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Stormwater Pollution Prevention Plan

Prepared for:

Rella Boulevard

Town of Ramapo
Rockland County, New York

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1.0 INTRODUCTION

1.1 Background

In 1972 Congress passed the Federal Water Pollution Control Act (FWPCA), also known as the Clean Water Act (CWA), to restore and maintain the quality of the nation's waterways. The ultimate goal was to make sure that rivers and streams were fishable, swimmable and drinkable. In 1987, the Water Quality Act (WQA) added provisions to the CWA that allowed the EPA to govern storm water discharges from construction sites. In 1998, the EPA published the final notice for General Permits for Storm Water Discharges from Construction Activities Disturbing 5 Acres of Greater (63 Federal Register 7898, February 14, 1998). The general permit includes provisions for development of a Storm Water Pollution Prevention Plan (SWPPP) to maximize the potential benefits of pollution prevention and sediment and erosion control measures at construction sites.

Pursuant to Section 402 of the Clean Water Act ("CWA"), stormwater discharges from certain construction activities are unlawful unless they are authorized by a NPDES (National Pollutant Discharge Elimination System) permit or by a state permit program. New York State's SPDES (State Pollutant Discharge Elimination System) is a NPDES-approved program with permits issued in accordance with the Environmental Conservation Law ("ECL").

The New York State Department of Environmental Conservation (NYSDEC) issued SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-20-001) in January, 2020. An owner or operator of a construction activity that is eligible for coverage under the SPDES General Permit (GP-0-20-001) must obtain coverage under the permit prior to the commencement of construction activity.

Development, implementation, and maintenance of a Stormwater Pollution Prevention Plan (SWPPP) will provide the framework for reducing soil erosion and minimizing pollutants in storm water during construction of the project. The SWPPP will:

- Define the characteristics of the site and the type of construction which will be occurring.
- Describe the site plan for the facility to be constructed.
- Describe the practices that will be implemented to control erosion and the release of pollutants in storm water.
- Create an implementation schedule to ensure that the practices described in this SWPPP are in fact implemented and to evaluate the plan's effectiveness in reducing erosion, sediment, and pollutant levels in storm water discharged from the site.
- Describe the final stabilization/termination design to minimize erosion and prevent storm water impacts after construction is complete.

1.2 SWPPP Content

This SWPPP includes the following:

- Background information about the scope, location, type and size of project.
- A site map and construction drawings for the project.
- Description of the soils present at the site.
- Construction phasing plan and sequence of operations.
- Description of the minimum erosion and sediment control practices to be installed or implemented for each construction activity that will result in soil disturbance.

- A temporary and permanent soil stabilization plan.
- Construction drawings showing the specific location and size of each erosion and sediment control practice.
- The dimensions, material specifications, installation details, and operation and maintenance requirements for all erosion and sediment control practices.
- Maintenance inspection schedules.
- Measures that will be used to control litter, construction chemicals and construction debris from becoming a pollutant source in stormwater discharges.
- Description and location of any stormwater discharges associated with industrial activity other than construction at the site.
- Identification of any elements of the design that are not in conformance with the design criteria in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016.
- Identification of all post-construction stormwater management practices to be constructed as part of the project.
- Construction drawings showing the location and size of each post-construction stormwater management practice.
- A Stormwater Modeling and Analysis Report.
- Soil testing results and locations, including infiltration test results, when required.
- An operations and maintenance plan that includes inspection and maintenance schedules and actions to ensure continuous and effective operation of each post-construction stormwater management practice.

1.3 Owner/Operator and Duties

The Owner/Operator for the facility is:
Company: Rella Partners LLC
Address: 4 Executive Boulevard, Suite 200, Suffern, NY 10901

The owner or operator must keep the SWPPP current so that it accurately documents the erosion and sediment control practices that are being used, and all post-construction stormwater management practices that will be constructed on the site. At a minimum, the owner or operator shall amend the SWPPP, including construction drawings:

a. whenever the current provisions prove to be ineffective in minimizing pollutants in stormwater discharges from the site;
b. whenever there is a change in design, construction, or operation at the construction site that has or could have an effect on the discharge of pollutants;
c. to address issues or deficiencies identified during an inspection by the qualified inspector, the Department or other regulatory authority; and
d. to document the final construction conditions

2.0 SITE DESCRIPTION

Project Name & Location:

Rella Boulevard
Village of Montebello
Rockland County, New York

Description:

The subject site is located on the northern side of Rella Boulevard, and on the eastern side of North Airmont Road. The property consists of approximately 18.5265 acres of undeveloped land. The site is completely wooded. The project site generally drains west toward North Airmont Road, and south to Rella Boulevard.

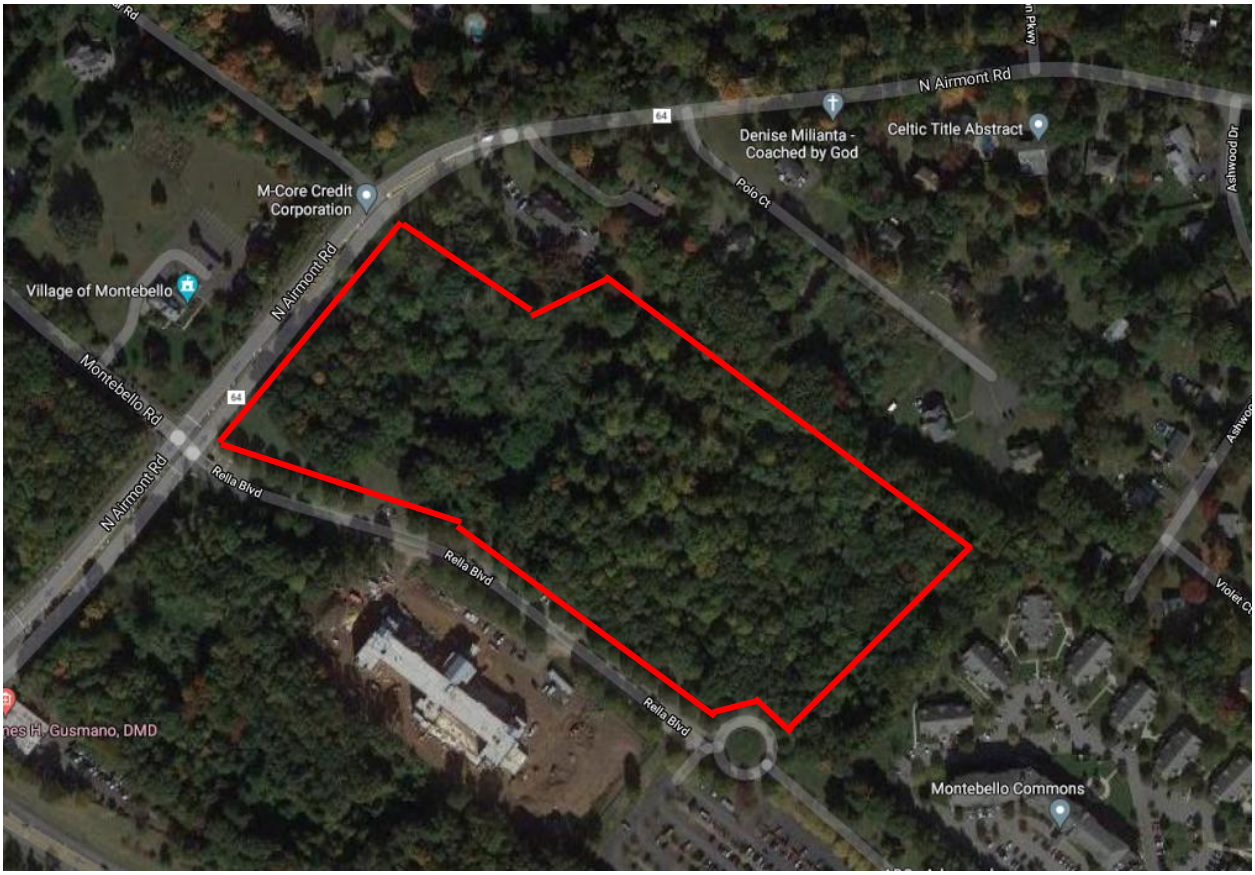
According to the U.S. Department of Agriculture Soil Conservation Service, the soil on-site consists mainly of Creshire gravelly fine sandy loam, 2 to 8 percent slopes (87.9%), and of Wethersfield gravelly silt loam, 8 to 15 percent slopes (12.1%).

The purpose of this action is to prepare the property for its future use. The proposed development of the property includes six (6) warehouse/flex-space buildings totaling 220,740 SF with 153 parking spaces having access from Rella Boulevard. The land preparation activities will include installing stabilized construction entrances; installation of perimeter and other erosion and sediment control measures; tree clearing; grading (cut and fill); installation of stormwater management measures; and installation of stabilized surfaces.

The total site area is the subject of the attached drainage analysis.

2.1 Site Map

APPROXIMATE SITE LOCATION



2.2 Sequence of Major Activities

The order of major construction activities is as follows:

1. Protect any areas designated on the plans by installing temporary snow fencing.
2. Install stabilized construction entrances.
3. Perform tree clearing, grubbing and stumping activities.
4. Install erosion and sediment controls, including silt fence, hay bales, temporary berms, swales, and temporary sediment traps.
5. Perform land grading, excavation and filling. Stockpile topsoil in approved locations.
6. As construction proceeds, all disturbed areas shall be seeded, mulched, planted or stabilized as specified on the plans in a timely manner to prevent unnecessary erosion.
7. Utilize erosion controls to stabilize any disturbed areas where construction will cease for more than 14 days.
8. Once disturbed areas have been properly stabilized, temporary control measures shall be removed.

2.3 Construction Sequence:

1. Notify all involved agencies of proposed construction schedule.
2. Install snow fencing around trees, structures, or other features identified by the owner to be protected during construction.
3. Construct stabilized construction entrances.
4. Install silt fence barriers at the base of all proposed slopes as designated on the Soil Erosion and Sediment Control Plan.
5. Construct temporary sediment traps (if needed) at locations of concentrated storm water runoff, including swales and berms as needed to direct storm water runoff to the traps.
6. Prior to the start of grading operations, the contractor shall demonstrate, to the satisfaction of the owner's representative, that the areas designated to remain protected or undisturbed are protected by the uninterrupted system of silt fence barriers, basins, berms, and/or swales.
7. Clear and grub vegetation in areas to be graded.
8. Strip topsoil and stockpile in approved locations, as designated on the plan.
9. Stabilize topsoil stockpile areas and install silt fence.
10. Install temporary diversion measures. During construction, hay bale inlet protection shall be provided at all inlets, but shall be removed from roadways and driveways once the road sub-base course has been installed.
11. Perform earthwork to grade out stormwater management systems.
12. Restore any existing site features disturbed during construction that were not part of the original scope.
13. The construction shall maintain all sediment and erosion control measures in proper condition throughout the construction period:
    - All Control measures shall be inspected at least once a week. If a repair is necessary, it shall be implemented within 24 hours of report.
    - Built-up sediment shall be removed from silt fence when it has reached one-third the height of the fence.
    - Silt fence shall be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.
    - Temporary and permanent seeding plantings shall be inspected for bare spots, washout, and healthy growth.
    - Sediment shall be removed from sediment traps once it has accumulated to one-half the design depth of the basin. Removed sediment shall be deposited in a suitable area in a manner such that it will not erode.
14. As construction proceeds, all disturbed areas shall be planted, seeded or stabilized with millings in a timely manner to prevent unnecessary erosion. Once disturbed uphill areas have been properly stabilized, temporary berms, temporary swales, temporary sediment traps, silt fence barriers, hay bales, crushed stone filter outlets, etc. shall be removed.
15. Perform final grading, soil restoration, and soil de-compaction. Soil restoration and de-compaction shall be performed for all areas that were cut, filled or subject to heavy vehicle traffic. Soil restoration and de-compaction shall be completed in conformance with the NYSDEC publication "Deep Ripping and De-compaction, 2008."
16. Install final seeding and landscaping.
17. Upon completion of the construction activities, remove soil erosion and sediment control measures.
18. Prepare As-Builts and post construction measures and procedures in accordance with all applicable federal, state and local requirements.

3.0 CONTROLS

3.1 Erosion and Sediment Controls

3.1.1 Description of Work

Provide all means necessary to install, inspect, maintain, and remove temporary erosion and sediment control measures as shown on the drawings and as required to minimize the erosion and unspecified transport of soil from the site.

3.1.2 Quality Assurance

A. General
   i. Install in accordance with the project drawings or the New York Standards and Specifications for Erosion and Sediment Control (November 2016 edition), whichever is stricter.
   ii. Grade and maintain site at all times such that all storm water runoff from disturbed areas is diverted to soil erosion and sedimentation control facilities.
   iii. No changes to the soil erosion and Sedimentation Control Plan shall be made without approval of the Owner's Representative.
   iv. The Contractor shall comply with applicable Federal, State, and local regulations relating to the prevention and abatement of pollution.
   v. The municipal Engineer may require additional erosion and sediment control measures to mitigate unforeseen siltation.

B. Product Stockpiling: Stockpiles of stabilization measures such as hay bales and mulch shall be maintained at site for use in stabilizing disturbed areas in advance of severe weather conditions.

3.1.3 Work Schedule

A. General: Install and remove measures as noted in the "Construction Sequence" narrative and plans. The measures shall be maintained until permanent protection of the contributing watershed is approved by the Municipal Representative. All storm drainage outlets will be stabilized, as required, before the discharge points become operational.
B. Inspections: Inspect measures at least once every seven (7) calendar days. Stabilized areas shall be inspected monthly until the entire site is stabilized.
C. Maintenance: Complete maintenance within seven calendar days determining its need, as determined by the Municipal Engineer.
D. Stabilization/Planting: Temporarily or permanently stabilize within 24 hours after the end of construction activities in an area unless there is snow cover or construction activities will resume within 14 days.

3.1.4 Products and Execution

A. Sediment Traps: Infiltration basins should not be utilized as a sediment trap if constructed to final grade. However, infiltration basin locations may be used as sediment basins/traps where partial excavation is performed to a minimum limit of 18" above bottom of the infiltration basin per NYSDEC Bluebook.

B. Earth Dikes: Compact dikes with earth moving equipment. Erosion control blankets shall be North American Green S150 or equal.

C. Stabilized Construction Entrance:
- A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.
- These entrances/exits will be used where dirt or mud can be tracked onto public roads; adjacent to water bodies; where poor soils are encountered; where dust is a problem during dry weather.
- The filter fabric shall be Mirafi 600X or equal. The contractor shall keep the roadways within the project clear of soil and debris and is responsible for any street cleaning necessary during the duration of construction.

D. Sediment Basins:
- Sediment basins are temporary basins formed by excavating and/or constructing an embankment so that sediment laden runoff is temporarily detained under slow-moving or inactive conditions, allowing sediment to settle out before the runoff is discharged.
- Sediment basins shall be designed to provide a minimum capacity of 3,600 cubic feet of storage per acre of drainage area contributing to the basin.
- Locate the basin so that it is accessible for maintenance.
- When possible, temporary sediment basins shall be located where permanent, post-construction detention basins will be constructed, except when the post-construction basin is an infiltration basin.
- Outflow structures and emergency spillways must be provided.
- When possible, the outflow structure can consist of the permanent outflow structure, provided that the low flow orifice is sufficiently blocked so as to be watertight and non-functional.
- The outflow shall be provided with outlet protection to prevent scouring and erosion of the embankment and channel.

E. Silt Fence:
- A silt fence is a temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff. Silt fences allow sediment to settle from runoff before water leaves the construction site.
- Silt fences will be placed below the toe of exposed and erodible slopes; down-slope of exposed soil areas; around temporary stockpiles; along streams and channels; along the perimeter of a project.
- Silt fence fabric shall be Mirafi 100X or equal.
- Wood posts shall be of sound quality hardwood, a minimum 36 inches long and two inches square.
- Metal posts shall be standard T and U section weighing not less than one pound per linear foot.
- Wire fence backing shall be a minimum 14-1/2 gage with a maximum six-inch mesh opening and securely attached to fence posts.
- Posts shall extend a minimum of 16 inches into the ground.

F. Hay Bale Barriers:
- A hay bale barrier is a temporary linear sediment barrier consisting of straw bales, designed to intercept and slow sediment-laden sheet flow runoff. Straw bale barriers allow sediment to settle from runoff before water leaves the construction site.

- This BMP will be implemented on a project site as determined by the Engineer.
- The hay bales will be placed along the perimeter of the site; along streams and channels; below the toe of exposed and erodible slopes; down slope of exposed soil areas; around stockpiles; across minor swales or ditches with small catchments; around above grade type temporary concrete washouts; parallel to a roadway to keep sediment off paved areas.

G. Modified Control Structure: All pipe connections and the barrel connection to the control structure shall be watertight.

H. Check Dams: The filter fabric shall be Mirafi 600X or equal.

I. Temporary Stabilization:
- Temporary Grass Cover: Prepare seed bed, scarify if compacted, remove debris and obstacles such as rocks and stumps, and seed within 24 hours. Amend soil, lime soil to pH of 6.0 and fertilize at a rate of 1/2 lbs. per 1,000 square feet with a 5-10-10 or equivalent fertilizer. Work amendments a minimum of four inches into soil. If seeding in October/November seed shall be Certified Aroostook winter rye at 100 lbs. per acre, otherwise seed shall be ryegrass (annual).
- Mulch: Small grain straw mulch as specified on the drawings. Straw much shall be applied at a rate of two tons (100 to 120 bales) per acre.

J. Riprap: Provide permanent section of rock protection placed at the outlet end of culverts, conduits, or channels to reduce the depth, velocity and energy of water, such that the flow will not erode the receiving downstream reach. See erosion control plan for details (if required).

K. Dust Control: Treat all disturbed areas within 500 feet of an inhabited dwelling as necessary to provide dust control. Conform to all local and state regulations governing these activities.

L. Rock Removal: Rock ripping shall be used wherever possible in place of blasting. Observations made during test blasting shall be used in the development of a controlled rock removal program.

M. Temporary Soil and Rock Stockpiling:
- Stockpile management procedures and practices are designed to reduce or eliminate storm water pollution from stockpiles of soil, and paving materials such as Portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub-base or pre-mixed aggregate, asphalt binder (“cold mix” asphalt) and pressure treated wood.
- Materials shall not be stockpiled on steep slopes, drainage swales, wetland areas, or wetland setback arrears. Stockpiles shall be surrounded with silt fence and re-vegetated following completion of construction activities.

N. Inlet Protection:
- Used at storm drain inlets that are subject to runoff from construction activities to detain and/or filter sediment-laden runoff to allow sediment to settle and/or to filter sediment prior to discharge into storm drainage systems or watercourses.
- Where ponding will not encroach into highway traffic; where sediment laden surface runoff may enter an inlet; where disturbed drainage areas have not yet

been permanently stabilized; where drainage area is 1 acre or less; appropriate during wet and snow-melt seasons.

O. Soil Restoration and De-compaction:
- Soil restoration is applied in the cleanup, restoration, and landscaping phase of construction, and is followed by the permanent establishment of an appropriate, deep-rooted groundcover.
- All soil restoration and de-compaction activities shall be conducted in accordance with the NYSDEC publication "Deep Ripping and De-compaction, 2008."
- Grade disturbed subsoil to rough final grade and apply the following soil restoration steps:
  1. Apply 3 inches of compost over subsoil
  2. Till compost into subsoil to a depth of at least 12 inches using a cat-mounted ripper, tractor-mounted disc, or tiller.
  3. Mix and circulate air and compost into subsoil.
  4. Rock-pick until uplifted stone/rock materials of four inches and larger size are cleaned off the site
  5. Apply topsoil to a depth of 6 inches.
  6. Vegetate as required by approved plan

P. Concrete Truck Washout:
- A temporary excavated or above ground lined constructed pit where concrete trucks, mixers and equipment can be washed after loads have been discharged.
- Used to prevent highly alkaline runoff from entering storm drainage systems or leaching into soil.
- Washout facilities shall be provided for any project where concrete will be poured or otherwise formed on the site. The facility will receive highly alkaline wash water from the cleaning of chutes, mixers, hoppers, vibrators, placing equipment, trowels, and screeds. Under no circumstances will wash water from these operations be allowed to enter surface waters.
- The washout facility should be sized to contain solids, wash water, and rainfall. Wash water is estimated at 7 gallons per chute and 50 gallons per hopper of the concrete pump truck and/or discharging drum. Minimum size shall be 8 feet by 8 feet at the bottom and 2 feet deep. If excavated, side slopes shall be 2h to 1v.
- Locate the facility a minimum of 100 feet from drainage swales, storm drain inlets, wetlands, streams and other surface waters. Prevent surface water from entering the structure except for the access road. Provide appropriate access 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.
- 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.

3.1.5 Maintenance

A. Repair or replace all damaged erosion and sediment control measures.

B. Sediment Traps: Clean out traps when sediment levels reach specified clean out levels. See Sediment Trap Schedule (if required).

C. Inlet Protection:

- Inspect fabric barriers after every rain event and repair as needed.
- Straw bales shall be kept tight, with bottom edge adhering to the ground.
- Only clean stone or gravel shall be used.
- Remove accumulated sediment as necessary and dispose on site.

D. Stabilized Construction Entrance:
- Inspect routinely for damage and assess effectiveness of the BMP. Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.
- Keep all temporary roadway ditches clear
- Inspect for damage and repair as needed.

E. Sediment Basins:
- Inspect before and after rainfall events and weekly during rainy season.
- Examine banks for seepage and structural soundness.
- Check inlets and outlet structure for damage or obstructions; repair damage and remove obstructions as needed.
- Remove accumulated sediment when its volume reaches one-third of the volume of the sediment storage.

F. Silt Fence:
- Repair undercut silt fences
- Repair or replace split, torn, slumping, or weathered fabric
- Inspect silt fence when rain is forecast. Perform necessary maintenance, or maintenance as required by the Resident Engineer (RE)
- Inspect silt fence following rainfall events. Perform maintenance as necessary, or as required by the RE.
- Maintain silt fences to provide adequate sediment holding capacity. Sediment shall be removed when the sediment accumulation reaches 1/3 of the barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the right-of-way in conformance with the Standard Specifications.
- Silt fences that are damaged and become unsuitable for the intended purpose, as determined by the RE, shall be removed from the site of work, disposed of in conformance with the Standard Specifications, and replaced with new silt fence.
- Holes, depressions or other ground disturbance caused by the removal of the temporary silt fences shall be backfilled and repaired in conformance with the Standard Specifications.
- Remove silt fence when no longer needed or as required by the RE. Fill and compact holes and anchorage trench, remove sediment accumulation, and grade fence alignment to blend with adjacent ground.

G. Hay Bale Barriers:
- Inspect straw bale barriers before and after each rainfall event, and weekly throughout the rainy season.
- Inspect straw bale barriers for sediment accumulations and remove sediment when depth reaches 1/3 the barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.
- Replace or repair damaged bales as needed or as directed by the RE

- Repair washouts or other damages as needed or as directed by the RE
- Remove hay bales when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilize the area.

H. Construction Vehicles:
- Procedures and practices to minimize or eliminate the discharge of pollutants to the storm drain systems or to watercourses from vehicle and equipment maintenance procedures.
- These maintenance procedures will be applied to all construction projects where the storage and maintenance of heavy equipment and vehicles is necessary.
- Maintain waste fluid containers in leak proof condition.
- Vehicle and equipment maintenance areas shall be inspected regularly
- Vehicles and equipment shall be inspected on each day of use. Leaks shall be repaired immediately or the problem vehicles(s) or equipment shall be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

I. Temporary Soil and Rock Stockpiling:
- Repair and/or replace perimeter controls and covers as needed, or as directed by the RE, to keep them functioning properly. Sediment shall be removed when sediment accumulation reached 1/3 of the barrier height.

J. Concrete Truck Washout:
- Concrete washout facilities shall be inspected daily. Damaged or leaking facilities shall be deactivated and repaired or replaced immediately.
- Inspect the project site frequently to ensure that no concrete discharges are taking place in non-designated areas.
- Excess rainwater that has accumulated over hardened concrete should be pumped to a stabilized area.
- Accumulated hardened material shall be removed when 75% of the storage capacity of the facility is filled. Dispose of the hardened material off-site in a
- construction/demolition landfill.
- The plastic liner shall be replaced with each cleaning of the washout facility.

3.2 STORM WATER MANAGEMENT CONTROL

3.2.1 Peak Flow Attenuation

Under existing conditions, the project site is divided into two (2) drainage areas, draining to separate points of interest. Drainage Area #1 drains to Point of Interest #1 at the network of catch basins in Rella Boulevard. Drainage Area #2 drains to Point of Interest #2 at the network of catch basins in Airmont Road.

Under proposed conditions, the project site divided into two (2) drainage areas. Drainage Area #1 is further broken down into Drainage Area #1A, Drainage Area #1B, and Drainage Area #1C. Drainage Area #1A is captured in the proposed underground infiltration system under Roadway C. Drainage Area #1C is captured in the proposed underground infiltration system under Roadway B. Drainage Area #1C drains to the network of catch basins in Rella Boulevard, as in existing conditions. Drainage Area #2 is further broken down into Drainage

Area #2A and Drainage Area #2B. Drainage Area #2A is captured in the proposed infiltration basin. Drainage Area #2B drains to the network of catch basins in Airmont Road, as in existing conditions.

For Drainage Area #1A, the developed, impervious portion of the land (consisting of buildings/roofs, pavement, sidewalks, and 62% of the emergency access road) is captured in a a network of catch basins along Roadway C, and routed to the proposed underground infiltration system underneath Roadway C. For Drainage Area #1C, the developed, impervious portion of the land (consisting of buildings/roofs, pavement, sidewalks, and 62% of the emergency access road) is captured in a a network of catch basins along Roadway B, and routed to the proposed underground infiltration system underneath Roadway B. For Drainage Area #2A, the developed, impervious portion of the land (consisting of buildings/roofs, pavement, sidewalks, and 62% of the emergency access road) runs through a network of catch basins underneath Roadways A and D to the proposed infiltration basin. The infiltration basins have been designed and sized to handle the runoff from a 100-year storm.
Precipitation data utilized for the design of the proposed stormwater management system was taken from the *NOAA National Weather Service Precipitation Frequency Data Server (PFDS)*.

The proposed stormwater management system consists of two (2) underground infiltration systems, and one (1) infiltration basin. A soil percolation rate of 12 inches per hour was utilized based upon soil testing data. The proposed system will provide enough storage and infiltration volume to offset the increases in runoff associated with the proposed land disturbance on the site. The system has been sized to reduce the peak rate of runoff leaving the site for rainfall events having recurrence intervals ranging from 1 to 100 years. Peak discharges are summarized as follows:

Peak Discharge from project area to Point of Interest #1 (cfs)

FREQUENCY	EXISTING CONDITIONS	PROPOSED CONDITIONS	DIFFERENCE
1 YEAR	1.66	1.45	- 0.21
2 YEAR	3.52	2.76	- 0.76
10 YEAR	8.73	7.04	- 1.69
25 YEAR	12.75	10.80	- 1.95
100 YEAR	26.27	26.17	- 0.10

Peak Discharge from project area to Point of Interest #2 (cfs)

FREQUENCY	EXISTING CONDITIONS	PROPOSED CONDITIONS	DIFFERENCE
1 YEAR	1.16	1.12	- 0.04
2 YEAR	2.45	2.44	- 0.01
10 YEAR	6.07	5.89	- 0.18
25 YEAR	8.91	8.52	- 0.39
100 YEAR	18.38	18.23	- 0.15

3.2.2 Water Quality

The stormwater management system has also been designed to provide water quality and quantity controls as required by the New York State Department of Environmental Conservation (NYSDEC) SPDES General Permit for Stormwater Discharges from Construction. The design incorporates sizing for Water Quality Volume Control (WQv), Runoff Reduction Volume (RRv), Channel Protection Storage Volume (CPv), Overbank Flood Control (Qp) and Extreme Storm Flood Control (Qf). These five components of the water quality sizing criteria are further described as follows:

- The Water Quality Volume (WQv) is designed to improve water quality by capturing and treating 90% of the average annual stormwater runoff volume. The WQv is directly related to the amount of impervious cover on a project site. On this project the water quality volume will be treated by the use of infiltration in the underground stormwater management system.
- The Runoff Reduction Volume (RRv) is designed to control post-development water quality volumes to replicate pre-development hydrology by maintaining pre-construction infiltration, peak runoff flow, and discharge volume as well as minimizing concentrated flow. Runoff Reduction is achieved by infiltration, groundwater recharge, reuse and recycling by incorporating green infrastructure techniques and standard stormwater management practices with runoff reducing capacity. On this project the runoff reduction volume will be treated by the use of infiltration in the underground stormwater management system.
- The Channel Protection Storage Volume (Cpv) is designed to protect stream channels from erosion. The CPv is accomplished by providing 24 hour extended detention of the one-year, 24-hour storm event.
- The purpose of Overbank Flood Control (Qp) is to prevent an increase in the frequency and magnitude of out-of-bank flooding generated by urban development. Overbank Flood Control is accomplished by attenuating the post development 10-year, 24-hour peak discharge rate from the site to the pre-development rate.
- The purpose of Extreme Flood Control (Qf) is to prevent an increased risk of flood damage from large storm events, to maintain the boundaries of the pre-development 100- year floodplain, and to protect the physical integrity of stormwater management practices. Extreme Flood Control is accomplished by attenuating the post development 100-year, 24-hour peak discharge rate from the site to the pre-development rate.

The required Water Quality Volume was calculated in accordance with the procedure outlined in the *New York State Stormwater Management Design Manual*. The Overbank Flood Control and Extreme Storm Flood Control are provided by controlling the peak discharge from the project site for the 10 year and 100-year storms to pre-development rates.

The minimum pretreatment volume of 50% of the water quality volume must be provided prior to entry to an infiltration facility. This requirement will be met by ADS Pipe designed systems, which have been sized and designed to capture initial runoff from the disturbed areas of the site.

3.2.3 Runoff Reduction Volume

According to the NYSDEC Stormwater Management Design Manual, Runoff Reduction Volume (RRv) is a reduction of the total Water Quality Volume (WQv) by application of green infrastructure techniques and Standard Stormwater Management Practices (SMPs) to replicate pre-development hydrology. This concept is intended to improve the mitigation of the negative effects of stormwater runoff from development by incorporating the design and layout of stormwater management features into the site planning process. The three primary components that mitigate the negative effects of stormwater runoff are:

1. Avoiding Impacts – Avoid or minimize disturbance by preserving natural features and using conservation design techniques.
2. Reducing Impacts – Reducing the impacts of development by reducing impervious cover.
3. Managing Impacts – Manage the impacts by using natural features and runoff reduction practices to slow down the runoff, promote infiltration and minimize the need for structural “end-of-pipe” practices.

The RRv requirement can be accomplished by application of on-site green infrastructure techniques, standard stormwater management practices with runoff reduction capacity, and good operation and maintenance. The NYSDEC Stormwater Management Design Manual requires planners and designers to address this approach in an iterative site planning and design process. The iterative process is a five-step process that combines site planning with the use of various green infrastructure techniques and standard stormwater management practices until the RRv requirement is met. The iterative five-step process is as follows:

1. Site planning to preserve natural features and reduce impervious cover;
2. Calculation of the water quality volume for the site;
3. Incorporation of green infrastructure techniques and standard SMPs with RRv capacity;
4. Use of standard SMPs, where applicable; and
5. Design of volume and peak rate control practices where required.

If by using these techniques the calculated RRv is greater than the required WQv, the RRv requirement is met. If the RRv is less than the required WQv then the design must, at a minimum, reduce a percentage of the runoff from impervious areas to be constructed on the site. The percent reduction is based on the Hydrologic Soil Group of the site, and is determined by the Specific Reduction Factor (S). The Specific Reduction Factor (S) for this project is 0.20, based on the Hydrologic Soil Group ‘B’ soils present on the site.

The runoff reduction technique selected for this project is infiltration. Infiltration was determined to be suitable for the proposed project in consideration of factors including site topography, slopes, soil properties, project layout, and maintenance requirements.

The disturbed areas are being directed to the stormwater management system that utilizes infiltration. The entire water quality volume will be stored and infiltrated in the proposed system. Therefore, the runoff reduction requirement of 100% is achieved.

3.2.4 Maintenance

The maintenance of the stormwater management facilities is the self-responsibility of the property owner, and a legally binding maintenance agreement will be filed in the Office of the Rockland County Clerk. The maintenance agreement includes provisions for any necessary easements. This mechanism will protect the practices from neglect, adverse alteration and/or unauthorized removal.

The stormwater management system will be maintained in accordance with standard procedures and guidelines as contained in the latest edition of the New York State Stormwater Management Design Manual. An Operation and Maintenance (O&M) plan for the post-construction stormwater management practices is included in Section 12 of this SWPPP.

3.3 Other Controls

Waste Materials:
All waste materials will be collected and stored in securely lidded metal dumpsters to be rented from licensed solid waste management company located in Rockland County. The dumpsters will meet all Town, County, and New York State solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpsters. The dumpsters will be emptied as necessary, and the trash will be hauled off-site. No construction waste materials will be buried on site.

Hazardous Waste:
All hazardous waste materials will be disposed of in the manner specified by local or State regulation or by the manufacturer. Site personnel will be instructed in these practices and the individual, who manages day-to-day site operations, will be responsible for seeing that these practices are followed.

Sanitary Waste:
All sanitary waste will be collected from the portable units by a licensed sanitary waste management contractor.

Offsite Vehicle Tracking:
A Stabilized construction entrance will be provided to help reduce vehicle tracking of sediments. Existing paved roadways located adjacent to the construction site entrances will be swept daily to remove any excess mud, dirt or rock tracked from the site. Dump trucks hauling material from the construction site will be covered with a tarpaulin.

3.4 Timing of Controls/Measures

As indicated in the Sequence of Major Activities, the stabilized construction entrances and other sediment and erosion controls will be constructed prior to earthwork activities on any part of the site. Areas where construction activity temporarily ceases for at least 21 days will be stabilized with a temporary seed and mulch within 14 days of the last disturbance. Once construction activity ceases permanently in an area, that area will be stabilized with permanent seed and mulch. After the entire site is stabilized, accumulated sediments will be removed from the sediment and erosion control structures and the controls will be removed.

3.5 Certification of Compliance with Federal, State & Local Regulations

The storm water pollution plan reflects New York State Department of Environmental Conservation requirements for storm water management and erosion and sediment control, as established in Article 17, Titles 7, 8 and Article 70 of the Environmental Conservation Law. To ensure compliance, this plan was prepared in accordance with guidelines issued with the SPDES General Permit for Storm Water Discharges from Construction Activities that are classified as "Associated with Construction Activity," published by the New York State Department of Environmental Conservation.

3.5.1 Historic Places or Archeological Resources

According to a search that was conducted using the New York State Office of Parks, Recreation and Historic Places (OPRHP) Cultural Resource Information System (CRIS) online resource, there are no historic places listed, or eligible for listing, on the State or National Registers of Historic Places in the vicinity of the proposed project site. However, two (2) grave sites have been identified on the project site by ground penetrating radar. These graves will be preserved in place as part of the project.

According to the NYSDEC Environmental Resource Mapper, the project site is located in the vicinity of Northern Long-eared Bats that are listed as endangered or threatened. The search did not indicate any known areas of archeological sensitivity that may indicate the need for a survey in the vicinity of the proposed project.

4.0 MAINTENANCE/INSPECTION PROCEDURES

4.1 Sediment & Erosion Control Inspection and Maintenance Practices

The following are inspection and maintenance practices that will be used to maintain sediment and erosion controls.

- All Control measures will be inspected at least once each week and immediately following any storm event of 0.5 inches or greater.
- All measures will be maintained in good working order. If a repair is necessary. It will be initiated within 24 hours of report.
- Built-up sediment will be removed from silt fence when it has reached 1/3 the height of the fence.
- Silt fence will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.
- Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and healthy growth.
- A Maintenance inspection report will be made after each inspection.

  The Job Supervisor will select individuals who will be responsible for inspections, maintenance and repair activities, and filling out the inspection and maintenance report. Inspection reports shall summarize:
  1. Name of inspector
  2. Qualifications of inspector
  3. Areas inspected, including measurements
  4. Observed conditions
  5. Changes necessary to the SWPPP

5.0 NON-STORM WATER DISCHARGES

It is expected that the following non-storm water discharges will occur from the site during the construction period:

- Water from water line flushing.
- Waste water from power washing.
- Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred).

There are no stormwater discharges associated with industrial activity other than construction at the site, including, but not limited to, stormwater discharges from asphalt plants and concrete plants located on the construction site.

6.0 INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances listed below are expected to be present on the site during construction:

Concrete and Mortar
Detergents
Paints (enamel and latex)
Metal Pipe
Concrete
Fertilizers
Petroleum Based Products
Cleaning Solvents
Wood (treated and untreated)
Masonry

7.0 SPILL CONTROL & PREVENTION

7.1 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 storm water runoff.

Good Housekeeping:
The following good housekeeping practices will be followed during the construction project:

- An effort will be made to store only enough product required to do the job.
- Designate trash and bulk waste-collection areas on-site. Locate waste-collection areas away from streets, watercourses, and storm drains. Dumpsters shall be located near construction site entrances to minimize traffic on disturbed soils.
- Recycle materials whenever possible (e.g., paper, wood, concrete, oil)
- Clean up litter and debris from the construction site daily.
- All materials stored on site will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure
- Products will be kept in their original containers with the original manufacturer's label.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product will be used up before disposing of the container.
- Manufacturer's recommendations for proper use and disposal will be followed.
- Job Supervisor to inspect daily to ensure proper use and disposal of materials on site.

Hazardous Products:
The following practices will be used to reduce the risks associated with hazardous materials:

- Products will be kept in original containers unless they are not re-sealable.
- Original labels and material safety data will be retained; they contain important product information.
- If surplus product must be disposed of, manufacturers' or local and State recommended methods for proper disposal will be followed.

7.2 Product Specific Practices

The following product specific practices will be followed on site.

Concrete Trucks:
Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash on the site.

Petroleum Products:
All onsite vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled. Any asphalt substances used on site will be applied according to the manufacturer's recommendations.

Fertilizers:
Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer or specified. Once applied fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.
Paints:

All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm drainage system, but will be properly disposed of according to manufacturers' instructions or State and local regulations.

Detergents and Cleaning Solvents:
Detergents and cleaning solvents will only be utilized on site when needed for immediate maintenance of construction equipment. Detergents and cleaning solvents will be stored in sealed containers, and will not be disposed of on the site or discharged to the storm drainage system. Environmentally friendly solvents and cleaners will be utilized when available.

8.0 SPILL CONTROL AND PREVENTION LOG

Date of Spill	Material Spilled	Spill Location	Cause

Cleanup	Agency Reported (Toxic/Hazardous)	Reoccurrence Prevention Measure

8.1 Spill Control Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanups:

- Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area on site. Equipment and materials will include, but not be limited to, brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated, and personnel will wear appropriate protective clothing to prevent injury from contact with hazardous substance.
- Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of the size of the spill.
- The spill prevention plan will be adjusted to include measures to prevent this type of spill from re-occurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.

The Job Supervisor responsible for the day-to-day site operations will be the spill prevention and cleanup coordinator. He will designate at least three other site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase or prevention and cleanup. The names of responsible spill personnel will be posted in the material storage area and in the office trailer on site.

9.0 SUPPORTING PLANS & ANALYSES

- Soil Erosion and Sediment Control Plan for "Rella Boulevard" dated November 11, 2025 by Brooker Engineering, P.L.L.C.
- Drainage Analysis, by Brooker Engineering, P.L.L.C., dated November 12, 2025.

10.0 POLLUTION PREVENTION PLAN CERTIFICATIONS

SWPPP Preparer:

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.

Signed: _____

Date: _____

Owner

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.

_____	_____
(Signature)	(Printed Name)
_____	_____
(Owner Name)	(Title)
_____	_____
(Date)	(Phone Number)

11.0 Erosion Control Inspection Notes

12.0 POST CONSTRUCTION CONTROLS

The long-term maintenance of the stormwater management systems will be the responsibility of the property owner, and a legally binding maintenance agreement will be filed in the Office of the Rockland County Clerk. The maintenance agreement includes provisions for any necessary easements. This mechanism will protect the practices from neglect, adverse alteration and/or unauthorized removal.

The Operation and Maintenance (O&M) plan for the post-construction stormwater management practices shall include the following:

1. The owner(s) of the stormwater management systems shall erect or post, in the immediate vicinity of the facility, a conspicuous and legible sign of not less than 18 inches by 24 inches bearing the following information:

   STORMWATER MANAGEMENT PRACTICE
   (INFILTRATION SYSTEM or STORMWATER DETENTION SYSTEM)
   Project Identification - (*SPDES Construction Permit #)*
   This facility must be maintained in accordance with O&M Plan
   DO NOT REMOVE OR ALTER

2. The owner of the property shall be responsible for the operation and maintenance of the post-construction stormwater management practices. As of the date of the preparation of this SWPPP, the owner is identified as:

   Rella Partners LLC
   4 Executive Boulevard, Suite 200
   Suffern, NY 10901

3. The long-term operation and maintenance of the stormwater management practices shall be ensured by a legally binding maintenance agreement that is to be filed in the Office of the Rockland County Clerk. The maintenance agreement shall include provisions for any necessary easements.

4. A Soil Erosion and Sediment Control Plan is part of the Site Plans entitled “Rella Boulevard” prepared by Brooker Engineering, P.L.L.C. The Site Plans are considered a part of this SWPPP, and include schematics, measurements and specifications for the stormwater management practices on the site.

12.1 Post Construction Controls Reporting

The maintenance and inspection records for each fiscal year shall be dutifully retained by the owner as well as submitted to the Village of Monroe.

The report shall be entitled:

"20___ #RELLA BOULEVARD, VILLAGE OF MONTEBELLO, ROCKLAND COUNTY, NEW YORK"
"Annual Maintenance and Inspection Report"

The report cover shall also include the following information:

- Name of company who prepared or assisted in compiling information and inspections
- Date
- Name, address and phone number of current owner

The required inspections and reports are to be performed by a New York State licensed Professional Engineer. The reports shall include photographs of each structure and additional photos of any corrective work that is undergone for that fiscal year. If corrective work is conducted, work logs and inventory of materials shall be documented and included within the report.

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Appendix A

Details and Specifications for Various Erosion Control Measures

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STANDARD AND SPECIFICATIONS FOR CONSTRUCTION ROAD STABILIZATION



Definition & Scope

The stabilization of temporary construction access routes, on-site vehicle transportation routes, and construction parking areas to control erosion on temporary construction routes and parking areas.

Conditions Where Practice Applies

All traffic routes and parking areas for temporary use by construction traffic.

Design Criteria

Construction roads should be located to reduce erosion potential, minimize impact on existing site resources, and maintain operations in a safe manner. Highly erosive soils, wet or rocky areas, and steep slopes should be avoided. Roads should be routed where seasonal water tables are deeper than 18 inches. Surface runoff and control should be in accordance with other standards.

Road Grade – A maximum grade of 12% is recommended, although grades up to 15% are possible for short distances.

Road Width – 12 foot minimum for one-way traffic or 24 foot minimum for two-way traffic.

Side Slope of Road Embankment – 2:1 or flatter.

Ditch Capacity – On-site roadside ditch and culvert capacities shall be the 10 yr. peak runoff.

Composition – Use a 6-inch layer of NYS DOT sub-base Types 1,2,3, 4 or equivalent as specified in NYSDOT Standard Specifications.

Construction Specifications

1. Clear and strip roadbed and parking areas of all vegetation, roots, and other objectionable material.

2. Locate parking areas on naturally flat areas as available. Keep grades sufficient for drainage, but not more than 2 to 3 percent.

3. Provide surface drainage and divert excess runoff to stabilized areas.

4. Maintain cut and fill slopes to 2:1 or flatter and stabilized with vegetation as soon as grading is accomplished.

5. Spread 6-inch layer of sub-base material evenly over the full width of the road and smooth to avoid depressions.

6. Provide appropriate sediment control measures to prevent offsite sedimentation.

Maintenance

Inspect construction roads and parking areas periodically for condition of surface. Top dress with new gravel as needed. Check ditches for erosion and sedimentation after rainfall events. Maintain vegetation in a healthy, vigorous condition. Areas producing sediment should be treated immediately.

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STANDARD AND SPECIFICATIONS FOR CONCRETE TRUCK WASHOUT



Definition & Scope

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 soil.

Conditions Where Practice Applies

Washout facilities shall be provided for every project where concrete will be poured or otherwise formed on the site. This facility will receive highly alkaline wash water from the cleaning of chutes, mixers, hoppers, vibrators, placing equipment, trowels, and screeds. Under no circumstances will wash water from these operations be allowed to infiltrate into the soil or enter surface waters.

Design Criteria

Capacity: The washout facility should be sized to contain solids, wash water, and rainfall and sized to allow for the evaporation of the wash water and rainfall. Wash water shall be estimated at 7 gallons per chute and 50 gallons per hopper of the concrete pump truck and/or discharging drum. The minimum size shall be 8 feet by 8 feet at the bottom and 2 feet deep. If excavated, the side slopes shall be 2 horizontal to 1 vertical.

Location: Locate the facility a minimum of 100 feet from drainage swales, storm drain inlets, wetlands, streams and other surface waters. Prevent surface water from entering the structure except for the access road. Provide appropriate access 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.

Liner: 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.

If pre-fabricated washouts are used they must ensure the capture and containment of the concrete wash and be sized based on the expected frequency of concrete pours. They shall be sited as noted in the location criteria.

Maintenance

- All concrete washout facilities shall be inspected daily. Damaged or leaking facilities shall be deactivated and repaired or replaced immediately. Excess rainwater that has accumulated over hardened concrete should be pumped to a stabilized area, such as a grass filter strip.
- Accumulated hardened material shall be removed when 75% of the storage capacity of the structure is filled. Any excess wash water shall be pumped into a containment vessel and properly disposed of off site.
- Dispose of the hardened material off-site in a construction/demolition landfill. On-site disposal may be allowed if this has been approved and accepted as part of the projects SWPPP. In that case, the material should be recycled as specified, or buried and covered with a minimum of 2 feet of clean compacted earthfill that is permanently stabilized to prevent erosion.
- The plastic liner shall be replaced with each cleaning of the washout facility.
- Inspect the project site frequently to ensure that no concrete discharges are taking place in non-designated areas.

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STANDARD AND SPECIFICATIONS FOR DUST CONTROL



Definition & Scope

The control of dust resulting from land-disturbing activities, to prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and traffic safety problems.

Conditions Where Practice Applies

On construction roads, access points, and other disturbed areas subject to surface dust movement and dust blowing where off-site damage may occur if dust is not controlled.

Design Criteria

Construction operations should be scheduled to minimize the amount of area disturbed at one time. Buffer areas of vegetation should be left where practical. Temporary or permanent stabilization measures shall be installed. No specific design criteria is given; see construction specifications below for common methods of dust control.

Water quality must be considered when materials are selected for dust control. Where there is a potential for the material to wash off to a stream, ingredient information must be provided to the NYSDEC.

No polymer application shall take place without written approval from the NYSDEC.

Construction Specifications

A. **Non-driving Areas** – These areas use products and materials applied or placed on soil surfaces to prevent airborne migration of soil particles.

Vegetative Cover – For disturbed areas not subject to traffic, vegetation provides the most practical method of dust control (see Section 3).

Mulch (including gravel mulch) – Mulch offers a fast effective means of controlling dust. This can also include rolled erosion control blankets.

Spray adhesives – These are products generally composed of polymers in a liquid or solid form that are mixed with water to form an emulsion that is sprayed on the soil surface with typical hydroseeding equipment. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations for the specific soils on the site. In no case should the application of these adhesives be made on wet soils or if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators and others working with the material.

B. **Driving Areas** – These areas utilize water, polymer emulsions, and barriers to prevent dust movement from the traffic surface into the air.

Sprinkling – The site may be sprayed with water until the surface is wet. This is especially effective on haul roads and access route to provide short term limited dust control.

Polymer Additives – These polymers are mixed with water and applied to the driving surface by a water truck with a gravity feed drip bar, spray bar or automated distributor truck. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations. Incorporation of the emulsion into the soil will be done to the appropriate depth based on expected traffic. Compaction after incorporation will be by vibratory roller to a minimum of 95%. The prepared surface shall be moist and no application of the polymer will be made if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators working with the material.

Barriers – Woven geo-textiles can be placed on the driving surface to effectively reduce dust throw and particle migration on haul roads. Stone can also be used for construction roads for effective dust control.

Windbreak – A silt fence or similar barrier can control air currents at intervals equal to ten times the barrier height. Preserve existing wind barrier vegetation as much as practical.

Maintenance

Maintain dust control measures through dry weather periods until all disturbed areas are stabilized.

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STANDARD AND SPECIFICATIONS FOR STABILIZED CONSTRUCTION ACCESS



Definition & Scope

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 stabilized construction access is to reduce or eliminate the tracking of sediment onto public rights-of-way or streets.

Conditions Where Practice Applies

A stabilized construction access shall be used at all points of construction ingress and egress.

Design Criteria

See Figure 2.1 on page 2.31 for details.

Aggregate Size: Use a matrix of 1-4 inch stone, or reclaimed or recycled concrete equivalent.

Thickness: Not less than six (6) inches.

Width: 12-foot minimum but not less than the full width of points where ingress or egress occurs. 24-foot minimum if there is only one access to the site.

Length: As required, but not less than 50 feet (except on a single residence lot where a 30 foot minimum would apply).

Geotextile: To be placed over the entire area to be covered with aggregate. Filter cloth will not be required on a single-family residence lot. Piping of surface water under entrance shall be provided as required. If piping is impossible, a mountable berm with 5:1 slopes will be permitted.

Criteria for Geotextile: The geotextile shall be woven or nonwoven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric shall be inert to commonly encountered chemicals, hydro-carbons, mildew, rot resistant, and conform to the fabric properties as shown:

Fabric Properties[3]	Light Duty[1] Roads Grade Subgrade	Heavy Duty[2] Haul Roads Rough Graded	Test Method
Grab Tensile Strength (lbs)	200	220	ASTM D1682
Elongation at Failure (%)	50	60	ASTM D1682
Mullen Burst Strength (lbs)	190	430	ASTM D3786
Puncture Strength (lbs)	40	125	ASTM D751 Modified
Equivalent	40-80	40-80	US Std Sieve
Opening Size			CW-02215
Aggregate Depth	6	10	-

[1]Light Duty Road: Area sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Acceptable materials are Trevira Spunbond 1115, Mirafi 100X, Typar 3401, or equivalent.

[2]Heavy Duty Road: Area sites with only rough grading, and where most travel would be multi-axle vehicles. Acceptable materials are Trevira Spunbond 1135, Mirafi 600X, or equivalent.

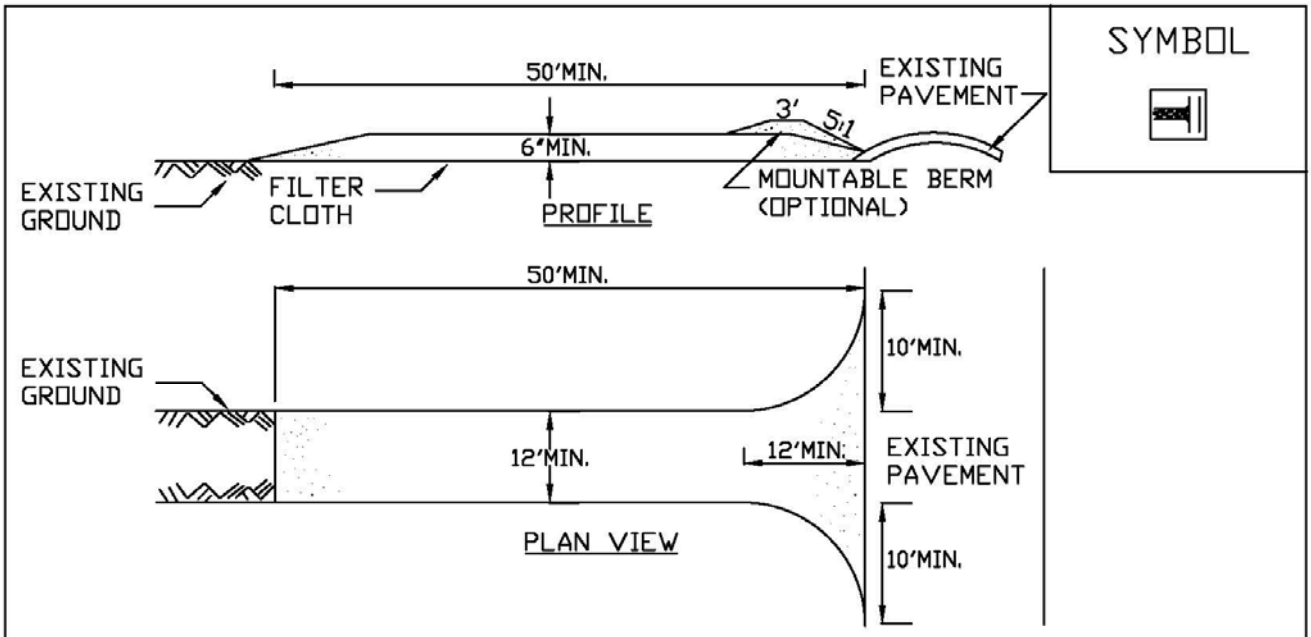
[3]Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

Maintenance

The access shall be maintained in a condition which will prevent tracking of sediment onto public rights-of-way or streets. 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 watercourses.

Figure 2.1
Stabilized Construction Access



CONSTRUCTION SPECIFICATIONS

1. STONE SIZE - USE 1-4 INCH STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. GEOTEXTILE - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ACCESS SHALL BE PIPED BENEATH 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 A 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.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

STABILIZED CONSTRUCTION ACCESS

STANDARD AND SPECIFICATIONS FOR WINTER STABILIZATION



Definition & Scope

A temporary site specific, enhanced erosion and sediment control plan to manage runoff and sediment at the site during construction activities in the winter months to protect off-site water resources.

Conditions Where Practice Applies

This standard applies to all construction activities involved with ongoing land disturbance and exposure between November 15th to the following April 1st.

Design Criteria

1. Prepare a snow management plan with adequate storage for snow and control of melt water, requiring cleared snow to be stored in a manner not affecting ongoing construction activities.

2. Enlarge and stabilize access points to provide for snow management and stockpiling. Snow management activities must not destroy or degrade installed erosion and sediment control practices.

3. A minimum 25 foot buffer shall be maintained from all perimeter controls such as silt fence. Mark silt fence with tall stakes that are visible above the snow pack.

4. Edges of disturbed areas that drain to a waterbody within 100 feet will have 2 rows of silt fence, 5 feet apart, installed on the contour.

5. Drainage structures must be kept open and free of snow and ice dams. All debris, ice dams, or debris from plowing operations, that restrict the flow of runoff and meltwater, shall be removed.

6. Sediment barriers must be installed at all appropriate perimeter and sensitive locations. Silt fence and other practices requiring earth disturbance must be installed before the ground freezes.

7. Soil stockpiles must be protected by the use of established vegetation, anchored straw mulch, rolled stabilization matting, or other durable covering. A barrier must be installed at least 15 feet from the toe of the stockpile to prevent soil migration and to capture loose soil.

8. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures should be initiated by the end of the next business day and completed within three (3) days. Rolled erosion control blankets must be used on all slopes 3 horizontal to 1 vertical or steeper.

9. If straw mulch alone is used for temporary stabilization, it shall be applied at double the standard rate of 2 tons per acre, making the application rate 4 tons per acre. Other manufactured mulches should be applied at double the manufacturer's recommended rate.

10. To ensure adequate stabilization of disturbed soil in advance of a melt event, areas of disturbed soil should be stabilized at the end of each work day unless:

    a. work will resume within 24 hours in the same area and no precipitation is forecast or;

    b. the work is in disturbed areas that collect and retain runoff, such as open utility trenches, foundation excavations, or water management areas.

11. Use stone paths to stabilize access perimeters of buildings under construction and areas where construction vehicle traffic is anticipated. Stone paths should be a minimum 10 feet in width but wider as necessary to accommodate equipment.

Maintenance

The site shall be inspected frequently to ensure that the erosion and sediment control plan is performing its winter stabilization function. If the site will not have earth disturbing activities ongoing during the "winter season", **all** bare exposed soil must be stabilized by established vegetation, straw or other acceptable mulch, matting, rock, or other approved material such as rolled erosion control products. Seeding of areas with mulch cover is preferred but seeding alone is not acceptable for proper stabilization.

Compliance inspections must be performed and reports filed properly in accordance with the SWPPP for all sites under a winter shutdown.

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STANDARD AND SPECIFICATIONS FOR CHECK DAM



Definition & Scope

Small barriers or dams constructed of stone, bagged sand or gravel, or other durable materials across a drainageway to reduce erosion in a drainage channel by reducing the velocity of flow in the channel.

Conditions Where Practice Applies

This practice is used as a **temporary** and, in some cases, a **permanent** measure to limit erosion by reducing velocities in open channels that are degrading or subject to erosion or where permanent stabilization is impractical due to short period of usefulness and time constraints of construction.

Design Criteria

Drainage Area: Maximum drainage area above the check dam shall not exceed two (2) acres.

Height: Not greater than 2 feet. Center shall be maintained 9 inches lower than abutments at natural ground elevation.

Side Slopes: Shall be 2:1 or flatter.

Spacing: The check dams shall be spaced as necessary in the channel so that the crest of the downstream dam is at the elevation of the toe of the upstream dam. This spacing is equal to the height of the check dam divided by the channel slope.

Therefore: $$S = \frac{h}{s}$$

Where: S = spacing interval (ft.)
h = height of check dam (ft.)
s = channel slope (ft./ft.)

Example:

For a channel with a 4% slope and 2 ft. high stone check dams, they are spaced as follows: $$S = \frac{2\ \text{ft}}{0.04\ \frac{\text{ft}}{\text{ft}}} = 50\ \text{ft}$$

For stone check dams: Use a well graded stone matrix 2 to 9 inches in size (NYS – DOT Light Stone Fill meets these requirements).

The overflow of the check dams will be stabilized to resist erosion that might be caused by the check dam. See Figure 3.1 on page 3.3 for details.

Check dams should be anchored in the channel by a cutoff trench 1.5 ft. wide and 0.5 ft. deep and lined with filter fabric to prevent soil migration.

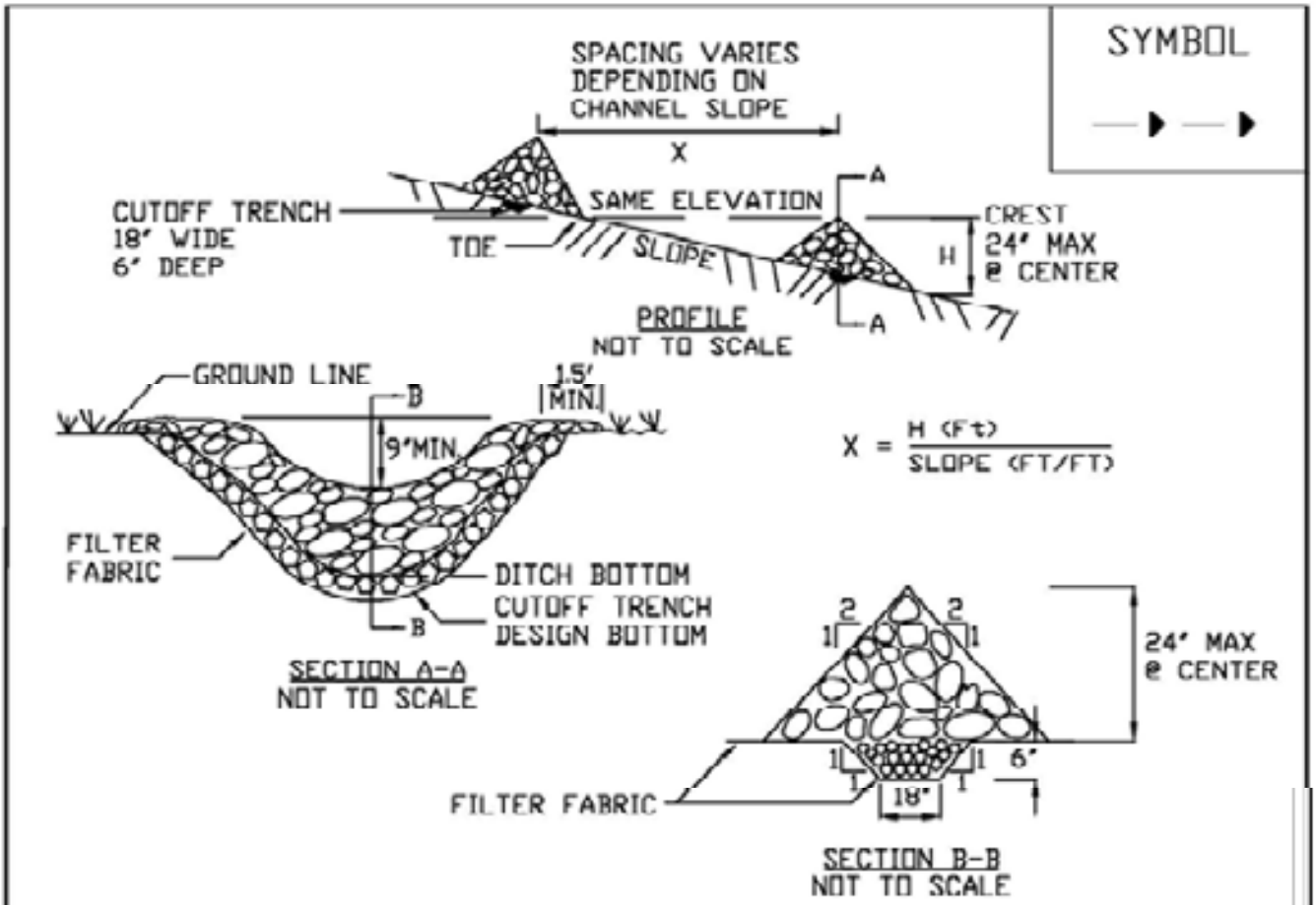
For filter sock or fiber roll check dams: The check dams will be anchored by staking the dam to the earth contact surface. The dam will extend to the top of the bank. The check dam will have a splash apron of NYS DOT #2 crushed stone extending a minimum 3 feet downstream from the dam and 1 foot up the sides of the channel. The compost and materials for a filter sock check dam shall meet the requirements shown in the standard for Compost Filter Sock on page 5.7.

Maintenance

The check dams should be inspected after each runoff event. Correct all damage immediately. If significant erosion has occurred between structures, a liner of stone or other suitable material should be installed in that portion of the channel or additional check dams added.

Remove sediment accumulated behind the dam as needed to allow channel to drain through the stone check dam and prevent large flows from carrying sediment over the dam.

Figure 3.1
Stone Check Dam Detail



CONSTRUCTION SPECIFICATIONS

1. STONE WILL BE PLACED ON A FILTER FABRIC FOUNDATION TO THE LINES, GRADES AND LOCATIONS SHOWN IN THE PLAN.
2. SET SPACING OF CHECK DAMS TO ASSUME THAT THE ELEVATIONS OF THE CREST OF THE DOWNSTREAM DAM IS AT THE SAME ELEVATION OF THE TOE OF THE UPSTREAM DAM.
3. EXTEND THE STONE A MINIMUM OF 1.5 FEET BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
4. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWEST CHECK DAM FROM SCOUR AND EROSION WITH STONE OR LINER AS APPROPRIATE.
5. ENSURE THAT CHANNEL APPURTENANCES SUCH AS CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONE.

MAXIMUM DRAINAGE AREA 2 ACRES.

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STONE CHECK DAM

STANDARD AND SPECIFICATIONS FOR CONSTRUCTION DITCH



Definition & Scope

A **temporary** excavated drainage way to intercept sediment laden water and divert it to a sediment trapping device or to prevent runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet.

Conditions Where Practice Applies

Construction ditches are constructed:

1. to divert flows from entering a disturbed area.
2. intermittently across disturbed areas to shorten overland flow distances.
3. to direct sediment laden water along the base of slopes to a trapping device.
4. to transport offsite flows across disturbed areas such as rights-of-way.

Ditches collecting runoff from disturbed areas shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 3.2 on page 3.6 for details.

General

	Ditch A	Ditch B
Drainage Area	<5 Ac	5-10 Ac
Bottom Width of Flow Channel	4 ft.	6 ft.
Depth of Flow Channel	1 ft.	1 ft.
Side Slopes	2:1 or flatter	2:1 or flatter
Grade	0.5% Min. 10% Max.	0.5% Min. 10% Max.

For drainage areas larger than 10 acres, refer to the Standard and Specification for Grassed Waterways on page 3.23 and 3.24.

Stabilization

Stabilization of the ditch shall be completed within 2 days of installation in accordance with the appropriate standard and specifications for vegetative stabilization or stabilization with mulch as determined by the time of year. The flow channel shall be stabilized as per the following criteria:

The seeding for vegetative stabilization shall be in accordance with the standard on Page 4.78. The seeded area will be mulched in accordance with the standard on Page 4.39.

Type of Treatment	Channel Grade[1]	Flow Channel	
		A (<5 Ac.)	B (5-10 Ac.)
1	0.5-3.0%	Seed & Straw Mulch	Seed & Straw Mulch
2	3.1-5.0%	Seed & Straw Mulch	Seed and cover with RECP[2], Sod, or lined with plastic or 2" stone
3	5.1-8.0%	Seed and cover with RECP[2], Sod, or line with plastic or 2 in. stone	Line with 4-8 in. rip-rap or, geotextile
4	8.1-10%	Line with 4-8 in. rip-rap or geotextile	Site Specific Design

1 In highly erodible soils, as defined by the local approving agency, refer to the next higher slope grade for type of stabilization.
2 Rolled Erosion Control Product.

Outlet

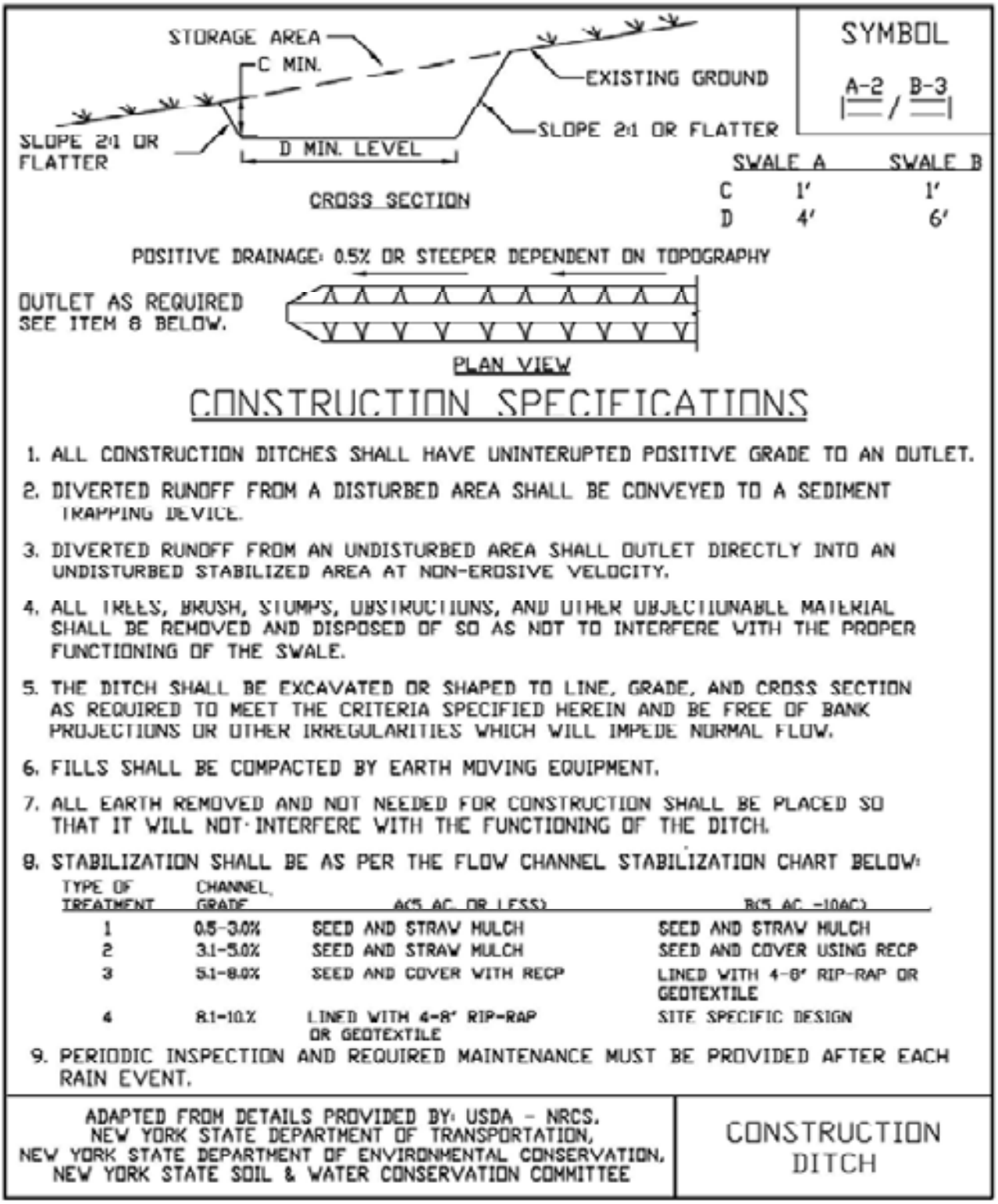
Ditch shall have an outlet that functions with a minimum of erosion, and dissipates runoff velocity prior to discharge off the site.

Runoff shall be conveyed to a sediment trapping device such as a sediment trap or sediment basin until the drainage area above the ditch is adequately stabilized.

The on-site location may need to be adusted to meet field conditions in order to utilize the most suitable outlet condition.

If a ditch is used to divert clean water flows from entering a disturbed area, a sediment trapping device may not be needed.

Figure 3.2
Construction Ditch Detail



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STANDARD AND SPECIFICATIONS FOR DEWATERING SUMP PIT



Discharge of turbid water pumped from the standpipe should be to a sediment trap, sediment basin, filter bag or stabilized area, such as a filter strip. If water from the sump pit will be pumped directly to a storm drain system, filter cloth with an equivalent sieve size between 40-80 should be wrapped around the standpipe to ensure clean water discharge. It is recommended that ¼ to ½ inch hardware cloth be wrapped around and secured to the standpipe prior to attaching the filter cloth. This will increase the rate of water seepage into the standpipe.

Definition & Scope

A **temporary** pit which is constructed using pipe and stone for pumping excessive water from excavations to a suitable discharge area.



Conditions Where Practice Applies

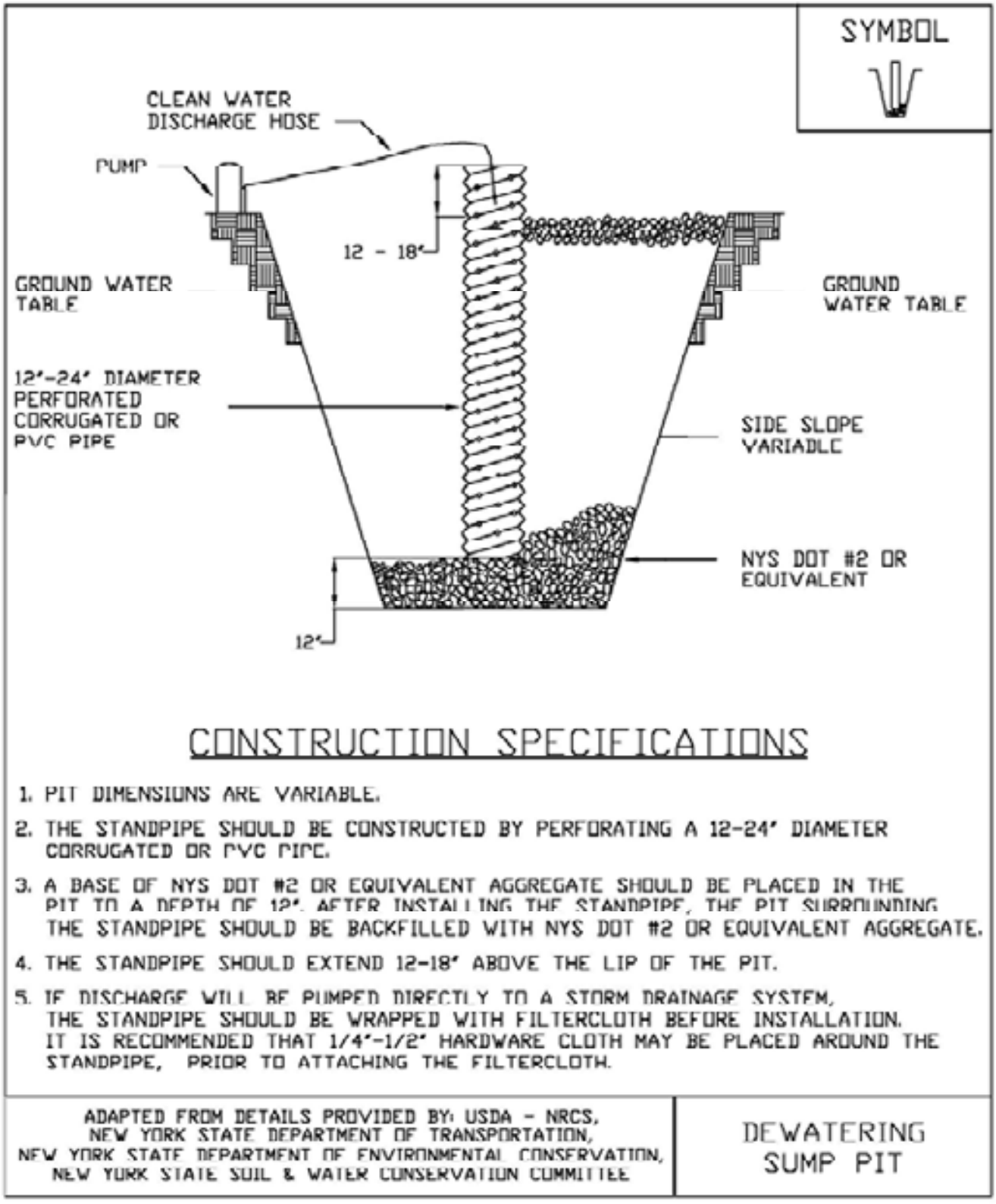
Sump pits are constructed when water collects during the excavation phase of construction. This practice is particularly useful in urban areas during excavation for building foundations. It may also be necessary during construction activities that encounter high ground water tables in floodplain locations.

Design Criteria

The number of sump pits and their locations shall be determined by the contractor/engineer. A design is not required, but construction should conform to the general criteria outlined on Figure 3.3 on page 3.8.

A perforated vertical standpipe is placed in the center of the pit and surrounded with a stone screening material to collect filtered water. Water is then pumped from the center of the pipe to a suitable discharge area.

Figure 3.3
Dewatering Sump Pit Detail



CONSTRUCTION SPECIFICATIONS

1. PIT DIMENSIONS ARE VARIABLE.
2. THE STANDPIPE SHOULD BE CONSTRUCTED BY PERFORATING A 12-24" DIAMETER CORRUGATED OR PVC PIPE.
3. A BASE OF NYS DOT #2 OR EQUIVALENT AGGREGATE SHOULD BE PLACED IN THE PIT TO A DEPTH OF 12". AFTER INSTALLING THE STANDPIPE, THE PIT SURROUNDING THE STANDPIPE SHOULD BE BACKFILLED WITH NYS DOT #2 OR EQUIVALENT AGGREGATE.
4. THE STANDPIPE SHOULD EXTEND 12-18" ABOVE THE LIP OF THE PIT.
5. IF DISCHARGE WILL BE PUMPED DIRECTLY TO A STORM DRAINAGE SYSTEM, THE STANDPIPE SHOULD BE WRAPPED WITH FILTERCLOTH BEFORE INSTALLATION. IT IS RECOMMENDED THAT 1/4"-1/2" HARDWARE CLOTH MAY BE PLACED AROUND THE STANDPIPE, PRIOR TO ATTACHING THE FILTERCLOTH.

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DEWATERING
SUMP PIT

STANDARD AND SPECIFICATIONS FOR DIVERSION



Definition & Scope

A drainage way of parabolic or trapezoidal cross-section with a supporting ridge on the lower side that is constructed across the slope to intercept and convey runoff to stable outlets at non-erosive velocities.

Conditions Where Practice Applies

Diversions are used where:

1. Runoff from higher areas has potential for damaging properties, causing erosion, or interfering with, or preventing the establishment of, vegetation on lower areas.

2. Surface and/or shallow subsurface flow is damaging sloping upland.

3. The length of slopes needs to be reduced so that soil loss will be kept to a minimum.

Diversions are only applicable below stabilized or protected areas. Avoid establishment on slopes greater than fifteen percent. Diversions should be used with caution on soils subject to slippage. Construction of diversions shall be in compliance with state and local drainage and water laws.

Design Criteria

Location

Diversion location shall be determined by considering outlet conditions, topography, land use, soil type, length of slope, seep planes (when seepage is a problem), and the development layout.

Capacity

Peak rates of runoff values used in determining the capacity requirements shall be calculated using the most current hydrologic data from the Northeast Regional Climate Center in an appropriate model.

The constructed diversion shall have capacity to carry, as a minimum, the peak discharge from a 10 year frequency rainfall event with freeboard of not less than 0.3 feet.

Diversions designed to protect homes, schools, industrial buildings, roads, parking lots, and comparable high-risk areas, and those designed to function in connection with other structures, shall have sufficient capacity to carry peak runoff expected from a storm frequency consistent with the hazard involved.

Cross Section

The diversion channel shall be parabolic or trapezoidal in shape. Parabolic Diversion design charts are provided in Tables 3.2, 3.3 and 3.4 on pages 3.10, 3.12 and 3.13**.** The diversion shall be designed to have stable side slopes. The side slopes shall not be steeper than 2:1 and shall be flat enough to ensure ease of maintenance of the diversion and its protective vegetative cover.

The ridge shall have a minimum width of four feet at the design water elevation; a minimum of 0.3 feet freeboard and a reasonable settlement factor shall be provided.

Velocity and Grade

The permissible velocity for the specified method of stabilization will determine the maximum grade. Maximum permissible velocities of flow for the stated conditions of stabilization shall be as shown in Table 3.1 on page 3.10 of this standard.

Diversions are not usually applicable below high sediment producing areas unless land treatment practices or structural measures, designed to prevent damaging accumulations of sediment in the channels, are installed with, or before, the diversions.

Outlets

Each diversion must have an adequate outlet. The outlet may be a grassed waterway, vegetated or paved area, grade stabilization structure, flow spreader, flow diffuser, stable watercourse, or subsurface drain outlet. In all cases, the outlet must convey runoff to a point where outflow will not cause damage. Vegetated outlets shall be installed before diversion construction, if needed, to ensure establishment of

vegetative cover in the outlet channel.

The design elevation of the water surface in the diversion shall not be lower than the design elevation of the water surface in the outlet at their junction when both are operating at design flow.

Stabilization

Vegetated diversions shall be stabilized in accordance with the following tables.

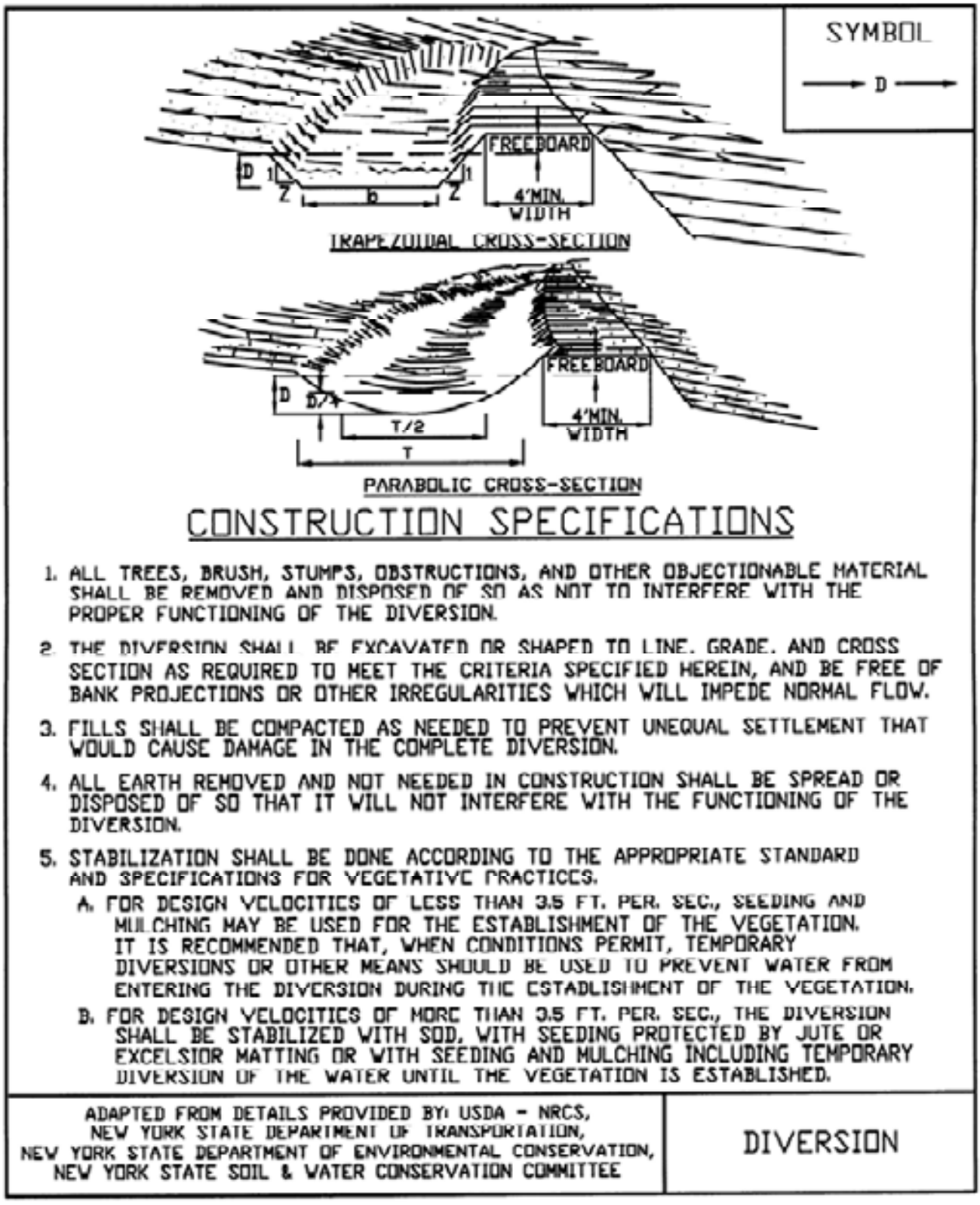
Table 3.1
Diversion Maximum Permissible Design Velocities Table

Soil Texture	Retardance and Cover	Permissible Velocity (ft / second) for Selected Channel Vegetation
Sand, Silt, Sandy loam, silty loam, loamy sand (ML, SM, SP, SW)	C-Kentucky 31 tall fescue and Kentucky bluegrass	3.0
	D-Annuals[1] Small grain (rye, oats, barley, millet) Ryegrass	2.5
Silty clay loam, Sandy clay loam (ML-CL, SC)	C-Kentucky 31 tall fescue and Kentucky bluegrass	4.0
	D-Annuals[1] Small grain (rye, oats, barley, millet) Ryegrass	3.5
Clay (CL)	C-Kentucky 31 tall fescue and Kentucky bluegrass	5.0
	D-Annuals[1] Small grain (rye, oats, barley, millet) Ryegrass	4.0
[1] Annuals—Use only as temporary protection until permanent vegetation is established.		

Table 3.2 - Retardance Factors for Various Grasses and Legumes Table

Retardance	Cover	Condition
A	Reed canarygrass	Excellent stand, tall (average 36 inches)
B	Smooth bromegrass	Good stand, mowed (average 12 to 15 inches)
	Tall fescue	Good stand, unmowed (average 18 inches)
	Grass-legume mixture—Timothy, smooth bromegrass, or Orchard grass with birdsfoot trefoil	Good stand, uncut (average 20 inches)
	Reed canarygrass	Good stand, mowed (average 12 to 15 inches)
	Tall fescue, with birdsfoot trefoil or ladino clover	Good stand, uncut (average 18 inches)
C	Redtop	Good stand, headed (15 to 20 inches)
	Grass-legume mixture—summer (Orchard grass, redtop, Annual ryegrass, and ladino or white clover)	Good stand, uncut (6 to 8 inches)
	Kentucky bluegrass	Good stand, headed (6 to 12 inches)
D	Red fescue	Good stand, headed (12 to 18 inches)
	Grass-legume mixture—fall, spring (Orchard grass, redtop, Annual ryegrass, and white or ladino clover)	Good stand, uncut (4 to 5 inches)

Figure 3.4
Diversion Detail



CONSTRUCTION SPECIFICATIONS

1. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE DIVERSION.
2. THE DIVERSION SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN, AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
3. FILLS SHALL BE COMPACTED AS NEEDED TO PREVENT UNEQUAL SETTLEMENT THAT WOULD CAUSE DAMAGE IN THE COMPLETE DIVERSION.
4. ALL EARTH REMOVED AND NOT NEEDED IN CONSTRUCTION SHALL BE SPREAD OR DISPOSED OF SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE DIVERSION.
5. STABILIZATION SHALL BE DONE ACCORDING TO THE APPROPRIATE STANDARD AND SPECIFICATIONS FOR VEGETATIVE PRACTICES.
   A. FOR DESIGN VELOCITIES OF LESS THAN 3.5 FT. PER. SEC., SEEDING AND MULCHING MAY BE USED FOR THE ESTABLISHMENT OF THE VEGETATION. IT IS RECOMMENDED THAT, WHEN CONDITIONS PERMIT, TEMPORARY DIVERSIONS OR OTHER MEANS SHOULD BE USED TO PREVENT WATER FROM ENTERING THE DIVERSION DURING THE ESTABLISHMENT OF THE VEGETATION.
   B. FOR DESIGN VELOCITIES OF MORE THAN 3.5 FT. PER. SEC., THE DIVERSION SHALL BE STABILIZED WITH SOD, WITH SEEDING PROTECTED BY JUTE OR EXCELSIOR MATTING OR WITH SEEDING AND MULCHING INCLUDING TEMPORARY DIVERSION OF THE WATER UNTIL THE VEGETATION IS ESTABLISHED.

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DIVERSION

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STANDARD AND SPECIFICATIONS FOR EARTH DIKE



Definition & Scope

A **temporary** berm or ridge of compacted soil, located in such a manner as to channel water to a desired location. Its purpose is to direct runoff to a sediment trapping device, thereby reducing the potential for erosion and off site sedimentation. Earth dikes can also be used for diverting clean water away from disturbed areas.

Conditions Where Practice Applies

Earth dikes are often constructed across disturbed areas and around construction sites such as graded parking lots and subdivisions. The dikes shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 3.5 on page 3.15 for details.

General

	Dike A	Dike B
Drainage Area	<5 Ac	5-10 Ac
Dike Height	18 in.	36 in.
Dike Width	24 in.	36 in.
Flow Width	4 ft.	6 ft.
Flow Depth in Channel	8 in.	15 in.
Side Slopes	2:1 or flatter	2:1 or flatter
Grade	0.5% Min. 10% Max.	0.5% Min. 10% Max.

For drainage areas larger than 10 acres, refer to the Standard and Specifications for Diversion on page 3.9.

Stabilization

Stabilization of the dike shall be completed within 2 days of installation in accordance with the standard and specifications for seed and straw mulch or straw mulch only if not in seeding season. The flow channel shall be stabilized as per the following criteria:

Type of Treatment	Channel Grade[1]	Flow Channel	
		A (<5 Ac.)	B (5-10 Ac.)
1	0.5-3.0%	Seed & Straw Mulch	Seed & Straw Mulch
2	3.1-5.0%	Seed & Straw Mulch	Seed and cover with RECP, sod, or lined with plastic or 2” stone
3	5.1-8.0%	Seed and cover with RECP, Sod, or line with plastic or 2 in. stone	Line with 4-8 in. rip-rap or, geotextile
4	8.1-10%	Line with 4-8 in. rip-rap or geotextile	Site Specific Design

1 In highly erodible soils, as defined by the local approving agency, refer to the next higher slope grade for type of stabilization.

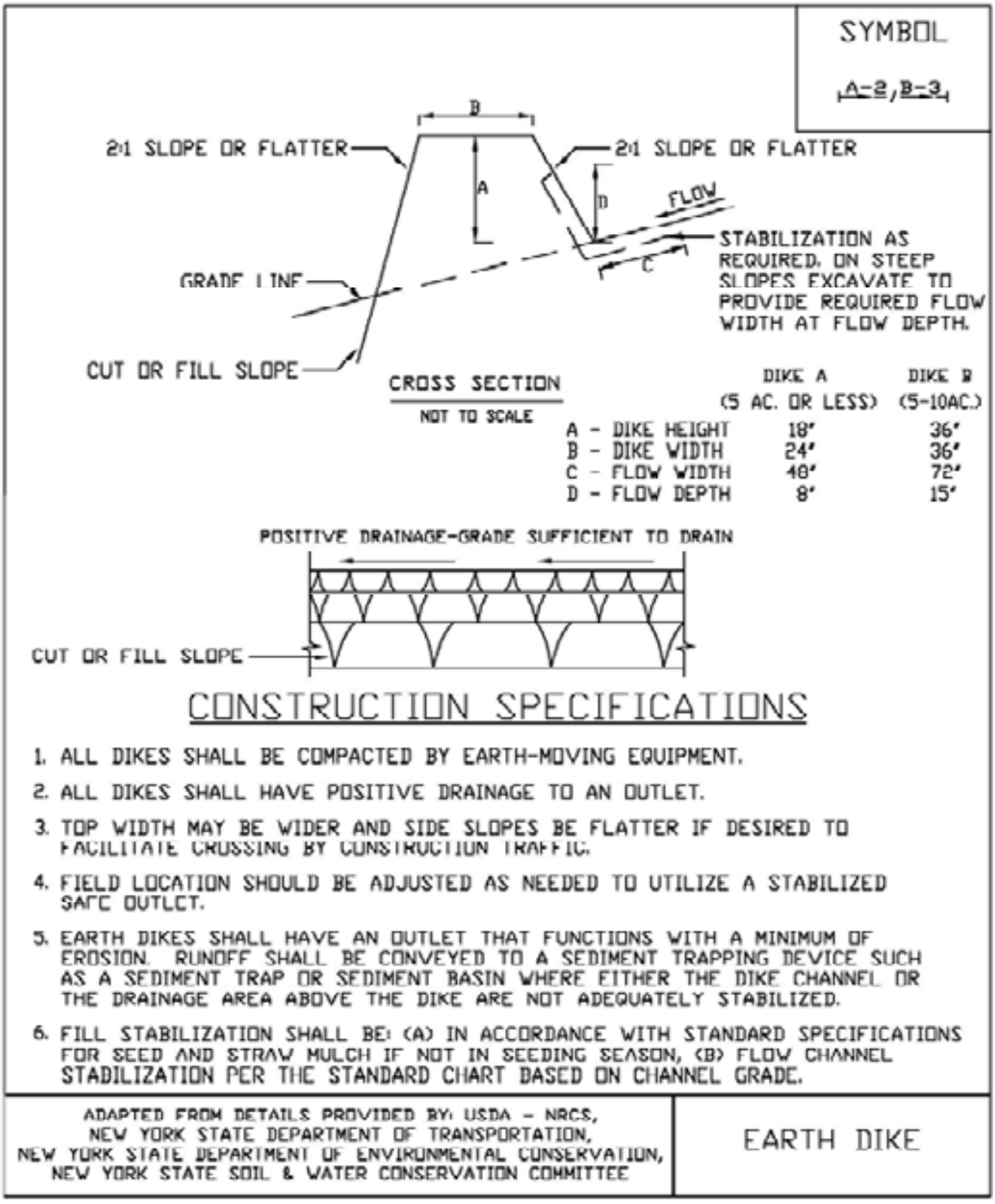
Outlet

Earth dikes shall have an outlet that functions with a minimum of erosion.

Runoff shall be conveyed to a sediment trapping device until the drainage area above the dike is adequately stabilized.

The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

Figure 3.5
Earth Dike Detail



STANDARD AND SPECIFICATIONS FOR FLOW DIFFUSER



Definition & Scope

A permanent non-erosive outlet for concentrated runoff constructed to diffuse flow uniformly through a stone matrix onto a stablilized area in the form of shallow, low velocity, sheet flow.

Conditions Where Practice Applies

Where sediment-free stormwater runoff can be released in low velocity sheet flow down stabilized areas without causing erosion; where the ground slope at the outlet of the diffuser is less than 30% and the runoff will not re-concentrate after release; and where construction of a flow spreader is not practicable.

Design Criteria

1. **Drainage area:** The maximum drainage area to the diffuser may not exceed 0.10 acre per foot length of the flow diffuser. The drainage area served by the diffuser discharging directly cannot be 10-20% more than half the size of the receiving buffer area.

2. **Discharge from diffuser onto receiving area:** The peak stormwater flow rate from a flow diffuser onto a receiving area from a 10-year 24-hour storm must be less than 0.25 cubic feet per second (0.25 cfs) per linear foot of weir crest length.

3. **Receiving area of buffer:** Each flow diffuser shall have a vegetated receiving area with a minimum continuous length of 150 feet and the capacity to pass the flow without erosion. The receiving area shall be stable prior to the construction of the flow diffuser. The receiving area shall have topography regular enough to prevent undue flow concentration before entering a stable watercourse but it shall have a slope that is less than 30%. If the receiving area is not presently stable, then the receiving area shall be stabilized prior to construction of the flow diffuser. The receiving area below the flow diffuser shall be protected from harm during construction. Sodding and/or turf reinforcement mat (TRM) in combination with vegetative measures shall stabilize disturbed areas. The receiving area shall not be used by the flow diffuser until stabilization has been accomplished. A temporary diversion may be necessary in this case.

4. **Cross-section:** The minimum stone diffuser cross-section shall be trapezoidal with a height of 1 foot above natural ground; top width equal to 2 foot and side slope equal to 1 horizontal to 1 vertical. The storage area behind the diffuser shall be excavated to a depth of 1 foot and overall width of storage area equal to 6 feet minimum.

5. **Sizing the diffuser:** The length of the stone diffuser is governed by the size of the stone in the structure, the height of the diffuser, and the flow length through it. The following equation is used to establish the design of the diffuser:

$$Q_d = \frac{h^{3/2} W}{[(\frac{L}{D}) + 2.5 + L^2]^{0.5}}$$

Where:

Q_d = Outflow through the stone diffuser (cfs)
h = Ponding depth behind the diffuser (ft.)
W = Linear length of the diffuser along centerline (ft.)
L = Average horizontal flow length through the diffuser perpendicular to the centerline (ft.)
D = Average stone diameter (d_{50}) in the structure (ft.)

The maximum d_{50} size shall be 9" or 0.75'.

The designer shall calculate the length of diffuser needed depending on the geometry of the cross-section and rock size to be used recognizing that the maximum allowable discharge through the diffuser shall be 0.25 cfs per foot of length.

Once the discharge is calculated for the 10 year storm for the drainage area to the diffuser (Q_{10}) it can be divided by the design discharge of the diffuser to determine the diffuser length as follows:

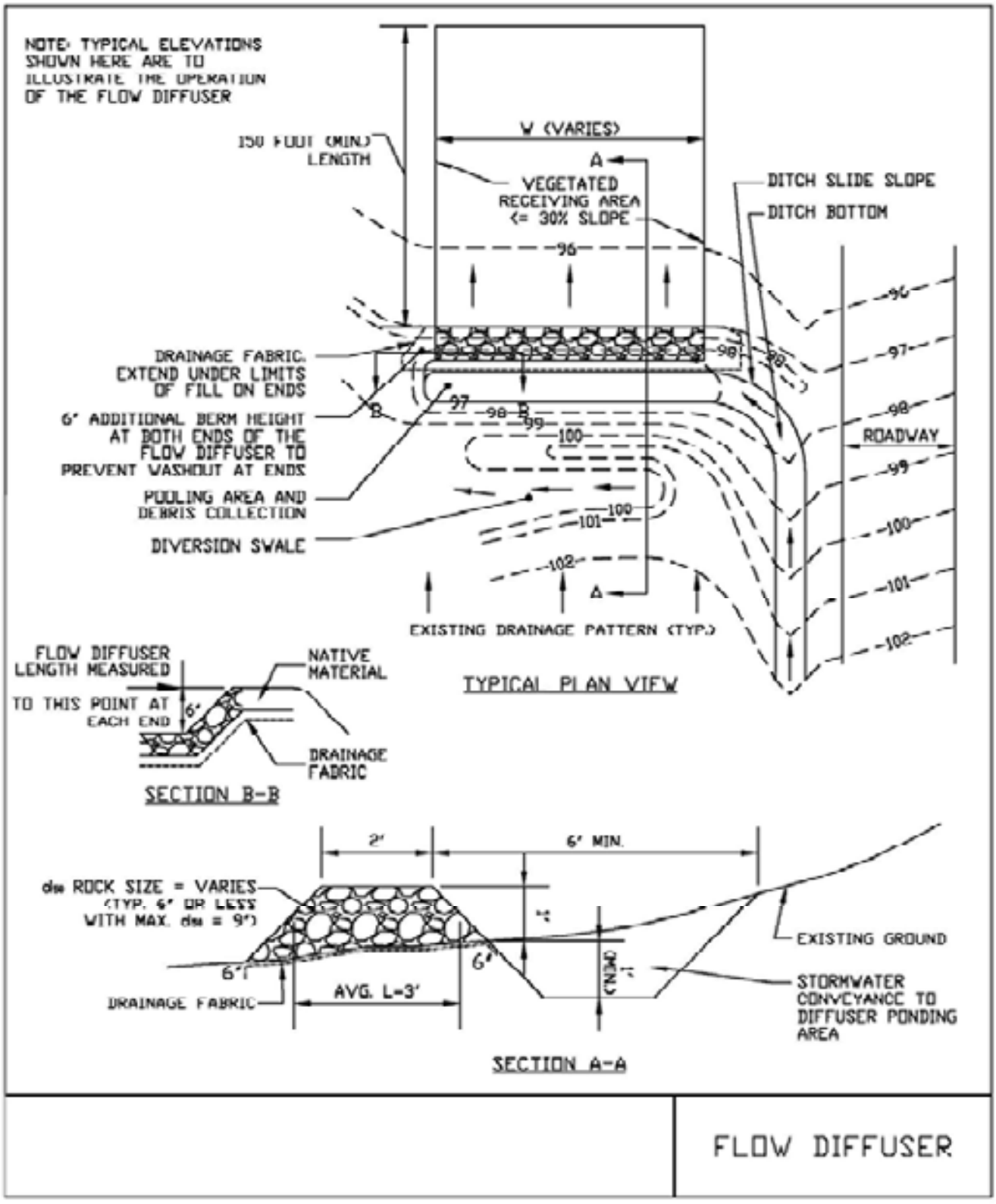
$$W = \frac{Q_{10}}{Q_d}$$

Where:

Q_d = Outflow through the stone diffuser (cfs/ft)
Q_{10} = Discharge rate for the 10 year storm (cfs)
W = Linear length of the diffuser along centerline (ft.)

Design examples are shown in Appendix B.

Figure 3.6
Flow Diffuser Detail



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STANDARD AND SPECIFICATIONS FOR FLOW SPREADER



Definition & Scope

A **permanent or temporary,** non-erosive outlet for concentrated runoff, constructed to disperse concentrated flow uniformly over a hardened weir into a stabilized area as shallow, low velocity, sheet flow.

Conditions Where Practice Applies

Where sediment-free storm runoff can be released in sheet flow down a stabilized slope without causing erosion; where a hardened level weir can be constructed without filling; where the area below the weir is uniform with a slope of 10% or less and the runoff will not re-concentrate after release; and where no traffic will disturb the flow spreader.

Design Criteria

1. **Drainage area:** The maximum drainage area to the spreader may not exceed 5 acres.

2. **Discharge to a flow spreader:** The peak stormwater flow rate to a flow spreader due to runoff from a 10-year 24-hour storm must be less than 0.5 cubic feet per second (0.5 cfs) per foot length of flow spreader lip.

3. **Length of flow spreader:** The flow spreader length may not be more than 30 feet if flow is entering from one end of the spreader. Longer lengths require flow to split evenly from the center of the spreader.

4. **Receiving area of buffer:** Each flow spreader shall have a vegetated receiving area with the capacity to pass the flow without erosion. The receiving area shall be stable prior to the construction of the flow spreader. The receiving area shall have topography regular enough to prevent undue flow concentration before entering a stable watercourse but it shall have a slope that is less than 10%. If the receiving area is not presently stable, then the receiving area shall be stabilized prior to construction of the flow spreader. The receiving area below the flow spreader shall be protected from harm during construction. Sodding and/or turf reinforced mat in combination with vegetative measures shall stabilize disturbed areas. The receiving area shall not be used by the flow spreader until stabilization has been accomplished. A temporary diversion may be necessary in this case.

5. **Weir:** The weir of the flow spreader should consist of a pressure treated 2"x12" timber plank laid on edge and set at level elevation perpendicular to flow. Alternate hardened weir structures may be used as long as a hard, durable, continuous weir is maintained.

6. **Channel:** The flow spreader entrance channel shall be a minimum of 1 foot deep with a minimum 2 foot bottom width to trap sediment and reduce lateral flow velocities. Side slopes shall be 2:1 or flatter. The channel shall be constructed with a 0% grade to ensure uniform flow distribution. Velocity entering the channel shall be reduced to ensure non-erosive low approach velocity in the weir.

7. **Maintenance:** Long term maintenance of the flow spreader is essential to ensure its continued effectiveness. The following provisions should be followed. In the first year the flow spreader should be inspected semi annually and following major storm events for any signs of channelization and should be immediately repaired. After the first year, annual inspection should be sufficient. Spreaders constructed of wood, asphalt, stone or concrete curbing require periodic inspection to check for damage and to be repaired as needed.

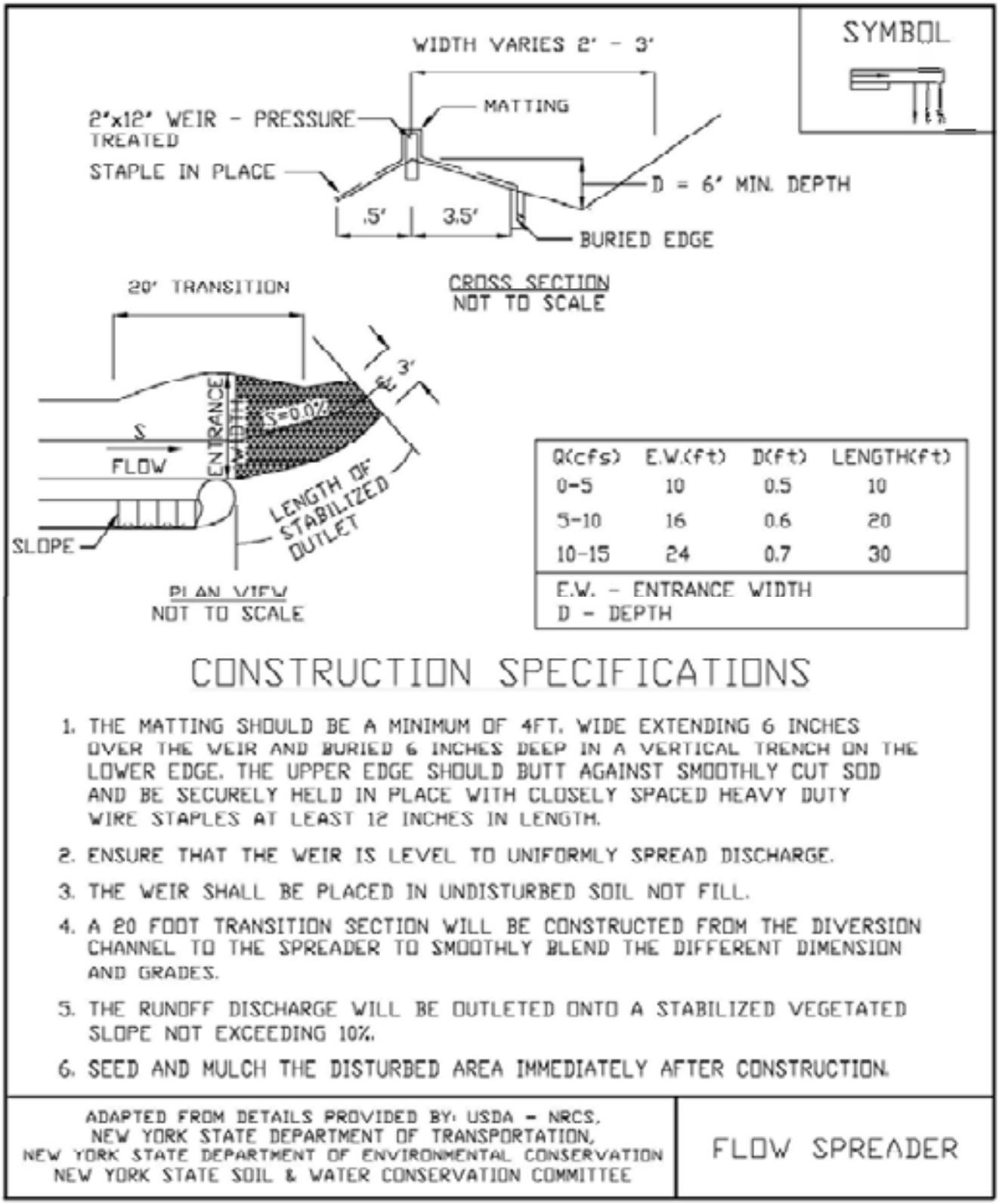
   A. **Inspections:** At least once a year, the spreader pool should be inspected for sand accumulation and debris that may reduce capacity.

   B. **Maintenance Access:** Flow spreaders should be sited to provide easy access for removal of accumulated sediment and rehabilitation of the berm.

   C. **Debris Removal:** Debris buildup within the channel should be removed when it has accumulated to approximately 10 to 20% of design volume or channel capacity. Remove debris such as leaf litter, branches, tree growth and any sediment build-up from the spreader and dispose of appropriately.

   D. **Mowing:** Vegetated spreaders may require

Figure 3.7
Flow Spreader Detail



Q(cfs)	E.W.(ft)	D(ft)	LENGTH(ft)
0-5	10	0.5	10
5-10	16	0.6	20
10-15	24	0.7	30

E.W. - ENTRANCE WIDTH
D - DEPTH

CONSTRUCTION SPECIFICATIONS

1. THE MATTING SHOULD BE A MINIMUM OF 4FT. WIDE EXTENDING 6 INCHES OVER THE WEIR AND BURIED 6 INCHES DEEP IN A VERTICAL TRENCH ON THE LOWER EDGE. THE UPPER EDGE SHOULD BUTT AGAINST SMOOTHLY CUT SOD AND BE SECURELY HELD IN PLACE WITH CLOSELY SPACED HEAVY DUTY WIRE STAPLES AT LEAST 12 INCHES IN LENGTH.
2. ENSURE THAT THE WEIR IS LEVEL TO UNIFORMLY SPREAD DISCHARGE.
3. THE WEIR SHALL BE PLACED IN UNDISTURBED SOIL NOT FILL.
4. A 20 FOOT TRANSITION SECTION WILL BE CONSTRUCTED FROM THE DIVERSION CHANNEL TO THE SPREADER TO SMOOTHLY BLEND THE DIFFERENT DIMENSION AND GRADES.
5. THE RUNOFF DISCHARGE WILL BE OUTLETED ONTO A STABILIZED VEGETATED SLOPE NOT EXCEEDING 10%.
6. SEED AND MULCH THE DISTURBED AREA IMMEDIATELY AFTER CONSTRUCTION.

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

FLOW SPREADER

STANDARD AND SPECIFICATIONS FOR PERIMETER DIKE/SWALE



Definition & Scope

A **temporary** ridge of soil formed by excavating an adjoining swale located along the perimeter of the site or disturbed area. Its purpose is to prevent off site storm run-on from entering a disturbed area and to prevent sediment laden storm runoff from leaving the construction site or disturbed area.

Conditions Where Practice Applies

Perimeter dike/swale is constructed to divert flows from entering a disturbed area, or along tops of slopes to prevent flows from eroding the slope, or along base of slopes to direct sediment laden flows to a trapping device.

The perimeter dike/swale shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 3.14 on page 3.36 for details.

The perimeter dike/swale shall not be constructed outside property lines or setbacks without obtaining legal easements from affected adjacent property owners. A design is not required for perimeter dike/swale. The following criteria shall be used:

Drainage area – Less than 2 acres (for drainage areas larger than 2 acres but less than 10 acres, see earth dike or construction ditch; for drainage areas larger than 10 acres, see standard and specifications for diversion).

Height – 18 inches minimum from bottom of swale to top of dike evenly divided between dike height and swale depth.

Bottom width of dike – 2 feet minimum.

Width of swale – 2 feet minimum.

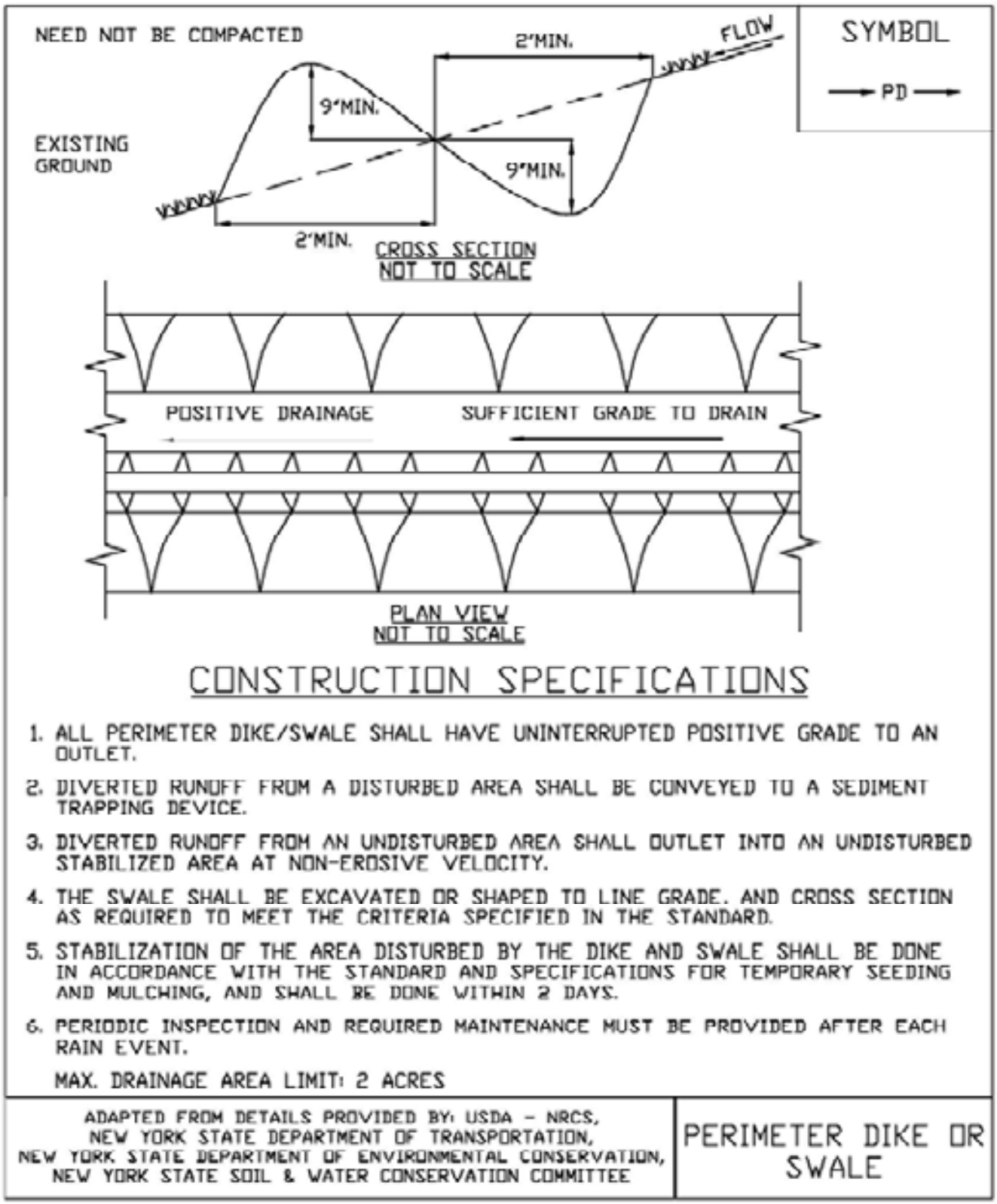
Grade – Dependent upon topography, but shall have positive drainage (sufficient grade to drain) to an adequate outlet. Maximum allowable grade not to exceed 8 percent.

Stabilization – The disturbed area of the dike and swale shall be stabilized within 2 days of installation, in accordance with the standard and specifications for construction ditch (page 3.4).

Outlet

1. Perimeter dike/swale shall have a stabilized outlet.
2. Diverted runoff from a protected or stabilized upland area shall outlet directly onto an undisturbed stabilized area.
3. Diverted runoff from a disturbed or exposed upland area shall be conveyed to a sediment trapping device such as a sediment trap, sediment basin, or to an area protected by any of these practices.
4. The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

Figure 3.14
Perimeter Dike/Swale Detail



CONSTRUCTION SPECIFICATIONS

1. ALL PERIMETER DIKE/SWALE SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSIVE VELOCITY.
4. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED IN THE STANDARD.
5. STABILIZATION OF THE AREA DISTURBED BY THE DIKE AND SWALE SHALL BE DONE IN ACCORDANCE WITH THE STANDARD AND SPECIFICATIONS FOR TEMPORARY SEEDING AND MULCHING, AND SHALL BE DONE WITHIN 2 DAYS.
6. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

MAX. DRAINAGE AREA LIMIT: 2 ACRES

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PERIMETER DIKE OR SWALE

STANDARD AND SPECIFICATIONS FOR PIPE SLOPE DRAIN



Definition & Scope

A **temporary** structure placed from the top of a slope to the bottom of a slope to convey surface runoff down slopes without causing erosion.

Conditions Where Practice Applies

Pipe slope drains are used where concentrated flow of surface runoff must be conveyed down a slope in order to prevent erosion. The maximum allowable drainage area shall be 3.5 acres.

Design Criteria

See Figure 3.15 on page 3.38 for details.

General

Size	Pipe/Tubing Diameter (in.)	Maximum Drainage Area (Ac.)
PSD-12	12	0.5
PSD-18	18	1.5
PSD-21	21	2.5
PSD-24	24	3.5

Inlet

The minimum height of the containment dike at the entrance to the pipe slope drain shall be the diameter of the pipe (D) plus 12 inches.

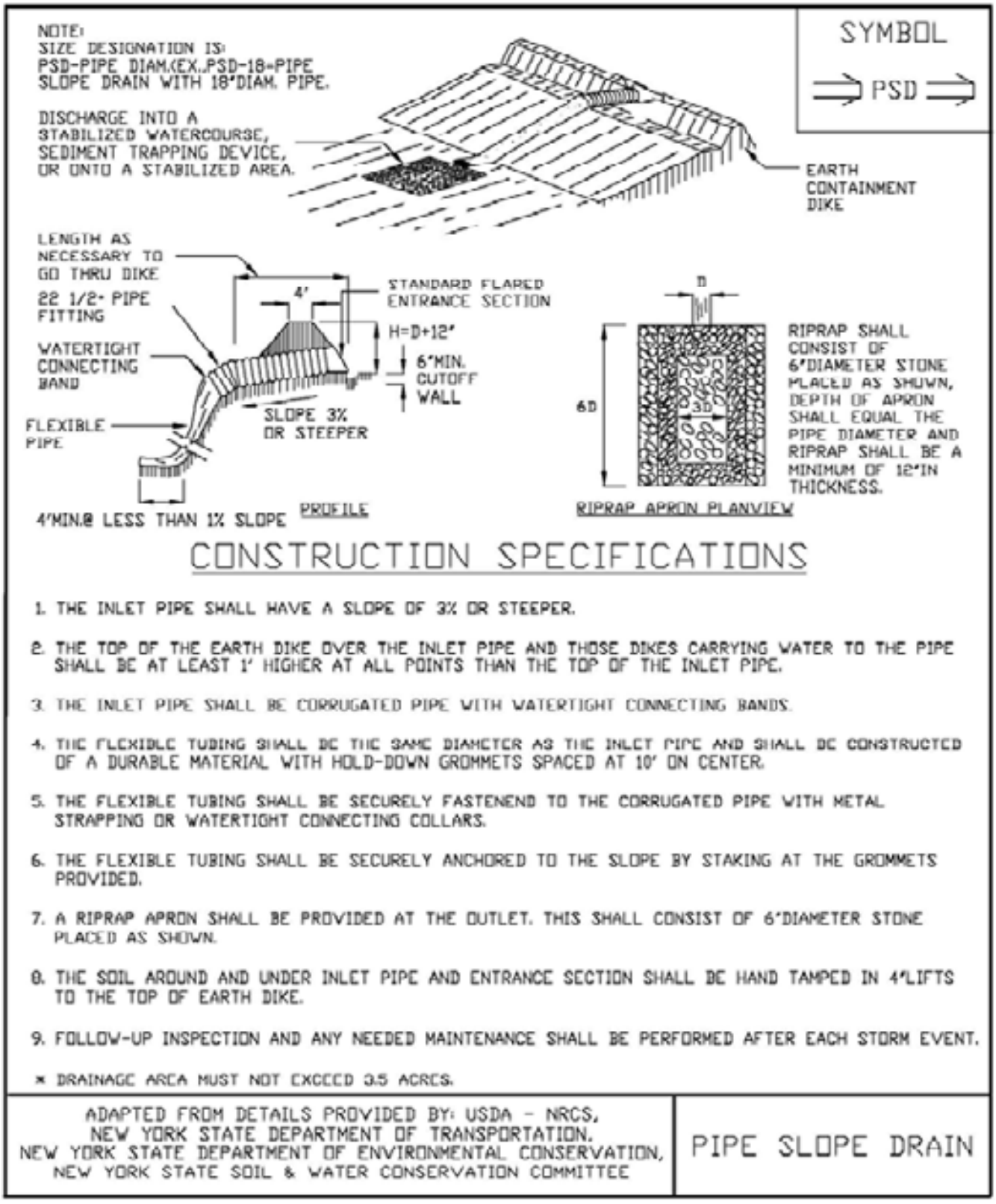
Outlet

The pipe slope drain shall outlet into a sediment trapping device when the drainage area is disturbed. A riprap apron shall be installed at all pipe outlet locations where water is being discharged.

Construction Specifications

1. The pipe slope drain shall have a slope of 3 percent or steeper.
2. The top of the containment dike over the inlet pipe, and those dikes carrying water to the pipe, shall be at least one (1) foot higher at all points than the top of the inlet pipe.
3. Corrugated plastic pipe or equivalent shall be used with watertight connecting bands.
4. A flared end section shall be attached to the inlet end of pipe with a watertight connection.
5. The soil around and under the pipe and end section shall be hand tamped in 4 in. lifts to the top of the earth dike.
6. Where flexible tubing is used, it shall be the same diameter as the inlet pipe and shall be constructed of a durable material with hold down grommets spaced 10 ft. on centers.
7. The flexible tubing shall be securely fastened to the corrugated plastic pipe with metal strapping or watertight connecting collars.
8. The flexible tubing shall be securely anchored to the slope by staking at the grommets provided.
9. Where a pipe slope drain outlets into a sediment trapping device, it shall discharge at the riser crest or weir elevation.
10. A riprap apron shall be used at all pipe outlet locations. See Figure 3.15 on page 3.38 .
11. Inspection and any needed maintenance shall be performed after each storm event.

Figure 3.15
Pipe Slope Drain Detail



STANDARD AND SPECIFICATIONS FOR STORM DRAIN DIVERSION



Definition & Scope

The **temporary** redirection of a storm drain line or outfall channel so that it may discharge into a sediment trapping device in order to prevent sediment laden water from entering a watercourse, public or private property through a storm drain system. This could either be above ground or an underground conveyance system to convey sediment laden water to a sediment trapping device.

Conditions Where Practice Applies

One of the following practices or procedures shall be used whenever the off-site drainage area is less than 50 percent of the on-site drainage area to that system. A special exception may be given, at the discretion of the local plan approval agency, where site conditions make this procedure impossible.

Method of Temporary Diversion

1. Construction of a sediment trap or basin below a permanent storm drain outfall. Temporarily diverts storm flow into the basin or trap constructed below permanent outfall channel.

2. In-line diversion of storm drain at an inlet or manhole, achieved by installing a pipe stub in the side of a manhole or inlet and temporarily blocking the permanent outfall pipe from that structure. A temporary outfall ditch or pipe may be used to convey storm flow from the stub to a sediment trap or basin. This method may be used just above a permanent outfall or prior to connecting into an existing storm drain system.

3. Delay completion of the permanent storm drain outfall and temporarily divert storm flow into a sediment basin or trap. Earth dike, swale or design diversion is used, depending on the drainage area, to direct flow into a sediment basin or trap. The basin or trap should be constructed to one side of the proposed permanent storm drain location whenever possible.

4. Installation of a stormwater management basin early in the construction sequence. Install temporary measures to allow use of this site as a sediment basin. Since these structures are designed to receive storm drain outfalls, diversion should not be necessary.

Completion and Disposition

When the areas contributing sediment to the system have been stabilized, procedures can be taken to restore the system to its planned use.

The following removal and restoration procedure is recommended:

1. Flush the storm drain system to remove any accumulated sediment.

2. Remove the sediment control devices, such as traps, basins, dikes, swales, etc.

3. For sites where an inlet was modified, brick and grout shut the temporary pipe stub and open the permanent outfall pipe.

4. Establish permanent stabilized outfall channel as noted on the plans.

5. Restore the area to grades shown on the plan and stabilize with vegetative measures.

6. For basins that will be incorporated into stormwater management facilities, remove the accumulated sediment, construct the stormwater facility as designed, and seed all disturbed areas to permanent vegetation.

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STANDARD AND SPECIFICATIONS FOR SUBSURFACE DRAIN



Definition & Scope

A **permanent** conduit, such as tile, pipe, or tubing, installed beneath the ground surface, which intercepts, collects, and/or conveys drainage water to serve one or more of the following purposes:

1. Improve the environment for vegetative growth by regulating the water table and groundwater flow.
2. Intercept and prevent water movement into a wet area.
3. Relieve artesian pressures.
4. Remove surface runoff.
5. Provide internal drainage of slopes to improve their stability and reduce erosion.
6. Provide internal drainage behind bulkheads, retaining walls, etc.
7. Replace existing subsurface drains that are interrupted or destroyed by construction operations.
8. Provide subsurface drainage for dry storm water management structures.
9. Improve dewatering of sediment in sediment basins. (See Standard and Specification for Sediment Basins in Section 5).

Conditions Where Practice Applies

Subsurface drains are used in areas having a high water table or where subsurface drainage is required. The soil shall have enough depth and permeability to permit installation of an effective system. This standard does not apply to storm drainage systems or foundation drains. Regulatory restrictions may apply if wetlands are present.

An outlet for the drainage system shall be available, either by gravity flow or by pumping. The outlet shall be adequate for the quantity of water to be discharged without causing damage above or below the point of discharge and shall comply with all state and local laws.

Design Criteria

The design and installation shall be based on adequate surveys and on-site soils investigations.

Required Capacity of Drains

The required capacity shall be determined by one or more of the following:

1. Where sub-surface drainage is to be uniform over an area through a systematic pattern of drains, a drainage coefficient of 1 inch to be removed in 24 hours shall be used; see Drain Chart, Figure 3.21 on page 3.51.
2. Where sub-surface drainage is to be by a random interceptor system, a minimum inflow rate of 0.5 cfs per 1,000 feet of line shall be used to determine the required capacity. If actual field tests and measurements of flow amounts are available, they may be used for determining capacity.

   For interceptor subsurface drains on sloping land, increase the inflow rate as follows:

Land Slope	Increase Inflow Rate By
2-5 percent	10 percent
5-12 percent	20 percent
Over 12 percent	30 percent

3. Additional design capacity must be provided if surface water is allowed to enter the system.

Size of Subsurface Drain

The size of subsurface drains shall be determined from the drain chart found on Figures 3.21 on page 3.51. All subsurface drains shall have a nominal diameter, which equals or exceeds four (4) inches.

Depth and Spacing

The minimum depth of cover of subsurface drains shall be 24 inches where possible. The minimum depth of cover may be reduced to 15 inches where it is not possible to attain the 24 inch depth and where the drain is not subject to equipment loading or frost action. Roots from some types of vegetation can plug drains, as the drains get closer to the surface.

The spacing of drain laterals will be dependent on the permeability of the soil, the depth of installation of the drains and degree of drainage required. Generally, drains installed 36 inches deep and spaced 50 feet center-to-center will be adequate. For more specific information, see the New York Drainage Guide (USDA-NRCS).

Minimum Velocity and Grade

The minimum grade for subsurface drains shall be 0.10 percent. Where surface water enters the system a velocity of not less than 2 feet per second shall be used to establish the minimum grades. Provisions shall be made for preventing debris or sediment from entering the system by means of filters or collection and periodic removal of sediment from installed traps.

Materials for Subsurface Drains

Acceptable subsurface drain materials include perforated, continuous closed joint conduits of polyethylene plastic, concrete, corrugated metal, polyvinyl chloride, and clay tile.

The conduit shall meet strength and durability requirements of the site.

Loading

The allowable loads on subsurface drain conduits shall be based on the trench and bedding conditions specified for the job. A factor of safety of not less than 1.5 shall be used in computing the maximum allowable depth of cover for a particular type of conduit.

Envelopes and Envelope Materials

Envelopes shall be used around subsurface drains for proper bedding and to provide better flow into the conduit. Not less than three inches of envelope material shall be used for sand/gravel envelopes. Where necessary to improve the characteristics of flow of groundwater into the conduit, more envelope material may be required.

Where county regulations do not allow sand/gravel envelopes, but require a special type and size of envelope material, they shall be followed.
Envelope material shall be placed to the height of the uppermost seepage strata. Behind bulkheads and retaining walls, it shall go to within twelve inches of the top of the structure. This standard does not cover the design of filter materials where needed.

Materials used for envelopes shall not contain materials which will cause an accumulation of sediment in the conduit or render the envelope unsuitable for bedding of the conduit. Envelope materials shall consist of either filter cloth or sand/gravel material, which shall pass a 1 ½ inch sieve, 90 to 100 percent shall pass a ¾ inch sieve, and not more than 10 percent shall pass a No. 60 sieve.

Filter cloth envelope can be either woven or non-woven monofilament yarns and shall have a sieve opening ranging from 40 to 80. The envelope shall be placed in such a manner that once the conduit is installed, it shall completely encase the conduit.

The conduit shall be placed and bedded in a sand/gravel envelope. A minimum of three inches depth of envelope materials shall be placed on the bottom of a conventional trench. The conduit shall be placed on this and the trench completely filled with envelope material to minimum depth of 3 inches above the conduit.

Soft or yielding soils under the drain shall be stabilized where required and lines protected from settlement by adding gravel or other suitable material to the trench, by placing the conduit on plank or other rigid support, or by using long sections of perforated or watertight pipe with adequate strength to ensure satisfactory subsurface drain performance.

Use of Heavy Duty Corrugated Plastic Drainage Tubing

Heavy duty corrugated drainage tubing shall be specified where rocky or gravelly soils are expected to be encountered during installation operations. The quality of tubing will also be specified when cover over this tubing is expected to exceed 24 inches for 4, 5, 6, or 8 inch tubing. Larger size tubing designs will be handled on an individual job basis.

Auxiliary Structure and Subsurface Drain Protection

The outlet shall be protected against erosion and undermining of the conduit, against damaging periods of submergence, and against entry of rodents or other animals into the subsurface drain. An animal guard shall be installed on the outlet end of the pipe. A swinging animal guard shall be used if surface water enters the pipe.

A continuous 10-foot section of corrugated metal, cast iron, polyvinyl chloride, or steel pipe without perforations shall be used at the outlet end of the line and shall outlet 1.0 foot above the normal elevation of low flow in the outlet ditch or

above mean high tide in tidal areas. No envelope material shall be used around the 10-foot section of pipe. Two-thirds of the pipe shall be buried in the ditch bank and the cantilevered section shall extend to a point above the toe of the ditch side slope. If not possible, the side slope shall be protected from erosion.

Conduits under roadways and embankments shall be water-tight and designed to exclude debris and prevent sediment from entering the conduit. Lines flowing under pressure shall be designed to withstand the resulting pressures and velocity of flow. Surface waterways shall be used where feasible.

The upper end of each subsurface drain line shall be capped with a tight fitting cap of the same material as the conduit or other durable material unless connected to a structure.

Construction Specifications

1. Deformed, warped, or otherwise damaged pipe or tubing shall not be used.

2. All subsurface drains shall be laid to a uniform line and covered with envelope material. The pipe or tubing shall be laid with the perforations down and oriented symmetrically about the vertical centerline. Connections will be made with manufactured appurtenances comparable in strength with the specified pipe or tubing unless otherwise specified. The method of placement and bedding shall be as specified on the drawing.

3. Envelope material shall consist of filter cloth or a sand/gravel (which shall pass the 1 ½ inch sieve, 90 to 100 percent shall pass ¾ inch sieve, and not more than 10 percent shall pass the No. 60 sieve).

4. The upper end of each subsurface drain line shall be capped with a tight fittings cap of the same material as the conduit or other durable material unless connected to a structure.

5. A continuous 10-foot section of corrugated metal, cast iron, polyvinyl chloride, or steel pipe without perforations shall be used at the outlet end of the line. No envelope material shall be used around the 10-foot section of the pipe. An animal guard shall be installed on the outlet end of the pipe.

6. Earth backfill material shall be placed in the trench in such a manner that displacement of the drain will not occur.

7. Where surface water is entering the system, the pipe outlet section of the system shall contain a swing type trash and animal guard.

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STANDARD AND SPECIFICATIONS FOR WATER BAR



Definition & Scope

A **permanent** or **temporary** ridge, ridge and channel, a structural channel, or flow deflector, constructed diagonally across a sloping road or utility right-of-way that is subject to erosion to limit the accumulation of erosive velocity of water by diverting surface runoff at pre-designed intervals.

Conditions Where Practice Applies

Where runoff protection is needed to prevent erosion from increased concentrated flow on narrow, steep access roads, driveways, and entrance ways to lot parcels as well as utility access right-of-ways generally up to 100 feet in width

Design Criteria

Design computations are not required.

1. The design height shall be minimum of 12 inches measured from channel bottom to ridge top.
2. The side slopes shall be 2:1 or flatter, a minimum of 4:1 where vehicles cross.
3. The base width of the ridge shall be six feet minimum.
4. The spacing of the water bars shall be as follows (Site spacing may need to be adjusted for field conditions to use the most suitable areas for water disposal):

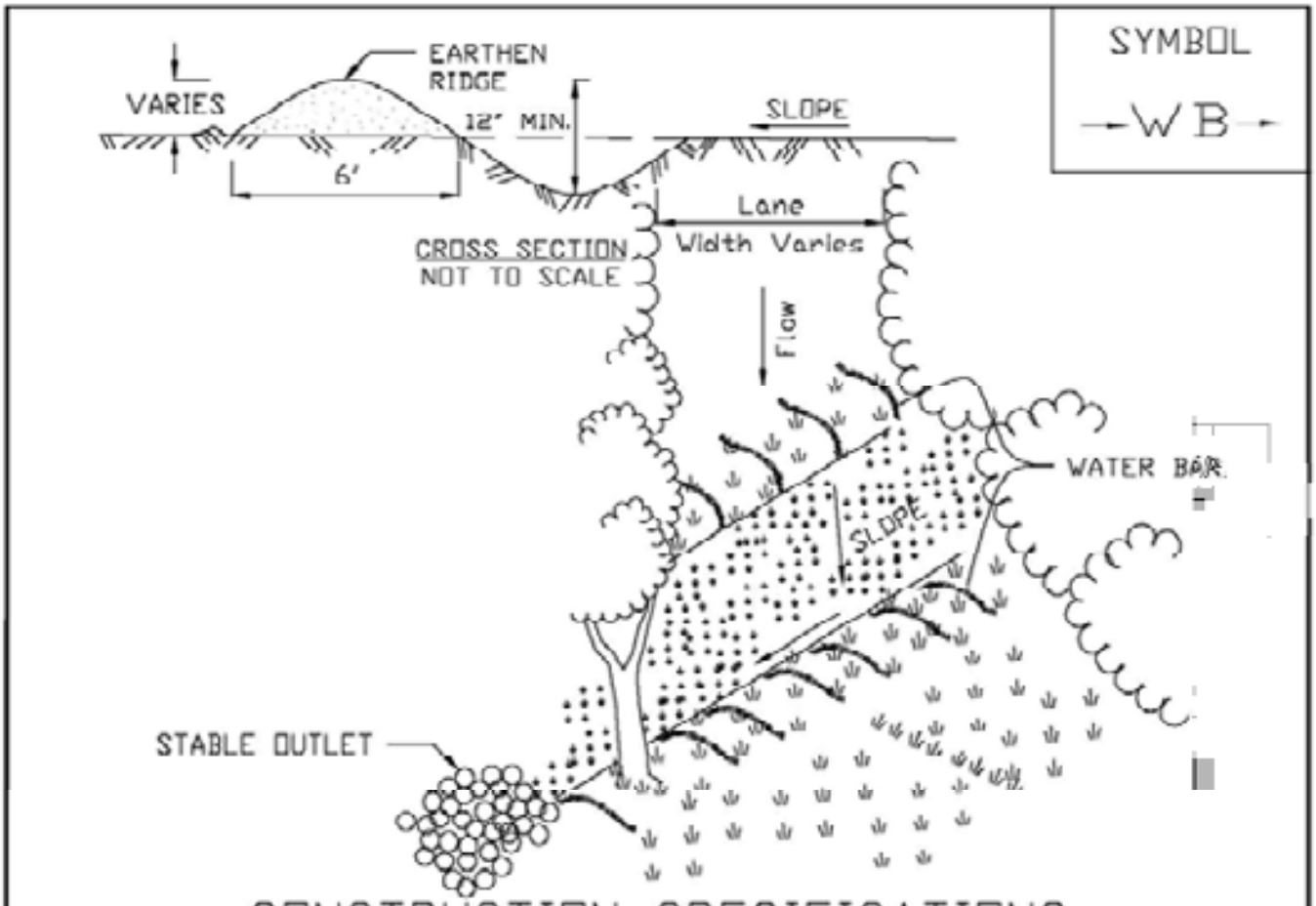
Slope (%)	Spacing (ft.)
<5	125
5 TO 10	100
10 TO 20	75
20 TO 35	50
>35	25

5. The positive grade of the water bar shall not exceed 2%. A crossing angle of approximately 60 degrees is preferred.
6. Once diverted, water must be conveyed to a stable system (i.e. vegetated swale or storm sewer system). Water bars should have stable, unrestricted outlets, either natural or constructed.

See Figure 3.22 on page 3.53 for details.



Figure 3.22
Water Bar Detail



CONSTRUCTION SPECIFICATIONS

1. INSTALL THE WATER BAR AS SOON AS THE RIGHT OF WAY IS CLEARED AND GRADED.
2. DISK OR STRIP THE SOD FROM THE BASE FOR THE CONSTRUCTED RIDGE BEFORE PLACING FILL.
3. TRACK THE RIDGE TO COMPACT IT TO THE DESIGN CROSS SECTION.
4. THE UNRESTRICTED OUTLET SHALL BE LOCATED ON AN UNDISTURBED AREA. FIELD SPACING WILL BE ADJUSTED TO USE THE MOST STABLE OUTLET AREAS. OUTLET PROTECTION WILL BE PROVIDED WHEN NATURAL AREAS ARE NOT ADEQUATE.
5. VEHICLE CROSSING SHALL BE STABILIZED WITH GRAVEL. EXPOSED AREAS SHALL BE SEEDED AND MULCHED WITHIN 2 DAYS.
6. PERIODICALLY INSPECT WATER BARS FOR EROSION DAMAGE AND SEDIMENT. CHECK OUTLET AREAS AND MAKE REPAIRS AS NEEDED TO RESTORE OPERATION.

ADAPTED FROM DETAILS PROVIDED BY: USDA – NRCS,
NEW YORK STATE DEPARTMENT OF TRANSPORTATION,
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION,
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

WATER BARS

STANDARD AND SPECIFICATIONS FOR ANCHORED STABILIZATION MATTING



Definition and Scope

A **temporary** or **permanent** protective covering placed on a prepared, seeded 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.

Conditions Where Practice Applies

Anchored stabilization mats are required for seeded earthen slopes steeper than 3 horizontal to 1 vertical; in vegetated channels where the velocity of the design flow exceeds the allowable velocity for vegetation alone (usually greater than 5 feet per second); on streambanks and shorelines where moving water is likely to erode newly seeded or planted areas; and in areas where wind prevents standard mulching with straw. This standard does not apply to slopes stabilized with sod, rock riprap or hard armor material.

Design Criteria

Slope Applications - Anchored stabilization mats for use on slopes are primarily used as mulch blankets where the mesh material is within the blanket or as a netting over previously placed mulch. These stabilization mats are NOT effective in preventing slope failures.

1. Required on all slopes steeper than 3:1
2. Matting will be designed for proper longevity need and strength based on intended use.
3. All installation details and directions will be included on the site erosion and sediment control plan and will follow manufactures specifications.

Channel Applications - Anchored stabilization mats, for use in supporting vegetation in flow channels, are generally a non-degradable, three dimensional plastic structure which can be filled with soil prior to planting. This structure provides a medium for root growth where the matting and roots become intertwined forming a continuous anchor for the vegetated lining.

1. Channel stabilization shall be based on the tractive force method.
2. For maximum design shear stresses less than 2 pounds per square foot, a temporary or bio-degradable mat may be used.
3. The design of the final matting shall be based on the mats ability to resist the tractive shear stress at bank full flow.
4. The installation details and procedures shall be included on the site erosion and sediment control plan and will follow manufacturers specifications.



Construction Specifications

1. Prepare soil before installing matting by smoothing the surface, removing debris and large stone, and applying lime, fertilizer and seed. Refer to manufacturers installation details.
2. Begin at the top of the slope by anchoring the mat in a 6” deep x 6” wide trench. Backfill and compact the trench after stapling.
3. In channels or swales, begin at the downslope end, anchoring the mat at the bottom and top ends of the blanket. When another roll is needed, the upslope roll

should overlay the lower layer, shingle style, so that channel flows do not peel back the material.

4. Roll the mats down a slope with a minimum 4" overlap. Roll center mat in a channel in direction of water flow on bottom of the channel. Do not stretch blankets. Blankets shall have good continuous contact with the underlying soil throughout its entire length.

5. Place mats end over end (shingle style) with a 6" overlap, use a double row of staggered staples 4" apart to secure mats.

6. Full length edge of mats at top of side slopes must be anchored in 6" deep x 6" wide trench; backfill and compact the trench after stapling.

7. Mats on side slopes of a channel must be overlapped 4" over the center mat and stapled.

8. In high flow channel applications, a staple check slot is recommended at 30 to 40 foot intervals. Use a row of staples 4" apart over entire width of the channel. Place a second row 4" below the first row in a staggered pattern.

9. The terminal end of the mats must be anchored in a 6"x6" wide trench. Backfill and compact the trench after stapling.

10. Stapling and anchoring of blanket shall be done in accordance with the manufactures recommendations.

Maintenance

Blanketed areas shall be inspected weekly and after each runoff event until perennial vegetation is established to a minimum uniform 80% coverage throughout the blanketed area. Damaged or displaced blankets shall be restored or replaced within 2 calendar days.

STANDARD AND SPECIFICATIONS FOR FIBER ROLL



Definition & Scope

A fiber roll is a coir (coconut fiber), straw, or excelsior roll encased in netting of jute, nylon, or burlap to dissipate energy along streambanks, channels, and bodies of water and to reduce sheet flow on slopes.

Conditions Where Practice Applies

Fiber rolls are used where the water surface levels are relatively constant. Artificially controlled streams for hydropower are not good candidates for this technique. The rolls provide a good medium for the introduction of herbaceous vegetation. Planting in the fiber roll is appropriate where the roll will remain continuously wet.

Design Criteria

1. The roll is placed in a shallow trench dug below baseflow or in a 4 inch trench on the slope contour and anchored by 2" x 2", 3-foot long posts driven on each side of the roll (see Figure 4.8).

2. The roll is contained by a 9-gauge non-galvanized wire placed over the roll from post to post. Braided nylon rope (1/8" thick) may be used.

3. The anchor posts shall be spaced laterally 4 feet on center on both sides of the roll and driven down to the top of the roll.

4. Soil is placed behind the roll and planted with suitable herbaceous or woody vegetation. If the roll will be continuously saturated, wetland plants may be planted into voids created in the upper surface of the roll.

5. Where water levels may fall below the bottom edge of the roll, a brush layer of willow should be installed so as to lay across the top edge of the roll.

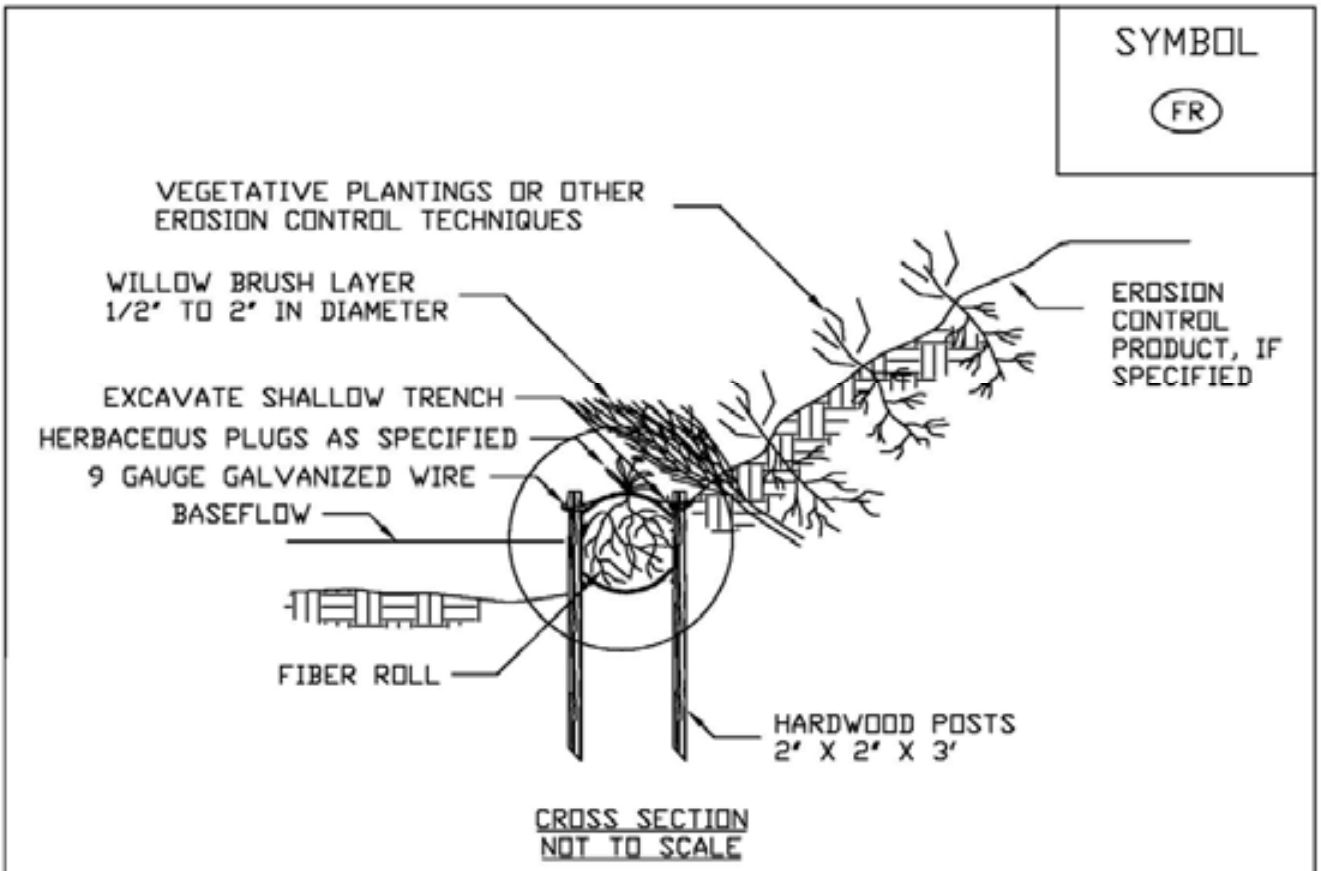
6. Where fiber rolls are used to reduce sheet flow on slopes they should be at least 12" in diameter and spaced according to the straw bale dike standard for sediment control.

Maintenance

Due to the susceptibility of plant materials to the physical constraints of the site, climate conditions, and animal populations, it is necessary to inspect installations frequently. This is especially important during the first year or two of establishment. Plant materials missing or damaged should be replaced as soon as possible. Sloughs or breaks in drainage pattern should be reestablished for the site as quickly as possible to maintain stability.



Figure 4.8
Fiber Roll



CONSTRUCTION SPECIFICATIONS

1. EXCAVATE A SHALLOW TRENCH SLIGHTLY BELOW BASEFLOW OR A 4" TRENCH ON SLOPE CONTOURS.
2. PLACE THE ROLL IN THE TRENCH AND ANCHOR WITH 2" x 2" POSTS PLACED ON BOTH SIDES OF THE ROLL AND SPACED LATERALLY ON 2' TO 4' CENTERS. TRIM THE TOP OF THE POSTS EVEN WITH THE EDGE OF THE ROLL, IF NECESSARY.
3. NOTCH THE POSTS AND TIE TOGETHER, ACROSS THE ROLL, WITH 9 GAUGE GALVANIZED WIRE OR 1/8" DIAMETER BRAIDED NYLON ROPE..
4. PLACE SOIL EXCAVATED FROM THE TRENCH BEHIND THE ROLL AND HAND TAMP. PLANT WITH SUITABLE HERBACEOUS OR WOODY VEGETATION AS SPECIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS. VEGETATION SHALL BE PLACED IMMEDIATELY ADJACENT TO THE ROLL TO PROMOTE ROOT GROWTH INTO THE FIBER. HERBACEOUS VEGETATION, IF SPECIFIED, SHALL BE PLANTED INTO THE FIBER ROLL.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

FIBER ROLL

STANDARD AND SPECIFICATIONS FOR MULCHING



Definition and Scope

Applying coarse plant residue or chips, or other suitable materials, to cover the soil surface to provide initial erosion control while a seeding or shrub planting is establishing. Mulch will conserve moisture and modify the surface soil temperature and reduce fluctuation of both. Mulch will prevent soil surface crusting and aid in weed control. Mulch can also be used alone for temporary stabilization in non-growing months. Use of stone as a mulch could be more permanent and should not be limited to non-growing months.

Conditions Where Practice Applies

On soils subject to erosion and on new seedings and shrub plantings. Mulch is useful on soils with low infiltration rates by retarding runoff.

Criteria

Site preparation prior to mulching requires the installation of necessary erosion control or water management practices and drainage systems.

Slope, grade and smooth the site to fit needs of selected mulch products.

Remove all undesirable stones and other debris to meet the needs of the anticipated land use and maintenance required.

Apply mulch after soil amendments and planting is accomplished or simultaneously if hydroseeding is used.

Select appropriate mulch material and application rate or material needs. Hay mulch shall not be used in wetlands or in areas of permanent seeding. Clean straw mulch is preferred alternative in wetland application. Determine local availability.

Select appropriate mulch anchoring material.

NOTE: The best combination for grass/legume establishment is straw (cereal grain) mulch applied at 2 ton/ acre (90 lbs./1000sq.ft.) and anchored with wood fiber mulch (hydromulch) at 500 – 750 lbs./acre (11 – 17 lbs./1000 sq. ft.). The wood fiber mulch must be applied through a hydroseeder immediately after mulching.



Table 4.2
Guide to Mulch Materials, Rates, and Uses

Mulch Material	Quality Standards	per 1000 Sq. Ft.	per Acre	Depth of Application	Remarks
Wood chips or shavings	Air-dried. Free of objectionable coarse material	500-900 lbs.	10-20 tons	2-7"	Used primarily around shrub and tree plantings and recreation trails to inhibit weed competition. Resistant to wind blowing. Decomposes slowly.
Wood fiber cellulose (partly digested wood fibers)	Made from natural wood usually with green dye and dispersing agent	50 lbs.	2,000 lbs.	—	Apply with hydromulcher. No tie down required. Less erosion control provided than 2 tons of hay or straw.
Gravel, Crushed Stone or Slag	Washed; Size 2B or 3A—1 1/2"	9 cu. yds.	405 cu. yds.	3"	Excellent mulch for short slopes and around plants and ornamentals. Use 2B where subject to traffic. (Approximately 2,000 lbs./cu. yd.). Frequently used over filter fabric for better weed control.
Hay or Straw	Air-dried; free of undesirable seeds & coarse materials	90-100 lbs. 2-3 bales	2 tons (100-120 bales)	cover about 90% surface	Use small grain straw where mulch is maintained for more than three months. Subject to wind blowing unless anchored. Most commonly used mulching material. Provides the best micro-environment for germinating seeds.
Jute twisted yarn	Undyed, unbleached plain weave. Warp 78 ends/yd., Weft 41 ends/ yd. 60-90 lbs./roll	48" x 50 yds. or 48" x 75 yds.	—	—	Use without additional mulch. Tie down as per manufacturers specifications. Good for center line of concentrated water flow.
Excelsior wood fiber mats	Interlocking web of excelsior fibers with photodegradable plastic netting	4' x 112.5' or 8' x 112.5'.	—	—	Use without additional mulch. Excellent for seeding establishment. Anchor as per manufacturers specifications. Approximately 72 lbs./roll for excelsior with plastic on both sides. Use two sided plastic for centerline of waterways.
Straw or coconut fiber, or combination	Photodegradable plastic net on one or two sides	Most are 6.5 ft. x 3.5 ft.	81 rolls	—	Designed to tolerate higher velocity water flow, centerlines of waterways, 60 sq. yds. per roll.

Table 4.3
Mulch Anchoring Guide

Anchoring Method or Material	Kind of Mulch to be Anchored	How to Apply
1. Peg and Twine	Hay or straw	After mulching, divide areas into blocks approximately 1 sq. yd. in size. Drive 4-6 pegs per block to within 2" to 3" of soil surface. Secure mulch to surface by stretching twine between pegs in criss-cross pattern on each block. Secure twine around each peg with 2 or more tight turns. Drive pegs flush with soil. Driving stakes into ground tightens the twine.
2. Mulch netting	Hay or straw	Staple the light-weight paper, jute, wood fiber, or plastic nettings to soil surface according to manufacturer's recommendations. Should be biodegradable. Most products are not suitable for foot traffic.
3. Wood cellulose fiber	Hay or straw	Apply with hydroseeder immediately after mulching. Use 500 lbs. wood fiber per acre. Some products contain an adhesive material ("tackifier"), possibly advantageous.
4. Mulch anchoring tool	Hay or straw	Apply mulch and pull a mulch anchoring tool (blunt, straight discs) over mulch as near to the contour as possible. Mulch material should be "tucked" into soil surface about 3".
5. Tackifier	Hay or straw	Mix and apply polymeric and gum tackifiers according to manufacturer's instructions. Avoid application during rain. A 24-hour curing period and a soil temperature higher than 45^0 Fahrenheit are required.

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STANDARD AND SPECIFICATIONS FOR SOIL RESTORATION



Definition & Scope

The decompaction of areas of a development site or construction project where soils have been disturbed to recover the original properties and porosity of the soil; thus providing a sustainable growth medium for vegetation, reduction of runoff and filtering of pollutants from stormwater runoff.

Conditions Where Practice Applies

Soil restoration is to be applied to areas whose heavy construction traffic is done and final stabilization is to begin. This is generally applied in the cleanup, site restoration, and landscaping phase of construction followed by the permanent establishment of an appropriate ground cover to maintain the soil structure. Soil restoration measures should be applied over and adjacent to any runoff reduction practices to achieve design performance.



Design Criteria

1. Soil restoration areas will be designated on the plan views of areas to be disturbed.
2. Soil restoration will be completed in accordance with Table 4.6 on page 4.53.

Specification for Full Soil Restoration

During periods of relatively low to moderate subsoil moisture, the disturbed subsoils are returned to rough grade and the following Soil Restoration steps applied:

1. Apply 3 inches of compost over subsoil. The compost shall be well decomposed (matured at least 3 months), weed-free, organic matter. It shall be aerobically composted, possess no objectionable odors, and contain less than 1%, by dry weight, of man-made foreign matter. The physical parameters of the compost shall meet the standards listed in Table 5.2 - Compost Standards Table. **Note: All biosolids compost produced in New York State (or approved for importation) must meet NYS DEC's 6 NYCRR Part 360 (Solid Waste Management Facilities) requirements. The Part 360 requirements are equal to or more stringent than 40 CFR Part 503 which ensure safe standards for pathogen reduction and heavy metals content.**



2. Till compost into subsoil to a depth of at least 12 inches using a cat-mounted ripper, tractor mounted disc, or tiller, to mix and circulate air and compost into the subsoil.
3. Rock-pick until uplifted stone/rock materials of four inches and larger size are cleaned off the site.
4. Apply topsoil to a depth of 6 inches.
5. Vegetate as required by the seeding plan. Use appropriate ground cover with deep roots to maintain the soil structure.
6. Topsoil may be manufactured as a mixture or a mineral component and organic material such as compost.

At the end of the project an inspector should be able to push a 3/8" metal bar 12 inches into the soil just with body weight. This should not be performed within the drip line of any existing trees or over utility installations that are within 24 inches of the surface.

Maintenance

Keep the site free of vehicular and foot traffic or other weight loads. Consider pedestrian footpaths.

Table 4.6
Soil Restoration Requirements

Type of Soil Disturbance	Soil Restoration Requirement		Comments/Examples
No soil disturbance	Restoration not permitted		Preservation of Natural Features
Minimal soil disturbance	Restoration not required		Clearing and grubbing
Areas where topsoil is stripped only - no change in grade	HSG A&B	HSG C&D	Protect area from any ongoing construction activities.
	Apply 6 inches of topsoil	Aerate* and apply 6 inches of topsoil	
Areas of cut or fill	HSG A&B	HSG C&D	
	Aerate* and apply 6 inches of topsoil	Apply full Soil Restoration**	
Heavy traffic areas on site (especially in a zone 5-25 feet around buildings but not within a 5 foot perimeter around foundation walls)	Apply full Soil Restoration (decompaction and compost enhancement)		
Areas where Runoff Reduction and/or Infiltration practices are applied	Restoration not required, but may be applied to enhance the reduction specified for appropriate practices.		Keep construction equipment from crossing these areas. To protect newly installed practice from any ongoing construction activities construct a single phase operation fence area
Redevelopment projects	Soil Restoration is required on redevelopment projects in areas where existing impervious area will be converted to pervious area.		

* Aeration includes the use of machines such as tractor-drawn implements with coulters making a narrow slit in the soil, a roller with many spikes making indentations in the soil, or prongs which function like a mini-subsoiler.
** Per "Deep Ripping and De-compaction, DEC 2008".

STANDARD AND SPECIFICATIONS FOR TEMPORARY CONSTRUCTION AREA SEEDING



Definition & Scope

Providing temporary erosion control protection to disturbed areas and/or localized critical areas for an interim period by covering all bare ground that exists as a result of construction activities or a natural event. Critical areas may include but are not limited to steep excavated cut or fill slopes and any disturbed, denuded natural slopes subject to erosion.

Conditions Where Practice Applies

Temporary seedings may be necessary on construction sites to protect an area, or section, where final grading is complete, when preparing for winter work shutdown, or to provide cover when permanent seedings are likely to fail due to mid-summer heat and drought. The intent is to provide temporary protective cover during temporary shutdown of construction and/or while waiting for optimal planting time.

Criteria

Water management practices must be installed as appropriate for site conditions. The area must be rough graded and slopes physically stable. Large debris and rocks are usually removed. Seedbed must be seeded within 24 hours of disturbance or scarification of the soil surface will be necessary prior to seeding.

Fertilizer or lime are not typically used for temporary seedings.

IF: Spring or summer or early fall, then seed the area with ryegrass (annual or perennial) at 30 lbs. per acre (Approximately 0.7 lb./1000 sq. ft. or use 1 lb./1000 sq. ft.).

IF: Late fall or early winter, then seed Certified 'Aroostook' winter rye (cereal rye) at 100 lbs. per acre (2.5 lbs./1000 sq. ft.).

Any seeding method may be used that will provide uniform application of seed to the area and result in relatively good soil to seed contact.

Mulch the area with hay or straw at 2 tons/acre (approx. 90 lbs./1000 sq. ft. or 2 bales). Quality of hay or straw mulch allowable will be determined based on long term use and visual concerns. Mulch anchoring will be required where wind or areas of concentrated water are of concern. Wood fiber hydromulch or other sprayable products approved for erosion control (nylon web or mesh) may be used if applied according to manufacturers' specification. Caution is advised when using nylon or other synthetic products. They may be difficult to remove prior to final seeding and can be a hazard to young wildlife species.

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STANDARD AND SPECIFICATIONS FOR TOPSOILING



Definition & Scope

Spreading a specified quality and quantity of topsoil materials on graded or constructed subsoil areas to provide acceptable plant cover growing conditions, thereby reducing erosion; to reduce irrigation water needs; and to reduce the need for nitrogen fertilizer application.

Conditions Where Practice Applies

Topsoil is applied to subsoils that are droughty (low available moisture for plants), stony, slowly permeable, salty or extremely acid. It is also used to backfill around shrub and tree transplants. This standard does not apply to wetland soils.

Design Criteria

1. Preserve existing topsoil in place where possible, thereby reducing the need for added topsoil.

2. Conserve by stockpiling topsoil and friable fine textured subsoils that must be stripped from the excavated site and applied after final grading where vegetation will be established. Topsoil stockpiles must be stabilized. Stockpile surfaces can be stabilized by vegetation, geotextile or plastic covers. This can be aided by orientating the stockpile lengthwise into prevailing winds.

3. Refer to USDA Natural Resource Conservation Service soil surveys or soil interpretation record sheets for further soil texture information for selecting appropriate design topsoil depths.

Site Preparation

1. As needed, install erosion and sediment control practices such as diversions, channels, sediment traps, and stabilizing measures, or maintain if already installed.

2. Complete rough grading and final grade, allowing for depth of topsoil to be added.

3. Scarify all compact, slowly permeable, medium and fine textured subsoil areas. Scarify at approximately right angles to the slope direction in soil areas that are steeper than 5 percent. Areas that have been overly compacted shall be decompacted in accordance with the Soil Restoration Standard.

4. Remove refuse, woody plant parts, stones over 3 inches in diameter, and other litter.

Topsoil Materials

1. Topsoil shall have at least 6 percent by weight of fine textured stable organic material, and no greater than 20 percent. Muck soil shall not be considered topsoil.

2. Topsoil shall have not less than 20 percent fine textured material (passing the NO. 200 sieve) and not more than 15 percent clay.

3. Topsoil treated with soil sterilants or herbicides shall be so identified to the purchaser.

4. Topsoil shall be relatively free of stones over 1 1/2 inches in diameter, trash, noxious weeds such as nut sedge and quackgrass, and will have less than 10 percent gravel.

5. Topsoil containing soluble salts greater than 500 parts per million shall not be used.

6. Topsoil may be manufactured as a mixture of a mineral component and organic material such as compost.

Application and Grading

1. Topsoil shall be distributed to a uniform depth over the area. It shall not be placed when it is partly frozen, muddy, or on frozen slopes or over ice, snow, or standing water puddles.

2. Topsoil placed and graded on slopes steeper than 5 percent shall be promptly fertilized, seeded, mulched, and stabilized by “tracking” with suitable equipment.

3. Apply topsoil in the amounts shown in Table 4.7 below:

Table 4.7 - Topsoil Application Depth		
Site Conditions	**Intended Use**	**Minimum Topsoil Depth**
1. Deep sand or loamy sand	Mowed lawn	6 in.
	Tall legumes, unmowed	2 in.
	Tall grass, unmowed	1 in.
2. Deep sandy loam	Mowed lawn	5 in.
	Tall legumes, unmowed	2 in.
	Tall grass, unmowed	none
3. Six inches or more: silt loam, clay loam, loam, or silt	Mowed lawn	4 in.
	Tall legumes, unmowed	1 in.
	Tall grass, unmowed	1 in.

STANDARD AND SPECIFICATIONS FOR GEOTEXTILE FILTER BAG



Definition & Scope

A **temporary** portable device through which sediment laden water is pumped to trap and retain sediment prior to its discharge to drainageways or off-site.

Condition Where Practice Applies

On sites where space is limited such as urban construction or linear projects (e.g. roads and utility work) where rights-of-way are limited and larger de-silting practices are impractical.

Design Criteria

1. Location - The portable filter bag should be located to minimize interference with construction activities and pedestrian traffic. It should also be placed in a location that is vegetated, relatively level, and provides for ease of access by heavy equipment, cleanout, disposal of trapped sediment, and proper release of filtered water.

   The filter bag shall also be placed at least 50 feet from all wetlands, streams or other surface waters.

2. Size - Geotextile filter bag shall be sized in accordance with the manufacturers recommendations based on the pump discharge rate.

Materials and Installation

1. The geotextile material will have the following attributes:

Minimum Grab Tensile Strength	200 lbs.
Minimum Grab Tensile Elongation	50 %
Minimum Trapezoid Tear Strength	80 lbs.
Mullen Burst Strength	380 psi
Minimum Puncture Strength	130 lbs
Apparent Opening Size	40 - 80 US sieve
Minimum UV Resistance	70%
Minimum Flow Thru Rate	70 gpm/sq ft

2. The bag shall be sewn with a double needle machine using high strength thread, double stitched "Joe" type capable of minimum roll strength of 100 lbs/inch (ASTM D4884).

3. The geotextile filter bag shall have an opening large enough to accommodate a 4 inch diameter discharge hose with an attached strap to tie off the bag to the hose to prevent back flow.

4. The geotextile shall be placed on a gravel bed 2 inches thick, a straw mat 4 inches thick, or a vegetated filter strip to allow water to flow out of the bag in all directions.

Maintenance

1. The geotextile filter bag is considered full when remaining bag flow area has been reduced by 75%. At this point, it should be replaced with a new bag.

2. Disposal may be accomplished by removing the bag to an appropriate designated upland area, cut open, remove the geotextile for disposal, and spread sediment contents and seeded and mulched according to the vegetative plan.

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STANDARD AND SPECIFICATIONS FOR ROCK DAM



Definition & Scope

A rock embankment located to capture and retain sediment on the construction site and prevent sedimentation in offsite water bodies.

Conditions Where Practice Applies

The rock dam may be used instead of the standard sediment basin with barrel and riser. The rock dam is preferred when it is difficult to construct a stable, earthen embankment and rock materials are readily available. The site should be accessible for periodic sediment removal. This rock dam shall not be located in a perennial stream. The top of the dam will serve as the overflow outlet. The inside of the dam will be faced with smaller stone to reduce the rate of seepage so a sediment pool forms during runoff events.

Design Criteria

Drainage Area: The drainage area for this off stream structure is limited to 50 acres.

Location: The location of the dam should:

- provide a large area to trap sediment
- intercept runoff from disturbed areas
- be accessible to remove sediment
- not interfere with construction activities

Storage Volume: The storage volume behind the dam shall be at least 3,600 cubic feet per acre of drainage area to the dam. This volume is measured one foot below the crest of the dam.

Dam Section:

Top Width	5 feet minimum @ crest
Side Slopes	2:1 upstream slope 3:1 downstream slope
Height	6' max to spillway crest

Length of Crest: The crest length should be designed to carry the 10 yr. peak runoff with a maximum flow depth of 1 foot and 1 foot of freeboard.

Rock at the abutments should extend at least 2 feet above the spillway and be at least 2 feet thick. These rock abutments should extend at least one foot above the downstream slope to prevent abutment scour. A rock apron at least 1.5 feet thick should extend downstream from the toe of the dam a distance equal to the height of the dam to protect the outlet area from scour.

Rock Fill: The rock fill should be well graded, hard, erosion resistant stone with a minimum d_{50} size of 9 inches. A "key trench" lined with geotextile filter fabric should be installed in the soil foundation under the rock fill. The filter fabric must extend from the key trench to the downstream edge of the apron and abutments to prevent soil movement and piping under the dam.

The upstream face of the dam should be covered with a fine washed gravel (NYS-DOT #1 or #1A gravel, crushed stone or equal) a minimum 3 feet thick to reduce the drainage rate.

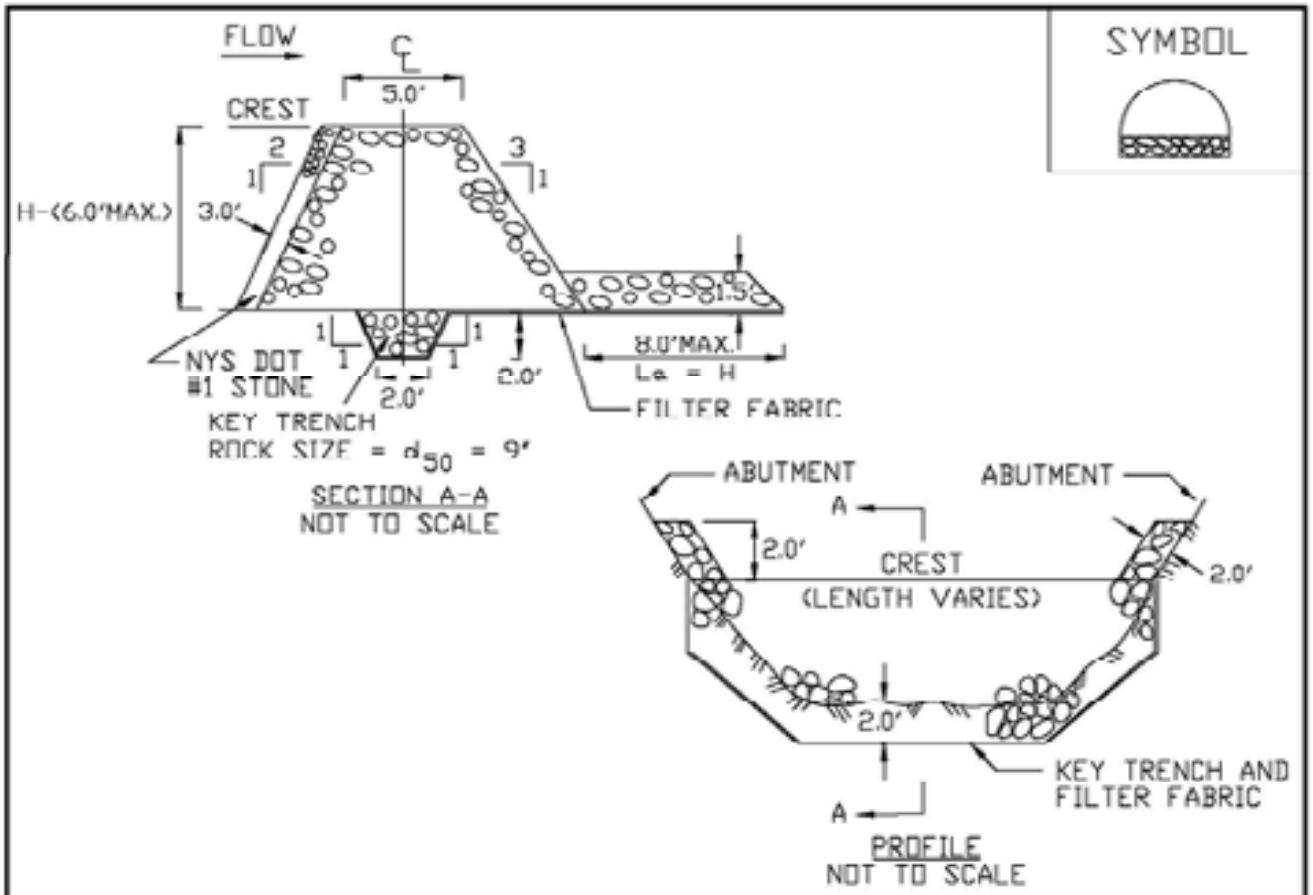
Trapping Efficiency: To obtain maximum trapping efficiency, design for a long detention period. Usually a minimum of eight (8) hours before the basin is completely drained. Maximize the length of travel of sediment laden water from the inlet to the drain for a minimum length to width ratio of 2 to 1 or greater. Achieve a surface area equal to 0.01 acres per cfs (inflow) based on the 10-year storm. See Figure 5.7 on page 5.18 for details.

Maintenance

Check the basin area after each rainfall event. Remove sediment and restore original volume when sediment accumulates to one-half the design volume. Check the structure for erosion, piping, and rock displacement after each significant event and replace immediately.

Remove the structure and any sediment immediately after the construction area has been permanently stabilized. All water should be removed from the basin prior to the removal of the rock dam. Sediment should be placed in designated disposal areas and not allowed to flow into streams or drainage ways during structure removal.

Figure 5.7
Rock Dam



CONSTRUCTION SPECIFICATIONS

1. THE AREA UNDER THE ROCK DAM SHALL BE CLEARED AND STRIPPED OF ROOTS AND OTHER OBJECTIONABLE MATERIAL. THE RESERVOIR SHALL BE CLEARED AS NEEDED TO FACILITATE SEDIMENT REMOVAL.
2. DIMENSIONS SHOWN ARE MINIMUM. TRENCH SHALL BE EXCAVATED FROM ABUTMENT TO ABUTMENT ON THE DAM CENTERLINE. FILTER FABRIC SHALL BE PLACED FROM UPSTREAM EDGE OF KEYTRENCH TO DOWNSTREAM EDGE OF APRON. JOINTS WILL LAP A MINIMUM OF 1 FT. WITH UPSTREAM STRIP ON TOP.
3. CONSTRUCT THE ROCK EMBANKMENT TO THE DIMENSIONS SHOWN ON THE DRAWING. ROCK ABUTMENTS SHALL BE MAINTAINED 2 FT. ABOVE THE CREST.
4. THE ROCK DAM SHALL BE CONSTRUCTED PRIOR TO CLEARING THE BASIN AREA. STABILIZE ALL DISTURBED AREAS, EXCEPT THE BASIN AREA, WITH TEMPORARY SEEDING.
5. FENCES AND WARNING SIGNS SHOULD BE PLACED AS APPROPRIATE.

MAXIMUM DRAINAGE AREA: 50 ACRES

ADAPTED FROM DETAILS PROVIDED BY: USDA – NRCS,
NEW YORK STATE DEPARTMENT OF TRANSPORTATION,
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION,
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

ROCK DAM

STANDARD AND SPECIFICATIONS FOR SEDIMENT DIKE



Definition & Scope

A **temporary** earth dike with an excavated trench on the upslope toe placed across a slope to capture sediment laden flow from small disturbed drainage areas and allowing sediment to settle out by ponding.

Condition Where Practice Applies

This practice can be used on slopes and in areas where it is difficult to place and maintain silt fence. This practice acts as a smaller sediment trap for linear type applications. This practice will handle sheet and rill erosion for small tributary areas.

Design Criteria

1. The earth dike will be a maximum of 2 feet high with a 2 foot top width and 2:1 side slopes.

2. All earth fill will be placed on a stripped foundation, contain no stumps or woody material, and be compacted with the weight of the excavator bucket.

3. The interior capture trench will be a minimum 1.5 feet deep, 2 feet wide, with 1:1 side slopes and with a near level bottom. In areas where linear slopes exceed 4% the sediment dike system shall be segmented to maintain capture volume and ponding.

4. The system shall be used with a minimum 5 foot vegetated buffer on the down slope toe of the dike or an artificial buffer of erosion control matting.

5. The maximum ponding depth behind the dike shall be 1/2 the height of the constructed dike at its lowest elevation.

6. The ends of the dike system shall terminate with a 90º return of NYS DOT #1A crushed stone to filter any excess flow.

7. The maximum drainage area tributary to this practice shall not exceed 0.5 acres per 100 feet of dike, for slopes less than 10%. For slopes greater than 10%, the drainage area shall be 0.25 acres per 100 feet of dike.

8. The earthen dike shall be seeded and mulched to prevent erosion using an annual rye grass mixture at a rate of 1 lb. per 1, 000 square feet.

