STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

For

PORT OF ALBANY EXPANSION SITE

PREPARED FOR:

ALBANY PORT DISTRICT COMMISSION
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PRELIMINARY SITE PLAN SUBMISSION

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TABLE OF CONTENTS

1. INTRODUCTION 2
2. PROJECT MAPS AND PLANS 5
3. PROJECT SOILS 5
4. CONSTRUCTION PHASING 8
5. EROSION AND SEDIMENT CONSTROL MEASURES 9
6. POLLUTION PREVENTION MEASURES 12
7. EXISTING SITE CONDITIONS 15
8. STORMWATER MANAGEMENT ASSESSMENT 16
9. POST CONSTRUCTION STORMWATER CONTROL PRACTICES 20

APPENDIX LIST

APPENDIX A – LOCATION MAP

APPENDIX B – EROSION & SEDIMENT CONTROL PLANS, DETAILS, & NOTES

APPENDIX C – DRAINAGE DESIGN REPORT

APPENDIX D – MAINTENANCE INSPECTION CHECKLISTS

APPENDIX E – SPDES PERMIT

APPENDIX F – New York State Historic Preservation Office (SHPO) “No Effect Letter”

APPENDIX G – DRAFT WHARF AND DREDGING E&SC PLANS

APPENDIX H – SOIL MANAGEMENT PLAN

1. INTRODUCTION

A stormwater management assessment has been conducted for the proposed project in order to protect the waters of the State of New York from the adverse impacts of stormwater runoff. This report presents an analysis of the project in accordance with the *New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from Construction Activity Permit No. GP-0-20-001.* A separate Drainage Design Report (Appendix C) has been developed to address the *New York State Stormwater Management Design Manual* ("The Manual"). As required, the Stormwater Pollution Prevention Plan is designed, where appropriate, to incorporate green infrastructure techniques that preserve natural resources and utilize the existing hydrology of the site, provide runoff reduction practices, water quality treatment practices, apply volume and peak control practices for channel protection, overbank flood control, and extreme flood control as appropriate.

In accordance with Appendix B, Table 2 of the SPDES General Permit for Construction Activity, GP-0-20-001, industrial facilities that involve a soil disturbance of one or more acres require the preparation of a full SWPPP that includes post-construction stormwater management practices. In total, approximately 69.3 acres of soil disturbance is expected during the construction of this project. Therefore, this project includes the development of erosion and sediment controls, green infrastructure site planning techniques, runoff reduction volume practices and post-construction stormwater management practices.

The general contractor and subcontractors performing any activity that involves soil disturbance will be required to comply with the terms and conditions of the SWPPP for the project identified as a condition of authorization to discharge stormwater. The Contractor shall provide signed certifications (Form CONR 5) for itself and all applicable subcontractors at the preconstruction meeting. These signed certifications shall be included as part of the SWPPP. The SPDES General Permit and SWPPP must be kept on file at the Project Field Office. As required by the conditions described in the SPDES general permit, the SWPPP shall be kept current, and updates will be made to reflect changes in the design, construction and operation, or maintenance of the project.

The complete set of construction drawings and specifications are provided as separate documents; however, they should be considered an integral component of the SWPPP and are referenced throughout this document. The applicant must retain all documentation for 5 years after NYSDEC accepts the Notice of Termination (NOT).

1.1 Scope of the Project

The proposed development is an offshore wind (OSW) manufacturing operation that will produce wind turbine tower components. The site development includes 569,358 +/- square feet of OSW manufacturing spread over four (4) buildings with ancillary impervious areas including parking for automobiles and trucks, roadway, bridge, and a maritime wharf. The remainder of the site will be used for tower storage and be made up of compacted gravel. There will also be small pervious areas of grass and unaltered brush and trees.

1.2 Location of Project

The Project is situated on 81.62 acres of land at the Beacon Island site, located at the confluence of the Normans Kill and Hudson River. The project also includes development within 4.4 acres of the adjoining parcel owned by National Grid as well as the extension and improvement of Normanskill Street. The project owner, Albany Port District Commission (APDC), is proposing to develop the vacant parcels of land (tax parcels 98.00-2-10.23 and 98.01-2-1.0) to expand the existing Port of Albany in the Town of Bethlehem, Albany County, New York. Refer to the Location Map in Appendix A.

The project is not located within a TMDL and does not discharge into a 303(d) listed waterbody.

Table 1 - Location Table

Approximate Coordinate Position @ Center of Project	
Latitude	42° 36' 10.8" N
Longitude	73° 45' 57.0" W

1.3 Project Type and Size

The project is a new development construction project that has a disturbance area of approximately 69.3 acres. The new impervious area is approximately 67.1 acres.

1.4 Project Description

The proposed project will include development of an OSW tower manufacturing (Marmen-Welcon) facility consisting of five (5) separate buildings totaling up to 589,000+/- square feet of floor space. The following is a breakdown of the function and size of each building:

- Building A Plate Preparation & Welding (289,931 SF)
- Building B Welding Finishing (99,936 SF)
- Building C Blast Metallization Plant (121,593 SF)
- Building D Internal Assembly Finishing (57,898 SF)
- Building E Material Receiving (19,600 SF)

Tower production will occur within four (4) buildings (Buildings A-D) at the main facility on the Port Expansion property located in the Town of Bethlehem. The 5th building (Building E) will be located at 700 Smith Boulevard within the existing Port District in the City of Albany. A proposed gated bridge over the Normans Kill will provide a truck transportation route in and out of the main facility, by connecting Beacon Island and the 14.7-acre offsite parcel at 700 Smith Boulevard. In conjunction with the proposed bridge, Normanskill Street is to be extended from its existing end point to the bridge. The existing pavement will be improved to accommodate the proposed trucking route. Employee parking will be situated on the adjoining land owned by National Grid with access from River Road. A proposed 500 LF wharf and associated dredging along the Hudson River will be used to load and ship completed tower sections. A separate drainage report and SWPPP will be prepared for the 14.7-acre Building E site at 700 Smith Boulevard and the portion of Normanskill St. located in the City of Albany, as the sites are separated by approximately 1-mile and are under separate MS4 jurisdictions.

The purpose of this report is to assess the stormwater quality, quantity, and erosion and sediment control for the development of the site. This report has been developed in accordance with the New York State Department of Environmental Conservation (NYSDEC) State Pollution Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity, GP-0-20-001 (Permit) and the NYSDEC Stormwater Management Design Manual (The Manual). The project site is located within the Town of Bethlehem, Albany County, New York, which is an MS4 community, requiring this report and project to receive approval from the Town.

The total disturbance area is 69.3 +/- acres. The existing impervious area is approximately 3.7 +/- acres, 5.3% of the total disturbance area. The proposed site development will consist of 67.1 +/- acres of impervious cover, 96.8% of the total disturbance area.

1.5 Cultural Resources

A Supplemental Environmental Impact Statement (SEIS) has been developed as part of the SEQR process for the Port of Albany Expansion Project. A SHPO review was conducted, and the current status reflects “No Adverse Effect”. The SHPO review letter, dated September 13, 2019, is included as Appendix F to this SWPPP. An additional SEIS has been submitted to the lead agency for the specific tenant on the site Marmen-Welcon.

1.6 On-site Wetlands

As part of the Draft Generic Environmental Impact Statement (DGEIS) and SEIS, impact to aquatic resources, including wetlands, were evaluated. The New York State Freshwater Wetland and Tidal Wetlands mapping of the project site indicates there are no NYSDEC jurisdictional wetlands within or adjacent to the project area. Review of USFWS National Wetlands Inventory (NWI) mapping of the project site indicates that the majority of the project area is mapped as palustrine emergent wetlands (PEM) and palustrine forested wetlands (PFO). It should be noted that NWI mapping does not have any regulatory consequence, but rather indicates areas that may meet federal wetland criteria as identified by the USFWS using aerial photography.

A wetland delineation was conducted in April 2019 by McFarland Johnson for the FGEIS. The results of the delineation indicated that there are 8 freshwater wetlands located within the project limits. These wetlands are hereafter referred to as Wetlands 1, 3, 4, 5, 6, 7, 8, and 9. Wetlands within the original study are totaled approximately 2.33 acres. A Supplemental Wetland Delineation was performed by MJ in April 2021 of the 18.22 acres on the National Grid Parcel. One contiguous wetland, comprising a total of approximately 7.13 acres, was delineated within the 18.22-acre area. The delineated wetland represents an extension of the 2019 wetland delineation and previously identified as Wetland 1. Wetland 1 drains in a northerly direction into 40-inch corrugated metal pipe (CMP) which discharges directly to the Normans Kill.

The Project will result in direct impacts to 0.81 acres of Wetland 1 located in Beacon Island (original Project Area) and 0.01 acres of direct impact to Wetland 1 on National Grid property for the construction of a retaining wall. In addition, there is a 0.04-acre impact to Wetland 9 for the bridge over the Normans Kill and a 0.02-acre impact to Wetland 7 for roadway improvements. There will also be approximately 0.33 acres of temporary impacts to wetlands during construction. Total permanent wetland impacts are estimated to be approximately 0.86 acre.

Compensatory wetland mitigation will be satisfied through a federally approved In-Lieu Fee Mitigation Program or off-site mitigation bank (The Wetland Trust). Mitigation in accordance with USACE rules and regulations will ensure no net loss of wetlands and will be included as part of the Joint application Permit submitted to the USACE and NYSDEC.

2. PROJECT MAPS AND PLANS

2.1 Location Map

See Appendix A

2.2 Soil Maps

See Drainage Design Report (Appendix C)

2.3 Erosion and Sediment Control Plans

See Appendix B

2.4 Existing and Proposed Subcatchment Maps

See Drainage Design Report (Appendix C)

3. PROJECT SOILS

3.1 NRCS Soil Map

See Drainage Design Report (Appendix C)

3.2 Soil Types

The following soil type(s) and hydrologic group(s) are present within the project area of disturbance:

Table 2 – Soil Types

Symbol	Soil Name	Hydrologic Soil Group
HuE	Hudson silt loam, 25 to 45 percent slopes	C/D
NrD	Nassau very channery silt loam, hilly, very rocky	D
Ug	Udorthents, loamy	A
Ur	Urban land	
Wo	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	B/D

3.3 Discussion of Soil Characteristics and Soil Erosion Hazard Potential

According to the Natural Resources Conservation Service (NRCS) web soil survey, there are five (5) mapped soil units identified within the project boundary (see Appendix E). The majority of the soil at the expansion site falls within the hydrologic soil group B/D. The first letter corresponds to drained soil's properties under drained conditions and the second to saturated conditions. Group B soils have moderate infiltration and runoff rates while group D have a low infiltration rate and a high runoff rate. The soils with dual group identifiers have been modeled with the more conservative of the two, in this case a D soils group. Most of the soil adjacent to Normanskill Street is within soil group A. Group A soils have a high infiltration rate.

Geotechnical studies have been undertaken to evaluate the subsurface conditions of the site. These investigations have been summarized in the following reports:

- *Preliminary Geotechnical Evaluation and Interpretive Report*, CME Associates, Inc., April 5, 2017
- *Supplemental Geotechnical Report*, Dente Group, July 20, 2017

Copies of these reports were included in the TOWN OF BETHLEHEM PLANNING BOARD, DRAFT GENERIC ENVIRONMENTAL IMPACT STATEMENT For ALBANY PORT DISTRICT COMMISSION PORT OF ALBANY EXPANSION PROJECT, Appendix E.

- *Draft Geotechnical Engineering Report,* Terracon, October 15, 2021

A copy of this reports is included in the TOWN OF BETHLEHEM PLANNING BOARD, SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT For ALBANY PORT DISTRICT COMMISSION PORT OF ALBANY EXPANSION PROJECT.

Based on these previous investigations, the subsurface conditions of the site are generally characterized by historic fills of various depths overlying, in sequence with depth; river sediments, alluvial sands, glaciolacustrine silt/ clay, glacial till, and shale bedrock. The fill was noted at specific boring locations ranging from 6 to 23 feet below existing grade. The fill material is characterized as a random landfill deposit containing natural and solid waste deposits such as, but not limited to, foundry sand waste, sand, silt, coal ash, gravel, and organic matter. A predominant component of the fill was reported as coal ash.

Shale bedrock was found beneath the glacial till soils at select boring locations. The depth to rock ranged from approximately 61 feet below grade near the northwest portion of the site, to greater than 148 feet at the southeast portion of the site. The rock depths appear shallowest on the north and west sides of the site and increase to the east towards the Hudson River and in a south direction across the site. Based on the New York State Museum and Science Service's Geologic Map of New York: State Hudson-Mohawk Sheet, and the geotechnical rock core samples, the bedrock appears to be consistent with the Normans kill Shale Formation.

According to the geotechnical reports, shallow groundwater was observed at depths ranging from approximately 1.5 to 13.7 feet below existing grade. However, due to the subsurface conditions, the shallower observations could be representative of perched groundwater zones due to discontinuous impermeable layers. Shallow groundwater fluctuations should be expected to occur at this site depending on several factors such as rainfall, seasonal changes, prevailing climate, ambient weather conditions, and the tidal influences of the Hudson River.

Historically, the project site was composed of small islands and river channels subject to natural shifts due to flows associated with the Hudson River and the former Island Creek, a side channel of the Hudson River. Island Creek historically flowed along the western side of the site through the current power line corridor and discharged to the Hudson River at the southern end of the site. Based on available mapping, sometime between 1936 and 1961, Island Creek channel was diverted at the north end of the site directly to the Hudson River, whereupon it was referred to solely as Normans Kill, the main tributary to this former channel. The site was subject to historic filling operations to create usable lands and a portion of the site was operated as a coal ash (fly ash) disposal site by Niagara Mohawk from approximately 1952 to 1970. As such, there are large areas of fly ash deposits on the site that must be considered during the design and construction of the site infrastructure and stormwater management facilities. Excavated fly ash material will need to be appropriately handled and properly disposed of.

Due to the presence of fly ash, in addition to a NYSDEC SPDES, a Site Management Plan (SMP) has been prepared in accordance with 6 NYCRR Part 375 and DER Technical Guidance for Site Investigation and Remediation and submitted to the NYSDEC, Division of Environmental Remediation and the NYSDOH. The SMP includes: a Health and Safety Plan (HASP), to inform and protect the contractor and their work force; a Community Air Monitoring Plan (CAMP), to monitor and protect the surrounding communities; and an Excavation Work Plan (EWP), to direct the activities of the contractor during construction. The EWP includes a detailed description of the work to be performed, the anticipated environmental conditions, and engineering controls to mitigate the movement of fly ash. The SMP is included as Appendix H.

4. CONSTRUCTION PHASING

4.1 Sequence of Construction Activities

The Contractor's work schedule and methods shall be consistent with the SWPPP or amended SWPPP. Once approved, the progress schedule shall become a part of the SWPPP. It should be noted that there is a NYSDEC approved SMP for this site, which is included as Appendix H. Any disturbance of the site must comply with the SMP.

The following list is a suggested sequence of major construction activities for the project to meet the NYSDEC Phase II erosion control requirements:

1. Conduct a pre-construction meeting with all required parties to review the SWPPP.
2. Notify the NYSDEC within 14 days, and no less than 3 days, prior to commencing work activities that may affects areas of the subject site that are impacted with ash, as required by Section 3.2 of the SMP.
3. Clearly identify project work limits, identifying all areas where construction disturbance shall be permitted.
4. Install erosion control measures prior to commencing earthwork operations. Construct temporary earthen berms, diversion swales, sediment control dams and associated erosion control measures necessary to divert runoff from entering planned areas of disturbance and to protect the adjacent waterway.
5. Establish temporary/permanent storm water management ponds/erosion control basins.
    a. Consult the SMP for the appropriate measures to handle or dispose of any encountered contaminated soils.
6. Remove vegetation and dispose of off-site.
7. Strip and stockpile topsoil from proposed pavement, structural fill and cut areas (stockpile materials in locations as directed by owner's representative).
    a. Consult the SMP for appropriate measures to handle or dispose of any encountered contaminated soils.
8. Establish mass grade elevations.
    a. Consult the SMP the appropriate measures to handle or dispose of any encountered contaminated soils.
9. All temporary erosion and sediment control measures as well as stock-piles are to be mulched and seeded for temporary vegetative cover immediately following grading.
10. Construct utility lines (water/electric/gas/communications/sanitary sewers/storm sewers), construct building and install infrastructure improvements.
11. Box out roadway and pavement areas and install concrete curbing.
12. Construct asphalt pavement section, up to binder course.
13. Fine grade and spread topsoil, install landscaping plantings and hardscapes, site amenities and permanent seeding.
14. Remove temporary erosion and sediment control features upon establishment of permanent ground cover and inspection/approval from a Town official or representative.
15. Notify owner's representative of completion of final site stabilization.
16. File Notice of Termination.

5. EROSION AND SEDIMENT CONSTROL MEASURES

5.1 Erosion Control Plan

An erosion control plan has been developed in accordance with the "New York Standards and Specifications for Erosion and Sediment Control". The erosion control plan employs permanent and temporary erosion and sediment control methods including silt fence, erosion control matting, construction entrances, and other appropriate measures. It should be noted that there is a NYSDEC approved SMP for this site, which is included as Appendix I. Any disturbance of the site must comply with the SMP. As stated in Section 3.2 of the SMP, NYSDEC must be notified within 14 days, and no less than 3 days, prior to commencing work activities that may affect areas of the subject site that are impacted with ash.

5.1.1 Temporary Surface Stabilization

All work and prior NYSDEC notification shall be in accordance with the SMP. Areas within the project limits that may be disturbed more than once during the construction activities will be stabilized using temporary seed and mulch item or as directed by the Engineer. Areas remaining unpaved and undisturbed for more than seven (7) days during construction operations shall be stabilized temporarily. Other areas that might need to be stabilized temporarily will be at the discretion of the Engineer.

5.1.2 Drainage Pipe Inlet / Outlet Stabilization

As part of the permanent erosion control measure, the inlet and outlet of the culvert pipes will be provided with either stone riprap apron or an apron consisting of erosion control product with vegetation to provide the required erosion control which blends in with the surrounding natural features and topography. The location and type of stabilization to be provided is shown on project plans.

5.1.3 De-watering

Any groundwater that is suspected of being contaminated shall be handled in accordance with Section 4.2 of the SMP. If required, de-watering of miscellaneous areas within the site will be performed utilizing a pump and filter bag system. The filter bags should be made of non-woven geotextile material capable of trapping particles larger than 150 microns. Filter bags should be replaced when they are half full or a no longer functioning per the manufacturer's requirements. Filter bags should be located in a well vegetated/grassy area and discharge into stable erosions resistant areas. Where this is not possible a geotextile flow path should be established. Bags shall not be placed on slopes greater than 5%. The pump discharge hose shall be inserted into the bags in the manner specified by the manufacturer and securely clamped. Pumping rate shall not be greater than 750 GPM or ½ the maximum specified by the manufacturer, whichever is less. Pump intakes shall be floated and screened.

5.1.4 Construction Entrance

As required, at least one (1) stabilized construction entrance will be constructed to access the Contractors Staging/Storage Area. This entrance/area shall conform to the details. See plans for location of construction entrance(s).

5.1.5 Concrete Truck Washout / Concrete Batch Plant Protection

As required, a temporary excavated or above ground lined 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 shall be constructed. See plans for location of concrete washout. If a concrete batch plant is installed at the site, temporary containment to prevent discharge of runoff from entering storm drainage systems or leaching into soil shall be constructed.

5.1.6 Permanent Stabilization

Stabilizing of the graded surfaces will be accomplished by using various seed mix for vegetation.

5.1.7 Dust Control

Dust shall be controlled and monitored in accordance with Section 4.3 of the SMP. The contractor will be required to minimize dust generation during the construction activities. Provisions such as applying water on haul roads, wetting equipment, and excavation faces, spraying water on buckets during excavation and dumping, hauling materials in properly tarped or watertight containers, restricting vehicle speeds to 10 mph, covering excavated areas and material after excavation activity ceases, and reducing the excavation size and/or number of excavations have proven effective in dust control.

5.1.8 Silt Fence

Silt fence will be placed per the Erosion and Sediment Control Plans, down slope of all disturbed areas, soil stockpiles, and spoil areas. Along the bank of the Normans Kill, two layers of silt fence are to be installed due to the proximity to the Mean Higher High Water (MHHW) level. The purpose of the silt fence is to remove sediment from sheet flow in these areas. Silt fence shall remain in place and functional until the contributing area has been permanently stabilized. Sediment socks or mulch dikes may be used in lieu of silt fence, where approved by the Engineer of Record. Erosion Control shall be in accordance with the SMP.

5.1.9 Weekly Inspections

A qualified inspector shall conduct site inspections at least twice every seven (7) calendar days. The qualified inspector shall inspect all erosion and sediment control practices and pollution prevention measures to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved final stabilization, all points of discharge to natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site, and all points of discharge from the construction site. The qualified construction inspector shall also prepare an inspection report after every inspection. Complete inspection and maintenance requirements can be found in Part IV of the SPDES General Permit GP-0-20-001 (Appendix E).

5.1.10 Final Inspection

Prior to the project being finally accepted, it shall be inspected for any evidence of erosion or slope failure. If any such condition becomes apparent upon final inspection, temporary soil erosion and sediment controls shall be installed immediately as directed by the Engineer. The situation shall be corrected per a schedule agreed to by the NYSDEC, Owner, and the Contractor.

The Erosion Control Plans are included in Appendix B.

5.1.11 Wharf E&SC

Erosion and sediment control measures associated with the construction of the wharf and dredging of the Hudson River are to be designed and approved prior to disturbance below the Mean High High Water (MHHW) elevation. These E&SC measures are being designed in conjunction with the NYSDEC, USACE and other State agencies through a separate permitting process. All additional permits required for the wharf and dredging will also be in place prior to disturbance below MHHW. Draft conceptual E&SC Plans associated with the wharf construction and dredging are included in Appendix G.

5.2 Permanent Erosion and Sediment Control Measures

Table 3 – List of Permanent Erosion & Sediment Control Measures

Permanent Feature	Converted Temporary Practice?	Location: ESC Plan	Receiving Waterbody Protected (where applicable)
Riprap outlet protection	Yes	See Plans	Hudson River, Normans Kill
Soil Stabilization	Yes	See Plans	Hudson River, Normans Kill
Check Dam	Yes	See Plans	N/A
Diversion Dike	Yes	See Plans	N/A

5.3 Installation Sequence

See the intended sequence of construction activities noted in Section 4 above.

5.4 Maintenance Schedule

The Contractor is required to inspect all E&SC devices in their active work area daily and repair any deficiencies in accordance with the SPDES permit.

5.5 SWPPP Implementation Responsibilities

Implementation of all E&SC devices will be by the Contractor as indicated in the contract documents.

6. POLLUTION PREVENTION MEASURES

6.1 Material Management Practices

All waste materials, including construction debris and trash that occur onsite shall be handled and disposed of in a lawful manner that is in accordance with state and local regulations. No waste material shall be buried on site.

- An effort will be made to store only enough products required for the project.
- All materials stored within the site will be stored in a neat orderly manner in their appropriate containers and if possible, an enclosed area.
- Products shall be kept in their original containers with the original manufacturer's labels. Manufacturer's recommendations for proper use and disposal shall be followed.
- Hazardous materials shall be disposed of in a lawful manner and in accordance with State and Local regulations.
- Sanitary waste will be collected from portable units as required and shall be disposed of in a lawful manner.

The following materials are expected to be on-site during construction:

- Concrete
- Asphalt
- Paints (Enamel and Latex)
- Petroleum based products
- Fertilizers
- Metal building components
- Detergents
- Cleaning Solvents
- Roofing Materials
- Tar

These materials and other materials used during construction with the potential to impact stormwater will be stored, managed, used, and disposed of in a lawful manner that minimizes the potential for releases to the environment and especially into stormwater.

Emergency contacts for the project will be posted at the project office and are included at the end of this section.

6.2 Spill Control Practices

The contractor will be responsible for preparing a project area specific spill control plan in accordance with Local and NYSDEC regulations. At a minimum, this plan shall:

1. Stop the source of the spill.
2. Contain the spill.
3. Reduce stormwater contact if there is a spill.
4. Dispose of contaminated material in lawful manner and in accordance with manufacturer's procedures and NYSDEC regulations.
5. Identify responsible trained personnel.
6. Ensure spill area is well ventilated.

6.3 General Material Handling Practices

The following general practices will be used throughout the project to reduce the potential for spills:

1. Potential pollutants will be stored and used in a manner consistent with the manufacturer's instructions in a secure location. To the extent practicable, material storage areas should not be located near storm drain inlets and should be equipped with covers, roofs, or secondary containment as needed to prevent stormwater from contacting stored materials. Potential pollutants should not be stored within 100 feet of a water course or wetland. Chemicals that are not compatible shall be stored in segregated areas so that spilled materials cannot combine and react.
2. Materials disposal will be in accordance with manufacturer's instructions and applicable local state and federal regulations.
3. Materials no longer required for construction will be removed from the site as soon as practicable.
4. Adequate garbage, construction waste, and sanitary waste handling and disposal facilities will be provided/utilized to the extent necessary to keep the site clear of obstruction and BMPs clear and functional.

6.4 Product Specific Practices

The following product specific practices will be followed within the project area.

6.4.1 Petroleum Products

All project related vehicles shall be monitored for leaks and receive regular preventative maintenance to reduce chance of leakage. Petroleum products shall be stored in tightly sealed containers, which are clearly labeled. Any asphalt substances used during construction shall be applied according to manufacturer's recommendations.

6.4.2 Fertilizers

Fertilizers used shall be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer shall be worked into the soil to limit exposure to stormwater. Fertilizers shall be stored in covered or other contained areas.

6.4.3 Paints

All containers shall be tightly sealed and stored when not required for use. Excess paint shall not be discharged into the storm sewer system but shall be disposed of according to manufacturer's instructions or State regulations.

6.4.4 Concrete Trucks

Concrete Trucks shall be allowed to wash out within project areas provided that the contractor provides an area which collects and contains any concrete / slurry material washed from trucks for recovery and disposal at a later time. No concrete or slurry shall be discharged from the property at any time of construction. The concrete washout area shall conform to the detail found on sheet ESC-06 (Appendix B).

6.5 Spill Response

The primary objective in responding to a spill is to quickly contain the material(s) and prevent or minimize their migration into stormwater runoff or conveyance systems. If the release has impacted on-site stormwater, it is critical to contain the released material on-site and prevent their release into receiving waters.

If a spill of pollutants threatens stormwater on-site, the spill response procedures outline below must be implemented in a timely manner to prevent release of the pollutant:

1. The site superintendent will be notified immediately when a spill or the threat of a spill is observed. The superintendent will assess the situation and determine the appropriate response.
2. If spills represent an imminent threat of escaping ESC facilities and entering the receiving waters, facility personnel will respond immediately to contain the release and notify the superintendent after the situation has been stabilized.
3. Spill kits containing materials and equipment for spill response and clean-up will be maintained onsite. Each spill kit may contain:
    - Oil absorbent pads (one bale)
    - Oil absorbent booms (40 feet)
    - 55-gallon drums (2)
    - 9-mil plastic bags (10)
    - Personal protective equipment including gloves and goggles
4. If an oil sheen is observed on surface water, absorbent pads and/or booms will be applied to contain and remove the oil. The source of the oil sheen will also be identified and removed or repaired as necessary to prevent further releases.
5. The site superintendent, or their designee, will be responsible for completing a spill reporting form to the appropriate state or local agency.
6. Spill response equipment will be inspected and maintained as necessary to replace any materials used in spill response activities.

6.6 Notification

In the event of a spill, make the appropriate notification(s) consistent with the following procedures:

1. Any spill of oil which a) violates water quality standards, b) produces a sheen on a surface water, c) causes a sludge or emulsion must be reported immediately by telephone to the National Response Center Hotline at (800) 424-8802.
2. Any oil, hazardous substance, or hazardous waste release which exceeds the reportable quantity must be reported immediately by telephone to the National Response Center Hotline at (800) 424-8802.
3. Any spill of oil or hazardous substance to waters of the state must be reported immediately by telephone to the NYSDEC.
4. Any release of hazardous substance that may be a threat to human health or the environment must be reported to the NYSDEC immediately upon discovery.

7. EXISTING SITE CONDITIONS

The existing site is Beacon Island, located in the Town of Bethlehem, Albany County, New York. The site is currently vacant and consists primarily of brush and trees with a small gravel area as well as abandoned railroad tracks.

7.1 Existing Watershed Information

The project area is in close proximity and includes shorelines to both the Hudson River and Normans Kill, which are the receiving waterbodies for runoff from the current site.

The existing drainage condition is split up into six (6) drainage areas. Drainage areas DR-A, DR-B and DR-F drain to analysis point #1 and drainage areas DR-D and DR-E drain to analysis point #2. Drainage area DR-C drains to a self-contained depression for storage.

Runoff from DR-A site travels via sheet and shallow concentrated flow directly to a wetland located in the northwest corner of the site (Wetland 1). During large storm events the wetland overflows into an existing 40” pipe with direct outlet to the Normans Kill. Analysis of the existing capacity of the outlet pipe is provided in section IV of the Drainage Design Report. Runoff from areas DR-B, DR-D, DR-E, and DR-F travel via sheet and concentrated flow to low areas with eventual outfall directly to the Normans Kill and Hudson River. An approximately 30-acre internal portion of the site (DR-C) was determined to be self-contained within the site capable of storing and infiltrating the 100-year storm event.

See the Drainage Design Report (Appendix C) for the Pre-Development Site Drainage Areas Map.

The existing site falls within the Normans Kill watershed of the Middle Hudson Sub-Basin for the Lower Hudson River Basin (HUC10: 0202000602, Water Index No H-221-4) which is listed as a Class C water. Neither the Normans Kill nor the Hudson River are listed in the Manual’s Appendix C as a watershed where enhanced phosphorus removal standards are required. Additionally, neither are listed in the Manual’s Appendix E as a watershed impaired by pollutants related to construction activity.

7.2 Table of Receiving Waterbodies

Table 4: Receiving Waterbodies

Stormwater Structure	*Receiving Waterbody*	*NYSDEC Regulated*
None	Hudson River	Yes – Class C
40” Outlet Pipe	Normans Kill	Yes – Class C

8. STORMWATER MANAGEMENT ASSESSMENT

8.1 Methodology

To analyze the hydrologic impacts of the proposed development, a storm water management model was developed in accordance with the Manual. HydroCAD™, by HydroCAD Software Solutions LLC was used to model both the existing and proposed conditions: soil data from the NRCS Web Soil Survey was entered into the software; land coverage areas were estimated using aerial photography and site visits; watershed areas were developed using the surveyed topography; time of concentrations were estimated using USDA, Urban Hydrology for Small Watersheds, TR-55 (TR-55) methodology; and finally runoff and routing calculations were performed using the SCS Unit Hydrograph method.

Green Infrastructure practices were designed in accordance with the Manual using the NYSDEC Runoff Reduction Worksheets available through the NYSDEC's Construction Stormwater Toolbox, available on their website.

The following general steps are followed when conducting a stormwater design:

1. **Site Planning:** The existing natural resource areas and drainage patterns including wetlands, waterways, floodplains, and soils are identified. Conservation of natural resources are maximized given the proposed site.
2. **Pre and Post-Development Conditions Analysis:** The pre and post-development stormwater runoff conditions for the 1, 10, and 100-year storm events are determined using HydroCAD (detailed HydroCAD reports for this project can be found in the Drainage Design Report, provided in Appendix C).
3. **Water Quality:** The Water Quality Volume and Runoff Reduction Volume are calculated using Chapter 4 of the Manual and Green Infrastructure Worksheets (see the Drainage Design Report, provided in Appendix C).
4. **Water Quantity:** Peak runoff and stormwater retention/detention are evaluated using the Manual.

8.1.1 Water Quality Volume (WQv) / Runoff Reduction Volume (RRv)

Section 4.2 of the Manual states that Water Quality Volume (WQv) is intended to improve the water quality by capturing and treating runoff from small, frequent storm events that contain higher pollutant levels created through the increase of impervious surfaces. Impervious surfaces accumulate pollutants that quickly wash off and rapidly enter downstream waters as well as prevent natural groundwater recharge.

The WQv required for the proposed site is based upon the 90% rainfall event number, percent of impervious cover, and the total site area. Calculations were done using the Green Infrastructure worksheets and can be found in Appendix C. The total WQv required is 277,111 cubic feet.

Runoff Reduction Volume (RRv) is the reduction of the total WQv by application of green infrastructure techniques and stormwater management practices to replicate pre-development hydrology more closely. The intent of RRv is to recognize the water quality benefits of certain site design practices to address flow as a pollutant of concern. Calculations were done using the Green Infrastructure worksheets and can be found in Appendix C. The minimum RRv was determined to be 59,687 cubic feet.

Due to the presence of fly ash over the majority of the site, infiltration is not a permissible RRv technique.

Filter strips are proposed on the Beacon Island, while dry swales and infiltration basins were utilized for the Normanskill Street extension to provide the most RRv as permitted by the site limitation. While the minimum RRv cannot be achieved, the total WQv requirement is met.

8.1.2 Channel Protection Volume (CPv)

Stream Channel Protection Volume Requirements (CPv) are designed to protect stream channels from erosion. The Manual was used to determine the water quantity requirements of CPv; specifically, providing 24-hour extended detention for the 1-year storm event or discharging directly to tidal waters.

According to Section 4.4 of the Manual, the Stream Channel Protection Volume (CPV) requirement does not apply when the site discharges to a tidal waterbody.

The CPv requirement does not apply in certain conditions, including the following:

- Reduction of the entire CPv volume is achieved at a site through green infrastructure or infiltration systems.
- The site discharges directly tidal waters or fifth order (fifth downstream) or larger streams.

The Hudson River and Normans Kill are classified as tidal waters at the project site. Therefore, the project site discharges directly to tidal waters in both the existing and proposed conditions and 24-hour extended detention of the 1-year storm event is not required for this project. In the drainage report provided in Appendix C, the Existing 40” outlet pipe from the existing Wetland 1 was analyzed to confirm that adequate capacity was present for the proposed drainage conditions prior to being discharged to the tidal waters of the Normanskill.

8.1.3 Overbank Flood Control (Qp)

The primary purpose of the overbank flood control sizing criterion is to prevent an increase in the frequency and magnitude of out-of-bank flooding generated by urban development. The Manual was used to determine the water quantity requirements of Qp; specifically, providing sufficient retention volume to discharge all runoff from the proposed 10-year storm event at a rate equal to or less than the existing peak 10-year runoff rate or discharging directly to tidal waters.

According to Section 4.5 of the Manual, the Overbank Flood Control Criteria (Qp) requirement does not apply when the site discharges to a tidal waterbody.

The overbank flood control requirement (Qp) does not apply in certain conditions, including:

- The site discharges directly tidal waters or fifth order (fifth downstream) or larger streams.

The Hudson River and Normans Kill are classified as tidal waters at the project site. Therefore, the project site discharges directly to tidal waters in both the existing and proposed conditions and retention of the 10-year storm event is not required for this project. In the drainage report provided in Appendix C, the Existing 40” outlet pipe from the existing Wetland 1 was analyzed to confirm that adequate capacity was present for the proposed drainage conditions prior to being discharged to the tidal waters of the Normanskill.

8.1.4 Extreme Flood Control (Qf)

The intent of the extreme flood criteria is to prevent the increased risk of flood damage from large storm events, maintain the boundaries of the predevelopment 100-year floodplain, and protect the physical integrity of stormwater management practices. The Manual was used to determine the water quantity requirements of Qf; specifically, providing sufficient retention volume to discharge all runoff from the proposed 100-year storm event at a rate equal to or less than the existing peak 100-year runoff rate or discharging directly to tidal waters.

According to Section 4.6 of the Manual, the Extreme Flood Control Criteria (Qf) requirement does not apply when the site discharges to a tidal waterbody.

The 100-year storm control requirement can be waived if:

- The site discharges directly tidal waters or fifth order (fifth downstream) or larger streams.

The Hudson River and Normans Kill are classified as tidal waters at the project site. Therefore, the project site discharges directly to tidal waters in both the existing and proposed conditions and retention of the 100-year storm event is not required for this project. In the drainage report provided in Appendix C, the Existing 40” outlet pipe from the existing Wetland 1 was analyzed to confirm that adequate capacity was present for the proposed drainage conditions prior to being discharged to the tidal waters of the Normanskill.

8.2 Evaluation of Green Infrastructure

According to Section 4.3 of the Manual, meeting the RRv (through green infrastructure) may not be feasible due to limitations that prevent the use of an infiltration technique and/or infiltration of the total WQv. The Beacon Island portion of the project site does not allow for the infiltration of any stormwater runoff due to the presence of fly ash across the site. However, green infrastructure practices were evaluated for potential use.

8.2.1 Conservation of Natural Areas

The existing vegetation located along the bank of the Hudson River is conserved in the proposed plan. No credit has been applied.

8.2.2 Sheetflow to Riparian Buffers and Filter Strips

The developed site contains filter strips in two (2) locations where there is adequate space. RRv credit has been applied for this practice.

8.2.3 Vegetated Swales

The developed site contains vegetated swales where there is sufficient room. Due to the limited lengths of the swales, no credit has been applied.

8.2.4 Tree Planting / Tree Pits

New landscaping will complement the existing environment and provide aesthetics for the buildings and parking areas. No credit has been applied for proposed tree plantings.

8.2.5 Disconnection of Rooftop Runoff

Rooftop disconnection was not considered for this project, as the buildings will have large sloped roofs in a single direction and are located within large, compacted gravel areas that would potentially cause erosion, unstable soil saturation of the dense graded aggregate as well as encourage infiltration into the fly ash sub-surface layer.

8.2.6 Stream Daylighting
Stream daylighting is not available for the proposed project.

8.2.7 Rain Gardens / Bioretention
The developed site does not have sufficient room for Rain Gardens or Bioretention. These practices also promote infiltration potentially into the fly ash sub-surface layer.

8.2.8 Green Roofs
Green roofs were not considered to be feasible for this project due to the nature of the proposed pre-engineered metal buildings.

8.2.9 Stormwater Planter
Stormwater Planters were not considered due to the poor soils and rooftop runoff volume.

8.2.10 Rain Barrels and Cisterns
The developed site does not have sufficient room for Rain Barrels or Cisterns to accommodate the amount of roof runoff.

8.2.11 Porous Pavement
Porous pavement was not considered due to the large loads associated with the Tower sections being moved and stored on site that would cause the porous pavement surface to crumble. This practice also promotes infiltration, which is not allowed.

8.2.12 Infiltration System
An infiltration system was not considered due to the presence of fly ash.

9. POST CONSTRUCTION STORMWATER CONTROL PRACTICES

9.1 Table of Post Construction Practices

See Table 5 below.

9.2 Post Construction Practices Plan

Locations of Post Construction Practices are found in the Erosion & Sediment Control Plans and Details (Appendix B).

To best mitigate the water quality requirements of the proposed site, two (2) stormwater ponds and seven (7) manufactured stormwater filtering systems were designed. The ponds were designed in accordance with Section 6.1, Stormwater Ponds, of the Manual. The ponds were sized to provide WQv; however, they do not provide any storm event flow mitigation (see sections 8.1.2 through 8.1.4 above).

Drainage Areas DR-1 through DR-7 will provide WQv using manufactured water quality systems. Drainage Areas DR-8 and DR-9 will drain to stormwater ponds providing WQv. The total of practices providing water quality volume is 277,488 cubic feet (cf). Drainage Areas DR-12 and DR-16 will not be disturbed during construction, therefore do not require water quality treatment.

A full description of the designed stormwater treatment practices is provided in Section III.B of the Drainage Design Report (Appendix C). The WQv is summarized in Table 5 below:

Table 5 – Water Quality Volume Practice Summary

Drainage Area	Stormwater Practice	WQv Provided (cf)
DR-1	Filter Type 2	28,967
DR-2	Filter Type 2	31,864
DR-3	Filter Type 3	36,829
DR-4	Filter Type 3	19,162
DR-5	Filter Type 2	29,795
DR-6	Filter Type 1	23,465
DR-7	Filter Type 3	16,470
DR-8	Stormwater Pond #1	40,545
DR-9	Stormwater Pond #2	50,391
	Total WQv	**277,488**

Due to the presence of fly ash over most of the site, infiltration is not a permissible RRv technique. Filter Strips were utilized within DR-10 and DR-11 to reduce the entire stormwater volume required by the respective areas.

The Normanskill Street improvement portion of this project is in an area of uncontaminated soil with high infiltration rates. Therefore, all treatment practices selected infiltrate into the ground and provide RRv. The minimum RRv as required by the entire project is not met, however the total volume of water to be treated (WQV) is satisfied.

The total RRv provided is 9,997 CF. The RRv is summarized in Table 6 below:

Table 6 – Runoff Reduction Practice Summary

Drainage Area	Practice	RRv (cf)
DR-10	Filter Strip	701
DR-11	Filter Strip	5,028
DR-13	Infiltration Basin	1,800
DR-14	Infiltration Basin	2,340
DR-15	Dry Swale	128
	Total RRv	**9,997**

9.3 Hydraulic Analysis of Pre- and Post-Development Conditions

In analyzing pre- and post-construction stormwater conditions, the Normans Kill and Hudson River were used as comparison points. Both the pre- and post-construction stormwater is discharged into the receiving water bodies. Using Chapter 4 of the Manual for new development, the project meets the total water quality volume required. Table 7 below summarizes the impervious cover of the pre- and post-development conditions.

Table 7 – Impervious Cover

	Pre-Development	Post-Development
Impervious Area	3.70 ac	67.1 ac
% Impervious Cover	5.3%	96.8%

The existing site has no water quality treatment measures. All stormwater not stored within the site is directly discharged into the Hudson River and Normans Kill. Per Chapter 4 of the Manual, new development projects are required to provide water quality treatment. As shown below, the project can meet the total water quality volume required. The peak discharge for the 1-year, 10-year and 100-year storm events exceed the existing value; however, as described in Section 8.1 above, this requirement is waived due to the site discharging directly to tidal waters and does not apply to this project, these values are shown for reference only.

Table 8 - Stormwater Management Plan Summary

Storm Event	Pre-Development	Post-Development
Analysis Point #1		
1-yr Discharge	3.5 cfs	50.68 cfs
10-yr Discharge	17.46 cfs	96.41 cfs
100-yr Discharge	49.54 cfs	177.15 cfs
Analysis Point #2		
1-yr Discharge	6.75 cfs	63.23 cfs
10-yr Discharge	20.79 cfs	116.62 cfs
100-yr Discharge	48.96 cfs	206.71 cfs
Total Area of Soil Disturbance	69.3 acres	
WQv Target	277,111cf	
Total WQv + RRv Provided	**287,485 cf**	

In the post-development condition, Analysis Point #1 has a total drainage area of 0.12 square miles (75.28 acres). This point drains to the Normans Kill with a drainage area of 162 square miles (103,680 acres). The project makes up approximately 0.07% of the total drainage area of the Normans Kill. With an overall project time of concentration of around 10 minutes, the proposed project will have a negligible impact on the total Normans Kill hydrology as the site-produced runoff will be conveyed prior to the Normans Kill peak and not have an impact on the overall flood conditions of the Normans Kill.

In the post-development condition, Analysis Point #2 has a total drainage area of 0.04 square miles (23.6 acres). This point drains to the Hudson River with a drainage area of 8,090 square miles (5,177,600 acres). The project makes up approximately 0.0005% of the total drainage area of the Hudson. With an overall project time of concentration of around 10 minutes, the proposed project will have a negligible impact on the total Hudson River hydrology, as the site-produced runoff will be conveyed prior to the Hudson River peak and not have an impact on the overall flood conditions of the Hudson River.

9.4 Deviation from NYS Stormwater Management Design Manual

The proposed stormwater management design deviates from The Manual in two areas. The first being the use of manufactured stormwater filtering systems for new development, and the second being the inability to meet the minimum RRv.

The need for alternative stormwater management practices is rooted in the extremely limited space available as well as the current site conditions. The proposed Offshore Wind Manufacturing Facility requires 85 acres of usable manufacturing and storage space along the Hudson River. It also requires close proximity to an existing port. Such requirements narrow the available project locations to a select few plots of unoccupied land in the entire state and this site was selected through a solicitation process by the state for off-shore wind development. This site was chosen given it is located adjacent to the existing Port of Albany and is directly on the Hudson River. However, the usable portion of the site adjacent to the Hudson River, is only 66-acre area. Therefore, the entirety of the site is needed for the OSW manufacturing process, with an ancillary receiving site located at 700 Smith Boulevard. In typical space restrictive scenarios, infiltration is a commonly used practice. However, this site is a historic fly ash disposal area, containing highly contaminated soil. According to the site specific SMP, developed in coordination with the NYSDEC, infiltration is not acceptable.

To adequately satisfy the WQv requirements of the Manual, manufactured systems are needed. The Contech Jellyfish units designed meet both the performance and sizing requirements of Chapter 4 of the Manual. The units are also certified by Washington State Department of Ecology (TAPE) and the Maryland Department of the Environment, adequate sources accepted by the NYSDEC. Specifications and details for the proposed units are provided in Appendix D of the Drainage Design Report (provided as Appendix C to this report).

The second deviation is a result of the need for manufactured stormwater management units. These units handle the majority of the WQv for the site, and do not provide RRv. Additionally, as stated above, infiltration is not an acceptable practice for the Expansion site, eliminating a majority of RRv techniques. See Section 8.2 of the SWPPP for an evaluation of green infrastructure practices. Where applicable, on the expansion site, filter strips were used to provide a small quantity of runoff reduction volume. The Normanskill Street improvement portion of this project is in an area of uncontaminated soil with high infiltration rates. Therefore, all treatment practices selected in this area infiltrate into the ground and provide all treatment as RRv. While the minimum RRv requirement cannot be met given the site restrictions, 9,997 cf of runoff is reduced per the proposed plan.

9.5 Maintenance Schedule of Post-Construction Stormwater Control Practices

Table 9 – Maintenance Schedule of Post-Construction Stormwater Management Facilities

Maintained By	Name of Entity
Name, Address, Phone of Responsible Party	Albany Port District Commission 106 Smith Boulevard Albany, NY 12202 (518) 463-8763
Facilities to be Maintained	Jellyfish Filter (12 units at 7 locations) Stormwater Ponds (2) Infiltration Basins (2) Dry Swale (1) Filter Strips (2) Stormwater Collection & Conveyance Systems
Description of Maintenance Activity for each Facility and Frequency	See Appendix F for maintenance guidelines, as recommended by the manufacturer and NYSDEC.
Description of Applicable Easements	N/A
Access and Safety Issues	Maintenance forces have access to all drainage facilities within the site.
Local and Non-Local Permits	Joint Permit Application
Legal Agreements	N/A

9.6 Drainage Structure Catchment Areas

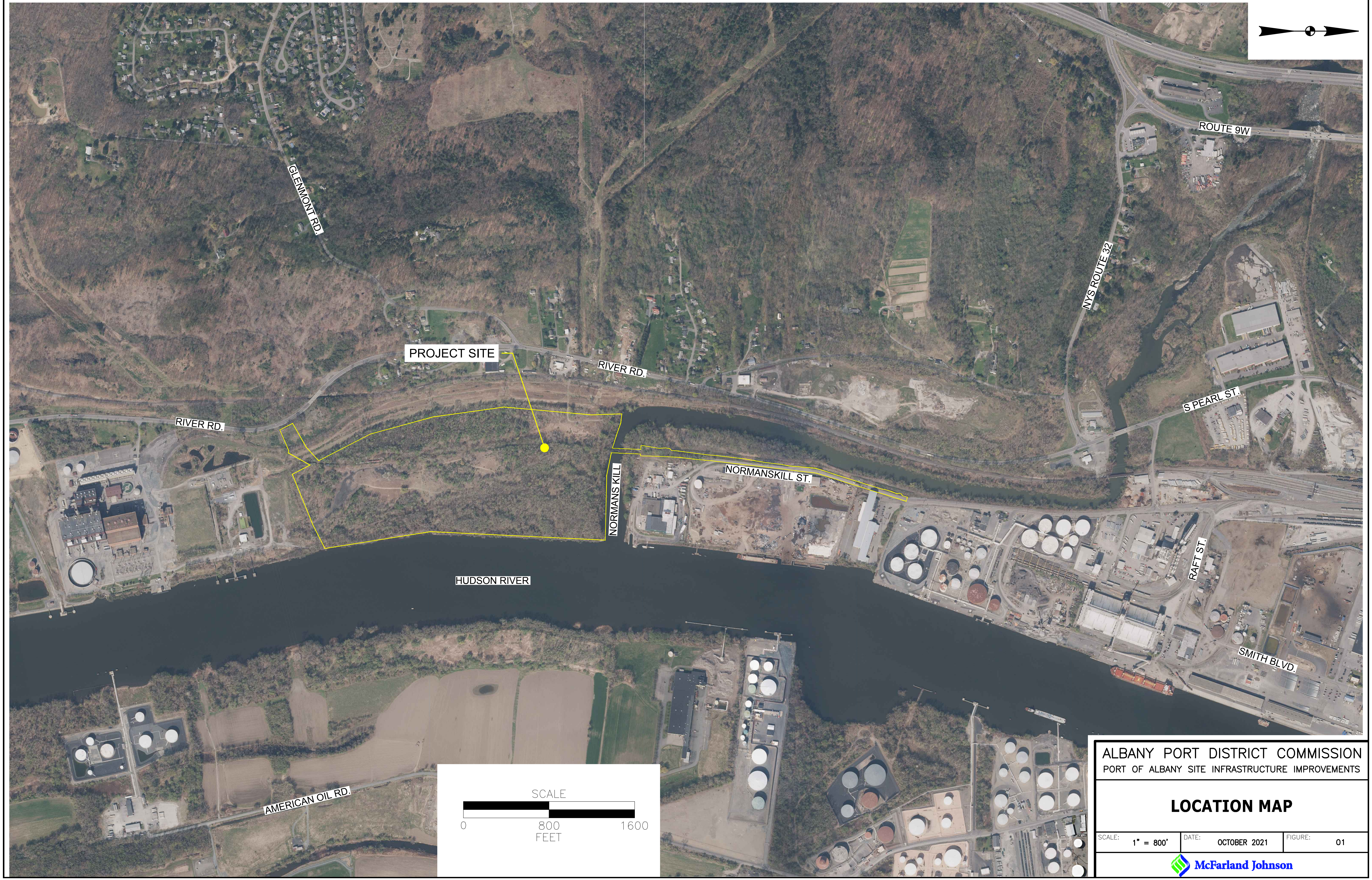
See Drainage Design Report (Appendix C).

9.7 Hydraulic Analysis of Stormwater Sewer System

All elements of the closed drainage system have been designed to be non-erosive during a 2-year storm event and capable of conveying a 10-year storm event. The profiles were created in AutoCAD Civil 3D which incorporates the rational method and Manning's Equation to iteratively calculate the hydraulic capacity, grade lines, and inlet spreads. Printouts of the closed drainage system analysis are in the Drainage Design Report (Appendix C).

APPENDIX A

LOCATION MAP



ALBANY PORT DISTRICT COMMISSION

PORT OF ALBANY SITE INFRASTRUCTURE IMPROVEMENTS

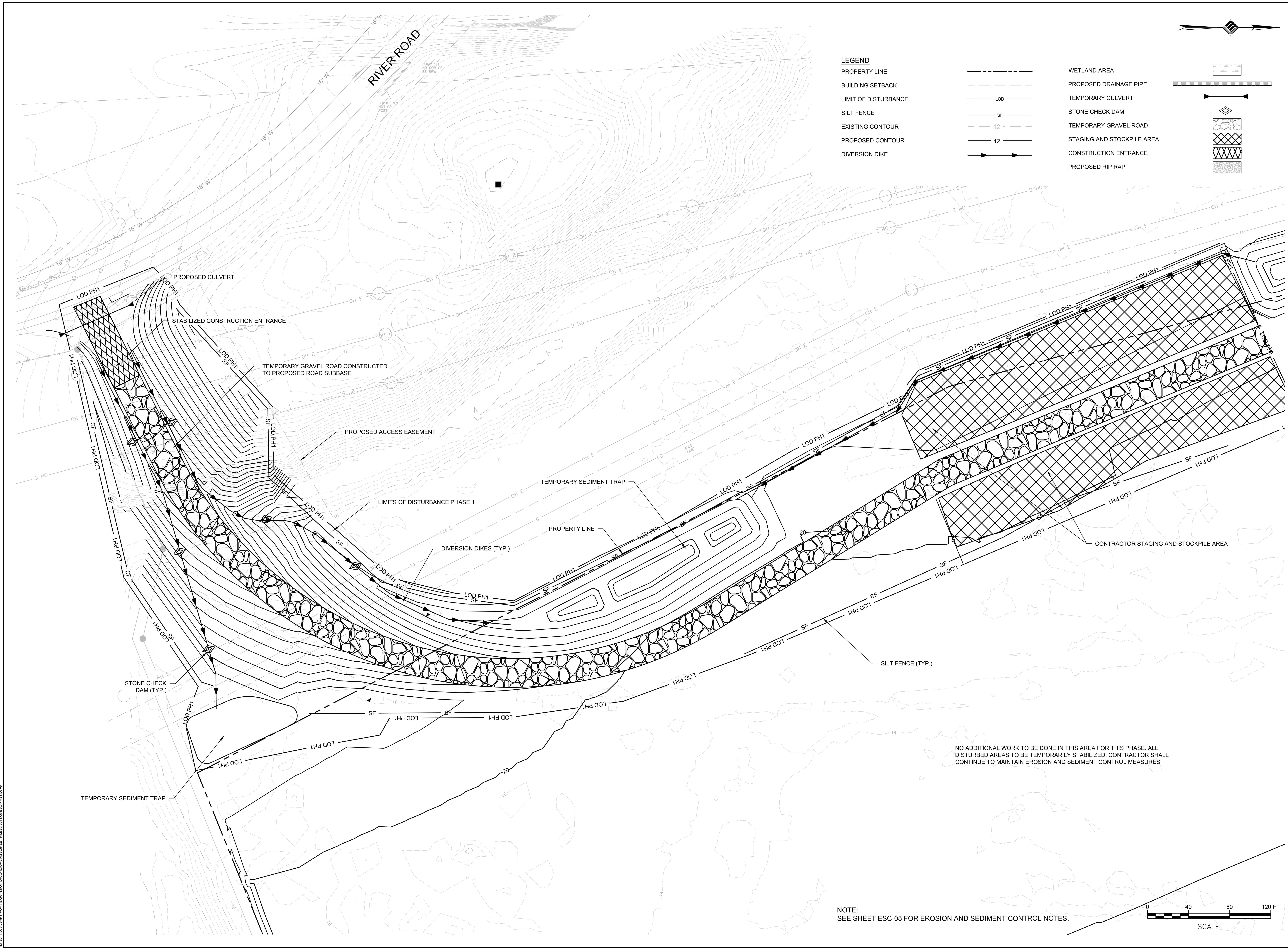
LOCATION MAP

SCALE:	DATE:	FIGURE:
1" = 800'	OCTOBER 2021	01

McFarland Johnson

APPENDIX B

EROSION & SEDIMENT CONTROL PLANS, DETAILS & NOTES



NOTE:
SEE SHEET ESC-05 FOR EROSION AND SEDIMENT CONTROL NOTES.

McFarland Johnson
60 RAILROAD PLACE
SUITE 402
SARATOGA SPRINGS, NEW YORK 12866
P:518-580-9380 F:518-580-9383
SaratogaROM@mjinc.com

PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

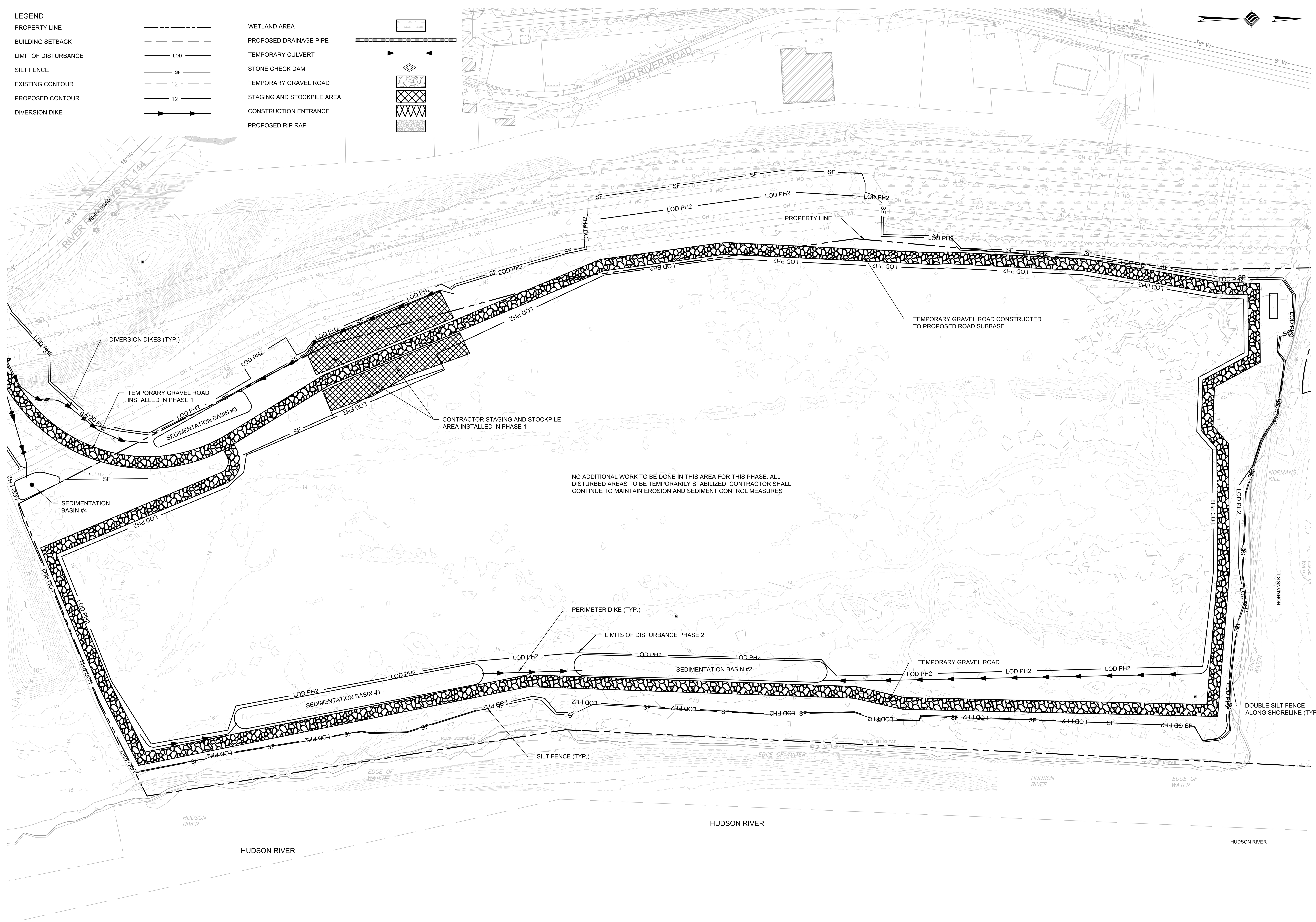
CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

PROJECT:
PORT OF ALBANY SITE INFRASTRUCTURE IMPROVEMENTS

DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	1"=40'
DATE	OCTOBER 2021
PROJECT	18641.00

DRAWING TITLE
EROSION & SEDIMENT CONTROL PLAN-PH.1

DRAWING NUMBER
ESC-01



NOTE:
SEE SHEET ESC-05 FOR EROSION AND SEDIMENT CONTROL NOTES.

0 100 200 300 FT
SCALE

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PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

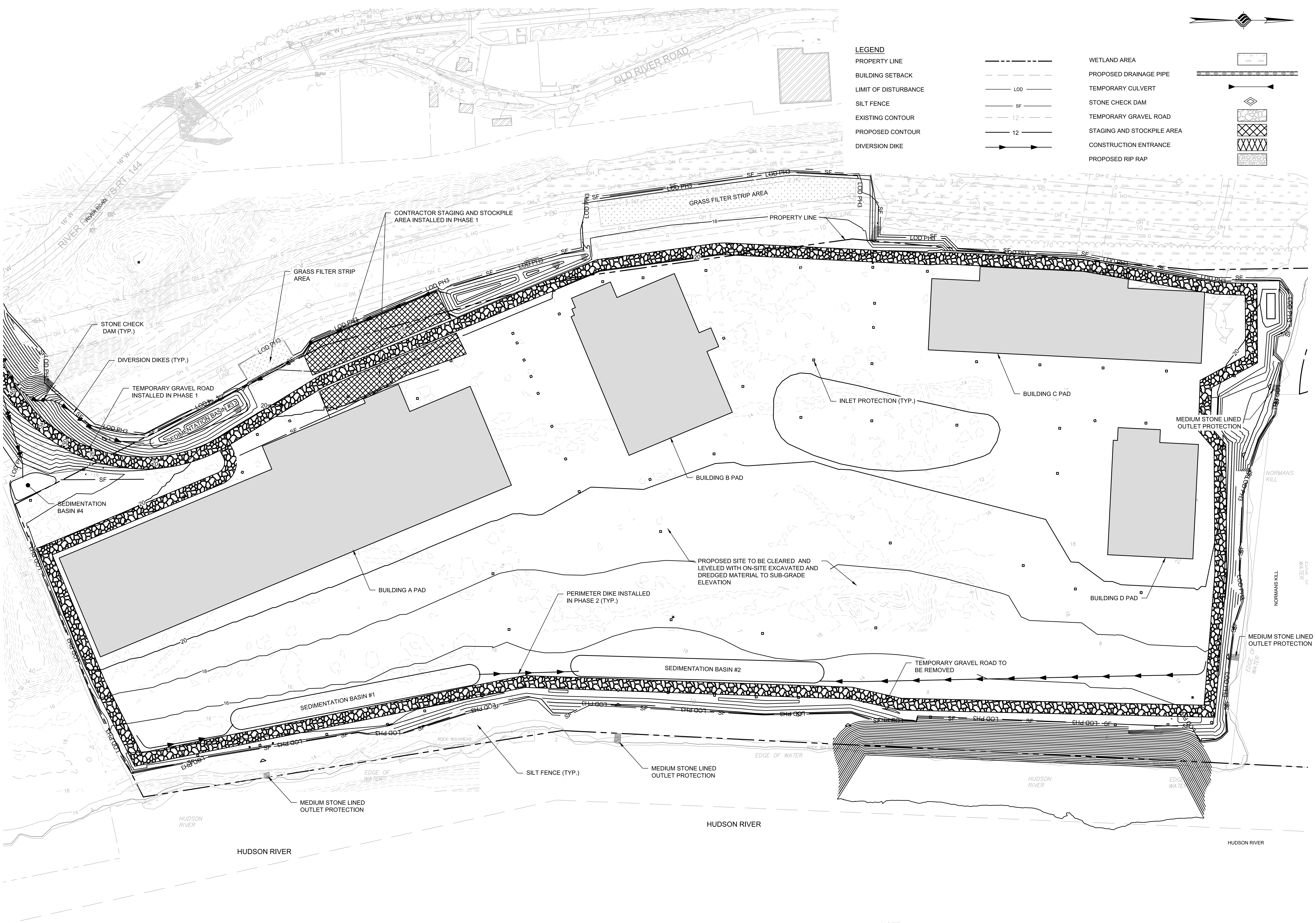
CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

PROJECT:
PORT OF ALBANY SITE INFRASTRUCTURE IMPROVEMENTS

DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	1"=100'
DATE	OCTOBER 2021
PROJECT	18641.00

DRAWING TITLE
EROSION & SEDIMENT CONTROL PLAN-PH.2

DRAWING NUMBER
ESC-02



NOTE:
SEE SHEET ESC-05 FOR EROSION AND SEDIMENT CONTROL NOTES.

0 100 200 300 FT
SCALE

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PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

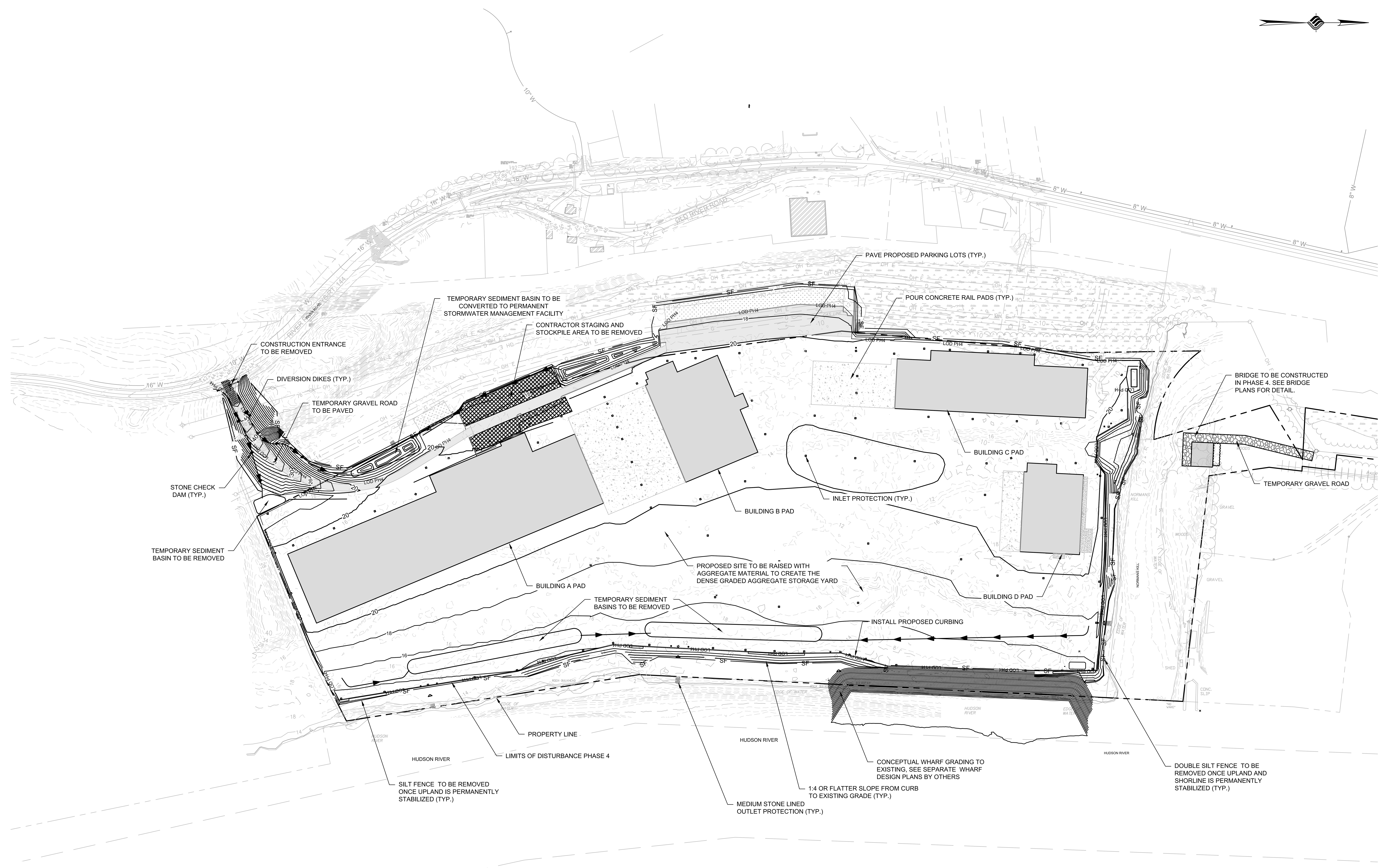
CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

PROJECT:
PORT OF ALBANY SITE INFRASTRUCTURE IMPROVEMENTS

DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	1"=100'
DATE	OCTOBER 2021
PROJECT	18641.00

DRAWING TITLE
EROSION & SEDIMENT CONTROL PLAN-PH.3

DRAWING NUMBER
ESC-03



LEGEND

PROPERTY LINE	
BUILDING SETBACK	
LIMIT OF DISTURBANCE	LOD
SILT FENCE	SF
EXISTING CONTOUR	12
PROPOSED CONTOUR	12
DIVERSION DIKE	
WETLAND AREA	
PROPOSED DRAINAGE PIPE	
TEMPORARY CULVERT	
STONE CHECK DAM	
TEMPORARY GRAVEL ROAD	
STAGING AND STOCKPILE AREA	
CONSTRUCTION ENTRANCE	
PROPOSED RIP RAP	

NOTE:
SEE SHEET ESC-05 FOR EROSION AND SEDIMENT CONTROL NOTES.

0 150 300 450 FT
SCALE

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PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

PROJECT:
PORT OF ALBANY SITE INFRASTRUCTURE IMPROVEMENTS

DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	1"=150'
DATE	OCTOBER 2021
PROJECT	18641.00

DRAWING TITLE
EROSION & SEDIMENT CONTROL PLAN-PH.4

DRAWING NUMBER
ESC-04

EROSION AND SEDIMENT CONTROL PLAN NOTES:

1. THE EROSION AND SEDIMENT CONTROL PLAN IS INTENDED TO REPRESENT A CONCEPTUAL APPROACH TO EROSION AND SEDIMENT CONTROL. IT IS FURTHER INTENDED THAT THE OWNER AND CONTRACTOR SHALL IMPLEMENT PRACTICES, AS REQUIRED, TO CONTROL EROSION AND SEDIMENT IN ACCORDANCE WITH THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL AND SWPPP.
2. INSTALL SILT FENCE, AND ALL OTHER EROSION CONTROL MEASURES AS INDICATED ON THE PLAN PRIOR TO THE START OF ANY EXCAVATION WORK. EROSION CONTROL MEASURES WILL BE IMPLEMENTED IN ACCORDANCE WITH THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION AND THE GOVERNING MUNICIPALITY REQUIREMENTS.
3. REMOVE AND STOCKPILE TOPSOIL IN ACCORDANCE WITH THE EROSION AND SEDIMENT CONTROL PLAN. REPLACE TOPSOIL TO A MINIMUM 4" DEPTH. ALL DISTURBED AREAS ARE TO BE HYDROSEEDED IN ACCORDANCE WITH THE EROSION AND SEDIMENT CONTROL PLANS.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND REMOVAL OF TEMPORARY SEDIMENTATION CONTROLS, INCLUDING INLET PROTECTION AND SILT FENCE. EROSION CONTROL MEASURES SHALL NOT BE REMOVED BEFORE AREAS HAVE BEEN PROPERLY STABILIZED.
5. CONTRACTOR SHALL MAINTAIN A STOCK PILE OF EROSION AND SEDIMENT CONTROL MEASURES ON SITE AS INDICATED ON THE PLAN.
6. NO PETROLEUM PRODUCTS ARE TO BE STORED ON SITE WITHOUT PRIOR APPROVAL OF THE LOCAL STORMWATER INSPECTOR. ANY PETROLEUM ON SITE WILL COMPLY WITH ALL LOCAL, STATE, AND FEDERAL GOVERNMENT REGULATIONS.
7. WRAP YARD INLET GRATES IN FILTER FABRIC PROGRESSIVELY AS STORM SEWER AND YARD INLETS ARE INSTALLED.
8. ALL EROSION CONTROL MEASURES ARE TO BE REPLACED WHENEVER THEY BECOME CLOGGED OR INOPERABLE AND SHALL BE REPLACED AT A MINIMUM OF EVERY 3 MONTHS.
9. JUTE MESH WILL BE USED ON SLOPES STEEPER THAN 3:1 AND WHEREVER NECESSARY TO CONTROL EROSION AND SILTATION OF EXISTING DRAINAGE SYSTEMS AS ORDERED BY THE ENGINEER.
10. ALL DISTURBED AREAS SHALL BE FINISH GRADED TO PROMOTE VEGETATION ON ALL EXPOSED AREAS AS SOON AS PRACTICABLE. STABILIZATION PRACTICES (TEMPORARY/PERMANENT SEEDING, MULCHING, GEOTEXTILES, ETC.) MUST BE IMPLEMENTED WITHIN SEVEN (7) DAYS WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, AND NOT EXPECTED TO RESUME WITHIN FOURTEEN (14) DAYS.
11. ALL RIP-RAP OUTLET PROTECTION TO BE CONSTRUCTED PER NYSDEC STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL.
12. CONTRACTOR SHALL TAKE THE NECESSARY MEASURES, INCLUDING WATER SPRINKLING, TO PROVIDE DUST CONTROL DURING CONSTRUCTION.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF ALL TEMPORARY AND PERMANENT EROSION CONTROL FEATURES THROUGHOUT THE DURATION OF CONSTRUCTION.
    A. ALL SEDIMENT TRAPPING DEVICES AND INLET PROTECTION DEVICES SHALL BE CLEANED OF ACCUMULATED SILT WHEN STORAGE CAPACITY HAS BEEN REDUCED BY 50% OF THEIR DESIGN CAPACITY.
    B. ALL SEDIMENT SHALL BE REMOVED FROM BEHIND SILT FENCE AND STRAW BALES WHEN IT ACCUMULATES TO A MAXIMUM HEIGHT OF 6".
    C. AFTER VEGETATION HAS BEEN SUBSTANTIALLY ESTABLISHED, EXCAVATE SWALES OF ACCUMULATED SILT. RE-ESTABLISHED VEGETATION ON DISTURBED AREAS.
    D. SEDIMENT COLLECTED BY EROSION CONTROL MEASURES SHALL BE DISPOSED OF BY SPREADING ON-SITE OR HAULED AWAY IF DETERMINED TO BE UNSUITABLE FOR FILL.

12\. ALL DISTURBED AREAS SHALL BE STABILIZED, SEEDED AND MULCHED WITHIN 7 DAYS OF CEASED CONSTRUCTION ACTIVITY.

13\. TOTAL PROJECT DISTURBANCE AREA PER THE NYSDEC SPDES STANDARDS IS 79 ACRES.

14\. ALL AREAS TO REMAIN AS PERVIOUS VEGETATED AREAS SHALL BE RESTORED IN ACCORDANCE WITH THE NYS STORMWATER MANAGEMENT DESIGN MANUAL TABLE 5.3 SOIL RESTORATION REQUIREMENTS.

PERMANENT SEEDING NON-SLOPED AREAS:

1. IF SOILS ARE COMPACTED, SCARIFY UPPER TWO INCHES BY BACKBLADING WITH DOZER, RAKING, OR DISKING.
2. PLACE TOPSOIL TO A MINIMUM DEPTH OF 4 INCHES.
3. SEED PER SCHEDULE SPECIFIED ON LANDSCAPE PLANS.
4. FERTILIZE WITH 600 POUNDS PER ACRE OF 10-10-10. LIME TO ACHIEVE A PH OF NOT LESS THAN 5.5 OR GREATER THAN 7.6. IF HYDROSEEDER IS NOT USED, SEED AND FERTILIZER SHOULD BE LIGHTLY RAKED INTO SOIL.
5. MULCH WITH CLEAN (WEED FREE) STRAW IF SPECIFIED ON PLANS.

PERMANENT SEEDING SLOPED AREAS:

1. IF SOILS ARE COMPACTED, SCARIFY UPPER TWO INCHES BY BACKBLADING WITH DOZER, RAKING, OR DISKING.
2. PLACE TOPSOIL TO A MINIMUM DEPTH OF 4 INCHES.
3. FERTILIZE WITH 600 POUNDS PER ACRE OF 10-10-10. LIME TO ACHIEVE A PH OF NOT LESS THAN 5.5 OR GREATER THAN 7.6. IF HYDROSEEDER IS NOT USED, SEED AND FERTILIZER SHOULD BE LIGHTLY RAKED INTO SOIL.
4. IMMEDIATELY SEED PER SEED SCHEDULE SPECIFIED ON LANDSCAPE PLAN.
5. PROVIDE JUTE MESH IF SPECIFIED ON PLANS OR MULCH WITH CLEAN (WEED FREE) STRAW.

EROSION AND SEDIMENT CONTROL SEQUENCE:

THE TOWN OF BETHLEHEM SHOULD BE NOTIFIED PRIOR TO CONSTRUCTION ACTIVITIES STARTING AND CEASING DISTURBANCE OF OVER 5 ACRES AT ONE TIME.

PHASE I:

- INSTALL CONSTRUCTION ENTRANCE ROADS
- ESTABLISH THE PROJECT CONSTRUCTION STAGING/OFFICE AREA
- USE ANY ACCESS ROAD CUT MATERIAL AS FILL FOR THE CONSTRUCTION STAGING AREA
- TEMPORARILY STABILIZE ALL DISTURBED AREAS
- INSTALL SILT FENCE DOWNSTREAM OF ALL DISTURBED AREAS
- STABILIZE THE CONSTRUCTION ACCESS ROAD DISTURBANCE AREA PRIOR TO PROGRESSING TO PHASE II

PHASE II:

- INSTALL PERIMETER CONTROLS
- INSTALL CONSTRUCTION ACCESS ROAD AROUND THE PERIMETER OF THE SITE
- CONSTRUCT SEDIMENTATION BASINS
- STABILIZE ALL DISTURBED AREAS BEFORE PROGRESSING INTO PHASE III

PHASE III:

- SITE TO BE CLEARED AND GRUBBED
- BALANCE CUT AND FILLS IN THE SITE
- COMPACT/IMPROVE EXISTING GROUND CONDITIONS ACCORDING TO GEOTECHNICAL REPORT
- IMPORT MATERIAL TO RAISE THE SITE TO PROPOSED SUBGRADE ELEVATIONS
- ESTABLISH BUILDING FOOTPRINTS AND INITIATION BUILDING FOUNDATION CONSTRUCTION
- INSTALL STORM SEWER SYSTEM WITH INLET PROTECTION FOR DRAINAGE STRUCTURES AND STONE LINING OUTLET PROTECTION
- INSTALL SITE UTILITIES
- STABILIZE ALL DISTURBED AREAS BEFORE PROGRESSING INTO PHASE IV

PHASE IV:

- CONVERT TEMPORARY SEDIMENT BASINS TO PERMANENT STORMWATER MANAGEMENT FACILITIES
- POUR ALL PROPOSED CONCRETE RAIL PADS AND SIDEWALKS
- INSTALL PROPOSED CONCRETE CURBING
- PAVE PARKING LOT AREAS
- REMOVE CONSTRUCTION STAGING AREA
- FINAL STABILIZATION FOR EMBANKMENT SLOPES ALONG THE NORMANS KILL AND HUDSON RIVER

TEMPORARY SEEDING:

1. IF SOILS ARE COMPACTED, SCARIFY UPPER TWO INCHES BY BACKBLADING WITH DOZER, RAKING, OR DISKING. FERTILIZE WITH 300 POUNDS PER ACRE OF 10-10-10.
2. NOTE: NO FERTILIZER SHOULD BE USED AFTER OCTOBER 1ST IF THERE IS DANGER OF LEACHING INTO WATER RESOURCE.
3. IMMEDIATELY SEED PER SEED SCHEDULE SPECIFIED ON LANDSCAPE PLAN.
4. APPLY STRAW MULCH AS NECESSARY TO HOLD IN MOISTURE, PROTECT SOIL FROM EROSION, HOLD SEED IN PLACE, AND KEEP SOIL TEMPERATURES MORE CONSTANT; 2 TONS PER ACRE.

SOIL RESTORATION NOTES:

SOIL RESTORATION PROCEDURE:

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
2. TILL COMPOST INTO SUBSOIL TO A DEPTH OF AT LEAST 12 INCHES USING A CAT-MOUNTED RIPPER, TRACTOR-MOUNTED DISC, OR TILLER, MIXING, AND CIRCULATING AIR AND COMPOST INTO SUBSOILS
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 APPROVED PLAN.

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. TILLING (STEP 2 ABOVE) SHOULD NOT BE PERFORMED WITHIN THE DRIP LINE OF ANY EXISTING TREES OR OVER UTILITY INSTALLATIONS THAT ARE WITHIN 24 INCHES OF THE SURFACE.

COMPOST SPECIFICATIONS:

COMPOST SHALL BE AGED, FROM PLANT DERIVED MATERIALS, FREE OF VIABLE WEED SEEDS, HAVE NO VISIBLE FREE WATER OR DUST PRODUCED WHEN HANDLING, PASS THROUGH A HALF INCH SCREEN AND HAVE A PH SUITABLE TO GROW DESIRED PLANTS.

MAINTENANCE:

A SIMPLE MAINTENANCE AGREEMENT SHOULD IDENTIFY WHERE SOIL RESTORATION IS APPLIED, WHERE NEWLY RESTORED AREAS ARE/CANNOT BE CLEARED, WHO THE RESPONSIBLE PARTIES ARE TO ENSURE THAT ROUTINE VEGETATION IMPROVEMENTS ARE MADE (I.E., THINNING, INVASIVE PLANT REMOVAL, ETC.). SOIL COMPOST AMENDMENTS WITHIN A FILTER STRIP OR GRASS CHANNEL SHOULD BE LOCATED IN PUBLIC RIGHT OF WAY, OR WITHIN A DEDICATED STORMWATER OR DRAINAGE EASEMENT.

FIRST YEAR MAINTENANCE OPERATIONS INCLUDES:

- INITIAL INSPECTIONS FOR THE FIRST SIX MONTHS (ONCE AFTER EACH STORM GREATER THAN HALF-INCH)
- RESEEDING TO REPAIR BARE OR ERODING AREAS TO ASSURE GRASS STABILIZATION
- WATER ONCE EVERY THREE DAYS FOR FIRST MONTH, AND THEN PROVIDE A HALF INCH OF WATER PER WEEK DURING FIRST YEAR. IRRIGATION PLAN MAY BE ADJUSTED ACCORDING TO THE RAIN EVENT.
- FERTILIZATION MAY BE NEEDED IN THE FALL AFTER THE FIRST GROWING SEASON TO INCREASE PLANT VIGOR.

ONGOING MAINTENANCE:

TWO POINTS HELP ENSURE LASTING RESULTS OF DECOMPACTION:

1. PLANTING THE APPROPRIATE GROUND COVER WITH DEEP ROOTS TO MAINTAIN SOIL STRUCTURE.
2. KEEPING THE SITE FREE OF VEHICULAR AND FOOT TRAFFIC OR OTHER WEIGHT LOADS. CONSIDER PEDESTRIAN FOOTPATHS. (SOMETIMES IT MAY BE NECESSARY TO DE-THATCH THE TURF EVERY FEW YEARS).

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PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

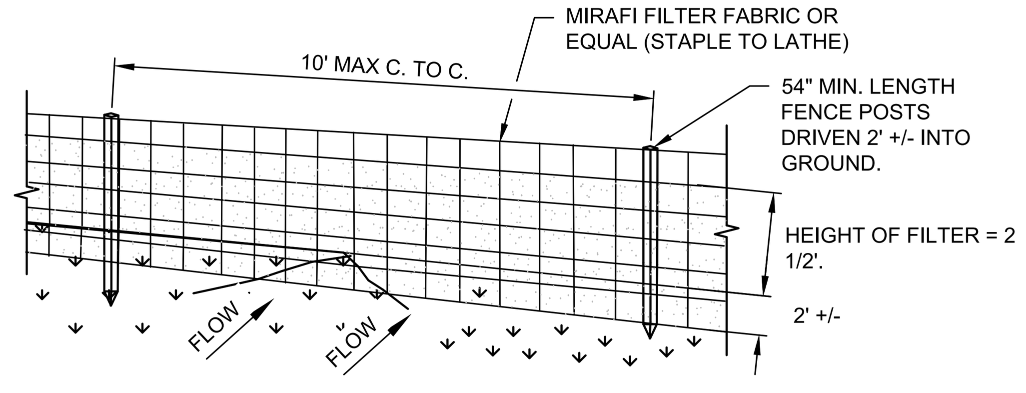
PROJECT:
PORT OF ALBANY SITE INFRASTRUCTURE IMPROVEMENTS

DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	N.T.S.
DATE	OCTOBER 2021
PROJECT	18641.00

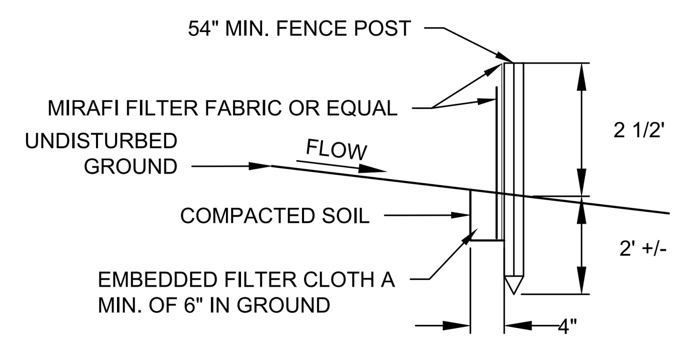
DRAWING TITLE
EROSION & SEDIMENT CONTROL NOTES

DRAWING NUMBER
ESC-05

SILT FENCE



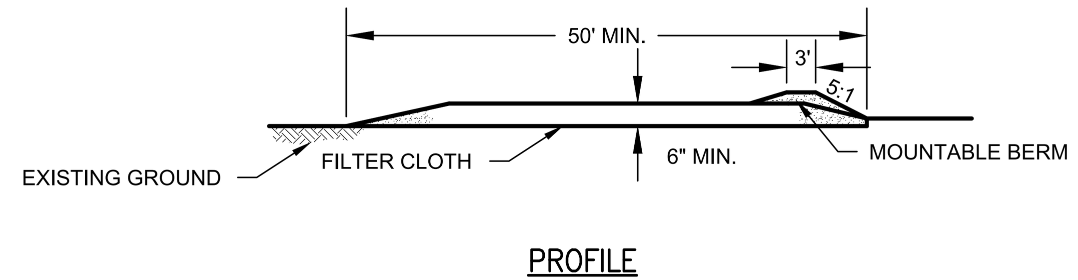
PERSPECTIVE VIEW



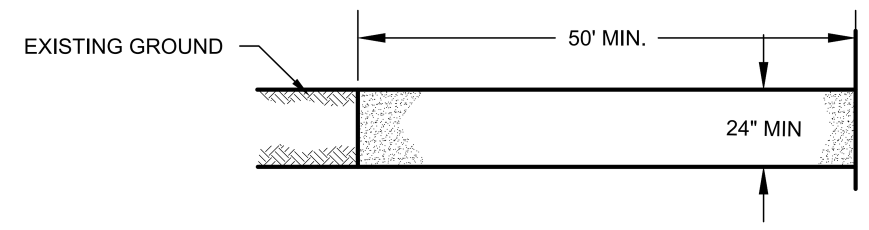
SECTION VIEW

NOTES:
1. MIRAFI FILTER FABRIC TO BE SECURED TO FENCE POSTS WITH STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED.
3. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

STABILIZED CONSTRUCTION ENTRANCE



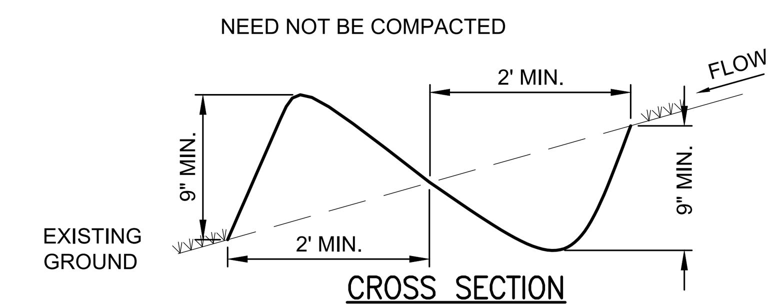
PROFILE



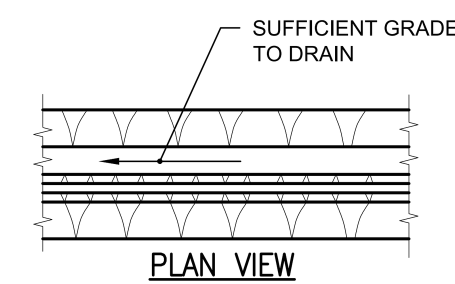
PLAN VIEW

NOTES:
1. STONE SIZE - USE #3 CRUSHED STONE OR GRAVEL (PER NYSDOT SECTION 209).
2. LENGTH - NOT LESS THAN 50 FEET.
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

PERIMETER DIKE



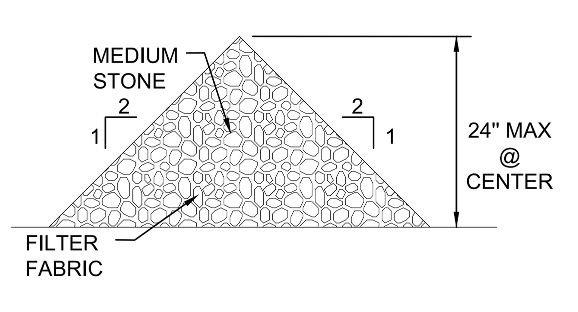
CROSS SECTION



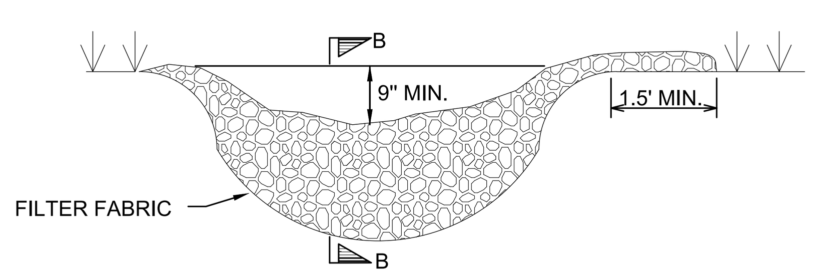
PLAN VIEW

NOTES:
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-EROSION 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 10 DAYS.
6. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

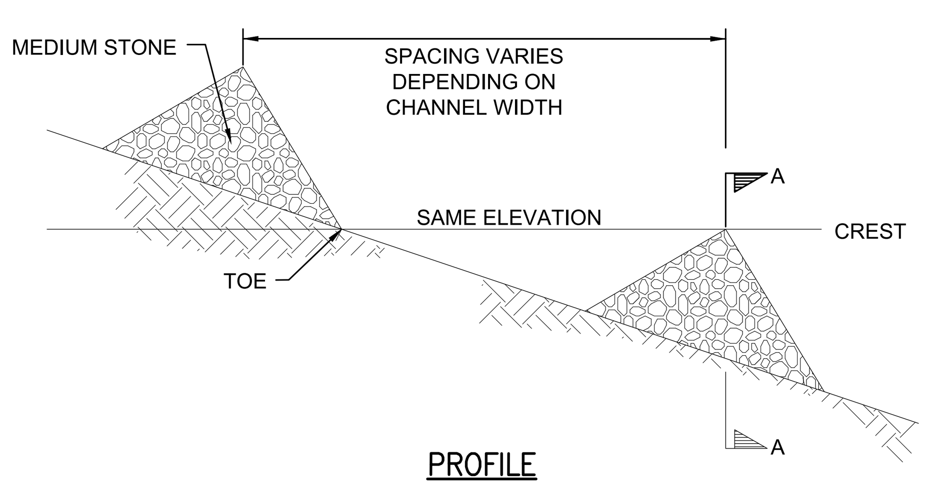
LIGHT STONE CHECK DAM



SECTION B–B



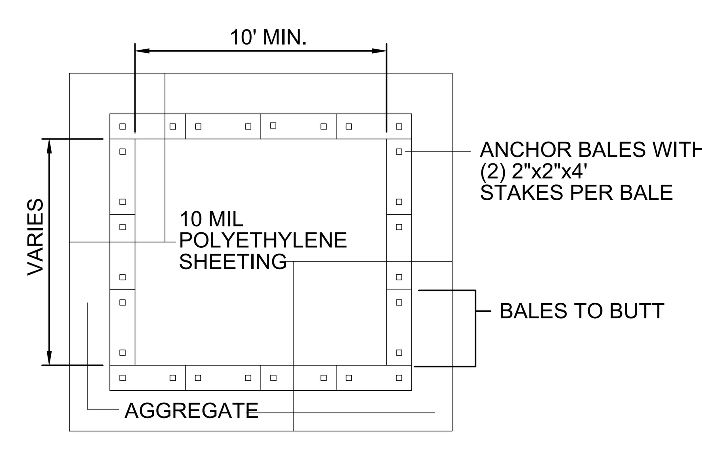
SECTION A–A



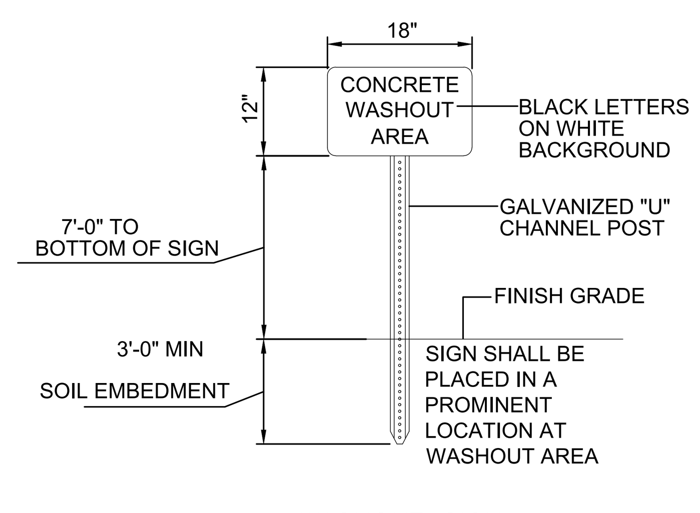
PROFILE

CONSTRUCTION SPECIFICATIONS
1. STONE WILL BE PLACED ON A FILTER FABRIC FOUNDATION TO THE LINES GRADES AND LOCATIONS SHOWN ON 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' BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
4. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWESTCHECK 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 STONES.

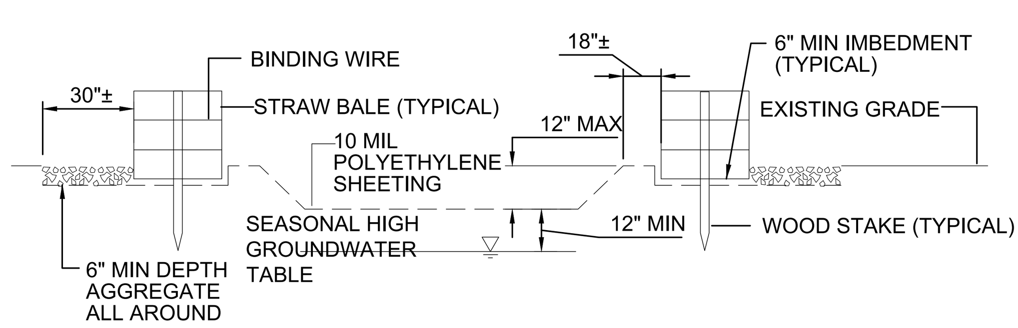
CONCRETE WASHOUT



PLAN



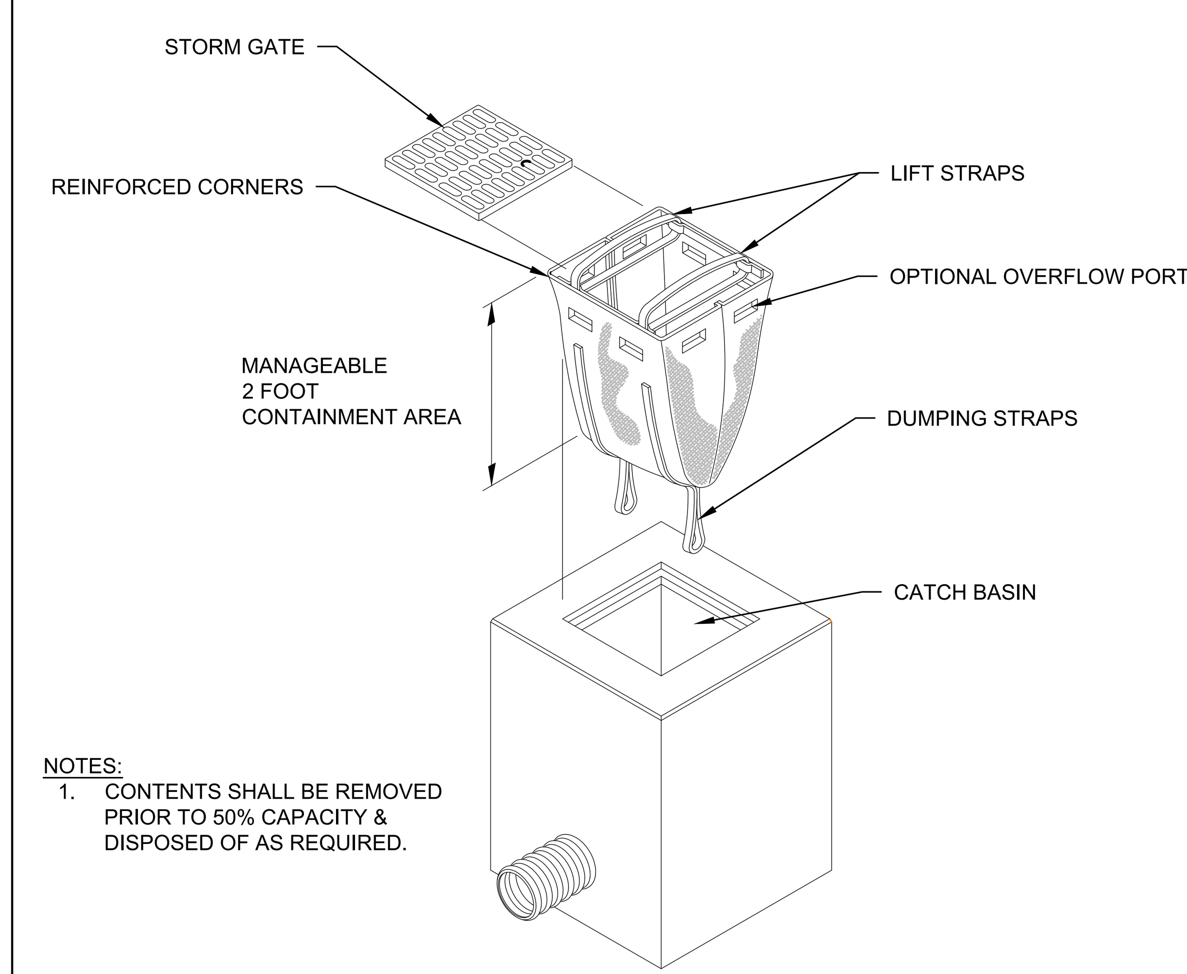
WASHOUT SIGN



TYPICAL SECTION

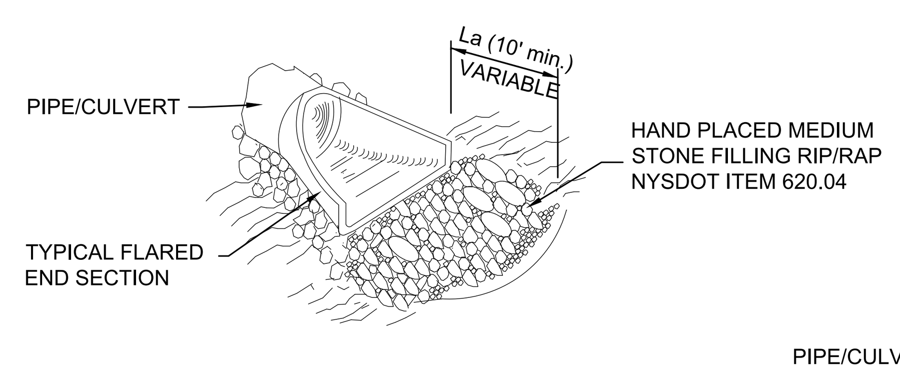
NOTES:
1. CONTAINMENT MUST BE STRUCTURALLY SOUND AND LEAK FREE AND CONTAIN ALL LIQUID WASTES.
2. CONTAINMENT DEVICES MUST BE OF SUFFICIENT QUANTITY OR VOLUME TO COMPLETELY CONTAIN THE LIQUID WASTES GENERATED.
3. WASHOUT MUST BE CLEANED OR NEW FACILITIES CONSTRUCTED AND READY TO USE ONCE WASHOUT IS 75% FULL.
4. WASHOUT AREA(S) SHALL BE INSTALLED IN A LOCATION EASILY ACCESSIBLE BY CONCRETE TRUCKS.
5. ONE OR MORE AREAS MAY BE INSTALLED ON THE CONSTRUCTION SITE AND MAY BE RELOCATED AS CONSTRUCTION PROGRESSES.
6. AT LEAST WEEKLY REMOVE ACCUMULATION OF SAND AND AGGREGATE AND DISPOSE OF PROPERLY.

INLET PROTECTION

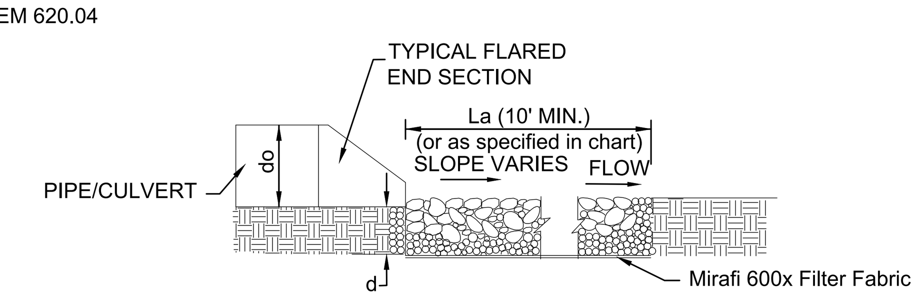


NOTES:
1. CONTENTS SHALL BE REMOVED PRIOR TO 50% CAPACITY & DISPOSED OF AS REQUIRED.

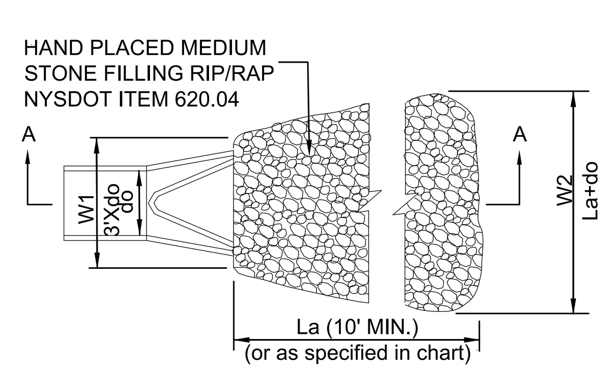
OUTLET PROTECTION - RIP RAP



ISOMETRIC VIEW



SECTION A–A

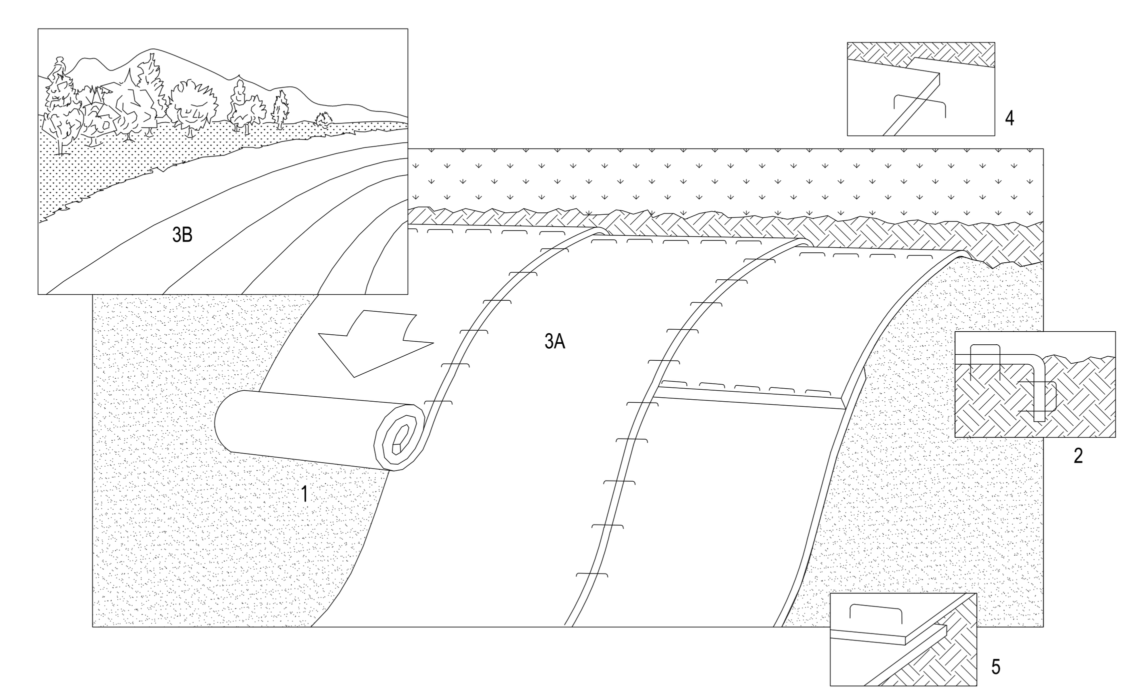


PLAN

do = Pipe Dia. (see plans)
La = Apron Length
W = Apron Width (centered on pipe)
d = Apron Depth

NOTES:
1. d = 1.5 TIMES THE MAXIMUM STONE DIAMETER BUT NO LESS THAN 6".
2. INSTALL FILTER MIRAFI 500X OR APPROVED EQUAL FILTER FABRIC BETWEEN RIP-RAP AND SUBGRADE.

EROSION CONTROL MAT INSTALLATION



INSTALLATION OF GEOSYNTHETICS EROSION CONTROL MATS:
1. EROSION CONTROL MATS SHALL BE UTILIZED ON ALL SLOPES OF 3:1 OR GREATER REQUIRING PERMANENT STABILIZATION.
2. SLOPES SHALL BE PREPARED AND EROSION CONTROL MATS SHALL BE INSTALLED, ANCHORED AND SOIL FILLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND INSTALLATION PROCEDURES.
3. SEEDING SHALL BE COMPLETED IN ACCORDANCE WITH THE PERMANENT SEEDING SPECIFICATIONS ABOVE PRIOR TO PLACEMENT OF THE EROSION CONTROL MAT. A SECOND APPLICATION OF PERMANENT SEEDING SHALL BE APPLIED AFTER THE MAT IS IN PLACE, PRIOR TO SOIL FILLING THE MAT.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE, RESEEDING AND REPAIR OF MATS AND SLOPES UNTIL PERMANENT STABILIZATION IS ACHIEVED.

NOTES:
REFER TO GENERAL STAPLE PATTERN GUIDE FOR CORRECT STAPLE PATTERN RECOMMENDATIONS FOR SLOPE INSTALLATIONS.
1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
3. ROLL THE BLANKETS (A) DOWN OR (B) HORIZONTALLY ACROSS THE SLOPE.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2" OVERLAP.
5. WHEN BLANKETS MUST BE SPLICED DOWN THE SLOPE, PLACE BLANKETS END OVER END (SHINGLE STYLE) WITH APPROXIMATELY 4" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART.
6. MANUFACTURER'S INSTALLATION INSTRUCTIONS SHALL SUPERCEDE THIS DETAIL.

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PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

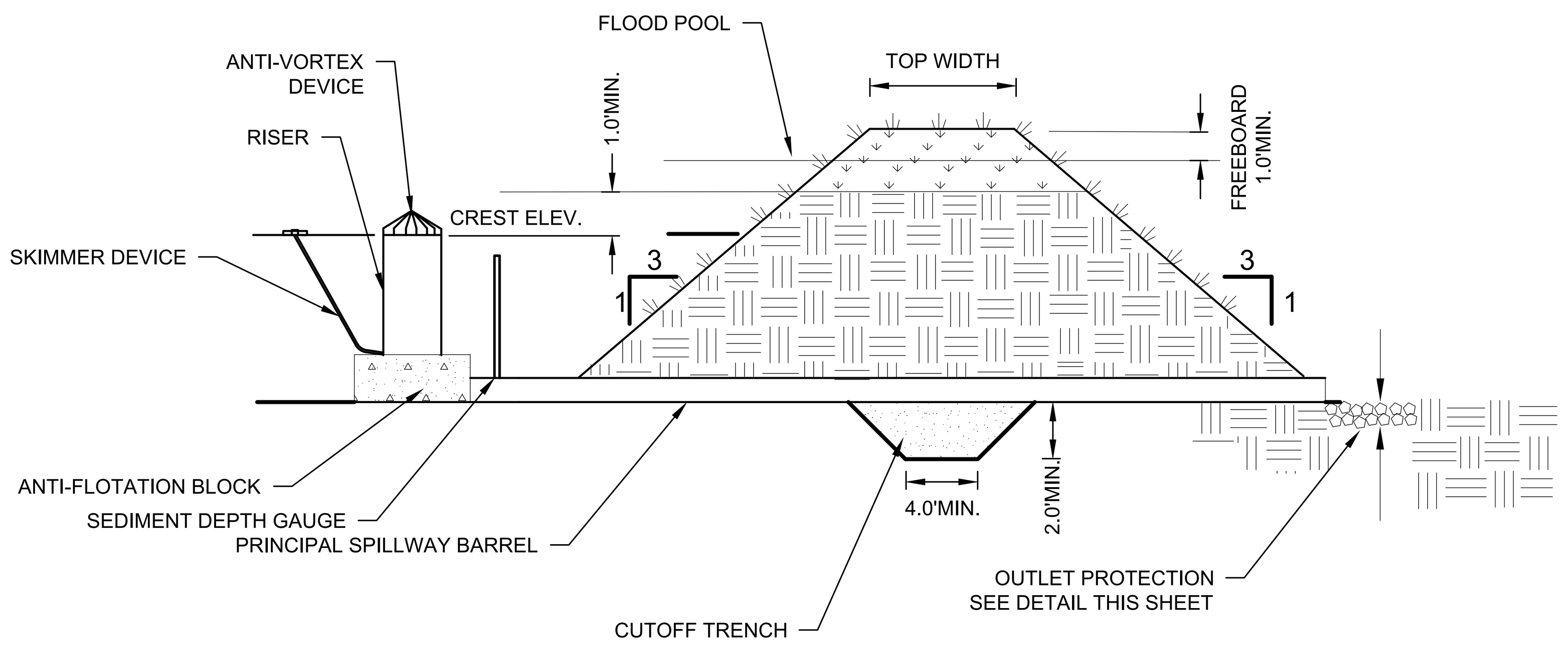
CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

PROJECT:
PORT OF ALBANY SITE INFRASTRUCTURE IMPROVEMENTS

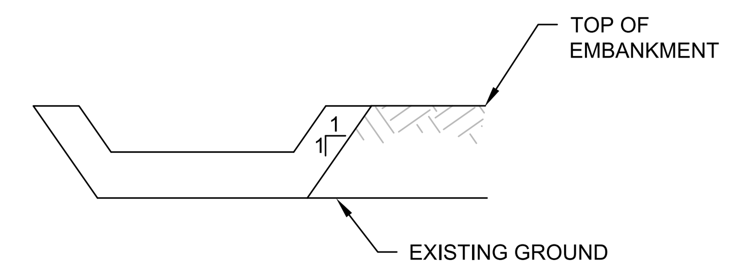
DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	N.T.S.
DATE	OCTOBER 2021
PROJECT	18641.00

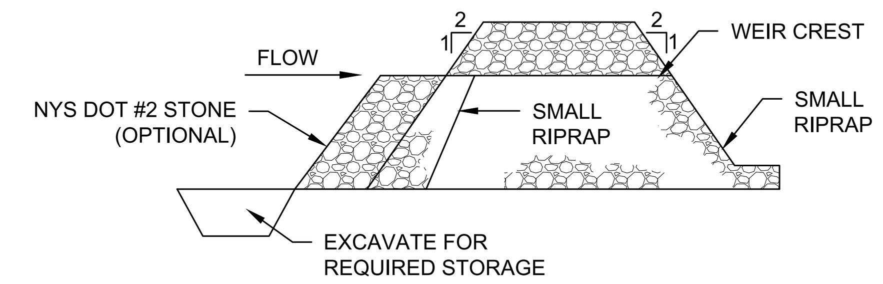
DRAWING TITLE
EROSION & SEDIMENT CONTROL DETAILS

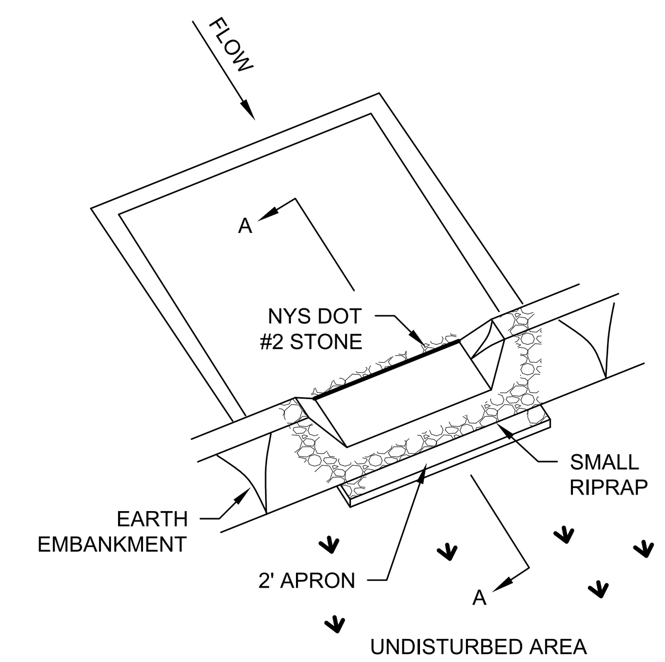
DRAWING NUMBER
ESC-06



SEDIMENT BASIN





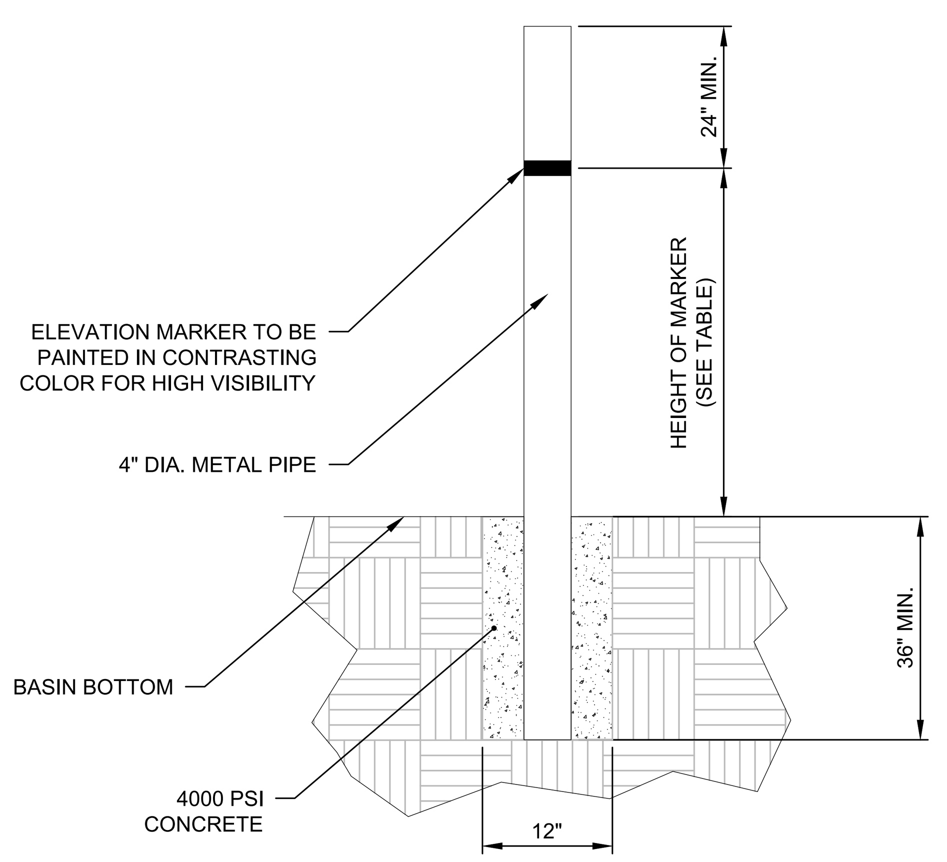


OPTION: A ONE FOOT LAYER OF NYS DOT #2 STONE MAY BE PLACED ON THE UPSTREAM SIDE OF THE RIPRAP INPLACE OF THE EMBEDDED FILTER CLOTH.

NOTES:

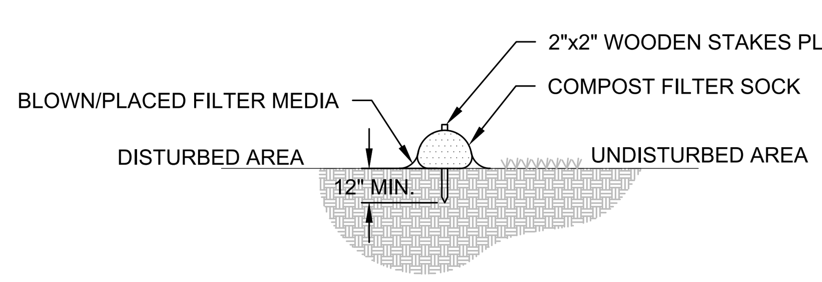
1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS AND OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. ALL CUT AND FILL SLOPES SHALL BE 2:1 OR FLATTER.
4. THE STONE USED IN THE OUTLET SHALL BE SMALL RIPRAP 4"-8" ALONG WITH A 1' THICKNESS OF 2" AGGREGATE PLACED ON THE UP-GRADE SIDE ON THE SMALL RIPRAP OR EMBEDDED FILTER CLOTH IN THE RIPRAP.
5. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO ½ THE DESIGN DEPTH OF THE TRAP. IT SHALL BE PLACED ON SITE AND STABILIZED.
6. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
7. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
8. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
9. THE MAXIMUM DRAINAGE AREA IS 5 ACRES.

STONE OUTLET SEDIMENT TRAP

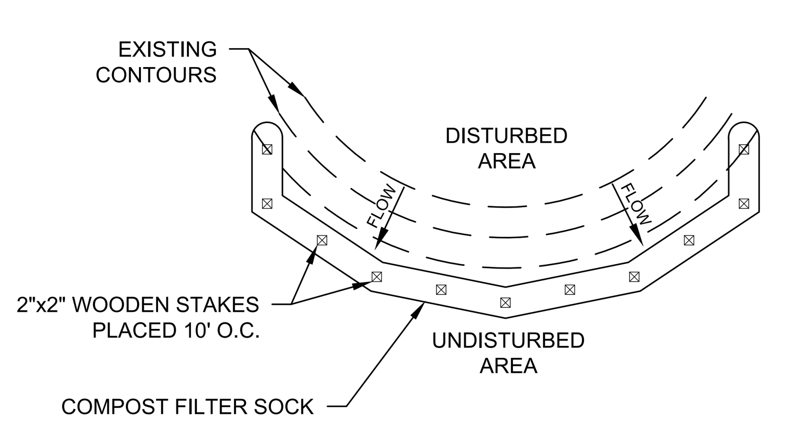


NOTES:
1. CONTRACTOR SHALL PLACE A 4" DIA. METAL PIPE AT A MINIMUM OF 36" BELOW THE BASIN BOTTOM ELEVATION ENCASED IN 12" OF 4000 PSI CONCRETE.
2. CONTRACTOR SHALL MARK THE CORRESPONDING ELEVATION FOR SEDIMENT STORAGE CLEANOUT ON THE PVC PIPE TO INDICATE WHEN MAINTENANCE IS REQUIRED.
3. SEDIMENT DEPTH GAUGE REQUIRED FOR SEDIMENT BASINS, FOREBAYS, AND INFILTRATION BASINS.

