☐.☐☐☐ **CFS**

Post-development

☐☐☐.☐☐☐ **CFS**

37a. The need to meet the Qp and Qf criteria has been waived because:

- ○ Site discharges directly to tidal waters or a fifth order or larger stream.
- ○ Downstream analysis reveals that the Qp and Qf controls are not required

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed? ○ **Yes** ○ **No**

If Yes, Identify the entity responsible for the long term Operation and Maintenance

39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required(#28). (See question 32a) This space can also be used for other pertinent project information.

40. Identify other DEC permits, existing and new, that are required for this project/facility.

- ○ Air Pollution Control
- ○ Coastal Erosion
- ○ Hazardous Waste
- ○ Long Island Wells
- ○ Mined Land Reclamation
- ○ Solid Waste
- ○ Navigable Waters Protection / Article 15
- ○ Water Quality Certificate
- ○ Dam Safety
- ○ Water Supply
- ○ Freshwater Wetlands/Article 24
- ○ Tidal Wetlands
- ○ Wild, Scenic and Recreational Rivers
- ○ Stream Bed or Bank Protection / Article 15
- ○ Endangered or Threatened Species(Incidental Take Permit)
- ○ Individual SPDES
- ○ SPDES Multi-Sector GP [N][Y][R][ ][ ][ ][ ][ ][ ]
- ○ Other [ ]
- ○ None

41. Does this project require a US Army Corps of Engineers Wetland Permit? ○ **Yes** ○ **No**
If Yes, Indicate Size of Impact. [ ][ ][ ][ ][ ].[ ]

42. Is this project subject to the requirements of a regulated, traditional land use control MS4? ○ **Yes** ○ **No**
(If No, skip question 43)

43. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI? ○ **Yes** ○ **No**

44. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned. [N][Y][R][ ][ ][ ][ ][ ][ ]

Owner/Operator Certification

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Print First Name **MI**

Print Last Name

Owner/Operator Signature

Date / /

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505
(NOTE: Submit completed form to address above)

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity

Please indicate your permit identification number: NYR ___ ___ ___ ___ ___ ___

I. Owner or Operator Information

1. Owner/Operator Name:

2. Street Address:

3. City/State/Zip:

4. Contact Person: | 4a.Telephone:

4b. Contact Person E-Mail:

II. Project Site Information

5. Project/Site Name:

6. Street Address:

7. City/Zip:

8. County:

III. Reason for Termination

9a. □ All disturbed areas have achieved final stabilization in accordance with the general permit and SWPPP. ***Date final stabilization completed** (month/year): _____

9b. □ Permit coverage has been transferred to new owner/operator. Indicate new owner/operator's permit identification number: NYR ___ ___ ___ ___ ___ ___
(Note: Permit coverage can not be terminated by owner identified in I.1. above until new owner/operator obtains coverage under the general permit)

9c. □ Other (Explain on Page 2)

IV. Final Site Information:

10a. Did this construction activity require the development of a SWPPP that includes post-construction stormwater management practices? □ yes □ no (If no, go to question 10f.)

10b. Have all post-construction stormwater management practices included in the final SWPPP been constructed? □ yes □ no (If no, explain on Page 2)

10c. Identify the entity responsible for long-term operation and maintenance of practice(s)?

_____

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

10d. Has the entity responsible for long-term operation and maintenance been given a copy of the operation and maintenance plan required by the general permit? □ yes □ no

10e. Indicate the method used to ensure long-term operation and maintenance of the post-construction stormwater management practice(s):

□ Post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain practice(s) have been deeded to the municipality.

□ Executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s).

□ For post-construction stormwater management practices that are privately owned, a mechanism is in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the owner or operator's deed of record.

□ For post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university or hospital), government agency or authority, or public utility; policy and procedures are in place that ensures operation and maintenance of the practice(s) in accordance with the operation and maintenance plan.

10f. Provide the total area of impervious surface (i.e. roof, pavement, concrete, gravel, etc.) constructed within the disturbance area? _____ (acres)

11. Is this project subject to the requirements of a regulated, traditional land use control MS4? □ yes □ no

(If Yes, complete section VI - "MS4 Acceptance" statement

V. Additional Information/Explanation:

(Use this section to answer questions 9c. and 10b., if applicable)

VI. MS4 Acceptance - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative (Note: Not required when 9b. is checked -transfer of coverage)

I have determined that it is acceptable for the owner or operator of the construction project identified in question 5 to submit the Notice of Termination at this time.