Maintenance

1. No traffic will be allowed on the dike.

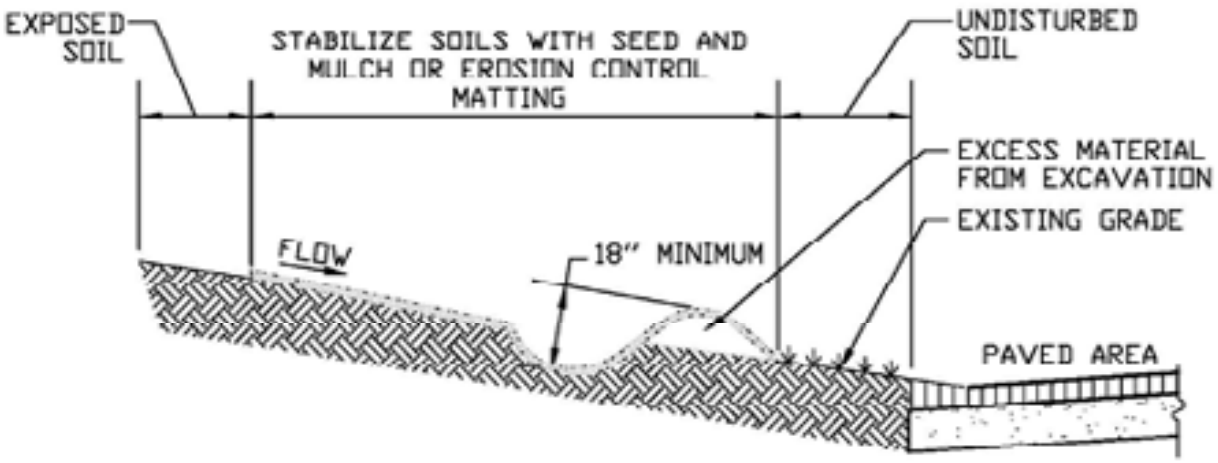
2. Dike system will be inspected weekly and after each runoff event.

3. Sediment in the system will be removed when the interior trench has filled to 75% capacity.

4. Sediment will be disposed of on-site as specified in the Erosion and Sediment Control Plan.

5. Upon stabilization of the tributary drainage area, the trench will be filled, excess dike fill removed, and the area graded and stabilized in accordance with the Erosion and Sediment Control Plan.

Figure 5.23
Sediment Dike



CONSTRUCTION NOTES:

1. ALL EARTH FILL WILL BE PLACED ON A STRIPPED FOUNDATION, CONTAIN NO STUMPS OR WOODY MATERIAL, AND BE COMPACTED WITH THE WEIGHT OF THE EXCAVATOR BUCKET.

2. THE SYSTEM SHALL BE USED WITH A MINIMUM 5 FOOT VEGETATED BUFFER ON THE DOWN SLOPE TOE OF THE DIKE OR AN ARTIFICIAL BUFFER OF EROSION CONTROL MATTING.

3. THE ENDS OF THE DIKE SYSTEM SHALL TERMINATE WITH A 90 DEGREE RETURN OF NYS DOT #1A CRUSHED STONE TO FILTER ANY EXCESS FLOW.

4. THE EARTHEN DIKE SHALL BE SEEDED AND MULCHED TO PREVENT EROSION USING AN ANNUAL RYE GRASS MIXTURE AT A RATE OF 1 LB. PER 1,000 SQUARE FEET.

ADAPTED FROM DETAILS PROVIDED BY: KEN BARBER, BARBER ENGINEERING	SEDIMENT DIKE

STANDARD AND SPECIFICATIONS FOR SILT FENCE



Definition & Scope

A **temporary** barrier of geotextile fabric installed on the contours across a slope used to intercept sediment laden runoff from small drainage areas of disturbed soil by temporarily ponding the sediment laden runoff allowing settling to occur. The maximum period of use is limited by the ultraviolet stability of the fabric (approximately one year).

Conditions Where Practice Applies

A silt fence may be used subject to the following conditions:

1. Maximum allowable slope length and fence length will not exceed the limits shown in the Design Criteria for the specific type of silt fence used ; and
2. Maximum ponding depth of 1.5 feet behind the fence; and
3. Erosion would occur in the form of sheet erosion; and
4. There is no concentration of water flowing to the barrier; and
5. Soil conditions allow for proper keying of fabric, or other anchorage, to prevent blowouts.

Design Criteria

1. Design computations are not required for installations of 1 month or less. Longer installation periods should be designed for expected runoff.
2. All silt fences shall be placed as close to the disturbed area as possible, but at least 10 feet from the toe of a slope steeper than 3H:1V, to allow for maintenance and roll down. The area beyond the fence must be undisturbed or stabilized.
3. The type of silt fence specified for each location on the plan shall not exceed the maximum slope length and maximum fence length requirements shown in the following table:

		Slope Length/Fence Length (ft.)		
Slope	Steepness	Standard	Reinforced	Super
<2%	< 50:1	300/1500	N/A	N/A
2-10%	50:1 to 10:1	125/1000	250/2000	300/2500
10-20%	10:1 to 5:1	100/750	150/1000	200/1000
20-33%	5:1 to 3:1	60/500	80/750	100/1000
33-50%	3:1 to 2:1	40/250	70/350	100/500
>50%	> 2:1	20/125	30/175	50/250

Standard Silt Fence (SF) is fabric rolls stapled to wooden stakes driven 16 inches in the ground.
Reinforced Silt Fence (RSF) is fabric placed against welded wire fabric with anchored steel posts driven 16 inches in the ground.
Super Silt Fence (SSF) is fabric placed against chain link fence as support backing with posts driven 3 feet in the ground.

4. Silt fence shall be removed as soon as the disturbed area has achieved final stabilization.

The silt fence shall be installed in accordance with the appropriate details. Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. Butt joints are not acceptable. A detail of the silt fence shall be shown on the plan. See Figure 5.30 on page 5.56 for Reinforced Silt Fence as an example of details to be provided.

Criteria for Silt Fence Materials

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance.

Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	110	ASTM D 4632
Elongation at Failure (%)	20	ASTM D 4632
Mullen Burst Strength (PSI)	300	ASTM D 3786
Puncture Strength (lbs)	60	ASTM D 4833
Minimum Trapezoidal Tear Strength (lbs)	50	ASTM D 4533
Flow Through Rate (gal/ min/sf)	25	ASTM D 4491
Equivalent Opening Size	40-80	US Std Sieve ASTM D 4751
Minimum UV Residual (%)	70	ASTM D 4355

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.5 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot. Posts for super silt fence shall be standard chain link fence posts.

3. Wire Fence for reinforced silt fence: Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.

4. Prefabricated silt fence is acceptable as long as all material specifications are met.

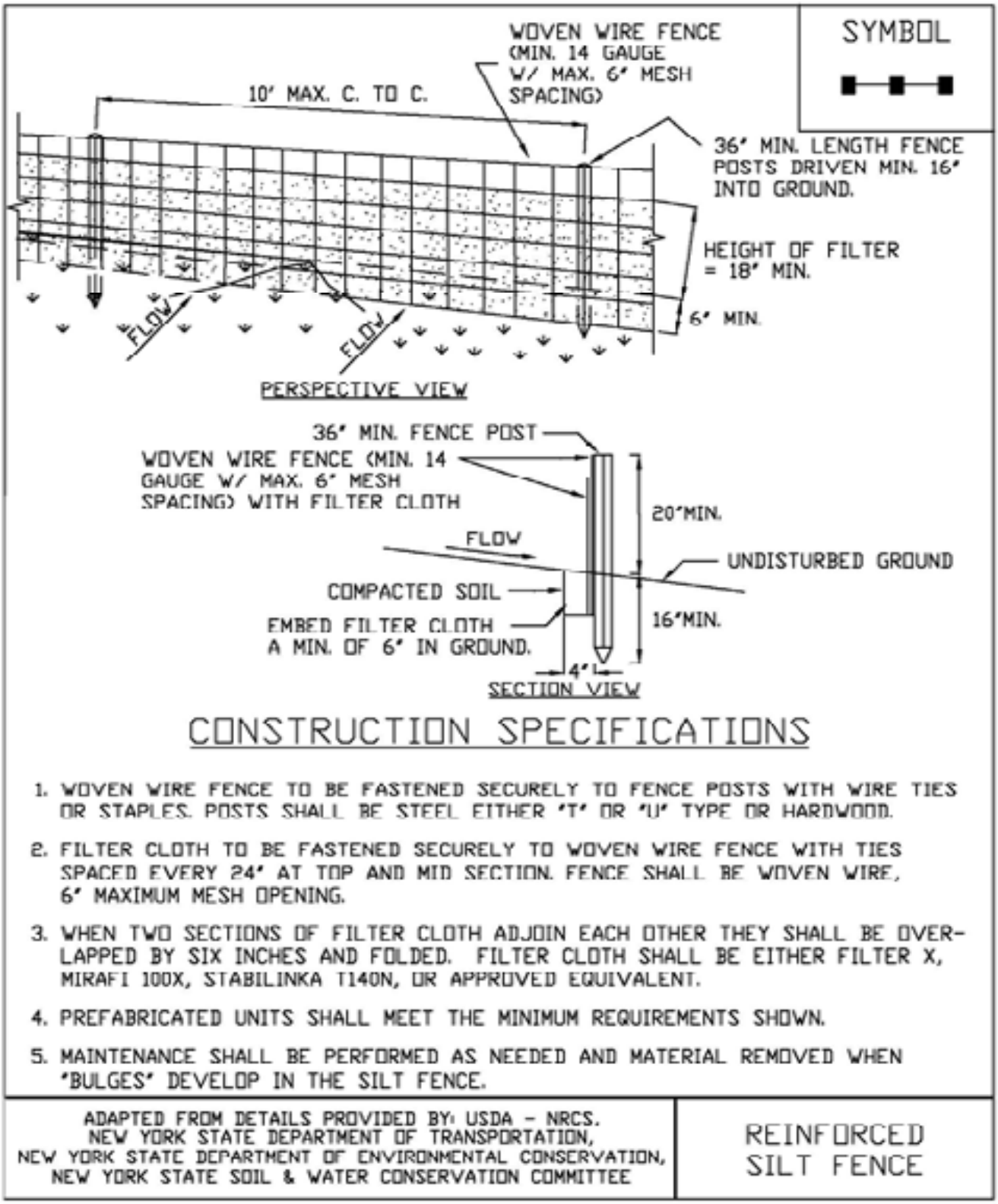
Super Silt Fence



Reinforced Silt Fence



Figure 5.30
Reinforced Silt Fence



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STANDARD AND SPECIFICATIONS FOR STORM DRAIN INLET PROTECTION



Definition & Scope

A **temporary** barrier with low permeability, installed around inlets in the form of a fence, berm or excavation around an opening, detaining water and thereby reducing the sediment content of sediment laden water by settling thus preventing heavily sediment laden water from entering a storm drain system.

Conditions Where Practice Applies

This practice shall be used where the drainage area to an inlet is disturbed, it is not possible to temporarily divert the storm drain outfall into a trapping device, and watertight blocking of inlets is not advisable. **It is not to be used in place of sediment trapping devices.** This practice shall be used with an upstream buffer strip if placed at a storm drain inlet on a paved surface. It may be used in conjunction with storm drain diversion to help prevent siltation of pipes installed with low slope angle.

Types of Storm Drain Inlet Practices

There are five (5) specific types of storm drain inlet protection practices that vary according to their function, location, drainage area, and availability of materials:

I. Excavated Drop Inlet Protection
II. Fabric Drop Inlet Protection
III. Stone & Block Drop Inlet Protection
IV. Paved Surface Inlet Protection
V. Manufactured Insert Inlet Protection

Design Criteria

Drainage Area – The drainage area for storm drain inlets shall not exceed one acre. Erosion control/temporary stabilization measures must be implemented on the disturbed drainage area tributary to the inlet. The crest elevations of these practices shall provide storage and minimize bypass flow.

Type I – Excavated Drop Inlet Protection

This practice is generally used during initial overlot grading after the storm drain trunk line is installed.

Limit the drainage area to the inlet device to 1 acre. Excavated side slopes shall be no steeper than 2:1. The minimum depth shall be 1 foot and the maximum depth 2 feet as measured from the crest of the inlet structure. Shape the excavated basin to fit conditions with the longest dimension oriented toward the longest inflow area to provide maximum trap efficiency. The capacity of the excavated basin should be established to contain 900 cubic feet per acre of disturbed area. Weep holes, protected by fabric and stone, should be provided for draining the temporary pool.

Inspect and clean the excavated basin after every storm. Sediment should be removed when 50 percent of the storage volume is achieved This material should be incorporated into the site in a stabilized manner.

Type II – Fabric Drop Inlet Protection



This practice is generally used during final elevation grading phases after the storm drain system is completed.

Limit the drainage area to 1 acre per inlet device. Land area slope immediately surrounding this device should not exceed 1 percent. The maximum height of the fabric above the inlet crest shall not exceed 1.5 feet unless reinforced.

The top of the barrier should be maintained to allow overflow to drop into the drop inlet and not bypass the inlet to

unprotected lower areas. Support stakes for fabric shall be a minimum of 3 feet long, spaced a maximum 3 feet apart. They should be driven close to the inlet so any overflow drops into the inlet and not on the unprotected soil. Improved performance and sediment storage volume can be obtained by excavating the area.

Inspect the fabric barrier after each rain event and make repairs as needed. Remove sediment from the pool area as necessary with care not to undercut or damage the filter fabric. Upon stabilization of the drainage area, remove all materials and unstable sediment and dispose of properly. Bring the adjacent area of the drop inlet to grade, smooth and compact and stabilize in the appropriate manner to the site.

Type III – Stone and Block Drop Inlet Protection

This practice is generally used during the initial and intermediate overlot grading of a construction site.

Limit the drainage area to 1 acre at the drop inlet. The stone barrier should have a minimum height of 1 foot and a maximum height of 2 feet. Do not use mortar. The height should be limited to prevent excess ponding and bypass flow.

Recess the first course of blocks at least 2 inches below the crest opening of the storm drain for lateral support. Subsequent courses can be supported laterally if needed by placing a 2x4 inch wood stud through the block openings perpendicular to the course. The bottom row should have a few blocks oriented so flow can drain through the block to dewater the basin area.

The stone should be placed just below the top of the blocks on slopes of 2:1 or flatter. Place hardware cloth of wire mesh with ½ inch openings over all block openings to hold stone in place.

As an optional design, the concrete blocks may be omitted and the entire structure constructed of stone, ringing the outlet ("doughnut"). The stone should be kept at a 3:1 slope toward the inlet to keep it from being washed into the inlet. A level area 1 foot wide and four inches below the crest will further prevent wash. Stone on the slope toward the inlet should be at least 3 inches in size for stability and 1 inch or smaller away from the inlet to control flow rate. The elevation of the top of the stone crest must be maintained 6 inches lower than the ground elevation down slope from the inlet to ensure that all storm flows pass over the stone into the storm drain and not past the structure. Temporary diking should be used as necessary to prevent bypass flow.

The barrier should be inspected after each rain event and repairs made where needed. Remove sediment as necessary to provide for accurate storage volume for subsequent rains. Upon stabilization of contributing drainage area, remove all materials and any unstable soil and dispose of properly.

Bring the disturbed area to proper grade, smooth, compact and stabilize in a manner appropriate to the site.

Type IV – Paved Surface Inlet Protection



This practice is generally used after pavement construction has been done while final grading and soil stabilization is occurring. These practices should be used with upstream buffer strips in linear construction applications, and with temporary surface stabilization for overlot areas, to reduce the sediment load at the practice. This practice includes sand bags, compost filter socks, geo-tubes filled with ballast, and manufactured surface barriers. Pea gravel can also be used in conjunction with these practices to improve performance. When the inlet is not at a low point, and is offset from the pavement or gutter line, protection should be selected and installed so that flows are not diverted around the inlet.



The drainage area should be limited to 1 acre at the drain inlet. All practices will be placed at the inlet perimeter or beyond to maximize the flow capacity of the inlet. Practices shall be weighted, braced, tied, or otherwise anchored to prevent movement or shifting of location on paved surfaces. Traffic safety shall be integrated with the use of this practice. All practices should be marked with traffic safety cones as appropriate. Structure height shall not cause flooding or by-pass flow that would cause additional erosion.

The structure should be inspected after every storm event. Any sediment should be removed and disposed of on the site. Any broken or damaged components should be replaced. Check all materials for proper anchorage and secure as necessary.

Type V - Manufactured Insert Inlet Protection



The drainage area shall be limited to 1 acre at the drain inlet. All inserts will be installed and anchored in accordance with the manufacturers recommendations and design details. The fabric portion of the structure will equal or exceed the performance standard for the silt fence fabric. The inserts will be installed to preserve a minimum of 50 percent of the open, unobstructed design flow area of the storm drain inlet opening to maintain capacity for storm events.

Figure 5.31
Excavated Drop Inlet Protection

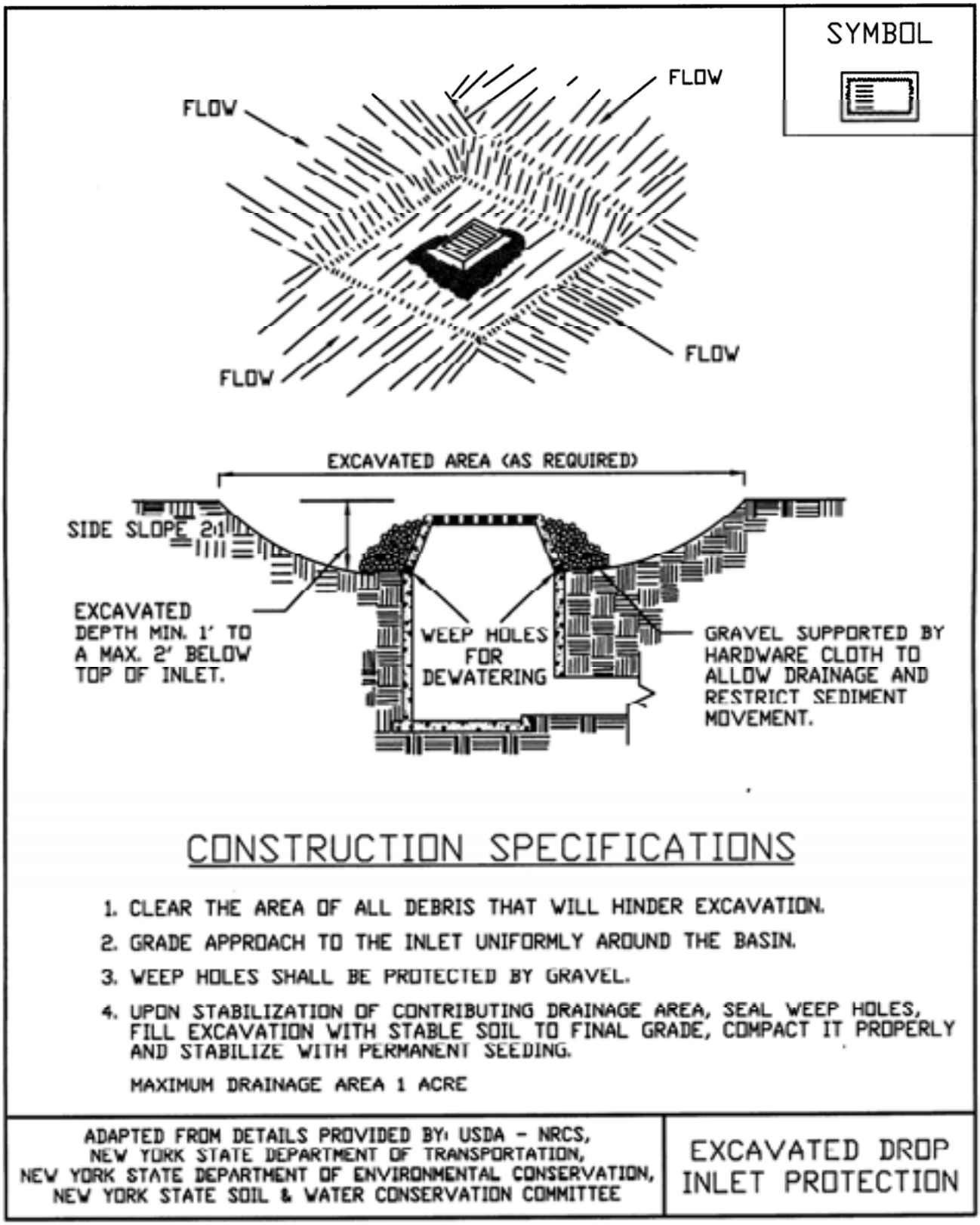


Figure 5.32
Fabric Drop Inlet Protection

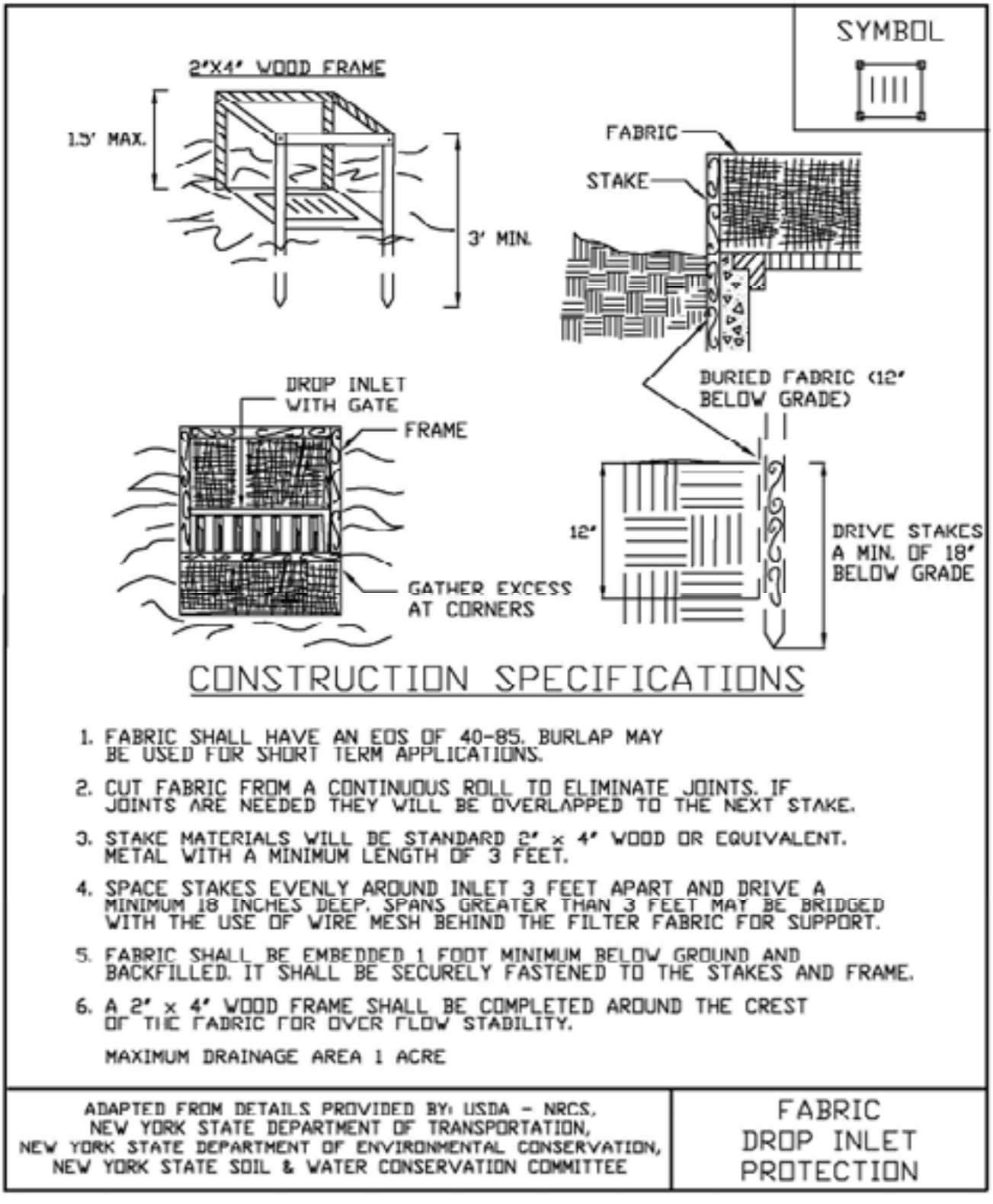
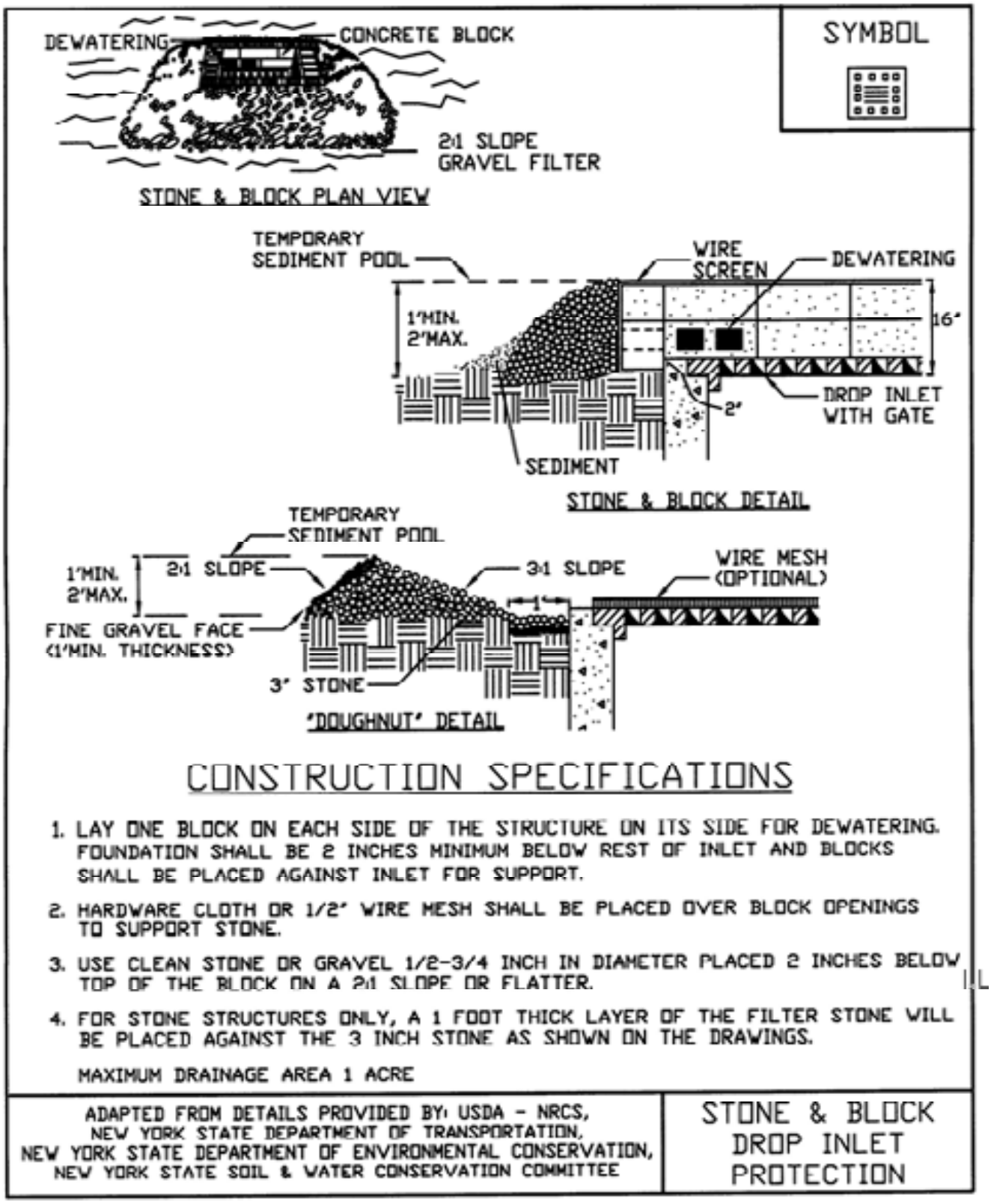


Figure 5.33
Stone & Block Drop Inlet Protection



CONSTRUCTION SPECIFICATIONS

1. LAY ONE BLOCK ON EACH SIDE OF THE STRUCTURE ON ITS SIDE FOR DEWATERING. FOUNDATION SHALL BE 2 INCHES MINIMUM BELOW REST OF INLET AND BLOCKS SHALL BE PLACED AGAINST INLET FOR SUPPORT.
2. HARDWARE CLOTH OR 1/2" WIRE MESH SHALL BE PLACED OVER BLOCK OPENINGS TO SUPPORT STONE.
3. USE CLEAN STONE OR GRAVEL 1/2-3/4 INCH IN DIAMETER PLACED 2 INCHES BELOW TOP OF THE BLOCK ON A 2:1 SLOPE OR FLATTER.
4. FOR STONE STRUCTURES ONLY, A 1 FOOT THICK LAYER OF THE FILTER STONE WILL BE PLACED AGAINST THE 3 INCH STONE AS SHOWN ON THE DRAWINGS.

MAXIMUM DRAINAGE AREA 1 ACRE

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS,
NEW YORK STATE DEPARTMENT OF TRANSPORTATION,
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION,
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

STONE & BLOCK DROP INLET PROTECTION

STANDARD AND SPECIFICATIONS FOR STRAW BALE DIKE



Definition & Scope

A **temporary** barrier of straw, or similar material, used to intercept sediment laden runoff from small drainage areas of disturbed soil to reduce runoff velocity and effect deposition of the transported sediment load. Straw bale dikes have an estimated design life of three (3) months.

Condition Where Practice Applies

The straw bale dike is used where:

1. No other practice is feasible.
2. There is no concentration of water in a channel or other drainageway above the barrier.
3. Erosion would occur in the form of sheet erosion.
4. Length of slope above the straw bale dike does not exceed the following limits with the bale placed 10 feet from the toe of the slope:

Constructed Slope	Percent Slope	Slope Length (ft.)
2:1	50	25
3:1	33	50
4:1	25	75

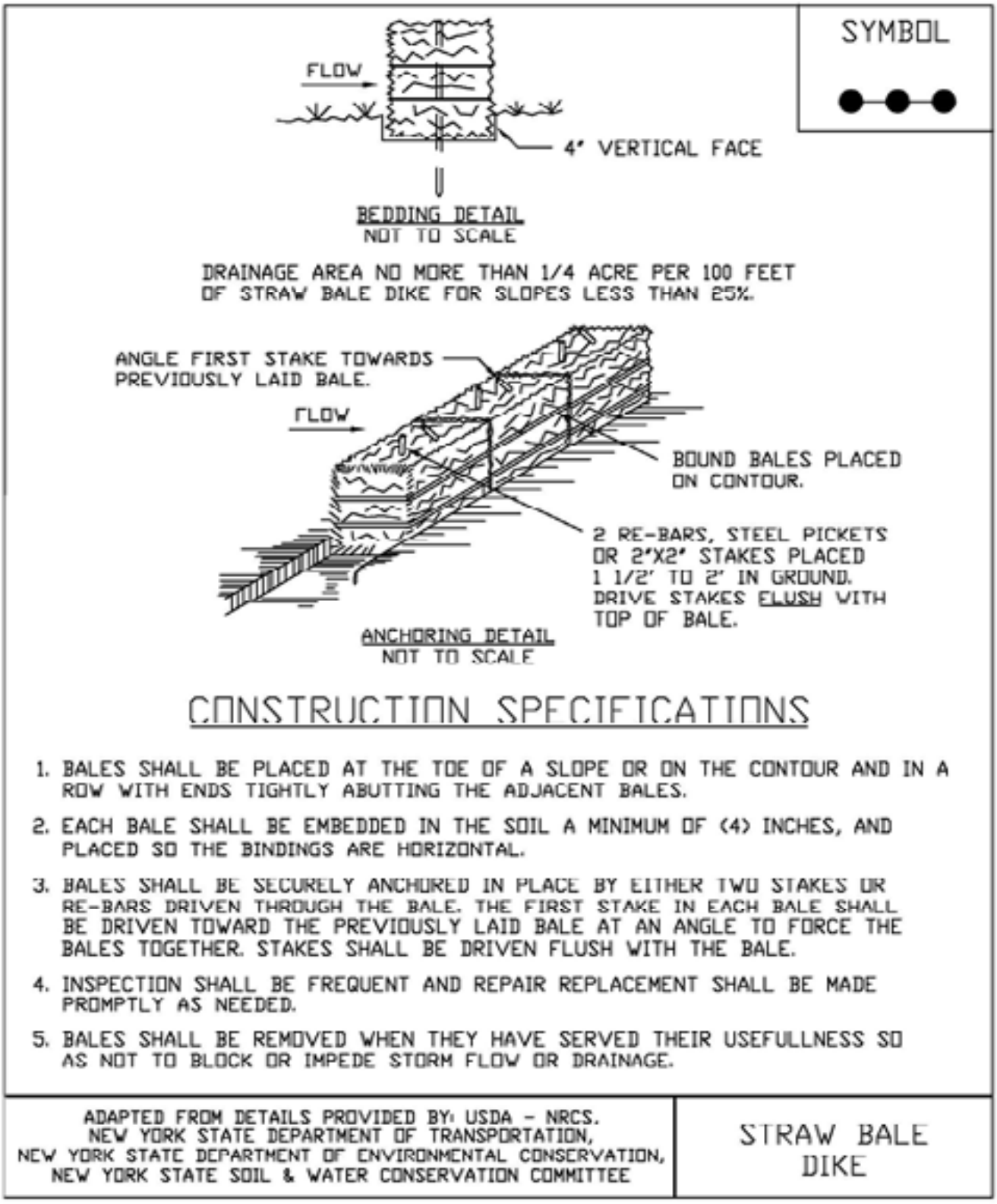
Where slope gradient changes through the drainage area, steepness refers to the steepest slope section contributing to the straw bale dike.

The practice may also be used for a single family lot if the slope is less than 15 percent. The contributing drainage areas in this instance shall be less than one quarter of an acre per 100 feet of dike and the length of slope above the dike shall be less than 100 feet.

Design Criteria

The above table is adequate, in general, for a one-inch rainfall event. Larger storms could cause failure of this practice. Use of this practice in sensitive areas for longer than one month should be specifically designed to store expected runoff. All bales shall be placed on the contour with cut edge of bale adhering to the ground. See Figure 5.34 on page 5.64 for details.

Figure 5.34
Straw Bale Dike



STANDARD AND SPECIFICATIONS FOR TURBIDITY CURTAIN



Definition & Scope

A **temporary** flexible, impenetrable barrier used to trap sediment in water bodies. This curtain is weighted at the bottom to achieve closure while supported at the top through a flotation system and used to prevent the migration of silt from a work site in a water environment into the larger body of water. Top bar float has to support weight of curtain material. Bottom anchor has to be flexible so that it will lie along the contour of the water body bottom.

Condition Where Practice Applies

A turbidity curtain is generally used when construction activity occurs within a waterbody or along its shoreline and is of short duration, generally less than one month. Curtains are used in calm water surfaces and not in areas of flowing water. **Turbidity curtains are not to be used across flowing watercourses.**

Design Criteria

The turbidity curtain shall be located beyond the lateral limits of the construction site and firmly anchored in place. The alignment should be set as close to the work area as possible but not so close as to be disturbed by applicable construction equipment. The height of the curtain shall be 20 percent greater than the depth of the water to allow for water level fluctuations. The area that the turbidity curtain protects shall not contain large culverts or drainage areas that if flows occur behind the curtain would cause a breach or lost contact at the bottom surface.

If water depths at the design alignment are minimal, the toe can be anchored in place by staking.

See Figure 5.35 on page 5.66.

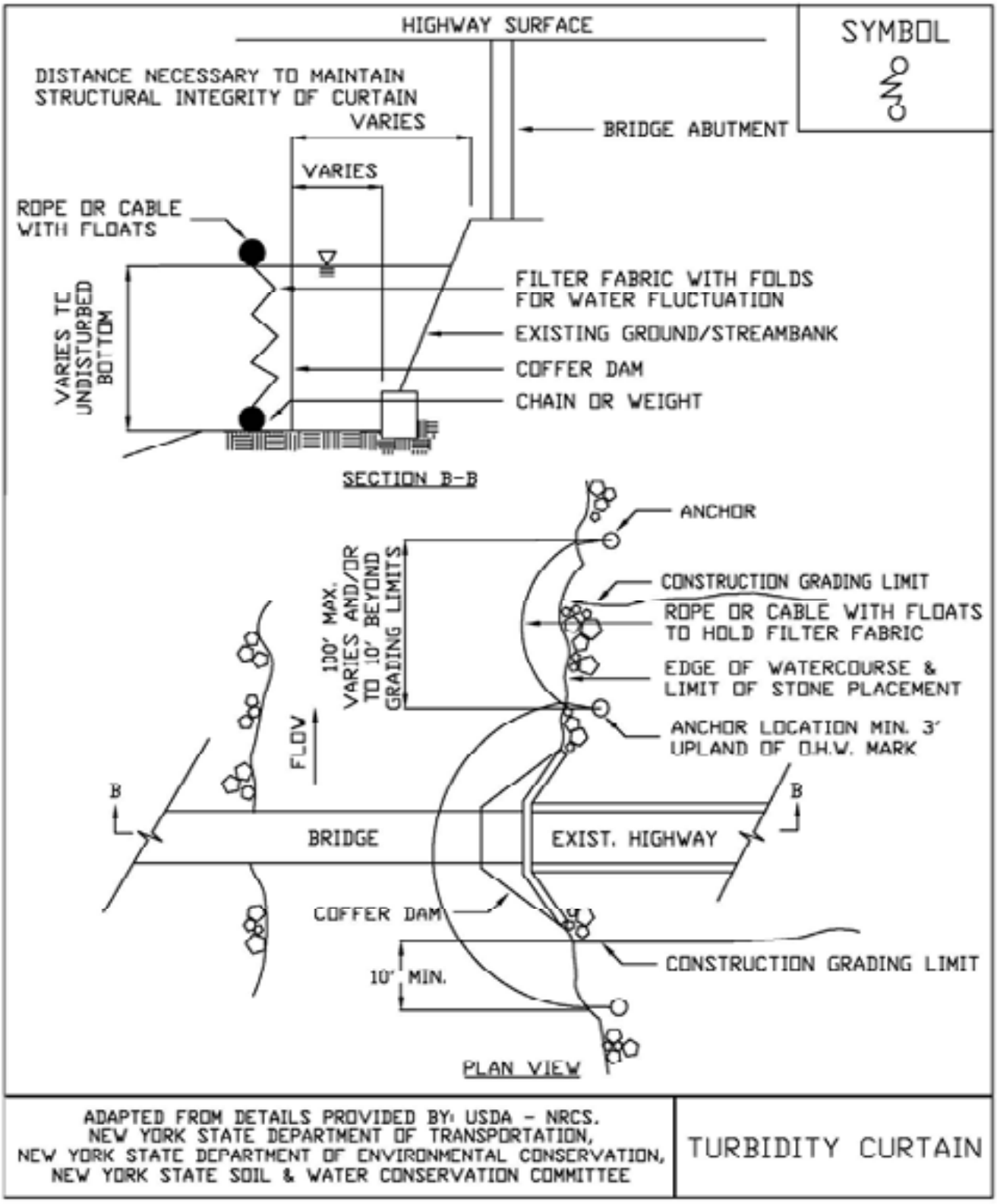
Construction Specifications

The area of proposed installation of the curtain shall be inspected for obstacles and impediments that could damage the curtain or impair its effectiveness to retain sediment. All materials shall be removed so they cannot enter the waterbody. Shallow installations can be made by securing the curtain by staking rather than using a flotation system. Supplemental anchors of the turbidity curtain toe shall be used, as needed, depending on water surface disturbances such as boats and wave action by winds.

Maintenance

The turbidity curtain shall be inspected daily and repaired or replaced immediately. It is not normally necessary to remove sediment deposited behind the curtain; but, when necessary, removal is usually done by hand prior to removal of the barrier. All removed silt is stabilized away from the waterbody. The barrier shall be removed by carefully pulling it toward the construction site to minimize the release of attached sediment. Any floating construction or natural debris shall be immediately removed to prevent damage to the curtain. If the curtain is oriented in a manner that faces the prevailing winds, frequent checks of the anchorage shall be made.

Figure 5.35
Turbidity Curtain



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Appendix B

Drainage Analysis

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DRAINAGE ANALYSIS

Prepared for:

Rella Boulevard

Village of Montebello
Rockland County, New York

Revised November 13,2025
Revised October 20, 2025
Revised September 18, 2025
Revised August 14, 2025
Revised July 3, 2025
Revised August 24, 2023
Revised November 17, 2022
Revised September 15, 2022
June 16, 2022

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Appendix B = Proposed Conditions Drainage Area Map

Appendix C = USDA NRCS Soil Report

Appendix D = Existing Conditions HydroCAD Summary

Appendix E = Proposed Conditions HydroCAD Summary

Appendix F = Stormwater Pipe Capacity Calculations & Routing Map

Appendix G = First Defense Stormwater Treatment Unit Data Sheet

Appendix H = Percolation Test Data

METHODOLOGY

Brooker Engineering, PLLC has been retained to perform a hydraulic and hydrologic analysis for the Rella Boulevard project to provide zero-net increase in peak runoff rates as a result of the proposed development.

The project site is Tax Lots 55.08-1-5 & 6 and has a total area of 18.5265 acres situated in the LO-C zoning district. The proposed development of the property includes six (6) warehouse/flex-space buildings totaling 220,740 SF with 153 parking spaces having access from Rella Boulevard.

The lots are currently vacant and heavily wooded. The site drains in two (2) directions: South to a network of catch basins in Rella Boulevard, and West to a network of catch basins in Airmont Road.

According to the U.S. Department of Agriculture Soil Conservation Service, the soil on-site consists mainly of Creshire gravelly fine sandy loam, 2 to 8 percent slopes (87.9%), and of Wethersfield gravelly silt loam, 8 to 15 percent slopes (12.1%).

The attached Existing Conditions Drainage Area Map shows the project site divided into two (2) drainage areas, draining to separate points of interest. Drainage Area #1 drains to Point of Interest #1 at the network of catch basins in Rella Boulevard. Drainage Area #2 drains to Point of Interest #2 at the network of catch basins in Airmont Road.

The attached Proposed Conditions Drainage Area Map also shows the project site divided into two (2) drainage areas. Drainage Area #1 is further broken down into Drainage Area #1A, Drainage Area #1B, and Drainage Area #1C. Drainage Area #1A is captured in the proposed underground infiltration system under Roadway C. Drainage Area #1C is captured in the proposed underground infiltration system under Roadway B. Drainage Area #1C drains to the network of catch basins in Rella Boulevard, as in existing conditions. Drainage Area #2 is further broken down into Drainage Area #2A and Drainage Area #2B. Drainage Area #2A is captured in the proposed infiltration basin. Drainage Area #2B drains to the network of catch basins in Airmont Road, as in existing conditions.

For Drainage Area #1A, the developed, impervious portion of the land (consisting of buildings/roofs, pavement, sidewalks, and 62% of the emergency access road) is captured in a a network of catch basins along Roadway C, and routed to the proposed underground infiltration system underneath Roadway C. For Drainage Area #1C, the developed, impervious portion of the land (consisting of buildings/roofs, pavement, sidewalks, and 62% of the emergency access road) is captured in a a network of catch basins along Roadway B, and routed to the proposed underground infiltration system underneath Roadway B. For Drainage Area #2A, the developed, impervious portion of the land (consisting of buildings/roofs, pavement, sidewalks, and 62% of the emergency access road) runs through a network of catch basins underneath Roadways A and D to the proposed infiltration basin. The infiltration basins have been designed and sized to handle the runoff from a 100-year storm.

Proposed Stormwater Management Facilities have been designed to provide water quality and quantity controls utilizing standard practices in accordance with the requirements of the New York State Department of Environmental Conservation (NYSDEC) SPDES General Permit for Stormwater Discharges from Construction. The design incorporates sizing for:

1) Water Quality Volume Control (WQv),
2) Runoff Reduction Volume (RRv),
3) Channel Protection Storage Volume (CPv),
4) Overbank Flood Control (Qp) and
5) Extreme Storm Flood Control (Qf).

These five components of the water quality sizing criteria are further described as follows:

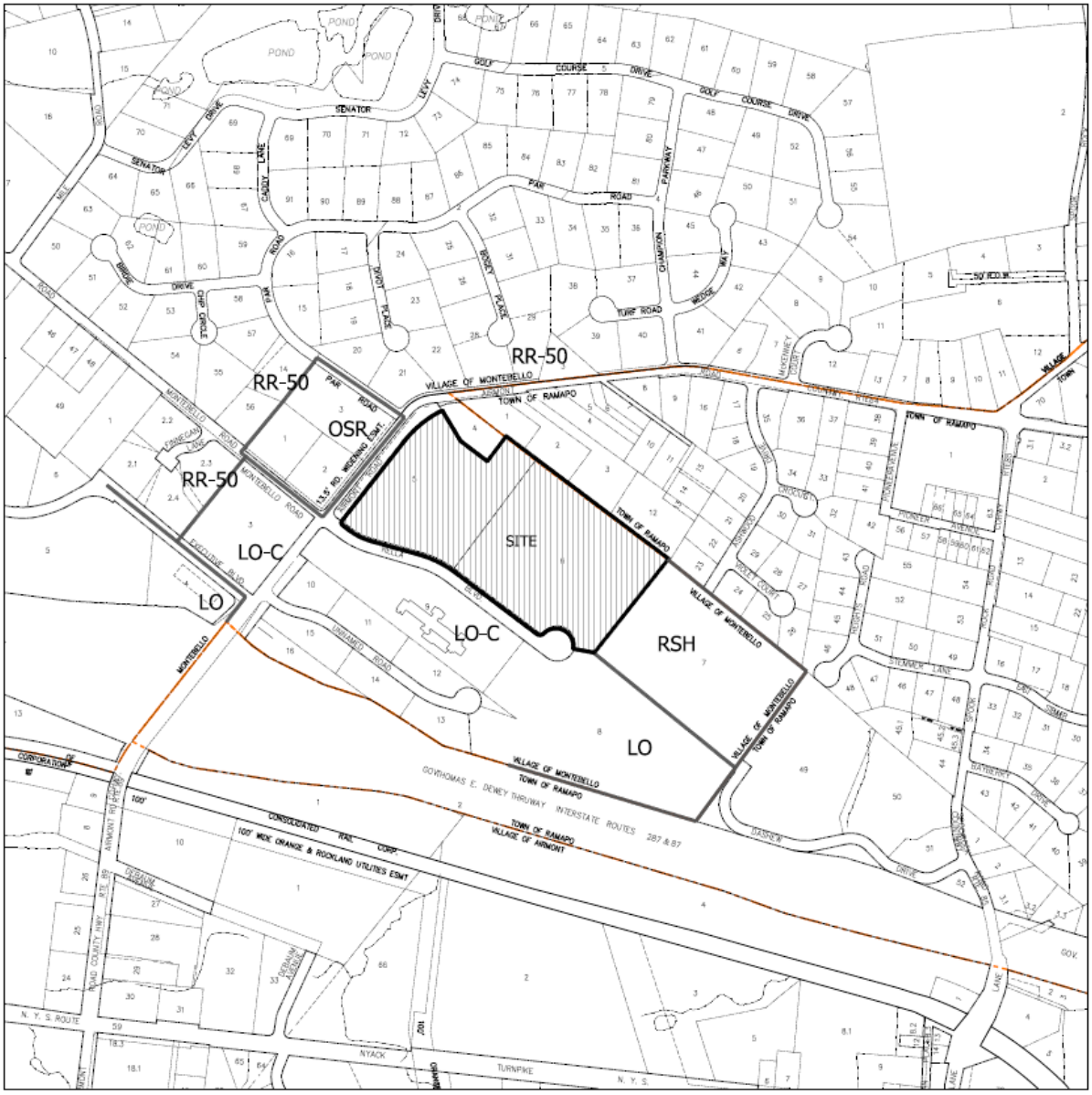
- The Water Quality Volume (WQv) is designed to improve water quality by capturing and treating 90% of the average annual stormwater runoff volume. The WQv is directly related to the amount of impervious cover on a project site. On this project the water quality volume will be treated by the use of the underground infiltration facilities.
- The Runoff Reduction Volume (RRv) is designed to control post-development water quality volumes to replicate pre-development hydrology by maintaining pre-construction infiltration, peak runoff flow, and discharge volume as well as minimizing concentrated flow. Runoff Reduction is achieved by infiltration, groundwater recharge, reuse and recycling by incorporating green infrastructure techniques and standard stormwater management practices with runoff reducing capacity.
- The Channel Protection Storage Volume (Cpv) is designed to protect stream channels from erosion. The CPv is accomplished by providing 24 hour extended detention of the one-year, 24-hour storm event.
- The purpose of Overbank Flood Control (Qp) is to prevent an increase in the frequency and magnitude of out-of-bank flooding generated by urban development. Overbank Flood Control is accomplished by attenuating the post development 10-year, 24-hour peak discharge rate from the site to the pre-development rate.
- The purpose of Extreme Flood Control (Qf) is to prevent an increased risk of flood damage from large storm events, to maintain the boundaries of the pre-development 100-year floodplain, and to protect the physical integrity of stormwater management practices. Extreme Flood Control is accomplished by attenuating the post development 100-year, 24-hour peak discharge rate from the site to the pre-development rate.

The required Water Quality Volume was calculated in accordance with the procedure outlined in the *New York State Stormwater Management Design Manual*. The 100% Runoff Reduction requirement is achieved by providing infiltration for the entire water quality volume. The Overbank Flood Control and Extreme Storm Flood Control are provided by controlling the peak discharge from the project site for the 10 year and 100-year storms to pre-development rates.

This hydrologic analysis utilized the HydroCAD computer program to generate, route and combine runoff hydrographs for storms having 1-, 2-, 10-, 25-, and 100-year recurrence intervals. Runoff hydrographs were generated by utilizing SCS hydrographs to match discharges as calculated using the TR-55 peak discharge method for each drainage subarea.

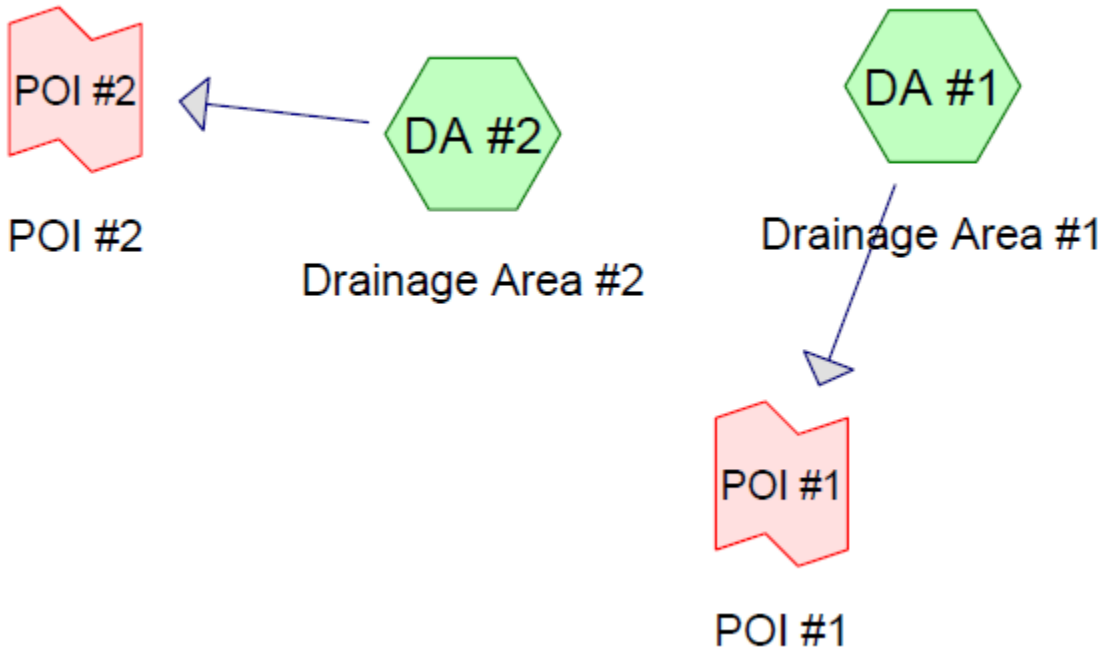
The attached tables summarize the results of the stormwater runoff analyses. Also attached are backup calculations, input data, and HydroCAD computer output.

VICINITY MAP

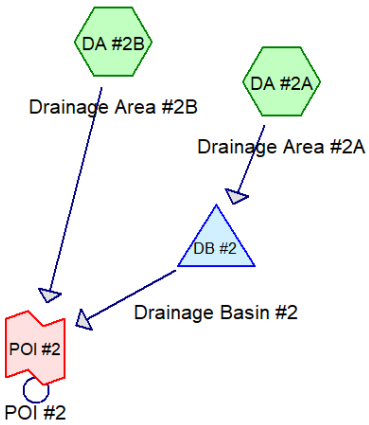


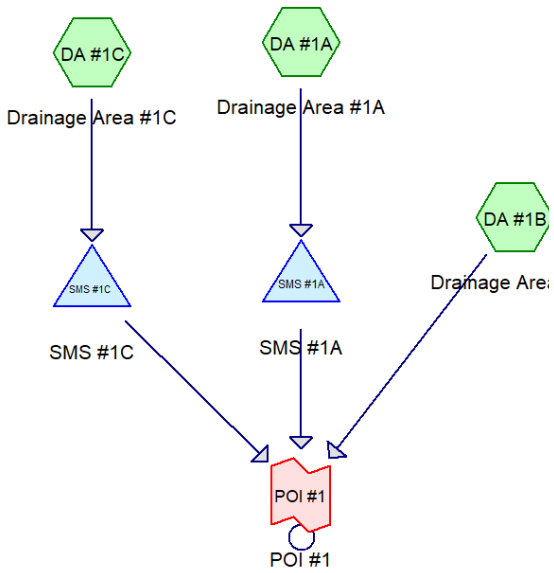
ROUTING DIAGRAMS

EXISTING



PROPOSED





SUMMARY OF PEAK DISCHARGES

Peak Discharge from project area to Point of Interest #1 (cfs)

FREQUENCY	EXISTING CONDITIONS	PROPOSED CONDITIONS	DIFFERENCE
1 YEAR	1.66	1.45	- 0.21
2 YEAR	3.52	2.76	- 0.76
10 YEAR	8.73	7.04	- 1.69
25 YEAR	12.75	10.80	- 1.95
100 YEAR	26.27	26.17	- 0.10

Peak Discharge from project area to Point of Interest #2 (cfs)

FREQUENCY	EXISTING CONDITIONS	PROPOSED CONDITIONS	DIFFERENCE
1 YEAR	1.16	1.12	- 0.04
2 YEAR	2.45	2.44	- 0.01
10 YEAR	6.07	5.89	- 0.18
25 YEAR	8.91	8.52	- 0.39
100 YEAR	18.38	18.23	- 0.15

SUMMARY OF UNIFIED SIZING CRITERIA

WQv:

Required WQv = 18,426 cf + 16,878 cf + 12,857 cf = 48,161 cf

Provided WQv = 18,644 cf + 16,945 cf + 12,894 cf = 48,483 cf

HydroCAD Input Data

Drainage Basins – Existing Conditions

DA #1 – Drainage Area #1

Cover Type: Woods/grass comb., Fair
Area = 10.206 acres
Hydrologic Soil Group: B
Composite SCS curve number (CN) = 65
Time of Concentration = 44.4 Minutes

DA #2 – Drainage Area #2

Cover Type: Woods/grass comb., Fair
Area = 8.321 acres
Hydrologic Soil Group: B
Composite SCS curve number (CN) = 65
Time of Concentration = 58.4 Minutes

Total Area Onsite: 18.5 Acres

Drainage Basins – Proposed Conditions

DA #1A – Drainage Area #1A

Area (sf)	CN	Description
10,723	61	>75% Grass cover, Good, HSG B
3,112	61	Emergency Access Road (Perv.), Good, HSG B
86,043	98	Building/Roof, HSG B
60,366	98	Pavement, HSG B
2,940	98	Sidewalk, HSG B
5,078	98	Emergency Access Road (Imp.), HSG B
168,262	95	Weighted Average
13,835		8.22% Pervious Area
154,427		91.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

DA #1B – Drainage Area #1B

Area (sf)	CN	Description
158,310	61	>75% Grass cover, Good, HSG B
5,648	61	Emergency Access Road (Perv.), Good, HSG B
9,215	98	Emergency Access Road (Imp.), HSG B
173,173	63	Weighted Average
163,958		94.68% Pervious Area
9,215		5.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	150	0.1200	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
4.8	488	0.0578	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	638	Total			

DA #1C – Drainage Area #1C

Area (sf)	CN	Description
9,732	61	>75% Grass cover, Good, HSG B
87,537	98	Building/Roof, HSG B
50,809	98	Pavement, HSG B
3,285	98	Sidewalk, HSG B
151,363	96	Weighted Average
9,732		6.43% Pervious Area
141,631		93.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Direct Minimum**

DA #2A – Drainage Area #2A

Area (sf)	CN	Description
48,398	98	Building/Roof, HSG B
45,328	98	Pavement, HSG B
1,404	98	Sidewalk, HSG B
13,851	61	>75% Grass cover, Good, HSG B
12,567	98	Infiltration Basin, HSG B
121,548	94	Weighted Average
13,851		11.40% Pervious Area
107,697		88.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

DA #1B – Drainage Area #2B

Area (sf)	CN	Description
187,035	61	>75% Grass cover, Good, HSG B
2,004	61	Emergency Access Road (Perv.), Good, HSG B
3,271	98	Emergency Acess Road (Imp.), HSG B
192,310	62	Weighted Average
189,039		98.30% Pervious Area
3,271		1.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	150	0.0667	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
3.0	634	0.2524	3.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
18.4	784	Total			

Total Area Onsite: 18.5 Acres

24 Hour Rainfall

Frequency	Rainfall (inches)
1 Year	2.80
2 Year	3.50
10 Year	5.00
25 Year	6.00
100 Year	9.00

Source: NOAA National Weather Service Precipitation Frequency Data Server (PFDS)

Water Quality (WQv) Calculations

Utilize the procedures outlined in Chapters 4 and Chapter 9 of NYSDEC *Stormwater Management Design Manual*

Compute Impervious Cover

Drainage Area to Roadway C Underground Infiltration Basin:

Contributing site area = 3.863 acres

Impervious area to be treated = 3.545 acres

Impervious Cover (I) = 91.78%

Compute Runoff Coefficient

Rv = 0.05 + (I) (0.009)
= 0.05 + (91.78) (0.009) = 0.876

Compute Required Water Quality Volume (WQv)

Use 90% Capture Rule

From Figure 4.1 of Stormwater Management Design Manual, 90% Rainfall = 1.5”

WQv = [(P)(Rv)(A)] / 12 = [(1.5”)(0.876)(3.863)] / 12 = **0.423 acre-feet = 18,426 ft^3**

The WQv = 18,426 cubic feet represents the required water quality volume *before* runoff reduction volume is considered. The WQv can be recalculated and reduced in accordance with the implementation of the Runoff Reduction measures.

Drainage Area to Roadway B Underground Infiltration Basin:

Contributing site area = 3.475 acres

Impervious area to be treated = 3.252 acres

Impervious Cover (I) = 93.57%

Compute Runoff Coefficient

Rv = 0.05 + (I) (0.009)
= 0.05 + (93.57) (0.009) = 0.892

Compute Required Water Quality Volume (WQv)

Use 90% Capture Rule

From Figure 4.1 of Stormwater Management Design Manual, 90% Rainfall = 1.5”

WQv = [(P)(Rv)(A)] / 12 = [(1.5”)(0.892)(3.475) / 12 = **0.387 acre-feet = 16,878 ft^3**

The WQv = 16,878 cubic feet represents the required water quality volume *before* runoff reduction volume is considered. The WQv can be recalculated and reduced in accordance with the implementation of the Runoff Reduction measures.

Drainage Area to West Infiltration Basin:

Contributing site area = 2.790 acres

Impervious area to be treated = 2.472 acres

Impervious Cover (I) = 88.60%

Compute Runoff Coefficient

Rv = 0.05 + (I) (0.009)
= 0.05 + (88.60) (0.009) = 0.847

Compute Required Water Quality Volume (WQv)

Use 90% Capture Rule

From Figure 4.1 of Stormwater Management Design Manual, 90% Rainfall = 1.5”

WQv = [(P)(Rv)(A)] / 12 = [(1.5”)(0.847)(2.790)] / 12 = **0.295 acre-feet = 12,857 ft^3**

The WQv = 12,857 cubic feet represents the required water quality volume *before* runoff reduction volume is considered. The WQv can be recalculated and reduced in accordance with the implementation of the Runoff Reduction measures.

Minimum Runoff Reduction Volume (RRv)

According to the NYSDEC Stormwater Management Design Manual, Runoff Reduction Volume (RRv) is a reduction of the total Water Quality Volume (WQv) by application of green infrastructure techniques and Standard Stormwater Management Practices (SMPs) to replicate pre-development hydrology. This concept is intended to improve the mitigation of the negative effects of stormwater runoff from development by incorporating the design and layout of stormwater management features into the site planning process. The three primary components that mitigate the negative effects of stormwater runoff are:

1. Avoiding Impacts – Avoid or minimize disturbance by preserving natural features and using conservation design techniques.
2. Reducing Impacts – Reducing the impacts of development by reducing impervious cover.
3. Managing Impacts – Manage the impacts by using natural features and runoff reduction practices to slow down the runoff, promote infiltration and minimize the need for structural “end-of-pipe” practices.

The RRv requirement can be accomplished by application of on-site green infrastructure techniques, standard stormwater management practices with runoff reduction capacity, and good operation and maintenance. The NYSDEC Stormwater Management Design Manual requires planners and designers to address this approach in an iterative site planning and design process. The iterative process is a five-step process that combines site planning with the use of various green infrastructure techniques and standard stormwater management practices until the RRv requirement is met. The iterative five-step process is as follows:

1. Site planning to preserve natural features and reduce impervious cover;
2. Calculation of the water quality volume for the site;
3. Incorporation of green infrastructure techniques and standard SMPs with RRv capacity;
4. Use of standard SMPs, where applicable; and
5. Design of volume and peak rate control practices where required.

If by using these techniques the calculated RRv is greater than the required WQv, the RRv requirement is met. If the RRv is less than the required WQv then the design must, at a minimum, reduce a percentage of the runoff from impervious areas to be constructed on the site. The percent reduction is based on the Hydrologic Soil Group of the site, and is determined by the Specific Reduction Factor (S). The Specific Reduction Factor (S) for this project is 0.40, based on the ‘B’ soils present.

The runoff reduction techniques that have been selected have been determined to be suitable for the proposed project in consideration of factors including site topography, slopes, soil properties, project layout, and maintenance requirements. The selected techniques include the following:

- Infiltration

Minimum Runoff Reduction Volume (RRv) Calculations

Utilize the procedure outlined in Chapter 4, Section 4.3 of NYSDEC *Stormwater Management Design Manual*

Infiltration Calculations

Two (2) underground infiltration systems, and one (1) infiltration basin will be installed to store, infiltrate and treat runoff from the site. The system has been sized to handle the runoff from the 100-year storm. A soil percolation rate of 12 inches per hour has been used based on test results.

Outlet control structures and outlet pipes are proposed from each system to the existing network of catch basins as in existing conditions.

Drainage Area to Roadway C Infiltration System:

The WQv storm was determined to be 1.84" of rainfall

Infiltration volume at WQv Peak Elevation (Elevation 492.55) = **0.428 acre-feet = 18,644 ft^3**
*Outlet invert = Elevation 492.55

Infiltration practices count as 100% of WQv towards meeting the RRv sizing criteria.
(Table 3.5 of the NYSDEC Stormwater Management Design Manual)

RRv = (1.0) x (18,644 ft^3) = 18,644 ft^3

Check 48-hour Infiltration

12 inches per hour percolation rate.

12 in/hour = 1 ft/ hour

Bottom area of Roadway C Infiltration System (El. 491.75) = 7,503 sq. ft.

18,644 ft^3 / 1 ft/ hour / 7,503 sq. ft. = 2.48 hours < 48 hours ➔ **OK**

Drainage Area to Roadway B Infiltration System:

The WQv storm was determined to be 1.76" of rainfall

Infiltration volume at WQv Peak Elevation (Elevation 495.91) = **0.389 acre-feet = 16,945 ft^3**
*Outlet invert = Elevation 495.91

Infiltration practices count as 100% of WQv towards meeting the RRv sizing criteria.
(Table 3.5 of the NYSDEC Stormwater Management Design Manual)

RRv = (1.0) x (16,945 ft^3) = 16,945 ft^3

Check 48-hour Infiltration

12 inches per hour percolation rate.

12 in/hour = 1 ft/ hour

Bottom area of Roadway B Infiltration System (El. 495.25) = 7,503 sq. ft.

16,945 ft^3 / 1 ft/ hour / 7,503 sq. ft. = 2.26 hours < 48 hours ➔ **OK**

Drainage Area to Infiltration Basin:

The WQv storm was determined to be 1.72" of rainfall

Infiltration volume at WQv Peak Elevation (Elevation 485.21) = **0.264 acre-feet = 11,500 ft^3**
*Outlet invert = Elevation 485.21

Infiltration practices count as 100% of WQv towards meeting the RRv sizing criteria.
(Table 3.5 of the NYSDEC Stormwater Management Design Manual)

RRv = (1.0) x (11,500 ft^3) = 11,500 ft^3

Check 48-hour Infiltration

12 inches per hour percolation rate.

12 in/hour = 1 ft/ hour

Bottom area of Infiltration Basin (El. 485.00) = 5,500 sq. ft.

11,500 ft^3 / 1 ft/ hour / 5,500 sq. ft. = 2.09 hours < 48 hours ➔ **OK**

Runoff Reduction Summary

The entire water quality volume from the site will be treated, stored and infiltrated in the proposed systems. Therefore, the runoff reduction requirement of 100% is achieved.

POI Roadway C Underground Infiltration System

An underground infiltration system is proposed to provide 100% water quality treatment and runoff reduction of Drainage Area #1A.

Storage Volume vs. Elevation per HydroCAD Output

Elevation Storage Volume (cubic-feet)

498.35 (Top of Stone)	= 32,520 cf
497.35 (Top of Chamber)	= 29,504 cf
492.53 (Low Orifice)	= 2,504 cf
492.50 (Bottom of Chamber)	= 2,387 cf
491.75 (Bottom of Stone)	= 0 cf

Outlets

- Exfiltration @ INV El. 491.75
- (1) 5” Diameter Orifice @ INV El. 492.53
- (1) 5” Diameter Orifice @ INV El. 493.83
- (1) 5” Diameter Orifice @ INV El. 494.49
- (1) 5” Diameter Orifice @ INV El. 495.32
- (1) 8” Diameter Orifice @ INV El. 496.23
- Emergency Spillway @ INV EL. 497.89

Freeboard

100-yr Peak WSEL = 498.46 (per attached HydroCAD analysis)
Freeboard = 501.88’ – 498.46’ = 3.42’

POI Roadway B Underground Infiltration System

An underground infiltration system is proposed to provide 100% water quality treatment and runoff reduction of Drainage Area #1C.

Storage Volume vs. Elevation per HydroCAD Output

Elevation Storage Volume (cubic-feet)

501.85 (Top of Stone)	= 32,520 cf
500.85 (Top of Chamber)	= 29,504 cf
496.09 (Low Orifice)	= 2,846 cf
496.00 (Bottom of Chamber)	= 2,387 cf
495.25 (Bottom of Stone)	= 0 cf

Outlets

- Exfiltration @ INV El. 495.25
- (1) 5” Diameter Orifice @ INV El. 496.09
- (1) 5” Diameter Orifice @ INV El. 496.92
- (1) 6” Diameter Orifice @ INV El. 497.83
- (1) 6” Diameter Orifice @ INV El. 498.75
- (1) 6” Diameter Orifice @ INV El. 499.67
- Emergency Spillway @ INV EL. 501.43

Freeboard

100-yr Peak WSEL = 500.79 (per attached HydroCAD analysis)
Freeboard = 505.25’ – 500.79’ = 4.46’

POI Infiltration Basin

An infiltration basin is proposed to provide 100% water quality treatment and runoff reduction of Drainage Area #2A.

Storage Volume vs. Elevation per HydroCAD Output

Elevation Storage Volume (cubic-feet)

485.00 (Bottom of Basin)	= 0 cf
486.00	= 6,500 cf
487.00	= 15,000 cf
488.00 (Top of Basin)	= 25,500 cf

Outlets

- Exfiltration @ INV El. 485.00
- (1) 7” Diameter Orifice @ INV El. 485.21
- (1) 7” Diameter Orifice @ INV El. 486.70
- Emergency Spillway @ INV EL. 487.72

Freeboard

100-yr Peak WSEL = 485.27 (per attached HydroCAD analysis)
Freeboard = 488.00’ – 485.27’ = 2.73’

Pretreatment

According to the NYSDEC publication *Stormwater Management Design Manual*, the definition of Pretreatment is as follows:

> Pretreatment – Techniques employed in stormwater SMPs to provide storage or filtering to help trap coarse materials before they enter the system.

In regard to pretreatment for infiltration practices, Section 6.3.3 of the NYSDEC *Stormwater Management Design Manual* states the following:

> A minimum pretreatment volume of 25% of the WQv must be provided prior to entry to an infiltration facility, and can be provided in the form of a sedimentation basin, sump pit, grass channel, plunge pool or other measure.
>
> Additionally, if the soil infiltration rate exceeds 5 inches per hour, a minimum pretreatment volume of 100% of the WQv must be provided.

In order to meet the pretreatment requirement, a *First Defense HC Stormwater Treatment Device* as manufactured by *Hydro International* has been selected. These devices are on the list of approved proprietary devices published by the New Jersey Corporation for Advanced Technology (NJCAT) and are thereby approved by the NYSDEC for use as pretreatment devices.

A *First Defense HC Stormwater Treatment Device* will be installed upstream of the inlet to proposed infiltration basins and underground infiltration system. The device is designed as flow-through device, and the selected sizing ensures that all water quality flows captured in the stormwater collection system will pass through the device prior to discharging into the stormwater infiltration system. Thus, the configuration provides pretreatment of the full water quality volume prior to it entering into the proposed stormwater infiltration system.

Pre-treatment Calculations:

This system is designed as a flow-through device.

Check the Water Quality volume flow rates. Flow rates are taken from the HydroCAD computer output for proposed conditions for the water quality design flow,

Roadway C Drainage Area:

Peak WQ flow rate = 4.96 cfs ➔ **OK**

Peak WQv flow rate of 8’ Diameter First Defense High Capacity unit = 6.00 cfs ➔ **OK**

Peak flow rate (100 year) = 29.26 cfs

Peak on-line flow rate of 8’ Diameter First Defense High Capacity unit = 32 cfs ➔ **OK**

WQv Pretreatment required = 100%

WQv Pretreatment provided = 100% ➔ **OK**

Roadway B Drainage Area:

Peak WQ flow rate = 4.58 cfs ➔ **OK**

Peak WQv flow rate of 8' Diameter First Defense High Capacity unit = 6.00 cfs ➔ **OK**

Peak flow rate (100 year) = 26.44 cfs

Peak on-line flow rate of 8' Diameter First Defense High Capacity unit = 32 cfs ➔ **OK**

WQv Pretreatment required = 100%

WQv Pretreatment provided = 100% ➔ **OK**

Infiltration Basin:

Peak WQ flow rate = 3.56 cfs ➔ **OK**

Peak WQv flow rate of 6' Diameter First Defense Optimum unit = 4.07 cfs ➔ **OK**

Peak flow rate (100 year) = 21.03 cfs

Peak on-line flow rate of 6' Diameter First Defense Optimum unit = 32 cfs ➔ **OK**

WQv Pretreatment required = 100%

WQv Pretreatment provided = 100% ➔ **OK**

Appendix A

Existing Conditions
Drainage Area Map

DRAINAGE AREA #1 Tc
SHEET FLOW
STA 0+00
EL. 520.0

Tc = 23.5 MINUTES

DRAINAGE AREA #1 Tc
SHEET FLOW
STA 1+50
EL. 510.3

DRAINAGE AREA #2 Tc
SHEET FLOW
STA 0+00
EL. 511.2

Tc = 47.2 MINUTES

DRAINAGE AREA #2
TOTAL PERVIOUS AREA = 362,422 S.F.

DRAINAGE AREA #2 Tc
SHEET FLOW
STA 1+50
EL. 509.5

Tc = 11.2 MINUTES

DRAINAGE AREA #1
TOTAL PERVIOUS AREA = 444,593 S.F.

Tc = 20.9 MINUTES

DRAINAGE AREA #2 Tc
SHALLOW CONCENTRATED FLOW
STA 8+64
EL. 477.5

NORTH AIRMONT ROAD

RELLA BOULEVARD

POINT OF
INTEREST #2

DRAINAGE AREA #1 Tc
SHALLOW CONCENTRATED FLOW
STA 10+47
EL. 492.0

POINT OF
INTEREST #1

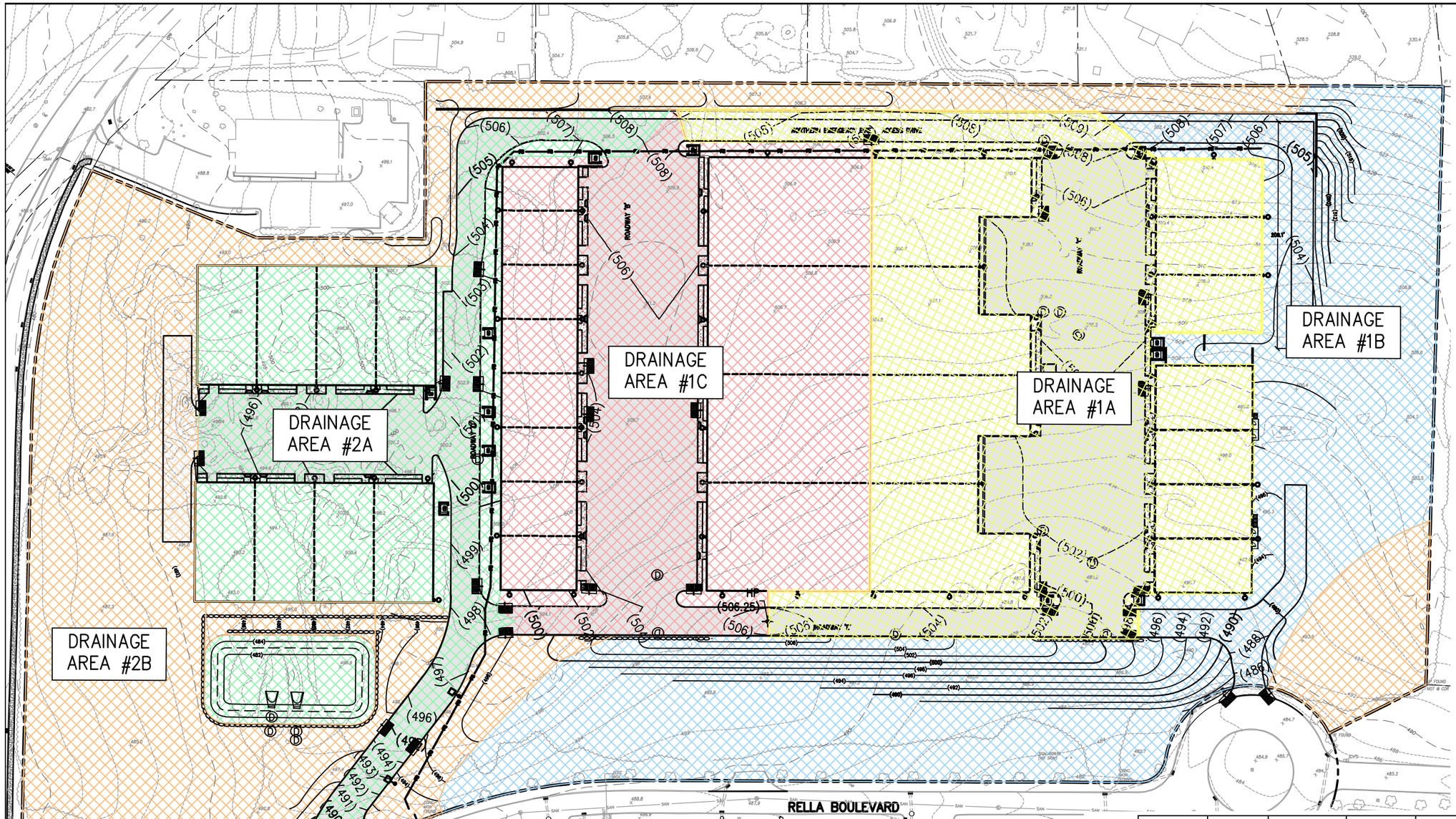
TOTAL Tc = 44.4 MINUTES

TOTAL Tc = 58.4 MINUTES

EXISTING CONDITIONS DRAINAGE MAP

Appendix B

Proposed Conditions
Drainage Area Map



PROPOSED CONDITIONS DRAINAGE AREA MAP

DRAINAGE AREA #	TOTAL AREA, SF	BUILDING ROOF	PAVEMENT	SIDEWALK	E. ACCESS ROAD	LAWN	DETENSION BASIN
1A	168,262	86,043	60,366	2,940	8,190	10,723	0
1B	173,173	0	0	0	14863	158,310	0
1C	151,363	87,537	50,809	3,285	0	9732	0
2A	121,548	48,398	45,328	1,404	0	13,851	12,567
2B	192,310	0	0	0	5,275	187,035	0
TOTAL	806656	221978	156503	7629	28328	379651	12567

Appendix C

USDA NRCS
Soil Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Rockland County, New York



May 6, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:3,040 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 100 200 400 600

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Rockland County, New York
Survey Area Data: Version 18, Jun 11, 2020

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

Date(s) aerial images were photographed: Aug 22, 2020—Sep 23, 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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CrB	Cheshire gravelly fine sandy loam, 2 to 8 percent slopes	15.4	87.9%
WeC	Wethersfield gravelly silt loam, 8 to 15 percent slopes	2.1	12.1%
Totals for Area of Interest		**17.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Rockland County, New York

CrB—Cheshire gravelly fine sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9v46
Elevation: 50 to 670 feet
Mean annual precipitation: 47 to 50 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Cheshire and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cheshire

Setting

Landform: Till plains, hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mostly from reddish sandstone, shale, and conglomerate

Typical profile

H1 - 0 to 10 inches: gravelly fine sandy loam
H2 - 10 to 22 inches: gravelly fine sandy loam
H3 - 22 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F145XY013CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Yalesville

Percent of map unit: 5 percent
Hydric soil rating: No

Wethersfield
Percent of map unit: 5 percent
Hydric soil rating: No

Watchaug
Percent of map unit: 5 percent
Hydric soil rating: No

Cheshire, very stony
Percent of map unit: 5 percent
Hydric soil rating: No

WeC—Wethersfield gravelly silt loam, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: 9v5m
Elevation: 20 to 690 feet
Mean annual precipitation: 47 to 50 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Wethersfield and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wethersfield

Setting
Landform: Till plains, hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy acid till derived mainly from reddish sandstone, shale, and conglomerate, with some basalt

Typical profile
H1 - 0 to 13 inches: gravelly silt loam
H2 - 13 to 22 inches: gravelly loam
H3 - 22 to 60 inches: gravelly fine sandy loam

Properties and qualities
Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 38 inches to densic material
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None

Frequency of ponding: None
Available water capacity: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F145XY012CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Cheshire

Percent of map unit: 5 percent
Hydric soil rating: No

Charlton

Percent of map unit: 5 percent
Hydric soil rating: No

Riverhead

Percent of map unit: 5 percent
Hydric soil rating: No

Wallington

Percent of map unit: 3 percent
Hydric soil rating: No

Yalesville

Percent of map unit: 2 percent
Hydric soil rating: No

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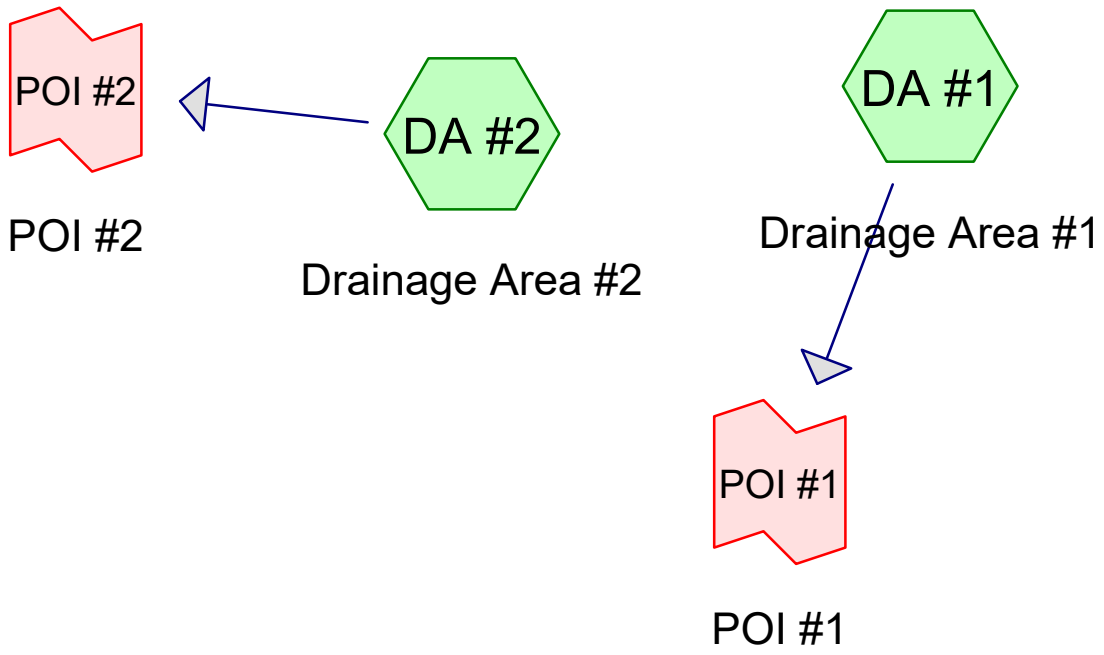
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Appendix D

Existing Conditions
HydroCAD Model



Subcat Reach Pond Link

Routing Diagram for 2022.09.15 - Existing Conditions
Prepared by Hewlett-Packard Company, Printed 11/14/2022
HydroCAD® 10.10-7a s/n 06354 © 2021 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type III 24-hr		Default	24.00	1	2.80	2
2	2-Year	Type III 24-hr		Default	24.00	1	3.50	2
3	10-Year	Type III 24-hr		Default	24.00	1	5.00	2
4	25-Year	Type III 24-hr		Default	24.00	1	6.00	2
5	100-Year	Type III 24-hr		Default	24.00	1	9.00	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
18.527	65	Woods/grass comb., Fair, HSG B (DA #1, DA #2)
18.527	**65**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
18.527	HSG B	DA #1, DA #2
0.000	HSG C	
0.000	HSG D	
0.000	Other	
18.527		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	18.527	0.000	0.000	0.000	18.527	Woods/grass comb., Fair	DA #1, DA #2
0.000	**18.527**	**0.000**	**0.000**	**0.000**	**18.527**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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: Drainage Area #1 Runoff Area=444,593 sf 0.00% Impervious Runoff Depth=0.42"
Flow Length=1,047' Tc=44.4 min CN=65 Runoff=1.66 cfs 0.355 af

Subcatchment DA #2: Drainage Area #2 Runoff Area=362,442 sf 0.00% Impervious Runoff Depth=0.42"
Flow Length=864' Tc=58.4 min CN=65 Runoff=1.16 cfs 0.290 af

Link POI #1: POI #1 Inflow=1.66 cfs 0.355 af
Primary=1.66 cfs 0.355 af

Link POI #2: POI #2 Inflow=1.16 cfs 0.290 af
Primary=1.16 cfs 0.290 af

Total Runoff Area = 18.527 ac Runoff Volume = 0.645 af Average Runoff Depth = 0.42"
100.00% Pervious = 18.527 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment DA #1: Drainage Area #1

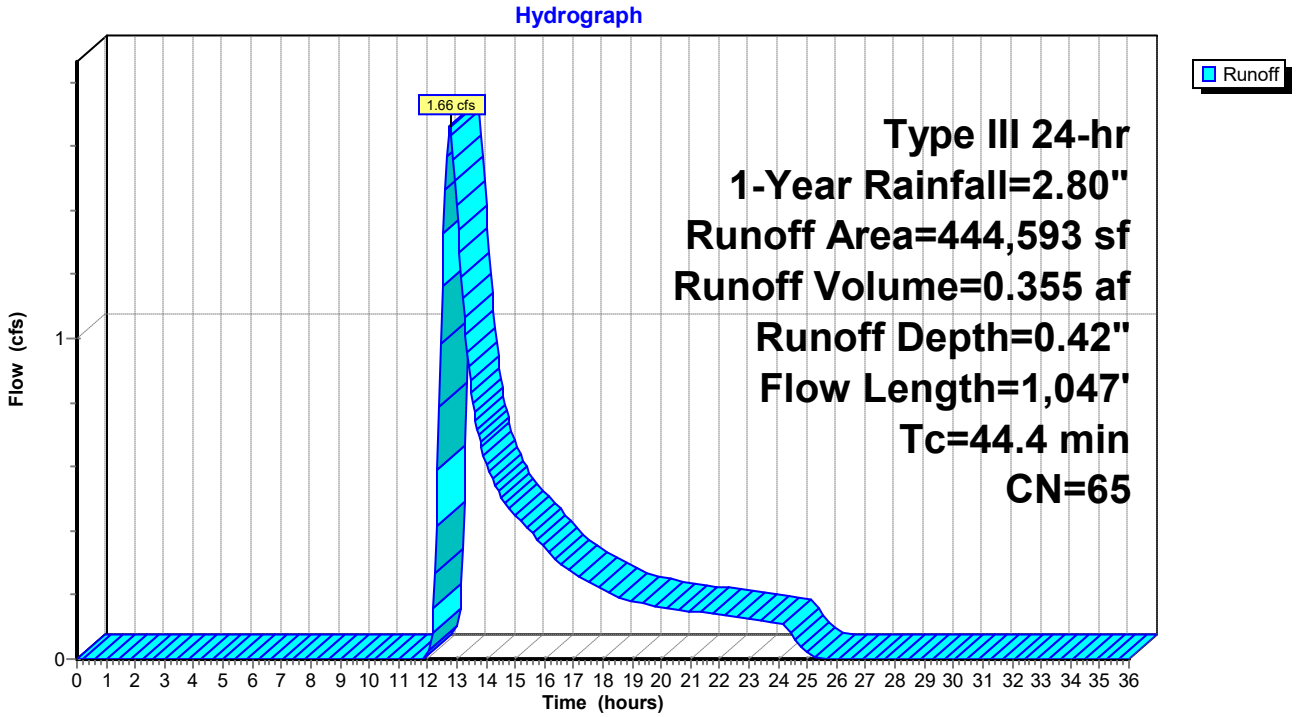
Runoff = 1.66 cfs @ 12.76 hrs, Volume= 0.355 af, Depth= 0.42"
Routed to Link POI #1 : POI #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

Area (sf)	CN	Description
444,593	65	Woods/grass comb., Fair, HSG B
444,593		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	150	0.0647	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.00"
20.9	897	0.0204	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
44.4	1,047	Total			

Subcatchment DA #1: Drainage Area #1



Hydrograph for Subcatchment DA #1: Drainage Area #1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.03	0.00	0.00
1.50	0.04	0.00	0.00
2.00	0.06	0.00	0.00
2.50	0.07	0.00	0.00
3.00	0.09	0.00	0.00
3.50	0.10	0.00	0.00
4.00	0.12	0.00	0.00
4.50	0.14	0.00	0.00
5.00	0.16	0.00	0.00
5.50	0.18	0.00	0.00
6.00	0.20	0.00	0.00
6.50	0.23	0.00	0.00
7.00	0.25	0.00	0.00
7.50	0.28	0.00	0.00
8.00	0.32	0.00	0.00
8.50	0.36	0.00	0.00
9.00	0.41	0.00	0.00
9.50	0.46	0.00	0.00
10.00	0.53	0.00	0.00
10.50	0.61	0.00	0.00
11.00	0.70	0.00	0.00
11.50	0.83	0.00	0.00
12.00	1.40	0.02	0.00
12.50	1.97	0.13	**1.16**
13.00	2.10	0.16	**1.41**
13.50	2.19	0.19	0.83
14.00	2.27	0.22	0.61
14.50	2.34	0.24	0.51
15.00	2.39	0.26	0.45
15.50	2.44	0.28	0.40
16.00	2.48	0.29	0.35
16.50	2.52	0.30	0.30
17.00	2.55	0.32	0.27
17.50	2.57	0.33	0.24
18.00	2.60	0.34	0.22
18.50	2.62	0.34	0.19
19.00	2.64	0.35	0.18
19.50	2.66	0.36	0.17
20.00	2.68	0.37	0.16
20.50	2.70	0.37	0.16
21.00	2.71	0.38	0.15
21.50	2.73	0.39	0.14
22.00	2.75	0.39	0.14
22.50	2.76	0.40	0.13
23.00	2.77	0.41	0.13
23.50	2.79	0.41	0.12
24.00	**2.80**	**0.42**	0.11
24.50	2.80	0.42	0.07
25.00	2.80	0.42	0.02
25.50	2.80	0.42	0.00
26.00	2.80	0.42	0.00
26.50	2.80	0.42	0.00
27.00	2.80	0.42	0.00
27.50	2.80	0.42	0.00
28.00	2.80	0.42	0.00
28.50	2.80	0.42	0.00
29.00	2.80	0.42	0.00
29.50	2.80	0.42	0.00
30.00	2.80	0.42	0.00
30.50	2.80	0.42	0.00
31.00	2.80	0.42	0.00
31.50	2.80	0.42	0.00
32.00	2.80	0.42	0.00
32.50	2.80	0.42	0.00
33.00	2.80	0.42	0.00
33.50	2.80	0.42	0.00
34.00	2.80	0.42	0.00
34.50	2.80	0.42	0.00
35.00	2.80	0.42	0.00
35.50	2.80	0.42	0.00
36.00	2.80	0.42	0.00

Summary for Subcatchment DA #2: Drainage Area #2

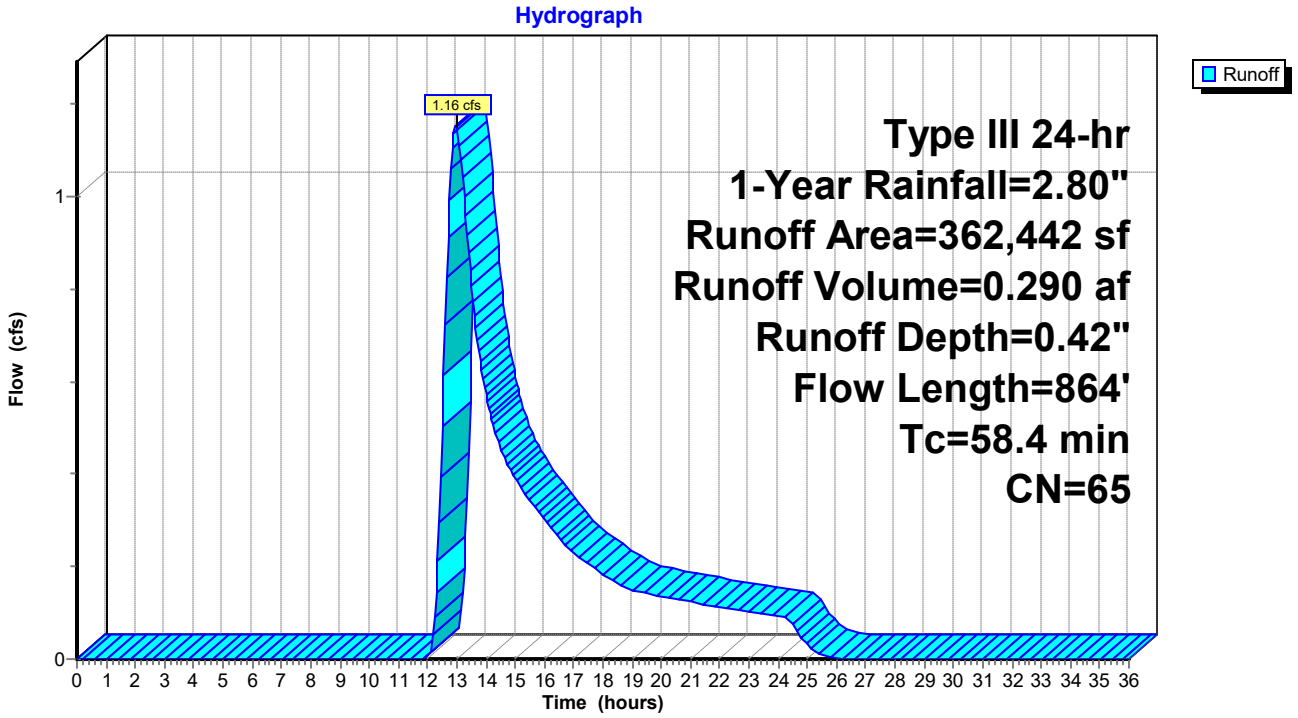
Runoff = 1.16 cfs @ 12.98 hrs, Volume= 0.290 af, Depth= 0.42"
Routed to Link POI #2 : POI #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

Area (sf)	CN	Description
362,442	65	Woods/grass comb., Fair, HSG B
362,442		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.2	150	0.0113	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.00"
11.2	714	0.0448	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
58.4	864	Total			

Subcatchment DA #2: Drainage Area #2



Hydrograph for Subcatchment DA #2: Drainage Area #2

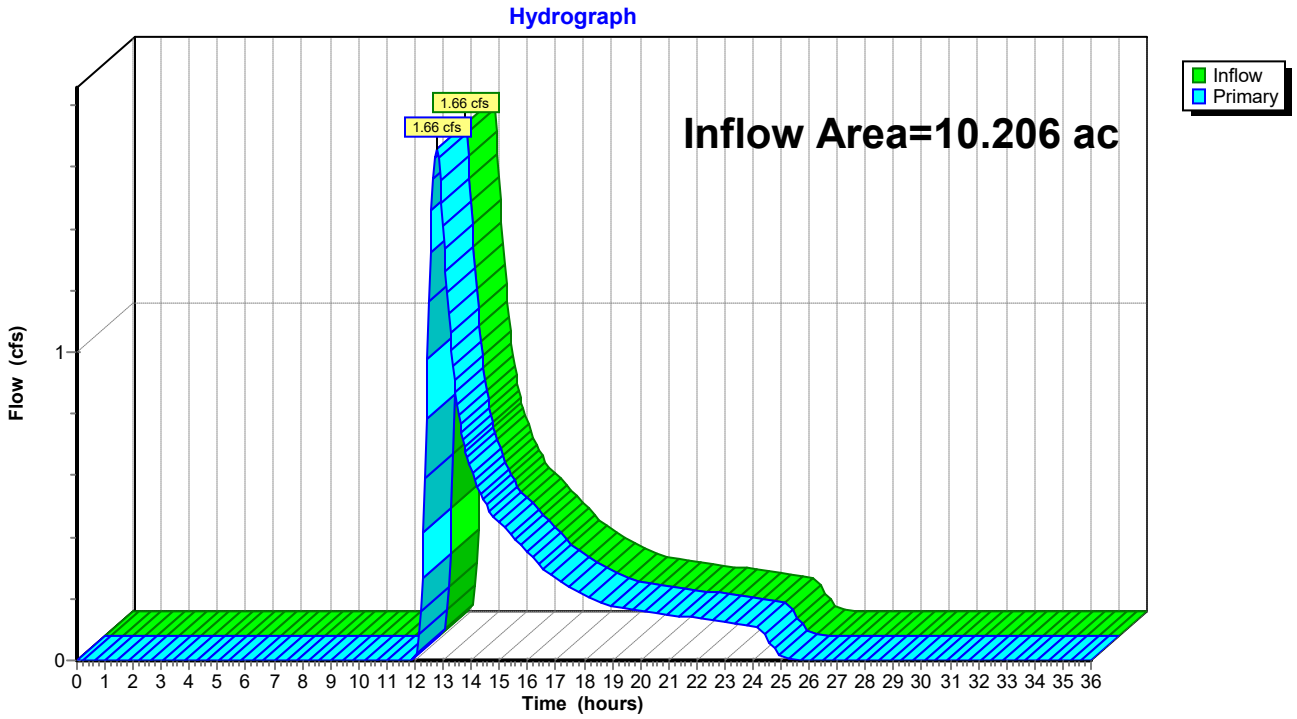
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.03	0.00	0.00
1.50	0.04	0.00	0.00
2.00	0.06	0.00	0.00
2.50	0.07	0.00	0.00
3.00	0.09	0.00	0.00
3.50	0.10	0.00	0.00
4.00	0.12	0.00	0.00
4.50	0.14	0.00	0.00
5.00	0.16	0.00	0.00
5.50	0.18	0.00	0.00
6.00	0.20	0.00	0.00
6.50	0.23	0.00	0.00
7.00	0.25	0.00	0.00
7.50	0.28	0.00	0.00
8.00	0.32	0.00	0.00
8.50	0.36	0.00	0.00
9.00	0.41	0.00	0.00
9.50	0.46	0.00	0.00
10.00	0.53	0.00	0.00
10.50	0.61	0.00	0.00
11.00	0.70	0.00	0.00
11.50	0.83	0.00	0.00
12.00	1.40	0.02	0.00
12.50	1.97	0.13	0.50
13.00	2.10	0.16	**1.15**
13.50	2.19	0.19	0.81
14.00	2.27	0.22	0.57
14.50	2.34	0.24	0.46
15.00	2.39	0.26	0.39
15.50	2.44	0.28	0.34
16.00	2.48	0.29	0.30
16.50	2.52	0.30	0.26
17.00	2.55	0.32	0.23
17.50	2.57	0.33	0.21
18.00	2.60	0.34	0.19
18.50	2.62	0.34	0.16
19.00	2.64	0.35	0.15
19.50	2.66	0.36	0.14
20.00	2.68	0.37	0.14
20.50	2.70	0.37	0.13
21.00	2.71	0.38	0.12
21.50	2.73	0.39	0.12
22.00	2.75	0.39	0.11
22.50	2.76	0.40	0.11
23.00	2.77	0.41	0.10
23.50	2.79	0.41	0.10
24.00	**2.80**	**0.42**	0.09
24.50	2.80	0.42	0.08
25.00	2.80	0.42	0.03
25.50	2.80	0.42	0.01
26.00	2.80	0.42	0.00
26.50	2.80	0.42	0.00
27.00	2.80	0.42	0.00
27.50	2.80	0.42	0.00
28.00	2.80	0.42	0.00
28.50	2.80	0.42	0.00
29.00	2.80	0.42	0.00
29.50	2.80	0.42	0.00
30.00	2.80	0.42	0.00
30.50	2.80	0.42	0.00
31.00	2.80	0.42	0.00
31.50	2.80	0.42	0.00
32.00	2.80	0.42	0.00
32.50	2.80	0.42	0.00
33.00	2.80	0.42	0.00
33.50	2.80	0.42	0.00
34.00	2.80	0.42	0.00
34.50	2.80	0.42	0.00
35.00	2.80	0.42	0.00
35.50	2.80	0.42	0.00
36.00	2.80	0.42	0.00

Summary for Link POI #1: POI #1

Inflow Area = 10.206 ac, 0.00% Impervious, Inflow Depth = 0.42" for 1-Year event
Inflow = 1.66 cfs @ 12.76 hrs, Volume= 0.355 af
Primary = 1.66 cfs @ 12.76 hrs, Volume= 0.355 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #1: POI #1



Hydrograph for Link POI #1: POI #1

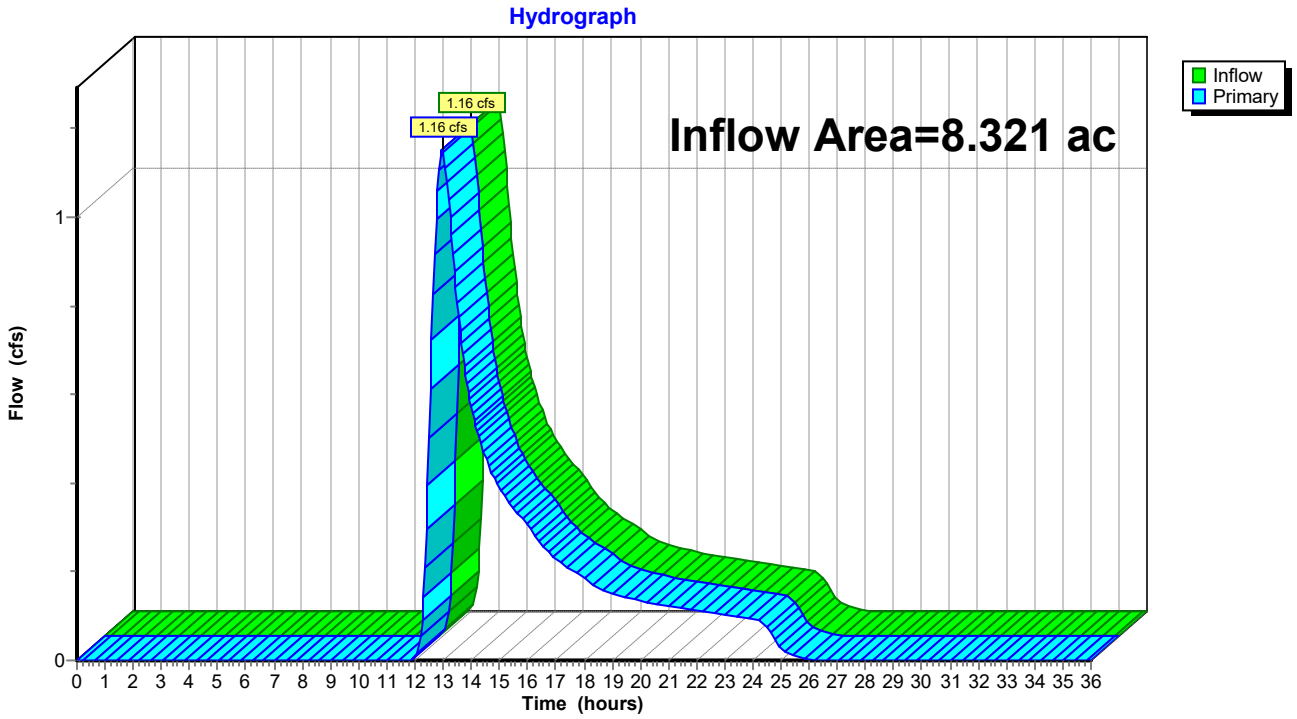
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.00	0.00	0.00
12.50	**1.16**	0.00	**1.16**
13.00	**1.41**	0.00	**1.41**
13.50	0.83	0.00	0.83
14.00	0.61	0.00	0.61
14.50	0.51	0.00	0.51
15.00	0.45	0.00	0.45
15.50	0.40	0.00	0.40
16.00	0.35	0.00	0.35
16.50	0.30	0.00	0.30
17.00	0.27	0.00	0.27
17.50	0.24	0.00	0.24
18.00	0.22	0.00	0.22
18.50	0.19	0.00	0.19
19.00	0.18	0.00	0.18
19.50	0.17	0.00	0.17
20.00	0.16	0.00	0.16
20.50	0.16	0.00	0.16
21.00	0.15	0.00	0.15
21.50	0.14	0.00	0.14
22.00	0.14	0.00	0.14
22.50	0.13	0.00	0.13
23.00	0.13	0.00	0.13
23.50	0.12	0.00	0.12
24.00	0.11	0.00	0.11
24.50	0.07	0.00	0.07
25.00	0.02	0.00	0.02
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Summary for Link POI #2: POI #2

Inflow Area = 8.321 ac, 0.00% Impervious, Inflow Depth = 0.42" for 1-Year event
Inflow = 1.16 cfs @ 12.98 hrs, Volume= 0.290 af
Primary = 1.16 cfs @ 12.98 hrs, Volume= 0.290 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #2: POI #2



Hydrograph for Link POI #2: POI #2

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.00	0.00	0.00
12.50	0.50	0.00	0.50
13.00	**1.15**	0.00	**1.15**
13.50	0.81	0.00	0.81
14.00	0.57	0.00	0.57
14.50	0.46	0.00	0.46
15.00	0.39	0.00	0.39
15.50	0.34	0.00	0.34
16.00	0.30	0.00	0.30
16.50	0.26	0.00	0.26
17.00	0.23	0.00	0.23
17.50	0.21	0.00	0.21
18.00	0.19	0.00	0.19
18.50	0.16	0.00	0.16
19.00	0.15	0.00	0.15
19.50	0.14	0.00	0.14
20.00	0.14	0.00	0.14
20.50	0.13	0.00	0.13
21.00	0.12	0.00	0.12
21.50	0.12	0.00	0.12
22.00	0.11	0.00	0.11
22.50	0.11	0.00	0.11
23.00	0.10	0.00	0.10
23.50	0.10	0.00	0.10
24.00	0.09	0.00	0.09
24.50	0.08	0.00	0.08
25.00	0.03	0.00	0.03
25.50	0.01	0.00	0.01
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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: Drainage Area #1 Runoff Area=444,593 sf 0.00% Impervious Runoff Depth=0.75"
Flow Length=1,047' Tc=44.4 min CN=65 Runoff=3.52 cfs 0.640 af

Subcatchment DA #2: Drainage Area #2 Runoff Area=362,442 sf 0.00% Impervious Runoff Depth=0.75"
Flow Length=864' Tc=58.4 min CN=65 Runoff=2.45 cfs 0.521 af

Link POI #1: POI #1 Inflow=3.52 cfs 0.640 af
Primary=3.52 cfs 0.640 af

Link POI #2: POI #2 Inflow=2.45 cfs 0.521 af
Primary=2.45 cfs 0.521 af

Total Runoff Area = 18.527 ac Runoff Volume = 1.161 af Average Runoff Depth = 0.75"
100.00% Pervious = 18.527 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment DA #1: Drainage Area #1

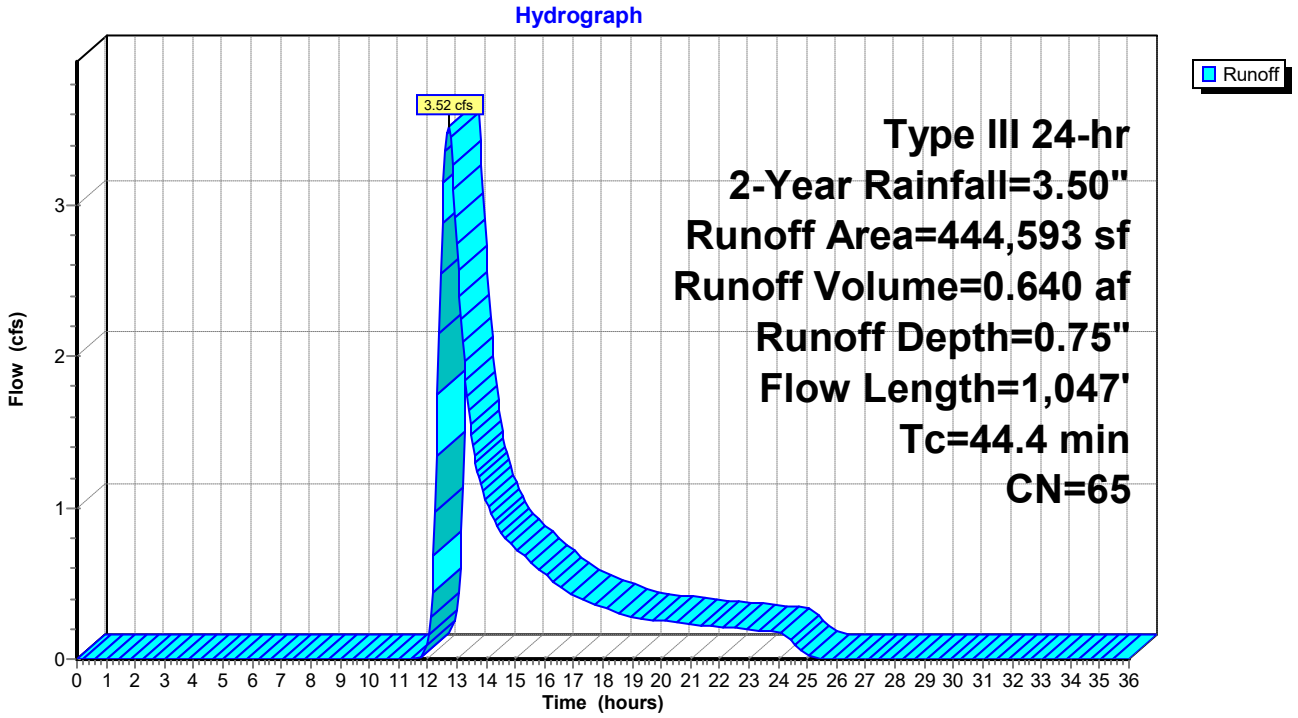
Runoff = 3.52 cfs @ 12.71 hrs, Volume= 0.640 af, Depth= 0.75"
Routed to Link POI #1 : POI #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.50"

Area (sf)	CN	Description
444,593	65	Woods/grass comb., Fair, HSG B
444,593		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	150	0.0647	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.00"
20.9	897	0.0204	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
44.4	1,047	Total			

Subcatchment DA #1: Drainage Area #1



Hydrograph for Subcatchment DA #1: Drainage Area #1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.02	0.00	0.00
1.00	0.04	0.00	0.00
1.50	0.05	0.00	0.00
2.00	0.07	0.00	0.00
2.50	0.09	0.00	0.00
3.00	0.11	0.00	0.00
3.50	0.13	0.00	0.00
4.00	0.15	0.00	0.00
4.50	0.17	0.00	0.00
5.00	0.20	0.00	0.00
5.50	0.22	0.00	0.00
6.00	0.25	0.00	0.00
6.50	0.28	0.00	0.00
7.00	0.32	0.00	0.00
7.50	0.36	0.00	0.00
8.00	0.40	0.00	0.00
8.50	0.45	0.00	0.00
9.00	0.51	0.00	0.00
9.50	0.58	0.00	0.00
10.00	0.66	0.00	0.00
10.50	0.76	0.00	0.00
11.00	0.88	0.00	0.00
11.50	1.04	0.00	0.00
12.00	1.75	0.07	0.09
12.50	2.46	0.28	**2.88**
13.00	2.62	0.35	**2.74**
13.50	2.74	0.39	1.48
14.00	2.84	0.43	1.04
14.50	2.92	0.47	0.84
15.00	2.99	0.50	0.73
15.50	3.05	0.53	0.64
16.00	3.10	0.55	0.56
16.50	3.14	0.57	0.48
17.00	3.18	0.59	0.42
17.50	3.22	0.61	0.38
18.00	3.25	0.62	0.34
18.50	3.28	0.64	0.30
19.00	3.30	0.65	0.28
19.50	3.33	0.66	0.27
20.00	3.35	0.67	0.25
20.50	3.37	0.69	0.24
21.00	3.39	0.70	0.23
21.50	3.41	0.71	0.22
22.00	3.43	0.72	0.21
22.50	3.45	0.73	0.20
23.00	3.47	0.74	0.19
23.50	3.48	0.74	0.18
24.00	**3.50**	**0.75**	0.17
24.50	3.50	0.75	0.12
25.00	3.50	0.75	0.02
25.50	3.50	0.75	0.00
26.00	3.50	0.75	0.00
26.50	3.50	0.75	0.00
27.00	3.50	0.75	0.00
27.50	3.50	0.75	0.00
28.00	3.50	0.75	0.00
28.50	3.50	0.75	0.00
29.00	3.50	0.75	0.00
29.50	3.50	0.75	0.00
30.00	3.50	0.75	0.00
30.50	3.50	0.75	0.00
31.00	3.50	0.75	0.00
31.50	3.50	0.75	0.00
32.00	3.50	0.75	0.00
32.50	3.50	0.75	0.00
33.00	3.50	0.75	0.00
33.50	3.50	0.75	0.00
34.00	3.50	0.75	0.00
34.50	3.50	0.75	0.00
35.00	3.50	0.75	0.00
35.50	3.50	0.75	0.00
36.00	3.50	0.75	0.00

Summary for Subcatchment DA #2: Drainage Area #2

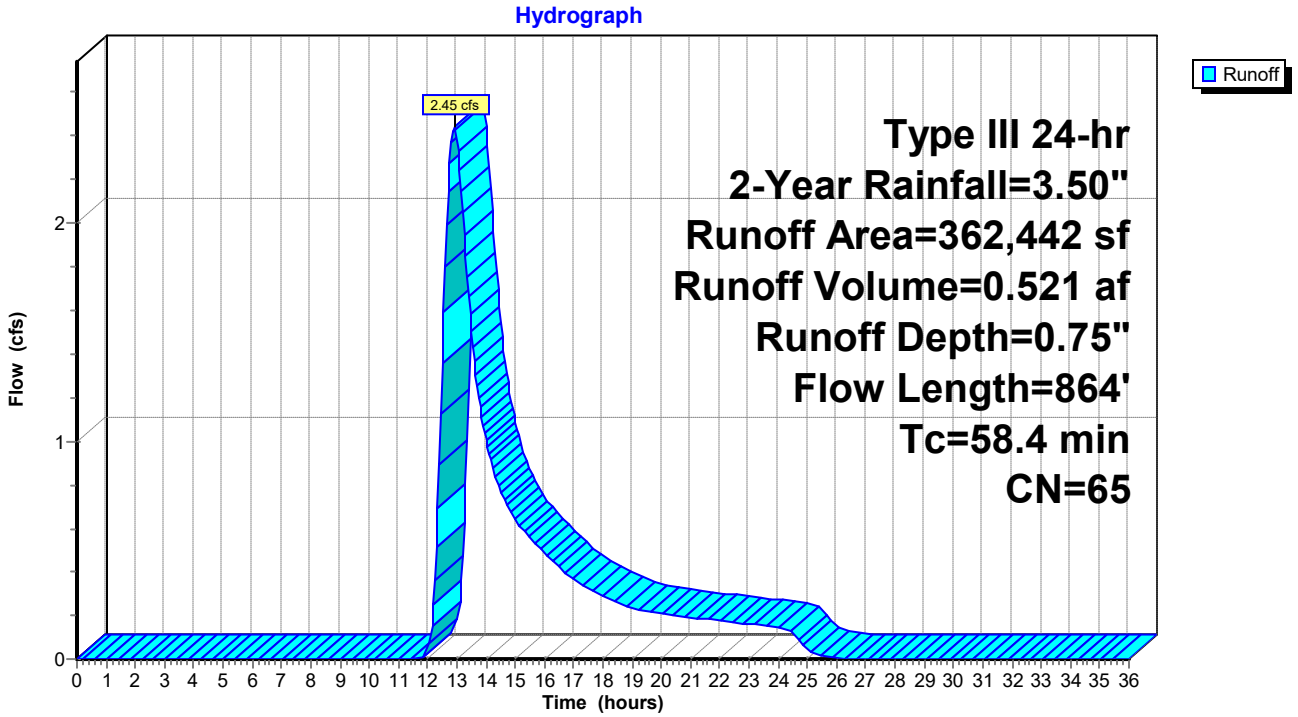
Runoff = 2.45 cfs @ 12.91 hrs, Volume= 0.521 af, Depth= 0.75"
Routed to Link POI #2 : POI #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.50"

Area (sf)	CN	Description
362,442	65	Woods/grass comb., Fair, HSG B
362,442		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.2	150	0.0113	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.00"
11.2	714	0.0448	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
58.4	864	Total			

Subcatchment DA #2: Drainage Area #2



Hydrograph for Subcatchment DA #2: Drainage Area #2

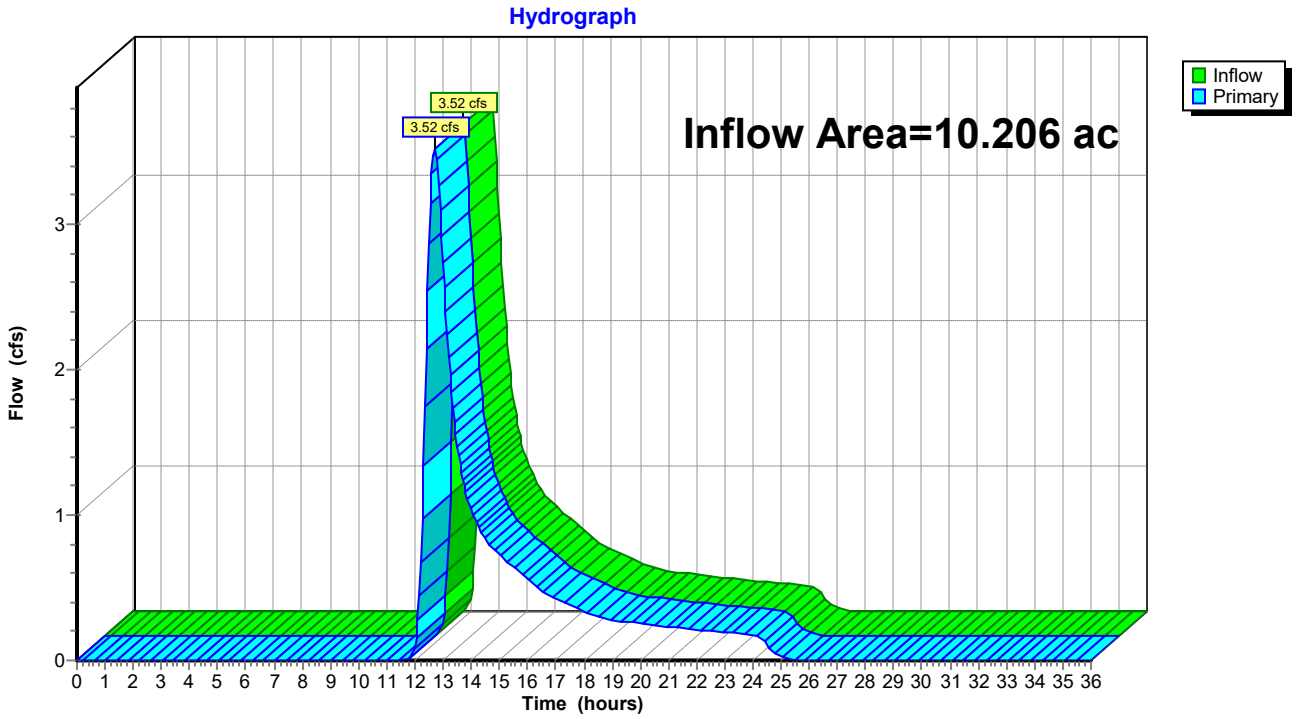
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.02	0.00	0.00
1.00	0.04	0.00	0.00
1.50	0.05	0.00	0.00
2.00	0.07	0.00	0.00
2.50	0.09	0.00	0.00
3.00	0.11	0.00	0.00
3.50	0.13	0.00	0.00
4.00	0.15	0.00	0.00
4.50	0.17	0.00	0.00
5.00	0.20	0.00	0.00
5.50	0.22	0.00	0.00
6.00	0.25	0.00	0.00
6.50	0.28	0.00	0.00
7.00	0.32	0.00	0.00
7.50	0.36	0.00	0.00
8.00	0.40	0.00	0.00
8.50	0.45	0.00	0.00
9.00	0.51	0.00	0.00
9.50	0.58	0.00	0.00
10.00	0.66	0.00	0.00
10.50	0.76	0.00	0.00
11.00	0.88	0.00	0.00
11.50	1.04	0.00	0.00
12.00	1.75	0.07	0.03
12.50	2.46	0.28	**1.36**
13.00	2.62	0.35	**2.39**
13.50	2.74	0.39	1.50
14.00	2.84	0.43	1.00
14.50	2.92	0.47	0.77
15.00	2.99	0.50	0.64
15.50	3.05	0.53	0.56
16.00	3.10	0.55	0.49
16.50	3.14	0.57	0.42
17.00	3.18	0.59	0.36
17.50	3.22	0.61	0.33
18.00	3.25	0.62	0.29
18.50	3.28	0.64	0.26
19.00	3.30	0.65	0.24
19.50	3.33	0.66	0.22
20.00	3.35	0.67	0.21
20.50	3.37	0.69	0.20
21.00	3.39	0.70	0.19
21.50	3.41	0.71	0.18
22.00	3.43	0.72	0.18
22.50	3.45	0.73	0.17
23.00	3.47	0.74	0.16
23.50	3.48	0.74	0.15
24.00	**3.50**	**0.75**	0.15
24.50	3.50	0.75	0.12
25.00	3.50	0.75	0.04
25.50	3.50	0.75	0.01
26.00	3.50	0.75	0.00
26.50	3.50	0.75	0.00
27.00	3.50	0.75	0.00
27.50	3.50	0.75	0.00
28.00	3.50	0.75	0.00
28.50	3.50	0.75	0.00
29.00	3.50	0.75	0.00
29.50	3.50	0.75	0.00
30.00	3.50	0.75	0.00
30.50	3.50	0.75	0.00
31.00	3.50	0.75	0.00
31.50	3.50	0.75	0.00
32.00	3.50	0.75	0.00
32.50	3.50	0.75	0.00
33.00	3.50	0.75	0.00
33.50	3.50	0.75	0.00
34.00	3.50	0.75	0.00
34.50	3.50	0.75	0.00
35.00	3.50	0.75	0.00
35.50	3.50	0.75	0.00
36.00	3.50	0.75	0.00

Summary for Link POI #1: POI #1

Inflow Area = 10.206 ac, 0.00% Impervious, Inflow Depth = 0.75" for 2-Year event
Inflow = 3.52 cfs @ 12.71 hrs, Volume= 0.640 af
Primary = 3.52 cfs @ 12.71 hrs, Volume= 0.640 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #1: POI #1



Hydrograph for Link POI #1: POI #1

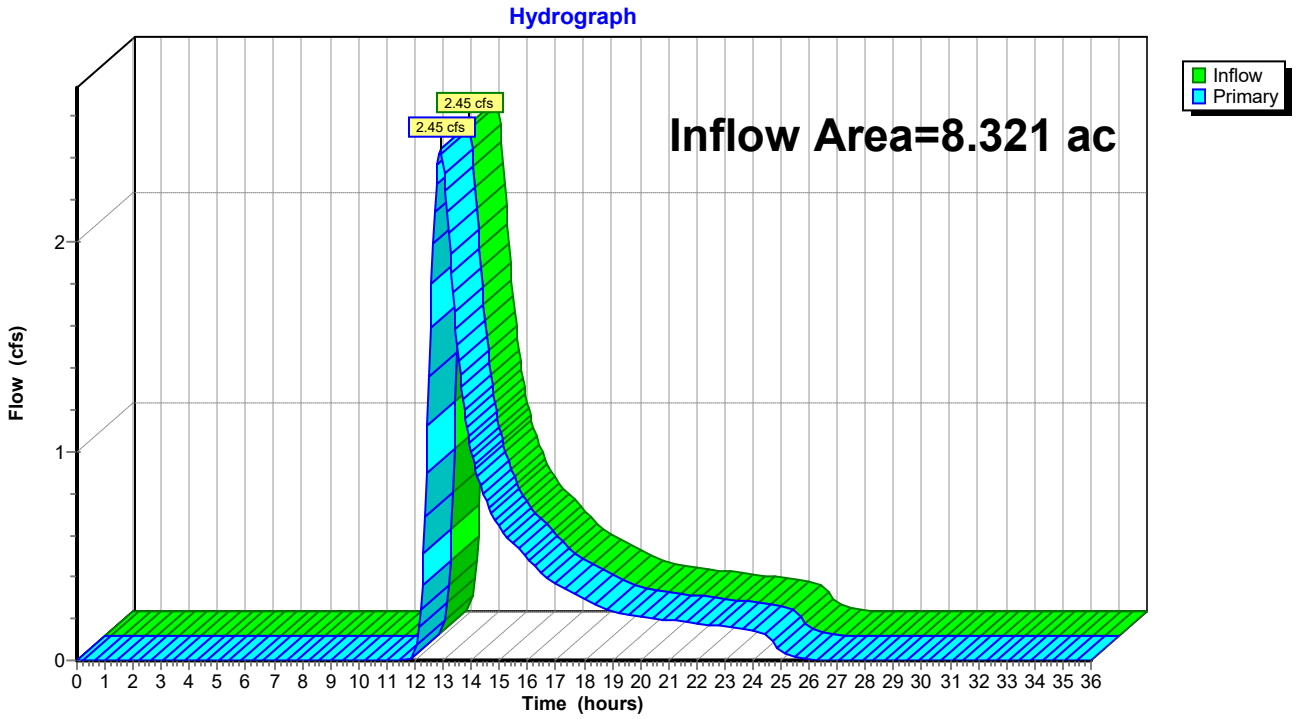
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.09	0.00	0.09
12.50	**2.88**	0.00	**2.88**
13.00	**2.74**	0.00	**2.74**
13.50	1.48	0.00	1.48
14.00	1.04	0.00	1.04
14.50	0.84	0.00	0.84
15.00	0.73	0.00	0.73
15.50	0.64	0.00	0.64
16.00	0.56	0.00	0.56
16.50	0.48	0.00	0.48
17.00	0.42	0.00	0.42
17.50	0.38	0.00	0.38
18.00	0.34	0.00	0.34
18.50	0.30	0.00	0.30
19.00	0.28	0.00	0.28
19.50	0.27	0.00	0.27
20.00	0.25	0.00	0.25
20.50	0.24	0.00	0.24
21.00	0.23	0.00	0.23
21.50	0.22	0.00	0.22
22.00	0.21	0.00	0.21
22.50	0.20	0.00	0.20
23.00	0.19	0.00	0.19
23.50	0.18	0.00	0.18
24.00	0.17	0.00	0.17
24.50	0.12	0.00	0.12
25.00	0.02	0.00	0.02
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Summary for Link POI #2: POI #2

Inflow Area = 8.321 ac, 0.00% Impervious, Inflow Depth = 0.75" for 2-Year event
Inflow = 2.45 cfs @ 12.91 hrs, Volume= 0.521 af
Primary = 2.45 cfs @ 12.91 hrs, Volume= 0.521 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #2: POI #2



Hydrograph for Link POI #2: POI #2

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.03	0.00	0.03
12.50	**1.36**	0.00	**1.36**
13.00	**2.39**	0.00	**2.39**
13.50	1.50	0.00	1.50
14.00	1.00	0.00	1.00
14.50	0.77	0.00	0.77
15.00	0.64	0.00	0.64
15.50	0.56	0.00	0.56
16.00	0.49	0.00	0.49
16.50	0.42	0.00	0.42
17.00	0.36	0.00	0.36
17.50	0.33	0.00	0.33
18.00	0.29	0.00	0.29
18.50	0.26	0.00	0.26
19.00	0.24	0.00	0.24
19.50	0.22	0.00	0.22
20.00	0.21	0.00	0.21
20.50	0.20	0.00	0.20
21.00	0.19	0.00	0.19
21.50	0.18	0.00	0.18
22.00	0.18	0.00	0.18
22.50	0.17	0.00	0.17
23.00	0.16	0.00	0.16
23.50	0.15	0.00	0.15
24.00	0.15	0.00	0.15
24.50	0.12	0.00	0.12
25.00	0.04	0.00	0.04
25.50	0.01	0.00	0.01
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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: Drainage Area #1 Runoff Area=444,593 sf 0.00% Impervious Runoff Depth=1.65"
Flow Length=1,047' Tc=44.4 min CN=65 Runoff=8.73 cfs 1.406 af

Subcatchment DA #2: Drainage Area #2 Runoff Area=362,442 sf 0.00% Impervious Runoff Depth=1.65"
Flow Length=864' Tc=58.4 min CN=65 Runoff=6.07 cfs 1.147 af

Link POI #1: POI #1 Inflow=8.73 cfs 1.406 af
Primary=8.73 cfs 1.406 af

Link POI #2: POI #2 Inflow=6.07 cfs 1.147 af
Primary=6.07 cfs 1.147 af

Total Runoff Area = 18.527 ac Runoff Volume = 2.553 af Average Runoff Depth = 1.65"
100.00% Pervious = 18.527 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment DA #1: Drainage Area #1

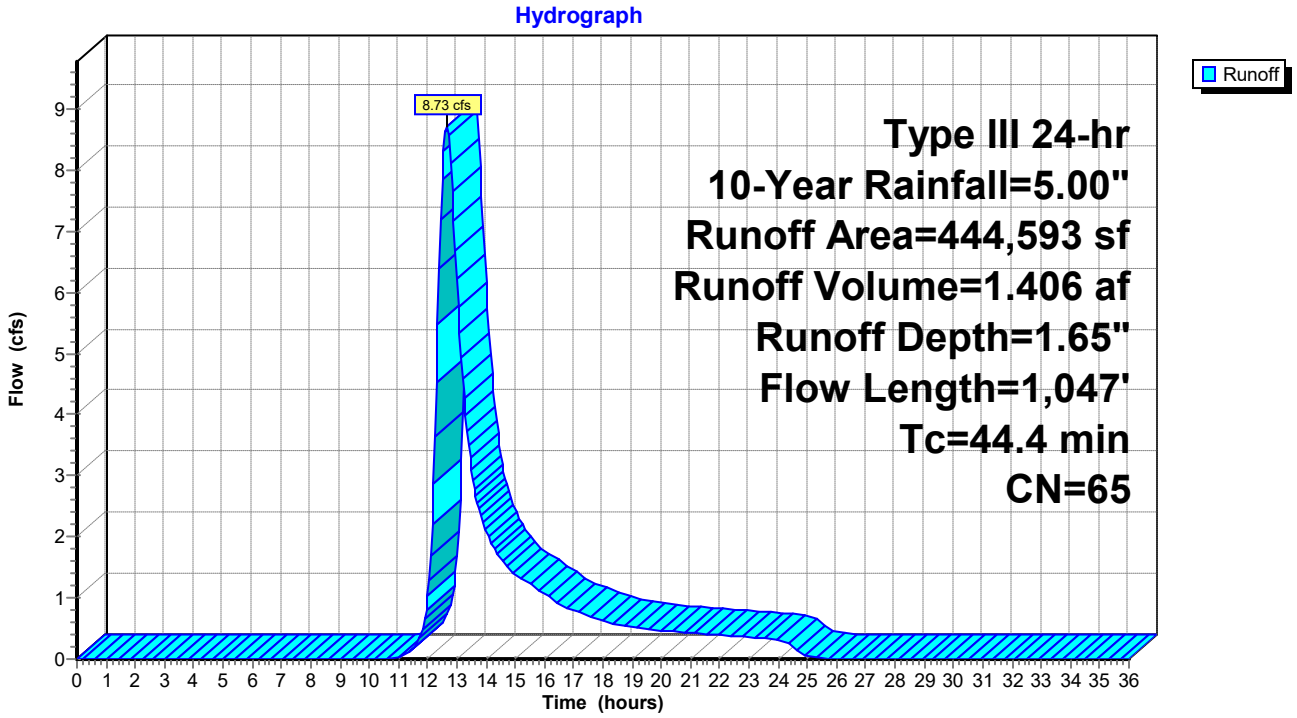
Runoff = 8.73 cfs @ 12.66 hrs, Volume= 1.406 af, Depth= 1.65"
Routed to Link POI #1 : POI #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.00"

Area (sf)	CN	Description
444,593	65	Woods/grass comb., Fair, HSG B
444,593		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	150	0.0647	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.00"
20.9	897	0.0204	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
44.4	1,047	Total			

Subcatchment DA #1: Drainage Area #1



Hydrograph for Subcatchment DA #1: Drainage Area #1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.05	0.00	0.00
1.50	0.08	0.00	0.00
2.00	0.10	0.00	0.00
2.50	0.13	0.00	0.00
3.00	0.15	0.00	0.00
3.50	0.18	0.00	0.00
4.00	0.22	0.00	0.00
4.50	0.25	0.00	0.00
5.00	0.28	0.00	0.00
5.50	0.32	0.00	0.00
6.00	0.36	0.00	0.00
6.50	0.40	0.00	0.00
7.00	0.45	0.00	0.00
7.50	0.51	0.00	0.00
8.00	0.57	0.00	0.00
8.50	0.64	0.00	0.00
9.00	0.73	0.00	0.00
9.50	0.83	0.00	0.00
10.00	0.95	0.00	0.00
10.50	1.08	0.00	0.00
11.00	1.25	0.01	0.02
11.50	1.49	0.03	0.18
12.00	2.50	0.30	1.02
12.50	3.51	0.76	**7.84**
13.00	3.75	0.89	**6.21**
13.50	3.92	0.98	3.10
14.00	4.06	1.06	2.08
14.50	4.17	1.13	1.63
15.00	4.27	1.19	1.40
15.50	4.36	1.24	1.23
16.00	4.43	1.29	1.06
16.50	4.49	1.33	0.90
17.00	4.55	1.36	0.79
17.50	4.60	1.39	0.71
18.00	4.64	1.42	0.63
18.50	4.68	1.44	0.56
19.00	4.72	1.47	0.52
19.50	4.75	1.49	0.49
20.00	4.79	1.51	0.47
20.50	4.82	1.53	0.44
21.00	4.85	1.55	0.42
21.50	4.88	1.57	0.41
22.00	4.90	1.59	0.39
22.50	4.93	1.61	0.37
23.00	4.95	1.62	0.35
23.50	4.98	1.64	0.33
24.00	**5.00**	**1.65**	0.32
24.50	5.00	1.65	0.21
25.00	5.00	1.65	0.04
25.50	5.00	1.65	0.01
26.00	5.00	1.65	0.00
26.50	5.00	1.65	0.00
27.00	5.00	1.65	0.00
27.50	5.00	1.65	0.00
28.00	5.00	1.65	0.00
28.50	5.00	1.65	0.00
29.00	5.00	1.65	0.00
29.50	5.00	1.65	0.00
30.00	5.00	1.65	0.00
30.50	5.00	1.65	0.00
31.00	5.00	1.65	0.00
31.50	5.00	1.65	0.00
32.00	5.00	1.65	0.00
32.50	5.00	1.65	0.00
33.00	5.00	1.65	0.00
33.50	5.00	1.65	0.00
34.00	5.00	1.65	0.00
34.50	5.00	1.65	0.00
35.00	5.00	1.65	0.00
35.50	5.00	1.65	0.00
36.00	5.00	1.65	0.00

Summary for Subcatchment DA #2: Drainage Area #2

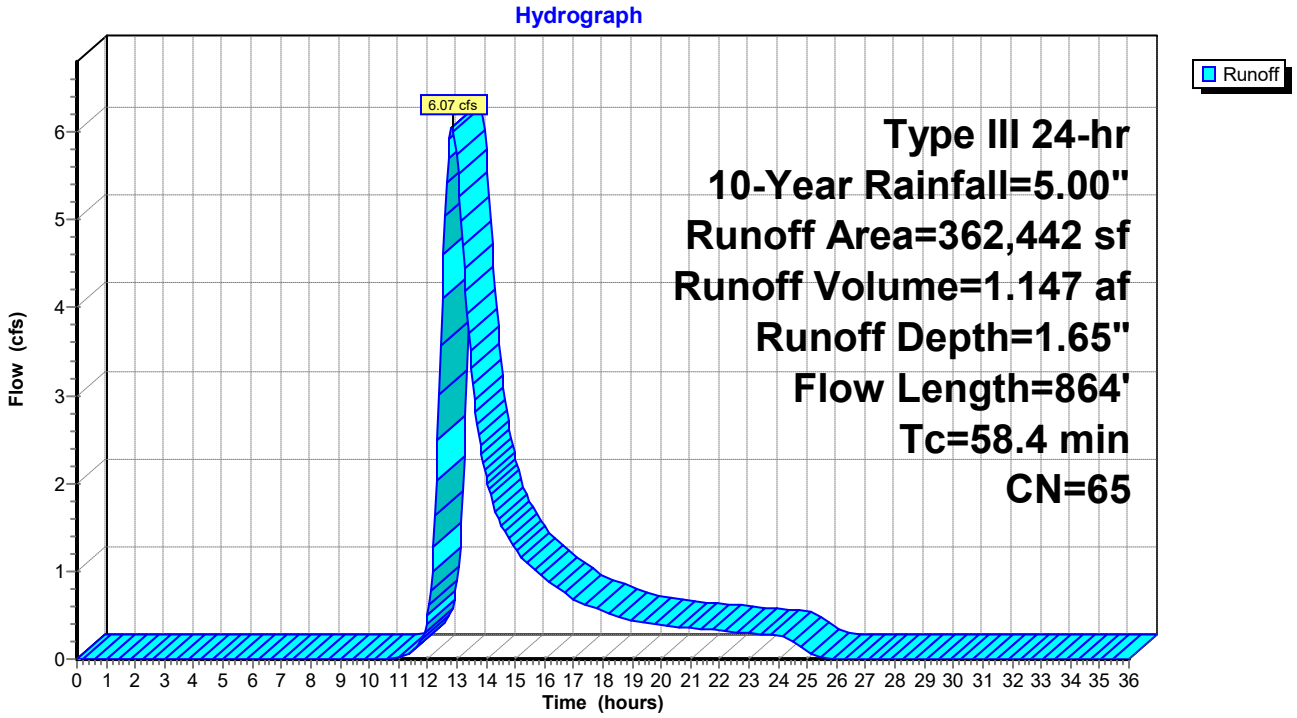
Runoff = 6.07 cfs @ 12.84 hrs, Volume= 1.147 af, Depth= 1.65"
Routed to Link POI #2 : POI #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.00"

Area (sf)	CN	Description
362,442	65	Woods/grass comb., Fair, HSG B
362,442		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.2	150	0.0113	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.00"
11.2	714	0.0448	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
58.4	864	Total			

Subcatchment DA #2: Drainage Area #2



Hydrograph for Subcatchment DA #2: Drainage Area #2

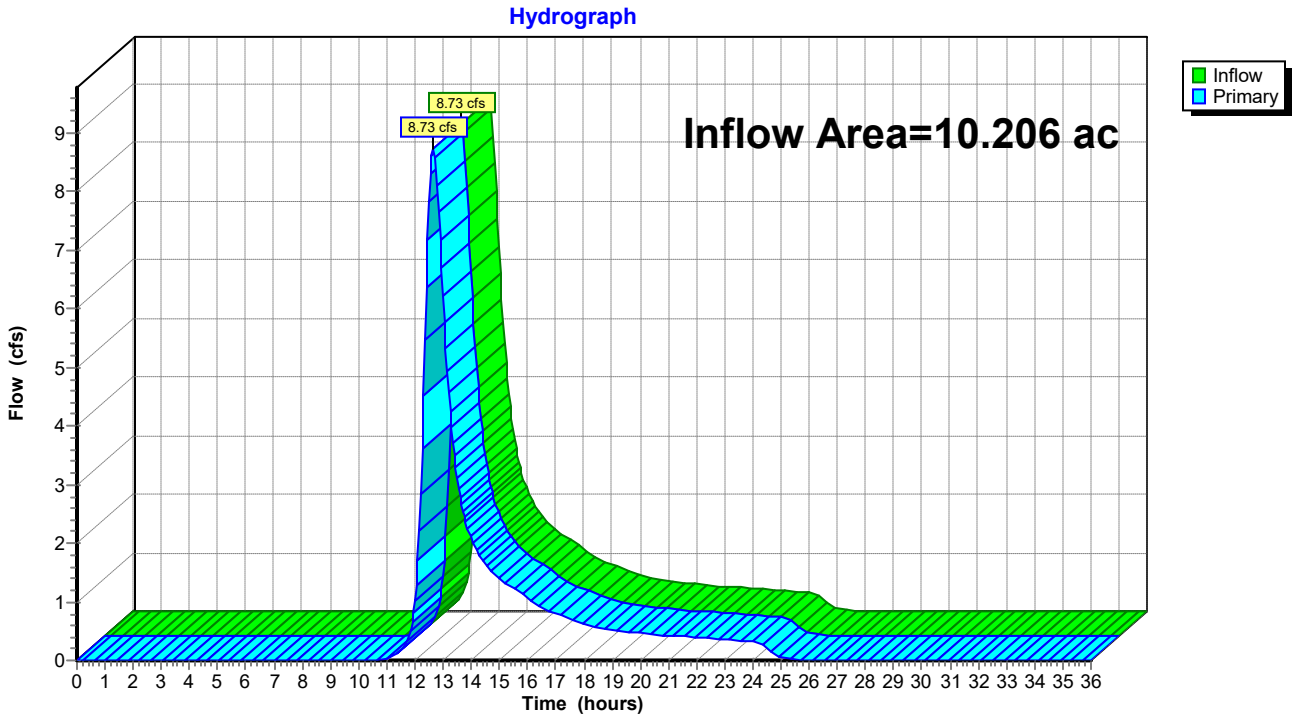
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.05	0.00	0.00
1.50	0.08	0.00	0.00
2.00	0.10	0.00	0.00
2.50	0.13	0.00	0.00
3.00	0.15	0.00	0.00
3.50	0.18	0.00	0.00
4.00	0.22	0.00	0.00
4.50	0.25	0.00	0.00
5.00	0.28	0.00	0.00
5.50	0.32	0.00	0.00
6.00	0.36	0.00	0.00
6.50	0.40	0.00	0.00
7.00	0.45	0.00	0.00
7.50	0.51	0.00	0.00
8.00	0.57	0.00	0.00
8.50	0.64	0.00	0.00
9.00	0.73	0.00	0.00
9.50	0.83	0.00	0.00
10.00	0.95	0.00	0.00
10.50	1.08	0.00	0.00
11.00	1.25	0.01	0.01
11.50	1.49	0.03	0.09
12.00	2.50	0.30	0.50
12.50	3.51	0.76	**4.11**
13.00	3.75	0.89	**5.75**
13.50	3.92	0.98	3.30
14.00	4.06	1.06	2.07
14.50	4.17	1.13	1.53
15.00	4.27	1.19	1.25
15.50	4.36	1.24	1.07
16.00	4.43	1.29	0.93
16.50	4.49	1.33	0.79
17.00	4.55	1.36	0.68
17.50	4.60	1.39	0.61
18.00	4.64	1.42	0.54
18.50	4.68	1.44	0.48
19.00	4.72	1.47	0.44
19.50	4.75	1.49	0.41
20.00	4.79	1.51	0.39
20.50	4.82	1.53	0.37
21.00	4.85	1.55	0.35
21.50	4.88	1.57	0.34
22.00	4.90	1.59	0.32
22.50	4.93	1.61	0.31
23.00	4.95	1.62	0.29
23.50	4.98	1.64	0.28
24.00	**5.00**	**1.65**	0.26
24.50	5.00	1.65	0.22
25.00	5.00	1.65	0.08
25.50	5.00	1.65	0.02
26.00	5.00	1.65	0.01
26.50	5.00	1.65	0.00
27.00	5.00	1.65	0.00
27.50	5.00	1.65	0.00
28.00	5.00	1.65	0.00
28.50	5.00	1.65	0.00
29.00	5.00	1.65	0.00
29.50	5.00	1.65	0.00
30.00	5.00	1.65	0.00
30.50	5.00	1.65	0.00
31.00	5.00	1.65	0.00
31.50	5.00	1.65	0.00
32.00	5.00	1.65	0.00
32.50	5.00	1.65	0.00
33.00	5.00	1.65	0.00
33.50	5.00	1.65	0.00
34.00	5.00	1.65	0.00
34.50	5.00	1.65	0.00
35.00	5.00	1.65	0.00
35.50	5.00	1.65	0.00
36.00	5.00	1.65	0.00

Summary for Link POI #1: POI #1

Inflow Area = 10.206 ac, 0.00% Impervious, Inflow Depth = 1.65" for 10-Year event
Inflow = 8.73 cfs @ 12.66 hrs, Volume= 1.406 af
Primary = 8.73 cfs @ 12.66 hrs, Volume= 1.406 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #1: POI #1



Hydrograph for Link POI #1: POI #1

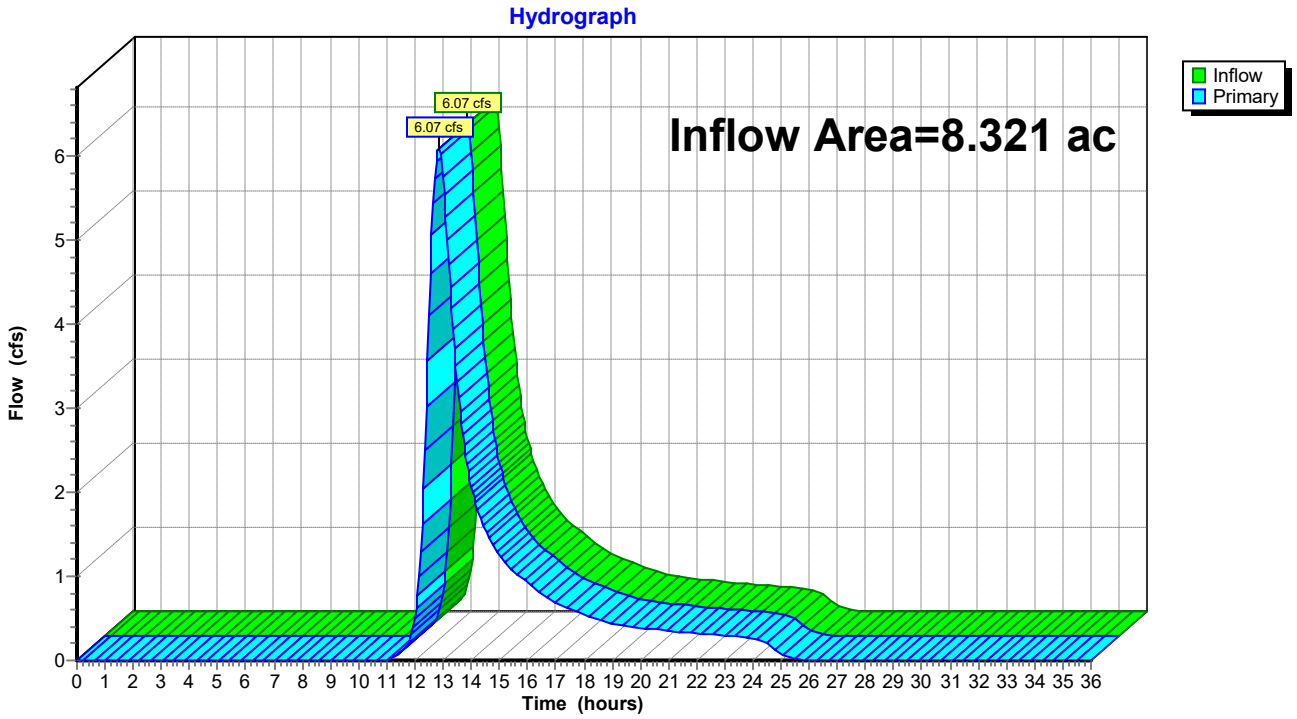
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.02	0.00	0.02
11.50	0.18	0.00	0.18
12.00	1.02	0.00	1.02
12.50	**7.84**	0.00	**7.84**
13.00	**6.21**	0.00	**6.21**
13.50	3.10	0.00	3.10
14.00	2.08	0.00	2.08
14.50	1.63	0.00	1.63
15.00	1.40	0.00	1.40
15.50	1.23	0.00	1.23
16.00	1.06	0.00	1.06
16.50	0.90	0.00	0.90
17.00	0.79	0.00	0.79
17.50	0.71	0.00	0.71
18.00	0.63	0.00	0.63
18.50	0.56	0.00	0.56
19.00	0.52	0.00	0.52
19.50	0.49	0.00	0.49
20.00	0.47	0.00	0.47
20.50	0.44	0.00	0.44
21.00	0.42	0.00	0.42
21.50	0.41	0.00	0.41
22.00	0.39	0.00	0.39
22.50	0.37	0.00	0.37
23.00	0.35	0.00	0.35
23.50	0.33	0.00	0.33
24.00	0.32	0.00	0.32
24.50	0.21	0.00	0.21
25.00	0.04	0.00	0.04
25.50	0.01	0.00	0.01
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Summary for Link POI #2: POI #2

Inflow Area = 8.321 ac, 0.00% Impervious, Inflow Depth = 1.65" for 10-Year event
Inflow = 6.07 cfs @ 12.84 hrs, Volume= 1.147 af
Primary = 6.07 cfs @ 12.84 hrs, Volume= 1.147 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #2: POI #2



Hydrograph for Link POI #2: POI #2

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.01	0.00	0.01
11.50	0.09	0.00	0.09
12.00	0.50	0.00	0.50
12.50	**4.11**	0.00	**4.11**
13.00	**5.75**	0.00	**5.75**
13.50	3.30	0.00	3.30
14.00	2.07	0.00	2.07
14.50	1.53	0.00	1.53
15.00	1.25	0.00	1.25
15.50	1.07	0.00	1.07
16.00	0.93	0.00	0.93
16.50	0.79	0.00	0.79
17.00	0.68	0.00	0.68
17.50	0.61	0.00	0.61
18.00	0.54	0.00	0.54
18.50	0.48	0.00	0.48
19.00	0.44	0.00	0.44
19.50	0.41	0.00	0.41
20.00	0.39	0.00	0.39
20.50	0.37	0.00	0.37
21.00	0.35	0.00	0.35
21.50	0.34	0.00	0.34
22.00	0.32	0.00	0.32
22.50	0.31	0.00	0.31
23.00	0.29	0.00	0.29
23.50	0.28	0.00	0.28
24.00	0.26	0.00	0.26
24.50	0.22	0.00	0.22
25.00	0.08	0.00	0.08
25.50	0.02	0.00	0.02
26.00	0.01	0.00	0.01
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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: Drainage Area #1 Runoff Area=444,593 sf 0.00% Impervious Runoff Depth=2.35"
Flow Length=1,047' Tc=44.4 min CN=65 Runoff=12.75 cfs 2.000 af

Subcatchment DA #2: Drainage Area #2 Runoff Area=362,442 sf 0.00% Impervious Runoff Depth=2.35"
Flow Length=864' Tc=58.4 min CN=65 Runoff=8.91 cfs 1.630 af

Link POI #1: POI #1 Inflow=12.75 cfs 2.000 af
Primary=12.75 cfs 2.000 af

Link POI #2: POI #2 Inflow=8.91 cfs 1.630 af
Primary=8.91 cfs 1.630 af

Total Runoff Area = 18.527 ac Runoff Volume = 3.630 af Average Runoff Depth = 2.35"
100.00% Pervious = 18.527 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment DA #1: Drainage Area #1

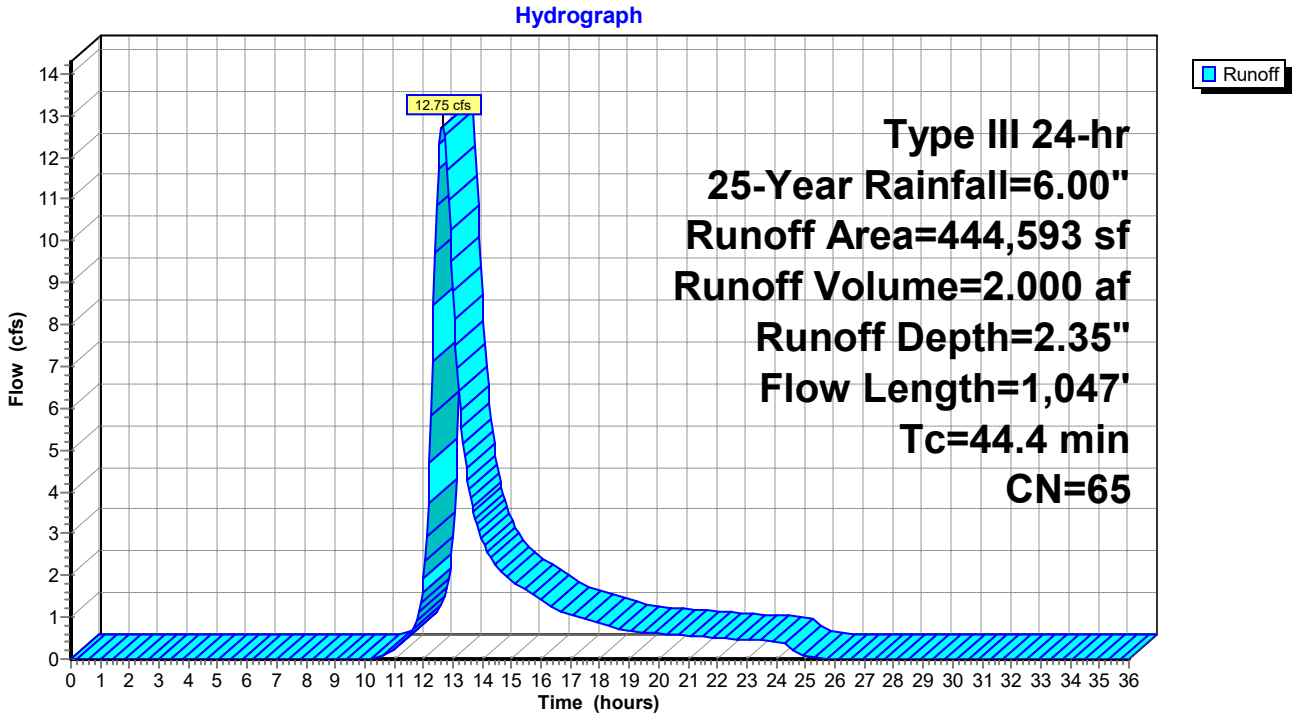
Runoff = 12.75 cfs @ 12.64 hrs, Volume= 2.000 af, Depth= 2.35"
Routed to Link POI #1 : POI #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
444,593	65	Woods/grass comb., Fair, HSG B
444,593		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	150	0.0647	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.00"
20.9	897	0.0204	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
44.4	1,047	Total			

Subcatchment DA #1: Drainage Area #1



Hydrograph for Subcatchment DA #1: Drainage Area #1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.06	0.00	0.00
1.50	0.09	0.00	0.00
2.00	0.12	0.00	0.00
2.50	0.15	0.00	0.00
3.00	0.18	0.00	0.00
3.50	0.22	0.00	0.00
4.00	0.26	0.00	0.00
4.50	0.30	0.00	0.00
5.00	0.34	0.00	0.00
5.50	0.39	0.00	0.00
6.00	0.43	0.00	0.00
6.50	0.48	0.00	0.00
7.00	0.54	0.00	0.00
7.50	0.61	0.00	0.00
8.00	0.68	0.00	0.00
8.50	0.77	0.00	0.00
9.00	0.87	0.00	0.00
9.50	1.00	0.00	0.00
10.00	1.13	0.00	0.00
10.50	1.30	0.01	0.04
11.00	1.50	0.03	0.22
11.50	1.79	0.08	0.55
12.00	3.00	0.51	1.92
12.50	4.21	1.15	**11.71**
13.00	4.50	1.33	**8.80**
13.50	4.70	1.46	4.28
14.00	4.87	1.57	2.83
14.50	5.00	1.66	2.20
15.00	5.13	1.74	1.87
15.50	5.23	1.81	1.64
16.00	5.32	1.87	1.42
16.50	5.39	1.92	1.20
17.00	5.46	1.96	1.05
17.50	5.52	2.01	0.94
18.00	5.57	2.04	0.84
18.50	5.61	2.08	0.74
19.00	5.66	2.11	0.68
19.50	5.70	2.14	0.65
20.00	5.74	2.17	0.61
20.50	5.78	2.19	0.58
21.00	5.82	2.22	0.56
21.50	5.85	2.24	0.53
22.00	5.88	2.27	0.51
22.50	5.92	2.29	0.49
23.00	5.95	2.31	0.46
23.50	5.97	2.33	0.44
24.00	**6.00**	**2.35**	0.42
24.50	6.00	2.35	0.27
25.00	6.00	2.35	0.06
25.50	6.00	2.35	0.01
26.00	6.00	2.35	0.00
26.50	6.00	2.35	0.00
27.00	6.00	2.35	0.00
27.50	6.00	2.35	0.00
28.00	6.00	2.35	0.00
28.50	6.00	2.35	0.00
29.00	6.00	2.35	0.00
29.50	6.00	2.35	0.00
30.00	6.00	2.35	0.00
30.50	6.00	2.35	0.00
31.00	6.00	2.35	0.00
31.50	6.00	2.35	0.00
32.00	6.00	2.35	0.00
32.50	6.00	2.35	0.00
33.00	6.00	2.35	0.00
33.50	6.00	2.35	0.00
34.00	6.00	2.35	0.00
34.50	6.00	2.35	0.00
35.00	6.00	2.35	0.00
35.50	6.00	2.35	0.00
36.00	6.00	2.35	0.00

Summary for Subcatchment DA #2: Drainage Area #2

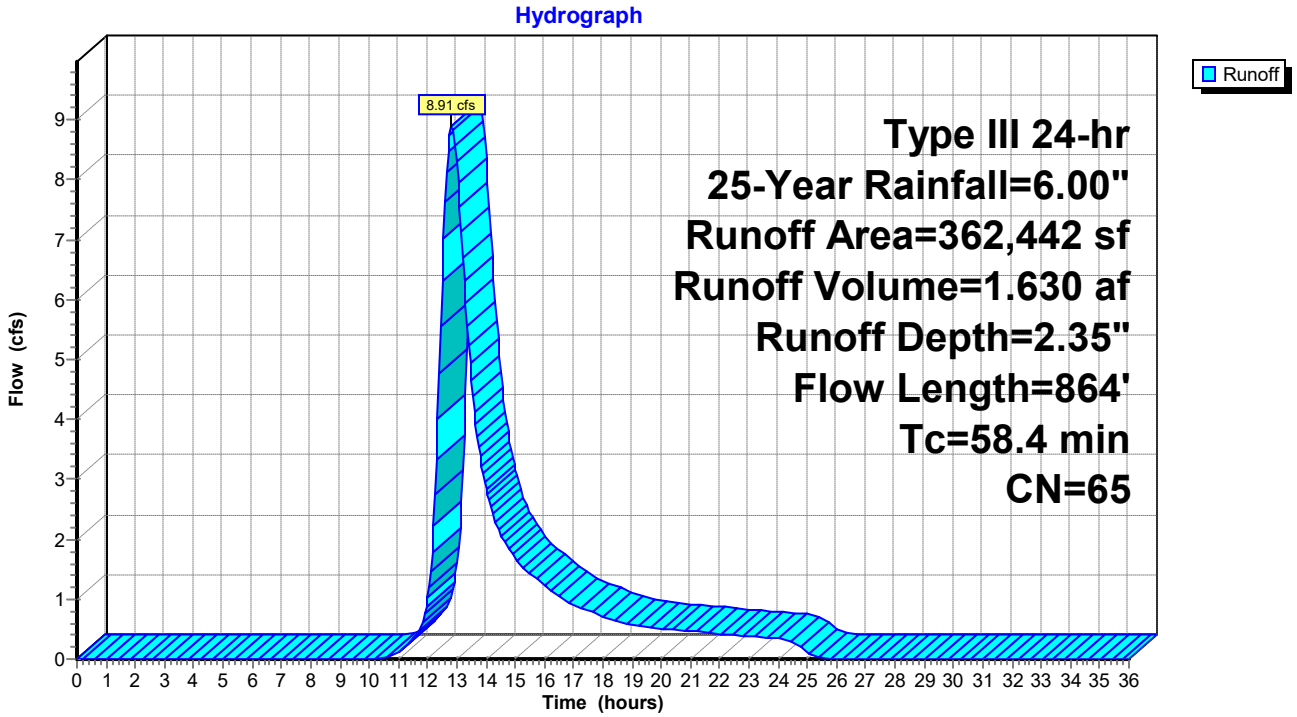
Runoff = 8.91 cfs @ 12.82 hrs, Volume= 1.630 af, Depth= 2.35"
Routed to Link POI #2 : POI #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
362,442	65	Woods/grass comb., Fair, HSG B
362,442		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.2	150	0.0113	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.00"
11.2	714	0.0448	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
58.4	864	Total			

Subcatchment DA #2: Drainage Area #2



Hydrograph for Subcatchment DA #2: Drainage Area #2

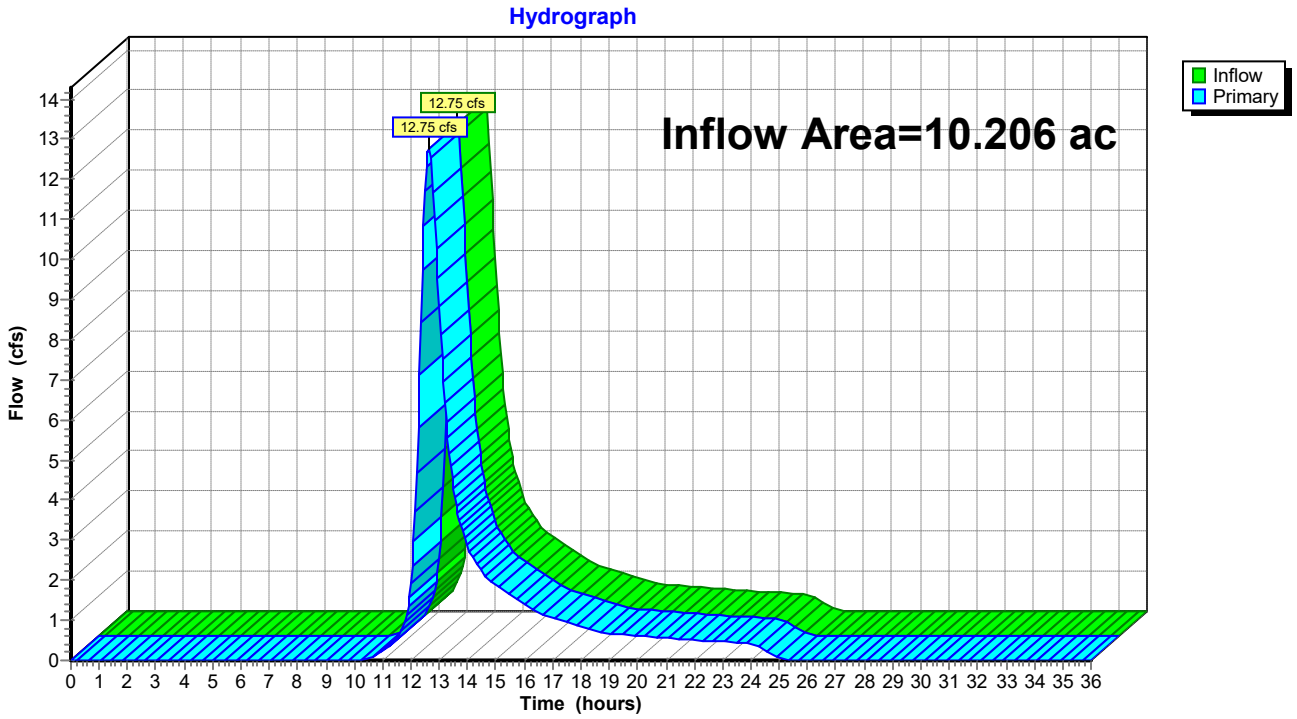
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.06	0.00	0.00
1.50	0.09	0.00	0.00
2.00	0.12	0.00	0.00
2.50	0.15	0.00	0.00
3.00	0.18	0.00	0.00
3.50	0.22	0.00	0.00
4.00	0.26	0.00	0.00
4.50	0.30	0.00	0.00
5.00	0.34	0.00	0.00
5.50	0.39	0.00	0.00
6.00	0.43	0.00	0.00
6.50	0.48	0.00	0.00
7.00	0.54	0.00	0.00
7.50	0.61	0.00	0.00
8.00	0.68	0.00	0.00
8.50	0.77	0.00	0.00
9.00	0.87	0.00	0.00
9.50	1.00	0.00	0.00
10.00	1.13	0.00	0.00
10.50	1.30	0.01	0.02
11.00	1.50	0.03	0.12
11.50	1.79	0.08	0.33
12.00	3.00	0.51	1.01
12.50	4.21	1.15	**6.31**
13.00	4.50	1.33	**8.30**
13.50	4.70	1.46	4.64
14.00	4.87	1.57	2.85
14.50	5.00	1.66	2.08
15.00	5.13	1.74	1.68
15.50	5.23	1.81	1.43
16.00	5.32	1.87	1.24
16.50	5.39	1.92	1.05
17.00	5.46	1.96	0.91
17.50	5.52	2.01	0.81
18.00	5.57	2.04	0.72
18.50	5.61	2.08	0.64
19.00	5.66	2.11	0.58
19.50	5.70	2.14	0.54
20.00	5.74	2.17	0.51
20.50	5.78	2.19	0.49
21.00	5.82	2.22	0.46
21.50	5.85	2.24	0.44
22.00	5.88	2.27	0.43
22.50	5.92	2.29	0.41
23.00	5.95	2.31	0.39
23.50	5.97	2.33	0.37
24.00	**6.00**	**2.35**	0.35
24.50	6.00	2.35	0.28
25.00	6.00	2.35	0.11
25.50	6.00	2.35	0.03
26.00	6.00	2.35	0.01
26.50	6.00	2.35	0.00
27.00	6.00	2.35	0.00
27.50	6.00	2.35	0.00
28.00	6.00	2.35	0.00
28.50	6.00	2.35	0.00
29.00	6.00	2.35	0.00
29.50	6.00	2.35	0.00
30.00	6.00	2.35	0.00
30.50	6.00	2.35	0.00
31.00	6.00	2.35	0.00
31.50	6.00	2.35	0.00
32.00	6.00	2.35	0.00
32.50	6.00	2.35	0.00
33.00	6.00	2.35	0.00
33.50	6.00	2.35	0.00
34.00	6.00	2.35	0.00
34.50	6.00	2.35	0.00
35.00	6.00	2.35	0.00
35.50	6.00	2.35	0.00
36.00	6.00	2.35	0.00

Summary for Link POI #1: POI #1

Inflow Area = 10.206 ac, 0.00% Impervious, Inflow Depth = 2.35" for 25-Year event
Inflow = 12.75 cfs @ 12.64 hrs, Volume= 2.000 af
Primary = 12.75 cfs @ 12.64 hrs, Volume= 2.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #1: POI #1



Hydrograph for Link POI #1: POI #1

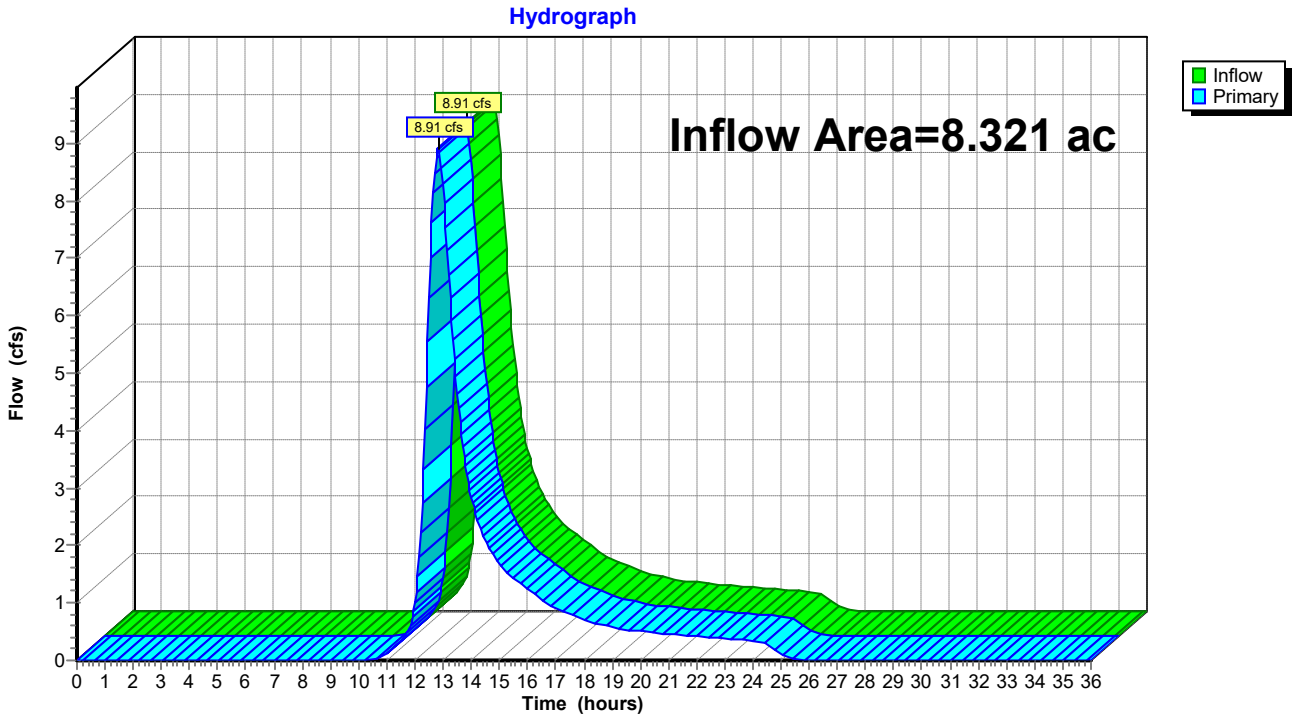
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.04	0.00	0.04
11.00	0.22	0.00	0.22
11.50	0.55	0.00	0.55
12.00	1.92	0.00	1.92
12.50	**11.71**	0.00	**11.71**
13.00	**8.80**	0.00	**8.80**
13.50	4.28	0.00	4.28
14.00	2.83	0.00	2.83
14.50	2.20	0.00	2.20
15.00	1.87	0.00	1.87
15.50	1.64	0.00	1.64
16.00	1.42	0.00	1.42
16.50	1.20	0.00	1.20
17.00	1.05	0.00	1.05
17.50	0.94	0.00	0.94
18.00	0.84	0.00	0.84
18.50	0.74	0.00	0.74
19.00	0.68	0.00	0.68
19.50	0.65	0.00	0.65
20.00	0.61	0.00	0.61
20.50	0.58	0.00	0.58
21.00	0.56	0.00	0.56
21.50	0.53	0.00	0.53
22.00	0.51	0.00	0.51
22.50	0.49	0.00	0.49
23.00	0.46	0.00	0.46
23.50	0.44	0.00	0.44
24.00	0.42	0.00	0.42
24.50	0.27	0.00	0.27
25.00	0.06	0.00	0.06
25.50	0.01	0.00	0.01
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Summary for Link POI #2: POI #2

Inflow Area = 8.321 ac, 0.00% Impervious, Inflow Depth = 2.35" for 25-Year event
Inflow = 8.91 cfs @ 12.82 hrs, Volume= 1.630 af
Primary = 8.91 cfs @ 12.82 hrs, Volume= 1.630 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #2: POI #2



Hydrograph for Link POI #2: POI #2

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.02	0.00	0.02
11.00	0.12	0.00	0.12
11.50	0.33	0.00	0.33
12.00	1.01	0.00	1.01
12.50	**6.31**	0.00	**6.31**
13.00	**8.30**	0.00	**8.30**
13.50	4.64	0.00	4.64
14.00	2.85	0.00	2.85
14.50	2.08	0.00	2.08
15.00	1.68	0.00	1.68
15.50	1.43	0.00	1.43
16.00	1.24	0.00	1.24
16.50	1.05	0.00	1.05
17.00	0.91	0.00	0.91
17.50	0.81	0.00	0.81
18.00	0.72	0.00	0.72
18.50	0.64	0.00	0.64
19.00	0.58	0.00	0.58
19.50	0.54	0.00	0.54
20.00	0.51	0.00	0.51
20.50	0.49	0.00	0.49
21.00	0.46	0.00	0.46
21.50	0.44	0.00	0.44
22.00	0.43	0.00	0.43
22.50	0.41	0.00	0.41
23.00	0.39	0.00	0.39
23.50	0.37	0.00	0.37
24.00	0.35	0.00	0.35
24.50	0.28	0.00	0.28
25.00	0.11	0.00	0.11
25.50	0.03	0.00	0.03
26.00	0.01	0.00	0.01
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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: Drainage Area #1 Runoff Area=444,593 sf 0.00% Impervious Runoff Depth=4.72"
Flow Length=1,047' Tc=44.4 min CN=65 Runoff=26.27 cfs 4.012 af

Subcatchment DA #2: Drainage Area #2 Runoff Area=362,442 sf 0.00% Impervious Runoff Depth=4.72"
Flow Length=864' Tc=58.4 min CN=65 Runoff=18.38 cfs 3.271 af

Link POI #1: POI #1 Inflow=26.27 cfs 4.012 af
Primary=26.27 cfs 4.012 af

Link POI #2: POI #2 Inflow=18.38 cfs 3.271 af
Primary=18.38 cfs 3.271 af

Total Runoff Area = 18.527 ac Runoff Volume = 7.283 af Average Runoff Depth = 4.72"
100.00% Pervious = 18.527 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment DA #1: Drainage Area #1