SEDIMENT DEPTH GAUGE



SECTION VIEW



PLAN VIEW

NOTES:

1. SOCK FABRIC SHALL MEET STANDARDS OF TABLE 5.1 OF NYS STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL. COMPOST SHALL MEET THE STANDARDS LISTED ON TABLE 5.2 OF NYS STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL.
2. COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE SOCK SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45° TO THE MAIN SOCK ALIGNMENT. MAXIMUM SLOPE LENGTH ABOVE ANY SOCK SHALL NOT EXCEED THAT SHOWN ON FIGURE X.X OF NYS STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL. STAKES MAY BE INSTALLED IMMEDIATELY DOWNSLOPE OF THE SOCK IF SO SPECIFIED BY THE MANUFACTURER.
3. TRAFFIC SHALL NOT BE PERMITTED TO CROSS FILTER SOCKS.
4. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES HALF THE ABOVEGROUND HEIGHT OF THE SOCK AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.
5. SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.
6. BIODEGRADABLE FILTER SOCKS SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
7. UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCKS, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

COMPOST FILTER SOCK

McFarland Johnson
60 RAILROAD PLACE
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PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

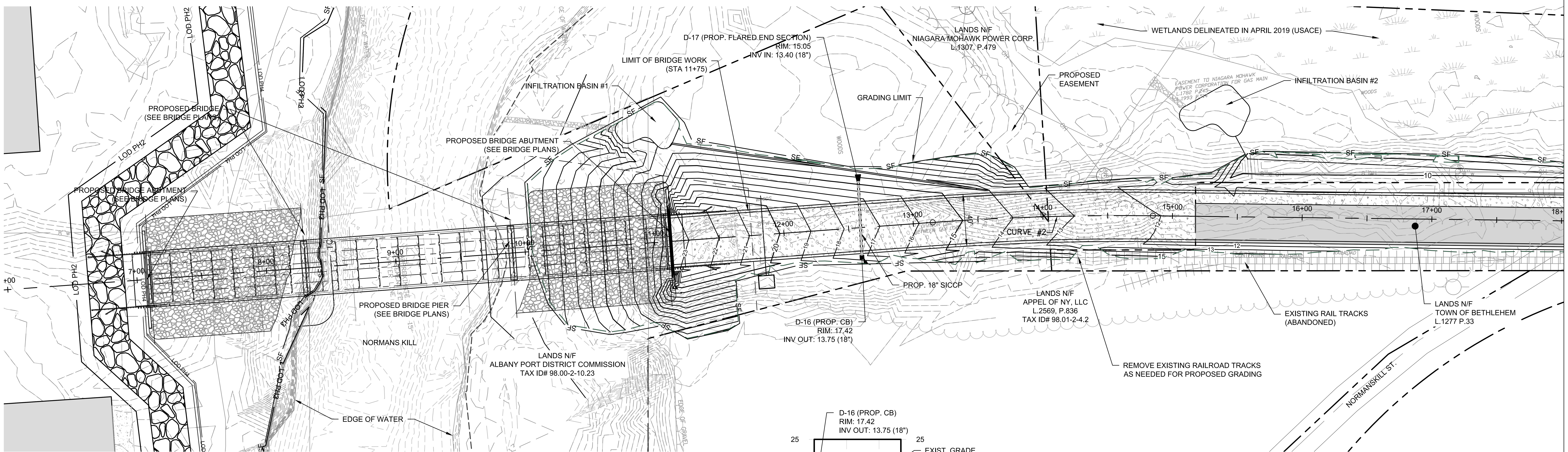
CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

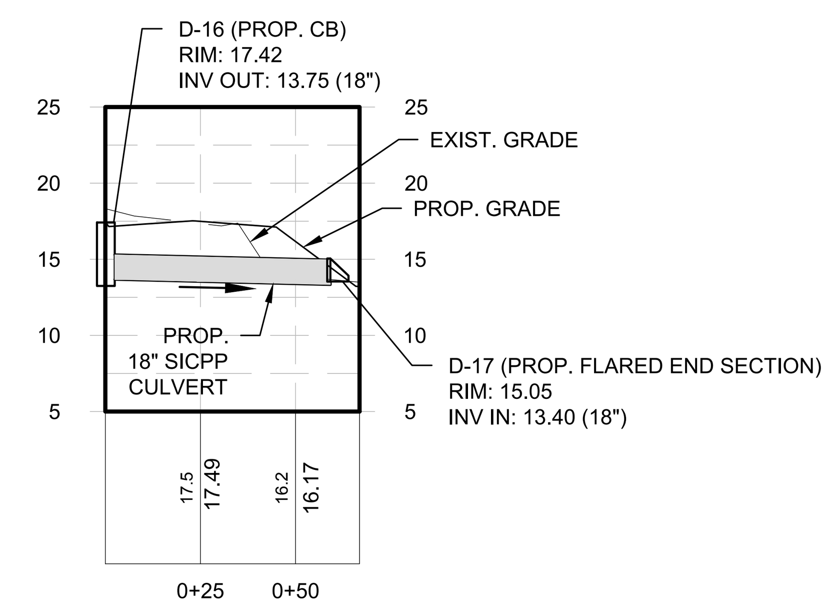
PROJECT:
PORT OF ALBANY SITE INFRASTRUCTURE IMPROVEMENTS

DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	N.T.S.
DATE	OCTOBER 2021
PROJECT	18641.00

DRAWING TITLE
EROSION & SEDIMENT CONTROL DETAILS

DRAWING NUMBER
ESC-07



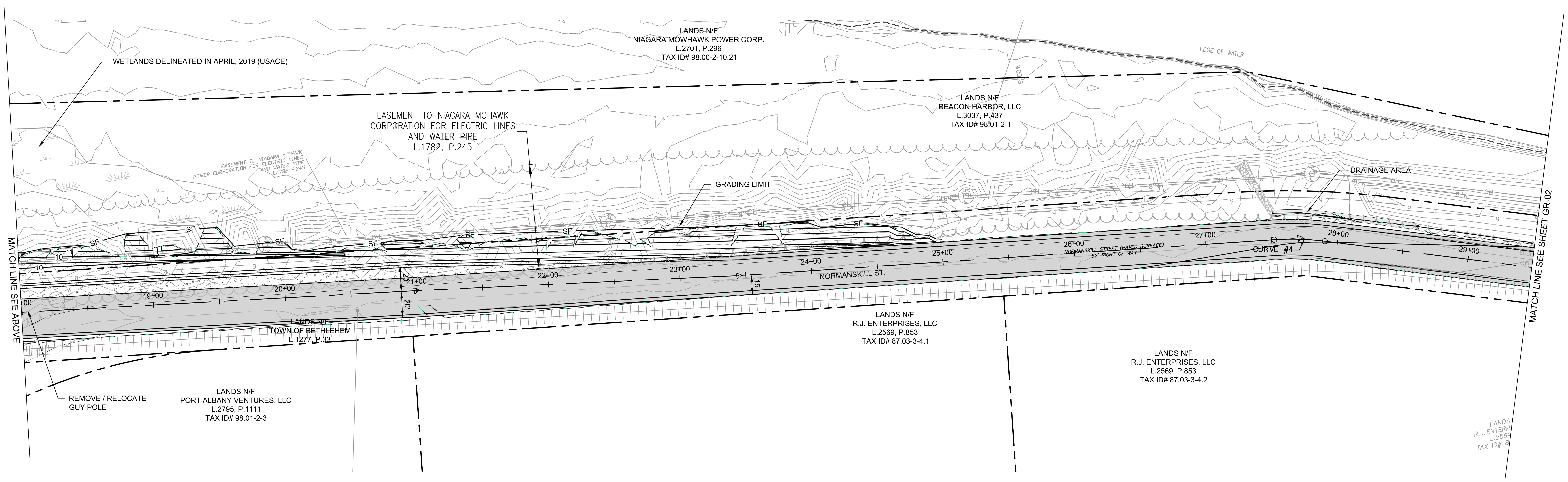


D-16 TO D-17
Horizontal Scale: 1" = 40'
Vertical Scale: 1" = 10'

LEGEND

PROPERTY LINE		EXISTING OVERHEAD ELECTRIC	OH
PROPOSED BOX BEAM GUIDE RAIL		EXISTING GAS LINE	G
DITCH CENTERLINE		EXISTING WATERLINE	W
WETLAND AREA		PROPOSED PAVEMENT	
SECURITY FENCE		PROPOSED CONCRETE	
SILT FENCE	SF	RIP-RAP WATER EMBANKMENT STABILIZATION	
CATCH BASIN			

0 40 80 120 FT
SCALE



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SaratogaROM@mjinc.com

PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

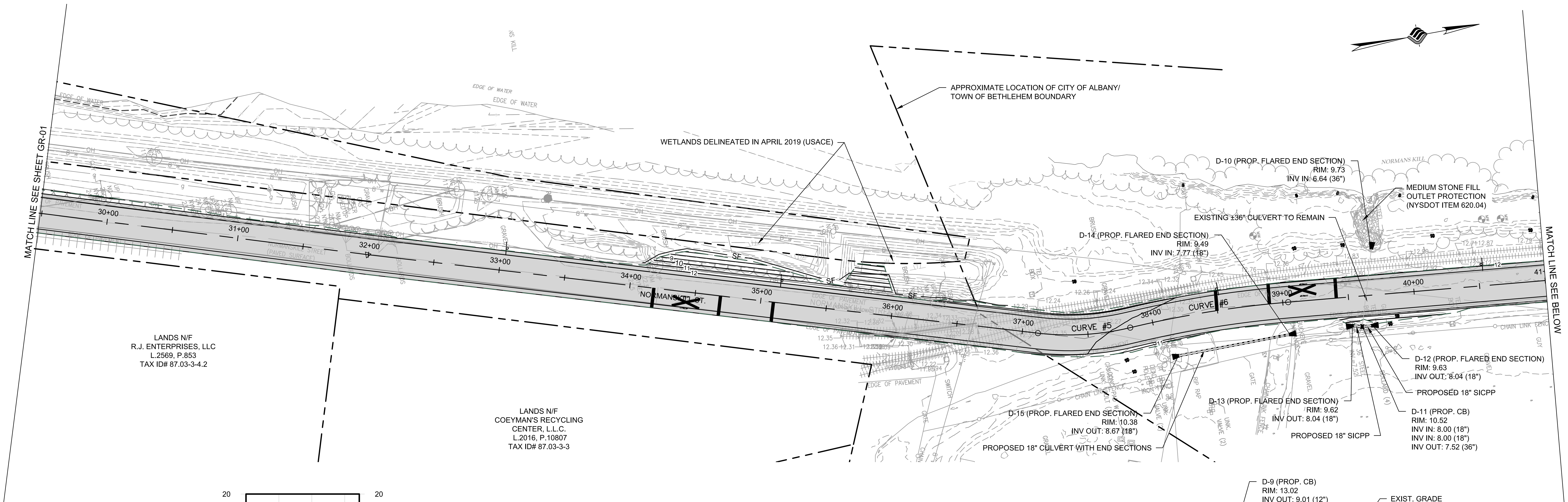
CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

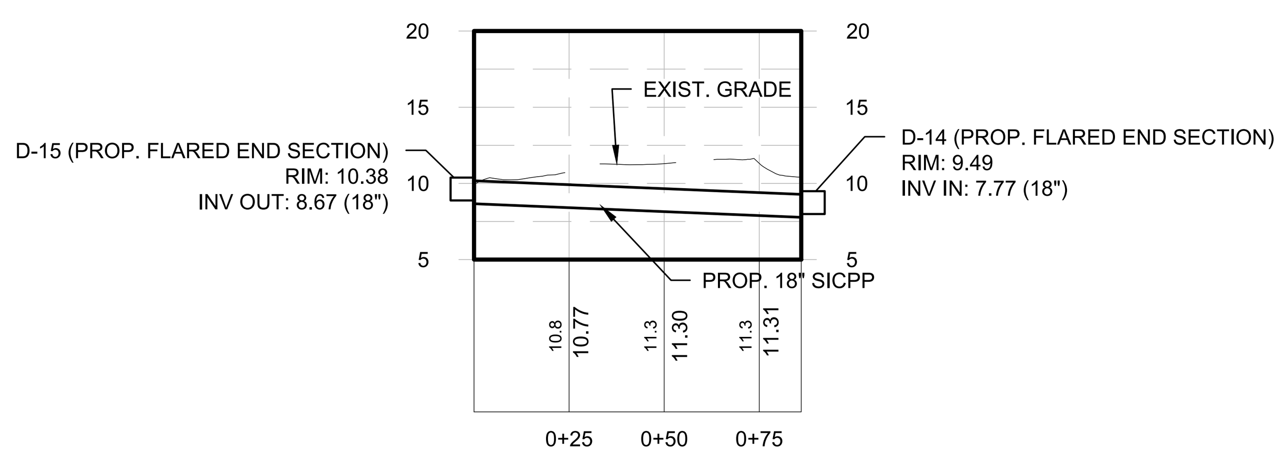
PROJECT:
NORMANSKILL ST. REHAB

DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	1"=40'
DATE	OCTOBER 2021
PROJECT	18641.00

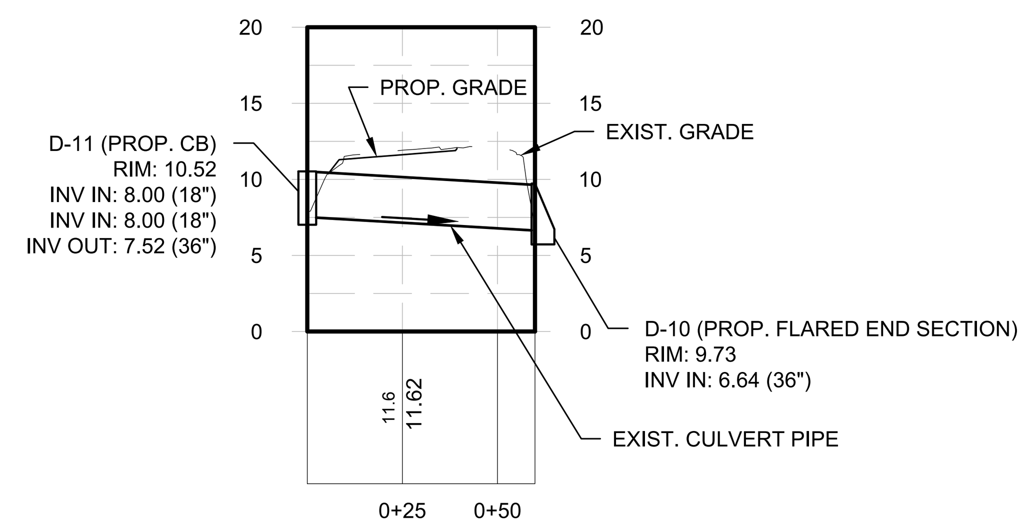
DRAWING TITLE
GRADING, DRAINAGE, EROSION AND SEDIMENT CONTROL

DRAWING NUMBER
GR-01





D-15 TO D-14
Horizontal Scale: 1" = 40'
Vertical Scale: 1" = 10'



D-11 TO D-10
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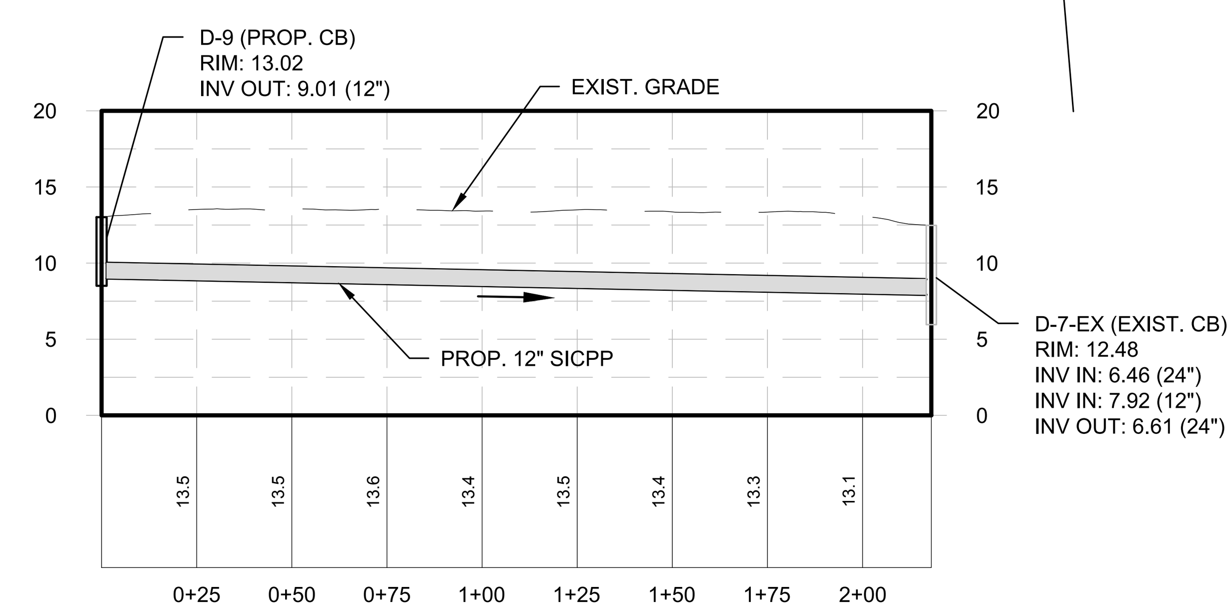
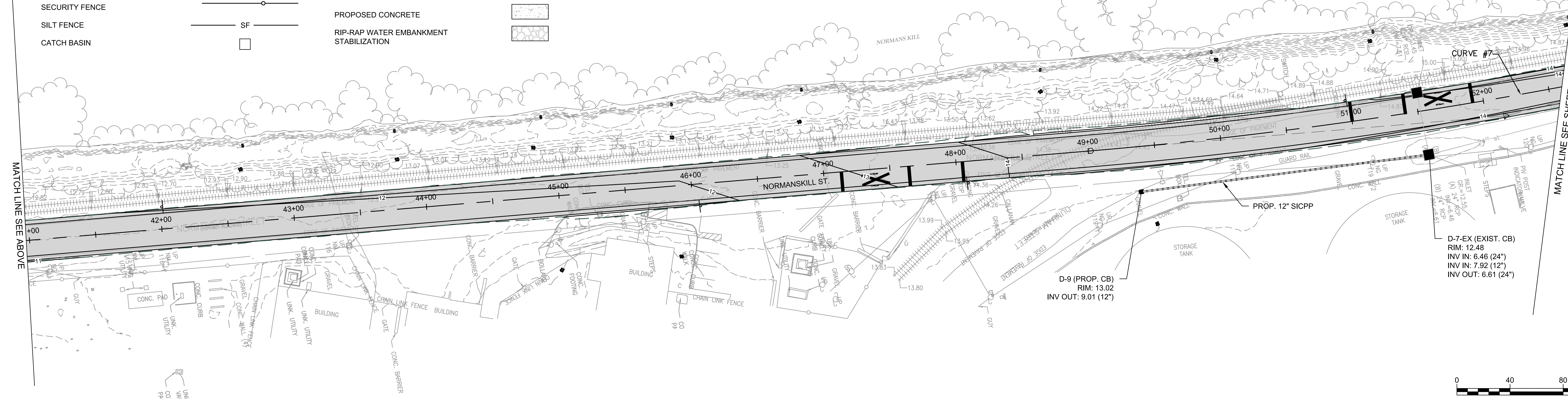
Vertical Scale: 1" = 10'



D-9 TO D-7-EX
Horizontal Scale: 1" = 40'
Vertical Scale: 1" = 10'

LEGEND

PROPERTY LINE
PROPOSED BOX BEAM GUIDE RAIL
DITCH CENTERLINE
WETLAND AREA
SECURITY FENCE
SILT FENCE — SF
CATCH BASIN
EXISTING OVERHEAD ELECTRIC — OH
EXISTING GAS LINE — G
EXISTING WATERLINE — W
PROPOSED PAVEMENT
PROPOSED CONCRETE
RIP-RAP WATER EMBANKMENT STABILIZATION



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PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

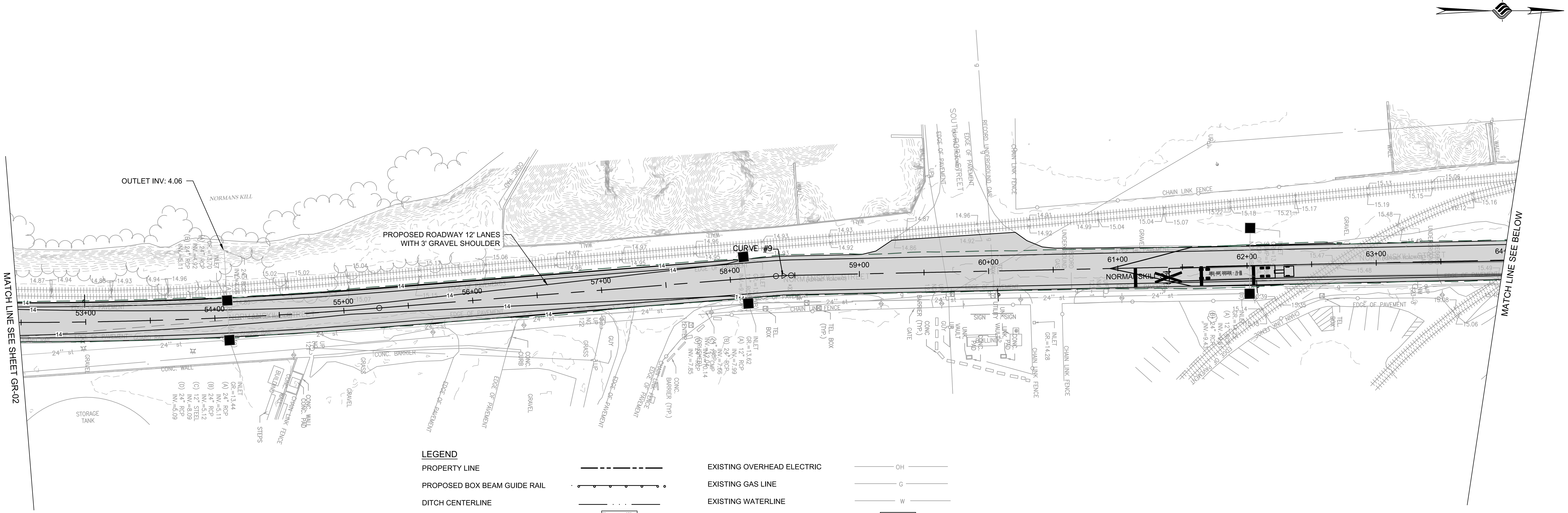
CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

PROJECT:
NORMANSKILL ST. REHAB

DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	1"=40'
DATE	OCTOBER 2021
PROJECT	18641.00

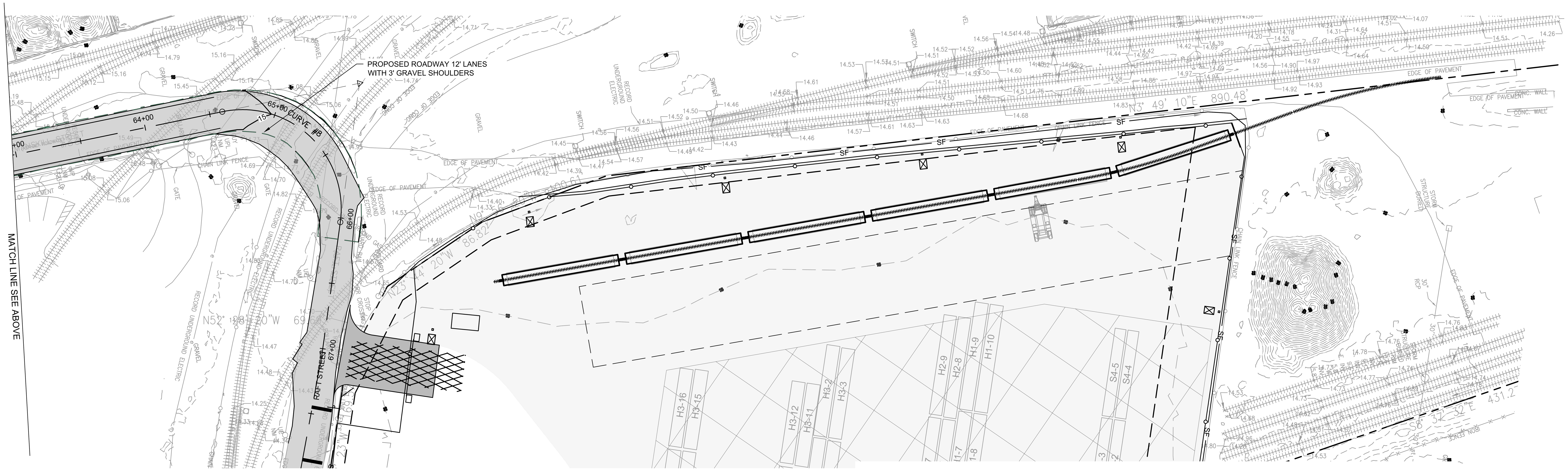
DRAWING TITLE
GRADING, DRAINAGE, EROSION AND SEDIMENT CONTROL

DRAWING NUMBER
GR-02



LEGEND

PROPERTY LINE	EXISTING OVERHEAD ELECTRIC — OH —
PROPOSED BOX BEAM GUIDE RAIL	EXISTING GAS LINE — G —
DITCH CENTERLINE	EXISTING WATERLINE — W —
WETLAND AREA	PROPOSED PAVEMENT
SECURITY FENCE	PROPOSED CONCRETE
SILT FENCE — SF —	RIP-RAP WATER EMBANKMENT STABILIZATION
CATCH BASIN	



0 40 80 120 FT
SCALE

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SARATOGA SPRINGS, NEW YORK 12866
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PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

PROJECT:
NORMANSKILL ST. REHAB

DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	1"=40'
DATE	OCTOBER 2021
PROJECT	18641.00

DRAWING TITLE
GRADING, DRAINAGE, EROSION AND SEDIMENT CONTROL

DRAWING NUMBER
GR-03

Pipe Table			
Pipe Name	Size	Length	Slope
P-10-EX	36.000	59.9	1.47%
P-8-EX	24.000	47.5	2.21%
P-7-EX	24.000	259.7	0.59%
P-5-EX	24.000	30.8	0.00%
P-6-EX	24.000	38.7	2.22%
P-4-EX	24.000	402.5	-0.68%
P-2-EX	24.000	388.0	-0.46%
P-1-EX	12.000	50.9	-2.73%
P-3-EX	12.000	36.2	-2.92%
P-9-PROP	12.000	218.1	0.50%
P-11-PROP	18.000	7.6	0.50%
P-12-PROP	18.000	7.4	0.50%

Pipe Table			
Pipe Name	Size	Length	Slope
P-13-PROP	18.000	86.0	1.04%

Pipe Table			
Pipe Name	Size	Length	Slope
P-14-PROP	18.000	59.1	0.59%

Structure Table		
Structure Name	Structure Details	STATION AND OFFSET
D-2-EX (EXIST. CB)	RIM = 14.103 SUMP = 9.430 P-2-EX INV IN = 9.430 P-1-EX INV OUT = 9.610	STA. 62+01.6 21.8'R
D-1-EX (EXIST. CB)	RIM = 14.004 SUMP = 11.000 P-1-EX INV IN = 11.000	STA. 62+03.1 -29.0'L
D-8-EX (EXIST. CB)	RIM = 13.968 SUMP = 7.510 P-8-EX INV OUT = 7.510	STA. 51+51.5 -14.2'L
D-6-EX (EXIST. CB)	RIM = 13.867 SUMP = 4.920 P-5-EX INV IN = 5.110 P-6-EX INV OUT = 4.920	STA. 54+10.2 -13.3'L
D-4-EX (EXIST. CB)	RIM = 13.837 SUMP = 9.050 P-3-EX INV IN = 9.050	STA. 58+11.4 -16.9'L
D-3-EX (EXIST. CB)	RIM = 13.603 SUMP = 7.660 P-4-EX INV IN = 7.850 P-2-EX INV OUT = 7.660 P-3-EX INV OUT = 7.990	STA. 58+12.4 19.3'R
D-5-EX (EXIST. CB)	RIM = 13.387 SUMP = 5.090 P-7-EX INV IN = 5.090 P-5-EX INV OUT = 5.110 P-4-EX INV OUT = 5.120	STA. 54+10.5 17.5'R
D-9 (PROP. CB)	RIM = 13.018 SUMP = 9.014 P-9-PROP INV OUT = 9.014	STA. 49+37.1 34.1'R
D-7-EX (EXIST. CB)	RIM = 12.481 SUMP = 6.460 P-8-EX INV IN = 6.460 P-9-PROP INV IN = 7.923 P-7-EX INV OUT = 6.610	STA. 51+53.1 33.3'R
D-11 (PROP. CB)	RIM = 10.524 SUMP = 7.520 P-11-PROP INV IN = 8.000 P-12-PROP INV IN = 8.000 P-10-EX INV OUT = 7.520	STA. 39+58.6 23.2'R
D-10 (PROP. FLARED END SECTION)	RIM = 9.728 SUMP = ??? P-10-EX INV IN = 6.640	STA. 39+70.5 -35.5'L
D-12 (PROP. FLARED END SECTION)	RIM = 9.626 SUMP = ??? P-11-PROP INV OUT = 8.038	STA. 39+66.3 23.1'R
D-13 (PROP. FLARED END SECTION)	RIM = 9.625 SUMP = ??? P-12-PROP INV OUT = 8.037	STA. 39+51.3 22.0'R

Structure Table		
Structure Name	Structure Details	STATION AND OFFSET
D-15 (PROP. FLARED END SECTION)	RIM = 10.382 SUMP = ??? P-13-PROP INV OUT = 8.666	STA. 38+14.4 28.8'R
D-14 (PROP. FLARED END SECTION)	RIM = 9.490 SUMP = ??? P-13-PROP INV IN = 7.774	STA. 39+03.4 24.6'R

Structure Table		
Structure Name	Structure Details	STATION AND OFFSET
D-16 (PROP. CB)	RIM = 17.418 SUMP = 13.750 P-14-PROP INV OUT = 13.750	STA. 12+58.7 22.8'R
D-17 (PROP. FLARED END SECTION)	RIM = 15.046 SUMP = ??? P-14-PROP INV IN = 13.400	STA. 12+60.0 -36.3'L

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PROJECT MILESTONE

PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

PROJECT:
NORMANSKILL ST. REHAB

DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	1"=40'
DATE	OCTOBER 2021
PROJECT	18641.00

DRAWING TITLE

DRAINAGE TABLES

DRAWING NUMBER

GR-04

McFarland Johnson
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PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

CLIENT: ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

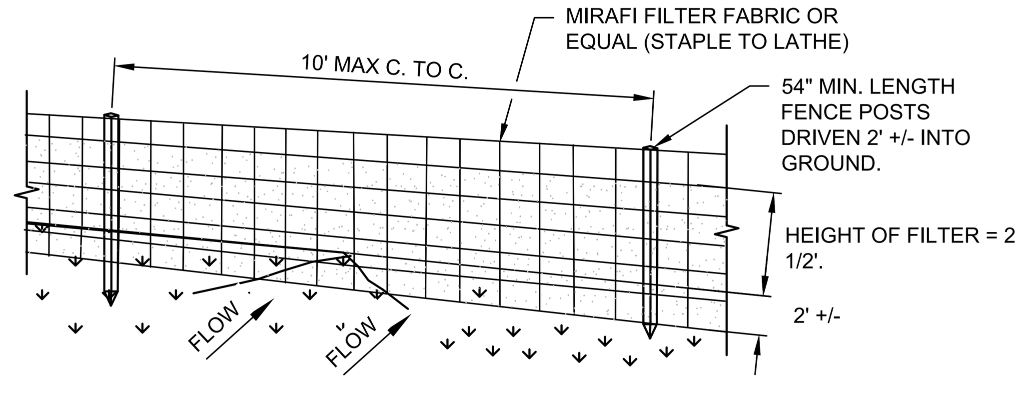
PROJECT: NORMANSKILL ST. REHAB

DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	1"=40'
DATE	OCTOBER 2021
PROJECT	18641.00

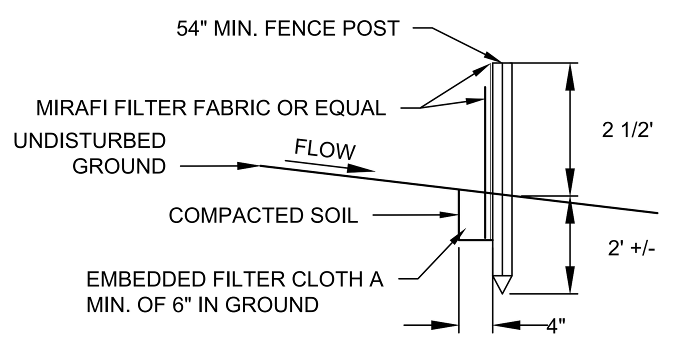
DRAWING TITLE
EROSION AND SEDIMENT CONTROL DETAILS

DRAWING NUMBER
DT-01

SILT FENCE



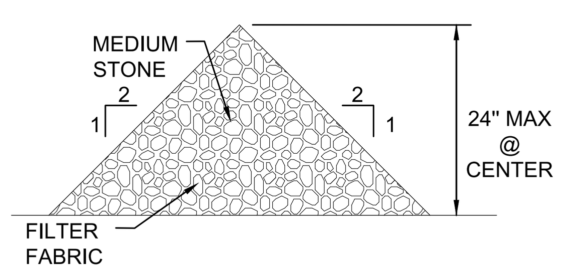
PERSPECTIVE VIEW



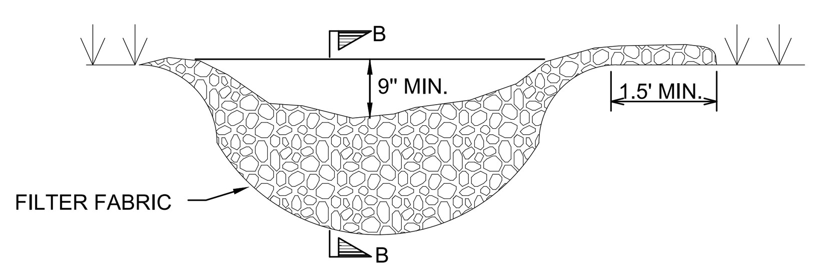
SECTION VIEW

NOTES:
1. MIRAFI FILTER FABRIC TO BE SECURED TO FENCE POSTS WITH STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED.
3. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

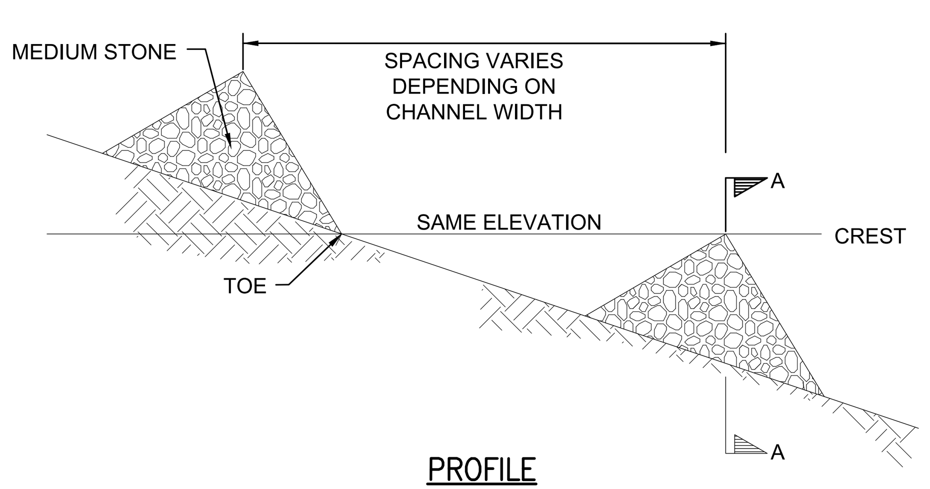
LIGHT STONE CHECK DAM



SECTION B–B



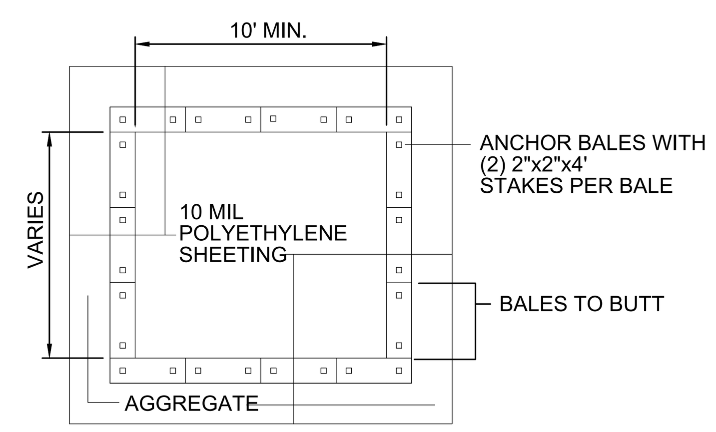
SECTION A–A



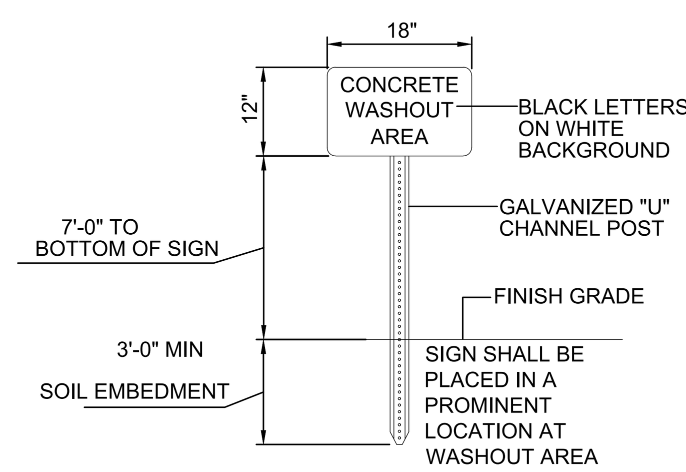
PROFILE

CONSTRUCTION SPECIFICATIONS
1. STONE WILL BE PLACED ON A FILTER FABRIC FOUNDATION TO THE LINES GRADES AND LOCATIONS SHOWN ON 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' BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
4. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWESTCHECK 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 STONES.

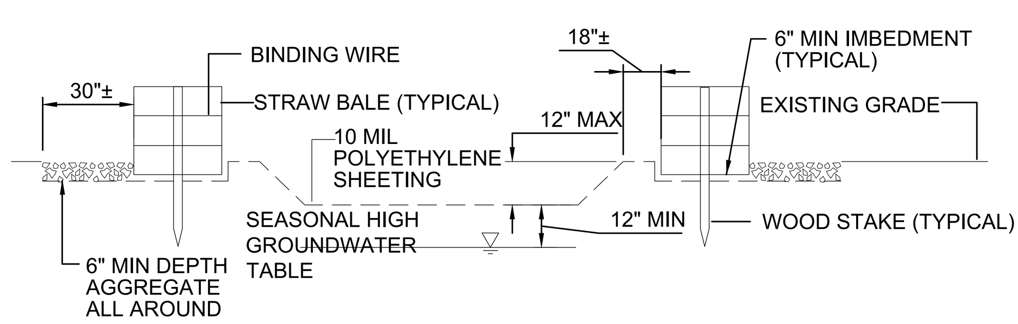
CONCRETE WASHOUT



PLAN



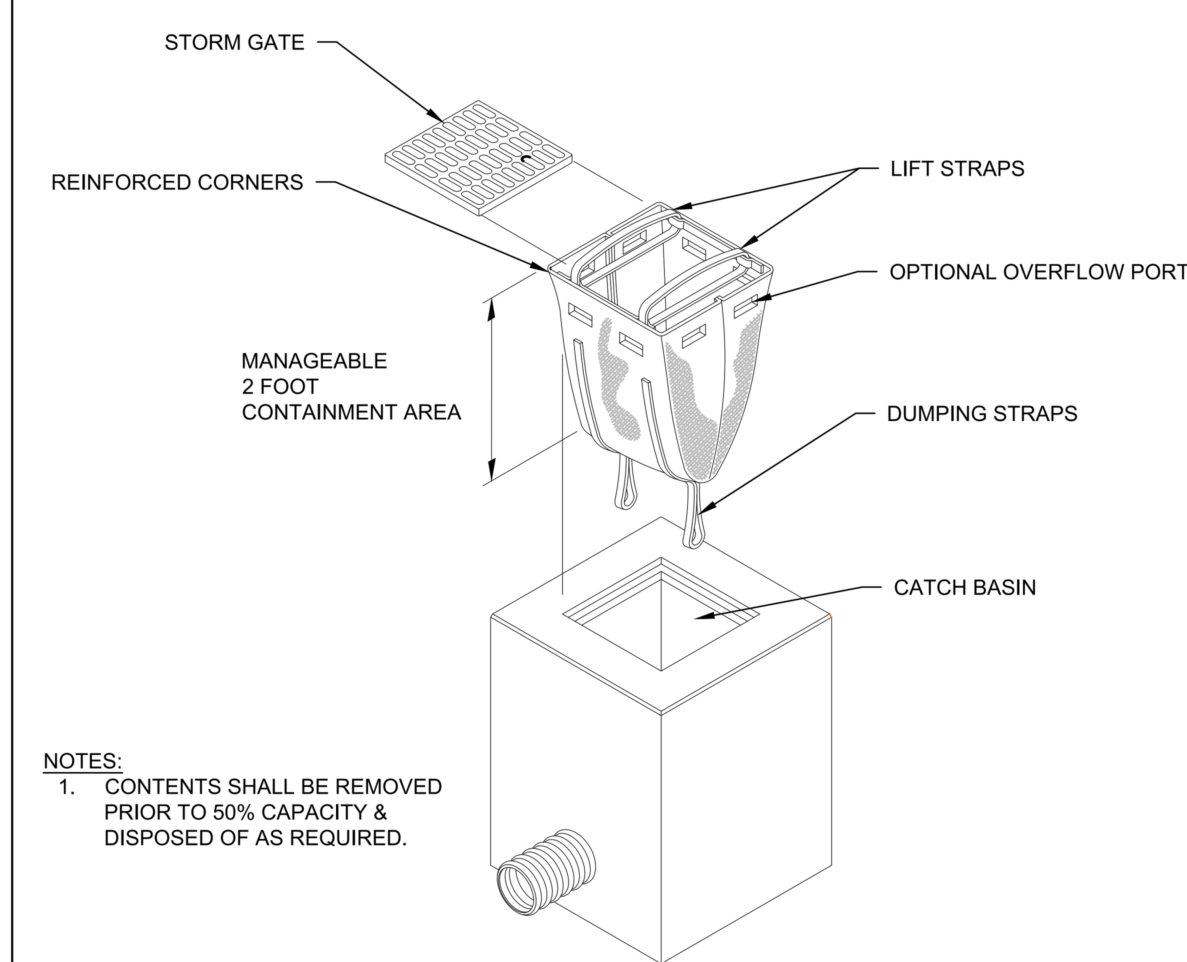
WASHOUT SIGN



TYPICAL SECTION

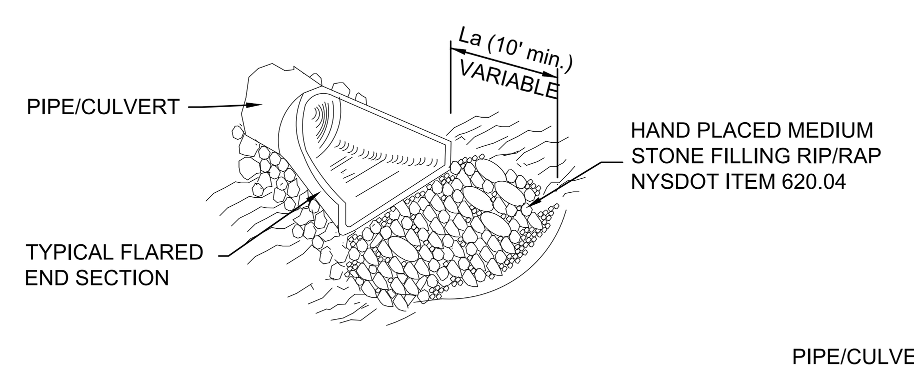
NOTES:
1. CONTAINMENT MUST BE STRUCTURALLY SOUND AND LEAK FREE AND CONTAIN ALL LIQUID WASTES.
2. CONTAINMENT DEVICES MUST BE OF SUFFICIENT QUANTITY OR VOLUME TO COMPLETELY CONTAIN THE LIQUID WASTES GENERATED.
3. WASHOUT MUST BE CLEANED OR NEW FACILITIES CONSTRUCTED AND READY TO USE ONCE WASHOUT IS 75% FULL.
4. WASHOUT AREA(S) SHALL BE INSTALLED IN A LOCATION EASILY ACCESSIBLE BY CONCRETE TRUCKS.
5. ONE OR MORE AREAS MAY BE INSTALLED ON THE CONSTRUCTION SITE AND MAY BE RELOCATED AS CONSTRUCTION PROGRESSES.
6. AT LEAST WEEKLY REMOVE ACCUMULATION OF SAND AND AGGREGATE AND DISPOSE OF PROPERLY.

INLET PROTECTION

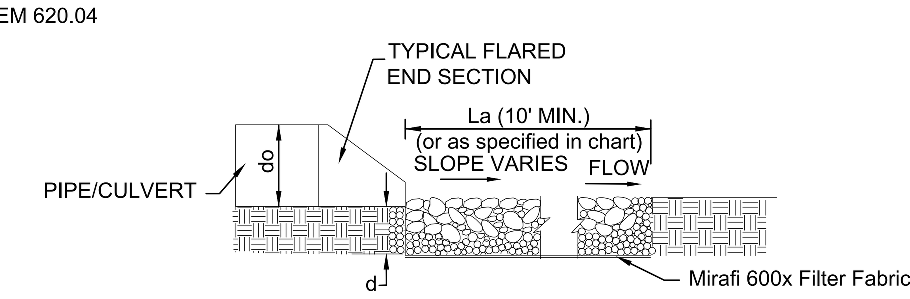


NOTES:
1. CONTENTS SHALL BE REMOVED PRIOR TO 50% CAPACITY & DISPOSED OF AS REQUIRED.

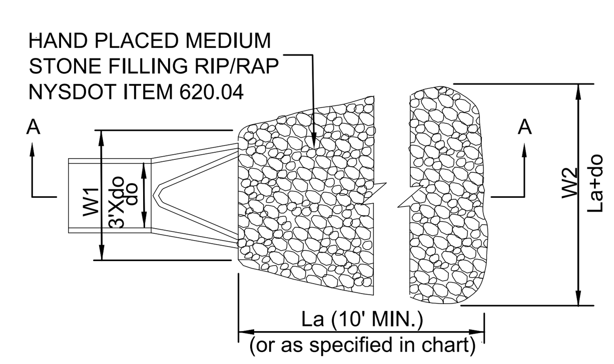
OUTLET PROTECTION - RIP RAP



ISOMETRIC VIEW



SECTION A–A

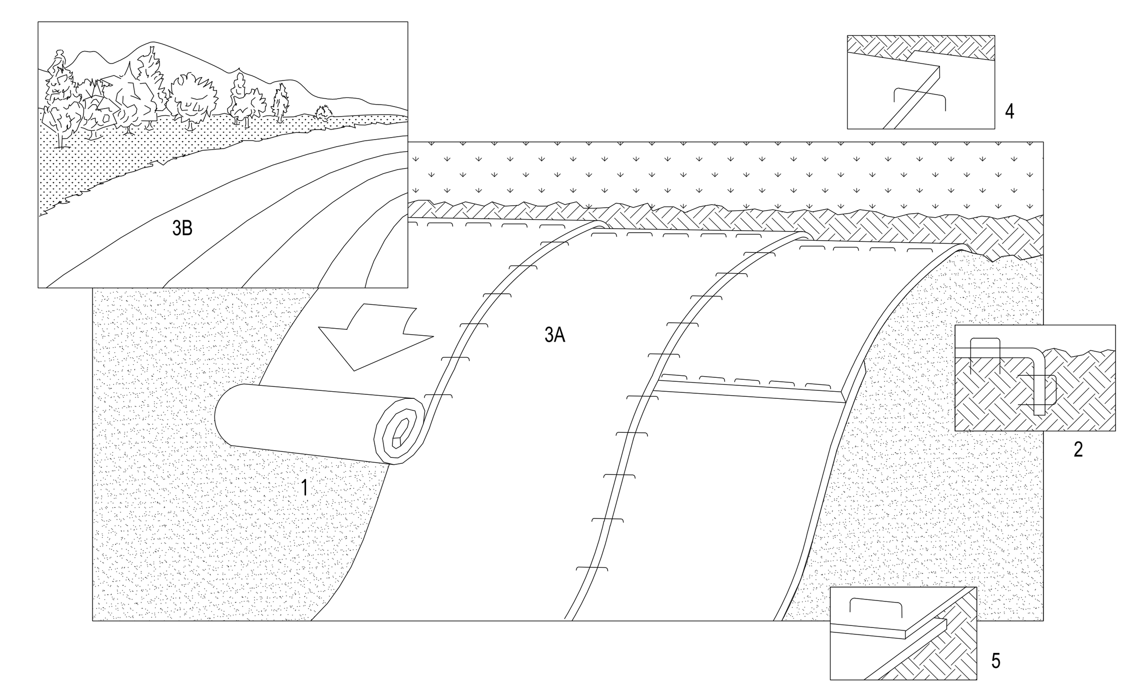


PLAN

do = Pipe Dia. (see plans)
La = Apron Length
W = Apron Width (centered on pipe)
d = Apron Depth

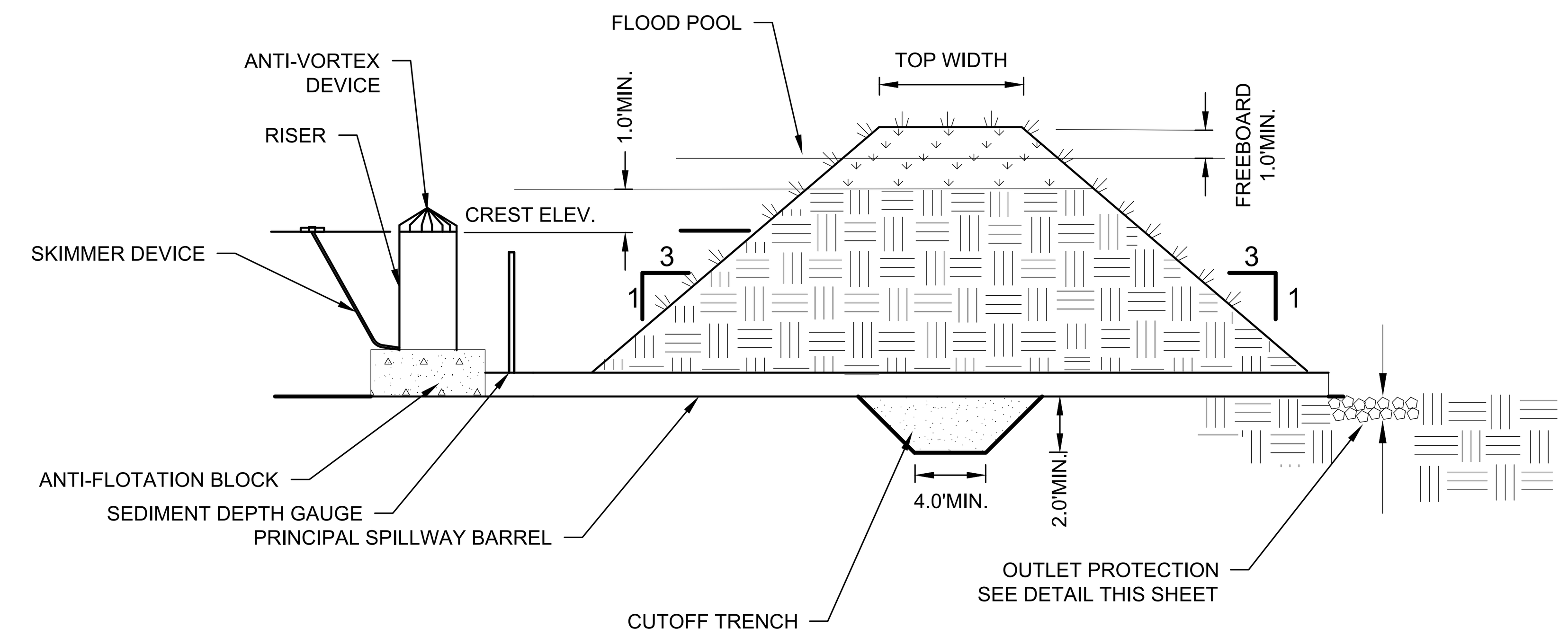
NOTES:
1. d = 1.5 TIMES THE MAXIMUM STONE DIAMETER BUT NO LESS THAN 6".
2. INSTALL FILTER MIRAFI 500X OR APPROVED EQUAL FILTER FABRIC BETWEEN RIP-RAP AND SUBGRADE.

EROSION CONTROL MAT INSTALLATION

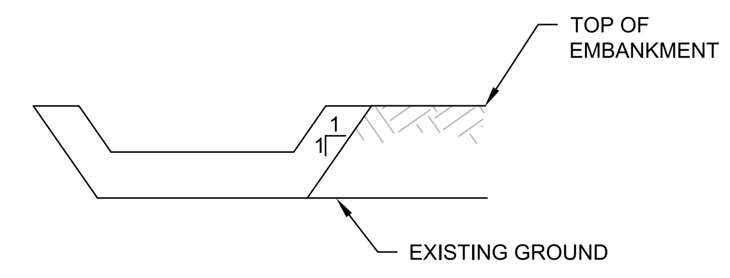


INSTALLATION OF GEOSYNTHETICS EROSION CONTROL MATS:
1. EROSION CONTROL MATS SHALL BE UTILIZED ON ALL SLOPES OF 3:1 OR GREATER REQUIRING PERMANENT STABILIZATION.
2. SLOPES SHALL BE PREPARED AND EROSION CONTROL MATS SHALL BE INSTALLED, ANCHORED AND SOIL FILLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND INSTALLATION PROCEDURES.
3. SEEDING SHALL BE COMPLETED IN ACCORDANCE WITH THE PERMANENT SEEDING SPECIFICATIONS ABOVE PRIOR TO PLACEMENT OF THE EROSION CONTROL MAT. A SECOND APPLICATION OF PERMANENT SEEDING SHALL BE APPLIED AFTER THE MAT IS IN PLACE, PRIOR TO SOIL FILLING THE MAT.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE, RESEEDING AND REPAIR OF MATS AND SLOPES UNTIL PERMANENT STABILIZATION IS ACHIEVED.

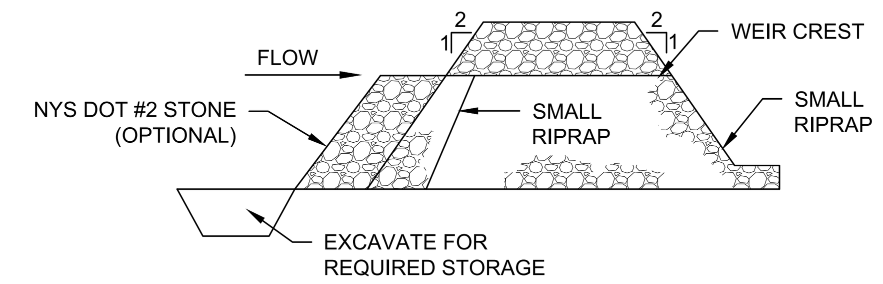
NOTES:
REFER TO GENERAL STAPLE PATTERN GUIDE FOR CORRECT STAPLE PATTERN RECOMMENDATIONS FOR SLOPE INSTALLATIONS.
1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
3. ROLL THE BLANKETS (A) DOWN OR (B) HORIZONTALLY ACROSS THE SLOPE.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2" OVERLAP.
5. WHEN BLANKETS MUST BE SPLICED DOWN THE SLOPE, PLACE BLANKETS END OVER END (SHINGLE STYLE) WITH APPROXIMATELY 4" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART.
6. MANUFACTURER'S INSTALLATION INSTRUCTIONS SHALL SUPERCEDE THIS DETAIL.



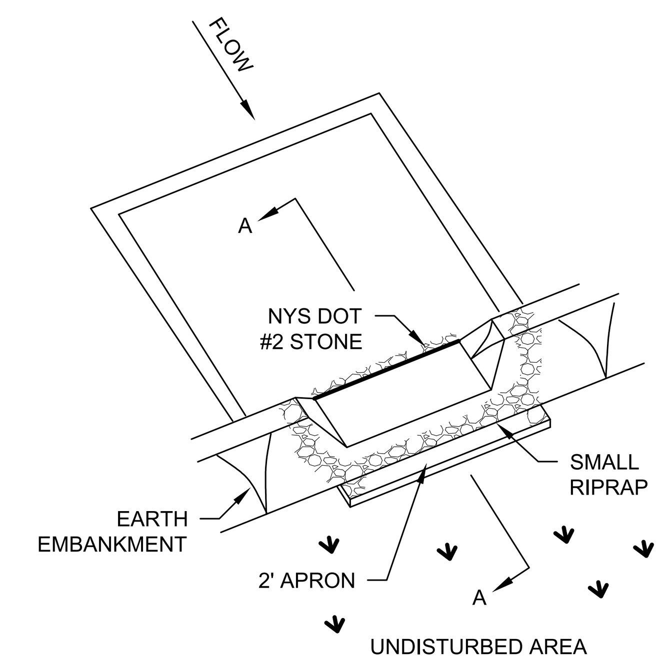
SEDIMENT BASIN



PROFILE



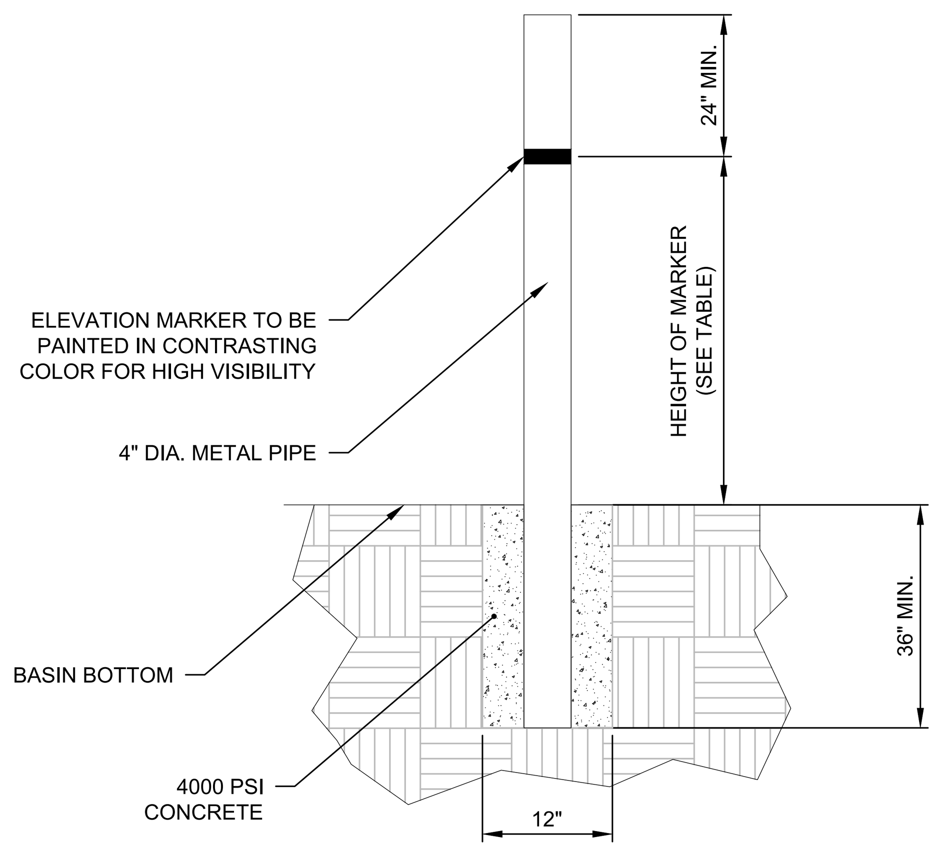
CROSS SECTION A-A



OPTION: A ONE FOOT LAYER OF NYS DOT #2 STONE MAY BE PLACED ON THE UPSTREAM SIDE OF THE RIPRAP INPLACE OF THE EMBEDDED FILTER CLOTH.

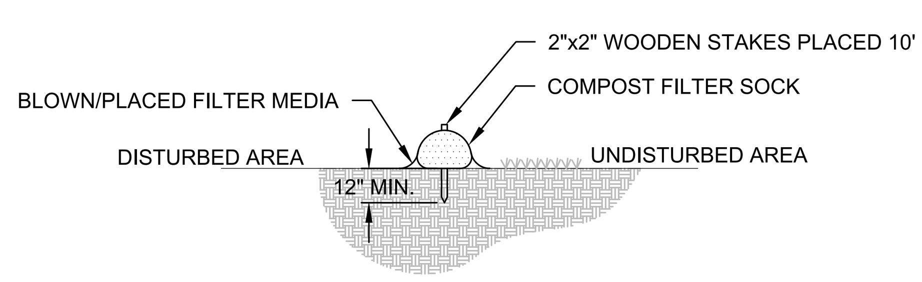
NOTES:
1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS AND OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. ALL CUT AND FILL SLOPES SHALL BE 2:1 OR FLATTER.
4. THE STONE USED IN THE OUTLET SHALL BE SMALL RIPRAP 4"-8" ALONG WITH A 1' THICKNESS OF 2" AGGREGATE PLACED ON THE UP-GRADE SIDE ON THE SMALL RIPRAP OR EMBEDDED FILTER CLOTH IN THE RIPRAP.
5. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO ½ THE DESIGN DEPTH OF THE TRAP. IT SHALL BE PLACED ON SITE AND STABILIZED.
6. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
7. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
8. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
9. THE MAXIMUM DRAINAGE AREA IS 5 ACRES.

STONE OUTLET SEDIMENT TRAP

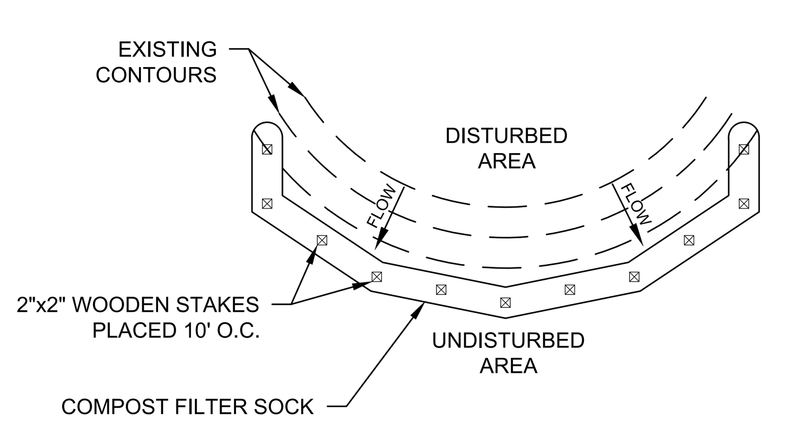


NOTES:
1. CONTRACTOR SHALL PLACE A 4" DIA. METAL PIPE AT A MINIMUM OF 36" BELOW THE BASIN BOTTOM ELEVATION ENCASED IN 12" OF 4000 PSI CONCRETE.
2. CONTRACTOR SHALL MARK THE CORRESPONDING ELEVATION FOR SEDIMENT STORAGE CLEANOUT ON THE PVC PIPE TO INDICATE WHEN MAINTENANCE IS REQUIRED.
3. SEDIMENT DEPTH GAUGE REQUIRED FOR SEDIMENT BASINS, FOREBAYS, AND INFILTRATION BASINS.

SEDIMENT DEPTH GAUGE



SECTION VIEW



PLAN VIEW

NOTES:
1. SOCK FABRIC SHALL MEET STANDARDS OF TABLE 5.1 OF NYS STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL. COMPOST SHALL MEET THE STANDARDS LISTED ON TABLE 5.2 OF NYS STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL.
2. COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE SOCK SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45° TO THE MAIN SOCK ALIGNMENT. MAXIMUM SLOPE LENGTH ABOVE ANY SOCK SHALL NOT EXCEED THAT SHOWN ON FIGURE X.X OF NYS STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL. STAKES MAY BE INSTALLED IMMEDIATELY DOWNSLOPE OF THE SOCK IF SO SPECIFIED BY THE MANUFACTURER.
3. TRAFFIC SHALL NOT BE PERMITTED TO CROSS FILTER SOCKS.
4. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES HALF THE ABOVEGROUND HEIGHT OF THE SOCK AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.
5. SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.
6. BIODEGRADABLE FILTER SOCKS SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
7. UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCKS, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

COMPOST FILTER SOCK

McFarland Johnson
60 RAILROAD PLACE
SUITE 402
SARATOGA SPRINGS, NEW YORK 12866
P:518-580-9380 F:518-580-9383
SaratogaROM@mjinc.com

PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

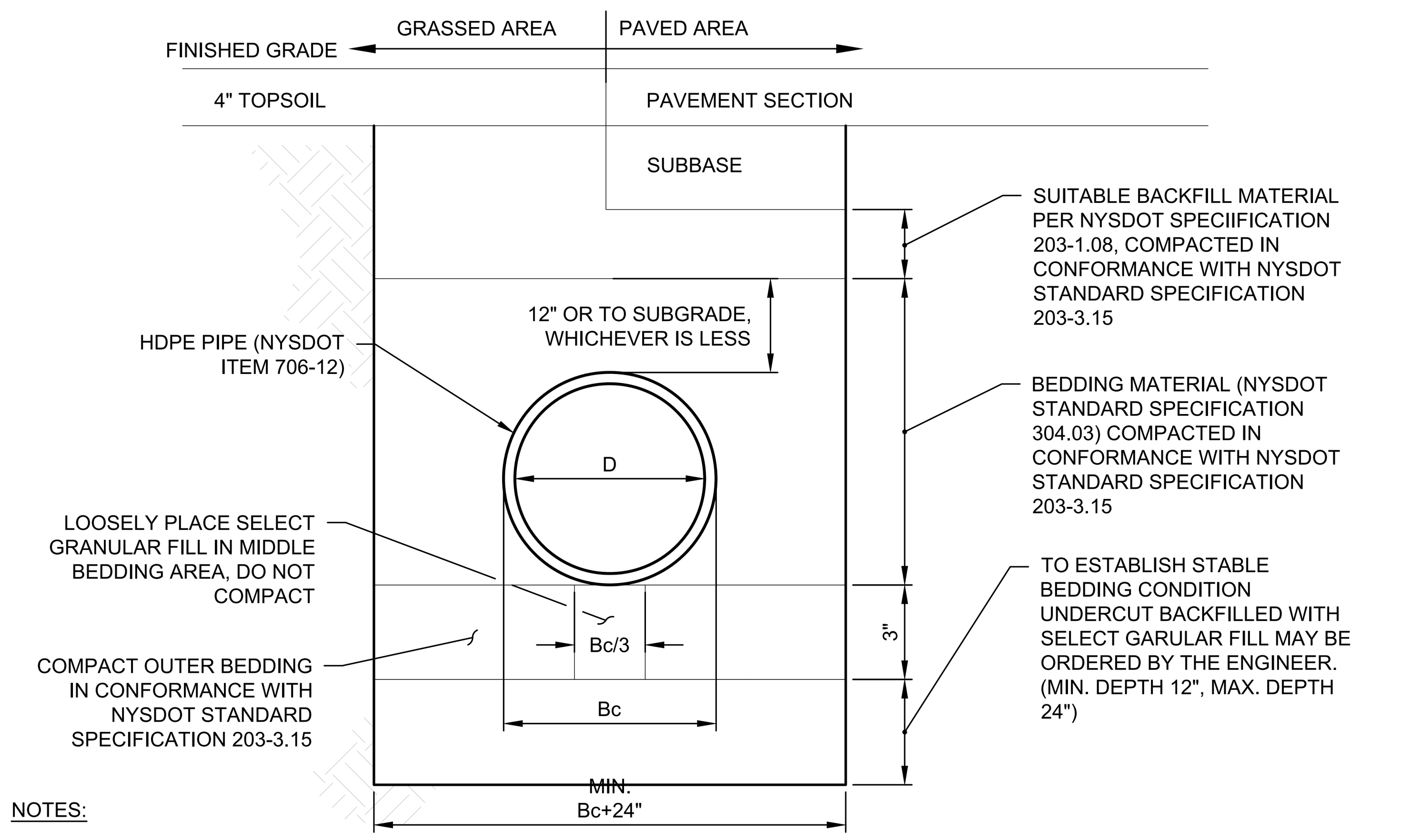
CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

PROJECT:
NORMANSKILL ST. REHAB

DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	1"=40'
DATE	OCTOBER 2021
PROJECT	18641.00

DRAWING TITLE
EROSION AND SEDIMENT CONTROL DETAILS

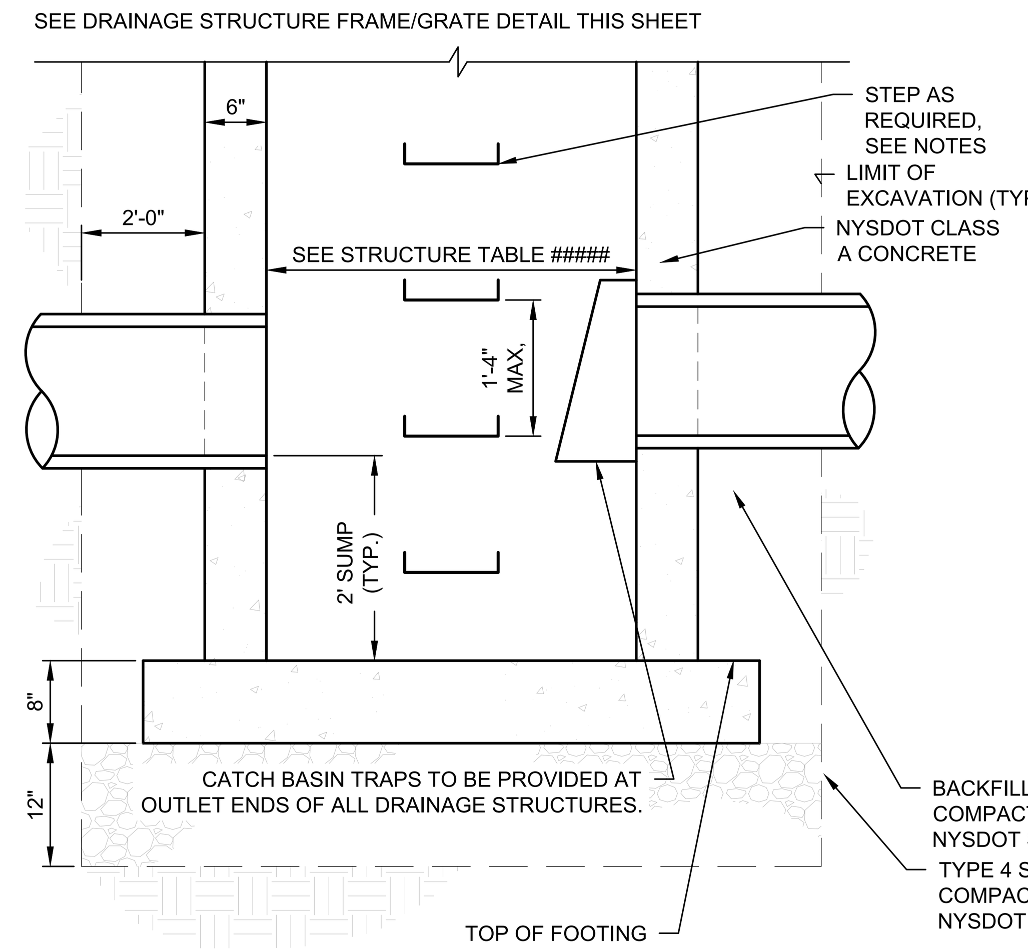
DRAWING NUMBER
DT-02



NOTES:

1. BRACING, SHEETING OR SHORING AS REQUIRED BY THE LATEST VERSION OF THE NEW YORK STATE DEPARTMENT OF LABOR AND U.S. DEPARTMENT OF LABOR O.S.H.A. REGULATIONS SHALL BE PREPARED BY A NYS LICENSED PROFESSIONAL ENGINEER.
2. ALL SPECIFIED STORM PIPE ITEMS SHALL BE SUPPLIED AND PLACED IN ACCORDANCE WITH NYSDOT STANDARD SPECIFICATIONS - SECTION 603, CULVERT AND STORM DRAINS.

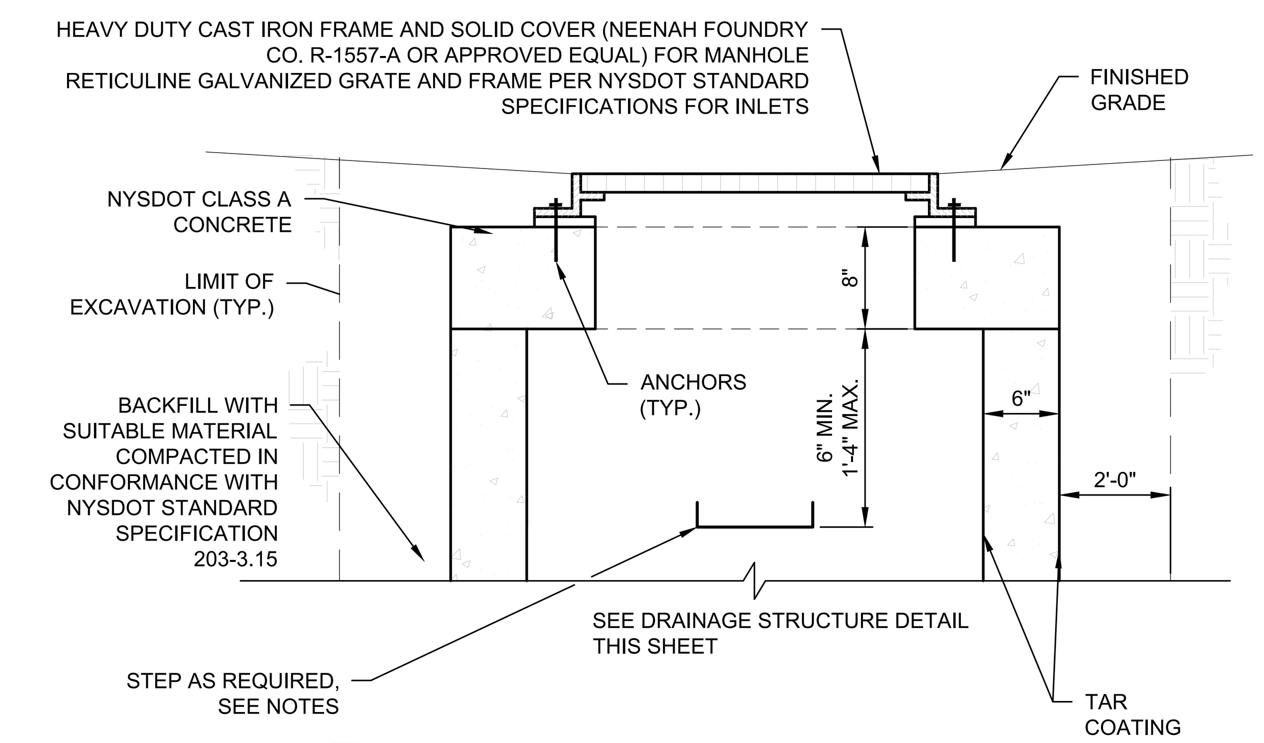
STORM PIPE BEDDING



NOTES:

1. ALL SPECIFIED DRAINAGE STRUCTURE ITEMS SHALL BE SUPPLIED AND PLACED IN ACCORDANCE WITH NYSDOT STANDARD SPECIFICATIONS - SECTION 604, DRAINAGE STRUCTURES.
2. DRAINAGE STRUCTURES SHALL BE CAST IN PLACE (RECTANGULAR ONLY) OR PRECAST UNITS (RECTANGULAR OR ROUND).
3. THE CONTRACTOR MAY SUBSTITUTE ROUND, PRECAST STRUCTURES USING SIZES INDICATED ON NYSDOT STANDARD SHEET 604-02, DRAINAGE STRUCTURE DETAILS (SHEET 4 OF 4)
4. ALL DRAINAGE STRUCTURES SHALL BE DESIGNED TO WITHSTAND H-20 LOADING.
5. STEPS SHALL BE REQUIRED IN ALL STRUCTURES DEEPER THAN 4'-0".

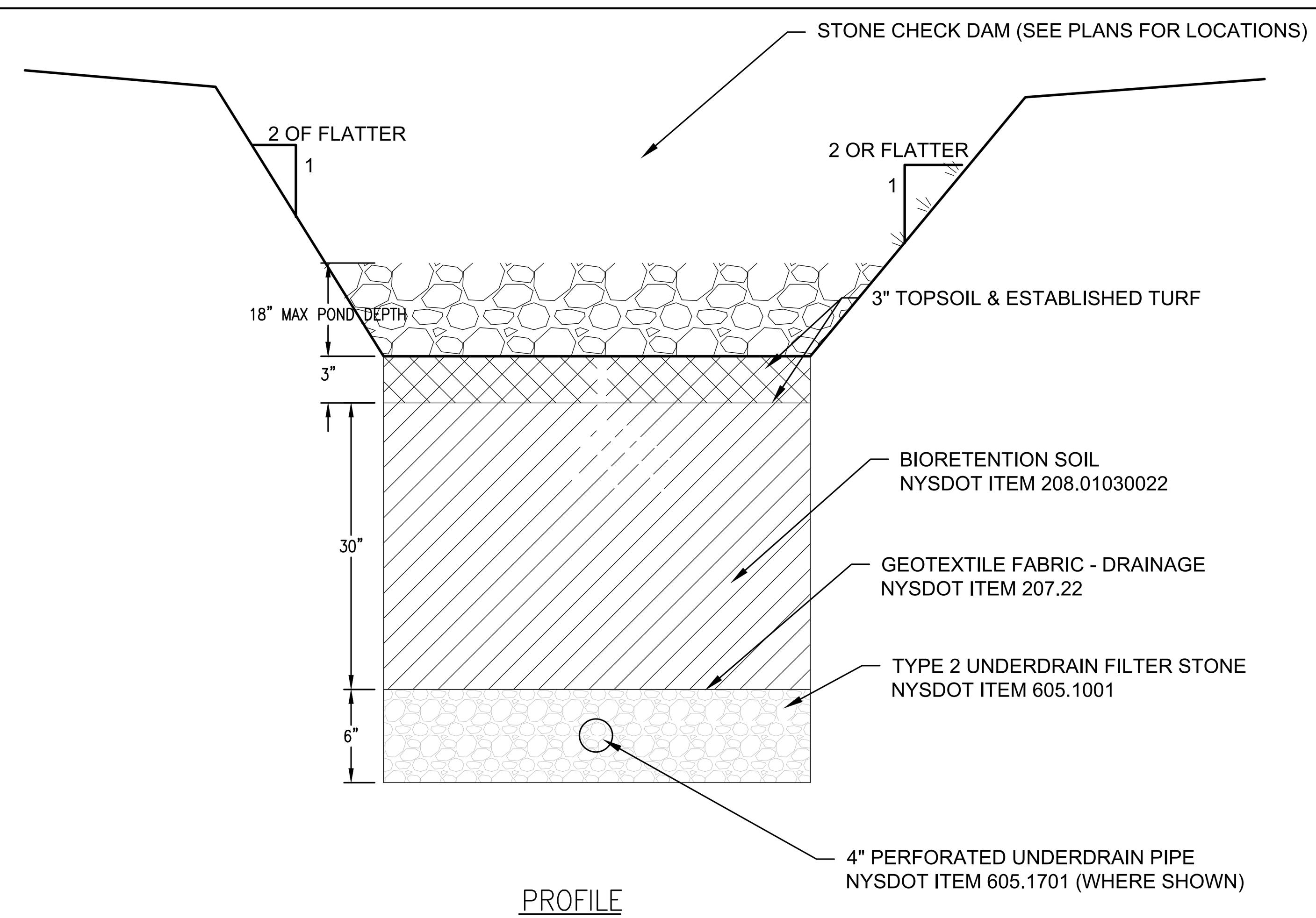
DRAINAGE STRUCTURE



NOTES:

1. ALL SPECIFIED STORM STRUCTURE ITEMS SHALL BE SUPPLIED AND PLACED IN ACCORDANCE WITH NYSDOT STANDARD SPECIFICATIONS - SECTION 604, DRAINAGE STRUCTURES.
2. ALL DRAINAGE STRUCTURES SHALL BE DESIGNED TO WITHSTAND H-20 LOADING.
3. STEPS SHALL BE REQUIRED IN ALL STRUCTURES DEEPER THAN 4'-0".

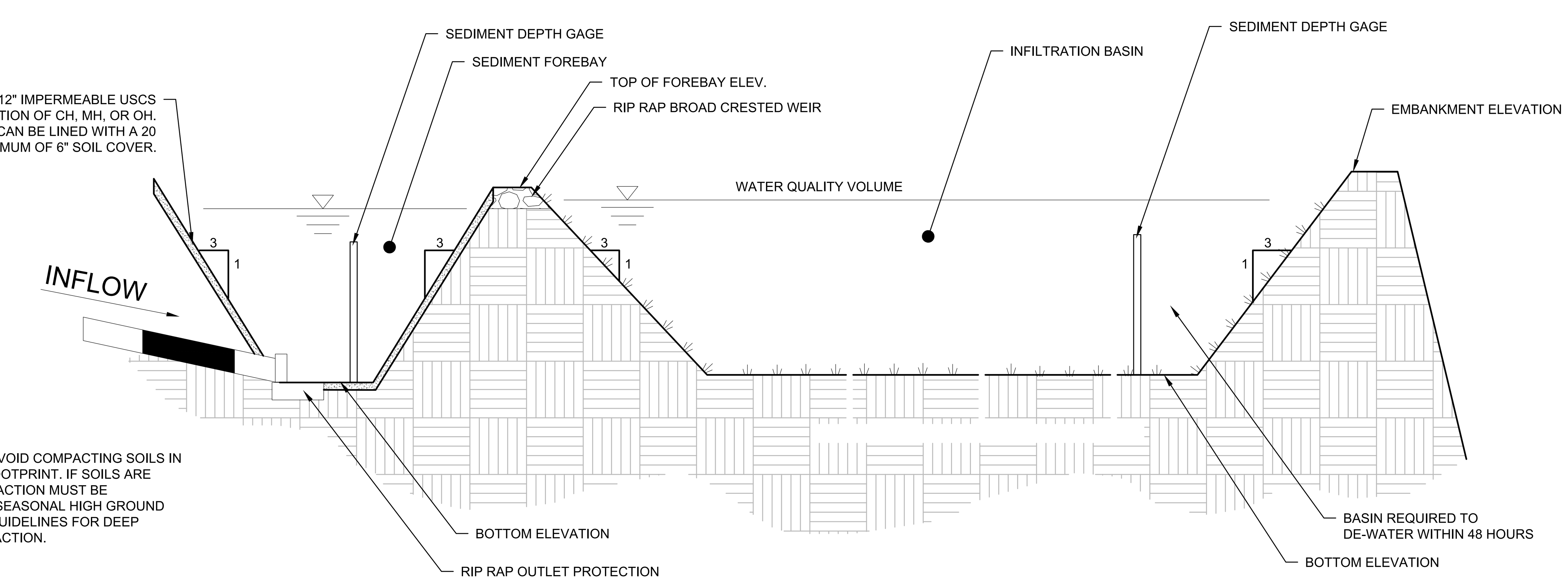
DRAINAGE STRUCTURE FRAME AND GRATE



PROFILE

DRY SWALE DETAIL

FOREBAY TO BE LINED WITH 12" IMPERMEABLE USCS SOIL CLASSIFICATION OF CH, MH, OR OH. ALTERNATIVELY, FOREBAYS CAN BE LINED WITH A 20 MIL HDPE LINER WITH A MINIMUM OF 6" SOIL COVER.



NOTES:

1. CONTRACTOR SHALL AVOID COMPACTING SOILS IN INFILTRATION BASIN FOOTPRINT. IF SOILS ARE COMPACTED, DECOMPACTION MUST BE PERFORMED PER THE SEASONAL HIGH GROUND WATER AND NYSDEC GUIDELINES FOR DEEP RIPPING AND DECOMPACTION.

FOREBAY ELEV. (FT)

IDENTIFIER NUMBER	1
TOP ELEV.	
BOTTOM ELEV.	
EXTREME FLOOD CONTROL ELEV.	
OVERBANK FLOOD CONTROL ELEV.	
CHANNEL PROTECTION ELEV.	
WATER QUALITY ELEV.	
SEDIMENT CLEANOUT ELEV.	

INFILTRATION BASIN ELEV. (FT)

IDENTIFIER NUMBER	1
EMBANKMENT ELEV.	
BOTTOM ELEV.	
EXTREME FLOOD CONTROL ELEV.	
OVERBANK FLOOD CONTROL ELEV.	
CHANNEL PROTECTION ELEV.	
WATER QUALITY ELEV.	
SEDIMENT CLEANOUT ELEV.	

INFILTRATION BASIN DETAIL

McFarland Johnson
60 RAILROAD PLACE
SUITE 402
SARATOGA SPRINGS, NEW YORK 12866
P:518-580-9380 F:518-580-9383
SaratogaROM@mjinc.com

PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

PROJECT:
NORMANSKILL ST. REHAB

DRAWN	JES
DESIGNED	NSO
CHECKED	AJF
SCALE	1"=40'
DATE	OCTOBER 2021
PROJECT	18641.00

DRAWING TITLE
DRAINAGE DETAILS

DRAWING NUMBER
DT-03

APPENDIX C

DRAINAGE DESIGN REPORT

DRAINAGE DESIGN REPORT

FOR

PORT OF ALBANY SITE INFRASTRUCTURE IMPROVEMENTS
TOWN OF BETHLEHEM
ALBANY COUNTY
NEW YORK

AUGUST 2021

UPDATED – OCTOBER 2021

CREATED FOR:

PORT OF ALBANY

ALBANY PORT DISTRICT COMMISSION
106 Smith Boulevard
Albany, NY 12202
518-463-8763
www.portofalbany.us

CREATED BY:

McFarland Johnson

60 Railroad Place, Suite 402
Saratoga Springs, NY 12866
518-580-9380
www.mjinc.com

Table of Contents

I. General Information
- *A. Project Description*
- *B. Soil Classification*

II. Hydrology
- *A. Existing Conditions*
- *B. Proposed Conditions*

III. Stormwater Management & SPDES Requirements
- *A. Methodology*
- *B. Water Quality Volume (WQv) / Runoff Reduction Volume (RRv)*
- *C. Channel Protection Volume (CPv)*
- *D. Overbank Flood (Qp)*
- *E. Extreme Storm (Qf)*

IV. Summary of Findings
- *A. Summary of Results*
- *B. Conclusion*

Appendix A – Existing Conditions Drainage Map and HydroCAD Report

Appendix B – Proposed Conditions Drainage Map and HydroCAD Report

Appendix C – Water Quality and Runoff Reduction Volume Calculations

Appendix D – Alternative Stormwater Practice Specifications

Appendix E – NRCS Soils Report

I. General Information

A. Project Description

This Stormwater Management Report has been developed for a Supplemental Environmental Impact Statement (SEIS) regarding a proposed development at the Port of Albany. The proposed development is an offshore wind (OSW) manufacturing facility that will produce wind turbine tower components. The Project is situated on 81.62 acres of land at the Beacon Island site, located at the confluence of the Normans Kill and Hudson River. The project also includes development within 4.4 acres of the adjoining parcel owned by National Grid as well as the extension and improvement of Normanskill Street. The project owner, Albany Port District Commission (APDC), is proposing to develop the vacant parcels of land (tax parcels 98.00-2-10.23 and 98.01-2-1.0) to expand the existing Port of Albany in the Town of Bethlehem, Albany County, New York.

The proposed project will include development of an OSW tower manufacturing (Marmen-Welcon) facility consisting of five (5) separate buildings totaling up to 589,000+/- square feet of floor space. The following is a breakdown of the function and size of each building:

- Building A Plate Preparation & Welding (289,931 SF)
- Building B Welding Finishing (99,936 SF)
- Building C Blast Metallization Plant (121,593 SF)
- Building D Internal Assembly Finishing (57,898 SF)
- Building E Material Receiving (19,600 SF)

Tower production will occur within four (4) buildings (Buildings A-D) at the main facility on the Port Expansion property located in the Town of Bethlehem. The 5th building (Building E) will be located at 700 Smith Boulevard within the existing Port District in the City of Albany. A proposed gated bridge over the Normans Kill will provide a truck transportation route in and out of the main facility, by connecting Beacon Island and the 14.7-acre offsite parcel at 700 Smith Boulevard. In conjunction with the proposed bridge, Normanskill street is to be extended from its existing end point to the bridge. The existing pavement will be improved to accommodate the proposed trucking route. Employee parking will be situated on the adjoining land owned by National Grid with access from River Road. A proposed 500 LF wharf and associated dredging along the Hudson River will be used to load and ship completed tower sections. A separate drainage report will be prepared for the 14.7-acre Building E site at 700 Smith Boulevard and the portion of Normanskill St. located in the City of Albany, as the sites are separated by approximately 1-mile and are under separate MS4 jurisdictions.

Historically, the Port Expansion site was composed of small islands and river channels subject to natural shifts due to flows associated with the Hudson River and the former Island Creek, a side channel of the Hudson River. Island Creek historically flowed along the western side of the site through the current power line corridor and discharged to the Hudson River at the southern end of the site. Based on available mapping, sometime between 1936 and 1961, Island Creek channel was diverted at the north end of the site directly to the Hudson River, whereupon it was referred to solely as Normans Kill, the main tributary to this former channel. The site was subject to historic filling operations to create usable lands and a portion of the site was operated as a coal ash (fly ash) disposal site by Niagara Mohawk from approximately 1952 to 1970. As such, there are large areas of fly ash deposits on the site that must be considered during the design and construction of the site infrastructure and stormwater management facilities. Excavated fly ash material will need to be appropriately handled and properly disposed of as discussed in Section B below. A soil management plan has been developed and will require a cap over the site.

The purpose of this report is to assess the stormwater quality, quantity, and erosion and sediment control for the development of the site. This report has been developed in accordance with the New York State Department of Environmental Conservation (NYSDEC) State Pollution Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity, GP-0-20-001 (Permit) and the NYSDEC Stormwater Management Design Manual (The Manual). The project site is located within the Town of Bethlehem, Albany County, New York, which is an MS4 community, requiring this report and project to receive approval from the Town. A separate drainage report will be prepared for the 14.7-acre Building E site at 700 Smith Boulevard and the portion of Normanskill St. located in the City of Albany, as the sites are separated by approximately 1-mile and are under separate MS4 jurisdictions.

B. Soil Classification

According to the Natural Resources Conservation Service (NRCS) web soil survey, there are five (5) mapped soil units identified within the project boundary (see Appendix E). The majority of the soil at the expansion site falls within the hydrologic soil group B/D. The first letter corresponds to drained soil's properties under drained conditions and the second to saturated conditions. Group B soils have moderate infiltration and runoff rates while group D have a low infiltration rate and a high runoff rate. The soils with dual group identifiers have been modeled with the more conservative of the two, in this case a D soils group. Most of the soil adjacent to Normanskill Street is within soil group A. Group A soils have a high infiltration rate.

The complete list of soils found on the project site is identified in the table below (see Appendix E for NRCS Soils Report).

Table I – Soils Summary

Symbol	Soil Name	Hydrologic Soil Group
HuE	Hudson silt loam, 25 to 45 Percent slopes	C/D
NrD	Nassau very channery silt loam, hilly, very rocky	D
Ug	Udorthents, loamy	A
Ur	Urban land	
Wo	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	B/D

Geotechnical studies have been undertaken to evaluate the subsurface conditions of the site. These investigations have been summarized in the following reports:

- *Preliminary Geotechnical Evaluation and Interpretive Report*, CME Associates, Inc., April 5, 2017
- *Supplemental Geotechnical Report*, Dente Group, July 20, 2017

Copies of these reports were included in the TOWN OF BETHLEHEM PLANNING BOARD, DRAFT GENERIC ENVIRONMENTAL IMPACT STATEMENT For ALBANY PORT DISTRICT COMMISSION PORT OF ALBANY EXPANSION PROJECT, Appendix E.

- *Draft Geotechnical Engineering Report,* Terracon, October 15, 2021

A copy of this reports is included in the TOWN OF BETHLEHEM PLANNING BOARD, SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT For ALBANY PORT DISTRICT COMMISSION PORT OF ALBANY EXPANSION PROJECT.

Based on these previous investigations, the subsurface conditions of the expansion site are generally characterized by historic fills of various depths overlying, in sequence with depth; river sediments, alluvial sands, glaciolacustrine silt/ clay, glacial till, and shale bedrock. The fill was noted at specific boring locations ranging from 6 to 23 feet below existing grade. The fill material is characterized as a random landfill deposit containing natural and solid waste deposits such as, but not limited to, foundry sand waste, sand, silt, coal ash, gravel, and organic matter. A predominant component of the fill was reported as coal ash.

Shale bedrock was found beneath the glacial till soils at select boring locations. The depth to rock ranged from approximately 61 feet below grade near the northwest portion of the site, to greater than 148 feet at the southeast portion of the site. The rock depths appear shallowest on the north and west sides of the site and increase to the east towards the Hudson River and in a south direction across the site. Based on the New York State Museum and Science Service's Geologic

Map of New York: State Hudson-Mohawk Sheet, and the geotechnical rock core samples, the bedrock appears to be consistent with the Normans kill Shale Formation.
According to the geotechnical reports, shallow groundwater was observed at depths ranging from approximately 1.5 to 13.7 feet below existing grade. However, due to the subsurface conditions, the shallower observations could be representative of perched groundwater zones due to discontinuous impermeable layers. Shallow groundwater fluctuations should be expected to occur at this site depending on several factors such as rainfall, seasonal changes, prevailing climate, ambient weather conditions, and the tidal influences of the Hudson River.

A soil management plan (SMP) has been prepared in accordance with the NYSDEC regulations. The SMP is included in SWPPP.

II. Hydrology

A. Existing Conditions

The existing drainage area is comprised of a total of 107.7 +/- acres, separated by the Normans Kill. The drainage area is bordered by the Hudson River to the east. At the south boundary there is a Public Service Energy Group (PSEG) power plant, and to the west a parcel owned by National Grid that conveys overhead electric transmission lines as well as an underground gas main. The Port Expansion site consists primarily of brush and trees with a small gravel area as well as abandoned railroad tracks. The Normanskill St. site consists of an existing road as well as brush and trees to the west. The existing pervious area is 104 +/- acres, and the existing impervious area is 3.7 +/- acres.

The existing drainage condition is split up into six (6) drainage areas. Drainage areas DR-A, DR-B and DR-F drain to analysis point #1 and drainage areas DR-D and DR-E drain to analysis point #2. Drainage area DR-C drains to a self-contained depression for storage. See Appendix A for the Existing Conditions Drainage Map.

Runoff from DR-A site travels via sheet and shallow concentrated flow directly to a wetland located in the northwest corner of the site (Wetland 1). During large storm events the wetland overflows into an existing 40” pipe with direct outlet to the Normans Kill. Analysis of the existing capacity of the outlet pipe is provided in section IV below. Runoff from areas DR-B, DR-D, DR-E, and DR-F travel via sheet and concentrated flow to low areas with eventual outfall directly to the Normans Kill and Hudson River. An approximately 30-acre internal portion of the site (DR-C) was determined to be self-contained within the site capable of storing and infiltrating the 100-year storm event.

A wetland delineation was conducted in April 2019 by McFarland Johnson for the FGEIS. The results of the delineation indicated that there are 8 freshwater wetlands located within the project limits. These wetlands are hereafter referred to as Wetlands 1, 3, 4, 5, 6, 7, 8, and 9. Wetlands within the original study are totaled approximately 2.33 acres.

A Supplemental Wetland Delineation was performed by MJ in April 2021 of the 18.22 acres on the National Grid Parcel. One contiguous wetland, comprising a total of approximately 7.13 acres, was delineated within the 18.22-acre area. The delineated wetland represents an extension of the 2019 wetland delineation and previously identified as Wetland 1. Wetland 1 drains in a northerly direction into 40-inch corrugated metal pipe (CMP) which discharges directly to the Normans Kill.

The existing site falls within the Normans Kill watershed of the Middle Hudson Sub-Basin for the Lower Hudson River Basin (HUC10: 0202000602, Water Index No H-221-4) which is listed as a Class C water. Neither the Normans Kill nor the Hudson River are listed in the Manual's Appendix C as a watershed where enhanced phosphorus removal standards are required. Additionally, neither are listed in the Manual's Appendix E as a watershed impaired by pollutants related to construction activity.

B. Proposed Conditions

The proposed Port Expansion Site development includes 569,358 +/- square feet of OSW manufacturing facility space spread out over four (4) separate buildings. Ancillary impervious areas include parking for automobiles and trucks, a roadway, bridge, and a maritime wharf. The remainder of the site will be used for tower storage and be made up of dense graded aggregate. There will also be small pervious areas of grass and unaltered brush and trees.

The Normanskill Street improvements are along a 0.52 mile stretch of roadway within the Town of Bethlehem. A new portion of Normanskill Street is to be constructed from the proposed vehicle bridge north to the existing roadway. This extension is approximately 925 feet long and will be dense graded aggregate. This area adds 0.9 acres of new impervious. The existing portion of Normanskill Street to be improved includes 0.18 acres of new pavement on the west side of the roadway. The remaining portion of the existing roadway will be re-paved and not disturbed as subbase will remain. A top course mill and fill of 1.11 acres is proposed. The improvements also include the required corresponding stormwater conveyance and treatment.

The total post-development drainage area will be 98.88 acres, consisting of approximately 67.13 acres of impervious cover and 31.75 acres of pervious cover. The total disturbance for construction of the site will be approximately 69.3 acres.

The proposed drainage condition is split up into sixteen (16) drainage areas. Drainage areas DR-1, DR-2, and DR-3 drain to analysis point #1 and Drainage Areas DR-4, DR-5, DR-6, DR-7, DR-8, DR-9, DR-10, DR-11, DR-12, DR-13, DR-14, DR-15, and DR-16 drain to analysis point #2. Each analysis point remains the same in the pre- and post-development condition for comparison. See Appendix B for the Proposed Conditions Drainage Map.

Runoff from the proposed impervious areas will travel via sheet and shallow concentrated flow to one of nine (9) closed drainage networks. Drainage networks 1-7 will be conveyed through a

NYSDEC approved stormwater filtering system which will provide water quality volume treatment prior to being discharged into the Normans Kill or Hudson River.

Drainage networks 8 and 9 will be conveyed to Micropool Extended Detention Ponds (Type P-1 per the Manual) via closed drainage systems. The ponds will provide water quality volume treatment. The portion of the water held above the wet pool will be slowly discharged to the surrounding area over a 24-hour period. During storm events greater than the WQv event, a stone lined spillway will convey water to the surrounding area, and flow into Wetland 1.

Drainage Areas 10 and 11 consist of pavement areas that will sheet flow to respective Filter Strips before sheet-flowing into Wetland 1. Drainage area DR-12 will not be disturbed in the development of this project and will continue to drain into Wetland #1. The existing overflow pipe within Wetland 1 has been analyzed for capacity in the proposed condition, see section IV below.

Drainage areas 13 and 14 correspond to sections of new Normanskill St roadway. In each area, stormwater is collected via roadside swales and directed into an infiltration basin. The basins are designed to infiltrate the WQv as well as smaller storm events. During large storm events water will overflow to the surrounding area and eventually to the Normans Kill.

Drainage area 15 corresponds to a section of Normanskill St that is being expanded to the west. Stormwater is collected via a roadside swale with a dry swale at the end. In large storm events, water will flow through the dry swale to an overflow trench to be discharged in the surrounded vegetated area, eventually flowing into the Normans Kill. Drainage Area DR-16 will not be disturbed in the development of this project and will continue to drain into the Normans Kill.

The overall drainage plan incorporates multiple separate systems with outlets to the Normans Kill and/or Hudson River to avoid a more concentrated larger outlet for the site. See Appendix B for proposed conditions plans and watershed mapping.

III. Stormwater Management & SPDES Requirements

The Proposed Development Project will have land disturbance of more than 1-acre, a full SPDES permit will be required, and a Stormwater Pollution Prevention Plan (SWPPP) will be developed in accordance with the Permit regulations and MS4 requirements as part of the Town of Bethlehem site plan approval process.

Due to the presence of fly ash, in addition to a NYSDEC SPDES, a Site Management Plan (SMP) has been prepared in accordance with 6 NYCRR Part 375 and DER Technical Guidance for Site Investigation and Remediation and submitted to the NYSDEC, Division of Environmental Remediation and the NYSDOH. The SMP includes: a Health and Safety Plan (HASP), to inform and protect the contractor and their work force; a Community Air Monitoring Plan (CAMP), to monitor and protect the surrounding communities; and an Excavation Work Plan (EWP), to direct the activities of the contractor during construction. The EWP includes a detailed description of the work to be performed, the anticipated environmental conditions, and engineering controls to mitigate the movement of fly ash. The SMP has been included in the SEIS and SWPPP.

The SWPPP will be prepared in coordination with the Manual and meet the following criteria as the principal objectives contained in an approved SWPPP:

- Reduction or elimination of erosion and sediment loading to waterbodies during construction activities. Controls will be designed in accordance with the NYSDEC's New York State Standards and Specifications for Erosion and Sediment Control.
- Mitigate the impact of stormwater runoff on the water quality of the receiving waters.
- Maintenance of stormwater controls during and after completion of construction.

These objectives will be accomplished by incorporating design criteria outlined within the Technical Guidelines provided by The Manual and summarized below.

A. Methodology

To analyze the hydrologic impacts of the proposed development, a storm water management model was developed in accordance with the Manual. HydroCAD™, by HydroCAD Software Solutions LLC was used to model both the existing and proposed conditions: soil data from the NRCS Web Soil Survey was entered into the software; land coverage areas were estimated using aerial photography and site visits; watershed areas were developed using the surveyed topography; time of concentrations were estimated using USDA, Urban Hydrology for Small Watersheds, TR-55 (TR-55) methodology; and finally runoff and routing calculations were performed using the SCS Unit Hydrograph method.

Green Infrastructure practices were designed in accordance with the Manual using the NYSDEC Runoff Reduction Worksheets available through the NYSDEC's Construction Stormwater Toolbox, available on their website.

The following general steps are followed when conducting a stormwater design:

1. Site Planning: The existing natural resource areas and drainage patterns including wetlands, waterways, floodplains, and soils are identified. Conservation of natural resources are maximized given the proposed site.
2. Pre and Post-Development Conditions Analysis: The pre and post-development stormwater runoff conditions for the 1, 10, and 100-year storm events are determined using HydroCAD (detailed HydroCAD reports for this project can be found in Appendices A and B).
3. Water Quality: The Water Quality Volume and Runoff Reduction Volume are calculated using Chapter 4 of the Manual and Green Infrastructure Worksheets (provided in Appendix C).
4. Water Quantity: Peak runoff and stormwater retention/detention are evaluated using

the Manual.

B. Water Quality Volume (WQv) / Runoff Reduction Volume (RRv)

Section 4.2 of the Manual states that Water Quality Volume (WQv) is intended to improve the water quality by capturing and treating runoff from small, frequent storm events that contain higher pollutant levels created through the increase of impervious surfaces. Impervious surfaces accumulate pollutants that quickly wash off and rapidly enter downstream waters as well as prevent natural groundwater recharge.

The WQv required for the proposed site is based upon the 90% rainfall event number, percent of impervious cover, and the total site area. Calculations were done using the Green Infrastructure worksheets and can be found in Appendix C. The total WQv required is 277,111 cubic feet.

Runoff Reduction Volume (RRv) is the reduction of the total WQv by application of green infrastructure techniques and stormwater management practices to replicate pre-development hydrology more closely. The intent of RRv is to recognize the water quality benefits of certain site design practices to address flow as a pollutant of concern.

According to Section 4.3 of the Manual, RRv may be calculated based on three methods:

1. Reduction of the practice contributing area in WQv
2. Reduction of runoff volume by storage capacity of the practice
3. Reduction using standard SMPs with runoff reduction capacity

The minimum RRv required by the proposed site is based on the total area of new impervious cover and the Hydrologic Soil Group (HSG) Specific Reduction Factor (S). The specific reduction factor is based on the HSGs present at the existing site. Calculations were done using the Green Infrastructure worksheets and can be found in Appendix C. The minimum RRv was determined to be 59,687 cubic feet.

As noted in the SMP, due to the level of contamination present in the existing soils across the majority of the site, stormwater infiltration is not a permissible practice for the Port Expansion Site. Without the capability to infiltrate stormwater runoff, most treatment practices selected do not include a RRv. However, filter strips were utilized in the where applicable.

The Normanskill Street improvement portion of this project is in an area of uncontaminated soil with high infiltration rates. Therefore, all treatment practices selected infiltrate into the ground and provide RRv. The minimum RRv as required by the entire project is not met, however the total volume of water to be treated (WQV) is satisfied. The RRv is summarized in Table II below:

Table II – Practices Providing Runoff Reduction

Drainage Area	Practice	RRv (cf)
DR-10	Filter Strip	701
DR-11	Filter Strip	5,028
DR-13	Infiltration Basin	1,800
DR-14	Infiltration Basin	2,340
DR-15	Dry Swale	128
	Total RRv	**9,997**

The following stormwater treatment practices were designed to meet the WQv requirements of the Manual:

Stormwater Ponds

Two stormwater ponds (Pond #1 and Pond #2 have been designed as Micropool Extended Detention Ponds (P-1) in accordance with the Manual. Pond #1 and #2 treat stormwater runoff from drainage areas DR-8 and DR-9 respectively. Runoff from these areas sheet flows to a closed drainage system and outlets into the forebay of the pond. As required by the manual, the permanent pool volume is approximately 20% of the WQv. Because detention of large storm events is not required (see section III.C through III.E below) the ponds do not have additional capacity for the Channel Protection Volume (CPv) or Overbank Flood Control (Qp). Any stormwater held above the permanent pool elevation will be slowly discharged from the pond over a period of 24 hours. In large storm events, the pond will provide a “first flush” treatment with stabilized emergency spillways to direct flow to the surrounding area for storage and eventual flow to Wetland #1. Detailed design of the stormwater ponds can be found on page GR-14 of the Expansion Site plan set.

Manufactured Stormwater Filtering Units

Seven stormwater filtering systems have been designed to treat runoff from drainage areas DR-1, DR-2, DR-3, DR-4, DR-5, DR-6, and DR-7. Runoff from these areas sheet flows to its respective closed drainage system and is treated through a filtering manhole unit(s) before the outfall. Details of the proposed systems are located on sheet GR-15 of the Expansion Site plan set. All systems meet the minimum criteria as defined in Chapter 4 of the Manual and are certified by Washington State Department of Ecology (TAPE) the Maryland Department of the Environment. The systems provide 89% TSS removal and 40% TP removal, which exceed the performance requirements defined in section 3.3.2 of the Manual. Usage of the manufactured stormwater systems is documented in section 9 of the SWPPP.

Filter Strips

Two filter strips have been designed to treat stormwater runoff from drainage areas DR-10 and DR-11. Runoff from these areas sheet flow from a pavement length no longer than 75’ to a gravel diaphragm (to ensure sheet flow entering the grassed filter strip). The filter strips have a maximum slope of 2% for a length of 60’. Runoff enters a permeable buffer at the end of the filter strip before flowing out toward Wetland 1. Detailed filter strip designs can be found in the GI worksheets (Appendix C) and sheet GR-14 of the Expansion Site plan set.

Infiltration Basins
Two infiltration basins (Basin #1 and Basin #2) have been designed in accordance with the manual. Basin #1 and #2 treat stormwater runoff from drainage areas DR-13 and DR-14 respectively. Runoff from these areas sheet flows to an open roadside swale which outlets into the forebay of the pond. Both ponds have been designed to infiltrate the WQv as required by each catchment area. Because detention of large storm events is not required (see section III.C through III.E below), the basins do not have additional capacity for the Channel Protection Volume (CPv), Overbank Flood Control (Qp), or Extreme Flood Control (Qf). In large storm events, the basin will provide a "first flush" treatment with stabilized emergency spillways to direct flow to the surrounding area for storage and eventual flow to the Normans Kill. All stormwater within the basin will be infiltrated within 48 hours of a rain event.

Dry Swale
A dry swale has been designed to treat the new impervious area within DR-15. Runoff from this section will sheet flow to a roadside swale with the end segment constructed as a dry swale. In large storm events, water not infiltrated into the swale will overflow to a stabilized overflow which drains to the surrounding area and eventually the Normanskill. Detailed design of the dry swale is provided in the GI Worksheets (Appendix C) and sheet DT-03 of the Normanskill Street plan set.

Sizing of the above practices were designed in accordance with Chapter 4 of the Manual; however, they do not provide, nor are they required to provide, large storm event flow mitigation (see section III.C through III.E below). The WQv provided for each drainage area is summarized in Table III below:

Table III – Practices Providing Water Quality Volume

Drainage Area	Stormwater Practice	WQv Provided (cf)
DR-1	Filter Type 2	28,967
DR-2	Filter Type 2	31,864
DR-3	Filter Type 3	36,829
DR-4	Filter Type 3	19,162
DR-5	Filter Type 2	29,795
DR-6	Filter Type 1	23,465
DR-7	Filter Type 3	16,470
DR-8	Stormwater Pond #1	40,545
DR-9	Stormwater Pond #2	50,391
	Total WQv	**277,488**

C. Channel Protection Volume (CPv)

Stream Channel Protection Volume Requirements (CPv) are designed to protect stream channels from erosion. The Manual was used to determine the water quantity requirements of CPv; specifically, providing 24-hour extended detention for the 1-year storm event or discharging directly to tidal waters.

According to Section 4.4 of the Manual, the Stream Channel Protection Volume (CPV) requirement does not apply when the site discharges to a tidal waterbody.
The CPv requirement does not apply in certain conditions, including the following:

- Reduction of the entire CPv volume is achieved at a site through green infrastructure or infiltration systems.
- The site discharges directly tidal waters or fifth order (fifth downstream) or larger streams.

The Hudson River and Normans Kill are classified as tidal waters at the project site. Therefore, the project site discharges directly to tidal waters in both the existing and proposed conditions and 24-hour extended detention of the 1-year storm event is not required for this project. Drainage areas DR-7 through DR-12 convey to existing Wetland # 1. Existing 40" outlet pipe from the existing wetland 1 was analyzed to confirm that adequate capacity was present for the proposed drainage conditions prior to being discharged to the tidal waters of the Normanskill. The 40" discharge pipe has adequate capacity to convey the 1-year storm event, see Table VIII.

The change in hydrology for the 1-year storm event from existing to proposed is shown in the HydroCAD Report printouts provided in Appendix B for reference.

D. Overbank Flood Control (Qp)

The primary purpose of the overbank flood control sizing criterion is to prevent an increase in the frequency and magnitude of out-of-bank flooding generated by urban development. The Manual was used to determine the water quantity requirements of Qp; specifically, providing sufficient retention volume to discharge all runoff from the proposed 10-year storm event at a rate equal to or less than the existing peak 10-year runoff rate or discharging directly to tidal waters.

According to Section 4.5 of the Manual, the Overbank Flood Control Criteria (Qp) requirement does not apply when the site discharges to a tidal waterbody.

The overbank flood control requirement (Qp) does not apply in certain conditions, including:

- The site discharges directly tidal waters or fifth order (fifth downstream) or larger streams. Refer to Section 4.3 of the Manual for instructions.

The Hudson River and Normans Kill are classified as tidal waters at the project site. Therefore, the project site discharges directly to tidal waters in both the existing and proposed conditions and retention of the 10-year storm event is not required for this project. Drainage areas DR-7 through DR-12 convey to existing Wetland # 1. Existing 40” outlet pipe from the existing wetland 1 was analyzed to confirm that adequate capacity was present for the proposed drainage conditions prior to being discharged to the tidal waters of the Normanskill. The 40” discharge pipe has adequate capacity to convey the 10-year storm event, see Table VIII.

The change in hydrology for the 10-year storm event from existing to proposed is shown in the HydroCAD Report printouts provided in Appendix B for reference.

E. Extreme Flood Control (Qf)

The intent of the extreme flood criteria is to prevent the increased risk of flood damage from large storm events, maintain the boundaries of the predevelopment 100-year floodplain, and protect the physical integrity of stormwater management practices. The Manual was used to determine the water quantity requirements of Qf; specifically, providing sufficient retention volume to discharge all runoff from the proposed 100-year storm event at a rate equal to or less than the existing peak 100-year runoff rate or discharging directly to tidal waters.

According to Section 4.6 of the Manual, the Extreme Flood Control Criteria (Qf) requirement does not apply when the site discharges to a tidal waterbody.

The 100-year storm control requirement can be waived if:

- The site discharges directly tidal waters or fifth order (fifth downstream) or larger streams. Refer to Section 4.3 of the Manual for instructions.

The Hudson River and Normans Kill are classified as tidal waters at the project site. Therefore, the project site discharges directly to tidal waters in both the existing and proposed conditions and retention of the 100-year storm event is not required for this project. Drainage areas DR-7 through DR-12 convey to existing Wetland # 1. Existing 40” outlet pipe from the existing wetland 1 was analyzed to confirm that adequate capacity was present for the proposed drainage conditions prior to being discharged to the tidal waters of the Normanskill. The 40” discharge pipe has adequate capacity to convey the 100-year storm event, see Table VIII.

The change in hydrology for the 100-year storm event from existing to proposed is shown in the HydroCAD Report printouts provided in Appendix B for reference.

IV. Summary of Findings

A. Summary of Results

Table IV lists the required and provided RRv and WQv for the project. As shown, the project is capable of meeting the total water quality volume required by the Manual.

Table IV – Stormwater Management Practice Summary

Drainage Area	RRv (cf)	WQv Provided (cf)	Total (RRv + WQv)
DR-1	-	28,967	28,967
DR-2	-	31,864	31,864
DR-3	-	36,829	36,829
DR-4	-	19,162	19,162
DR-5	-	29,795	29,795
DR-6	-	23,465	23,465
DR-7	-	16,470	16,470
DR-8	-	40,545	40,545
DR-9	-	50,391	50,391
DR-10	701	-	701
DR-11	5,028	-	5,028
DR-13	1,800	-	1,800
DR-14	2,340	-	2,340
DR-15	128	-	128
Totals	**9,997**	268,962	**287,485**
Required	59,687	-	277,111

Tables V and VI below depict the peak discharge in the existing and proposed conditions for 10-year and 100-year design storms. The peak discharge for both storm events exceeds the existing value; however, as described in Sections III, C through E above, this requirement does not apply to this project and these values are shown for reference only.

Table V – Peak Discharge for 1-Year Design Storm

Analysis Point	1-Year Design Storm Discharge (cfs)	
	Existing	Proposed
1	3.5	50.68
2	6.75	63.23

Table VI – Peak Discharge for 10-Year Design Storm

Analysis Point	10-Year Design Storm Discharge (cfs)	
	Existing	Proposed
1	17.46	96.41
2	20.79	116.62

Table VII – Peak Discharge for 100-Year Design Storm

Analysis Point	100-Year Design Storm Discharge (cfs)	
	Existing	Proposed
1	49.54	177.15
2	48.96	206.71

In the post-development condition, Analysis Point #1 has a total drainage area of 0.12 square miles (75.28 acres). This point drains to the Normans Kill with a drainage area of 162 square miles (103,680 acres). The project makes up approximately 0.07% of the total drainage area of the Normans Kill. With an overall project time of concentration of around 10 minutes, the proposed project will have a negligible impact on the total Normans Kill hydrology as the site-produced runoff will be conveyed prior to the Normans Kill peak and not have an impact on the overall flood conditions of the Normans Kill.

In the post-development condition, Analysis Point #2 has a total drainage area of 0.04 square miles (23.6 acres). This point drains to the Hudson River with a drainage area of 8,090 square miles (5,177,600 acres). The project makes up approximately 0.0005% of the total drainage area of the Hudson. With an overall project time of concentration of around 10 minutes, the proposed project will have a negligible impact on the total Hudson River hydrology, as the site-produced runoff will be conveyed prior to the Hudson River peak and not have an impact on the overall flood conditions of the Hudson River.

In both the pre- and post-development condition, Wetland 1 provides stormwater storage. In large storm events, the existing 40" outlet pipe is used as an overflow device directly to the Normans Kill. The outlet pipe has been analyzed to verify it has sufficient capacity for the proposed condition. The proposed condition will send an additional volume of water to Wetland 1; however, the flowrate will be spaced out over various times of concentration. The analysis can be found in the HydroCAD calculations (Appendix B) and summarized in tables VIII and IX below.

Table VIII – Outlet Pipe Capacity Comparison

Storm Event	Wetland 1 Outlet Pipe Flow (cfs)		
	Existing	Proposed	Capacity
1-yr	3.44	3.84	70.83
10-yr	16.91	15.98	70.83
100-yr	47.26	39.59	70.83

Table IX – Wetland Runoff Volume Comparison

Storm Event	Wetland 1 Runoff Volume (ac-ft)	
	Existing	Proposed
1-yr	2.136	2.545
10-yr	5.891	7.256
100-yr	13.523	16.076

B. Deviation from NYS Stormwater Management Design Manual

The proposed stormwater management design deviates from The Manual in two areas. The first being the use of manufactured stormwater filtering systems for new development, and the second being the inability to meet the minimum RRv.

The need for alternative stormwater management practices is rooted in the extremely limited space available as well as the current site conditions. The proposed Offshore Wind Manufacturing Facility requires 85 acres of usable manufacturing and storage space along the Hudson River. It also requires close proximity to an existing port. Such requirements narrow the available project locations to a select few plots of unoccupied land in the entire state and this site was selected through a solicitation process by the state for off-shore wind development. This site was chosen given it is located adjacent to the existing Port of Albany and is directly on the Hudson River. However, the usable portion of the site adjacent to the Hudson River, is only 66-acre area. Therefore, the entirety of the site is needed for the OSW manufacturing process, with an ancillary receiving site located at 700 Smith Boulevard. In typical space restrictive scenarios, infiltration is a commonly used practice. However, this site is a historic fly ash disposal area, containing highly contaminated soil. According to the site specific SMP, developed in coordination with the NYSDEC, infiltration is not recommended.

To adequately satisfy the WQv requirements of the Manual, manufactured systems are needed. The Contech Jellyfish units designed meet both the performance and sizing requirements of Chapter 4 of the Manual. The units are also certified by Washington State Department of Ecology (TAPE) and the Maryland Department of the Environment, adequate sources accepted by the NYSDEC. Specifications and details for the proposed units are provided in Appendix D.

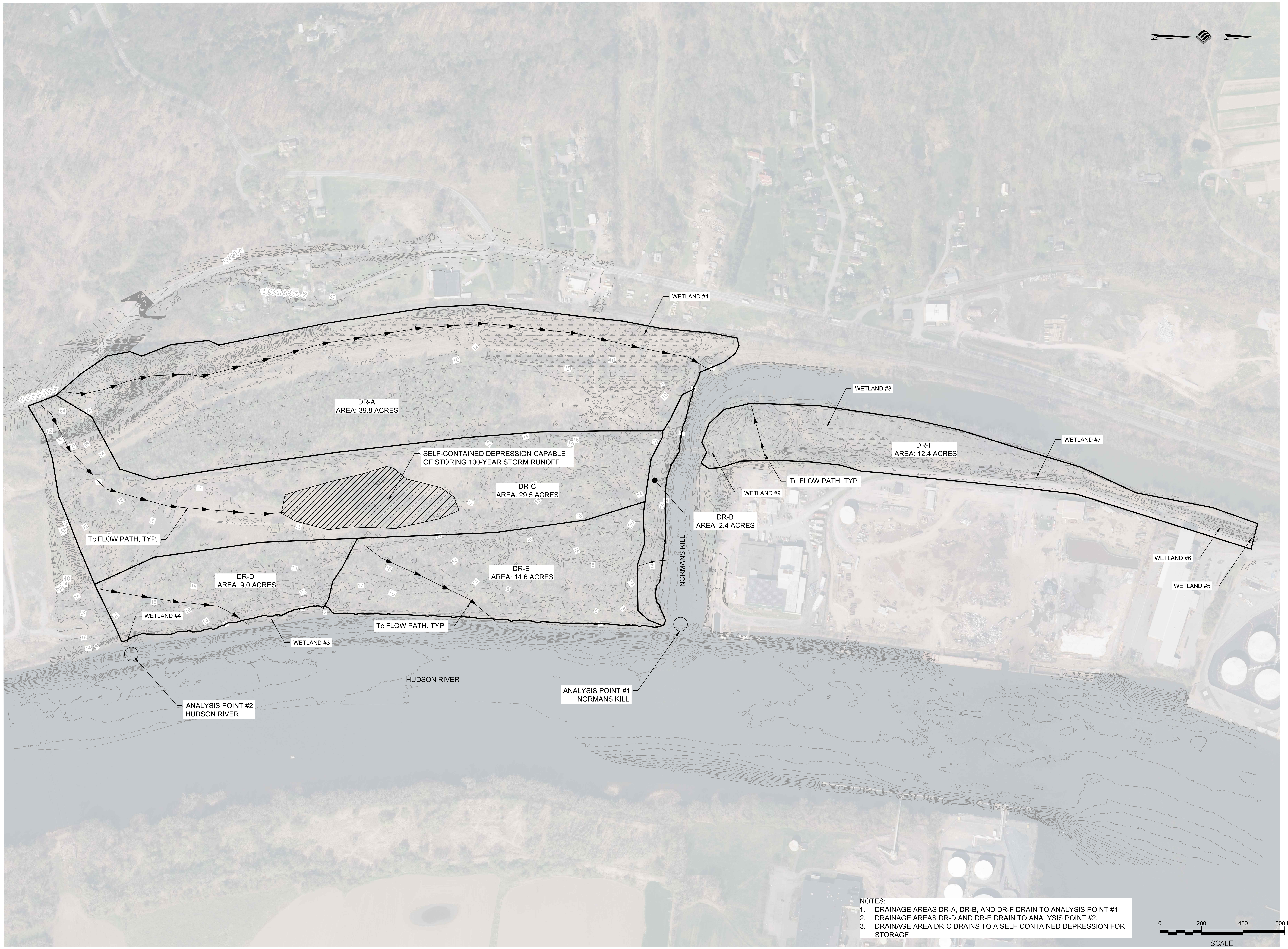
The second deviation is a result of the need for manufactured stormwater management units. These units handle the majority of the WQv for the site, and do not provide RRv. Additionally, as stated above, infiltration is not an acceptable practice for the Expansion site, eliminating a majority of RRv techniques. See Section 8.2 of the SWPPP for an evaluation of green infrastructure practices. Where applicable, on the expansion site, filter strips were used to provide a small quantity of runoff reduction volume. The Normanskill Street improvement portion of this project is in an area of uncontaminated soil with high infiltration rates. Therefore, all treatment practices selected infiltrate into the ground and provide all treatment as RRv. While the minimum RRv requirement cannot be met given the site restrictions, 9,997 cf of runoff is reduced per the proposed plan.

C. Conclusion

Based upon the analysis provided in this report, the proposed development can meet the sizing and performance requirements as defined in Chapter 4 of the Manual. During construction, Erosion and Sediment Control activities will be designed and enforced in accordance with the NYSDEC New York State Standards and Specifications for Erosion and Sediment Control. Stormwater management practices can provide the required WQv for the proposed conditions. The elements of the Manual and the SPDES Permit that relate to stormwater quantity controls, specifically CPv (1-year), Qp (10-year), and Qf (100-year), are not required at this site as the site discharges directly to a tidal water. A downstream analysis was completed for the existing Wetland #1 and its outlet pipe to confirm adequate capacity prior to discharging into the tidal waters of the Normans Kill. All elements of the closed drainage system have been designed to be non-erosive during a 2-year storm event and capable of conveying a 10-year storm event. Analysis of all closed drainage pipe networks is included in Appendix C. After construction, a maintenance and operation report program and agreement will be made between the site operator and town to ensure all stormwater management practices are maintained over the life of the site's operations.

Appendix A

Existing Conditions Drainage Map and HydroCAD Report



NOTES:
1. DRAINAGE AREAS DR-A, DR-B, AND DR-F DRAIN TO ANALYSIS POINT #1.
2. DRAINAGE AREAS DR-D AND DR-E DRAIN TO ANALYSIS POINT #2.
3. DRAINAGE AREA DR-C DRAINS TO A SELF-CONTAINED DEPRESSION FOR STORAGE.

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PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

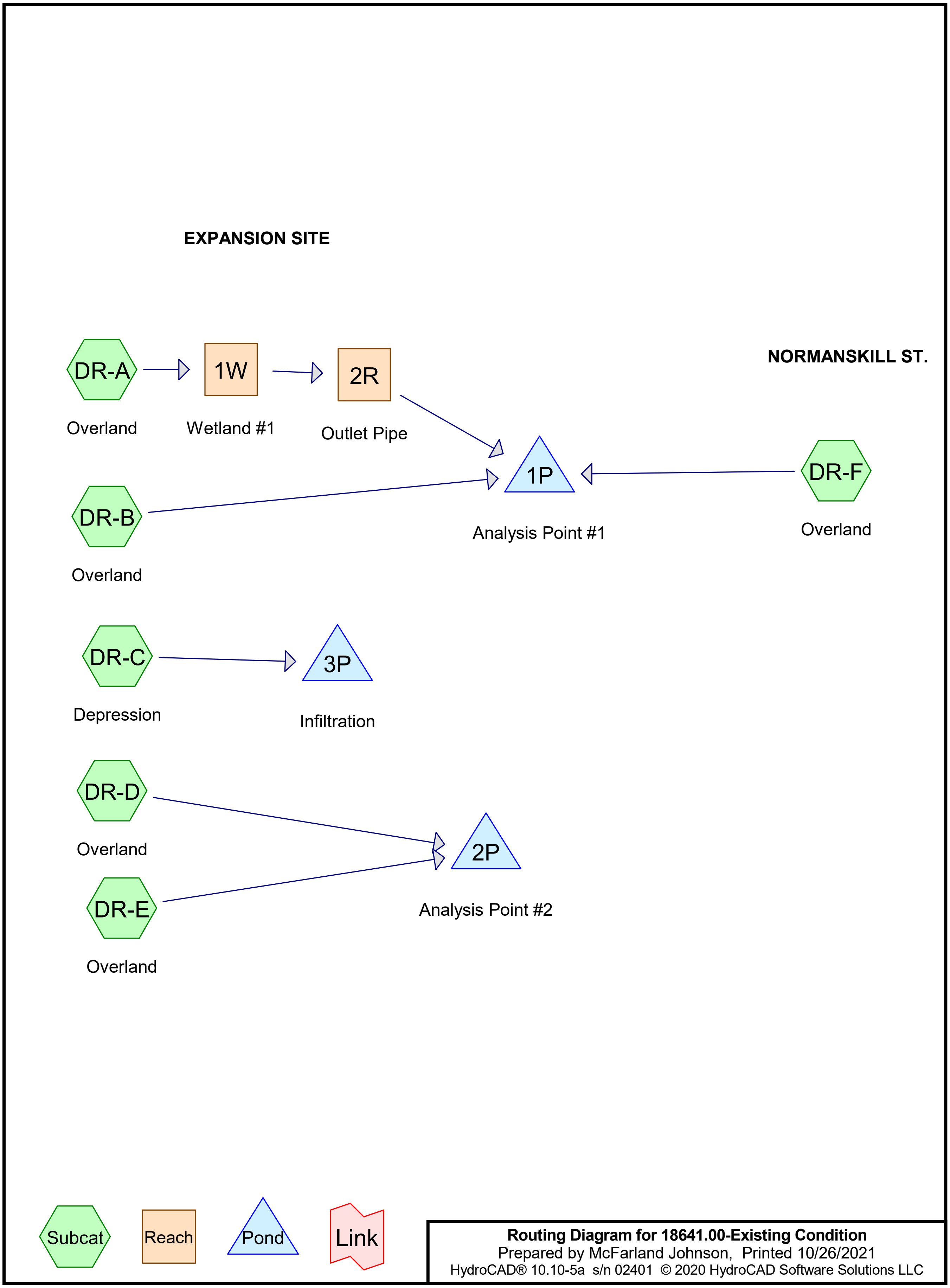
PROJECT:
PORT OF ALBANY SITE INFRASTRUCTURE IMPROVEMENTS

DRAWN	NSO
DESIGNED	NSO
CHECKED	AJF
SCALE	1" = 200'
DATE	OCTOBER 2021
PROJECT	18641.00

DRAWING TITLE
PRE-DEVELOPMENT SITE DRAINAGE AREAS

DRAWING NUMBER
DR-EX

01 OF 01



Routing Diagram for 18641.00-Existing Condition
Prepared by McFarland Johnson, Printed 10/26/2021
HydroCAD® 10.10-5a s/n 02401 © 2020 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type II 24-hr		Default	24.00	1	2.25	2
2	10-Year	Type II 24-hr		Default	24.00	1	3.88	2
3	100-Year	Type II 24-hr		Default	24.00	1	6.68	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.970	77	Brush, Fair, HSG D (DR-C)
1.100	98	Existing Railroad (DR-A)
2.500	96	Gravel surface, HSG D (DR-C)
1.100	98	Pavement (DR-F)
87.730	79	Woods, Fair, HSG D (DR-A, DR-B, DR-C, DR-D, DR-E)
11.300	43	Woods/grass comb., Fair, HSG A (DR-F)
107.700	**76**	**TOTAL AREA**

Summary for Subcatchment DR-A: Overland

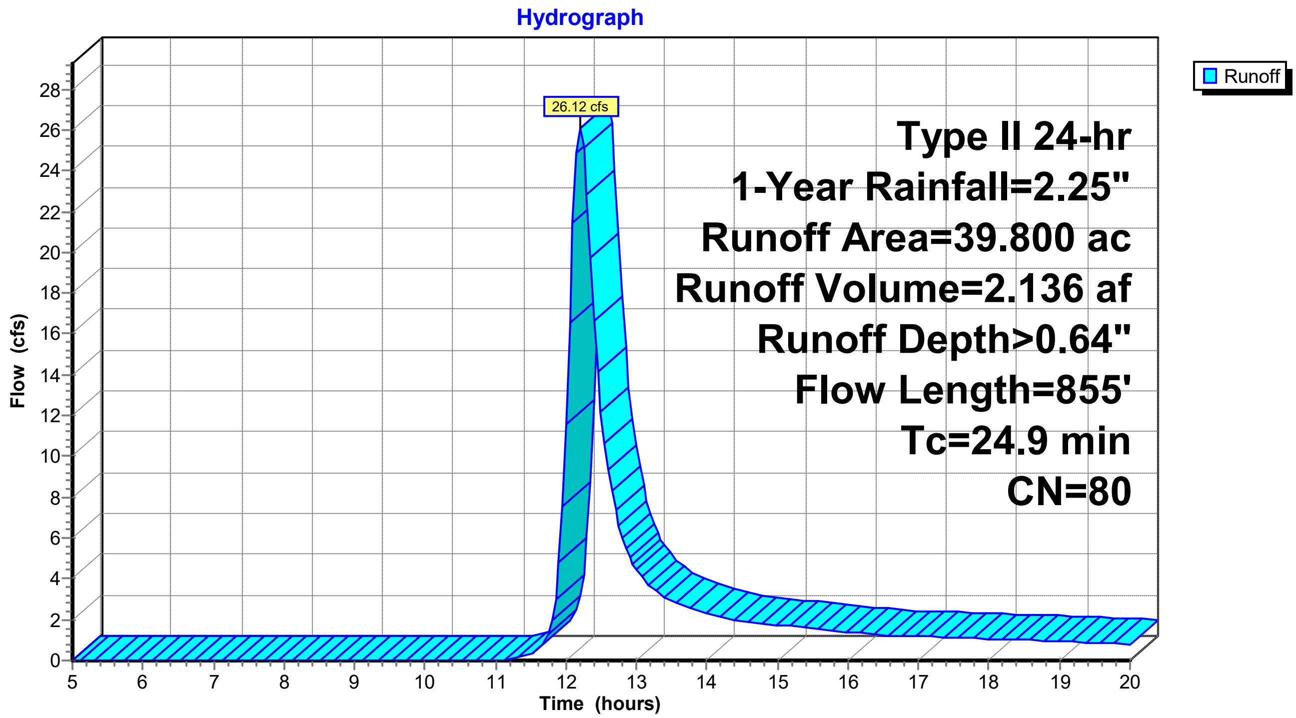
Runoff = 26.12 cfs @ 12.20 hrs, Volume= 2.136 af, Depth> 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
	38.700	79	Woods, Fair, HSG D
*	1.100	98	Existing Railroad
	39.800	80	Weighted Average
	38.700		97.24% Pervious Area
	1.100		2.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	200	0.1500	0.18		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.67"
4.4	525	0.1600	2.00		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
2.2	130	0.0400	1.00		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
24.9	855	Total			

Subcatchment DR-A: Overland



Summary for Subcatchment DR-B: Overland

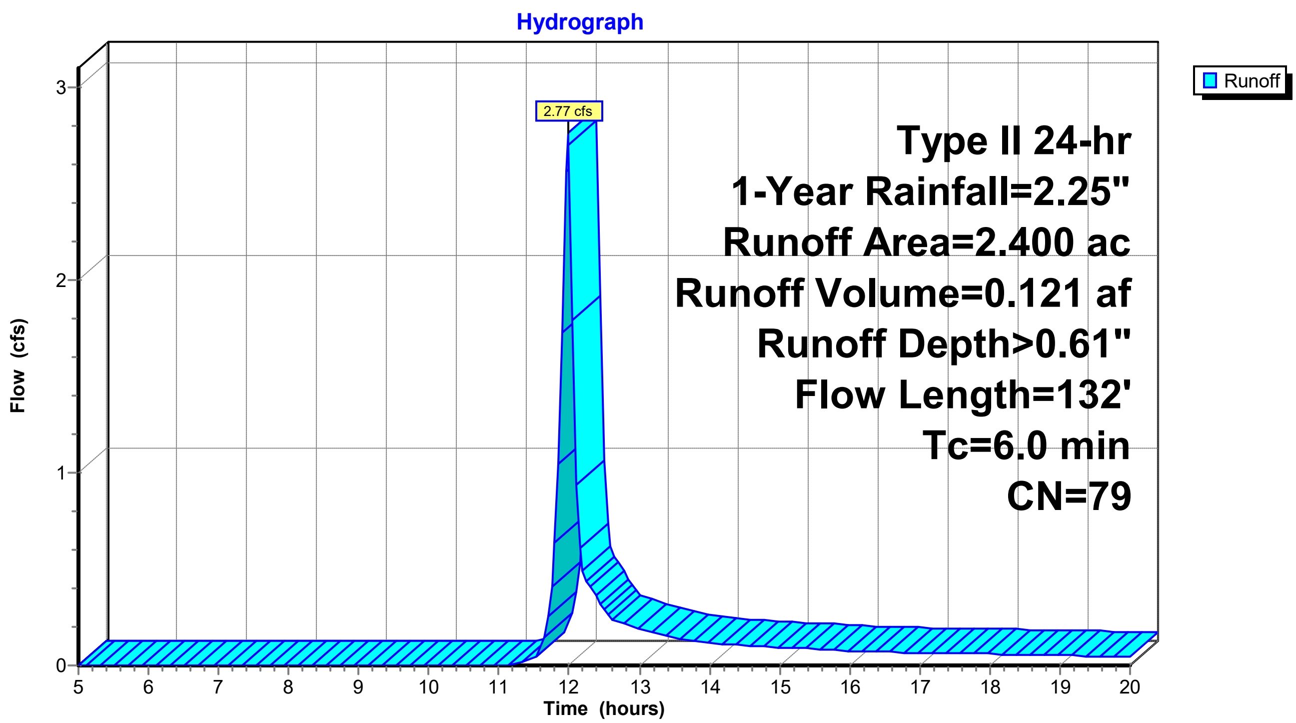
Runoff = 2.77 cfs @ 11.98 hrs, Volume= 0.121 af, Depth> 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

Area (ac)	CN	Description
2.400	79	Woods, Fair, HSG D
2.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	132		0.37		**Direct Entry, Sheet Flow**

Subcatchment DR-B: Overland



Summary for Subcatchment DR-C: Depression

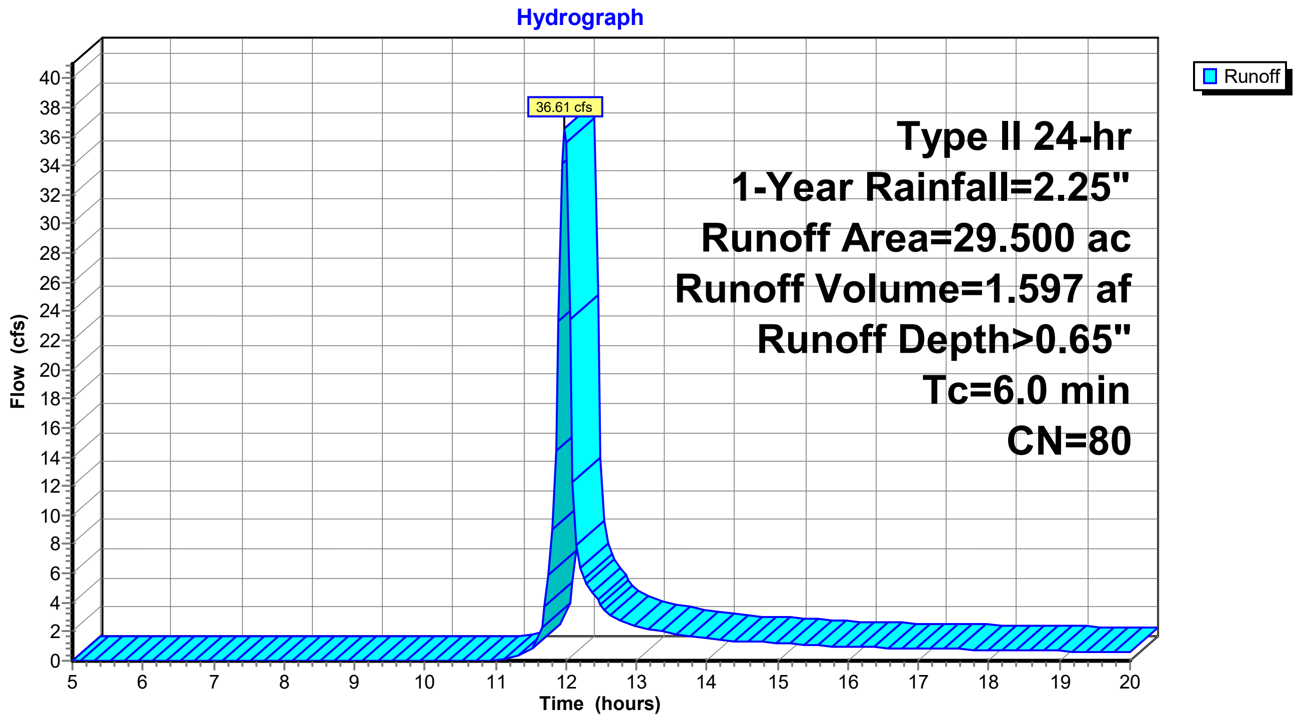
Runoff = 36.61 cfs @ 11.98 hrs, Volume= 1.597 af, Depth> 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

Area (ac)	CN	Description
3.970	77	Brush, Fair, HSG D
2.500	96	Gravel surface, HSG D
23.030	79	Woods, Fair, HSG D
29.500	80	Weighted Average
29.500		100.00% Pervious Area

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

Subcatchment DR-C: Depression



Summary for Subcatchment DR-D: Overland

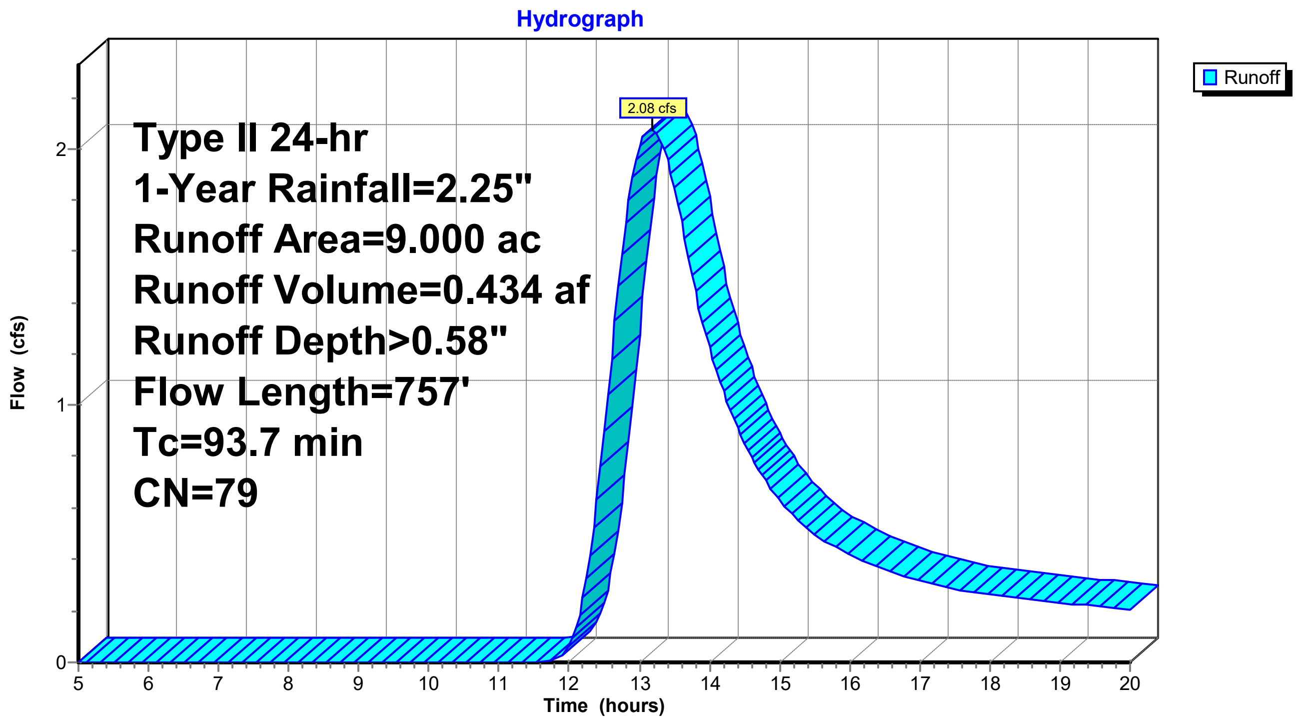
Runoff = 2.08 cfs @ 13.18 hrs, Volume= 0.434 af, Depth> 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

Area (ac)	CN	Description
9.000	79	Woods, Fair, HSG D
9.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
71.3	200	0.0050	0.05		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.67"
21.5	457	0.0050	0.35		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
0.9	100	0.1300	1.80		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
93.7	757	Total			

Subcatchment DR-D: Overland



Summary for Subcatchment DR-E: Overland

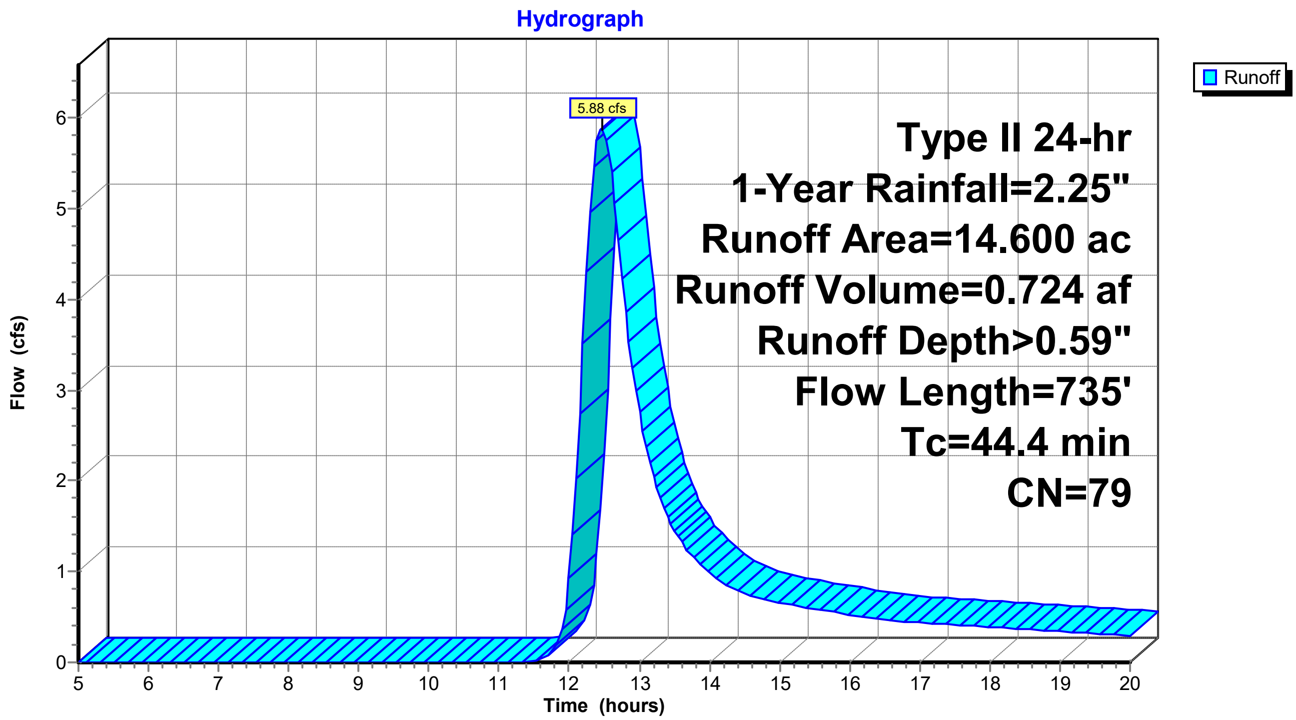
Runoff = 5.88 cfs @ 12.46 hrs, Volume= 0.724 af, Depth> 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