Printed Name:

Title/Position:

Signature:	Date:

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

VII. Qualified Inspector Certification - Final Stabilization:

I hereby certify that all disturbed areas have achieved final stabilization as defined in the current version of the general permit, and that all temporary, structural erosion and sediment control measures have been removed. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:	
Title/Position:	
Signature:	Date:

VIII. Qualified Inspector Certification - Post-construction Stormwater Management Practice(s):

I hereby certify that all post-construction stormwater management practices have been constructed in conformance with the SWPPP. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:	
Title/Position:	
Signature:	Date:

IX. Owner or Operator Certification

I hereby certify that this document was prepared by me or under my direction or supervision. My determination, based upon my inquiry of the person(s) who managed the construction activity, or those persons directly responsible for gathering the information, is that the information provided in this document is true, accurate and complete. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:	
Title/Position:	
Signature:	Date:

(NYS DEC Notice of Termination - January 2015)

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STORMWATER POLLUTION PREVENTION PLAN
GENERAL CONTRACTOR'S CERTIFICATION

Construction Site: SUPERIOR METALS
901 EAST GENESEE STREET
CHITTENANGO, NY 13037

STORMWATER POLLUTION PREVENTION PLAN

GENERAL CONTRACTOR'S CERTIFICATION:

> "I hereby certify under penalty of the law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner* or *operator* must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater *discharges* from *construction activities* and that it is unlawful for any person to cause or contribute to a violation of *water quality standards*. Furthermore, I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Name: _____
(Print)

Signature: _____

Title: _____

Company Name: _____

Address: _____

_____

Telephone Number: _____

Date: _____

Scope of Services: _____

_____

_____

_____

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STORMWATER POLLUTION PREVENTION PLAN
SUBCONTRACTOR'S CERTIFICATION

Construction Site: SUPERIOR METALS
901 EAST GENESEE STREET
CHITTENANGO, NY 13037

STORMWATER POLLUTION PREVENTION PLAN

SUBCONTRACTOR'S CERTIFICATION:

> "I hereby certify under penalty of the law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner* or *operator* must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater *discharges* from *construction activities* and that it is unlawful for any person to cause or contribute to a violation of *water quality standards*. Furthermore, I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Name: _____
(Print)

Signature: _____

Title: _____

Company Name: _____

Address: _____

_____

Telephone Number: _____

Date: _____

Scope of Services: _____

_____

_____

_____

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APPENDIX G: BIORETENTION BASIN CONSTRUCTION AND MAINTENANCE

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2.7. Bioretention

Areas of Bioretention

Key areas to inspect for Bioretention include the following:

- BR 1. Drainage Area
- BR 2. Inlets
- BR 3. Bioretention Ponding Area
- BR 4. Vegetation
- BR 5. Outlets

Note: The category of Bioretention includes:

- Bioretention cells – areas of soil, mulch, and vegetation that treat runoff
- Dry swales – long, linear bioretention cells, sometimes with check dams along a mildly sloping swale
- Rain gardens – usually small-scale bioretention practices on residential or small commercial properties

Figure 2.7.1. Key Areas for Level 1 Inspection of Bioretention

- Stormwater planters – usually in more urban settings, with soil and plants in a concrete box that receives roof runoff or perhaps other water from the site
- Tree pits – also a more urban practice where the bioretention is confined within some sort of box (e.g., concrete) and places along road curbs or other areas to treat runoff

For the purposes of this chapter, the term “Bioretention cell” will be used to generally describe these practices.

Bioretention Level 1 Inspection

The Level 1 Inspection focuses on the Drainage Area (BR1), Inlets (BR2), Bioretention Ponding Area (BR3), Vegetation (BR4), and Outlets (BR5). This inspection should be conducted on a regular basis, with an early spring inspection to ensure that the practice has survived the winter, particularly if there has been a significant amount of snow. An inspection during the growing season or in the early fall is also recommended to check on the health of vegetation.

BR 1. Drainage Area

Description: The drainage area sends runoff to and is uphill from the Bioretention cell. When it rains, water runs off and flows to the Bioretention cell and ponds within the cell temporarily (usually for no more than 48 hours). Sometimes, the runoff will contain dirt, grit, grass clippings, oil, or other substances that SHOULD NOT be directed to the Bioretention area.

Instruction: Look for areas that are uphill from the Bioretention cell. Consult **Table 2.7.1** below.

Table 2.7.1 BR Drainage Area

Problem (Check if Present)		Follow-Up Actions
	☐ Bare soil, erosion of the ground (rills washing out the dirt)	☐ Seed and mulch areas of bare soil to establish vegetation. ☐ Fill in erosion areas with soil, compact, and seed and straw to establish vegetation. ☐ If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths.
	☐ Piles of grass clippings, mulch, dirt, salt, or other materials	☐ Remove or cover piles of grass clippings, mulch, dirt, etc. ☐ Other:
	☐ Open containers of oil, grease, paint, or other substances	☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous. ☐ Other:

BR 2. Inlets

Description: The inlets to a Bioretention cell are where water flows into the cell. Depending on the design, water can flow in through:

- Curb cuts or openings in a parking lot or roadway
- Pipes or ditches that carry water into the Bioretention cell from the drainage area
- Flow directly over the land surface (known as “sheetflow”), sometimes across a strip of rock or stone

Figure 2.7.2 Bioretention Cell Inlets

CSN, 2013

Instruction: Stand in the Bioretention cell itself and look for all the places where water flows in. Often there will be multiple points of inflow to the practice. Consult **Table 2.7.2** below for possible problems.