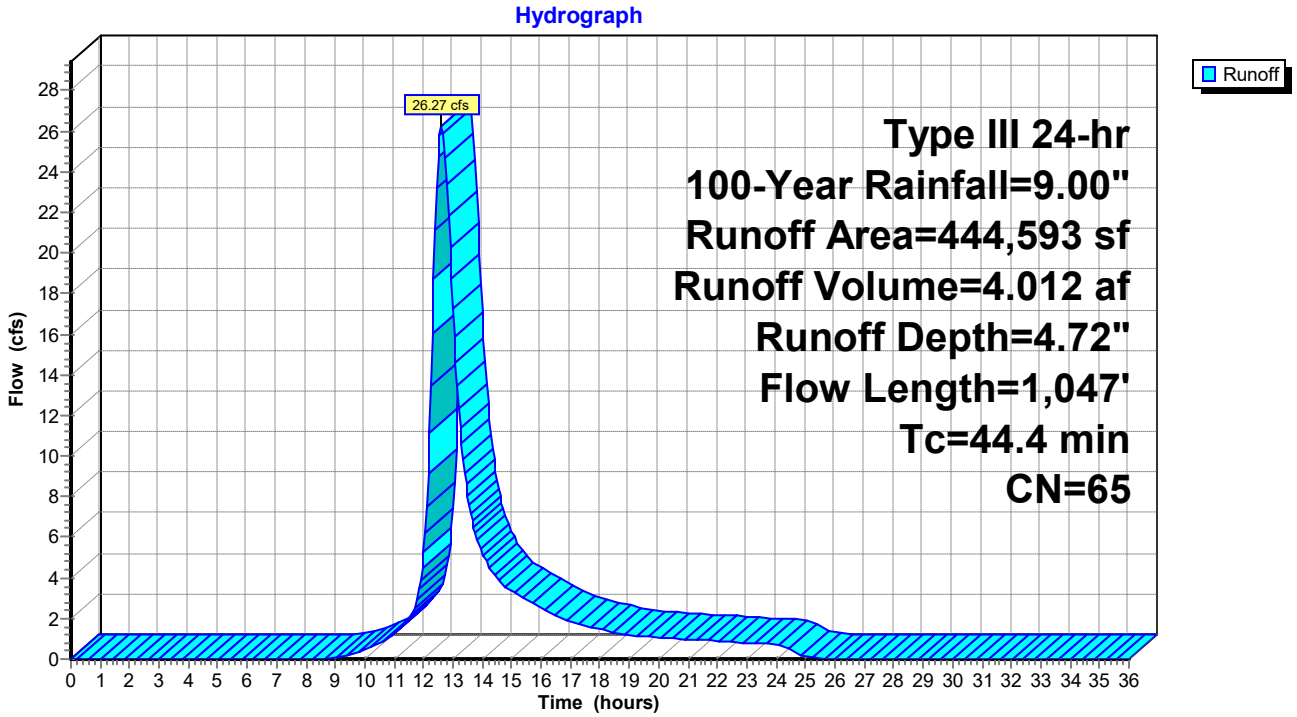
Runoff = 26.27 cfs @ 12.62 hrs, Volume= 4.012 af, Depth= 4.72"
Routed to Link POI #1 : POI #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=9.00"

Area (sf)	CN	Description
444,593	65	Woods/grass comb., Fair, HSG B
444,593		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	150	0.0647	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.00"
20.9	897	0.0204	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
44.4	1,047	Total			

Subcatchment DA #1: Drainage Area #1



Hydrograph for Subcatchment DA #1: Drainage Area #1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.04	0.00	0.00
1.00	0.09	0.00	0.00
1.50	0.13	0.00	0.00
2.00	0.18	0.00	0.00
2.50	0.23	0.00	0.00
3.00	0.28	0.00	0.00
3.50	0.33	0.00	0.00
4.00	0.39	0.00	0.00
4.50	0.45	0.00	0.00
5.00	0.51	0.00	0.00
5.50	0.58	0.00	0.00
6.00	0.65	0.00	0.00
6.50	0.73	0.00	0.00
7.00	0.81	0.00	0.00
7.50	0.91	0.00	0.00
8.00	1.03	0.00	0.00
8.50	1.16	0.00	0.00
9.00	1.31	0.01	0.06
9.50	1.49	0.03	0.22
10.00	1.70	0.06	0.46
10.50	1.95	0.12	0.79
11.00	2.25	0.21	1.27
11.50	2.68	0.37	2.04
12.00	4.50	1.33	5.23
12.50	6.32	2.59	**24.77**
13.00	6.75	2.91	**17.24**
13.50	7.05	3.14	8.06
14.00	7.30	3.34	5.18
14.50	7.51	3.50	3.97
15.00	7.69	3.64	3.36
15.50	7.84	3.77	2.93
16.00	7.97	3.87	2.52
16.50	8.09	3.96	2.12
17.00	8.19	4.04	1.85
17.50	8.27	4.12	1.66
18.00	8.35	4.18	1.47
18.50	8.42	4.24	1.29
19.00	8.49	4.29	1.19
19.50	8.55	4.35	1.13
20.00	8.61	4.40	1.07
20.50	8.67	4.44	1.02
21.00	8.72	4.49	0.97
21.50	8.78	4.53	0.93
22.00	8.83	4.57	0.89
22.50	8.87	4.61	0.84
23.00	8.92	4.65	0.80
23.50	8.96	4.68	0.76
24.00	**9.00**	**4.72**	0.72
24.50	9.00	4.72	0.47
25.00	9.00	4.72	0.10
25.50	9.00	4.72	0.02
26.00	9.00	4.72	0.00
26.50	9.00	4.72	0.00
27.00	9.00	4.72	0.00
27.50	9.00	4.72	0.00
28.00	9.00	4.72	0.00
28.50	9.00	4.72	0.00
29.00	9.00	4.72	0.00
29.50	9.00	4.72	0.00
30.00	9.00	4.72	0.00
30.50	9.00	4.72	0.00
31.00	9.00	4.72	0.00
31.50	9.00	4.72	0.00
32.00	9.00	4.72	0.00
32.50	9.00	4.72	0.00
33.00	9.00	4.72	0.00
33.50	9.00	4.72	0.00
34.00	9.00	4.72	0.00
34.50	9.00	4.72	0.00
35.00	9.00	4.72	0.00
35.50	9.00	4.72	0.00
36.00	9.00	4.72	0.00

Summary for Subcatchment DA #2: Drainage Area #2

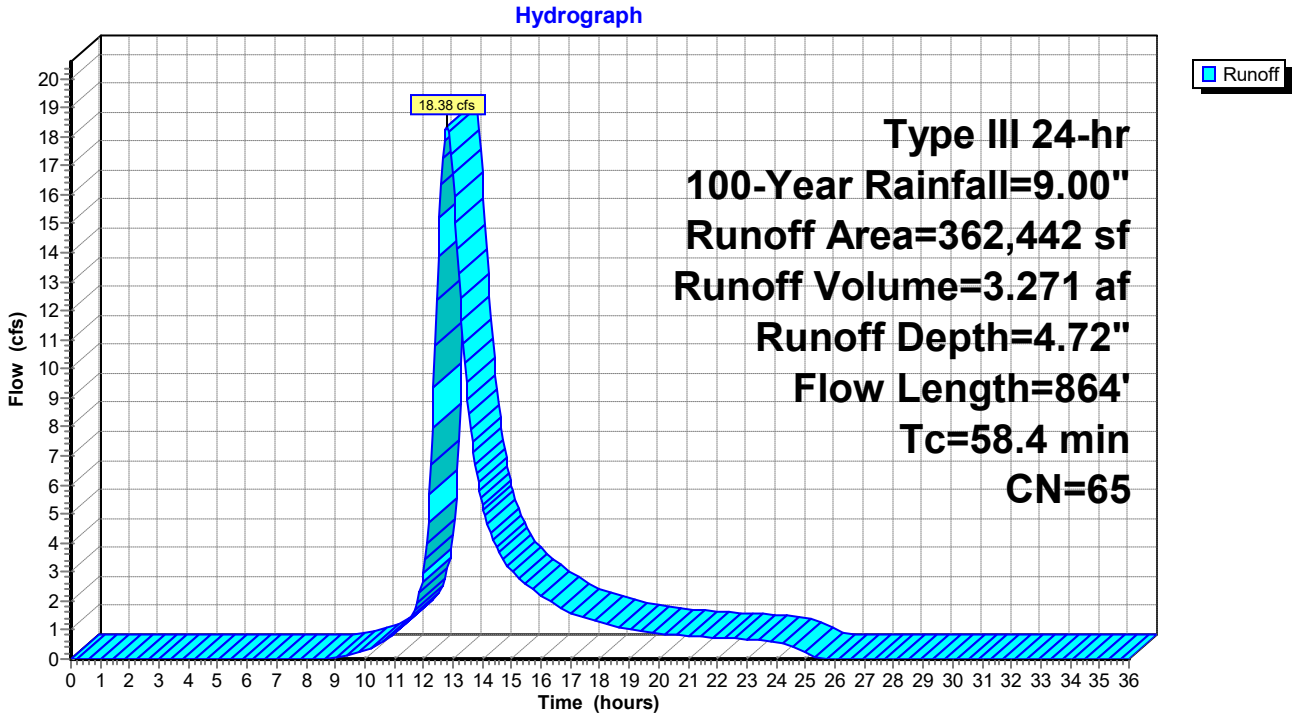
Runoff = 18.38 cfs @ 12.80 hrs, Volume= 3.271 af, Depth= 4.72"
Routed to Link POI #2 : POI #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=9.00"

Area (sf)	CN	Description
362,442	65	Woods/grass comb., Fair, HSG B
362,442		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.2	150	0.0113	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.00"
11.2	714	0.0448	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
58.4	864	Total			

Subcatchment DA #2: Drainage Area #2



Hydrograph for Subcatchment DA #2: Drainage Area #2

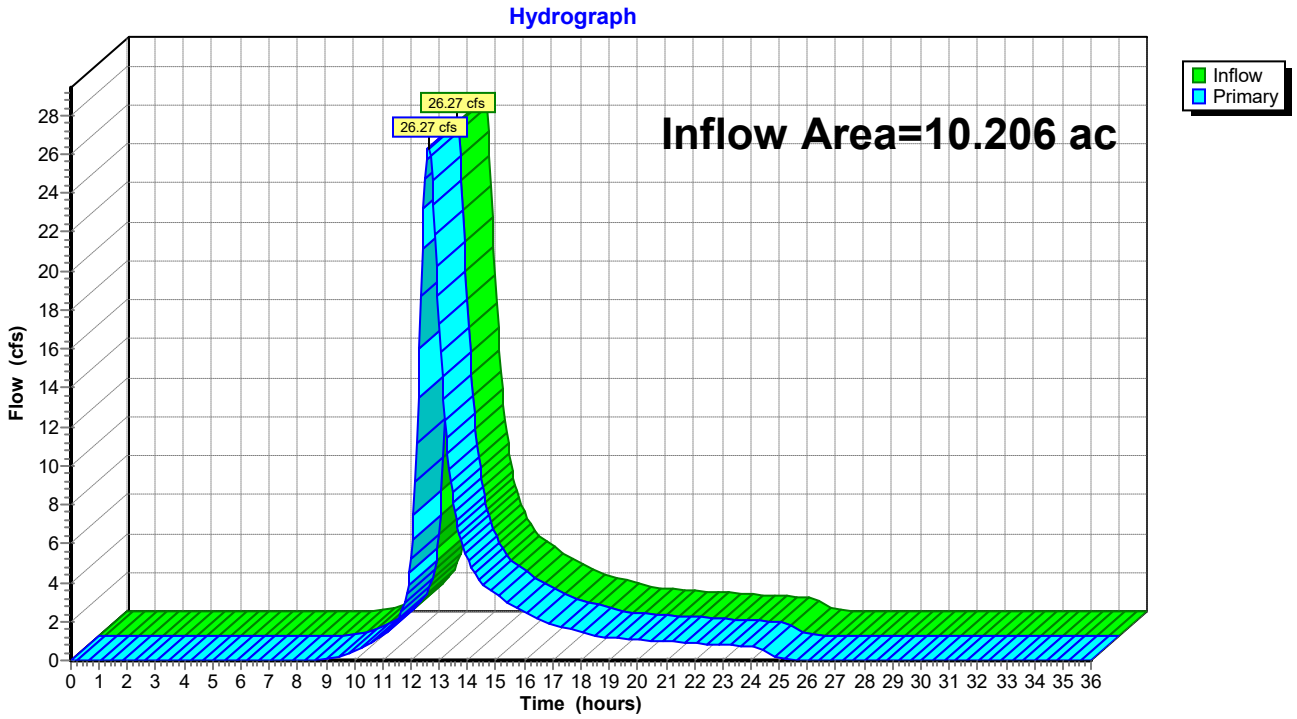
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.04	0.00	0.00
1.00	0.09	0.00	0.00
1.50	0.13	0.00	0.00
2.00	0.18	0.00	0.00
2.50	0.23	0.00	0.00
3.00	0.28	0.00	0.00
3.50	0.33	0.00	0.00
4.00	0.39	0.00	0.00
4.50	0.45	0.00	0.00
5.00	0.51	0.00	0.00
5.50	0.58	0.00	0.00
6.00	0.65	0.00	0.00
6.50	0.73	0.00	0.00
7.00	0.81	0.00	0.00
7.50	0.91	0.00	0.00
8.00	1.03	0.00	0.00
8.50	1.16	0.00	0.00
9.00	1.31	0.01	0.03
9.50	1.49	0.03	0.12
10.00	1.70	0.06	0.29
10.50	1.95	0.12	0.53
11.00	2.25	0.21	0.87
11.50	2.68	0.37	1.39
12.00	4.50	1.33	2.99
12.50	6.32	2.59	**13.87**
13.00	6.75	2.91	**16.73**
13.50	7.05	3.14	8.96
14.00	7.30	3.34	5.33
14.50	7.51	3.50	3.81
15.00	7.69	3.64	3.03
15.50	7.84	3.77	2.56
16.00	7.97	3.87	2.20
16.50	8.09	3.96	1.87
17.00	8.19	4.04	1.61
17.50	8.27	4.12	1.42
18.00	8.35	4.18	1.26
18.50	8.42	4.24	1.12
19.00	8.49	4.29	1.01
19.50	8.55	4.35	0.94
20.00	8.61	4.40	0.89
20.50	8.67	4.44	0.85
21.00	8.72	4.49	0.81
21.50	8.78	4.53	0.77
22.00	8.83	4.57	0.74
22.50	8.87	4.61	0.70
23.00	8.92	4.65	0.67
23.50	8.96	4.68	0.63
24.00	**9.00**	**4.72**	0.60
24.50	9.00	4.72	0.49
25.00	9.00	4.72	0.18
25.50	9.00	4.72	0.05
26.00	9.00	4.72	0.01
26.50	9.00	4.72	0.00
27.00	9.00	4.72	0.00
27.50	9.00	4.72	0.00
28.00	9.00	4.72	0.00
28.50	9.00	4.72	0.00
29.00	9.00	4.72	0.00
29.50	9.00	4.72	0.00
30.00	9.00	4.72	0.00
30.50	9.00	4.72	0.00
31.00	9.00	4.72	0.00
31.50	9.00	4.72	0.00
32.00	9.00	4.72	0.00
32.50	9.00	4.72	0.00
33.00	9.00	4.72	0.00
33.50	9.00	4.72	0.00
34.00	9.00	4.72	0.00
34.50	9.00	4.72	0.00
35.00	9.00	4.72	0.00
35.50	9.00	4.72	0.00
36.00	9.00	4.72	0.00

Summary for Link POI #1: POI #1

Inflow Area = 10.206 ac, 0.00% Impervious, Inflow Depth = 4.72" for 100-Year event
Inflow = 26.27 cfs @ 12.62 hrs, Volume= 4.012 af
Primary = 26.27 cfs @ 12.62 hrs, Volume= 4.012 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #1: POI #1



Hydrograph for Link POI #1: POI #1

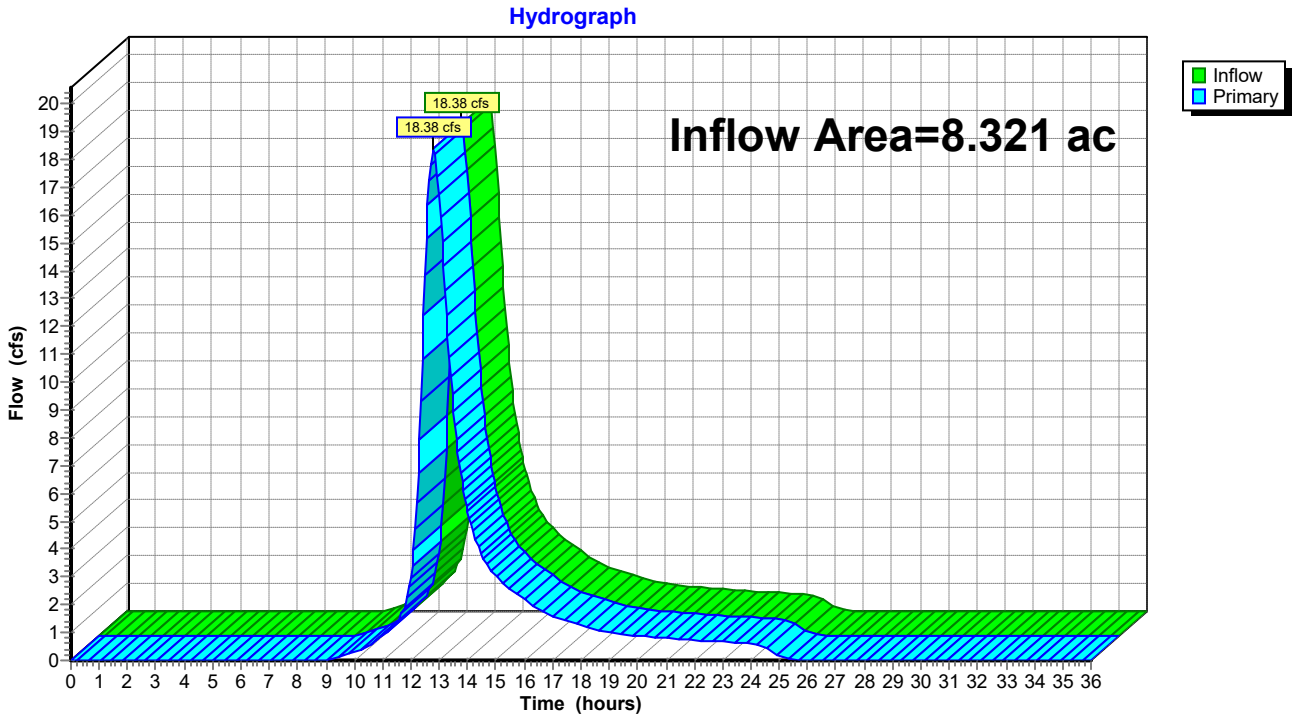
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.06	0.00	0.06
9.50	0.22	0.00	0.22
10.00	0.46	0.00	0.46
10.50	0.79	0.00	0.79
11.00	1.27	0.00	1.27
11.50	2.04	0.00	2.04
12.00	5.23	0.00	5.23
12.50	**24.77**	0.00	**24.77**
13.00	**17.24**	0.00	**17.24**
13.50	8.06	0.00	8.06
14.00	5.18	0.00	5.18
14.50	3.97	0.00	3.97
15.00	3.36	0.00	3.36
15.50	2.93	0.00	2.93
16.00	2.52	0.00	2.52
16.50	2.12	0.00	2.12
17.00	1.85	0.00	1.85
17.50	1.66	0.00	1.66
18.00	1.47	0.00	1.47
18.50	1.29	0.00	1.29
19.00	1.19	0.00	1.19
19.50	1.13	0.00	1.13
20.00	1.07	0.00	1.07
20.50	1.02	0.00	1.02
21.00	0.97	0.00	0.97
21.50	0.93	0.00	0.93
22.00	0.89	0.00	0.89
22.50	0.84	0.00	0.84
23.00	0.80	0.00	0.80
23.50	0.76	0.00	0.76
24.00	0.72	0.00	0.72
24.50	0.47	0.00	0.47
25.00	0.10	0.00	0.10
25.50	0.02	0.00	0.02
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Summary for Link POI #2: POI #2

Inflow Area = 8.321 ac, 0.00% Impervious, Inflow Depth = 4.72" for 100-Year event
Inflow = 18.38 cfs @ 12.80 hrs, Volume= 3.271 af
Primary = 18.38 cfs @ 12.80 hrs, Volume= 3.271 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #2: POI #2



Hydrograph for Link POI #2: POI #2

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.03	0.00	0.03
9.50	0.12	0.00	0.12
10.00	0.29	0.00	0.29
10.50	0.53	0.00	0.53
11.00	0.87	0.00	0.87
11.50	1.39	0.00	1.39
12.00	2.99	0.00	2.99
12.50	**13.87**	0.00	**13.87**
13.00	**16.73**	0.00	**16.73**
13.50	8.96	0.00	8.96
14.00	5.33	0.00	5.33
14.50	3.81	0.00	3.81
15.00	3.03	0.00	3.03
15.50	2.56	0.00	2.56
16.00	2.20	0.00	2.20
16.50	1.87	0.00	1.87
17.00	1.61	0.00	1.61
17.50	1.42	0.00	1.42
18.00	1.26	0.00	1.26
18.50	1.12	0.00	1.12
19.00	1.01	0.00	1.01
19.50	0.94	0.00	0.94
20.00	0.89	0.00	0.89
20.50	0.85	0.00	0.85
21.00	0.81	0.00	0.81
21.50	0.77	0.00	0.77
22.00	0.74	0.00	0.74
22.50	0.70	0.00	0.70
23.00	0.67	0.00	0.67
23.50	0.63	0.00	0.63
24.00	0.60	0.00	0.60
24.50	0.49	0.00	0.49
25.00	0.18	0.00	0.18
25.50	0.05	0.00	0.05
26.00	0.01	0.00	0.01
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

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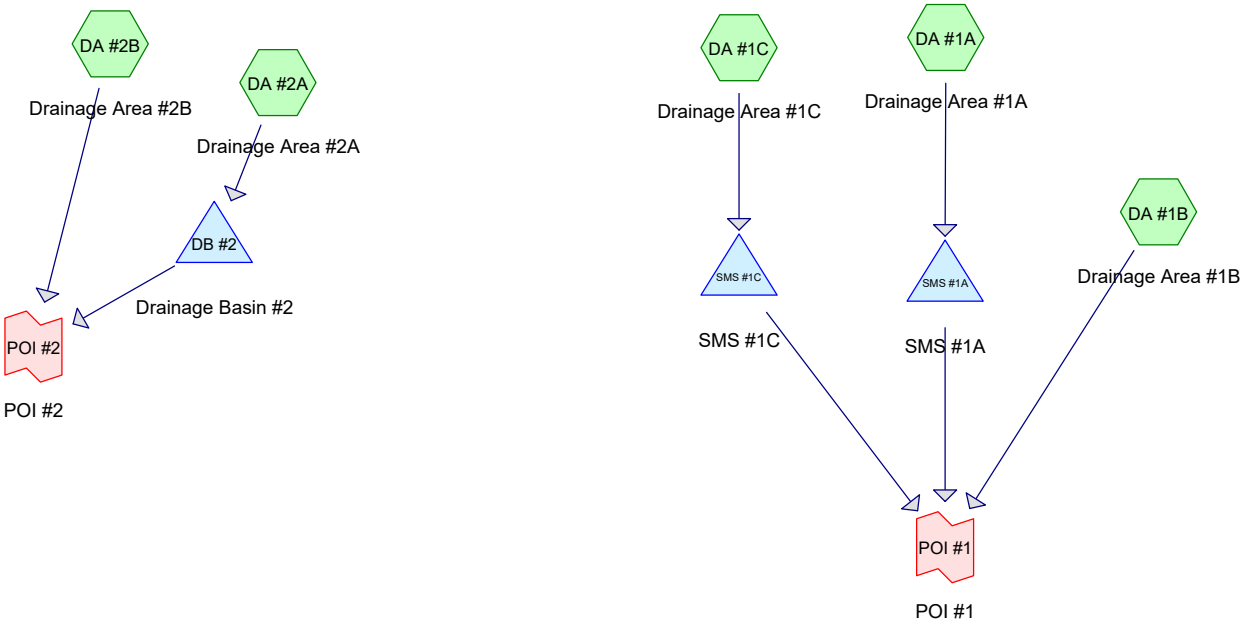
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Appendix E

Proposed Conditions
HydroCAD Model



Subcat Reach Pond Link

Routing Diagram for 2025.11.10 - Proposed Conditions
Prepared by Weston & Sampson Engineers, Inc, Printed 11/12/2025
HydroCAD® 10.20-5c s/n 00455 © 2023 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type III 24-hr		Default	24.00	1	2.80	
2	2-Year	Type III 24-hr		Default	24.00	1	3.50	
3	10-Year	Type III 24-hr		Default	24.00	1	5.00	
4	25-Year	Type III 24-hr		Default	24.00	1	6.00	
5	100-Year	Type III 24-hr		Default	24.00	1	9.00	
6	WQv (Roadway B)	Type III 24-hr		Default	24.00	1	1.76	
7	WQv (Roadway C)	Type III 24-hr		Default	24.00	1	1.80	
8	WQv (Underground Infiltration System)	Type III 24-hr		Default	24.00	1	1.87	

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
8.716	61	>75% Grass cover, Good, HSG B (DA #1A, DA #1B, DA #1C, DA #2A, DA #2B)
5.096	98	Building/Roof, HSG B (DA #1A, DA #1C, DA #2A)
0.328	98	Emergency Access Road (Imp.), HSG B (DA #1A, DA #1B)
0.247	61	Emergency Access Road (Perv.), Good, HSG B (DA #1A, DA #1B, DA #2B)
0.075	98	Emergency Acess Road (Imp.), HSG B (DA #2B)
0.288	98	Infiltration Basin, HSG B (DA #2A)
3.593	98	Pavement, HSG B (DA #1A, DA #1C, DA #2A)
0.175	98	Sidewalk, HSG B (DA #1A, DA #1C, DA #2A)
18.518	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
18.518	HSG B	DA #1A, DA #1B, DA #1C, DA #2A, DA #2B
0.000	HSG C	
0.000	HSG D	
0.000	Other	
18.518		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcat Numbe
0.000	8.716	0.000	0.000	0.000	8.716	>75% Grass cover, Good	
0.000	5.096	0.000	0.000	0.000	5.096	Building/Roof	
0.000	0.328	0.000	0.000	0.000	0.328	Emergency Access Road (Imp.)	
0.000	0.247	0.000	0.000	0.000	0.247	Emergency Access Road (Perv.), Good	
0.000	0.075	0.000	0.000	0.000	0.075	Emergency Acess Road (Imp.)	
0.000	0.288	0.000	0.000	0.000	0.288	Infiltration Basin	
0.000	3.593	0.000	0.000	0.000	3.593	Pavement	
0.000	0.175	0.000	0.000	0.000	0.175	Sidewalk	
0.000	**18.518**	**0.000**	**0.000**	**0.000**	**18.518**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 #1A: Drainage Area #1A Runoff Area=168,262 sf 91.78% Impervious Runoff Depth=2.25"
Tc=10.0 min CN=95 Runoff=8.42 cfs 0.726 af

Subcatchment DA #1B: Drainage Area #1B Runoff Area=173,173 sf 5.32% Impervious Runoff Depth=0.35"
Flow Length=638' Tc=17.0 min CN=63 Runoff=0.71 cfs 0.117 af

Subcatchment DA #1C: Drainage Area Runoff Area=151,363 sf 93.57% Impervious Runoff Depth=2.36"
Tc=10.0 min CN=96 Runoff=7.79 cfs 0.682 af

Subcatchment DA #2A: Drainage Area #2A Runoff Area=121,548 sf 88.60% Impervious Runoff Depth=2.16"
Tc=10.0 min CN=94 Runoff=5.89 cfs 0.502 af

Subcatchment DA #2B: Drainage Area #2B Runoff Area=192,310 sf 1.70% Impervious Runoff Depth=0.32"
Flow Length=784' Tc=18.4 min CN=62 Runoff=0.66 cfs 0.118 af

Pond DB #2: Drainage Basin #2 Peak Elev=485.63' Storage=3,874 cf Inflow=5.89 cfs 0.502 af
Discarded=1.95 cfs 0.481 af Primary=0.46 cfs 0.021 af Outflow=2.41 cfs 0.501 af

Pond SMS #1A: SMS #1A Peak Elev=493.17' Storage=6,685 cf Inflow=8.42 cfs 0.726 af
Discarded=2.14 cfs 0.698 af Primary=0.43 cfs 0.028 af Outflow=2.58 cfs 0.726 af

Pond SMS #1C: SMS #1C Peak Elev=496.56' Storage=5,932 cf Inflow=7.79 cfs 0.682 af
Discarded=2.13 cfs 0.665 af Primary=0.34 cfs 0.017 af Outflow=2.47 cfs 0.682 af

Link POI #1: POI #1 Inflow=1.45 cfs 0.162 af
Primary=1.45 cfs 0.162 af

Link POI #2: POI #2 Inflow=1.12 cfs 0.139 af
Primary=1.12 cfs 0.139 af

Total Runoff Area = 18.518 ac Runoff Volume = 2.144 af Average Runoff Depth = 1.39"
48.40% Pervious = 8.963 ac 51.60% Impervious = 9.556 ac

Summary for Subcatchment DA #1A: Drainage Area #1A

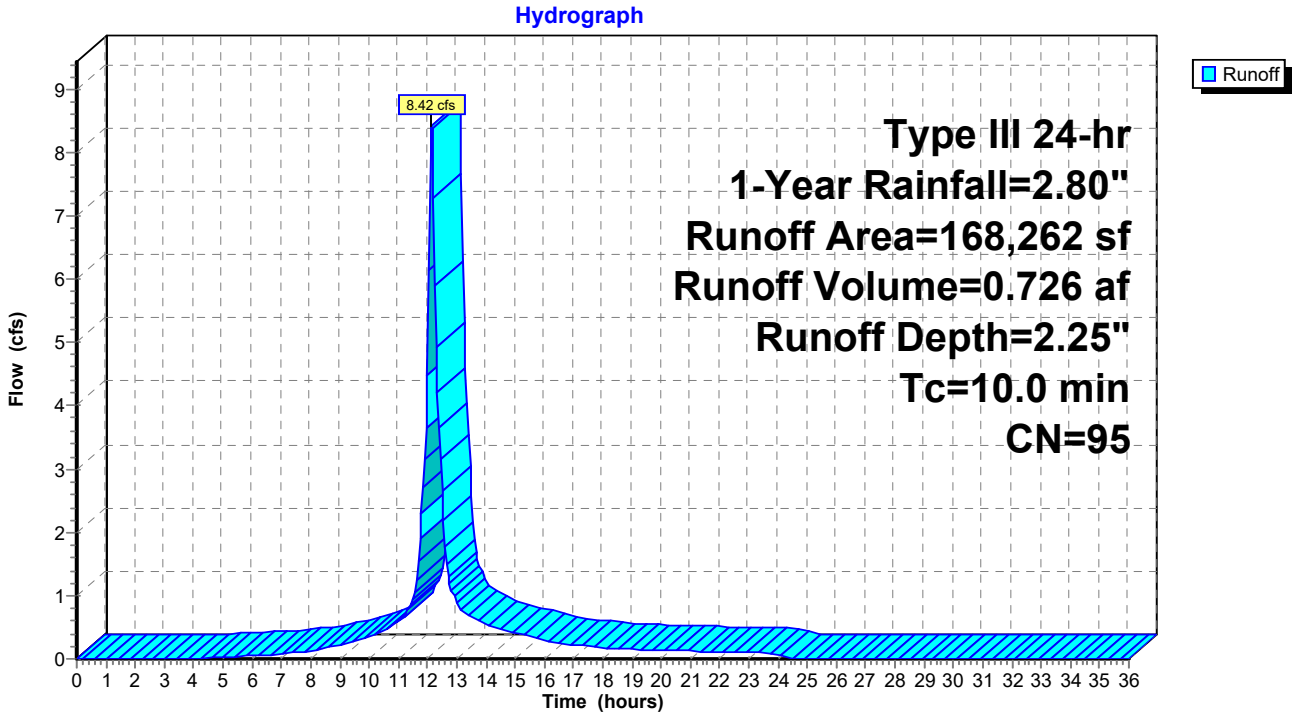
Runoff = 8.42 cfs @ 12.14 hrs, Volume= 0.726 af, Depth= 2.25"
Routed to Pond SMS #1A : SMS #1A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

	Area (sf)	CN	Description
	10,723	61	>75% Grass cover, Good, HSG B
*	3,112	61	Emergency Access Road (Perv.), Good, HSG B
*	86,043	98	Building/Roof, HSG B
*	60,366	98	Pavement, HSG B
*	2,940	98	Sidewalk, HSG B
*	5,078	98	Emergency Access Road (Imp.), HSG B
	168,262	95	Weighted Average
	13,835		8.22% Pervious Area
	154,427		91.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #1A: Drainage Area #1A



Hydrograph for Subcatchment DA #1A: Drainage Area #1A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.03	0.00	0.00
1.50	0.04	0.00	0.00
2.00	0.06	0.00	0.00
2.50	0.07	0.00	0.00
3.00	0.09	0.00	0.00
3.50	0.10	0.00	0.00
4.00	0.12	0.00	0.00
4.50	0.14	0.00	0.01
5.00	0.16	0.00	0.02
5.50	0.18	0.01	0.04
6.00	0.20	0.01	0.05
6.50	0.23	0.02	0.06
7.00	0.25	0.03	0.08
7.50	0.28	0.05	0.11
8.00	0.32	0.06	0.13
8.50	0.36	0.08	0.17
9.00	0.41	0.11	0.23
9.50	0.46	0.15	0.29
10.00	0.53	0.19	0.35
10.50	0.61	0.24	0.45
11.00	0.70	0.32	0.58
11.50	0.83	0.42	0.93
12.00	1.40	0.92	**4.47**
12.50	1.97	1.45	**2.66**
13.00	2.10	1.58	0.91
13.50	2.19	1.67	0.68
14.00	2.27	1.74	0.55
14.50	2.34	1.80	0.47
15.00	2.39	1.86	0.41
15.50	2.44	1.91	0.35
16.00	2.48	1.94	0.29
16.50	2.52	1.98	0.26
17.00	2.55	2.01	0.23
17.50	2.57	2.04	0.20
18.00	2.60	2.06	0.18
18.50	2.62	2.08	0.16
19.00	2.64	2.10	0.16
19.50	2.66	2.12	0.15
20.00	2.68	2.14	0.14
20.50	2.70	2.15	0.13
21.00	2.71	2.17	0.13
21.50	2.73	2.19	0.12
22.00	2.75	2.20	0.12
22.50	2.76	2.22	0.11
23.00	2.77	2.23	0.10
23.50	2.79	2.24	0.10
24.00	**2.80**	**2.25**	0.09
24.50	2.80	2.25	0.00
25.00	2.80	2.25	0.00
25.50	2.80	2.25	0.00
26.00	2.80	2.25	0.00
26.50	2.80	2.25	0.00
27.00	2.80	2.25	0.00
27.50	2.80	2.25	0.00
28.00	2.80	2.25	0.00
28.50	2.80	2.25	0.00
29.00	2.80	2.25	0.00
29.50	2.80	2.25	0.00
30.00	2.80	2.25	0.00
30.50	2.80	2.25	0.00
31.00	2.80	2.25	0.00
31.50	2.80	2.25	0.00
32.00	2.80	2.25	0.00
32.50	2.80	2.25	0.00
33.00	2.80	2.25	0.00
33.50	2.80	2.25	0.00
34.00	2.80	2.25	0.00
34.50	2.80	2.25	0.00
35.00	2.80	2.25	0.00
35.50	2.80	2.25	0.00
36.00	2.80	2.25	0.00

Summary for Subcatchment DA #1B: Drainage Area #1B

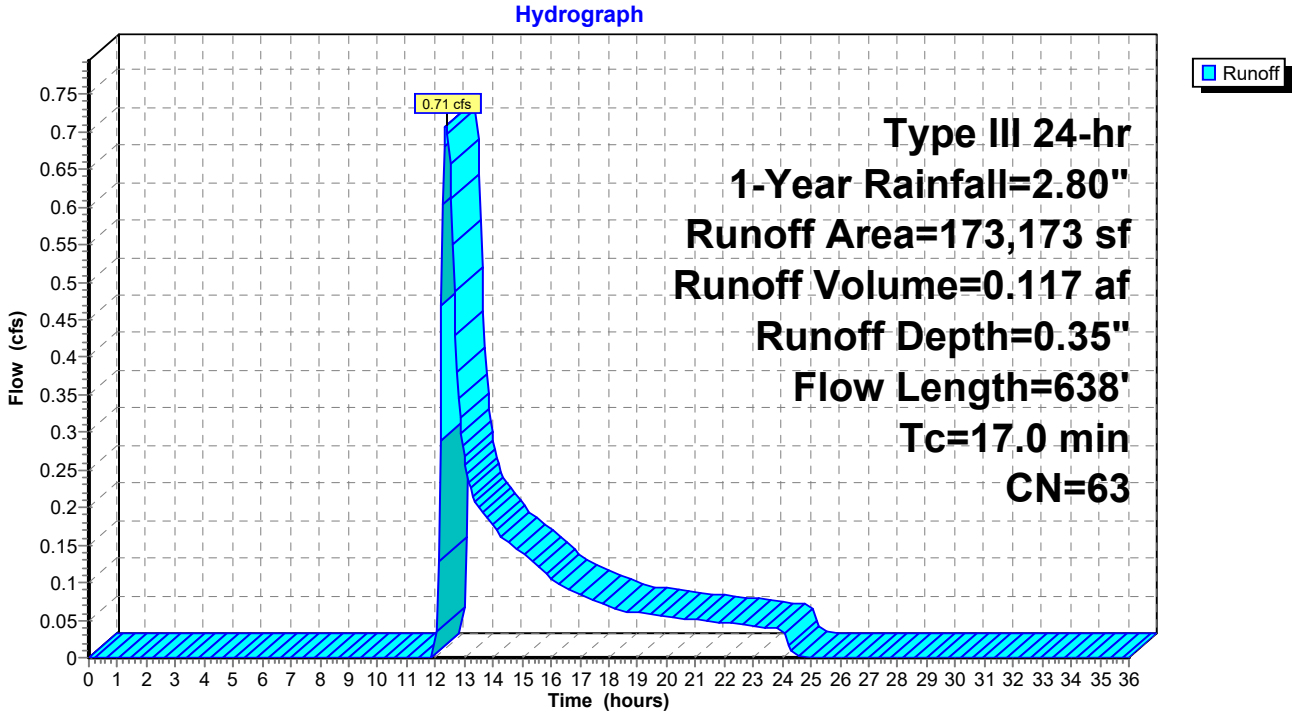
Runoff = 0.71 cfs @ 12.37 hrs, Volume= 0.117 af, Depth= 0.35"
Routed to Link POI #1 : POI #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

	Area (sf)	CN	Description
	158,310	61	>75% Grass cover, Good, HSG B
*	5,648	61	Emergency Access Road (Perv.), Good, HSG B
*	9,215	98	Emergency Access Road (Imp.), HSG B
	173,173	63	Weighted Average
	163,958		94.68% Pervious Area
	9,215		5.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	150	0.1200	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
4.8	488	0.0578	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	638	Total			

Subcatchment DA #1B: Drainage Area #1B



Hydrograph for Subcatchment DA #1B: Drainage Area #1B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.03	0.00	0.00
1.50	0.04	0.00	0.00
2.00	0.06	0.00	0.00
2.50	0.07	0.00	0.00
3.00	0.09	0.00	0.00
3.50	0.10	0.00	0.00
4.00	0.12	0.00	0.00
4.50	0.14	0.00	0.00
5.00	0.16	0.00	0.00
5.50	0.18	0.00	0.00
6.00	0.20	0.00	0.00
6.50	0.23	0.00	0.00
7.00	0.25	0.00	0.00
7.50	0.28	0.00	0.00
8.00	0.32	0.00	0.00
8.50	0.36	0.00	0.00
9.00	0.41	0.00	0.00
9.50	0.46	0.00	0.00
10.00	0.53	0.00	0.00
10.50	0.61	0.00	0.00
11.00	0.70	0.00	0.00
11.50	0.83	0.00	0.00
12.00	1.40	0.01	**0.01**
12.50	1.97	0.09	**0.66**
13.00	2.10	0.13	0.27
13.50	2.19	0.15	0.20
14.00	2.27	0.17	0.17
14.50	2.34	0.19	0.15
15.00	2.39	0.21	0.14
15.50	2.44	0.22	0.12
16.00	2.48	0.24	0.11
16.50	2.52	0.25	0.09
17.00	2.55	0.26	0.09
17.50	2.57	0.27	0.08
18.00	2.60	0.28	0.07
18.50	2.62	0.29	0.06
19.00	2.64	0.29	0.06
19.50	2.66	0.30	0.06
20.00	2.68	0.31	0.05
20.50	2.70	0.31	0.05
21.00	2.71	0.32	0.05
21.50	2.73	0.33	0.05
22.00	2.75	0.33	0.05
22.50	2.76	0.34	0.04
23.00	2.77	0.34	0.04
23.50	2.79	0.35	0.04
24.00	**2.80**	**0.35**	0.04
24.50	2.80	0.35	0.00
25.00	2.80	0.35	0.00
25.50	2.80	0.35	0.00
26.00	2.80	0.35	0.00
26.50	2.80	0.35	0.00
27.00	2.80	0.35	0.00
27.50	2.80	0.35	0.00
28.00	2.80	0.35	0.00
28.50	2.80	0.35	0.00
29.00	2.80	0.35	0.00
29.50	2.80	0.35	0.00
30.00	2.80	0.35	0.00
30.50	2.80	0.35	0.00
31.00	2.80	0.35	0.00
31.50	2.80	0.35	0.00
32.00	2.80	0.35	0.00
32.50	2.80	0.35	0.00
33.00	2.80	0.35	0.00
33.50	2.80	0.35	0.00
34.00	2.80	0.35	0.00
34.50	2.80	0.35	0.00
35.00	2.80	0.35	0.00
35.50	2.80	0.35	0.00
36.00	2.80	0.35	0.00

Summary for Subcatchment DA #1C: Drainage Area #1C

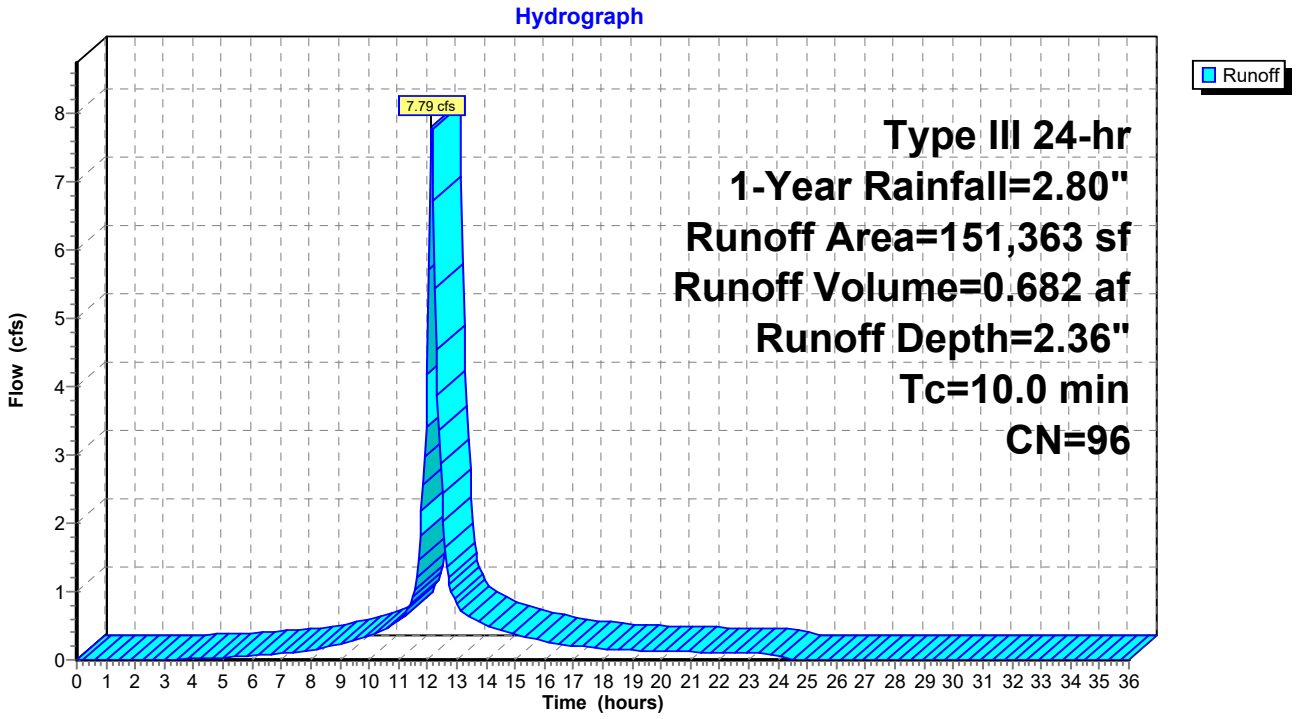
Runoff = 7.79 cfs @ 12.14 hrs, Volume= 0.682 af, Depth= 2.36"
Routed to Pond SMS #1C : SMS #1C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

	Area (sf)	CN	Description
	9,732	61	>75% Grass cover, Good, HSG B
*	87,537	98	Building/Roof, HSG B
*	50,809	98	Pavement, HSG B
*	3,285	98	Sidewalk, HSG B
	151,363	96	Weighted Average
	9,732		6.43% Pervious Area
	141,631		93.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Direct Minimum**

Subcatchment DA #1C: Drainage Area #1C



Hydrograph for Subcatchment DA #1C: Drainage Area #1C

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.03	0.00	0.00
1.50	0.04	0.00	0.00
2.00	0.06	0.00	0.00
2.50	0.07	0.00	0.00
3.00	0.09	0.00	0.00
3.50	0.10	0.00	0.01
4.00	0.12	0.00	0.02
4.50	0.14	0.01	0.03
5.00	0.16	0.01	0.04
5.50	0.18	0.02	0.05
6.00	0.20	0.03	0.06
6.50	0.23	0.04	0.07
7.00	0.25	0.05	0.10
7.50	0.28	0.07	0.12
8.00	0.32	0.09	0.14
8.50	0.36	0.11	0.18
9.00	0.41	0.14	0.23
9.50	0.46	0.18	0.29
10.00	0.53	0.23	0.35
10.50	0.61	0.29	0.45
11.00	0.70	0.37	0.56
11.50	0.83	0.48	0.89
12.00	1.40	1.00	**4.18**
12.50	1.97	1.54	**2.44**
13.00	2.10	1.67	0.83
13.50	2.19	1.76	0.62
14.00	2.27	1.84	0.50
14.50	2.34	1.90	0.43
15.00	2.39	1.96	0.38
15.50	2.44	2.00	0.32
16.00	2.48	2.04	0.27
16.50	2.52	2.08	0.23
17.00	2.55	2.11	0.21
17.50	2.57	2.13	0.19
18.00	2.60	2.16	0.16
18.50	2.62	2.18	0.15
19.00	2.64	2.20	0.14
19.50	2.66	2.22	0.13
20.00	2.68	2.24	0.13
20.50	2.70	2.25	0.12
21.00	2.71	2.27	0.12
21.50	2.73	2.29	0.11
22.00	2.75	2.30	0.11
22.50	2.76	2.32	0.10
23.00	2.77	2.33	0.09
23.50	2.79	2.34	0.09
24.00	**2.80**	**2.36**	0.08
24.50	2.80	2.36	0.00
25.00	2.80	2.36	0.00
25.50	2.80	2.36	0.00
26.00	2.80	2.36	0.00
26.50	2.80	2.36	0.00
27.00	2.80	2.36	0.00
27.50	2.80	2.36	0.00
28.00	2.80	2.36	0.00
28.50	2.80	2.36	0.00
29.00	2.80	2.36	0.00
29.50	2.80	2.36	0.00
30.00	2.80	2.36	0.00
30.50	2.80	2.36	0.00
31.00	2.80	2.36	0.00
31.50	2.80	2.36	0.00
32.00	2.80	2.36	0.00
32.50	2.80	2.36	0.00
33.00	2.80	2.36	0.00
33.50	2.80	2.36	0.00
34.00	2.80	2.36	0.00
34.50	2.80	2.36	0.00
35.00	2.80	2.36	0.00
35.50	2.80	2.36	0.00
36.00	2.80	2.36	0.00

Summary for Subcatchment DA #2A: Drainage Area #2A

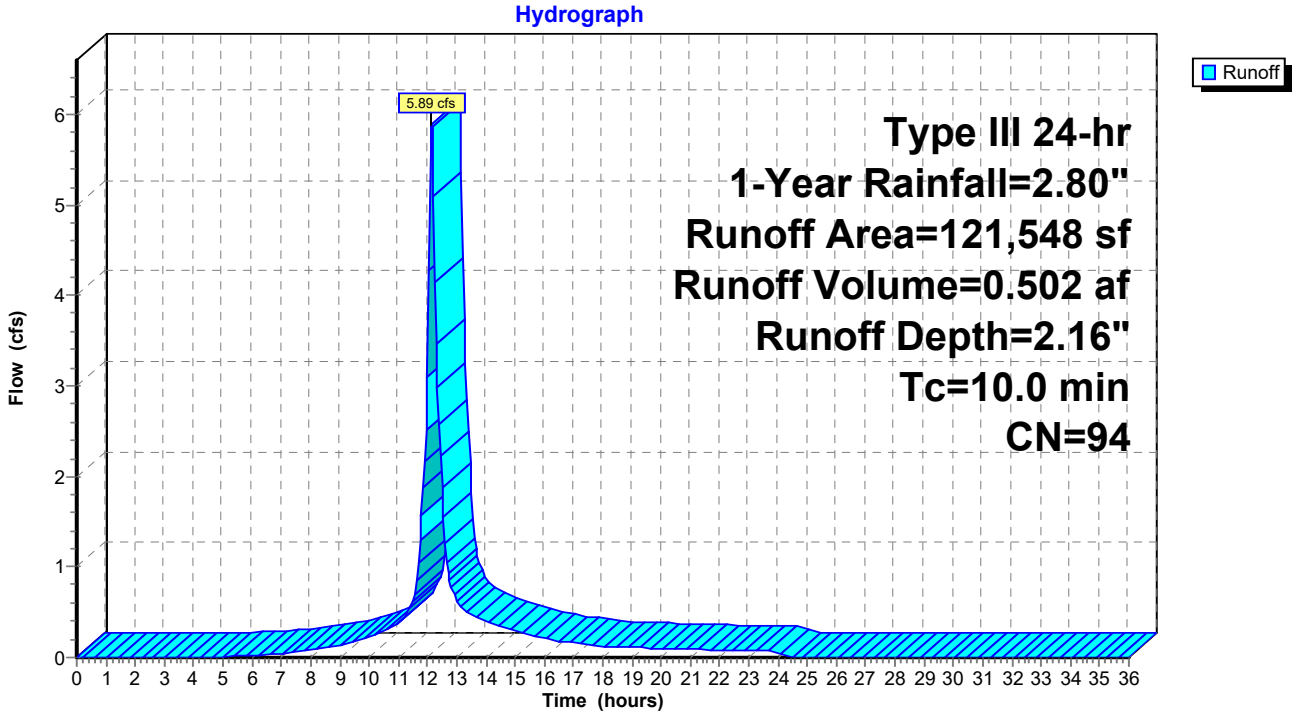
Runoff = 5.89 cfs @ 12.14 hrs, Volume= 0.502 af, Depth= 2.16"
Routed to Pond DB #2 : Drainage Basin #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

	Area (sf)	CN	Description
*	48,398	98	Building/Roof, HSG B
*	45,328	98	Pavement, HSG B
*	1,404	98	Sidewalk, HSG B
	13,851	61	>75% Grass cover, Good, HSG B
*	12,567	98	Infiltration Basin, HSG B
	121,548	94	Weighted Average
	13,851		11.40% Pervious Area
	107,697		88.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #2A: Drainage Area #2A



Hydrograph for Subcatchment DA #2A: Drainage Area #2A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.03	0.00	0.00
1.50	0.04	0.00	0.00
2.00	0.06	0.00	0.00
2.50	0.07	0.00	0.00
3.00	0.09	0.00	0.00
3.50	0.10	0.00	0.00
4.00	0.12	0.00	0.00
4.50	0.14	0.00	0.00
5.00	0.16	0.00	0.01
5.50	0.18	0.00	0.02
6.00	0.20	0.01	0.02
6.50	0.23	0.01	0.03
7.00	0.25	0.02	0.05
7.50	0.28	0.03	0.06
8.00	0.32	0.04	0.08
8.50	0.36	0.06	0.11
9.00	0.41	0.09	0.14
9.50	0.46	0.12	0.18
10.00	0.53	0.16	0.23
10.50	0.61	0.21	0.30
11.00	0.70	0.27	0.39
11.50	0.83	0.37	0.63
12.00	1.40	0.85	**3.10**
12.50	1.97	1.36	**1.88**
13.00	2.10	1.49	0.65
13.50	2.19	1.58	0.48
14.00	2.27	1.65	0.39
14.50	2.34	1.71	0.34
15.00	2.39	1.77	0.29
15.50	2.44	1.81	0.25
16.00	2.48	1.85	0.21
16.50	2.52	1.88	0.18
17.00	2.55	1.91	0.16
17.50	2.57	1.94	0.15
18.00	2.60	1.96	0.13
18.50	2.62	1.98	0.12
19.00	2.64	2.00	0.11
19.50	2.66	2.02	0.11
20.00	2.68	2.04	0.10
20.50	2.70	2.06	0.10
21.00	2.71	2.07	0.09
21.50	2.73	2.09	0.09
22.00	2.75	2.11	0.08
22.50	2.76	2.12	0.08
23.00	2.77	2.13	0.07
23.50	2.79	2.15	0.07
24.00	**2.80**	**2.16**	0.07
24.50	2.80	2.16	0.00
25.00	2.80	2.16	0.00
25.50	2.80	2.16	0.00
26.00	2.80	2.16	0.00
26.50	2.80	2.16	0.00
27.00	2.80	2.16	0.00
27.50	2.80	2.16	0.00
28.00	2.80	2.16	0.00
28.50	2.80	2.16	0.00
29.00	2.80	2.16	0.00
29.50	2.80	2.16	0.00
30.00	2.80	2.16	0.00
30.50	2.80	2.16	0.00
31.00	2.80	2.16	0.00
31.50	2.80	2.16	0.00
32.00	2.80	2.16	0.00
32.50	2.80	2.16	0.00
33.00	2.80	2.16	0.00
33.50	2.80	2.16	0.00
34.00	2.80	2.16	0.00
34.50	2.80	2.16	0.00
35.00	2.80	2.16	0.00
35.50	2.80	2.16	0.00
36.00	2.80	2.16	0.00

Summary for Subcatchment DA #2B: Drainage Area #2B

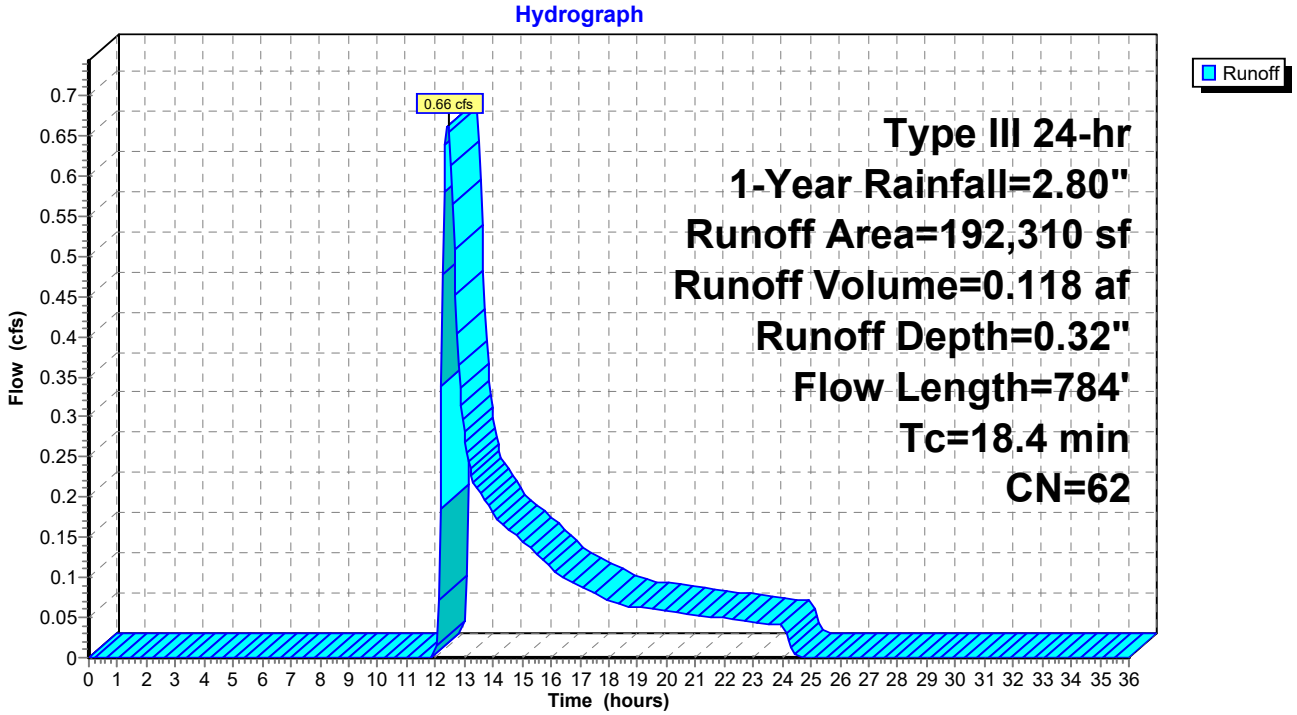
Runoff = 0.66 cfs @ 12.43 hrs, Volume= 0.118 af, Depth= 0.32"
Routed to Link POI #2 : POI #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.80"

	Area (sf)	CN	Description
	187,035	61	>75% Grass cover, Good, HSG B
*	2,004	61	Emergency Access Road (Perv.), Good, HSG B
*	3,271	98	Emergency Acess Road (Imp.), HSG B
	192,310	62	Weighted Average
	189,039		98.30% Pervious Area
	3,271		1.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	150	0.0667	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
3.0	634	0.2524	3.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
18.4	784	Total			

Subcatchment DA #2B: Drainage Area #2B



Hydrograph for Subcatchment DA #2B: Drainage Area #2B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.03	0.00	0.00
1.50	0.04	0.00	0.00
2.00	0.06	0.00	0.00
2.50	0.07	0.00	0.00
3.00	0.09	0.00	0.00
3.50	0.10	0.00	0.00
4.00	0.12	0.00	0.00
4.50	0.14	0.00	0.00
5.00	0.16	0.00	0.00
5.50	0.18	0.00	0.00
6.00	0.20	0.00	0.00
6.50	0.23	0.00	0.00
7.00	0.25	0.00	0.00
7.50	0.28	0.00	0.00
8.00	0.32	0.00	0.00
8.50	0.36	0.00	0.00
9.00	0.41	0.00	0.00
9.50	0.46	0.00	0.00
10.00	0.53	0.00	0.00
10.50	0.61	0.00	0.00
11.00	0.70	0.00	0.00
11.50	0.83	0.00	0.00
12.00	1.40	0.00	**0.00**
12.50	1.97	0.08	**0.65**
13.00	2.10	0.11	0.28
13.50	2.19	0.13	0.21
14.00	2.27	0.15	0.18
14.50	2.34	0.17	0.16
15.00	2.39	0.19	0.15
15.50	2.44	0.20	0.13
16.00	2.48	0.21	0.11
16.50	2.52	0.22	0.10
17.00	2.55	0.23	0.09
17.50	2.57	0.24	0.08
18.00	2.60	0.25	0.07
18.50	2.62	0.26	0.07
19.00	2.64	0.27	0.06
19.50	2.66	0.27	0.06
20.00	2.68	0.28	0.06
20.50	2.70	0.28	0.06
21.00	2.71	0.29	0.05
21.50	2.73	0.30	0.05
22.00	2.75	0.30	0.05
22.50	2.76	0.31	0.05
23.00	2.77	0.31	0.04
23.50	2.79	0.32	0.04
24.00	**2.80**	**0.32**	0.04
24.50	2.80	0.32	0.00
25.00	2.80	0.32	0.00
25.50	2.80	0.32	0.00
26.00	2.80	0.32	0.00
26.50	2.80	0.32	0.00
27.00	2.80	0.32	0.00
27.50	2.80	0.32	0.00
28.00	2.80	0.32	0.00
28.50	2.80	0.32	0.00
29.00	2.80	0.32	0.00
29.50	2.80	0.32	0.00
30.00	2.80	0.32	0.00
30.50	2.80	0.32	0.00
31.00	2.80	0.32	0.00
31.50	2.80	0.32	0.00
32.00	2.80	0.32	0.00
32.50	2.80	0.32	0.00
33.00	2.80	0.32	0.00
33.50	2.80	0.32	0.00
34.00	2.80	0.32	0.00
34.50	2.80	0.32	0.00
35.00	2.80	0.32	0.00
35.50	2.80	0.32	0.00
36.00	2.80	0.32	0.00

Summary for Pond DB #2: Drainage Basin #2

Inflow Area = 2.790 ac, 88.60% Impervious, Inflow Depth = 2.16" for 1-Year event
Inflow = 5.89 cfs @ 12.14 hrs, Volume= 0.502 af
Outflow = 2.41 cfs @ 12.42 hrs, Volume= 0.501 af, Atten= 59%, Lag= 17.1 min
Discarded = 1.95 cfs @ 12.42 hrs, Volume= 0.481 af
Primary = 0.46 cfs @ 12.42 hrs, Volume= 0.021 af
Routed to Link POI #2 : POI #2

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 485.63' @ 12.42 hrs Surf.Area= 6,764 sf Storage= 3,874 cf

Plug-Flow detention time= 10.5 min calculated for 0.501 af (100% of inflow)
Center-of-Mass det. time= 10.1 min (805.4 - 795.3)

Volume	Invert	Avail.Storage	Storage Description
#1	485.00'	25,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

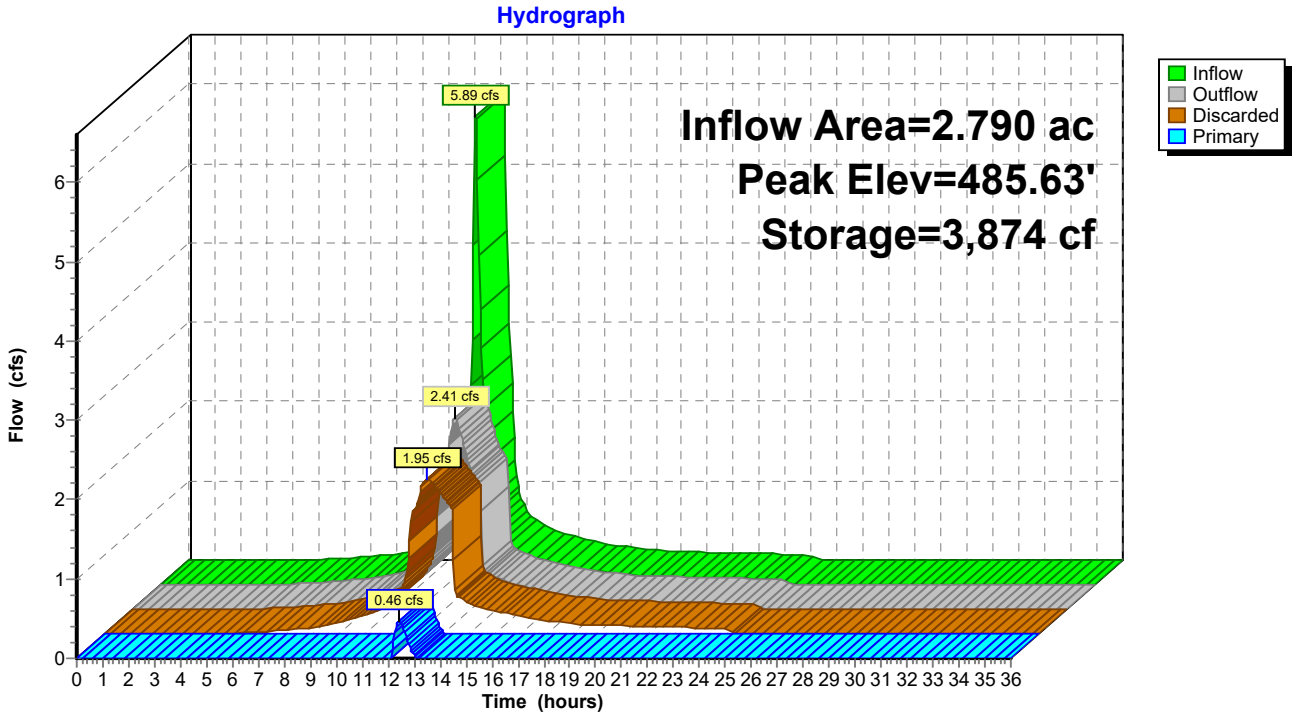
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
485.00	5,500	0	0
486.00	7,500	6,500	6,500
487.00	9,500	8,500	15,000
488.00	11,500	10,500	25,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	485.00'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 470.00'
#2	Primary	485.21'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	486.70'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

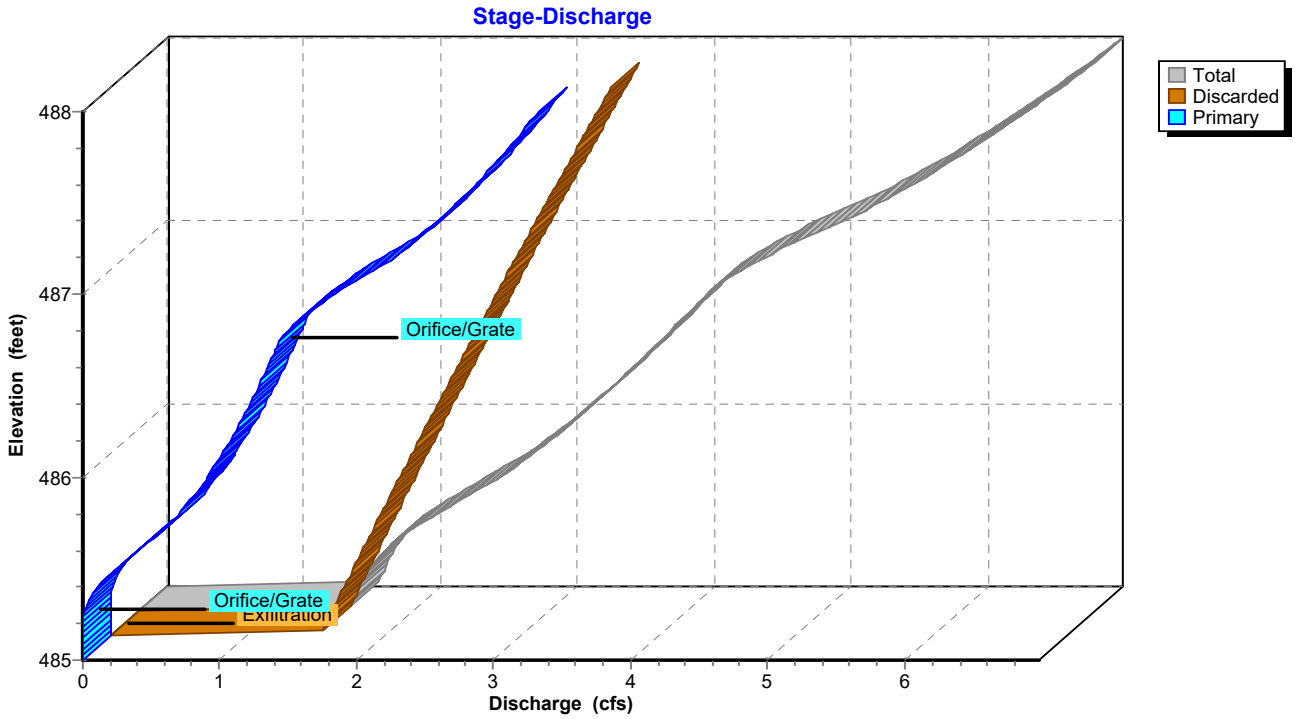
Discarded OutFlow Max=1.95 cfs @ 12.42 hrs HW=485.63' (Free Discharge)
└**1=Exfiltration** (Controls 1.95 cfs)

Primary OutFlow Max=0.46 cfs @ 12.42 hrs HW=485.63' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.46 cfs @ 2.21 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

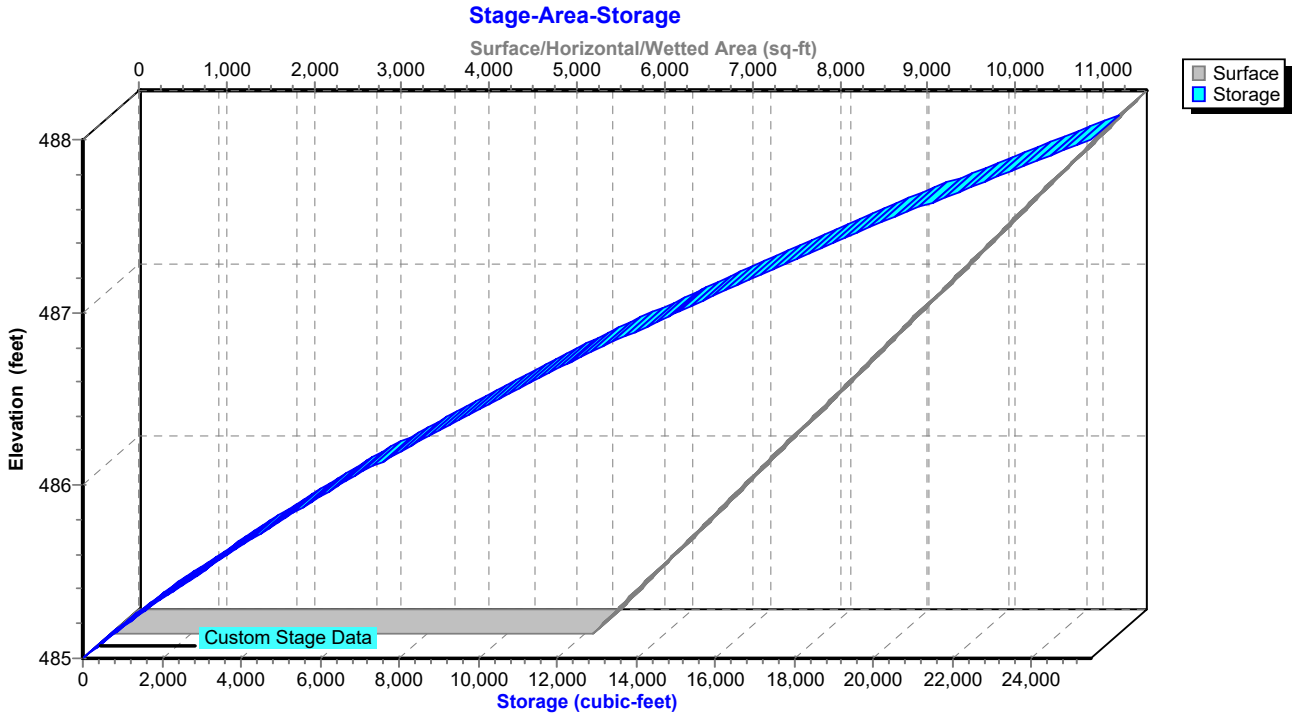
Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Hydrograph for Pond DB #2: Drainage Basin #2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	485.00	0.00	0.00	0.00
1.00	0.00	0	485.00	0.00	0.00	0.00
2.00	0.00	0	485.00	0.00	0.00	0.00
3.00	0.00	0	485.00	0.00	0.00	0.00
4.00	0.00	0	485.00	0.00	0.00	0.00
5.00	0.01	1	485.00	0.01	0.01	0.00
6.00	0.02	2	485.00	0.02	0.02	0.00
7.00	0.05	5	485.00	0.04	0.04	0.00
8.00	0.08	8	485.00	0.08	0.08	0.00
9.00	0.14	15	485.00	0.14	0.14	0.00
10.00	0.23	24	485.00	0.22	0.22	0.00
11.00	0.39	41	485.01	0.38	0.38	0.00
12.00	**3.10**	**632**	**485.11**	**1.60**	**1.60**	**0.00**
13.00	**0.65**	**1,840**	**485.32**	**1.77**	**1.74**	**0.04**
14.00	0.39	43	485.01	0.40	0.40	0.00
15.00	0.29	32	485.01	0.30	0.30	0.00
16.00	0.21	23	485.00	0.21	0.21	0.00
17.00	0.16	18	485.00	0.17	0.17	0.00
18.00	0.13	14	485.00	0.13	0.13	0.00
19.00	0.11	12	485.00	0.11	0.11	0.00
20.00	0.10	11	485.00	0.10	0.10	0.00
21.00	0.09	10	485.00	0.09	0.09	0.00
22.00	0.08	9	485.00	0.08	0.08	0.00
23.00	0.07	8	485.00	0.07	0.07	0.00
24.00	0.07	7	485.00	0.07	0.07	0.00
25.00	0.00	0	485.00	0.00	0.00	0.00
26.00	0.00	0	485.00	0.00	0.00	0.00
27.00	0.00	0	485.00	0.00	0.00	0.00
28.00	0.00	0	485.00	0.00	0.00	0.00
29.00	0.00	0	485.00	0.00	0.00	0.00
30.00	0.00	0	485.00	0.00	0.00	0.00
31.00	0.00	0	485.00	0.00	0.00	0.00
32.00	0.00	0	485.00	0.00	0.00	0.00
33.00	0.00	0	485.00	0.00	0.00	0.00
34.00	0.00	0	485.00	0.00	0.00	0.00
35.00	0.00	0	485.00	0.00	0.00	0.00
36.00	0.00	0	485.00	0.00	0.00	0.00

Stage-Discharge for Pond DB #2: Drainage Basin #2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
485.00	0.00	0.00	0.00
485.05	1.56	1.56	0.00
485.10	1.59	1.59	0.00
485.15	1.63	1.63	0.00
485.20	1.66	1.66	0.00
485.25	1.70	1.69	0.01
485.30	1.75	1.73	0.03
485.35	1.82	1.76	0.06
485.40	1.91	1.79	0.11
485.45	2.00	1.83	0.17
485.50	2.10	1.86	0.24
485.55	2.22	1.89	0.32
485.60	2.33	1.93	0.40
485.65	2.45	1.96	0.49
485.70	2.57	2.00	0.57
485.75	2.68	2.03	0.65
485.80	2.77	2.06	0.70
485.85	2.86	2.10	0.76
485.90	2.95	2.13	0.81
485.95	3.03	2.17	0.86
486.00	3.11	2.20	0.91
486.05	3.19	2.24	0.95
486.10	3.27	2.27	1.00
486.15	3.34	2.31	1.04
486.20	3.42	2.34	1.08
486.25	3.49	2.38	1.11
486.30	3.56	2.41	1.15
486.35	3.63	2.45	1.19
486.40	3.70	2.48	1.22
486.45	3.77	2.52	1.25
486.50	3.84	2.55	1.29
486.55	3.91	2.59	1.32
486.60	3.97	2.62	1.35
486.65	4.04	2.66	1.38
486.70	4.10	2.70	1.41
486.75	4.18	2.73	1.45
486.80	4.27	2.77	1.50
486.85	4.37	2.80	1.57
486.90	4.49	2.84	1.65
486.95	4.61	2.88	1.73
487.00	4.75	2.91	1.83
487.05	4.89	2.95	1.94
487.10	5.03	2.99	2.05
487.15	5.18	3.02	2.16
487.20	5.32	3.06	2.26
487.25	5.46	3.10	2.36
487.30	5.57	3.13	2.44
487.35	5.69	3.17	2.52
487.40	5.80	3.21	2.60
487.45	5.91	3.24	2.67
487.50	6.02	3.28	2.74
487.55	6.12	3.32	2.80
487.60	6.22	3.35	2.87
487.65	6.32	3.39	2.93
487.70	6.42	3.43	2.99
487.75	6.52	3.47	3.05
487.80	6.61	3.50	3.11
487.85	6.71	3.54	3.16
487.90	6.80	3.58	3.22
487.95	6.89	3.62	3.27
488.00	**6.98**	**3.65**	**3.33**

Stage-Area-Storage for Pond DB #2: Drainage Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
485.00	5,500	0
485.05	5,600	278
485.10	5,700	560
485.15	5,800	847
485.20	5,900	1,140
485.25	6,000	1,438
485.30	6,100	1,740
485.35	6,200	2,048
485.40	6,300	2,360
485.45	6,400	2,677
485.50	6,500	3,000
485.55	6,600	3,328
485.60	6,700	3,660
485.65	6,800	3,997
485.70	6,900	4,340
485.75	7,000	4,688
485.80	7,100	5,040
485.85	7,200	5,398
485.90	7,300	5,760
485.95	7,400	6,127
486.00	7,500	6,500
486.05	7,600	6,878
486.10	7,700	7,260
486.15	7,800	7,647
486.20	7,900	8,040
486.25	8,000	8,438
486.30	8,100	8,840
486.35	8,200	9,248
486.40	8,300	9,660
486.45	8,400	10,077
486.50	8,500	10,500
486.55	8,600	10,928
486.60	8,700	11,360
486.65	8,800	11,797
486.70	8,900	12,240
486.75	9,000	12,688
486.80	9,100	13,140
486.85	9,200	13,598
486.90	9,300	14,060
486.95	9,400	14,527
487.00	9,500	15,000
487.05	9,600	15,478
487.10	9,700	15,960
487.15	9,800	16,447
487.20	9,900	16,940
487.25	10,000	17,438
487.30	10,100	17,940
487.35	10,200	18,448
487.40	10,300	18,960
487.45	10,400	19,477
487.50	10,500	20,000
487.55	10,600	20,528
487.60	10,700	21,060
487.65	10,800	21,597
487.70	10,900	22,140
487.75	11,000	22,688
487.80	11,100	23,240
487.85	11,200	23,798
487.90	11,300	24,360
487.95	11,400	24,927
488.00	**11,500**	**25,500**

Summary for Pond SMS #1A: SMS #1A

Inflow Area = 3.863 ac, 91.78% Impervious, Inflow Depth = 2.25" for 1-Year event
Inflow = 8.42 cfs @ 12.14 hrs, Volume= 0.726 af
Outflow = 2.58 cfs @ 12.51 hrs, Volume= 0.726 af, Atten= 69%, Lag= 22.3 min
Discarded = 2.14 cfs @ 12.51 hrs, Volume= 0.698 af
Primary = 0.43 cfs @ 12.51 hrs, Volume= 0.028 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 493.17' @ 12.51 hrs Surf.Area= 7,503 sf Storage= 6,685 cf

Plug-Flow detention time= 15.0 min calculated for 0.726 af (100% of inflow)
Center-of-Mass det. time= 14.9 min (803.8 - 788.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	491.75'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	492.50'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	491.75'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	492.53'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	493.83'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	494.49'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	495.32'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	496.23'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.14 cfs @ 12.51 hrs HW=493.17' (Free Discharge)
└**1=Exfiltration** (Controls 2.14 cfs)

Primary OutFlow Max=0.43 cfs @ 12.51 hrs HW=493.17' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.43 cfs @ 3.18 fps)
├**3=Orifice/Grate** (Controls 0.00 cfs)
├**4=Orifice/Grate** (Controls 0.00 cfs)
├**5=Orifice/Grate** (Controls 0.00 cfs)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1A: SMS #1A - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

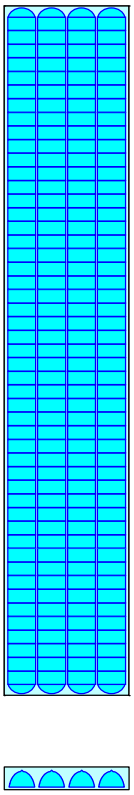
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

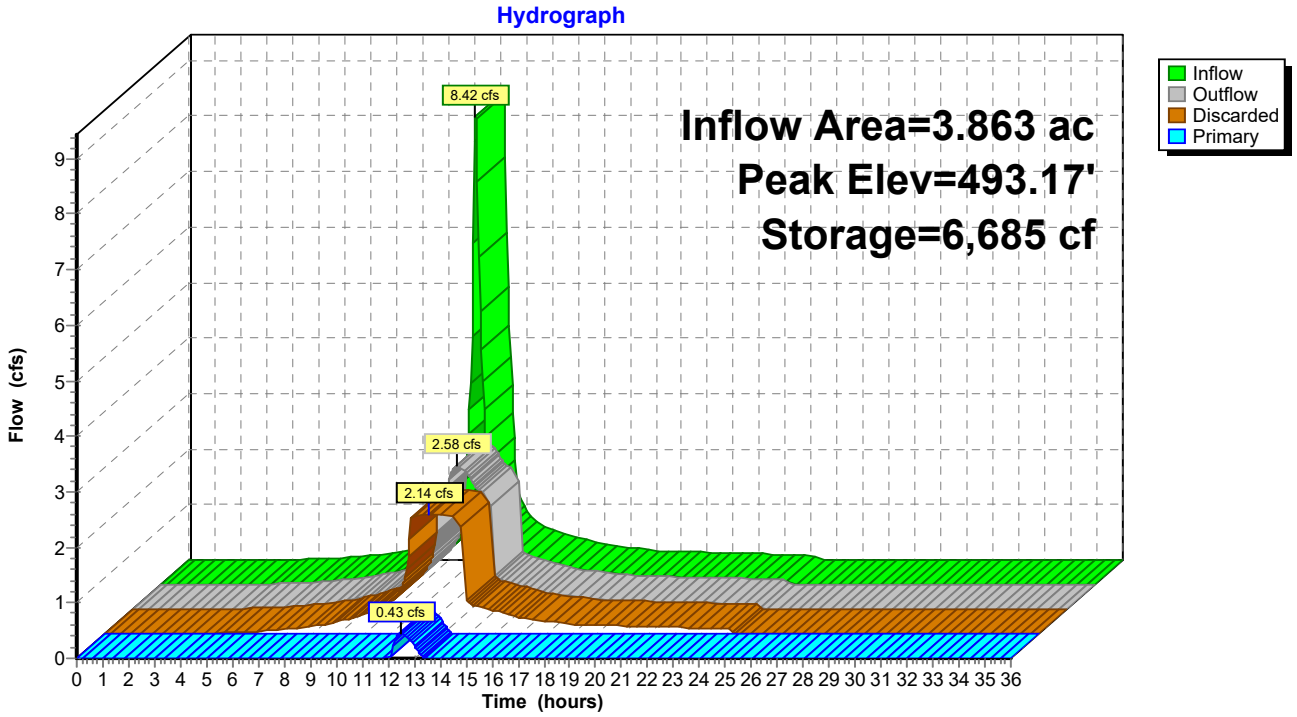
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

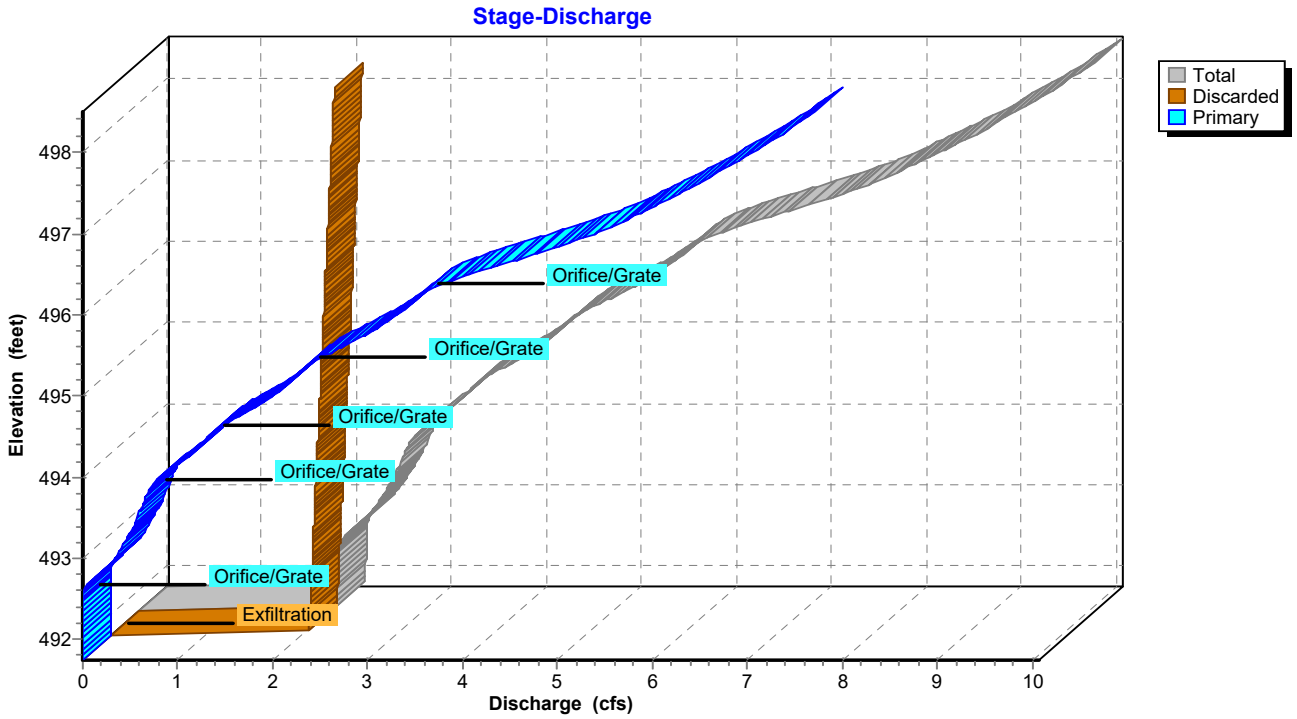
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



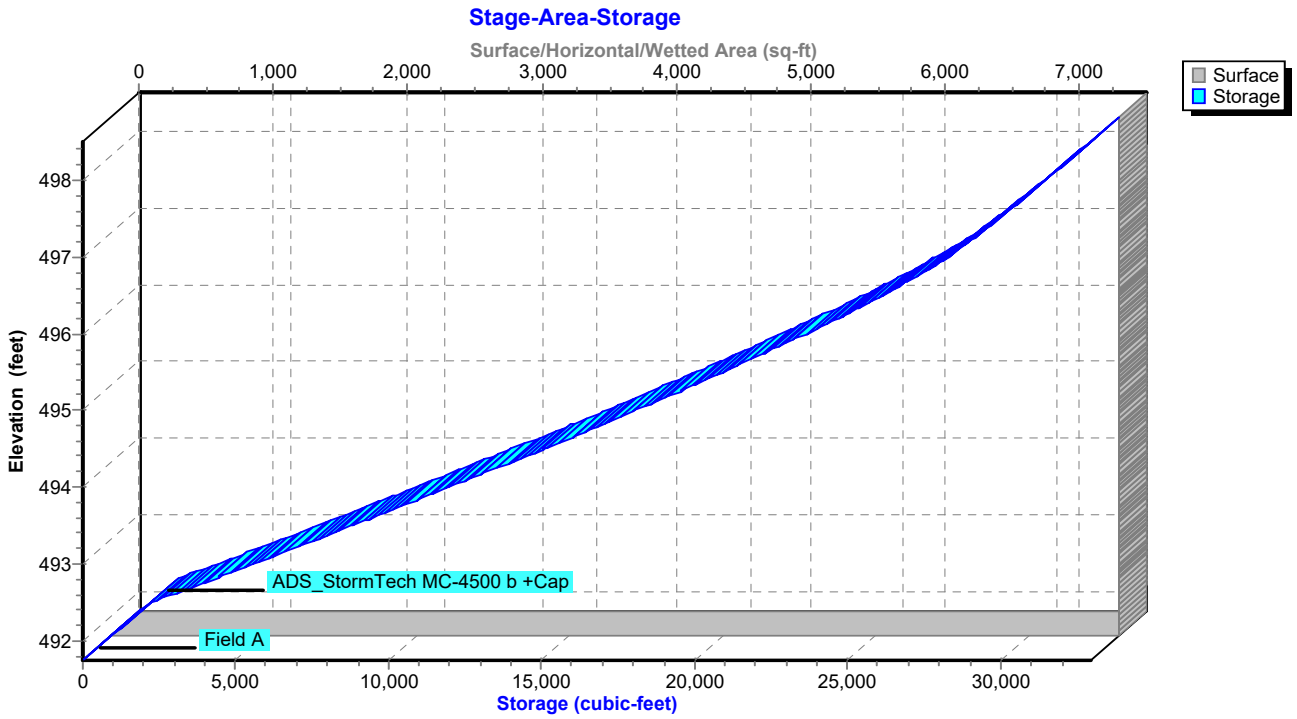
Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Hydrograph for Pond SMS #1A: SMS #1A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	491.75	0.00	0.00	0.00
1.00	0.00	0	491.75	0.00	0.00	0.00
2.00	0.00	0	491.75	0.00	0.00	0.00
3.00	0.00	0	491.75	0.00	0.00	0.00
4.00	0.00	0	491.75	0.00	0.00	0.00
5.00	0.02	2	491.75	0.02	0.02	0.00
6.00	0.05	4	491.75	0.05	0.05	0.00
7.00	0.08	8	491.75	0.08	0.08	0.00
8.00	0.13	13	491.75	0.13	0.13	0.00
9.00	0.23	22	491.76	0.22	0.22	0.00
10.00	0.35	34	491.76	0.35	0.35	0.00
11.00	0.58	56	491.77	0.57	0.57	0.00
12.00	**4.47**	**1,022**	**492.09**	**2.10**	**2.10**	**0.00**
13.00	**0.91**	**4,690**	**492.87**	**2.36**	**2.13**	**0.24**
14.00	0.55	54	491.77	0.56	0.56	0.00
15.00	0.41	40	491.76	0.42	0.42	0.00
16.00	0.29	29	491.76	0.30	0.30	0.00
17.00	0.23	22	491.76	0.23	0.23	0.00
18.00	0.18	17	491.76	0.18	0.18	0.00
19.00	0.16	15	491.76	0.16	0.16	0.00
20.00	0.14	14	491.75	0.14	0.14	0.00
21.00	0.13	12	491.75	0.13	0.13	0.00
22.00	0.12	11	491.75	0.12	0.12	0.00
23.00	0.10	10	491.75	0.10	0.10	0.00
24.00	0.09	9	491.75	0.09	0.09	0.00
25.00	0.00	0	491.75	0.00	0.00	0.00
26.00	0.00	0	491.75	0.00	0.00	0.00
27.00	0.00	0	491.75	0.00	0.00	0.00
28.00	0.00	0	491.75	0.00	0.00	0.00
29.00	0.00	0	491.75	0.00	0.00	0.00
30.00	0.00	0	491.75	0.00	0.00	0.00
31.00	0.00	0	491.75	0.00	0.00	0.00
32.00	0.00	0	491.75	0.00	0.00	0.00
33.00	0.00	0	491.75	0.00	0.00	0.00
34.00	0.00	0	491.75	0.00	0.00	0.00
35.00	0.00	0	491.75	0.00	0.00	0.00
36.00	0.00	0	491.75	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1A: SMS #1A

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
491.75	0.00	0.00	0.00
491.85	2.09	2.09	0.00
491.95	2.09	2.09	0.00
492.05	2.10	2.10	0.00
492.15	2.10	2.10	0.00
492.25	2.10	2.10	0.00
492.35	2.11	2.11	0.00
492.45	2.11	2.11	0.00
492.55	2.12	2.12	0.00
492.65	2.16	2.12	0.04
492.75	2.24	2.12	0.12
492.85	2.34	2.13	0.22
492.95	2.43	2.13	0.30
493.05	2.50	2.14	0.37
493.15	2.56	2.14	0.42
493.25	2.61	2.14	0.47
493.35	2.66	2.15	0.51
493.45	2.71	2.15	0.55
493.55	2.75	2.16	0.59
493.65	2.79	2.16	0.63
493.75	2.82	2.16	0.66
493.85	2.86	2.17	0.69
493.95	2.93	2.17	0.76
494.05	3.05	2.18	0.87
494.15	3.18	2.18	1.00
494.25	3.29	2.18	1.11
494.35	3.39	2.19	1.20
494.45	3.47	2.19	1.28
494.55	3.56	2.20	1.36
494.65	3.69	2.20	1.49
494.75	3.85	2.20	1.64
494.85	4.01	2.21	1.80
494.95	4.15	2.21	1.93
495.05	4.26	2.22	2.05
495.15	4.37	2.22	2.15
495.25	4.48	2.23	2.25
495.35	4.57	2.23	2.35
495.45	4.71	2.23	2.47
495.55	4.88	2.24	2.64
495.65	5.06	2.24	2.82
495.75	5.23	2.25	2.98
495.85	5.37	2.25	3.12
495.95	5.50	2.25	3.25
496.05	5.62	2.26	3.36
496.15	5.74	2.26	3.48
496.25	5.85	2.27	3.58
496.35	6.00	2.27	3.74
496.45	6.22	2.27	3.94
496.55	6.48	2.28	4.20
496.65	6.76	2.28	4.48
496.75	7.06	2.29	4.78
496.85	7.35	2.29	5.06
496.95	7.57	2.29	5.28
497.05	7.79	2.30	5.49
497.15	7.99	2.30	5.69
497.25	8.18	2.31	5.87
497.35	8.36	2.31	6.05
497.45	8.53	2.31	6.22
497.55	8.70	2.32	6.38
497.65	8.86	2.32	6.54
497.75	9.02	2.33	6.69
497.85	9.17	2.33	6.84
497.95	9.32	2.33	6.98
498.05	9.46	2.34	7.12
498.15	9.60	2.34	7.26
498.25	9.74	2.35	7.39
498.35	9.87	2.35	7.52
498.45	**10.00**	**2.35**	**7.65**

Stage-Area-Storage for Pond SMS #1A: SMS #1A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
491.75	**7,503**	0
491.85	7,503	300
491.95	7,503	600
492.05	7,503	900
492.15	7,503	1,200
492.25	7,503	1,501
492.35	7,503	1,801
492.45	7,503	2,101
492.55	7,503	2,582
492.65	7,503	3,243
492.75	7,503	3,902
492.85	7,503	4,560
492.95	7,503	5,216
493.05	7,503	5,871
493.15	7,503	6,523
493.25	7,503	7,173
493.35	7,503	7,822
493.45	7,503	8,468
493.55	7,503	9,111
493.65	7,503	9,752
493.75	7,503	10,391
493.85	7,503	11,026
493.95	7,503	11,658
494.05	7,503	12,288
494.15	7,503	12,914
494.25	7,503	13,537
494.35	7,503	14,155
494.45	7,503	14,770
494.55	7,503	15,381
494.65	7,503	15,988
494.75	7,503	16,590
494.85	7,503	17,188
494.95	7,503	17,781
495.05	7,503	18,369
495.15	7,503	18,952
495.25	7,503	19,530
495.35	7,503	20,101
495.45	7,503	20,667
495.55	7,503	21,226
495.65	7,503	21,779
495.75	7,503	22,324
495.85	7,503	22,862
495.95	7,503	23,393
496.05	7,503	23,915
496.15	7,503	24,428
496.25	7,503	24,932
496.35	7,503	25,426
496.45	7,503	25,909
496.55	7,503	26,381
496.65	7,503	26,840
496.75	7,503	27,285
496.85	7,503	27,713
496.95	7,503	28,121
497.05	7,503	28,501
497.15	7,503	28,850
497.25	7,503	29,181
497.35	7,503	29,504
497.45	7,503	29,817
497.55	7,503	30,119
497.65	7,503	30,419
497.75	7,503	30,719
497.85	7,503	31,019
497.95	7,503	31,319
498.05	7,503	31,620
498.15	7,503	31,920
498.25	7,503	32,220
498.35	7,503	32,520
498.45	7,503	**32,820**

Summary for Pond SMS #1C: SMS #1C

Inflow Area = 3.475 ac, 93.57% Impervious, Inflow Depth = 2.36" for 1-Year event
Inflow = 7.79 cfs @ 12.14 hrs, Volume= 0.682 af
Outflow = 2.47 cfs @ 12.50 hrs, Volume= 0.682 af, Atten= 68%, Lag= 21.6 min
Discarded = 2.13 cfs @ 12.50 hrs, Volume= 0.665 af
Primary = 0.34 cfs @ 12.50 hrs, Volume= 0.017 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 496.56' @ 12.50 hrs Surf.Area= 7,503 sf Storage= 5,932 cf

Plug-Flow detention time= 13.4 min calculated for 0.681 af (100% of inflow)
Center-of-Mass det. time= 13.4 min (795.0 - 781.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	495.25'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	496.00'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	495.25'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	496.09'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	496.92'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	497.83'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	498.75'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	499.67'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.13 cfs @ 12.50 hrs HW=496.56' (Free Discharge)
└**1=Exfiltration** (Controls 2.13 cfs)

Primary OutFlow Max=0.34 cfs @ 12.50 hrs HW=496.56' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.34 cfs @ 2.46 fps)
├**3=Orifice/Grate** (Controls 0.00 cfs)
├**4=Orifice/Grate** (Controls 0.00 cfs)
├**5=Orifice/Grate** (Controls 0.00 cfs)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1C: SMS #1C - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

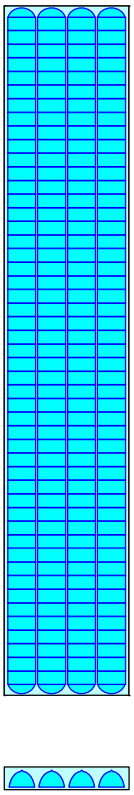
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

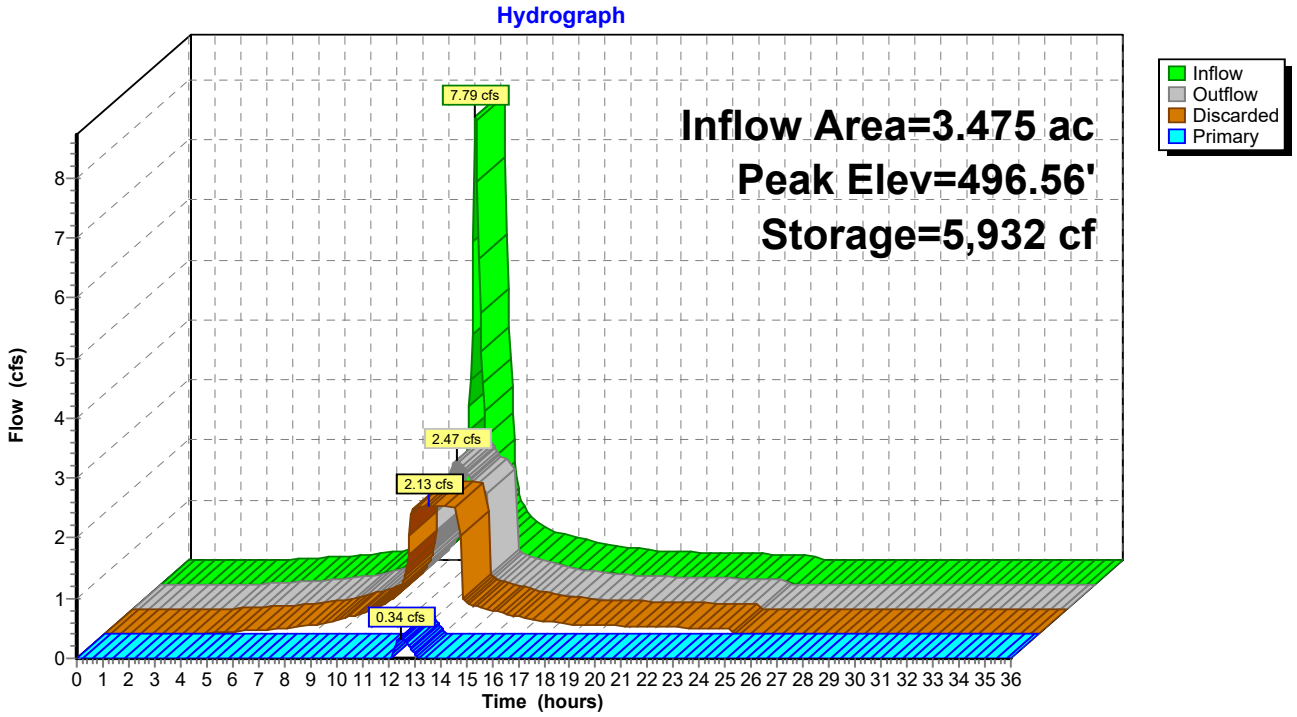
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

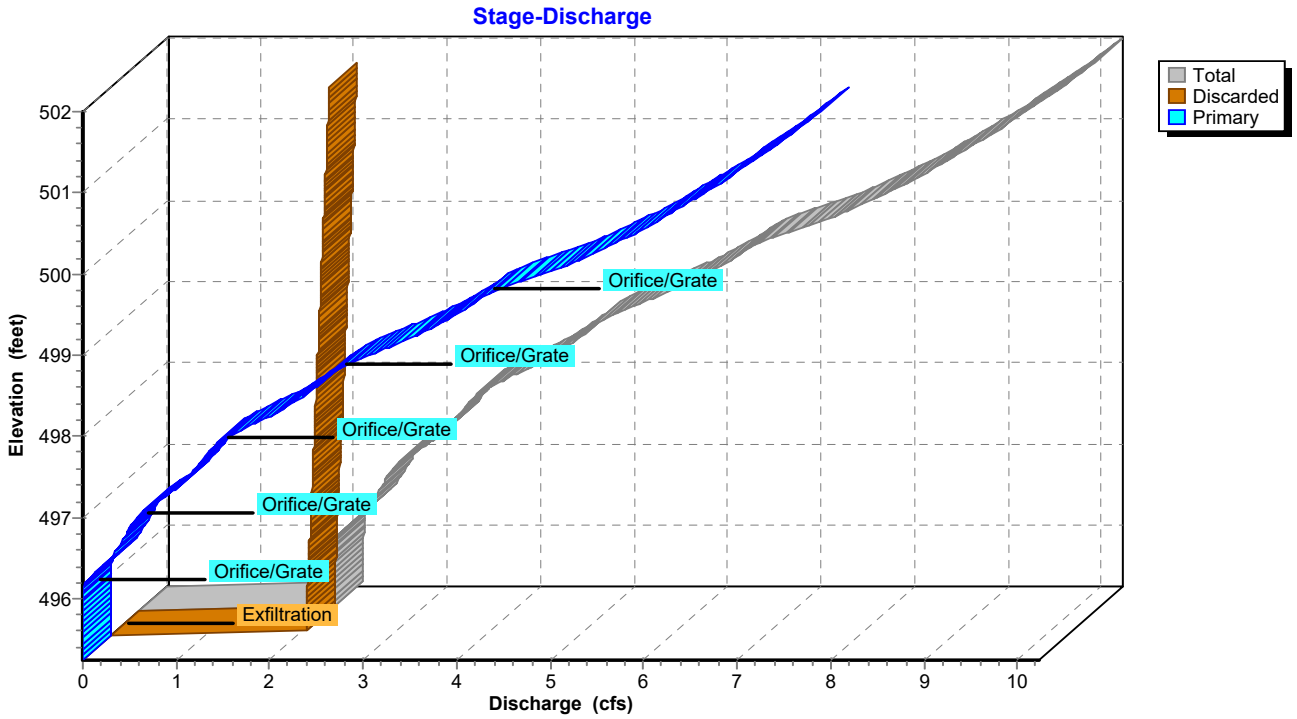
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



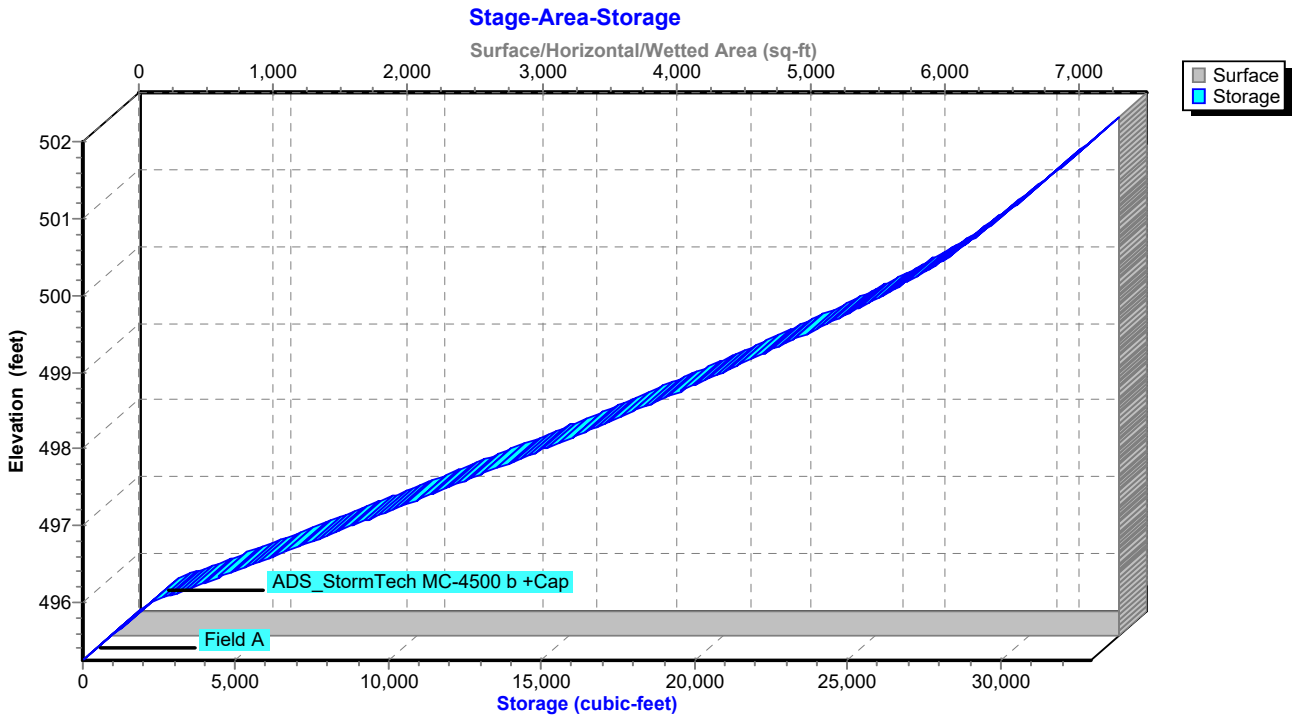
Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Hydrograph for Pond SMS #1C: SMS #1C

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	495.25	0.00	0.00	0.00
1.00	0.00	0	495.25	0.00	0.00	0.00
2.00	0.00	0	495.25	0.00	0.00	0.00
3.00	0.00	0	495.25	0.00	0.00	0.00
4.00	0.02	2	495.25	0.02	0.02	0.00
5.00	0.04	4	495.25	0.04	0.04	0.00
6.00	0.06	6	495.25	0.06	0.06	0.00
7.00	0.10	9	495.25	0.09	0.09	0.00
8.00	0.14	14	495.25	0.14	0.14	0.00
9.00	0.23	23	495.26	0.23	0.23	0.00
10.00	0.35	34	495.26	0.35	0.35	0.00
11.00	0.56	54	495.27	0.56	0.56	0.00
12.00	**4.18**	**881**	**495.54**	**2.10**	**2.10**	**0.00**
13.00	**0.83**	**3,972**	**496.26**	**2.20**	**2.12**	**0.07**
14.00	0.50	49	495.27	0.51	0.51	0.00
15.00	0.38	37	495.26	0.38	0.38	0.00
16.00	0.27	26	495.26	0.27	0.27	0.00
17.00	0.21	20	495.26	0.21	0.21	0.00
18.00	0.16	16	495.26	0.16	0.16	0.00
19.00	0.14	14	495.25	0.14	0.14	0.00
20.00	0.13	12	495.25	0.13	0.13	0.00
21.00	0.12	11	495.25	0.12	0.12	0.00
22.00	0.11	10	495.25	0.11	0.11	0.00
23.00	0.09	9	495.25	0.09	0.09	0.00
24.00	0.08	8	495.25	0.08	0.08	0.00
25.00	0.00	0	495.25	0.00	0.00	0.00
26.00	0.00	0	495.25	0.00	0.00	0.00
27.00	0.00	0	495.25	0.00	0.00	0.00
28.00	0.00	0	495.25	0.00	0.00	0.00
29.00	0.00	0	495.25	0.00	0.00	0.00
30.00	0.00	0	495.25	0.00	0.00	0.00
31.00	0.00	0	495.25	0.00	0.00	0.00
32.00	0.00	0	495.25	0.00	0.00	0.00
33.00	0.00	0	495.25	0.00	0.00	0.00
34.00	0.00	0	495.25	0.00	0.00	0.00
35.00	0.00	0	495.25	0.00	0.00	0.00
36.00	0.00	0	495.25	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1C: SMS #1C

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
495.25	0.00	0.00	0.00
495.35	2.09	2.09	0.00
495.45	2.09	2.09	0.00
495.55	2.10	2.10	0.00
495.65	2.10	2.10	0.00
495.75	2.10	2.10	0.00
495.85	2.11	2.11	0.00
495.95	2.11	2.11	0.00
496.05	2.11	2.11	0.00
496.15	2.13	2.12	0.01
496.25	2.19	2.12	0.07
496.35	2.28	2.13	0.16
496.45	2.39	2.13	0.26
496.55	2.46	2.13	0.33
496.65	2.53	2.14	0.39
496.75	2.58	2.14	0.44
496.85	2.63	2.14	0.49
496.95	2.68	2.15	0.53
497.05	2.77	2.15	0.61
497.15	2.89	2.16	0.73
497.25	3.03	2.16	0.87
497.35	3.15	2.16	0.98
497.45	3.24	2.17	1.08
497.55	3.33	2.17	1.16
497.65	3.41	2.17	1.24
497.75	3.49	2.18	1.31
497.85	3.56	2.18	1.38
497.95	3.67	2.19	1.48
498.05	3.82	2.19	1.63
498.15	4.01	2.19	1.81
498.25	4.20	2.20	2.00
498.35	4.36	2.20	2.16
498.45	4.50	2.20	2.29
498.55	4.62	2.21	2.42
498.65	4.74	2.21	2.53
498.75	4.85	2.22	2.64
498.85	4.99	2.22	2.77
498.95	5.17	2.22	2.95
499.05	5.39	2.23	3.16
499.15	5.61	2.23	3.38
499.25	5.81	2.23	3.58
499.35	5.99	2.24	3.75
499.45	6.15	2.24	3.91
499.55	6.30	2.25	4.05
499.65	6.44	2.25	4.19
499.75	6.60	2.25	4.34
499.85	6.80	2.26	4.54
499.95	7.04	2.26	4.78
500.05	7.29	2.27	5.03
500.15	7.53	2.27	5.26
500.25	7.73	2.27	5.46
500.35	7.92	2.28	5.64
500.45	8.10	2.28	5.82
500.55	8.27	2.28	5.98
500.65	8.43	2.29	6.14
500.75	8.58	2.29	6.29
500.85	8.73	2.30	6.44
500.95	8.88	2.30	6.58
501.05	9.02	2.30	6.72
501.15	9.16	2.31	6.85
501.25	9.30	2.31	6.99
501.35	9.43	2.31	7.11
501.45	9.56	2.32	7.24
501.55	9.68	2.32	7.36
501.65	9.81	2.33	7.48
501.75	9.93	2.33	7.60
501.85	10.05	2.33	7.72
501.95	**10.17**	**2.34**	**7.83**

Stage-Area-Storage for Pond SMS #1C: SMS #1C

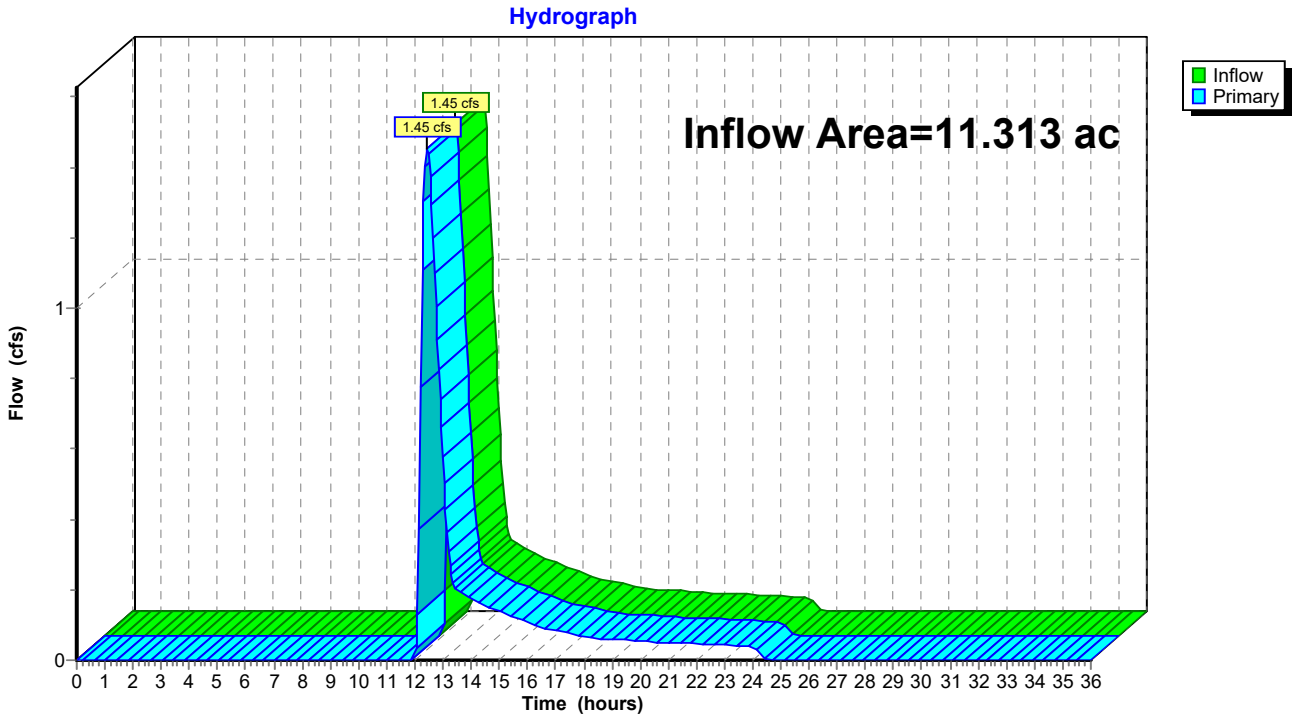
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
495.25	**7,503**	0
495.35	7,503	300
495.45	7,503	600
495.55	7,503	900
495.65	7,503	1,200
495.75	7,503	1,501
495.85	7,503	1,801
495.95	7,503	2,101
496.05	7,503	2,582
496.15	7,503	3,243
496.25	7,503	3,902
496.35	7,503	4,560
496.45	7,503	5,216
496.55	7,503	5,871
496.65	7,503	6,523
496.75	7,503	7,173
496.85	7,503	7,822
496.95	7,503	8,468
497.05	7,503	9,111
497.15	7,503	9,752
497.25	7,503	10,391
497.35	7,503	11,026
497.45	7,503	11,658
497.55	7,503	12,288
497.65	7,503	12,914
497.75	7,503	13,537
497.85	7,503	14,155
497.95	7,503	14,770
498.05	7,503	15,381
498.15	7,503	15,988
498.25	7,503	16,590
498.35	7,503	17,188
498.45	7,503	17,781
498.55	7,503	18,369
498.65	7,503	18,952
498.75	7,503	19,530
498.85	7,503	20,101
498.95	7,503	20,667
499.05	7,503	21,226
499.15	7,503	21,779
499.25	7,503	22,324
499.35	7,503	22,862
499.45	7,503	23,393
499.55	7,503	23,915
499.65	7,503	24,428
499.75	7,503	24,932
499.85	7,503	25,426
499.95	7,503	25,909
500.05	7,503	26,381
500.15	7,503	26,840
500.25	7,503	27,285
500.35	7,503	27,713
500.45	7,503	28,121
500.55	7,503	28,501
500.65	7,503	28,850
500.75	7,503	29,181
500.85	7,503	29,504
500.95	7,503	29,817
501.05	7,503	30,119
501.15	7,503	30,419
501.25	7,503	30,719
501.35	7,503	31,019
501.45	7,503	31,319
501.55	7,503	31,620
501.65	7,503	31,920
501.75	7,503	32,220
501.85	7,503	32,520
501.95	7,503	**32,820**

Summary for Link POI #1: POI #1

Inflow Area = 11.313 ac, 61.95% Impervious, Inflow Depth = 0.17" for 1-Year event
Inflow = 1.45 cfs @ 12.44 hrs, Volume= 0.162 af
Primary = 1.45 cfs @ 12.44 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #1: POI #1



Hydrograph for Link POI #1: POI #1

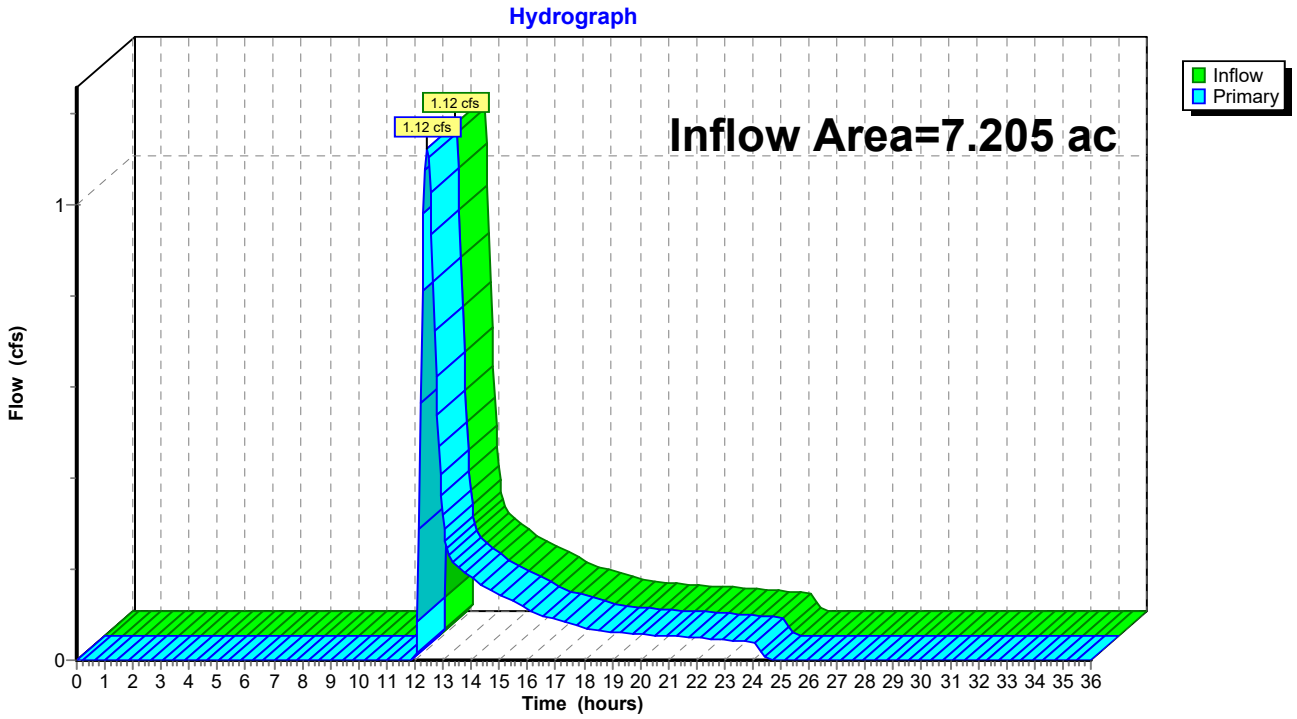
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	**0.01**	0.00	**0.01**
12.50	**1.43**	0.00	**1.43**
13.00	0.58	0.00	0.58
13.50	0.20	0.00	0.20
14.00	0.17	0.00	0.17
14.50	0.15	0.00	0.15
15.00	0.14	0.00	0.14
15.50	0.12	0.00	0.12
16.00	0.11	0.00	0.11
16.50	0.09	0.00	0.09
17.00	0.09	0.00	0.09
17.50	0.08	0.00	0.08
18.00	0.07	0.00	0.07
18.50	0.06	0.00	0.06
19.00	0.06	0.00	0.06
19.50	0.06	0.00	0.06
20.00	0.05	0.00	0.05
20.50	0.05	0.00	0.05
21.00	0.05	0.00	0.05
21.50	0.05	0.00	0.05
22.00	0.05	0.00	0.05
22.50	0.04	0.00	0.04
23.00	0.04	0.00	0.04
23.50	0.04	0.00	0.04
24.00	0.04	0.00	0.04
24.50	0.00	0.00	0.00
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Summary for Link POI #2: POI #2

Inflow Area = 7.205 ac, 35.36% Impervious, Inflow Depth = 0.23" for 1-Year event
Inflow = 1.12 cfs @ 12.43 hrs, Volume= 0.139 af
Primary = 1.12 cfs @ 12.43 hrs, Volume= 0.139 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #2: POI #2



Hydrograph for Link POI #2: POI #2

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	**0.00**	0.00	**0.00**
12.50	**1.09**	0.00	**1.09**
13.00	0.32	0.00	0.32
13.50	0.21	0.00	0.21
14.00	0.18	0.00	0.18
14.50	0.16	0.00	0.16
15.00	0.15	0.00	0.15
15.50	0.13	0.00	0.13
16.00	0.11	0.00	0.11
16.50	0.10	0.00	0.10
17.00	0.09	0.00	0.09
17.50	0.08	0.00	0.08
18.00	0.07	0.00	0.07
18.50	0.07	0.00	0.07
19.00	0.06	0.00	0.06
19.50	0.06	0.00	0.06
20.00	0.06	0.00	0.06
20.50	0.06	0.00	0.06
21.00	0.05	0.00	0.05
21.50	0.05	0.00	0.05
22.00	0.05	0.00	0.05
22.50	0.05	0.00	0.05
23.00	0.04	0.00	0.04
23.50	0.04	0.00	0.04
24.00	0.04	0.00	0.04
24.50	0.00	0.00	0.00
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentDA #1A: Drainage Area #1A Runoff Area=168,262 sf 91.78% Impervious Runoff Depth=2.94"
Tc=10.0 min CN=95 Runoff=10.82 cfs 0.946 af

SubcatchmentDA #1B: Drainage Area #1B Runoff Area=173,173 sf 5.32% Impervious Runoff Depth=0.66"
Flow Length=638' Tc=17.0 min CN=63 Runoff=1.71 cfs 0.219 af

SubcatchmentDA #1C: Drainage Area Runoff Area=151,363 sf 93.57% Impervious Runoff Depth=3.05"
Tc=10.0 min CN=96 Runoff=9.93 cfs 0.882 af

SubcatchmentDA #2A: Drainage Area #2A Runoff Area=121,548 sf 88.60% Impervious Runoff Depth=2.84"
Tc=10.0 min CN=94 Runoff=7.64 cfs 0.659 af

SubcatchmentDA #2B: Drainage Area #2B Runoff Area=192,310 sf 1.70% Impervious Runoff Depth=0.62"
Flow Length=784' Tc=18.4 min CN=62 Runoff=1.66 cfs 0.226 af

Pond DB #2: Drainage Basin #2 Peak Elev=485.89' Storage=5,707 cf Inflow=7.64 cfs 0.659 af
Discarded=2.13 cfs 0.609 af Primary=0.80 cfs 0.051 af Outflow=2.93 cfs 0.660 af

Pond SMS #1A: SMS #1A Peak Elev=493.70' Storage=10,054 cf Inflow=10.82 cfs 0.946 af
Discarded=2.16 cfs 0.880 af Primary=0.64 cfs 0.066 af Outflow=2.81 cfs 0.946 af

Pond SMS #1C: SMS #1C Peak Elev=497.01' Storage=8,843 cf Inflow=9.93 cfs 0.882 af
Discarded=2.15 cfs 0.834 af Primary=0.57 cfs 0.047 af Outflow=2.73 cfs 0.882 af

Link POI #1: POI #1 Inflow=2.76 cfs 0.331 af
Primary=2.76 cfs 0.331 af

Link POI #2: POI #2 Inflow=2.44 cfs 0.277 af
Primary=2.44 cfs 0.277 af

Total Runoff Area = 18.518 ac Runoff Volume = 2.932 af Average Runoff Depth = 1.90"
48.40% Pervious = 8.963 ac 51.60% Impervious = 9.556 ac

Summary for Subcatchment DA #1A: Drainage Area #1A

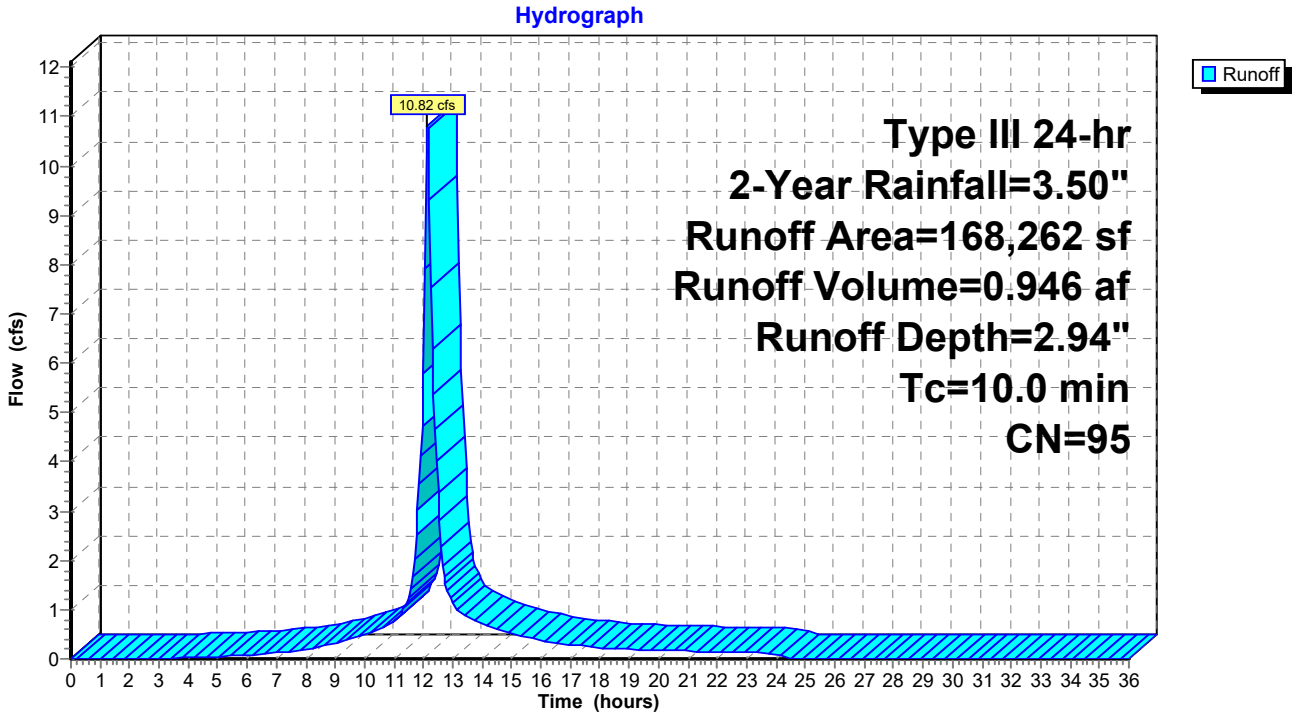
Runoff = 10.82 cfs @ 12.14 hrs, Volume= 0.946 af, Depth= 2.94"
Routed to Pond SMS #1A : SMS #1A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.50"

	Area (sf)	CN	Description
	10,723	61	>75% Grass cover, Good, HSG B
*	3,112	61	Emergency Access Road (Perv.), Good, HSG B
*	86,043	98	Building/Roof, HSG B
*	60,366	98	Pavement, HSG B
*	2,940	98	Sidewalk, HSG B
*	5,078	98	Emergency Access Road (Imp.), HSG B
	168,262	95	Weighted Average
	13,835		8.22% Pervious Area
	154,427		91.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #1A: Drainage Area #1A



Hydrograph for Subcatchment DA #1A: Drainage Area #1A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.02	0.00	0.00
1.00	0.04	0.00	0.00
1.50	0.05	0.00	0.00
2.00	0.07	0.00	0.00
2.50	0.09	0.00	0.00
3.00	0.11	0.00	0.00
3.50	0.13	0.00	0.01
4.00	0.15	0.00	0.02
4.50	0.17	0.01	0.04
5.00	0.20	0.01	0.05
5.50	0.22	0.02	0.07
6.00	0.25	0.03	0.08
6.50	0.28	0.04	0.10
7.00	0.32	0.06	0.13
7.50	0.36	0.08	0.16
8.00	0.40	0.11	0.20
8.50	0.45	0.14	0.25
9.00	0.51	0.18	0.32
9.50	0.58	0.23	0.40
10.00	0.66	0.29	0.48
10.50	0.76	0.36	0.62
11.00	0.88	0.46	0.78
11.50	1.04	0.60	1.23
12.00	1.75	1.25	**5.80**
12.50	2.46	1.92	**3.39**
13.00	2.62	2.08	1.15
13.50	2.74	2.20	0.86
14.00	2.84	2.29	0.70
14.50	2.92	2.37	0.60
15.00	2.99	2.44	0.52
15.50	3.05	2.50	0.45
16.00	3.10	2.55	0.37
16.50	3.14	2.59	0.32
17.00	3.18	2.63	0.29
17.50	3.22	2.66	0.26
18.00	3.25	2.69	0.22
18.50	3.28	2.72	0.21
19.00	3.30	2.74	0.20
19.50	3.33	2.77	0.19
20.00	3.35	2.79	0.18
20.50	3.37	2.81	0.17
21.00	3.39	2.83	0.16
21.50	3.41	2.85	0.15
22.00	3.43	2.87	0.15
22.50	3.45	2.89	0.14
23.00	3.47	2.91	0.13
23.50	3.48	2.92	0.12
24.00	**3.50**	**2.94**	0.12
24.50	3.50	2.94	0.00
25.00	3.50	2.94	0.00
25.50	3.50	2.94	0.00
26.00	3.50	2.94	0.00
26.50	3.50	2.94	0.00
27.00	3.50	2.94	0.00
27.50	3.50	2.94	0.00
28.00	3.50	2.94	0.00
28.50	3.50	2.94	0.00
29.00	3.50	2.94	0.00
29.50	3.50	2.94	0.00
30.00	3.50	2.94	0.00
30.50	3.50	2.94	0.00
31.00	3.50	2.94	0.00
31.50	3.50	2.94	0.00
32.00	3.50	2.94	0.00
32.50	3.50	2.94	0.00
33.00	3.50	2.94	0.00
33.50	3.50	2.94	0.00
34.00	3.50	2.94	0.00
34.50	3.50	2.94	0.00
35.00	3.50	2.94	0.00
35.50	3.50	2.94	0.00
36.00	3.50	2.94	0.00

Summary for Subcatchment DA #1B: Drainage Area #1B

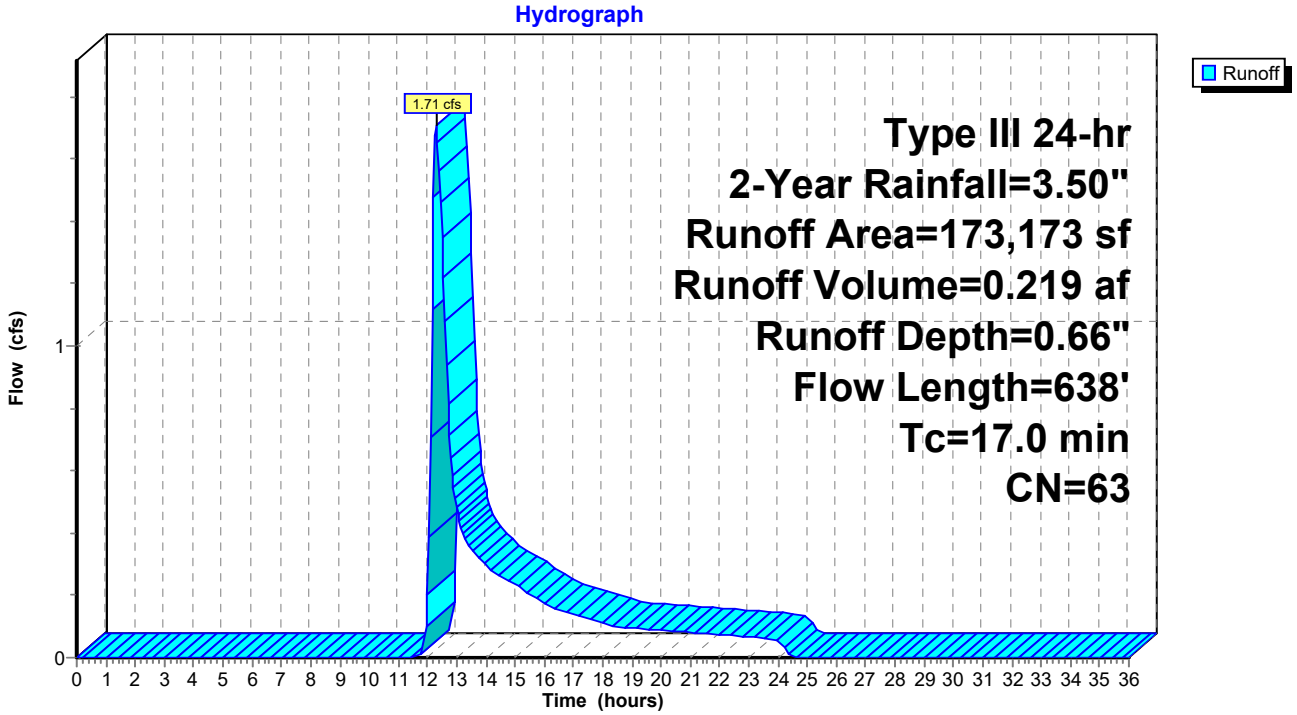
Runoff = 1.71 cfs @ 12.29 hrs, Volume= 0.219 af, Depth= 0.66"
Routed to Link POI #1 : POI #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.50"

	Area (sf)	CN	Description
	158,310	61	>75% Grass cover, Good, HSG B
*	5,648	61	Emergency Access Road (Perv.), Good, HSG B
*	9,215	98	Emergency Access Road (Imp.), HSG B
	173,173	63	Weighted Average
	163,958		94.68% Pervious Area
	9,215		5.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	150	0.1200	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
4.8	488	0.0578	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	638	Total			

Subcatchment DA #1B: Drainage Area #1B



Hydrograph for Subcatchment DA #1B: Drainage Area #1B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.02	0.00	0.00
1.00	0.04	0.00	0.00
1.50	0.05	0.00	0.00
2.00	0.07	0.00	0.00
2.50	0.09	0.00	0.00
3.00	0.11	0.00	0.00
3.50	0.13	0.00	0.00
4.00	0.15	0.00	0.00
4.50	0.17	0.00	0.00
5.00	0.20	0.00	0.00
5.50	0.22	0.00	0.00
6.00	0.25	0.00	0.00
6.50	0.28	0.00	0.00
7.00	0.32	0.00	0.00
7.50	0.36	0.00	0.00
8.00	0.40	0.00	0.00
8.50	0.45	0.00	0.00
9.00	0.51	0.00	0.00
9.50	0.58	0.00	0.00
10.00	0.66	0.00	0.00
10.50	0.76	0.00	0.00
11.00	0.88	0.00	0.00
11.50	1.04	0.00	0.00
12.00	1.75	0.05	**0.20**
12.50	2.46	0.23	**1.35**
13.00	2.62	0.29	0.48
13.50	2.74	0.33	0.35
14.00	2.84	0.37	0.30
14.50	2.92	0.40	0.26
15.00	2.99	0.43	0.23
15.50	3.05	0.45	0.21
16.00	3.10	0.48	0.17
16.50	3.14	0.49	0.15
17.00	3.18	0.51	0.14
17.50	3.22	0.53	0.12
18.00	3.25	0.54	0.11
18.50	3.28	0.55	0.10
19.00	3.30	0.57	0.10
19.50	3.33	0.58	0.09
20.00	3.35	0.59	0.09
20.50	3.37	0.60	0.08
21.00	3.39	0.61	0.08
21.50	3.41	0.62	0.08
22.00	3.43	0.63	0.07
22.50	3.45	0.64	0.07
23.00	3.47	0.64	0.07
23.50	3.48	0.65	0.06
24.00	**3.50**	**0.66**	0.06
24.50	3.50	0.66	0.00
25.00	3.50	0.66	0.00
25.50	3.50	0.66	0.00
26.00	3.50	0.66	0.00
26.50	3.50	0.66	0.00
27.00	3.50	0.66	0.00
27.50	3.50	0.66	0.00
28.00	3.50	0.66	0.00
28.50	3.50	0.66	0.00
29.00	3.50	0.66	0.00
29.50	3.50	0.66	0.00
30.00	3.50	0.66	0.00
30.50	3.50	0.66	0.00
31.00	3.50	0.66	0.00
31.50	3.50	0.66	0.00
32.00	3.50	0.66	0.00
32.50	3.50	0.66	0.00
33.00	3.50	0.66	0.00
33.50	3.50	0.66	0.00
34.00	3.50	0.66	0.00
34.50	3.50	0.66	0.00
35.00	3.50	0.66	0.00
35.50	3.50	0.66	0.00
36.00	3.50	0.66	0.00

Summary for Subcatchment DA #1C: Drainage Area #1C

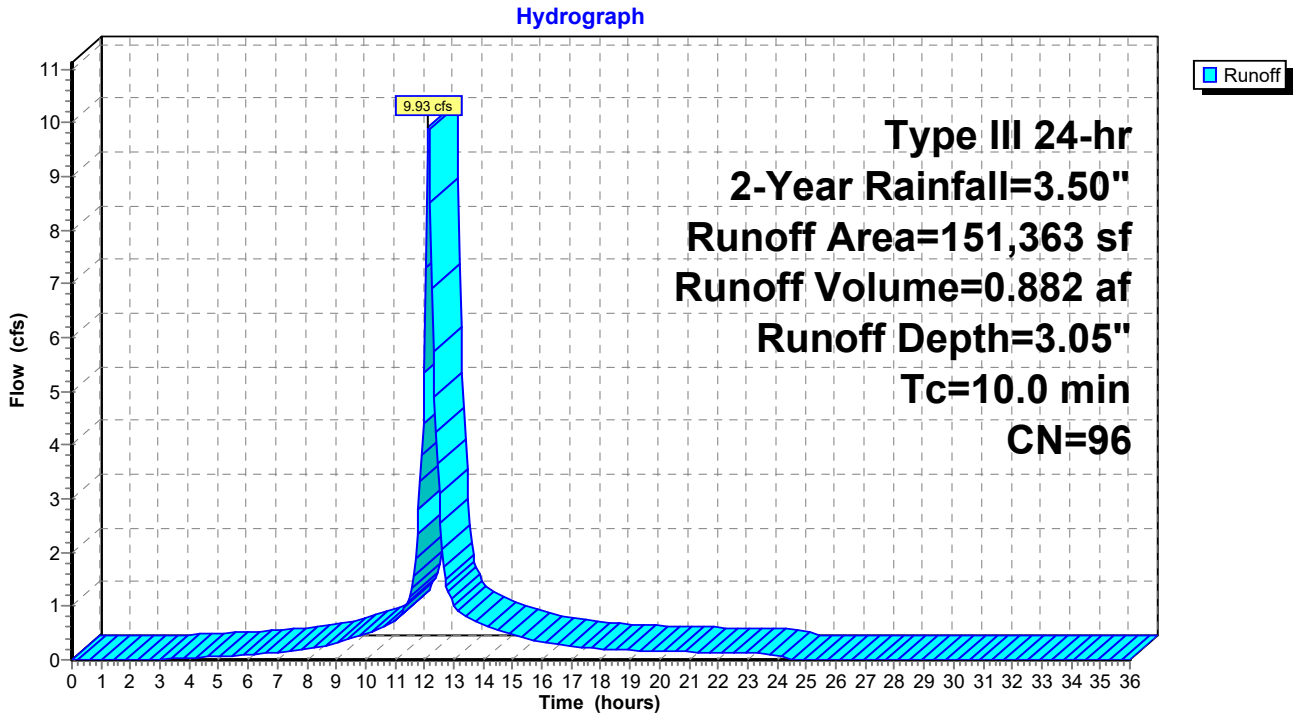
Runoff = 9.93 cfs @ 12.14 hrs, Volume= 0.882 af, Depth= 3.05"
Routed to Pond SMS #1C : SMS #1C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.50"

	Area (sf)	CN	Description
	9,732	61	>75% Grass cover, Good, HSG B
*	87,537	98	Building/Roof, HSG B
*	50,809	98	Pavement, HSG B
*	3,285	98	Sidewalk, HSG B
	151,363	96	Weighted Average
	9,732		6.43% Pervious Area
	141,631		93.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Direct Minimum**

Subcatchment DA #1C: Drainage Area #1C



Hydrograph for Subcatchment DA #1C: Drainage Area #1C

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.02	0.00	0.00
1.00	0.04	0.00	0.00
1.50	0.05	0.00	0.00
2.00	0.07	0.00	0.00
2.50	0.09	0.00	0.00
3.00	0.11	0.00	0.01
3.50	0.13	0.00	0.02
4.00	0.15	0.01	0.04
4.50	0.17	0.02	0.05
5.00	0.20	0.02	0.06
5.50	0.22	0.04	0.08
6.00	0.25	0.05	0.09
6.50	0.28	0.06	0.11
7.00	0.32	0.08	0.14
7.50	0.36	0.11	0.17
8.00	0.40	0.14	0.21
8.50	0.45	0.17	0.26
9.00	0.51	0.22	0.33
9.50	0.58	0.27	0.40
10.00	0.66	0.34	0.47
10.50	0.76	0.42	0.59
11.00	0.88	0.52	0.74
11.50	1.04	0.67	1.16
12.00	1.75	1.33	**5.36**
12.50	2.46	2.02	**3.08**
13.00	2.62	2.18	1.05
13.50	2.74	2.30	0.78
14.00	2.84	2.39	0.63
14.50	2.92	2.47	0.54
15.00	2.99	2.54	0.47
15.50	3.05	2.60	0.40
16.00	3.10	2.65	0.34
16.50	3.14	2.69	0.29
17.00	3.18	2.73	0.26
17.50	3.22	2.77	0.23
18.00	3.25	2.80	0.20
18.50	3.28	2.82	0.19
19.00	3.30	2.85	0.18
19.50	3.33	2.87	0.17
20.00	3.35	2.90	0.16
20.50	3.37	2.92	0.15
21.00	3.39	2.94	0.15
21.50	3.41	2.96	0.14
22.00	3.43	2.98	0.13
22.50	3.45	3.00	0.13
23.00	3.47	3.01	0.12
23.50	3.48	3.03	0.11
24.00	**3.50**	**3.05**	0.11
24.50	3.50	3.05	0.00
25.00	3.50	3.05	0.00
25.50	3.50	3.05	0.00
26.00	3.50	3.05	0.00
26.50	3.50	3.05	0.00
27.00	3.50	3.05	0.00
27.50	3.50	3.05	0.00
28.00	3.50	3.05	0.00
28.50	3.50	3.05	0.00
29.00	3.50	3.05	0.00
29.50	3.50	3.05	0.00
30.00	3.50	3.05	0.00
30.50	3.50	3.05	0.00
31.00	3.50	3.05	0.00
31.50	3.50	3.05	0.00
32.00	3.50	3.05	0.00
32.50	3.50	3.05	0.00
33.00	3.50	3.05	0.00
33.50	3.50	3.05	0.00
34.00	3.50	3.05	0.00
34.50	3.50	3.05	0.00
35.00	3.50	3.05	0.00
35.50	3.50	3.05	0.00
36.00	3.50	3.05	0.00

Summary for Subcatchment DA #2A: Drainage Area #2A

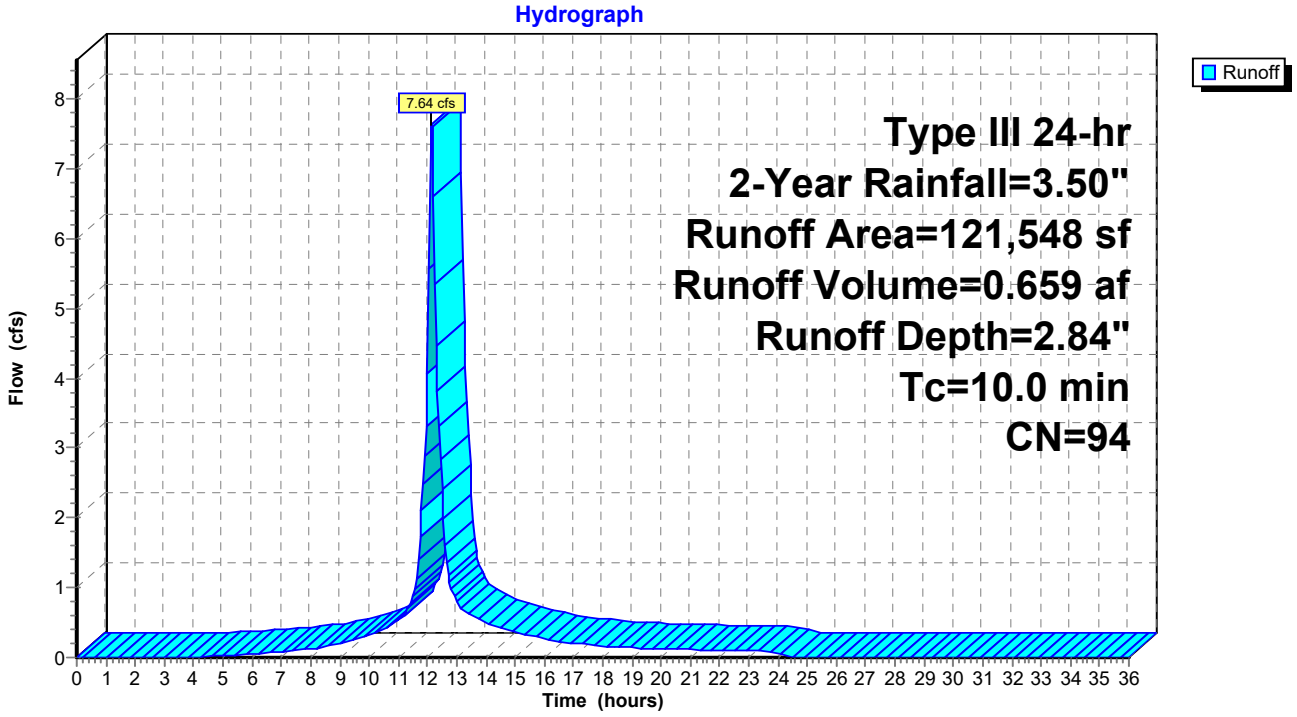
Runoff = 7.64 cfs @ 12.14 hrs, Volume= 0.659 af, Depth= 2.84"
Routed to Pond DB #2 : Drainage Basin #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.50"

	Area (sf)	CN	Description
*	48,398	98	Building/Roof, HSG B
*	45,328	98	Pavement, HSG B
*	1,404	98	Sidewalk, HSG B
	13,851	61	>75% Grass cover, Good, HSG B
*	12,567	98	Infiltration Basin, HSG B
	121,548	94	Weighted Average
	13,851		11.40% Pervious Area
	107,697		88.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #2A: Drainage Area #2A



Hydrograph for Subcatchment DA #2A: Drainage Area #2A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.02	0.00	0.00
1.00	0.04	0.00	0.00
1.50	0.05	0.00	0.00
2.00	0.07	0.00	0.00
2.50	0.09	0.00	0.00
3.00	0.11	0.00	0.00
3.50	0.13	0.00	0.00
4.00	0.15	0.00	0.01
4.50	0.17	0.00	0.01
5.00	0.20	0.01	0.02
5.50	0.22	0.01	0.03
6.00	0.25	0.02	0.04
6.50	0.28	0.03	0.06
7.00	0.32	0.04	0.08
7.50	0.36	0.06	0.10
8.00	0.40	0.08	0.12
8.50	0.45	0.11	0.16
9.00	0.51	0.14	0.21
9.50	0.58	0.19	0.26
10.00	0.66	0.24	0.32
10.50	0.76	0.31	0.41
11.00	0.88	0.40	0.53
11.50	1.04	0.54	0.84
12.00	1.75	1.16	**4.06**
12.50	2.46	1.83	**2.41**
13.00	2.62	1.99	0.82
13.50	2.74	2.10	0.61
14.00	2.84	2.19	0.50
14.50	2.92	2.27	0.43
15.00	2.99	2.34	0.37
15.50	3.05	2.40	0.32
16.00	3.10	2.45	0.26
16.50	3.14	2.49	0.23
17.00	3.18	2.53	0.21
17.50	3.22	2.56	0.18
18.00	3.25	2.59	0.16
18.50	3.28	2.62	0.15
19.00	3.30	2.64	0.14
19.50	3.33	2.67	0.13
20.00	3.35	2.69	0.13
20.50	3.37	2.71	0.12
21.00	3.39	2.73	0.12
21.50	3.41	2.75	0.11
22.00	3.43	2.77	0.10
22.50	3.45	2.79	0.10
23.00	3.47	2.80	0.09
23.50	3.48	2.82	0.09
24.00	**3.50**	**2.84**	0.08
24.50	3.50	2.84	0.00
25.00	3.50	2.84	0.00
25.50	3.50	2.84	0.00
26.00	3.50	2.84	0.00
26.50	3.50	2.84	0.00
27.00	3.50	2.84	0.00
27.50	3.50	2.84	0.00
28.00	3.50	2.84	0.00
28.50	3.50	2.84	0.00
29.00	3.50	2.84	0.00
29.50	3.50	2.84	0.00
30.00	3.50	2.84	0.00
30.50	3.50	2.84	0.00
31.00	3.50	2.84	0.00
31.50	3.50	2.84	0.00
32.00	3.50	2.84	0.00
32.50	3.50	2.84	0.00
33.00	3.50	2.84	0.00
33.50	3.50	2.84	0.00
34.00	3.50	2.84	0.00
34.50	3.50	2.84	0.00
35.00	3.50	2.84	0.00
35.50	3.50	2.84	0.00
36.00	3.50	2.84	0.00

Summary for Subcatchment DA #2B: Drainage Area #2B

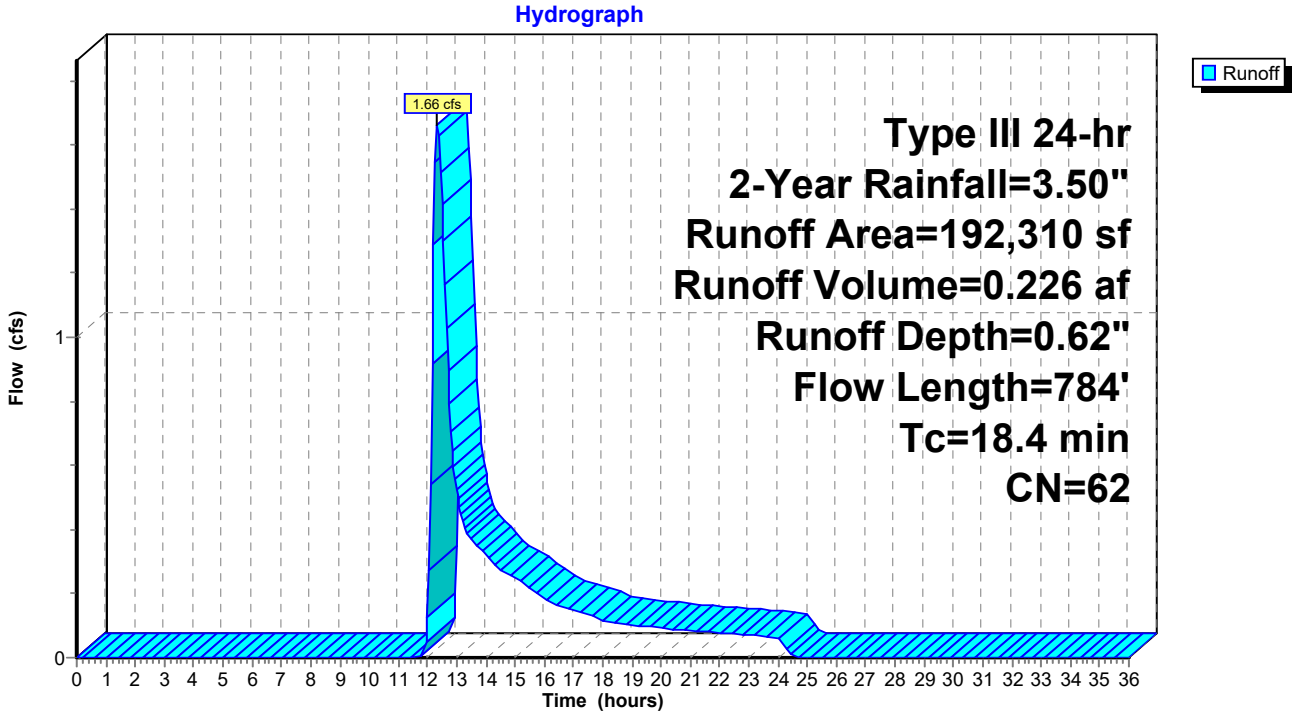
Runoff = 1.66 cfs @ 12.33 hrs, Volume= 0.226 af, Depth= 0.62"
Routed to Link POI #2 : POI #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.50"

	Area (sf)	CN	Description
	187,035	61	>75% Grass cover, Good, HSG B
*	2,004	61	Emergency Access Road (Perv.), Good, HSG B
*	3,271	98	Emergency Acess Road (Imp.), HSG B
	192,310	62	Weighted Average
	189,039		98.30% Pervious Area
	3,271		1.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	150	0.0667	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
3.0	634	0.2524	3.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
18.4	784	Total			

Subcatchment DA #2B: Drainage Area #2B



Hydrograph for Subcatchment DA #2B: Drainage Area #2B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.02	0.00	0.00
1.00	0.04	0.00	0.00
1.50	0.05	0.00	0.00
2.00	0.07	0.00	0.00
2.50	0.09	0.00	0.00
3.00	0.11	0.00	0.00
3.50	0.13	0.00	0.00
4.00	0.15	0.00	0.00
4.50	0.17	0.00	0.00
5.00	0.20	0.00	0.00
5.50	0.22	0.00	0.00
6.00	0.25	0.00	0.00
6.50	0.28	0.00	0.00
7.00	0.32	0.00	0.00
7.50	0.36	0.00	0.00
8.00	0.40	0.00	0.00
8.50	0.45	0.00	0.00
9.00	0.51	0.00	0.00
9.50	0.58	0.00	0.00
10.00	0.66	0.00	0.00
10.50	0.76	0.00	0.00
11.00	0.88	0.00	0.00
11.50	1.04	0.00	0.00
12.00	1.75	0.04	**0.12**
12.50	2.46	0.21	**1.41**
13.00	2.62	0.26	0.52
13.50	2.74	0.30	0.37
14.00	2.84	0.34	0.32
14.50	2.92	0.37	0.28
15.00	2.99	0.39	0.25
15.50	3.05	0.42	0.22
16.00	3.10	0.44	0.19
16.50	3.14	0.46	0.16
17.00	3.18	0.47	0.15
17.50	3.22	0.49	0.13
18.00	3.25	0.50	0.12
18.50	3.28	0.51	0.11
19.00	3.30	0.53	0.10
19.50	3.33	0.54	0.10
20.00	3.35	0.55	0.09
20.50	3.37	0.56	0.09
21.00	3.39	0.57	0.09
21.50	3.41	0.58	0.08
22.00	3.43	0.58	0.08
22.50	3.45	0.59	0.08
23.00	3.47	0.60	0.07
23.50	3.48	0.61	0.07
24.00	**3.50**	**0.62**	0.06
24.50	3.50	0.62	0.00
25.00	3.50	0.62	0.00
25.50	3.50	0.62	0.00
26.00	3.50	0.62	0.00
26.50	3.50	0.62	0.00
27.00	3.50	0.62	0.00
27.50	3.50	0.62	0.00
28.00	3.50	0.62	0.00
28.50	3.50	0.62	0.00
29.00	3.50	0.62	0.00
29.50	3.50	0.62	0.00
30.00	3.50	0.62	0.00
30.50	3.50	0.62	0.00
31.00	3.50	0.62	0.00
31.50	3.50	0.62	0.00
32.00	3.50	0.62	0.00
32.50	3.50	0.62	0.00
33.00	3.50	0.62	0.00
33.50	3.50	0.62	0.00
34.00	3.50	0.62	0.00
34.50	3.50	0.62	0.00
35.00	3.50	0.62	0.00
35.50	3.50	0.62	0.00
36.00	3.50	0.62	0.00

Summary for Pond DB #2: Drainage Basin #2

Inflow Area = 2.790 ac, 88.60% Impervious, Inflow Depth = 2.84" for 2-Year event
Inflow = 7.64 cfs @ 12.14 hrs, Volume= 0.659 af
Outflow = 2.93 cfs @ 12.44 hrs, Volume= 0.660 af, Atten= 62%, Lag= 18.2 min
Discarded = 2.13 cfs @ 12.44 hrs, Volume= 0.609 af
Primary = 0.80 cfs @ 12.44 hrs, Volume= 0.051 af
Routed to Link POI #2 : POI #2

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 485.89' @ 12.44 hrs Surf.Area= 7,286 sf Storage= 5,707 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 12.9 min (800.8 - 787.9)

Volume	Invert	Avail.Storage	Storage Description
#1	485.00'	25,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

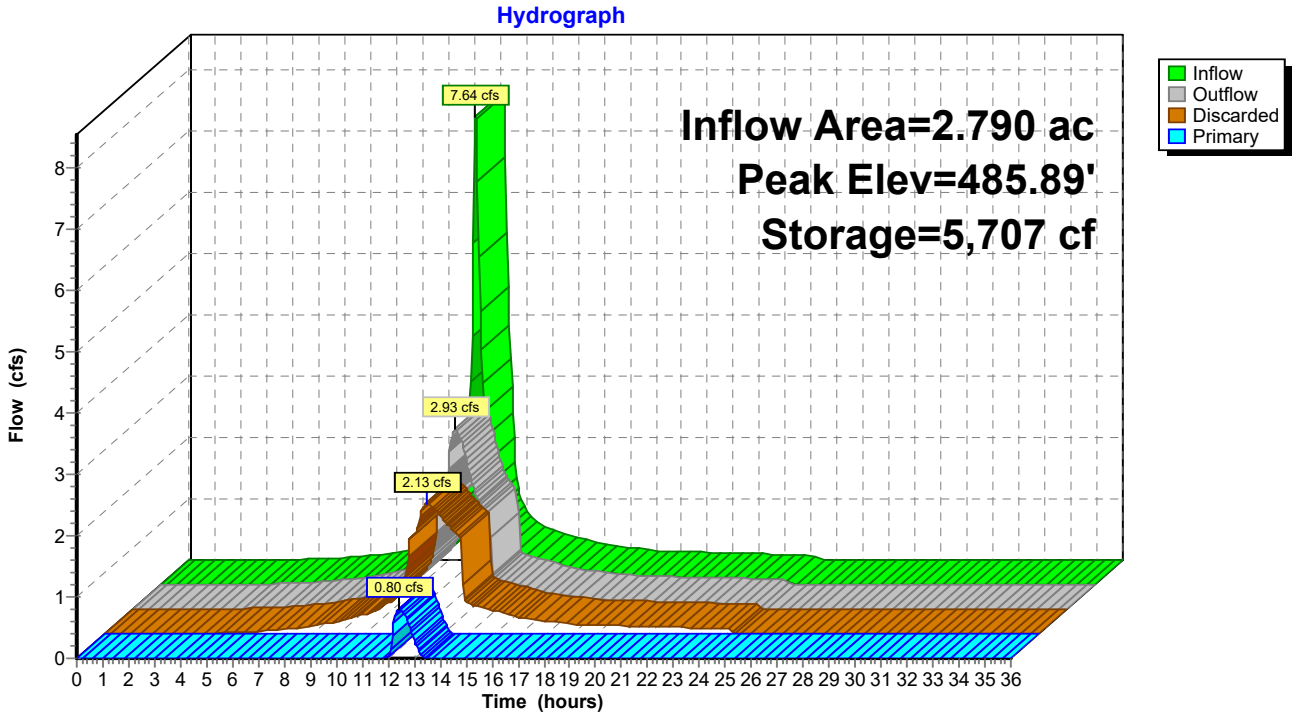
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
485.00	5,500	0	0
486.00	7,500	6,500	6,500
487.00	9,500	8,500	15,000
488.00	11,500	10,500	25,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	485.00'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 470.00'
#2	Primary	485.21'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	486.70'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

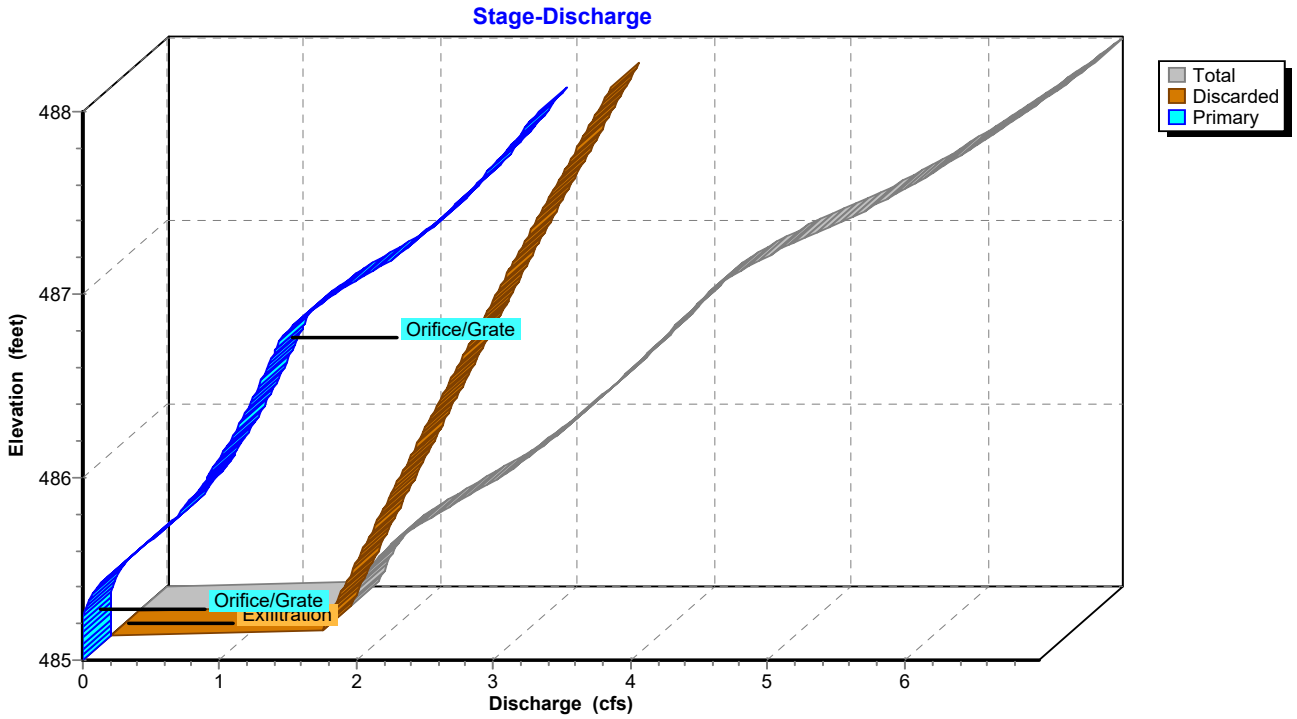
Discarded OutFlow Max=2.13 cfs @ 12.44 hrs HW=485.89' (Free Discharge)
└**1=Exfiltration** (Controls 2.13 cfs)

Primary OutFlow Max=0.80 cfs @ 12.44 hrs HW=485.89' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.80 cfs @ 3.01 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

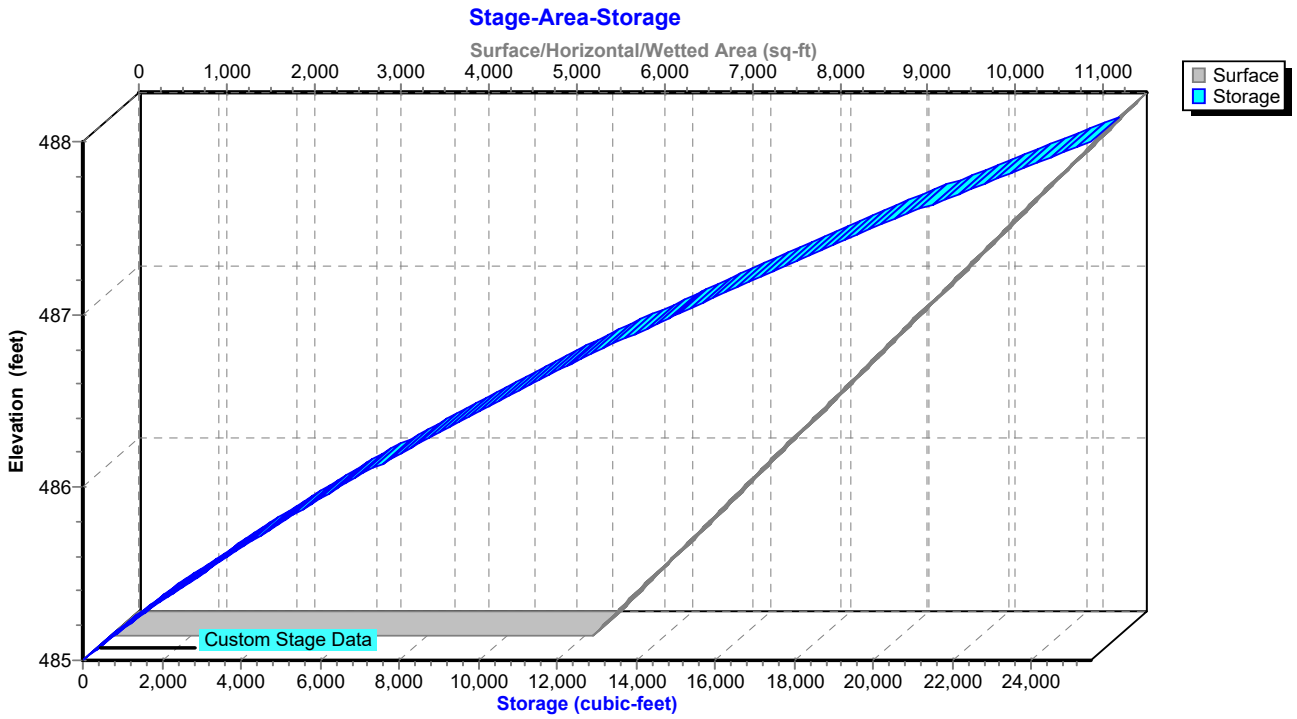
Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Hydrograph for Pond DB #2: Drainage Basin #2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	485.00	0.00	0.00	0.00
1.00	0.00	0	485.00	0.00	0.00	0.00
2.00	0.00	0	485.00	0.00	0.00	0.00
3.00	0.00	0	485.00	0.00	0.00	0.00
4.00	0.01	1	485.00	0.01	0.01	0.00
5.00	0.02	3	485.00	0.02	0.02	0.00
6.00	0.04	5	485.00	0.04	0.04	0.00
7.00	0.08	8	485.00	0.08	0.08	0.00
8.00	0.12	13	485.00	0.12	0.12	0.00
9.00	0.21	22	485.00	0.21	0.21	0.00
10.00	0.32	34	485.01	0.32	0.32	0.00
11.00	0.53	56	485.01	0.52	0.52	0.00
12.00	**4.06**	**1,193**	**485.21**	**1.67**	**1.67**	**0.00**
13.00	**0.82**	**3,231**	**485.54**	**2.18**	**1.88**	**0.30**
14.00	0.50	54	485.01	0.51	0.51	0.00
15.00	0.37	40	485.01	0.38	0.38	0.00
16.00	0.26	29	485.01	0.27	0.27	0.00
17.00	0.21	22	485.00	0.21	0.21	0.00
18.00	0.16	17	485.00	0.16	0.16	0.00
19.00	0.14	15	485.00	0.14	0.14	0.00
20.00	0.13	14	485.00	0.13	0.13	0.00
21.00	0.12	12	485.00	0.12	0.12	0.00
22.00	0.10	11	485.00	0.11	0.11	0.00
23.00	0.09	10	485.00	0.09	0.09	0.00
24.00	0.08	9	485.00	0.08	0.08	0.00
25.00	0.00	0	485.00	0.00	0.00	0.00
26.00	0.00	0	485.00	0.00	0.00	0.00
27.00	0.00	0	485.00	0.00	0.00	0.00
28.00	0.00	0	485.00	0.00	0.00	0.00
29.00	0.00	0	485.00	0.00	0.00	0.00
30.00	0.00	0	485.00	0.00	0.00	0.00
31.00	0.00	0	485.00	0.00	0.00	0.00
32.00	0.00	0	485.00	0.00	0.00	0.00
33.00	0.00	0	485.00	0.00	0.00	0.00
34.00	0.00	0	485.00	0.00	0.00	0.00
35.00	0.00	0	485.00	0.00	0.00	0.00
36.00	0.00	0	485.00	0.00	0.00	0.00

Stage-Discharge for Pond DB #2: Drainage Basin #2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
485.00	0.00	0.00	0.00
485.05	1.56	1.56	0.00
485.10	1.59	1.59	0.00
485.15	1.63	1.63	0.00
485.20	1.66	1.66	0.00
485.25	1.70	1.69	0.01
485.30	1.75	1.73	0.03
485.35	1.82	1.76	0.06
485.40	1.91	1.79	0.11
485.45	2.00	1.83	0.17
485.50	2.10	1.86	0.24
485.55	2.22	1.89	0.32
485.60	2.33	1.93	0.40
485.65	2.45	1.96	0.49
485.70	2.57	2.00	0.57
485.75	2.68	2.03	0.65
485.80	2.77	2.06	0.70
485.85	2.86	2.10	0.76
485.90	2.95	2.13	0.81
485.95	3.03	2.17	0.86
486.00	3.11	2.20	0.91
486.05	3.19	2.24	0.95
486.10	3.27	2.27	1.00
486.15	3.34	2.31	1.04
486.20	3.42	2.34	1.08
486.25	3.49	2.38	1.11
486.30	3.56	2.41	1.15
486.35	3.63	2.45	1.19
486.40	3.70	2.48	1.22
486.45	3.77	2.52	1.25
486.50	3.84	2.55	1.29
486.55	3.91	2.59	1.32
486.60	3.97	2.62	1.35
486.65	4.04	2.66	1.38
486.70	4.10	2.70	1.41
486.75	4.18	2.73	1.45
486.80	4.27	2.77	1.50
486.85	4.37	2.80	1.57
486.90	4.49	2.84	1.65
486.95	4.61	2.88	1.73
487.00	4.75	2.91	1.83
487.05	4.89	2.95	1.94
487.10	5.03	2.99	2.05
487.15	5.18	3.02	2.16
487.20	5.32	3.06	2.26
487.25	5.46	3.10	2.36
487.30	5.57	3.13	2.44
487.35	5.69	3.17	2.52
487.40	5.80	3.21	2.60
487.45	5.91	3.24	2.67
487.50	6.02	3.28	2.74
487.55	6.12	3.32	2.80
487.60	6.22	3.35	2.87
487.65	6.32	3.39	2.93
487.70	6.42	3.43	2.99
487.75	6.52	3.47	3.05
487.80	6.61	3.50	3.11
487.85	6.71	3.54	3.16
487.90	6.80	3.58	3.22
487.95	6.89	3.62	3.27
488.00	**6.98**	**3.65**	**3.33**

Stage-Area-Storage for Pond DB #2: Drainage Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
485.00	5,500	0
485.05	5,600	278
485.10	5,700	560
485.15	5,800	847
485.20	5,900	1,140
485.25	6,000	1,438
485.30	6,100	1,740
485.35	6,200	2,048
485.40	6,300	2,360
485.45	6,400	2,677
485.50	6,500	3,000
485.55	6,600	3,328
485.60	6,700	3,660
485.65	6,800	3,997
485.70	6,900	4,340
485.75	7,000	4,688
485.80	7,100	5,040
485.85	7,200	5,398
485.90	7,300	5,760
485.95	7,400	6,127
486.00	7,500	6,500
486.05	7,600	6,878
486.10	7,700	7,260
486.15	7,800	7,647
486.20	7,900	8,040
486.25	8,000	8,438
486.30	8,100	8,840
486.35	8,200	9,248
486.40	8,300	9,660
486.45	8,400	10,077
486.50	8,500	10,500
486.55	8,600	10,928
486.60	8,700	11,360
486.65	8,800	11,797
486.70	8,900	12,240
486.75	9,000	12,688
486.80	9,100	13,140
486.85	9,200	13,598
486.90	9,300	14,060
486.95	9,400	14,527
487.00	9,500	15,000
487.05	9,600	15,478
487.10	9,700	15,960
487.15	9,800	16,447
487.20	9,900	16,940
487.25	10,000	17,438
487.30	10,100	17,940
487.35	10,200	18,448
487.40	10,300	18,960
487.45	10,400	19,477
487.50	10,500	20,000
487.55	10,600	20,528
487.60	10,700	21,060
487.65	10,800	21,597
487.70	10,900	22,140
487.75	11,000	22,688
487.80	11,100	23,240
487.85	11,200	23,798
487.90	11,300	24,360
487.95	11,400	24,927
488.00	**11,500**	**25,500**