Area (ac)	CN	Description
14.600	79	Woods, Fair, HSG D
14.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.8	200	0.0300	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.67"
8.9	460	0.0300	0.87		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
0.7	75	0.1200	1.73		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
44.4	735	Total			

Subcatchment DR-E: Overland



Summary for Subcatchment DR-F: Overland

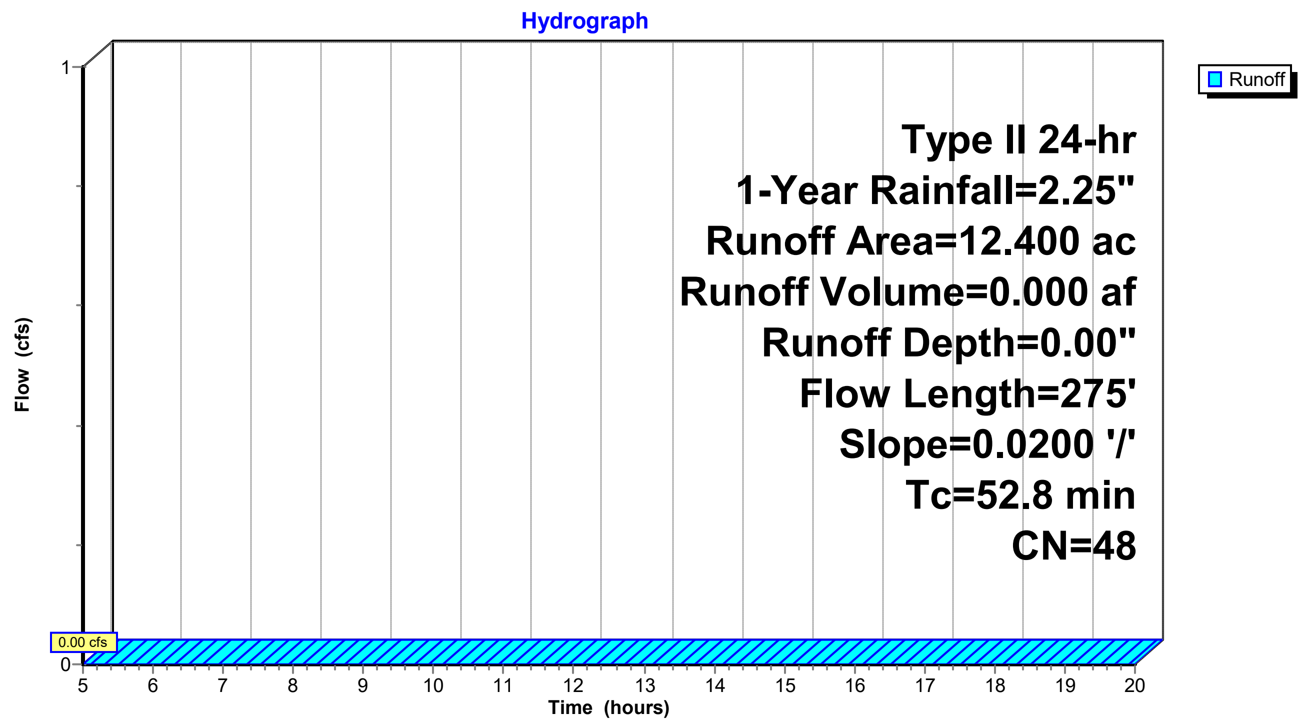
Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	1.100	98	Pavement
	11.300	43	Woods/grass comb., Fair, HSG A
	12.400	48	Weighted Average
	11.300		91.13% Pervious Area
	1.100		8.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
52.8	275	0.0200	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.67"

Subcatchment DR-F: Overland



Summary for Reach 1W: Wetland #1

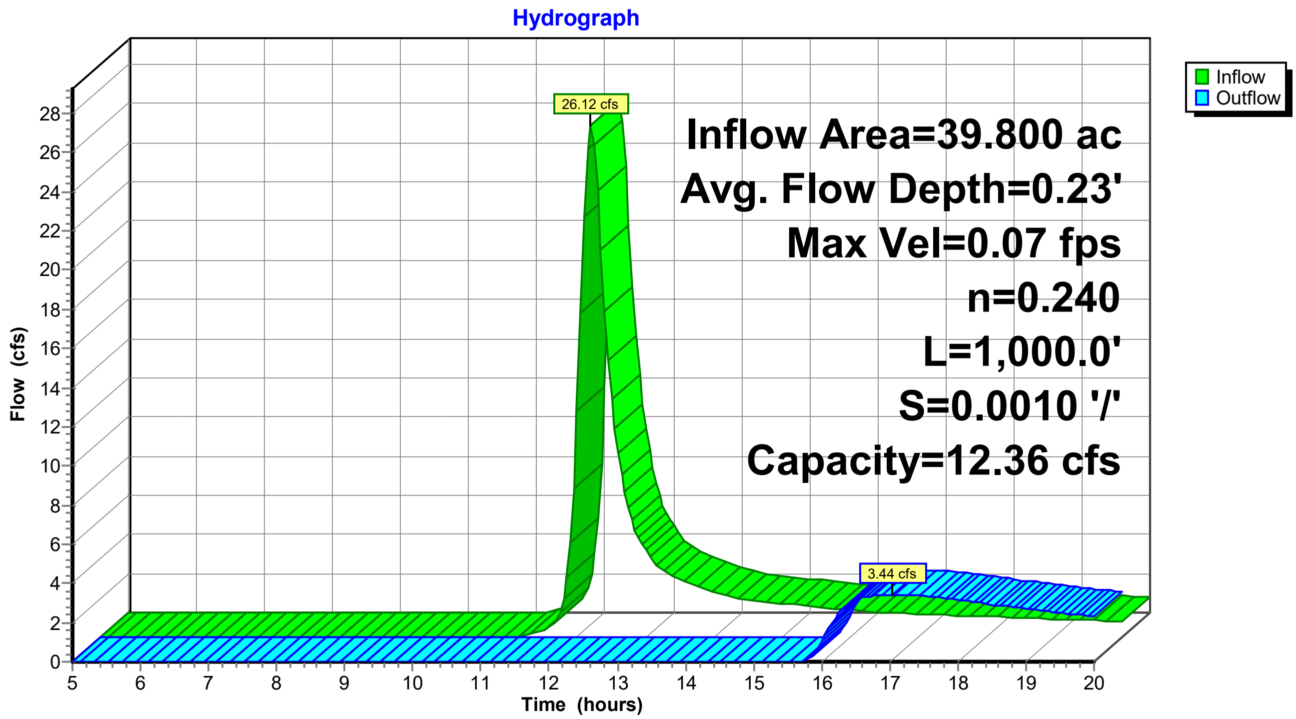
Inflow Area = 39.800 ac, 2.76% Impervious, Inflow Depth > 0.64" for 1-Year event
Inflow = 26.12 cfs @ 12.20 hrs, Volume= 2.136 af
Outflow = 3.44 cfs @ 17.03 hrs, Volume= 0.972 af, Atten= 87%, Lag= 289.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.07 fps, Min. Travel Time= 225.9 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 301.4 min

Peak Storage= 46,607 cf @ 13.26 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 201.39'
Bank-Full Depth= 0.50' Flow Area= 100.8 sf, Capacity= 12.36 cfs

200.00' x 0.50' deep channel, n= 0.240 Sheet flow over Dense Grass
Side Slope Z-value= 3.0 '/' Top Width= 203.00'
Length= 1,000.0' Slope= 0.0010 '/'
Inlet Invert= 6.00', Outlet Invert= 5.00'

Reach 1W: Wetland #1



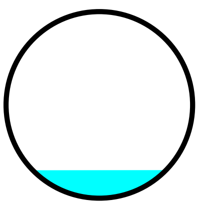
Summary for Reach 2R: Outlet Pipe

Inflow Area = 39.800 ac, 2.76% Impervious, Inflow Depth > 0.29" for 1-Year event
Inflow = 3.44 cfs @ 17.03 hrs, Volume= 0.972 af
Outflow = 3.44 cfs @ 17.03 hrs, Volume= 0.970 af, Atten= 0%, Lag= 0.5 min

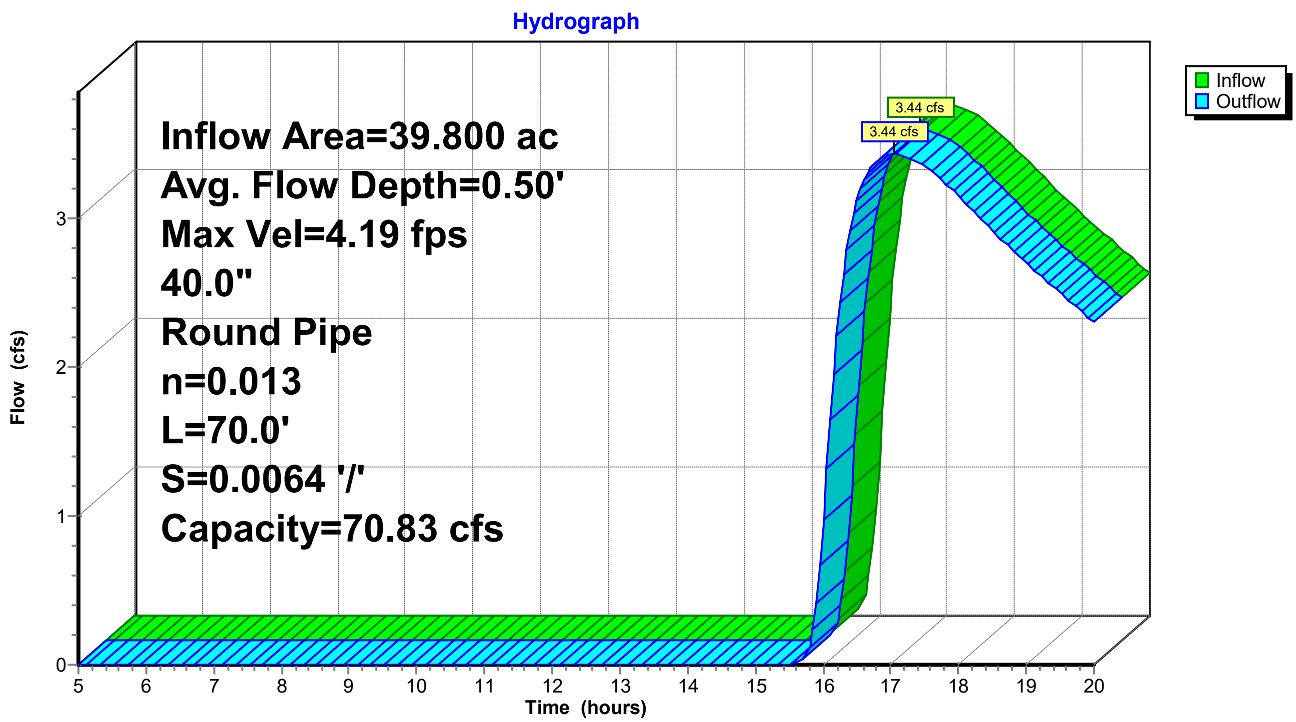
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.19 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 3.39 fps, Avg. Travel Time= 0.3 min

Peak Storage= 57 cf @ 17.03 hrs
Average Depth at Peak Storage= 0.50' , Surface Width= 2.38'
Bank-Full Depth= 3.33' Flow Area= 8.7 sf, Capacity= 70.83 cfs

40.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.0064 '/'
Inlet Invert= 4.25', Outlet Invert= 3.80'



Reach 2R: Outlet Pipe

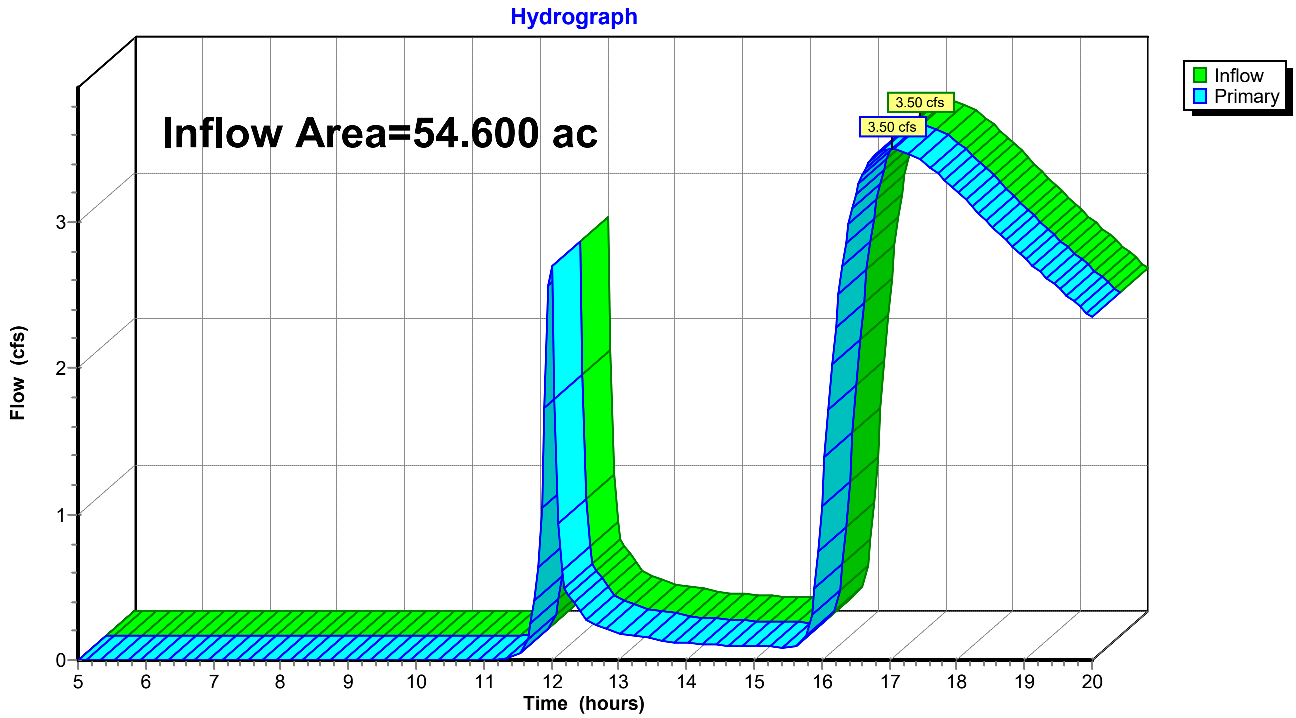


Summary for Pond 1P: Analysis Point #1

Inflow Area =	54.600 ac,	4.03% Impervious, Inflow Depth >	0.24"	for 1-Year event
Inflow =	3.50 cfs @	17.03 hrs, Volume=	1.092 af	
Primary =	3.50 cfs @	17.03 hrs, Volume=	1.092 af,	Atten= 0%, Lag= 0.0 min

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

Pond 1P: Analysis Point #1

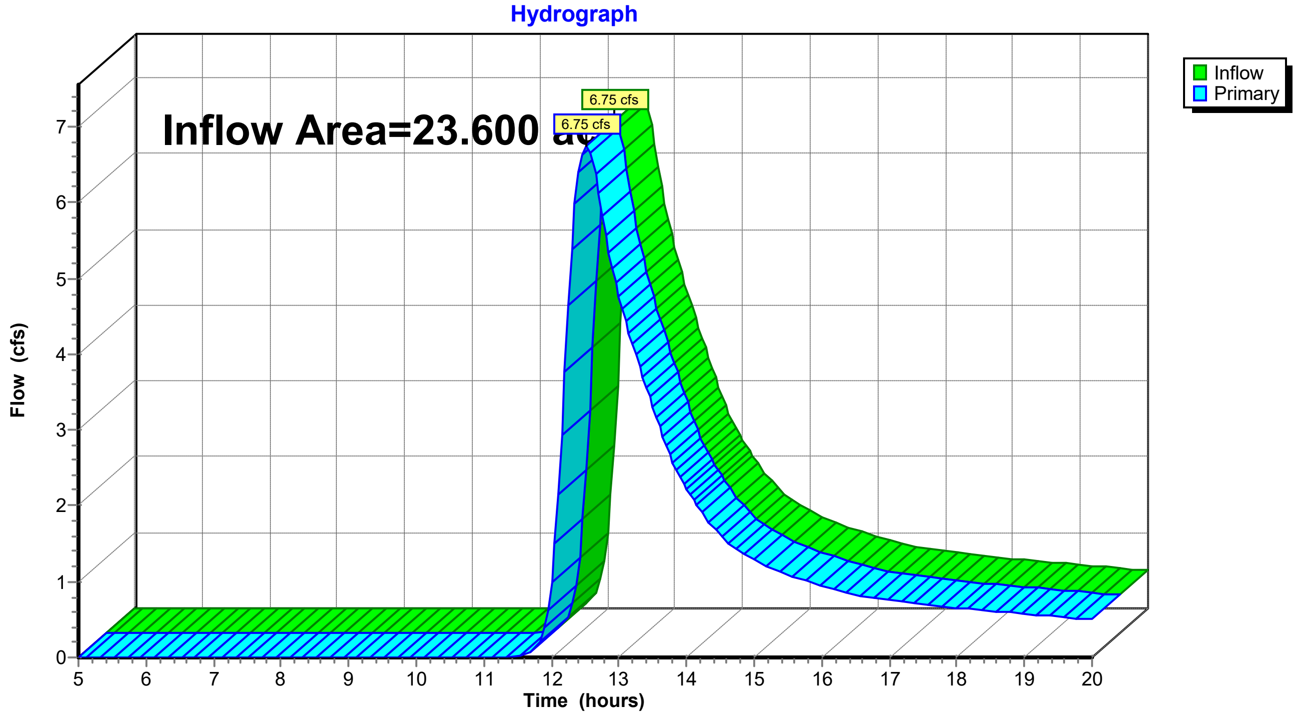


Summary for Pond 2P: Analysis Point #2

Inflow Area =	23.600 ac,	0.00% Impervious, Inflow Depth > 0.59"	for 1-Year event	
Inflow =	6.75 cfs @	12.51 hrs, Volume=	1.157 af	
Primary =	6.75 cfs @	12.51 hrs, Volume=	1.157 af,	Atten= 0%, Lag= 0.0 min

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

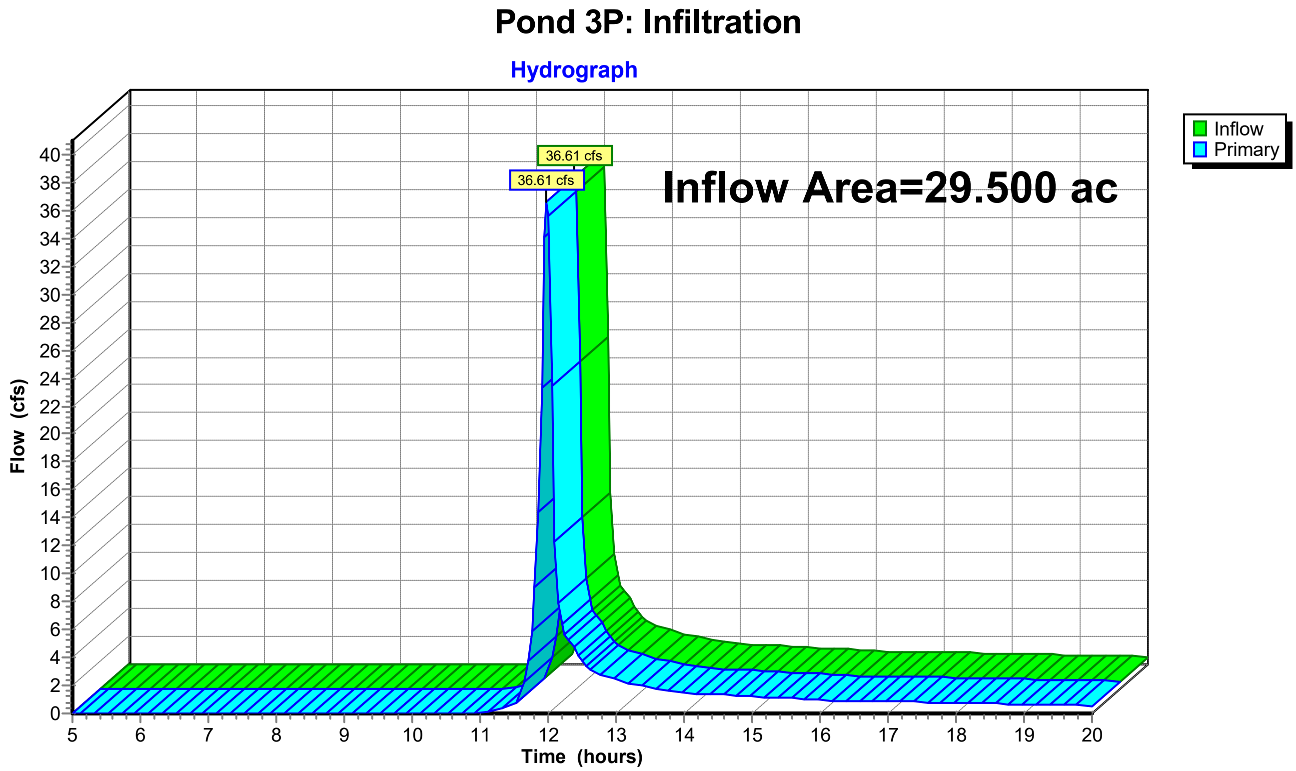
Pond 2P: Analysis Point #2



Summary for Pond 3P: Infiltration

Inflow Area =	29.500 ac,	0.00% Impervious,	Inflow Depth > 0.65"	for 1-Year event	
Inflow =	36.61 cfs @	11.98 hrs,	Volume=	1.597 af	
Primary =	36.61 cfs @	11.98 hrs,	Volume=	1.597 af,	Atten= 0%, Lag= 0.0 min

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



Summary for Subcatchment DR-A: Overland

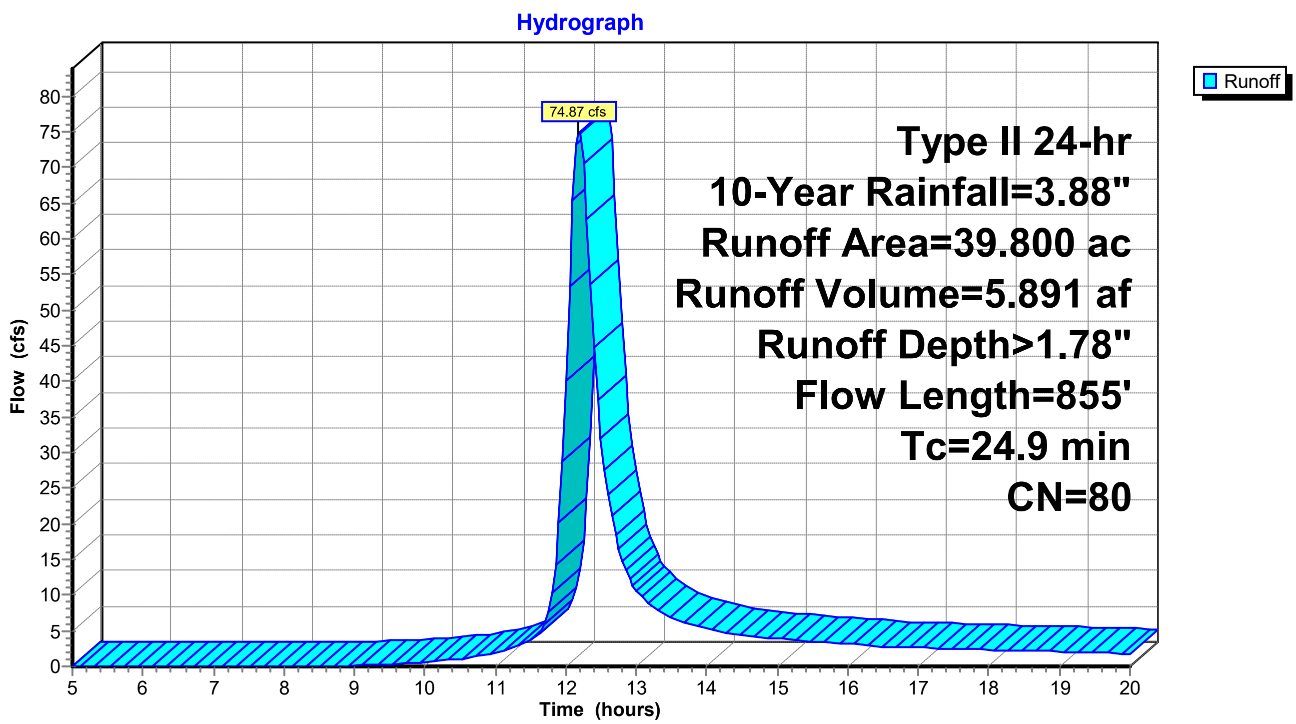
Runoff = 74.87 cfs @ 12.19 hrs, Volume= 5.891 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
	38.700	79	Woods, Fair, HSG D
*	1.100	98	Existing Railroad
	39.800	80	Weighted Average
	38.700		97.24% Pervious Area
	1.100		2.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	200	0.1500	0.18		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.67"
4.4	525	0.1600	2.00		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
2.2	130	0.0400	1.00		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
24.9	855	Total			

Subcatchment DR-A: Overland



Summary for Subcatchment DR-B: Overland

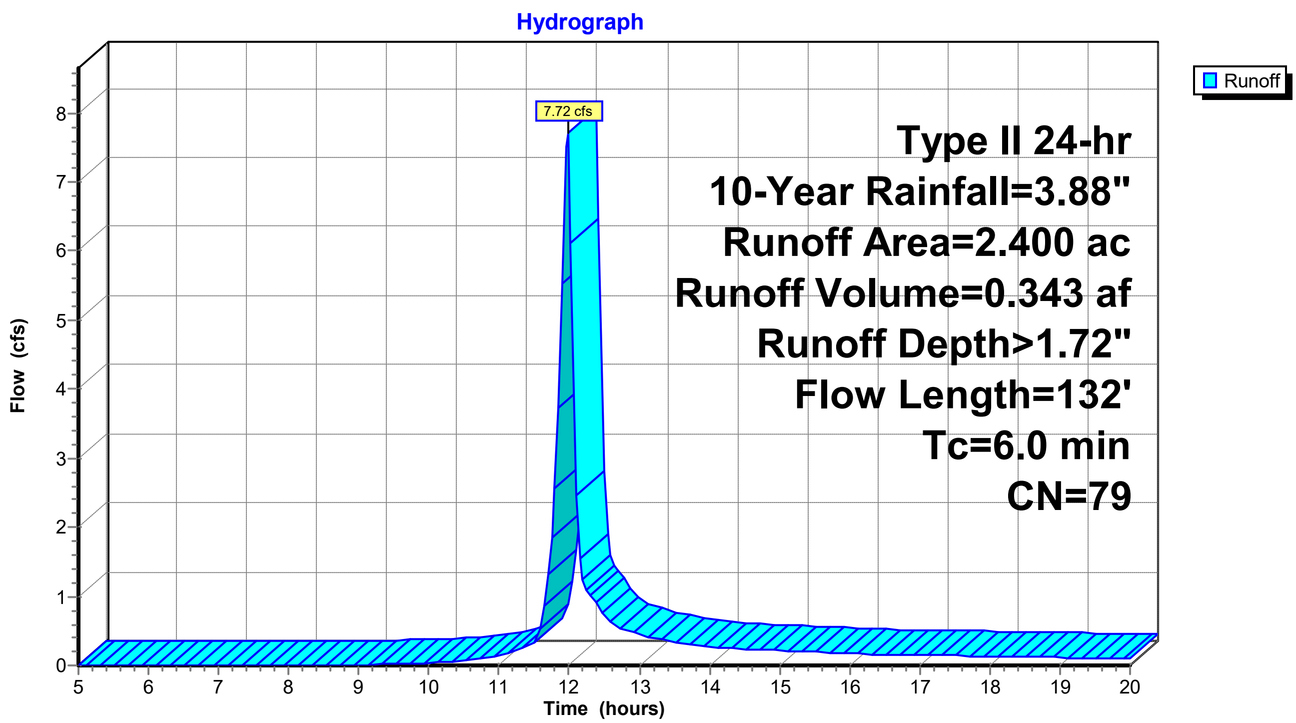
Runoff = 7.72 cfs @ 11.97 hrs, Volume= 0.343 af, Depth> 1.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

Area (ac)	CN	Description
2.400	79	Woods, Fair, HSG D
2.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	132		0.37		**Direct Entry, Sheet Flow**

Subcatchment DR-B: Overland



Summary for Subcatchment DR-C: Depression

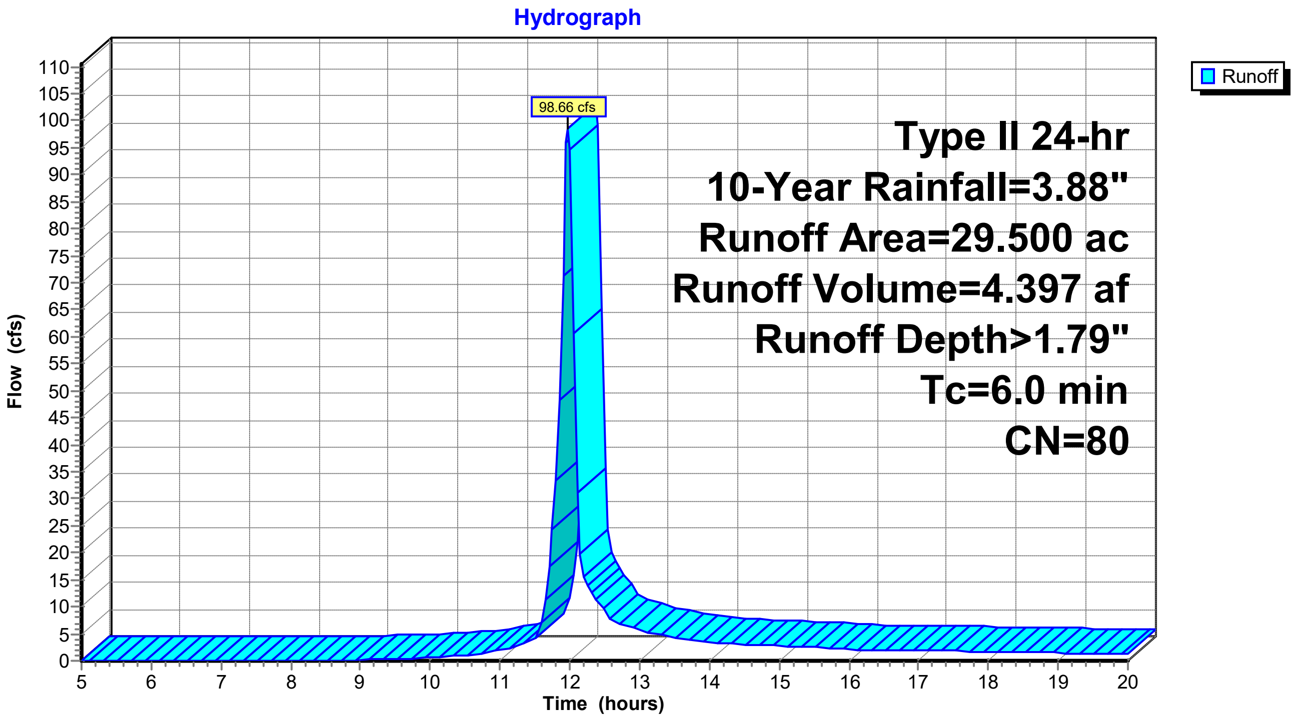
Runoff = 98.66 cfs @ 11.97 hrs, Volume= 4.397 af, Depth> 1.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

Area (ac)	CN	Description
3.970	77	Brush, Fair, HSG D
2.500	96	Gravel surface, HSG D
23.030	79	Woods, Fair, HSG D
29.500	80	Weighted Average
29.500		100.00% Pervious Area

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

Subcatchment DR-C: Depression



Summary for Subcatchment DR-D: Overland

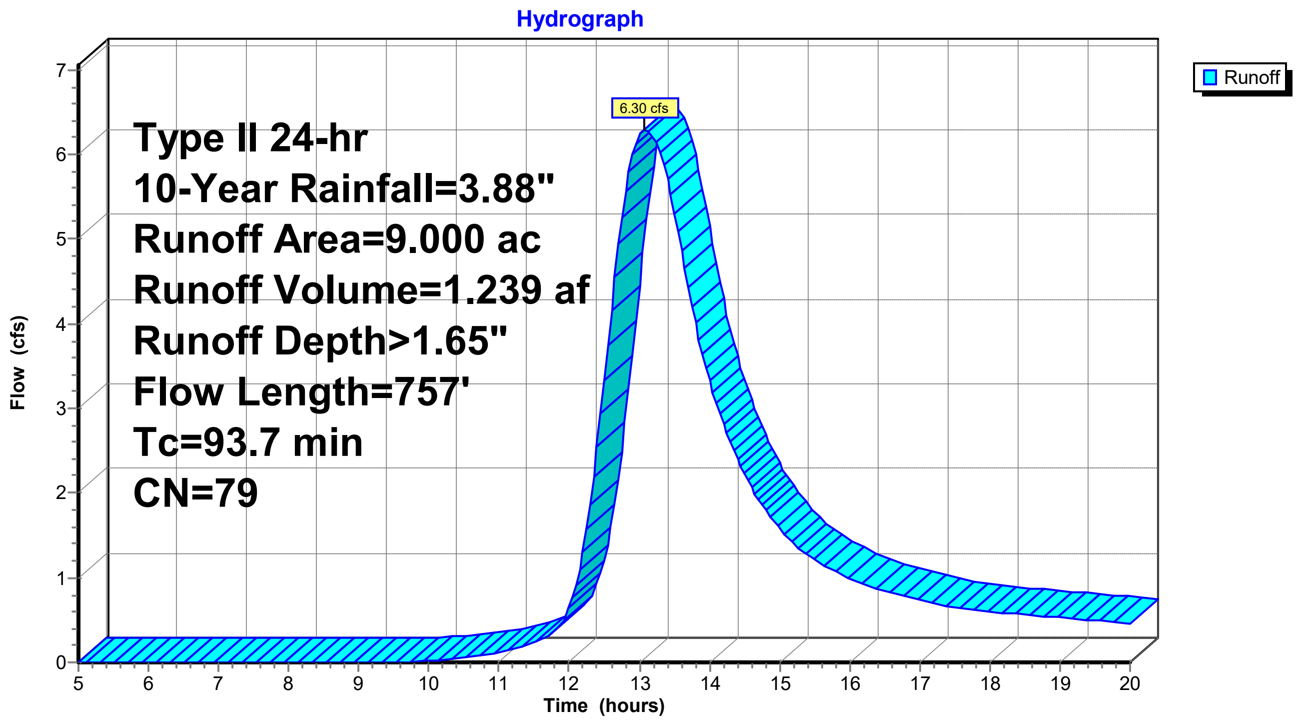
Runoff = 6.30 cfs @ 13.08 hrs, Volume= 1.239 af, Depth> 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

Area (ac)	CN	Description
9.000	79	Woods, Fair, HSG D
9.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
71.3	200	0.0050	0.05		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.67"
21.5	457	0.0050	0.35		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
0.9	100	0.1300	1.80		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
93.7	757	Total			

Subcatchment DR-D: Overland



Summary for Subcatchment DR-E: Overland

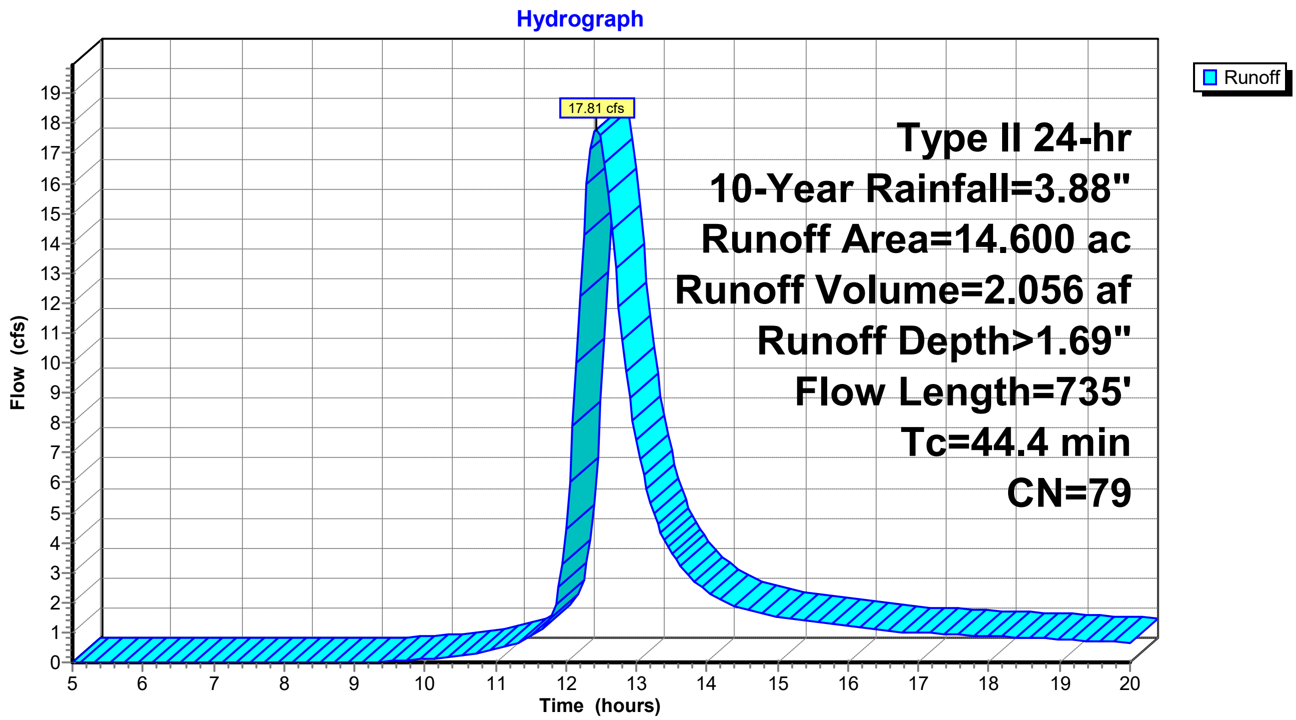
Runoff = 17.81 cfs @ 12.43 hrs, Volume= 2.056 af, Depth> 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

Area (ac)	CN	Description
14.600	79	Woods, Fair, HSG D
14.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.8	200	0.0300	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.67"
8.9	460	0.0300	0.87		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
0.7	75	0.1200	1.73		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
44.4	735	Total			

Subcatchment DR-E: Overland



Summary for Subcatchment DR-F: Overland

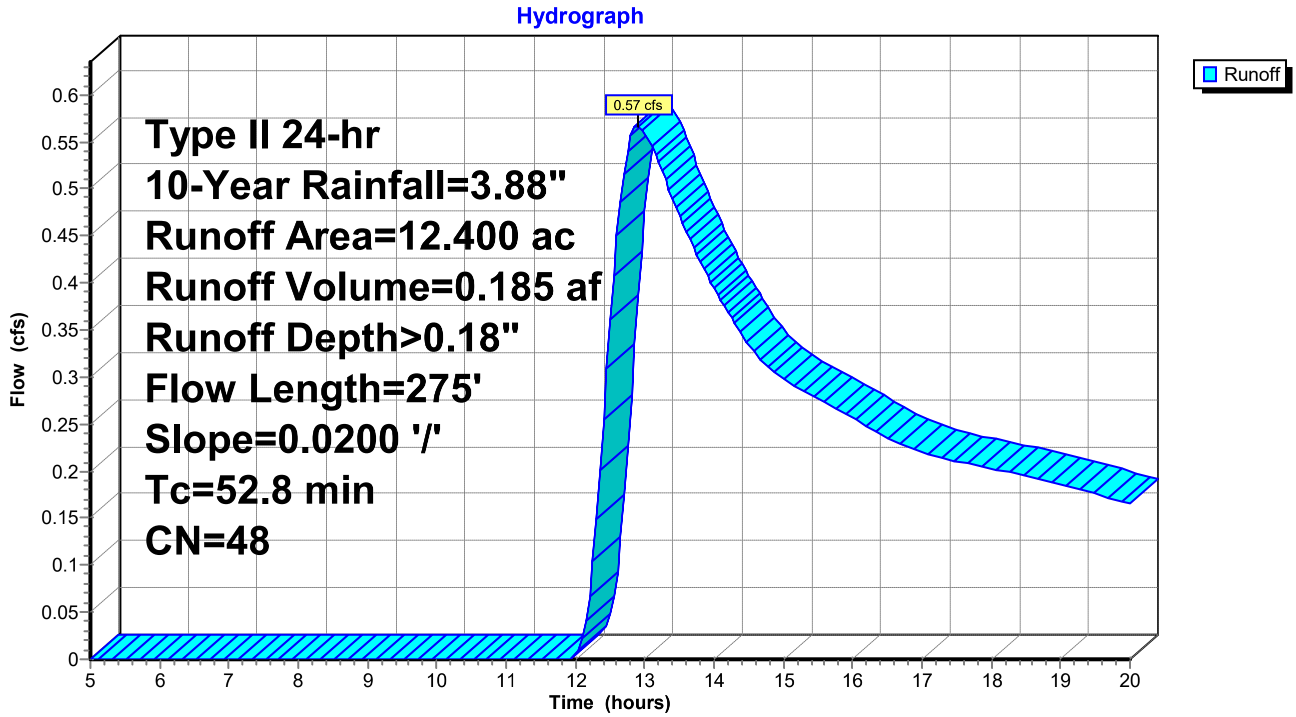
Runoff = 0.57 cfs @ 12.90 hrs, Volume= 0.185 af, Depth> 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	1.100	98	Pavement
	11.300	43	Woods/grass comb., Fair, HSG A
	12.400	48	Weighted Average
	11.300		91.13% Pervious Area
	1.100		8.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
52.8	275	0.0200	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.67"

Subcatchment DR-F: Overland



Summary for Reach 1W: Wetland #1

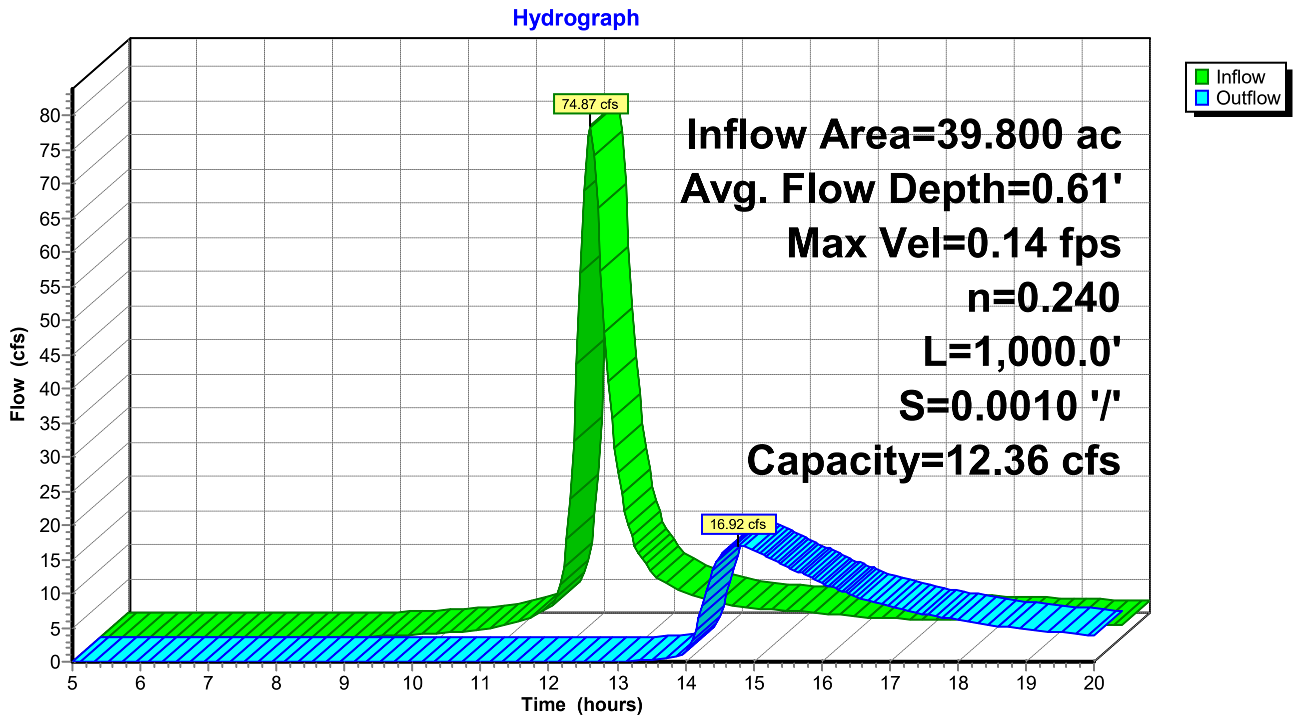
Inflow Area = 39.800 ac, 2.76% Impervious, Inflow Depth > 1.78" for 10-Year event
Inflow = 74.87 cfs @ 12.19 hrs, Volume= 5.891 af
Outflow = 16.92 cfs @ 14.77 hrs, Volume= 4.399 af, Atten= 77%, Lag= 154.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.14 fps, Min. Travel Time= 121.4 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 234.0 min

Peak Storage= 123,287 cf @ 12.74 hrs
Average Depth at Peak Storage= 0.61' , Surface Width= 203.67'
Bank-Full Depth= 0.50' Flow Area= 100.8 sf, Capacity= 12.36 cfs

200.00' x 0.50' deep channel, n= 0.240 Sheet flow over Dense Grass
Side Slope Z-value= 3.0 '/' Top Width= 203.00'
Length= 1,000.0' Slope= 0.0010 '/'
Inlet Invert= 6.00', Outlet Invert= 5.00'

Reach 1W: Wetland #1



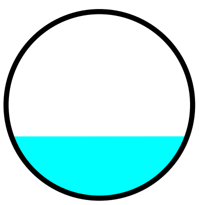
Summary for Reach 2R: Outlet Pipe

Inflow Area = 39.800 ac, 2.76% Impervious, Inflow Depth > 1.33" for 10-Year event
Inflow = 16.92 cfs @ 14.77 hrs, Volume= 4.399 af
Outflow = 16.91 cfs @ 14.77 hrs, Volume= 4.397 af, Atten= 0%, Lag= 0.3 min

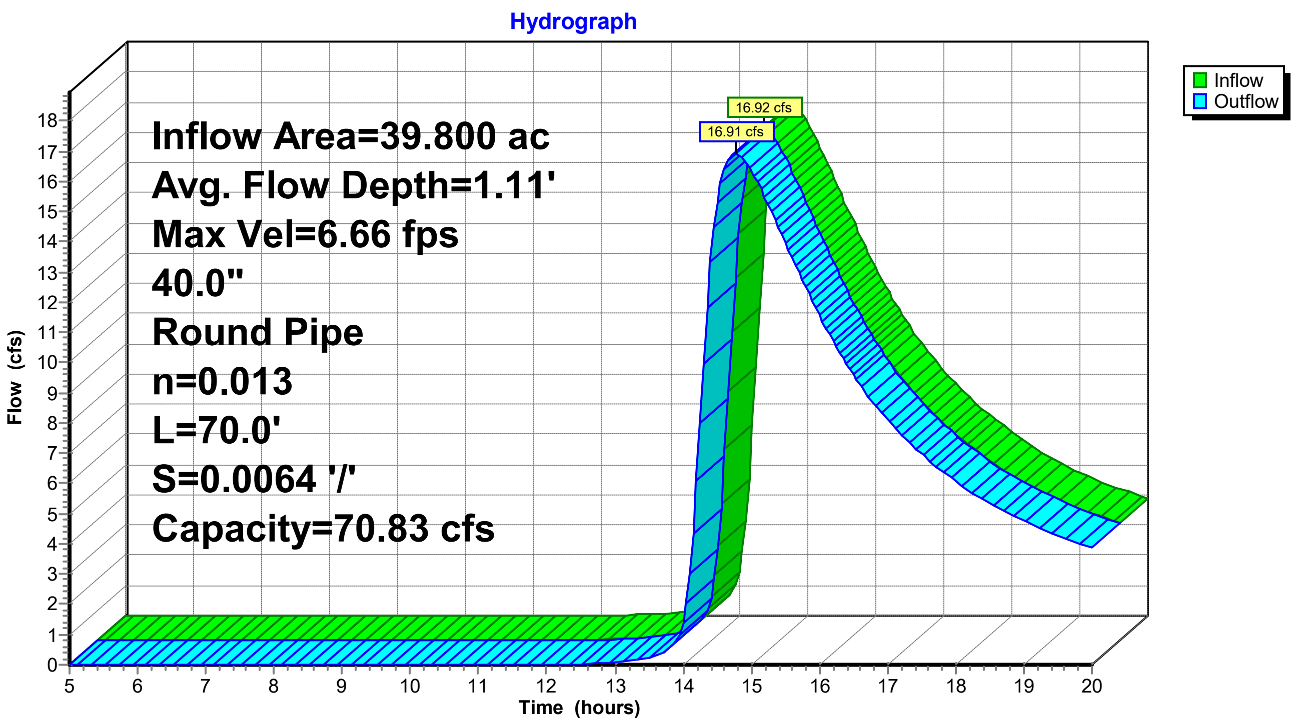
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.66 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.96 fps, Avg. Travel Time= 0.3 min

Peak Storage= 178 cf @ 14.77 hrs
Average Depth at Peak Storage= 1.11' , Surface Width= 3.14'
Bank-Full Depth= 3.33' Flow Area= 8.7 sf, Capacity= 70.83 cfs

40.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.0064 '/'
Inlet Invert= 4.25', Outlet Invert= 3.80'



Reach 2R: Outlet Pipe

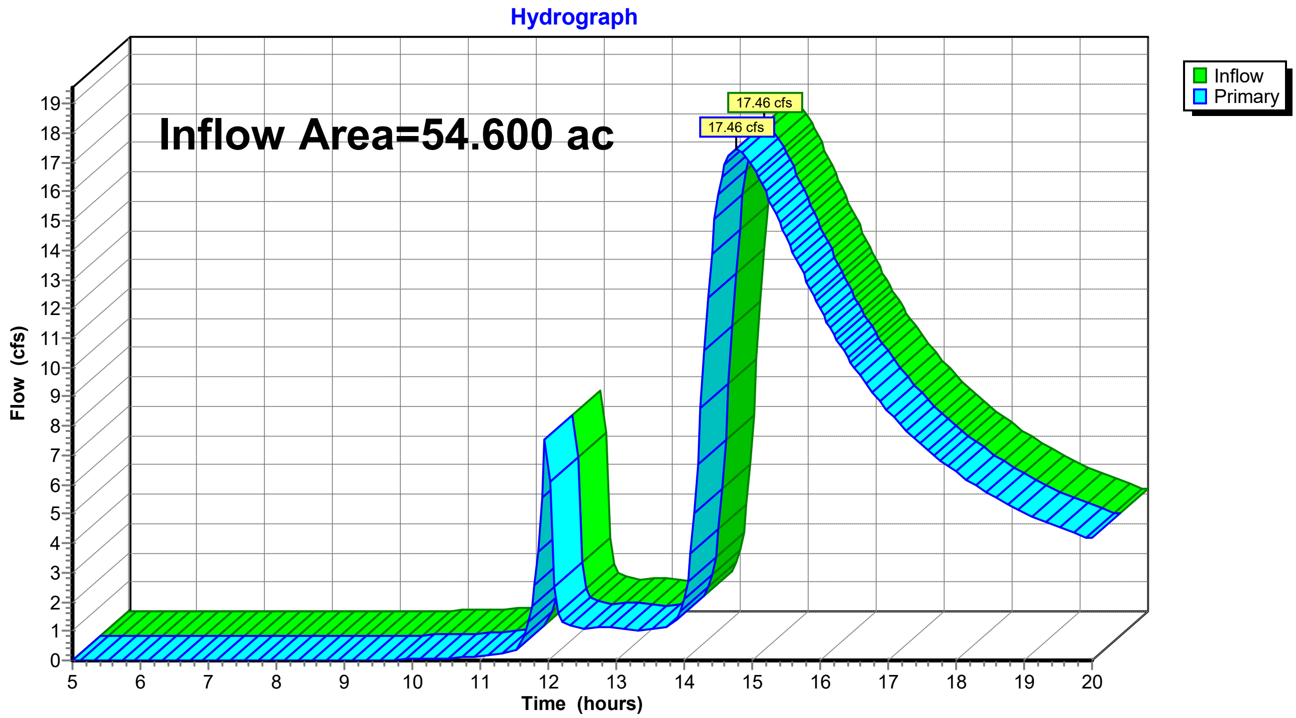


Summary for Pond 1P: Analysis Point #1

Inflow Area =	54.600 ac,	4.03% Impervious,	Inflow Depth > 1.08"	for 10-Year event	
Inflow =	17.46 cfs @	14.77 hrs,	Volume=	4.925 af	
Primary =	17.46 cfs @	14.77 hrs,	Volume=	4.925 af,	Atten= 0%, Lag= 0.0 min

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

Pond 1P: Analysis Point #1

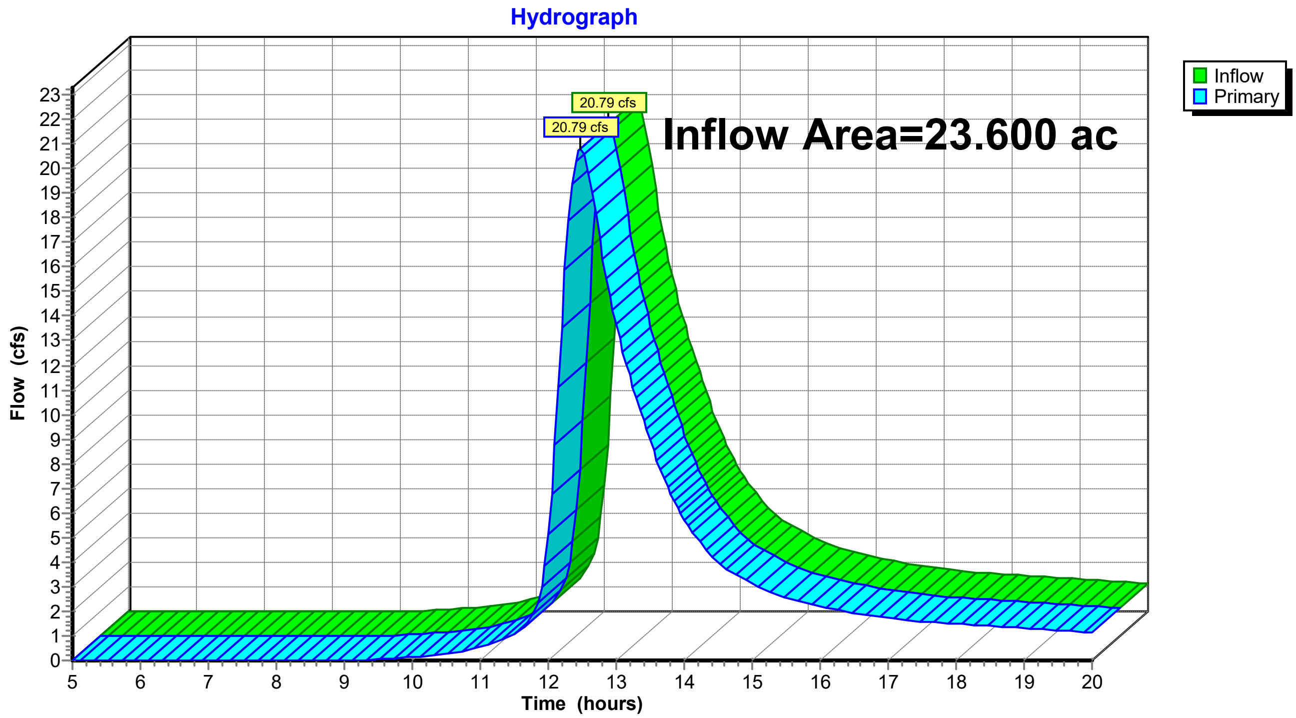


Summary for Pond 2P: Analysis Point #2

Inflow Area = 23.600 ac, 0.00% Impervious, Inflow Depth > 1.68" for 10-Year event
Inflow = 20.79 cfs @ 12.48 hrs, Volume= 3.294 af
Primary = 20.79 cfs @ 12.48 hrs, Volume= 3.294 af, Atten= 0%, Lag= 0.0 min

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

Pond 2P: Analysis Point #2

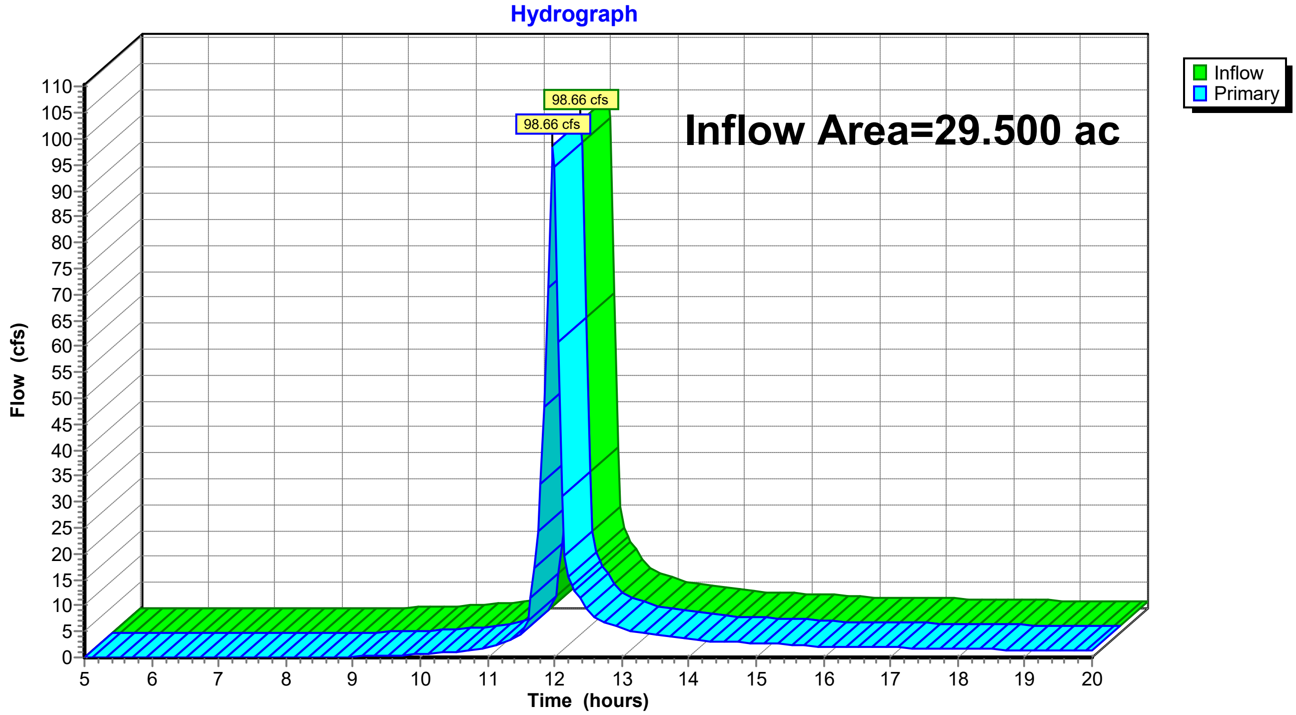


Summary for Pond 3P: Infiltration

Inflow Area = 29.500 ac, 0.00% Impervious, Inflow Depth > 1.79" for 10-Year event
Inflow = 98.66 cfs @ 11.97 hrs, Volume= 4.397 af
Primary = 98.66 cfs @ 11.97 hrs, Volume= 4.397 af, Atten= 0%, Lag= 0.0 min

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

Pond 3P: Infiltration



Summary for Subcatchment DR-A: Overland

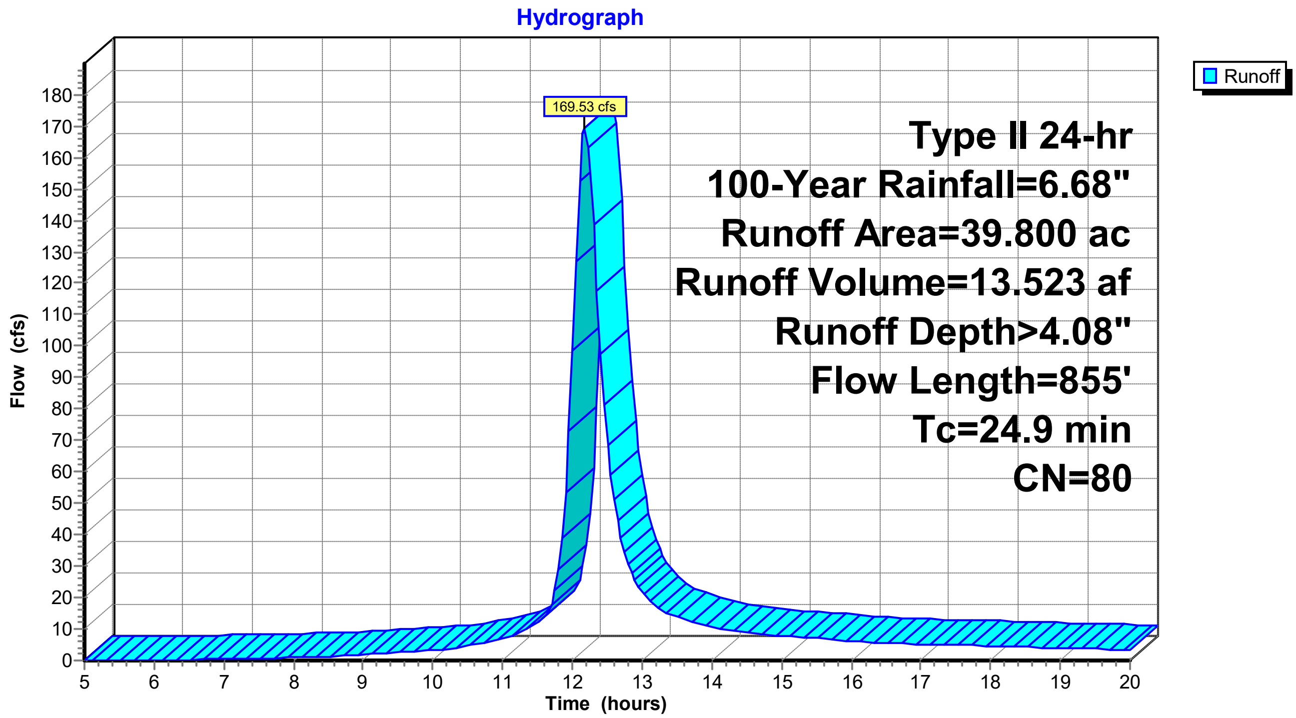
Runoff = 169.53 cfs @ 12.18 hrs, Volume= 13.523 af, Depth> 4.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
	38.700	79	Woods, Fair, HSG D
*	1.100	98	Existing Railroad
	39.800	80	Weighted Average
	38.700		97.24% Pervious Area
	1.100		2.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	200	0.1500	0.18		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.67"
4.4	525	0.1600	2.00		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
2.2	130	0.0400	1.00		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
24.9	855	Total			

Subcatchment DR-A: Overland



Summary for Subcatchment DR-B: Overland

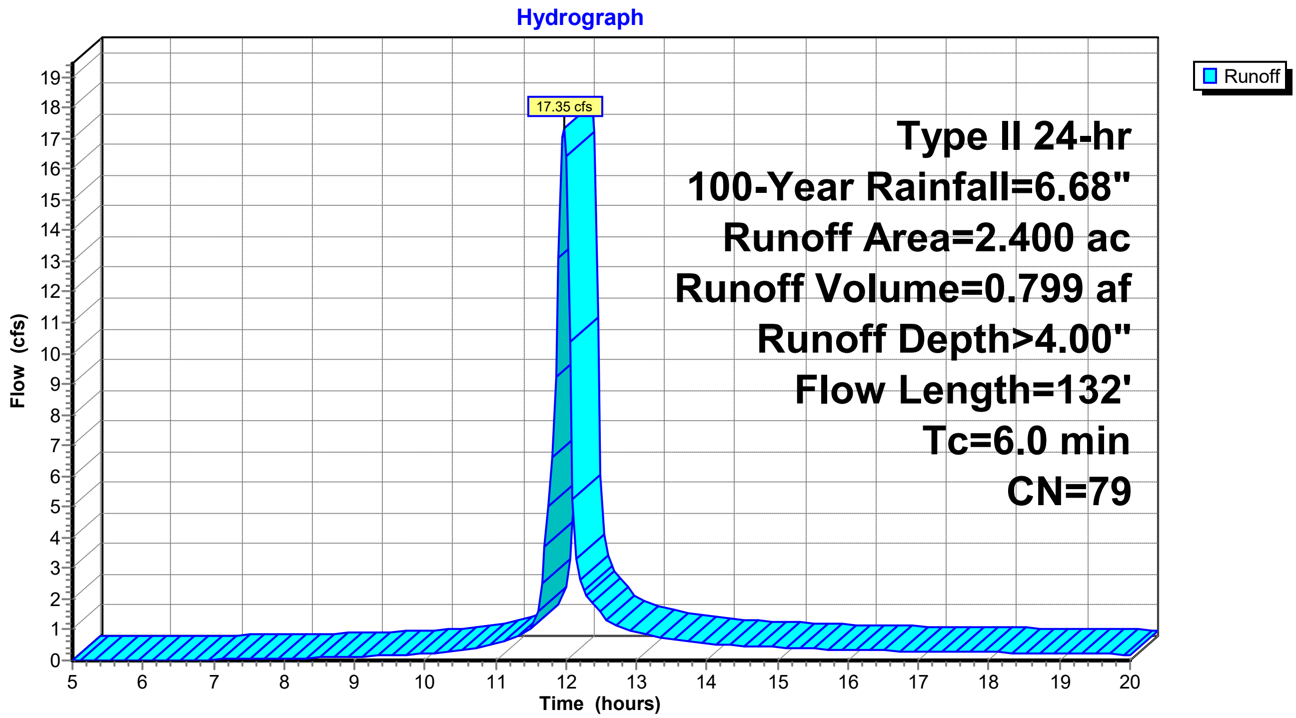
Runoff = 17.35 cfs @ 11.97 hrs, Volume= 0.799 af, Depth> 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

Area (ac)	CN	Description
2.400	79	Woods, Fair, HSG D
2.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	132		0.37		**Direct Entry, Sheet Flow**

Subcatchment DR-B: Overland



Summary for Subcatchment DR-C: Depression

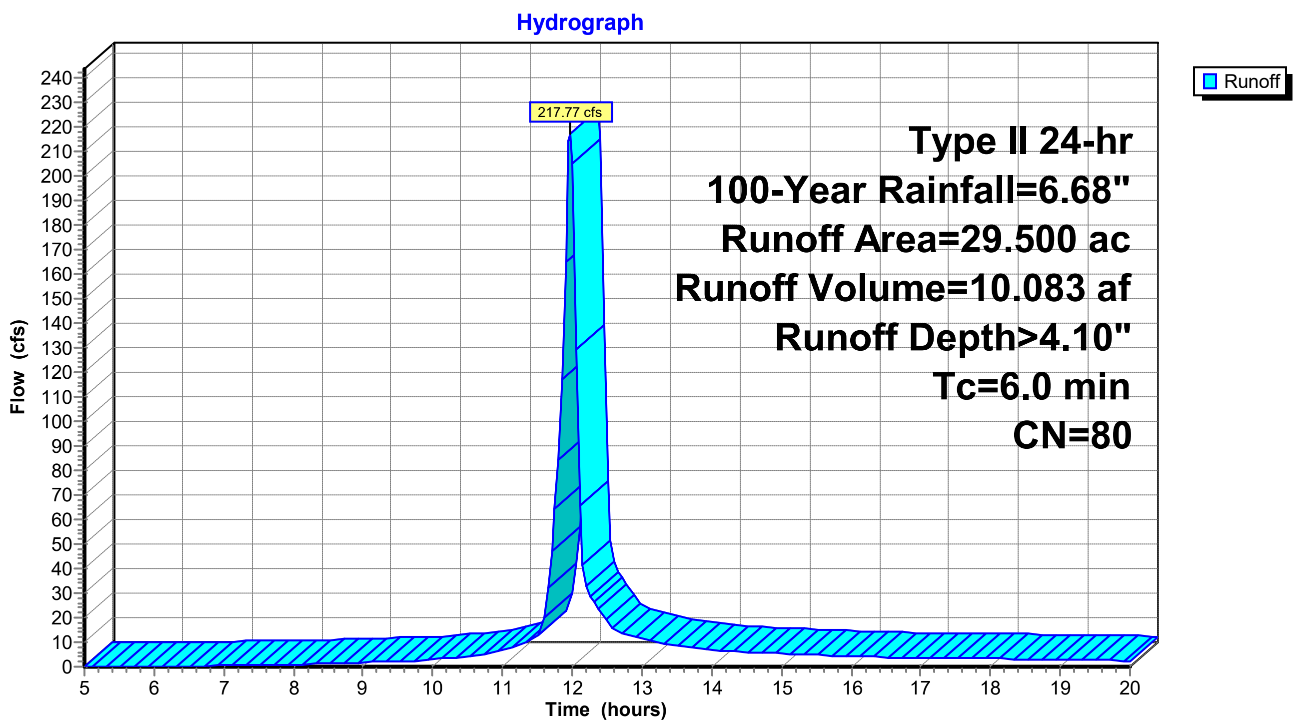
Runoff = 217.77 cfs @ 11.97 hrs, Volume= 10.083 af, Depth> 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

Area (ac)	CN	Description
3.970	77	Brush, Fair, HSG D
2.500	96	Gravel surface, HSG D
23.030	79	Woods, Fair, HSG D
29.500	80	Weighted Average
29.500		100.00% Pervious Area

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

Subcatchment DR-C: Depression



Summary for Subcatchment DR-D: Overland

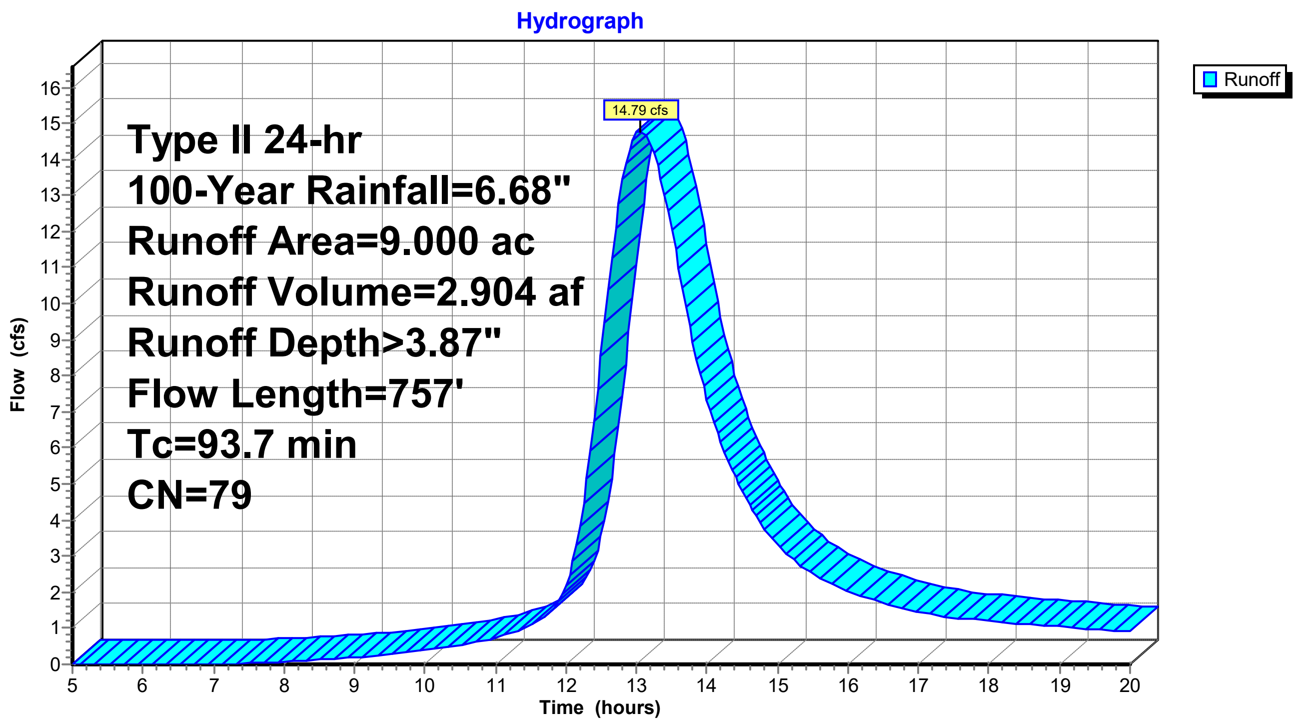
Runoff = 14.79 cfs @ 13.04 hrs, Volume= 2.904 af, Depth> 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

Area (ac)	CN	Description
9.000	79	Woods, Fair, HSG D
9.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
71.3	200	0.0050	0.05		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.67"
21.5	457	0.0050	0.35		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
0.9	100	0.1300	1.80		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
93.7	757	Total			

Subcatchment DR-D: Overland



Summary for Subcatchment DR-E: Overland

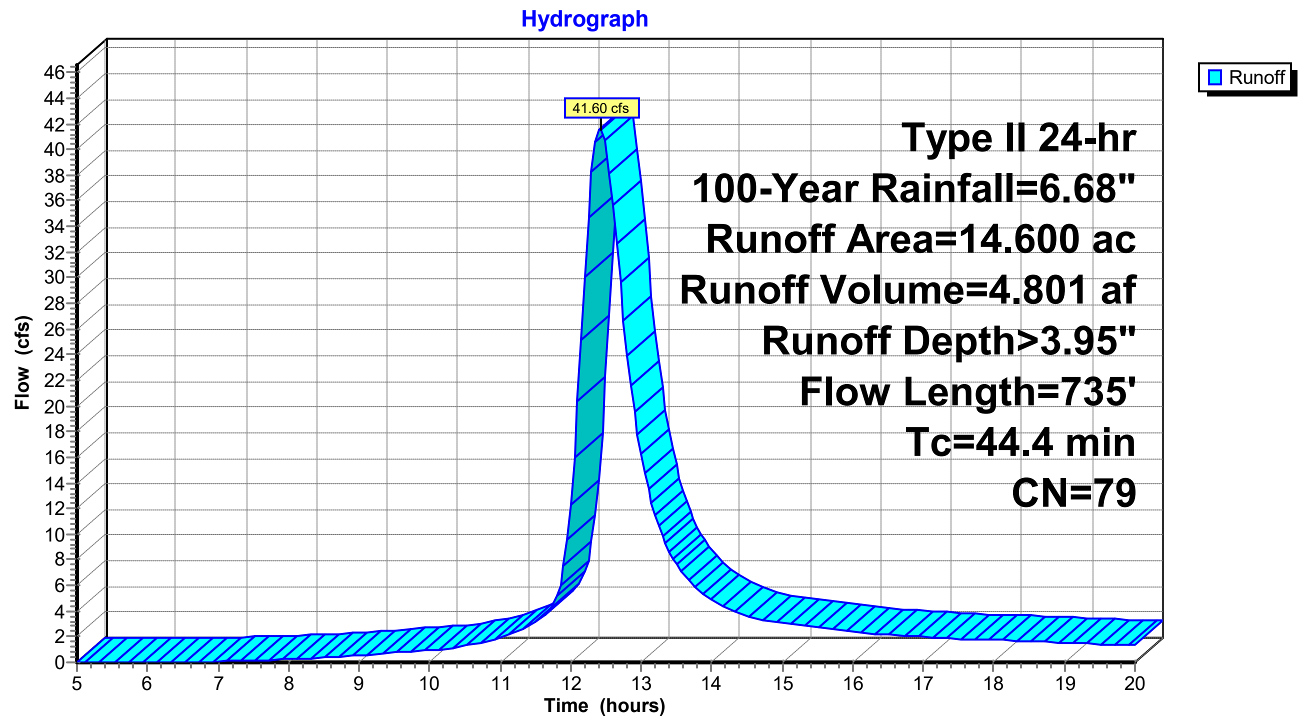
Runoff = 41.60 cfs @ 12.41 hrs, Volume= 4.801 af, Depth> 3.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

Area (ac)	CN	Description
14.600	79	Woods, Fair, HSG D
14.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.8	200	0.0300	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 2.67"
8.9	460	0.0300	0.87		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
0.7	75	0.1200	1.73		**Shallow Concentrated Flow, Shallow Concentrated** Woodland Kv= 5.0 fps
44.4	735	Total			

Subcatchment DR-E: Overland



Summary for Subcatchment DR-F: Overland

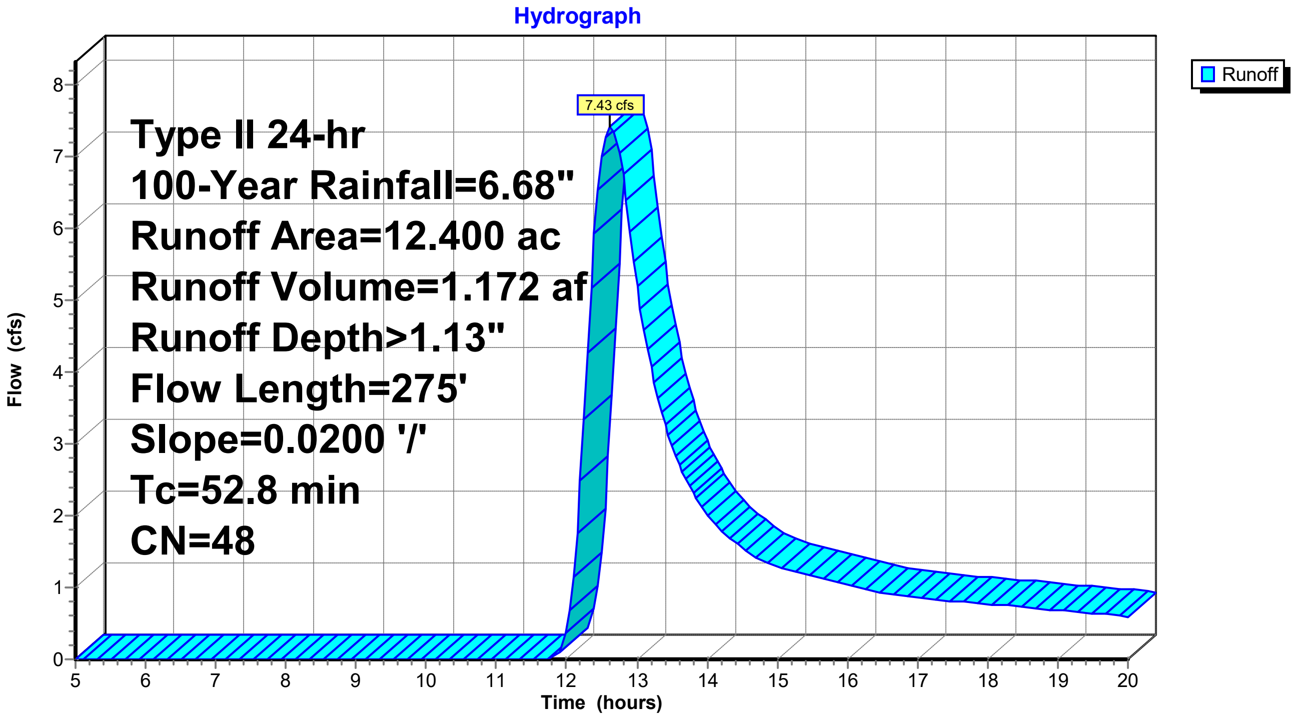
Runoff = 7.43 cfs @ 12.62 hrs, Volume= 1.172 af, Depth> 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	1.100	98	Pavement
	11.300	43	Woods/grass comb., Fair, HSG A
	12.400	48	Weighted Average
	11.300		91.13% Pervious Area
	1.100		8.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
52.8	275	0.0200	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.67"

Subcatchment DR-F: Overland



Summary for Reach 1W: Wetland #1

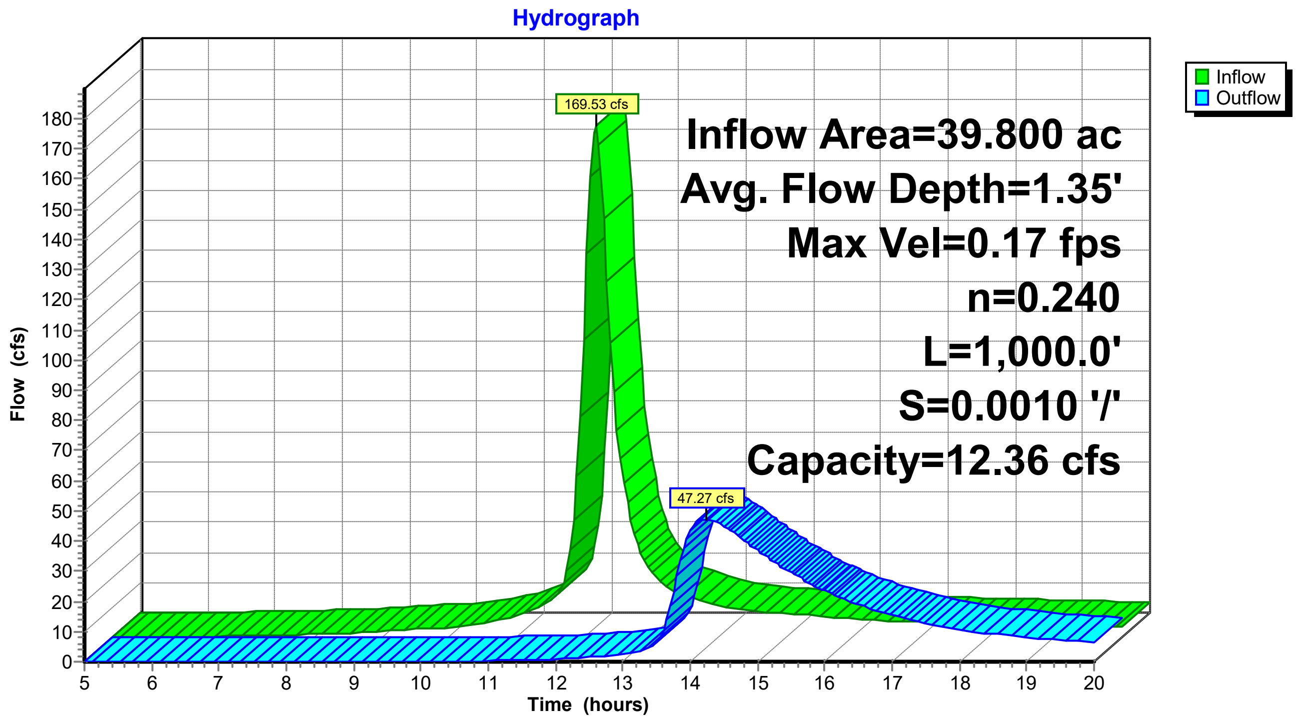
Inflow Area = 39.800 ac, 2.76% Impervious, Inflow Depth > 4.08" for 100-Year event
Inflow = 169.53 cfs @ 12.18 hrs, Volume= 13.523 af
Outflow = 47.27 cfs @ 14.24 hrs, Volume= 11.437 af, Atten= 72%, Lag= 123.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.17 fps, Min. Travel Time= 96.3 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 197.9 min

Peak Storage= 273,172 cf @ 12.63 hrs
Average Depth at Peak Storage= 1.35' , Surface Width= 208.10'
Bank-Full Depth= 0.50' Flow Area= 100.8 sf, Capacity= 12.36 cfs

200.00' x 0.50' deep channel, n= 0.240 Sheet flow over Dense Grass
Side Slope Z-value= 3.0 '/' Top Width= 203.00'
Length= 1,000.0' Slope= 0.0010 '/'
Inlet Invert= 6.00', Outlet Invert= 5.00'

Reach 1W: Wetland #1



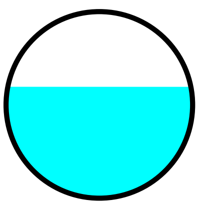
Summary for Reach 2R: Outlet Pipe

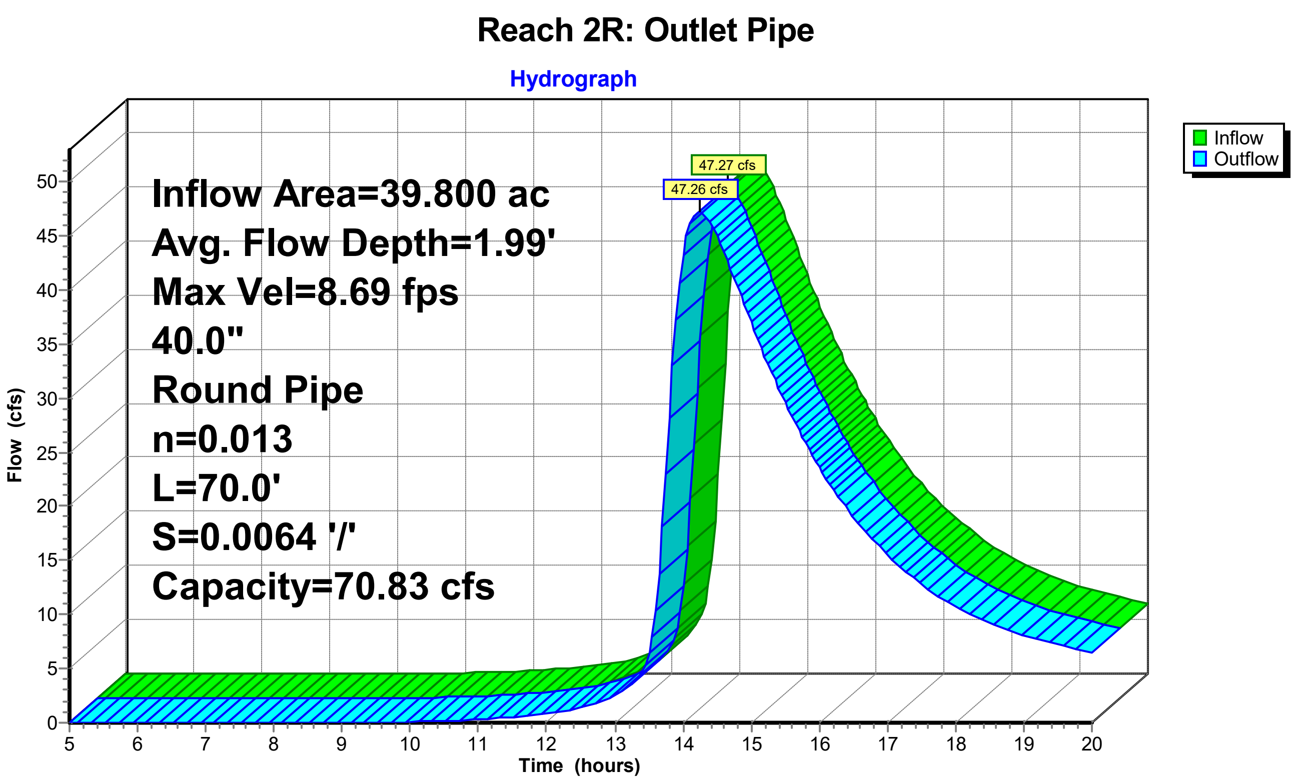
Inflow Area = 39.800 ac, 2.76% Impervious, Inflow Depth > 3.45" for 100-Year event
Inflow = 47.27 cfs @ 14.24 hrs, Volume= 11.437 af
Outflow = 47.26 cfs @ 14.24 hrs, Volume= 11.434 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.69 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.49 fps, Avg. Travel Time= 0.3 min

Peak Storage= 381 cf @ 14.24 hrs
Average Depth at Peak Storage= 1.99' , Surface Width= 3.27'
Bank-Full Depth= 3.33' Flow Area= 8.7 sf, Capacity= 70.83 cfs

40.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.0064 '/'
Inlet Invert= 4.25', Outlet Invert= 3.80'



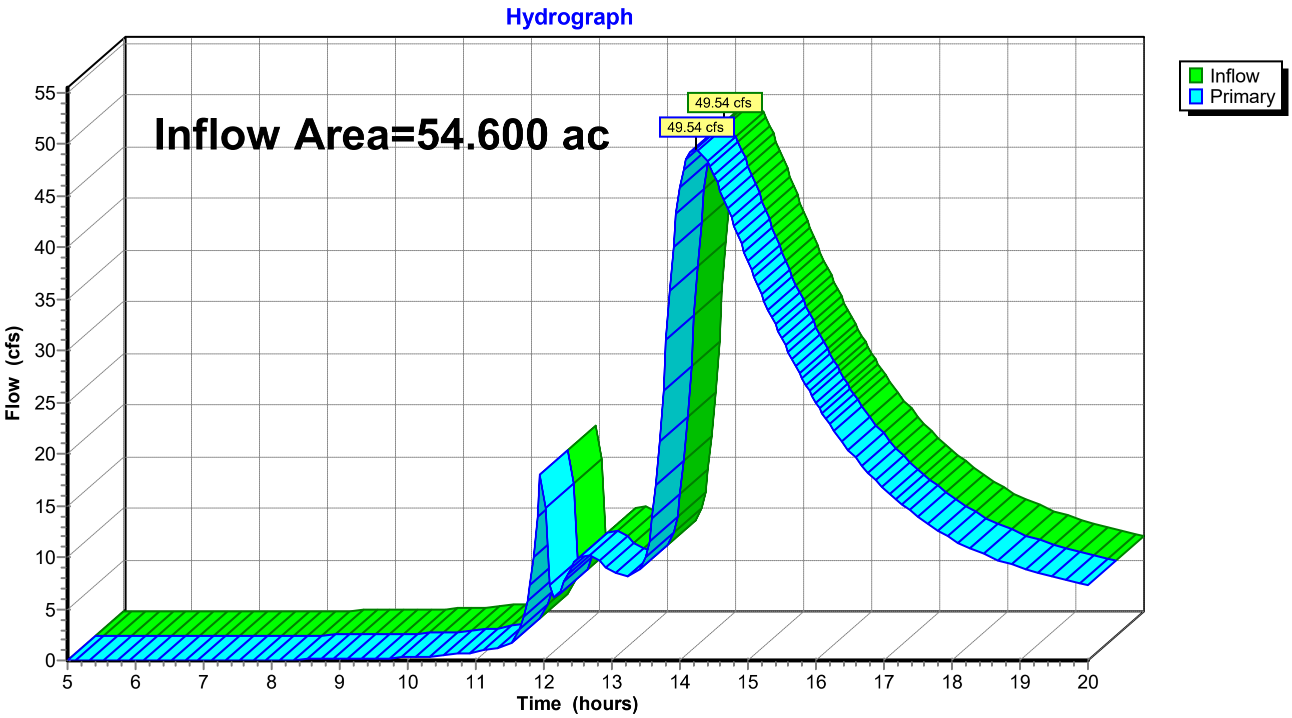


Summary for Pond 1P: Analysis Point #1

Inflow Area = 54.600 ac, 4.03% Impervious, Inflow Depth > 2.95" for 100-Year event
Inflow = 49.54 cfs @ 14.23 hrs, Volume= 13.405 af
Primary = 49.54 cfs @ 14.23 hrs, Volume= 13.405 af, Atten= 0%, Lag= 0.0 min

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

Pond 1P: Analysis Point #1

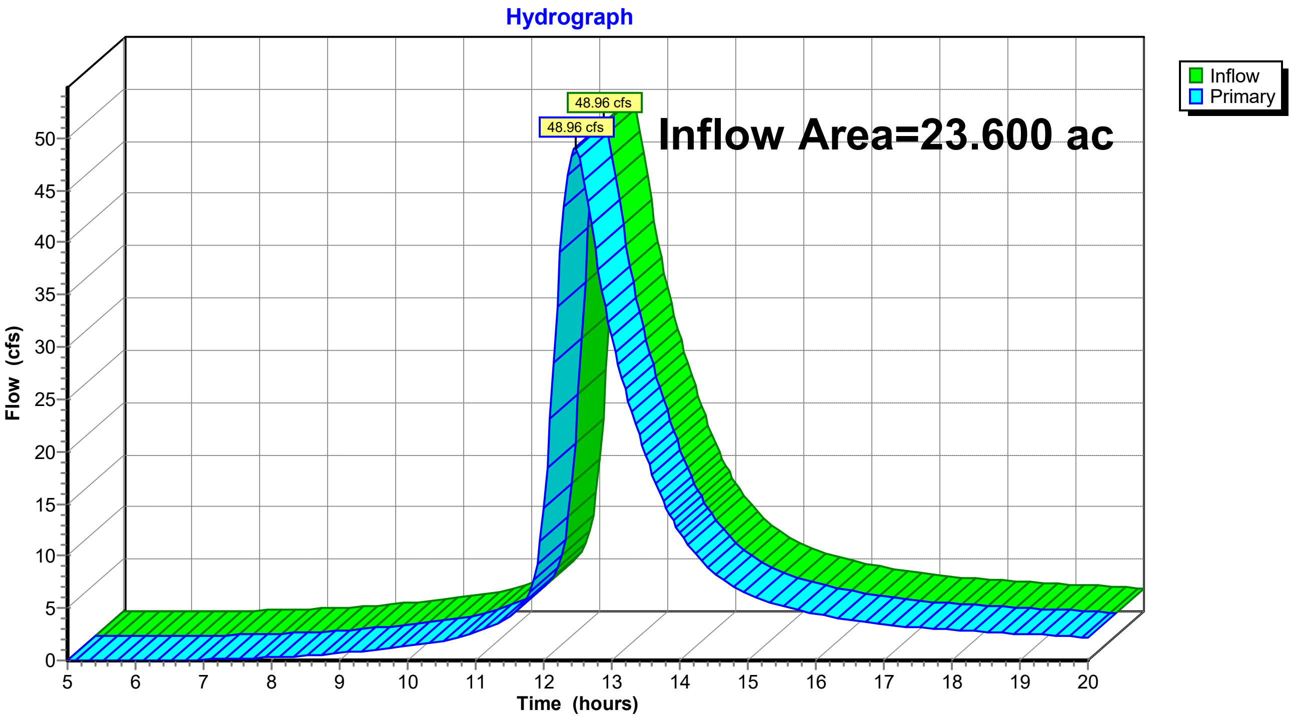


Summary for Pond 2P: Analysis Point #2

Inflow Area = 23.600 ac, 0.00% Impervious, Inflow Depth > 3.92" for 100-Year event
Inflow = 48.96 cfs @ 12.46 hrs, Volume= 7.705 af
Primary = 48.96 cfs @ 12.46 hrs, Volume= 7.705 af, Atten= 0%, Lag= 0.0 min

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

Pond 2P: Analysis Point #2

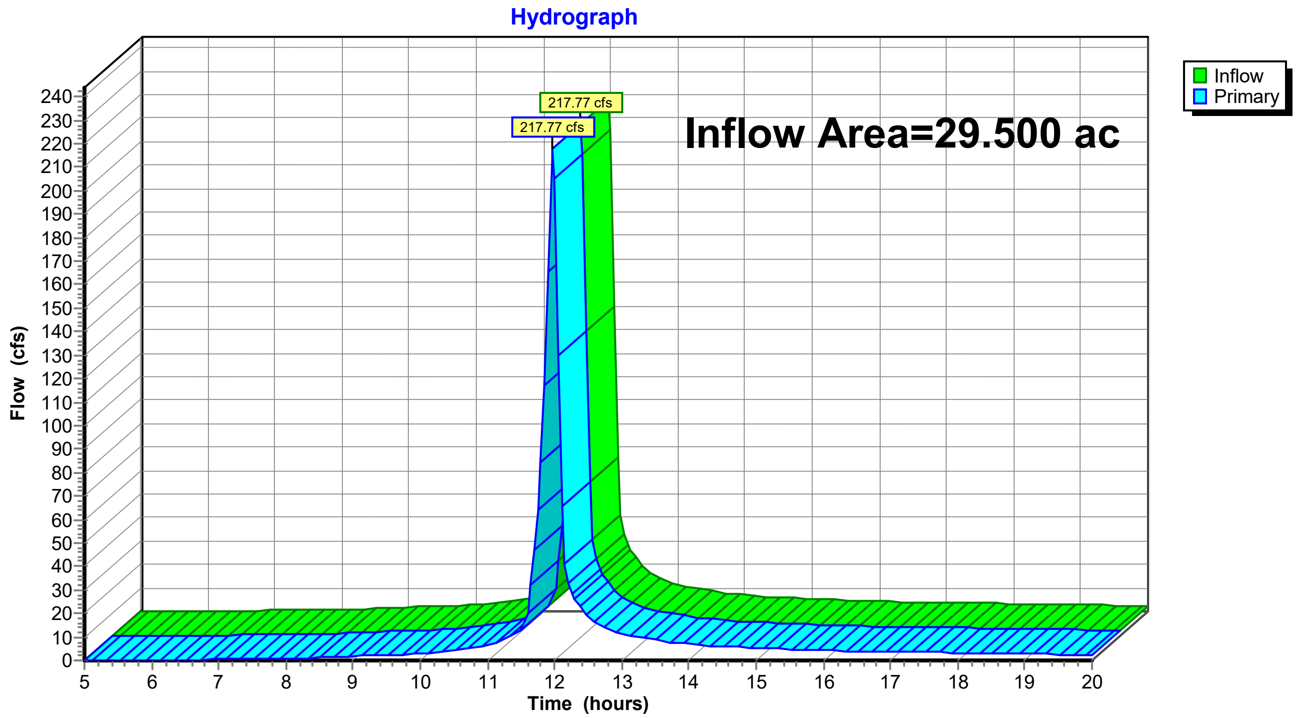


Summary for Pond 3P: Infiltration

Inflow Area = 29.500 ac, 0.00% Impervious, Inflow Depth > 4.10" for 100-Year event
Inflow = 217.77 cfs @ 11.97 hrs, Volume= 10.083 af
Primary = 217.77 cfs @ 11.97 hrs, Volume= 10.083 af, Atten= 0%, Lag= 0.0 min

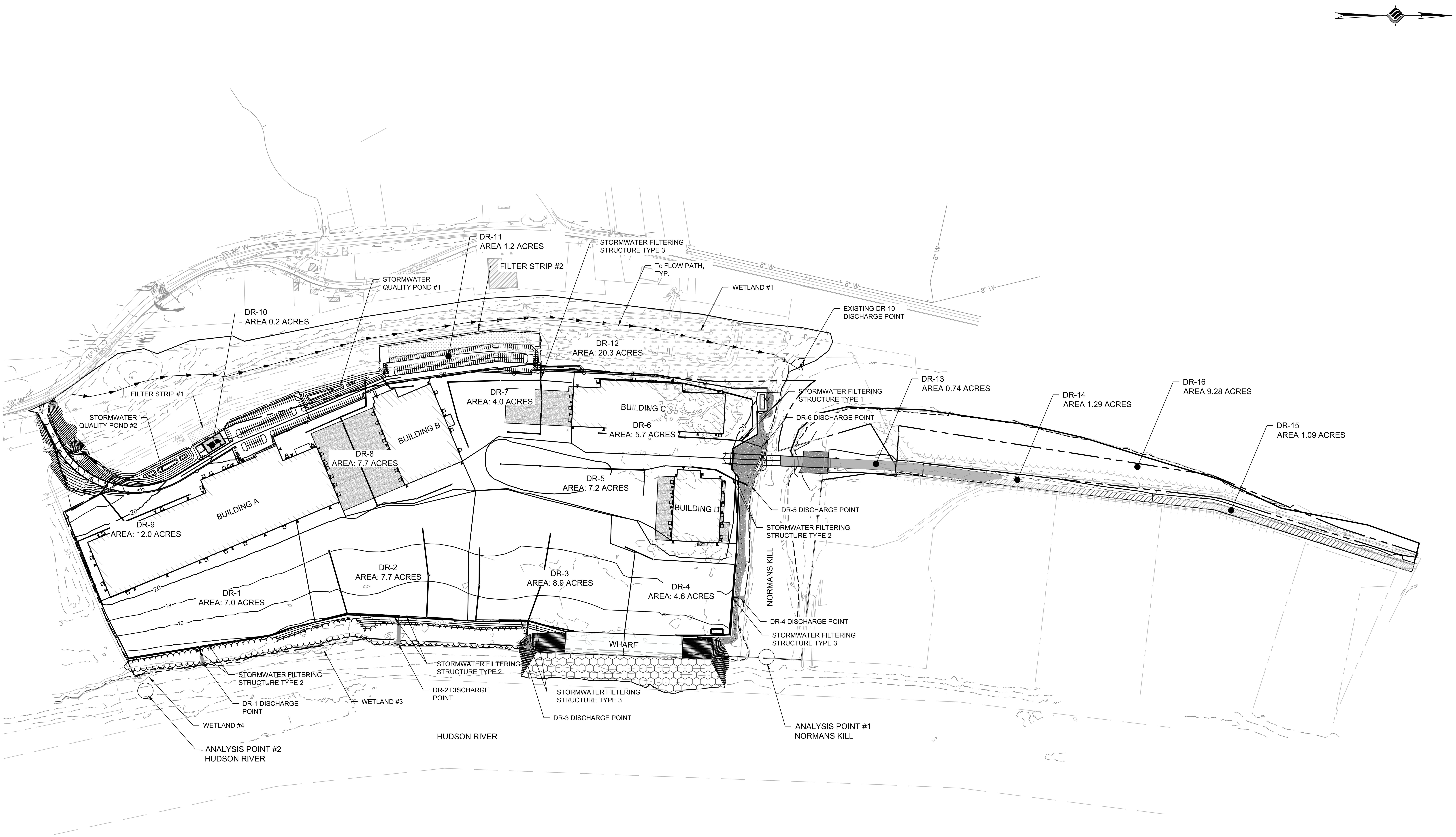
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 3P: Infiltration



Appendix B

Proposed Conditions Drainage Map and HydroCAD Report



LEGEND:

ROADWAY NEW IMPERVIOUS

MILL & FILL EXISTING PAVEMENT

NOTE:
1. DRAINAGE AREAS DR-4, DR-5, DR-6, DR-7, DR-8, DR-9, DR-10, DR-11, DR-12, DR-13, DR-14, AND DR-15 DRAIN TO ANALYSIS POINT #1.
2. DRAINAGE AREAS DR-1, DR-2, AND DR-3 DRAIN TO ANALYSIS POINT #2.

0 200 400 600 FT
SCALE

McFarland Johnson
60 RAILROAD PLACE
SUITE 402
SARATOGA SPRINGS, NEW YORK 12866
P:518-580-9380 F:518-580-9383
SaratogaROM@mjinc.com

PROJECT MILESTONE
PRELIMINARY PLANS

NO.	DATE	DESCRIPTION

CLIENT:
ALBANY PORT DISTRICT COMMISSION
ALBANY, NEW YORK

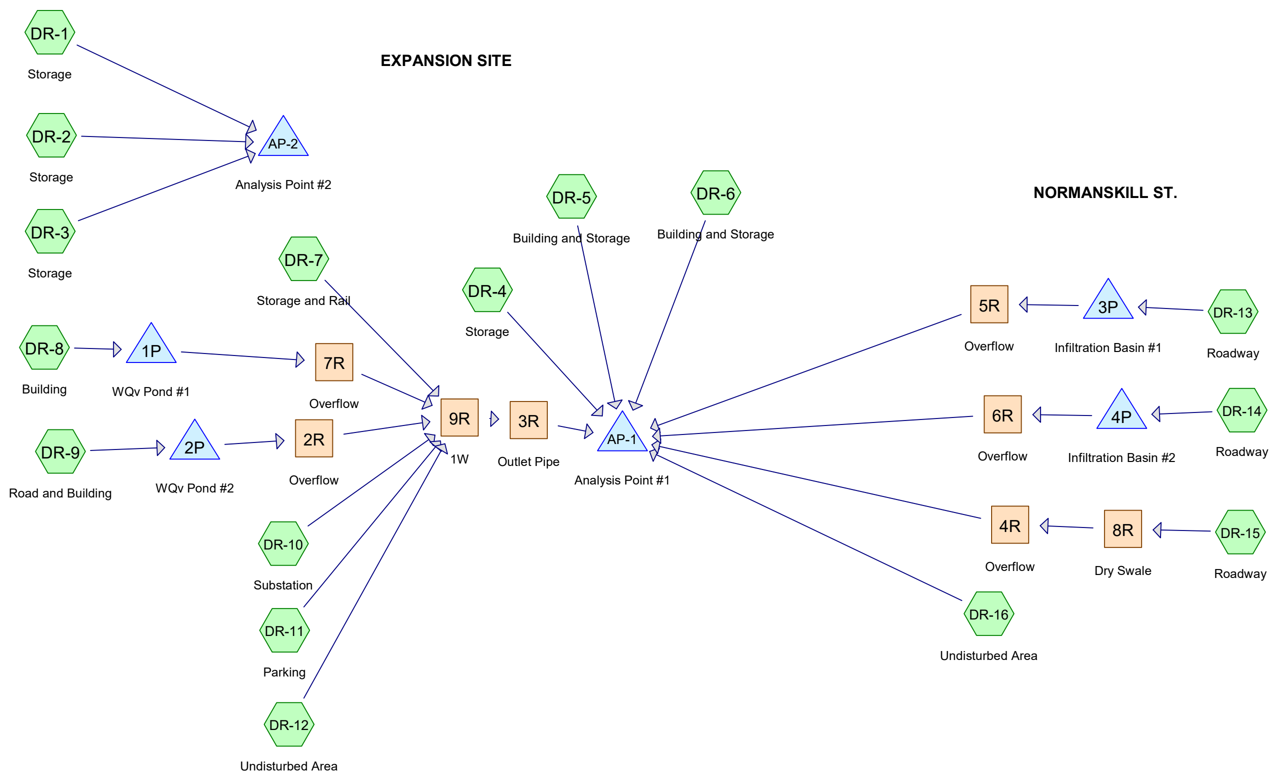
PROJECT:
PORT OF ALBANY SITE INFRASTRUCTURE IMPROVEMENTS

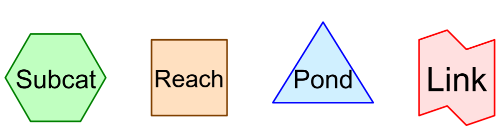
DRAWN	NSO
DESIGNED	NSO
CHECKED	AJF
SCALE	1" = 200'
DATE	OCTOBER 2021
PROJECT	18641.00

DRAWING TITLE
POST-DEVELOPMENT SITE DRAINAGE AREAS

DRAWING NUMBER
DR-PR

01 OF 01





Routing Diagram for 18641.00-Proposed Condition
Prepared by McFarland Johnson, Printed 10/26/2021
HydroCAD® 10.10-5a s/n 02401 © 2020 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type II 24-hr		Default	24.00	1	2.25	2
2	10-Year	Type II 24-hr		Default	24.00	1	3.88	2
3	100-Year	Type II 24-hr		Default	24.00	1	6.68	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.690	39	>75% Grass cover, Good, HSG A (DR-13, DR-14, DR-15)
0.230	80	>75% Grass cover, Good, HSG D (DR-9)
2.791	98	Building C (DR-6)
1.329	98	Building D (DR-5)
6.710	98	Building Rail Parking (DR-8)
40.980	95	Compacted Gravel (DR-1, DR-2, DR-3, DR-4, DR-5, DR-6, DR-7, DR-8)
1.900	92	Compacted Gravel (DR-9)
1.350	98	Mill & Fill of Old Pavement (DR-14, DR-15)
0.630	98	New Pavement (DR-14, DR-15)
1.220	98	Parking (DR-11)
0.450	98	Pavement (DR-13)
0.980	98	Rail (DR-7)
9.870	98	Road and Building (DR-9)
0.170	98	Substation (DR-10)
20.300	79	Woods, Fair, HSG D (DR-12)
9.280	43	Woods/grass comb., Fair, HSG A (DR-16)
98.880	**87**	**TOTAL AREA**

Summary for Subcatchment DR-1: Storage

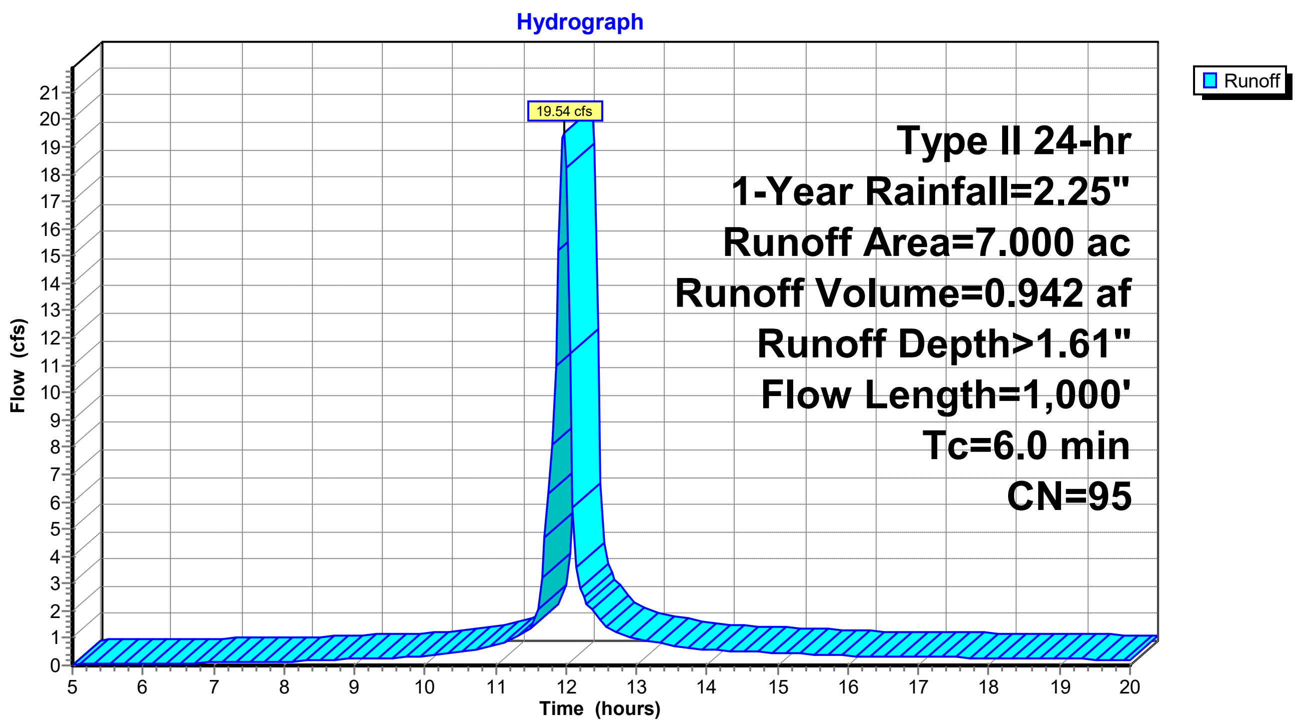
Runoff = 19.54 cfs @ 11.96 hrs, Volume= 0.942 af, Depth> 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	7.000	95	Compacted Gravel
	7.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	1,000		2.78		**Direct Entry, Min**

Subcatchment DR-1: Storage



Summary for Subcatchment DR-10: Substation

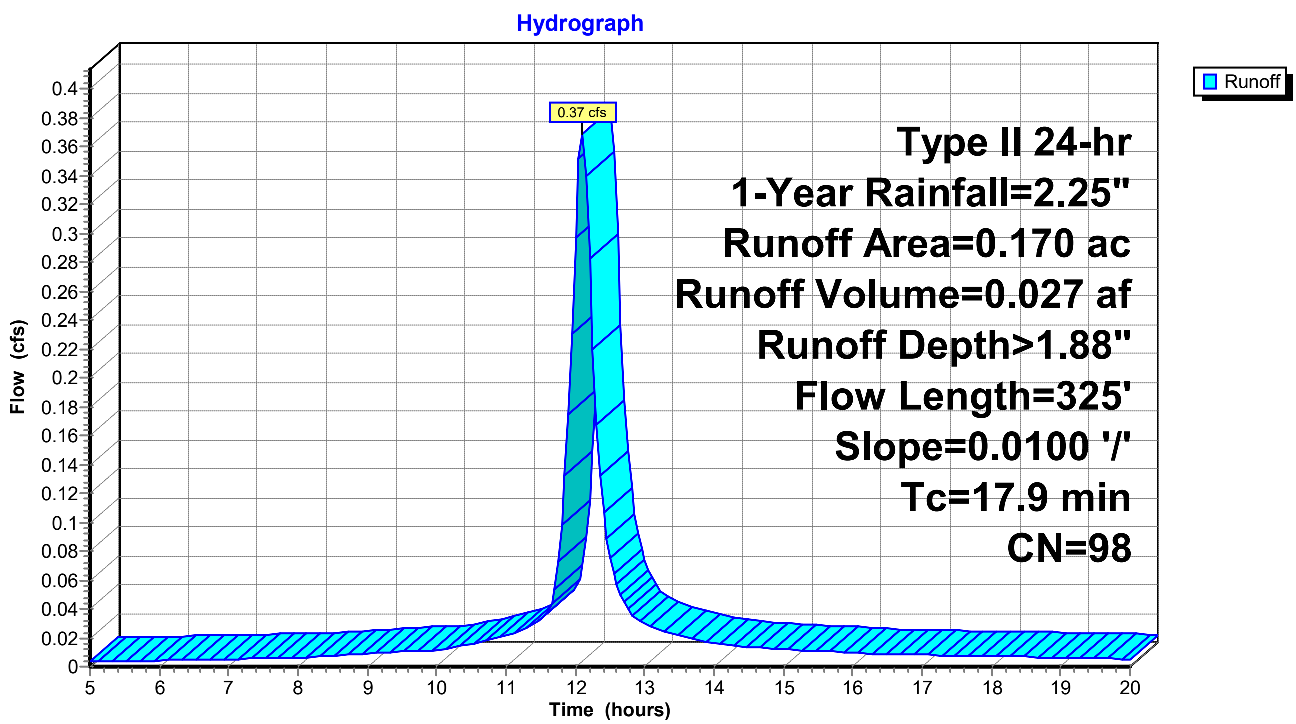
Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.027 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	0.170	98	Substation
	0.170		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	65	0.0100	0.83		**Sheet Flow, paved** Smooth surfaces n= 0.011 P2= 2.40"
9.9	60	0.0100	0.10		**Sheet Flow, filter strip** Grass: Short n= 0.150 P2= 2.40"
6.7	200	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.9	325	Total			

Subcatchment DR-10: Substation



Summary for Subcatchment DR-11: Parking

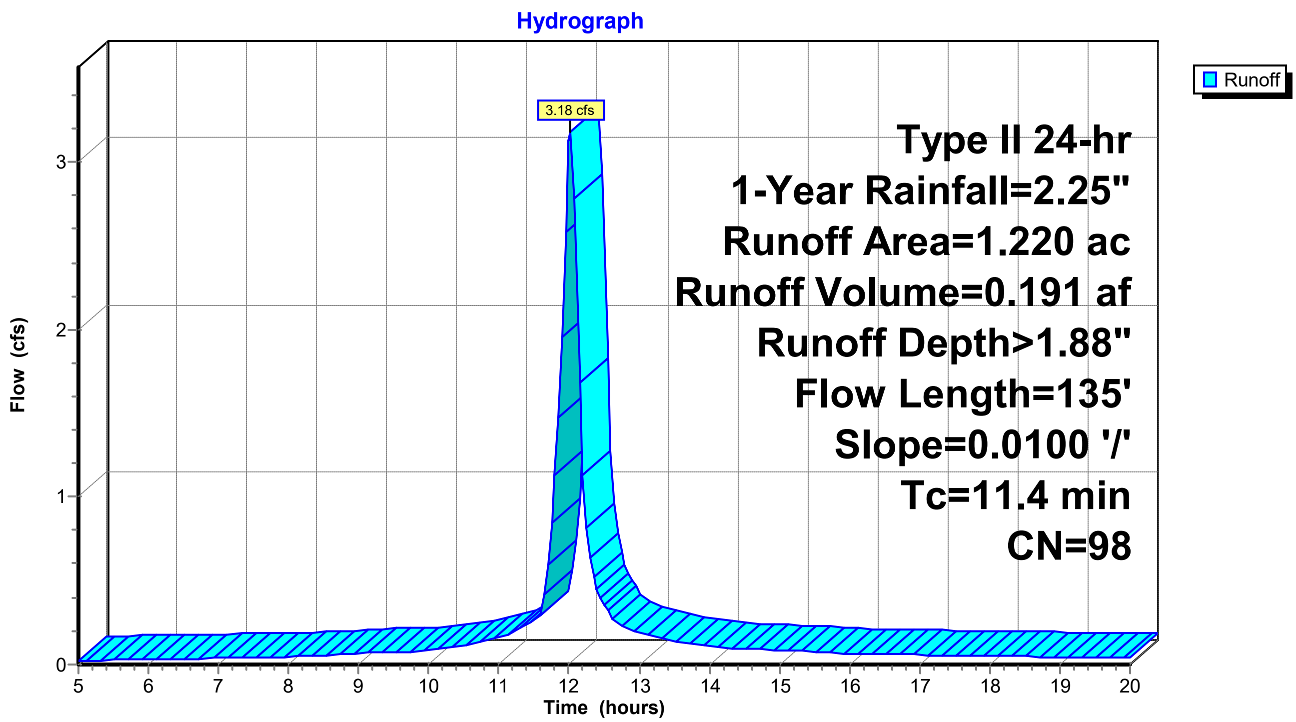
Runoff = 3.18 cfs @ 12.02 hrs, Volume= 0.191 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	1.220	98	Parking
	1.220		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	75	0.0100	0.85		**Sheet Flow, parking lot** Smooth surfaces n= 0.011 P2= 2.40"
9.9	60	0.0100	0.10		**Sheet Flow, Filter Strip** Grass: Short n= 0.150 P2= 2.40"
11.4	135	Total			

Subcatchment DR-11: Parking



Summary for Subcatchment DR-12: Undisturbed Area

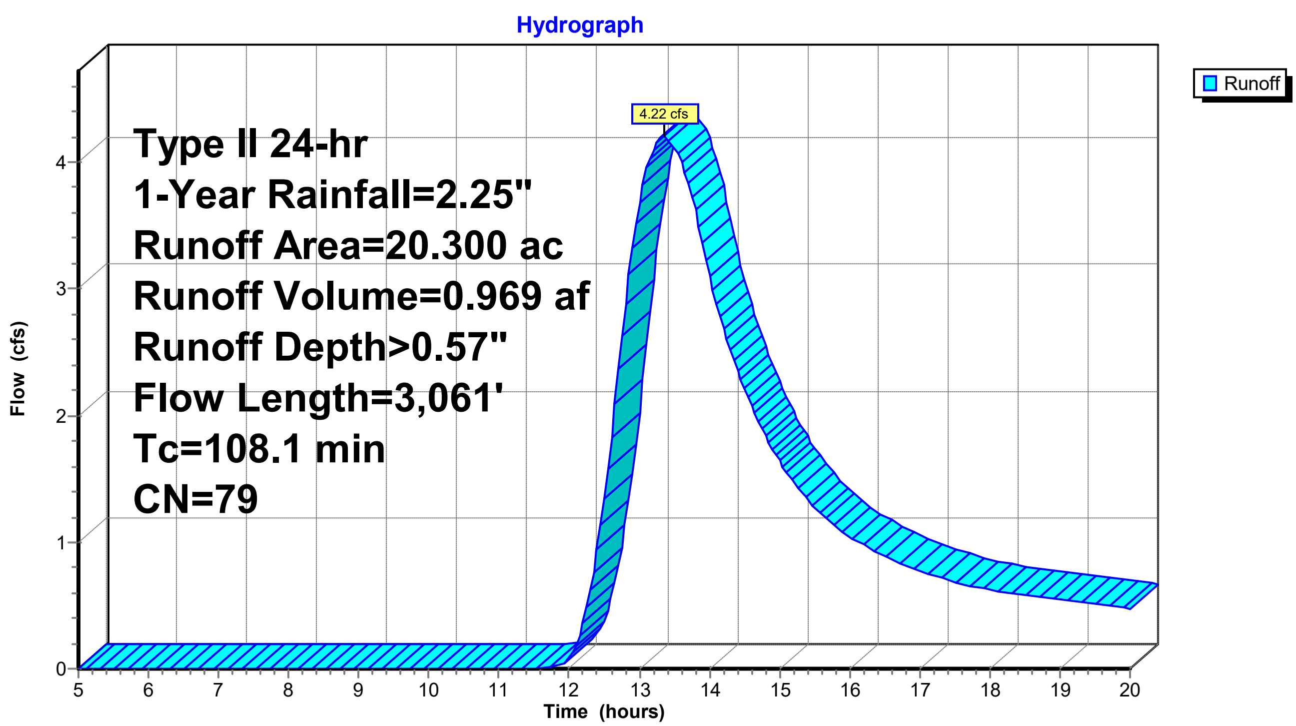
Runoff = 4.22 cfs @ 13.35 hrs, Volume= 0.969 af, Depth> 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

Area (ac)	CN	Description
20.300	79	Woods, Fair, HSG D
20.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	200	0.0800	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
3.0	200	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.6	250	0.2600	2.55		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
78.7	2,361	0.0100	0.50		**Shallow Concentrated Flow, Wetland Flow** Woodland Kv= 5.0 fps
0.0	50	0.0500	22.86	161.57	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012 Corrugated PP, smooth interior
108.1	3,061	Total			

Subcatchment DR-12: Undisturbed Area



Summary for Subcatchment DR-13: Roadway

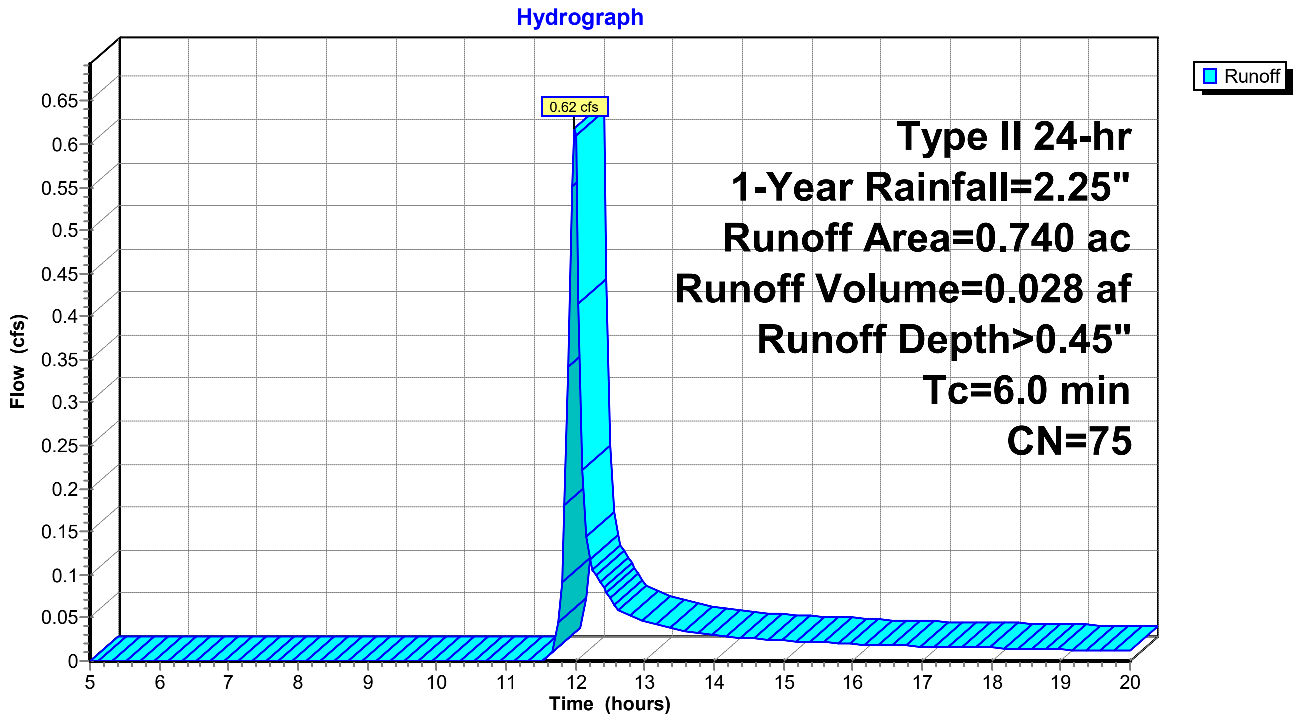
Runoff = 0.62 cfs @ 11.99 hrs, Volume= 0.028 af, Depth> 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	0.450	98	Pavement
	0.290	39	>75% Grass cover, Good, HSG A
	0.740	75	Weighted Average
	0.290		39.19% Pervious Area
	0.450		60.81% Impervious Area

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

Subcatchment DR-13: Roadway



Summary for Subcatchment DR-14: Roadway

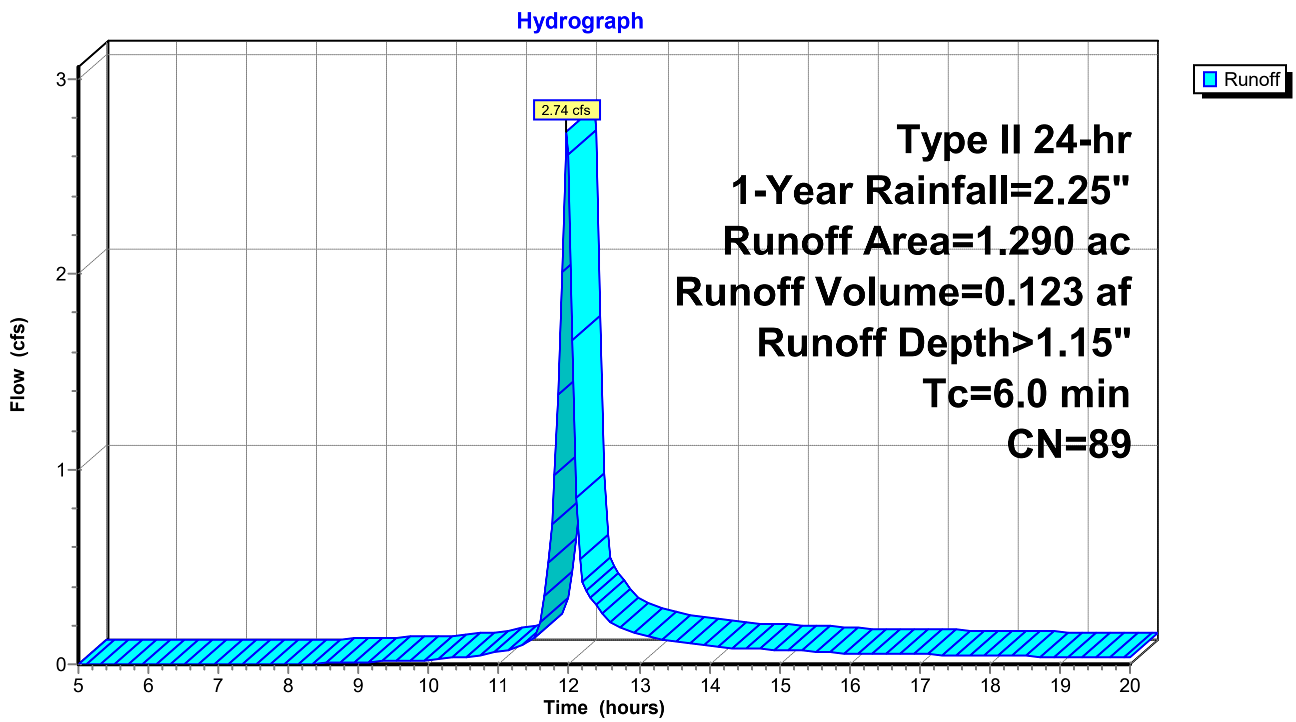
Runoff = 2.74 cfs @ 11.97 hrs, Volume= 0.123 af, Depth> 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	0.580	98	New Pavement
	0.200	39	>75% Grass cover, Good, HSG A
*	0.510	98	Mill & Fill of Old Pavement
	1.290	89	Weighted Average
	0.200		15.50% Pervious Area
	1.090		84.50% Impervious Area

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

Subcatchment DR-14: Roadway



Summary for Subcatchment DR-15: Roadway

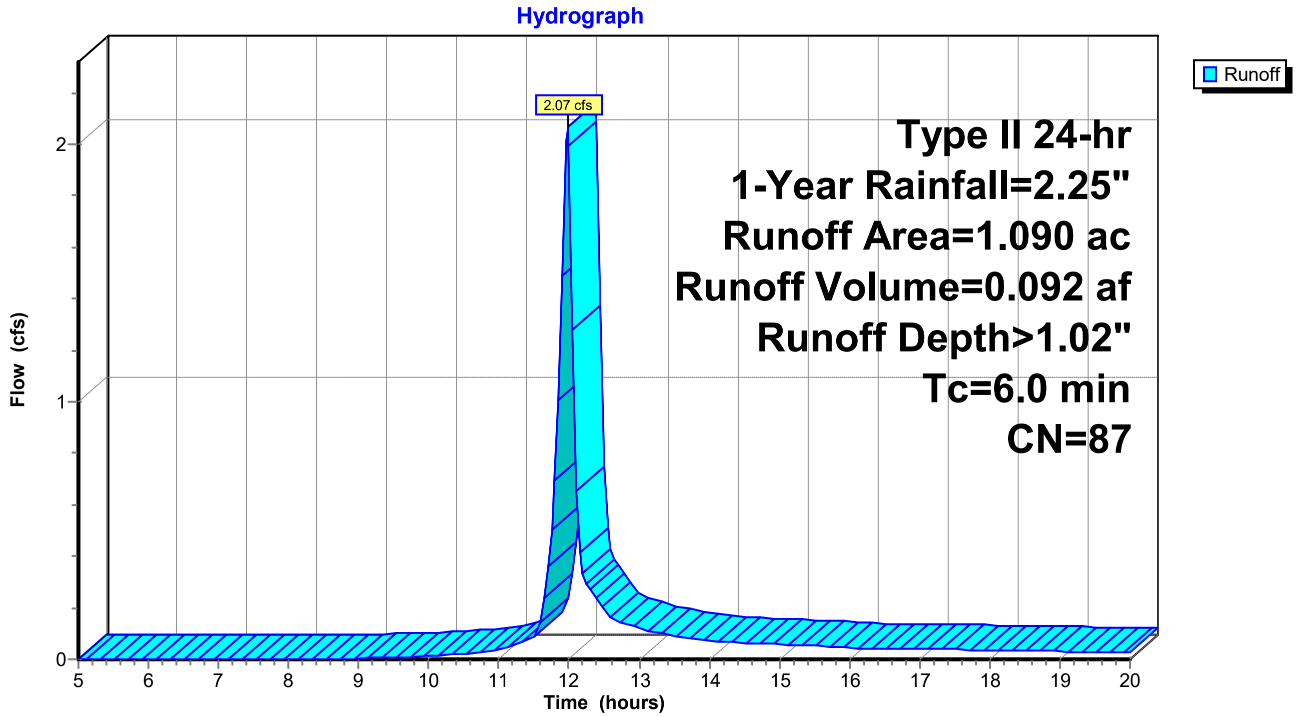
Runoff = 2.07 cfs @ 11.97 hrs, Volume= 0.092 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	0.050	98	New Pavement
	0.200	39	>75% Grass cover, Good, HSG A
*	0.840	98	Mill & Fill of Old Pavement
	1.090	87	Weighted Average
	0.200		18.35% Pervious Area
	0.890		81.65% Impervious Area

