PLUG POWER

Hydrogen Production Facility
STAMP Project Gateway

6840 Crosby Road
Alabama, New York 14013

STORMWATER POLLUTION PREVENTION PLAN & DESIGN REPORT

Owner/Applicant:
Plug Power
968 Albany Shaker Road
Latham, NY 12110

Date:
May 21, 2021
Revised July 16, 2021

STATE OF NEW YORK
RICHARD J HAIGHT
082525
LICENSED PROFESSIONAL ENGINEER

Prepared by:

INVICTUS
Civil Engineering, P.C.

4759 N. 5th Street
Lewiston, NY 14092
1-716-946-2415

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STORMWATER POLLUTION PREVENTION PLAN
(The Stormwater Management and Erosion Control Plan) & Design Report

This Stormwater Pollution Prevention Plan (SWPPP) & Design Report has been prepared to address construction activities associated with the site clearing, preparation, and construction of the Plug Power Hydrogen Production Facility (STAMP – Project Gateway) in the Town of Alabama, Genesee County, New York. The SWPPP, drainage design and Erosion & Sediment Control Plan have been prepared in conformance with the SPDES General Permit (GP-0-20-001) and the current NYS Standards and Specifications for Erosion and Sediment Control. This document is intended to be a dynamic document which will be amended, as necessary, to reflect any changes occurring as part of the construction process. This Stormwater Pollution Prevention Plan (hereafter to be called "The Plan") has been prepared in conformance with the requirements set forth in the New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from Construction Activity Permit No. GP-0-20-001 (see Appendix B). The Plan addresses:

1. Impacts to surface water quality caused by soil erosion and sedimentation during construction and immediately following construction.

2. Post-construction increases in stormwater runoff.

3. Stormwater pollution caused by the use of the site after construction is complete.

4. Green Infrastructure per NYSDEC Phase 2 permit requirements.

The Plan must do the following:

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 *discharges*, 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 *discharges* from the site;
(vi) Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas and maximize stormwater infiltration to reduce *pollutant discharges*, 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; and

(viii) Unless *infeasible*, preserve a sufficient amount of topsoil to complete soil restoration and establish a uniform, dense vegetative cover.
(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.

A complete copy of The Plan shall be kept on site throughout the duration of the project.

The permittee is responsible to comply with the requirements and conditions as described in The Plan and in the *New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from Construction Activity* Permit No. GP-0-20-001.

A complete copy of The Plan includes the following items:

1. Drainage Calculations for the design of the stormwater management system – see Appendix A.

2. A copy of the *New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from Construction Activity* Permit No. GP-0-20-001 – see Appendix B.

3. A copy of the Notice of Intent – See Appendix C.

4. Contractor Certification Forms – see Appendix E.

5. Document referred to hereafter as the Project Drawings (see Appendix N for an 11" x 17" set):

   Latest revision of the drawing set of construction plans (as filed with the Town of Alabama):

Plug Power
Hydrogen Production Facility
STAMP Project Gateway
Alabama, New York 14013
Prepared for:
Plug Power
968 Albany Shaker Road
Latham, New York 12110

The intent of The Plan is to:

- Provide background information about the scope of the project.
- Provide a statement of stormwater management objectives.
- Describe proposed structural and vegetative stormwater measures to ensure that the quantity, temporal distribution and quality of stormwater runoff during and after development are not substantially altered from pre-development conditions.
- Identify the type and frequency of maintenance required by the stormwater management and erosion control facilities utilized.

Owner/Operator Contact Information:

Company:	Plug Power
Contact Person:	Brenor Brophy
	Vice-President, Project Development
Mailing Address:	968 Albany Shaker Road
	Latham, NY 12110
Email Address:	brbrophy@plugpower.com
Phone Number:	(408) 823-6566

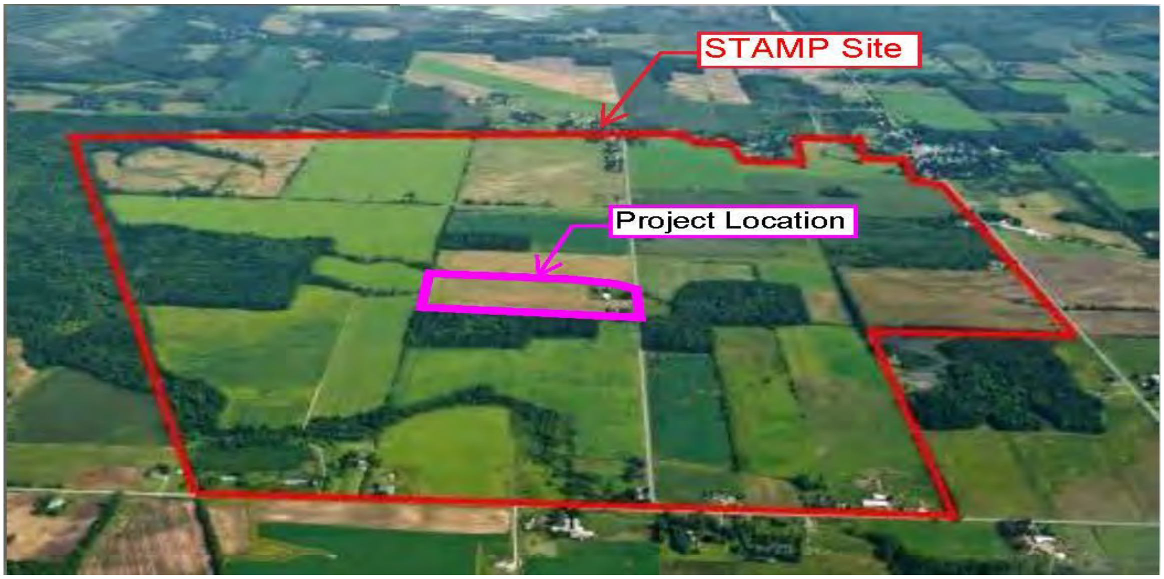
Engineer of Record Information:

Firm:	Invictus Civil Engineering, P.C.
Contact Person:	Richard J. Haight, P.E.
Mailing Address:	4759 N. 5th Street
	Lewiston, New York 14092
Email Address:	rhaight@invictuscivilengineering.com
Phone Number:	(716) 946-2415

I. PROJECT DESCRIPTION

The Plug Power Hydrogen Production Facility Project (STAMP Project Gateway) is located at 6840 Crosby Road on a 29.096+/- acre parcel (excluding R.O.W.) within the Science & Technology Advanced Manufacturing Park (STAMP) in the Town of Alabama (See Site Location Map and Site Aerial Map below:). The Parcel is illustrated as Proposed Parcel "A", a portion of Liber 428 page 880, a portion of SBL 10-1-42 on the boundary survey for the parcel (See Appendix N – Project Drawings). The GCEDC is the current owner of the parcel but is in the final stages of closing the sale of the site to Plug Power. A copy of correspondence from GCEDC authorizing Plug Power (and their agent) to proceed through the Town of Alabama and Genesee County Planning Board Site Plan Submission and Approval process can be found in Appendix L – Project Related Correspondence.

Site Location Map



Site Aerial Map

The STAMP project was initiated in 2005 and the overall STAMP site was selected based on an 18-month review of alternatives in Genesee County. A thorough evaluation of Site background, history, cultural and natural resources, utilities, and region has been conducted by the Genesee County Economic Development Corporation (GCEDC) as detailed in their STAMP Land Management Plan. Technical studies and analysis were utilized to optimize site design and minimize adverse impacts to sensitive resources. The potential environmental impacts of STAMP were evaluated pursuant to, and in accordance with, Article 8 of the Environmental Conservation Law and the regulations adopted pursuant thereto being 6 NYCRR Part 617, as amended (collectively State Environmental Quality Review or SEQR) utilizing a Generic Environmental Impact Statement (GEIS). The GCEDC, as lead agency, issued a Final GEIS (FGEIS) for the Project on January 19, 2012 and a Written Findings Statement (GCEDC's Findings) on March 12, 2012. The Town of Alabama issued an Involved Agency Findings Statement on August 13, 2012. As lead agency, the GCEDC conducted an updated SEQR analysis to review proposed changes to STAMP since completion of the GEIS. Based on this review, a Lead Agency Amended Findings Statement was issued by GCEDC in July 2016.

The STAMP Site was rezoned as a Technology District (TD) broken down into three sub-districts, TD1, TD2 and TD3, each of which has its own set of permitted uses under the Town Code. The Plug Power Hydrogen Production Facility will be located in the TD1 District which is the primary heavy manufacturing/industrial district.

The Plug Power Hydrogen Production Facility Project will be the construction of a 75 metric-tons-per-day (mTPD) green hydrogen production facility, built in two phases. 45 mTPD are anticipated to be produced by the Phase 1 Facility, while the remaining 30 mTPD will be produced by the Phase 2 expansion. The hydrogen is produced by electrolysis using clean hydropower. The process includes the drying, compression, and liquefaction of hydrogen gas using vendor-designed skids. The dryers will remove residual water vapor and oxygen from the incoming product stream (municipal water), which will then be sent to the compression and liquefaction skids. Th compression and liquefaction processes use cooling water and liquid nitrogen to condense the hydrogen gas into liquid hydrogen. The liquid hydrogen is then stored in the storage sphere(s). Liquid nitrogen vaporizes during this process; therefore, the re-liquefaction of the liquid nitrogen used in hydrogen liquefaction is also located in this building. The process produces no pollution and creates essentially no waste. Phase 1 of the facility will include an approximately 40,040 sq-ft electrolyzer building housing the hydrogen production equipment, a 68,153+/_ sq. ft. compressor/liquefaction building with control room which will house compressors, cold-boxes and re-liquefaction units, and an approximately 8,125 sq-ft operations and maintenance building containing office space, a conference room, facility restrooms, employee breakroom and maintenance shop. Additional equipment located outside includes cooling units, electrical transformers & cabinets, an electrical substation, tanks, pumps, and a filling facility for transport tankers that pick up the liquid hydrogen product for delivery. There will be a 22-space parking lot adjacent to the O & M Building for employees. In addition, staging areas will be established for truck trailer parking with space for 28 trailers. Phase 2 of the facility will include an approximately 26,260 sq-ft electrolyzer building for the hydrogen production equipment and a 40,200+/_ sq. ft. compressor/liquefaction building with control room which will again house compressors, cold-boxes and re-liquefaction units. Phase 2 starts after phase 1 commissioning.

II. DESCRIPTION OF SITE CONDITIONS AND UTILITY IMPROVEMENTS

Note: See the Project Drawings for additional information on site conditions

The site has historically been used in the production of agricultural crops along with supporting farm structures and residences.

A. SOILS INFORMATION

There are five (5) soil types within the project site:

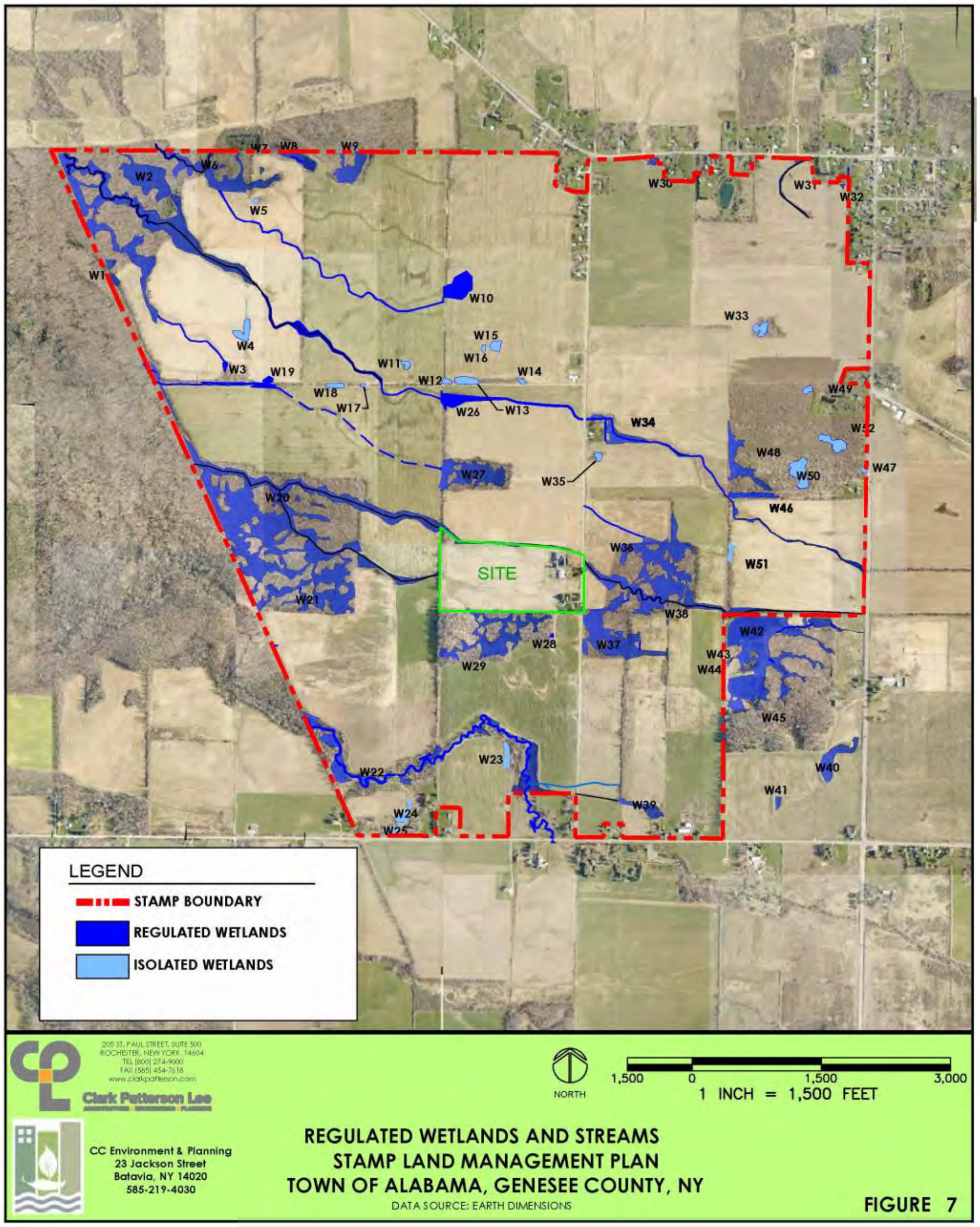
Canandaigua silt loam, 0 – 2% slopes	6.7%	(CaA – Hydrologic Soil Group "C/D")
Collamer silt loam, 2 – 6% slopes	2.9%	(ClB – Hydrologic Soil Group "C/D")
Lakemont silty clay loam, 0 – 3% slopes	7.0%	(La – Hydrologic Soil Group "D")
Niagara silt loam, 0 – 2% slopes	1.4%	(NgA – Hydrologic Soil Group "C/D")
Odessa silt loam, 3 – 8% slopes	64.7%	(OdB – Hydrologic Soil Group "D")

Hydrologic Soil Group "D" has been used in the hydraulic analysis for all areas of the site as a conservative estimate.

See Appendix A – Drainage Calculations for a copy of the soil survey map and soils information obtained from the USDA Natural Resources Conservation Service Web Soil Survey National Cooperative Soil Survey.

B. WETLANDS

As indicated in Figure 7 below from GCEDC's Land Management Plan, the project site is bounded by USACOE Wetlands within a tributary along the north property line of the site, Wetlands on the property to the south and a Wetland finger to the west. The primary functions and values provided by wetlands at the STAMP Site include flood-flow alteration, nutrient removal/retention/transformation, sediment/toxicant retention, and wildlife habitat. The Plug Power Hydrogen Production Facility will not disturb any of the Wetlands. A 25' wide Conservation Buffer Area will be maintained along the northern limits of the site along the tributary Wetland.



C. ARCHAEOLOGICAL AND HISTORIC RESOURCES

As indicated in GCEDC's LMP and Amended SEQR Findings Statement, Cultural resource investigations were completed for the STAMP Site by Deuel Archaeology & CRM in 2010 and by the Archaeological Survey, Department of Anthropology at the State University of New York at Buffalo in 2013 and 2016. A Phase 1B Archaeological Investigation has been completed on the subject parcel which has been fully cleared. See Appendix I for Archaeological Investigation Mapping and Findings from Appendix D of the GCEDC LMP.

D. WILDLIFE HABITAT

The Plug Power Hydrogen Production Facility will be located on a parcel which is primarily utilized in agricultural production and has some perimeter shrub, forest and wetland habitat. These communities are not considered rare habitats. According to the GCEDC LMP, a Phase I Summer Habitat Assessment was completed for the northern long-eared bat, which has recently been listed as a Threatened Species under State and Federal Law. As indicated in the GCEDC Amended Findings Statement, removal of trees grater than 3" DBH will be prohibited between June 1 and July 31, as well as between October 31 and March 31, where possible. There will be limited clearing of treed areas on the Project site and therefore no adverse impact to the northern long-eared bat.

E. TRAFFIC AND ACCESS

A boulevard entry and new access road (STAMP Drive) has been constructed by GCEDC from NYS Route 77/63 to Crosby Road at the heart of the STAMP campus. The Project Site is located to the south on Crosby Road. Crosby Road is currently a local roadway serving residential and agricultural properties. The GCEDC will be reconstructing the portion of Crosby Road from STAMP Drive to the site to accommodate industrial vehicles.

Access to the site will be provided via a 30' driveway which will narrow to 26' within the site. A looped roadway will be provided around the perimeter of the Facility, as well as a 26' wide internal Fire Access connecting drive.

Traffic generated by the site is anticipated to be relatively low, consisting of approximately 20 employees and 16 tanker trucks per day.

F. UTILITIES

1. Water:

The STAMP Site consists of agricultural land and a few residential houses that do not contain municipal water service or fire protection and are served by private wells. As part of the development of the STAMP campus, the GCEDC will be constructing a new 12" transmission water main. The water main will extend from the Village of Oakfield existing water system located approximately seven miles to the east along NYS Route 63 to Routes 77/63 and into the STAMP Site. The GCEDC will be extending the 12" water main down Crosby Road to service the Plug Power Hydrogen Production Facility.

Water modeling for the new water main provided by GCEDC's consultant indicates the following available pressure and fire flow at the Crosby Road site:

- Minimum Pressure at Crosby Road: +/- 98 psi
- Maximum Pressure at Crosby Road: +/- 152 psi
- Fire Flow at Crosby Road: +/- 1,698 gpm

There are two water supply sources that were utilized in the water model: The Village of Oakfield with an HGL of 910, and Town of Pembroke with an HGL of 1031. The static pressure of 98 psi is from the "Oakfield" supply, as the "Pembroke" supply would have a static pressure of approximately 152 psi. The fire flow capacity of 1,698 gpm @ 26 psi residual is from the "Pembroke" supply, as the "Oakfield" supply would have a fire flow capacity of 2,616 gpm @ 20 psi. As the GCEDC has not yet determined which supply source will be utilized, the lower static and fire flow values were utilized as the worst-case scenario. The final on-site waterline design and engineering will be based on the available design flow and pressure data provided by GCEDC for the new municipal watermain.

According to GCEDC's consultant, the approximate schedule for construction of the 12-inch watermain is as follows:

- Design: July-August 2021
- Bidding: September 2021
- Construction: November 2021-July 2022

The water main will be constructed and ready to serve Plug Power prior to completion of the Plug Power project.

Anticipated demand from the Facility is as follows:

- The site's annual water demand is expected to be 89,200,000 gal/ yr (53,500,000 gal/ yr Phase 1 only), or an average of about 244,000 gal/ day (147,000 gal/ day Phase 1 only).
- Maximum daily use: 807,000 gal/day Phase 1 & Phase 2 (484,000 gal/ day Phase 1)
- Water use calculation: 84,000,000 gal/ yr for H2 Production + 5,000,000 gal/ yr for process cooling + 183,000 gal/ yr for domestic uses = 89,200,000 gal/ yr
- The maximum summer daily demand will peak at 807,000 gal/day (484,000 gal/ day Phase 1 only) based on the facilities cooling water needs. Wintertime demand is expected to be 231,000 gal/ day (139,000 gal/ day Phase 1 only).
- *The maximum* instantaneous *demand for the domestic system is expected to be 1,056 gpm (633 gpm Phase 1 only) during the hottest hours of the year when the dry bulb temperature is 95°F or above.*

A new 10″ PVC water line will be constructed into the site off the Crosby Road main. Once on the site, the flow will be split prior to entering a hot box to provide an 8″ PVC fire protection line and a 10″ Process/Domestic water line. A double check valve will be provided within the hot box for the fire protection line, while a meter and RPZ backflow preventor will be installed within the hot box for the Process/Domestic line.

The water connection will be coordinated with GCEDC. A 12″x12″x10″ tee will be added to GCEDC plans for Crosby Road with a 10″ water service valve for the Plug Power site.

The Fire Protection line will loop around the exterior of the internal roadway, with hydrants installed periodically within 500′ of each other. The Electrolyzer Buildings and the Compressor/Liquefaction Buildings will have internal fire protection systems in accordance with NFPA and FCNYS. The smaller Operations & Maintenance Building will not require an internal fire protection system.

A 2″ Type K copper service will be provided to the site's O & M Building off the Process/Domestic line. The Process/Domestic line will run down the south side of the Fire Access drive to service the remainder of the Facility.

Sizing calculations for the on-site water services will be provided by Plug Power's project team upon submission of the project for building permit.

2. Sanitary:

The STAMP Site does not contain municipal sanitary sewer service. The closest municipal wastewater treatment facilities are in the Villages of Oakfield and Corfu (approximately 9 miles from the Site). The GCEDC is currently designing wastewater facilities to service the Plug Power Hydrogen Production Facility.

The Facility is anticipated to produce approximately 500 gpd of domestic sanitary flow from bathroom facilities within the site. This value is based on 25 gal/day x 20 on-site employees = 500 gpd. The domestic discharge will be via a 6″ PVC SDR-35 sanitary lateral along the southern limits of the site. The discharge will be directed to a holding tank located at the GCEDC on-site Utility Parcel located to the north of the Project site. GCEDC's consultant is currently developing the details on the tank structure, frequency of pumping and size. It is anticipated that the GCEDC will contract with the Village of Corfu for pumping and hauling.

According to the GCEDC's consultant, the approximate schedule for construction of the temporary sanitary sewer facilities is as follows:

- Design: July-August 2021
- Bidding: September 2021

- Construction: November 2021-July 2022

All facilities will be constructed and ready to accept sanitary and process water for Plug Power.

Plug Power has decided to design the water purification system such that there will be no process wastewater discharge for the facility. Process water will be generated with feed city water through a high efficiency RO system that will generate 5% by volume reject water which will contain all of the concentrated dissolve solids contained in the incoming city water. This concentrated stream (High TDS) will be evaporated then condensed and the resulting water will be collected and reused in the process while the concentrated solids will be reduced to a solid waste, or sludge, collected in a hopper/ bin system that will be disposed of per local requirements as a solid waste on a weekly basis. The process cooling requirements will be met using adiabatic cooling towers which eliminates the high TDS blowdown waste stream generated with traditional cooling towers

Sizing calculations for the on-site sanitary services will be provided by Plug Power's project team upon submission of the project for building permit.

3. Electrical:

The STAMP Site lies within the Niagara Hydro Power Zone, which has the potential to provide a low-cost, renewable source of energy for users at the Site. A 115 kV line currently traverses the Site. A 345 kV line is located just north of STAMP. GCEDC is working with National Grid on the process of establishing a new substation for the STAMP site for conversion to 115kV which will service the Plug Power Hydrogen Production Facility.

A new substation for the Facility is currently under design for conversion to 69kV and will be located at the northeast corner of the site. Estimated annual electrical demand for the Facility is 225 MW under Full-Build conditions.

G. SEQRA

The STAMP site went through the SEQRA process pursuant to the New York State Environmental Quality Review Act, Article 8 of the Environmental Conservation Law and the regulations promulgated thereto at 6 N.Y.C.R.R. Part 617 with the Genesee County Industrial Development Agency d/b/a the Genesee County Economic Development Corporation ("GCEDC") as Lead Agency. A generic environmental impact statement consisting of the Draft Generic Environmental Impact Statement ("DGEIS") accepted by the GCEDC on April 14, 2011, the Final Generic Environmental Impact Statement ("FGEIS") accepted by the GCEDC on January 19, 2012, as well as the public comments on the DGEIS received at the May 12, 2011 public hearing and during the public comment period which was conducted from

April 21, 2011 through June 23, 2011. A smart growth impact statement pursuant to the State Smart Growth Public Infrastructure Policy Act was completed separately from the GEIS in February 2012. The GCEDC, as lead agency, issued a written Findings Statement ("GCEDC Findings") on March 12, 2012 approving the Project and committing to undertake it. An Amended Findings Statement was issued in July, 2016. A copy of the Amended Findings Statement can be found in Appendix I – SEQR.

Plug Power submitted a long form EAF dated December 30, 2020 to the GCEDC, as Lead Agency for the original Environmental Impact Study (EIS). At their February 4, 2021 meeting, the GCEDC voted unanimously to adopt the Resolution No. 02/2021 – 02 indicating that "there are no significant adverse environmental impacts that would be created by this project that had not previously been analyzed. No mitigation is necessary if Project Gateway commits to the best practices outlined in the EIS". A copy of the Plug Power Hydrogen Production Facility (STAMP – Project Gateway) EAF, along with the GCEDC February 4, 2021 Meeting Minutes can be found in Appendix I – SEQR.

H. STORMWATER MANAGEMENT

I. <u>Existing Conditions</u>:

The existing site drains predominantly in a west/northwesterly direction toward either to the northern Wetland Tributary or the western Wetland Finger. Parcels to the south of the site drain overland to and through the site to the same design points. The contributing drainage area can be broken into the following four (4) sub-catchment drainage areas:

<u>Off-Site Area & Southwest Site Overland to West Property Line (Wetland)</u>: The stormwater runoff from approximately 11.28 acres drains overland through the southwest corner of the site and off-site to the adjacent Wetland along the west property line.

<u>Area Overland to Southwest Property Line Collection Area</u>: Approximately 13.02 acres, the majority of which is land south of the site, drains overland to a low (collection) point along the south property line of the site. From there, the flow works its way to the northwest to exit the site to the adjacent Wetland along the west property line.

<u>Site Area Overland to West Property Line (Wetland)</u>: Approximately 4.61 acres of the existing site drain overland in a westerly direction to the west property line where it leaves the site and enters the adjacent Wetland finger.

<u>Area Overland to North Property Line Tributary (Wetland)</u>: Flow from the majority of the existing site (21.66+/- acres) combines with flow from contributing area to the southeast of the site and drains in a northerly direction to the Tributary (Wetland) along the north property line of the site. The tributary also carries flow from the watershed on the east side of Crosby Lane (185.75+/- ac.) and from the contributing Ag field north of the site (12.67+/- ac.) to the west to a Wetland area.

See Appendix A-1 – Existing Conditions Drainage Calculations - for the Existing Conditions Drainage Map.

II. **Proposed Conditions**:

Under the proposed conditions, the drainage areas simplified to the two design points, the West Property Line Wetland and the Ditch at the Northwest Corner of the Site to the Adjacent Wetland, as follows:

Area to West Property Line Wetland: Stormwater runoff from approximately 29.27 acres, the majority of which is contributing area from the south, will be collected by a "cut-off" swale along the south property line which will direct the flow to the west and then northerly along the west property line and discharge to the adjacent Wetland to the west. The area will not contain any impervious cover.

Area to Ditch at the Northwest Corner of the Site to the Adjacent Wetland: Stormwater runoff from approximately 27.16 acres of the site will be directed to the drainage ditch (Tributary Wetland) along the north property line of the site which discharges to the Wetland at the northwest corner of the site. Within the site, the stormwater runoff will either be collected by a series of storm drainage inlets and piped to, or drain overland to the gravel area surrounding the Electrolyzer Building and supporting mechanical equipment. A perforated pipe system will be constructed along the perimeter of the inside of the loop road/fire access drive. The subgrade will be pitched to drain to the perimeter perforated pipe system. A portion of the gravel area will be utilized for stormwater storage for the larger storm events. Three (3) discharge pipes will be installed to direct the low flow (one-year) storm event to a 50,275+/- sq.ft. Bio-Retention Area at the northwest corner of the site via two vegetated sedimentation basins that will provide pre-treatment. Four (4) additional discharge pipes will be installed above the one-year storm storage elevation to discharge the larger storm events to a Vegetated Dry Detention Pond along the north side of the site. Both the bio-retention area and the vegetated dry detention pond will discharge to the Tributary Wetland along the north property line of the site. The off-site contributing flows to the northern ditch from the north and east are included in the analyses to include the tailwater effects on the proposed storm drainage system.

See Appendix A-2 – Proposed Conditions Drainage Calculations - for the Proposed Conditions Drainage Map.

Methodology:

HydroCAD 10.10 was utilized to analyze the site-specific routing created for the drainage areas, sub-catchments, ponds and reaches. This computer software models the stormwater quantity, peak rate and volume, given the unique site characteristics including, but not limited to: natural vegetation, soil conditions, topography and various proposed drainage systems, using SCS/NRCS TR-20 methodology. The rainfall depths for the various storm events were obtained from the Northeast Regional Climate Center (NRCC) and Natural Resources Conservation Service (NRCS)

Extreme Precipitation in New York & New England Interactive Web Tool for Extreme Precipitation Analysis (www.precip.net) and are specific to the site.

Water quantity controls will be provided by the subsurface detention provided by the gravel area around the Electrolyzer Building and the vegetated dry detention pond. Water quality controls will be provided the bio-retention area. Pre-treatment will be provided by the vegetated sedimentation basins.

The following table indicates a composite summary of the site discharges to the two (2) design points under the Existing and Proposed (Full Build) conditions for the 1, 10, 25 and 100-year design storms, as well as a total peak discharge. There will be no increase in peak discharge from the site and there will be no increase in peak discharge to the design points, other than a minimal increase in the 1-year storm event to the West property line created by the elimination of the existing collection area. In addition, the Town of Alabama requires the stormwater management design to detain the difference between the 10-year pre-developed storm and the 25-year post-developed storm for the site. The table indicates that the requirement has been met for both areas, as well as the Total Peak Discharge, although only the contributing area to the northern ditch contains impervious cover. The area to the West Property Line Wetland contains no impervious cover and is a re-routing of off-site flows around the site to their original destination.

Design Point	**Design Storm**							
	1-year		10-year		25-year		100-year	
	Exist. Q_{peak} **(cfs)**	Prop. (Full Build) Q_{peak} **(cfs)**	Exist. Q_{peak} **(cfs)**	Prop. (Full Build) Q_{peak} **(cfs))**	Exist. Q_{peak} **(cfs)**	Prop. (Full Build) Q_{peak} **(cfs)**	Exist. Q_{peak} **(cfs)**	Prop. (Full Build) Q_{peak} **(cfs)**
Area to W. Prop. Line	5.97	6.54	**24.96**	22.46	35.54	**24.50**	56.46	54.22
Area to Ditch at NW Prop. Corner	73.58	61.37	**207.43**	185.59	289.25	**201.27**	455.57	434.63
* Total Peak Discharge	79.53	67.88	**231.84**	208.05	324.60	**226.52**	511.81	488.49

* The Peak Site Discharge is not a cumulative total of the peak flows from the various drainage areas but is based on the relationship of the various times to peak for the drainage areas within the site.

A ten-year design recurrence has been used as design criteria for storm system sizing for the site; however, the stormwater management practices have been designed to contain the 100-year storm event. The Project Drawings depict the grading and drainage improvements for the site. A copy of the hydraulic analyses can be found in Appendix A – Drainage Calculations.

Approximately 27.0 acres of the site will be disturbed under the Phase 1 and Phase 2 construction. The preliminary cut/fill analysis taking into account the site grading, roadways, buildings, gravel areas, pads and bio-retention area results in a net cut of approximately 137,690 cu.yd. of material. Plug Power will work with GCEDC to determine a stockpile location within the STAMP site for the excess material.

The bio-retention area, vegetated sedimentation basins, vegetated swales and vegetated dry detention pond will be constructed by Plug Power. Upon completion of construction, Plug Power will assume the responsibility and maintenance for site's stormwater management system.

The completed Notice of Intent, along with a copy of this SWPPP document will be submitted to the NYSDEC for Permit Coverage under GP-0-20-001. (See Appendix C). An Erosion and Sediment Control Plan has been prepared for the site (See Appendix N – Project Drawings). This SWPPP document and the Erosion and Sediment Control Plan have been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book).

- **WATER QUALITY VOLUME (WQ$_v$) and GREEN INFRASTRUCTURE TECHNIQUES**

  The Plug Power Hydrogen Production Facility project falls under the New Development Guidelines of the N.Y.S.D.E.C., which apply to the increase in impervious cover on the site.

  The New York State Stormwater Management Design Manual requires the incorporation of green infrastructure techniques and standard stormwater management practices (SMPs) with Runoff Reduction Volume (RRv) capacity. The Manual requires that Green Infrastructure techniques be incorporated in the site design to allow for micromanagement of runoff, promote groundwater recharge, increase losses through evapotranspiration and emulate the preconstruction hydrology, resulting in reduced water quality treatment volume and thereby providing a Runoff Reduction Volume (RRv). (See below for RRv requirements.) Green Infrastructure techniques utilize the natural features of the site and promote runoff reduction.

  The WQv for the development (15.513+/- ac. of impervious cover within the 25.013+/- contributing drainage area) has been calculated to be 1.268 ac-ft. (see Appendix A – Drainage Calculations – A-3 for the WQv calculations).

By utilizing a Bio-Retention Area (standard SMP with runoff reduction capacity), the Green Infrastructure requirements can be met. A Bio-retention area constructed with a planting soil bed, mulch layer and surface ponding area, along with an underdrain, will be utilized to provide a portion of peak flow attenuation, filter flow and promote infiltration. In order to meet the minimum WQv requirements, 50,174 sq.ft. of bio-retention area must be provided (see Appendix A – Drainage Calculations). By constructing an 50,275 sq.ft. of bio-retention area, 1.270 ac-ft of WQv will be provided.
A review of the seasonal high ground water was conducted to verify that the bio-retention area would function properly. Based on the March, 2021 Geotechnical Report prepared by Glynn Group (see Appendix M), a groundwater elevation of 656 was utilized. The low point of the bio-retention area underdrain is located at approximately 659.56.

- **RUNOFF REDUCTION VOLUME (RR_v)**

The current NYSDEC Stormwater Management Design Manual (Manual) was adopted in January, 2015 and addresses stormwater runoff reduction and provides planning, design and implementation of green infrastructure techniques for New Construction. (According to Chapter 9, Section 9.2B.II of the Manual, although encouraged, meeting the Runoff Reduction Volume (RRv) sizing criteria is not required for the Redevelopment activity portion of the project.) The regulations are intended to control the quality and flow-rate of stormwater runoff from a developed site and to control the volume of runoff from a developed site (runoff reduction). The Manual promotes that the runoff reduction requirement is to be achieved through the use of re-use and infiltration of the runoff. The Manual requires the incorporation of green infrastructure techniques and standard stormwater management practices (SMPs) with Runoff Reduction Volume (RRv) capacity.

Ten Green Infrastructure Techniques are allowed by the N.Y.S.D.E.C. Stormwater Management Design Manual to provide the required RRv, as follows:

1. Conservation of Natural Areas
2. Sheetflow to Riparian Buffers or Filter Strips
3. Vegetated Swale
4. Tree Planting/Tree Pit
5. Stream Daylighting
6. Rain Gardens
7. Green Roofs
8. Stormwater Planters
9. Rain Barrels and Cisterns
10. Porous Pavement

Each of these Techniques has been reviewed for implementation at the site with the following results:

1. Conservation of Natural Areas

   The majority of the site is utilized in agricultural crop production; however, a 25′ wide Conservation Buffer will be maintained along the northern property line along the Tributary Wetland.

2. Sheetflow to Riparian Buffers or Filter Strips

   Vegetated drainage areas along the perimeter of the site will be allowed to continue to drain overland to the adjacent Wetland areas.

3. Vegetated Swale

   Vegetated sediment basins will be utilized for pre-treatment of runoff to the bio-retention area. They will not be used to meet WQv requirements since there is only a 10% runoff reduction of the WQv allowed by the practice for HSG D soils. Vegetated swales will be used to direct off-site contributing flow around the developed site.

4. Tree Planting/Tree Pit

   The runoff reduction for tree planting is limited to the pervious area in which the trees are planted. The project is not conducive to this technique.

5. Stream Daylighting

   There are no previously culverted/piped streams on the site.

6. Rain Gardens

   This technique cannot be used for infiltration when used in HSG D soils and must have an underdrain and an overflow for larger storm events, both connected to a conveyance system (storm sewer). Runoff reduction in poor soils is limited to 40% of the WQv for the contributing area. A bio-retention area is proposed for the site.

7. Green Roofs

   The project is not conducive to this technique.

8. Stormwater Planters

   This technique is used for filtration only in poor soils and must have an underdrain system and overflow connected to a conveyance system (storm sewer). The technique is geared toward urban sites. This project is not conducive to stormwater planters.

9. Rain Barrels and Cisterns

   Overflow discharge must be provided and operation during cold weather conditions is difficult. There must be a use for the captured water. This project is not conducive to rain barrels or cisterns.

10. Porous Pavement

    Porous pavement on poor soils cannot be utilized for infiltration and must have an underdrain system connected to a conveyance system (storm sewer). There are no advantages for using porous pavement on this project.

The Runoff Reduction volume for the increase in impervious cover (15.280+/- ac.) at the site has been calculated to be 0.242 ac-ft. (see Appendix A-3 – Drainage Calculations for RRv calculations). According to Table 3.5 in the NYS Stormwater Management Design Manual (the Manual), a bio-retention practice can utilize 40% of the WQv provided by the practice towards meeting the RRv requirement. Therefore, a RRv of 0.508 ac-ft will be provided by the bio-retention area (0.40 x 1.270 ac-ft).

- **STREAM CHANNEL PROTECTION VOLUME REQUIREMENTS (Cp_v)**

Stream Channel Protection Volume Requirements (Cpv) are designed to protect stream channels from erosion. In New York State this goal is accomplished by providing 24-hour extended detention of the one-year, 24-hour storm event. The post-developed 1-year storm runoff volume is determined and then converted to an average discharge rate over a 24-hour period. Outlet controls are designed to result in less than or equal discharge from the developed site for the 1-year storm event.

The Cpv requirement for the project has been calculated to be 1.15 ac-ft which computes to a flow rate of 0.58 cfs over 24 hours (See Appendix A – Drainage Calculations – A-3 for Cpv calculations). By utilizing the gravel area around the Electrolyzer Building, the vegetated sedimentation basins and a Bio-retention area, a CPv of 1.42 ac-ft will be provided with a 1-year 24-hour peak discharge rate of 0.53 cfs.

- **OVERBANK FLOOD CONTROL CRITERIA (Q_p)**

  Overbank Flood Control requires storage to attenuate the post development 10-year, 24 –hour peak discharge rate (Qp) to predevelopment rates. The site discharges meet this requirement – see tables above and Appendix A - Drainage Calculations.

- **EXTREME FLOOD CONTROL CRITERIA (Q_f)**

  Extreme Flood Control requires storage to attenuate the post development 100-year, 24-hour peak discharge rate (Qf) to predevelopment rates. The proposed site discharges meet this requirement – see tables above and Appendix A - Drainage Calculations.

  Both the Qp and Qf requirements have been met through detaining flow onsite within gravel area around the Electrolyzer Building, within the vegetated sedimentation basins, within the Bio-retention area and within the Vegetated Dry Detention Pond, thereby increasing the time the flow is on site.

III. EROSION AND SEDIMENT CONTROL

An Erosion and Sediment Control Plan in conformance with the SPDES General Permit (GP-0-20-001) and the current NYS Standards and Specifications for Erosion and Sediment Control has been prepared for the project. A copy of the plan can be found in Appendix N – Project Drawings

A. Temporary Erosion and Sediment Control Measures

The temporary erosion and sediment control measures that will be implemented are described below. The anticipated locations of these temporary measures are indicated on the Project Drawings. The quantity and location(s) of the erosion and sediment control measures will be finalized with the Permittee and/or Contractor prior to the start of construction and will be modified as field conditions and construction activities warrant. The Permittee and/or Contractor shall be responsible for implementation and maintenance of all required sediment control measures as described in The Plan. All erosion and sediment control measures are to be installed as specified in The Plan and the project details. The details and specifications for materials, sizing and installation requirements can be found in Appendix G and on the Project Drawings.

- Stabilized Construction Entrance (CE) – Construction vehicles will enter and exit the site via a stabilized construction entrance to be located at the proposed driveway intersection with Crosby Road. A stabilized construction entrance will be installed to reduce or eliminate the tracking or deposition of sediment onto the public right-of-way during construction. The access point shall be maintained in a condition which will prevent tracking of sediment onto public rights-of-way or streets. This may require periodic top dressing with additional aggregate. All sediment spilled, dropped, or washed onto public rights-of-way must be removed immediately.

- Silt Fence (SF) – The silt fence will be installed as shown on the Project Drawings and as necessary during construction to reduce sheet-flow and runoff velocity and reduce the amount of sediment within the sheet-flow/runoff. It will also be utilized to protect the bio-retention area from sediment laden runoff until the adjacent areas are stabilized. Maintenance shall be performed as needed and material removed when 'bulges' develop in the silt fence.

- Fiber Roll (FR) –Fiber rolls may be utilized in place of silt fence for sediment control and as inlet protection if installed according to manufacturer's specifications. Maintenance shall be performed as needed. Maintenance includes replacing slumping rolls, removing accumulated sediment, and filling in rills.

- Dust Control – Dust control will be implemented routinely to reduce dust movement from disturbed soil surfaces to off-site areas where it may cause health hazards, inconvenience and traffic safety problems.

- Temporary Vegetation (TV) – Temporary vegetation will be established on all areas as shown on the Project Drawings and as necessary on all other disturbed areas that remain inactive for more than fourteen (14) days. This will significantly reduce the erosion of the disturbed soils until the area becomes active again.

- Check Dams – The check dams will be utilized within the vegetated swales and as necessary, to reduce erosion in the ditches during grading and/or installation of the proposed pipe culverts by restricting the velocity of flow in the channel until permanent vegetation/stabilization can be established. The check dams should be inspected after each runoff event. Correct all damage immediately. If significant erosion has occurred between structures, a liner of stone or other suitable material should be installed in that portion of the channel or additional check dams added. Remove sediment accumulated behind the dam as needed to allow channel to drain through the stone check dam and prevent large flows from carrying sediment over the dam.

The proposed construction activity is likely to result in more than five (5) acres of disturbance at one time. Once construction activities approach 5 acres of disturbance, the owner will request authorization to disturb greater than 5 acres and will implement stormwater inspections two times per week while greater than 5 acres are disturbed.

B. Permanent Erosion and Sediment Control Measures

The following permanent erosion and sediment control measures, vegetative practices and green infrastructure techniques will be used to provide long-term control of erosion and sedimentation when construction activities are completed and the project site is stabilized:

- Enclosed Storm Drainage System –Enclosed storm drainage systems will be constructed within the site, perimeter perforated pipe within the gravel area around the Electrolyzer Building and bio-retention area, along with their associated conveyance systems and their discharge points.

- Rock Outlet Protection (OP) – The rock protection (rip-rap) will be installed as shown on the Project Drawings at the pipe outlets from the enclosed storm drainage system to on-site stormwater management areas and the Tributary Wetland ditch along the north property line. It will be utilized to reduce the depth, velocity and energy of the water leaving the stormwater conveyance system and minimize the erosion of the receiving downstream channel.

- Vegetated Dry Detention Pond – A vegetated dry detention pond will be constructed to filter flow and detain peak discharges from the site during larger storm events.

- Vegetated Swale – Vegetated swales will be established along the southern and western property lines leading to the off-site Wetlands to increase the time of concentration, reduce the peak discharge, provide infiltration and convey stormwater at a low velocity, promoting natural treatment and infiltration.

- Vegetated Sedimentation Basin – Vegetated sedimentation basins will be established along the northern and western property lines leading to the bio-retention area to increase the time of concentration, reduce the peak discharge, provide infiltration and to serve as pre-treatment by conveying stormwater at a low velocity, promoting natural treatment and infiltration. They will discharge via level spreaders to the bio-retention area to promote sheet flow.

- Permanent Vegetation (PV) – Permanent vegetation will be established on all areas as shown on the Project Drawings and as necessary on all other disturbed areas upon the completion of construction. This will significantly reduce the erosion of the disturbed soils while the site stabilizes and during daily use of the site following construction. A landscaped buffer will also be established along the site frontage for screening from Crosby Road.

The location and construction information for implementation of the permanent measures for the project are indicated on the Project Drawings. The details showing materials, sizing and installation requirements can be found in Appendix G and on the Project Drawings.

C. Sequence of Construction and Erosion Control Installation

The following is the anticipated construction sequence to be utilized. The contractor must notify the owner of any significant deviations from this sequence:

1. Install the stabilized construction entrance/exit per Project Drawings and Appendix G.

2. Install the silt fence/fiber roll per Project Drawings and Appendix G.

3. Strip and stockpile any topsoil and sub-soil in designated areas (see Project Drawings). All stockpiled material shall be seeded and silt fence/fiber roll placed around perimeter immediately.

4. Begin earthwork and grading for the site development and drainage, along with the bio-retention area, vegetated dry detention pond and vegetated swales and sedimentation basins.

5. Additional silt fence/fiber roll, storm drain inlet protection and dust control will be implemented as necessary in conjunction with the earthwork construction activities.

6. Install storm drainage for the site and bio-retention area, as shown on the Project Drawings.

7. Install site utilities and infrastructure.

8. Continue site activities for the construction of the Buildings and supporting facilities.

9. Complete remaining site construction, fine grade and topsoil remaining disturbed areas. Spread permanent seed mix in required areas, including the vegetated dry detention pond, vegetated swales and vegetated sedimentation basins. Vegetation should be established as soon as possible as detailed on the Project Drawings.

10. Complete soil media, mulch and planting installation within the bio-retention area.

11. Remove temporary soil erosion and sediment controls after permanent vegetation has been established and project site is stabilized. A project site

is considered stabilized only after a minimum of 80% vegetative density is established on the entire project site.

All soil erosion and sediment control measures must be installed and maintained in conformance with The Plan, the Project Drawings and the *New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from Construction Activity* Permit No. GP-0-20-001.

D. Construction Site Wastes

The following best management practices shall be implemented to ensure proper storage and handling of construction site wastes:

- Designate an onsite water / concrete waste collection area that does not receive a substantial amount of runoff from upland area and does not drain directly to a water body.
- Ensure that any containers have lids so they can be covered before periods of rain. Material / chemical containers should be kept in a covered area whenever possible.
- Ensure waste collection frequency is adequate to prevent receptacles from overfilling.
- Clean up spills immediately. For hazardous materials, follow cleanup instructions on package. For smaller spills, use an absorbent material such as sawdust or kitty litter to contain the spill.
- Collect, remove and dispose of all construction site wastes at authorized disposal areas. A local environmental agency can be contacted to identify the disposal sites.

If pesticides are required, the following practices should be used to reduce health and environmental risks associated with pesticides as well as reduce the amount of pesticides that may come in contact with stormwater:

- Follow all federal, state and local regulations that apply to the use, handling or disposal of pesticides.
- Do not handle the materials any more than necessary.
- Store pesticides/fertilizers in a dry, covered area.
- Construct curbs or dikes to contain pesticides in case of spillage.

- Follow the recommended application rates and methods.

- Have equipment and absorbent materials available in areas where pesticides are stored and used in order to contain and clean up any spills that occur.

The following management practices should be followed to reduce the contamination risk associated with petroleum products:

- Store petroleum products and fuel for vehicles in covered areas with dikes in place to contain any spills.

- Immediately contain and clean up any spills with absorbent materials.

- Have equipment available in fuel storage areas and in vehicles to contain and clean up any spills that occur.

To reduce risks of nutrient pollution, the following management practices shall apply:

- Have equipment available in storage areas and in vehicles to contain and clean up any spills that occur.

- Apply fertilizers at the minimum rate and to the minimum area needed.

- Work the fertilizer deeply into the soil to reduce exposure of nutrients to storm water runoff.

- Apply fertilizer at lower application rates with a higher application frequency.

- Limit hydro-seeding, which is the simultaneous application of lime and fertilizers.

- Ensure that erosion and sediment controls are in place to prevent fertilizers and sediments from being transported off-site.

- Use detergents only as recommended and limit their onsite use. Wash water containing detergents should not be mixed with storm water. All polluted waste waters shall be directed to a sanitary sewer or be otherwise contained so that polluted waters may be appropriately treated at a wastewater treatment plant.

IV. INSPECTIONS AND MAINTENACE

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 the General Permit (GP-0-20-001).

2. The terms of the 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 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. The erosion control measures must be maintained/repaired/replaced as necessary such that each measure will meet the specifications included in Appendix G and the latest version of the New York State Standards and Specifications for Erosion and Sediment Control. The specifications include standard maintenance practices for each or the proposed measures.

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 the General 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

During construction, the *owner or operator* will provide a qualified inspector to inspect all erosion and sediment control practices to ensure integrity and effectiveness, all areas of disturbance that have not achieved final stabilization, and all points of discharge to natural surface water bodies located within, or immediately adjacent to, the boundaries of the construction site, and all points of discharge from the construction site. Inspection forms can be found in Appendix H.

Site inspections shall be performed according to the following schedule:

a. For construction sites where soil disturbance activities are ongoing, 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 ongoing and the *owner or operator* has received authorization in accordance with Part II.C.3 of the General Permit 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 Regional Office stormwater contact person or, in areas under the jurisdiction of a *regulated, traditional land use control MS4*, the MS4 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 Regional Office stormwater contact person or, in areas under the jurisdiction of a *regulated, traditional land use control MS4*, the MS4 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(s)* 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 Notice of Termination (NOT). The *owner or operator* shall then submit the completed NOT form to the address in Part II.A.1 of Permit No. GP-0-20-001.

e. For construction sites that directly discharge to one of the 303(d) segments listed in Appendix E of the General Permit or is located in one of the watersheds listed in Appendix C of the General Permit, 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.

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.

The *qualified inspector* shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection reports 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 water bodies located within, or immediately adjacent to, the property boundaries of the construction site which receive runoff from disturbed areas. This shall include identification of any discharges of sediment to the surface water body.

f. Identification of all erosion and sediment control practices that need repair or maintenance;

g. Identification of all erosion and sediment control practices that were not installed properly or are not functioning as designed and need to be reinstalled or replaced;

h. Description and sketch of areas that are disturbed 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; and

j. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s).

k. Identification and status of all corrective actions that were required by previous inspection

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.

m. All inspection reports shall be signed by the qualified inspector.

Within one business day of the completion of an inspection, the *qualified inspector* shall notify the *owner or operator* and appropriate contractor (or subcontractor) of any corrective actions that need to be taken. The contractor (or subcontractor) shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame. The erosion control measures must be maintained/repaired/replaced as necessary such that each measure will meet the specifications included in Appendix G. The specifications include standard maintenance practices for each or the proposed measures. The Plan shall be revised and the measures updated in accordance with sound engineering practices, the guidelines of the General Permit and the Project Drawings. The

Project Engineer is to be notified of any significant revisions to the implemented measures or The Plan.

V. POST-CONSTRUCTION OPERATION AND MAINTENANCE

Post-construction, Plug Power will provide a qualified inspector to inspect and maintain the stormwater conveyance system, the bio-retention area, the vegetated dry detention pond and the outlet structures at least twice annually and after a 25-year or greater storm event. During each inspection, the qualified inspector shall inspect the permanent stormwater management practices and stormwater conveyance system to ensure they are clear of silt, debris, weeds and woody plants. Removal of material shall be by mechanical methods or by hand. All material removed shall be disposed of by an approved method. All areas of permanent vegetation shall be fertilized, as necessary, to keep the vegetation healthy and vigorous and at a minimum density of eighty (80) percent over the entire pervious surface. Vegetation within the vegetated dry detention pond, vegetated swales and vegetated sedimentation basins should be maintained at an approximate 6" height. The Bioretention Operation, Maintenance and Management Inspection Checklist from Appendix G of the NYSEC Stormwater Management Design Manual can be found in Appendix H for use by the qualified inspector.

Appendix H.2 Bioretention from the NYSDEC Stormwater Management Design Manual is also included in Appendix J of the SWPPP document to address the specifications for the mulch and plantings for the bio-retention areas. Silt/sediment shall be removed from the filter bed of the bio-retention areas when the accumulation exceeds one inch. When the filtering capacity of the filter diminishes substantially such that water ponds on the surface for more than 48 hours, the top few inches of discolored material shall be removed and shall be replaced with fresh material.

The following two-year maintenance schedule shall be followed for the bio-retention areas:

Description	Method	Frequency	Time of Year
Watering	Hand Hose or Sprinkler	At planting, once/week for 1st month if < 1" rain received. As necessary thereafter to maintain health of plants (min. ½"/week)	November May-August
Inspection	Visual	Once per week for first month, monthly thereafter	Growing Season
Replacement	Root Stock or Seed, as necessary	As needed during first two years of growing season per visual inspection	Growing Season

VI. ADDITIONAL INFORMATION

1. Contractor and subcontractors must review the New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from Construction Activity permit No. GP-0-20-001, effective January 29, 2015. Any questions or concerns regarding material discussed in this General Permit should be immediately directed to the permittee.

   Each contractor and subcontractor that will perform on the site actions which may reasonably be expected to cause or have the potential to cause pollution of the waters of the State of New York, shall sign the contractor's certification statement at the back of this Stormwater Pollution Prevention Plan (SWPPP) in Appendix E.

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, 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 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 the General Permit.

4. 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 form the date that the site achieves final stabilization. This period may be extended by the Department of Environmental Conservation, in its sole discretion, at any time upon written notification.

5. The owner 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 MS4. 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 one time:

a) The *owner or operator* shall have a qualified inspector conduct at least two (2) site inspections 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 been temporarily or permanently ceased, temporary and/or permanent soil stabilization measures shall be installed and/or implemented within seven (7) days from the date the soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the most current version of technical standard, New York State Standards and Specifications for Erosion and Sediment Control.
c) The *owner of 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.

6. The following list describes some of the construction materials that may be stored at the project site:

- Drainage and construction materials (plastic pipe, catch basins, end-sections)

- Stone

- Fill and Topsoil

- Soil Erosion and Sediment Control Materials for immediate repairs

- Construction Equipment

7. A Notice of Termination (N.O.T.) must be filed with the NYS DEC upon completion of the project. The Notice of Termination form can be found in Appendix D of this plan.

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; and all areas of disturbance have achieved final stabilization; and all temporary, structural erosion and sediment control measures have been removed; and 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 postconstruction 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 The Permit in accordance with Part II.F of the General Permit.

d. The owner or operator obtains coverage under an alternative SPDES general permit or an individual SPDES permit.

For *construction activities* meeting a. or b. above, 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 the General Permit have been achieved.

For construction activities that are subject to the requirements of a regulated, traditional land use control MS4 and meeting a. or b. above, 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 the General 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) as required above.

For post-construction stormwater management practices that are privately owned, the owner or operator shall have 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.

8. Permittee, Contractor and Sub-contractor to implement best management practices (BMP) to prevent litter, debris, building materials, or similar material from being discharged into waters of the State of New York.

9. The Plan shall be revised, and the measures updated, as site conditions require, in accordance with sound engineering practices, the guidelines of the General Permit and the Project Drawings. The Project Engineer is to be notified of any significant revisions to the implemented measures or The Plan.

10. Upon the completion of construction, the bio-retention area, vegetated dry detention pond, the vegetated swales, vegetated sedimentation basins and the site's enclosed storm drainage system will become the responsibility of Plug Power.

11. The Town of Alabama shall approve a formal maintenance agreement for stormwater management facilities binding on all subsequent landowners and recorded in the office of the County Clerk as a deed restriction on the property prior to final plan approval. The maintenance agreement shall be consistent with the terms and conditions of the Sample Stormwater Control Facility Maintenance Agreement in Appendix K of this document.

VII. OWNER/OPERATOR CERTIFICATION STATEMENT

The following certification shall be made in accordance with the SPDES General Permit for Stormwater Discharges from Construction Activity, Permit GP-0-20-001

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate and complete. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."

Signature: ________________________________Date: ___________________________

Print Name: Brenor Brophy

Title: Vice-President, Project Development

Company: Plug Power

Address: 968 Albany Shaker Road
Latham, NY 12110

Phone: (408) 823-6566

Email Address: brbrophy@plugpower.com

Appendix A

Drainage Calculations

Appendix A-1

Drainage Calculations
Existing Conditions

Soil Map—Genesee County, New York
(Gateway Site)

Map Scale: 1:2,760 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- □ Area of Interest (AOI)

Soils

- □ Soil Map Unit Polygons
- Soil Map Unit Lines
- ■ Soil Map Unit Points

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Genesee County, New York
Survey Area Data: Version 21, Jun 11, 2020

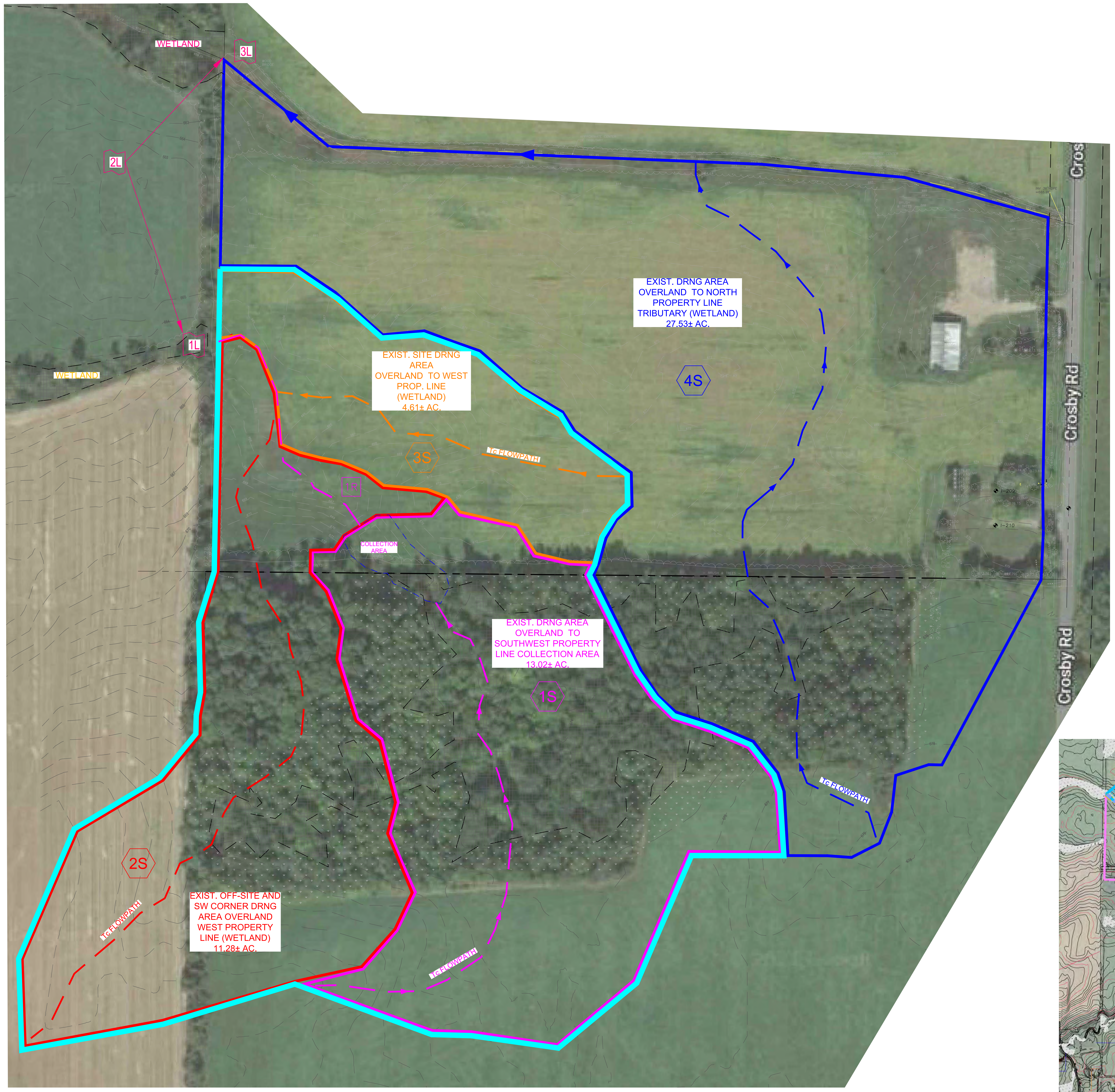
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 18, 2016

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
CaA	Canandaigua silt loam, 0 to 2 percent slopes	1.9	6.7%
ClB	Collamer silt loam, 2 to 6 percent slopes	0.8	2.9%
La	Lakemont silty clay loam, 0 to 3 percent slopes	7.0	24.2%
NgA	Niagara silt loam, 0 to 2 percent slopes	0.4	1.4%
OdB	Odessa silt loam, 3 to 8 percent slopes	18.6	64.7%
Totals for Area of Interest		**28.8**	**100.0%**



EXISTING CONDITIONS DRAINAGE MAP

SCALE: 1'=100'

100 0 50 100 200

(IN FEET)
1 inch = 100 ft.

LEGEND

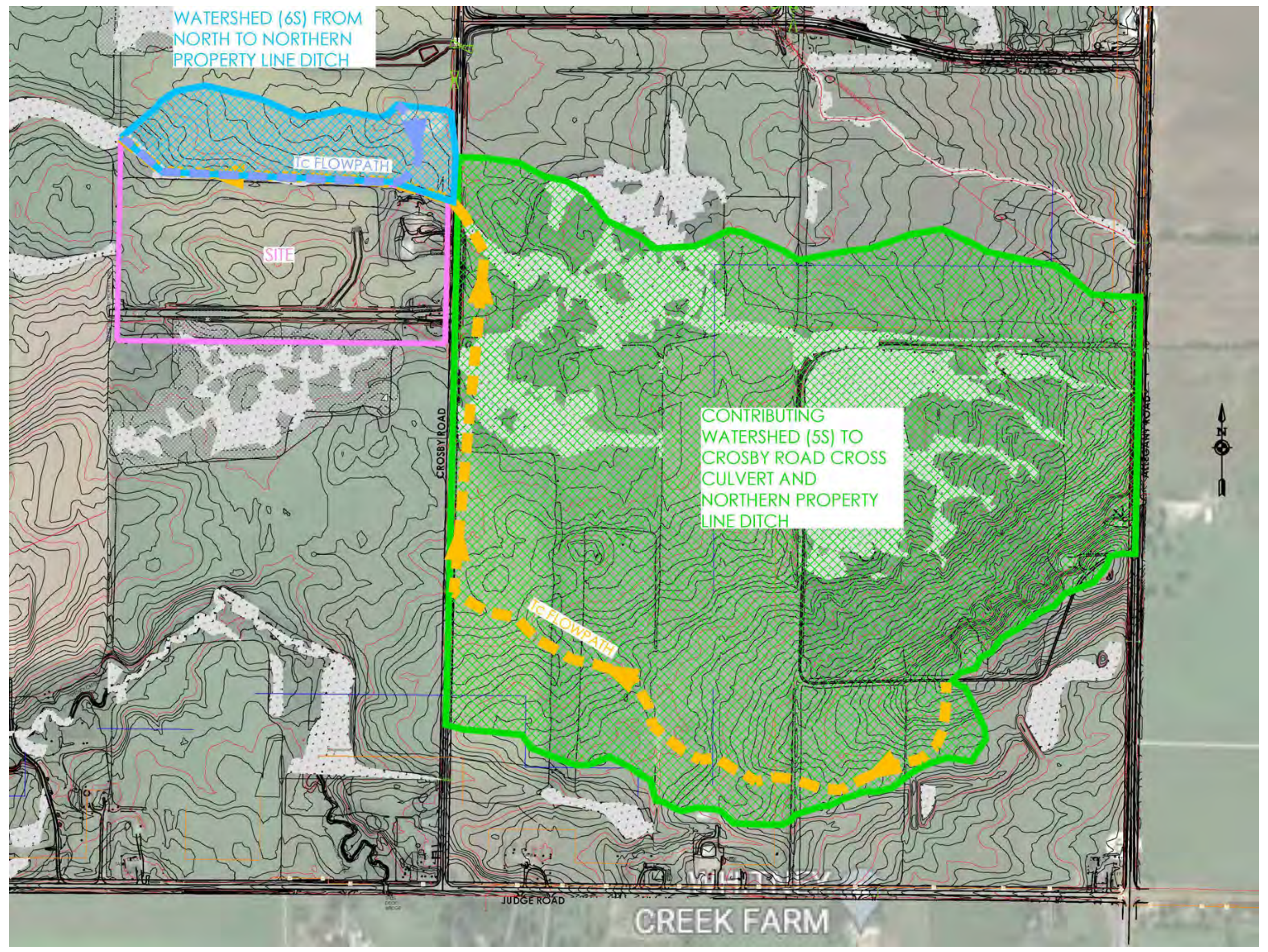
—ST—		STORM SEWER LINE
INV		INVERT ELEVATION
UP	∅	UTILITY POLE
UPL		UTILITY POLE W/ LIGHT
—OHW—		OVERHEAD WIRES
MW	⊗	MONITORING WELL
EP		EDGE OF PAVEMENT
CP	△	PRIMARY CONTROL POINT
		TREE DECIDUOUS
		TREE CONIFEROUS

MAP REFERENCES:

PROPOSED WYDER PARCEL A, A PORTION OF SBL 10.-1-42, BOUNDARY SURVEY PART OF LOT 14, TWP 13, RGE 4 OF THE TONAWANDA RESERVATION, TOWN OF ALABAMA, COUNTY OF GENESEE AND STATE OF NEW YORK, PREPARED BY FRANDINA ENGINEERING AND LAND SURVEYING, PC; DATED FEBRUARY 16, 2021, JOB No. 3646-3B.

TOPOGRAPHIC SURVEY PART OF LOT 14, TWP 13, RGE 4 OF THE TONAWANDA RESERVATION, TOWN OF ALABAMA, COUNTY OF GENESEE AND STATE OF NEW YORK, PREPARED BY FRANDINA ENGINEERING AND LAND SURVEYING, PC; DATED FEBRUARY 26, 2021, JOB No. 3646-3B.

STAMP BASEMAP 2019 PROVIDED BY CLARK PATTERSON LEE ARCHITECTURE ENGINEERING PLANNING



CONTRIBUTING WATERSHED TO CROSBY ROAD CROSS CULVERT AND NORTH PROPERTY LINE DITCH (2R)

SCALE: 1'=600'±

N

NO.	ISSUE DATE	REVISION DESCRIPTION
0	05-15-2021	SITE PLAN SUBMITTAL
1	07-15-2021	SITE PLAN SUBMITTAL - REVISED PER TOWN COMMENTS
2		
3		
4		
5		
6		
7		
8		
9		

CLIENT:

PLUG POWER
968 ALBANY SHAKER ROAD
LATHAM, NY 12110

PROJECT:

PLUG POWER HYDROGEN
PRODUCTION FACILITY

INVICTUS
Civil Engineering, P.C.

4759 N 5th Street
Lewiston, NY 14092
Phone: (716) 946-2415
Email: rhaight@invictuscivilengineering.com

SEAL / SIGNATURE

Following is an excerpt from the New York State Education Law, Article 145, Section 7209 & applies to this drawing:
It is a violation of this law for any person unless he is acting under the direct supervision of a licensed professional engineer to alter an item in any way. If an item bearing the seal of a professional engineer is altered, the altering engineer shall affix his seal and the notation, "ALTERED BY" followed by his signature and date of such alteration and a specific description of the alteration.
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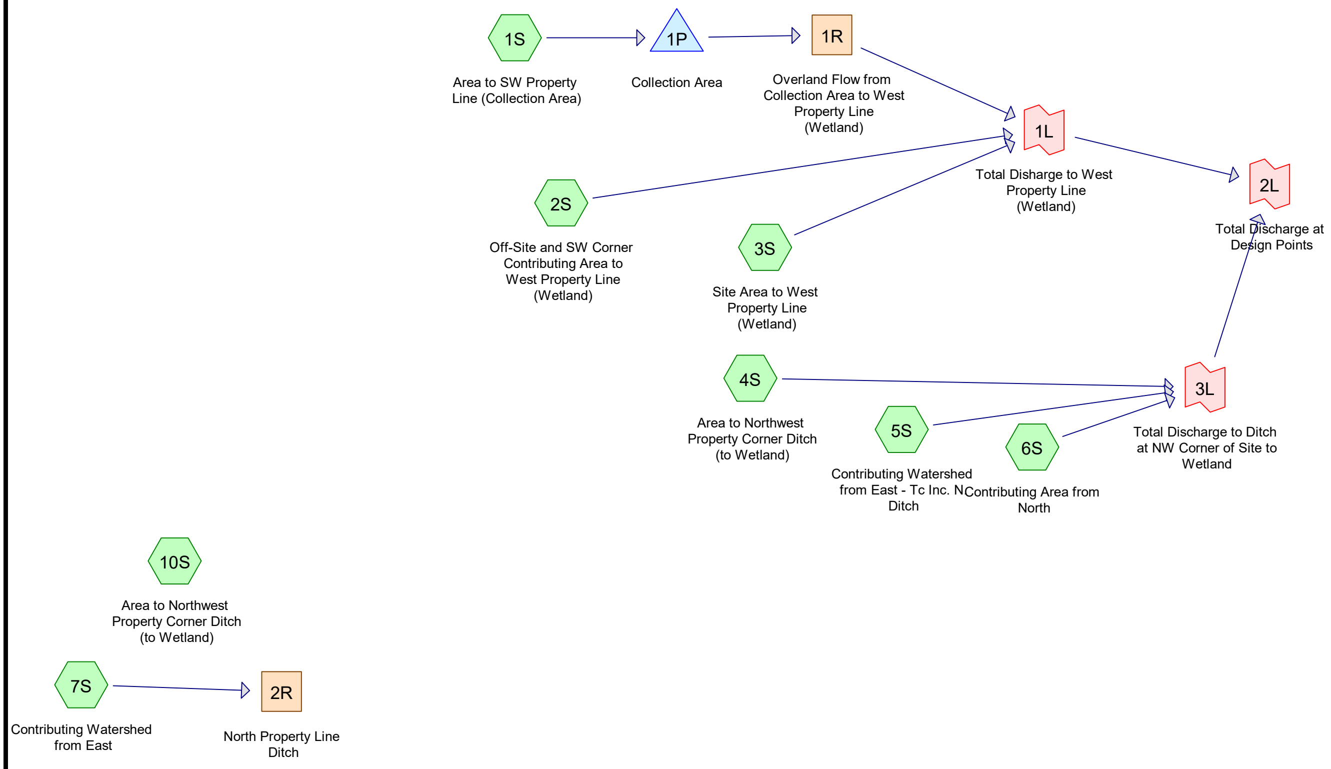
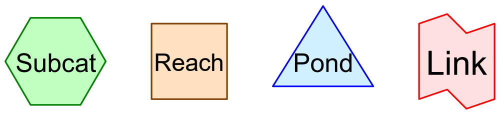
SHEET TITLE
EXISTING CONDITIONS
DRAINAGE MAP

SHEET
DR-000

SCALE	PROJECT #	DATE
AS NOTED	21-1002	05/15/2021





Routing Diagram for Plug Power - Existing Conditions 6-29-21
Prepared by {enter your company name here}, Printed 7/15/2021
HydroCAD® 10.10-6a s/n 11585 © 2020 HydroCAD Software Solutions LLC

Project Notes

Defined 9 rainfall events from Gateway IDF

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr	Type II 24-hr		Default	24.00	1	1.82	2
2	10-yr	Type II 24-hr		Default	24.00	1	3.04	2
3	25-yr	Type II 24-hr		Default	24.00	1	3.71	2
4	100-yr	Type II 24-hr		Default	24.00	1	5.01	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.866	77	Brush, Fair, HSG D (4S, 10S)
0.241	91	Gravel drive, HSG D (4S, 10S)
2.100	96	Gravel surface, HSG D (5S, 7S)
9.365	78	Meadow, non-grazed, HSG D (1S, 2S, 4S, 10S)
206.140	84	Pasture/grassland/range, Fair, HSG D (5S, 7S)
56.192	89	Row crops, straight row, Good, HSG D (1S, 2S, 3S, 4S, 6S, 10S)
0.225	98	Unconnected roofs, HSG D (4S, 10S)
5.940	98	Water Surface, 0% imp, HSG D (5S, 7S)
179.935	79	Woods, Fair, HSG D (1S, 2S, 4S, 5S, 7S, 10S)
5.130	79	Woods/grass comb., Good, HSG D (4S, 10S)
468.134	**83**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
468.134	HSG D	1S, 2S, 3S, 4S, 5S, 6S, 7S, 10S
0.000	Other	
468.134		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	2.866	0.000	2.866	Brush, Fair	4S, 10S
0.000	0.000	0.000	0.241	0.000	0.241	Gravel drive	4S, 10S
0.000	0.000	0.000	2.100	0.000	2.100	Gravel surface	5S, 7S
0.000	0.000	0.000	9.365	0.000	9.365	Meadow, non-grazed	1S, 2S, 4S, 10S
0.000	0.000	0.000	206.140	0.000	206.140	Pasture/grassland/range, Fair	5S, 7S
0.000	0.000	0.000	56.192	0.000	56.192	Row crops, straight row, Good	1S, 2S, 3S, 4S, 6S, 10S
0.000	0.000	0.000	0.225	0.000	0.225	Unconnected roofs	4S, 10S
0.000	0.000	0.000	5.940	0.000	5.940	Water Surface, 0% imp	5S, 7S
0.000	0.000	0.000	179.935	0.000	179.935	Woods, Fair	1S, 2S, 4S, 5S, 7S, 10S
0.000	0.000	0.000	5.130	0.000	5.130	Woods/grass comb., Good	4S, 10S
0.000	**0.000**	**0.000**	**468.134**	**0.000**	**468.134**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	5S	0.00	0.00	75.0	0.0200	0.011	0.0	42.0	0.0
2	7S	0.00	0.00	75.0	0.0200	0.011	0.0	42.0	0.0

```
                  Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
                  Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
          Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area to SW Property      Runoff Area=567,060 sf   0.00% Impervious   Runoff Depth=0.42"
                                     Flow Length=1,100'   Tc=42.2 min   CN=79   Runoff=3.10 cfs  0.456 af

Subcatchment 2S: Off-Site and SW Corner  Runoff Area=491,210 sf   0.00% Impervious   Runoff Depth=0.58"
                                     Flow Length=1,600'   Tc=53.0 min   CN=83   Runoff=3.46 cfs  0.540 af

Subcatchment 3S: Site Area to West        Runoff Area=200,760 sf   0.00% Impervious   Runoff Depth=0.88"
                        Flow Length=875'   Slope=0.0080 '/'   Tc=35.1 min   CN=89   Runoff=3.14 cfs  0.338 af

Subcatchment 4S: Area to Northwest      Runoff Area=1,199,225 sf   0.41% Impervious   Runoff Depth=0.67"
                                    Flow Length=2,485'   Tc=43.0 min   CN=85   Runoff=11.77 cfs  1.528 af

Subcatchment 5S: Contributing             Runoff Area=185.750 ac   0.00% Impervious   Runoff Depth=0.53"
                                    Flow Length=6,615'   Tc=45.0 min   CN=82   Runoff=58.27 cfs  8.255 af

Subcatchment 6S: Contributing Area from   Runoff Area=12.670 ac   0.00% Impervious   Runoff Depth=0.88"
                                    Flow Length=1,850'   Tc=18.3 min   CN=89   Runoff=12.95 cfs  0.930 af

Subcatchment 7S: Contributing             Runoff Area=185.750 ac   0.00% Impervious   Runoff Depth=0.53"
                                    Flow Length=4,945'   Tc=40.0 min   CN=82   Runoff=63.46 cfs  8.255 af

Subcatchment 10S: Area to Northwest     Runoff Area=1,199,225 sf   0.41% Impervious   Runoff Depth=0.67"
                                    Flow Length=1,520'   Tc=39.2 min   CN=85   Runoff=12.57 cfs  1.528 af

Reach 1R: Overland Flow from         Avg. Flow Depth=0.18'   Max Vel=1.18 fps   Inflow=1.60 cfs  0.309 af
                  n=0.030   L=500.0'   S=0.0097 '/'   Capacity=399.92 cfs   Outflow=1.37 cfs  0.309 af

Reach 2R: North Property Line Ditch   Avg. Flow Depth=1.34'   Max Vel=2.99 fps   Inflow=63.46 cfs  8.255 af
                n=0.030   L=1,670.0'   S=0.0060 '/'   Capacity=470.66 cfs   Outflow=57.80 cfs  8.255 af

Pond 1P: Collection Area                  Peak Elev=669.84'  Storage=6,808 cf   Inflow=3.10 cfs  0.456 af
                                                                                Outflow=1.60 cfs  0.309 af

Link 1L: Total Disharge to West Property Line (Wetland)                          Inflow=5.97 cfs  1.188 af
                                                                                Primary=5.97 cfs  1.188 af

Link 2L: Total Discharge at Design Points                                      Inflow=79.53 cfs  11.901 af
                                                                              Primary=79.53 cfs  11.901 af

Link 3L: Total Discharge to Ditch at NW Corner of Site to Wetland              Inflow=73.58 cfs  10.713 af
                                                                              Primary=73.58 cfs  10.713 af

        Total Runoff Area = 468.134 ac   Runoff Volume = 21.830 af   Average Runoff Depth = 0.56"
                                    99.95% Pervious = 467.909 ac     0.05% Impervious = 0.225 ac
```

Summary for Subcatchment 1S: Area to SW Property Line (Collection Area)

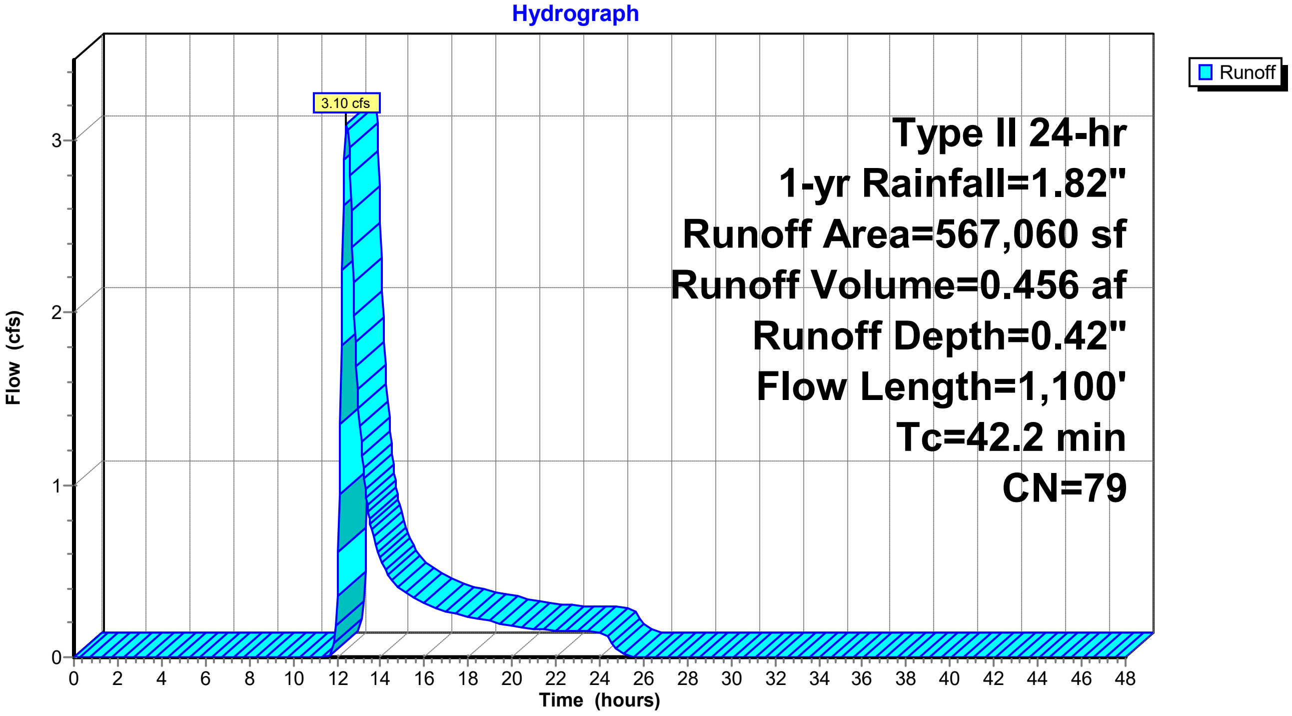
Runoff = 3.10 cfs @ 12.46 hrs, Volume= 0.456 af, Depth= 0.42"
Routed to Pond 1P : Collection Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
31,900	89	Row crops, straight row, Good, HSG D
345,195	79	Woods, Fair, HSG D
189,965	78	Meadow, non-grazed, HSG D
567,060	79	Weighted Average
567,060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
7.3	375	0.0150	0.86		**Shallow Concentrated Flow, 375' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
20.8	625	0.0100	0.50		**Shallow Concentrated Flow, 625' Shallow Conc. Flow** Woodland Kv= 5.0 fps
42.2	1,100	Total			

Subcatchment 1S: Area to SW Property Line (Collection Area)



Summary for Subcatchment 2S: Off-Site and SW Corner Contributing Area to West Property Line (Wetland)

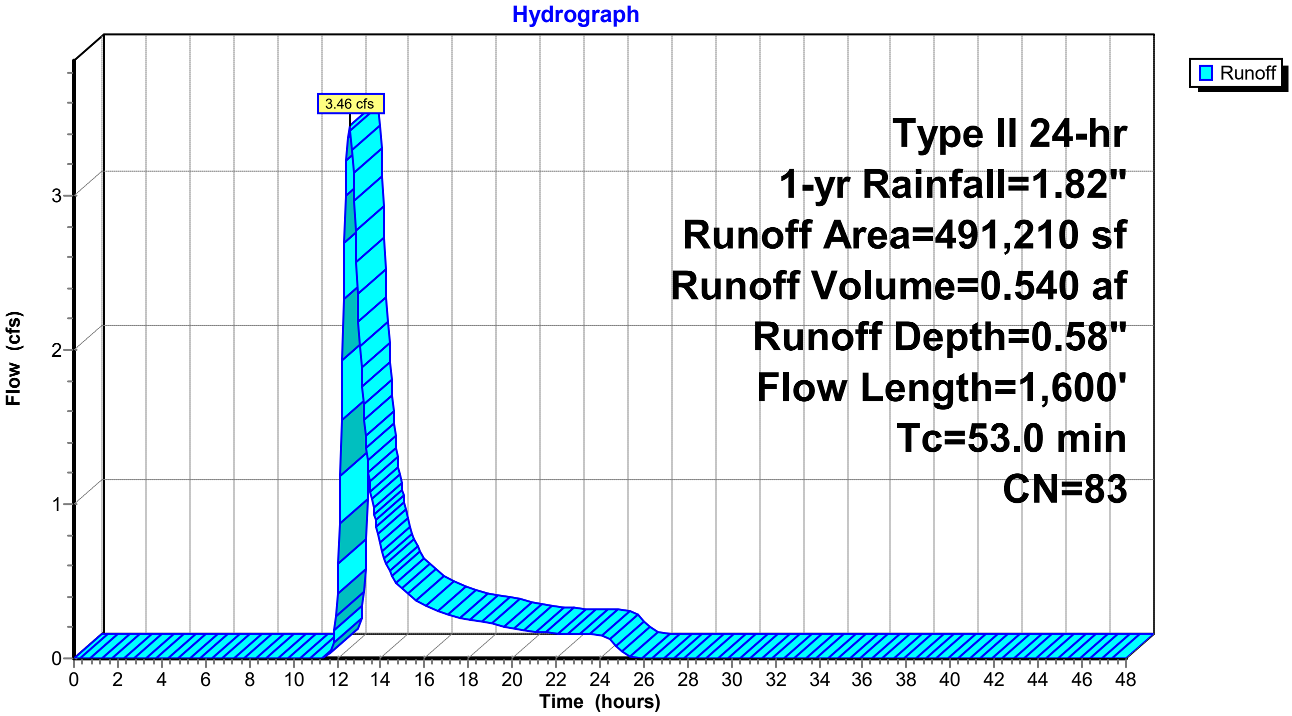
Runoff = 3.46 cfs @ 12.57 hrs, Volume= 0.540 af, Depth= 0.58"
Routed to Link 1L : Total Disharge to West Property Line (Wetland)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
125,880	89	Row crops, straight row, Good, HSG D
51,080	78	Meadow, non-grazed, HSG D
232,840	79	Woods, Fair, HSG D
81,410	89	Row crops, straight row, Good, HSG D
491,210	83	Weighted Average
491,210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.1	100	0.0050	0.07		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
21.7	650	0.0100	0.50		**Shallow Concentrated Flow, 650' Shallow Conc. Flow** Woodland Kv= 5.0 fps
1.7	500	0.0140	4.95	346.85	**Trap/Vee/Rect Channel Flow, Channel Flow across site** Bot.W=50.00' D=1.00' Z= 20.0 '/' Top.W=90.00' n= 0.030
53.0	1,600	Total			

Subcatchment 2S: Off-Site and SW Corner Contributing Area to West Property Line (Wetland)



Summary for Subcatchment 3S: Site Area to West Property Line (Wetland)

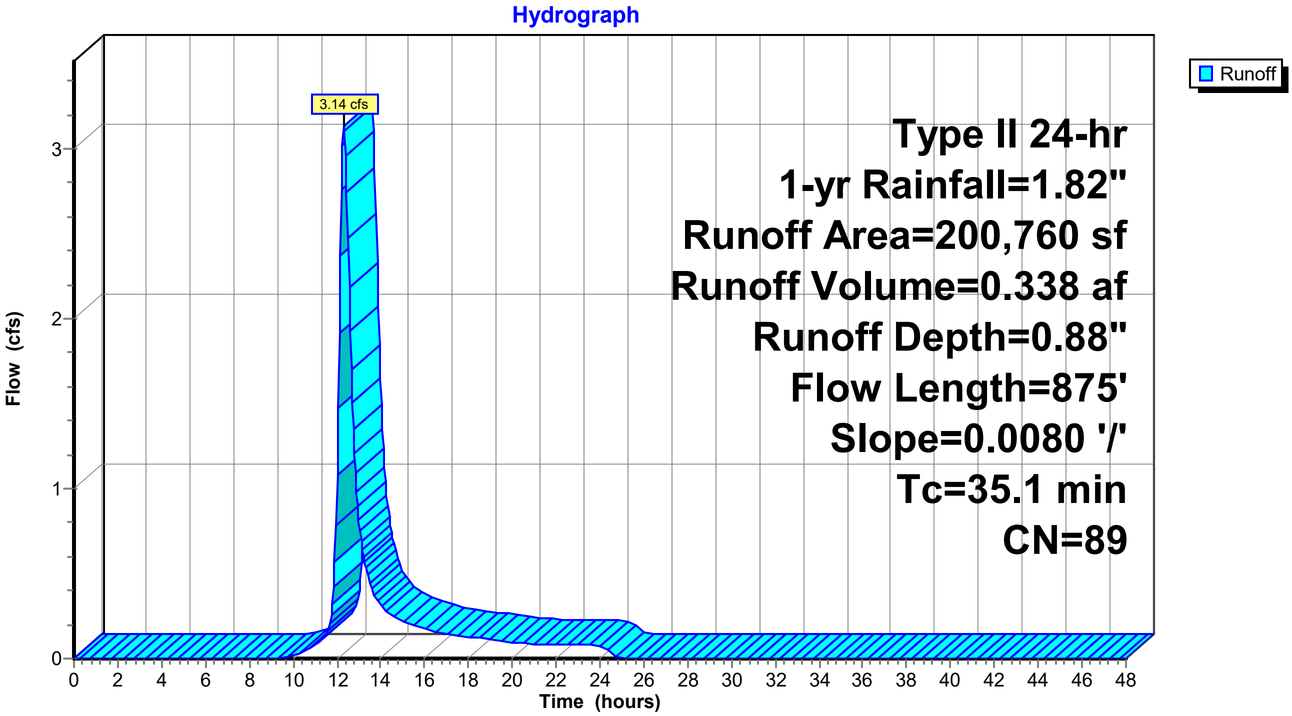
Runoff = 3.14 cfs @ 12.31 hrs, Volume= 0.338 af, Depth= 0.88"
Routed to Link 1L : Total Disharge to West Property Line (Wetland)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
200,760	89	Row crops, straight row, Good, HSG D
200,760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0080	0.09		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
16.0	775	0.0080	0.80		**Shallow Concentrated Flow, 775' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
35.1	875	Total			

Subcatchment 3S: Site Area to West Property Line (Wetland)



Summary for Subcatchment 4S: Area to Northwest Property Corner Ditch (to Wetland)

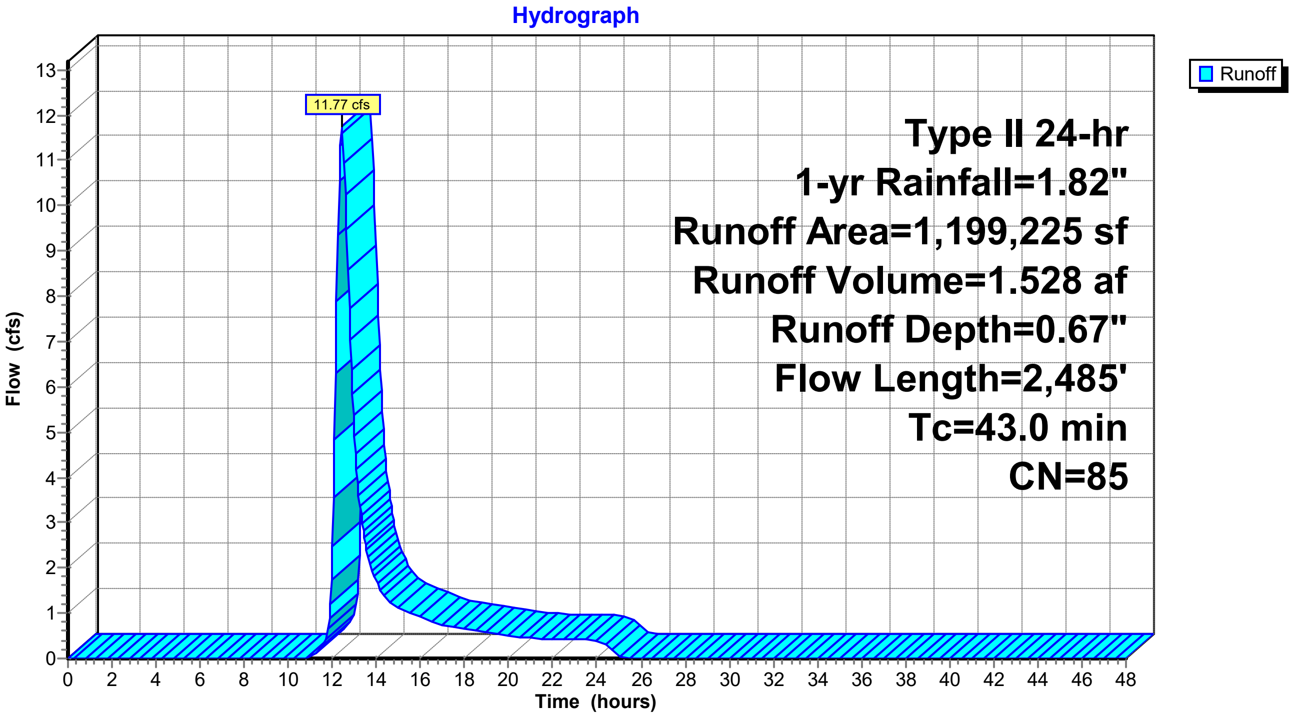
Runoff = 11.77 cfs @ 12.43 hrs, Volume= 1.528 af, Depth= 0.67"
Routed to Link 3L : Total Discharge to Ditch at NW Corner of Site to Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=1.82"