Summary for Pond SMS #1A: SMS #1A

Inflow Area = 3.863 ac, 91.78% Impervious, Inflow Depth = 2.94" for 2-Year event
Inflow = 10.82 cfs @ 12.14 hrs, Volume= 0.946 af
Outflow = 2.81 cfs @ 12.55 hrs, Volume= 0.946 af, Atten= 74%, Lag= 24.8 min
Discarded = 2.16 cfs @ 12.55 hrs, Volume= 0.880 af
Primary = 0.64 cfs @ 12.55 hrs, Volume= 0.066 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 493.70' @ 12.55 hrs Surf.Area= 7,503 sf Storage= 10,054 cf

Plug-Flow detention time= 21.7 min calculated for 0.945 af (100% of inflow)
Center-of-Mass det. time= 21.7 min (803.6 - 782.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	491.75'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	492.50'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	491.75'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	492.53'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	493.83'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	494.49'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	495.32'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	496.23'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.16 cfs @ 12.55 hrs HW=493.70' (Free Discharge)
└**1=Exfiltration** (Controls 2.16 cfs)

Primary OutFlow Max=0.64 cfs @ 12.55 hrs HW=493.70' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.64 cfs @ 4.71 fps)
├**3=Orifice/Grate** (Controls 0.00 cfs)
├**4=Orifice/Grate** (Controls 0.00 cfs)
├**5=Orifice/Grate** (Controls 0.00 cfs)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1A: SMS #1A - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

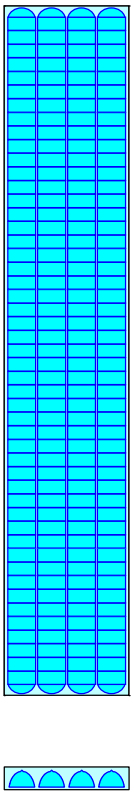
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

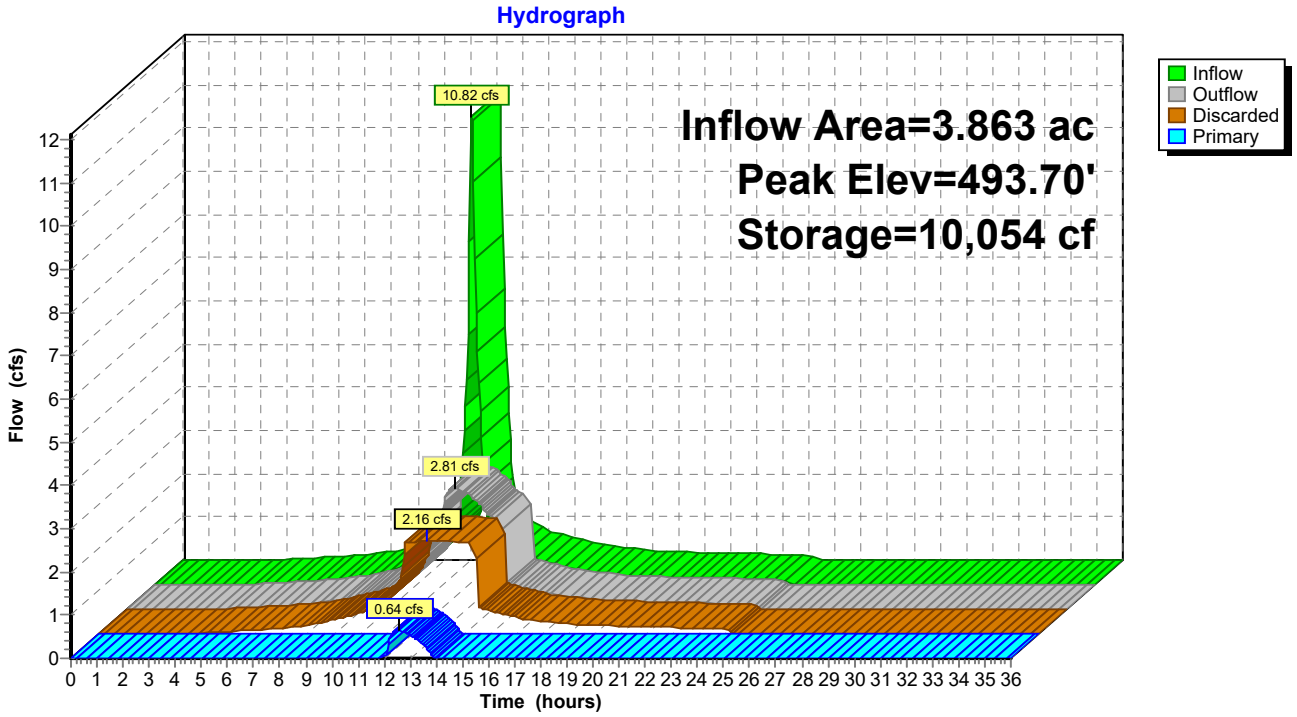
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

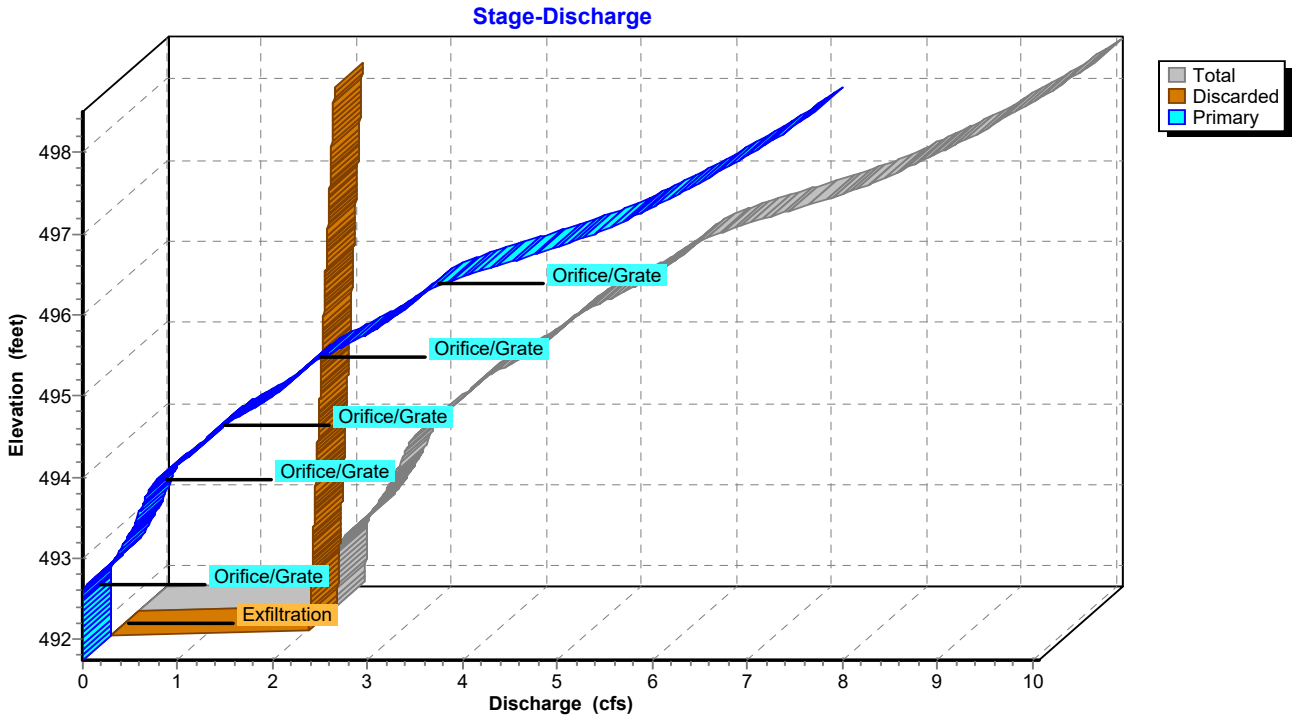
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



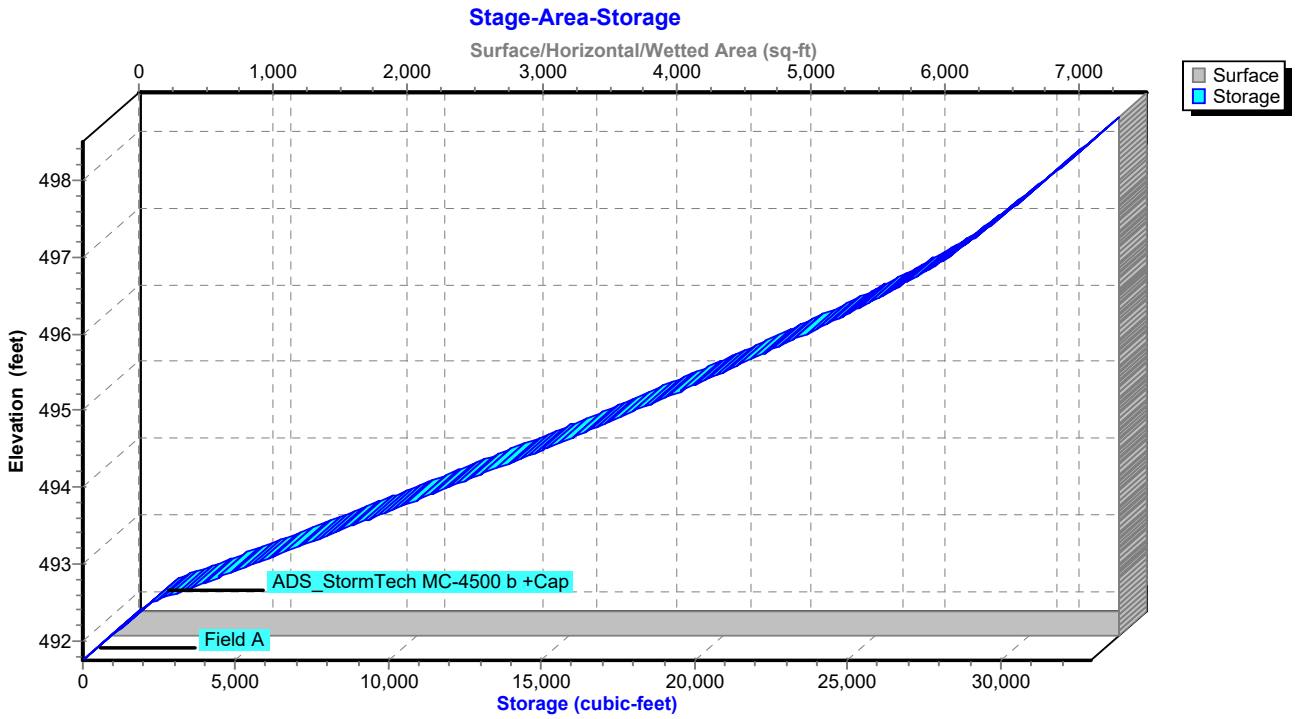
Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Hydrograph for Pond SMS #1A: SMS #1A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	491.75	0.00	0.00	0.00
1.00	0.00	0	491.75	0.00	0.00	0.00
2.00	0.00	0	491.75	0.00	0.00	0.00
3.00	0.00	0	491.75	0.00	0.00	0.00
4.00	0.02	2	491.75	0.02	0.02	0.00
5.00	0.05	5	491.75	0.05	0.05	0.00
6.00	0.08	8	491.75	0.08	0.08	0.00
7.00	0.13	13	491.75	0.13	0.13	0.00
8.00	0.20	19	491.76	0.20	0.20	0.00
9.00	0.32	31	491.76	0.32	0.32	0.00
10.00	0.48	47	491.77	0.48	0.48	0.00
11.00	0.78	75	491.77	0.77	0.77	0.00
12.00	**5.80**	**1,875**	**492.37**	**2.11**	**2.11**	**0.00**
13.00	**1.15**	**8,209**	**493.41**	**2.69**	**2.15**	**0.54**
14.00	0.70	2,638	492.56	2.12	2.12	0.00
15.00	0.52	51	491.77	0.53	0.53	0.00
16.00	0.37	36	491.76	0.37	0.37	0.00
17.00	0.29	28	491.76	0.29	0.29	0.00
18.00	0.22	22	491.76	0.23	0.23	0.00
19.00	0.20	19	491.76	0.20	0.20	0.00
20.00	0.18	17	491.76	0.18	0.18	0.00
21.00	0.16	16	491.76	0.16	0.16	0.00
22.00	0.15	14	491.75	0.15	0.15	0.00
23.00	0.13	13	491.75	0.13	0.13	0.00
24.00	0.12	11	491.75	0.12	0.12	0.00
25.00	0.00	0	491.75	0.00	0.00	0.00
26.00	0.00	0	491.75	0.00	0.00	0.00
27.00	0.00	0	491.75	0.00	0.00	0.00
28.00	0.00	0	491.75	0.00	0.00	0.00
29.00	0.00	0	491.75	0.00	0.00	0.00
30.00	0.00	0	491.75	0.00	0.00	0.00
31.00	0.00	0	491.75	0.00	0.00	0.00
32.00	0.00	0	491.75	0.00	0.00	0.00
33.00	0.00	0	491.75	0.00	0.00	0.00
34.00	0.00	0	491.75	0.00	0.00	0.00
35.00	0.00	0	491.75	0.00	0.00	0.00
36.00	0.00	0	491.75	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1A: SMS #1A

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
491.75	0.00	0.00	0.00
491.85	2.09	2.09	0.00
491.95	2.09	2.09	0.00
492.05	2.10	2.10	0.00
492.15	2.10	2.10	0.00
492.25	2.10	2.10	0.00
492.35	2.11	2.11	0.00
492.45	2.11	2.11	0.00
492.55	2.12	2.12	0.00
492.65	2.16	2.12	0.04
492.75	2.24	2.12	0.12
492.85	2.34	2.13	0.22
492.95	2.43	2.13	0.30
493.05	2.50	2.14	0.37
493.15	2.56	2.14	0.42
493.25	2.61	2.14	0.47
493.35	2.66	2.15	0.51
493.45	2.71	2.15	0.55
493.55	2.75	2.16	0.59
493.65	2.79	2.16	0.63
493.75	2.82	2.16	0.66
493.85	2.86	2.17	0.69
493.95	2.93	2.17	0.76
494.05	3.05	2.18	0.87
494.15	3.18	2.18	1.00
494.25	3.29	2.18	1.11
494.35	3.39	2.19	1.20
494.45	3.47	2.19	1.28
494.55	3.56	2.20	1.36
494.65	3.69	2.20	1.49
494.75	3.85	2.20	1.64
494.85	4.01	2.21	1.80
494.95	4.15	2.21	1.93
495.05	4.26	2.22	2.05
495.15	4.37	2.22	2.15
495.25	4.48	2.23	2.25
495.35	4.57	2.23	2.35
495.45	4.71	2.23	2.47
495.55	4.88	2.24	2.64
495.65	5.06	2.24	2.82
495.75	5.23	2.25	2.98
495.85	5.37	2.25	3.12
495.95	5.50	2.25	3.25
496.05	5.62	2.26	3.36
496.15	5.74	2.26	3.48
496.25	5.85	2.27	3.58
496.35	6.00	2.27	3.74
496.45	6.22	2.27	3.94
496.55	6.48	2.28	4.20
496.65	6.76	2.28	4.48
496.75	7.06	2.29	4.78
496.85	7.35	2.29	5.06
496.95	7.57	2.29	5.28
497.05	7.79	2.30	5.49
497.15	7.99	2.30	5.69
497.25	8.18	2.31	5.87
497.35	8.36	2.31	6.05
497.45	8.53	2.31	6.22
497.55	8.70	2.32	6.38
497.65	8.86	2.32	6.54
497.75	9.02	2.33	6.69
497.85	9.17	2.33	6.84
497.95	9.32	2.33	6.98
498.05	9.46	2.34	7.12
498.15	9.60	2.34	7.26
498.25	9.74	2.35	7.39
498.35	9.87	2.35	7.52
498.45	**10.00**	**2.35**	**7.65**

Stage-Area-Storage for Pond SMS #1A: SMS #1A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
491.75	**7,503**	0
491.85	7,503	300
491.95	7,503	600
492.05	7,503	900
492.15	7,503	1,200
492.25	7,503	1,501
492.35	7,503	1,801
492.45	7,503	2,101
492.55	7,503	2,582
492.65	7,503	3,243
492.75	7,503	3,902
492.85	7,503	4,560
492.95	7,503	5,216
493.05	7,503	5,871
493.15	7,503	6,523
493.25	7,503	7,173
493.35	7,503	7,822
493.45	7,503	8,468
493.55	7,503	9,111
493.65	7,503	9,752
493.75	7,503	10,391
493.85	7,503	11,026
493.95	7,503	11,658
494.05	7,503	12,288
494.15	7,503	12,914
494.25	7,503	13,537
494.35	7,503	14,155
494.45	7,503	14,770
494.55	7,503	15,381
494.65	7,503	15,988
494.75	7,503	16,590
494.85	7,503	17,188
494.95	7,503	17,781
495.05	7,503	18,369
495.15	7,503	18,952
495.25	7,503	19,530
495.35	7,503	20,101
495.45	7,503	20,667
495.55	7,503	21,226
495.65	7,503	21,779
495.75	7,503	22,324
495.85	7,503	22,862
495.95	7,503	23,393
496.05	7,503	23,915
496.15	7,503	24,428
496.25	7,503	24,932
496.35	7,503	25,426
496.45	7,503	25,909
496.55	7,503	26,381
496.65	7,503	26,840
496.75	7,503	27,285
496.85	7,503	27,713
496.95	7,503	28,121
497.05	7,503	28,501
497.15	7,503	28,850
497.25	7,503	29,181
497.35	7,503	29,504
497.45	7,503	29,817
497.55	7,503	30,119
497.65	7,503	30,419
497.75	7,503	30,719
497.85	7,503	31,019
497.95	7,503	31,319
498.05	7,503	31,620
498.15	7,503	31,920
498.25	7,503	32,220
498.35	7,503	32,520
498.45	7,503	**32,820**

Summary for Pond SMS #1C: SMS #1C

Inflow Area = 3.475 ac, 93.57% Impervious, Inflow Depth = 3.05" for 2-Year event
Inflow = 9.93 cfs @ 12.14 hrs, Volume= 0.882 af
Outflow = 2.73 cfs @ 12.54 hrs, Volume= 0.882 af, Atten= 73%, Lag= 23.9 min
Discarded = 2.15 cfs @ 12.53 hrs, Volume= 0.834 af
Primary = 0.57 cfs @ 12.54 hrs, Volume= 0.047 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 497.01' @ 12.53 hrs Surf.Area= 7,503 sf Storage= 8,843 cf

Plug-Flow detention time= 19.1 min calculated for 0.881 af (100% of inflow)
Center-of-Mass det. time= 19.1 min (794.4 - 775.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	495.25'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	496.00'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	495.25'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	496.09'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	496.92'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	497.83'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	498.75'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	499.67'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.15 cfs @ 12.53 hrs HW=497.01' (Free Discharge)
└**1=Exfiltration** (Controls 2.15 cfs)

Primary OutFlow Max=0.57 cfs @ 12.54 hrs HW=497.01' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.55 cfs @ 4.05 fps)
├**3=Orifice/Grate** (Orifice Controls 0.02 cfs @ 1.00 fps)
├**4=Orifice/Grate** (Controls 0.00 cfs)
├**5=Orifice/Grate** (Controls 0.00 cfs)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1C: SMS #1C - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

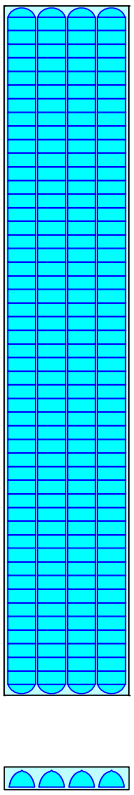
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

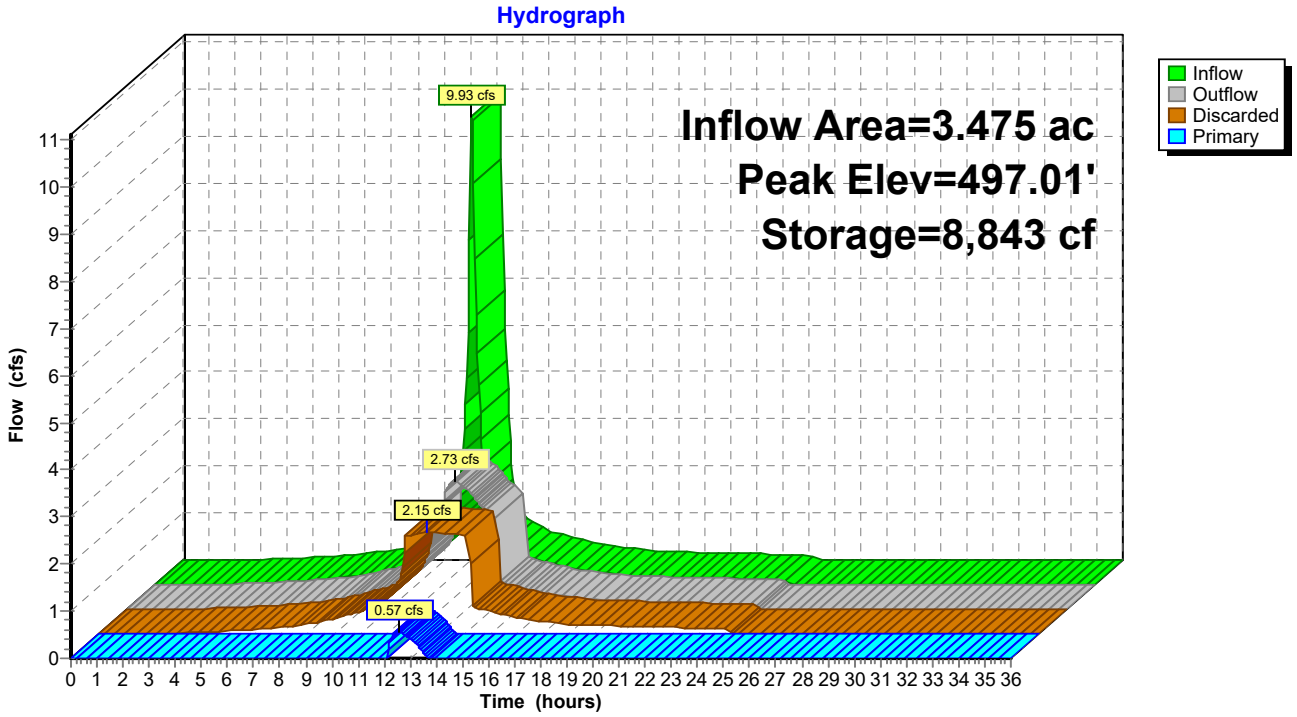
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

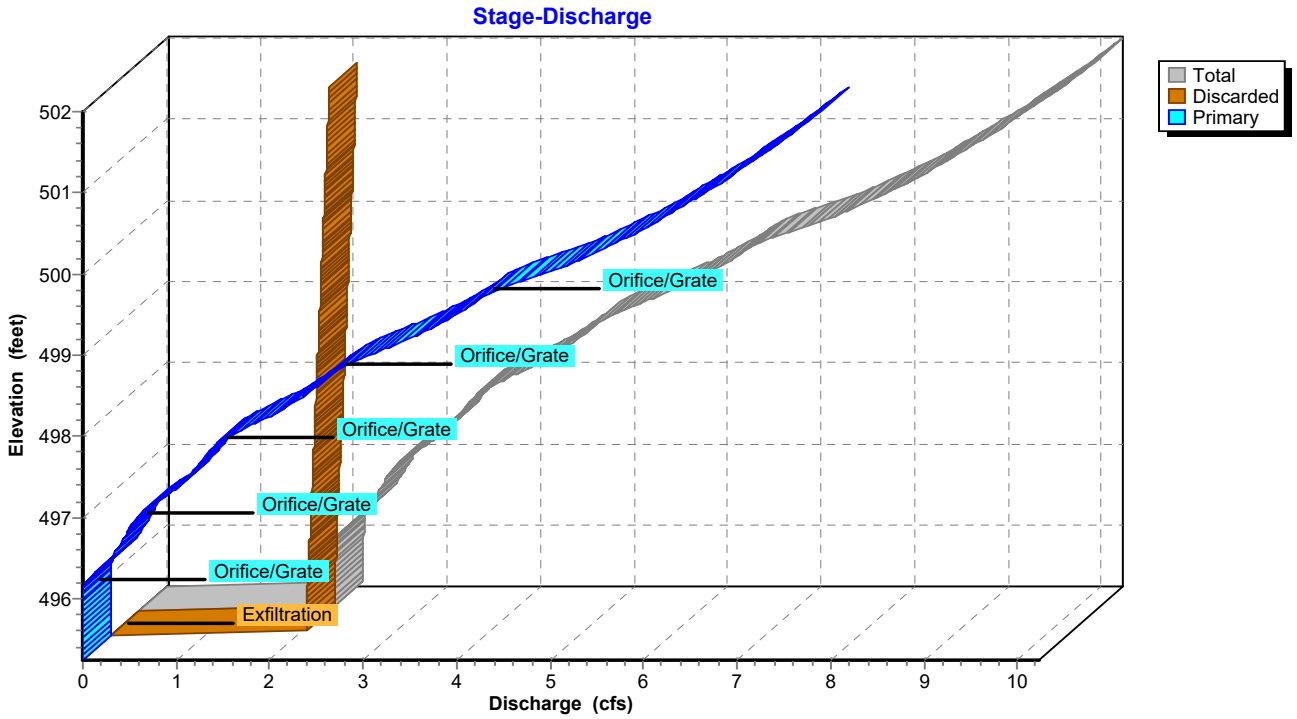
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



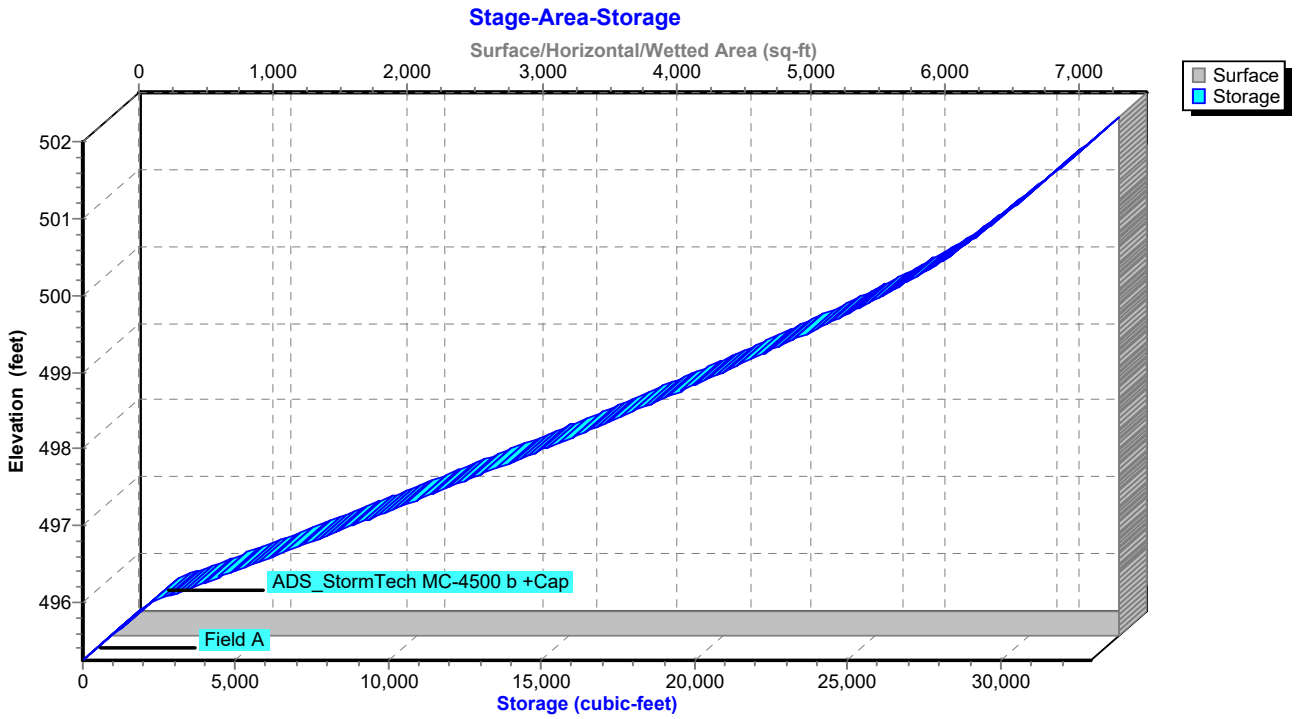
Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Hydrograph for Pond SMS #1C: SMS #1C

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	495.25	0.00	0.00	0.00
1.00	0.00	0	495.25	0.00	0.00	0.00
2.00	0.00	0	495.25	0.00	0.00	0.00
3.00	0.01	1	495.25	0.01	0.01	0.00
4.00	0.04	4	495.25	0.04	0.04	0.00
5.00	0.06	6	495.25	0.06	0.06	0.00
6.00	0.09	9	495.25	0.09	0.09	0.00
7.00	0.14	14	495.25	0.14	0.14	0.00
8.00	0.21	20	495.26	0.20	0.20	0.00
9.00	0.33	31	495.26	0.32	0.32	0.00
10.00	0.47	45	495.27	0.47	0.47	0.00
11.00	0.74	71	495.27	0.73	0.73	0.00
12.00	**5.36**	**1,601**	**495.78**	**2.10**	**2.10**	**0.00**
13.00	**1.05**	**6,933**	**496.71**	**2.56**	**2.14**	**0.42**
14.00	0.63	1,599	495.78	2.10	2.10	0.00
15.00	0.47	46	495.27	0.48	0.48	0.00
16.00	0.34	33	495.26	0.34	0.34	0.00
17.00	0.26	26	495.26	0.26	0.26	0.00
18.00	0.20	20	495.26	0.20	0.20	0.00
19.00	0.18	17	495.26	0.18	0.18	0.00
20.00	0.16	16	495.26	0.16	0.16	0.00
21.00	0.15	14	495.25	0.15	0.15	0.00
22.00	0.13	13	495.25	0.13	0.13	0.00
23.00	0.12	12	495.25	0.12	0.12	0.00
24.00	0.11	10	495.25	0.11	0.11	0.00
25.00	0.00	0	495.25	0.00	0.00	0.00
26.00	0.00	0	495.25	0.00	0.00	0.00
27.00	0.00	0	495.25	0.00	0.00	0.00
28.00	0.00	0	495.25	0.00	0.00	0.00
29.00	0.00	0	495.25	0.00	0.00	0.00
30.00	0.00	0	495.25	0.00	0.00	0.00
31.00	0.00	0	495.25	0.00	0.00	0.00
32.00	0.00	0	495.25	0.00	0.00	0.00
33.00	0.00	0	495.25	0.00	0.00	0.00
34.00	0.00	0	495.25	0.00	0.00	0.00
35.00	0.00	0	495.25	0.00	0.00	0.00
36.00	0.00	0	495.25	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1C: SMS #1C

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
495.25	0.00	0.00	0.00
495.35	2.09	2.09	0.00
495.45	2.09	2.09	0.00
495.55	2.10	2.10	0.00
495.65	2.10	2.10	0.00
495.75	2.10	2.10	0.00
495.85	2.11	2.11	0.00
495.95	2.11	2.11	0.00
496.05	2.11	2.11	0.00
496.15	2.13	2.12	0.01
496.25	2.19	2.12	0.07
496.35	2.28	2.13	0.16
496.45	2.39	2.13	0.26
496.55	2.46	2.13	0.33
496.65	2.53	2.14	0.39
496.75	2.58	2.14	0.44
496.85	2.63	2.14	0.49
496.95	2.68	2.15	0.53
497.05	2.77	2.15	0.61
497.15	2.89	2.16	0.73
497.25	3.03	2.16	0.87
497.35	3.15	2.16	0.98
497.45	3.24	2.17	1.08
497.55	3.33	2.17	1.16
497.65	3.41	2.17	1.24
497.75	3.49	2.18	1.31
497.85	3.56	2.18	1.38
497.95	3.67	2.19	1.48
498.05	3.82	2.19	1.63
498.15	4.01	2.19	1.81
498.25	4.20	2.20	2.00
498.35	4.36	2.20	2.16
498.45	4.50	2.20	2.29
498.55	4.62	2.21	2.42
498.65	4.74	2.21	2.53
498.75	4.85	2.22	2.64
498.85	4.99	2.22	2.77
498.95	5.17	2.22	2.95
499.05	5.39	2.23	3.16
499.15	5.61	2.23	3.38
499.25	5.81	2.23	3.58
499.35	5.99	2.24	3.75
499.45	6.15	2.24	3.91
499.55	6.30	2.25	4.05
499.65	6.44	2.25	4.19
499.75	6.60	2.25	4.34
499.85	6.80	2.26	4.54
499.95	7.04	2.26	4.78
500.05	7.29	2.27	5.03
500.15	7.53	2.27	5.26
500.25	7.73	2.27	5.46
500.35	7.92	2.28	5.64
500.45	8.10	2.28	5.82
500.55	8.27	2.28	5.98
500.65	8.43	2.29	6.14
500.75	8.58	2.29	6.29
500.85	8.73	2.30	6.44
500.95	8.88	2.30	6.58
501.05	9.02	2.30	6.72
501.15	9.16	2.31	6.85
501.25	9.30	2.31	6.99
501.35	9.43	2.31	7.11
501.45	9.56	2.32	7.24
501.55	9.68	2.32	7.36
501.65	9.81	2.33	7.48
501.75	9.93	2.33	7.60
501.85	10.05	2.33	7.72
501.95	**10.17**	**2.34**	**7.83**

Stage-Area-Storage for Pond SMS #1C: SMS #1C

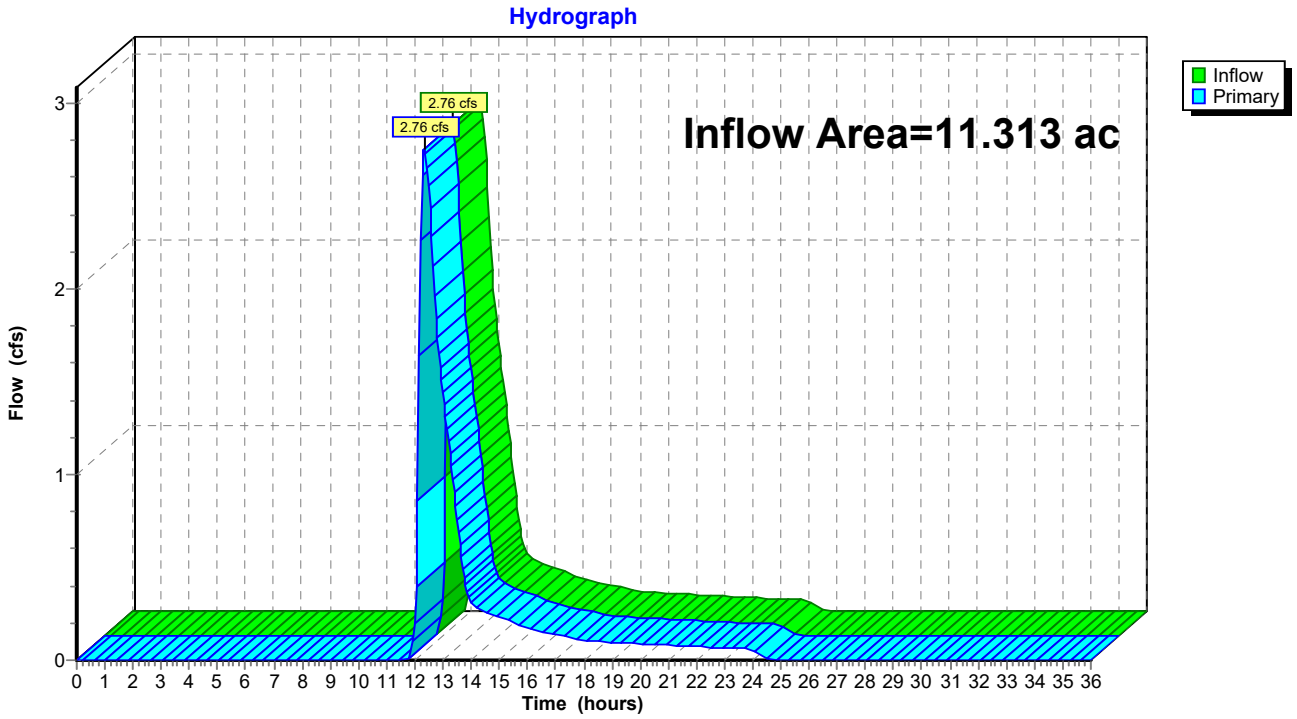
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
495.25	**7,503**	0
495.35	7,503	300
495.45	7,503	600
495.55	7,503	900
495.65	7,503	1,200
495.75	7,503	1,501
495.85	7,503	1,801
495.95	7,503	2,101
496.05	7,503	2,582
496.15	7,503	3,243
496.25	7,503	3,902
496.35	7,503	4,560
496.45	7,503	5,216
496.55	7,503	5,871
496.65	7,503	6,523
496.75	7,503	7,173
496.85	7,503	7,822
496.95	7,503	8,468
497.05	7,503	9,111
497.15	7,503	9,752
497.25	7,503	10,391
497.35	7,503	11,026
497.45	7,503	11,658
497.55	7,503	12,288
497.65	7,503	12,914
497.75	7,503	13,537
497.85	7,503	14,155
497.95	7,503	14,770
498.05	7,503	15,381
498.15	7,503	15,988
498.25	7,503	16,590
498.35	7,503	17,188
498.45	7,503	17,781
498.55	7,503	18,369
498.65	7,503	18,952
498.75	7,503	19,530
498.85	7,503	20,101
498.95	7,503	20,667
499.05	7,503	21,226
499.15	7,503	21,779
499.25	7,503	22,324
499.35	7,503	22,862
499.45	7,503	23,393
499.55	7,503	23,915
499.65	7,503	24,428
499.75	7,503	24,932
499.85	7,503	25,426
499.95	7,503	25,909
500.05	7,503	26,381
500.15	7,503	26,840
500.25	7,503	27,285
500.35	7,503	27,713
500.45	7,503	28,121
500.55	7,503	28,501
500.65	7,503	28,850
500.75	7,503	29,181
500.85	7,503	29,504
500.95	7,503	29,817
501.05	7,503	30,119
501.15	7,503	30,419
501.25	7,503	30,719
501.35	7,503	31,019
501.45	7,503	31,319
501.55	7,503	31,620
501.65	7,503	31,920
501.75	7,503	32,220
501.85	7,503	32,520
501.95	7,503	**32,820**

Summary for Link POI #1: POI #1

Inflow Area = 11.313 ac, 61.95% Impervious, Inflow Depth = 0.35" for 2-Year event
Inflow = 2.76 cfs @ 12.33 hrs, Volume= 0.331 af
Primary = 2.76 cfs @ 12.33 hrs, Volume= 0.331 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #1: POI #1



Hydrograph for Link POI #1: POI #1

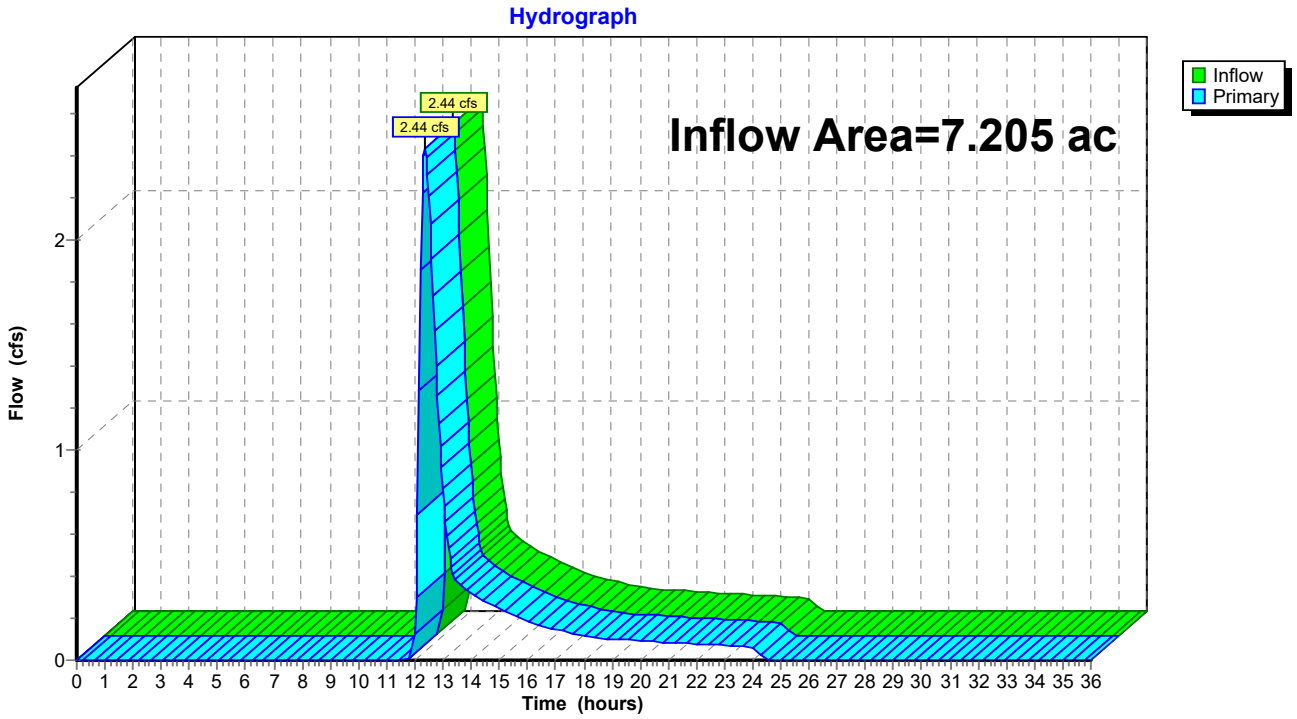
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00	26.00	0.00	0.00	0.00
0.50	0.00	0.00	0.00	26.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00	27.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00	27.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00	28.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00	28.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00	29.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00	29.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00	30.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00	30.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00	31.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00	31.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00	32.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00	32.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00	33.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00	33.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00	34.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00	34.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00	35.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00	35.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00	36.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00				
11.00	0.00	0.00	0.00				
11.50	0.00	0.00	0.00				
12.00	**0.20**	0.00	**0.20**				
12.50	**2.56**	0.00	**2.56**				
13.00	1.44	0.00	1.44				
13.50	0.76	0.00	0.76				
14.00	0.30	0.00	0.30				
14.50	0.26	0.00	0.26				
15.00	0.23	0.00	0.23				
15.50	0.21	0.00	0.21				
16.00	0.17	0.00	0.17				
16.50	0.15	0.00	0.15				
17.00	0.14	0.00	0.14				
17.50	0.12	0.00	0.12				
18.00	0.11	0.00	0.11				
18.50	0.10	0.00	0.10				
19.00	0.10	0.00	0.10				
19.50	0.09	0.00	0.09				
20.00	0.09	0.00	0.09				
20.50	0.08	0.00	0.08				
21.00	0.08	0.00	0.08				
21.50	0.08	0.00	0.08				
22.00	0.07	0.00	0.07				
22.50	0.07	0.00	0.07				
23.00	0.07	0.00	0.07				
23.50	0.06	0.00	0.06				
24.00	0.06	0.00	0.06				
24.50	0.00	0.00	0.00				
25.00	0.00	0.00	0.00				
25.50	0.00	0.00	0.00				

Summary for Link POI #2: POI #2

Inflow Area = 7.205 ac, 35.36% Impervious, Inflow Depth = 0.46" for 2-Year event
Inflow = 2.44 cfs @ 12.35 hrs, Volume= 0.277 af
Primary = 2.44 cfs @ 12.35 hrs, Volume= 0.277 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #2: POI #2



Hydrograph for Link POI #2: POI #2

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	**0.12**	0.00	**0.12**
12.50	**2.21**	0.00	**2.21**
13.00	0.82	0.00	0.82
13.50	0.37	0.00	0.37
14.00	0.32	0.00	0.32
14.50	0.28	0.00	0.28
15.00	0.25	0.00	0.25
15.50	0.22	0.00	0.22
16.00	0.19	0.00	0.19
16.50	0.16	0.00	0.16
17.00	0.15	0.00	0.15
17.50	0.13	0.00	0.13
18.00	0.12	0.00	0.12
18.50	0.11	0.00	0.11
19.00	0.10	0.00	0.10
19.50	0.10	0.00	0.10
20.00	0.09	0.00	0.09
20.50	0.09	0.00	0.09
21.00	0.09	0.00	0.09
21.50	0.08	0.00	0.08
22.00	0.08	0.00	0.08
22.50	0.08	0.00	0.08
23.00	0.07	0.00	0.07
23.50	0.07	0.00	0.07
24.00	0.06	0.00	0.06
24.50	0.00	0.00	0.00
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 #1A: Drainage Area #1A Runoff Area=168,262 sf 91.78% Impervious Runoff Depth=4.42"
Tc=10.0 min CN=95 Runoff=15.90 cfs 1.423 af

Subcatchment DA #1B: Drainage Area #1B Runoff Area=173,173 sf 5.32% Impervious Runoff Depth=1.51"
Flow Length=638' Tc=17.0 min CN=63 Runoff=4.67 cfs 0.500 af

Subcatchment DA #1C: Drainage Area Runoff Area=151,363 sf 93.57% Impervious Runoff Depth=4.53"
Tc=10.0 min CN=96 Runoff=14.47 cfs 1.312 af

Subcatchment DA #2A: Drainage Area #2A Runoff Area=121,548 sf 88.60% Impervious Runoff Depth=4.31"
Tc=10.0 min CN=94 Runoff=11.33 cfs 1.002 af

Subcatchment DA #2B: Drainage Area #2B Runoff Area=192,310 sf 1.70% Impervious Runoff Depth=1.44"
Flow Length=784' Tc=18.4 min CN=62 Runoff=4.72 cfs 0.529 af

Pond DB #2: Drainage Basin #2 Peak Elev=486.45' Storage=10,061 cf Inflow=11.33 cfs 1.002 af
Discarded=2.52 cfs 0.877 af Primary=1.25 cfs 0.124 af Outflow=3.77 cfs 1.002 af

Pond SMS #1A: SMS #1A Peak Elev=494.82' Storage=17,012 cf Inflow=15.90 cfs 1.423 af
Discarded=2.21 cfs 1.223 af Primary=1.75 cfs 0.200 af Outflow=3.96 cfs 1.423 af

Pond SMS #1C: SMS #1C Peak Elev=497.97' Storage=14,914 cf Inflow=14.47 cfs 1.312 af
Discarded=2.19 cfs 1.149 af Primary=1.51 cfs 0.164 af Outflow=3.70 cfs 1.312 af

Link POI #1: POI #1 Inflow=7.04 cfs 0.864 af
Primary=7.04 cfs 0.864 af

Link POI #2: POI #2 Inflow=5.89 cfs 0.654 af
Primary=5.89 cfs 0.654 af

Total Runoff Area = 18.518 ac Runoff Volume = 4.766 af Average Runoff Depth = 3.09"
48.40% Pervious = 8.963 ac 51.60% Impervious = 9.556 ac

Summary for Subcatchment DA #1A: Drainage Area #1A

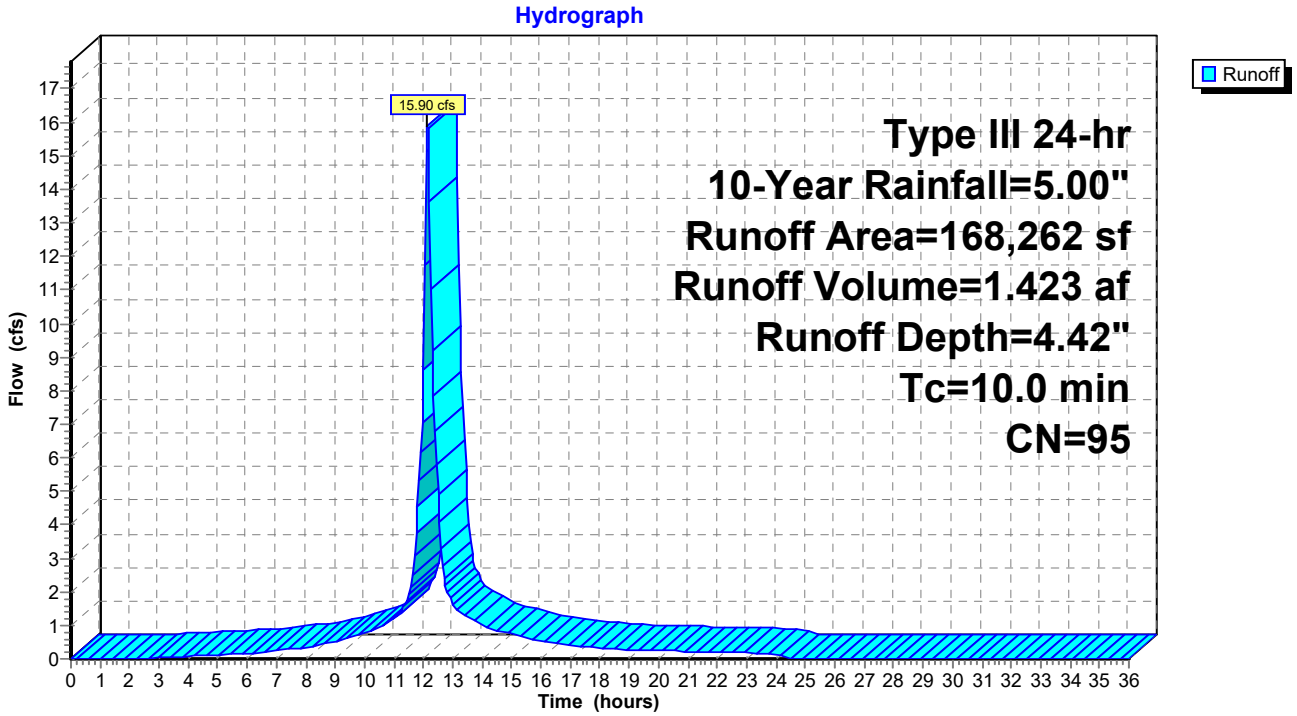
Runoff = 15.90 cfs @ 12.14 hrs, Volume= 1.423 af, Depth= 4.42"
Routed to Pond SMS #1A : SMS #1A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.00"

	Area (sf)	CN	Description
	10,723	61	>75% Grass cover, Good, HSG B
*	3,112	61	Emergency Access Road (Perv.), Good, HSG B
*	86,043	98	Building/Roof, HSG B
*	60,366	98	Pavement, HSG B
*	2,940	98	Sidewalk, HSG B
*	5,078	98	Emergency Access Road (Imp.), HSG B
	168,262	95	Weighted Average
	13,835		8.22% Pervious Area
	154,427		91.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #1A: Drainage Area #1A



Hydrograph for Subcatchment DA #1A: Drainage Area #1A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.05	0.00	0.00
1.50	0.08	0.00	0.00
2.00	0.10	0.00	0.00
2.50	0.13	0.00	0.01
3.00	0.15	0.00	0.03
3.50	0.18	0.01	0.05
4.00	0.22	0.02	0.07
4.50	0.25	0.03	0.10
5.00	0.28	0.05	0.12
5.50	0.32	0.06	0.14
6.00	0.36	0.08	0.16
6.50	0.40	0.11	0.20
7.00	0.45	0.14	0.25
7.50	0.51	0.17	0.30
8.00	0.57	0.22	0.35
8.50	0.64	0.27	0.43
9.00	0.73	0.34	0.54
9.50	0.83	0.42	0.66
10.00	0.95	0.52	0.78
10.50	1.08	0.64	0.97
11.00	1.25	0.78	1.21
11.50	1.49	1.00	1.87
12.00	2.50	1.96	**8.61**
12.50	3.51	2.95	**4.92**
13.00	3.75	3.18	1.67
13.50	3.92	3.35	1.24
14.00	4.06	3.49	1.01
14.50	4.17	3.60	0.87
15.00	4.27	3.70	0.76
15.50	4.36	3.78	0.64
16.00	4.43	3.86	0.53
16.50	4.49	3.92	0.47
17.00	4.55	3.97	0.42
17.50	4.60	4.02	0.37
18.00	4.64	4.06	0.32
18.50	4.68	4.10	0.30
19.00	4.72	4.14	0.28
19.50	4.75	4.17	0.27
20.00	4.79	4.21	0.26
20.50	4.82	4.24	0.24
21.00	4.85	4.27	0.23
21.50	4.88	4.30	0.22
22.00	4.90	4.32	0.21
22.50	4.93	4.35	0.20
23.00	4.95	4.37	0.19
23.50	4.98	4.40	0.18
24.00	**5.00**	**4.42**	0.17
24.50	5.00	4.42	0.00
25.00	5.00	4.42	0.00
25.50	5.00	4.42	0.00
26.00	5.00	4.42	0.00
26.50	5.00	4.42	0.00
27.00	5.00	4.42	0.00
27.50	5.00	4.42	0.00
28.00	5.00	4.42	0.00
28.50	5.00	4.42	0.00
29.00	5.00	4.42	0.00
29.50	5.00	4.42	0.00
30.00	5.00	4.42	0.00
30.50	5.00	4.42	0.00
31.00	5.00	4.42	0.00
31.50	5.00	4.42	0.00
32.00	5.00	4.42	0.00
32.50	5.00	4.42	0.00
33.00	5.00	4.42	0.00
33.50	5.00	4.42	0.00
34.00	5.00	4.42	0.00
34.50	5.00	4.42	0.00
35.00	5.00	4.42	0.00
35.50	5.00	4.42	0.00
36.00	5.00	4.42	0.00

Summary for Subcatchment DA #1B: Drainage Area #1B

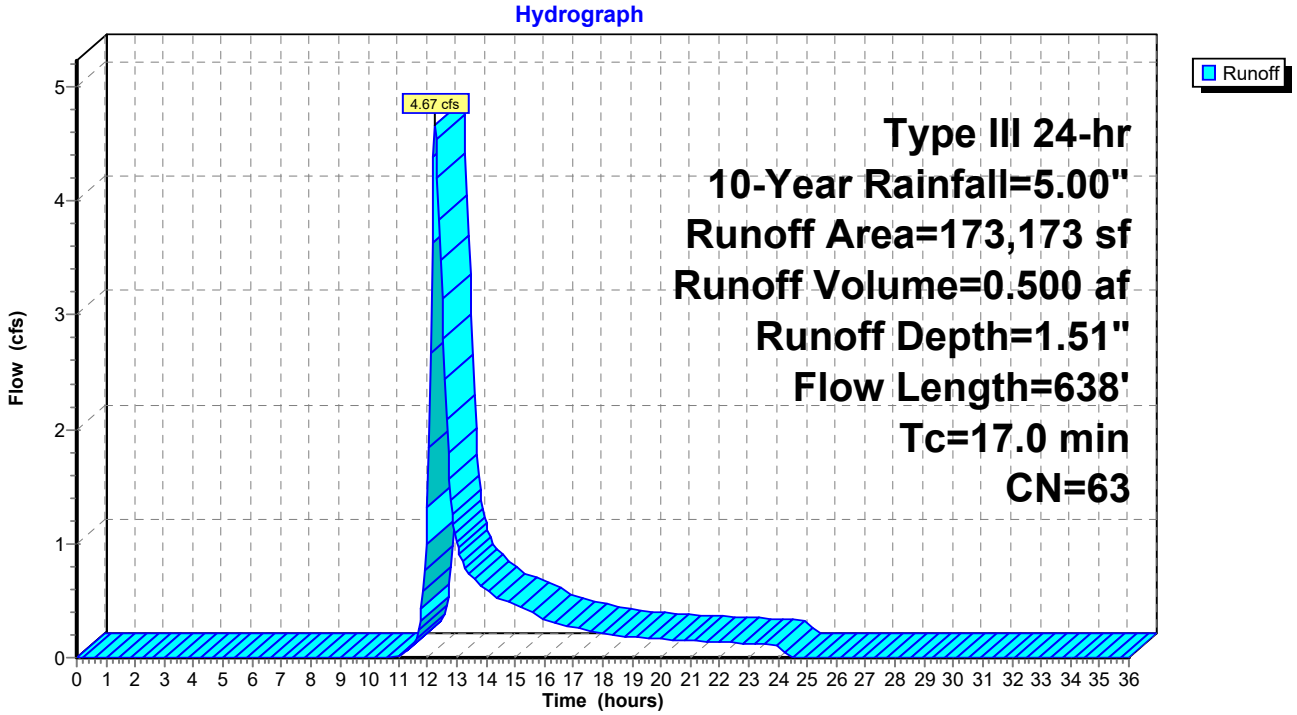
Runoff = 4.67 cfs @ 12.26 hrs, Volume= 0.500 af, Depth= 1.51"
Routed to Link POI #1 : POI #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.00"

	Area (sf)	CN	Description
	158,310	61	>75% Grass cover, Good, HSG B
*	5,648	61	Emergency Access Road (Perv.), Good, HSG B
*	9,215	98	Emergency Access Road (Imp.), HSG B
	173,173	63	Weighted Average
	163,958		94.68% Pervious Area
	9,215		5.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	150	0.1200	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
4.8	488	0.0578	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	638	Total			

Subcatchment DA #1B: Drainage Area #1B



Hydrograph for Subcatchment DA #1B: Drainage Area #1B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.05	0.00	0.00
1.50	0.08	0.00	0.00
2.00	0.10	0.00	0.00
2.50	0.13	0.00	0.00
3.00	0.15	0.00	0.00
3.50	0.18	0.00	0.00
4.00	0.22	0.00	0.00
4.50	0.25	0.00	0.00
5.00	0.28	0.00	0.00
5.50	0.32	0.00	0.00
6.00	0.36	0.00	0.00
6.50	0.40	0.00	0.00
7.00	0.45	0.00	0.00
7.50	0.51	0.00	0.00
8.00	0.57	0.00	0.00
8.50	0.64	0.00	0.00
9.00	0.73	0.00	0.00
9.50	0.83	0.00	0.00
10.00	0.95	0.00	0.00
10.50	1.08	0.00	0.00
11.00	1.25	0.00	0.00
11.50	1.49	0.02	0.11
12.00	2.50	0.24	**1.32**
12.50	3.51	0.66	**3.15**
13.00	3.75	0.79	1.02
13.50	3.92	0.87	0.71
14.00	4.06	0.95	0.60
14.50	4.17	1.01	0.52
15.00	4.27	1.07	0.46
15.50	4.36	1.12	0.40
16.00	4.43	1.16	0.34
16.50	4.49	1.20	0.29
17.00	4.55	1.23	0.27
17.50	4.60	1.26	0.24
18.00	4.64	1.29	0.21
18.50	4.68	1.31	0.19
19.00	4.72	1.33	0.18
19.50	4.75	1.35	0.17
20.00	4.79	1.37	0.17
20.50	4.82	1.39	0.16
21.00	4.85	1.41	0.15
21.50	4.88	1.43	0.14
22.00	4.90	1.45	0.14
22.50	4.93	1.46	0.13
23.00	4.95	1.48	0.13
23.50	4.98	1.49	0.12
24.00	**5.00**	**1.51**	0.11
24.50	5.00	1.51	0.01
25.00	5.00	1.51	0.00
25.50	5.00	1.51	0.00
26.00	5.00	1.51	0.00
26.50	5.00	1.51	0.00
27.00	5.00	1.51	0.00
27.50	5.00	1.51	0.00
28.00	5.00	1.51	0.00
28.50	5.00	1.51	0.00
29.00	5.00	1.51	0.00
29.50	5.00	1.51	0.00
30.00	5.00	1.51	0.00
30.50	5.00	1.51	0.00
31.00	5.00	1.51	0.00
31.50	5.00	1.51	0.00
32.00	5.00	1.51	0.00
32.50	5.00	1.51	0.00
33.00	5.00	1.51	0.00
33.50	5.00	1.51	0.00
34.00	5.00	1.51	0.00
34.50	5.00	1.51	0.00
35.00	5.00	1.51	0.00
35.50	5.00	1.51	0.00
36.00	5.00	1.51	0.00

Summary for Subcatchment DA #1C: Drainage Area #1C

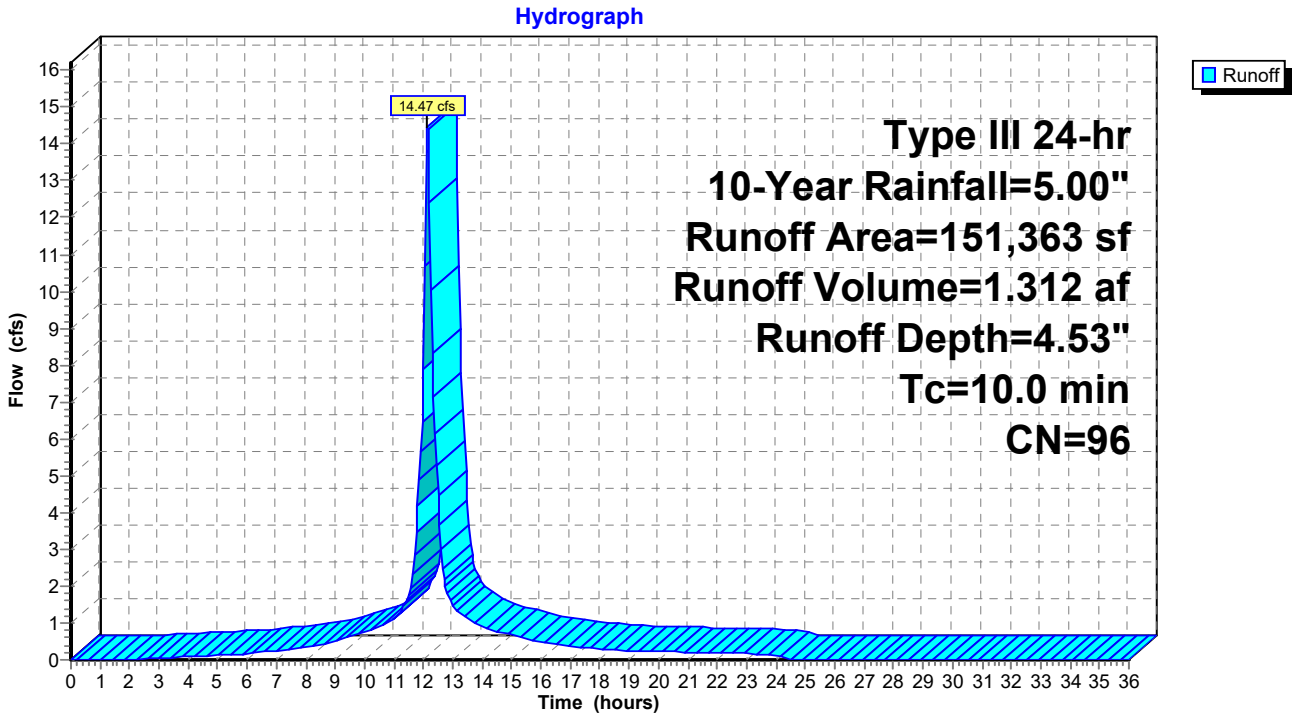
Runoff = 14.47 cfs @ 12.14 hrs, Volume= 1.312 af, Depth= 4.53"
Routed to Pond SMS #1C : SMS #1C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.00"

	Area (sf)	CN	Description
	9,732	61	>75% Grass cover, Good, HSG B
*	87,537	98	Building/Roof, HSG B
*	50,809	98	Pavement, HSG B
*	3,285	98	Sidewalk, HSG B
	151,363	96	Weighted Average
	9,732		6.43% Pervious Area
	141,631		93.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Direct Minimum**

Subcatchment DA #1C: Drainage Area #1C



Hydrograph for Subcatchment DA #1C: Drainage Area #1C

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.05	0.00	0.00
1.50	0.08	0.00	0.00
2.00	0.10	0.00	0.01
2.50	0.13	0.00	0.03
3.00	0.15	0.01	0.05
3.50	0.18	0.02	0.07
4.00	0.22	0.03	0.09
4.50	0.25	0.05	0.11
5.00	0.28	0.07	0.13
5.50	0.32	0.09	0.15
6.00	0.36	0.11	0.17
6.50	0.40	0.14	0.21
7.00	0.45	0.17	0.25
7.50	0.51	0.21	0.30
8.00	0.57	0.26	0.34
8.50	0.64	0.32	0.42
9.00	0.73	0.39	0.52
9.50	0.83	0.48	0.63
10.00	0.95	0.58	0.73
10.50	1.08	0.71	0.91
11.00	1.25	0.86	1.12
11.50	1.49	1.09	1.73
12.00	2.50	2.06	**7.87**
12.50	3.51	3.06	**4.46**
13.00	3.75	3.29	1.51
13.50	3.92	3.46	1.12
14.00	4.06	3.59	0.91
14.50	4.17	3.71	0.78
15.00	4.27	3.81	0.68
15.50	4.36	3.89	0.58
16.00	4.43	3.97	0.48
16.50	4.49	4.03	0.42
17.00	4.55	4.08	0.38
17.50	4.60	4.13	0.34
18.00	4.64	4.17	0.29
18.50	4.68	4.21	0.27
19.00	4.72	4.25	0.26
19.50	4.75	4.29	0.24
20.00	4.79	4.32	0.23
20.50	4.82	4.35	0.22
21.00	4.85	4.38	0.21
21.50	4.88	4.41	0.20
22.00	4.90	4.44	0.19
22.50	4.93	4.46	0.18
23.00	4.95	4.49	0.17
23.50	4.98	4.51	0.16
24.00	**5.00**	**4.53**	0.15
24.50	5.00	4.53	0.00
25.00	5.00	4.53	0.00
25.50	5.00	4.53	0.00
26.00	5.00	4.53	0.00
26.50	5.00	4.53	0.00
27.00	5.00	4.53	0.00
27.50	5.00	4.53	0.00
28.00	5.00	4.53	0.00
28.50	5.00	4.53	0.00
29.00	5.00	4.53	0.00
29.50	5.00	4.53	0.00
30.00	5.00	4.53	0.00
30.50	5.00	4.53	0.00
31.00	5.00	4.53	0.00
31.50	5.00	4.53	0.00
32.00	5.00	4.53	0.00
32.50	5.00	4.53	0.00
33.00	5.00	4.53	0.00
33.50	5.00	4.53	0.00
34.00	5.00	4.53	0.00
34.50	5.00	4.53	0.00
35.00	5.00	4.53	0.00
35.50	5.00	4.53	0.00
36.00	5.00	4.53	0.00

Summary for Subcatchment DA #2A: Drainage Area #2A

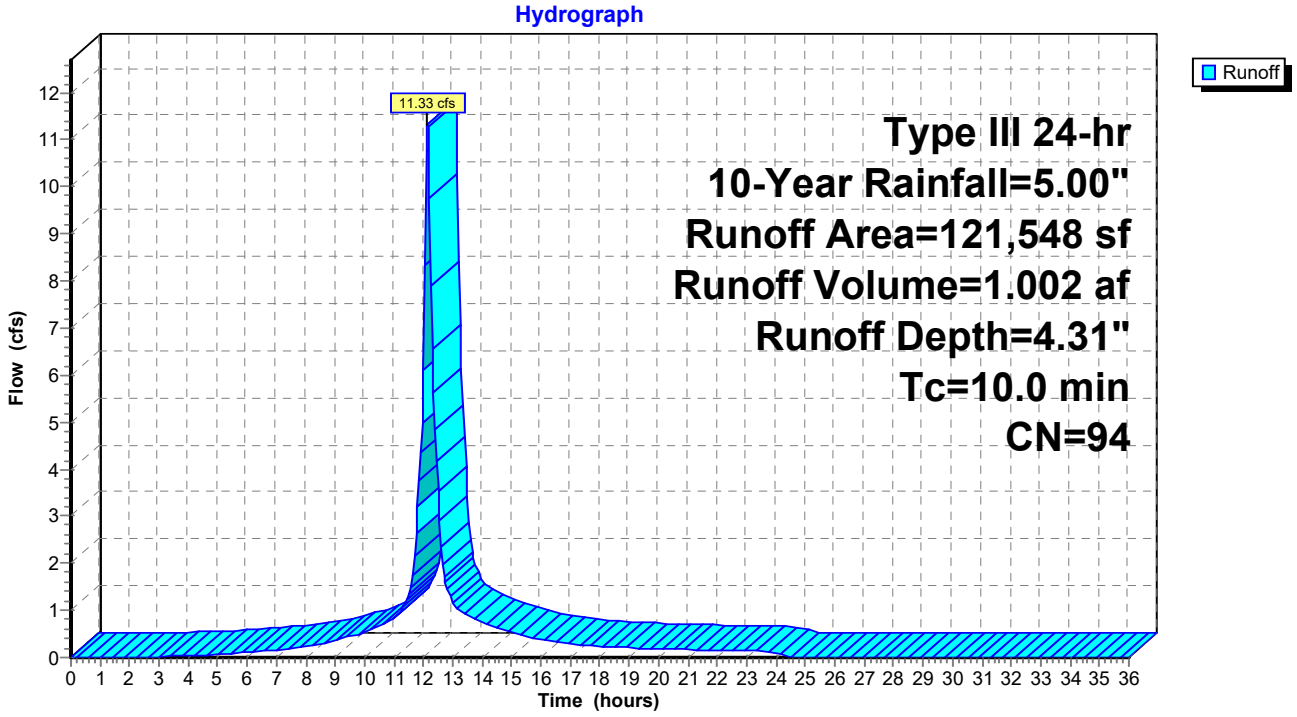
Runoff = 11.33 cfs @ 12.14 hrs, Volume= 1.002 af, Depth= 4.31"
Routed to Pond DB #2 : Drainage Basin #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.00"

	Area (sf)	CN	Description
*	48,398	98	Building/Roof, HSG B
*	45,328	98	Pavement, HSG B
*	1,404	98	Sidewalk, HSG B
	13,851	61	>75% Grass cover, Good, HSG B
*	12,567	98	Infiltration Basin, HSG B
	121,548	94	Weighted Average
	13,851		11.40% Pervious Area
	107,697		88.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #2A: Drainage Area #2A



Hydrograph for Subcatchment DA #2A: Drainage Area #2A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.05	0.00	0.00
1.50	0.08	0.00	0.00
2.00	0.10	0.00	0.00
2.50	0.13	0.00	0.00
3.00	0.15	0.00	0.01
3.50	0.18	0.00	0.02
4.00	0.22	0.01	0.04
4.50	0.25	0.02	0.05
5.00	0.28	0.03	0.07
5.50	0.32	0.04	0.08
6.00	0.36	0.06	0.10
6.50	0.40	0.08	0.12
7.00	0.45	0.11	0.16
7.50	0.51	0.14	0.19
8.00	0.57	0.18	0.23
8.50	0.64	0.23	0.29
9.00	0.73	0.29	0.36
9.50	0.83	0.37	0.44
10.00	0.95	0.46	0.53
10.50	1.08	0.57	0.67
11.00	1.25	0.72	0.84
11.50	1.49	0.93	1.31
12.00	2.50	1.87	**6.11**
12.50	3.51	2.85	**3.53**
13.00	3.75	3.08	1.20
13.50	3.92	3.24	0.89
14.00	4.06	3.38	0.73
14.50	4.17	3.49	0.62
15.00	4.27	3.59	0.54
15.50	4.36	3.68	0.46
16.00	4.43	3.75	0.38
16.50	4.49	3.81	0.34
17.00	4.55	3.86	0.30
17.50	4.60	3.91	0.27
18.00	4.64	3.95	0.23
18.50	4.68	3.99	0.21
19.00	4.72	4.03	0.20
19.50	4.75	4.06	0.19
20.00	4.79	4.10	0.18
20.50	4.82	4.13	0.17
21.00	4.85	4.16	0.17
21.50	4.88	4.19	0.16
22.00	4.90	4.21	0.15
22.50	4.93	4.24	0.14
23.00	4.95	4.26	0.14
23.50	4.98	4.29	0.13
24.00	**5.00**	**4.31**	0.12
24.50	5.00	4.31	0.00
25.00	5.00	4.31	0.00
25.50	5.00	4.31	0.00
26.00	5.00	4.31	0.00
26.50	5.00	4.31	0.00
27.00	5.00	4.31	0.00
27.50	5.00	4.31	0.00
28.00	5.00	4.31	0.00
28.50	5.00	4.31	0.00
29.00	5.00	4.31	0.00
29.50	5.00	4.31	0.00
30.00	5.00	4.31	0.00
30.50	5.00	4.31	0.00
31.00	5.00	4.31	0.00
31.50	5.00	4.31	0.00
32.00	5.00	4.31	0.00
32.50	5.00	4.31	0.00
33.00	5.00	4.31	0.00
33.50	5.00	4.31	0.00
34.00	5.00	4.31	0.00
34.50	5.00	4.31	0.00
35.00	5.00	4.31	0.00
35.50	5.00	4.31	0.00
36.00	5.00	4.31	0.00

Summary for Subcatchment DA #2B: Drainage Area #2B

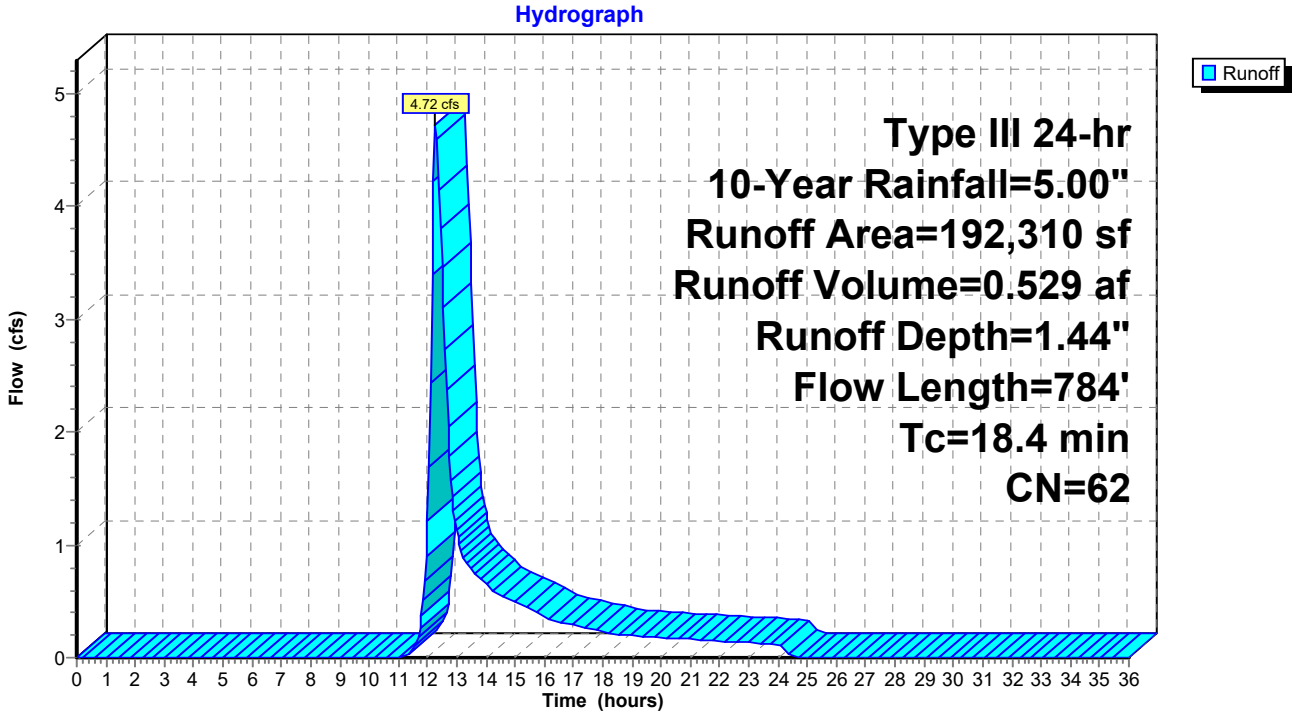
Runoff = 4.72 cfs @ 12.28 hrs, Volume= 0.529 af, Depth= 1.44"
Routed to Link POI #2 : POI #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.00"

	Area (sf)	CN	Description
	187,035	61	>75% Grass cover, Good, HSG B
*	2,004	61	Emergency Access Road (Perv.), Good, HSG B
*	3,271	98	Emergency Acess Road (Imp.), HSG B
	192,310	62	Weighted Average
	189,039		98.30% Pervious Area
	3,271		1.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	150	0.0667	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
3.0	634	0.2524	3.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
18.4	784	Total			

Subcatchment DA #2B: Drainage Area #2B



Hydrograph for Subcatchment DA #2B: Drainage Area #2B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.05	0.00	0.00
1.50	0.08	0.00	0.00
2.00	0.10	0.00	0.00
2.50	0.13	0.00	0.00
3.00	0.15	0.00	0.00
3.50	0.18	0.00	0.00
4.00	0.22	0.00	0.00
4.50	0.25	0.00	0.00
5.00	0.28	0.00	0.00
5.50	0.32	0.00	0.00
6.00	0.36	0.00	0.00
6.50	0.40	0.00	0.00
7.00	0.45	0.00	0.00
7.50	0.51	0.00	0.00
8.00	0.57	0.00	0.00
8.50	0.64	0.00	0.00
9.00	0.73	0.00	0.00
9.50	0.83	0.00	0.00
10.00	0.95	0.00	0.00
10.50	1.08	0.00	0.00
11.00	1.25	0.00	0.00
11.50	1.49	0.01	0.08
12.00	2.50	0.22	**1.21**
12.50	3.51	0.62	**3.46**
13.00	3.75	0.74	1.13
13.50	3.92	0.82	0.77
14.00	4.06	0.89	0.65
14.50	4.17	0.96	0.56
15.00	4.27	1.01	0.50
15.50	4.36	1.06	0.43
16.00	4.43	1.10	0.37
16.50	4.49	1.14	0.32
17.00	4.55	1.17	0.29
17.50	4.60	1.20	0.26
18.00	4.64	1.22	0.23
18.50	4.68	1.24	0.21
19.00	4.72	1.27	0.20
19.50	4.75	1.29	0.19
20.00	4.79	1.31	0.18
20.50	4.82	1.33	0.17
21.00	4.85	1.35	0.16
21.50	4.88	1.36	0.16
22.00	4.90	1.38	0.15
22.50	4.93	1.40	0.14
23.00	4.95	1.41	0.14
23.50	4.98	1.42	0.13
24.00	**5.00**	**1.44**	0.12
24.50	5.00	1.44	0.01
25.00	5.00	1.44	0.00
25.50	5.00	1.44	0.00
26.00	5.00	1.44	0.00
26.50	5.00	1.44	0.00
27.00	5.00	1.44	0.00
27.50	5.00	1.44	0.00
28.00	5.00	1.44	0.00
28.50	5.00	1.44	0.00
29.00	5.00	1.44	0.00
29.50	5.00	1.44	0.00
30.00	5.00	1.44	0.00
30.50	5.00	1.44	0.00
31.00	5.00	1.44	0.00
31.50	5.00	1.44	0.00
32.00	5.00	1.44	0.00
32.50	5.00	1.44	0.00
33.00	5.00	1.44	0.00
33.50	5.00	1.44	0.00
34.00	5.00	1.44	0.00
34.50	5.00	1.44	0.00
35.00	5.00	1.44	0.00
35.50	5.00	1.44	0.00
36.00	5.00	1.44	0.00

Summary for Pond DB #2: Drainage Basin #2

Inflow Area = 2.790 ac, 88.60% Impervious, Inflow Depth = 4.31" for 10-Year event
Inflow = 11.33 cfs @ 12.14 hrs, Volume= 1.002 af
Outflow = 3.77 cfs @ 12.48 hrs, Volume= 1.002 af, Atten= 67%, Lag= 20.6 min
Discarded = 2.52 cfs @ 12.48 hrs, Volume= 0.877 af
Primary = 1.25 cfs @ 12.48 hrs, Volume= 0.124 af
Routed to Link POI #2 : POI #2

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 486.45' @ 12.48 hrs Surf.Area= 8,396 sf Storage= 10,061 cf

Plug-Flow detention time= 18.5 min calculated for 1.000 af (100% of inflow)
Center-of-Mass det. time= 18.4 min (795.6 - 777.2)

Volume	Invert	Avail.Storage	Storage Description
#1	485.00'	25,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

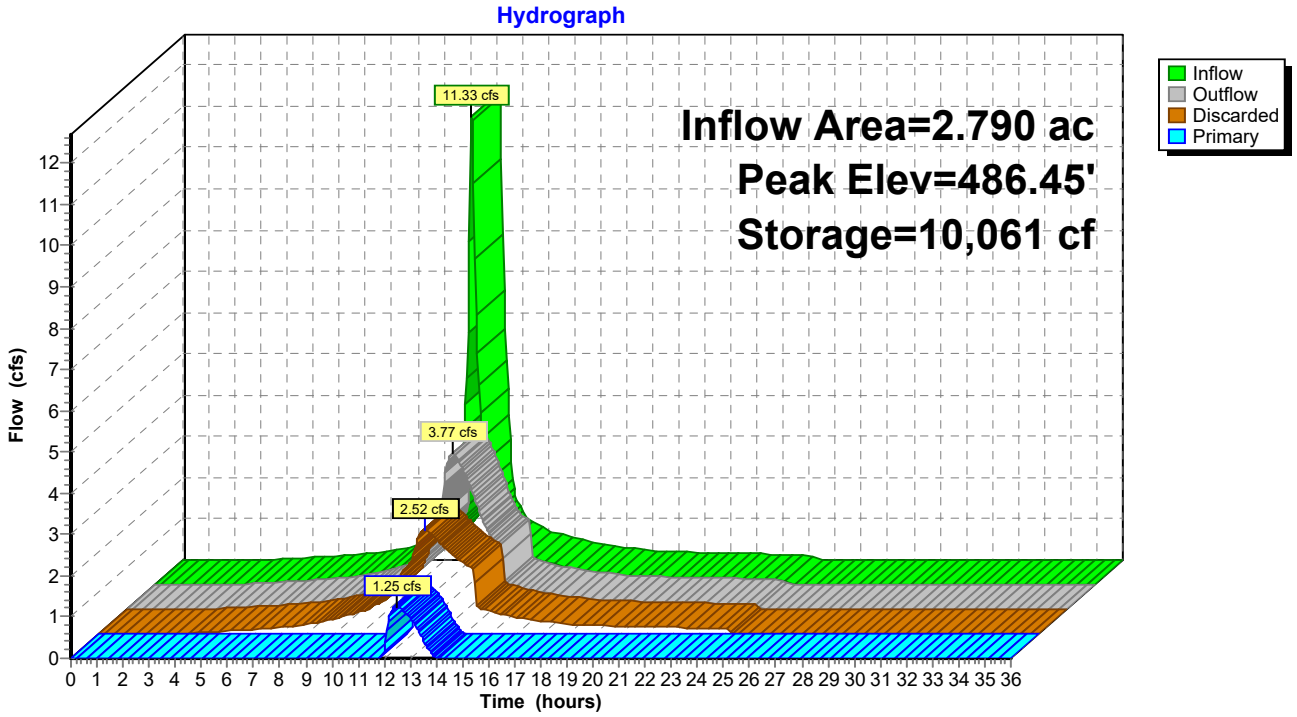
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
485.00	5,500	0	0
486.00	7,500	6,500	6,500
487.00	9,500	8,500	15,000
488.00	11,500	10,500	25,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	485.00'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 470.00'
#2	Primary	485.21'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	486.70'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

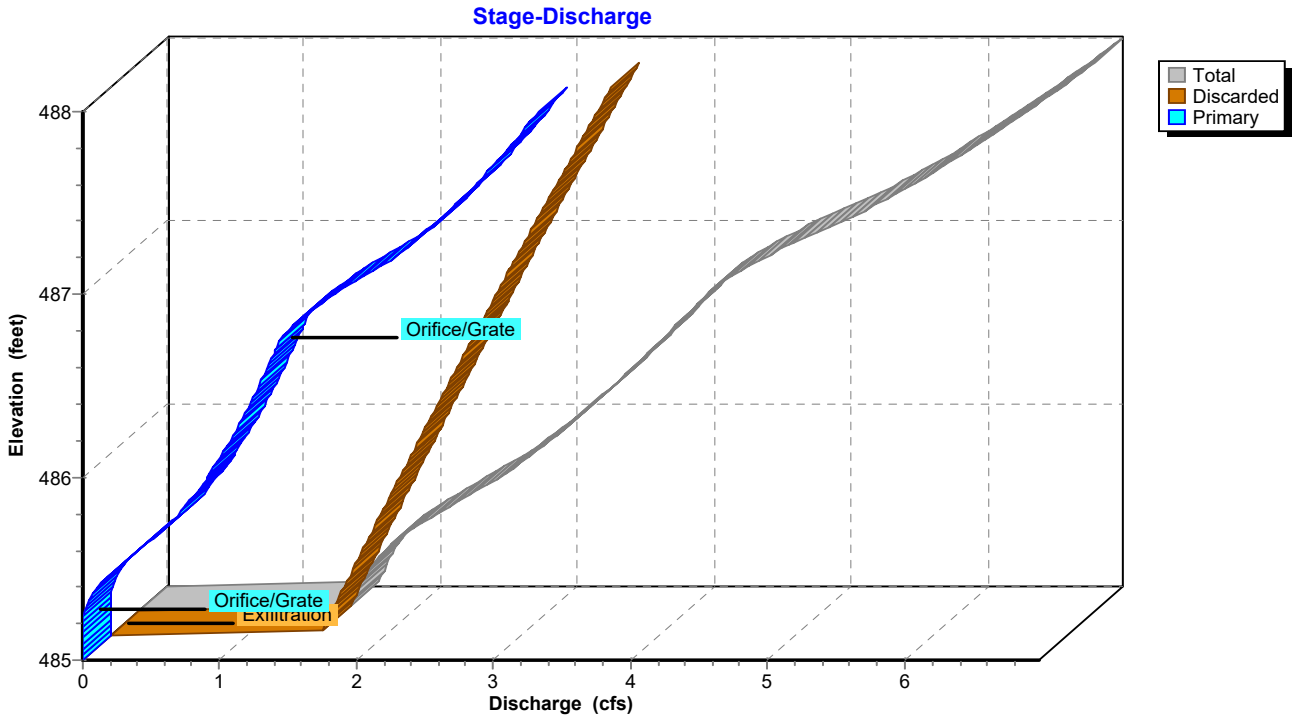
Discarded OutFlow Max=2.52 cfs @ 12.48 hrs HW=486.45' (Free Discharge)
└**1=Exfiltration** (Controls 2.52 cfs)

Primary OutFlow Max=1.25 cfs @ 12.48 hrs HW=486.45' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 1.25 cfs @ 4.68 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

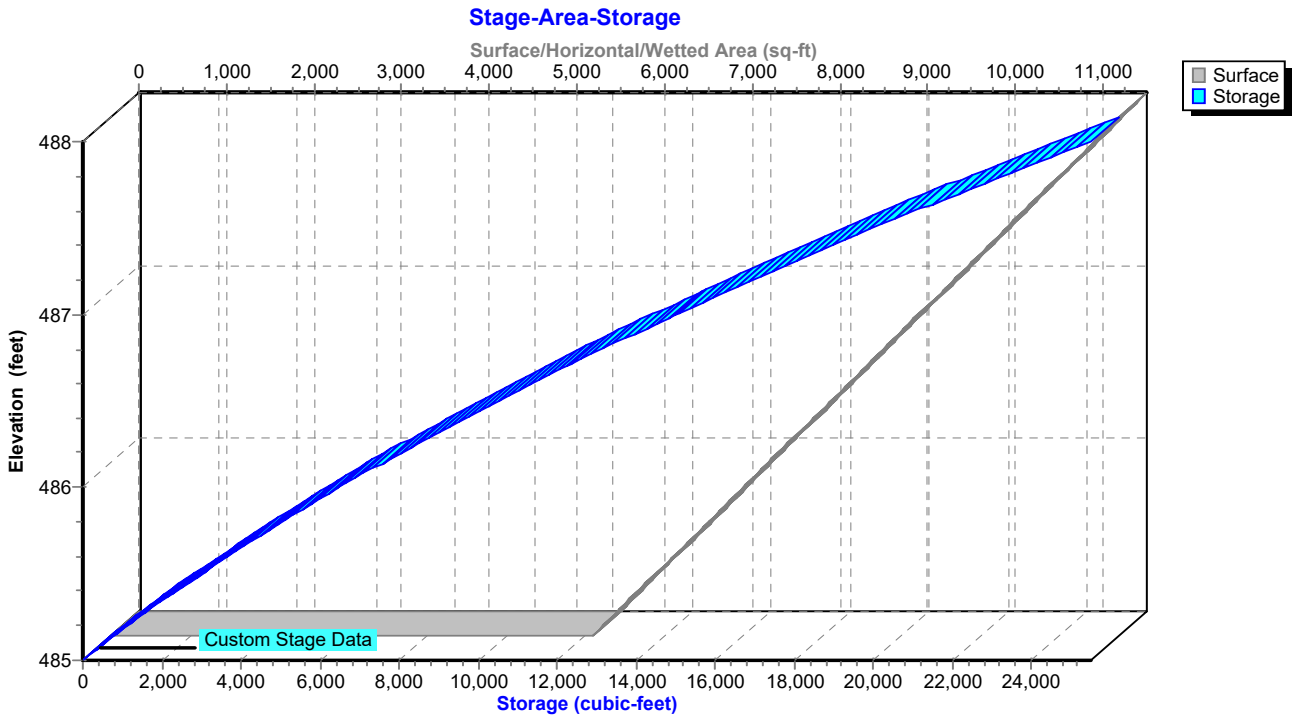
Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Hydrograph for Pond DB #2: Drainage Basin #2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	485.00	0.00	0.00	0.00
1.00	0.00	0	485.00	0.00	0.00	0.00
2.00	0.00	0	485.00	0.00	0.00	0.00
3.00	0.01	1	485.00	0.01	0.01	0.00
4.00	0.04	4	485.00	0.04	0.04	0.00
5.00	0.07	7	485.00	0.07	0.07	0.00
6.00	0.10	11	485.00	0.10	0.10	0.00
7.00	0.16	16	485.00	0.15	0.15	0.00
8.00	0.23	24	485.00	0.22	0.22	0.00
9.00	0.36	38	485.01	0.36	0.36	0.00
10.00	0.53	56	485.01	0.52	0.52	0.00
11.00	0.84	89	485.02	0.83	0.83	0.00
12.00	**6.11**	**2,601**	**485.44**	**1.98**	**1.82**	**0.16**
13.00	**1.20**	**6,996**	**486.07**	**3.21**	**2.25**	**0.97**
14.00	0.73	1,609	485.28	1.73	1.71	0.02
15.00	0.54	59	485.01	0.55	0.55	0.00
16.00	0.38	42	485.01	0.39	0.39	0.00
17.00	0.30	33	485.01	0.30	0.30	0.00
18.00	0.23	25	485.00	0.23	0.23	0.00
19.00	0.20	22	485.00	0.20	0.20	0.00
20.00	0.18	20	485.00	0.18	0.18	0.00
21.00	0.17	18	485.00	0.17	0.17	0.00
22.00	0.15	16	485.00	0.15	0.15	0.00
23.00	0.14	15	485.00	0.14	0.14	0.00
24.00	0.12	13	485.00	0.12	0.12	0.00
25.00	0.00	0	485.00	0.00	0.00	0.00
26.00	0.00	0	485.00	0.00	0.00	0.00
27.00	0.00	0	485.00	0.00	0.00	0.00
28.00	0.00	0	485.00	0.00	0.00	0.00
29.00	0.00	0	485.00	0.00	0.00	0.00
30.00	0.00	0	485.00	0.00	0.00	0.00
31.00	0.00	0	485.00	0.00	0.00	0.00
32.00	0.00	0	485.00	0.00	0.00	0.00
33.00	0.00	0	485.00	0.00	0.00	0.00
34.00	0.00	0	485.00	0.00	0.00	0.00
35.00	0.00	0	485.00	0.00	0.00	0.00
36.00	0.00	0	485.00	0.00	0.00	0.00

Stage-Discharge for Pond DB #2: Drainage Basin #2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
485.00	0.00	0.00	0.00
485.05	1.56	1.56	0.00
485.10	1.59	1.59	0.00
485.15	1.63	1.63	0.00
485.20	1.66	1.66	0.00
485.25	1.70	1.69	0.01
485.30	1.75	1.73	0.03
485.35	1.82	1.76	0.06
485.40	1.91	1.79	0.11
485.45	2.00	1.83	0.17
485.50	2.10	1.86	0.24
485.55	2.22	1.89	0.32
485.60	2.33	1.93	0.40
485.65	2.45	1.96	0.49
485.70	2.57	2.00	0.57
485.75	2.68	2.03	0.65
485.80	2.77	2.06	0.70
485.85	2.86	2.10	0.76
485.90	2.95	2.13	0.81
485.95	3.03	2.17	0.86
486.00	3.11	2.20	0.91
486.05	3.19	2.24	0.95
486.10	3.27	2.27	1.00
486.15	3.34	2.31	1.04
486.20	3.42	2.34	1.08
486.25	3.49	2.38	1.11
486.30	3.56	2.41	1.15
486.35	3.63	2.45	1.19
486.40	3.70	2.48	1.22
486.45	3.77	2.52	1.25
486.50	3.84	2.55	1.29
486.55	3.91	2.59	1.32
486.60	3.97	2.62	1.35
486.65	4.04	2.66	1.38
486.70	4.10	2.70	1.41
486.75	4.18	2.73	1.45
486.80	4.27	2.77	1.50
486.85	4.37	2.80	1.57
486.90	4.49	2.84	1.65
486.95	4.61	2.88	1.73
487.00	4.75	2.91	1.83
487.05	4.89	2.95	1.94
487.10	5.03	2.99	2.05
487.15	5.18	3.02	2.16
487.20	5.32	3.06	2.26
487.25	5.46	3.10	2.36
487.30	5.57	3.13	2.44
487.35	5.69	3.17	2.52
487.40	5.80	3.21	2.60
487.45	5.91	3.24	2.67
487.50	6.02	3.28	2.74
487.55	6.12	3.32	2.80
487.60	6.22	3.35	2.87
487.65	6.32	3.39	2.93
487.70	6.42	3.43	2.99
487.75	6.52	3.47	3.05
487.80	6.61	3.50	3.11
487.85	6.71	3.54	3.16
487.90	6.80	3.58	3.22
487.95	6.89	3.62	3.27
488.00	**6.98**	**3.65**	**3.33**

Stage-Area-Storage for Pond DB #2: Drainage Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
485.00	5,500	0
485.05	5,600	278
485.10	5,700	560
485.15	5,800	847
485.20	5,900	1,140
485.25	6,000	1,438
485.30	6,100	1,740
485.35	6,200	2,048
485.40	6,300	2,360
485.45	6,400	2,677
485.50	6,500	3,000
485.55	6,600	3,328
485.60	6,700	3,660
485.65	6,800	3,997
485.70	6,900	4,340
485.75	7,000	4,688
485.80	7,100	5,040
485.85	7,200	5,398
485.90	7,300	5,760
485.95	7,400	6,127
486.00	7,500	6,500
486.05	7,600	6,878
486.10	7,700	7,260
486.15	7,800	7,647
486.20	7,900	8,040
486.25	8,000	8,438
486.30	8,100	8,840
486.35	8,200	9,248
486.40	8,300	9,660
486.45	8,400	10,077
486.50	8,500	10,500
486.55	8,600	10,928
486.60	8,700	11,360
486.65	8,800	11,797
486.70	8,900	12,240
486.75	9,000	12,688
486.80	9,100	13,140
486.85	9,200	13,598
486.90	9,300	14,060
486.95	9,400	14,527
487.00	9,500	15,000
487.05	9,600	15,478
487.10	9,700	15,960
487.15	9,800	16,447
487.20	9,900	16,940
487.25	10,000	17,438
487.30	10,100	17,940
487.35	10,200	18,448
487.40	10,300	18,960
487.45	10,400	19,477
487.50	10,500	20,000
487.55	10,600	20,528
487.60	10,700	21,060
487.65	10,800	21,597
487.70	10,900	22,140
487.75	11,000	22,688
487.80	11,100	23,240
487.85	11,200	23,798
487.90	11,300	24,360
487.95	11,400	24,927
488.00	**11,500**	**25,500**

Summary for Pond SMS #1A: SMS #1A

Inflow Area = 3.863 ac, 91.78% Impervious, Inflow Depth = 4.42" for 10-Year event
Inflow = 15.90 cfs @ 12.14 hrs, Volume= 1.423 af
Outflow = 3.96 cfs @ 12.56 hrs, Volume= 1.423 af, Atten= 75%, Lag= 25.3 min
Discarded = 2.21 cfs @ 12.56 hrs, Volume= 1.223 af
Primary = 1.75 cfs @ 12.56 hrs, Volume= 0.200 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 494.82' @ 12.56 hrs Surf.Area= 7,503 sf Storage= 17,012 cf

Plug-Flow detention time= 32.2 min calculated for 1.423 af (100% of inflow)
Center-of-Mass det. time= 32.2 min (804.1 - 771.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	491.75'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	492.50'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	491.75'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	492.53'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	493.83'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	494.49'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	495.32'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	496.23'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.21 cfs @ 12.56 hrs HW=494.82' (Free Discharge)
└**1=Exfiltration** (Controls 2.21 cfs)

Primary OutFlow Max=1.75 cfs @ 12.56 hrs HW=494.82' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.95 cfs @ 6.95 fps)
├**3=Orifice/Grate** (Orifice Controls 0.58 cfs @ 4.25 fps)
├**4=Orifice/Grate** (Orifice Controls 0.23 cfs @ 1.95 fps)
├**5=Orifice/Grate** (Controls 0.00 cfs)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1A: SMS #1A - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

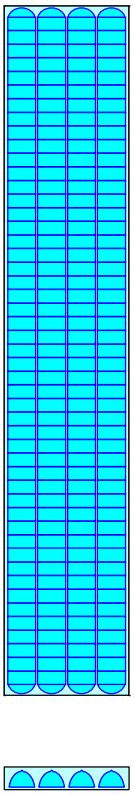
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

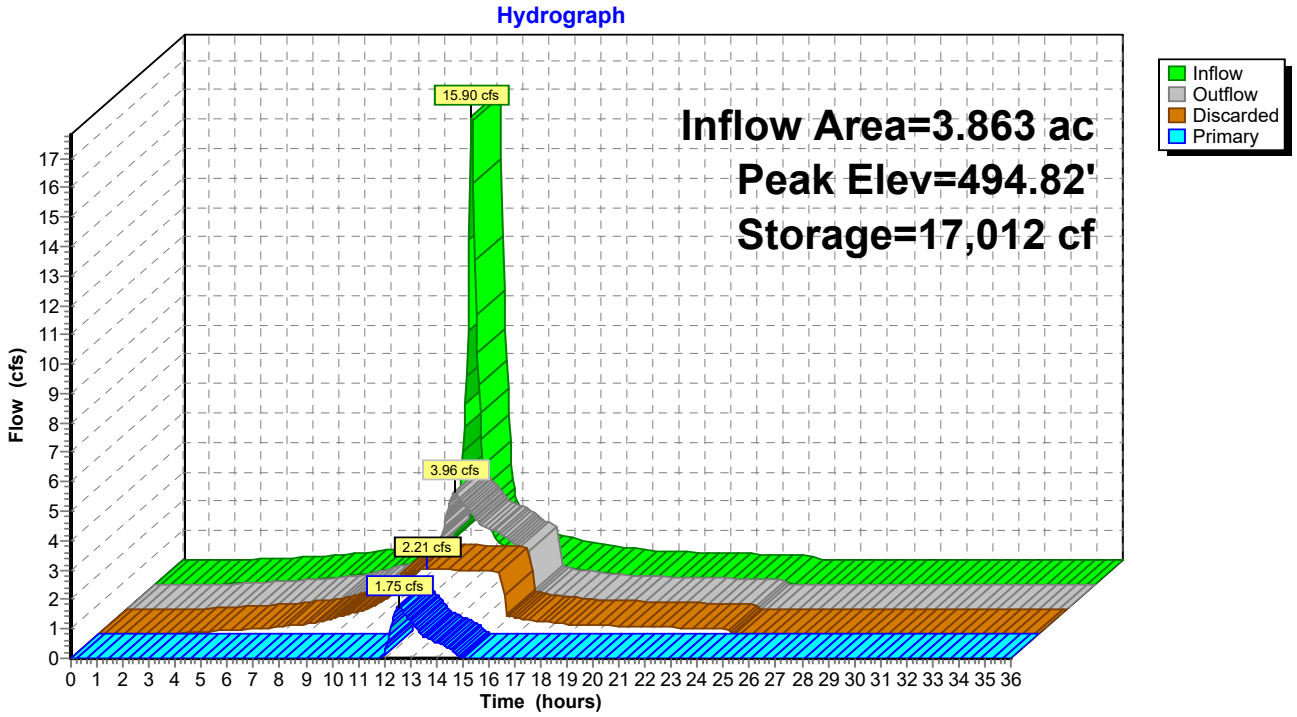
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

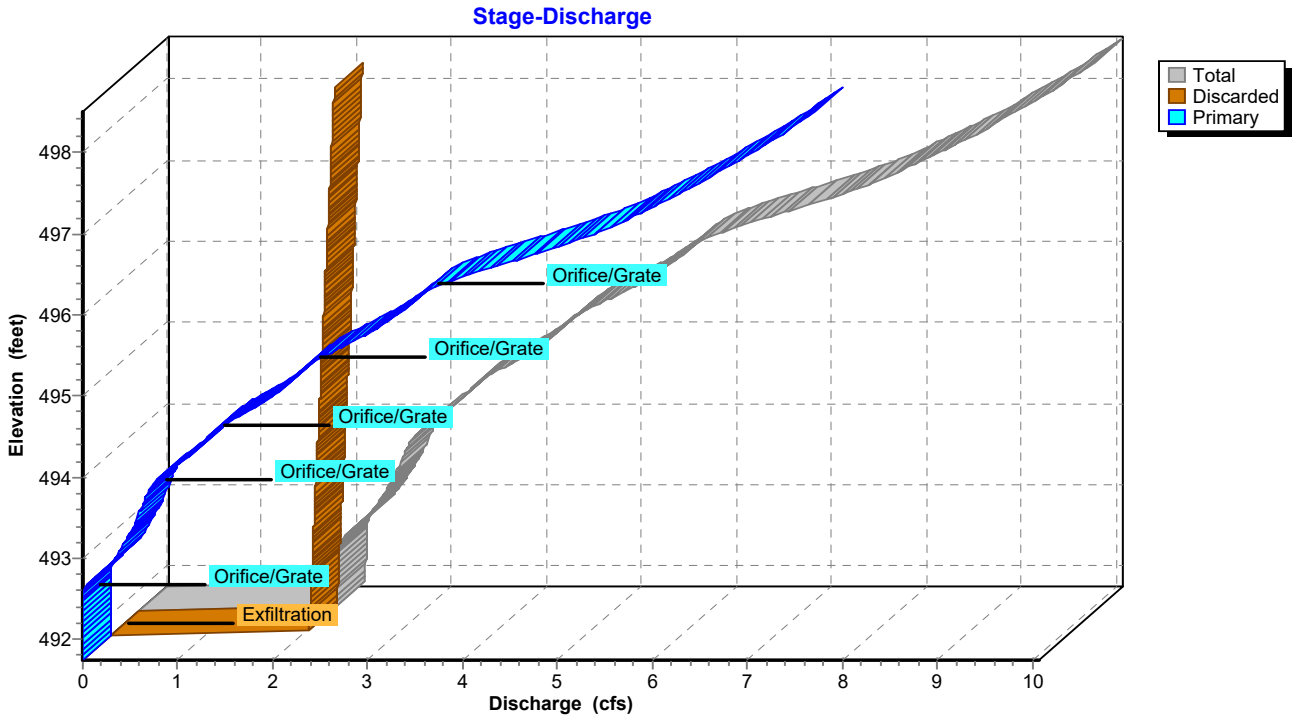
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



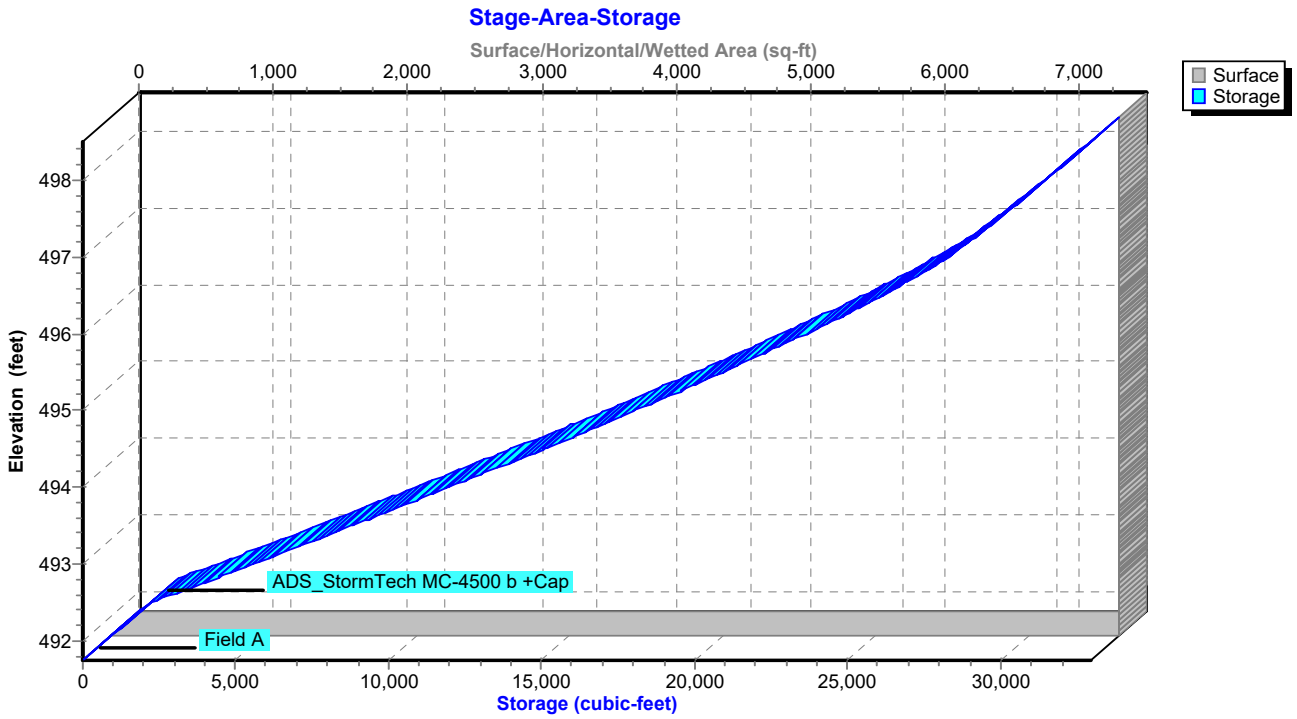
Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Hydrograph for Pond SMS #1A: SMS #1A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	491.75	0.00	0.00	0.00
1.00	0.00	0	491.75	0.00	0.00	0.00
2.00	0.00	0	491.75	0.00	0.00	0.00
3.00	0.03	3	491.75	0.03	0.03	0.00
4.00	0.07	7	491.75	0.07	0.07	0.00
5.00	0.12	11	491.75	0.12	0.12	0.00
6.00	0.16	16	491.76	0.16	0.16	0.00
7.00	0.25	24	491.76	0.24	0.24	0.00
8.00	0.35	33	491.76	0.34	0.34	0.00
9.00	0.54	52	491.77	0.54	0.54	0.00
10.00	0.78	75	491.77	0.77	0.77	0.00
11.00	1.21	116	491.79	1.19	1.19	0.00
12.00	**8.61**	**3,975**	**492.76**	**2.25**	**2.12**	**0.13**
13.00	**1.67**	**14,775**	**494.45**	**3.47**	**2.19**	**1.28**
14.00	1.01	8,501	493.46	2.71	2.15	0.56
15.00	0.76	2,849	492.59	2.13	2.12	0.01
16.00	0.53	52	491.77	0.54	0.54	0.00
17.00	0.42	41	491.76	0.42	0.42	0.00
18.00	0.32	32	491.76	0.33	0.33	0.00
19.00	0.28	28	491.76	0.28	0.28	0.00
20.00	0.26	25	491.76	0.26	0.26	0.00
21.00	0.23	23	491.76	0.23	0.23	0.00
22.00	0.21	21	491.76	0.21	0.21	0.00
23.00	0.19	18	491.76	0.19	0.19	0.00
24.00	0.17	16	491.76	0.17	0.17	0.00
25.00	0.00	0	491.75	0.00	0.00	0.00
26.00	0.00	0	491.75	0.00	0.00	0.00
27.00	0.00	0	491.75	0.00	0.00	0.00
28.00	0.00	0	491.75	0.00	0.00	0.00
29.00	0.00	0	491.75	0.00	0.00	0.00
30.00	0.00	0	491.75	0.00	0.00	0.00
31.00	0.00	0	491.75	0.00	0.00	0.00
32.00	0.00	0	491.75	0.00	0.00	0.00
33.00	0.00	0	491.75	0.00	0.00	0.00
34.00	0.00	0	491.75	0.00	0.00	0.00
35.00	0.00	0	491.75	0.00	0.00	0.00
36.00	0.00	0	491.75	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1A: SMS #1A

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
491.75	0.00	0.00	0.00
491.85	2.09	2.09	0.00
491.95	2.09	2.09	0.00
492.05	2.10	2.10	0.00
492.15	2.10	2.10	0.00
492.25	2.10	2.10	0.00
492.35	2.11	2.11	0.00
492.45	2.11	2.11	0.00
492.55	2.12	2.12	0.00
492.65	2.16	2.12	0.04
492.75	2.24	2.12	0.12
492.85	2.34	2.13	0.22
492.95	2.43	2.13	0.30
493.05	2.50	2.14	0.37
493.15	2.56	2.14	0.42
493.25	2.61	2.14	0.47
493.35	2.66	2.15	0.51
493.45	2.71	2.15	0.55
493.55	2.75	2.16	0.59
493.65	2.79	2.16	0.63
493.75	2.82	2.16	0.66
493.85	2.86	2.17	0.69
493.95	2.93	2.17	0.76
494.05	3.05	2.18	0.87
494.15	3.18	2.18	1.00
494.25	3.29	2.18	1.11
494.35	3.39	2.19	1.20
494.45	3.47	2.19	1.28
494.55	3.56	2.20	1.36
494.65	3.69	2.20	1.49
494.75	3.85	2.20	1.64
494.85	4.01	2.21	1.80
494.95	4.15	2.21	1.93
495.05	4.26	2.22	2.05
495.15	4.37	2.22	2.15
495.25	4.48	2.23	2.25
495.35	4.57	2.23	2.35
495.45	4.71	2.23	2.47
495.55	4.88	2.24	2.64
495.65	5.06	2.24	2.82
495.75	5.23	2.25	2.98
495.85	5.37	2.25	3.12
495.95	5.50	2.25	3.25
496.05	5.62	2.26	3.36
496.15	5.74	2.26	3.48
496.25	5.85	2.27	3.58
496.35	6.00	2.27	3.74
496.45	6.22	2.27	3.94
496.55	6.48	2.28	4.20
496.65	6.76	2.28	4.48
496.75	7.06	2.29	4.78
496.85	7.35	2.29	5.06
496.95	7.57	2.29	5.28
497.05	7.79	2.30	5.49
497.15	7.99	2.30	5.69
497.25	8.18	2.31	5.87
497.35	8.36	2.31	6.05
497.45	8.53	2.31	6.22
497.55	8.70	2.32	6.38
497.65	8.86	2.32	6.54
497.75	9.02	2.33	6.69
497.85	9.17	2.33	6.84
497.95	9.32	2.33	6.98
498.05	9.46	2.34	7.12
498.15	9.60	2.34	7.26
498.25	9.74	2.35	7.39
498.35	9.87	2.35	7.52
498.45	**10.00**	**2.35**	**7.65**

Stage-Area-Storage for Pond SMS #1A: SMS #1A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
491.75	**7,503**	0
491.85	7,503	300
491.95	7,503	600
492.05	7,503	900
492.15	7,503	1,200
492.25	7,503	1,501
492.35	7,503	1,801
492.45	7,503	2,101
492.55	7,503	2,582
492.65	7,503	3,243
492.75	7,503	3,902
492.85	7,503	4,560
492.95	7,503	5,216
493.05	7,503	5,871
493.15	7,503	6,523
493.25	7,503	7,173
493.35	7,503	7,822
493.45	7,503	8,468
493.55	7,503	9,111
493.65	7,503	9,752
493.75	7,503	10,391
493.85	7,503	11,026
493.95	7,503	11,658
494.05	7,503	12,288
494.15	7,503	12,914
494.25	7,503	13,537
494.35	7,503	14,155
494.45	7,503	14,770
494.55	7,503	15,381
494.65	7,503	15,988
494.75	7,503	16,590
494.85	7,503	17,188
494.95	7,503	17,781
495.05	7,503	18,369
495.15	7,503	18,952
495.25	7,503	19,530
495.35	7,503	20,101
495.45	7,503	20,667
495.55	7,503	21,226
495.65	7,503	21,779
495.75	7,503	22,324
495.85	7,503	22,862
495.95	7,503	23,393
496.05	7,503	23,915
496.15	7,503	24,428
496.25	7,503	24,932
496.35	7,503	25,426
496.45	7,503	25,909
496.55	7,503	26,381
496.65	7,503	26,840
496.75	7,503	27,285
496.85	7,503	27,713
496.95	7,503	28,121
497.05	7,503	28,501
497.15	7,503	28,850
497.25	7,503	29,181
497.35	7,503	29,504
497.45	7,503	29,817
497.55	7,503	30,119
497.65	7,503	30,419
497.75	7,503	30,719
497.85	7,503	31,019
497.95	7,503	31,319
498.05	7,503	31,620
498.15	7,503	31,920
498.25	7,503	32,220
498.35	7,503	32,520
498.45	7,503	**32,820**

Summary for Pond SMS #1C: SMS #1C

Inflow Area = 3.475 ac, 93.57% Impervious, Inflow Depth = 4.53" for 10-Year event
Inflow = 14.47 cfs @ 12.14 hrs, Volume= 1.312 af
Outflow = 3.70 cfs @ 12.55 hrs, Volume= 1.312 af, Atten= 74%, Lag= 24.8 min
Discarded = 2.19 cfs @ 12.55 hrs, Volume= 1.149 af
Primary = 1.51 cfs @ 12.55 hrs, Volume= 0.164 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 497.97' @ 12.55 hrs Surf.Area= 7,503 sf Storage= 14,914 cf

Plug-Flow detention time= 28.0 min calculated for 1.311 af (100% of inflow)
Center-of-Mass det. time= 28.0 min (794.1 - 766.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	495.25'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	496.00'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	495.25'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	496.09'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	496.92'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	497.83'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	498.75'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	499.67'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.19 cfs @ 12.55 hrs HW=497.97' (Free Discharge)
└**1=Exfiltration** (Controls 2.19 cfs)

Primary OutFlow Max=1.51 cfs @ 12.55 hrs HW=497.97' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.85 cfs @ 6.23 fps)
├**3=Orifice/Grate** (Orifice Controls 0.60 cfs @ 4.43 fps)
├**4=Orifice/Grate** (Orifice Controls 0.06 cfs @ 1.29 fps)
├**5=Orifice/Grate** (Controls 0.00 cfs)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1C: SMS #1C - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

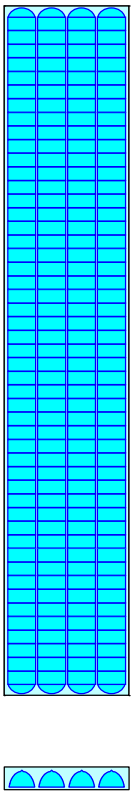
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

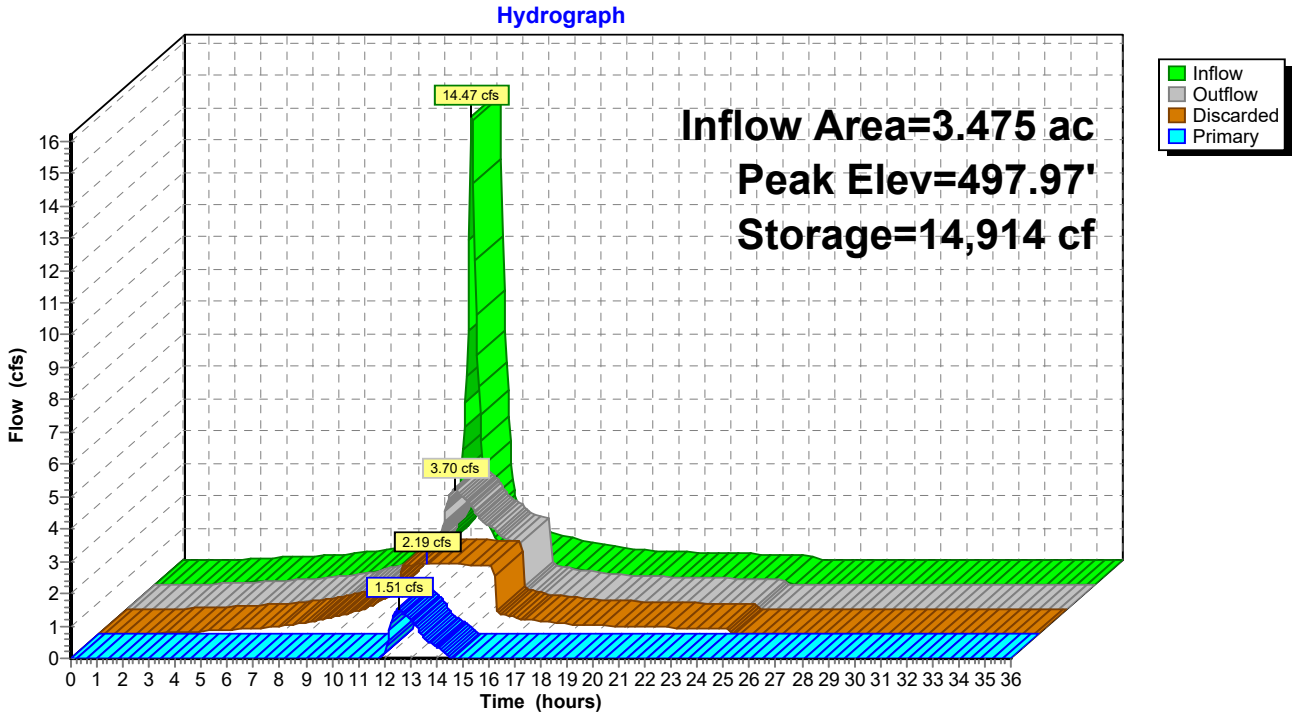
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

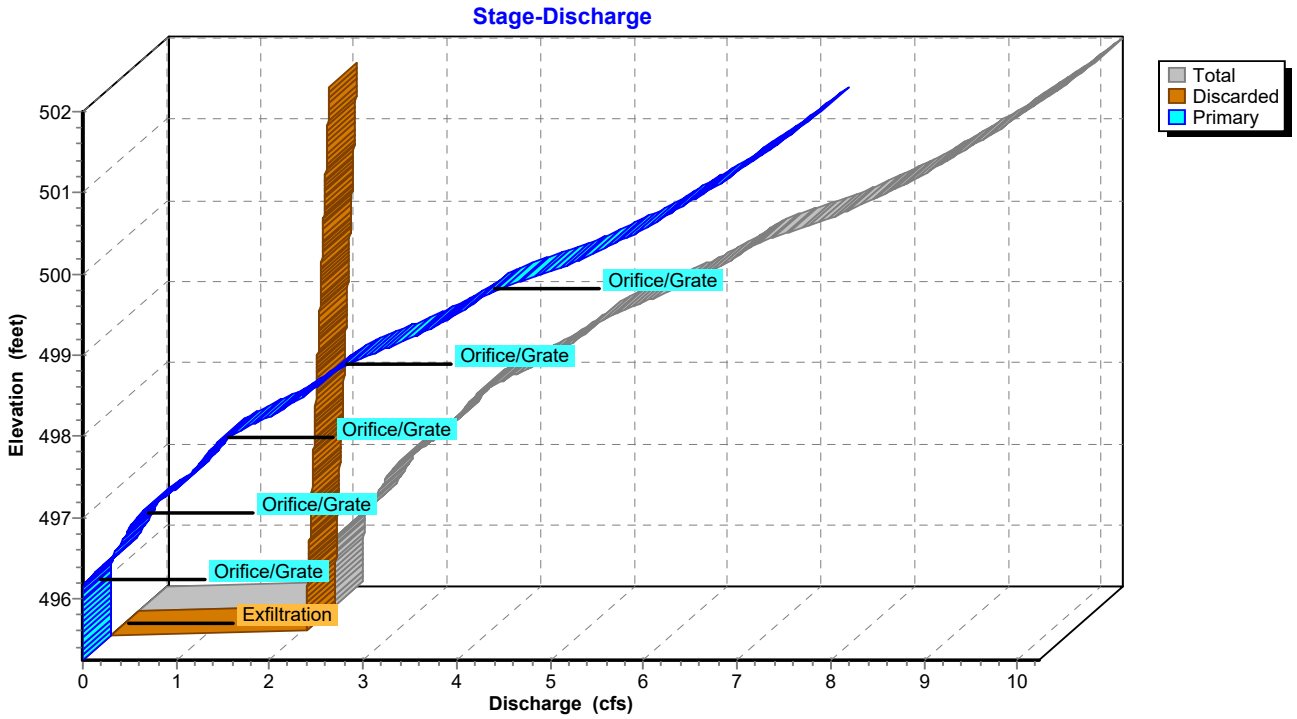
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



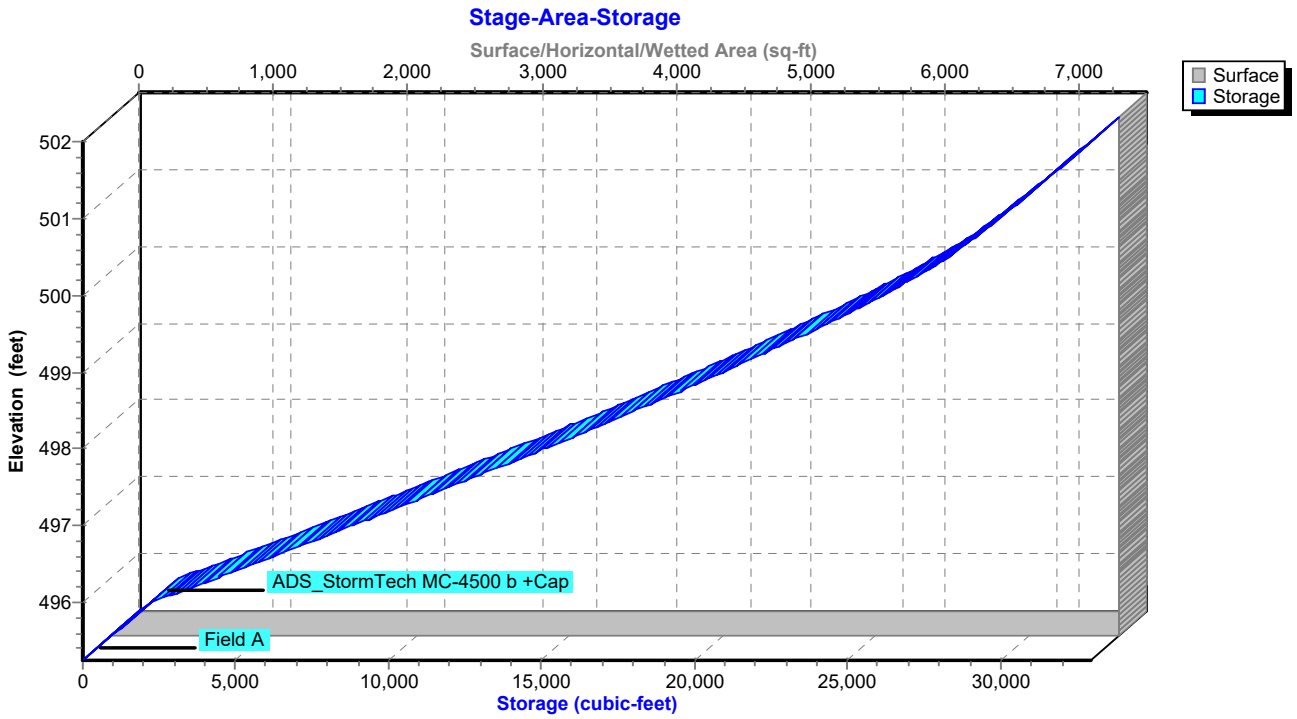
Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Hydrograph for Pond SMS #1C: SMS #1C

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	495.25	0.00	0.00	0.00
1.00	0.00	0	495.25	0.00	0.00	0.00
2.00	0.01	1	495.25	0.01	0.01	0.00
3.00	0.05	5	495.25	0.05	0.05	0.00
4.00	0.09	9	495.25	0.09	0.09	0.00
5.00	0.13	13	495.25	0.13	0.13	0.00
6.00	0.17	17	495.26	0.17	0.17	0.00
7.00	0.25	24	495.26	0.25	0.25	0.00
8.00	0.34	33	495.26	0.34	0.34	0.00
9.00	0.52	50	495.27	0.52	0.52	0.00
10.00	0.73	71	495.27	0.73	0.73	0.00
11.00	1.12	108	495.29	1.11	1.11	0.00
12.00	**7.87**	**3,432**	**496.18**	**2.14**	**2.12**	**0.02**
13.00	**1.51**	**12,614**	**497.60**	**3.37**	**2.17**	**1.20**
14.00	0.91	6,379	496.63	2.51	2.14	0.38
15.00	0.68	1,180	495.64	2.10	2.10	0.00
16.00	0.48	47	495.27	0.49	0.49	0.00
17.00	0.38	37	495.26	0.38	0.38	0.00
18.00	0.29	29	495.26	0.29	0.29	0.00
19.00	0.26	25	495.26	0.26	0.26	0.00
20.00	0.23	22	495.26	0.23	0.23	0.00
21.00	0.21	20	495.26	0.21	0.21	0.00
22.00	0.19	19	495.26	0.19	0.19	0.00
23.00	0.17	17	495.26	0.17	0.17	0.00
24.00	0.15	15	495.25	0.15	0.15	0.00
25.00	0.00	0	495.25	0.00	0.00	0.00
26.00	0.00	0	495.25	0.00	0.00	0.00
27.00	0.00	0	495.25	0.00	0.00	0.00
28.00	0.00	0	495.25	0.00	0.00	0.00
29.00	0.00	0	495.25	0.00	0.00	0.00
30.00	0.00	0	495.25	0.00	0.00	0.00
31.00	0.00	0	495.25	0.00	0.00	0.00
32.00	0.00	0	495.25	0.00	0.00	0.00
33.00	0.00	0	495.25	0.00	0.00	0.00
34.00	0.00	0	495.25	0.00	0.00	0.00
35.00	0.00	0	495.25	0.00	0.00	0.00
36.00	0.00	0	495.25	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1C: SMS #1C

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
495.25	0.00	0.00	0.00
495.35	2.09	2.09	0.00
495.45	2.09	2.09	0.00
495.55	2.10	2.10	0.00
495.65	2.10	2.10	0.00
495.75	2.10	2.10	0.00
495.85	2.11	2.11	0.00
495.95	2.11	2.11	0.00
496.05	2.11	2.11	0.00
496.15	2.13	2.12	0.01
496.25	2.19	2.12	0.07
496.35	2.28	2.13	0.16
496.45	2.39	2.13	0.26
496.55	2.46	2.13	0.33
496.65	2.53	2.14	0.39
496.75	2.58	2.14	0.44
496.85	2.63	2.14	0.49
496.95	2.68	2.15	0.53
497.05	2.77	2.15	0.61
497.15	2.89	2.16	0.73
497.25	3.03	2.16	0.87
497.35	3.15	2.16	0.98
497.45	3.24	2.17	1.08
497.55	3.33	2.17	1.16
497.65	3.41	2.17	1.24
497.75	3.49	2.18	1.31
497.85	3.56	2.18	1.38
497.95	3.67	2.19	1.48
498.05	3.82	2.19	1.63
498.15	4.01	2.19	1.81
498.25	4.20	2.20	2.00
498.35	4.36	2.20	2.16
498.45	4.50	2.20	2.29
498.55	4.62	2.21	2.42
498.65	4.74	2.21	2.53
498.75	4.85	2.22	2.64
498.85	4.99	2.22	2.77
498.95	5.17	2.22	2.95
499.05	5.39	2.23	3.16
499.15	5.61	2.23	3.38
499.25	5.81	2.23	3.58
499.35	5.99	2.24	3.75
499.45	6.15	2.24	3.91
499.55	6.30	2.25	4.05
499.65	6.44	2.25	4.19
499.75	6.60	2.25	4.34
499.85	6.80	2.26	4.54
499.95	7.04	2.26	4.78
500.05	7.29	2.27	5.03
500.15	7.53	2.27	5.26
500.25	7.73	2.27	5.46
500.35	7.92	2.28	5.64
500.45	8.10	2.28	5.82
500.55	8.27	2.28	5.98
500.65	8.43	2.29	6.14
500.75	8.58	2.29	6.29
500.85	8.73	2.30	6.44
500.95	8.88	2.30	6.58
501.05	9.02	2.30	6.72
501.15	9.16	2.31	6.85
501.25	9.30	2.31	6.99
501.35	9.43	2.31	7.11
501.45	9.56	2.32	7.24
501.55	9.68	2.32	7.36
501.65	9.81	2.33	7.48
501.75	9.93	2.33	7.60
501.85	10.05	2.33	7.72
501.95	**10.17**	**2.34**	**7.83**

Stage-Area-Storage for Pond SMS #1C: SMS #1C

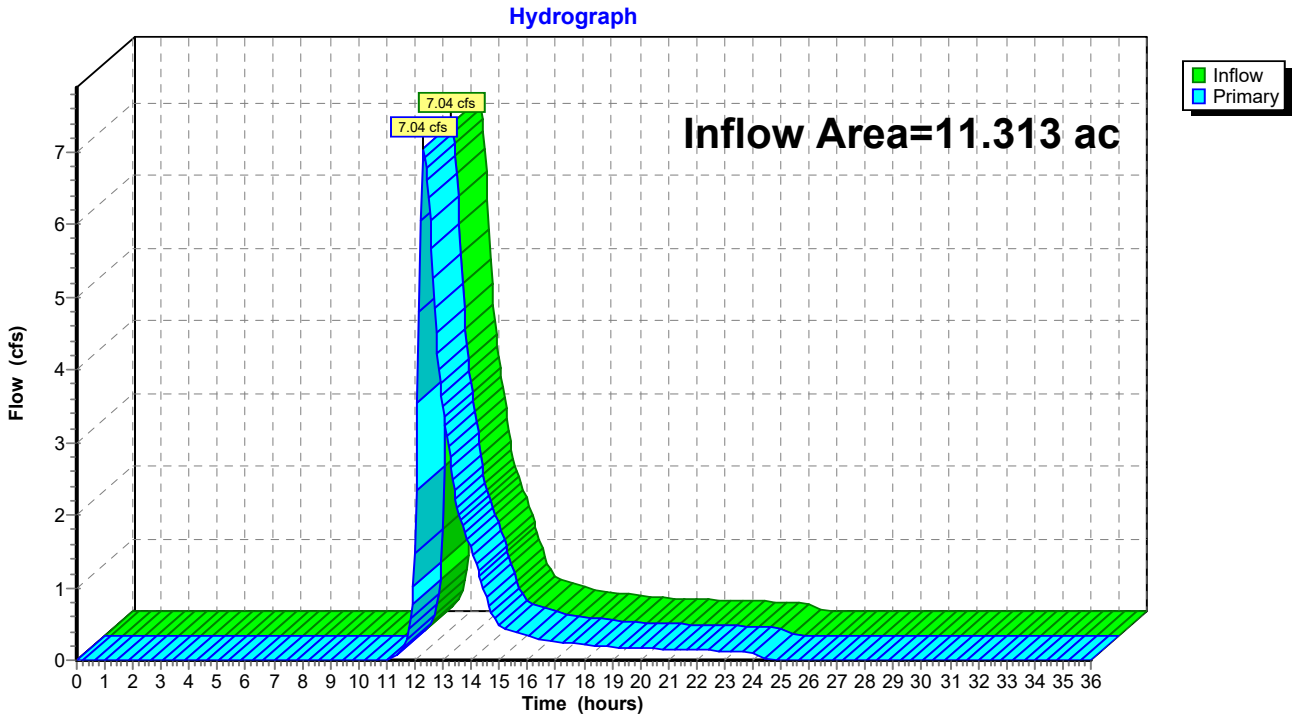
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
495.25	**7,503**	0
495.35	7,503	300
495.45	7,503	600
495.55	7,503	900
495.65	7,503	1,200
495.75	7,503	1,501
495.85	7,503	1,801
495.95	7,503	2,101
496.05	7,503	2,582
496.15	7,503	3,243
496.25	7,503	3,902
496.35	7,503	4,560
496.45	7,503	5,216
496.55	7,503	5,871
496.65	7,503	6,523
496.75	7,503	7,173
496.85	7,503	7,822
496.95	7,503	8,468
497.05	7,503	9,111
497.15	7,503	9,752
497.25	7,503	10,391
497.35	7,503	11,026
497.45	7,503	11,658
497.55	7,503	12,288
497.65	7,503	12,914
497.75	7,503	13,537
497.85	7,503	14,155
497.95	7,503	14,770
498.05	7,503	15,381
498.15	7,503	15,988
498.25	7,503	16,590
498.35	7,503	17,188
498.45	7,503	17,781
498.55	7,503	18,369
498.65	7,503	18,952
498.75	7,503	19,530
498.85	7,503	20,101
498.95	7,503	20,667
499.05	7,503	21,226
499.15	7,503	21,779
499.25	7,503	22,324
499.35	7,503	22,862
499.45	7,503	23,393
499.55	7,503	23,915
499.65	7,503	24,428
499.75	7,503	24,932
499.85	7,503	25,426
499.95	7,503	25,909
500.05	7,503	26,381
500.15	7,503	26,840
500.25	7,503	27,285
500.35	7,503	27,713
500.45	7,503	28,121
500.55	7,503	28,501
500.65	7,503	28,850
500.75	7,503	29,181
500.85	7,503	29,504
500.95	7,503	29,817
501.05	7,503	30,119
501.15	7,503	30,419
501.25	7,503	30,719
501.35	7,503	31,019
501.45	7,503	31,319
501.55	7,503	31,620
501.65	7,503	31,920
501.75	7,503	32,220
501.85	7,503	32,520
501.95	7,503	**32,820**

Summary for Link POI #1: POI #1

Inflow Area = 11.313 ac, 61.95% Impervious, Inflow Depth = 0.92" for 10-Year event
Inflow = 7.04 cfs @ 12.30 hrs, Volume= 0.864 af
Primary = 7.04 cfs @ 12.30 hrs, Volume= 0.864 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #1: POI #1



Hydrograph for Link POI #1: POI #1

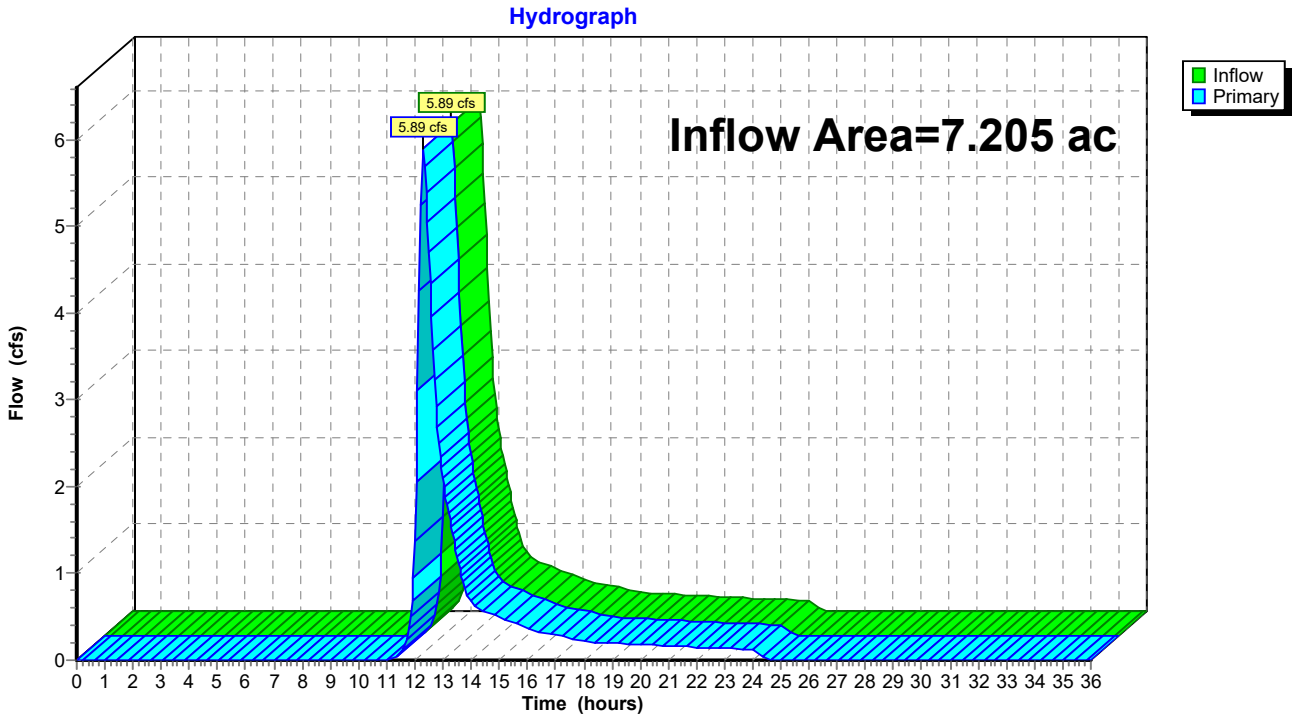
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.11	0.00	0.11
12.00	**1.47**	0.00	**1.47**
12.50	**6.37**	0.00	**6.37**
13.00	3.50	0.00	3.50
13.50	2.10	0.00	2.10
14.00	1.53	0.00	1.53
14.50	0.89	0.00	0.89
15.00	0.47	0.00	0.47
15.50	0.40	0.00	0.40
16.00	0.34	0.00	0.34
16.50	0.29	0.00	0.29
17.00	0.27	0.00	0.27
17.50	0.24	0.00	0.24
18.00	0.21	0.00	0.21
18.50	0.19	0.00	0.19
19.00	0.18	0.00	0.18
19.50	0.17	0.00	0.17
20.00	0.17	0.00	0.17
20.50	0.16	0.00	0.16
21.00	0.15	0.00	0.15
21.50	0.14	0.00	0.14
22.00	0.14	0.00	0.14
22.50	0.13	0.00	0.13
23.00	0.13	0.00	0.13
23.50	0.12	0.00	0.12
24.00	0.11	0.00	0.11
24.50	0.01	0.00	0.01
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Summary for Link POI #2: POI #2

Inflow Area = 7.205 ac, 35.36% Impervious, Inflow Depth = 1.09" for 10-Year event
Inflow = 5.89 cfs @ 12.29 hrs, Volume= 0.654 af
Primary = 5.89 cfs @ 12.29 hrs, Volume= 0.654 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #2: POI #2



Hydrograph for Link POI #2: POI #2

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.08	0.00	0.08
12.00	**1.36**	0.00	**1.36**
12.50	**4.71**	0.00	**4.71**
13.00	2.10	0.00	2.10
13.50	1.20	0.00	1.20
14.00	0.67	0.00	0.67
14.50	0.56	0.00	0.56
15.00	0.50	0.00	0.50
15.50	0.43	0.00	0.43
16.00	0.37	0.00	0.37
16.50	0.32	0.00	0.32
17.00	0.29	0.00	0.29
17.50	0.26	0.00	0.26
18.00	0.23	0.00	0.23
18.50	0.21	0.00	0.21
19.00	0.20	0.00	0.20
19.50	0.19	0.00	0.19
20.00	0.18	0.00	0.18
20.50	0.17	0.00	0.17
21.00	0.16	0.00	0.16
21.50	0.16	0.00	0.16
22.00	0.15	0.00	0.15
22.50	0.14	0.00	0.14
23.00	0.14	0.00	0.14
23.50	0.13	0.00	0.13
24.00	0.12	0.00	0.12
24.50	0.01	0.00	0.01
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 #1A: Drainage Area #1A Runoff Area=168,262 sf 91.78% Impervious Runoff Depth=5.41"
Tc=10.0 min CN=95 Runoff=19.26 cfs 1.742 af

Subcatchment DA #1B: Drainage Area #1B Runoff Area=173,173 sf 5.32% Impervious Runoff Depth=2.18"
Flow Length=638' Tc=17.0 min CN=63 Runoff=6.99 cfs 0.721 af

Subcatchment DA #1C: Drainage Area Runoff Area=151,363 sf 93.57% Impervious Runoff Depth=5.53"
Tc=10.0 min CN=96 Runoff=17.47 cfs 1.601 af

Subcatchment DA #2A: Drainage Area #2A Runoff Area=121,548 sf 88.60% Impervious Runoff Depth=5.30"
Tc=10.0 min CN=94 Runoff=13.77 cfs 1.232 af

Subcatchment DA #2B: Drainage Area #2B Runoff Area=192,310 sf 1.70% Impervious Runoff Depth=2.09"
Flow Length=784' Tc=18.4 min CN=62 Runoff=7.19 cfs 0.769 af

Pond DB #2: Drainage Basin #2 Peak Elev=486.80' Storage=13,164 cf Inflow=13.77 cfs 1.232 af
Discarded=2.77 cfs 1.052 af Primary=1.50 cfs 0.179 af Outflow=4.27 cfs 1.231 af

Pond SMS #1A: SMS #1A Peak Elev=495.58' Storage=21,399 cf Inflow=19.26 cfs 1.742 af
Discarded=2.24 cfs 1.415 af Primary=2.70 cfs 0.327 af Outflow=4.93 cfs 1.742 af

Pond SMS #1C: SMS #1C Peak Elev=498.60' Storage=18,686 cf Inflow=17.47 cfs 1.601 af
Discarded=2.21 cfs 1.328 af Primary=2.48 cfs 0.272 af Outflow=4.69 cfs 1.601 af

Link POI #1: POI #1 Inflow=10.80 cfs 1.321 af
Primary=10.80 cfs 1.321 af

Link POI #2: POI #2 Inflow=8.52 cfs 0.948 af
Primary=8.52 cfs 0.948 af

Total Runoff Area = 18.518 ac Runoff Volume = 6.064 af Average Runoff Depth = 3.93"
48.40% Pervious = 8.963 ac 51.60% Impervious = 9.556 ac

Summary for Subcatchment DA #1A: Drainage Area #1A

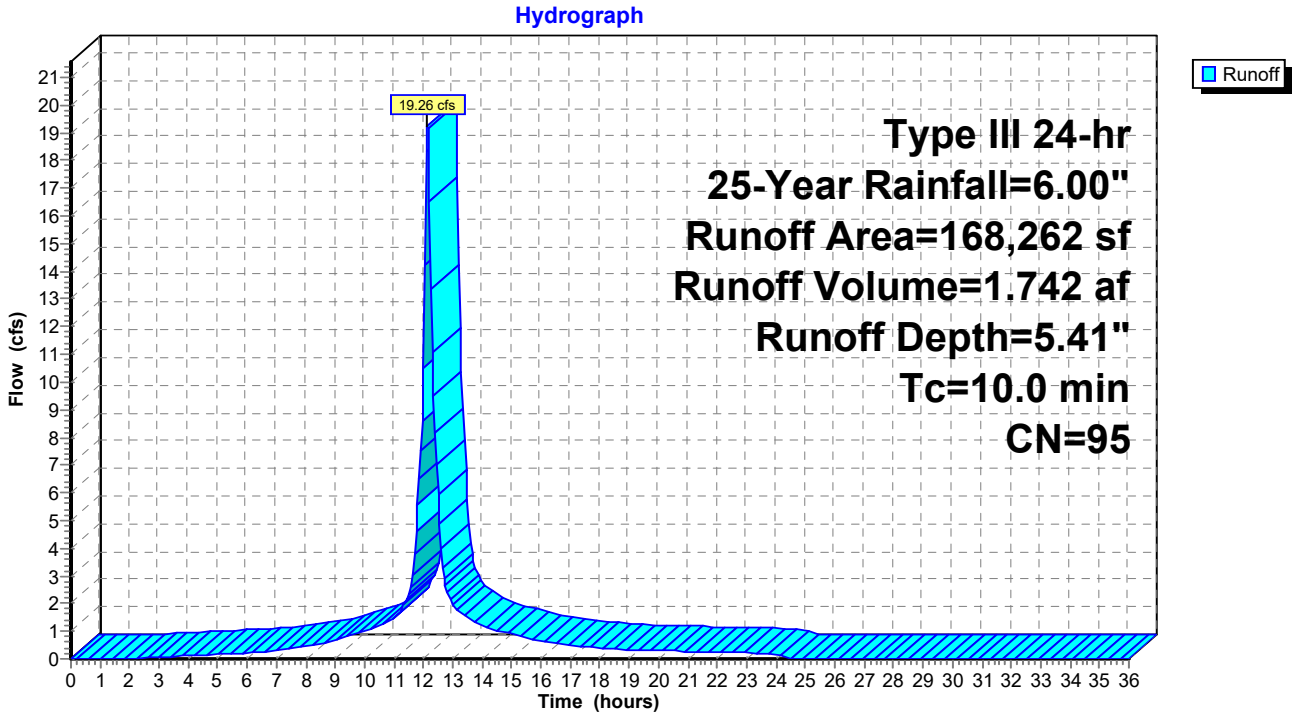
Runoff = 19.26 cfs @ 12.14 hrs, Volume= 1.742 af, Depth= 5.41"
Routed to Pond SMS #1A : SMS #1A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
	10,723	61	>75% Grass cover, Good, HSG B
*	3,112	61	Emergency Access Road (Perv.), Good, HSG B
*	86,043	98	Building/Roof, HSG B
*	60,366	98	Pavement, HSG B
*	2,940	98	Sidewalk, HSG B
*	5,078	98	Emergency Access Road (Imp.), HSG B
	168,262	95	Weighted Average
	13,835		8.22% Pervious Area
	154,427		91.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #1A: Drainage Area #1A



Hydrograph for Subcatchment DA #1A: Drainage Area #1A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.06	0.00	0.00
1.50	0.09	0.00	0.00
2.00	0.12	0.00	0.01
2.50	0.15	0.00	0.03
3.00	0.18	0.01	0.06
3.50	0.22	0.02	0.08
4.00	0.26	0.03	0.11
4.50	0.30	0.05	0.14
5.00	0.34	0.07	0.17
5.50	0.39	0.10	0.20
6.00	0.43	0.13	0.22
6.50	0.48	0.16	0.27
7.00	0.54	0.20	0.33
7.50	0.61	0.25	0.39
8.00	0.68	0.30	0.45
8.50	0.77	0.37	0.56
9.00	0.87	0.46	0.69
9.50	1.00	0.56	0.83
10.00	1.13	0.68	0.97
10.50	1.30	0.83	1.21
11.00	1.50	1.01	1.49
11.50	1.79	1.28	2.30
12.00	3.00	2.45	**10.47**
12.50	4.21	3.64	**5.94**
13.00	4.50	3.92	2.01
13.50	4.70	4.12	1.50
14.00	4.87	4.29	1.22
14.50	5.00	4.42	1.04
15.00	5.13	4.54	0.91
15.50	5.23	4.65	0.78
16.00	5.32	4.73	0.64
16.50	5.39	4.81	0.56
17.00	5.46	4.87	0.50
17.50	5.52	4.93	0.45
18.00	5.57	4.98	0.39
18.50	5.61	5.03	0.36
19.00	5.66	5.07	0.34
19.50	5.70	5.12	0.32
20.00	5.74	5.16	0.31
20.50	5.78	5.19	0.29
21.00	5.82	5.23	0.28
21.50	5.85	5.26	0.27
22.00	5.88	5.30	0.25
22.50	5.92	5.33	0.24
23.00	5.95	5.36	0.23
23.50	5.97	5.39	0.21
24.00	**6.00**	**5.41**	0.20
24.50	6.00	5.41	0.00
25.00	6.00	5.41	0.00
25.50	6.00	5.41	0.00
26.00	6.00	5.41	0.00
26.50	6.00	5.41	0.00
27.00	6.00	5.41	0.00
27.50	6.00	5.41	0.00
28.00	6.00	5.41	0.00
28.50	6.00	5.41	0.00
29.00	6.00	5.41	0.00
29.50	6.00	5.41	0.00
30.00	6.00	5.41	0.00
30.50	6.00	5.41	0.00
31.00	6.00	5.41	0.00
31.50	6.00	5.41	0.00
32.00	6.00	5.41	0.00
32.50	6.00	5.41	0.00
33.00	6.00	5.41	0.00
33.50	6.00	5.41	0.00
34.00	6.00	5.41	0.00
34.50	6.00	5.41	0.00
35.00	6.00	5.41	0.00
35.50	6.00	5.41	0.00
36.00	6.00	5.41	0.00

Summary for Subcatchment DA #1B: Drainage Area #1B

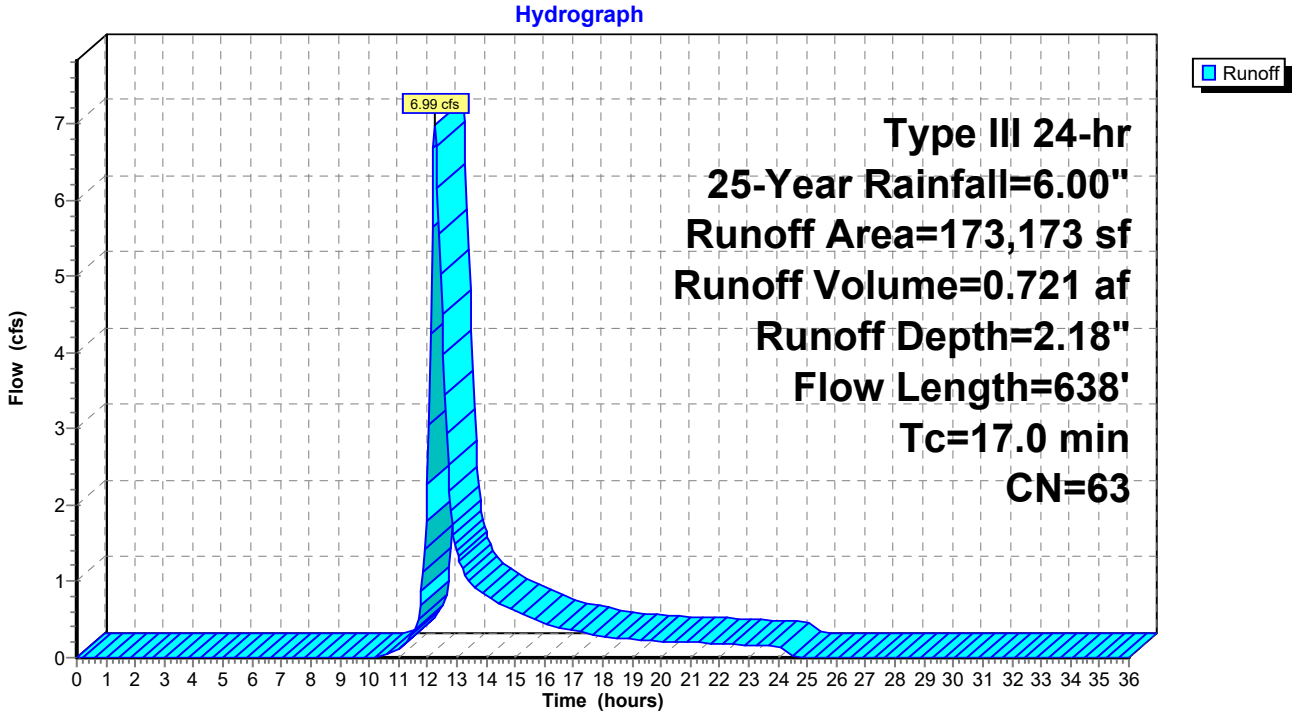
Runoff = 6.99 cfs @ 12.25 hrs, Volume= 0.721 af, Depth= 2.18"
Routed to Link POI #1 : POI #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
	158,310	61	>75% Grass cover, Good, HSG B
*	5,648	61	Emergency Access Road (Perv.), Good, HSG B
*	9,215	98	Emergency Access Road (Imp.), HSG B
	173,173	63	Weighted Average
	163,958		94.68% Pervious Area
	9,215		5.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	150	0.1200	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
4.8	488	0.0578	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	638	Total			

Subcatchment DA #1B: Drainage Area #1B



Hydrograph for Subcatchment DA #1B: Drainage Area #1B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.06	0.00	0.00
1.50	0.09	0.00	0.00
2.00	0.12	0.00	0.00
2.50	0.15	0.00	0.00
3.00	0.18	0.00	0.00
3.50	0.22	0.00	0.00
4.00	0.26	0.00	0.00
4.50	0.30	0.00	0.00
5.00	0.34	0.00	0.00
5.50	0.39	0.00	0.00
6.00	0.43	0.00	0.00
6.50	0.48	0.00	0.00
7.00	0.54	0.00	0.00
7.50	0.61	0.00	0.00
8.00	0.68	0.00	0.00
8.50	0.77	0.00	0.00
9.00	0.87	0.00	0.00
9.50	1.00	0.00	0.00
10.00	1.13	0.00	0.00
10.50	1.30	0.00	0.02
11.00	1.50	0.02	0.11
11.50	1.79	0.06	0.32
12.00	3.00	0.43	**2.27**
12.50	4.21	1.04	**4.50**
13.00	4.50	1.20	1.41
13.50	4.70	1.32	0.98
14.00	4.87	1.42	0.82
14.50	5.00	1.51	0.70
15.00	5.13	1.59	0.62
15.50	5.23	1.66	0.54
16.00	5.32	1.71	0.46
16.50	5.39	1.76	0.39
17.00	5.46	1.81	0.36
17.50	5.52	1.85	0.32
18.00	5.57	1.88	0.28
18.50	5.61	1.91	0.25
19.00	5.66	1.94	0.24
19.50	5.70	1.97	0.23
20.00	5.74	2.00	0.22
20.50	5.78	2.02	0.21
21.00	5.82	2.05	0.20
21.50	5.85	2.07	0.19
22.00	5.88	2.10	0.18
22.50	5.92	2.12	0.17
23.00	5.95	2.14	0.17
23.50	5.97	2.16	0.16
24.00	**6.00**	**2.18**	0.15
24.50	6.00	2.18	0.01
25.00	6.00	2.18	0.00
25.50	6.00	2.18	0.00
26.00	6.00	2.18	0.00
26.50	6.00	2.18	0.00
27.00	6.00	2.18	0.00
27.50	6.00	2.18	0.00
28.00	6.00	2.18	0.00
28.50	6.00	2.18	0.00
29.00	6.00	2.18	0.00
29.50	6.00	2.18	0.00
30.00	6.00	2.18	0.00
30.50	6.00	2.18	0.00
31.00	6.00	2.18	0.00
31.50	6.00	2.18	0.00
32.00	6.00	2.18	0.00
32.50	6.00	2.18	0.00
33.00	6.00	2.18	0.00
33.50	6.00	2.18	0.00
34.00	6.00	2.18	0.00
34.50	6.00	2.18	0.00
35.00	6.00	2.18	0.00
35.50	6.00	2.18	0.00
36.00	6.00	2.18	0.00

Summary for Subcatchment DA #1C: Drainage Area #1C

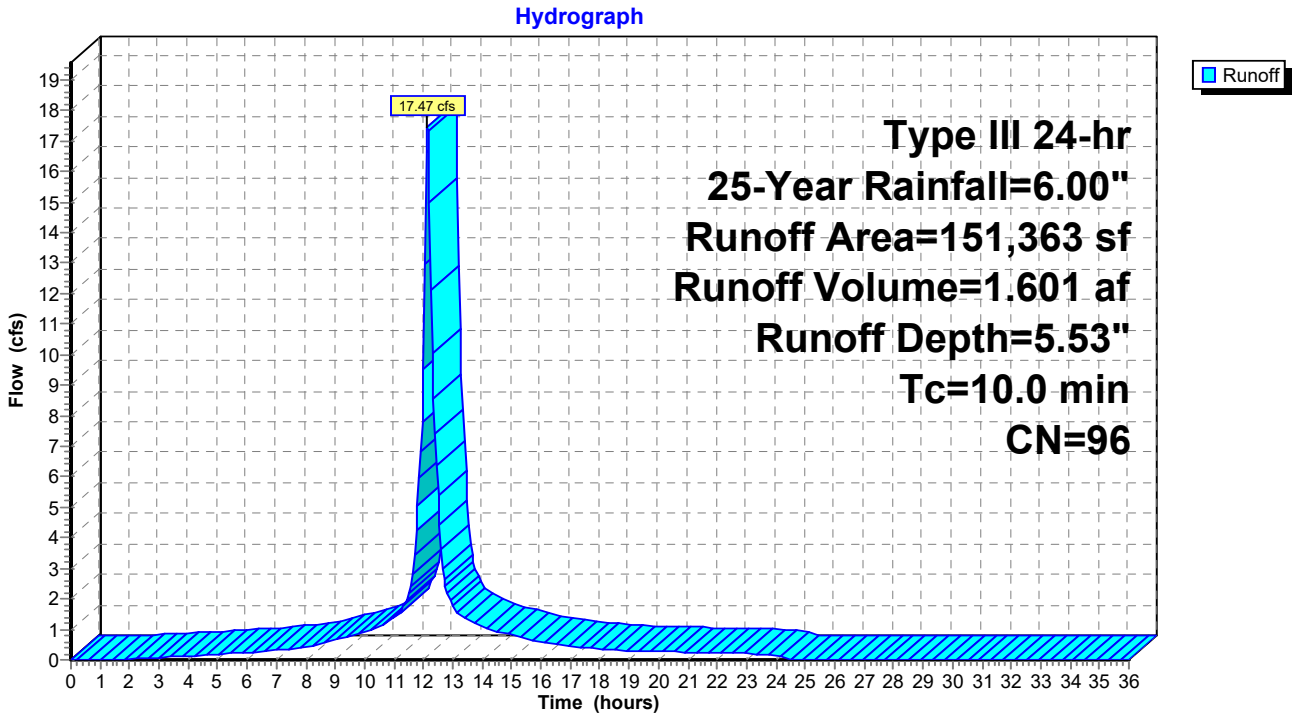
Runoff = 17.47 cfs @ 12.14 hrs, Volume= 1.601 af, Depth= 5.53"
Routed to Pond SMS #1C : SMS #1C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
	9,732	61	>75% Grass cover, Good, HSG B
*	87,537	98	Building/Roof, HSG B
*	50,809	98	Pavement, HSG B
*	3,285	98	Sidewalk, HSG B
	151,363	96	Weighted Average
	9,732		6.43% Pervious Area
	141,631		93.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Direct Minimum**

Subcatchment DA #1C: Drainage Area #1C



Hydrograph for Subcatchment DA #1C: Drainage Area #1C

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.06	0.00	0.00
1.50	0.09	0.00	0.00
2.00	0.12	0.00	0.03
2.50	0.15	0.01	0.05
3.00	0.18	0.02	0.08
3.50	0.22	0.03	0.10
4.00	0.26	0.05	0.13
4.50	0.30	0.07	0.16
5.00	0.34	0.10	0.18
5.50	0.39	0.13	0.21
6.00	0.43	0.16	0.23
6.50	0.48	0.20	0.27
7.00	0.54	0.24	0.32
7.50	0.61	0.29	0.38
8.00	0.68	0.35	0.44
8.50	0.77	0.43	0.54
9.00	0.87	0.52	0.66
9.50	1.00	0.63	0.78
10.00	1.13	0.75	0.91
10.50	1.30	0.91	1.12
11.00	1.50	1.09	1.38
11.50	1.79	1.37	2.11
12.00	3.00	2.55	**9.53**
12.50	4.21	3.75	**5.37**
13.00	4.50	4.04	1.82
13.50	4.70	4.24	1.35
14.00	4.87	4.40	1.10
14.50	5.00	4.54	0.94
15.00	5.13	4.66	0.82
15.50	5.23	4.76	0.70
16.00	5.32	4.85	0.58
16.50	5.39	4.92	0.51
17.00	5.46	4.99	0.46
17.50	5.52	5.05	0.40
18.00	5.57	5.10	0.35
18.50	5.61	5.14	0.32
19.00	5.66	5.19	0.31
19.50	5.70	5.23	0.29
20.00	5.74	5.27	0.28
20.50	5.78	5.31	0.26
21.00	5.82	5.34	0.25
21.50	5.85	5.38	0.24
22.00	5.88	5.41	0.23
22.50	5.92	5.44	0.22
23.00	5.95	5.47	0.21
23.50	5.97	5.50	0.19
24.00	**6.00**	**5.53**	0.18
24.50	6.00	5.53	0.00
25.00	6.00	5.53	0.00
25.50	6.00	5.53	0.00
26.00	6.00	5.53	0.00
26.50	6.00	5.53	0.00
27.00	6.00	5.53	0.00
27.50	6.00	5.53	0.00
28.00	6.00	5.53	0.00
28.50	6.00	5.53	0.00
29.00	6.00	5.53	0.00
29.50	6.00	5.53	0.00
30.00	6.00	5.53	0.00
30.50	6.00	5.53	0.00
31.00	6.00	5.53	0.00
31.50	6.00	5.53	0.00
32.00	6.00	5.53	0.00
32.50	6.00	5.53	0.00
33.00	6.00	5.53	0.00
33.50	6.00	5.53	0.00
34.00	6.00	5.53	0.00
34.50	6.00	5.53	0.00
35.00	6.00	5.53	0.00
35.50	6.00	5.53	0.00
36.00	6.00	5.53	0.00

Summary for Subcatchment DA #2A: Drainage Area #2A

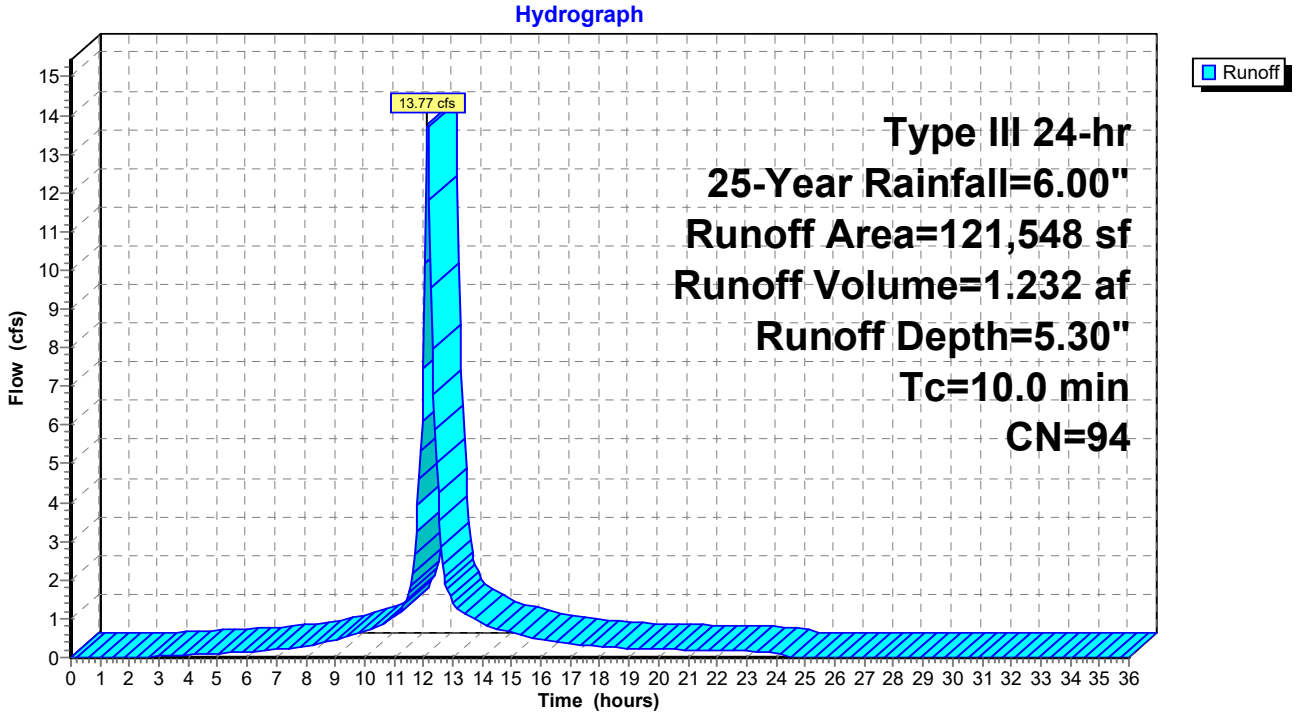
Runoff = 13.77 cfs @ 12.14 hrs, Volume= 1.232 af, Depth= 5.30"
Routed to Pond DB #2 : Drainage Basin #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	48,398	98	Building/Roof, HSG B
*	45,328	98	Pavement, HSG B
*	1,404	98	Sidewalk, HSG B
	13,851	61	>75% Grass cover, Good, HSG B
*	12,567	98	Infiltration Basin, HSG B
	121,548	94	Weighted Average
	13,851		11.40% Pervious Area
	107,697		88.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #2A: Drainage Area #2A



Hydrograph for Subcatchment DA #2A: Drainage Area #2A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.06	0.00	0.00
1.50	0.09	0.00	0.00
2.00	0.12	0.00	0.00
2.50	0.15	0.00	0.01
3.00	0.18	0.00	0.02
3.50	0.22	0.01	0.04
4.00	0.26	0.02	0.06
4.50	0.30	0.04	0.08
5.00	0.34	0.05	0.10
5.50	0.39	0.07	0.12
6.00	0.43	0.10	0.14
6.50	0.48	0.13	0.17
7.00	0.54	0.16	0.21
7.50	0.61	0.21	0.25
8.00	0.68	0.26	0.30
8.50	0.77	0.32	0.37
9.00	0.87	0.40	0.47
9.50	1.00	0.50	0.57
10.00	1.13	0.62	0.67
10.50	1.30	0.76	0.84
11.00	1.50	0.94	1.04
11.50	1.79	1.20	1.62
12.00	3.00	2.35	**7.46**
12.50	4.21	3.53	**4.27**
13.00	4.50	3.82	1.45
13.50	4.70	4.01	1.08
14.00	4.87	4.18	0.88
14.50	5.00	4.31	0.75
15.00	5.13	4.43	0.65
15.50	5.23	4.53	0.56
16.00	5.32	4.62	0.46
16.50	5.39	4.69	0.40
17.00	5.46	4.76	0.36
17.50	5.52	4.82	0.32
18.00	5.57	4.87	0.28
18.50	5.61	4.92	0.26
19.00	5.66	4.96	0.25
19.50	5.70	5.00	0.23
20.00	5.74	5.04	0.22
20.50	5.78	5.08	0.21
21.00	5.82	5.12	0.20
21.50	5.85	5.15	0.19
22.00	5.88	5.18	0.18
22.50	5.92	5.21	0.17
23.00	5.95	5.24	0.16
23.50	5.97	5.27	0.15
24.00	**6.00**	**5.30**	0.15
24.50	6.00	5.30	0.00
25.00	6.00	5.30	0.00
25.50	6.00	5.30	0.00
26.00	6.00	5.30	0.00
26.50	6.00	5.30	0.00
27.00	6.00	5.30	0.00
27.50	6.00	5.30	0.00
28.00	6.00	5.30	0.00
28.50	6.00	5.30	0.00
29.00	6.00	5.30	0.00
29.50	6.00	5.30	0.00
30.00	6.00	5.30	0.00
30.50	6.00	5.30	0.00
31.00	6.00	5.30	0.00
31.50	6.00	5.30	0.00
32.00	6.00	5.30	0.00
32.50	6.00	5.30	0.00
33.00	6.00	5.30	0.00
33.50	6.00	5.30	0.00
34.00	6.00	5.30	0.00
34.50	6.00	5.30	0.00
35.00	6.00	5.30	0.00
35.50	6.00	5.30	0.00
36.00	6.00	5.30	0.00

Summary for Subcatchment DA #2B: Drainage Area #2B

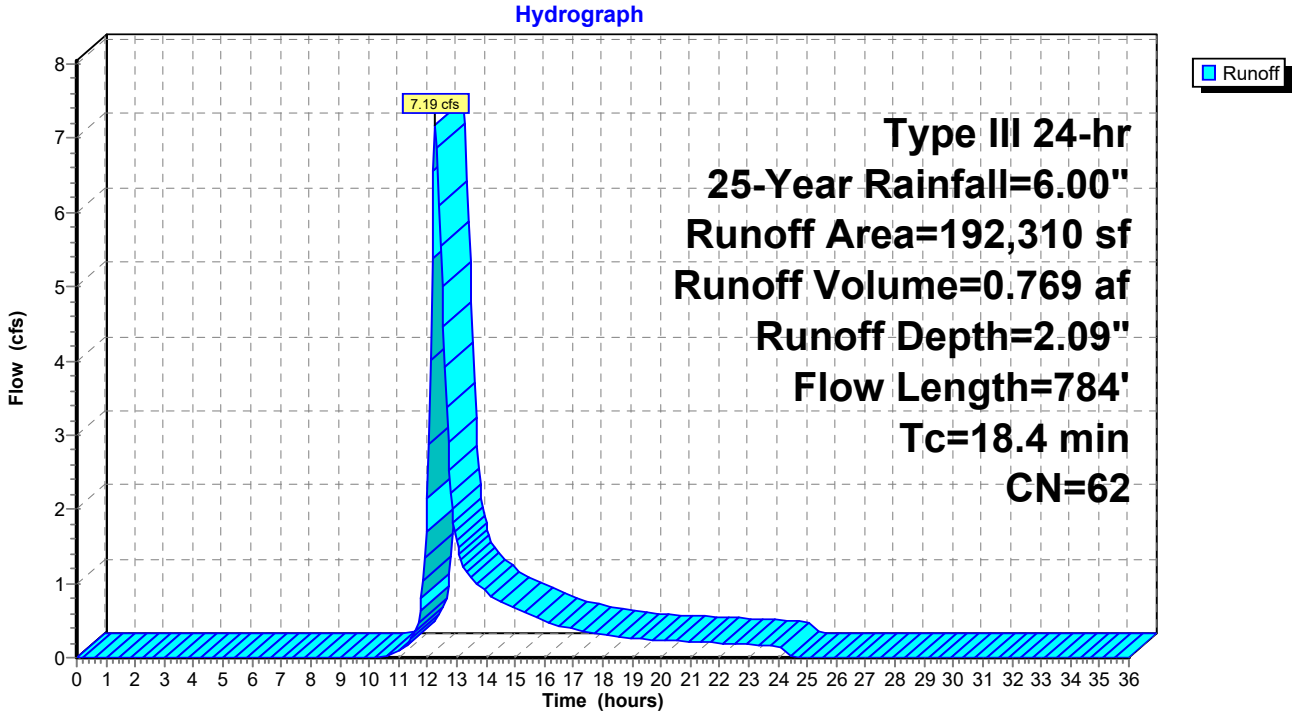
Runoff = 7.19 cfs @ 12.27 hrs, Volume= 0.769 af, Depth= 2.09"
Routed to Link POI #2 : POI #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
	187,035	61	>75% Grass cover, Good, HSG B
*	2,004	61	Emergency Access Road (Perv.), Good, HSG B
*	3,271	98	Emergency Acess Road (Imp.), HSG B
	192,310	62	Weighted Average
	189,039		98.30% Pervious Area
	3,271		1.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	150	0.0667	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
3.0	634	0.2524	3.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
18.4	784	Total			