Table 2.7.2 BR Inlets

Problem (Check if Present)	Follow-Up Actions
 ☐ Inlets collect grit and debris or grass/weeds. Some water may not be getting into the Bioretention cell. The objective is to have a clear pathway for water to flow into the cell.	☐ Use a flat shovel to remove grit and debris (especially at curb inlets or openings). Parking lots generate fine grit that will accumulate at these spots. ☐ Pull out clumps of growing grass or weeds and scoop out the soil or grit that the plants are growing in. ☐ Remove any grass clippings, leaves, sticks, and other debris that is collecting at inlets. ☐ For pipes and ditches, remove sediment and debris that is partially blocking the pipe or ditch opening where it enters the Bioretention cell. ☐ Dispose of all material properly where it will not re-enter the Bioretention cell. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Inlets are blocked to the extent that most of the water does not seem to be entering the Bioretention cell.
 ☐ Some or all of the inlets are eroding so that rills, gullies, and other erosion is present, or there is bare dirt that is washing into the Bioretention cell.	☐ For small areas of erosion, smooth out the eroded part and apply rock or stone (e.g., river cobble) to prevent further erosion. Usually, filter fabric is placed under the rock or stone. ☐ In some cases, reseeding and applying erosion-control matting can be used to prevent further erosion. Some of these materials may be available at a garden center, but it may be best to consult a landscape contractor. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Erosion is occurring at most of the inlets, and it looks like there is too much water that is concentrating at these points. The inlet design may have to be modified.

BR 3. Bioretention Ponding Area

Description: The ponding area fills up with water during a rainstorm. If you picture the Bioretention cell as a bathtub, there is the *bottom* (usually flat surface), *side slopes* (areas that slope down to the bottom from the surrounding ground), and *berms or structures that control the depth to which water ponds.*

Instruction: Examine the entire Bioretention surface and side slopes. Consult the table below for possible problems.

Table 2.7.3 BR Ponding Area

Problem (Check if Present)	Follow-Up Actions
 ☐ Mulch (if used) needs to be replaced or replenished. The mulch layer had decomposed or is less than 1-inch thick.	☐ Add new mulch to a total depth (including any existing mulch that is left) of 2 to 3 inches. The mulch should be shredded hardwood mulch that is less likely to float away during rainstorms. ☐ Avoid adding too much mulch so that inlets are obstructed or certain areas become higher than the rest of the Bioretention surface. ☐ Other:
 ☐ Minor areas of sediment, grit, trash, or other debris are accumulating on the bottom.	☐ Use a shovel to scoop out minor areas of sediment or grit, especially in the spring after winter sanding materials may wash in and accumulate. Dispose of the material where it cannot re-enter the Bioretention cell. ☐ If removing the material creates a hole or low area, fill with soil mix that matches original mix and cover with mulch so that the Bioretention surface area is as flat as possible. ☐ Remove trash, vegetative debris, and other undesirable materials. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Sediment has accumulated more than 2-inches deep and covers 25% or more of the Bioretention surface. ☐ Kick-Out to Level 2 Inspection: The Bioretention cell is too densely vegetated to assess sediment accumulation or ponding; see BR-4, Vegetation.

 ☐ There is erosion in the bottom or on the side slopes. Water seems to be carving out rills as it flows across the Bioretention surface or on the slopes, or sinkholes are forming in certain areas. ☐ Source: Stormwater Maintenance, LLC.	☐ Try filling the eroded areas with clean topsoil or sand, and cover with mulch. ☐ If the problem recurs, you may have to use stone (e.g., river cobble) to fill in problem areas. ☐ If the erosion is on a side slope, fill with clay that can be compacted and seed and mulch the area. ☐ Other: ☐ Kick-Out to Level 2 Inspection: The problem persists or the erosion is more than 3-inches deep and seems to be an issue with how water enters and moves through the Bioretention cell. ☐ Kick-Out to Level 2 Inspection: The problem does not seem to be caused by flowing water, but a collapse or sinking of the surface (e.g., “sinkhole”) due to some underground problem.
 ☐ The bottom of the Bioretention cell is not flat, and the water pools at one end, along an edge, or in certain pockets. The whole bottom is not uniformly covered with water. See design plan to verify that Bioretention surface is intended to be flat. Check during or immediately after a rainstorm.	☐ If the problem is minor (just small, isolated areas are not covered with water), try raking the surface OR adding mulch to low spots to create a more level surface. You may need to remove and replace plantings in order to properly even off the surface. ☐ Check the surface with a string and bubble level to get the surface as flat as possible. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Ponding water is isolated to less than half of the Bioretention surface area, and there seem to be elevation differences of more than a couple of inches across the surface.
 ☐ Water stands on the surface more than 72 hours after a rainstorm and /or wetland-type vegetation is present. The Bioretention cell does not appear to be draining properly.	☐ Kick-Out to Level 2 Inspection: This is generally a serious problem, and it will be necessary to activate a Level 2 Inspection.