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

Subcatchment DR-15: Roadway



Summary for Subcatchment DR-16: Undisturbed Area

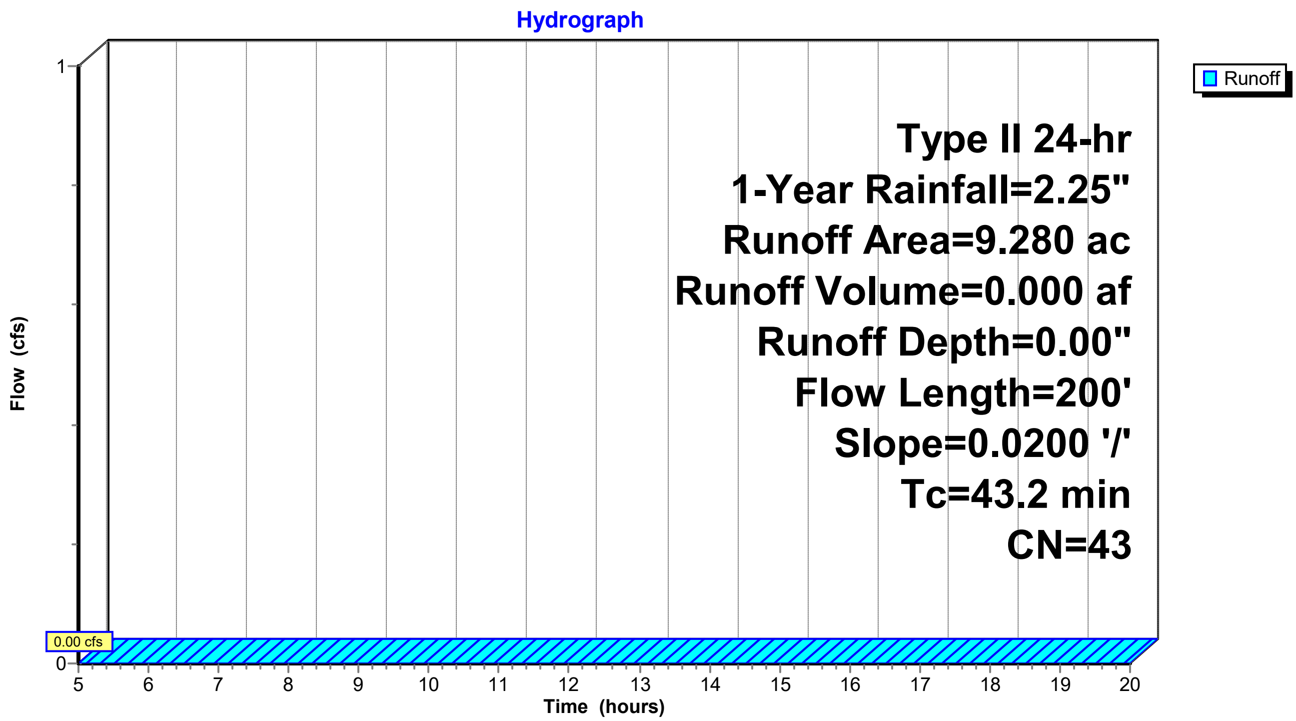
Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

Area (ac)	CN	Description
9.280	43	Woods/grass comb., Fair, HSG A
9.280		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
43.2	200	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"

Subcatchment DR-16: Undisturbed Area



Summary for Subcatchment DR-2: Storage

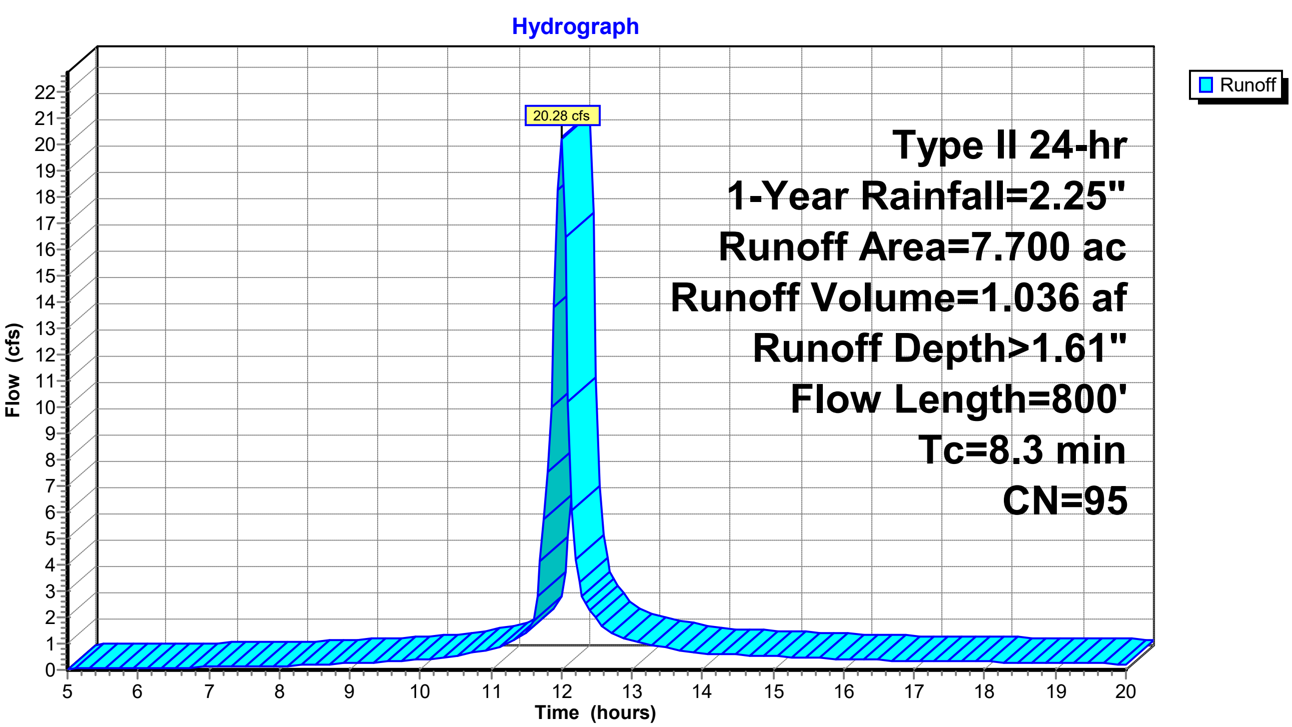
Runoff = 20.28 cfs @ 11.99 hrs, Volume= 1.036 af, Depth> 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	7.700	95	Compacted Gravel
	7.700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	300	0.0100	1.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
3.1	300	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	200	0.0050	4.34	30.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.020 Corrugated PE, corrugated interior
8.3	800	Total			

Subcatchment DR-2: Storage



Summary for Subcatchment DR-3: Storage

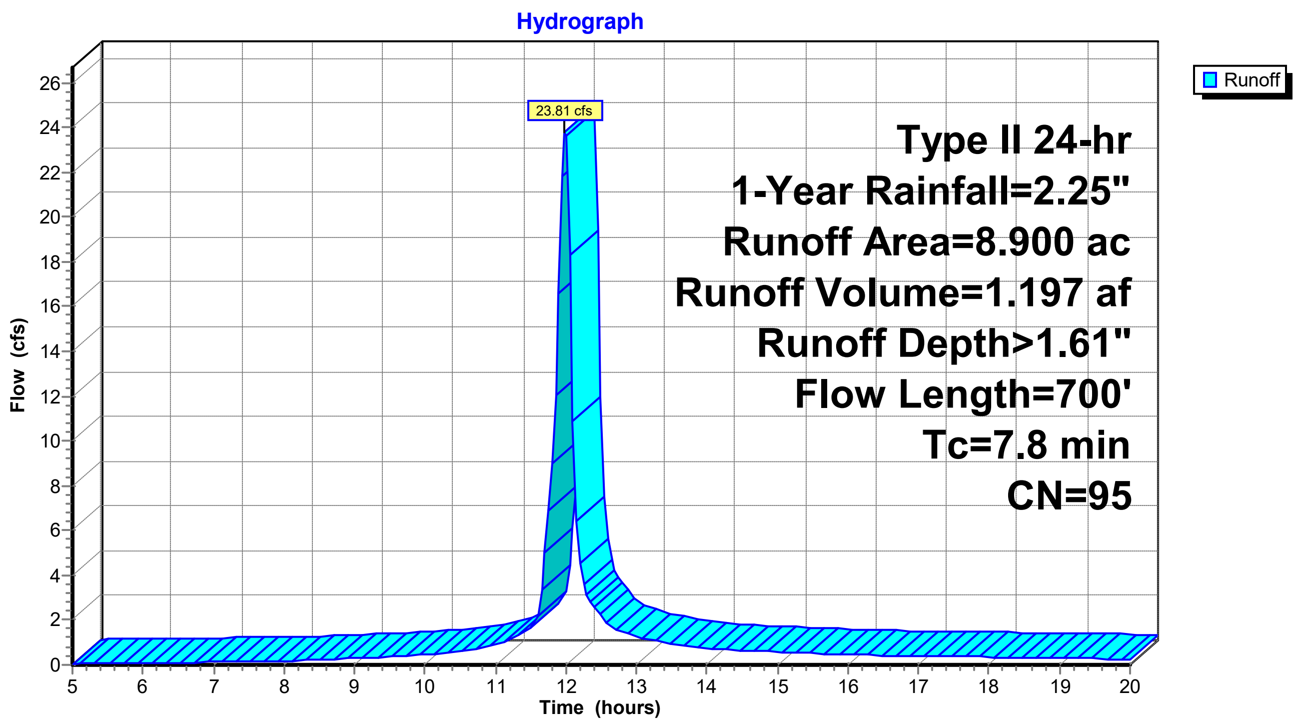
Runoff = 23.81 cfs @ 11.99 hrs, Volume= 1.197 af, Depth> 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	8.900	95	Compacted Gravel
	8.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	300	0.0100	1.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
2.6	250	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	150	0.0050	3.31	10.40	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.020 Corrugated PE, corrugated interior
7.8	700	Total			

Subcatchment DR-3: Storage



Summary for Subcatchment DR-4: Storage

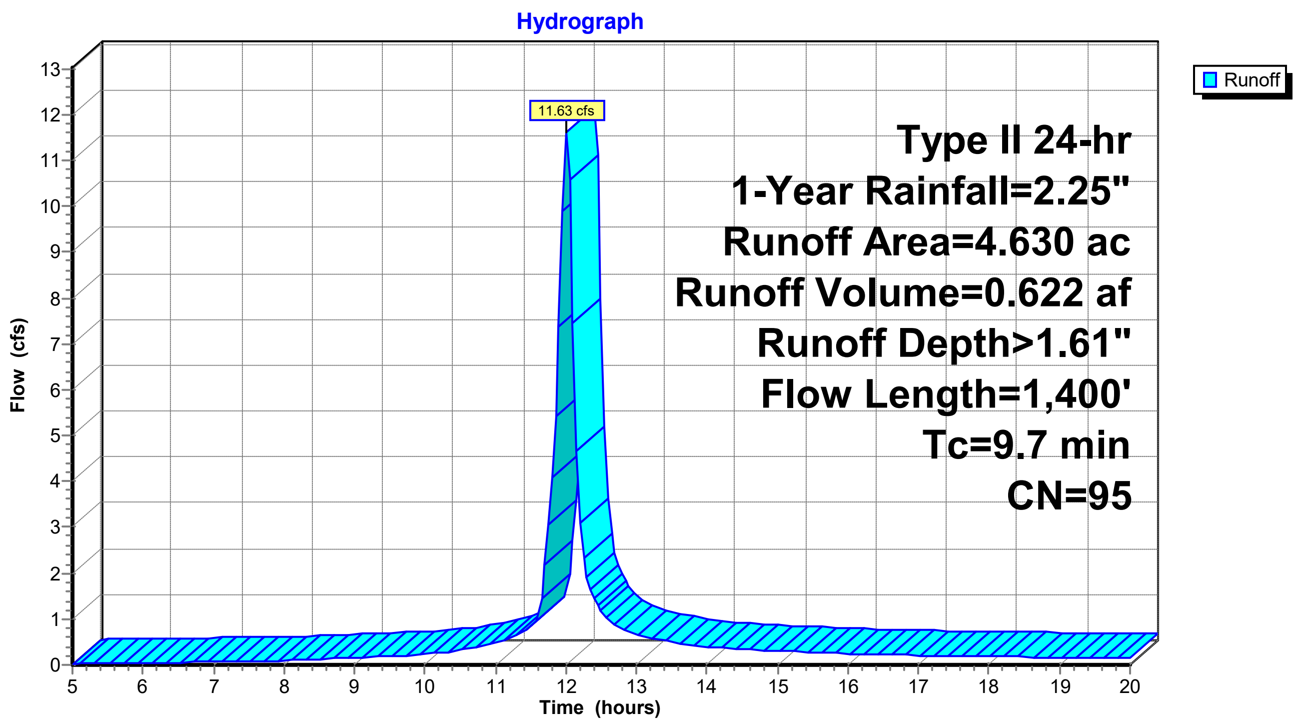
Runoff = 11.63 cfs @ 12.01 hrs, Volume= 0.622 af, Depth> 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	4.630	95	Compacted Gravel
	4.630		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	300	0.0100	1.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
2.5	300	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.8	800	0.0050	4.81	46.24	**Pipe Channel,** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.020 Corrugated PE, corrugated interior
9.7	1,400	Total			

Subcatchment DR-4: Storage



Summary for Subcatchment DR-5: Building and Storage

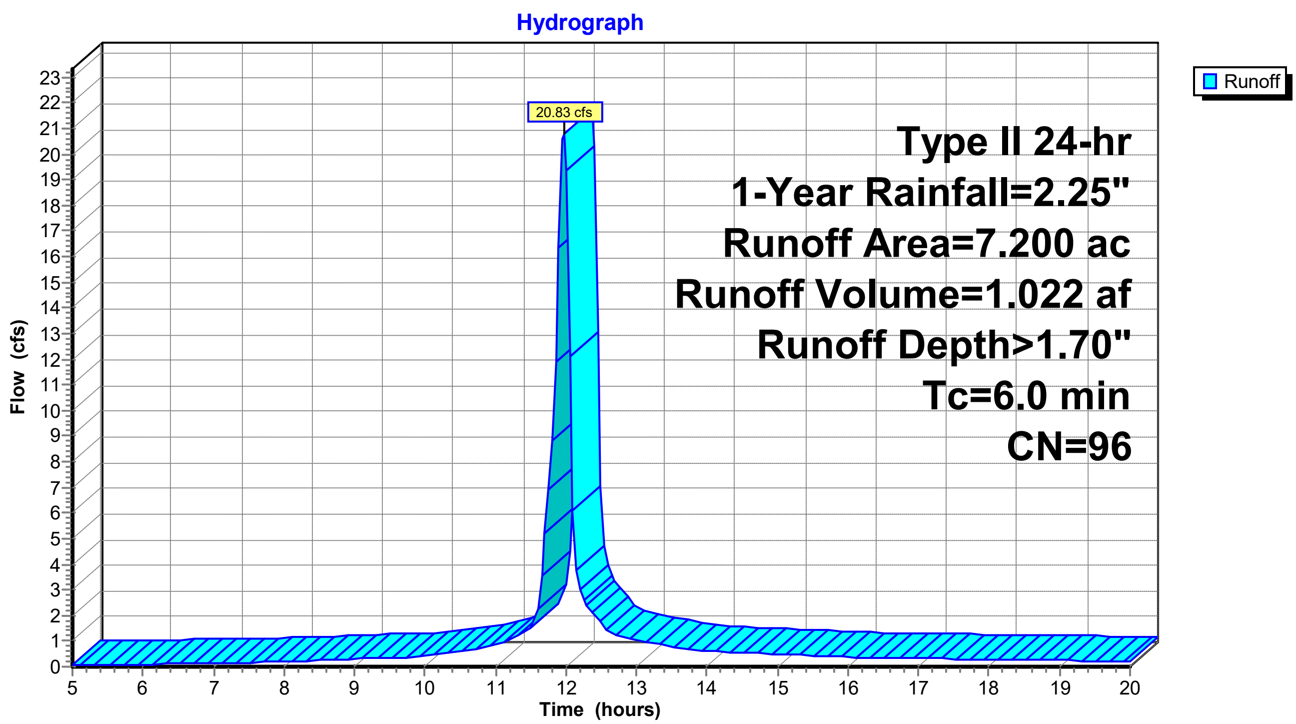
Runoff = 20.83 cfs @ 11.96 hrs, Volume= 1.022 af, Depth> 1.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	1.329	98	Building D
*	5.871	95	Compacted Gravel
	7.200	96	Weighted Average
	5.871		81.54% Pervious Area
	1.329		18.46% Impervious Area

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

Subcatchment DR-5: Building and Storage



Summary for Subcatchment DR-6: Building and Storage

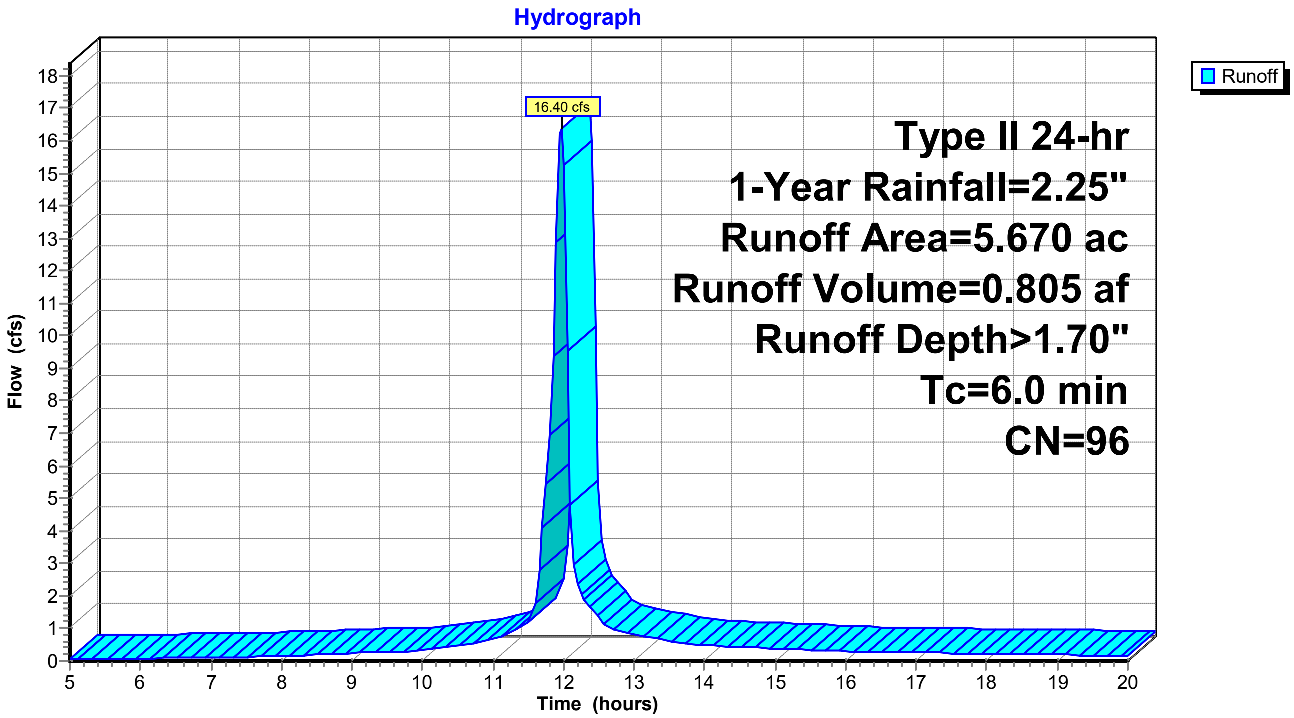
Runoff = 16.40 cfs @ 11.96 hrs, Volume= 0.805 af, Depth> 1.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	2.791	98	Building C
*	2.879	95	Compacted Gravel
	5.670	96	Weighted Average
	2.879		50.78% Pervious Area
	2.791		49.22% Impervious Area

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

Subcatchment DR-6: Building and Storage



Summary for Subcatchment DR-7: Storage and Rail

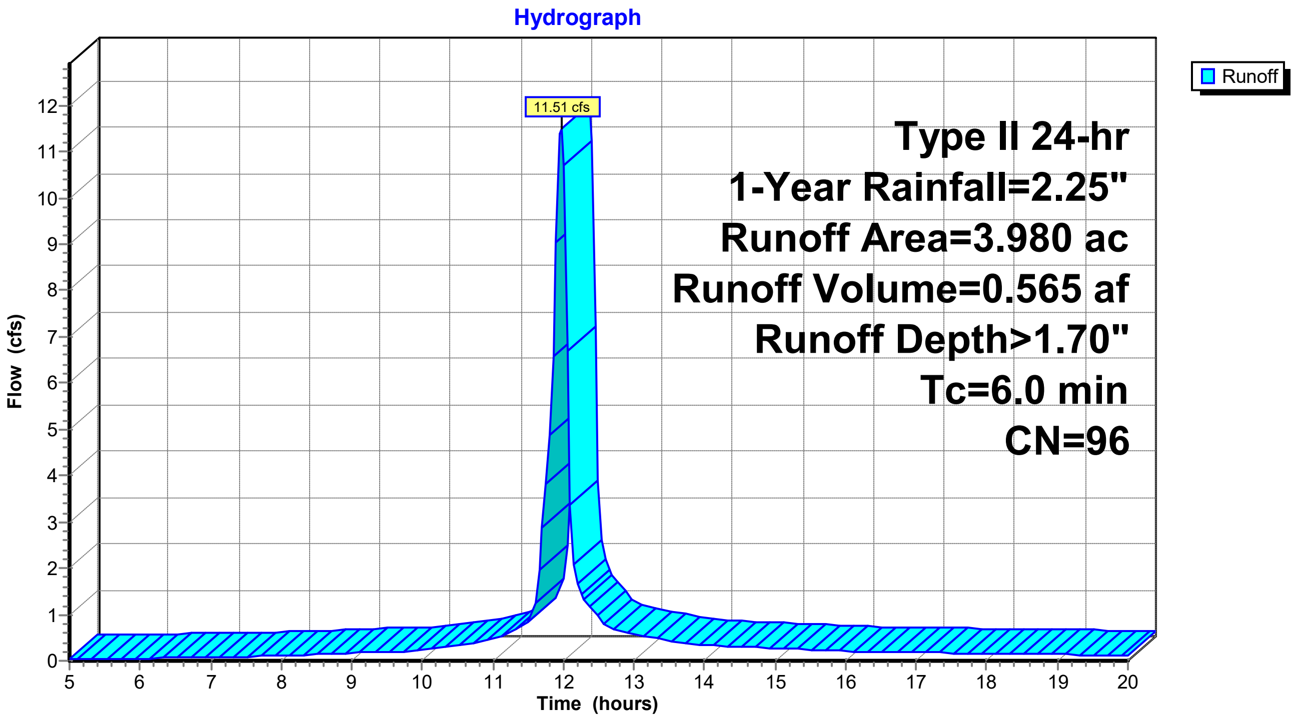
Runoff = 11.51 cfs @ 11.96 hrs, Volume= 0.565 af, Depth> 1.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	3.000	95	Compacted Gravel
*	0.980	98	Rail
	3.980	96	Weighted Average
	3.000		75.38% Pervious Area
	0.980		24.62% Impervious Area

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

Subcatchment DR-7: Storage and Rail



Summary for Subcatchment DR-8: Building

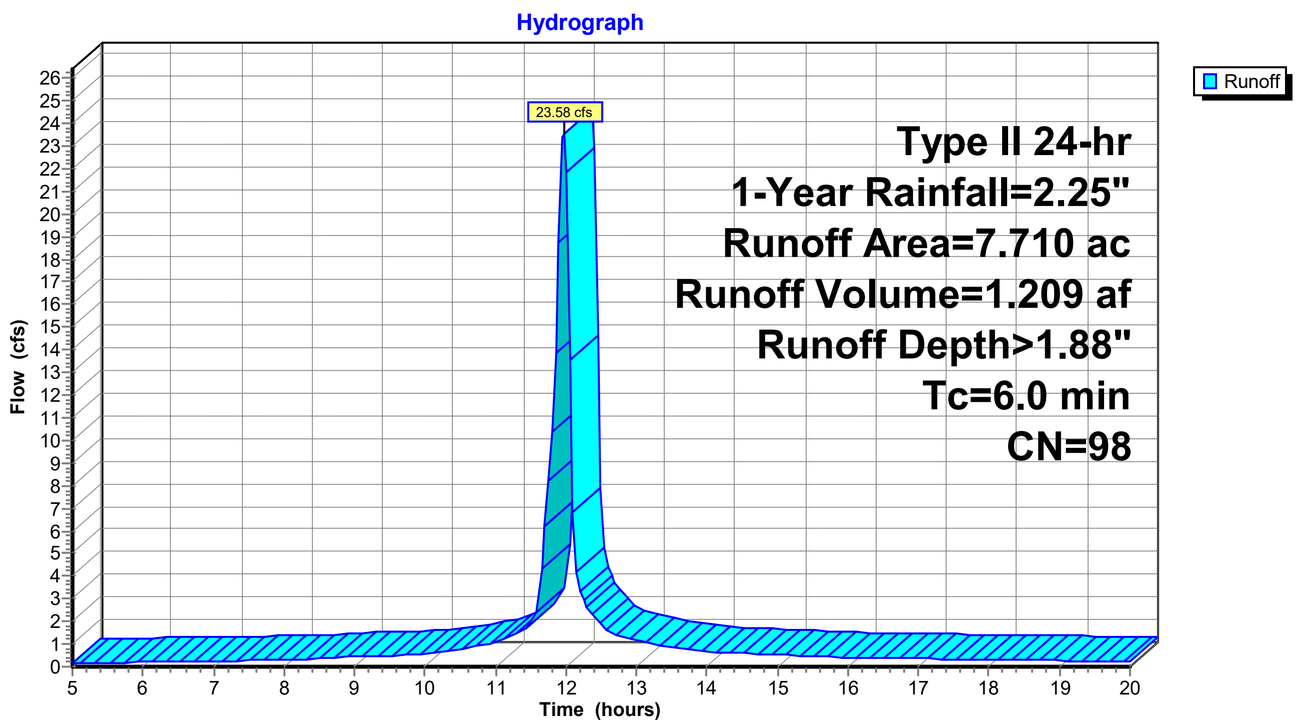
Runoff = 23.58 cfs @ 11.96 hrs, Volume= 1.209 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	6.710	98	Building Rail Parking
*	1.000	95	Compacted Gravel
	7.710	98	Weighted Average
	1.000		12.97% Pervious Area
	6.710		87.03% Impervious Area

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

Subcatchment DR-8: Building



Summary for Subcatchment DR-9: Road and Building

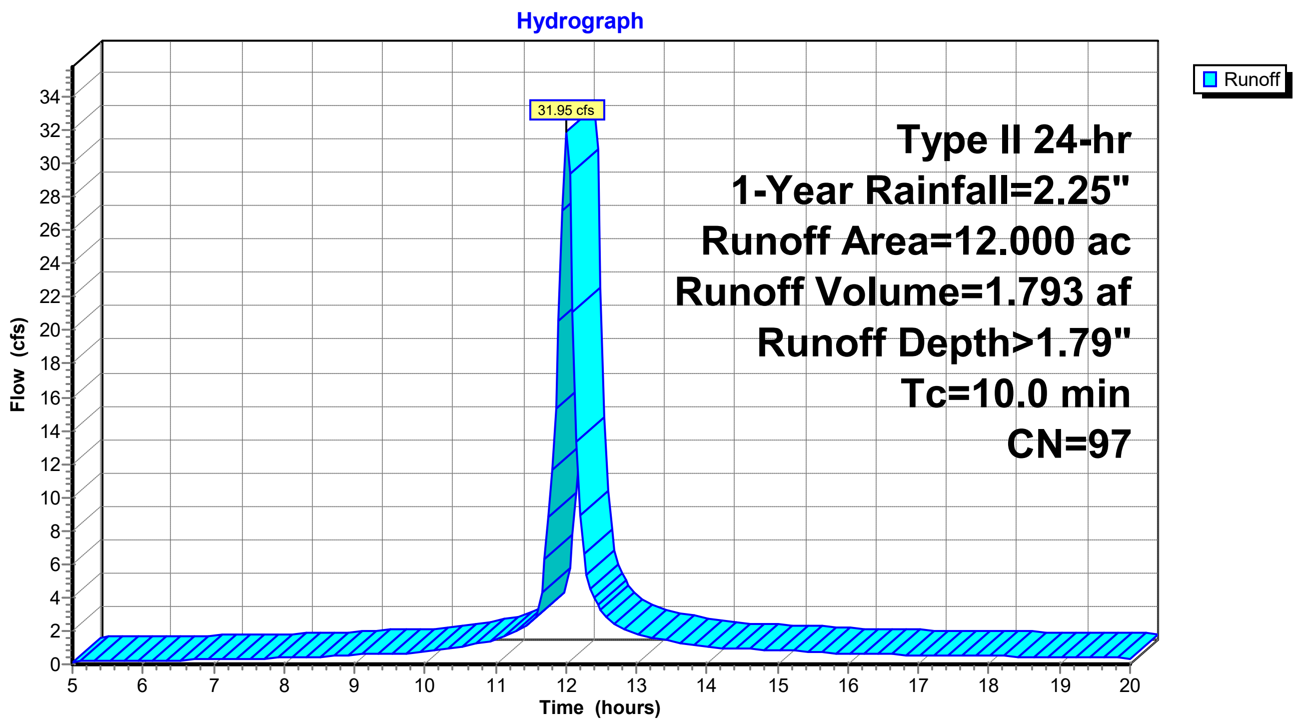
Runoff = 31.95 cfs @ 12.01 hrs, Volume= 1.793 af, Depth> 1.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.25"

	Area (ac)	CN	Description
	0.230	80	>75% Grass cover, Good, HSG D
*	1.900	92	Compacted Gravel
*	9.870	98	Road and Building
	12.000	97	Weighted Average
	2.130		17.75% Pervious Area
	9.870		82.25% Impervious Area

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

Subcatchment DR-9: Road and Building



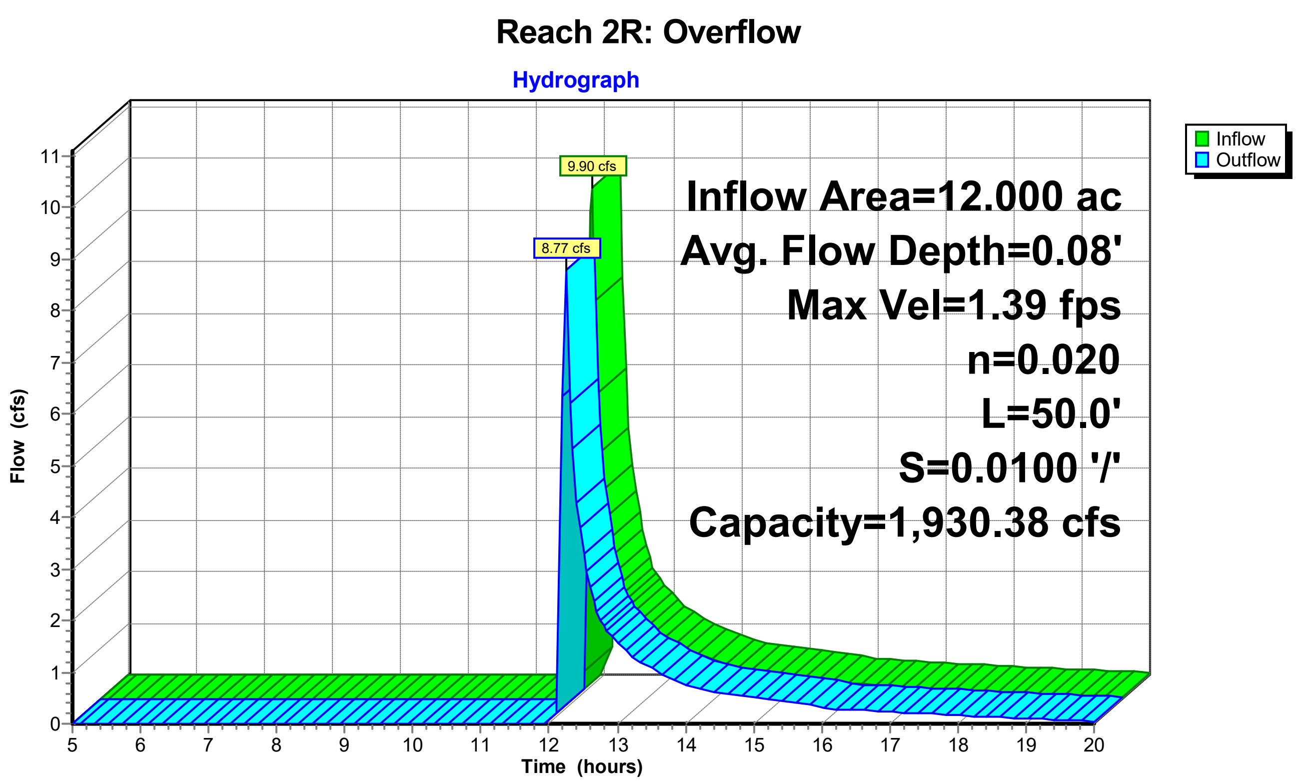
Summary for Reach 2R: Overflow

Inflow Area = 12.000 ac, 82.25% Impervious, Inflow Depth > 0.47" for 1-Year event
Inflow = 9.90 cfs @ 12.22 hrs, Volume= 0.474 af
Outflow = 8.77 cfs @ 12.25 hrs, Volume= 0.474 af, Atten= 11%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.39 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.60 fps, Avg. Travel Time= 1.4 min

Peak Storage= 328 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 80.49'
Bank-Full Depth= 2.00' Flow Area= 172.0 sf, Capacity= 1,930.38 cfs

80.00' x 2.00' deep channel, n= 0.020 Corrugated PE, corrugated interior
Side Slope Z-value= 3.0 '/' Top Width= 92.00'
Length= 50.0' Slope= 0.0100 '/'
Inlet Invert= 14.50', Outlet Invert= 14.00'



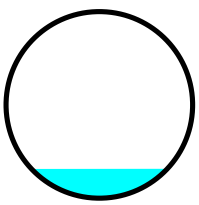
Summary for Reach 3R: Outlet Pipe

Inflow Area = 45.380 ac, 41.76% Impervious, Inflow Depth > 0.30" for 1-Year event
Inflow = 3.84 cfs @ 18.01 hrs, Volume= 1.133 af
Outflow = 3.84 cfs @ 18.02 hrs, Volume= 1.131 af, Atten= 0%, Lag= 0.5 min

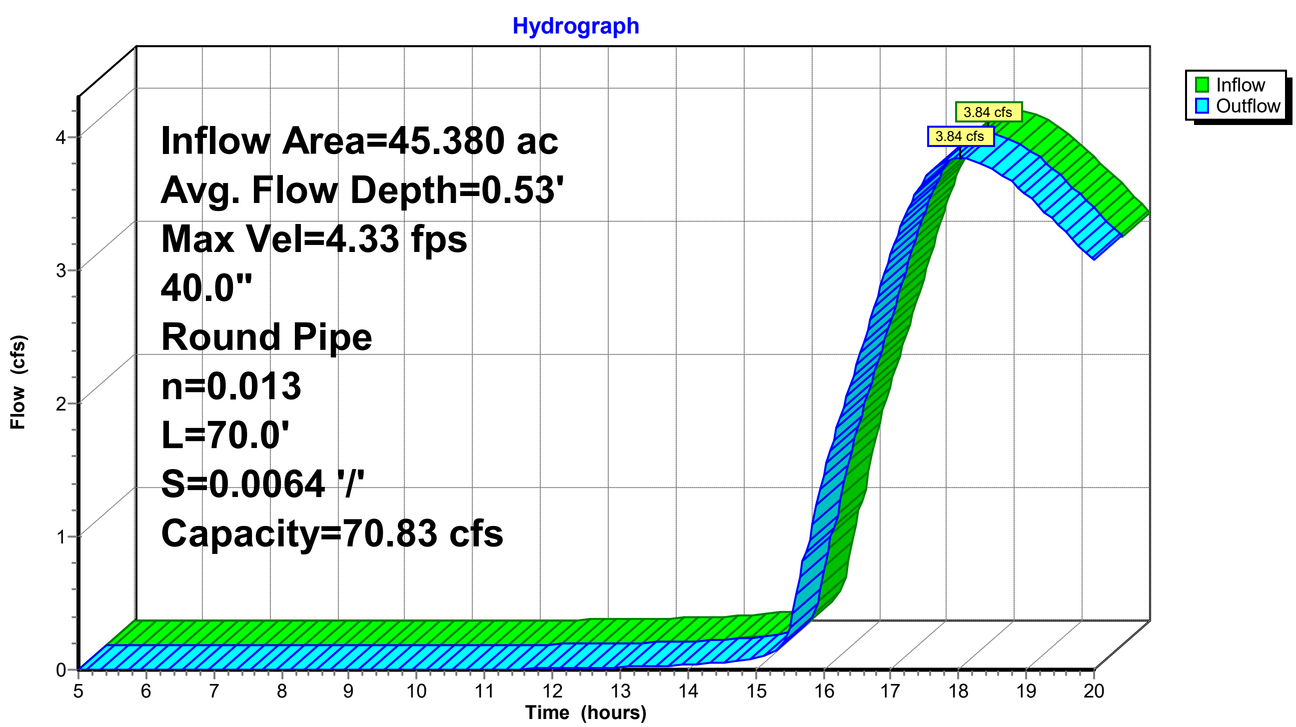
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.33 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.13 fps, Avg. Travel Time= 0.5 min

Peak Storage= 62 cf @ 18.01 hrs
Average Depth at Peak Storage= 0.53' , Surface Width= 2.43'
Bank-Full Depth= 3.33' Flow Area= 8.7 sf, Capacity= 70.83 cfs

40.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.0064 '/'
Inlet Invert= 4.25', Outlet Invert= 3.80'



Reach 3R: Outlet Pipe



Summary for Reach 4R: Overflow

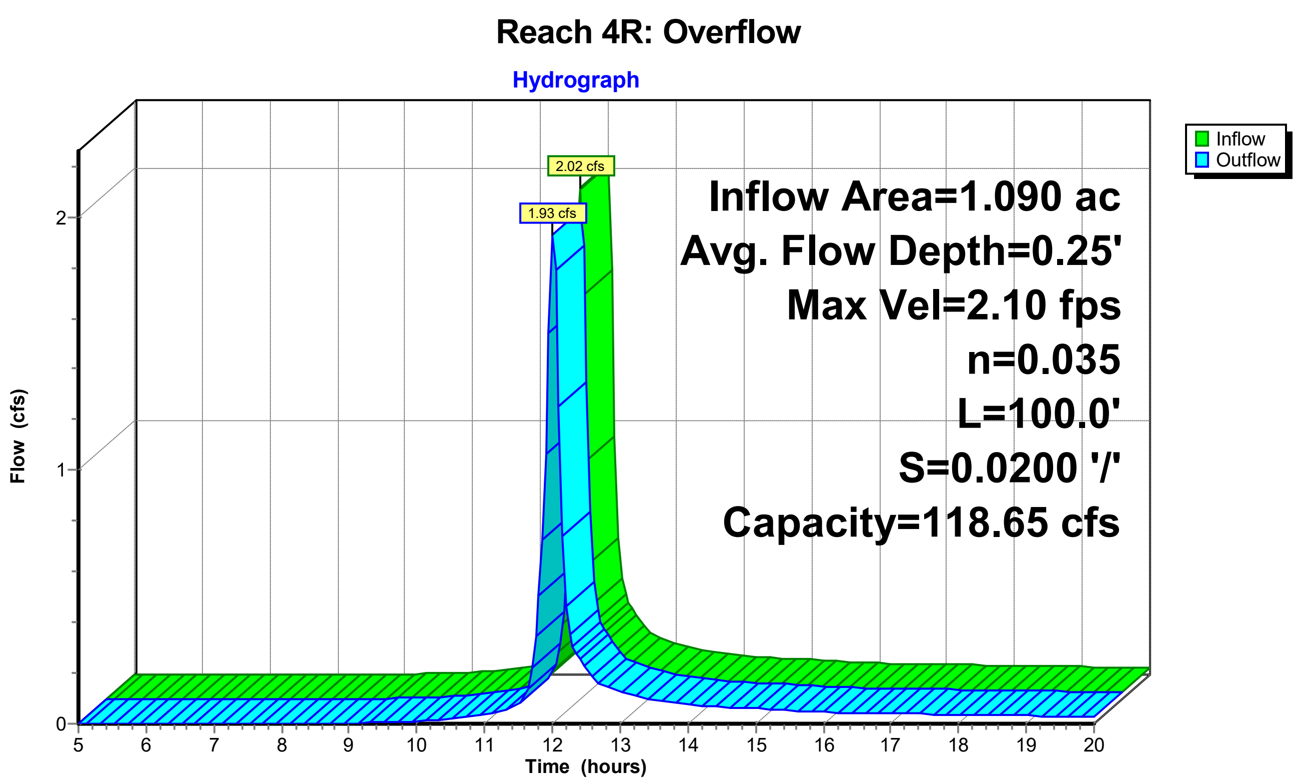
Inflow Area = 1.090 ac, 81.65% Impervious, Inflow Depth > 1.01" for 1-Year event
Inflow = 2.02 cfs @ 11.99 hrs, Volume= 0.092 af
Outflow = 1.93 cfs @ 12.01 hrs, Volume= 0.092 af, Atten= 4%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.10 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.62 fps, Avg. Travel Time= 2.7 min

Peak Storage= 95 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.25' , Surface Width= 4.52'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 118.65 cfs

3.00' x 2.00' deep channel, n= 0.035 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 12.00', Outlet Invert= 10.00'

‡



Summary for Reach 5R: Overflow

Inflow Area = 0.740 ac, 60.81% Impervious, Inflow Depth = 0.00" for 1-Year event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

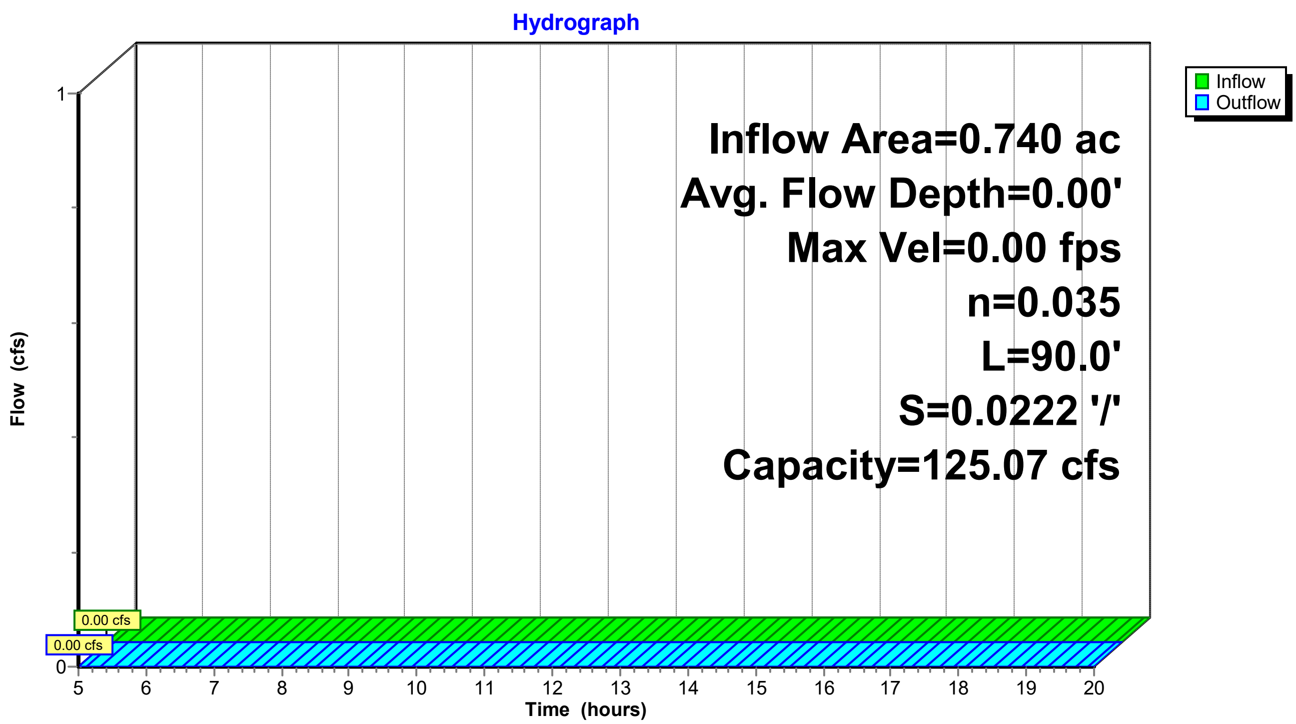
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 125.07 cfs

3.00' x 2.00' deep channel, n= 0.035 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 90.0' Slope= 0.0222 '/'
Inlet Invert= 12.00', Outlet Invert= 10.00'

‡

Reach 5R: Overflow



Summary for Reach 6R: Overflow

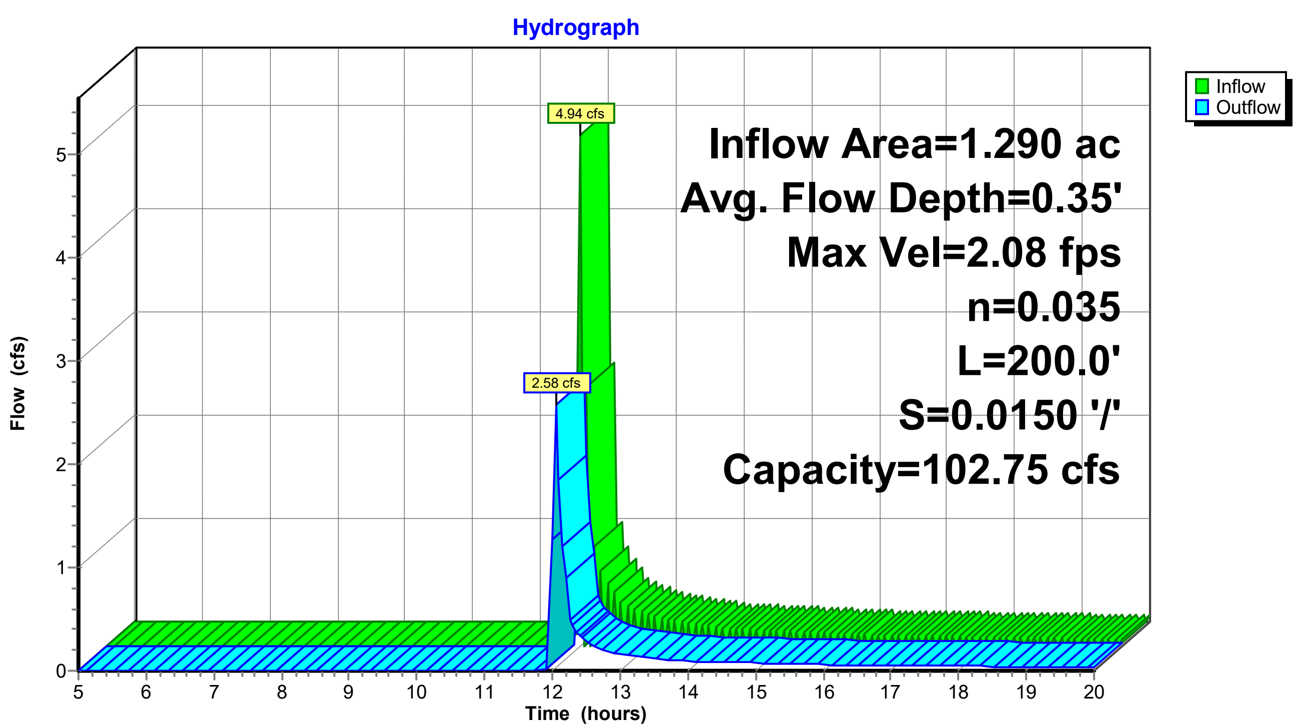
Inflow Area = 1.290 ac, 84.50% Impervious, Inflow Depth > 0.82" for 1-Year event
Inflow = 4.94 cfs @ 12.00 hrs, Volume= 0.088 af
Outflow = 2.58 cfs @ 12.06 hrs, Volume= 0.087 af, Atten= 48%, Lag= 3.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.08 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.63 fps, Avg. Travel Time= 5.3 min

Peak Storage= 279 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.35' , Surface Width= 5.11'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 102.75 cfs

3.00' x 2.00' deep channel, n= 0.035 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 200.0' Slope= 0.0150 '/'
Inlet Invert= 12.00', Outlet Invert= 9.00'

‡



Summary for Reach 7R: Overflow

Inflow Area = 7.710 ac, 87.03% Impervious, Inflow Depth > 0.50" for 1-Year event
Inflow = 0.91 cfs @ 12.70 hrs, Volume= 0.322 af
Outflow = 0.91 cfs @ 12.76 hrs, Volume= 0.319 af, Atten= 0%, Lag= 3.4 min

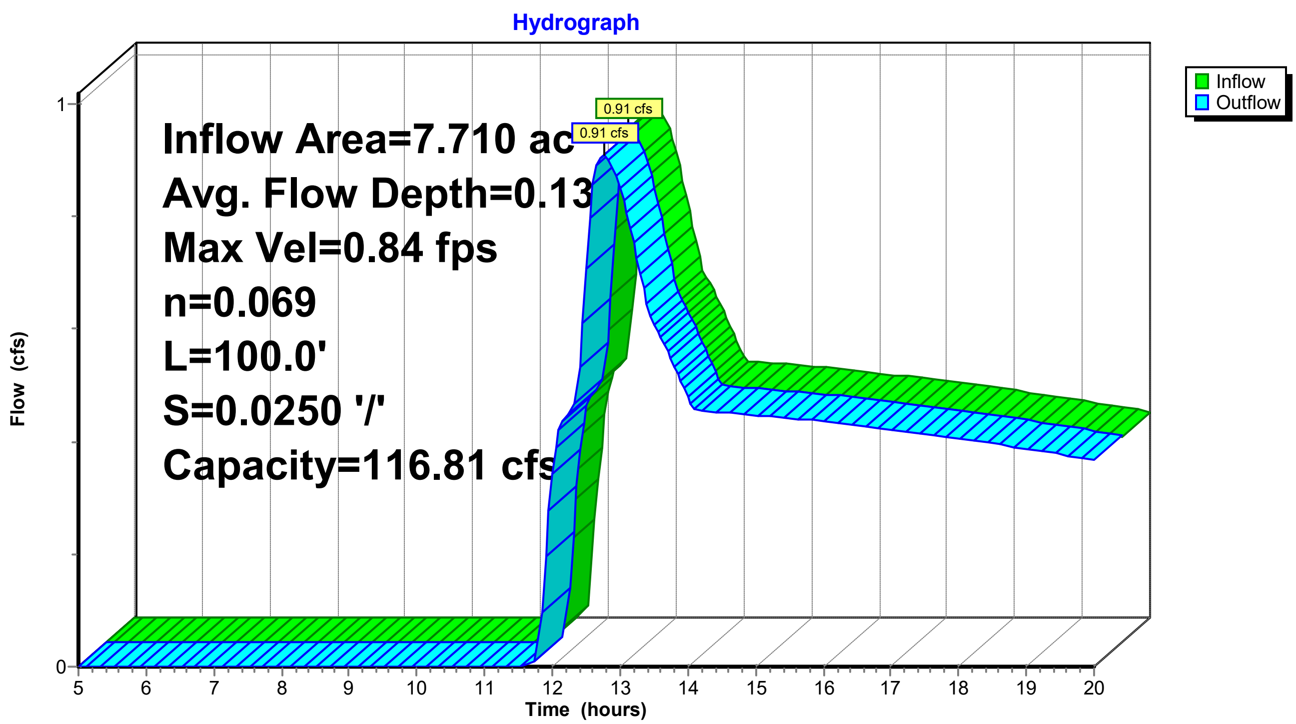
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.84 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 2.6 min

Peak Storage= 108 cf @ 12.72 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 8.77'
Bank-Full Depth= 2.00' Flow Area= 28.0 sf, Capacity= 116.81 cfs

8.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 100.0' Slope= 0.0250 '/'
Inlet Invert= 14.50', Outlet Invert= 12.00'

‡

Reach 7R: Overflow



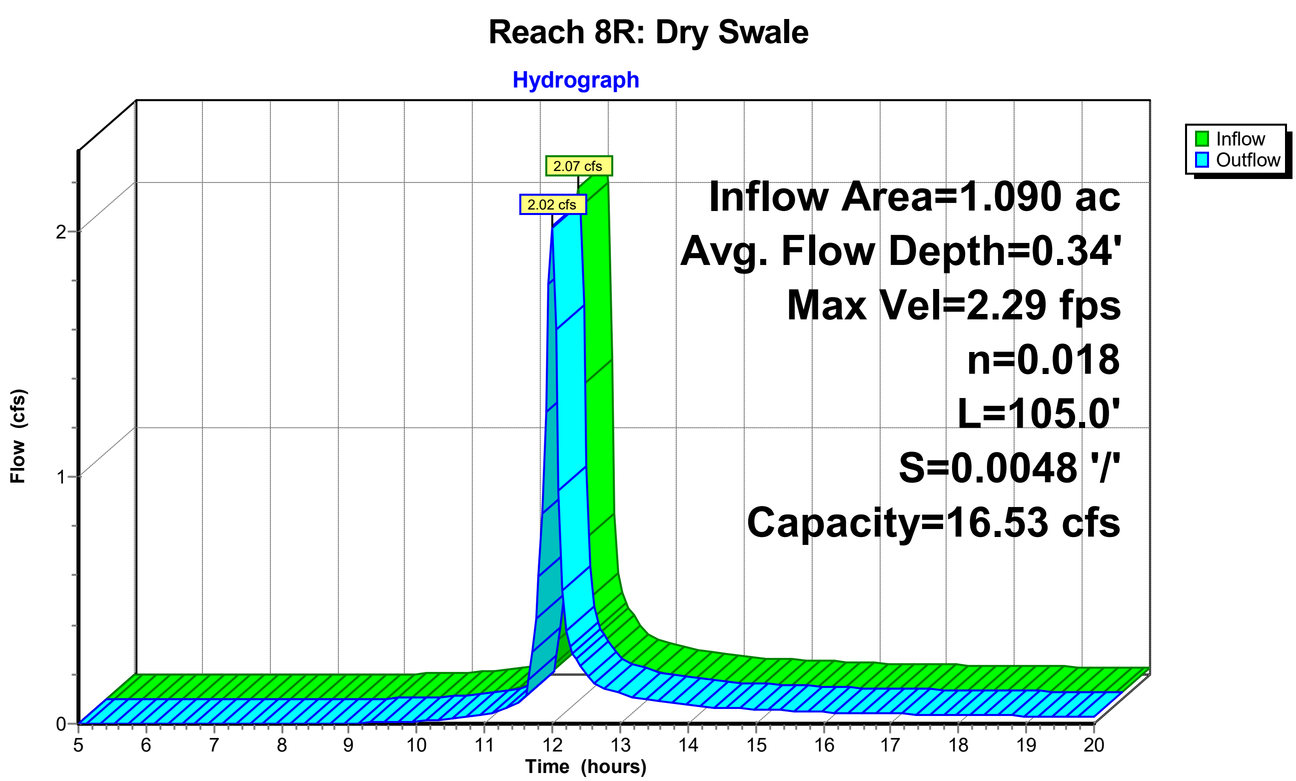
Summary for Reach 8R: Dry Swale

Inflow Area = 1.090 ac, 81.65% Impervious, Inflow Depth > 1.02" for 1-Year event
Inflow = 2.07 cfs @ 11.97 hrs, Volume= 0.092 af
Outflow = 2.02 cfs @ 11.99 hrs, Volume= 0.092 af, Atten= 3%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.29 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 2.7 min

Peak Storage= 95 cf @ 11.98 hrs
Average Depth at Peak Storage= 0.34' , Surface Width= 3.35'
Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 16.53 cfs

2.00' x 1.00' deep channel, n= 0.018 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 6.00'
Length= 105.0' Slope= 0.0048 '/'
Inlet Invert= 10.00', Outlet Invert= 9.50'



Summary for Reach 9R: 1W

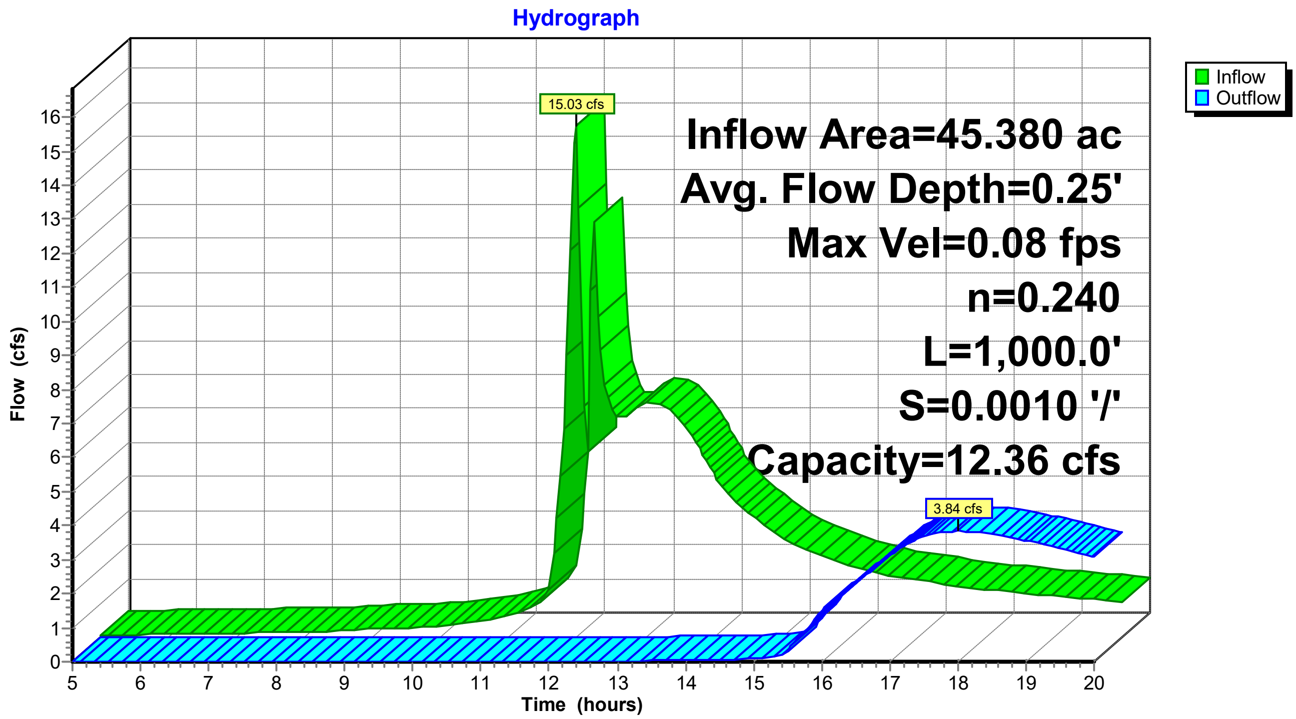
Inflow Area = 45.380 ac, 41.76% Impervious, Inflow Depth > 0.67" for 1-Year event
Inflow = 15.03 cfs @ 11.98 hrs, Volume= 2.545 af
Outflow = 3.84 cfs @ 18.01 hrs, Volume= 1.133 af, Atten= 74%, Lag= 362.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.08 fps, Min. Travel Time= 216.2 min
Avg. Velocity = 0.04 fps, Avg. Travel Time= 415.6 min

Peak Storage= 49,782 cf @ 14.40 hrs
Average Depth at Peak Storage= 0.25' , Surface Width= 201.49'
Bank-Full Depth= 0.50' Flow Area= 100.8 sf, Capacity= 12.36 cfs

200.00' x 0.50' deep channel, n= 0.240
Side Slope Z-value= 3.0 '/' Top Width= 203.00'
Length= 1,000.0' Slope= 0.0010 '/'
Inlet Invert= 6.00', Outlet Invert= 5.00'

Reach 9R: 1W



Summary for Pond 1P: WQv Pond #1

Inflow Area = 7.710 ac, 87.03% Impervious, Inflow Depth > 1.88" for 1-Year event
Inflow = 23.58 cfs @ 11.96 hrs, Volume= 1.209 af
Outflow = 1.41 cfs @ 12.70 hrs, Volume= 0.671 af, Atten= 94%, Lag= 44.4 min
Discarded = 0.50 cfs @ 12.70 hrs, Volume= 0.350 af
Primary = 0.91 cfs @ 12.70 hrs, Volume= 0.322 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 14.58' @ 12.70 hrs Surf.Area= 15,396 sf Storage= 34,681 cf

Plug-Flow detention time= 256.9 min calculated for 0.669 af (55% of inflow)
Center-of-Mass det. time= 177.5 min (914.5 - 737.0)

Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	2,785 cf	**Forebay (Prismatic)** Listed below (Recalc)
#2	8.00'	37,761 cf	**Permanent Pool (Prismatic)** Listed below (Recalc)
		40,545 cf	Total Available Storage

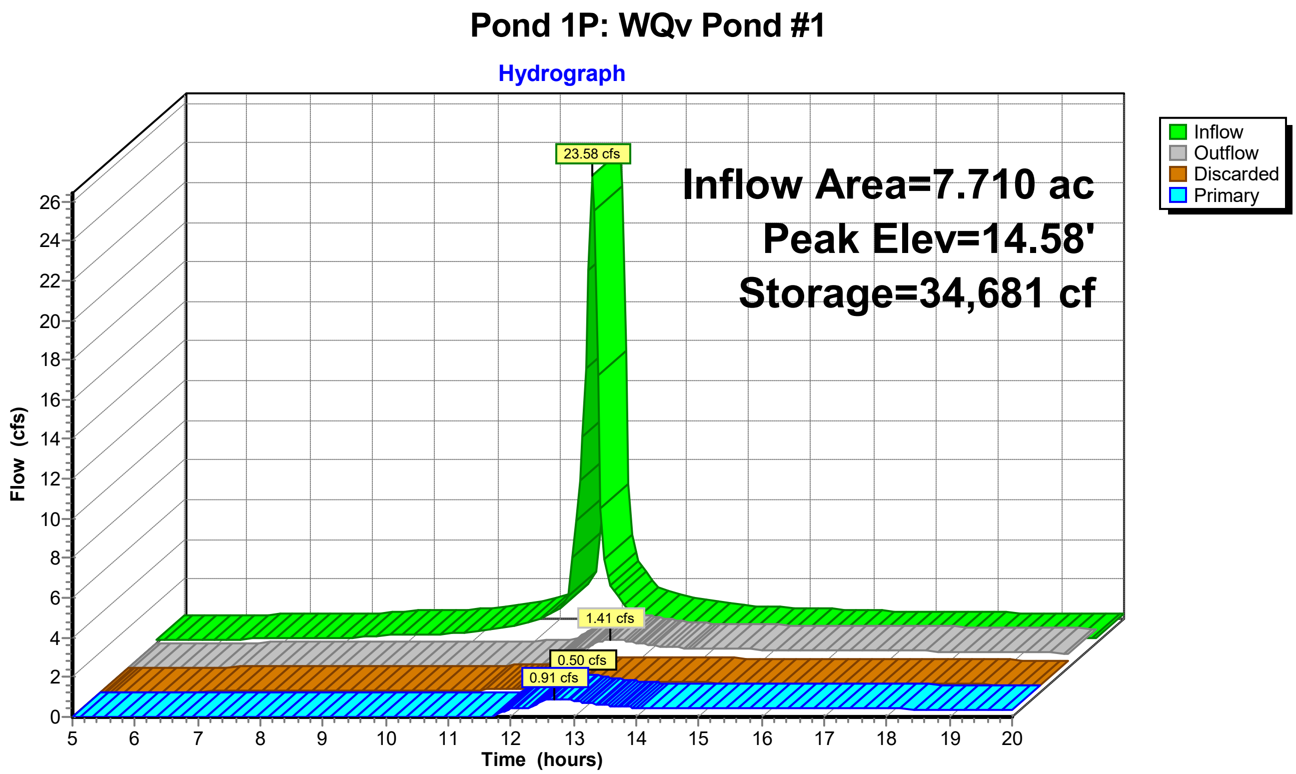
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
10.00	232	0	0
11.00	569	401	401
12.00	1,018	794	1,194
13.00	2,163	1,591	2,785

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.00	1,208	0	0
9.00	1,839	1,524	1,524
10.00	2,499	2,169	3,693
11.00	3,185	2,842	6,535
12.00	4,658	3,922	10,456
13.00	6,233	5,446	15,902
14.00	11,487	8,860	24,762
15.00	14,511	12,999	37,761

Device	Routing	Invert	Outlet Devices
#1	Primary	14.50'	**Channel/Reach** using Reach 7R: Overflow
#2	Discarded	8.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 4.00'
#3	Primary	12.00'	**4.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 8.00' / 12.00' S= -0.0800 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Discarded OutFlow Max=0.50 cfs @ 12.70 hrs HW=14.58' (Free Discharge)
└**2=Exfiltration** (Controls 0.50 cfs)

Primary OutFlow Max=0.85 cfs @ 12.70 hrs HW=14.58' (Free Discharge)
├**1=Channel/Reach** (Channel Controls 0.39 cfs @ 0.61 fps)
└**3=Culvert** (Outlet Controls 0.46 cfs @ 5.30 fps)



Summary for Pond 2P: WQv Pond #2

Inflow Area = 12.000 ac, 82.25% Impervious, Inflow Depth > 1.79" for 1-Year event
Inflow = 31.95 cfs @ 12.01 hrs, Volume= 1.793 af
Outflow = 10.23 cfs @ 12.22 hrs, Volume= 0.725 af, Atten= 68%, Lag= 12.5 min
Discarded = 0.34 cfs @ 12.22 hrs, Volume= 0.252 af
Primary = 9.90 cfs @ 12.22 hrs, Volume= 0.474 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 14.58' @ 12.22 hrs Surf.Area= 18,973 sf Storage= 47,733 cf

Plug-Flow detention time= 203.0 min calculated for 0.723 af (40% of inflow)
Center-of-Mass det. time= 105.6 min (852.1 - 746.5)

Volume	Invert	Avail.Storage	Storage Description
#1	8.00'	2,406 cf	**Forebay #1 (Prismatic)** Listed below (Recalc)
#2	8.00'	1,481 cf	**Forebay #2 (Prismatic)** Listed below (Recalc)
#3	7.00'	70,718 cf	**Permanent Pool (Prismatic)** Listed below (Recalc)
		74,605 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.00	330	0	0
9.00	562	446	446
10.00	866	714	1,160
11.00	1,625	1,246	2,406

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.00	202	0	0
9.00	351	277	277
10.00	535	443	720
11.00	988	762	1,481

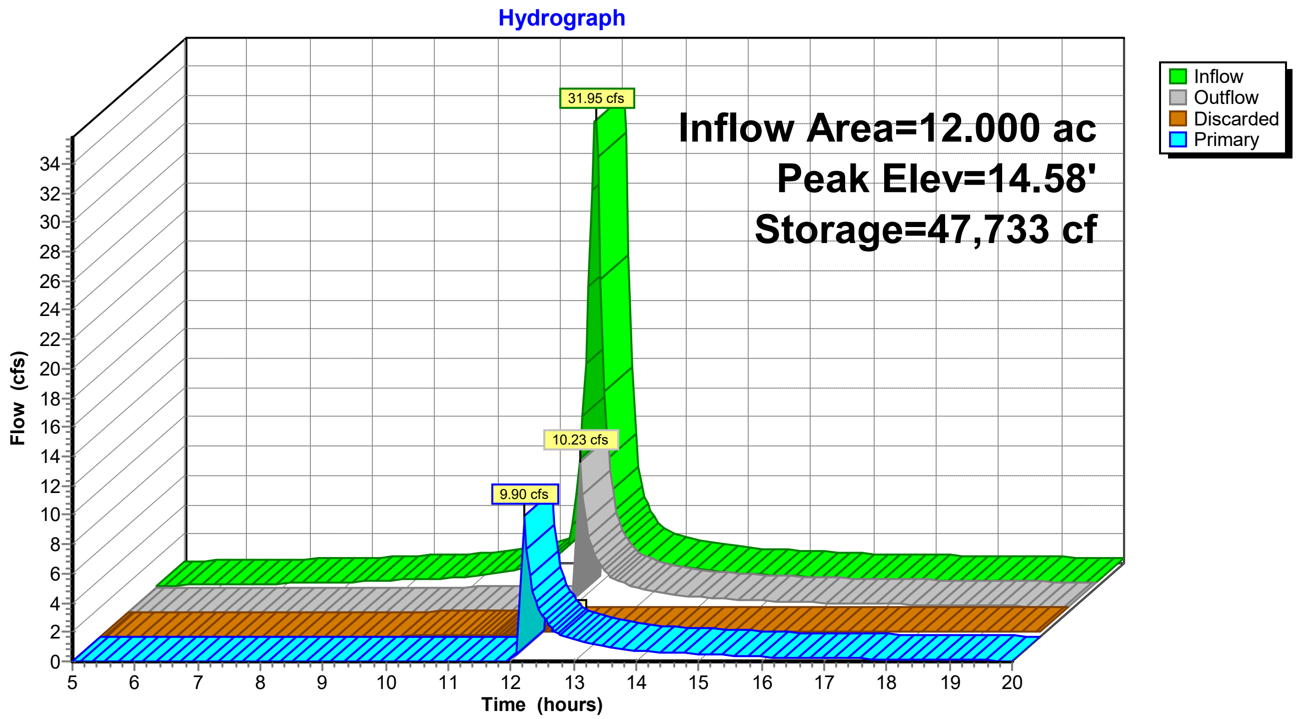
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	808	0	0
8.00	1,190	999	999
9.00	1,604	1,397	2,396
10.00	2,040	1,822	4,218
11.00	3,026	2,533	6,751
12.00	8,323	5,675	12,426
13.00	11,150	9,737	22,162
14.00	14,421	12,786	34,948
15.00	17,774	16,098	51,045
16.00	21,572	19,673	70,718

Device	Routing	Invert	Outlet Devices
#1	Discarded	7.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 4.00'
#2	Primary	14.50'	**Channel/Reach** using Reach 2R: Overflow

Discarded OutFlow Max=0.34 cfs @ 12.22 hrs HW=14.57' (Free Discharge)
└─**1=Exfiltration** (Controls 0.34 cfs)

Primary OutFlow Max=7.15 cfs @ 12.22 hrs HW=14.57' (Free Discharge)
└─**2=Channel/Reach** (Channel Controls 7.15 cfs @ 1.27 fps)

Pond 2P: WQv Pond #2



Summary for Pond 3P: Infiltration Basin #1

Inflow Area = 0.740 ac, 60.81% Impervious, Inflow Depth > 0.45" for 1-Year event
Inflow = 0.62 cfs @ 11.99 hrs, Volume= 0.028 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 11.44' @ 20.00 hrs Surf.Area= 930 sf Storage= 1,212 cf

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

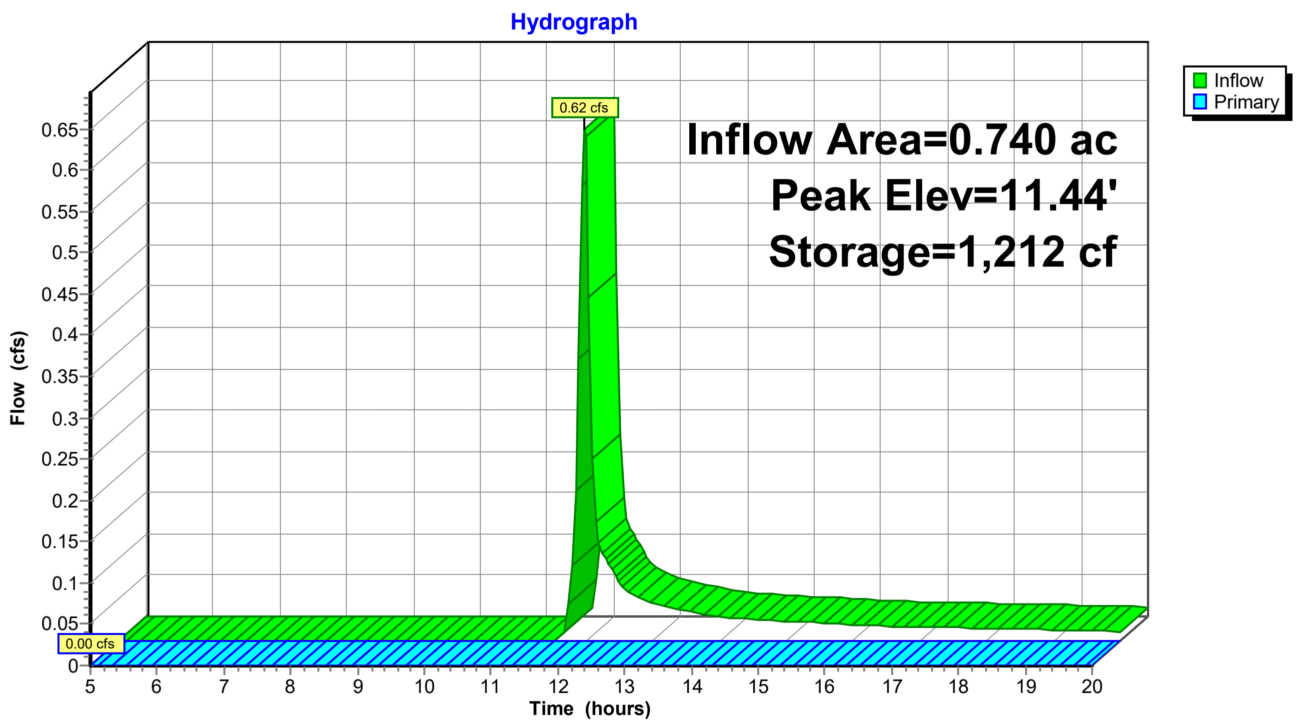
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	1,750 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
10.00	750	0	0
12.00	1,000	1,750	1,750

Device	Routing	Invert	Outlet Devices
#1	Primary	12.00'	**Channel/Reach** using Reach 5R: Overflow

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=10.00' (Free Discharge)
1=Channel/Reach (Controls 0.00 cfs)

Pond 3P: Infiltration Basin #1



Summary for Pond 4P: Infiltration Basin #2

Inflow Area = 1.290 ac, 84.50% Impervious, Inflow Depth > 1.15" for 1-Year event
Inflow = 2.74 cfs @ 11.97 hrs, Volume= 0.123 af
Outflow = 4.94 cfs @ 12.00 hrs, Volume= 0.088 af, Atten= 0%, Lag= 1.7 min
Primary = 4.94 cfs @ 12.00 hrs, Volume= 0.088 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 12.45' @ 12.00 hrs Surf.Area= 1,000 sf Storage= 1,750 cf

Plug-Flow detention time= 104.2 min calculated for 0.087 af (71% of inflow)
Center-of-Mass det. time= 38.5 min (820.8 - 782.2)

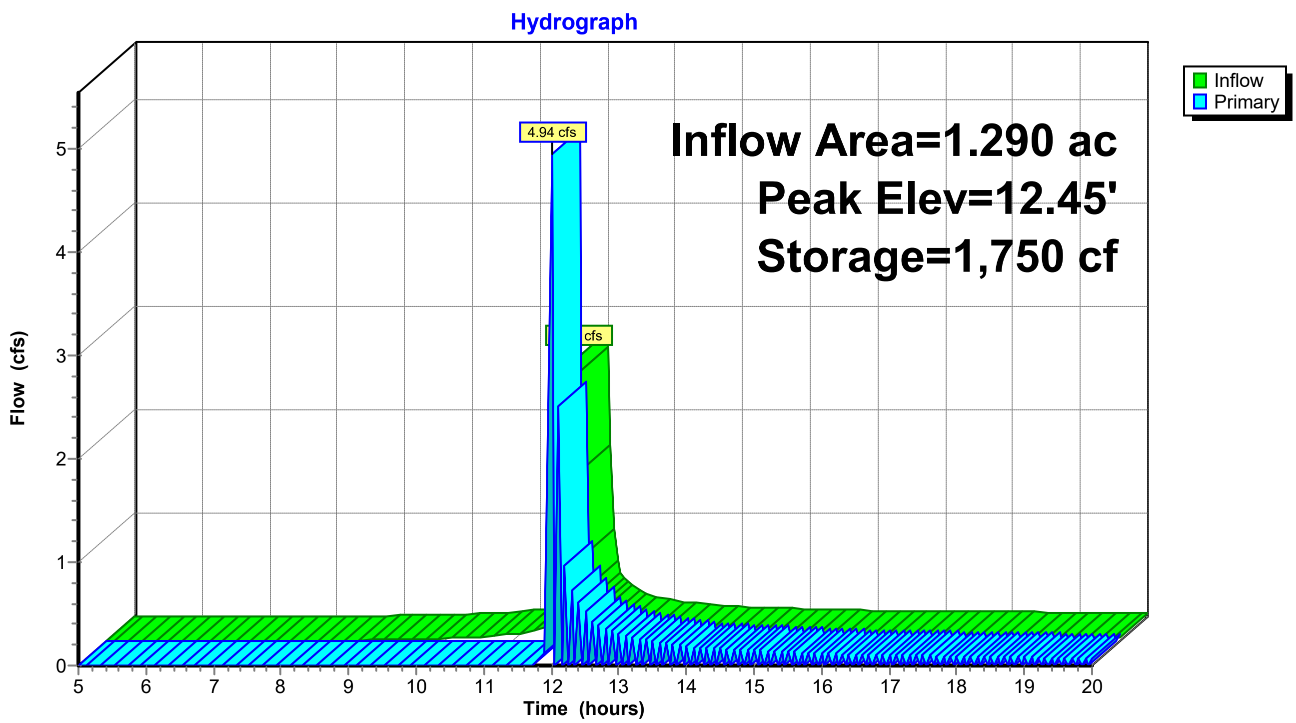
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	1,750 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
10.00	750	0	0
12.00	1,000	1,750	1,750

Device	Routing	Invert	Outlet Devices
#1	Primary	12.00'	**Channel/Reach** using Reach 6R: Overflow

Primary OutFlow Max=4.81 cfs @ 12.00 hrs HW=12.44' (Free Discharge)
└─**1=Channel/Reach** (Channel Controls 4.81 cfs @ 2.49 fps)

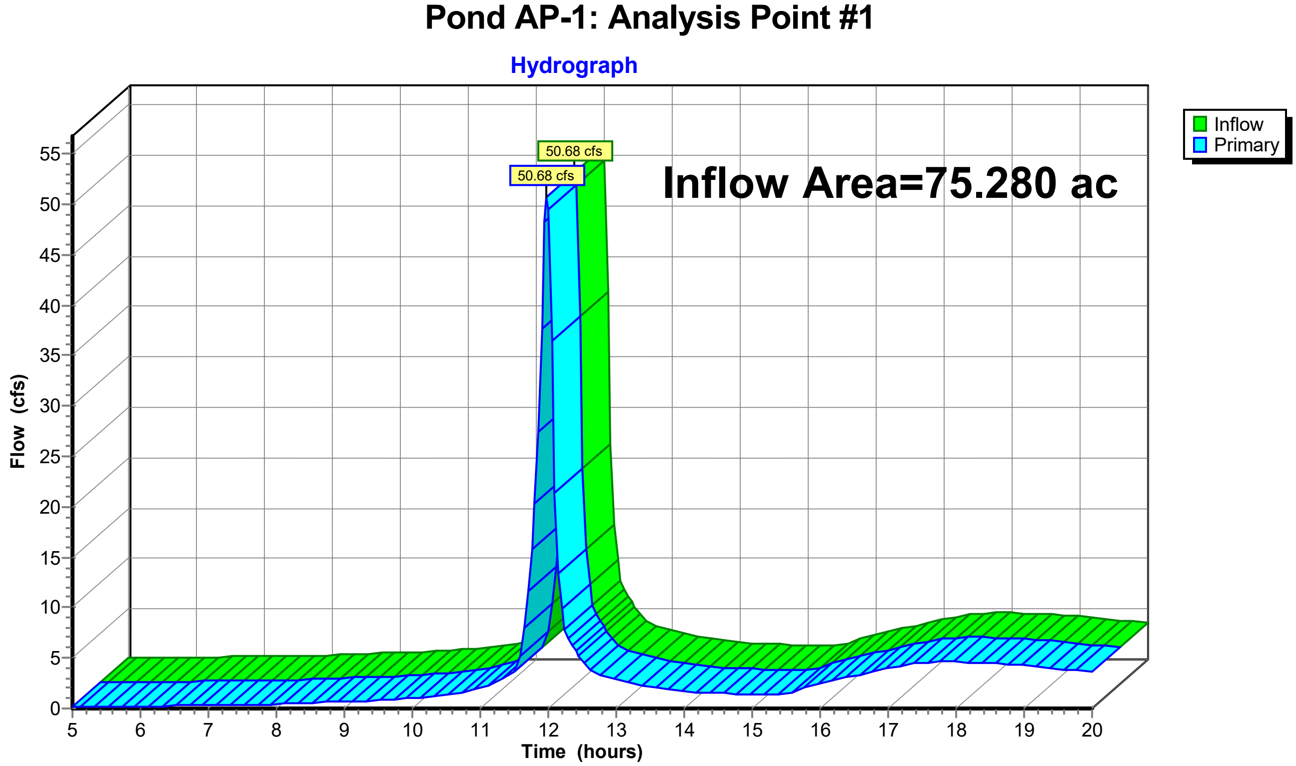
Pond 4P: Infiltration Basin #2



Summary for Pond AP-1: Analysis Point #1

Inflow Area = 75.280 ac, 33.87% Impervious, Inflow Depth > 0.60" for 1-Year event
Inflow = 50.68 cfs @ 11.98 hrs, Volume= 3.760 af
Primary = 50.68 cfs @ 11.98 hrs, Volume= 3.760 af, Atten= 0%, Lag= 0.0 min

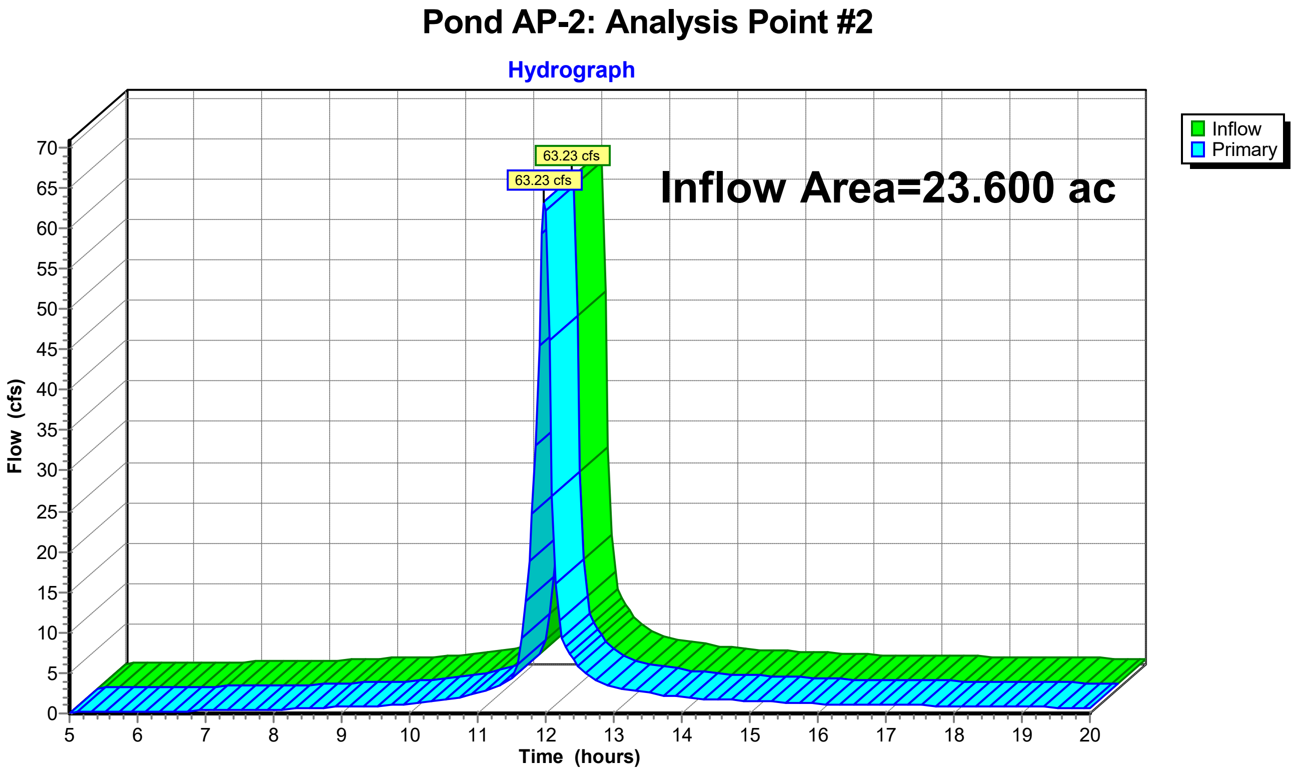
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Summary for Pond AP-2: Analysis Point #2

Inflow Area = 23.600 ac, 0.00% Impervious, Inflow Depth > 1.61" for 1-Year event
Inflow = 63.23 cfs @ 11.98 hrs, Volume= 3.175 af
Primary = 63.23 cfs @ 11.98 hrs, Volume= 3.175 af, Atten= 0%, Lag= 0.0 min

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



Summary for Subcatchment DR-1: Storage

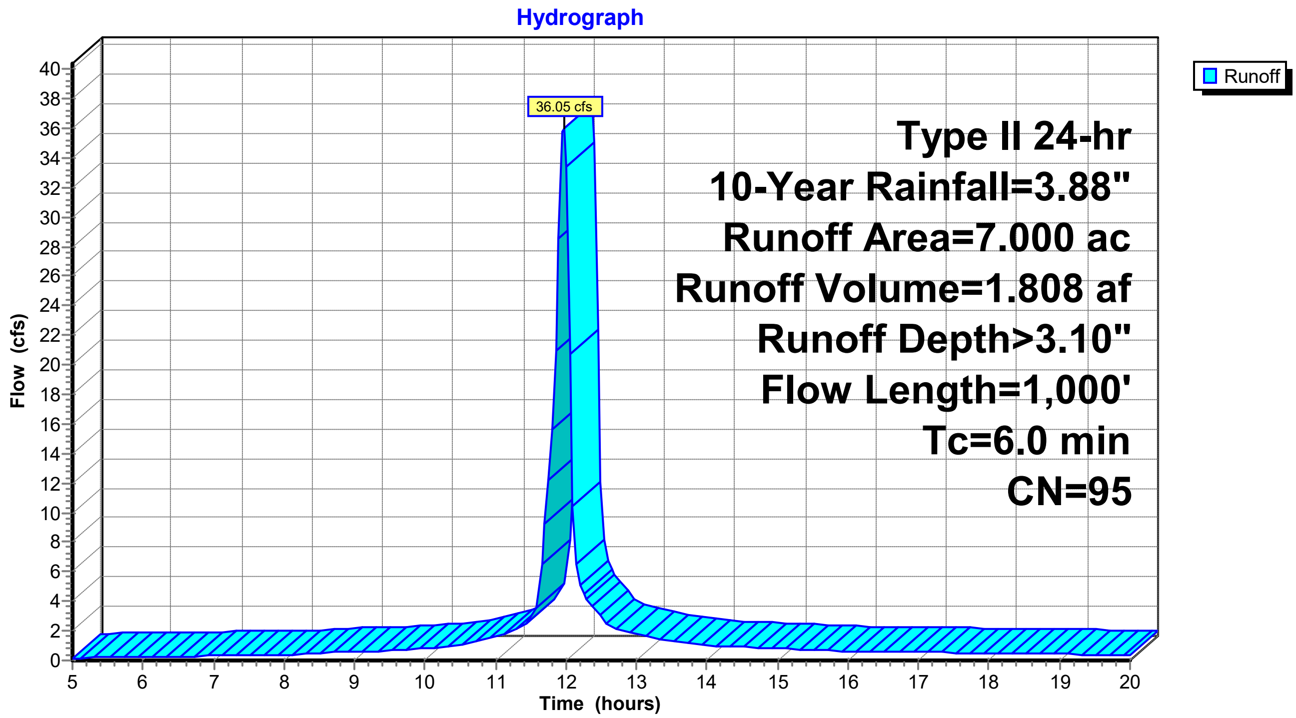
Runoff = 36.05 cfs @ 11.96 hrs, Volume= 1.808 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	7.000	95	Compacted Gravel
	7.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	1,000		2.78		**Direct Entry, Min**

Subcatchment DR-1: Storage



Summary for Subcatchment DR-10: Substation

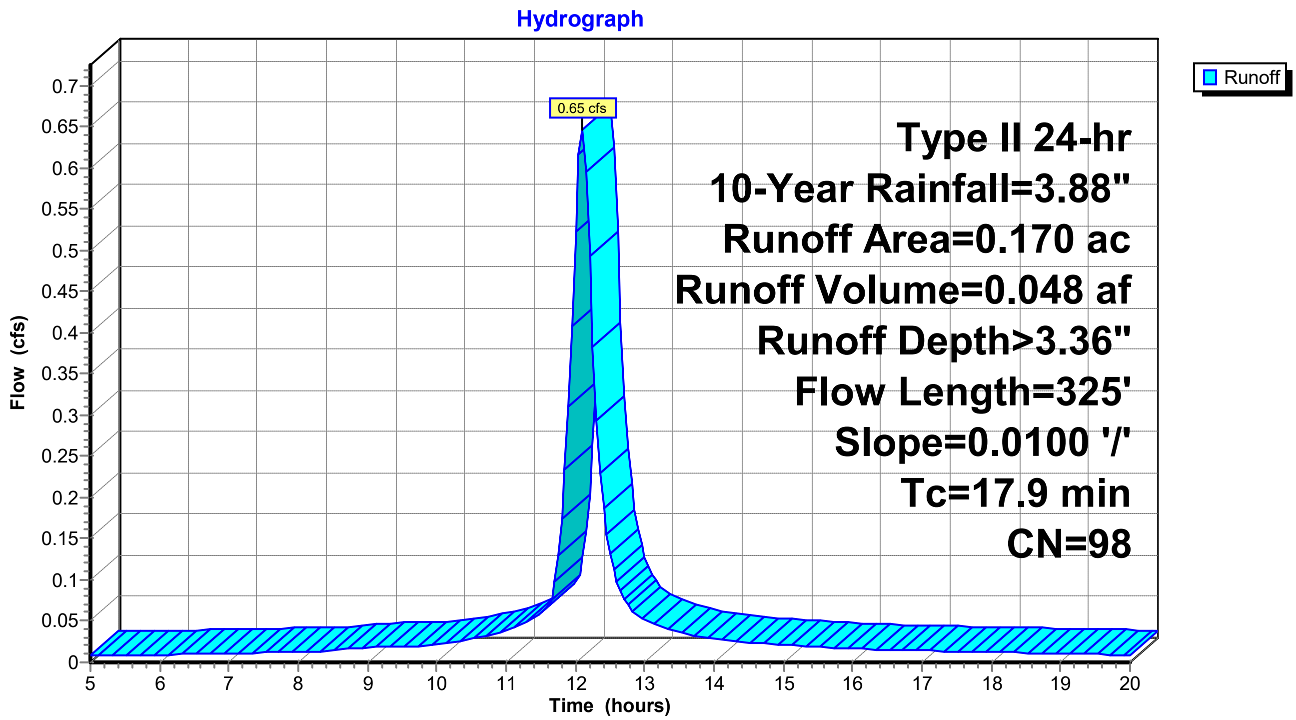
Runoff = 0.65 cfs @ 12.09 hrs, Volume= 0.048 af, Depth> 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	0.170	98	Substation
	0.170		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	65	0.0100	0.83		**Sheet Flow, paved** Smooth surfaces n= 0.011 P2= 2.40"
9.9	60	0.0100	0.10		**Sheet Flow, filter strip** Grass: Short n= 0.150 P2= 2.40"
6.7	200	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.9	325	Total			

Subcatchment DR-10: Substation



Summary for Subcatchment DR-11: Parking

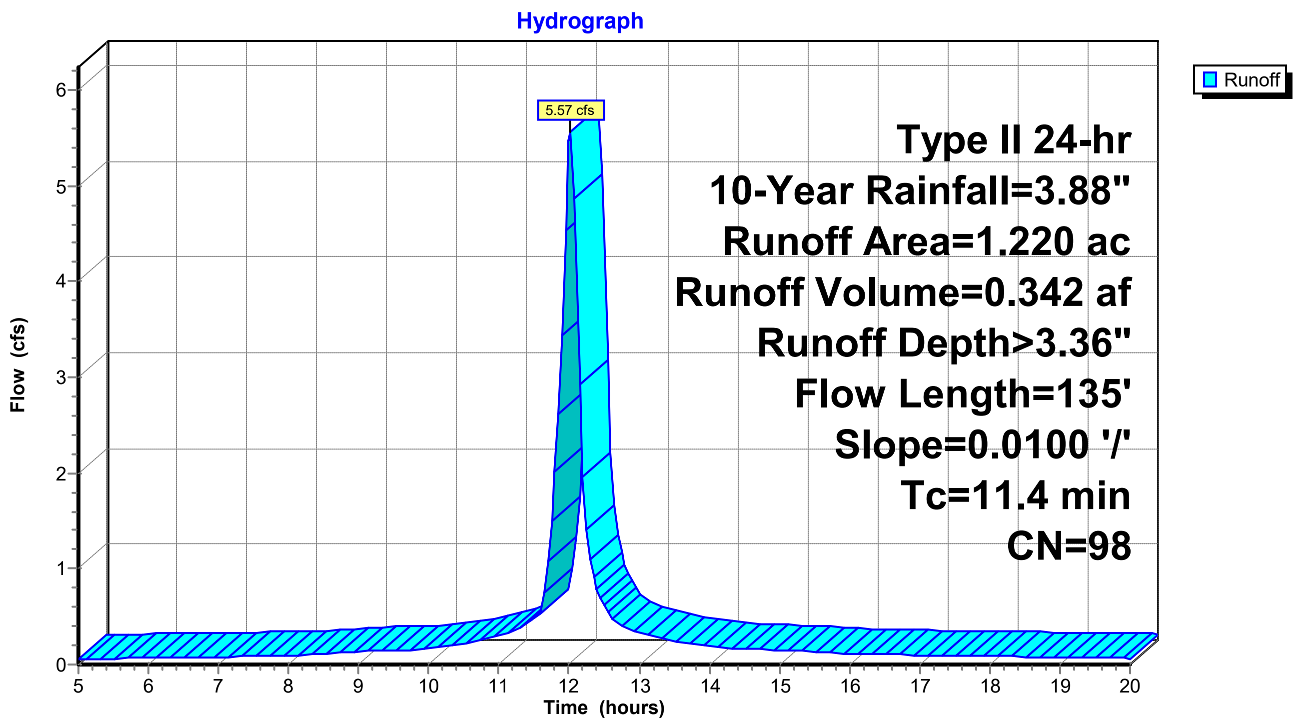
Runoff = 5.57 cfs @ 12.02 hrs, Volume= 0.342 af, Depth> 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	1.220	98	Parking
	1.220		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	75	0.0100	0.85		**Sheet Flow, parking lot** Smooth surfaces n= 0.011 P2= 2.40"
9.9	60	0.0100	0.10		**Sheet Flow, Filter Strip** Grass: Short n= 0.150 P2= 2.40"
11.4	135	Total			

Subcatchment DR-11: Parking



Summary for Subcatchment DR-12: Undisturbed Area

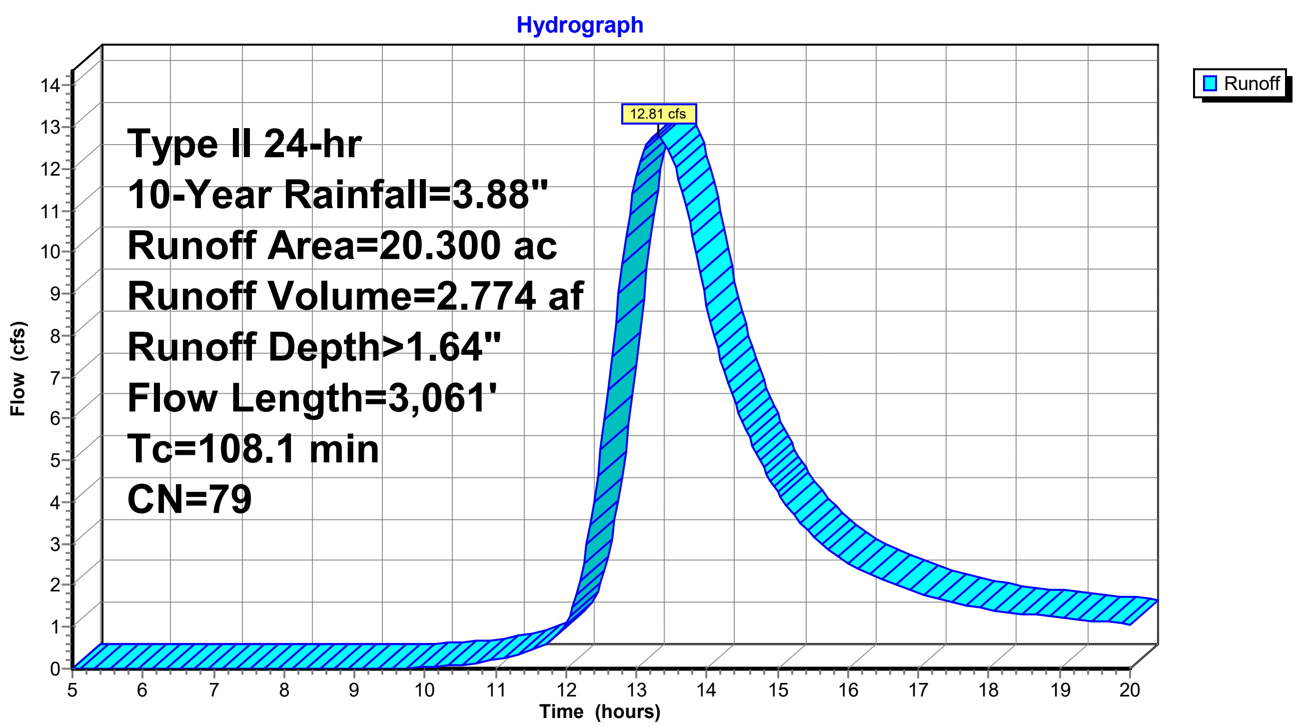
Runoff = 12.81 cfs @ 13.30 hrs, Volume= 2.774 af, Depth> 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

Area (ac)	CN	Description
20.300	79	Woods, Fair, HSG D
20.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	200	0.0800	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
3.0	200	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.6	250	0.2600	2.55		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
78.7	2,361	0.0100	0.50		**Shallow Concentrated Flow, Wetland Flow** Woodland Kv= 5.0 fps
0.0	50	0.0500	22.86	161.57	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012 Corrugated PP, smooth interior
108.1	3,061	Total			

Subcatchment DR-12: Undisturbed Area



Summary for Subcatchment DR-13: Roadway

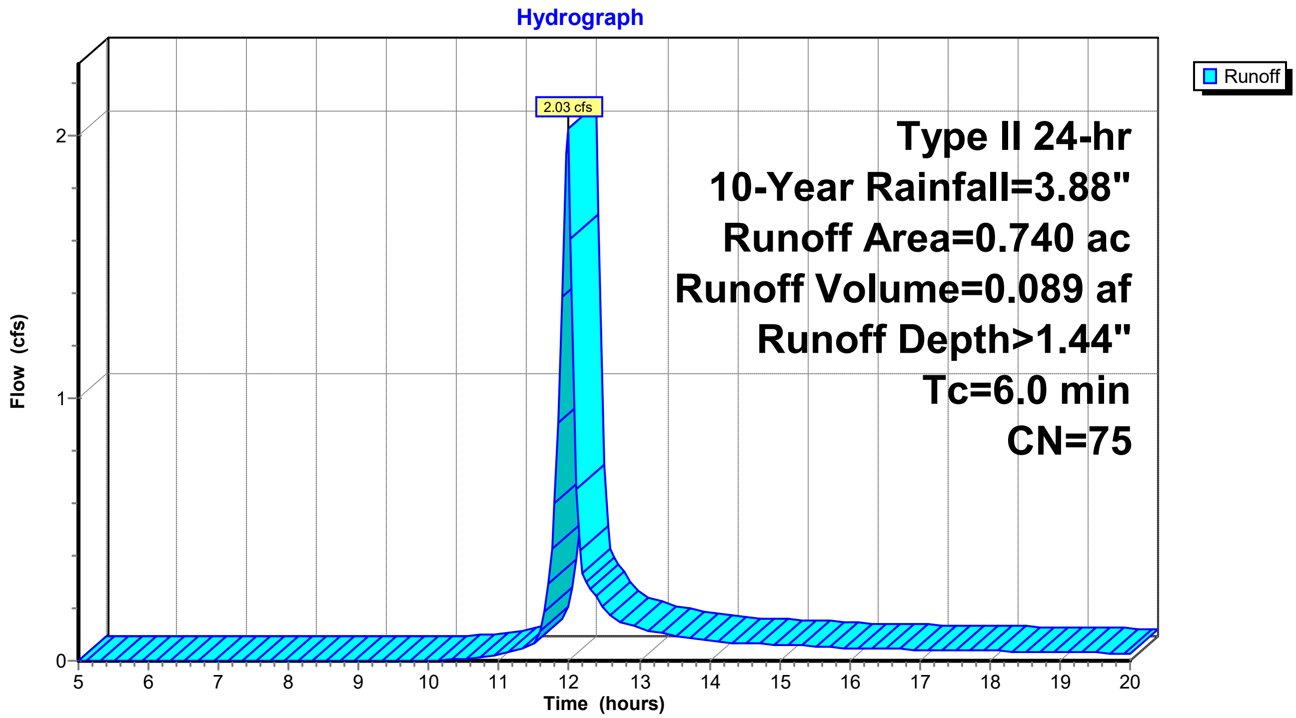
Runoff = 2.03 cfs @ 11.98 hrs, Volume= 0.089 af, Depth> 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	0.450	98	Pavement
	0.290	39	>75% Grass cover, Good, HSG A
	0.740	75	Weighted Average
	0.290		39.19% Pervious Area
	0.450		60.81% Impervious Area

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

Subcatchment DR-13: Roadway



Summary for Subcatchment DR-14: Roadway

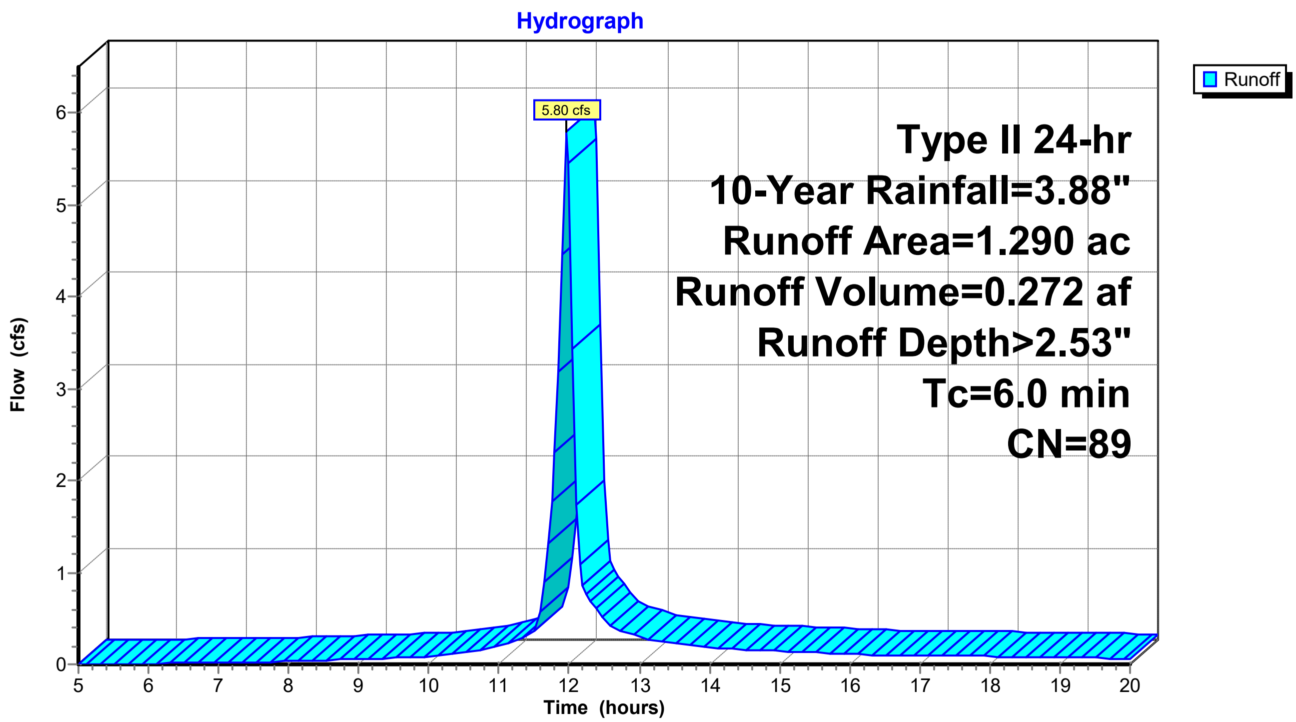
Runoff = 5.80 cfs @ 11.97 hrs, Volume= 0.272 af, Depth> 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	0.580	98	New Pavement
	0.200	39	>75% Grass cover, Good, HSG A
*	0.510	98	Mill & Fill of Old Pavement
	1.290	89	Weighted Average
	0.200		15.50% Pervious Area
	1.090		84.50% Impervious Area

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

Subcatchment DR-14: Roadway



Summary for Subcatchment DR-15: Roadway

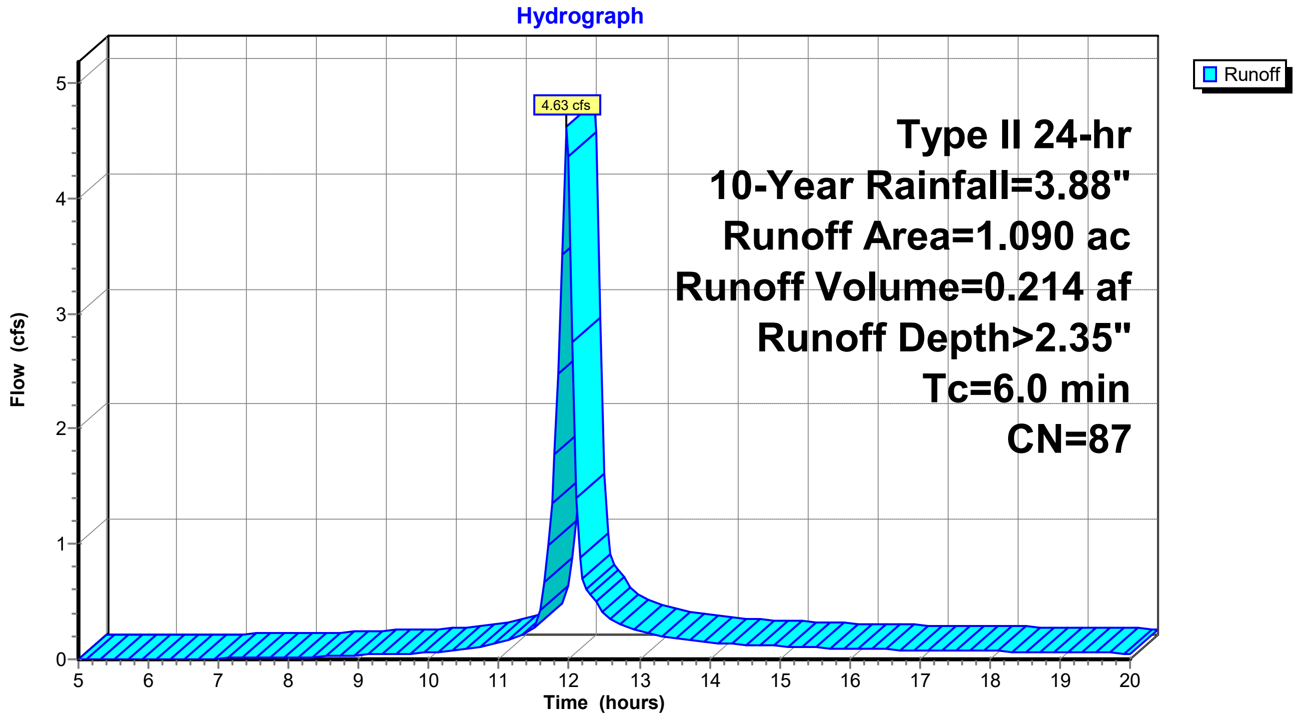
Runoff = 4.63 cfs @ 11.97 hrs, Volume= 0.214 af, Depth> 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	0.050	98	New Pavement
	0.200	39	>75% Grass cover, Good, HSG A
*	0.840	98	Mill & Fill of Old Pavement
	1.090	87	Weighted Average
	0.200		18.35% Pervious Area
	0.890		81.65% Impervious Area

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

Subcatchment DR-15: Roadway



Summary for Subcatchment DR-16: Undisturbed Area

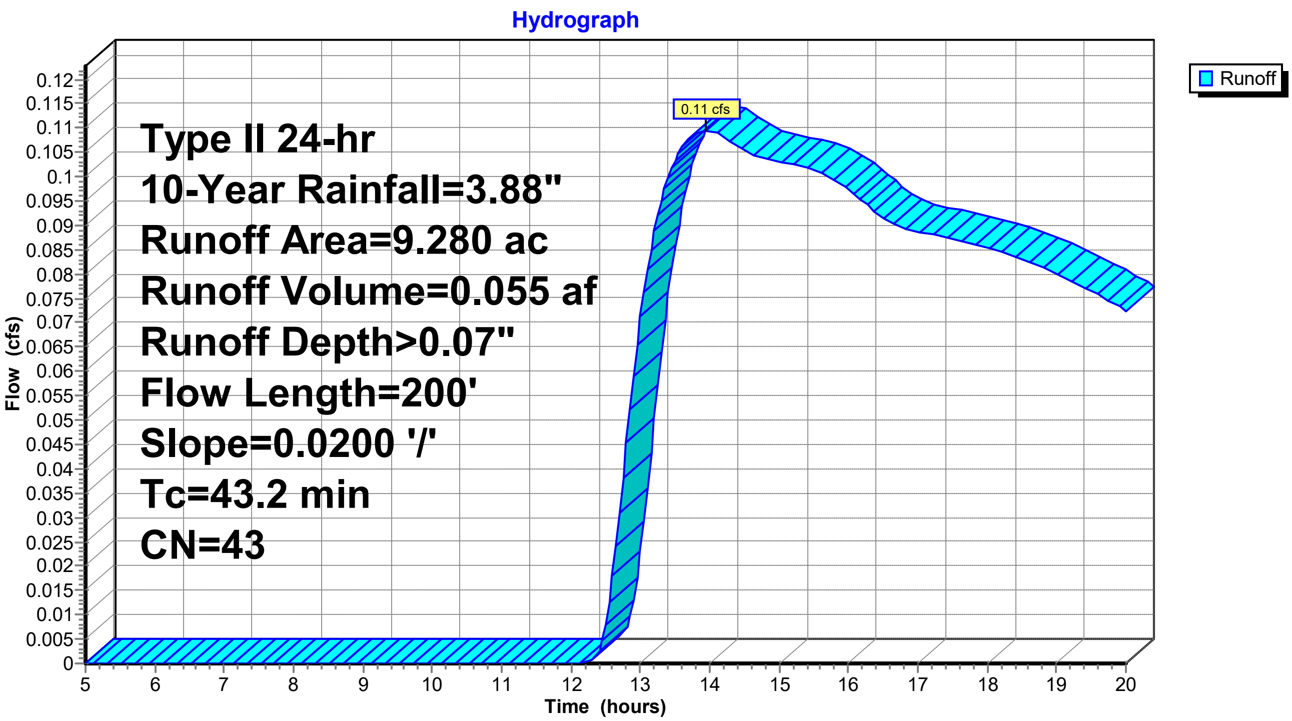
Runoff = 0.11 cfs @ 13.95 hrs, Volume= 0.055 af, Depth> 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

Area (ac)	CN	Description
9.280	43	Woods/grass comb., Fair, HSG A
9.280		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
43.2	200	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"

Subcatchment DR-16: Undisturbed Area



Summary for Subcatchment DR-2: Storage

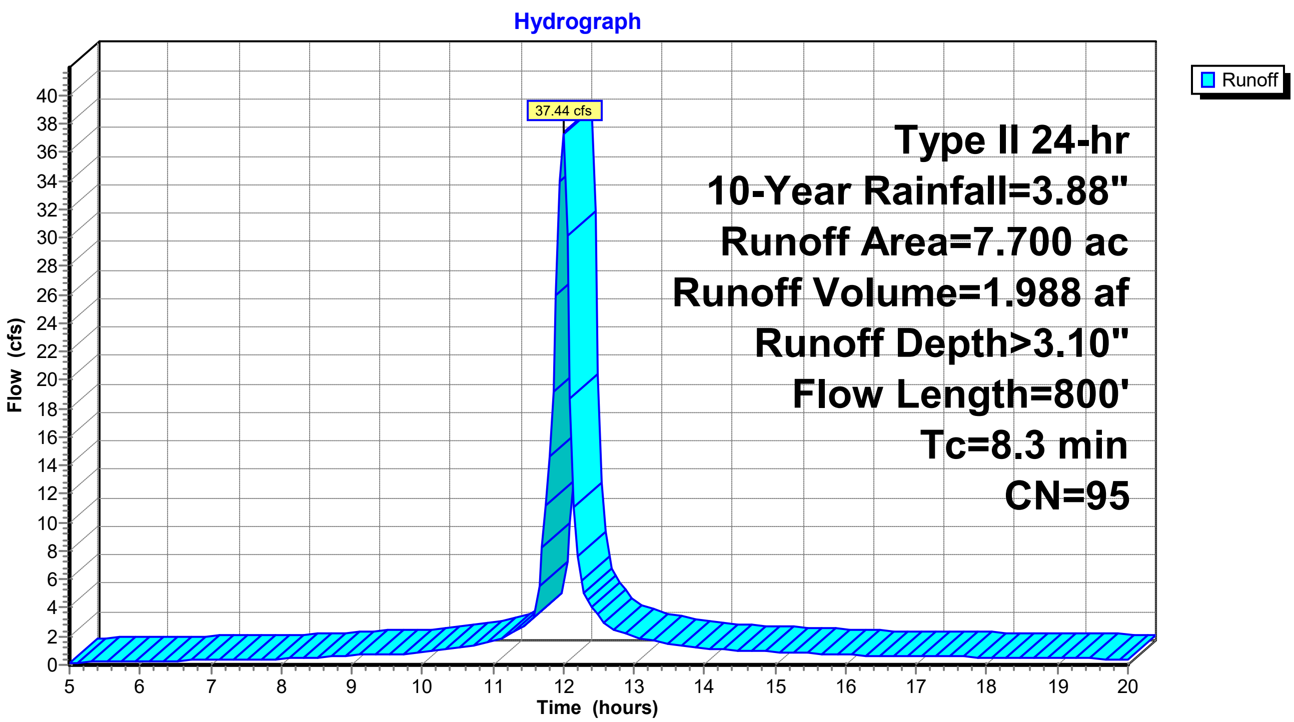
Runoff = 37.44 cfs @ 11.99 hrs, Volume= 1.988 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	7.700	95	Compacted Gravel
	7.700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	300	0.0100	1.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
3.1	300	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	200	0.0050	4.34	30.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.020 Corrugated PE, corrugated interior
8.3	800	Total			

Subcatchment DR-2: Storage



Summary for Subcatchment DR-3: Storage

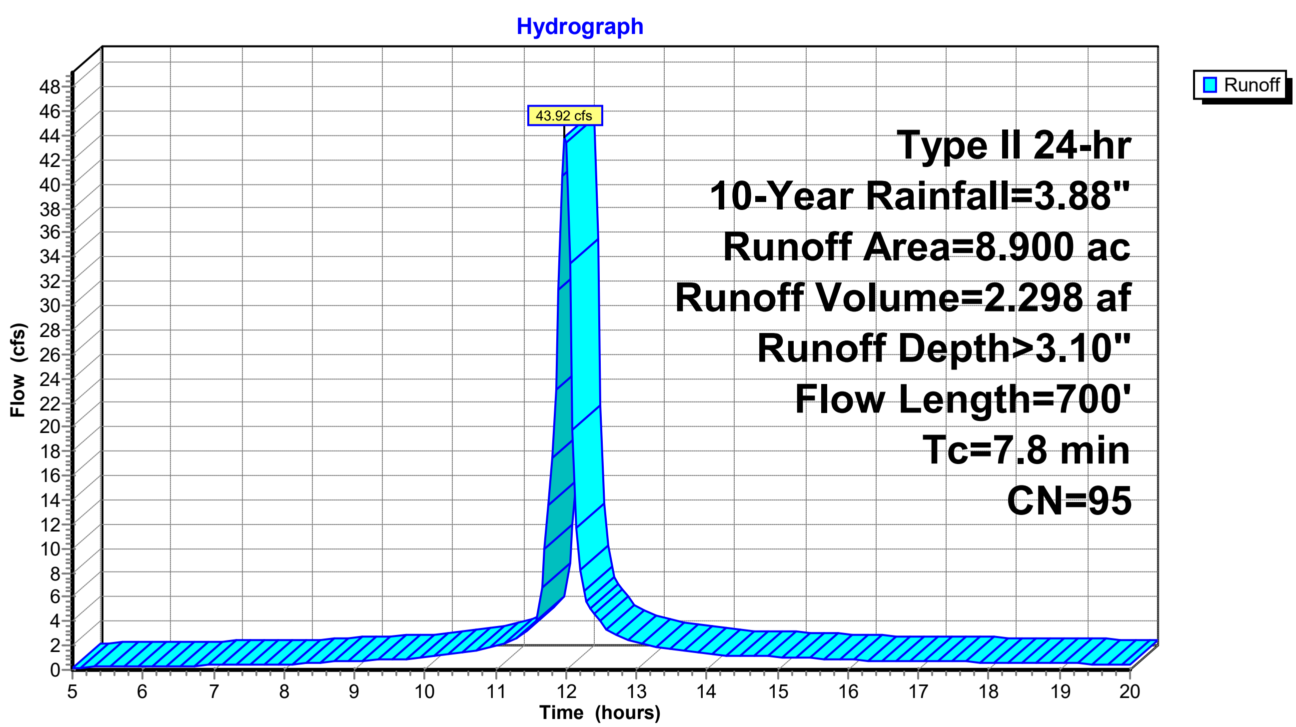
Runoff = 43.92 cfs @ 11.99 hrs, Volume= 2.298 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	8.900	95	Compacted Gravel
	8.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	300	0.0100	1.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
2.6	250	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	150	0.0050	3.31	10.40	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.020 Corrugated PE, corrugated interior
7.8	700	Total			

Subcatchment DR-3: Storage



Summary for Subcatchment DR-4: Storage

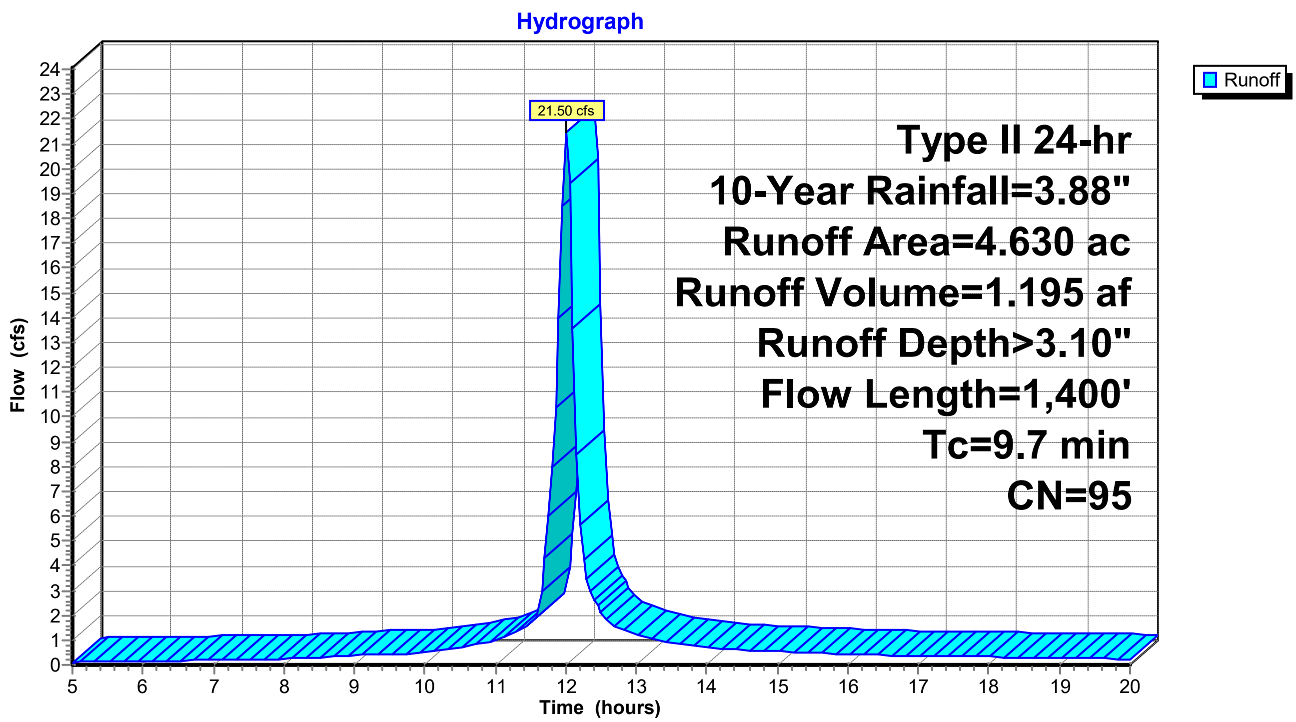
Runoff = 21.50 cfs @ 12.00 hrs, Volume= 1.195 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	4.630	95	Compacted Gravel
	4.630		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	300	0.0100	1.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
2.5	300	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.8	800	0.0050	4.81	46.24	**Pipe Channel,** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.020 Corrugated PE, corrugated interior
9.7	1,400	Total			

Subcatchment DR-4: Storage



Summary for Subcatchment DR-5: Building and Storage

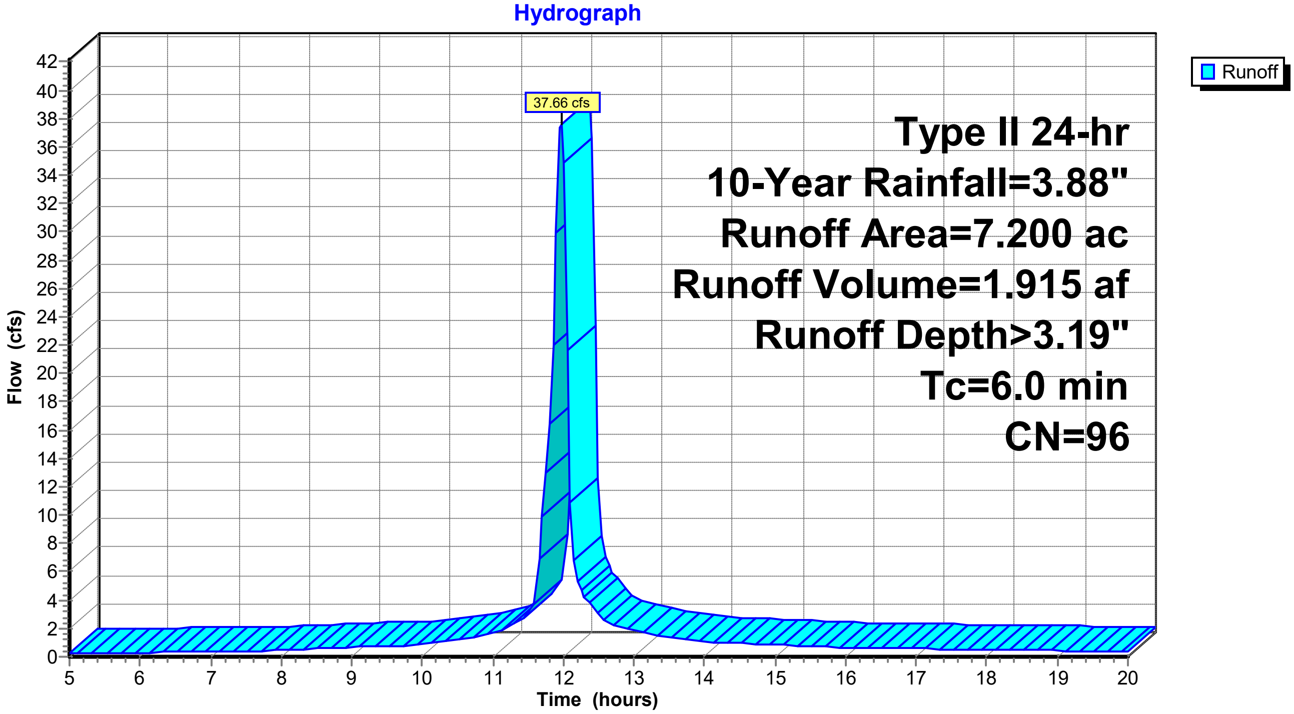
Runoff = 37.66 cfs @ 11.96 hrs, Volume= 1.915 af, Depth> 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	1.329	98	Building D
*	5.871	95	Compacted Gravel
	7.200	96	Weighted Average
	5.871		81.54% Pervious Area
	1.329		18.46% Impervious Area

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

Subcatchment DR-5: Building and Storage



Summary for Subcatchment DR-6: Building and Storage

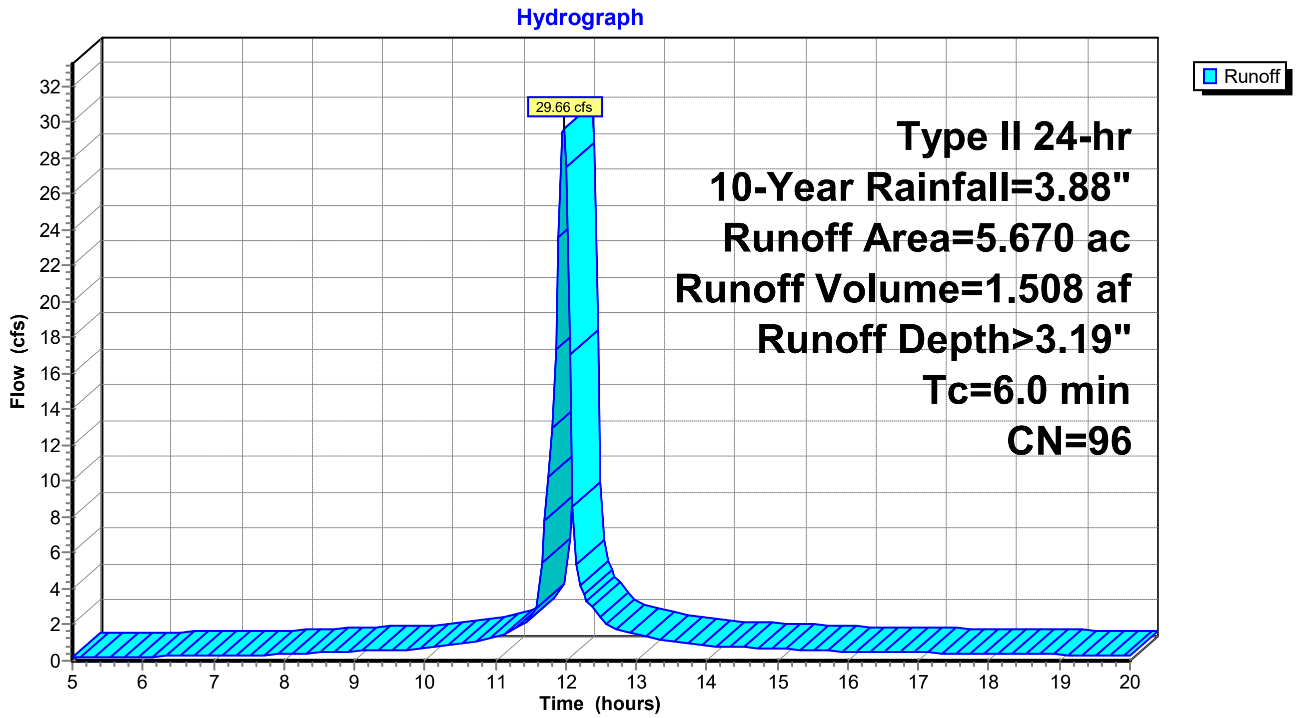
Runoff = 29.66 cfs @ 11.96 hrs, Volume= 1.508 af, Depth> 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	2.791	98	Building C
*	2.879	95	Compacted Gravel
	5.670	96	Weighted Average
	2.879		50.78% Pervious Area
	2.791		49.22% Impervious Area

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

Subcatchment DR-6: Building and Storage



Summary for Subcatchment DR-7: Storage and Rail

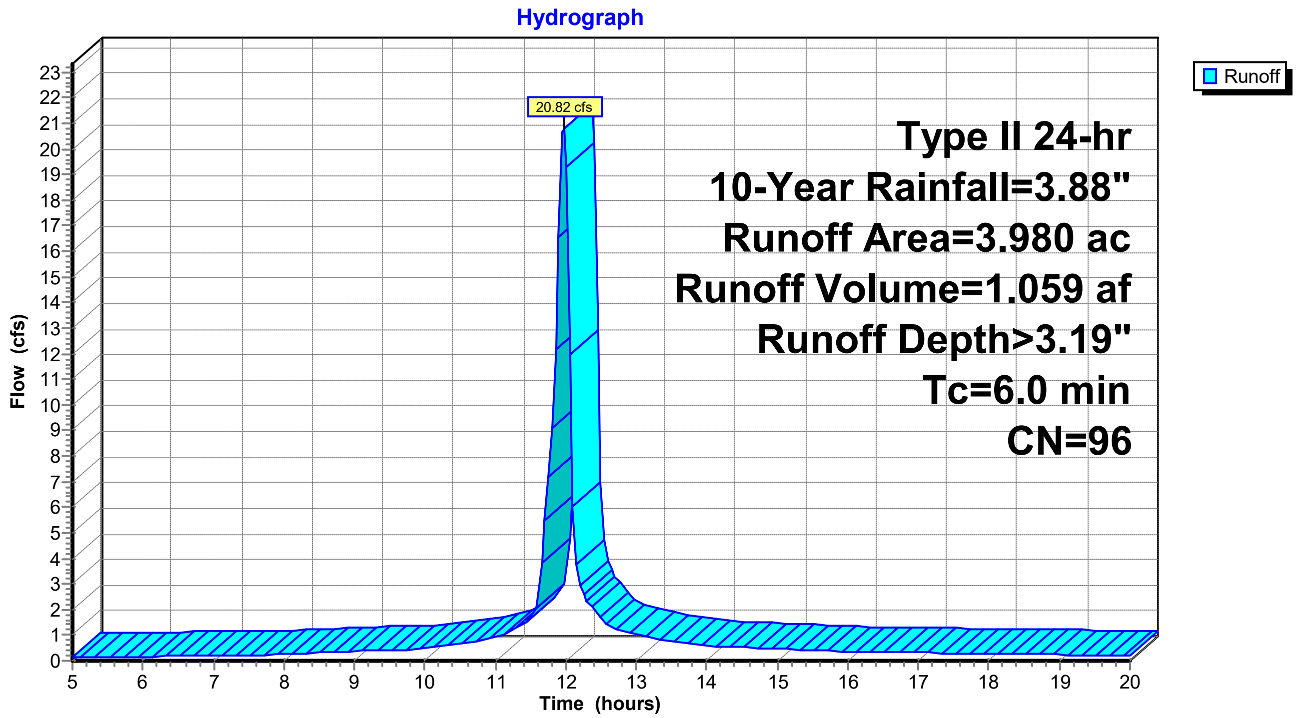
Runoff = 20.82 cfs @ 11.96 hrs, Volume= 1.059 af, Depth> 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	3.000	95	Compacted Gravel
*	0.980	98	Rail
	3.980	96	Weighted Average
	3.000		75.38% Pervious Area
	0.980		24.62% Impervious Area