	Area (sf)	CN	Description
*	5,250	91	Gravel drive, HSG D
	111,735	79	Woods/grass comb., Good, HSG D
	4,900	98	Unconnected roofs, HSG D
	62,430	77	Brush, Fair, HSG D
	727,935	89	Row crops, straight row, Good, HSG D
	83,440	78	Meadow, non-grazed, HSG D
	203,535	79	Woods, Fair, HSG D
	1,199,225	85	Weighted Average
	1,194,325		99.59% Pervious Area
	4,900		0.41% Impervious Area
	4,900		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0120	0.13		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.7	90	0.0150	0.86		**Shallow Concentrated Flow, 90' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
12.7	435	0.0130	0.57		**Shallow Concentrated Flow, 435' Shallow Conc. Flow** Woodland Kv= 5.0 fps
10.0	380	0.0050	0.64		**Shallow Concentrated Flow, 380' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
1.7	515	0.0117	5.20	415.88	**Trap/Vee/Rect Channel Flow, Channel flow across site** Bot.W=50.00' D=1.00' Z= 30.0 '/' Top.W=110.00' n= 0.025
3.8	965	0.0042	4.24	394.18	**Trap/Vee/Rect Channel Flow, North Property Line Ditch** Bot.W=1.00' D=3.00' Z= 10.0 '/' Top.W=61.00' n= 0.030
43.0	2,485	Total			

Subcatchment 4S: Area to Northwest Property Corner Ditch (to Wetland)



Summary for Subcatchment 5S: Contributing Watershed from East - Tc Inc. N. Ditch

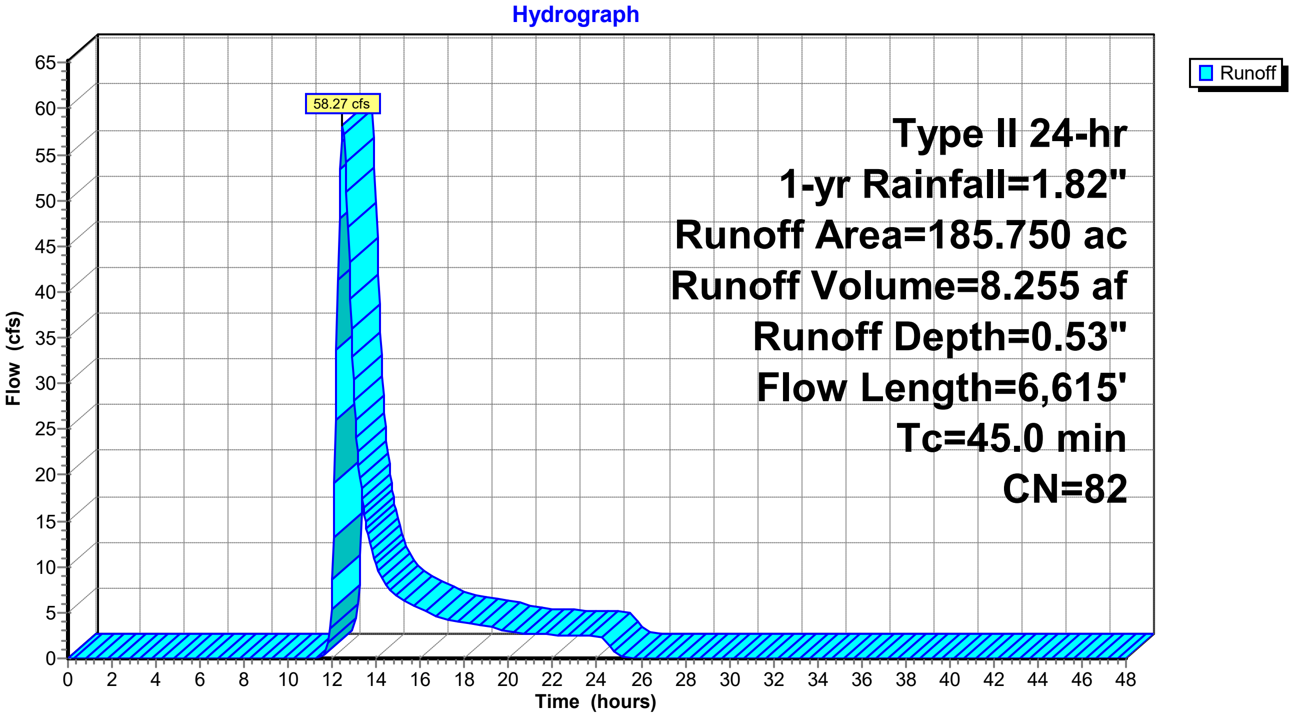
```
Runoff      =       58.27 cfs @   12.47 hrs,  Volume=           8.255 af,  Depth=  0.53"
    Routed to Link 3L : Total Discharge to Ditch at NW Corner of Site to Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr  1-yr Rainfall=1.82"

   Area (ac)   CN   Description
---------------------------------------------------------------
      78.660   79   Woods, Fair, HSG D
       2.970   98   Water Surface, 0% imp, HSG D
       1.050   96   Gravel surface, HSG D
     103.070   84   Pasture/grassland/range, Fair, HSG D
---------------------------------------------------------------
     185.750   82   Weighted Average
     185.750        100.00% Pervious Area

    Tc  Length   Slope  Velocity  Capacity  Description
 (min)  (feet)  (ft/ft)  (ft/sec)     (cfs)
---------------------------------------------------------------
  10.6     100  0.0350      0.16            Sheet Flow, 100' Overland Flow
                                            Cultivated: Residue>20%   n= 0.170   P2= 2.14"
  14.2   1,000  0.0170      1.17            Shallow Concentrated Flow, 1000' Shallow Conc. Flow
                                            Cultivated Straight Rows   Kv= 9.0 fps
   2.9     750  0.0130      4.31    430.96  Trap/Vee/Rect Channel Flow, 750 Flow Through Ag Field
                                            Bot.W=50.00'  D=1.00'  Z= 50.0 '/'  Top.W=150.00'
                                            n= 0.030  Earth, grassed & winding
   2.7     670  0.0120      4.14    414.05  Trap/Vee/Rect Channel Flow, 670' Flow Through Woods
                                            Bot.W=50.00'  D=1.00'  Z= 50.0 '/'  Top.W=150.00'
                                            n= 0.030  Earth, grassed & winding
   1.9     550  0.0100      4.74    889.55  Trap/Vee/Rect Channel Flow, 550' Flow Through Ag Field
                                            Bot.W=50.00'  D=1.50'  Z= 50.0 '/'  Top.W=200.00'
                                            n= 0.030  Earth, grassed & winding
   7.6   1,800  0.0070      3.97    744.25  Trap/Vee/Rect Channel Flow, 1,800' Along Crosby Road
                                            Bot.W=50.00'  D=1.50'  Z= 50.0 '/'  Top.W=200.00'
                                            n= 0.030  Earth, grassed & winding
   0.1      75  0.0200     17.48    168.15  Pipe Channel, Crosby Road Cross Culvert
                                            42.0"  Round  Area= 9.6 sf  Perim= 11.0'  r= 0.88'
                                            n= 0.011
   5.0   1,670  0.0060      5.61    706.31  Trap/Vee/Rect Channel Flow, North Property Line Ditch
                                            Bot.W=1.00'  D=3.50'  Z= 10.0 '/'  Top.W=71.00'
                                            n= 0.030
---------------------------------------------------------------
  45.0   6,615  Total
```

Subcatchment 5S: Contributing Watershed from East - Tc Inc. N. Ditch



Summary for Subcatchment 6S: Contributing Area from North

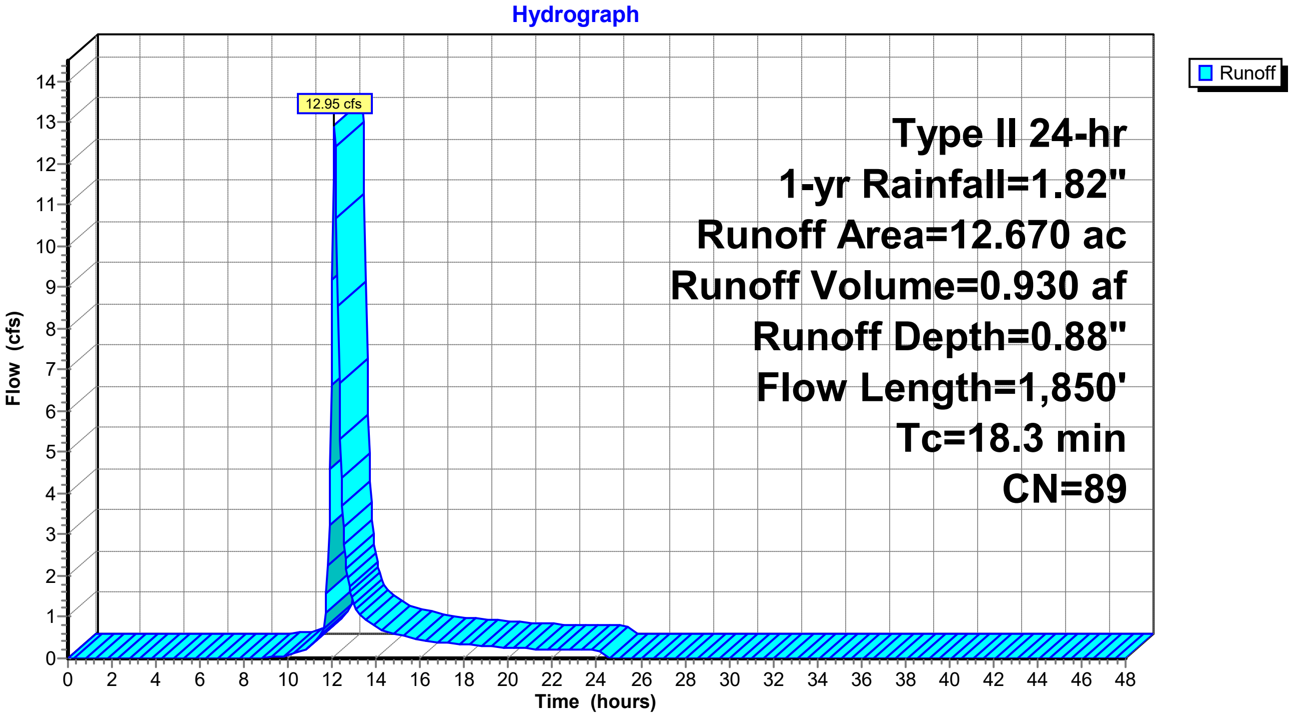
Runoff = 12.95 cfs @ 12.11 hrs, Volume= 0.930 af, Depth= 0.88"
Routed to Link 3L : Total Discharge to Ditch at NW Corner of Site to Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (ac)	CN	Description
12.670	89	Row crops, straight row, Good, HSG D
12.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0100	0.22		**Sheet Flow, 100' Overland Flow** Cultivated: Residue<=20% n= 0.060 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
4.2	1,400	0.0060	5.61	706.31	**Trap/Vee/Rect Channel Flow, North Property Line Ditch** Bot.W=1.00' D=3.50' Z= 10.0 '/' Top.W=71.00' n= 0.030
18.3	1,850	Total			

Subcatchment 6S: Contributing Area from North



Summary for Subcatchment 7S: Contributing Watershed from East

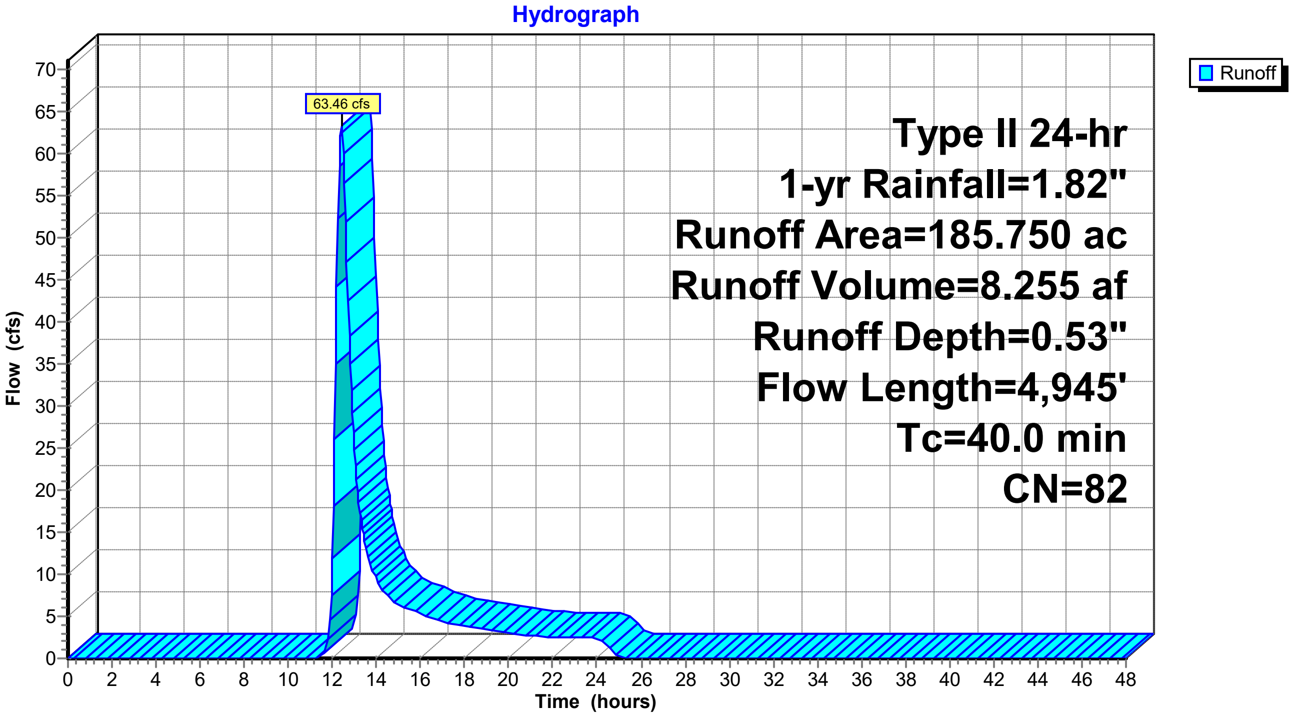
Runoff = 63.46 cfs @ 12.40 hrs, Volume= 8.255 af, Depth= 0.53"
Routed to Reach 2R : North Property Line Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (ac)	CN	Description
78.660	79	Woods, Fair, HSG D
2.970	98	Water Surface, 0% imp, HSG D
1.050	96	Gravel surface, HSG D
103.070	84	Pasture/grassland/range, Fair, HSG D
185.750	82	Weighted Average
185.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0350	0.16		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
14.2	1,000	0.0170	1.17		**Shallow Concentrated Flow, 1000' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
2.9	750	0.0130	4.31	430.96	**Trap/Vee/Rect Channel Flow, 750 Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.7	670	0.0120	4.14	414.05	**Trap/Vee/Rect Channel Flow, 670' Flow Through Woods** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
1.9	550	0.0100	4.74	889.55	**Trap/Vee/Rect Channel Flow, 550' Flow Through Ag Field** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
7.6	1,800	0.0070	3.97	744.25	**Trap/Vee/Rect Channel Flow, 1,800' Along Crosby Road** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
0.1	75	0.0200	17.48	168.15	**Pipe Channel, Crosby Road Cross Culvert** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.011
40.0	4,945	Total			

Subcatchment 7S: Contributing Watershed from East



Summary for Subcatchment 10S: Area to Northwest Property Corner Ditch (to Wetland)

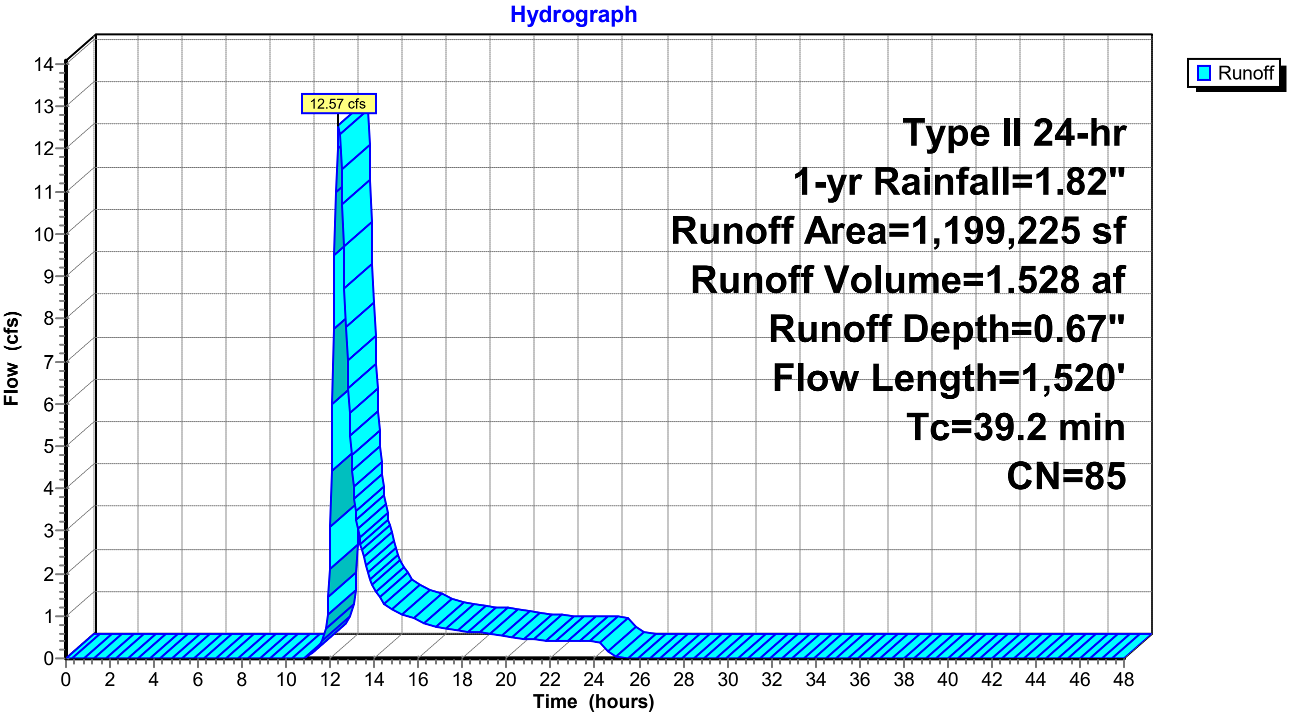
Runoff = 12.57 cfs @ 12.38 hrs, Volume= 1.528 af, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=1.82"

	Area (sf)	CN	Description
*	5,250	91	Gravel drive, HSG D
	111,735	79	Woods/grass comb., Good, HSG D
	4,900	98	Unconnected roofs, HSG D
	62,430	77	Brush, Fair, HSG D
	727,935	89	Row crops, straight row, Good, HSG D
	83,440	78	Meadow, non-grazed, HSG D
	203,535	79	Woods, Fair, HSG D
	1,199,225	85	Weighted Average
	1,194,325		99.59% Pervious Area
	4,900		0.41% Impervious Area
	4,900		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0120	0.13		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.7	90	0.0150	0.86		**Shallow Concentrated Flow, 90' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
12.7	435	0.0130	0.57		**Shallow Concentrated Flow, 435' Shallow Conc. Flow** Woodland Kv= 5.0 fps
10.0	380	0.0050	0.64		**Shallow Concentrated Flow, 380' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
1.7	515	0.0117	5.20	415.88	**Trap/Vee/Rect Channel Flow, Channel flow across site** Bot.W=50.00' D=1.00' Z= 30.0 '/' Top.W=110.00' n= 0.025
39.2	1,520	Total			

Subcatchment 10S: Area to Northwest Property Corner Ditch (to Wetland)



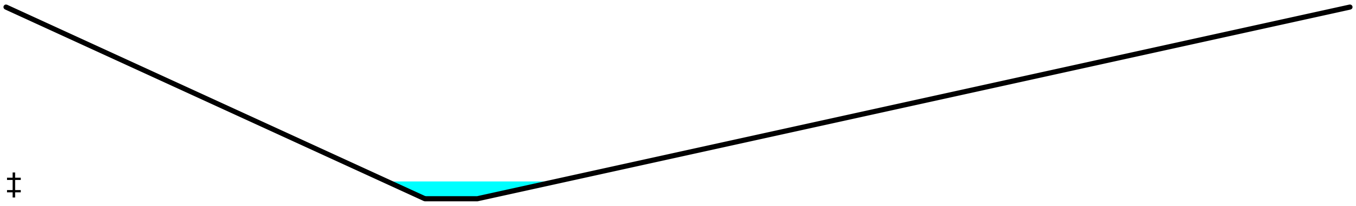
Summary for Reach 1R: Overland Flow from Collection Area to West Property Line (Wetland)

Inflow Area = 13.018 ac, 0.00% Impervious, Inflow Depth = 0.29" for 1-yr event
Inflow = 1.60 cfs @ 12.95 hrs, Volume= 0.309 af
Outflow = 1.37 cfs @ 13.10 hrs, Volume= 0.309 af, Atten= 15%, Lag= 9.1 min
Routed to Link 1L : Total Disharge to West Property Line (Wetland)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.18 fps, Min. Travel Time= 7.1 min
Avg. Velocity = 0.62 fps, Avg. Travel Time= 13.5 min

Peak Storage= 579 cf @ 13.10 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 9.73'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 399.92 cfs

3.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 12.0 25.0 '/' Top Width= 77.00'
Length= 500.0' Slope= 0.0097 '/'
Inlet Invert= 668.85', Outlet Invert= 664.00'



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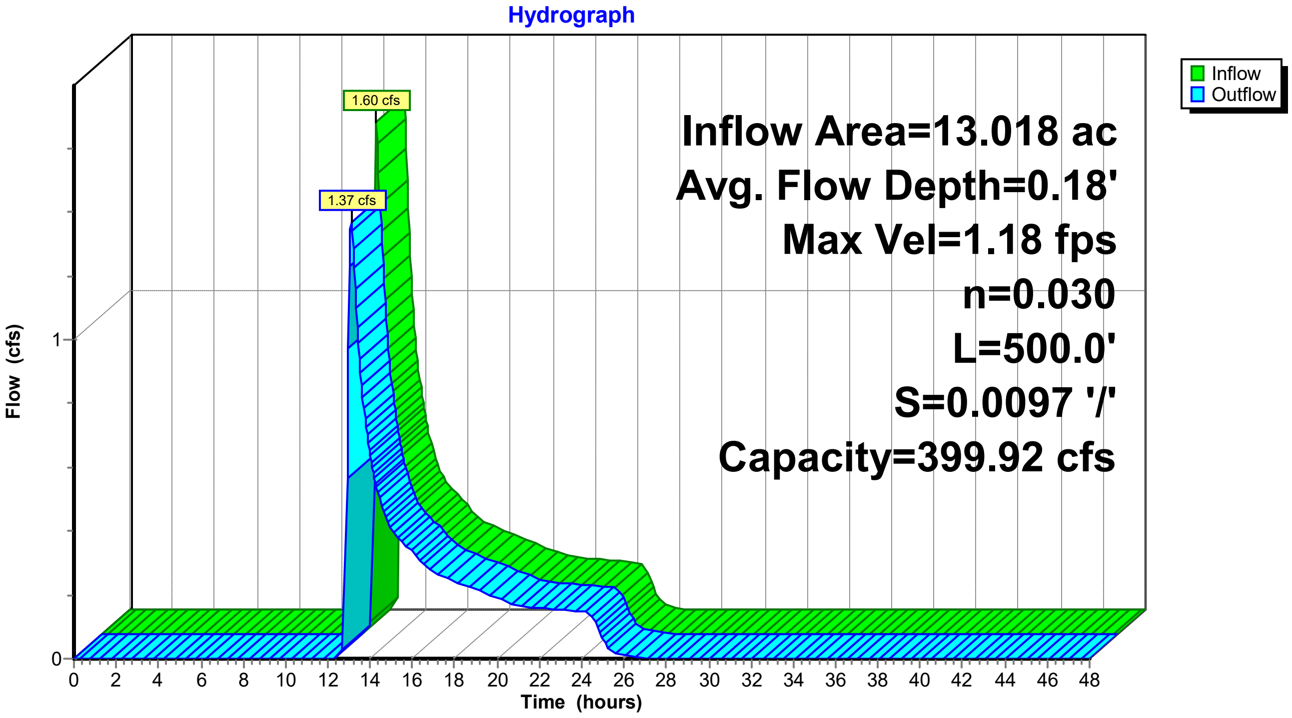
Reach 1R: Overland Flow from Collection Area to West Property Line (Wetland)



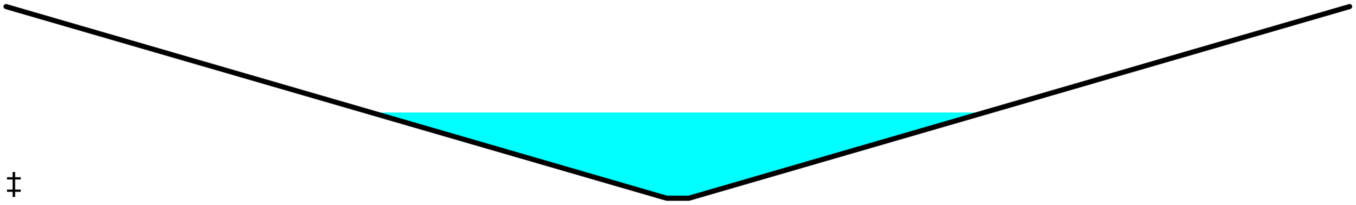
Summary for Reach 2R: North Property Line Ditch

Inflow Area =	185.750 ac,	0.00% Impervious,	Inflow Depth =	0.53"	for 1-yr event
Inflow =	63.46 cfs @	12.40 hrs,	Volume=	8.255 af	
Outflow =	57.80 cfs @	12.53 hrs,	Volume=	8.255 af,	Atten= 9%, Lag= 7.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.99 fps, Min. Travel Time= 9.3 min
Avg. Velocity = 1.04 fps, Avg. Travel Time= 26.7 min

Peak Storage= 32,223 cf @ 12.53 hrs
Average Depth at Peak Storage= 1.34' , Surface Width= 27.80'
Bank-Full Depth= 3.00' Flow Area= 93.0 sf, Capacity= 470.66 cfs

1.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 61.00'
Length= 1,670.0' Slope= 0.0060 '/'
Inlet Invert= 669.00', Outlet Invert= 659.00'



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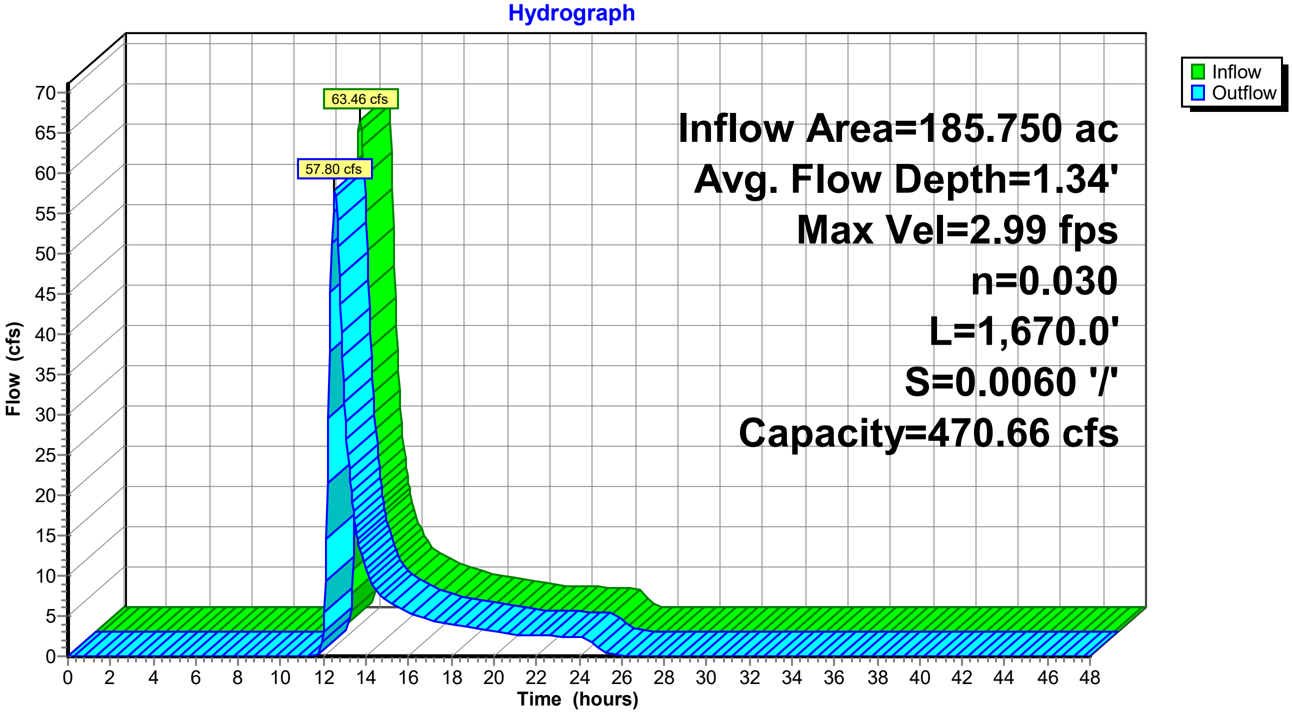
Reach 2R: North Property Line Ditch



Summary for Pond 1P: Collection Area

Inflow Area = 13.018 ac, 0.00% Impervious, Inflow Depth = 0.42" for 1-yr event
Inflow = 3.10 cfs @ 12.46 hrs, Volume= 0.456 af
Outflow = 1.60 cfs @ 12.95 hrs, Volume= 0.309 af, Atten= 48%, Lag= 29.4 min
Primary = 1.60 cfs @ 12.95 hrs, Volume= 0.309 af
Routed to Reach 1R : Overland Flow from Collection Area to West Property Line (Wetland)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 669.84' @ 12.95 hrs Surf.Area= 9,567 sf Storage= 6,808 cf

Plug-Flow detention time= 209.7 min calculated for 0.309 af (68% of inflow)
Center-of-Mass det. time= 86.2 min (999.4 - 913.2)

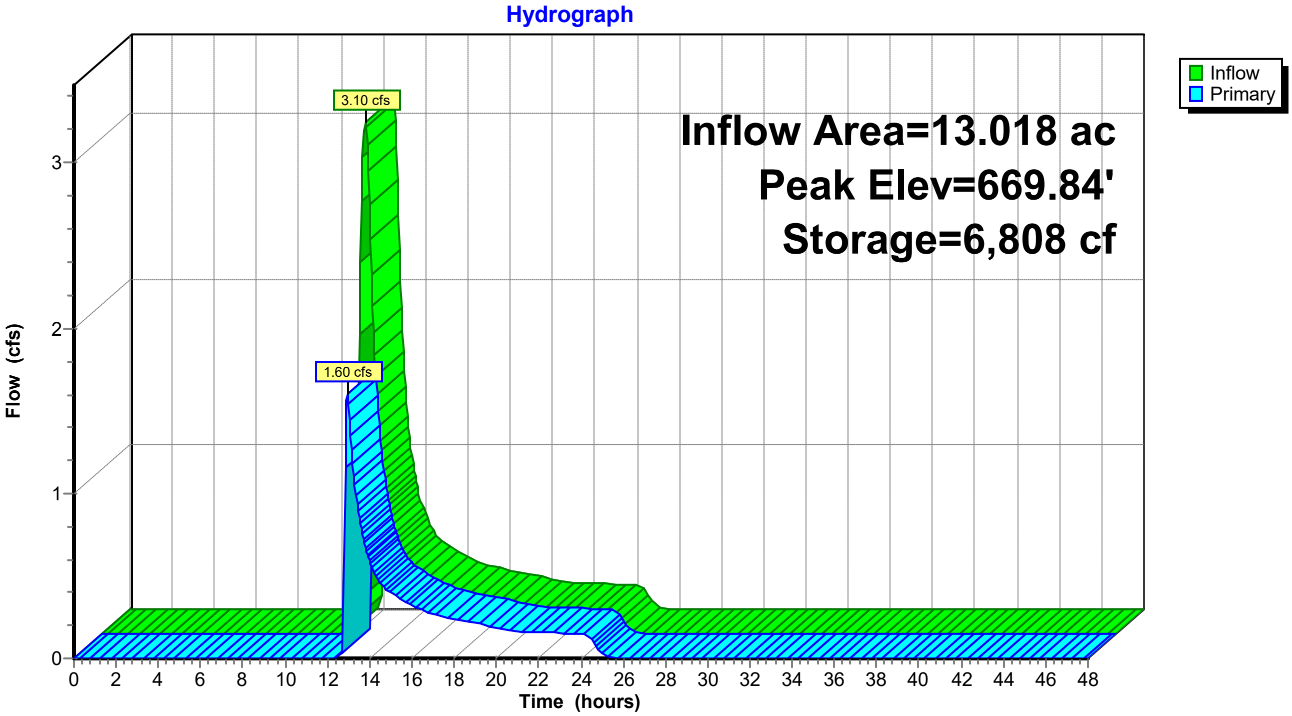
Volume	Invert	Avail.Storage	Storage Description
#1	668.00'	15,369 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
668.00	45	0	0
669.00	2,985	1,515	1,515
670.00	10,790	6,888	8,403
670.50	17,075	6,966	15,369

Device	Routing	Invert	Outlet Devices
#1	Primary	669.80'	**70.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=1.60 cfs @ 12.95 hrs HW=669.84' TW=669.00' (Dynamic Tailwater)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 1.60 cfs @ 0.53 fps)

Pond 1P: Collection Area

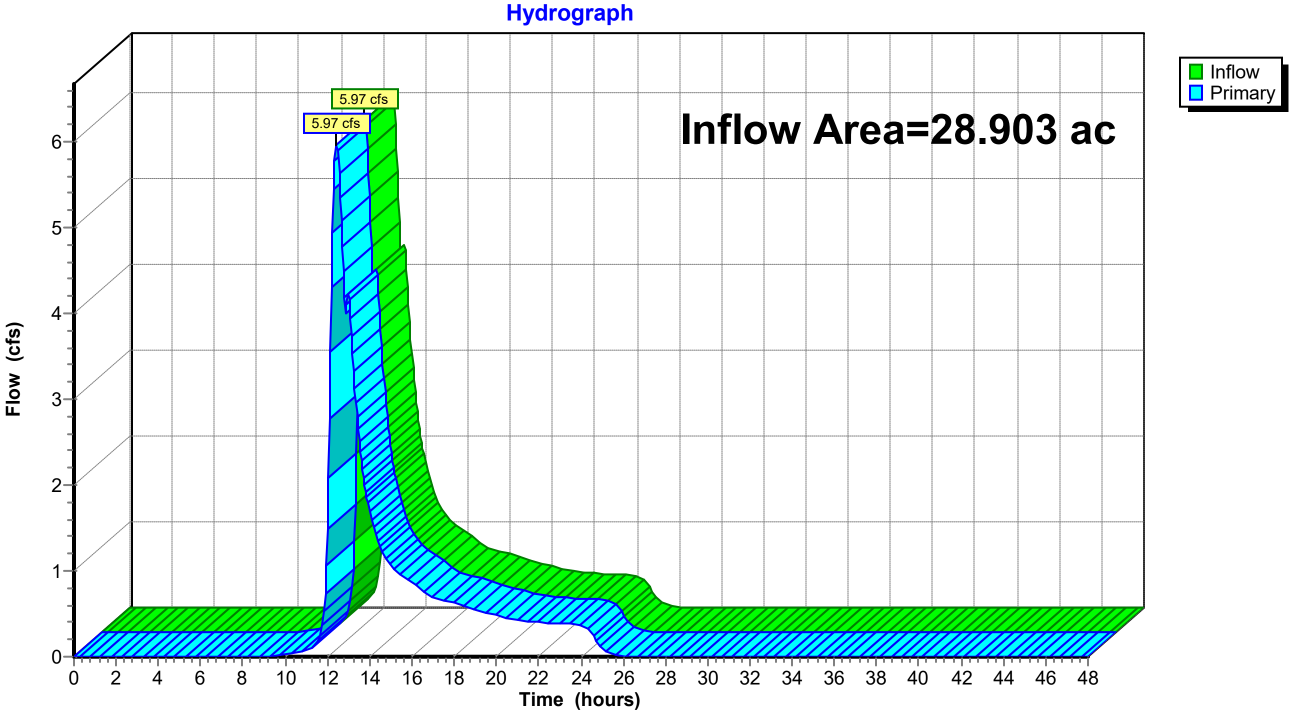


Summary for Link 1L: Total Disharge to West Property Line (Wetland)

Inflow Area = 28.903 ac, 0.00% Impervious, Inflow Depth = 0.49" for 1-yr event
Inflow = 5.97 cfs @ 12.43 hrs, Volume= 1.188 af
Primary = 5.97 cfs @ 12.43 hrs, Volume= 1.188 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 1L: Total Discharge to West Property Line (Wetland)

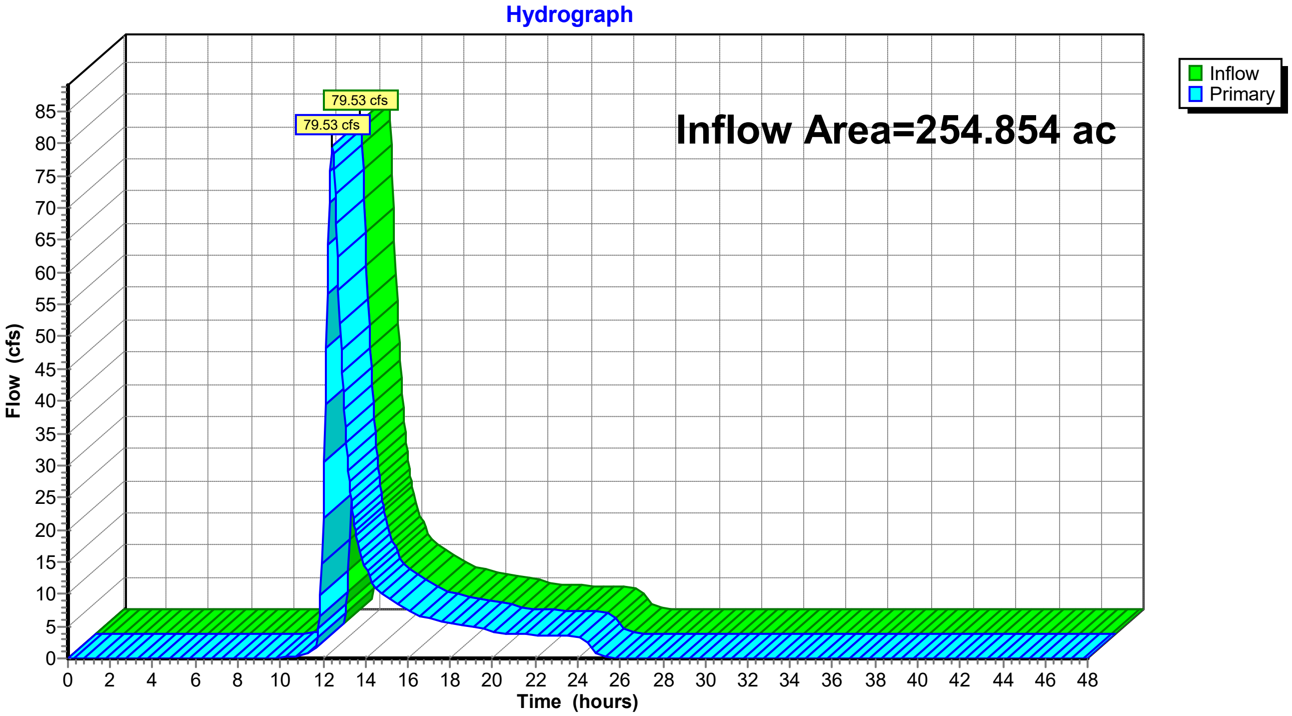


Summary for Link 2L: Total Discharge at Design Points

Inflow Area = 254.854 ac, 0.04% Impervious, Inflow Depth = 0.56" for 1-yr event
Inflow = 79.53 cfs @ 12.45 hrs, Volume= 11.901 af
Primary = 79.53 cfs @ 12.45 hrs, Volume= 11.901 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 2L: Total Discharge at Design Points

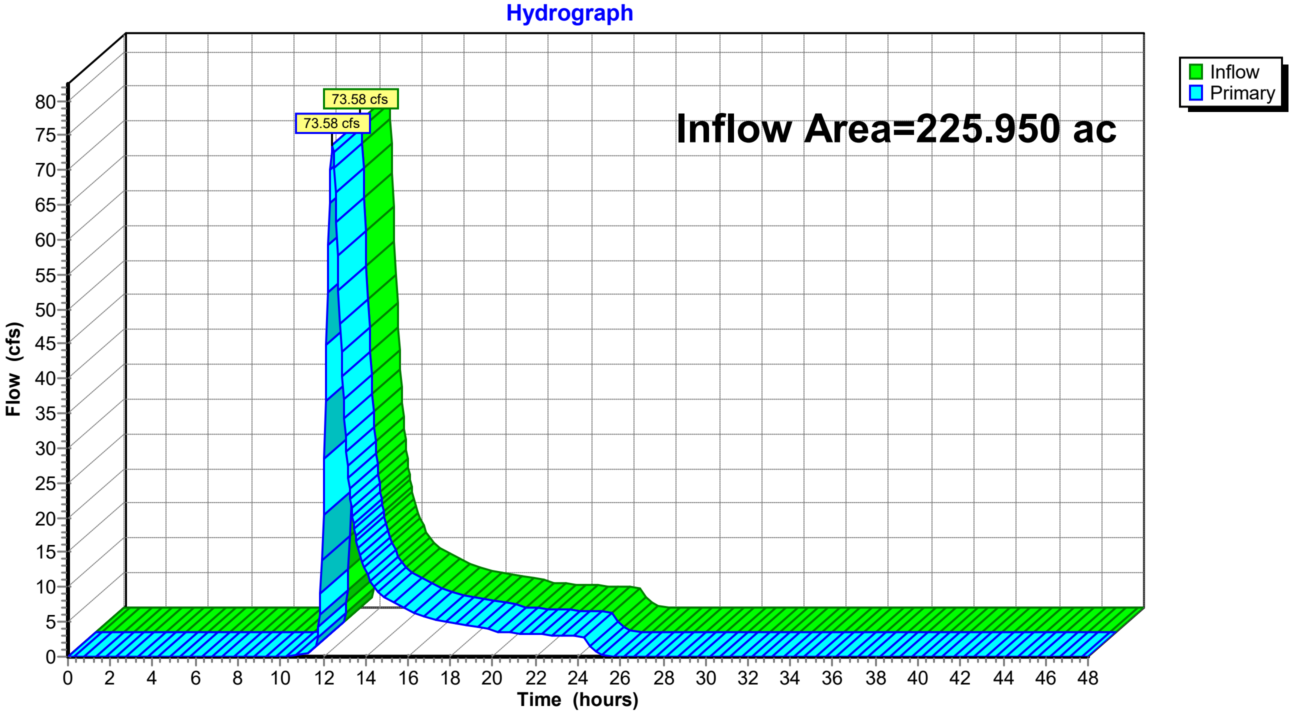


Summary for Link 3L: Total Discharge to Ditch at NW Corner of Site to Wetland

Inflow Area = 225.950 ac, 0.05% Impervious, Inflow Depth = 0.57" for 1-yr event
Inflow = 73.58 cfs @ 12.45 hrs, Volume= 10.713 af
Primary = 73.58 cfs @ 12.45 hrs, Volume= 10.713 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 3L: Total Discharge to Ditch at NW Corner of Site to Wetland



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area to SW Property Runoff Area=567,060 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=1,100' Tc=42.2 min CN=79 Runoff=10.49 cfs 1.321 af

Subcatchment 2S: Off-Site and SW Corner Runoff Area=491,210 sf 0.00% Impervious Runoff Depth=1.48"
Flow Length=1,600' Tc=53.0 min CN=83 Runoff=9.63 cfs 1.390 af

Subcatchment 3S: Site Area to West Runoff Area=200,760 sf 0.00% Impervious Runoff Depth=1.94"
Flow Length=875' Slope=0.0080 '/' Tc=35.1 min CN=89 Runoff=6.96 cfs 0.744 af

Subcatchment 4S: Area to Northwest Runoff Area=1,199,225 sf 0.41% Impervious Runoff Depth=1.62"
Flow Length=2,485' Tc=43.0 min CN=85 Runoff=30.15 cfs 3.721 af

Subcatchment 5S: Contributing Runoff Area=185.750 ac 0.00% Impervious Runoff Depth=1.41"
Flow Length=6,615' Tc=45.0 min CN=82 Runoff=169.35 cfs 21.834 af

Subcatchment 6S: Contributing Area from Runoff Area=12.670 ac 0.00% Impervious Runoff Depth=1.94"
Flow Length=1,850' Tc=18.3 min CN=89 Runoff=28.39 cfs 2.044 af

Subcatchment 7S: Contributing Runoff Area=185.750 ac 0.00% Impervious Runoff Depth=1.41"
Flow Length=4,945' Tc=40.0 min CN=82 Runoff=183.94 cfs 21.834 af

Subcatchment 10S: Area to Northwest Runoff Area=1,199,225 sf 0.41% Impervious Runoff Depth=1.62"
Flow Length=1,520' Tc=39.2 min CN=85 Runoff=32.18 cfs 3.721 af

Reach 1R: Overland Flow from Avg. Flow Depth=0.45' Max Vel=1.98 fps Inflow=10.44 cfs 1.174 af
n=0.030 L=500.0' S=0.0097 '/' Capacity=399.92 cfs Outflow=10.13 cfs 1.174 af

Reach 2R: North Property Line Ditch Avg. Flow Depth=2.05' Max Vel=3.94 fps Inflow=183.94 cfs 21.834 af
n=0.030 L=1,670.0' S=0.0060 '/' Capacity=470.66 cfs Outflow=174.14 cfs 21.834 af

Pond 1P: Collection Area Peak Elev=669.95' Storage=7,884 cf Inflow=10.49 cfs 1.321 af
Outflow=10.44 cfs 1.174 af

Link 1L: Total Disharge to West Property Line (Wetland) Inflow=24.96 cfs 3.307 af
Primary=24.96 cfs 3.307 af

Link 2L: Total Discharge at Design Points Inflow=231.84 cfs 30.906 af
Primary=231.84 cfs 30.906 af

Link 3L: Total Discharge to Ditch at NW Corner of Site to Wetland Inflow=207.43 cfs 27.599 af
Primary=207.43 cfs 27.599 af

Total Runoff Area = 468.134 ac Runoff Volume = 56.608 af Average Runoff Depth = 1.45"
99.95% Pervious = 467.909 ac 0.05% Impervious = 0.225 ac

Summary for Subcatchment 1S: Area to SW Property Line (Collection Area)

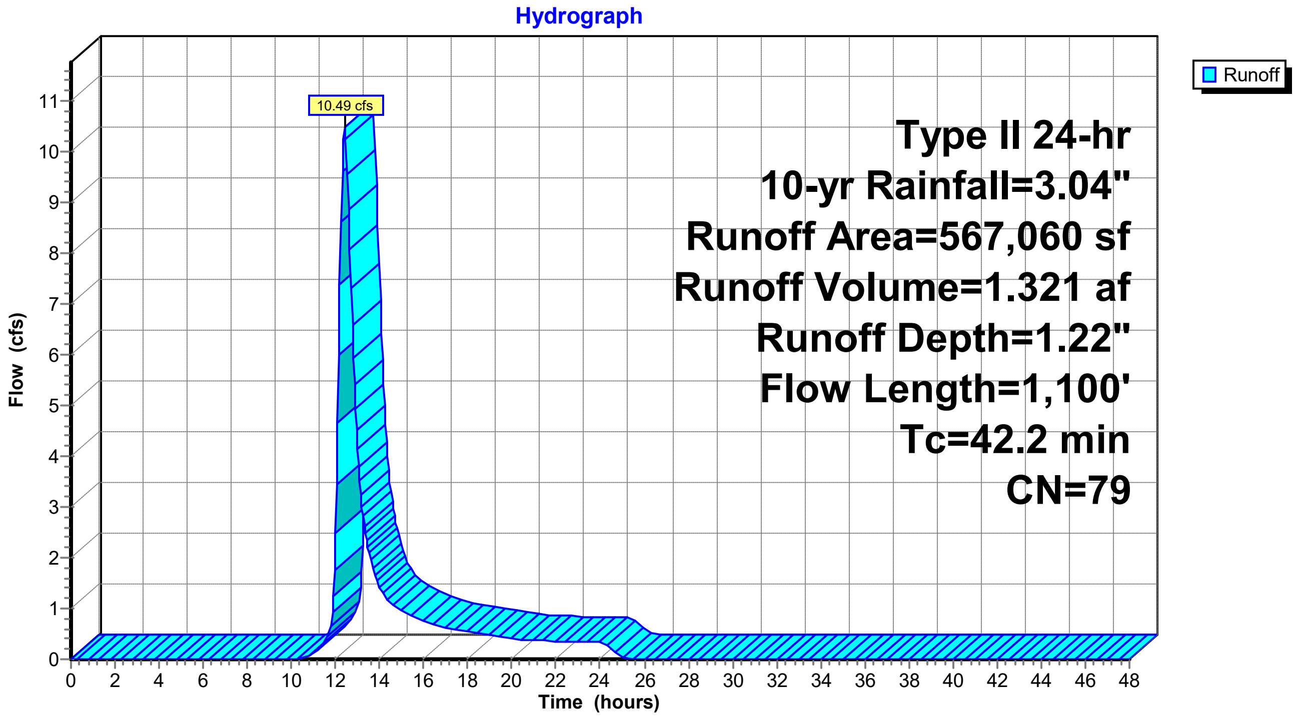
Runoff = 10.49 cfs @ 12.41 hrs, Volume= 1.321 af, Depth= 1.22"
Routed to Pond 1P : Collection Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
31,900	89	Row crops, straight row, Good, HSG D
345,195	79	Woods, Fair, HSG D
189,965	78	Meadow, non-grazed, HSG D
567,060	79	Weighted Average
567,060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
7.3	375	0.0150	0.86		**Shallow Concentrated Flow, 375' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
20.8	625	0.0100	0.50		**Shallow Concentrated Flow, 625' Shallow Conc. Flow** Woodland Kv= 5.0 fps
42.2	1,100	Total			

Subcatchment 1S: Area to SW Property Line (Collection Area)



Summary for Subcatchment 2S: Off-Site and SW Corner Contributing Area to West Property Line (Wetland

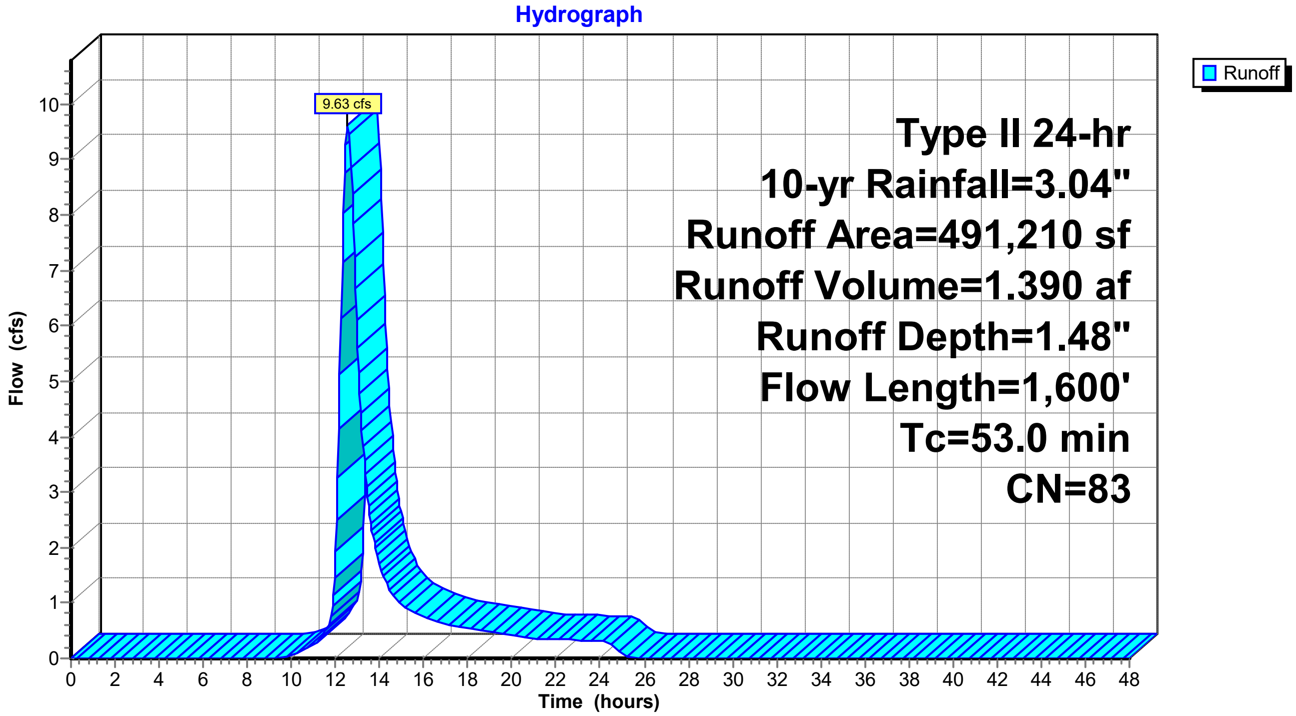
Runoff = 9.63 cfs @ 12.55 hrs, Volume= 1.390 af, Depth= 1.48"
Routed to Link 1L : Total Disharge to West Property Line (Wetland)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
125,880	89	Row crops, straight row, Good, HSG D
51,080	78	Meadow, non-grazed, HSG D
232,840	79	Woods, Fair, HSG D
81,410	89	Row crops, straight row, Good, HSG D
491,210	83	Weighted Average
491,210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.1	100	0.0050	0.07		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
21.7	650	0.0100	0.50		**Shallow Concentrated Flow, 650' Shallow Conc. Flow** Woodland Kv= 5.0 fps
1.7	500	0.0140	4.95	346.85	**Trap/Vee/Rect Channel Flow, Channel Flow across site** Bot.W=50.00' D=1.00' Z= 20.0 '/' Top.W=90.00' n= 0.030
53.0	1,600	Total			

Subcatchment 2S: Off-Site and SW Corner Contributing Area to West Property Line (Wetland)



Summary for Subcatchment 3S: Site Area to West Property Line (Wetland)

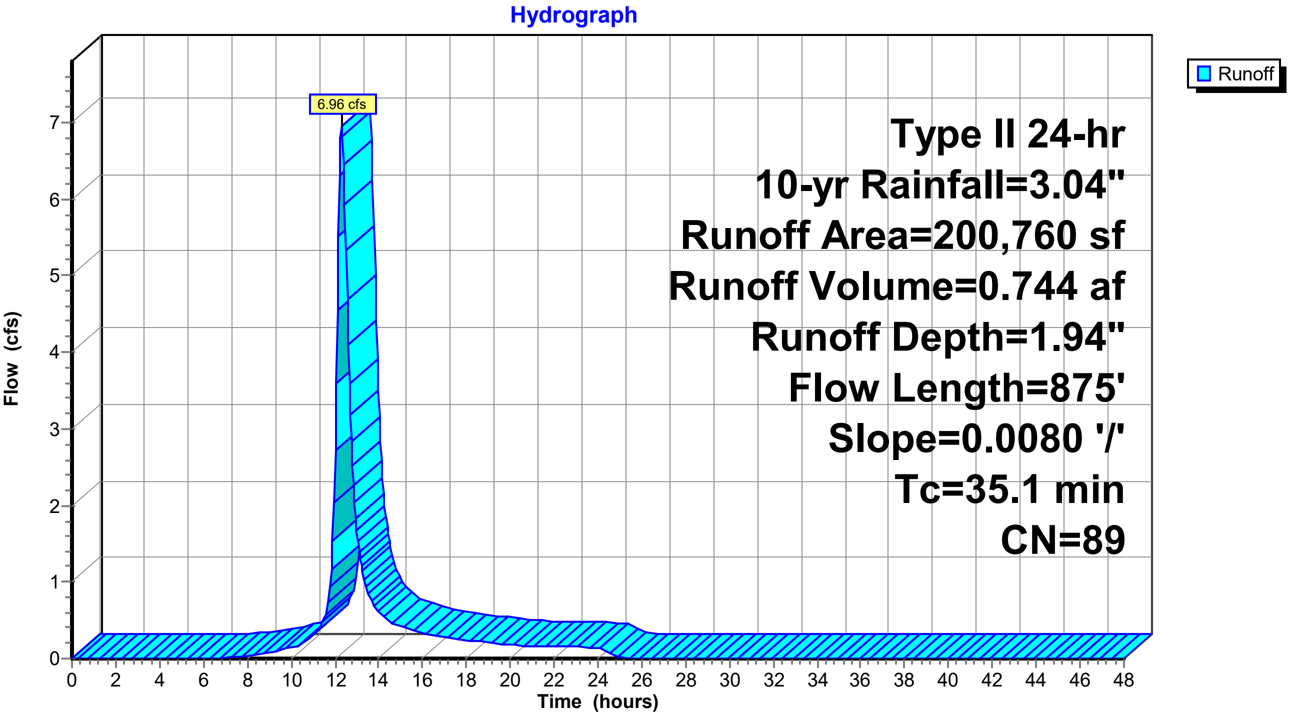
Runoff = 6.96 cfs @ 12.30 hrs, Volume= 0.744 af, Depth= 1.94"
Routed to Link 1L : Total Disharge to West Property Line (Wetland)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
200,760	89	Row crops, straight row, Good, HSG D
200,760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0080	0.09		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
16.0	775	0.0080	0.80		**Shallow Concentrated Flow, 775' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
35.1	875	Total			

Subcatchment 3S: Site Area to West Property Line (Wetland)



Summary for Subcatchment 4S: Area to Northwest Property Corner Ditch (to Wetland)

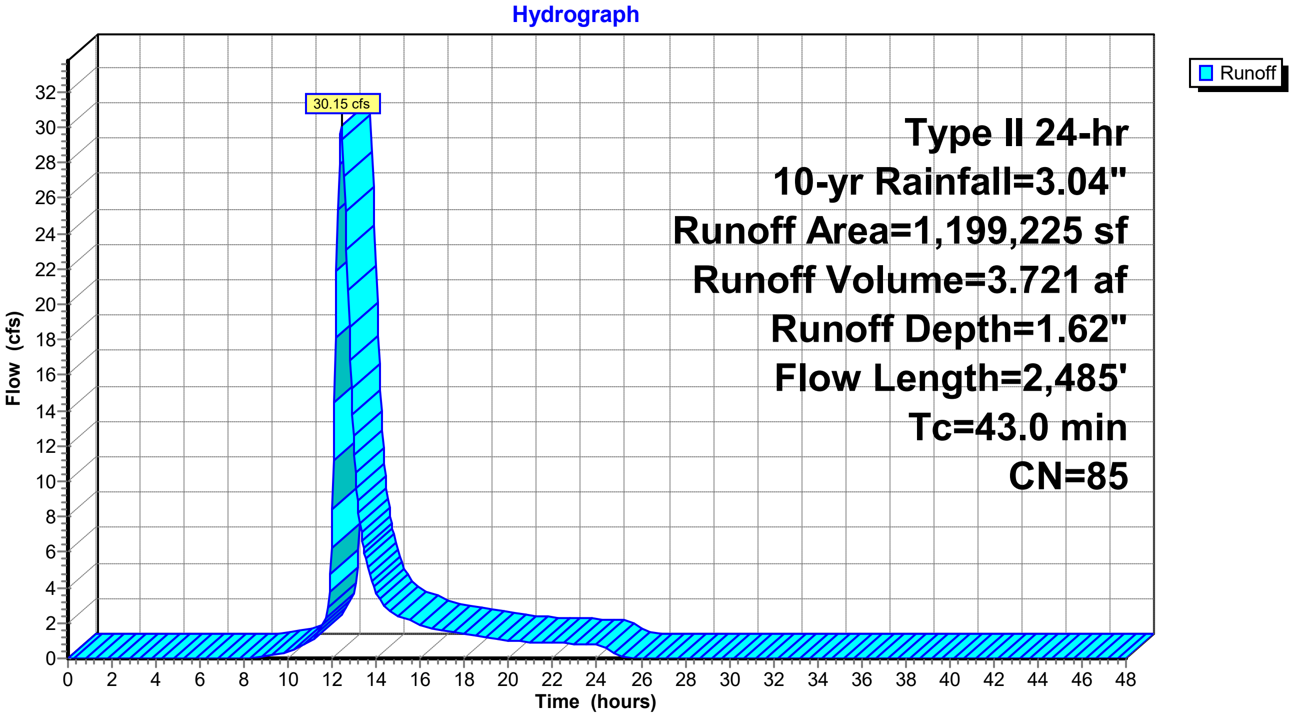
Runoff = 30.15 cfs @ 12.41 hrs, Volume= 3.721 af, Depth= 1.62"
Routed to Link 3L : Total Discharge to Ditch at NW Corner of Site to Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.04"

	Area (sf)	CN	Description
*	5,250	91	Gravel drive, HSG D
	111,735	79	Woods/grass comb., Good, HSG D
	4,900	98	Unconnected roofs, HSG D
	62,430	77	Brush, Fair, HSG D
	727,935	89	Row crops, straight row, Good, HSG D
	83,440	78	Meadow, non-grazed, HSG D
	203,535	79	Woods, Fair, HSG D
	1,199,225	85	Weighted Average
	1,194,325		99.59% Pervious Area
	4,900		0.41% Impervious Area
	4,900		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0120	0.13		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.7	90	0.0150	0.86		**Shallow Concentrated Flow, 90' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
12.7	435	0.0130	0.57		**Shallow Concentrated Flow, 435' Shallow Conc. Flow** Woodland Kv= 5.0 fps
10.0	380	0.0050	0.64		**Shallow Concentrated Flow, 380' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
1.7	515	0.0117	5.20	415.88	**Trap/Vee/Rect Channel Flow, Channel flow across site** Bot.W=50.00' D=1.00' Z= 30.0 '/' Top.W=110.00' n= 0.025
3.8	965	0.0042	4.24	394.18	**Trap/Vee/Rect Channel Flow, North Property Line Ditch** Bot.W=1.00' D=3.00' Z= 10.0 '/' Top.W=61.00' n= 0.030
43.0	2,485	Total			

Subcatchment 4S: Area to Northwest Property Corner Ditch (to Wetland)



Summary for Subcatchment 5S: Contributing Watershed from East - Tc Inc. N. Ditch

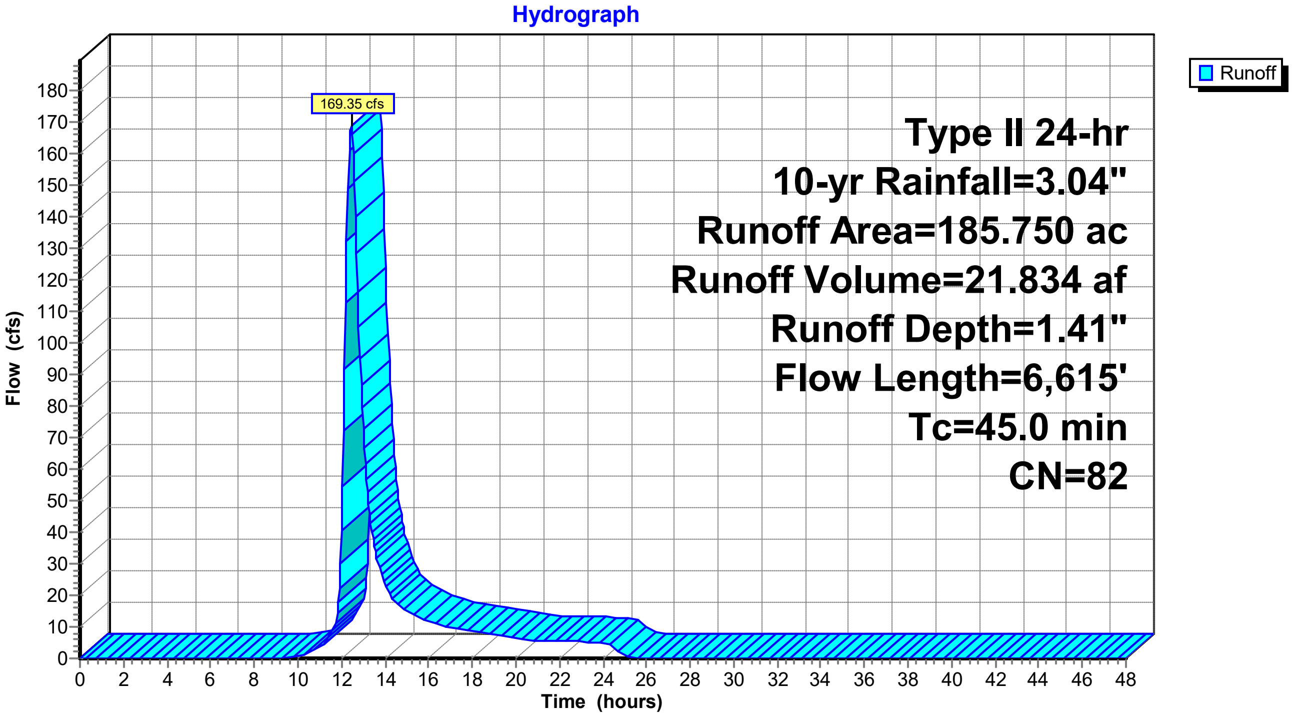
Runoff = 169.35 cfs @ 12.44 hrs, Volume= 21.834 af, Depth= 1.41"
Routed to Link 3L : Total Discharge to Ditch at NW Corner of Site to Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (ac)	CN	Description
78.660	79	Woods, Fair, HSG D
2.970	98	Water Surface, 0% imp, HSG D
1.050	96	Gravel surface, HSG D
103.070	84	Pasture/grassland/range, Fair, HSG D
185.750	82	Weighted Average
185.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0350	0.16		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
14.2	1,000	0.0170	1.17		**Shallow Concentrated Flow, 1000' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
2.9	750	0.0130	4.31	430.96	**Trap/Vee/Rect Channel Flow, 750 Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.7	670	0.0120	4.14	414.05	**Trap/Vee/Rect Channel Flow, 670' Flow Through Woods** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
1.9	550	0.0100	4.74	889.55	**Trap/Vee/Rect Channel Flow, 550' Flow Through Ag Field** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
7.6	1,800	0.0070	3.97	744.25	**Trap/Vee/Rect Channel Flow, 1,800' Along Crosby Road** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
0.1	75	0.0200	17.48	168.15	**Pipe Channel, Crosby Road Cross Culvert** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.011
5.0	1,670	0.0060	5.61	706.31	**Trap/Vee/Rect Channel Flow, North Property Line Ditch** Bot.W=1.00' D=3.50' Z= 10.0 '/' Top.W=71.00' n= 0.030
45.0	6,615	Total			

Subcatchment 5S: Contributing Watershed from East - Tc Inc. N. Ditch



Summary for Subcatchment 6S: Contributing Area from North

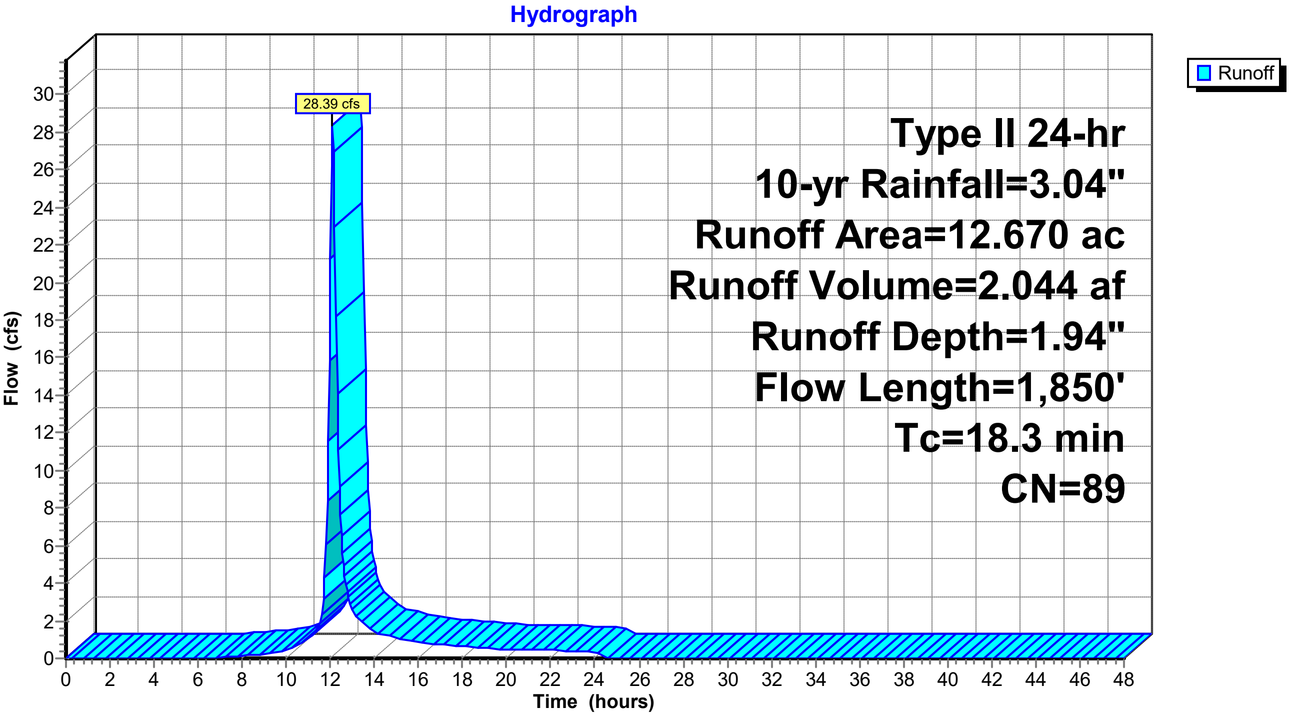
Runoff = 28.39 cfs @ 12.11 hrs, Volume= 2.044 af, Depth= 1.94"
Routed to Link 3L : Total Discharge to Ditch at NW Corner of Site to Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (ac)	CN	Description
12.670	89	Row crops, straight row, Good, HSG D
12.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0100	0.22		**Sheet Flow, 100' Overland Flow** Cultivated: Residue<=20% n= 0.060 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
4.2	1,400	0.0060	5.61	706.31	**Trap/Vee/Rect Channel Flow, North Property Line Ditch** Bot.W=1.00' D=3.50' Z= 10.0 '/' Top.W=71.00' n= 0.030
18.3	1,850	Total			

Subcatchment 6S: Contributing Area from North



Summary for Subcatchment 7S: Contributing Watershed from East

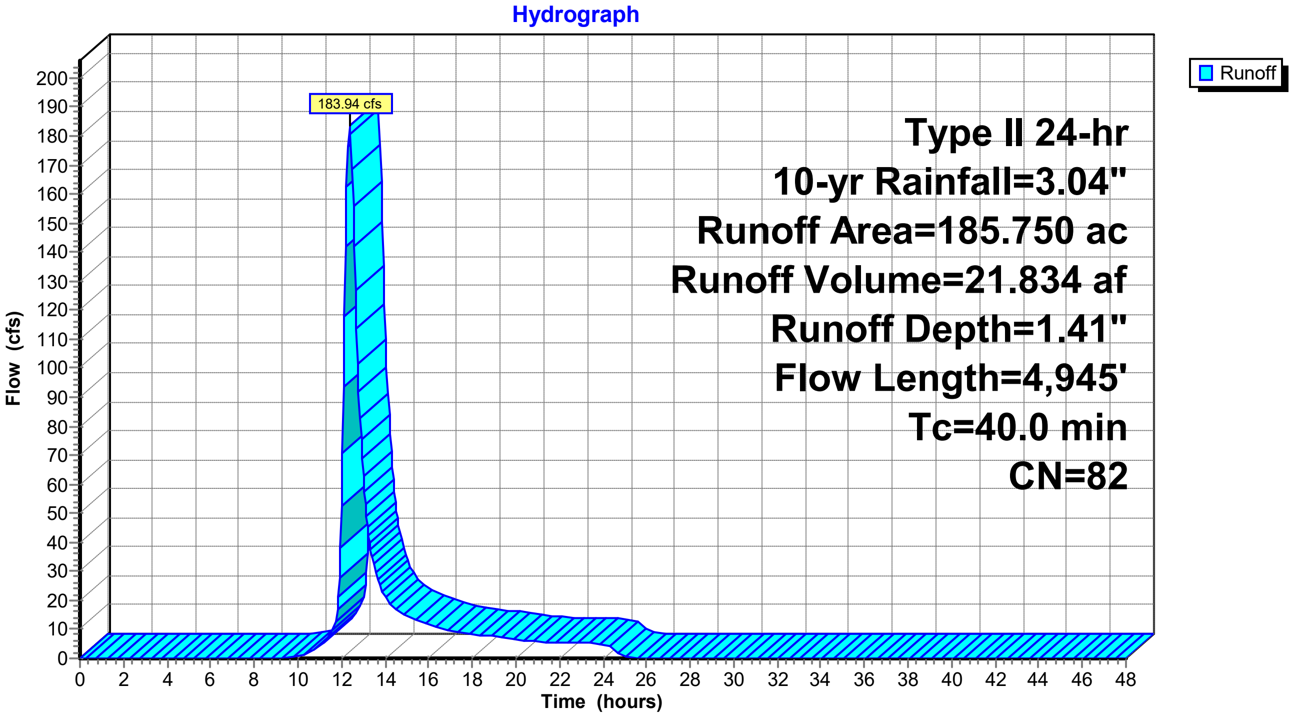
Runoff = 183.94 cfs @ 12.38 hrs, Volume= 21.834 af, Depth= 1.41"
Routed to Reach 2R : North Property Line Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (ac)	CN	Description
78.660	79	Woods, Fair, HSG D
2.970	98	Water Surface, 0% imp, HSG D
1.050	96	Gravel surface, HSG D
103.070	84	Pasture/grassland/range, Fair, HSG D
185.750	82	Weighted Average
185.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0350	0.16		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
14.2	1,000	0.0170	1.17		**Shallow Concentrated Flow, 1000' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
2.9	750	0.0130	4.31	430.96	**Trap/Vee/Rect Channel Flow, 750 Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.7	670	0.0120	4.14	414.05	**Trap/Vee/Rect Channel Flow, 670' Flow Through Woods** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
1.9	550	0.0100	4.74	889.55	**Trap/Vee/Rect Channel Flow, 550' Flow Through Ag Field** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
7.6	1,800	0.0070	3.97	744.25	**Trap/Vee/Rect Channel Flow, 1,800' Along Crosby Road** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
0.1	75	0.0200	17.48	168.15	**Pipe Channel, Crosby Road Cross Culvert** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.011
40.0	4,945	Total			

Subcatchment 7S: Contributing Watershed from East



Summary for Subcatchment 10S: Area to Northwest Property Corner Ditch (to Wetland)

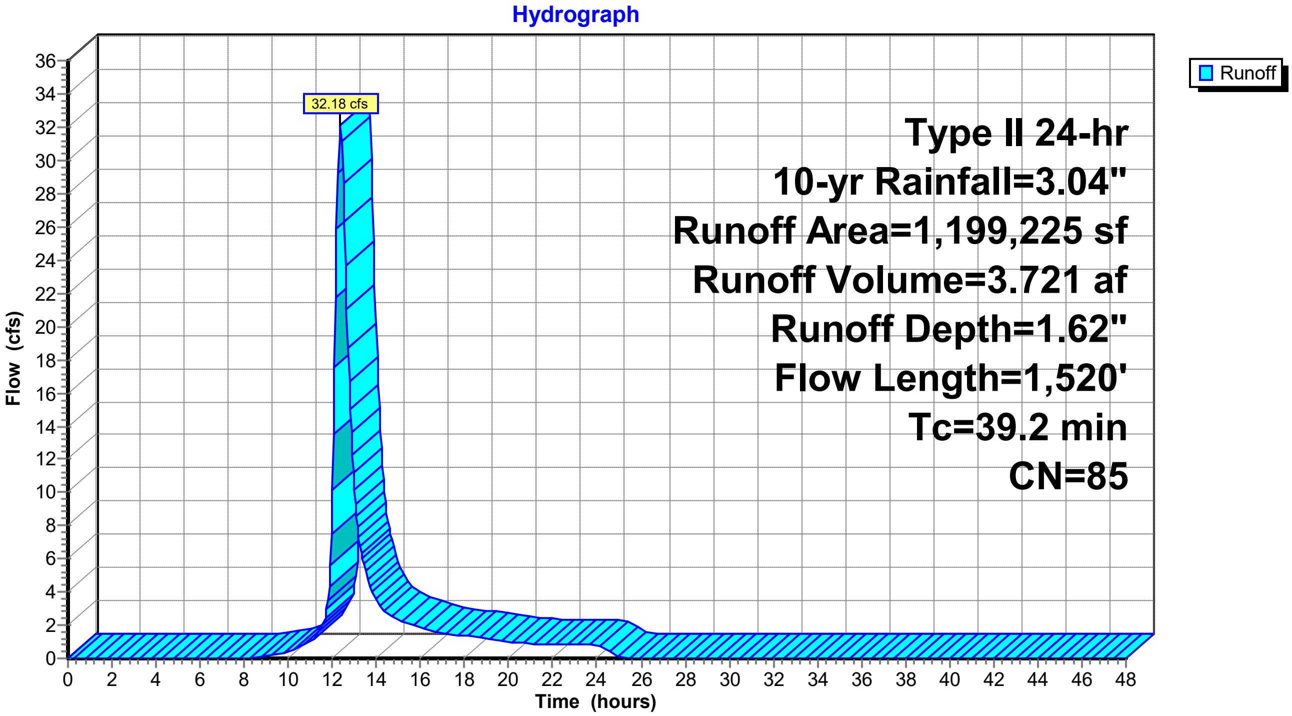
Runoff = 32.18 cfs @ 12.36 hrs, Volume= 3.721 af, Depth= 1.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.04"

	Area (sf)	CN	Description
*	5,250	91	Gravel drive, HSG D
	111,735	79	Woods/grass comb., Good, HSG D
	4,900	98	Unconnected roofs, HSG D
	62,430	77	Brush, Fair, HSG D
	727,935	89	Row crops, straight row, Good, HSG D
	83,440	78	Meadow, non-grazed, HSG D
	203,535	79	Woods, Fair, HSG D
	1,199,225	85	Weighted Average
	1,194,325		99.59% Pervious Area
	4,900		0.41% Impervious Area
	4,900		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0120	0.13		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.7	90	0.0150	0.86		**Shallow Concentrated Flow, 90' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
12.7	435	0.0130	0.57		**Shallow Concentrated Flow, 435' Shallow Conc. Flow** Woodland Kv= 5.0 fps
10.0	380	0.0050	0.64		**Shallow Concentrated Flow, 380' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
1.7	515	0.0117	5.20	415.88	**Trap/Vee/Rect Channel Flow, Channel flow across site** Bot.W=50.00' D=1.00' Z= 30.0 '/' Top.W=110.00' n= 0.025
39.2	1,520	Total			

Subcatchment 10S: Area to Northwest Property Corner Ditch (to Wetland)



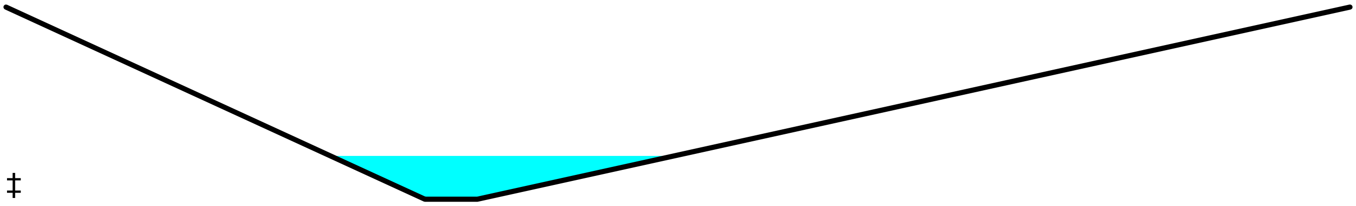
Summary for Reach 1R: Overland Flow from Collection Area to West Property Line (Wetland)

Inflow Area = 13.018 ac, 0.00% Impervious, Inflow Depth = 1.08" for 10-yr event
Inflow = 10.44 cfs @ 12.44 hrs, Volume= 1.174 af
Outflow = 10.13 cfs @ 12.52 hrs, Volume= 1.174 af, Atten= 3%, Lag= 4.7 min
Routed to Link 1L : Total Disharge to West Property Line (Wetland)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.98 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 0.79 fps, Avg. Travel Time= 10.5 min

Peak Storage= 2,552 cf @ 12.52 hrs
Average Depth at Peak Storage= 0.45' , Surface Width= 19.66'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 399.92 cfs

3.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 12.0 25.0 '/' Top Width= 77.00'
Length= 500.0' Slope= 0.0097 '/'
Inlet Invert= 668.85', Outlet Invert= 664.00'



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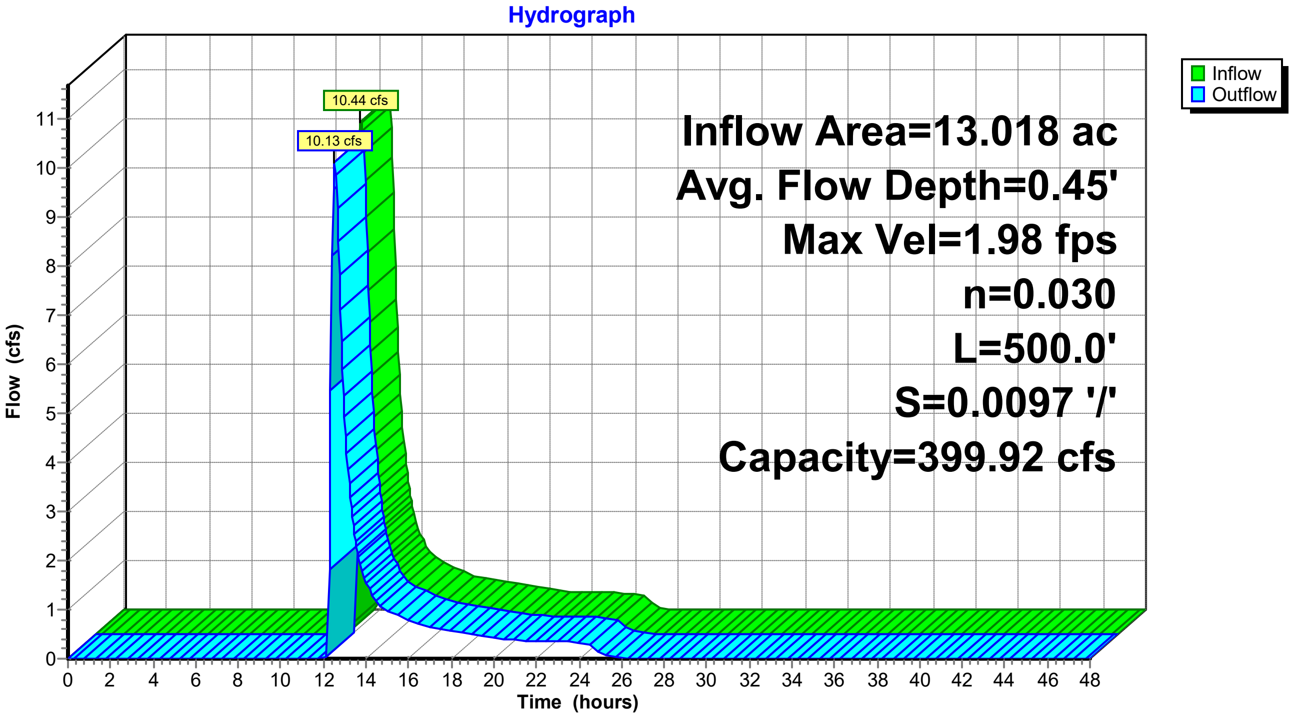
Reach 1R: Overland Flow from Collection Area to West Property Line (Wetland)



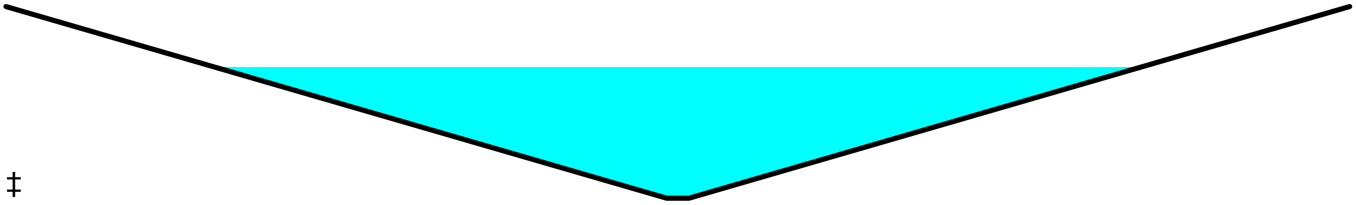
Summary for Reach 2R: North Property Line Ditch

Inflow Area = 185.750 ac, 0.00% Impervious, Inflow Depth = 1.41" for 10-yr event
Inflow = 183.94 cfs @ 12.38 hrs, Volume= 21.834 af
Outflow = 174.14 cfs @ 12.47 hrs, Volume= 21.834 af, Atten= 5%, Lag= 5.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.94 fps, Min. Travel Time= 7.1 min
Avg. Velocity = 1.25 fps, Avg. Travel Time= 22.3 min

Peak Storage= 73,681 cf @ 12.47 hrs
Average Depth at Peak Storage= 2.05' , Surface Width= 42.02'
Bank-Full Depth= 3.00' Flow Area= 93.0 sf, Capacity= 470.66 cfs

1.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 61.00'
Length= 1,670.0' Slope= 0.0060 '/'
Inlet Invert= 669.00', Outlet Invert= 659.00'



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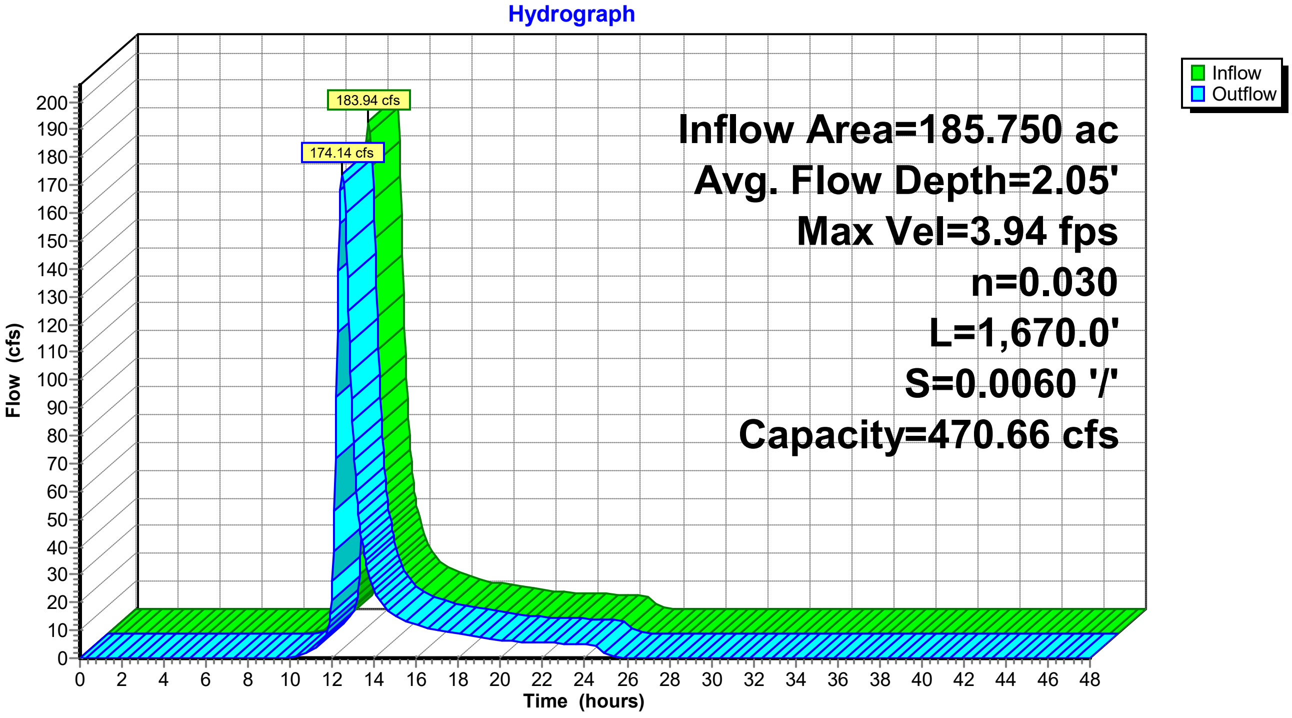
Reach 2R: North Property Line Ditch



Summary for Pond 1P: Collection Area

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Inflow Area =      13.018 ac,   0.00% Impervious,  Inflow Depth =   1.22"    for  10-yr event
Inflow      =      10.49 cfs @   12.41 hrs,  Volume=          1.321 af
Outflow     =      10.44 cfs @   12.44 hrs,  Volume=          1.174 af,  Atten= 1%,  Lag= 1.8 min
Primary     =      10.44 cfs @   12.44 hrs,  Volume=          1.174 af
    Routed to Reach 1R : Overland Flow from Collection Area to West Property Line (Wetland)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 669.95' @ 12.44 hrs   Surf.Area= 10,408 sf   Storage= 7,884 cf

Plug-Flow detention time= 80.2 min calculated for 1.174 af (89% of inflow)
Center-of-Mass det. time= 24.1 min ( 903.0 - 879.0 )

Volume       Invert     Avail.Storage   Storage Description
  #1        668.00'         15,369 cf   Custom Stage Data (Prismatic) Listed below (Recalc)

 Elevation        Surf.Area         Inc.Store        Cum.Store
    (feet)          (sq-ft)      (cubic-feet)     (cubic-feet)
    668.00               45                 0                0
    669.00            2,985             1,515            1,515
    670.00           10,790             6,888            8,403
    670.50           17,075             6,966           15,369

Device   Routing          Invert   Outlet Devices
  #1     Primary          669.80'  70.0' long  x 2.0' breadth Broad-Crested Rectangular Weir
                                   Head (feet)  0.20  0.40  0.60  0.80  1.00  1.20  1.40  1.60  1.80  2.00
                                   2.50  3.00  3.50
                                   Coef. (English)  2.54  2.61  2.61  2.60  2.66  2.70  2.77  2.89  2.88
                                   2.85  3.07  3.20  3.32