BR 4. Vegetation

Description: The health of vegetation within the Bioretention cell is perhaps the most critical maintenance item for the property owner or responsible party. Many Bioretention cells become overgrown, and "desirable" vegetation becomes choked out by weeds and invasive plants. It is important to know what the Bioretention cell is supposed to look like and what plants seem to be thriving or doing poorly. Periodic maintenance of vegetation will prevent larger problems that are more difficult and costly to manage.

Instruction: Examine all Bioretention cell vegetation. Consult the table below for possible problems.

Table 2.7.4 BR Vegetation

Problem (Check if Present)	Follow-Up Actions
 ☐ Vegetation requires regular maintenance—pulling weeds, removing dead and diseased plants, replacing mulch around plants, adding plants to fill in areas that are not well vegetated, etc.	☐ If you can identify which plants are weeds or not intended to be part of the planting plan, eliminate these, preferably by hand pulling. ☐ If weeds are widespread, check with the local stormwater authority and/or Extension Office about proper use of herbicides for areas connected with the flow of water. ☐ Even vegetation that is intended to be present can become large, overgrown, and/or crowd out surrounding plants. Prune and thin accordingly. ☐ If weeds or invasive plants have overtaken the whole Bioretention cell, bush-hog the entire area before seedheads form in the spring. It will be necessary to remove the root mat manually or with appropriate herbicides, as noted above. ☐ Re-plant with species that are aesthetically pleasing and seem to be doing well in the Bioretention cell. ☐ Other: ☐ Kick-Out to Level 2 Inspection: You are unsure of the original planting design, or the vegetation maintenance task is beyond your capabilities of time, expertise, or resources. If you are unsure of the health of the vegetation (e.g. salt damage, invasives, which plants are undesirable) or the appropriate season to conduct vegetation management, consult a landscape professional before undertaking any cutting, pruning, mowing, or brush hogging.
 ☐ Vegetation is too thin, is not healthy, and there are many spots that are not well vegetated.	☐ The original plants are likely not suited for the actual conditions within the Bioretention cell. If you are knowledgeable about plants, select and plant more appropriate vegetation (preferably native plants) so that almost the entire surface area will be covered by the end of the second growing season. ☐ Other: ☐ Kick-Out to Level 2 Inspection: For all but small practices (e.g., rain gardens), this task will likely require a landscape design professional or horticulturalist.

BR 5. Outlets

Description: Outlets are where water leaves the Bioretention cell when there is too much ponded water. There are various ways that outlets are configured. They can be a yard drain type of structure in the Bioretention cell itself or a rock weir where water flows during large storms. Many Bioretention practices have an underdrain, which is like a French drain, that helps the Bioretention cell drain properly after storms. The underdrain pipe may “daylight” (come to the ground surface) at some point downhill from the Bioretention cell.

Instruction: Examine outlets that release water out of the Bioretention cell. Consult the table below for possible problems.

Table 2.7.5 BR Outlets

Problem (Check if Present)	Follow-Up Actions
☐ Erosion at outlet	☐ Add stone to reduce the impact from the water flowing out of the outlet pipe or weir during storms. ☐ Other:
	☐ Kick-Out to Level 2 Inspection: Rills have formed and erosion problem becomes more severe.
 ☐ Outlet obstructed with mulch, sediment, debris, trash, etc.	☐ Remove the debris and dispose of it where it cannot re-enter the Bioretention cell. ☐ Other:
	☐ Kick-Out to Level 2 Inspection: Outlet is completely clogged or obstructed; there is too much material to remove by hand or with simple hand tools.

2.8. Green Roof

Areas of the Green Roof

Key areas to inspect for green roofs include the following:

GR 1. Vegetation and Surface
GR 2. Overflows and Drains

Note: Green Roofs consist of green infrastructure practices applied on rooftops, wherein stormwater is filtered through a vegetated planting bed. Green Roofs are a unique practice in that they are often covered by a professional ongoing maintenance contract, and their design is highly variable depending on the specific product. This section highlights some key inspection items.

Figure 2.8.1. Key Areas for Level 1 Inspection of Green Roof

3.7. Bioretention – Level 2 Inspections and Triggers for Level 3

The most likely triggers for a Level 3 Inspection for Bioretention are:

- Standing water, clogged media
- Vegetation management
- Bioretention does not conform to original design plan in surface area or storage.
- Severe erosion of filter bed, inlets, or around outlets
- Significant sediment accumulation, indicating an uncontrolled source of sediment

Table 3.7.1 Level 2 Inspection: BIORETENTION
NOTE: Key Source for this Information *(CSN, 2013)*

Recommended Repairs	Triggers for Level 3 Inspection
Observed Condition: Water Stands on Surface for More than 72 Hours after Storm	
Condition 1: Small pockets of standing water Use a soil probe or auger to examine the soil profile. If isolated areas have accumulated grit, fines, or vegetative debris or have bad soil media, try scraping off top 3 inches of media and replacing with clean material. Also check to see that surface is level and water is not ponding selectively in certain areas. Condition 2: Standing water is widespread or covers entire surface Requires diagnosis and resolution of problem: • Clogged underdrain? • Filter fabric between soil media and underdrain stone? • Need to install underdrain if not present? • Too much sediment/grit washing in from drainage area? • Too much ponding depth? • Improper soil media?	• Soil media is clogged and problem is not evident from Level 2 inspection. • Level 2 inspection identifies problem, but it cannot be resolved easily or is associated with the original design of the practice.