Subcatchment DA #2B: Drainage Area #2B



Hydrograph for Subcatchment DA #2B: Drainage Area #2B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.06	0.00	0.00
1.50	0.09	0.00	0.00
2.00	0.12	0.00	0.00
2.50	0.15	0.00	0.00
3.00	0.18	0.00	0.00
3.50	0.22	0.00	0.00
4.00	0.26	0.00	0.00
4.50	0.30	0.00	0.00
5.00	0.34	0.00	0.00
5.50	0.39	0.00	0.00
6.00	0.43	0.00	0.00
6.50	0.48	0.00	0.00
7.00	0.54	0.00	0.00
7.50	0.61	0.00	0.00
8.00	0.68	0.00	0.00
8.50	0.77	0.00	0.00
9.00	0.87	0.00	0.00
9.50	1.00	0.00	0.00
10.00	1.13	0.00	0.00
10.50	1.30	0.00	0.00
11.00	1.50	0.01	0.09
11.50	1.79	0.05	0.29
12.00	3.00	0.40	**2.16**
12.50	4.21	0.98	**5.01**
13.00	4.50	1.14	1.58
13.50	4.70	1.26	1.06
14.00	4.87	1.36	0.89
14.50	5.00	1.44	0.76
15.00	5.13	1.52	0.68
15.50	5.23	1.58	0.59
16.00	5.32	1.64	0.50
16.50	5.39	1.68	0.43
17.00	5.46	1.73	0.39
17.50	5.52	1.77	0.35
18.00	5.57	1.80	0.31
18.50	5.61	1.83	0.28
19.00	5.66	1.86	0.26
19.50	5.70	1.89	0.25
20.00	5.74	1.92	0.24
20.50	5.78	1.94	0.23
21.00	5.82	1.97	0.22
21.50	5.85	1.99	0.21
22.00	5.88	2.01	0.20
22.50	5.92	2.03	0.19
23.00	5.95	2.05	0.18
23.50	5.97	2.07	0.17
24.00	**6.00**	**2.09**	0.16
24.50	6.00	2.09	0.01
25.00	6.00	2.09	0.00
25.50	6.00	2.09	0.00
26.00	6.00	2.09	0.00
26.50	6.00	2.09	0.00
27.00	6.00	2.09	0.00
27.50	6.00	2.09	0.00
28.00	6.00	2.09	0.00
28.50	6.00	2.09	0.00
29.00	6.00	2.09	0.00
29.50	6.00	2.09	0.00
30.00	6.00	2.09	0.00
30.50	6.00	2.09	0.00
31.00	6.00	2.09	0.00
31.50	6.00	2.09	0.00
32.00	6.00	2.09	0.00
32.50	6.00	2.09	0.00
33.00	6.00	2.09	0.00
33.50	6.00	2.09	0.00
34.00	6.00	2.09	0.00
34.50	6.00	2.09	0.00
35.00	6.00	2.09	0.00
35.50	6.00	2.09	0.00
36.00	6.00	2.09	0.00

Summary for Pond DB #2: Drainage Basin #2

Inflow Area = 2.790 ac, 88.60% Impervious, Inflow Depth = 5.30" for 25-Year event
Inflow = 13.77 cfs @ 12.14 hrs, Volume= 1.232 af
Outflow = 4.27 cfs @ 12.50 hrs, Volume= 1.231 af, Atten= 69%, Lag= 21.8 min
Discarded = 2.77 cfs @ 12.50 hrs, Volume= 1.052 af
Primary = 1.50 cfs @ 12.50 hrs, Volume= 0.179 af
Routed to Link POI #2 : POI #2

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 486.80' @ 12.50 hrs Surf.Area= 9,105 sf Storage= 13,164 cf

Plug-Flow detention time= 21.9 min calculated for 1.230 af (100% of inflow)
Center-of-Mass det. time= 21.7 min (794.0 - 772.2)

Volume	Invert	Avail.Storage	Storage Description
#1	485.00'	25,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

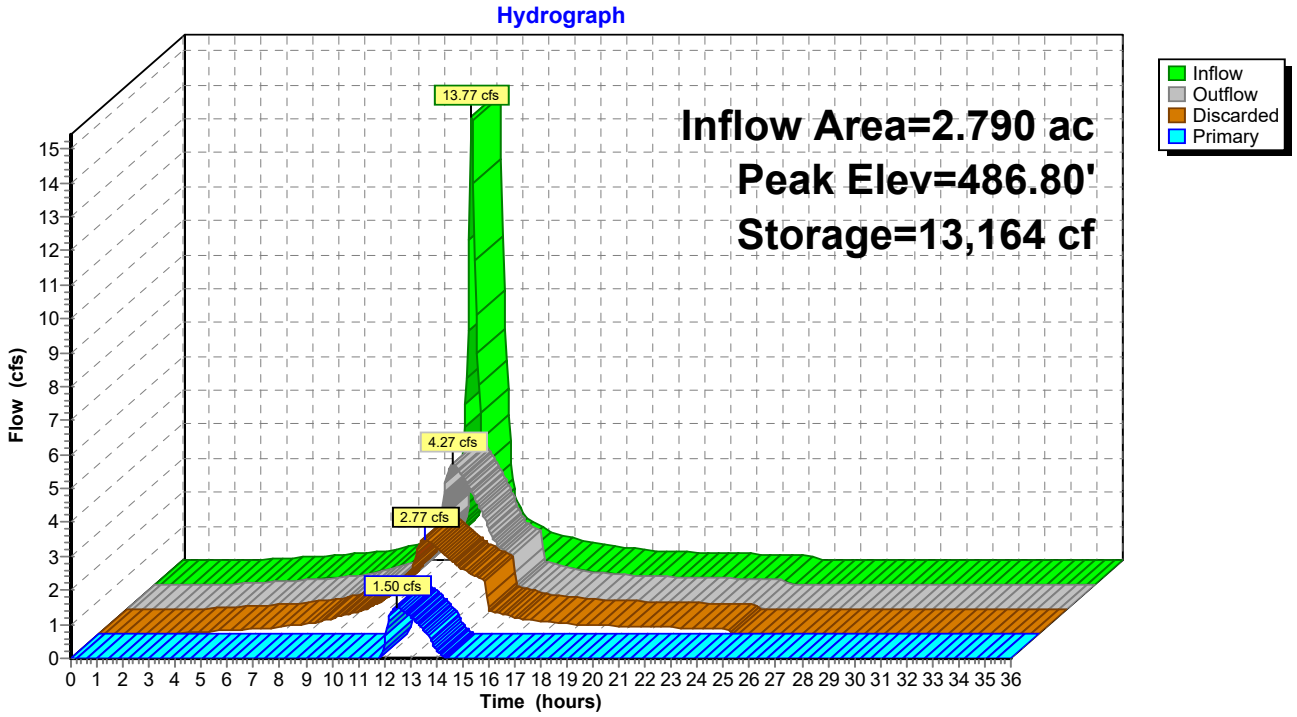
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
485.00	5,500	0	0
486.00	7,500	6,500	6,500
487.00	9,500	8,500	15,000
488.00	11,500	10,500	25,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	485.00'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 470.00'
#2	Primary	485.21'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	486.70'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

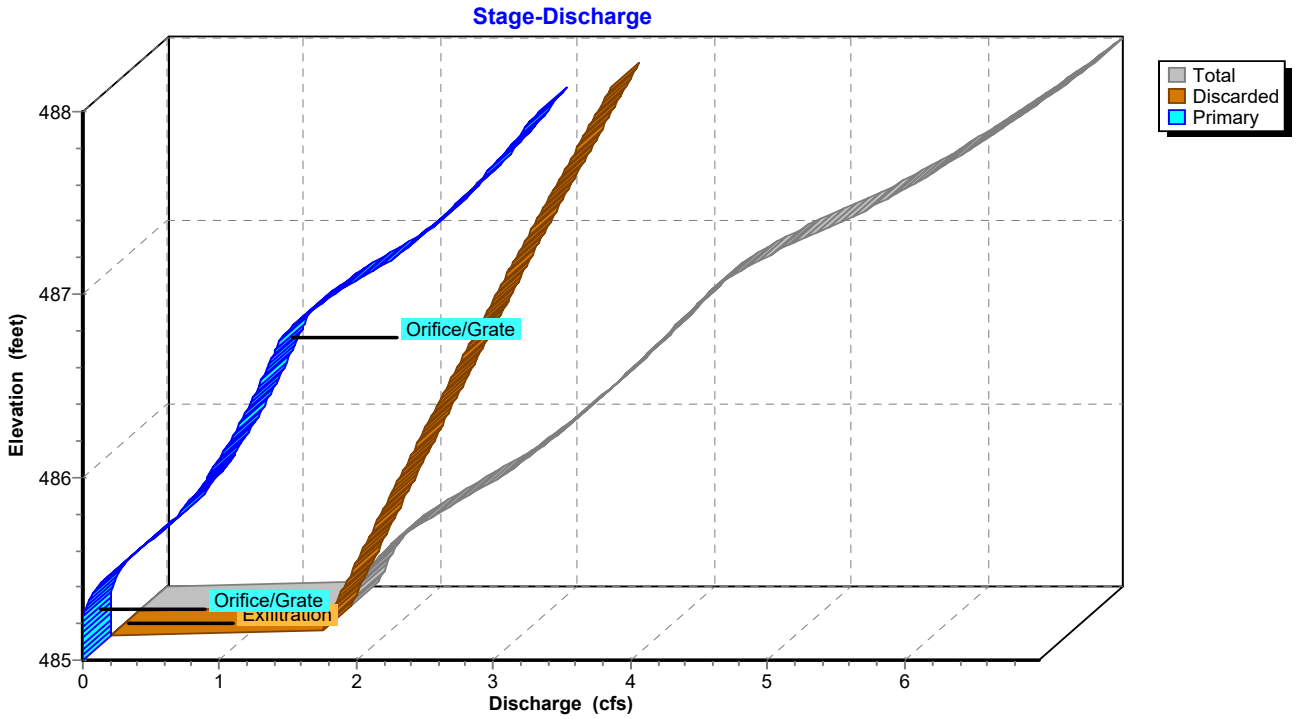
Discarded OutFlow Max=2.77 cfs @ 12.50 hrs HW=486.80' (Free Discharge)
└**1=Exfiltration** (Controls 2.77 cfs)

Primary OutFlow Max=1.50 cfs @ 12.50 hrs HW=486.80' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 1.47 cfs @ 5.49 fps)
└**3=Orifice/Grate** (Orifice Controls 0.03 cfs @ 1.09 fps)

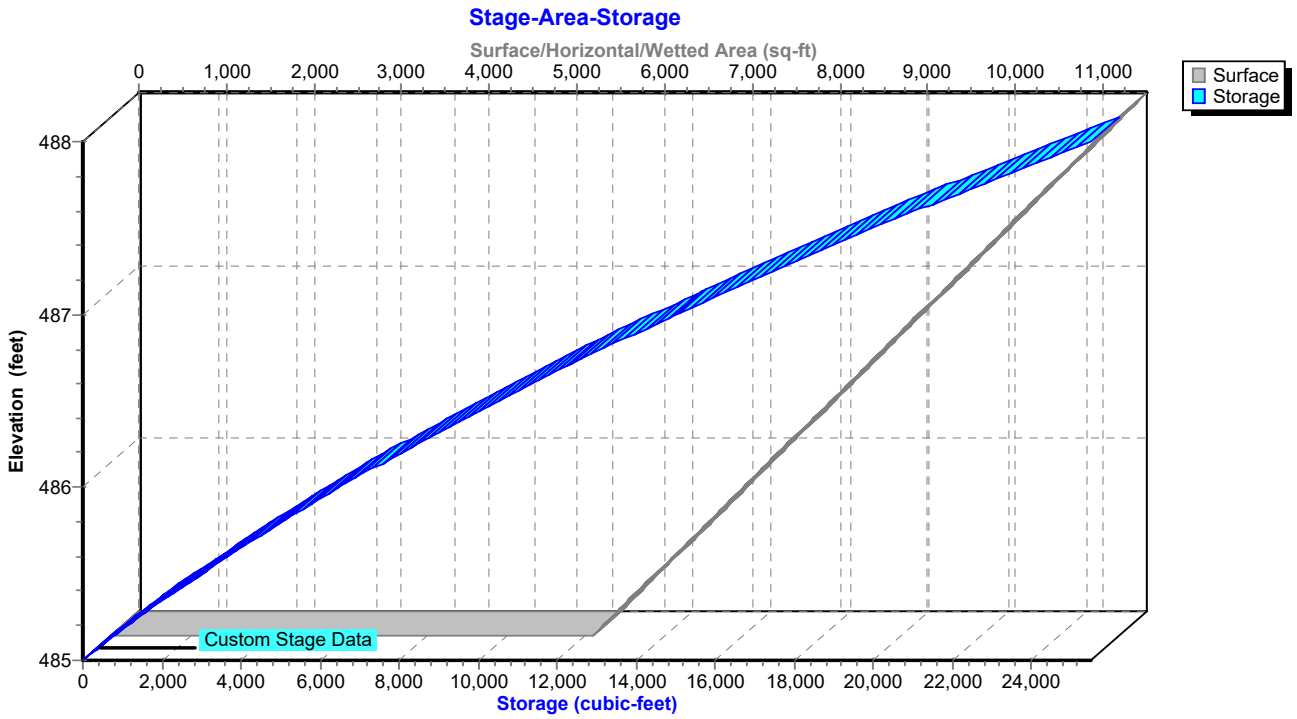
Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Hydrograph for Pond DB #2: Drainage Basin #2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	485.00	0.00	0.00	0.00
1.00	0.00	0	485.00	0.00	0.00	0.00
2.00	0.00	0	485.00	0.00	0.00	0.00
3.00	0.02	3	485.00	0.02	0.02	0.00
4.00	0.06	7	485.00	0.06	0.06	0.00
5.00	0.10	11	485.00	0.10	0.10	0.00
6.00	0.14	15	485.00	0.14	0.14	0.00
7.00	0.21	22	485.00	0.21	0.21	0.00
8.00	0.30	32	485.01	0.30	0.30	0.00
9.00	0.47	50	485.01	0.46	0.46	0.00
10.00	0.67	71	485.01	0.66	0.66	0.00
11.00	1.04	111	485.02	1.03	1.03	0.00
12.00	**7.46**	**3,624**	**485.59**	**2.32**	**1.92**	**0.39**
13.00	**1.45**	**9,887**	**486.43**	**3.74**	**2.50**	**1.24**
14.00	0.88	3,107	485.52	2.14	1.87	0.27
15.00	0.65	71	485.01	0.66	0.66	0.00
16.00	0.46	50	485.01	0.47	0.47	0.00
17.00	0.36	39	485.01	0.37	0.37	0.00
18.00	0.28	30	485.01	0.28	0.28	0.00
19.00	0.25	26	485.00	0.25	0.25	0.00
20.00	0.22	24	485.00	0.22	0.22	0.00
21.00	0.20	22	485.00	0.20	0.20	0.00
22.00	0.18	20	485.00	0.18	0.18	0.00
23.00	0.16	18	485.00	0.16	0.16	0.00
24.00	0.15	16	485.00	0.15	0.15	0.00
25.00	0.00	0	485.00	0.00	0.00	0.00
26.00	0.00	0	485.00	0.00	0.00	0.00
27.00	0.00	0	485.00	0.00	0.00	0.00
28.00	0.00	0	485.00	0.00	0.00	0.00
29.00	0.00	0	485.00	0.00	0.00	0.00
30.00	0.00	0	485.00	0.00	0.00	0.00
31.00	0.00	0	485.00	0.00	0.00	0.00
32.00	0.00	0	485.00	0.00	0.00	0.00
33.00	0.00	0	485.00	0.00	0.00	0.00
34.00	0.00	0	485.00	0.00	0.00	0.00
35.00	0.00	0	485.00	0.00	0.00	0.00
36.00	0.00	0	485.00	0.00	0.00	0.00

Stage-Discharge for Pond DB #2: Drainage Basin #2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
485.00	0.00	0.00	0.00
485.05	1.56	1.56	0.00
485.10	1.59	1.59	0.00
485.15	1.63	1.63	0.00
485.20	1.66	1.66	0.00
485.25	1.70	1.69	0.01
485.30	1.75	1.73	0.03
485.35	1.82	1.76	0.06
485.40	1.91	1.79	0.11
485.45	2.00	1.83	0.17
485.50	2.10	1.86	0.24
485.55	2.22	1.89	0.32
485.60	2.33	1.93	0.40
485.65	2.45	1.96	0.49
485.70	2.57	2.00	0.57
485.75	2.68	2.03	0.65
485.80	2.77	2.06	0.70
485.85	2.86	2.10	0.76
485.90	2.95	2.13	0.81
485.95	3.03	2.17	0.86
486.00	3.11	2.20	0.91
486.05	3.19	2.24	0.95
486.10	3.27	2.27	1.00
486.15	3.34	2.31	1.04
486.20	3.42	2.34	1.08
486.25	3.49	2.38	1.11
486.30	3.56	2.41	1.15
486.35	3.63	2.45	1.19
486.40	3.70	2.48	1.22
486.45	3.77	2.52	1.25
486.50	3.84	2.55	1.29
486.55	3.91	2.59	1.32
486.60	3.97	2.62	1.35
486.65	4.04	2.66	1.38
486.70	4.10	2.70	1.41
486.75	4.18	2.73	1.45
486.80	4.27	2.77	1.50
486.85	4.37	2.80	1.57
486.90	4.49	2.84	1.65
486.95	4.61	2.88	1.73
487.00	4.75	2.91	1.83
487.05	4.89	2.95	1.94
487.10	5.03	2.99	2.05
487.15	5.18	3.02	2.16
487.20	5.32	3.06	2.26
487.25	5.46	3.10	2.36
487.30	5.57	3.13	2.44
487.35	5.69	3.17	2.52
487.40	5.80	3.21	2.60
487.45	5.91	3.24	2.67
487.50	6.02	3.28	2.74
487.55	6.12	3.32	2.80
487.60	6.22	3.35	2.87
487.65	6.32	3.39	2.93
487.70	6.42	3.43	2.99
487.75	6.52	3.47	3.05
487.80	6.61	3.50	3.11
487.85	6.71	3.54	3.16
487.90	6.80	3.58	3.22
487.95	6.89	3.62	3.27
488.00	**6.98**	**3.65**	**3.33**

Stage-Area-Storage for Pond DB #2: Drainage Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
485.00	5,500	0
485.05	5,600	278
485.10	5,700	560
485.15	5,800	847
485.20	5,900	1,140
485.25	6,000	1,438
485.30	6,100	1,740
485.35	6,200	2,048
485.40	6,300	2,360
485.45	6,400	2,677
485.50	6,500	3,000
485.55	6,600	3,328
485.60	6,700	3,660
485.65	6,800	3,997
485.70	6,900	4,340
485.75	7,000	4,688
485.80	7,100	5,040
485.85	7,200	5,398
485.90	7,300	5,760
485.95	7,400	6,127
486.00	7,500	6,500
486.05	7,600	6,878
486.10	7,700	7,260
486.15	7,800	7,647
486.20	7,900	8,040
486.25	8,000	8,438
486.30	8,100	8,840
486.35	8,200	9,248
486.40	8,300	9,660
486.45	8,400	10,077
486.50	8,500	10,500
486.55	8,600	10,928
486.60	8,700	11,360
486.65	8,800	11,797
486.70	8,900	12,240
486.75	9,000	12,688
486.80	9,100	13,140
486.85	9,200	13,598
486.90	9,300	14,060
486.95	9,400	14,527
487.00	9,500	15,000
487.05	9,600	15,478
487.10	9,700	15,960
487.15	9,800	16,447
487.20	9,900	16,940
487.25	10,000	17,438
487.30	10,100	17,940
487.35	10,200	18,448
487.40	10,300	18,960
487.45	10,400	19,477
487.50	10,500	20,000
487.55	10,600	20,528
487.60	10,700	21,060
487.65	10,800	21,597
487.70	10,900	22,140
487.75	11,000	22,688
487.80	11,100	23,240
487.85	11,200	23,798
487.90	11,300	24,360
487.95	11,400	24,927
488.00	**11,500**	**25,500**

Summary for Pond SMS #1A: SMS #1A

Inflow Area = 3.863 ac, 91.78% Impervious, Inflow Depth = 5.41" for 25-Year event
Inflow = 19.26 cfs @ 12.14 hrs, Volume= 1.742 af
Outflow = 4.93 cfs @ 12.55 hrs, Volume= 1.742 af, Atten= 74%, Lag= 24.8 min
Discarded = 2.24 cfs @ 12.55 hrs, Volume= 1.415 af
Primary = 2.70 cfs @ 12.55 hrs, Volume= 0.327 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 495.58' @ 12.55 hrs Surf.Area= 7,503 sf Storage= 21,399 cf

Plug-Flow detention time= 36.0 min calculated for 1.740 af (100% of inflow)
Center-of-Mass det. time= 36.0 min (803.3 - 767.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	491.75'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	492.50'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	491.75'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	492.53'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	493.83'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	494.49'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	495.32'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	496.23'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.24 cfs @ 12.55 hrs HW=495.58' (Free Discharge)
└**1=Exfiltration** (Controls 2.24 cfs)

Primary OutFlow Max=2.70 cfs @ 12.55 hrs HW=495.58' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 1.11 cfs @ 8.12 fps)
├**3=Orifice/Grate** (Orifice Controls 0.82 cfs @ 5.98 fps)
├**4=Orifice/Grate** (Orifice Controls 0.62 cfs @ 4.52 fps)
├**5=Orifice/Grate** (Orifice Controls 0.16 cfs @ 1.74 fps)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1A: SMS #1A - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

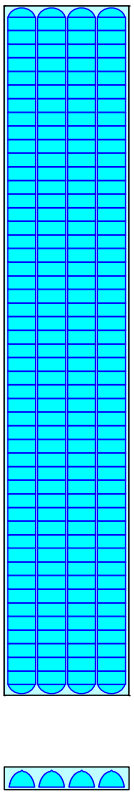
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

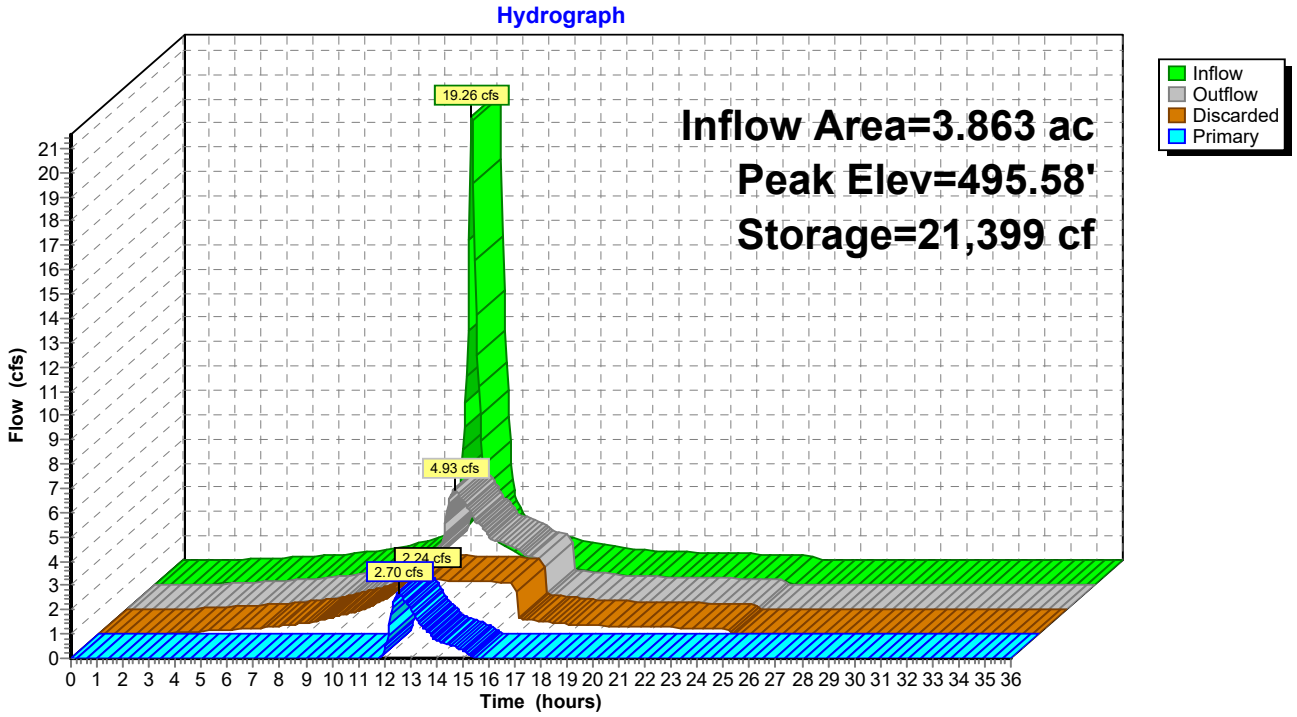
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

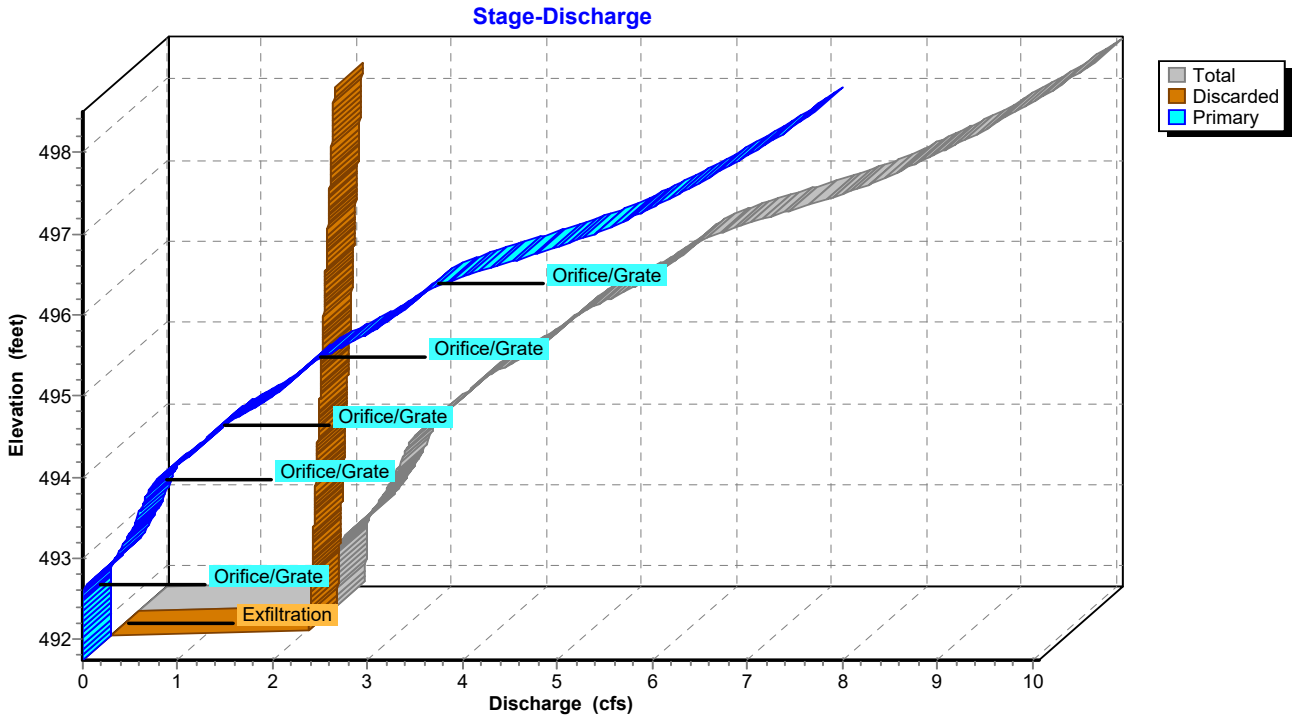
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



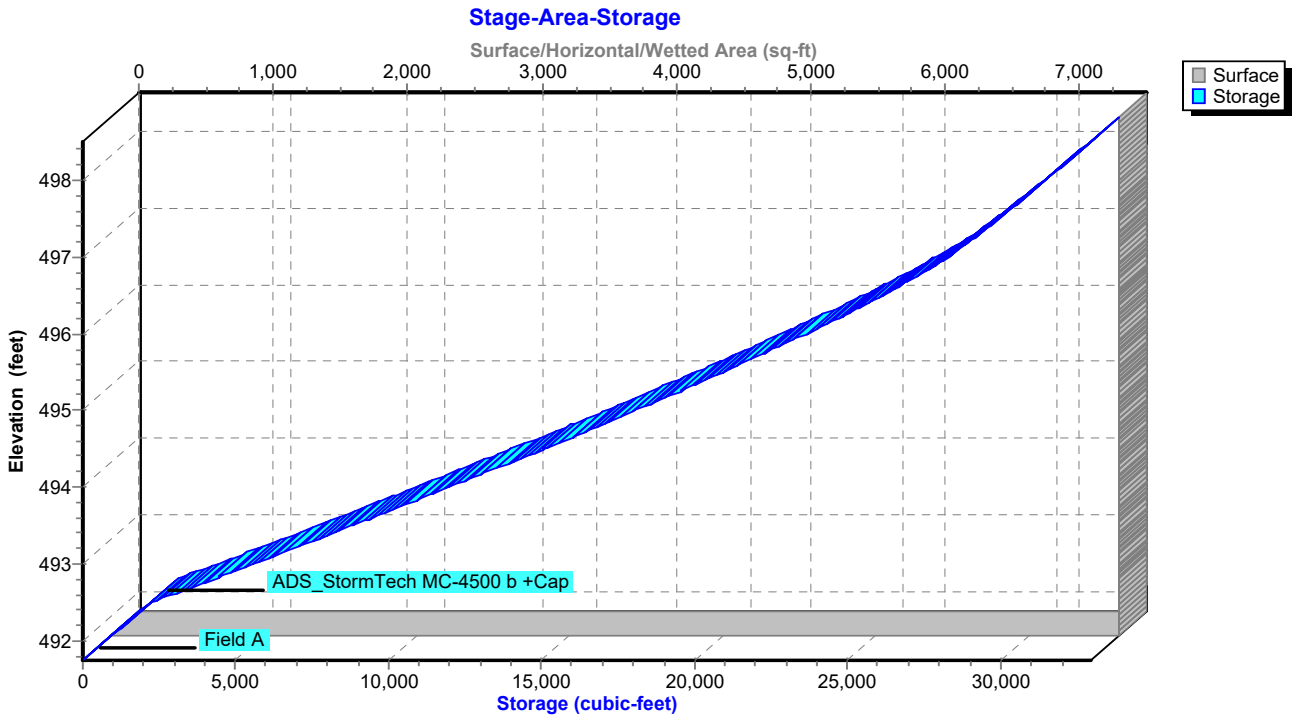
Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Hydrograph for Pond SMS #1A: SMS #1A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	491.75	0.00	0.00	0.00
1.00	0.00	0	491.75	0.00	0.00	0.00
2.00	0.01	0	491.75	0.00	0.00	0.00
3.00	0.06	5	491.75	0.06	0.06	0.00
4.00	0.11	11	491.75	0.11	0.11	0.00
5.00	0.17	16	491.76	0.17	0.17	0.00
6.00	0.22	22	491.76	0.22	0.22	0.00
7.00	0.33	31	491.76	0.32	0.32	0.00
8.00	0.45	43	491.76	0.45	0.45	0.00
9.00	0.69	66	491.77	0.68	0.68	0.00
10.00	0.97	93	491.78	0.96	0.96	0.00
11.00	1.49	143	491.80	1.47	1.47	0.00
12.00	**10.47**	**5,570**	**493.00**	**2.47**	**2.13**	**0.34**
13.00	**2.01**	**18,500**	**495.07**	**4.29**	**2.22**	**2.07**
14.00	1.22	11,357	493.90	2.89	2.17	0.72
15.00	0.91	5,442	492.98	2.46	2.13	0.33
16.00	0.64	343	491.86	2.09	2.09	0.00
17.00	0.50	49	491.77	0.51	0.51	0.00
18.00	0.39	38	491.76	0.39	0.39	0.00
19.00	0.34	33	491.76	0.34	0.34	0.00
20.00	0.31	30	491.76	0.31	0.31	0.00
21.00	0.28	27	491.76	0.28	0.28	0.00
22.00	0.25	25	491.76	0.25	0.25	0.00
23.00	0.23	22	491.76	0.23	0.23	0.00
24.00	0.20	20	491.76	0.20	0.20	0.00
25.00	0.00	0	491.75	0.00	0.00	0.00
26.00	0.00	0	491.75	0.00	0.00	0.00
27.00	0.00	0	491.75	0.00	0.00	0.00
28.00	0.00	0	491.75	0.00	0.00	0.00
29.00	0.00	0	491.75	0.00	0.00	0.00
30.00	0.00	0	491.75	0.00	0.00	0.00
31.00	0.00	0	491.75	0.00	0.00	0.00
32.00	0.00	0	491.75	0.00	0.00	0.00
33.00	0.00	0	491.75	0.00	0.00	0.00
34.00	0.00	0	491.75	0.00	0.00	0.00
35.00	0.00	0	491.75	0.00	0.00	0.00
36.00	0.00	0	491.75	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1A: SMS #1A

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
491.75	0.00	0.00	0.00
491.85	2.09	2.09	0.00
491.95	2.09	2.09	0.00
492.05	2.10	2.10	0.00
492.15	2.10	2.10	0.00
492.25	2.10	2.10	0.00
492.35	2.11	2.11	0.00
492.45	2.11	2.11	0.00
492.55	2.12	2.12	0.00
492.65	2.16	2.12	0.04
492.75	2.24	2.12	0.12
492.85	2.34	2.13	0.22
492.95	2.43	2.13	0.30
493.05	2.50	2.14	0.37
493.15	2.56	2.14	0.42
493.25	2.61	2.14	0.47
493.35	2.66	2.15	0.51
493.45	2.71	2.15	0.55
493.55	2.75	2.16	0.59
493.65	2.79	2.16	0.63
493.75	2.82	2.16	0.66
493.85	2.86	2.17	0.69
493.95	2.93	2.17	0.76
494.05	3.05	2.18	0.87
494.15	3.18	2.18	1.00
494.25	3.29	2.18	1.11
494.35	3.39	2.19	1.20
494.45	3.47	2.19	1.28
494.55	3.56	2.20	1.36
494.65	3.69	2.20	1.49
494.75	3.85	2.20	1.64
494.85	4.01	2.21	1.80
494.95	4.15	2.21	1.93
495.05	4.26	2.22	2.05
495.15	4.37	2.22	2.15
495.25	4.48	2.23	2.25
495.35	4.57	2.23	2.35
495.45	4.71	2.23	2.47
495.55	4.88	2.24	2.64
495.65	5.06	2.24	2.82
495.75	5.23	2.25	2.98
495.85	5.37	2.25	3.12
495.95	5.50	2.25	3.25
496.05	5.62	2.26	3.36
496.15	5.74	2.26	3.48
496.25	5.85	2.27	3.58
496.35	6.00	2.27	3.74
496.45	6.22	2.27	3.94
496.55	6.48	2.28	4.20
496.65	6.76	2.28	4.48
496.75	7.06	2.29	4.78
496.85	7.35	2.29	5.06
496.95	7.57	2.29	5.28
497.05	7.79	2.30	5.49
497.15	7.99	2.30	5.69
497.25	8.18	2.31	5.87
497.35	8.36	2.31	6.05
497.45	8.53	2.31	6.22
497.55	8.70	2.32	6.38
497.65	8.86	2.32	6.54
497.75	9.02	2.33	6.69
497.85	9.17	2.33	6.84
497.95	9.32	2.33	6.98
498.05	9.46	2.34	7.12
498.15	9.60	2.34	7.26
498.25	9.74	2.35	7.39
498.35	9.87	2.35	7.52
498.45	**10.00**	**2.35**	**7.65**

Stage-Area-Storage for Pond SMS #1A: SMS #1A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
491.75	**7,503**	0
491.85	7,503	300
491.95	7,503	600
492.05	7,503	900
492.15	7,503	1,200
492.25	7,503	1,501
492.35	7,503	1,801
492.45	7,503	2,101
492.55	7,503	2,582
492.65	7,503	3,243
492.75	7,503	3,902
492.85	7,503	4,560
492.95	7,503	5,216
493.05	7,503	5,871
493.15	7,503	6,523
493.25	7,503	7,173
493.35	7,503	7,822
493.45	7,503	8,468
493.55	7,503	9,111
493.65	7,503	9,752
493.75	7,503	10,391
493.85	7,503	11,026
493.95	7,503	11,658
494.05	7,503	12,288
494.15	7,503	12,914
494.25	7,503	13,537
494.35	7,503	14,155
494.45	7,503	14,770
494.55	7,503	15,381
494.65	7,503	15,988
494.75	7,503	16,590
494.85	7,503	17,188
494.95	7,503	17,781
495.05	7,503	18,369
495.15	7,503	18,952
495.25	7,503	19,530
495.35	7,503	20,101
495.45	7,503	20,667
495.55	7,503	21,226
495.65	7,503	21,779
495.75	7,503	22,324
495.85	7,503	22,862
495.95	7,503	23,393
496.05	7,503	23,915
496.15	7,503	24,428
496.25	7,503	24,932
496.35	7,503	25,426
496.45	7,503	25,909
496.55	7,503	26,381
496.65	7,503	26,840
496.75	7,503	27,285
496.85	7,503	27,713
496.95	7,503	28,121
497.05	7,503	28,501
497.15	7,503	28,850
497.25	7,503	29,181
497.35	7,503	29,504
497.45	7,503	29,817
497.55	7,503	30,119
497.65	7,503	30,419
497.75	7,503	30,719
497.85	7,503	31,019
497.95	7,503	31,319
498.05	7,503	31,620
498.15	7,503	31,920
498.25	7,503	32,220
498.35	7,503	32,520
498.45	7,503	**32,820**

Summary for Pond SMS #1C: SMS #1C

Inflow Area = 3.475 ac, 93.57% Impervious, Inflow Depth = 5.53" for 25-Year event
Inflow = 17.47 cfs @ 12.14 hrs, Volume= 1.601 af
Outflow = 4.69 cfs @ 12.54 hrs, Volume= 1.601 af, Atten= 73%, Lag= 24.0 min
Discarded = 2.21 cfs @ 12.54 hrs, Volume= 1.328 af
Primary = 2.48 cfs @ 12.54 hrs, Volume= 0.272 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 498.60' @ 12.54 hrs Surf.Area= 7,503 sf Storage= 18,686 cf

Plug-Flow detention time= 31.3 min calculated for 1.598 af (100% of inflow)
Center-of-Mass det. time= 31.3 min (793.2 - 761.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	495.25'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	496.00'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	495.25'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	496.09'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	496.92'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	497.83'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	498.75'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	499.67'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.21 cfs @ 12.54 hrs HW=498.60' (Free Discharge)
└**1=Exfiltration** (Controls 2.21 cfs)

Primary OutFlow Max=2.48 cfs @ 12.54 hrs HW=498.60' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 1.00 cfs @ 7.31 fps)
├**3=Orifice/Grate** (Orifice Controls 0.80 cfs @ 5.84 fps)
├**4=Orifice/Grate** (Orifice Controls 0.68 cfs @ 3.48 fps)
├**5=Orifice/Grate** (Controls 0.00 cfs)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1C: SMS #1C - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

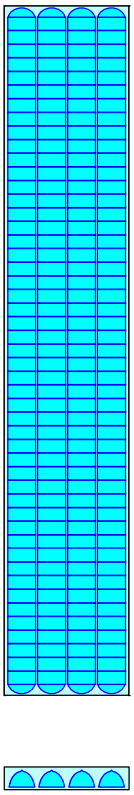
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

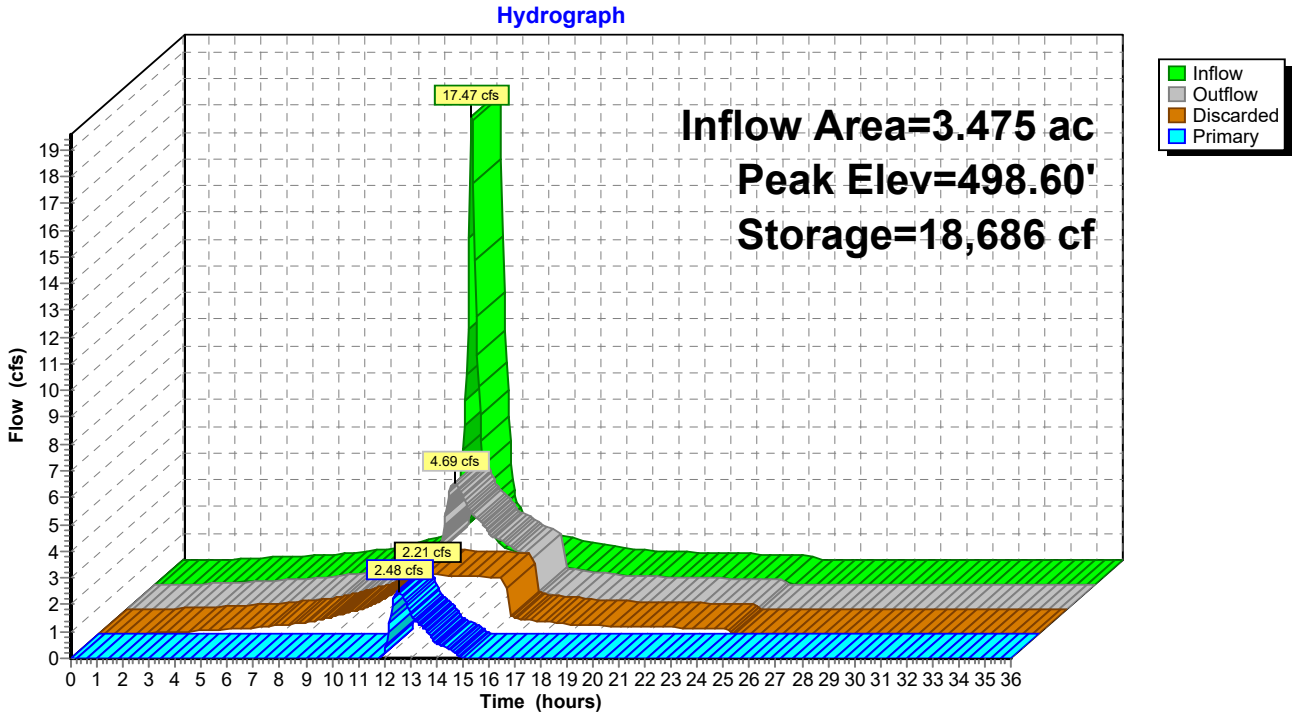
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

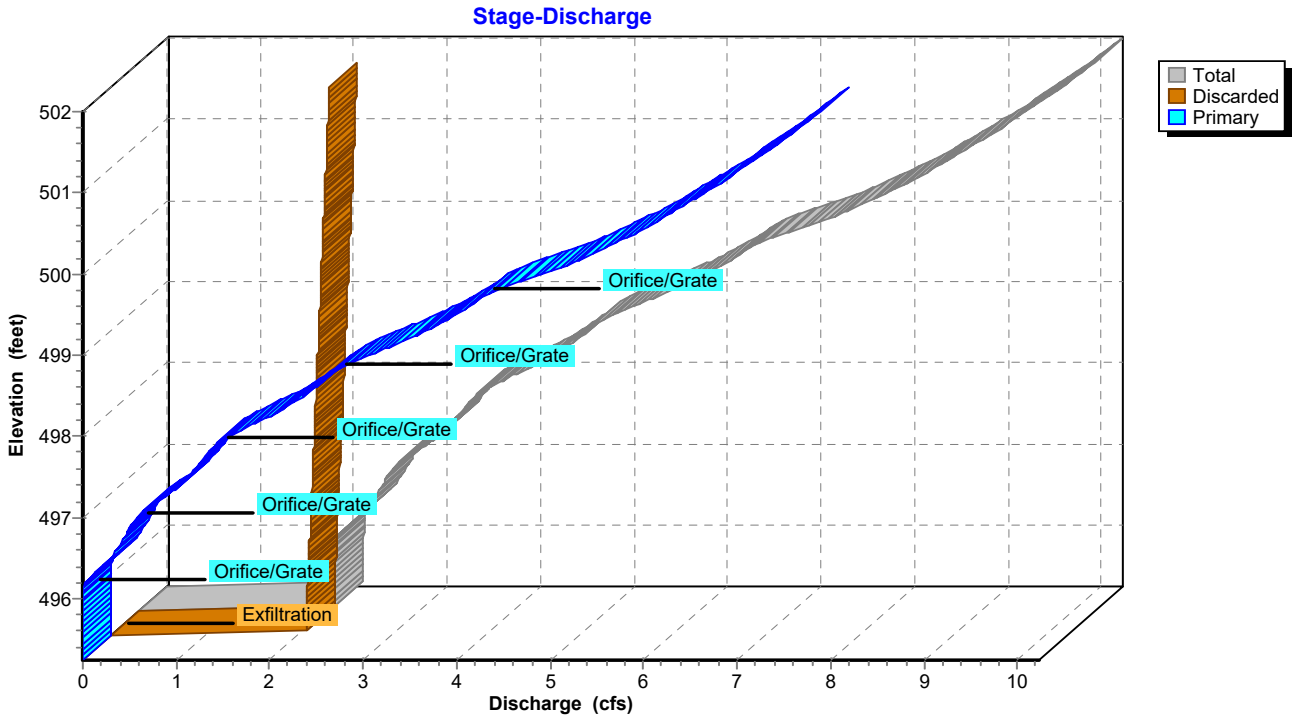
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



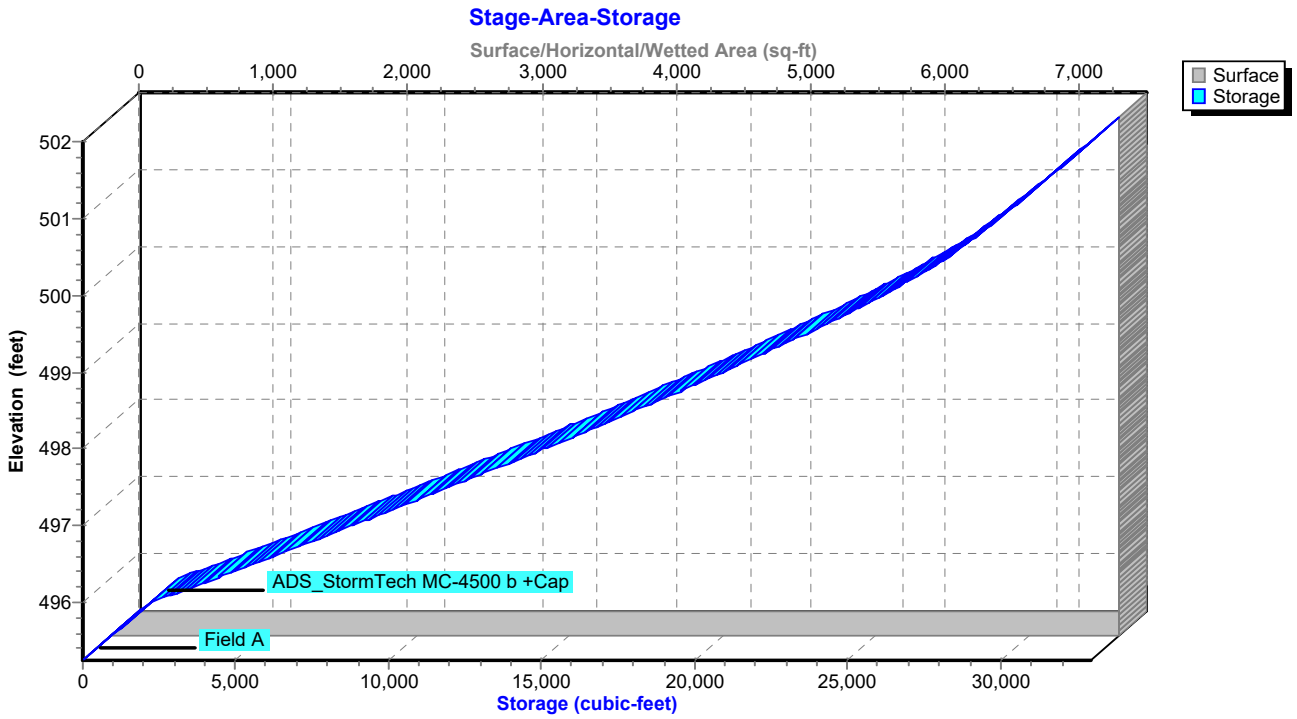
Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Hydrograph for Pond SMS #1C: SMS #1C

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	495.25	0.00	0.00	0.00
1.00	0.00	0	495.25	0.00	0.00	0.00
2.00	0.03	2	495.25	0.02	0.02	0.00
3.00	0.08	7	495.25	0.08	0.08	0.00
4.00	0.13	12	495.25	0.13	0.13	0.00
5.00	0.18	17	495.26	0.18	0.18	0.00
6.00	0.23	22	495.26	0.23	0.23	0.00
7.00	0.32	31	495.26	0.32	0.32	0.00
8.00	0.44	42	495.26	0.43	0.43	0.00
9.00	0.66	63	495.27	0.65	0.65	0.00
10.00	0.91	87	495.28	0.90	0.90	0.00
11.00	1.38	132	495.29	1.36	1.36	0.00
12.00	**9.53**	**4,793**	**496.39**	**2.32**	**2.13**	**0.19**
13.00	**1.82**	**15,727**	**498.11**	**3.93**	**2.19**	**1.73**
14.00	1.10	8,842	497.01	2.73	2.15	0.57
15.00	0.82	3,427	496.18	2.14	2.12	0.02
16.00	0.58	57	495.27	0.59	0.59	0.00
17.00	0.46	44	495.26	0.46	0.46	0.00
18.00	0.35	34	495.26	0.35	0.35	0.00
19.00	0.31	30	495.26	0.31	0.31	0.00
20.00	0.28	27	495.26	0.28	0.28	0.00
21.00	0.25	25	495.26	0.25	0.25	0.00
22.00	0.23	22	495.26	0.23	0.23	0.00
23.00	0.21	20	495.26	0.21	0.21	0.00
24.00	0.18	18	495.26	0.18	0.18	0.00
25.00	0.00	0	495.25	0.00	0.00	0.00
26.00	0.00	0	495.25	0.00	0.00	0.00
27.00	0.00	0	495.25	0.00	0.00	0.00
28.00	0.00	0	495.25	0.00	0.00	0.00
29.00	0.00	0	495.25	0.00	0.00	0.00
30.00	0.00	0	495.25	0.00	0.00	0.00
31.00	0.00	0	495.25	0.00	0.00	0.00
32.00	0.00	0	495.25	0.00	0.00	0.00
33.00	0.00	0	495.25	0.00	0.00	0.00
34.00	0.00	0	495.25	0.00	0.00	0.00
35.00	0.00	0	495.25	0.00	0.00	0.00
36.00	0.00	0	495.25	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1C: SMS #1C

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
495.25	0.00	0.00	0.00
495.35	2.09	2.09	0.00
495.45	2.09	2.09	0.00
495.55	2.10	2.10	0.00
495.65	2.10	2.10	0.00
495.75	2.10	2.10	0.00
495.85	2.11	2.11	0.00
495.95	2.11	2.11	0.00
496.05	2.11	2.11	0.00
496.15	2.13	2.12	0.01
496.25	2.19	2.12	0.07
496.35	2.28	2.13	0.16
496.45	2.39	2.13	0.26
496.55	2.46	2.13	0.33
496.65	2.53	2.14	0.39
496.75	2.58	2.14	0.44
496.85	2.63	2.14	0.49
496.95	2.68	2.15	0.53
497.05	2.77	2.15	0.61
497.15	2.89	2.16	0.73
497.25	3.03	2.16	0.87
497.35	3.15	2.16	0.98
497.45	3.24	2.17	1.08
497.55	3.33	2.17	1.16
497.65	3.41	2.17	1.24
497.75	3.49	2.18	1.31
497.85	3.56	2.18	1.38
497.95	3.67	2.19	1.48
498.05	3.82	2.19	1.63
498.15	4.01	2.19	1.81
498.25	4.20	2.20	2.00
498.35	4.36	2.20	2.16
498.45	4.50	2.20	2.29
498.55	4.62	2.21	2.42
498.65	4.74	2.21	2.53
498.75	4.85	2.22	2.64
498.85	4.99	2.22	2.77
498.95	5.17	2.22	2.95
499.05	5.39	2.23	3.16
499.15	5.61	2.23	3.38
499.25	5.81	2.23	3.58
499.35	5.99	2.24	3.75
499.45	6.15	2.24	3.91
499.55	6.30	2.25	4.05
499.65	6.44	2.25	4.19
499.75	6.60	2.25	4.34
499.85	6.80	2.26	4.54
499.95	7.04	2.26	4.78
500.05	7.29	2.27	5.03
500.15	7.53	2.27	5.26
500.25	7.73	2.27	5.46
500.35	7.92	2.28	5.64
500.45	8.10	2.28	5.82
500.55	8.27	2.28	5.98
500.65	8.43	2.29	6.14
500.75	8.58	2.29	6.29
500.85	8.73	2.30	6.44
500.95	8.88	2.30	6.58
501.05	9.02	2.30	6.72
501.15	9.16	2.31	6.85
501.25	9.30	2.31	6.99
501.35	9.43	2.31	7.11
501.45	9.56	2.32	7.24
501.55	9.68	2.32	7.36
501.65	9.81	2.33	7.48
501.75	9.93	2.33	7.60
501.85	10.05	2.33	7.72
501.95	**10.17**	**2.34**	**7.83**

Stage-Area-Storage for Pond SMS #1C: SMS #1C

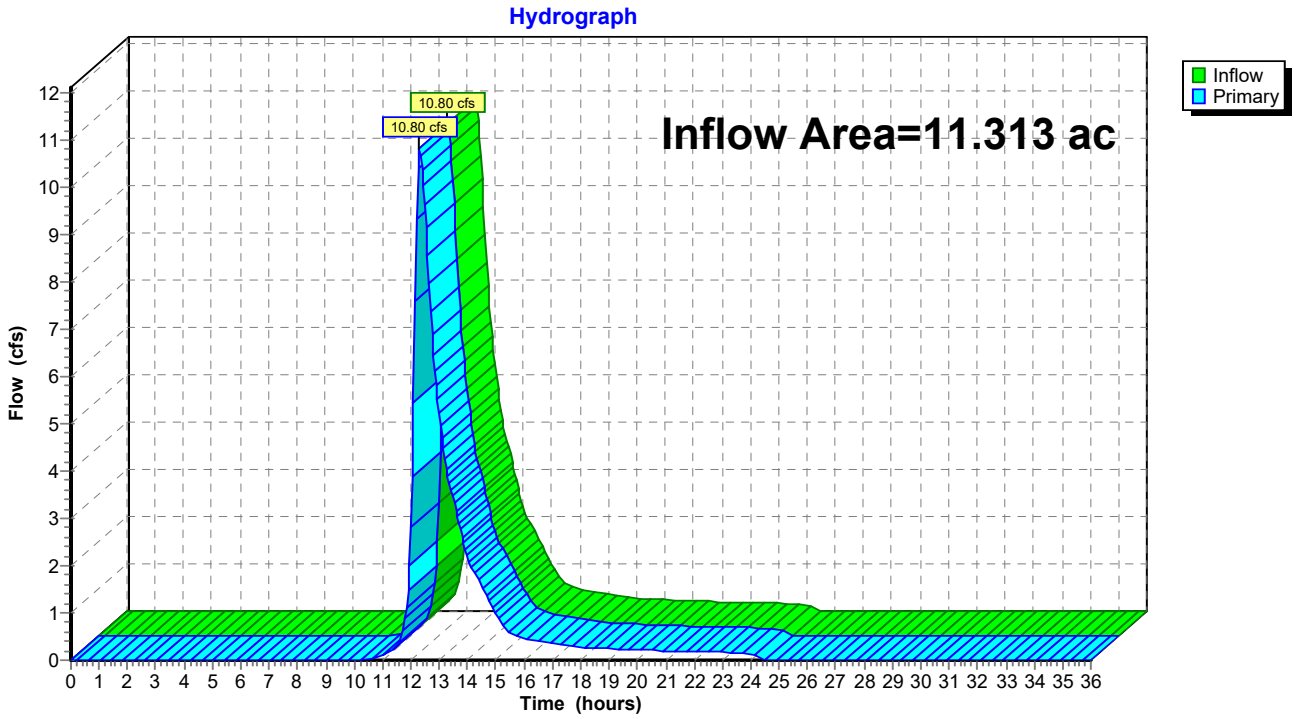
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
495.25	**7,503**	0
495.35	7,503	300
495.45	7,503	600
495.55	7,503	900
495.65	7,503	1,200
495.75	7,503	1,501
495.85	7,503	1,801
495.95	7,503	2,101
496.05	7,503	2,582
496.15	7,503	3,243
496.25	7,503	3,902
496.35	7,503	4,560
496.45	7,503	5,216
496.55	7,503	5,871
496.65	7,503	6,523
496.75	7,503	7,173
496.85	7,503	7,822
496.95	7,503	8,468
497.05	7,503	9,111
497.15	7,503	9,752
497.25	7,503	10,391
497.35	7,503	11,026
497.45	7,503	11,658
497.55	7,503	12,288
497.65	7,503	12,914
497.75	7,503	13,537
497.85	7,503	14,155
497.95	7,503	14,770
498.05	7,503	15,381
498.15	7,503	15,988
498.25	7,503	16,590
498.35	7,503	17,188
498.45	7,503	17,781
498.55	7,503	18,369
498.65	7,503	18,952
498.75	7,503	19,530
498.85	7,503	20,101
498.95	7,503	20,667
499.05	7,503	21,226
499.15	7,503	21,779
499.25	7,503	22,324
499.35	7,503	22,862
499.45	7,503	23,393
499.55	7,503	23,915
499.65	7,503	24,428
499.75	7,503	24,932
499.85	7,503	25,426
499.95	7,503	25,909
500.05	7,503	26,381
500.15	7,503	26,840
500.25	7,503	27,285
500.35	7,503	27,713
500.45	7,503	28,121
500.55	7,503	28,501
500.65	7,503	28,850
500.75	7,503	29,181
500.85	7,503	29,504
500.95	7,503	29,817
501.05	7,503	30,119
501.15	7,503	30,419
501.25	7,503	30,719
501.35	7,503	31,019
501.45	7,503	31,319
501.55	7,503	31,620
501.65	7,503	31,920
501.75	7,503	32,220
501.85	7,503	32,520
501.95	7,503	**32,820**

Summary for Link POI #1: POI #1

Inflow Area = 11.313 ac, 61.95% Impervious, Inflow Depth = 1.40" for 25-Year event
Inflow = 10.80 cfs @ 12.31 hrs, Volume= 1.321 af
Primary = 10.80 cfs @ 12.31 hrs, Volume= 1.321 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #1: POI #1



Hydrograph for Link POI #1: POI #1

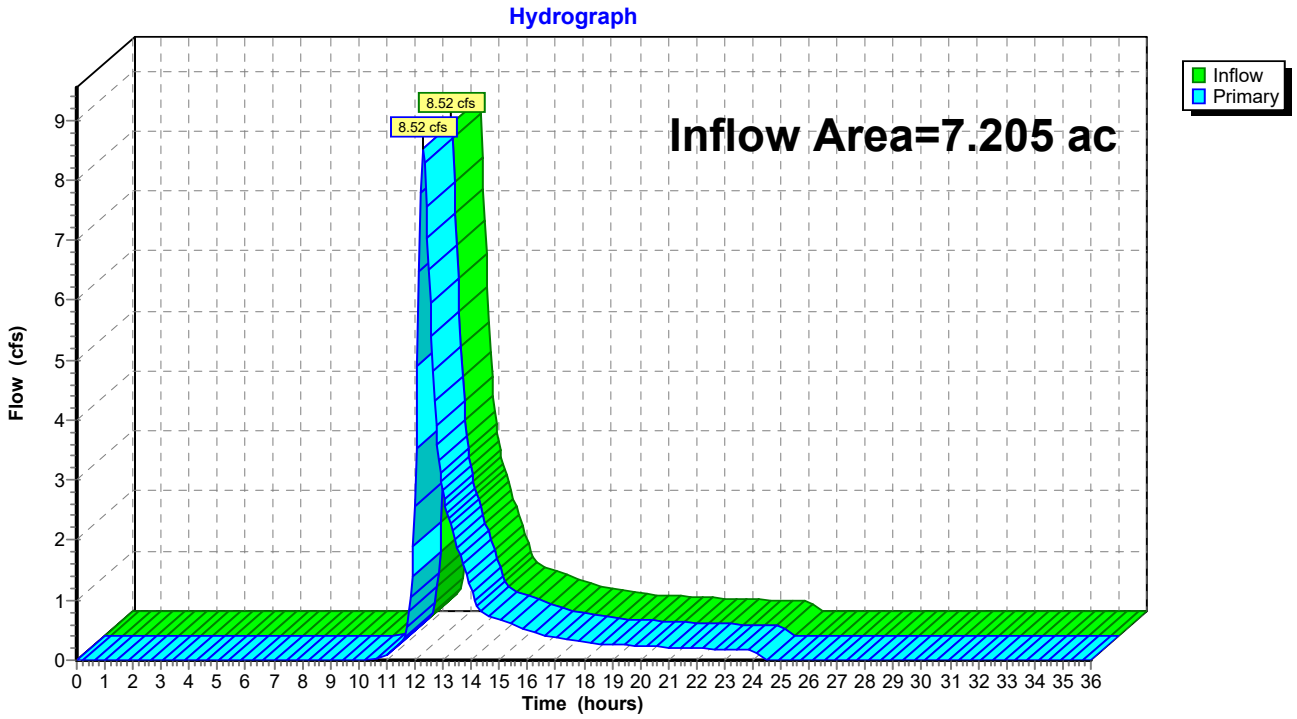
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.02	0.00	0.02
11.00	0.11	0.00	0.11
11.50	0.32	0.00	0.32
12.00	**2.80**	0.00	**2.80**
12.50	**9.63**	0.00	**9.63**
13.00	5.22	0.00	5.22
13.50	3.37	0.00	3.37
14.00	2.12	0.00	2.12
14.50	1.59	0.00	1.59
15.00	0.97	0.00	0.97
15.50	0.55	0.00	0.55
16.00	0.46	0.00	0.46
16.50	0.39	0.00	0.39
17.00	0.36	0.00	0.36
17.50	0.32	0.00	0.32
18.00	0.28	0.00	0.28
18.50	0.25	0.00	0.25
19.00	0.24	0.00	0.24
19.50	0.23	0.00	0.23
20.00	0.22	0.00	0.22
20.50	0.21	0.00	0.21
21.00	0.20	0.00	0.20
21.50	0.19	0.00	0.19
22.00	0.18	0.00	0.18
22.50	0.17	0.00	0.17
23.00	0.17	0.00	0.17
23.50	0.16	0.00	0.16
24.00	0.15	0.00	0.15
24.50	0.01	0.00	0.01
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Summary for Link POI #2: POI #2

Inflow Area = 7.205 ac, 35.36% Impervious, Inflow Depth = 1.58" for 25-Year event
Inflow = 8.52 cfs @ 12.28 hrs, Volume= 0.948 af
Primary = 8.52 cfs @ 12.28 hrs, Volume= 0.948 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #2: POI #2



Hydrograph for Link POI #2: POI #2

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.09	0.00	0.09
11.50	0.29	0.00	0.29
12.00	**2.55**	0.00	**2.55**
12.50	**6.51**	0.00	**6.51**
13.00	2.82	0.00	2.82
13.50	1.91	0.00	1.91
14.00	1.16	0.00	1.16
14.50	0.76	0.00	0.76
15.00	0.68	0.00	0.68
15.50	0.59	0.00	0.59
16.00	0.50	0.00	0.50
16.50	0.43	0.00	0.43
17.00	0.39	0.00	0.39
17.50	0.35	0.00	0.35
18.00	0.31	0.00	0.31
18.50	0.28	0.00	0.28
19.00	0.26	0.00	0.26
19.50	0.25	0.00	0.25
20.00	0.24	0.00	0.24
20.50	0.23	0.00	0.23
21.00	0.22	0.00	0.22
21.50	0.21	0.00	0.21
22.00	0.20	0.00	0.20
22.50	0.19	0.00	0.19
23.00	0.18	0.00	0.18
23.50	0.17	0.00	0.17
24.00	0.16	0.00	0.16
24.50	0.01	0.00	0.01
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 #1A: Drainage Area #1A Runoff Area=168,262 sf 91.78% Impervious Runoff Depth=8.40"
Tc=10.0 min CN=95 Runoff=29.26 cfs 2.703 af

Subcatchment DA #1B: Drainage Area #1B Runoff Area=173,173 sf 5.32% Impervious Runoff Depth=4.47"
Flow Length=638' Tc=17.0 min CN=63 Runoff=14.87 cfs 1.481 af

Subcatchment DA #1C: Drainage Area Runoff Area=151,363 sf 93.57% Impervious Runoff Depth=8.52"
Tc=10.0 min CN=96 Runoff=26.44 cfs 2.467 af

Subcatchment DA #2A: Drainage Area #2A Runoff Area=121,548 sf 88.60% Impervious Runoff Depth=8.28"
Tc=10.0 min CN=94 Runoff=21.03 cfs 1.925 af

Subcatchment DA #2B: Drainage Area #2B Runoff Area=192,310 sf 1.70% Impervious Runoff Depth=4.35"
Flow Length=784' Tc=18.4 min CN=62 Runoff=15.56 cfs 1.599 af

Pond DB #2: Drainage Basin #2 Peak Elev=487.71' Storage=22,271 cf Inflow=21.03 cfs 1.925 af
Discarded=3.44 cfs 1.524 af Primary=3.01 cfs 0.401 af Outflow=6.44 cfs 1.925 af

Pond SMS #1A: SMS #1A Peak Elev=498.46' Storage=32,853 cf Inflow=29.26 cfs 2.703 af
Discarded=2.35 cfs 1.881 af Primary=7.66 cfs 0.823 af Outflow=10.02 cfs 2.703 af

Pond SMS #1C: SMS #1C Peak Elev=500.79' Storage=29,323 cf Inflow=26.44 cfs 2.467 af
Discarded=2.29 cfs 1.774 af Primary=6.36 cfs 0.693 af Outflow=8.65 cfs 2.467 af

Link POI #1: POI #1 Inflow=26.17 cfs 2.996 af
Primary=26.17 cfs 2.996 af

Link POI #2: POI #2 Inflow=18.23 cfs 2.000 af
Primary=18.23 cfs 2.000 af

Total Runoff Area = 18.518 ac Runoff Volume = 10.175 af Average Runoff Depth = 6.59"
48.40% Pervious = 8.963 ac 51.60% Impervious = 9.556 ac

Summary for Subcatchment DA #1A: Drainage Area #1A

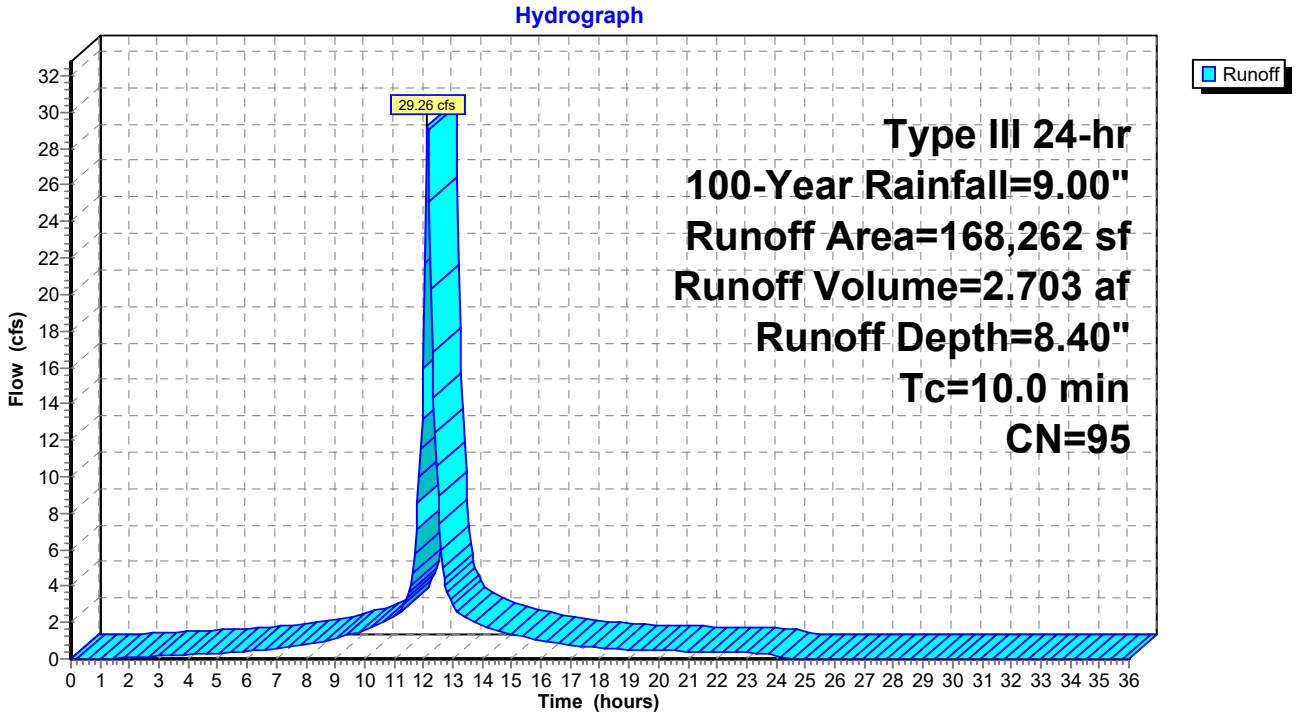
Runoff = 29.26 cfs @ 12.14 hrs, Volume= 2.703 af, Depth= 8.40"
Routed to Pond SMS #1A : SMS #1A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=9.00"

	Area (sf)	CN	Description
	10,723	61	>75% Grass cover, Good, HSG B
*	3,112	61	Emergency Access Road (Perv.), Good, HSG B
*	86,043	98	Building/Roof, HSG B
*	60,366	98	Pavement, HSG B
*	2,940	98	Sidewalk, HSG B
*	5,078	98	Emergency Access Road (Imp.), HSG B
	168,262	95	Weighted Average
	13,835		8.22% Pervious Area
	154,427		91.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #1A: Drainage Area #1A



Hydrograph for Subcatchment DA #1A: Drainage Area #1A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.04	0.00	0.00
1.00	0.09	0.00	0.00
1.50	0.13	0.00	0.02
2.00	0.18	0.01	0.07
2.50	0.23	0.02	0.11
3.00	0.28	0.04	0.16
3.50	0.33	0.07	0.20
4.00	0.39	0.10	0.25
4.50	0.45	0.13	0.29
5.00	0.51	0.18	0.33
5.50	0.58	0.22	0.37
6.00	0.65	0.28	0.41
6.50	0.73	0.34	0.48
7.00	0.81	0.41	0.57
7.50	0.91	0.49	0.67
8.00	1.03	0.59	0.76
8.50	1.16	0.70	0.93
9.00	1.31	0.84	1.13
9.50	1.49	1.01	1.34
10.00	1.70	1.20	1.55
10.50	1.95	1.43	1.90
11.00	2.25	1.72	2.33
11.50	2.68	2.14	3.56
12.00	4.50	3.92	**15.99**
12.50	6.32	5.73	**8.98**
13.00	6.75	6.16	3.04
13.50	7.05	6.46	2.26
14.00	7.30	6.70	1.84
14.50	7.51	6.91	1.57
15.00	7.69	7.09	1.37
15.50	7.84	7.25	1.17
16.00	7.97	7.38	0.97
16.50	8.09	7.49	0.85
17.00	8.19	7.59	0.76
17.50	8.27	7.67	0.67
18.00	8.35	7.75	0.59
18.50	8.42	7.82	0.54
19.00	8.49	7.89	0.51
19.50	8.55	7.95	0.49
20.00	8.61	8.01	0.46
20.50	8.67	8.07	0.44
21.00	8.72	8.12	0.42
21.50	8.78	8.18	0.40
22.00	8.83	8.23	0.38
22.50	8.87	8.27	0.36
23.00	8.92	8.32	0.34
23.50	8.96	8.36	0.32
24.00	**9.00**	**8.40**	0.30
24.50	9.00	8.40	0.00
25.00	9.00	8.40	0.00
25.50	9.00	8.40	0.00
26.00	9.00	8.40	0.00
26.50	9.00	8.40	0.00
27.00	9.00	8.40	0.00
27.50	9.00	8.40	0.00
28.00	9.00	8.40	0.00
28.50	9.00	8.40	0.00
29.00	9.00	8.40	0.00
29.50	9.00	8.40	0.00
30.00	9.00	8.40	0.00
30.50	9.00	8.40	0.00
31.00	9.00	8.40	0.00
31.50	9.00	8.40	0.00
32.00	9.00	8.40	0.00
32.50	9.00	8.40	0.00
33.00	9.00	8.40	0.00
33.50	9.00	8.40	0.00
34.00	9.00	8.40	0.00
34.50	9.00	8.40	0.00
35.00	9.00	8.40	0.00
35.50	9.00	8.40	0.00
36.00	9.00	8.40	0.00

Summary for Subcatchment DA #1B: Drainage Area #1B

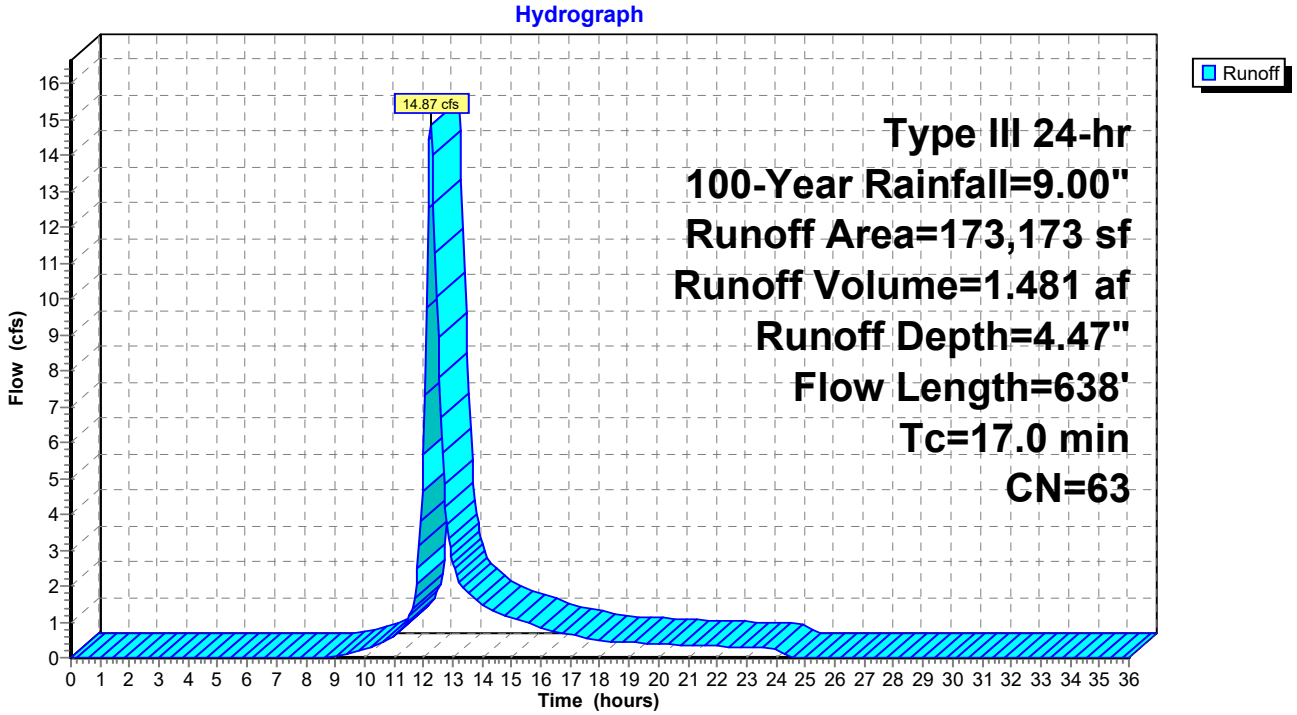
Runoff = 14.87 cfs @ 12.24 hrs, Volume= 1.481 af, Depth= 4.47"
Routed to Link POI #1 : POI #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=9.00"

	Area (sf)	CN	Description
	158,310	61	>75% Grass cover, Good, HSG B
*	5,648	61	Emergency Access Road (Perv.), Good, HSG B
*	9,215	98	Emergency Access Road (Imp.), HSG B
	173,173	63	Weighted Average
	163,958		94.68% Pervious Area
	9,215		5.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	150	0.1200	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
4.8	488	0.0578	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	638	Total			

Subcatchment DA #1B: Drainage Area #1B



Hydrograph for Subcatchment DA #1B: Drainage Area #1B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.04	0.00	0.00
1.00	0.09	0.00	0.00
1.50	0.13	0.00	0.00
2.00	0.18	0.00	0.00
2.50	0.23	0.00	0.00
3.00	0.28	0.00	0.00
3.50	0.33	0.00	0.00
4.00	0.39	0.00	0.00
4.50	0.45	0.00	0.00
5.00	0.51	0.00	0.00
5.50	0.58	0.00	0.00
6.00	0.65	0.00	0.00
6.50	0.73	0.00	0.00
7.00	0.81	0.00	0.00
7.50	0.91	0.00	0.00
8.00	1.03	0.00	0.00
8.50	1.16	0.00	0.00
9.00	1.31	0.00	0.02
9.50	1.49	0.02	0.10
10.00	1.70	0.04	0.21
10.50	1.95	0.09	0.37
11.00	2.25	0.17	0.60
11.50	2.68	0.31	1.11
12.00	4.50	1.20	**5.67**
12.50	6.32	2.40	**8.91**
13.00	6.75	2.72	2.66
13.50	7.05	2.94	1.81
14.00	7.30	3.13	1.51
14.50	7.51	3.29	1.28
15.00	7.69	3.43	1.13
15.50	7.84	3.55	0.98
16.00	7.97	3.65	0.82
16.50	8.09	3.74	0.71
17.00	8.19	3.82	0.64
17.50	8.27	3.89	0.57
18.00	8.35	3.95	0.50
18.50	8.42	4.00	0.45
19.00	8.49	4.06	0.43
19.50	8.55	4.11	0.41
20.00	8.61	4.16	0.39
20.50	8.67	4.20	0.37
21.00	8.72	4.25	0.35
21.50	8.78	4.29	0.34
22.00	8.83	4.33	0.32
22.50	8.87	4.37	0.31
23.00	8.92	4.40	0.29
23.50	8.96	4.44	0.28
24.00	**9.00**	**4.47**	0.26
24.50	9.00	4.47	0.01
25.00	9.00	4.47	0.00
25.50	9.00	4.47	0.00
26.00	9.00	4.47	0.00
26.50	9.00	4.47	0.00
27.00	9.00	4.47	0.00
27.50	9.00	4.47	0.00
28.00	9.00	4.47	0.00
28.50	9.00	4.47	0.00
29.00	9.00	4.47	0.00
29.50	9.00	4.47	0.00
30.00	9.00	4.47	0.00
30.50	9.00	4.47	0.00
31.00	9.00	4.47	0.00
31.50	9.00	4.47	0.00
32.00	9.00	4.47	0.00
32.50	9.00	4.47	0.00
33.00	9.00	4.47	0.00
33.50	9.00	4.47	0.00
34.00	9.00	4.47	0.00
34.50	9.00	4.47	0.00
35.00	9.00	4.47	0.00
35.50	9.00	4.47	0.00
36.00	9.00	4.47	0.00

Summary for Subcatchment DA #1C: Drainage Area #1C

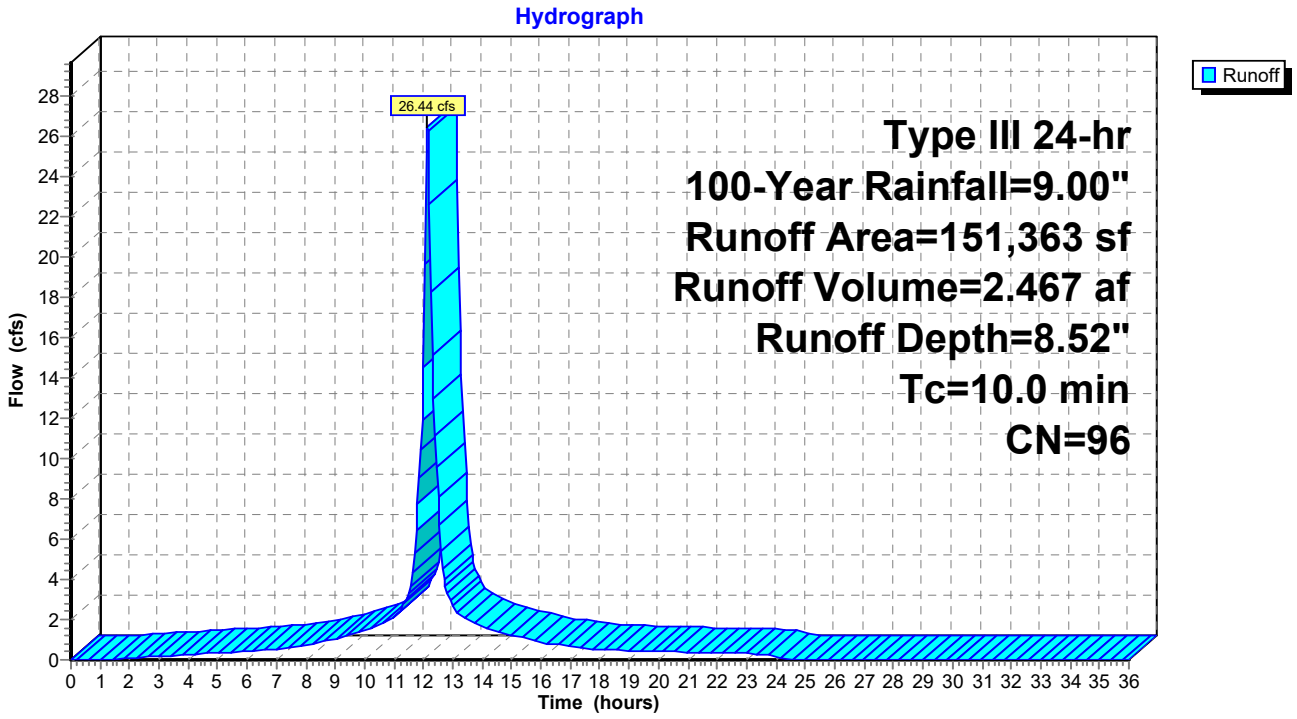
Runoff = 26.44 cfs @ 12.14 hrs, Volume= 2.467 af, Depth= 8.52"
Routed to Pond SMS #1C : SMS #1C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=9.00"

	Area (sf)	CN	Description
	9,732	61	>75% Grass cover, Good, HSG B
*	87,537	98	Building/Roof, HSG B
*	50,809	98	Pavement, HSG B
*	3,285	98	Sidewalk, HSG B
	151,363	96	Weighted Average
	9,732		6.43% Pervious Area
	141,631		93.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Direct Minimum**

Subcatchment DA #1C: Drainage Area #1C



Hydrograph for Subcatchment DA #1C: Drainage Area #1C

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.04	0.00	0.00
1.00	0.09	0.00	0.00
1.50	0.13	0.01	0.05
2.00	0.18	0.02	0.10
2.50	0.23	0.04	0.14
3.00	0.28	0.06	0.18
3.50	0.33	0.09	0.22
4.00	0.39	0.13	0.26
4.50	0.45	0.17	0.30
5.00	0.51	0.22	0.33
5.50	0.58	0.27	0.37
6.00	0.65	0.32	0.40
6.50	0.73	0.39	0.47
7.00	0.81	0.47	0.55
7.50	0.91	0.55	0.63
8.00	1.03	0.65	0.72
8.50	1.16	0.77	0.87
9.00	1.31	0.92	1.05
9.50	1.49	1.09	1.24
10.00	1.70	1.29	1.42
10.50	1.95	1.52	1.74
11.00	2.25	1.82	2.12
11.50	2.68	2.24	3.23
12.00	4.50	4.04	**14.47**
12.50	6.32	5.84	**8.10**
13.00	6.75	6.27	2.74
13.50	7.05	6.58	2.03
14.00	7.30	6.82	1.66
14.50	7.51	7.03	1.42
15.00	7.69	7.21	1.24
15.50	7.84	7.37	1.05
16.00	7.97	7.49	0.87
16.50	8.09	7.61	0.76
17.00	8.19	7.71	0.68
17.50	8.27	7.79	0.61
18.00	8.35	7.87	0.53
18.50	8.42	7.94	0.49
19.00	8.49	8.01	0.46
19.50	8.55	8.07	0.44
20.00	8.61	8.13	0.42
20.50	8.67	8.19	0.40
21.00	8.72	8.24	0.38
21.50	8.78	8.30	0.36
22.00	8.83	8.35	0.34
22.50	8.87	8.39	0.33
23.00	8.92	8.44	0.31
23.50	8.96	8.48	0.29
24.00	**9.00**	**8.52**	0.27
24.50	9.00	8.52	0.00
25.00	9.00	8.52	0.00
25.50	9.00	8.52	0.00
26.00	9.00	8.52	0.00
26.50	9.00	8.52	0.00
27.00	9.00	8.52	0.00
27.50	9.00	8.52	0.00
28.00	9.00	8.52	0.00
28.50	9.00	8.52	0.00
29.00	9.00	8.52	0.00
29.50	9.00	8.52	0.00
30.00	9.00	8.52	0.00
30.50	9.00	8.52	0.00
31.00	9.00	8.52	0.00
31.50	9.00	8.52	0.00
32.00	9.00	8.52	0.00
32.50	9.00	8.52	0.00
33.00	9.00	8.52	0.00
33.50	9.00	8.52	0.00
34.00	9.00	8.52	0.00
34.50	9.00	8.52	0.00
35.00	9.00	8.52	0.00
35.50	9.00	8.52	0.00
36.00	9.00	8.52	0.00

Summary for Subcatchment DA #2A: Drainage Area #2A

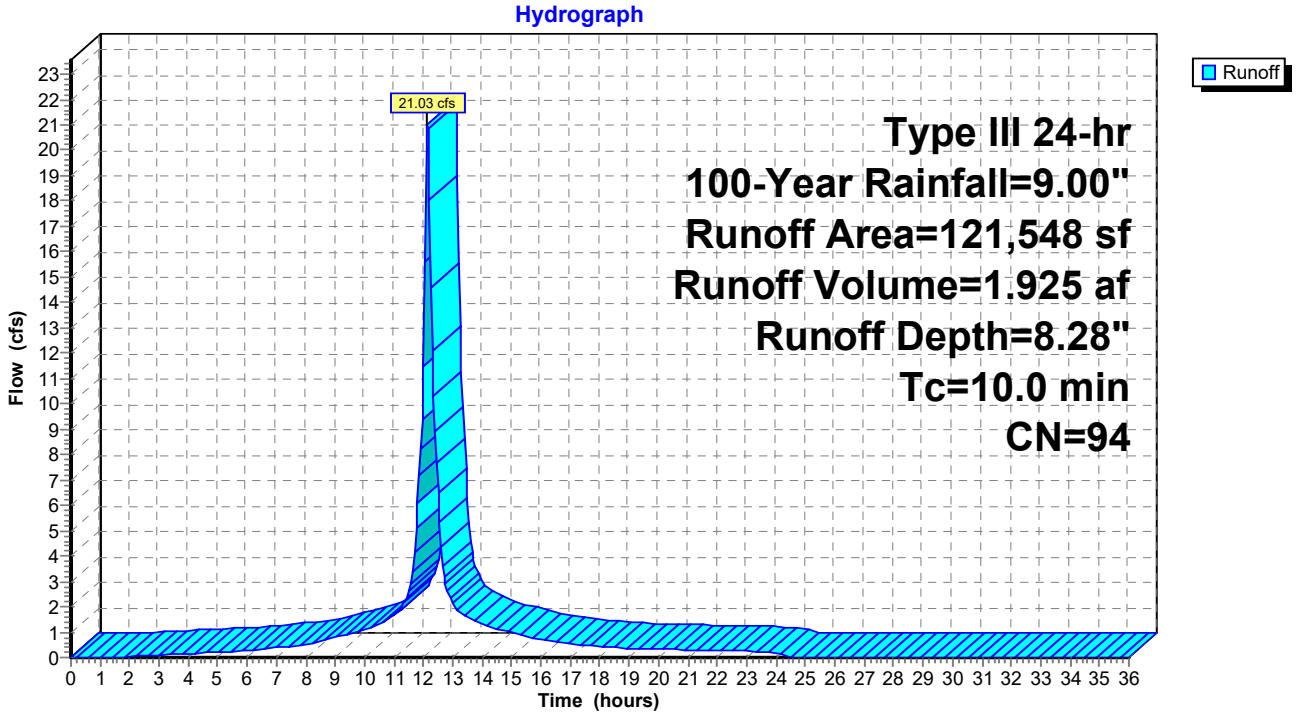
Runoff = 21.03 cfs @ 12.14 hrs, Volume= 1.925 af, Depth= 8.28"
Routed to Pond DB #2 : Drainage Basin #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=9.00"

	Area (sf)	CN	Description
*	48,398	98	Building/Roof, HSG B
*	45,328	98	Pavement, HSG B
*	1,404	98	Sidewalk, HSG B
	13,851	61	>75% Grass cover, Good, HSG B
*	12,567	98	Infiltration Basin, HSG B
	121,548	94	Weighted Average
	13,851		11.40% Pervious Area
	107,697		88.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #2A: Drainage Area #2A



Hydrograph for Subcatchment DA #2A: Drainage Area #2A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.04	0.00	0.00
1.00	0.09	0.00	0.00
1.50	0.13	0.00	0.00
2.00	0.18	0.00	0.03
2.50	0.23	0.01	0.06
3.00	0.28	0.03	0.09
3.50	0.33	0.05	0.12
4.00	0.39	0.07	0.15
4.50	0.45	0.11	0.18
5.00	0.51	0.14	0.21
5.50	0.58	0.19	0.24
6.00	0.65	0.23	0.27
6.50	0.73	0.29	0.32
7.00	0.81	0.36	0.39
7.50	0.91	0.43	0.45
8.00	1.03	0.53	0.52
8.50	1.16	0.63	0.64
9.00	1.31	0.77	0.79
9.50	1.49	0.93	0.94
10.00	1.70	1.12	1.09
10.50	1.95	1.35	1.35
11.00	2.25	1.63	1.65
11.50	2.68	2.04	2.54
12.00	4.50	3.82	**11.47**
12.50	6.32	5.61	**6.47**
13.00	6.75	6.04	2.19
13.50	7.05	6.34	1.63
14.00	7.30	6.59	1.33
14.50	7.51	6.79	1.13
15.00	7.69	6.97	0.99
15.50	7.84	7.13	0.84
16.00	7.97	7.26	0.70
16.50	8.09	7.37	0.61
17.00	8.19	7.47	0.55
17.50	8.27	7.55	0.49
18.00	8.35	7.63	0.42
18.50	8.42	7.70	0.39
19.00	8.49	7.77	0.37
19.50	8.55	7.83	0.35
20.00	8.61	7.89	0.33
20.50	8.67	7.95	0.32
21.00	8.72	8.00	0.30
21.50	8.78	8.06	0.29
22.00	8.83	8.10	0.28
22.50	8.87	8.15	0.26
23.00	8.92	8.20	0.25
23.50	8.96	8.24	0.23
24.00	**9.00**	**8.28**	0.22
24.50	9.00	8.28	0.00
25.00	9.00	8.28	0.00
25.50	9.00	8.28	0.00
26.00	9.00	8.28	0.00
26.50	9.00	8.28	0.00
27.00	9.00	8.28	0.00
27.50	9.00	8.28	0.00
28.00	9.00	8.28	0.00
28.50	9.00	8.28	0.00
29.00	9.00	8.28	0.00
29.50	9.00	8.28	0.00
30.00	9.00	8.28	0.00
30.50	9.00	8.28	0.00
31.00	9.00	8.28	0.00
31.50	9.00	8.28	0.00
32.00	9.00	8.28	0.00
32.50	9.00	8.28	0.00
33.00	9.00	8.28	0.00
33.50	9.00	8.28	0.00
34.00	9.00	8.28	0.00
34.50	9.00	8.28	0.00
35.00	9.00	8.28	0.00
35.50	9.00	8.28	0.00
36.00	9.00	8.28	0.00

Summary for Subcatchment DA #2B: Drainage Area #2B

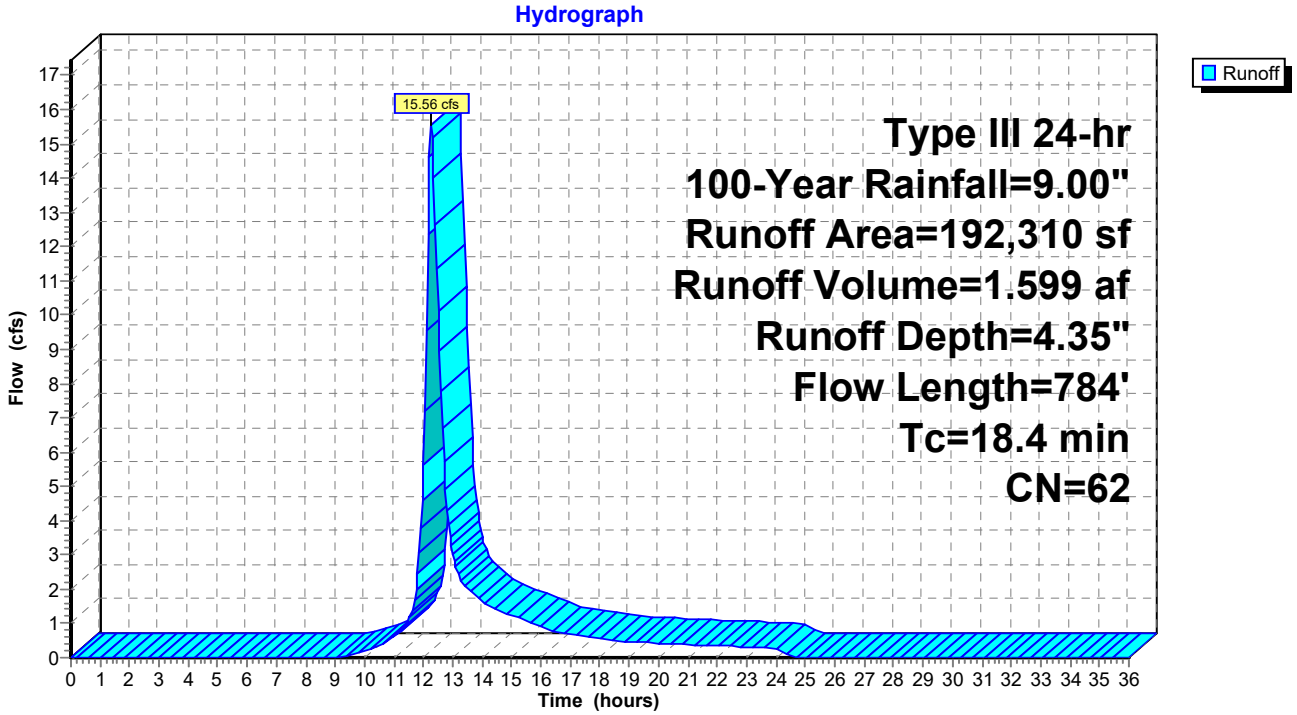
Runoff = 15.56 cfs @ 12.26 hrs, Volume= 1.599 af, Depth= 4.35"
Routed to Link POI #2 : POI #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=9.00"

	Area (sf)	CN	Description
	187,035	61	>75% Grass cover, Good, HSG B
*	2,004	61	Emergency Access Road (Perv.), Good, HSG B
*	3,271	98	Emergency Acess Road (Imp.), HSG B
	192,310	62	Weighted Average
	189,039		98.30% Pervious Area
	3,271		1.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	150	0.0667	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
3.0	634	0.2524	3.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
18.4	784	Total			

Subcatchment DA #2B: Drainage Area #2B



Hydrograph for Subcatchment DA #2B: Drainage Area #2B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.04	0.00	0.00
1.00	0.09	0.00	0.00
1.50	0.13	0.00	0.00
2.00	0.18	0.00	0.00
2.50	0.23	0.00	0.00
3.00	0.28	0.00	0.00
3.50	0.33	0.00	0.00
4.00	0.39	0.00	0.00
4.50	0.45	0.00	0.00
5.00	0.51	0.00	0.00
5.50	0.58	0.00	0.00
6.00	0.65	0.00	0.00
6.50	0.73	0.00	0.00
7.00	0.81	0.00	0.00
7.50	0.91	0.00	0.00
8.00	1.03	0.00	0.00
8.50	1.16	0.00	0.00
9.00	1.31	0.00	0.01
9.50	1.49	0.01	0.08
10.00	1.70	0.03	0.20
10.50	1.95	0.08	0.36
11.00	2.25	0.15	0.61
11.50	2.68	0.28	1.13
12.00	4.50	1.14	**5.63**
12.50	6.32	2.31	**10.13**
13.00	6.75	2.62	3.02
13.50	7.05	2.84	2.00
14.00	7.30	3.02	1.66
14.50	7.51	3.18	1.40
15.00	7.69	3.32	1.24
15.50	7.84	3.44	1.07
16.00	7.97	3.54	0.90
16.50	8.09	3.62	0.78
17.00	8.19	3.70	0.70
17.50	8.27	3.77	0.62
18.00	8.35	3.83	0.55
18.50	8.42	3.89	0.50
19.00	8.49	3.94	0.47
19.50	8.55	3.99	0.45
20.00	8.61	4.04	0.43
20.50	8.67	4.08	0.41
21.00	8.72	4.13	0.39
21.50	8.78	4.17	0.37
22.00	8.83	4.21	0.35
22.50	8.87	4.25	0.34
23.00	8.92	4.28	0.32
23.50	8.96	4.32	0.30
24.00	**9.00**	**4.35**	0.28
24.50	9.00	4.35	0.02
25.00	9.00	4.35	0.00
25.50	9.00	4.35	0.00
26.00	9.00	4.35	0.00
26.50	9.00	4.35	0.00
27.00	9.00	4.35	0.00
27.50	9.00	4.35	0.00
28.00	9.00	4.35	0.00
28.50	9.00	4.35	0.00
29.00	9.00	4.35	0.00
29.50	9.00	4.35	0.00
30.00	9.00	4.35	0.00
30.50	9.00	4.35	0.00
31.00	9.00	4.35	0.00
31.50	9.00	4.35	0.00
32.00	9.00	4.35	0.00
32.50	9.00	4.35	0.00
33.00	9.00	4.35	0.00
33.50	9.00	4.35	0.00
34.00	9.00	4.35	0.00
34.50	9.00	4.35	0.00
35.00	9.00	4.35	0.00
35.50	9.00	4.35	0.00
36.00	9.00	4.35	0.00

Summary for Pond DB #2: Drainage Basin #2

Inflow Area = 2.790 ac, 88.60% Impervious, Inflow Depth = 8.28" for 100-Year event
Inflow = 21.03 cfs @ 12.14 hrs, Volume= 1.925 af
Outflow = 6.44 cfs @ 12.50 hrs, Volume= 1.925 af, Atten= 69%, Lag= 21.9 min
Discarded = 3.44 cfs @ 12.50 hrs, Volume= 1.524 af
Primary = 3.01 cfs @ 12.50 hrs, Volume= 0.401 af
Routed to Link POI #2 : POI #2

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 487.71' @ 12.50 hrs Surf.Area= 10,924 sf Storage= 22,271 cf

Plug-Flow detention time= 28.4 min calculated for 1.922 af (100% of inflow)
Center-of-Mass det. time= 28.4 min (790.8 - 762.4)

Volume	Invert	Avail.Storage	Storage Description
#1	485.00'	25,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

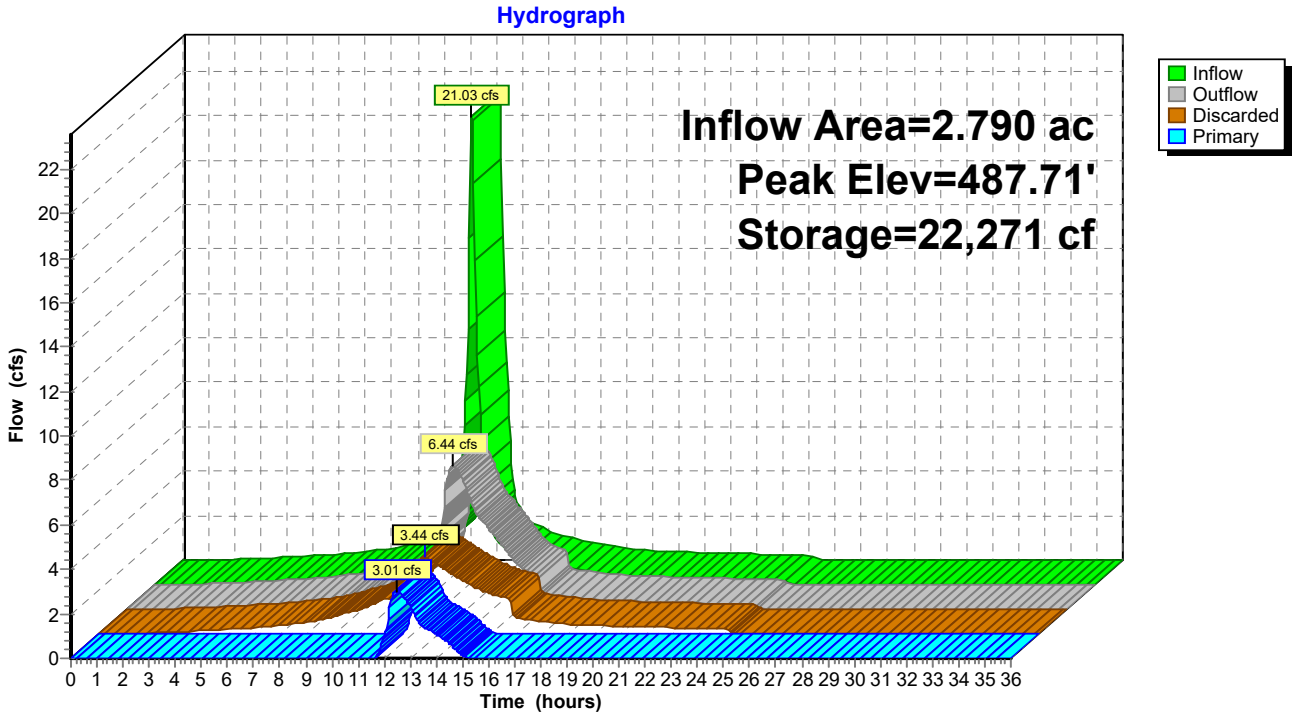
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
485.00	5,500	0	0
486.00	7,500	6,500	6,500
487.00	9,500	8,500	15,000
488.00	11,500	10,500	25,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	485.00'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 470.00'
#2	Primary	485.21'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	486.70'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

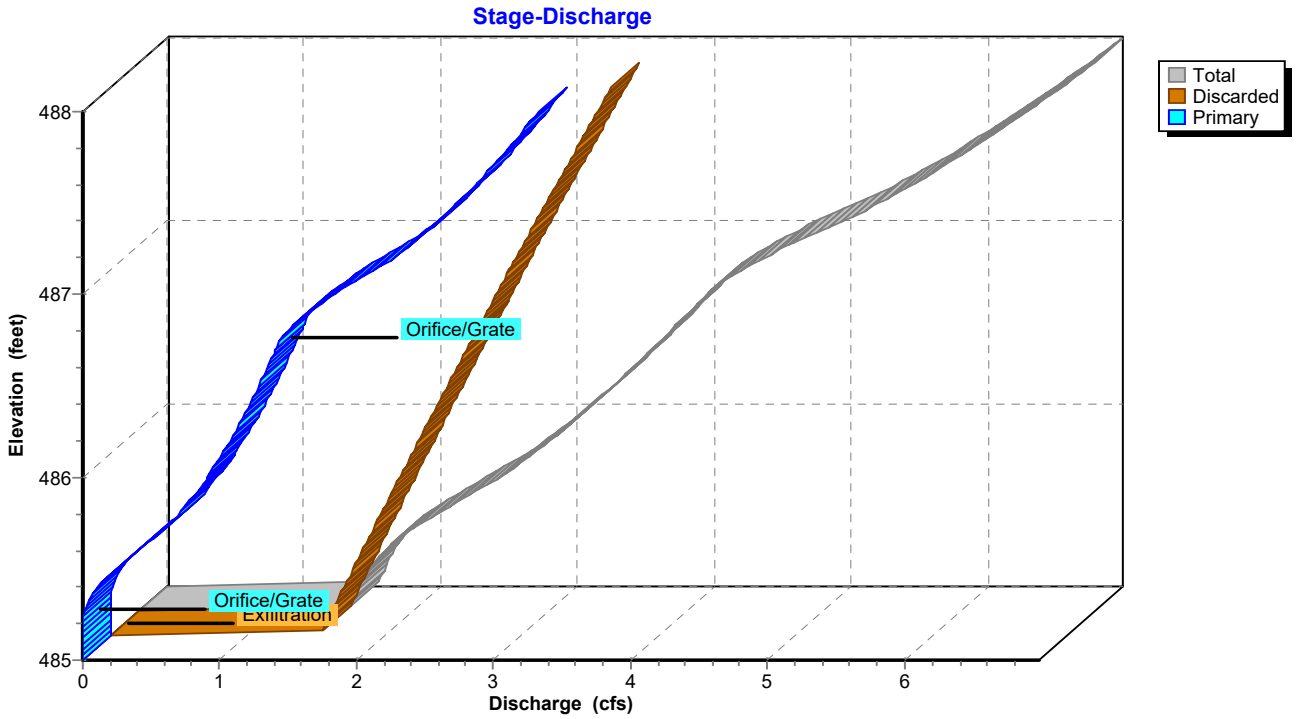
Discarded OutFlow Max=3.44 cfs @ 12.50 hrs HW=487.71' (Free Discharge)
└**1=Exfiltration** (Controls 3.44 cfs)

Primary OutFlow Max=3.00 cfs @ 12.50 hrs HW=487.71' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 1.91 cfs @ 7.16 fps)
└**3=Orifice/Grate** (Orifice Controls 1.09 cfs @ 4.09 fps)

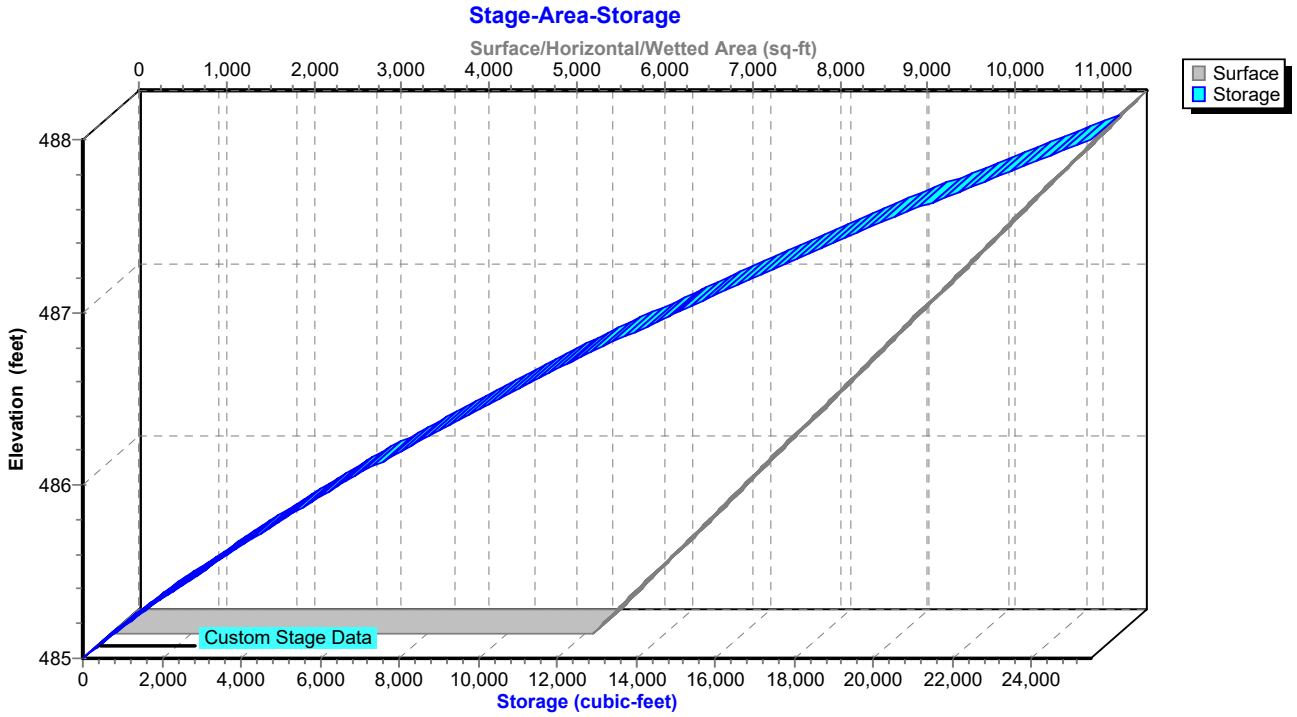
Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Hydrograph for Pond DB #2: Drainage Basin #2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	485.00	0.00	0.00	0.00
1.00	0.00	0	485.00	0.00	0.00	0.00
2.00	0.03	3	485.00	0.03	0.03	0.00
3.00	0.09	9	485.00	0.09	0.09	0.00
4.00	0.15	16	485.00	0.15	0.15	0.00
5.00	0.21	23	485.00	0.21	0.21	0.00
6.00	0.27	29	485.01	0.27	0.27	0.00
7.00	0.39	41	485.01	0.38	0.38	0.00
8.00	0.52	56	485.01	0.52	0.52	0.00
9.00	0.79	83	485.02	0.78	0.78	0.00
10.00	1.09	116	485.02	1.08	1.08	0.00
11.00	1.65	197	485.04	1.55	1.55	0.00
12.00	**11.47**	**7,211**	**486.09**	**3.26**	**2.27**	**0.99**
13.00	**2.19**	**17,440**	**487.25**	**5.46**	**3.10**	**2.36**
14.00	1.33	8,136	486.21	3.44	2.35	1.08
15.00	0.99	2,551	485.43	1.96	1.81	0.15
16.00	0.70	76	485.01	0.71	0.71	0.00
17.00	0.55	59	485.01	0.55	0.55	0.00
18.00	0.42	46	485.01	0.43	0.43	0.00
19.00	0.37	40	485.01	0.37	0.37	0.00
20.00	0.33	36	485.01	0.33	0.33	0.00
21.00	0.30	33	485.01	0.30	0.30	0.00
22.00	0.28	30	485.01	0.28	0.28	0.00
23.00	0.25	27	485.00	0.25	0.25	0.00
24.00	0.22	24	485.00	0.22	0.22	0.00
25.00	0.00	0	485.00	0.00	0.00	0.00
26.00	0.00	0	485.00	0.00	0.00	0.00
27.00	0.00	0	485.00	0.00	0.00	0.00
28.00	0.00	0	485.00	0.00	0.00	0.00
29.00	0.00	0	485.00	0.00	0.00	0.00
30.00	0.00	0	485.00	0.00	0.00	0.00
31.00	0.00	0	485.00	0.00	0.00	0.00
32.00	0.00	0	485.00	0.00	0.00	0.00
33.00	0.00	0	485.00	0.00	0.00	0.00
34.00	0.00	0	485.00	0.00	0.00	0.00
35.00	0.00	0	485.00	0.00	0.00	0.00
36.00	0.00	0	485.00	0.00	0.00	0.00

Stage-Discharge for Pond DB #2: Drainage Basin #2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
485.00	0.00	0.00	0.00
485.05	1.56	1.56	0.00
485.10	1.59	1.59	0.00
485.15	1.63	1.63	0.00
485.20	1.66	1.66	0.00
485.25	1.70	1.69	0.01
485.30	1.75	1.73	0.03
485.35	1.82	1.76	0.06
485.40	1.91	1.79	0.11
485.45	2.00	1.83	0.17
485.50	2.10	1.86	0.24
485.55	2.22	1.89	0.32
485.60	2.33	1.93	0.40
485.65	2.45	1.96	0.49
485.70	2.57	2.00	0.57
485.75	2.68	2.03	0.65
485.80	2.77	2.06	0.70
485.85	2.86	2.10	0.76
485.90	2.95	2.13	0.81
485.95	3.03	2.17	0.86
486.00	3.11	2.20	0.91
486.05	3.19	2.24	0.95
486.10	3.27	2.27	1.00
486.15	3.34	2.31	1.04
486.20	3.42	2.34	1.08
486.25	3.49	2.38	1.11
486.30	3.56	2.41	1.15
486.35	3.63	2.45	1.19
486.40	3.70	2.48	1.22
486.45	3.77	2.52	1.25
486.50	3.84	2.55	1.29
486.55	3.91	2.59	1.32
486.60	3.97	2.62	1.35
486.65	4.04	2.66	1.38
486.70	4.10	2.70	1.41
486.75	4.18	2.73	1.45
486.80	4.27	2.77	1.50
486.85	4.37	2.80	1.57
486.90	4.49	2.84	1.65
486.95	4.61	2.88	1.73
487.00	4.75	2.91	1.83
487.05	4.89	2.95	1.94
487.10	5.03	2.99	2.05
487.15	5.18	3.02	2.16
487.20	5.32	3.06	2.26
487.25	5.46	3.10	2.36
487.30	5.57	3.13	2.44
487.35	5.69	3.17	2.52
487.40	5.80	3.21	2.60
487.45	5.91	3.24	2.67
487.50	6.02	3.28	2.74
487.55	6.12	3.32	2.80
487.60	6.22	3.35	2.87
487.65	6.32	3.39	2.93
487.70	6.42	3.43	2.99
487.75	6.52	3.47	3.05
487.80	6.61	3.50	3.11
487.85	6.71	3.54	3.16
487.90	6.80	3.58	3.22
487.95	6.89	3.62	3.27
488.00	**6.98**	**3.65**	**3.33**

Stage-Area-Storage for Pond DB #2: Drainage Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
485.00	5,500	0
485.05	5,600	278
485.10	5,700	560
485.15	5,800	847
485.20	5,900	1,140
485.25	6,000	1,438
485.30	6,100	1,740
485.35	6,200	2,048
485.40	6,300	2,360
485.45	6,400	2,677
485.50	6,500	3,000
485.55	6,600	3,328
485.60	6,700	3,660
485.65	6,800	3,997
485.70	6,900	4,340
485.75	7,000	4,688
485.80	7,100	5,040
485.85	7,200	5,398
485.90	7,300	5,760
485.95	7,400	6,127
486.00	7,500	6,500
486.05	7,600	6,878
486.10	7,700	7,260
486.15	7,800	7,647
486.20	7,900	8,040
486.25	8,000	8,438
486.30	8,100	8,840
486.35	8,200	9,248
486.40	8,300	9,660
486.45	8,400	10,077
486.50	8,500	10,500
486.55	8,600	10,928
486.60	8,700	11,360
486.65	8,800	11,797
486.70	8,900	12,240
486.75	9,000	12,688
486.80	9,100	13,140
486.85	9,200	13,598
486.90	9,300	14,060
486.95	9,400	14,527
487.00	9,500	15,000
487.05	9,600	15,478
487.10	9,700	15,960
487.15	9,800	16,447
487.20	9,900	16,940
487.25	10,000	17,438
487.30	10,100	17,940
487.35	10,200	18,448
487.40	10,300	18,960
487.45	10,400	19,477
487.50	10,500	20,000
487.55	10,600	20,528
487.60	10,700	21,060
487.65	10,800	21,597
487.70	10,900	22,140
487.75	11,000	22,688
487.80	11,100	23,240
487.85	11,200	23,798
487.90	11,300	24,360
487.95	11,400	24,927
488.00	**11,500**	**25,500**

Summary for Pond SMS #1A: SMS #1A

Inflow Area = 3.863 ac, 91.78% Impervious, Inflow Depth = 8.40" for 100-Year event
Inflow = 29.26 cfs @ 12.14 hrs, Volume= 2.703 af
Outflow = 10.02 cfs @ 12.47 hrs, Volume= 2.703 af, Atten= 66%, Lag= 20.0 min
Discarded = 2.35 cfs @ 12.47 hrs, Volume= 1.881 af
Primary = 7.66 cfs @ 12.47 hrs, Volume= 0.823 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 498.46' @ 12.47 hrs Surf.Area= 7,503 sf Storage= 32,853 cf

Plug-Flow detention time= 39.2 min calculated for 2.703 af (100% of inflow)
Center-of-Mass det. time= 39.2 min (797.6 - 758.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	491.75'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	492.50'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	491.75'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	492.53'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	493.83'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	494.49'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	495.32'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	496.23'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.35 cfs @ 12.47 hrs HW=498.45' (Free Discharge)
└**1=Exfiltration** (Controls 2.35 cfs)

Primary OutFlow Max=7.65 cfs @ 12.47 hrs HW=498.45' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 1.57 cfs @ 11.51 fps)
├**3=Orifice/Grate** (Orifice Controls 1.38 cfs @ 10.11 fps)
├**4=Orifice/Grate** (Orifice Controls 1.27 cfs @ 9.32 fps)
├**5=Orifice/Grate** (Orifice Controls 1.12 cfs @ 8.23 fps)
└**6=Orifice/Grate** (Orifice Controls 2.31 cfs @ 6.61 fps)

Pond SMS #1A: SMS #1A - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

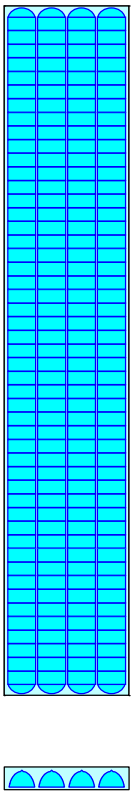
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

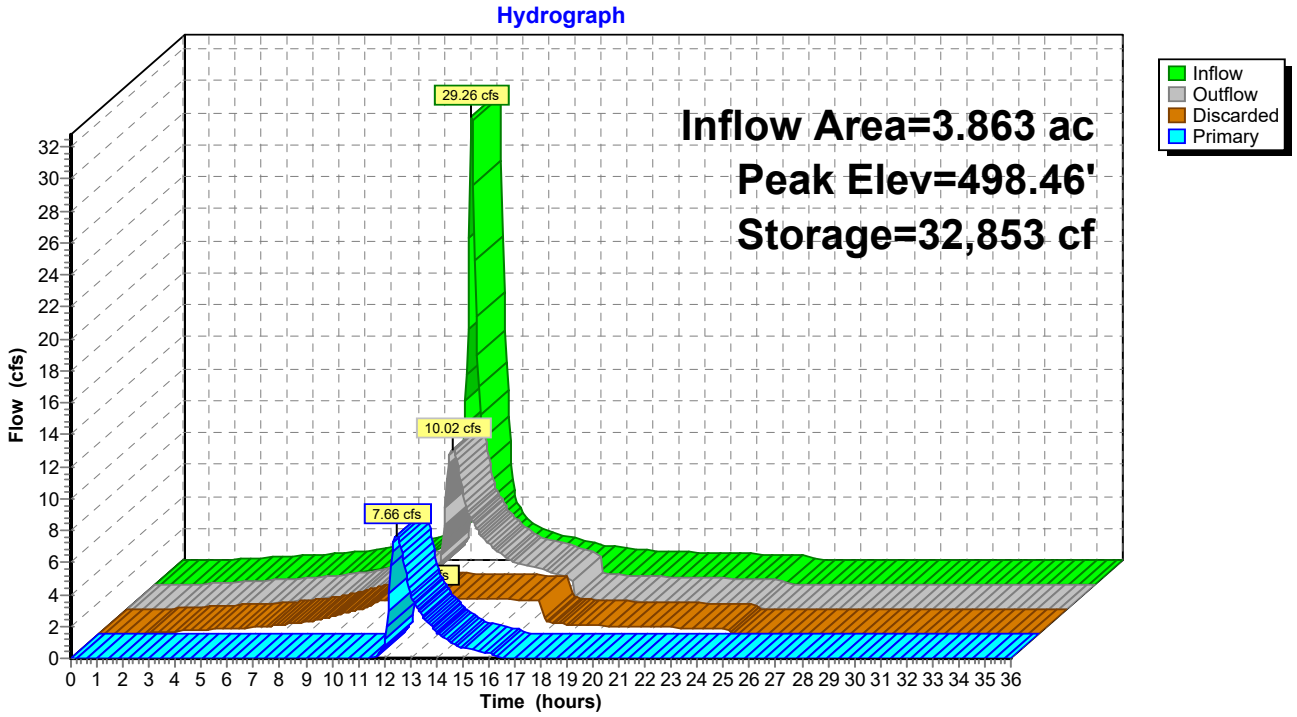
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

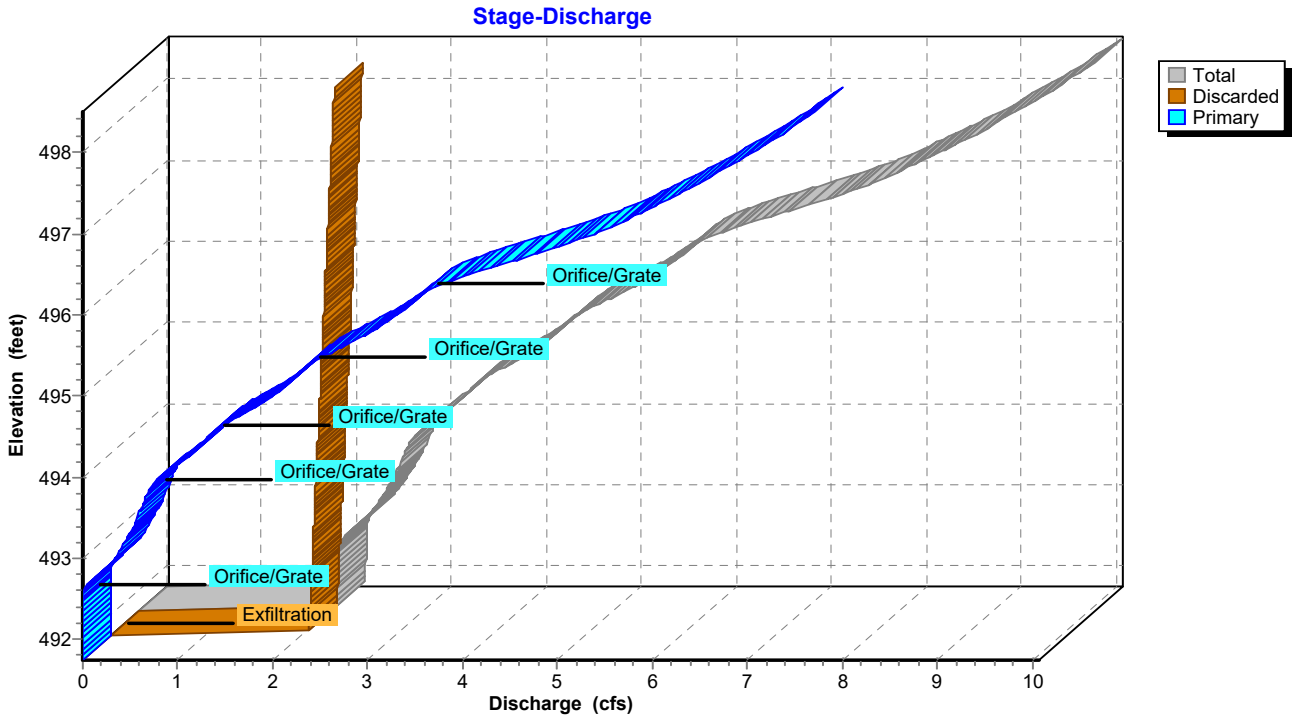
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



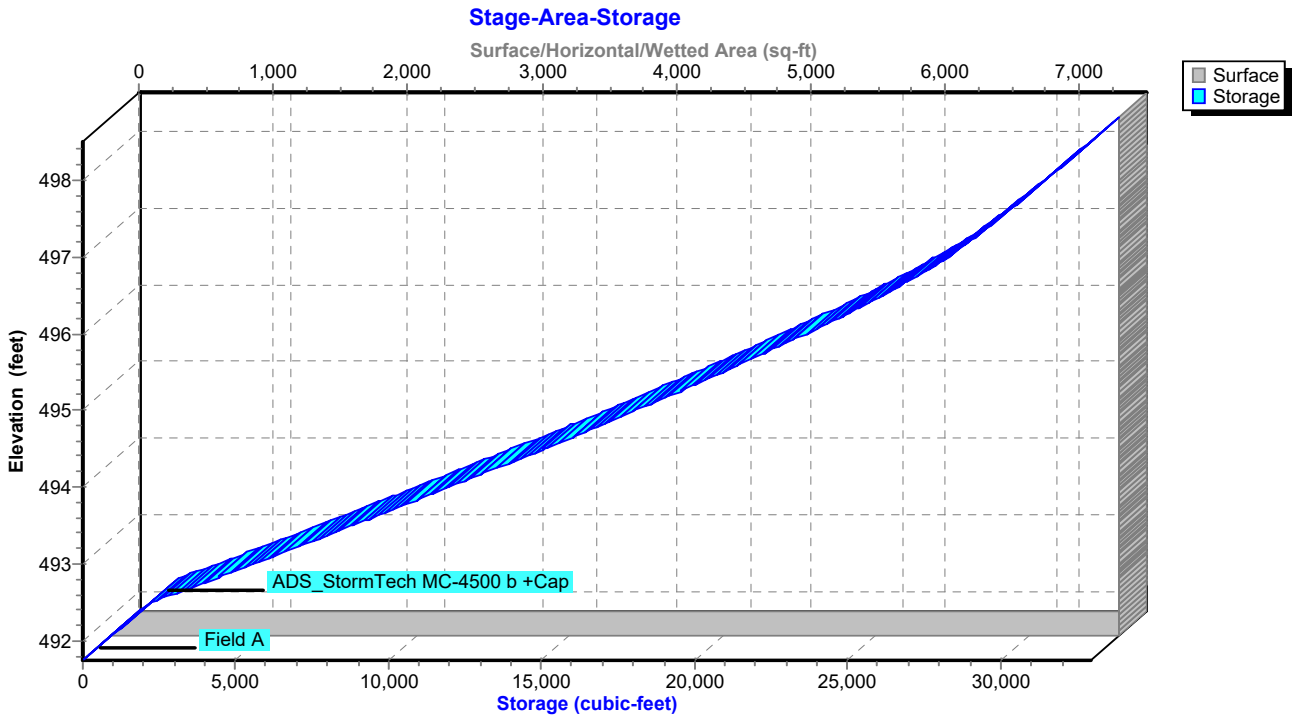
Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Hydrograph for Pond SMS #1A: SMS #1A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	491.75	0.00	0.00	0.00
1.00	0.00	0	491.75	0.00	0.00	0.00
2.00	0.07	6	491.75	0.07	0.07	0.00
3.00	0.16	15	491.76	0.16	0.16	0.00
4.00	0.25	24	491.76	0.25	0.25	0.00
5.00	0.33	32	491.76	0.33	0.33	0.00
6.00	0.41	40	491.76	0.41	0.41	0.00
7.00	0.57	55	491.77	0.57	0.57	0.00
8.00	0.76	73	491.77	0.76	0.76	0.00
9.00	1.13	109	491.79	1.12	1.12	0.00
10.00	1.55	149	491.80	1.54	1.54	0.00
11.00	2.33	323	491.86	2.09	2.09	0.00
12.00	**15.99**	**11,511**	**493.93**	**2.91**	**2.17**	**0.74**
13.00	**3.04**	**26,149**	**496.50**	**6.34**	**2.28**	**4.07**
14.00	1.84	16,748	494.78	3.89	2.21	1.68
15.00	1.37	10,646	493.79	2.84	2.17	0.67
16.00	0.97	5,276	492.96	2.44	2.13	0.31
17.00	0.76	469	491.91	2.09	2.09	0.00
18.00	0.59	57	491.77	0.59	0.59	0.00
19.00	0.51	50	491.77	0.52	0.52	0.00
20.00	0.46	45	491.76	0.46	0.46	0.00
21.00	0.42	41	491.76	0.42	0.42	0.00
22.00	0.38	37	491.76	0.38	0.38	0.00
23.00	0.34	33	491.76	0.34	0.34	0.00
24.00	0.30	30	491.76	0.30	0.30	0.00
25.00	0.00	0	491.75	0.00	0.00	0.00
26.00	0.00	0	491.75	0.00	0.00	0.00
27.00	0.00	0	491.75	0.00	0.00	0.00
28.00	0.00	0	491.75	0.00	0.00	0.00
29.00	0.00	0	491.75	0.00	0.00	0.00
30.00	0.00	0	491.75	0.00	0.00	0.00
31.00	0.00	0	491.75	0.00	0.00	0.00
32.00	0.00	0	491.75	0.00	0.00	0.00
33.00	0.00	0	491.75	0.00	0.00	0.00
34.00	0.00	0	491.75	0.00	0.00	0.00
35.00	0.00	0	491.75	0.00	0.00	0.00
36.00	0.00	0	491.75	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1A: SMS #1A

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
491.75	0.00	0.00	0.00
491.85	2.09	2.09	0.00
491.95	2.09	2.09	0.00
492.05	2.10	2.10	0.00
492.15	2.10	2.10	0.00
492.25	2.10	2.10	0.00
492.35	2.11	2.11	0.00
492.45	2.11	2.11	0.00
492.55	2.12	2.12	0.00
492.65	2.16	2.12	0.04
492.75	2.24	2.12	0.12
492.85	2.34	2.13	0.22
492.95	2.43	2.13	0.30
493.05	2.50	2.14	0.37
493.15	2.56	2.14	0.42
493.25	2.61	2.14	0.47
493.35	2.66	2.15	0.51
493.45	2.71	2.15	0.55
493.55	2.75	2.16	0.59
493.65	2.79	2.16	0.63
493.75	2.82	2.16	0.66
493.85	2.86	2.17	0.69
493.95	2.93	2.17	0.76
494.05	3.05	2.18	0.87
494.15	3.18	2.18	1.00
494.25	3.29	2.18	1.11
494.35	3.39	2.19	1.20
494.45	3.47	2.19	1.28
494.55	3.56	2.20	1.36
494.65	3.69	2.20	1.49
494.75	3.85	2.20	1.64
494.85	4.01	2.21	1.80
494.95	4.15	2.21	1.93
495.05	4.26	2.22	2.05
495.15	4.37	2.22	2.15
495.25	4.48	2.23	2.25
495.35	4.57	2.23	2.35
495.45	4.71	2.23	2.47
495.55	4.88	2.24	2.64
495.65	5.06	2.24	2.82
495.75	5.23	2.25	2.98
495.85	5.37	2.25	3.12
495.95	5.50	2.25	3.25
496.05	5.62	2.26	3.36
496.15	5.74	2.26	3.48
496.25	5.85	2.27	3.58
496.35	6.00	2.27	3.74
496.45	6.22	2.27	3.94
496.55	6.48	2.28	4.20
496.65	6.76	2.28	4.48
496.75	7.06	2.29	4.78
496.85	7.35	2.29	5.06
496.95	7.57	2.29	5.28
497.05	7.79	2.30	5.49
497.15	7.99	2.30	5.69
497.25	8.18	2.31	5.87
497.35	8.36	2.31	6.05
497.45	8.53	2.31	6.22
497.55	8.70	2.32	6.38
497.65	8.86	2.32	6.54
497.75	9.02	2.33	6.69
497.85	9.17	2.33	6.84
497.95	9.32	2.33	6.98
498.05	9.46	2.34	7.12
498.15	9.60	2.34	7.26
498.25	9.74	2.35	7.39
498.35	9.87	2.35	7.52
498.45	**10.00**	**2.35**	**7.65**

Stage-Area-Storage for Pond SMS #1A: SMS #1A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
491.75	**7,503**	0
491.85	7,503	300
491.95	7,503	600
492.05	7,503	900
492.15	7,503	1,200
492.25	7,503	1,501
492.35	7,503	1,801
492.45	7,503	2,101
492.55	7,503	2,582
492.65	7,503	3,243
492.75	7,503	3,902
492.85	7,503	4,560
492.95	7,503	5,216
493.05	7,503	5,871
493.15	7,503	6,523
493.25	7,503	7,173
493.35	7,503	7,822
493.45	7,503	8,468
493.55	7,503	9,111
493.65	7,503	9,752
493.75	7,503	10,391
493.85	7,503	11,026
493.95	7,503	11,658
494.05	7,503	12,288
494.15	7,503	12,914
494.25	7,503	13,537
494.35	7,503	14,155
494.45	7,503	14,770
494.55	7,503	15,381
494.65	7,503	15,988
494.75	7,503	16,590
494.85	7,503	17,188
494.95	7,503	17,781
495.05	7,503	18,369
495.15	7,503	18,952
495.25	7,503	19,530
495.35	7,503	20,101
495.45	7,503	20,667
495.55	7,503	21,226
495.65	7,503	21,779
495.75	7,503	22,324
495.85	7,503	22,862
495.95	7,503	23,393
496.05	7,503	23,915
496.15	7,503	24,428
496.25	7,503	24,932
496.35	7,503	25,426
496.45	7,503	25,909
496.55	7,503	26,381
496.65	7,503	26,840
496.75	7,503	27,285
496.85	7,503	27,713
496.95	7,503	28,121
497.05	7,503	28,501
497.15	7,503	28,850
497.25	7,503	29,181
497.35	7,503	29,504
497.45	7,503	29,817
497.55	7,503	30,119
497.65	7,503	30,419
497.75	7,503	30,719
497.85	7,503	31,019
497.95	7,503	31,319
498.05	7,503	31,620
498.15	7,503	31,920
498.25	7,503	32,220
498.35	7,503	32,520
498.45	7,503	**32,820**

Summary for Pond SMS #1C: SMS #1C

Inflow Area = 3.475 ac, 93.57% Impervious, Inflow Depth = 8.52" for 100-Year event
Inflow = 26.44 cfs @ 12.14 hrs, Volume= 2.467 af
Outflow = 8.65 cfs @ 12.48 hrs, Volume= 2.467 af, Atten= 67%, Lag= 20.8 min
Discarded = 2.29 cfs @ 12.48 hrs, Volume= 1.774 af
Primary = 6.36 cfs @ 12.48 hrs, Volume= 0.693 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 500.79' @ 12.48 hrs Surf.Area= 7,503 sf Storage= 29,323 cf

Plug-Flow detention time= 35.8 min calculated for 2.463 af (100% of inflow)
Center-of-Mass det. time= 35.8 min (789.7 - 753.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	495.25'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	496.00'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	495.25'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	496.09'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	496.92'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	497.83'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	498.75'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	499.67'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.29 cfs @ 12.48 hrs HW=500.78' (Free Discharge)
└**1=Exfiltration** (Controls 2.29 cfs)

Primary OutFlow Max=6.34 cfs @ 12.48 hrs HW=500.78' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 1.39 cfs @ 10.20 fps)
├**3=Orifice/Grate** (Orifice Controls 1.26 cfs @ 9.21 fps)
├**4=Orifice/Grate** (Orifice Controls 1.55 cfs @ 7.92 fps)
├**5=Orifice/Grate** (Orifice Controls 1.26 cfs @ 6.43 fps)
└**6=Orifice/Grate** (Orifice Controls 0.88 cfs @ 4.48 fps)

Pond SMS #1C: SMS #1C - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

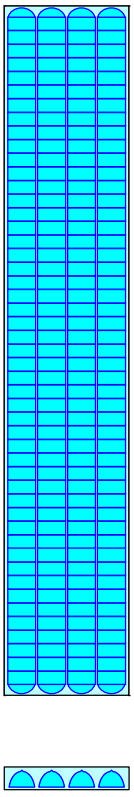
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

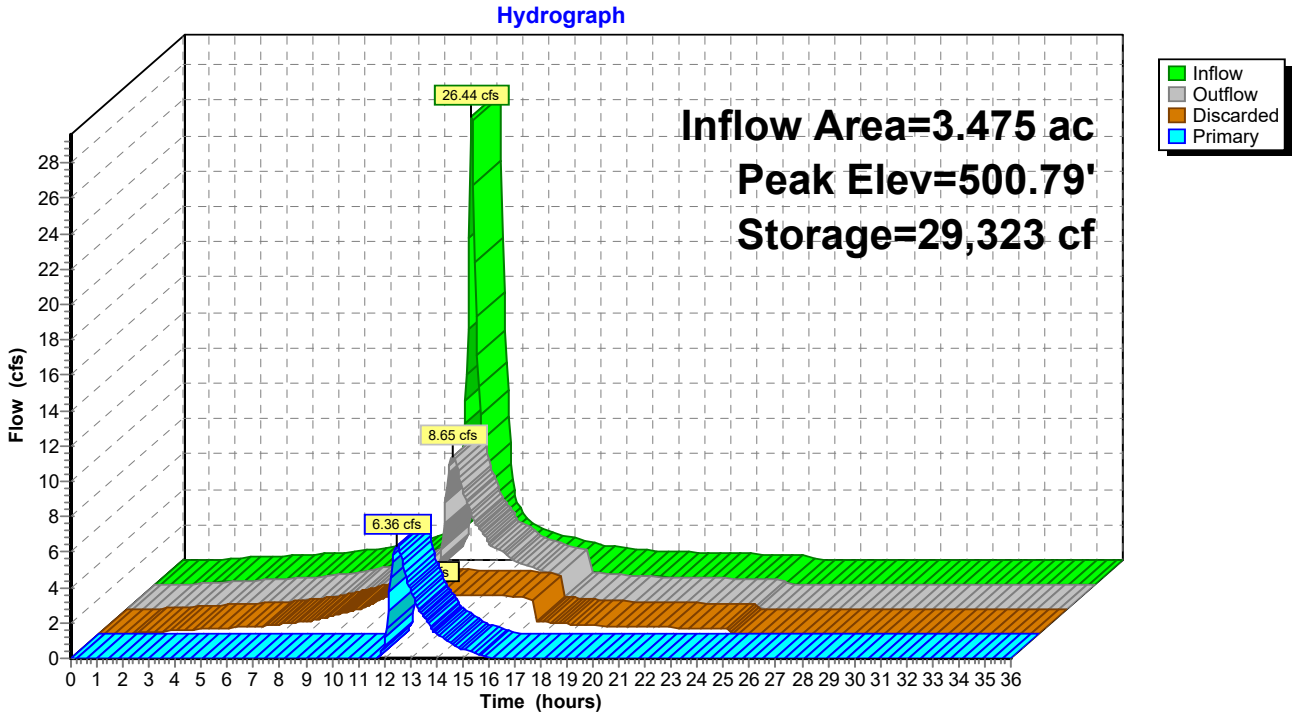
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

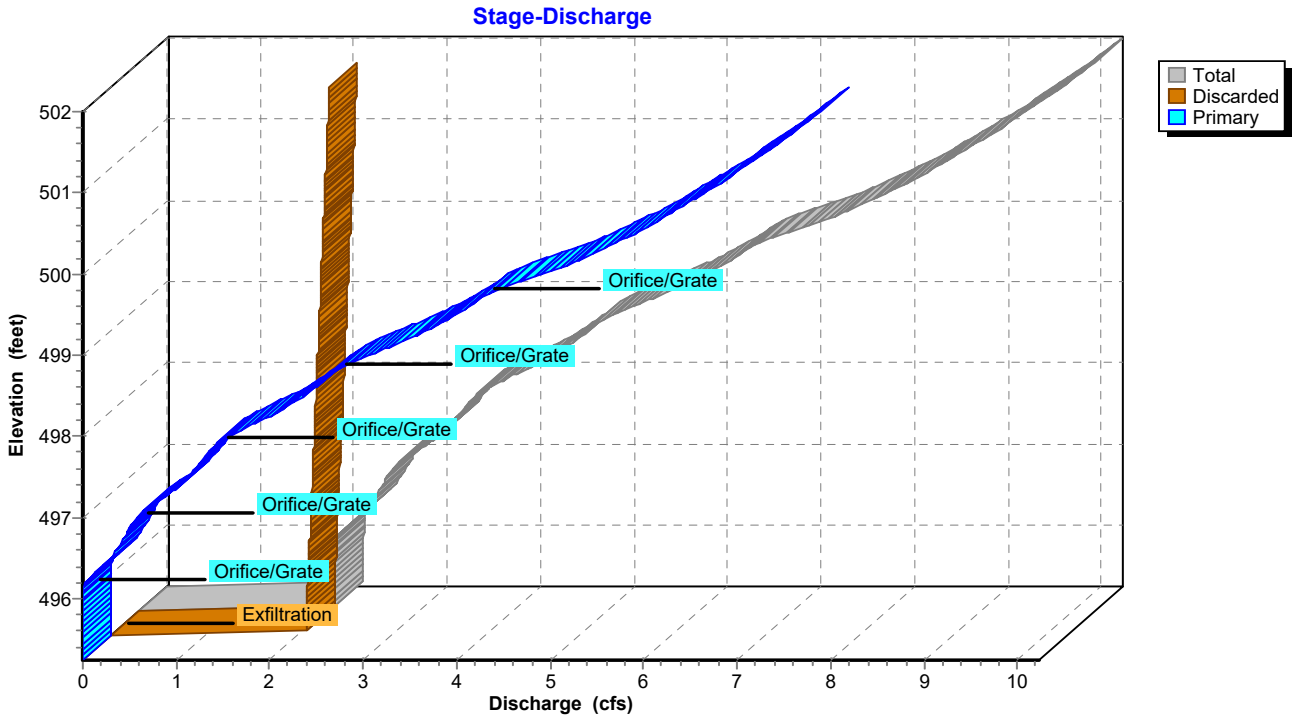
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



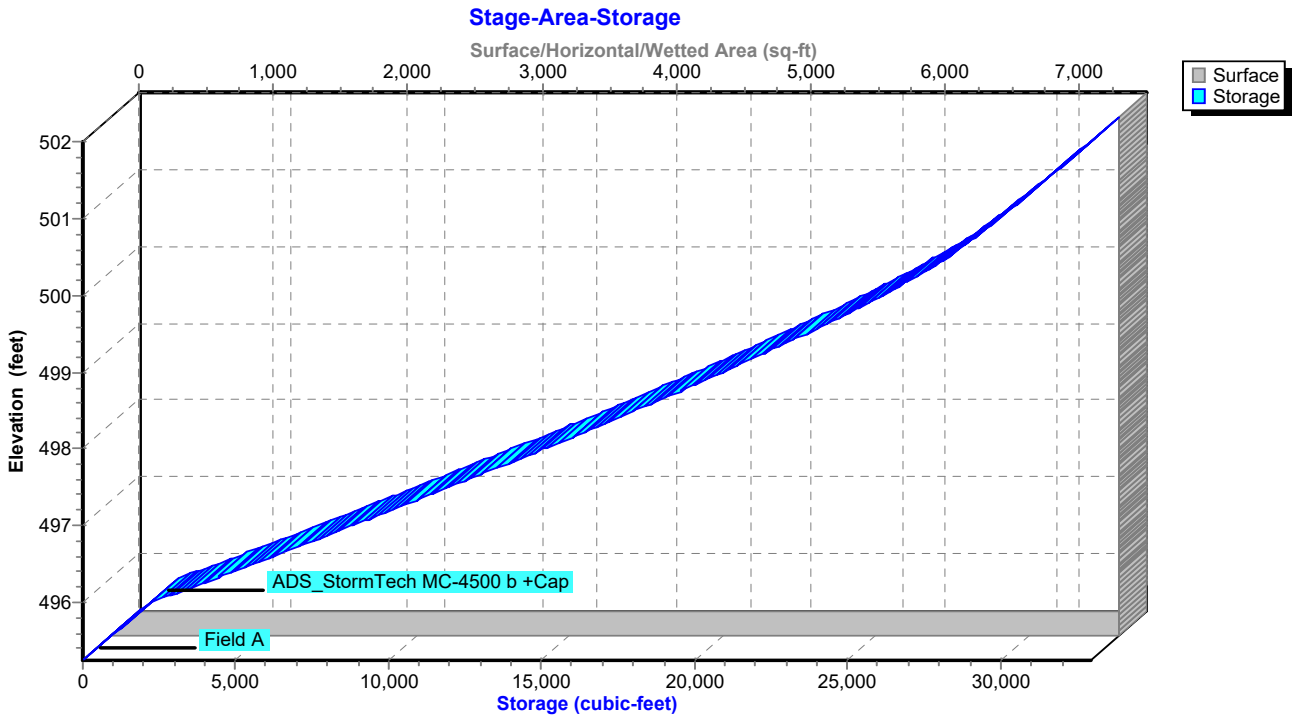
Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Hydrograph for Pond SMS #1C: SMS #1C

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	495.25	0.00	0.00	0.00
1.00	0.00	0	495.25	0.00	0.00	0.00
2.00	0.10	9	495.25	0.09	0.09	0.00
3.00	0.18	17	495.26	0.18	0.18	0.00
4.00	0.26	25	495.26	0.26	0.26	0.00
5.00	0.33	32	495.26	0.33	0.33	0.00
6.00	0.40	39	495.26	0.40	0.40	0.00
7.00	0.55	53	495.27	0.55	0.55	0.00
8.00	0.72	69	495.27	0.71	0.71	0.00
9.00	1.05	101	495.28	1.04	1.04	0.00
10.00	1.42	137	495.30	1.41	1.41	0.00
11.00	2.12	206	495.32	2.09	2.09	0.00
12.00	**14.47**	**9,791**	**497.16**	**2.90**	**2.16**	**0.74**
13.00	**2.74**	**23,499**	**499.47**	**6.18**	**2.24**	**3.94**
14.00	1.66	14,212	497.86	3.57	2.18	1.39
15.00	1.24	8,156	496.90	2.66	2.15	0.51
16.00	0.87	3,273	496.15	2.13	2.12	0.01
17.00	0.68	67	495.27	0.69	0.69	0.00
18.00	0.53	52	495.27	0.53	0.53	0.00
19.00	0.46	45	495.27	0.46	0.46	0.00
20.00	0.42	41	495.26	0.42	0.42	0.00
21.00	0.38	37	495.26	0.38	0.38	0.00
22.00	0.34	33	495.26	0.34	0.34	0.00
23.00	0.31	30	495.26	0.31	0.31	0.00
24.00	0.27	27	495.26	0.27	0.27	0.00
25.00	0.00	0	495.25	0.00	0.00	0.00
26.00	0.00	0	495.25	0.00	0.00	0.00
27.00	0.00	0	495.25	0.00	0.00	0.00
28.00	0.00	0	495.25	0.00	0.00	0.00
29.00	0.00	0	495.25	0.00	0.00	0.00
30.00	0.00	0	495.25	0.00	0.00	0.00
31.00	0.00	0	495.25	0.00	0.00	0.00
32.00	0.00	0	495.25	0.00	0.00	0.00
33.00	0.00	0	495.25	0.00	0.00	0.00
34.00	0.00	0	495.25	0.00	0.00	0.00
35.00	0.00	0	495.25	0.00	0.00	0.00
36.00	0.00	0	495.25	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1C: SMS #1C

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
495.25	0.00	0.00	0.00
495.35	2.09	2.09	0.00
495.45	2.09	2.09	0.00
495.55	2.10	2.10	0.00
495.65	2.10	2.10	0.00
495.75	2.10	2.10	0.00
495.85	2.11	2.11	0.00
495.95	2.11	2.11	0.00
496.05	2.11	2.11	0.00
496.15	2.13	2.12	0.01
496.25	2.19	2.12	0.07
496.35	2.28	2.13	0.16
496.45	2.39	2.13	0.26
496.55	2.46	2.13	0.33
496.65	2.53	2.14	0.39
496.75	2.58	2.14	0.44
496.85	2.63	2.14	0.49
496.95	2.68	2.15	0.53
497.05	2.77	2.15	0.61
497.15	2.89	2.16	0.73
497.25	3.03	2.16	0.87
497.35	3.15	2.16	0.98
497.45	3.24	2.17	1.08
497.55	3.33	2.17	1.16
497.65	3.41	2.17	1.24
497.75	3.49	2.18	1.31
497.85	3.56	2.18	1.38
497.95	3.67	2.19	1.48
498.05	3.82	2.19	1.63
498.15	4.01	2.19	1.81
498.25	4.20	2.20	2.00
498.35	4.36	2.20	2.16
498.45	4.50	2.20	2.29
498.55	4.62	2.21	2.42
498.65	4.74	2.21	2.53
498.75	4.85	2.22	2.64
498.85	4.99	2.22	2.77
498.95	5.17	2.22	2.95
499.05	5.39	2.23	3.16
499.15	5.61	2.23	3.38
499.25	5.81	2.23	3.58
499.35	5.99	2.24	3.75
499.45	6.15	2.24	3.91
499.55	6.30	2.25	4.05
499.65	6.44	2.25	4.19
499.75	6.60	2.25	4.34
499.85	6.80	2.26	4.54
499.95	7.04	2.26	4.78
500.05	7.29	2.27	5.03
500.15	7.53	2.27	5.26
500.25	7.73	2.27	5.46
500.35	7.92	2.28	5.64
500.45	8.10	2.28	5.82
500.55	8.27	2.28	5.98
500.65	8.43	2.29	6.14
500.75	8.58	2.29	6.29
500.85	8.73	2.30	6.44
500.95	8.88	2.30	6.58
501.05	9.02	2.30	6.72
501.15	9.16	2.31	6.85
501.25	9.30	2.31	6.99
501.35	9.43	2.31	7.11
501.45	9.56	2.32	7.24
501.55	9.68	2.32	7.36
501.65	9.81	2.33	7.48
501.75	9.93	2.33	7.60
501.85	10.05	2.33	7.72
501.95	**10.17**	**2.34**	**7.83**

Stage-Area-Storage for Pond SMS #1C: SMS #1C

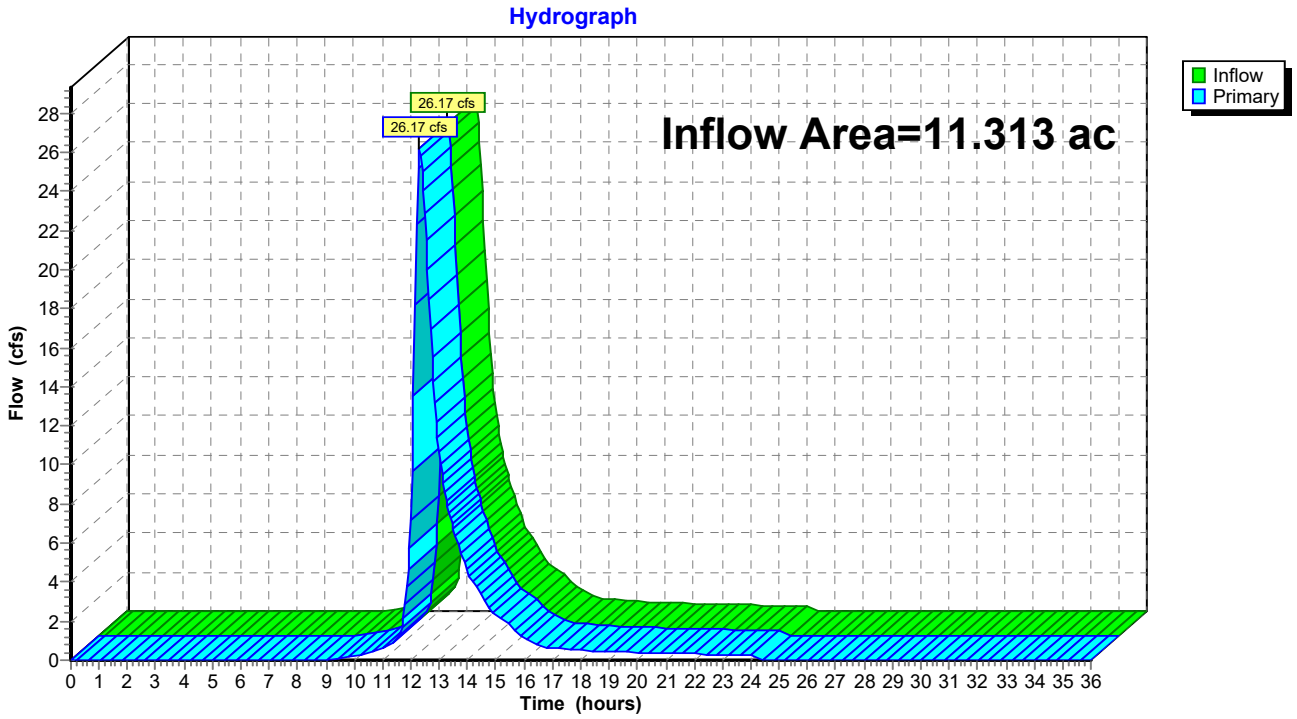
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
495.25	**7,503**	0
495.35	7,503	300
495.45	7,503	600
495.55	7,503	900
495.65	7,503	1,200
495.75	7,503	1,501
495.85	7,503	1,801
495.95	7,503	2,101
496.05	7,503	2,582
496.15	7,503	3,243
496.25	7,503	3,902
496.35	7,503	4,560
496.45	7,503	5,216
496.55	7,503	5,871
496.65	7,503	6,523
496.75	7,503	7,173
496.85	7,503	7,822
496.95	7,503	8,468
497.05	7,503	9,111
497.15	7,503	9,752
497.25	7,503	10,391
497.35	7,503	11,026
497.45	7,503	11,658
497.55	7,503	12,288
497.65	7,503	12,914
497.75	7,503	13,537
497.85	7,503	14,155
497.95	7,503	14,770
498.05	7,503	15,381
498.15	7,503	15,988
498.25	7,503	16,590
498.35	7,503	17,188
498.45	7,503	17,781
498.55	7,503	18,369
498.65	7,503	18,952
498.75	7,503	19,530
498.85	7,503	20,101
498.95	7,503	20,667
499.05	7,503	21,226
499.15	7,503	21,779
499.25	7,503	22,324
499.35	7,503	22,862
499.45	7,503	23,393
499.55	7,503	23,915
499.65	7,503	24,428
499.75	7,503	24,932
499.85	7,503	25,426
499.95	7,503	25,909
500.05	7,503	26,381
500.15	7,503	26,840
500.25	7,503	27,285
500.35	7,503	27,713
500.45	7,503	28,121
500.55	7,503	28,501
500.65	7,503	28,850
500.75	7,503	29,181
500.85	7,503	29,504
500.95	7,503	29,817
501.05	7,503	30,119
501.15	7,503	30,419
501.25	7,503	30,719
501.35	7,503	31,019
501.45	7,503	31,319
501.55	7,503	31,620
501.65	7,503	31,920
501.75	7,503	32,220
501.85	7,503	32,520
501.95	7,503	**32,820**

Summary for Link POI #1: POI #1

Inflow Area = 11.313 ac, 61.95% Impervious, Inflow Depth = 3.18" for 100-Year event
Inflow = 26.17 cfs @ 12.31 hrs, Volume= 2.996 af
Primary = 26.17 cfs @ 12.31 hrs, Volume= 2.996 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #1: POI #1



Hydrograph for Link POI #1: POI #1

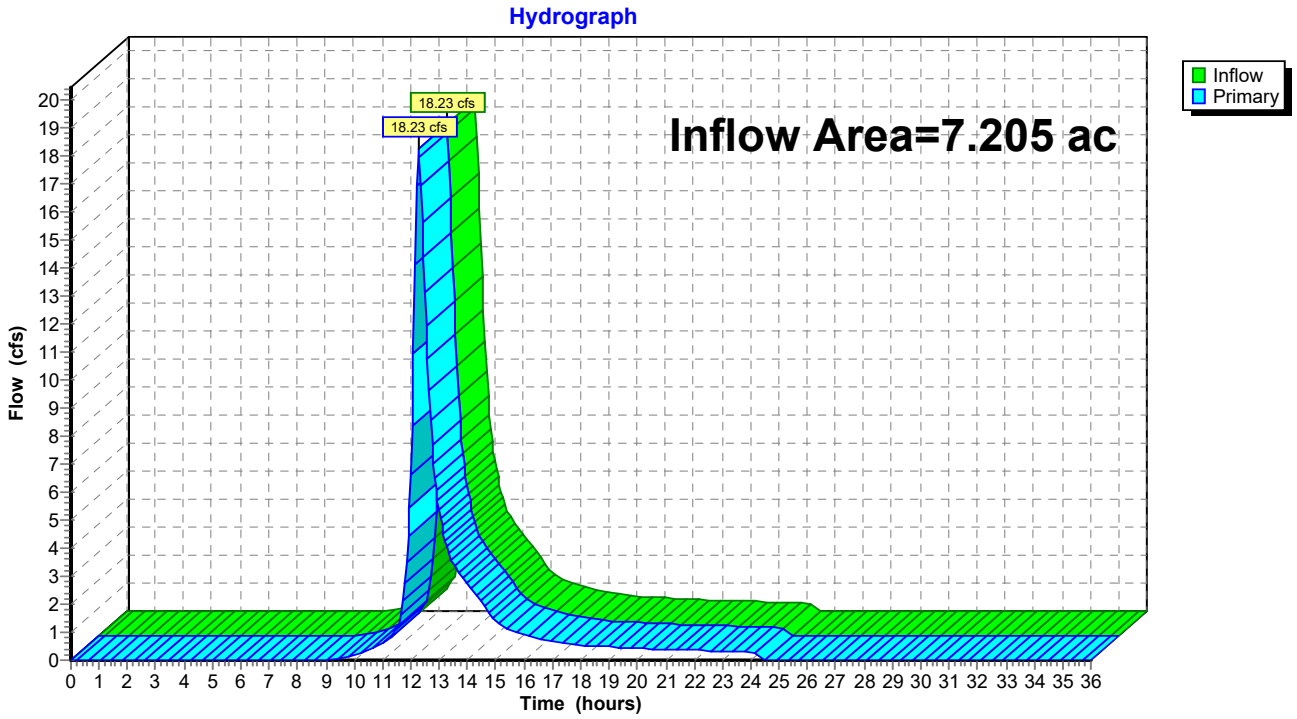
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00	26.00	0.00	0.00	0.00
0.50	0.00	0.00	0.00	26.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00	27.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00	27.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00	28.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00	28.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00	29.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00	29.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00	30.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00	30.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00	31.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00	31.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00	32.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00	32.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00	33.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00	33.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00	34.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00	34.50	0.00	0.00	0.00
9.00	0.02	0.00	0.02	35.00	0.00	0.00	0.00
9.50	0.10	0.00	0.10	35.50	0.00	0.00	0.00
10.00	0.21	0.00	0.21	36.00	0.00	0.00	0.00
10.50	0.37	0.00	0.37				
11.00	0.60	0.00	0.60				
11.50	1.11	0.00	1.11				
12.00	**7.16**	0.00	**7.16**				
12.50	**22.90**	0.00	**22.90**				
13.00	10.66	0.00	10.66				
13.50	6.71	0.00	6.71				
14.00	4.58	0.00	4.58				
14.50	3.33	0.00	3.33				
15.00	2.31	0.00	2.31				
15.50	1.80	0.00	1.80				
16.00	1.14	0.00	1.14				
16.50	0.71	0.00	0.71				
17.00	0.64	0.00	0.64				
17.50	0.57	0.00	0.57				
18.00	0.50	0.00	0.50				
18.50	0.45	0.00	0.45				
19.00	0.43	0.00	0.43				
19.50	0.41	0.00	0.41				
20.00	0.39	0.00	0.39				
20.50	0.37	0.00	0.37				
21.00	0.35	0.00	0.35				
21.50	0.34	0.00	0.34				
22.00	0.32	0.00	0.32				
22.50	0.31	0.00	0.31				
23.00	0.29	0.00	0.29				
23.50	0.28	0.00	0.28				
24.00	0.26	0.00	0.26				
24.50	0.01	0.00	0.01				
25.00	0.00	0.00	0.00				
25.50	0.00	0.00	0.00				

Summary for Link POI #2: POI #2

Inflow Area = 7.205 ac, 35.36% Impervious, Inflow Depth = 3.33" for 100-Year event
Inflow = 18.23 cfs @ 12.27 hrs, Volume= 2.000 af
Primary = 18.23 cfs @ 12.27 hrs, Volume= 2.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #2: POI #2



Hydrograph for Link POI #2: POI #2

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.01	0.00	0.01
9.50	0.08	0.00	0.08
10.00	0.20	0.00	0.20
10.50	0.36	0.00	0.36
11.00	0.61	0.00	0.61
11.50	1.13	0.00	1.13
12.00	**6.62**	0.00	**6.62**
12.50	**13.14**	0.00	**13.14**
13.00	5.38	0.00	5.38
13.50	3.41	0.00	3.41
14.00	2.74	0.00	2.74
14.50	2.07	0.00	2.07
15.00	1.39	0.00	1.39
15.50	1.07	0.00	1.07
16.00	0.90	0.00	0.90
16.50	0.78	0.00	0.78
17.00	0.70	0.00	0.70
17.50	0.62	0.00	0.62
18.00	0.55	0.00	0.55
18.50	0.50	0.00	0.50
19.00	0.47	0.00	0.47
19.50	0.45	0.00	0.45
20.00	0.43	0.00	0.43
20.50	0.41	0.00	0.41
21.00	0.39	0.00	0.39
21.50	0.37	0.00	0.37
22.00	0.35	0.00	0.35
22.50	0.34	0.00	0.34
23.00	0.32	0.00	0.32
23.50	0.30	0.00	0.30
24.00	0.28	0.00	0.28
24.50	0.02	0.00	0.02
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 #1A: Drainage Area #1A Runoff Area=168,262 sf 91.78% Impervious Runoff Depth=1.26"
Tc=10.0 min CN=95 Runoff=4.82 cfs 0.404 af

Subcatchment DA #1B: Drainage Area #1B Runoff Area=173,173 sf 5.32% Impervious Runoff Depth=0.05"
Flow Length=638' Tc=17.0 min CN=63 Runoff=0.03 cfs 0.018 af

Subcatchment DA #1C: Drainage Area Runoff Area=151,363 sf 93.57% Impervious Runoff Depth=1.34"
Tc=10.0 min CN=96 Runoff=4.58 cfs 0.389 af

Subcatchment DA #2A: Drainage Area #2A Runoff Area=121,548 sf 88.60% Impervious Runoff Depth=1.17"
Tc=10.0 min CN=94 Runoff=3.29 cfs 0.273 af

Subcatchment DA #2B: Drainage Area #2B Runoff Area=192,310 sf 1.70% Impervious Runoff Depth=0.04"
Flow Length=784' Tc=18.4 min CN=62 Runoff=0.03 cfs 0.016 af

Pond DB #2: Drainage Basin #2 Peak Elev=485.22' Storage=1,284 cf Inflow=3.29 cfs 0.273 af
Discarded=1.68 cfs 0.273 af Primary=0.00 cfs 0.000 af Outflow=1.68 cfs 0.273 af

Pond SMS #1A: SMS #1A Peak Elev=492.50' Storage=2,257 cf Inflow=4.82 cfs 0.404 af
Discarded=2.11 cfs 0.404 af Primary=0.00 cfs 0.000 af Outflow=2.11 cfs 0.404 af

Pond SMS #1C: SMS #1C Peak Elev=495.91' Storage=1,985 cf Inflow=4.58 cfs 0.389 af
Discarded=2.11 cfs 0.389 af Primary=0.00 cfs 0.000 af Outflow=2.11 cfs 0.389 af

Link POI #1: POI #1 Inflow=0.03 cfs 0.018 af
Primary=0.03 cfs 0.018 af

Link POI #2: POI #2 Inflow=0.03 cfs 0.016 af
Primary=0.03 cfs 0.016 af

Total Runoff Area = 18.518 ac Runoff Volume = 1.099 af Average Runoff Depth = 0.71"
48.40% Pervious = 8.963 ac 51.60% Impervious = 9.556 ac

Summary for Subcatchment DA #1A: Drainage Area #1A

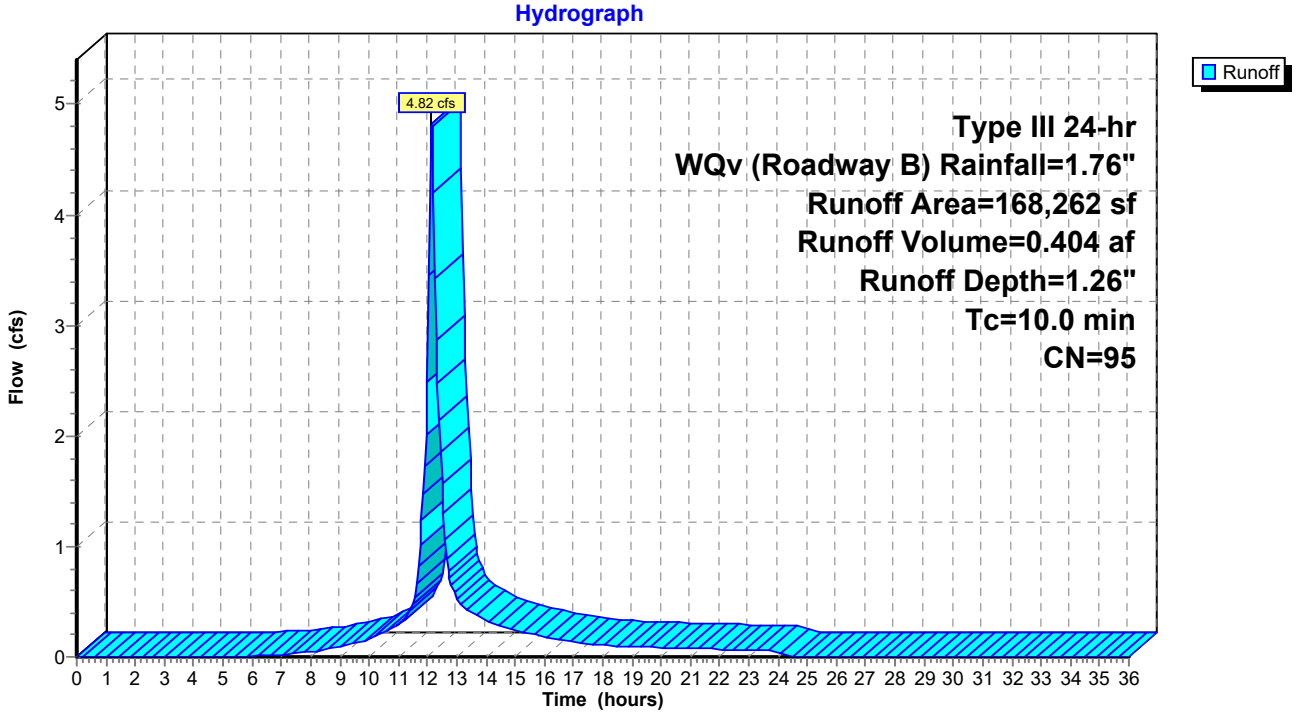
Runoff = 4.82 cfs @ 12.14 hrs, Volume= 0.404 af, Depth= 1.26"
Routed to Pond SMS #1A : SMS #1A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Roadway B) Rainfall=1.76"

	Area (sf)	CN	Description
	10,723	61	>75% Grass cover, Good, HSG B
*	3,112	61	Emergency Access Road (Perv.), Good, HSG B
*	86,043	98	Building/Roof, HSG B
*	60,366	98	Pavement, HSG B
*	2,940	98	Sidewalk, HSG B
*	5,078	98	Emergency Access Road (Imp.), HSG B
	168,262	95	Weighted Average
	13,835		8.22% Pervious Area
	154,427		91.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #1A: Drainage Area #1A



Hydrograph for Subcatchment DA #1A: Drainage Area #1A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.04	0.00	0.00
3.00	0.05	0.00	0.00
3.50	0.06	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.10	0.00	0.00
5.50	0.11	0.00	0.00
6.00	0.13	0.00	0.01
6.50	0.14	0.00	0.01
7.00	0.16	0.01	0.02
7.50	0.18	0.01	0.03
8.00	0.20	0.01	0.05
8.50	0.23	0.02	0.07
9.00	0.26	0.03	0.09
9.50	0.29	0.05	0.12
10.00	0.33	0.07	0.16
10.50	0.38	0.09	0.22
11.00	0.44	0.13	0.29
11.50	0.52	0.19	0.48
12.00	0.88	0.46	**2.49**
12.50	1.24	0.77	**1.57**
13.00	1.32	0.85	0.54
13.50	1.38	0.90	0.40
14.00	1.43	0.95	0.33
14.50	1.47	0.98	0.28
15.00	1.50	1.02	0.25
15.50	1.53	1.04	0.21
16.00	1.56	1.07	0.18
16.50	1.58	1.09	0.15
17.00	1.60	1.11	0.14
17.50	1.62	1.12	0.12
18.00	1.63	1.14	0.11
18.50	1.65	1.15	0.10
19.00	1.66	1.16	0.09
19.50	1.67	1.17	0.09
20.00	1.68	1.18	0.09
20.50	1.70	1.19	0.08
21.00	1.71	1.20	0.08
21.50	1.72	1.21	0.07
22.00	1.73	1.22	0.07
22.50	1.74	1.23	0.07
23.00	1.74	1.24	0.06
23.50	1.75	1.25	0.06
24.00	**1.76**	**1.26**	0.06
24.50	1.76	1.26	0.00
25.00	1.76	1.26	0.00
25.50	1.76	1.26	0.00
26.00	1.76	1.26	0.00
26.50	1.76	1.26	0.00
27.00	1.76	1.26	0.00
27.50	1.76	1.26	0.00
28.00	1.76	1.26	0.00
28.50	1.76	1.26	0.00
29.00	1.76	1.26	0.00
29.50	1.76	1.26	0.00
30.00	1.76	1.26	0.00
30.50	1.76	1.26	0.00
31.00	1.76	1.26	0.00
31.50	1.76	1.26	0.00
32.00	1.76	1.26	0.00
32.50	1.76	1.26	0.00
33.00	1.76	1.26	0.00
33.50	1.76	1.26	0.00
34.00	1.76	1.26	0.00
34.50	1.76	1.26	0.00
35.00	1.76	1.26	0.00
35.50	1.76	1.26	0.00
36.00	1.76	1.26	0.00

Summary for Subcatchment DA #1B: Drainage Area #1B

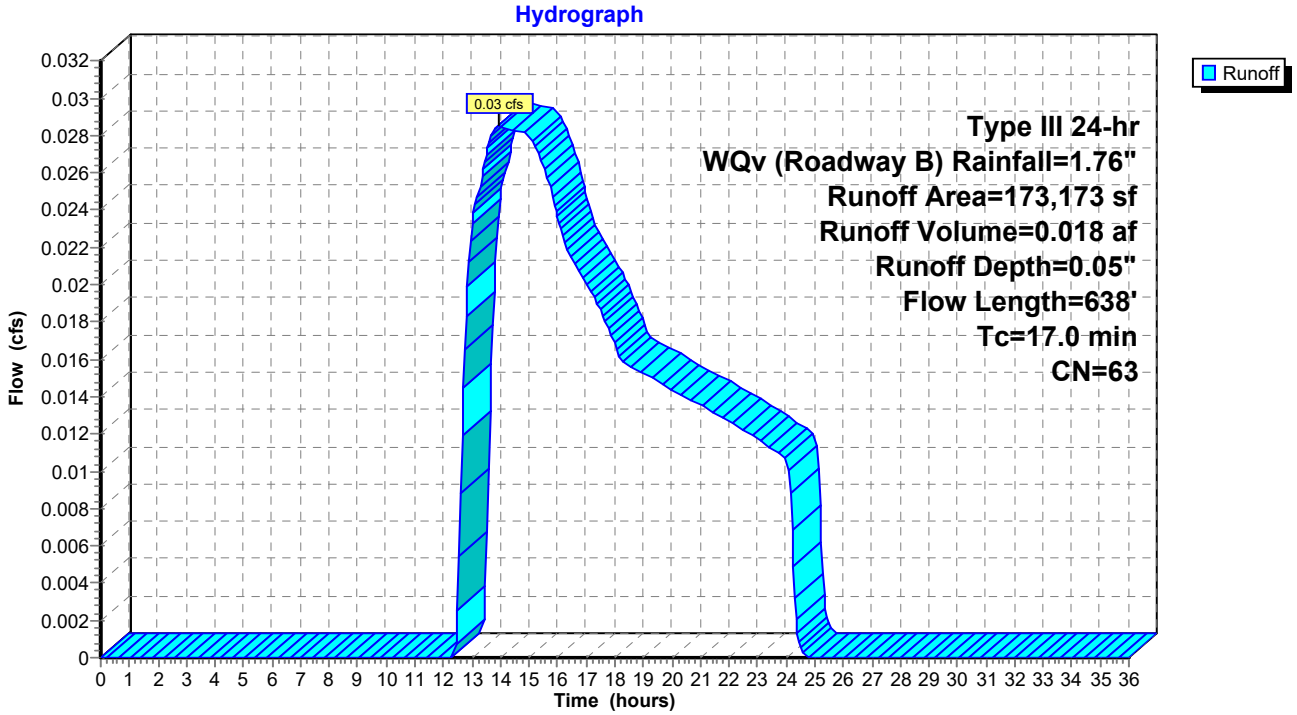
Runoff = 0.03 cfs @ 13.94 hrs, Volume= 0.018 af, Depth= 0.05"
Routed to Link POI #1 : POI #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Roadway B) Rainfall=1.76"