Primary OutFlow  Max=10.42 cfs @ 12.44 hrs  HW=669.95'  TW=669.29'   (Dynamic Tailwater)
└─1=Broad-Crested Rectangular Weir  (Weir Controls 10.42 cfs @ 0.99 fps)
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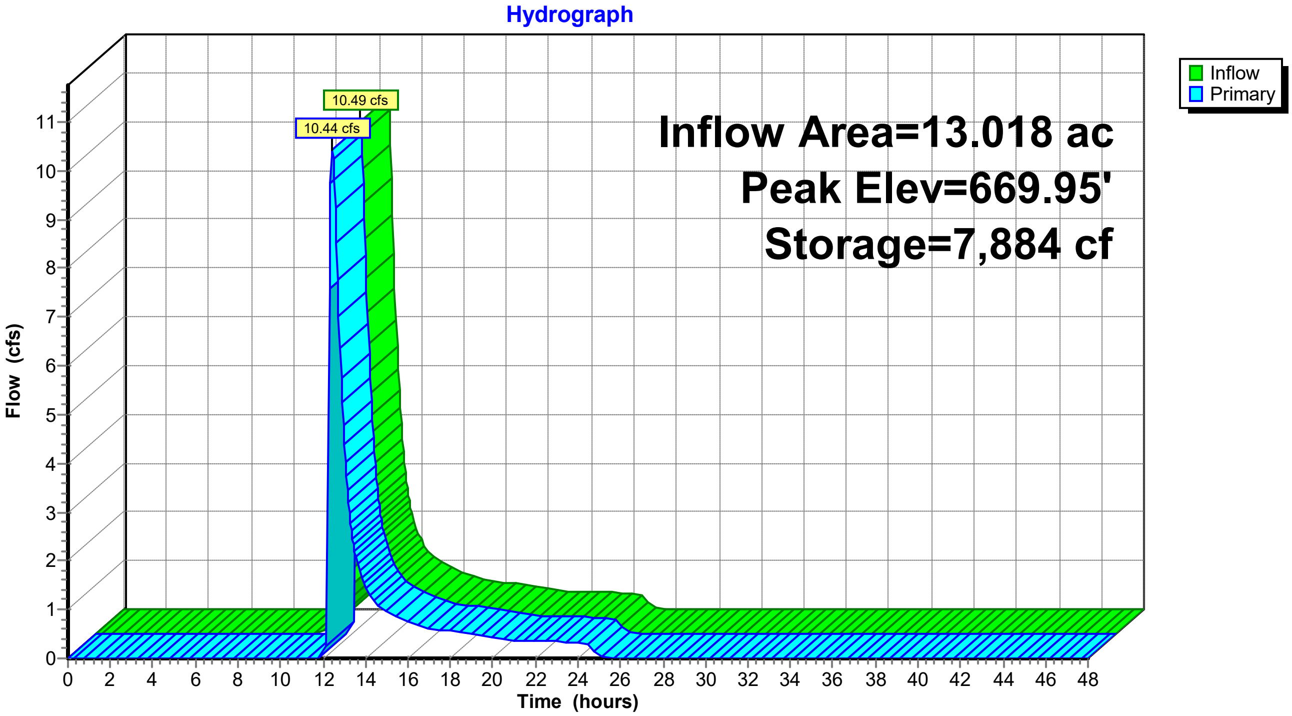
Pond 1P: Collection Area

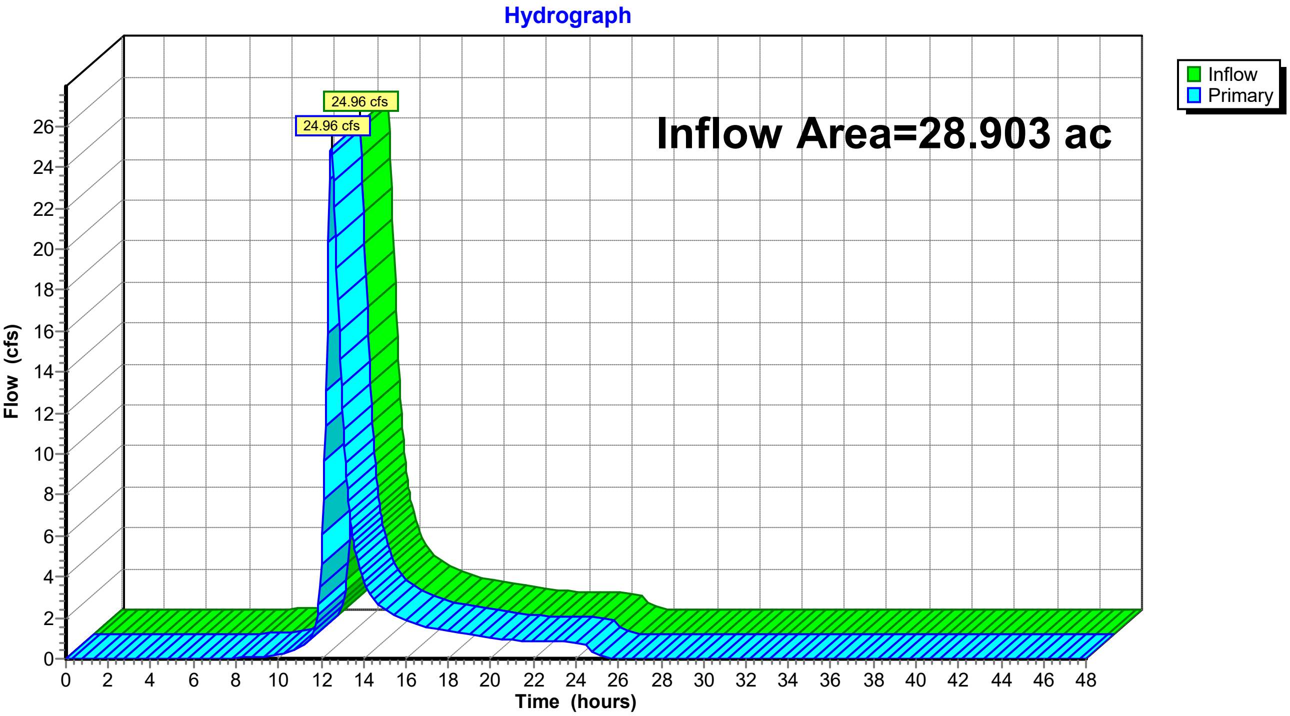


Summary for Link 1L: Total Disharge to West Property Line (Wetland)

Inflow Area = 28.903 ac, 0.00% Impervious, Inflow Depth = 1.37" for 10-yr event
Inflow = 24.96 cfs @ 12.49 hrs, Volume= 3.307 af
Primary = 24.96 cfs @ 12.49 hrs, Volume= 3.307 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 1L: Total Disharge to West Property Line (Wetland)

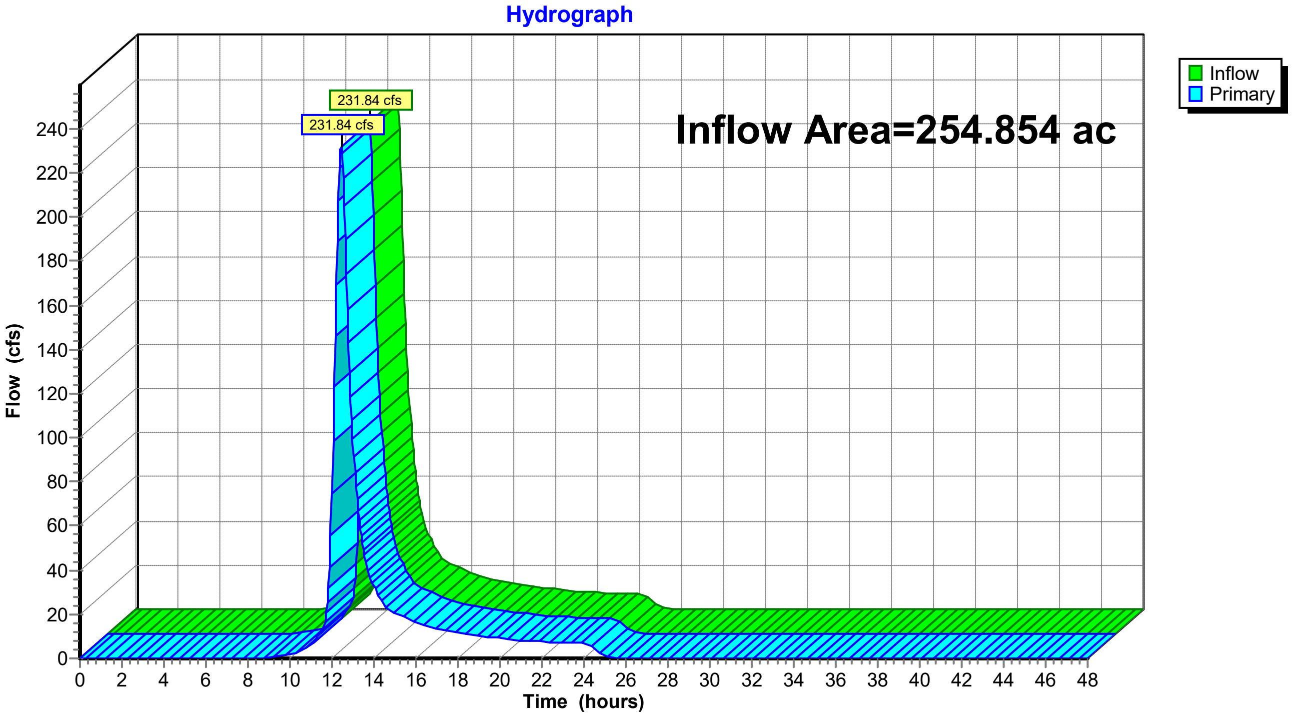


Summary for Link 2L: Total Discharge at Design Points

Inflow Area = 254.854 ac, 0.04% Impervious, Inflow Depth = 1.46" for 10-yr event
Inflow = 231.84 cfs @ 12.44 hrs, Volume= 30.906 af
Primary = 231.84 cfs @ 12.44 hrs, Volume= 30.906 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 2L: Total Discharge at Design Points

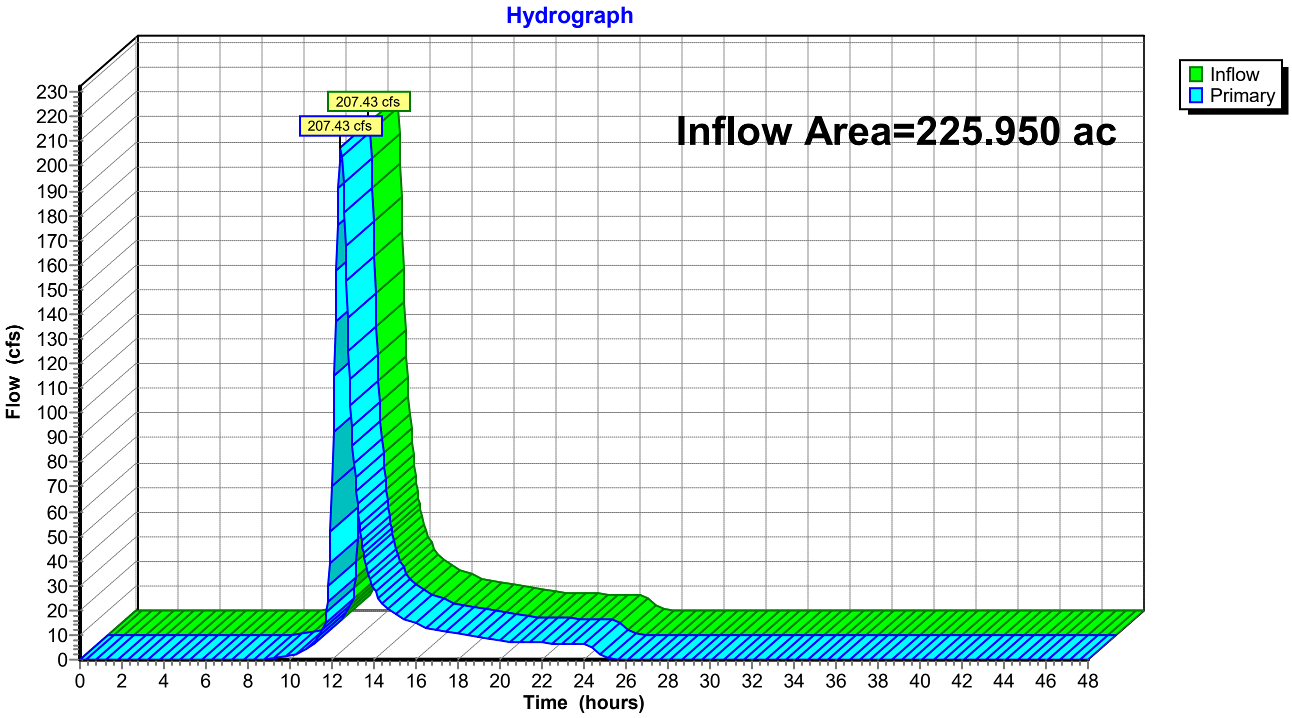


Summary for Link 3L: Total Discharge to Ditch at NW Corner of Site to Wetland

Inflow Area = 225.950 ac, 0.05% Impervious, Inflow Depth = 1.47" for 10-yr event
Inflow = 207.43 cfs @ 12.43 hrs, Volume= 27.599 af
Primary = 207.43 cfs @ 12.43 hrs, Volume= 27.599 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 3L: Total Discharge to Ditch at NW Corner of Site to Wetland



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area to SW Property Runoff Area=567,060 sf 0.00% Impervious Runoff Depth=1.73"
Flow Length=1,100' Tc=42.2 min CN=79 Runoff=15.24 cfs 1.878 af

Subcatchment 2S: Off-Site and SW Corner Runoff Area=491,210 sf 0.00% Impervious Runoff Depth=2.04"
Flow Length=1,600' Tc=53.0 min CN=83 Runoff=13.39 cfs 1.914 af

Subcatchment 3S: Site Area to West Runoff Area=200,760 sf 0.00% Impervious Runoff Depth=2.55"
Flow Length=875' Slope=0.0080 '/' Tc=35.1 min CN=89 Runoff=9.14 cfs 0.980 af

Subcatchment 4S: Area to Northwest Runoff Area=1,199,225 sf 0.41% Impervious Runoff Depth=2.20"
Flow Length=2,485' Tc=43.0 min CN=85 Runoff=41.10 cfs 5.048 af

Subcatchment 5S: Contributing Runoff Area=185.750 ac 0.00% Impervious Runoff Depth=1.96"
Flow Length=6,615' Tc=45.0 min CN=82 Runoff=237.86 cfs 30.299 af

Subcatchment 6S: Contributing Area from Runoff Area=12.670 ac 0.00% Impervious Runoff Depth=2.55"
Flow Length=1,850' Tc=18.3 min CN=89 Runoff=37.14 cfs 2.694 af

Subcatchment 7S: Contributing Runoff Area=185.750 ac 0.00% Impervious Runoff Depth=1.96"
Flow Length=4,945' Tc=40.0 min CN=82 Runoff=258.16 cfs 30.299 af

Subcatchment 10S: Area to Northwest Runoff Area=1,199,225 sf 0.41% Impervious Runoff Depth=2.20"
Flow Length=1,520' Tc=39.2 min CN=85 Runoff=43.83 cfs 5.048 af

Reach 1R: Overland Flow from Avg. Flow Depth=0.53' Max Vel=2.19 fps Inflow=15.17 cfs 1.731 af
n=0.030 L=500.0' S=0.0097 '/' Capacity=399.92 cfs Outflow=14.94 cfs 1.731 af

Reach 2R: North Property Line Ditch Avg. Flow Depth=2.34' Max Vel=4.30 fps Inflow=258.16 cfs 30.299 af
n=0.030 L=1,670.0' S=0.0060 '/' Capacity=470.66 cfs Outflow=246.53 cfs 30.299 af

Pond 1P: Collection Area Peak Elev=669.99' Storage=8,336 cf Inflow=15.24 cfs 1.878 af
Outflow=15.17 cfs 1.731 af

Link 1L: Total Disharge to West Property Line (Wetland) Inflow=35.54 cfs 4.625 af
Primary=35.54 cfs 4.625 af

Link 2L: Total Discharge at Design Points Inflow=324.60 cfs 42.666 af
Primary=324.60 cfs 42.666 af

Link 3L: Total Discharge to Ditch at NW Corner of Site to Wetland Inflow=289.25 cfs 38.041 af
Primary=289.25 cfs 38.041 af

Total Runoff Area = 468.134 ac Runoff Volume = 78.160 af Average Runoff Depth = 2.00"
99.95% Pervious = 467.909 ac 0.05% Impervious = 0.225 ac

Summary for Subcatchment 1S: Area to SW Property Line (Collection Area)

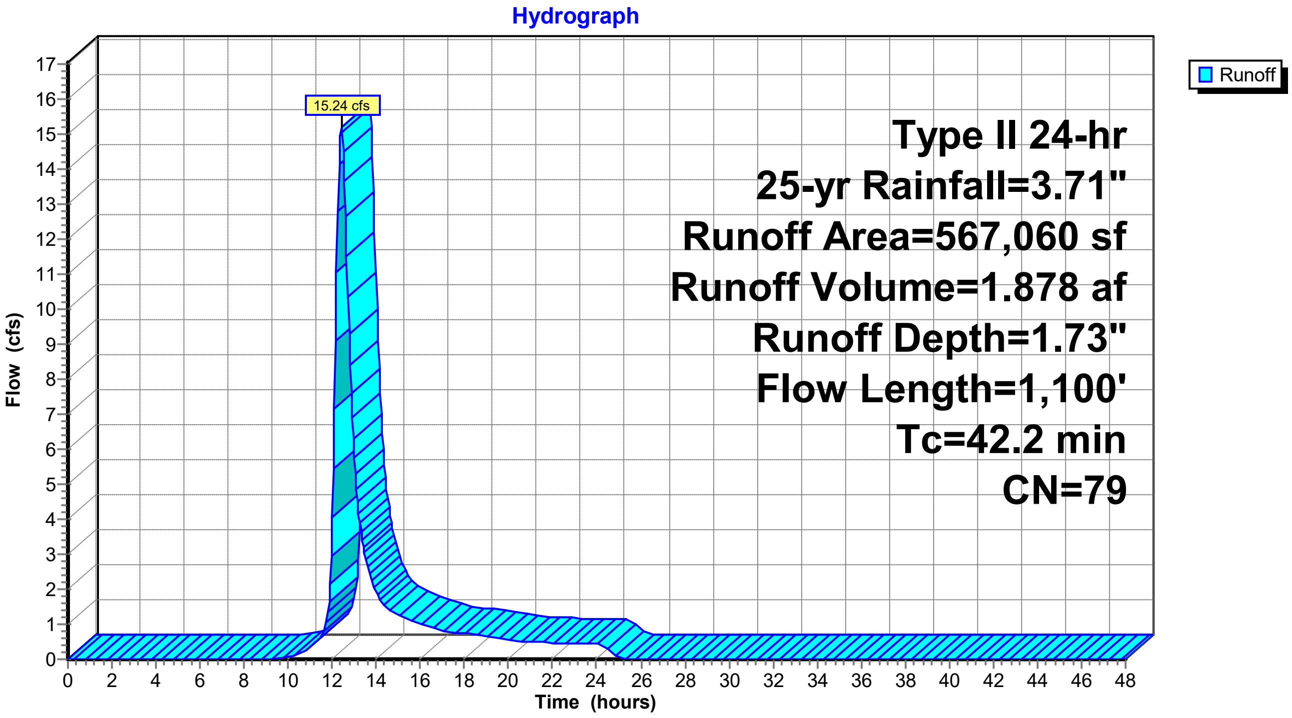
Runoff = 15.24 cfs @ 12.41 hrs, Volume= 1.878 af, Depth= 1.73"
Routed to Pond 1P : Collection Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
31,900	89	Row crops, straight row, Good, HSG D
345,195	79	Woods, Fair, HSG D
189,965	78	Meadow, non-grazed, HSG D
567,060	79	Weighted Average
567,060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
7.3	375	0.0150	0.86		**Shallow Concentrated Flow, 375' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
20.8	625	0.0100	0.50		**Shallow Concentrated Flow, 625' Shallow Conc. Flow** Woodland Kv= 5.0 fps
42.2	1,100	Total			

Subcatchment 1S: Area to SW Property Line (Collection Area)



Summary for Subcatchment 2S: Off-Site and SW Corner Contributing Area to West Property Line (Wetland

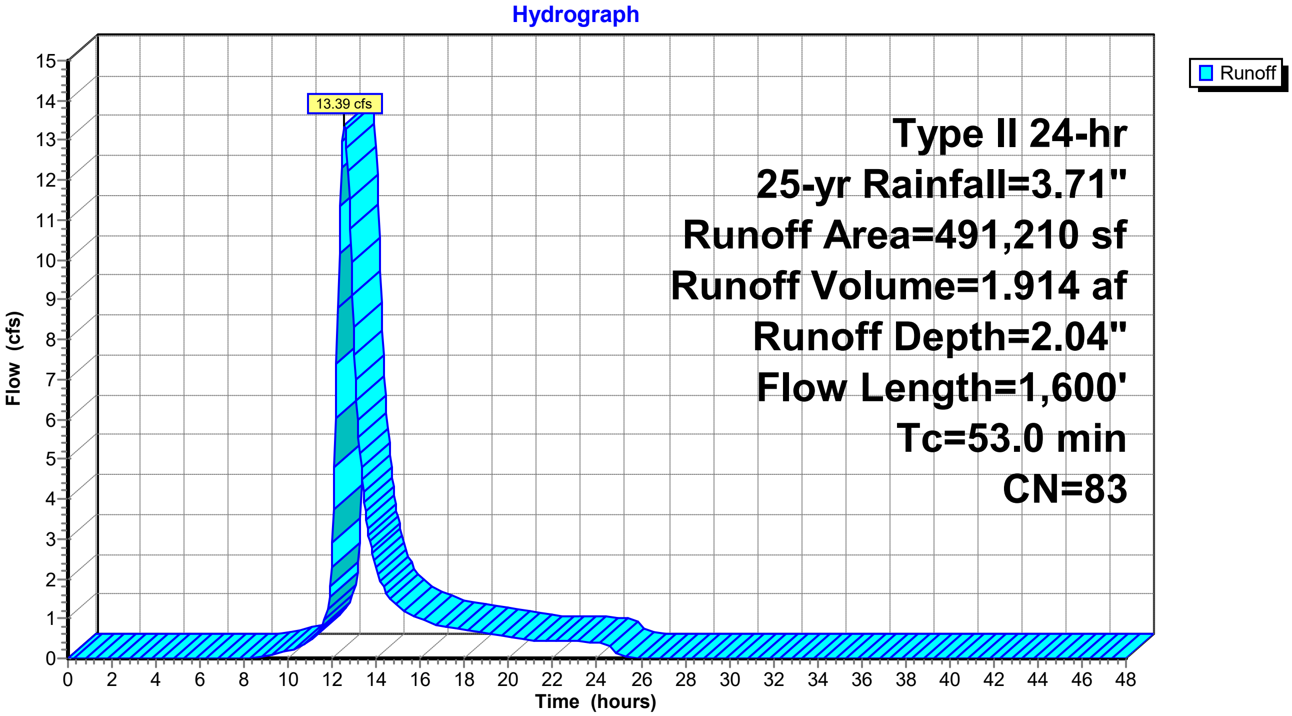
```
Runoff      =        13.39 cfs @   12.54 hrs,  Volume=            1.914 af,  Depth=  2.04"
    Routed to Link 1L : Total Disharge to West Property Line (Wetland)
```

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
125,880	89	Row crops, straight row, Good, HSG D
51,080	78	Meadow, non-grazed, HSG D
232,840	79	Woods, Fair, HSG D
81,410	89	Row crops, straight row, Good, HSG D
491,210	83	Weighted Average
491,210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.1	100	0.0050	0.07		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
21.7	650	0.0100	0.50		**Shallow Concentrated Flow, 650' Shallow Conc. Flow** Woodland Kv= 5.0 fps
1.7	500	0.0140	4.95	346.85	**Trap/Vee/Rect Channel Flow, Channel Flow across site** Bot.W=50.00' D=1.00' Z= 20.0 '/' Top.W=90.00' n= 0.030
53.0	1,600	Total			

Subcatchment 2S: Off-Site and SW Corner Contributing Area to West Property Line (Wetland)



Summary for Subcatchment 3S: Site Area to West Property Line (Wetland)

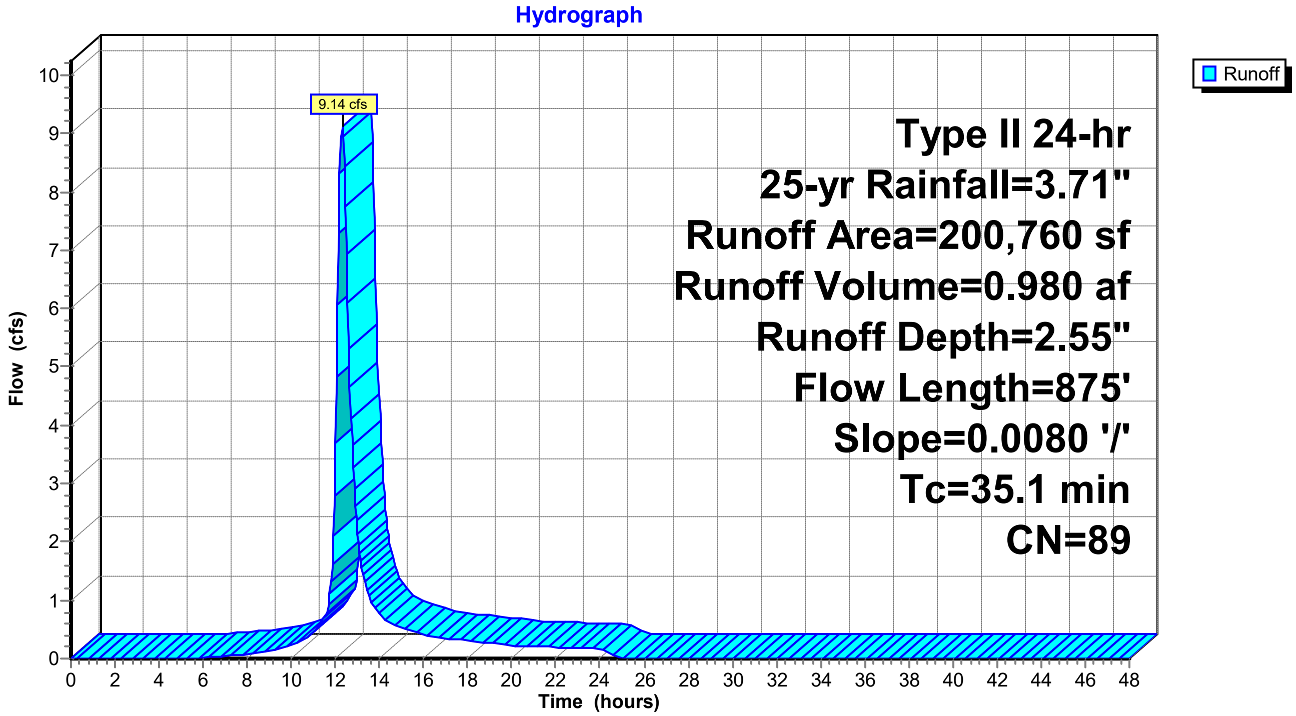
Runoff = 9.14 cfs @ 12.30 hrs, Volume= 0.980 af, Depth= 2.55"
Routed to Link 1L : Total Disharge to West Property Line (Wetland)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
200,760	89	Row crops, straight row, Good, HSG D
200,760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0080	0.09		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
16.0	775	0.0080	0.80		**Shallow Concentrated Flow, 775' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
35.1	875	Total			

Subcatchment 3S: Site Area to West Property Line (Wetland)



Summary for Subcatchment 4S: Area to Northwest Property Corner Ditch (to Wetland)

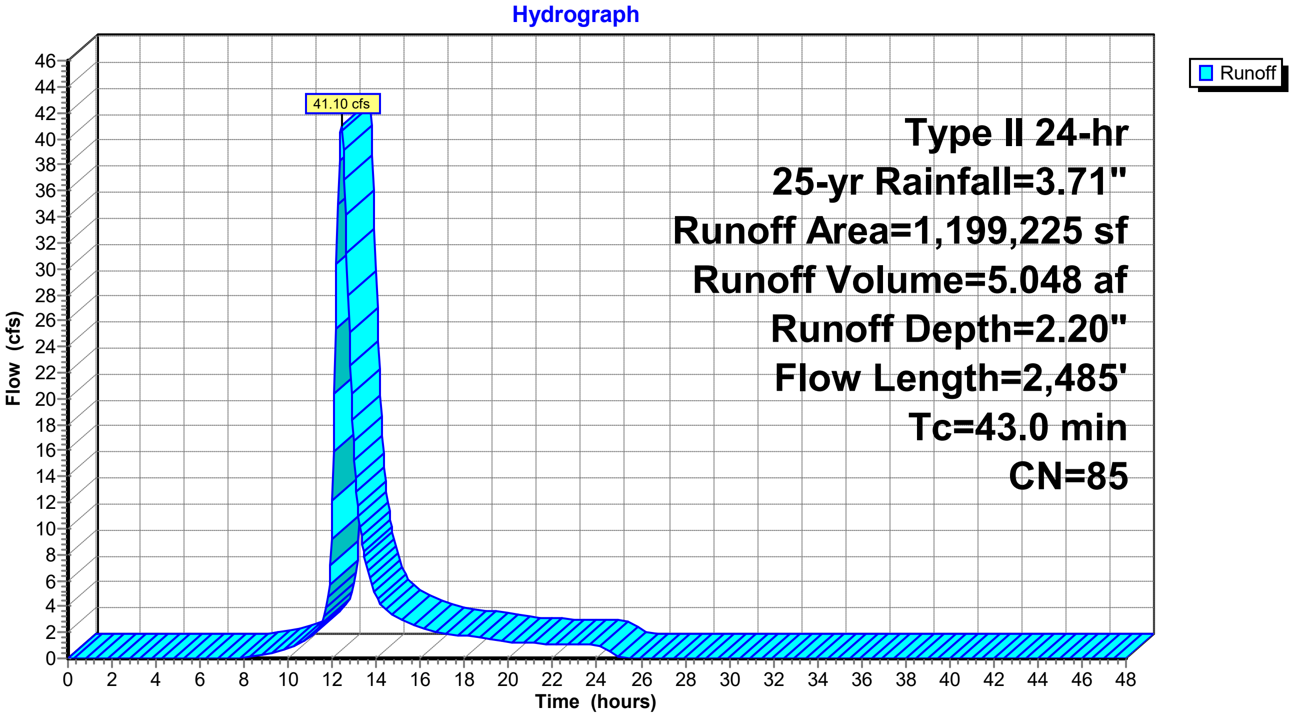
Runoff = 41.10 cfs @ 12.40 hrs, Volume= 5.048 af, Depth= 2.20"
Routed to Link 3L : Total Discharge to Ditch at NW Corner of Site to Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=3.71"

	Area (sf)	CN	Description
*	5,250	91	Gravel drive, HSG D
	111,735	79	Woods/grass comb., Good, HSG D
	4,900	98	Unconnected roofs, HSG D
	62,430	77	Brush, Fair, HSG D
	727,935	89	Row crops, straight row, Good, HSG D
	83,440	78	Meadow, non-grazed, HSG D
	203,535	79	Woods, Fair, HSG D
	1,199,225	85	Weighted Average
	1,194,325		99.59% Pervious Area
	4,900		0.41% Impervious Area
	4,900		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0120	0.13		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.7	90	0.0150	0.86		**Shallow Concentrated Flow, 90' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
12.7	435	0.0130	0.57		**Shallow Concentrated Flow, 435' Shallow Conc. Flow** Woodland Kv= 5.0 fps
10.0	380	0.0050	0.64		**Shallow Concentrated Flow, 380' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
1.7	515	0.0117	5.20	415.88	**Trap/Vee/Rect Channel Flow, Channel flow across site** Bot.W=50.00' D=1.00' Z= 30.0 '/' Top.W=110.00' n= 0.025
3.8	965	0.0042	4.24	394.18	**Trap/Vee/Rect Channel Flow, North Property Line Ditch** Bot.W=1.00' D=3.00' Z= 10.0 '/' Top.W=61.00' n= 0.030
43.0	2,485	Total			

Subcatchment 4S: Area to Northwest Property Corner Ditch (to Wetland)



Summary for Subcatchment 5S: Contributing Watershed from East - Tc Inc. N. Ditch

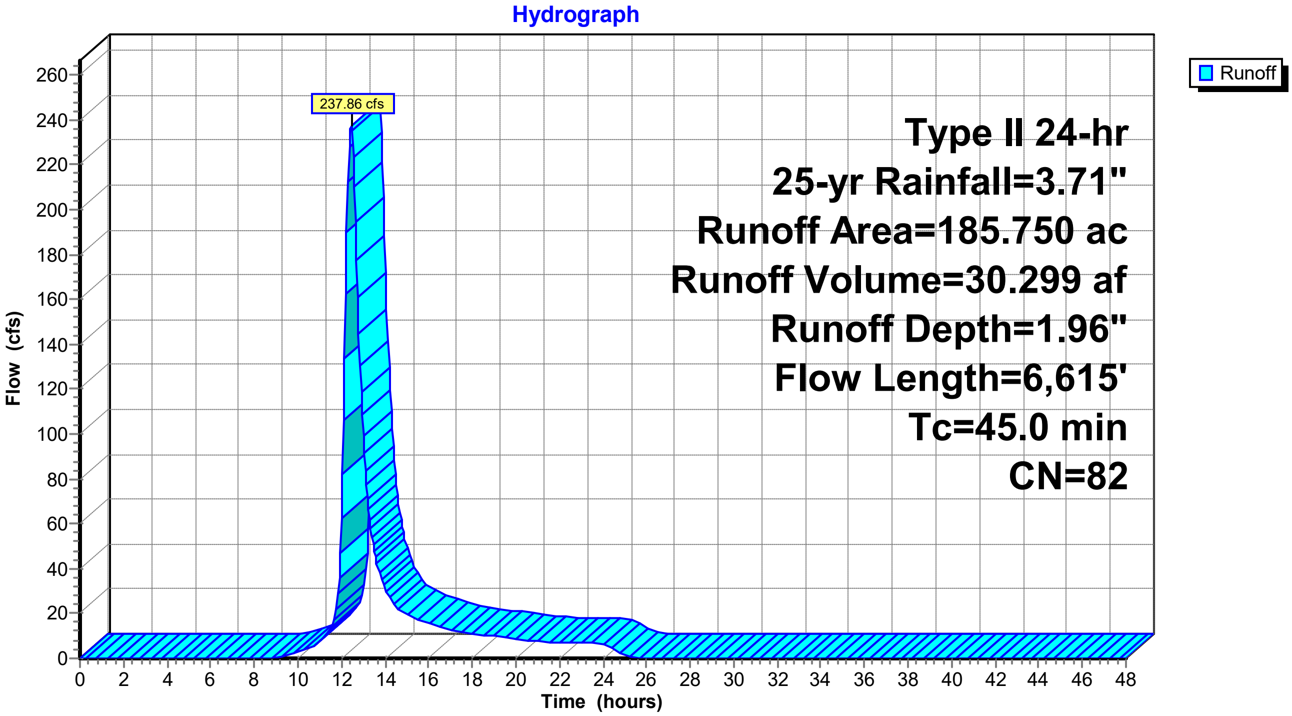
Runoff = 237.86 cfs @ 12.44 hrs, Volume= 30.299 af, Depth= 1.96"
Routed to Link 3L : Total Discharge to Ditch at NW Corner of Site to Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (ac)	CN	Description
78.660	79	Woods, Fair, HSG D
2.970	98	Water Surface, 0% imp, HSG D
1.050	96	Gravel surface, HSG D
103.070	84	Pasture/grassland/range, Fair, HSG D
185.750	82	Weighted Average
185.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0350	0.16		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
14.2	1,000	0.0170	1.17		**Shallow Concentrated Flow, 1000' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
2.9	750	0.0130	4.31	430.96	**Trap/Vee/Rect Channel Flow, 750 Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.7	670	0.0120	4.14	414.05	**Trap/Vee/Rect Channel Flow, 670' Flow Through Woods** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
1.9	550	0.0100	4.74	889.55	**Trap/Vee/Rect Channel Flow, 550' Flow Through Ag Field** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
7.6	1,800	0.0070	3.97	744.25	**Trap/Vee/Rect Channel Flow, 1,800' Along Crosby Road** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
0.1	75	0.0200	17.48	168.15	**Pipe Channel, Crosby Road Cross Culvert** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.011
5.0	1,670	0.0060	5.61	706.31	**Trap/Vee/Rect Channel Flow, North Property Line Ditch** Bot.W=1.00' D=3.50' Z= 10.0 '/' Top.W=71.00' n= 0.030
45.0	6,615	Total			

Subcatchment 5S: Contributing Watershed from East - Tc Inc. N. Ditch



Summary for Subcatchment 6S: Contributing Area from North

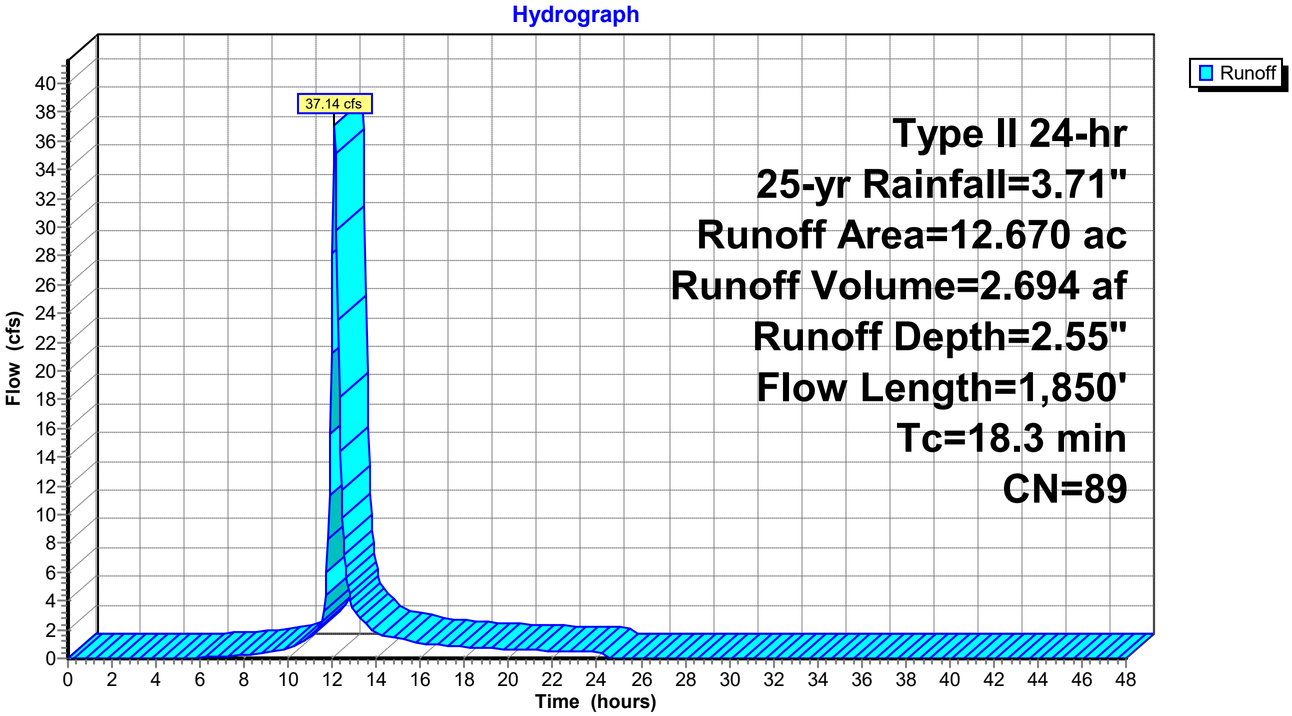
Runoff = 37.14 cfs @ 12.10 hrs, Volume= 2.694 af, Depth= 2.55"
Routed to Link 3L : Total Discharge to Ditch at NW Corner of Site to Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (ac)	CN	Description
12.670	89	Row crops, straight row, Good, HSG D
12.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0100	0.22		**Sheet Flow, 100' Overland Flow** Cultivated: Residue<=20% n= 0.060 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
4.2	1,400	0.0060	5.61	706.31	**Trap/Vee/Rect Channel Flow, North Property Line Ditch** Bot.W=1.00' D=3.50' Z= 10.0 '/' Top.W=71.00' n= 0.030
18.3	1,850	Total			

Subcatchment 6S: Contributing Area from North



Summary for Subcatchment 7S: Contributing Watershed from East

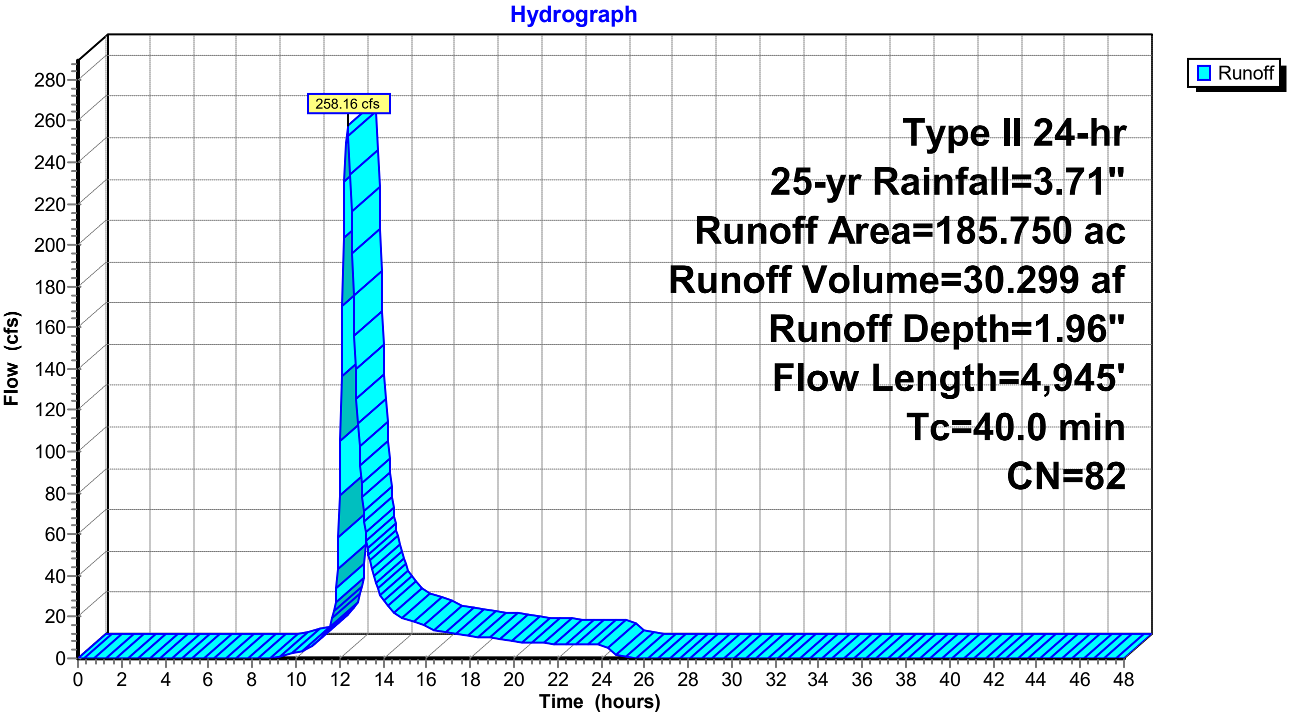
Runoff = 258.16 cfs @ 12.37 hrs, Volume= 30.299 af, Depth= 1.96"
Routed to Reach 2R : North Property Line Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (ac)	CN	Description
78.660	79	Woods, Fair, HSG D
2.970	98	Water Surface, 0% imp, HSG D
1.050	96	Gravel surface, HSG D
103.070	84	Pasture/grassland/range, Fair, HSG D
185.750	82	Weighted Average
185.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0350	0.16		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
14.2	1,000	0.0170	1.17		**Shallow Concentrated Flow, 1000' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
2.9	750	0.0130	4.31	430.96	**Trap/Vee/Rect Channel Flow, 750 Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.7	670	0.0120	4.14	414.05	**Trap/Vee/Rect Channel Flow, 670' Flow Through Woods** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
1.9	550	0.0100	4.74	889.55	**Trap/Vee/Rect Channel Flow, 550' Flow Through Ag Field** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
7.6	1,800	0.0070	3.97	744.25	**Trap/Vee/Rect Channel Flow, 1,800' Along Crosby Road** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
0.1	75	0.0200	17.48	168.15	**Pipe Channel, Crosby Road Cross Culvert** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.011
40.0	4,945	Total			

Subcatchment 7S: Contributing Watershed from East



Summary for Subcatchment 10S: Area to Northwest Property Corner Ditch (to Wetland)

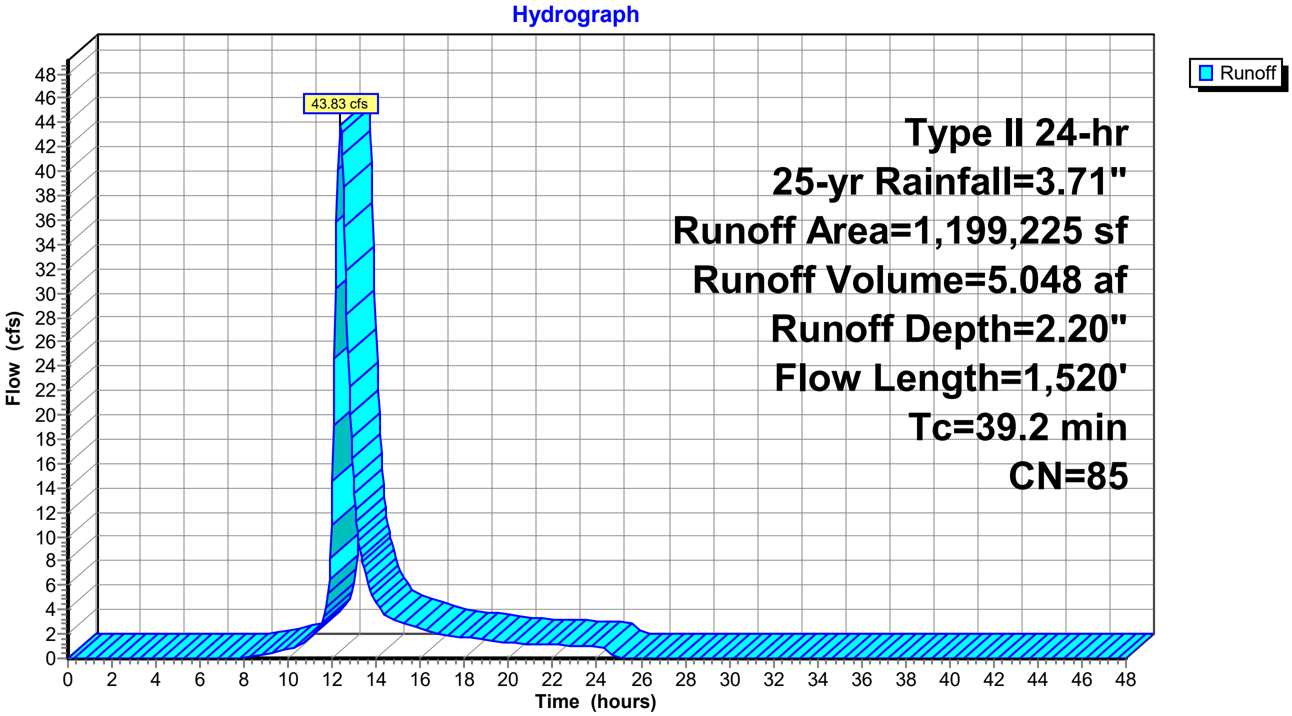
Runoff = 43.83 cfs @ 12.36 hrs, Volume= 5.048 af, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=3.71"

	Area (sf)	CN	Description
*	5,250	91	Gravel drive, HSG D
	111,735	79	Woods/grass comb., Good, HSG D
	4,900	98	Unconnected roofs, HSG D
	62,430	77	Brush, Fair, HSG D
	727,935	89	Row crops, straight row, Good, HSG D
	83,440	78	Meadow, non-grazed, HSG D
	203,535	79	Woods, Fair, HSG D
	1,199,225	85	Weighted Average
	1,194,325		99.59% Pervious Area
	4,900		0.41% Impervious Area
	4,900		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0120	0.13		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.7	90	0.0150	0.86		**Shallow Concentrated Flow, 90' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
12.7	435	0.0130	0.57		**Shallow Concentrated Flow, 435' Shallow Conc. Flow** Woodland Kv= 5.0 fps
10.0	380	0.0050	0.64		**Shallow Concentrated Flow, 380' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
1.7	515	0.0117	5.20	415.88	**Trap/Vee/Rect Channel Flow, Channel flow across site** Bot.W=50.00' D=1.00' Z= 30.0 '/' Top.W=110.00' n= 0.025
39.2	1,520	Total			

Subcatchment 10S: Area to Northwest Property Corner Ditch (to Wetland)



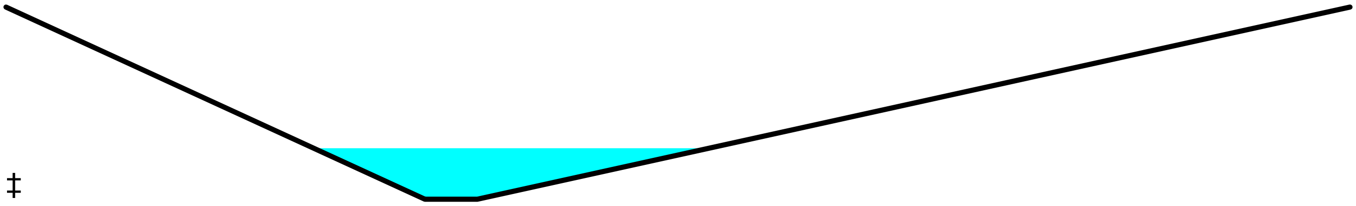
Summary for Reach 1R: Overland Flow from Collection Area to West Property Line (Wetland)

Inflow Area = 13.018 ac, 0.00% Impervious, Inflow Depth = 1.60" for 25-yr event
Inflow = 15.17 cfs @ 12.43 hrs, Volume= 1.731 af
Outflow = 14.94 cfs @ 12.48 hrs, Volume= 1.731 af, Atten= 2%, Lag= 3.2 min
Routed to Link 1L : Total Disharge to West Property Line (Wetland)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.19 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 0.86 fps, Avg. Travel Time= 9.7 min

Peak Storage= 3,412 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.53' , Surface Width= 22.67'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 399.92 cfs

3.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 12.0 25.0 '/' Top Width= 77.00'
Length= 500.0' Slope= 0.0097 '/'
Inlet Invert= 668.85', Outlet Invert= 664.00'



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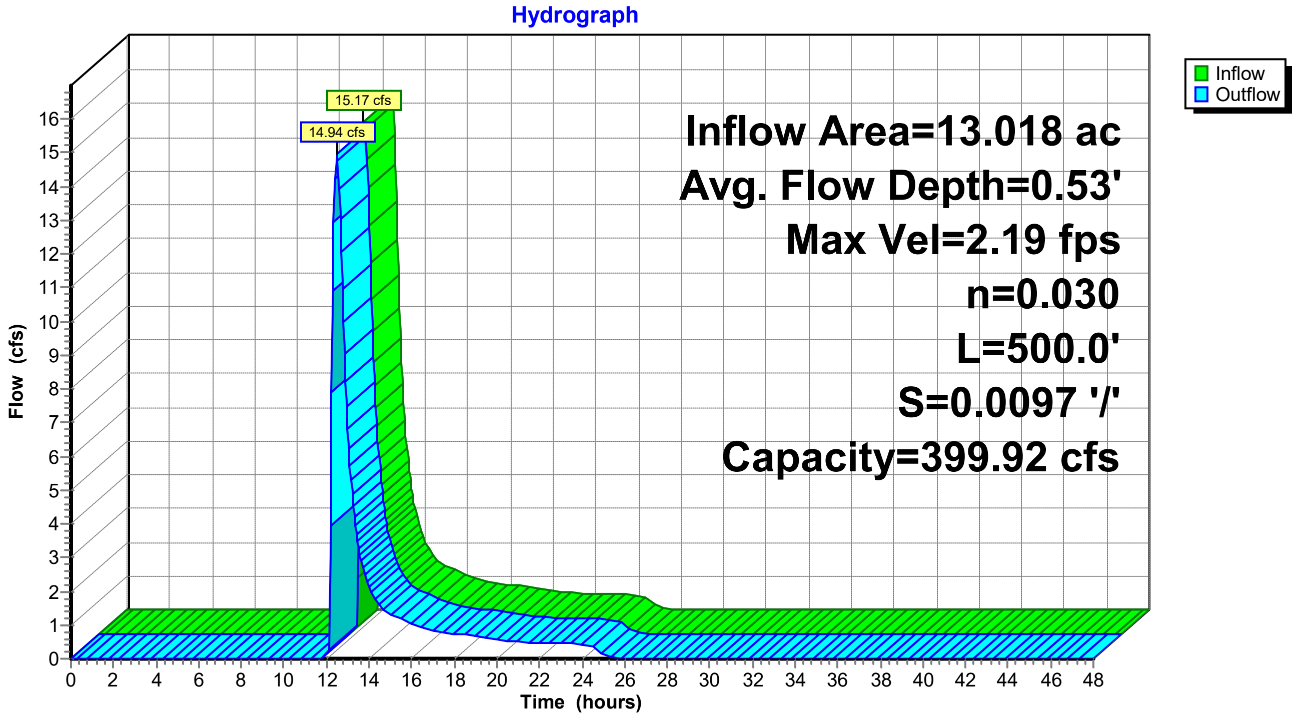
Reach 1R: Overland Flow from Collection Area to West Property Line (Wetland)



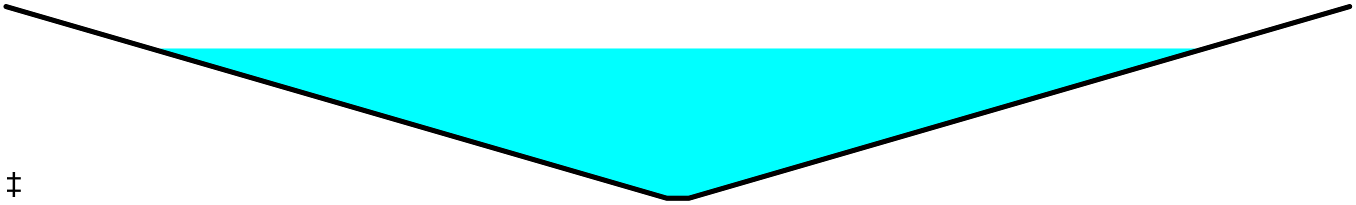
Summary for Reach 2R: North Property Line Ditch

Inflow Area = 185.750 ac, 0.00% Impervious, Inflow Depth = 1.96" for 25-yr event
Inflow = 258.16 cfs @ 12.37 hrs, Volume= 30.299 af
Outflow = 246.53 cfs @ 12.46 hrs, Volume= 30.299 af, Atten= 5%, Lag= 5.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.30 fps, Min. Travel Time= 6.5 min
Avg. Velocity = 1.33 fps, Avg. Travel Time= 20.9 min

Peak Storage= 95,627 cf @ 12.46 hrs
Average Depth at Peak Storage= 2.34' , Surface Width= 47.87'
Bank-Full Depth= 3.00' Flow Area= 93.0 sf, Capacity= 470.66 cfs

1.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 61.00'
Length= 1,670.0' Slope= 0.0060 '/'
Inlet Invert= 669.00', Outlet Invert= 659.00'



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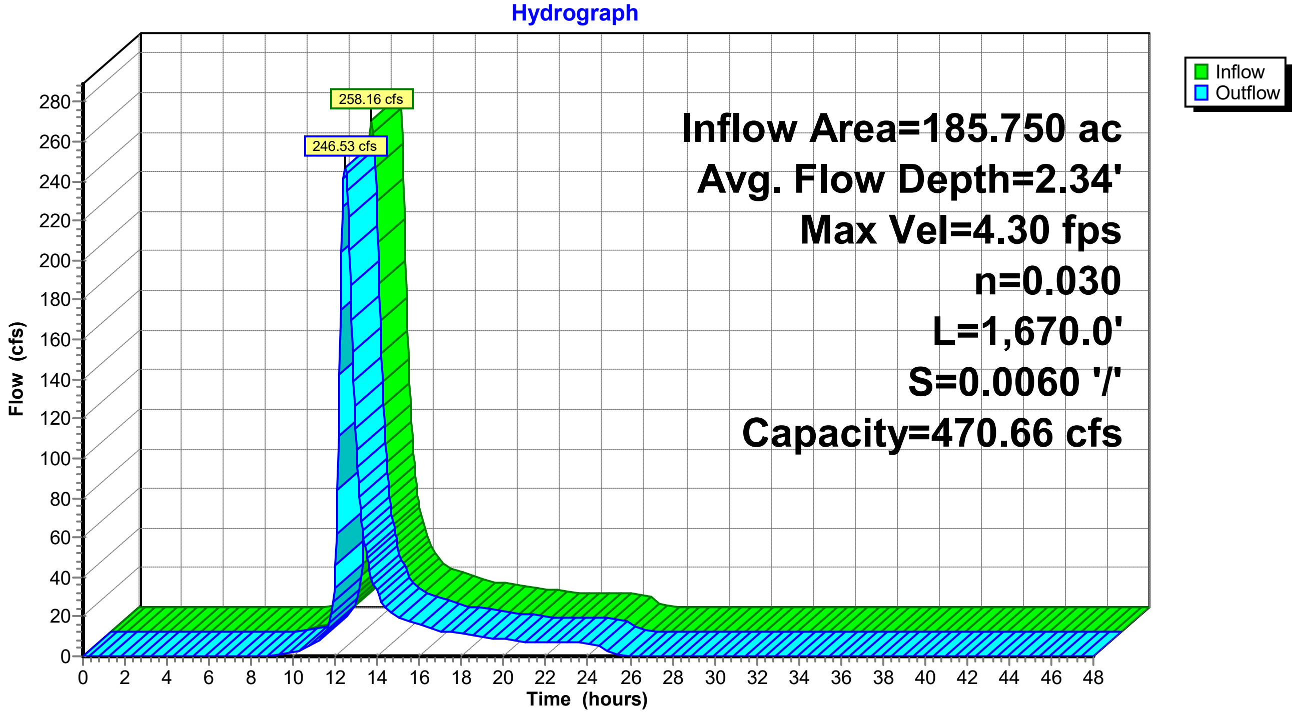
Reach 2R: North Property Line Ditch