Observed Condition: Vegetation is sparse or out of control	
Condition 1: Original design planting plan seems good but has not been maintained, so there are many invasives and/or dead plants Will require some horticultural experience to restore vegetation to intended condition by weeding, pruning, removing plants, and adding new plants. Condition 2: Original design planting plan is unknown or cannot be actualized A landscape architect or horticulturalist will be needed to redo the planting plan. Will likely require analysis of soil pH, moisture, organic content, sun/shade, and other conditions to make sure plants match conditions. Plan should include invasive plant management and maintenance plan to include mulching, watering, disease intervention, periodic thinning/pruning, etc.	• Vegetation deviates significantly from original planting plan; Bioretention has been neglected and suffered from deferred maintenance. • Owner/responsible party does not know how to maintain the practice.
Observed Condition: Bioretention does not conform to original design plan in surface area or storage	
Condition 1: Level 2 Inspection reveals that practice is too small based on design dimension, does not have adequate storage (e.g., ponding depth) based on the plan, and/or does not treat the drainage area runoff as indicated on the plan Small areas of deviation can be corrected by the property owner or responsible party, but it is likely that a Qualified Professional will have to revisit the design and attempt a redesign that meets original objectives or that can be resubmitted to the municipality for approval.	• More than a 25% departure from the approved plan in surface area, storage, or drainage area; sometimes less than this threshold at the discretion of the Level 2 inspector.
Observed Condition: Severe erosion of filter bed, inlets, or around outlets	
Condition 1: Erosion at inlets The lining (e.g., grass, matting, stone, rock) may not be adequate for the actual flow velocities coming through the inlets. First line of defense is to try a more non-erosive lining and/or to extend the lining further down to where inlet slopes meet the Bioretention surface. If problem persists, analysis by a Qualified Professional is warranted. Condition 2: Erosion of Bioretention filter bed This is often caused by “preferential flow paths” through and along the Bioretention surface. The source of flow should be analyzed and methods employed to dissipate energy and disperse the flow (e.g., check dams, rock splash pads). Condition 3: Erosion on side slopes Again, the issue is likely linked with unanticipated flow paths down the side slopes (probably overland flow that concentrates as it hits the edge of the slope). For small or isolated areas, try filling, compacting, and re-establishing healthy ground cover vegetation. If the problem is more widespread, further analysis is required to determine how to redirect the flow.	• Erosion (rills, gullies) is more than 12 inches deep at inlets or the filter bed or more than 3 inches deep on side slopes. • If the issue is not caused by moving water but some sort of subsurface defect. This may manifest as a sinkhole or linear depression and be associated with problems with the underdrain stone or pipe or underlying soil.
Observed Condition: Significant sediment accumulation, indicating an uncontrolled source of sediment	
Condition 1: Isolated areas of sediment accumulation, generally less than 3-inches deep Sediment source may be from a one-time or isolated event. Remove accumulated sediment and top 2 to 3 inches of Bioretention soil media; replace with clean material. Check drainage area for any ongoing sources of sediment. Condition 2: Majority of the surface is caked with “hard pan” (thin layer of clogging material) or accumulated sediment that is 3-inches deep or more This can be caused by an improper construction sequence (drainage area not fully stabilized prior to installation of Bioretention soil media) or another chronic source of sediment in the drainage area. Augering several holes down through the media can indicate how severe the problem is; often the damage is confined to the first several inches of soil media. Removing and replacing this top layer (or to the depth where sediment incursion is seen in auger holes) can be adequate, as long as the problem does not recur.	• More than 2 inches of accumulated sediment cover 25% or more of the Bioretention surface area. • “Hard pan” of thin, crusty layer covers majority of Bioretention surface area and seems to be impeding flow of water down through the soil media. • New sources of sediment seem to be accumulating with each significant rainfall event.

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Bioretention Stormwater Management Practices Level 1 Inspection Checklist

SMP ID #		**SMP Owner**		☐ Private ☐ Public
SMP Location (Address; Latitude & Longitude)				
	Latitude		**Longitude**	

Party Responsible for Maintenance	**System Type**		**Type of Site**
☐ Same as SMP Owner ☐ Other _____	☐ Seasonal ☐ Continuous Use ☐ Other	☐ Above Ground ☐ Below Ground	☐ Commercial ☐ Industrial ☐ Residential ☐ State

Inspection Date		**Inspection Time**	
Inspector			
Date of Last Inspection			

BR Drainage Area

Look for areas that are uphill from the Bioretention cell.