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

Subcatchment DR-7: Storage and Rail



Summary for Subcatchment DR-8: Building

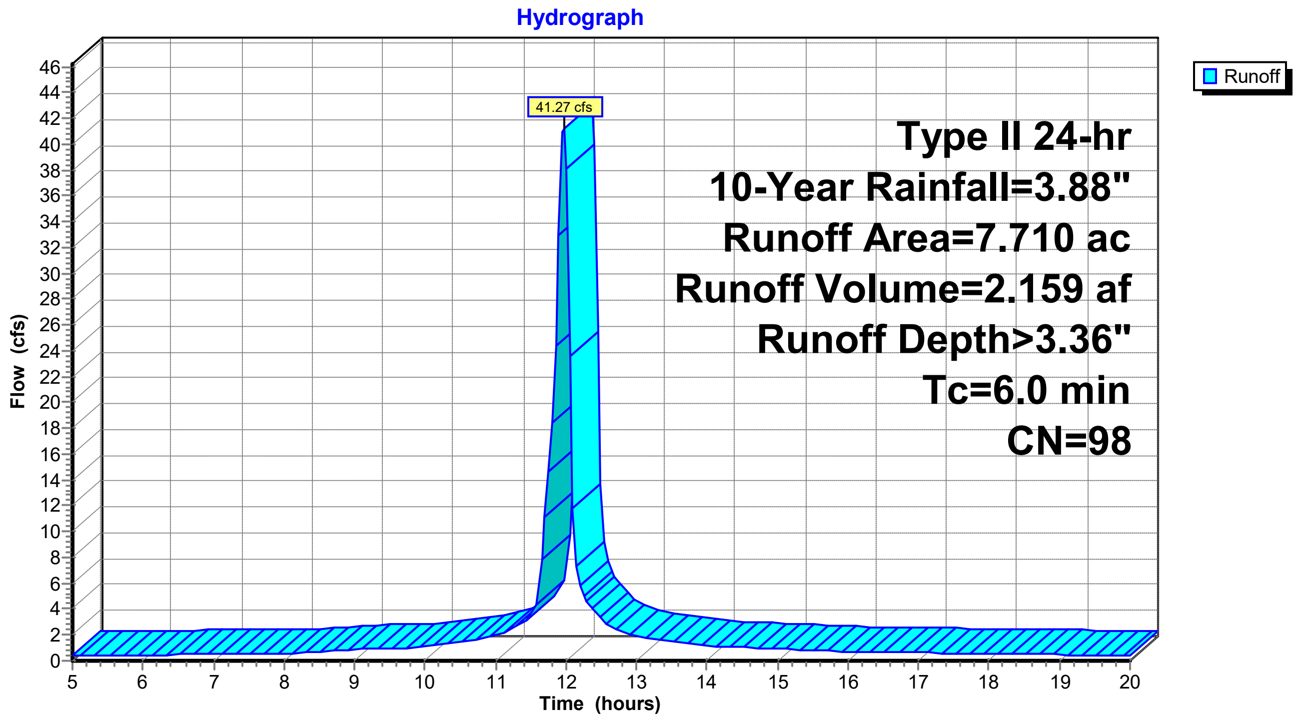
Runoff = 41.27 cfs @ 11.96 hrs, Volume= 2.159 af, Depth> 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	6.710	98	Building Rail Parking
*	1.000	95	Compacted Gravel
	7.710	98	Weighted Average
	1.000		12.97% Pervious Area
	6.710		87.03% Impervious Area

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

Subcatchment DR-8: Building



Summary for Subcatchment DR-9: Road and Building

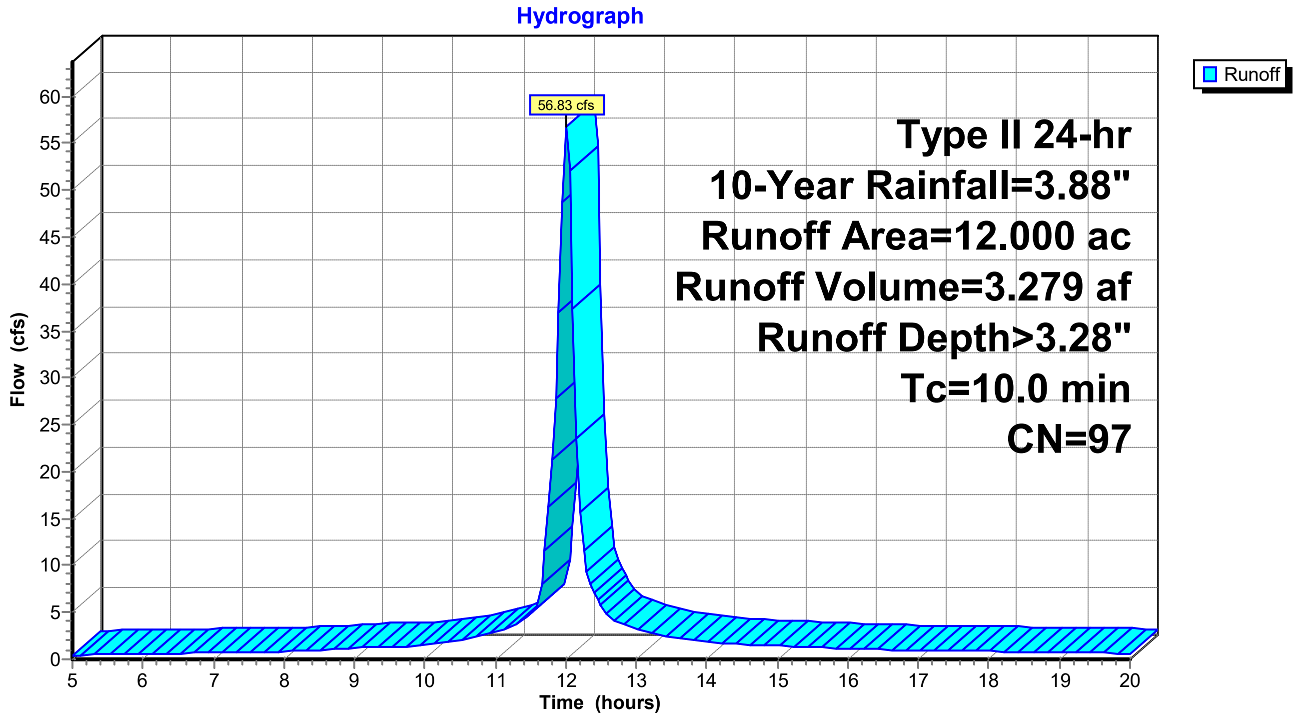
Runoff = 56.83 cfs @ 12.01 hrs, Volume= 3.279 af, Depth> 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.88"

	Area (ac)	CN	Description
	0.230	80	>75% Grass cover, Good, HSG D
*	1.900	92	Compacted Gravel
*	9.870	98	Road and Building
	12.000	97	Weighted Average
	2.130		17.75% Pervious Area
	9.870		82.25% Impervious Area

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

Subcatchment DR-9: Road and Building



Summary for Reach 2R: Overflow

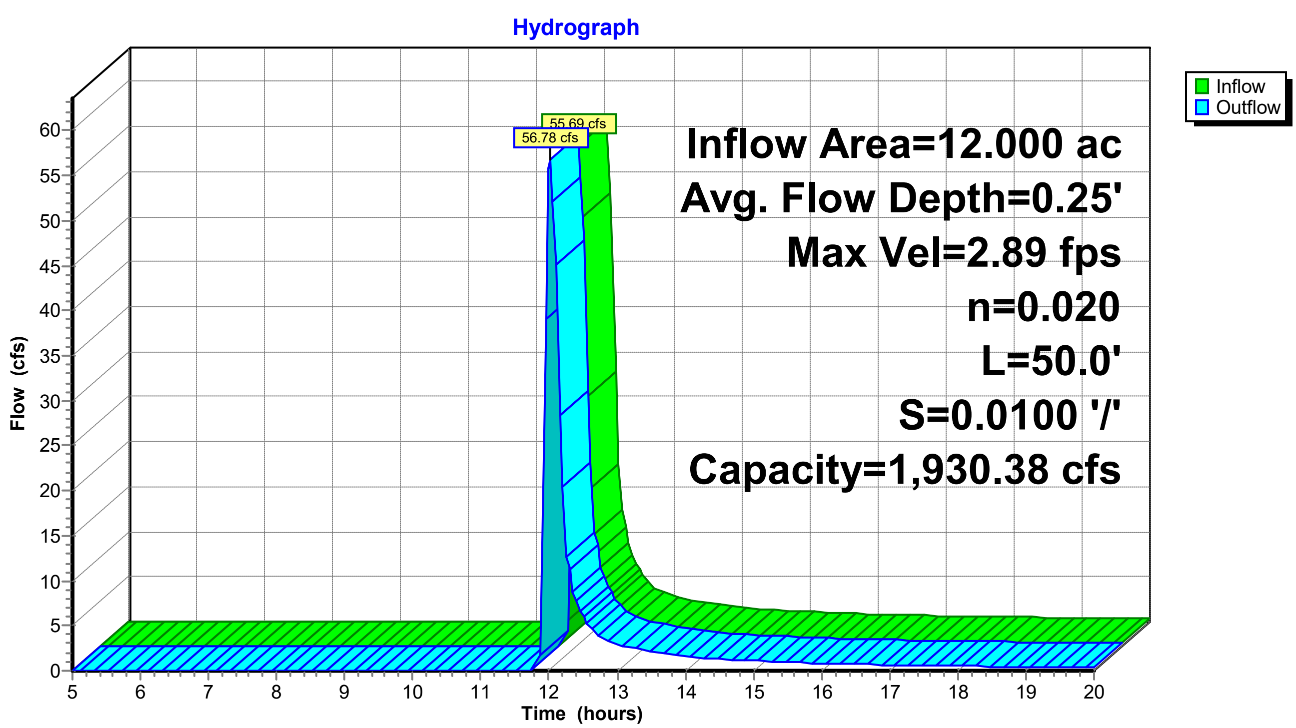
Inflow Area = 12.000 ac, 82.25% Impervious, Inflow Depth > 1.93" for 10-Year event
Inflow = 55.69 cfs @ 12.03 hrs, Volume= 1.928 af
Outflow = 56.78 cfs @ 12.02 hrs, Volume= 1.928 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.89 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.73 fps, Avg. Travel Time= 1.1 min

Peak Storage= 994 cf @ 12.01 hrs
Average Depth at Peak Storage= 0.25' , Surface Width= 81.48'
Bank-Full Depth= 2.00' Flow Area= 172.0 sf, Capacity= 1,930.38 cfs

80.00' x 2.00' deep channel, n= 0.020 Corrugated PE, corrugated interior
Side Slope Z-value= 3.0 '/' Top Width= 92.00'
Length= 50.0' Slope= 0.0100 '/'
Inlet Invert= 14.50', Outlet Invert= 14.00'

Reach 2R: Overflow



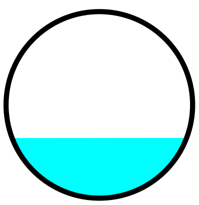
Summary for Reach 3R: Outlet Pipe

Inflow Area = 45.380 ac, 41.76% Impervious, Inflow Depth > 1.45" for 10-Year event
Inflow = 15.98 cfs @ 15.66 hrs, Volume= 5.499 af
Outflow = 15.98 cfs @ 15.66 hrs, Volume= 5.496 af, Atten= 0%, Lag= 0.3 min

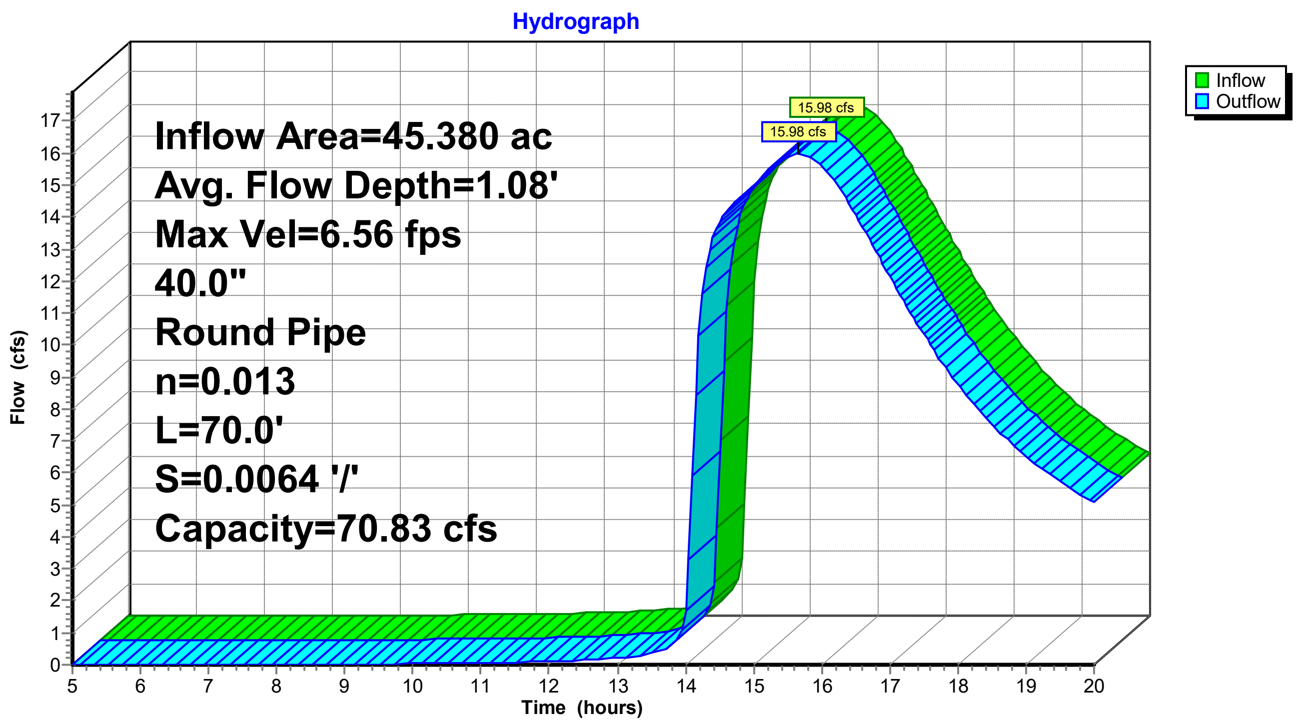
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.56 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.37 fps, Avg. Travel Time= 0.3 min

Peak Storage= 171 cf @ 15.66 hrs
Average Depth at Peak Storage= 1.08' , Surface Width= 3.12'
Bank-Full Depth= 3.33' Flow Area= 8.7 sf, Capacity= 70.83 cfs

40.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.0064 '/'
Inlet Invert= 4.25', Outlet Invert= 3.80'



Reach 3R: Outlet Pipe



Summary for Reach 4R: Overflow

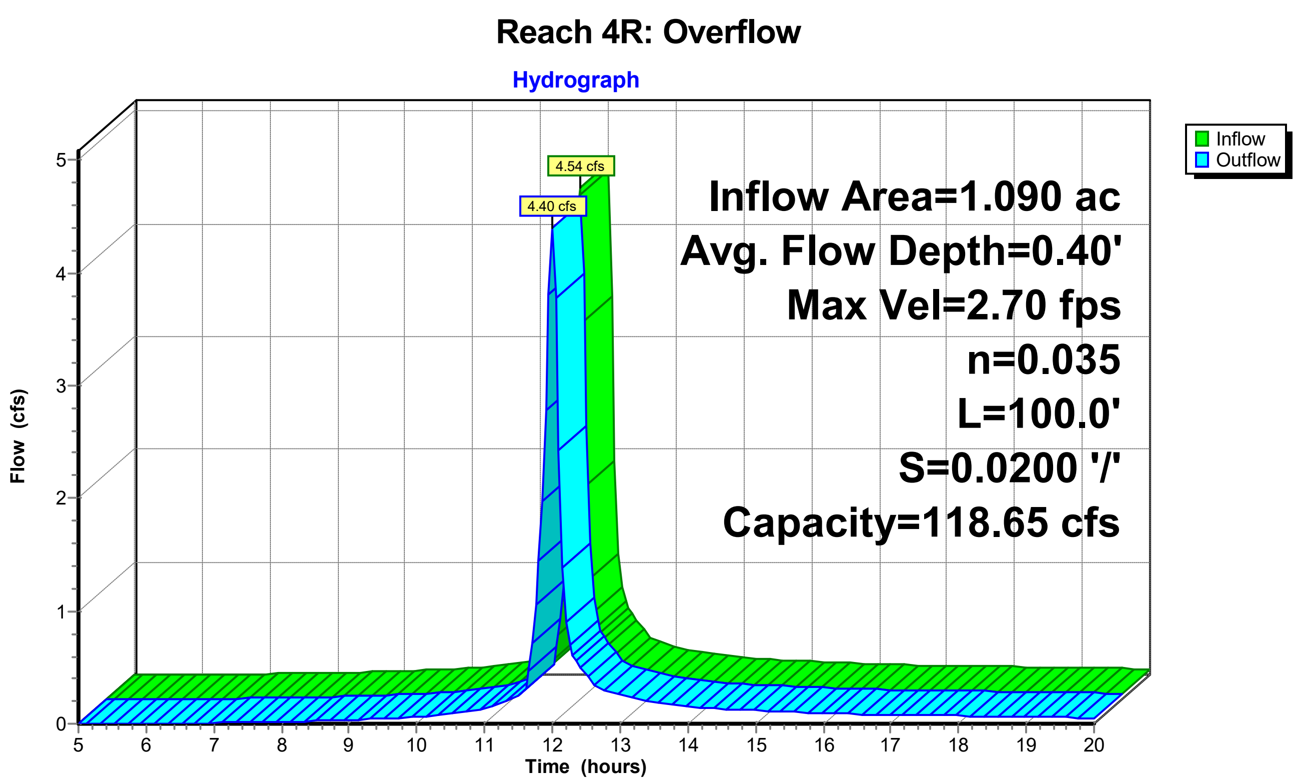
Inflow Area = 1.090 ac, 81.65% Impervious, Inflow Depth > 2.35" for 10-Year event
Inflow = 4.54 cfs @ 11.99 hrs, Volume= 0.214 af
Outflow = 4.40 cfs @ 12.00 hrs, Volume= 0.213 af, Atten= 3%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.70 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.74 fps, Avg. Travel Time= 2.3 min

Peak Storage= 167 cf @ 11.99 hrs
Average Depth at Peak Storage= 0.40' , Surface Width= 5.39'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 118.65 cfs

3.00' x 2.00' deep channel, n= 0.035 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 12.00', Outlet Invert= 10.00'

‡



Summary for Reach 5R: Overflow

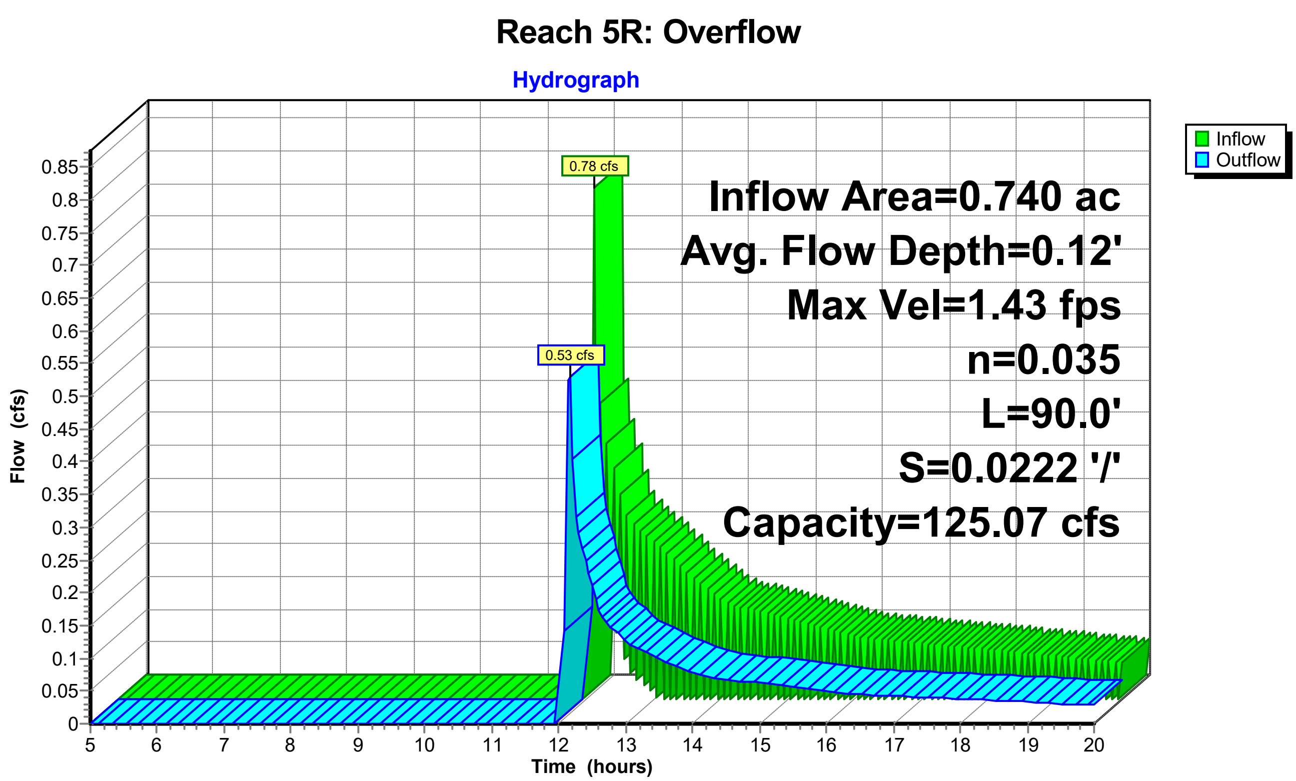
Inflow Area = 0.740 ac, 60.81% Impervious, Inflow Depth > 0.79" for 10-Year event
Inflow = 0.78 cfs @ 12.11 hrs, Volume= 0.049 af
Outflow = 0.53 cfs @ 12.16 hrs, Volume= 0.049 af, Atten= 32%, Lag= 3.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.43 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 2.3 min

Peak Storage= 36 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 3.72'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 125.07 cfs

3.00' x 2.00' deep channel, n= 0.035 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 90.0' Slope= 0.0222 '/'
Inlet Invert= 12.00', Outlet Invert= 10.00'

‡



Summary for Reach 6R: Overflow

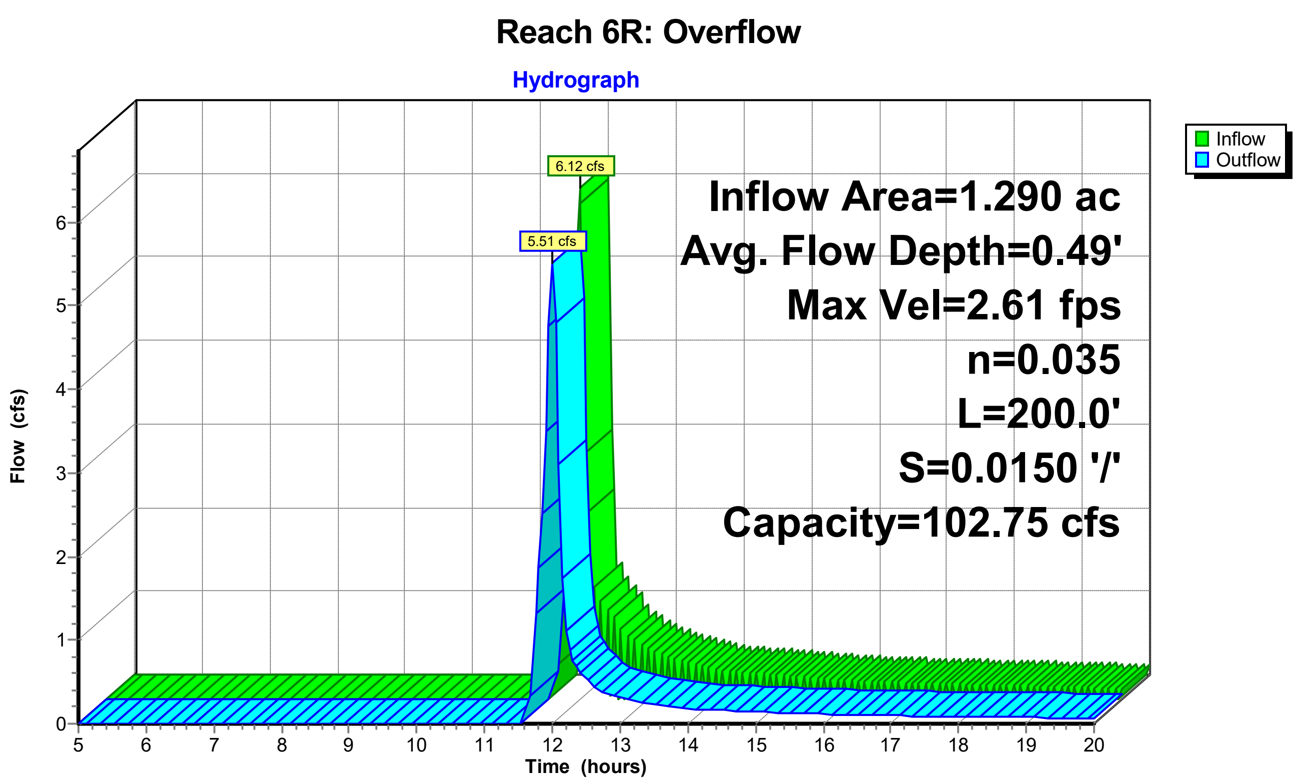
Inflow Area = 1.290 ac, 84.50% Impervious, Inflow Depth > 2.17" for 10-Year event
Inflow = 6.12 cfs @ 11.98 hrs, Volume= 0.233 af
Outflow = 5.51 cfs @ 12.00 hrs, Volume= 0.232 af, Atten= 10%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.61 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.84 fps, Avg. Travel Time= 4.0 min

Peak Storage= 438 cf @ 11.98 hrs
Average Depth at Peak Storage= 0.49' , Surface Width= 5.94'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 102.75 cfs

3.00' x 2.00' deep channel, n= 0.035 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 200.0' Slope= 0.0150 '/'
Inlet Invert= 12.00', Outlet Invert= 9.00'

‡



Summary for Reach 7R: Overflow

Inflow Area = 7.710 ac, 87.03% Impervious, Inflow Depth > 1.73" for 10-Year event
Inflow = 64.65 cfs @ 12.00 hrs, Volume= 1.109 af
Outflow = 48.99 cfs @ 12.01 hrs, Volume= 1.107 af, Atten= 24%, Lag= 0.6 min

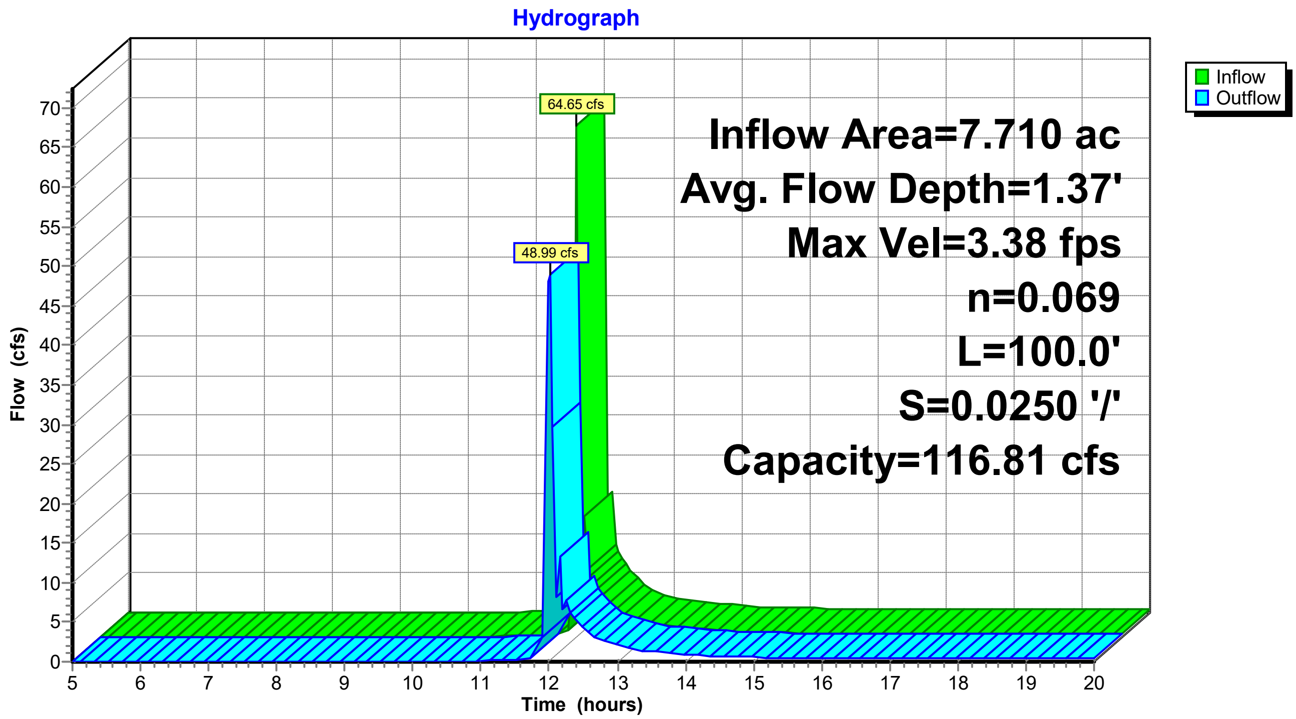
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.38 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.78 fps, Avg. Travel Time= 2.1 min

Peak Storage= 1,656 cf @ 12.01 hrs
Average Depth at Peak Storage= 1.37' , Surface Width= 16.23'
Bank-Full Depth= 2.00' Flow Area= 28.0 sf, Capacity= 116.81 cfs

8.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 100.0' Slope= 0.0250 '/'
Inlet Invert= 14.50', Outlet Invert= 12.00'

‡

Reach 7R: Overflow



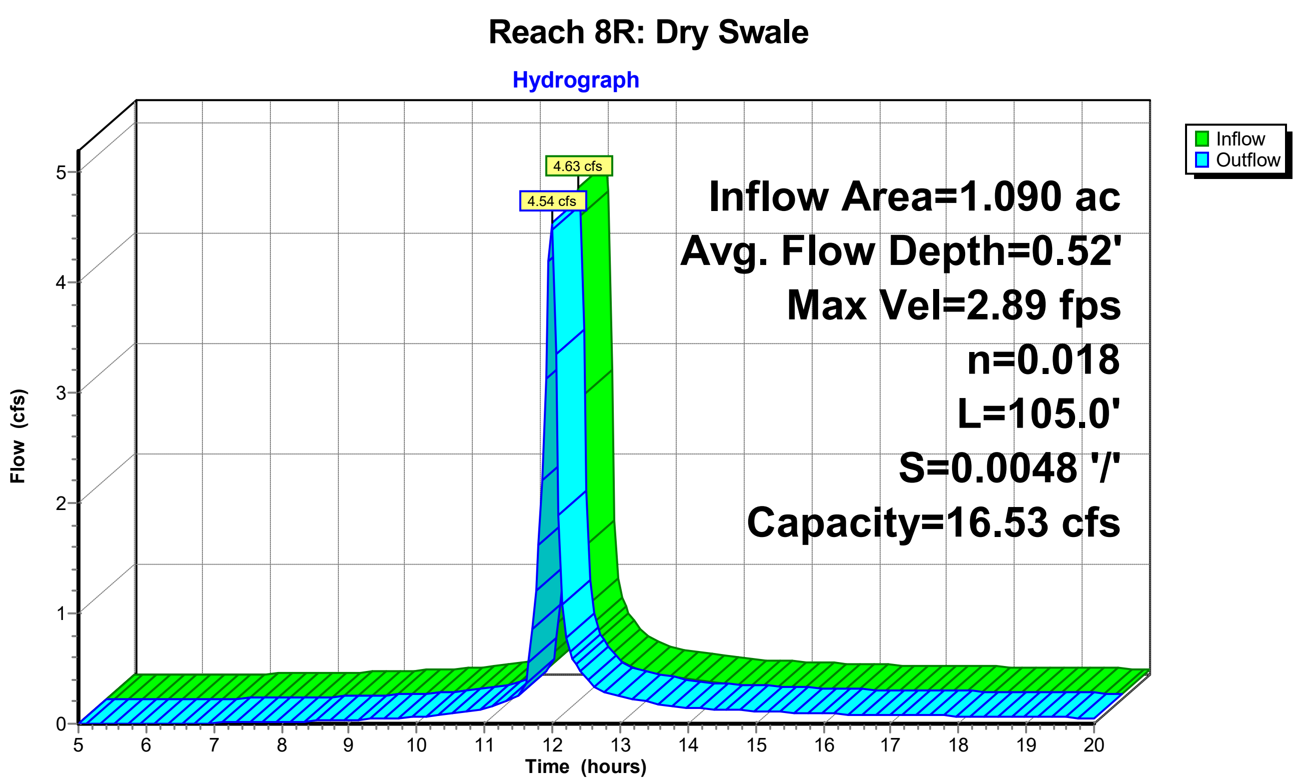
Summary for Reach 8R: Dry Swale

Inflow Area = 1.090 ac, 81.65% Impervious, Inflow Depth > 2.35" for 10-Year event
Inflow = 4.63 cfs @ 11.97 hrs, Volume= 0.214 af
Outflow = 4.54 cfs @ 11.99 hrs, Volume= 0.214 af, Atten= 2%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.89 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.79 fps, Avg. Travel Time= 2.2 min

Peak Storage= 167 cf @ 11.98 hrs
Average Depth at Peak Storage= 0.52' , Surface Width= 4.09'
Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 16.53 cfs

2.00' x 1.00' deep channel, n= 0.018 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 6.00'
Length= 105.0' Slope= 0.0048 '/'
Inlet Invert= 10.00', Outlet Invert= 9.50'



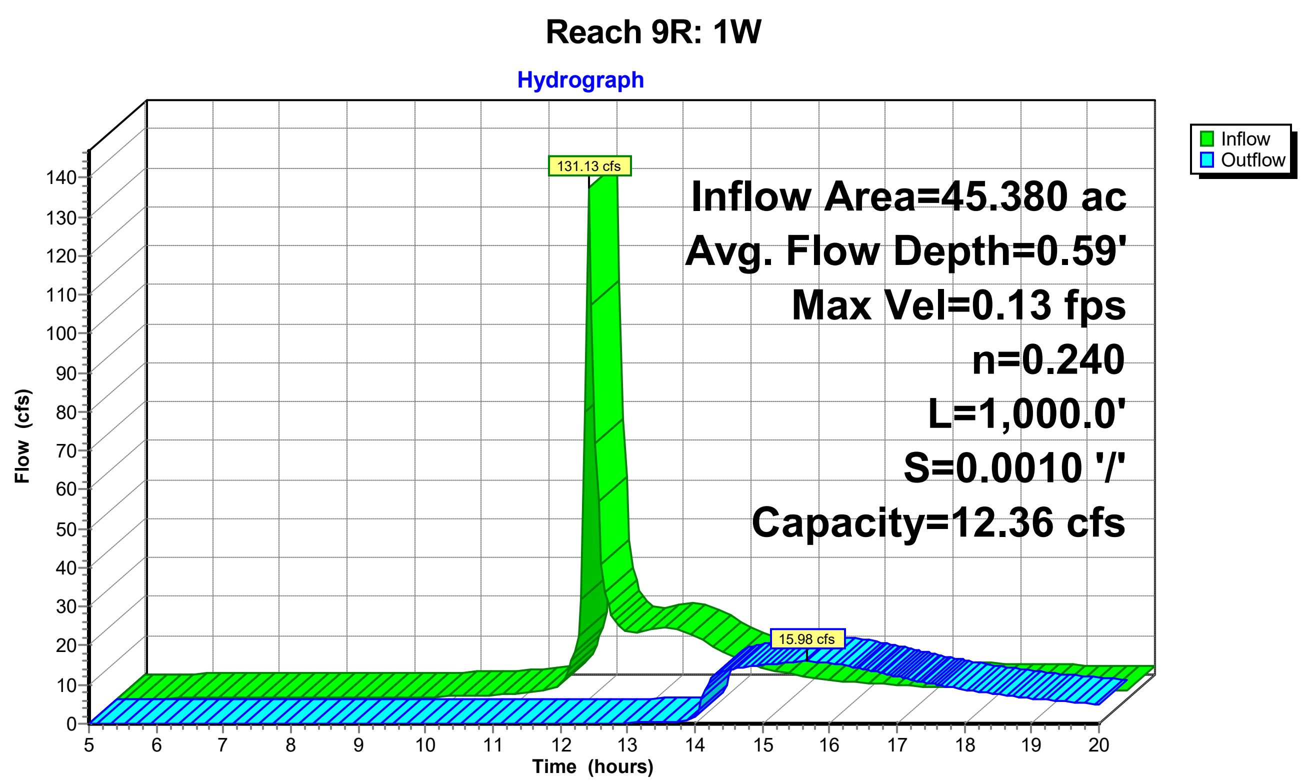
Summary for Reach 9R: 1W

Inflow Area = 45.380 ac, 41.76% Impervious, Inflow Depth > 1.92" for 10-Year event
Inflow = 131.13 cfs @ 12.01 hrs, Volume= 7.256 af
Outflow = 15.98 cfs @ 15.66 hrs, Volume= 5.499 af, Atten= 88%, Lag= 219.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.13 fps, Min. Travel Time= 123.7 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 261.1 min

Peak Storage= 118,642 cf @ 13.60 hrs
Average Depth at Peak Storage= 0.59' , Surface Width= 203.53'
Bank-Full Depth= 0.50' Flow Area= 100.8 sf, Capacity= 12.36 cfs

200.00' x 0.50' deep channel, n= 0.240
Side Slope Z-value= 3.0 '/' Top Width= 203.00'
Length= 1,000.0' Slope= 0.0010 '/'
Inlet Invert= 6.00', Outlet Invert= 5.00'



Summary for Pond 1P: WQv Pond #1

Inflow Area = 7.710 ac, 87.03% Impervious, Inflow Depth > 3.36" for 10-Year event
Inflow = 41.27 cfs @ 11.96 hrs, Volume= 2.159 af
Outflow = 65.25 cfs @ 12.00 hrs, Volume= 1.510 af, Atten= 0%, Lag= 2.2 min
Discarded = 0.60 cfs @ 12.00 hrs, Volume= 0.401 af
Primary = 64.65 cfs @ 12.00 hrs, Volume= 1.109 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 15.97' @ 12.00 hrs Surf.Area= 16,674 sf Storage= 40,545 cf

Plug-Flow detention time= 154.9 min calculated for 1.504 af (70% of inflow)
Center-of-Mass det. time= 89.3 min (821.0 - 731.6)

Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	2,785 cf	**Forebay (Prismatic)** Listed below (Recalc)
#2	8.00'	37,761 cf	**Permanent Pool (Prismatic)** Listed below (Recalc)
		40,545 cf	Total Available Storage

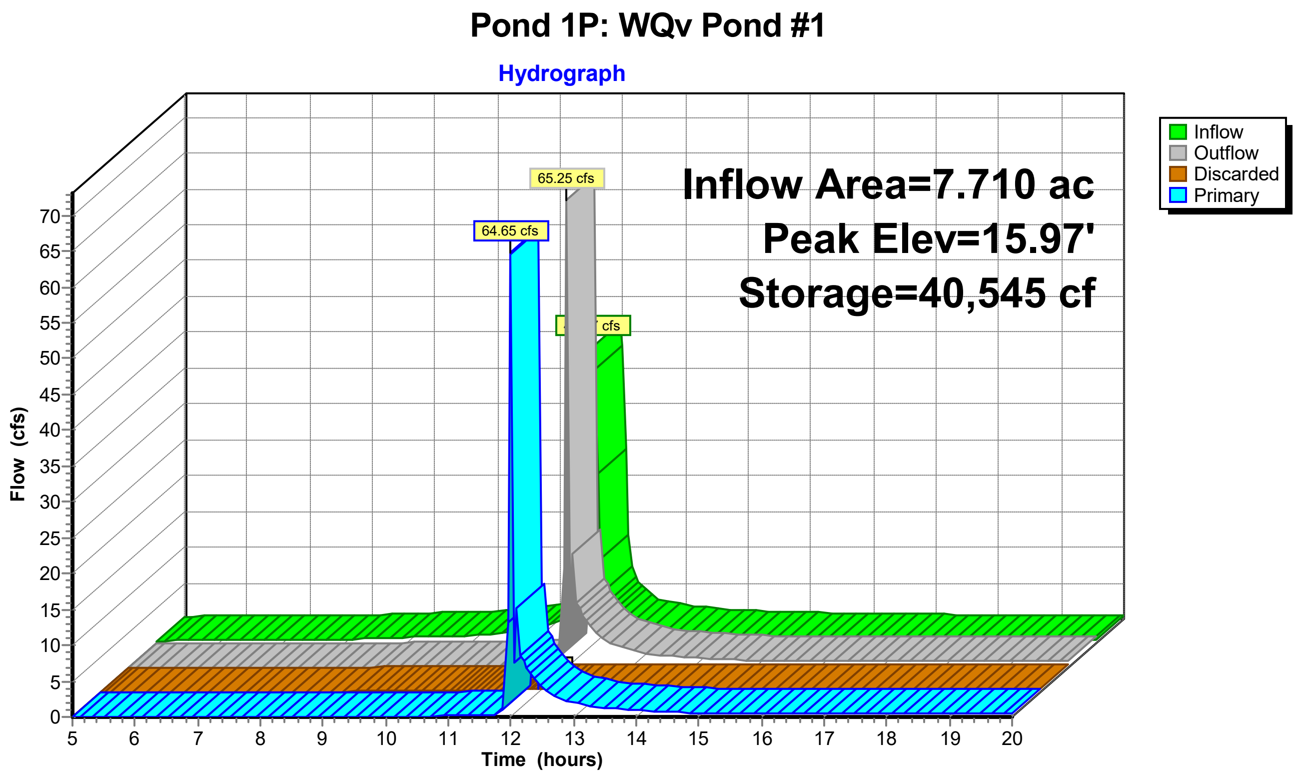
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
10.00	232	0	0
11.00	569	401	401
12.00	1,018	794	1,194
13.00	2,163	1,591	2,785

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.00	1,208	0	0
9.00	1,839	1,524	1,524
10.00	2,499	2,169	3,693
11.00	3,185	2,842	6,535
12.00	4,658	3,922	10,456
13.00	6,233	5,446	15,902
14.00	11,487	8,860	24,762
15.00	14,511	12,999	37,761

Device	Routing	Invert	Outlet Devices
#1	Primary	14.50'	**Channel/Reach** using Reach 7R: Overflow
#2	Discarded	8.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 4.00'
#3	Primary	12.00'	**4.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 8.00' / 12.00' S= -0.0800 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Discarded OutFlow Max=0.60 cfs @ 12.00 hrs HW=15.91' (Free Discharge)
└**2=Exfiltration** (Controls 0.60 cfs)

Primary OutFlow Max=62.67 cfs @ 12.00 hrs HW=15.94' (Free Discharge)
├**1=Channel/Reach** (Channel Controls 62.10 cfs @ 3.49 fps)
└**3=Culvert** (Outlet Controls 0.57 cfs @ 6.55 fps)



Summary for Pond 2P: WQv Pond #2

Inflow Area = 12.000 ac, 82.25% Impervious, Inflow Depth > 3.28" for 10-Year event
Inflow = 56.83 cfs @ 12.01 hrs, Volume= 3.279 af
Outflow = 56.04 cfs @ 12.03 hrs, Volume= 2.210 af, Atten= 1%, Lag= 1.2 min
Discarded = 0.35 cfs @ 12.03 hrs, Volume= 0.282 af
Primary = 55.69 cfs @ 12.03 hrs, Volume= 1.928 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 14.74' @ 12.03 hrs Surf.Area= 19,509 sf Storage= 50,391 cf

Plug-Flow detention time= 125.9 min calculated for 2.209 af (67% of inflow)
Center-of-Mass det. time= 57.5 min (796.0 - 738.4)

Volume	Invert	Avail.Storage	Storage Description
#1	8.00'	2,406 cf	**Forebay #1 (Prismatic)** Listed below (Recalc)
#2	8.00'	1,481 cf	**Forebay #2 (Prismatic)** Listed below (Recalc)
#3	7.00'	70,718 cf	**Permanent Pool (Prismatic)** Listed below (Recalc)
		74,605 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.00	330	0	0
9.00	562	446	446
10.00	866	714	1,160
11.00	1,625	1,246	2,406

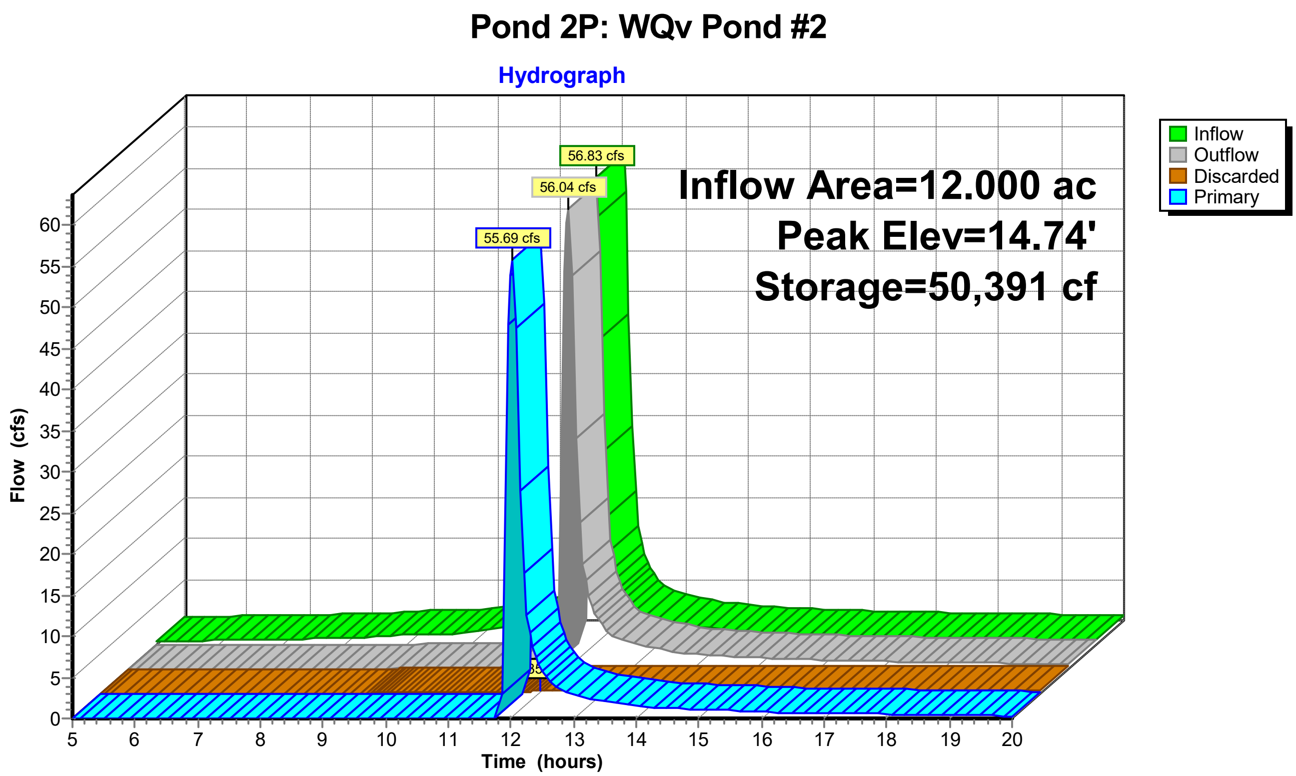
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.00	202	0	0
9.00	351	277	277
10.00	535	443	720
11.00	988	762	1,481

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	808	0	0
8.00	1,190	999	999
9.00	1,604	1,397	2,396
10.00	2,040	1,822	4,218
11.00	3,026	2,533	6,751
12.00	8,323	5,675	12,426
13.00	11,150	9,737	22,162
14.00	14,421	12,786	34,948
15.00	17,774	16,098	51,045
16.00	21,572	19,673	70,718

Device	Routing	Invert	Outlet Devices
#1	Discarded	7.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 4.00'
#2	Primary	14.50'	**Channel/Reach** using Reach 2R: Overflow

Discarded OutFlow Max=0.35 cfs @ 12.03 hrs HW=14.73' (Free Discharge)
└**1=Exfiltration** (Controls 0.35 cfs)

Primary OutFlow Max=52.84 cfs @ 12.03 hrs HW=14.73' (Free Discharge)
└**2=Channel/Reach** (Channel Controls 52.84 cfs @ 2.80 fps)



Summary for Pond 3P: Infiltration Basin #1

Inflow Area = 0.740 ac, 60.81% Impervious, Inflow Depth > 1.44" for 10-Year event
Inflow = 2.03 cfs @ 11.98 hrs, Volume= 0.089 af
Outflow = 0.78 cfs @ 12.11 hrs, Volume= 0.049 af, Atten= 62%, Lag= 7.8 min
Primary = 0.78 cfs @ 12.11 hrs, Volume= 0.049 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 12.16' @ 12.12 hrs Surf.Area= 1,000 sf Storage= 1,750 cf

Plug-Flow detention time= 155.5 min calculated for 0.049 af (55% of inflow)
Center-of-Mass det. time= 72.3 min (870.7 - 798.4)

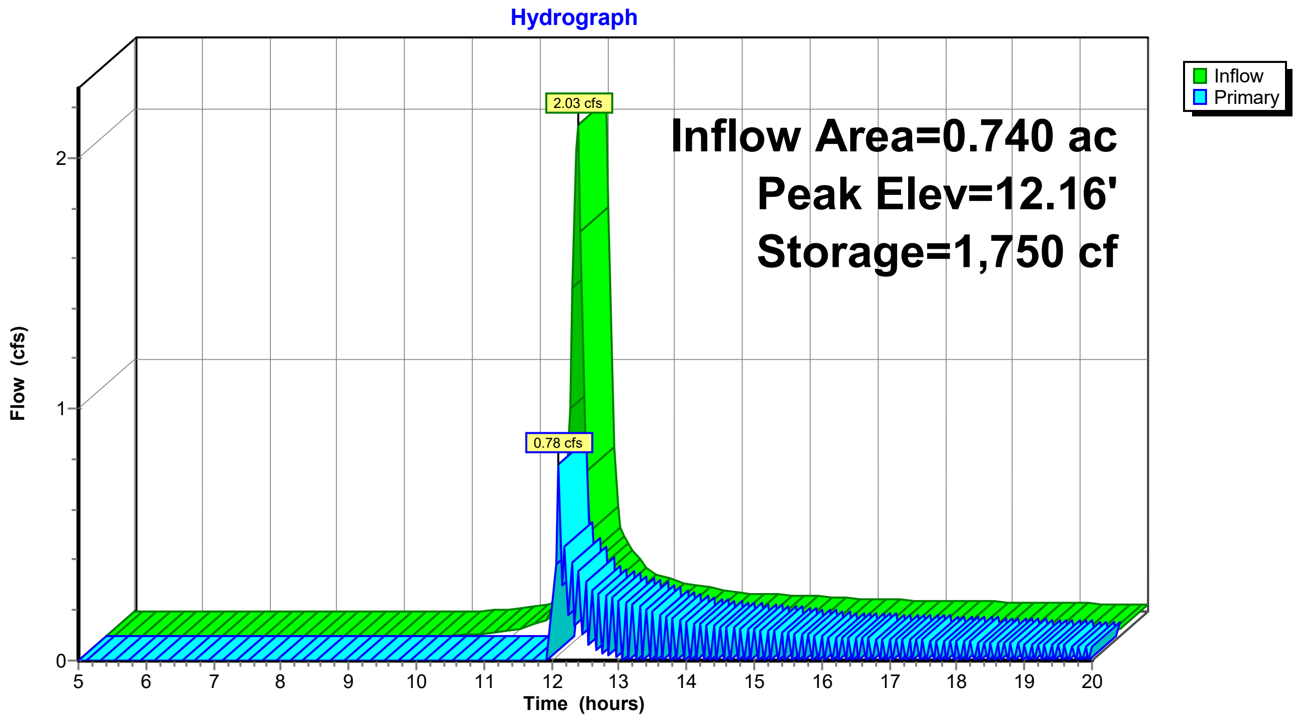
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	1,750 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
10.00	750	0	0
12.00	1,000	1,750	1,750

Device	Routing	Invert	Outlet Devices
#1	Primary	12.00'	**Channel/Reach** using Reach 5R: Overflow

Primary OutFlow Max=0.70 cfs @ 12.11 hrs HW=12.13' (Free Discharge)
└─**1=Channel/Reach** (Channel Controls 0.70 cfs @ 1.53 fps)

Pond 3P: Infiltration Basin #1



Summary for Pond 4P: Infiltration Basin #2

Inflow Area = 1.290 ac, 84.50% Impervious, Inflow Depth > 2.53" for 10-Year event
Inflow = 5.80 cfs @ 11.97 hrs, Volume= 0.272 af
Outflow = 6.12 cfs @ 11.98 hrs, Volume= 0.233 af, Atten= 0%, Lag= 1.1 min
Primary = 6.12 cfs @ 11.98 hrs, Volume= 0.233 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 12.51' @ 11.98 hrs Surf.Area= 1,000 sf Storage= 1,750 cf

Plug-Flow detention time= 69.8 min calculated for 0.233 af (86% of inflow)
Center-of-Mass det. time= 25.7 min (789.9 - 764.2)

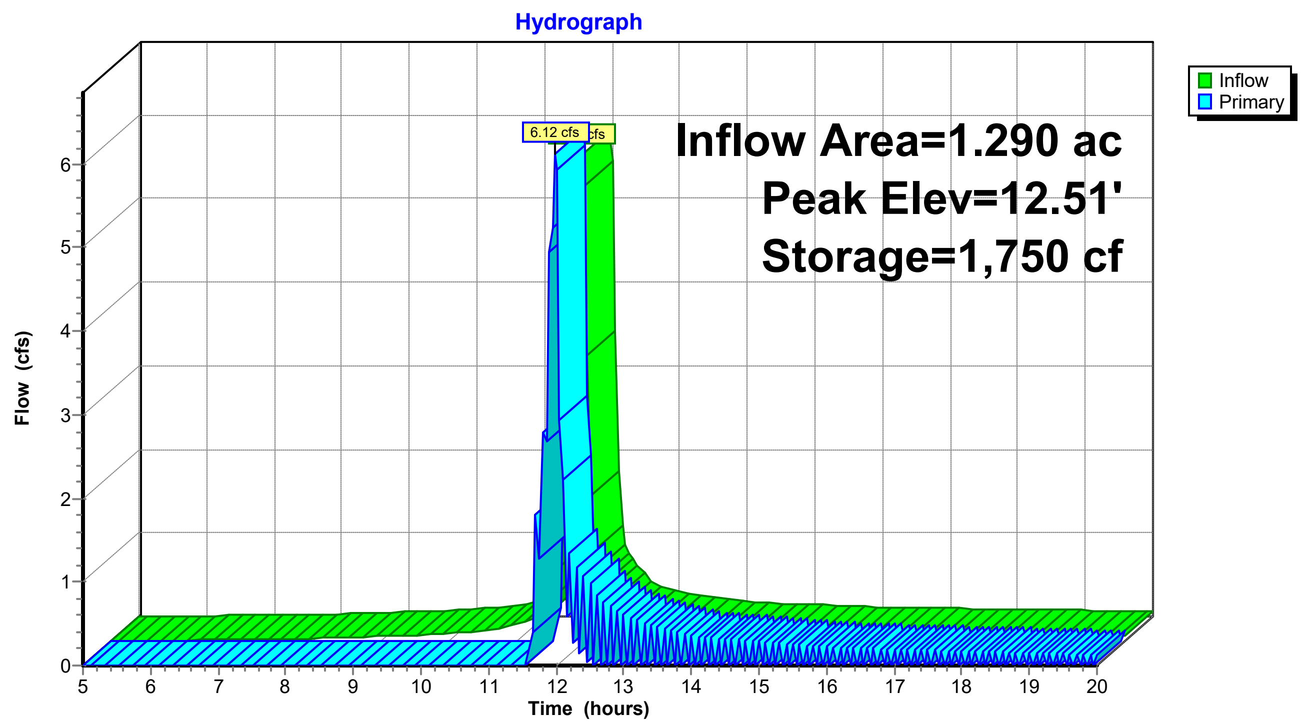
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	1,750 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
10.00	750	0	0
12.00	1,000	1,750	1,750

Device	Routing	Invert	Outlet Devices
#1	Primary	12.00'	**Channel/Reach** using Reach 6R: Overflow

Primary OutFlow Max=5.71 cfs @ 11.98 hrs HW=12.49' (Free Discharge)
↑—**1=Channel/Reach** (Channel Controls 5.71 cfs @ 2.62 fps)

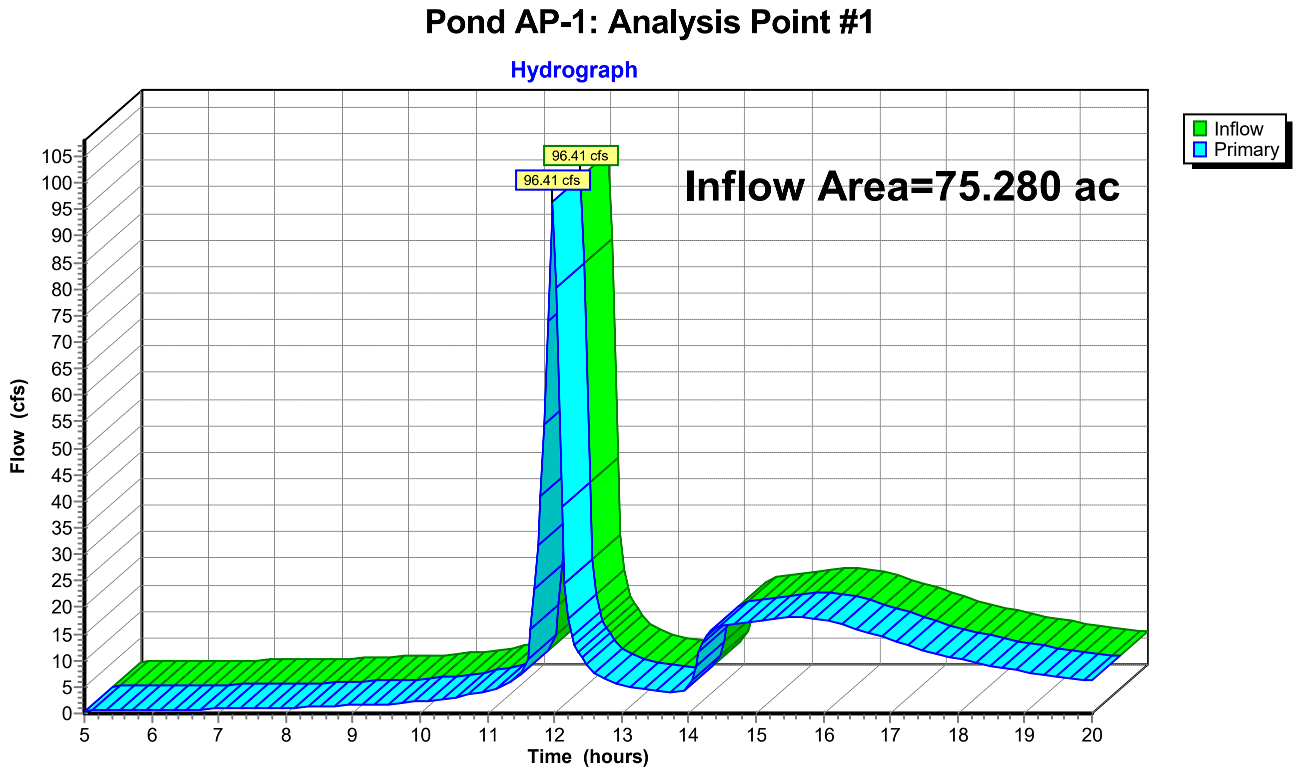
Pond 4P: Infiltration Basin #2



Summary for Pond AP-1: Analysis Point #1

Inflow Area = 75.280 ac, 33.87% Impervious, Inflow Depth > 1.70" for 10-Year event
Inflow = 96.41 cfs @ 11.97 hrs, Volume= 10.664 af
Primary = 96.41 cfs @ 11.97 hrs, Volume= 10.664 af, Atten= 0%, Lag= 0.0 min

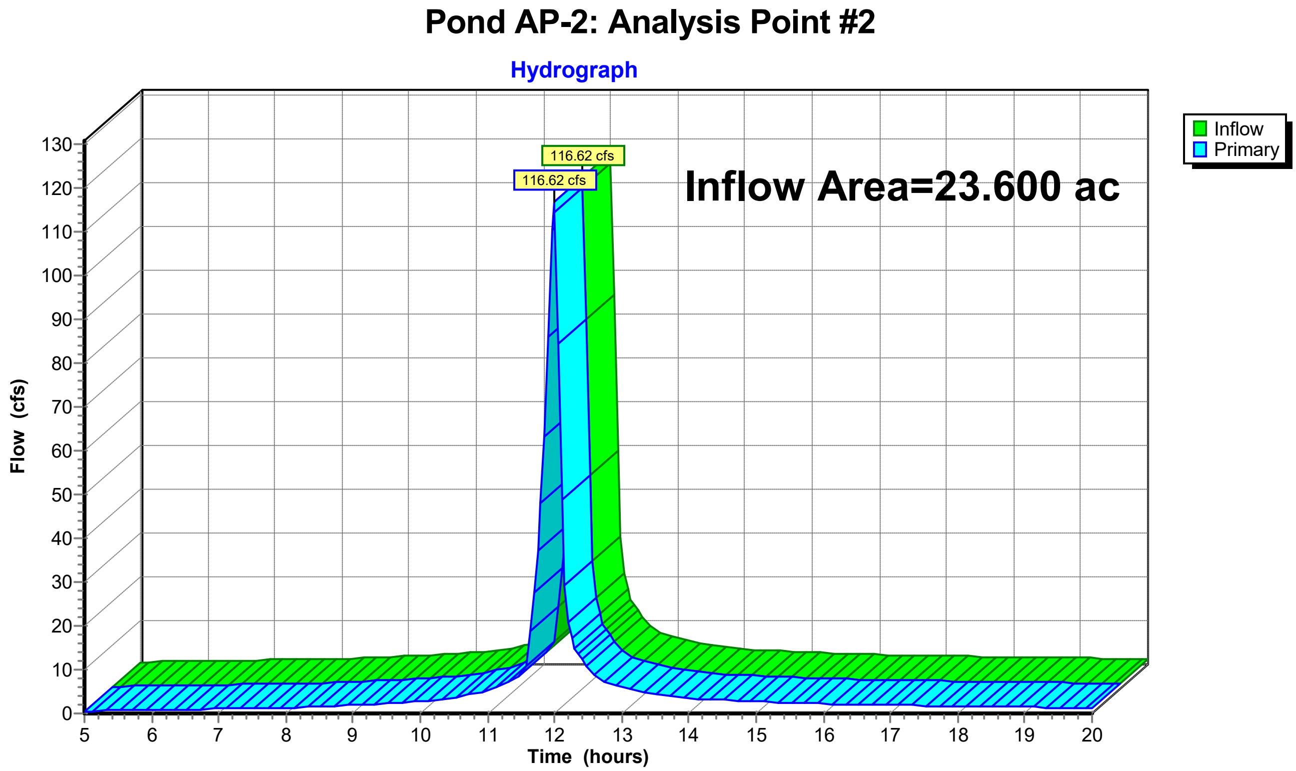
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Summary for Pond AP-2: Analysis Point #2

Inflow Area = 23.600 ac, 0.00% Impervious, Inflow Depth > 3.10" for 10-Year event
Inflow = 116.62 cfs @ 11.98 hrs, Volume= 6.095 af
Primary = 116.62 cfs @ 11.98 hrs, Volume= 6.095 af, Atten= 0%, Lag= 0.0 min

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



Summary for Subcatchment DR-1: Storage

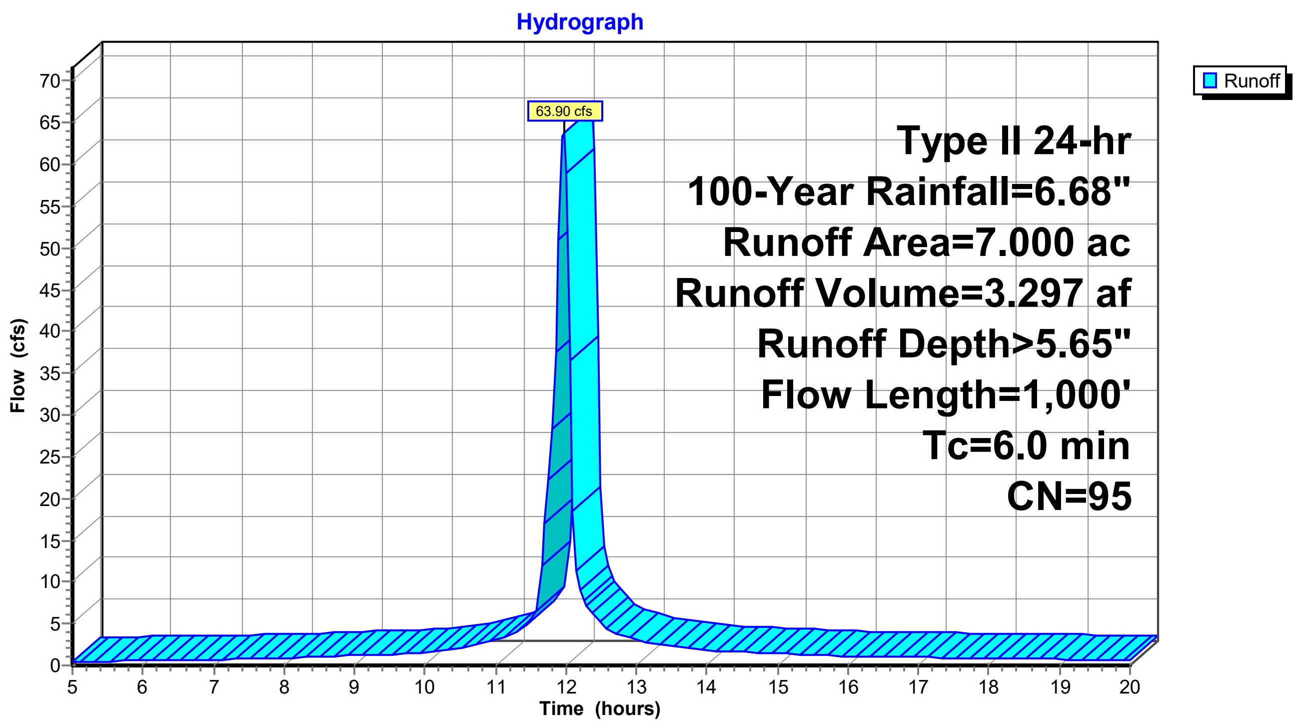
Runoff = 63.90 cfs @ 11.96 hrs, Volume= 3.297 af, Depth> 5.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	7.000	95	Compacted Gravel
	7.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	1,000		2.78		**Direct Entry, Min**

Subcatchment DR-1: Storage



Summary for Subcatchment DR-10: Substation

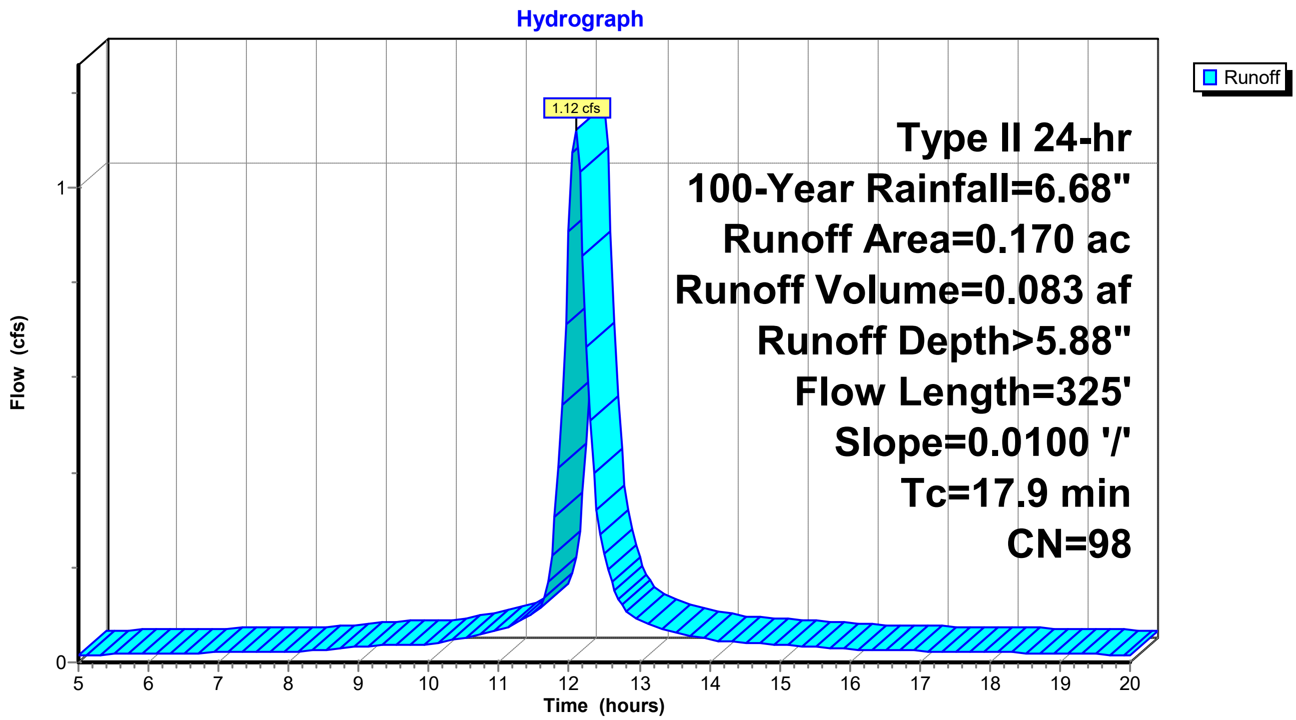
Runoff = 1.12 cfs @ 12.09 hrs, Volume= 0.083 af, Depth> 5.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	0.170	98	Substation
	0.170		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	65	0.0100	0.83		**Sheet Flow, paved** Smooth surfaces n= 0.011 P2= 2.40"
9.9	60	0.0100	0.10		**Sheet Flow, filter strip** Grass: Short n= 0.150 P2= 2.40"
6.7	200	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.9	325	Total			

Subcatchment DR-10: Substation



Summary for Subcatchment DR-11: Parking

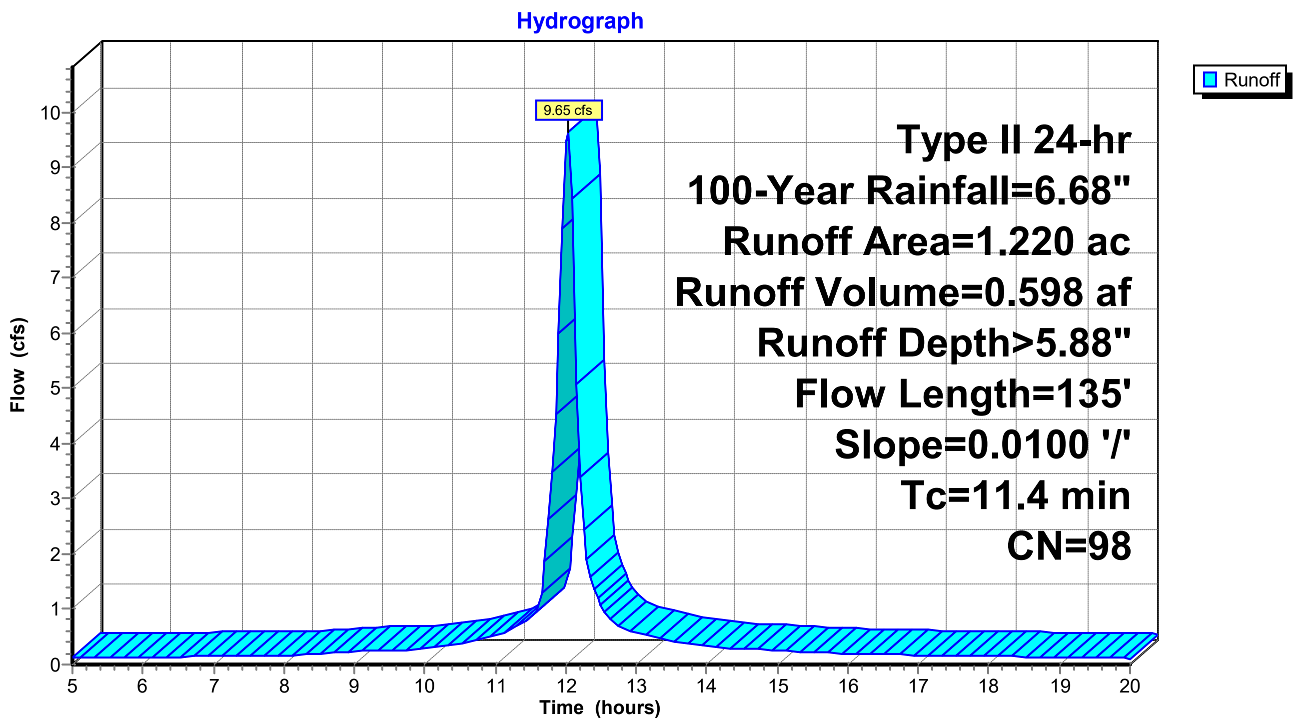
Runoff = 9.65 cfs @ 12.02 hrs, Volume= 0.598 af, Depth> 5.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	1.220	98	Parking
	1.220		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	75	0.0100	0.85		**Sheet Flow, parking lot** Smooth surfaces n= 0.011 P2= 2.40"
9.9	60	0.0100	0.10		**Sheet Flow, Filter Strip** Grass: Short n= 0.150 P2= 2.40"
11.4	135	Total			

Subcatchment DR-11: Parking



Summary for Subcatchment DR-12: Undisturbed Area

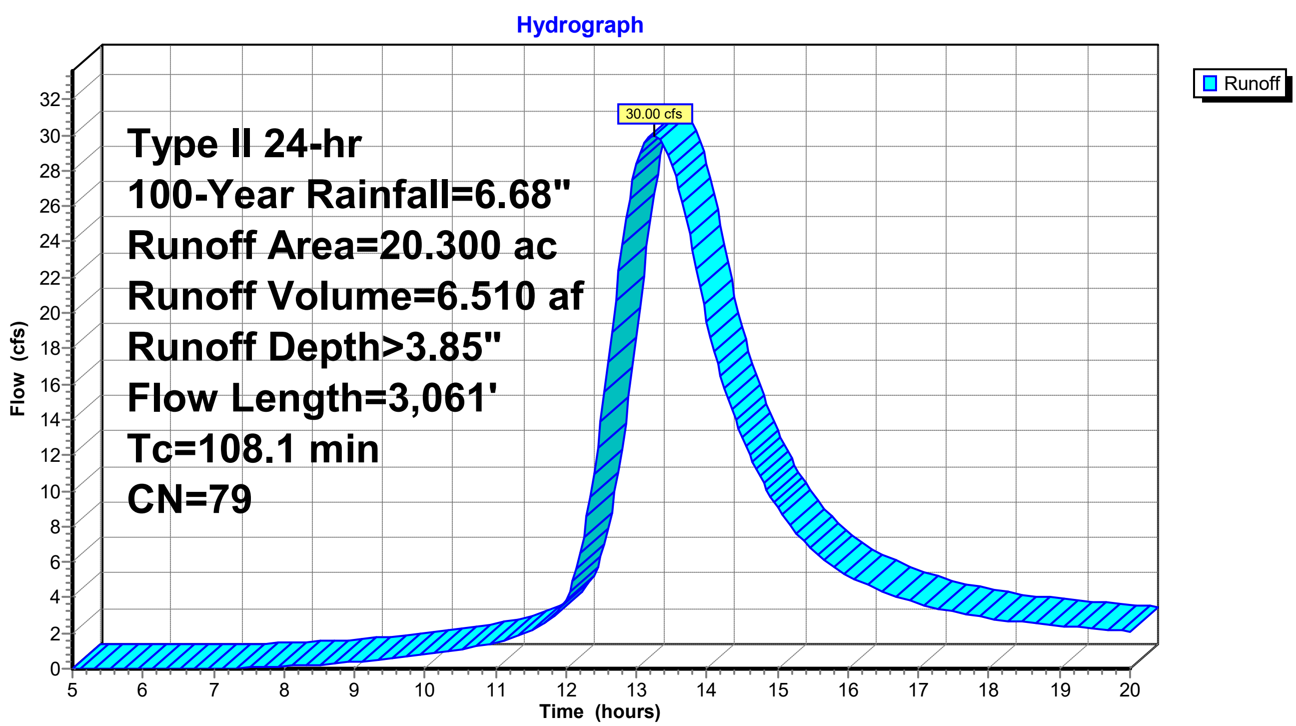
Runoff = 30.00 cfs @ 13.25 hrs, Volume= 6.510 af, Depth> 3.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

Area (ac)	CN	Description
20.300	79	Woods, Fair, HSG D
20.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	200	0.0800	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
3.0	200	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.6	250	0.2600	2.55		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
78.7	2,361	0.0100	0.50		**Shallow Concentrated Flow, Wetland Flow** Woodland Kv= 5.0 fps
0.0	50	0.0500	22.86	161.57	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012 Corrugated PP, smooth interior
108.1	3,061	Total			

Subcatchment DR-12: Undisturbed Area



Summary for Subcatchment DR-13: Roadway

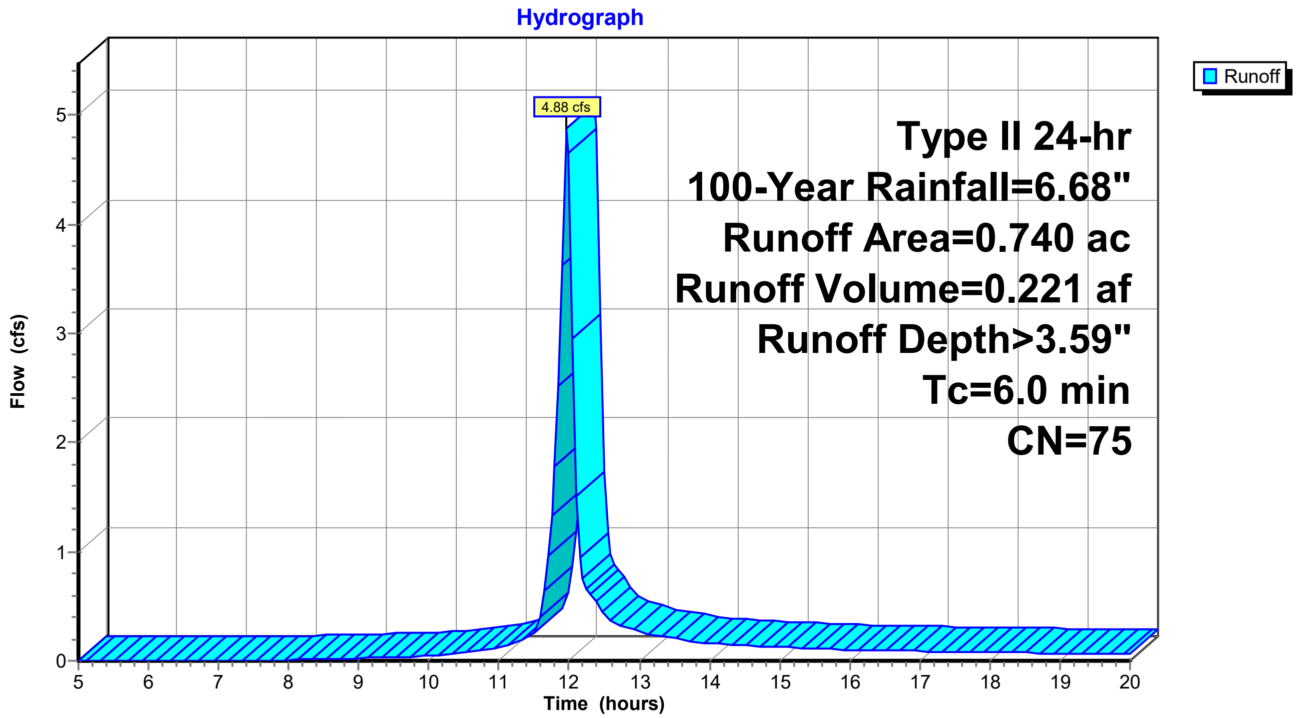
Runoff = 4.88 cfs @ 11.97 hrs, Volume= 0.221 af, Depth> 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	0.450	98	Pavement
	0.290	39	>75% Grass cover, Good, HSG A
	0.740	75	Weighted Average
	0.290		39.19% Pervious Area
	0.450		60.81% Impervious Area

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

Subcatchment DR-13: Roadway



Summary for Subcatchment DR-14: Roadway

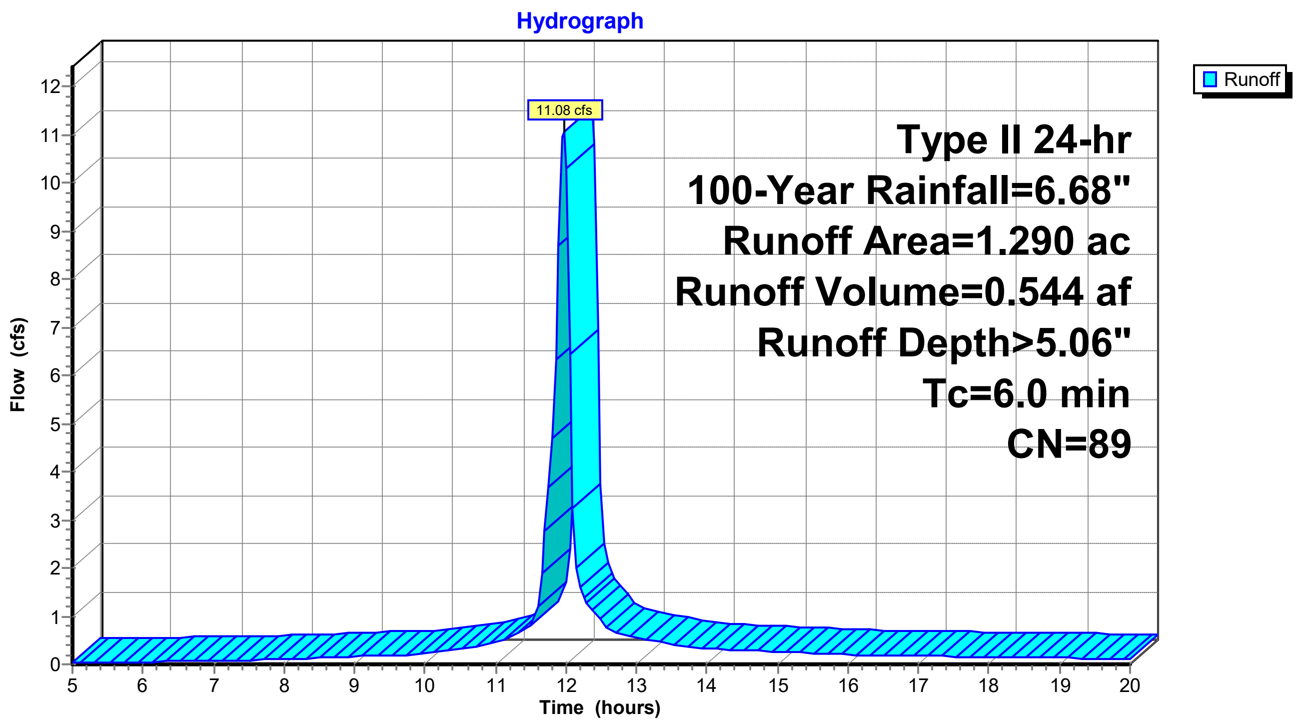
Runoff = 11.08 cfs @ 11.96 hrs, Volume= 0.544 af, Depth> 5.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	0.580	98	New Pavement
	0.200	39	>75% Grass cover, Good, HSG A
*	0.510	98	Mill & Fill of Old Pavement
	1.290	89	Weighted Average
	0.200		15.50% Pervious Area
	1.090		84.50% Impervious Area

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

Subcatchment DR-14: Roadway



Summary for Subcatchment DR-15: Roadway

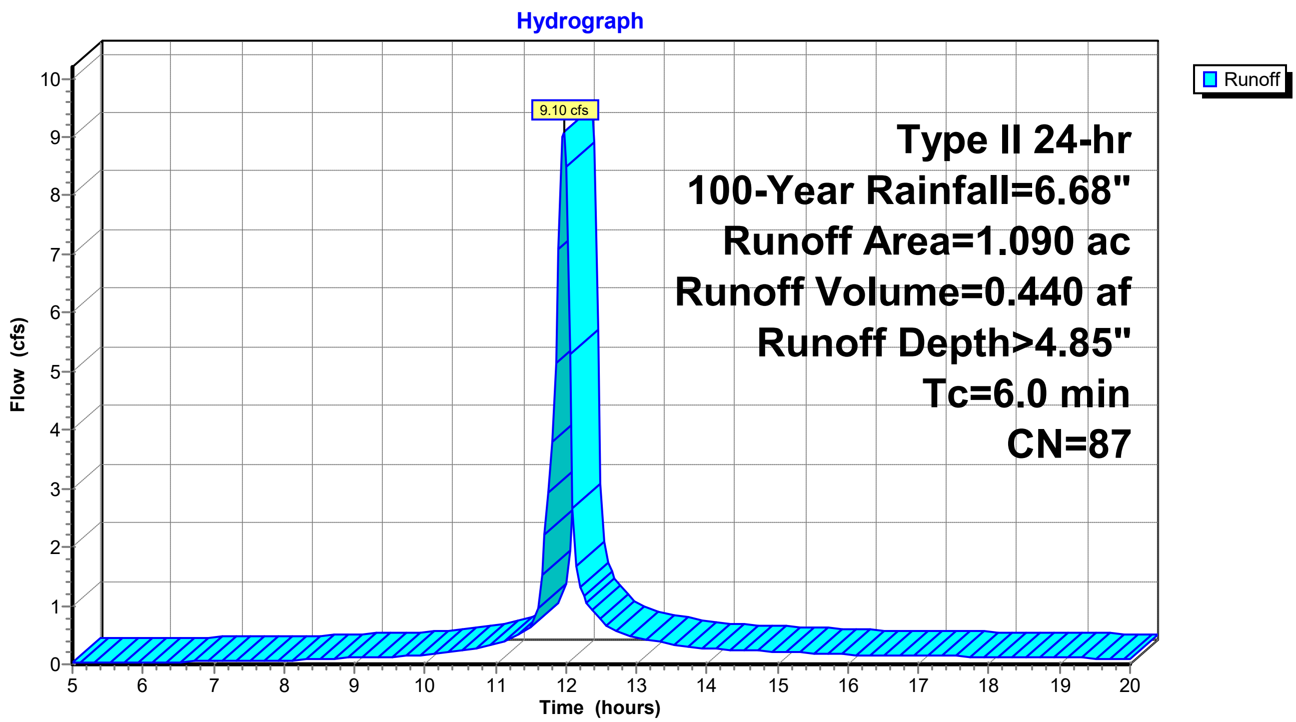
Runoff = 9.10 cfs @ 11.96 hrs, Volume= 0.440 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	0.050	98	New Pavement
	0.200	39	>75% Grass cover, Good, HSG A
*	0.840	98	Mill & Fill of Old Pavement
	1.090	87	Weighted Average
	0.200		18.35% Pervious Area
	0.890		81.65% Impervious Area

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

Subcatchment DR-15: Roadway



Summary for Subcatchment DR-16: Undisturbed Area

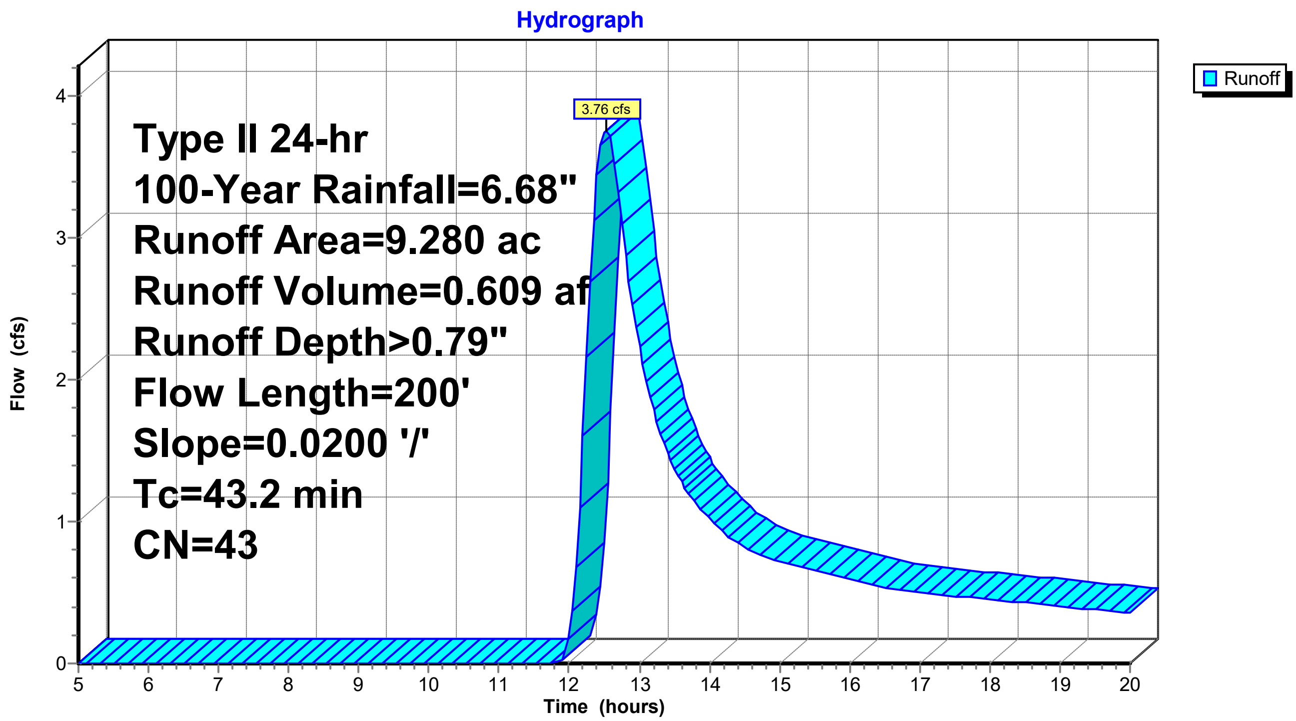
Runoff = 3.76 cfs @ 12.53 hrs, Volume= 0.609 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

Area (ac)	CN	Description
9.280	43	Woods/grass comb., Fair, HSG A
9.280		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
43.2	200	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"

Subcatchment DR-16: Undisturbed Area



Summary for Subcatchment DR-2: Storage

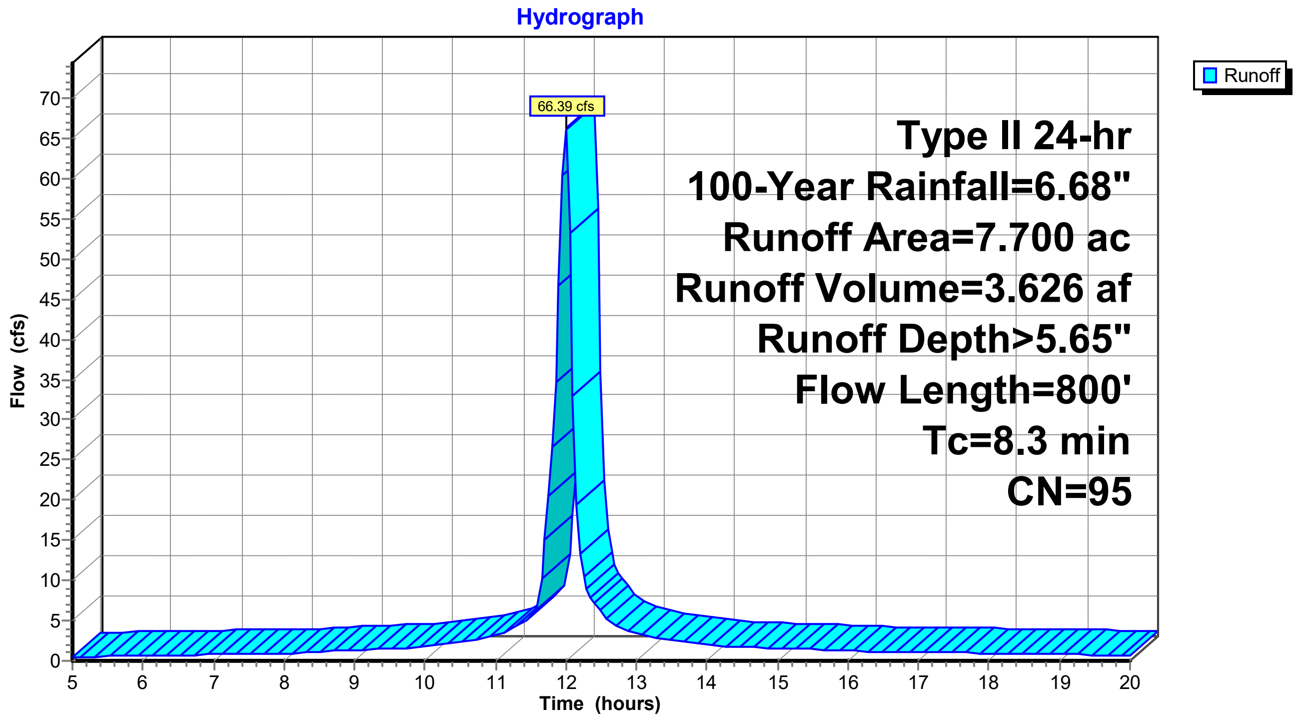
Runoff = 66.39 cfs @ 11.99 hrs, Volume= 3.626 af, Depth> 5.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	7.700	95	Compacted Gravel
	7.700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	300	0.0100	1.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
3.1	300	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	200	0.0050	4.34	30.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.020 Corrugated PE, corrugated interior
8.3	800	Total			

Subcatchment DR-2: Storage



Summary for Subcatchment DR-3: Storage

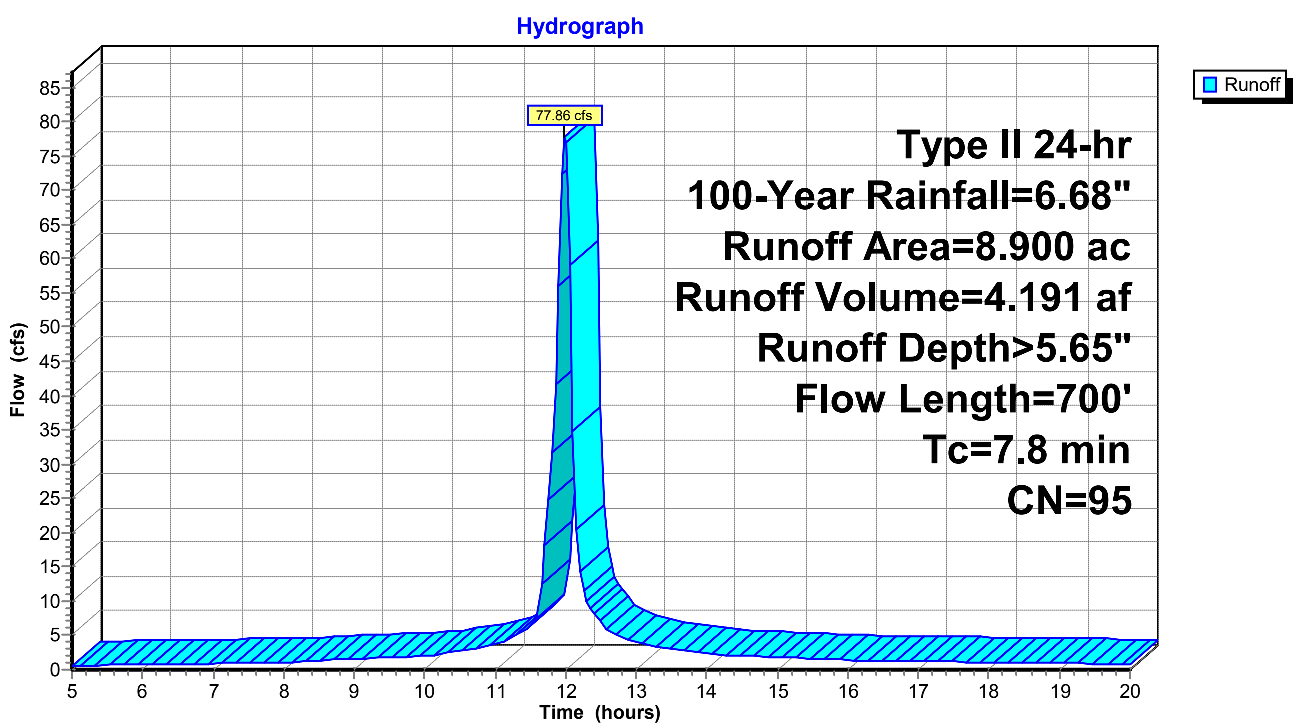
Runoff = 77.86 cfs @ 11.99 hrs, Volume= 4.191 af, Depth> 5.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	8.900	95	Compacted Gravel
	8.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	300	0.0100	1.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
2.6	250	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	150	0.0050	3.31	10.40	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.020 Corrugated PE, corrugated interior
7.8	700	Total			

Subcatchment DR-3: Storage



Summary for Subcatchment DR-4: Storage

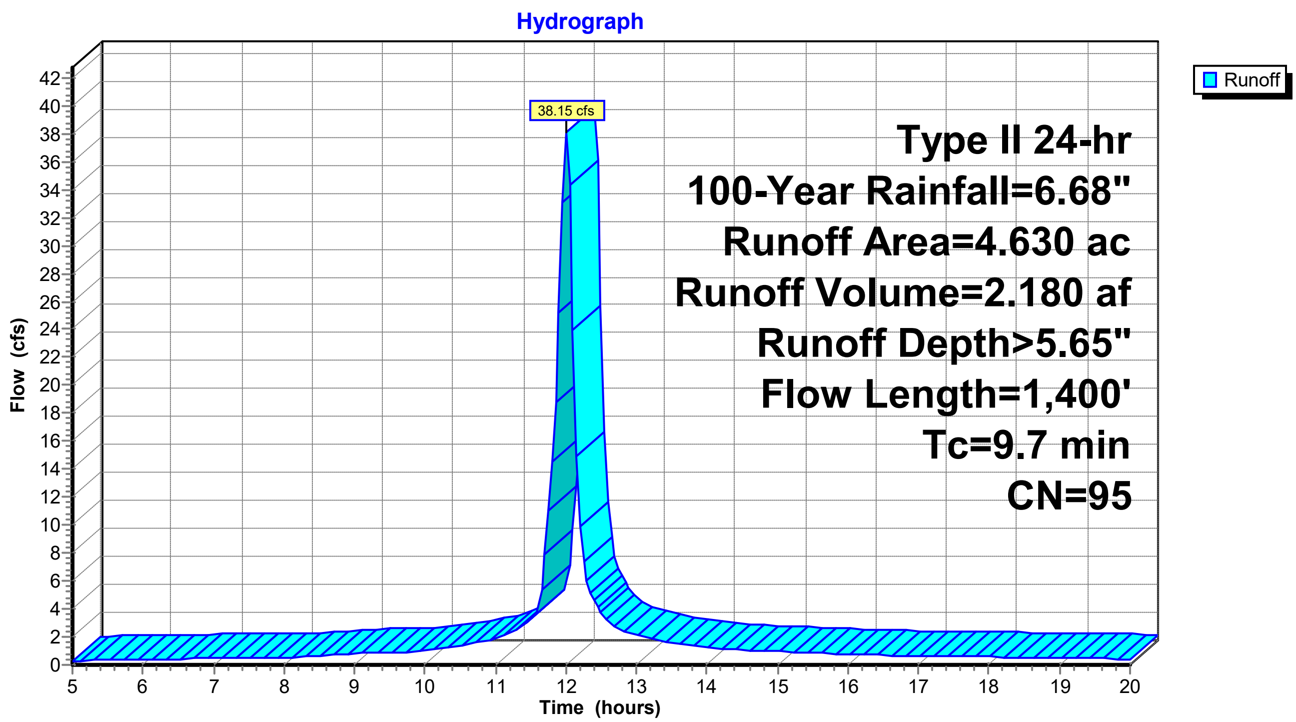
Runoff = 38.15 cfs @ 12.00 hrs, Volume= 2.180 af, Depth> 5.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	4.630	95	Compacted Gravel
	4.630		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	300	0.0100	1.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
2.5	300	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.8	800	0.0050	4.81	46.24	**Pipe Channel,** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.020 Corrugated PE, corrugated interior
9.7	1,400	Total			

Subcatchment DR-4: Storage



Summary for Subcatchment DR-5: Building and Storage

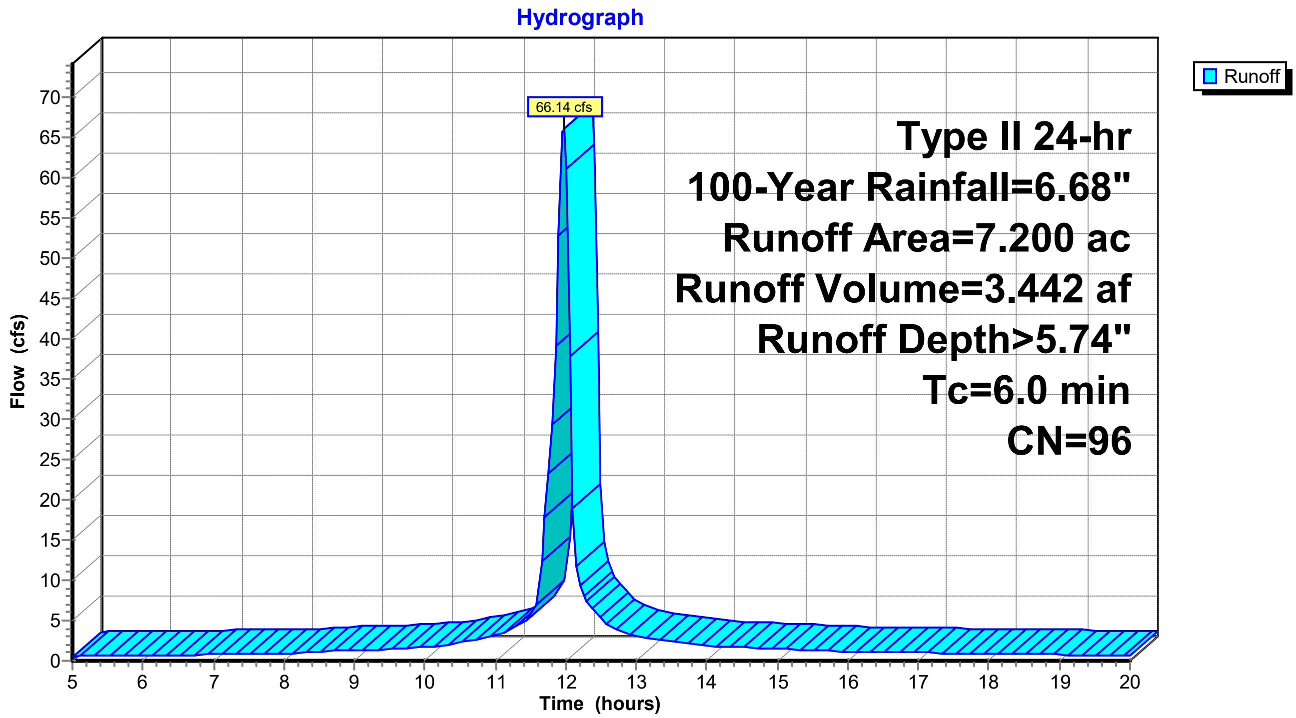
Runoff = 66.14 cfs @ 11.96 hrs, Volume= 3.442 af, Depth> 5.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	1.329	98	Building D
*	5.871	95	Compacted Gravel
	7.200	96	Weighted Average
	5.871		81.54% Pervious Area
	1.329		18.46% Impervious Area

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

Subcatchment DR-5: Building and Storage



Summary for Subcatchment DR-6: Building and Storage

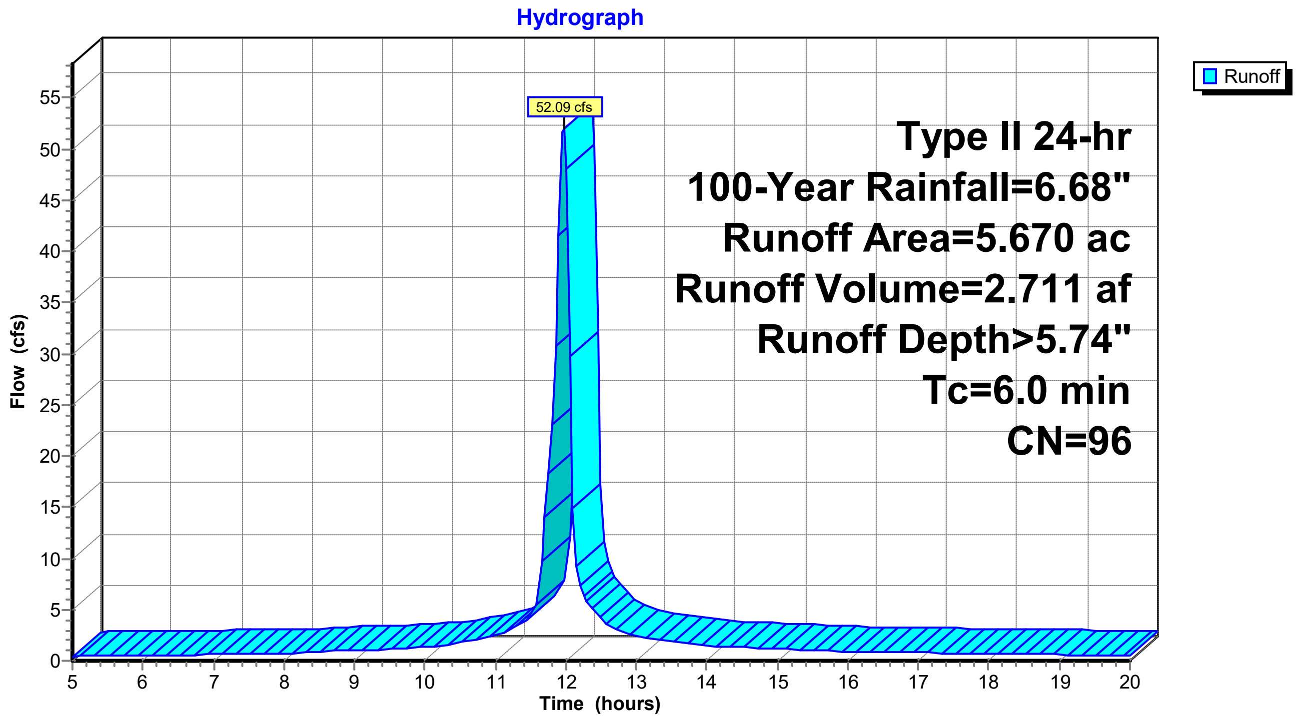
Runoff = 52.09 cfs @ 11.96 hrs, Volume= 2.711 af, Depth> 5.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	2.791	98	Building C
*	2.879	95	Compacted Gravel
	5.670	96	Weighted Average
	2.879		50.78% Pervious Area
	2.791		49.22% Impervious Area

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

Subcatchment DR-6: Building and Storage



Summary for Subcatchment DR-7: Storage and Rail

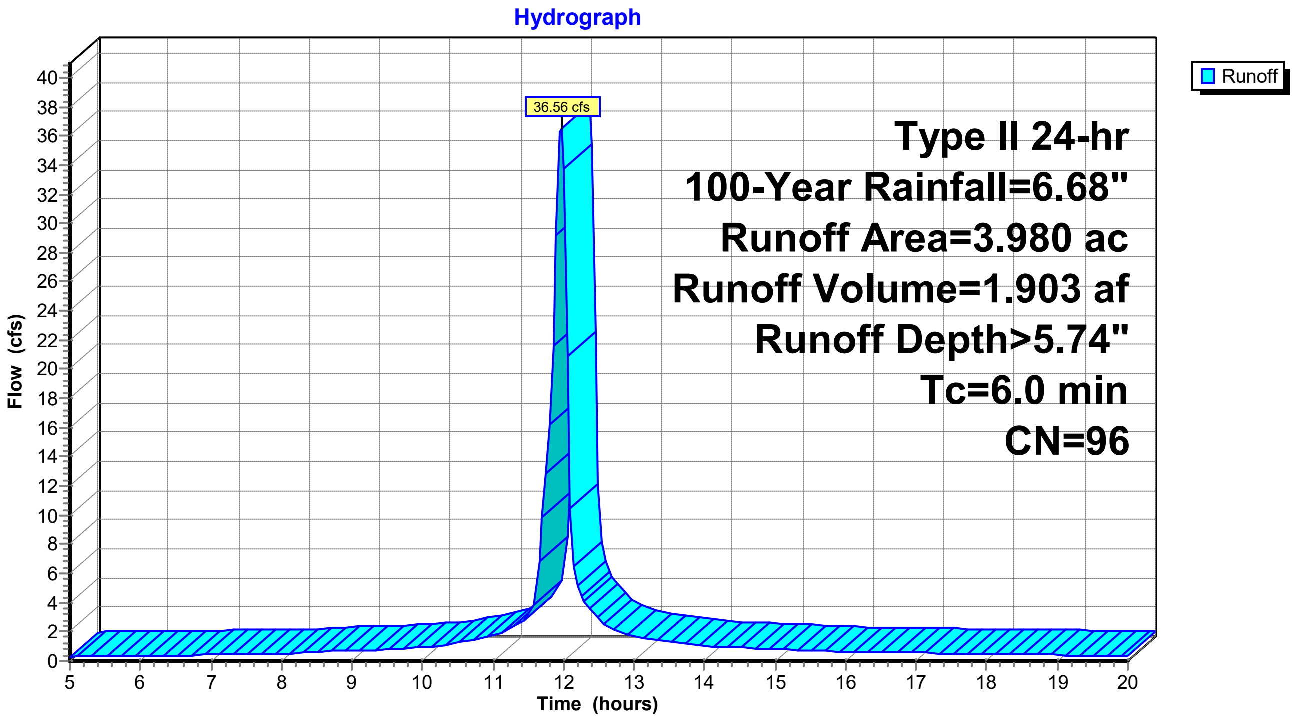
Runoff = 36.56 cfs @ 11.96 hrs, Volume= 1.903 af, Depth> 5.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	3.000	95	Compacted Gravel
*	0.980	98	Rail
	3.980	96	Weighted Average
	3.000		75.38% Pervious Area
	0.980		24.62% Impervious Area

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

Subcatchment DR-7: Storage and Rail



Summary for Subcatchment DR-8: Building

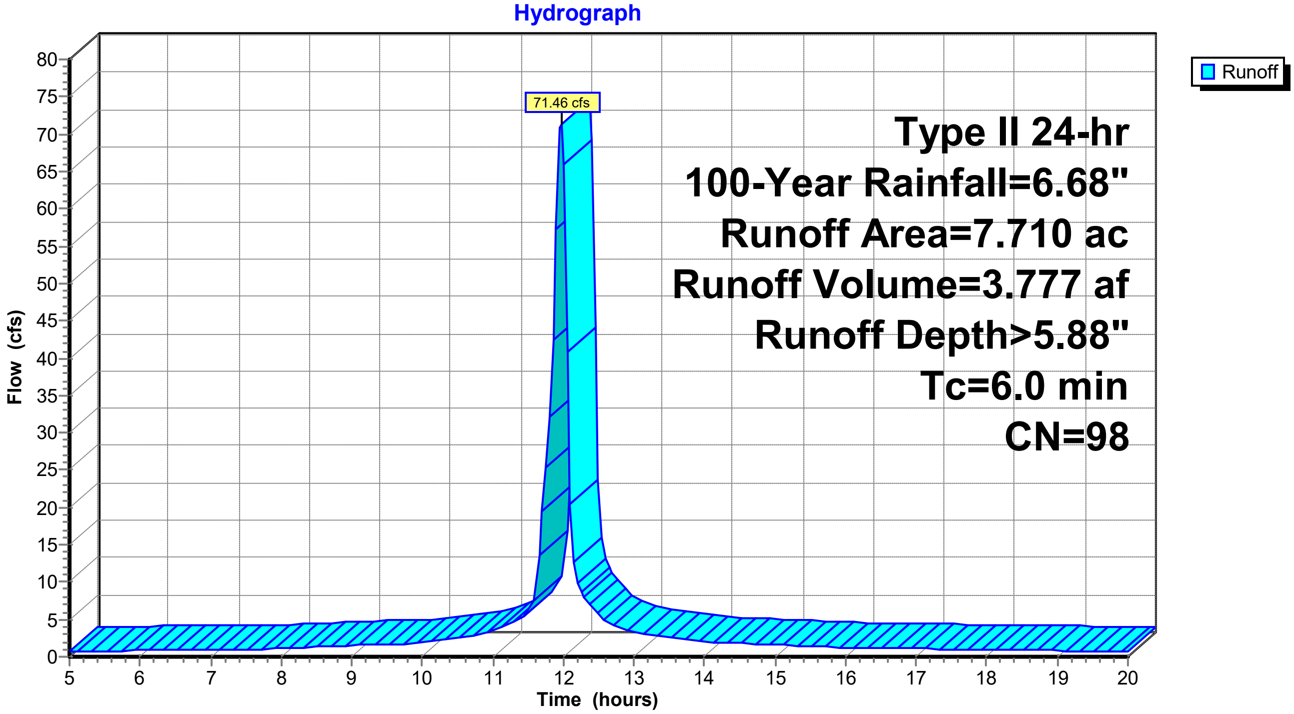
Runoff = 71.46 cfs @ 11.96 hrs, Volume= 3.777 af, Depth> 5.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
*	6.710	98	Building Rail Parking
*	1.000	95	Compacted Gravel
	7.710	98	Weighted Average
	1.000		12.97% Pervious Area
	6.710		87.03% Impervious Area

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

Subcatchment DR-8: Building



Summary for Subcatchment DR-9: Road and Building

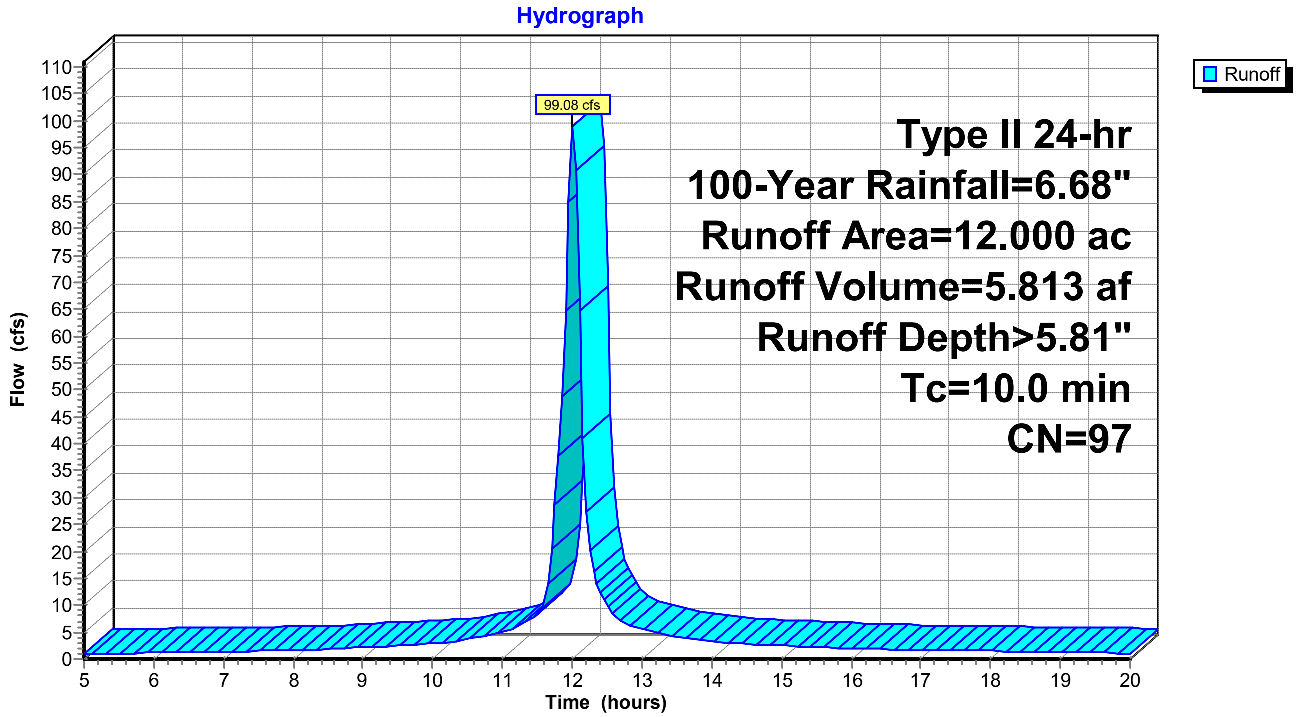
Runoff = 99.08 cfs @ 12.01 hrs, Volume= 5.813 af, Depth> 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.68"

	Area (ac)	CN	Description
	0.230	80	>75% Grass cover, Good, HSG D
*	1.900	92	Compacted Gravel
*	9.870	98	Road and Building
	12.000	97	Weighted Average
	2.130		17.75% Pervious Area
	9.870		82.25% Impervious Area

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

Subcatchment DR-9: Road and Building



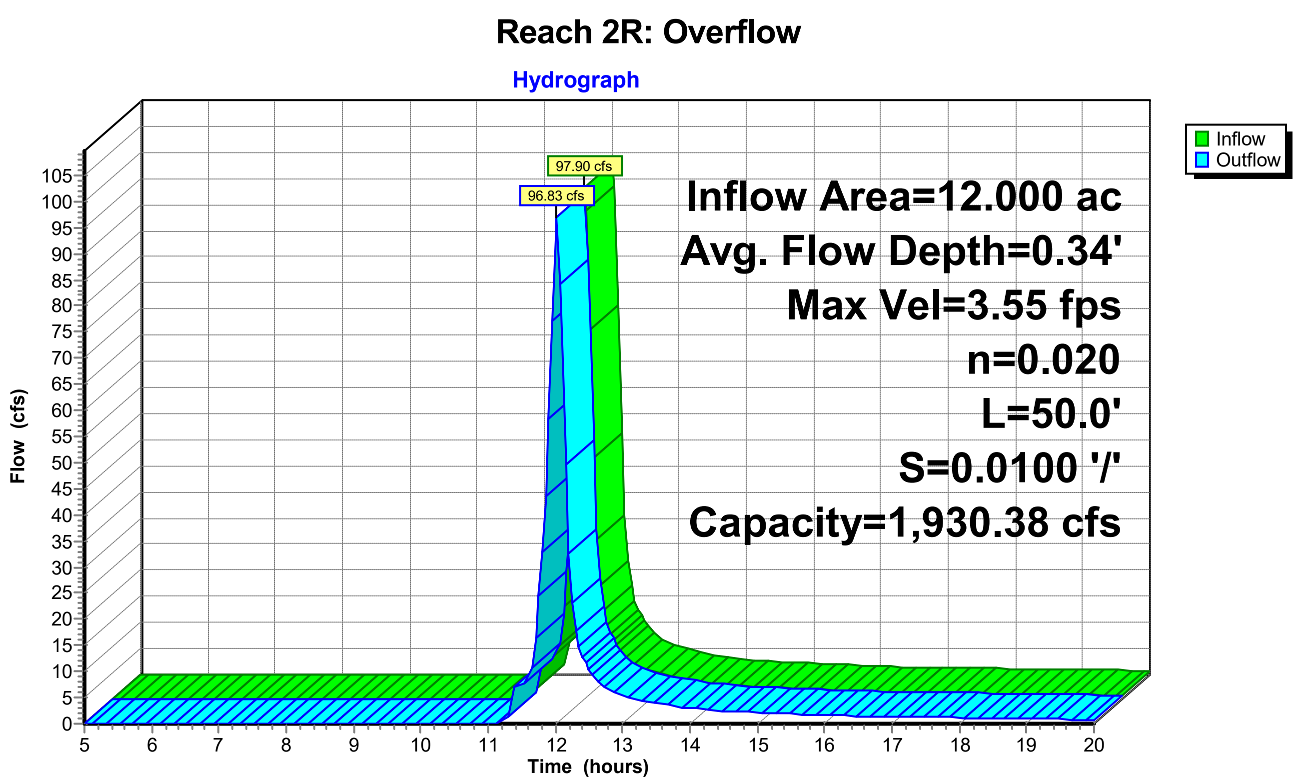
Summary for Reach 2R: Overflow

Inflow Area = 12.000 ac, 82.25% Impervious, Inflow Depth > 4.42" for 100-Year event
Inflow = 97.90 cfs @ 12.02 hrs, Volume= 4.423 af
Outflow = 96.83 cfs @ 12.02 hrs, Volume= 4.421 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.55 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 0.9 min

Peak Storage= 1,368 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.34' , Surface Width= 82.03'
Bank-Full Depth= 2.00' Flow Area= 172.0 sf, Capacity= 1,930.38 cfs

80.00' x 2.00' deep channel, n= 0.020 Corrugated PE, corrugated interior
Side Slope Z-value= 3.0 '/' Top Width= 92.00'
Length= 50.0' Slope= 0.0100 '/'
Inlet Invert= 14.50', Outlet Invert= 14.00'



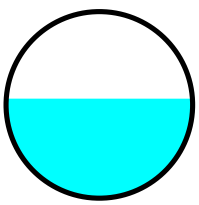
Summary for Reach 3R: Outlet Pipe

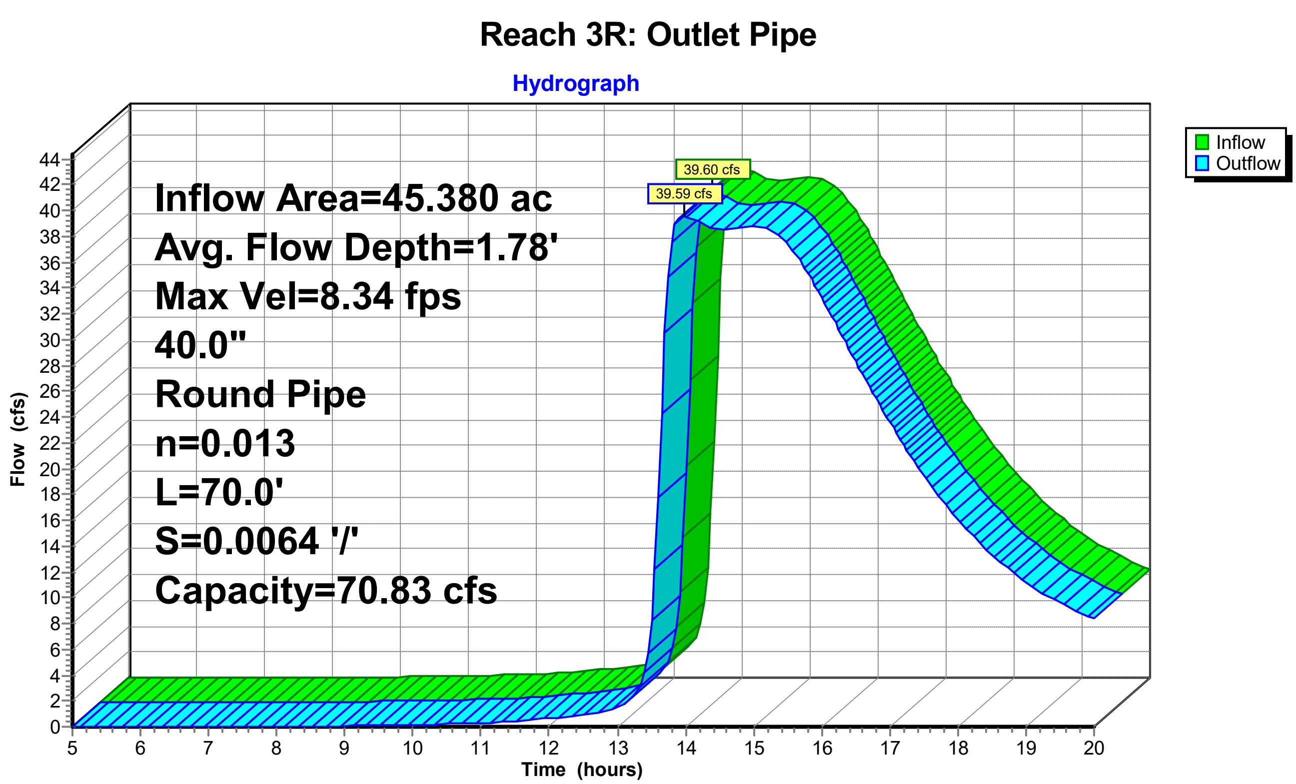
Inflow Area = 45.380 ac, 41.76% Impervious, Inflow Depth > 3.61" for 100-Year event
Inflow = 39.60 cfs @ 13.98 hrs, Volume= 13.671 af
Outflow = 39.59 cfs @ 13.99 hrs, Volume= 13.667 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.34 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.45 fps, Avg. Travel Time= 0.3 min

Peak Storage= 332 cf @ 13.98 hrs
Average Depth at Peak Storage= 1.78' , Surface Width= 3.33'
Bank-Full Depth= 3.33' Flow Area= 8.7 sf, Capacity= 70.83 cfs

40.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.0064 '/'
Inlet Invert= 4.25', Outlet Invert= 3.80'





Summary for Reach 4R: Overflow

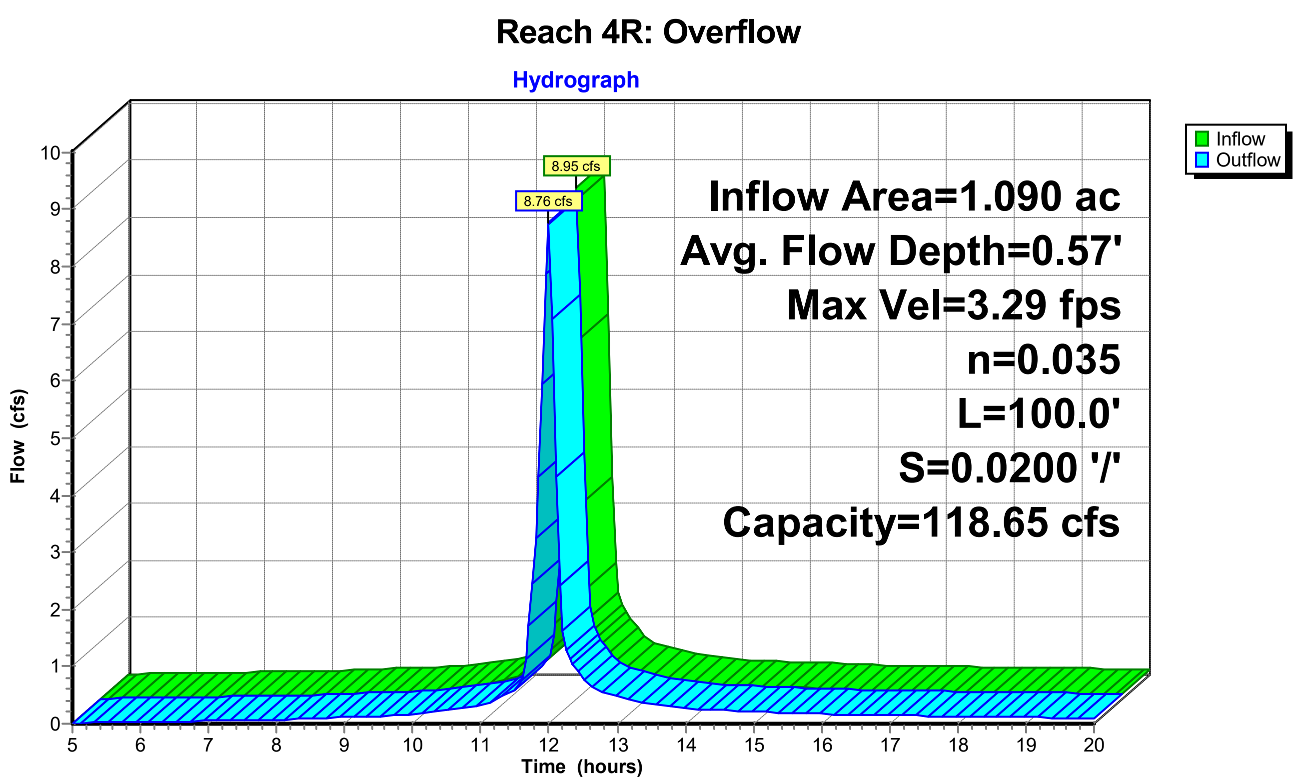
Inflow Area = 1.090 ac, 81.65% Impervious, Inflow Depth > 4.84" for 100-Year event
Inflow = 8.95 cfs @ 11.98 hrs, Volume= 0.440 af
Outflow = 8.76 cfs @ 11.99 hrs, Volume= 0.440 af, Atten= 2%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.29 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.93 fps, Avg. Travel Time= 1.8 min

Peak Storage= 270 cf @ 11.99 hrs
Average Depth at Peak Storage= 0.57' , Surface Width= 6.44'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 118.65 cfs

3.00' x 2.00' deep channel, n= 0.035 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 12.00', Outlet Invert= 10.00'

‡



Summary for Reach 5R: Overflow

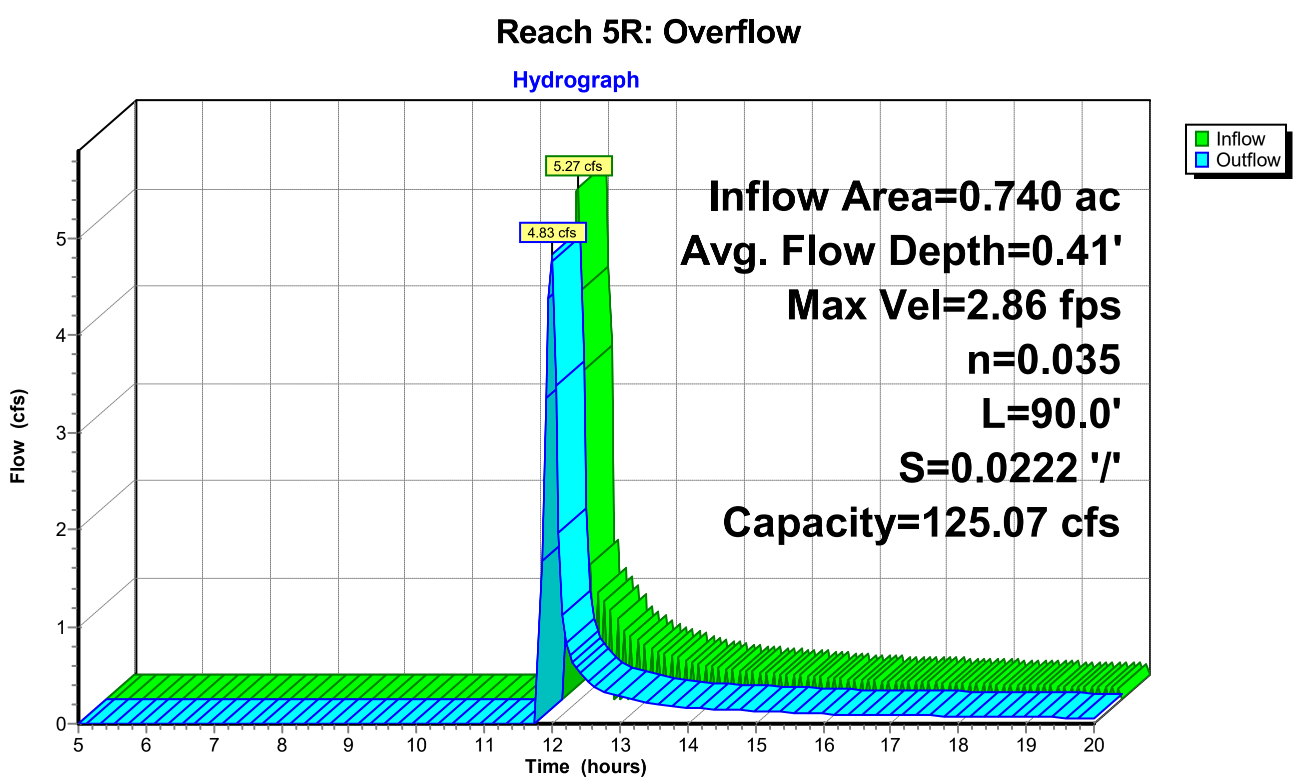
Inflow Area = 0.740 ac, 60.81% Impervious, Inflow Depth > 2.94" for 100-Year event
Inflow = 5.27 cfs @ 11.96 hrs, Volume= 0.182 af
Outflow = 4.83 cfs @ 11.99 hrs, Volume= 0.181 af, Atten= 8%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.86 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 1.7 min

Peak Storage= 154 cf @ 11.98 hrs
Average Depth at Peak Storage= 0.41' , Surface Width= 5.44'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 125.07 cfs

3.00' x 2.00' deep channel, n= 0.035 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 90.0' Slope= 0.0222 '/'
Inlet Invert= 12.00', Outlet Invert= 10.00'