Summary for Pond 1P: Collection Area

```
Inflow Area =        13.018 ac,    0.00% Impervious,  Inflow Depth =   1.73"    for  25-yr event
Inflow       =       15.24 cfs @   12.41 hrs,  Volume=            1.878 af
Outflow      =       15.17 cfs @   12.43 hrs,  Volume=            1.731 af,  Atten= 0%,  Lag= 1.6 min
Primary      =       15.17 cfs @   12.43 hrs,  Volume=            1.731 af
     Routed to Reach 1R : Overland Flow from Collection Area to West Property Line (Wetland)
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 669.99' @ 12.43 hrs Surf.Area= 10,742 sf Storage= 8,336 cf

Plug-Flow detention time= 59.9 min calculated for 1.731 af (92% of inflow)
Center-of-Mass det. time= 17.9 min (886.6 - 868.7)

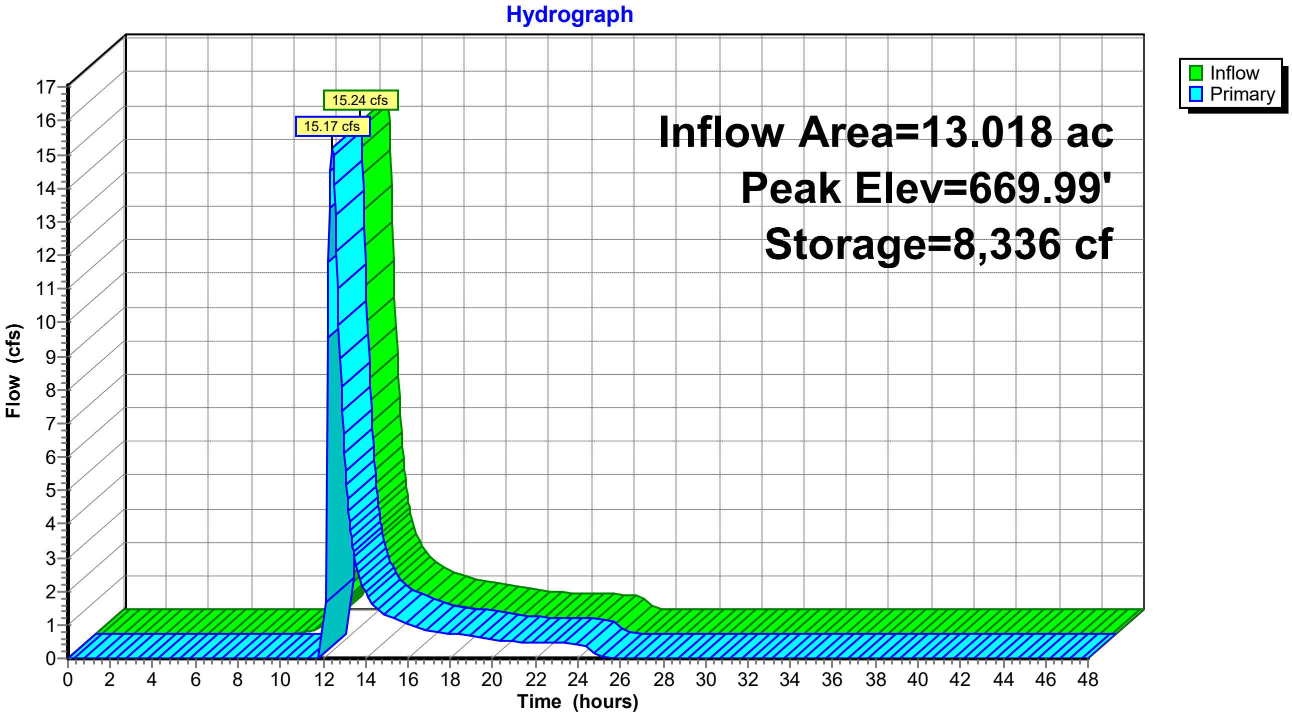
Volume	Invert	Avail.Storage	Storage Description
#1	668.00'	15,369 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
668.00	45	0	0
669.00	2,985	1,515	1,515
670.00	10,790	6,888	8,403
670.50	17,075	6,966	15,369

Device	Routing	Invert	Outlet Devices
#1	Primary	669.80'	**70.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=15.12 cfs @ 12.43 hrs HW=669.99' TW=669.38' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 15.12 cfs @ 1.12 fps)

Pond 1P: Collection Area

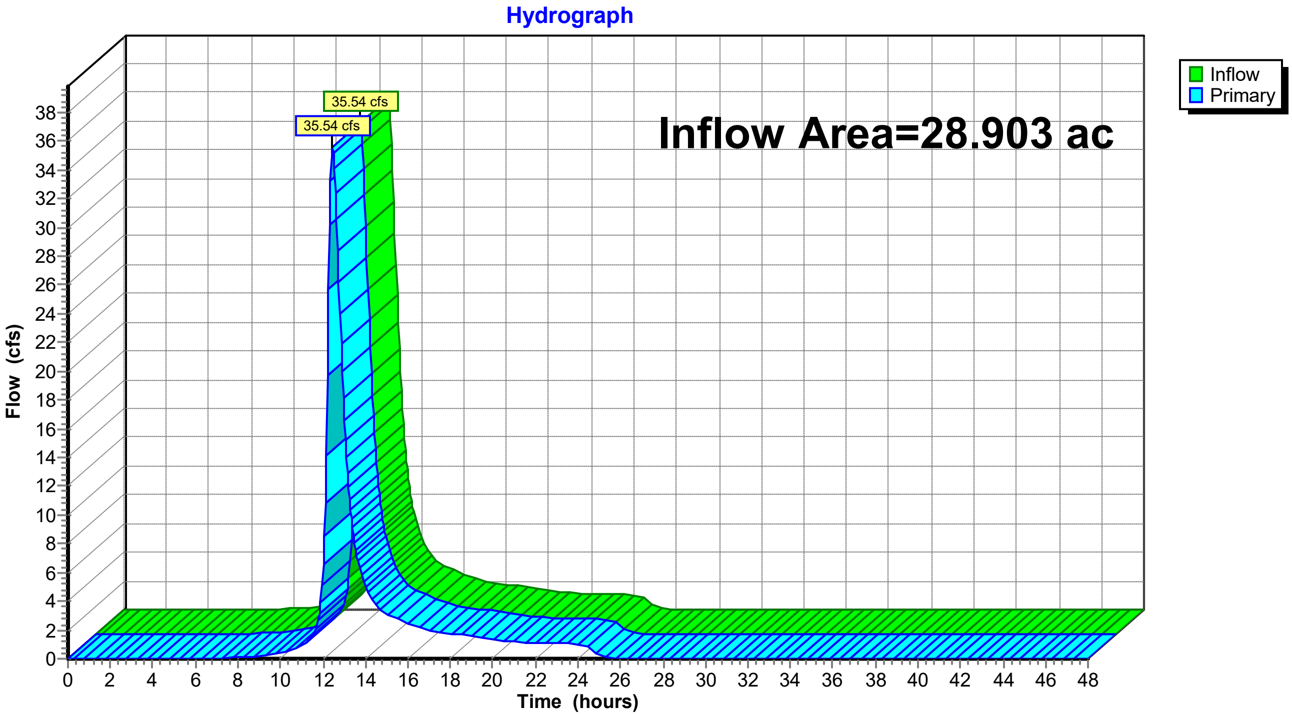


Summary for Link 1L: Total Disharge to West Property Line (Wetland)

Inflow Area = 28.903 ac, 0.00% Impervious, Inflow Depth = 1.92" for 25-yr event
Inflow = 35.54 cfs @ 12.45 hrs, Volume= 4.625 af
Primary = 35.54 cfs @ 12.45 hrs, Volume= 4.625 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 1L: Total Disharge to West Property Line (Wetland)

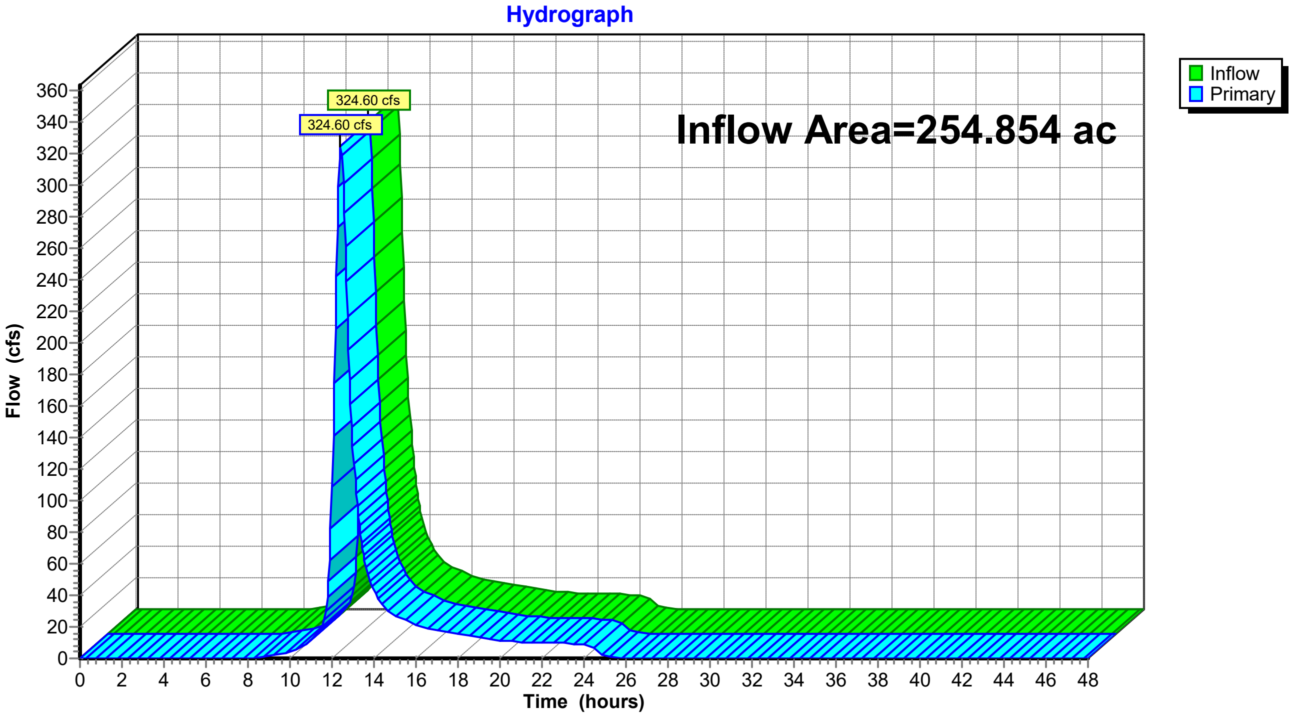


Summary for Link 2L: Total Discharge at Design Points

Inflow Area =	254.854 ac,	0.04% Impervious,	Inflow Depth = 2.01"	for 25-yr event	
Inflow =	324.60 cfs @	12.42 hrs,	Volume=	42.666 af	
Primary =	324.60 cfs @	12.42 hrs,	Volume=	42.666 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 2L: Total Discharge at Design Points

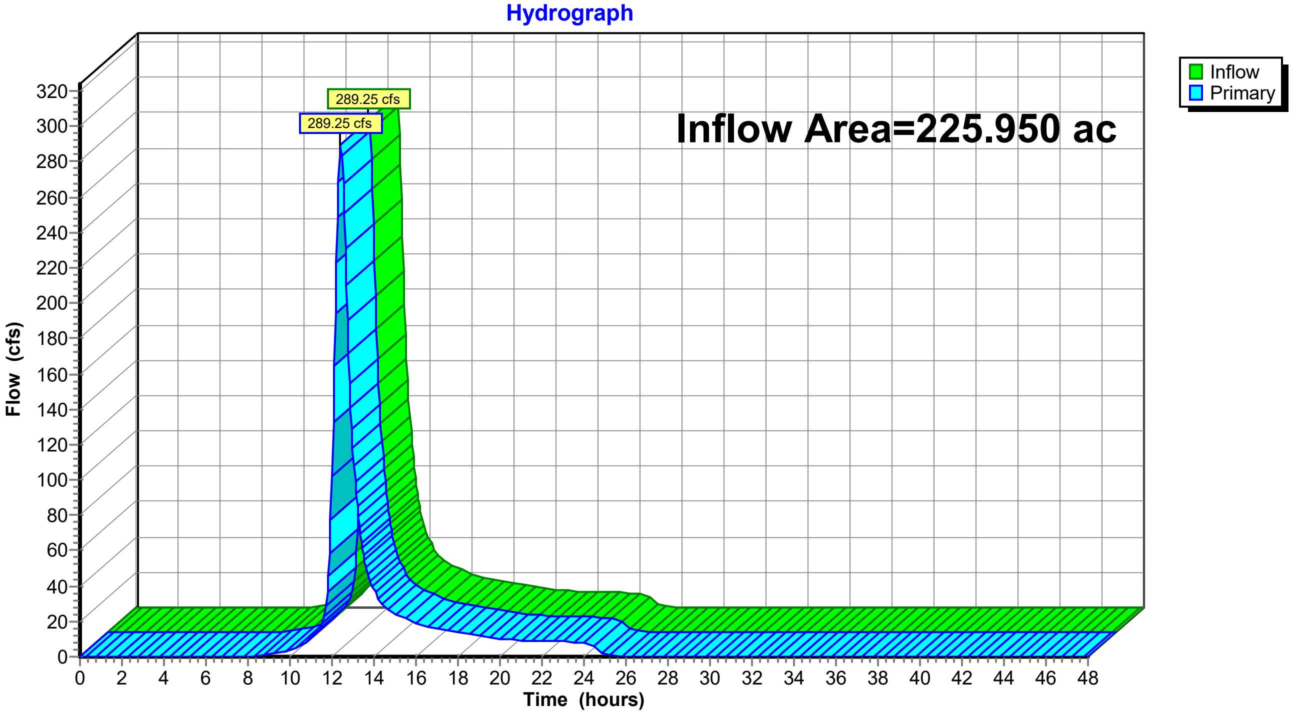


Summary for Link 3L: Total Discharge to Ditch at NW Corner of Site to Wetland

Inflow Area = 225.950 ac, 0.05% Impervious, Inflow Depth = 2.02" for 25-yr event
Inflow = 289.25 cfs @ 12.42 hrs, Volume= 38.041 af
Primary = 289.25 cfs @ 12.42 hrs, Volume= 38.041 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 3L: Total Discharge to Ditch at NW Corner of Site to Wetland



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area to SW Property Runoff Area=567,060 sf 0.00% Impervious Runoff Depth=2.81"
Flow Length=1,100' Tc=42.2 min CN=79 Runoff=25.11 cfs 3.049 af

Subcatchment 2S: Off-Site and SW Corner Runoff Area=491,210 sf 0.00% Impervious Runoff Depth=3.18"
Flow Length=1,600' Tc=53.0 min CN=83 Runoff=21.02 cfs 2.991 af

Subcatchment 3S: Site Area to West Runoff Area=200,760 sf 0.00% Impervious Runoff Depth=3.78"
Flow Length=875' Slope=0.0080 '/' Tc=35.1 min CN=89 Runoff=13.39 cfs 1.452 af

Subcatchment 4S: Area to Northwest Runoff Area=1,199,225 sf 0.41% Impervious Runoff Depth=3.38"
Flow Length=2,485' Tc=43.0 min CN=85 Runoff=62.97 cfs 7.748 af

Subcatchment 5S: Contributing Runoff Area=185.750 ac 0.00% Impervious Runoff Depth=3.09"
Flow Length=6,615' Tc=45.0 min CN=82 Runoff=377.44 cfs 47.800 af

Subcatchment 6S: Contributing Area from Runoff Area=12.670 ac 0.00% Impervious Runoff Depth=3.78"
Flow Length=1,850' Tc=18.3 min CN=89 Runoff=54.17 cfs 3.993 af

Subcatchment 7S: Contributing Runoff Area=185.750 ac 0.00% Impervious Runoff Depth=3.09"
Flow Length=4,945' Tc=40.0 min CN=82 Runoff=409.40 cfs 47.800 af

Subcatchment 10S: Area to Northwest Runoff Area=1,199,225 sf 0.41% Impervious Runoff Depth=3.38"
Flow Length=1,520' Tc=39.2 min CN=85 Runoff=67.12 cfs 7.748 af

Reach 1R: Overland Flow from Avg. Flow Depth=0.66' Max Vel=2.49 fps Inflow=25.04 cfs 2.902 af
n=0.030 L=500.0' S=0.0097 '/' Capacity=399.92 cfs Outflow=24.76 cfs 2.902 af

Reach 2R: North Property Line Ditch Avg. Flow Depth=2.81' Max Vel=4.84 fps Inflow=409.40 cfs 47.800 af
n=0.030 L=1,670.0' S=0.0060 '/' Capacity=470.66 cfs Outflow=394.65 cfs 47.800 af

Pond 1P: Collection Area Peak Elev=670.07' Storage=9,177 cf Inflow=25.11 cfs 3.049 af
Outflow=25.04 cfs 2.902 af

Link 1L: Total Disharge to West Property Line (Wetland) Inflow=56.46 cfs 7.345 af
Primary=56.46 cfs 7.345 af

Link 2L: Total Discharge at Design Points Inflow=511.81 cfs 66.886 af
Primary=511.81 cfs 66.886 af

Link 3L: Total Discharge to Ditch at NW Corner of Site to Wetland Inflow=455.57 cfs 59.541 af
Primary=455.57 cfs 59.541 af

Total Runoff Area = 468.134 ac Runoff Volume = 122.581 af Average Runoff Depth = 3.14"
99.95% Pervious = 467.909 ac 0.05% Impervious = 0.225 ac

Summary for Subcatchment 1S: Area to SW Property Line (Collection Area)

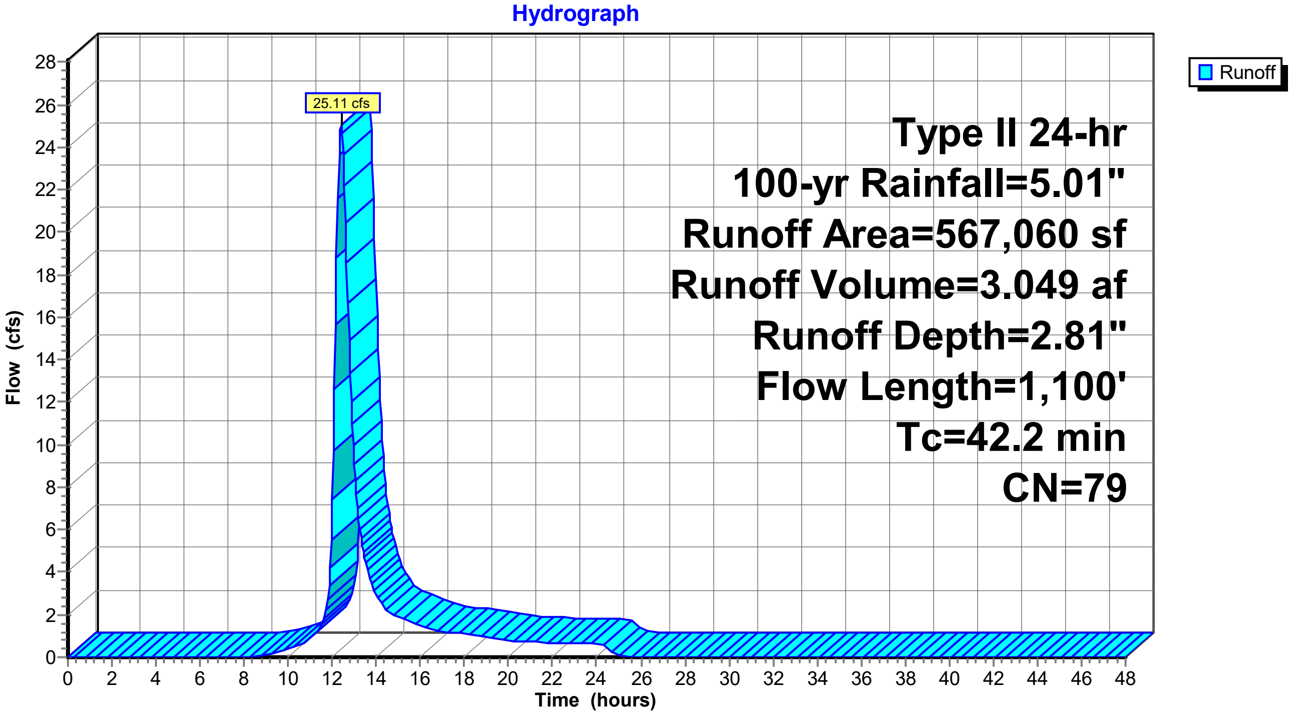
Runoff = 25.11 cfs @ 12.40 hrs, Volume= 3.049 af, Depth= 2.81"
Routed to Pond 1P : Collection Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
31,900	89	Row crops, straight row, Good, HSG D
345,195	79	Woods, Fair, HSG D
189,965	78	Meadow, non-grazed, HSG D
567,060	79	Weighted Average
567,060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
7.3	375	0.0150	0.86		**Shallow Concentrated Flow, 375' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
20.8	625	0.0100	0.50		**Shallow Concentrated Flow, 625' Shallow Conc. Flow** Woodland Kv= 5.0 fps
42.2	1,100	Total			

Subcatchment 1S: Area to SW Property Line (Collection Area)



Summary for Subcatchment 2S: Off-Site and SW Corner Contributing Area to West Property Line (Wetland

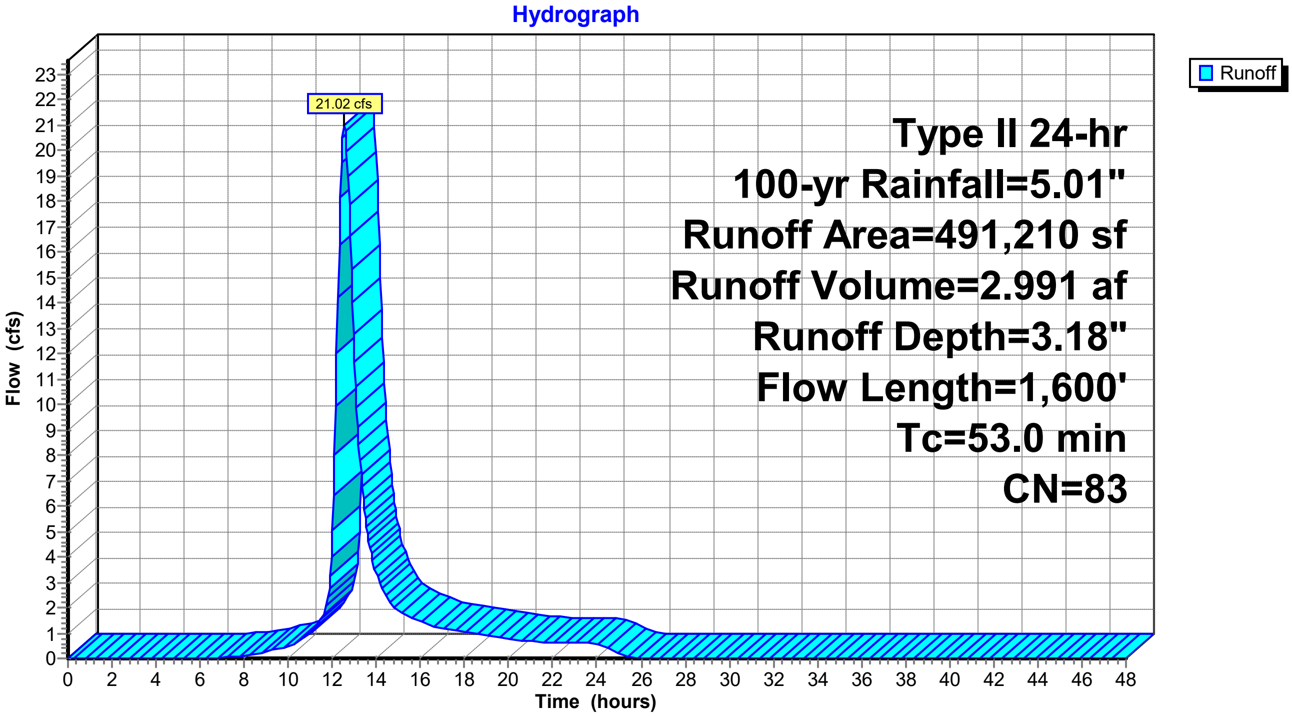
Runoff = 21.02 cfs @ 12.53 hrs, Volume= 2.991 af, Depth= 3.18"
Routed to Link 1L : Total Disharge to West Property Line (Wetland)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
125,880	89	Row crops, straight row, Good, HSG D
51,080	78	Meadow, non-grazed, HSG D
232,840	79	Woods, Fair, HSG D
81,410	89	Row crops, straight row, Good, HSG D
491,210	83	Weighted Average
491,210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.1	100	0.0050	0.07		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
21.7	650	0.0100	0.50		**Shallow Concentrated Flow, 650' Shallow Conc. Flow** Woodland Kv= 5.0 fps
1.7	500	0.0140	4.95	346.85	**Trap/Vee/Rect Channel Flow, Channel Flow across site** Bot.W=50.00' D=1.00' Z= 20.0 '/' Top.W=90.00' n= 0.030
53.0	1,600	Total			

Subcatchment 2S: Off-Site and SW Corner Contributing Area to West Property Line (Wetland)



Summary for Subcatchment 3S: Site Area to West Property Line (Wetland)

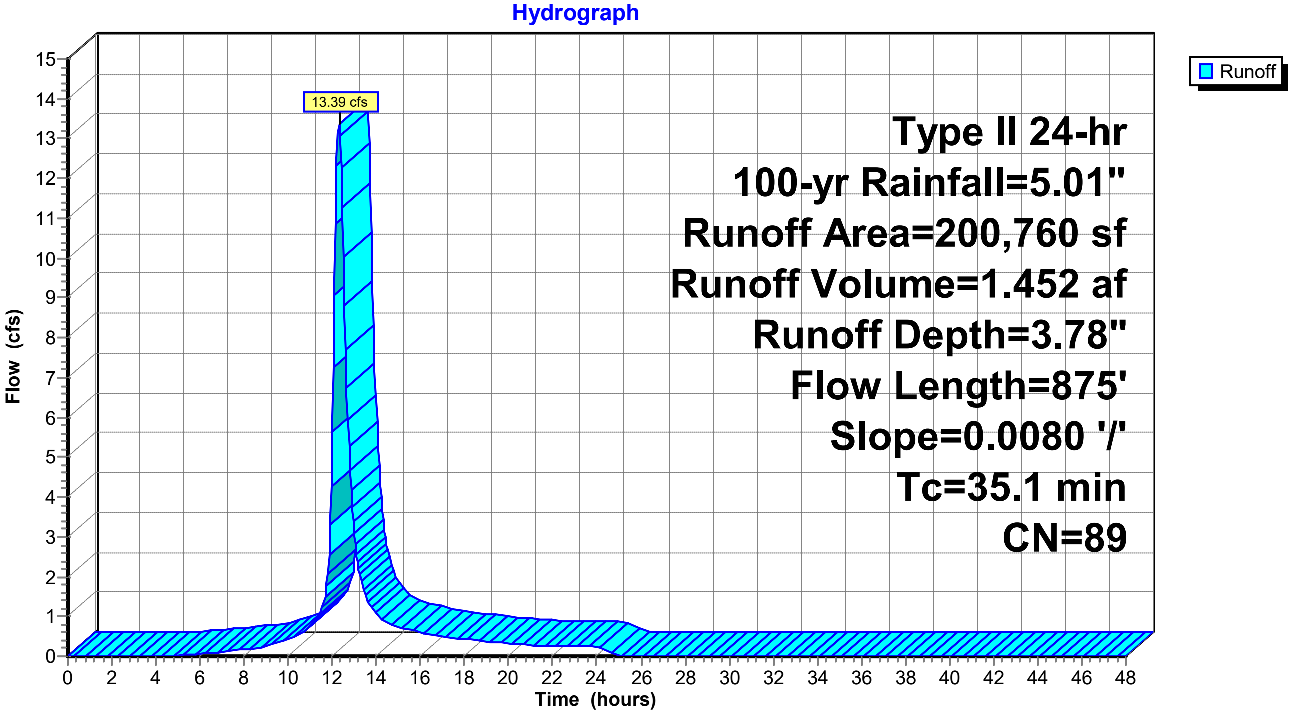
Runoff = 13.39 cfs @ 12.30 hrs, Volume= 1.452 af, Depth= 3.78"
Routed to Link 1L : Total Disharge to West Property Line (Wetland)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
200,760	89	Row crops, straight row, Good, HSG D
200,760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0080	0.09		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
16.0	775	0.0080	0.80		**Shallow Concentrated Flow, 775' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
35.1	875	Total			

Subcatchment 3S: Site Area to West Property Line (Wetland)



Summary for Subcatchment 4S: Area to Northwest Property Corner Ditch (to Wetland)

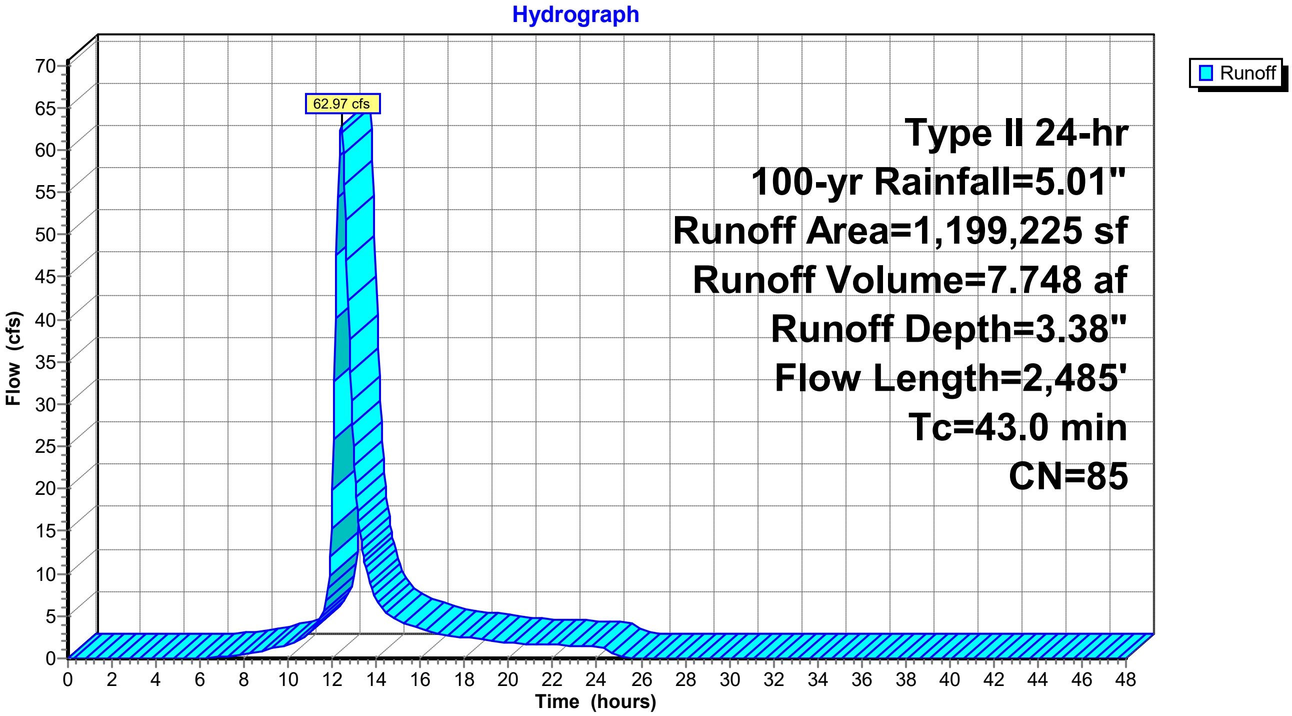
Runoff = 62.97 cfs @ 12.40 hrs, Volume= 7.748 af, Depth= 3.38"
Routed to Link 3L : Total Discharge to Ditch at NW Corner of Site to Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.01"

	Area (sf)	CN	Description
*	5,250	91	Gravel drive, HSG D
	111,735	79	Woods/grass comb., Good, HSG D
	4,900	98	Unconnected roofs, HSG D
	62,430	77	Brush, Fair, HSG D
	727,935	89	Row crops, straight row, Good, HSG D
	83,440	78	Meadow, non-grazed, HSG D
	203,535	79	Woods, Fair, HSG D
	1,199,225	85	Weighted Average
	1,194,325		99.59% Pervious Area
	4,900		0.41% Impervious Area
	4,900		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0120	0.13		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.7	90	0.0150	0.86		**Shallow Concentrated Flow, 90' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
12.7	435	0.0130	0.57		**Shallow Concentrated Flow, 435' Shallow Conc. Flow** Woodland Kv= 5.0 fps
10.0	380	0.0050	0.64		**Shallow Concentrated Flow, 380' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
1.7	515	0.0117	5.20	415.88	**Trap/Vee/Rect Channel Flow, Channel flow across site** Bot.W=50.00' D=1.00' Z= 30.0 '/' Top.W=110.00' n= 0.025
3.8	965	0.0042	4.24	394.18	**Trap/Vee/Rect Channel Flow, North Property Line Ditch** Bot.W=1.00' D=3.00' Z= 10.0 '/' Top.W=61.00' n= 0.030
43.0	2,485	Total			

Subcatchment 4S: Area to Northwest Property Corner Ditch (to Wetland)



Summary for Subcatchment 5S: Contributing Watershed from East - Tc Inc. N. Ditch

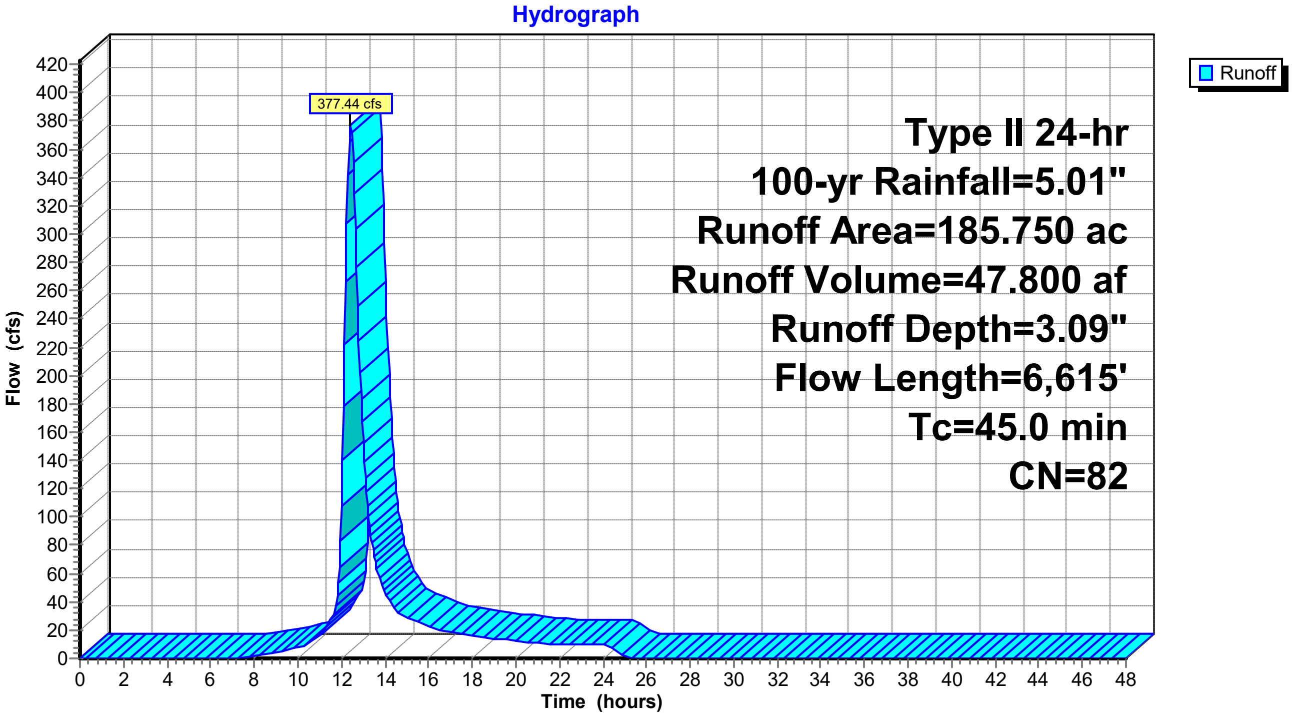
Runoff = 377.44 cfs @ 12.43 hrs, Volume= 47.800 af, Depth= 3.09"
Routed to Link 3L : Total Discharge to Ditch at NW Corner of Site to Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (ac)	CN	Description
78.660	79	Woods, Fair, HSG D
2.970	98	Water Surface, 0% imp, HSG D
1.050	96	Gravel surface, HSG D
103.070	84	Pasture/grassland/range, Fair, HSG D
185.750	82	Weighted Average
185.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0350	0.16		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
14.2	1,000	0.0170	1.17		**Shallow Concentrated Flow, 1000' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
2.9	750	0.0130	4.31	430.96	**Trap/Vee/Rect Channel Flow, 750 Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.7	670	0.0120	4.14	414.05	**Trap/Vee/Rect Channel Flow, 670' Flow Through Woods** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
1.9	550	0.0100	4.74	889.55	**Trap/Vee/Rect Channel Flow, 550' Flow Through Ag Field** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
7.6	1,800	0.0070	3.97	744.25	**Trap/Vee/Rect Channel Flow, 1,800' Along Crosby Road** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
0.1	75	0.0200	17.48	168.15	**Pipe Channel, Crosby Road Cross Culvert** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.011
5.0	1,670	0.0060	5.61	706.31	**Trap/Vee/Rect Channel Flow, North Property Line Ditch** Bot.W=1.00' D=3.50' Z= 10.0 '/' Top.W=71.00' n= 0.030
45.0	6,615	Total			

Subcatchment 5S: Contributing Watershed from East - Tc Inc. N. Ditch



Summary for Subcatchment 6S: Contributing Area from North

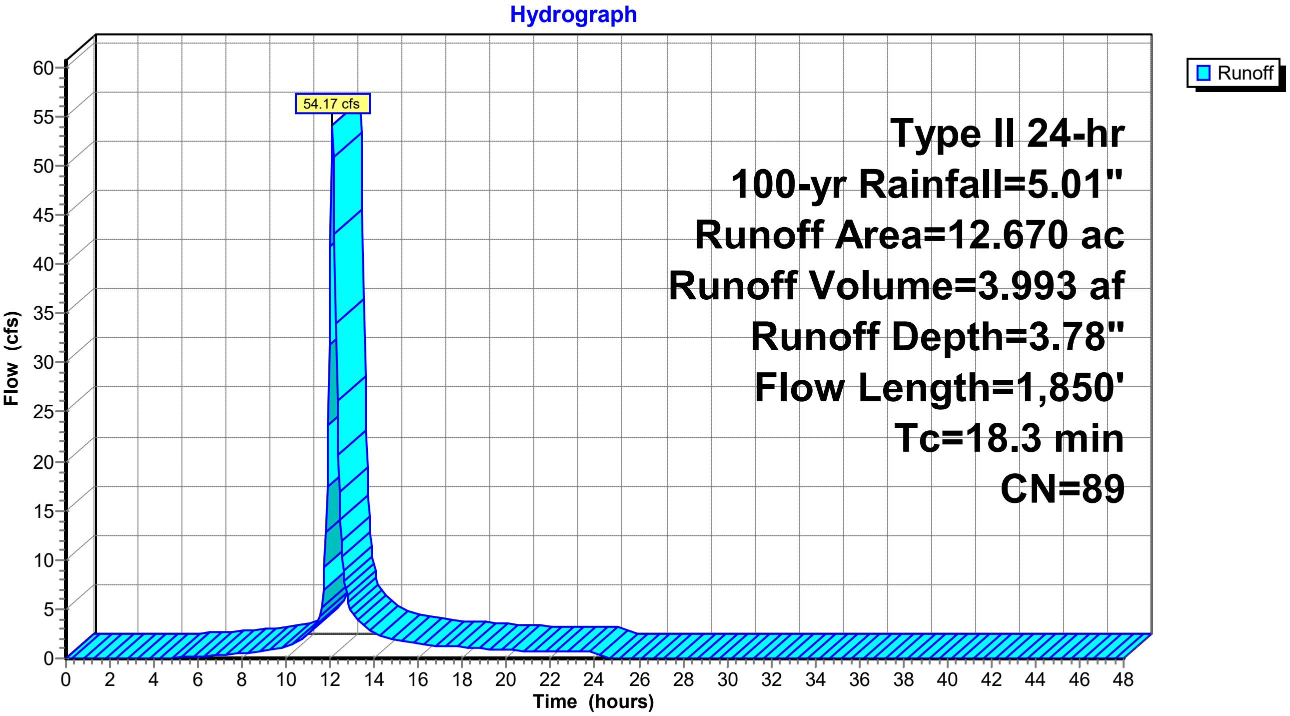
Runoff = 54.17 cfs @ 12.10 hrs, Volume= 3.993 af, Depth= 3.78"
Routed to Link 3L : Total Discharge to Ditch at NW Corner of Site to Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (ac)	CN	Description
12.670	89	Row crops, straight row, Good, HSG D
12.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0100	0.22		**Sheet Flow, 100' Overland Flow** Cultivated: Residue<=20% n= 0.060 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
4.2	1,400	0.0060	5.61	706.31	**Trap/Vee/Rect Channel Flow, North Property Line Ditch** Bot.W=1.00' D=3.50' Z= 10.0 '/' Top.W=71.00' n= 0.030
18.3	1,850	Total			

Subcatchment 6S: Contributing Area from North



Summary for Subcatchment 7S: Contributing Watershed from East

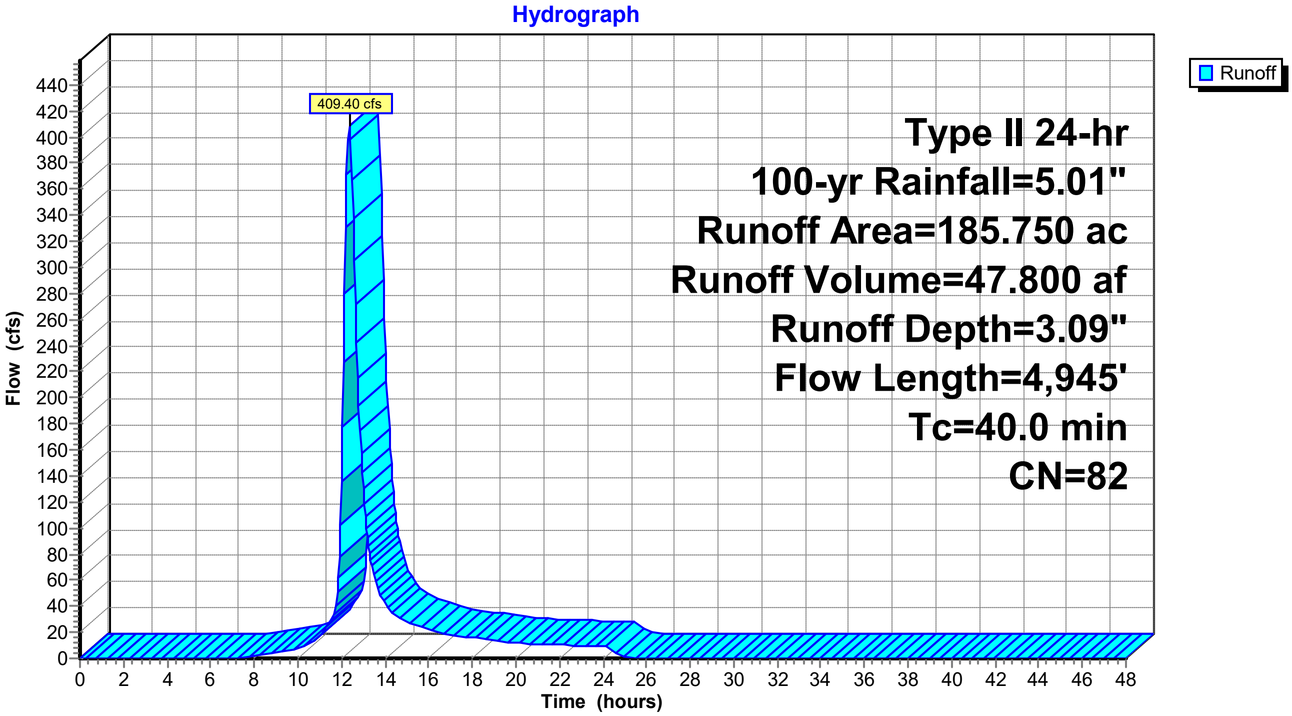
Runoff = 409.40 cfs @ 12.36 hrs, Volume= 47.800 af, Depth= 3.09"
Routed to Reach 2R : North Property Line Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (ac)	CN	Description
78.660	79	Woods, Fair, HSG D
2.970	98	Water Surface, 0% imp, HSG D
1.050	96	Gravel surface, HSG D
103.070	84	Pasture/grassland/range, Fair, HSG D
185.750	82	Weighted Average
185.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0350	0.16		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
14.2	1,000	0.0170	1.17		**Shallow Concentrated Flow, 1000' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
2.9	750	0.0130	4.31	430.96	**Trap/Vee/Rect Channel Flow, 750 Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.7	670	0.0120	4.14	414.05	**Trap/Vee/Rect Channel Flow, 670' Flow Through Woods** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
1.9	550	0.0100	4.74	889.55	**Trap/Vee/Rect Channel Flow, 550' Flow Through Ag Field** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
7.6	1,800	0.0070	3.97	744.25	**Trap/Vee/Rect Channel Flow, 1,800' Along Crosby Road** Bot.W=50.00' D=1.50' Z= 50.0 '/' Top.W=200.00' n= 0.030 Earth, grassed & winding
0.1	75	0.0200	17.48	168.15	**Pipe Channel, Crosby Road Cross Culvert** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.011
40.0	4,945	Total			

Subcatchment 7S: Contributing Watershed from East



Summary for Subcatchment 10S: Area to Northwest Property Corner Ditch (to Wetland)

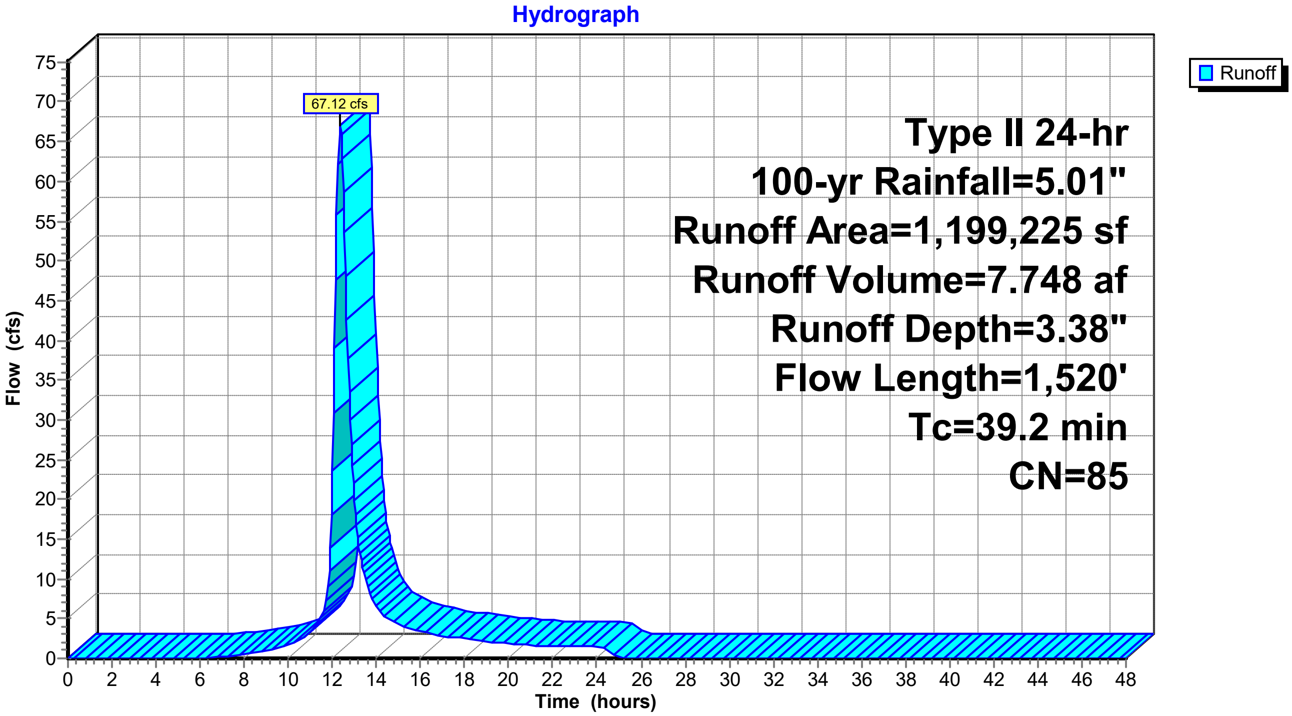
Runoff = 67.12 cfs @ 12.35 hrs, Volume= 7.748 af, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.01"

	Area (sf)	CN	Description
*	5,250	91	Gravel drive, HSG D
	111,735	79	Woods/grass comb., Good, HSG D
	4,900	98	Unconnected roofs, HSG D
	62,430	77	Brush, Fair, HSG D
	727,935	89	Row crops, straight row, Good, HSG D
	83,440	78	Meadow, non-grazed, HSG D
	203,535	79	Woods, Fair, HSG D
	1,199,225	85	Weighted Average
	1,194,325		99.59% Pervious Area
	4,900		0.41% Impervious Area
	4,900		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0120	0.13		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.7	90	0.0150	0.86		**Shallow Concentrated Flow, 90' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
12.7	435	0.0130	0.57		**Shallow Concentrated Flow, 435' Shallow Conc. Flow** Woodland Kv= 5.0 fps
10.0	380	0.0050	0.64		**Shallow Concentrated Flow, 380' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
1.7	515	0.0117	5.20	415.88	**Trap/Vee/Rect Channel Flow, Channel flow across site** Bot.W=50.00' D=1.00' Z= 30.0 '/' Top.W=110.00' n= 0.025
39.2	1,520	Total			

Subcatchment 10S: Area to Northwest Property Corner Ditch (to Wetland)



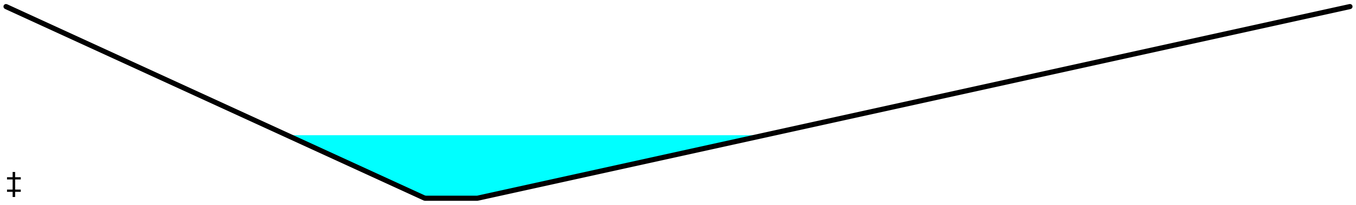
Summary for Reach 1R: Overland Flow from Collection Area to West Property Line (Wetland)

Inflow Area = 13.018 ac, 0.00% Impervious, Inflow Depth = 2.67" for 100-yr event
Inflow = 25.04 cfs @ 12.42 hrs, Volume= 2.902 af
Outflow = 24.76 cfs @ 12.46 hrs, Volume= 2.902 af, Atten= 1%, Lag= 2.7 min
Routed to Link 1L : Total Disharge to West Property Line (Wetland)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.49 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.96 fps, Avg. Travel Time= 8.7 min

Peak Storage= 4,977 cf @ 12.46 hrs
Average Depth at Peak Storage= 0.66' , Surface Width= 27.30'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 399.92 cfs

3.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 12.0 25.0 '/' Top Width= 77.00'
Length= 500.0' Slope= 0.0097 '/'
Inlet Invert= 668.85', Outlet Invert= 664.00'



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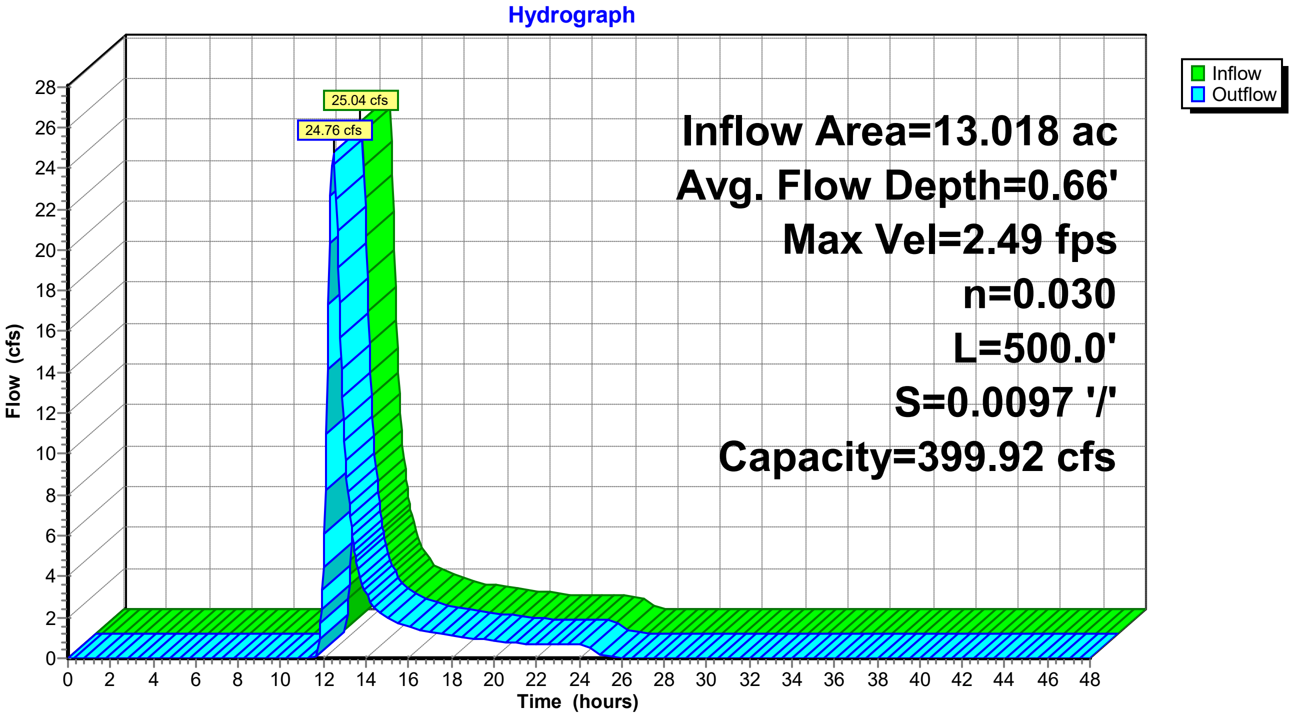
Reach 1R: Overland Flow from Collection Area to West Property Line (Wetland)



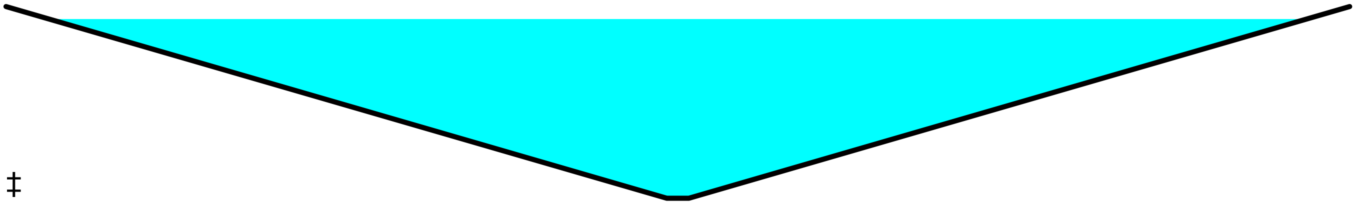
Summary for Reach 2R: North Property Line Ditch

Inflow Area = 185.750 ac, 0.00% Impervious, Inflow Depth = 3.09" for 100-yr event
Inflow = 409.40 cfs @ 12.36 hrs, Volume= 47.800 af
Outflow = 394.65 cfs @ 12.44 hrs, Volume= 47.800 af, Atten= 4%, Lag= 4.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.84 fps, Min. Travel Time= 5.7 min
Avg. Velocity = 1.47 fps, Avg. Travel Time= 19.0 min

Peak Storage= 136,089 cf @ 12.44 hrs
Average Depth at Peak Storage= 2.81' , Surface Width= 57.10'
Bank-Full Depth= 3.00' Flow Area= 93.0 sf, Capacity= 470.66 cfs

1.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 61.00'
Length= 1,670.0' Slope= 0.0060 '/'
Inlet Invert= 669.00', Outlet Invert= 659.00'



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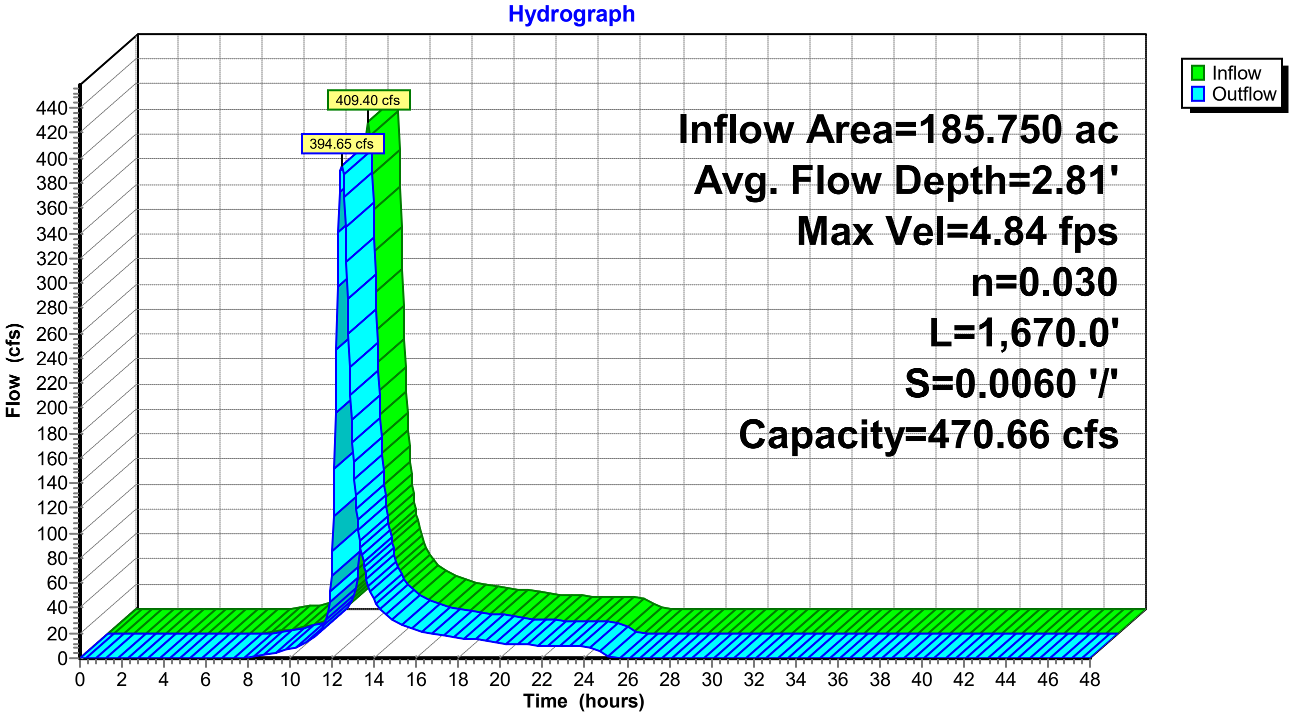
Reach 2R: North Property Line Ditch



Summary for Pond 1P: Collection Area

Inflow Area = 13.018 ac, 0.00% Impervious, Inflow Depth = 2.81" for 100-yr event
Inflow = 25.11 cfs @ 12.40 hrs, Volume= 3.049 af
Outflow = 25.04 cfs @ 12.42 hrs, Volume= 2.902 af, Atten= 0%, Lag= 1.4 min
Primary = 25.04 cfs @ 12.42 hrs, Volume= 2.902 af
Routed to Reach 1R : Overland Flow from Collection Area to West Property Line (Wetland)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 670.07' @ 12.42 hrs Surf.Area= 11,657 sf Storage= 9,177 cf

Plug-Flow detention time= 40.9 min calculated for 2.899 af (95% of inflow)
Center-of-Mass det. time= 13.7 min (868.5 - 854.8)

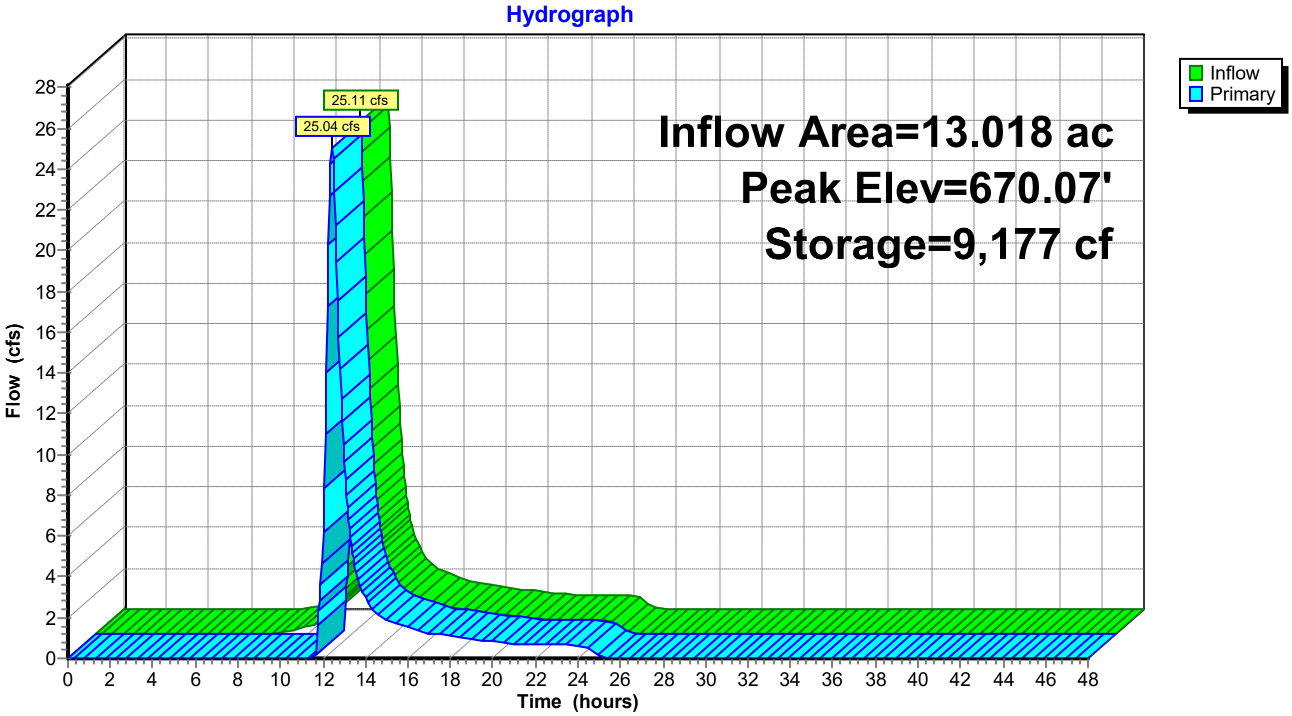
Volume	Invert	Avail.Storage	Storage Description
#1	668.00'	15,369 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
668.00	45	0	0
669.00	2,985	1,515	1,515
670.00	10,790	6,888	8,403
670.50	17,075	6,966	15,369

Device	Routing	Invert	Outlet Devices
#1	Primary	669.80'	**70.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=24.95 cfs @ 12.42 hrs HW=670.07' TW=669.50' (Dynamic Tailwater)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 24.95 cfs @ 1.33 fps)

Pond 1P: Collection Area

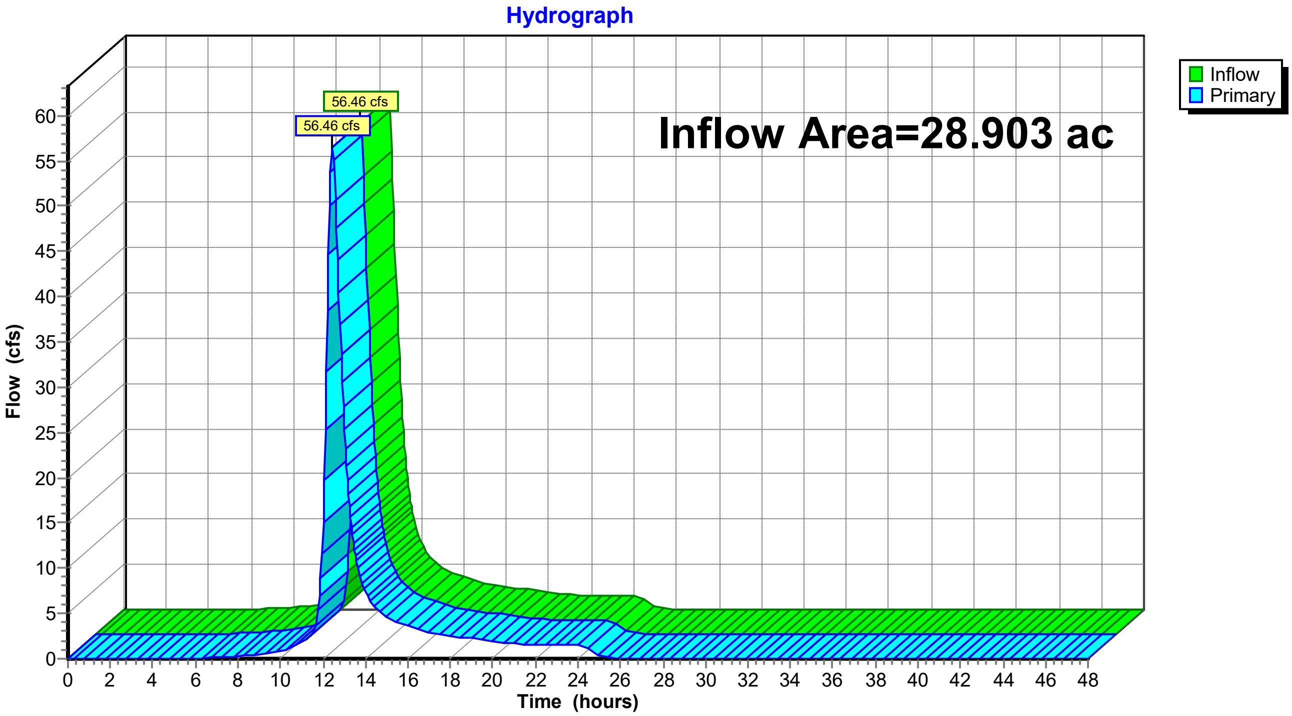


Summary for Link 1L: Total Disharge to West Property Line (Wetland)

Inflow Area = 28.903 ac, 0.00% Impervious, Inflow Depth = 3.05" for 100-yr event
Inflow = 56.46 cfs @ 12.44 hrs, Volume= 7.345 af
Primary = 56.46 cfs @ 12.44 hrs, Volume= 7.345 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 1L: Total Disharge to West Property Line (Wetland)

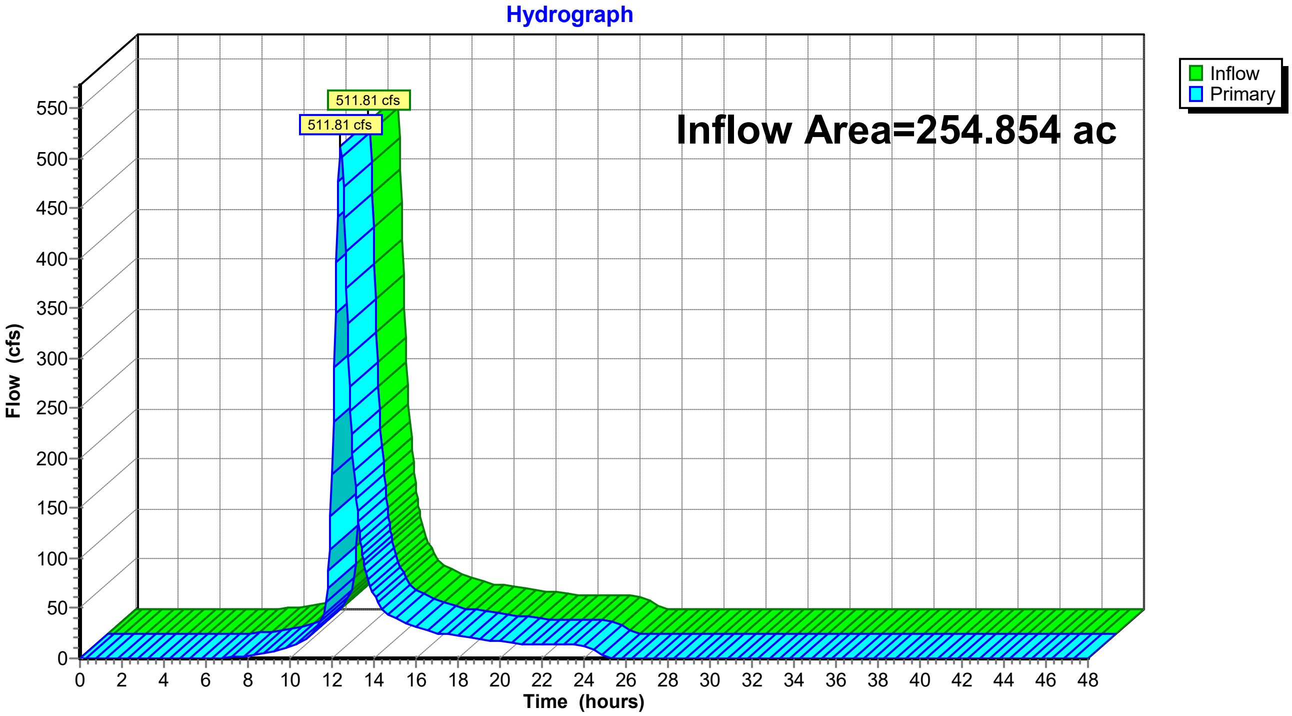


Summary for Link 2L: Total Discharge at Design Points

Inflow Area = 254.854 ac, 0.04% Impervious, Inflow Depth = 3.15" for 100-yr event
Inflow = 511.81 cfs @ 12.42 hrs, Volume= 66.886 af
Primary = 511.81 cfs @ 12.42 hrs, Volume= 66.886 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 2L: Total Discharge at Design Points

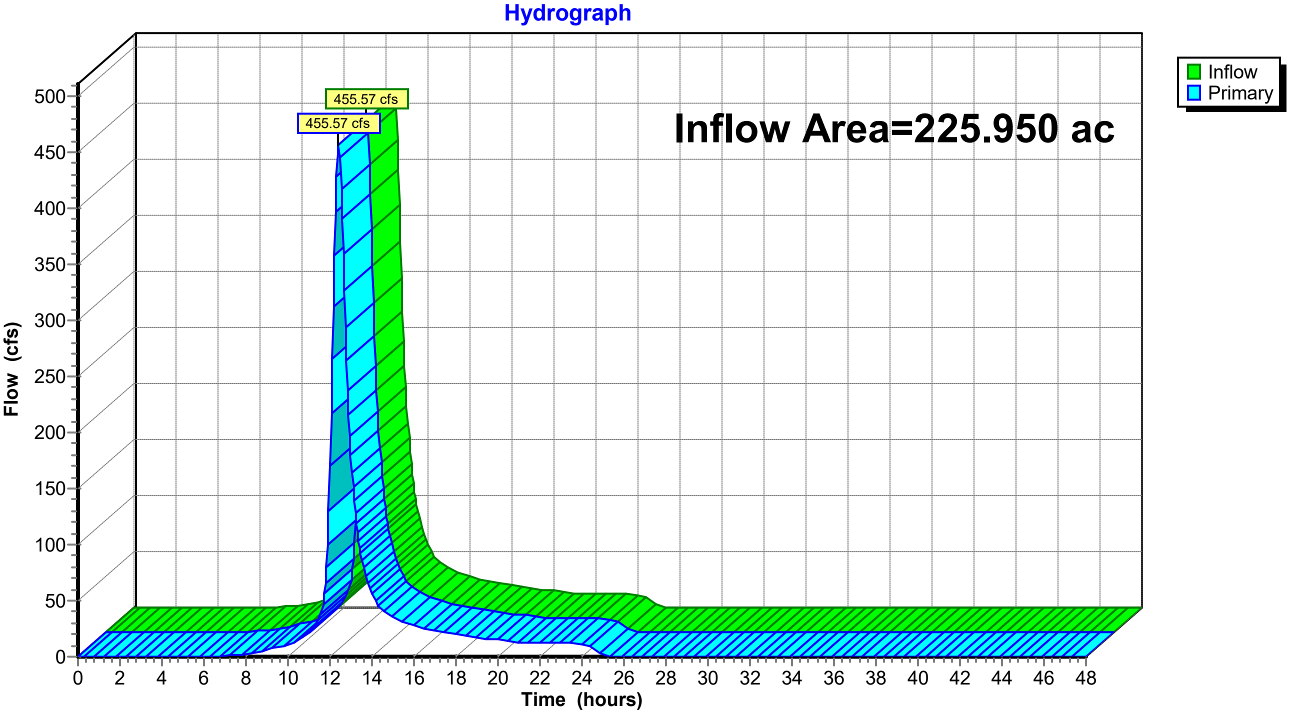


Summary for Link 3L: Total Discharge to Ditch at NW Corner of Site to Wetland

Inflow Area = 225.950 ac, 0.05% Impervious, Inflow Depth = 3.16" for 100-yr event
Inflow = 455.57 cfs @ 12.41 hrs, Volume= 59.541 af
Primary = 455.57 cfs @ 12.41 hrs, Volume= 59.541 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

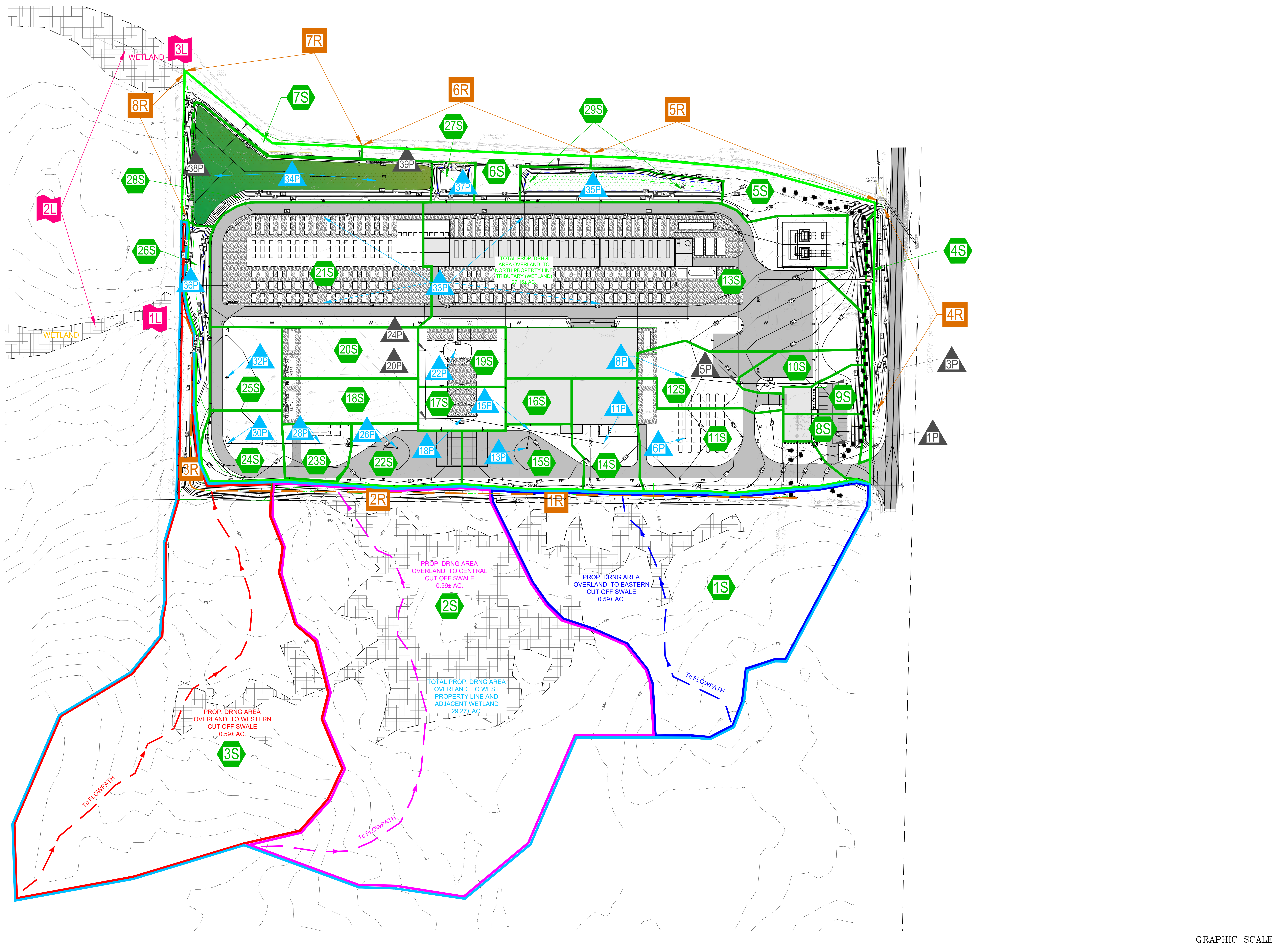
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 3L: Total Discharge to Ditch at NW Corner of Site to Wetland



Appendix A-2

Drainage Calculations
Proposed Conditions



PROPOSED CONDITIONS DRAINAGE MAP

SCALE: 1'=60'

GRAPHIC SCALE

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

NO.	ISSUE DATE	REVISION DESCRIPTION
0	05-15-2021	SITE PLAN SUBMITTAL
1	07-15-2021	SITE PLAN SUBMITTAL - REVISED PER TOWN COMMENTS
2		
3		
4		
5		
6		
7		
8		
9		

CLIENT:

PLUG POWER
968 ALBANY SHAKER ROAD
LATHAM, NY 12110

PROJECT:

PLUG POWER HYDROGEN
PRODUCTION FACILITY

INVICTUS
Civil Engineering, P.C.

4759 N 5th Street
Lewiston, NY 14092
Phone: (716) 946-2415
Email: rhaight@invictuscivilengineering.com

SEAL / SIGNATURE

Following is an excerpt from the New York State Education Law, Article 145, Section 7209 & applies to this drawing:
It is a violation of this law for any person unless he is acting under the direct supervision of a licensed professional engineer to alter an item in any way. If an item bearing the seal of a professional engineer is altered, the altering engineer shall affix his seal and the notation, "ALTERED BY" followed by his signature and date of such alteration and a specific description of the alteration.

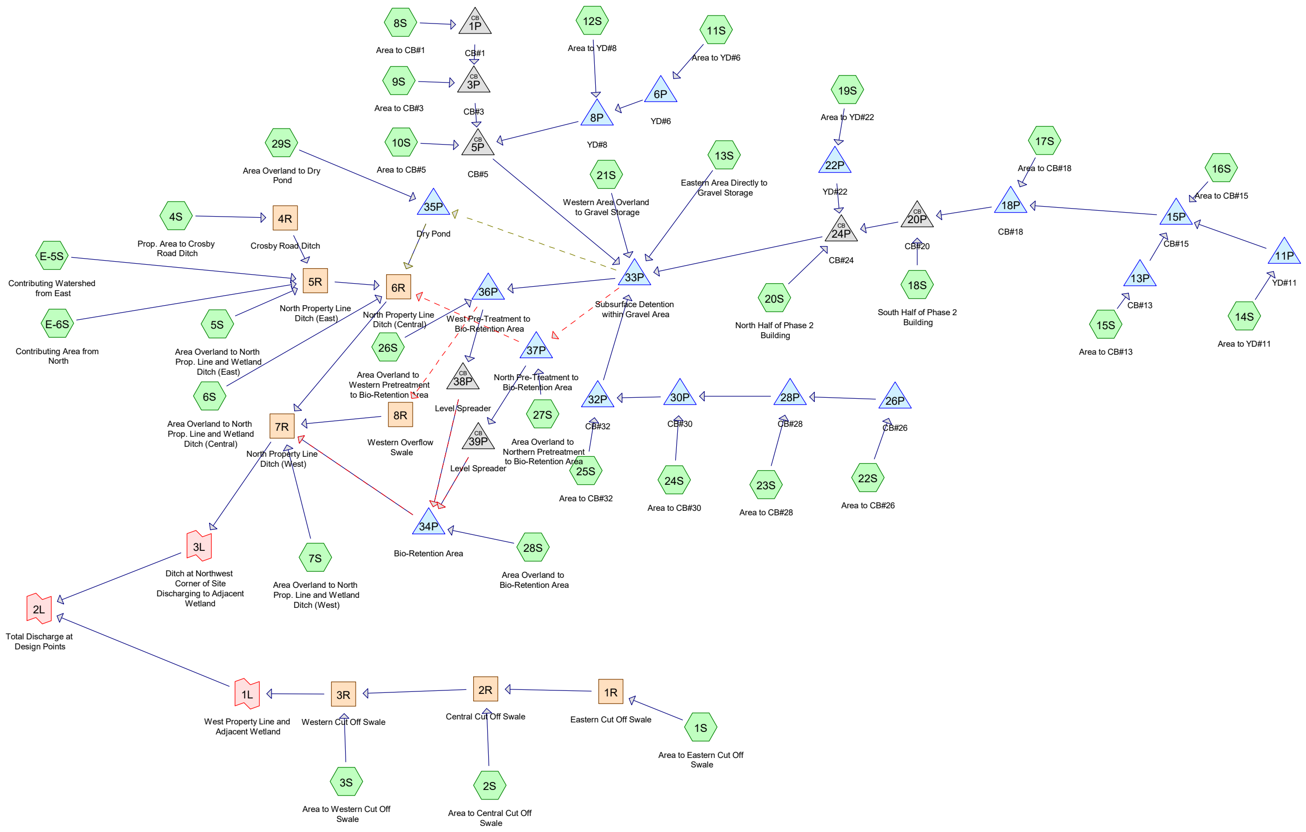
SHEET TITLE

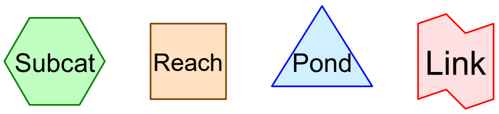
PROPOSED CONDITIONS
DRAINAGE MAP

SHEET

DR-001

SCALE	PROJECT #	DATE
AS NOTED	21-1002	05/15/2021





Routing Diagram for Plug Power - Proposed Conditions 1 7-7-21
Prepared by {enter your company name here}, Printed 7/14/2021
HydroCAD® 10.10-6a s/n 11585 © 2020 HydroCAD Software Solutions LLC

Project Notes

Defined 9 rainfall events from Gateway IDF

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.164	80	>75% Grass cover, Good, HSG D (8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 17S, 19S, 21S, 22S, 23S, 24S, 26S, 27S, 28S, 29S)
2.119	77	Brush, Fair, HSG D (5S, 6S, 7S)
1.861	73	Brush, Good, HSG D (1S, 2S, 3S)
3.004	80	Gravel Storage Area, Good, HSG D (13S, 21S)
1.050	96	Gravel surface, HSG D (E-5S)
7.585	78	Meadow, non-grazed, HSG D (1S, 2S, 3S, 24S)
103.070	84	Pasture/grassland/range, Fair, HSG D (E-5S)
5.945	98	Paved parking, HSG D (8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 21S, 22S, 23S, 24S, 25S)
5.115	98	Roofs, HSG D (8S, 9S, 11S, 12S, 13S, 14S, 15S, 16S, 18S, 20S, 21S)
15.560	89	Row crops, straight row, Good, HSG D (3S, E-6S)
1.449	98	Unconnected pavement, HSG D (13S, 17S, 19S, 21S, 23S)
2.970	98	Water Surface, 0% imp, HSG D (E-5S)
95.731	79	Woods, Fair, HSG D (1S, 2S, 3S, E-5S)
0.230	79	Woods/grass comb., Good, HSG D (4S)
254.854	**83**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
254.854	HSG D	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 17S, 18S, 19S, 20S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 29S, E-5S, E-6S
0.000	Other	
254.854		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	9.164	0.000	9.164	>75% Grass cover, Good	8S, 9S, 10S , 11S , 12S , 13S , 14S , 15S , 17S , 19S , 21S , 22S , 23S , 24S , 26S , 27S , 28S , 29S
0.000	0.000	0.000	2.119	0.000	2.119	Brush, Fair	5S, 6S, 7S
0.000	0.000	0.000	1.861	0.000	1.861	Brush, Good	1S, 2S, 3S
0.000	0.000	0.000	3.004	0.000	3.004	Gravel Storage Area, Good	13S , 21S

Ground Covers (selected nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	1.050	0.000	1.050	Gravel surface	E-5S
0.000	0.000	0.000	7.585	0.000	7.585	Meadow, non-grazed	1S, 2S, 3S, 24S
0.000	0.000	0.000	103.070	0.000	103.070	Pasture/grassland/range, Fair	E-5S
0.000	0.000	0.000	5.945	0.000	5.945	Paved parking	8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 21S, 22S, 23S, 24S, 25S
0.000	0.000	0.000	5.115	0.000	5.115	Roofs	8S, 9S, 11S, 12S, 13S, 14S, 15S, 16S, 18S

Ground Covers (selected nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	15.560	0.000	15.560	Row crops, straight row, Good	3S, E-6S
0.000	0.000	0.000	1.449	0.000	1.449	Unconnected pavement	13S, 17S, 19S, 21S, 23S
0.000	0.000	0.000	2.970	0.000	2.970	Water Surface, 0% imp	E-5S
0.000	0.000	0.000	95.731	0.000	95.731	Woods, Fair	1S, 2S, 3S, E-5S
0.000	0.000	0.000	0.230	0.000	0.230	Woods/grass comb., Good	4S
0.000	**0.000**	**0.000**	**254.854**	**0.000**	**254.854**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	E-5S	0.00	0.00	75.0	0.0200	0.012	0.0	42.0	0.0
2	1P	670.15	669.88	137.0	0.0020	0.012	0.0	12.0	0.0
3	3P	668.88	668.45	213.0	0.0020	0.012	0.0	12.0	0.0
4	5P	666.71	666.35	180.0	0.0020	0.012	0.0	24.0	0.0
5	6P	667.37	667.09	138.0	0.0020	0.012	0.0	15.0	0.0
6	8P	666.95	666.71	122.0	0.0020	0.012	0.0	18.0	0.0
7	11P	667.04	666.70	170.0	0.0020	0.012	0.0	12.0	0.0
8	13P	665.99	665.91	40.0	0.0020	0.012	0.0	12.0	0.0
9	15P	665.91	665.60	157.0	0.0020	0.012	0.0	18.0	0.0
10	18P	665.60	665.43	83.0	0.0020	0.012	0.0	18.0	0.0
11	20P	665.43	665.12	157.0	0.0020	0.012	0.0	24.0	0.0
12	22P	666.65	666.51	70.0	0.0020	0.012	0.0	10.0	0.0
13	24P	665.12	664.91	105.0	0.0020	0.012	0.0	24.0	0.0
14	26P	665.90	665.55	175.0	0.0020	0.012	0.0	12.0	0.0
15	28P	665.30	664.87	214.0	0.0020	0.012	0.0	15.0	0.0
16	30P	664.68	664.38	150.0	0.0020	0.012	0.0	18.0	0.0
17	32P	664.38	664.05	166.0	0.0020	0.012	0.0	24.0	0.0
18	33P	664.01	663.90	57.0	0.0019	0.012	0.0	18.0	0.0
19	33P	664.01	663.90	57.0	0.0019	0.012	0.0	18.0	0.0
20	33P	665.71	664.71	50.0	0.0200	0.012	0.0	18.0	0.0
21	33P	666.05	665.05	50.0	0.0200	0.012	0.0	15.0	0.0
22	33P	666.39	665.39	50.0	0.0200	0.012	0.0	12.0	0.0
23	33P	666.56	665.56	50.0	0.0200	0.012	0.0	10.0	0.0
24	34P	660.55	660.50	25.0	0.0020	0.012	0.0	15.0	0.0
25	34P	660.55	660.50	25.0	0.0020	0.012	0.0	15.0	0.0
26	34P	660.56	660.55	5.0	0.0020	0.012	0.0	4.0	0.0
27	34P	660.56	660.55	5.0	0.0020	0.012	0.0	4.0	0.0
28	35P	662.56	662.50	30.0	0.0020	0.012	0.0	12.0	0.0
29	36P	663.04	663.00	20.0	0.0020	0.012	0.0	15.0	0.0
30	37P	663.05	663.00	25.0	0.0020	0.012	0.0	12.0	0.0

Time span=0.00-48.00 hrs, dt=0.15 hrs, 321 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area to Eastern Cut Off Runoff Area=300,195 sf 0.00% Impervious Runoff Depth=0.39"
Flow Length=625' Tc=27.5 min CN=78 Runoff=1.91 cfs 0.222 af

Subcatchment 2S: Area to Central Cut Off Runoff Area=542,635 sf 0.00% Impervious Runoff Depth=0.39"
Flow Length=1,100' Tc=42.2 min CN=78 Runoff=2.62 cfs 0.402 af

Subcatchment 3S: Area to Western Cut Off Runoff Area=432,245 sf 0.00% Impervious Runoff Depth=0.49"
Flow Length=1,100' Tc=51.3 min CN=81 Runoff=2.53 cfs 0.408 af

Subcatchment 4S: Prop. Area to Crosby Runoff Area=10,015 sf 0.00% Impervious Runoff Depth=0.42"
Flow Length=125' Slope=0.0100 '/' Tc=23.3 min CN=79 Runoff=0.08 cfs 0.008 af

Subcatchment 5S: Area Overland to North Runoff Area=47,675 sf 0.00% Impervious Runoff Depth=0.36"
Flow Length=140' Tc=11.7 min CN=77 Runoff=0.39 cfs 0.032 af

Subcatchment 6S: Area Overland to North Runoff Area=23,585 sf 0.00% Impervious Runoff Depth=0.36"
Flow Length=100' Tc=10.8 min CN=77 Runoff=0.21 cfs 0.016 af

Subcatchment 7S: Area Overland to North Runoff Area=21,065 sf 0.00% Impervious Runoff Depth=0.36"
Flow Length=170' Tc=14.9 min CN=77 Runoff=0.16 cfs 0.014 af

Subcatchment 8S: Area to CB#1 Runoff Area=19,240 sf 67.06% Impervious Runoff Depth=1.08"
Flow Length=80' Tc=12.8 min CN=92 Runoff=0.58 cfs 0.040 af

Subcatchment 9S: Area to CB#3 Runoff Area=12,315 sf 47.61% Impervious Runoff Depth=0.88"
Flow Length=80' Tc=12.8 min CN=89 Runoff=0.30 cfs 0.021 af

Subcatchment 10S: Area to CB#5 Runoff Area=18,345 sf 46.99% Impervious Runoff Depth=0.82"
Flow Length=260' Tc=19.1 min CN=88 Runoff=0.37 cfs 0.029 af

Subcatchment 11S: Area to YD#6 Runoff Area=75,770 sf 32.52% Impervious Runoff Depth=0.72"
Flow Length=340' Tc=25.3 min CN=86 Runoff=1.13 cfs 0.104 af

Subcatchment 12S: Area to YD#8 Runoff Area=33,010 sf 38.97% Impervious Runoff Depth=0.77"
Flow Length=150' Slope=0.0100 '/' Tc=23.6 min CN=87 Runoff=0.56 cfs 0.048 af

Subcatchment 13S: Eastern Area Directly Runoff Area=327,610 sf 62.80% Impervious Runoff Depth=1.01"
Flow Length=330' Tc=30.2 min CN=91 Runoff=6.31 cfs 0.632 af

Subcatchment 14S: Area to YD#11 Runoff Area=37,050 sf 56.59% Impervious Runoff Depth=0.94"
Flow Length=70' Slope=0.0100 '/' Tc=17.3 min CN=90 Runoff=0.88 cfs 0.067 af

Subcatchment 15S: Area to CB#13 Runoff Area=37,370 sf 68.58% Impervious Runoff Depth=1.08"
Flow Length=100' Tc=16.9 min CN=92 Runoff=1.01 cfs 0.077 af

Subcatchment 16S: Area to CB#15 Runoff Area=17,040 sf 100.00% Impervious Runoff Depth=1.60"
Tc=5.0 min CN=98 Runoff=0.80 cfs 0.052 af

Subcatchment 17S: Area to CB#18 Runoff Area=20,100 sf 15.05% Impervious Runoff Depth=0.49"
Flow Length=140' Slope=0.0100 '/' Tc=23.4 min UI Adjusted CN=81 Runoff=0.20 cfs 0.019 af

Subcatchment 18S: South Half of Phase Runoff Area=32,290 sf 100.00% Impervious Runoff Depth=1.60"
Tc=5.0 min CN=98 Runoff=1.51 cfs 0.099 af

Subcatchment 19S: Area to YD#22 Runoff Area=27,200 sf 27.67% Impervious Runoff Depth=0.53"
Flow Length=140' Slope=0.0100 '/' Tc=23.4 min UI Adjusted CN=82 Runoff=0.30 cfs 0.028 af

Subcatchment 20S: North Half of Phase 2 Runoff Area=36,505 sf 100.00% Impervious Runoff Depth=1.60"
Tc=5.0 min CN=98 Runoff=1.70 cfs 0.111 af

Subcatchment 21S: Western Area Runoff Area=139,665 sf 42.71% Impervious Runoff Depth=0.82"
Flow Length=50' Slope=0.0200 '/' Tc=6.3 min CN=88 Runoff=3.93 cfs 0.220 af

Subcatchment 22S: Area to CB#26 Runoff Area=35,330 sf 71.10% Impervious Runoff Depth=1.15"
Flow Length=100' Tc=16.9 min CN=93 Runoff=1.02 cfs 0.078 af

Subcatchment 23S: Area to CB#28 Runoff Area=18,475 sf 44.79% Impervious Runoff Depth=0.82"
Flow Length=80' Slope=0.0100 '/' Tc=19.3 min CN=88 Runoff=0.37 cfs 0.029 af

Subcatchment 24S: Area to CB#30 Runoff Area=29,125 sf 23.11% Impervious Runoff Depth=0.62"
Flow Length=150' Slope=0.0140 '/' Tc=20.6 min CN=84 Runoff=0.42 cfs 0.035 af

Subcatchment 25S: Area to CB#32 Runoff Area=31,495 sf 100.00% Impervious Runoff Depth=1.60"
Flow Length=170' Slope=0.0120 '/' Tc=22.1 min CN=98 Runoff=1.09 cfs 0.096 af

Subcatchment 26S: Area Overland to Runoff Area=19,545 sf 0.00% Impervious Runoff Depth=0.46"
Flow Length=45' Slope=0.0100 '/' Tc=12.2 min CN=80 Runoff=0.22 cfs 0.017 af

Subcatchment 27S: Area Overland to Runoff Area=8,970 sf 0.00% Impervious Runoff Depth=0.46"
Tc=5.0 min CN=80 Runoff=0.13 cfs 0.008 af

Subcatchment 28S: Area Overland to Runoff Area=71,325 sf 0.00% Impervious Runoff Depth=0.46"
Flow Length=30' Tc=5.4 min CN=80 Runoff=1.06 cfs 0.062 af

Subcatchment 29S: Area Overland to Dry Runoff Area=33,090 sf 0.00% Impervious Runoff Depth=0.46"
Tc=5.0 min CN=80 Runoff=0.49 cfs 0.029 af

Subcatchment E-5S: Contributing Runoff Area=185.750 ac 0.00% Impervious Runoff Depth=0.53"
Flow Length=4,945' Tc=42.4 min CN=82 Runoff=60.22 cfs 8.255 af

Subcatchment E-6S: Contributing Area Runoff Area=12.670 ac 0.00% Impervious Runoff Depth=0.88"
Flow Length=450' Slope=0.0100 '/' Tc=14.1 min CN=89 Runoff=12.82 cfs 0.930 af

Reach 1R: Eastern Cut Off Swale Avg. Flow Depth=0.34' Max Vel=1.31 fps Inflow=1.91 cfs 0.222 af
n=0.030 L=700.0' S=0.0050 '/' Capacity=43.86 cfs Outflow=1.64 cfs 0.222 af

Reach 2R: Central Cut Off Swale Avg. Flow Depth=0.53' Max Vel=1.67 fps Inflow=4.23 cfs 0.624 af
n=0.030 L=500.0' S=0.0050 '/' Capacity=88.03 cfs Outflow=4.17 cfs 0.624 af

Reach 3R: Western Cut Off Swale Avg. Flow Depth=0.69' Max Vel=1.99 fps Inflow=6.58 cfs 1.032 af
n=0.030 L=600.0' S=0.0050 '/' Capacity=73.73 cfs Outflow=6.54 cfs 1.032 af

Reach 4R: Crosby Road Ditch Avg. Flow Depth=0.05' Max Vel=0.58 fps Inflow=0.08 cfs 0.008 af
n=0.030 L=450.0' S=0.0089 '/' Capacity=98.41 cfs Outflow=0.06 cfs 0.008 af

Reach 5R: North Property Line Ditch Avg. Flow Depth=1.36' Max Vel=2.96 fps Inflow=63.26 cfs 9.225 af
n=0.030 L=670.0' S=0.0055 '/' Capacity=471.44 cfs Outflow=62.56 cfs 9.225 af

Reach 6R: North Property Line Ditch Avg. Flow Depth=1.44' Max Vel=2.60 fps Inflow=62.61 cfs 9.270 af
n=0.030 L=500.0' S=0.0040 '/' Capacity=401.23 cfs Outflow=61.71 cfs 9.270 af

Reach 7R: North Property Line Ditch Avg. Flow Depth=1.59' Max Vel=2.16 fps Inflow=61.78 cfs 9.902 af
n=0.030 L=500.0' S=0.0024 '/' Capacity=463.27 cfs Outflow=61.37 cfs 9.900 af

Reach 8R: Western Overflow Swale Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=500.0' S=0.0100 '/' Capacity=43.30 cfs Outflow=0.00 cfs 0.000 af

Pond 1P: CB#1 Peak Elev=670.67' Inflow=0.58 cfs 0.040 af
12.0" Round Culvert n=0.012 L=137.0' S=0.0020 '/' Outflow=0.58 cfs 0.040 af

Pond 3P: CB#3 Peak Elev=669.54' Inflow=0.88 cfs 0.060 af
12.0" Round Culvert n=0.012 L=213.0' S=0.0020 '/' Outflow=0.88 cfs 0.060 af

Pond 5P: CB#5 Peak Elev=667.60' Inflow=2.68 cfs 0.241 af
24.0" Round Culvert n=0.012 L=180.0' S=0.0020 '/' Outflow=2.68 cfs 0.241 af

Pond 6P: YD#6 Peak Elev=668.08' Storage=1 cf Inflow=1.13 cfs 0.104 af
15.0" Round Culvert n=0.012 L=138.0' S=0.0020 '/' Outflow=1.13 cfs 0.104 af

Pond 8P: YD#8 Peak Elev=667.83' Storage=1 cf Inflow=1.68 cfs 0.152 af
18.0" Round Culvert n=0.012 L=122.0' S=0.0020 '/' Outflow=1.68 cfs 0.152 af

Pond 11P: YD#11 Peak Elev=667.69' Storage=1 cf Inflow=0.88 cfs 0.067 af
12.0" Round Culvert n=0.012 L=170.0' S=0.0020 '/' Outflow=0.88 cfs 0.067 af

Pond 13P: CB#13 Peak Elev=666.95' Storage=4 cf Inflow=1.01 cfs 0.077 af
12.0" Round Culvert n=0.012 L=40.0' S=0.0020 '/' Outflow=1.01 cfs 0.077 af

Pond 15P: CB#15 Peak Elev=666.92' Storage=4 cf Inflow=2.38 cfs 0.196 af
18.0" Round Culvert n=0.012 L=157.0' S=0.0020 '/' Outflow=2.38 cfs 0.196 af

Pond 18P: CB#18 Peak Elev=666.78' Storage=5 cf Inflow=2.50 cfs 0.215 af
18.0" Round Culvert n=0.012 L=83.0' S=0.0020 '/' Outflow=2.50 cfs 0.215 af

Pond 20P: CB#20 Peak Elev=666.66' Inflow=3.86 cfs 0.313 af
24.0" Round Culvert n=0.012 L=157.0' S=0.0020 '/' Outflow=3.86 cfs 0.313 af

Pond 22P: YD#22 Peak Elev=667.04' Storage=0 cf Inflow=0.30 cfs 0.028 af
10.0" Round Culvert n=0.012 L=70.0' S=0.0020 '/' Outflow=0.30 cfs 0.028 af

```
Pond 24P: CB#24                                              Peak Elev=666.44'   Inflow=5.64 cfs  0.453 af
                        24.0"  Round Culvert  n=0.012  L=105.0'  S=0.0020 '/'   Outflow=5.64 cfs  0.453 af

Pond 26P: CB#26                                 Peak Elev=666.61'  Storage=3 cf   Inflow=1.02 cfs  0.078 af
                        12.0"  Round Culvert  n=0.012  L=175.0'  S=0.0020 '/'   Outflow=1.02 cfs  0.078 af

Pond 28P: CB#28                                 Peak Elev=666.05'  Storage=3 cf   Inflow=1.38 cfs  0.107 af
                        15.0"  Round Culvert  n=0.012  L=214.0'  S=0.0020 '/'   Outflow=1.38 cfs  0.107 af

Pond 30P: CB#30                                 Peak Elev=665.68'  Storage=4 cf   Inflow=1.79 cfs  0.141 af
                        18.0"  Round Culvert  n=0.012  L=150.0'  S=0.0020 '/'   Outflow=1.79 cfs  0.141 af

Pond 32P: CB#32                                 Peak Elev=665.63'  Storage=5 cf   Inflow=2.87 cfs  0.238 af
                        24.0"  Round Culvert  n=0.012  L=166.0'  S=0.0020 '/'   Outflow=2.87 cfs  0.238 af

Pond 33P: Subsurface Detention within     Peak Elev=665.53'  Storage=2,448 cf   Inflow=17.26 cfs  1.783 af
Primary=10.91 cfs  1.133 af   Secondary=5.45 cfs  0.650 af   Tertiary=0.00 cfs  0.000 af   Outflow=16.36 cfs  1.783 af

Pond 34P: Bio-Retention Area             Peak Elev=664.18'  Storage=61,848 cf   Inflow=10.04 cfs  1.824 af
                     Primary=0.53 cfs  0.618 af   Secondary=0.00 cfs  0.000 af   Outflow=0.53 cfs  0.618 af

Pond 35P: Dry Pond                          Peak Elev=662.90'  Storage=839 cf   Inflow=0.49 cfs  0.029 af
                      Primary=0.05 cfs  0.029 af   Tertiary=0.00 cfs  0.000 af   Outflow=0.05 cfs  0.029 af

Pond 36P: West Pre-Treatment to          Peak Elev=665.26'  Storage=10,057 cf   Inflow=11.09 cfs  1.150 af
                     Primary=6.08 cfs  1.126 af   Secondary=0.00 cfs  0.000 af   Outflow=6.08 cfs  1.126 af

Pond 37P: North Pre-Treatment to          Peak Elev=664.95'  Storage=4,645 cf   Inflow=5.49 cfs  0.658 af
                     Primary=3.74 cfs  0.637 af   Secondary=0.00 cfs  0.000 af   Outflow=3.74 cfs  0.637 af

Pond 38P: Level Spreader                                     Peak Elev=664.25'   Inflow=6.08 cfs  1.126 af
                     Primary=6.08 cfs  1.126 af   Secondary=0.00 cfs  0.000 af   Outflow=6.08 cfs  1.126 af

Pond 39P: Level Spreader                                     Peak Elev=664.33'   Inflow=3.74 cfs  0.637 af
                     Primary=3.74 cfs  0.637 af   Secondary=0.00 cfs  0.000 af   Outflow=3.74 cfs  0.637 af

Link 1L: West Property Line and Adjacent Wetland                                  Inflow=6.54 cfs  1.032 af
                                                                                Primary=6.54 cfs  1.032 af

Link 2L: Total Discharge at Design Points                                      Inflow=67.88 cfs  10.932 af
                                                                              Primary=67.88 cfs  10.932 af