Problem (Check if Present)	**Follow-Up Actions**
 ☐ Bare soil, erosion of the ground (rills washing out the dirt)	☐ Seed and mulch areas of bare soil to establish vegetation. ☐ Fill in erosion areas with soil, compact, and seed and straw to establish vegetation. ☐ If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted. ☐ Other:

BR Drainage Area

Look for areas that are uphill from the Bioretention cell.

Problem (Check if Present)	Follow-Up Actions
	☐ Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths.
 ☐ Piles of grass clippings, mulch, dirt, salt, or other materials	☐ Remove or cover piles of grass clippings, mulch, dirt, etc. ☐ Other:
 ☐ Open containers of oil, grease, paint, or other substances	☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous. ☐ Other:

BR Inlets

Stand in the Bioretention cell itself and look for all the places where water flows in. Often there will be multiple points of inflow to the practice.

Problem (Check if Present)	Follow-Up Actions
 ☐ Inlets collect grit and debris or grass/weeds. Some water may not be getting into the Bioretention cell. The objective is to have a clear pathway for water to flow into the cell.	☐ Use a flat shovel to remove grit and debris (especially at curb inlets or openings). Parking lots generate fine grit that will accumulate at these spots. ☐ Pull out clumps of growing grass or weeds and scoop out the soil or grit that the plants are growing in. ☐ Remove any grass clippings, leaves, sticks, and other debris that is collecting at inlets. ☐ For pipes and ditches, remove sediment and debris that is partially blocking the pipe or ditch opening where it enters the Bioretention cell. ☐ Dispose of all material properly where it will not re-enter the Bioretention cell. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Inlets are blocked to the extent that most of the water does not seem to be entering the Bioretention cell.
 ☐ Some or all of the inlets are eroding so that rills, gullies, and other erosion is present, or there is bare dirt that is washing into the Bioretention cell.	☐ For small areas of erosion, smooth out the eroded part and apply rock or stone (e.g., river cobble) to prevent further erosion. Usually, filter fabric is placed under the rock or stone. ☐ In some cases, reseeding and applying erosion-control matting can be used to prevent further erosion. Some of these materials may be available at a garden center, but it may be best to consult a landscape contractor. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Erosion is occurring at most of the inlets, and it looks like there is too much water that is concentrating at these points. The inlet design may have to be modified.

BR Ponding Area

Examine the entire Bioretention surface and side slopes

Problem (Check if Present)	Follow-Up Actions
 ☐ Mulch (if used) needs to be replaced or replenished. The mulch layer had decomposed or is less than 1-inch thick.	☐ Add new mulch to a total depth (including any existing mulch that is left) of 2 to 3 inches. The mulch should be shredded hardwood mulch that is less likely to float away during rainstorms. ☐ Avoid adding too much mulch so that inlets are obstructed or certain areas become higher than the rest of the Bioretention surface. ☐ Other:
 ☐ Minor areas of sediment, grit, trash, or other debris are accumulating on the bottom.	☐ Use a shovel to scoop out minor areas of sediment or grit, especially in the spring after winter sanding materials may wash in and accumulate. Dispose of the material where it cannot re-enter the Bioretention cell . ☐ If removing the material creates a hole or low area, fill with soil mix that matches original mix and cover with mulch so that the Bioretention surface area is as flat as possible. ☐ Remove trash, vegetative debris, and other undesirable materials. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Sediment has accumulated more than 2-inches deep and covers 25% or more of the Bioretention surface. ☐ Kick-Out to Level 2 Inspection: The Bioretention cell is too densely vegetated to assess sediment accumulation or ponding; see BR-4, Vegetation.

BR Ponding Area

Examine the entire Bioretention surface and side slopes

Problem (Check if Present)	Follow-Up Actions
 ☐ There is erosion in the bottom or on the side slopes. Water seems to be carving out rills as it flows across the Bioretention surface or on the slopes, or sinkholes are forming in certain areas. ☐ Source: Stormwater Maintenance, LLC.	☐ Try filling the eroded areas with clean topsoil or sand, and cover with mulch. ☐ If the problem recurs, you may have to use stone (e.g., river cobble) to fill in problem areas. ☐ If the erosion is on a side slope, fill with clay that can be compacted and seed and mulch the area. ☐ Other: ☐ Kick-Out to Level 2 Inspection: The problem persists or the erosion is more than 3-inches deep and seems to be an issue with how water enters and moves through the Bioretention cell. ☐ Kick-Out to Level 2 Inspection: The problem does not seem to be caused by flowing water, but a collapse or sinking of the surface (e.g., “sinkhole”) due to some underground problem.
 ☐ The bottom of the Bioretention cell is not flat, and the water pools at one end, along an edge, or in certain pockets. The whole bottom is not uniformly covered with water. See design plan to verify that bioretention surface is intended to be flat. Check during or immediately after a rainstorm.	☐ If the problem is minor (just small, isolated areas are not covered with water), try raking the surface OR adding mulch to low spots to create a more level surface. You may need to remove and replace plantings in order to properly even off the surface. ☐ Check the surface with a string and bubble level to get the surface as flat as possible. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Ponding water is isolated to less than half of the Bioretention surface area, and there seem to be elevation differences of more than a couple of inches across the surface.