‡



Summary for Reach 6R: Overflow

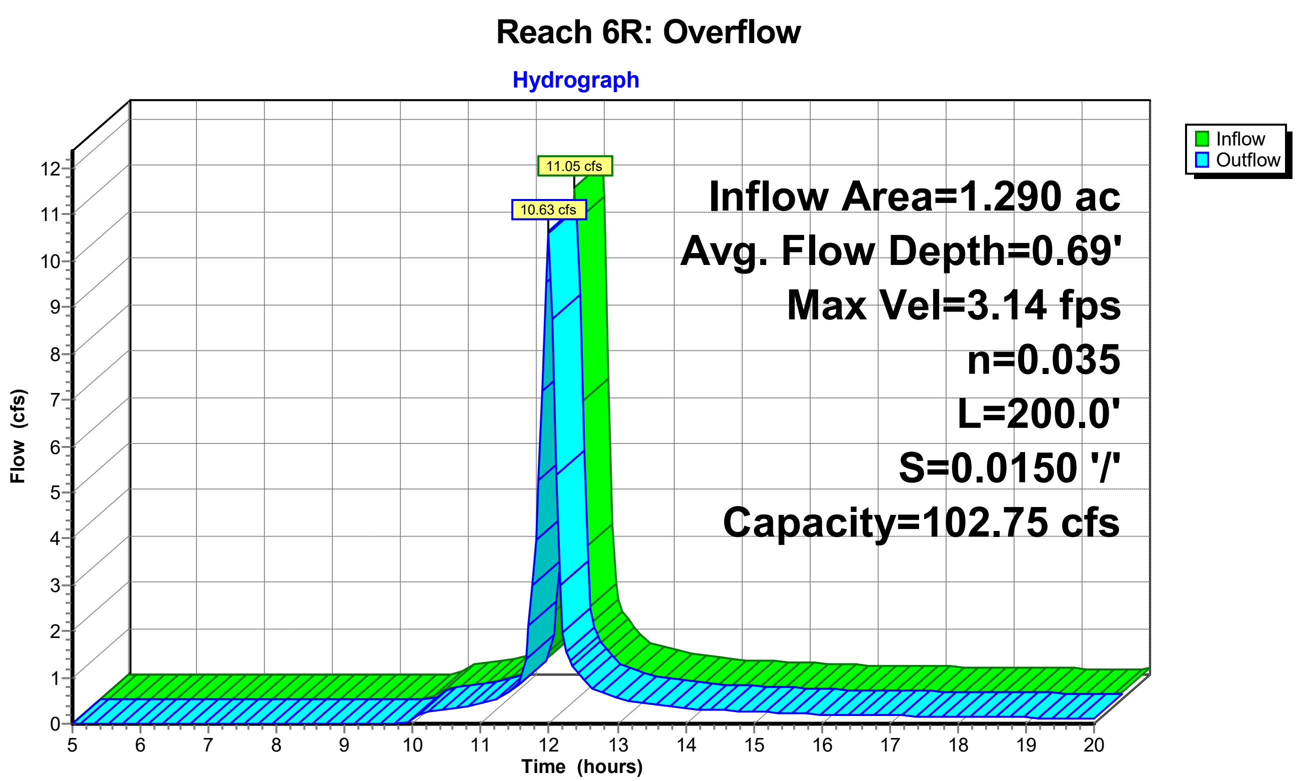
Inflow Area = 1.290 ac, 84.50% Impervious, Inflow Depth > 4.69" for 100-Year event
Inflow = 11.05 cfs @ 11.96 hrs, Volume= 0.504 af
Outflow = 10.63 cfs @ 11.99 hrs, Volume= 0.503 af, Atten= 4%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.14 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.05 fps, Avg. Travel Time= 3.2 min

Peak Storage= 697 cf @ 11.98 hrs
Average Depth at Peak Storage= 0.69' , Surface Width= 7.13'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 102.75 cfs

3.00' x 2.00' deep channel, n= 0.035 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 200.0' Slope= 0.0150 '/'
Inlet Invert= 12.00', Outlet Invert= 9.00'

‡



Summary for Reach 7R: Overflow

Inflow Area = 7.710 ac, 87.03% Impervious, Inflow Depth > 3.99" for 100-Year event
Inflow = 79.07 cfs @ 11.99 hrs, Volume= 2.563 af
Outflow = 69.83 cfs @ 11.98 hrs, Volume= 2.561 af, Atten= 12%, Lag= 0.0 min

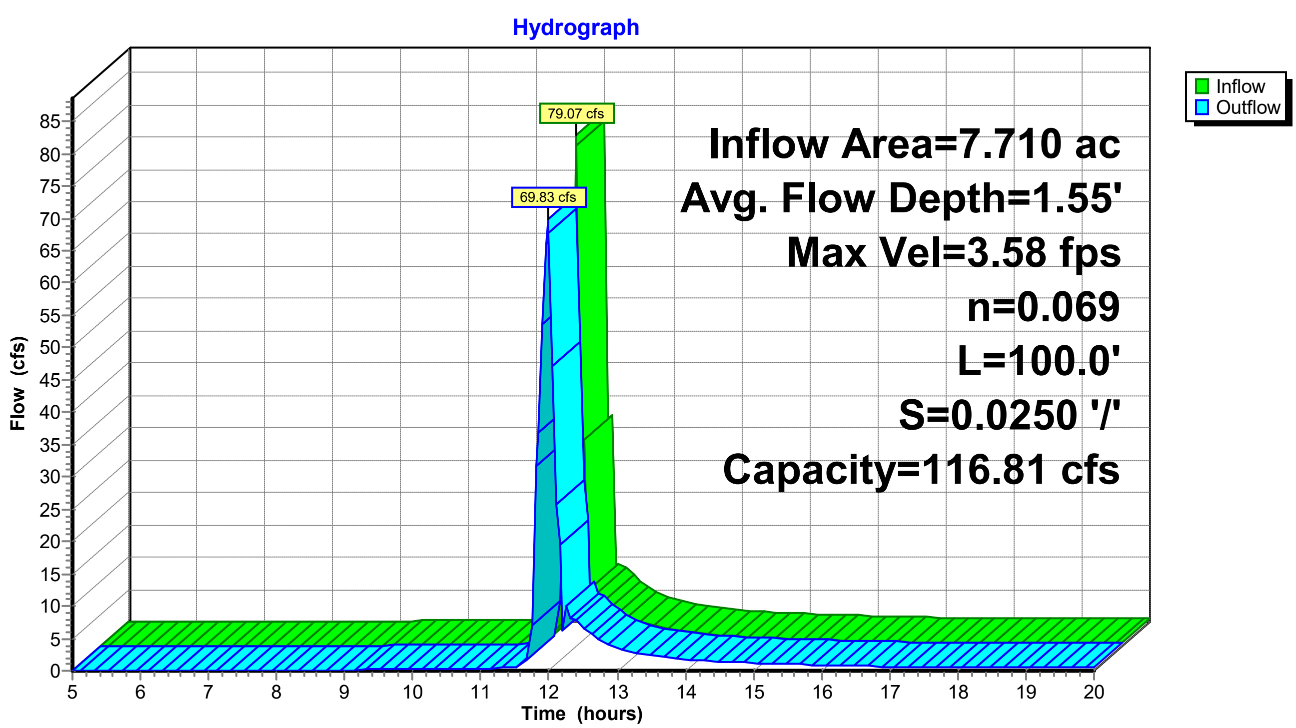
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.58 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 1.8 min

Peak Storage= 1,958 cf @ 11.98 hrs
Average Depth at Peak Storage= 1.55' , Surface Width= 17.31'
Bank-Full Depth= 2.00' Flow Area= 28.0 sf, Capacity= 116.81 cfs

8.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 100.0' Slope= 0.0250 '/'
Inlet Invert= 14.50', Outlet Invert= 12.00'

‡

Reach 7R: Overflow



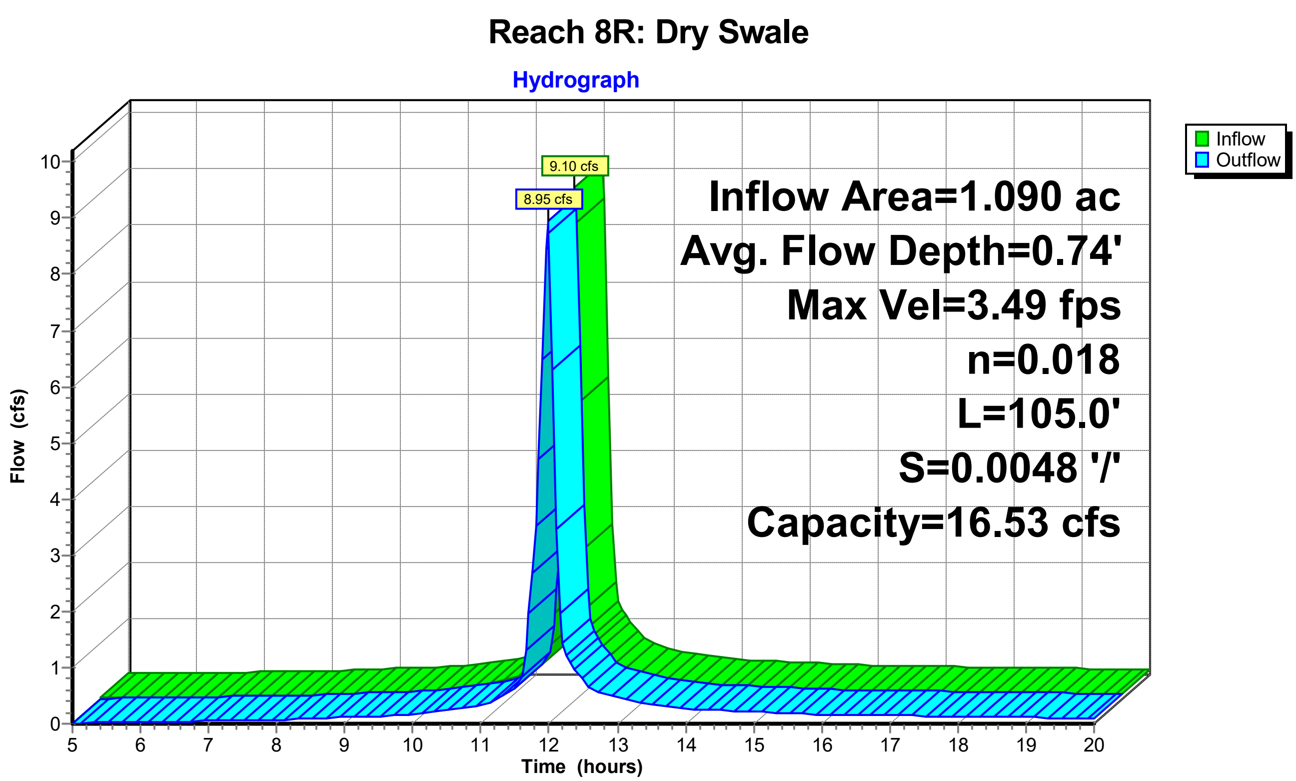
Summary for Reach 8R: Dry Swale

Inflow Area = 1.090 ac, 81.65% Impervious, Inflow Depth > 4.85" for 100-Year event
Inflow = 9.10 cfs @ 11.96 hrs, Volume= 0.440 af
Outflow = 8.95 cfs @ 11.98 hrs, Volume= 0.440 af, Atten= 2%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.49 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.02 fps, Avg. Travel Time= 1.7 min

Peak Storage= 270 cf @ 11.97 hrs
Average Depth at Peak Storage= 0.74' , Surface Width= 4.96'
Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 16.53 cfs

2.00' x 1.00' deep channel, n= 0.018 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 6.00'
Length= 105.0' Slope= 0.0048 '/'
Inlet Invert= 10.00', Outlet Invert= 9.50'



Summary for Reach 9R: 1W

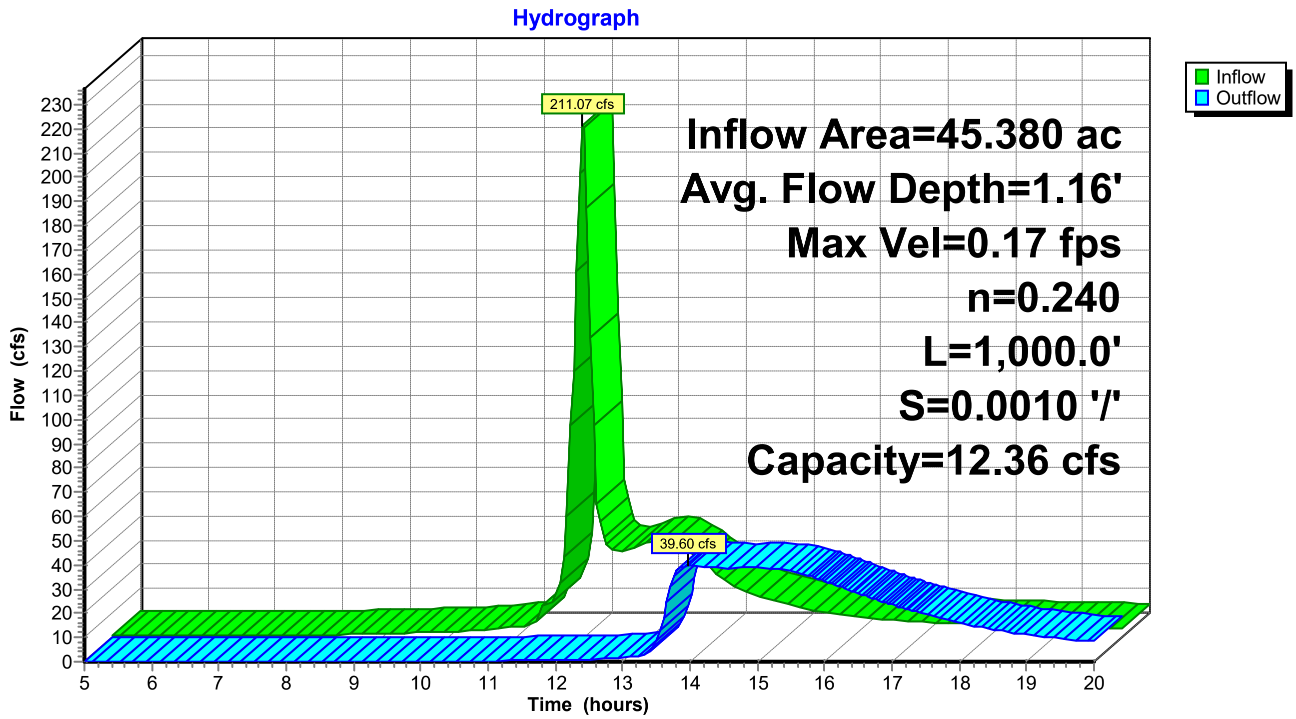
Inflow Area = 45.380 ac, 41.76% Impervious, Inflow Depth > 4.25" for 100-Year event
Inflow = 211.07 cfs @ 11.99 hrs, Volume= 16.076 af
Outflow = 39.60 cfs @ 13.98 hrs, Volume= 13.671 af, Atten= 81%, Lag= 119.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.17 fps, Min. Travel Time= 99.0 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 194.0 min

Peak Storage= 235,243 cf @ 12.33 hrs
Average Depth at Peak Storage= 1.16' , Surface Width= 206.98'
Bank-Full Depth= 0.50' Flow Area= 100.8 sf, Capacity= 12.36 cfs

200.00' x 0.50' deep channel, n= 0.240
Side Slope Z-value= 3.0 '/' Top Width= 203.00'
Length= 1,000.0' Slope= 0.0010 '/'
Inlet Invert= 6.00', Outlet Invert= 5.00'

Reach 9R: 1W



Summary for Pond 1P: WQv Pond #1

Inflow Area = 7.710 ac, 87.03% Impervious, Inflow Depth > 5.88" for 100-Year event
Inflow = 71.46 cfs @ 11.96 hrs, Volume= 3.777 af
Outflow = 79.68 cfs @ 11.99 hrs, Volume= 3.022 af, Atten= 0%, Lag= 1.6 min
Discarded = 0.61 cfs @ 11.99 hrs, Volume= 0.459 af
Primary = 79.07 cfs @ 11.99 hrs, Volume= 2.563 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 16.14' @ 11.99 hrs Surf.Area= 16,674 sf Storage= 40,545 cf

Plug-Flow detention time= 106.4 min calculated for 3.010 af (80% of inflow)
Center-of-Mass det. time= 52.3 min (781.1 - 728.8)

Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	2,785 cf	**Forebay (Prismatic)** Listed below (Recalc)
#2	8.00'	37,761 cf	**Permanent Pool (Prismatic)** Listed below (Recalc)
		40,545 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
10.00	232	0	0
11.00	569	401	401
12.00	1,018	794	1,194
13.00	2,163	1,591	2,785

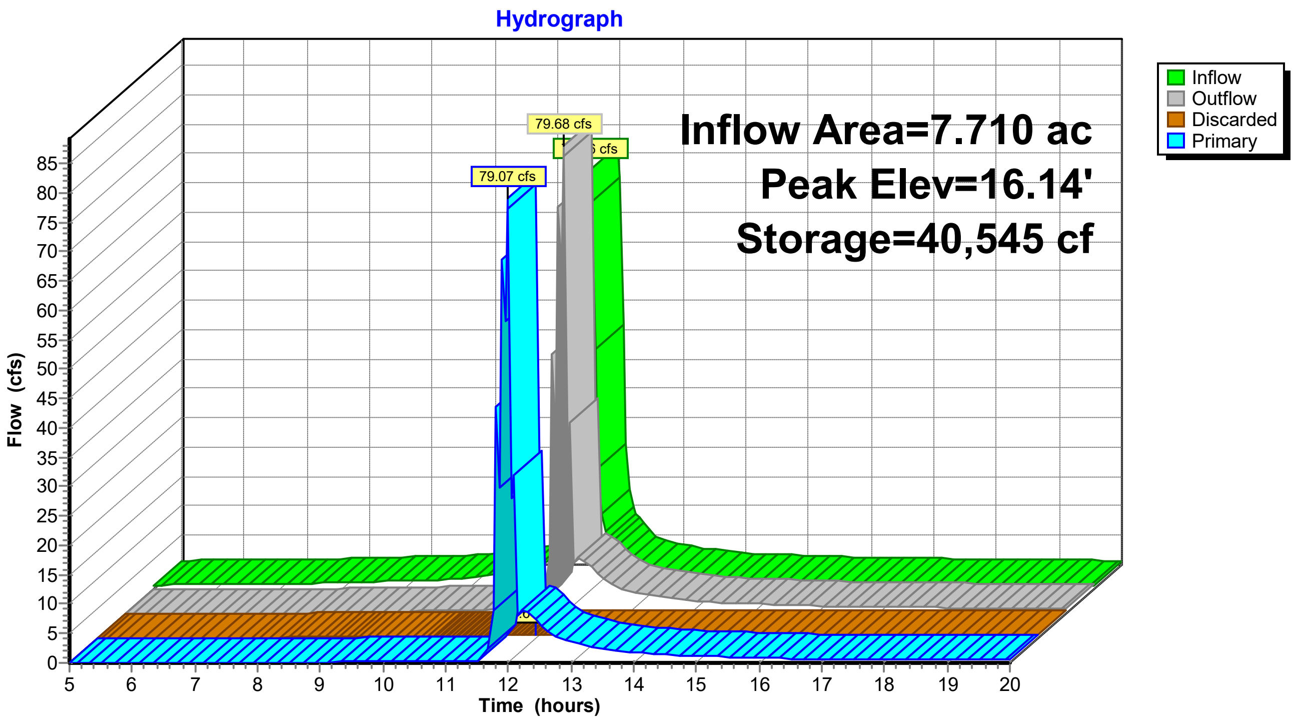
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.00	1,208	0	0
9.00	1,839	1,524	1,524
10.00	2,499	2,169	3,693
11.00	3,185	2,842	6,535
12.00	4,658	3,922	10,456
13.00	6,233	5,446	15,902
14.00	11,487	8,860	24,762
15.00	14,511	12,999	37,761

Device	Routing	Invert	Outlet Devices
#1	Primary	14.50'	**Channel/Reach** using Reach 7R: Overflow
#2	Discarded	8.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 4.00'
#3	Primary	12.00'	**4.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 8.00' / 12.00' S= -0.0800 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Discarded OutFlow Max=0.61 cfs @ 11.99 hrs HW=16.06' (Free Discharge)
└─**2=Exfiltration** (Controls 0.61 cfs)

Primary OutFlow Max=72.89 cfs @ 11.99 hrs HW=16.06' (Free Discharge)
├─**1=Channel/Reach** (Channel Controls 72.31 cfs @ 3.65 fps)
└─**3=Culvert** (Outlet Controls 0.58 cfs @ 6.65 fps)

Pond 1P: WQv Pond #1



Summary for Pond 2P: WQv Pond #2

Inflow Area = 12.000 ac, 82.25% Impervious, Inflow Depth > 5.81" for 100-Year event
Inflow = 99.08 cfs @ 12.01 hrs, Volume= 5.813 af
Outflow = 98.25 cfs @ 12.02 hrs, Volume= 4.743 af, Atten= 1%, Lag= 0.6 min
Discarded = 0.36 cfs @ 12.02 hrs, Volume= 0.320 af
Primary = 97.90 cfs @ 12.02 hrs, Volume= 4.423 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 14.84' @ 12.02 hrs Surf.Area= 19,837 sf Storage= 52,060 cf

Plug-Flow detention time= 96.7 min calculated for 4.741 af (82% of inflow)
Center-of-Mass det. time= 44.4 min (778.0 - 733.7)

Volume	Invert	Avail.Storage	Storage Description
#1	8.00'	2,406 cf	**Forebay #1 (Prismatic)** Listed below (Recalc)
#2	8.00'	1,481 cf	**Forebay #2 (Prismatic)** Listed below (Recalc)
#3	7.00'	70,718 cf	**Permanent Pool (Prismatic)** Listed below (Recalc)
		74,605 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.00	330	0	0
9.00	562	446	446
10.00	866	714	1,160
11.00	1,625	1,246	2,406

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.00	202	0	0
9.00	351	277	277
10.00	535	443	720
11.00	988	762	1,481

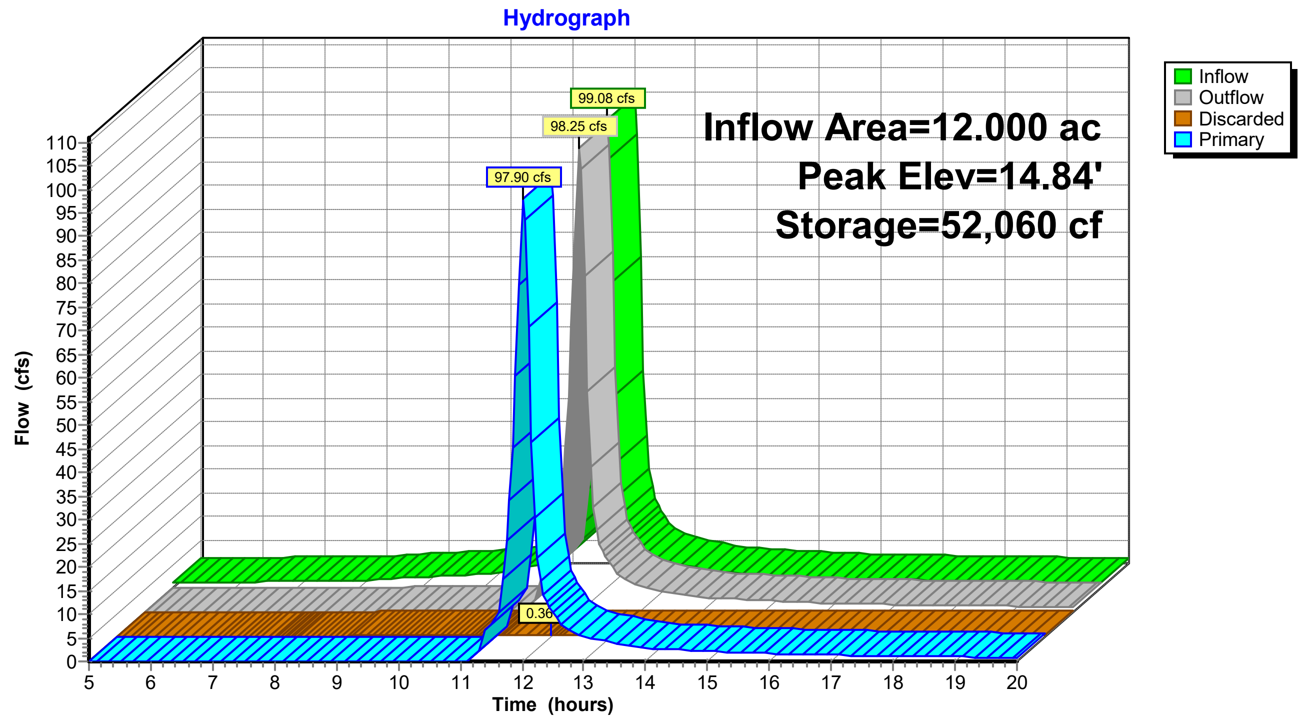
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	808	0	0
8.00	1,190	999	999
9.00	1,604	1,397	2,396
10.00	2,040	1,822	4,218
11.00	3,026	2,533	6,751
12.00	8,323	5,675	12,426
13.00	11,150	9,737	22,162
14.00	14,421	12,786	34,948
15.00	17,774	16,098	51,045
16.00	21,572	19,673	70,718

Device	Routing	Invert	Outlet Devices
#1	Discarded	7.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 4.00'
#2	Primary	14.50'	**Channel/Reach** using Reach 2R: Overflow

Discarded OutFlow Max=0.35 cfs @ 12.02 hrs HW=14.83' (Free Discharge)
└**1=Exfiltration** (Controls 0.35 cfs)

Primary OutFlow Max=94.56 cfs @ 12.02 hrs HW=14.83' (Free Discharge)
└**2=Channel/Reach** (Channel Controls 94.56 cfs @ 3.52 fps)

Pond 2P: WQv Pond #2



Summary for Pond 3P: Infiltration Basin #1

Inflow Area = 0.740 ac, 60.81% Impervious, Inflow Depth > 3.59" for 100-Year event
Inflow = 4.88 cfs @ 11.97 hrs, Volume= 0.221 af
Outflow = 5.27 cfs @ 11.96 hrs, Volume= 0.182 af, Atten= 0%, Lag= 0.0 min
Primary = 5.27 cfs @ 11.96 hrs, Volume= 0.182 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 12.42' @ 11.96 hrs Surf.Area= 1,000 sf Storage= 1,750 cf

Plug-Flow detention time= 75.2 min calculated for 0.182 af (82% of inflow)
Center-of-Mass det. time= 23.9 min (802.9 - 778.9)

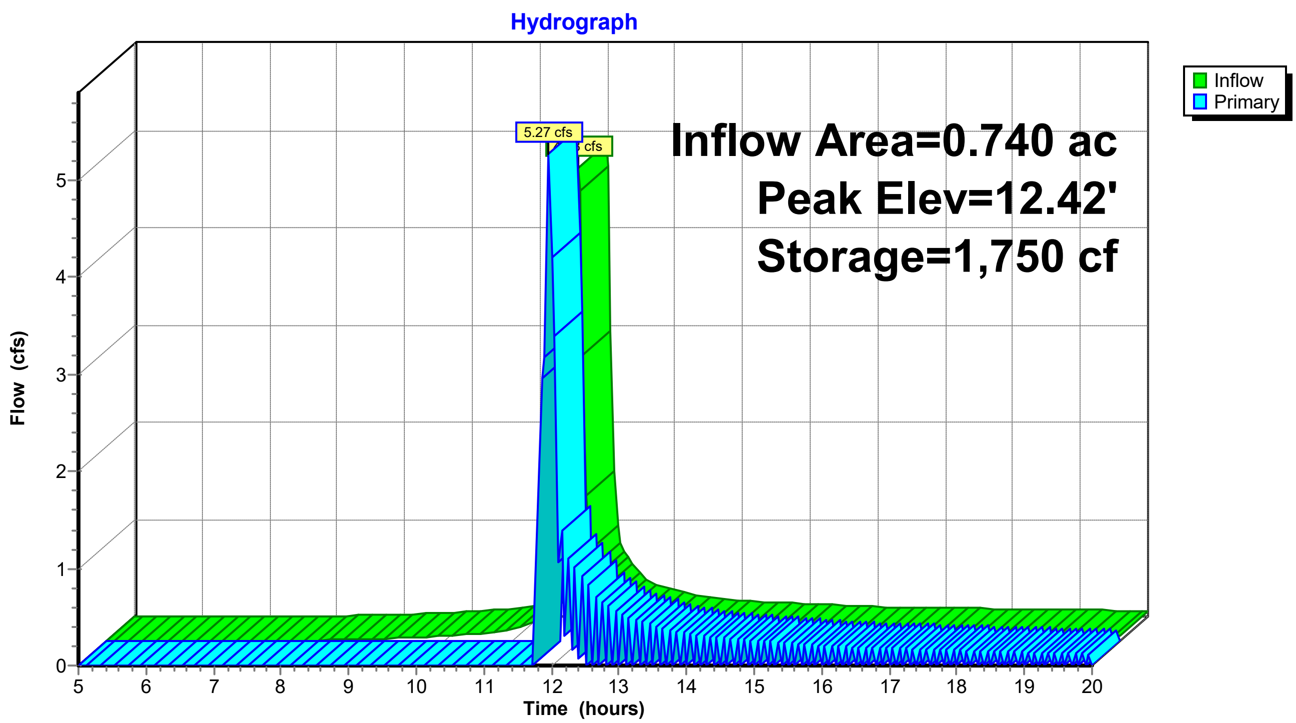
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	1,750 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
10.00	750	0	0
12.00	1,000	1,750	1,750

Device	Routing	Invert	Outlet Devices
#1	Primary	12.00'	**Channel/Reach** using Reach 5R: Overflow

Primary OutFlow Max=5.04 cfs @ 11.96 hrs HW=12.41' (Free Discharge)
└─**1=Channel/Reach** (Channel Controls 5.04 cfs @ 2.90 fps)

Pond 3P: Infiltration Basin #1



Summary for Pond 4P: Infiltration Basin #2

Inflow Area = 1.290 ac, 84.50% Impervious, Inflow Depth > 5.06" for 100-Year event
Inflow = 11.08 cfs @ 11.96 hrs, Volume= 0.544 af
Outflow = 11.05 cfs @ 11.96 hrs, Volume= 0.504 af, Atten= 0%, Lag= 0.0 min
Primary = 11.05 cfs @ 11.96 hrs, Volume= 0.504 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 12.69' @ 11.96 hrs Surf.Area= 1,000 sf Storage= 1,750 cf

Plug-Flow detention time= 48.2 min calculated for 0.504 af (93% of inflow)
Center-of-Mass det. time= 20.7 min (770.1 - 749.4)

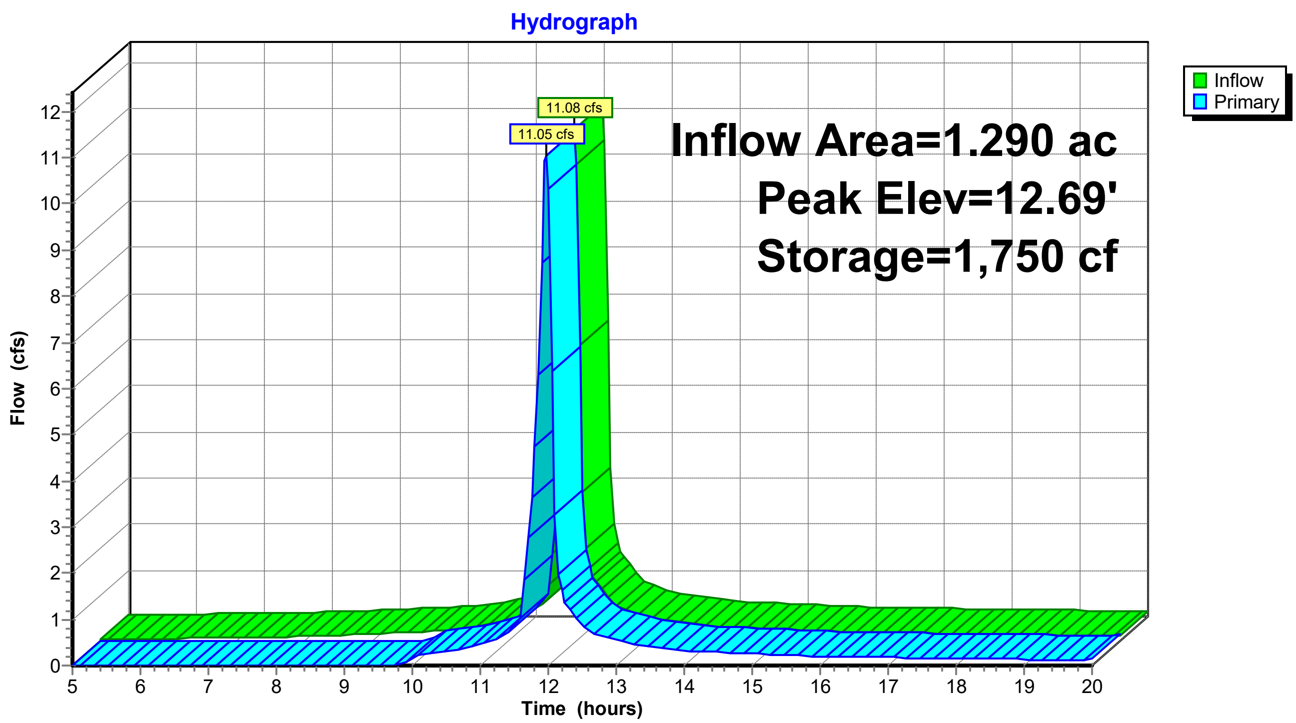
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	1,750 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
10.00	750	0	0
12.00	1,000	1,750	1,750

Device	Routing	Invert	Outlet Devices
#1	Primary	12.00'	**Channel/Reach** using Reach 6R: Overflow

Primary OutFlow Max=10.76 cfs @ 11.96 hrs HW=12.68' (Free Discharge)
└─**1=Channel/Reach** (Channel Controls 10.76 cfs @ 3.14 fps)

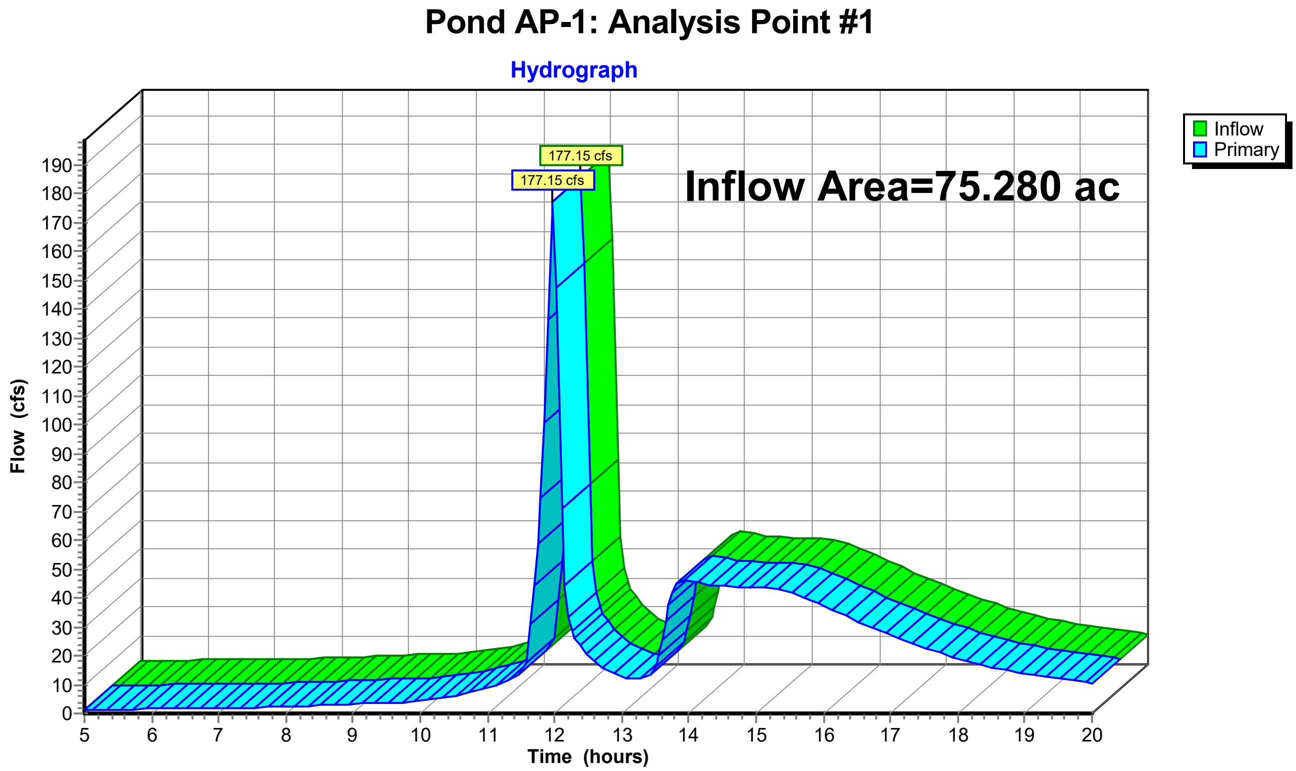
Pond 4P: Infiltration Basin #2



Summary for Pond AP-1: Analysis Point #1

Inflow Area = 75.280 ac, 33.87% Impervious, Inflow Depth > 3.78" for 100-Year event
Inflow = 177.15 cfs @ 11.97 hrs, Volume= 23.733 af
Primary = 177.15 cfs @ 11.97 hrs, Volume= 23.733 af, Atten= 0%, Lag= 0.0 min

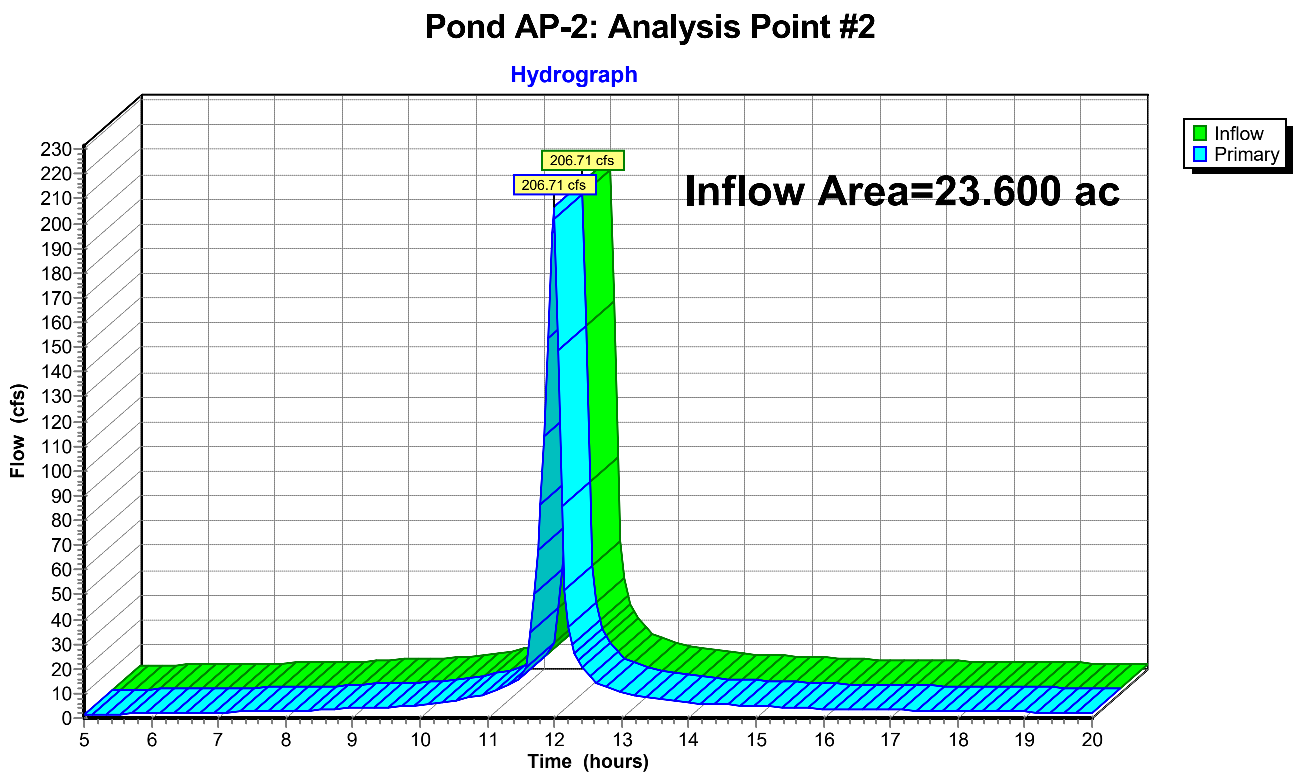
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Summary for Pond AP-2: Analysis Point #2

Inflow Area = 23.600 ac, 0.00% Impervious, Inflow Depth > 5.65" for 100-Year event
Inflow = 206.71 cfs @ 11.98 hrs, Volume= 11.114 af
Primary = 206.71 cfs @ 11.98 hrs, Volume= 11.114 af, Atten= 0%, Lag= 0.0 min

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



Appendix C

Water Quality and Runoff Reduction Volume Calculations

Version 1.8 — Total Water Quality Volume Calculation

Last Updated: 11/09/2015 — WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?...		No
Design Point:		
P=	1.20	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft³)*	Description
1	7.00	7.00	100%	0.95	28,847	
2	7.70	7.70	100%	0.95	31,731	
3	8.90	8.90	100%	0.95	36,677	
4	4.63	4.63	100%	0.95	19,080	
5	7.20	7.20	100%	0.95	29,671	
6	5.67	5.67	100%	0.95	23,366	
7	3.98	3.98	100%	0.95	16,401	
8	7.71	7.71	100%	0.95	31,773	
9	12.00	11.87	99%	0.94	48,944	
10	0.17	0.17	100%	0.95	701	Filter Strips
Subtotal (1-30)	69.30	67.13	97%	0.92	**277,111**	**Subtotal 1**
Total	69.30	67.13	97%	0.92	**277,111**	**Initial WQv**

Identify Runoff Reduction Techniques By Area

Technique	Total Contributing Area *(Acre)*	Contributing Impervious Area *(Acre)*	Notes
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	1.39	1.39	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**1.39**	**1.39**	

Recalculate WQv after application of Area Reduction Techniques

	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Runoff Coefficient Rv	WQv *(ft³)*
"<<Initial WQv"	69.30	67.13	97%	0.92	277,111
Subtract Area	-1.39	-1.39			
WQv adjusted after Area Reductions	**67.91**	**65.74**	97%	0.92	271,382
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	67.91	65.74	97%	0.92	**271,382**
WQv reduced by Area Reduction techniques					5,728

Total Water Quality Volume Calculation

WQv(acre-feet) = [(P)(Rv)(A)] /12

Additional Subcatchments						
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Description**
11	1.22	1.22	100%	0.95	5,028	Filter Strips
12	0.00	0.00				
13	0.74	0.45	61%	0.60	1,917	Infiltration Basin
14	1.29	0.58	45%	0.45	2,544	Infiltration Basin
15	1.09	0.05	5%	0.09	432	Dry Swale
16	0.00	0.00				
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
Subtotal	4.34	2.30	53%	0.53	**9,921**	**Subtotal**

Total Water Quality Volume Calculation
WQv(acre-feet) = [(P)(Rv)(A)] /12

All Subcatchments						
Catchment	**Total Area** *(Acres)*	**Impervious Cover** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient** *Rv*	**WQv** *(ft^3)*	**Description**
1	7.00	7.00	1.00	0.95	28846.70	
2	7.70	7.70	1.00	0.95	31,731	
3	8.90	8.90	1.00	0.95	36676.52	
4	4.63	4.63	1.00	0.95	19080.03	
5	7.20	7.20	1.00	0.95	29670.89	
6	5.67	5.67	1.00	0.95	23365.83	
7	3.98	3.98	1.00	0.95	16401.41	
8	7.71	7.71	1.00	0.95	31772.58	
9	12.00	11.87	0.99	0.94	48943.96	
10	0.17	0.17	1.00	0.95	700.56	Filter Strips
11	1.22	1.22	1.00	0.95	5027.57	Filter Strips
12	0.00	0.00				
13	0.74	0.45	0.61	0.60	1917.33	Infiltration Basin
14	1.29	0.58	0.45	0.45	2544.15	Infiltration Basin
15	1.09	0.05	0.05	0.09	431.62	Dry Swale
16	0.00	0.00				
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techiques/Standard SMPs		**Total Contributing Area**	**Total Contributing Impervious Area**	**WQv Reduced (RRv)**	**WQv Treated**
			(acres)	**(acres)**	**cf**	**cf**
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	1.39	1.39		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	2.03	1.03	4140	
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4				
	Bioretention & Infiltration Bioretention	F-5	0.00	0.00	0	0
	Dry swale	O-1	1.09	0.05	128	
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				90936.000
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				186552.000
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
Totals by Area Reduction		→	1.39	1.39	5728	
Totals by Volume Reduction		→	0.00	0.00	0	
Totals by Standard SMP w/RRV		→	3.12	1.08	4268	0
Totals by Standard SMP		→	0.00	0.00		277488
Totals (Area + Volume + all SMPs)		→	4.51	2.47	9,996	277,488
	Impervious Cover √	error				

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A	3.12	55%
B		40%
C		30%
D	**66.18**	20%
Total Area	69.3	
Calculate the Minimum RRv		
S =	**0.22**	
Impervious =	67.13	*acre*
Precipitation	1.195	*in*
Rv	0.95	
Minimum RRv	**59,687**	***ft3***
	1.37	af

Planning

Practice	Description	Application
Preservation of Undisturbed Areas	Delineate and place into permanent conservation undisturbed forests, native vegetated areas, riparian corridors, wetlands, and natural terrain.	Considered & Not Applied
Preservation of Buffers	Define, delineate and preserve naturally vegetated buffers along perennial streams, rivers, shorelines and wetlands.	Considered & Not Applied
Reduction of Clearing and Grading	Limit clearing and grading to the minimum amount needed for roads, driveways, foundations, utilities and stormwater management facilities.	Considered & Applied
Locating Development in Less Sensitive Areas	Avoid sensitive resource areas such as floodplains, steep slopes, erodible soils, wetlands, mature forests and critical habitats by locating development to fit the terrain in areas that will create the least impact.	Considered & Applied
Open Space Design	Use clustering, conservation design or open space design to reduce impervious cover, preserve more open space and protect water resources.	N/A
Soil Restoration	Restore the original properties and porosity of the soil by deep till and amendment with compost to reduce the generation of runoff and enhance the runoff reduction performance of post construction practices.	N/A
Roadway Reduction	Minimize roadway widths and lengths to reduce site impervious area	Considered & Applied
Sidewalk Reduction	Minimize sidewalk lengths and widths to reduce site impervious area	Considered & Applied
Driveway Reduction	Minimize driveway lengths and widths to reduce site impervious area	N/A
Cul-de-sac Reduction	Minimize the number of cul-de-sacs and incorporate landscaped areas to reduce their impervious cover.	N/A
Building Footprint Reduction	Reduce the impervious footprint of residences and commercial buildings by using alternate or taller buildings while maintaining the same floor to area ratio.	Considered & Applied
Parking Reduction	Reduce imperviousness on parking lots by eliminating unneeded spaces, providing compact car spaces and efficient parking lanes, minimizing stall dimensions, using porous pavement surfaces in overflow parking areas, and using multi-storied parking decks where appropriate.	Considered & Applied

NOI QUESTIONS

#	NOI Question	Reported Value	
		cf	af
28	Total Water Quality Volume (WQv) Required	277111	*6.362*
30	Total RRV Provided	9996	*0.229*
31	Is RRv Provided ≥WQv Required?	No	
32	Minimum RRv	59687	*1.370*
32a	Is RRv Provided ≥ Minimum RRv Required?	No	
	Contact Regional Office		
33a	Total WQv Treated	277488	*6.370*
34	Sum of Volume Reduced & Treated	287484	*6.600*
34	Sum of Volume Reduced and Treated	287484	*6.600*
35	Is Sum RRv Provided and WQv Provided ≥WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	*Cpv*	
37	Overbank	*Qp*	
37	Extreme Flood Control	*Qf*	
	Are Quantity Control requirements met?	*Yes*	Plan Completed

Filter Strip

Design Point:	

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
10	0.17	0.17	1.00	0.95	700.56	1.20	Filter Strips

Design Elements			
Is another area based practice applied to this area?	*No*	*Y/N*	
Amended Soils & Dense Turf Cover?	*No*	*Y/N*	
Is area protected from compaction from heavy equipment during construction?	*Yes*	*Y/N*	
Small Area of Impervious Area & close to source?	*Yes*	*Y/N*	
Composte Amendments?	*No*	*Y/N*	
Boundary Spreader?	*Yes*	*Y/N*	*Gravel Diaphram at top*
Boundary Zone?	*Yes*	*Y/N*	*25 feet of level grass*
Specify how sheet flow will be ensured.	Gravel Diaphram		*level spreader shall be used for buffer slopes ranging from 3-15%*
Average contributing slope	1	*%*	*3% maximum unless a level spreader is used.*
Slope of first 10 feet of Filter Strip	2	*%*	*2% maximum*
Overall Slope	3	*%*	*8% maximum*
Contributing Length of Pervious Areas (PC)	0	*ft*	*150 ft maximum*
Contributing Length of Impervious areas	55	*ft*	*75 ft maximum*
Maximum PC Contributing Length for combination of PC & IC	95	*ft*	
Soil Group (HSG)	D		
Filter Strip Width	60	*ft*	*50 ft minimum for slopes 0-8%* *75 ft minimum for slopes 8-12%* *100 ft minimum for slopes 12-15%* *HSG C or D increase by 15-20%*
Are All Criteria for filter strips in Section 5.3.2 met?	*Yes*		

Area Reduction Adjustments		
Subtract	**0.17**	***Acres from total Area***
Subtract	**0.17**	***Acres from total Impervious Area***

TRUE

Filter Strip

Design Point:	

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
11	1.22	1.22	1.00	0.95	5027.57	1.20	Filter Strips

Design Elements			
Is another area based practice applied to this area?	*No*	*Y/N*	
Amended Soils & Dense Turf Cover?	*No*	*Y/N*	
Is area protected from compaction from heavy equipment during construction?	*Yes*	*Y/N*	
Small Area of Impervious Area & close to source?	*Yes*	*Y/N*	
Composte Amendments?	*No*	*Y/N*	
Boundary Spreader?	*No*	*Y/N*	*Gravel Diaphram at top*
Boundary Zone?	*Yes*	*Y/N*	*25 feet of level grass*
Specify how sheet flow will be ensured.	Gravel Diaphram		*level spreader shall be used for buffer slopes ranging from 3-15%*
Average contributing slope	2	*%*	*3% maximum unless a level spreader is*
Slope of first 10 feet of Filter Strip	2	*%*	*2% maximum*
Overall Slope	3	*%*	*8% maximum*
Contributing Length of Pervious Areas (PC)	0	*ft*	*150 ft maximum*
Contributing Length of Impervious areas (IC)	75	*ft*	*75 ft maximum*
Maximum PC Contributing Length for combination of PC & IC	75	*ft*	
Soil Group (HSG)	D		
Filter Strip Width	60	*ft*	*50 ft minimum for slopes 0-8%* *75 ft minimum for slopes 8-12%* *100 ft minimum for slopes 12-15%* *HSG C or D increase by 15-20%*
Are All Criteria for Filter Strips in Section 5.3.2 met?	*Yes*		

Area Reduction Adjustments		
Subtract	**1.22**	***Acres from total Area***
Subtract	**1.22**	***Acres from total Impervious Area***

TRUE

Infiltration Basin Worksheet

Design Point:							
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
13	0.74	0.45	0.61	0.60	1917.33	1.20	Infiltration Basin
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	61%	0.60	1,917	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	

Pretreatment Techniques to Prevent Clogging			
Infiltration Rate	2.00	*in/hour*	*Okay*
Pretreatment Sizing	25	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*
Pretreatment Required Volume	479	*ft^3*	
Pretreatment Provided	500	*ft^3*	
Pretreatment Techniques utilized	*Sedimentation Basin*		

Size An Infiltration Basin			
Design Volume	1,917	*ft^3*	WQv
Basal Area Required	959	*ft^2*	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*
Basal Area Provided	1,000	*ft^2*	
Design Depth	2.00	*ft*	
Volume Provided	2,000	*ft^3*	*Storage Volume provided in infiltration basin area (not including pretreatment.*
Determine Runoff Reduction			
RRv	**1,800**	***ft^3***	***90% of the storage provided in the basin or WQv whichever is smaller***
Volume Treated	117	*ft^3*	*This is the portion of the WQv that is not reduced/infiltrated*
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*

Infiltration Basin Worksheet

Design Point:	

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
14	1.29	0.58	0.45	0.45	2544.15	1.20	Infiltration Basin
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	45%	0.45	2,544	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	

Pretreatment Techniques to Prevent Clogging

Infiltration Rate	2.00	*in/hour*	*Okay*
Pretreatment Sizing	25	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*
Pretreatment Required Volume	636	*ft^3*	
Pretreatment Provided	650	*ft^3*	
Pretreatment Techniques utilized	*Sedimentation Basin*		

Size An Infiltration Basin

Design Volume	2,544	*ft^3*	WQv
Basal Area Required	1,272	*ft^2*	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*
Basal Area Provided	1,300	*ft^2*	
Design Depth	2.00	*ft*	
Volume Provided	2,600	*ft^3*	*Storage Volume provided in infiltration basin area (not including pretreatment.*

Determine Runoff Reduction

RRv	**2,340**	***ft^3***	***90% of the storage provided in the basin or WQv whichever is smaller***
Volume Treated	204	*ft^3*	*This is the portion of the WQv that is not reduced/infiltrated*
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*

Dry Swale Worksheet

Design Point:	

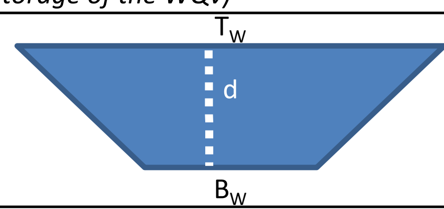
Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
15	1.09	0.05	0.05	0.09	431.62	1.20	Dry Swale
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	5%	0.09	432	<<WQv after adjusting for Disconnected Rooftops	

Pretreatment Provided			**Pretreatment Technique**
Pretreatment (10% of WQv)	43	*ft^3*	

Calculate Available Storage Capacity

Bottom Width	2	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	2	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	2%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	0.75	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Top Width	5	*ft*	
Area	2.63	*sf*	
Minimum Length	148	*ft*	
Actual Length	105	*ft*	
End Point Depth check	1.00	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	319	*ft^3*	
Soil Group (HSG)		A	



Runoff Reduction

Is the Dry Swale contributing flow to another practice?		No	Select Practice	
RRv	**128**	***ft^3***	**Runnoff Reduction equals 40% in HSG A and B and 20% in HSG C and D up to the WQv**	
Volume Treated	304	*ft^3*	This is the difference between the WQv calculated and the runoff reduction achieved in the swale	
Volume Directed	0	*ft^3*	This volume is directed another practice	
Volume √	*Error*		Check to be sure that channel is long enough to store WQv	

Date: 10/18/2021
Project: Port of Albany
Location: Albany, NY
Prepared For: McFarland Johnson

Purpose: To calculate the water quality flow rate (Qwq) over a given site area. In this situation the WQv to be analyzed is the runoff produced by the first 1.2 inch(es) of rainfall, per Fig 4.1 of the New York State Stormwater Management Design Manual

Reference: United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual, New York State Stormwater Management Design Manual - 2015

Formulas:

$$WQv = \frac{(P)(R_v)(A)}{12}$$

$$R_v = (0.05+0.009(I))$$

$$CN = 1000/[10+5P+10Qa-10(Qa^2+1.25QaP)^{1/2}]$$

$$Qwq = (q_u)*(A)*(Qa)$$

Structure:	DA 1		Structure:	DA 2		Structure:	DA 3	
P	1.20	in.	P	1.20	in.	P	1.20	in.
A	7.000	ac	A	7.700	ac	A	8.900	ac
I	100.00	%	I	100.00	%	I	100.00	%
t_c	10.0	min.	t_c	10.0	min.	t_c	10.0	min.
t_c	0.167	hr.	t_c	0.167	hr.	t_c	0.167	hr.
R_v	0.95		R_v	0.95		R_v	0.95	
90% WQv	0.665	ac-ft	90% WQv	0.732	ac-ft	90% WQv	0.846	ac-ft
90% WQv	28967.40	ft^3	90% WQv	31864.14	ft^3	90% WQv	36829.98	ft^3
Qa	1.140	in.	Qa	1.140	in.	Qa	1.140	in.
CN	99.48		CN	99.48		CN	99.48	
I_a	0.041		I_a	0.041		I_a	0.041	
I_a/P	0.034		I_a/P	0.034		I_a/P	0.034	
qu	850	(csm/in)	qu	850	(csm/in)	qu	850	(csm/in)
A	0.01094	$miles^2$	A	0.01203	$miles^2$	A	0.01391	$miles^2$
Qwq	10.60	cfs	Qwq	11.66	cfs	Qwq	13.48	cfs

Date: 10/18/2021
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Reference: United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual, New York State Stormwater Management Design Manual - 2015

Formulas:

$$WQv = \frac{(P)(R_v)(A)}{12}$$

$$R_v = (0.05+0.009(I))$$

$$CN = 1000/[10+5P+10Qa-10(Qa^2+1.25QaP)^{1/2}]$$

$$Qwq = (q_u)*(A)*(Qa)$$

Structure:	DA 4		Structure:	DA 5		Structure:	DA 6	
P	1.20	in.	P	1.20	in.	P	1.20	in.
A	4.630	ac	A	7.200	ac	A	5.670	ac
I	100.00	%	I	100.00	%	I	100.00	%
t_c	10.0	min.	t_c	10.0	min.	t_c	10.0	min.
t_c	0.167	hr.	t_c	0.167	hr.	t_c	0.167	hr.
R_v	0.95		R_v	0.950		R_v	0.95	
90% WQv	0.440	ac-ft	90% WQv	0.684	ac-ft	90% WQv	0.539	ac-ft
90% WQv	19162.04	ft^3	90% WQv	29795.04	ft^3	90% WQv	23465.77	ft^3
Qa	1.140	in.	Qa	1.140	in.	Qa	1.140	in.
CN	99.49		CN	99.48		CN	99.49	
I_a	0.041		I_a	0.041		I_a	0.041	
I_a/P	0.034		I_a/P	0.034		I_a/P	0.034	
qu	850	(csm/in)	qu	850	(csm/in)	qu	850	(csm/in)
A	0.00723	$miles^2$	A	0.01125	$miles^2$	A	0.00886	$miles^2$
Qwq	7.01	cfs	Qwq	10.90	cfs	Qwq	8.59	cfs

Date: 10/18/2021
Project: Port of Albany
Location: Albany, NY
Prepared For: McFarland Johnson

Purpose: To calculate the water quality flow rate (Qwq) over a given site area. In this situation the WQv to be analyzed is the runoff produced by the first 1.2 inch(es) of rainfall, per Fig 4.1 of the New York State Stormwater Management Design Manual

Reference: United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual, New York State Stormwater Management Design Manual - 2015

Formulas:

$$WQv = \frac{(P)(R_v)(A)}{12}$$

$$R_v = (0.05+0.009(I)$$

$$CN = 1000/[10+5P+10Qa-10(Qa^2+1.25QaP)^{1/2}]$$

$$Qwq = (q_u)*(A)*(Qa)$$

Structure: DA 7

P	1.20	in.
A	3.980	ac
I	100.00	%
t_c	10.0	min.
t_c	0.167	hr.
R_v	0.95	
90% WQv	0.378	ac-ft
90% WQv	16470.04	ft^3
Qa	1.140	in.
CN	99.48	
I_a	0.041	
I_a/P	0.034	
qu	850	(csm/in)
A	0.00622	$miles^2$
Qwq	6.03	cfs

DA-1 **2-YEAR STORM**

#Line	Pipe	From	To	3D Length Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP1	DS1	ES1	61.49	54977.7	305391.5	0.95	52228.81	290121.9	6	7.097	4.364	29.307	0	29.307	3	42.332	5.989	6.46	0.159	5.31	5.1	N/A	0.34%
2	DP1-1	DS1-1	DS1	160.2	52457.37	155753.9	0.95	49834.5	147966.2	6	6.737	4.439	15.203	0	15.203	2.5	38.806	7.905	7.419	0.36	7.03	5.81	N/A	0.76%
3	DP1-2	DS1-2	DS1-1	145.79	45686.39	103296.5	0.95	43402.07	98131.67	6	6.314	4.527	10.283	0	10.283	2	17.346	5.521	5.751	0.423	8.26	7.53	N/A	0.50%
4	DP1-3	DS1-3	DS1-2	93.7	57610.11	57610.11	0.95	54729.6	54729.6	6	6	4.592	5.818	0	5.818	2	17.346	5.521	4.971	0.314	8.73	8.26	N/A	0.50%
5	DP1-4	DS1-4	DS1	149.38	47671.16	94659.94	0.95	45287.6	89926.94	6	6.527	4.482	9.331	0	9.331	2	17.346	5.521	5.618	0.443	7.06	6.31	N/A	0.50%
6	DP1-5	DS1-5	DS1-4	148.61	46988.78	46988.78	0.95	44639.34	44639.34	6	6	4.592	4.745	0	4.745	2	17.346	5.521	4.702	0.527	7.8	7.06	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	DS1	3	29.307	61.49	6.46	1.84	1.75	0.65	7.59	6.94	0.003	0.21	7.8	7.15	3.32	8.63	8.31	13.53	N/A	Case A	Case B
1	DS1-1	2.5	15.203	160.2	3.097	1.09	1.32	0.15	8.69	8.54	0.001	0.19	8.88	8.73	2.04	9.07	9.53	13.8	Case B	N/A	Case B
2	DS1-2	2	10.283	145.79	5.751	1.11	1.15	0.51	9.17	8.92	0	0	9.88	9.37	1.9	10.16	10.26	14.01	N/A	Case F	N/A
3	DS1-3	2	5.818	93.7	4.971	0.8	0.85	0.38	10.19	10.13	0	0	10.19	9.8	1.46	10.19	---	13.73	N/A	Case F	N/A
4	DS1-4	2	9.331	149.38	2.97	1.05	1.09	0.14	8.69	8.55	0.001	0.22	8.9	8.77	1.9	8.96	9.06	13.29	Case B	N/A	Case B
5	DS1-5	2	4.745	148.61	4.702	0.72	0.77	0.34	8.98	8.94	0	0	8.98	8.63	1.18	8.98	---	13.08	N/A	Case F	N/A
6	ES1								0	0							8.1	8.28			

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	DS1	0	0.21	0	0	0	0	0.21	2.49	1.84	0.422	2.69	0	2.686	0.332	0.63	3.32
1	DS1-1	0.06	0.19	0	0	0	0	0.19	1.85	1.7	0.345	1.96	0	0.008	0.647	0.08	2.04
2	DS1-2	0.1	0	0	0	0	0	0	1.62	1.11	0.408	1.76	0	0.231	0.883	0.15	1.9
3	DS1-3	0.02	0	0	0	0	0	0	1.46	1.07	0.231	1.2	0	0	1.899	0	1.46
4	DS1-4	0.05	0.22	0	0	0	0	0.22	1.84	1.71	0.37	1.87	0	0.007	1.097	0.03	1.9
5	DS1-5	0.01	0	0	0	0	0	0	1.18	0.83	0.188	1.05	0	0	2.119	0	1.18
6	ES1																

DA-1 **10-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP1	DS1	ES1	61.49	54977.7	305391.5	0.95	52228.81	290121.9	6	7.021	5.903	39.644	0	39.644	3	42.332	5.989	6.801	0.151	5.31	5.1	N/A	0.34%
2	DP1-1	DS1-1	DS1	160.2	52457.37	155753.9	0.95	49834.5	147966.2	6	6.688	5.98	20.483	0	20.483	2.5	38.806	7.905	8.007	0.333	7.03	5.81	N/A	0.76%
3	DP1-2	DS1-2	DS1-1	145.79	45686.39	103296.5	0.95	43402.07	98131.67	6	6.291	6.072	13.792	0	13.792	2	17.346	5.521	6.123	0.397	8.26	7.53	N/A	0.50%
4	DP1-3	DS1-3	DS1-2	93.7	57610.11	57610.11	0.95	54729.6	54729.6	6	6	6.139	7.777	0	7.777	2	17.346	5.521	5.367	0.291	8.73	8.26	N/A	0.50%
5	DP1-4	DS1-4	DS1	149.38	47671.16	94659.94	0.95	45287.6	89926.94	6	6.487	6.027	12.545	0	12.545	2	17.346	5.521	6.01	0.414	7.06	6.31	N/A	0.50%
6	DP1-5	DS1-5	DS1-4	148.61	46988.78	46988.78	0.95	44639.34	44639.34	6	6	6.139	6.344	0	6.344	2	17.346	5.521	5.088	0.487	7.8	7.06	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	DS1	3	39.644	61.49	6.801	2.31	2.05	0.72	8.13	7.41	0.003	0.21	8.34	7.62	4.11	9.42	8.31	13.53	N/A	Case A	Case B
1	DS1-1	2.5	20.483	160.2	4.173	2.5	n/a	0.27	9.53	9.26	0.002	0.34	9.87	9.6	2.92	9.95	9.53	13.8	Case B	N/A	Case A
2	DS1-2	2	13.792	145.79	4.39	1.35	1.34	0.3	10.07	9.77	0.003	0.46	10.53	10.23	2.39	10.65	10.26	14.01	Case B	N/A	Case B
3	DS1-3	2	7.777	93.7	2.476	0.94	0.99	0.1	10.69	10.6	0.001	0.09	10.78	10.69	2.1	10.83	---	13.73	Case B	N/A	Case B
4	DS1-4	2	12.545	149.38	3.993	2	n/a	0.25	9.52	9.27	0.003	0.39	9.91	9.66	2.94	10	9.06	13.29	Case B	N/A	Case A
5	DS1-5	2	6.344	148.61	2.019	2	n/a	0.06	10.03	9.96	0.001	0.1	10.13	10.06	2.36	10.16	---	13.08	Case B	N/A	Case A
6	ES1								0	0							8.1	8.28			

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	DS1	0	0.21	0	0	0	0	0.21	3.02	2.31	0.571	3.3	0	2.673	0.295	0.81	4.11
1	DS1-1	0.11	0.34	0	0	0	0	0.34	2.84	2.57	0.465	2.89	0	0.008	0.522	0.03	2.92
2	DS1-2	0.12	0.46	0	0	0	0	0.46	2.27	1.97	0.547	2.33	0	0.23	0.756	0.06	2.39
3	DS1-3	0.04	0.09	0	0	0	0	0.09	2.05	1.96	0.309	2.07	0	0	1.461	0.03	2.1
4	DS1-4	0.1	0.39	0	0	0	0	0.39	2.85	2.6	0.498	2.9	0	0.007	0.837	0.04	2.94
5	DS1-5	0.03	0.1	0	0	0	0	0.1	2.33	2.26	0.252	2.34	0	0	1.472	0.02	2.36
6	ES1																

DA-2 **2-YEAR STORM**

#Line	Pipe	From	To	3D Length Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP2	DS2	ES2	97.97	21007.42	329426	0.95	19957.05	312954.7	6	7.231	5.855	42.412	0	42.412	4	110.14	8.765	8.188	0.199	5.13	4.64	N/A	0.50%
2	DP2-1	DS2-1	DS2	118.27	20615.43	138137.5	0.95	19584.66	131230.6	6	7.006	5.907	17.943	0	17.943	3	76.554	10.83	8.836	0.223	8.52	7.19	N/A	1.12%
3	DP2-2	DS2-2	DS2-1	110.23	45817.7	45817.7	0.95	43526.82	43526.82	6	6	6.139	6.185	0	6.185	2	17.346	5.521	5.054	0.364	10.07	9.52	N/A	0.50%
4	DP2-3	DS2-3	DS2-1	172.76	46603.54	71704.38	0.95	44273.37	68119.16	6	6.601	6	9.461	0	9.461	2.5	43.73	8.909	7.107	0.405	10.74	9.07	N/A	0.97%
5	DP2-4	DS2-4	DS2-3	210.41	25100.84	25100.84	0.95	23845.8	23845.8	6	6	6.139	3.389	0	3.389	2	26.794	8.529	5.836	0.601	13.75	11.24	N/A	1.19%
6	DP2-5	DS2-5	DS2	97.76	48086.19	170281	0.95	45681.88	161767	6	6.996	5.909	22.126	0	22.126	2.5	31.45	6.407	6.934	0.235	7.12	6.63	N/A	0.50%
7	DP2-6	DS2-6	DS2-5	122.84	47194.63	122194.9	0.95	44834.89	116085.1	6	6.678	5.982	16.075	0	16.075	2.5	31.45	6.407	6.438	0.318	7.74	7.12	N/A	0.50%
8	DP2-7	DS2-7	DS2-6	104.9	27407.03	27407.03	0.95	26036.68	26036.68	6	6	6.139	3.7	0	3.7	2	17.346	5.521	4.387	0.399	8.76	8.24	N/A	0.50%
9	DP2-8	DS2-8	DS2-6	137.84	12723.61	47593.2	0.95	12087.43	45213.54	6	6.352	6.058	6.34	0	6.34	2	27.083	8.621	7.031	0.327	11.35	9.67	N/A	1.22%
10	DP2-9	DS2-9	DS2-8	137.58	34869.59	34869.59	0.95	33126.11	33126.11	6	6	6.139	4.707	0	4.707	2	27.43	8.731	6.522	0.352	13.07	11.35	N/A	1.25%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	DS2	4	42.412	97.97	8.188	1.72	1.95	1.04	7.41	6.37	0	0	7.9	6.86	3.08	8.21	10.19	14.59	N/A	Case A	N/A
1	DS2-1	3	17.943	118.27	8.836	0.99	1.36	1.21	9.4	8.18	0	0	10.72	9.51	2.2	10.72	11.57	14.57	N/A	Case B	N/A
2	DS2-2	2	6.185	110.23	5.054	0.83	0.88	0.4	10.78	10.63	0	0	11.29	10.9	1.3	11.37	---	15.07	N/A	Case F	N/A
3	DS2-3	2.5	9.461	172.76	7.107	0.79	1.03	0.79	10.77	10.65	0	0	12.32	11.53	1.58	12.32	13.24	16.24	N/A	Case F	N/A
4	DS2-4	2	3.389	210.41	5.836	0.48	0.64	0.53	12.34	12.28	0	0	14.76	14.23	1.01	14.76	---	18.75	N/A	Case F	N/A
5	DS2-5	2.5	22.126	97.76	6.934	1.55	1.6	0.75	8.93	8.18	0	0	9.42	8.67	2.66	9.78	9.62	15.02	N/A	Case B	N/A
6	DS2-6	2.5	16.075	122.84	3.275	1.27	1.35	0.17	9.85	9.68	0.001	0.16	10.01	9.84	2.37	10.11	10.24	14.67	Case B	N/A	Case B
7	DS2-7	2	3.7	104.9	4.387	0.63	0.67	0.3	10.12	10.09	0	0	10.12	9.82	1.36	10.12	---	13.76	N/A	Case F	N/A
8	DS2-8	2	6.34	137.84	7.031	0.66	0.89	0.77	11.1	10.33	0	0	12.78	12.01	1.43	12.78	13.35	16.35	N/A	Case B	N/A
9	DS2-9	2	4.707	137.58	6.522	0.56	0.76	0.66	12.8	12.74	0	0	14.29	13.63	1.22	14.29	---	18.07	N/A	Case F	N/A
10	ES2								0	0							8.64	8.84			

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	DS2	0	0	0	0	0	0	0	2.77	1.72	0.298	2.84	0	2.999	0.106	0.23	3.08
1	DS2-1	0	0	0	0	0	0	0	2.2	0.99	0.258	1.94	0	1.808	0.204	0	2.2
2	DS2-2	0.06	0	0	0	0	0	0	1.22	0.83	0.245	1.25	0	0	1.875	0.05	1.3
3	DS2-3	0.05	0	0	0	0	0	0	1.58	0.79	0.215	1.43	0	0.128	1.058	0	1.58
4	DS2-4	0.02	0	0	0	0	0	0	1.01	0.48	0.134	0.83	0	0	2.083	0	1.01
5	DS2-5	0	0	0	0	0	0	0	2.3	1.55	0.503	2.52	0	0.002	0.607	0.14	2.66
6	DS2-6	0.07	0.16	0	0	0	0	0.16	2.28	2.11	0.365	2.31	0	1.209	0.715	0.06	2.37
7	DS2-7	0.01	0	0	0	0	0	0	1.36	1.06	0.147	0.89	0	0	2.059	0	1.36
8	DS2-8	0	0	0	0	0	0	0	1.43	0.66	0.252	1.27	0	0	0.499	0	1.43
9	DS2-9	0.02	0	0	0	0	0	0	1.22	0.56	0.187	1.04	0	0	1.982	0	1.22
10	ES2																

DA-2 **10-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP2	DS2	ES2	97.97	21007.42	329426	0.95	19957.05	312954.7	6	7.231	5.855	42.412	0	42.412	4	110.14	8.765	8.188	0.199	5.13	4.64	N/A	0.50%
2	DP2-1	DS2-1	DS2	118.27	20615.43	138137.5	0.95	19584.66	131230.6	6	7.006	5.907	17.943	0	17.943	3	76.554	10.83	8.836	0.223	8.52	7.19	N/A	1.12%
3	DP2-2	DS2-2	DS2-1	110.23	45817.7	45817.7	0.95	43526.82	43526.82	6	6	6.139	6.185	0	6.185	2	17.346	5.521	5.054	0.364	10.07	9.52	N/A	0.50%
4	DP2-3	DS2-3	DS2-1	172.76	46603.54	71704.38	0.95	44273.37	68119.16	6	6.601	6	9.461	0	9.461	2.5	43.73	8.909	7.107	0.405	10.74	9.07	N/A	0.97%
5	DP2-4	DS2-4	DS2-3	210.41	25100.84	25100.84	0.95	23845.8	23845.8	6	6	6.139	3.389	0	3.389	2	26.794	8.529	5.836	0.601	13.75	11.24	N/A	1.19%
6	DP2-5	DS2-5	DS2	97.76	48086.19	170281	0.95	45681.88	161767	6	6.996	5.909	22.126	0	22.126	2.5	31.45	6.407	6.934	0.235	7.12	6.63	N/A	0.50%
7	DP2-6	DS2-6	DS2-5	122.84	47194.63	122194.9	0.95	44834.89	116085.1	6	6.678	5.982	16.075	0	16.075	2.5	31.45	6.407	6.438	0.318	7.74	7.12	N/A	0.50%
8	DP2-7	DS2-7	DS2-6	104.9	27407.03	27407.03	0.95	26036.68	26036.68	6	6	6.139	3.7	0	3.7	2	17.346	5.521	4.387	0.399	8.76	8.24	N/A	0.50%
9	DP2-8	DS2-8	DS2-6	137.84	12723.61	47593.2	0.95	12087.43	45213.54	6	6.352	6.058	6.34	0	6.34	2	27.083	8.621	7.031	0.327	11.35	9.67	N/A	1.22%
10	DP2-9	DS2-9	DS2-8	137.58	34869.59	34869.59	0.95	33126.11	33126.11	6	6	6.139	4.707	0	4.707	2	27.43	8.731	6.522	0.352	13.07	11.35	N/A	1.25%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	ES2								0	0							8.64	8.84			
1	DS2	4	42.412	97.97	8.188	1.72	1.95	1.04	7.41	6.37	0	0	7.9	6.86	3.08	8.21	10.19	14.59	N/A	Case A	N/A
2	DS2-5	2.5	22.126	97.76	6.934	1.55	1.6	0.75	8.93	8.18	0	0	9.42	8.67	2.66	9.78	9.62	15.02	N/A	Case B	N/A
3	DS2-6	2.5	16.075	122.84	3.275	1.27	1.35	0.17	9.85	9.68	0.001	0.16	10.01	9.84	2.37	10.11	10.24	14.67	Case B	N/A	Case B
4	DS2-7	2	3.7	104.9	4.387	0.63	0.67	0.3	10.12	10.09	0	0	10.12	9.82	1.36	10.12	---	13.76	N/A	Case F	N/A
5	DS2-8	2	6.34	137.84	7.031	0.66	0.89	0.77	11.1	10.33	0	0	12.78	12.01	1.43	12.78	13.35	16.35	N/A	Case B	N/A
6	DS2-9	2	4.707	137.58	6.522	0.56	0.76	0.66	12.8	12.74	0	0	14.29	13.63	1.22	14.29	---	18.07	N/A	Case F	N/A
7	DS2-1	3	17.943	118.27	8.836	0.99	1.36	1.21	9.4	8.18	0	0	10.72	9.51	2.2	10.72	11.57	14.57	N/A	Case B	N/A
8	DS2-2	2	6.185	110.23	5.054	0.83	0.88	0.4	10.78	10.63	0	0	11.29	10.9	1.3	11.37	---	15.07	N/A	Case F	N/A
9	DS2-3	2.5	9.461	172.76	7.107	0.79	1.03	0.79	10.77	10.65	0	0	12.32	11.53	1.58	12.32	13.24	16.24	N/A	Case F	N/A
10	DS2-4	2	3.389	210.41	5.836	0.48	0.64	0.53	12.34	12.28	0	0	14.76	14.23	1.01	14.76	---	18.75	N/A	Case F	N/A

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	ES2																
1	DS2	0	0	0	0	0	0	0	2.77	1.72	0.298	2.84	0	2.999	0.106	0.23	3.08
2	DS2-5	0	0	0	0	0	0	0	2.3	1.55	0.503	2.52	0	0.002	0.607	0.14	2.66
3	DS2-6	0.07	0.16	0	0	0	0	0.16	2.28	2.11	0.365	2.31	0	1.209	0.715	0.06	2.37
4	DS2-7	0.01	0	0	0	0	0	0	1.36	1.06	0.147	0.89	0	0	2.059	0	1.36
5	DS2-8	0	0	0	0	0	0	0	1.43	0.66	0.252	1.27	0	0	0.499	0	1.43
6	DS2-9	0.02	0	0	0	0	0	0	1.22	0.56	0.187	1.04	0	0	1.982	0	1.22
7	DS2-1	0	0	0	0	0	0	0	2.2	0.99	0.258	1.94	0	1.808	0.204	0	2.2
8	DS2-2	0.06	0	0	0	0	0	0	1.22	0.83	0.245	1.25	0	0	1.875	0.05	1.3
9	DS2-3	0.05	0	0	0	0	0	0	1.58	0.79	0.215	1.43	0	0.128	1.058	0	1.58
10	DS2-4	0.02	0	0	0	0	0	0	1.01	0.48	0.134	0.83	0	0	2.083	0	1.01

DA-3 **2-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP3	DS3	ES3	83.23	16868.51	369143.4	0.95	16025.08	351622.7	6	7.549	4.27	34.754	0	34.754	3	73.343	10.376	10.229	0.136	7.67	6.81	N/A	1.03%
2	DP3-1	DS3-1	DS3	176.83	37204.07	60698.12	0.95	35343.87	57663.22	6	6.696	4.447	5.936	0	5.936	2	25.16	8.009	6.546	0.45	11.38	9.52	N/A	1.05%
3	DP3-2	DS3-2	DS3-1	203.92	23494.05	23494.05	0.95	22319.35	22319.35	6	6	4.592	2.372	0	2.372	2	24.112	7.675	4.881	0.696	13.35	11.38	N/A	0.97%
4	DP3-3	DS3-3	DS3	88.96	55847.12	149493.8	0.95	53054.76	142955.6	6	6.314	4.527	14.98	0	14.98	2.5	31.45	6.407	6.325	0.234	8.61	8.17	N/A	0.50%
5	DP3-4	DS3-4	DS3-3	105.76	93646.65	93646.65	0.96	89900.79	89900.79	6	6	4.592	9.556	0	9.556	2.5	31.45	6.407	5.616	0.314	9.14	8.61	N/A	0.50%
6	DP3-5	DS3-5	DS3	123.02	64103.88	142083	0.95	60898.68	134978.8	6	7.216	4.339	13.557	0	13.557	2.5	31.45	6.407	6.165	0.333	9.55	8.93	N/A	0.50%
7	DP3-6	DS3-6	DS3-5	100.27	21431.78	77979.08	0.95	20360.19	74080.12	6	6.899	4.405	7.554	0	7.554	2.5	31.45	6.407	5.263	0.318	10.05	9.55	N/A	0.50%
8	DP3-7	DS3-7	DS3-6	151.16	20111.96	56547.29	0.95	19106.36	53719.93	6	6.492	4.49	5.583	0	5.583	2	23.861	7.595	6.193	0.407	11.98	10.55	N/A	0.95%
9	DP3-8	DS3-8	DS3-7	153.56	36435.33	36435.33	0.95	34613.57	34613.57	6	6	4.592	3.679	0	3.679	2	22.044	7.017	5.2	0.492	13.22	11.98	N/A	0.81%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	DS3	3	34.754	83.23	10.229	1.45	1.92	1.63	9.89	8.26	0	0	10.75	9.12	3.08	10.75	11.52	14.52	N/A	Case A	N/A
1	DS3-1	2	5.936	176.83	6.546	0.66	0.86	0.67	10.8	10.67	0	0	12.71	12.04	1.33	12.71	13.38	16.38	N/A	Case F	N/A
2	DS3-2	2	2.372	203.92	4.881	0.42	0.54	0.37	12.71	12.7	0	0	14.14	13.77	0.79	14.14	---	18.42	N/A	Case F	N/A
3	DS3-3	2.5	14.98	88.96	3.052	1.22	1.31	0.14	10.81	10.66	0.001	0.1	10.91	10.76	2.34	10.95	11.11	14.1	Case B	N/A	Case B
4	DS3-4	2.5	9.556	105.76	5.616	0.95	1.03	0.49	10.98	10.91	0	0	10.98	10.49	1.84	10.98	---	14.64	N/A	Case F	N/A
5	DS3-5	2.5	13.557	123.02	6.165	1.15	1.24	0.59	10.83	10.63	0	0	11.29	10.7	1.87	11.42	12.05	15.14	N/A	Case F	N/A
6	DS3-6	2.5	7.554	100.27	5.263	0.83	0.91	0.43	11.44	11.39	0	0	11.44	11.01	1.39	11.44	12.55	15.55	N/A	Case F	N/A
7	DS3-7	2	5.583	151.16	6.193	0.66	0.83	0.6	11.55	11.28	0	0	13.23	12.64	1.25	13.23	13.98	16.58	N/A	Case F	N/A
8	DS3-8	2	3.679	153.56	5.2	0.55	0.67	0.42	13.25	13.21	0	0	14.19	13.77	0.97	14.19	---	18.22	N/A	Case F	N/A
9	ES3								0	0							9.81	9.99			

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	DS3	0	0	0	0	0	0	0	3.08	1.45	0.501	3.02	0	2.889	0.058	0	3.08
1	DS3-1	0.05	0	0	0	0	0	0	1.33	0.66	0.236	1.21	0	0.158	1.159	0	1.33
2	DS3-2	0.01	0	0	0	0	0	0	0.79	0.42	0.094	0.66	0	0	2.207	0	0.79
3	DS3-3	0.06	0.1	0	0	0	0	0.1	2.3	2.15	0.34	2.32	0	0.099	0.47	0.02	2.34
4	DS3-4	0.02	0	0	0	0	0	0	1.84	1.35	0.217	1.44	0	0	1.625	0	1.84
5	DS3-5	0.08	0	0	0	0	0	0	1.74	1.15	0.308	1.82	0	0	0.681	0.05	1.87
6	DS3-6	0.02	0	0	0	0	0	0	1.39	0.96	0.172	1.23	0	2.452	0.469	0	1.39
7	DS3-7	0.11	0	0	0	0	0	0	1.25	0.66	0.222	1.17	0	0.139	0.611	0	1.25
8	DS3-8	0.02	0	0	0	0	0	0	0.97	0.55	0.146	0.88	0	0	2.058	0	0.97
9	ES3																

DA-3 **10-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP3	DS3	ES3	83.23	16868.51	369143.4	0.95	16025.08	351622.7	6	7.429	5.809	47.281	0	47.281	3	73.343	10.376	11.018	0.126	7.67	6.81	N/A	1.03%
2	DP3-1	DS3-1	DS3	176.83	37204.07	60698.12	0.95	35343.87	57663.22	6	6.64	5.991	7.997	0	7.997	2	25.16	8.009	7.107	0.415	11.38	9.52	N/A	1.05%
3	DP3-2	DS3-2	DS3-1	203.92	23494.05	23494.05	0.95	22319.35	22319.35	6	6	6.139	3.172	0	3.172	2	24.112	7.675	5.311	0.64	13.35	11.38	N/A	0.97%
4	DP3-3	DS3-3	DS3	88.96	55847.12	149493.8	0.95	53054.76	142955.6	6	6.29	6.072	20.093	0	20.093	2.5	31.45	6.407	6.789	0.218	8.61	8.17	N/A	0.50%
5	DP3-4	DS3-4	DS3-3	105.76	93646.65	93646.65	0.96	89900.79	89900.79	6	6	6.139	12.775	0	12.775	2.5	31.45	6.407	6.07	0.29	9.14	8.61	N/A	0.50%
6	DP3-5	DS3-5	DS3	123.02	64103.88	142083	0.95	60898.68	134978.8	6	7.12	5.88	18.373	0	18.373	2.5	31.45	6.407	6.65	0.308	9.55	8.93	N/A	0.50%
7	DP3-6	DS3-6	DS3-5	100.27	21431.78	77979.08	0.95	20360.19	74080.12	6	6.828	5.948	10.199	0	10.199	2.5	31.45	6.407	5.717	0.292	10.05	9.55	N/A	0.50%
8	DP3-7	DS3-7	DS3-6	151.16	20111.96	56547.29	0.95	19106.36	53719.93	6	6.453	6.034	7.504	0	7.504	2	23.861	7.595	6.72	0.375	11.98	10.55	N/A	0.95%
9	DP3-8	DS3-8	DS3-7	153.56	36435.33	36435.33	0.95	34613.57	34613.57	6	6	6.139	4.919	0	4.919	2	22.044	7.017	5.646	0.453	13.22	11.98	N/A	0.81%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	DS3	3	47.281	83.23	11.018	1.75	2.24	1.89	10.45	8.56	0	0	11.31	9.42	3.91	11.58	11.52	14.52	N/A	Case A	N/A
1	DS3-1	2	7.997	176.83	7.107	0.78	1.01	0.79	11.62	11.52	0.001	0	12.94	12.16	1.56	12.94	13.38	16.38	Case B	N/A	Case D
2	DS3-2	2	3.172	203.92	5.311	0.49	0.62	0.44	12.95	12.93	0	0	14.28	13.84	0.93	14.28	---	18.42	N/A	Case F	N/A
3	DS3-3	2.5	20.093	88.96	4.093	2.5	n/a	0.26	11.68	11.42	0.002	0.18	11.87	11.61	3.33	11.94	11.11	14.1	Case B	N/A	Case A
4	DS3-4	2.5	12.775	105.76	2.603	2.5	n/a	0.11	11.98	11.88	0.001	0.09	12.07	11.96	2.97	12.11	---	14.64	Case B	N/A	Case A
5	DS3-5	2.5	18.373	123.02	3.743	1.37	1.45	0.22	11.67	11.45	0.002	0.21	11.88	11.66	2.4	11.95	12.05	15.14	Case B	N/A	Case B
6	DS3-6	2.5	10.199	100.27	5.717	0.98	1.07	0.51	11.97	11.91	0	0	11.97	11.47	1.92	11.97	12.55	15.55	N/A	Case F	N/A
7	DS3-7	2	7.504	151.16	6.72	0.77	0.97	0.7	12.04	11.88	0	0	13.45	12.75	1.47	13.45	13.98	16.58	N/A	Case F	N/A
8	DS3-8	2	4.919	153.56	5.646	0.64	0.78	0.5	13.48	13.42	0	0	14.36	13.86	1.14	14.36	---	18.22	N/A	Case F	N/A
9	ES3								0	0							9.81	9.99			

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	DS3	0	0	0	0	0	0	0	3.64	1.75	0.681	3.71	0	2.864	0.048	0.2	3.91
1	DS3-1	0.04	0	0	0	0	0	0	1.56	0.78	0.317	1.48	0	0.157	1.077	0	1.56
2	DS3-2	0.01	0	0	0	0	0	0	0.93	0.49	0.126	0.8	0	0	2.136	0	0.93
3	DS3-3	0.1	0.18	0	0	0	0	0.18	3.26	2.99	0.457	3.31	0	0.099	0.324	0.02	3.33
4	DS3-4	0.04	0.09	0	0	0	0	0.09	2.93	2.82	0.29	2.95	0	0	1.019	0.02	2.97
5	DS3-5	0.09	0.21	0	0	0	0	0.21	2.33	2.11	0.417	2.37	0	0	0.581	0.03	2.4
6	DS3-6	0.03	0	0	0	0	0	0	1.92	1.42	0.232	1.5	0	2.441	0.439	0	1.92
7	DS3-7	0.06	0	0	0	0	0	0	1.47	0.77	0.298	1.42	0	0.139	0.565	0	1.47
8	DS3-8	0.02	0	0	0	0	0	0	1.14	0.64	0.195	1.07	0	0	1.963	0	1.14
9	ES3																

DA-4 **2-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP4	DS4	ES4	35.99	5507.54	215050.1	0.95	5232.17	205400.9	6	8.333	4.107	19.526	0	19.526	3	51.142	7.235	6.744	0.089	6.7	6.52	N/A	0.50%
2	DP4-1	DS4-1	DS4	156.71	5117.57	151155.2	0.95	4861.69	144700.9	6	6.628	4.461	14.944	0	14.944	2.5	31.45	6.407	6.321	0.413	7.98	7.2	N/A	0.50%
3	DP4-2	DS4-2	DS4	139.95	10097.61	58387.26	0.95	9592.73	55467.9	6	7.854	4.206	5.401	0	5.401	2	17.346	5.521	4.872	0.479	11.41	10.71	N/A	0.50%
4	DP4-3	DS4-3	DS4-2	189.55	11047.53	48289.65	0.95	10495.15	45875.17	6	7.177	4.347	4.616	0	4.616	2	17.346	5.521	4.667	0.677	12.35	11.41	N/A	0.50%
5	DP4-4	DS4-4	DS4-3	155.9	16880.57	37242.12	0.95	16036.55	35380.02	6	6.592	4.469	3.66	0	3.66	1.5	8.054	4.558	4.446	0.584	13.63	12.85	N/A	0.50%
6	DP4-5	DS4-5	DS4-4	135.37	20361.55	20361.55	0.95	19343.47	19343.47	6	6	4.592	2.056	0	2.056	1.5	8.054	4.558	3.808	0.592	14.31	13.63	N/A	0.50%
7	DP4-6	DS4-6	DS4-1	103.33	35698.58	146037.7	0.95	33913.65	139839.2	6	6.354	4.518	14.626	0	14.626	2.5	31.45	6.407	6.286	0.274	8.5	7.98	N/A	0.50%
8	DP4-7	DS4-7	DS4-6	124.75	110339.1	110339.1	0.96	105925.5	105925.5	6	6	4.592	11.259	0	11.259	2.5	31.45	6.407	5.871	0.354	9.12	8.5	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	DS4	3	19.526	35.99	6.744	1.29	1.42	0.71	8.51	7.8	0	0	8.69	7.98	2.21	8.9	12.71	17.62	N/A	Case A	N/A
1	DS4-1	2.5	14.944	156.71	6.321	1.21	1.3	0.62	9.01	8.74	0	0	9.81	9.19	2.25	10.23	10.48	15.86	N/A	Case F	N/A
2	DS4-2	2	5.401	139.95	4.872	0.77	0.82	0.37	11.84	11.47	0	0	12.54	12.17	1.16	12.56	13.41	19.19	N/A	Case A	N/A
3	DS4-3	2	4.616	189.55	4.667	0.7	0.76	0.34	12.6	12.5	0	0	13.4	13.06	1.04	13.4	14.35	19.77	N/A	Case F	N/A
4	DS4-4	1.5	3.66	155.9	4.446	0.71	0.73	0.31	13.87	13.56	0	0	14.65	14.34	1.16	14.79	15.13	19.03	N/A	Case B	N/A
5	DS4-5	1.5	2.056	135.37	3.808	0.52	0.54	0.23	14.8	14.77	0	0	15.05	14.83	0.74	15.05	---	18.81	N/A	Case F	N/A
6	DS4-6	2.5	14.626	103.33	6.286	1.2	1.29	0.61	10.29	10.14	0	0	10.31	9.7	1.97	10.46	11	15.31	N/A	Case F	N/A
7	DS4-7	2.5	11.259	124.75	5.871	1.03	1.12	0.54	10.51	10.4	0	0	10.69	10.15	1.66	10.78	---	14.62	N/A	Case F	N/A
8	ES4								0	0							9.52	9.7			

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	DS4	0	0	0	0	0	0	0	1.99	1.29	0.281	2.05	0	2.395	0.256	0.15	2.21
1	DS4-1	0.11	0	0	0	0	0	0	1.84	1.21	0.34	1.94	0	2.901	0.08	0.31	2.25
2	DS4-2	0	0	0	0	0	0	0	1.14	0.77	0.214	1.14	0	2.733	0.575	0.01	1.16
3	DS4-3	0.04	0	0	0	0	0	0	1.04	0.7	0.183	1.03	0	0.012	0.73	0	1.04
4	DS4-4	0	0	0	0	0	0	0	1.02	0.71	0.298	1.07	0	0.462	1.309	0.09	1.16
5	DS4-5	0.01	0	0	0	0	0	0	0.74	0.52	0.168	0.73	0	0	2.518	0	0.74
6	DS4-6	0.06	0	0	0	0	0	0	1.81	1.2	0.332	1.91	0	0.093	0.476	0.06	1.97
7	DS4-7	0.05	0	0	0	0	0	0	1.57	1.03	0.256	1.6	0	0	1.558	0.05	1.66
8	ES4																

DA-4 **10-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP4	DS4	ES4	35.99	5507.54	215050.1	0.95	5232.17	205400.9	6	8.155	5.641	26.822	0	26.822	3	51.142	7.235	7.316	0.082	6.7	6.52	N/A	0.50%
2	DP4-1	DS4-1	DS4	156.71	5117.57	151155.2	0.95	4861.69	144700.9	6	6.583	6.004	20.112	0	20.112	2.5	31.45	6.407	6.791	0.385	7.98	7.2	N/A	0.50%
3	DP4-2	DS4-2	DS4	139.95	10097.61	58387.26	0.95	9592.73	55467.9	6	7.714	5.743	7.374	0	7.374	2	17.346	5.521	5.294	0.441	11.41	10.71	N/A	0.50%
4	DP4-3	DS4-3	DS4-2	189.55	11047.53	48289.65	0.95	10495.15	45875.17	6	7.091	5.887	6.252	0	6.252	2	17.346	5.521	5.068	0.623	12.35	11.41	N/A	0.50%
5	DP4-4	DS4-4	DS4-3	155.9	16880.57	37242.12	0.95	16036.55	35380.02	6	6.547	6.013	4.924	0	4.924	1.5	8.054	4.558	4.781	0.543	13.63	12.85	N/A	0.50%
6	DP4-5	DS4-5	DS4-4	135.37	20361.55	20361.55	0.95	19343.47	19343.47	6	6	6.139	2.749	0	2.749	1.5	8.054	4.558	4.123	0.547	14.31	13.63	N/A	0.50%
7	DP4-6	DS4-6	DS4-1	103.33	35698.58	146037.7	0.95	33913.65	139839.2	6	6.328	6.063	19.626	0	19.626	2.5	31.45	6.407	6.753	0.255	8.5	7.98	N/A	0.50%
8	DP4-7	DS4-7	DS4-6	124.75	110339.1	110339.1	0.96	105925.5	105925.5	6	6	6.139	15.053	0	15.053	2.5	31.45	6.407	6.332	0.328	9.12	8.5	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	DS4	3	26.822	35.99	7.316	1.54	1.67	0.83	8.89	8.06	0	0	9.07	8.24	2.95	9.65	12.71	17.62	N/A	Case A	N/A
1	DS4-1	2.5	20.112	156.71	6.791	1.45	1.52	0.72	9.75	9.49	0	0	10.15	9.43	2.95	10.93	10.48	15.86	N/A	Case F	N/A
2	DS4-2	2	7.374	139.95	5.294	0.91	0.96	0.44	12.05	11.62	0	0	12.75	12.32	1.59	13	13.41	19.19	N/A	Case A	N/A
3	DS4-3	2	6.252	189.55	5.068	0.83	0.88	0.4	13.03	12.95	0	0	13.58	13.18	1.28	13.63	14.35	19.77	N/A	Case F	N/A
4	DS4-4	1.5	4.924	155.9	4.781	0.85	0.85	0.36	14.06	13.7	0	0	14.84	14.48	1.47	15.1	15.13	19.03	N/A	Case B	N/A
5	DS4-5	1.5	2.749	135.37	4.123	0.6	0.63	0.26	15.12	15.08	0	0	15.18	14.91	0.91	15.22	---	18.81	N/A	Case F	N/A
6	DS4-6	2.5	19.626	103.33	3.998	1.43	1.5	0.25	11.03	10.78	0.002	0.2	11.23	10.98	2.81	11.3	11	15.31	Case B	N/A	Case B
7	DS4-7	2.5	15.053	124.75	3.067	1.22	1.31	0.15	11.36	11.21	0.001	0.14	11.5	11.36	2.45	11.57	---	14.62	Case B	N/A	Case B
8	ES4								0	0							9.52	9.7			

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	DS4	0	0	0	0	0	0	0	2.38	1.54	0.386	2.54	0	2.347	0.206	0.41	2.95
1	DS4-1	0.11	0	0	0	0	0	0	2.17	1.45	0.457	2.37	0	2.892	0.074	0.58	2.95
2	DS4-2	0	0	0	0	0	0	0	1.35	0.91	0.293	1.4	0	2.711	0.552	0.19	1.59
3	DS4-3	0.03	0	0	0	0	0	0	1.23	0.83	0.248	1.26	0	0.012	0.704	0.02	1.28
4	DS4-4	0	0	0	0	0	0	0	1.2	0.85	0.401	1.3	0	0.46	1.238	0.17	1.47
5	DS4-5	0.02	0	0	0	0	0	0	0.87	0.6	0.224	0.88	0	0	2.414	0.03	0.91
6	DS4-6	0.1	0.2	0	0	0	0	0.2	2.73	2.48	0.446	2.78	0	0.093	0.391	0.02	2.81
7	DS4-7	0.06	0.14	0	0	0	0	0.14	2.38	2.24	0.342	2.41	0	0	1.235	0.04	2.45
8	ES4																

DA-5 **2-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP5	DS5	ES5	70.06	4552.1	315512.4	0.95	4324.5	302021.8	6	8.759	4.018	28.092	0	28.092	3	51.142	7.235	7.399	0.158	7.84	7.49	N/A	0.50%
2	DP5-1	DS5-1	DS5	93.61	37247.63	292705.4	0.98	36502.68	280355.1	6	8.545	4.063	26.366	0	26.366	3	51.142	7.235	7.285	0.214	8.31	7.84	N/A	0.50%
3	DP5-2	DS5-2	DS5-1	102.79	38917.45	255457.7	0.98	38139.1	243852.4	6	8.3	4.114	23.22	0	23.22	2.5	31.45	6.407	7.004	0.245	9.32	8.81	N/A	0.50%
4	DP5-3	DS5-3	DS5-2	116.83	8420.14	216540.3	0.95	7999.13	205713.3	6	8.013	4.173	19.873	0	19.873	2.5	31.45	6.407	6.772	0.288	9.91	9.32	N/A	0.50%
5	DP5-4	DS5-4	DS5-3	85.3	21308.08	208120.2	0.95	20242.67	197714.1	6	7.801	4.217	19.302	0	19.302	2.5	31.45	6.407	6.727	0.211	10.33	9.91	N/A	0.50%
6	DP5-8	DS5-8	DS5-4	106.97	26821.74	26821.74	0.95	25480.65	25480.65	6	6	4.592	2.708	0	2.708	2	17.346	5.521	4.014	0.444	15.1	14.57	N/A	0.50%
7	DP5-5	DS5-5	DS5-4	243.62	52155.8	159990.3	0.95	49548.01	151990.8	6	7.163	4.35	15.305	0	15.305	2.5	31.45	6.407	6.359	0.639	11.55	10.33	N/A	0.50%
8	DP5-6	DS5-6	DS5-5	201.79	56710.72	107834.5	0.95	53875.19	102442.8	6	6.582	4.471	10.602	0	10.602	2	17.346	5.521	5.792	0.581	13.06	12.05	N/A	0.50%
9	DP5-7	DS5-7	DS5-6	168.07	51123.81	51123.81	0.95	48567.62	48567.62	6	6	4.592	5.163	0	5.163	2	17.346	5.521	4.813	0.582	13.9	13.06	N/A	0.50%
10	DP5-9	DS5-9	DS5	142.51	18254.95	18254.95	0.95	17342.21	17342.21	6	6	4.592	1.843	0	1.843	1.5	8.054	4.558	3.694	0.643	14.31	13.6	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	ES5								0	0							10.49	10.67			
1	DS5	3	28.092	70.06	7.399	1.59	1.71	0.85	9.93	9.08	0	0	10.28	9.43	2.68	10.52	15.1	20.04	N/A	Case A	N/A
2	DS5-1	3	26.366	93.61	7.285	1.53	1.66	0.83	10.61	10.37	0	0	10.66	9.84	2.69	11	11.31	20.74	N/A	Case F	N/A
3	DS5-2	2.5	23.22	102.79	7.004	1.6	1.64	0.76	11.16	10.75	0	0	11.68	10.92	2.77	12.09	11.82	20.65	N/A	Case F	N/A
4	DS5-3	2.5	19.873	116.83	4.049	1.44	1.51	0.25	12.2	11.94	0.002	0.23	12.43	12.18	2.61	12.52	12.41	20.53	Case B	N/A	Case B
5	DS5-4	2.5	19.302	85.3	3.932	1.42	1.49	0.24	12.61	12.37	0.002	0.16	12.77	12.53	2.53	12.86	12.83	20.5	Case B	N/A	Case B
6	DS5-8	2	2.708	106.97	4.014	0.53	0.57	0.25	15.35	15.1	0	0	15.89	15.63	0.79	15.89	---	20.1	N/A	Case A	N/A
7	DS5-5	2.5	15.305	243.62	3.118	1.23	1.32	0.15	12.92	12.77	0.001	0.29	13.21	13.06	2.2	13.75	14.05	18.9	Case B	N/A	Case B
8	DS5-6	2	10.602	201.79	5.792	1.13	1.17	0.52	13.84	13.62	0	0	14.71	14.19	1.93	14.99	15.06	18.5	N/A	Case F	N/A
9	DS5-7	2	5.163	168.07	4.813	0.75	0.8	0.36	15	14.96	0	0	15.01	14.65	1.11	15.01	---	18.9	N/A	Case F	N/A
10	DS5-9	1.5	1.843	142.51	3.694	0.49	0.51	0.21	14.3	14.09	0	0	15.01	14.8	0.7	15.01	---	19.81	N/A	Case A	N/A

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	ES5																
1	DS5	0	0	0	0	0	0	0	2.44	1.59	0.405	2.62	0	0.208	0.114	0.06	2.68
2	DS5-1	0.1	0	0	0	0	0	0	2.35	1.53	0.38	2.51	0	0.721	0.431	0.18	2.69
3	DS5-2	0.16	0	0	0	0	0	0	2.36	1.6	0.528	2.61	0	0.138	0.545	0.17	2.77
4	DS5-3	0.1	0.23	0	0	0	0	0.23	2.52	2.27	0.452	2.58	0	0.556	0.125	0.03	2.61
5	DS5-4	0.1	0.16	0	0	0	0	0.16	2.44	2.2	0.439	2.49	0	0.43	0.412	0.04	2.53
6	DS5-8	0	0	0	0	0	0	0	0.79	0.53	0.107	0.72	0	0	2.141	0	0.79
7	DS5-5	0.06	0.29	0	0	0	0	0.29	1.66	1.51	0.348	1.97	0	0.032	0.701	0.23	2.2
8	DS5-6	0.09	0	0	0	0	0	0	1.65	1.13	0.421	1.79	0	0.004	0.959	0.13	1.93
9	DS5-7	0.02	0	0	0	0	0	0	1.11	0.75	0.205	1.11	0	0	1.947	0	1.11
10	DS5-9	0	0	0	0	0	0	0	0.7	0.49	0.15	0.67	0	0	3.214	0	0.7

DA-5 **10-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP5	DS5	ES5	70.06	4552.1	315512.4	0.95	4324.5	302021.8	6	8.581	5.543	38.751	0	38.751	3	51.142	7.235	7.95	0.147	7.84	7.49	N/A	0.50%
2	DP5-1	DS5-1	DS5	93.61	37247.63	292705.4	0.98	36502.68	280355.1	6	8.382	5.589	36.269	0	36.269	3	51.142	7.235	7.844	0.199	8.31	7.84	N/A	0.50%
3	DP5-2	DS5-2	DS5-1	102.79	38917.45	255457.7	0.98	38139.1	243852.4	6	8.147	5.643	31.853	0	31.853	2.5	31.45	6.407	7.293	0.235	9.32	8.81	N/A	0.50%
4	DP5-3	DS5-3	DS5-2	116.83	8420.14	216540.3	0.95	7999.13	205713.3	6	7.877	5.705	27.169	0	27.169	2.5	31.45	6.407	7.204	0.27	9.91	9.32	N/A	0.50%
5	DP5-4	DS5-4	DS5-3	85.3	21308.08	208120.2	0.95	20242.67	197714.1	6	7.678	5.751	26.322	0	26.322	2.5	31.45	6.407	7.168	0.198	10.33	9.91	N/A	0.50%
6	DP5-8	DS5-8	DS5-4	106.97	26821.74	26821.74	0.95	25480.65	25480.65	6	6	6.139	3.621	0	3.621	2	17.346	5.521	4.36	0.409	15.1	14.57	N/A	0.50%
7	DP5-5	DS5-5	DS5-4	243.62	52155.8	159990.3	0.95	49548.01	151990.8	6	7.084	5.888	20.718	0	20.718	2.5	31.45	6.407	6.836	0.594	11.55	10.33	N/A	0.50%
8	DP5-6	DS5-6	DS5-5	201.79	56710.72	107834.5	0.95	53875.19	102442.8	6	6.538	6.015	14.263	0	14.263	2	17.346	5.521	6.159	0.546	13.06	12.05	N/A	0.50%
9	DP5-7	DS5-7	DS5-6	168.07	51123.81	51123.81	0.95	48567.62	48567.62	6	6	6.139	6.902	0	6.902	2	17.346	5.521	5.203	0.538	13.9	13.06	N/A	0.50%
10	DP5-9	DS5-9	DS5	142.51	18254.95	18254.95	0.95	17342.21	17342.21	6	6	6.139	2.464	0	2.464	1.5	8.054	4.558	4.003	0.593	14.31	13.6	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	ES5								0	0							10.49	10.67			
1	DS5	3	38.751	70.06	7.95	1.95	2.03	0.98	10.43	9.44	0	0	10.78	9.79	3.34	11.18	15.1	20.04	N/A	Case A	N/A
2	DS5-1	3	36.269	93.61	5.131	1.87	1.96	0.41	11.35	10.94	0.003	0.24	11.58	11.17	3.45	11.75	11.31	20.74	Case B	N/A	Case B
3	DS5-2	2.5	31.853	102.79	6.489	2.5	n/a	0.65	12.02	11.36	0.005	0.53	12.54	11.89	3.44	12.76	11.82	20.65	Case B	N/A	Case A
4	DS5-3	2.5	27.169	116.83	5.535	2.5	n/a	0.48	12.95	12.47	0.004	0.44	13.39	12.91	3.64	13.54	12.41	20.53	Case B	N/A	Case A
5	DS5-4	2.5	26.322	85.3	5.362	2.5	n/a	0.45	13.72	13.28	0.004	0.3	14.02	13.58	3.84	14.18	12.83	20.5	Case B	N/A	Case A
6	DS5-8	2	3.621	106.97	4.36	0.62	0.67	0.3	15.48	15.19	0	0	16.02	15.72	0.92	16.02	---	20.1	N/A	Case A	N/A
7	DS5-5	2.5	20.718	243.62	4.221	2.5	n/a	0.28	14.29	14.01	0.002	0.53	14.82	14.54	3.35	14.9	14.05	18.9	Case B	N/A	Case A
8	DS5-6	2	14.263	201.79	4.54	2	n/a	0.32	15.03	14.71	0.003	0.68	15.71	15.39	2.76	15.82	15.06	18.5	Case B	N/A	Case A
9	DS5-7	2	6.902	168.07	2.197	2	n/a	0.08	15.85	15.78	0.001	0.13	15.99	15.91	2.12	16.02	---	18.9	Case B	N/A	Case A
10	DS5-9	1.5	2.464	142.51	4.003	0.57	0.59	0.25	14.42	14.17	0	0	15.13	14.88	0.82	15.13	---	19.81	N/A	Case A	N/A

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	ES5																
1	DS5	0	0	0	0	0	0	0	2.94	1.95	0.558	3.25	0	0.208	0.096	0.09	3.34
2	DS5-1	0.16	0.24	0	0	0	0	0.24	3.27	2.86	0.522	3.36	0	0.719	0.394	0.09	3.45
3	DS5-2	0.26	0.53	0	0	0	0	0.53	3.22	2.57	0.724	3.35	0	0.137	0.499	0.08	3.44
4	DS5-3	0.19	0.44	0	0	0	0	0.44	3.48	3	0.617	3.58	0	0.555	0.11	0.06	3.64
5	DS5-4	0.18	0.3	0	0	0	0	0.3	3.69	3.24	0.598	3.78	0	0.427	0.287	0.06	3.84
6	DS5-8	0	0	0	0	0	0	0	0.92	0.62	0.144	0.87	0	0	2.064	0	0.92
7	DS5-5	0.11	0.53	0	0	0	0	0.53	3.27	2.99	0.471	3.32	0	0.032	0.525	0.03	3.35
8	DS5-6	0.13	0.68	0	0	0	0	0.68	2.65	2.33	0.566	2.72	0	0.004	0.716	0.05	2.76
9	DS5-7	0.03	0.13	0	0	0	0	0.13	2.09	2.01	0.274	2.1	0	0	1.449	0.02	2.12
10	DS5-9	0	0	0	0	0	0	0	0.82	0.57	0.201	0.82	0	0	3.118	0	0.82

DA-6 **2-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP6	DS6-1	ES6	88.89	4550.62	248107.1	0.95	4323.09	235701.7	6	8.652	4.04	22.044	0	22.044	3	51.142	7.235	6.962	0.213	10.55	10.1	N/A	0.50%
2	DP6-1	DS6-2	DS6-1	161.51	16977.6	69923.24	0.95	16128.72	66427.08	6	7.759	4.226	6.498	0	6.498	2.5	31.45	6.407	5.045	0.534	12.75	11.94	N/A	0.50%
3	DP6-2	DS6-3	DS6-2	150.27	14066.7	52945.64	0.95	13363.37	50298.35	6	7.226	4.337	5.05	0	5.05	2.5	31.45	6.407	4.696	0.533	13.5	12.75	N/A	0.50%
4	DP6-3	DS6-4	DS6-3	149.77	17090.78	38878.94	0.95	16236.24	36934.99	6	6.662	4.454	3.808	0	3.808	2	17.346	5.521	4.423	0.564	14.75	14	N/A	0.50%
5	DP6-4	DS6-5	DS6-4	150.11	21788.16	21788.16	0.95	20698.75	20698.75	6	6	4.592	2.2	0	2.2	2	17.346	5.521	3.781	0.662	15.5	14.75	N/A	0.50%
6	DP6-5	DS6-6	DS6-1	71.08	11580.65	173633.2	0.95	11001.62	164951.6	6	8.467	4.079	15.575	0	15.575	2.5	31.45	6.407	6.387	0.185	11.4	11.05	N/A	0.50%
7	DP6-6	DS6-7	DS6-6	120.19	18967.54	162052.6	0.95	18019.16	153950	6	8.149	4.145	14.772	0	14.772	2.5	31.45	6.407	6.302	0.318	12	11.4	N/A	0.50%
8	DP6-7	DS6-8	DS6-7	135.97	27072.31	143085	0.95	25718.69	135930.8	6	7.779	4.222	13.284	0	13.284	2.5	31.45	6.407	6.133	0.37	12.68	12	N/A	0.50%
9	DP6-8	DS6-9	DS6-8	166.94	18189.6	116012.7	0.95	17280.12	110212.1	6	7.303	4.321	11.024	0	11.024	2.5	31.45	6.407	5.838	0.477	13.52	12.68	N/A	0.50%
10	DP6-9	DS6-10	DS6-9	48.35	14875.49	97823.14	0.95	14131.72	92931.98	6	7.158	4.351	9.36	0	9.36	2.5	31.45	6.407	5.584	0.144	13.76	13.52	N/A	0.50%
11	DP6-10	DS6-11	DS6-10	109.54	29466.3	82947.64	0.95	27992.98	78800.26	6	6.818	4.422	8.066	0	8.066	2.5	31.45	6.407	5.36	0.341	14.31	13.76	N/A	0.50%
12	DP6-11	DS6-12	DS6-11	129.5	29206.29	53481.35	0.95	27745.97	50807.28	6	6.373	4.514	5.309	0	5.309	2	17.346	5.521	4.85	0.445	15.45	14.81	N/A	0.50%
13	DP6-12	DS6-13	DS6-12	87.23	24275.06	24275.06	0.95	23061.31	23061.31	6	6	4.592	2.451	0	2.451	2	17.346	5.521	3.901	0.373	15.89	15.45	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	ES6								0	0							13.1	13.28			
1	DS6-1	3	22.044	88.89	6.962	1.38	1.51	0.75	12.23	11.48	0	0	12.68	11.92	2.51	13.06	13.55	19.51	N/A	Case A	N/A
2	DS6-2	2.5	6.498	161.51	5.045	0.77	0.84	0.4	13.11	12.97	0	0	13.92	13.52	1.17	13.92	15.25	20.5	N/A	Case F	N/A
3	DS6-3	2.5	5.05	150.27	4.696	0.68	0.74	0.34	13.95	13.87	0	0	14.52	14.18	1.02	14.52	16	20.5	N/A	Case F	N/A
4	DS6-4	2	3.808	149.77	4.423	0.64	0.68	0.3	14.94	14.64	0	0	15.69	15.39	0.94	15.69	16.75	20.5	N/A	Case B	N/A
5	DS6-5	2	2.2	150.11	3.781	0.48	0.52	0.22	15.7	15.67	0	0	16.2	15.98	0.7	16.2	---	20.5	N/A	Case F	N/A
6	DS6-6	2.5	15.575	71.08	6.387	1.24	1.33	0.63	13.14	12.93	0	0	13.28	12.65	2.18	13.58	13.9	19.23	N/A	Case F	N/A
7	DS6-7	2.5	14.772	120.19	6.302	1.21	1.3	0.62	13.64	13.48	0	0	13.83	13.21	2.21	14.21	14.5	20.07	N/A	Case F	N/A
8	DS6-8	2.5	13.284	135.97	6.133	1.13	1.23	0.58	14.26	14.13	0	0	14.4	13.82	1.83	14.52	15.18	20.81	N/A	Case F	N/A
9	DS6-9	2.5	11.024	166.94	5.838	1.02	1.11	0.53	14.57	14.44	0	0	15.07	14.54	1.6	15.12	16.02	20.89	N/A	Case F	N/A
10	DS6-10	2.5	9.36	48.35	5.584	0.94	1.02	0.48	15.17	15.04	0	0	15.18	14.69	1.42	15.18	16.26	20.89	N/A	Case F	N/A
11	DS6-11	2.5	8.066	109.54	5.36	0.86	0.94	0.45	15.23	15.11	0	0	15.62	15.17	1.31	15.62	16.81	20.87	N/A	Case F	N/A
12	DS6-12	2	5.309	129.5	4.85	0.76	0.81	0.37	15.93	15.57	0	0	16.58	16.21	1.13	16.58	17.45	20.88	N/A	Case B	N/A
13	DS6-13	2	2.451	87.23	3.901	0.51	0.54	0.24	16.59	16.57	0	0	16.63	16.4	0.74	16.63	---	20.89	N/A	Case F	N/A

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	ES6																
1	DS6-1	0	0	0	0	0	0	0	2.13	1.38	0.318	2.23	0	2.966	0.041	0.28	2.51
2	DS6-2	0.06	0	0	0	0	0	0	1.17	0.77	0.148	1.11	0	0.035	0.645	0	1.17
3	DS6-3	0.03	0	0	0	0	0	0	1.02	0.68	0.115	0.94	0	0	0.644	0	1.02
4	DS6-4	0	0	0	0	0	0	0	0.94	0.64	0.151	0.9	0	0	1.066	0	0.94
5	DS6-5	0.01	0	0	0	0	0	0	0.7	0.48	0.087	0.62	0	0	2.188	0	0.7
6	DS6-6	0.08	0	0	0	0	0	0	1.88	1.24	0.354	1.99	0	1.41	0.156	0.18	2.18
7	DS6-7	0.07	0	0	0	0	0	0	1.82	1.21	0.336	1.92	0	2.477	0.287	0.28	2.21
8	DS6-8	0.05	0	0	0	0	0	0	1.72	1.13	0.302	1.79	0	0.077	0.479	0.04	1.83
9	DS6-9	0.05	0	0	0	0	0	0	1.55	1.02	0.25	1.58	0	0.229	0.363	0.02	1.6
10	DS6-10	0.05	0	0	0	0	0	0	1.42	0.94	0.213	1.42	0	0.056	0.348	0	1.42
11	DS6-11	0.05	0	0	0	0	0	0	1.31	0.86	0.183	1.28	0	0.025	0.75	0	1.31
12	DS6-12	0	0	0	0	0	0	0	1.13	0.76	0.211	1.13	0	0.001	1.175	0	1.13
13	DS6-13	0.01	0	0	0	0	0	0	0.74	0.51	0.097	0.67	0	0	2.166	0	0.74

DA-6 **10-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP6	DS6-1	ES6	88.89	4550.62	248107.1	0.95	4323.09	235701.7	6	8.45	5.573	30.407	0	30.407	3	51.142	7.235	7.541	0.196	10.55	10.1	N/A	0.50%
2	DP6-1	DS6-2	DS6-1	161.51	16977.6	69923.24	0.95	16128.72	66427.08	6	7.617	5.765	8.865	0	8.865	2.5	31.45	6.407	5.502	0.489	12.75	11.94	N/A	0.50%
3	DP6-2	DS6-3	DS6-2	150.27	14066.7	52945.64	0.95	13363.37	50298.35	6	7.128	5.878	6.844	0	6.844	2.5	31.45	6.407	5.12	0.489	13.5	12.75	N/A	0.50%
4	DP6-3	DS6-4	DS6-3	149.77	17090.78	38878.94	0.95	16236.24	36934.99	6	6.609	5.998	5.128	0	5.128	2	17.346	5.521	4.804	0.52	14.75	14	N/A	0.50%
5	DP6-4	DS6-5	DS6-4	150.11	21788.16	21788.16	0.95	20698.75	20698.75	6	6	6.139	2.941	0	2.941	2	17.346	5.521	4.111	0.609	15.5	14.75	N/A	0.50%
6	DP6-5	DS6-6	DS6-1	71.08	11580.65	173633.2	0.95	11001.62	164951.6	6	8.278	5.613	21.432	0	21.432	2.5	31.45	6.407	6.887	0.172	11.4	11.05	N/A	0.50%
7	DP6-6	DS6-7	DS6-6	120.19	18967.54	162052.6	0.95	18019.16	153950	6	7.983	5.681	20.245	0	20.245	2.5	31.45	6.407	6.801	0.295	12	11.4	N/A	0.50%
8	DP6-7	DS6-8	DS6-7	135.97	27072.31	143085	0.95	25718.69	135930.8	6	7.641	5.76	18.124	0	18.124	2.5	31.45	6.407	6.628	0.342	12.68	12	N/A	0.50%
9	DP6-8	DS6-9	DS6-8	166.94	18189.6	116012.7	0.95	17280.12	110212.1	6	7.201	5.862	14.954	0	14.954	2.5	31.45	6.407	6.322	0.44	13.52	12.68	N/A	0.50%
10	DP6-9	DS6-10	DS6-9	48.35	14875.49	97823.14	0.95	14131.72	92931.98	6	7.068	5.892	12.675	0	12.675	2.5	31.45	6.407	6.058	0.133	13.76	13.52	N/A	0.50%
11	DP6-10	DS6-11	DS6-10	109.54	29466.3	82947.64	0.95	27992.98	78800.26	6	6.754	5.965	10.88	0	10.88	2.5	31.45	6.407	5.817	0.314	14.31	13.76	N/A	0.50%
12	DP6-11	DS6-12	DS6-11	129.5	29206.29	53481.35	0.95	27745.97	50807.28	6	6.343	6.06	7.127	0	7.127	2	17.346	5.521	5.247	0.411	15.45	14.81	N/A	0.50%
13	DP6-12	DS6-13	DS6-12	87.23	24275.06	24275.06	0.95	23061.31	23061.31	6	6	6.139	3.277	0	3.277	2	17.346	5.521	4.239	0.343	15.89	15.45	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	ES6								0	0							13.1	13.28			
1	DS6-1	3	30.407	88.89	7.541	1.67	1.79	0.88	12.65	11.77	0	0	13.1	12.21	3.39	13.94	13.55	19.51	N/A	Case A	N/A
2	DS6-2	2.5	8.865	161.51	5.502	0.91	0.99	0.47	13.96	13.89	0	0	14.13	13.66	1.38	14.13	15.25	20.5	N/A	Case F	N/A
3	DS6-3	2.5	6.844	150.27	5.12	0.79	0.87	0.41	14.17	14.07	0	0	14.7	14.29	1.2	14.7	16	20.5	N/A	Case F	N/A
4	DS6-4	2	5.128	149.77	4.804	0.75	0.8	0.36	15.11	14.75	0	0	15.85	15.5	1.1	15.85	16.75	20.5	N/A	Case B	N/A
5	DS6-5	2	2.941	150.11	4.111	0.56	0.6	0.26	15.87	15.83	0	0	16.32	16.06	0.82	16.32	---	20.5	N/A	Case F	N/A
6	DS6-6	2.5	21.432	71.08	4.366	2.5	n/a	0.3	14.05	13.76	0.002	0.17	14.22	13.92	2.97	14.37	13.9	19.23	Case B	N/A	Case A
7	DS6-7	2.5	20.245	120.19	4.124	1.46	1.53	0.26	14.48	14.21	0.002	0.25	14.73	14.46	2.92	14.92	14.5	20.07	Case B	N/A	Case B
8	DS6-8	2.5	18.124	135.97	3.692	1.36	1.44	0.21	15.01	14.79	0.002	0.23	15.23	15.02	2.61	15.3	15.18	20.81	Case B	N/A	Case B
9	DS6-9	2.5	14.954	166.94	3.046	1.21	1.3	0.14	15.35	15.21	0.001	0.19	15.54	15.4	2.07	15.59	16.02	20.89	Case B	N/A	Case B
10	DS6-10	2.5	12.675	48.35	6.058	1.1	1.2	0.57	15.64	15.51	0	0	15.64	15.07	1.88	15.64	16.26	20.89	N/A	Case F	N/A
11	DS6-11	2.5	10.88	109.54	5.817	1.02	1.1	0.53	15.69	15.57	0	0	15.85	15.32	1.59	15.89	16.81	20.87	N/A	Case F	N/A
12	DS6-12	2	7.127	129.5	5.247	0.89	0.95	0.43	16	15.74	0	0	16.78	16.35	1.43	16.88	17.45	20.88	N/A	Case F	N/A
13	DS6-13	2	3.277	87.23	4.239	0.59	0.63	0.28	16.9	16.87	0	0	16.9	16.62	1.01	16.9	---	20.89	N/A	Case F	N/A

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	ES6																
1	DS6-1	0	0	0	0	0	0	0	2.55	1.67	0.438	2.76	0	2.957	0.038	0.63	3.39
2	DS6-2	0.03	0	0	0	0	0	0	1.38	0.91	0.201	1.37	0	0.035	0.62	0	1.38
3	DS6-3	0.04	0	0	0	0	0	0	1.2	0.79	0.155	1.15	0	0	0.622	0	1.2
4	DS6-4	0	0	0	0	0	0	0	1.1	0.75	0.204	1.1	0	0	1.022	0	1.1
5	DS6-5	0.02	0	0	0	0	0	0	0.82	0.56	0.117	0.76	0	0	2.121	0	0.82
6	DS6-6	0.12	0.17	0	0	0	0	0.17	2.82	2.52	0.487	2.88	0	1.404	0.132	0.09	2.97
7	DS6-7	0.11	0.25	0	0	0	0	0.25	2.72	2.46	0.46	2.78	0	2.466	0.248	0.14	2.92
8	DS6-8	0.08	0.23	0	0	0	0	0.23	2.55	2.34	0.412	2.59	0	0.077	0.419	0.02	2.61
9	DS6-9	0.06	0.19	0	0	0	0	0.19	2.03	1.88	0.34	2.05	0	0.229	0.334	0.02	2.07
10	DS6-10	0.05	0	0	0	0	0	0	1.88	1.31	0.288	1.74	0	0.056	0.328	0	1.88
11	DS6-11	0.05	0	0	0	0	0	0	1.54	1.02	0.247	1.57	0	0.025	0.71	0.02	1.59
12	DS6-12	0.1	0	0	0	0	0	0	1.32	0.89	0.283	1.37	0	0.001	1.108	0.06	1.43
13	DS6-13	0.01	0	0	0	0	0	0	1.01	0.73	0.13	0.82	0	0	2.093	0	1.01

DA-7 **2-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP7-1	DS7-1	ES7	60.45	9317.61	164471.5	0.95	8851.73	157509.8	6	8.482	4.076	14.861	0	14.861	3	51.142	7.235	6.265	0.161	10.89	10.59	N/A	0.50%
2	DP7-2	DS7-2	DS7-1	170.95	19624.97	83814.67	0.95	18643.72	79623.94	6	7.943	4.188	7.719	0	7.719	2.5	31.45	6.407	5.295	0.538	12.24	11.39	N/A	0.50%
3	DP7-3	DS7-3	DS7-2	224.35	23095.79	64189.71	0.95	21941	60980.22	6	7.202	4.342	6.129	0	6.129	2	17.346	5.521	5.042	0.742	13.87	12.74	N/A	0.50%
4	DP7-4	DS7-4	DS7-3	165.92	26171.3	41093.92	0.95	24862.73	39039.22	6	6.587	4.47	4.039	0	4.039	2	17.346	5.521	4.497	0.615	14.7	13.87	N/A	0.50%
5	DP7-5	DS7-5	DS7-4	122.86	14922.62	14922.62	0.95	14176.49	14176.49	6	6	4.592	1.507	0	1.507	1.5	8.054	4.558	3.489	0.587	15.81	15.2	N/A	0.50%
6	DP7-10	DS7-10	DS7-1	129.66	8600.82	8600.82	0.95	8170.77	8170.77	6	6	4.592	0.869	0	0.869	1.5	9.309	5.268	3.299	0.655	16	15.13	N/A	0.67%
7	DP7-6	DS7-6	DS7-1	85.28	18242.84	62738.39	0.98	17877.98	60863.37	6	7.363	4.308	6.07	0	6.07	2	17.346	5.521	5.028	0.283	14.17	13.75	N/A	0.50%
8	DP7-7	DS7-7	DS7-6	57.09	23820.3	44495.56	0.98	23343.89	42985.39	6	7.158	4.351	4.329	0	4.329	1.5	8.054	4.558	4.637	0.205	14.96	14.67	N/A	0.50%
9	DP7-8	DS7-8	DS7-7	85.94	12300.93	20675.26	0.95	11685.89	19641.5	6	6.78	4.43	2.014	0	2.014	1.5	8.054	4.558	3.786	0.378	15.39	14.96	N/A	0.50%
10	DP7-9	DS7-9	DS7-8	138.22	8374.33	8374.33	0.95	7955.61	7955.61	6	6	4.592	0.846	0	0.846	1.5	8.054	4.558	2.954	0.78	16.08	15.39	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	ES7								0	0							13.59	13.77			
1	DS7-1	3	14.861	60.45	6.265	1.11	1.23	0.61	12.31	11.7	0	0	12.61	12	1.72	12.61	15.75	20.5	N/A	Case A	N/A
2	DS7-2	2.5	7.719	170.95	5.295	0.84	0.92	0.44	12.67	12.51	0	0	13.52	13.09	1.28	13.52	14.74	20.5	N/A	Case F	N/A
3	DS7-3	2	6.129	224.35	5.042	0.82	0.88	0.4	13.96	13.57	0	0	15.08	14.69	1.32	15.19	15.87	20.45	N/A	Case B	N/A
4	DS7-4	2	4.039	165.92	4.497	0.66	0.7	0.31	15.21	15.16	0	0	15.67	15.35	0.97	15.67	16.7	20.5	N/A	Case F	N/A
5	DS7-5	1.5	1.507	122.86	3.489	0.44	0.46	0.19	15.73	15.57	0	0	16.44	16.25	0.63	16.44	---	20.31	N/A	Case F	N/A
6	DS7-10	1.5	0.869	129.66	3.299	0.31	0.35	0.17	15.61	15.44	0	0	16.48	16.31	0.48	16.48	---	20.75	N/A	Case A	N/A
7	DS7-6	2	6.07	85.28	5.028	0.82	0.87	0.39	14.96	14.56	0	0	15.38	14.99	1.25	15.43	16.17	20.52	N/A	Case A	N/A
8	DS7-7	1.5	4.329	57.09	4.637	0.78	0.8	0.33	15.79	15.46	0	0	16.08	15.74	1.32	16.27	16.46	20.53	N/A	Case B	N/A
9	DS7-8	1.5	2.014	85.94	3.786	0.51	0.54	0.22	16.28	16.26	0	0	16.28	16.06	0.89	16.28	16.89	20.41	N/A	Case F	N/A
10	DS7-9	1.5	0.846	138.22	2.954	0.33	0.34	0.14	16.29	16.28	0	0	16.54	16.41	0.46	16.54	---	20.58	N/A	Case F	N/A

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	ES7																
1	DS7-1	0	0	0	0	0	0	0	1.72	1.11	0.214	1.71	0	1.637	0.354	0	1.72
2	DS7-2	0.07	0	0	0	0	0	0	1.28	0.84	0.175	1.25	0	0.045	0.657	0	1.28
3	DS7-3	0	0	0	0	0	0	0	1.22	0.82	0.243	1.24	0	2.322	0.961	0.08	1.32
4	DS7-4	0.02	0	0	0	0	0	0	0.97	0.66	0.16	0.94	0	0.099	1.549	0	0.97
5	DS7-5	0.06	0	0	0	0	0	0	0.63	0.44	0.123	0.59	0	0	2.609	0	0.63
6	DS7-10	0	0	0	0	0	0	0	0.48	0.31	0.071	0.41	0	0	2.898	0	0.48
7	DS7-6	0	0	0	0	0	0	0	1.21	0.82	0.241	1.23	0	0.147	0.752	0.02	1.25
8	DS7-7	0	0	0	0	0	0	0	1.12	0.78	0.353	1.19	0	0	1.586	0.12	1.32
9	DS7-8	0.01	0	0	0	0	0	0	0.89	0.67	0.164	0.72	0	1.349	1.71	0	0.89
10	DS7-9	0	0	0	0	0	0	0	0.46	0.33	0.069	0.4	0	0	2.733	0	0.46