Link 3L: Ditch at Northwest Corner of Site Discharging to Adjacent Wetland      Inflow=61.37 cfs  9.900 af
                                                                               Primary=61.37 cfs  9.900 af
```

Total Runoff Area = 254.854 ac Runoff Volume = 12.187 af Average Runoff Depth = 0.57"
95.09% Pervious = 242.345 ac 4.91% Impervious = 12.509 ac

Summary for Subcatchment 1S: Area to Eastern Cut Off Swale

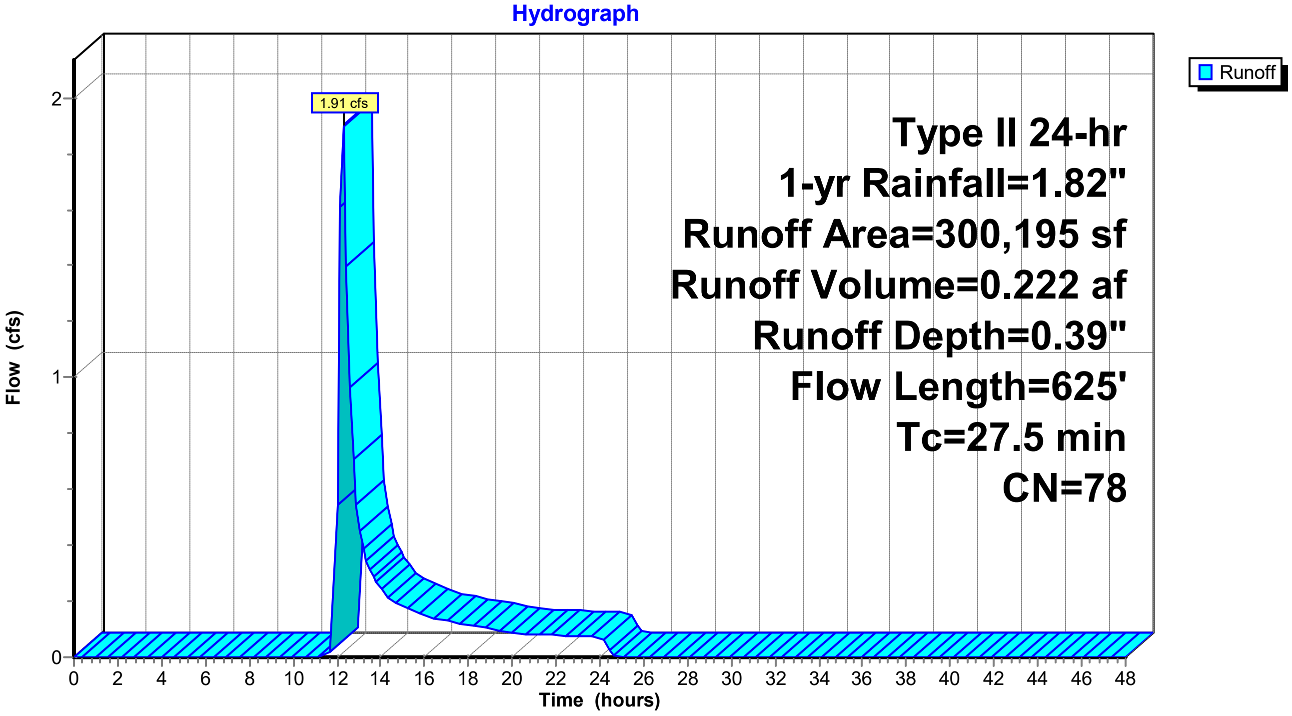
Runoff = 1.91 cfs @ 12.28 hrs, Volume= 0.222 af, Depth= 0.39"
Routed to Reach 1R : Eastern Cut Off Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
83,440	78	Meadow, non-grazed, HSG D
185,160	79	Woods, Fair, HSG D
31,595	73	Brush, Good, HSG D
300,195	78	Weighted Average
300,195		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0120	0.13		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.7	90	0.0150	0.86		**Shallow Concentrated Flow, 90' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
12.7	435	0.0130	0.57		**Shallow Concentrated Flow, 435' Shallow Conc. Flow** Woodland Kv= 5.0 fps
27.5	625	Total			

Subcatchment 1S: Area to Eastern Cut Off Swale



Summary for Subcatchment 2S: Area to Central Cut Off Swale

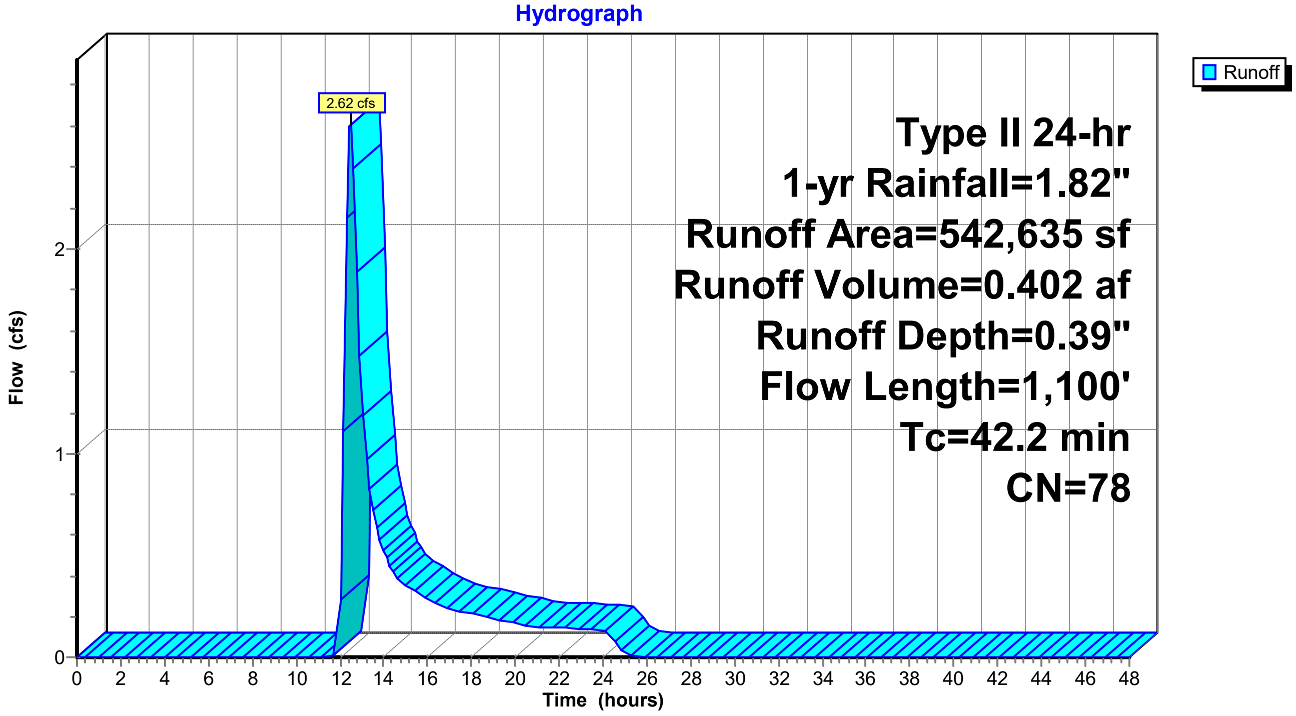
Runoff = 2.62 cfs @ 12.48 hrs, Volume= 0.402 af, Depth= 0.39"
Routed to Reach 2R : Central Cut Off Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
333,020	79	Woods, Fair, HSG D
189,965	78	Meadow, non-grazed, HSG D
19,650	73	Brush, Good, HSG D
542,635	78	Weighted Average
542,635		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
7.3	375	0.0150	0.86		**Shallow Concentrated Flow, 375' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
20.8	625	0.0100	0.50		**Shallow Concentrated Flow, 625' Shallow Conc. Flow** Woodland Kv= 5.0 fps
42.2	1,100	Total			

Subcatchment 2S: Area to Central Cut Off Swale



Summary for Subcatchment 3S: Area to Western Cut Off Swale

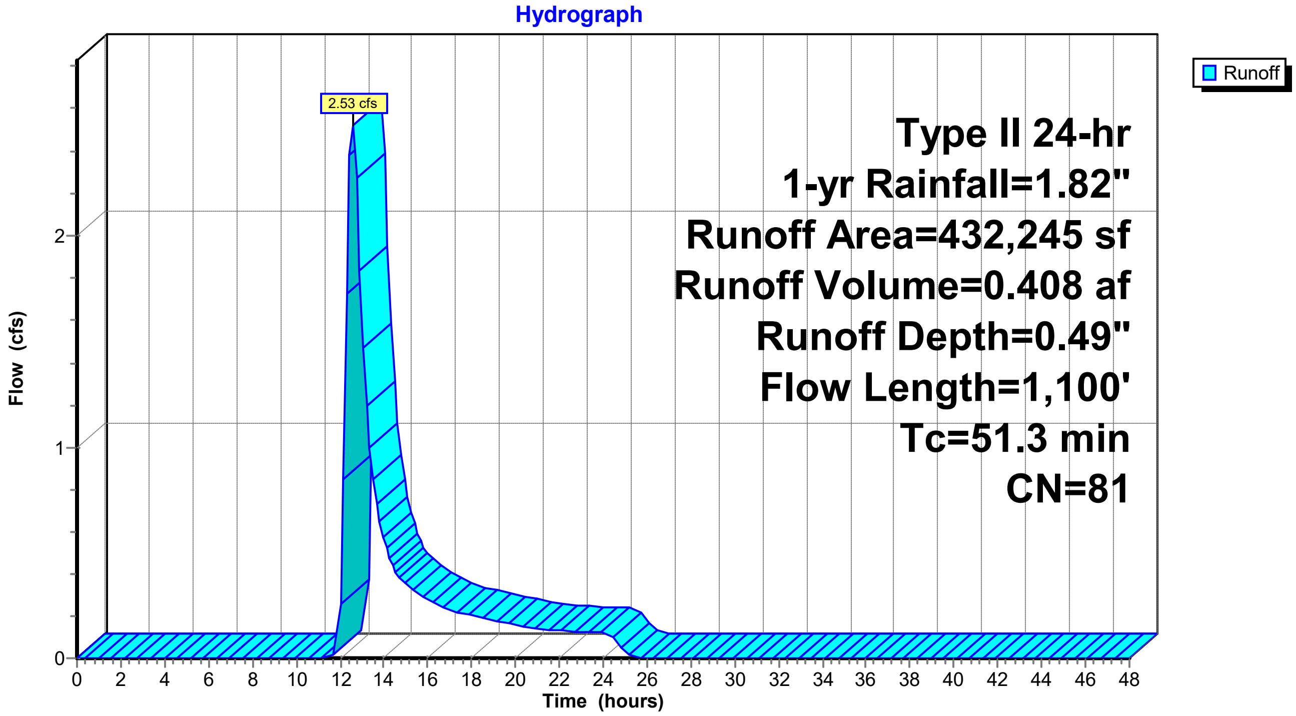
Runoff = 2.53 cfs @ 12.58 hrs, Volume= 0.408 af, Depth= 0.49"
Routed to Reach 3R : Western Cut Off Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
125,880	89	Row crops, straight row, Good, HSG D
51,080	78	Meadow, non-grazed, HSG D
225,445	79	Woods, Fair, HSG D
29,840	73	Brush, Good, HSG D
432,245	81	Weighted Average
432,245		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.1	100	0.0050	0.07		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
21.7	650	0.0100	0.50		**Shallow Concentrated Flow, 650' Shallow Conc. Flow** Woodland Kv= 5.0 fps
51.3	1,100	Total			

Subcatchment 3S: Area to Western Cut Off Swale



Summary for Subcatchment 4S: Prop. Area to Crosby Road Ditch

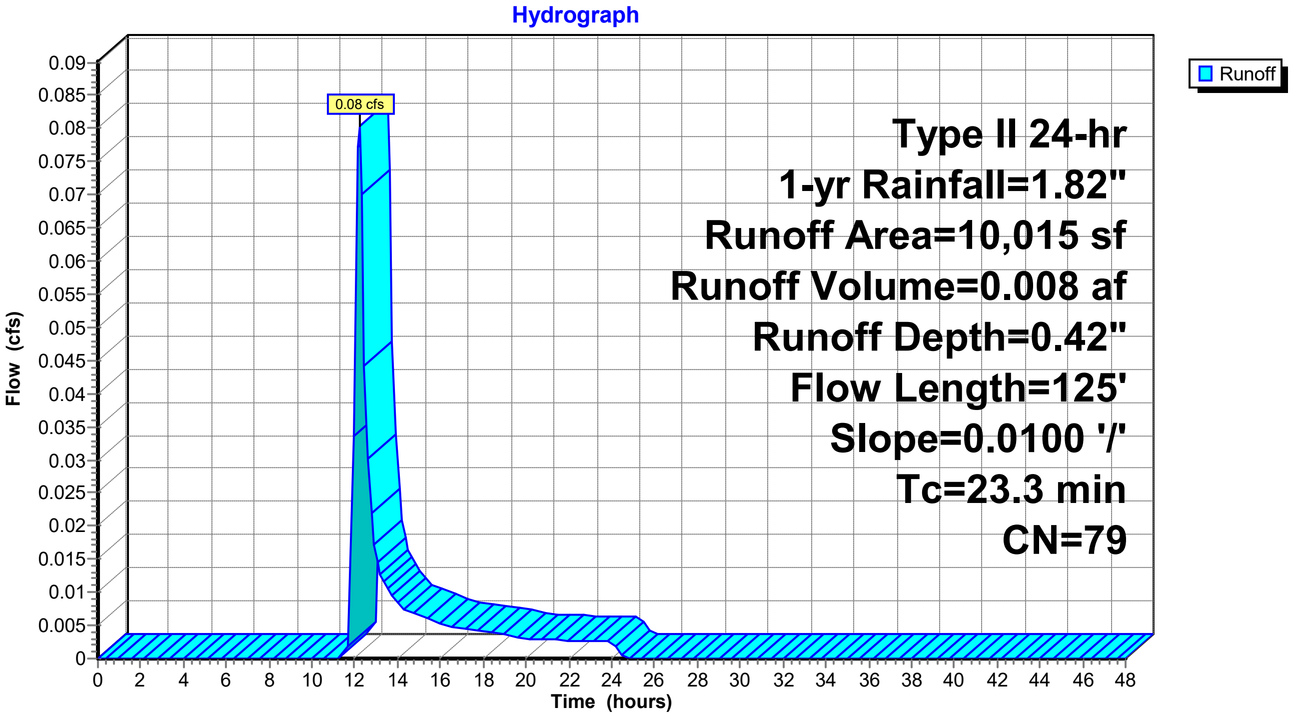
Runoff = 0.08 cfs @ 12.20 hrs, Volume= 0.008 af, Depth= 0.42"
Routed to Reach 4R : Crosby Road Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
10,015	79	Woods/grass comb., Good, HSG D
10,015		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	100	0.0100	0.07		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.3	25	0.0100	1.50		**Shallow Concentrated Flow, 25' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
23.3	125	Total			

Subcatchment 4S: Prop. Area to Crosby Road Ditch



Summary for Subcatchment 5S: Area Overland to North Prop. Line and Wetland Ditch (East)

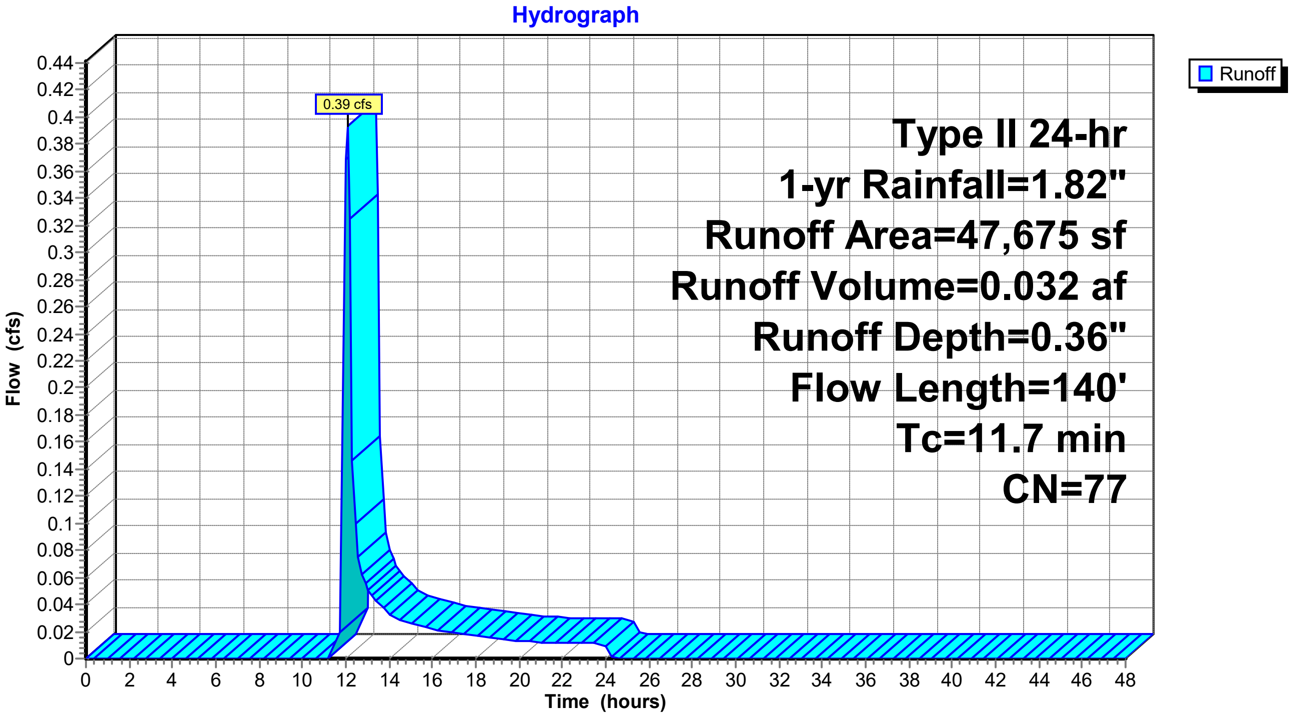
Runoff = 0.39 cfs @ 12.06 hrs, Volume= 0.032 af, Depth= 0.36"
Routed to Reach 5R : North Property Line Ditch (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
47,675	77	Brush, Fair, HSG D
47,675		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	100	0.0200	0.16		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.0	40	0.0100	0.70		**Shallow Concentrated Flow, 40' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
11.7	140	Total			

Subcatchment 5S: Area Overland to North Prop. Line and Wetland Ditch (East)



Summary for Subcatchment 6S: Area Overland to North Prop. Line and Wetland Ditch (Central)

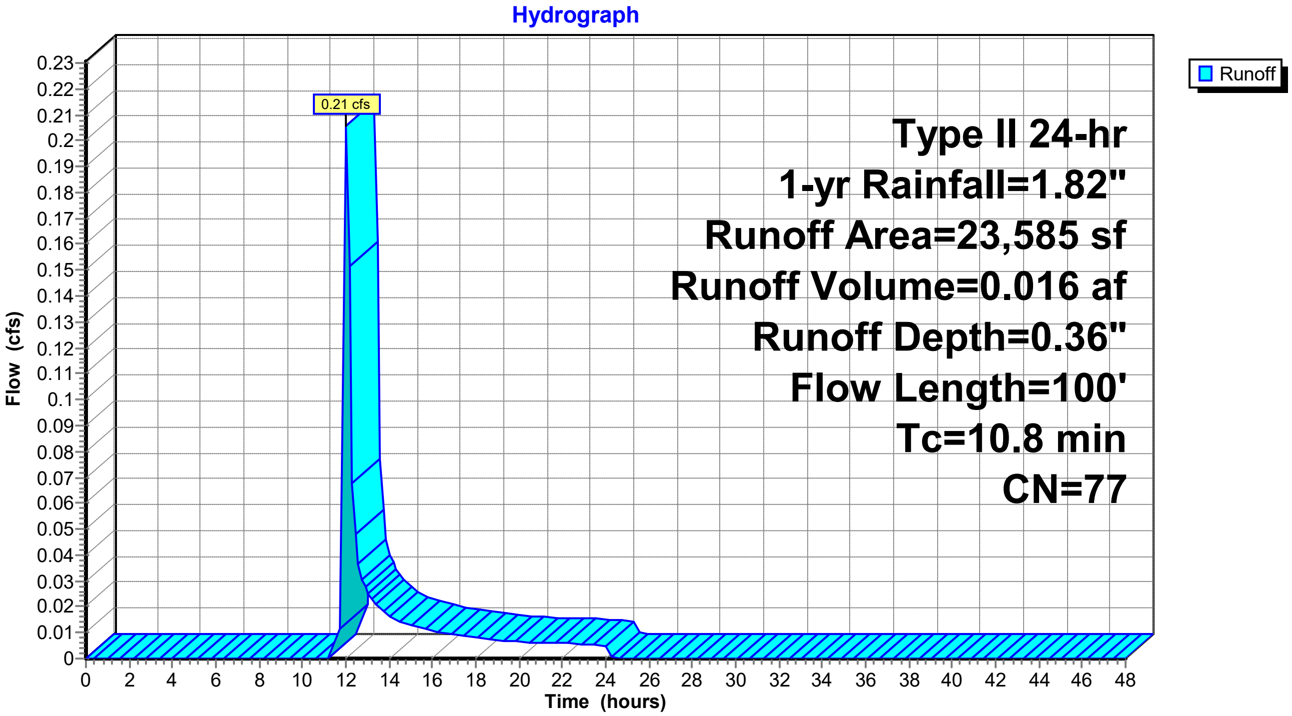
Runoff = 0.21 cfs @ 12.04 hrs, Volume= 0.016 af, Depth= 0.36"
Routed to Reach 6R : North Property Line Ditch (Central)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
23,585	77	Brush, Fair, HSG D
23,585		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	70	0.0100	0.11		**Sheet Flow, 70' Overland Flow** Range n= 0.130 P2= 2.14"
0.2	30	0.1000	2.21		**Shallow Concentrated Flow, 30' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
10.8	100	Total			

Subcatchment 6S: Area Overland to North Prop. Line and Wetland Ditch (Central)



Summary for Subcatchment 7S: Area Overland to North Prop. Line and Wetland Ditch (West)

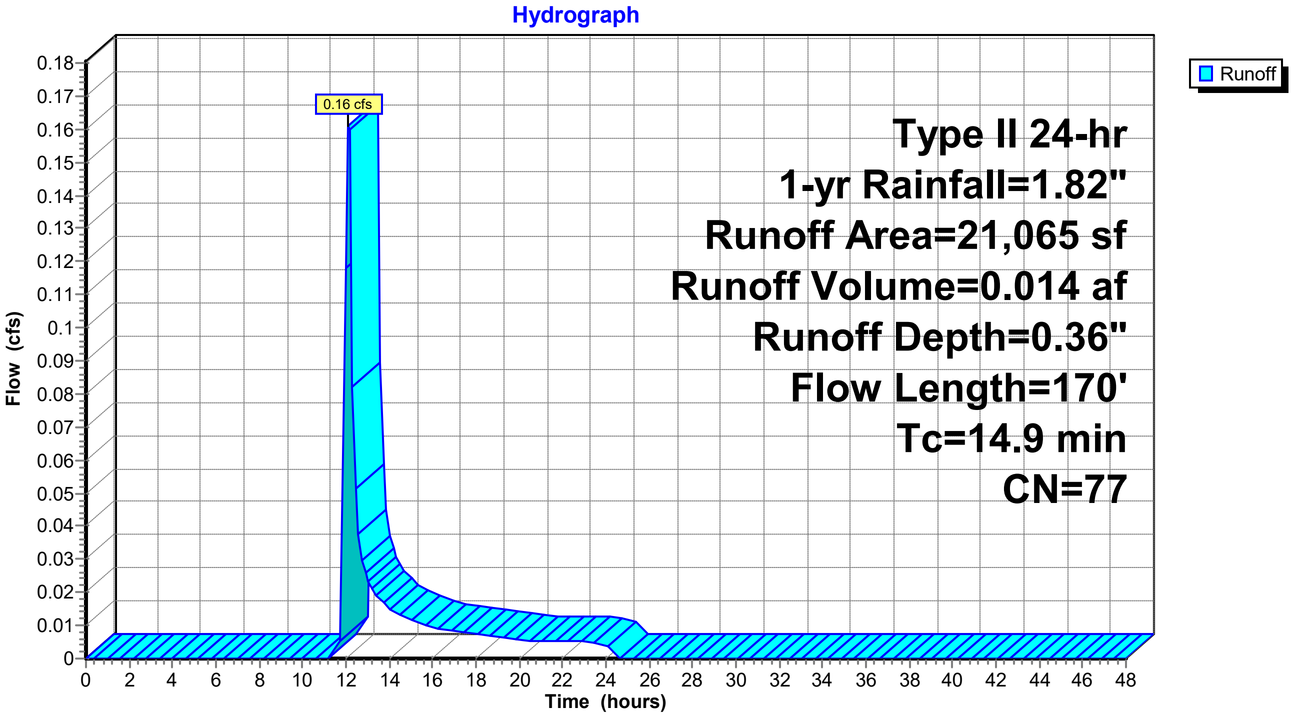
Runoff = 0.16 cfs @ 12.13 hrs, Volume= 0.014 af, Depth= 0.36"
Routed to Reach 7R : North Property Line Ditch (West)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
21,065	77	Brush, Fair, HSG D
21,065		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
0.8	70	0.0400	1.40		**Shallow Concentrated Flow, 70' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
14.9	170	Total			

Subcatchment 7S: Area Overland to North Prop. Line and Wetland Ditch (West)



Summary for Subcatchment 8S: Area to CB#1

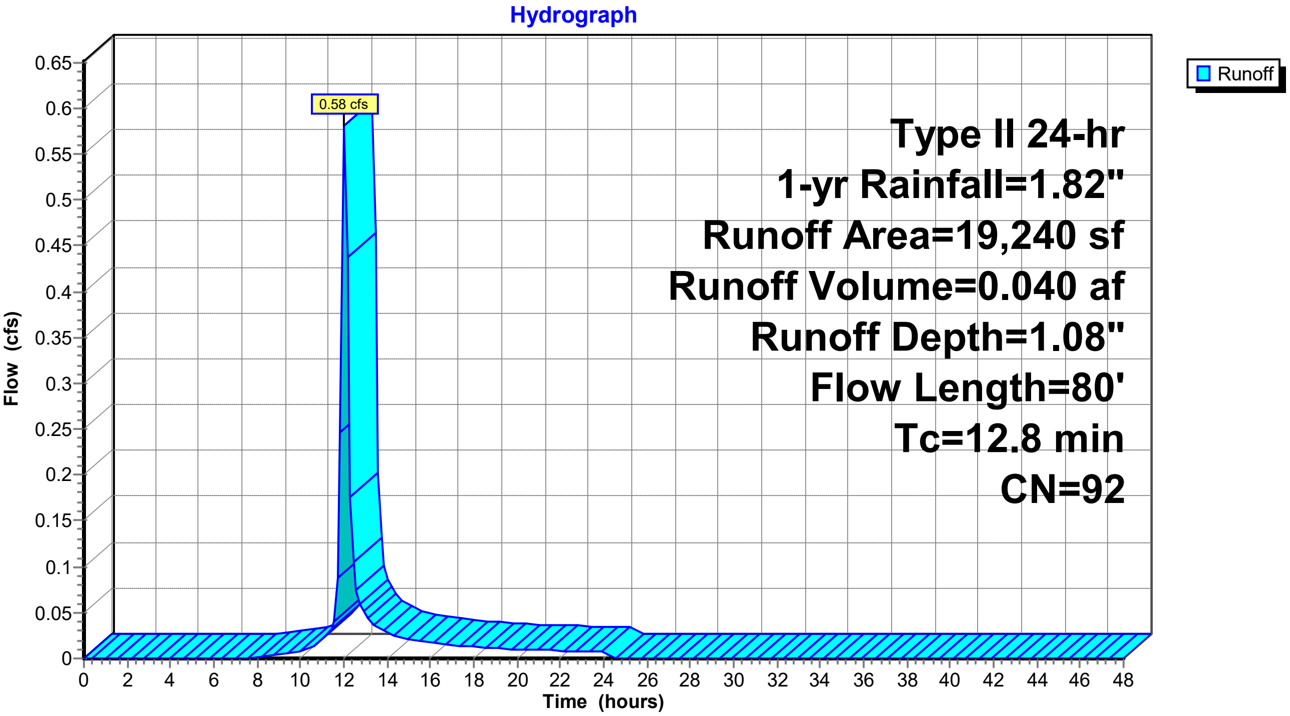
Runoff = 0.58 cfs @ 12.03 hrs, Volume= 0.040 af, Depth= 1.08"
Routed to Pond 1P : CB#1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
4,063	98	Roofs, HSG D
8,840	98	Paved parking, HSG D
6,337	80	>75% Grass cover, Good, HSG D
19,240	92	Weighted Average
6,337		32.94% Pervious Area
12,903		67.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	65	0.0200	0.09		**Sheet Flow, 65' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.4	15	0.0100	0.58		**Sheet Flow, 15' Overland Flow** Smooth surfaces n= 0.011 P2= 2.14"
12.8	80	Total			

Subcatchment 8S: Area to CB#1



Summary for Subcatchment 9S: Area to CB#3

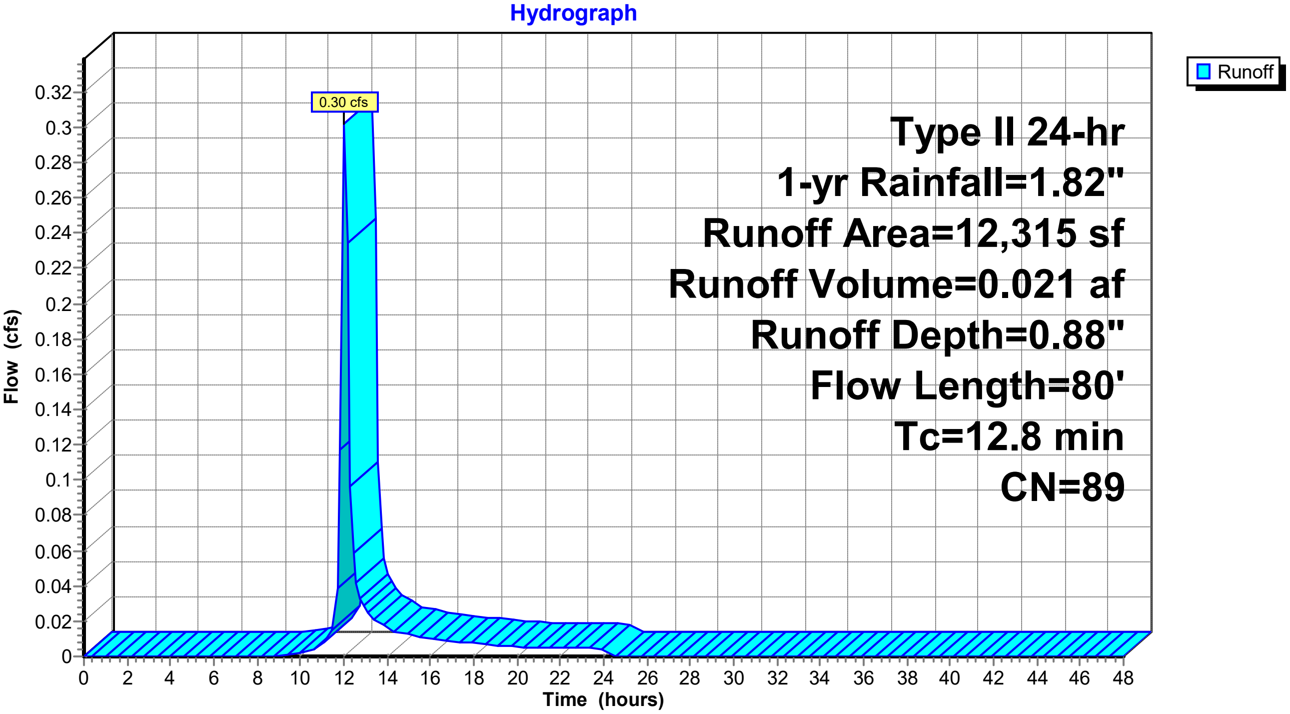
Runoff = 0.30 cfs @ 12.04 hrs, Volume= 0.021 af, Depth= 0.88"
Routed to Pond 3P : CB#3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
4,063	98	Roofs, HSG D
1,800	98	Paved parking, HSG D
6,452	80	>75% Grass cover, Good, HSG D
12,315	89	Weighted Average
6,452		52.39% Pervious Area
5,863		47.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	65	0.0200	0.09		**Sheet Flow, 65' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.4	15	0.0100	0.58		**Sheet Flow, 15' Overland Flow** Smooth surfaces n= 0.011 P2= 2.14"
12.8	80	Total			

Subcatchment 9S: Area to CB#3



Summary for Subcatchment 10S: Area to CB#5

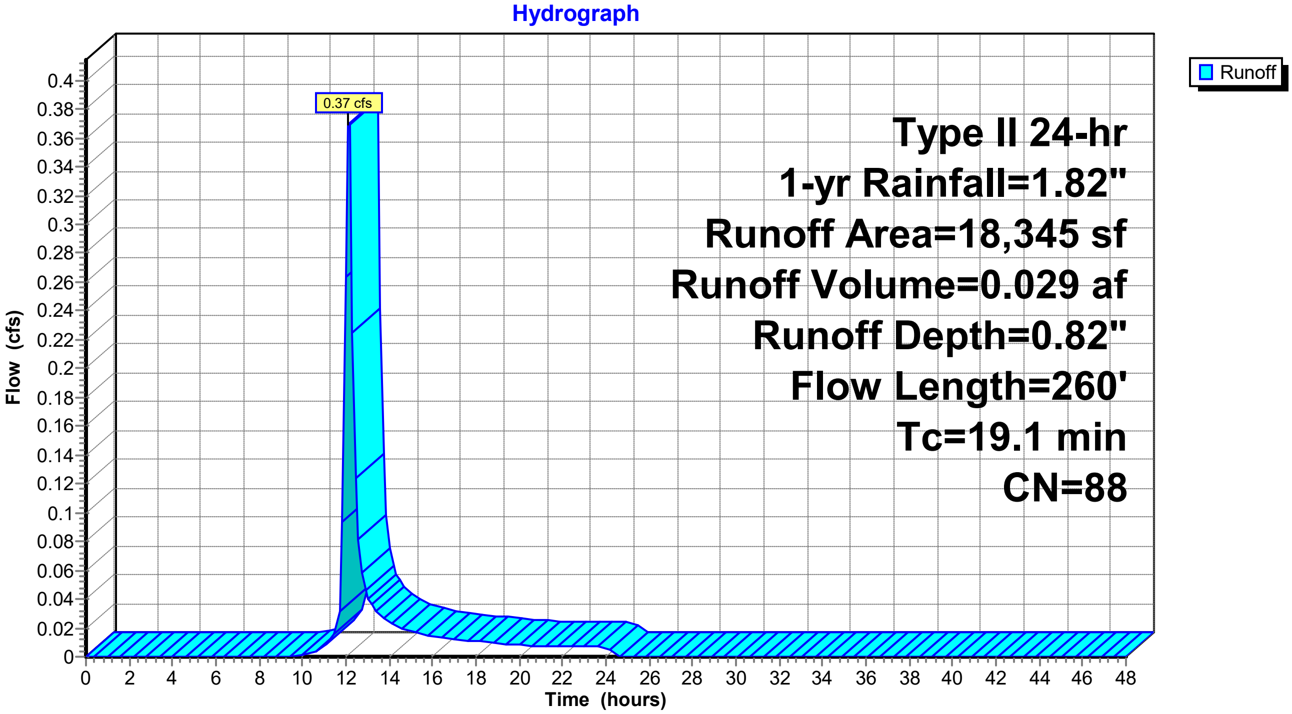
Runoff = 0.37 cfs @ 12.14 hrs, Volume= 0.029 af, Depth= 0.82"
Routed to Pond 5P : CB#5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
8,620	98	Paved parking, HSG D
9,725	80	>75% Grass cover, Good, HSG D
18,345	88	Weighted Average
9,725		53.01% Pervious Area
8,620		46.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0200	0.10		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
1.4	130	0.0100	1.50		**Shallow Concentrated Flow, 130' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
0.2	30	0.0200	2.87		**Shallow Concentrated Flow, 30' Shallow Conc. Flow** Paved Kv= 20.3 fps
19.1	260	Total			

Subcatchment 10S: Area to CB#5



Summary for Subcatchment 11S: Area to YD#6

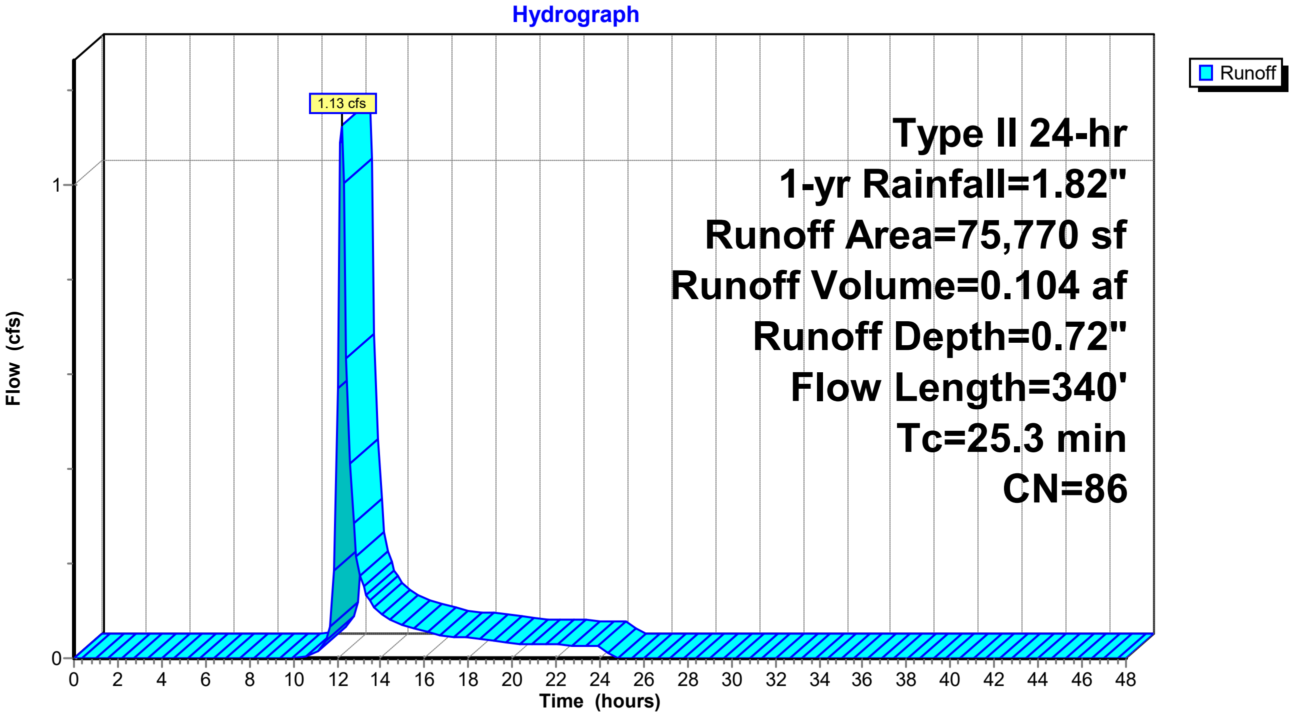
Runoff = 1.13 cfs @ 12.20 hrs, Volume= 0.104 af, Depth= 0.72"
Routed to Pond 6P : YD#6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
20,040	98	Paved parking, HSG D
51,130	80	>75% Grass cover, Good, HSG D
4,600	98	Roofs, HSG D
75,770	86	Weighted Average
51,130		67.48% Pervious Area
24,640		32.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	100	0.0100	0.07		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.3	60	0.0200	2.87		**Shallow Concentrated Flow, 60' Shallow Conc. Flow** Paved Kv= 20.3 fps
2.0	180	0.0100	1.50		**Shallow Concentrated Flow, 180' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
25.3	340	Total			

Subcatchment 11S: Area to YD#6



Summary for Subcatchment 12S: Area to YD#8

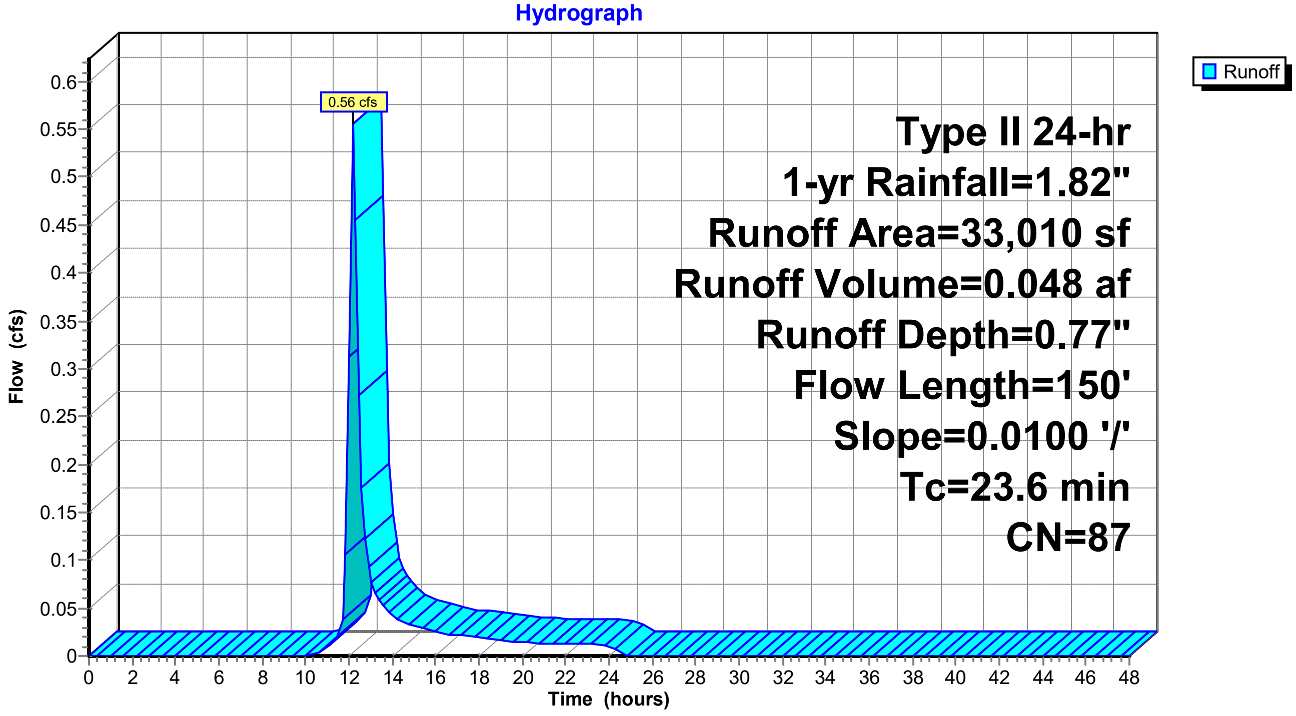
Runoff = 0.56 cfs @ 12.18 hrs, Volume= 0.048 af, Depth= 0.77"
Routed to Pond 8P : YD#8

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
2,610	98	Roofs, HSG D
20,145	80	>75% Grass cover, Good, HSG D
10,255	98	Paved parking, HSG D
33,010	87	Weighted Average
20,145		61.03% Pervious Area
12,865		38.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	100	0.0100	0.07		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.6	50	0.0100	1.50		**Shallow Concentrated Flow, 50' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
23.6	150	Total			

Subcatchment 12S: Area to YD#8



Summary for Subcatchment 13S: Eastern Area Directly to Gravel Storage

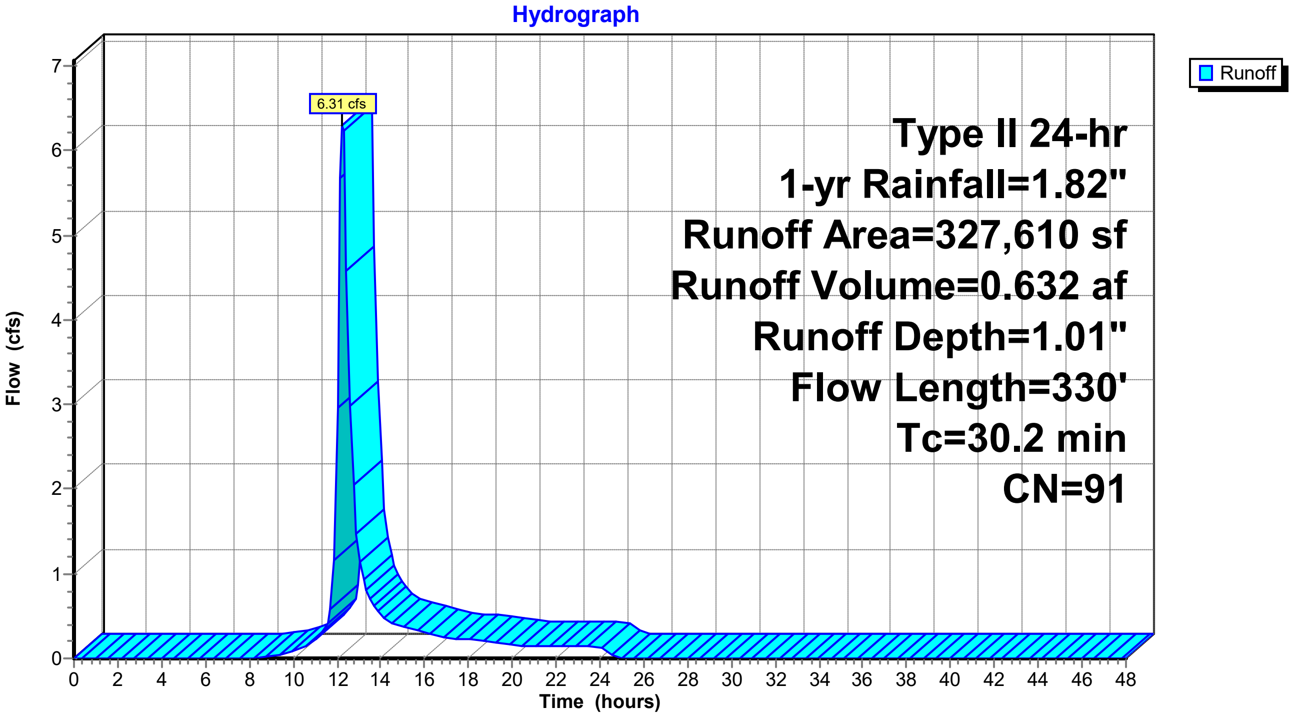
Runoff = 6.31 cfs @ 12.26 hrs, Volume= 0.632 af, Depth= 1.01"
Routed to Pond 33P : Subsurface Detention within Gravel Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

	Area (sf)	CN	Description
*	77,480	80	Gravel Storage Area, Good, HSG D
	80,190	98	Paved parking, HSG D
	77,985	98	Roofs, HSG D
	47,575	98	Unconnected pavement, HSG D
	44,380	80	>75% Grass cover, Good, HSG D
	327,610	91	Weighted Average
	121,860		37.20% Pervious Area
	205,750		62.80% Impervious Area
	47,575		23.12% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	75	0.0130	0.08		**Sheet Flow, 75' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
12.3	25	0.0030	0.03		**Sheet Flow, 25' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.2	30	0.0300	2.60		**Shallow Concentrated Flow, 30' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
1.2	200	0.0200	2.87		**Shallow Concentrated Flow, 200' Shallow Conc. Flow** Paved Kv= 20.3 fps
30.2	330	Total			

Subcatchment 13S: Eastern Area Directly to Gravel Storage



Summary for Subcatchment 14S: Area to YD#11

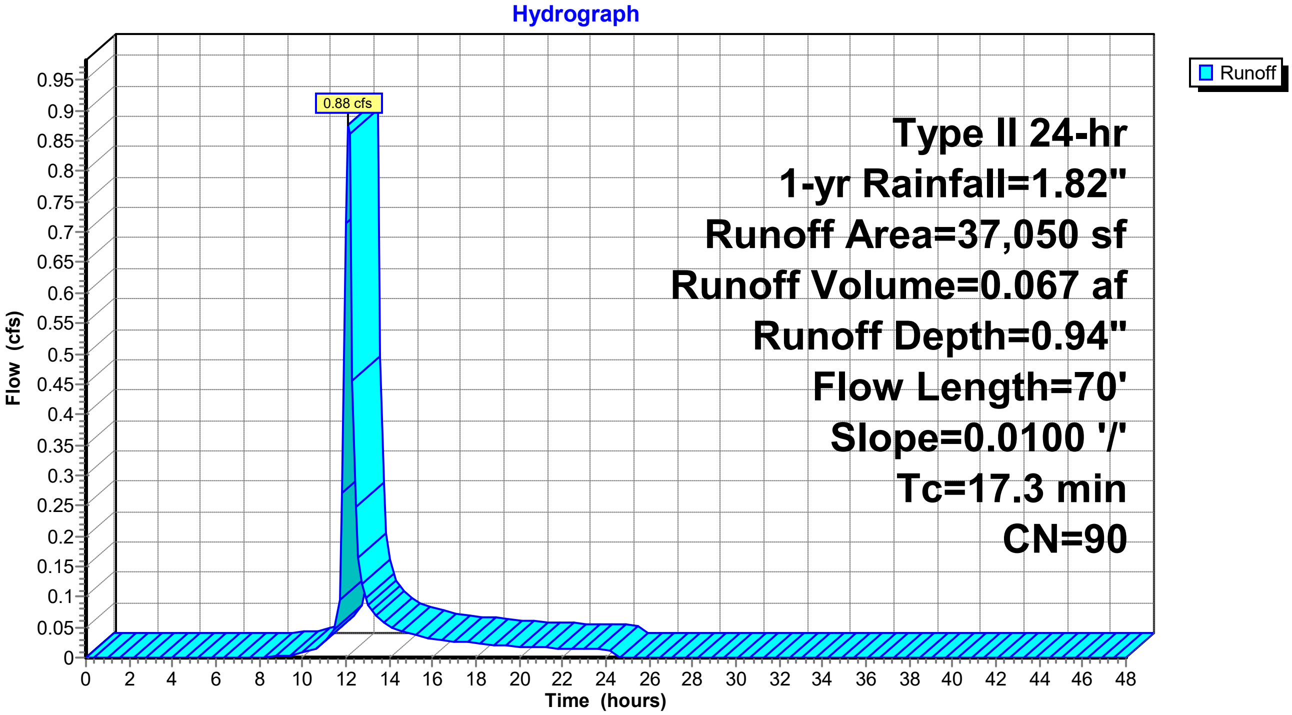
Runoff = 0.88 cfs @ 12.11 hrs, Volume= 0.067 af, Depth= 0.94"
Routed to Pond 11P : YD#11

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
3,925	98	Paved parking, HSG D
16,085	80	>75% Grass cover, Good, HSG D
17,040	98	Roofs, HSG D
37,050	90	Weighted Average
16,085		43.41% Pervious Area
20,965		56.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.3	70	0.0100	0.07		**Sheet Flow, 70' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"

Subcatchment 14S: Area to YD#11



Summary for Subcatchment 15S: Area to CB#13

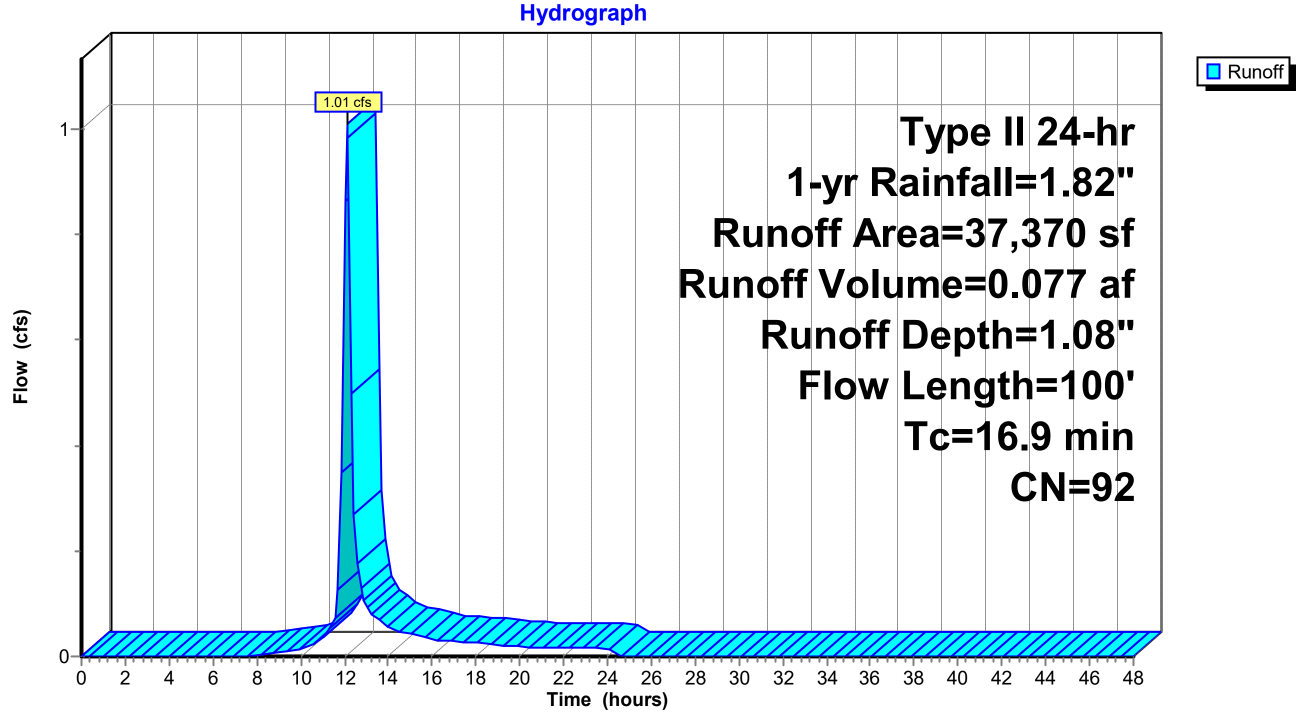
Runoff = 1.01 cfs @ 12.10 hrs, Volume= 0.077 af, Depth= 1.08"
Routed to Pond 13P : CB#13

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
510	98	Roofs, HSG D
25,120	98	Paved parking, HSG D
11,740	80	>75% Grass cover, Good, HSG D
37,370	92	Weighted Average
11,740		31.42% Pervious Area
25,630		68.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	65	0.0100	0.07		**Sheet Flow, 65' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.6	35	0.0200	0.91		**Sheet Flow, 35' Overland Flow** Smooth surfaces n= 0.011 P2= 2.14"
16.9	100	Total			

Subcatchment 15S: Area to CB#13



Summary for Subcatchment 16S: Area to CB#15

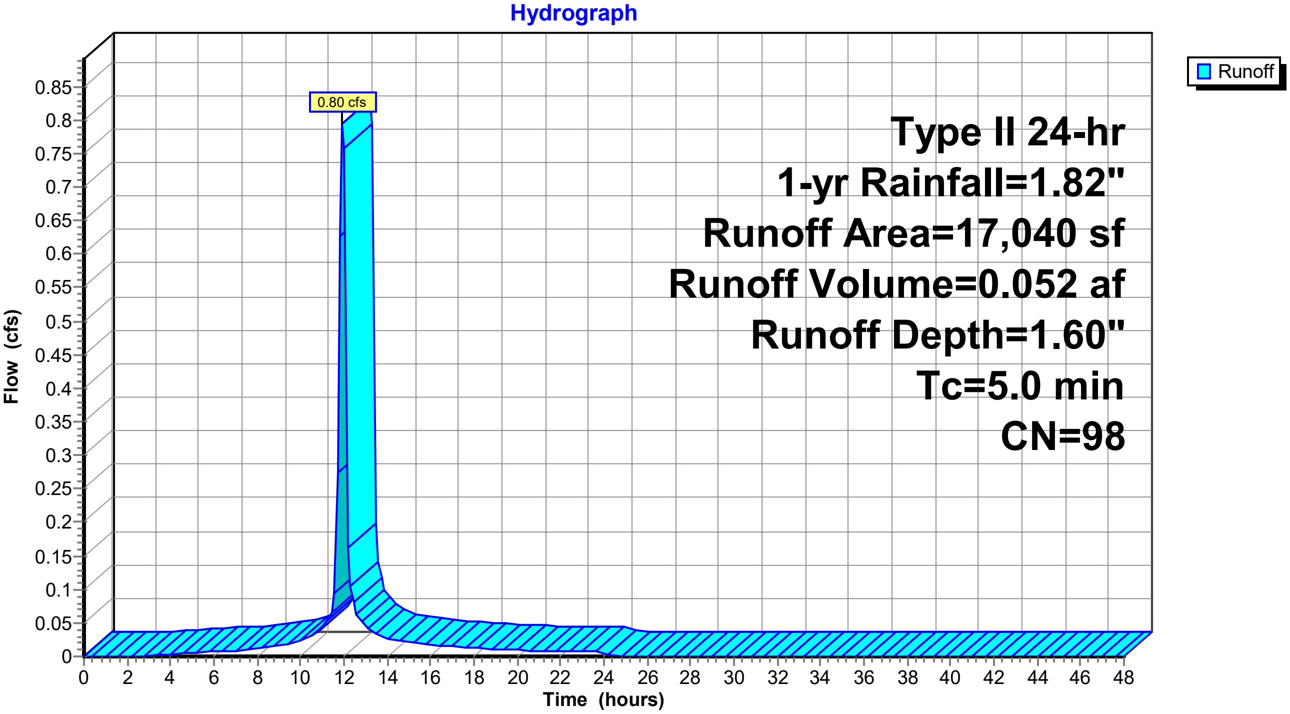
Runoff = 0.80 cfs @ 11.95 hrs, Volume= 0.052 af, Depth= 1.60"
Routed to Pond 15P : CB#15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
17,040	98	Roofs, HSG D
17,040		100.00% Impervious Area

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

Subcatchment 16S: Area to CB#15



Summary for Subcatchment 17S: Area to CB#18

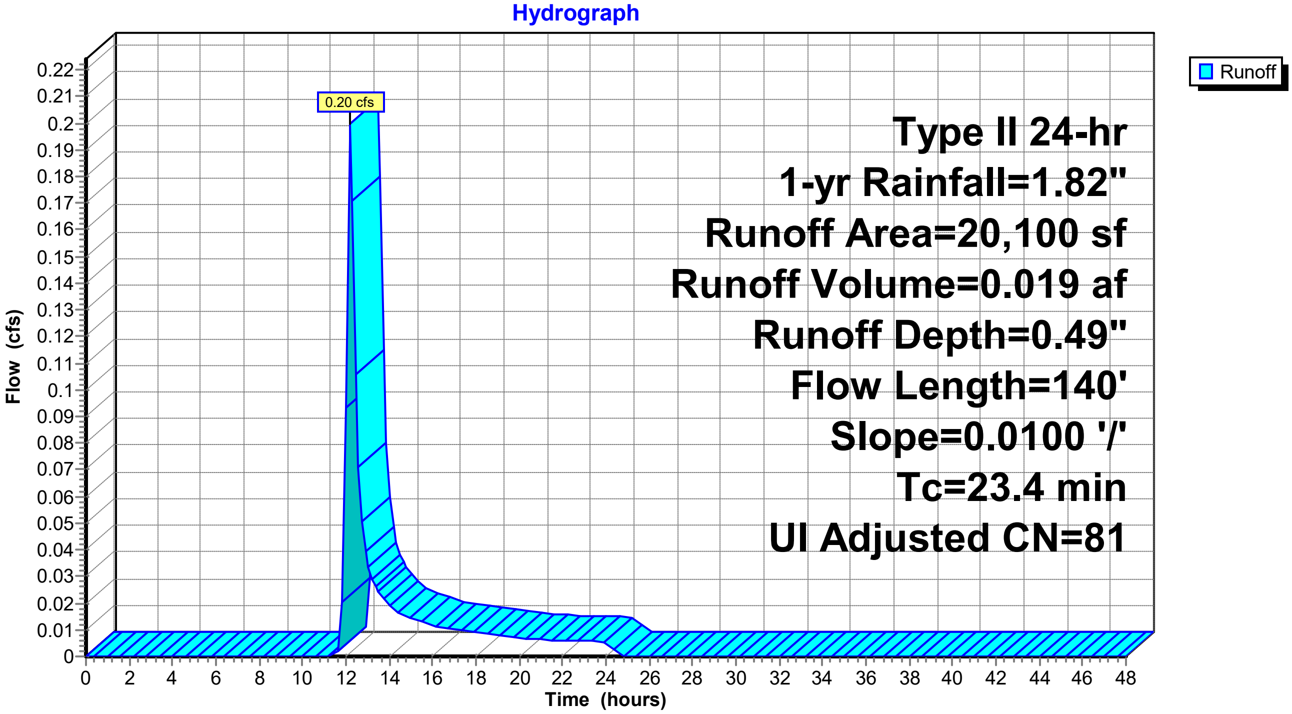
Runoff = 0.20 cfs @ 12.20 hrs, Volume= 0.019 af, Depth= 0.49"
Routed to Pond 18P : CB#18

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Adj	Description
3,025	98		Unconnected pavement, HSG D
17,075	80		>75% Grass cover, Good, HSG D
20,100	83	81	Weighted Average, UI Adjusted
17,075			84.95% Pervious Area
3,025			15.05% Impervious Area
3,025			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	100	0.0100	0.07		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.4	40	0.0100	1.50		**Shallow Concentrated Flow, 40' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
23.4	140	Total			

Subcatchment 17S: Area to CB#18



Summary for Subcatchment 18S: South Half of Phase 2 Building

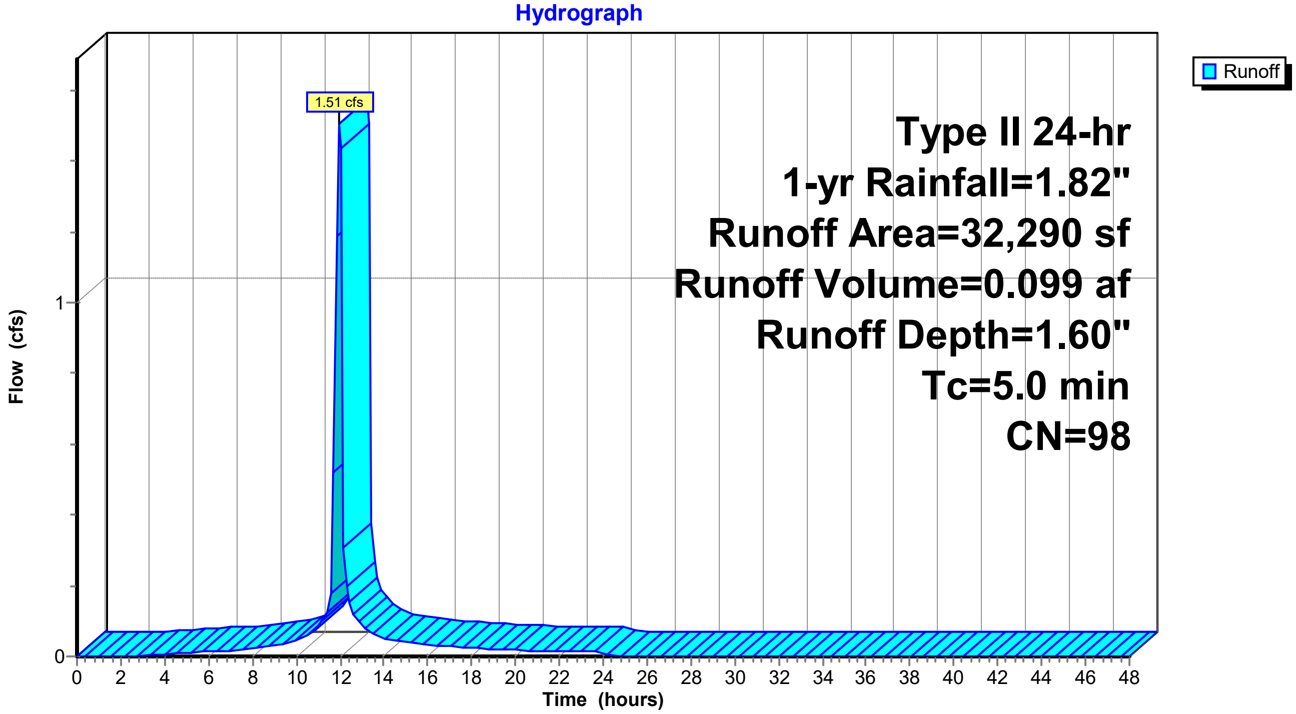
Runoff = 1.51 cfs @ 11.95 hrs, Volume= 0.099 af, Depth= 1.60"
Routed to Pond 20P : CB#20

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
32,290	98	Roofs, HSG D
32,290		100.00% Impervious Area

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

Subcatchment 18S: South Half of Phase 2 Building



Summary for Subcatchment 19S: Area to YD#22

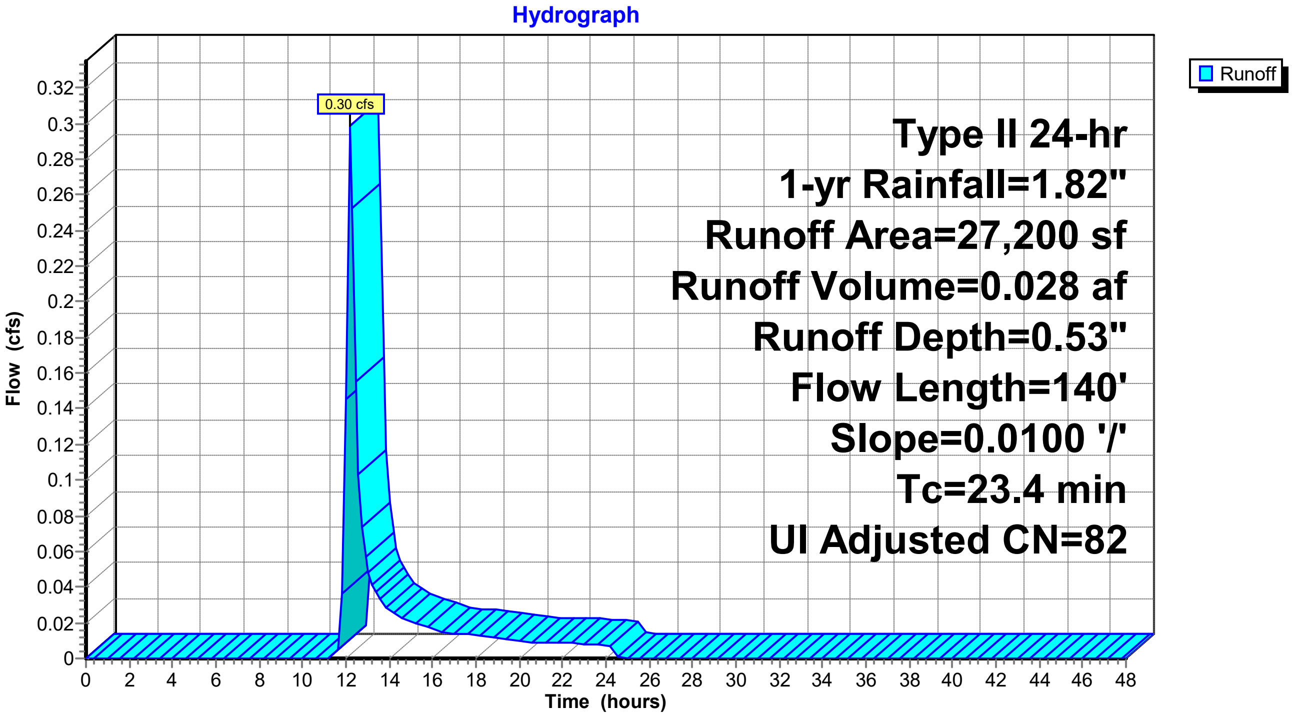
Runoff = 0.30 cfs @ 12.19 hrs, Volume= 0.028 af, Depth= 0.53"
Routed to Pond 22P : YD#22

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Adj	Description
19,675	80		>75% Grass cover, Good, HSG D
7,525	98		Unconnected pavement, HSG D
27,200	85	82	Weighted Average, UI Adjusted
19,675			72.33% Pervious Area
7,525			27.67% Impervious Area
7,525			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	100	0.0100	0.07		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.4	40	0.0100	1.50		**Shallow Concentrated Flow, 40' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
23.4	140	Total			

Subcatchment 19S: Area to YD#22



Summary for Subcatchment 20S: North Half of Phase 2 Building

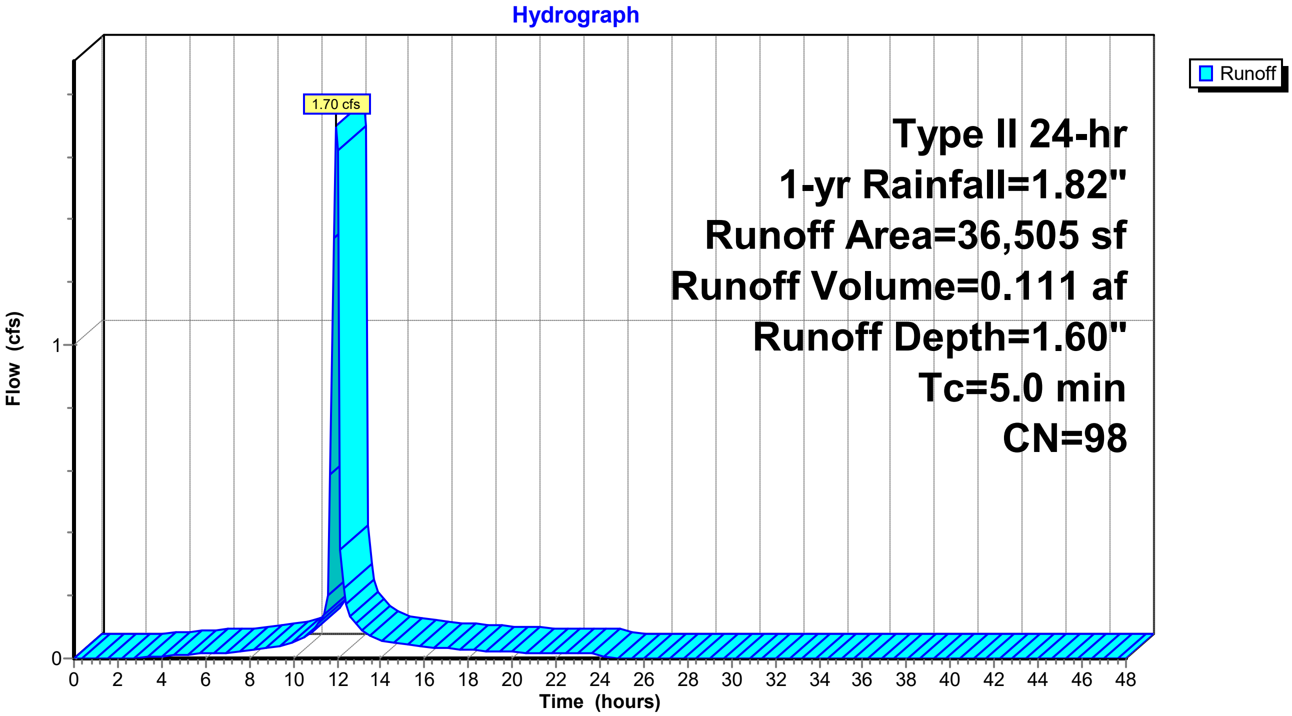
Runoff = 1.70 cfs @ 11.95 hrs, Volume= 0.111 af, Depth= 1.60"
Routed to Pond 24P : CB#24

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
36,505	98	Roofs, HSG D
36,505		100.00% Impervious Area

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

Subcatchment 20S: North Half of Phase 2 Building



Summary for Subcatchment 21S: Western Area Overland to Gravel Storage

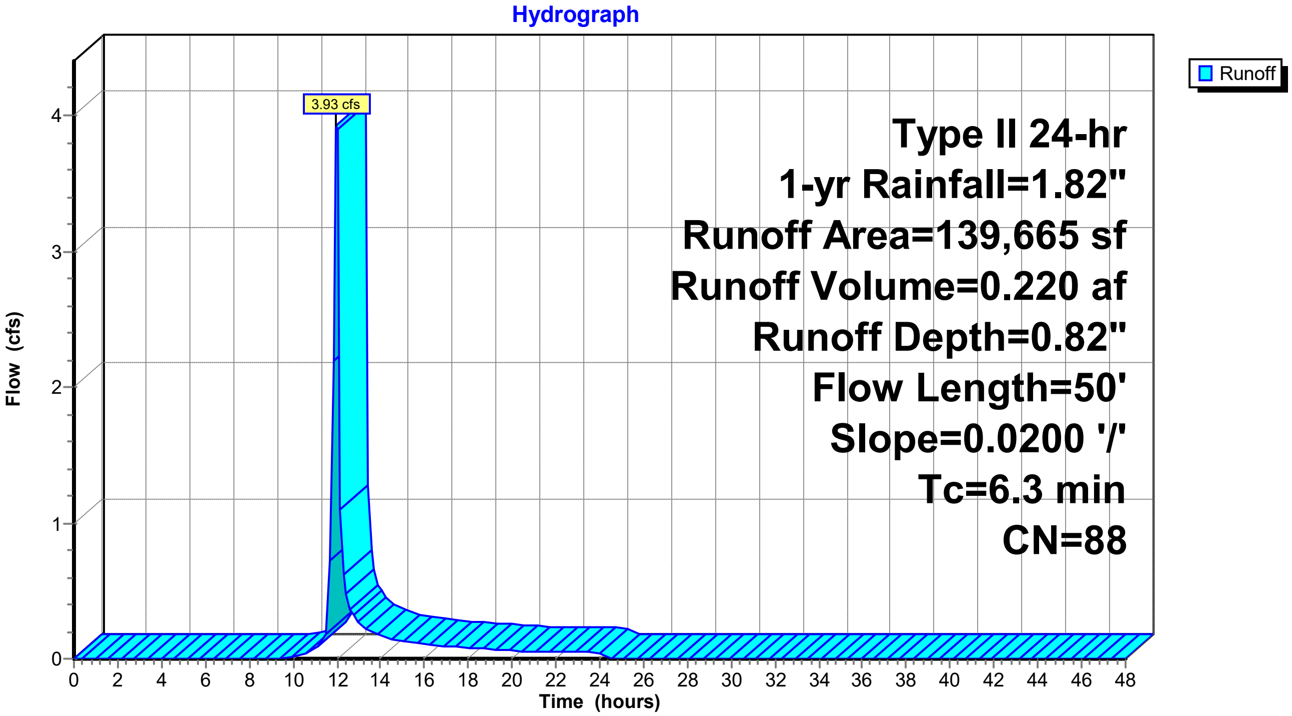
Runoff = 3.93 cfs @ 11.98 hrs, Volume= 0.220 af, Depth= 0.82"
Routed to Pond 33P : Subsurface Detention within Gravel Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

	Area (sf)	CN	Description
*	53,390	80	Gravel Storage Area, Good, HSG D
	31,080	98	Paved parking, HSG D
	2,460	98	Unconnected pavement, HSG D
	26,630	80	>75% Grass cover, Good, HSG D
	26,105	98	Roofs, HSG D
	139,665	88	Weighted Average
	80,020		57.29% Pervious Area
	59,645		42.71% Impervious Area
	2,460		4.12% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	25	0.0200	0.07		**Sheet Flow, 25' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.5	25	0.0200	0.85		**Sheet Flow, 25' Overland Flow** Smooth surfaces n= 0.011 P2= 2.14"
6.3	50	Total			

Subcatchment 21S: Western Area Overland to Gravel Storage



Summary for Subcatchment 22S: Area to CB#26

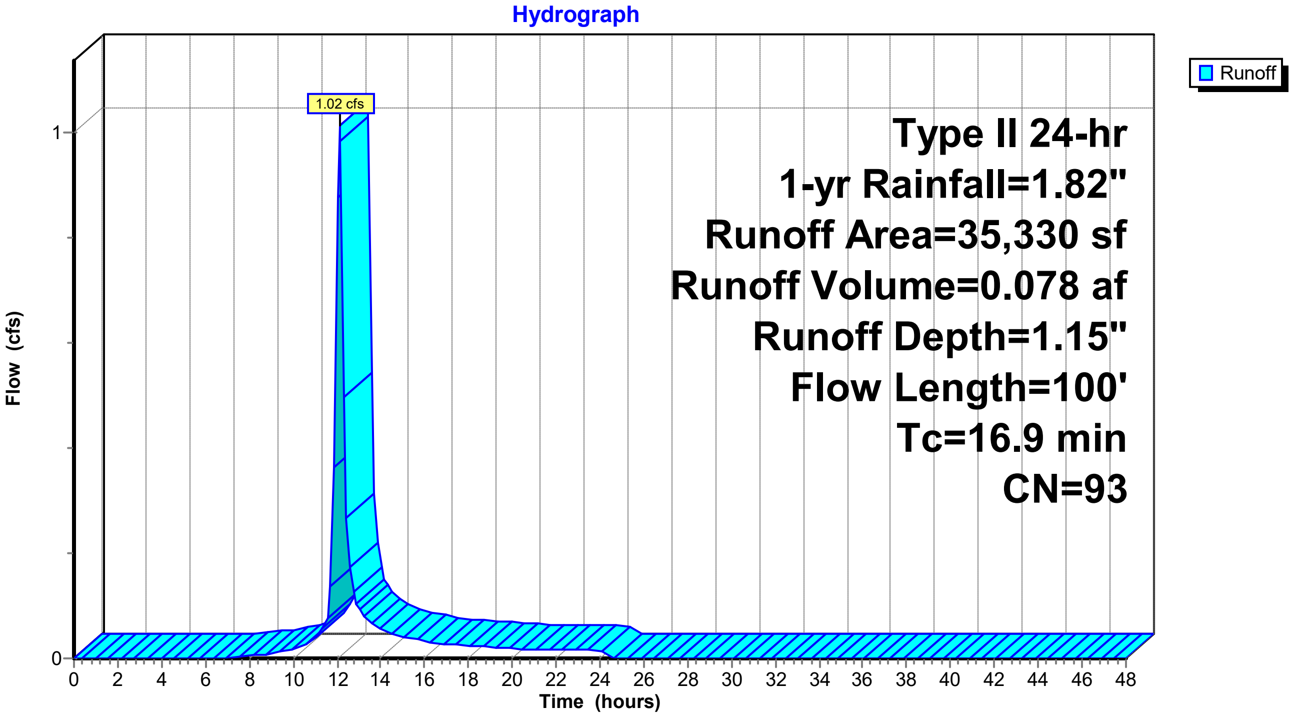
Runoff = 1.02 cfs @ 12.10 hrs, Volume= 0.078 af, Depth= 1.15"
Routed to Pond 26P : CB#26

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
25,120	98	Paved parking, HSG D
10,210	80	>75% Grass cover, Good, HSG D
35,330	93	Weighted Average
10,210		28.90% Pervious Area
25,120		71.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	65	0.0100	0.07		**Sheet Flow, 65' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.6	35	0.0200	0.91		**Sheet Flow, 35' Overland Flow** Smooth surfaces n= 0.011 P2= 2.14"
16.9	100	Total			

Subcatchment 22S: Area to CB#26



Summary for Subcatchment 23S: Area to CB#28

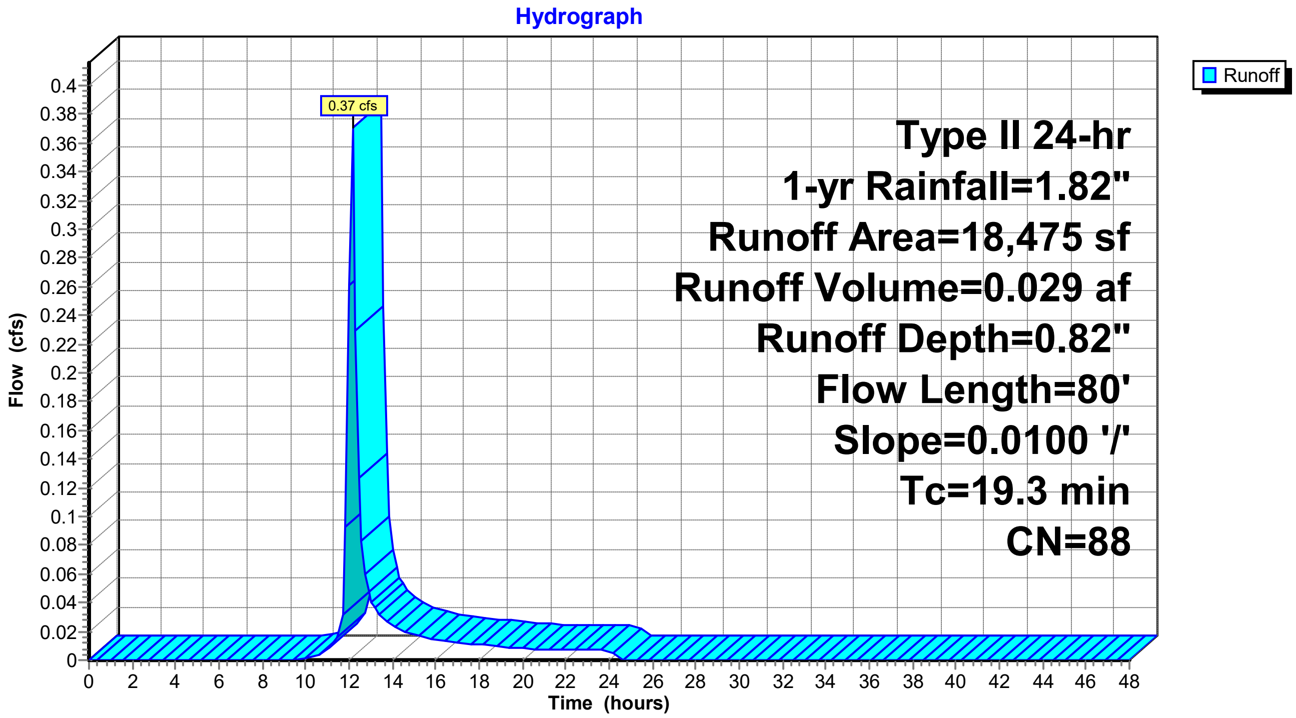
Runoff = 0.37 cfs @ 12.14 hrs, Volume= 0.029 af, Depth= 0.82"
Routed to Pond 28P : CB#28

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
5,755	98	Paved parking, HSG D
2,520	98	Unconnected pavement, HSG D
10,200	80	>75% Grass cover, Good, HSG D
18,475	88	Weighted Average
10,200		55.21% Pervious Area
8,275		44.79% Impervious Area
2,520		30.45% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	80	0.0100	0.07		**Sheet Flow, 80' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"

Subcatchment 23S: Area to CB#28



Summary for Subcatchment 24S: Area to CB#30

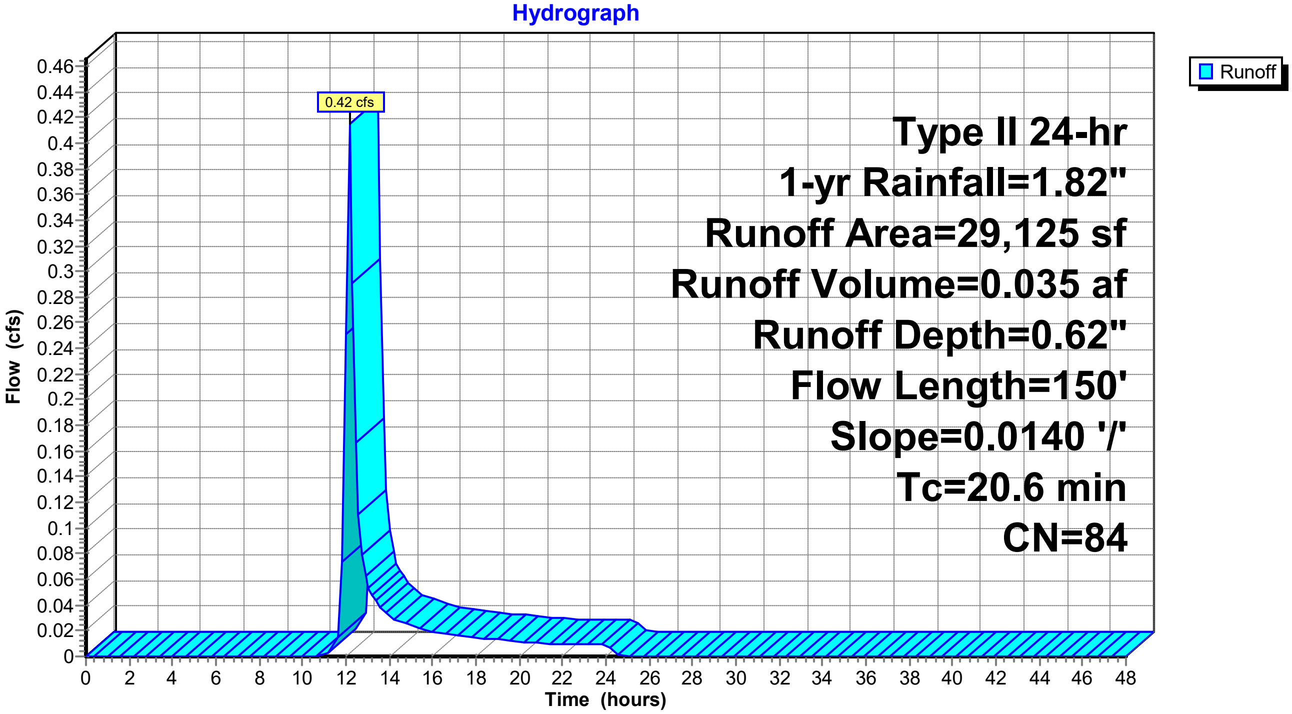
Runoff = 0.42 cfs @ 12.16 hrs, Volume= 0.035 af, Depth= 0.62"
Routed to Pond 30P : CB#30

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
5,920	78	Meadow, non-grazed, HSG D
6,730	98	Paved parking, HSG D
16,475	80	>75% Grass cover, Good, HSG D
29,125	84	Weighted Average
22,395		76.89% Pervious Area
6,730		23.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.1	100	0.0140	0.08		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.5	50	0.0140	1.77		**Shallow Concentrated Flow, 50' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
20.6	150	Total			

Subcatchment 24S: Area to CB#30



Summary for Subcatchment 25S: Area to CB#32

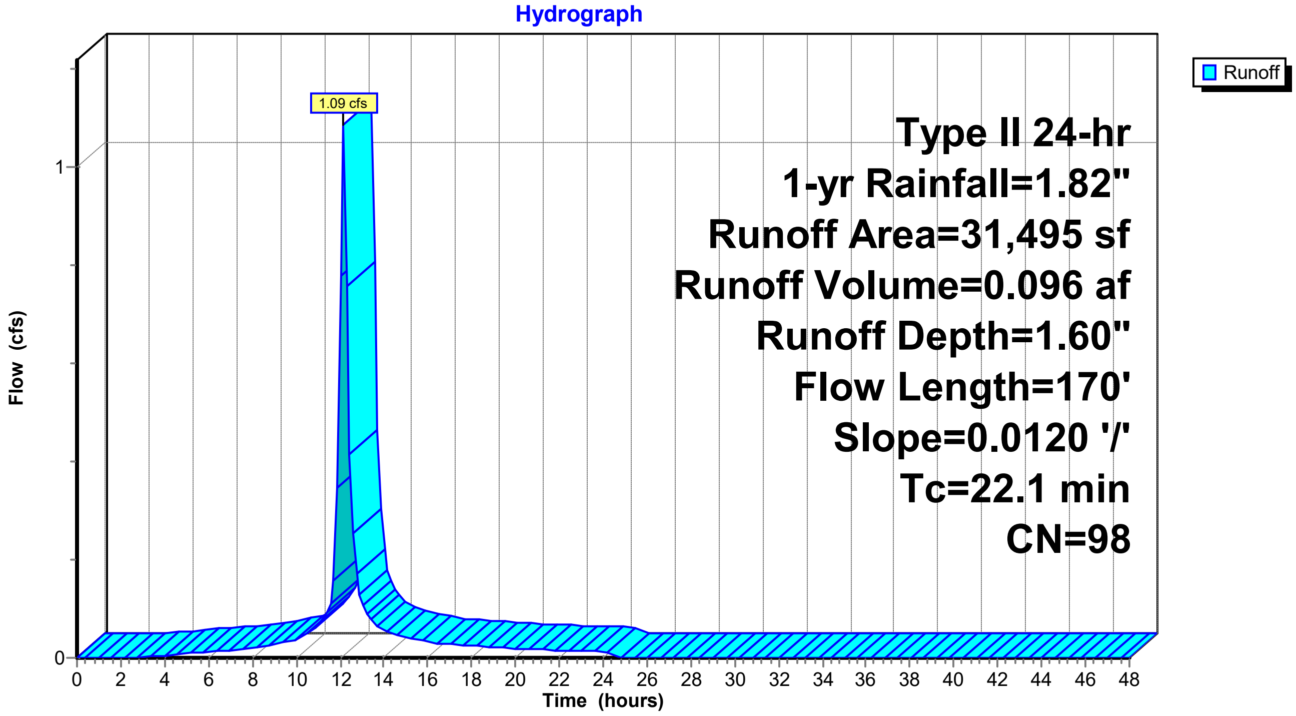
Runoff = 1.09 cfs @ 12.15 hrs, Volume= 0.096 af, Depth= 1.60"
Routed to Pond 32P : CB#32

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
4,960	98	Paved parking, HSG D
26,535	98	Paved parking, HSG D
31,495	98	Weighted Average
31,495		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0120	0.08		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.7	70	0.0120	1.64		**Shallow Concentrated Flow, 70' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
22.1	170	Total			

Subcatchment 25S: Area to CB#32



Summary for Subcatchment 26S: Area Overland to Western Pretreatment to Bio-Retention Area

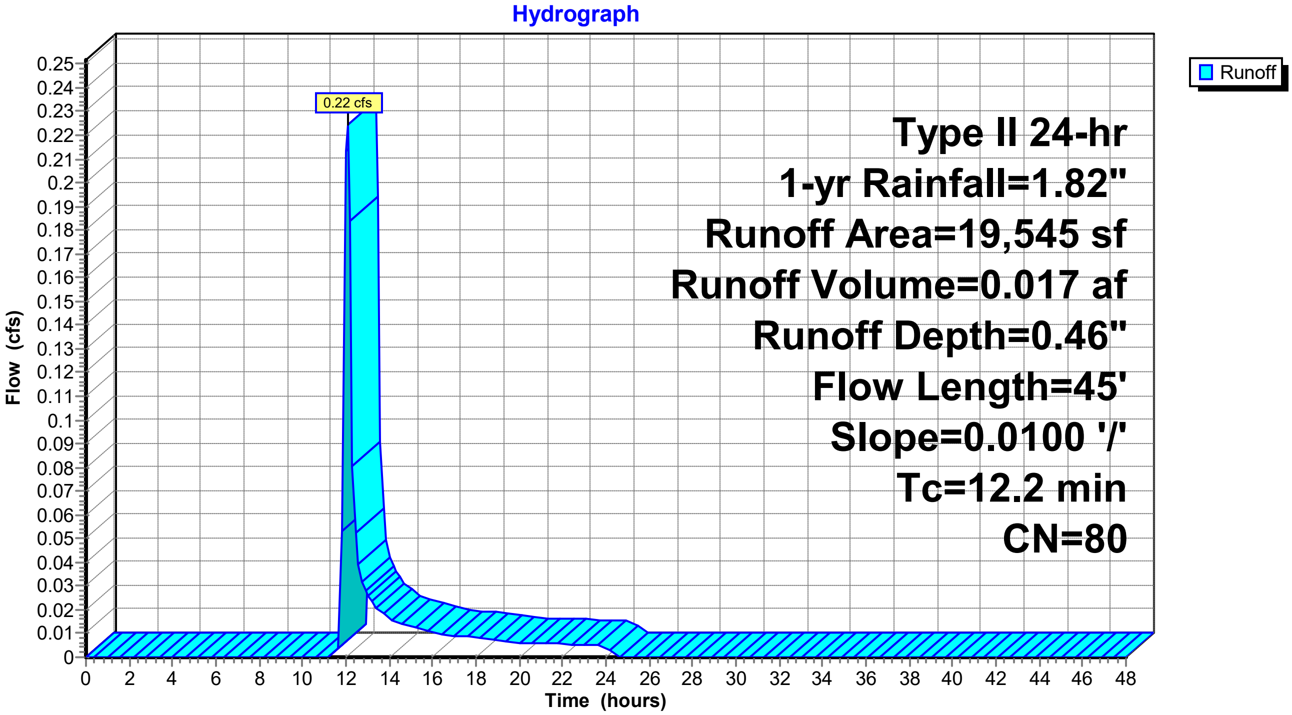
Runoff = 0.22 cfs @ 12.05 hrs, Volume= 0.017 af, Depth= 0.46"
Routed to Pond 36P : West Pre-Treatment to Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
19,545	80	>75% Grass cover, Good, HSG D
19,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	45	0.0100	0.06		**Sheet Flow, 45' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"

Subcatchment 26S: Area Overland to Western Pretreatment to Bio-Retention Area



Summary for Subcatchment 27S: Area Overland to Northern Pretreatment to Bio-Retention Area

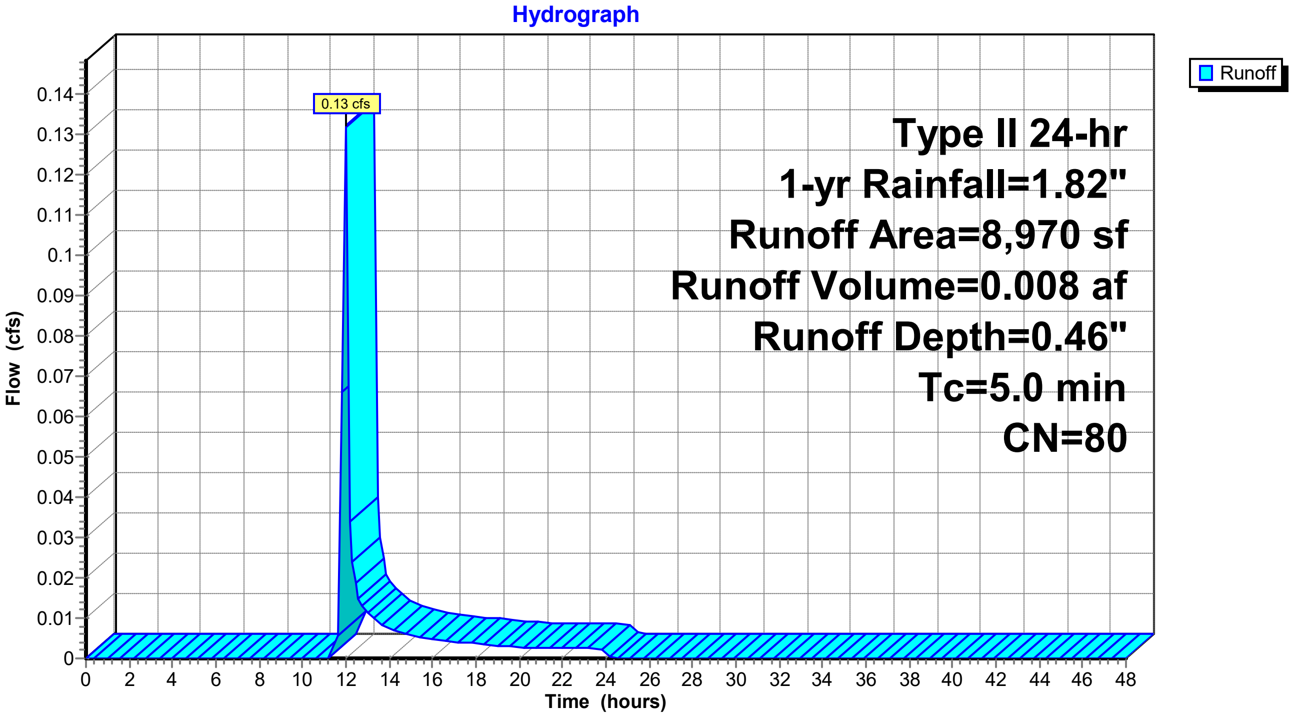
Runoff = 0.13 cfs @ 11.99 hrs, Volume= 0.008 af, Depth= 0.46"
Routed to Pond 37P : North Pre-Treatment to Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
8,970	80	>75% Grass cover, Good, HSG D
8,970		100.00% Pervious Area

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

Subcatchment 27S: Area Overland to Northern Pretreatment to Bio-Retention Area



Summary for Subcatchment 28S: Area Overland to Bio-Retention Area

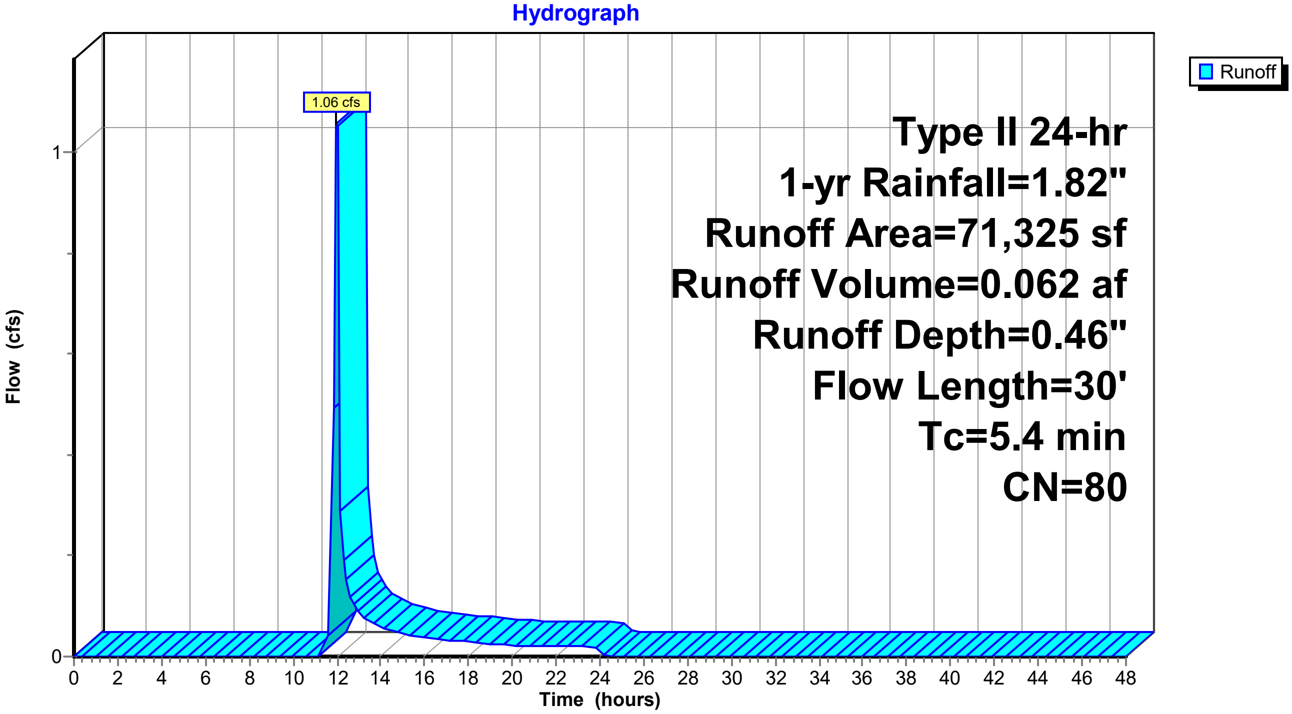
Runoff = 1.06 cfs @ 11.99 hrs, Volume= 0.062 af, Depth= 0.46"
Routed to Pond 34P : Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
71,325	80	>75% Grass cover, Good, HSG D
71,325		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	10	0.0100	0.05		**Sheet Flow, 10' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
1.8	20	0.2500	0.19		**Sheet Flow, 20' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
5.4	30	Total			

Subcatchment 28S: Area Overland to Bio-Retention Area



Summary for Subcatchment 29S: Area Overland to Dry Pond

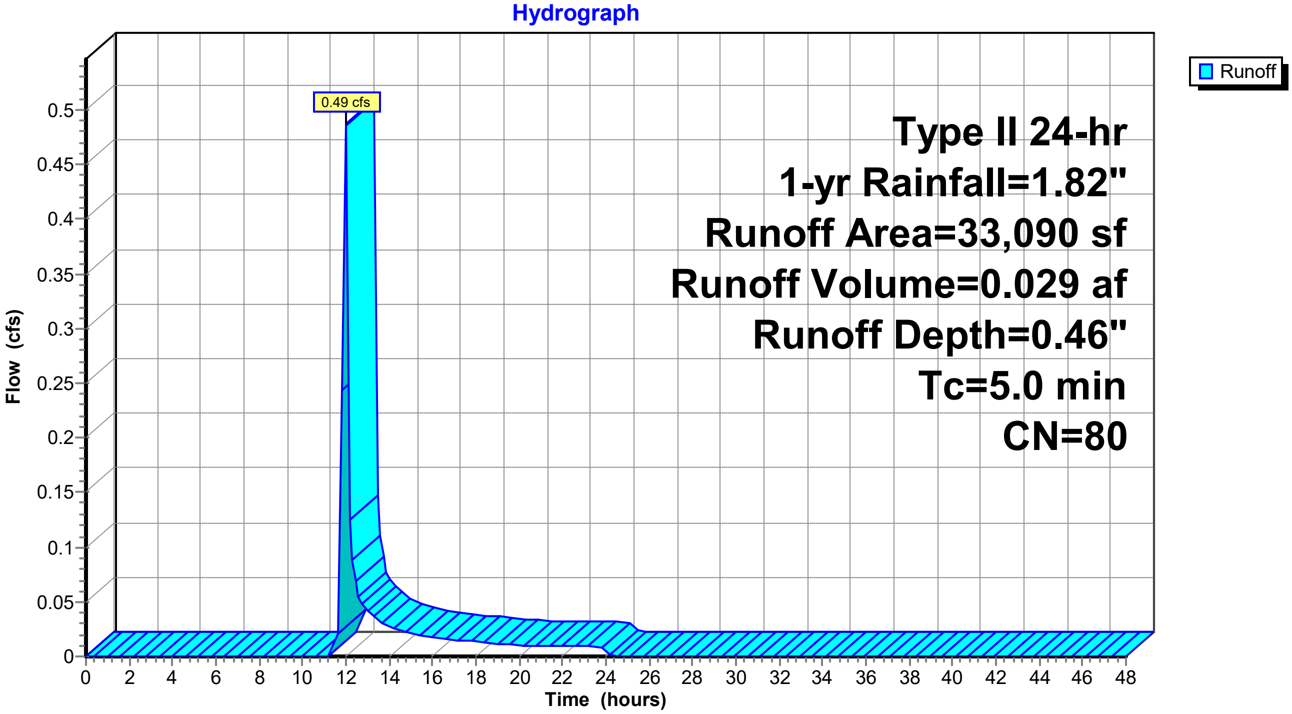
Runoff = 0.49 cfs @ 11.99 hrs, Volume= 0.029 af, Depth= 0.46"
Routed to Pond 35P : Dry Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (sf)	CN	Description
33,090	80	>75% Grass cover, Good, HSG D
33,090		100.00% Pervious Area

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

Subcatchment 29S: Area Overland to Dry Pond



Summary for Subcatchment E-5S: Contributing Watershed from East

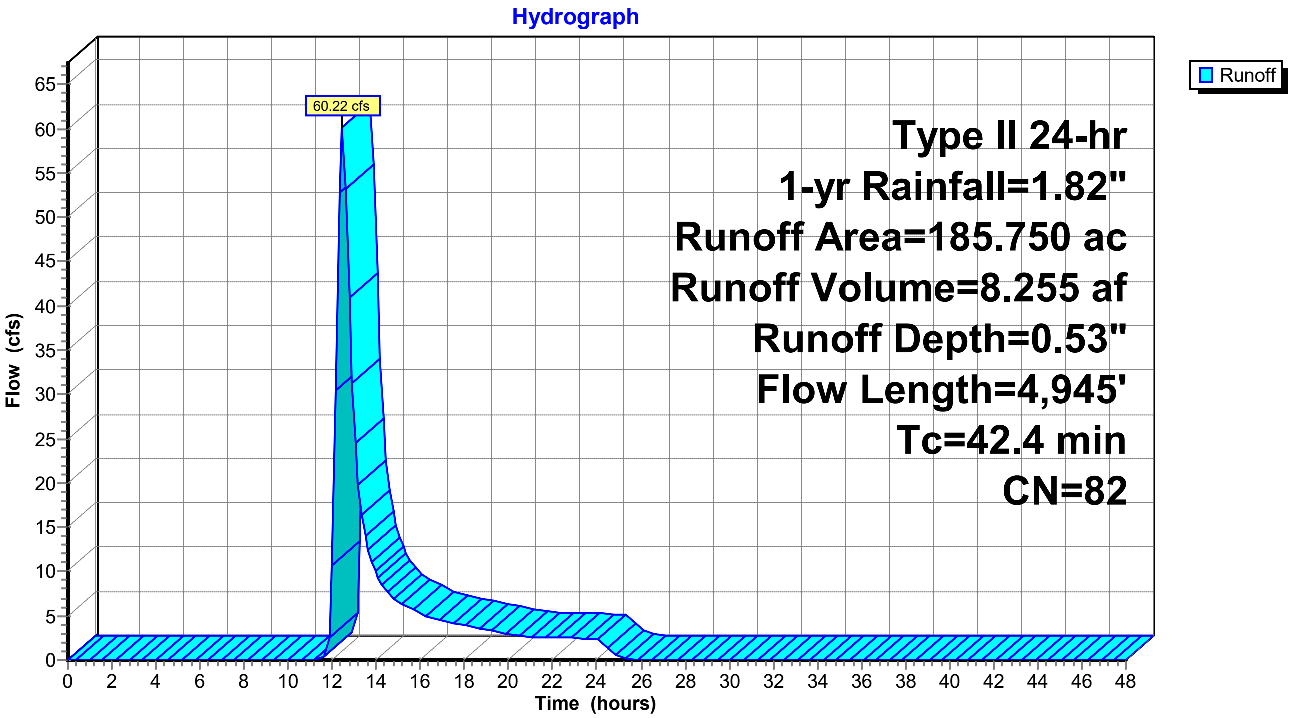
Runoff = 60.22 cfs @ 12.45 hrs, Volume= 8.255 af, Depth= 0.53"
Routed to Reach 5R : North Property Line Ditch (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (ac)	CN	Description
78.660	79	Woods, Fair, HSG D
2.970	98	Water Surface, 0% imp, HSG D
1.050	96	Gravel surface, HSG D
103.070	84	Pasture/grassland/range, Fair, HSG D
185.750	82	Weighted Average
185.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0350	0.16		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
14.2	1,000	0.0170	1.17		**Shallow Concentrated Flow, 1000' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
2.9	750	0.0130	4.31	430.96	**Trap/Vee/Rect Channel Flow, 750 Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.7	670	0.0120	4.14	414.05	**Trap/Vee/Rect Channel Flow, 670' Flow Through Woods** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.4	550	0.0100	3.78	377.98	**Trap/Vee/Rect Channel Flow, 550' Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
9.5	1,800	0.0070	3.16	316.24	**Trap/Vee/Rect Channel Flow, 1,800' Along Crosby Road** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
0.1	75	0.0200	16.02	154.14	**Pipe Channel, Crosby Road Cross Culvert** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
42.4	4,945	Total			

Subcatchment E-5S: Contributing Watershed from East



Summary for Subcatchment E-6S: Contributing Area from North

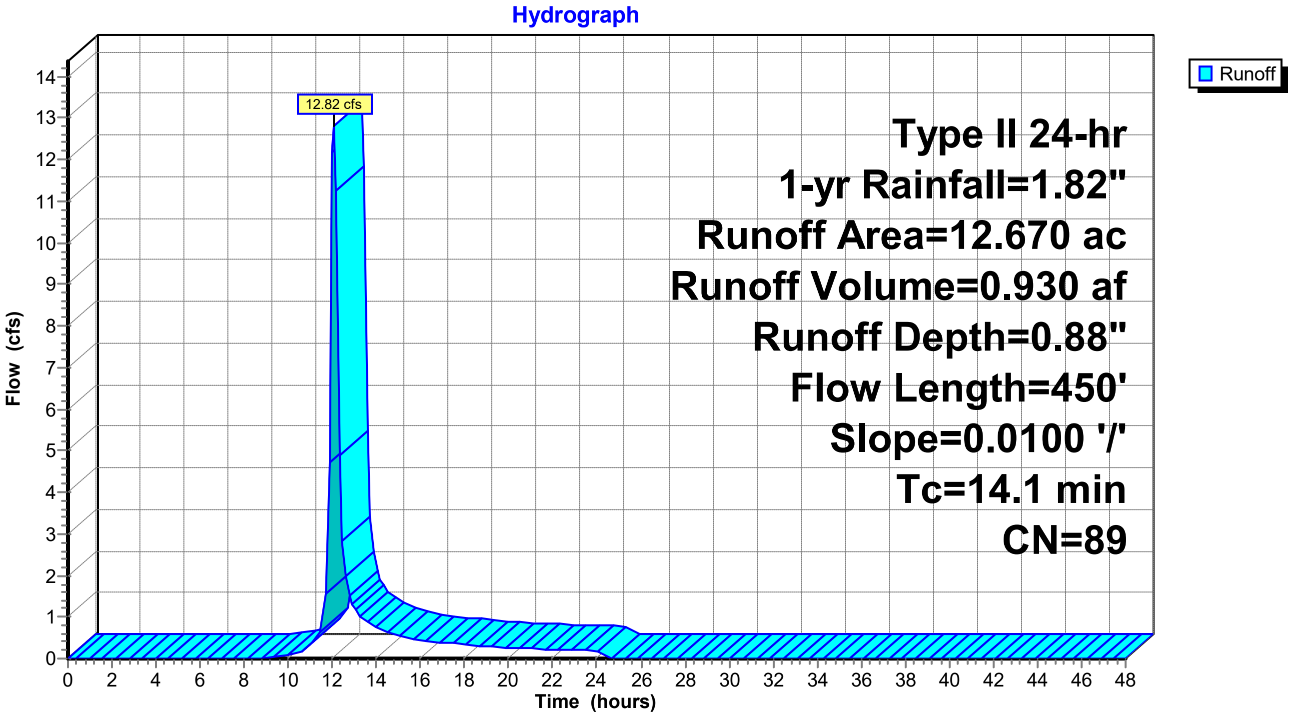
Runoff = 12.82 cfs @ 12.06 hrs, Volume= 0.930 af, Depth= 0.88"
Routed to Reach 5R : North Property Line Ditch (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Type II 24-hr 1-yr Rainfall=1.82"

Area (ac)	CN	Description
12.670	89	Row crops, straight row, Good, HSG D
12.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0100	0.22		**Sheet Flow, 100' Overland Flow** Cultivated: Residue<=20% n= 0.060 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
14.1	450	Total			

Subcatchment E-6S: Contributing Area from North



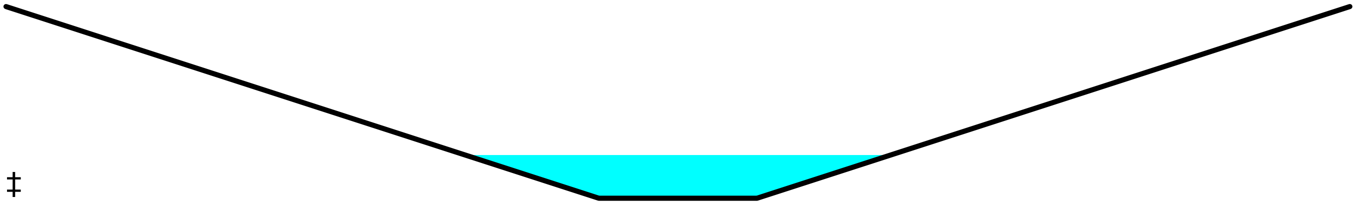
Summary for Reach 1R: Eastern Cut Off Swale

Inflow Area = 6.892 ac, 0.00% Impervious, Inflow Depth = 0.39" for 1-yr event
Inflow = 1.91 cfs @ 12.28 hrs, Volume= 0.222 af
Outflow = 1.64 cfs @ 12.41 hrs, Volume= 0.222 af, Atten= 14%, Lag= 7.7 min
Routed to Reach 2R : Central Cut Off Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Max. Velocity= 1.31 fps, Min. Travel Time= 8.9 min
Avg. Velocity = 0.50 fps, Avg. Travel Time= 23.2 min

Peak Storage= 877 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.34' , Surface Width= 5.39'
Bank-Full Depth= 1.50' Flow Area= 14.3 sf, Capacity= 43.86 cfs

2.00' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 5.0 '/' Top Width= 17.00'
Length= 700.0' Slope= 0.0050 '/'
Inlet Invert= 673.00', Outlet Invert= 669.50'



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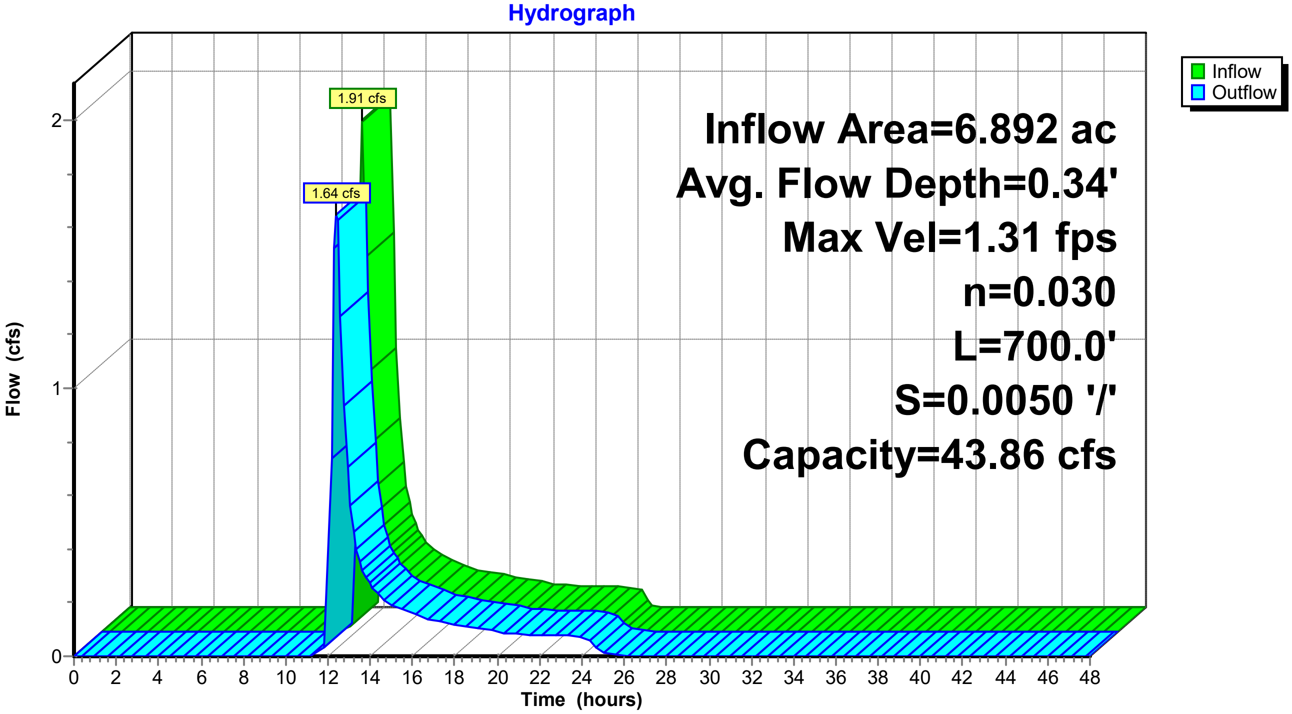
Reach 1R: Eastern Cut Off Swale



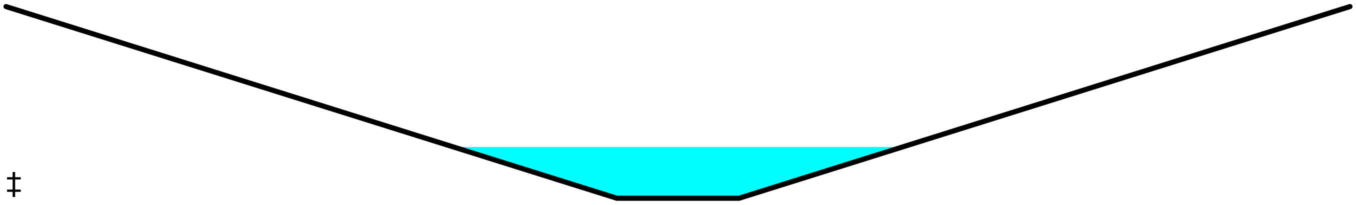
Summary for Reach 2R: Central Cut Off Swale

Inflow Area = 19.349 ac, 0.00% Impervious, Inflow Depth = 0.39" for 1-yr event
Inflow = 4.23 cfs @ 12.45 hrs, Volume= 0.624 af
Outflow = 4.17 cfs @ 12.51 hrs, Volume= 0.624 af, Atten= 1%, Lag= 3.8 min
Routed to Reach 3R : Western Cut Off Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Max. Velocity= 1.67 fps, Min. Travel Time= 5.0 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 12.4 min

Peak Storage= 1,240 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.53' , Surface Width= 7.33'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 88.03 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 5.0 '/' Top Width= 22.00'
Length= 500.0' Slope= 0.0050 '/'
Inlet Invert= 669.50', Outlet Invert= 667.00'



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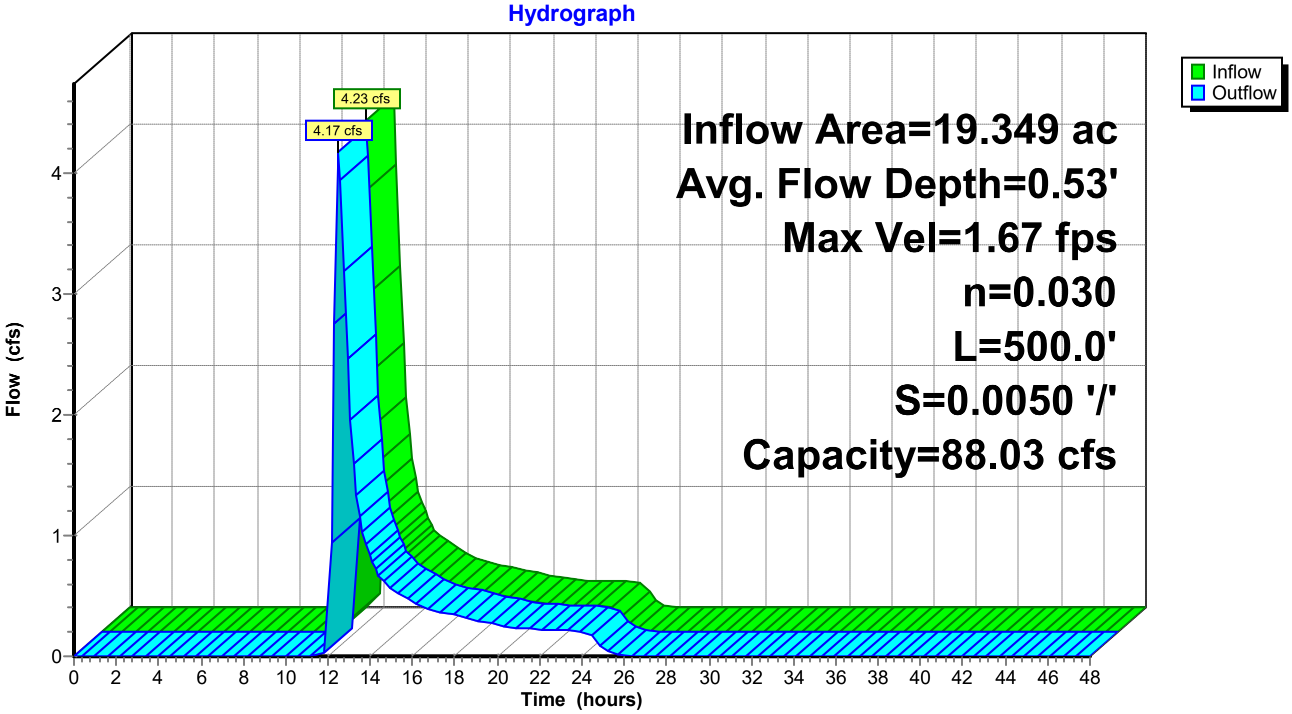
Reach 2R: Central Cut Off Swale



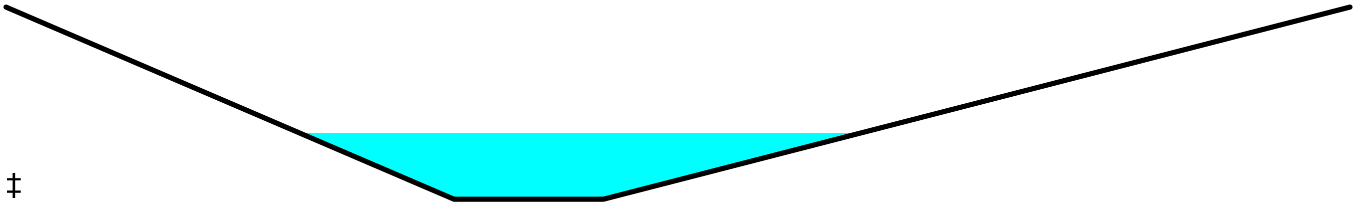
Summary for Reach 3R: Western Cut Off Swale

Inflow Area = 29.272 ac, 0.00% Impervious, Inflow Depth = 0.42" for 1-yr event
Inflow = 6.58 cfs @ 12.53 hrs, Volume= 1.032 af
Outflow = 6.54 cfs @ 12.62 hrs, Volume= 1.032 af, Atten= 1%, Lag= 5.3 min
Routed to Link 1L : West Property Line and Adjacent Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Max. Velocity= 1.99 fps, Min. Travel Time= 5.0 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 13.1 min

Peak Storage= 1,974 cf @ 12.62 hrs
Average Depth at Peak Storage= 0.69' , Surface Width= 7.53'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 73.73 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 5.0 '/' Top Width= 18.00'
Length= 600.0' Slope= 0.0050 '/'
Inlet Invert= 667.00', Outlet Invert= 664.00'



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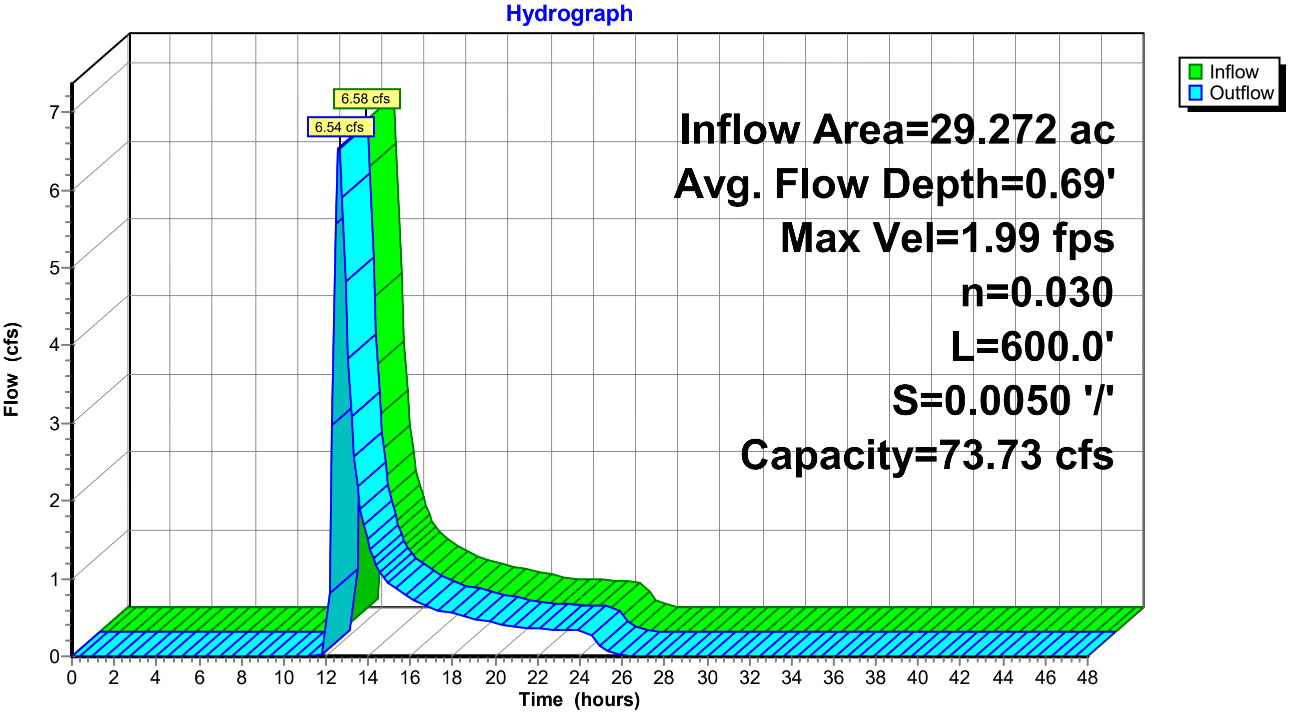
Reach 3R: Western Cut Off Swale



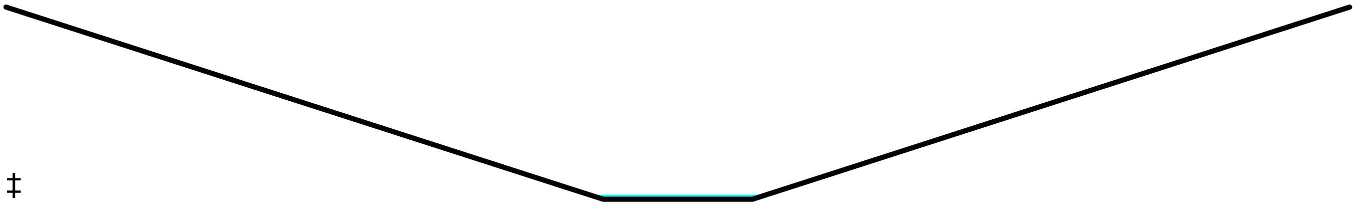
Summary for Reach 4R: Crosby Road Ditch