BR Ponding Area

Examine the entire Bioretention surface and side slopes

Problem (Check if Present)	Follow-Up Actions
 ☐ Water stands on the surface more than 72 hours after a rainstorm and /or wetland-type vegetation is present. The Bioretention cell does not appear to be draining properly.	☐ Kick-Out to Level 2 Inspection: This is generally a serious problem, and it will be necessary to activate a Level 2 Inspection.

BR Vegetation

Examine all Bioretention cell vegetation.

Problem (Check if Present)	Follow-Up Actions
 ☐ Vegetation requires regular maintenance—pulling weeds, removing dead and diseased plants, replacing mulch around plants, adding plants to fill in areas that are not well vegetated, etc.	☐ If you can identify which plants are weeds or not intended to be part of the planting plan, eliminate these, preferably by hand pulling. ☐ If weeds are widespread, check with the local stormwater authority and/or Extension Office about proper use of herbicides for areas connected with the flow of water. ☐ Even vegetation that is intended to be present can become large, overgrown, and/or crowd out surrounding plants. Prune and thin accordingly. ☐ If weeds or invasive plants have overtaken the whole Bioretention cell , bush-hog the entire area before seedheads form in the spring. It will be necessary to remove the root mat manually or with appropriate herbicides, as noted above. ☐ Re-plant with species that are aesthetically pleasing and seem to be doing well in the Bioretention cell. ☐ Other: ☐ Kick-Out to Level 2 Inspection: You are unsure of the original planting design, or the vegetation maintenance task is beyond your capabilities of time, expertise, or resources. If you are unsure of the health of the vegetation (e.g. salt damage, invasives, which plants are undesirable) or the appropriate season to conduct vegetation management, consult a landscape professional before undertaking any cutting, pruning, mowing, or brush hogging.

BR Vegetation

Examine all Bioretention cell vegetation.

Problem (Check if Present)	Follow-Up Actions
 ☐ Vegetation is too thin, is not healthy, and there are many spots that are not well vegetated.	☐ The original plants are likely not suited for the actual conditions within the Bioretention cell . If you are knowledgeable about plants, select and plant more appropriate vegetation (preferably native plants) so that almost the entire surface area will be covered by the end of the second growing season. ☐ Other:
	☐ Kick-Out to Level 2 Inspection: For all but small practices (e.g., rain gardens), this task will likely require a landscape design professional or horticulturalist.

BR Outlets

Examine outlets that release water out of the Bioretention cell.

Problem (Check if Present)	Follow-Up Actions
☐ Erosion at outlet	☐ Add stone to reduce the impact from the water flowing out of the outlet pipe or weir during storms. ☐ Other:
	☐ Kick-Out to Level 2 Inspection: Rills have formed and erosion problem becomes more severe.
 ☐ Outlet obstructed with mulch, sediment, debris, trash, etc.	☐ Remove the debris and dispose of it where it cannot re-enter the Bioretention cell . ☐ Other:
	☐ Kick-Out to Level 2 Inspection: Outlet is completely clogged or obstructed; there is too much material to remove by hand or with simple hand tools.

Additional Notes:

Inspector:_____ Date: _____

Complete the following if follow-up/corrective actions were identified during this inspection:

Certified Completion of Follow-Up Actions:

"I hereby certify that the follow-up/corrective actions identified in the inspection performed on _____ (DATE) have been completed and any required maintenance deficiencies have been adequately corrected."

Inspector/Operator: _____ Date: _____

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Bioretention Stormwater Management Practices Level 2 Inspection Checklist

SMP ID #		**SMP Owner**		☐ Private ☐ Public
SMP Location (Address; Latitude & Longitude)				
	Latitude		**Longitude**	

Party Responsible for Maintenance	**System Type**		**Type of Site**
☐ Same as SMP Owner ☐ Other _____	☐ Seasonal ☐ Continuous Use ☐ Other	☐ Above Ground ☐ Below Ground	☐ Commercial ☐ Industrial ☐ Residential ☐ State