DA-7 **10-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP7-1	DS7-1	ES7	60.45	9317.61	164471.5	0.95	8851.73	157509.8	6	8.286	5.611	20.457	0	20.457	3	51.142	7.235	6.827	0.148	10.89	10.59	N/A	0.50%
2	DP7-2	DS7-2	DS7-1	170.95	19624.97	83814.67	0.95	18643.72	79623.94	6	7.792	5.725	10.552	0	10.552	2.5	31.45	6.407	5.769	0.494	12.24	11.39	N/A	0.50%
3	DP7-3	DS7-3	DS7-2	224.35	23095.79	64189.71	0.95	21941	60980.22	6	7.107	5.883	8.305	0	8.305	2	17.346	5.521	5.458	0.685	13.87	12.74	N/A	0.50%
4	DP7-4	DS7-4	DS7-3	165.92	26171.3	41093.92	0.95	24862.73	39039.22	6	6.541	6.014	5.435	0	5.435	2	17.346	5.521	4.881	0.567	14.7	13.87	N/A	0.50%
5	DP7-5	DS7-5	DS7-4	122.86	14922.62	14922.62	0.95	14176.49	14176.49	6	6	6.139	2.015	0	2.015	1.5	8.054	4.558	3.787	0.541	15.81	15.2	N/A	0.50%
6	DP7-10	DS7-10	DS7-1	129.66	8600.82	8600.82	0.95	8170.77	8170.77	6	6	6.139	1.161	0	1.161	1.5	9.309	5.268	3.59	0.602	16	15.13	N/A	0.67%
7	DP7-6	DS7-6	DS7-1	85.28	18242.84	62738.39	0.98	17877.98	60863.37	6	7.257	5.849	8.24	0	8.24	2	17.346	5.521	5.447	0.261	14.17	13.75	N/A	0.50%
8	DP7-7	DS7-7	DS7-6	57.09	23820.3	44495.56	0.98	23343.89	42985.39	6	7.065	5.893	5.864	0	5.864	1.5	8.054	4.558	4.968	0.192	14.96	14.67	N/A	0.50%
9	DP7-8	DS7-8	DS7-7	85.94	12300.93	20675.26	0.95	11685.89	19641.5	6	6.717	5.973	2.716	0	2.716	1.5	8.054	4.558	4.11	0.349	15.39	14.96	N/A	0.50%
10	DP7-9	DS7-9	DS7-8	138.22	8374.33	8374.33	0.95	7955.61	7955.61	6	6	6.139	1.131	0	1.131	1.5	8.054	4.558	3.214	0.717	16.08	15.39	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	ES7								0	0							13.59	13.77			
1	DS7-1	3	20.457	60.45	6.827	1.32	1.45	0.72	12.63	11.91	0	0	12.93	12.21	2.25	13.14	15.75	20.5	N/A	Case A	N/A
2	DS7-2	2.5	10.552	170.95	5.769	1	1.09	0.52	13.19	13.07	0	0	13.76	13.24	1.55	13.79	14.74	20.5	N/A	Case F	N/A
3	DS7-3	2	8.305	224.35	5.458	0.98	1.03	0.46	13.95	13.56	0	0	15.3	14.84	1.79	15.65	15.87	20.45	N/A	Case F	N/A
4	DS7-4	2	5.435	165.92	4.881	0.77	0.82	0.37	15.67	15.62	0	0	15.84	15.47	1.15	15.85	16.7	20.5	N/A	Case F	N/A
5	DS7-5	1.5	2.015	122.86	3.787	0.51	0.54	0.22	15.9	15.78	0	0	16.54	16.32	0.73	16.54	---	20.31	N/A	Case F	N/A
6	DS7-10	1.5	1.161	129.66	3.59	0.36	0.4	0.2	15.69	15.49	0	0	16.56	16.36	0.56	16.56	---	20.75	N/A	Case A	N/A
7	DS7-6	2	8.24	85.28	5.447	0.97	1.02	0.46	15.18	14.72	0	0	15.61	15.14	1.58	15.76	16.17	20.52	N/A	Case A	N/A
8	DS7-7	1.5	5.864	57.09	4.968	0.95	0.93	0.38	15.87	15.58	0.005	0	16.29	15.91	1.66	16.61	16.46	20.53	N/A	Case F	Case D
9	DS7-8	1.5	2.716	85.94	1.537	0.6	0.63	0.04	16.63	16.59	0.001	0.05	16.68	16.64	1.32	16.71	16.89	20.41	Case B	N/A	Case B
10	DS7-9	1.5	1.131	138.22	3.214	0.38	0.4	0.16	16.71	16.7	0	0	16.71	16.55	0.63	16.71	---	20.58	N/A	Case F	N/A

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	ES7																
1	DS7-1	0	0	0	0	0	0	0	2.04	1.32	0.295	2.12	0	1.625	0.28	0.14	2.25
2	DS7-2	0.05	0	0	0	0	0	0	1.52	1	0.24	1.54	0	0.045	0.629	0.01	1.55
3	DS7-3	0.15	0	0	0	0	0	0	1.44	0.98	0.33	1.52	0	2.306	0.911	0.27	1.79
4	DS7-4	0.02	0	0	0	0	0	0	1.14	0.77	0.216	1.15	0	0.099	1.484	0.01	1.15
5	DS7-5	0.05	0	0	0	0	0	0	0.73	0.51	0.164	0.72	0	0	2.525	0	0.73
6	DS7-10	0	0	0	0	0	0	0	0.56	0.36	0.095	0.49	0	0	2.84	0	0.56
7	DS7-6	0	0	0	0	0	0	0	1.43	0.97	0.327	1.51	0	0.146	0.71	0.07	1.58
8	DS7-7	0.11	0	0	0	0	0	0	1.33	0.95	0.478	1.46	0	0	1.488	0.19	1.66
9	DS7-8	0.01	0.05	0	0	0	0	0.05	1.29	1.25	0.221	1.3	0	1.337	1.479	0.02	1.32
10	DS7-9	0	0	0	0	0	0	0	0.63	0.47	0.092	0.49	0	0	2.675	0	0.63

DA-8 **2-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP8	DS8A	ES8	93.22	0	164859.1	0	0	159615.3	0	8.979	3.972	14.677	0	14.677	3	51.142	7.235	6.244	0.249	9.94	9.47	N/A	0.50%
2	DP8-1	DS8-1	DS8	24.59	8260.24	142459.5	0.98	8095.03	138335.7	6	8.595	4.052	12.976	0	12.976	2.5	31.45	6.407	6.095	0.067	11.15	11.03	N/A	0.50%
3	DP8-10	DS8-10	DS8	160.26	10933.42	10933.42	0.95	10386.75	10386.75	6	6	4.592	1.104	0	1.104	1.5	8.054	4.558	3.192	0.837	14.8	14	N/A	0.50%
4	DP8-11	DS8	DS8A	119.07	11466.18	164859.1	0.95	10892.87	159615.3	6	8.662	4.038	14.92	0	14.92	3	51.142	7.235	6.272	0.316	10.53	9.94	N/A	0.50%
5	DP8-2	DS8-2	DS8-1	43.84	10761.12	134199.3	0.98	10545.89	130240.7	6	8.473	4.078	12.293	0	12.293	2.5	31.45	6.407	6.009	0.122	11.37	11.15	N/A	0.50%
6	DP8-3	DS8-3	DS8-2	42.33	13804.57	123438.2	0.98	13528.48	119694.8	6	8.354	4.102	11.367	0	11.367	2	17.346	5.521	5.884	0.12	12.09	11.87	N/A	0.50%
7	DP8-4	DS8-4	DS8-3	43.45	22396.17	109633.6	0.98	21948.25	106166.3	6	8.227	4.129	10.147	0	10.147	2	17.346	5.521	5.733	0.126	12.3	12.09	N/A	0.50%
8	DP8-5	DS8-5	DS8-4	84.6	22191.86	87237.42	0.98	21748.03	84218.04	6	7.968	4.183	8.154	0	8.154	2	17.346	5.521	5.432	0.26	12.73	12.3	N/A	0.50%
9	DP8-6	DS8-6	DS8-5	83.75	22558.01	65045.55	0.98	22106.85	62470.02	6	7.691	4.24	6.132	0	6.132	2	17.346	5.521	5.042	0.277	13.14	12.73	N/A	0.50%
10	DP8-7	DS8-7	DS8-6	83.67	7562.95	42487.54	0.95	7184.8	40363.16	6	7.38	4.305	4.022	0	4.022	2	17.346	5.521	4.491	0.31	13.56	13.14	N/A	0.50%
11	DP8-8	DS8-8	DS8-7	170.19	13066.47	34924.59	0.95	12413.14	33178.36	6	6.719	4.442	3.412	0	3.412	2	17.346	5.521	4.288	0.662	14.41	13.56	N/A	0.50%
12	DP8-9	DS8-9	DS8-8	163.23	21858.12	21858.12	0.95	20765.21	20765.21	6	6	4.592	2.207	0	2.207	2	17.346	5.521	3.785	0.719	15.23	14.41	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	DS8	3	14.92	119.07	6.272	1.11	1.23	0.61	11.72	11.52	0	0	12.25	11.64	1.72	12.25	13.53	20.32	N/A	Case F	N/A
1	DS8-1	2.5	12.976	24.59	6.095	1.12	1.21	0.58	12.44	11.98	0	0	12.85	12.27	1.78	12.94	13.65	20.5	N/A	Case F	N/A
2	DS8-10	1.5	1.104	160.26	3.192	0.38	0.39	0.16	14.53	14.37	0	0	15.33	15.18	0.53	15.33	---	20.38	N/A	Case A	N/A
3	DS8-2	2.5	12.293	43.84	6.009	1.09	1.18	0.56	13	12.83	0	0	13.02	12.46	1.72	13.09	13.87	20.5	N/A	Case F	N/A
4	DS8-3	2	11.367	42.33	5.884	1.18	1.21	0.54	13.29	12.79	0	0	13.81	13.27	1.94	14.02	14.09	20.5	N/A	Case F	N/A
5	DS8-4	2	10.147	43.45	5.733	1.1	1.14	0.51	14.09	13.92	0	0	14.09	13.58	1.79	14.09	14.3	20.5	N/A	Case F	N/A
6	DS8-5	2	8.154	84.6	5.432	0.97	1.02	0.46	14.14	14.02	0	0	14.15	13.69	1.57	14.29	14.73	20.5	N/A	Case F	N/A
7	DS8-6	2	6.132	83.75	5.042	0.82	0.88	0.4	14.33	14.24	0	0	14.36	13.97	1.27	14.41	15.14	20.5	N/A	Case F	N/A
8	DS8-7	2	4.022	83.67	4.491	0.66	0.7	0.31	14.44	14.38	0	0	14.53	14.22	0.97	14.53	15.56	20.04	N/A	Case F	N/A
9	DS8-8	2	3.412	170.19	4.288	0.6	0.65	0.29	14.56	14.48	0	0	15.3	15.02	0.89	15.3	16.41	20.15	N/A	Case F	N/A
10	DS8-9	2	2.207	163.23	3.785	0.48	0.52	0.22	15.32	15.28	0	0	15.93	15.71	0.7	15.93	---	20.23	N/A	Case F	N/A
11	DS8A	3	14.677	93.22	6.244	1.1	1.22	0.61	11.18	10.57	0	0	11.64	11.04	1.71	11.64	12.94	20.67	N/A	Case A	N/A
12	ES8								0	0							12.47	12.65			

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	DS8	0.08	0	0	0	0	0	0	1.72	1.11	0.215	1.71	0	2.791	0.227	0	1.72
1	DS8-1	0.18	0	0	0	0	0	0	1.7	1.12	0.295	1.76	0	0.061	0.177	0.02	1.78
2	DS8-10	0	0	0	0	0	0	0	0.53	0.38	0.09	0.48	0	0	3.399	0	0.53
3	DS8-2	0.07	0	0	0	0	0	0	1.65	1.09	0.279	1.7	0	0.031	0.24	0.01	1.72
4	DS8-3	0.2	0	0	0	0	0	0	1.72	1.18	0.451	1.88	0	0.012	0.369	0.06	1.94
5	DS8-4	0.07	0	0	0	0	0	0	1.79	1.28	0.403	1.74	0	0.001	0.667	0	1.79
6	DS8-5	0.05	0	0	0	0	0	0	1.42	0.97	0.324	1.5	0	0.007	0.81	0.06	1.57
7	DS8-6	0.03	0	0	0	0	0	0	1.22	0.82	0.243	1.24	0	0.007	1.082	0.03	1.27
8	DS8-7	0.02	0	0	0	0	0	0	0.97	0.66	0.16	0.94	0	2.379	0.494	0	0.97
9	DS8-8	0.03	0	0	0	0	0	0	0.89	0.6	0.135	0.84	0	0.307	0.915	0	0.89
10	DS8-9	0.02	0	0	0	0	0	0	0.7	0.48	0.088	0.63	0	0	2.187	0	0.7
11	DS8A	0	0	0	0	0	0	0	1.71	1.1	0.211	1.69	0	2.646	0	0	1.71
12	ES8																

DA-8 **10-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP8	DS8A	ES8	93.22	0	164859.1	0	0	159615.3	0	8.746	5.505	20.338	0	20.338	3	51.142	7.235	6.817	0.228	9.94	9.47	N/A	0.50%
2	DP8-1	DS8-1	DS8	24.59	8260.24	142459.5	0.98	8095.03	138335.7	6	8.394	5.586	17.887	0	17.887	2.5	31.45	6.407	6.608	0.062	11.15	11.03	N/A	0.50%
3	DP8-10	DS8-10	DS8	160.26	10933.42	10933.42	0.95	10386.75	10386.75	6	6	6.139	1.476	0	1.476	1.5	8.054	4.558	3.469	0.77	14.8	14	N/A	0.50%
4	DP8-11	DS8	DS8A	119.07	11466.18	164859.1	0.95	10892.87	159615.3	6	8.456	5.572	20.586	0	20.586	3	51.142	7.235	6.839	0.29	10.53	9.94	N/A	0.50%
5	DP8-2	DS8-2	DS8-1	43.84	10761.12	134199.3	0.98	10545.89	130240.7	6	8.282	5.612	16.919	0	16.919	2.5	31.45	6.407	6.519	0.112	11.37	11.15	N/A	0.50%
6	DP8-3	DS8-3	DS8-2	42.33	13804.57	123438.2	0.98	13528.48	119694.8	6	8.169	5.638	15.621	0	15.621	2	17.346	5.521	6.244	0.113	12.09	11.87	N/A	0.50%
7	DP8-4	DS8-4	DS8-3	43.45	22396.17	109633.6	0.98	21948.25	106166.3	6	8.051	5.665	13.923	0	13.923	2	17.346	5.521	6.133	0.118	12.3	12.09	N/A	0.50%
8	DP8-5	DS8-5	DS8-4	84.6	22191.86	87237.42	0.98	21748.03	84218.04	6	7.81	5.721	11.153	0	11.153	2	17.346	5.521	5.859	0.241	12.73	12.3	N/A	0.50%
9	DP8-6	DS8-6	DS8-5	83.75	22558.01	65045.55	0.98	22106.85	62470.02	6	7.555	5.78	8.358	0	8.358	2	17.346	5.521	5.466	0.255	13.14	12.73	N/A	0.50%
10	DP8-7	DS8-7	DS8-6	83.67	7562.95	42487.54	0.95	7184.8	40363.16	6	7.27	5.846	5.462	0	5.462	2	17.346	5.521	4.887	0.285	13.56	13.14	N/A	0.50%
11	DP8-8	DS8-8	DS8-7	170.19	13066.47	34924.59	0.95	12413.14	33178.36	6	6.661	5.986	4.598	0	4.598	2	17.346	5.521	4.662	0.608	14.41	13.56	N/A	0.50%
12	DP8-9	DS8-9	DS8-8	163.23	21858.12	21858.12	0.95	20765.21	20765.21	6	6	6.139	2.951	0	2.951	2	17.346	5.521	4.114	0.661	15.23	14.41	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	DS8	3	20.586	119.07	6.839	1.32	1.46	0.73	12.31	12.11	0	0	12.58	11.86	2.35	12.88	13.53	20.32	N/A	Case F	N/A
1	DS8-1	2.5	17.887	24.59	6.608	1.35	1.43	0.68	13.01	12.68	0	0	13.18	12.51	2.22	13.38	13.65	20.5	N/A	Case F	N/A
2	DS8-10	1.5	1.476	160.26	3.469	0.44	0.46	0.19	14.62	14.43	0	0	15.42	15.24	0.62	15.42	---	20.38	N/A	Case A	N/A
3	DS8-2	2.5	16.919	43.84	6.519	1.31	1.39	0.66	13.46	13.25	0	0	13.46	12.8	2.11	13.49	13.87	20.5	N/A	Case F	N/A
4	DS8-3	2	15.621	42.33	6.244	1.49	1.43	0.61	13.69	13.18	0.005	0	14.18	13.57	2.41	14.49	14.09	20.5	N/A	Case F	Case D
5	DS8-4	2	13.923	43.45	4.432	2	n/a	0.31	14.61	14.31	0.003	0.14	14.75	14.45	2.55	14.85	14.3	20.5	Case B	N/A	Case A
6	DS8-5	2	11.153	84.6	3.55	2	n/a	0.2	14.93	14.73	0.002	0.18	15.1	14.91	2.44	15.17	14.73	20.5	Case B	N/A	Case A
7	DS8-6	2	8.358	83.75	2.66	2	n/a	0.11	15.21	15.1	0.001	0.1	15.31	15.2	2.21	15.35	15.14	20.5	Case B	N/A	Case A
8	DS8-7	2	5.462	83.67	1.739	0.77	0.82	0.05	15.37	15.33	0	0.04	15.41	15.37	1.89	15.45	15.56	20.04	Case B	N/A	Case B
9	DS8-8	2	4.598	170.19	4.662	0.7	0.75	0.34	15.46	15.43	0	0	15.46	15.13	1.05	15.46	16.41	20.15	N/A	Case F	N/A
10	DS8-9	2	2.951	163.23	4.114	0.56	0.6	0.26	15.48	15.43	0	0	16.05	15.79	0.82	16.05	---	20.23	N/A	Case F	N/A
11	DS8A	3	20.338	93.22	6.817	1.32	1.45	0.72	11.51	10.79	0	0	11.97	11.25	2.29	12.23	12.94	20.67	N/A	Case A	N/A
12	ES8								0	0							12.47	12.65			

*URBAN DRAINAGE DESIGN MANUAL - Hydraulic Engineering Circular No.22 Third Edition

#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	DS8	0.08	0	0	0	0	0	0	2.05	1.32	0.296	2.13	0	2.789	0.206	0.22	2.35
1	DS8-1	0.13	0	0	0	0	0	0	2.03	1.35	0.406	2.19	0	0.061	0.168	0.04	2.22
2	DS8-10	0	0	0	0	0	0	0	0.62	0.44	0.12	0.58	0	0	3.331	0	0.62
3	DS8-2	0.08	0	0	0	0	0	0	2.09	1.43	0.384	2.11	0	0.031	0.227	0.01	2.11
4	DS8-3	0.21	0	0	0	0	0	0	2.09	1.49	0.62	2.32	0	0.012	0.344	0.08	2.41
5	DS8-4	0.12	0.14	0	0	0	0	0.14	2.45	2.15	0.553	2.51	0	0.001	0.588	0.04	2.55
6	DS8-5	0.08	0.18	0	0	0	0	0.18	2.38	2.18	0.443	2.42	0	0.007	0.692	0.03	2.44
7	DS8-6	0.04	0.1	0	0	0	0	0.1	2.17	2.06	0.332	2.19	0	0.007	0.914	0.02	2.21
8	DS8-7	0.02	0.04	0	0	0	0	0.04	1.85	1.8	0.217	1.86	0	2.361	0.411	0.03	1.89
9	DS8-8	0.01	0	0	0	0	0	0	1.05	0.71	0.182	1.02	0	0.304	0.881	0	1.05
10	DS8-9	0.02	0	0	0	0	0	0	0.82	0.56	0.117	0.76	0	0	2.12	0	0.82
11	DS8A	0	0	0	0	0	0	0	2.04	1.32	0.293	2.11	0	2.634	0	0.18	2.29
12	ES8																

DA-9 **2-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP9	DS9	ES9	84.39	40220.26	233159.6	0.95	38209.25	221501.6	6	8.107	4.154	21.298	0	21.298	2.5	31.45	6.407	6.878	0.204	13.5	13.08	N/A	0.50%
2	DP9-1	DS9-1	DS9	144.78	18814.5	18814.5	0.95	17873.78	17873.78	6	6	4.592	1.9	0	1.9	1	2.154	2.742	3.093	0.78	13.95	13.5	N/A	0.31%
3	DP9-10	DS9-10	DS9-2	150	35535.79	47173.36	0.95	33759	44814.69	6	7.216	4.339	4.501	0	4.501	2	17.346	5.521	4.634	0.539	15.43	14.68	N/A	0.50%
4	DP9-11	DS9-11	DS9-10	66.25	4477.85	11637.57	0.95	4253.96	11055.69	6	6.873	4.41	1.129	0	1.129	1.5	8.054	4.558	3.212	0.344	15.76	15.43	N/A	0.50%
5	DP9-12	DS9-12	DS9-11	147.73	7159.72	7159.72	0.95	6801.73	6801.73	6	6	4.592	0.723	0	0.723	1.5	8.054	4.558	2.822	0.873	16.5	15.76	N/A	0.50%
6	DP9-2	DS9-2	DS9	157.84	43984.92	174124.8	0.95	41785.67	165418.6	6	7.756	4.227	16.185	0	16.185	2.5	38.457	7.834	7.492	0.351	14.68	13.5	N/A	0.75%
7	DP9-3	DS9-3	DS9-2	150	41949.81	82966.56	0.95	39852.32	78818.23	6	6.552	4.477	8.169	0	8.169	2	17.346	5.521	5.435	0.46	16.22	15.47	N/A	0.50%
8	DP9-4	DS9-4	DS9-3	150	41016.75	41016.75	0.95	38965.91	38965.91	6	6	4.592	4.142	0	4.142	2	17.346	5.521	4.528	0.552	16.97	16.22	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	DS9	2.5	21.298	84.39	6.878	1.51	1.57	0.74	15.32	14.59	0	0	15.74	15.01	2.95	16.45	16	18	N/A	Case A	N/A
1	DS9-1	1	1.9	144.78	2.419	1	n/a	0.09	16.49	16.4	0.002	0.35	16.84	16.75	2.91	16.86	---	16.95	Case B	N/A	Case A
2	DS9-10	2	4.501	150	1.433	0.7	0.75	0.03	16.87	16.84	0	0.05	16.92	16.89	1.51	16.94	16.93	20.46	Case B	N/A	Case B
3	DS9-11	1.5	1.129	66.25	0.639	0.38	0.4	0.01	16.94	16.93	0	0.01	16.94	16.94	1.19	16.95	17.26	20.22	Case B	N/A	Case B
4	DS9-12	1.5	0.723	147.73	2.822	0.3	0.32	0.12	16.95	16.95	0	0	16.95	16.83	0.45	16.95	---	20.4	N/A	Case F	N/A
5	DS9-2	2.5	16.185	157.84	3.297	1.13	1.36	0.17	16.52	16.35	0.001	0.21	16.73	16.56	2.18	16.86	17.47	20.49	Case B	N/A	Case B
6	DS9-3	2	8.169	150	5.435	0.97	1.02	0.46	16.93	16.74	0	0	17.65	17.19	1.56	17.78	18.22	20.74	N/A	Case F	N/A
7	DS9-4	2	4.142	150	4.528	0.67	0.71	0.32	17.8	17.76	0	0	17.95	17.64	0.98	17.95	---	20.97	N/A	Case F	N/A
8	ES9								0	0							15.58	15.74			

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	DS9	0	0	0	0	0	0	0	2.24	1.51	0.484	2.46	0	2.152	0.141	0.49	2.95
1	DS9-1	0.04	0.35	0	0	0	0	0.35	2.89	2.8	0.427	2.91	0	0	0.088	0	2.91
2	DS9-10	0.01	0.05	0	0	0	0	0.05	1.49	1.46	0.179	1.5	0	0.001	1.332	0.01	1.51
3	DS9-11	0	0.01	0	0	0	0	0.01	1.18	1.18	0.092	1.19	0	2.018	0.84	0	1.19
4	DS9-12	0	0	0	0	0	0	0	0.45	0.33	0.059	0.36	0	0	2.358	0	0.45
5	DS9-2	0.07	0.21	0	0	0	0	0.21	2.05	1.88	0.368	2.08	0	2.385	0.377	0.09	2.18
6	DS9-3	0.08	0	0	0	0	0	0	1.43	0.97	0.324	1.5	0	0	0.763	0.06	1.56
7	DS9-4	0.02	0	0	0	0	0	0	0.98	0.67	0.164	0.95	0	0	1.522	0	0.98
8	ES9																

DA-9 **10-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP9	DS9	ES9	84.39	40220.26	233159.6	0.95	38209.25	221501.6	6	7.938	5.691	29.181	0	29.181	2.5	31.45	6.407	7.27	0.193	13.5	13.08	N/A	0.50%
2	DP9-1	DS9-1	DS9	144.78	18814.5	18814.5	0.95	17873.78	17873.78	6	6	6.139	2.54	0	2.54	1	2.154	2.742	3.234	0.746	13.95	13.5	N/A	0.31%
3	DP9-10	DS9-10	DS9-2	150	35535.79	47173.36	0.95	33759	44814.69	6	7.117	5.881	6.101	0	6.101	2	17.346	5.521	5.035	0.496	15.43	14.68	N/A	0.50%
4	DP9-11	DS9-11	DS9-10	66.25	4477.85	11637.57	0.95	4253.96	11055.69	6	6.802	5.954	1.524	0	1.524	1.5	8.054	4.558	3.501	0.315	15.76	15.43	N/A	0.50%
5	DP9-12	DS9-12	DS9-11	147.73	7159.72	7159.72	0.95	6801.73	6801.73	6	6	6.139	0.967	0	0.967	1.5	8.054	4.558	3.071	0.802	16.5	15.76	N/A	0.50%
6	DP9-2	DS9-2	DS9	157.84	43984.92	174124.8	0.95	41785.67	165418.6	6	7.614	5.766	22.08	0	22.08	2.5	38.457	7.834	8.098	0.325	14.68	13.5	N/A	0.75%
7	DP9-3	DS9-3	DS9-2	150	41949.81	82966.56	0.95	39852.32	78818.23	6	6.51	6.021	10.986	0	10.986	2	17.346	5.521	5.839	0.428	16.22	15.47	N/A	0.50%
8	DP9-4	DS9-4	DS9-3	150	41016.75	41016.75	0.95	38965.91	38965.91	6	6	6.139	5.537	0	5.537	2	17.346	5.521	4.905	0.51	16.97	16.22	N/A	0.50%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	DS9	2.5	29.181	84.39	7.27	1.91	1.84	0.82	15.8	14.98	0.005	0.42	16.23	15.41	3.73	17.23	16	18	N/A	Case A	Case B
1	DS9-1	1	2.54	144.78	3.234	1	n/a	0.16	17.3	17.13	0.004	0.63	17.92	17.76	4.01	17.96	---	16.95	Case B	N/A	Case A
2	DS9-10	2	6.101	150	1.942	2	n/a	0.06	18	17.94	0.001	0.09	18.09	18.03	2.68	18.11	16.93	20.46	Case B	N/A	Case A
3	DS9-11	1.5	1.524	66.25	0.862	1.5	n/a	0.01	18.12	18.11	0	0.01	18.13	18.12	2.38	18.14	17.26	20.22	Case B	N/A	Case A
4	DS9-12	1.5	0.967	147.73	0.547	1.5	n/a	0	18.14	18.14	0	0.01	18.15	18.15	1.65	18.15	---	20.4	Case B	N/A	Case A
5	DS9-2	2.5	22.08	157.84	4.498	2.5	n/a	0.31	17.36	17.04	0.002	0.39	17.75	17.43	3.3	17.98	17.47	20.49	Case B	N/A	Case A
6	DS9-3	2	10.986	150	3.497	1.16	1.19	0.19	18.05	17.86	0.002	0.3	18.35	18.16	2.19	18.41	18.22	20.74	Case B	N/A	Case B
7	DS9-4	2	5.537	150	1.763	0.78	0.83	0.05	18.43	18.39	0.001	0.08	18.51	18.46	1.56	18.53	---	20.97	Case B	N/A	Case B
8	ES9								0	0							15.58	15.74			

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	DS9	0	0.42	0	0	0	0	0.42	2.73	1.91	0.663	3.04	0	2.14	0.101	0.7	3.73
1	DS9-1	0.07	0.63	0	0	0	0	0.63	3.97	3.81	0.57	4.01	0	0	0	0	4.01
2	DS9-10	0.02	0.09	0	0	0	0	0.09	2.66	2.6	0.242	2.67	0	0.001	0.889	0.01	2.68
3	DS9-11	0	0.01	0	0	0	0	0.01	2.37	2.36	0.124	2.37	0	1.999	0.536	0.01	2.38
4	DS9-12	0	0.01	0	0	0	0	0.01	1.65	1.65	0.079	1.65	0	0	1.496	0	1.65
5	DS9-2	0.13	0.39	0	0	0	0	0.39	3.07	2.75	0.502	3.13	0	2.359	0.271	0.17	3.3
6	DS9-3	0.08	0.3	0	0	0	0	0.3	2.13	1.94	0.436	2.17	0	0	0.594	0.02	2.19
7	DS9-4	0.02	0.08	0	0	0	0	0.08	1.54	1.49	0.22	1.55	0	0	1.225	0.01	1.56
8	ES9																

DA-9A **2-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP9-5	DS9-5	ES9A	67.64	23502.57	177684.2	0.95	22327.44	168800	6	7.386	4.304	16.816	0	16.816	3	46.836	6.626	6.076	0.186	14.02	13.74	N/A	0.42%
2	DP9-6	DS9-6	DS9-5	83.15	55179.45	154181.6	0.95	52420.48	146472.6	6	7.166	4.349	14.747	0	14.747	2.5	31.45	6.407	6.3	0.22	14.44	14.02	N/A	0.50%
3	DP9-7	DS9-7	DS9-6	149.59	49843.38	99002.19	0.95	47351.21	94052.08	6	6.724	4.441	9.67	0	9.67	2.5	31.45	6.407	5.634	0.442	15.19	14.44	N/A	0.50%
4	DP9-8	DS9-8	DS9-7	147.47	7043.37	49158.81	0.95	6691.2	46700.87	6	6.209	4.548	4.917	0	4.917	2	17.494	5.569	4.778	0.514	16.44	15.69	N/A	0.51%
5	DP9-9	DS9-9	DS9-8	68.41	42115.44	42115.44	0.95	40009.67	40009.67	6	6	4.592	4.253	0	4.253	2	22.195	7.065	5.446	0.209	17	16.44	N/A	0.82%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	ES9A								0	0							16.74	16.92			
1	DS9-5	3	16.816	67.64	6.076	1.24	1.31	0.57	15.55	14.98	0	0	15.84	15.26	1.96	15.98	16.52	20.6	N/A	Case A	N/A
2	DS9-6	2.5	14.747	83.15	6.3	1.2	1.29	0.62	16.06	15.86	0	0	16.26	15.64	1.98	16.42	16.94	20.33	N/A	Case F	N/A
3	DS9-7	2.5	9.67	149.59	5.634	0.95	1.04	0.49	16.45	16.37	0	0	16.64	16.14	1.45	16.64	17.69	19.69	N/A	Case F	N/A
4	DS9-8	2	4.917	147.47	4.778	0.73	0.78	0.35	16.71	16.54	0	0	17.52	17.17	1.08	17.52	18.44	20.44	N/A	Case F	N/A
5	DS9-9	2	4.253	68.41	5.446	0.59	0.72	0.46	17.56	17.46	0	0	18.05	17.59	1.05	18.05	---	21	N/A	Case F	N/A

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#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	ES9A																
1	DS9-5	0	0	0	0	0	0	0	1.82	1.24	0.242	1.86	0	2.421	0.208	0.1	1.96
2	DS9-6	0.08	0	0	0	0	0	0	1.82	1.2	0.335	1.92	0	0	0.568	0.06	1.98
3	DS9-7	0.03	0	0	0	0	0	0	1.45	0.95	0.22	1.45	0	0.007	0.614	0	1.45
4	DS9-8	0.07	0	0	0	0	0	0	1.08	0.73	0.195	1.07	0	2.71	0.21	0	1.08
5	DS9-9	0.04	0	0	0	0	0	0	1.05	0.59	0.169	0.97	0	0	1.514	0	1.05

DA-9A **10-YEAR STORM**

#Line	Pipe	From	To	3D Length - Center to Center	Drainage Area Inc	Drainage Area Total	Runoff Coeff "C"	Area X "C" Inc	Area X "C" Total	Time of Concentration Inlet	Time of Concentration System	Rain "I"	Runoff "Q"	Known Q	Total Q	Pipe Dia.	Full Q	Velocity Full	Velocity Design	Sec Time	Invert Elevation U/S	Invert Elevation D/S	Crown Drop	Slope
				(ft)	(sq. ft)	(sq. ft)		(sq. ft)	(sq. ft)	(min)	(min)	(inch/hr)	(cu. ft/sec)	(cu. ft/sec)	(cu. ft/sec)	(ft)	(cu. ft/sec)	(ft/s)	(ft/s)	(min)	(ft)	(ft)	(ft)	
1	DP9-5	DS9-5	ES9A	67.64	23502.57	177684.2	0.95	22327.44	168800	6	7.281	5.843	22.831	0	22.831	3	46.836	6.626	6.579	0.171	14.02	13.74	N/A	0.42%
2	DP9-6	DS9-6	DS9-5	83.15	55179.45	154181.6	0.95	52420.48	146472.6	6	7.077	5.89	19.971	0	19.971	2.5	31.45	6.407	6.78	0.204	14.44	14.02	N/A	0.50%
3	DP9-7	DS9-7	DS9-6	149.59	49843.38	99002.19	0.95	47351.21	94052.08	6	6.668	5.985	13.029	0	13.029	2.5	31.45	6.407	6.102	0.409	15.19	14.44	N/A	0.50%
4	DP9-8	DS9-8	DS9-7	147.47	7043.37	49158.81	0.95	6691.2	46700.87	6	6.193	6.094	6.588	0	6.588	2	17.494	5.569	5.172	0.475	16.44	15.69	N/A	0.51%
5	DP9-9	DS9-9	DS9-8	68.41	42115.44	42115.44	0.95	40009.67	40009.67	6	6	6.139	5.686	0	5.686	2	22.195	7.065	5.909	0.193	17	16.44	N/A	0.82%

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe Loss	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface Elev.	Step4*	Step7*	Step14*
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0	ES9A								0	0							16.74	16.92			
1	DS9-5	3	22.831	67.64	6.579	1.48	1.54	0.67	15.89	15.21	0	0	16.17	15.5	2.61	16.63	16.52	20.6	N/A	Case A	N/A
2	DS9-6	2.5	19.971	83.15	4.069	1.45	1.52	0.26	16.73	16.47	0.002	0.17	16.9	16.64	2.54	16.98	16.94	20.33	Case B	N/A	Case B
3	DS9-7	2.5	13.029	149.59	2.654	1.12	1.21	0.11	17.02	16.91	0.001	0.13	17.15	17.04	1.99	17.18	17.69	19.69	Case B	N/A	Case B
4	DS9-8	2	6.588	147.47	5.172	0.85	0.91	0.42	17.22	17.12	0	0	17.71	17.29	1.41	17.85	18.44	20.44	N/A	Case F	N/A
5	DS9-9	2	5.686	68.41	5.909	0.69	0.84	0.54	17.88	17.79	0	0	18.23	17.69	1.23	18.23	---	21	N/A	Case F	N/A

*URBAN DRAINAGE DESIGN MANUAL - Hydraulic Engineering Circular No.22 Third Edition

#Line	Struct. ID	Exit Ho	Hf	Hb	Hc	He	Hj	Total	Ei	y+(P/gamma)	DI	Eai	CB	C-theta	Cp	Ha	Ea
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)				(ft)	(ft)
0	ES9A																
1	DS9-5	0	0	0	0	0	0	0	2.15	1.48	0.329	2.28	0	2.415	0.19	0.33	2.61
2	DS9-6	0.1	0.17	0	0	0	0	0.17	2.46	2.2	0.454	2.51	0	0	0.484	0.02	2.54
3	DS9-7	0.04	0.13	0	0	0	0	0.13	1.96	1.85	0.296	1.98	0	0.007	0.507	0.01	1.99
4	DS9-8	0.04	0	0	0	0	0	0	1.27	0.85	0.261	1.3	0	2.704	0.193	0.1	1.41
5	DS9-9	0.04	0	0	0	0	0	0	1.23	0.69	0.226	1.18	0	0	1.41	0	1.23

Appendix D

Alternative Stormwater Practice Specifications

CONTECH®
ENGINEERED SOLUTIONS

Jellyfish® Filter
Stormwater Treatment

The experts you need to solve your stormwater challenges

Your Contech Team

Contech is the leader in stormwater solutions, helping engineers, contractors and owners with infrastructure and land development projects throughout North America.

With our responsive team of stormwater experts, local regulatory expertise and flexible solutions, Contech is the trusted partner you can count on for stormwater management solutions.

STORMWATER CONSULTANT

It's my job to recommend the best solution to meet permitting requirements.

STORMWATER DESIGN ENGINEER

I work with consultants to design the best approved solution to meet your project's needs.

REGULATORY MANAGER

I understand the local stormwater regulations and what solutions will be approved.

SALES ENGINEER

I make sure our solutions meet the needs of the contractor during construction.

Contech is your partner in stormwater management solutions

Setting new standards in Stormwater Treatment – Jellyfish® Filter

The Jellyfish Filter has been tested in the field and laboratory, and has received approval from numerous stormwater regulatory agencies.

The Jellyfish Filter is a stormwater quality treatment technology featuring high flow pretreatment and membrane filtration in a compact stand-alone system. Jellyfish removes floatables, trash, oil, debris, TSS, fine silt-sized particles, and a high percentage of particulate-bound pollutants; including phosphorus, nitrogen, metals and hydrocarbons. The high surface area membrane cartridges, combined with up-flow hydraulics, frequent, passive backwashing, and rinseable/reusable cartridges ensure long-lasting performance.

Jellyfish® Filter

How the Jellyfish® Filter Treats Stormwater

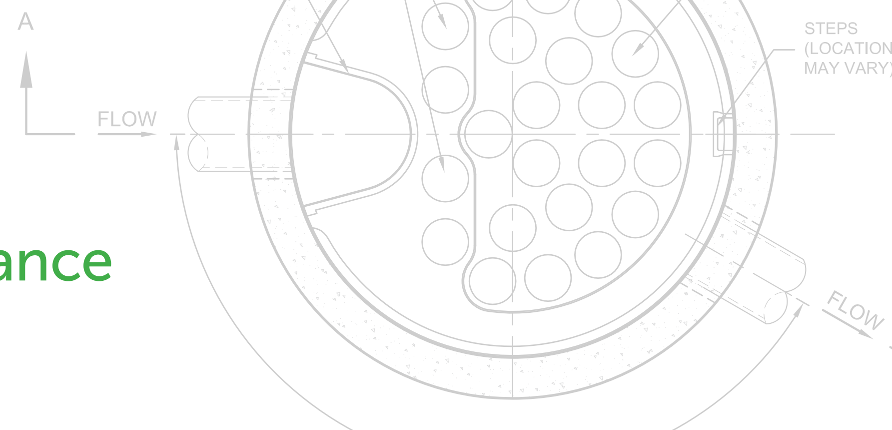
Tested in the field and laboratory ...

- Stormwater enters the Jellyfish through the inlet pipe and traps floating pollutants behind the maintenance access wall and below the cartridge deck.
- Water is conveyed below the cartridge deck where a separation skirt around the cartridges isolates oil, trash and debris outside the filtration zone.
- Water is directed to the filtration zone and up through the top of the cartridge where it exits via the outlet pipe.
- The membrane filters provide a very large surface area to effectively remove fine sand and silt-sized particles, and a high percentage of particulate-bound pollutants such as nitrogen, phosphorus, metals, and hydrocarbons while ensuring long-lasting treatment.
- As influent flow subsides, the water in the backwash pool flows back into the lower chamber. This passive backwash extends cartridge life.
- The draindown cartridge(s) located outside the backwash pool enables water levels to balance.

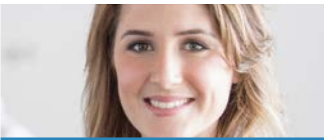
Jellyfish® Filter Standard Configuration

Learn More:
www.ContechES.com/jellyfish

Pretreat bioretention or infiltration with Jellyfish to extend service life.



Jellyfish® Filter Performance Testing Results



APPLICATION TIPS

- The Peak Diversion Jellyfish provides treatment and high-flow bypass in one structure, eliminating the need for a separate bypass structure.
- LID and GI are complemented by filtration solutions, as they help keep sites free from fine sediments that can impede performance, remove unsightly trash, and provide a single point of maintenance.
- Selecting a filter with a long maintenance cycle and low maintenance cost will result in healthy waterways and happy property owners.

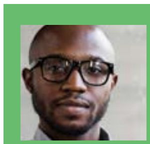
The pleated tentacles of the Jellyfish® Filter provide a large surface area for pollutant removal.

POLLUTANT OF CONCERN	% REMOVAL
Total Trash	99%
Total Suspended Solids (TSS)	89%
Total Phosphorus (TP)	59%
Total Nitrogen (TN)	51%
Total Copper (TCu)	> 50%
Total Zinc (TZn)	> 50%

Sources:
TARP II Field Study – 2012 JF 4-2-1 Configuration
MRDC Floatables Testing – 2008 JF6-6-1 Configuration

Jellyfish® Filter Features and Benefits

FEATURE	BENEFITS
High surface area membrane filtration	Low flux rate promotes cake filtration and slows membrane occlusion
High design treatment flow rate per cartridge (up to 80 gpm (5 L/s))	Compact system with a small footprint, lower construction cost
Low driving head (typically 18 inches or less (457 mm))	Design flexibility, lower construction cost
Lightweight cartridges with passive backwash	Easy maintenance and low life-cycle cost



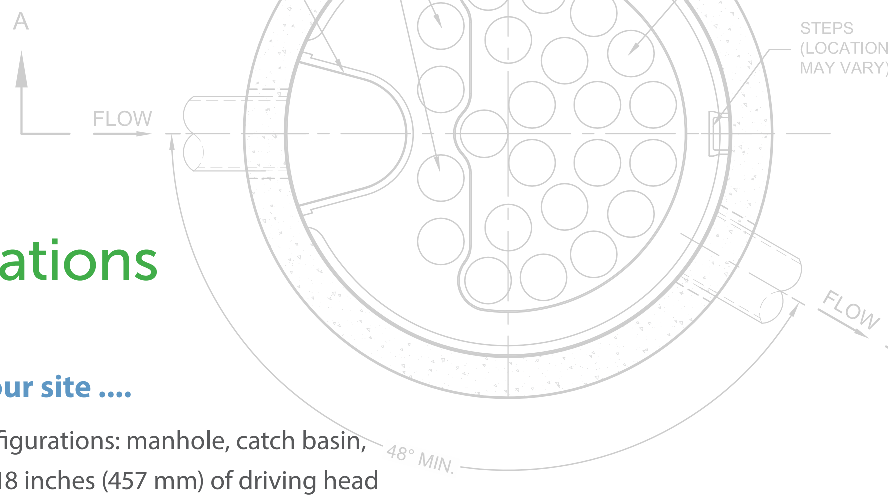
The Jellyfish Filter can be configured in a manhole, catch basin, or vault.

Select Jellyfish® Filter Certifications and Verifications

The Jellyfish Filter has been reviewed by numerous state and federal programs, including:

- Washington State Department of Ecology (TAPE) GULD – BASIC, Phosphorus
- Virginia Department of Environmental Quality (VA DEQ)
- Texas Commission of Environmental Quality (TCEQ)
- Canada ISO 14034 Environmental Management – Environmental Technology Verification (ETV)
- Philadelphia Water District (PWD)
- Maryland Department of the Environment (MD DOE)

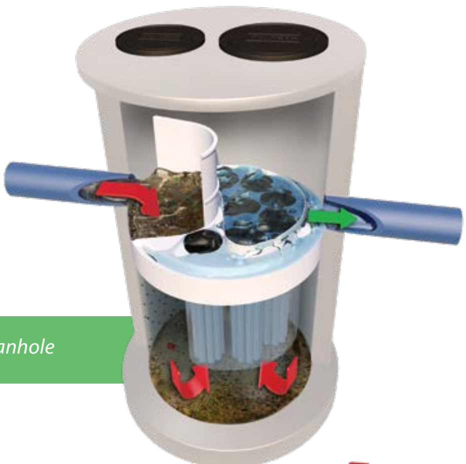
Field tested and performance verified



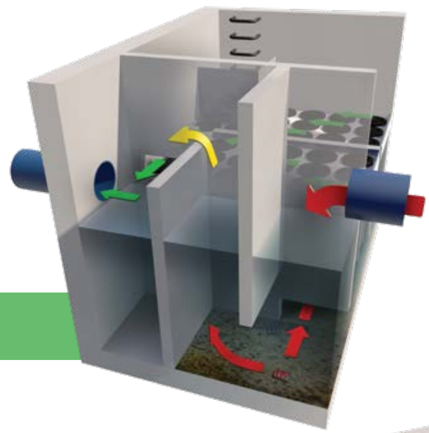
Jellyfish® Filter Configurations

Multiple system configurations to optimize your site ....

The Jellyfish Filter can be manufactured in a variety of configurations: manhole, catch basin, vault, fiberglass tank, or custom configurations. Typically, 18 inches (457 mm) of driving head is designed into the system. For low drop sites, the designed driving head can be less.

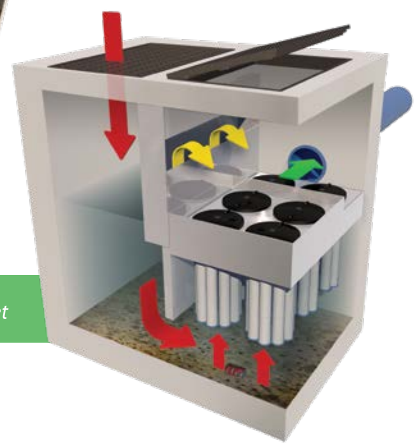


Manhole



Vault

Curb Inlet



Grated Inlet

Jellyfish® Filter Maintenance

- Jellyfish Filter cartridges are light weight and reusable
- Maintenance of the filter cartridges is performed by removing, rinsing and reusing the cartridge tentacles.
- Vacuum extraction of captured pollutants in the sump is recommended at the same time.
- Full cartridge replacement intervals differ by site due to varying pollutant loading and type, and maintenance frequency. Replacement is anticipated every 2-5 years.
- Contech® has created a network of Certified Maintenance Providers to provide maintenance on stormwater BMP's.

The Jellyfish® Filter tentacle is light and easy to clean.

A partner you can rely on

STORMWATER SOLUTIONS

PIPE SOLUTIONS

STRUCTURES SOLUTIONS

Few companies offer the wide range of high-quality stormwater resources you can find with us — state-of-the-art products, decades of expertise, and all the maintenance support you need to operate your system cost-effectively.

THE CONTECH WAY

Contech® Engineered Solutions provides innovative, cost-effective site solutions to engineers, contractors, and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.

TAKE THE NEXT STEP

For more information: www.ContechES.com

CONTECH® ENGINEERED SOLUTIONS

Get social with us:

800-338-1122 | **www.ContechES.com**

Appendix E

NRCS Soils Report

United States Department of Agriculture

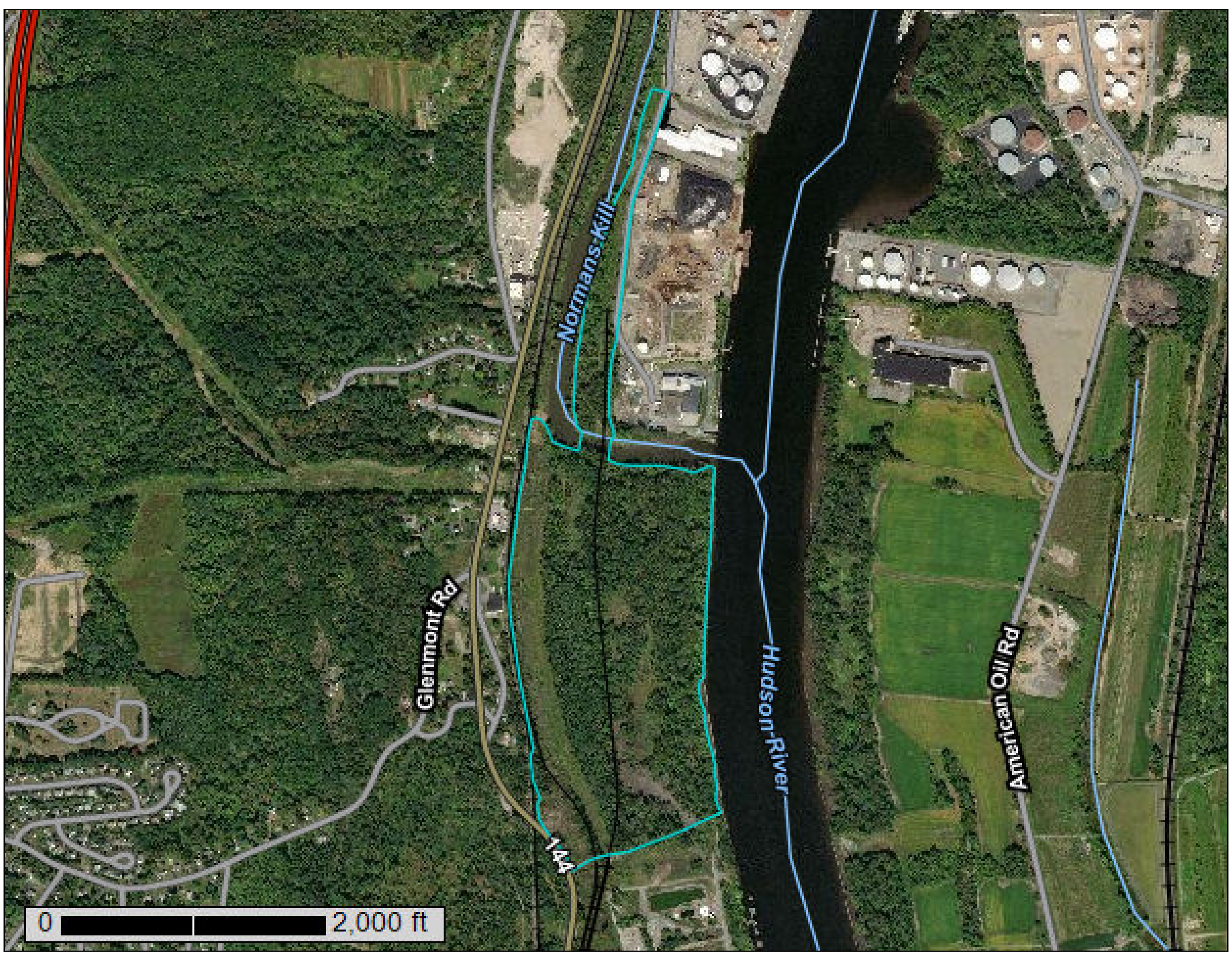
NRCS

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

Albany County, New York



October 21, 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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

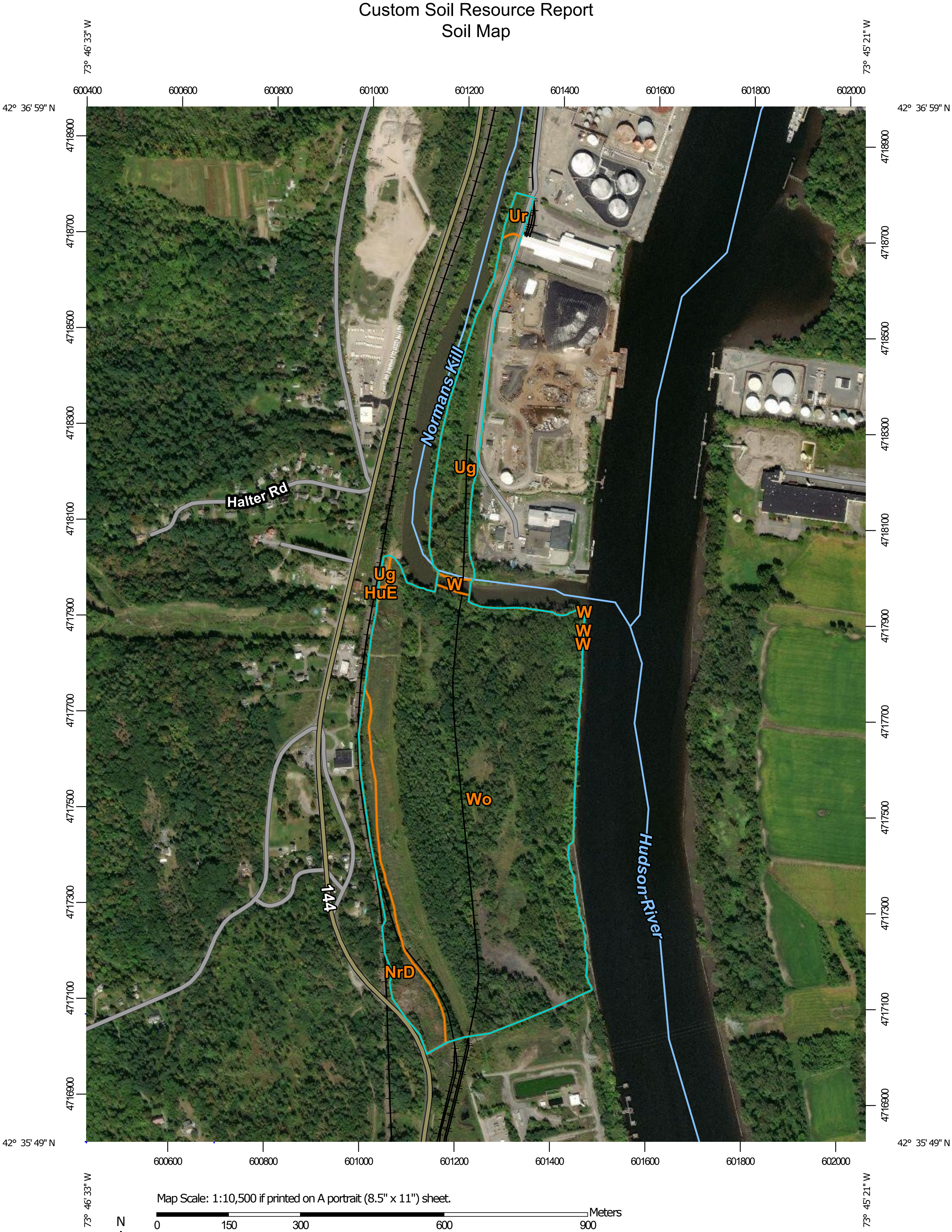
Contents

Preface.......... 2
Soil Map.......... 5
Soil Map.......... 6
Legend.......... 7
Map Unit Legend.......... 8
Map Unit Descriptions.......... 8
Albany County, New York.......... 10
HuE—Hudson silt loam, 25 to 45 percent slopes.......... 10
NrD—Nassau very channery silt loam, hilly, very rocky.......... 11
Ug—Udorthents, loamy.......... 12
Ur—Urban land.......... 13
W—Water.......... 14
Wo—Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded.......... 14
Soil Information for All Uses.......... 17
Soil Properties and Qualities.......... 17
Soil Qualities and Features.......... 17
Hydrologic Soil Group.......... 17

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.

Soil Map



Map Scale: 1:10,500 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

N

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 1:15,800.

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: Albany County, New York
Survey Area Data: Version 19, Aug 29, 2021

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

Date(s) aerial images were photographed: Jul 1, 2014—Sep 22, 2017

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
HuE	Hudson silt loam, 25 to 45 percent slopes	0.1	0.1%
NrD	Nassau very channery silt loam, hilly, very rocky	6.5	6.0%
Ug	Udorthents, loamy	11.8	10.9%
Ur	Urban land	0.9	0.8%
W	Water	0.5	0.4%
Wo	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	88.8	81.9%
Totals for Area of Interest		**108.4**	**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.

Albany County, New York

HuE—Hudson silt loam, 25 to 45 percent slopes

Map Unit Setting

National map unit symbol: 9pg8
Elevation: 300 to 1,800 feet
Mean annual precipitation: 36 to 41 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 100 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Hudson and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hudson

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey and silty glaciolacustrine deposits

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 16 inches: silty clay loam
H3 - 16 to 31 inches: silty clay
H4 - 31 to 60 inches: clay

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately 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 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C/D
Ecological site: F144AY018NY - Moist Lake Plain
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 5 percent

Unadilla

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

Colonie

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

Udifluvents

Percent of map unit: 1 percent
Hydric soil rating: No

Fluvaquents

Percent of map unit: 1 percent
Landform: Flood plains
Hydric soil rating: Yes

NrD—Nassau very channery silt loam, hilly, very rocky

Map Unit Setting

National map unit symbol: 9ph1
Elevation: 600 to 1,800 feet
Mean annual precipitation: 36 to 41 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 100 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Nassau, hilly, and similar soils: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nassau, Hilly

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy till derived mainly from local slate or shale

Typical profile

H1 - 0 to 8 inches: very channery silt loam
H2 - 8 to 16 inches: very channery silt loam
H3 - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 9 percent
Hydric soil rating: Unranked

Manlius

Percent of map unit: 8 percent
Hydric soil rating: No

Unnamed soils

Percent of map unit: 8 percent

Lordstown

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

Ug—Udorthents, loamy

Map Unit Setting

National map unit symbol: 9pj1
Elevation: 0 to 1,640 feet
Mean annual precipitation: 36 to 41 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 100 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, loamy, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Loamy

Typical profile

H1 - 0 to 4 inches: loam
H2 - 4 to 70 inches: channery loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 5.95 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Minor Components

Unnamed soils

Percent of map unit: 10 percent

Ur—Urban land

Map Unit Setting

National map unit symbol: 9pj8
Mean annual precipitation: 36 to 41 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 100 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Typical profile

H1 - 0 to 6 inches: variable

Minor Components

Unnamed soils

Percent of map unit: 10 percent

Udorthents

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

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Wo—Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2srgt
Elevation: 160 to 1,970 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Wayland and similar soils: 60 percent
Wayland, very poorly drained, and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wayland

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty and clayey alluvium derived from interbedded sedimentary rock

Typical profile

Ap - 0 to 9 inches: silt loam
Bg - 9 to 21 inches: silt loam
Cg1 - 21 to 28 inches: silt loam
Cg2 - 28 to 47 inches: silt loam
Cg3 - 47 to 54 inches: silt loam
Cg4 - 54 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches

Frequency of flooding: FrequentNone
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 13.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Description of Wayland, Very Poorly Drained

Setting
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty and clayey alluvium derived from interbedded sedimentary rock

Typical profile
A - 0 to 9 inches: mucky silt loam
Bg - 9 to 21 inches: silt loam
Cg1 - 21 to 28 inches: silt loam
Cg2 - 28 to 47 inches: silt loam
Cg3 - 47 to 54 inches: silt loam
Cg4 - 54 to 60 inches: silt loam

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 13.3 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Holderton
Percent of map unit: 10 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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

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

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

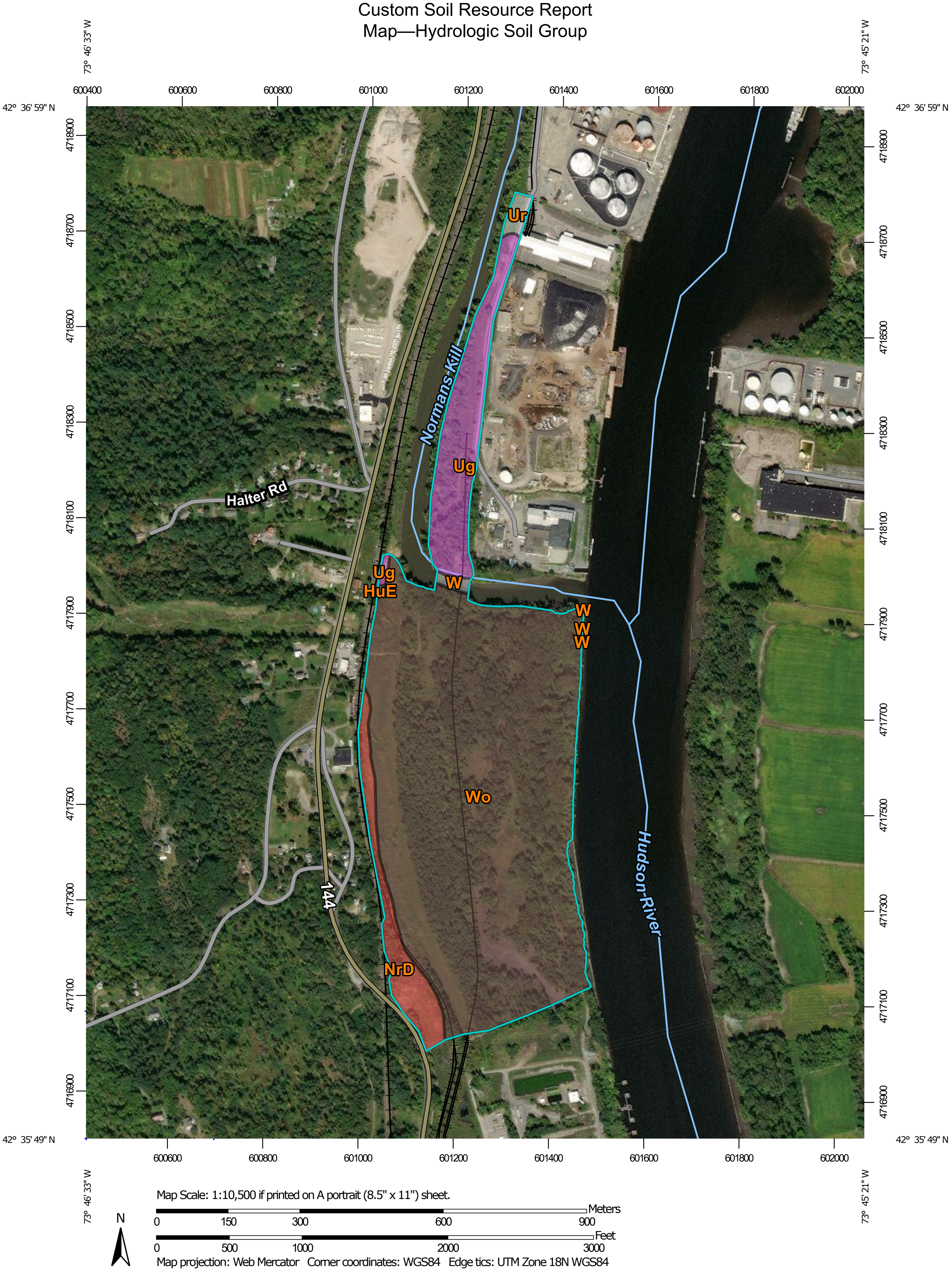
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

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

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

Map—Hydrologic Soil Group



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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: Albany County, New York
Survey Area Data: Version 19, Aug 29, 2021

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

Date(s) aerial images were photographed: Jul 1, 2014—Sep 22, 2017

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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
HuE	Hudson silt loam, 25 to 45 percent slopes	C/D	0.1	0.1%
NrD	Nassau very channery silt loam, hilly, very rocky	D	6.5	6.0%
Ug	Udorthents, loamy	A	11.8	10.9%
Ur	Urban land		0.9	0.8%
W	Water		0.5	0.4%
Wo	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	B/D	88.8	81.9%
Totals for Area of Interest			**108.4**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX D

MAINTENANCE INSPECTION CHECKLISTS

Stormwater Pond/Wetland Operation, Maintenance and Management Inspection Checklist

Project ____________________
Location: ____________________
Site Status: ____________________

Date: ____________________
Time: ____________________

Inspector: ____________________

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Embankment and emergency spillway (Annual, After Major Storms)		
1. Vegetation and ground cover adequate		
2. Embankment erosion		
3. Animal burrows		
4. Unauthorized planting		
5. Cracking, bulging, or sliding of dam		
a. Upstream face		
b. Downstream face		
c. At or beyond toe		
downstream		
upstream		
d. Emergency spillway		
6.Pond, toe & chimney drains clear and functioning		
7.Seeps/leaks on downstream face		
8.Slope protection or riprap failure		
9. Vertical/horizontal alignment of top of dam “As-Built”		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
10. Emergency spillway clear of obstructions and debris		
11. Other (specify)		
2. Riser and principal spillway (Annual)		
Type: Reinforced concrete ______ Corrugated pipe _______ Masonry _______ 1. Low flow orifice obstructed		
2. Low flow trash rack. a. Debris removal necessary		
b. Corrosion control		
3. Weir trash rack maintenance a. Debris removal necessary		
b. corrosion control		
4. Excessive sediment accumulation insider riser		
5. Concrete/masonry condition riser and barrels a. cracks or displacement		
b. Minor spalling (<1")		
c. Major spalling (rebars exposed)		
d. Joint failures		
e. Water tightness		
6. Metal pipe condition		
7. Control valve a. Operational/exercised		
b. Chained and locked		
8. Pond drain valve a. Operational/exercised		
b. Chained and locked		
9. Outfall channels functioning		
10. Other (specify)		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
3. Permanent Pool (Wet Ponds) (monthly)		
1. Undesirable vegetative growth		
2. Floating or floatable debris removal required		
3. Visible pollution		
4. Shoreline problem		
5. Other (specify)		
4. Sediment Forebays		
1.Sedimentation noted		
2. Sediment cleanout when depth < 50% design depth		
5. Dry Pond Areas		
1. Vegetation adequate		
2. Undesirable vegetative growth		
3. Undesirable woody vegetation		
4. Low flow channels clear of obstructions		
5. Standing water or wet spots		
6. Sediment and / or trash accumulation		
7. Other (specify)		
6. Condition of Outfalls (Annual , After Major Storms)		
1. Riprap failures		
2. Slope erosion		
3. Storm drain pipes		
4.Endwalls / Headwalls		
5. Other (specify)		
7. Other (Monthly)		
1. Encroachment on pond, wetland or easement area		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
2. Complaints from residents		
3.Aesthetics a. Grass growing required		
b. Graffiti removal needed		
c. Other (specify)		
4. Conditions of maintenance access routes.		
5. Signs of hydrocarbon build-up		
6. Any public hazards (specify)		
8. Wetland Vegetation (Annual)		
1. Vegetation healthy and growing Wetland maintaining 50% surface area coverage of wetland plants after the second growing season. (If unsatisfactory, reinforcement plantings needed)		
2. Dominant wetland plants: Survival of desired wetland plant species Distribution according to landscaping plan?		
3. Evidence of invasive species		
4. Maintenance of adequate water depths for desired wetland plant species		
5. Harvesting of emergent plantings needed		
6. Have sediment accumulations reduced pool volume significantly or are plants “choked” with sediment		
7. Eutrophication level of the wetland.		
8. Other (specify)		

Comments:

Actions to be Taken:

Infiltration Trench Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Trench surface clear of debris		
Inflow pipes clear of debris		
Overflow spillway clear of debris		
Inlet area clear of debris		
2. Sediment Traps or Forebays (Annual)		
Obviously trapping sediment		
Greater than 50% of storage volume remaining		
3. Dewatering (Monthly)		
Trench dewaters between storms		
4. Sediment Cleanout of Trench (Annual)		
No evidence of sedimentation in trench		
Sediment accumulation doesn't yet require cleanout		
5. Inlets (Annual)		

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Good condition		
No evidence of erosion		
6. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repair		
No evidence of erosion		
7. Aggregate Repairs (Annual)		
Surface of aggregate clean		
Top layer of stone does not need replacement		
Trench does not need rehabilitation		

Comments:

Actions to be Taken:

Sand/Organic Filter Operation, Maintenance and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Contributing areas clean of debris		
Filtration facility clean of debris		
Inlet and outlets clear of debris		
2. Oil and Grease (Monthly)		
No evidence of filter surface clogging		
Activities in drainage area minimize oil and grease entry		
3. Vegetation (Monthly)		
Contributing drainage area stabilized		
No evidence of erosion		
Area mowed and clipping removed		
4. Water Retention Where Required (Monthly)		
Water holding chambers at normal pool		
No evidence of leakage		
5. Sediment Deposition (Annual)		

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Filter chamber free of sediments		
Sedimentation chamber not more than half full of sediments		
6. Structural Components (Annual)		
No evidence of structural deterioration		
Any grates are in good condition		
No evidence of spalling or cracking of structural parts		
7. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repairs		
No evidence of erosion (if draining into a natural channel)		
8. Overall Function of Facility (Annual)		
Evidence of flow bypassing facility		
No noticeable odors outside of facility		

Comments:

Actions to be Taken:

Open Channel Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY/ UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Contributing areas clean of debris		
2. Check Dams or Energy Dissipators (Annual, After Major Storms)		
No evidence of flow going around structures		
No evidence of erosion at downstream toe		
Soil permeability		
Groundwater / bedrock		
3. Vegetation (Monthly)		
Mowing done when needed		
Minimum mowing depth not exceeded		
No evidence of erosion		
Fertilized per specification		
4. Dewatering (Monthly)		
Dewaters between storms		

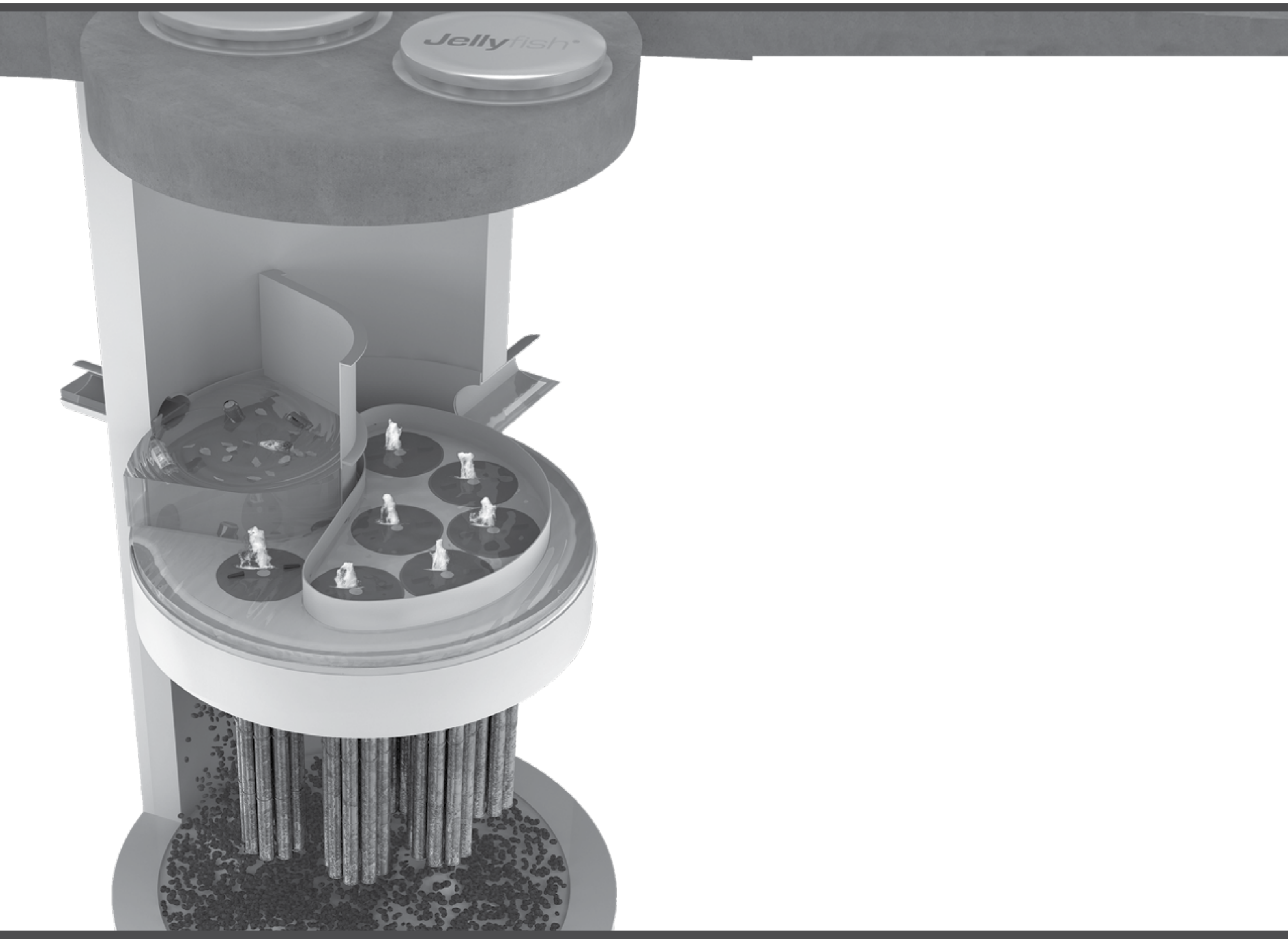
MAINTENANCE ITEM	SATISFACTORY/ UNSATISFACTORY	COMMENTS
5. Sediment deposition (Annual)		
Clean of sediment		
6. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repairs		
No evidence of erosion		

Comments:

Actions to be Taken:

CONTECH® ENGINEERED SOLUTIONS

Jellyfish® Filter Maintenance Guide



Jellyfish®

JELLYFISH® FILTER
INSPECTION & MAINTENANCE GUIDE

Jellyfish units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

In order for maintenance of the Jellyfish filter to be successful, it is imperative that all other components be properly maintained. The maintenance and repair of upstream facilities should be carried out prior to Jellyfish maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.

TABLE OF CONTENTS

Inspection and Maintenance Overview 3

Inspection Procedure 3

Maintenance Procedure 4

Cartridge Assembly & Cleaning 5

Inspection Process 7

1.0 Inspection and Maintenance Overview

The primary purpose of the Jellyfish® Filter is to capture and remove pollutants from stormwater runoff. As with any filtration system, these pollutants must be removed to maintain the filter's maximum treatment performance. Regular inspection and maintenance are required to insure proper functioning of the system.

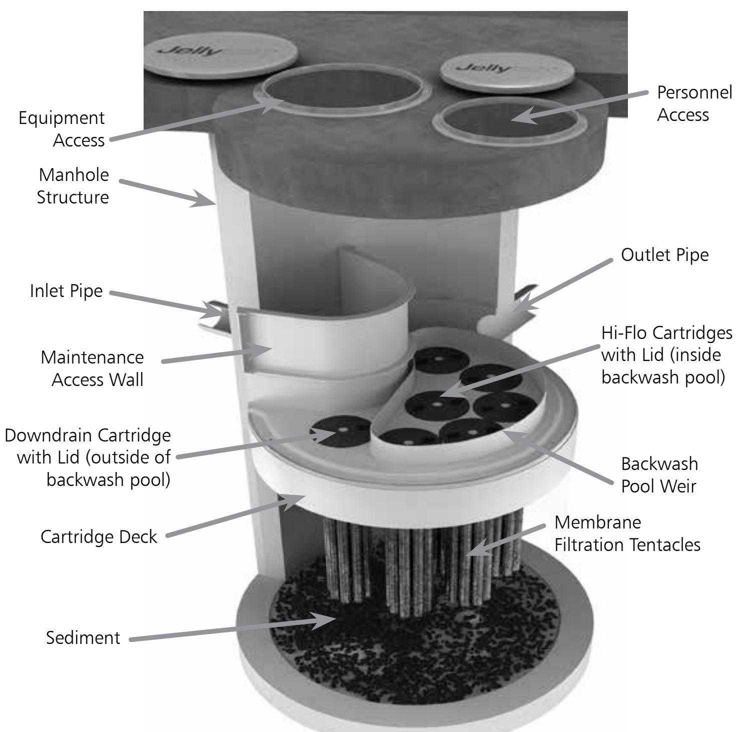
Maintenance frequencies and requirements are site specific and vary depending on pollutant loading. Additional maintenance activities may be required in the event of non-storm event runoff, such as base-flow or seasonal flow, an upstream chemical spill or due to excessive sediment loading from site erosion or extreme runoff events. It is a good practice to inspect the system after major storm events.

Inspection activities are typically conducted from surface observations and include:

- Observe if standing water is present
- Observe if there is any physical damage to the deck or cartridge lids
- Observe the amount of debris in the Maintenance Access Wall (MAW) or inlet bay for vault systems

Maintenance activities include:

- Removal of oil, floatable trash and debris
- Removal of collected sediments
- Rinsing and re-installing the filter cartridges
- Replace filter cartridge tentacles, as needed



Note: Separator Skirt not shown

2.0 Inspection Timing

Inspection of the Jellyfish Filter is key in determining the maintenance requirements for, and to develop a history of, the site's pollutant loading characteristics. In general, inspections should be performed at the times indicated below; *or per the approved project stormwater quality documents (if applicable), whichever is more frequent*.

1. A minimum of quarterly inspections during the first year of operation to assess the sediment and floatable pollutant accumulation, and to ensure proper functioning of the system.
2. Inspection frequency in subsequent years is based on the inspection and maintenance plan developed in the first year of operation. Minimum frequency should be once per year.
3. Inspection is recommended after each major storm event.
4. Inspection is required immediately after an upstream oil, fuel or other chemical spill.

3.0 Inspection Procedure

The following procedure is recommended when performing inspections:

1. Provide traffic control measures as necessary.
2. Inspect the MAW or inlet bay for floatable pollutants such as trash, debris, and oil sheen.
3. Measure oil and sediment depth in several locations, by lowering a sediment probe until contact is made with the floor of the structure. Record sediment depth, and presences of any oil layers.
4. Inspect cartridge lids. Missing or damaged cartridge lids to be replaced.
5. Inspect the MAW (where appropriate), cartridge deck and receptacles, and backwash pool weir, for damaged or broken components.

3.1 Dry weather inspections

- Inspect the cartridge deck for standing water, and/or sediment on the deck.
- No standing water under normal operating conditions.
- Standing water inside the backwash pool, but not outside the backwash pool indicates, that the filter cartridges need to be rinsed.

Inspection Utilizing Sediment Probe

- Standing water outside the backwash pool is not anticipated and may indicate a backwater condition caused by high water elevation in the receiving water body, or possibly a blockage in downstream infrastructure.
- Any appreciable sediment (≥1/16") accumulated on the deck surface should be removed.

3.2 Wet weather inspections

- Observe the rate and movement of water in the unit. Note the depth of water above deck elevation within the MAW or inlet bay.
- Less than 6 inches, flow should be exiting the cartridge lids of each of the draindown cartridges (i.e. cartridges located outside the backwash pool).
- Greater than 6 inches, flow should be exiting the cartridge lids of each of the draindown cartridges and each of the hi-flo cartridges (i.e. cartridges located inside the backwash pool), and water should be overflowing the backwash pool weir.
- 18 inches or greater and relatively little flow is exiting the cartridge lids and outlet pipe, this condition indicates that the filter cartridges need to be rinsed.

4.0 Maintenance Requirements

Required maintenance for the Jellyfish Filter is based upon results of the most recent inspection, historical maintenance records, or the site specific water quality management plan; whichever is more frequent. In general, maintenance requires some combination of the following:

1. Sediment removal for depths reaching 12 inches or greater, or within 3 years of the most recent sediment cleaning, whichever occurs sooner.
2. Floatable trash, debris, and oil removal.
3. Deck cleaned and free from sediment.
4. Filter cartridges rinsed and re-installed as required by the most recent inspection results, or within 12 months of the most recent filter rinsing, whichever occurs sooner.
5. Replace tentacles if rinsing does not restore adequate hydraulic capacity, remove accumulated sediment, or if damaged or missing. It is recommended that tentacles should remain in service no longer than 5 years before replacement.
6. Damaged or missing cartridge deck components must be repaired or replaced as indicated by results of the most recent inspection.
7. The unit must be cleaned out and filter cartridges inspected immediately after an upstream oil, fuel, or chemical spill. Filter cartridge tentacles should be replaced if damaged or compromised by the spill.

5.0 Maintenance Procedure

The following procedures are recommended when maintaining the Jellyfish Filter:

1. Provide traffic control measures as necessary.
2. Open all covers and hatches. Use ventilation equipment as required, according to confined space entry procedures. *Caution: Dropping objects onto the cartridge deck may cause damage*.
3. Perform Inspection Procedure prior to maintenance activity.
4. To access the cartridge deck for filter cartridge service, descend into the structure and step directly onto the deck. Caution: Do not step onto the maintenance access wall (MAW) or backwash pool weir, as damage may result. Note that the cartridge deck may be slippery.
5. Maximum weight of maintenance crew and equipment on the cartridge deck not to exceed 450 lbs.

5.1 Filter Cartridge Removal

1. Remove a cartridge lid.
2. Remove cartridges from the deck using the lifting loops in the cartridge head plate. Rope or a lifting device (available from Contech) should be used. ***Caution: Should a snag occur, do not force the cartridge upward as damage to the tentacles may result. Wet cartridges typically weigh between 100 and 125 lbs***.
3. Replace and secure the cartridge lid on the exposed empty receptacle as a safety precaution. Contech does not recommend exposing more than one empty cartridge receptacle at a time.

5.2 Filter Cartridge Rinsing

1. Remove all 11 tentacles from the cartridge head plate. Take care not to lose or damage the O-ring seal as well as the plastic threaded nut and connector.

Cartridge Removal & Lifting Device

2. Position tentacles in a container (or over the MAW), with the threaded connector (open end) facing down, so rinse water is flushed through the membrane and captured in the container.
3. Using the Jellyfish rinse tool (available from Contech) or a low-pressure garden hose sprayer, direct water spray onto the tentacle membrane, sweeping from top to bottom along the length of the tentacle. Rinse until all sediment is removed from the membrane. ***Caution: Do not use a high pressure sprayer or focused stream of water on the membrane. Excessive water pressure may damage the membrane***.

4. Collected rinse water is typically removed by vacuum hose.
5. Reassemble cartridges as detailed later in this document. Reuse O-rings and nuts, ensuring proper placement on each tentacle.

5.3 Sediment and Flotables Extraction

1. Perform vacuum cleaning of the Jellyfish Filter only after filter cartridges have been removed from the system. Access the lower chamber for vacuum cleaning only through the maintenance access wall (MAW) opening. Be careful not to damage the flexible plastic separator skirt that is attached to the underside of the deck on manhole systems. Do not lower the vacuum wand through a cartridge receptacle, as damage to the receptacle will result.
2. Vacuum floatable trash, debris, and oil, from the MAW opening or inlet bay. Alternatively, floatable solids may be removed by a net or skimmer.

Vacuuming Sump Through MAW

3. Pressure wash cartridge deck and receptacles to remove all sediment and debris. Sediment should be rinsed into the sump area. Take care not to flush rinse water into the outlet pipe.
4. Remove water from the sump area. Vacuum or pump equipment should only be introduced through the MAW or inlet bay.
5. Remove the sediment from the bottom of the unit through the MAW or inlet bay opening.

Vacuuming Sump Through MAW

6. For larger diameter Jellyfish Filter manholes (≥8-ft) and some vaults complete sediment removal may be facilitated by removing a cartridge lid from an empty receptacle and inserting a jetting wand (not a vacuum wand) through the receptacle. Use the sprayer to rinse loosened sediment toward the vacuum hose in the MAW opening, being careful not to damage the receptacle.

5.4 Filter Cartridge Reinstallation and Replacement

1. Cartridges should be installed after the deck has been cleaned. It is important that the receptacle surfaces be free from grit and debris.
2. Remove cartridge lid from deck and carefully lower the filter cartridge into the receptacle until head plate gasket is seated squarely in receptacle. ***Caution: Do not force the cartridge downward; damage may occur.***
3. Replace the cartridge lid and check to see that both male threads are properly seated before rotating approximately 1/3 of a full rotation until firmly seated. Use of an approved rim gasket lubricant may facilitate installation. See next page for additional details.
4. If rinsing is ineffective in removing sediment from the tentacles, or if tentacles are damaged, provisions must be made to replace the spent or damaged tentacles with new tentacles. Contact Contech to order replacement tentacles.

5.5 Chemical Spills

Caution: If a chemical spill has been captured, do not attempt maintenance. Immediately contact the local hazard response agency and contact Contech.

5.6 Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads. Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.

Jellyfish Filter Components & Filter Cartridge Assembly and Installation

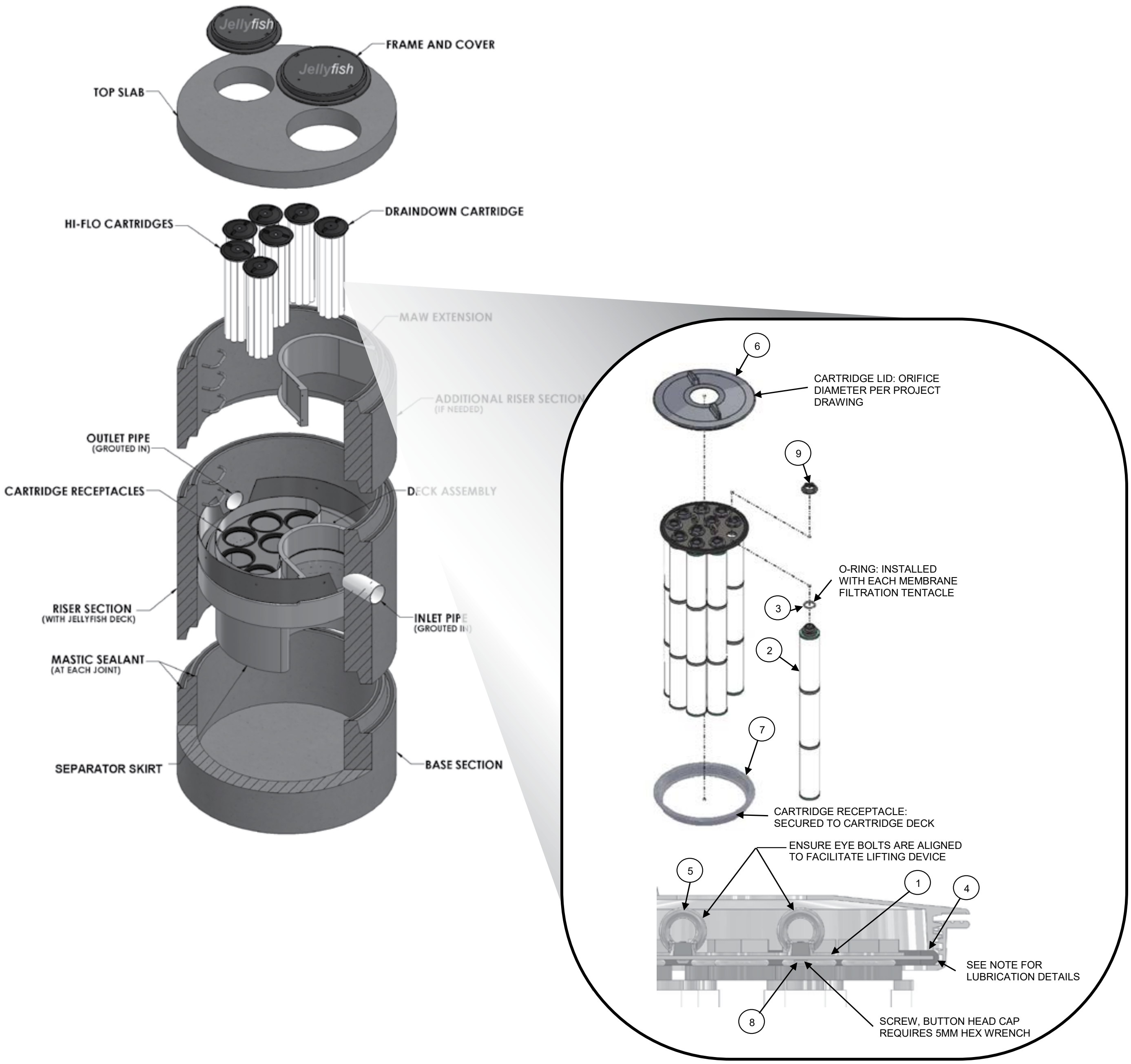


TABLE 1: BOM

ITEM NO.	DESCRIPTION
1	JF HEAD PLATE
2	JF TENTACLE
3	JF O-RING
4	JF HEAD PLATE GASKET
5	JF CARTRIDGE EYELET
6	JF 14IN COVER
7	JF RECEPTACLE
8	BUTTON HEAD CAP SCREW M6X14MM SS
9	JF CARTRIDGE NUT

TABLE 2: APPROVED GASKET LUBRICANTS

PART NO.	MFR	DESCRIPTION
78713	LA-CO	LUBRI-JOINT
40501	HERCULES	DUCK BUTTER
30600	OATEY	PIPE LUBRICANT
PSLUBXL1Q	PROSELECT	PIPE JOINT LUBRICANT

NOTES:

Head Plate Gasket Installation:
Install Head Plate Gasket (Item 4) onto the Head Plate (Item 1) and liberally apply a lubricant from Table 2: Approved Gasket Lubricants onto the gasket where it contacts the Receptacle (Item 7) and Cartridge Lide (ITem 6). Follow Lubricant manufacturer's instructions.

Lid Assembly:
Rotate Cartridge Lid counter-clockwise until both male threads drop down and properly seat. Then rotate Cartridge Lid clock-wise approximately one-third of a full rotation until Cartridge Lid is firmly secured, creating a watertight seal.

Jellyfish Filter Inspection and Maintenance Log

Owner:				Jellyfish Model No:		
Location:				GPS Coordinates:		
Land Use:	Commercial:		Industrial:		Service Station:	
	Roadway/Highway:		Airport:		Residential:	

Date/Time:						
Inspector:						
Maintenance Contractor:						
Visible Oil Present: (Y/N)						
Oil Quantity Removed:						
Floatable Debris Present: (Y/N)						
Floatable Debris Removed: (Y/N)						
Water Depth in Backwash Pool						
Draindown Cartridges externally rinsed and recommissioned: (Y/N)						
New tentacles put on Draindown Cartridges: (Y/N)						
Hi-Flo Cartridges externally rinsed and recommissioned: (Y/N)						
New tentacles put on Hi-Flo Cartridges: (Y/N)						
Sediment Depth Measured: (Y/N)						
Sediment Depth (inches or mm):						
Sediment Removed: (Y/N)						
Cartridge Lids intact: (Y/N)						
Observed Damage:						
Comments:						

Jellyfish®

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ENGINEERED SOLUTIONS

800.338.1122
www.ContechES.com

Support

- Drawings and specifications are available at www.conteches.com/jellyfish.
- Site-specific design support is available from Contech Engineered Solutions.
- Find a Certified Maintenance Provider at www.conteches.com/ccmp

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, wastewater treatment and earth stabilization products. For information on other Contech segment offerings, visit ContechES.com or call 800.338.1122

APPENDIX E

SPDES PERMIT

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SPDES GENERAL PERMIT
FOR STORMWATER DISCHARGES

From

CONSTRUCTION ACTIVITY

Permit No. GP- 0-20-001

Issued Pursuant to Article 17, Titles 7, 8 and Article 70

of the Environmental Conservation Law

Effective Date: January 29, 2020

Expiration Date: January 28, 2025

John J. Ferguson

Chief Permit Administrator

Authorized Signature

1-23-20

Date

Address: NYS DEC
Division of Environmental Permits
625 Broadway, 4th Floor
Albany, N.Y. 12233-1750

PREFACE

Pursuant to Section 402 of the Clean Water Act ("CWA"), 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 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, 8 and Article 70.

An *owner or operator* of a *construction activity* that is eligible for coverage under this permit must obtain coverage prior to the *commencement of construction activity*. Activities that fit the definition of "*construction activity*", as defined under 40 CFR 122.26(b)(14)(x), (15)(i), and (15)(ii), constitute construction of a *point source* and therefore, pursuant to ECL section 17-0505 and 17-0701, the *owner or operator* must have coverage under a SPDES permit prior to *commencing construction activity*. 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 GENERAL PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITIES

Table of Contents

Part 1. PERMIT COVERAGE AND LIMITATIONS 1
A. Permit Application 1
B. Effluent Limitations Applicable to Discharges from Construction Activities 1
C. Post-construction Stormwater Management Practice Requirements 4
D. Maintaining Water Quality 8
E. Eligibility Under This General Permit 9
F. Activities Which Are Ineligible for Coverage Under This General Permit 9
Part II. PERMIT COVERAGE 12
A. How to Obtain Coverage 12
B. Notice of Intent (NOI) Submittal 13
C. Permit Authorization 13
D. General Requirements For Owners or Operators With Permit Coverage 15
E. Permit Coverage for Discharges Authorized Under GP-0-15-002 17
F. Change of Owner or Operator 17
Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP) 18
A. General SWPPP Requirements 18
B. Required SWPPP Contents 20
C. Required SWPPP Components by Project Type 24
Part IV. INSPECTION AND MAINTENANCE REQUIREMENTS 24
A. General Construction Site Inspection and Maintenance Requirements 24
B. Contractor Maintenance Inspection Requirements 24
C. Qualified Inspector Inspection Requirements 25
Part V. TERMINATION OF PERMIT COVERAGE 29
A. Termination of Permit Coverage 29
Part VI. REPORTING AND RETENTION RECORDS 31
A. Record Retention 31
B. Addresses 31
Part VII. STANDARD PERMIT CONDITIONS 31
A. Duty to Comply 31
B. Continuation of the Expired General Permit 32
C. Enforcement 32
D. Need to Halt or Reduce Activity Not a Defense 32
E. Duty to Mitigate 33
F. Duty to Provide Information 33
G. Other Information 33
H. Signatory Requirements 33
I. Property Rights 35
J. Severability 35

K. Requirement to Obtain Coverage Under an Alternative Permit ... 35
L. Proper Operation and Maintenance ... 36
M. Inspection and Entry ... 36
N. Permit Actions ... 37
O. Definitions ... 37
P. Re-Opener Clause ... 37
Q. Penalties for Falsification of Forms and Reports ... 37
R. Other Permits ... 38
APPENDIX A – Acronyms and Definitions ... 39
Acronyms ... 39
Definitions ... 40
APPENDIX B – Required SWPPP Components by Project Type ... 48
Table 1 ... 48
Table 2 ... 50
APPENDIX C – Watersheds Requiring Enhanced Phosphorus Removal ... 52
APPENDIX D – Watersheds with Lower Disturbance Threshold ... 58
APPENDIX E – 303(d) Segments Impaired by Construction Related Pollutant(s) ... 59
APPENDIX F – List of NYS DEC Regional Offices ... 65

Part 1. PERMIT COVERAGE AND LIMITATIONS

A. Permit Application

This permit authorizes stormwater *discharges* to *surface waters of the State* from the following *construction activities* identified within 40 CFR Parts 122.26(b)(14)(x), 122.26(b)(15)(i) and 122.26(b)(15)(ii), provided all of the eligibility provisions of this permit are met:

1. *Construction activities* involving soil disturbances of one (1) or more acres; including disturbances of less than one acre that are part of a *larger common plan of development or sale* that will ultimately disturb one or more acres of land; excluding *routine maintenance activity* that is performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility;

2. *Construction activities* involving soil disturbances of less than one (1) acre where the Department 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.*

3. *Construction activities* located in the watershed(s) identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

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 I.B.1. (a) – (f) of this permit. 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 I.B.1.(a) – (f) of this permit and be in accordance with the New York State Standards and Specifications for Erosion and Sediment Control, 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 the *Stormwater Pollution Prevention Plan* (“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.

a. **Erosion and Sediment Controls.** Design, install and maintain effective erosion and sediment controls to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. At a minimum, such controls must be designed, installed and maintained to:

(i) *Minimize* soil erosion through application of runoff control and soil stabilization control measure to *minimize pollutant discharges*;

(ii) Control stormwater *discharge*s, including both peak flowrates and total stormwater volume, to *minimize* channel and *streambank* erosion and scour in the immediate vicinity of the *discharge* points;

(iii) *Minimize* the amount of soil exposed during *construction activity*;

(iv) *Minimize* the disturbance of *steep slopes*;

(v) *Minimize* sediment *discharge*s from the site;

(vi) Provide and maintain *natural buffer*s around surface waters, direct stormwater to vegetated areas and maximize stormwater infiltration to reduce *pollutant discharge*s, unless *infeasible*;

(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;

(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 temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within fourteen (14) 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 E or is located in one of the watersheds listed in Appendix C, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. See Appendix A for definition of *Temporarily 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**. 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 designed, installed, implemented and maintained to:

(i) *Minimize* the *discharge* of *pollutants* from equipment and vehicle washing, wheel wash water, and other wash waters. This applies to washing operations that use clean water only. Soaps, detergents and solvents cannot be used;

(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. **Prohibited *Discharge*s.** The following *discharge*s are prohibited:

(i) Wastewater from washout of concrete;

(ii) Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;

(iii) Fuels, oils, or other *pollutants* used in vehicle and equipment operation and maintenance;

(iv) Soaps or solvents used in vehicle and equipment washing; and

(v) Toxic or hazardous substances from a spill or other release.

f. Surface Outlets. When discharging from basins and impoundments, the outlets shall 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 Requirements

1. The *owner or operator* of a *construction activity* that requires post-construction stormwater management practices pursuant to Part III.C. of this permit must select, design, install, and maintain the practices to meet the *performance criteria* in the New York State Stormwater Management Design Manual ("Design Manual"), dated January 2015, using sound engineering judgment. Where post-construction stormwater management practices ("SMPs") are not designed in conformance with the *performance criteria* in the Design Manual, 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 post-construction stormwater management practices pursuant to Part III.C. of this permit must design the practices to meet the applicable *sizing criteria* in Part I.C.2.a., b., c. or d. of this permit.

a. Sizing Criteria for New Development

(i) Runoff Reduction Volume ("RRv"): Reduce the total Water Quality Volume ("WQv") by application of RR techniques and standard SMPs with RRv capacity. The total WQv shall be calculated in accordance with the criteria in Section 4.2 of the Design Manual.

(ii) Minimum RRv and Treatment of Remaining Total WQv: Construction activities that cannot meet the criteria in Part I.C.2.a.(i) of this permit due to site limitations shall 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 shall 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 4.3 of the Design Manual. The remaining portion of the total WQv that cannot be reduced shall be treated by application of standard SMPs.

(iii) Channel Protection Volume (“Cpv”): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. 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 site discharges directly to tidal waters, or fifth order or larger streams.

(iv) *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 discharges directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

(v) 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 discharges directly 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 Watershed

(i) Runoff Reduction Volume (RRv): Reduce the total Water Quality Volume (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 shall be calculated in accordance with the criteria in Section 10.3 of the Design Manual.

(ii) Minimum RRv and Treatment of Remaining Total WQv: *Construction activities* that cannot meet the criteria in Part I.C.2.b.(i) of this permit due to *site limitations* shall 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 shall 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 10.3 of the Design Manual. The remaining portion of the total WQv that cannot be reduced shall be treated by application of standard SMPs.

(iii) Channel Protection Volume (Cpv): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. 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 site *discharge*s directly to tidal waters, or fifth order or larger streams.

(iv) *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 *discharge*s directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

(v) 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 *discharge*s directly 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* shall be addressed by one of the following options. *Redevelopment activities* located in an Enhanced Phosphorus Removal Watershed (see Part III.B.3. and Appendix C of this permit) shall calculate the WQv in accordance with Section 10.3 of the Design Manual. All other *redevelopment activities* shall calculate the WQv in accordance with Section 4.2 of the Design Manual.

(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 Design Manual must be applied to all newly created pervious areas, or

(2) Capture and treat a minimum of 25% of the WQv from the disturbed, *impervious area* by the application of standard SMPs; or reduce 25% of the WQv from the disturbed, *impervious area* by the application of RR techniques or standard SMPs with RRv capacity., or

(3) Capture and treat a minimum of 75% of the WQv from the disturbed, *impervious area* as well as any additional runoff from tributary areas by application of the alternative practices discussed in Sections 9.3 and 9.4 of the Design Manual., or

(4) Application of a combination of 1, 2 and 3 above that provide a weighted average of at least two of the above methods. Application of this method shall be in accordance with the criteria in Section 9.2.1(B) (IV) of the Design Manual.

If there is an existing post-construction stormwater management practice 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 – 4 above.

(ii) Channel Protection Volume (Cpv): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.

(iii) *Overbank* Flood Control Criteria (Qp): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.

(iv) Extreme Flood Control Criteria (Qf): Not required if there are no changes to hydrology that increase 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 shall provide post-construction stormwater management controls that meet the sizing criteria calculated as an aggregate of the Sizing Criteria in Part I.C.2.a. or b. of this permit for the New Development portion of the project and Part I.C.2.c of this permit for Redevelopment Activity portion of the project.

D. Maintaining Water Quality

The Department expects that compliance with the conditions 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 *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, such as:

1. There shall be no increase in turbidity that will cause a substantial visible contrast to natural conditions;

2. There shall be no increase in suspended, colloidal or settleable solids that will cause deposition or impair the waters for their best usages; and

3. There shall 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 standards*; the *owner or operator* must take appropriate corrective action in accordance with Part IV.C.5. of this general permit and document in accordance with Part IV.C.4. of this general permit. To address the *water quality standard* violation the *owner or operator* may need to provide additional information, include and implement appropriate controls in the SWPPP to correct the problem, or obtain an individual SPDES permit.

If there is evidence indicating that despite compliance with the terms and conditions of this general 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 the Department determines that a modification of the 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. The Department may require the *owner or operator* to obtain an individual SPDES permit to continue discharging.

E. Eligibility Under This General Permit

1. This permit may authorize all *discharges* of stormwater from *construction activity* to *surface waters of the State* and *groundwaters* except for ineligible *discharges* identified under subparagraph F. of this Part.

2. Except for non-stormwater *discharges* explicitly listed in the next paragraph, this permit only authorizes stormwater *discharge*s; including stormwater runoff, snowmelt runoff, and surface runoff and drainage, from *construction activities*.

3. Notwithstanding paragraphs E.1 and E.2 above, the following non-stormwater discharges are authorized by this permit: those 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"; waters to which other components have not been added that are used to control dust in accordance with the SWPPP; and uncontaminated *discharge*s from *construction site* de-watering operations. All non-stormwater discharges must be identified in the SWPPP. Under all circumstances, the *owner or operator* must still comply with *water quality standards* in Part I.D of this permit.

4. The *owner or operator* must maintain permit eligibility to *discharge* under this permit. Any *discharges* that are not compliant with the eligibility conditions of this permit are not authorized by the permit and the *owner or operator* must either apply for a separate permit to cover those ineligible *discharges* or take steps necessary to make the *discharge* eligible for coverage.

F. Activities Which Are Ineligible for Coverage Under This General Permit

All of the following are **<u>not</u>** authorized by this permit:

1. *Discharge*s after *construction activities* have been completed and the site has undergone *final stabilization*;

2. *Discharge*s that are mixed with sources of non-stormwater other than those expressly authorized under subsection E.3. of this Part and identified in the SWPPP required by this permit;

3. *Discharges* that are required to obtain an individual SPDES permit or another SPDES general permit pursuant to Part VII.K. of this permit;

4. *Construction activities* or *discharges* from *construction activities* that may adversely affect an *endangered or threatened species* unless the *owner or*

operator has obtained a permit issued pursuant to 6 NYCRR Part 182 for the project or the Department has issued a letter of non-jurisdiction for the project. All documentation necessary to demonstrate eligibility shall be maintained on site in accordance with Part II.D.2 of this permit;

5. *Discharges* which either cause or contribute to a violation of *water quality standards* adopted pursuant to the *ECL* and its accompanying regulations;

6. *Construction activities* for residential, commercial and institutional projects:

   a. Where the *discharge*s from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

   b. Which are undertaken on land with no existing *impervious cover*; and

   c. Which disturb one (1) or more acres of land designated on the current United States Department of Agriculture ("USDA") Soil Survey as Soil Slope Phase "D", (provided the map unit name 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.

7. *Construction activities* for linear transportation projects and linear utility projects:

   a. Where the *discharge*s from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

   b. Which are undertaken on land with no existing *impervious cover*; and

   c. Which disturb two (2) or more acres of land designated on the current USDA Soil Survey as Soil Slope Phase "D" (provided the map unit name 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.

8. *Construction activities* that have the potential to affect an *historic property*, unless there is documentation that such impacts have been resolved. The following documentation necessary to demonstrate eligibility with this requirement shall be maintained on site in accordance with Part II.D.2 of this permit and made available to the Department in accordance with Part VII.F of this permit:

   a. Documentation that the *construction activity* is not within an archeologically sensitive 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.

      - 1-5 acres of disturbance - 20 feet
      - 5-20 acres of disturbance - 50 feet
      - 20+ acres of disturbance - 100 feet, or

   b. DEC consultation form sent to OPRHP, and copied to the NYS DEC Agency Historic Preservation Officer (APO), and
      (i) the State Environmental Quality Review (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/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); or

   c. Documentation of satisfactory compliance with Section 106 of the National Historic Preservation Act for a coterminous project area:

(i) No Affect
(ii) No Adverse Affect
(iii) Executed Memorandum of Agreement, or

d. Documentation that:

(i) SHPA Section 14.09 has been completed by NYS DEC or another state agency.

9. *Discharge*s from *construction activities* that are subject to an existing SPDES individual or general permit where a SPDES permit for *construction activity* has been terminated or denied; or where the *owner or operator* has failed to renew an expired individual permit.

Part II. PERMIT COVERAGE

A. How to Obtain Coverage

1. An *owner or operator* of a *construction activity* that is not subject to the requirements of a regulated, traditional land use control MS4 must first prepare a SWPPP in accordance with all applicable requirements of this permit and then submit a completed Notice of Intent (NOI) to the Department to be authorized to discharge under this permit.

2. An *owner or operator* of a *construction activity* that is subject to the requirements of a *regulated, traditional land use control MS4* must first prepare a SWPPP in accordance with all applicable requirements of this permit and then have the SWPPP reviewed and accepted by the *regulated, traditional land use control MS4* prior to submitting the NOI to the Department. The *owner or operator* shall have the “MS4 SWPPP Acceptance” form signed in accordance with Part VII.H., and then submit that form along with a completed NOI to the Department.

3. The requirement for an *owner or operator* to have its SWPPP reviewed and accepted by the *regulated, traditional land use control MS4* prior to submitting the NOI to the Department does not apply to an *owner or operator* that is obtaining permit coverage in accordance with the requirements in Part II.F. (Change of *Owner or Operator*) or where the *owner or operator* of the *construction activity* is the *regulated, traditional land use control MS4* . This exemption does not apply to *construction activities* subject to the New York City Administrative Code.

B. Notice of Intent (NOI) Submittal

1. Prior to December 21, 2020, an owner or operator shall use either the electronic (eNOI) or paper version of the NOI that the Department prepared. Both versions of the NOI are located on the Department's website (http://www.dec.ny.gov/). The paper version of the NOI shall be signed in accordance with Part VII.H. of this permit and submitted to the following address:

   NOTICE OF INTENT
   NYS DEC, Bureau of Water Permits
   625 Broadway, 4th Floor
   Albany, New York 12233-3505

2. Beginning December 21, 2020 and in accordance with EPA's 2015 NPDES Electronic Reporting Rule (40 CFR Part 127), the *owner or operator* must submit the NOI electronically using the *Department's* online NOI.

3. The *owner or operator* shall have the SWPPP preparer sign the "SWPPP Preparer Certification" statement on the NOI prior to submitting the form to the Department.

4. As of the date the NOI is submitted to the Department, the *owner or operator* shall make the NOI and SWPPP available for review and copying in accordance with the requirements in Part VII.F. of this permit.

C. Permit Authorization

1. An *owner or operator* shall not *commence construction activity* until their authorization to *discharge* under this permit goes into effect.

2. Authorization to *discharge* under this permit will be effective when the *owner or operator* has satisfied all of the following criteria:

   a. project review pursuant to the State Environmental Quality Review Act ("SEQRA") have been satisfied, when SEQRA is applicable. See the Department's website (http://www.dec.ny.gov/) for more information,

   b. where required, all necessary Department permits subject to the *Uniform Procedures Act ("UPA")* (see 6 NYCRR Part 621), or the equivalent from another New York State agency, have been obtained, unless otherwise notified by the Department pursuant to 6 NYCRR 621.3(a)(4). *Owners or operators* of *construction activities* that are required to obtain *UPA* permits must submit a preliminary SWPPP to the appropriate DEC Permit Administrator at the Regional Office listed in Appendix F at the time all other necessary *UPA* permit applications are submitted. The preliminary SWPPP must include sufficient information to demonstrate that the *construction activity* qualifies for authorization under this permit,

c. the final SWPPP has been prepared, and

d. a complete NOI has been submitted to the Department in accordance with the requirements of this permit.

3. An *owner or operator* that has satisfied the requirements of Part II.C.2 above will be authorized to *discharge* stormwater from their *construction activity* in accordance with the following schedule:

   a. For *construction activities* that are not subject to the requirements of a *regulated, traditional land use control MS4*:

      (i) Five (5) business days from the date the Department receives a complete electronic version of the NOI (eNOI) for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.; or

      (ii) Sixty (60) business days from the date the Department receives a complete NOI (electronic or paper version) for *construction activities* with a SWPPP that has not been prepared in conformance with the design criteria in technical standard referenced in Part III.B.1. or, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C., the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, or;

      (iii) Ten (10) business days from the date the Department receives a complete paper version of the NOI for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.

b. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*:

(i) Five (5) business days from the date the Department receives both a complete electronic version of the NOI (eNOI) and signed "*MS4* SWPPP Acceptance" form, or

(ii) Ten (10) business days from the date the Department receives both a complete paper version of the NOI and signed "MS4 SWPPP Acceptance" form.

4. Coverage under this permit authorizes stormwater *discharges* from only those areas of disturbance that are identified in the NOI. If an *owner or operator* wishes to have stormwater *discharges* from future or additional areas of disturbance authorized, they must submit a new NOI that addresses that phase of the development, unless otherwise notified by the Department. The *owner or operator* shall not *commence construction activity* on the future or additional areas until their authorization to *discharge* under this permit goes into effect in accordance with Part II.C. of this permit.

D. General Requirements For Owners or Operators With Permit Coverage

1. The *owner or operator* shall ensure that the provisions of the SWPPP are implemented from the *commencement of construction activity* until all areas of disturbance have achieved *final stabilization* and the Notice of Termination ("NOT") has been submitted to the Department in accordance with Part V. of this permit. This includes any changes made to the SWPPP pursuant to Part III.A.4. of this permit.

2. The *owner or operator* shall maintain a copy of the General Permit (GP-0-20-001), NOI, *NOI Acknowledgment Letter*, SWPPP, MS4 SWPPP Acceptance form, inspection reports, responsible contractor's or subcontractor's certification statement (see Part III.A.6.), and all documentation necessary to demonstrate eligibility with this permit at the *construction site* until all disturbed areas have achieved *final stabilization* and the NOT has been submitted to the Department. The documents must be maintained 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.

3. The *owner or operator* of a *construction activity* shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a *regulated, traditional land* *use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*). At a minimum, the *owner or operator* must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:

a. The *owner or operator* shall have a *qualified inspector* conduct **at least** two (2) site inspections in accordance with Part IV.C. of this permit every seven (7) calendar days, for as long as greater than five (5) acres of soil remain disturbed. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

b. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016.

c. The *owner or operator* shall prepare a phasing plan that defines maximum disturbed area per phase and shows required cuts and fills.

d. The *owner or operator* shall install any additional site-specific practices needed to protect water quality.

e. The *owner or operator* shall include the requirements above in their SWPPP.

4. In accordance with statute, regulations, and the terms and conditions of this permit, the Department may suspend or revoke an *owner's or operator's* coverage under this permit at any time if the Department determines that the SWPPP does not meet the permit requirements or consistent with Part VII.K..

5. Upon a finding of significant non-compliance with the practices described in the SWPPP or violation of this permit, the Department may order an immediate stop to all activity at the site until the non-compliance is remedied. The stop work order shall be in writing, describe the non-compliance in detail, and be sent to the *owner or operator*.

6. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*, the *owner or operator* shall notify the

regulated, traditional land use control MS4 in writing of any planned amendments or modifications to the post-construction stormwater management practice component of the SWPPP required by Part III.A. 4. and 5. of this permit. Unless otherwise notified by the *regulated, traditional land use control MS4*, the *owner or operator* shall have the SWPPP amendments or modifications reviewed and accepted by the *regulated, traditional land use control MS4* prior to commencing construction of the post-construction stormwater management practice.

E. Permit Coverage for Discharges Authorized Under GP-0-15-002

1. Upon renewal of SPDES General Permit for Stormwater Discharges from *Construction Activity* (Permit No. GP-0-15-002), an *owner or operator* of *a construction activity* with coverage under GP-0-15-002, as of the effective date of GP- 0-20-001, shall be authorized to *discharge* in accordance with GP- 0-20-001, unless otherwise notified by the Department.

   An *owner or operator* may continue to implement the technical/design components of the post-construction stormwater management controls provided that such design was done in conformance with the technical standards in place at the time of initial project authorization. However, they must comply with the other, non-design provisions of GP-0-20-001.

F. Change of Owner or Operator

1. When property ownership changes or when there is a change in operational control over the construction plans and specifications, the original *owner or operator* must notify the new *owner or operator*, in writing, of the requirement to obtain permit coverage by submitting a NOI with the Department. For *construction activities* subject to the requirements of a *regulated, traditional land use control MS4,* the original *owner or operator* must also notify the MS4, in writing, of the change in ownership at least 30 calendar days prior to the change in ownership.

2. Once the new *owner or operator* obtains permit coverage, the original *owner or operator* shall then submit a completed NOT with the name and permit identification number of the new *owner or operator* to the Department at the address in Part II.B.1. of this permit. If the original *owner or operator* maintains ownership of a portion of the *construction activity* and will disturb soil, they must maintain their coverage under the permit.

3. Permit coverage for the new *owner or operator* will be effective as of the date the Department receives a complete NOI, provided the original *owner or*

operator was not subject to a sixty (60) business day authorization period that has not expired as of the date the Department receives the NOI from the new *owner or operator*.

Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A. General SWPPP Requirements

1. A SWPPP shall be prepared and implemented by the *owner or operator* of each *construction activity* covered by this permit. 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 I.B. of this permit and where applicable, the post-construction stormwater management practice requirements in Part I.C. of this permit. The SWPPP shall be prepared prior to the submittal of the NOI. The NOI shall be submitted to the Department prior to the *commencement of construction activity*. A copy of the completed, final NOI shall be included in the SWPPP.

2. The SWPPP shall describe the erosion and sediment control practices and where required, post-construction stormwater management practices that will be used and/or constructed to reduce the *pollutants* in stormwater *discharges* and to assure compliance with the terms and conditions of this permit. In addition, the SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater *discharges*.

3. All SWPPPs that require the post-construction stormwater management practice component shall be prepared by a *qualified professional* that is knowledgeable in the principles and practices of stormwater management and treatment.

4. The *owner or operator* must keep the SWPPP current so that it at all times accurately documents the erosion and sediment controls practices that are being used or will be used during construction, 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.

5. The Department 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 shall 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 the Department, the *owner or operator* shall make the required changes to the SWPPP and submit written notification to the Department that the changes have been made. If the *owner or operator* does not respond to the Department's comments in the specified time frame, the Department 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. of this permit.

6. 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 post-construction stormwater management practices included in the SWPPP. The *owner or operator* shall have each of the contractors and subcontractors identify at least one person from their company that will be responsible for implementation of the SWPPP. This person shall be known as the *trained contractor.* The *owner or operator* shall ensure that at least one *trained contractor* is on site on a daily basis when soil disturbance activities are being performed.

   The *owner or operator* shall have each of the contractors and subcontractors identified above sign a copy of the following certification statement below before they commence any *construction activity*:

   > "I hereby certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner or operator* must comply with

the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater *discharge*s 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* shall 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 construction has commenced, they must also sign the certification statement and provide the information listed above.

7. For projects where the Department requests a copy of the SWPPP or inspection reports, the *owner or operator* shall submit the documents in both electronic (PDF only) and paper format within five (5) business days, unless otherwise notified by the Department.

B. Required SWPPP Contents

1. Erosion and sediment control component - All SWPPPs prepared pursuant to this permit shall include erosion and sediment control practices designed in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016. Where erosion and sediment control practices are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must demonstrate *equivalence* to the technical standard. At a minimum, the erosion and sediment control component of the SWPPP shall include the following:

   a. Background information about the scope of the project, including the location, type and size of project

b. A site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map shall 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);

c. A description of the soil(s) present at the site, including an identification of the Hydrologic Soil Group (HSG);

d. A construction phasing plan and sequence of operations describing the intended order of *construction activities*, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance;

e. 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;

f. A temporary and permanent soil stabilization plan that meets the requirements of this general permit and the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of *final stabilization*;

g. A site map/construction drawing(s) showing the specific location(s), size(s), and length(s) of each erosion and sediment control practice;

h. 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;

i. A maintenance inspection schedule for the contractor(s) identified in Part III.A.6. of this permit, to ensure continuous and effective operation of the erosion and sediment control practices. The maintenance inspection schedule shall be in accordance with the requirements in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016;

j. 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*;

k. 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

l. 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. 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. Post-construction stormwater management practice component – The *owner or operator* of any construction project identified in Table 2 of Appendix B as needing post-construction stormwater management practices shall prepare a SWPPP that includes practices designed in conformance with the applicable *sizing criteria* in Part I.C.2.a., c. or d. of this permit and the *performance criteria* in the technical standard, New York State Stormwater Management Design Manual dated January 2015

   Where post-construction stormwater management practices are not designed in conformance with the *performance criteria* in the technical standard, 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.

   The post-construction stormwater management practice component of the SWPPP shall include the following:

   a. Identification of all post-construction stormwater management practices to be constructed as part of the project. Include the dimensions, material specifications and installation details for each post-construction stormwater management practice;

b. A site map/construction drawing(s) showing the specific location and size of each post-construction stormwater management practice;

c. 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;

(ii) Map(s) showing post-development conditions, including watershed/subcatchments boundaries, flow paths/routing, design points and post-construction stormwater management practices;

(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;

(iv) Summary table, with supporting calculations, which demonstrates that each post-construction stormwater management practice has been designed in conformance with the *sizing criteria* included in the Design Manual;

(v) Identification of any *sizing criteria* that is not required based on the requirements included in Part I.C. of this permit; and

(vi) Identification of any elements of the design that are not in conformance with the *performance criteria* in the Design Manual. 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 Design Manual;

d. Soil testing results and locations (test pits, borings);

e. Infiltration test results, when required; and

f. 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. The plan shall identify the entity that will be responsible for the long term operation and maintenance of each practice.

3. Enhanced Phosphorus Removal Standards - All construction projects identified in Table 2 of Appendix B that are located in the watersheds identified in Appendix C shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the applicable *sizing criteria* in Part I.C.2. b., c. or d. of this permit and the *performance criteria,* Enhanced Phosphorus Removal Standards included in the Design Manual. At a minimum, the post-construction stormwater management practice component of the SWPPP shall include items 2.a - 2.f. above.

C. Required SWPPP Components by Project Type

Unless otherwise notified by the Department, *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 conformance with Part III.B.1 of this permit. *Owners or operators* of the *construction activities* identified in Table 2 of Appendix B shall prepare a SWPPP that also includes post-construction stormwater management practices designed in conformance with Part III.B.2 or 3 of this permit.

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 post-construction stormwater management practices identified in the SWPPP are inspected and maintained in accordance with Part IV.B. and C. of this permit.

2. The terms of this permit shall not be construed to prohibit the State of New York from exercising any authority pursuant to the ECL, common law or federal law, or prohibit New York State from taking any measures, whether civil or criminal, to prevent violations of the laws of the State of New York or protect the public health and safety and/or the environment.

B. Contractor Maintenance Inspection Requirements

1. The *owner or operator* of each *construction activity* identified in Tables 1 and 2 of Appendix B shall 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 shall

begin implementing corrective actions within one business day and shall complete the corrective actions in a reasonable time frame.

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. The *trained contractor* shall begin conducting the maintenance inspections in accordance with Part IV.B.1. of this permit 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 if all areas disturbed as of the project shutdown date have achieved *final stabilization* <u>and</u> all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

C. Qualified Inspector Inspection Requirements

The *owner or operator* shall have a *qualified inspector* conduct site inspections in conformance with the following requirements:

[Note: The *trained contractor* identified in Part III.A.6. and IV.B. of this permit **cannot** conduct the *qualified inspector* site inspections unless they meet the *qualified inspector* qualifications included in Appendix A. In order to perform these inspections, the *trained contractor* would have to be a:

- licensed Professional Engineer,
- Certified Professional in Erosion and Sediment Control (CPESC),
- New York State Erosion and Sediment Control Certificate Program holder
- Registered Landscape Architect, 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 Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity].

1. A *qualified inspector* shall conduct site inspections for all *construction activities* identified in Tables 1 and 2 of Appendix B, <u>with the exception of</u>:

    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 five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E;

b. the construction of a single family home that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E;

c. construction on agricultural property that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres; and

d. *construction activities* located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

2. Unless otherwise notified by the Department, the *qualified inspector* shall conduct site inspections in accordance with the following timetable:

   a. For construction sites where soil disturbance activities are on-going, the *qualified inspector* shall conduct a site inspection at least once every seven (7) calendar days.

   b. For construction sites where soil disturbance activities are on-going and the *owner or operator* has received authorization in accordance with Part II.D.3 to disturb greater than five (5) acres of soil at any one time, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

   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* shall conduct a site inspection at least once every thirty (30) calendar days. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to reducing the frequency of inspections.

d. For construction sites where soil disturbance activities have been shut down with partial project completion, the *qualified inspector* can stop conducting inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to the shutdown. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the *owner or operator* shall have the *qualified inspector* perform a final inspection and certify that all disturbed areas have achieved *final stabilization,* and all temporary, structural erosion and sediment control measures have been removed*;* and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice" certification statements on the NOT. The *owner or operator* shall then submit the completed NOT form to the address in Part II.B.1 of this permit.

e. For construction sites that directly *discharge* to one of the 303(d) segments listed in Appendix E or is located in one of the watersheds listed in Appendix C, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

3. At a minimum, the *qualified inspector* shall inspect all erosion and sediment control practices and pollution prevention measures to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved *final stabilization,* all points of *discharge* to natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the *construction site*, and all points of *discharge* from the *construction site*.

4. The *qualified inspector* shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:

a. Date and time of inspection;

b. Name and title of person(s) performing inspection;

c. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;

d. A description of the condition of the runoff at all points of *discharge* from the *construction site*. This shall include identification of any *discharges* of sediment from the *construction site*. Include *discharges* from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;

e. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the *construction site* which receive runoff from disturbed areas. This shall include identification of any *discharges* of sediment to the surface waterbody;

f. Identification of all erosion and sediment control practices and pollution prevention measures that need repair or maintenance;

g. 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;

h. Description and sketch 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;

i. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards;

j. 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 post-construction stormwater management practice(s);

k. Identification and status of all corrective actions that were required by previous inspection; and

l. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven (7) calendar days of the date of the inspection. The *qualified inspector* shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven (7) calendar days of that inspection.

5. Within one business day of the completion of an inspection, the *qualified inspector* shall notify the *owner or operator* and appropriate contractor or subcontractor identified in Part III.A.6. of this permit of any corrective actions that need to be taken. The contractor or subcontractor shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.

6. All inspection reports shall be signed by the *qualified inspector.* Pursuant to Part II.D.2. of this permit, the inspection reports shall be maintained on site with the SWPPP.

Part V. TERMINATION OF PERMIT COVERAGE

A. Termination of Permit Coverage

1. An *owner or operator* that is eligible to terminate coverage under this permit must submit a completed NOT form to the address in Part II.B.1 of this permit. The NOT form shall be one which is associated with this permit, signed in accordance with Part VII.H of this permit.

2. An *owner or operator* may terminate coverage when one or more the following conditions have been met:

   a. Total project completion - All *construction activity* identified in the SWPPP has been completed; <u>and</u> all areas of disturbance have achieved *final stabilization*; <u>and</u> all temporary, structural erosion and sediment control measures have been removed; <u>and</u> all post-construction stormwater management practices have been constructed in conformance with the SWPPP and are operational;

b. Planned shutdown with partial project completion - All soil disturbance activities have ceased; and all areas disturbed as of the project shutdown date have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational;

c. A new *owner or operator* has obtained coverage under this permit in accordance with Part II.F. of this permit.

d. The *owner or operator* obtains coverage under an alternative SPDES general permit or an individual SPDES permit.

3. For *construction activities* meeting subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *qualified inspector* perform a final site inspection prior to submitting the NOT. The *qualified inspector* shall, by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice certification statements on the NOT, certify that all the requirements in Part V.A.2.a. or b. of this permit have been achieved.

4. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4* and meet subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *regulated, traditional land use control MS4* sign the "MS4 Acceptance" statement on the NOT in accordance with the requirements in Part VII.H. of this permit. The *regulated, traditional land use control MS4* official, by signing this statement, has determined that it is acceptable for the *owner or operator* to submit the NOT in accordance with the requirements of this Part. The *regulated, traditional land use control MS4* can make this determination by performing a final site inspection themselves or by accepting the *qualified inspector*'s final site inspection certification(s) required in Part V.A.3. of this permit.

5. For *construction activities* that require post-construction stormwater management practices and meet subdivision 2a. of this Part, the *owner or operator* must, prior to submitting the NOT, ensure one of the following:

a. the post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain such practice(s) have been deeded to the municipality in which the practice(s) is located,

b. an executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s),

c. for post-construction stormwater management practices 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,

d. for post-construction stormwater management practices 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 policy and procedures in place that ensures operation and maintenance of the practices in accordance with the operation and maintenance plan.

Part VI. REPORTING AND RETENTION RECORDS

A. Record Retention

The *owner or operator* shall retain a copy of the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form and any inspection reports that were prepared in conjunction with this permit for a period of at least five (5) years from the date that the Department receives a complete NOT submitted in accordance with Part V. of this general permit.

B. Addresses

With the exception of the NOI, NOT, and MS4 SWPPP Acceptance form (which must be submitted to the address referenced in Part II.B.1 of this permit), all written correspondence requested by the Department, including individual permit applications, shall be sent to the address of the appropriate DOW Water (SPDES) Program contact at the Regional Office listed in Appendix F.

Part VII. STANDARD PERMIT CONDITIONS

A. Duty to Comply

The *owner or operator* must comply with all conditions of this permit. All contractors and subcontractors associated with the project must comply with the terms of the SWPPP. Any non-compliance with this permit constitutes a violation of the Clean Water

Act (CWA) and the ECL and is grounds for an enforcement action against the *owner or operator* and/or the contractor/subcontractor; permit revocation, suspension or modification; or denial of a permit renewal application. Upon a finding of significant non-compliance with this permit or the applicable SWPPP, the Department may order an immediate stop to all *construction activity* at the site until the non-compliance is remedied. The stop work order shall be in writing, shall describe the non-compliance in detail, and shall be sent to the *owner or operator*.

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). *Construction activity* shall not resume until written permission to do so has been received from the RWE.

B. Continuation of the Expired General Permit

This permit expires five (5) years from the effective date. If a new general permit is not issued prior to the expiration of this general permit, an *owner or operator* with coverage under this permit may continue to operate and *discharge* in accordance with the terms and conditions of this general permit, if it is extended pursuant to the State Administrative Procedure Act and 6 NYCRR Part 621, until a new general permit is issued.

C. Enforcement

Failure of the *owner or operator,* its contractors, subcontractors, agents and/or assigns to strictly adhere to any of the permit requirements contained herein shall constitute a violation of this permit. There are substantial criminal, civil, and administrative penalties associated with violating the provisions of this permit. Fines of up to $37,500 per day for each violation and imprisonment for up to fifteen (15) years may be assessed depending upon the nature and degree of the offense.

D. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for an *owner or operator* in an enforcement action that it would have been necessary to halt or reduce the *construction activity* in order to maintain compliance with the conditions of this permit.

E. Duty to Mitigate

The *owner or operator* and its contractors and subcontractors shall 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.

F. Duty to Provide Information

The *owner or operator* shall furnish to the Department, within a reasonable specified time period of a written request, all documentation necessary to demonstrate eligibility and any information to determine compliance with this permit or to determine whether cause exists for modifying or revoking this permit, or suspending or denying coverage under this permit, in accordance with the terms and conditions of this permit. The NOI, SWPPP 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 (5) 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.

G. Other Information

When the *owner or operator* becomes aware that they failed to submit any relevant facts, or submitted incorrect information in the NOI or in any of the documents required by this permit , or have made substantive revisions to the SWPPP (e.g. the scope of the project changes significantly, the type of post-construction stormwater management practice(s) changes, there is a reduction in the sizing of the post-construction stormwater management practice, or there is an increase in the disturbance area or *impervious area*), which were not reflected in the original NOI submitted to the Department, they shall promptly submit such facts or information to the Department using the contact information in Part II.A. of this permit. Failure of the *owner or operator* to correct or supplement any relevant facts within five (5) business days of becoming aware of the deficiency shall constitute a violation of this permit.

H. Signatory Requirements

1. All NOIs and NOTs shall be signed as follows:

   a. For a corporation these forms shall be signed 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 permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

b. For a partnership or sole proprietorship these forms shall be signed by a general partner or the proprietor, respectively; or

c. For a municipality, State, Federal, or other public agency these forms shall be signed by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

(i) the chief executive officer of the agency, or

(ii) 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. The SWPPP and other information requested by the Department shall be signed by a person described in Part VII.H.1. of this permit 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.H.1. of this permit;

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, 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 shall include the name, title and signature of the authorized representative and be attached to the SWPPP.

3. All inspection reports shall be signed by the *qualified inspector* that performs the inspection.

4. The MS4 SWPPP Acceptance form shall be signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4,* or by a duly authorized representative of that person.

   It shall constitute a permit violation if an incorrect and/or improper signatory authorizes any required forms, SWPPP and/or inspection reports.

I. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations. *Owners or operators* must obtain any applicable conveyances, easements, licenses and/or access to real property prior to *commencing construction activity*.

J. 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 shall not be affected thereby.

K. Requirement to Obtain Coverage Under an Alternative Permit

1. The Department may require any owner or operator authorized by this permit to apply for and/or obtain either an individual SPDES permit or another SPDES general permit. When the Department requires any discharger authorized by a general permit to apply for an individual SPDES permit, it shall notify the discharger in writing that a permit application is required. This notice shall

include a brief statement of the reasons for this decision, an application form, a statement setting a time frame for the owner or operator to file the application for an individual SPDES permit, and a deadline, not sooner than 180 days from owner or operator receipt of the notification letter, whereby the authorization to discharge under this general permit shall be terminated. Applications must be submitted to the appropriate Permit Administrator at the Regional Office. The Department may grant additional time upon demonstration, to the satisfaction of the Department, that additional time to apply for an alternative authorization is necessary or where the Department has not provided a permit determination in accordance with Part 621 of this Title.

2. When an individual SPDES permit is issued to a discharger authorized to *discharge* under a general SPDES permit for the same *discharge*(s), the general permit authorization for outfalls authorized under the individual SPDES permit is automatically terminated on the effective date of the individual permit unless termination is earlier in accordance with 6 NYCRR Part 750.

L. Proper Operation and Maintenance

The *owner or operator* shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the *owner or operator* to achieve compliance with the conditions of this permit and with the requirements of the SWPPP.

M. Inspection and Entry

The *owner or operator* shall allow an authorized representative of the Department, EPA, applicable county health department, 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 conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment), practices or operations regulated or required by this permit.

4. Sample or monitor at reasonable times, for purposes of assuring permit compliance or as otherwise authorized by the Act or ECL, any substances or parameters at any location.

N. Permit Actions

This permit may, at any time, be modified, suspended, revoked, or renewed by the Department in accordance with 6 NYCRR Part 621. The filing of a request by the *owner or operator* for a permit modification, revocation and reissuance, termination, a notification of planned changes or anticipated noncompliance does not limit, diminish and/or stay compliance with any terms of this permit.

O. Definitions

Definitions of key terms are included in Appendix A of this permit.

P. Re-Opener Clause

1. If there is evidence indicating potential or realized impacts on water quality due to any stormwater discharge associated with construction activity covered by this permit, the owner or operator of such discharge may be required to obtain an individual permit or alternative general permit in accordance with Part VII.K. of this permit or the permit may be modified to include different limitations and/or requirements.

2. Any Department initiated permit modification, suspension or revocation will be conducted in accordance with 6 NYCRR Part 621, 6 NYCRR 750-1.18, and 6 NYCRR 750-1.20.

Q. Penalties for Falsification of Forms and Reports

In accordance with 6NYCRR Part 750-2.4 and 750-2.5, 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 reports of compliance or noncompliance shall, upon conviction, be punished in accordance with ECL §71-1933 and or Articles 175 and 210 of the New York State Penal Law.

R. Other Permits

Nothing in this permit relieves the *owner or operator* from a requirement to obtain any other permits required by law.

APPENDIX A – Acronyms and Definitions

Acronyms

APO – Agency Preservation Officer
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)
DOW – Division of Water
EAF – Environmental Assessment Form
ECL - 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
OPRHP – Office of Parks, Recreation and Historic Places
Qf – Extreme Flood
Qp – Overbank Flood
RRv – Runoff Reduction Volume
RWE – Regional Water Engineer
SEQR – State Environmental Quality Review
SEQRA - State Environmental Quality Review Act
SHPA – State Historic Preservation Act
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.

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 –means the land for construction of a barn, *agricultural building*, silo, stockyard, pen or other structural practices identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" prepared by the Department in cooperation with agencies of New York Nonpoint Source Coordinating Committee (dated June 2007).

Alter Hydrology from Pre to Post-Development Conditions - means 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 - means a sewer that is designed to collect and convey both "sewage" and "stormwater".

Commence (Commencement of) Construction Activities - means 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.

Construction Activity(ies) - means any clearing, grading, excavation, filling, demolition or stockpiling activities that result in soil disturbance. Clearing activities can include, but are not limited to, 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.

Construction Site – means the land area where *construction activity(ies)* will occur. See definition for "*Commence (Commencement of) Construction Activities"* and "*Larger Common Plan of Development or Sale" also.*

Dewatering – means the act of draining rainwater and/or groundwater from building foundations, vaults or excavations/trenches.