```
Inflow Area =         0.230 ac,    0.00% Impervious,  Inflow Depth =   0.42"    for  1-yr event
Inflow       =        0.08 cfs @   12.20 hrs,  Volume=            0.008 af
Outflow      =        0.06 cfs @   12.37 hrs,  Volume=            0.008 af,  Atten= 24%,  Lag= 10.1 min
     Routed to Reach 5R : North Property Line Ditch (East)
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Max. Velocity= 0.58 fps, Min. Travel Time= 13.0 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 21.6 min

Peak Storage= 47 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.05' , Surface Width= 2.38'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 98.41 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 450.0' Slope= 0.0089 '/'
Inlet Invert= 673.00', Outlet Invert= 669.00'



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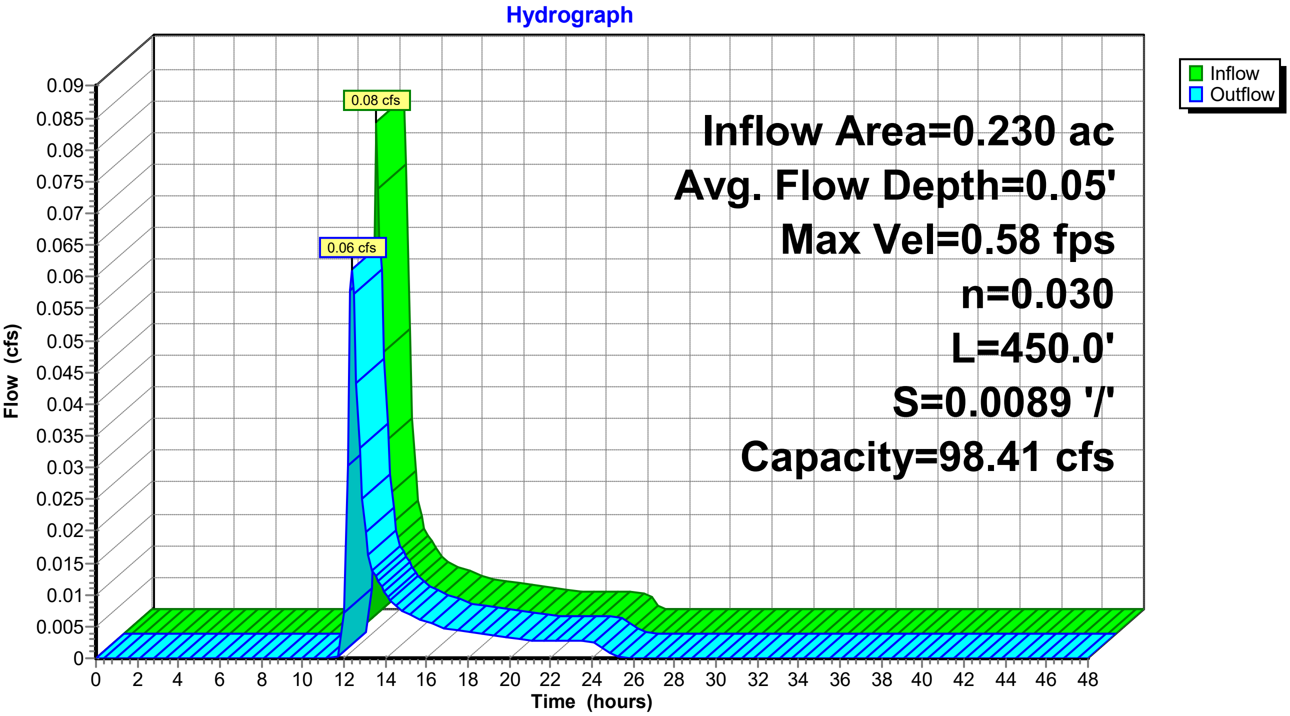
Reach 4R: Crosby Road Ditch



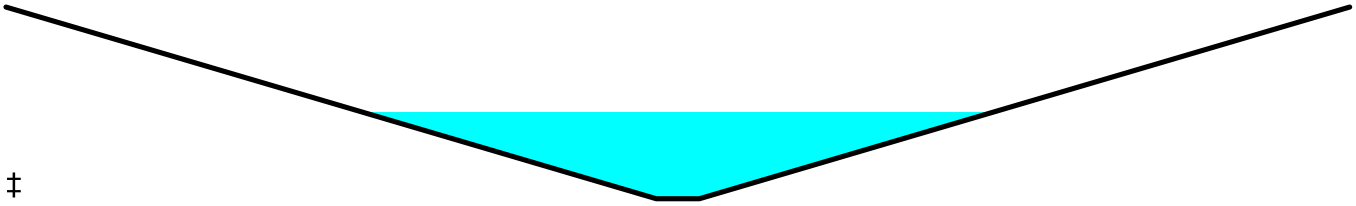
Summary for Reach 5R: North Property Line Ditch (East)

Inflow Area = 199.744 ac, 0.00% Impervious, Inflow Depth = 0.55" for 1-yr event
Inflow = 63.26 cfs @ 12.44 hrs, Volume= 9.225 af
Outflow = 62.56 cfs @ 12.48 hrs, Volume= 9.225 af, Atten= 1%, Lag= 2.9 min
Routed to Reach 6R : North Property Line Ditch (Central)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Max. Velocity= 2.96 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 1.18 fps, Avg. Travel Time= 9.5 min

Peak Storage= 14,156 cf @ 12.48 hrs
Average Depth at Peak Storage= 1.36' , Surface Width= 29.14'
Bank-Full Depth= 3.00' Flow Area= 96.0 sf, Capacity= 471.44 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 62.00'
Length= 670.0' Slope= 0.0055 '/'
Inlet Invert= 666.00', Outlet Invert= 662.30'



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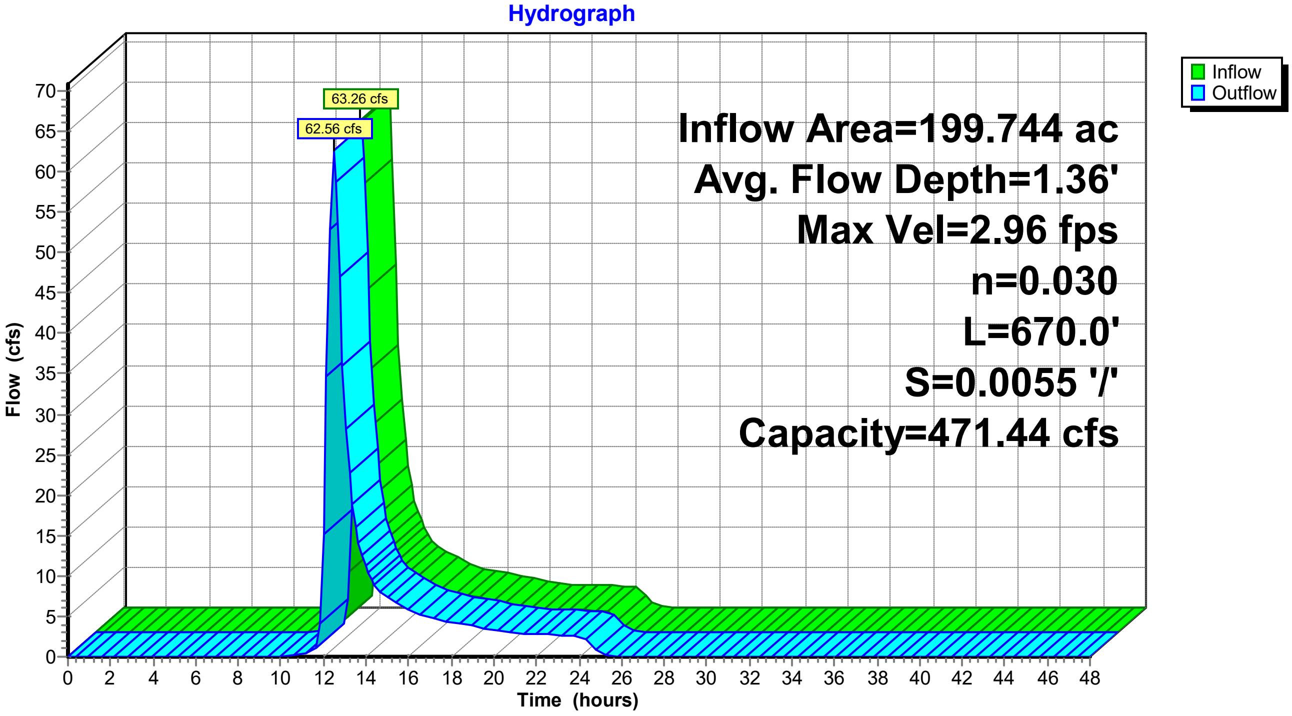
Reach 5R: North Property Line Ditch (East)



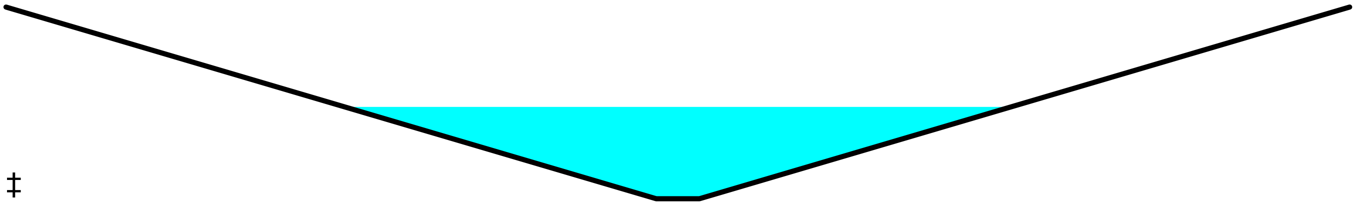
Summary for Reach 6R: North Property Line Ditch (Central)

Inflow Area = 201.045 ac, 0.00% Impervious, Inflow Depth = 0.55" for 1-yr event
Inflow = 62.61 cfs @ 12.48 hrs, Volume= 9.270 af
Outflow = 61.71 cfs @ 12.53 hrs, Volume= 9.270 af, Atten= 1%, Lag= 2.6 min
Routed to Reach 7R : North Property Line Ditch (West)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Max. Velocity= 2.60 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.74 fps, Avg. Travel Time= 11.3 min

Peak Storage= 11,800 cf @ 12.53 hrs
Average Depth at Peak Storage= 1.44' , Surface Width= 30.80'
Bank-Full Depth= 3.00' Flow Area= 96.0 sf, Capacity= 401.23 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 62.00'
Length= 500.0' Slope= 0.0040 '/'
Inlet Invert= 662.30', Outlet Invert= 660.30'



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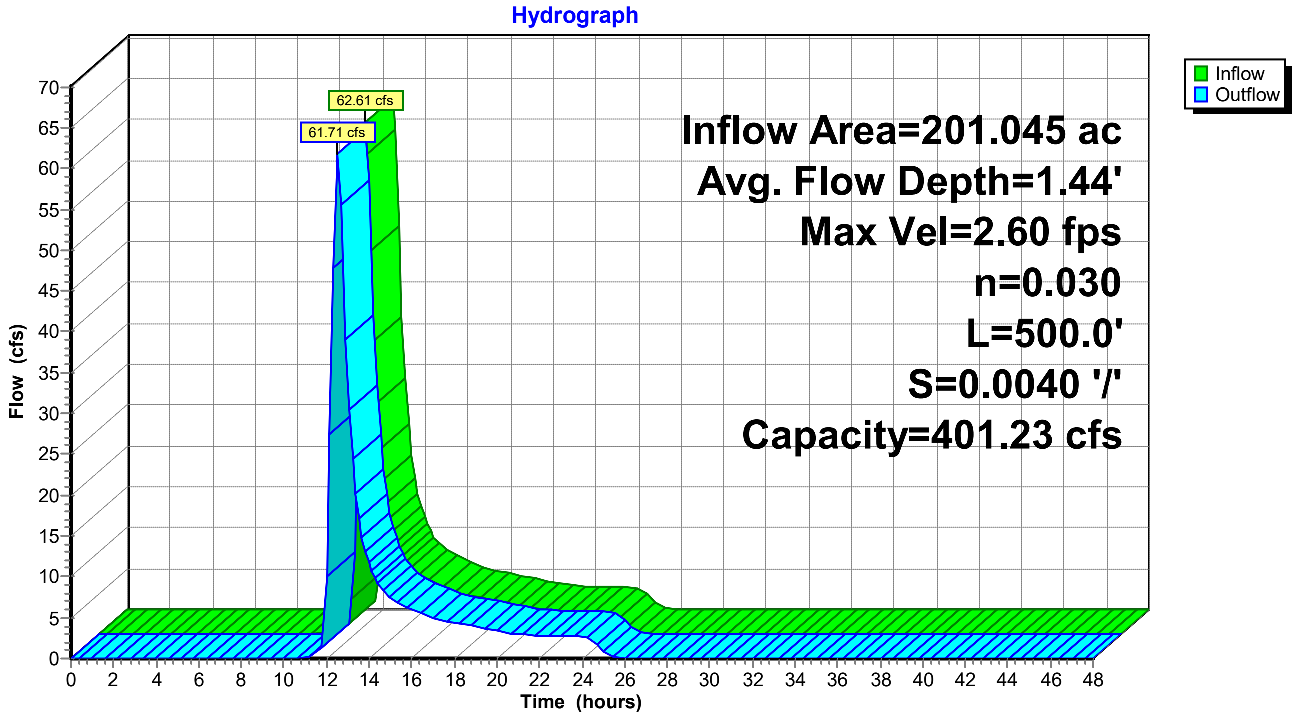
Reach 6R: North Property Line Ditch (Central)



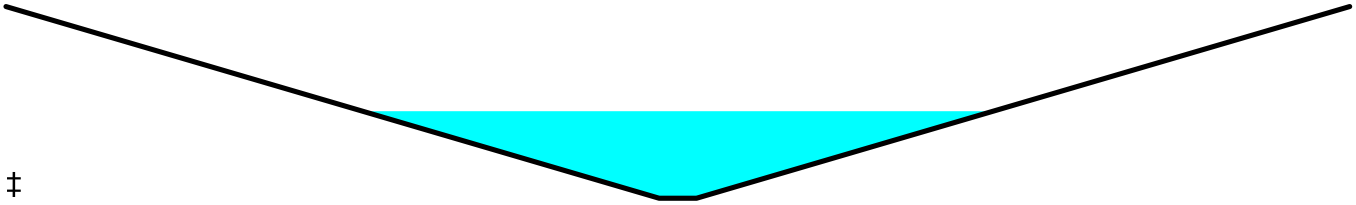
Summary for Reach 7R: North Property Line Ditch (West)

Inflow Area = 225.583 ac, 5.55% Impervious, Inflow Depth > 0.53" for 1-yr event
Inflow = 61.78 cfs @ 12.53 hrs, Volume= 9.902 af
Outflow = 61.37 cfs @ 12.58 hrs, Volume= 9.900 af, Atten= 1%, Lag= 3.5 min
Routed to Link 3L : Ditch at Northwest Corner of Site Discharging to Adjacent Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Max. Velocity= 2.16 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 13.0 min

Peak Storage= 14,227 cf @ 12.58 hrs
Average Depth at Peak Storage= 1.59' , Surface Width= 33.79'
Bank-Full Depth= 3.50' Flow Area= 129.5 sf, Capacity= 463.27 cfs

2.00' x 3.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 72.00'
Length= 500.0' Slope= 0.0024 '/'
Inlet Invert= 660.30', Outlet Invert= 659.10'



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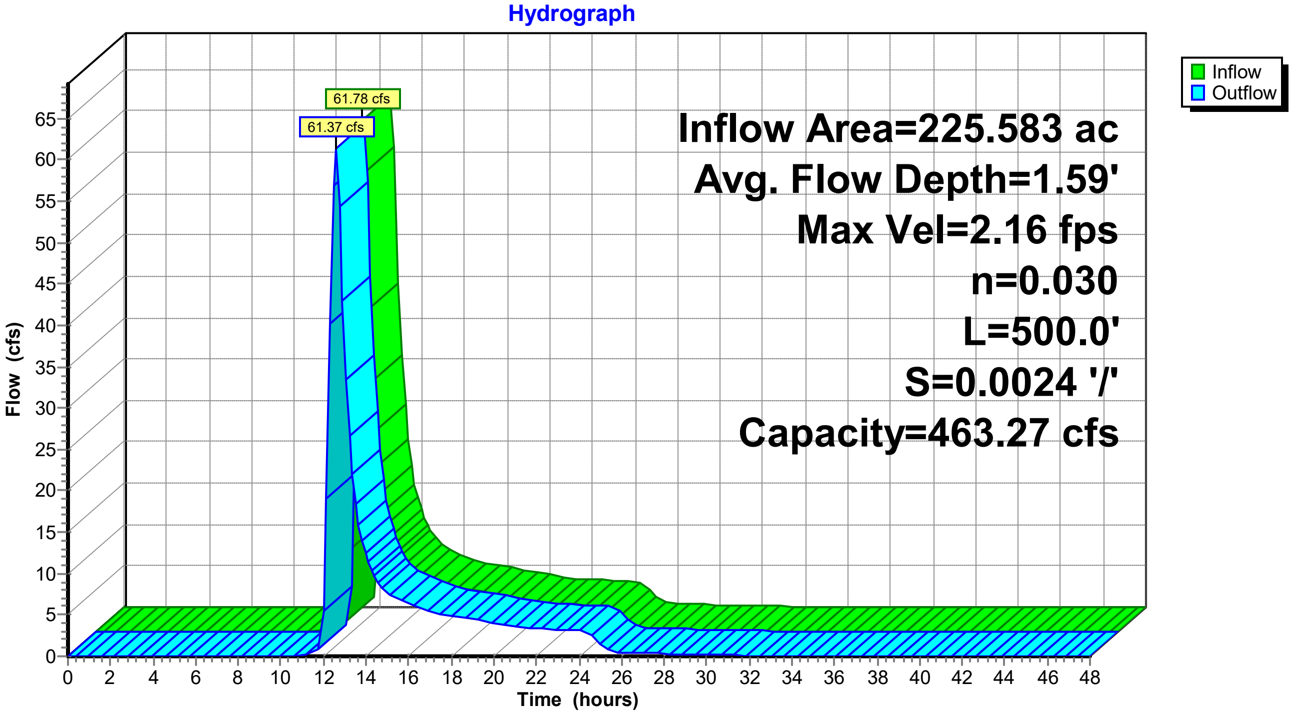
Reach 7R: North Property Line Ditch (West)



Summary for Reach 8R: Western Overflow Swale

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routed to Reach 7R : North Property Line Ditch (West)

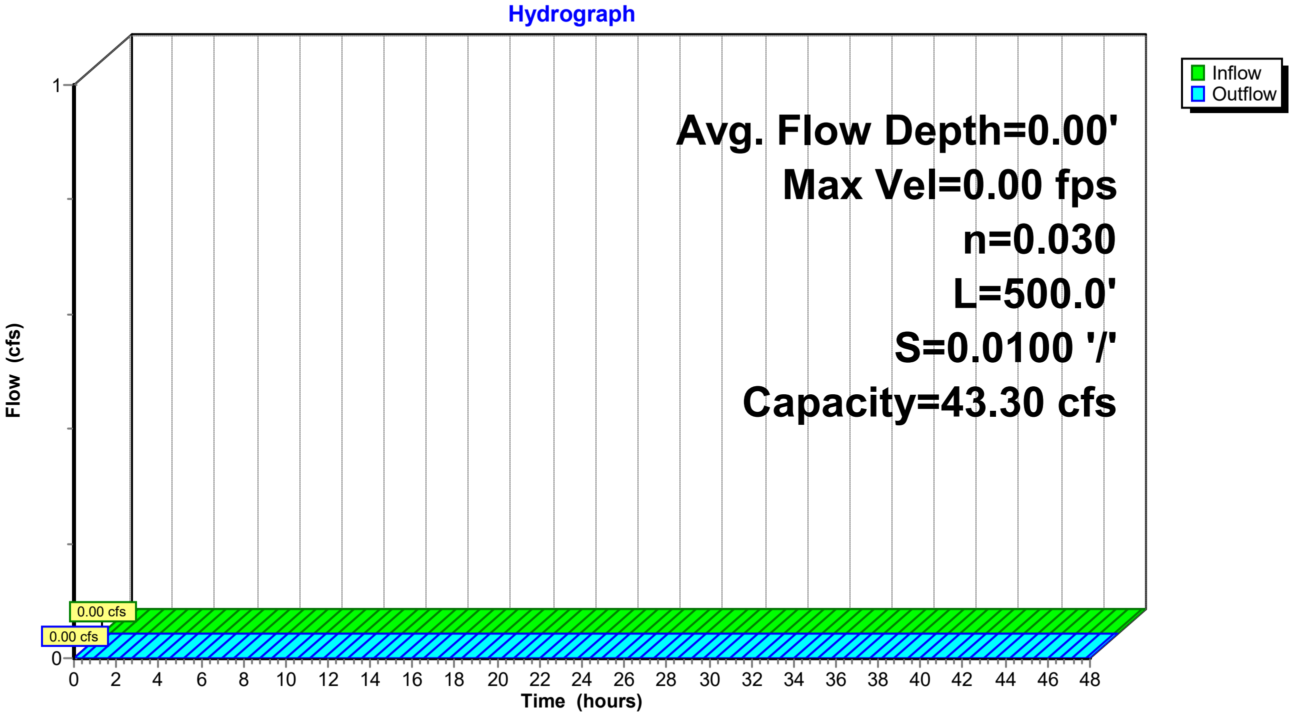
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 43.30 cfs

2.00' x 1.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 500.0' Slope= 0.0100 '/'
Inlet Invert= 665.00', Outlet Invert= 660.00'

‡

Reach 8R: Western Overflow Swale



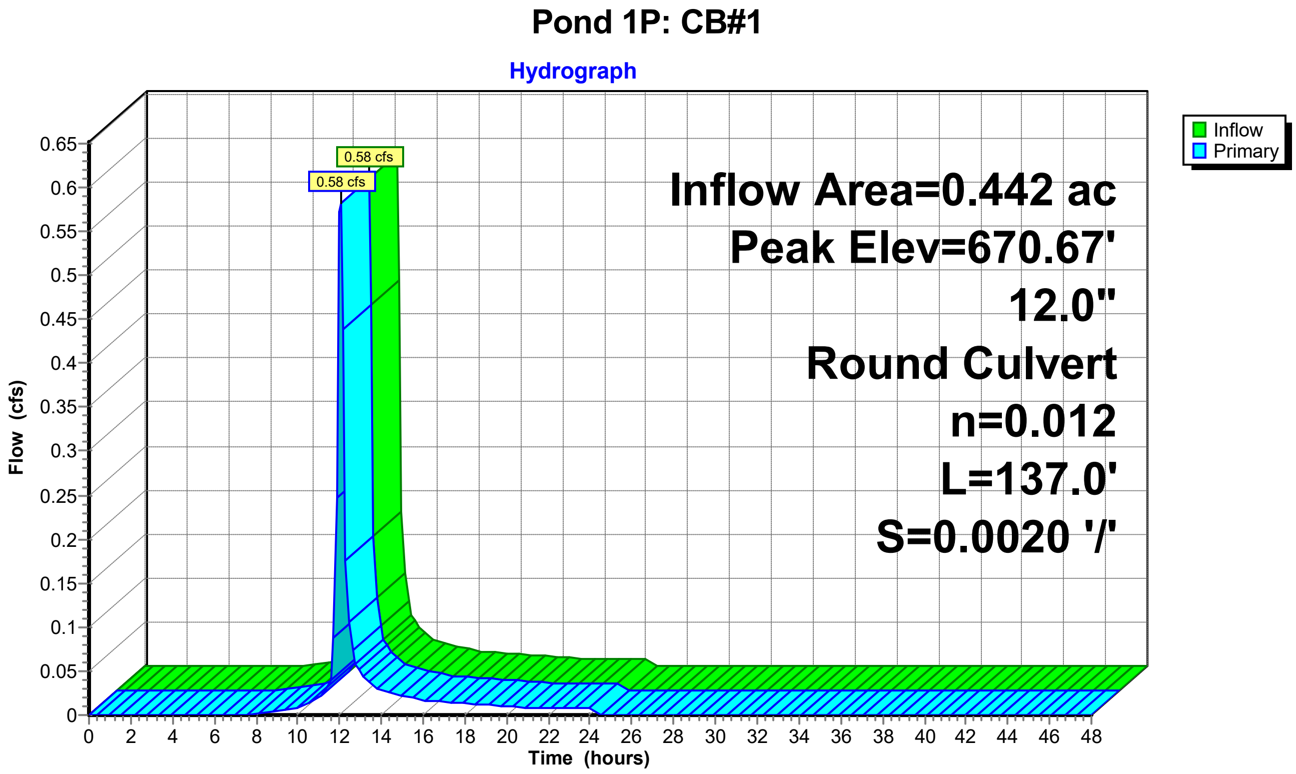
Summary for Pond 1P: CB#1

Inflow Area = 0.442 ac, 67.06% Impervious, Inflow Depth = 1.08" for 1-yr event
Inflow = 0.58 cfs @ 12.03 hrs, Volume= 0.040 af
Outflow = 0.58 cfs @ 12.03 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min
Primary = 0.58 cfs @ 12.03 hrs, Volume= 0.040 af
Routed to Pond 3P : CB#3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 670.67' @ 12.03 hrs
Flood Elev= 672.65'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.15'	**12.0" Round Culvert** L= 137.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.15' / 669.88' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.54 cfs @ 12.03 hrs HW=670.65' TW=669.51' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 0.54 cfs @ 2.01 fps)



Summary for Pond 3P: CB#3

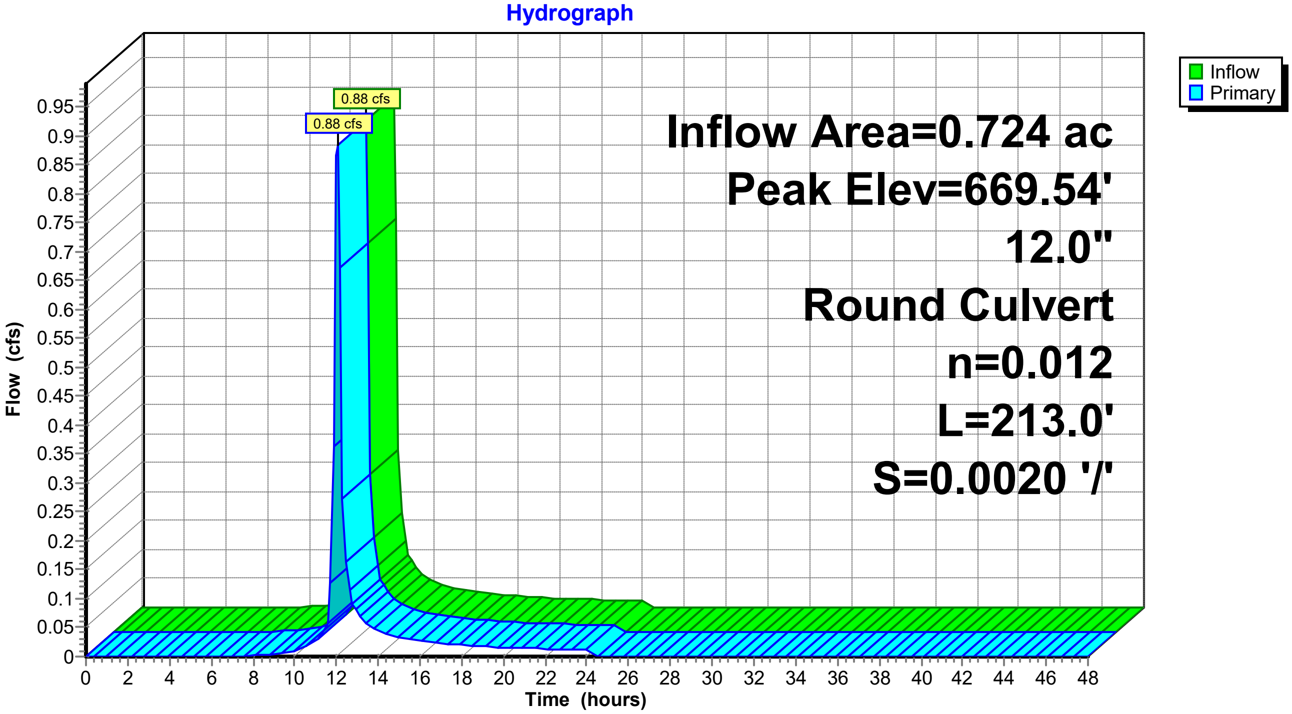
Inflow Area = 0.724 ac, 59.47% Impervious, Inflow Depth = 1.00" for 1-yr event
Inflow = 0.88 cfs @ 12.03 hrs, Volume= 0.060 af
Outflow = 0.88 cfs @ 12.03 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min
Primary = 0.88 cfs @ 12.03 hrs, Volume= 0.060 af
Routed to Pond 5P : CB#5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 669.54' @ 12.04 hrs
Flood Elev= 672.65'

Device	Routing	Invert	Outlet Devices
#1	Primary	668.88'	**12.0" Round Culvert** L= 213.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 668.88' / 668.45' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.82 cfs @ 12.03 hrs HW=669.51' TW=667.50' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.82 cfs @ 2.25 fps)

Pond 3P: CB#3



Summary for Pond 5P: CB#5

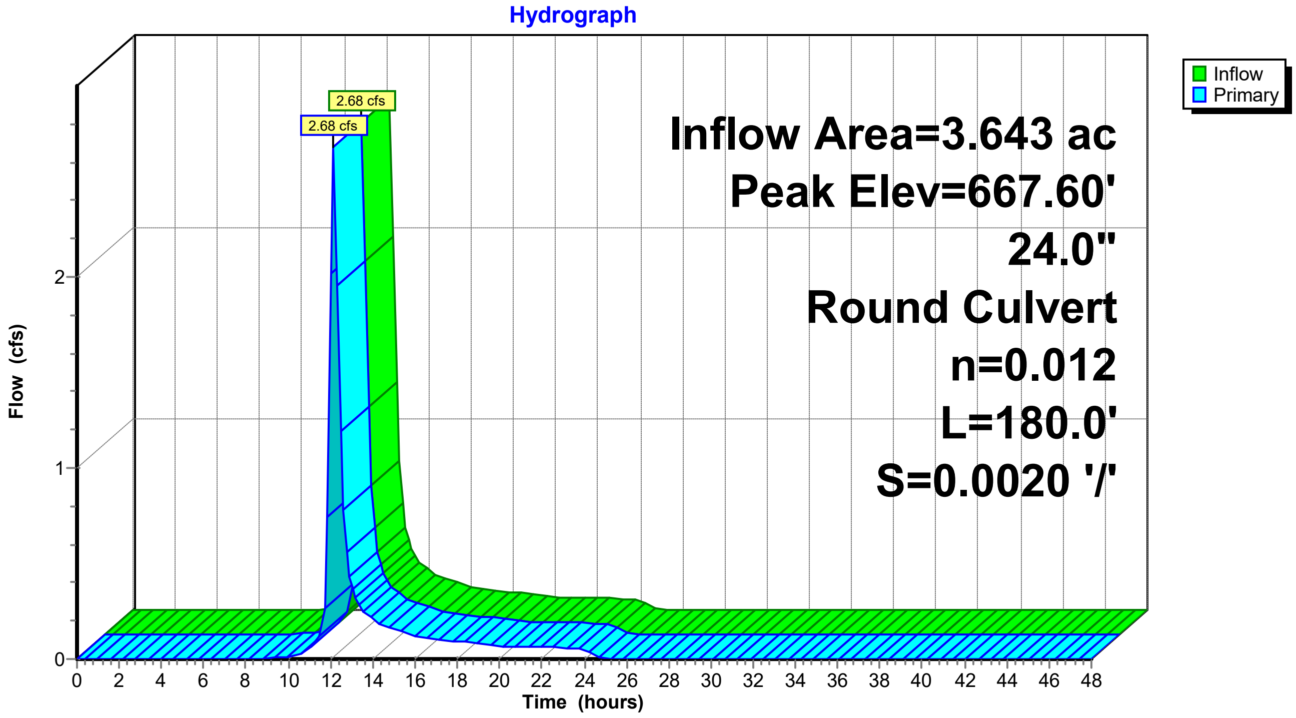
Inflow Area = 3.643 ac, 40.89% Impervious, Inflow Depth = 0.80" for 1-yr event
Inflow = 2.68 cfs @ 12.15 hrs, Volume= 0.241 af
Outflow = 2.68 cfs @ 12.15 hrs, Volume= 0.241 af, Atten= 0%, Lag= 0.0 min
Primary = 2.68 cfs @ 12.15 hrs, Volume= 0.241 af
Routed to Pond 33P : Subsurface Detention within Gravel Area

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 667.60' @ 12.15 hrs
Flood Elev= 670.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	666.71'	**24.0" Round Culvert** L= 180.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 666.71' / 666.35' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=2.66 cfs @ 12.15 hrs HW=667.59' TW=665.52' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 2.66 cfs @ 2.93 fps)

Pond 5P: CB#5



Summary for Pond 6P: YD#6

Inflow Area =	1.739 ac,	32.52% Impervious,	Inflow Depth = 0.72"	for 1-yr event	
Inflow =	1.13 cfs @	12.20 hrs,	Volume=	0.104 af	
Outflow =	1.13 cfs @	12.20 hrs,	Volume=	0.104 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.13 cfs @	12.20 hrs,	Volume=	0.104 af	

Routed to Pond 8P : YD#8

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 668.08' @ 12.28 hrs Surf.Area= 1 sf Storage= 1 cf
Flood Elev= 669.95' Surf.Area= 10,725 sf Storage= 3,815 cf

Plug-Flow detention time= 0.0 min calculated for 0.103 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (864.6 - 864.5)

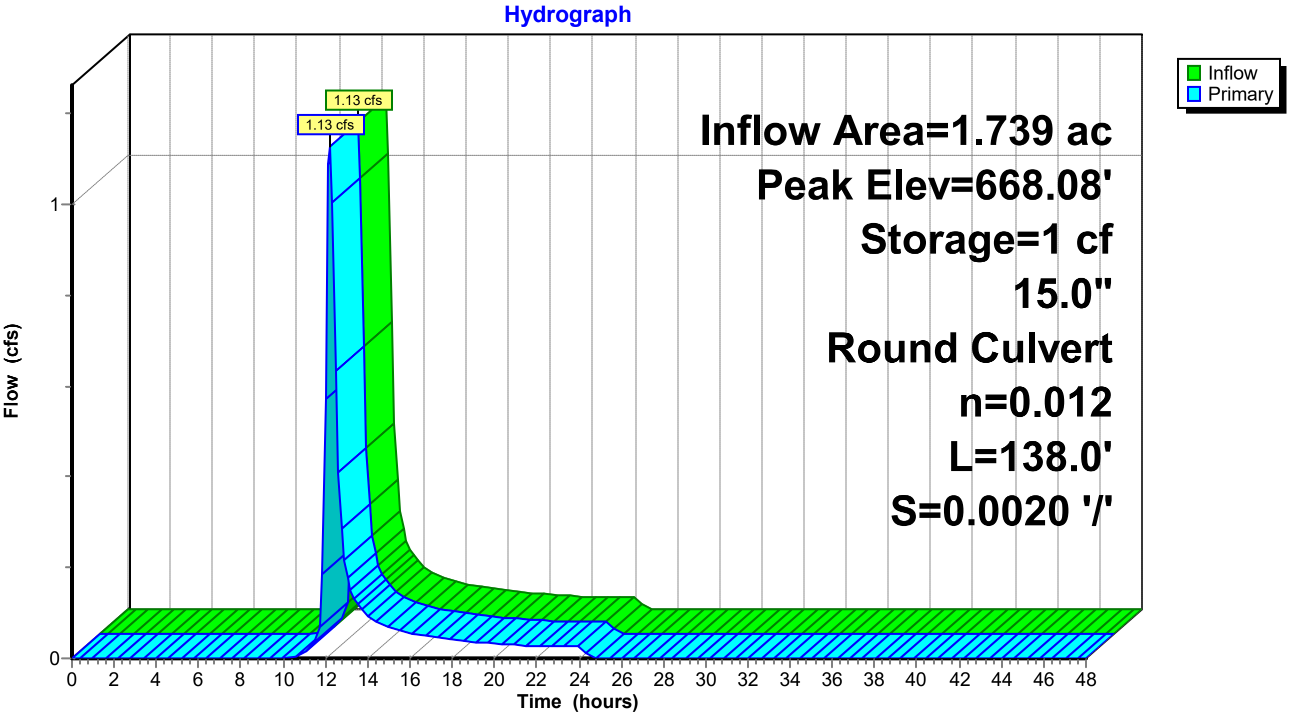
Volume	Invert	Avail.Storage	Storage Description
#1	667.37'	3,815 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
667.37	1	0	0
669.25	1	2	2
669.70	7,065	1,590	1,592
669.95	10,725	2,224	3,815

Device	Routing	Invert	Outlet Devices
#1	Primary	667.37'	**15.0" Round Culvert** L= 138.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 667.37' / 667.09' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.85 cfs @ 12.20 hrs HW=668.05' TW=667.80' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.85 cfs @ 1.82 fps)

Pond 6P: YD#6


Hydrograph
1.13 cfs
1.13 cfs
Inflow
Primary
Inflow Area=1.739 ac
Peak Elev=668.08'
Storage=1 cf
15.0"
Round Culvert
n=0.012
L=138.0'
S=0.0020 '/'
Flow (cfs)
1
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48
Time (hours)

Summary for Pond 8P: YD#8

```
Inflow Area =        2.497 ac,  34.48% Impervious,  Inflow Depth =   0.73"    for  1-yr event
Inflow      =        1.68 cfs @   12.20 hrs,  Volume=          0.152 af
Outflow     =        1.68 cfs @   12.20 hrs,  Volume=          0.152 af,  Atten= 0%,  Lag= 0.0 min
Primary     =        1.68 cfs @   12.20 hrs,  Volume=          0.152 af
    Routed to Pond 5P : CB#5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 667.83' @ 12.25 hrs   Surf.Area= 1 sf   Storage= 1 cf
Flood Elev= 669.90'   Surf.Area= 8,385 sf   Storage= 3,357 cf

Plug-Flow detention time= 0.0 min calculated for 0.152 af (100% of inflow)
Center-of-Mass det. time= 0.0 min ( 862.6 - 862.6 )

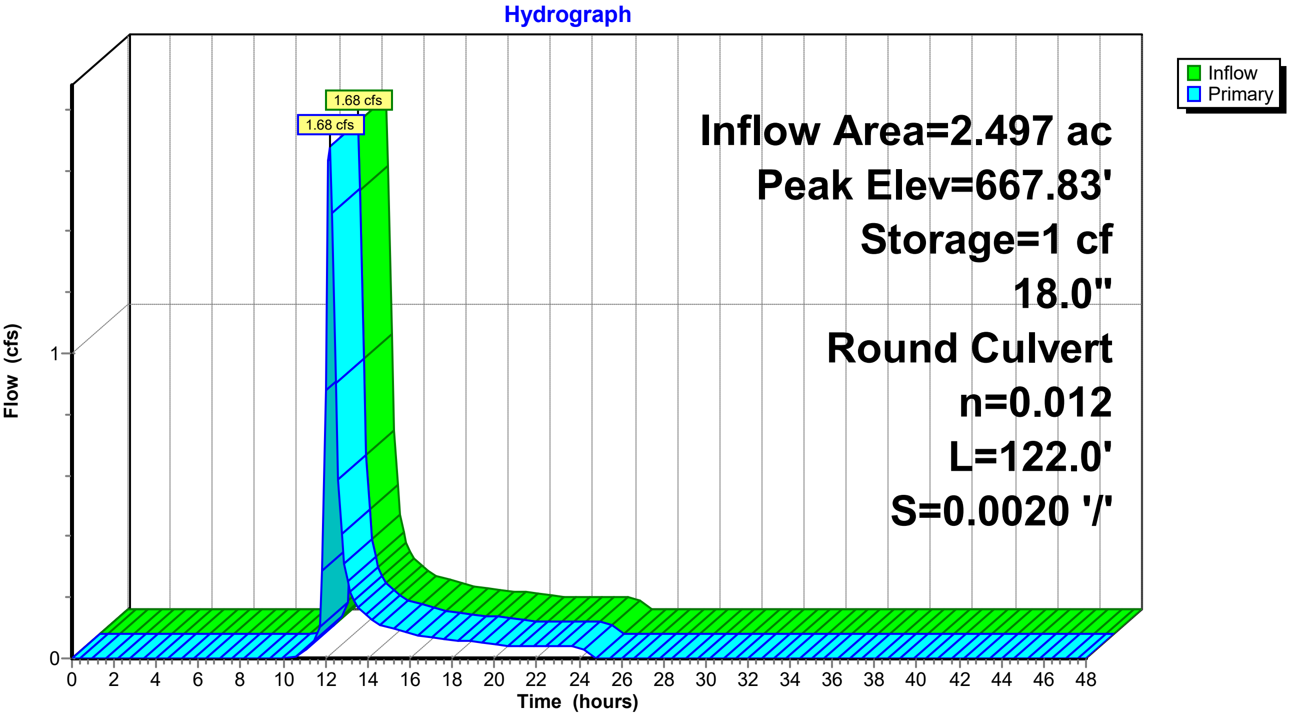
Volume       Invert     Avail.Storage   Storage Description
   #1        666.95'         3,357 cf   Custom Stage Data (Prismatic) Listed below (Recalc)

 Elevation          Surf.Area           Inc.Store          Cum.Store
    (feet)            (sq-ft)        (cubic-feet)       (cubic-feet)
    666.95                  1                   0                  0
    669.10                  1                   2                  2
    669.90              8,385               3,354              3,357

Device   Routing            Invert   Outlet Devices
   #1    Primary           666.95'   18.0"  Round Culvert
                                     L= 122.0'   CPP, square edge headwall,  Ke= 0.500
                                     Inlet / Outlet Invert= 666.95' / 666.71'   S= 0.0020 '/'   Cc= 0.900
                                     n= 0.012,  Flow Area= 1.77 sf

Primary OutFlow  Max=1.46 cfs @ 12.20 hrs  HW=667.80'  TW=667.55'   (Dynamic Tailwater)
└─1=Culvert  (Outlet Controls 1.46 cfs @ 2.06 fps)
```

Pond 8P: YD#8


Hydrograph
1.68 cfs
1.68 cfs
Inflow Area=2.497 ac
Peak Elev=667.83'
Storage=1 cf
18.0"
Round Culvert
n=0.012
L=122.0'
S=0.0020 '/'
🟩 Inflow
🟦 Primary
Flow (cfs)
0
1
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48
Time (hours)

Summary for Pond 11P: YD#11

```
Inflow Area =       0.851 ac, 56.59% Impervious, Inflow Depth =  0.94"   for 1-yr event
Inflow      =      0.88 cfs @  12.11 hrs, Volume=         0.067 af
Outflow     =      0.88 cfs @  12.12 hrs, Volume=         0.067 af, Atten= 0%, Lag= 0.0 min
Primary     =      0.88 cfs @  12.12 hrs, Volume=         0.067 af
   Routed to Pond 15P : CB#15
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 667.69' @ 12.11 hrs Surf.Area= 1 sf Storage= 1 cf
Flood Elev= 669.70' Surf.Area= 3,725 sf Storage= 1,027 cf

Plug-Flow detention time= 0.0 min calculated for 0.067 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (838.1 - 838.0)

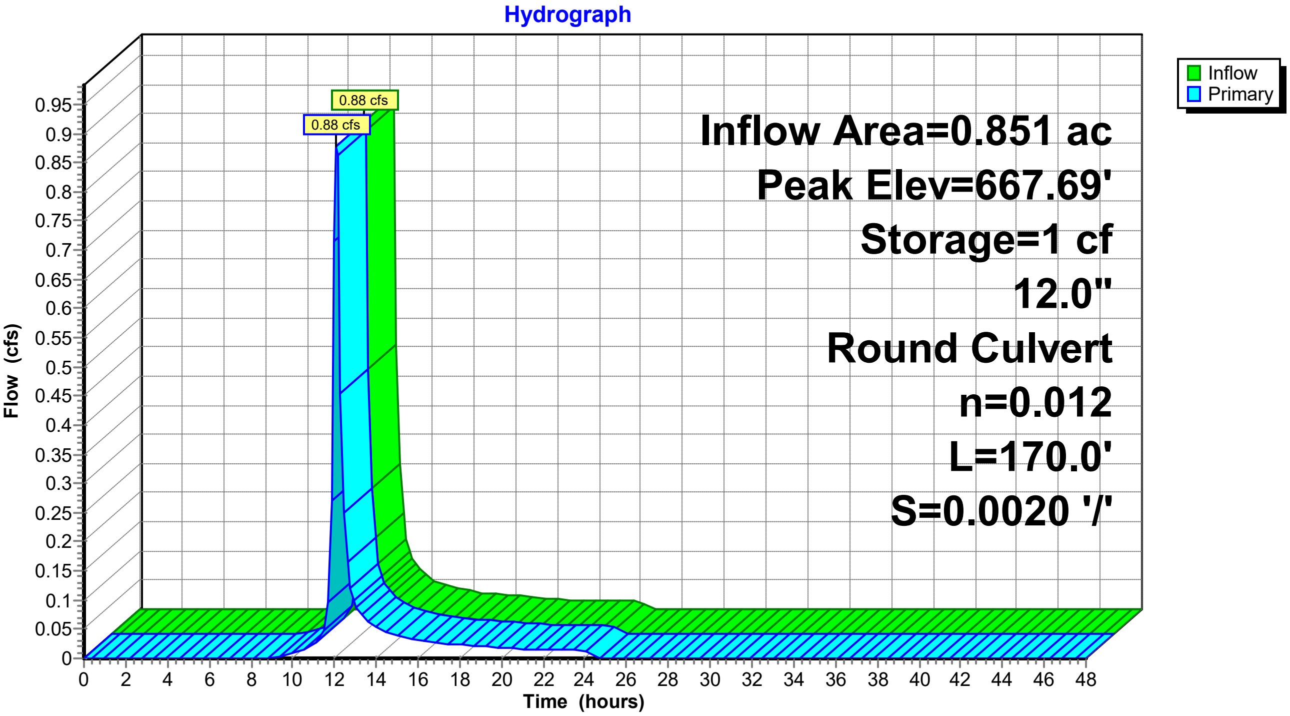
Volume	Invert	Avail.Storage	Storage Description
#1	667.04'	1,027 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
667.04	1	0	0
669.15	1	2	2
669.70	3,725	1,025	1,027

Device	Routing	Invert	Outlet Devices
#1	Primary	667.04'	**12.0" Round Culvert** L= 170.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 667.04' / 666.70' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.12 hrs HW=667.67' TW=666.90' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.83 cfs @ 2.26 fps)

Pond 11P: YD#11



Summary for Pond 13P: CB#13

```
Inflow Area =         0.858 ac, 68.58% Impervious, Inflow Depth =   1.08"    for  1-yr event
Inflow      =        1.01 cfs @  12.10 hrs, Volume=           0.077 af
Outflow     =        1.01 cfs @  12.11 hrs, Volume=           0.077 af,  Atten= 0%,  Lag= 0.0 min
Primary     =        1.01 cfs @  12.11 hrs, Volume=           0.077 af
    Routed to Pond 15P : CB#15

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 666.95' @ 12.24 hrs   Surf.Area= 4 sf   Storage= 4 cf
Flood Elev= 669.15'   Surf.Area= 5,345 sf   Storage= 1,597 cf

Plug-Flow detention time= 0.2 min calculated for 0.077 af (100% of inflow)
Center-of-Mass det. time= 0.2 min ( 827.1 - 826.9 )

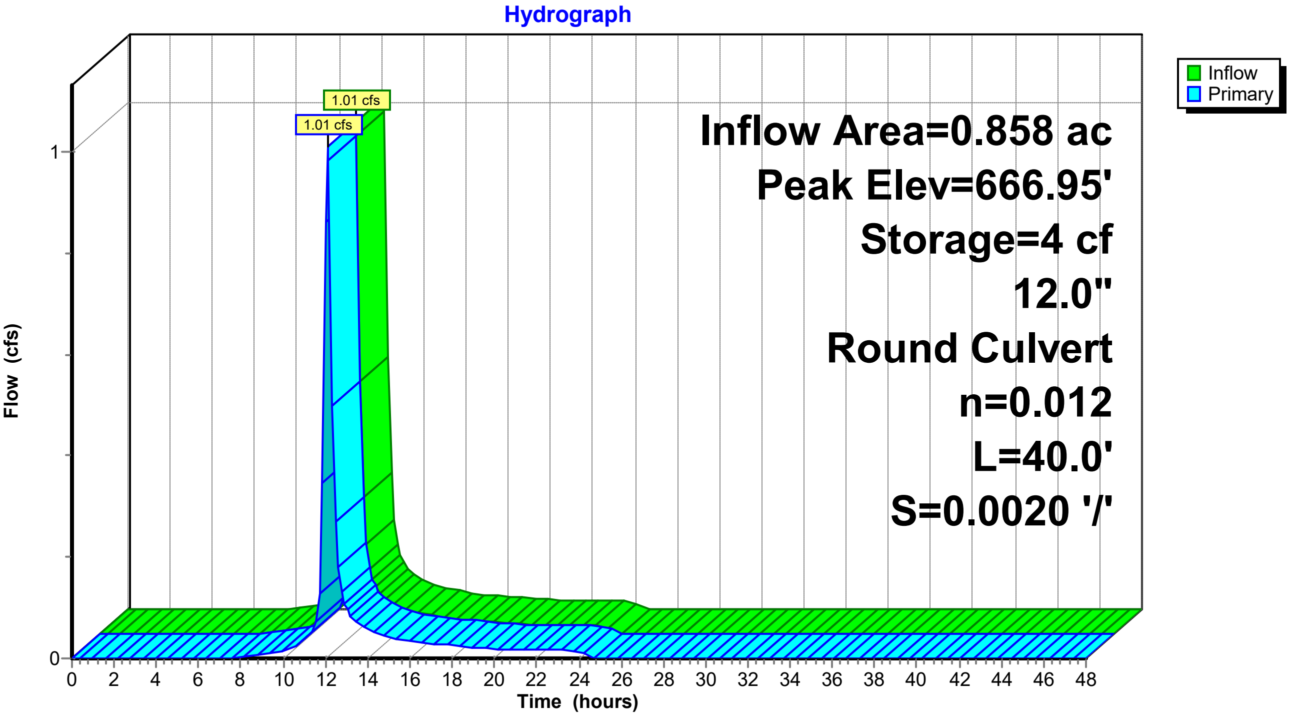
Volume       Invert     Avail.Storage   Storage Description
   #1        665.99'         1,597 cf   Custom Stage Data (Prismatic) Listed below (Recalc)

 Elevation          Surf.Area          Inc.Store         Cum.Store
    (feet)            (sq-ft)      (cubic-feet)      (cubic-feet)
    665.99                  4                 0                 0
    668.40                  4                10                10
    669.00              3,160               949               959
    669.15              5,345               638             1,597

Device   Routing          Invert   Outlet Devices
   #1    Primary          665.99'  12.0"  Round Culvert
                                   L= 40.0'   CPP, square edge headwall,  Ke= 0.500
                                   Inlet / Outlet Invert= 665.99' / 665.91'   S= 0.0020 '/'   Cc= 0.900
                                   n= 0.012,  Flow Area= 0.79 sf

Primary OutFlow  Max=0.00 cfs @ 12.11 hrs  HW=666.87'  TW=666.89'   (Dynamic Tailwater)
└─1=Culvert  ( Controls 0.00 cfs)
```

Pond 13P: CB#13



Summary for Pond 15P: CB#15

```
Inflow Area =         2.100 ac,  69.58% Impervious,  Inflow Depth =   1.12"    for  1-yr event
Inflow      =        2.38 cfs @   12.04 hrs,  Volume=           0.196 af
Outflow     =        2.38 cfs @   12.04 hrs,  Volume=           0.196 af,  Atten= 0%,  Lag= 0.0 min
Primary     =        2.38 cfs @   12.04 hrs,  Volume=           0.196 af
    Routed to Pond 18P : CB#18
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 666.92' @ 12.18 hrs Surf.Area= 4 sf Storage= 4 cf
Flood Elev= 669.20' Surf.Area= 4 sf Storage= 13 cf

Plug-Flow detention time= 1.3 min calculated for 0.196 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (814.5 - 814.4)

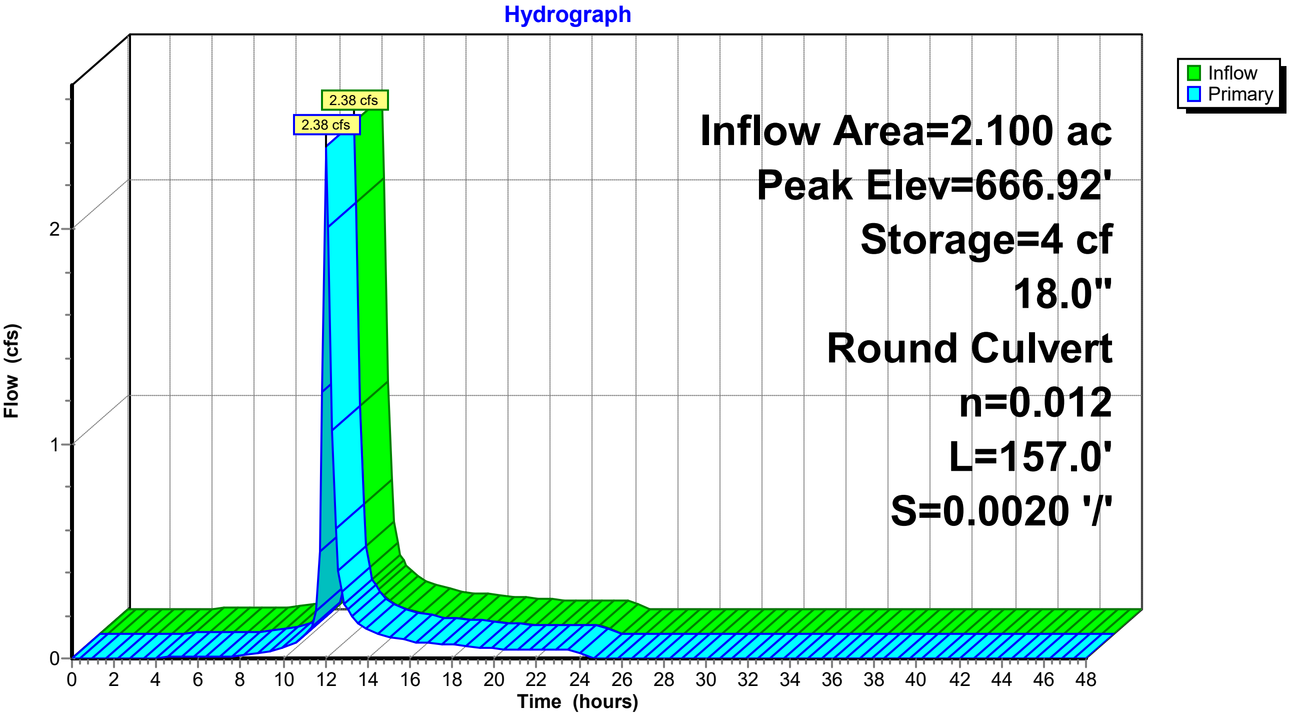
Volume	Invert	Avail.Storage	Storage Description
#1	665.91'	13 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
665.91	4	0	0
669.20	4	13	13

Device	Routing	Invert	Outlet Devices
#1	Primary	665.91'	**18.0" Round Culvert** L= 157.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 665.91' / 665.60' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=1.48 cfs @ 12.04 hrs HW=666.86' TW=666.66' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.48 cfs @ 1.79 fps)

Pond 15P: CB#15



Summary for Pond 18P: CB#18

Inflow Area = 2.561 ac, 59.75% Impervious, Inflow Depth = 1.01" for 1-yr event
Inflow = 2.50 cfs @ 12.05 hrs, Volume= 0.215 af
Outflow = 2.50 cfs @ 12.05 hrs, Volume= 0.215 af, Atten= 0%, Lag= 0.0 min
Primary = 2.50 cfs @ 12.05 hrs, Volume= 0.215 af
Routed to Pond 20P : CB#20

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 666.78' @ 12.17 hrs Surf.Area= 4 sf Storage= 5 cf
Flood Elev= 669.45' Surf.Area= 9,895 sf Storage= 3,251 cf

Plug-Flow detention time= 0.1 min calculated for 0.214 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (820.9 - 820.8)

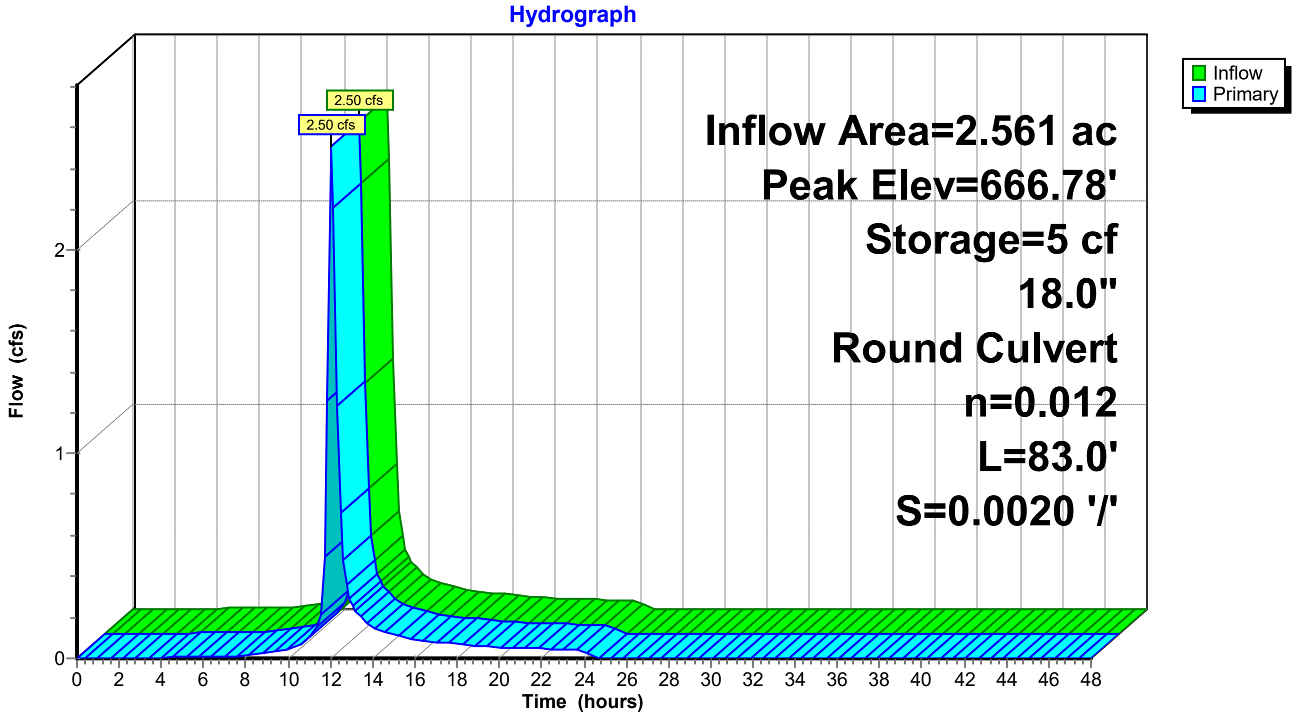
Volume	Invert	Avail.Storage	Storage Description
#1	665.60'	3,251 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
665.60	4	0	0
668.65	4	12	12
669.00	2,530	443	456
669.45	9,895	2,796	3,251

Device	Routing	Invert	Outlet Devices
#1	Primary	665.60'	**18.0" Round Culvert** L= 83.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 665.60' / 665.43' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=1.07 cfs @ 12.05 hrs HW=666.67' TW=666.61' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 1.07 cfs @ 1.12 fps)

Pond 18P: CB#18



Summary for Pond 20P: CB#20

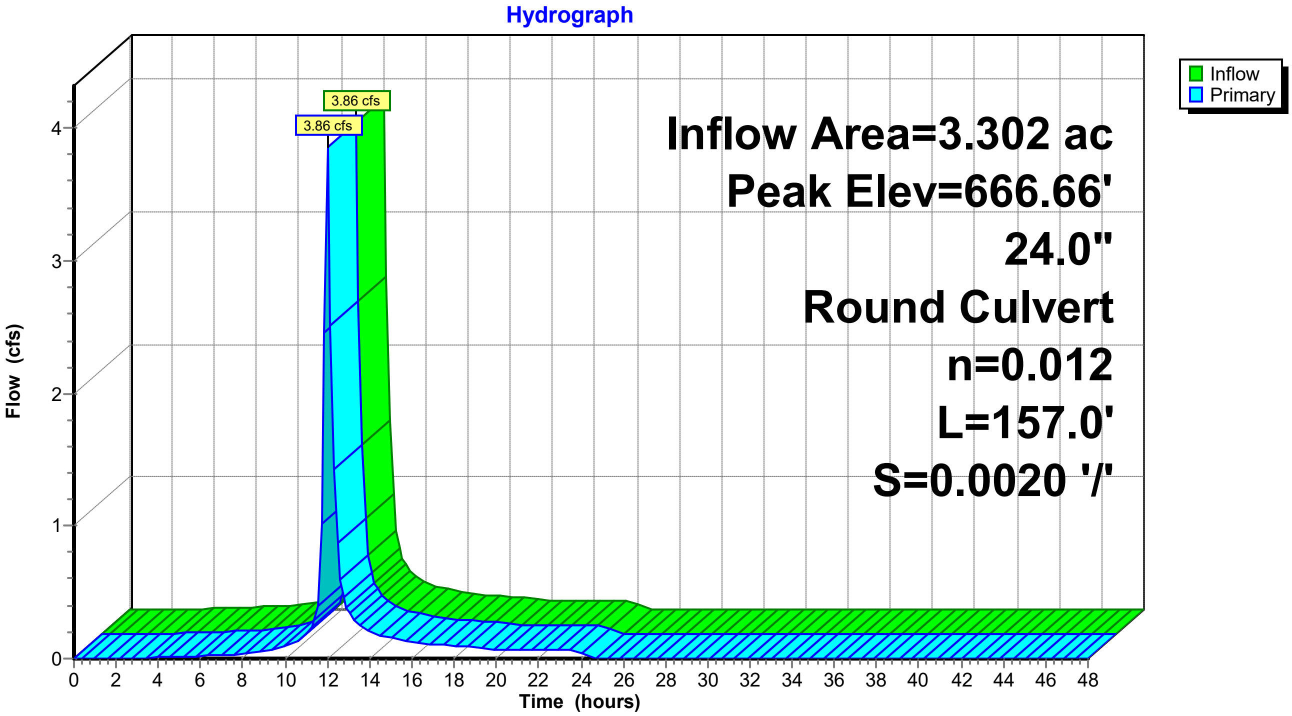
```
Inflow Area =      3.302 ac,  68.79% Impervious,  Inflow Depth =   1.14"    for  1-yr event
Inflow      =     3.86 cfs @   12.00 hrs,  Volume=          0.313 af
Outflow     =     3.86 cfs @   12.00 hrs,  Volume=          0.313 af,  Atten= 0%,  Lag= 0.0 min
Primary     =     3.86 cfs @   12.00 hrs,  Volume=          0.313 af
    Routed to Pond 24P : CB#24
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 666.66' @ 12.08 hrs
Flood Elev= 669.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	665.43'	**24.0" Round Culvert** L= 157.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 665.43' / 665.12' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=2.50 cfs @ 12.00 hrs HW=666.61' TW=666.43' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 2.50 cfs @ 1.86 fps)

Pond 20P: CB#20



Summary for Pond 22P: YD#22

```
Inflow Area =        0.624 ac, 27.67% Impervious, Inflow Depth =  0.53"   for 1-yr event
Inflow      =        0.30 cfs @  12.19 hrs, Volume=          0.028 af
Outflow     =        0.30 cfs @  12.19 hrs, Volume=          0.028 af, Atten= 0%, Lag= 0.0 min
Primary     =        0.30 cfs @  12.19 hrs, Volume=          0.028 af
    Routed to Pond 24P : CB#24
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 667.04' @ 12.20 hrs Surf.Area= 1 sf Storage= 0 cf
Flood Elev= 669.45' Surf.Area= 17,680 sf Storage= 5,215 cf

Plug-Flow detention time= 0.1 min calculated for 0.028 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (881.2 - 881.1)

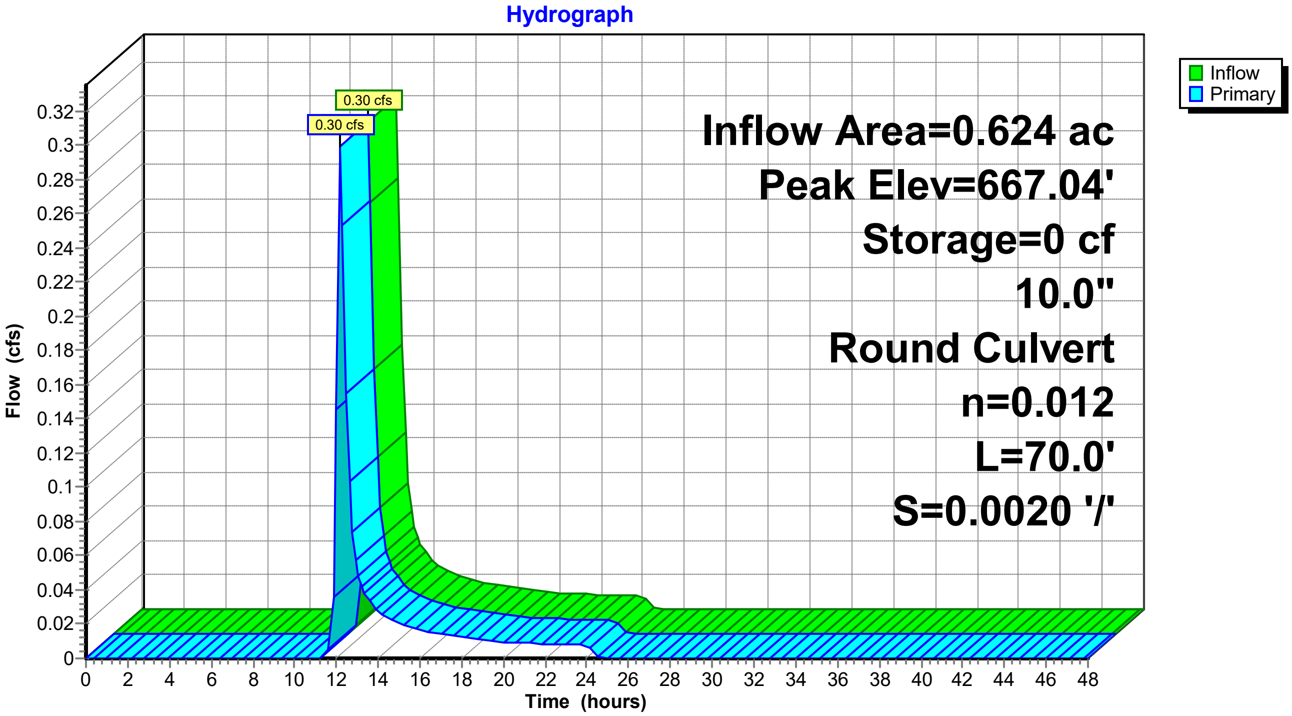
Volume	Invert	Avail.Storage	Storage Description
#1	666.65'	5,215 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
666.65	1	0	0
668.55	1	2	2
669.00	2,745	618	620
669.45	17,680	4,596	5,215

Device	Routing	Invert	Outlet Devices
#1	Primary	666.65'	**10.0" Round Culvert** L= 70.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 666.65' / 666.51' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=0.28 cfs @ 12.19 hrs HW=667.02' TW=666.02' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.28 cfs @ 1.73 fps)

Pond 22P: YD#22



Summary for Pond 24P: CB#24

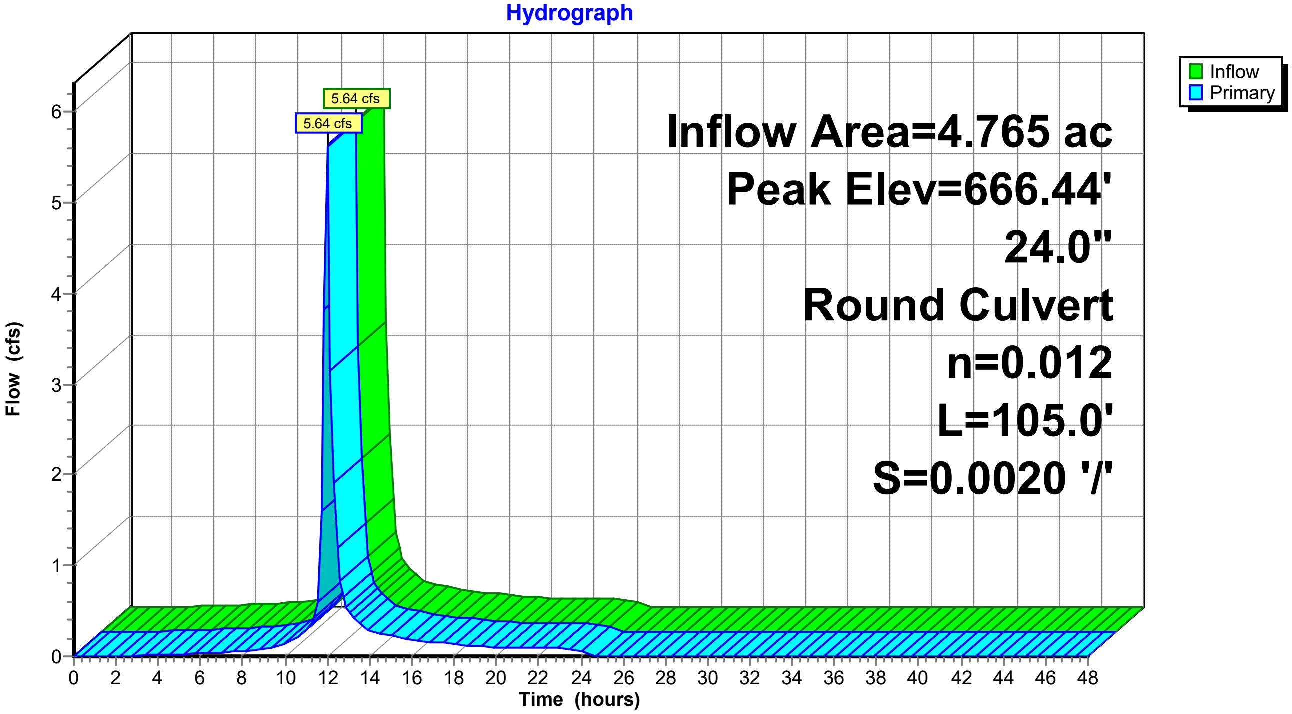
Inflow Area = 4.765 ac, 68.89% Impervious, Inflow Depth = 1.14" for 1-yr event
Inflow = 5.64 cfs @ 11.99 hrs, Volume= 0.453 af
Outflow = 5.64 cfs @ 11.99 hrs, Volume= 0.453 af, Atten= 0%, Lag= 0.0 min
Primary = 5.64 cfs @ 11.99 hrs, Volume= 0.453 af
Routed to Pond 33P : Subsurface Detention within Gravel Area

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 666.44' @ 11.99 hrs
Flood Elev= 669.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	665.12'	**24.0" Round Culvert** L= 105.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 665.12' / 664.91' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=5.47 cfs @ 11.99 hrs HW=666.42' TW=665.35' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 5.47 cfs @ 3.61 fps)