	Area (sf)	CN	Description
	158,310	61	>75% Grass cover, Good, HSG B
*	5,648	61	Emergency Access Road (Perv.), Good, HSG B
*	9,215	98	Emergency Access Road (Imp.), HSG B
	173,173	63	Weighted Average
	163,958		94.68% Pervious Area
	9,215		5.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	150	0.1200	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
4.8	488	0.0578	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	638	Total			

Subcatchment DA #1B: Drainage Area #1B



Hydrograph for Subcatchment DA #1B: Drainage Area #1B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.04	0.00	0.00
3.00	0.05	0.00	0.00
3.50	0.06	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.10	0.00	0.00
5.50	0.11	0.00	0.00
6.00	0.13	0.00	0.00
6.50	0.14	0.00	0.00
7.00	0.16	0.00	0.00
7.50	0.18	0.00	0.00
8.00	0.20	0.00	0.00
8.50	0.23	0.00	0.00
9.00	0.26	0.00	0.00
9.50	0.29	0.00	0.00
10.00	0.33	0.00	0.00
10.50	0.38	0.00	0.00
11.00	0.44	0.00	0.00
11.50	0.52	0.00	0.00
12.00	0.88	0.00	0.00
12.50	1.24	0.00	0.00
13.00	1.32	0.00	0.02
13.50	1.38	0.01	**0.03**
14.00	1.43	0.01	**0.03**
14.50	1.47	0.01	0.03
15.00	1.50	0.02	0.03
15.50	1.53	0.02	0.03
16.00	1.56	0.02	0.02
16.50	1.58	0.03	0.02
17.00	1.60	0.03	0.02
17.50	1.62	0.03	0.02
18.00	1.63	0.03	0.02
18.50	1.65	0.04	0.02
19.00	1.66	0.04	0.02
19.50	1.67	0.04	0.01
20.00	1.68	0.04	0.01
20.50	1.70	0.04	0.01
21.00	1.71	0.04	0.01
21.50	1.72	0.05	0.01
22.00	1.73	0.05	0.01
22.50	1.74	0.05	0.01
23.00	1.74	0.05	0.01
23.50	1.75	0.05	0.01
24.00	**1.76**	**0.05**	0.01
24.50	1.76	0.05	0.00
25.00	1.76	0.05	0.00
25.50	1.76	0.05	0.00
26.00	1.76	0.05	0.00
26.50	1.76	0.05	0.00
27.00	1.76	0.05	0.00
27.50	1.76	0.05	0.00
28.00	1.76	0.05	0.00
28.50	1.76	0.05	0.00
29.00	1.76	0.05	0.00
29.50	1.76	0.05	0.00
30.00	1.76	0.05	0.00
30.50	1.76	0.05	0.00
31.00	1.76	0.05	0.00
31.50	1.76	0.05	0.00
32.00	1.76	0.05	0.00
32.50	1.76	0.05	0.00
33.00	1.76	0.05	0.00
33.50	1.76	0.05	0.00
34.00	1.76	0.05	0.00
34.50	1.76	0.05	0.00
35.00	1.76	0.05	0.00
35.50	1.76	0.05	0.00
36.00	1.76	0.05	0.00

Summary for Subcatchment DA #1C: Drainage Area #1C

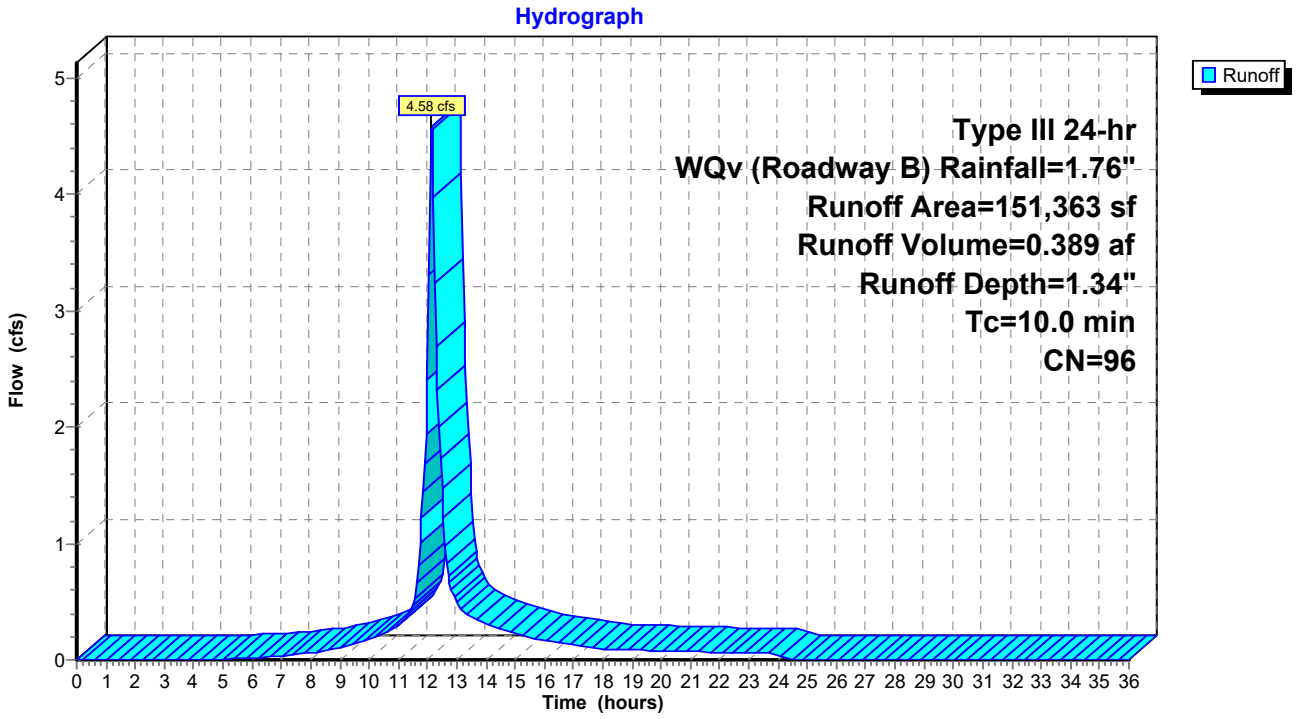
Runoff = 4.58 cfs @ 12.14 hrs, Volume= 0.389 af, Depth= 1.34"
Routed to Pond SMS #1C : SMS #1C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Roadway B) Rainfall=1.76"

	Area (sf)	CN	Description
	9,732	61	>75% Grass cover, Good, HSG B
*	87,537	98	Building/Roof, HSG B
*	50,809	98	Pavement, HSG B
*	3,285	98	Sidewalk, HSG B
	151,363	96	Weighted Average
	9,732		6.43% Pervious Area
	141,631		93.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Direct Minimum**

Subcatchment DA #1C: Drainage Area #1C



Hydrograph for Subcatchment DA #1C: Drainage Area #1C

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.04	0.00	0.00
3.00	0.05	0.00	0.00
3.50	0.06	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.10	0.00	0.01
5.50	0.11	0.00	0.01
6.00	0.13	0.00	0.02
6.50	0.14	0.01	0.02
7.00	0.16	0.01	0.03
7.50	0.18	0.02	0.05
8.00	0.20	0.03	0.06
8.50	0.23	0.04	0.08
9.00	0.26	0.05	0.11
9.50	0.29	0.07	0.14
10.00	0.33	0.09	0.17
10.50	0.38	0.12	0.23
11.00	0.44	0.16	0.30
11.50	0.52	0.23	0.48
12.00	0.88	0.52	**2.40**
12.50	1.24	0.85	**1.47**
13.00	1.32	0.93	0.50
13.50	1.38	0.98	0.37
14.00	1.43	1.03	0.31
14.50	1.47	1.06	0.26
15.00	1.50	1.10	0.23
15.50	1.53	1.13	0.20
16.00	1.56	1.15	0.16
16.50	1.58	1.17	0.14
17.00	1.60	1.19	0.13
17.50	1.62	1.21	0.11
18.00	1.63	1.22	0.10
18.50	1.65	1.23	0.09
19.00	1.66	1.25	0.09
19.50	1.67	1.26	0.08
20.00	1.68	1.27	0.08
20.50	1.70	1.28	0.07
21.00	1.71	1.29	0.07
21.50	1.72	1.30	0.07
22.00	1.73	1.31	0.06
22.50	1.74	1.32	0.06
23.00	1.74	1.33	0.06
23.50	1.75	1.34	0.05
24.00	**1.76**	**1.34**	0.05
24.50	1.76	1.34	0.00
25.00	1.76	1.34	0.00
25.50	1.76	1.34	0.00
26.00	1.76	1.34	0.00
26.50	1.76	1.34	0.00
27.00	1.76	1.34	0.00
27.50	1.76	1.34	0.00
28.00	1.76	1.34	0.00
28.50	1.76	1.34	0.00
29.00	1.76	1.34	0.00
29.50	1.76	1.34	0.00
30.00	1.76	1.34	0.00
30.50	1.76	1.34	0.00
31.00	1.76	1.34	0.00
31.50	1.76	1.34	0.00
32.00	1.76	1.34	0.00
32.50	1.76	1.34	0.00
33.00	1.76	1.34	0.00
33.50	1.76	1.34	0.00
34.00	1.76	1.34	0.00
34.50	1.76	1.34	0.00
35.00	1.76	1.34	0.00
35.50	1.76	1.34	0.00
36.00	1.76	1.34	0.00

Summary for Subcatchment DA #2A: Drainage Area #2A

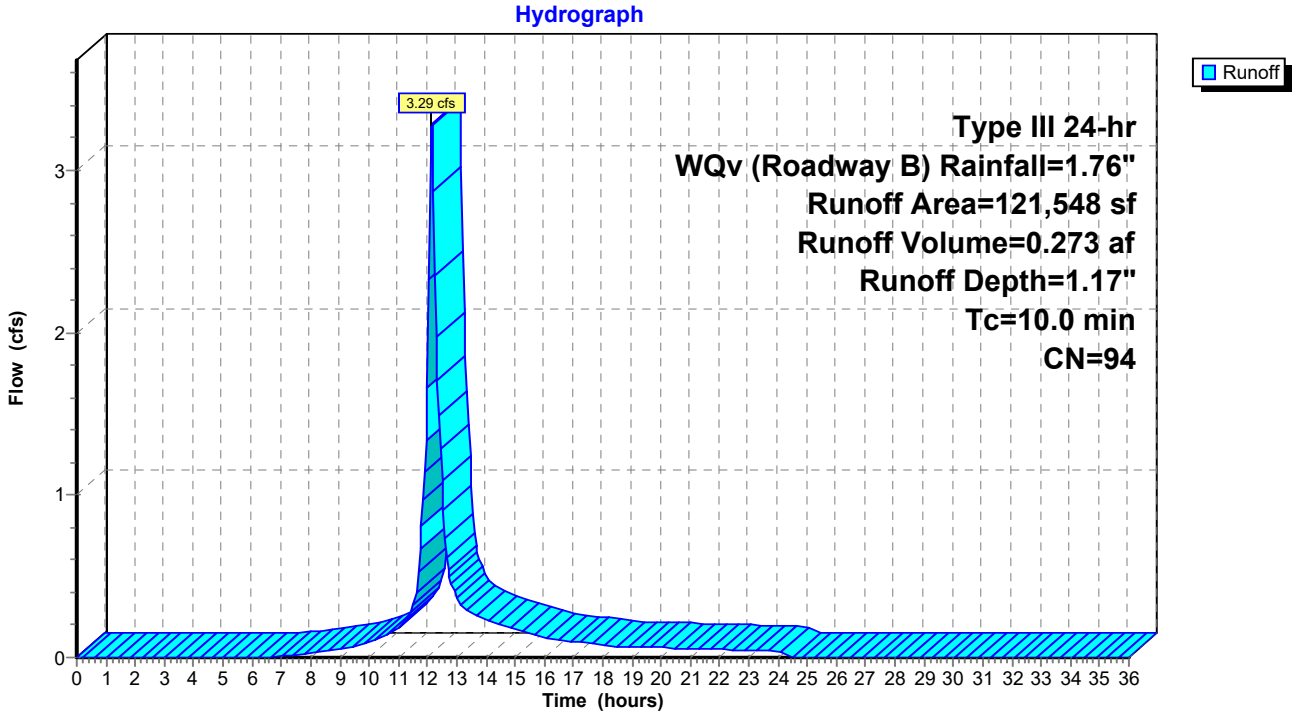
Runoff = 3.29 cfs @ 12.14 hrs, Volume= 0.273 af, Depth= 1.17"
Routed to Pond DB #2 : Drainage Basin #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Roadway B) Rainfall=1.76"

	Area (sf)	CN	Description
*	48,398	98	Building/Roof, HSG B
*	45,328	98	Pavement, HSG B
*	1,404	98	Sidewalk, HSG B
	13,851	61	>75% Grass cover, Good, HSG B
*	12,567	98	Infiltration Basin, HSG B
	121,548	94	Weighted Average
	13,851		11.40% Pervious Area
	107,697		88.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #2A: Drainage Area #2A



Hydrograph for Subcatchment DA #2A: Drainage Area #2A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.04	0.00	0.00
3.00	0.05	0.00	0.00
3.50	0.06	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.10	0.00	0.00
5.50	0.11	0.00	0.00
6.00	0.13	0.00	0.00
6.50	0.14	0.00	0.00
7.00	0.16	0.00	0.01
7.50	0.18	0.00	0.01
8.00	0.20	0.01	0.02
8.50	0.23	0.01	0.03
9.00	0.26	0.02	0.05
9.50	0.29	0.03	0.07
10.00	0.33	0.05	0.10
10.50	0.38	0.07	0.13
11.00	0.44	0.10	0.18
11.50	0.52	0.15	0.31
12.00	0.88	0.41	**1.67**
12.50	1.24	0.70	**1.09**
13.00	1.32	0.78	0.38
13.50	1.38	0.83	0.28
14.00	1.43	0.87	0.23
14.50	1.47	0.91	0.20
15.00	1.50	0.94	0.17
15.50	1.53	0.97	0.15
16.00	1.56	0.99	0.12
16.50	1.58	1.01	0.11
17.00	1.60	1.03	0.10
17.50	1.62	1.04	0.09
18.00	1.63	1.06	0.08
18.50	1.65	1.07	0.07
19.00	1.66	1.08	0.07
19.50	1.67	1.09	0.06
20.00	1.68	1.10	0.06
20.50	1.70	1.11	0.06
21.00	1.71	1.12	0.05
21.50	1.72	1.13	0.05
22.00	1.73	1.14	0.05
22.50	1.74	1.15	0.05
23.00	1.74	1.16	0.04
23.50	1.75	1.17	0.04
24.00	**1.76**	**1.17**	0.04
24.50	1.76	1.17	0.00
25.00	1.76	1.17	0.00
25.50	1.76	1.17	0.00
26.00	1.76	1.17	0.00
26.50	1.76	1.17	0.00
27.00	1.76	1.17	0.00
27.50	1.76	1.17	0.00
28.00	1.76	1.17	0.00
28.50	1.76	1.17	0.00
29.00	1.76	1.17	0.00
29.50	1.76	1.17	0.00
30.00	1.76	1.17	0.00
30.50	1.76	1.17	0.00
31.00	1.76	1.17	0.00
31.50	1.76	1.17	0.00
32.00	1.76	1.17	0.00
32.50	1.76	1.17	0.00
33.00	1.76	1.17	0.00
33.50	1.76	1.17	0.00
34.00	1.76	1.17	0.00
34.50	1.76	1.17	0.00
35.00	1.76	1.17	0.00
35.50	1.76	1.17	0.00
36.00	1.76	1.17	0.00

Summary for Subcatchment DA #2B: Drainage Area #2B

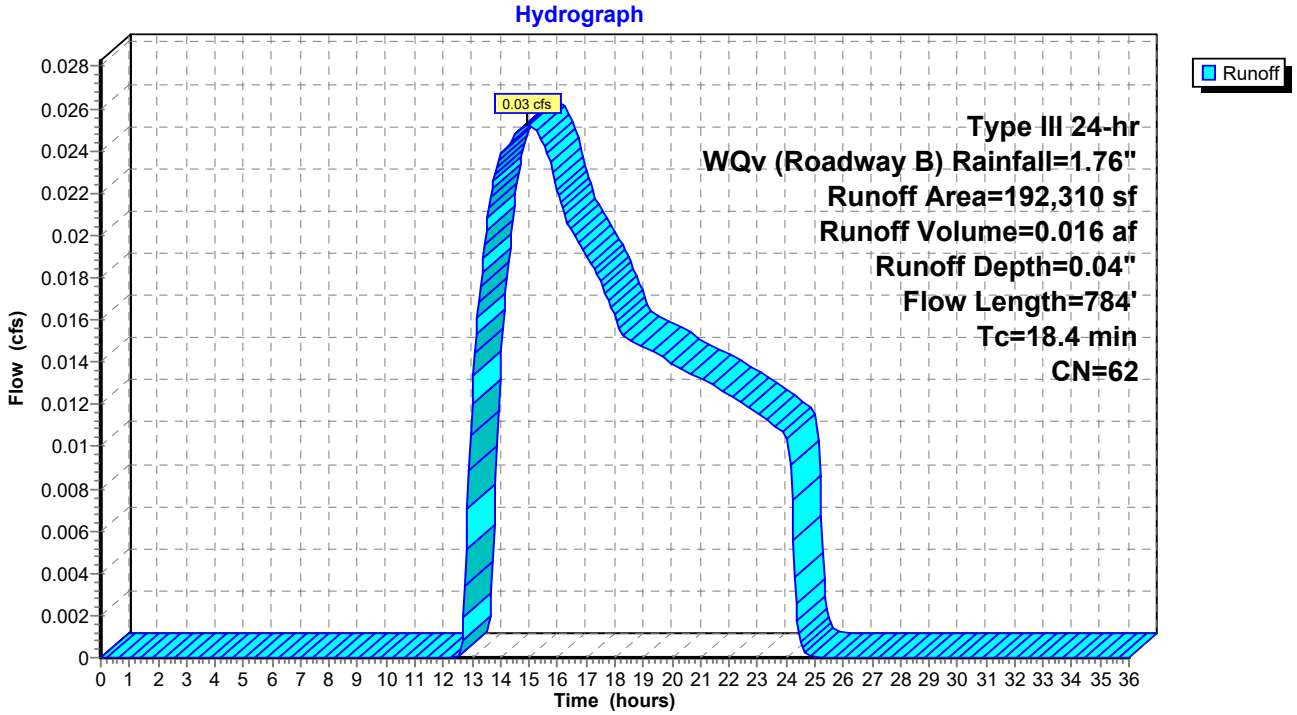
Runoff = 0.03 cfs @ 14.91 hrs, Volume= 0.016 af, Depth= 0.04"
Routed to Link POI #2 : POI #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Roadway B) Rainfall=1.76"

	Area (sf)	CN	Description
	187,035	61	>75% Grass cover, Good, HSG B
*	2,004	61	Emergency Access Road (Perv.), Good, HSG B
*	3,271	98	Emergency Acess Road (Imp.), HSG B
	192,310	62	Weighted Average
	189,039		98.30% Pervious Area
	3,271		1.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	150	0.0667	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
3.0	634	0.2524	3.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
18.4	784	Total			

Subcatchment DA #2B: Drainage Area #2B



Hydrograph for Subcatchment DA #2B: Drainage Area #2B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.04	0.00	0.00
3.00	0.05	0.00	0.00
3.50	0.06	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.10	0.00	0.00
5.50	0.11	0.00	0.00
6.00	0.13	0.00	0.00
6.50	0.14	0.00	0.00
7.00	0.16	0.00	0.00
7.50	0.18	0.00	0.00
8.00	0.20	0.00	0.00
8.50	0.23	0.00	0.00
9.00	0.26	0.00	0.00
9.50	0.29	0.00	0.00
10.00	0.33	0.00	0.00
10.50	0.38	0.00	0.00
11.00	0.44	0.00	0.00
11.50	0.52	0.00	0.00
12.00	0.88	0.00	0.00
12.50	1.24	0.00	0.00
13.00	1.32	0.00	0.01
13.50	1.38	0.00	0.02
14.00	1.43	0.01	0.02
14.50	1.47	0.01	**0.02**
15.00	1.50	0.01	**0.03**
15.50	1.53	0.01	0.02
16.00	1.56	0.02	0.02
16.50	1.58	0.02	0.02
17.00	1.60	0.02	0.02
17.50	1.62	0.02	0.02
18.00	1.63	0.03	0.02
18.50	1.65	0.03	0.02
19.00	1.66	0.03	0.01
19.50	1.67	0.03	0.01
20.00	1.68	0.03	0.01
20.50	1.70	0.03	0.01
21.00	1.71	0.03	0.01
21.50	1.72	0.04	0.01
22.00	1.73	0.04	0.01
22.50	1.74	0.04	0.01
23.00	1.74	0.04	0.01
23.50	1.75	0.04	0.01
24.00	**1.76**	**0.04**	0.01
24.50	1.76	0.04	0.00
25.00	1.76	0.04	0.00
25.50	1.76	0.04	0.00
26.00	1.76	0.04	0.00
26.50	1.76	0.04	0.00
27.00	1.76	0.04	0.00
27.50	1.76	0.04	0.00
28.00	1.76	0.04	0.00
28.50	1.76	0.04	0.00
29.00	1.76	0.04	0.00
29.50	1.76	0.04	0.00
30.00	1.76	0.04	0.00
30.50	1.76	0.04	0.00
31.00	1.76	0.04	0.00
31.50	1.76	0.04	0.00
32.00	1.76	0.04	0.00
32.50	1.76	0.04	0.00
33.00	1.76	0.04	0.00
33.50	1.76	0.04	0.00
34.00	1.76	0.04	0.00
34.50	1.76	0.04	0.00
35.00	1.76	0.04	0.00
35.50	1.76	0.04	0.00
36.00	1.76	0.04	0.00

Summary for Pond DB #2: Drainage Basin #2

Inflow Area = 2.790 ac, 88.60% Impervious, Inflow Depth = 1.17" for WQv (Roadway B) event
Inflow = 3.29 cfs @ 12.14 hrs, Volume= 0.273 af
Outflow = 1.68 cfs @ 12.36 hrs, Volume= 0.273 af, Atten= 49%, Lag= 13.0 min
Discarded = 1.68 cfs @ 12.36 hrs, Volume= 0.273 af
Primary = 0.00 cfs @ 12.36 hrs, Volume= 0.000 af
Routed to Link POI #2 : POI #2

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 485.22' @ 12.36 hrs Surf.Area= 5,949 sf Storage= 1,284 cf

Plug-Flow detention time= 4.4 min calculated for 0.273 af (100% of inflow)
Center-of-Mass det. time= 4.4 min (816.7 - 812.3)

Volume	Invert	Avail.Storage	Storage Description
#1	485.00'	25,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

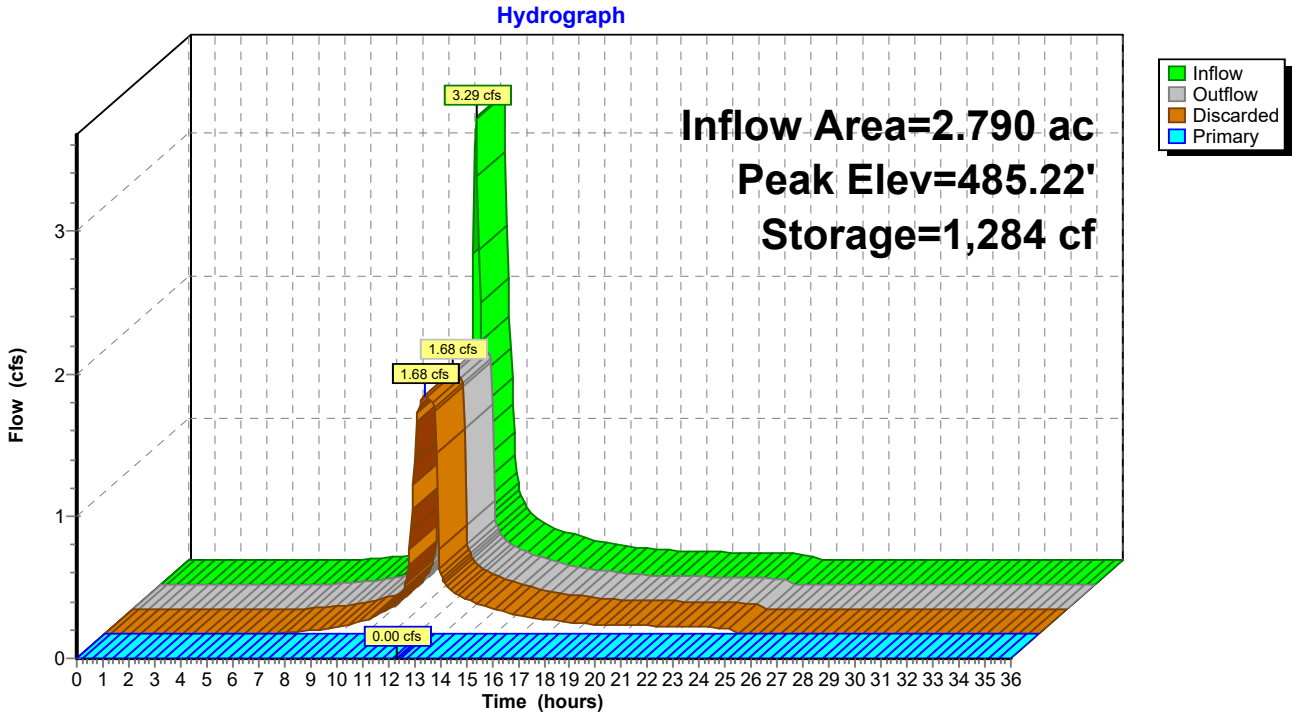
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
485.00	5,500	0	0
486.00	7,500	6,500	6,500
487.00	9,500	8,500	15,000
488.00	11,500	10,500	25,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	485.00'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 470.00'
#2	Primary	485.21'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	486.70'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

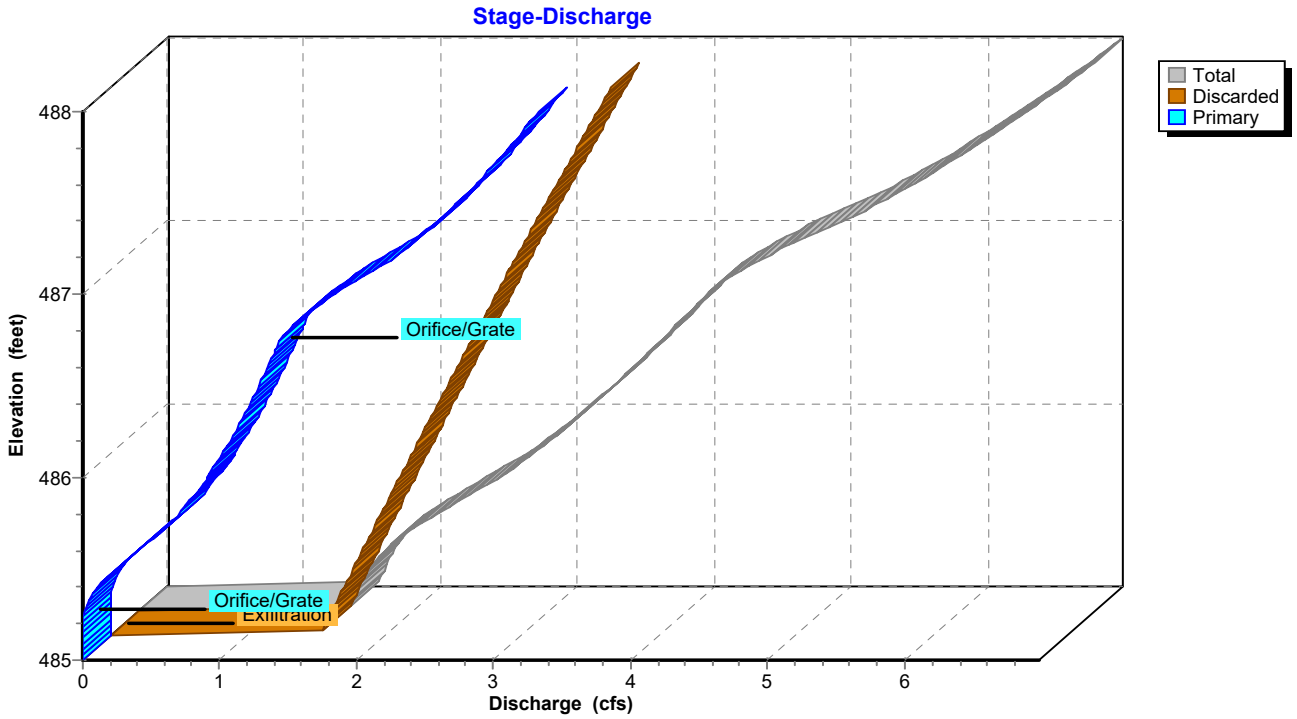
Discarded OutFlow Max=1.68 cfs @ 12.36 hrs HW=485.22' (Free Discharge)
└**1=Exfiltration** (Controls 1.68 cfs)

Primary OutFlow Max=0.00 cfs @ 12.36 hrs HW=485.22' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.40 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

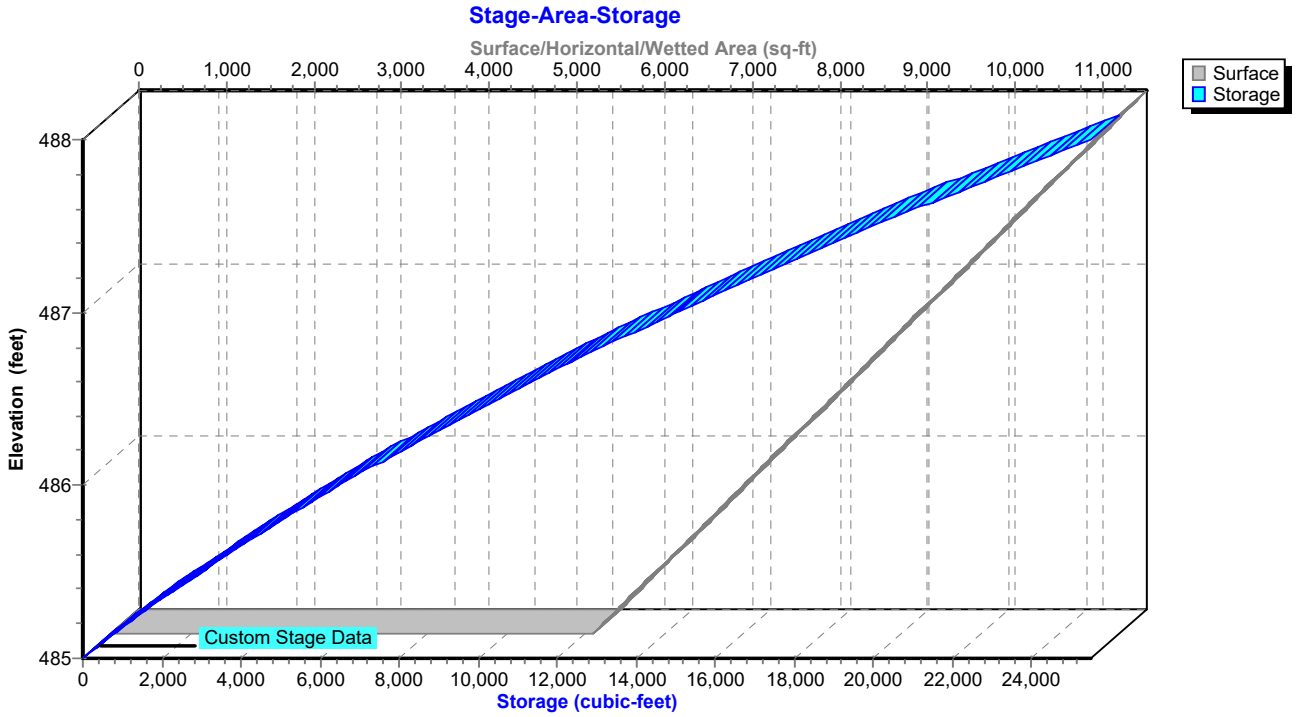
Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Hydrograph for Pond DB #2: Drainage Basin #2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	485.00	0.00	0.00	0.00
1.00	0.00	0	485.00	0.00	0.00	0.00
2.00	0.00	0	485.00	0.00	0.00	0.00
3.00	0.00	0	485.00	0.00	0.00	0.00
4.00	0.00	0	485.00	0.00	0.00	0.00
5.00	0.00	0	485.00	0.00	0.00	0.00
6.00	0.00	0	485.00	0.00	0.00	0.00
7.00	0.01	1	485.00	0.01	0.01	0.00
8.00	0.02	2	485.00	0.02	0.02	0.00
9.00	0.05	5	485.00	0.05	0.05	0.00
10.00	0.10	10	485.00	0.09	0.09	0.00
11.00	0.18	19	485.00	0.18	0.18	0.00
12.00	**1.67**	**159**	**485.03**	**1.48**	**1.48**	**0.00**
13.00	**0.38**	**42**	**485.01**	**0.39**	**0.39**	**0.00**
14.00	0.23	25	485.00	0.24	0.24	0.00
15.00	0.17	19	485.00	0.18	0.18	0.00
16.00	0.12	13	485.00	0.13	0.13	0.00
17.00	0.10	11	485.00	0.10	0.10	0.00
18.00	0.08	8	485.00	0.08	0.08	0.00
19.00	0.07	7	485.00	0.07	0.07	0.00
20.00	0.06	6	485.00	0.06	0.06	0.00
21.00	0.05	6	485.00	0.05	0.05	0.00
22.00	0.05	5	485.00	0.05	0.05	0.00
23.00	0.04	5	485.00	0.04	0.04	0.00
24.00	0.04	4	485.00	0.04	0.04	0.00
25.00	0.00	0	485.00	0.00	0.00	0.00
26.00	0.00	0	485.00	0.00	0.00	0.00
27.00	0.00	0	485.00	0.00	0.00	0.00
28.00	0.00	0	485.00	0.00	0.00	0.00
29.00	0.00	0	485.00	0.00	0.00	0.00
30.00	0.00	0	485.00	0.00	0.00	0.00
31.00	0.00	0	485.00	0.00	0.00	0.00
32.00	0.00	0	485.00	0.00	0.00	0.00
33.00	0.00	0	485.00	0.00	0.00	0.00
34.00	0.00	0	485.00	0.00	0.00	0.00
35.00	0.00	0	485.00	0.00	0.00	0.00
36.00	0.00	0	485.00	0.00	0.00	0.00

Stage-Discharge for Pond DB #2: Drainage Basin #2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
485.00	0.00	0.00	0.00
485.05	1.56	1.56	0.00
485.10	1.59	1.59	0.00
485.15	1.63	1.63	0.00
485.20	1.66	1.66	0.00
485.25	1.70	1.69	0.01
485.30	1.75	1.73	0.03
485.35	1.82	1.76	0.06
485.40	1.91	1.79	0.11
485.45	2.00	1.83	0.17
485.50	2.10	1.86	0.24
485.55	2.22	1.89	0.32
485.60	2.33	1.93	0.40
485.65	2.45	1.96	0.49
485.70	2.57	2.00	0.57
485.75	2.68	2.03	0.65
485.80	2.77	2.06	0.70
485.85	2.86	2.10	0.76
485.90	2.95	2.13	0.81
485.95	3.03	2.17	0.86
486.00	3.11	2.20	0.91
486.05	3.19	2.24	0.95
486.10	3.27	2.27	1.00
486.15	3.34	2.31	1.04
486.20	3.42	2.34	1.08
486.25	3.49	2.38	1.11
486.30	3.56	2.41	1.15
486.35	3.63	2.45	1.19
486.40	3.70	2.48	1.22
486.45	3.77	2.52	1.25
486.50	3.84	2.55	1.29
486.55	3.91	2.59	1.32
486.60	3.97	2.62	1.35
486.65	4.04	2.66	1.38
486.70	4.10	2.70	1.41
486.75	4.18	2.73	1.45
486.80	4.27	2.77	1.50
486.85	4.37	2.80	1.57
486.90	4.49	2.84	1.65
486.95	4.61	2.88	1.73
487.00	4.75	2.91	1.83
487.05	4.89	2.95	1.94
487.10	5.03	2.99	2.05
487.15	5.18	3.02	2.16
487.20	5.32	3.06	2.26
487.25	5.46	3.10	2.36
487.30	5.57	3.13	2.44
487.35	5.69	3.17	2.52
487.40	5.80	3.21	2.60
487.45	5.91	3.24	2.67
487.50	6.02	3.28	2.74
487.55	6.12	3.32	2.80
487.60	6.22	3.35	2.87
487.65	6.32	3.39	2.93
487.70	6.42	3.43	2.99
487.75	6.52	3.47	3.05
487.80	6.61	3.50	3.11
487.85	6.71	3.54	3.16
487.90	6.80	3.58	3.22
487.95	6.89	3.62	3.27
488.00	**6.98**	**3.65**	**3.33**

Stage-Area-Storage for Pond DB #2: Drainage Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
485.00	5,500	0
485.05	5,600	278
485.10	5,700	560
485.15	5,800	847
485.20	5,900	1,140
485.25	6,000	1,438
485.30	6,100	1,740
485.35	6,200	2,048
485.40	6,300	2,360
485.45	6,400	2,677
485.50	6,500	3,000
485.55	6,600	3,328
485.60	6,700	3,660
485.65	6,800	3,997
485.70	6,900	4,340
485.75	7,000	4,688
485.80	7,100	5,040
485.85	7,200	5,398
485.90	7,300	5,760
485.95	7,400	6,127
486.00	7,500	6,500
486.05	7,600	6,878
486.10	7,700	7,260
486.15	7,800	7,647
486.20	7,900	8,040
486.25	8,000	8,438
486.30	8,100	8,840
486.35	8,200	9,248
486.40	8,300	9,660
486.45	8,400	10,077
486.50	8,500	10,500
486.55	8,600	10,928
486.60	8,700	11,360
486.65	8,800	11,797
486.70	8,900	12,240
486.75	9,000	12,688
486.80	9,100	13,140
486.85	9,200	13,598
486.90	9,300	14,060
486.95	9,400	14,527
487.00	9,500	15,000
487.05	9,600	15,478
487.10	9,700	15,960
487.15	9,800	16,447
487.20	9,900	16,940
487.25	10,000	17,438
487.30	10,100	17,940
487.35	10,200	18,448
487.40	10,300	18,960
487.45	10,400	19,477
487.50	10,500	20,000
487.55	10,600	20,528
487.60	10,700	21,060
487.65	10,800	21,597
487.70	10,900	22,140
487.75	11,000	22,688
487.80	11,100	23,240
487.85	11,200	23,798
487.90	11,300	24,360
487.95	11,400	24,927
488.00	**11,500**	**25,500**

Summary for Pond SMS #1A: SMS #1A

Inflow Area = 3.863 ac, 91.78% Impervious, Inflow Depth = 1.26" for WQv (Roadway B) event
Inflow = 4.82 cfs @ 12.14 hrs, Volume= 0.404 af
Outflow = 2.11 cfs @ 12.41 hrs, Volume= 0.404 af, Atten= 56%, Lag= 16.0 min
Discarded = 2.11 cfs @ 12.41 hrs, Volume= 0.404 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 492.50' @ 12.41 hrs Surf.Area= 7,503 sf Storage= 2,257 cf

Plug-Flow detention time= 5.6 min calculated for 0.404 af (100% of inflow)
Center-of-Mass det. time= 5.6 min (810.6 - 805.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	491.75'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	492.50'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	491.75'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	492.53'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	493.83'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	494.49'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	495.32'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	496.23'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.11 cfs @ 12.41 hrs HW=492.50' (Free Discharge)
└**1=Exfiltration** (Controls 2.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=491.75' (Free Discharge)
├**2=Orifice/Grate** (Controls 0.00 cfs)
├**3=Orifice/Grate** (Controls 0.00 cfs)
├**4=Orifice/Grate** (Controls 0.00 cfs)
├**5=Orifice/Grate** (Controls 0.00 cfs)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1A: SMS #1A - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

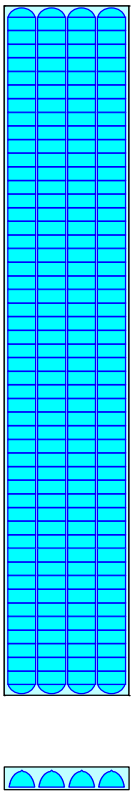
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

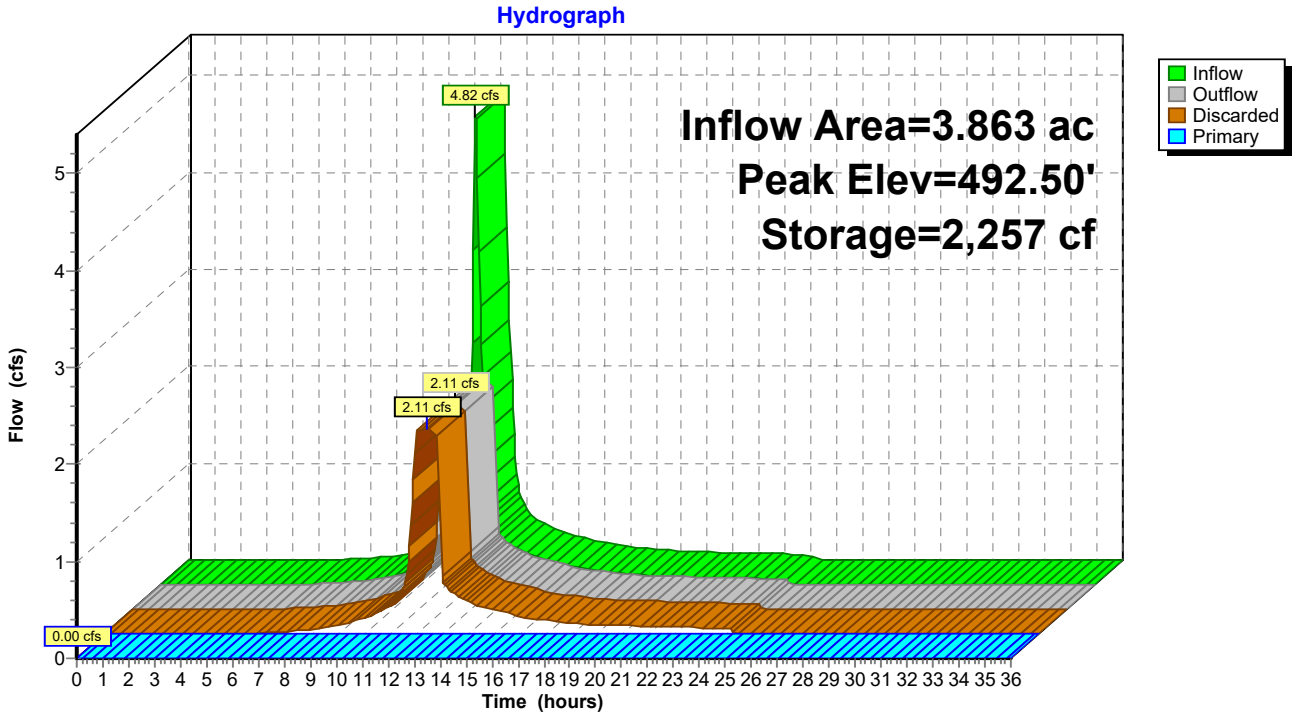
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

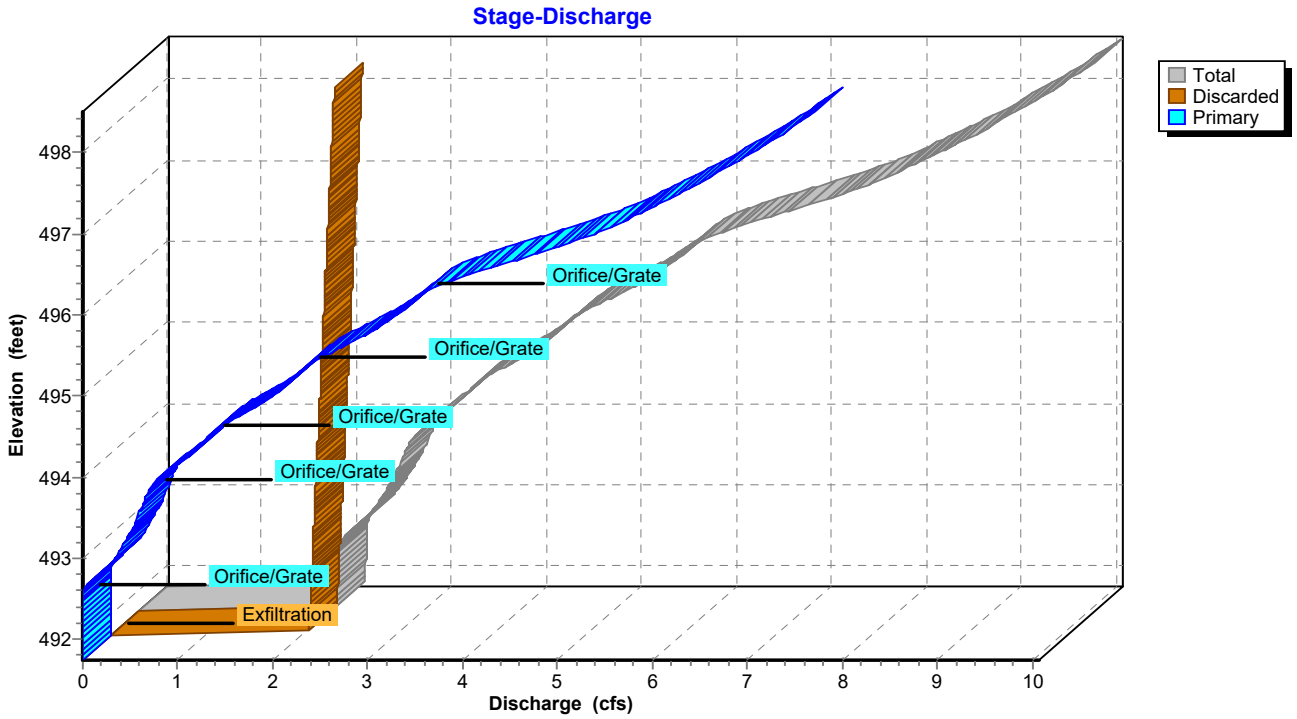
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



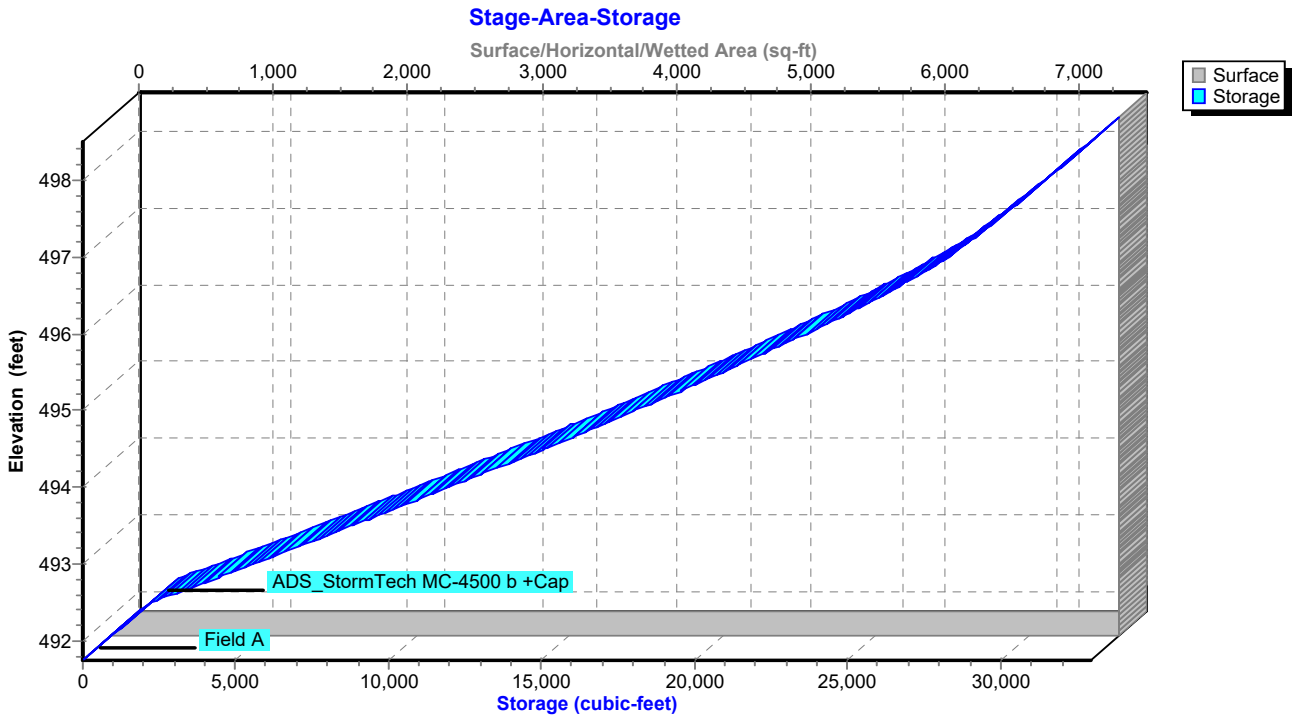
Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Hydrograph for Pond SMS #1A: SMS #1A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	491.75	0.00	0.00	**0.00**
1.00	0.00	0	491.75	0.00	0.00	0.00
2.00	0.00	0	491.75	0.00	0.00	0.00
3.00	0.00	0	491.75	0.00	0.00	0.00
4.00	0.00	0	491.75	0.00	0.00	0.00
5.00	0.00	0	491.75	0.00	0.00	0.00
6.00	0.01	1	491.75	0.01	0.01	0.00
7.00	0.02	2	491.75	0.02	0.02	0.00
8.00	0.05	4	491.75	0.05	0.05	0.00
9.00	0.09	9	491.75	0.09	0.09	0.00
10.00	0.16	15	491.76	0.16	0.16	0.00
11.00	0.29	28	491.76	0.29	0.29	0.00
12.00	**2.49**	**230**	**491.83**	**2.09**	**2.09**	0.00
13.00	**0.54**	**59**	**491.77**	**0.60**	**0.60**	0.00
14.00	0.33	33	491.76	0.34	0.34	0.00
15.00	0.25	24	491.76	0.25	0.25	0.00
16.00	0.18	17	491.76	0.18	0.18	0.00
17.00	0.14	14	491.75	0.14	0.14	0.00
18.00	0.11	11	491.75	0.11	0.11	0.00
19.00	0.09	9	491.75	0.09	0.09	0.00
20.00	0.09	8	491.75	0.09	0.09	0.00
21.00	0.08	8	491.75	0.08	0.08	0.00
22.00	0.07	7	491.75	0.07	0.07	0.00
23.00	0.06	6	491.75	0.06	0.06	0.00
24.00	0.06	5	491.75	0.06	0.06	0.00
25.00	0.00	0	491.75	0.00	0.00	0.00
26.00	0.00	0	491.75	0.00	0.00	0.00
27.00	0.00	0	491.75	0.00	0.00	0.00
28.00	0.00	0	491.75	0.00	0.00	0.00
29.00	0.00	0	491.75	0.00	0.00	0.00
30.00	0.00	0	491.75	0.00	0.00	0.00
31.00	0.00	0	491.75	0.00	0.00	0.00
32.00	0.00	0	491.75	0.00	0.00	0.00
33.00	0.00	0	491.75	0.00	0.00	0.00
34.00	0.00	0	491.75	0.00	0.00	0.00
35.00	0.00	0	491.75	0.00	0.00	0.00
36.00	0.00	0	491.75	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1A: SMS #1A

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
491.75	0.00	0.00	0.00
491.85	2.09	2.09	0.00
491.95	2.09	2.09	0.00
492.05	2.10	2.10	0.00
492.15	2.10	2.10	0.00
492.25	2.10	2.10	0.00
492.35	2.11	2.11	0.00
492.45	2.11	2.11	0.00
492.55	2.12	2.12	0.00
492.65	2.16	2.12	0.04
492.75	2.24	2.12	0.12
492.85	2.34	2.13	0.22
492.95	2.43	2.13	0.30
493.05	2.50	2.14	0.37
493.15	2.56	2.14	0.42
493.25	2.61	2.14	0.47
493.35	2.66	2.15	0.51
493.45	2.71	2.15	0.55
493.55	2.75	2.16	0.59
493.65	2.79	2.16	0.63
493.75	2.82	2.16	0.66
493.85	2.86	2.17	0.69
493.95	2.93	2.17	0.76
494.05	3.05	2.18	0.87
494.15	3.18	2.18	1.00
494.25	3.29	2.18	1.11
494.35	3.39	2.19	1.20
494.45	3.47	2.19	1.28
494.55	3.56	2.20	1.36
494.65	3.69	2.20	1.49
494.75	3.85	2.20	1.64
494.85	4.01	2.21	1.80
494.95	4.15	2.21	1.93
495.05	4.26	2.22	2.05
495.15	4.37	2.22	2.15
495.25	4.48	2.23	2.25
495.35	4.57	2.23	2.35
495.45	4.71	2.23	2.47
495.55	4.88	2.24	2.64
495.65	5.06	2.24	2.82
495.75	5.23	2.25	2.98
495.85	5.37	2.25	3.12
495.95	5.50	2.25	3.25
496.05	5.62	2.26	3.36
496.15	5.74	2.26	3.48
496.25	5.85	2.27	3.58
496.35	6.00	2.27	3.74
496.45	6.22	2.27	3.94
496.55	6.48	2.28	4.20
496.65	6.76	2.28	4.48
496.75	7.06	2.29	4.78
496.85	7.35	2.29	5.06
496.95	7.57	2.29	5.28
497.05	7.79	2.30	5.49
497.15	7.99	2.30	5.69
497.25	8.18	2.31	5.87
497.35	8.36	2.31	6.05
497.45	8.53	2.31	6.22
497.55	8.70	2.32	6.38
497.65	8.86	2.32	6.54
497.75	9.02	2.33	6.69
497.85	9.17	2.33	6.84
497.95	9.32	2.33	6.98
498.05	9.46	2.34	7.12
498.15	9.60	2.34	7.26
498.25	9.74	2.35	7.39
498.35	9.87	2.35	7.52
498.45	**10.00**	**2.35**	**7.65**

Stage-Area-Storage for Pond SMS #1A: SMS #1A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
491.75	**7,503**	0
491.85	7,503	300
491.95	7,503	600
492.05	7,503	900
492.15	7,503	1,200
492.25	7,503	1,501
492.35	7,503	1,801
492.45	7,503	2,101
492.55	7,503	2,582
492.65	7,503	3,243
492.75	7,503	3,902
492.85	7,503	4,560
492.95	7,503	5,216
493.05	7,503	5,871
493.15	7,503	6,523
493.25	7,503	7,173
493.35	7,503	7,822
493.45	7,503	8,468
493.55	7,503	9,111
493.65	7,503	9,752
493.75	7,503	10,391
493.85	7,503	11,026
493.95	7,503	11,658
494.05	7,503	12,288
494.15	7,503	12,914
494.25	7,503	13,537
494.35	7,503	14,155
494.45	7,503	14,770
494.55	7,503	15,381
494.65	7,503	15,988
494.75	7,503	16,590
494.85	7,503	17,188
494.95	7,503	17,781
495.05	7,503	18,369
495.15	7,503	18,952
495.25	7,503	19,530
495.35	7,503	20,101
495.45	7,503	20,667
495.55	7,503	21,226
495.65	7,503	21,779
495.75	7,503	22,324
495.85	7,503	22,862
495.95	7,503	23,393
496.05	7,503	23,915
496.15	7,503	24,428
496.25	7,503	24,932
496.35	7,503	25,426
496.45	7,503	25,909
496.55	7,503	26,381
496.65	7,503	26,840
496.75	7,503	27,285
496.85	7,503	27,713
496.95	7,503	28,121
497.05	7,503	28,501
497.15	7,503	28,850
497.25	7,503	29,181
497.35	7,503	29,504
497.45	7,503	29,817
497.55	7,503	30,119
497.65	7,503	30,419
497.75	7,503	30,719
497.85	7,503	31,019
497.95	7,503	31,319
498.05	7,503	31,620
498.15	7,503	31,920
498.25	7,503	32,220
498.35	7,503	32,520
498.45	7,503	**32,820**

Summary for Pond SMS #1C: SMS #1C

Inflow Area = 3.475 ac, 93.57% Impervious, Inflow Depth = 1.34" for WQv (Roadway B) event
Inflow = 4.58 cfs @ 12.14 hrs, Volume= 0.389 af
Outflow = 2.11 cfs @ 12.38 hrs, Volume= 0.389 af, Atten= 54%, Lag= 14.7 min
Discarded = 2.11 cfs @ 12.38 hrs, Volume= 0.389 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 495.91' @ 12.38 hrs Surf.Area= 7,503 sf Storage= 1,985 cf

Plug-Flow detention time= 5.0 min calculated for 0.389 af (100% of inflow)
Center-of-Mass det. time= 5.0 min (801.6 - 796.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	495.25'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	496.00'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	495.25'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	496.09'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	496.92'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	497.83'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	498.75'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	499.67'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.11 cfs @ 12.38 hrs HW=495.91' (Free Discharge)
└**1=Exfiltration** (Controls 2.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=495.25' (Free Discharge)
├**2=Orifice/Grate** (Controls 0.00 cfs)
├**3=Orifice/Grate** (Controls 0.00 cfs)
├**4=Orifice/Grate** (Controls 0.00 cfs)
├**5=Orifice/Grate** (Controls 0.00 cfs)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1C: SMS #1C - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

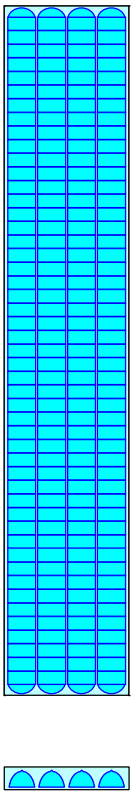
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

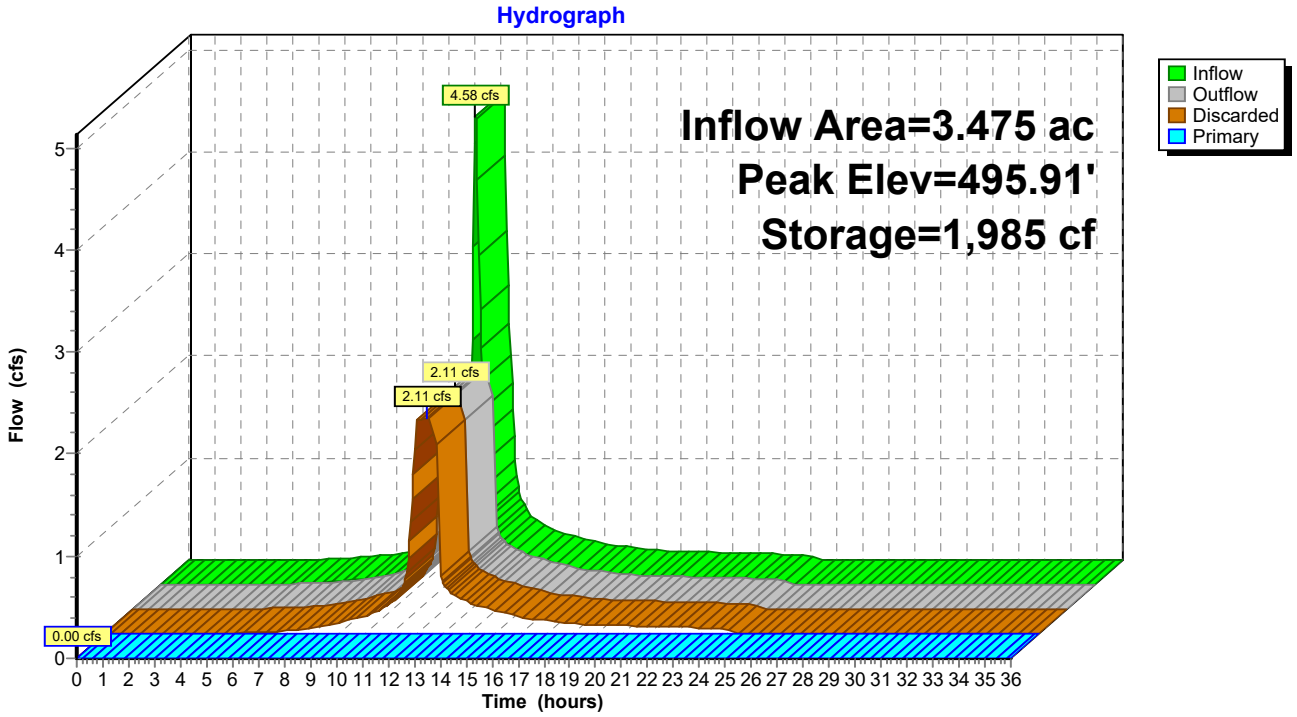
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

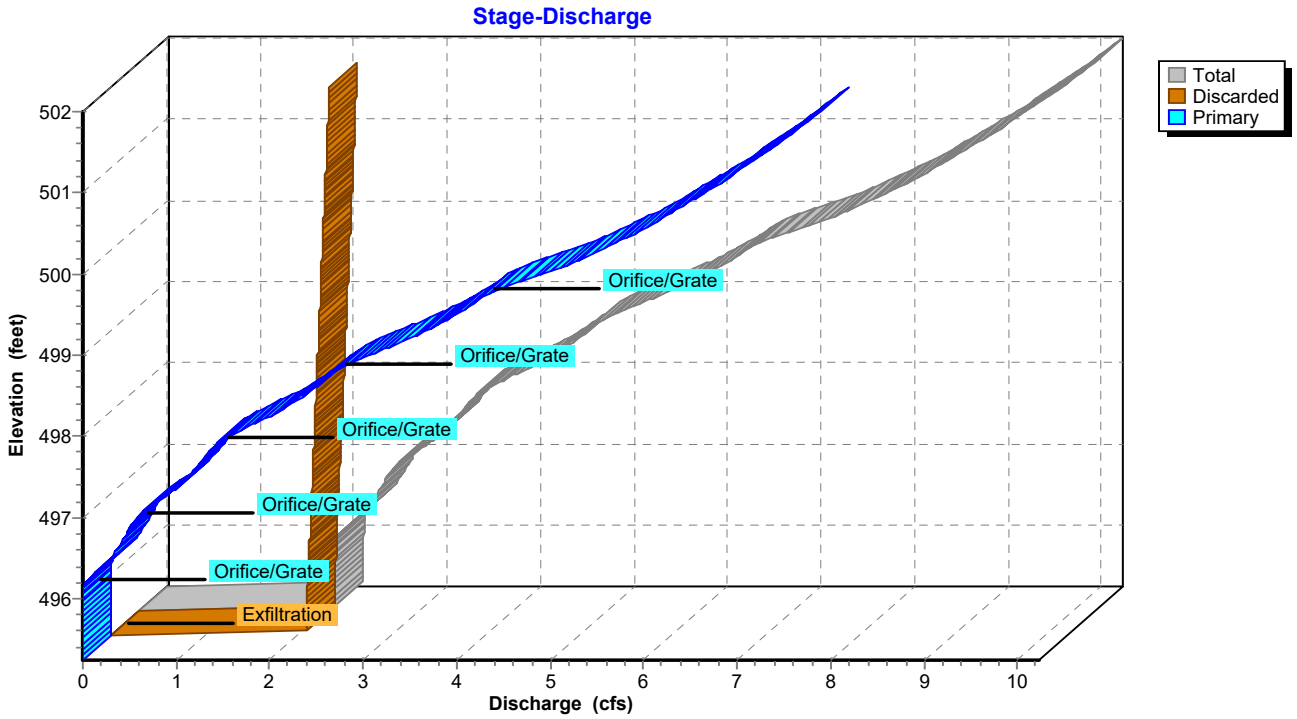
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



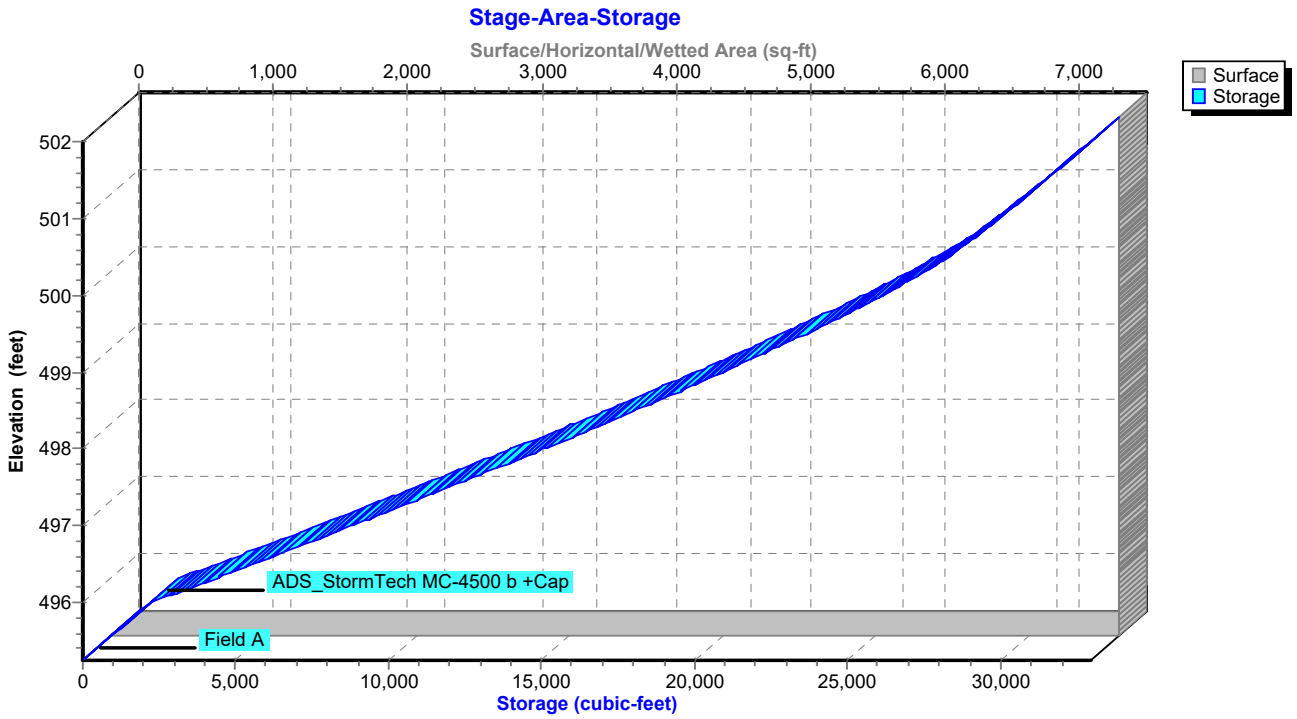
Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Hydrograph for Pond SMS #1C: SMS #1C

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	495.25	0.00	0.00	**0.00**
1.00	0.00	0	495.25	0.00	0.00	0.00
2.00	0.00	0	495.25	0.00	0.00	0.00
3.00	0.00	0	495.25	0.00	0.00	0.00
4.00	0.00	0	495.25	0.00	0.00	0.00
5.00	0.01	0	495.25	0.00	0.00	0.00
6.00	0.02	2	495.25	0.02	0.02	0.00
7.00	0.03	3	495.25	0.03	0.03	0.00
8.00	0.06	6	495.25	0.06	0.06	0.00
9.00	0.11	10	495.25	0.11	0.11	0.00
10.00	0.17	17	495.26	0.17	0.17	0.00
11.00	0.30	28	495.26	0.29	0.29	0.00
12.00	**2.40**	**216**	**495.32**	**2.09**	**2.09**	0.00
13.00	**0.50**	**50**	**495.27**	**0.52**	**0.52**	0.00
14.00	0.31	30	495.26	0.31	0.31	0.00
15.00	0.23	22	495.26	0.23	0.23	0.00
16.00	0.16	16	495.26	0.16	0.16	0.00
17.00	0.13	13	495.25	0.13	0.13	0.00
18.00	0.10	10	495.25	0.10	0.10	0.00
19.00	0.09	8	495.25	0.09	0.09	0.00
20.00	0.08	8	495.25	0.08	0.08	0.00
21.00	0.07	7	495.25	0.07	0.07	0.00
22.00	0.06	6	495.25	0.06	0.06	0.00
23.00	0.06	6	495.25	0.06	0.06	0.00
24.00	0.05	5	495.25	0.05	0.05	0.00
25.00	0.00	0	495.25	0.00	0.00	0.00
26.00	0.00	0	495.25	0.00	0.00	0.00
27.00	0.00	0	495.25	0.00	0.00	0.00
28.00	0.00	0	495.25	0.00	0.00	0.00
29.00	0.00	0	495.25	0.00	0.00	0.00
30.00	0.00	0	495.25	0.00	0.00	0.00
31.00	0.00	0	495.25	0.00	0.00	0.00
32.00	0.00	0	495.25	0.00	0.00	0.00
33.00	0.00	0	495.25	0.00	0.00	0.00
34.00	0.00	0	495.25	0.00	0.00	0.00
35.00	0.00	0	495.25	0.00	0.00	0.00
36.00	0.00	0	495.25	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1C: SMS #1C

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
495.25	0.00	0.00	0.00
495.35	2.09	2.09	0.00
495.45	2.09	2.09	0.00
495.55	2.10	2.10	0.00
495.65	2.10	2.10	0.00
495.75	2.10	2.10	0.00
495.85	2.11	2.11	0.00
495.95	2.11	2.11	0.00
496.05	2.11	2.11	0.00
496.15	2.13	2.12	0.01
496.25	2.19	2.12	0.07
496.35	2.28	2.13	0.16
496.45	2.39	2.13	0.26
496.55	2.46	2.13	0.33
496.65	2.53	2.14	0.39
496.75	2.58	2.14	0.44
496.85	2.63	2.14	0.49
496.95	2.68	2.15	0.53
497.05	2.77	2.15	0.61
497.15	2.89	2.16	0.73
497.25	3.03	2.16	0.87
497.35	3.15	2.16	0.98
497.45	3.24	2.17	1.08
497.55	3.33	2.17	1.16
497.65	3.41	2.17	1.24
497.75	3.49	2.18	1.31
497.85	3.56	2.18	1.38
497.95	3.67	2.19	1.48
498.05	3.82	2.19	1.63
498.15	4.01	2.19	1.81
498.25	4.20	2.20	2.00
498.35	4.36	2.20	2.16
498.45	4.50	2.20	2.29
498.55	4.62	2.21	2.42
498.65	4.74	2.21	2.53
498.75	4.85	2.22	2.64
498.85	4.99	2.22	2.77
498.95	5.17	2.22	2.95
499.05	5.39	2.23	3.16
499.15	5.61	2.23	3.38
499.25	5.81	2.23	3.58
499.35	5.99	2.24	3.75
499.45	6.15	2.24	3.91
499.55	6.30	2.25	4.05
499.65	6.44	2.25	4.19
499.75	6.60	2.25	4.34
499.85	6.80	2.26	4.54
499.95	7.04	2.26	4.78
500.05	7.29	2.27	5.03
500.15	7.53	2.27	5.26
500.25	7.73	2.27	5.46
500.35	7.92	2.28	5.64
500.45	8.10	2.28	5.82
500.55	8.27	2.28	5.98
500.65	8.43	2.29	6.14
500.75	8.58	2.29	6.29
500.85	8.73	2.30	6.44
500.95	8.88	2.30	6.58
501.05	9.02	2.30	6.72
501.15	9.16	2.31	6.85
501.25	9.30	2.31	6.99
501.35	9.43	2.31	7.11
501.45	9.56	2.32	7.24
501.55	9.68	2.32	7.36
501.65	9.81	2.33	7.48
501.75	9.93	2.33	7.60
501.85	10.05	2.33	7.72
501.95	**10.17**	**2.34**	**7.83**

Stage-Area-Storage for Pond SMS #1C: SMS #1C

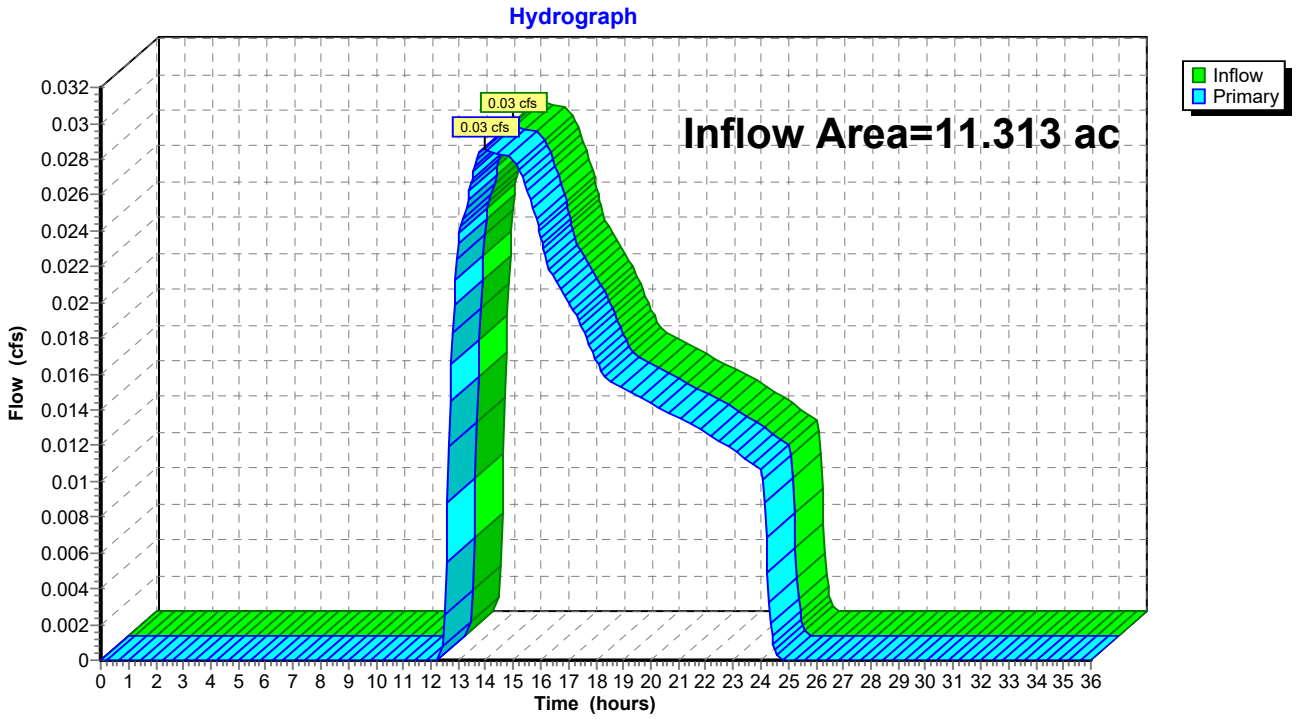
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
495.25	**7,503**	0
495.35	7,503	300
495.45	7,503	600
495.55	7,503	900
495.65	7,503	1,200
495.75	7,503	1,501
495.85	7,503	1,801
495.95	7,503	2,101
496.05	7,503	2,582
496.15	7,503	3,243
496.25	7,503	3,902
496.35	7,503	4,560
496.45	7,503	5,216
496.55	7,503	5,871
496.65	7,503	6,523
496.75	7,503	7,173
496.85	7,503	7,822
496.95	7,503	8,468
497.05	7,503	9,111
497.15	7,503	9,752
497.25	7,503	10,391
497.35	7,503	11,026
497.45	7,503	11,658
497.55	7,503	12,288
497.65	7,503	12,914
497.75	7,503	13,537
497.85	7,503	14,155
497.95	7,503	14,770
498.05	7,503	15,381
498.15	7,503	15,988
498.25	7,503	16,590
498.35	7,503	17,188
498.45	7,503	17,781
498.55	7,503	18,369
498.65	7,503	18,952
498.75	7,503	19,530
498.85	7,503	20,101
498.95	7,503	20,667
499.05	7,503	21,226
499.15	7,503	21,779
499.25	7,503	22,324
499.35	7,503	22,862
499.45	7,503	23,393
499.55	7,503	23,915
499.65	7,503	24,428
499.75	7,503	24,932
499.85	7,503	25,426
499.95	7,503	25,909
500.05	7,503	26,381
500.15	7,503	26,840
500.25	7,503	27,285
500.35	7,503	27,713
500.45	7,503	28,121
500.55	7,503	28,501
500.65	7,503	28,850
500.75	7,503	29,181
500.85	7,503	29,504
500.95	7,503	29,817
501.05	7,503	30,119
501.15	7,503	30,419
501.25	7,503	30,719
501.35	7,503	31,019
501.45	7,503	31,319
501.55	7,503	31,620
501.65	7,503	31,920
501.75	7,503	32,220
501.85	7,503	32,520
501.95	7,503	**32,820**

Summary for Link POI #1: POI #1

Inflow Area = 11.313 ac, 61.95% Impervious, Inflow Depth = 0.02" for WQv (Roadway B) event
Inflow = 0.03 cfs @ 13.94 hrs, Volume= 0.018 af
Primary = 0.03 cfs @ 13.94 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #1: POI #1



Hydrograph for Link POI #1: POI #1

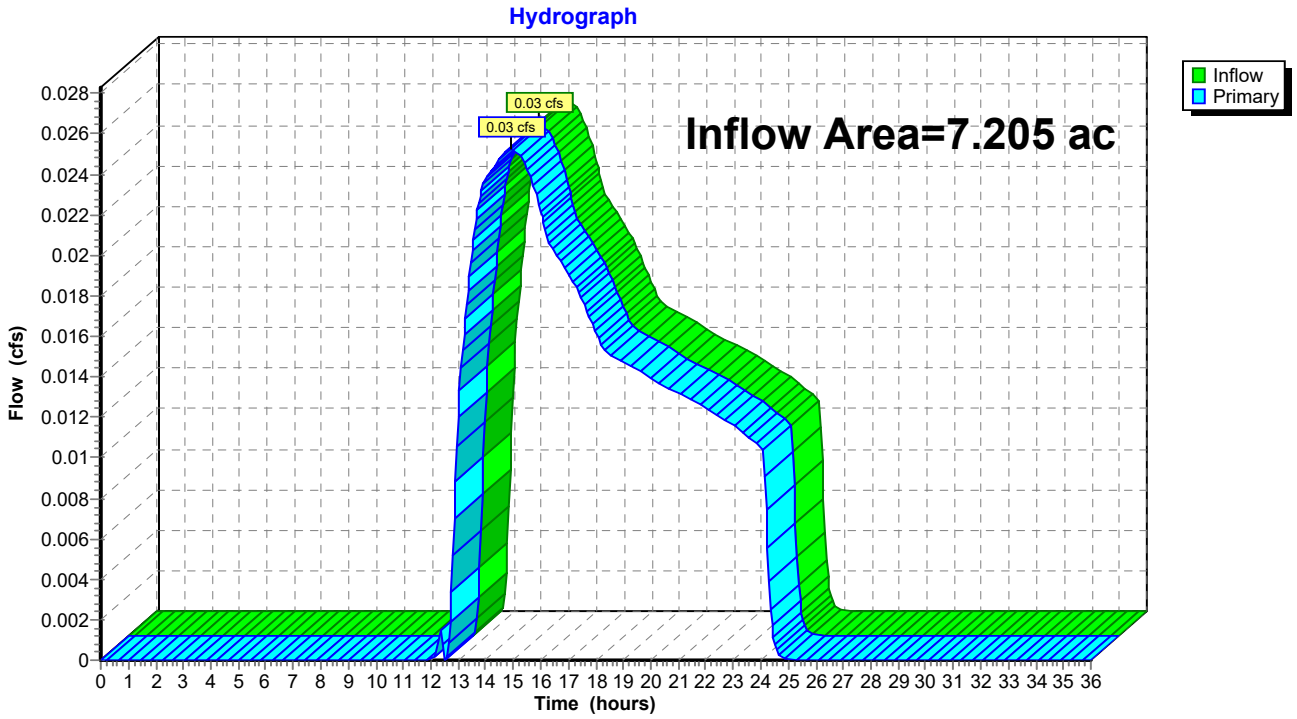
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.00	0.00	0.00
12.50	0.00	0.00	0.00
13.00	0.02	0.00	0.02
13.50	**0.03**	0.00	**0.03**
14.00	**0.03**	0.00	**0.03**
14.50	0.03	0.00	0.03
15.00	0.03	0.00	0.03
15.50	0.03	0.00	0.03
16.00	0.02	0.00	0.02
16.50	0.02	0.00	0.02
17.00	0.02	0.00	0.02
17.50	0.02	0.00	0.02
18.00	0.02	0.00	0.02
18.50	0.02	0.00	0.02
19.00	0.02	0.00	0.02
19.50	0.01	0.00	0.01
20.00	0.01	0.00	0.01
20.50	0.01	0.00	0.01
21.00	0.01	0.00	0.01
21.50	0.01	0.00	0.01
22.00	0.01	0.00	0.01
22.50	0.01	0.00	0.01
23.00	0.01	0.00	0.01
23.50	0.01	0.00	0.01
24.00	0.01	0.00	0.01
24.50	0.00	0.00	0.00
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Summary for Link POI #2: POI #2

Inflow Area = 7.205 ac, 35.36% Impervious, Inflow Depth = 0.03" for WQv (Roadway B) event
Inflow = 0.03 cfs @ 14.91 hrs, Volume= 0.016 af
Primary = 0.03 cfs @ 14.91 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #2: POI #2



Hydrograph for Link POI #2: POI #2

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.00	0.00	0.00
12.50	0.00	0.00	0.00
13.00	0.01	0.00	0.01
13.50	0.02	0.00	0.02
14.00	0.02	0.00	0.02
14.50	**0.02**	0.00	**0.02**
15.00	**0.03**	0.00	**0.03**
15.50	0.02	0.00	0.02
16.00	0.02	0.00	0.02
16.50	0.02	0.00	0.02
17.00	0.02	0.00	0.02
17.50	0.02	0.00	0.02
18.00	0.02	0.00	0.02
18.50	0.02	0.00	0.02
19.00	0.01	0.00	0.01
19.50	0.01	0.00	0.01
20.00	0.01	0.00	0.01
20.50	0.01	0.00	0.01
21.00	0.01	0.00	0.01
21.50	0.01	0.00	0.01
22.00	0.01	0.00	0.01
22.50	0.01	0.00	0.01
23.00	0.01	0.00	0.01
23.50	0.01	0.00	0.01
24.00	0.01	0.00	0.01
24.50	0.00	0.00	0.00
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentDA #1A: Drainage Area #1A Runoff Area=168,262 sf 91.78% Impervious Runoff Depth=1.29"
Tc=10.0 min CN=95 Runoff=4.96 cfs 0.416 af

SubcatchmentDA #1B: Drainage Area #1B Runoff Area=173,173 sf 5.32% Impervious Runoff Depth=0.06"
Flow Length=638' Tc=17.0 min CN=63 Runoff=0.03 cfs 0.020 af

SubcatchmentDA #1C: Drainage Area Runoff Area=151,363 sf 93.57% Impervious Runoff Depth=1.38"
Tc=10.0 min CN=96 Runoff=4.70 cfs 0.400 af

SubcatchmentDA #2A: Drainage Area #2A Runoff Area=121,548 sf 88.60% Impervious Runoff Depth=1.21"
Tc=10.0 min CN=94 Runoff=3.39 cfs 0.281 af

SubcatchmentDA #2B: Drainage Area #2B Runoff Area=192,310 sf 1.70% Impervious Runoff Depth=0.05"
Flow Length=784' Tc=18.4 min CN=62 Runoff=0.03 cfs 0.018 af

Pond DB #2: Drainage Basin #2 Peak Elev=485.24' Storage=1,377 cf Inflow=3.39 cfs 0.281 af
Discarded=1.69 cfs 0.281 af Primary=0.00 cfs 0.000 af Outflow=1.69 cfs 0.281 af

Pond SMS #1A: SMS #1A Peak Elev=492.52' Storage=2,415 cf Inflow=4.96 cfs 0.416 af
Discarded=2.12 cfs 0.416 af Primary=0.00 cfs 0.000 af Outflow=2.12 cfs 0.416 af

Pond SMS #1C: SMS #1C Peak Elev=495.96' Storage=2,123 cf Inflow=4.70 cfs 0.400 af
Discarded=2.11 cfs 0.400 af Primary=0.00 cfs 0.000 af Outflow=2.11 cfs 0.400 af

Link POI #1: POI #1 Inflow=0.03 cfs 0.020 af
Primary=0.03 cfs 0.020 af

Link POI #2: POI #2 Inflow=0.03 cfs 0.018 af
Primary=0.03 cfs 0.018 af

Total Runoff Area = 18.518 ac Runoff Volume = 1.136 af Average Runoff Depth = 0.74"
48.40% Pervious = 8.963 ac 51.60% Impervious = 9.556 ac

Summary for Subcatchment DA #1A: Drainage Area #1A

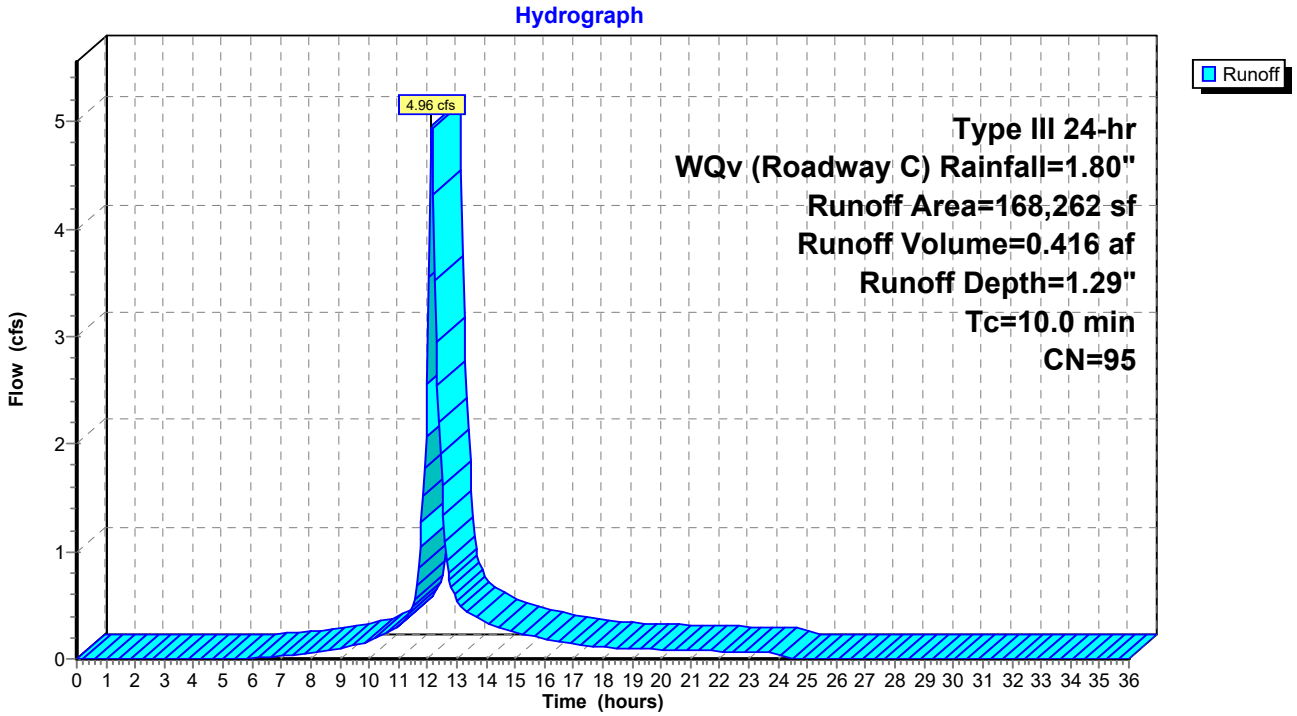
Runoff = 4.96 cfs @ 12.14 hrs, Volume= 0.416 af, Depth= 1.29"
Routed to Pond SMS #1A : SMS #1A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Roadway C) Rainfall=1.80"

	Area (sf)	CN	Description
	10,723	61	>75% Grass cover, Good, HSG B
*	3,112	61	Emergency Access Road (Perv.), Good, HSG B
*	86,043	98	Building/Roof, HSG B
*	60,366	98	Pavement, HSG B
*	2,940	98	Sidewalk, HSG B
*	5,078	98	Emergency Access Road (Imp.), HSG B
	168,262	95	Weighted Average
	13,835		8.22% Pervious Area
	154,427		91.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #1A: Drainage Area #1A



Hydrograph for Subcatchment DA #1A: Drainage Area #1A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.05	0.00	0.00
3.00	0.06	0.00	0.00
3.50	0.07	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.10	0.00	0.00
5.50	0.12	0.00	0.00
6.00	0.13	0.00	0.01
6.50	0.15	0.00	0.01
7.00	0.16	0.01	0.02
7.50	0.18	0.01	0.04
8.00	0.21	0.02	0.05
8.50	0.23	0.02	0.07
9.00	0.26	0.04	0.10
9.50	0.30	0.05	0.13
10.00	0.34	0.07	0.17
10.50	0.39	0.10	0.23
11.00	0.45	0.14	0.30
11.50	0.54	0.19	0.50
12.00	0.90	0.48	**2.57**
12.50	1.26	0.80	**1.62**
13.00	1.35	0.87	0.56
13.50	1.41	0.93	0.42
14.00	1.46	0.98	0.34
14.50	1.50	1.01	0.29
15.00	1.54	1.05	0.26
15.50	1.57	1.08	0.22
16.00	1.59	1.10	0.18
16.50	1.62	1.12	0.16
17.00	1.64	1.14	0.14
17.50	1.65	1.16	0.13
18.00	1.67	1.17	0.11
18.50	1.68	1.18	0.10
19.00	1.70	1.20	0.10
19.50	1.71	1.21	0.09
20.00	1.72	1.22	0.09
20.50	1.73	1.23	0.08
21.00	1.74	1.24	0.08
21.50	1.76	1.25	0.08
22.00	1.77	1.26	0.07
22.50	1.77	1.27	0.07
23.00	1.78	1.28	0.06
23.50	1.79	1.29	0.06
24.00	**1.80**	**1.29**	0.06
24.50	1.80	1.29	0.00
25.00	1.80	1.29	0.00
25.50	1.80	1.29	0.00
26.00	1.80	1.29	0.00
26.50	1.80	1.29	0.00
27.00	1.80	1.29	0.00
27.50	1.80	1.29	0.00
28.00	1.80	1.29	0.00
28.50	1.80	1.29	0.00
29.00	1.80	1.29	0.00
29.50	1.80	1.29	0.00
30.00	1.80	1.29	0.00
30.50	1.80	1.29	0.00
31.00	1.80	1.29	0.00
31.50	1.80	1.29	0.00
32.00	1.80	1.29	0.00
32.50	1.80	1.29	0.00
33.00	1.80	1.29	0.00
33.50	1.80	1.29	0.00
34.00	1.80	1.29	0.00
34.50	1.80	1.29	0.00
35.00	1.80	1.29	0.00
35.50	1.80	1.29	0.00
36.00	1.80	1.29	0.00

Summary for Subcatchment DA #1B: Drainage Area #1B

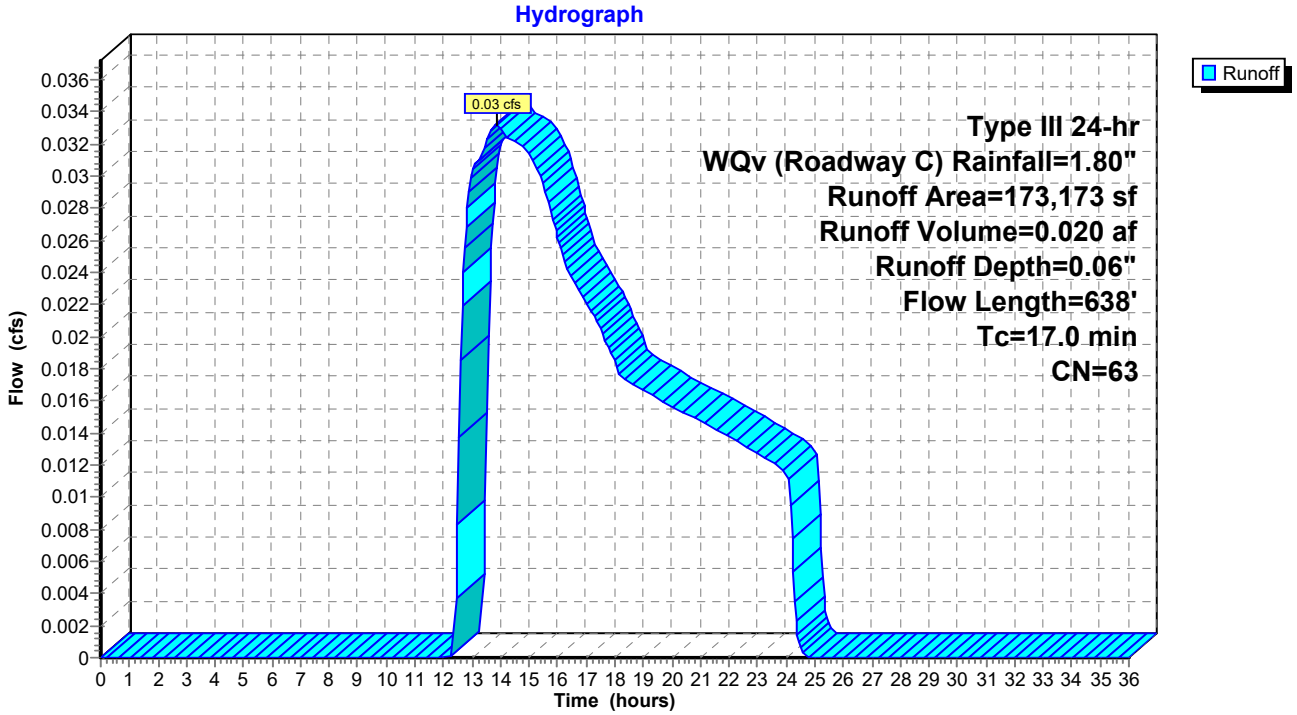
Runoff = 0.03 cfs @ 13.86 hrs, Volume= 0.020 af, Depth= 0.06"
Routed to Link POI #1 : POI #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Roadway C) Rainfall=1.80"

	Area (sf)	CN	Description
	158,310	61	>75% Grass cover, Good, HSG B
*	5,648	61	Emergency Access Road (Perv.), Good, HSG B
*	9,215	98	Emergency Access Road (Imp.), HSG B
	173,173	63	Weighted Average
	163,958		94.68% Pervious Area
	9,215		5.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	150	0.1200	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
4.8	488	0.0578	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	638	Total			

Subcatchment DA #1B: Drainage Area #1B



Hydrograph for Subcatchment DA #1B: Drainage Area #1B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.05	0.00	0.00
3.00	0.06	0.00	0.00
3.50	0.07	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.10	0.00	0.00
5.50	0.12	0.00	0.00
6.00	0.13	0.00	0.00
6.50	0.15	0.00	0.00
7.00	0.16	0.00	0.00
7.50	0.18	0.00	0.00
8.00	0.21	0.00	0.00
8.50	0.23	0.00	0.00
9.00	0.26	0.00	0.00
9.50	0.30	0.00	0.00
10.00	0.34	0.00	0.00
10.50	0.39	0.00	0.00
11.00	0.45	0.00	0.00
11.50	0.54	0.00	0.00
12.00	0.90	0.00	0.00
12.50	1.26	0.00	0.01
13.00	1.35	0.01	0.03
13.50	1.41	0.01	**0.03**
14.00	1.46	0.01	**0.03**
14.50	1.50	0.02	0.03
15.00	1.54	0.02	0.03
15.50	1.57	0.02	0.03
16.00	1.59	0.03	0.03
16.50	1.62	0.03	0.02
17.00	1.64	0.03	0.02
17.50	1.65	0.04	0.02
18.00	1.67	0.04	0.02
18.50	1.68	0.04	0.02
19.00	1.70	0.04	0.02
19.50	1.71	0.04	0.02
20.00	1.72	0.05	0.02
20.50	1.73	0.05	0.02
21.00	1.74	0.05	0.01
21.50	1.76	0.05	0.01
22.00	1.77	0.05	0.01
22.50	1.77	0.06	0.01
23.00	1.78	0.06	0.01
23.50	1.79	0.06	0.01
24.00	**1.80**	**0.06**	0.01
24.50	1.80	0.06	0.00
25.00	1.80	0.06	0.00
25.50	1.80	0.06	0.00
26.00	1.80	0.06	0.00
26.50	1.80	0.06	0.00
27.00	1.80	0.06	0.00
27.50	1.80	0.06	0.00
28.00	1.80	0.06	0.00
28.50	1.80	0.06	0.00
29.00	1.80	0.06	0.00
29.50	1.80	0.06	0.00
30.00	1.80	0.06	0.00
30.50	1.80	0.06	0.00
31.00	1.80	0.06	0.00
31.50	1.80	0.06	0.00
32.00	1.80	0.06	0.00
32.50	1.80	0.06	0.00
33.00	1.80	0.06	0.00
33.50	1.80	0.06	0.00
34.00	1.80	0.06	0.00
34.50	1.80	0.06	0.00
35.00	1.80	0.06	0.00
35.50	1.80	0.06	0.00
36.00	1.80	0.06	0.00

Summary for Subcatchment DA #1C: Drainage Area #1C

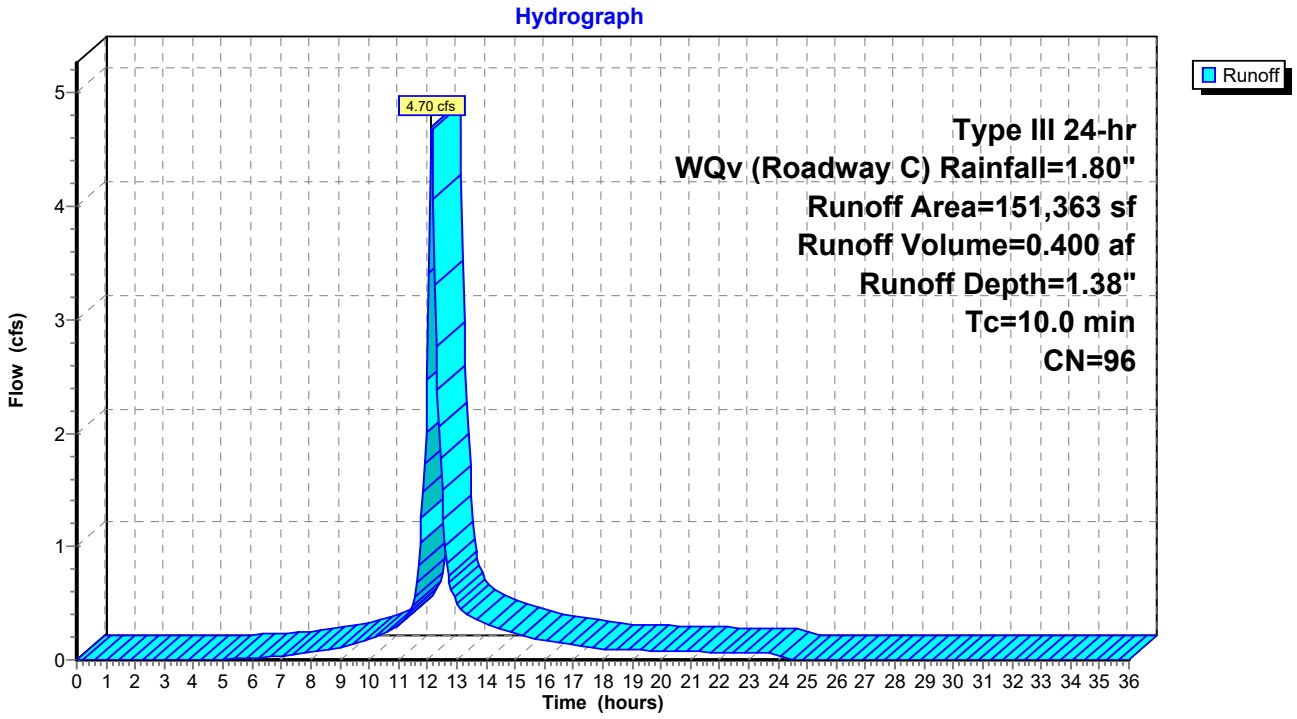
Runoff = 4.70 cfs @ 12.14 hrs, Volume= 0.400 af, Depth= 1.38"
Routed to Pond SMS #1C : SMS #1C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Roadway C) Rainfall=1.80"

	Area (sf)	CN	Description
	9,732	61	>75% Grass cover, Good, HSG B
*	87,537	98	Building/Roof, HSG B
*	50,809	98	Pavement, HSG B
*	3,285	98	Sidewalk, HSG B
	151,363	96	Weighted Average
	9,732		6.43% Pervious Area
	141,631		93.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Direct Minimum**

Subcatchment DA #1C: Drainage Area #1C



Hydrograph for Subcatchment DA #1C: Drainage Area #1C

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.05	0.00	0.00
3.00	0.06	0.00	0.00
3.50	0.07	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.10	0.00	0.01
5.50	0.12	0.00	0.01
6.00	0.13	0.00	0.02
6.50	0.15	0.01	0.03
7.00	0.16	0.01	0.04
7.50	0.18	0.02	0.05
8.00	0.21	0.03	0.06
8.50	0.23	0.04	0.08
9.00	0.26	0.05	0.11
9.50	0.30	0.07	0.14
10.00	0.34	0.10	0.18
10.50	0.39	0.13	0.24
11.00	0.45	0.17	0.31
11.50	0.54	0.24	0.50
12.00	0.90	0.54	**2.47**
12.50	1.26	0.87	**1.50**
13.00	1.35	0.95	0.52
13.50	1.41	1.01	0.38
14.00	1.46	1.06	0.31
14.50	1.50	1.10	0.27
15.00	1.54	1.13	0.24
15.50	1.57	1.16	0.20
16.00	1.59	1.18	0.17
16.50	1.62	1.21	0.15
17.00	1.64	1.23	0.13
17.50	1.65	1.24	0.12
18.00	1.67	1.26	0.10
18.50	1.68	1.27	0.09
19.00	1.70	1.28	0.09
19.50	1.71	1.30	0.08
20.00	1.72	1.31	0.08
20.50	1.73	1.32	0.08
21.00	1.74	1.33	0.07
21.50	1.76	1.34	0.07
22.00	1.77	1.35	0.07
22.50	1.77	1.36	0.06
23.00	1.78	1.37	0.06
23.50	1.79	1.37	0.06
24.00	**1.80**	**1.38**	0.05
24.50	1.80	1.38	0.00
25.00	1.80	1.38	0.00
25.50	1.80	1.38	0.00
26.00	1.80	1.38	0.00
26.50	1.80	1.38	0.00
27.00	1.80	1.38	0.00
27.50	1.80	1.38	0.00
28.00	1.80	1.38	0.00
28.50	1.80	1.38	0.00
29.00	1.80	1.38	0.00
29.50	1.80	1.38	0.00
30.00	1.80	1.38	0.00
30.50	1.80	1.38	0.00
31.00	1.80	1.38	0.00
31.50	1.80	1.38	0.00
32.00	1.80	1.38	0.00
32.50	1.80	1.38	0.00
33.00	1.80	1.38	0.00
33.50	1.80	1.38	0.00
34.00	1.80	1.38	0.00
34.50	1.80	1.38	0.00
35.00	1.80	1.38	0.00
35.50	1.80	1.38	0.00
36.00	1.80	1.38	0.00

Summary for Subcatchment DA #2A: Drainage Area #2A

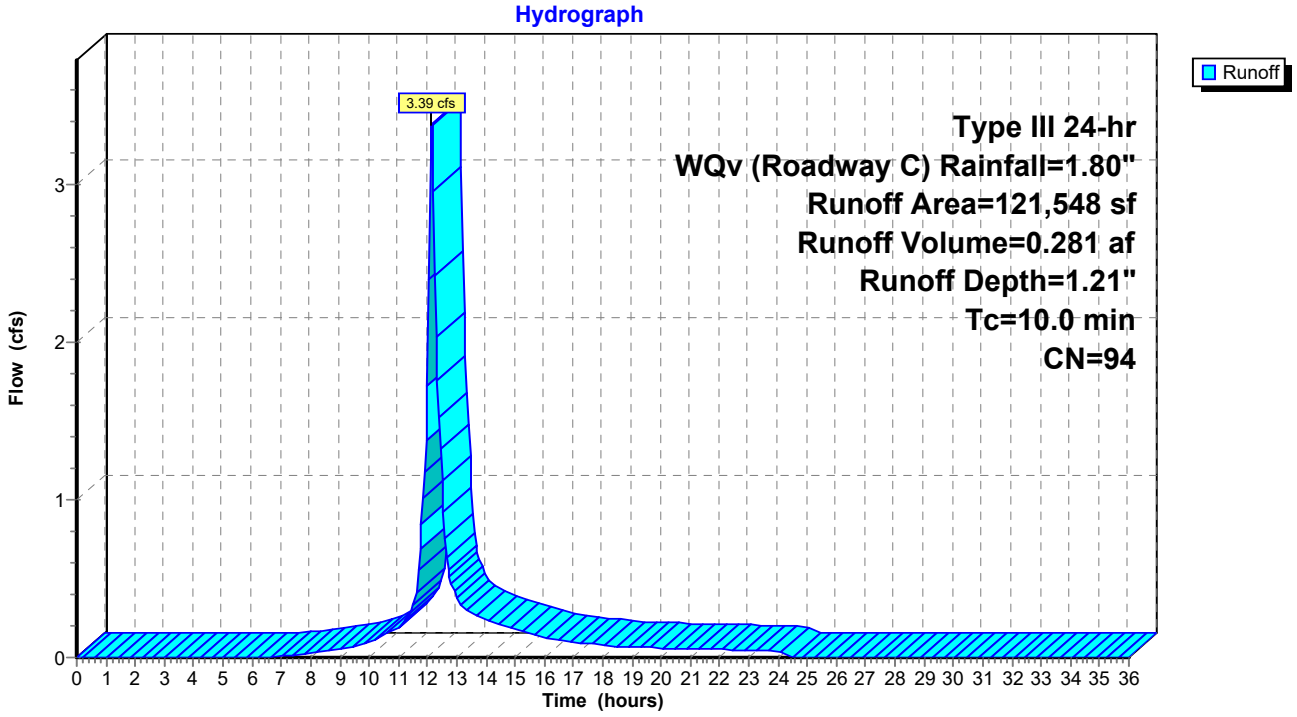
Runoff = 3.39 cfs @ 12.14 hrs, Volume= 0.281 af, Depth= 1.21"
Routed to Pond DB #2 : Drainage Basin #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Roadway C) Rainfall=1.80"

	Area (sf)	CN	Description
*	48,398	98	Building/Roof, HSG B
*	45,328	98	Pavement, HSG B
*	1,404	98	Sidewalk, HSG B
	13,851	61	>75% Grass cover, Good, HSG B
*	12,567	98	Infiltration Basin, HSG B
	121,548	94	Weighted Average
	13,851		11.40% Pervious Area
	107,697		88.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #2A: Drainage Area #2A



Hydrograph for Subcatchment DA #2A: Drainage Area #2A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.05	0.00	0.00
3.00	0.06	0.00	0.00
3.50	0.07	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.10	0.00	0.00
5.50	0.12	0.00	0.00
6.00	0.13	0.00	0.00
6.50	0.15	0.00	0.00
7.00	0.16	0.00	0.01
7.50	0.18	0.00	0.02
8.00	0.21	0.01	0.02
8.50	0.23	0.01	0.04
9.00	0.26	0.02	0.05
9.50	0.30	0.04	0.08
10.00	0.34	0.05	0.10
10.50	0.39	0.08	0.14
11.00	0.45	0.11	0.19
11.50	0.54	0.16	0.32
12.00	0.90	0.42	**1.72**
12.50	1.26	0.73	**1.12**
13.00	1.35	0.80	0.39
13.50	1.41	0.86	0.29
14.00	1.46	0.90	0.24
14.50	1.50	0.94	0.20
15.00	1.54	0.97	0.18
15.50	1.57	1.00	0.15
16.00	1.59	1.02	0.13
16.50	1.62	1.04	0.11
17.00	1.64	1.06	0.10
17.50	1.65	1.08	0.09
18.00	1.67	1.09	0.08
18.50	1.68	1.10	0.07
19.00	1.70	1.12	0.07
19.50	1.71	1.13	0.06
20.00	1.72	1.14	0.06
20.50	1.73	1.15	0.06
21.00	1.74	1.16	0.06
21.50	1.76	1.17	0.05
22.00	1.77	1.18	0.05
22.50	1.77	1.19	0.05
23.00	1.78	1.20	0.05
23.50	1.79	1.20	0.04
24.00	**1.80**	**1.21**	0.04
24.50	1.80	1.21	0.00
25.00	1.80	1.21	0.00
25.50	1.80	1.21	0.00
26.00	1.80	1.21	0.00
26.50	1.80	1.21	0.00
27.00	1.80	1.21	0.00
27.50	1.80	1.21	0.00
28.00	1.80	1.21	0.00
28.50	1.80	1.21	0.00
29.00	1.80	1.21	0.00
29.50	1.80	1.21	0.00
30.00	1.80	1.21	0.00
30.50	1.80	1.21	0.00
31.00	1.80	1.21	0.00
31.50	1.80	1.21	0.00
32.00	1.80	1.21	0.00
32.50	1.80	1.21	0.00
33.00	1.80	1.21	0.00
33.50	1.80	1.21	0.00
34.00	1.80	1.21	0.00
34.50	1.80	1.21	0.00
35.00	1.80	1.21	0.00
35.50	1.80	1.21	0.00
36.00	1.80	1.21	0.00

Summary for Subcatchment DA #2B: Drainage Area #2B

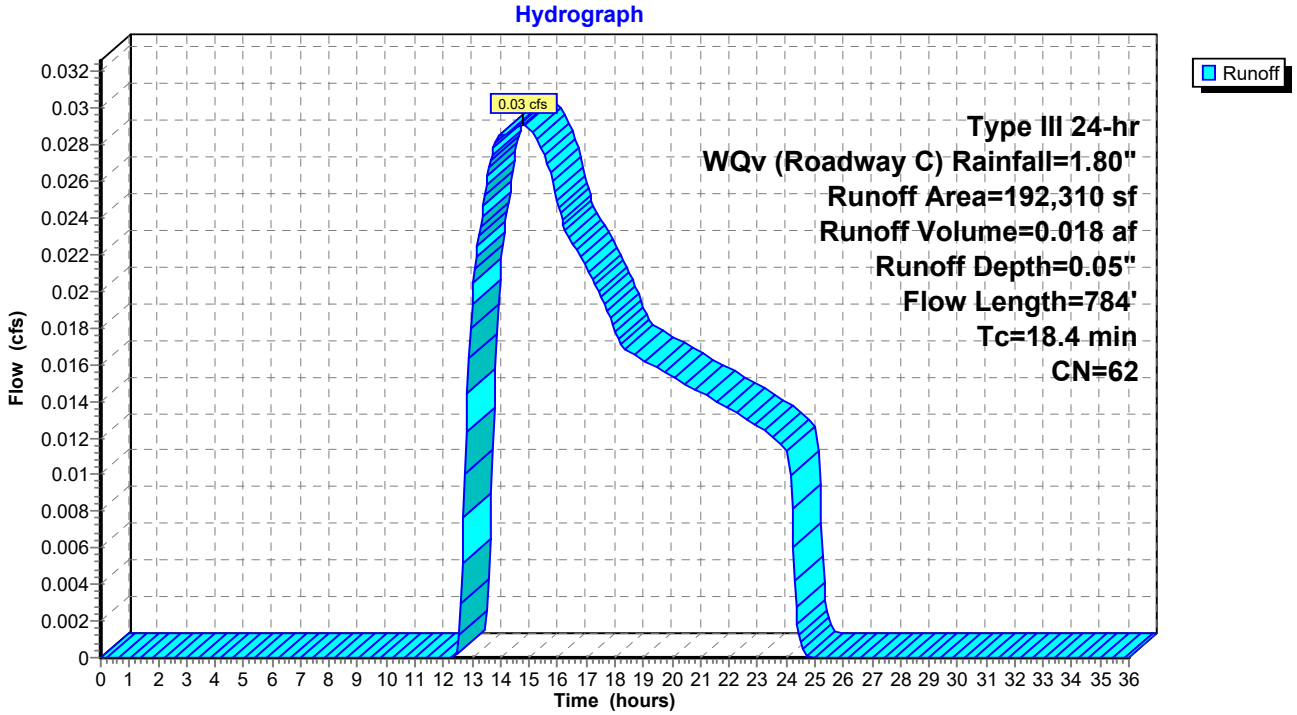
Runoff = 0.03 cfs @ 14.78 hrs, Volume= 0.018 af, Depth= 0.05"
Routed to Link POI #2 : POI #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Roadway C) Rainfall=1.80"

	Area (sf)	CN	Description
	187,035	61	>75% Grass cover, Good, HSG B
*	2,004	61	Emergency Access Road (Perv.), Good, HSG B
*	3,271	98	Emergency Acess Road (Imp.), HSG B
	192,310	62	Weighted Average
	189,039		98.30% Pervious Area
	3,271		1.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	150	0.0667	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
3.0	634	0.2524	3.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
18.4	784	Total			

Subcatchment DA #2B: Drainage Area #2B



Hydrograph for Subcatchment DA #2B: Drainage Area #2B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.05	0.00	0.00
3.00	0.06	0.00	0.00
3.50	0.07	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.10	0.00	0.00
5.50	0.12	0.00	0.00
6.00	0.13	0.00	0.00
6.50	0.15	0.00	0.00
7.00	0.16	0.00	0.00
7.50	0.18	0.00	0.00
8.00	0.21	0.00	0.00
8.50	0.23	0.00	0.00
9.00	0.26	0.00	0.00
9.50	0.30	0.00	0.00
10.00	0.34	0.00	0.00
10.50	0.39	0.00	0.00
11.00	0.45	0.00	0.00
11.50	0.54	0.00	0.00
12.00	0.90	0.00	0.00
12.50	1.26	0.00	0.00
13.00	1.35	0.00	0.02
13.50	1.41	0.01	0.03
14.00	1.46	0.01	0.03
14.50	1.50	0.01	**0.03**
15.00	1.54	0.02	**0.03**
15.50	1.57	0.02	0.03
16.00	1.59	0.02	0.02
16.50	1.62	0.02	0.02
17.00	1.64	0.03	0.02
17.50	1.65	0.03	0.02
18.00	1.67	0.03	0.02
18.50	1.68	0.03	0.02
19.00	1.70	0.03	0.02
19.50	1.71	0.04	0.02
20.00	1.72	0.04	0.02
20.50	1.73	0.04	0.01
21.00	1.74	0.04	0.01
21.50	1.76	0.04	0.01
22.00	1.77	0.04	0.01
22.50	1.77	0.05	0.01
23.00	1.78	0.05	0.01
23.50	1.79	0.05	0.01
24.00	**1.80**	**0.05**	0.01
24.50	1.80	0.05	0.00
25.00	1.80	0.05	0.00
25.50	1.80	0.05	0.00
26.00	1.80	0.05	0.00
26.50	1.80	0.05	0.00
27.00	1.80	0.05	0.00
27.50	1.80	0.05	0.00
28.00	1.80	0.05	0.00
28.50	1.80	0.05	0.00
29.00	1.80	0.05	0.00
29.50	1.80	0.05	0.00
30.00	1.80	0.05	0.00
30.50	1.80	0.05	0.00
31.00	1.80	0.05	0.00
31.50	1.80	0.05	0.00
32.00	1.80	0.05	0.00
32.50	1.80	0.05	0.00
33.00	1.80	0.05	0.00
33.50	1.80	0.05	0.00
34.00	1.80	0.05	0.00
34.50	1.80	0.05	0.00
35.00	1.80	0.05	0.00
35.50	1.80	0.05	0.00
36.00	1.80	0.05	0.00

Summary for Pond DB #2: Drainage Basin #2

Inflow Area = 2.790 ac, 88.60% Impervious, Inflow Depth = 1.21" for WQv (Roadway C) event
Inflow = 3.39 cfs @ 12.14 hrs, Volume= 0.281 af
Outflow = 1.69 cfs @ 12.37 hrs, Volume= 0.281 af, Atten= 50%, Lag= 13.5 min
Discarded = 1.69 cfs @ 12.37 hrs, Volume= 0.281 af
Primary = 0.00 cfs @ 12.37 hrs, Volume= 0.000 af
Routed to Link POI #2 : POI #2

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 485.24' @ 12.37 hrs Surf.Area= 5,980 sf Storage= 1,377 cf

Plug-Flow detention time= 5.0 min calculated for 0.281 af (100% of inflow)
Center-of-Mass det. time= 4.7 min (816.1 - 811.4)

Volume	Invert	Avail.Storage	Storage Description
#1	485.00'	25,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

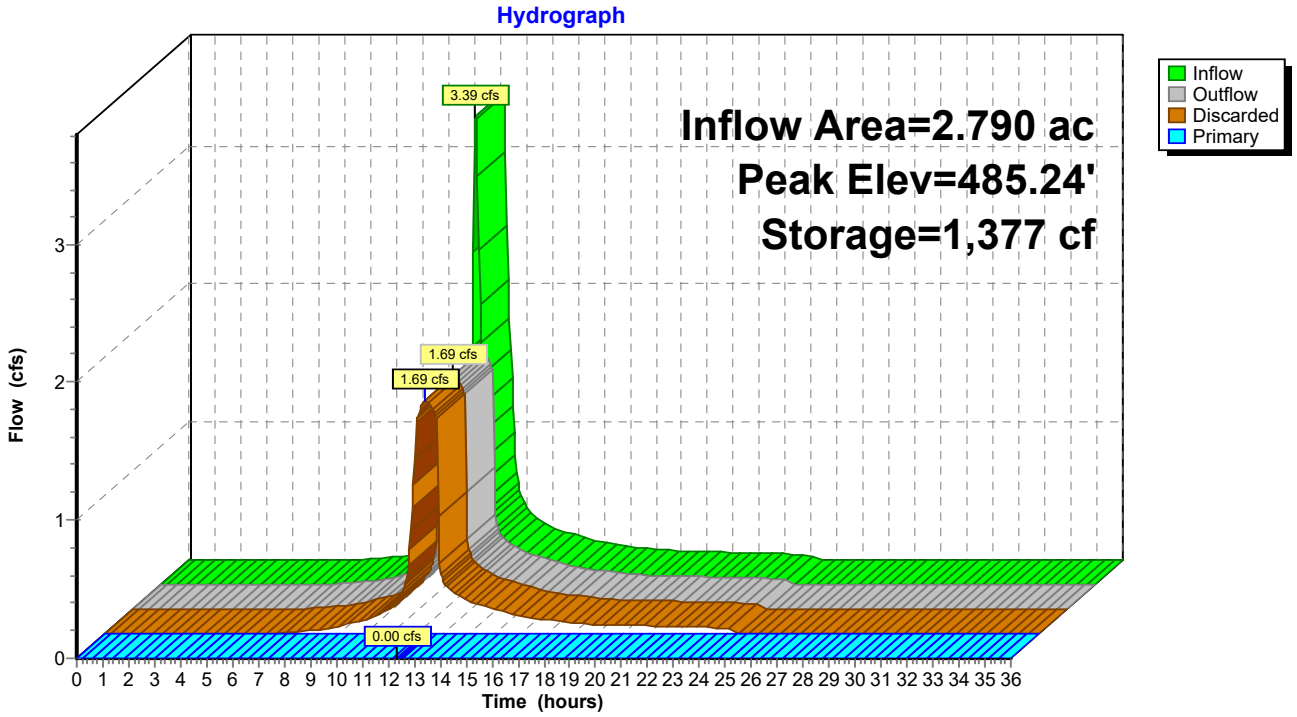
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
485.00	5,500	0	0
486.00	7,500	6,500	6,500
487.00	9,500	8,500	15,000
488.00	11,500	10,500	25,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	485.00'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 470.00'
#2	Primary	485.21'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	486.70'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

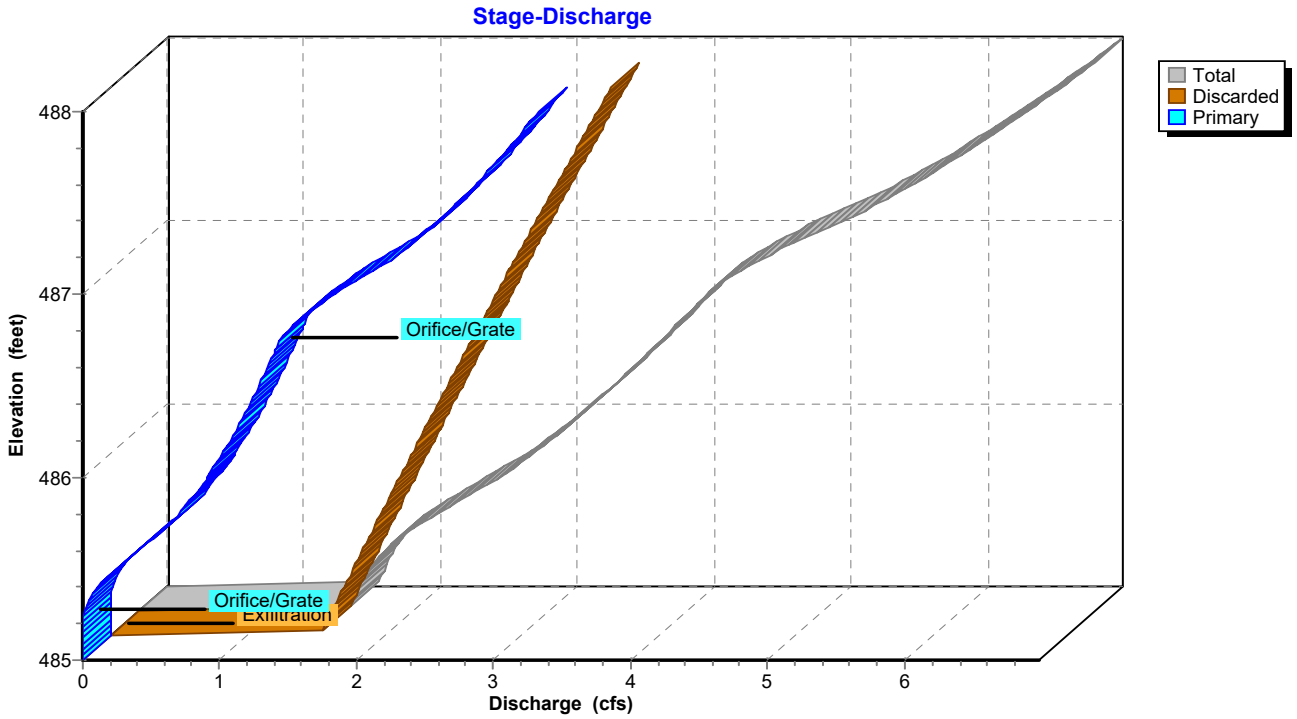
Discarded OutFlow Max=1.69 cfs @ 12.37 hrs HW=485.24' (Free Discharge)
└**1=Exfiltration** (Controls 1.69 cfs)

Primary OutFlow Max=0.00 cfs @ 12.37 hrs HW=485.24' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.58 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

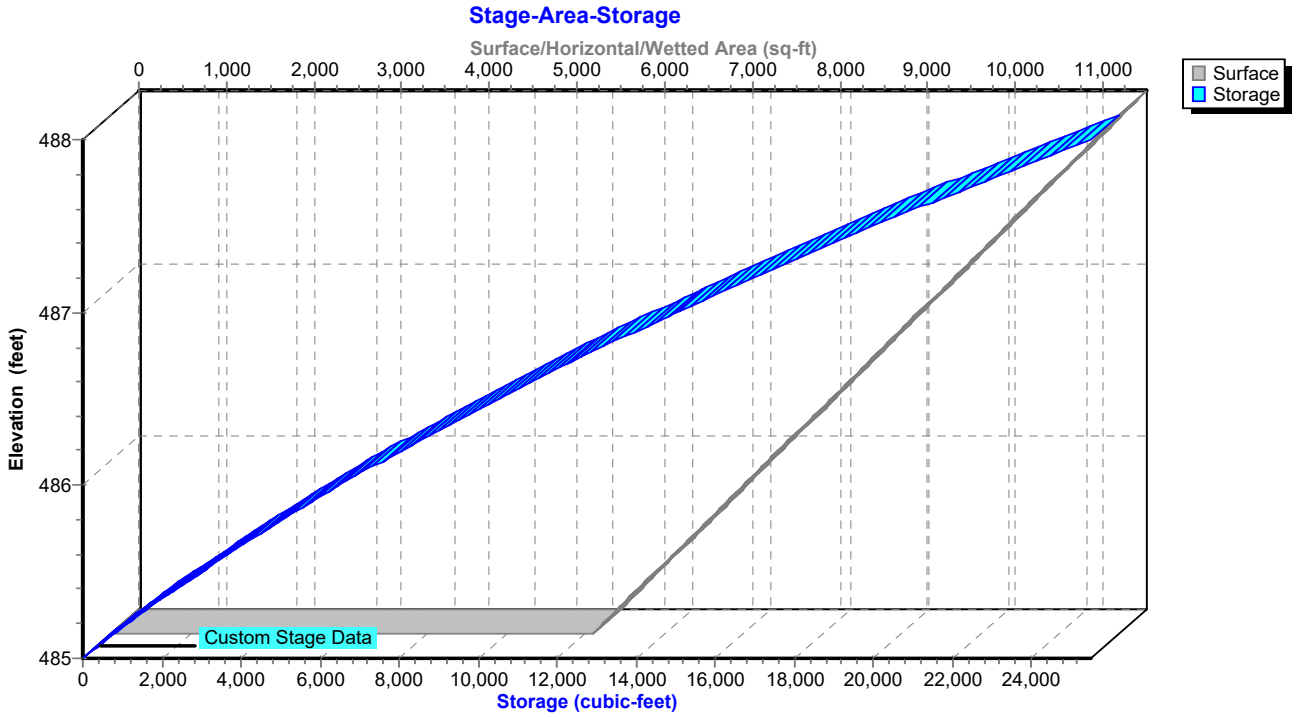
Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Hydrograph for Pond DB #2: Drainage Basin #2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	485.00	0.00	0.00	0.00
1.00	0.00	0	485.00	0.00	0.00	0.00
2.00	0.00	0	485.00	0.00	0.00	0.00
3.00	0.00	0	485.00	0.00	0.00	0.00
4.00	0.00	0	485.00	0.00	0.00	0.00
5.00	0.00	0	485.00	0.00	0.00	0.00
6.00	0.00	0	485.00	0.00	0.00	0.00
7.00	0.01	1	485.00	0.01	0.01	0.00
8.00	0.02	3	485.00	0.02	0.02	0.00
9.00	0.05	6	485.00	0.05	0.05	0.00
10.00	0.10	11	485.00	0.10	0.10	0.00
11.00	0.19	20	485.00	0.19	0.19	0.00
12.00	**1.72**	**164**	**485.03**	**1.53**	**1.53**	**0.00**
13.00	**0.39**	**43**	**485.01**	**0.40**	**0.40**	**0.00**
14.00	0.24	26	485.00	0.24	0.24	0.00
15.00	0.18	19	485.00	0.18	0.18	0.00
16.00	0.13	14	485.00	0.13	0.13	0.00
17.00	0.10	11	485.00	0.10	0.10	0.00
18.00	0.08	8	485.00	0.08	0.08	0.00
19.00	0.07	7	485.00	0.07	0.07	0.00
20.00	0.06	7	485.00	0.06	0.06	0.00
21.00	0.06	6	485.00	0.06	0.06	0.00
22.00	0.05	5	485.00	0.05	0.05	0.00
23.00	0.05	5	485.00	0.05	0.05	0.00
24.00	0.04	4	485.00	0.04	0.04	0.00
25.00	0.00	0	485.00	0.00	0.00	0.00
26.00	0.00	0	485.00	0.00	0.00	0.00
27.00	0.00	0	485.00	0.00	0.00	0.00
28.00	0.00	0	485.00	0.00	0.00	0.00
29.00	0.00	0	485.00	0.00	0.00	0.00
30.00	0.00	0	485.00	0.00	0.00	0.00
31.00	0.00	0	485.00	0.00	0.00	0.00
32.00	0.00	0	485.00	0.00	0.00	0.00
33.00	0.00	0	485.00	0.00	0.00	0.00
34.00	0.00	0	485.00	0.00	0.00	0.00
35.00	0.00	0	485.00	0.00	0.00	0.00
36.00	0.00	0	485.00	0.00	0.00	0.00

Stage-Discharge for Pond DB #2: Drainage Basin #2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
485.00	0.00	0.00	0.00
485.05	1.56	1.56	0.00
485.10	1.59	1.59	0.00
485.15	1.63	1.63	0.00
485.20	1.66	1.66	0.00
485.25	1.70	1.69	0.01
485.30	1.75	1.73	0.03
485.35	1.82	1.76	0.06
485.40	1.91	1.79	0.11
485.45	2.00	1.83	0.17
485.50	2.10	1.86	0.24
485.55	2.22	1.89	0.32
485.60	2.33	1.93	0.40
485.65	2.45	1.96	0.49
485.70	2.57	2.00	0.57
485.75	2.68	2.03	0.65
485.80	2.77	2.06	0.70
485.85	2.86	2.10	0.76
485.90	2.95	2.13	0.81
485.95	3.03	2.17	0.86
486.00	3.11	2.20	0.91
486.05	3.19	2.24	0.95
486.10	3.27	2.27	1.00
486.15	3.34	2.31	1.04
486.20	3.42	2.34	1.08
486.25	3.49	2.38	1.11
486.30	3.56	2.41	1.15
486.35	3.63	2.45	1.19
486.40	3.70	2.48	1.22
486.45	3.77	2.52	1.25
486.50	3.84	2.55	1.29
486.55	3.91	2.59	1.32
486.60	3.97	2.62	1.35
486.65	4.04	2.66	1.38
486.70	4.10	2.70	1.41
486.75	4.18	2.73	1.45
486.80	4.27	2.77	1.50
486.85	4.37	2.80	1.57
486.90	4.49	2.84	1.65
486.95	4.61	2.88	1.73
487.00	4.75	2.91	1.83
487.05	4.89	2.95	1.94
487.10	5.03	2.99	2.05
487.15	5.18	3.02	2.16
487.20	5.32	3.06	2.26
487.25	5.46	3.10	2.36
487.30	5.57	3.13	2.44
487.35	5.69	3.17	2.52
487.40	5.80	3.21	2.60
487.45	5.91	3.24	2.67
487.50	6.02	3.28	2.74
487.55	6.12	3.32	2.80
487.60	6.22	3.35	2.87
487.65	6.32	3.39	2.93
487.70	6.42	3.43	2.99
487.75	6.52	3.47	3.05
487.80	6.61	3.50	3.11
487.85	6.71	3.54	3.16
487.90	6.80	3.58	3.22
487.95	6.89	3.62	3.27
488.00	**6.98**	**3.65**	**3.33**

Stage-Area-Storage for Pond DB #2: Drainage Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
485.00	5,500	0
485.05	5,600	278
485.10	5,700	560
485.15	5,800	847
485.20	5,900	1,140
485.25	6,000	1,438
485.30	6,100	1,740
485.35	6,200	2,048
485.40	6,300	2,360
485.45	6,400	2,677
485.50	6,500	3,000
485.55	6,600	3,328
485.60	6,700	3,660
485.65	6,800	3,997
485.70	6,900	4,340
485.75	7,000	4,688
485.80	7,100	5,040
485.85	7,200	5,398
485.90	7,300	5,760
485.95	7,400	6,127
486.00	7,500	6,500
486.05	7,600	6,878
486.10	7,700	7,260
486.15	7,800	7,647
486.20	7,900	8,040
486.25	8,000	8,438
486.30	8,100	8,840
486.35	8,200	9,248
486.40	8,300	9,660
486.45	8,400	10,077
486.50	8,500	10,500
486.55	8,600	10,928
486.60	8,700	11,360
486.65	8,800	11,797
486.70	8,900	12,240
486.75	9,000	12,688
486.80	9,100	13,140
486.85	9,200	13,598
486.90	9,300	14,060
486.95	9,400	14,527
487.00	9,500	15,000
487.05	9,600	15,478
487.10	9,700	15,960
487.15	9,800	16,447
487.20	9,900	16,940
487.25	10,000	17,438
487.30	10,100	17,940
487.35	10,200	18,448
487.40	10,300	18,960
487.45	10,400	19,477
487.50	10,500	20,000
487.55	10,600	20,528
487.60	10,700	21,060
487.65	10,800	21,597
487.70	10,900	22,140
487.75	11,000	22,688
487.80	11,100	23,240
487.85	11,200	23,798
487.90	11,300	24,360
487.95	11,400	24,927
488.00	**11,500**	**25,500**

Summary for Pond SMS #1A: SMS #1A

Inflow Area = 3.863 ac, 91.78% Impervious, Inflow Depth = 1.29" for WQv (Roadway C) event
Inflow = 4.96 cfs @ 12.14 hrs, Volume= 0.416 af
Outflow = 2.12 cfs @ 12.42 hrs, Volume= 0.416 af, Atten= 57%, Lag= 16.5 min
Discarded = 2.12 cfs @ 12.42 hrs, Volume= 0.416 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 492.52' @ 12.42 hrs Surf.Area= 7,503 sf Storage= 2,415 cf

Plug-Flow detention time= 6.0 min calculated for 0.416 af (100% of inflow)
Center-of-Mass det. time= 6.0 min (810.1 - 804.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	491.75'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	492.50'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	491.75'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	492.53'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	493.83'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	494.49'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	495.32'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	496.23'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.12 cfs @ 12.42 hrs HW=492.52' (Free Discharge)
└**1=Exfiltration** (Controls 2.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=491.75' (Free Discharge)
├**2=Orifice/Grate** (Controls 0.00 cfs)
├**3=Orifice/Grate** (Controls 0.00 cfs)
├**4=Orifice/Grate** (Controls 0.00 cfs)
├**5=Orifice/Grate** (Controls 0.00 cfs)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1A: SMS #1A - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

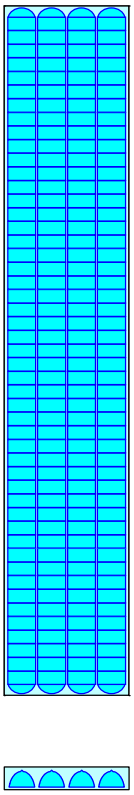
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

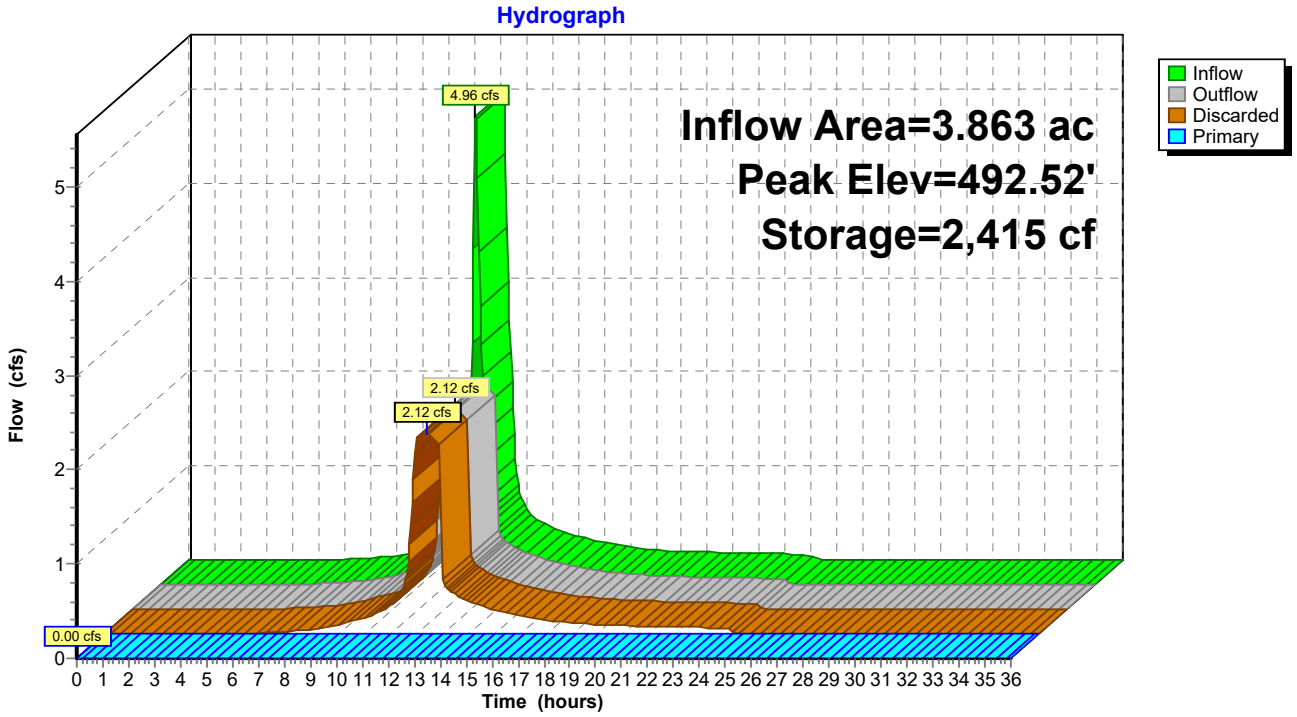
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

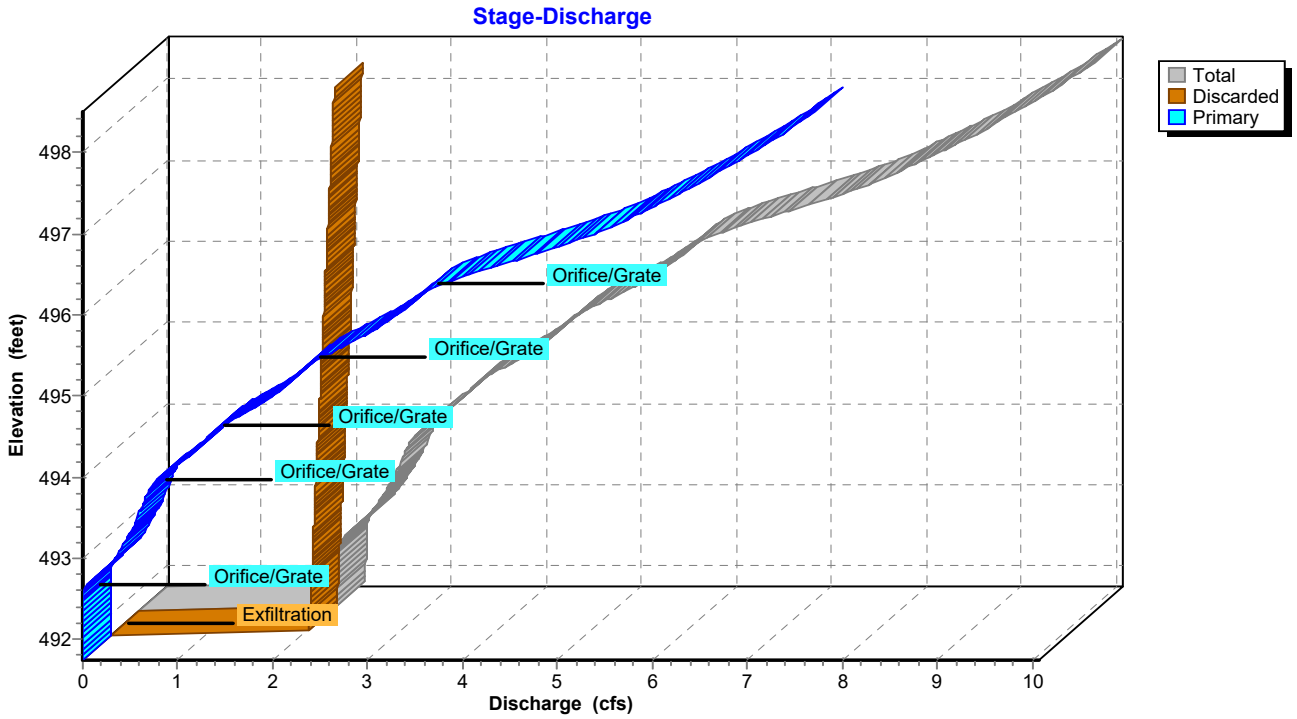
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



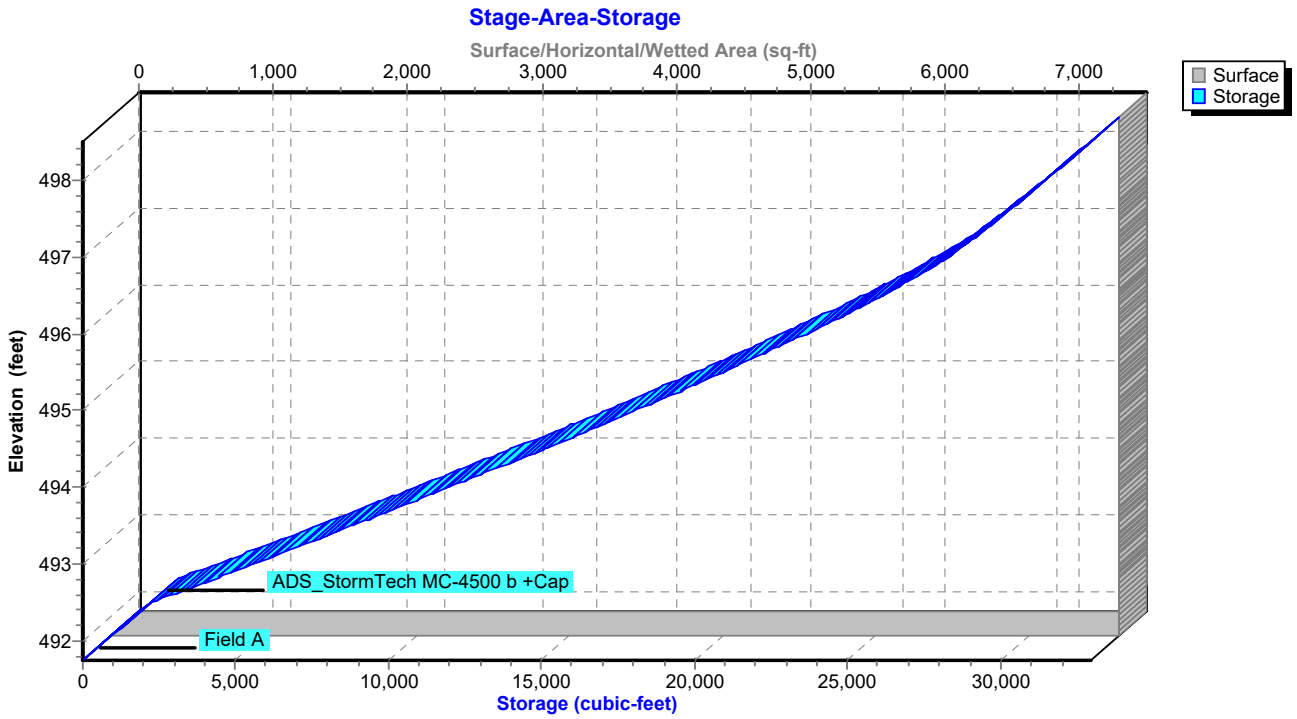
Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Hydrograph for Pond SMS #1A: SMS #1A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	491.75	0.00	0.00	**0.00**
1.00	0.00	0	491.75	0.00	0.00	0.00
2.00	0.00	0	491.75	0.00	0.00	0.00
3.00	0.00	0	491.75	0.00	0.00	0.00
4.00	0.00	0	491.75	0.00	0.00	0.00
5.00	0.00	0	491.75	0.00	0.00	0.00
6.00	0.01	1	491.75	0.01	0.01	0.00
7.00	0.02	2	491.75	0.02	0.02	0.00
8.00	0.05	5	491.75	0.05	0.05	0.00
9.00	0.10	9	491.75	0.10	0.10	0.00
10.00	0.17	16	491.76	0.17	0.17	0.00
11.00	0.30	29	491.76	0.30	0.30	0.00
12.00	**2.57**	**243**	**491.83**	**2.09**	**2.09**	0.00
13.00	**0.56**	**139**	**491.80**	**1.43**	**1.43**	0.00
14.00	0.34	33	491.76	0.34	0.34	0.00
15.00	0.26	25	491.76	0.26	0.26	0.00
16.00	0.18	18	491.76	0.18	0.18	0.00
17.00	0.14	14	491.75	0.14	0.14	0.00
18.00	0.11	11	491.75	0.11	0.11	0.00
19.00	0.10	9	491.75	0.10	0.10	0.00
20.00	0.09	8	491.75	0.09	0.09	0.00
21.00	0.08	8	491.75	0.08	0.08	0.00
22.00	0.07	7	491.75	0.07	0.07	0.00
23.00	0.06	6	491.75	0.06	0.06	0.00
24.00	0.06	6	491.75	0.06	0.06	0.00
25.00	0.00	0	491.75	0.00	0.00	0.00
26.00	0.00	0	491.75	0.00	0.00	0.00
27.00	0.00	0	491.75	0.00	0.00	0.00
28.00	0.00	0	491.75	0.00	0.00	0.00
29.00	0.00	0	491.75	0.00	0.00	0.00
30.00	0.00	0	491.75	0.00	0.00	0.00
31.00	0.00	0	491.75	0.00	0.00	0.00
32.00	0.00	0	491.75	0.00	0.00	0.00
33.00	0.00	0	491.75	0.00	0.00	0.00
34.00	0.00	0	491.75	0.00	0.00	0.00
35.00	0.00	0	491.75	0.00	0.00	0.00
36.00	0.00	0	491.75	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1A: SMS #1A

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
491.75	0.00	0.00	0.00
491.85	2.09	2.09	0.00
491.95	2.09	2.09	0.00
492.05	2.10	2.10	0.00
492.15	2.10	2.10	0.00
492.25	2.10	2.10	0.00
492.35	2.11	2.11	0.00
492.45	2.11	2.11	0.00
492.55	2.12	2.12	0.00
492.65	2.16	2.12	0.04
492.75	2.24	2.12	0.12
492.85	2.34	2.13	0.22
492.95	2.43	2.13	0.30
493.05	2.50	2.14	0.37
493.15	2.56	2.14	0.42
493.25	2.61	2.14	0.47
493.35	2.66	2.15	0.51
493.45	2.71	2.15	0.55
493.55	2.75	2.16	0.59
493.65	2.79	2.16	0.63
493.75	2.82	2.16	0.66
493.85	2.86	2.17	0.69
493.95	2.93	2.17	0.76
494.05	3.05	2.18	0.87
494.15	3.18	2.18	1.00
494.25	3.29	2.18	1.11
494.35	3.39	2.19	1.20
494.45	3.47	2.19	1.28
494.55	3.56	2.20	1.36
494.65	3.69	2.20	1.49
494.75	3.85	2.20	1.64
494.85	4.01	2.21	1.80
494.95	4.15	2.21	1.93
495.05	4.26	2.22	2.05
495.15	4.37	2.22	2.15
495.25	4.48	2.23	2.25
495.35	4.57	2.23	2.35
495.45	4.71	2.23	2.47
495.55	4.88	2.24	2.64
495.65	5.06	2.24	2.82
495.75	5.23	2.25	2.98
495.85	5.37	2.25	3.12
495.95	5.50	2.25	3.25
496.05	5.62	2.26	3.36
496.15	5.74	2.26	3.48
496.25	5.85	2.27	3.58
496.35	6.00	2.27	3.74
496.45	6.22	2.27	3.94
496.55	6.48	2.28	4.20
496.65	6.76	2.28	4.48
496.75	7.06	2.29	4.78
496.85	7.35	2.29	5.06
496.95	7.57	2.29	5.28
497.05	7.79	2.30	5.49
497.15	7.99	2.30	5.69
497.25	8.18	2.31	5.87
497.35	8.36	2.31	6.05
497.45	8.53	2.31	6.22
497.55	8.70	2.32	6.38
497.65	8.86	2.32	6.54
497.75	9.02	2.33	6.69
497.85	9.17	2.33	6.84
497.95	9.32	2.33	6.98
498.05	9.46	2.34	7.12
498.15	9.60	2.34	7.26
498.25	9.74	2.35	7.39
498.35	9.87	2.35	7.52
498.45	**10.00**	**2.35**	**7.65**

Stage-Area-Storage for Pond SMS #1A: SMS #1A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
491.75	**7,503**	0
491.85	7,503	300
491.95	7,503	600
492.05	7,503	900
492.15	7,503	1,200
492.25	7,503	1,501
492.35	7,503	1,801
492.45	7,503	2,101
492.55	7,503	2,582
492.65	7,503	3,243
492.75	7,503	3,902
492.85	7,503	4,560
492.95	7,503	5,216
493.05	7,503	5,871
493.15	7,503	6,523
493.25	7,503	7,173
493.35	7,503	7,822
493.45	7,503	8,468
493.55	7,503	9,111
493.65	7,503	9,752
493.75	7,503	10,391
493.85	7,503	11,026
493.95	7,503	11,658
494.05	7,503	12,288
494.15	7,503	12,914
494.25	7,503	13,537
494.35	7,503	14,155
494.45	7,503	14,770
494.55	7,503	15,381
494.65	7,503	15,988
494.75	7,503	16,590
494.85	7,503	17,188
494.95	7,503	17,781
495.05	7,503	18,369
495.15	7,503	18,952
495.25	7,503	19,530
495.35	7,503	20,101
495.45	7,503	20,667
495.55	7,503	21,226
495.65	7,503	21,779
495.75	7,503	22,324
495.85	7,503	22,862
495.95	7,503	23,393
496.05	7,503	23,915
496.15	7,503	24,428
496.25	7,503	24,932
496.35	7,503	25,426
496.45	7,503	25,909
496.55	7,503	26,381
496.65	7,503	26,840
496.75	7,503	27,285
496.85	7,503	27,713
496.95	7,503	28,121
497.05	7,503	28,501
497.15	7,503	28,850
497.25	7,503	29,181
497.35	7,503	29,504
497.45	7,503	29,817
497.55	7,503	30,119
497.65	7,503	30,419
497.75	7,503	30,719
497.85	7,503	31,019
497.95	7,503	31,319
498.05	7,503	31,620
498.15	7,503	31,920
498.25	7,503	32,220
498.35	7,503	32,520
498.45	7,503	**32,820**

Summary for Pond SMS #1C: SMS #1C

Inflow Area = 3.475 ac, 93.57% Impervious, Inflow Depth = 1.38" for WQv (Roadway C) event
Inflow = 4.70 cfs @ 12.14 hrs, Volume= 0.400 af
Outflow = 2.11 cfs @ 12.39 hrs, Volume= 0.400 af, Atten= 55%, Lag= 15.2 min
Discarded = 2.11 cfs @ 12.39 hrs, Volume= 0.400 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 495.96' @ 12.39 hrs Surf.Area= 7,503 sf Storage= 2,123 cf

Plug-Flow detention time= 5.2 min calculated for 0.399 af (100% of inflow)
Center-of-Mass det. time= 5.2 min (801.1 - 795.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	495.25'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	496.00'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	495.25'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	496.09'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	496.92'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	497.83'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	498.75'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	499.67'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.11 cfs @ 12.39 hrs HW=495.96' (Free Discharge)
└**1=Exfiltration** (Controls 2.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=495.25' (Free Discharge)
├**2=Orifice/Grate** (Controls 0.00 cfs)
├**3=Orifice/Grate** (Controls 0.00 cfs)
├**4=Orifice/Grate** (Controls 0.00 cfs)
├**5=Orifice/Grate** (Controls 0.00 cfs)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1C: SMS #1C - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

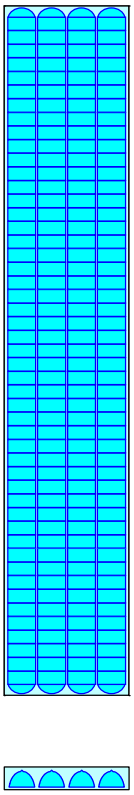
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

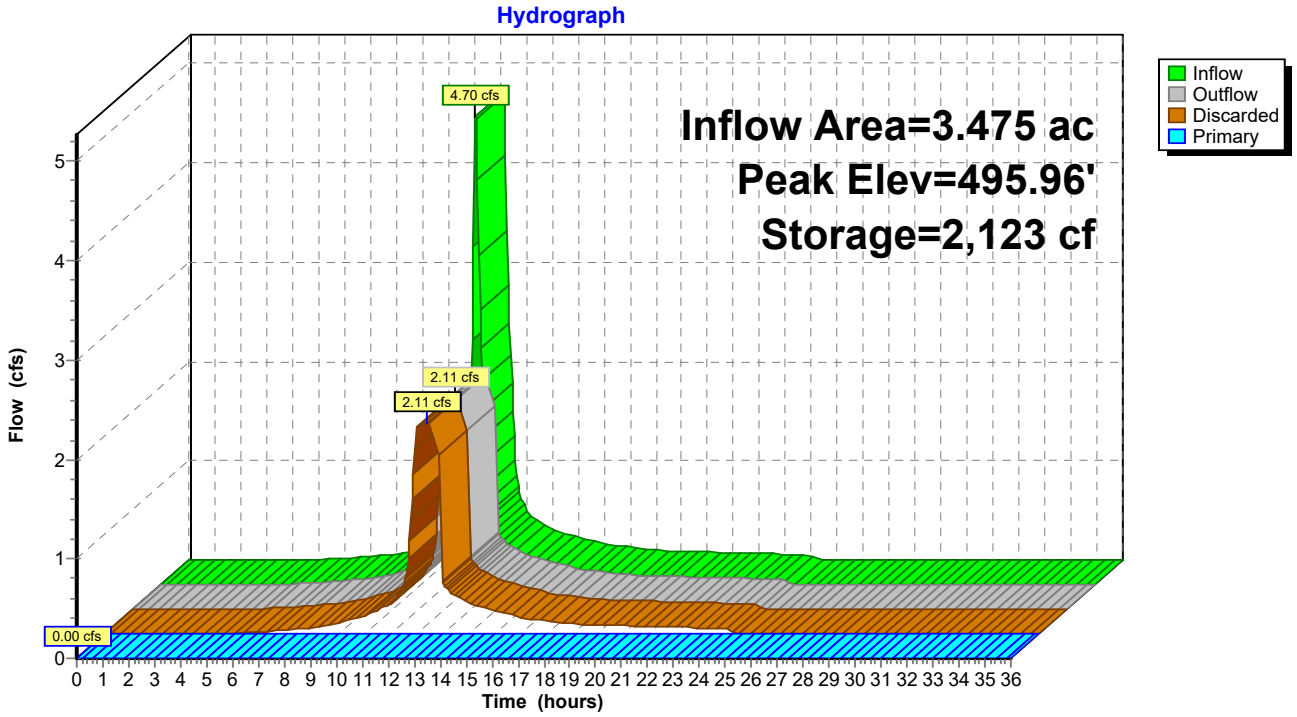
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

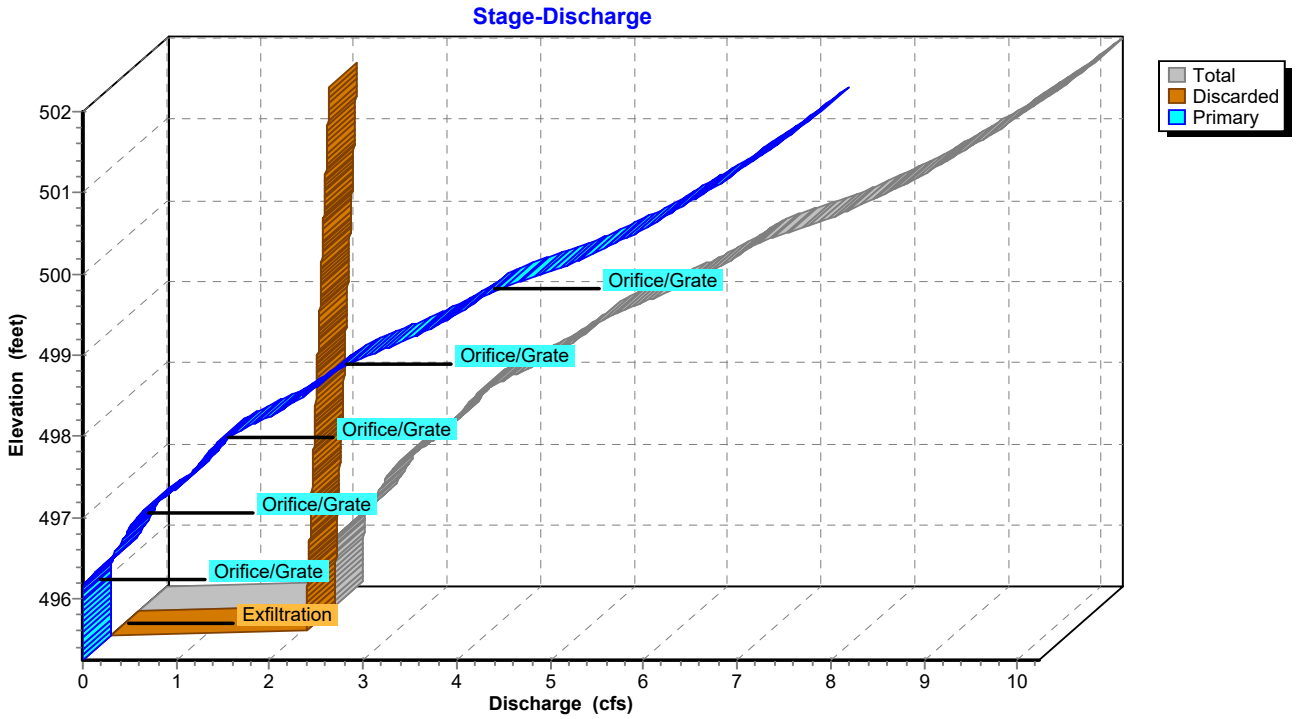
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



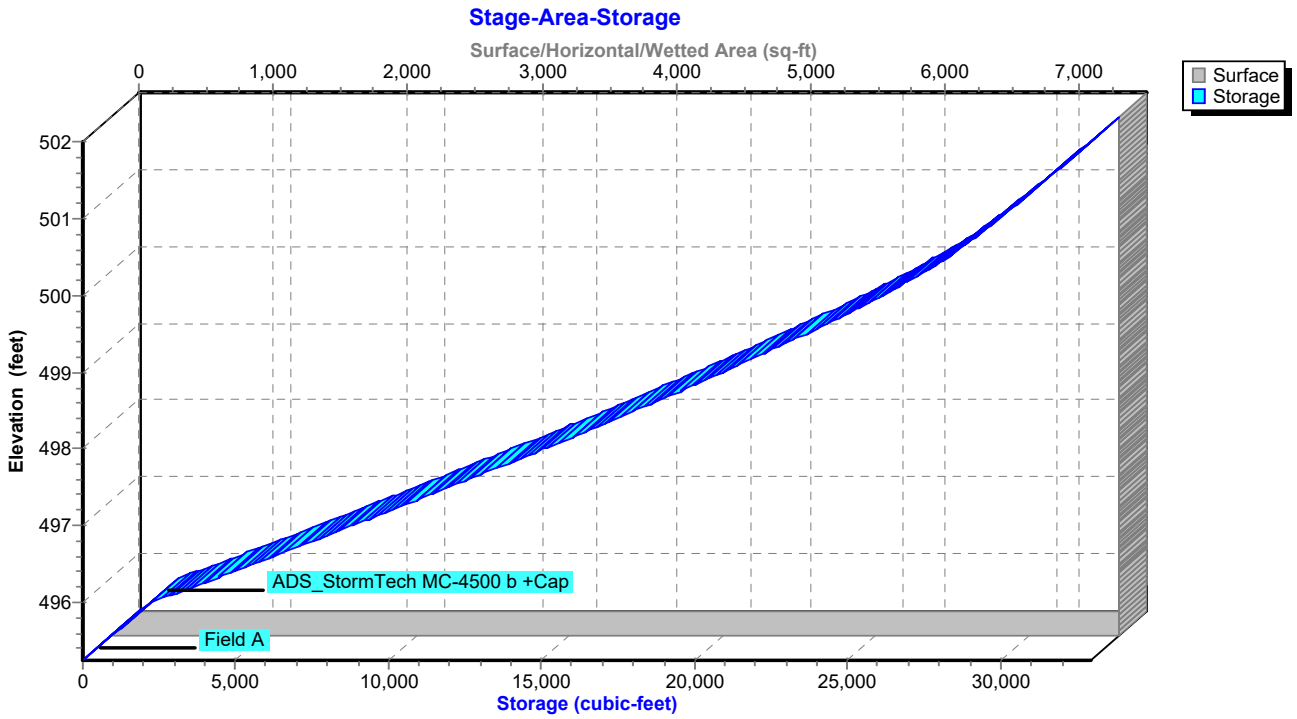
Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Hydrograph for Pond SMS #1C: SMS #1C

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	495.25	0.00	0.00	**0.00**
1.00	0.00	0	495.25	0.00	0.00	0.00
2.00	0.00	0	495.25	0.00	0.00	0.00
3.00	0.00	0	495.25	0.00	0.00	0.00
4.00	0.00	0	495.25	0.00	0.00	0.00
5.00	0.01	1	495.25	0.01	0.01	0.00
6.00	0.02	2	495.25	0.02	0.02	0.00
7.00	0.04	3	495.25	0.03	0.03	0.00
8.00	0.06	6	495.25	0.06	0.06	0.00
9.00	0.11	11	495.25	0.11	0.11	0.00
10.00	0.18	17	495.26	0.18	0.18	0.00
11.00	0.31	29	495.26	0.30	0.30	0.00
12.00	**2.47**	**228**	**495.33**	**2.09**	**2.09**	0.00
13.00	**0.52**	**52**	**495.27**	**0.53**	**0.53**	0.00
14.00	0.31	31	495.26	0.32	0.32	0.00
15.00	0.24	23	495.26	0.24	0.24	0.00
16.00	0.17	16	495.26	0.17	0.17	0.00
17.00	0.13	13	495.25	0.13	0.13	0.00
18.00	0.10	10	495.25	0.10	0.10	0.00
19.00	0.09	9	495.25	0.09	0.09	0.00
20.00	0.08	8	495.25	0.08	0.08	0.00
21.00	0.07	7	495.25	0.07	0.07	0.00
22.00	0.07	6	495.25	0.07	0.07	0.00
23.00	0.06	6	495.25	0.06	0.06	0.00
24.00	0.05	5	495.25	0.05	0.05	0.00
25.00	0.00	0	495.25	0.00	0.00	0.00
26.00	0.00	0	495.25	0.00	0.00	0.00
27.00	0.00	0	495.25	0.00	0.00	0.00
28.00	0.00	0	495.25	0.00	0.00	0.00
29.00	0.00	0	495.25	0.00	0.00	0.00
30.00	0.00	0	495.25	0.00	0.00	0.00
31.00	0.00	0	495.25	0.00	0.00	0.00
32.00	0.00	0	495.25	0.00	0.00	0.00
33.00	0.00	0	495.25	0.00	0.00	0.00
34.00	0.00	0	495.25	0.00	0.00	0.00
35.00	0.00	0	495.25	0.00	0.00	0.00
36.00	0.00	0	495.25	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1C: SMS #1C

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
495.25	0.00	0.00	0.00
495.35	2.09	2.09	0.00
495.45	2.09	2.09	0.00
495.55	2.10	2.10	0.00
495.65	2.10	2.10	0.00
495.75	2.10	2.10	0.00
495.85	2.11	2.11	0.00
495.95	2.11	2.11	0.00
496.05	2.11	2.11	0.00
496.15	2.13	2.12	0.01
496.25	2.19	2.12	0.07
496.35	2.28	2.13	0.16
496.45	2.39	2.13	0.26
496.55	2.46	2.13	0.33
496.65	2.53	2.14	0.39
496.75	2.58	2.14	0.44
496.85	2.63	2.14	0.49
496.95	2.68	2.15	0.53
497.05	2.77	2.15	0.61
497.15	2.89	2.16	0.73
497.25	3.03	2.16	0.87
497.35	3.15	2.16	0.98
497.45	3.24	2.17	1.08
497.55	3.33	2.17	1.16
497.65	3.41	2.17	1.24
497.75	3.49	2.18	1.31
497.85	3.56	2.18	1.38
497.95	3.67	2.19	1.48
498.05	3.82	2.19	1.63
498.15	4.01	2.19	1.81
498.25	4.20	2.20	2.00
498.35	4.36	2.20	2.16
498.45	4.50	2.20	2.29
498.55	4.62	2.21	2.42
498.65	4.74	2.21	2.53
498.75	4.85	2.22	2.64
498.85	4.99	2.22	2.77
498.95	5.17	2.22	2.95
499.05	5.39	2.23	3.16
499.15	5.61	2.23	3.38
499.25	5.81	2.23	3.58
499.35	5.99	2.24	3.75
499.45	6.15	2.24	3.91
499.55	6.30	2.25	4.05
499.65	6.44	2.25	4.19
499.75	6.60	2.25	4.34
499.85	6.80	2.26	4.54
499.95	7.04	2.26	4.78
500.05	7.29	2.27	5.03
500.15	7.53	2.27	5.26
500.25	7.73	2.27	5.46
500.35	7.92	2.28	5.64
500.45	8.10	2.28	5.82
500.55	8.27	2.28	5.98
500.65	8.43	2.29	6.14
500.75	8.58	2.29	6.29
500.85	8.73	2.30	6.44
500.95	8.88	2.30	6.58
501.05	9.02	2.30	6.72
501.15	9.16	2.31	6.85
501.25	9.30	2.31	6.99
501.35	9.43	2.31	7.11
501.45	9.56	2.32	7.24
501.55	9.68	2.32	7.36
501.65	9.81	2.33	7.48
501.75	9.93	2.33	7.60
501.85	10.05	2.33	7.72
501.95	**10.17**	**2.34**	**7.83**

Stage-Area-Storage for Pond SMS #1C: SMS #1C

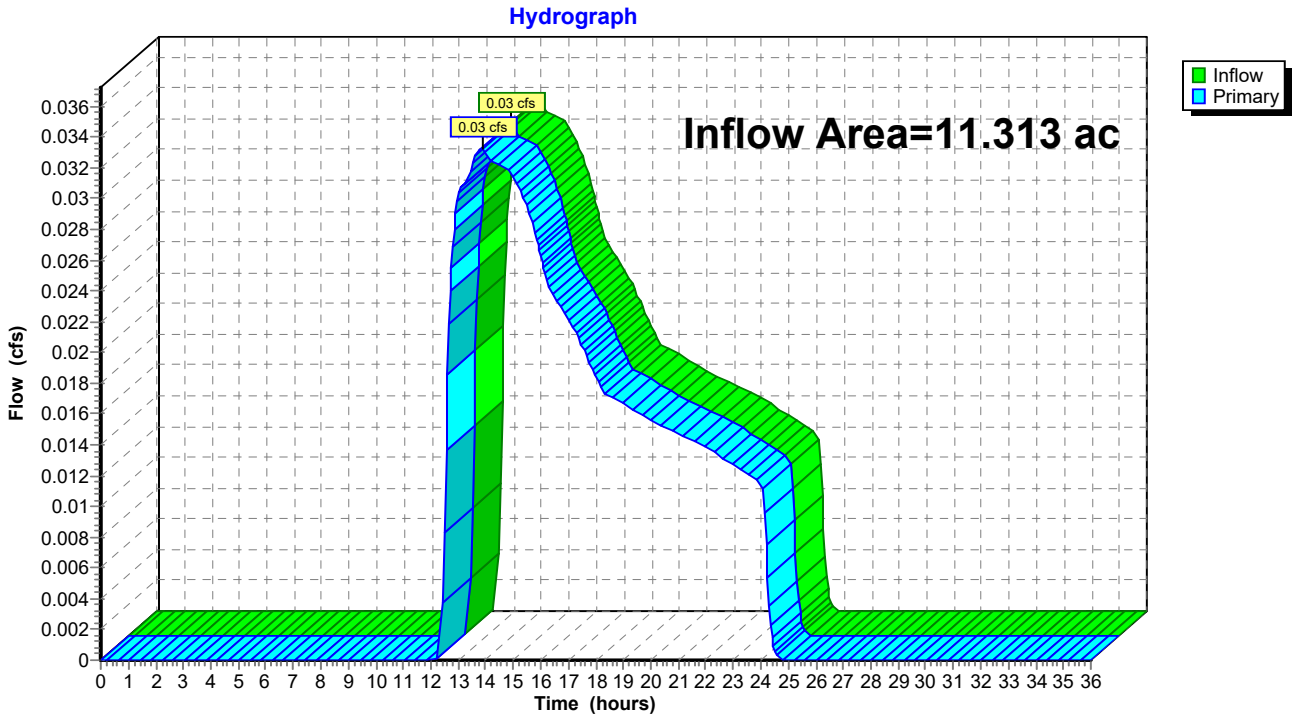
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
495.25	**7,503**	0
495.35	7,503	300
495.45	7,503	600
495.55	7,503	900
495.65	7,503	1,200
495.75	7,503	1,501
495.85	7,503	1,801
495.95	7,503	2,101
496.05	7,503	2,582
496.15	7,503	3,243
496.25	7,503	3,902
496.35	7,503	4,560
496.45	7,503	5,216
496.55	7,503	5,871
496.65	7,503	6,523
496.75	7,503	7,173
496.85	7,503	7,822
496.95	7,503	8,468
497.05	7,503	9,111
497.15	7,503	9,752
497.25	7,503	10,391
497.35	7,503	11,026
497.45	7,503	11,658
497.55	7,503	12,288
497.65	7,503	12,914
497.75	7,503	13,537
497.85	7,503	14,155
497.95	7,503	14,770
498.05	7,503	15,381
498.15	7,503	15,988
498.25	7,503	16,590
498.35	7,503	17,188
498.45	7,503	17,781
498.55	7,503	18,369
498.65	7,503	18,952
498.75	7,503	19,530
498.85	7,503	20,101
498.95	7,503	20,667
499.05	7,503	21,226
499.15	7,503	21,779
499.25	7,503	22,324
499.35	7,503	22,862
499.45	7,503	23,393
499.55	7,503	23,915
499.65	7,503	24,428
499.75	7,503	24,932
499.85	7,503	25,426
499.95	7,503	25,909
500.05	7,503	26,381
500.15	7,503	26,840
500.25	7,503	27,285
500.35	7,503	27,713
500.45	7,503	28,121
500.55	7,503	28,501
500.65	7,503	28,850
500.75	7,503	29,181
500.85	7,503	29,504
500.95	7,503	29,817
501.05	7,503	30,119
501.15	7,503	30,419
501.25	7,503	30,719
501.35	7,503	31,019
501.45	7,503	31,319
501.55	7,503	31,620
501.65	7,503	31,920
501.75	7,503	32,220
501.85	7,503	32,520
501.95	7,503	**32,820**

Summary for Link POI #1: POI #1

Inflow Area = 11.313 ac, 61.95% Impervious, Inflow Depth = 0.02" for WQv (Roadway C) event
Inflow = 0.03 cfs @ 13.86 hrs, Volume= 0.020 af
Primary = 0.03 cfs @ 13.86 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #1: POI #1