Direct Discharge (to a specific surface waterbody) - means that 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) - means any addition of any pollutant to waters of the State through an outlet or *point source*.

Embankment –means an earthen or rock slope that supports a road/highway.

Endangered or Threatened Species – see 6 NYCRR Part 182 of the Department's rules and regulations for definition of terms and requirements.

Environmental Conservation Law (ECL) - means chapter 43-B of the Consolidated Laws of the State of New York, entitled the Environmental Conservation Law.

Equivalent (Equivalence) – means that 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 - means that 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.

General SPDES permit - means a SPDES permit issued pursuant to 6 NYCRR Part 750-1.21 and Section 70-0117 of the ECL authorizing a category of discharges.

Groundwater(s) - means waters in the saturated zone. The saturated zone is a subsurface zone in which all the interstices are filled with water under pressure greater than that of the atmosphere. Although the zone may contain gas-filled interstices or interstices filled with fluids other than water, it is still considered saturated.

Historic Property – means 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) - means all impermeable surfaces that cannot effectively infiltrate rainfall. This includes paved, concrete and gravel surfaces (i.e. parking lots, driveways, roads, runways and sidewalks); building rooftops and miscellaneous impermeable structures such as patios, pools, and sheds.

Infeasible – means not technologically possible, or not economically practicable and achievable in light of best industry practices.

Larger Common Plan of Development or Sale - means a contiguous area where multiple separate and distinct *construction activities* are occurring, or will occur, under one plan. The term “plan” in “larger 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 (SEQRA) environmental assessment form or other documents, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating that *construction activities* may occur on a specific plot.

For discrete construction projects that are located within a larger common plan of development or sale that are at least 1/4 mile apart, each project can be treated as a separate plan of development or sale provided any interconnecting road, pipeline or utility project that is part of the same “common plan” is not concurrently being disturbed.

Minimize – means 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 (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):

(i) Owned or operated by a State, city, town, 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*;*
(ii) Designed or used for collecting or conveying stormwater;
(iii) Which is not a *combined sewer*; and
(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

National Pollutant Discharge Elimination System (NPDES) - means the national system for the issuance of wastewater and stormwater permits under the Federal Water Pollution Control Act (Clean Water Act).

Natural Buffer –means an undisturbed area with natural cover running along a surface water (e.g. wetland, stream, river, lake, etc.).

New Development – means 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.

NOI Acknowledgment Letter - means the letter that the Department sends to an owner or operator to acknowledge the Department's receipt and acceptance of a complete Notice of Intent. This letter documents the owner's or operator's authorization to discharge in accordance with the general permit for stormwater discharges from *construction activity*.

Nonpoint Source - means 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 –means flow events that exceed the capacity of the stream channel and spill out into the adjacent floodplain.

Owner or Operator - means 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 conditions.

Performance Criteria – means the design criteria listed under the “Required Elements” sections in Chapters 5, 6 and 10 of the technical standard, New York State Stormwater Management Design Manual, dated January 2015. It does not include the Sizing Criteria (i.e. WQv, RRv, Cpv, Qp and Qf) in Part I.C.2. of the permit.

Point Source - means 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 - means 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 - means 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 Department 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 Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department 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 post-construction stormwater management practices that include structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.

Qualified Professional - means 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 Department endorsed individual(s). Individuals preparing SWPPPs that require the post-construction stormwater management practice 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) – means 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.).

Regulated, Traditional Land Use Control MS4 - means 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).

Routine Maintenance Activity - means *construction activity* that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility, including, but not limited to:

- Re-grading of gravel roads or parking lots,
- Cleaning and shaping of existing roadside ditches and culverts that maintains the approximate original line and grade, and hydraulic capacity of the ditch,
- 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),
- Placement of aggregate shoulder backing that stabilizes the transition between the road shoulder and the ditch or *embankment*,
- 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,
- Long-term use of equipment storage areas at or near highway maintenance facilities,
- 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*,
- Existing use of Canal Corp owned upland disposal sites for the canal, and
- Replacement of curbs, gutters, sidewalks and guide rail posts.

Site limitations – means 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 – means the criteria included in Part I.C.2 of the permit that are used to size post-construction stormwater management control practices. The criteria include; Water Quality Volume (WQv), Runoff Reduction Volume (RRv), Channel Protection Volume (Cpv), *Overbank* Flood (Qp), and Extreme Flood (Qf).

State Pollutant Discharge Elimination System (SPDES) - means the system established pursuant to Article 17 of the ECL and 6 NYCRR Part 750 for issuance of permits authorizing discharges to the waters of the state.

Steep Slope – means land area designated on the current United States Department of Agriculture ("USDA") Soil Survey as Soil Slope Phase "D", (provided the map unit name 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.

Streambank – as used in this permit, means 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) – means 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 post-construction stormwater management controls); and identifies procedures the *owner or operator* will implement to comply with the terms and conditions 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 – means that an existing disturbed area will not be disturbed again within 14 calendar days of the previous soil disturbance.

Temporary Stabilization - means that 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 Loads (TMDLs) - A TMDL is 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 on a daily basis and still meet *water quality standards*, and an allocation of that amount to the pollutant's sources. A TMDL stipulates wasteload allocations (WLAs) for *point source* discharges, load allocations (LAs) for *nonpoint source*s, and a margin of safety (MOS).

Trained Contractor - means an employee from the contracting (construction) company, identified in Part III.A.6., that has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department 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.6., 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 Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity).

The *trained contractor* is responsible for the day to day implementation of the SWPPP.

Uniform Procedures Act (UPA) Permit - means a permit required under 6 NYCRR Part 621 of the Environmental Conservation Law (ECL), Article 70.

Water Quality Standard - means 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 or not *directly discharging* to one of the 303(d) segments listed in Appendix E • 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 E • Construction of a barn or other *agricultural building*, silo, stock yard or pen.
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 watersheds identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.
The following construction activities that involve soil disturbances of one (1) or more acres of land: • 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 projects, stormwater retrofits and stream restoration projects • Pond construction • Linear bike paths running through areas with vegetative cover, including bike paths surfaced with an impervious cover • Cross-country ski trails and walking/hiking trails • Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are not part of residential, commercial or institutional development; • Sidewalk, bike path or walking path projects, 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. • Slope stabilization projects • Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics

Table 1 (Continued) 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:

- Spoil areas that will be covered with vegetation
- Vegetated open space projects (i.e. recreational parks, lawns, meadows, fields, downhill ski trails) excluding projects that *alter hydrology from pre to post development* conditions,
- Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* <u>and</u> do not *alter hydrology from pre to post development* conditions
- Demolition project where vegetation will be established, and no redevelopment is planned
- Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover*
- Structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State", excluding projects that involve soil disturbances of greater than five acres and construction activities that include the construction or reconstruction of impervious area
- 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

Table 2

CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- 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 E
- 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 E
- 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 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 larger common plan of development or sale that will ultimately disturb five or more acres of land
- Multi-family residential developments; includes duplexes, townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- 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) and structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" that include the construction or reconstruction of *impervious area*, excluding projects that involve soil disturbances of less than five acres.
- Golf courses
- Institutional development; includes hospitals, prisons, schools and colleges
- Industrial facilities; includes industrial parks
- Landfills
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTW's, water treatment plants, and water storage tanks
- Office complexes
- Playgrounds that include the construction or reconstruction of impervious area
- Sports complexes
- Racetracks; includes racetracks with earthen (dirt) surface
- Road construction or reconstruction, including roads constructed as part of the construction activities listed in Table 1

Table 2 (Continued)

CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Parking lot construction or reconstruction, including parking lots constructed as part of the construction activities listed in Table 1
- 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 over-head electric transmission line project, wind-power project, cell tower project, oil or gas well drilling project, sewer or water main project or other linear utility project
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a residential, commercial or institutional development
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a highway construction or reconstruction project
- 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 post-construction stormwater management practices designed in conformance with the Enhanced Phosphorus Removal Standards included in the technical standard, New York State Stormwater Management Design Manual ("Design Manual").

- 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

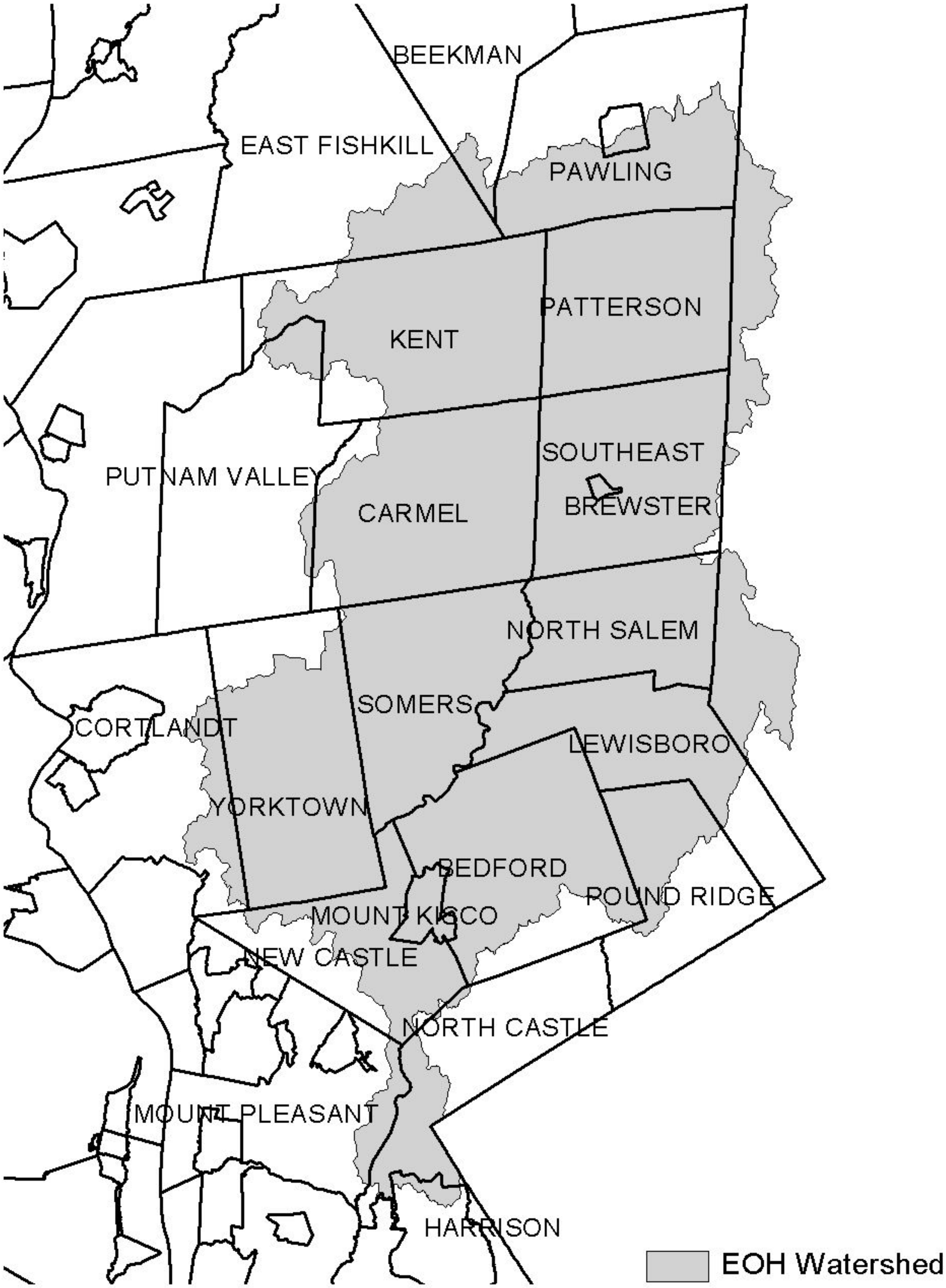


Figure 2 - Onondaga Lake Watershed

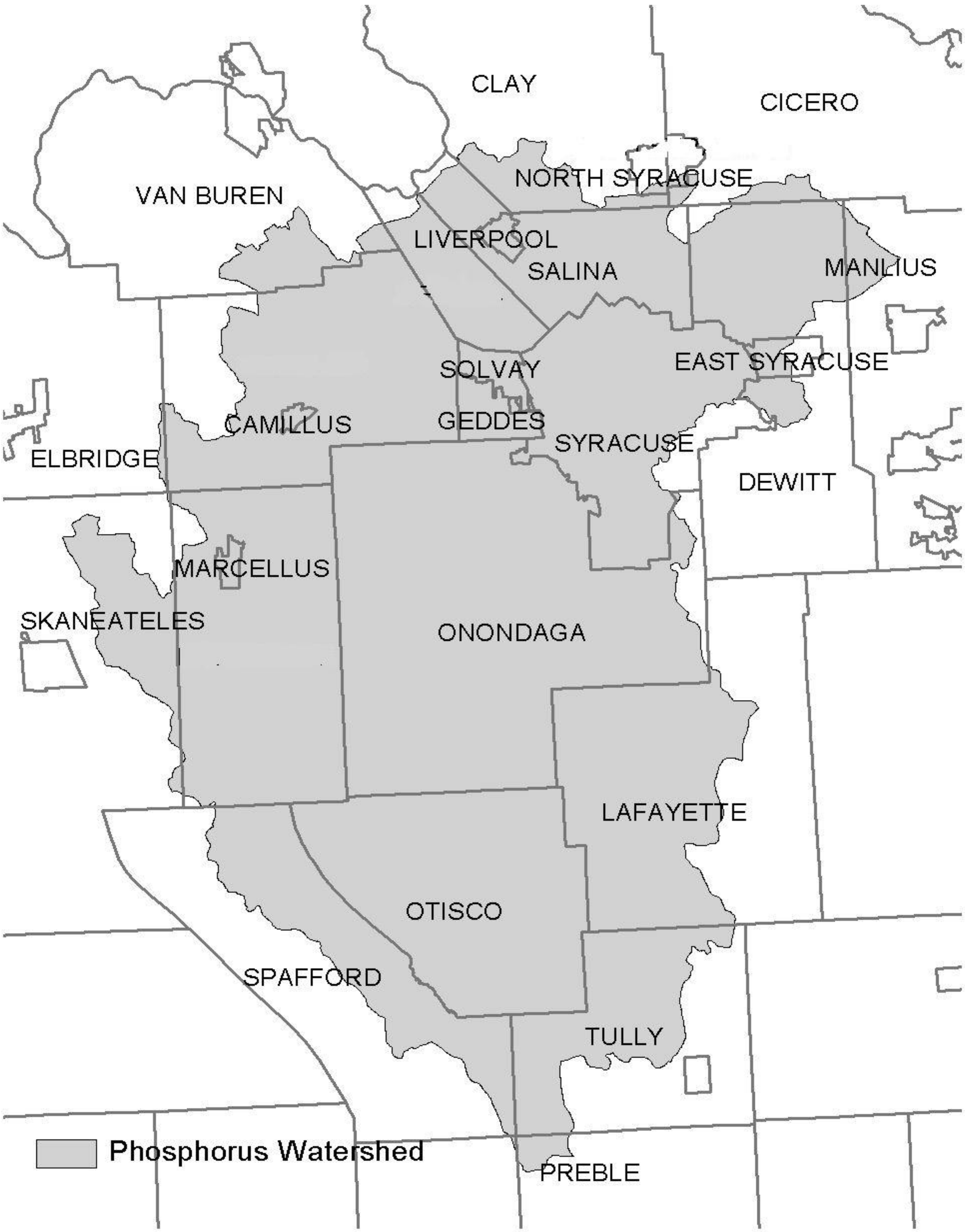


Figure 3 - Greenwood Lake Watershed

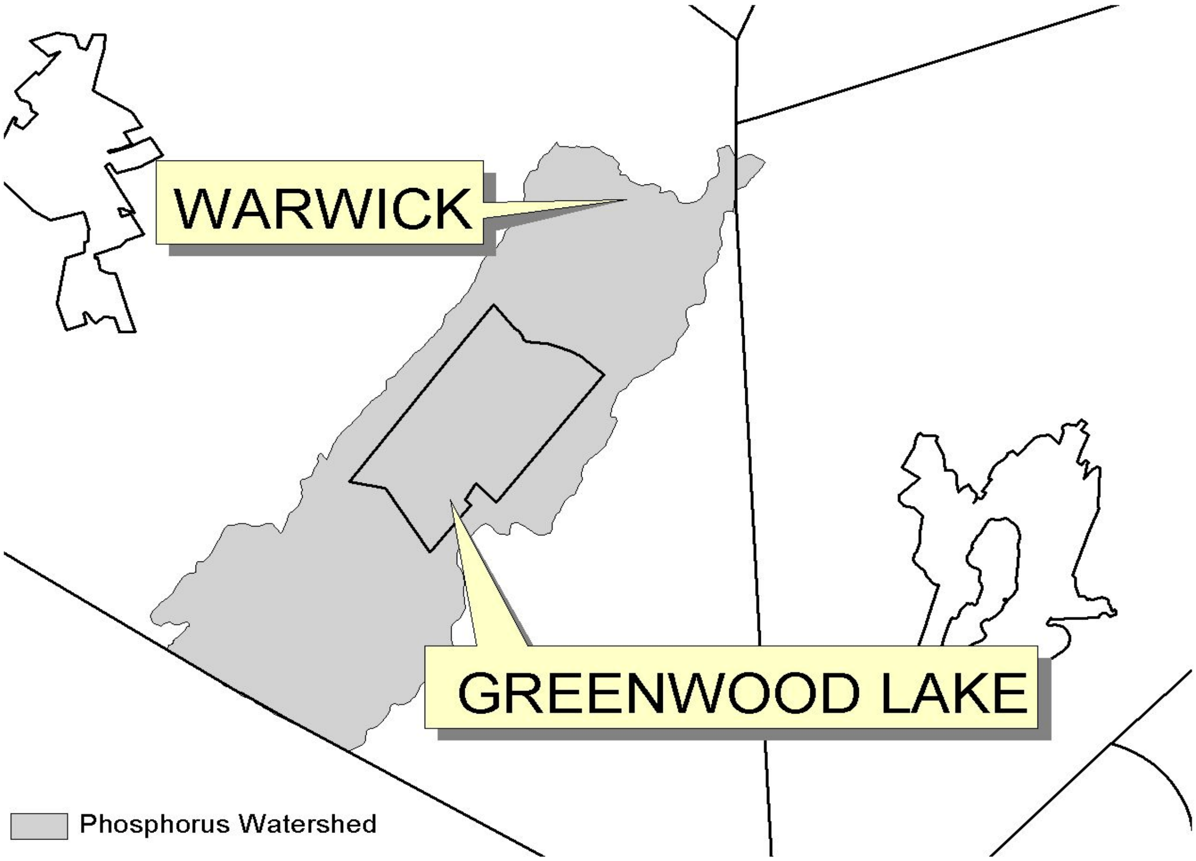


Figure 4 - Oscawana Lake Watershed

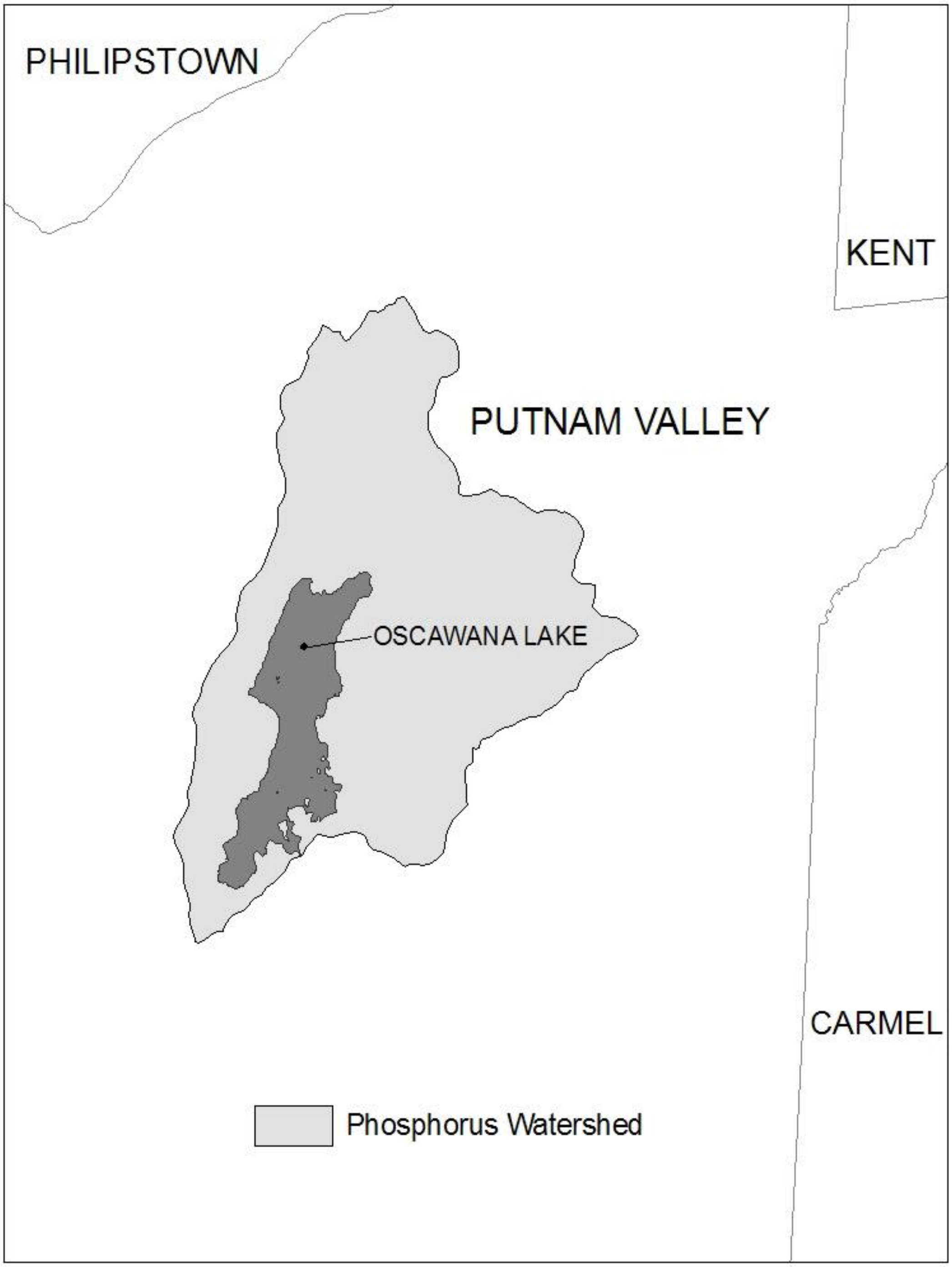
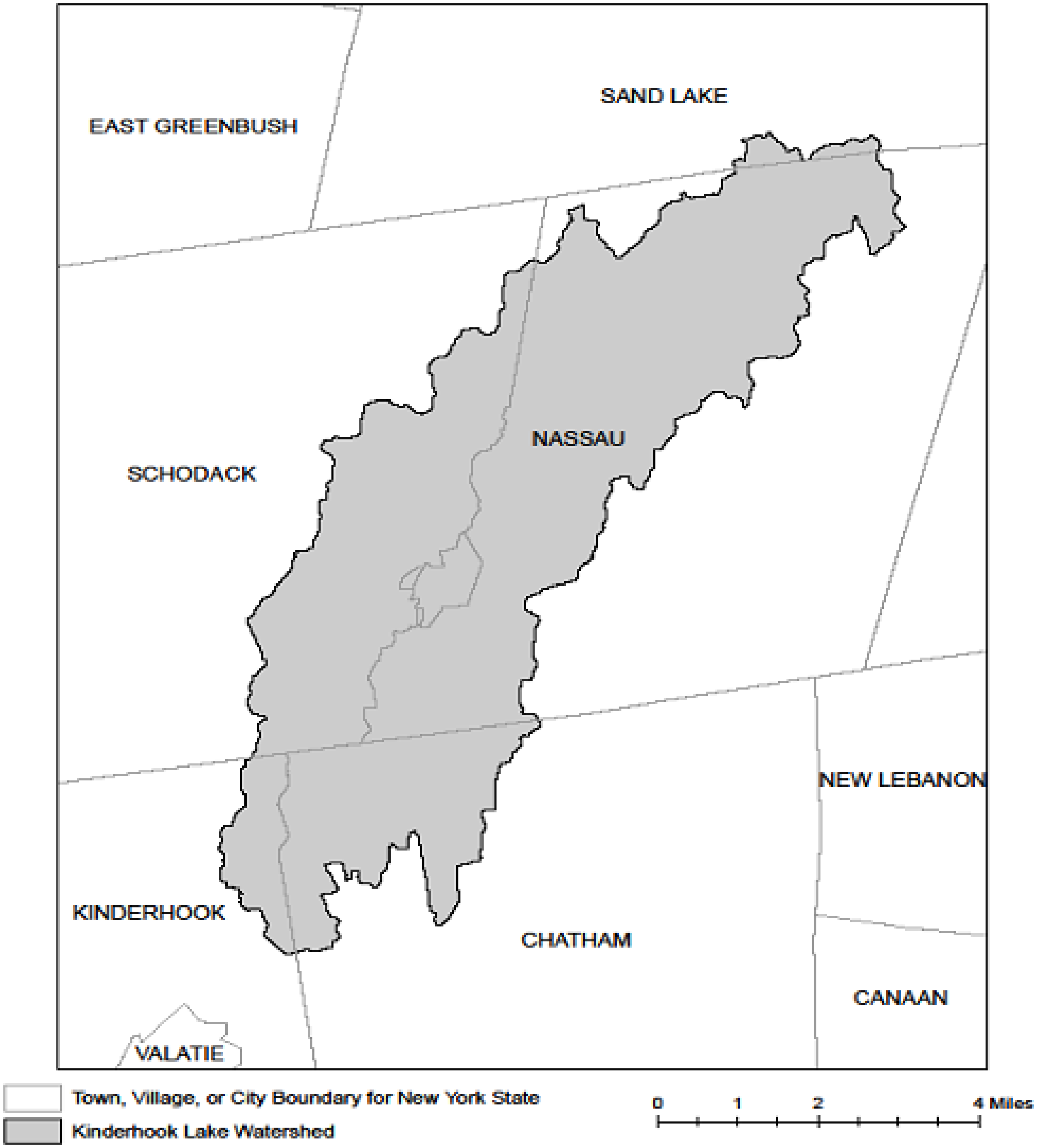


Figure 5 - Kinderhook Lake Watershed



APPENDIX D – Watersheds with Lower Disturbance Threshold

Watersheds where *owners or operators* of construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land must obtain coverage under this permit.

Entire New York City Watershed that is located east of the Hudson River **-** See Figure 1 in Appendix C

APPENDIX E – 303(d) Segments Impaired by Construction Related Pollutant(s)

List of 303(d) segments impaired by pollutants related to *construction activity* (e.g. silt, sediment or nutrients). The list was developed using "The Final New York State 2016 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy" dated November 2016. *Owners or operators* of single family home and single family residential subdivisions with 25% or less total impervious cover at total site build-out that involve soil disturbances of one or more acres of land, but less than 5 acres, and *directly discharge* to one of the listed segments below shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the New York State Stormwater Management Design Manual ("Design Manual"), dated January 2015.

COUNTY	WATERBODY	POLLUTANT
Albany	Ann Lee (Shakers) Pond, Stump Pond	Nutrients
Albany	Basic Creek Reservoir	Nutrients
Allegany	Amity Lake, Saunders Pond	Nutrients
Bronx	Long Island Sound, Bronx	Nutrients
Bronx	Van Cortlandt Lake	Nutrients
Broome	Fly Pond, Deer Lake, Sky Lake	Nutrients
Broome	Minor Tribs to Lower Susquehanna (north)	Nutrients
Broome	Whitney Point Lake/Reservoir	Nutrients
Cattaraugus	Allegheny River/Reservoir	Nutrients
Cattaraugus	Beaver (Alma) Lake	Nutrients
Cattaraugus	Case Lake	Nutrients
Cattaraugus	Linlyco/Club Pond	Nutrients
Cayuga	Duck Lake	Nutrients
Cayuga	Little Sodus Bay	Nutrients
Chautauqua	Bear Lake	Nutrients
Chautauqua	Chadakoin River and tribs	Nutrients
Chautauqua	Chautauqua Lake, North	Nutrients
Chautauqua	Chautauqua Lake, South	Nutrients
Chautauqua	Findley Lake	Nutrients
Chautauqua	Hulburt/Clymer Pond	Nutrients
Clinton	Great Chazy River, Lower, Main Stem	Silt/Sediment
Clinton	Lake Champlain, Main Lake, Middle	Nutrients
Clinton	Lake Champlain, Main Lake, North	Nutrients
Columbia	Kinderhook Lake	Nutrients
Columbia	Robinson Pond	Nutrients
Cortland	Dean Pond	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Dutchess	Fall Kill and tribs	Nutrients
Dutchess	Hillside Lake	Nutrients
Dutchess	Wappingers Lake	Nutrients
Dutchess	Wappingers Lake	Silt/Sediment
Erie	Beeman Creek and tribs	Nutrients
Erie	Ellicott Creek, Lower, and tribs	Silt/Sediment
Erie	Ellicott Creek, Lower, and tribs	Nutrients
Erie	Green Lake	Nutrients
Erie	Little Sister Creek, Lower, and tribs	Nutrients
Erie	Murder Creek, Lower, and tribs	Nutrients
Erie	Rush Creek and tribs	Nutrients
Erie	Scajaquada Creek, Lower, and tribs	Nutrients
Erie	Scajaquada Creek, Middle, and tribs	Nutrients
Erie	Scajaquada Creek, Upper, and tribs	Nutrients
Erie	South Branch Smoke Cr, Lower, and tribs	Silt/Sediment
Erie	South Branch Smoke Cr, Lower, and tribs	Nutrients
Essex	Lake Champlain, Main Lake, South	Nutrients
Essex	Lake Champlain, South Lake	Nutrients
Essex	Willsboro Bay	Nutrients
Genesee	Bigelow Creek and tribs	Nutrients
Genesee	Black Creek, Middle, and minor tribs	Nutrients
Genesee	Black Creek, Upper, and minor tribs	Nutrients
Genesee	Bowen Brook and tribs	Nutrients
Genesee	LeRoy Reservoir	Nutrients
Genesee	Oak Orchard Cr, Upper, and tribs	Nutrients
Genesee	Tonawanda Creek, Middle, Main Stem	Nutrients
Greene	Schoharie Reservoir	Silt/Sediment
Greene	Sleepy Hollow Lake	Silt/Sediment
Herkimer	Steele Creek tribs	Silt/Sediment
Herkimer	Steele Creek tribs	Nutrients
Jefferson	Moon Lake	Nutrients
Kings	Hendrix Creek	Nutrients
Kings	Prospect Park Lake	Nutrients
Lewis	Mill Creek/South Branch, and tribs	Nutrients
Livingston	Christie Creek and tribs	Nutrients
Livingston	Conesus Lake	Nutrients
Livingston	Mill Creek and minor tribs	Silt/Sediment
Monroe	Black Creek, Lower, and minor tribs	Nutrients
Monroe	Buck Pond	Nutrients
Monroe	Cranberry Pond	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Monroe	Lake Ontario Shoreline, Western	Nutrients
Monroe	Long Pond	Nutrients
Monroe	Mill Creek and tribs	Nutrients
Monroe	Mill Creek/Blue Pond Outlet and tribs	Nutrients
Monroe	Minor Tribs to Irondequoit Bay	Nutrients
Monroe	Rochester Embayment - East	Nutrients
Monroe	Rochester Embayment - West	Nutrients
Monroe	Shipbuilders Creek and tribs	Nutrients
Monroe	Thomas Creek/White Brook and tribs	Nutrients
Nassau	Beaver Lake	Nutrients
Nassau	Camaans Pond	Nutrients
Nassau	East Meadow Brook, Upper, and tribs	Silt/Sediment
Nassau	East Rockaway Channel	Nutrients
Nassau	Grant Park Pond	Nutrients
Nassau	Hempstead Bay	Nutrients
Nassau	Hempstead Lake	Nutrients
Nassau	Hewlett Bay	Nutrients
Nassau	Hog Island Channel	Nutrients
Nassau	Long Island Sound, Nassau County Waters	Nutrients
Nassau	Massapequa Creek and tribs	Nutrients
Nassau	Milburn/Parsonage Creeks, Upp, and tribs	Nutrients
Nassau	Reynolds Channel, west	Nutrients
Nassau	Tidal Tribs to Hempstead Bay	Nutrients
Nassau	Tribs (fresh) to East Bay	Nutrients
Nassau	Tribs (fresh) to East Bay	Silt/Sediment
Nassau	Tribs to Smith/Halls Ponds	Nutrients
Nassau	Woodmere Channel	Nutrients
New York	Harlem Meer	Nutrients
New York	The Lake in Central Park	Nutrients
Niagara	Bergholtz Creek and tribs	Nutrients
Niagara	Hyde Park Lake	Nutrients
Niagara	Lake Ontario Shoreline, Western	Nutrients
Niagara	Lake Ontario Shoreline, Western	Nutrients
Oneida	Ballou, Nail Creeks and tribs	Nutrients
Onondaga	Harbor Brook, Lower, and tribs	Nutrients
Onondaga	Ley Creek and tribs	Nutrients
Onondaga	Minor Tribs to Onondaga Lake	Nutrients
Onondaga	Ninemile Creek, Lower, and tribs	Nutrients
Onondaga	Onondaga Creek, Lower, and tribs	Nutrients
Onondaga	Onondaga Creek, Middle, and tribs	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Onondaga	Onondaga Lake, northern end	Nutrients
Onondaga	Onondaga Lake, southern end	Nutrients
Ontario	Great Brook and minor tribs	Silt/Sediment
Ontario	Great Brook and minor tribs	Nutrients
Ontario	Hemlock Lake Outlet and minor tribs	Nutrients
Ontario	Honeoye Lake	Nutrients
Orange	Greenwood Lake	Nutrients
Orange	Monhagen Brook and tribs	Nutrients
Orange	Orange Lake	Nutrients
Orleans	Lake Ontario Shoreline, Western	Nutrients
Orleans	Lake Ontario Shoreline, Western	Nutrients
Oswego	Lake Neatahwanta	Nutrients
Oswego	Pleasant Lake	Nutrients
Putnam	Bog Brook Reservoir	Nutrients
Putnam	Boyd Corners Reservoir	Nutrients
Putnam	Croton Falls Reservoir	Nutrients
Putnam	Diverting Reservoir	Nutrients
Putnam	East Branch Reservoir	Nutrients
Putnam	Lake Carmel	Nutrients
Putnam	Middle Branch Reservoir	Nutrients
Putnam	Oscawana Lake	Nutrients
Putnam	Palmer Lake	Nutrients
Putnam	West Branch Reservoir	Nutrients
Queens	Bergen Basin	Nutrients
Queens	Flushing Creek/Bay	Nutrients
Queens	Jamaica Bay, Eastern, and tribs (Queens)	Nutrients
Queens	Kissena Lake	Nutrients
Queens	Meadow Lake	Nutrients
Queens	Willow Lake	Nutrients
Rensselaer	Nassau Lake	Nutrients
Rensselaer	Snyders Lake	Nutrients
Richmond	Grasmere Lake/Bradys Pond	Nutrients
Rockland	Congers Lake, Swartout Lake	Nutrients
Rockland	Rockland Lake	Nutrients
Saratoga	Ballston Lake	Nutrients
Saratoga	Dwaas Kill and tribs	Silt/Sediment
Saratoga	Dwaas Kill and tribs	Nutrients
Saratoga	Lake Lonely	Nutrients
Saratoga	Round Lake	Nutrients
Saratoga	Tribs to Lake Lonely	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Schenectady	Collins Lake	Nutrients
Schenectady	Duane Lake	Nutrients
Schenectady	Mariaville Lake	Nutrients
Schoharie	Engleville Pond	Nutrients
Schoharie	Summit Lake	Nutrients
Seneca	Reeder Creek and tribs	Nutrients
St.Lawrence	Black Lake Outlet/Black Lake	Nutrients
St.Lawrence	Fish Creek and minor tribs	Nutrients
Steuben	Smith Pond	Nutrients
Suffolk	Agawam Lake	Nutrients
Suffolk	Big/Little Fresh Ponds	Nutrients
Suffolk	Canaan Lake	Silt/Sediment
Suffolk	Canaan Lake	Nutrients
Suffolk	Flanders Bay, West/Lower Sawmill Creek	Nutrients
Suffolk	Fresh Pond	Nutrients
Suffolk	Great South Bay, East	Nutrients
Suffolk	Great South Bay, Middle	Nutrients
Suffolk	Great South Bay, West	Nutrients
Suffolk	Lake Ronkonkoma	Nutrients
Suffolk	Long Island Sound, Suffolk County, West	Nutrients
Suffolk	Mattituck (Marratooka) Pond	Nutrients
Suffolk	Meetinghouse/Terrys Creeks and tribs	Nutrients
Suffolk	Mill and Seven Ponds	Nutrients
Suffolk	Millers Pond	Nutrients
Suffolk	Moriches Bay, East	Nutrients
Suffolk	Moriches Bay, West	Nutrients
Suffolk	Peconic River, Lower, and tidal tribs	Nutrients
Suffolk	Quantuck Bay	Nutrients
Suffolk	Shinnecock Bay and Inlet	Nutrients
Suffolk	Tidal tribs to West Moriches Bay	Nutrients
Sullivan	Bodine, Montgomery Lakes	Nutrients
Sullivan	Davies Lake	Nutrients
Sullivan	Evens Lake	Nutrients
Sullivan	Pleasure Lake	Nutrients
Tompkins	Cayuga Lake, Southern End	Nutrients
Tompkins	Cayuga Lake, Southern End	Silt/Sediment
Tompkins	Owasco Inlet, Upper, and tribs	Nutrients
Ulster	Ashokan Reservoir	Silt/Sediment
Ulster	Esopus Creek, Upper, and minor tribs	Silt/Sediment
Warren	Hague Brook and tribs	Silt/Sediment

303(d) Segments Impaired by Construction Related Pollutant(s)

Warren	Huddle/Finkle Brooks and tribs	Silt/Sediment
Warren	Indian Brook and tribs	Silt/Sediment
Warren	Lake George	Silt/Sediment
Warren	Tribs to L.George, Village of L George	Silt/Sediment
Washington	Cossayuna Lake	Nutrients
Washington	Lake Champlain, South Bay	Nutrients
Washington	Tribs to L.George, East Shore	Silt/Sediment
Washington	Wood Cr/Champlain Canal and minor tribs	Nutrients
Wayne	Port Bay	Nutrients
Westchester	Amawalk Reservoir	Nutrients
Westchester	Blind Brook, Upper, and tribs	Silt/Sediment
Westchester	Cross River Reservoir	Nutrients
Westchester	Lake Katonah	Nutrients
Westchester	Lake Lincolndale	Nutrients
Westchester	Lake Meahagh	Nutrients
Westchester	Lake Mohegan	Nutrients
Westchester	Lake Shenorock	Nutrients
Westchester	Long Island Sound, Westchester (East)	Nutrients
Westchester	Mamaroneck River, Lower	Silt/Sediment
Westchester	Mamaroneck River, Upper, and minor tribs	Silt/Sediment
Westchester	Muscoot/Upper New Croton Reservoir	Nutrients
Westchester	New Croton Reservoir	Nutrients
Westchester	Peach Lake	Nutrients
Westchester	Reservoir No.1 (Lake Isle)	Nutrients
Westchester	Saw Mill River, Lower, and tribs	Nutrients
Westchester	Saw Mill River, Middle, and tribs	Nutrients
Westchester	Sheldrake River and tribs	Silt/Sediment
Westchester	Sheldrake River and tribs	Nutrients
Westchester	Silver Lake	Nutrients
Westchester	Teatown Lake	Nutrients
Westchester	Titicus Reservoir	Nutrients
Westchester	Truesdale Lake	Nutrients
Westchester	Wallace Pond	Nutrients
Wyoming	Java Lake	Nutrients
Wyoming	Silver Lake	Nutrients

APPENDIX F – List of NYS DEC 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	100 HILLSIDE AVENUE, SUITE 1W WHITE PLAINS, NY 10603 TEL. (914) 428 - 2505
4	ALBANY, COLUMBIA, DELAWARE, GREENE, MONTGOMERY, OTSEGO, RENSSELAER, SCHENECTADY AND SCHOHARIE	1150 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	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7438	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 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	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7165	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7070

APPENDIX F

NEW YORK STATE HISTORIC PRESERVATION OFFICE (SHPO) “NO EFFECT LETTER”

September 13, 2019

Mr. Andrew Dangler
USACE Update Regulatory Field Office
1 Buffington Street
Building 10, 3rd Floor North
Watervliet, NY 12819

Re: USACE
Albany Port District Commission Industrial Park Project
City of Albany, Town of Bethlehem, Albany County, NY
18PR07273

Dear Mr. Dangler:

Thank you for requesting the comments of the New York State Historic Preservation Office (SHPO). We have reviewed the visual simulation and the August 6, 2019 McFarland Johnson letter noting that the proposed building height has changed and could reach 85 feet in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources.

The visual simulation of the proposed building shows that the roof will be visible from the National Register eligible Papscanee Island Historic District. As noted in our November 2009 Determination of Eligibility for Papscanee Island, "Papscanee Island is historically and archaeologically significant for its association with the Upper Hudson Valley's predominate native people, the Mohican…"The rich soil along the flats and on Papscanee Island were flooded annually and generations of Mohicans cleared and cultivated these areas."

While some buildings have been introduced into the landscape, these buildings are not directly across from one of the few remaining cultivated areas on the Island. Since only the top of the building will be visible, the SHPO continues to recommend that this undertaking will have **No Adverse Effect** on historic properties with the **condition** that non-reflective, earth toned roofing materials are utilized. Maintaining a non-reflective roof will minimize any visual intrusions and help maintain the agricultural setting of the Papscanee Island Historic District.

If you have any questions, I can be reached at (518) 268-2179.

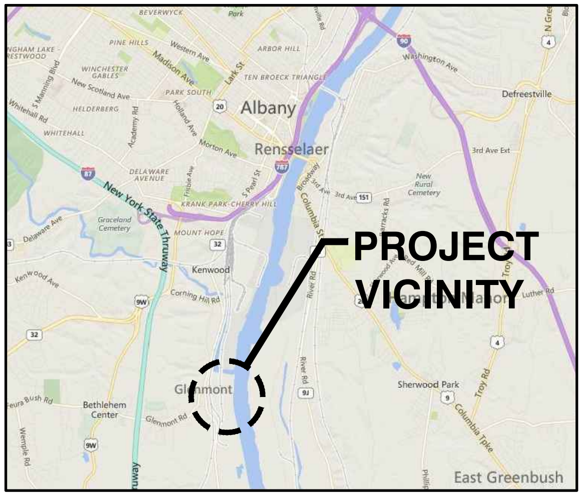
Sincerely,

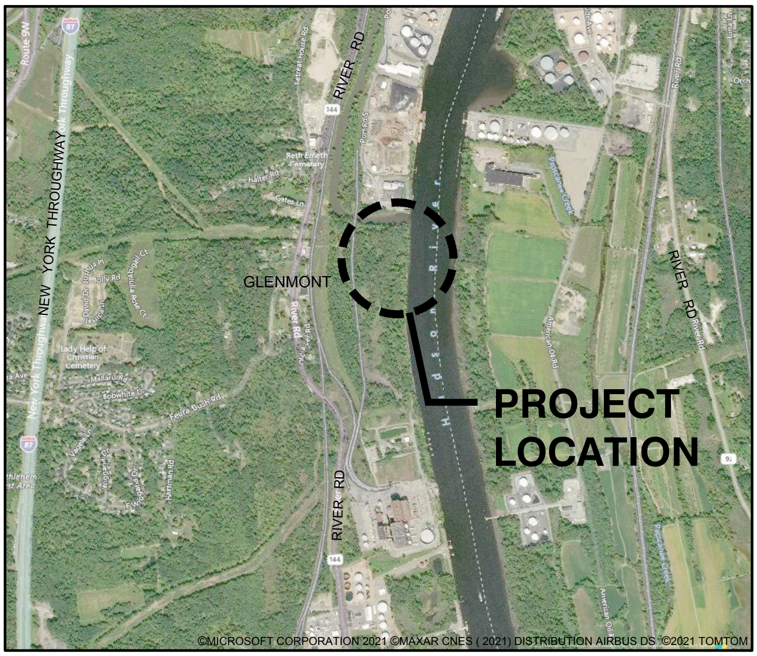
Nancy Herter

Nancy Herter
Archaeology Unit Program Coordinator

APPENDIX G

DRAFT WHARF AND DREDGING E&SC PLANS





VICINITY AND LOCATION MAP

SCALE: N.T.S.

NOTES:

1. HORIZONTAL CONTROL REFERENCED TO NORTH AMERICAN DATUM OF 1983, STATE PLANE COORDINATE SYSTEM, NEW YORK, EAST ZONE, IN FEET.

2. WATER LEVEL DATUM IS BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), AS FOLLOWS:

- MEAN HIGHER HIGH WATER LEVEL (MHHW) = +3.78 (NAVD88)
- MEAN HIGH WATER LEVEL (MHW) = +3.40 (NAVD88)
- MEAN TIDE LEVEL (MTL) = +0.91 (NAVD88)
- MEAN LOW WATER LEVEL (MLW) = -1.59 (NAVD88)
- MEAN LOWER LOW WATER LEVEL (MLLW) = -1.81 (NAVD88)

PURPOSE: WHARF CONSTRUCTION
PERMIT SUBMITTAL-NOT TO BE USED
FOR CONSTRUCTION
DATUM: NAVD88

m&n engineering, p.c.

OWNER/APPLICANT:
ALBANY PORT DISTRICT COMMISSION
PORT OF ALBANY

IN: HUDSON RIVER
NEAR: SOUTH OF ALBANY
LOCATION: PORT OF ALBANY
106 SMITH BOULEVARD
ALBANY, NEW YORK 12202

WHARF DREDGING AND CONSTRUCTION

VICINITY AND LOCATION

SHEET 1 OF 5 DATE: (REV1) 2021-10-11

PLAN - EXISTING CONDITIONS

150' 0' 150' 300'

SCALE: 1"=300'

PURPOSE: WHARF CONSTRUCTION PERMIT SUBMITTAL-NOT TO BE USED FOR CONSTRUCTION DATUM: NAVD88 m&n engineering, p.c.	OWNER/APPLICANT: ALBANY PORT DISTRICT COMMISSION PORT OF ALBANY IN: HUDSON RIVER NEAR: SOUTH OF ALBANY LOCATION: PORT OF ALBANY 106 SMITH BOULEVARD ALBANY, NEW YORK 12202	WHARF DREDGING AND CONSTRUCTION **PLAN - EXISTING CONDITIONS** SHEET 2 OF 5 DATE: (REV1) 2021-10-11

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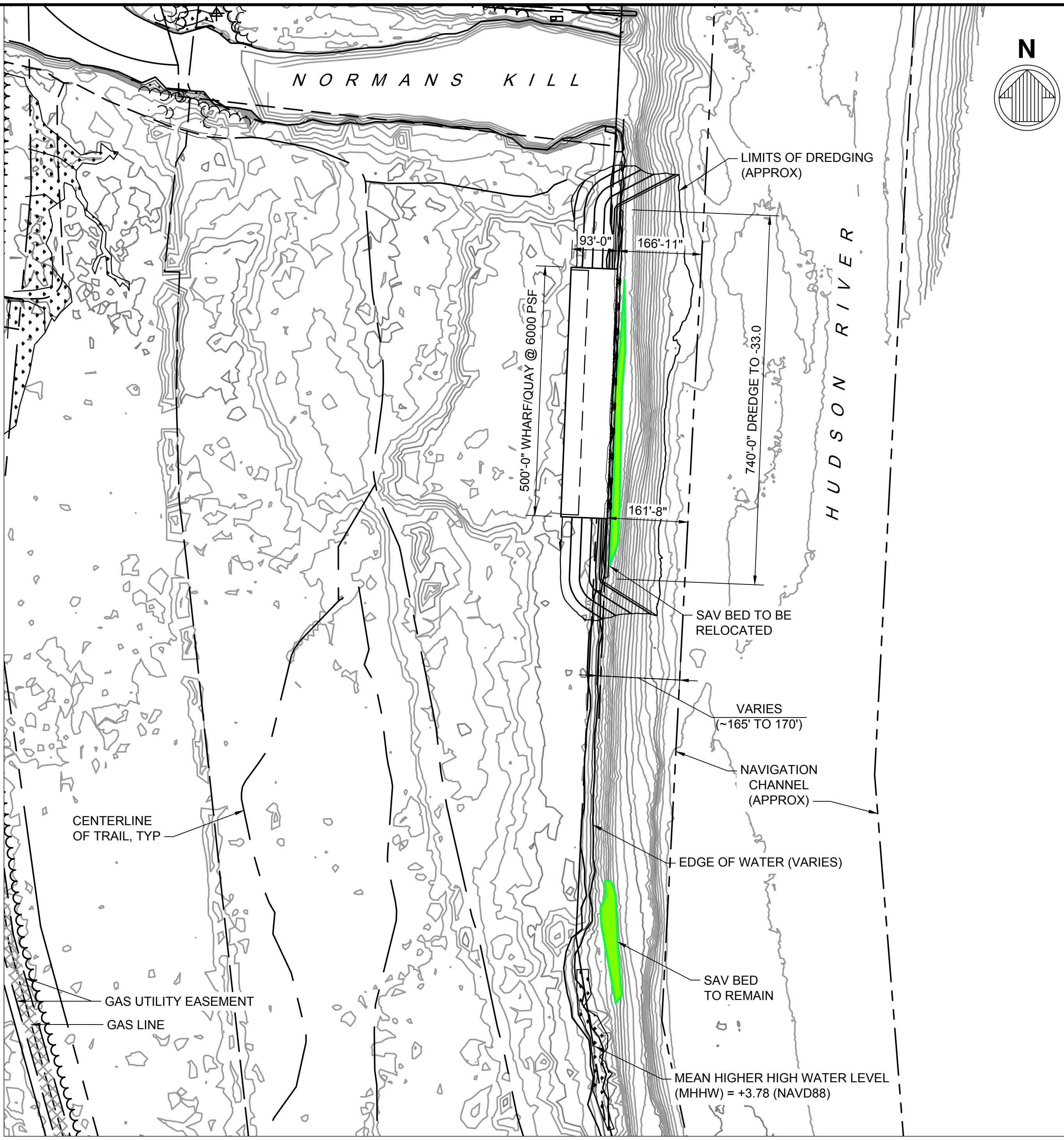

PLAN - PROPOSED CONDITIONS

150' 0' 150' 300'

SCALE: 1"=300'

PURPOSE: WHARF CONSTRUCTION
PERMIT SUBMITTAL-NOT TO BE USED FOR CONSTRUCTION
DATUM: NAVD88

m&n engineering, p.c.

OWNER/APPLICANT:
ALBANY PORT DISTRICT COMMISSION
PORT OF ALBANY

IN: HUDSON RIVER
NEAR: SOUTH OF ALBANY
LOCATION: PORT OF ALBANY
106 SMITH BOULEVARD
ALBANY, NEW YORK 12202

WHARF DREDGING AND CONSTRUCTION

PLAN - PROPOSED CONDITIONS

SHEET 3 OF 5 DATE: (REV1) 2021-10-11

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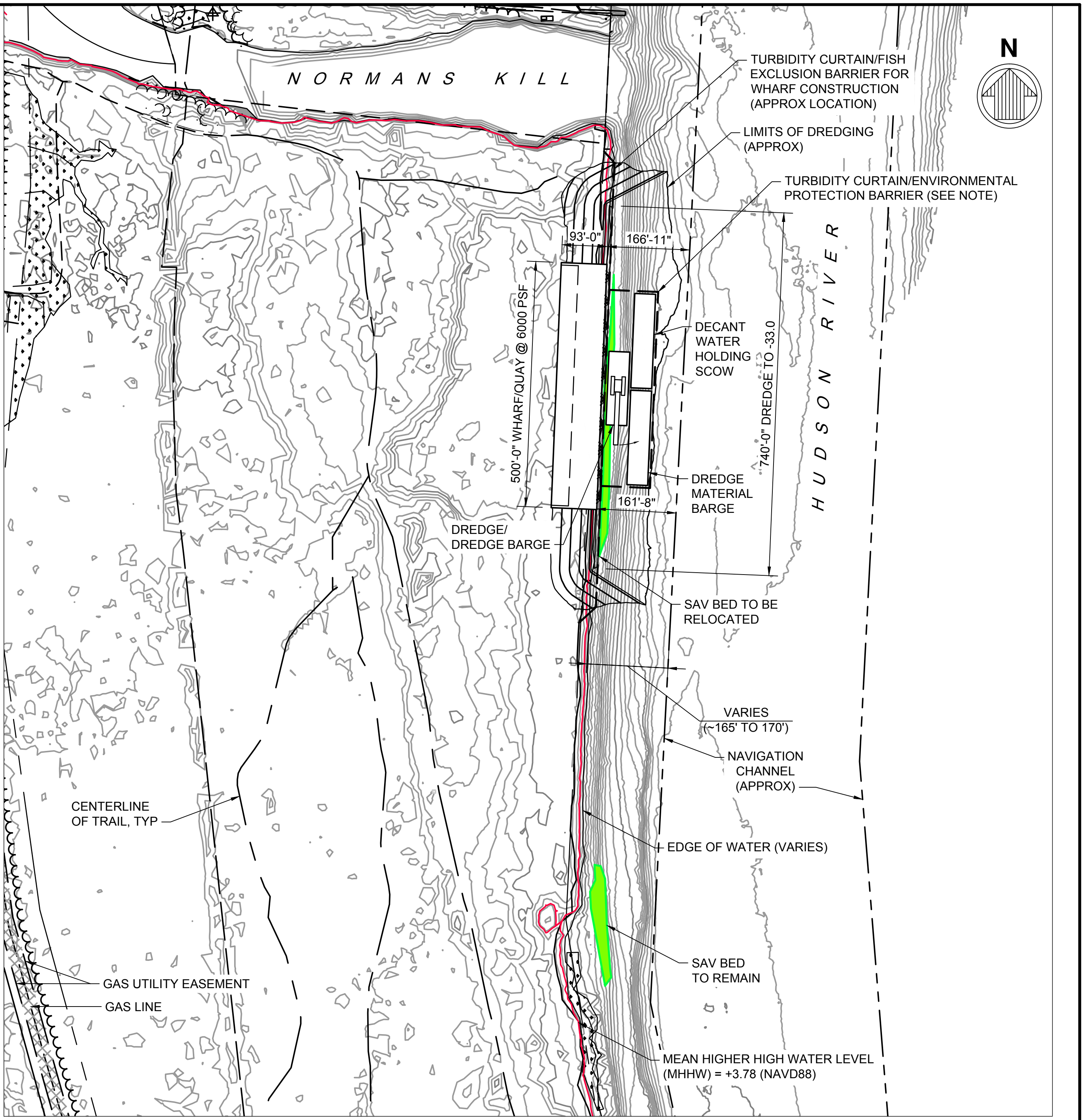

NOTE: DREDGE EQUIPMENT AND ASSOCIATED TURBIDITY CURTAIN/ ENVIRONMENTAL PROTECTION BARRIER LOCATIONS VARY.

PLAN - PROPOSED TEMPORARY ENVIRONMENTAL PROTECTION

PURPOSE: WHARF CONSTRUCTION PERMIT SUBMITTAL-NOT TO BE USED FOR CONSTRUCTION
DATUM: NAVD88

m&n engineering, p.c.

OWNER/APPLICANT:
ALBANY PORT DISTRICT COMMISSION
PORT OF ALBANY

IN: HUDSON RIVER
NEAR: SOUTH OF ALBANY
LOCATION: PORT OF ALBANY
106 SMITH BOULEVARD
ALBANY, NEW YORK 12202

WHARF DREDGING AND CONSTRUCTION

PLAN - PROPOSED TEMPORARY ENVIRONMENTAL PROTECTION

SHEET 4 OF 5 DATE: (REV1) 2021-10-11

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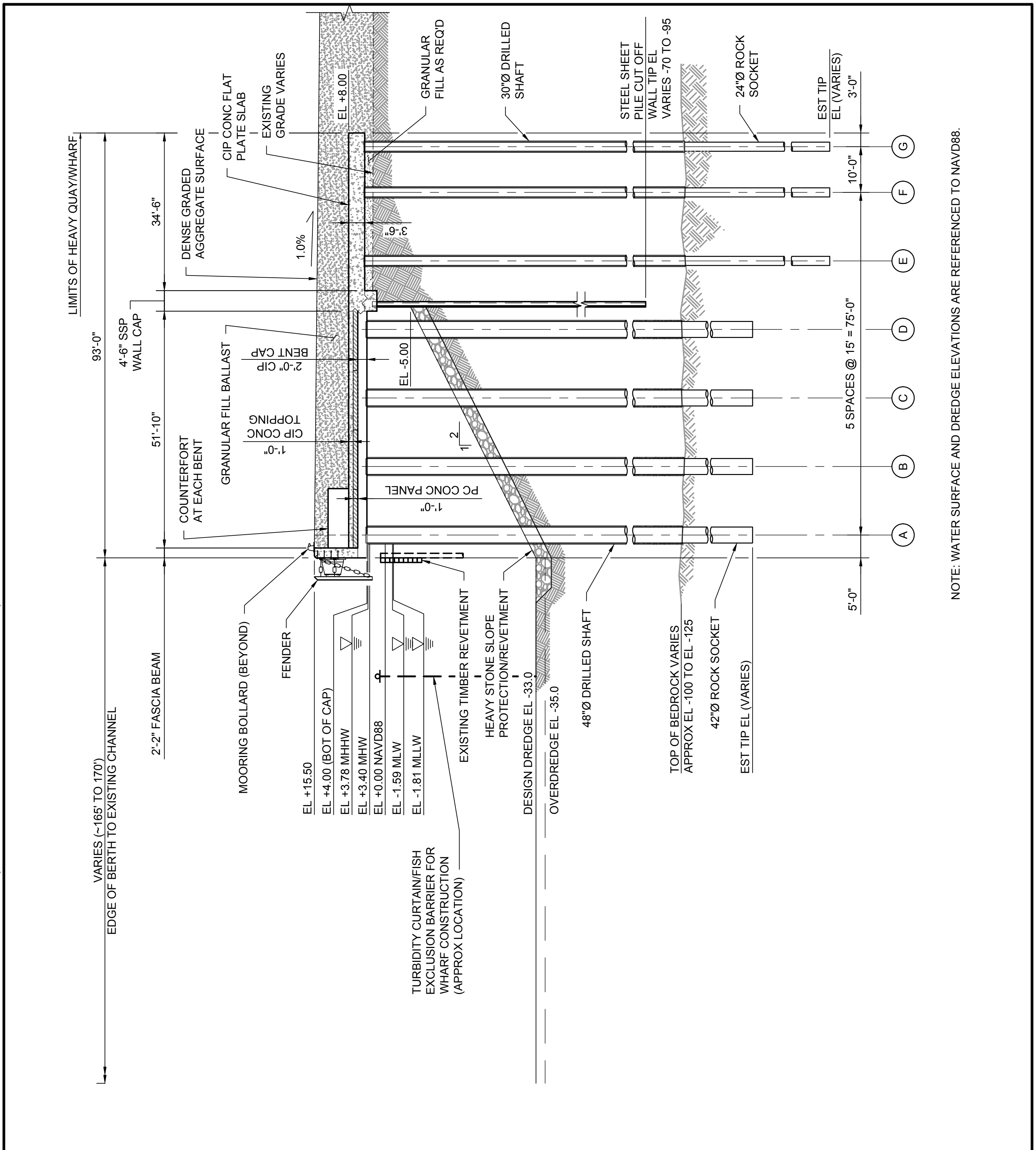


SECTION - WHARF AND DREDGING

SCALE: N.T.S.

File: Q:\NY\10949-01\20 CADD_Active_Permits\1094901P-05 ; Plotted: 10/14/2021 10:16 AM by COKER, MAEVE ; Saved: 10/13/2021 4:32 PM by MCOKER

PURPOSE: WHARF CONSTRUCTION
PERMIT SUBMITTAL-NOT TO BE USED
FOR CONSTRUCTION
DATUM: NAVD88

m&n engineering, p.c.

OWNER/APPLICANT:
ALBANY PORT DISTRICT COMMISSION
PORT OF ALBANY

IN: HUDSON RIVER
NEAR: SOUTH OF ALBANY
LOCATION: PORT OF ALBANY
106 SMITH BOULEVARD
ALBANY, NEW YORK 12202

WHARF DREDGING AND CONSTRUCTION

SECTION - WHARF AND DREDGING

SHEET 5 OF 5 DATE: (REV1) 2021-10-11

APPENDIX H

SOIL MANAGEMENT PLAN

ATLANTIC TESTING LABORATORIES

WBE certified company

Albany
22 Corporate Drive
Clifton Park, NY 12065
518-383-9144 (T)
atlantictesting.com

October 23, 2020

McFarland Johnson, Inc.
60 Railroad Place, Suite 402
Saratoga Springs, New York 12866

Attn: David Rosa

Re: Soil Management Plan
Port of Albany Expansion Project
Beacon Island Parcel
Bethlehem, Albany County, New York
MJ Project No. 18641.02
ATL Report No. AT5596CE-05-10-20

Ladies/Gentlemen:

Enclosed is a copy of the Soil Management Plan prepared for the referenced site. This report was completed in accordance with the standard form of agreement between McFarland Johnson, Inc., and Atlantic Testing Laboratories, Limited.

Please contact our office should you have any questions, or if we may be of further assistance.

Sincerely,
ATLANTIC TESTING LABORATORIES, Limited

Cheyenne J. Dashnaw, P.E.
Senior Engineer

CJD/cjd

Enclosures

cc: Georgie Nugent, McFarland Johnson, Inc.

SOIL MANAGEMENT PLAN

PORT OF ALBANY EXPANSION PROJECT
BEACON ISLAND PARCEL
BETHLEHEM, ALBANY COUNTY, NEW YORK

WBE certified company

PREPARED BY:

ATLANTIC TESTING LABORATORIES, LIMITED
22 Corporate Drive
Clifton Park, New York 12065

PREPARED FOR:

McFarland Johnson, Inc.
60 Railroad Place, Suite 402
Saratoga Springs, New York 12866
MJ Project No. 18641.02

Albany Port District Commission
106 Smith Boulevard
Albany, New York 12202

ATL REPORT NO. AT5596CE-05-10-20

October 23, 2020

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Purpose 1
1.2 Site Description 1
1.3 Plan Contents and Organization 1
1.4 Applicability 1
1.4.1 Areas to be Developed with Buildings/Structures 1
1.4.2 Areas to be Developed with Asphalt/Concrete Surfaces 2
1.4.3 Areas to be Developed with Lawn/Landscaping 2
1.4.4 Areas to Remain Wooded 2
1.4.5 Areas to be Dredged 3

2.0 BACKGROUND INFORMATION AND AREAS OF CONCERN 3
2.1 Summary of Previous Investigations 3
2.2 Known Locations of Impacted Soil 4

3.0 COORDINATION OF WORK 4
3.1 Roles and Responsibilities 4
3.2 Project Notifications 5
3.3 Spill Reporting/Administration 5

4.0 GENERAL SITE WORK AND SOIL MANAGEMENT PLAN CONDITIONS 6
4.1 Health and Safety 6
4.2 Groundwater Removal and Management (If Applicable) 6
4.3 Dust Control and Air Monitoring 6
4.4 Personnel and Equipment Decontamination 7

5.0 EXCAVATION IN AREAS IMPACTED WITH ASH 7
5.1 Soil Removal and Stockpile 7
5.2 Excavation Monitoring and Soil Sampling 8
5.3 Soil Reuse or Disposal 9

6.0 EXCAVATION IN NON-IMPACTED AREAS 9
6.1 Soil Removal and Stockpile 9
6.2 Excavation Monitoring 9
6.3 Soil Reuse or Disposal 9

7.0 EXCAVATION IN AREAS OF PETROLEUM/CHEMICAL SPILLS 10
7.1 Soil Removal and Stockpile 10
7.2 Excavation Monitoring and Soil Sampling 11
7.3 Soil Reuse or Disposal 11

8.0 SOIL COVER SYSTEM INSTALLATION 12

9.0 VAPOR BARRIER SYSTEM INSTALLATION 12

10.0 DREDGING OF SEDIMENT 12
10.1 Sediment Removal and Stockpile 12
10.2 Sediment Reuse or Disposal 13

TABLE OF CONTENTS (CONTINUED)

11.0 BACKFILL AND SOIL REUSE **13**
11.1 Suitable On-Site Soil 13
11.2 Imported Fill 13

12.0 WASTE TRANSPORT AND DISPOSAL **13**

13.0 REPORTING AND RECORDKEEPING **14**

APPENDICES

Site Location Map .... A
Soil Management Plan Flow Chart .... B
Summary of Data from Previous Investigations C
Aerial Overview of Affected Locations .... D
Sampling and Analysis Schedule for Fill .... E

1.0 INTRODUCTION

1.1 Purpose

Atlantic Testing Laboratories, Limited (ATL) was retained by McFarland Johnson, Inc., on behalf of the Albany Port District Commission, to prepare a Soil Management Plan that can be used to address areas at the Beacon Island parcel that are impacted with ash material and related debris. The purpose of this Soil Management Plan is to summarize procedures to implement for planned excavation activities, installation of a soil cover system in areas of ash material or other potential impacted fill, and management of waste soil and/or groundwater. This Soil Management Plan also addresses protocol for monitoring and sampling and analysis during excavation and site work, and recommendations for installation of vapor barrier systems beneath proposed buildings.

1.2 Site Description

The project site is the Beacon Island parcel located to the east of River Road (County Route 144) and along the west side of the Hudson River, in the Town of Bethlehem, Albany County, New York. The Beacon Island parcel is comprised of approximately 80 acres, and is the site of a planned expansion for the Port of Albany. A Site Location Map, showing the approximate location of the subject site, is included in Appendix A.

Information provided to ATL by McFarland Johnson, Inc., indicates that planned redevelopment for the site includes land clearing, excavation and backfill operations, dredging sediment for the area along the Hudson River, and construction of facilities to be associated with the Port of Albany.

1.3 Plan Contents and Organization

This Soil Management Plan includes an introductory section (Section 1), a summary of information obtained from prior investigations (Section 2), pertinent coordination items when work is scheduled for impacted areas (Section 4) and a description of procedures that may be warranted for various site work activities (Section 3), a description of procedures to be implemented during specific site work activities (Sections 5 through 12), and a description of reports and records that should be maintained for work completed at the subject site (Section 13). Appendices are included to provide supplemental information that is considered pertinent to the items described in the Soil Management Plan and are referenced where applicable.

This Soil Management Plan is organized in a manner to allow for site representatives to review and identify applicable measures to be implemented for different areas of work and types of work activities being performed. Section 1.4 describes different areas of work and the associated work activities that may be applicable. A Soil Management Plan Flow Chart, contained in Appendix B, is provided to outline tasks to be implemented for management of existing on-site soil and soil that may be imported for use as fill.

1.4 Applicability

1.4.1 Areas to be Developed with Buildings/Structures

Areas to be developed with buildings or other structures will require appropriate soil management procedures, in association with the excavation, backfill, and grading for the installation of foundation systems, and with the construction of slabs-on-grade for buildings. Following is a summary of the soil management procedures to be implemented, with reference to applicable sections of this Soil Management Plan.

- *Excavation for foundations in areas of known/suspect impacts from ash:* Refer to **Section 5** and **Item A** of Soil Management Plan Flow Chart (Appendix B)
- *Excavation for foundations in areas without known/suspect impacts from ash:* Refer to **Section 6** and **Item B** of Soil Management Plan Flow Chart (Appendix B)
- *Backfill in areas of construction:* Refer to **Section 11** and **Items E and F** of Soil Management Plan Flow Chart (Appendix B)
- *Construction of slabs-on-grade for buildings:* Refer to **Section 9** and **Item E** of Soil Management Plan Flow Chart (Appendix B)

1.4.2 Areas to be Developed with Asphalt/Concrete Surfaces

Areas to be developed with asphalt or concrete surfaces (e.g., driveways, parking lots, walking paths) will require appropriate soil management procedures, in association with the excavation, backfill, and grading prior to installation of the asphalt or concrete surface cover. Following is a summary of the soil management procedures to be implemented, with reference to applicable sections of this Soil Management Plan.

- *Excavation and site preparation in areas of known/suspect impacts from ash:* Refer to **Section 5** and **Item A** of Soil Management Plan Flow Chart (Appendix B)
- *Excavation and site preparation in areas without known/suspect impacts from ash:* Refer to **Section 6** and **Item B** of Soil Management Plan Flow Chart (Appendix B)
- *Backfill in areas of construction:* Refer to **Section 11** and **Items E and F** of Soil Management Plan Flow Chart (Appendix B)

1.4.3 Areas to be Developed with Lawn/Landscaping

Areas to be redeveloped with lawn or landscaping will require appropriate soil management procedures, in association with the excavation, backfill, grading, and soil cover system installation. Following is a summary of the soil management procedures to be implemented, with reference to applicable sections of this Soil Management Plan.

- *Excavation and site preparation in areas of known/suspect impacts from ash:* Refer to **Section 5** and **Item A** of Soil Management Plan Flow Chart (Appendix B)
- *Excavation and site preparation in areas without known/suspect impacts from ash:* Refer to **Section 6** and **Item B** of Soil Management Plan Flow Chart (Appendix B)
- *Backfill and soil cover system in areas of lawns and landscaping:* Refer to **Sections 8 and 11** and **Items E and F** of Soil Management Plan Flow Chart (Appendix B)

1.4.4 Areas to Remain Wooded

Areas of the subject site that are currently wooded and are planned to remain wooded will not require implementation of specific soil management procedures at this time. In the event that these areas are scheduled for redevelopment in the future, or if there are any ground intrusive activities performed, appropriate soil management procedures should then be provided.

1.4.5 Areas to be Dredged

Management of areas where sediment is planned for dredging is described in general for this Soil Management Plan; however, additional planning and coordination with the New York State Department of Environmental Conservation (NYSDEC), United States Army Corps of Engineers (USACE), and other applicable regulatory agencies will be necessary prior to performing the dredging operations and the handling and reuse or disposal of dredged sediments. Refer to **Section 10** and **Item D** of the Soil Management Plan Flow Chart (Appendix B).

2.0 BACKGROUND INFORMATION AND AREAS OF CONCERN

2.1 Summary of Previous Investigations

ATL performed sediment sampling at the subject site in June 2019 and August 2020, and a subsurface investigation and soil sampling in September 2020. Additionally, ATL was provided with a draft Phase II Environmental Site Assessment report prepared by Bergmann Associates for the Port of Albany and dated April 6, 2017.

The sediment sampling conducted by ATL in June 2019 included the advancement of 5 cores, and the sediment sampling conducted by ATL in August 2020 included the advancement of 10 cores. The cores were advanced in the areas scheduled for dredging as part of planned redevelopment for the site. Sediment samples were collected from the core locations and submitted for subsequent laboratory analysis. Laboratory analysis parameters for the June 2019 sampling event were selected to include compounds described in NYSDEC Technical and Operational Guidance Series (TOGS) 5.1.9, whereas the samples collected in August 2020 were analyzed for parameters to evaluate potential reuse options in addition to the NYSDEC TOGS 5.1.9 parameters. A complete summary of findings for the previously completed sediment sampling and analysis are provided in ATL Report No. CD4644CE-01-07-19, dated July 15, 2019, ATL Report No. CD4644CE-01-07-19 Addendum 1, dated August 2, 2019, and ATL Report No. AT5596CE-03-09-20 dated September 24, 2020.

The subsurface investigation and soil sampling conducted by ATL in September 2020 included the advancement of 45 probes. The probes were advanced in accessible areas throughout the site, to assess the presence or absence of ash material. Additionally, soil samples were collected from locations without ash material to evaluate potential reuse options for consideration during site redevelopment. The subsurface investigation identified multiple locations where ash material is present, but did not identify obvious visual or olfactive evidence of petroleum or chemical-related contamination. Soil samples were collected from areas without ash material, including 22 samples for analysis of volatile organic compounds (VOC), and 11 samples for analysis of semi-VOC, polychlorinated biphenyls (PCB), pesticides, metals, and cyanide. With a few exceptions, laboratory analysis results for the soil samples collected from areas without ash material were below 6 NYCRR Part 360 fill material pre-determined beneficial use criteria and below NYSDEC Unrestricted Use Soil Cleanup Objectives (SCO) listed in 6 NYCRR Part 375 and/or NYSDEC CP-51 document. A general summary of the findings for the subsurface investigation previously completed by ATL is provided as Table C-1 in Appendix C. A complete summary of findings is provided in ATL Report No. AT5596CE-04-10-20, dated October 22, 2020.

The Phase II ESA conducted by Bergmann Associates in February 2017 included the advancement of 12 test pits and 8 borings, and the installation of temporary monitor wells at 3 of the boring locations. Information in the draft Phase II ESA report indicates that coal ash was observed throughout the depths for 3 of the test pits and a fourth test pit exhibited the presence of railroad ties covered in a black tar-like substance at depths of 8 to 12 feet below ground surface. Of the 8 borings advanced during this investigation, 7 exhibited evidence of coal ash. A surface soil sample was collected from the initial 2 inches for each boring. Subsurface soil samples were also collected from the borings at varying depths. There were 3 temporary monitor wells installed for collection of groundwater samples. The soil and groundwater samples were laboratory analyzed for VOC, semi-VOC, cyanide, pesticides, PCB, and target compound list (TCL) metals. With the exception of metals, target compounds for the referenced analytical parameters were non-detect for each of the soil and groundwater samples. A general summary of the findings for the subsurface investigation previously completed by Bergmann Associates is provided as Tables C-2 and C-3 in Appendix C. The report prepared by Bergmann Associates and dated April 6, 2017, should be referenced for additional details pertaining to the findings of the subsurface investigation.

2.2 Known Locations of Impacted Soil

Data and information from the previous subsurface investigation activities indicates that ash material is present at the site in a widespread condition. The ash material has been predominantly observed on the west side of the subject site. No obvious visual or olfactive evidence of petroleum or chemical-related contamination was observed at the locations investigated.

The Aerial Overview of Affected Locations, contained in Appendix D, shows approximate locations for the borings, test pits, and probes previously advanced at the subject site, along with an indication of which exhibited the presence of ash material. The referenced drawing also shows an approximate delineation of areas where ash material is expected to be present, areas where ash material is not expected, and areas that are considered to potentially contain ash material. The areas shown on the drawing are based on existing available data and not intended to represent an exact delineation for the locations of ash material.

3.0 COORDINATION OF WORK

3.1 Roles and Responsibilities

The soil management procedures described herein should be coordinated and conducted by firms and individuals who are familiar with the conditions of the Soil Management Plan, have an understanding of the known or suspected conditions in different areas of the subject site, and have related experience and capabilities to implement the applicable work activities. While the Owner of the property has responsibility for the implementation of the Soil Management Plan, it is anticipated that performance of work activities associated with the Soil Management Plan would be coordinated and completed by design professionals, contractors, and environmental consultants who are retained by the Owner. The following table provides a summary of the primary roles and responsibilities for implementation of the Soil Management Plan.

Role	Responsibilities
Owner	• Retain and coordinate with Design Professionals, Contractors, and Environmental Consultants for performance of site work pursuant to conditions of the Soil Management Plan • Maintain site records and documentation for work completed pursuant to Soil Management Plan
Design Professionals	• Incorporate applicable provisions of the Soil Management Plan into design plans and specifications for planned site redevelopment • Coordinate with Owner, Contractors, and Environmental Consultants during design and construction phases to confirm work is completed as planned
Contractors	• Correspond with NYSDEC (and other regulatory agencies, as applicable) for notifications of work activities • Perform site work activities, including, but not limited to, excavation, grading, placement and compaction of backfill, dust control, groundwater management, soil cover system installation, vapor barrier system installation, construction, and waste transport and disposal
Environmental Consultants	• Provide guidance and assistance with implementation of the Soil Management Plan • Correspond with NYSDEC (and other regulatory agencies, as applicable) to discuss clarifications or modifications to conditions of the Soil Management Plan • Conduct monitoring and soil screening during performance of work activities that affect impacted or contaminated soil • Conduct air monitoring during ground intrusive activities that affect impacted or contaminated soil • Perform soil sampling and laboratory analysis for waste materials, fill materials, and excavation areas

3.2 Project Notifications

Within 14 days, and no less than 3 days, prior to commencing work activities that may affect areas of the subject site that are impacted with ash, the NYSDEC should be notified of the planned work. This notification should be performed by the Owner and/or Contractor performing the site work. The Design Professional and Environmental Consultant should also be similarly notified.

3.3 Spill Reporting/Administration

The subject site is known to have areas impacted with ash and related debris. Other types of contamination (i.e., petroleum, chemical) have not been encountered at locations of past investigations. The NYSDEC must be notified in the event that petroleum- or chemical-related contaminated soil is discovered on the project site. This notification will need to be provided directly to the NYSDEC Spill Hotline (telephone number 1-800-457-7362).

4.0 GENERAL SITE WORK AND SOIL MANAGEMENT PLAN CONDITIONS

4.1 Health and Safety

In addition to construction site health and safety, site personnel should be aware of the contaminants of concern associated with the ash material (metals) and utilize appropriate control methods, personal protective clothing, and personal protective equipment during the handling and management of impacted materials. Contractors working at the subject site should perform work pursuant to a health and safety plan that is specific to their scope of work and associated hazards or potential hazards.

4.2 Groundwater Removal and Management (If Applicable)

In the event that there is significant groundwater inflow in a zone of contaminated soil, a vacuum truck should be provided to remove the infiltrated groundwater as the excavation progresses or at the completion of excavation activities. Alternatively, groundwater can be pumped into a frac tank(s) or other appropriate receptacles and temporarily stored on-site prior to on-site treatment and discharge or transfer and disposal off-site.

4.3 Dust Control and Air Monitoring

Fugitive dust and vapors should be minimized or mitigated during the excavation and handling of contaminated soil, if encountered. In the event that particulates and/or vapors represent a potential concern for the work area and/or surrounding areas, particulates and/or vapors should be monitored during ground intrusive activities associated with contaminated soil by setting up real-time instrumentation at locations upwind and downwind of the project area. Assessment for airborne dust would be performed using particulate monitors capable of measuring particulate matter less than 10 microns (PM10). Assessment for vapors (applicable to areas where petroleum- or chemical-related contamination is encountered) would be performed using a photoionization detector (PID) to screen the ambient air for the measurable presence of VOC.

If air monitoring for particulates is conducted, an action level of 0.15 milligrams per cubic meter (mg/m^3) should be used for PM10 concentrations associated with the project work area. If screening is performed for ambient airborne VOC concentrations, an action level of 5 parts per million (ppm) should be used for the project work area. These action levels are consistent with the NYSDEC DER-10 “Technical Guidance for Site Investigation and Remediation” and the New York State Department of Health (NYSDOH) “Generic Community Air Monitoring Plan.”

In the event that the PM10 action level is exceeded for the work site (downwind monitoring station), the upwind background level should be immediately confirmed and it should be determined whether the work site (downwind) level exceeds the upwind background by greater than 0.1 mg/m^3. For any such exceedance, work activities should temporarily cease and dust suppression techniques should be implemented. Dust suppression techniques may include some or all of the following (as cited from Appendix 1B of the NYSDEC DER-10):

- Applying water on haul roads
- Wetting equipment and excavation faces
- Spraying water on buckets during excavation and dumping
- Hauling materials in properly tarped or watertight containers

- Restricting vehicle speeds to 10 mph
- Covering excavated areas and material after excavtion activity ceases
- Reducing the excavation size and/or number of excavations

In the event that the VOC action level is exceeded for the work site (downwind monitoring station), the upwind background level should be immediately confirmed and it should be determined whether the work site (downwind) level exceeds the upwind background by greater than 5 ppm. For any such exceedance, work activities should temporarily cease while monitoring continues. If the concentrations readily decrease below 5 ppm over background, work activities can resume. If the concentrations do not readily decrease and a definitive source can not be eliminated, the work site and on-site work activities would require further evaluation to determine an appropriate course of action.

4.4 Personnel and Equipment Decontamination

Equipment that is in contact with contaminated soil should be decontaminated, as necessary to prevent cross-contamination to other areas. Equipment and tools can be decontaminated by initially scrubbing the bulk material from the item, cleaning with a phosphate-free detergent and tap water wash, rinsing with tap water, and rinsing with distilled water. In order to contain decontamination liquids, a decontamination pad, of sufficient size to accommodate the affected portions of equipment, can be constructed using double layers of polyethylene sheeting as a base and a suitable material (i.e., lumber, clean soil, hay bales) for a perimeter berm. A more durable setup would be necessary if larger, heavier items need to be decontaminated. The polyethylene sheeting should be wrapped around the perimeter berm. Wastewater generated from decontamination activities shall be disposed of pursuant to applicable local, state and federal requirements.

5.0 EXCAVATION IN AREAS IMPACTED WITH ASH AND DEBRIS

5.1 Soil Removal and Stockpile

Soil that is impacted with ash and requires excavation for planned site redevelopment activities will need to be transported off-site for disposal. In consideration of the ash materials being widespread at various locations of the subject site, and the soil cover system that will be implemented as described in other sections of this Soil Management Plan, the areal extent of excavation for ash and debris wastes will be only as necessary to complete the scheduled site redevelopment. It is intended that the depths of removal be similarly limited to scheduled depths of excavations; however, if existing available information suggests that waste ash/debris exists at only a limited distance below scheduled depths of excavations, removal of the additional material should be conducted to limit the amount of material that would remain below permanent structures or site features to be constructed.

Excavated soil should be field examined for the visual and/or olfactive indicators of the presence of ash and debris materials or the potential presence of petroleum- or chemical-related impacts. In the event that petroleum- or chemical-related impacts are identified, procedures described in Section 7 should implemented.

Excavated soil should be segregated between soil that is impacted with ash and overburden soil that does not exhibit visual evidence of these wastes. The impacted soil should be stockpiled or directly loaded for subsequent transport and disposal. The overburden soil can be processed for reuse on-site, provided applicable conditions are satisfied (reference Section 11).

For impacted soil that is stockpiled on-site, the selected location(s) should be an area not susceptible to flooding or inundation of water during precipitation events, readily accessible to equipment that will be utilized for loading and hauling the material, and located away from stormwater or site drainage components. Any contaminated soil stockpile would need to be placed on and covered with 6-mil polyethylene sheeting or other comparable impervious material that can be readily removed and disposed of. The following items should be applicable to stockpiles for contaminated soil materials.

- Polyethylene sheeting or other impervious membrane used for the base of the soil stockpile should be placed with sheets overlapping a minimum of 1 foot.
- The base of the soil stockpile should be bermed at the perimeter to contain the soil stockpile and potential runoff during precipitation events. The berm materials, which can be comprised of mounds of clean soil material, hay bales, lumber, or other readily available suitable materials, should be placed along the perimeter and wrapped with the polyethylene sheeting or other impervious membrane that is used for the base of the soil stockpile. To minimize extraneous handling of materials and the size of the completed soil stockpile area, the berm perimeter can initially be constructed along 2 sides, and the remaining 2 sides can be constructed after all soil material is placed in the stockpile or temporarily bermed at the end of each workday.
- The height and slopes of the soil stockpile should be limited such that slope stability is not compromised during storage or the loading process.
- The soil stockpile should be covered with the polyethylene sheeting upon placement of all impacted soil material or at the end of each workday. Seams should be overlapped a minimum of 1 foot. The stockpile cover should be sufficiently weighted to contain the stored soil and resist damage from wind. Materials used to weigh down and stabilize the stockpile cover should consist of readily available materials that will not tend to damage the cover upon placement (e.g., clean soil material, sand bags, tires).
- Any temporary on-site soil stockpiles should be periodically inspected to ensure that material continues to be contained and is not released to the surrounding environment. The temporary on-site soil stockpiles will need to be properly protected and maintained until removal and off-site disposal. Polyethylene sheeting should be repaired or replaced as needed.
- Water from precipitation events that ponds on the surface of the stockpile cover should be removed upon discovery. The ponded water can be discharged on-site provided there is no contact with the petroleum-contaminated soil, and provided such activities are compliant with any stormwater discharge permits that may be applicable for the site or active construction work. Water that contacts the petroleum-impacted soil shall be properly containerized and managed as impacted waste water.
- Stockpiles with impacted soil should not remain on-site in excess of 60 days.

5.2 Excavation Monitoring and Soil Sampling

A representative of the Environmental Consultant should be on-site during excavation activities in the known or suspect areas of ash materials, to examine exposed soil for the presence of ash. The on-site representative should assist with determinations for the segregation of soil material that is considered relatively clean overburden to be reused and soil material that would be classified as contaminated for off-site disposal. The on-site representative would also be available to provide guidance relative to the management of the contaminated subsurface materials.

Since it is planned to manage ash materials in-place for various locations at the subject site, soil samples are not proposed for excavation area(s) where waste ash/debris is removed, unless other potential contaminants of concern are encountered or suspected. If soil samples are to be collected from these excavation areas, the Environmental Consultant should coordinate with the NYSDEC to confirm analytical parameters, sampling locations, and quantity of samples.

5.3 Soil Reuse or Disposal

Overburden soil scheduled for reuse should be managed pursuant to procedures described in Section 11. Waste soil materials scheduled for disposal should be managed pursuant to procedures described in Section 12.

6.0 EXCAVATION IN NON-IMPACTED AREAS

6.1 Soil Removal and Stockpile

Soil that is excavated from areas without known or suspect impacts from ash can be removed and handled pursuant to routine construction and site work methods. Contractors performing the excavation work should be cognizant of the potential for impacted soil and should visually monitor the soil as removed to determine if it may be potentially affected. If ash material is identified, the excavation and soil management procedures should transition to the methods described in Section 5. In the event that petroleum- or chemical-related impacts are identified, procedures described in Section 7 should implemented.

6.2 Excavation Monitoring

As indicated in Section 6.1, a representative of the Contractor should examine exposed soil for visual and/or olfactive indicators of potential contamination. If suspect impacted materials are encountered, a representative of the Environmental Consultant should be on-site for further assessment and monitoring in the affected area.

Unless suspect contamination is encountered, soil samples are not proposed for the excavations. If soil samples are to be collected from these excavation areas, the Environmental Consultant should coordinate with the NYSDEC to confirm analytical parameters, sampling locations, and quantity of samples.

6.3 Soil Reuse or Disposal

The excavated soil that is scheduled for reuse should be managed pursuant to procedures described in Section 11. In the event that the soil materials need to be disposed of, transport and disposal should be performed pursuant to procedures described in Section 12.

7.0 EXCAVATION IN AREAS OF PETROLEUM/CHEMICAL SPILLS

7.1 Soil Removal and Stockpile

If petroleum- or chemical-related contamination is encountered during site work, a spill will need to be reported (reference Section 3.3) and contaminated soil will need to be removed for disposal. The areal extent and depths of excavation for material affected by a spill should be inclusive of the entirety of the contaminated material, if feasible and practical. If the affected materials cannot be completely removed, an alternate approach to site remediation should be coordinated through the NYSDEC.

Excavated soil should be field examined for the visual and/or olfactive indicators of the petroleum- or chemical-related impacts, and field screened for the measurable presence of VOC with a photoionization detector (PID), equipped with the 10.6 eV lamp. In general, soil exhibiting obvious visual or olfactive evidence of contamination and/or greater than 10 ppm via ambient PID screening should be removed from the excavation, and processed for subsequent disposal. Overburden soil that does not exhibit these characteristics should be stockpiled on-site for subsequent sampling and evaluation of reuse options.

For petroleum-contaminated soil that is stockpiled on-site, the selected location(s) should be an area not susceptible to flooding or inundation of water during precipitation events, readily accessible to equipment that will be utilized for loading and hauling the material, and located away from stormwater or site drainage components. Any contaminated soil stockpile would need to be placed on and covered with 6-mil polyethylene sheeting or other comparable impervious material that can be readily removed and disposed of. The following items should be applicable to stockpiles for contaminated soil materials.

- Polyethylene sheeting or other impervious membrane used for the base of the soil stockpile should be placed with sheets overlapping a minimum of 1 foot.
- The base of the soil stockpile should be bermed at the perimeter to contain the soil stockpile and potential runoff during precipitation events. The berm materials, which can be comprised of mounds of clean soil material, hay bales, lumber, or other readily available suitable materials, should be placed along the perimeter and wrapped with the polyethylene sheeting or other impervious membrane that is used for the base of the soil stockpile. To minimize extraneous handling of materials and the size of the completed soil stockpile area, the berm perimeter can initially be constructed along 2 sides, and the remaining 2 sides can be constructed after all soil material is placed in the stockpile or temporarily bermed at the end of each workday.
- The height and slopes of the soil stockpile should be limited such that slope stability is not compromised during storage or the loading process.
- The soil stockpile should be covered with the polyethylene sheeting upon placement of all impacted soil material or at the end of each workday. Seams should be overlapped a minimum of 1 foot. The stockpile cover should be sufficiently weighted to contain the stored soil and resist damage from wind. Materials used to weigh down and stabilize the stockpile cover should consist of readily available materials that will not tend to damage the cover upon placement (e.g., clean soil material, sand bags, tires).
- Any temporary on-site soil stockpiles should be periodically inspected to ensure that material continues to be contained and is not released to the surrounding environment. The temporary on-site soil stockpiles will need to be properly

protected and maintained until removal and off-site disposal. Polyethylene sheeting should be repaired or replaced as needed.

- Water from precipitation events that ponds on the surface of the stockpile cover should be removed upon discovery. The ponded water can be discharged on-site provided there is no contact with the petroleum-contaminated soil, and provided such activities are compliant with any stormwater discharge permits that may be applicable for the site or active construction work. Water that contacts the petroleum-impacted soil shall be properly containerized and managed as impacted waste water.
- Stockpiles with impacted soil should not remain on-site in excess of 60 days.

7.2 Excavation Monitoring and Sampling

A representative of the Environmental Consultant should be on-site during excavation activities in the areas affected by a petroleum- or chemical-related spill, to examine exposed soil for visual and/or olfactive indicators of petroleum- or chemical-related impacts. Additionally, field screening for the measurable presence of VOC should be performed at the time of the excavation activities, using a portable PID, equipped with a 10.6 eV lamp.

The on-site representative should assist with determinations for the segregation of soil material that is considered relatively clean overburden to be reused and soil material that would be classified as contaminated for off-site disposal. The on-site representative would also be available to provide guidance relative to the management of the contaminated subsurface materials.

Post-excavation soil samples should be collected from the walls and floor of the excavation area(s) where petroleum- or chemical-contaminated soil is removed. The quantities of soil samples to be collected from these excavation areas should be selected pursuant to the following criteria:

- For excavations with a perimeter of less than 20 feet, 1 bottom and 1 sidewall sample should be collected.
- For excavations with a perimeter between 20 and 300 feet, samples from sidewalls should be collected at a frequency of 1 per 30 linear feet and samples from the bottom should be collected at a frequency of 1 per 900 square feet.
- For excavations with a perimeter of greater than 300 linear feet, the quantity of samples to be collected should be coordinated through the NYSDEC, or selected pursuant to the same criteria specified for an excavation perimeter between 20 and 300 feet.

The post-excavation soil samples should be laboratory analyzed for VOC, in accordance with EPA Method 8260; and semi-VOC, in accordance with EPA Method 8270 (base/neutral extractables).

7.3 Soil Reuse or Disposal

Overburden soil scheduled for reuse should be managed pursuant to procedures described in Section 11. Waste soil materials scheduled for disposal should be managed pursuant to procedures described in Section 12.

8.0 SOIL COVER SYSTEM INSTALLATION

A soil cover should be installed in areas of the site that are impacted with ash material and will be utilized as lawn or landscaped areas. The following criteria should be applicable to the soil cover system.

- The upper 6 inches of the soil cover should be suitable to sustain growth of appropriate vegetation at the ground surface.
- A minimum of 1 foot of soil cover should be placed above the ash material.
- The upper 1 foot of the soil cover should not have concentrations of contaminants that exceed the Restricted Residential Soil Cleanup Objectives (SCO) set forth in 6 NYCRR Part 375-6.
- Fill that is placed at a depth below the upper 1 foot of soil cover should not have concentrations of contaminants that exceed the Commercial SCO set forth in 6 NYCRR Part 375-6.
- A demarcation layer should be provided between the soil cover layer and underlying impacted soil, unless approval is obtained from the NYSDEC to forego installation of a demarcation layer.
- In the event that the soil cover system is breached, penetrated, or temporarily removed, restoration to original conditions (or equivalent) should be performed.
- Areas with a soil cover should be inspected at least annually, to assess existing conditions and determine if any restoration or repairs are necessary. Inspections should also be performed after severe weather events or significant site operations that may have adversely affected the soil cover system.

9.0 VAPOR BARRIER SYSTEM INSTALLATION

A vapor barrier system could be considered as an option for buildings that are constructed at the subject site, especially for buildings that would be occupied on a routine basis. While risks with vapor migration from contaminants associated with ash material is relatively low, installation of a vapor barrier system is generally an inexpensive addition to the construction of a new building. A vapor barrier system could consist of a gas permeable layer (i.e., crushed stone) and a soil gas retarder membrane (i.e., polyethylene or polyolefin sheeting) between the gas permeable layer and concrete slab. Soil gas collector pipes could also be installed in the gas permeable layer, and established as a passive system, active system, or passive with capability to be transitioned to an active system. If the Owner opts for installation of a vapor barrier system for buildings, the vapor barrier system should be incorporated into design plans and specifications for the specific building(s) being constructed.

10.0 DREDGING OF SEDIMENT

10.1 Sediment Removal and Management

Dredging of sediment would need to be conducted pursuant to conditions of applicable permits, as determined through the joint application for permits process with state agencies and the USACE. A dredging plan should also be developed to identify the dredging methods and management options. Direct coordination with the NYSDEC and reference to NYSDEC TOGS 5.1.9 would be necessary to ensure that necessary criteria for the dredging operations are addressed.

10.2 Sediment Reuse or Disposal

6 NYCRR Part 360.12(c)(1)(iv) describes conditions for pre-determined beneficial use of navigational dredged material; however, laboratory analysis data for previously collected samples at the site are not indicative of the sediment material meeting the requisite criteria. For navigational dredged material that does not meet the pre-determined beneficial use criteria, a petition for a case-specific beneficial use determination (BUD) could be considered.

Laboratory analysis results from previously collected sediment samples have identified elevated concentrations for metals and PCB, and as such, dredged sediment (or affected portions thereof) should be disposed of at a permitted solid waste management facility. If reuse is desired for portions that may exhibit lesser contaminant concentrations, a plan would need to be developed for segregation and sampling and analysis, along with submitting the petition for a case-specific BUD.

11.0 BACKFILL AND SOIL REUSE

11.1 Suitable On-Site Soil

Laboratory analysis results for samples previously collected from locations on the subject site not impacted with ash indicate that concentrations of contaminants generally do not exceed the 6 NYCRR Part 375 Commercial SCO and the 6 NYCRR Part 360 fill material pre-determined beneficial use criteria. This material should be suitable for on-site reuse below the upper 1 foot of soil cover. Additional sampling and analysis may be needed for areas not previously investigated and for previously sampled areas where exceedances were identified relative to the 6 NYCRR Part 375 Commercial SCO and/or the 6 NYCRR Part 360 fill material pre-determined beneficial use criteria. If additional sampling and analysis is performed, the quantity of samples and analytical parameters should be selected pursuant to the Sampling and Analysis Schedule for Fill in Appendix E.

11.2 Imported Fill

Fill material may need to be imported to the site, for use as the upper 1 foot of soil cover system or for other areas specific types of fill material. Imported fill material should be sampled and analyzed prior to delivery to the site, to confirm the material satisfies criteria established for use as a soil cover (reference Section 8) or criteria for use as general fill, restricted use fill, or limited use fill per 6 NYCRR Part 360.13. The quantity of samples and analytical parameters for imported fill should be selected pursuant to the Sampling and Analysis Schedule for Fill in Appendix E.

12.0 WASTE TRANSPORT AND DISPOSAL

The Contractor should provide for loading and transporting contaminated soil to a permitted solid waste management facility. Transport of waste materials will require use of trucks with applicable permits pursuant to 6 NYCRR Part 364 criteria. The disposal of waste soil materials should be documented via waste manifests and/or copies of waste disposal receipts.

Waste characterization soil samples should be collected and laboratory analyzed from the impacted material, pursuant to requirements of the selected disposal facility. The selected disposal facility should be contacted prior to excavation work to identify applicable laboratory analysis parameters and quantity of samples, and to process waste profile documentation.

13.0 REPORTING AND RECORDKEEPING

Reports and records of site work should be maintained, as needed to document site conditions and soil management procedures that are completed. Reports and records to be maintained in association with this Soil Management Plan include, but may not be limited to, the following:

- As-built plans
- Waste manifests and/or disposal receipts for ash, soil, and groundwater
- Air monitoring data
- Excavation monitoring data
- Soil sampling and laboratory analysis data
- Site observation reports

APPENDIX A

Site Location Map

Site Location Map	Drawn by: TSP	Scale: Not to scale	Project No.: AT5596	Date: May 2020

Beacon Island Parcel
Bethlehem, Albany County, New York

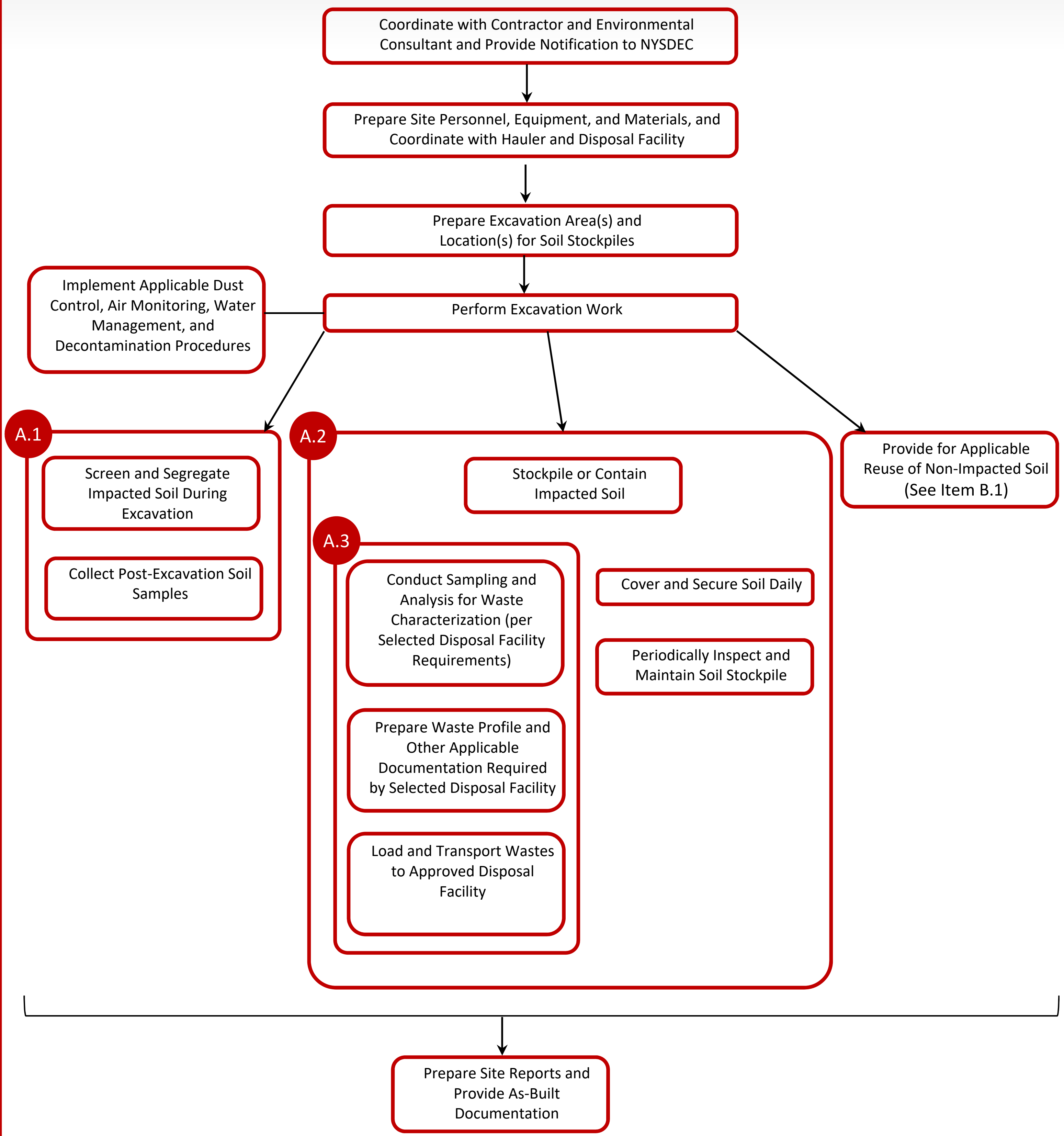
***ATLANTIC TESTING LABORATORIES*, Limited**

Albany, NY	Binghamton, NY	Canton, NY	Elmira, NY	Plattsburgh, NY
Poughkeepsie,	Syracuse, NY	Rochester, NY	Utica, NY	Watertown, NY

APPENDIX B

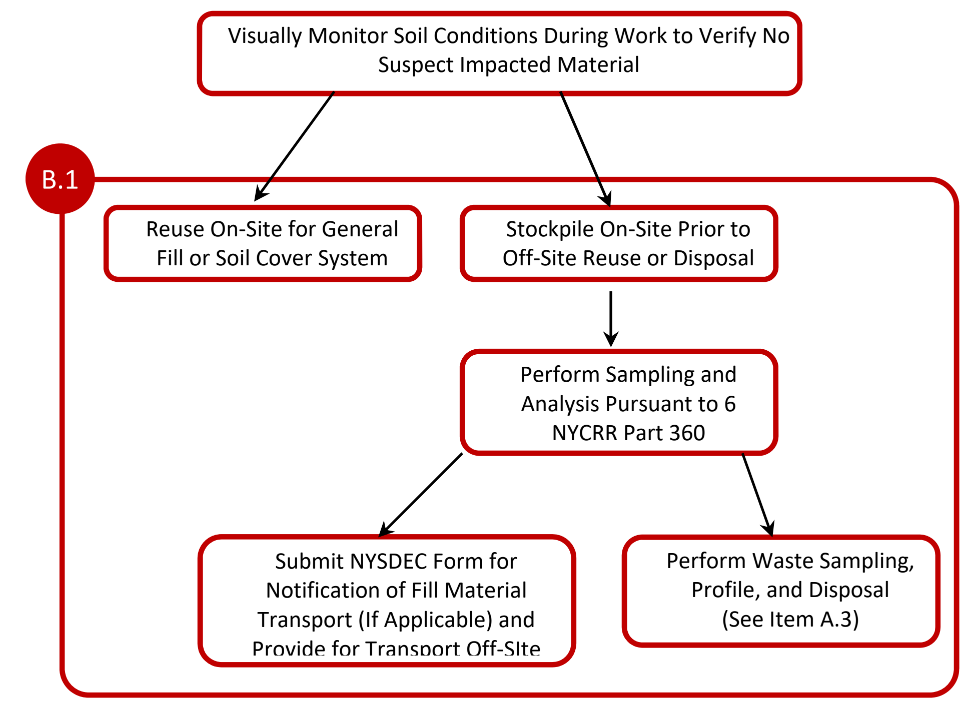
Soil Management Plan Flow Chart

A — Soil Excavation/Ground Disturbance Activities – Areas of Known/Suspect Impacts from Ash/Debris



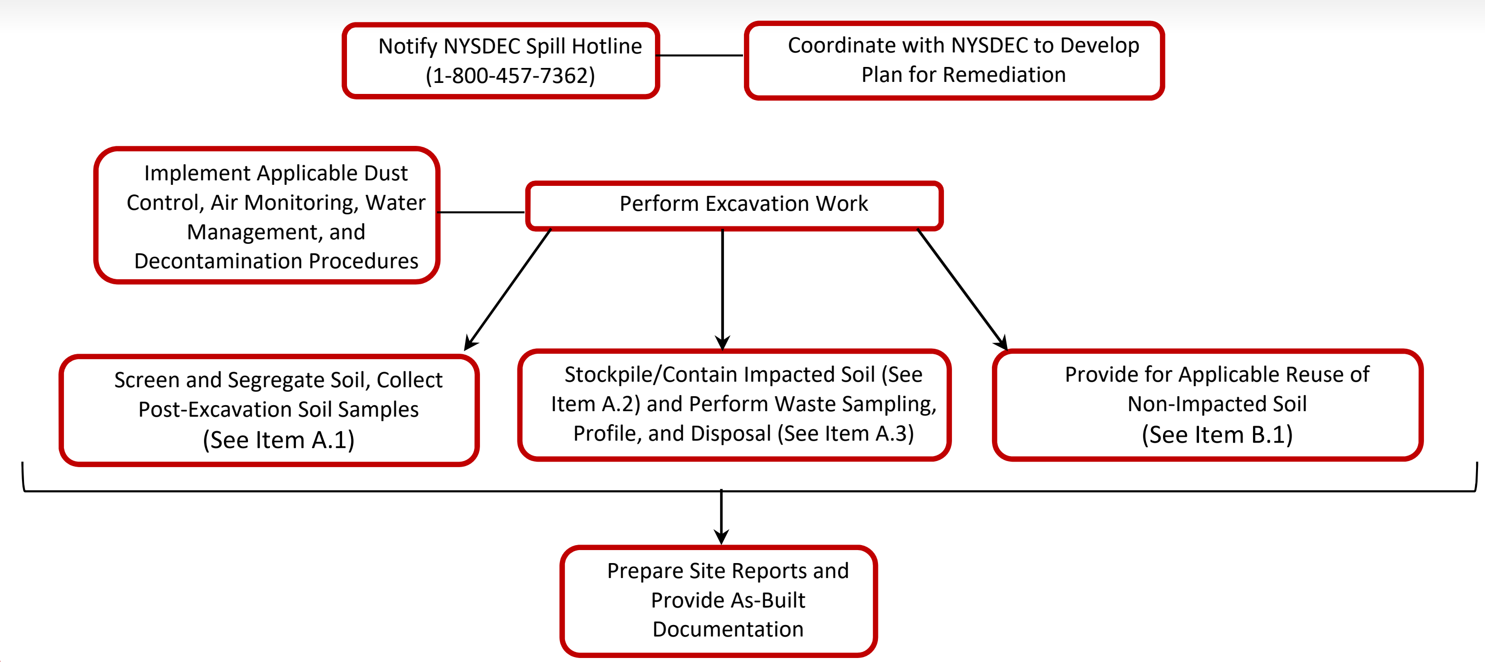
1. *If petroleum/chemical spill or contamination is encountered, implement soil management procedures described in Item C.*
2. *Reference Items D and E for procedures pertaining to site backfill/soil cover system and assessment for imported fill.*

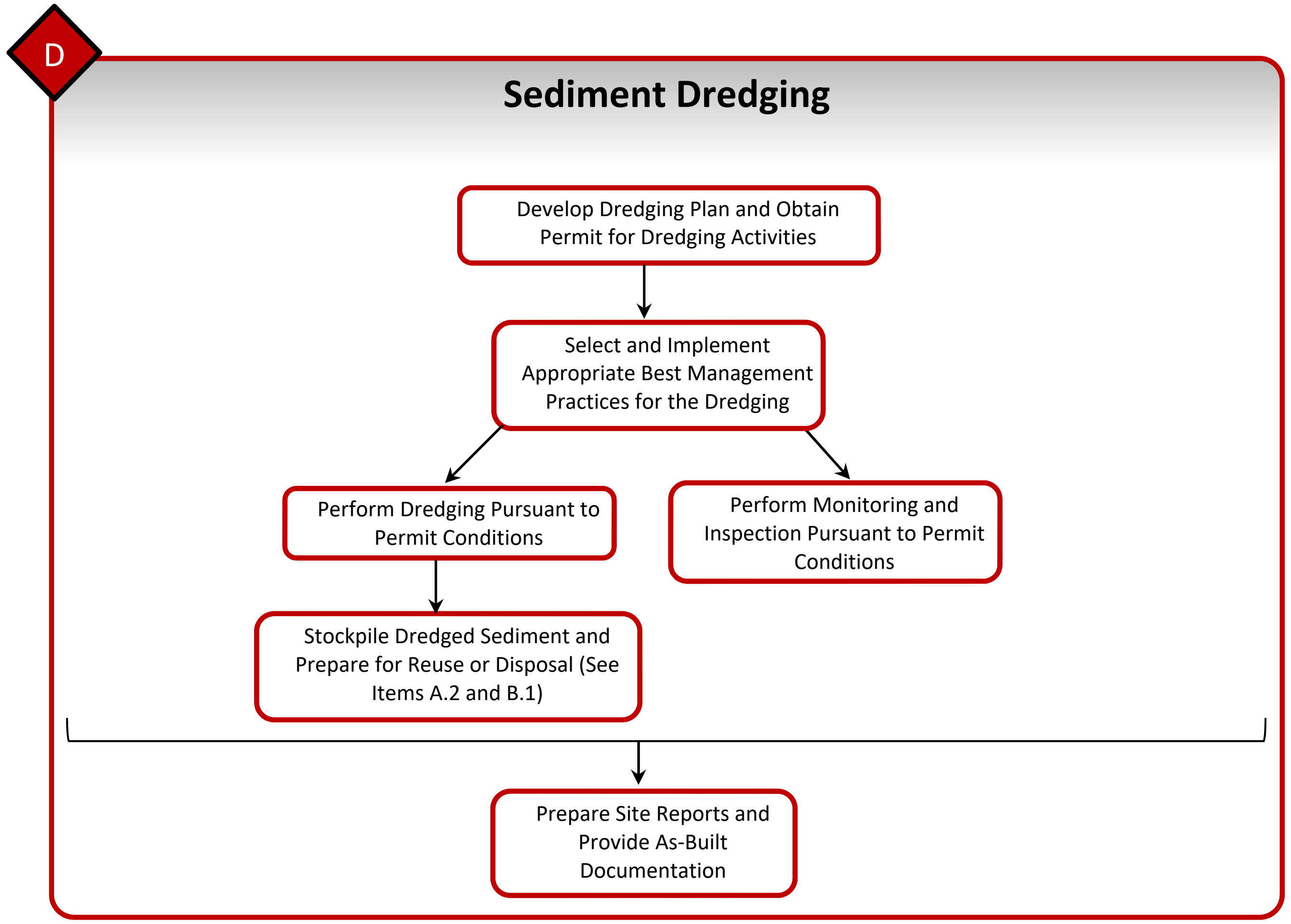
B — Soil Excavation/Ground Disturbance Activities – Areas without Known/Suspect Impacts from Ash/Debris

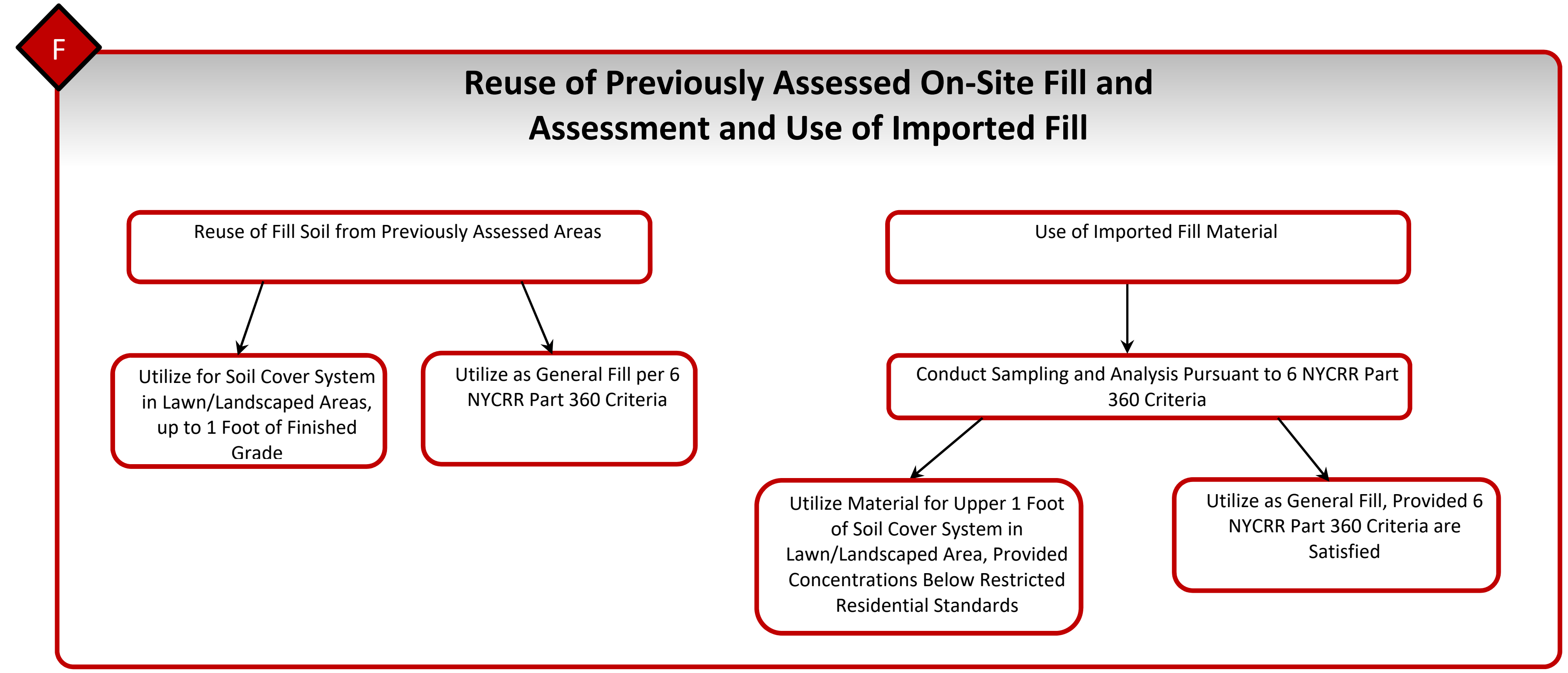


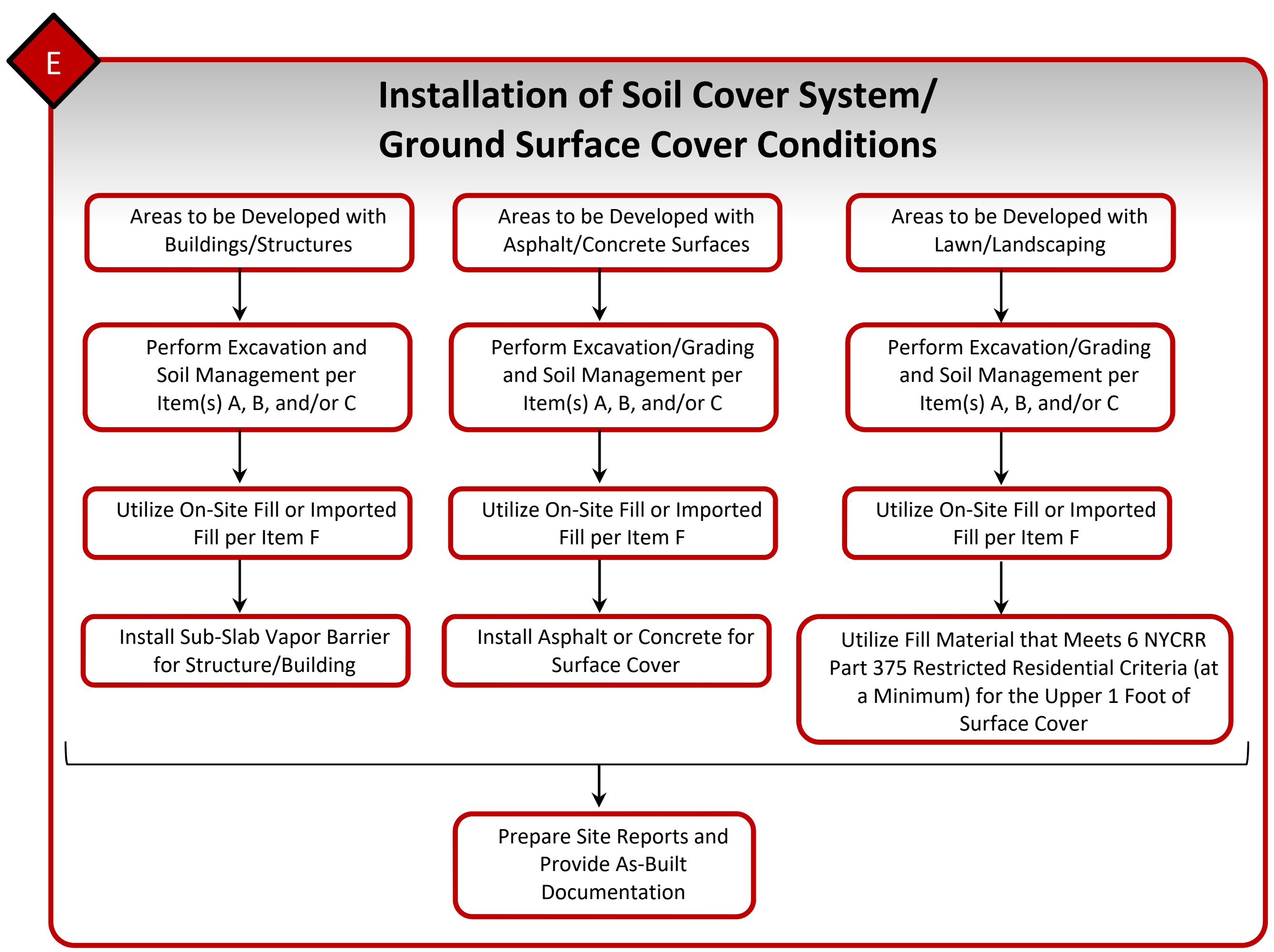
1. *If ash/debris material is encountered, implement soil management procedures described in Item A.*
2. *If petroleum/chemical spill or contamination is encountered, implement soil management procedures described in Item C.*
3. *Reference Items D and E for procedures pertaining to site backfill/soil cover system and assessment for imported fill.*

C — Soil Excavation/Ground Disturbance Activities – Petroleum/Chemical Spill or Contamination Encountered




D
Sediment Dredging
Develop Dredging Plan and Obtain Permit for Dredging Activities
Select and Implement Appropriate Best Management Practices for the Dredging
Perform Dredging Pursuant to Permit Conditions
Perform Monitoring and Inspection Pursuant to Permit Conditions
Stockpile Dredged Sediment and Prepare for Reuse or Disposal (See Items A.2 and B.1)
Prepare Site Reports and Provide As-Built Documentation


F
Reuse of Previously Assessed On-Site Fill and Assessment and Use of Imported Fill
Reuse of Fill Soil from Previously Assessed Areas
Utilize for Soil Cover System in Lawn/Landscaped Areas, up to 1 Foot of Finished Grade
Utilize as General Fill per 6 NYCRR Part 360 Criteria
Use of Imported Fill Material
Conduct Sampling and Analysis Pursuant to 6 NYCRR Part 360 Criteria
Utilize Material for Upper 1 Foot of Soil Cover System in Lawn/Landscaped Area, Provided Concentrations Below Restricted Residential Standards
Utilize as General Fill, Provided 6 NYCRR Part 360 Criteria are Satisfied


E
Installation of Soil Cover System/ Ground Surface Cover Conditions
Areas to be Developed with Buildings/Structures
Perform Excavation and Soil Management per Item(s) A, B, and/or C
Utilize On-Site Fill or Imported Fill per Item F
Install Sub-Slab Vapor Barrier for Structure/Building
Areas to be Developed with Asphalt/Concrete Surfaces
Perform Excavation/Grading and Soil Management per Item(s) A, B, and/or C
Utilize On-Site Fill or Imported Fill per Item F
Install Asphalt or Concrete for Surface Cover
Areas to be Developed with Lawn/Landscaping
Perform Excavation/Grading and Soil Management per Item(s) A, B, and/or C
Utilize On-Site Fill or Imported Fill per Item F
Utilize Fill Material that Meets 6 NYCRR Part 375 Restricted Residential Criteria (at a Minimum) for the Upper 1 Foot of Surface Cover
Prepare Site Reports and Provide As-Built Documentation

APPENDIX C

Summary of Data from Previous Investigations

Table C-1
Summary of Information from September 2020 Investigation – Probes
(Information Available from Environmental Subsurface Investigation and Soil Sampling Report prepared by ATL and dated October 22, 2020)

Probe ID**	Depth Advanced	Coal Ash/Debris Observations	VOC Field Screening (ppm)	Samples Collected for Analysis of VOC	Compounds Exceeding 6 NYCRR Part 375 Unrestricted Use SCO	Samples Collected for Analysis of Semi-VOC, PCB, Metals, Pesticides, and Cyanide	Compounds Exceeding 6 NYCRR Part 375 Unrestricted Use SCO
B-1	20'	Coal Ash @ 0'.5 – 2'	ND				
B-2	20'	Coal Ash @ 0' – 20'	ND				
B-3	20'	Coal Ash @ 0' – 20'	ND				
B-4	20'	Coal Ash @ 0' – 18'	ND				
B-5	20'		ND	Soil @ 0' – 5'		Soil @ 0' – 20' (Composite with B-6 and B-8)	Iron
B-6	20'		ND	Soil @ 10' – 15'		Soil @ 0' – 20' (Composite with B-5 and B-8)	See B-5
B-7	20'	Coal Ash @ 0' – 11'	ND				
B-8	20'		ND	Soil @ 5' – 10'		Soil @ 0' – 20' (Composite with B-5 and B-6)	See B-5
B-9	20'	Coal Ash @ 0.5' – 2.5'	ND – 18.2				
B-10	20'		ND			Soil @ 0' – 20' (Composite with B-11 and B-12)	4,4'-DDD, Arsenic, Iron, Vanadium
B-11	20'	Coal Ash @ 8' – 11.5'	ND	Soil @ 15' – 20'		Soil @ 0' – 20' (Composite with B-10 and B-12)	See B-10

Table C-1 (continued)
Summary of Information from September 2020 Investigation – Probes
(Information Available from Environmental Subsurface Investigation and Soil Sampling Report prepared by ATL and dated October 22, 2020)

Probe ID**	Depth Advanced	Coal Ash/Debris Observations	VOC Field Screening (ppm)	Samples Collected for Analysis of VOC	Compounds Exceeding 6 NYCRR Part 375 Unrestricted Use SCO	Samples Collected for Analysis of Semi-VOC, PCB, Metals, Pesticides, and Cyanide	Compounds Exceeding 6 NYCRR Part 375 Unrestricted Use SCO
B-12	20’		ND	Soil @ 0’ – 5’		Soil @ 0’ – 20’ (Composite with B-10 and B-11)	See B-10
B-13	20’		ND	Soil @ 10’ – 15’	Acetone	Soil @ 0’ – 20’ (Composite with B-15 and B-16)	Iron, Vanadium
B-14	20’		ND				
B-15	20’		ND	Soil @ 5’ – 10’		Soil @ 0’ – 20’ (Composite with B-13 and B-16)	See B-13
B-16	20’		ND	Soil @ 15’ – 20’		Soil @ 0’ – 20’ (Composite with B-13 and B-15)	See B-13
B-17	20’		ND	Soil @ 0’ – 5’		Soil @ 0’ – 20’ (Composite with B-18 and B-19)	Iron, Vanadium
B-18	20’		ND	Soil @ 10’ – 15’		Soil @ 0’ – 20’ (Composite with B-17 and B-19)	See B-17
B-19	20’		ND	Soil @ 5’ – 10’		Soil @ 0’ – 20’ (Composite with B-17 and B-18)	See B-17
B-20	20’	Coal Ash @ 0’ – 2’	ND				
B-21	20’		ND	Soil @ 15’ – 20’		Soil @ 0’ – 20’ (Composite with B-22 and B-23)	Iron
B-22	20’		ND	Soil @ 5’ – 10’		Soil @ 0’ – 20’ (Composite with B-21 and B-23)	See B-21
B-23	20’		ND	Soil @ 15’ – 20’		Soil @ 0’ – 20’ (Composite with B-21 and B-22)	See B-21
B-24	20’		ND			Soil @ 0’ – 20’ (Composite with B-25)	Aluminum, Iron
B-25	20’		ND			Soil @ 0’ – 20’ (Composite with B-24)	See B-24
B-26	5.1’ (Refusal)		ND	Soil @ 0’ – 5’		Soil @ 0’ – 20’ (Composite with B-27)	Iron
B-27	20’		ND			Soil @ 0’ – 20’ (Composite with B-26)	See B-26
B-28	20’		ND	Soil @ 10’ – 15’		Soil @ 0’ – 20’ (Composite with B-29)	Iron

Table C-1 (continued)
Summary of Information from September 2020 Investigation – Probes
(Information Available from Environmental Subsurface Investigation and Soil Sampling Report prepared by ATL and dated October 22, 2020)

Probe ID**	Depth Advanced	Coal Ash/Debris Observations	VOC Field Screening (ppm)	Samples Collected for Analysis of VOC	Compounds Exceeding 6 NYCRR Part 375 Unrestricted Use SCO	Samples Collected for Analysis of Semi-VOC, PCB, Metals, Pesticides, and Cyanide	Compounds Exceeding 6 NYCRR Part 375 Unrestricted Use SCO
B-29	20’		ND			Soil @ 0’ – 20’ (Composite with B-28)	See B-28
B-30	10’ (Refusal)		ND	Soil @ 5’ – 10’		Soil @ 0’ – 20’ (Composite with B-31)	Iron
B-31	20’		ND	Soil @ 15’ – 20’		Soil @ 0’ – 20’ (Composite with B-30)	See B-30
B-32	20’		ND				
B-33	20’		ND				
B-34	20’		ND				
B-35	20’	Coal Ash @ 0’ – 12.5’	ND				
B-36	20’	Coal Ash @ 0.5’ – 6’	ND				
B-37	20’	Coal Ash @ 0.5’ – 7.5’	ND				
B-38	20’	Coal Ash @ 0’ – 11.5’	ND				
B-39	20’	Coal Ash @ 0’ – 15’	ND				
B-40	20’	Coal Ash @ 0.5’ – 20’	ND				
B-41	20’		ND	Soil @ 5’ – 10’		Soil @ 0’ – 20’ (Composite with B-43)	4,4’-DDE, 4,4’-DDD, Aluminum, Calcium, Iron
B-42	20’	Coal Ash @ 0’ – 8’	ND				
B-43	20’		ND	Soil @ 15’ – 20’		Soil @ 0’ – 20’ (Composite with B-41)	See B-41

Table C-1 (continued)
Summary of Information from September 2020 Investigation – Probes
(Information Available from Environmental Subsurface Investigation and Soil Sampling Report prepared by ATL and dated October 22, 2020)

Probe ID**	Depth Advanced	Coal Ash/Debris Observations	VOC Field Screening (ppm)	Samples Collected for Analysis of VOC	Compounds Exceeding 6 NYCRR Part 375 Unrestricted Use SCO	Samples Collected for Analysis of Semi-VOC, PCB, Metals, Pesticides, and Cyanide	Compounds Exceeding 6 NYCRR Part 375 Unrestricted Use SCO
B-44	20’		ND	Soil @ 0’ – 5’	Acetone	Soil @ 0’ – 20’ (Composite with B-45)	Iron
B-45	20’		ND	Soil @ 10’ – 15’		Soil @ 0’ – 20’ (Composite with B-44)	See B-44

** Approximate locations of probes are shown on the *Aerial Overview of Affected Locations* plan in Appendix D.

Table C-2
Summary of Information from February 2017 Investigation – Borings/Monitor Wells
(Information Available from Draft Phase II Environmental Site Assessment Report prepared by Bergmann Associates and dated April 6, 2017)

Boring/ Monitor Well ID**	Depth Advanced	Coal Ash/Debris Observations	VOC Field Screening (ppm)	Groundwater Observations	Samples Collected for Metals Analysis	Metals Exceeding 6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives
B-1	100’ (environmental assessment to 12’)	Coal Ash @ 0’ – 12’	0.0	Water @ 12.9’	0” – 2” (Soil)	Arsenic, Barium, Nickel
					10’ – 12’ (Soil)	Arsenic, Barium
B-2	50’ (environmental assessment to 10’)	Coal Ash @ 0’ – 10’	0.0 – 2.9	Water @ 6’	0” – 2” (Soil)	Arsenic, Barium, Silver
					4’ – 6’ (Soil)	Arsenic, Barium, Chromium, Selenium, Silver
B-3/ MW-1	150’ (environmental assessment to 16’)	Coal Ash @ 0’ – 6’	0.0 – 13.7	Water @ 14.9’	0” – 2” (Soil)	Nickel
					2’ – 4’ (Soil)	Silver
					Groundwater (Screened @ 12’ – 22’)	Iron, Manganese
B-4/ MW-3	100’ (environmental assessment to 12’)	Coal Ash @ 0’ – 12’	0.0 – 0.9		0” – 2” (Soil)	Arsenic, Barium, Mercury
					2’ – 4’ (Soil)	Arsenic, Barium, Mercury
					Groundwater (Screened @ 5’ – 15’)	Iron, Sodium
B-5/ MW-2	50’ (environmental assessment to 14’)		2.9 – 22.9		0” – 2” (Soil)	Arsenic, Barium, Silver
					4’ – 6’ (Soil)	Arsenic, Selenium, Silver
					Groundwater (Screened @ 11’ – 21’)	Iron, Manganese
B-6	50’ (environmental assessment to 14’)	Coal Ash @ 0’ – 14’	0.0 – 0.2	Water @ 7.8’	0” – 2” (Soil)	Arsenic, Barium, Chromium, Nickel, Silver
					4’ – 6’ (Soil)	Arsenic, Barium, Nickel
B-7	50’ (environmental assessment to 20’)	Coal Ash @ 0’ – 18	0.1 – 0.2	Water @ 2.5’	0” – 2” (Soil)	Arsenic, Barium, Nickel, Silver
					1’ – 4’ (Soil)	Arsenic, Barium, Chromium, Mercury, Nickel
B-8	50’ (environmental assessment to 18’)	Coal Ash @ 6’ – 18’	0.1 – 0.6		0” – 2” (Soil)	
					6’ – 8’ (Soil)	

** Approximate locations of borings are shown on the *Aerial Overview of Affected Locations* plan in Appendix D.

Table C-3

Summary of Information from February 2017 Investigation – Test Pits
(Information Available from Draft Phase II Environmental Site Assessment Report prepared by Bergmann Associates and dated April 6, 2017)

Test Pit ID**	Depth Advanced	Coal Ash/Debris Observations	VOC Field Screening (ppm)
TP-1	12’		0.0 – 0.1
TP-2	12’		0.0 – 0.1
TP-3	12’		0.0 – 0.2
TP-4	12’		0.1 – 0.2
TP-5	12’		0.0 – 0.1
TP-6	12’		0.0
TP-7	12’		0.0
TP-8	12’	Railroad ties covered in black tar-like substance @ 8’ – 12’	0.0 – 10.1
TP-9	10’		0.0
TP-10	12’	Coal Ash @ 0’ – 12’	0.1
TP-11	12’	Coal Ash @ 0’ – 12’	0.0 – 0.1
TP-12	12’	Coal Ash @ 0’ – 12’	0.1
** Approximate locations of test pits are shown on the *Aerial Overview of Affected Locations* plan in Appendix D.			

APPENDIX D

Aerial Overview of Affected Locations

LEGEND :

B-5 (02/17)	Approximate Location of Previous Boring or Test Pit with or Debris Ash Material Present (and Month/Year of Investigation)
TP-4 (02/17)	Approximate Location of Previous Boring or Test Pit without Ash Material Present (and Month/Year of Investigation)

- Approximate Extents of Area Expected to have Ash Material Present
- Approximate Extents of Area with Potential to have Ash Material Present
- Approximate Extents of Area Not Expected to have Ash Material Present

AERIAL OVERVIEW OF AFFECTED LOCATIONS	Drawn By: CJD	Drawing: 1 of 1	Scale: As Noted	Project No.: AT5596	Date : October 2020

Beacon Island Parcel
Bethlehem, Albany County, New York

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APPENDIX E

Sampling and Analysis Schedule for Fill

Sampling Criteria for Fill Material per 6 NYCRR Part 360.13(e)

Soil Quantity (cubic yards)	Number of Discrete Samples	Number of Composite Samples[1]
	Volatile Organic Compounds (VOC)	Semi-VOC, Inorganics, Polychlorinated Biphenyls (PCB), and Pesticides
0 – 300	2	1
300 – 1,000	4	2
1,000 – 10,000	6	3
>10,000	2 for every additional 10,000 cubic yards	1 for every additional 10,000 cubic yards

Notes: [1]Each composite sample will be comprised of 3 to 5 discrete samples from different locations within the fill material.