Pond 24P: CB#24



Summary for Pond 26P: CB#26

```
Inflow Area =       0.811 ac, 71.10% Impervious, Inflow Depth =  1.15"   for 1-yr event
Inflow      =       1.02 cfs @  12.10 hrs, Volume=          0.078 af
Outflow     =       1.02 cfs @  12.10 hrs, Volume=          0.078 af, Atten= 0%, Lag= 0.0 min
Primary     =       1.02 cfs @  12.10 hrs, Volume=          0.078 af
    Routed to Pond 28P : CB#28
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 666.61' @ 12.11 hrs Surf.Area= 4 sf Storage= 3 cf
Flood Elev= 669.00' Surf.Area= 3,160 sf Storage= 959 cf

Plug-Flow detention time= 0.2 min calculated for 0.078 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (821.0 - 820.9)

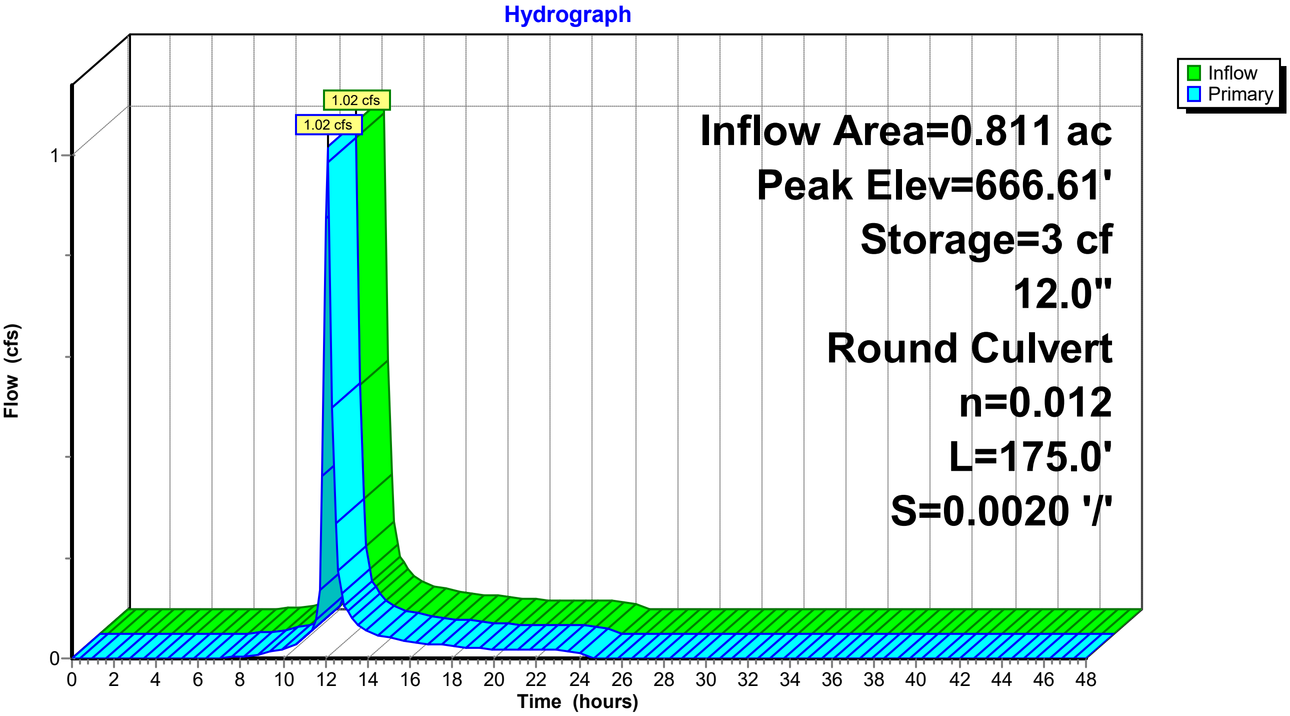
Volume	Invert	Avail.Storage	Storage Description
#1	665.90'	1,597 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
665.90	4	0	0
668.40	4	10	10
669.00	3,160	949	959
669.15	5,345	638	1,597

Device	Routing	Invert	Outlet Devices
#1	Primary	665.90'	**12.0" Round Culvert** L= 175.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 665.90' / 665.55' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.95 cfs @ 12.10 hrs HW=666.58' TW=666.03' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.95 cfs @ 2.35 fps)

Pond 26P: CB#26



Summary for Pond 28P: CB#28

Inflow Area = 1.235 ac, 62.07% Impervious, Inflow Depth = 1.04" for 1-yr event
Inflow = 1.38 cfs @ 12.11 hrs, Volume= 0.107 af
Outflow = 1.38 cfs @ 12.11 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min
Primary = 1.38 cfs @ 12.11 hrs, Volume= 0.107 af
Routed to Pond 30P : CB#30

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 666.05' @ 12.13 hrs Surf.Area= 4 sf Storage= 3 cf
Flood Elev= 669.75' Surf.Area= 5,170 sf Storage= 1,568 cf

Plug-Flow detention time= 0.5 min calculated for 0.107 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (829.0 - 828.8)

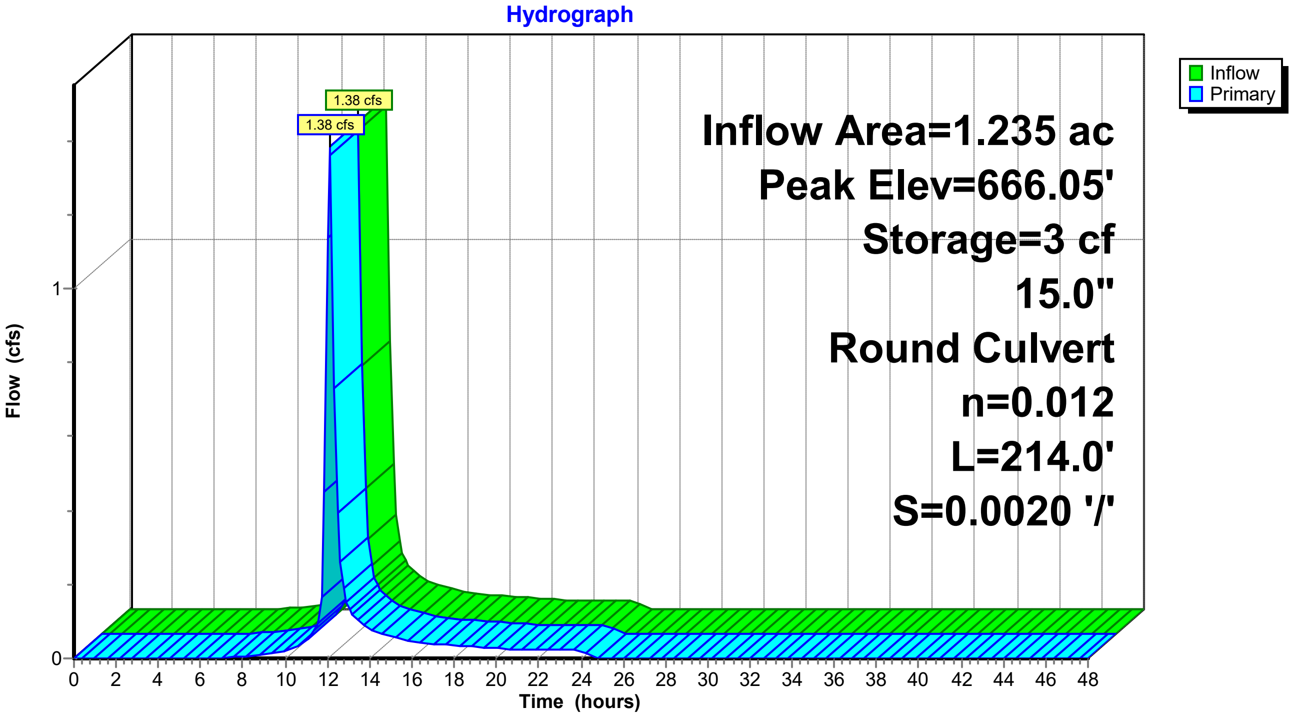
Volume	Invert	Avail.Storage	Storage Description
#1	665.30'	1,568 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
665.30	4	0	0
669.15	4	15	15
669.75	5,170	1,552	1,568

Device	Routing	Invert	Outlet Devices
#1	Primary	665.30'	**15.0" Round Culvert** L= 214.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 665.30' / 664.87' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.16 cfs @ 12.11 hrs HW=666.03' TW=665.55' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.16 cfs @ 2.24 fps)

Pond 28P: CB#28



Summary for Pond 30P: CB#30

```
Inflow Area =       1.904 ac,  48.38% Impervious,  Inflow Depth =   0.89"    for  1-yr event
Inflow      =       1.79 cfs @   12.13 hrs,  Volume=         0.141 af
Outflow     =       1.79 cfs @   12.13 hrs,  Volume=         0.141 af,  Atten= 0%,  Lag= 0.0 min
Primary     =       1.79 cfs @   12.13 hrs,  Volume=         0.141 af
    Routed to Pond 32P : CB#32
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 665.68' @ 12.32 hrs Surf.Area= 4 sf Storage= 4 cf
Flood Elev= 668.00' Surf.Area= 220 sf Storage= 19 cf

Plug-Flow detention time= 1.0 min calculated for 0.141 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (838.9 - 838.8)

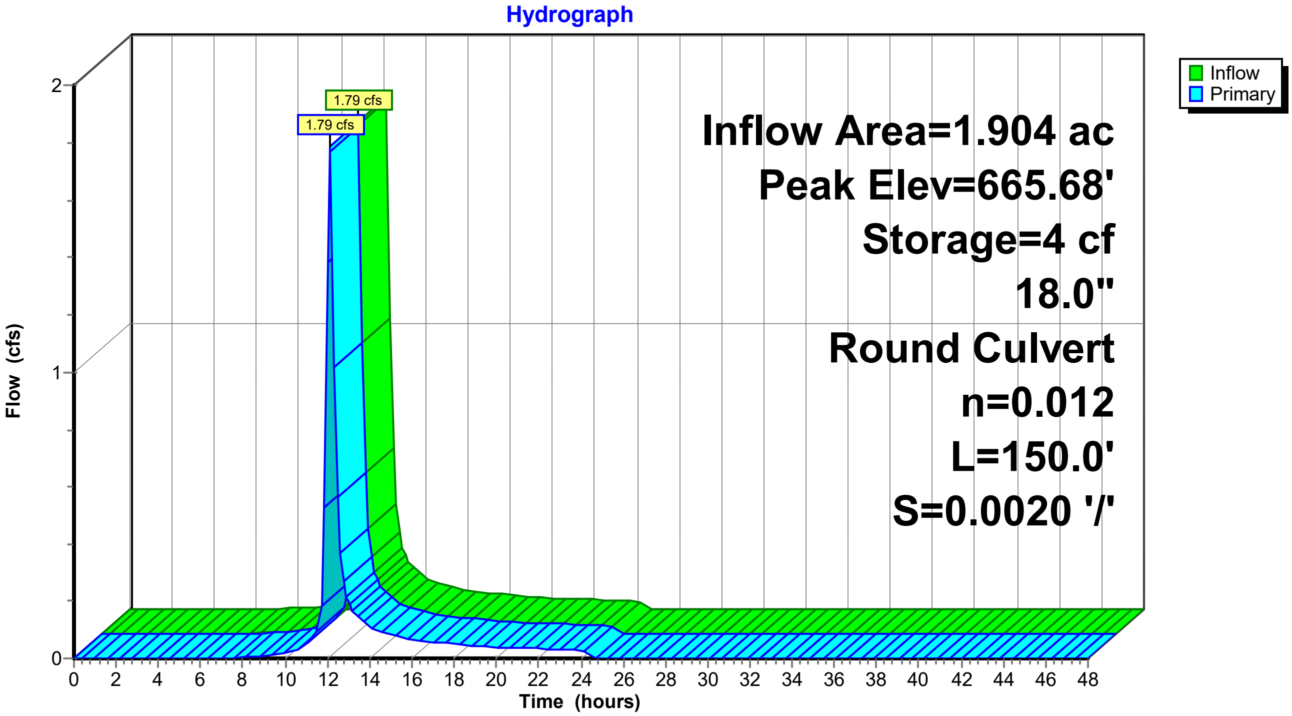
Volume	Invert	Avail.Storage	Storage Description
#1	664.68'	19 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
664.68	4	0	0
667.95	4	13	13
668.00	220	6	19

Device	Routing	Invert	Outlet Devices
#1	Primary	664.68'	**18.0" Round Culvert** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 664.68' / 664.38' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=0.31 cfs @ 12.13 hrs HW=665.56' TW=665.55' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.31 cfs @ 0.42 fps)

Pond 30P: CB#30



Summary for Pond 32P: CB#32

Inflow Area = 2.627 ac, 62.59% Impervious, Inflow Depth = 1.09" for 1-yr event
Inflow = 2.87 cfs @ 12.13 hrs, Volume= 0.238 af
Outflow = 2.87 cfs @ 12.13 hrs, Volume= 0.238 af, Atten= 0%, Lag= 0.0 min
Primary = 2.87 cfs @ 12.13 hrs, Volume= 0.238 af
Routed to Pond 33P : Subsurface Detention within Gravel Area

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 665.63' @ 12.23 hrs Surf.Area= 4 sf Storage= 5 cf
Flood Elev= 668.00' Surf.Area= 5 sf Storage= 15 cf

Plug-Flow detention time= 0.1 min calculated for 0.237 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (815.7 - 815.6)

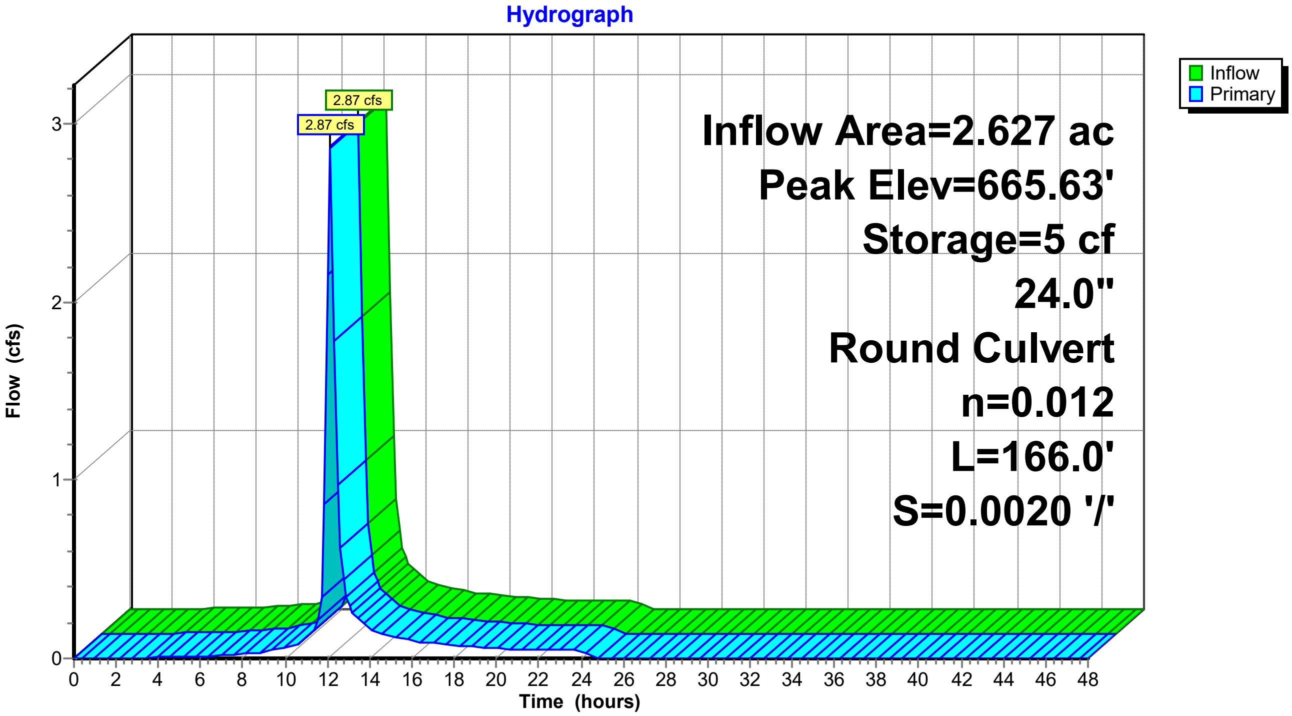
Volume	Invert	Avail.Storage	Storage Description
#1	664.38'	3,522 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
664.38	4	0	0
667.95	4	14	14
688.05	345	3,507	3,522

Device	Routing	Invert	Outlet Devices
#1	Primary	664.38'	**24.0" Round Culvert** L= 166.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 664.38' / 664.05' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=1.40 cfs @ 12.13 hrs HW=665.57' TW=665.51' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 1.40 cfs @ 1.03 fps)

Pond 32P: CB#32



Summary for Pond 33P: Subsurface Detention within Gravel Area

Inflow Area = 21.762 ac, 57.48% Impervious, Inflow Depth = 0.98" for 1-yr event
Inflow = 17.26 cfs @ 12.06 hrs, Volume= 1.783 af
Outflow = 16.36 cfs @ 12.14 hrs, Volume= 1.783 af, Atten= 5%, Lag= 5.2 min
Primary = 10.91 cfs @ 12.14 hrs, Volume= 1.133 af
Routed to Pond 36P : West Pre-Treatment to Bio-Retention Area
Secondary = 5.45 cfs @ 12.14 hrs, Volume= 0.650 af
Routed to Pond 37P : North Pre-Treatment to Bio-Retention Area
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 35P : Dry Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 665.53' @ 12.14 hrs Surf.Area= 4,807 sf Storage= 2,448 cf
Flood Elev= 668.95' Surf.Area= 129,465 sf Storage= 48,972 cf

Plug-Flow detention time= 2.5 min calculated for 1.777 af (100% of inflow)
Center-of-Mass det. time= 2.5 min (831.9 - 829.4)

Volume	Invert	Avail.Storage	Storage Description
#1	664.01'	9,879 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 30,436 cf Overall - 5,739 cf Embedded = 24,697 cf x 40.0% Voids
#2	664.01'	126 cf	**24.0" Round Pipe Storage** Inside #1 L= 40.0'
#3	664.01'	3,657 cf	**24.0" Round Pipe Storage** Inside #1 L= 1,164.0' S= 0.0020 '/'
#4	664.01'	1,421 cf	**18.0" Round Pipe Storage** Inside #1 L= 804.0' S= 0.0020 '/'
#5	665.61'	209 cf	**15.0" Round Pipe Storage** Inside #1 L= 170.0' S= 0.0020 '/'
#6	665.95'	202 cf	**12.0" Round Pipe Storage** Inside #1 L= 257.0' S= 0.0020 '/'
#7	666.46'	38 cf	**10.0" Round Pipe Storage** Inside #1 L= 69.0' S= 0.0020 '/'
#8	666.35'	88 cf	**10.0" Round Pipe Storage** Inside #1 L= 161.0' S= 0.0020 '/'
#9	668.03'	33,354 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 83,386 cf Overall x 40.0% Voids
		48,972 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
664.01	3	0	0
666.67	8,430	11,216	11,216
668.95	8,430	19,220	30,436

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
668.03	0	0	0
668.19	33,970	2,718	2,718
668.45	121,035	20,151	22,868
668.95	121,035	60,518	83,386

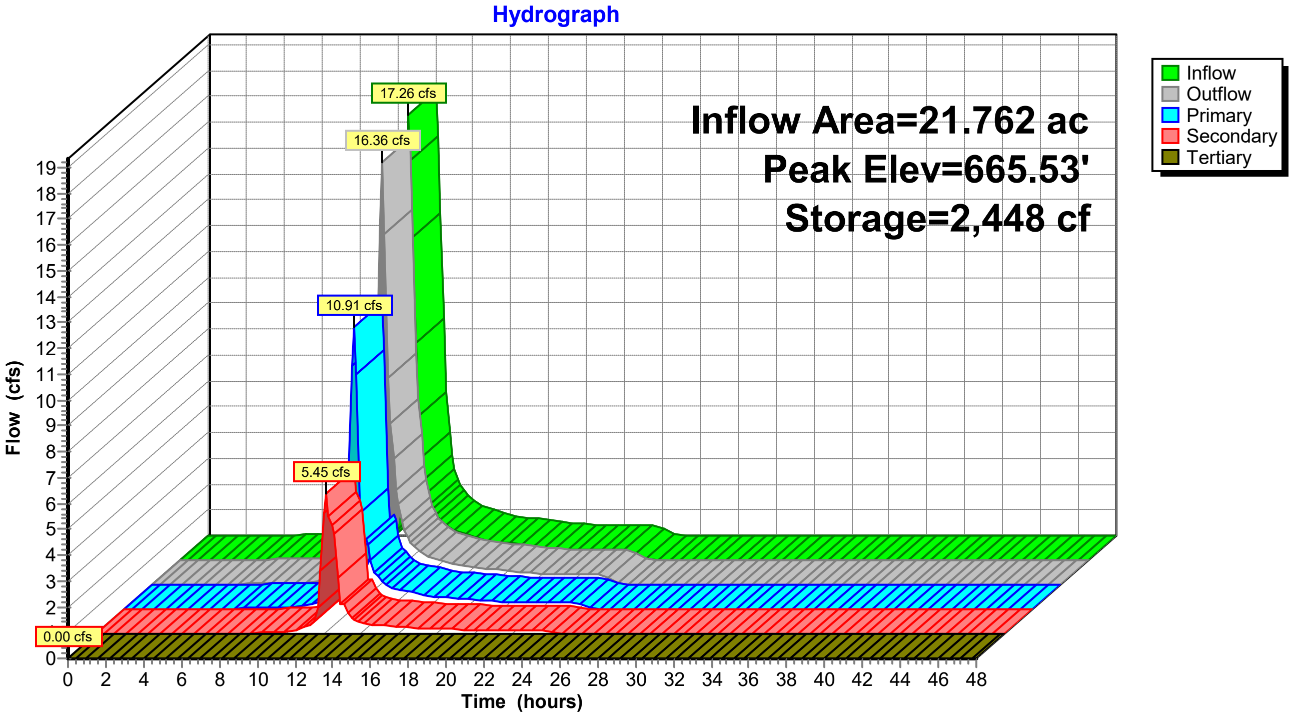
Device	Routing	Invert	Outlet Devices
#1	Primary	664.01'	**18.0" Round Culvert X 2.00** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 664.01' / 663.90' S= 0.0019 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	664.01'	**18.0" Round Culvert** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 664.01' / 663.90' S= 0.0019 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#3	Tertiary	665.71'	**18.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 665.71' / 664.71' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#4	Tertiary	666.05'	**15.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 666.05' / 665.05' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#5	Tertiary	666.39'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 666.39' / 665.39' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#6	Tertiary	666.56'	**10.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 666.56' / 665.56' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=10.83 cfs @ 12.14 hrs HW=665.52' TW=664.86' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 10.83 cfs @ 3.78 fps)

Secondary OutFlow Max=5.41 cfs @ 12.14 hrs HW=665.52' TW=664.54' (Dynamic Tailwater)
└─**2=Culvert** (Barrel Controls 5.41 cfs @ 3.78 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=664.01' TW=662.56' (Dynamic Tailwater)
├─**3=Culvert** (Controls 0.00 cfs)
├─**4=Culvert** (Controls 0.00 cfs)
├─**5=Culvert** (Controls 0.00 cfs)
└─**6=Culvert** (Controls 0.00 cfs)

Pond 33P: Subsurface Detention within Gravel Area



Summary for Pond 34P: Bio-Retention Area

```
Inflow Area =        24.054 ac,  52.00% Impervious,  Inflow Depth =   0.91"    for  1-yr event
Inflow      =        10.04 cfs @  12.35 hrs,  Volume=          1.824 af
Outflow     =         0.53 cfs @  19.38 hrs,  Volume=          0.618 af,  Atten= 95%,  Lag= 421.9 min
Primary     =         0.53 cfs @  19.38 hrs,  Volume=          0.618 af
    Routed to Reach 7R : North Property Line Ditch (West)
Secondary =           0.00 cfs @   0.00 hrs,  Volume=          0.000 af
    Routed to Reach 7R : North Property Line Ditch (West)
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 664.18' @ 19.38 hrs Surf.Area= 57,227 sf Storage= 61,848 cf

Plug-Flow detention time= 821.2 min calculated for 0.618 af (34% of inflow)
Center-of-Mass det. time= 651.0 min (1,528.3 - 877.4)

Volume	Invert	Avail.Storage	Storage Description
#1	663.00'	95,677 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.00	48,935	0	0
663.25	50,025	12,370	12,370
663.50	51,115	12,643	25,013
664.00	56,110	26,806	51,819
664.75	60,845	43,858	95,677

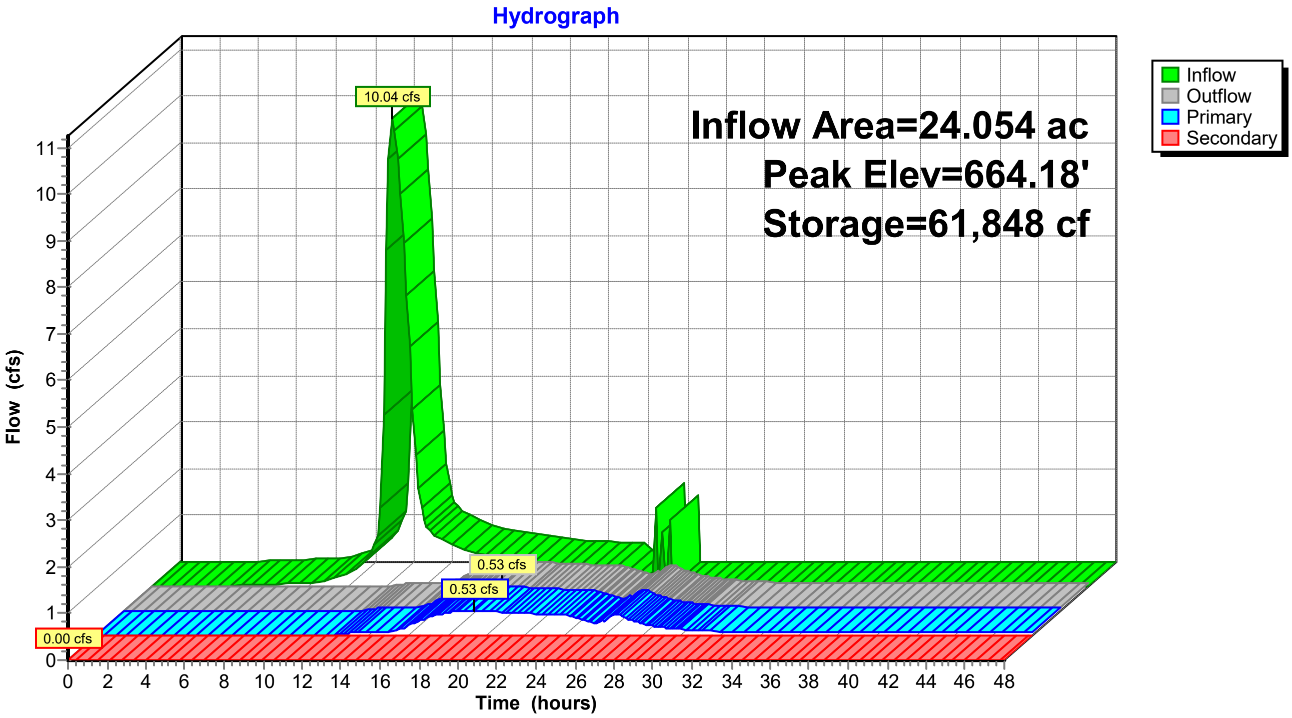
Device	Routing	Invert	Outlet Devices
#1	Primary	660.55'	**15.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.55' / 660.50' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Primary	660.55'	**15.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.55' / 660.50' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 1	660.56'	**4.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.56' / 660.55' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#4	Device 2	660.56'	**4.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.56' / 660.55' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#5	Device 3	663.00'	**0.500 in/hr Exfiltration X 0.50 over Surface area above 663.00'** Excluded Surface area = 48,935 sf
#6	Device 4	663.00'	**0.500 in/hr Exfiltration X 0.50 over Surface area above 663.00'** Excluded Surface area = 48,935 sf
#7	Device 3	664.10'	**4.0" Horiz. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#8	Device 4	664.10'	**4.0" Horiz. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#9	Device 1	664.25'	**1.4" x 4.5" Horiz. Orifice/Grate X 72.00** C= 0.600

			Limited to weir flow at low heads
#10	Device 2	664.25'	**1.4" x 4.5" Horiz. Orifice/Grate X 72.00** C= 0.600 Limited to weir flow at low heads
#11	Secondary	664.50'	**100.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.53 cfs @ 19.38 hrs HW=664.18' TW=660.83' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.27 cfs of 10.24 cfs potential flow)
  - **3=Culvert** (Passes 0.27 cfs of 0.77 cfs potential flow)
    - **5=Exfiltration** (Exfiltration Controls 0.05 cfs)
    - **7=Orifice/Grate** (Weir Controls 0.22 cfs @ 0.91 fps)
  - **9=Orifice/Grate** (Controls 0.00 cfs)
- **2=Culvert** (Passes 0.27 cfs of 10.24 cfs potential flow)
  - **4=Culvert** (Passes 0.27 cfs of 0.77 cfs potential flow)
    - **6=Exfiltration** (Exfiltration Controls 0.05 cfs)
    - **8=Orifice/Grate** (Weir Controls 0.22 cfs @ 0.91 fps)
  - **10=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=663.00' TW=660.30' (Dynamic Tailwater)
- **11=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 34P: Bio-Retention Area



Summary for Pond 35P: Dry Pond

```
Inflow Area =        0.760 ac,   0.00% Impervious,  Inflow Depth =  0.46"    for  1-yr event
Inflow      =        0.49 cfs @   11.99 hrs,  Volume=          0.029 af
Outflow     =        0.05 cfs @   17.02 hrs,  Volume=          0.029 af,  Atten= 89%,  Lag= 302.0 min
Primary     =        0.05 cfs @   17.02 hrs,  Volume=          0.029 af
   Routed to Reach 6R : North Property Line Ditch (Central)
Tertiary    =        0.00 cfs @    0.00 hrs,  Volume=          0.000 af
   Routed to Reach 6R : North Property Line Ditch (Central)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 662.90' @ 15.37 hrs   Surf.Area= 4,667 sf   Storage= 839 cf

Plug-Flow detention time= 296.0 min calculated for 0.029 af (100% of inflow)
Center-of-Mass det. time= 296.6 min ( 1,170.3 - 873.7 )

Volume       Invert    Avail.Storage   Storage Description
  #1        662.56'        49,313 cf   Custom Stage Data (Prismatic) Listed below (Recalc)

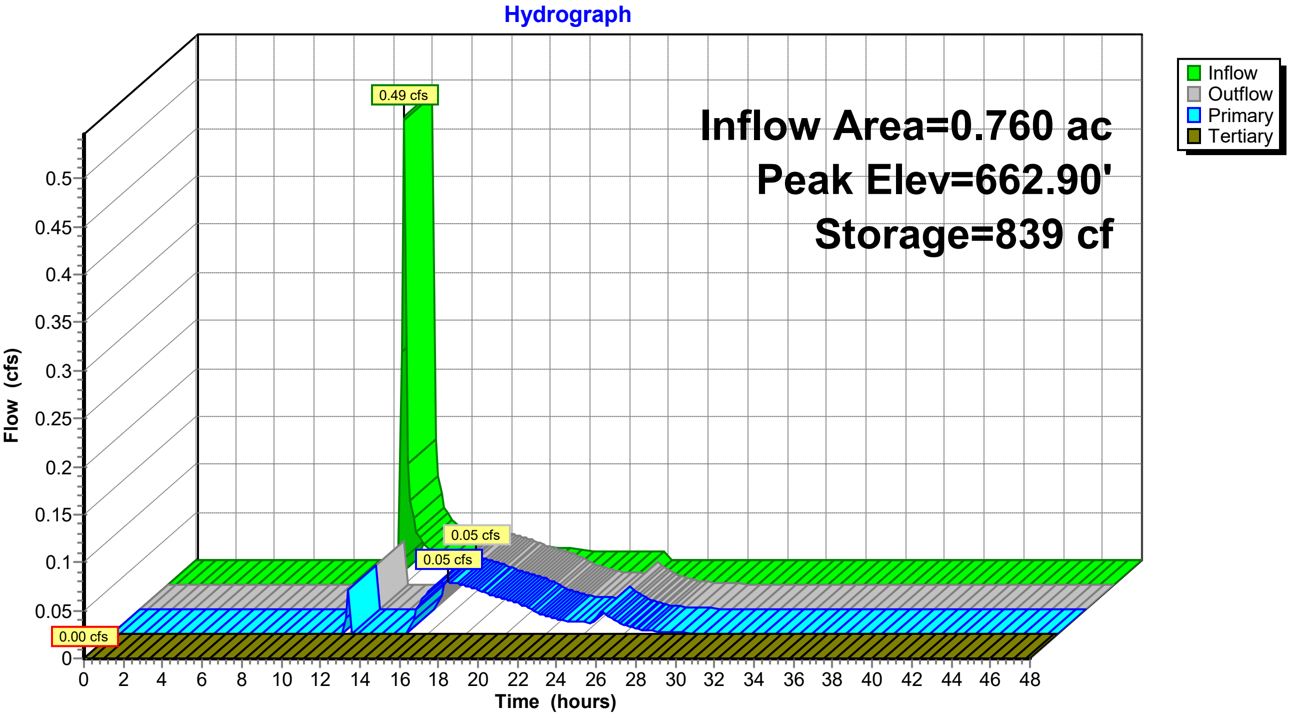
 Elevation        Surf.Area          Inc.Store          Cum.Store
    (feet)           (sq-ft)       (cubic-feet)       (cubic-feet)
    662.56              300                  0                  0
    663.00            5,985              1,383              1,383
    664.00           14,620             10,303             11,685
    665.00           19,235             16,928             28,613
    666.00           22,165             20,700             49,313

Device   Routing            Invert   Outlet Devices
  #1     Primary           662.56'   12.0"  Round Culvert
                                     L= 30.0'   CPP, square edge headwall,  Ke= 0.500
                                     Inlet / Outlet Invert= 662.56' / 662.50'   S= 0.0020 '/'   Cc= 0.900
                                     n= 0.012,  Flow Area= 0.79 sf
  #2     Device 1          662.56'   3.0" Vert. Orifice/Grate    C= 0.600   Limited to weir flow at low heads
  #3     Device 1          663.06'   6.0" Vert. Orifice/Grate    C= 0.600   Limited to weir flow at low heads
  #4     Device 1          665.20'   1.4" x 4.5" Horiz. Orifice/Grate X 72.00    C= 0.600
                                     Limited to weir flow at low heads
  #5     Tertiary          665.70'   100.0' long  x 2.0' breadth Broad-Crested Rectangular Weir
                                     Head (feet)  0.20  0.40  0.60  0.80  1.00  1.20  1.40  1.60  1.80  2.00
                                     2.50  3.00  3.50
                                     Coef. (English)  2.54  2.61  2.61  2.60  2.66  2.70  2.77  2.89  2.88
                                     2.85  3.07  3.20  3.32

Primary OutFlow  Max=0.06 cfs @ 17.02 hrs  HW=662.86'  TW=662.81'   (Dynamic Tailwater)
↑
└─1=Culvert  (Passes 0.06 cfs of 0.14 cfs potential flow)
   ↑
   ├─2=Orifice/Grate  (Orifice Controls 0.06 cfs @ 1.15 fps)
   ├─3=Orifice/Grate  ( Controls 0.00 cfs)
   └─4=Orifice/Grate  ( Controls 0.00 cfs)

Tertiary OutFlow  Max=0.00 cfs @ 0.00 hrs  HW=662.56'  TW=662.30'   (Dynamic Tailwater)
↑
└─5=Broad-Crested Rectangular Weir  ( Controls 0.00 cfs)
```

Pond 35P: Dry Pond



Summary for Pond 36P: West Pre-Treatment to Bio-Retention Area

Inflow Area = 22.210 ac, 56.32% Impervious, Inflow Depth = 0.62" for 1-yr event
Inflow = 11.09 cfs @ 12.14 hrs, Volume= 1.150 af
Outflow = 6.08 cfs @ 12.34 hrs, Volume= 1.126 af, Atten= 45%, Lag= 11.8 min
Primary = 6.08 cfs @ 12.34 hrs, Volume= 1.126 af
Routed to Pond 38P : Level Spreader
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 8R : Western Overflow Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 665.26' @ 12.40 hrs Surf.Area= 7,472 sf Storage= 10,057 cf

Plug-Flow detention time= 60.1 min calculated for 1.122 af (98% of inflow)
Center-of-Mass det. time= 47.9 min (883.5 - 835.6)

Volume	Invert	Avail.Storage	Storage Description
#1	663.00'	21,098 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

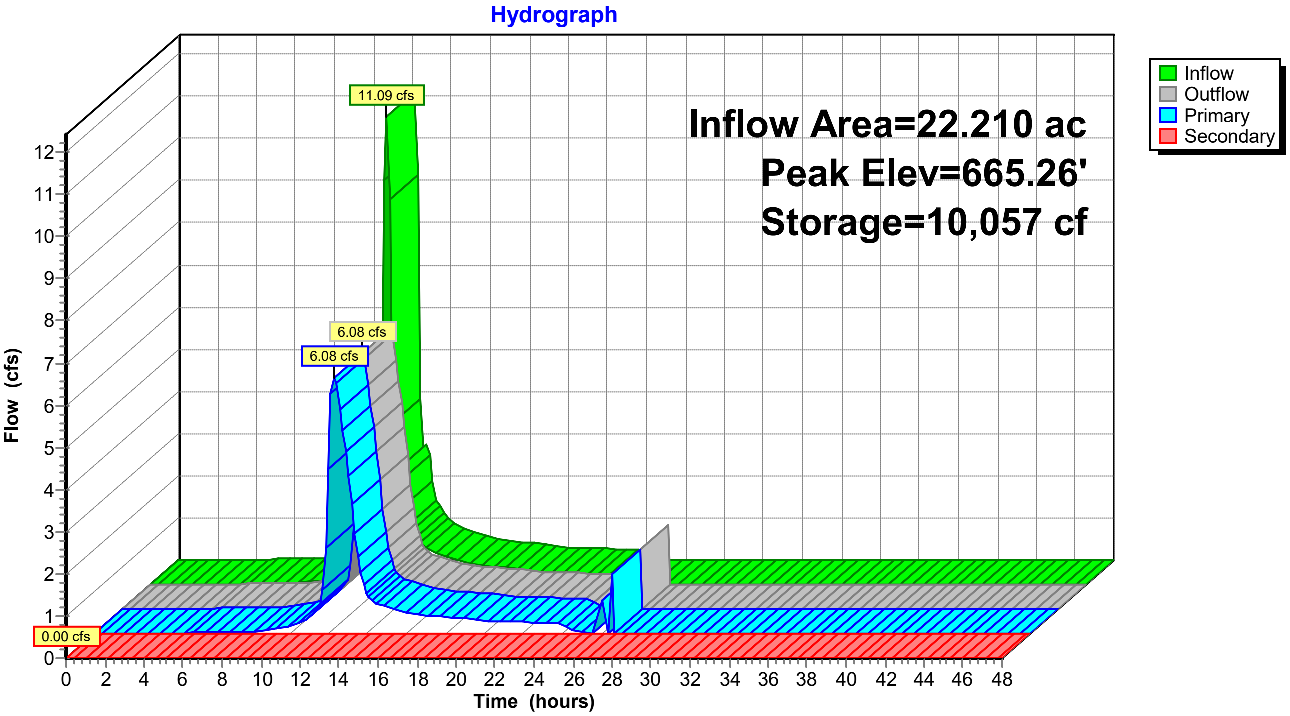
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.00	5	0	0
664.00	4,770	2,388	2,388
665.00	6,900	5,835	8,223
666.00	9,140	8,020	16,243
666.50	10,280	4,855	21,098

Device	Routing	Invert	Outlet Devices
#1	Primary	663.04'	**15.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 663.04' / 663.00' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	666.05'	**100.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.84 cfs @ 12.34 hrs HW=665.22' TW=664.24' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 5.84 cfs @ 4.76 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=663.00' TW=665.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 36P: West Pre-Treatment to Bio-Retention Area



Summary for Pond 37P: North Pre-Treatment to Bio-Retention Area

Inflow Area = 0.206 ac, 0.00% Impervious, Inflow Depth = 38.34" for 1-yr event
Inflow = 5.49 cfs @ 12.14 hrs, Volume= 0.658 af
Outflow = 3.74 cfs @ 12.30 hrs, Volume= 0.637 af, Atten= 32%, Lag= 9.8 min
Primary = 3.74 cfs @ 12.30 hrs, Volume= 0.637 af
Routed to Pond 39P : Level Spreader
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 6R : North Property Line Ditch (Central)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 664.95' @ 12.58 hrs Surf.Area= 3,642 sf Storage= 4,645 cf

Plug-Flow detention time= 58.4 min calculated for 0.635 af (96% of inflow)
Center-of-Mass det. time= 39.5 min (866.8 - 827.3)

Volume	Invert	Avail.Storage	Storage Description
#1	663.00'	11,188 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

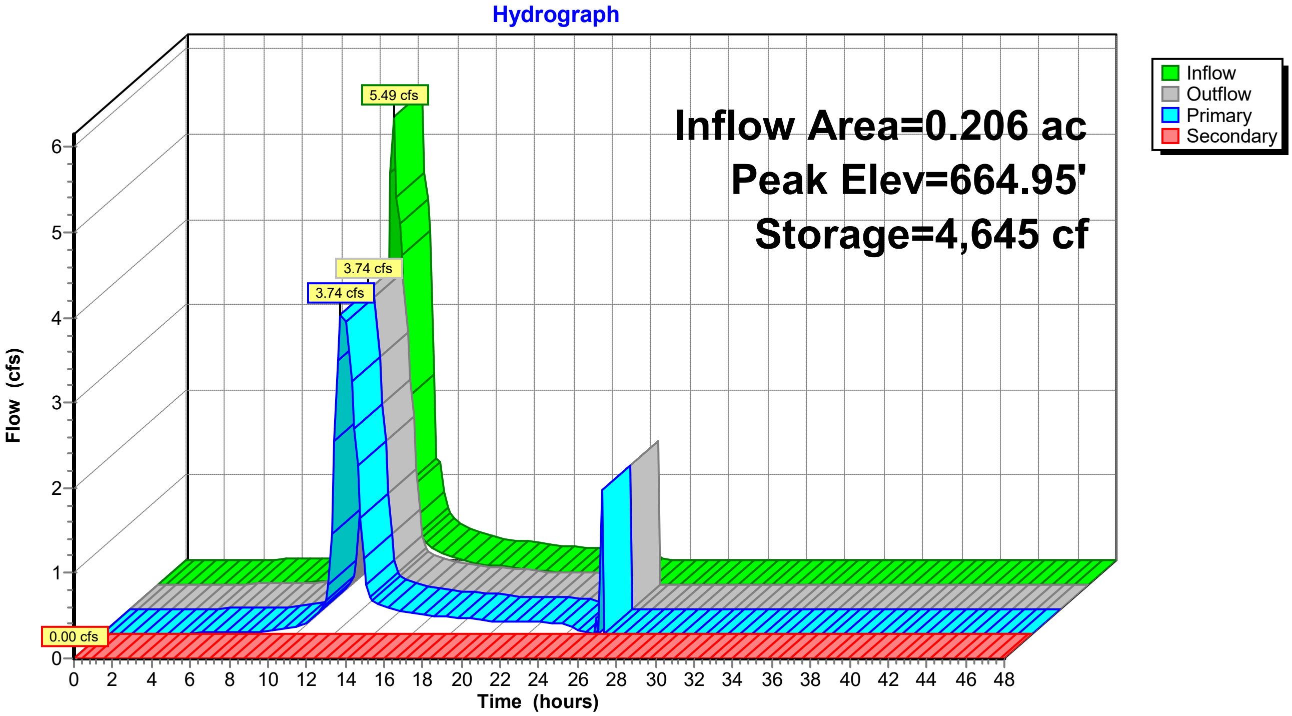
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.00	5	0	0
664.00	2,975	1,490	1,490
665.00	3,675	3,325	4,815
666.00	4,435	4,055	8,870
666.50	4,835	2,318	11,188

Device	Routing	Invert	Outlet Devices
#1	Primary	663.05'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 663.05' / 663.00' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Secondary	665.85'	**75.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=3.52 cfs @ 12.30 hrs HW=664.80' TW=663.94' (Dynamic Tailwater)
↳**1=Culvert** (Inlet Controls 3.52 cfs @ 4.49 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=663.00' TW=662.30' (Dynamic Tailwater)
↳**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 37P: North Pre-Treatment to Bio-Retention Area



Summary for Pond 38P: Level Spreader

```
Inflow Area =       22.210 ac,  56.32% Impervious,  Inflow Depth =   0.61"    for  1-yr event
Inflow      =        6.08 cfs @  12.34 hrs,  Volume=          1.126 af
Outflow     =        6.08 cfs @  12.34 hrs,  Volume=          1.126 af,  Atten= 0%,  Lag= 0.0 min
Primary     =        6.08 cfs @  12.34 hrs,  Volume=          1.126 af
    Routed to Pond 34P : Bio-Retention Area
Secondary =          0.00 cfs @   0.00 hrs,  Volume=          0.000 af
    Routed to Pond 34P : Bio-Retention Area

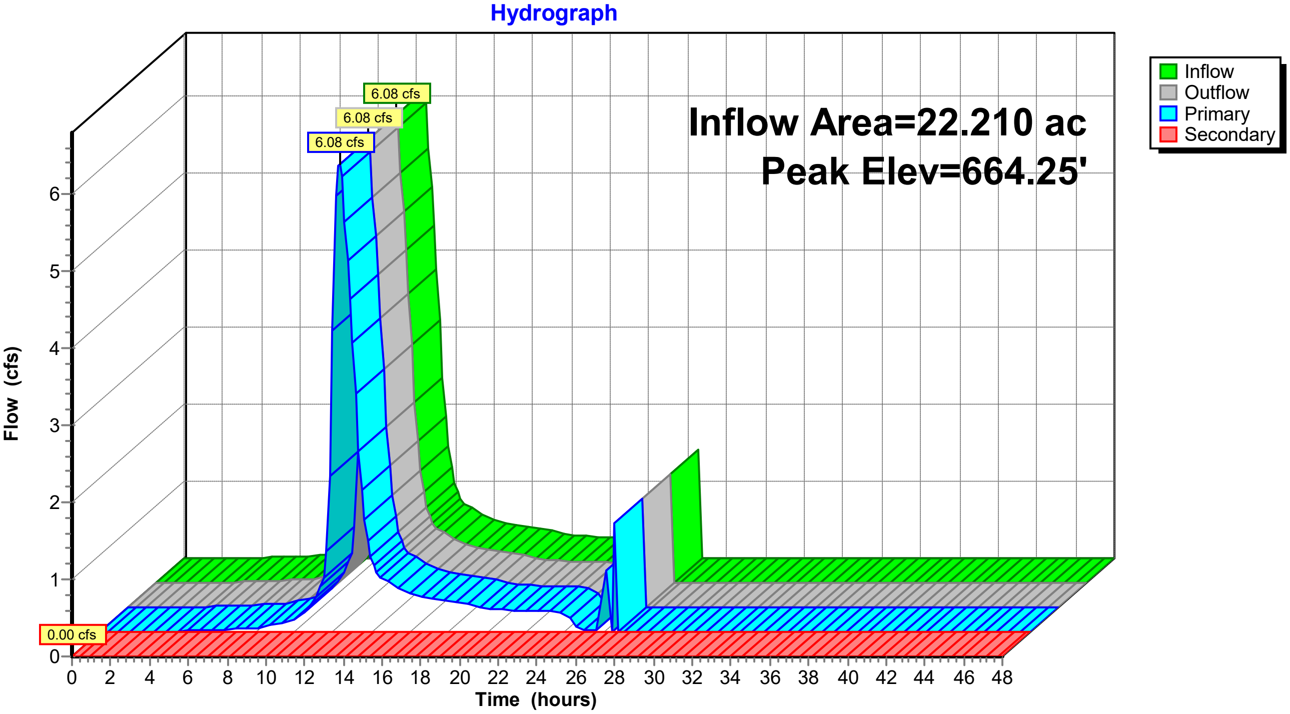
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 664.25' @ 12.39 hrs
Flood Elev= 665.00'
```

Device	Routing	Invert	Outlet Devices
#1	Primary	663.00'	**0.3" Horiz. Orifice/Grate X 650.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	663.32'	**0.3" Vert. Orifice/Grate X 650.00** C= 0.600 Limited to weir flow at low heads
#3	Primary	663.32'	**0.3" Vert. Orifice/Grate X 650.00** C= 0.600 Limited to weir flow at low heads
#4	Primary	663.94'	**0.3" Vert. Orifice/Grate X 650.00** C= 0.600 Limited to weir flow at low heads
#5	Primary	663.94'	**0.3" Vert. Orifice/Grate X 650.00** C= 0.600 Limited to weir flow at low heads
#6	Primary	664.25'	**0.3" Horiz. Orifice/Grate X 650.00** C= 0.600 Limited to weir flow at low heads
#7	Secondary	664.90'	**15.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

```
Primary OutFlow  Max=5.83 cfs @ 12.34 hrs  HW=664.24'  TW=663.41'   (Dynamic Tailwater)
↑─1=Orifice/Grate  (Orifice Controls 1.39 cfs @ 4.37 fps)
├─2=Orifice/Grate  (Orifice Controls 1.39 cfs @ 4.37 fps)
├─3=Orifice/Grate  (Orifice Controls 1.39 cfs @ 4.37 fps)
├─4=Orifice/Grate  (Orifice Controls 0.82 cfs @ 2.58 fps)
├─5=Orifice/Grate  (Orifice Controls 0.82 cfs @ 2.58 fps)
└─6=Orifice/Grate  ( Controls 0.00 cfs)

Secondary OutFlow  Max=0.00 cfs @ 0.00 hrs  HW=663.00'  TW=663.00'   (Dynamic Tailwater)
↑─7=Orifice/Grate  ( Controls 0.00 cfs)
```

Pond 38P: Level Spreader



Summary for Pond 39P: Level Spreader

Inflow Area = 0.206 ac, 0.00% Impervious, Inflow Depth = 37.10" for 1-yr event
Inflow = 3.74 cfs @ 12.30 hrs, Volume= 0.637 af
Outflow = 3.74 cfs @ 12.30 hrs, Volume= 0.637 af, Atten= 0%, Lag= 0.0 min
Primary = 3.74 cfs @ 12.30 hrs, Volume= 0.637 af
Routed to Pond 34P : Bio-Retention Area
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 34P : Bio-Retention Area

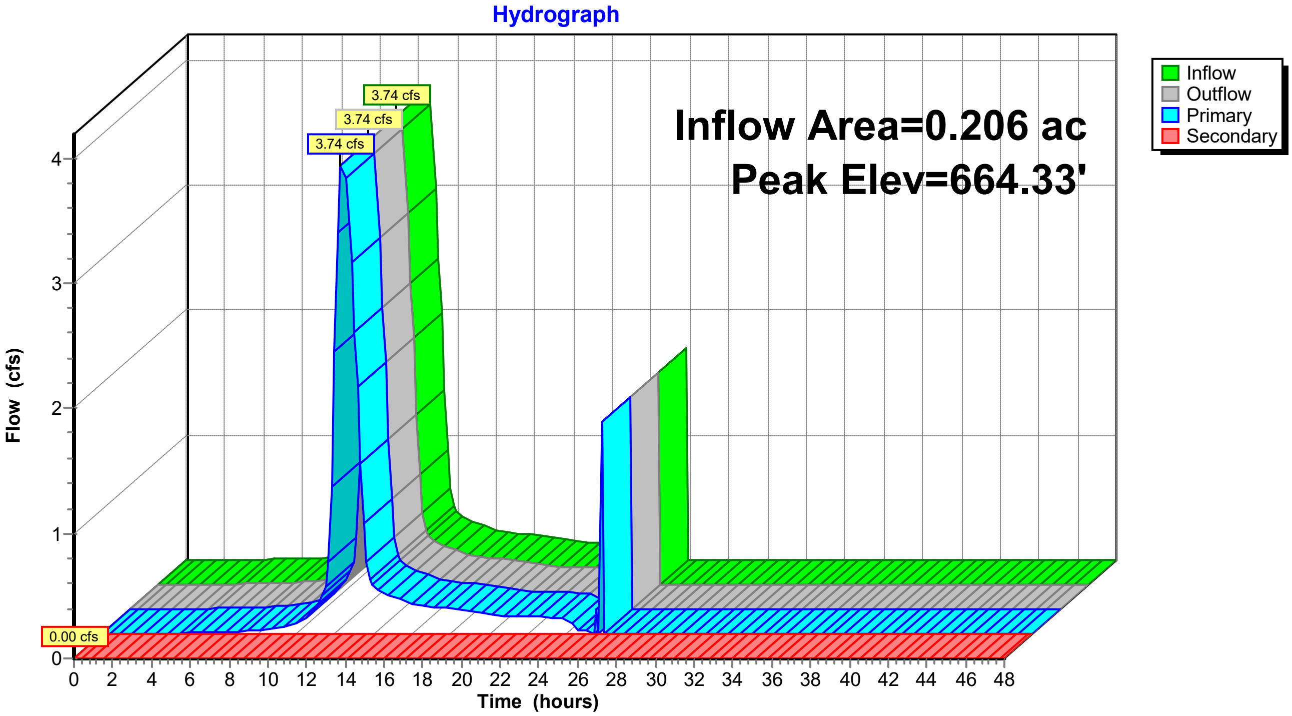
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs
Peak Elev= 664.33' @ 25.87 hrs
Flood Elev= 665.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	663.00'	**0.3" Horiz. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	663.25'	**0.3" Vert. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#3	Primary	663.25'	**0.3" Vert. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#4	Primary	663.75'	**0.3" Vert. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#5	Primary	663.75'	**0.3" Vert. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#6	Primary	664.00'	**0.3" Horiz. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#7	Secondary	664.55'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.51 cfs @ 12.30 hrs HW=663.94' TW=663.39' (Dynamic Tailwater)
├─**1=Orifice/Grate** (Orifice Controls 0.85 cfs @ 3.56 fps)
├─**2=Orifice/Grate** (Orifice Controls 0.85 cfs @ 3.56 fps)
├─**3=Orifice/Grate** (Orifice Controls 0.85 cfs @ 3.56 fps)
├─**4=Orifice/Grate** (Orifice Controls 0.48 cfs @ 2.00 fps)
├─**5=Orifice/Grate** (Orifice Controls 0.48 cfs @ 2.00 fps)
└─**6=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=663.00' TW=663.00' (Dynamic Tailwater)
└─**7=Orifice/Grate** (Controls 0.00 cfs)

Pond 39P: Level Spreader



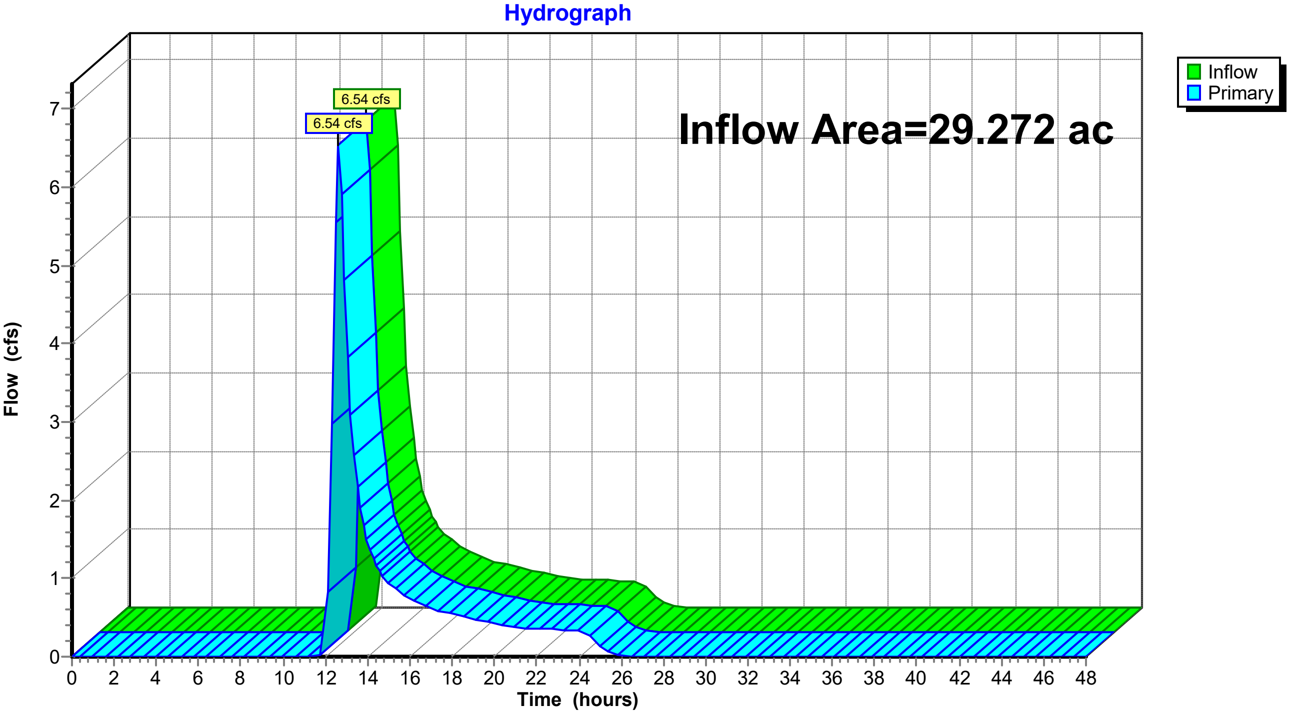
Summary for Link 1L: West Property Line and Adjacent Wetland

Inflow Area =	29.272 ac,	0.00% Impervious,	Inflow Depth = 0.42"	for 1-yr event	
Inflow =	6.54 cfs @	12.62 hrs,	Volume=	1.032 af	
Primary =	6.54 cfs @	12.62 hrs,	Volume=	1.032 af,	Atten= 0%, Lag= 0.0 min

Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs

Link 1L: West Property Line and Adjacent Wetland

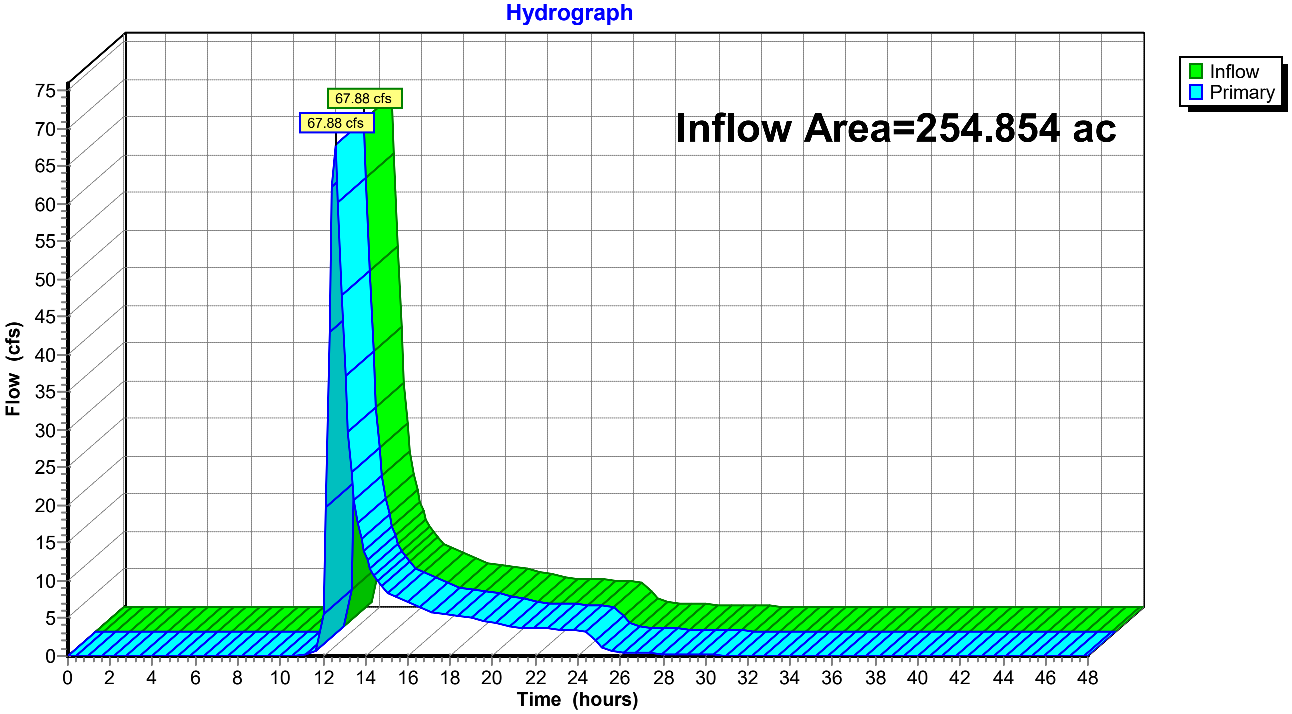


Summary for Link 2L: Total Discharge at Design Points

```
Inflow Area =      254.854 ac,   4.91% Impervious,  Inflow Depth >   0.51"    for  1-yr event
Inflow      =       67.88 cfs @   12.59 hrs,  Volume=          10.932 af
Primary     =       67.88 cfs @   12.59 hrs,  Volume=          10.932 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs

Link 2L: Total Discharge at Design Points

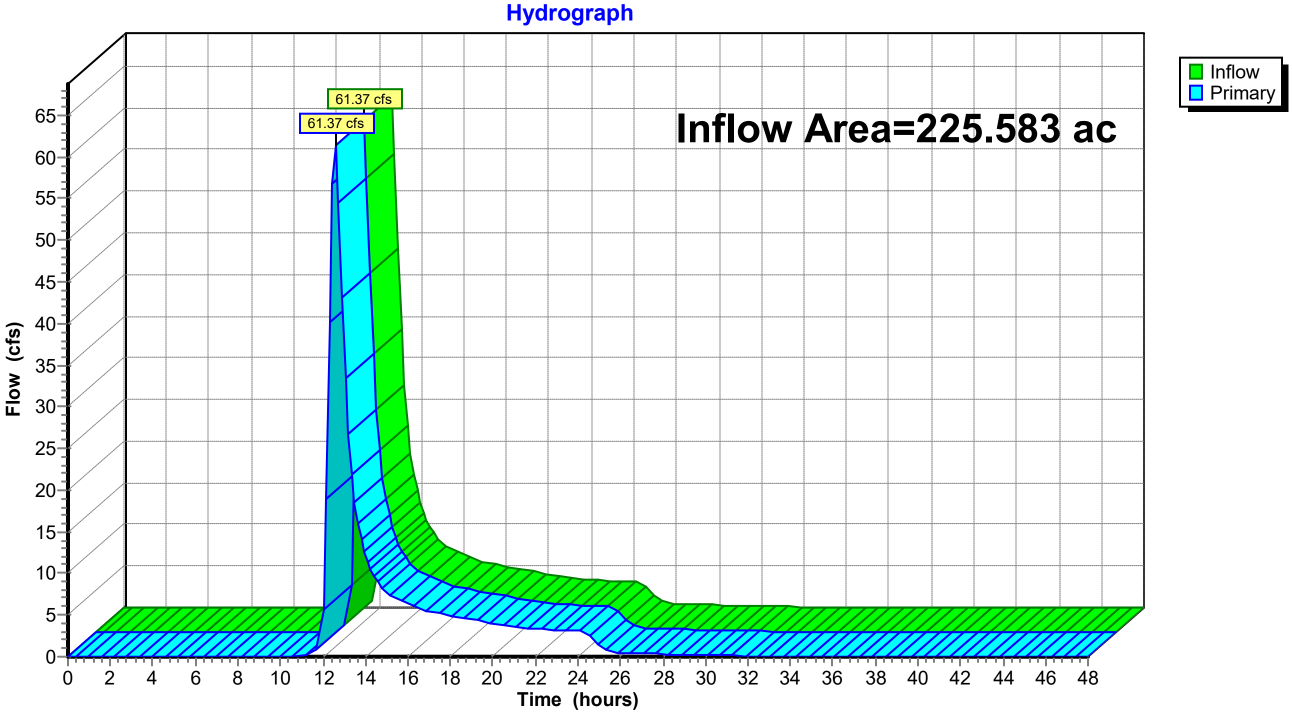


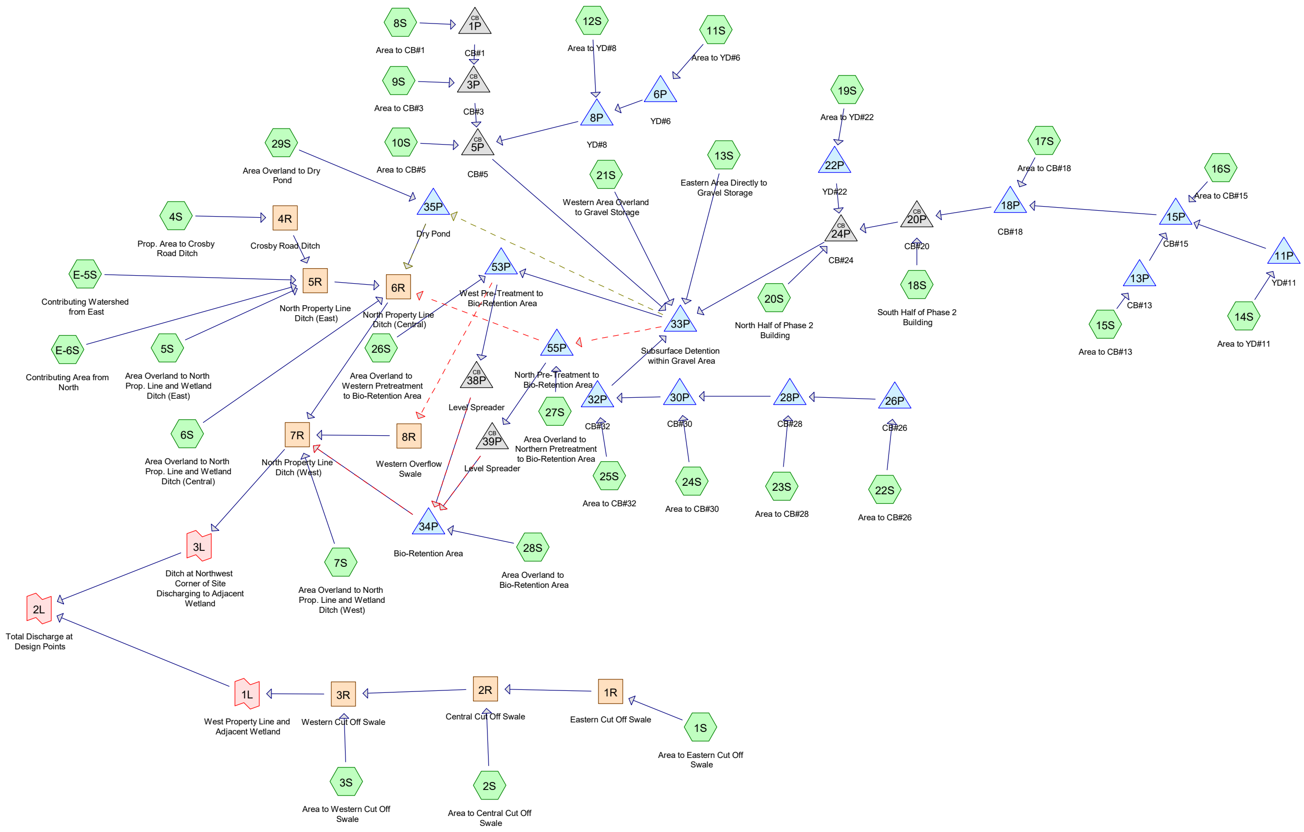
Summary for Link 3L: Ditch at Northwest Corner of Site Discharging to Adjacent Wetland

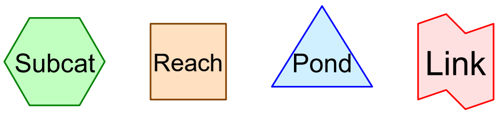
Inflow Area = 225.583 ac, 5.55% Impervious, Inflow Depth > 0.53" for 1-yr event
Inflow = 61.37 cfs @ 12.58 hrs, Volume= 9.900 af
Primary = 61.37 cfs @ 12.58 hrs, Volume= 9.900 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.15 hrs

Link 3L: Ditch at Northwest Corner of Site Discharging to Adjacent Wetland







Routing Diagram for Plug Power - Proposed Conditions 10 7-7-21
Prepared by {enter your company name here}, Printed 7/14/2021
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Project Notes

Defined 9 rainfall events from Gateway IDF

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.164	80	>75% Grass cover, Good, HSG D (8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 17S, 19S, 21S, 22S, 23S, 24S, 26S, 27S, 28S, 29S)
2.119	77	Brush, Fair, HSG D (5S, 6S, 7S)
1.861	73	Brush, Good, HSG D (1S, 2S, 3S)
3.004	80	Gravel Storage Area, Good, HSG D (13S, 21S)
1.050	96	Gravel surface, HSG D (E-5S)
7.585	78	Meadow, non-grazed, HSG D (1S, 2S, 3S, 24S)
103.070	84	Pasture/grassland/range, Fair, HSG D (E-5S)
5.945	98	Paved parking, HSG D (8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 21S, 22S, 23S, 24S, 25S)
5.115	98	Roofs, HSG D (8S, 9S, 11S, 12S, 13S, 14S, 15S, 16S, 18S, 20S, 21S)
15.560	89	Row crops, straight row, Good, HSG D (3S, E-6S)
1.449	98	Unconnected pavement, HSG D (13S, 17S, 19S, 21S, 23S)
2.970	98	Water Surface, 0% imp, HSG D (E-5S)
95.731	79	Woods, Fair, HSG D (1S, 2S, 3S, E-5S)
0.230	79	Woods/grass comb., Good, HSG D (4S)
254.854	**83**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
254.854	HSG D	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 17S, 18S, 19S, 20S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 29S, E-5S, E-6S
0.000	Other	
254.854		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	9.164	0.000	9.164	>75% Grass cover, Good	8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 17S, 19S, 21S, 22S, 23S, 24S, 26S, 27S, 28S, 29S
0.000	0.000	0.000	2.119	0.000	2.119	Brush, Fair	5S, 6S, 7S
0.000	0.000	0.000	1.861	0.000	1.861	Brush, Good	1S, 2S, 3S
0.000	0.000	0.000	3.004	0.000	3.004	Gravel Storage Area, Good	13S, 21S

Ground Covers (selected nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	1.050	0.000	1.050	Gravel surface	E-5S
0.000	0.000	0.000	7.585	0.000	7.585	Meadow, non-grazed	1S, 2S, 3S, 24S
0.000	0.000	0.000	103.070	0.000	103.070	Pasture/grassland/range, Fair	E-5S
0.000	0.000	0.000	5.945	0.000	5.945	Paved parking	8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 21S, 22S, 23S, 24S, 25S
0.000	0.000	0.000	5.115	0.000	5.115	Roofs	8S, 9S, 11S, 12S, 13S, 14S, 15S, 16S, 18S

Ground Covers (selected nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	15.560	0.000	15.560	Row crops, straight row, Good	3S, E-6S
0.000	0.000	0.000	1.449	0.000	1.449	Unconnected pavement	13S, 17S, 19S, 21S, 23S
0.000	0.000	0.000	2.970	0.000	2.970	Water Surface, 0% imp	E-5S
0.000	0.000	0.000	95.731	0.000	95.731	Woods, Fair	1S, 2S, 3S, E-5S
0.000	0.000	0.000	0.230	0.000	0.230	Woods/grass comb., Good	4S
0.000	**0.000**	**0.000**	**254.854**	**0.000**	**254.854**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	E-5S	0.00	0.00	75.0	0.0200	0.012	0.0	42.0	0.0
2	1P	670.15	669.88	137.0	0.0020	0.012	0.0	12.0	0.0
3	3P	668.88	668.45	213.0	0.0020	0.012	0.0	12.0	0.0
4	5P	666.71	666.35	180.0	0.0020	0.012	0.0	24.0	0.0
5	6P	667.37	667.09	138.0	0.0020	0.012	0.0	15.0	0.0
6	8P	666.95	666.71	122.0	0.0020	0.012	0.0	18.0	0.0
7	11P	667.04	666.70	170.0	0.0020	0.012	0.0	12.0	0.0
8	13P	665.99	665.91	40.0	0.0020	0.012	0.0	12.0	0.0
9	15P	665.91	665.60	157.0	0.0020	0.012	0.0	18.0	0.0
10	18P	665.60	665.43	83.0	0.0020	0.012	0.0	18.0	0.0
11	20P	665.43	665.12	157.0	0.0020	0.012	0.0	24.0	0.0
12	22P	666.65	666.51	70.0	0.0020	0.012	0.0	10.0	0.0
13	24P	665.12	664.91	105.0	0.0020	0.012	0.0	24.0	0.0
14	26P	665.90	665.55	175.0	0.0020	0.012	0.0	12.0	0.0
15	28P	665.30	664.87	214.0	0.0020	0.012	0.0	15.0	0.0
16	30P	664.68	664.38	150.0	0.0020	0.012	0.0	18.0	0.0
17	32P	664.38	664.05	166.0	0.0020	0.012	0.0	24.0	0.0
18	33P	664.01	663.90	57.0	0.0019	0.012	0.0	18.0	0.0
19	33P	664.01	663.90	57.0	0.0019	0.012	0.0	18.0	0.0
20	33P	665.71	664.71	50.0	0.0200	0.012	0.0	18.0	0.0
21	33P	666.05	665.05	50.0	0.0200	0.012	0.0	15.0	0.0
22	33P	666.39	665.39	50.0	0.0200	0.012	0.0	12.0	0.0
23	33P	666.56	665.56	50.0	0.0200	0.012	0.0	10.0	0.0
24	34P	660.55	660.50	25.0	0.0020	0.012	0.0	15.0	0.0
25	34P	660.55	660.50	25.0	0.0020	0.012	0.0	15.0	0.0
26	34P	660.56	660.55	5.0	0.0020	0.012	0.0	4.0	0.0
27	34P	660.56	660.55	5.0	0.0020	0.012	0.0	4.0	0.0
28	35P	662.56	662.50	30.0	0.0020	0.012	0.0	12.0	0.0
29	53P	663.04	663.00	20.0	0.0020	0.012	0.0	15.0	0.0
30	55P	663.05	663.00	25.0	0.0020	0.012	0.0	12.0	0.0

Time span=0.00-48.00 hrs, dt=0.09 hrs, 534 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area to Eastern Cut Off Runoff Area=300,195 sf 0.00% Impervious Runoff Depth=1.16"
Flow Length=625' Tc=27.5 min CN=78 Runoff=6.98 cfs 0.665 af

Subcatchment 2S: Area to Central Cut Off Runoff Area=542,635 sf 0.00% Impervious Runoff Depth=1.16"
Flow Length=1,100' Tc=42.2 min CN=78 Runoff=9.43 cfs 1.201 af

Subcatchment 3S: Area to Western Cut Off Runoff Area=432,245 sf 0.00% Impervious Runoff Depth=1.34"
Flow Length=1,100' Tc=51.3 min CN=81 Runoff=7.78 cfs 1.112 af

Subcatchment 4S: Prop. Area to Crosby Runoff Area=10,015 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=125' Slope=0.0100 '/' Tc=23.3 min CN=79 Runoff=0.27 cfs 0.023 af

Subcatchment 5S: Area Overland to North Runoff Area=47,675 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=140' Tc=11.7 min CN=77 Runoff=1.64 cfs 0.100 af

Subcatchment 6S: Area Overland to North Runoff Area=23,585 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=100' Tc=10.8 min CN=77 Runoff=0.83 cfs 0.050 af

Subcatchment 7S: Area Overland to North Runoff Area=21,065 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=170' Tc=14.9 min CN=77 Runoff=0.66 cfs 0.044 af

Subcatchment 8S: Area to CB#1 Runoff Area=19,240 sf 67.06% Impervious Runoff Depth=2.20"
Flow Length=80' Tc=12.8 min CN=92 Runoff=1.27 cfs 0.081 af

Subcatchment 9S: Area to CB#3 Runoff Area=12,315 sf 47.61% Impervious Runoff Depth=1.94"
Flow Length=80' Tc=12.8 min CN=89 Runoff=0.73 cfs 0.046 af

Subcatchment 10S: Area to CB#5 Runoff Area=18,345 sf 46.99% Impervious Runoff Depth=1.85"
Flow Length=260' Tc=19.1 min CN=88 Runoff=0.86 cfs 0.065 af

Subcatchment 11S: Area to YD#6 Runoff Area=75,770 sf 32.52% Impervious Runoff Depth=1.70"
Flow Length=340' Tc=25.3 min CN=86 Runoff=2.82 cfs 0.246 af

Subcatchment 12S: Area to YD#8 Runoff Area=33,010 sf 38.97% Impervious Runoff Depth=1.77"
Flow Length=150' Slope=0.0100 '/' Tc=23.6 min CN=87 Runoff=1.34 cfs 0.112 af

Subcatchment 13S: Eastern Area Directly Runoff Area=327,610 sf 62.80% Impervious Runoff Depth=2.11"
Flow Length=330' Tc=30.2 min CN=91 Runoff=13.50 cfs 1.321 af

Subcatchment 14S: Area to YD#11 Runoff Area=37,050 sf 56.59% Impervious Runoff Depth=2.02"
Flow Length=70' Slope=0.0100 '/' Tc=17.3 min CN=90 Runoff=1.99 cfs 0.143 af

Subcatchment 15S: Area to CB#13 Runoff Area=37,370 sf 68.58% Impervious Runoff Depth=2.20"
Flow Length=100' Tc=16.9 min CN=92 Runoff=2.19 cfs 0.157 af

Subcatchment 16S: Area to CB#15 Runoff Area=17,040 sf 100.00% Impervious Runoff Depth=2.81"
Tc=5.0 min CN=98 Runoff=1.63 cfs 0.092 af

Subcatchment 17S: Area to CB#18 Runoff Area=20,100 sf 15.05% Impervious Runoff Depth=1.34"
Flow Length=140' Slope=0.0100 '/' Tc=23.4 min UI Adjusted CN=81 Runoff=0.61 cfs 0.052 af

Subcatchment 18S: South Half of Phase Runoff Area=32,290 sf 100.00% Impervious Runoff Depth=2.81"
Tc=5.0 min CN=98 Runoff=3.10 cfs 0.173 af

Subcatchment 19S: Area to YD#22 Runoff Area=27,200 sf 27.67% Impervious Runoff Depth=1.41"
Flow Length=140' Slope=0.0100 '/' Tc=23.4 min UI Adjusted CN=82 Runoff=0.88 cfs 0.073 af

Subcatchment 20S: North Half of Phase 2 Runoff Area=36,505 sf 100.00% Impervious Runoff Depth=2.81"
Tc=5.0 min CN=98 Runoff=3.50 cfs 0.196 af

Subcatchment 21S: Western Area Runoff Area=139,665 sf 42.71% Impervious Runoff Depth=1.85"
Flow Length=50' Slope=0.0200 '/' Tc=6.3 min CN=88 Runoff=9.78 cfs 0.495 af

Subcatchment 22S: Area to CB#26 Runoff Area=35,330 sf 71.10% Impervious Runoff Depth=2.29"
Flow Length=100' Tc=16.9 min CN=93 Runoff=2.14 cfs 0.155 af

Subcatchment 23S: Area to CB#28 Runoff Area=18,475 sf 44.79% Impervious Runoff Depth=1.85"
Flow Length=80' Slope=0.0100 '/' Tc=19.3 min CN=88 Runoff=0.87 cfs 0.066 af

Subcatchment 24S: Area to CB#30 Runoff Area=29,125 sf 23.11% Impervious Runoff Depth=1.55"
Flow Length=150' Slope=0.0140 '/' Tc=20.6 min CN=84 Runoff=1.11 cfs 0.086 af

Subcatchment 25S: Area to CB#32 Runoff Area=31,495 sf 100.00% Impervious Runoff Depth=2.81"
Flow Length=170' Slope=0.0120 '/' Tc=22.1 min CN=98 Runoff=1.90 cfs 0.169 af

Subcatchment 26S: Area Overland to Runoff Area=19,545 sf 0.00% Impervious Runoff Depth=1.28"
Flow Length=45' Slope=0.0100 '/' Tc=12.2 min CN=80 Runoff=0.78 cfs 0.048 af

Subcatchment 27S: Area Overland to Runoff Area=8,970 sf 0.00% Impervious Runoff Depth=1.28"
Tc=5.0 min CN=80 Runoff=0.46 cfs 0.022 af

Subcatchment 28S: Area Overland to Runoff Area=71,325 sf 0.00% Impervious Runoff Depth=1.28"
Flow Length=30' Tc=5.4 min CN=80 Runoff=3.62 cfs 0.175 af

Subcatchment 29S: Area Overland to Dry Runoff Area=33,090 sf 0.00% Impervious Runoff Depth=1.28"
Tc=5.0 min CN=80 Runoff=1.70 cfs 0.081 af

Subcatchment E-5S: Contributing Runoff Area=185.750 ac 0.00% Impervious Runoff Depth=1.41"
Flow Length=4,945' Tc=42.4 min CN=82 Runoff=175.95 cfs 21.834 af

Subcatchment E-6S: Contributing Area Runoff Area=12.670 ac 0.00% Impervious Runoff Depth=1.94"
Flow Length=450' Slope=0.0100 '/' Tc=14.1 min CN=89 Runoff=31.64 cfs 2.044 af

Reach 1R: Eastern Cut Off Swale Avg. Flow Depth=0.65' Max Vel=1.89 fps Inflow=6.98 cfs 0.665 af
n=0.030 L=700.0' S=0.0050 '/' Capacity=43.86 cfs Outflow=6.46 cfs 0.665 af

Reach 2R: Central Cut Off Swale Avg. Flow Depth=0.96' Max Vel=2.36 fps Inflow=15.59 cfs 1.866 af
n=0.030 L=500.0' S=0.0050 '/' Capacity=88.03 cfs Outflow=15.32 cfs 1.866 af

Reach 3R: Western Cut Off Swale Avg. Flow Depth=1.21' Max Vel=2.73 fps Inflow=22.81 cfs 2.978 af
n=0.030 L=600.0' S=0.0050 '/' Capacity=73.73 cfs Outflow=22.46 cfs 2.978 af

Reach 4R: Crosby Road Ditch Avg. Flow Depth=0.11' Max Vel=0.93 fps Inflow=0.27 cfs 0.023 af
n=0.030 L=450.0' S=0.0089 '/' Capacity=98.41 cfs Outflow=0.24 cfs 0.023 af

Reach 5R: North Property Line Ditch Avg. Flow Depth=2.07' Max Vel=3.87 fps Inflow=182.96 cfs 24.002 af
n=0.030 L=670.0' S=0.0055 '/' Capacity=471.44 cfs Outflow=181.99 cfs 24.002 af

Reach 6R: North Property Line Ditch Avg. Flow Depth=2.21' Max Vel=3.43 fps Inflow=183.70 cfs 24.447 af
n=0.030 L=500.0' S=0.0040 '/' Capacity=401.23 cfs Outflow=183.10 cfs 24.447 af

Reach 7R: North Property Line Ditch Avg. Flow Depth=2.46' Max Vel=2.84 fps Inflow=186.92 cfs 26.868 af
n=0.030 L=500.0' S=0.0024 '/' Capacity=463.27 cfs Outflow=185.59 cfs 26.865 af

Reach 8R: Western Overflow Swale Avg. Flow Depth=0.64' Max Vel=2.74 fps Inflow=8.55 cfs 0.145 af
n=0.030 L=500.0' S=0.0100 '/' Capacity=43.30 cfs Outflow=6.82 cfs 0.145 af

Pond 1P: CB#1 Peak Elev=670.96' Inflow=1.27 cfs 0.081 af
12.0" Round Culvert n=0.012 L=137.0' S=0.0020 '/' Outflow=1.27 cfs 0.081 af

Pond 3P: CB#3 Peak Elev=670.02' Inflow=2.00 cfs 0.127 af
12.0" Round Culvert n=0.012 L=213.0' S=0.0020 '/' Outflow=2.00 cfs 0.127 af

Pond 5P: CB#5 Peak Elev=668.13' Inflow=6.33 cfs 0.550 af
24.0" Round Culvert n=0.012 L=180.0' S=0.0020 '/' Outflow=6.33 cfs 0.550 af

Pond 6P: YD#6 Peak Elev=668.80' Storage=1 cf Inflow=2.82 cfs 0.246 af
15.0" Round Culvert n=0.012 L=138.0' S=0.0020 '/' Outflow=2.82 cfs 0.246 af

Pond 8P: YD#8 Peak Elev=668.49' Storage=2 cf Inflow=4.16 cfs 0.358 af
18.0" Round Culvert n=0.012 L=122.0' S=0.0020 '/' Outflow=4.16 cfs 0.358 af

Pond 11P: YD#11 Peak Elev=668.23' Storage=1 cf Inflow=1.99 cfs 0.143 af
12.0" Round Culvert n=0.012 L=170.0' S=0.0020 '/' Outflow=1.99 cfs 0.143 af

Pond 13P: CB#13 Peak Elev=668.11' Storage=8 cf Inflow=2.19 cfs 0.157 af
12.0" Round Culvert n=0.012 L=40.0' S=0.0020 '/' Outflow=2.19 cfs 0.157 af

Pond 15P: CB#15 Peak Elev=668.01' Storage=8 cf Inflow=4.81 cfs 0.392 af
18.0" Round Culvert n=0.012 L=157.0' S=0.0020 '/' Outflow=4.81 cfs 0.392 af

Pond 18P: CB#18 Peak Elev=667.81' Storage=9 cf Inflow=5.26 cfs 0.444 af
18.0" Round Culvert n=0.012 L=83.0' S=0.0020 '/' Outflow=5.26 cfs 0.444 af

Pond 20P: CB#20 Peak Elev=667.48' Inflow=7.85 cfs 0.617 af
24.0" Round Culvert n=0.012 L=157.0' S=0.0020 '/' Outflow=7.85 cfs 0.617 af

Pond 22P: YD#22 Peak Elev=667.40' Storage=1 cf Inflow=0.88 cfs 0.073 af
10.0" Round Culvert n=0.012 L=70.0' S=0.0020 '/' Outflow=0.88 cfs 0.073 af

Pond 24P: CB#24 Peak Elev=667.19' Inflow=11.64 cfs 0.887 af
24.0" Round Culvert n=0.012 L=105.0' S=0.0020 '/' Outflow=11.64 cfs 0.887 af

Pond 26P: CB#26 Peak Elev=667.13' Storage=5 cf Inflow=2.14 cfs 0.155 af
12.0" Round Culvert n=0.012 L=175.0' S=0.0020 '/' Outflow=2.14 cfs 0.155 af

Pond 28P: CB#28 Peak Elev=666.98' Storage=7 cf Inflow=2.99 cfs 0.220 af
15.0" Round Culvert n=0.012 L=214.0' S=0.0020 '/' Outflow=2.99 cfs 0.220 af

Pond 30P: CB#30 Peak Elev=666.89' Storage=9 cf Inflow=4.03 cfs 0.307 af
18.0" Round Culvert n=0.012 L=150.0' S=0.0020 '/' Outflow=4.02 cfs 0.307 af

Pond 32P: CB#32 Peak Elev=666.73' Storage=9 cf Inflow=5.90 cfs 0.476 af
24.0" Round Culvert n=0.012 L=166.0' S=0.0020 '/' Outflow=5.90 cfs 0.476 af

Pond 33P: Subsurface Detention within Peak Elev=666.68' Storage=7,165 cf Inflow=36.46 cfs 3.729 af
Primary=19.78 cfs 2.198 af Secondary=10.19 cfs 1.288 af Tertiary=6.16 cfs 0.243 af Outflow=34.68 cfs 3.729 af

Pond 34P: Bio-Retention Area Peak Elev=664.32' Storage=69,817 cf Inflow=13.12 cfs 3.442 af
Primary=8.97 cfs 2.232 af Secondary=0.00 cfs 0.000 af Outflow=8.97 cfs 2.232 af

Pond 35P: Dry Pond Peak Elev=664.07' Storage=12,688 cf Inflow=6.26 cfs 0.324 af
Primary=0.89 cfs 0.324 af Tertiary=0.00 cfs 0.000 af Outflow=0.89 cfs 0.324 af

Pond 38P: Level Spreader Peak Elev=664.67' Inflow=7.68 cfs 2.048 af
Primary=7.68 cfs 2.048 af Secondary=0.00 cfs 0.000 af Outflow=7.68 cfs 2.048 af

Pond 39P: Level Spreader Peak Elev=664.57' Inflow=4.95 cfs 1.219 af
Primary=4.95 cfs 1.218 af Secondary=0.05 cfs 0.001 af Outflow=4.95 cfs 1.219 af

Pond 53P: West Pre-Treatment to Peak Elev=666.17' Storage=17,804 cf Inflow=20.55 cfs 2.245 af
Primary=7.68 cfs 2.048 af Secondary=8.55 cfs 0.145 af Outflow=16.10 cfs 2.193 af

Pond 55P: North Pre-Treatment to Peak Elev=665.92' Storage=8,524 cf Inflow=10.32 cfs 1.310 af
Primary=4.95 cfs 1.219 af Secondary=3.49 cfs 0.071 af Outflow=8.36 cfs 1.290 af

Link 1L: West Property Line and Adjacent Wetland Inflow=22.46 cfs 2.978 af
Primary=22.46 cfs 2.978 af

Link 2L: Total Discharge at Design Points Inflow=208.05 cfs 29.843 af
Primary=208.05 cfs 29.843 af

Link 3L: Ditch at Northwest Corner of Site Discharging to Adjacent Inflow=185.59 cfs 26.865 af
Primary=185.59 cfs 26.865 af

Total Runoff Area = 254.854 ac Runoff Volume = 31.128 af Average Runoff Depth = 1.47"
95.09% Pervious = 242.345 ac 4.91% Impervious = 12.509 ac

Summary for Subcatchment 1S: Area to Eastern Cut Off Swale

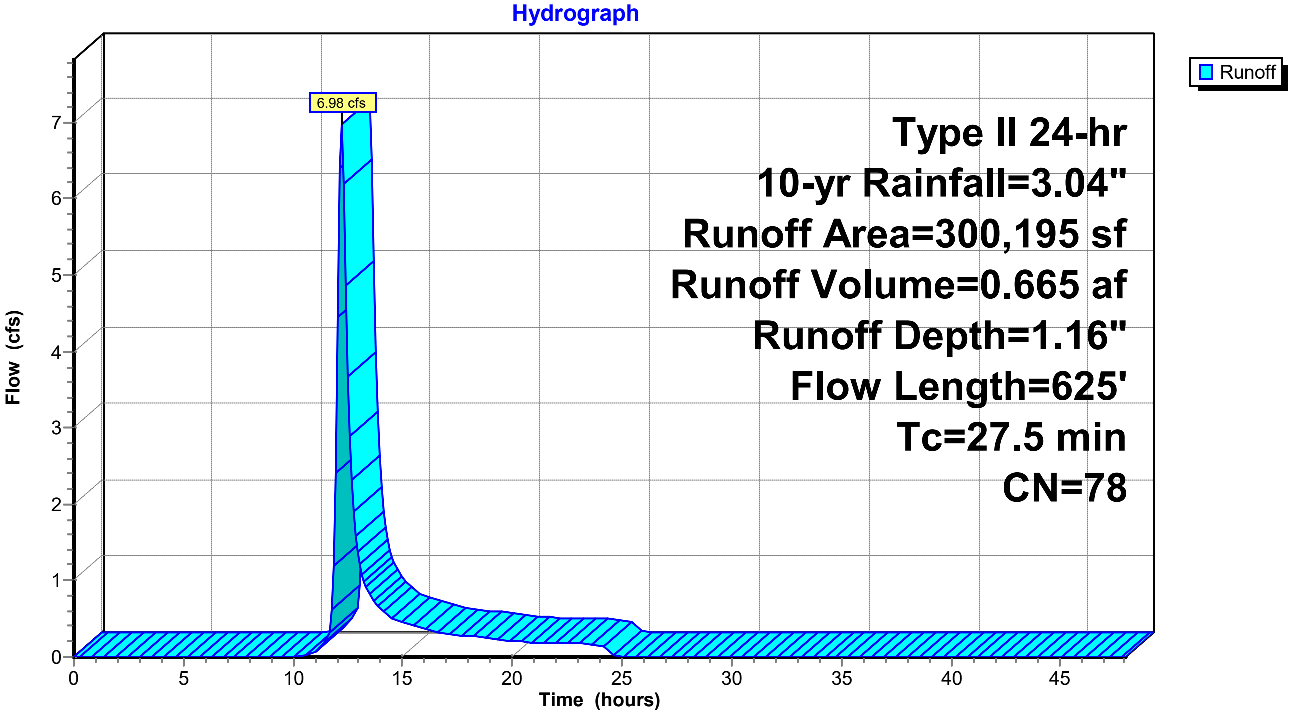
Runoff = 6.98 cfs @ 12.23 hrs, Volume= 0.665 af, Depth= 1.16"
Routed to Reach 1R : Eastern Cut Off Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
83,440	78	Meadow, non-grazed, HSG D
185,160	79	Woods, Fair, HSG D
31,595	73	Brush, Good, HSG D
300,195	78	Weighted Average
300,195		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0120	0.13		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.7	90	0.0150	0.86		**Shallow Concentrated Flow, 90' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
12.7	435	0.0130	0.57		**Shallow Concentrated Flow, 435' Shallow Conc. Flow** Woodland Kv= 5.0 fps
27.5	625	Total			