Hydrograph for Link POI #1: POI #1

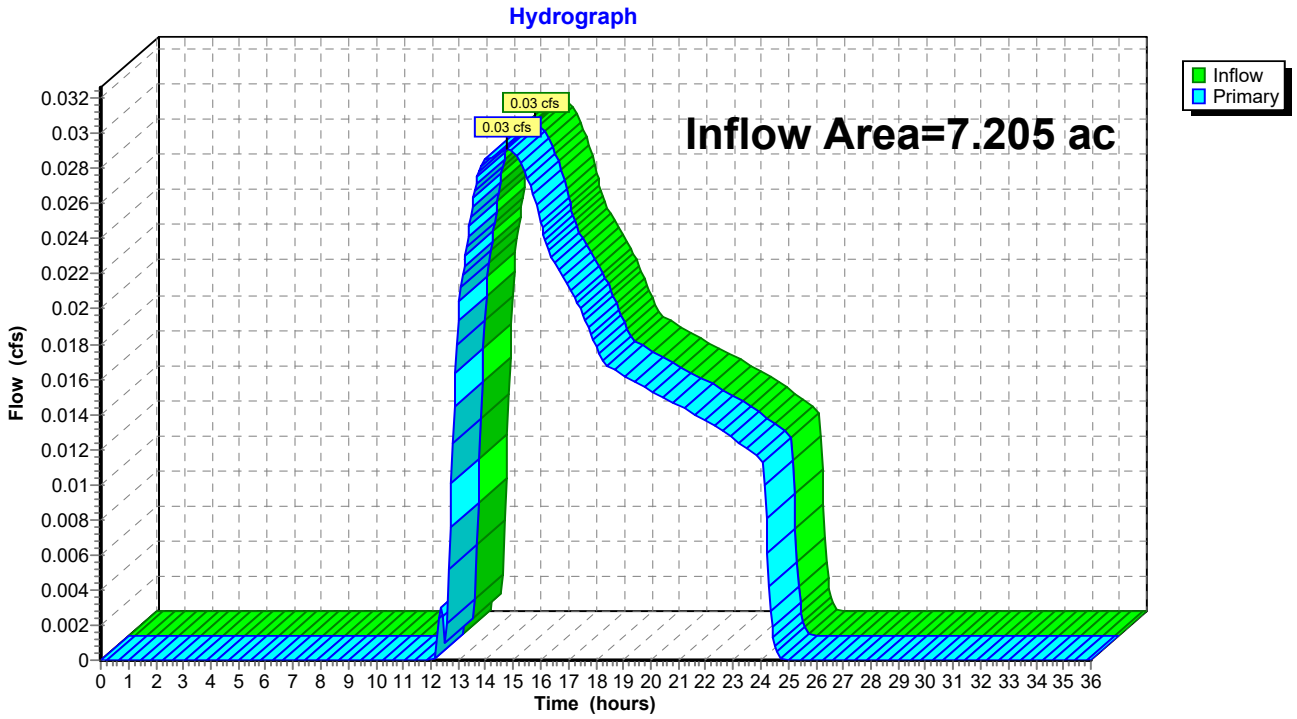
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.00	0.00	0.00
12.50	0.01	0.00	0.01
13.00	0.03	0.00	0.03
13.50	**0.03**	0.00	**0.03**
14.00	**0.03**	0.00	**0.03**
14.50	0.03	0.00	0.03
15.00	0.03	0.00	0.03
15.50	0.03	0.00	0.03
16.00	0.03	0.00	0.03
16.50	0.02	0.00	0.02
17.00	0.02	0.00	0.02
17.50	0.02	0.00	0.02
18.00	0.02	0.00	0.02
18.50	0.02	0.00	0.02
19.00	0.02	0.00	0.02
19.50	0.02	0.00	0.02
20.00	0.02	0.00	0.02
20.50	0.02	0.00	0.02
21.00	0.01	0.00	0.01
21.50	0.01	0.00	0.01
22.00	0.01	0.00	0.01
22.50	0.01	0.00	0.01
23.00	0.01	0.00	0.01
23.50	0.01	0.00	0.01
24.00	0.01	0.00	0.01
24.50	0.00	0.00	0.00
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Summary for Link POI #2: POI #2

Inflow Area = 7.205 ac, 35.36% Impervious, Inflow Depth = 0.03" for WQv (Roadway C) event
Inflow = 0.03 cfs @ 14.78 hrs, Volume= 0.018 af
Primary = 0.03 cfs @ 14.78 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #2: POI #2



Hydrograph for Link POI #2: POI #2

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.00	0.00	0.00
12.50	0.00	0.00	0.00
13.00	0.02	0.00	0.02
13.50	0.03	0.00	0.03
14.00	0.03	0.00	0.03
14.50	**0.03**	0.00	**0.03**
15.00	**0.03**	0.00	**0.03**
15.50	0.03	0.00	0.03
16.00	0.02	0.00	0.02
16.50	0.02	0.00	0.02
17.00	0.02	0.00	0.02
17.50	0.02	0.00	0.02
18.00	0.02	0.00	0.02
18.50	0.02	0.00	0.02
19.00	0.02	0.00	0.02
19.50	0.02	0.00	0.02
20.00	0.02	0.00	0.02
20.50	0.01	0.00	0.01
21.00	0.01	0.00	0.01
21.50	0.01	0.00	0.01
22.00	0.01	0.00	0.01
22.50	0.01	0.00	0.01
23.00	0.01	0.00	0.01
23.50	0.01	0.00	0.01
24.00	0.01	0.00	0.01
24.50	0.00	0.00	0.00
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 #1A: Drainage Area #1A Runoff Area=168,262 sf 91.78% Impervious Runoff Depth=1.36"
Tc=10.0 min CN=95 Runoff=5.21 cfs 0.438 af

Subcatchment DA #1B: Drainage Area #1B Runoff Area=173,173 sf 5.32% Impervious Runoff Depth=0.07"
Flow Length=638' Tc=17.0 min CN=63 Runoff=0.04 cfs 0.024 af

Subcatchment DA #1C: Drainage Area Runoff Area=151,363 sf 93.57% Impervious Runoff Depth=1.45"
Tc=10.0 min CN=96 Runoff=4.92 cfs 0.420 af

Subcatchment DA #2A: Drainage Area #2A Runoff Area=121,548 sf 88.60% Impervious Runoff Depth=1.28"
Tc=10.0 min CN=94 Runoff=3.56 cfs 0.297 af

Subcatchment DA #2B: Drainage Area #2B Runoff Area=192,310 sf 1.70% Impervious Runoff Depth=0.06"
Flow Length=784' Tc=18.4 min CN=62 Runoff=0.04 cfs 0.023 af

Pond DB #2: Drainage Basin #2 Peak Elev=485.27' Storage=1,544 cf Inflow=3.56 cfs 0.297 af
Discarded=1.70 cfs 0.296 af Primary=0.01 cfs 0.000 af Outflow=1.72 cfs 0.296 af

Pond SMS #1A: SMS #1A Peak Elev=492.57' Storage=2,694 cf Inflow=5.21 cfs 0.438 af
Discarded=2.12 cfs 0.438 af Primary=0.00 cfs 0.000 af Outflow=2.12 cfs 0.438 af

Pond SMS #1C: SMS #1C Peak Elev=496.02' Storage=2,367 cf Inflow=4.92 cfs 0.420 af
Discarded=2.11 cfs 0.420 af Primary=0.00 cfs 0.000 af Outflow=2.11 cfs 0.420 af

Link POI #1: POI #1 Inflow=0.04 cfs 0.024 af
Primary=0.04 cfs 0.024 af

Link POI #2: POI #2 Inflow=0.04 cfs 0.023 af
Primary=0.04 cfs 0.023 af

Total Runoff Area = 18.518 ac Runoff Volume = 1.201 af Average Runoff Depth = 0.78"
48.40% Pervious = 8.963 ac 51.60% Impervious = 9.556 ac

Summary for Subcatchment DA #1A: Drainage Area #1A

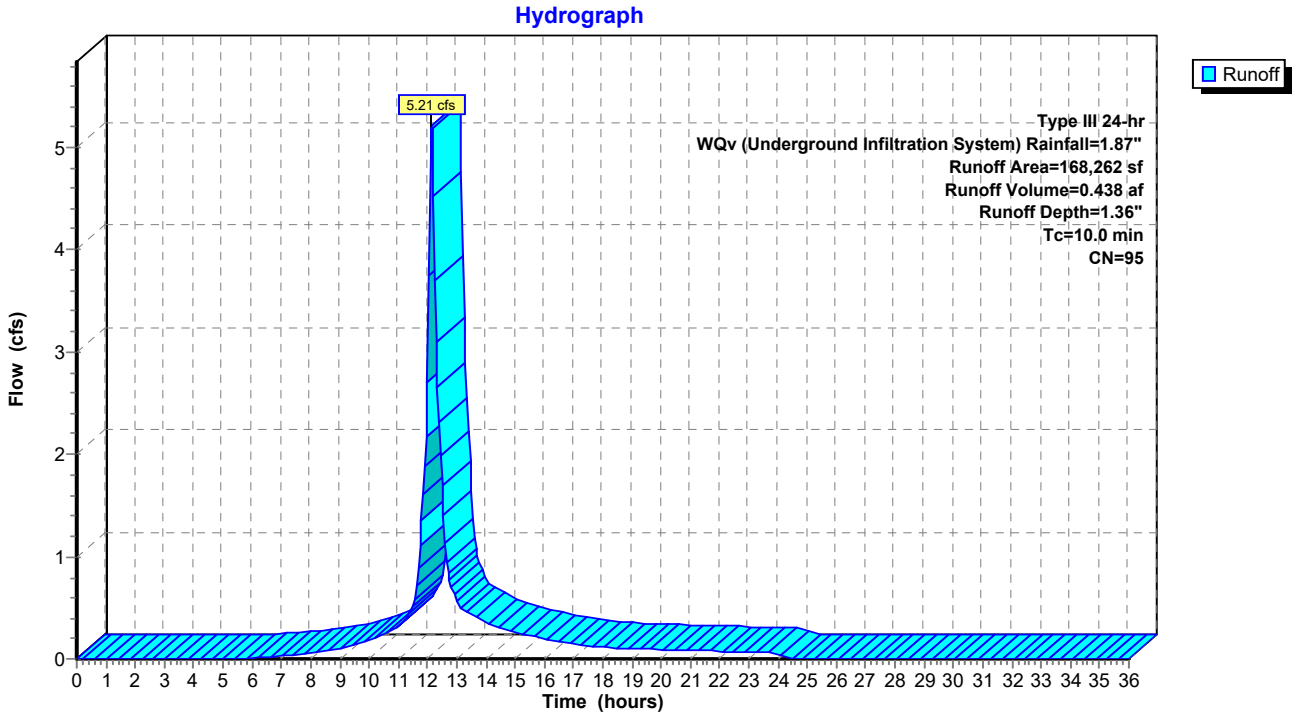
Runoff = 5.21 cfs @ 12.14 hrs, Volume= 0.438 af, Depth= 1.36"
Routed to Pond SMS #1A : SMS #1A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Underground Infiltration System) Rainfall=1.87"

	Area (sf)	CN	Description
	10,723	61	>75% Grass cover, Good, HSG B
*	3,112	61	Emergency Access Road (Perv.), Good, HSG B
*	86,043	98	Building/Roof, HSG B
*	60,366	98	Pavement, HSG B
*	2,940	98	Sidewalk, HSG B
*	5,078	98	Emergency Access Road (Imp.), HSG B
	168,262	95	Weighted Average
	13,835		8.22% Pervious Area
	154,427		91.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #1A: Drainage Area #1A



Hydrograph for Subcatchment DA #1A: Drainage Area #1A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.05	0.00	0.00
3.00	0.06	0.00	0.00
3.50	0.07	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.11	0.00	0.00
5.50	0.12	0.00	0.00
6.00	0.13	0.00	0.01
6.50	0.15	0.00	0.02
7.00	0.17	0.01	0.03
7.50	0.19	0.01	0.04
8.00	0.21	0.02	0.05
8.50	0.24	0.03	0.08
9.00	0.27	0.04	0.11
9.50	0.31	0.06	0.14
10.00	0.35	0.08	0.18
10.50	0.40	0.11	0.24
11.00	0.47	0.15	0.32
11.50	0.56	0.21	0.53
12.00	0.93	0.51	**2.70**
12.50	1.31	0.84	**1.69**
13.00	1.40	0.92	0.58
13.50	1.47	0.98	0.43
14.00	1.52	1.03	0.36
14.50	1.56	1.07	0.30
15.00	1.60	1.10	0.27
15.50	1.63	1.13	0.23
16.00	1.66	1.16	0.19
16.50	1.68	1.18	0.17
17.00	1.70	1.20	0.15
17.50	1.72	1.22	0.13
18.00	1.74	1.23	0.11
18.50	1.75	1.25	0.11
19.00	1.76	1.26	0.10
19.50	1.78	1.27	0.10
20.00	1.79	1.28	0.09
20.50	1.80	1.29	0.09
21.00	1.81	1.31	0.08
21.50	1.82	1.32	0.08
22.00	1.83	1.33	0.08
22.50	1.84	1.33	0.07
23.00	1.85	1.34	0.07
23.50	1.86	1.35	0.06
24.00	**1.87**	**1.36**	0.06
24.50	1.87	1.36	0.00
25.00	1.87	1.36	0.00
25.50	1.87	1.36	0.00
26.00	1.87	1.36	0.00
26.50	1.87	1.36	0.00
27.00	1.87	1.36	0.00
27.50	1.87	1.36	0.00
28.00	1.87	1.36	0.00
28.50	1.87	1.36	0.00
29.00	1.87	1.36	0.00
29.50	1.87	1.36	0.00
30.00	1.87	1.36	0.00
30.50	1.87	1.36	0.00
31.00	1.87	1.36	0.00
31.50	1.87	1.36	0.00
32.00	1.87	1.36	0.00
32.50	1.87	1.36	0.00
33.00	1.87	1.36	0.00
33.50	1.87	1.36	0.00
34.00	1.87	1.36	0.00
34.50	1.87	1.36	0.00
35.00	1.87	1.36	0.00
35.50	1.87	1.36	0.00
36.00	1.87	1.36	0.00

Summary for Subcatchment DA #1B: Drainage Area #1B

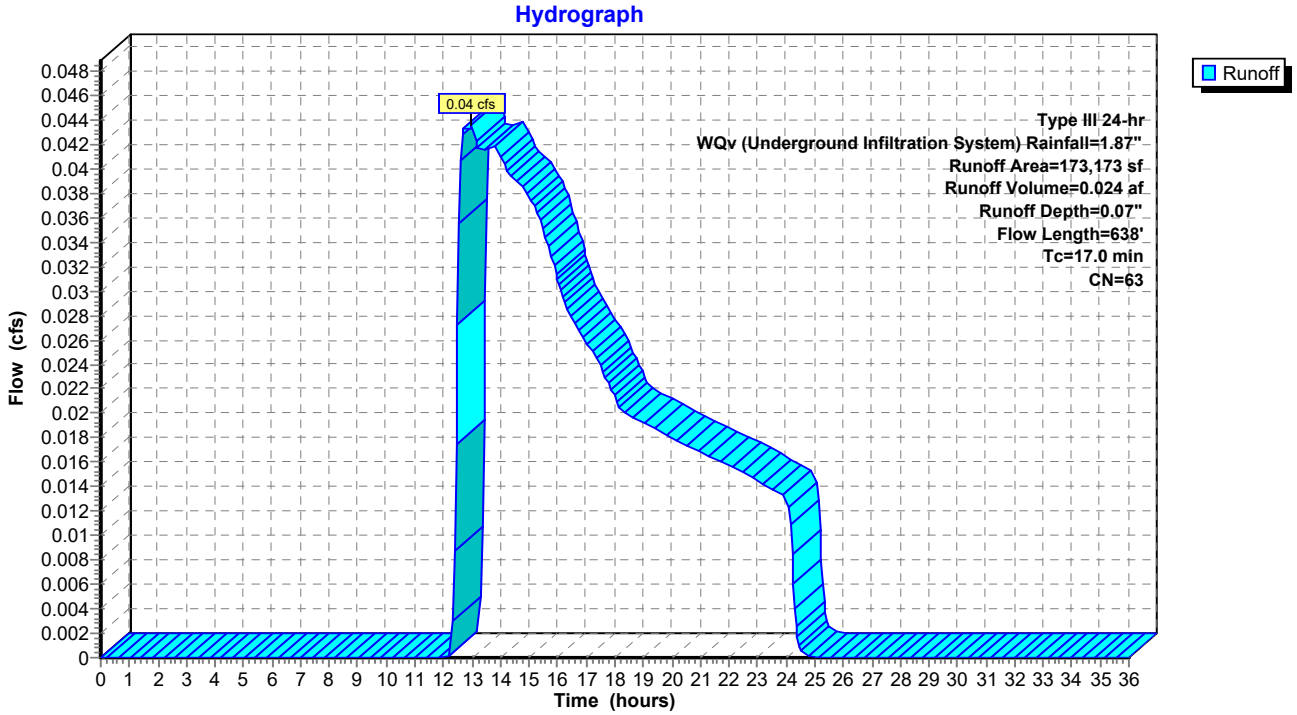
Runoff = 0.04 cfs @ 12.95 hrs, Volume= 0.024 af, Depth= 0.07"
Routed to Link POI #1 : POI #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Underground Infiltration System) Rainfall=1.87"

	Area (sf)	CN	Description
	158,310	61	>75% Grass cover, Good, HSG B
*	5,648	61	Emergency Access Road (Perv.), Good, HSG B
*	9,215	98	Emergency Access Road (Imp.), HSG B
	173,173	63	Weighted Average
	163,958		94.68% Pervious Area
	9,215		5.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	150	0.1200	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
4.8	488	0.0578	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	638	Total			

Subcatchment DA #1B: Drainage Area #1B



Hydrograph for Subcatchment DA #1B: Drainage Area #1B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.05	0.00	0.00
3.00	0.06	0.00	0.00
3.50	0.07	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.11	0.00	0.00
5.50	0.12	0.00	0.00
6.00	0.13	0.00	0.00
6.50	0.15	0.00	0.00
7.00	0.17	0.00	0.00
7.50	0.19	0.00	0.00
8.00	0.21	0.00	0.00
8.50	0.24	0.00	0.00
9.00	0.27	0.00	0.00
9.50	0.31	0.00	0.00
10.00	0.35	0.00	0.00
10.50	0.40	0.00	0.00
11.00	0.47	0.00	0.00
11.50	0.56	0.00	0.00
12.00	0.93	0.00	0.00
12.50	1.31	0.00	**0.03**
13.00	1.40	0.01	**0.04**
13.50	1.47	0.01	0.04
14.00	1.52	0.02	0.04
14.50	1.56	0.02	0.04
15.00	1.60	0.03	0.04
15.50	1.63	0.03	0.03
16.00	1.66	0.04	0.03
16.50	1.68	0.04	0.03
17.00	1.70	0.04	0.03
17.50	1.72	0.05	0.02
18.00	1.74	0.05	0.02
18.50	1.75	0.05	0.02
19.00	1.76	0.05	0.02
19.50	1.78	0.06	0.02
20.00	1.79	0.06	0.02
20.50	1.80	0.06	0.02
21.00	1.81	0.06	0.02
21.50	1.82	0.06	0.02
22.00	1.83	0.07	0.02
22.50	1.84	0.07	0.02
23.00	1.85	0.07	0.01
23.50	1.86	0.07	0.01
24.00	**1.87**	**0.07**	0.01
24.50	1.87	0.07	0.00
25.00	1.87	0.07	0.00
25.50	1.87	0.07	0.00
26.00	1.87	0.07	0.00
26.50	1.87	0.07	0.00
27.00	1.87	0.07	0.00
27.50	1.87	0.07	0.00
28.00	1.87	0.07	0.00
28.50	1.87	0.07	0.00
29.00	1.87	0.07	0.00
29.50	1.87	0.07	0.00
30.00	1.87	0.07	0.00
30.50	1.87	0.07	0.00
31.00	1.87	0.07	0.00
31.50	1.87	0.07	0.00
32.00	1.87	0.07	0.00
32.50	1.87	0.07	0.00
33.00	1.87	0.07	0.00
33.50	1.87	0.07	0.00
34.00	1.87	0.07	0.00
34.50	1.87	0.07	0.00
35.00	1.87	0.07	0.00
35.50	1.87	0.07	0.00
36.00	1.87	0.07	0.00

Summary for Subcatchment DA #1C: Drainage Area #1C

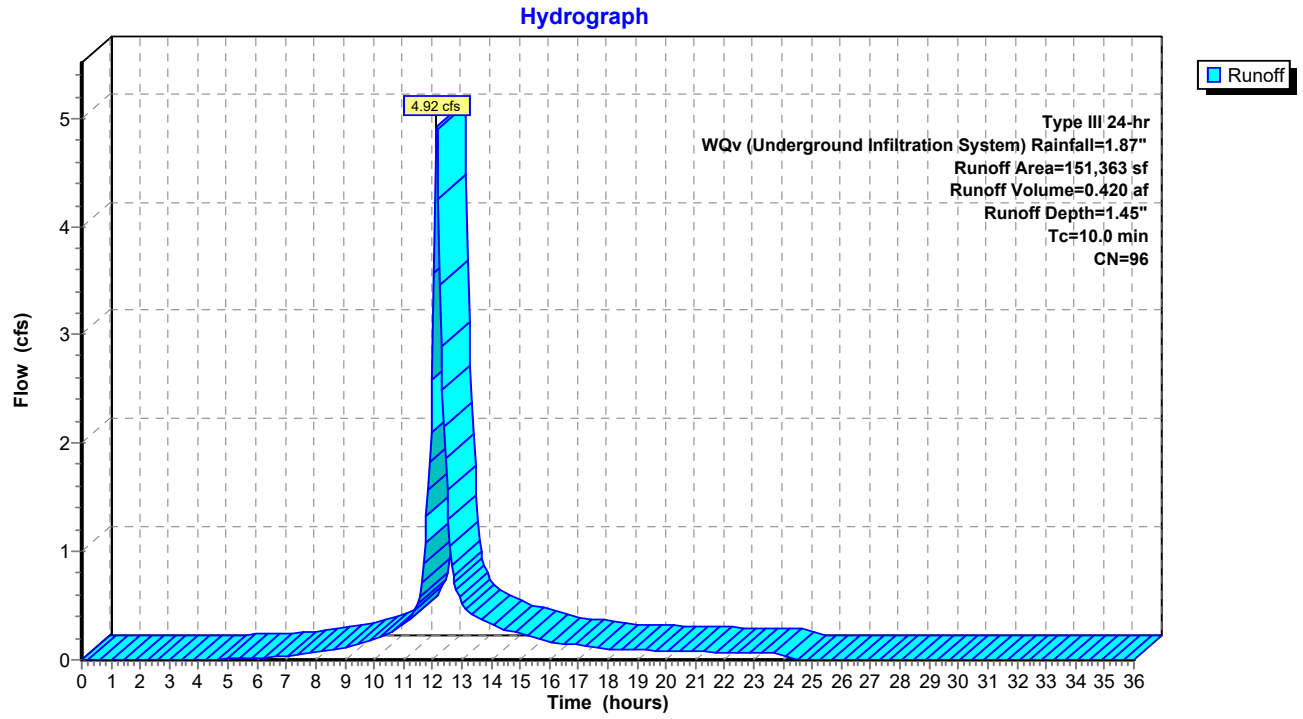
Runoff = 4.92 cfs @ 12.14 hrs, Volume= 0.420 af, Depth= 1.45"
Routed to Pond SMS #1C : SMS #1C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Underground Infiltration System) Rainfall=1.87"

	Area (sf)	CN	Description
	9,732	61	>75% Grass cover, Good, HSG B
*	87,537	98	Building/Roof, HSG B
*	50,809	98	Pavement, HSG B
*	3,285	98	Sidewalk, HSG B
	151,363	96	Weighted Average
	9,732		6.43% Pervious Area
	141,631		93.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Direct Minimum**

Subcatchment DA #1C: Drainage Area #1C



Hydrograph for Subcatchment DA #1C: Drainage Area #1C

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.05	0.00	0.00
3.00	0.06	0.00	0.00
3.50	0.07	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.11	0.00	0.01
5.50	0.12	0.00	0.01
6.00	0.13	0.01	0.02
6.50	0.15	0.01	0.03
7.00	0.17	0.01	0.04
7.50	0.19	0.02	0.05
8.00	0.21	0.03	0.07
8.50	0.24	0.04	0.09
9.00	0.27	0.06	0.12
9.50	0.31	0.08	0.15
10.00	0.35	0.11	0.19
10.50	0.40	0.14	0.25
11.00	0.47	0.18	0.32
11.50	0.56	0.25	0.53
12.00	0.93	0.57	**2.59**
12.50	1.31	0.92	**1.57**
13.00	1.40	1.00	0.54
13.50	1.47	1.06	0.40
14.00	1.52	1.11	0.33
14.50	1.56	1.15	0.28
15.00	1.60	1.19	0.25
15.50	1.63	1.22	0.21
16.00	1.66	1.24	0.17
16.50	1.68	1.27	0.15
17.00	1.70	1.29	0.14
17.50	1.72	1.30	0.12
18.00	1.74	1.32	0.11
18.50	1.75	1.33	0.10
19.00	1.76	1.35	0.09
19.50	1.78	1.36	0.09
20.00	1.79	1.37	0.08
20.50	1.80	1.38	0.08
21.00	1.81	1.39	0.08
21.50	1.82	1.40	0.07
22.00	1.83	1.41	0.07
22.50	1.84	1.42	0.07
23.00	1.85	1.43	0.06
23.50	1.86	1.44	0.06
24.00	**1.87**	**1.45**	0.05
24.50	1.87	1.45	0.00
25.00	1.87	1.45	0.00
25.50	1.87	1.45	0.00
26.00	1.87	1.45	0.00
26.50	1.87	1.45	0.00
27.00	1.87	1.45	0.00
27.50	1.87	1.45	0.00
28.00	1.87	1.45	0.00
28.50	1.87	1.45	0.00
29.00	1.87	1.45	0.00
29.50	1.87	1.45	0.00
30.00	1.87	1.45	0.00
30.50	1.87	1.45	0.00
31.00	1.87	1.45	0.00
31.50	1.87	1.45	0.00
32.00	1.87	1.45	0.00
32.50	1.87	1.45	0.00
33.00	1.87	1.45	0.00
33.50	1.87	1.45	0.00
34.00	1.87	1.45	0.00
34.50	1.87	1.45	0.00
35.00	1.87	1.45	0.00
35.50	1.87	1.45	0.00
36.00	1.87	1.45	0.00

Summary for Subcatchment DA #2A: Drainage Area #2A

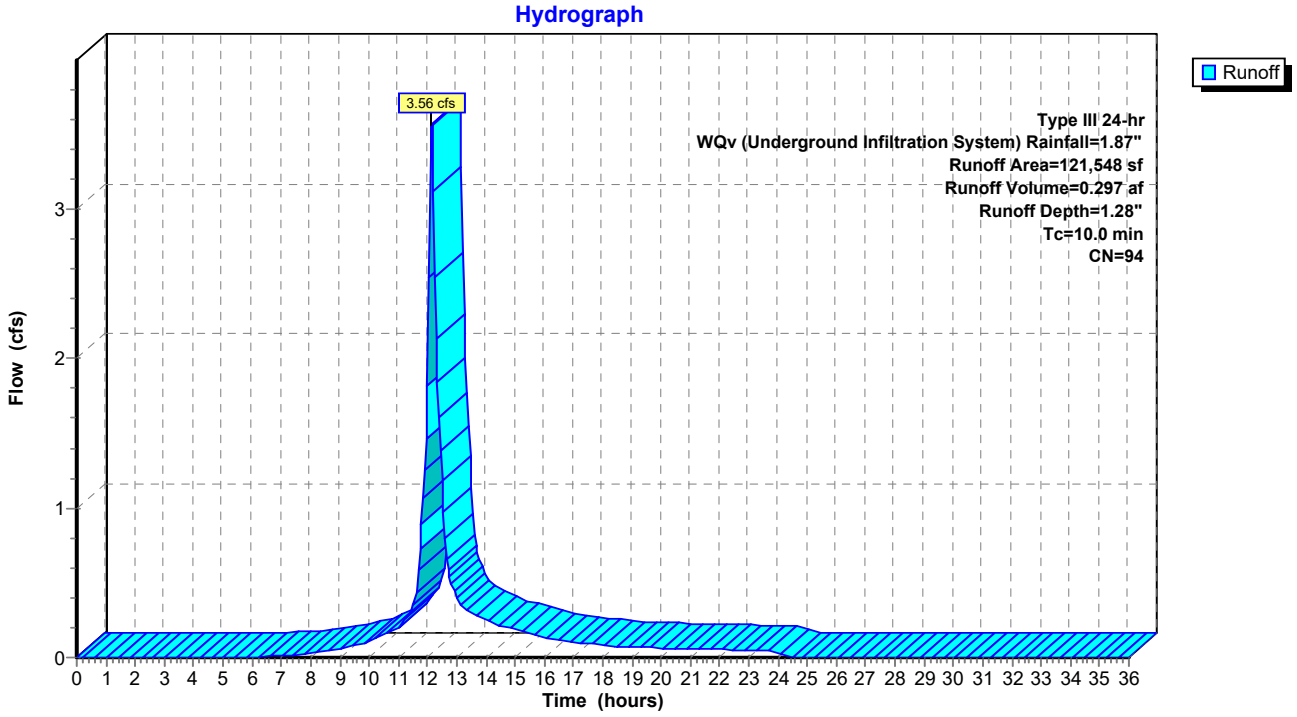
Runoff = 3.56 cfs @ 12.14 hrs, Volume= 0.297 af, Depth= 1.28"
Routed to Pond DB #2 : Drainage Basin #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Underground Infiltration System) Rainfall=1.87"

	Area (sf)	CN	Description
*	48,398	98	Building/Roof, HSG B
*	45,328	98	Pavement, HSG B
*	1,404	98	Sidewalk, HSG B
	13,851	61	>75% Grass cover, Good, HSG B
*	12,567	98	Infiltration Basin, HSG B
	121,548	94	Weighted Average
	13,851		11.40% Pervious Area
	107,697		88.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, 10 Minute Minimum**

Subcatchment DA #2A: Drainage Area #2A



Hydrograph for Subcatchment DA #2A: Drainage Area #2A

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.05	0.00	0.00
3.00	0.06	0.00	0.00
3.50	0.07	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.11	0.00	0.00
5.50	0.12	0.00	0.00
6.00	0.13	0.00	0.00
6.50	0.15	0.00	0.01
7.00	0.17	0.00	0.01
7.50	0.19	0.01	0.02
8.00	0.21	0.01	0.03
8.50	0.24	0.02	0.04
9.00	0.27	0.03	0.06
9.50	0.31	0.04	0.08
10.00	0.35	0.06	0.11
10.50	0.40	0.08	0.15
11.00	0.47	0.12	0.20
11.50	0.56	0.17	0.34
12.00	0.93	0.45	**1.82**
12.50	1.31	0.77	**1.18**
13.00	1.40	0.85	0.41
13.50	1.47	0.91	0.30
14.00	1.52	0.95	0.25
14.50	1.56	0.99	0.21
15.00	1.60	1.02	0.19
15.50	1.63	1.05	0.16
16.00	1.66	1.08	0.13
16.50	1.68	1.10	0.12
17.00	1.70	1.12	0.10
17.50	1.72	1.14	0.09
18.00	1.74	1.15	0.08
18.50	1.75	1.16	0.07
19.00	1.76	1.18	0.07
19.50	1.78	1.19	0.07
20.00	1.79	1.20	0.06
20.50	1.80	1.21	0.06
21.00	1.81	1.22	0.06
21.50	1.82	1.23	0.06
22.00	1.83	1.24	0.05
22.50	1.84	1.25	0.05
23.00	1.85	1.26	0.05
23.50	1.86	1.27	0.05
24.00	**1.87**	**1.28**	0.04
24.50	1.87	1.28	0.00
25.00	1.87	1.28	0.00
25.50	1.87	1.28	0.00
26.00	1.87	1.28	0.00
26.50	1.87	1.28	0.00
27.00	1.87	1.28	0.00
27.50	1.87	1.28	0.00
28.00	1.87	1.28	0.00
28.50	1.87	1.28	0.00
29.00	1.87	1.28	0.00
29.50	1.87	1.28	0.00
30.00	1.87	1.28	0.00
30.50	1.87	1.28	0.00
31.00	1.87	1.28	0.00
31.50	1.87	1.28	0.00
32.00	1.87	1.28	0.00
32.50	1.87	1.28	0.00
33.00	1.87	1.28	0.00
33.50	1.87	1.28	0.00
34.00	1.87	1.28	0.00
34.50	1.87	1.28	0.00
35.00	1.87	1.28	0.00
35.50	1.87	1.28	0.00
36.00	1.87	1.28	0.00

Summary for Subcatchment DA #2B: Drainage Area #2B

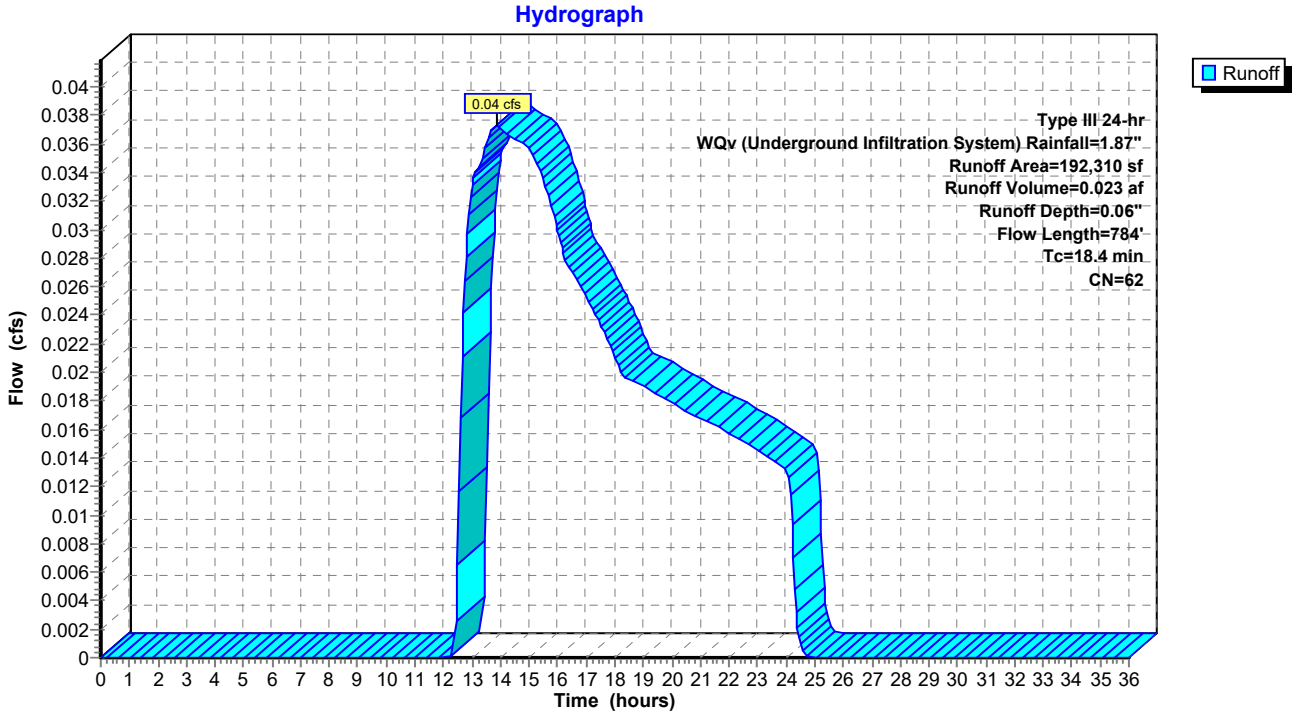
Runoff = 0.04 cfs @ 13.89 hrs, Volume= 0.023 af, Depth= 0.06"
Routed to Link POI #2 : POI #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv (Underground Infiltration System) Rainfall=1.87"

	Area (sf)	CN	Description
	187,035	61	>75% Grass cover, Good, HSG B
*	2,004	61	Emergency Access Road (Perv.), Good, HSG B
*	3,271	98	Emergency Acess Road (Imp.), HSG B
	192,310	62	Weighted Average
	189,039		98.30% Pervious Area
	3,271		1.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	150	0.0667	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.00"
3.0	634	0.2524	3.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
18.4	784	Total			

Subcatchment DA #2B: Drainage Area #2B



Hydrograph for Subcatchment DA #2B: Drainage Area #2B

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.01	0.00	0.00
1.00	0.02	0.00	0.00
1.50	0.03	0.00	0.00
2.00	0.04	0.00	0.00
2.50	0.05	0.00	0.00
3.00	0.06	0.00	0.00
3.50	0.07	0.00	0.00
4.00	0.08	0.00	0.00
4.50	0.09	0.00	0.00
5.00	0.11	0.00	0.00
5.50	0.12	0.00	0.00
6.00	0.13	0.00	0.00
6.50	0.15	0.00	0.00
7.00	0.17	0.00	0.00
7.50	0.19	0.00	0.00
8.00	0.21	0.00	0.00
8.50	0.24	0.00	0.00
9.00	0.27	0.00	0.00
9.50	0.31	0.00	0.00
10.00	0.35	0.00	0.00
10.50	0.40	0.00	0.00
11.00	0.47	0.00	0.00
11.50	0.56	0.00	0.00
12.00	0.93	0.00	0.00
12.50	1.31	0.00	0.01
13.00	1.40	0.00	0.03
13.50	1.47	0.01	**0.04**
14.00	1.52	0.01	**0.04**
14.50	1.56	0.02	0.04
15.00	1.60	0.02	0.04
15.50	1.63	0.02	0.03
16.00	1.66	0.03	0.03
16.50	1.68	0.03	0.03
17.00	1.70	0.03	0.03
17.50	1.72	0.04	0.02
18.00	1.74	0.04	0.02
18.50	1.75	0.04	0.02
19.00	1.76	0.04	0.02
19.50	1.78	0.05	0.02
20.00	1.79	0.05	0.02
20.50	1.80	0.05	0.02
21.00	1.81	0.05	0.02
21.50	1.82	0.05	0.02
22.00	1.83	0.05	0.02
22.50	1.84	0.06	0.02
23.00	1.85	0.06	0.01
23.50	1.86	0.06	0.01
24.00	**1.87**	**0.06**	0.01
24.50	1.87	0.06	0.00
25.00	1.87	0.06	0.00
25.50	1.87	0.06	0.00
26.00	1.87	0.06	0.00
26.50	1.87	0.06	0.00
27.00	1.87	0.06	0.00
27.50	1.87	0.06	0.00
28.00	1.87	0.06	0.00
28.50	1.87	0.06	0.00
29.00	1.87	0.06	0.00
29.50	1.87	0.06	0.00
30.00	1.87	0.06	0.00
30.50	1.87	0.06	0.00
31.00	1.87	0.06	0.00
31.50	1.87	0.06	0.00
32.00	1.87	0.06	0.00
32.50	1.87	0.06	0.00
33.00	1.87	0.06	0.00
33.50	1.87	0.06	0.00
34.00	1.87	0.06	0.00
34.50	1.87	0.06	0.00
35.00	1.87	0.06	0.00
35.50	1.87	0.06	0.00
36.00	1.87	0.06	0.00

Summary for Pond DB #2: Drainage Basin #2

Inflow Area = 2.790 ac, 88.60% Impervious, Inflow Depth = 1.28" for WQv (Underground Infiltration System
Inflow = 3.56 cfs @ 12.14 hrs, Volume= 0.297 af
Outflow = 1.72 cfs @ 12.38 hrs, Volume= 0.296 af, Atten= 52%, Lag= 14.1 min
Discarded = 1.70 cfs @ 12.38 hrs, Volume= 0.296 af
Primary = 0.01 cfs @ 12.38 hrs, Volume= 0.000 af
Routed to Link POI #2 : POI #2

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 485.27' @ 12.38 hrs Surf.Area= 6,035 sf Storage= 1,544 cf

Plug-Flow detention time= 5.7 min calculated for 0.296 af (100% of inflow)
Center-of-Mass det. time= 5.1 min (815.1 - 809.9)

Volume	Invert	Avail.Storage	Storage Description
#1	485.00'	25,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

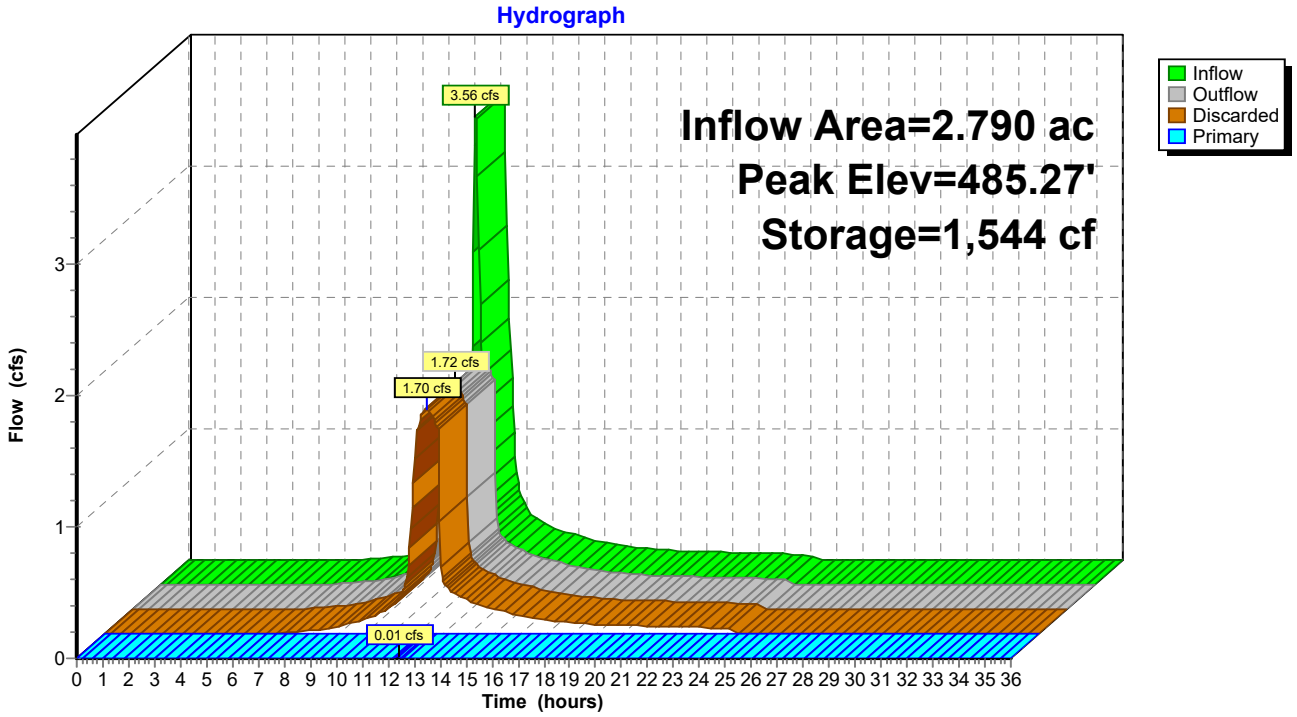
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
485.00	5,500	0	0
486.00	7,500	6,500	6,500
487.00	9,500	8,500	15,000
488.00	11,500	10,500	25,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	485.00'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 470.00'
#2	Primary	485.21'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	486.70'	**7.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

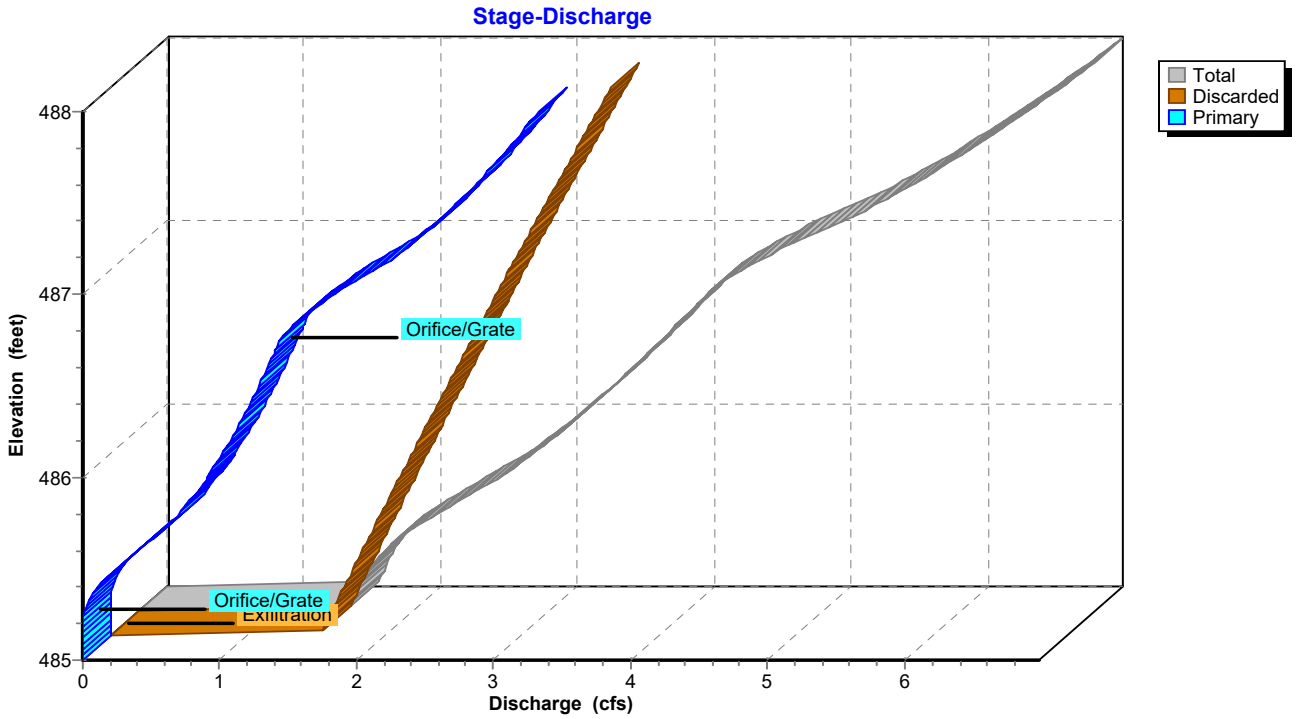
Discarded OutFlow Max=1.70 cfs @ 12.38 hrs HW=485.27' (Free Discharge)
└**1=Exfiltration** (Controls 1.70 cfs)

Primary OutFlow Max=0.01 cfs @ 12.38 hrs HW=485.27' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.81 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

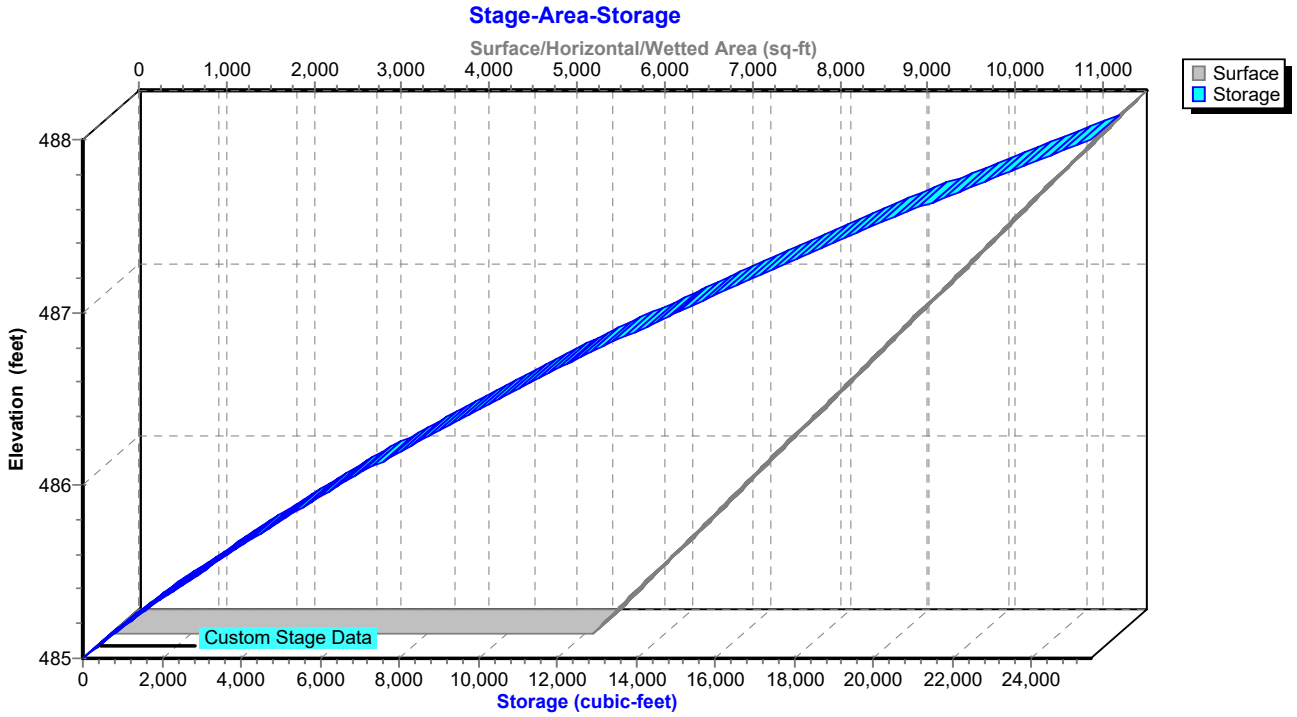
Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Pond DB #2: Drainage Basin #2



Hydrograph for Pond DB #2: Drainage Basin #2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	485.00	0.00	0.00	0.00
1.00	0.00	0	485.00	0.00	0.00	0.00
2.00	0.00	0	485.00	0.00	0.00	0.00
3.00	0.00	0	485.00	0.00	0.00	0.00
4.00	0.00	0	485.00	0.00	0.00	0.00
5.00	0.00	0	485.00	0.00	0.00	0.00
6.00	0.00	0	485.00	0.00	0.00	0.00
7.00	0.01	1	485.00	0.01	0.01	0.00
8.00	0.03	3	485.00	0.03	0.03	0.00
9.00	0.06	6	485.00	0.06	0.06	0.00
10.00	0.11	11	485.00	0.11	0.11	0.00
11.00	0.20	21	485.00	0.20	0.20	0.00
12.00	**1.82**	**176**	**485.03**	**1.55**	**1.55**	**0.00**
13.00	**0.41**	**46**	**485.01**	**0.43**	**0.43**	**0.00**
14.00	0.25	27	485.00	0.25	0.25	0.00
15.00	0.19	20	485.00	0.19	0.19	0.00
16.00	0.13	14	485.00	0.14	0.14	0.00
17.00	0.10	11	485.00	0.11	0.11	0.00
18.00	0.08	9	485.00	0.08	0.08	0.00
19.00	0.07	8	485.00	0.07	0.07	0.00
20.00	0.06	7	485.00	0.06	0.06	0.00
21.00	0.06	6	485.00	0.06	0.06	0.00
22.00	0.05	6	485.00	0.05	0.05	0.00
23.00	0.05	5	485.00	0.05	0.05	0.00
24.00	0.04	5	485.00	0.04	0.04	0.00
25.00	0.00	0	485.00	0.00	0.00	0.00
26.00	0.00	0	485.00	0.00	0.00	0.00
27.00	0.00	0	485.00	0.00	0.00	0.00
28.00	0.00	0	485.00	0.00	0.00	0.00
29.00	0.00	0	485.00	0.00	0.00	0.00
30.00	0.00	0	485.00	0.00	0.00	0.00
31.00	0.00	0	485.00	0.00	0.00	0.00
32.00	0.00	0	485.00	0.00	0.00	0.00
33.00	0.00	0	485.00	0.00	0.00	0.00
34.00	0.00	0	485.00	0.00	0.00	0.00
35.00	0.00	0	485.00	0.00	0.00	0.00
36.00	0.00	0	485.00	0.00	0.00	0.00

Stage-Discharge for Pond DB #2: Drainage Basin #2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
485.00	0.00	0.00	0.00
485.05	1.56	1.56	0.00
485.10	1.59	1.59	0.00
485.15	1.63	1.63	0.00
485.20	1.66	1.66	0.00
485.25	1.70	1.69	0.01
485.30	1.75	1.73	0.03
485.35	1.82	1.76	0.06
485.40	1.91	1.79	0.11
485.45	2.00	1.83	0.17
485.50	2.10	1.86	0.24
485.55	2.22	1.89	0.32
485.60	2.33	1.93	0.40
485.65	2.45	1.96	0.49
485.70	2.57	2.00	0.57
485.75	2.68	2.03	0.65
485.80	2.77	2.06	0.70
485.85	2.86	2.10	0.76
485.90	2.95	2.13	0.81
485.95	3.03	2.17	0.86
486.00	3.11	2.20	0.91
486.05	3.19	2.24	0.95
486.10	3.27	2.27	1.00
486.15	3.34	2.31	1.04
486.20	3.42	2.34	1.08
486.25	3.49	2.38	1.11
486.30	3.56	2.41	1.15
486.35	3.63	2.45	1.19
486.40	3.70	2.48	1.22
486.45	3.77	2.52	1.25
486.50	3.84	2.55	1.29
486.55	3.91	2.59	1.32
486.60	3.97	2.62	1.35
486.65	4.04	2.66	1.38
486.70	4.10	2.70	1.41
486.75	4.18	2.73	1.45
486.80	4.27	2.77	1.50
486.85	4.37	2.80	1.57
486.90	4.49	2.84	1.65
486.95	4.61	2.88	1.73
487.00	4.75	2.91	1.83
487.05	4.89	2.95	1.94
487.10	5.03	2.99	2.05
487.15	5.18	3.02	2.16
487.20	5.32	3.06	2.26
487.25	5.46	3.10	2.36
487.30	5.57	3.13	2.44
487.35	5.69	3.17	2.52
487.40	5.80	3.21	2.60
487.45	5.91	3.24	2.67
487.50	6.02	3.28	2.74
487.55	6.12	3.32	2.80
487.60	6.22	3.35	2.87
487.65	6.32	3.39	2.93
487.70	6.42	3.43	2.99
487.75	6.52	3.47	3.05
487.80	6.61	3.50	3.11
487.85	6.71	3.54	3.16
487.90	6.80	3.58	3.22
487.95	6.89	3.62	3.27
488.00	**6.98**	**3.65**	**3.33**

Stage-Area-Storage for Pond DB #2: Drainage Basin #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
485.00	5,500	0
485.05	5,600	278
485.10	5,700	560
485.15	5,800	847
485.20	5,900	1,140
485.25	6,000	1,438
485.30	6,100	1,740
485.35	6,200	2,048
485.40	6,300	2,360
485.45	6,400	2,677
485.50	6,500	3,000
485.55	6,600	3,328
485.60	6,700	3,660
485.65	6,800	3,997
485.70	6,900	4,340
485.75	7,000	4,688
485.80	7,100	5,040
485.85	7,200	5,398
485.90	7,300	5,760
485.95	7,400	6,127
486.00	7,500	6,500
486.05	7,600	6,878
486.10	7,700	7,260
486.15	7,800	7,647
486.20	7,900	8,040
486.25	8,000	8,438
486.30	8,100	8,840
486.35	8,200	9,248
486.40	8,300	9,660
486.45	8,400	10,077
486.50	8,500	10,500
486.55	8,600	10,928
486.60	8,700	11,360
486.65	8,800	11,797
486.70	8,900	12,240
486.75	9,000	12,688
486.80	9,100	13,140
486.85	9,200	13,598
486.90	9,300	14,060
486.95	9,400	14,527
487.00	9,500	15,000
487.05	9,600	15,478
487.10	9,700	15,960
487.15	9,800	16,447
487.20	9,900	16,940
487.25	10,000	17,438
487.30	10,100	17,940
487.35	10,200	18,448
487.40	10,300	18,960
487.45	10,400	19,477
487.50	10,500	20,000
487.55	10,600	20,528
487.60	10,700	21,060
487.65	10,800	21,597
487.70	10,900	22,140
487.75	11,000	22,688
487.80	11,100	23,240
487.85	11,200	23,798
487.90	11,300	24,360
487.95	11,400	24,927
488.00	**11,500**	**25,500**

Summary for Pond SMS #1A: SMS #1A

Inflow Area = 3.863 ac, 91.78% Impervious, Inflow Depth = 1.36" for WQv (Underground Infiltration System
Inflow = 5.21 cfs @ 12.14 hrs, Volume= 0.438 af
Outflow = 2.12 cfs @ 12.43 hrs, Volume= 0.438 af, Atten= 59%, Lag= 17.4 min
Discarded = 2.12 cfs @ 12.43 hrs, Volume= 0.438 af
Primary = 0.00 cfs @ 12.43 hrs, Volume= 0.000 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 492.57' @ 12.43 hrs Surf.Area= 7,503 sf Storage= 2,694 cf

Plug-Flow detention time= 6.6 min calculated for 0.437 af (100% of inflow)
Center-of-Mass det. time= 6.6 min (809.3 - 802.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	491.75'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	492.50'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	491.75'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	492.53'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	493.83'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	494.49'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	495.32'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	496.23'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.12 cfs @ 12.43 hrs HW=492.57' (Free Discharge)
└**1=Exfiltration** (Controls 2.12 cfs)

Primary OutFlow Max=0.00 cfs @ 12.43 hrs HW=492.57' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.65 fps)
├**3=Orifice/Grate** (Controls 0.00 cfs)
├**4=Orifice/Grate** (Controls 0.00 cfs)
├**5=Orifice/Grate** (Controls 0.00 cfs)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1A: SMS #1A - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

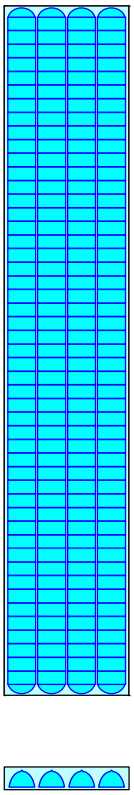
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

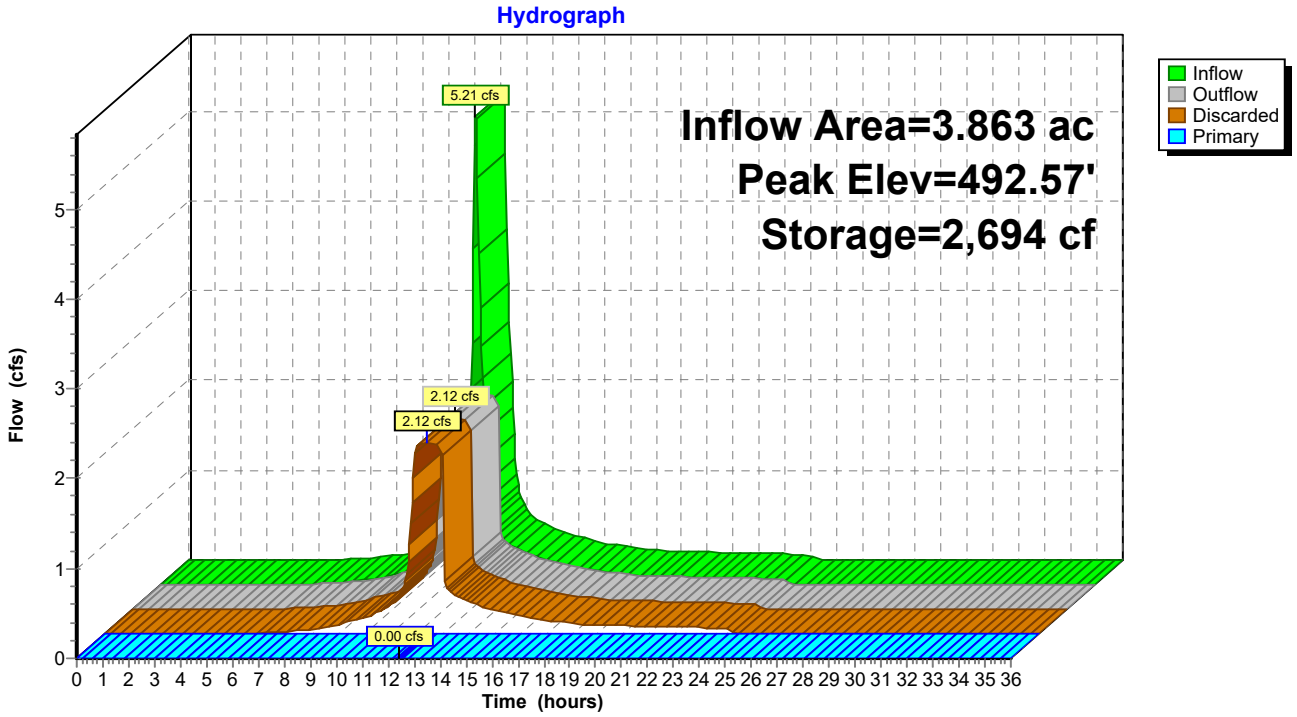
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

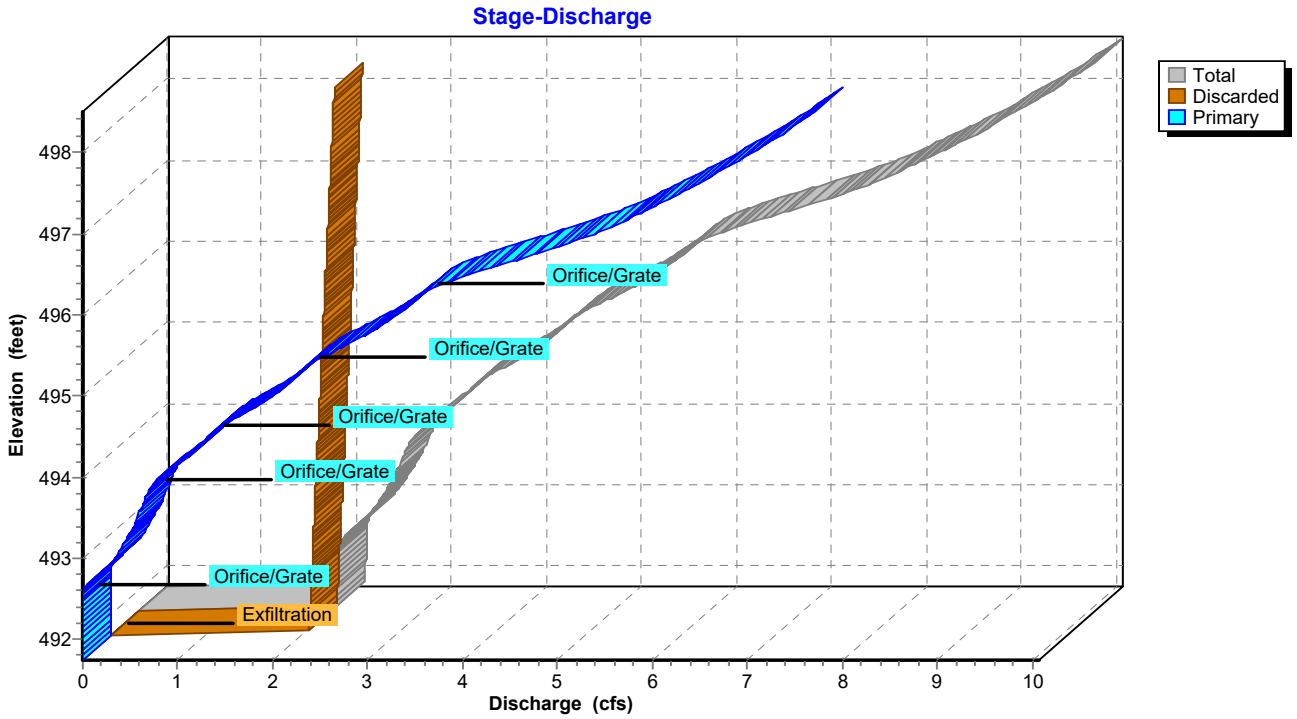
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



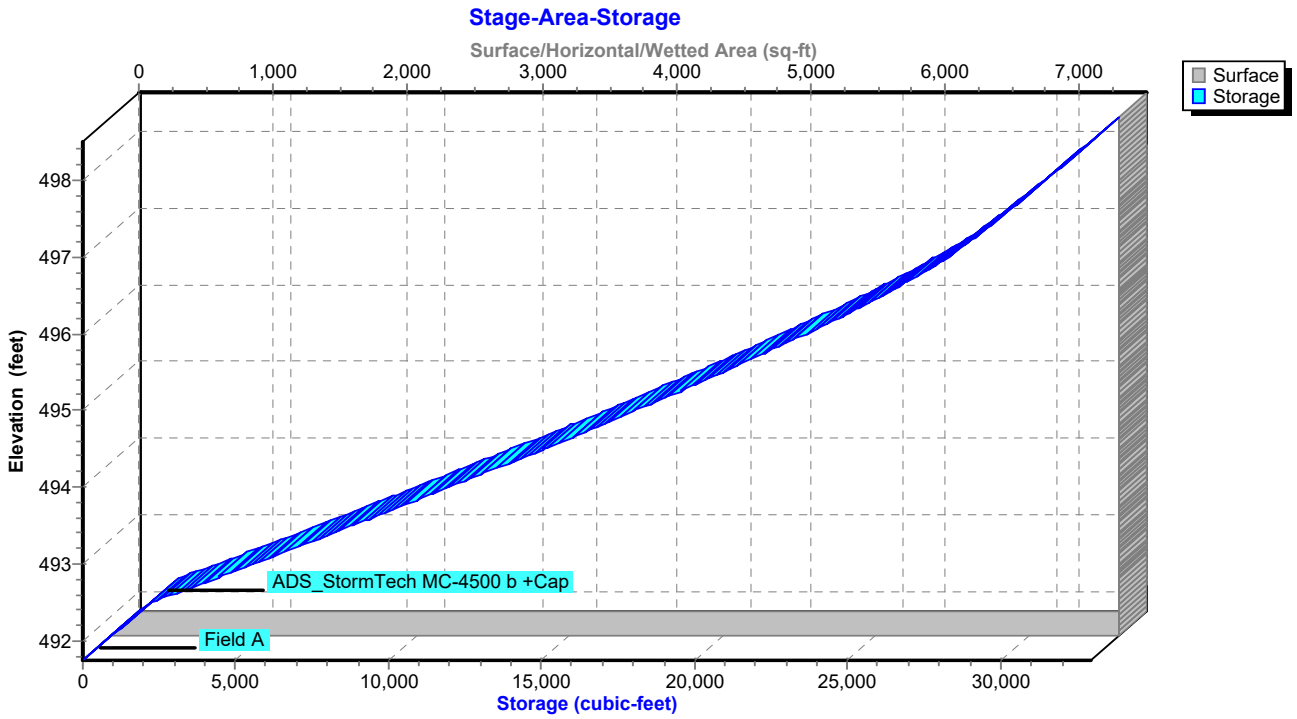
Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Pond SMS #1A: SMS #1A



Hydrograph for Pond SMS #1A: SMS #1A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	491.75	0.00	0.00	0.00
1.00	0.00	0	491.75	0.00	0.00	0.00
2.00	0.00	0	491.75	0.00	0.00	0.00
3.00	0.00	0	491.75	0.00	0.00	0.00
4.00	0.00	0	491.75	0.00	0.00	0.00
5.00	0.00	0	491.75	0.00	0.00	0.00
6.00	0.01	1	491.75	0.01	0.01	0.00
7.00	0.03	3	491.75	0.03	0.03	0.00
8.00	0.05	5	491.75	0.05	0.05	0.00
9.00	0.11	10	491.75	0.10	0.10	0.00
10.00	0.18	17	491.76	0.18	0.18	0.00
11.00	0.32	31	491.76	0.31	0.31	0.00
12.00	**2.70**	**265**	**491.84**	**2.09**	**2.09**	**0.00**
13.00	**0.58**	**443**	**491.90**	**2.09**	**2.09**	**0.00**
14.00	0.36	35	491.76	0.36	0.36	0.00
15.00	0.27	26	491.76	0.27	0.27	0.00
16.00	0.19	19	491.76	0.19	0.19	0.00
17.00	0.15	15	491.75	0.15	0.15	0.00
18.00	0.11	11	491.75	0.12	0.12	0.00
19.00	0.10	10	491.75	0.10	0.10	0.00
20.00	0.09	9	491.75	0.09	0.09	0.00
21.00	0.08	8	491.75	0.08	0.08	0.00
22.00	0.08	7	491.75	0.08	0.08	0.00
23.00	0.07	7	491.75	0.07	0.07	0.00
24.00	0.06	6	491.75	0.06	0.06	0.00
25.00	0.00	0	491.75	0.00	0.00	0.00
26.00	0.00	0	491.75	0.00	0.00	0.00
27.00	0.00	0	491.75	0.00	0.00	0.00
28.00	0.00	0	491.75	0.00	0.00	0.00
29.00	0.00	0	491.75	0.00	0.00	0.00
30.00	0.00	0	491.75	0.00	0.00	0.00
31.00	0.00	0	491.75	0.00	0.00	0.00
32.00	0.00	0	491.75	0.00	0.00	0.00
33.00	0.00	0	491.75	0.00	0.00	0.00
34.00	0.00	0	491.75	0.00	0.00	0.00
35.00	0.00	0	491.75	0.00	0.00	0.00
36.00	0.00	0	491.75	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1A: SMS #1A

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
491.75	0.00	0.00	0.00
491.85	2.09	2.09	0.00
491.95	2.09	2.09	0.00
492.05	2.10	2.10	0.00
492.15	2.10	2.10	0.00
492.25	2.10	2.10	0.00
492.35	2.11	2.11	0.00
492.45	2.11	2.11	0.00
492.55	2.12	2.12	0.00
492.65	2.16	2.12	0.04
492.75	2.24	2.12	0.12
492.85	2.34	2.13	0.22
492.95	2.43	2.13	0.30
493.05	2.50	2.14	0.37
493.15	2.56	2.14	0.42
493.25	2.61	2.14	0.47
493.35	2.66	2.15	0.51
493.45	2.71	2.15	0.55
493.55	2.75	2.16	0.59
493.65	2.79	2.16	0.63
493.75	2.82	2.16	0.66
493.85	2.86	2.17	0.69
493.95	2.93	2.17	0.76
494.05	3.05	2.18	0.87
494.15	3.18	2.18	1.00
494.25	3.29	2.18	1.11
494.35	3.39	2.19	1.20
494.45	3.47	2.19	1.28
494.55	3.56	2.20	1.36
494.65	3.69	2.20	1.49
494.75	3.85	2.20	1.64
494.85	4.01	2.21	1.80
494.95	4.15	2.21	1.93
495.05	4.26	2.22	2.05
495.15	4.37	2.22	2.15
495.25	4.48	2.23	2.25
495.35	4.57	2.23	2.35
495.45	4.71	2.23	2.47
495.55	4.88	2.24	2.64
495.65	5.06	2.24	2.82
495.75	5.23	2.25	2.98
495.85	5.37	2.25	3.12
495.95	5.50	2.25	3.25
496.05	5.62	2.26	3.36
496.15	5.74	2.26	3.48
496.25	5.85	2.27	3.58
496.35	6.00	2.27	3.74
496.45	6.22	2.27	3.94
496.55	6.48	2.28	4.20
496.65	6.76	2.28	4.48
496.75	7.06	2.29	4.78
496.85	7.35	2.29	5.06
496.95	7.57	2.29	5.28
497.05	7.79	2.30	5.49
497.15	7.99	2.30	5.69
497.25	8.18	2.31	5.87
497.35	8.36	2.31	6.05
497.45	8.53	2.31	6.22
497.55	8.70	2.32	6.38
497.65	8.86	2.32	6.54
497.75	9.02	2.33	6.69
497.85	9.17	2.33	6.84
497.95	9.32	2.33	6.98
498.05	9.46	2.34	7.12
498.15	9.60	2.34	7.26
498.25	9.74	2.35	7.39
498.35	9.87	2.35	7.52
498.45	**10.00**	**2.35**	**7.65**

Stage-Area-Storage for Pond SMS #1A: SMS #1A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
491.75	**7,503**	0
491.85	7,503	300
491.95	7,503	600
492.05	7,503	900
492.15	7,503	1,200
492.25	7,503	1,501
492.35	7,503	1,801
492.45	7,503	2,101
492.55	7,503	2,582
492.65	7,503	3,243
492.75	7,503	3,902
492.85	7,503	4,560
492.95	7,503	5,216
493.05	7,503	5,871
493.15	7,503	6,523
493.25	7,503	7,173
493.35	7,503	7,822
493.45	7,503	8,468
493.55	7,503	9,111
493.65	7,503	9,752
493.75	7,503	10,391
493.85	7,503	11,026
493.95	7,503	11,658
494.05	7,503	12,288
494.15	7,503	12,914
494.25	7,503	13,537
494.35	7,503	14,155
494.45	7,503	14,770
494.55	7,503	15,381
494.65	7,503	15,988
494.75	7,503	16,590
494.85	7,503	17,188
494.95	7,503	17,781
495.05	7,503	18,369
495.15	7,503	18,952
495.25	7,503	19,530
495.35	7,503	20,101
495.45	7,503	20,667
495.55	7,503	21,226
495.65	7,503	21,779
495.75	7,503	22,324
495.85	7,503	22,862
495.95	7,503	23,393
496.05	7,503	23,915
496.15	7,503	24,428
496.25	7,503	24,932
496.35	7,503	25,426
496.45	7,503	25,909
496.55	7,503	26,381
496.65	7,503	26,840
496.75	7,503	27,285
496.85	7,503	27,713
496.95	7,503	28,121
497.05	7,503	28,501
497.15	7,503	28,850
497.25	7,503	29,181
497.35	7,503	29,504
497.45	7,503	29,817
497.55	7,503	30,119
497.65	7,503	30,419
497.75	7,503	30,719
497.85	7,503	31,019
497.95	7,503	31,319
498.05	7,503	31,620
498.15	7,503	31,920
498.25	7,503	32,220
498.35	7,503	32,520
498.45	7,503	**32,820**

Summary for Pond SMS #1C: SMS #1C

Inflow Area = 3.475 ac, 93.57% Impervious, Inflow Depth = 1.45" for WQv (Underground Infiltration System
Inflow = 4.92 cfs @ 12.14 hrs, Volume= 0.420 af
Outflow = 2.11 cfs @ 12.41 hrs, Volume= 0.420 af, Atten= 57%, Lag= 16.1 min
Discarded = 2.11 cfs @ 12.41 hrs, Volume= 0.420 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link POI #1 : POI #1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 496.02' @ 12.41 hrs Surf.Area= 7,503 sf Storage= 2,367 cf

Plug-Flow detention time= 5.8 min calculated for 0.420 af (100% of inflow)
Center-of-Mass det. time= 5.8 min (800.3 - 794.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	495.25'	11,782 cf	**36.83'W x 203.69'L x 6.75'H Field A** 50,643 cf Overall - 21,188 cf Embedded = 29,455 cf x 40.0% Voids
#2A	496.00'	21,188 cf	**ADS_StormTech MC-4500 b +Cap**x 196 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 196 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		32,970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	495.25'	**12.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 440.00'
#2	Primary	496.09'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	496.92'	**5.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	497.83'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	498.75'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	499.67'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.11 cfs @ 12.41 hrs HW=496.02' (Free Discharge)
└**1=Exfiltration** (Controls 2.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=495.25' (Free Discharge)
├**2=Orifice/Grate** (Controls 0.00 cfs)
├**3=Orifice/Grate** (Controls 0.00 cfs)
├**4=Orifice/Grate** (Controls 0.00 cfs)
├**5=Orifice/Grate** (Controls 0.00 cfs)
└**6=Orifice/Grate** (Controls 0.00 cfs)

Pond SMS #1C: SMS #1C - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 6.0" Spacing = 106.0" C-C Row Spacing

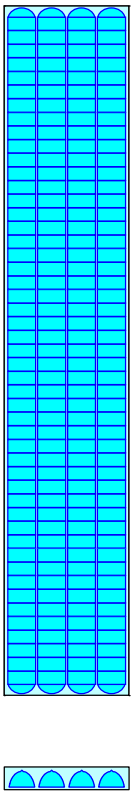
49 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 202.69' Row Length +6.0" End Stone x 2 = 203.69' Base Length
4 Rows x 100.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 36.83' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

196 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 21,188.1 cf Chamber Storage

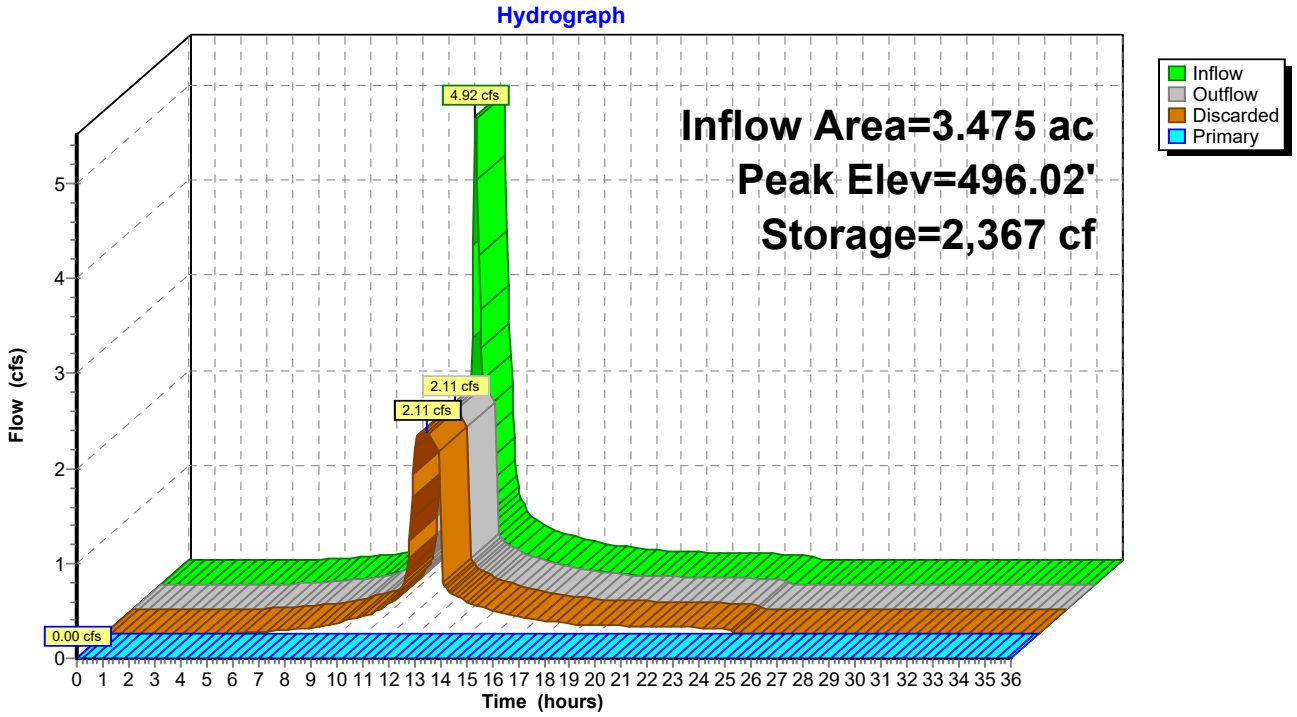
50,642.8 cf Field - 21,188.1 cf Chambers = 29,454.7 cf Stone x 40.0% Voids = 11,781.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,970.0 cf = 0.757 af
Overall Storage Efficiency = 65.1%
Overall System Size = 203.69' x 36.83' x 6.75'

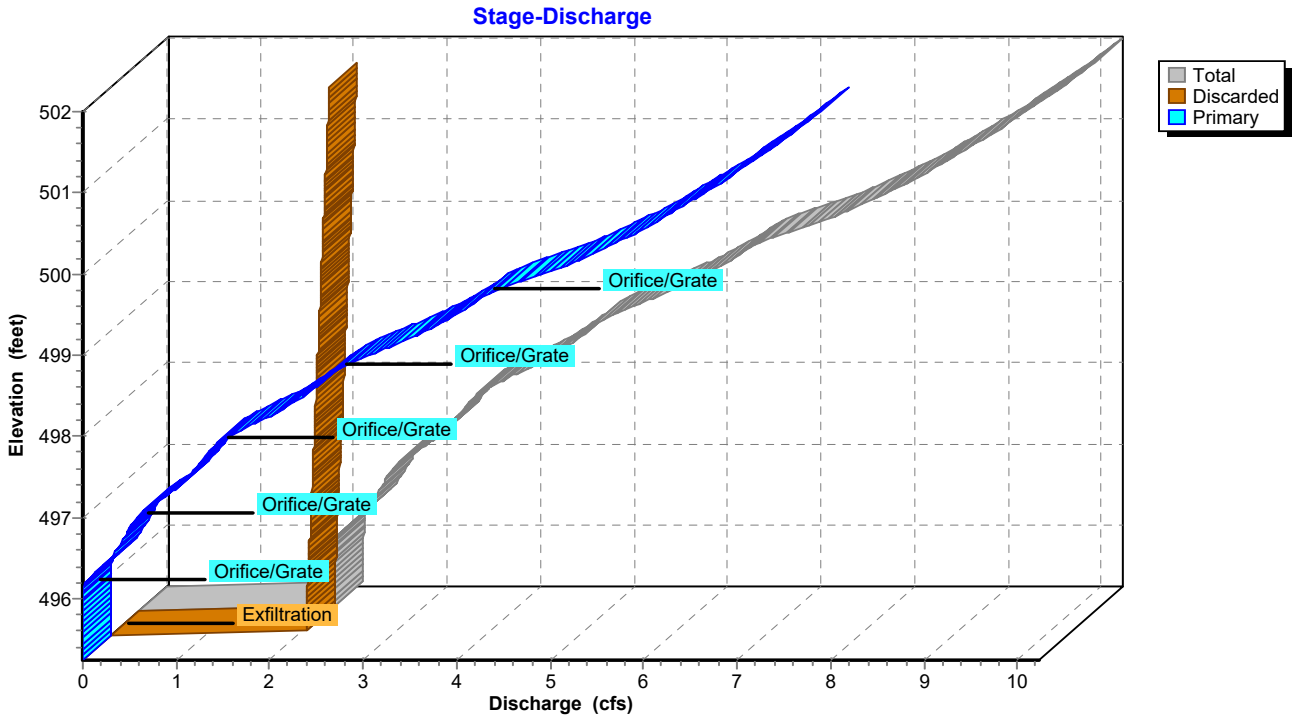
196 Chambers
1,875.7 cy Field
1,090.9 cy Stone



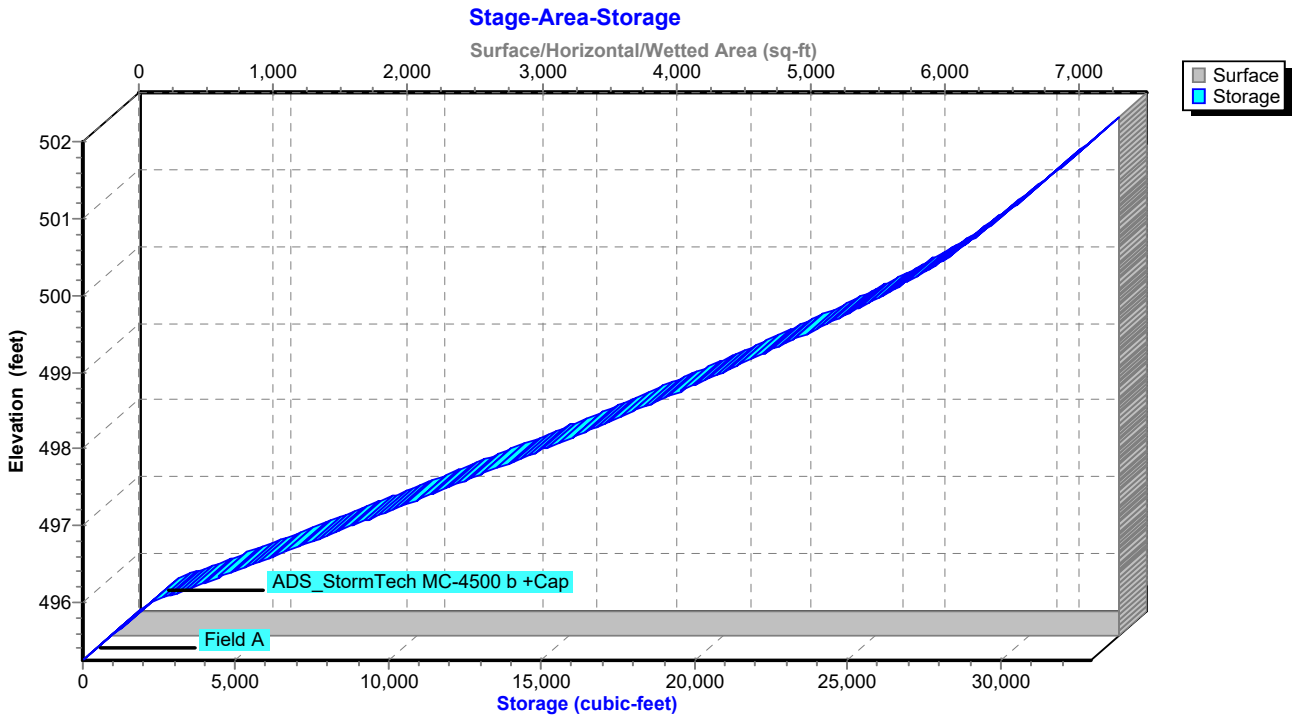
Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Pond SMS #1C: SMS #1C



Hydrograph for Pond SMS #1C: SMS #1C

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	495.25	0.00	0.00	**0.00**
1.00	0.00	0	495.25	0.00	0.00	0.00
2.00	0.00	0	495.25	0.00	0.00	0.00
3.00	0.00	0	495.25	0.00	0.00	0.00
4.00	0.00	0	495.25	0.00	0.00	0.00
5.00	0.01	1	495.25	0.01	0.01	0.00
6.00	0.02	2	495.25	0.02	0.02	0.00
7.00	0.04	4	495.25	0.04	0.04	0.00
8.00	0.07	6	495.25	0.07	0.07	0.00
9.00	0.12	11	495.25	0.12	0.12	0.00
10.00	0.19	18	495.26	0.19	0.19	0.00
11.00	0.32	31	495.26	0.32	0.32	0.00
12.00	**2.59**	**248**	**495.33**	**2.09**	**2.09**	0.00
13.00	**0.54**	**84**	**495.28**	**0.87**	**0.87**	0.00
14.00	0.33	32	495.26	0.33	0.33	0.00
15.00	0.25	24	495.26	0.25	0.25	0.00
16.00	0.17	17	495.26	0.18	0.18	0.00
17.00	0.14	13	495.25	0.14	0.14	0.00
18.00	0.11	10	495.25	0.11	0.11	0.00
19.00	0.09	9	495.25	0.09	0.09	0.00
20.00	0.08	8	495.25	0.08	0.08	0.00
21.00	0.08	7	495.25	0.08	0.08	0.00
22.00	0.07	7	495.25	0.07	0.07	0.00
23.00	0.06	6	495.25	0.06	0.06	0.00
24.00	0.05	5	495.25	0.05	0.05	0.00
25.00	0.00	0	495.25	0.00	0.00	0.00
26.00	0.00	0	495.25	0.00	0.00	0.00
27.00	0.00	0	495.25	0.00	0.00	0.00
28.00	0.00	0	495.25	0.00	0.00	0.00
29.00	0.00	0	495.25	0.00	0.00	0.00
30.00	0.00	0	495.25	0.00	0.00	0.00
31.00	0.00	0	495.25	0.00	0.00	0.00
32.00	0.00	0	495.25	0.00	0.00	0.00
33.00	0.00	0	495.25	0.00	0.00	0.00
34.00	0.00	0	495.25	0.00	0.00	0.00
35.00	0.00	0	495.25	0.00	0.00	0.00
36.00	0.00	0	495.25	0.00	0.00	0.00

Stage-Discharge for Pond SMS #1C: SMS #1C

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
495.25	0.00	0.00	0.00
495.35	2.09	2.09	0.00
495.45	2.09	2.09	0.00
495.55	2.10	2.10	0.00
495.65	2.10	2.10	0.00
495.75	2.10	2.10	0.00
495.85	2.11	2.11	0.00
495.95	2.11	2.11	0.00
496.05	2.11	2.11	0.00
496.15	2.13	2.12	0.01
496.25	2.19	2.12	0.07
496.35	2.28	2.13	0.16
496.45	2.39	2.13	0.26
496.55	2.46	2.13	0.33
496.65	2.53	2.14	0.39
496.75	2.58	2.14	0.44
496.85	2.63	2.14	0.49
496.95	2.68	2.15	0.53
497.05	2.77	2.15	0.61
497.15	2.89	2.16	0.73
497.25	3.03	2.16	0.87
497.35	3.15	2.16	0.98
497.45	3.24	2.17	1.08
497.55	3.33	2.17	1.16
497.65	3.41	2.17	1.24
497.75	3.49	2.18	1.31
497.85	3.56	2.18	1.38
497.95	3.67	2.19	1.48
498.05	3.82	2.19	1.63
498.15	4.01	2.19	1.81
498.25	4.20	2.20	2.00
498.35	4.36	2.20	2.16
498.45	4.50	2.20	2.29
498.55	4.62	2.21	2.42
498.65	4.74	2.21	2.53
498.75	4.85	2.22	2.64
498.85	4.99	2.22	2.77
498.95	5.17	2.22	2.95
499.05	5.39	2.23	3.16
499.15	5.61	2.23	3.38
499.25	5.81	2.23	3.58
499.35	5.99	2.24	3.75
499.45	6.15	2.24	3.91
499.55	6.30	2.25	4.05
499.65	6.44	2.25	4.19
499.75	6.60	2.25	4.34
499.85	6.80	2.26	4.54
499.95	7.04	2.26	4.78
500.05	7.29	2.27	5.03
500.15	7.53	2.27	5.26
500.25	7.73	2.27	5.46
500.35	7.92	2.28	5.64
500.45	8.10	2.28	5.82
500.55	8.27	2.28	5.98
500.65	8.43	2.29	6.14
500.75	8.58	2.29	6.29
500.85	8.73	2.30	6.44
500.95	8.88	2.30	6.58
501.05	9.02	2.30	6.72
501.15	9.16	2.31	6.85
501.25	9.30	2.31	6.99
501.35	9.43	2.31	7.11
501.45	9.56	2.32	7.24
501.55	9.68	2.32	7.36
501.65	9.81	2.33	7.48
501.75	9.93	2.33	7.60
501.85	10.05	2.33	7.72
501.95	**10.17**	**2.34**	**7.83**

Stage-Area-Storage for Pond SMS #1C: SMS #1C

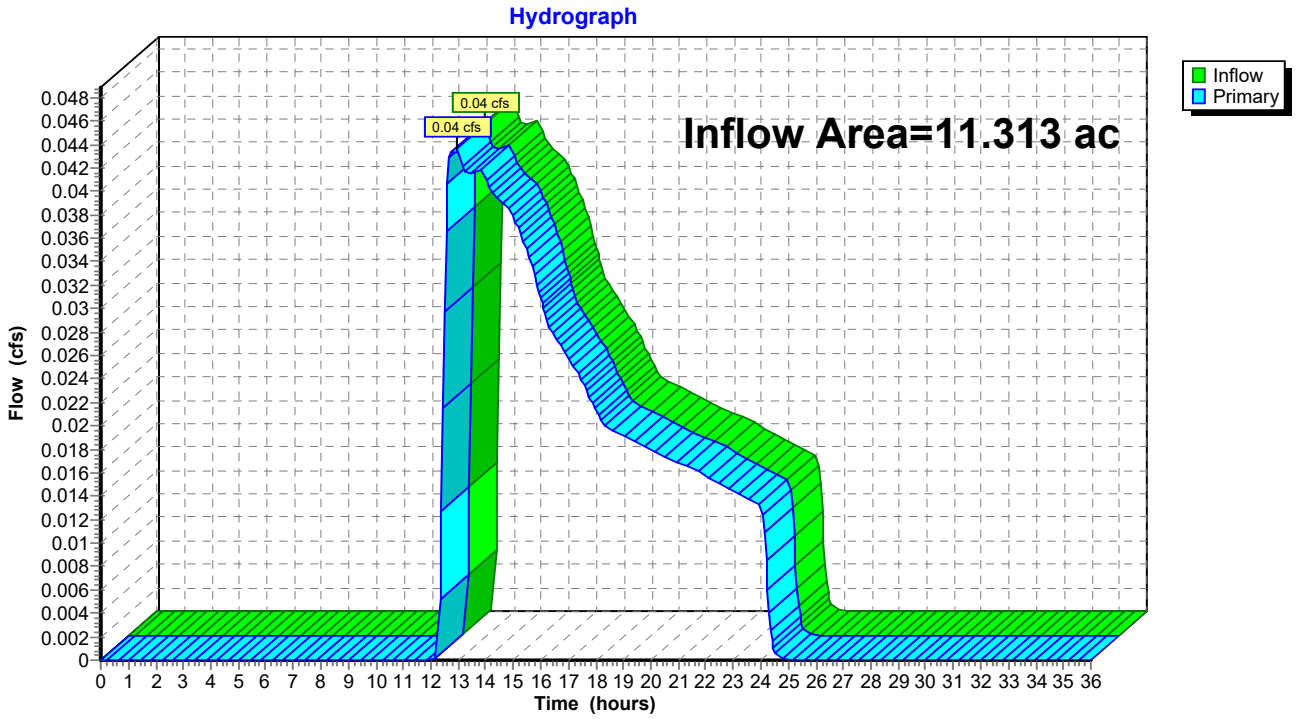
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
495.25	**7,503**	0
495.35	7,503	300
495.45	7,503	600
495.55	7,503	900
495.65	7,503	1,200
495.75	7,503	1,501
495.85	7,503	1,801
495.95	7,503	2,101
496.05	7,503	2,582
496.15	7,503	3,243
496.25	7,503	3,902
496.35	7,503	4,560
496.45	7,503	5,216
496.55	7,503	5,871
496.65	7,503	6,523
496.75	7,503	7,173
496.85	7,503	7,822
496.95	7,503	8,468
497.05	7,503	9,111
497.15	7,503	9,752
497.25	7,503	10,391
497.35	7,503	11,026
497.45	7,503	11,658
497.55	7,503	12,288
497.65	7,503	12,914
497.75	7,503	13,537
497.85	7,503	14,155
497.95	7,503	14,770
498.05	7,503	15,381
498.15	7,503	15,988
498.25	7,503	16,590
498.35	7,503	17,188
498.45	7,503	17,781
498.55	7,503	18,369
498.65	7,503	18,952
498.75	7,503	19,530
498.85	7,503	20,101
498.95	7,503	20,667
499.05	7,503	21,226
499.15	7,503	21,779
499.25	7,503	22,324
499.35	7,503	22,862
499.45	7,503	23,393
499.55	7,503	23,915
499.65	7,503	24,428
499.75	7,503	24,932
499.85	7,503	25,426
499.95	7,503	25,909
500.05	7,503	26,381
500.15	7,503	26,840
500.25	7,503	27,285
500.35	7,503	27,713
500.45	7,503	28,121
500.55	7,503	28,501
500.65	7,503	28,850
500.75	7,503	29,181
500.85	7,503	29,504
500.95	7,503	29,817
501.05	7,503	30,119
501.15	7,503	30,419
501.25	7,503	30,719
501.35	7,503	31,019
501.45	7,503	31,319
501.55	7,503	31,620
501.65	7,503	31,920
501.75	7,503	32,220
501.85	7,503	32,520
501.95	7,503	**32,820**

Summary for Link POI #1: POI #1

Inflow Area = 11.313 ac, 61.95% Impervious, Inflow Depth = 0.03" for WQv (Underground Infiltration System
Inflow = 0.04 cfs @ 12.95 hrs, Volume= 0.024 af
Primary = 0.04 cfs @ 12.95 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #1: POI #1



Hydrograph for Link POI #1: POI #1

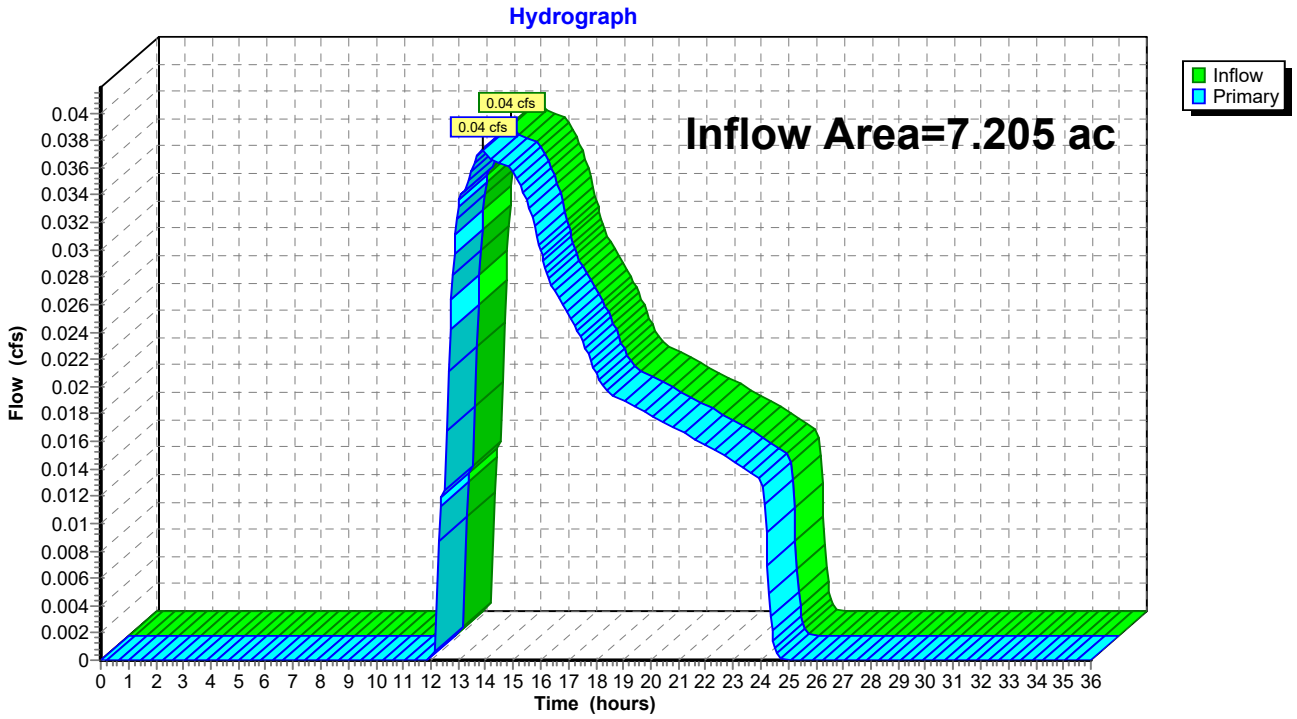
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.00	0.00	0.00
12.50	**0.03**	0.00	**0.03**
13.00	**0.04**	0.00	**0.04**
13.50	0.04	0.00	0.04
14.00	0.04	0.00	0.04
14.50	0.04	0.00	0.04
15.00	0.04	0.00	0.04
15.50	0.03	0.00	0.03
16.00	0.03	0.00	0.03
16.50	0.03	0.00	0.03
17.00	0.03	0.00	0.03
17.50	0.02	0.00	0.02
18.00	0.02	0.00	0.02
18.50	0.02	0.00	0.02
19.00	0.02	0.00	0.02
19.50	0.02	0.00	0.02
20.00	0.02	0.00	0.02
20.50	0.02	0.00	0.02
21.00	0.02	0.00	0.02
21.50	0.02	0.00	0.02
22.00	0.02	0.00	0.02
22.50	0.02	0.00	0.02
23.00	0.01	0.00	0.01
23.50	0.01	0.00	0.01
24.00	0.01	0.00	0.01
24.50	0.00	0.00	0.00
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Summary for Link POI #2: POI #2

Inflow Area = 7.205 ac, 35.36% Impervious, Inflow Depth = 0.04" for WQv (Underground Infiltration System
Inflow = 0.04 cfs @ 13.89 hrs, Volume= 0.023 af
Primary = 0.04 cfs @ 13.89 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link POI #2: POI #2



Hydrograph for Link POI #2: POI #2

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	**0.00**	0.00
0.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00
2.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00
3.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00
4.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.00	0.00	0.00
12.50	0.01	0.00	0.01
13.00	0.03	0.00	0.03
13.50	**0.04**	0.00	**0.04**
14.00	**0.04**	0.00	**0.04**
14.50	0.04	0.00	0.04
15.00	0.04	0.00	0.04
15.50	0.03	0.00	0.03
16.00	0.03	0.00	0.03
16.50	0.03	0.00	0.03
17.00	0.03	0.00	0.03
17.50	0.02	0.00	0.02
18.00	0.02	0.00	0.02
18.50	0.02	0.00	0.02
19.00	0.02	0.00	0.02
19.50	0.02	0.00	0.02
20.00	0.02	0.00	0.02
20.50	0.02	0.00	0.02
21.00	0.02	0.00	0.02
21.50	0.02	0.00	0.02
22.00	0.02	0.00	0.02
22.50	0.02	0.00	0.02
23.00	0.01	0.00	0.01
23.50	0.01	0.00	0.01
24.00	0.01	0.00	0.01
24.50	0.00	0.00	0.00
25.00	0.00	0.00	0.00
25.50	0.00	0.00	0.00
26.00	0.00	0.00	0.00
26.50	0.00	0.00	0.00
27.00	0.00	0.00	0.00
27.50	0.00	0.00	0.00
28.00	0.00	0.00	0.00
28.50	0.00	0.00	0.00
29.00	0.00	0.00	0.00
29.50	0.00	0.00	0.00
30.00	0.00	0.00	0.00
30.50	0.00	0.00	0.00
31.00	0.00	0.00	0.00
31.50	0.00	0.00	0.00
32.00	0.00	0.00	0.00
32.50	0.00	0.00	0.00
33.00	0.00	0.00	0.00
33.50	0.00	0.00	0.00
34.00	0.00	0.00	0.00
34.50	0.00	0.00	0.00
35.00	0.00	0.00	0.00
35.50	0.00	0.00	0.00
36.00	0.00	0.00	0.00

Appendix F

Stormwater Pipe Capacity Calculations & Map

BROOKER ENGINEERING, PLLC

DRAINAGE SYSTEM PIPE SIZING - RATIONAL METHOD

PROJECT NAME: Rella Boulevard **BBE#:** 20313

	LOCATION		PIPE INFORMATION										DESIGN FLOW					FULL FLOW CAPACITY		
DESIGN YEAR	FROM	TO	SIZE (IN)	N	LENGTH (FT)	INV UPPER ELEV	INV LOWER ELEV	UP RIM ELEV	PIPE AREA (FT^2)	PIPE COVER (FT)	SLOPE	FALL (FT)	SUB AREA NAME	SUB AREA (ACRES)	SUBBASIN DESIGN FLOW (CFS)	TOTAL AREA (ACRES)	TOTAL DESIGN FLOW THROUGH PIPE (CFS)	PERCENT OF FULL FLOW CAPACTIY	CAPACITY (CFS)	HYDRAULIC RADIUS (FT)	CHECK
100-Year	CB 12	CB 13	12	0.01	20	494.51	494.29	501.52	0.79	6.01	0.0110	0.22	CB 12	0.17	1.21	0.17	1.21	24.9%	4.87	0.2500	OK
100-Year	CB 13	DMH 14	15	0.01	54	494.04	493.44	499.69	1.23	4.40	0.0111	0.60	CB 13	0.26	1.89	0.43	3.10	35.0%	8.88	0.3125	OK
100-Year	TRENCH DRAIN #1	DMH 14	15	0.01	54	496.00	492.68	501.22	1.23	3.97	0.0615	3.32	NCH DRAI	0.96	6.91	0.96	6.91	33.1%	20.88	0.3125	OK
100-Year	DMH 14	DMH7	24	0.01	202	492.69	490.47	502.04	3.14	7.35	0.0110	2.22	DMH 14	0.00	0.00	1.39	10.02	32.4%	30.91	0.5000	OK
100-Year	TRENCH DRAIN #2	DMH 7	12	0.01	53	495.00	491.47	503.61	0.79	7.61	0.0666	3.53	NCH DRAI	0.30	2.14	0.30	2.14	17.9%	11.99	0.2500	OK
25-Year	CB 8B	DMH 8A	12	0.01	159	503.00	499.50	506.84	0.79	2.84	0.0220	3.50	CB 8B	0.22	1.29	0.22	1.29	18.7%	6.89	0.2500	OK
25-Year	DMH 8A	CB 8	12	0.01	68	499.50	498.00	508.46	0.79	7.96	0.0221	1.50	DMH 8A	0.00	0.00	0.22	1.29	18.7%	6.90	0.2500	OK
25-Year	CB 8	DMH 7	12	0.01	90	496.00	491.47	504.87	0.79	7.87	0.0503	4.53	CB 8	0.41	2.42	0.63	3.71	35.6%	10.42	0.2500	OK
100-Year	CB 9	CB 10	12	0.01	26	494.90	494.67	497.57	0.79	1.67	0.0088	0.23	CB 9	0.10	0.72	0.10	0.72	16.5%	4.37	0.2500	OK
100-Year	CB 10	CB 11	12	0.01	18	494.67	494.51	497.58	0.79	1.91	0.0089	0.16	CB 10	0.09	0.65	0.09	1.37	31.3%	4.38	0.2500	OK
100-Year	CB 11	CB 4	15	0.01	188	494.26	492.56	500.00	1.23	4.49	0.0090	1.70	CB 11	0.56	4.00	0.56	5.37	67.0%	8.01	0.3125	OK
25-Year	CB 4	CB 3	18	0.01	84	492.31	491.55	503.12	1.77	9.31	0.0090	0.76	CB 4	0.39	2.27	0.39	7.64	58.7%	13.02	0.3750	OK
25-Year	CB 3	DMH 6	24	0.01	80	491.05	490.30	504.46	3.14	11.41	0.0094	0.75	CB 3	0.40	2.31	1.53	9.95	34.9%	28.55	0.5000	OK
100-Year	DMH 7	DMH 6	24	0.01	15	490.47	490.30	504.41	3.14	11.94	0.0113	0.17	DMH 7	0.00	0.00	2.32	5.86	18.7%	31.39	0.5000	OK
100-Year	DMH 6	INFILTRATION SYSTEM #1	24	0.01	21	490.30	490.00	504.70	3.14	12.40	0.0143	0.30	DMH 6	0.00	0.00	3.85	15.81	44.9%	35.25	0.5000	OK
100-Year	CB 25	CB 21	15	0.01	166	501.33	497.61	504.40	1.23	1.82	0.0224	3.72	CB 25	0.72	5.20	0.72	5.20	41.2%	12.61	0.3125	OK
100-Year	CB 24	CB 23	18	0.01	162	500.50	496.86	503.79	1.77	1.79	0.0225	3.64	CB 24	0.52	3.72	1.24	3.72	18.1%	20.52	0.3750	OK
100-Year	CB 23	CB 22	18	0.01	45	496.86	495.87	503.83	1.77	5.47	0.0220	0.99	CB 23	0.17	1.22	1.41	4.93	24.3%	20.31	0.3750	OK
25-Year	CB 21	CB 20	15	0.01	41	497.61	496.70	504.42	1.23	5.56	0.0222	0.91	CB 21	0.19	1.10	0.19	6.30	50.2%	12.54	0.3125	OK
25-Year	CB 20	DMH 19	18	0.01	65	496.45	495.00	504.67	1.77	6.72	0.0223	1.45	CB 20	0.96	5.62	1.15	11.91	58.3%	20.45	0.3750	OK
100-Year	CB 22	DMH 19	18	0.01	39	495.87	495.00	504.07	1.77	6.70	0.0223	0.87	CB 22	0.63	0.00	2.04	4.93	24.1%	20.45	0.3750	OK
100-Year	DMH 19	INFILTRATION SYSTEM #2	24	0.01	9	494.50	494.30	504.95	3.14	8.45	0.0222	0.20	DMH 19	0.00	0.00	3.19	16.85	38.3%	43.96	0.5000	OK
25-Year	CB 28	CB 29	12	0.01	106	497.00	493.00	503.62	0.79	5.62	0.0377	4.00	CB 28	0.19	1.10	0.19	1.10	12.2%	9.02	0.2500	OK
25-Year	CB 30	CB 29	12	0.01	34	493.50	493.00	501.74	0.79	7.24	0.0147	0.50	CB 30	0.10	0.61	0.10	0.61	10.8%	5.63	0.2500	OK
25-Year	CB 29	DMH 31	12	0.01	69	493.00	489.00	501.74	0.79	7.74	0.0580	4.00	CB 29	0.08	0.46	0.37	2.17	19.4%	11.18	0.2500	OK
100-Year	CB 33	CB 32	18	0.01	46	490.65	490.25	494.11	1.77	1.96	0.0087	0.40	CB 33	0.80	5.75	0.80	5.75	45.0%	12.77	0.3750	OK
100-Year	CB 32	DMH 31	24	0.01	258	489.75	488.00	494.11	3.14	2.36	0.0068	1.75	CB 32	0.79	5.71	1.59	11.45	47.2%	24.29	0.5000	OK
100-Year	DMH 31	CB 34	24	0.01	117	488.00	486.00	500.55	3.14	10.55	0.0171	2.00	DMH 31	0.00	0.00	1.96	13.62	35.3%	38.55	0.5000	OK
25-Year	CB 36	CB 35	12	0.01	26	491.00	490.45	498.61	0.79	6.61	0.0212	0.55	CB 36	0.07	0.42	0.07	0.42	6.1%	6.75	0.2500	OK
100-Year	CB 35	CB 34	12	0.01	31	487.45	487.00	498.44	0.79	9.99	0.0145	0.45	CB 35	0.19	1.36	0.26	1.78	31.7%	5.60	0.2500	OK
100-Year	CB 34	CB 37	24	0.01	156	486.00	484.00	498.44	3.14	10.44	0.0128	2.00	CB 34	0.14	1.00	2.36	16.40	49.1%	33.39	0.5000	OK
100-Year	CB 38	CB 37	12	0.01	35	486.00	485.00	494.81	0.79	7.81	0.0286	1.00	CB 38	0.07	0.53	0.07	0.53	6.7%	7.85	0.2500	OK
100-Year	CB 42	CB 43	12	0.01	74	487.50	484.75	490.96	0.79	2.46	0.0372	2.75	CB 42	0.05	0.33	0.05	0.33	3.7%	8.95	0.2500	OK
100-Year	CB 43	DMH 39	12	0.01	116	484.75	483.75	490.58	0.79	4.83	0.0086	1.00	CB 43	0.07	0.48	0.11	0.81	18.8%	4.31	0.2500	OK
100-Year	CB 37	DMH 39	24	0.01	82	484.00	482.75	494.72	3.14	8.72	0.0152	1.25	CB 37	0.17	1.22	2.60	18.14	49.8%	36.41	0.5000	OK
100-Year	DMH 39	INFILTRATION BASIN	24	0.01	8	482.75	482.59	496.00	3.14	11.25	0.0200	0.16	DMH 39	0.00	0.00	2.72	18.96	45.5%	41.70	0.5000	OK

9.757369

AREA #2A-CB30
4,512 SF

AREA #2A-CB28
8,227 SF

AREA #1A-CB8B
9,592 SF

AREA #1A-CB8
18,050 SF

AREA #1A-CB3
17,216 SF

AREA #1C-CB22
27,595 SF

AREA #1C-CB20
41,829 SF

AREA #1A-TD2
12,964 SF

AREA #1A-CB4
16,932 SF

AREA #2A-CB29
3,430 SF

AREA #2A-CB33
34,766 SF

AREA #1C-CB23
7,355 SF

AREA #1C-CB21
8,192 SF

AREA #2A-CB34
6,057 SF

AREA #1A-TD1
41,822 SF

AREA #2A-CB32
34,527 SF

AREA #1C-CB24
22,499 SF

AREA #1C-CB25
31,432 SF

AREA #1A-CB11
24,184 SF

AREA #1A-CB13
11,461 SF

AREA #1A-CB10
3,917 SF

AREA #1C-CB35
8,229 SF

AREA #1A-CB12
7,324 SF

AREA #1C-CB36
3,092 SF

AREA #1A-CB9
4,366 SF

AREA #2A-CB37
7,351 SF

AREA #2A-BASIN
12,583 SF

AREA #2A-CB38
3,191 SF

AREA #2A-CB43
2,921 SF

AREA #2A-CB42
1,995 SF

NORTHERN EMERGENCY FIRE ACCESS DRIVE

ROADWAY 'A'

ROADWAY 'B'

ROADWAY 'C'

ROADWAY 'D'

ROADWAY 'E'

RELLA BOULEVARD

PROPOSED CONDITIONS
DRAINAGE SUB AREA MAP

Appendix G

First Defense
Stormwater Treatment Unit
Data Sheet

First Defense®

Advanced Hydrodynamic Separator

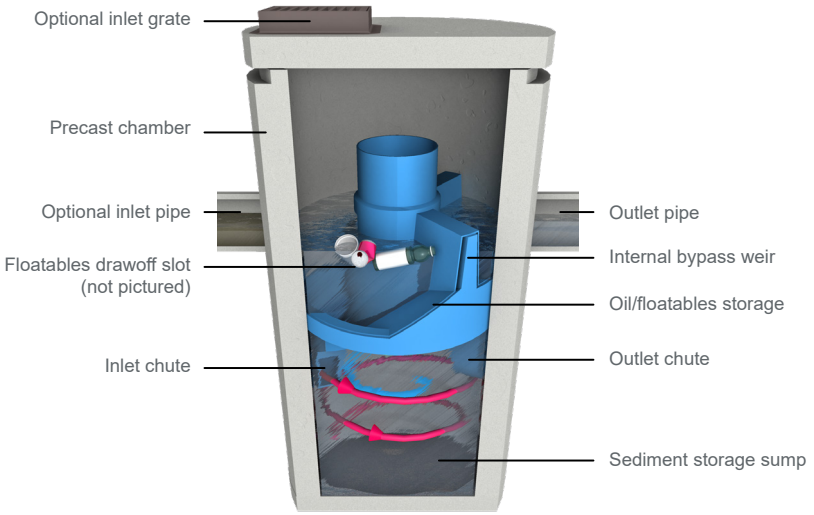


Product Summary

A Simple Solution for the Trickiest Sites

First Defense is a versatile stormwater separator with some of the highest approved flow rates in the United States. Engineers and contractors can save site space and reduce project costs by using the smallest possible footprint. It works with single or multiple inlet pipes and inlet grates. An internal bypass conveys infrequent peak flows directly to the outlet, efficiently capturing pollutants and preventing washouts.

Features



Contaminated stormwater runoff enters the inlet chute from a surface grate and/or inlet pipe. The inlet chute introduces flow into the chamber tangentially to create a low energy vortex flow regime (magenta arrow) that directs sediment into the sump while oils, floating trash and debris rise to the surface.

Treated stormwater exits through a submerged outlet chute located opposite to the direction of the rotating flow (blue arrow). Enhanced vortex separation is provided by forcing the rotating flow within the vessel to follow the longest path possible rather than directly from inlet to outlet.

Higher flows bypass the treatment chamber to prevent turbulence and washout of captured pollutants. An internal bypass conveys infrequent peak flows directly to the outlet eliminating the need for, and expense of, external bypass control structures. A floatables draw off slot functions to convey floatables into the treatment chamber prior to bypass.

Applications

- Areas requiring a minimum of 50% TSS removal
- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Highways, parking lots, industrial areas and urban developments
- Pre-treatment to ponds, storage systems, green infrastructure

Benefits

Highest Flow Through the Smallest Footprint

- **Smaller Footprint, Lower Costs**
  First Defense provides space-saving, easy-to-install surface water treatment in standard size chambers/manholes.
- **Adapt to Site Limitations**
  Variable configurations will help you effectively slip First Defense into a tight spot. It also works well with large pipes, multiple inlet pipes and inlet grates.
- **Reduce Installation Time & Costs**
  Every First Defense unit is delivered to site pre-assembled and ready for install.
- **Online System Configuration**
  First Defense eliminates the need for separate structures with its integrated internal bypass.
- **Designed with Maintenance in Mind**
  Easy vactor hose access through the center shaft of the system makes for quick sump cleanout, saving time and reducing long-term operational cost.



Sizing & Specifications

First Defense units are available in **six diameters** to fit standard chamber and manhole sizes. The dimensions below are common across all model numbers.

Diameter	Peak Online Flow Rate	Maximum Pipe Diameter[1]	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Standard Distance from Outlet Invert to Sump Floor
(ft / m)	(cfs / L/s)	(in / mm)	(yd^3 / m^3)	(ft / m)	(ft / m)
3 / 0.9	15 / 424	18 / 450	0.4 / 0.3	2.0 - 2.5 / 0.61 - 0.76	3.71 / 1.13
4 / 1.2	18 / 510	24 / 600	0.7 / 0.5	2.0 - 3.0 / 0.61 - 0.91	4.97 / 1.5
5 / 1.5	20 / 566	24 / 600	1.1 / .84	2.0 - 3.7 / 0.61 - 1.13	5.83 / 1.5
6 / 1.8	32 / 906	30 / 750	1.6 / 1.2	2.0 - 4.1 / 0.61 - 1.25	5.97 / 1.8
8 / 2.4	50 / 1415	48 / 1200	2.8 / 2.1	2.4 - 5.4 / 0.73 -1.65	7.40 / 2.2
10 / 3.0	50 / 1415	48 / 1200	4.4 / 3.3	2.4 - 6.8 / 0.73 - 2.07	10.25 / 3.12

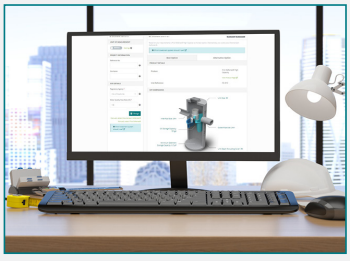
Hydro International offers First Defense units in **two versions** that conform to the performance requirements of different states' water quality regulations.[4]

First Defense High Capacity Model Number	Typical TSS Treatment Flow Rates	
	NJDEP Certified[4]	110µm
	(cfs / L/s)	(cfs / L/s)
FDHC-3	0.84 / 23.7	1.06 / 30.0
FDHC-4	1.50 / 42.4	1.88 / 53.2
FDHC-5	2.35 / 66.2	2.94 / 83.2
FDHC-6	3.38 / 95.7	4.23 / 119.8
FDHC-8	6.00 / 169.9	7.52 / 212.9
FDHC-10	9.38 / 265.6	11.75 / 332.7

First Defense Optimum Model Number	NJDEP Certified Treatment Flow Rates[4]
	(cfs / L/s)
FDO-3	1.02 / 28.9
FDO-4	1.81 / 51.3
FDO-5	2.83 / 80.0
FDO-6	4.07 / 115.2
FDO-8	7.23 / 204.7
FDO-10	11.33 / 320.6

[1]Contact Hydro International when larger pipe sizes are required.
[2]Contact Hydro International when custom sediment storage capacity is required.
[3]These are guidlines only. Minimum distance is based on pipe diameter and headloss at assumed flow rates, contact Hydro for detailed design.
[4]NJDEP Certified / NJCAT Verified, based on one inlet pipe and no inlet grate.

Also available in a screened configuration for Full Trash Capture!



Free Online Design Tool

This free online sizing tool will recommend the best separator, model size and online or offline configuration based on site-specific data entered by the user.

Upon completion, users have the option to submit the design to Hydro International for a free review by our engineering team.

Go to hydro-int.com/sizing to access the tool.

Hydro International

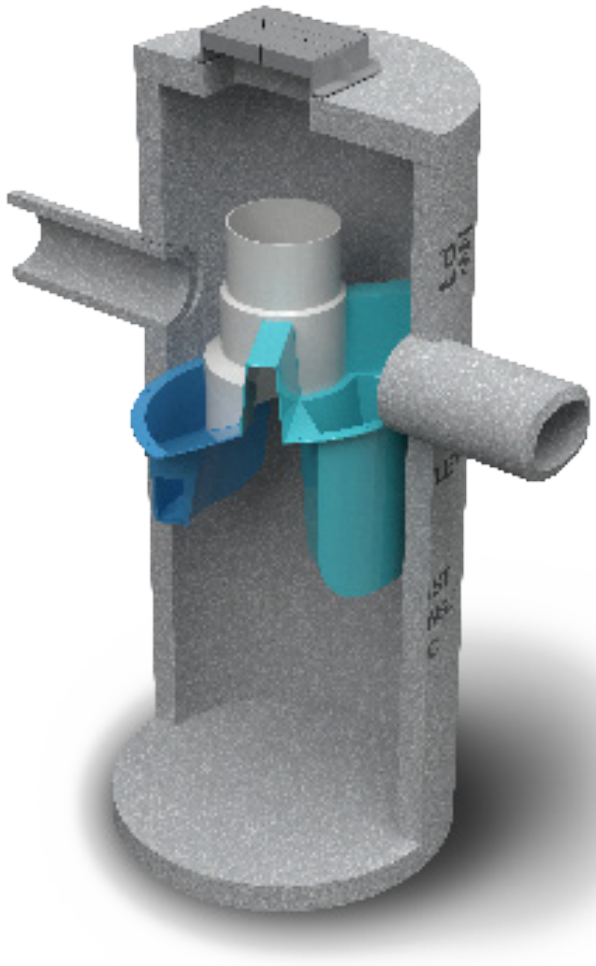
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Email: stormwaterinquiry@hydro-int.com
Web: www.hydro-int.com/firstdefense

FD_SS_B_2203

Download Drawings:
→ hydro-int.com/fddrawings

Operation & Maintenance Manual:
→ hydro-int.com/fd-om

Hydro International



Operation and Maintenance Manual

First Defense® High Capacity and First Defense®Optimum

Vortex Separator for Stormwater Treatment

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3 First Defense® by Hydro International
- Introduction
- Operation
- Pollutant Capture and Retention

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5 Maintenance
- Overview
- Maintenance Equipment Considerations
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6 Maintenance Procedures
- Inspection
- Floatables and Sediment Clean Out

8 First Defense® Installation Log

9 First Defense® Inspection and Maintenance Log

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DISCLAIMER: Information and data contained in this manual is exclusively for the purpose of assisting in the operation and maintenance of Hydro International plc's First Defense®. No warranty is given nor can liability be accepted for use of this information for any other purpose. Hydro International plc has a policy of continuous product development and reserves the right to amend specifications without notice.

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

I. First Defense® by Hydro International

Introduction

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints.

The two product models described in this guide are the First Defense® High Capacity and the First Defense® Optimum; they are inspected and maintained identically.

Operation

The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

Pollutant Capture and Retention

The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for “offline” arrangements using separate junction manholes
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

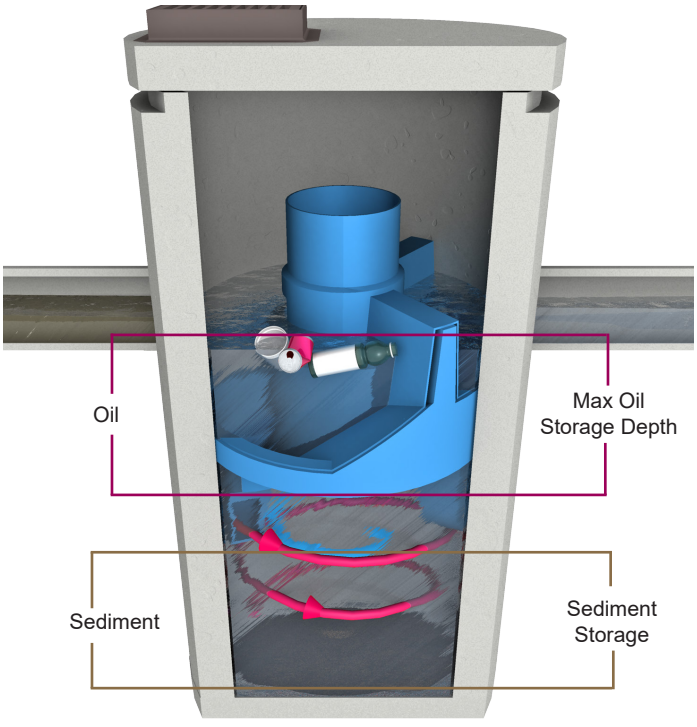


Fig.1 Pollutant storage volumes in the First Defense®.

II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components have modified geometries allowing greater design flexibility to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2). First Defense® model sizes (diameter) are shown in Table 1.

III. Maintenance

First Defense® Components

1. **Built-In Bypass**
2. **Inlet Pipe**
3. **Inlet Chute**
4. **Floatables Draw-off Port**
5. **Outlet Pipe**
6. **Floatables Storage**
7. **Sediment Storage**
8. **Inlet Grate or Cover**

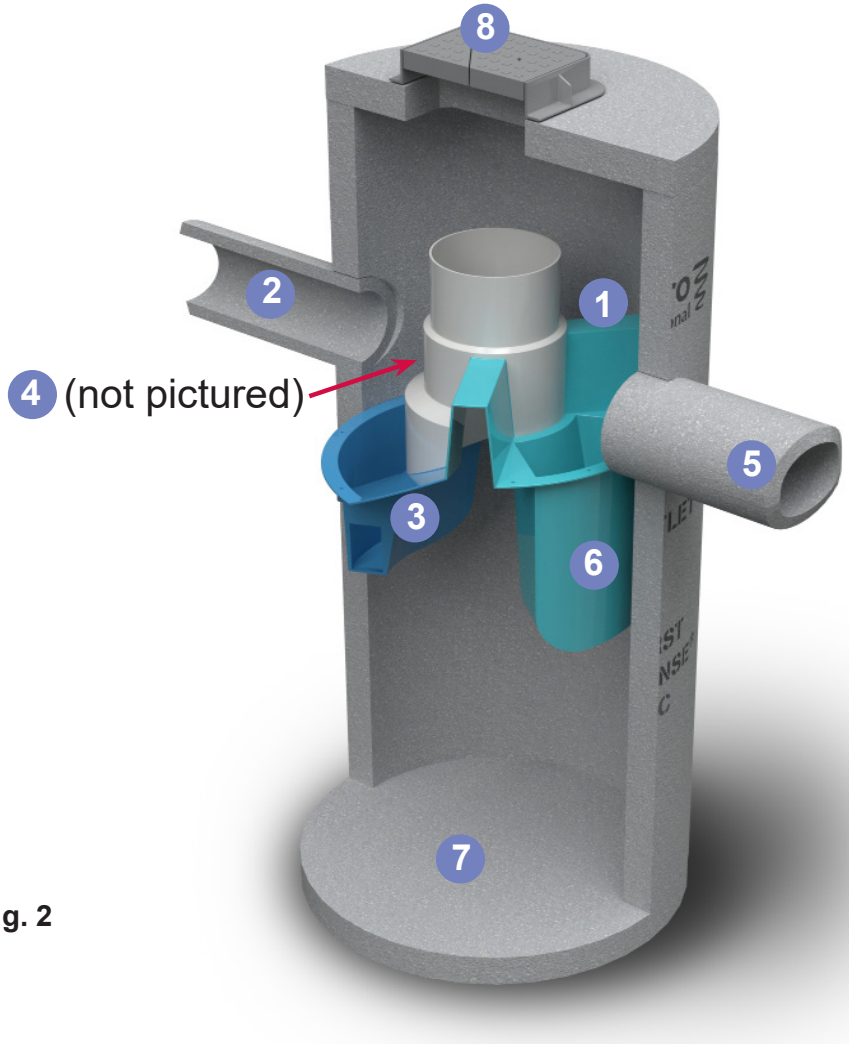


Fig. 2

Table 1

First Defense® Model Sizes
(ft / m) diameter
3 / 0.9
4 / 1.2
5 / 1.5
6 / 1.8
7 / 2.1
8 / 2.4
10 / 3.0

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense® have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.

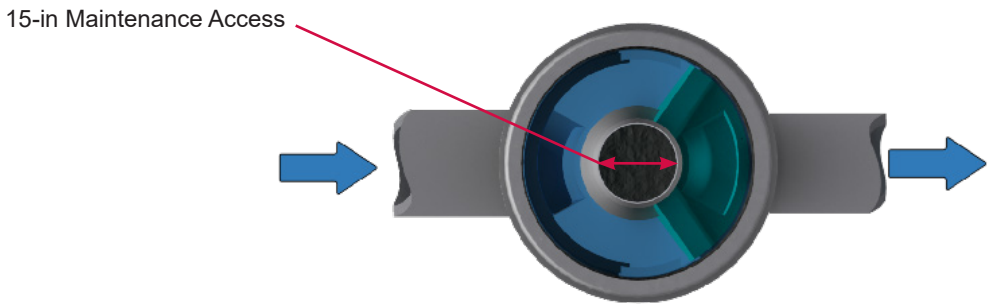


Fig.3 The central opening to the sump of the First Defense®is 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / flotables removal, for First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.

6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

7. Securely replace the grate or lid.

8. Take down safety equipment.

9. Notify Hydro International of any irregularities noted during inspection.

Floatables and Sediment Clean Out

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.4).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose to be lowered to the base of the sump.

Scheduling

- Floatables and sump clean out are typically conducted once a year during any season.

- Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.



Fig.4 Floatables are removed with a vactor hose

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vactor truck (flexible hose recommended)
- First Defense® Maintenance Log

Floatables and Sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.

4. Remove oil and floatables stored on the surface of the water with the vactor hose or with the skimmer or net

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).

6. Once all floatables have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris off the sump floor

7. Retract the vactor hose from the vessel.

8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.

9. Securely replace the grate or lid.

Maintenance at a Glance

Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area
NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.	

First Defense® Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

MODEL SIZE (CIRCLE ONE): [3-FT] [4-FT] [5-FT] [6-FT] [7-FT] [8-FT] [10-FT]

INLET (CIRCLE ALL THAT APPLY): GRATED INLET (CATCH BASIN) INLET PIPE (FLOW THROUGH)

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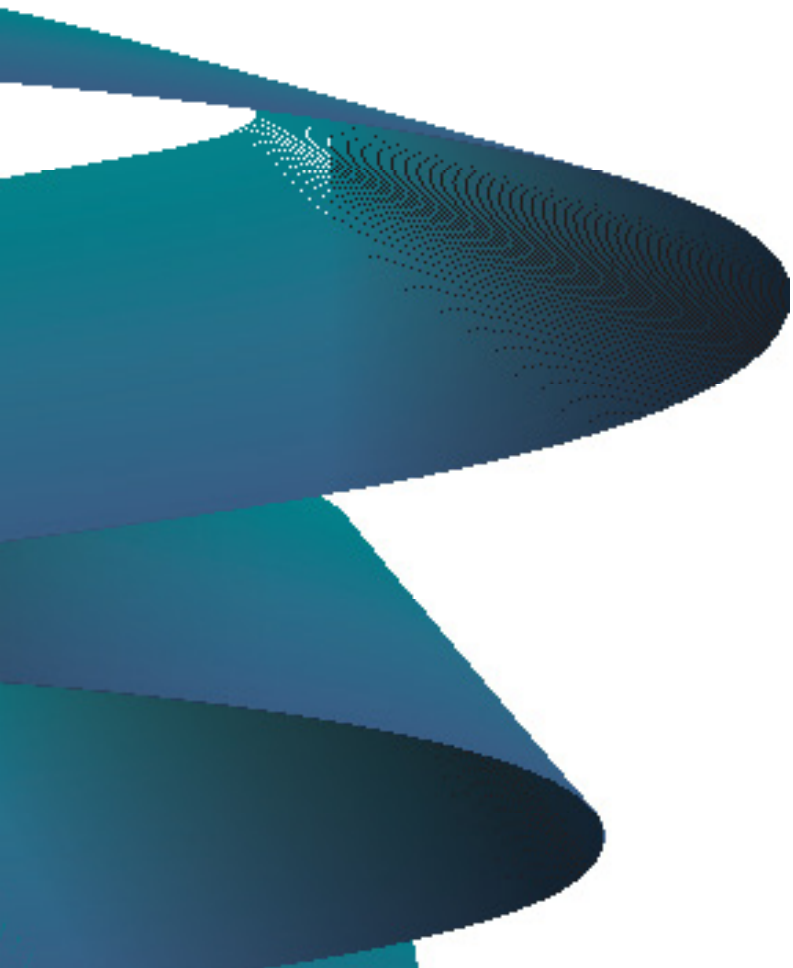
First Defense® Inspection and Maintenance Log

Date	Initials	Depth of Floatables and Oils	Sediment Depth Measured	Volume of Sediment Removed	Site Activity and Comments

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Hydro International



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Division of Water Quality
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http://www.state.nj.us/dep/dwq/bnpc_home.htm

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Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

April 4, 2016

Lisa Lemont, CPSWQ
Business Development Manager
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Portland, ME 04102

Re: MTD Lab Certification
First Defense® HC (FDHC) Stormwater Treatment Device by Hydro International

TSS Removal Rate 50%

Dear Ms. Lemont:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested an MTD Laboratory Certification for the First Defense® HC Stormwater Treatment Device.

The projects falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated February 2016) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the First Defense® HC Stormwater Treatment Device by Hydro International at a TSS removal rate of 50% when designed, operated and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The First Defense® HC Stormwater Treatment Device shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This First Defense® HC Stormwater Treatment Device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using the First Defense® HC Stormwater Treatment Device shall incorporate, at a minimum, the maintenance requirements noted in the attached document. However, it is recommended to review the maintenance website at http://www.hydro-int.com/UserFiles/downloads/FD_O%2BM_F1512.pdf for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for the First Defense® HC Stormwater Treatment Device:

   Example: A 0.25 acre impervious site is to be treated to 50% TSS removal using a First Defense® HC Stormwater Treatment Device. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

   Maximum Treatment Flow Rate (MTFR) Evaluation:

   The site runoff (Q) was based on the following:
   time of concentration = 10 minutes
   i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
   c=0.99 (curve number for impervious)
   Q=ciA=0.99x3.2x0.25=0.79 cfs

   Given the site runoff is 0.79 cfs and based on Table 1 below, the First Defense® HC Model 4-ft with a MTFR of 1.5 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

   The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1 and Table A-2 of the NJCAT Verification Report.

Table 1 First Defense® HC Models

First Defense® Model	Manhole Diameter (ft)	Maximum Treatment Flowrate, MTFR (cfs)
4-ft	4-ft	1.50
6-ft	6-ft	3.38
8-ft	8-ft	6.00

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance of the New Jersey Stormwater Best Management Practices Manual.

If you have any questions regarding the above information, please contact Mr. Titus Magnanao of my office at (609) 633-7021.

Sincerely,

James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan
C: Chron File
Richard Magee, NJCAT
Vince Mazzei, DLUR
Ravi Patraju, NJDEP
Gabriel Mahon, BNPC
Titus Magnanao, BNPC

Appendix H

Percolation Test Data

BROOKER ENGINEERING, PLLC

74 Lafayette Avenue, Suite 501
Suffern, NY 10901
Tel: 845.357.4411

22 Paris Avenue, Suite 105
Rockleigh, NJ 07647
Tel: 201.750.3527

12/20/2022

Percolation Test Data

Development/Site: Rella Blvd (T/V/C) Montebello County: Rockland

Date : Test Conducted By:

Test Hole No.	Test Hole Depth (ft-in.)	Lot No.	Soil Profile	Presoak date & time	Time	Percolation Test Runs					
						1	2	3	4	5	6
1C	11'			12/19/2022	END	11:01	12:03	13:01			
					BEGIN	10:04	11:01	12:03			
					RESULT	23"/hr	21"/hr	19"/hr			
1B	11"			12/19/2022	END	11:06	12:07	13:04			
					BEGIN	10:10	11:06	12:07			
					RESULT	24"/hr	24"/hr	24"/hr			
2B	8'			12/19/2022	END	11:09	12:09	13:07			
					BEGIN	10:13	11:09	12:09			
					RESULT	22"/hr	19.5"/hr	16"/hr			
3B	4'			12/19/2022	END	11:12	12:12	13:09			
					BEGIN	10:17	11:12	12:12			
					RESULT	20"/hr	16"/hr	15"/hr			
3A	3.5'			12/19/2022	END	11:18	12:15	13:11			
					BEGIN	10:20	11:18	12:15			
					RESULT	19"/hr	18"/hr	17"/hr			
2A	5.5'			12/19/2022	END	11:20	12:17	12:13			
					BEGIN	10:22	11:20	12:17			
					RESULT	24"/hr	22"/hr	20.5"/hr			
1A	9.5			12/19/2022	END	11:21	12:19	13:14			
					BEGIN	10:24	11:21	12:19			
					RESULT	24"/hr	24"/hr	24"/hr			

1. Test to be run for 1 hour and result recorded as inches of water elevation drop.

TAX LOT 55.08-3-1
N OR F OLSON

TAX LOT 55.08-1-4
N OR F H & S DEVELOPMENT CORP.

TAX LOT 55.08-3-3.2
N OR F WALLER

TAX LOT 55.08-3-3.3
N OR F ADAMS

TAX LOT 55.08-3-23
N OR F KINLAN

TAX LOT 55.08-1-7
N OR F MONTEBELLO CC

NORTH AIRMONT ROAD

RELLA BOULEVARD

TAX LOT 55.08-1-9
N OR F SADLE-REALTY LLC
ASSISTED LIVING FACILITY
"THE SENTINEL- OF ROCKLAND"
2200 RELLA BLVD

TAX LOT 55.08-1-8
N OR F FOUR HUNDRED RELLA

1A
TEST LOCATION #1
EXISTING GRADE = 502.00
PROPOSED BOTTOM OF BASIN = 494.50
BOTTOM OF INFILTRATION CASING = 492.50
EXCAVATE 4' BELOW BOTTOM TO
DETERMINE GROUNDWATER = 490.50

2A
TEST LOCATION #2
EXISTING GRADE = 498.00
PROPOSED BOTTOM OF BASIN = 494.50
BOTTOM OF INFILTRATION CASING = 492.50
EXCAVATE 4' BELOW BOTTOM TO
DETERMINE GROUNDWATER = 490.50

3A
TEST LOCATION #3
EXISTING GRADE = 496.00
PROPOSED BOTTOM OF BASIN = 494.50
BOTTOM OF INFILTRATION CASING = 492.50
EXCAVATE 4' BELOW BOTTOM TO
DETERMINE GROUNDWATER = 490.50

1B
TEST LOCATION #1
EXISTING GRADE = 493.00
PROPOSED BOTTOM OF BASIN = 484.00
BOTTOM OF INFILTRATION CASING = 482.00
EXCAVATE 4' BELOW BOTTOM TO
DETERMINE GROUNDWATER = 480.00

2B
TEST LOCATION #2
EXISTING GRADE = 490.00
PROPOSED BOTTOM OF BASIN = 484.00
BOTTOM OF INFILTRATION CASING = 482.00
EXCAVATE 4' BELOW BOTTOM TO
DETERMINE GROUNDWATER = 480.00

3B
TEST LOCATION #3
EXISTING GRADE = 486.00
PROPOSED BOTTOM OF BASIN = 484.00
BOTTOM OF INFILTRATION CASING = 482.00
EXCAVATE 4' BELOW BOTTOM TO
DETERMINE GROUNDWATER = 480.00

1C
TEST LOCATION #1
EXISTING GRADE = 494.00
PROPOSED BOTTOM OF BASIN = 485.00
BOTTOM OF INFILTRATION CASING = 483.00
EXCAVATE 4' BELOW BOTTOM TO
DETERMINE GROUNDWATER = 481.00

PROPOSED INFILTRATION BASIN #1
BOT. EL. 494.5 (15,000 S.F.)
EL. 495.5 (16,000 S.F.)
EL. 496.5 (16,000)
TOP EL. 497.3 (20,000 S.F.)

PROPOSED INFILTRATION BASIN #2
BOT. EL. 485.0 (5,900 S.F.)
EL. 486.0 (7,200 S.F.)
EL. 487.00 (8,100 S.F.)
TOP EL. 488.0 (11,200 S.F.)

PROPOSED TRENCH DRAIN
RIM 502.0
INV OUT 498.73

PROPOSED DOWNSPOUT

SWALE

CONTRACTOR TO VERIFY IN FIELD IF CATCH BASIN CAN BE RELOCATED AND MODIFIED OR REMOVED AND REPLACED

EXISTING CB TO REMAIN MODIFY AS NEEDED

EXISTING BASIN TO REMAIN AND REPLACE GRATE

REMOVE EXISTING BASIN

RELOCATE EXISTING TSB

PROJECT EXISTING HYDRANT W/ EXTENDERS

RELOCATE EXISTING TSB

PROPOSED SIDEWALK

RELOCATE EXISTING UTILITY POLE

EXISTING BASIN TO BE RELOCATED

SANITARY SEWER NOTES:

1. SANITARY SEWER INFILTRATION AND EXFILTRATION LIMIT IS 25 GALLONS PER INCH DIAMETER PER MILE PER DAY. CERTIFICATES OF OCCUPANCY MAY NOT BE REQUESTED, NOR ANY OCCUPANCY PERMITTED, UNTIL A CERTIFICATE OF COMPLIANCE, CERTIFIED BY A LICENSED NEW YORK STATE PROFESSIONAL ENGINEER, IS SUBMITTED TO AND APPROVED BY THE TOWN OF RAMAPO. COPIES OF THIS CERTIFICATE SHOULD ALSO BE SENT TO THE ROCKLAND COUNTY DEPARTMENT OF HEALTH.
2. ALL SANITARY SEWER CONSTRUCTION TO MEET CURRENT TOWN OF RAMAPO STANDARDS. IF STANDARDS CONTRADICT THE STRICTER SHALL APPLY.
3. SANITARY SEWER PERMITS MUST BE OBTAINED FROM THE TOWN OF RAMAPO PRIOR TO THE ISSUANCE OF BUILDING PERMITS.
4. ALL MANHOLES TO BE VACUUM TESTED AS REQUIRED BY THE TOWN OF RAMAPO.
5. ROCKLAND COUNTY SEWER DISTRICT No.1 REQUIRES SANITARY SEWER CONSTRUCTION TO CONFORM TO DISTRICT STANDARDS. THIS INCLUDES BUT NOT LIMITED TO RELATIVE AIR, VACUUM AND DEFLECTION TESTING OF MAINLINE SEWER AND MANHOLE CONSTRUCTION. THE DISTRICT MUST RECEIVE AND APPROVE CERTIFICATION OF TEST RESULTS FROM LICENSED PROFESSIONAL ENGINEER BEFORE APPROVING THE SEWERS ON THIS PROJECT.

LEGEND (PROPOSED)

- CLEAN OUT
- SANITARY SEWER MANHOLE
- CATCH BASIN
- OUTLET STRUCTURE
- DRAINAGE MANHOLE
- FLARE END SECTION
- LIGHT POLE
- SIGN
- HYDRANT
- WATER VALVE
- GAS VALVE
- SPOT ELEVATION
- DRAINAGE PIPE
- GAS MAIN
- GAS SERVICE
- OVERHEAD UTILITY
- SANITARY SEWER PIPE
- HOUSE CONNECTION
- WATER MAIN
- ROOF LEADER
- TELEPHONE, ELECTRIC, CAS, CABLE
- GUIDE RAIL
- STONE WALL
- CURB WITH DROP CURB
- DOOR LOCATION
- TOP OF WALL
- FACE OF WALL
- TOP OF PARAPET WALL
- BOTTOM OF WALL
- TOP OF SOUND BARRIER WALL

LEGEND

- CONTOUR
- SPOT GRADE
- CATCH BASIN/FIELD INLET
- DRAIN LINE
- SANITARY MANHOLE / PIPE
- EDGE OF PAVEMENT
- CONCRETE CURB
- GAS LINE/ VALVE
- WATER LINE / VALVE
- UTILITY POLE
- LIGHT POLE
- OVERHEAD WIRES
- UNDERGROUND ELECTRIC
- IRRIGATION CONTROL VALVE/BOX
- TRANSFORMER
- EDGE OF WOODED AREA
- TELEPHONE MANHOLE
- TRAFFIC SIGNAL BOX

REV	DESCRIPTION	BY	DATE
2	VILLAGE OF MONTEBELLO SUBMISSION	AP	11/17/22
1	REVISED TRAILER STORAGE PARKING	AP	9/15/22

DISCLAIMER:
UNAUTHORIZED ALTERATION OR ADDITIONS TO THESE PLANS IS A VIOLATION OF THE N.Y.S. EDUCATION LAW, ARTICLE 145, SECTION 7209, SUBSECTION 2.

BROOKER ENGINEERING, PLLC
PROFESSIONAL ENGINEERS AND LAND SURVEYORS
LAND DEVELOPMENT · MUNICIPAL · STRUCTURAL · HYDROLOGICAL · SURVEYING
www.BrookerEngineering.com
74 Lafayette Avenue, Suite 501, Suffern, NY 10901, (845) 357-4411
32 Park Avenue, Suite 105, Rockleigh, NJ 07647, (201) 684-1221

PROJECT:
RELLA BOULEVARD
VILLAGE OF MONTEBELLO
ROCKLAND COUNTY
NEW YORK

TITLE:
DRAINAGE AND UTILITY PLAN

PROJECT NO:	DRAWN:	CHECKED:
20313	AP	JN

SCALE: 1" = 40'

GRAPHIC SCALE: 0 40' 80'

DATE: 06/16/22

DRAWING NO: 4

BRIAN R. BROOKER, PROFESSIONAL ENGINEER
N.Y.S. Lic. No. 60229

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Appendix C

NYS DEC SPDES

General Permit GP-0-20-001

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NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL
CONSERVATION (NYSDEC)

SPDES GENERAL PERMIT
FOR STORMWATER DISCHARGES

From

CONSTRUCTION ACTIVITY

Permit No. GP-0-25-001

Construction General Permit (CGP)

Issued Pursuant to Article 17, Titles 7, 8 and Article 70

of the Environmental Conservation Law

Effective Date: January 29, 2025 Expiration Date: January 28, 2030

Scott E. Sheeley

Chief Permit Administrator

Scott E. Sheeley JAN. 29, 2025

Authorized Signature Date

Address: NYSDEC
Division of Environmental Permits
625 Broadway, 4th Floor
Albany, N.Y. 12233-1750

PREFACE

Pursuant to Section 402 of the Clean Water Act (CWA), and 40 CFR 122.26(b)(14)(x), (15)(i), and (15)(ii), *stormwater discharges* from certain *construction activities* are unlawful unless they are authorized by a National Pollutant Discharge Elimination System (NPDES) permit or by a state permit program. New York State administers the approved State Pollutant Discharge Elimination System (SPDES) program with permits issued in accordance with the New York State Environmental Conservation Law (ECL) Article 17, Titles 7 and 8, and Article 70, as well as 6 NYCRR Parts 621 and 750.

C*onstruction activities* constitute construction of a *point source* and, therefore, pursuant to ECL sections 17-0505, 17-0701, and 17-0803, the *owner or operator* must have coverage under a SPDES permit prior to *commencement of construction activities*. The *owner or operator* cannot wait until there is an actual *discharge* from the *construction site* to obtain permit coverage.

***Note: The italicized words/phrases within this permit are defined in Appendix A.**

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SPDES CONSTRUCTION GENERAL PERMIT (CGP) GP-0-25-001
FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITIES

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Part I. How to Obtain Coverage and General Requirements

To be covered under this permit, the *owner or operator* must meet all eligibility requirements in Part I.A. and follow the requirements for obtaining permit coverage in Part I.D., F., or G.

A. Eligibility Requirements

For a *common plan of development or sale*, the *phase(s)* that meet the eligibility requirements in Part I.A. may obtain coverage under this permit even if other *phase(s)* of the same *common plan of development or sale* do not meet the eligibility requirements and require an individual SPDES permit.

1. The *owner's or operator's construction activities* involve soil disturbances of:

    a. one or more acres; or

    b. less than one acre which are part of a *common plan of development or sale* that will ultimately disturb one or more acres; or

    c. less than one acre where NYSDEC has determined that a SPDES permit is required for *stormwater discharges* based on the potential for contribution to a violation of a *water quality standard* or for significant contribution of pollutants to *surface waters of the State*.

        i. 5,000 square feet or more, but less than one acre, and are in the New York City Watershed located east of the Hudson River, Appendix C Figure 1; or

        ii. 20,000 square feet or more, but less than one acre, within the municipal boundaries of the City of New York (NYC); or

        iii. less than 20,000 square feet which are part of a *common plan of development or sale* that will ultimately disturb 20,000 square feet or more, but less than one acre, within the municipal boundaries of NYC; or

        iv. that creates 5,000 square feet or more of *impervious area* within the municipal boundaries of NYC.

2. *Discharges* from the *owner's or operator's construction activities* are/were not:

    a. already covered by a different SPDES permit; or

    b. covered under a different SPDES permit that was denied, terminated, or revoked; or

    c. identified in an expired individual SPDES permit that was not renewed; or

    d. required to obtain an individual SPDES permit or another general SPDES permit in accordance with Part VII.K.

3. If *construction activities* may adversely affect a species that is endangered or threatened, the *owner or operator* must obtain a:

    a. permit issued pursuant to 6 NYCRR Part 182 for the project; or

    b. letter issued by NYSDEC of non-jurisdiction pursuant to 6 NYCRR Part 182 for the project.

4. If *construction activities* have the potential to affect an *historic property*, the *owner or operator* must obtain one of the following:

    a. documentation that the *construction activity* is not within an archeological buffer area indicated on the sensitivity map, and that the *construction activity* is not located on or immediately adjacent to a property listed or determined to be eligible for listing on the National or State Registers of Historic Places, and that there is no new permanent building on the *construction site* within the following distances from a building, structure, or object that is more than 50 years old, or if there is such a new permanent building on the *construction site* within those parameters that NYS Office of Parks, Recreation and Historic Preservation (OPRHP), a Historic Preservation Commission of a Certified Local Government, or a qualified preservation professional has determined that the building, structure, or object more than 50 years old is not historically/archeologically significant:

        i. 1-5 acres of disturbance - 20 feet; or

        ii. 5-20 acres of disturbance - 50 feet; or

iii. 20+ acres of disturbance - 100 feet.

b. NYSDEC consultation form sent to OPRHP,[1] and copied to NYSDEC's Agency Historic Preservation Officer (APO), and

i. the State Environmental Quality Review Act (SEQR) Environmental Assessment Form (EAF) with a negative declaration or the Findings Statement, with documentation of OPRHP's agreement with the resolution; or

ii. documentation from OPRHP that the *construction activity* will result in No Impact; or

iii. documentation from OPRHP providing a determination of No Adverse Impact; or

iv. a Letter of Resolution signed by the *owner or operator*, OPRHP and the DEC APO which allows for this *construction activity* to be eligible for coverage under the general permit in terms of the State Historic Preservation Act (SHPA).

c. documentation of satisfactory compliance with Section 106 of the National Historic Preservation Act for a coterminous project area:

i. No Affect; or

ii. No Adverse Affect; or

iii. Executed Memorandum of Agreement.

d. documentation that SHPA Section 14.09 has been completed by NYSDEC or another state agency.

5. If *construction activities* are subject to SEQR, the *owner or operator* must obtain documentation that SEQR has been satisfied.

6. If *construction activities* are not subject to SEQR, but subject to the equivalent environmental review from another New York State or federal agency, the

[1] The consultation form can be submitted, along with other project information, through OPRHP's Cultural Resource Information System (CRIS) portal. If submitted through CRIS, paper copies of the consultation form need not be mailed.

owner or operator must obtain documentation that project review, pursuant to a process equivalent to SEQR from another New York State or federal agency, has been satisfied.

7. If *construction activities* require Uniform Procedures Act (UPA) Permits (see 6 NYCRR Part 621) from NYSDEC, or the equivalent from another New York State or federal agency, the *owner or operator* must:

    a. obtain all such necessary permits; or

    b. receive notification from NYSDEC pursuant to 6 NYCRR 621.3(a)(4) excepting Part I.A.7.a.

8. *Construction activities* are not eligible if they meet the following criteria in Part I.A.8.a. or b.:

    a. For linear transportation and linear utility project types, the *construction activities*:

        i. are within the watershed of *surface waters of the State* classified as AA or AA-S identified utilizing the Stormwater Interactive Map on NYSDEC's website; and

        ii. are undertaken on land with no existing *impervious cover*; and

        iii. disturb two or more acres of *steep slope*.

    b. For all other project types, the *construction activities*:

        i. are within the watershed of *surface waters of the State* classified as AA or AA-S identified utilizing the Stormwater Interactive Map on NYSDEC's website; and

        ii. are undertaken on land with no existing *impervious cover*; and

        iii. disturb one or more acres of *steep slope*.

B. Types of *Discharges* Authorized

1. The following *stormwater discharges* are authorized under this permit:

   a. *Stormwater discharges*, including *stormwater* runoff, snowmelt runoff, and surface runoff and drainage, associated with *construction activity*, are authorized under this permit provided that appropriate *stormwater* controls are designed, installed, and maintained in accordance with Part II. and Part III.

   b. *Stormwater discharges* from construction support activities at the *construction site* (including concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, and borrow areas) if the following requirements are met:

      i. The support activity is directly related to the *construction site* required to have permit coverage for *stormwater discharges*; and

      ii. The support activity is not a commercial operation, nor does it serve multiple unrelated *construction sites*; and

      iii. The support activity does not continue to operate beyond the completion of the *construction activity* at the site it supports; and

      iv. *Stormwater* controls are implemented in accordance with Part II. and Part III. for *discharges* from the support activity areas.

2. The following non-*stormwater discharges* associated with *construction activity* are authorized under this permit:

   a. Non-*stormwater discharges* listed in 6 NYCRR 750-1.2(a)(29)(vi), with the following exception: "*Discharges* from firefighting activities are authorized only when the firefighting activities are emergencies/unplanned"; and

   b. Non-*stormwater discharges* of waters to which other components have not been added that are used in accordance with the *SWPPP* to control dust or irrigate vegetation in stabilized areas; and

   c. Uncontaminated *discharges* from *dewatering* operations

3. Authorized *discharges* of *stormwater* or authorized *discharges* of non-*stormwater*, commingled with a *discharge* authorized by a different SPDES permit and/or a *discharge* that does not require SPDES permit authorization, are also authorized under this permit.

C. Prohibited *Discharges*

1. Non-*stormwater discharges* prohibited under this permit include but are not limited to:

    a. Wastewater from washout of concrete; and

    b. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials; and

    c. Fuels, oils, or other *pollutants* used in vehicle and equipment operation and maintenance; and

    d. Soaps, solvents, or detergents used in vehicle and equipment washing or external building washdown; and

    e. Toxic or hazardous substances from a spill or other release.

D. Electronic Notice of Intent (eNOI) Submittal

To receive authorization in accordance with Part I.D.3.b., the *owner or operator* must submit a complete eNOI in accordance with the requirements in Part I.D. The eNOI contains questions to: ensure eligibility requirements in Part I.A. have been met; obtain *owner or operator* contact information; obtain the total area to be disturbed and the existing/future *impervious areas* (rounded to the nearest tenth of an acre); confirm *Traditional Land Use Control MS4 Operator* jurisdiction over construction projects; satisfy the EPA eRule requirements; confirm that the Water Quality-Based Effluent Limitations in Part II. have been met; demonstrate consideration of the future risks due to climate change in accordance with Part III.A.2.; and confirm that the other *Stormwater Pollution Prevention Plan (SWPPP)* requirements in Part III. have been met.

1. An eNOI may be submitted for:

    a. *construction activities* that are not part of a *common plan of development or sale*; or

b. an entire *common plan of development or sale*; or

c. separate *phase(s)* of a *common plan of development or sale* if the following requirements are met:

    i. the *common plan of development or sale* meets the eligibility requirements of Part I.A.5. or 6.; and

    ii. the *phase(s)* meet(s) all other eligibility requirements of Part I.A.; and

    iii. Part III.C. Required *SWPPP* Components by Project Type is based on the *common plan of development or sale*, not the *phase(s)*; or

d. *tree clearing* that is associated with, or will support, a *renewable energy* generation, transmission, or storage project that meets Part I.A.5. and 6., if the *tree clearing*:

    i. meets all other eligibility requirements of Part I.A.; and

    ii. will occur in NYSDEC's Regions 3-9; and

    iii. is not within ¼ mile of a bat hibernaculum protected pursuant to 6 NYCRR Part 182; and

    iv. will occur between November 1st and March 31st.

2. As prerequisites for submitting an eNOI, the *owner or operator* must:

    a. prepare a *SWPPP* for Part I.D.1.a., b., c., or d. in accordance with Part III.; and

    b. based on the following criteria, upload the following signature forms signed in accordance with Part VII.J. to the eNOI prior to submission:

        i. for all eNOIs:

            1. the SWPPP Preparer Certification Form, Appendix F, signed by the *SWPPP* preparer; and

2. the Owner/Operator Certification Form, Appendix J, signed by the *owner or operator*; and

ii. if an eNOI includes *construction activities* within the municipal boundary(ies) of *Traditional Land Use Control MS4 Operator(s)* that will *discharge* to the *MS4(s)*:

1. determine if the *Traditional Land Use Control MS4 Operator(s)* have review authority. A *Traditional Land Use Control MS4 Operator* does not have review authority where:

a. the *owner or operator* of the *construction activities* in Part I.D.2.b.ii. is the same entity as the *Traditional Land Use Control MS4 Operator* identified in Part I.D.2.b.ii.; or

b. there is a statute exempting the *owner or operator* from zoning review by the *Traditional Land Use Control MS4 Operator*; or

c. there is no such statute per Part I.D.2.b.ii.1.b., the *Traditional Land Use Control MS4 Operator* concludes, after public hearing, that it does not have zoning review authority in accordance with Legal Memorandum LU14 Updated January 2020 “Governmental Immunity from Zoning and Other Legislation”; and

2. if the *Traditional Land Use Control MS4 Operator(s)* have review authority, submit the *SWPPP* to the *Traditional Land Use Control MS4 Operator(s)* for review and have:

a. if outside the municipal boundaries of NYC: the MS4 SWPPP Acceptance Form, Appendix G, signed by the principal executive officer or ranking elected official from the *Traditional Land Use Control MS4 Operator,* or by a duly authorized representative of that person in accordance with Part VII.J.2.; or

b. if within the municipal boundaries of NYC: The City of New York Department of Environmental Protection (NYCDEP) SWPPP Acceptance/Approval Form, Appendix H, signed by the principal executive officer or ranking elected official from the Traditional Land Use Control MS4 Operator, or by a duly authorized representative of that person in accordance with Part VII.J.2.; and

3. if the *Traditional Land Use Control MS4 Operator* does not have review authority, have the MS4 No Jurisdiction Form, Appendix I, signed by the principal executive officer or ranking elected official from the *Traditional Land Use Control MS4 Operator,* or by a duly authorized representative of that person in accordance with Part VII.J.2.

3. Submitting an eNOI:

a. The *owner or operator* must submit a complete Notice of Intent electronically using a NYSDEC approved form.[2]

b. The *owner or operator* is authorized to *commence construction activity* as of the authorization date indicated in the Letter of Authorization (LOA), which is sent by NYSDEC after a complete eNOI is submitted.

i. If an eNOI is received for a *SWPPP* that deviates from one of the technical standards but demonstrates *equivalence* in accordance with Part III.B.1.a.ii. or Part III.B.2.b.ii., if the *SWPPP* includes *construction activities* that are not within the municipal boundary(ies) of *Traditional Land Use Control MS4 Operator(s)*, and/or if the *SWPPP* includes *construction activities* within the municipal boundary(ies) of *Traditional Land Use Control MS4 Operator(s)* that do not have review authority in accordance with Part I.D.2.b.ii.1., the authorization date indicated in the LOA will be 60 business days after the eNOI submission date.

[2] Unless NYSDEC grants a waiver in accordance with 40 CFR 127.15(c) or (d). All waiver requests must be submitted to Stormwater_info@dec.ny.gov or NYSDEC, Bureau of Water Permits, 625 Broadway, 4th Floor, Albany, New York 12233-3505.

c. If *Traditional Land Use Control MS4 Operator(s)* have review authority in accordance with Part I.D.2.b.ii.2., the *owner or operator* must, within five business days of receipt of the LOA, send an electronic copy of the LOA to the *Traditional Land Use Control MS4 Operator(s)* with review authority.

E. General Requirements for *Owners or Operators* with Permit Coverage

1. As of the date the LOA is received, the *owner or operator* must make the eNOI, *SWPPP*, and LOA available for review and copying in accordance with the requirements in Part VII.H. When applicable, as of the date an updated LOA is received, the *owner or operator* must make the updated LOA available for review and copying in accordance with the requirements in Part VII.H.

2. The *owner or operator* must ensure compliance with all requirements of this permit and that the provisions of the *SWPPP*, including any changes made to the *SWPPP* in accordance with Part III.A.5., are properly implemented and maintained from the *commencement of construction activity* until:

   a. all areas of disturbance have achieved *final stabilization;* and

   b. the owner's or operator's coverage under this permit is terminated in accordance with Part V.A.5.a.

3. As of the date of the *commencement of construction activities* until Part I.E.2.a. and b. have been met, the *owner or operator* must maintain at the *construction site*, a copy of:

   a. all documentation necessary to demonstrate eligibility with this permit; and

   b. this permit; and

   c. the *SWPPP*; and

   d. the signed SWPPP Preparer Certification Form; and

   e. the signed MS4 SWPPP Acceptance Form or signed NYCDEP SWPPP Acceptance/Approval Form or signed MS4 No Jurisdiction Form (when applicable); and

   f. the signed Owner/Operator Certification Form; and

g. the eNOI; and

h. the LOA; and

i. the LOA transmittal to the Traditional Land Use Control MS4 Operator in accordance with Part I.D.3.c. (when applicable).

4. The *owner or operator* must maintain at the *construction site*, until Part I.E.2.a. and b. have been met, as of the date the documents become final or are received, a copy of the:

   a. responsible contractor's or subcontractor's certification statement(s) in accordance with Part III.A.7.; and

   b. inspection reports in accordance with Part IV.C.4. and 6.; and

   c. Request to Disturb Greater Than Five Acres and the Authorization Letter to Disturb Greater Than Five Acres in accordance with Part I.E.6. (when applicable); and

   d. Request to Continue Coverage and the Letter of Continued Coverage (LOCC) in accordance with Part I.F.2. and 4. (when applicable); and

   e. The updated LOA(s) in accordance with Part I.E.9. (when applicable).

5. The *owner or operator* must maintain the documents in Part I.E.3. and 4. in a secure location, such as a job trailer, on-site construction office, or mailbox with lock. The secure location must be accessible during normal business hours to an individual performing a compliance inspection. The documents must be paper documents unless electronic documents are accessible to the inspector during an inspection to the same extent as a paper copy stored at the site would be. If electronic documents are kept on site, the *owner or operator* must maintain functional equipment on site available to an inspector during normal hours of operation such that an inspector may view the electronic documents in a format that can be read in a similar manner as a paper record and in a legally dependable format with no less evidentiary value than their paper equivalent.

6. The *owner or operator* must meet the following requirements prior to disturbing greater than five acres of soil at any one time:

   a. The *owner or operator* must submit a written Request to Disturb Greater Than Five Acres to:

i. NYSDEC's Regional Office Division of Water staff based on the project location, Appendix E, if a *Traditional Land Use Control MS4 Operator* does not have review authority in accordance with Part I.D.2.b.ii.1.; or

ii. the *Traditional Land Use Control MS4 Operator*, if a *Traditional Land Use Control MS4 Operator* has review authority in accordance with Part I.D.2.b.ii.1.; or

iii. NYSDEC's Regional Office Division of Water staff based on the project location, Appendix E, and each involved *Traditional Land Use Control MS4 Operator*, if the project spans multiple municipalities with more than one *Traditional Land Use Control MS4 Operator* involved with review authority in accordance with Part I.D.2.b.ii.1.

b. The written Request to Disturb Greater Than Five Acres must include:

i. The SPDES permit identification number (Permit ID); and

ii. Full technical justification demonstrating why alternative methods of construction that would result in five acres of soil disturbance or less at any one time are not feasible; and

iii. The phasing plan for the project and sequencing plans for all *phases* from the *SWPPP* in accordance with Part III.B.1.d.; and

iv. Plans with locations and details of erosion and sediment control practices such that the heightened concern for erosion when disturbing greater than five acres at one time has been addressed; and

v. Acknowledgment that "the *owner or operator* will comply with the requirements in Part IV.C.2.b."; and

vi. Acknowledgment that "the *owner or operator* will comply with the requirements in Part II.B.1.b."

c. The *owner or operator* must be in receipt of an Authorization Letter to Disturb Greater Than Five Acres, which will include when the

authorization begins and ends and indicate a maximum area (acres) of soil disturbance allowed at any one time, from:

i. NYSDEC, if Part I.E.6.a.i. or iii. apply; or

ii. the *Traditional Land Use Control MS4 Operator*, if Part I.E.6.a.ii. applies.

7. Upon a finding of significant non-compliance with the practices described in the *SWPPP* or violation of this permit, NYSDEC may order an immediate stop to all *construction activity* at the site until the non-compliance is remedied. The stop work order must be in writing, describe the non-compliance in detail, and be sent to the *owner or operator*.

8. If any human remains or archaeological remains are encountered during excavation, the *owner or operator* must immediately cease, or cause to cease, all *construction activity* in the area of the remains and notify the appropriate Regional Water Engineer (RWE).[3] *Construction activity* shall not resume until written permission to do so has been received from the RWE.

9. To be authorized to implement modifications to the information previously submitted in the eNOI, the *owner or operator* must:

   a. notify NYSDEC via email at Stormwater_info@dec.ny.gov requesting access to update the eNOI; and

   b. update the eNOI to reflect the modifications and resubmit the eNOI in accordance with Part I.D.; and

   c. receive an updated LOA.

10. The eNOI, *SWPPP*, LOA, updated LOAs (when applicable), and inspection reports required by this permit are public documents that the *owner or operator* must make available for review and copying by any person within five business days of the *owner or operator* receiving a written request by any such person to review these documents. Copying of documents will be done at the requester's expense.

[3] The Regional Water Manager where a DEC Region does not have a RWE.

F. Permit Coverage for *Discharges* Authorized Under GP-0-20-001

When applicable:

1. Upon the effective date of this permit, an *owner or operator* of *a construction activity*, with coverage under GP-0-20-001, will have interim coverage under GP-0-25-001 for 45 calendar days starting on the effective date of GP-0-25-001 so long as the *owner or operator* maintains compliance with all applicable requirements of this permit.

2. Within 30 calendar days of the effective date of this permit, the *owner or operator*, with coverage under GP-0-20-001, must submit a complete Request to Continue Coverage electronically using a NYSDEC approved form,[4] which contains the information identified in Part I.F.3. below, if:

   a. the *owner or operator* continues to implement the SMP component in conformance with the technical standards in place at the time of initial project authorization; and

   b. the *owner or operator* will comply with all non-design requirements of GP-0-25-001.

3. The Request to Continue Coverage form contains questions to: ensure eligibility requirements in Part I.A. have been met; verify *owner or operator* contact information; verify the permit identification number; verify the original eNOI submission ID, if applicable; verify Part I.F.2.a. and b.; verify the version of the Design Manual that the technical/design components conform to; and receive an updated Owner/Operator Certification Form, Appendix I.

4. The *owner or operator* has obtained continued coverage under GP-0-25-001 as of the date indicated in the LOCC, which is sent by NYSDEC after a complete Request to Continue Coverage form is submitted.

5. If the owner or operator does not submit the Request to Continue Coverage form in accordance with Part I.F.2. and 3., coverage under this permit is automatically terminated after interim coverage expires.

[4] Unless NYSDEC grants a waiver in accordance with 40 CFR 127.15(c) or (d). All waiver requests must be submitted to Stormwater_info@dec.ny.gov or NYSDEC, Bureau of Water Permits, 625 Broadway, 4th Floor, Albany, New York 12233-3505.

G. Change of *Owner or Operator*

When applicable:

1. When property ownership changes, or when there is a change in operational control over the construction plans and specifications, the following process applies:

    a. The new *owner or operator* must meet the applicable prerequisites for submitting an eNOI in accordance with Part I.D.2.; and

    b. The new *owner or operator* must submit an eNOI in accordance with Part I.D.3.; and

    c. Permit coverage for the new *owner or operator* will be effective upon receipt of the LOA in accordance with Part I.D.3.b.; and

    d. The new *owner or operator*, upon receipt of their LOA, must provide their Permit ID to the original *owner or operator*; and

    e. If the original *owner or operator* will no longer be the *owner or operator* of the *construction activity* identified in the original *owner's or operator's* eNOI, the original *owner or operator*, upon receipt of the new *owner's or operator's* Permit ID in accordance with Part I.G.1.d., must submit to NYSDEC a completed eNOT in accordance with Part V. that includes the name and Permit ID of the new *owner or operator*; or

    f. If the original *owner or operator* maintains ownership of a portion of the *construction activity*, the original *owner or operator* must maintain their coverage under the permit by modifying their eNOI; modifications to the eNOI must include:

        i. the revised area of disturbance and/or *impervious area(s)*; and

        ii. the revised SMP information, if applicable; and

        iii. a narrative description of what has changed; and

        iv. the new *owner's or operator's* Permit ID for the portion of the project removed from the eNOI.

    Owners or operators must follow Part I.E.9. to modify the eNOI.

Part II. Water Quality-Based Effluent Limitations

A. Maintaining Water Quality

NYSDEC expects that compliance with the requirements of this permit will control *discharge*s necessary to meet applicable *water quality standards*. It shall be a violation of the *ECL* for any *discharge* to either cause or contribute to a violation of the following *water quality standards* as contained in Parts 700 through 705 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York:

1. There must be no increase in turbidity that will cause a substantial visible contrast to natural conditions; and

2. There must be no increase in suspended, colloidal or settleable solids that will cause deposition or impair the waters for their best usages; and

3. There must be no residue from oil and floating substances, nor visible oil film, nor globules of grease.

If there is evidence indicating that the *stormwater discharge*s authorized by this permit are causing, have the reasonable potential to cause, or are contributing to a violation of the *water quality standard,* the *owner or operator* must take appropriate corrective action in accordance with Part IV.C.5. of this permit and document in accordance with Part IV.C.4. of this permit. To address the *water quality standard* violation the *owner or operator* must include and implement appropriate controls in the *SWPPP* to correct the problem or obtain an individual SPDES permit.

If, despite compliance with the requirements of this permit, it is demonstrated that the *stormwater discharge*s authorized by this permit are causing or contributing to a violation of *water quality standards*, or if NYSDEC determines that a modification of this permit is necessary to prevent a violation of *water quality standards*, the authorized *discharge*s will no longer be eligible for coverage under this permit, and the *owner or operator* must obtain an individual SPDES permit prior to further *discharges* from the *construction site*.

B. Effluent Limitations Applicable to *Discharges* from *Construction Activities*

*Discharge*s authorized by this permit must achieve, at a minimum, the effluent limitations in Part II.B.1.a., b., c., d., and e. These limitations represent the

degree of effluent reduction attainable by the application of best practicable technology currently available.

1. Erosion and Sediment Control Requirements - The *owner or operator* must select, design, install, implement, and maintain control measures to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. The selection, design, installation, implementation, and maintenance of these control measures must meet the non-numeric effluent limitations in Part II.B.1.a., b., c., d., and e. and be in accordance with the New York State Standards and Specifications for Erosion and Sediment Control (BB), dated November 2016, using sound engineering judgment. Where control measures are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must include in *SWPPP* the reason(s) for the deviation, or alternative design, and provide information in the *SWPPP* demonstrating that the deviation or alternative design is *equivalent* to the technical standard.

    a. **Erosion and Sediment Controls.** At a minimum, erosion and sediment controls must be selected, designed, installed, implemented, and maintained to:

        i. *Minimize* soil erosion through application of runoff control and soil stabilization control measure to *minimize pollutant discharge*s; and

        ii. Control *stormwater discharge*s, including both peak flow rates and total *stormwater* volume, to *minimize* channel and *streambank* erosion and scour in the immediate vicinity of the *discharge* points; and

        iii. *Minimize* the amount of soil exposed during *construction activity*; and

        iv. *Minimize* the disturbance of *steep slope*; and

        v. *Minimize* sediment *discharge*s from the site; and

        vi. Provide and maintain *natural buffers* around surface waters, direct *stormwater* to vegetated areas and maximize *stormwater* infiltration to reduce *pollutant discharge*s, unless *infeasible*; and

        vii. *Minimize* soil compaction. *Minimizing* soil compaction is not required

where the intended function of a specific area of the site dictates that it be compacted; and

viii. Unless *infeasible*, preserve a sufficient amount of topsoil to complete soil restoration and establish a uniform, dense vegetative cover; and

ix. *Minimize* dust. On areas of exposed soil, *minimize* dust through the appropriate application of water or other dust suppression techniques to control the generation of *pollutants* that could be discharged from the site.

b. **Soil Stabilization**. In areas where soil disturbance activity has ceased, whether permanently or *temporarily ceased*, the application of soil stabilization measures must be initiated by the end of the next business day and completed within 14 calendar days from the date the current soil disturbance activity ceased. For *construction sites* that *directly discharge* to one of the 303(d) segments listed in Appendix D, or are located in one of the watersheds listed in Appendix C, or are authorized to disturb greater than five acres in accordance with Part I.E.5.a.viii., the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven calendar days from the date the soil disturbance activity ceased.

c. **Dewatering**. *Discharge*s from *dewatering* activities, including *discharge*s from *dewatering* of trenches and excavations, must be managed by appropriate control measures.

d. **Pollution Prevention Measures**. Select, design, install, implement, and maintain effective pollution prevention measures to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. At a minimum, such measures must be selected, designed, installed, implemented, and maintained to:

i. *Minimize* the *discharge* of *pollutants* from equipment and vehicle washing, wheel wash water, and other wash waters. Soaps, detergents and solvents cannot be used; and

ii. *Minimize* the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, hazardous and toxic waste, and other materials present on the site to precipitation

and to *stormwater*. *Minimization* of exposure is not required in cases where the exposure to precipitation and to *stormwater* will not result in a *discharge* of *pollutants*, or where exposure of a specific material or product poses little risk of *stormwater* contamination (such as final products and materials intended for outdoor use); and

iii. Prevent the *discharge* of *pollutants* from spills and leaks and implement chemical spill and leak prevention and response procedures.

e. **Surface Outlets.** When discharging from basins and impoundments, the surface outlets must be designed, constructed, and maintained in such a manner that sediment does not leave the basin or impoundment and that erosion at or below the outlet does not occur.