Inspection Date		**Inspection Time**	
Inspector			
Date of Last Inspection			

Level 2 Inspection: BIORETENTION NOTE: Key Source for this Information *(CSN, 2013)*	
Recommended Repairs	**Triggers for Level 3 Inspection**
Observed Condition: Water Stands on Surface for More than 72 Hours after Storm	
☐ Condition 1: Small pockets of standing water Use a soil probe or auger to examine the soil profile. If isolated areas have accumulated grit, fines, or vegetative debris or have bad soil media, try scraping off top 3 inches of media and replacing with clean material. Also check to see that surface is level and water is not ponding selectively in certain areas. ☐ Condition 2: Standing water is widespread or covers entire surface Requires diagnosis and resolution of problem: • Clogged underdrain? • Filter fabric between soil media and underdrain stone? • Need to install underdrain if not present? • Too much sediment/grit washing in from drainage area? • Too much ponding depth? • Improper soil media?	• Soil media is clogged and problem is not evident from Level 2 inspection. • Level 2 inspection identifies problem, but it cannot be resolved easily or is associated with the original design of the practice. ☐ Level 3 inspection necessary
Observed Condition: Vegetation is sparse or out of control	
☐ Condition 1: Original design planting plan seems good but has not been maintained, so there are many invasives and/or dead plants Will require some horticultural experience to restore vegetation to intended condition by weeding, pruning, removing plants, and adding new plants. ☐ Condition 2: Original design planting plan is unknown or cannot be actualized A landscape architect or horticulturalist will be needed to redo the planting plan. Will likely require analysis of soil pH, moisture, organic content, sun/shade, and other conditions to make sure plants match conditions. Plan should include invasive plant management and maintenance plan to include mulching, watering, disease intervention, periodic thinning/pruning, etc.	• Vegetation deviates significantly from original planting plan; Bioretention has been neglected and suffered from deferred maintenance. • Owner/responsible party does not know how to maintain the practice. ☐ Level 3 inspection necessary
Observed Condition: Bioretention does not conform to original design plan in surface area or storage	
☐ Condition 1: Level 2 Inspection reveals that practice is too small based on design dimension, does not have adequate storage (e.g., ponding depth) based on the plan, and/or does not treat the drainage area runoff as indicated on the plan Small areas of deviation can be corrected by the property owner or responsible party, but it is likely that a Qualified Professional will have to revisit the design and attempt a redesign that meets original objectives or that can be resubmitted to the municipality for approval.	• More than a 25% departure from the approved plan in surface area, storage, or drainage area; sometimes less than this threshold at the discretion of the Level 2 inspector. ☐ Level 3 inspection necessary

Level 2 Inspection: BIORETENTION
NOTE: Key Source for this Information *(CSN, 2013)*

Recommended Repairs	Triggers for Level 3 Inspection
Observed Condition: Severe erosion of filter bed, inlets, or around outlets	
☐ Condition 1: Erosion at inlets The lining (e.g., grass, matting, stone, rock) may not be adequate for the actual flow velocities coming through the inlets. First line of defense is to try a more non-erosive lining and/or to extend the lining further down to where inlet slopes meet the Bioretention surface. If problem persists, analysis by a Qualified Professional is warranted. ☐ Condition 2: Erosion of Bioretention filter bed This is often caused by "preferential flow paths" through and along the Bioretention surface. The source of flow should be analyzed and methods employed to dissipate energy and disperse the flow (e.g., check dams, rock splash pads). ☐ Condition 3: Erosion on side slopes Again, the issue is likely linked with unanticipated flow paths down the side slopes (probably overland flow that concentrates as it hits the edge of the slope). For small or isolated areas, try filling, compacting, and re-establishing healthy ground cover vegetation. If the problem is more widespread, further analysis is required to determine how to redirect the flow.	• Erosion (rills, gullies) is more than 12 inches deep at inlets or the filter bed or more than 3 inches deep on side slopes. • If the issue is not caused by moving water but some sort of subsurface defect. This may manifest as a sinkhole or linear depression and be associated with problems with the underdrain stone or pipe or underlying soil. ☐ Level 3 inspection necessary
Observed Condition: Significant sediment accumulation, indicating an uncontrolled source of sediment	
☐ Condition 1: Isolated areas of sediment accumulation, generally less than 3-inches deep Sediment source may be from a one-time or isolated event. Remove accumulated sediment and top 2 to 3 inches of Bioretention soil media; replace with clean material. Check drainage area for any ongoing sources of sediment. ☐ Condition 2: Majority of the surface is caked with "hard pan" (thin layer of clogging material) or accumulated sediment that is 3-inches deep or more This can be caused by an improper construction sequence (drainage area not fully stabilized prior to installation of Bioretention soil media) or another chronic source of sediment in the drainage area. Augering several holes down through the media can indicate how severe the problem is; often the damage is confined to the first several inches of soil media. Removing and replacing this top layer (or to the depth where sediment incursion is seen in auger holes) can be adequate, as long as the problem does not recur.	• More than 2 inches of accumulated sediment cover 25% or more of the Bioretention surface area. • "Hard pan" of thin, crusty layer covers majority of Bioretention surface area and seems to be impeding flow of water down through the soil media. • New sources of sediment seem to be accumulating with each significant rainfall event. ☐ Level 3 inspection necessary

Notes:

Inspector:_____ Date: _____

Complete the following if follow-up/corrective actions were identified during this inspection:

Certified Completion of Follow-Up Actions:

"I hereby certify that the follow-up/corrective actions identified in the inspection performed on _____ (DATE) have been completed and any required maintenance deficiencies have been adequately corrected."

Inspector/Operator: _____ Date: _____