C. Post-Construction Stormwater Management Practice (SMP) Requirements

1. The *owner or operator* of a *construction activity* that requires post-construction SMPs, in accordance with Part III.C., must select, design, install, implement, and maintain the SMPs to meet the *performance criteria* in the New York State Stormwater Management Design Manual, dated July 31, 2024 (DM), using sound engineering judgment. Where SMPs are not designed in conformance with the *performance criteria* in the DM, the *owner or operator* must include in the *SWPPP* the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

2. The *owner or operator* of a *construction activity*, that requires SMPs in accordance with Part III.C., must design the practices to meet the applicable *sizing criteria* in Part II.C.2.a., b., c., or d.

a. Sizing Criteria for *New Development*

i. Runoff Reduction Volume (RRv) and Water Quality Volume (WQv):

1. Reduce the total WQv by application of RR techniques and standard SMPs with RRv capacity. The total WQv must be calculated in accordance with the criteria in Section 4.2 of the DM; or

2. Minimum RRv and Treatment of Remaining Total WQv: *Construction activities* that cannot meet the requirements in Part II.C.2.a.i.1. due to *site limitations* must direct runoff from all newly constructed *impervious areas* to a RR technique or standard SMP with RRv capacity unless *infeasible*. The specific *site limitations* that prevent the reduction of 100% of the WQv must be documented in the *SWPPP*. For each *impervious area* that is not directed to a RR technique or standard SMP with RRv capacity, the *SWPPP* must include documentation which demonstrates that all options were considered and for each option explains why it is considered *infeasible*.

   In no case shall the runoff reduction achieved from the newly constructed *impervious areas* be less than the Minimum RRv as calculated using the criteria in Section 4.4 of the DM. The remaining portion of the total WQv that cannot be reduced must be treated by application of standard SMPs.

ii. Channel Protection Volume (CPv): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event, remaining after runoff reduction. Where a CPv control orifice is provided, the minimum orifice size must be 3 inches, with acceptable external trash rack or orifice protection. The CPv requirement does not apply when:

   1. Reduction of the entire CPv is achieved by application of runoff reduction techniques or infiltration systems; or

   2. The 1-year post-development peak *discharge* is less than or equal to 2.0 cfs without detention or velocity controls; or

   3. The site *directly discharges* into a fifth order or larger water body (stream, river, or lake), or tidal waters, where the increase in smaller flows will not impact the stream bank or channel integrity. However, the point of *discharge* must be adequately protected against scour and erosion by the increased peak *discharge*.

iii. *Overbank* Flood Control Criteria (Qp): Requires storage to attenuate the post-development 10-year, 24-hour peak *discharge* rate (Qp) to predevelopment rates. The Qp requirement does not apply when:

1. the site *directly discharges* to tidal waters or fifth order or larger streams, or

2. A downstream analysis reveals that *overbank* control is not required.

iv. Extreme Flood Control Criteria (Qf): Requires storage to attenuate the post-development 100-year, 24-hour peak *discharge* rate (Qf) to predevelopment rates. The Qf requirement does not apply when:

1. the site *directly discharges* to tidal waters or fifth order or larger streams, or

2. A downstream analysis reveals that *overbank* control is not required.

b. *Sizing Criteria* for *New Development* in Enhanced Phosphorus Removal Watersheds

i. Runoff Reduction Volume (RRv) and Water Quality Volume (WQv):

1. Reduce the WQv by application of RR techniques and standard SMPs with RRv capacity. The total WQv is the runoff volume from the 1-year, 24-hour design storm over the post-developed watershed and must be calculated in accordance with the criteria in Section 4.3 of the DM; or

2. Minimum RRv and Treatment of Remaining Total WQv: *Construction activities* that cannot meet the criteria in Part II.C.2.b.i.1. due to *site limitations* must direct runoff from all newly constructed *impervious areas* to a RR technique or standard SMP with RRv capacity unless *infeasible*. The specific *site limitations* that prevent the reduction of 100% of the WQv must be documented in the *SWPPP*. For each *impervious area* that is not directed to a RR technique or standard SMP with RRv capacity, the *SWPPP* must include

documentation which demonstrates that all options were considered and for each option explains why it is considered *infeasible.*

In no case shall the runoff reduction achieved from the newly constructed *impervious areas* be less than the Minimum RRv as calculated using the criteria in Section 4.5 of the DM. The remaining portion of the total WQv that cannot be reduced must be treated by application of standard SMPs.

ii. Channel Protection Volume (CPv): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event, remaining after runoff reduction. Where a CPv control orifice is provided, the minimum orifice size must be 3 inches, with acceptable external trash rack or orifice protection. The CPv requirement does not apply when:

1. Reduction of the entire CPv is achieved by application of runoff reduction techniques or infiltration systems; or

2. The 1-year post-development peak *discharge* is less than or equal to 2.0 cfs; or

3. The site *directly discharges* to tidal waters, or a fifth order or larger water body (stream, river, or lake) where the increase in smaller flows will not impact the stream bank or channel integrity. However, the point of *discharge* must be adequately protected against scour and erosion by the increased peak *discharge*.

iii. *Overbank* Flood Control Criteria (Qp): Requires storage to attenuate the post-development 10-year, 24-hour peak *discharge* rate (Qp) to predevelopment rates. The Qp requirement does not apply when:

1. the site *directly discharges* to tidal waters or fifth order or larger streams; or

2. A downstream analysis reveals that *overbank* control is not required.

iv. Extreme Flood Control Criteria (Qf): Requires storage to attenuate the post-development 100-year, 24-hour peak *discharge* rate (Qf) to predevelopment rates. The Qf requirement does not apply when:

1. the site *directly discharges* to tidal waters or fifth order or larger streams; or

2. A downstream analysis reveals that *overbank* control is not required.

c. *Sizing Criteria* for *Redevelopment Activity*

i. Water Quality Volume (WQv): The WQv treatment objective for *redevelopment activity* must be addressed by one of the following options, as outlined in Section 9.2.1. *Redevelopment activities* located in an Enhanced Phosphorus Removal Watershed (see Part III.B.3. and Appendix C) must calculate the WQv in accordance with Section 4.3 of the DM. All other *redevelopment activities* must calculate the WQv in accordance with Section 4.2 of the DM.

1. Reduce the existing *impervious cover* by a minimum of 25% of the total disturbed, *impervious area*. The Soil Restoration criteria in Section 5.1.6 of the DM must be applied to all newly created pervious areas; or

2. Capture and treat 100% of the required WQv, for a minimum of 25% of the disturbed redevelopment *impervious area*, by implementation of standard SMPs or reduced by application of runoff reduction techniques; or

3. Capture and treat 100% of the required WQv, for a minimum of 75% of the disturbed redevelopment *impervious area*, by implementation of a volume-based alternative SMP, as defined in Section 9.4 of the DM; or

4. Capture and treat 100% of the required WQv, for a minimum of 75% of the disturbed redevelopment *impervious area*, by implementation of a flow-through alternative SMP sized to treat the peak rate of runoff from the WQv design storm; or

5. Application of a combination of 1 through 4 above that provide a weighted average of at least two of the above methods. Application of this method must be in accordance with the criteria in Section 9.2.1(A)(V) of the DM; or

6. If there is an existing SMP located on the site that captures and treats runoff from the *impervious area* that is being disturbed, the WQv treatment option selected must, at a minimum, provide treatment equal to the treatment that was being provided by the existing practice(s) if that treatment is greater than the treatment required by options 1 through 5 above.

ii. Channel Protection Volume (CPv) is not required if there is 0% change to hydrology that increases the *discharge* rate and volume from the project site.

iii. *Overbank* Flood Control (Qp) is not required if there is 0% change to hydrology that increases the *discharge* rate from the project site.

iv. Extreme Flood Control (Qf) is not required if there is 0% change to hydrology that increases the *discharge* rate from the project site.

d. *Sizing Criteria* for Combination of *Redevelopment Activity* and *New Development*

Construction projects, that include both *new development* and *redevelopment activity*, must use SMPs that meet the *sizing criteria* calculated as an aggregate of the *sizing criteria* in Part II.C.2.a. or b. for the *new development* portion of the project and Part II.C.2.c. for the *redevelopment activity* portion of the project.

Part III. Stormwater Pollution Prevention Plan (SWPPP)

A. General *SWPPP* Requirements

1. A *SWPPP* must be prepared and implemented by the *owner or operator* of all *construction activity* covered by this permit. All authorized *discharges* must be identified in the *SWPPP*. The *SWPPP* must document the selection, design, installation, implementation and maintenance of the control measures and

practices that will be used to meet the effluent limitations in Part II.B. and, where applicable, the SMP requirements in Part II.C.

2. The *SWPPP* must demonstrate consideration in narrative format of the future physical risks due to climate change pursuant to the Community Risk and Resiliency Act (CRRA), 6 NYCRR Part 490, and associated guidance.

    a. The owner or operator must consider:

        i. the following physical risks due to climate change:

            (i) increasing temperature; and

            (ii) increasing precipitation; and

            (iii) increasing variability in precipitation, including chance of drought; and

            (iv) increasing frequency and severity of flooding; and

            (v) rising sea level; and

            (vi) increasing storm surge; and

            (vii) shifting ecology.

        ii. for each of the following:

            (i) overall site planning; and

            (ii) location, elevation, and sizing of:

                a. control measures and practices; and

                b. conveyance system(s); and

                c. detention system(s).

3. The *SWPPP* must describe the erosion and sediment control practices and where required, SMPs that will be used and/or constructed to reduce the *pollutants* in *stormwater discharges* and to assure compliance with the

requirements of this permit. In addition, the *SWPPP* must identify potential sources of pollution which may reasonably be expected to affect the quality of *stormwater discharges*.

4. All *SWPPPs*, that require the SMP component in accordance with Part III.B.2., must be prepared by a *qualified professional*.

5. The *owner or operator* must keep the *SWPPP* current so that, at all times, it accurately documents the erosion and sediment control practices that are being used or will be used during construction, and all SMPs that will be constructed on the site. At a minimum, the *owner or operator* must modify the *SWPPP*, including construction drawings:

   a. whenever the current provisions prove to be ineffective in *minimizing pollutants* in *stormwater discharges* from the site; and

   b. whenever there is a change in design, construction, or operation at the *construction site* that has or could have an effect on the *discharge* of *pollutants*; and

   c. to address issues or deficiencies identified during an inspection by the *qualified inspector,* NYSDEC, or other regulatory authority; and

   d. to document the final construction conditions in an as-built drawing.

6. NYSDEC may notify the *owner or operator* at any time that the *SWPPP* does not meet one or more of the minimum requirements of this permit. The notification must be in writing and identify the provisions of the *SWPPP* that require modification. Within fourteen (14) calendar days of such notification, or as otherwise indicated by NYSDEC, the *owner or operator* must make the required changes to the *SWPPP* and submit written notification to NYSDEC that the changes have been made. If the *owner or operator* does not respond to NYSDEC's comments in the specified time frame, NYSDEC may suspend the *owner's or operator's* coverage under this permit or require the *owner or operator* to obtain coverage under an individual SPDES permit in accordance with Part II.D.4.

7. Prior to the *commencement of construction activity*, the *owner or operator* must 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* and the

contractor(s) and subcontractor(s) that will be responsible for constructing the SMPs included in the *SWPPP*. The *owner or operator* must have each of the contractors and subcontractors identify at least one person from their company to be *trained contractor* that will be responsible for implementation of the *SWPPP*. The *owner or operator* must ensure that at least one *trained contractor* is on site daily when soil disturbance activities are being performed.

The *owner or operator* must have each of the contractors and subcontractors identified above sign a copy of the following certification statement below before the *commencement of construction activities*:

> "I hereby certify under penalty of law that I understand and agree to comply with the requirements 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 requirements of the most current version of the New York State Pollutant Discharge Elimination System (SPDES) Construction General Permit (CGP) 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, that I do not believe to be true, including the possibility of fine and imprisonment for knowing violations"

In addition to providing the certification statement above, the certification page must also identify the specific elements of the *SWPPP* that each contractor and subcontractor will be responsible for and include the name and title of the person providing the signature; the name and title of the *trained contractor* responsible for *SWPPP* implementation; the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification statement is signed. The *owner or operator* must attach the certification statement(s) to the copy of the *SWPPP* that is maintained at the *construction site*. If new or additional contractors are hired to implement measures identified in the *SWPPP* after the *commencement of construction activities*, they must also sign the certification statement and provide the information listed above prior to performing *construction activities*.

B. Required *SWPPP* Contents

1. Erosion and sediment control component - The *owner or operator* must prepare a *SWPPP* that includes erosion and sediment control practices.

    a. Erosion and sediment control practices must be designed:

        i. in conformance with the BB; or

        ii. *equivalent* to the BB if deviating from Part III.B.1.a.i.

    b. If the erosion and sediment control practices are designed in conformance with Part III.B.1.a.ii., the *SWPPP* must include a demonstration of *equivalence* to the BB.

    c. At a minimum, the erosion and sediment control component of the *SWPPP* must include the following:

        i. Background information about the scope of the project, including the location, type and size of project; and

        ii. A site map/construction drawing(s) with north arrows for the project, including a general location map. At a minimum, the site map must show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s); floodplain/floodway boundaries; wetlands and drainage patterns that could be affected by the *construction activity*; existing and final contours; locations of different soil types with boundaries; material, waste, borrow or equipment storage areas located on adjacent properties; and location(s) of the *stormwater discharge*(s) and receiving surface water(s); and

        iii. A description of the soil(s) present at the site, including an identification of the Hydrologic Soil Group (HSG); and

        iv. A phasing plan for the project and sequencing plans for all *phases*, both of which must address clearing and grubbing, excavation and grading, utility and infrastructure installation, *final stabilization*,

and any other *construction activity* at the site that will result in soil disturbance.

1. The phasing plan must include:

    a. a map delineating and labeling the limits of soil disturbance for all *phases* of a project; and

    b. a table identifying the order and intended schedule of when each *phase* will begin and end its sequencing plan. The table must identify the total disturbed area for each *phase* at any one time and the total disturbed area for the overall project at any one time all on one timeline showing all overlapping quantities of disturbed area at any one time; and

2. A sequencing plan for a specific *phase* must include:

    a. a table indicating the order and intended schedule of *construction activities* within a *phase*, and corresponding construction drawings with a description of the work to be performed; and

    b. all permanent and *temporary stabilization* measures; and

v. A description of the minimum erosion and sediment control practices to be installed or implemented for each *construction activity* that will result in soil disturbance. Include a schedule that identifies the timing of initial placement or implementation of each erosion and sediment control practice and the minimum time frames that each practice should remain in place or be implemented; and

vi. A site map/construction drawing(s) showing the specific location(s), size(s), and length(s) of each erosion and sediment control practice; and

vii. The dimensions, material specifications, installation details, and operation and maintenance requirements for all erosion and sediment control practices. Include the location and sizing of any

temporary sediment basins and structural practices that will be used to divert flows from exposed soils; and

viii. A maintenance inspection schedule for the contractor(s) and subcontractor(s) identified in Part III.A.7. to ensure continuous and effective operation of the erosion and sediment control practices. The maintenance inspection schedule must be in accordance with the requirements in the BB technical standard; and

ix. A description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a *pollutant* source in the *stormwater discharges*; and

x. A description and location of any *stormwater discharges* associated with industrial activity other than construction at the site, including, but not limited to, *stormwater discharges* from asphalt plants and concrete plants located on the *construction site*; and

xi. Identification of any elements of the design that are not in conformance with the design criteria in the BB technical standard. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

2. SMP component – The *owner or operator* of *construction activity* identified in Table 2 of Appendix B must prepare a *SWPPP* that includes SMPs.

   a. SMPs must be designed in conformance with the applicable *sizing criteria* in Part II.C.2.a., c., or d.; and

   b. SMPs must be designed in conformance with the *performance criteria*:

      i. in the DM; or

      ii. *equivalent* to the DM if deviating from Part III.B.2.b.i.; or

      iii. in the New York State Stormwater Management Design Manual, dated January 2015 (2015 Design Manual), or *equivalent* to it, if the following criteria are met:

1. The eNOI is submitted in accordance with Part I.D. before January 29, 2027 for *construction activities* that are either:

    a. subject to governmental review and approval:

        i. where the *owner or operator* made any application to that governmental entity prior to the effective date of this permit; and

        ii. such application included a *SWPPP* developed using the 2015 Design Manual or *equivalent* to it; or

    b. not subject to governmental review and approval:

        i. where a fiscal allocation for the *construction activities* has been developed and approved by a governmental entity; and

        ii. the *SWPPP* was developed using the 2015 Design Manual or *equivalent* to it; and

c. If SMPs are designed in conformance with Part III.B.2.b.ii., the *SWPPP* must include the reason(s) for the deviation or alternative design and a demonstration of *equivalence* to the DM; and

d. If SMPs are designed in conformance with Part III.B.2.b.iii., the *SWPPP* must include supporting information or documentation demonstrating that Part III.B.2.b.iii.1.a. or b. apply; and

e. The SMP component of the *SWPPP* must include the following:

    i. Identification of all SMPs to be constructed as part of the project, including which option the SMP designs conform to, either Part III.B.2.b.i., ii., or iii. Include the dimensions, material specifications and installation details for each SMP; and

    ii. A site map/construction drawing(s) showing the specific location and size of each SMP; and

iii. A Stormwater Modeling and Analysis Report that includes:

(i) Map(s) showing pre-development conditions, including watershed/subcatchments boundaries, flow paths/routing, and design points; and

(ii) Map(s) showing post-development conditions, including watershed/subcatchments boundaries, flow paths/routing, design points and SMPs; and

(iii) Results of *stormwater* modeling (i.e. hydrology and hydraulic analysis) for the required storm events. Include supporting calculations (model runs), methodology, and a summary table that compares pre- and post-development runoff rates and volumes for the different storm events; and

(iv) Summary table, with supporting calculations, which demonstrates that each SMP has been designed in conformance with the *sizing criteria* included in the DM; and

(v) Identification of any *sizing criteria* that is not required based on the requirements included in Part II.C.; and

(vi) Identification of any elements of the design that are not in conformance with the *performance criteria* in the DM. Include the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the DM.

iv. Soil testing results and locations (test pits, borings); and

v. Infiltration test results, when required in accordance with Part III.B.2.a.; and

vi. An operations and maintenance plan that includes inspection and maintenance schedules and actions to ensure continuous and effective operation of each SMP. The plan must identify the entity

that will be responsible for the long-term operation and maintenance of each practice; and

3. Enhanced Phosphorus Removal Standards - The *owner or operator* of *construction activity* identified in Table 2 of Appendix B that is located in a watershed identified in Appendix C must prepare a *SWPPP* that includes SMPs designed in conformance with the applicable *sizing criteria* in Part II.C.2.b., c., or d. and the *performance criteria* Enhanced Phosphorus Removal Standards included in the DM. At a minimum, the SMP component of the *SWPPP* must meet the requirements of Part III.B.2.

C. Required *SWPPP* Components by Project Type

Owners or operators of *construction activities*, identified in Table 1 of Appendix B, are required to prepare a *SWPPP* that only includes erosion and sediment control practices designed in accordance with Part III.B.1. *Owners or operators* of the *construction activities*, identified in Table 2 of Appendix B, must prepare a *SWPPP* that also includes SMPs designed in accordance with Part III.B.2 or 3.

For the entire area of disturbance, including the entire *common plan of development or sale* if applicable, the owner or operator must evaluate every bullet from Appendix B Table 1 and Table 2 separately. If bullets from both Table 1 and Table 2 apply, the *SWPPP* must include erosion and sediment control practices for all *construction activities* but SMPs for only those portions of the *construction activities* that fall under Table 2 bullet(s).

Part IV. Inspection and Maintenance Requirements

A. General Construction Site Inspection and Maintenance Requirements

1. The *owner or operator* must ensure that all erosion and sediment control practices (including pollution prevention measures), and all SMPs identified in the *SWPPP*, are inspected and maintained in accordance with Part IV.B. and C.

B. Contractor Maintenance Inspection Requirements

1. The *owner or operator* of each *construction activity*, identified in Tables 1 and 2 of Appendix B, must have a *trained contractor* inspect the erosion and sediment control practices and pollution prevention measures being

implemented within the active work area daily to ensure that they are being maintained in effective operating condition at all times. If deficiencies are identified, the contractor must:

a. if the corrective action does not require engineering design:

    i. begin implementing corrective actions within one business day; and

    ii. complete the corrective actions within five business days; or

b. if the corrective action requires engineering design:

    i. begin the engineering design process within five business days; and

    ii. complete the corrective action in a reasonable time frame but no later than within 60 calendar days.

2. For *construction sites* where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *trained contractor* can stop conducting the maintenance inspections in accordance with Part IV.B.1. The *trained contractor* must begin conducting the maintenance inspections in accordance with Part IV.B.1. as soon as soil disturbance activities resume.

3. For *construction sites* where soil disturbance activities have been shut down with partial project completion, the *trained contractor* can stop conducting the maintenance inspections in accordance with Part IV.B.1. if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all SMPs required for the completed portion of the project have been constructed in conformance with the *SWPPP* and are operational.

C. *Qualified Inspector* Inspection Requirements

1. With the exception of the following *construction activities* identified in Tables 1 and 2 of Appendix B, a *qualified inspector* must conduct site inspections for all other *construction activities* identified in Tables 1 and 2 of Appendix B:

    a. the construction of a single-family residential subdivision with 25% or less *impervious cover* at total site build-out that involves a soil disturbance of one (1) or more acres of land but less than or equal to five (5) acres and is

not located in one of the watersheds listed in Appendix C and not *directly discharging* to one of the 303(d) segments listed in Appendix D; and

b. the construction of a single-family home that involves soil disturbances of one (1) or more acres but less than or equal to five (5) acres and is not located in one of the watersheds listed in Appendix C and not *directly discharging* to one of the 303(d) segments listed in Appendix D; and

c. construction on *agricultural property* that involves soil disturbances of one (1) or more acres but less than five (5) acres; and

d. *construction activities* located in the New York City Watershed located east of the Hudson River, see Appendix C Figure 1, that involve soil disturbances of 5,000 square feet or more, but less than one acre.

2. The *qualified inspector* must conduct site inspections in accordance with the following timetable:

a. For *construction sites* where soil disturbance activities are on-going, the *qualified inspector* must conduct a site inspection at least once every seven (7) calendar days; or

b. For *construction sites* where soil disturbance activities are on-going and the *owner or operator* has received authorization in accordance with Part I.E.6. to disturb greater than five (5) acres of soil at any one time, the *qualified inspector* must conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections must be separated by a minimum of two (2) full calendar days; or

c. For *construction sites* where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *qualified inspector* must conduct a site inspection at least once every thirty (30) calendar days. The *owner or operator* must notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix E) or, in areas under the jurisdiction of a *Traditional Land Use Control MS4 Operator,* the *Traditional Land Use Control MS4 Operator* (provided the *Traditional Land Use Control MS4 Operator* is not the *owner or operator* of the *construction activity*) by hard copy or email prior to reducing the inspections to this frequency and again by hard copy or email prior to re-commencing construction; or

d. For *construction sites* where soil disturbance activities have been shut down with partial project completion, the requirement to have the *qualified inspector* conduct inspections ceases if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all SMPs required for the completed portion of the project have been constructed in conformance with the *SWPPP* and are operational. The *owner or operator* must notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix E) or, in areas subject to the review authority of *Traditional Land Use Control MS4 Operator(s)* in accordance with Part I.D.2.b.ii.1., the *Traditional Land Use Control MS4 Operator(s)* (provided the *Traditional Land Use Control MS4 Operator(s)* are not the *owners or operators* of the *construction activity*) in writing prior to the shutdown and again in writing prior to resuming *construction activity*. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the *owner or operator* must terminate coverage by meeting the requirements of Part V; or

e. For *construction sites* involving soil disturbance of one (1) or more acres that *directly discharge* to one of the 303(d) segments listed in Appendix D or is located in one of the watersheds listed in Appendix C, the *qualified inspector* must conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections must be separated by a minimum of two (2) full calendar days.

3. At a minimum, the *qualified inspector* must inspect:

   a. all erosion and sediment control practices and pollution prevention measures to ensure integrity and effectiveness; and

   b. all SMPs under construction to ensure that they are constructed in conformance with the *SWPPP*; and

   c. all areas of disturbance that have not achieved *final stabilization*; and

   d. all points of *discharge* to *surface waters of the State* located within, or immediately adjacent to, the property boundaries of the *construction site*; and

   e. all points of *discharge* from the *construction site*.

4. The *qualified inspector* must prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report must include and/or address all of the following, for all *construction activities* except those listed in Part IV.C.1.:

   a. Permit identification number; and

   b. Date and time of inspection; and

   c. Name and title of person(s) performing inspection; and

   d. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection, including the temperature at the time of the inspection; and

   e. A description of the condition of the runoff at all points of *discharge* from the *construction site*. This must 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; and

   f. A description of the condition of all *surface waters of the State* located within, or immediately adjacent to, the property boundaries of the *construction site* which receive runoff from disturbed areas. This must include identification of any *discharges* of sediment to the *surface waters of the State*; and

   g. Identification of all erosion and sediment control practices and pollution prevention measures that need repair or maintenance; and

   h. Identification of all erosion and sediment control practices and pollution prevention measures that were not installed properly or are not functioning as designed and need to be reinstalled or replaced; and

   i. Description and sketch (map) of areas with active soil disturbance activity, areas that have been disturbed but are inactive at the time of the inspection, and areas that have been stabilized (temporary and/or final) since the last inspection; and

   j. Estimates, in square feet or acres, of the following areas:

i. Total area with active soil disturbance (not requiring either *temporary stabilization* or *final stabilization*); and

ii. Total area with inactive soil disturbance (requiring either *temporary stabilization* or *final stabilization*); and

iii. Total area that has achieved *temporary stabilization*; and

iv. Total area that has achieved *final stabilization*; and

k. Current stage of construction of all SMPs and identification of all *construction activity* on site that is not in conformance with the *SWPPP* and technical standards; and

l. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices and pollution prevention measures; and to correct deficiencies identified with the construction of the SMP(s); and

m. Identification and status of all corrective actions that were required by previous inspection; and

n. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The *qualified inspector* must attach 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* must 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* must 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.

5. Within one business day of the completion of an inspection, the *qualified inspector* must notify the *owner or operator*, and appropriate contractor or subcontractor identified in Part III.A.7., of any corrective actions that need to be taken. The contractor or subcontractor must:

a. if the corrective action does not require engineering design:

i. begin implementing corrective actions within one business day; and

ii. complete the corrective actions within five business days; or

b. if the corrective action requires engineering design:

i. begin the engineering design process within five business days; and

ii. complete the corrective action in a reasonable time frame but no later than within 60 calendar days.

6. All inspection reports must be signed by the *qualified inspector.* In accordance with Part I.E.3., the inspection reports must be maintained on site with the *SWPPP*.

Part V. How to Terminate CGP Coverage

A. Electronic Notice of Termination (eNOT) Submittal

The eNOT contains questions to ensure requirements in Part V.A. have been met.

1. An *owner or operator* must terminate coverage when one or more of the following requirements have been met:

a. Total project completion:

i. all *construction activity* identified in the *SWPPP* has been completed; and

ii. all areas of disturbance have achieved *final stabilization*; and

iii. all temporary, structural erosion and sediment control measures have been removed; and

iv. all SMPs have been constructed in conformance with the *SWPPP* and are operational; and

v. an as-built drawing has been prepared; or

b. Planned shutdown with partial project completion:

   i. all soil disturbance activities have ceased; and

   ii. all areas disturbed as of the project shutdown date have achieved *final stabilization*; and

   iii. all temporary, structural erosion and sediment control measures have been removed; and

   iv. all SMPs required for the completed portion of the project have been constructed in conformance with the *SWPPP* and are operational; and

   v. an as-built drawing has been prepared; or

c. In accordance with Part I.G. Change of Owner or Operator; or

d. The *owner or operator* has obtained coverage under an alternative general SPDES permit or an individual SPDES permit.

2. For *construction activities* that require *qualified inspector* inspections in accordance with Part IV.C.1. and have met Part V.A.1.a. or b., the *owner or operator* must have the *qualified inspector* perform a final site inspection prior to submitting the eNOT. The *qualified inspector* must, by signing the "Final Stabilization" and "Post-Construction Stormwater Management Practice(s)" certification statements on the eNOT, certify that all the requirements in Part V.A.1.a. or b. have been achieved.

3. For *construction activities* that are subject to the review authority of *Traditional Land Use Control MS4 Operator(s)* in accordance with Part I.D.2.b.ii.1. and meet Part V.A.1.a. or b., the *owner or operator* must have the *Traditional Land Use Control MS4 Operator(s)* sign the "MS4 Acceptance" statement on the eNOT in accordance with the requirements in Part VII.J. A *Traditional Land Use Control MS4 Operator* official, by signing this statement, determined that it is acceptable for the *owner or operator* to submit the eNOT in accordance with the requirements of this Part. A *Traditional Land Use Control MS4 Operator* can make this determination by performing a final site inspection themselves or by accepting the *qualified inspector*'s final site inspection certification(s) when required in Part V.A.2.

4. For *construction activities* that require SMPs and meet Part V.A.1.a. or b., the *owner or operator* must, prior to submitting the eNOT, ensure one of the following:

    a. for SMP(s) that were constructed by a private entity, but will be owned, operated, and maintained by a public entity, the SMP(s) and any right-of-way(s) needed to operate and maintain such practice(s) have been deeded to the municipality in which the practice(s) is located; or

    b. for SMP(s) that are privately owned, but will be operated and maintained by a public entity, an executed operation and maintenance agreement is in place with the municipality that will operate and maintain the SMP(s); or

    c. for SMP(s) that are privately owned, the *owner or operator* has a mechanism 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; or

    d. for SMP(s) that are owned by a public or private institution (e.g. school, university, hospital), government agency or authority, or public utility, the *owner or operator* has policies and procedures in place that ensure operation and maintenance of the practices in accordance with the operation and maintenance plan.

5. An *owner or operator* that has met the requirements of Part V.A.1., 2., 3., and 4. must request termination of coverage under this permit by submitting a complete Notice of Termination form electronically using a NYSDEC approved form.[5]

    a. The owner's or operator's coverage is terminated as of the termination date indicated in the Letter of Termination (LOT), which is sent by NYSDEC after a complete eNOT is submitted.

[5] Unless NYSDEC grants a waiver in accordance with 40 CFR 127.15(c) or (d). All waiver requests must be submitted to Stormwater_info@dec.ny.gov or NYSDEC, Bureau of Water Permits, 625 Broadway, 4th Floor, Albany, New York 12233-3505.

Part VI. Record Retention and Reporting

A. Record Retention

The *owner or operator* must retain a copy of the documents listed in Part I.E.3. and a copy of the LOT for a period of at least five years from the date that NYSDEC accepts a complete NOT submitted in accordance with Part V.

B. Reporting

Except for the eNOI, the signature forms associated with the eNOI, and the eNOT, all other written correspondence requested by NYSDEC, including individual permit applications, must be sent to the address of the appropriate DOW (SPDES) Program contact at the Regional Office listed in Appendix E.

Part VII. Standard Permit Requirements

For the purposes of this permit, examples of contractors and subcontractors include: third-party maintenance and construction contractors.

A. Duty to Comply

The *owner or operator*, and all contractors or subcontractors, must comply with all requirements of this permit. Any non-compliance with the requirements of this permit constitutes a violation of the New York State Environmental Conservation Law (ECL), and its implementing regulations, and is grounds for enforcement action. Filing of a request for termination of coverage under this permit, or a notification of planned changes or anticipated non-compliance, does not limit, diminish or stay compliance with any requirements of this permit.

B. Need to Halt or Reduce Activity Not a Defense

The necessity to halt or reduce the *construction activity* regulated by this permit, in order to maintain compliance with the requirements of this permit, must not be a defense in an enforcement action.

C. Penalties

There are substantial criminal, civil, and administrative penalties associated with violating the requirements of this permit. Fines of up to $37,500 per day for each

violation and imprisonment for up to 15 years may be assessed depending upon the nature and degree of the offense.

D. False Statements

Any person who knowingly makes any false material statement, representation, or certification in any application, record, report, or other document filed or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance must, upon conviction, be punished in accordance with ECL §71-1933 and or New York State Penal Law Articles 175 and 210.

E. Re-Opener Clause

Upon issuance of this permit, a determination has been made on the basis of a submitted Notice of Intent, plans, or other available information, that compliance with the specified permit requirements will reasonably protect classified water use and assure compliance with applicable *water quality standards*. Satisfaction of the requirements of this permit notwithstanding, if operation pursuant to this permit causes or contributes to a condition in contravention of State *water quality standards* or guidance values, or if NYSDEC determines that a modification is necessary to prevent impairment of the best use of the waters or to assure maintenance of *water quality standards* or compliance with other provisions of ECL Article 17 or the Clean Water Act (CWA), or any regulations adopted pursuant thereto, NYSDEC may require such modification and the Commissioner may require abatement action to be taken by the *owner or operator* and may also prohibit such operation until the modification has been implemented.

F. Duty to Mitigate

The *owner or operator*, and its contractors and subcontractors, must take all reasonable steps to *minimize* or prevent any *discharge* in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

G. Requiring Another General Permit or Individual SPDES Permit

NYSDEC may require any *owner or operator* authorized to *discharge* in accordance with this permit to apply for and obtain an individual SPDES permit or apply for authorization to *discharge* in accordance with another general SPDES permit.

1. Cases where an individual SPDES permit or authorization to discharge in accordance with another general SPDES permit may be required include, but is not limited to the following:

a. the *owner or operator* is not in compliance with the conditions of this permit or does not meet the requirements for coverage under this permit; and

b. a change has occurred in the availability of demonstrated technology or practices for the control or abatement of *pollutants* applicable to the *point source*; and

c. new effluent limitation guidelines or new source performance standards are promulgated that are applicable to *point sources* authorized to *discharge* in accordance with this permit; and

d. existing effluent limitation guidelines or new source performance standards that are applicable to *point sources* authorized to *discharge* in accordance with this permit are modified; and

e. a water quality management plan containing requirements applicable to such *point sources* is approved by NYSDEC; and

f. circumstances have changed since the time of the request to be covered so that the *owner or operator* is no longer appropriately controlled under this permit, or either a temporary or permanent reduction or elimination of the authorized *discharge* is necessary; and

g. the *discharge* is in violation of section 17-0501 of the ECL; and

h. the *discharge(s)* is a significant contributor of *pollutants*. In making this determination, NYSDEC may consider the following factors:

   i. the location of the *discharge(s)* with respect to *surface waters of the State*; and

   ii. the size of the *discharge(s)*; and

   iii. the quantity and nature of the *pollutants discharged* to *surface waters of the State*; and

   iv. other relevant factors including compliance with other provisions of ECL Article 17, or the CWA.

2. When NYSDEC requires any *owner or operator* authorized by this permit to apply for an individual SPDES permit as provided for in this subdivision, it must notify the *owner or operator* in writing that a permit application is required. This notice must include a brief statement of the reasons for this decision, an application

form, a statement setting a time for the *owner or operator* to file the application for an individual SPDES permit, and a deadline, not sooner than 180 days from the *owner's or operator's* receipt of the notification letter, whereby the authorization to *discharge* under this permit must be terminated. NYSDEC may grant additional time upon demonstration, to the satisfaction of the RWE,[6] that additional time to apply for an alternative authorization is necessary or where NYSDEC has not provided a permit determination in accordance with 6 NYCRR Part 621.

3. When an individual SPDES permit is issued to an *owner or operator* authorized to *discharge* under this permit for the same *discharge(s)*, this permit authorization for *construction activities* authorized under the individual SPDES permit is automatically terminated on the effective date of the individual SPDES permit unless termination is earlier in accordance with 6 NYCRR Part 750.

H. Duty to Provide Information

The *owner or operator* must furnish to NYSDEC, within five business days, unless otherwise set forth by NYSDEC, any information that NYSDEC may request to determine whether cause exists to determine compliance with this permit or to determine whether cause exists for requiring an individual SPDES permit in accordance with 6 NYCRR 750-1.21(e) (see Part VII.G. Requiring Another General Permit or Individual Permit).

The *owner or operator* must make available to NYSDEC, for inspection and copying, or furnish to NYSDEC within 25 business days of receipt of a NYSDEC request for such information, any information retained in accordance with this permit.

Except for Part I.D.4. and 5. and Part I.G., the following applies: where the *owner or operator* becomes aware that it failed to submit any relevant facts on the Notice of Intent, or submitted incorrect information in a Notice of Intent or in any report to NYSDEC, the *owner or operator* must submit such facts or corrected information to NYSDEC within five business days.

I. Extension

In the event a new permit is not issued and effective prior to the expiration of this permit, and this permit is extended pursuant to the State Administrative Procedure Act and 6 NYCRR Part 621, then the *owner or operator* with coverage under this permit may continue to operate and *discharge* in accordance with the requirements of this permit until a new permit is issued and effective.

[6] The Regional Water Manager where a DEC Region does not have a RWE.

J. Signatories and Certification

The Notice of Intent, Notice of Termination, and reports required by this permit must be signed as provided in 40 CFR §122.22.

1. All Notices of Intent and Notices of Termination must be signed as follows:

    a. For a corporation. By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

        (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation; or

        (ii) the manager of one or more manufacturing, production or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for Notice of Intent or Notice of Termination requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

        Note: NYSDEC does not require specific assignments or delegations of authority to responsible corporate officers identified in 40 CFR §122.22(a)(1)(i). NYSDEC will presume that these responsible corporate officers have the requisite authority to sign the Notice of Intent or Notice of Termination unless the corporation has notified NYSDEC to the contrary. Corporate procedures governing authority to sign a Notice of Intent or Notice of Termination may provide for assignment or delegation to applicable corporate positions under 40 CFR §122.22(a)(1)(ii) rather than to specific individuals.

    b. For a partnership or sole proprietorship. By a general partner or the proprietor, respectively.

c. For a municipality, State, Federal, or other public agency. By either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

    1. the chief executive officer of the agency; or

    2. a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

2. All reports required by this permit, and other information requested by NYSDEC, must be signed by a person described in Part VII.J.1., or by a duly authorized representative of that person. A person is a duly authorized representative only if:

    a. The authorization is made in writing by a person described in Part VII.J.1. or using the Duly Authorized Form, found on the DEC website; and

    b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

    c. The written authorization is submitted to NYSDEC.

3. Changes to authorization. If an authorization under Part VII.J.2. is no longer accurate because a different individual or position has responsibility for the overall operation of the *construction activity*, a new authorization satisfying the requirements of Part VII.J.2. must be submitted to NYSDEC prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under Part VII.J.1. or 2. must make the following certification:

    I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who

manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

5. Electronic reporting. If documents described in Part VII.J.1. or 2. are submitted electronically by or on behalf of the *construction activity* with coverage under this permit, any person providing the electronic signature for such documents must meet all relevant requirements of this section, and must ensure that all of the relevant requirements of 40 CFR Part 3 (including, in all cases, subpart D to Part 3) (Cross-Media Electronic Reporting) and 40 CFR Part 127 (NPDES Electronic Reporting Requirements) are met for that submission.

K. Inspection and Entry

The *owner or operator* must allow NYSDEC, the USEPA Regional Administrator, the applicable county health department, or any authorized representatives of those entities, or, in the case of a *construction site* which *discharges* through an *MS4*, an authorized representative of the *MS4* receiving the *discharge*, upon the presentation of credentials and other documents as may be required by law, to:

1. enter upon the *owner's or operator's* premises where a regulated facility or activity is located or conducted or where records must be kept under the requirements of this permit; and

2. have access to and copy at reasonable times, any records that must be kept under the requirements of this permit, including records required to be maintained for purposes of operation and maintenance; and

3. inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this permit; and

4. sample or monitor at reasonable times, for the purposes of assuring general SPDES permit compliance or as otherwise authorized by the CWA or ECL, any substances or parameters at any location; and

5. enter upon the property of any contributor to the regulated facility or activity under authority of the *owner or operator*.

L. Confidentiality of Information

The following must not be held confidential: this permit, the fact sheet for this permit, the name and address of any *owner or operator*, effluent data, the Notice of Intent, and information regarding the need to obtain an individual permit or an alternative general SPDES permit. This includes information submitted on forms themselves and any attachments used to supply information required by the forms (except information submitted on usage of substances). Upon the request of the *owner or operator*, NYSDEC must make determinations of confidentiality in accordance with 6 NYCRR Part 616, except as set forth in the previous sentence. Any information accorded confidential status must be disclosed to the Regional Administrator upon his or her written request. Prior to disclosing such information to the Regional Administrator, NYSDEC will notify the Regional Administrator of the confidential status of such information.

M. Other Permits May Be Required

Nothing in this permit relieves the *owner or operator* from a requirement to obtain any other permits required by law.

N. NYSDEC Orders or Civil Decrees/Judgments

The issuance of this permit by the NYSDEC, and the coverage under this permit by the *owner or operator*, does not supersede, revoke, or rescind any existing order on consent or civil Decree/Judgment, or modification to any such documents or to any order issued by the Commissioner, or any of the terms, conditions, or requirements contained in such order or modification therefore, unless expressly noted.

O. Property Rights

Coverage under this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining the assent of any other jurisdiction as required by law for the *discharge* authorized.

P. Compliance with Interstate Standards

If the *construction activity* covered by this permit originates within the jurisdiction of an interstate water pollution control agency, then the *construction activity* must also comply with any applicable effluent standards or *water quality standards* promulgated by that interstate agency and as set forth in this permit for such *construction activities*.

Q. Oil and Hazardous Substance Liability

Coverage under this permit does not affect the imposition of responsibilities upon, or the institution of any legal action against, the *owner or operator* under section 311 of the CWA, which must be in conformance with regulations promulgated pursuant to section 311 governing the applicability of section 311 of the CWA to *discharges* from facilities with *NPDES* permits, nor must such issuance preclude the institution of any legal action or relieve the *owner or operator* from any responsibilities, liabilities, or penalties to which the *owner or operator* is or may be subject pursuant to the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. section 9601 et seq. (CERCLA).

R. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, must not be affected thereby.

S. NYSDEC Approved Forms

The *owner or operator* must provide all relevant information that is requested by NYSDEC, and required by this permit, on all NYSDEC approved forms.

APPENDIX A – Abbreviations and Definitions

Abbreviations

APO – Agency Preservation Officer
BB – New York State Standards and Specifications for Erosion and Sediment Control (Blue Book), dated November 2016
BMP – Best Management Practice
CPESC – Certified Professional in Erosion and Sediment Control
CPv – Channel Protection Volume
CWA – Clean Water Act (or the Federal Water Pollution Control Act, 33 U.S.C. §1251 et seq)
DM – New York State Stormwater Management Design Manual (Design Manual), dated July 31, 2024
DOW – Division of Water
EAF – Environmental Assessment Form
ECL – chapter 43-B of the Consolidated Laws of the State of New York, entitled the Environmental Conservation Law
EPA – U.S. Environmental Protection Agency
HSG – Hydrologic Soil Group
MS4 – Municipal Separate Storm Sewer System
NOI – Notice of Intent
NOT – Notice of Termination
NPDES – National Pollutant Discharge Elimination System
NYC – The City of New York
NYCDEP – The City of New York Department of Environmental Protection
NYSDEC – The New York State Department of Environmental Conservation
OPRHP – Office of Parks, Recreation and Historic Places
Qf – Extreme Flood
Qp – Overbank Flood
RR – Runoff Reduction
RRv – Runoff Reduction Volume
RWE – Regional Water Engineer
SEQR – State Environmental Quality Review Act
SHPA – State Historic Preservation Act
SMP – Post-Construction Stormwater Management Practice
SPDES – State Pollutant Discharge Elimination System
SWPPP – Stormwater Pollution Prevention Plan
TMDL – Total Maximum Daily Load
UPA – Uniform Procedures Act
USDA – United States Department of Agriculture
WQv – Water Quality Volume

Definitions

All definitions in this section are solely for the purposes of this permit. If a word is not italicized in the permit, use its common definition.

Agricultural Building – a structure designed and constructed to house farm implements, hay, grain, poultry, livestock or other horticultural products; excluding any structure designed, constructed or used, in whole or in part, for human habitation, as a place of employment where agricultural products are processed, treated or packaged, or as a place used by the public.

Agricultural Property – the land for construction of a barn, *agricultural building*, silo, stockyard, pen or other structural practices identified in Table II in the "Agricultural Best Management Practice Systems Catalogue" (dated June 2023).

Alter Hydrology from Pre- to Post-Development Conditions – the post-development peak flow rate(s) has increased by more than 5% of the pre-developed condition for the design storm of interest (e.g. 10 yr and 100 yr).

Combined Sewer System – a sewer system which conveys sewage and *stormwater* through a single pipe system to a publicly owned treatment works.

Commence (Commencement of) Construction Activities – the initial disturbance of soils associated with clearing, grading or excavation activities; or other construction related activities that disturb or expose soils such as demolition, stockpiling of fill material, and the initial installation of erosion and sediment control practices required in the *SWPPP*. See definition for "*Construction Activity(ies)*" also.

Common Plan of Development or Sale – a contiguous area where multiple separate and distinct *construction activities* are occurring, or may occur, under one plan. The "common plan" of development or sale is broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, marketing plan, advertisement, drawing, permit application, State Environmental Quality Review Act (SEQR) environmental assessment form or other documents, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating *construction activities* may occur on a specific plot. A *common plan of development or sale* is comprised of two or more *phases*.

Common plan of development or sale does not include separate and distinct *construction activities* that are occurring, or may occur, under one plan that are at least 1/4 mile apart provided any interconnecting road, pipeline or utility project that is part of the same "common plan" is not concurrently being disturbed.

Construction Activity(ies) – identified within 40 CFR 122.26(b)(14)(x), 122.26(b)(15)(i), and 122.26(b)(15)(ii), any clearing, grading, excavation, filling, demolition or stockpiling activities that result in soil disturbance. Clearing activities can include, but are not limited to, mechanized logging equipment operation, the cutting and skidding of trees, stump removal and/or brush root removal.

Construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility, which is excluded from the calculation of the soil disturbance for a project. Routine maintenance includes, but is not limited to:

- Re-grading of gravel roads or parking lots; and
- Cleaning and shaping of existing roadside ditches and culverts that maintains the approximate original line and grade, and maintains or improves the hydraulic capacity of the ditch; and
- Replacement of existing culverts that maintains the approximate original line and grade, and maintains or improves the hydraulic capacity of a ditch; and
- Replacement of existing bridges that maintains the approximate original line and grade, and maintains or improves the hydraulic capacity beneath the bridges; and
- Cleaning and shaping of existing roadside ditches that does not maintain the approximate original grade, hydraulic capacity and purpose of the ditch if the changes to the line and grade, hydraulic capacity or purpose of the ditch are installed to improve water quality and quantity controls (e.g. installing grass lined ditch); and
- Placement of aggregate shoulder backing that stabilizes the transition between the road shoulder and the ditch or *embankment*; and
- Full depth milling and filling of existing asphalt pavements, replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six (6) inches of subbase material; and
- Long-term use of equipment storage areas at or near highway maintenance facilities; and
- Removal of sediment from the edge of the highway to restore a previously existing sheet-flow drainage connection from the highway surface to the highway ditch or *embankment*; and
- Existing use of Canal Corp owned upland disposal sites for the canal, and
- Replacement of curbs, gutters, sidewalks and guide rail posts; and
- Maintenance of ski trails including brush hog use and mowing; and
- Above ground snowmaking pipe replacement; and
- Replacement of existing utility poles; etc.

Construction Site – the land area where *construction activity(ies)* will occur. See also the definitions for "*Commence (Commencement of) Construction Activities"* and "*Common Plan of Development or Sale."*

Dewatering – the act of draining rainwater and/or groundwater from building foundations, vaults or excavations/trenches.

Directly Discharge(s)(ing) (to a specific surface waterbody) – runoff flows from a *construction site* by overland flow and the first point of *discharge* is the specific surface waterbody, or runoff flows from a *construction site* to a separate storm sewer system and the first point of *discharge* from the separate storm sewer system is the specific surface waterbody.

Discharge(s)(d) – any addition of any *pollutant* to waters of the State through an outlet or *point source*.

Embankment – an earthen or rock slope that supports a road/highway.

Equivalent (Equivalence) – the practice or measure meets all the performance, longevity, maintenance, and safety objectives of the technical standard and will provide an equal or greater degree of water quality protection.

Final Stabilization – all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other *equivalent* stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.

Historic Property – any building, structure, site, object or district that is listed on the State or National Registers of Historic Places or is determined to be eligible for listing on the State or National Registers of Historic Places.

Impervious Area (Cover) – all impermeable surfaces that cannot effectively infiltrate rainfall. This includes paved, concrete and compacted gravel surfaces (i.e. parking lots, driveways, roads, runways and sidewalks); building rooftops and miscellaneous impermeable structures such as patios, pools, and sheds.

Infeasible – not technologically possible, or not economically practicable and achievable considering best industry practices.

Minimize(ing)(ation) – reduce and/or eliminate to the extent achievable using control measures (including best management practices) that are technologically available and economically practicable and achievable in light of best industry practices.

Municipal Separate Storm Sewer System (MS4) - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

1. owned or operated by a State, city, town, village, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, *stormwater*, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA, that *discharges* to *surface waters of the State*; and

2. designed or used for collecting or conveying *stormwater*; and

3. which is not a *combined sewer system*; and

4. which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

Natural Buffer(s) – an undisturbed area with natural cover running along a surface water (e.g. wetland, stream, river, lake, etc.).

New Development – any land disturbance that does not meet the definition of *Redevelopment Activity* included in this appendix.

New York State Erosion and Sediment Control Certificate Program – a certificate program that establishes and maintains a process to identify and recognize individuals who are capable of developing, designing, inspecting and maintaining erosion and sediment control plans on projects that disturb soils in New York State. The certificate program is administered by the New York State Conservation District Employees Association.

Nonpoint Source(s) – any source of water pollution or *pollutants* which is not a discrete conveyance or *point source* permitted pursuant to Title 7 or 8 of Article 17 of the Environmental Conservation Law (see ECL Section 17-1403).

Overbank – flow events that exceed the capacity of the stream channel and spill out into the adjacent floodplain.

Owner or Operator – the person, persons, or legal entity which owns or leases the property on which the *construction activity* is occurring; an entity that has operational control over the construction plans and specifications, including the ability to make modifications to the plans and specifications; and/or an entity that has day-to-day operational control of those activities at a project that are necessary to ensure compliance with the permit requirements.

Performance Criteria – the six performance criteria for each group of SMPs in Chapters 5 and 6 of the technical standard, New York State Stormwater Management Design Manual (DM), dated July 31, 2024. These include feasibility, conveyance, pretreatment, treatment, landscaping, and maintenance. It does not include the *Sizing Criteria* (i.e. WQv, RRv, CPv, Qp and Qf) in Part I.C.2. of the permit.

Phase – a defined area in which *construction activities* are occurring or will occur separate from other defined area(s).

Point Source – any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel or other floating craft, or landfill leachate collection system from which *pollutants* are or may be *discharged*.

Pollutant(s) – dredged spoil, filter backwash, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand and industrial, municipal, agricultural waste and ballast *discharged* into water; which may cause or might reasonably be expected to cause pollution of the waters of the state in contravention of the standards or guidance values adopted as provided in 6 NYCRR Parts 700 et seq.

Qualified Inspector – a person that is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, *New York State Erosion and Sediment Control Certificate Program* holder or other NYSDEC endorsed individual(s).

It can also mean someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided that person has training in the principles and practices of erosion and sediment control. Training in the principles and practices of erosion and sediment control means that the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect has received four (4) hours of NYSDEC endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other NYSDEC endorsed entity. After receiving the initial training, the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect shall receive four (4) hours of training every three (3) years.

It can also mean a person that meets the *Qualified Professional* qualifications in addition to the *Qualified Inspector* qualifications.

Note: Inspections of any SMPs that include structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.

Qualified Professional – a person that is knowledgeable in the principles and practices of *stormwater* management and treatment, such as a licensed Professional Engineer, Registered Landscape Architect or other NYSDEC endorsed individual(s). Individuals preparing *SWPPPs* that require the SMP component must have an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics. All components of the *SWPPP* that involve the practice of engineering, as defined by the NYS Education Law (see Article 145), shall be prepared by, or under the direct supervision of, a professional engineer licensed to practice in the State of New York.

Redevelopment Activity(ies) – the disturbance and reconstruction of existing *impervious area*, including *impervious areas* that were removed from a project site within five (5) years of preliminary project plan submission to the local government (i.e. site plan, subdivision, etc.).

Renewable Energy – electricity or thermal energy generated by renewable energy systems through use of the following technologies: solar thermal, photovoltaics, on land and offshore wind, hydroelectric, geothermal electric, geothermal ground source heat, tidal energy, wave energy, ocean thermal, and fuel cells which do not utilize a fossil fuel resource in the process of generating electricity.

Site Limitations – site conditions that prevent the use of an infiltration technique and or infiltration of the total WQv. Typical *site limitations* include: seasonal high groundwater, shallow depth to bedrock, and soils with an infiltration rate less than 0.5 inches/hour. The existence of *site limitations* shall be confirmed and documented using actual field testing (i.e. test pits, soil borings, and infiltration test) or using information from the most current United States Department of Agriculture (USDA) Soil Survey for the County where the project is located.

Sizing Criteria – the criteria included in Part I.C.2 of the permit that are used to size SMPs. The criteria include; Water Quality Volume (WQv), Runoff Reduction Volume (RRv), Channel Protection Volume (Cpv), *Overbank* Flood (Qp), and Extreme Flood (Qf).

Steep Slope – land area designated on the current United States Department of Agriculture (USDA) Soil Survey as Soil Slope Phase D, (provided the map unit name or description is inclusive of slopes greater than 25%), or Soil Slope Phase E or F, (regardless of the map unit name), or a combination of the three designations.

Stormwater – that portion of precipitation that, once having fallen to the ground, is in excess of the evaporative or infiltrative capacity of soils, or the retentive capacity of surface features, which flows or will flow off the land by surface runoff to waters of the State.

Streambank – the terrain alongside the bed of a creek or stream. The bank consists of the sides of the channel, between which the flow is confined.

Stormwater Pollution Prevention Plan (SWPPP) – a project specific report, including construction drawings, that among other things: describes the *construction activity(ies)*, identifies the potential sources of pollution at the *construction site*; describes and shows the *stormwater* controls that will be used to control the *pollutants* (i.e. erosion and sediment controls; for many projects, includes SMPs); and identifies procedures the *owner or operator* will implement to comply with the requirements of the permit. See Part III of the permit for a complete description of the information that must be included in the *SWPPP*.

Surface Waters of the State – shall be construed to include lakes, bays, sounds, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic ocean within the territorial seas of the state of New York and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface waters), which are wholly or partially within or bordering the state or within its jurisdiction. Waters of the state are further defined in 6 NYCRR Parts 800 to 941.

Temporarily Ceased – an existing disturbed area will not be disturbed again within 14 calendar days of the previous soil disturbance.

Temporary Stabilization – exposed soil has been covered with material(s) as set forth in the technical standard, New York Standards and Specifications for Erosion and Sediment Control, to prevent the exposed soil from eroding. The materials can include, but are not limited to, mulch, seed and mulch, and erosion control mats (e.g. jute twisted yarn, excelsior wood fiber mats).

Total Maximum Daily Load (TMDL) – the sum of the allowable loads of a single *pollutant* from all contributing point and *nonpoint source*s. It is a calculation of the maximum amount of a *pollutant* that a waterbody can receive and still meet *water quality standards*, and an allocation of that amount to the *pollutant's* sources. A TMDL stipulates Waste Load Allocations (WLA) for *point source discharges*, Load Allocations (LA) for *nonpoint source*s, and a margin of safety (MOS).

Traditional Land Use Control MS4 Operator – a city, town, or village with land use control authority that is authorized to *discharge* under New York State DEC's SPDES General Permit For Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s) or the City of New York's Individual SPDES Permit for their Municipal Separate Storm Sewer Systems (NY-0287890).

Trained Contractor – an employee from the contracting (construction) company, identified in Part III.A.7., that has received four (4) hours of NYSDEC endorsed training

in proper erosion and sediment control principles from a Soil and Water Conservation District, or other NYSDEC endorsed entity. After receiving the initial training, the *trained contractor* shall receive four (4) hours of training every three (3) years.

It can also mean an employee from the contracting (construction) company, identified in Part III.A.7., that meets the *qualified inspector* qualifications (e.g. licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, *New York State Erosion and Sediment Control Certificate Program* holder, or someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of NYSDEC endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other NYSDEC endorsed entity).

The *trained contractor* is responsible for the day-to-day implementation of the *SWPPP*.

Tree Clearing – *construction activities* limited to felling and removal of trees.

Tree clearing does not include hand felling and leaving the trees in place with no support from mechanized equipment, which is not considered *construction activity* requiring coverage under this permit.

Water Quality Standard – such measures of purity or quality for any waters in relation to their reasonable and necessary use as promulgated in 6 NYCRR Part 700 et seq.

APPENDIX B – Required SWPPP Components by Project Type

Table 1
CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A *SWPPP* THAT ONLY INCLUDES EROSION AND SEDIMENT CONTROLS

The following *construction activities* that involve soil disturbances of one (1) or more acres of land, but less than five (5) acres:

- Single-family home not located in one of the watersheds listed in Appendix C and not *directly discharging* to one of the 303(d) segments listed in Appendix D
- Single-family residential subdivisions with 25% or less *impervious cover* at total site build-out and not located in one of the watersheds listed in Appendix C and not *directly discharging* to one of the 303(d) segments listed in Appendix D
- Construction of a barn or other *agricultural building*, silo, stock yard or pen.
- Structural agricultural conservation practices as identified in Table II in the "Agricultural Best Management Practice Systems Catalogue" (dated June 2023) that include construction or reconstruction of *impervious area* or *alter hydrology from pre- to post-development* conditions.

The following *construction activities* that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land:

- All construction activities located in the New York City Watershed located east of the Hudson River, see Appendix C Figure 1, that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

Within the municipal boundaries of NYC:

- Stand-alone road reconstruction, where the total soil disturbance from only that road construction, is less than one (1) acre of land.

The following *construction activities*:

- Installation of underground linear utilities; such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains
- Environmental enhancement projects, such as wetland mitigation, *stormwater* retrofits, stream restoration, and resiliency projects that reconstruct shoreline areas to address sea level rise
- Pond construction
- Linear bike paths running through areas with vegetative cover, including bike paths surfaced with an *impervious cover*
- Cross-country ski trails, walking/hiking trails, and mountain biking trails, including a de minimis parking lot (maximum 10 spaces total, sized for passenger cars) with 35 feet minimum preservation of undisturbed area downgradient from the parking lot
- Dam rehabilitation (the structure of the dam itself)
- Sidewalks, bike paths, or walking paths, surfaced with an *impervious cover*, that are not part of residential, commercial, or institutional development;
- Sidewalks, bike paths, or walking paths, surfaced with an *impervious cover*, that include incidental shoulder or curb work along an existing highway to support construction of the sidewalk, bike path, or walking path.

Table 1 (Continued)
CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A *SWPPP* THAT ONLY INCLUDES EROSION AND SEDIMENT CONTROLS

The following *construction activities*:

- Slope stabilization
- Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics
- Spoil areas that will be covered with vegetation
- Vegetated open space (i.e. recreational parks, lawns, meadows, fields, downhill ski trails) that do not *alter hydrology from pre- to post-development* conditions
- Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* and do not *alter hydrology from pre- to post-development* conditions
- Demolition where vegetation will be established, and no *redevelopment activity* is planned[1]
- Installation or replacement of either an overhead electric transmission line or a ski lift tower that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover*.
- Solar array field areas that have tables elevated off the ground, spaced one table width apart, do not *alter hydrology from pre- to post-development conditions*, and address water quality volume and runoff reduction volume by maintaining sheet flow on slopes less than 8%.
- Structural agricultural conservation practices as identified in Table II in the "Agricultural Best Management Practice Systems Catalogue" (dated June 2023) that do not include construction or reconstruction of *impervious area* and do not *alter hydrology from pre- to post-development* conditions.
- Temporary access roads, median crossovers, detour roads, lanes, or other temporary *impervious areas* that will be restored to pre-construction conditions once the *construction activity* is complete (in this context, "temporary" means the *impervious area* will be in place for two years or less)
- Other *construction activities* that do not include the construction or reconstruction of *impervious area*, and do not *alter hydrology from pre- to post-development* conditions, and are not listed in Table 2.

1. If the site is redeveloped in the future, a new eNOI must be submitted.

Table 2
CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A *SWPPP* THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES (SMPS)

The following *construction activities*:

- Single-family home located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix D
- Single-family home that disturbs five (5) or more acres of land
- Single-family residential subdivisions located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix D
- Single-family residential subdivisions that involve soil disturbances of between one (1) and five (5) acres of land with greater than 25% *impervious cover* at total site build-out
- Single-family residential subdivisions that involve soil disturbances of between 20,000 square feet and one (1) acre of land within the municipal boundaries of NYC with greater than 25% *impervious cover* at total site build-out
- Single-family residential subdivisions that involve soil disturbances of five (5) or more acres of land, and single-family residential subdivisions that involve soil disturbances of less than five (5) acres that are part of a *common plan of development or sale* that will ultimately disturb five (5) or more acres of land
- Multi-family residential developments; includes duplexes, townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- Creation of 5,000 square feet or more of *impervious area* in the municipal boundaries of NYC
- Airports
- Amusement parks
- Breweries, cideries, and wineries, including establishments constructed on agricultural land
- Campgrounds
- Cemeteries that include the construction or reconstruction of *impervious area* (>5% of disturbed area) or *alter the hydrology from pre- to post-development* conditions
- Commercial developments
- Churches and other places of worship
- Construction of a barn or other *agricultural building* (e.g. silo) that involves soil disturbance greater than five acres.
- Structural agricultural conservation practices as identified in Table II in the “Agricultural Best Management Practice Systems Catalogue” (dated June 2023) that involves soil disturbance greater than five acres and include the construction or reconstruction of *impervious area* or *alter hydrology from pre- to post-development* conditions.
- Facility buildings, including ski lodges, restroom buildings, pumphouses, ski lift terminals, and maintenance and groomer garages
- Institutional development; includes hospitals, prisons, schools and colleges
- Industrial facilities; includes industrial parks
- Landfills; including creation of landfills or capping landfills.
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTWs, water treatment plants, and water storage tanks
- Golf courses
- Office complexes

Table 2 (Continued)

CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A *SWPPP* THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES (SMPS)

The following *construction activities*:

- Permanent laydown yards and equipment storage lots
- Playgrounds that include the construction or reconstruction of *impervious area*
- Sports complexes
- Racetracks; includes racetracks with earthen (dirt) surfaces
- Road construction or reconstruction, outside the municipal boundaries of NYC
- Road construction within the municipal boundaries of NYC
- Stand-alone road reconstruction, within the municipal boundaries of NYC where the total soil disturbance from that road reconstruction involves soil disturbance of one (1) acre or more of land
- Parking lot construction or reconstruction (as with all Table 2 bullets, this includes parking lots constructed as part of the *construction activities* listed in Table 1, unless a Table 1 bullet specifies otherwise)
- Athletic fields (natural grass) that include the construction or reconstruction of *impervious area* (>5% of disturbed area) or *alter the hydrology from pre- to post-development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations, and well drilling pads, surfaced with *impervious cover,* and constructed as part of an overhead electric transmission line, wind-power, cell tower, oil or gas well drilling, sewer or water main, ski lift, or other linear utility project
- Sidewalks, bike paths, or walking paths, surfaced with an *impervious cover*, that are part of a residential, commercial or institutional development
- Sidewalks, bike paths, or walking paths, surfaced with an *impervious cover*, that are part of highway construction or reconstruction
- Solar array field areas on slopes greater than 8% that cannot maintain sheet flow using management practices identified in the BB or the DM
- Solar array field areas on slopes less than 8% that will *alter the hydrology from pre- to post-development* conditions
- Solar array field areas with tables that are not elevated high enough to achieve *final stabilization* beneath the tables
- Traditional *impervious areas* associated with solar development (e.g. roads, buildings, transformers)
- Utility pads surfaced with *impervious cover*, including electric vehicle charging stations
- All other *construction activities* that include the construction or reconstruction of *impervious area* or *alter the hydrology from pre- to post-development* conditions, and are not listed in Table 1

APPENDIX C – Watersheds Requiring Enhanced Phosphorus Removal

Watersheds where *owners or operators* of *construction activities* identified in Table 2 of Appendix B must prepare a *SWPPP* that includes SMPs designed in conformance with the Enhanced Phosphorus Removal Standards included in the DM technical standard.

- Entire New York City Watershed located east of the Hudson River – Figure 1
- Onondaga Lake Watershed – Figure 2
- Greenwood Lake Watershed – Figure 3
- Oscawana Lake Watershed – Figure 4
- Kinderhook Lake Watershed – Figure 5

Figure 1 - New York City Watershed East of the Hudson

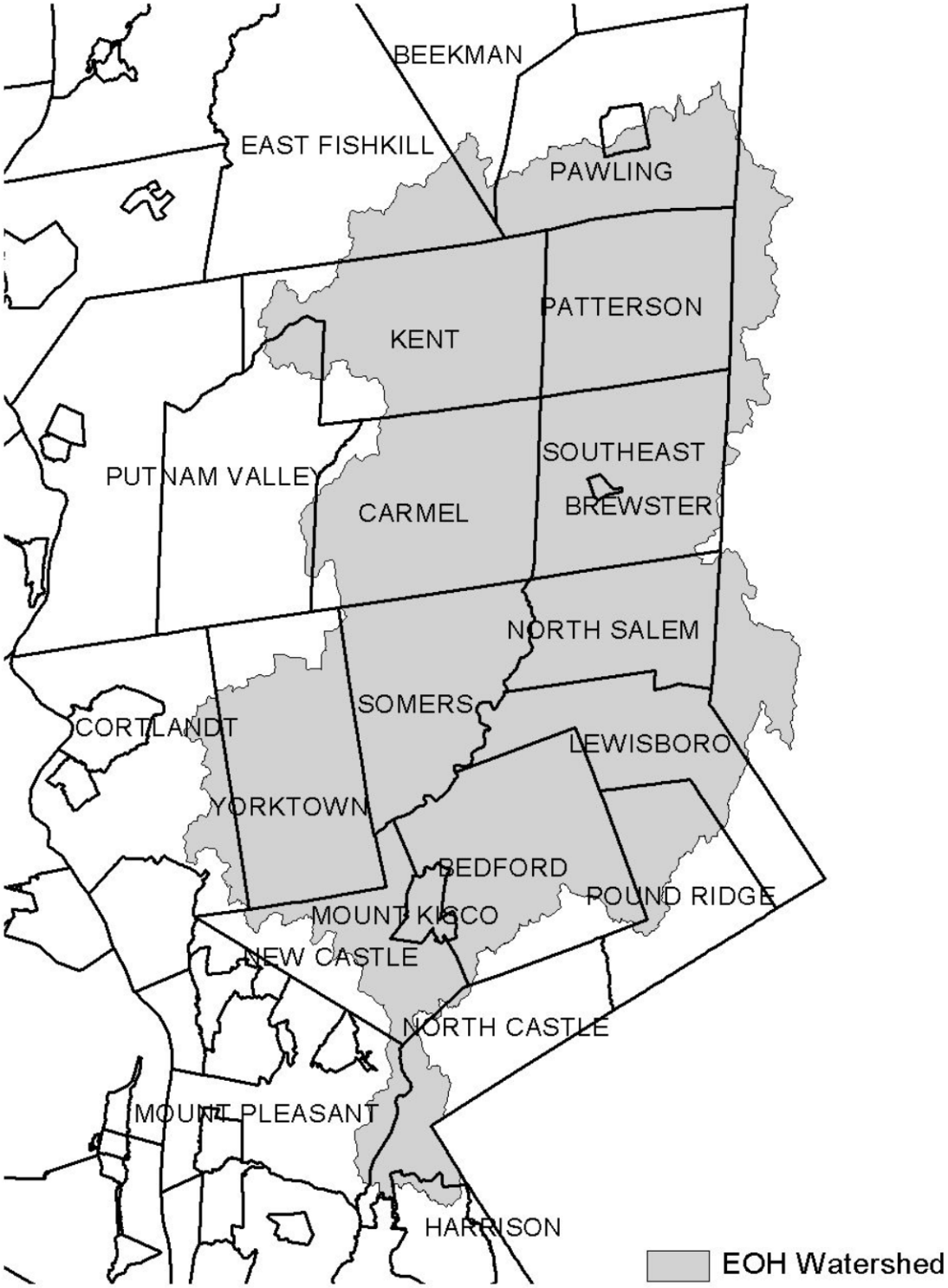


Figure 2 - Onondaga Lake Watershed



Figure 3 - Greenwood Lake Watershed

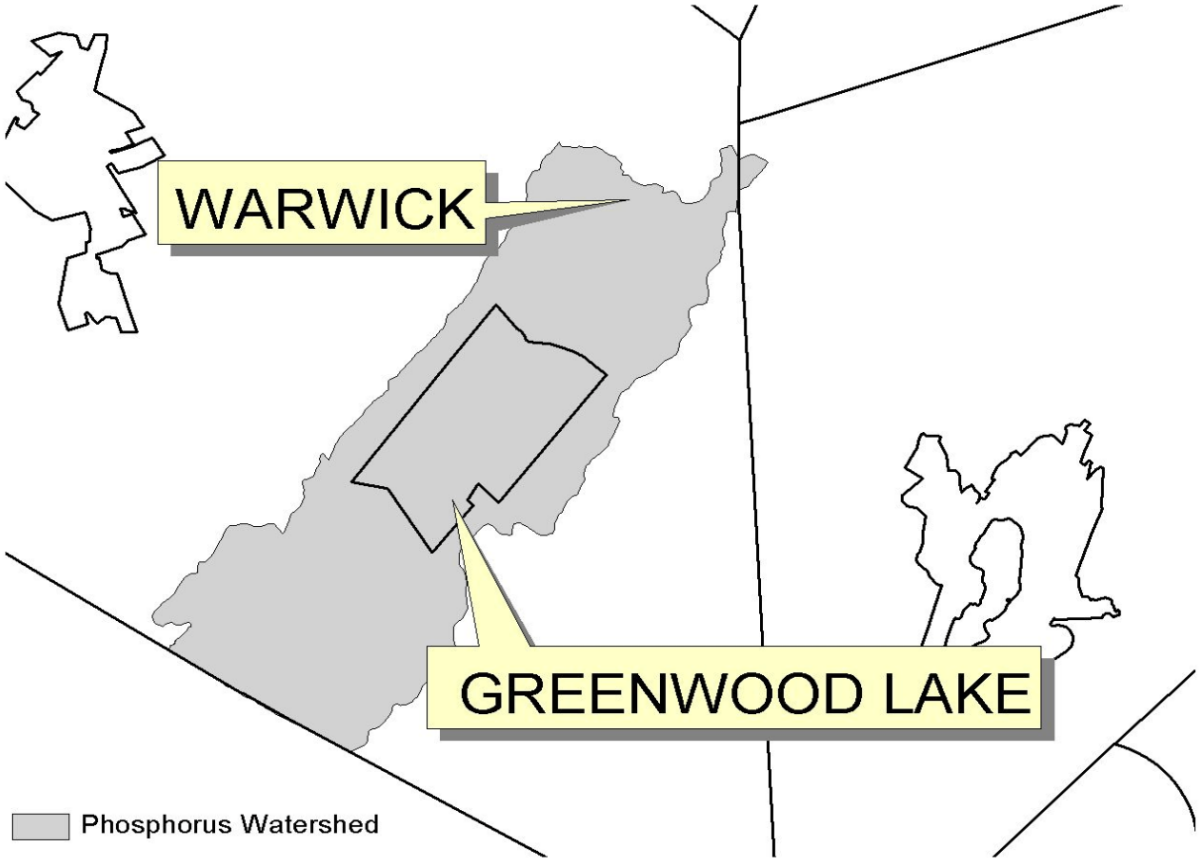


Figure 4 - Oscawana Lake Watershed

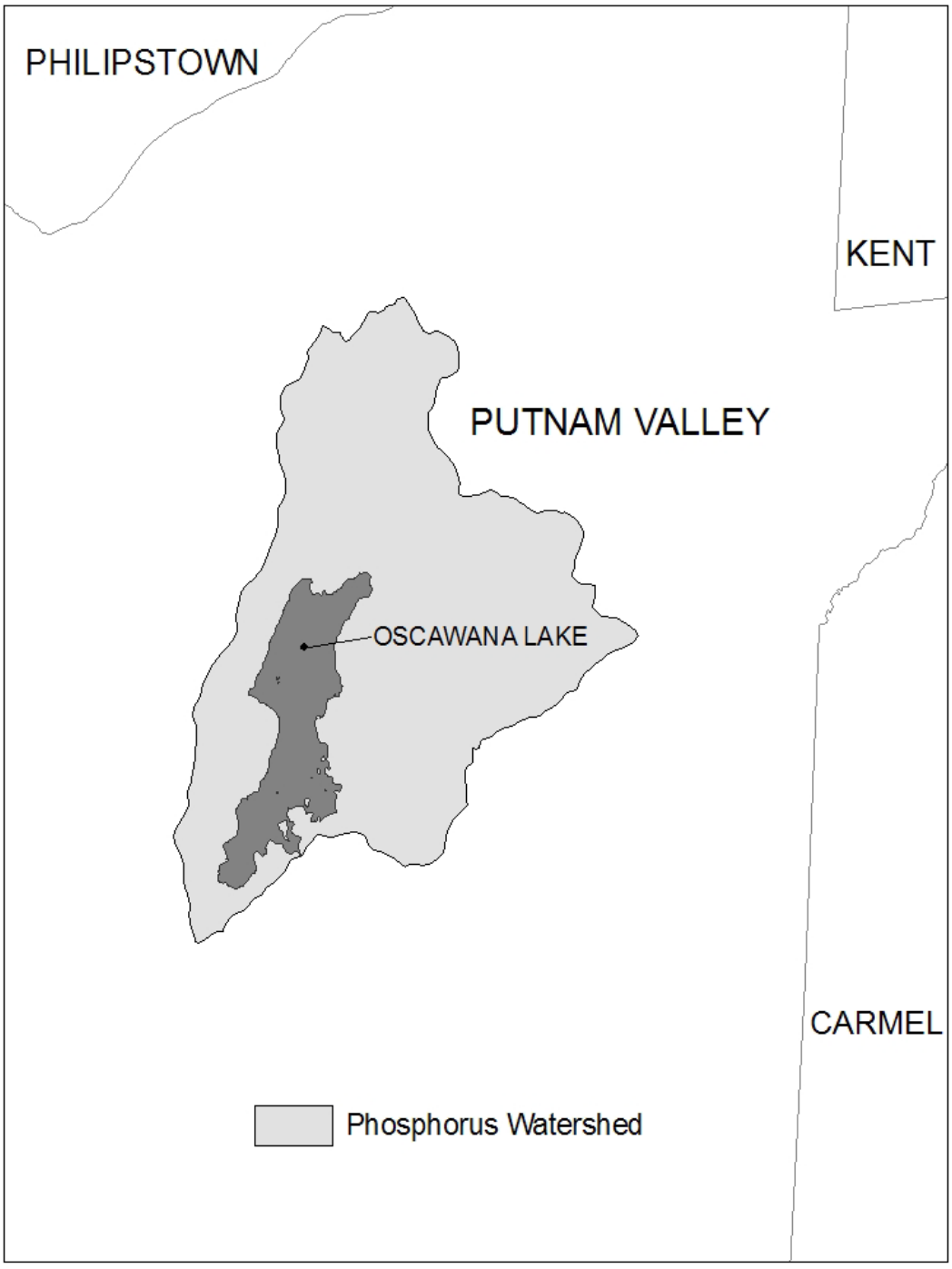
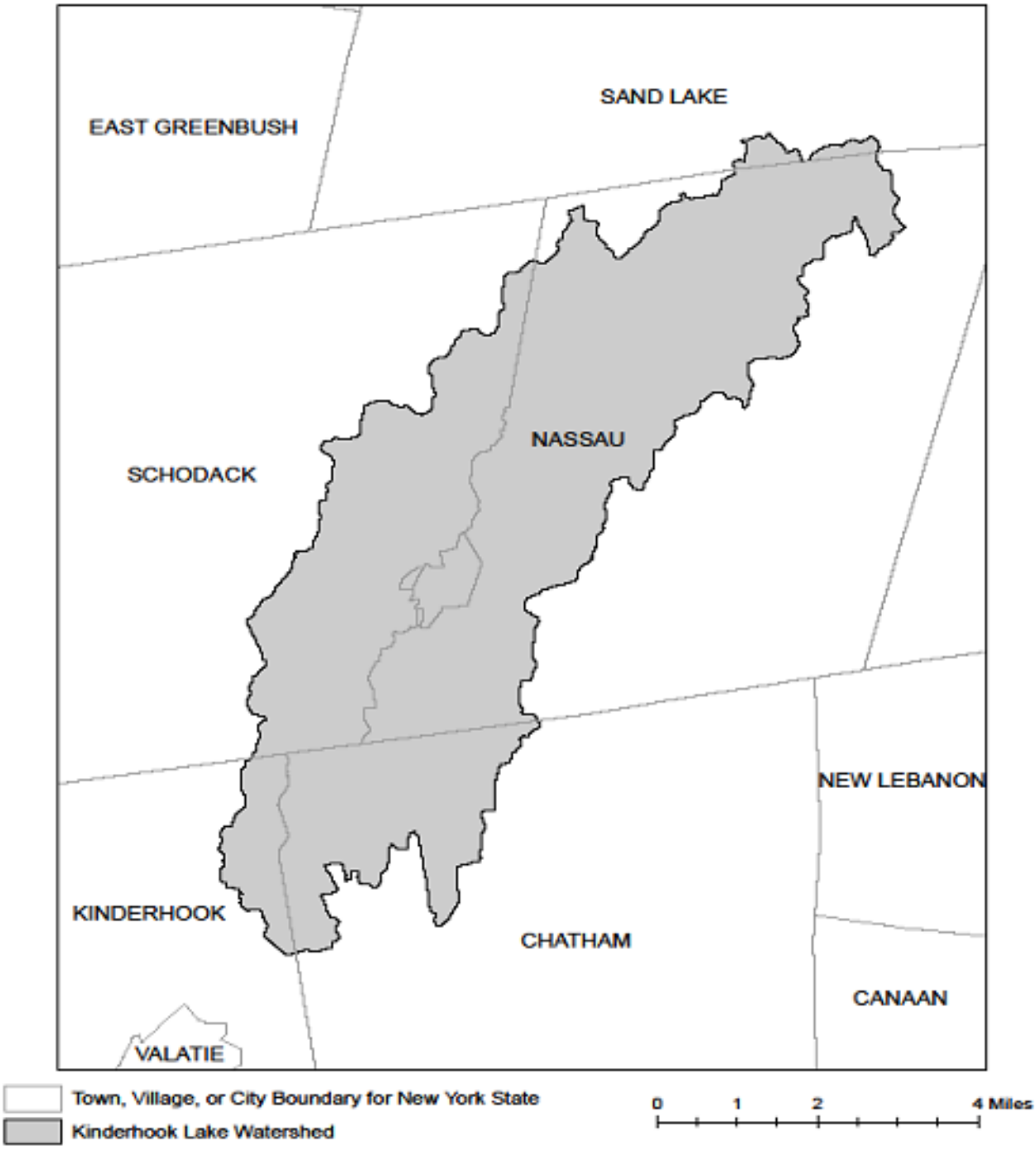


Figure 5 - Kinderhook Lake Watershed



APPENDIX D – Impaired Waterbodies (by Construction Related Pollutants)

List of waterbodies impaired by *pollutants* related to *construction activity*, including turbidity, silt/sediment, and nutrients (e.g. nitrogen, phosphorus). This list is a subset of "The Final New York State 2018 Section 303(d) List of Impaired Waters Requiring a TMDL" dated June 2020.

County	Waterbody	Pollutant
Albany	Ann Lee (Shakers) Pond, Stump Pond (1201-0096)	Phosphorus
Albany	Lawsons Lake (1301-0235)	Phosphorus
Allegany	Amity Lake, Saunders Pond (0403-0054)	Phosphorus
Allegany	Andover Pond (0403-0056)	Phosphorus
Bronx	Reservoir No.1/Lake Isle (1702-0075)	Phosphorus
Bronx	Van Cortlandt Lake (1702-0008)	Phosphorus
Broome	Blueberry, Laurel Lakes (1404-0033)	Phosphorus
Broome	Fly Pond, Deer Lake (1404-0038)	Phosphorus
Broome	Minor Tribs to Lower Susquehanna (0603-0044)	Phosphorus
Broome	Whitney Point Lake/Reservoir (0602-0004)	Phosphorus
Cattaraugus	Allegheny River/Reservoir (0201-0023)	Phosphorus
Cattaraugus	Beaver Lake/Alma Pond (0201-0073)	Phosphorus
Cattaraugus	Case Lake (0201-0020)	Phosphorus
Cattaraugus	Linlyco/Club Pond (0201-0035)	Phosphorus
Cayuga	Duck Lake (0704-0025)	Phosphorus
Cayuga	Owasco Inlet, Upper, and tribs (0706-0014)	Nutrients
Chautauqua	Chadakoin River and tribs (0202-0018)	Phosphorus
Chautauqua	Hulburt/Clymer Pond (0202-0079)	Phosphorus
Chautauqua	Middle Cassadaga Lake (0202-0002)	Phosphorus
Clinton	Great Chazy River, Lower, Main Stem (1002-0001)	Silt/Sediment
Columbia	Robinson Pond (1308-0003)	Phosphorus
Cortland	Dean Pond (0602-0077)	Phosphorus
Dutchess	Fallkill Creek (1301-0087)	Phosphorus
Dutchess	Hillside Lake (1304-0001)	Phosphorus
Dutchess	Wappingers Lake (1305-0001)	Phosphorus
Dutchess	Wappingers Lake (1305-0001)	Silt/Sediment
Erie	Beeman Creek and tribs (0102-0030)	Phosphorus
Erie	Delaware Park Pond (0101-0026)	Phosphorus
Erie	Ellicott Creek, Lower, and tribs (0102-0018)	Phosphorus
Erie	Ellicott Creek, Lower, and tribs (0102-0018)	Silt/Sediment
Erie	Green Lake (0101-0038)	Phosphorus
Erie	Little Sister Creek, Lower, and tribs (0104-0045)	Phosphorus
Erie	Murder Creek, Lower, and tribs (0102-0031)	Phosphorus

Erie	Rush Creek and tribs (0104-0018)	Phosphorus
Erie	Scajaquada Creek, Lower, and tribs (0101-0023)	Phosphorus
Erie	Scajaquada Creek, Middle, and tribs (0101-0033)	Phosphorus
Erie	Scajaquada Creek, Upper, and tribs (0101-0034)	Phosphorus
Erie	South Branch Smoke Cr, Lower, and tribs (0101-0036)	Phosphorus
Erie	South Branch Smoke Cr, Lower, and tribs (0101-0036)	Silt/Sediment
Genesee	Bigelow Creek and tribs (0402-0016)	Phosphorus
Genesee	Black Creek, Middle, and minor tribs (0402 0028)	Phosphorus
Genesee	Black Creek, Upper, and minor tribs (0402-0048)	Phosphorus
Genesee	Bowen Brook and tribs (0102-0036)	Phosphorus
Genesee	LeRoy Reservoir (0402-0003)	Phosphorus
Genesee	Mill Pond (0402-0050)	Phosphorus
Genesee	Oak Orchard Cr, Upper, and tribs (0301-0014)	Phosphorus
Genesee	Oatka Creek, Middle, and minor tribs (0402-0031)	Phosphorus
Genessee	Tonawanda Cr, Middle, Main Stem (0102-0002)	Phosphorus
Greene	Schoharie Reservoir (1202-0012)	Silt/Sediment
Greene	Sleepy Hollow Lake (1301-0059)	Silt/Sediment
Herkimer	Steele Creek tribs (1201-0197)	Phosphorus
Herkimer	Steele Creek tribs (1201-0197)	Silt/Sediment
Kings	Hendrix Creek (1701-0006) 18	Nitrogen
Kings	Prospect Park Lake (1701-0196)	Phosphorus
Lewis	Mill Creek/South Branch, and tribs (0801-0200)	Nutrients
Livingston	Christie Creek and tribs (0402-0060)	Phosphorus
Livingston	Conesus Lake (0402-0004)	Phosphorus
Livingston	Mill Creek and minor tribs (0404-0011)	Silt/Sediment
Monroe	Black Creek, Lower, and minor tribs (0402-0033)	Phosphorus
Monroe	Buck Pond (0301-0017)	Phosphorus
Monroe	Cranberry Pond (0301-0016)	Phosphorus
Monroe	Durand, Eastman Lakes (0302-0037)	Phosphorus
Monroe	Lake Ontario Shoreline, Western (0301-0069) 9	Phosphorus
Monroe	Long Pond (0301-0015)	Phosphorus
Monroe	Mill Creek and tribs (0302-0025)	Phosphorus 2
Monroe	Mill Creek/Blue Pond Outlet and tribs (0402-0049)	Phosphorus
Monroe	Minor Tribs to Irondequoit Bay (0302-0038)	Phosphorus
Monroe	Rochester Embayment - East (0302-0002) [9]	Phosphorus
Monroe	Rochester Embayment - West (0301-0068) 9	Phosphorus
Monroe	Shipbuilders Creek and tribs (0302-0026)	Phosphorus 2
Monroe	Thomas Creek/White Brook and tribs (0302-0023)	Phosphorus

Nassau	Bannister Creek/Bay (1701-0380)	Nitrogen
Nassau	Beaver Lake (1702-0152)	Phosphorus
Nassau	Browswere Bay (1701-0383)	Nitrogen
Nassau	Camaans Pond (1701-0052)	Phosphorus
Nassau	East Meadow Brook, Upper, and tribs (1701-0211)	Silt/Sediment
Nassau	East Rockaway Channel (1701-0381)	Nitrogen
Nassau	Glen Cove Creek, Lower, and tribs (1702-0146)	Silt/Sediment
Nassau	Grant Park Pond (1701-0054)	Phosphorus
Nassau	Hempstead Bay, Broad Channel (1701-0032)	Nitrogen
Nassau	Hempstead Lake (1701-0015)	Phosphorus
Nassau	Hewlett Bay (1701-0382)	Nitrogen
Nassau	Hog Island Channel (1701-0220)	Nitrogen
Nassau	Massapequa Creek, Upper, and tribs (1701-0174)	Phosphorus
Nassau	Milburn/Parsonage Creeks, Upp, and tribs (1701-0212)	Phosphorus
Nassau	Reynolds Channel, East (1701-0215) [12]	Nitrogen
Nassau	Reynolds Channel, West (1701-0216) 12	Nitrogen
Nassau	Tidal Tribs to Hempstead Bay (1701-0218)	Nitrogen
Nassau	Tribs (fresh) to East Bay (1701-0204)	Silt/Sediment
Nassau	Tribs (fresh) to East Bay (1701-0204)	Phosphorus
Nassau	Tribs to Smith Pond/Halls Pond (1701-0221)	Phosphorus
Nassau	Woodmere Channel (1701-0219)	Nitrogen
New York	Harlem Meer (1702-0103)	Phosphorus
New York	The Lake in Central Park (1702-0105)	Phosphorus
Niagara	Bergholtz Creek and tribs (0101-0004)	Phosphorus
Niagara	Hyde Park Lake (0101-0030)	Phosphorus
Niagara	Lake Ontario Shoreline, Western (0301-0053) 9	Phosphorus
Niagara	Lake Ontario Shoreline, Western (0301-0072) 9	Phosphorus
Oneida	Ballou, Nail Creeks (1201-0203)	Phosphorus
Onondaga	Ley Creek and tribs (0702-0001) 10	Nutrients (phosphorus)
Onondaga	Minor Tribs to Onondaga Lake (0702-0022) 10	Nutrients (phosphorus)
Onondaga	Minor Tribs to Onondaga Lake (0702-0022) 10	Nitrogen (NH3, NO2)
Onondaga	Onondaga Creek, Lower (0702-0023) 10	Nutrients (phosphorus)
Onondaga	Onondaga Creek, Lower, and tribs (0702-0023)	Turbidity
Onondaga	Onondaga Creek, Middle, and tribs (0702-0004)	Turbidity
Onondaga	Onondaga Creek, Upper, and tribs (0702-0024)	Turbidity
Ontario	Great Brook and minor tribs (0704-0034)	Phosphorus 2
Ontario	Great Brook and minor tribs (0704-0034)	Silt/Sediment

Ontario	Hemlock Lake Outlet and minor tribs (0402-0013)	Phosphorus
Ontario	Honeoye Lake (0402-0032)	Phosphorus
Orange	Brown Pond Reservoir (1303-0013)	Phosphorus
Orange	Lake Washington (1303-0012)	Phosphorus
Orange	Minor Tribs to Middle Wallkill (1306-0061)	Phosphorus
Orange	Monhagen Brook and tribs (1306-0074)	Phosphorus
Orange	Orange Lake (1301-0008) [16]	Phosphorus
Orange	Quaker Creek and tribs (1306-0025)	Phosphorus
Orange	Wallkill River, Middle, Main Stem (1306-0038)	Phosphorus
Orange	Wallkill River, Upper, and Minor tribs (1306-0017)	Phosphorus
Orleans	Glenvwood Lake (0301-0041)	Phosphorus
Orleans	Lake Ontario Shoreline, Western (0301-0070) 9	Phosphorus
Orleans	Lake Ontario Shoreline, Western (0301-0071) 9	Phosphorus
Oswego	Lake Neatahwanta (0701-0018)	Nutrients (phosphorus)
Oswego	Pleasant Lake (0703-0047)	Phosphorus
Putnam	Lost Lake, Putnam Lake (1302-0053)	Phosphorus
Putnam	Minor Tribs to Croton Falls Reservoir (1302-0001)	Phosphorus
Queens	Bergen Basin (1701-0009) 18	Nitrogen
Queens	Jamaica Bay, Eastern, and tribs, Queens (1701-0005) 18	Nitrogen
Queens	Kissena Lake (1702-0258)	Phosphorus
Queens	Meadow Lake (1702-0030)	Phosphorus
Queens	Shellbank Basin (1701-0001) 18	Nitrogen
Queens	Willow Lake (1702-0031)	Phosphorus
Rensselaer	Nassau Lake (1310-0001)	Phosphorus
Rensselaer	Snyders Lake (1301-0043)	Phosphorus
Richmond	Grassmere Lake/Bradys Pond (1701-0357)	Phosphorus
Rockland	Congers Lake, Swartout Lake (1501-0019)	Phosphorus
Rockland	Rockland Lake (1501-0021)	Phosphorus
Saratoga	Ballston Lake (1101-0036)	Phosphorus
Saratoga	Dwaas Kill and tribs (1101-0007)	Phosphorus
Saratoga	Dwaas Kill and tribs (1101-0007)	Silt/Sediment
Saratoga	Lake Lonely (1101-0034)	Phosphorus
Saratoga	Round Lake (1101-0060)	Phosphorus
Saratoga	Tribs to Lake Lonely (1101-0001)	Phosphorus
Schenectady	Collins Lake (1201-0077)	Phosphorus
Schenectady	Duane Lake (1311-0006)	Phosphorus
Schenectady Lake	Mariaville Lake (1201-0113)	Phosphorus
Schuyler	Cayuta Lake (0603-0005)	Phosphorus

Seneca	Reeder Creek and tribs (0705-0074)	Phosphorus
St.Lawrence	Black Lake Outlet, Black Lake (0906-0001)	Phosphorus
St.Lawrence	Fish Creek and minor tribs (0906-0026)	Phosphorus
Steuben	Smith Pond (0502-0012)	Phosphorus
Suffolk	Agawam Lake (1701-0117)	Phosphorus
Suffolk	Big/Little Fresh Ponds (1701-0125)	Phosphorus
Suffolk	Canaan Lake (1701-0018)	Phosphorus
Suffolk	Canaan Lake (1701-0018)	Silt/Sediment
Suffolk	Fresh Pond (1701-0241)	Phosphorus
Suffolk	Great South Bay, East (1701-0039)	Nitrogen
Suffolk	Great South Bay, Middle (1701-0040)	Nitrogen
Suffolk	Great South Bay, West (1701-0173)	Nitrogen
Suffolk	Lake Ronkonkoma (1701-0020)	Phosphorus
Suffolk	Mattituck/Marratooka Pond (1701-0129)	Phosphorus
Suffolk	Mill and Seven Ponds (1701-0113)	Phosphorus
Suffolk	Millers Pond (1702-0013)	Phosphorus
Suffolk	Moriches Bay, East (1701-0305)	Nitrogen
Suffolk	Moriches Bay, West (1701-0038)	Nitrogen
Suffolk	Quantuck Bay (1701-0042)	Nitrogen
Suffolk	Shinnecock Bay and Inlet (1701-0033)	Nitrogen
Suffolk	Tidal Tribs to West Moriches Bay (1701-0312)	Nitrogen
Sullivan	Bodine, Mongomery Lakes (1401-0091)	Phosphorus
Sullivan	Davies Lake (1402-0047)	Phosphorus
Sullivan	Evens Lake (1402-0004)	Phosphorus
Sullivan	Pleasure Lake (1402-0055)	Phosphorus
Sullivan	Swan Lake (1401-0063)	Phosphorus
Tompkins	Cayuga Lake, Southern End (0705-0040)	Phosphorus
Tompkins	Cayuga Lake, Southern End (0705-0040)	Silt/Sediment
Ulster	Ashokan Reservoir (1307-0004)	Silt/Sediment
Ulster	Esopus Creek, Lower, Main Stem (1307-0010) [17]	Turbidity
Ulster	Esopus Creek, Middle, Main Stem (1307-0003) 17	Turbidity
Ulster	Esopus Creek, Upper, and minor tribs (1307-0007)[3]	Silt/Sediment
Ulster	Wallkill River, Lower, Main Stem (1306-0027)	Phosphorus
Warren	Hague Brook and tribs (1006-0006)	Silt/Sediment
Warren	Huddle/Finkle Brooks and tribs (1006-0003)	Silt/Sediment
Warren	Indian Brook and tribs (1006-0002)	Silt/Sediment
Warren	Lake George (1006-0016) and tribs	Silt/Sediment
Warren	Tribs to Lake George, East Shore (1006-0020)	Silt/Sediment
Warren	Tribs to Lake George, Lk.George Village (1006-0008)	Silt/Sediment

Washington	Wood Cr/Champlain Canal and tribs (1005-0036)	Phosphorus
Westchester	Lake Katonah (1302-0136)	Phosphorus
Westchester	Lake Lincolndale (1302-0089)	Phosphorus
Westchester	Lake Meahagh (1301-0053)	Phosphorus
Westchester	Lake Mohegan (1301-0149)	Phosphorus
Westchester	Lake Shenorock (1302-0083)	Phosphorus
Westchester	Mamaroneck River, Lower (1702-0071)	Silt/Sediment
Westchester	Mamaroneck River, Upp, & minor tribs (1702-0123)	Silt/Sediment
Westchester	Saw Mill River (1301-0007)	Phosphorus
Westchester	Saw Mill River, Middle, and tribs (1301-0100)	Phosphorus
Westchester	Sheldrake River (1702-0069)	Phosphorus
Westchester	Sheldrake River (1702-0069)	Silt/Sedimnt
Westchester	Silver Lake (1702-0040)	Phosphorus
Westchester	Teatown Lake (1302-0150)	Phosphorus
Westchester	Truesdale Lake (1302-0054)	Phosphorus
Westchester	Wallace Pond (1301-0140)	Phosphorus

APPENDIX E – List of NYSDEC Regional Offices

Region	Covering the following counties:	DIVISION OF ENVIRONMENTAL PERMITS (DEP) Permit Administrators	DIVISION OF WATER (DOW) Water (SPDES) Program
1	Nassau and Suffolk	50 Circle Road Stony Brook, NY 11790 Tel. (631) 444-0365	50 Circle Road Stony Brook, NY 11790-3409 Tel. (631) 444-0405
2	Bronx, Kings, New York, Queens and Richmond	1 Hunters Point Plaza, 47-40 21st St. Long Island City, NY 11101-5407 Tel. (718) 482-4997	1 Hunters Point Plaza, 47-40 21st St. Long Island City, NY 11101-5407 Tel. (718) 482-4933
3	Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster and Westchester	21 South Putt Corners Road New Paltz, NY 12561-1696 Tel. (845) 256-3059	220 White Plains Road, Suite 110 Tel. (914) 428 - 2505
4	Albany, Columbia, Delaware, Greene, Montgomery, Otsego, Rensselaer, Schenectady and Schoharie	1130 North Westcott Road Schenectady, NY 12306-2014 Tel. (518) 357-2069	1130 North Westcott Road Schenectady, NY 12306-2014 Tel. (518) 357-2045
5	Clinton, Essex, Franklin, Fulton, Hamilton, Saratoga, Warren and Washington	1115 State Route 86, Po Box 296 Ray Brook, NY 12977-0296 Tel. (518) 897-1234	232 Golf Course Road Warrensburg, NY 12885-1172 Tel. (518) 623-1200
6	HERKIMER, JEFFERSON, LEWIS, ONEIDA AND ST. LAWRENCE	STATE OFFICE BUILDING 317 WASHINGTON STREET WATERTOWN, NY 13601-3787 TEL. (315) 785-2245	STATE OFFICE BUILDING 207 GENESEE STREET UTICA, NY 13501-2885 TEL. (315) 793-2554
7	BROOME, CAYUGA, CHENANGO, CORTLAND, MADISON, ONONDAGA, OSWEGO, TIOGA AND TOMPKINS	5786 WIDEWATERS PARKWAY SYRACUSE, NY 13214-1867 TEL. (315) 426-7438	5786 WIDEWATERS PARKWAY SYRACUSE, NY 13214-1867 TEL. (315) 426-7500
8	CHEMUNG, GENESEE, LIVINGSTON, MONROE, ONTARIO, ORLEANS, SCHUYLER, SENECA, STEUBEN, WAYNE AND YATES	6274 EAST AVON-LIMA ROADAVON, NY 14414-9519 TEL. (585) 226-2466	6274 EAST AVON-LIMA RD. AVON, NY 14414-9519 TEL. (585) 226-2466
9	ALLEGANY, CATTARAUGUS, CHAUTAUQUA, ERIE, NIAGARA AND WYOMING	700 DELAWARE AVENUE BUFFALO, NY 14209-2999 TEL. (716) 851-7165	700 DELAWARE AVENUE BUFFALO, NY 14209-2999 TEL. (716) 851-7070

APPENDIX F – SWPPP Preparer Certification Form

The SWPPP Preparer Certification Form required by this permit begins on the following page.

SWPPP Preparer Certification Form

SPDES General Permit for Stormwater Discharges from Construction Activity, GP-0-25-001 (CGP)

(In accordance with CGP Part I.D.2.b., the completed form must be attached to the eNOI and submitted to NYSDEC electronically.)

Project/Site Name:

eNOI Submission ID:

Owner/Operator Name:

Certification Statement – SWPPP Preparer

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) has been prepared in accordance with the requirements of GP-0-25-001. I certify under penalty of law that the SWPPP and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SWPPP Preparer First Name | MI | SWPPP Preparer Last Name

Signature

Date

Revised: January 2025

APPENDIX G – MS4 SWPPP Acceptance Form

The MS4 SWPPP Acceptance Form required by this permit begins on the following page.

MS4 SWPPP Acceptance Form

for construction activities seeking authorization under the

SPDES General Permit for Stormwater Discharges from Construction Activity, GP-0-25-001 (CGP)

(In accordance with CGP Part I.D.2.b., the completed form must be attached to the eNOI and submitted to NYSDEC electronically.)

I. Project Owner/Operator Information
1. Owner/Operator Name:
2. Contact Person:
3. Street Address:
4. City/State/Zip:
II. Project Site Information
5. Project/Site Name:
6. Street Address:
7. City/State/Zip:
III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information
8. SWPPP Reviewed by:
9. Title/Position:
10. Date Final SWPPP Reviewed and Accepted:
IV. Regulated MS4 Information
11. Name of MS4 Operator:
12. MS4 SPDES Permit Identification Number: NYR20A
13. Street Address:
14. City/State/Zip:
15. Telephone Number:

MS4 SWPPP Acceptance Form - continued

V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative

I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in section II. of this form has been reviewed and meets the substantive requirements in the SPDES General Permit for Stormwater Discharges from Construction Activity, GP-0-25-001 (CGP). Note: The MS4 Operator, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 Operator does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.

Printed Name[1]:

Title/Position:

Signature:

Date:

VI. Additional Information

[1] Printed name of the principal executive officer or ranking elected official for the MS4 Operator or their duly authorized representative in accordance with CGP Part VII.J.2.

APPENDIX H – NYCDEP SWPPP Acceptance/Approval Form

The City of New York Department of Environmental Protection (NYCDEP) SWPPP Acceptance/Approval form required by this permit begins on the following page.

THE CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Environmental Planning and Analysis
59-17 Junction Blvd., 9th Floor; Flushing, NY 11373

SWPPP Acceptance/Approval

Application Number:

I. Project Owner/Operator Information

1. Owner/Operator Name:
2. Contact Person:
3. Street Address:
4. City/State/Zip:

II. Project Site Information

5. Project/Site Name:
6. Street Address:
7. City/State/Zip:

III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance/Approval

8. SWPPP Reviewed by:
9. Title/Position: /
10. Date Final SWPPP Reviewed and Accepted:
11. Acceptance/Approval Expiration Date:

IV. Regulated MS4 Information for projects that require coverage under the NY State Pollution Discharge Elimination System General Permit for Stormwater Discharges from Construction Activity

12. Name of MS4: *CITY OF NEW YORK*
13. MS4 SPDES Permit Identification Number: *NY-0287890*
14. Contact Person:
15. Street Address: *59-17 Junction Blvd. 9th Floor*
16. City/State/Zip: *Flushing, NY 11373*
17. Telephone Number:

Projects in the MS4 area must submit a copy of this SWPPP Acceptance with a Notice of Intent for coverage under the NY SPDES General Permit for Stormwater Discharges from Construction Activity to: NYS Department of Environmental Conservation, Division of Water; 625 Broadway, 4th Floor; Albany, New York 12233-3505.

V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative

I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s).

Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.

Printed Name:

Title/Position:

Signature:

Date:

VI. Conditions of Acceptance/Approval and Additional Information

Projects in the MS4 area must submit a copy of this SWPPP Acceptance with a Notice of Intent for coverage under the NY SPDES General Permit for Stormwater Discharges from Construction Activity to: NYS Department of Environmental Conservation, Division of Water; 625 Broadway, 4th Floor; Albany, New York 12233-3505.

APPENDIX I – MS4 No Jurisdiction Form

The MS4 No Jurisdiction Form required by this permit begins on the following page.

MS4 No Jurisdiction Form

for construction activities seeking authorization under the

SPDES General Permit for Stormwater Discharges from Construction Activity, GP-0-25-001 (CGP)

(In accordance with CGP Part I.D.2.b., the completed form must be attached to the eNOI and submitted to NYSDEC electronically.)

I. Project Owner/Operator Information

a. Owner/Operator Name:

b. Contact Person:

c. Street Address:

d. City/State/Zip:

II. Project Site Information

a. Project/Site Name:

b. Street Address:

c. City/State/Zip:

d. eNOI Submission ID:

III. Traditional Land Use Control MS4 Operator Information

a. Name of MS4 Operator:

b. MS4 SPDES Permit ID Number: NYR20A

c. Street Address:

d. City/State/Zip:

e. Telephone Number:

IV. Certification Statement

In accordance with CGP Part I.D.2.b.ii.3., I hereby certify that the Traditional Land Use Control MS4 Operator identified in section III. of this form does not have review authority over the construction project identified in section II. of this form, which is owned/operated by the entity identified in section I. of this form. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

a. Printed name of the principal executive officer or ranking elected official for the MS4 Operator or their duly authorized representative in accordance with CGP Part VII.J.2.:

b. Title/Position:

c. Signature:

d. Date:

APPENDIX J – Owner/Operator Certification Form

The Owner/Operator Certification Form required by this permit begins on the following page.

Owner/Operator Certification Form

SPDES General Permit for Stormwater Discharges from Construction Activity, GP-0-25-001 (CGP)

(In accordance with CGP Part I.D.2.b. or Part I.F.2. and 3., the completed form must be attached to the eNOI or the Request to Continue Coverage, and submitted to NYSDEC electronically.

Project/Site Name: _____

eNOI Submission ID: _____

eNOI Submitted by: ☐ **Owner/Operator** ☐ **SWPPP Preparer** ☐ **Other**

Certification Statement - Owner/Operator

I hereby certify that I read, and will comply with, the GP-0-25-001 permit requirements. I understand that authorization to discharge under the permit for the project/site named above is dependent on receipt of a Letter of Authorization (LOA) or a Letter of Continued Coverage (LOCC) from the New York State Department of Environmental Conservation (NYSDEC) in accordance with CGP Part I.D.3.b. or Part I.F.4. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Owner/Operator First Name MI Owner/Operator Last Name

_____

Signature

_____

Date

Revised: January 2025

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Appendix D

Notice of Intent for Coverage under GP-0-20-001

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Appendix E

Inspection Reports

(To be included during construction)

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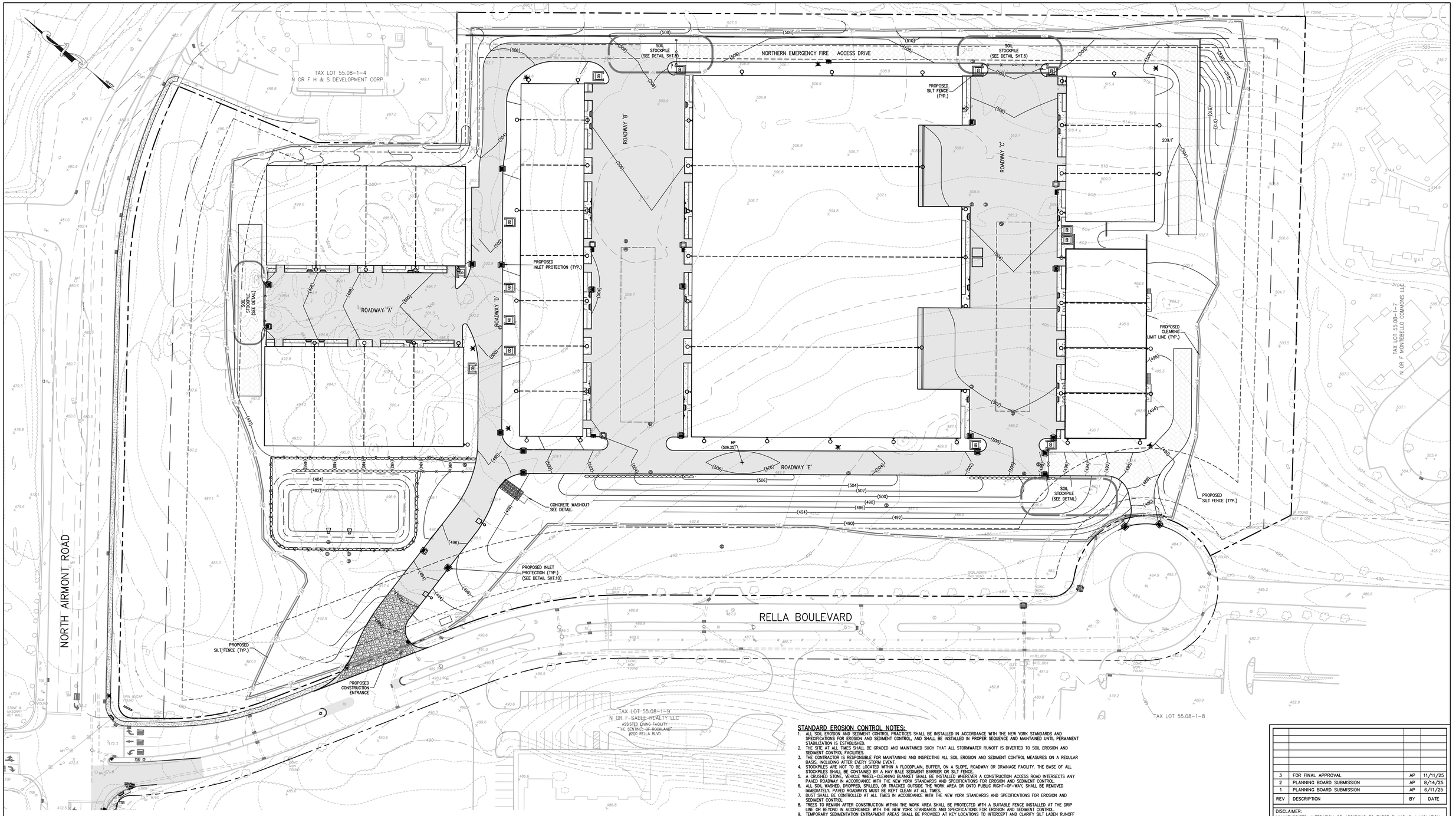
Appendix F

“Soil Erosion and Sediment Control Plan”

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STANDARD EROSION CONTROL NOTES:

1. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE INSTALLED IN ACCORDANCE WITH THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL, AND SHALL BE INSTALLED IN PROPER SEQUENCE AND MAINTAINED UNTIL PERMANENT STABILIZATION IS ESTABLISHED.
2. THE SITE AT ALL TIMES SHALL BE GRADED AND MAINTAINED SUCH THAT ALL STORMWATER RUNOFF IS DIVERTED TO SOIL EROSION AND SEDIMENT CONTROL FACILITIES.
3. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND INSPECTING ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES ON A REGULAR BASIS, INCLUDING AFTER EVERY STORM EVENT.
4. STOCKPILES ARE NOT TO BE LOCATED WITHIN A FLOODPLAIN, BUFFER, ON A SLOPE, ROADWAY OR DRAINAGE FACILITY. THE BASE OF ALL STOCKPILES SHALL BE CONTAINED BY A HAY BALE SEDIMENT BARRIER OR SILT FENCE.
5. A CRUSHED STONE, VEHICLE WHEEL-CLEANING BLANKET SHALL BE INSTALLED WHEREVER A CONSTRUCTION ACCESS ROAD INTERSECTS ANY PAVED ROADWAY IN ACCORDANCE WITH THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL.
6. ALL SOIL WASHED, DROPPED, SPILLED, OR TRACKED OUTSIDE THE WORK AREA OR ONTO PUBLIC RIGHT-OF-WAY, SHALL BE REMOVED IMMEDIATELY. PAVED ROADWAYS MUST BE KEPT CLEAN AT ALL TIMES.
7. DUST SHALL BE CONTROLLED AT ALL TIMES IN ACCORDANCE WITH THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL.
8. TREES TO REMAIN AFTER CONSTRUCTION WITHIN THE WORK AREA SHALL BE PROTECTED WITH A SUITABLE FENCE INSTALLED AT THE DRIP LINE OR BEYOND IN ACCORDANCE WITH THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL.
9. TEMPORARY SEDIMENTATION ENTRAPMENT AREAS SHALL BE PROVIDED AT KEY LOCATIONS TO INTERCEPT AND CLARIFY SILT LADEN RUNOFF FROM THE SITE. THESE MAY BE EXCAVATED OR MAY BE CREATED UTILIZING EARTHEN BERMS, RIP-RAP OR CRUSHED STONE DAMS, HAY BALES, OR OTHER CHANNELIZATION SHALL BE CONSTRUCTED TO INSURE THAT ALL SILT LADEN WATERS ARE DIRECTED INTO THE ENTRAPMENT AREAS, WHICH SHALL NOT BE PERMITTED TO FILL IN, BUT SHALL BE CLEANED PERIODICALLY DURING THE COURSE OF CONSTRUCTION. THE COLLECTION SILT SHALL BE DEPOSITED IN AREAS SAFE FROM FURTHER EROSION.
10. ALL DISTURBED AREAS, EXCEPT ROADWAYS, WHICH WILL REMAIN OPEN OR UNFINISHED FOR MORE THAN 10 DAYS SHALL BE TEMPORARILY SEEDED WITH 1/2 LB. OF RYE GRASS OR MULCHED WITH 100 LBS. OF STRAW OR HAY PER 1,000 SQUARE FEET. ROADWAYS SHALL BE STABILIZED AS RAPIDLY AS PRACTICABLE BY THE INSTALLATION OF THE BASE COURSE. A TEMPORARY SEEDING AND/ OR MULCHING SHOULD BE APPLIED TO DISTURBED AREAS THAT ARE LEFT FOR 15 DAYS UNLESS CONSTRUCTION WILL BEGIN WITHIN 30 DAYS.
11. SILT THAT LEAVES THE SITE SHALL BE COLLECTED AND REMOVED AS DIRECTED BY APPROPRIATE MUNICIPAL AUTHORITIES.
12. AT THE COMPLETION OF THE PROJECT, ALL TEMPORARY SILTATION DEVICES SHALL BE REMOVED AND THE AFFECTED AREAS RE-GRADED, PLANTED, OR TREATED IN ACCORDANCE WITH THE APPROVED PLANS.
13. ALL AREAS DISTURBED BY ON-SITE GRADING, THAT WILL NOT BE CONSTRUCTED UPON, SHALL BE STABILIZED WITH PERMANENT VEGETATIVE COVER, USING THE FOLLOWING SEEDING SCHEDULE, OR EQUIVALENT:

	1 LB. PER ACRE	1 LB. PER 1,000 SF
KENTUCKY BLUE GRASS –	20	0.45
CREEPING RED FESCUE	20	0.45
PERENNIAL RYE GRASS –	5	0.10

14. ALL SEEDED AREAS TO HAVE AN APPLICATION OF THE FOLLOWING:
    LIME – AMOUNT NEEDED TO OBTAIN A pH OF 5.5
    FERTILIZER – 15 LBS. PER 1,000 SF OF 10-20-10 FERTILIZER OR APPROVED EQUAL.
    IF NOT LANDSCAPED OTHERWISE, ALL NEW CONSTRUCTED STEEP PERMANENT SLOPED LESS THEN 1 (VERTICAL) : 2.5 (HORIZONTAL) TO BE SEEDED WITH THE FOLLOWING:

	1 LB. PER ACRE	1 LB. PER 1,000 SF
CREEPING RED FESCUE –	10	0.45
CROWN VETCH –	15	0.35
BIRDSFOOT TREFOIL –	8	0.20
TALL FESCUE OR SMOOTH		
BROMEGRASS –	15	0.35
W/PERENNIAL RYE GRASS –	5	0.10

15. ALL SLOPES 1 (VERTICAL) : 2.5 (HORIZONTAL) TO BE MULCHED AND STABILIZED WITH CLOTH FABRIC AND PINNED TO THE GROUND.
16. SOD CAN BE USED INSTEAD OF SEED.
    CONSTRUCTION SEQUENCE:
    a. CONSTRUCT STABILIZING CONSTRUCTION ENTRANCE.
    b. INSTALL SEDIMENT BARRIERS AS PER NOTE 1 ABOVE.
    c. CONSTRUCT DIVERSIONS SWALES AND DRAINAGE SYSTEMS WITH MINIMUM NECESSARY CLEARING.
    d. CLEAR EXISTING TREES AND VEGETATION FROM AREAS TO BE EXCAVATED OR FILLED, STRIP AND STOCKPILE TOPSOIL FROM ALL AREAS TO BE DISTURBED.
    e. PERFORM NECESSARY EXCAVATION OR FILL OPERATIONS TO BRING SITE TO DESIRED SUBGRADE. INSTALL STORM DRAINAGE SYSTEM.
    f. INSTALL SEDIMENT CONTROL BARRIERS AROUND ALL STORM DRAIN INLETS.
    g. SEED ALL DISTURBED AREAS WHICH WILL REMAIN UNDISTURBED FOR A PERIOD OR 30 DAYS AS PER NOTE 2 ABOVE.
    h. AFTER COMPLETION OF THE SITE CONSTRUCTION FINE GRADE AND SPREAD TOPSOIL ON ALL LAWN AREAS AND SEED AS PER NOTES 5 AND 6 ABOVE.
    i. REMOVE SEDIMENT BARRIERS AS PER NOTE 4 ABOVE.
    j. MAINTAIN ALL SEEDED AND PLANTED AREAS TO INSURE A VIABLE STABILIZED VEGETATIVE SPECS.
17. ALL CONSTRUCTION TO MEET CURRENT MUNICIPALITY SPECS.
18. 4" OF TOP SOIL TO BE SPREAD PRIOR TO SEEDING IN ALL DISTURBED AREAS.

NOTES:
1. ADDITIONAL ROWS OF SILT FENCE MAYBE REQUIRED AS PART OF THE DEVELOPMENT.
2. ORANGE SAFETY FENCE SHALL BE INSTALLED ALONG THE CLEARING LIMIT LINE

TOTAL AREA TO BE DISTURBED:
599,034 S.F. = 13.8 ACRES

LEGEND
CONSTRUCTION ENTRANCE
SILT FENCE / CLEARING LIMIT LINE — SF — SF —
INLET PROTECTION

REV	DESCRIPTION	BY	DATE
3	FOR FINAL APPROVAL	AP	11/11/25
2	PLANNING BOARD SUBMISSION	AP	8/14/25
1	PLANNING BOARD SUBMISSION	AP	6/11/25

DISCLAIMER:
UNAUTHORIZED ALTERATION OR ADDITIONS TO THESE PLANS IS A VIOLATION OF THE N.Y.S. EDUCATION LAW, ARTICLE 145, SECTION 7209, SUBSECTION 2.

Weston & Sampson
Weston & Sampson PE, LS, LA, Architects, PC
74 Lafayette Ave, Suite 501
Suffern, NY 10901
845.357.4411 800.SAMPSON
www.westonandsampson.com

PROJECT:
RELLA BOULEVARD
VILLAGE OF MONTEBELLO
ROCKLAND COUNTY
NEW YORK

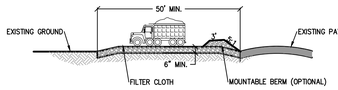
TITLE:
FINAL EROSION AND SEDIMENT CONTROL PLAN

BRIAN A. BROOKER, PROFESSIONAL ENGINEER
N.Y.S. Lic. No. 60229

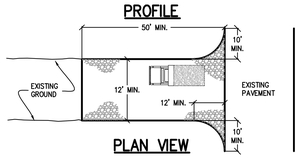
PROJECT NO:	DRAWN:	CHECKED:
ENG24-1108	AP	JN

SCALE: 1" = 40'
GRAPHIC SCALE: 0 40' 80'
DATE: 05/09/25
DRAWING NO: 4

R:\SEC\2023\11-Halb Blvd_Dwg\Rev 3\RELLA BLVD Fnal Signed.dwg



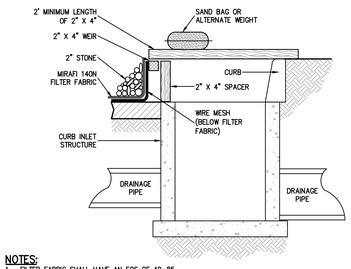
PROFILE



PLAN VIEW

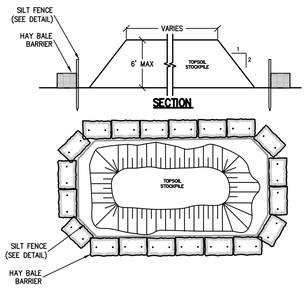
NOTES:
1. STONE SIZE – USE 1 INCH STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH – NOT LESS THAN 50' (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS – NOT LESS THAN SIX (6) INCHES.
4. WIDTH – TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS AND EGRESS OCCURS. TWENTY – FOUR (24) FOOT IF SINGLE ENTRANCE SITE.
5. GEOTEXTILE – 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 BENEATH 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 SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS–OF–WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRES, 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.

STABILIZED CONSTRUCTION ENTRANCE DETAIL
N.T.S.



NOTES:
1. FILTER FABRIC SHALL HAVE AN EOS OF 40–85.
2. WOODEN FRAME SHALL BE CONSTRUCTED OF 2" X 4" CONSTRUCTION GRADE LUMBER.
3. WIRE MESH ACROSS THROAT SHALL BE A CONTINUOUS PIECE 30 INCH MINIMUM WIDTH WITH A LENGTH 4 FEET LONGER THAN THE THROAT. IT SHALL BE SHAPED AND SECURELY NAILED TO A 2" X 4" WEIR.
4. THE WEIR SHALL BE SECURELY NAILED TO 2" X 4" SPACERS 9 INCHES LONG SPACED NO MORE THAN 6 FEET APART.
5. THE ASSEMBLY SHALL BE PLACED AGAINST THE INLET AND SECURED BY 2" X 4" ANCHORS 2 FEET LONG EXTENDING ACROSS THE TOP OF THE INLET AND HELD IN PLACE BY SAND BAGS OR ALTERNATE WEIGHTS.

CURB INLET PROTECTION DETAIL
N.T.S.



SOIL STOCKPILE SEDIMENT BARRIER
N.T.S.

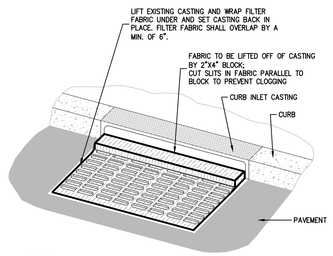
STANDARD EROSION CONTROL NOTES:
1. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE INSTALLED IN ACCORDANCE WITH THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL, AND SHALL BE INSTALLED IN PROPER SEQUENCE AND MAINTAINED UNTIL PERMANENT STABILIZATION IS ESTABLISHED.
2. THE SITE AT ALL TIMES SHALL BE GRADED AND MAINTAINED SUCH THAT ALL STORMWATER RUNOFF IS DIVERTED TO SOIL EROSION AND SEDIMENT CONTROL FACILITIES.
3. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND INSPECTING ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES ON A REGULAR BASIS, INCLUDING AFTER EVERY STORM EVENT.
4. STOCKPILES ARE NOT TO BE LOCATED WITHIN A FLOODPLAIN, BUFFER, ON A SLOPE, ROADWAY OR DRAINAGE FACILITY. THE BASE OF ALL STOCKPILES SHALL BE CONTAINED BY A HAY BALE SEDIMENT BARRIER OR SILT FENCE.
5. A CRUSHED STONE, VEHICLE WHEEL–CLEANING BLANKET SHALL BE INSTALLED WHEREVER A CONSTRUCTION ACCESS ROAD INTERSECTS ANY PAVED ROADWAY IN ACCORDANCE WITH THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL.
6. ALL SOIL WASHED, DROPPED, SPILLED, OR TRACKED OUTSIDE THE WORK AREA OR ONTO PUBLIC RIGHT–OF–WAY, SHALL BE REMOVED IMMEDIATELY. PAVED ROADWAYS MUST BE KEPT CLEAN AT ALL TIMES.
7. DUST SHALL BE CONTROLLED AT ALL TIMES IN ACCORDANCE WITH THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL.
8. TREES TO REMAIN AFTER CONSTRUCTION WITHIN THE WORK AREA SHALL BE PROTECTED WITH A SUITABLE FENCE INSTALLED AT THE DRIP LINE OR BEYOND IN ACCORDANCE WITH THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL.
9. TEMPORARY SEDIMENTATION ENTRAPMENT AREAS SHALL BE PROVIDED AT KEY LOCATIONS TO INTERCEPT AND CLARIFY SILT LADEN RUNOFF FROM THE SITE. THESE MAY BE EXCAVATED OR MAY BE CREATED UTILIZING EARTHEN BERMS, RIP–RAP OR CRUSHED STONE DAMS, HAY BALES, OR OTHER CHANNELIZATION SHALL BE CONSTRUCTED TO INSURE THAT ALL SILT LADEN WATERS ARE DIRECTED INTO THE ENTRAPMENT AREAS, WHICH SHALL NOT BE PERMITTED TO FILL IN, BUT SHALL BE CLEANED PERIODICALLY DURING THE COURSE OF CONSTRUCTION. THE COLLECTION SILT SHALL BE DEPOSITED IN AREAS SAFE FROM FURTHER EROSION.
10. ALL DISTURBED AREAS, EXCEPT ROADWAYS, WHICH WILL REMAIN OPEN OR UNFINISHED FOR MORE THAN 10 DAYS SHALL BE TEMPORARILY SEEDED WITH 1/2 LB. OF RYE GRASS OR MULCHED WITH 100 LBS. OF STRAW OR HAY PER 1,000 SQUARE FEET. ROADWAYS SHALL BE STABILIZED AS RAPIDLY AS PRACTICABLE BY THE INSTALLATION OF THE BASE COURSE. A TEMPORARY SEEDING AND/ OR MULCHING SHOULD BE APPLIED TO DISTURBED AREAS THAT ARE LEFT FOR 15 DAYS UNLESS CONSTRUCTION WILL BEGIN WITHIN 30 DAYS.
11. SILT THAT LEAVES THE SITE SHALL BE COLLECTED AND REMOVED AS DIRECTED BY APPROPRIATE MUNICIPAL AUTHORITIES.
12. AT THE COMPLETION OF THE PROJECT, ALL TEMPORARY SILTATION DEVICES SHALL BE REMOVED AND THE AFFECTED AREAS RE–GRADED, PLANTED, OR TREATED IN ACCORDANCE WITH THE APPROVED PLANS.
13. ALL AREAS DISTURBED BY ON–SITE GRADING, THAT WILL NOT BE CONSTRUCTED UPON, SHALL BE STABILIZED WITH PERMANENT VEGETATIVE COVER, USING THE FOLLOWING SEEDING SCHEDULE, OR EQUIVALENT:

	1 LB. PER ACRE	1 LB. PER 1,000 SF
KENTUCKY BLUE GRASS –	20	0.45
CREEPING RED FESCUE	20	0.45
PERENNIAL RYE GRASS –	5	0.10

14. ALL SEEDED AREAS TO HAVE AN APPLICATION OF THE FOLLOWING:
LIME – AMOUNT NEEDED TO OBTAIN A pH OF 5.5
FERTILIZER – 15 LBS. PER 1,000 SF OF 10–20–10 FERTILIZER OR APPROVED EQUAL.
IF NOT LANDSCAPED OTHERWISE, ALL NEW CONSTRUCTED STEEP PERMANENT SLOPED LESS THEN 1 (VERTICAL) : 2.5 (HORIZONTAL) TO BE SEEDED WITH THE FOLLOWING:

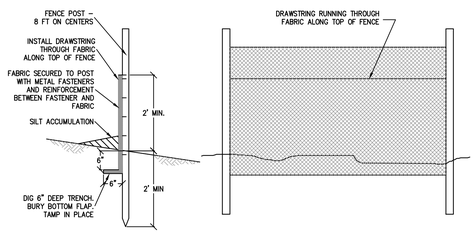
	1 LB. PER ACRE	1 LB. PER 1,000 SF
CREEPING RED FESCUE –	10	0.45
CROWN VETCH –	15	0.35
BIRDSFOOT TREFOIL –	8	0.20
TALL FESCUE OR SMOOTH BROMEGRASS –	15	0.35
W/PERENNIAL RYE GRASS –	5	0.10

15. ALL SLOPES 1 (VERTICAL) : 2.5 (HORIZONTAL) TO BE MULCHED AND STABILIZED WITH CLOTH FABRIC AND PINNED TO THE GROUND.
16. SOD CAN BE USED INSTEAD OF SEED.
CONSTRUCTION SEQUENCE:
a. CONSTRUCT STABILIZING CONSTRUCTION ENTRANCE.
b. INSTALL SEDIMENT BARRIERS AS PER NOTE 1 ABOVE.
c. CONSTRUCT DIVERSIONS SWALES AND DRAINAGE SYSTEMS WITH MINIMUM NECESSARY CLEARING.
d. CLEAR EXISTING TREES AND VEGETATION FROM AREAS TO BE EXCAVATED OR FILLED, STRIP AND STOCKPILE TOPSOIL FROM ALL AREAS TO BE DISTURBED.
e. PERFORM NECESSARY EXCAVATION OR FILL OPERATIONS TO BRING SITE TO DESIRED SUBGRADE. INSTALL STORM DRAINAGE SYSTEM.
f. INSTALL SEDIMENT CONTROL BARRIERS AROUND ALL STORM DRAIN INLETS.
g. SEED ALL DISTURBED AREAS WHICH WILL REMAIN UNDISTURBED FOR A PERIOD OR 30 DAYS AS PER NOTE 2 ABOVE.
h. AFTER COMPLETION OF THE SITE CONSTRUCTION FINE GRADE AND SPREAD TOPSOIL ON ALL LAWN AREAS AND SEED AS PER NOTES 5 AND 6 ABOVE.
I. REMOVE SEDIMENT BARRIERS AS PER NOTE 4 ABOVE.
j. MAINTAIN ALL SEEDED AND PLANTED AREAS TO INSURE A VIABLE STABILIZED VEGETATIVE SPECS.
17. ALL CONSTRUCTION TO MEET CURRENT MUNICIPALITY SPECS.
18. 4" OF TOP SOIL TO BE SPREAD PRIOR TO SEEDING IN ALL DISTURBED AREAS.

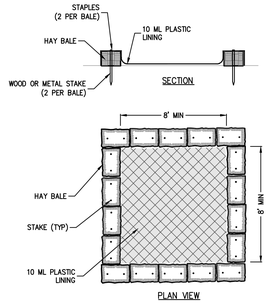


NOTE:
1. CONTRACTOR IS TO CLEAN INLET FILTER AFTER EVERY STORM
2. CONTRACTOR TO REMOVE FABRIC AND LUMBER UPON COMPLETION OF PROJECT
3. FABRIC TO BE MIRAFI 100X OR EQUIVALENT

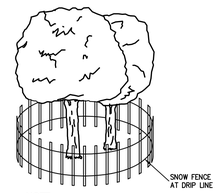
CURB INLET FILTER DETAIL
N.T.S.



SILT FENCE DETAIL
N.T.S.



CONCRETE TRUCK CLEANOUT AREA
N.T.S.



NOTE:
PROVIDE PROTECTION FOR TREES TO REMAIN WITHIN THE LIMIT OF DISTURBANCE

TREE PROTECTION DETAIL
N.T.S.

REV	DESCRIPTION	BY	DATE
3	FOR FINAL APPROVAL	AP	11/11/25
2	PLANNING BOARD SUBMISSION	AP	8/14/25
1	PLANNING BOARD SUBMISSION	AP	6/11/25

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www.westonandsampson.com

PROJECT:
RELLA BOULEVARD
VILLAGE OF MONTEBELLO
ROCKLAND COUNTY
NEW YORK

TITLE:
EROSION AND SEDIMENT CONTROL DETAILS

STATE OF NEW YORK – BRIAN A. BROCKER – 60229 – LICENSED PROFESSIONAL ENGINEER

BRIAN A. BROCKER,
PROFESSIONAL ENGINEER
N.Y.S. Lic. No. 60229

PROJECT NO:	DRAWN:	CHECKED:
ENG24–1108	AP	JN

SCALE: 1" = 40'
GRAPHIC SCALE: 0 40' 80'
DATE: 05/09/25
DRAWING NO: 5

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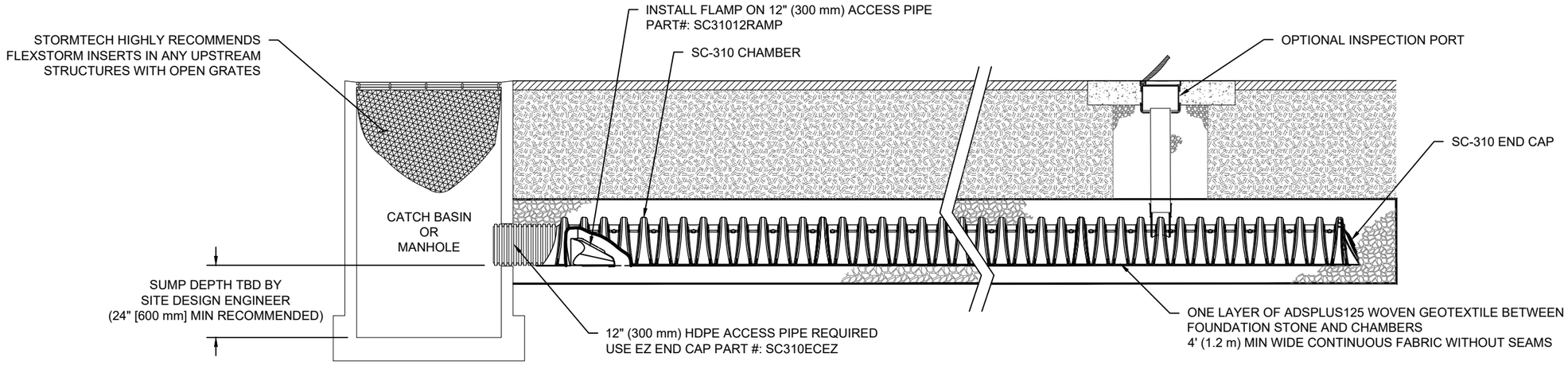
Appendix G

"Stormwater Infiltration System and Water Quality Pretreatment Manufacturer Maintenance Requirements"

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SC-310 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

PENNINGTON SUBDIVISION
VILLAGE OF NEW HEMPSTEAD, NY
DATE: | DRAWN: JN
PROJECT #: | CHECKED: N/A

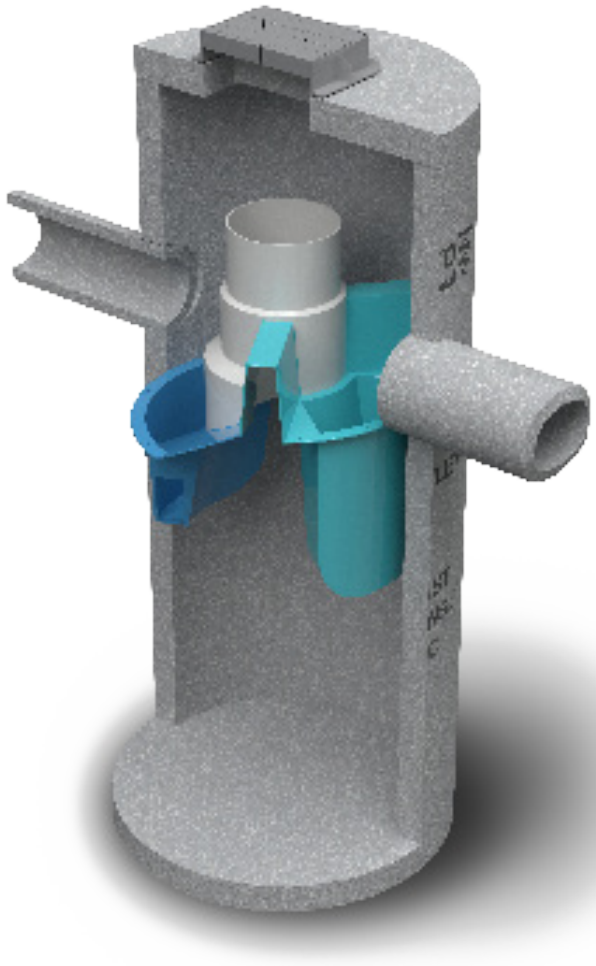
DATE	DRW	CHK	DESCRIPTION

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

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Hydro International



Operation and Maintenance Manual

First Defense® High Capacity and First Defense®Optimum

Vortex Separator for Stormwater Treatment

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5 Maintenance
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- Determining Your Maintenance Schedule

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- Floatables and Sediment Clean Out

8 First Defense® Installation Log

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DISCLAIMER: Information and data contained in this manual is exclusively for the purpose of assisting in the operation and maintenance of Hydro International plc's First Defense®. No warranty is given nor can liability be accepted for use of this information for any other purpose. Hydro International plc has a policy of continuous product development and reserves the right to amend specifications without notice.

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I. First Defense® by Hydro International

Introduction

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints.

The two product models described in this guide are the First Defense® High Capacity and the First Defense® Optimum; they are inspected and maintained identically.

Operation

The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

Pollutant Capture and Retention

The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for “offline” arrangements using separate junction manholes
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

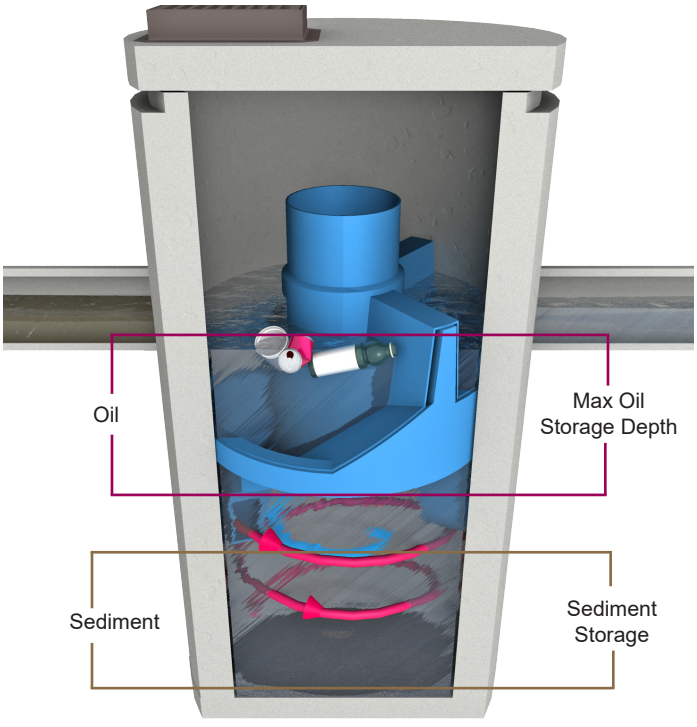


Fig.1 Pollutant storage volumes in the First Defense®.

II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components have modified geometries allowing greater design flexibility to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2). First Defense® model sizes (diameter) are shown in Table 1.

III. Maintenance

First Defense® Components

1. **Built-In Bypass**
2. **Inlet Pipe**
3. **Inlet Chute**
4. **Floatables Draw-off Port**
5. **Outlet Pipe**
6. **Floatables Storage**
7. **Sediment Storage**
8. **Inlet Grate or Cover**

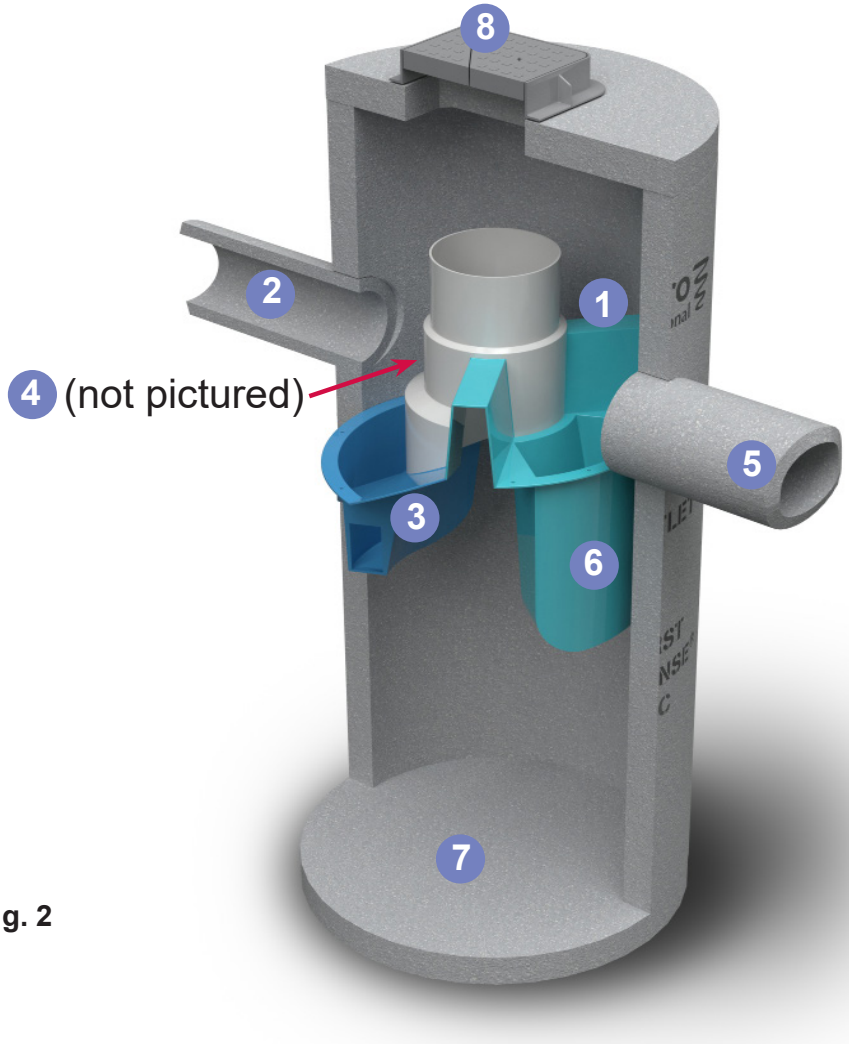


Fig. 2

Table 1

First Defense® Model Sizes
(ft / m) diameter
3 / 0.9
4 / 1.2
5 / 1.5
6 / 1.8
7 / 2.1
8 / 2.4
10 / 3.0

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense® have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.

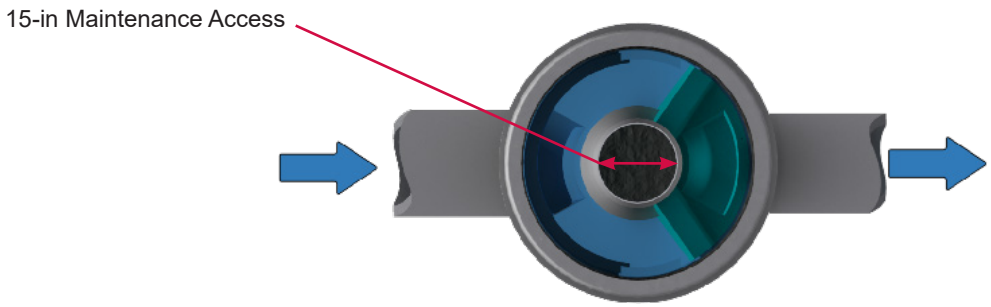


Fig.3 The central opening to the sump of the First Defense®is 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / flotables removal, for First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.

6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

7. Securely replace the grate or lid.

8. Take down safety equipment.

9. Notify Hydro International of any irregularities noted during inspection.

Floatables and Sediment Clean Out

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.4).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose to be lowered to the base of the sump.

Scheduling

- Floatables and sump clean out are typically conducted once a year during any season.

- Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.



Fig.4 Floatables are removed with a vactor hose

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vactor truck (flexible hose recommended)
- First Defense® Maintenance Log

Floatables and Sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.

4. Remove oil and floatables stored on the surface of the water with the vactor hose or with the skimmer or net

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).

6. Once all floatables have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris off the sump floor

7. Retract the vactor hose from the vessel.

8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.

9. Securely replace the grate or lid.

Maintenance at a Glance

Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area
NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.	

First Defense® Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

MODEL SIZE (CIRCLE ONE): [3-FT] [4-FT] [5-FT] [6-FT] [7-FT] [8-FT] [10-FT]

INLET (CIRCLE ALL THAT APPLY): GRATED INLET (CATCH BASIN) INLET PIPE (FLOW THROUGH)

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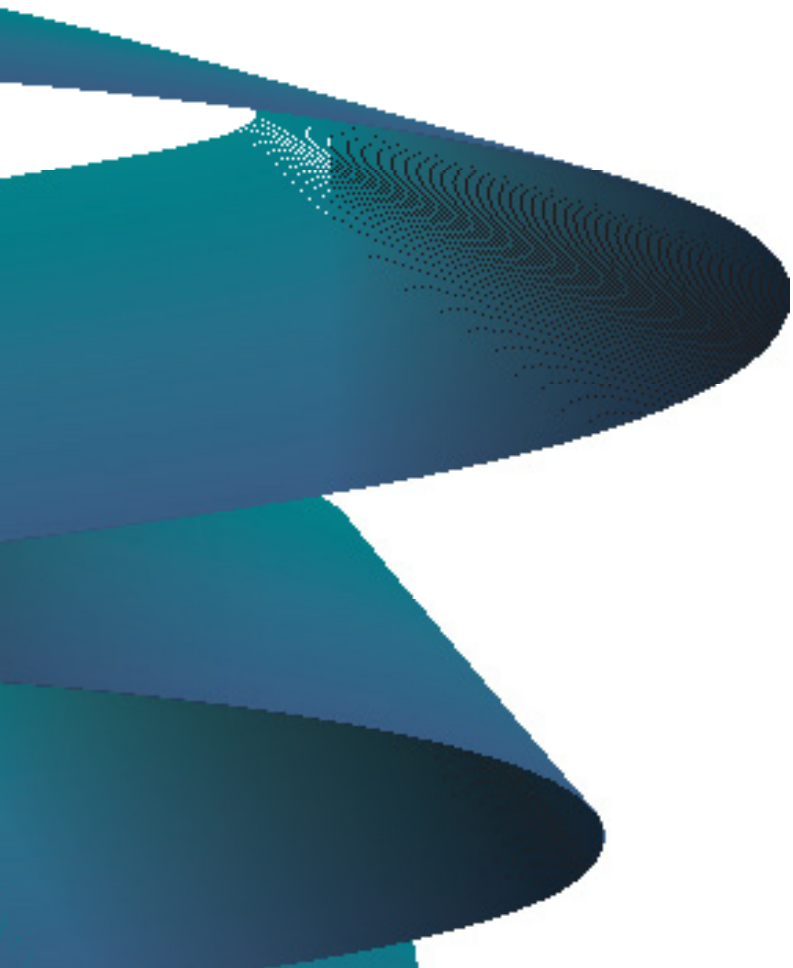
First Defense® Inspection and Maintenance Log

Date	Initials	Depth of Floatables and Oils	Sediment Depth Measured	Volume of Sediment Removed	Site Activity and Comments

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www.hydro-int.com

Turning Water Around...®

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Chapter 12: Maintenance Guidance

SMPs will not function to protect water resources without proper attention to operation and maintenance (O&M). In order to ensure long-term performance, it's critical that O&M tasks and responsibilities are identified, clearly outlined in an inspection and maintenance plan, and assigned to various stakeholders. This Chapter was developed to address the need for maintenance guidance, and is structured in the following sections:

- **Section 12.1** introduces the 10 SMP groups used in this Chapter, establishes the 3 level hierarchy for inspection and maintenance responsibilities and procedures, and provides an overview of planning and budgeting for maintenance.
- **Section 12.2** outlines the key components to be inspected, the Level 1 inspection and maintenance procedures, and common triggers for Level 2 and Level 3 inspections, for each of the 10 SMP groups.
- **Section 12.3** includes diagnostic measures for specific problems, as well as guidance for performing repair activities.

Section 12.1 Introduction

12.1.1 Stormwater Management Practice (SMP) Groups

For the purpose of this Chapter, the standard SMPs and Runoff Reduction Techniques have been clustered into ten SMP groups (**Table 12.1**), containing practices that share common inspection components and maintenance concerns. This grouping has been applied to the detailed inspection guidance provided in **Section 12.2,** as well as the fillable **Level 1 and Level 2 Inspection Checklists** that are available for download on the NYSDEC Construction Stormwater Toolbox website (www.dec.ny.gov). The checklists identify common problems with key components of the SMPs, recommend follow-up actions to correct them, and outline triggers for Level 2 and Level 3 inspections. These checklists have been developed as a guideline to assist responsible parties with efficient and thorough O&M.

Table 12.1 Practices Discussed in this Chapter, by Group

SMP Group	Practices Included	
1. Sheet Flow and Disconnection	• Sheet Flow to Filter Strip • Rooftop Disconnection	• Sheet Flow to Riparian Buffers
2. Tree Planting	• Tree Planting	
3. Swales	• Vegetated Swale	• Wet Swale
4. Bioretention	• Tree Pit • Tree Trench • Rain Garden • Stormwater Planter	• Infiltration Bioretention • Filtration Bioretention • Bioslope • Dry Swale
5. Rainwater Harvesting	• Rain Barrel	• Cistern
6. Porous Pavements	• Porous Asphalt • Porous Paver	• Porous Concrete • Stabilized Grid/Cell
7. Green Roofs	• Extensive Green Roof	• Intensive Green Roof
8. Ponds and Wetlands	• Stormwater Ponds	• Stormwater Wetlands
9. Infiltration	• Infiltration Trench • Infiltration Basin	• Dry Well • Underground Infiltration
10. Sand Filters	• Surface Sand Filters • Perimeter Sand Filters	• Underground Sand Filters

12.1.2 Maintenance Hierarchy

This Chapter is structured around a hierarchy concept, where the severity of the problem directly correlates to the level of experience needed to perform the inspection and identify corrective maintenance measures.

Many SMP maintenance problems start out as minor and can be easily identified by individuals with limited experience (**Level 1**). As long as these issues are detected early, through regular inspections, they can typically be addressed in an expedient and cost-effective manner.

However, in some cases, issues may arise that require additional technical knowledge or capabilities to diagnose the problem and identify the appropriate remedy (**Level 2**). At this point, assistance from an individual with training in SMP inspection, operation and maintenance, may be necessary.

Similarly, some problems escalate to the point where a Qualified Professional or specialized expert is needed to return the SMP to proper functioning condition (**Level 3**).

The step-wise approach of the Maintenance Hierarchy (**Figure 12.1**) was developed to ensure long-term performance of SMPS, through cost-effective implementation of inspection and maintenance.



Figure 12.1 The SMP Maintenance Hierarchy

Level 1: Individuals with Limited or No Training

Level 1 includes routine inspection and maintenance activities conducted by:

- Property owners, property managers, or HOA representatives, for privately owned SMPs.
- Municipal maintenance staff/interns or volunteers, for municipally owned SMPS.

These individuals typically have very limited training in stormwater operation, inspection, and maintenance, but can use available guidance to quickly identify and rectify common or minor issues with SMP performance. For most SMPs, the majority of inspection and maintenance activities can be conducted at this skill level, thus Level 1 forms the base of the Maintenance Hierarchy pyramid. Many well-functioning SMPs can be adequately maintained for long periods of time using Level 1 capabilities.

Some issues may arise that require a higher level of resources and expertise. Such issues are referred to in this Chapter and the Inspection Checklists as “kick-outs to Level 2.”

Level 2: Trained Individuals

Level 2 includes inspection and maintenance activities conducted by municipal employees or landscape contractors who have completed training on SMP operation, inspection, and maintenance. Level 2 inspections can occur in response to two circumstances:

1. As part of an ongoing, municipal inspection program whereby SMPs are visited on a rotating basis at a frequency of once every five years, or a frequency established by the local program; or
2. In response to a “kick-out” from a Level 1 Inspector.

Circumstance #2 requires coordination and communication between the Level 1 and Level 2 Inspectors, with documentation and background provided by the Level 1 Inspector. This is essential to make the hierarchy approach successful.

As with kick-outs from Level 1 to Level 2, the same can exist from Level 2 to Level 3. If the Level 2 Inspector encounters a problem where a Qualified Professional is needed to re-design certain components of the SMP, and/or a Qualified Contractor is needed to undertake a more serious repair, then Level 3 is activated.

Level 3: Qualified Professionals

Level 3 includes inspection and maintenance conducted by Qualified professionals, including professional engineers and landscape architects, that can revisit design issues associated with chronic or serious problems. For repair and maintenance of the SMPs at this level, individuals with specific skills and certifications, such as a certified plumber with experience working with rainwater harvesting systems or a horticulturalist with knowledge on proper plantings, may need to be called in by the Qualified Professional.

Table 12.2 describes how SMP inspection and maintenance activities differ at each level of the Maintenance Hierarchy.

Table 12.2 SMP Inspection and Maintenance Hierarchy Levels

	Level 1: Individuals with Limited or No Training	**Level 2: Trained Individuals**	**Level 3: Qualified Professionals**
Qualifications/ Training of Inspectors	No special training, but person is provided educational materials	On-the-job training and/or workshops	Professional License, such as a PE or RLA
Frequency of Inspection	At least annually	Routine as determined by the local program OR as kick-out from Level 1 inspection	Only as needed from Level 2 inspection
Inspection Guidance	Inspection guidance is included in **Section 12.2.** Refer to the NYSDEC Construction Stormwater Toolbox website (www.dec.ny.gov) for **Level 1 Inspection Checklists**.	Refer to the NYSDEC Construction Stormwater Toolbox website (www.dec.ny.gov) for **Level 2 Inspection Checklists**.	Guidance on diagnosing common problems is included in **Section 12.3.** Refer to the NYSDEC Construction Stormwater Toolbox website (www.dec.ny.gov) for a **Level 3 Inspection Form**.
Typical Maintenance Activities	Routine mowing. Trash removal. Plant care and upkeep. Mulching as needed. Removal of small amounts of sediment from pretreatment areas of the practice.	Removal of larger amounts of sediment. Structural damage repair. Minor regrading and scarification of soil surface to restore permeability.	Redesign an improperly functioning practice, to include: regrading the contributing drainage area, replacing filter media or plantings, modifying conveyance structures, etc.
Triggers for Inspection or Maintenance by this Level	Regular inspection (no trigger)	Common triggers for Level 2 inspection are included in **Section 12.2.**	Common triggers for Level 3 inspection are included in **Section 12.2.**

12.1.3 Level 1, 2 and 3 Inspections

12.1.3.1 General Guidance for Level 1 Inspections

Read through this guidance before performing an inspection and use the specific guidance in **Section 12.2** for the SMP Group that includes the practice being inspected. Refer to **Chapter 11** for guidance on plant maintenance, as well as control of invasive species.

When to Conduct a Level 1 Inspection

Level 1 Inspections are the most common and are intended to identify minor maintenance issues early and keep up with routine maintenance tasks. They should be conducted *at least annually* for all practices and supplemented with additional visits after large storms, winter salting and sanding, or other seasonal changes. In addition, it is recommended that inspections take place more frequently during the first few years after installation of an SMP. Many issues can be identified and corrected during this early period, so that they do not lead to larger problems in subsequent years. Once the SMP is stable and seems to be functioning properly, the inspections can become less frequent.

What to Take into the Field

The Level 1 Inspection is simple, and it is assumed that very little measurement is needed. However, the Inspector should take pictures to document findings and keep a record of all inspections. The following items may be needed during a Level 1 Inspection:

1. Letter of permission to access property if the Inspector is from an outside agency
2. Clipboard and pencils (if using paper forms), or Tablet or smartphone (if using digital forms)
3. Level 1 Inspection Checklists (paper or digital copies)
4. Notes or records from past inspections
5. Approved Site Plan, Planting Plan (includes planting/seed mixes), and/or details for SMP's
6. Digital camera or smartphone
7. Engineer's scale
8. Flagging/stakes and waterproof marker (to mark problem areas that need to be revisited)
9. 25-ft Measuring Tape (optional, to measure pipe sizes and SMP dimensions)
10. Safety equipment: safety vest, steel-toe shoes, traffic cones, etc. (if SMP is located near traffic)
11. Bug spray (if needed)
12. Sun block (if needed)

Level 1 Checklists

The **Level 1 Inspection Checklists** are available for download on the NYSDEC Construction Stormwater Toolbox website (www.dec.ny.gov). These checklists outline common problems with key components of the SMPs and describe follow-up actions for each observed condition. Refer to **Figure 12.2**, for an example checklist.

The Checklists are intended to be used as follows:

- Check the box in the LEFT column if the problem is present at the site.
- Check the appropriate follow-up action(s) in the RIGHT column, or add an action as needed to fix the problem.
- Record all your actions. Keep copies of the Level 1 Inspection Checklists, plus notes, photos, or other documentation of corrective measures to fix problems. Record dates of actions and any follow-up inspections. This will be important for communicating with Level 2 Inspectors and/or the local maintenance program.
- Activate a Level 2 Inspection using the blue cells to identify conditions when a more detailed inspection is necessary to further diagnose a problem. Refer to **Section 12.2** for common triggers of Level 2 Inspection for each of the SMP Groups. Consult the local stormwater program authority for the most appropriate Level 2 inspection option.

Porous Pavement 1. 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 get vegetation established. ☐ Fill in erosion areas with soil, compact, and seed straw to get vegetation established. ☐ If a rill or small channel is forming, try to redirect water flowing to this area by creating a small bern or adding topsoil to area by creating a small berm or adding topsoil to areas that are heavily compacted. ☐ Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths.

Figure 12.2 Example Level 1 Inspection Checklist, with Follow-Up Actions. *Note "Kick-Out to Level 2" highlighted in light blue.*

12.1.3.2 General Guidance for Level 2 and 3 Inspections

Read through this guidance before performing an inspection, and use the specific guidance in **Section 12.2** for the SMP Group that includes the practice being inspected, or **Section 12.3** for the specific problem encountered.

When to Conduct a Level 2 Inspection

Level 2 Inspections occur as routine inspections for compliance with local stormwater regulations or when triggered by a Level 1 Inspector to address or diagnose specific problems. In this situation, the Level 2 Inspector should confer with the Level 1 Inspector about problems they have identified and then conduct a follow-up inspection that focuses on diagnosing the causes of the problems and possible solutions.

The frequency of Level 2 Inspections is typically defined by the municipality, but shall occur at least once every five years. As with Level 1 inspections, the frequency may change with the age of the SMP, with higher inspection frequency the first couple of years after installation.

Notifying the Owner/Operator

Consult the project files and maintenance agreement to ascertain the Owner/Operator. Confirm that there is right of access through the local code, signed maintenance agreement, or other means. Contact the Owner/Operator at least three business days in advance of the proposed inspection. If the Owner/Operator cannot be found or contacted, make a reasonable effort through file research to contact a property representative, and document those efforts in writing. If the inspection is in response to a Level 1 inspection and referral to your agency, speak with the person who conducted the Level 1 inspection and get any documentation they may have. For publicly owned and managed SMPs, the municipality or other regulated MS4 is responsible for long-term operation and maintenance.

What to Take in the Field

Level 2 inspections may require authorized access to private property. Therefore, additional identification shall be provided for these inspections. It is recommended that the following items be taken into the field during a Level 2 Inspection:

1. Letter on municipal letterhead granting access to property and/or agency photo badge
2. Clipboard and pencils (if using paper forms), or Tablet or smartphone (if using digital forms)
3. Level 2 Inspection Checklists (paper or digital copies)
4. Dry erase board and marker (optional) to include in photos to keep track of SMP tracking # in municipal database (see **Figure 12.3** as example)
5. Notes or records from past inspections
6. Approved Site Plan, Planting Plan (includes planting/seed mixes), and/or details for SMP's
7. SMP As-Built Plan (if available)
8. Digital camera or smartphone
9. Engineer's scale
10. Flagging/stakes and waterproof marker (to mark problem areas that need to be revisited)
11. 100-ft Measuring Tape
12. Hand level and pocket rod (if needed to measure relative elevations)
13. Pipe wrench (to open underdrain clean-out caps)
14. Flashlight (to look into underdrain cleanouts and/or manholes)
15. Manhole cover puller
16. Soil probe, auger, and/or shovel
17. Safety equipment: safety vest, steel-toe shoes, traffic cones, etc. (if SMP is located near traffic)
18. Bug spray (if needed)
19. Sun block (if needed)

Level 2 Checklists

The **Level 2 Inspection Checklists** are available for download on the NYSDEC Construction Stormwater Toolbox website (www.dec.ny.gov). These checklists outline recommended repairs for common problems with key SMP components, and common triggers for Level 3 Inspection.

Conducting the Inspection

In general, the inspection should follow a consistent, logical approach, such as outlined below.

- Conduct a quick tour of the practice to identify any obvious issues and important components: inlets (number, location), surface area, outlet structures, berms or impoundments, outfalls, downstream conveyance channels or receiving waters. Check these components against the approved design plan or as-built drawing (if available).



Figure 12.3 Use a white board and digital camera to note SMP tracking #, date of inspection, and other forms of documentation. Alternatively, tag photographs using a smartphone

- Starting at the upland area, use the Level 2 Checklist to evaluate the practice. The inspection will proceed from the upland drainage area to inlets, side slopes, berms, treatment area, and outlets/outfalls. Make sure to fill in key information on the inspection form, such as SMP identifier number, site name, Inspector name, date, and weather conditions.
- Take photos of key practice components or maintenance concerns. Mark photo locations and orientation on a sketch Site Plan.
- Review the Inspection Checklists before leaving the site to make sure that all necessary information has been collected.

Follow-Up Actions

Upon completion of an inspection, complete these follow-up actions as soon as possible:

- Enter the inspection information in the appropriate database or hard copy file
- Download and label photos
- Communicate problems and corrective measures to the Owner/Operator (private or public). This may involve the Level 2 Inspector making a judgement call as to whether observed problems warrant a Level 3 investigation, providing a timeframe for correcting simpler issues, and coordinating with the Owner/Operator to pursue such an investigation, if required. Many local programs have existing protocols for sending letters, activating a compliance procedure, or verifying that repairs and corrections are completed by the Owner/Operator.

The **Level 2 Inspection Checklists** summarize follow-up actions and recommended repairs associated with various observations of SMP condition (blue cells) and highlight specific conditions that would trigger Level 3 Inspection (grey cells).

Level 3 Inspection Guidance

Level 3 Inspections are conducted in response to more complex issues identified during a Level 2 inspection, with the goal of developing specific repairs to resolve the issues. Therefore, the inspection primarily focuses on the problematic components of the SMP, but it is good practice to perform a cursory review of all system components. **Section 12.3** identifies twelve problems that are typically addressed in Level 3 inspections and discusses how to diagnose the cause of each problem, as well as repairs needed to address them. It should be noted that the problems addressed in each subsection can occur in a variety of SMPs. As a result, each subsection identifies the SMPs where the problem most commonly occurs and, in some cases, an SMP-specific diagnosis procedure.

12.1.4 Planning for Stormwater Maintenance

This section outlines key elements of stormwater maintenance planning, including:

1. Program models for stormwater maintenance
2. Inspection and maintenance checklists
3. Planning for the costs of stormwater maintenance
4. Identifying the need for infrequent maintenance items

12.1.4.1 Program Models for Stormwater Maintenance

The Maintenance Hierarchy concept (See **Section 12.1.2**) is discussed throughout this Chapter, but the individuals who will conduct the Level 1, Level 2 and Level 3 inspections and maintenance will vary depending on how the local program is administered. While this Chapter does not focus on program elements, it is important to note that the local program requirements will influence who performs ongoing maintenance. A legally binding and enforceable maintenance agreement shall be established between the property owner and local reviewing authorities to assign maintenance responsibilities to the responsible parties. This will play an important role in how to develop a comprehensive maintenance plan. All required maintenance elements shall be included in the maintenance plan.

Stormwater maintenance plans can generally be designated in three categories: 1) Private; 2) Local Government; and 3) Hybrid Approach. Understanding the program and regulations in the local community will influence the best techniques for developing the maintenance plan (**Table 12.3**).

Option 1: Private Maintenance

In this option, maintenance is the responsibility of the private landowner. In regulated MS4s, however, the landowner will periodically report to the local government. In this model, it is important to ensure that the maintenance plan is very easy to understand.

Option 2: Local Government Maintenance

In this option, the local government takes over maintenance responsibility for all stormwater practices. While it is still important to develop a clear and simple plan, the designer can assume some level of training or supervision for the individuals conducting inspections and maintenance. Maintenance access should be made available to local government staff through official easements.

Option 3: Hybrid Approach

In the hybrid approach to stormwater maintenance, larger practices or practices on public land are maintained by the local government, and smaller practices on private property are maintained by the landowner. Alternatively, the local government may take responsibility for inspections, but leave the landowner responsible for maintenance items identified during the inspection.

Table 12.3 Maintenance Considerations for Three Program Options

Program Option	Inspection/Maintenance Performed By:	Key Considerations for the Designer
Option 1: Private	Level 1: Property owner or HOA Level 2: Trained Individual Level 3: Qualified Professional/Contractor	Make the plan very simple and graphic intensive. Make a landscape/seed plan very simple and graphic intensive Include a list of contractors if applicable. Provide links to educational materials.
Option 2: Local Government Program	Level 1: Interns or Untrained Staff Level 2: Trained Local Staff Level 3: City/Town/Village Engineer or other individual hired by the municipality	Learn about the resources the local program has at its disposal. If government staff are being trained, develop a maintenance plan that is consistent with their knowledge and understanding. Be aware of equipment and materials on hand in this community.
Option 3: Hybrid Approach	Inspection and maintenance responsibilities are divided between the local government and private landowner.	Understand how the responsibilities are divided and develop a plan that is consistent with this arrangement.

12.1.4.2 Inspection and Maintenance Checklists and Documentation

The NYSDEC Construction Stormwater Toolbox website (www.dec.ny.gov) includes inspection checklists specific to each level of the maintenance hierarchy. The maintenance plan should include the inspection checklists for each level for the SMP Group(s) being constructed. The checklists include blank sections under each of the practice key components, to input project specific information. All materials developed as a part of the maintenance plan should be provided to the practice owner and local government. (See **Table 12.4**)

Table 12.4 Customizing Checklists and Guidance

Level 1	**Section 12.2** includes guidance.	Attach photographs of the practice (once installed), and a simple aerial photograph of the site to locate the practice. Include key local government contacts and contractors along with the checklist. Modify to add other problems, as they are identified during inspections. Attach site specific photographs of each problem identified.
Level 2	**Section 12.2** includes triggers for Level 2 and Level 3 Inspection.	Modify to add other observed conditions and recommended repairs, as they are identified during inspections. Attach site specific photographs of each observed condition identified.
Level 3	**Section 12.2** and **Section 12.3** include guidance.	Attach site specific photographs of each observed condition identified. Develop plans, details, and/or written narrative of recommended.

12.1.4.3 Budgeting for Maintenance

A maintenance plan should include a budget for annual maintenance. In the Local Government Maintenance model, a single entity (the local government) will be responsible for maintenance of many practices, so the cost of maintenance for an individual practice may not be as important as estimating the average cost of maintenance across all practices. For privately maintained practices, on the other hand, it is very helpful to develop a cost estimate that is as accurate as possible for the specific location. As a result, two options for estimating costs are presented here, including:

- **Option 1**: Average or Unit Costs
  Generalized cost data are used to estimate an annual cost. This option may be used for a municipality or other institution that manages a large number of practices.
- **Option 2:** Detailed Individual Practice Budget
  Annual costs are estimated using more detailed practice information, as well as more detailed estimates of labor and material costs.

Option 1: Average or Unit Costs

In this option, annual maintenance costs are estimated on a per-acre basis or as a percentage of the total construction costs. These prices typically range from about 1% to 4% of the construction costs (King and Hagan, 2011; **Table 12.5** Typical Maintenance Costs**)**.

Table 12.5 Typical Maintenance Costs
(Source: King and Hagan, 2011; Adjusted to 2015 Costs)

Practice	Annual Maintenance Cost (% of Construction)	Annual Maintenance Cost ($/cf of water quality volume treated)
Buffers	4%	$0.25 - $0.35
Tree Planting	4%	$0.35
Ponds and Wetlands	4%	$0.22 - $0.35
Infiltration Trench/ Basin	2%	$0.25
Filtering Practices	4%	$0.41 - $0.47
Bioretention	4%	$0.44
Swales	3%	$0.18 - $0.26
Porous Pavement	1%	$0.64 - $0.89

While the costs in **Table 12.5** may be a reasonable starting point, it is important to note that the actual data will vary greatly, depending on labor rates and material costs. For example, the hourly "Open Shop" labor rate for rough grading is approximately $27/hour in Elmira and $38/hour in New York City (Means, 2015). In addition, costs for labor, materials and equipment will vary depending on the maintenance arrangement (**Table 12.6**).

Table 12.6 Variability in Maintenance Costs Based on Maintenance Arrangement

Maintenance Arrangement	Labor	Materials	Equipment
Public Maintenance (Municipality)	Level 1: Intern Wage Level 2: Staff Salary Level 3: Professional Staff or Contractor	Low: Materials bought in bulk.	Low: Typically owned by Public Works or similar department.
Private Maintenance (Homeowner)	Level 1: Homeowner (Free) or Contractor Level 2: Private Landscaper or Contractor Level 3: Professional Contractor	High: Materials purchased in small quantities.	High: Specialized equipment needs to be rented if needed.
Private Maintenance (Commercial or HOA)	Level 1: Free (with HOA volunteers) or Contracted Labor Rate Level 2: Private Landscaper or Contractor Level 3: Professional Contractor	Varies: Materials may be bought in bulk or on a small scale, depending on the size of the private entity.	High: Specialized equipment needs to be rented if needed.

Option 2: Site-Based Costs

Because the unit costs of labor and materials, and the average annual costs of maintenance can be highly variable, more detailed data will be needed to estimate costs at a particular site. One approach for estimating costs is to generate a list of routine maintenance items, along with associated unit costs for labor, materials, and equipment. This approach requires the user to enter basic design data for the practice, as well as information regarding local labor rates and other general costs. In the bioretention example below, unit costs are used to estimate routine maintenance costs, including regular inspections and maintenance.

Example Annual Cost Estimation: Bioretention

An example cost estimation for a bioretention filter follows below, which demonstrates how the unit cost and typical frequency data can be used to estimate average annual maintenance costs. **Table 12.7** summarizes the characteristics of the example bioretention practice, as well as the unit cost assumptions for typical inspection and maintenance activities. **Table 12.8** then summarizes routine inspection and maintenance activities, their frequency and extent, and associated labor costs.

Using the assumptions for this example, the annual costs for routine inspection and maintenance would be $1,828 ($1.15/cfof Water Quality Volume) in the first year, and $1,468 ($0.90/cf WQ_v) in subsequent years. These values are much higher than the $0.44/cf estimated using general cost data (**Table 12.5**). However, significant cost savings could be realized by using volunteer or intern-level labor for Level 1 inspections and routine maintenance.

12.2.9 Infiltration

Includes: Infiltration Trench (I-1), Infiltration Basin (I-2), Dry Well (I-3), Underground Infiltration System (I-4)

Components

Key components to inspect for Infiltration include the following:

- **IN-1 Drainage Area:** The drainage area conveys runoff to and is uphill from the infiltration cell. When it rains, water runs off and flows to the infiltration cell and soaks into its underlying layers.
- **IN-2 Inlets:** The inlets are where water flows into the practice. Depending on the design, inlets can include curb cuts, openings in a parking lot or roadway, downspouts, pipes, or ditches. Water can also enter the practice directly as sheet flow.

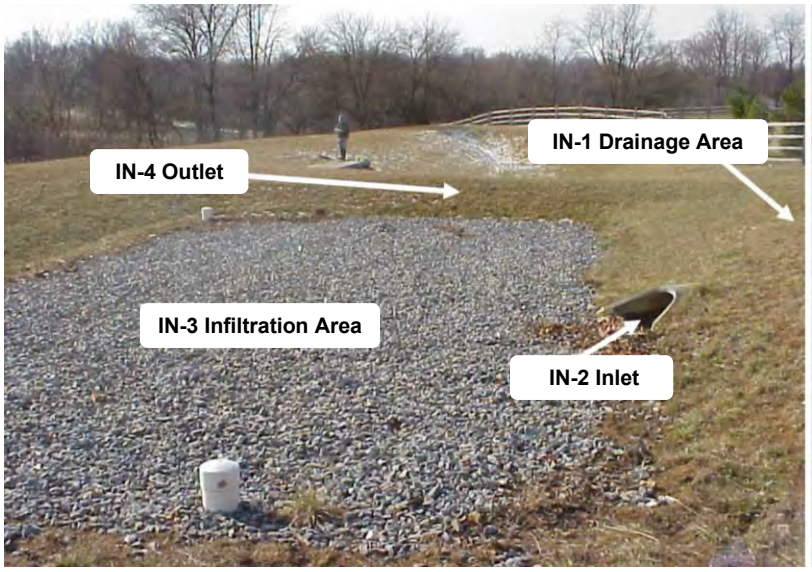


Figure 12.17 Key Areas for Level 1 Inspection of Infiltration Practices

- **IN-3 Infiltration Area:** The area that collects water and allows it to seep into the underlying soil.
- **IN-4 Outlets:** Outlets are where water exits the surface of the infiltration area during larger storms when the underground infiltration reservoir fills up and the excess water needs somewhere to go. Note that not all infiltration practices will have an identifiable outlet if the design is for all the water to infiltrate into the ground. Outlets may be a berm, stone weir, or pipe.

Level 1 Inspections

Frequency: *At least 2 times a year, especially in early spring, to ensure that the practice has survived the winter. Debris cleanout and dewatering inspection should occur monthly. Inspection of sediment traps, forebays, inlets and outlets should occur at least 1 time per year along with sediment cleanout and aggregate repairs.*

Triggers for Level 2 Inspection

The most likely triggers for Level 2 Inspection of IN practices are:

- Water stands on the surface for more than 72 hours after a storm event
- Erosion of inlets, infiltration area or outlets
- Excessive sediment buildup

Triggers for Level 3 Inspection

The most likely triggers for Level 3 Inspection of IN practices are:

- Standing water caused by clogged media
- Severe erosion of infiltration area, inlets, or around outlets
- Reoccurring significant sediment accumulation that is getting worse with time
- Solving the problem would require practice redesign or modification