Subcatchment 1S: Area to Eastern Cut Off Swale



Summary for Subcatchment 2S: Area to Central Cut Off Swale

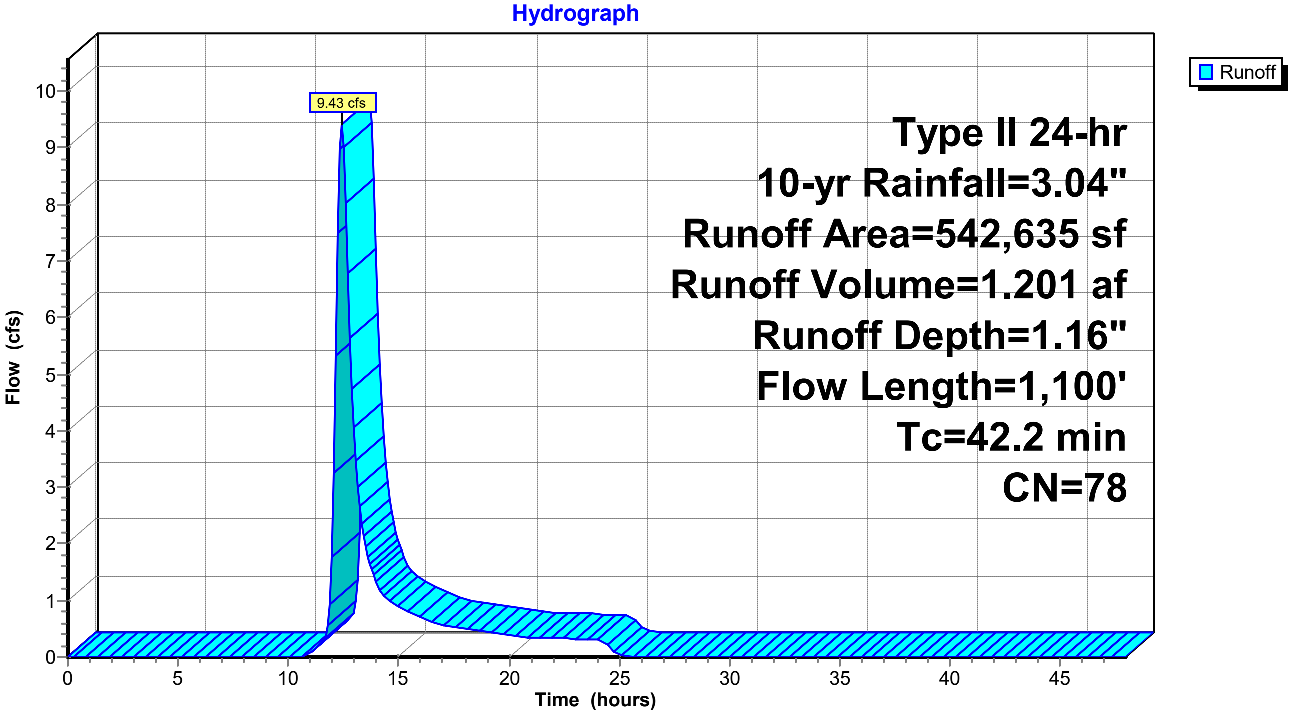
Runoff = 9.43 cfs @ 12.42 hrs, Volume= 1.201 af, Depth= 1.16"
Routed to Reach 2R : Central Cut Off Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
333,020	79	Woods, Fair, HSG D
189,965	78	Meadow, non-grazed, HSG D
19,650	73	Brush, Good, HSG D
542,635	78	Weighted Average
542,635		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
7.3	375	0.0150	0.86		**Shallow Concentrated Flow, 375' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
20.8	625	0.0100	0.50		**Shallow Concentrated Flow, 625' Shallow Conc. Flow** Woodland Kv= 5.0 fps
42.2	1,100	Total			

Subcatchment 2S: Area to Central Cut Off Swale



Summary for Subcatchment 3S: Area to Western Cut Off Swale

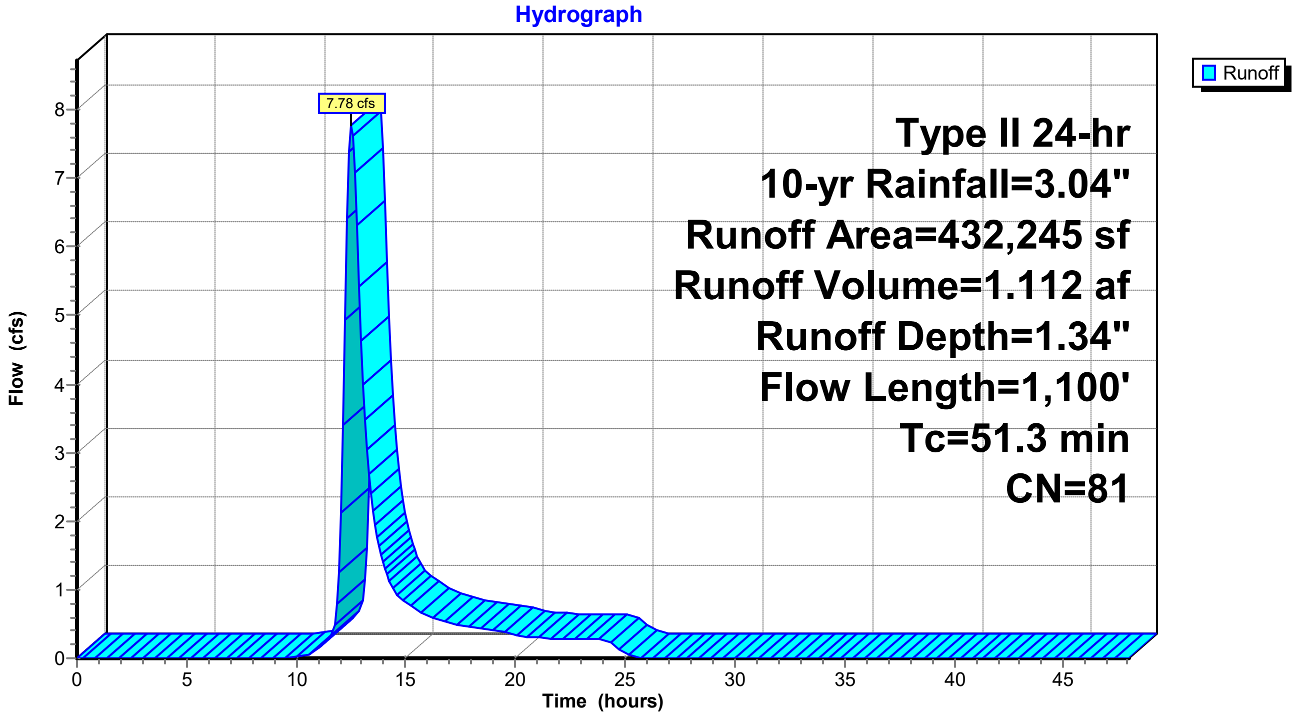
Runoff = 7.78 cfs @ 12.53 hrs, Volume= 1.112 af, Depth= 1.34"
Routed to Reach 3R : Western Cut Off Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
125,880	89	Row crops, straight row, Good, HSG D
51,080	78	Meadow, non-grazed, HSG D
225,445	79	Woods, Fair, HSG D
29,840	73	Brush, Good, HSG D
432,245	81	Weighted Average
432,245		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.1	100	0.0050	0.07		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
21.7	650	0.0100	0.50		**Shallow Concentrated Flow, 650' Shallow Conc. Flow** Woodland Kv= 5.0 fps
51.3	1,100	Total			

Subcatchment 3S: Area to Western Cut Off Swale



Summary for Subcatchment 4S: Prop. Area to Crosby Road Ditch

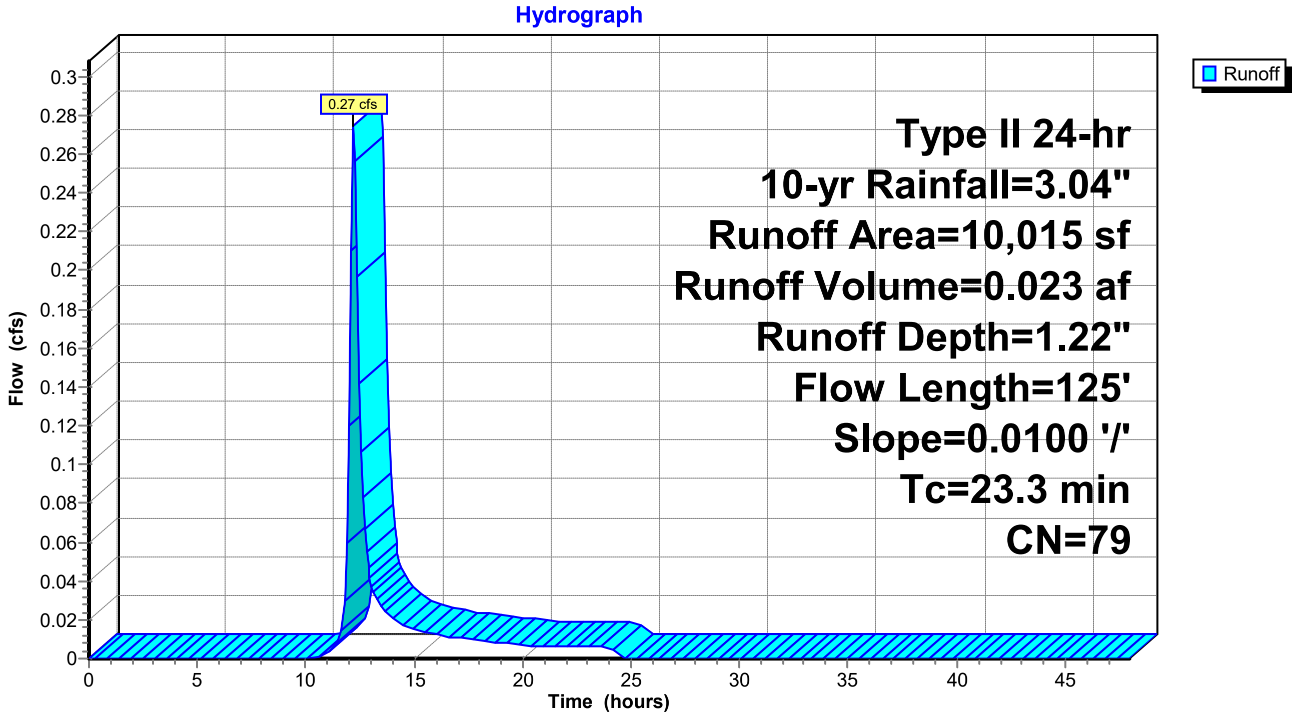
Runoff = 0.27 cfs @ 12.18 hrs, Volume= 0.023 af, Depth= 1.22"
Routed to Reach 4R : Crosby Road Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
10,015	79	Woods/grass comb., Good, HSG D
10,015		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	100	0.0100	0.07		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.3	25	0.0100	1.50		**Shallow Concentrated Flow, 25' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
23.3	125	Total			

Subcatchment 4S: Prop. Area to Crosby Road Ditch



Summary for Subcatchment 5S: Area Overland to North Prop. Line and Wetland Ditch (East)

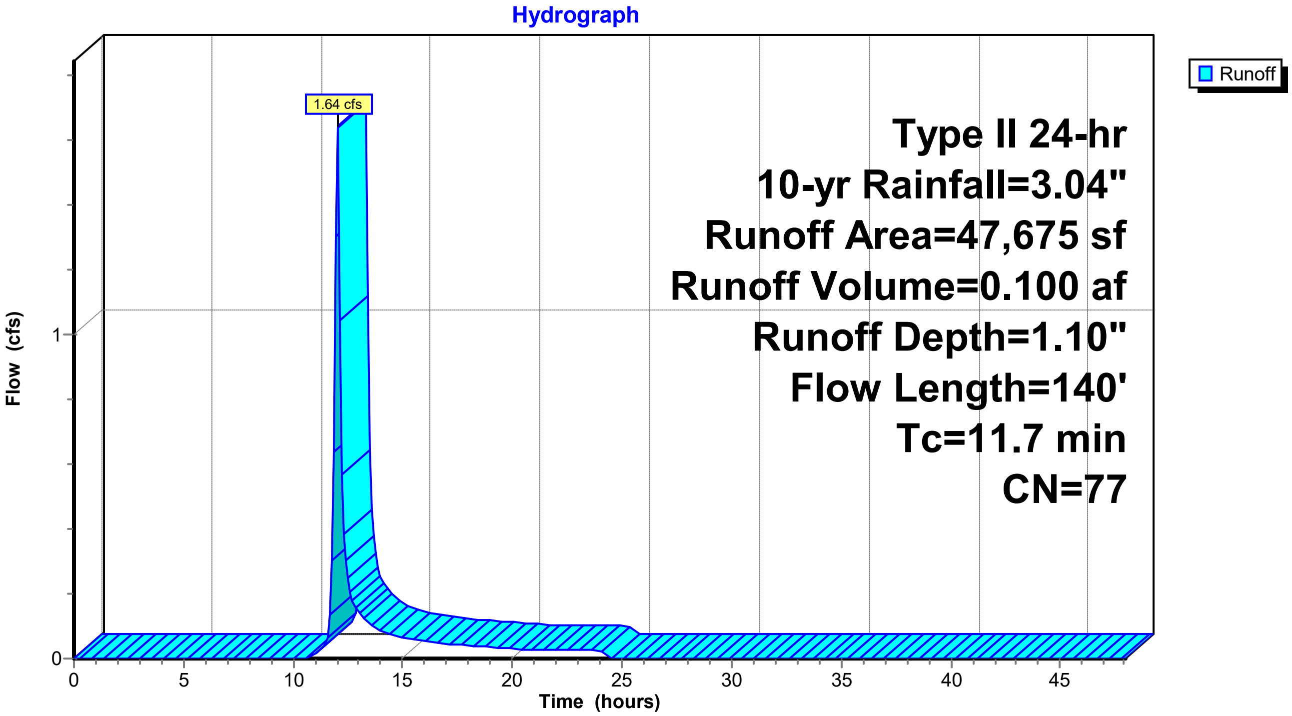
Runoff = 1.64 cfs @ 12.05 hrs, Volume= 0.100 af, Depth= 1.10"
Routed to Reach 5R : North Property Line Ditch (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
47,675	77	Brush, Fair, HSG D
47,675		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	100	0.0200	0.16		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.0	40	0.0100	0.70		**Shallow Concentrated Flow, 40' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
11.7	140	Total			

Subcatchment 5S: Area Overland to North Prop. Line and Wetland Ditch (East)



Summary for Subcatchment 6S: Area Overland to North Prop. Line and Wetland Ditch (Central)

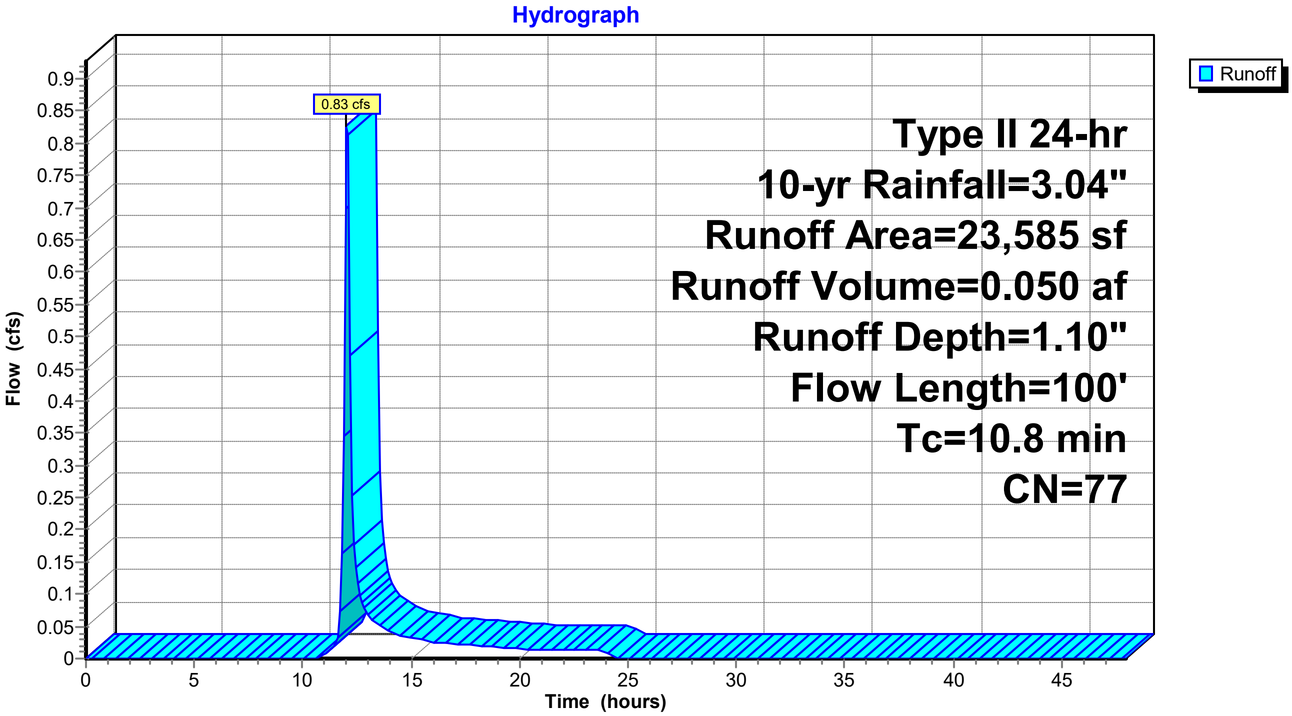
Runoff = 0.83 cfs @ 12.04 hrs, Volume= 0.050 af, Depth= 1.10"
Routed to Reach 6R : North Property Line Ditch (Central)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
23,585	77	Brush, Fair, HSG D
23,585		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	70	0.0100	0.11		**Sheet Flow, 70' Overland Flow** Range n= 0.130 P2= 2.14"
0.2	30	0.1000	2.21		**Shallow Concentrated Flow, 30' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
10.8	100	Total			

Subcatchment 6S: Area Overland to North Prop. Line and Wetland Ditch (Central)



Summary for Subcatchment 7S: Area Overland to North Prop. Line and Wetland Ditch (West)

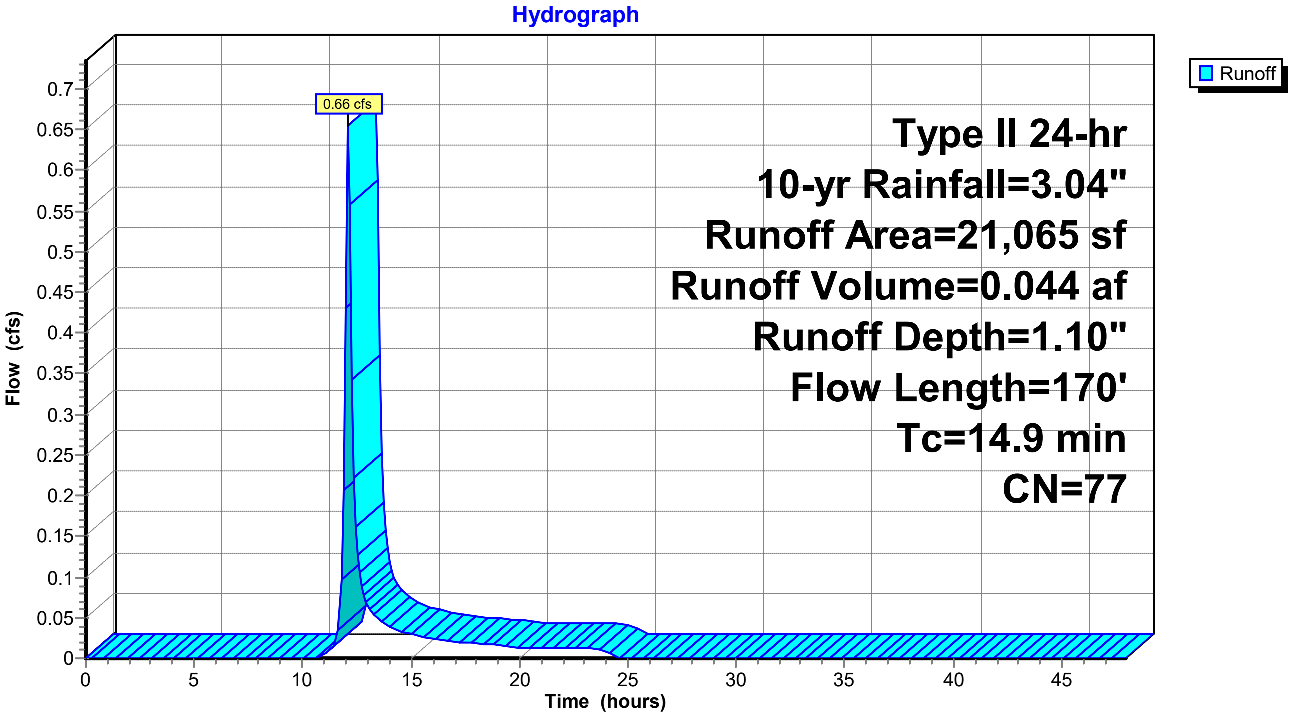
Runoff = 0.66 cfs @ 12.08 hrs, Volume= 0.044 af, Depth= 1.10"
Routed to Reach 7R : North Property Line Ditch (West)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
21,065	77	Brush, Fair, HSG D
21,065		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
0.8	70	0.0400	1.40		**Shallow Concentrated Flow, 70' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
14.9	170	Total			

Subcatchment 7S: Area Overland to North Prop. Line and Wetland Ditch (West)



Summary for Subcatchment 8S: Area to CB#1

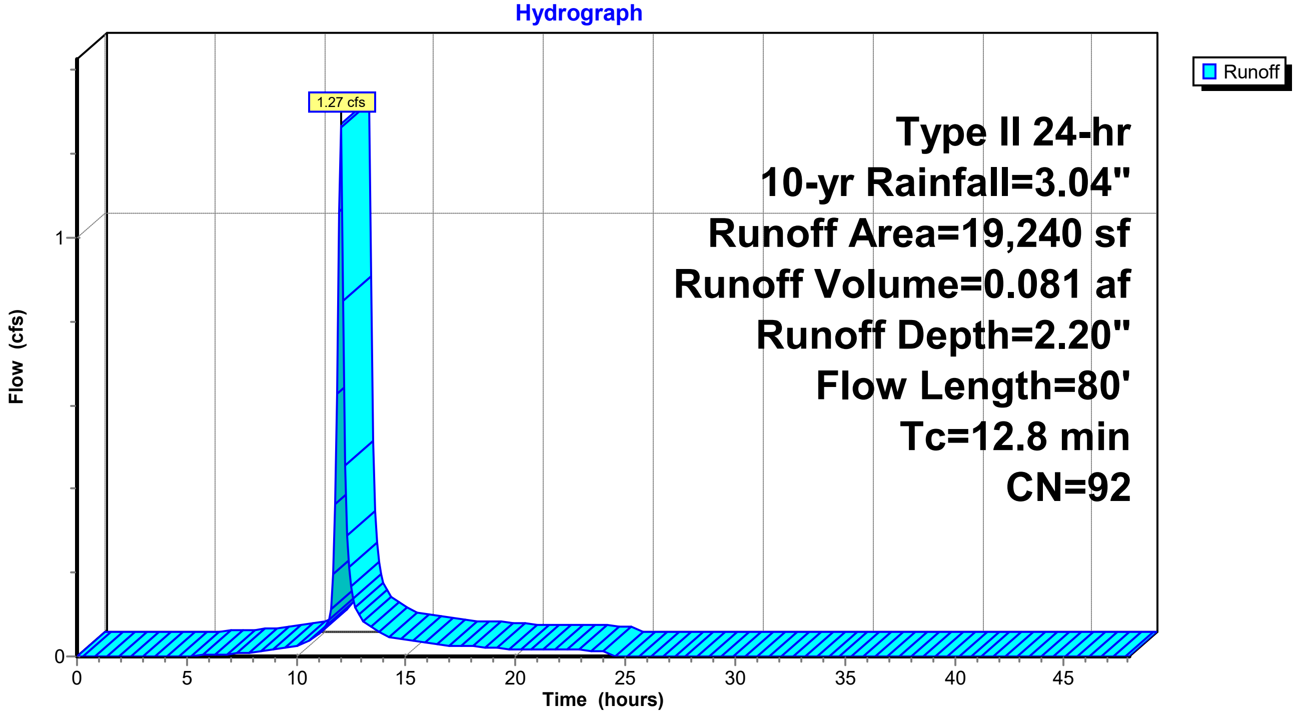
Runoff = 1.27 cfs @ 12.04 hrs, Volume= 0.081 af, Depth= 2.20"
Routed to Pond 1P : CB#1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
4,063	98	Roofs, HSG D
8,840	98	Paved parking, HSG D
6,337	80	>75% Grass cover, Good, HSG D
19,240	92	Weighted Average
6,337		32.94% Pervious Area
12,903		67.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	65	0.0200	0.09		**Sheet Flow, 65' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.4	15	0.0100	0.58		**Sheet Flow, 15' Overland Flow** Smooth surfaces n= 0.011 P2= 2.14"
12.8	80	Total			

Subcatchment 8S: Area to CB#1



Summary for Subcatchment 9S: Area to CB#3

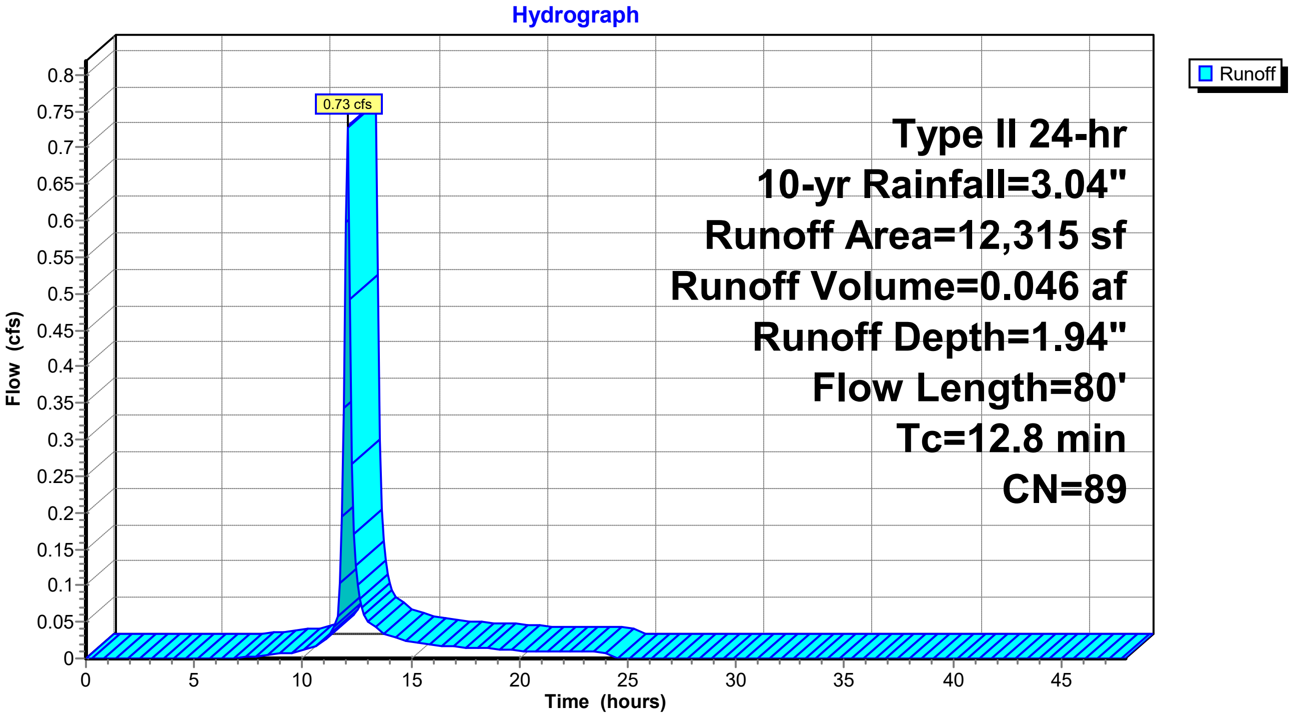
Runoff = 0.73 cfs @ 12.05 hrs, Volume= 0.046 af, Depth= 1.94"
Routed to Pond 3P : CB#3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
4,063	98	Roofs, HSG D
1,800	98	Paved parking, HSG D
6,452	80	>75% Grass cover, Good, HSG D
12,315	89	Weighted Average
6,452		52.39% Pervious Area
5,863		47.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	65	0.0200	0.09		**Sheet Flow, 65' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.4	15	0.0100	0.58		**Sheet Flow, 15' Overland Flow** Smooth surfaces n= 0.011 P2= 2.14"
12.8	80	Total			

Subcatchment 9S: Area to CB#3



Summary for Subcatchment 10S: Area to CB#5

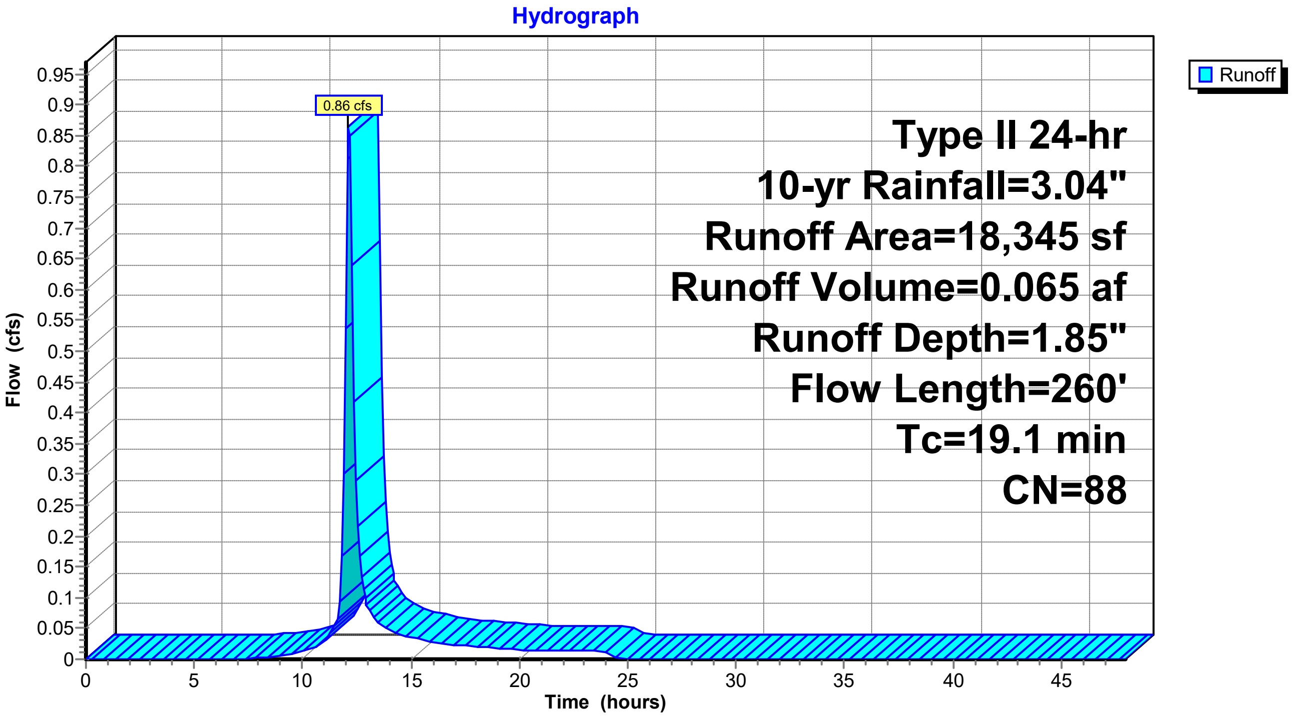
Runoff = 0.86 cfs @ 12.12 hrs, Volume= 0.065 af, Depth= 1.85"
Routed to Pond 5P : CB#5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
8,620	98	Paved parking, HSG D
9,725	80	>75% Grass cover, Good, HSG D
18,345	88	Weighted Average
9,725		53.01% Pervious Area
8,620		46.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0200	0.10		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
1.4	130	0.0100	1.50		**Shallow Concentrated Flow, 130' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
0.2	30	0.0200	2.87		**Shallow Concentrated Flow, 30' Shallow Conc. Flow** Paved Kv= 20.3 fps
19.1	260	Total			

Subcatchment 10S: Area to CB#5



Summary for Subcatchment 11S: Area to YD#6

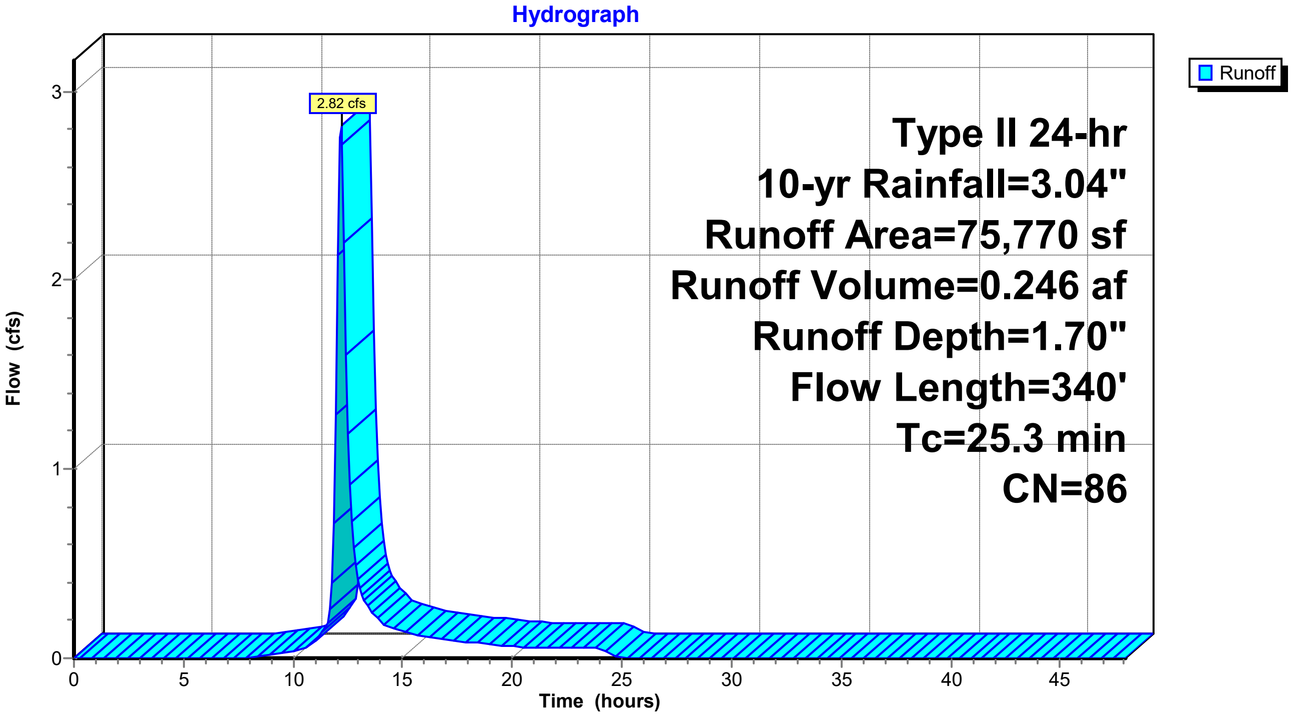
Runoff = 2.82 cfs @ 12.19 hrs, Volume= 0.246 af, Depth= 1.70"
Routed to Pond 6P : YD#6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
20,040	98	Paved parking, HSG D
51,130	80	>75% Grass cover, Good, HSG D
4,600	98	Roofs, HSG D
75,770	86	Weighted Average
51,130		67.48% Pervious Area
24,640		32.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	100	0.0100	0.07		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.3	60	0.0200	2.87		**Shallow Concentrated Flow, 60' Shallow Conc. Flow** Paved Kv= 20.3 fps
2.0	180	0.0100	1.50		**Shallow Concentrated Flow, 180' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
25.3	340	Total			

Subcatchment 11S: Area to YD#6



Summary for Subcatchment 12S: Area to YD#8

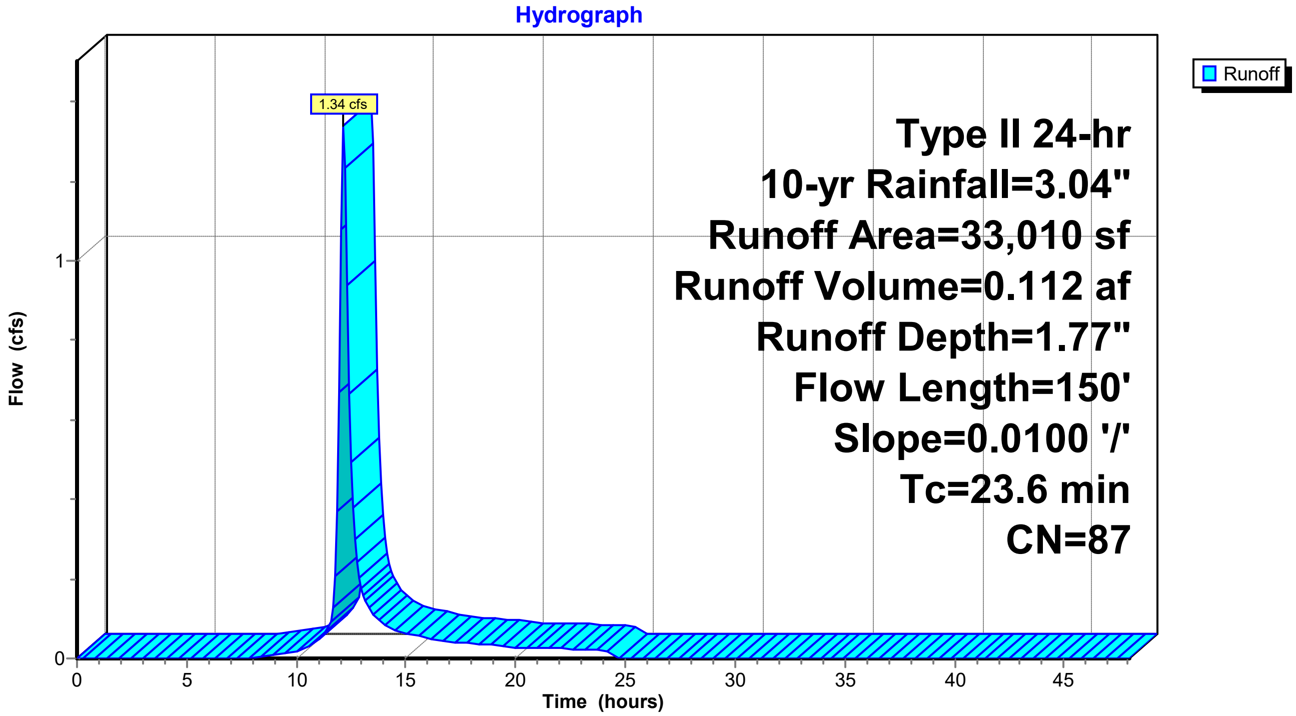
Runoff = 1.34 cfs @ 12.17 hrs, Volume= 0.112 af, Depth= 1.77"
Routed to Pond 8P : YD#8

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
2,610	98	Roofs, HSG D
20,145	80	>75% Grass cover, Good, HSG D
10,255	98	Paved parking, HSG D
33,010	87	Weighted Average
20,145		61.03% Pervious Area
12,865		38.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	100	0.0100	0.07		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.6	50	0.0100	1.50		**Shallow Concentrated Flow, 50' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
23.6	150	Total			

Subcatchment 12S: Area to YD#8



Summary for Subcatchment 13S: Eastern Area Directly to Gravel Storage

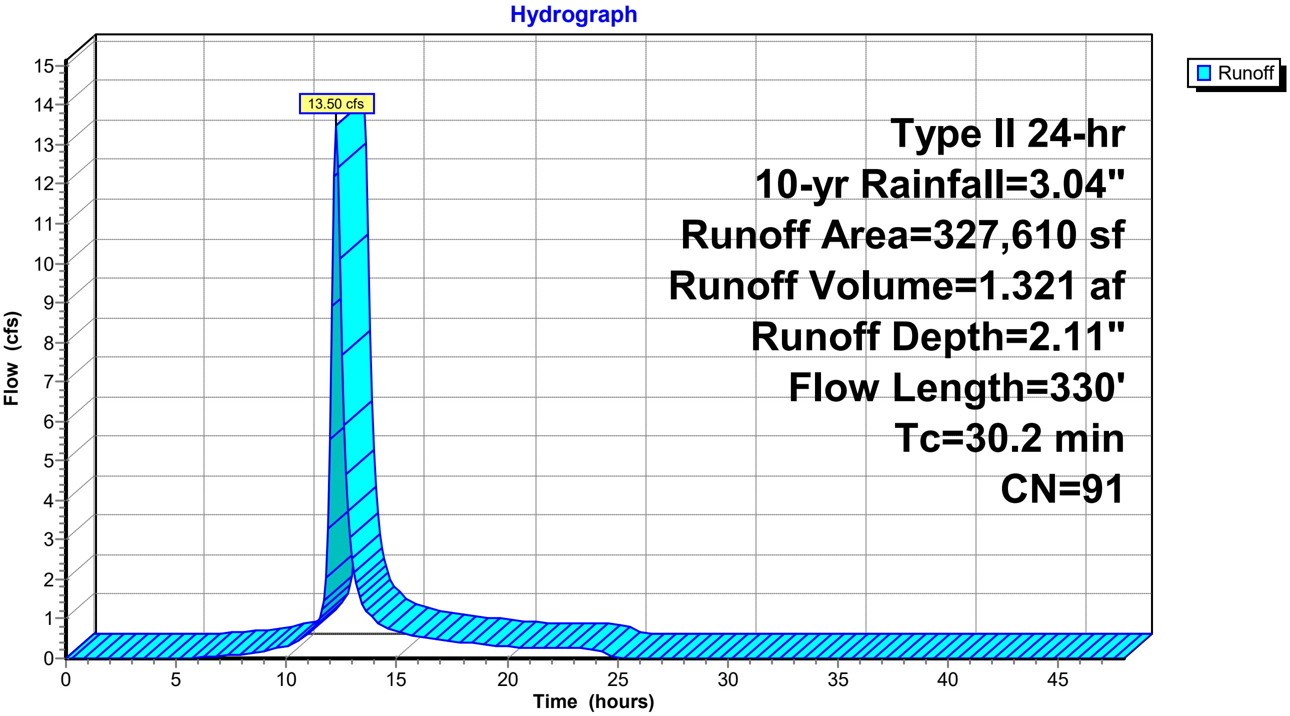
Runoff = 13.50 cfs @ 12.24 hrs, Volume= 1.321 af, Depth= 2.11"
Routed to Pond 33P : Subsurface Detention within Gravel Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

	Area (sf)	CN	Description
*	77,480	80	Gravel Storage Area, Good, HSG D
	80,190	98	Paved parking, HSG D
	77,985	98	Roofs, HSG D
	47,575	98	Unconnected pavement, HSG D
	44,380	80	>75% Grass cover, Good, HSG D
	327,610	91	Weighted Average
	121,860		37.20% Pervious Area
	205,750		62.80% Impervious Area
	47,575		23.12% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	75	0.0130	0.08		**Sheet Flow, 75' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
12.3	25	0.0030	0.03		**Sheet Flow, 25' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.2	30	0.0300	2.60		**Shallow Concentrated Flow, 30' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
1.2	200	0.0200	2.87		**Shallow Concentrated Flow, 200' Shallow Conc. Flow** Paved Kv= 20.3 fps
30.2	330	Total			

Subcatchment 13S: Eastern Area Directly to Gravel Storage



Summary for Subcatchment 14S: Area to YD#11

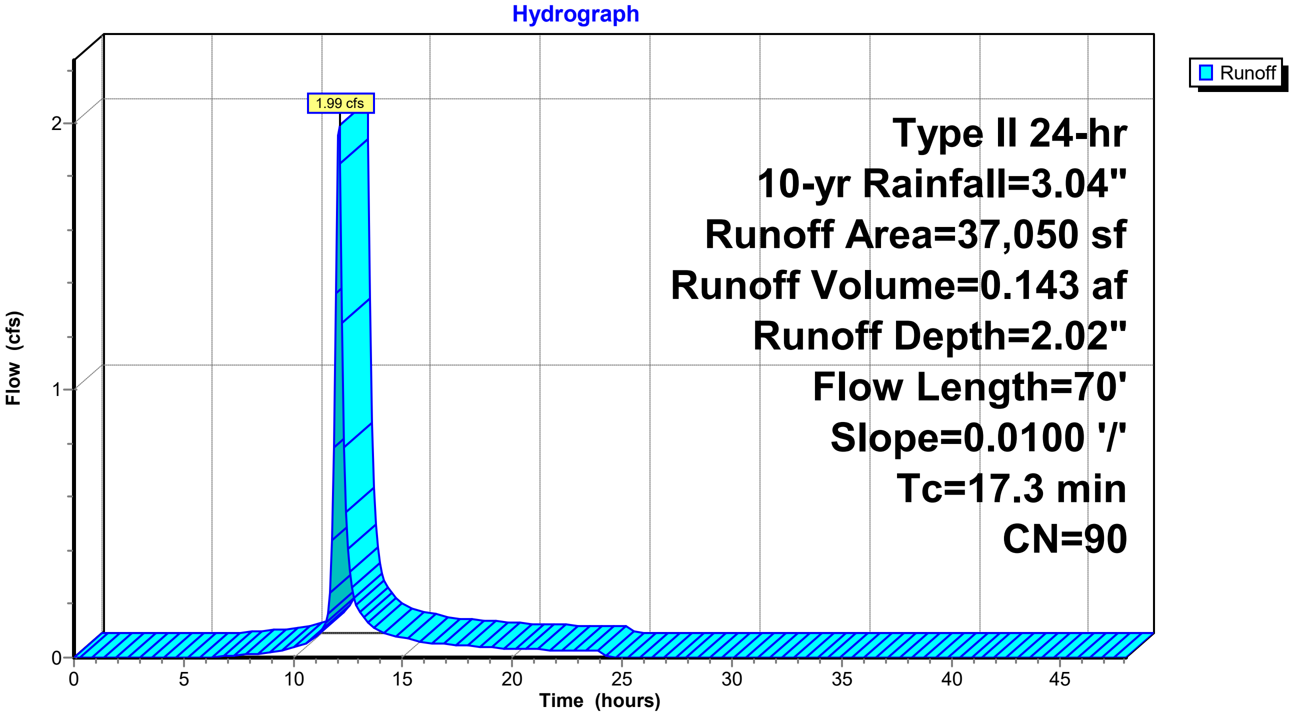
Runoff = 1.99 cfs @ 12.09 hrs, Volume= 0.143 af, Depth= 2.02"
Routed to Pond 11P : YD#11

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
3,925	98	Paved parking, HSG D
16,085	80	>75% Grass cover, Good, HSG D
17,040	98	Roofs, HSG D
37,050	90	Weighted Average
16,085		43.41% Pervious Area
20,965		56.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.3	70	0.0100	0.07		**Sheet Flow, 70' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"

Subcatchment 14S: Area to YD#11



Summary for Subcatchment 15S: Area to CB#13

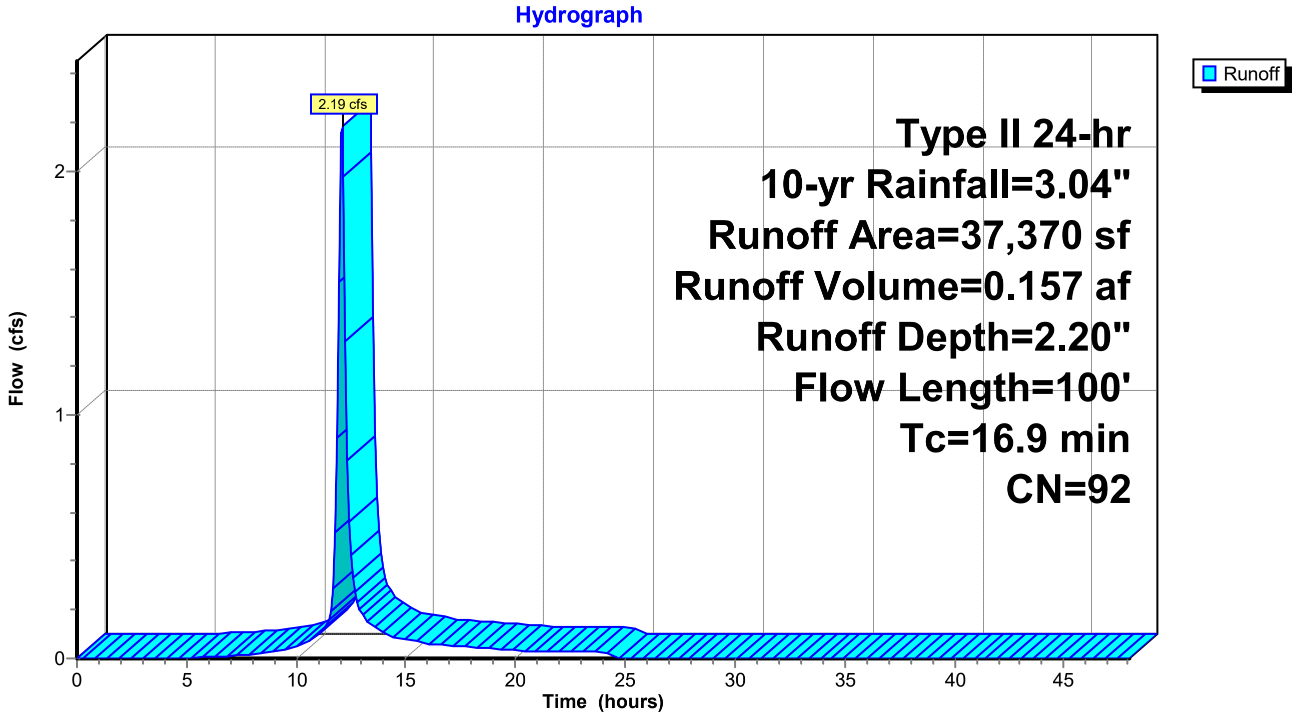
Runoff = 2.19 cfs @ 12.08 hrs, Volume= 0.157 af, Depth= 2.20"
Routed to Pond 13P : CB#13

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
510	98	Roofs, HSG D
25,120	98	Paved parking, HSG D
11,740	80	>75% Grass cover, Good, HSG D
37,370	92	Weighted Average
11,740		31.42% Pervious Area
25,630		68.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	65	0.0100	0.07		**Sheet Flow, 65' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.6	35	0.0200	0.91		**Sheet Flow, 35' Overland Flow** Smooth surfaces n= 0.011 P2= 2.14"
16.9	100	Total			

Subcatchment 15S: Area to CB#13



Summary for Subcatchment 16S: Area to CB#15

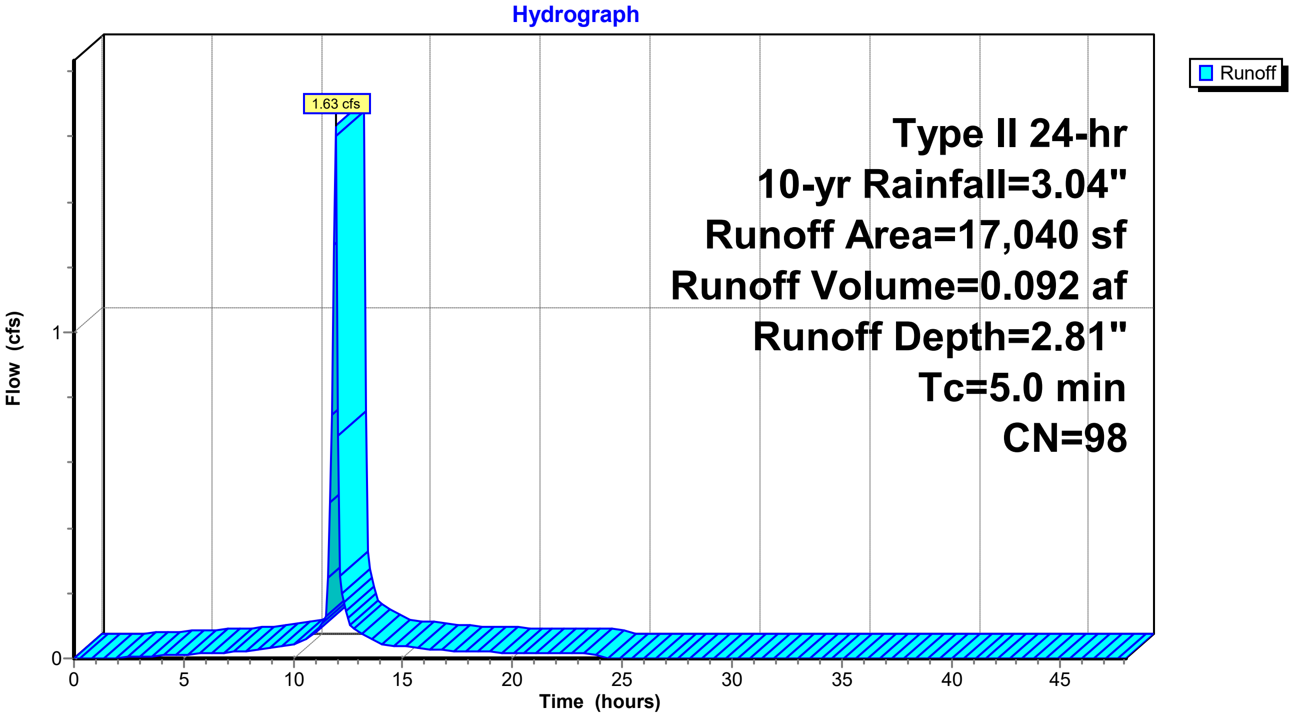
Runoff = 1.63 cfs @ 11.95 hrs, Volume= 0.092 af, Depth= 2.81"
Routed to Pond 15P : CB#15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
17,040	98	Roofs, HSG D
17,040		100.00% Impervious Area

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

Subcatchment 16S: Area to CB#15



Summary for Subcatchment 17S: Area to CB#18

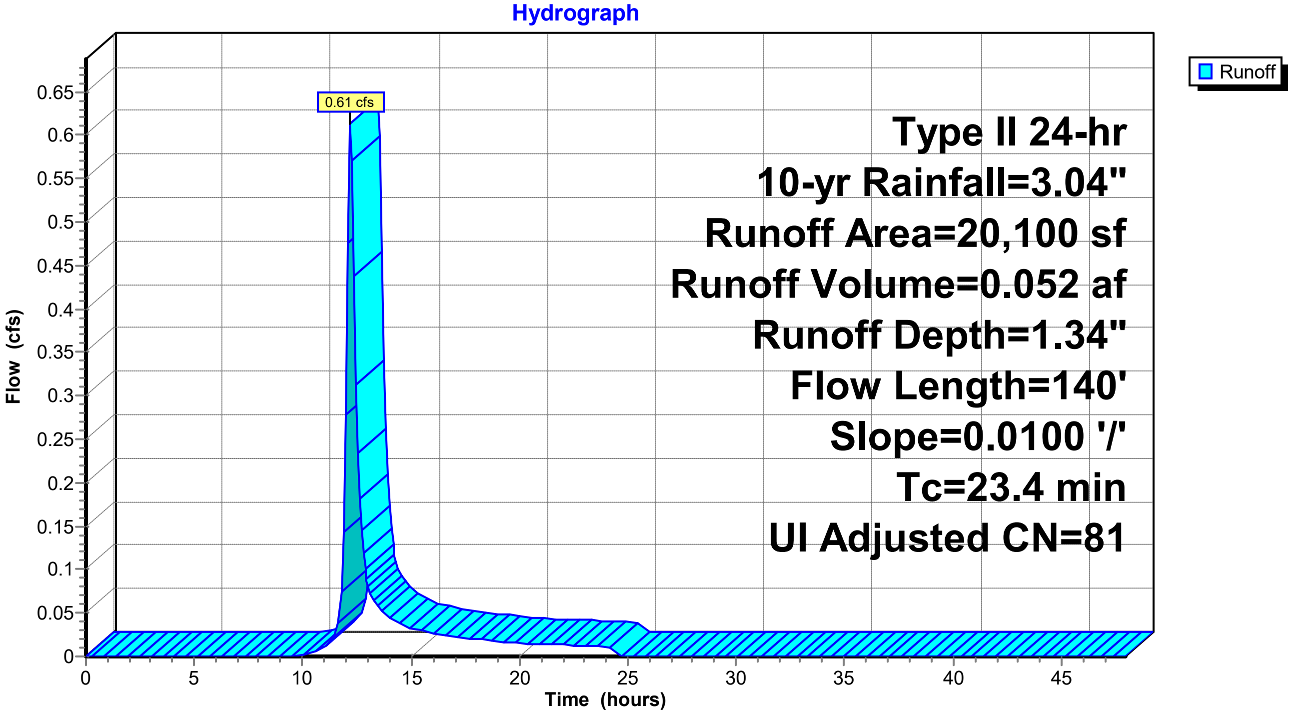
Runoff = 0.61 cfs @ 12.18 hrs, Volume= 0.052 af, Depth= 1.34"
Routed to Pond 18P : CB#18

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Adj	Description
3,025	98		Unconnected pavement, HSG D
17,075	80		>75% Grass cover, Good, HSG D
20,100	83	81	Weighted Average, UI Adjusted
17,075			84.95% Pervious Area
3,025			15.05% Impervious Area
3,025			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	100	0.0100	0.07		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.4	40	0.0100	1.50		**Shallow Concentrated Flow, 40' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
23.4	140	Total			

Subcatchment 17S: Area to CB#18



Summary for Subcatchment 18S: South Half of Phase 2 Building

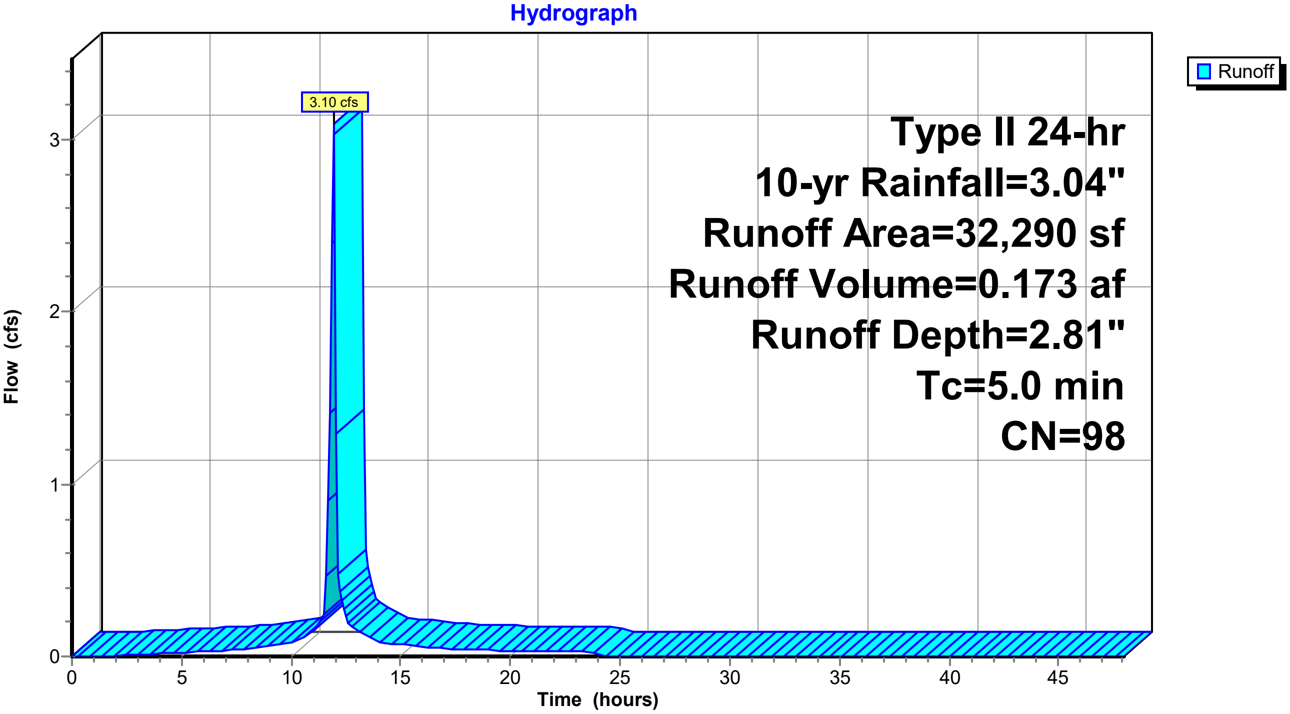
Runoff = 3.10 cfs @ 11.95 hrs, Volume= 0.173 af, Depth= 2.81"
Routed to Pond 20P : CB#20

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
32,290	98	Roofs, HSG D
32,290		100.00% Impervious Area

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

Subcatchment 18S: South Half of Phase 2 Building



Summary for Subcatchment 19S: Area to YD#22

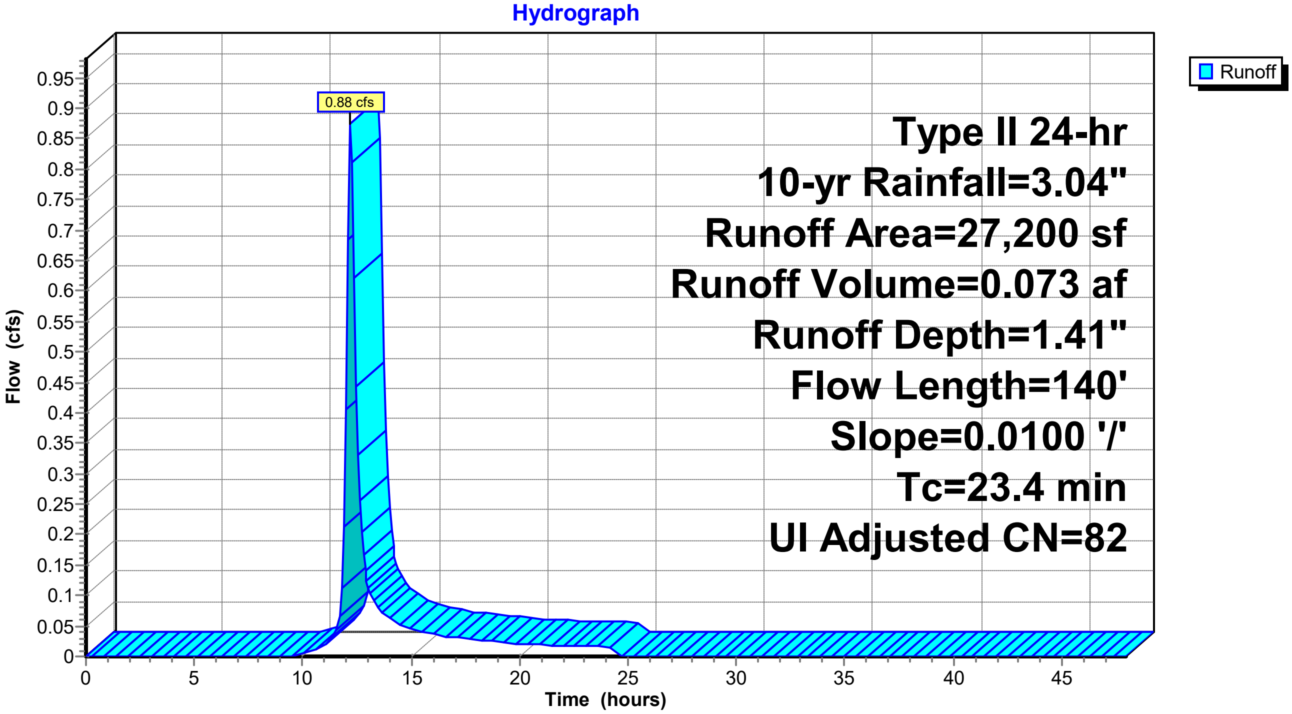
Runoff = 0.88 cfs @ 12.17 hrs, Volume= 0.073 af, Depth= 1.41"
Routed to Pond 22P : YD#22

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Adj	Description
19,675	80		>75% Grass cover, Good, HSG D
7,525	98		Unconnected pavement, HSG D
27,200	85	82	Weighted Average, UI Adjusted
19,675			72.33% Pervious Area
7,525			27.67% Impervious Area
7,525			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	100	0.0100	0.07		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.4	40	0.0100	1.50		**Shallow Concentrated Flow, 40' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
23.4	140	Total			

Subcatchment 19S: Area to YD#22



Summary for Subcatchment 20S: North Half of Phase 2 Building

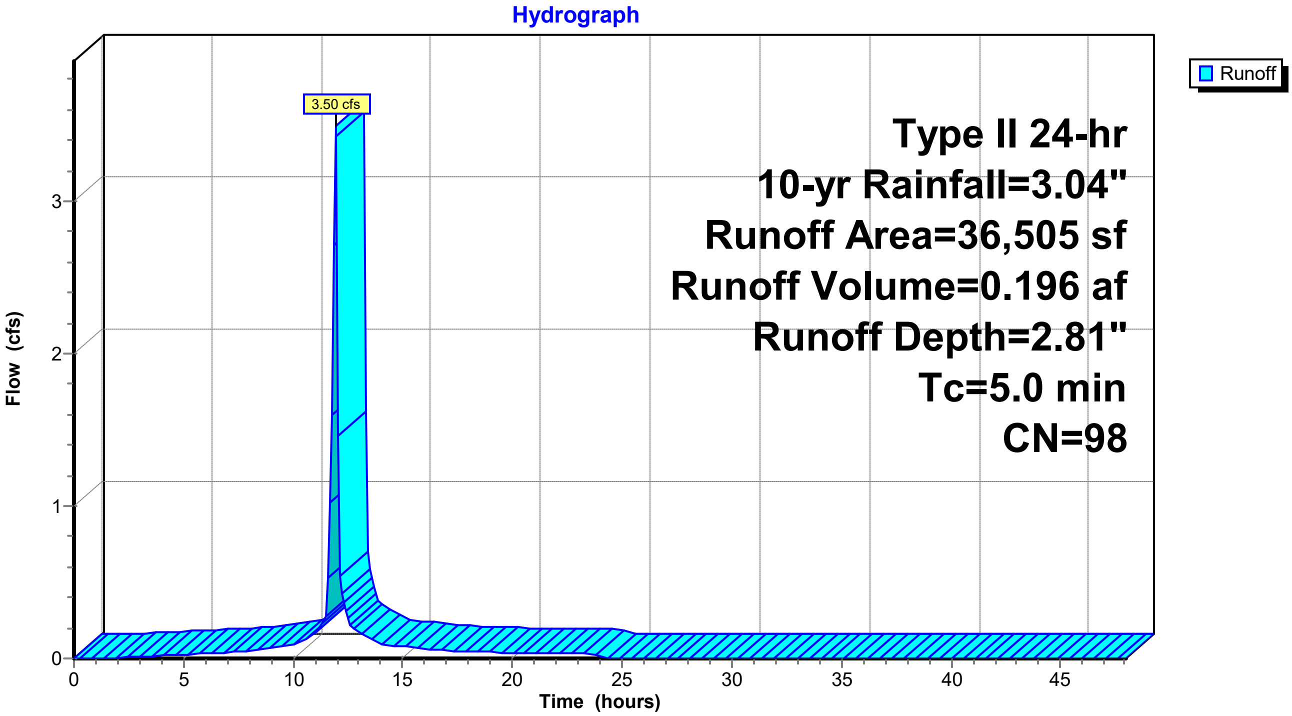
Runoff = 3.50 cfs @ 11.95 hrs, Volume= 0.196 af, Depth= 2.81"
Routed to Pond 24P : CB#24

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
36,505	98	Roofs, HSG D
36,505		100.00% Impervious Area

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

Subcatchment 20S: North Half of Phase 2 Building



Summary for Subcatchment 21S: Western Area Overland to Gravel Storage

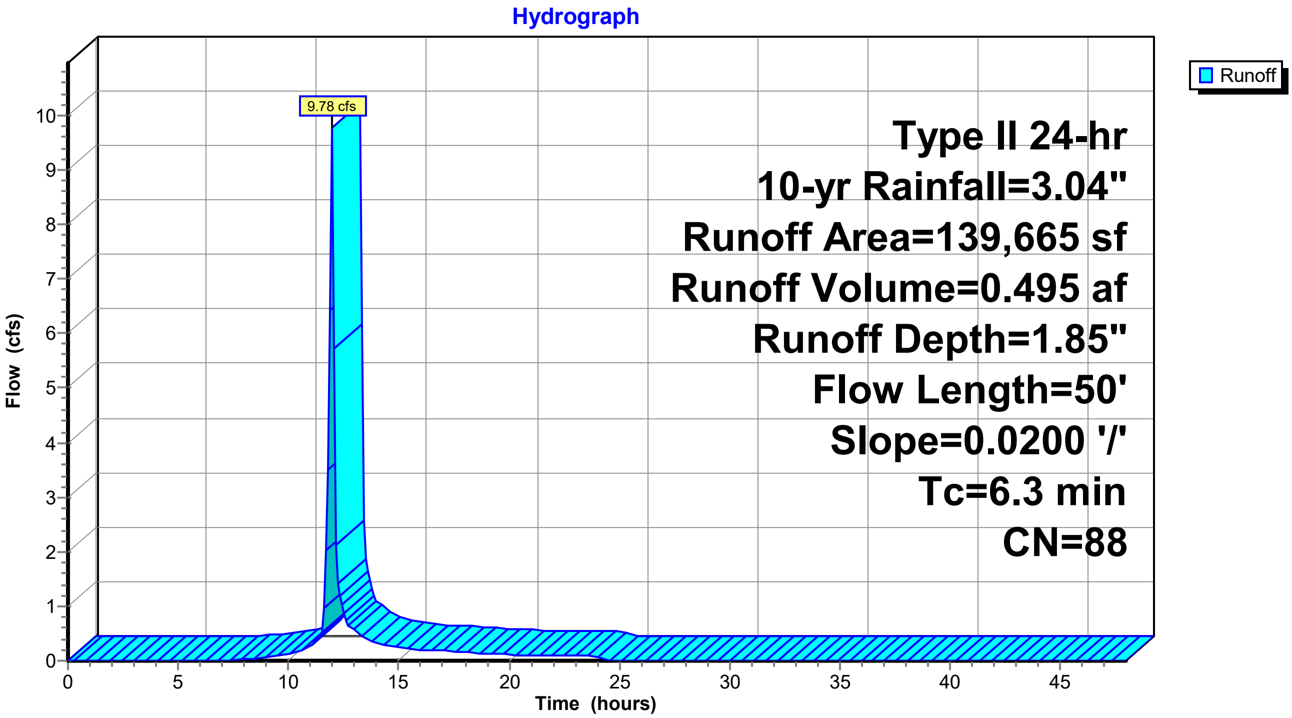
Runoff = 9.78 cfs @ 11.97 hrs, Volume= 0.495 af, Depth= 1.85"
Routed to Pond 33P : Subsurface Detention within Gravel Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

	Area (sf)	CN	Description
*	53,390	80	Gravel Storage Area, Good, HSG D
	31,080	98	Paved parking, HSG D
	2,460	98	Unconnected pavement, HSG D
	26,630	80	>75% Grass cover, Good, HSG D
	26,105	98	Roofs, HSG D
	139,665	88	Weighted Average
	80,020		57.29% Pervious Area
	59,645		42.71% Impervious Area
	2,460		4.12% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	25	0.0200	0.07		**Sheet Flow, 25' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.5	25	0.0200	0.85		**Sheet Flow, 25' Overland Flow** Smooth surfaces n= 0.011 P2= 2.14"
6.3	50	Total			

Subcatchment 21S: Western Area Overland to Gravel Storage



Summary for Subcatchment 22S: Area to CB#26

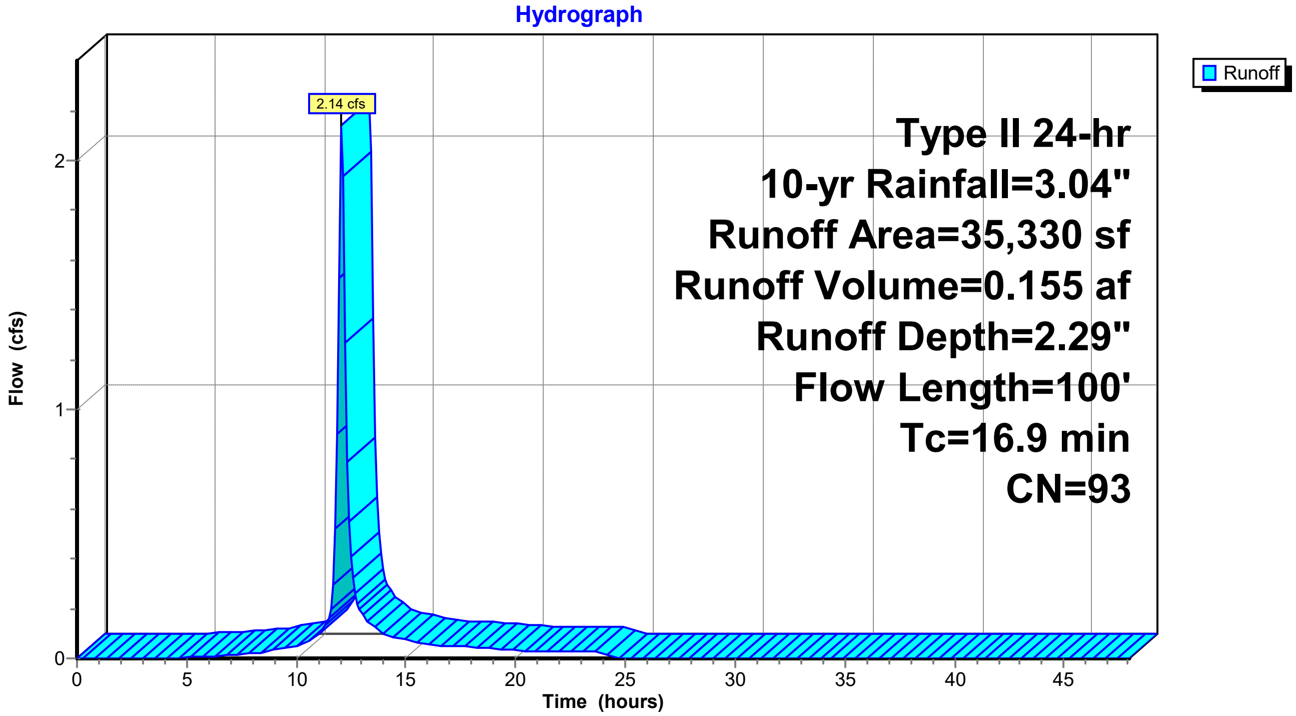
Runoff = 2.14 cfs @ 12.08 hrs, Volume= 0.155 af, Depth= 2.29"
Routed to Pond 26P : CB#26

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
25,120	98	Paved parking, HSG D
10,210	80	>75% Grass cover, Good, HSG D
35,330	93	Weighted Average
10,210		28.90% Pervious Area
25,120		71.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	65	0.0100	0.07		**Sheet Flow, 65' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.6	35	0.0200	0.91		**Sheet Flow, 35' Overland Flow** Smooth surfaces n= 0.011 P2= 2.14"
16.9	100	Total			

Subcatchment 22S: Area to CB#26



Summary for Subcatchment 23S: Area to CB#28

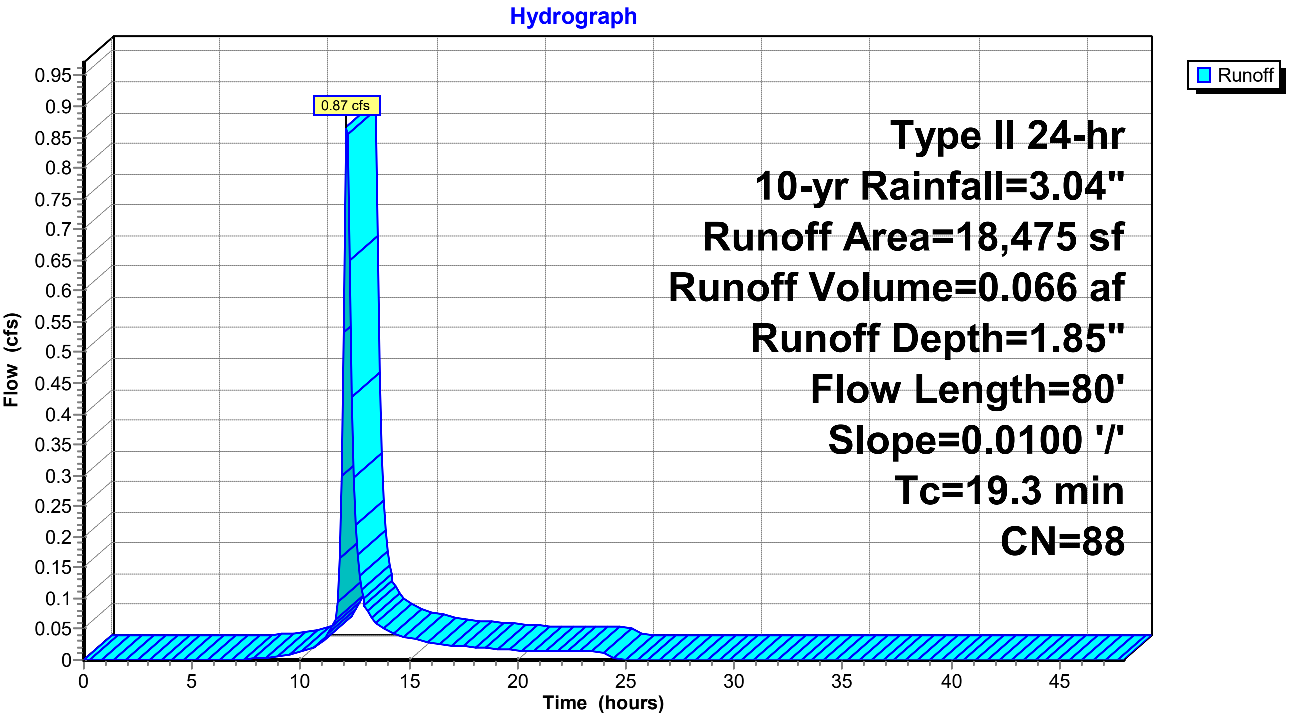
Runoff = 0.87 cfs @ 12.12 hrs, Volume= 0.066 af, Depth= 1.85"
Routed to Pond 28P : CB#28

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
5,755	98	Paved parking, HSG D
2,520	98	Unconnected pavement, HSG D
10,200	80	>75% Grass cover, Good, HSG D
18,475	88	Weighted Average
10,200		55.21% Pervious Area
8,275		44.79% Impervious Area
2,520		30.45% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	80	0.0100	0.07		**Sheet Flow, 80' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"

Subcatchment 23S: Area to CB#28



Summary for Subcatchment 24S: Area to CB#30

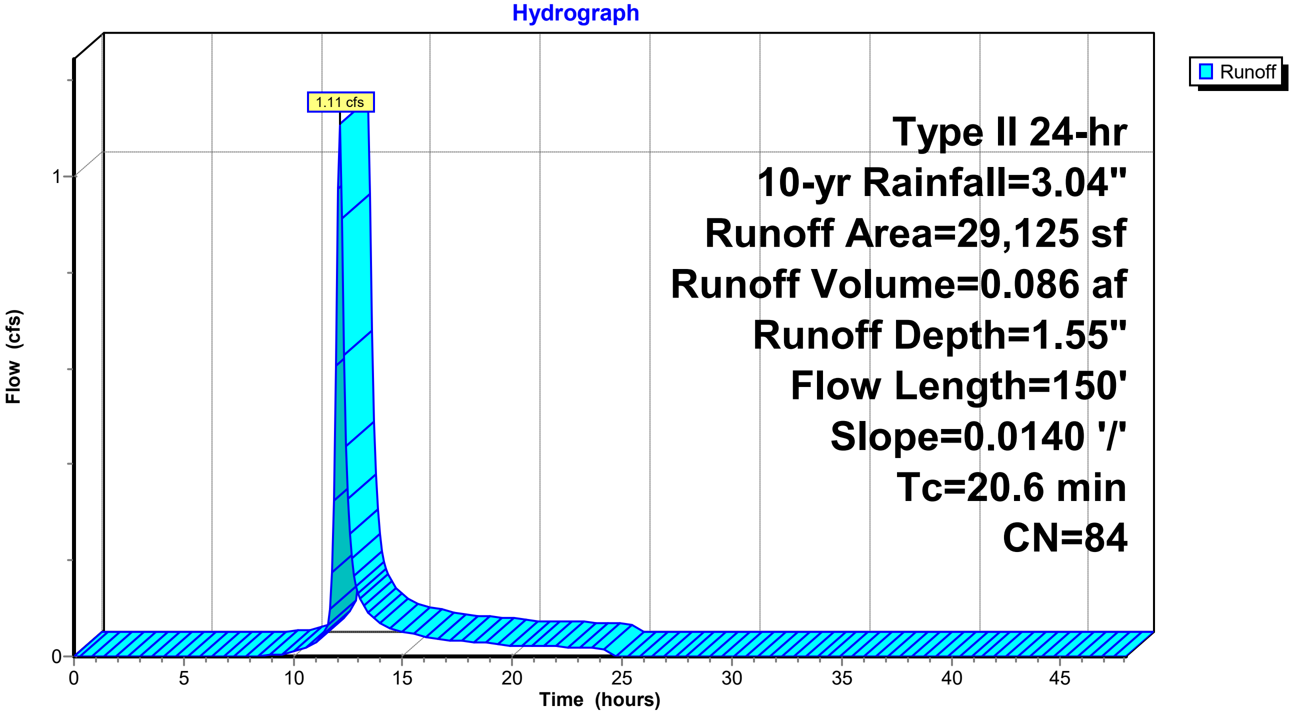
Runoff = 1.11 cfs @ 12.14 hrs, Volume= 0.086 af, Depth= 1.55"
Routed to Pond 30P : CB#30

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
5,920	78	Meadow, non-grazed, HSG D
6,730	98	Paved parking, HSG D
16,475	80	>75% Grass cover, Good, HSG D
29,125	84	Weighted Average
22,395		76.89% Pervious Area
6,730		23.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.1	100	0.0140	0.08		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.5	50	0.0140	1.77		**Shallow Concentrated Flow, 50' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
20.6	150	Total			

Subcatchment 24S: Area to CB#30



Summary for Subcatchment 25S: Area to CB#32

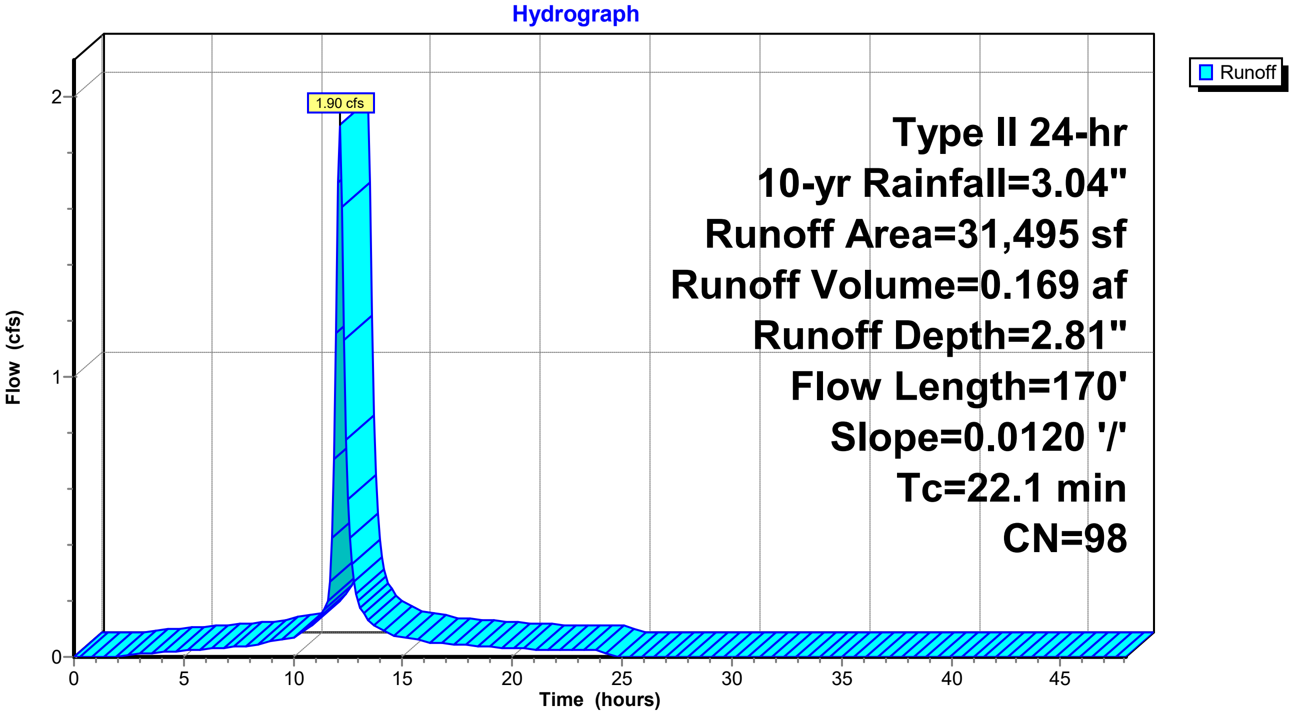
Runoff = 1.90 cfs @ 12.14 hrs, Volume= 0.169 af, Depth= 2.81"
Routed to Pond 32P : CB#32

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
4,960	98	Paved parking, HSG D
26,535	98	Paved parking, HSG D
31,495	98	Weighted Average
31,495		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.4	100	0.0120	0.08		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.7	70	0.0120	1.64		**Shallow Concentrated Flow, 70' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
22.1	170	Total			

Subcatchment 25S: Area to CB#32



Summary for Subcatchment 26S: Area Overland to Western Pretreatment to Bio-Retention Area

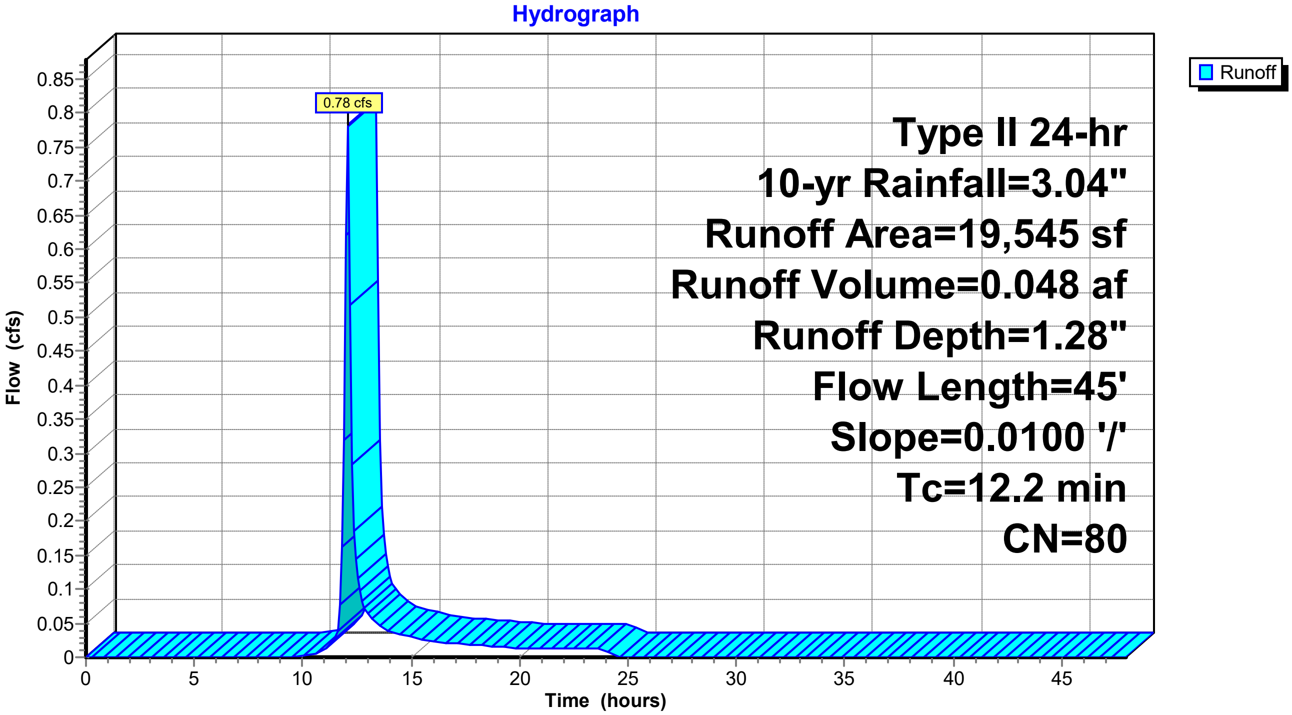
Runoff = 0.78 cfs @ 12.05 hrs, Volume= 0.048 af, Depth= 1.28"
Routed to Pond 53P : West Pre-Treatment to Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
19,545	80	>75% Grass cover, Good, HSG D
19,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	45	0.0100	0.06		**Sheet Flow, 45' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"

Subcatchment 26S: Area Overland to Western Pretreatment to Bio-Retention Area



Summary for Subcatchment 27S: Area Overland to Northern Pretreatment to Bio-Retention Area

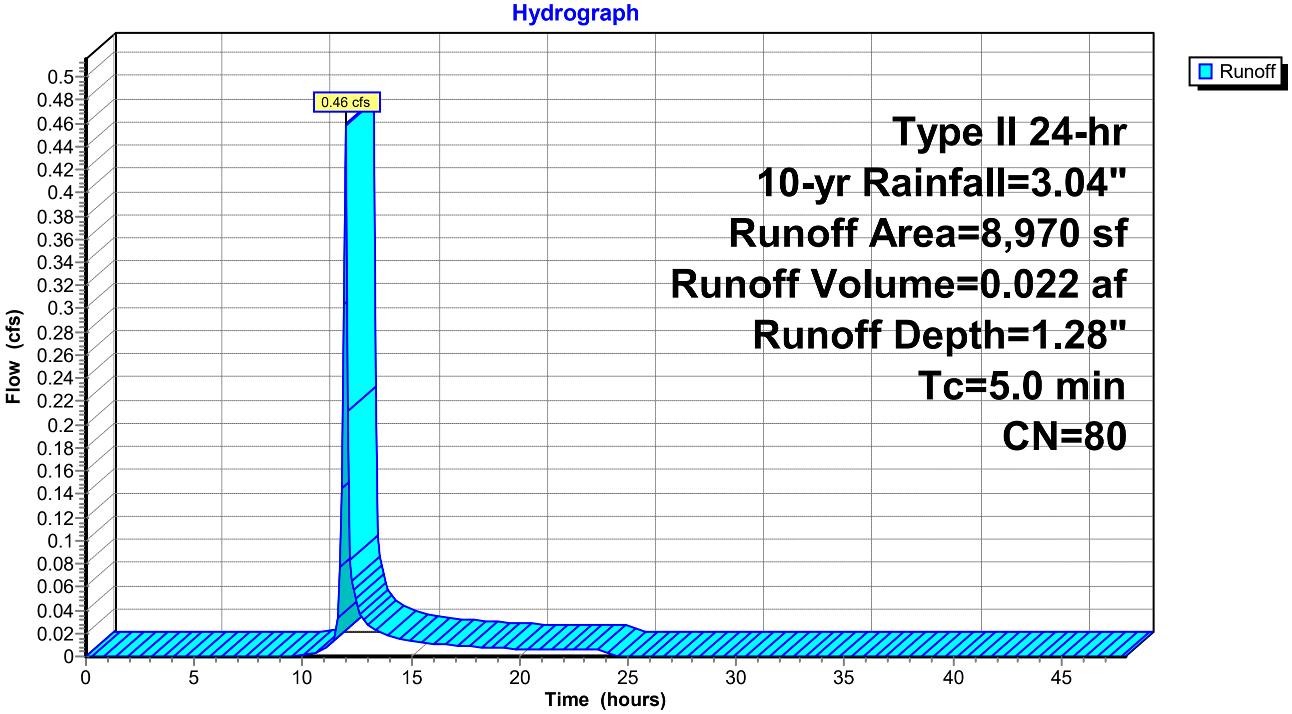
Runoff = 0.46 cfs @ 11.96 hrs, Volume= 0.022 af, Depth= 1.28"
Routed to Pond 55P : North Pre-Treatment to Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
8,970	80	>75% Grass cover, Good, HSG D
8,970		100.00% Pervious Area

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

Subcatchment 27S: Area Overland to Northern Pretreatment to Bio-Retention Area



Summary for Subcatchment 28S: Area Overland to Bio-Retention Area

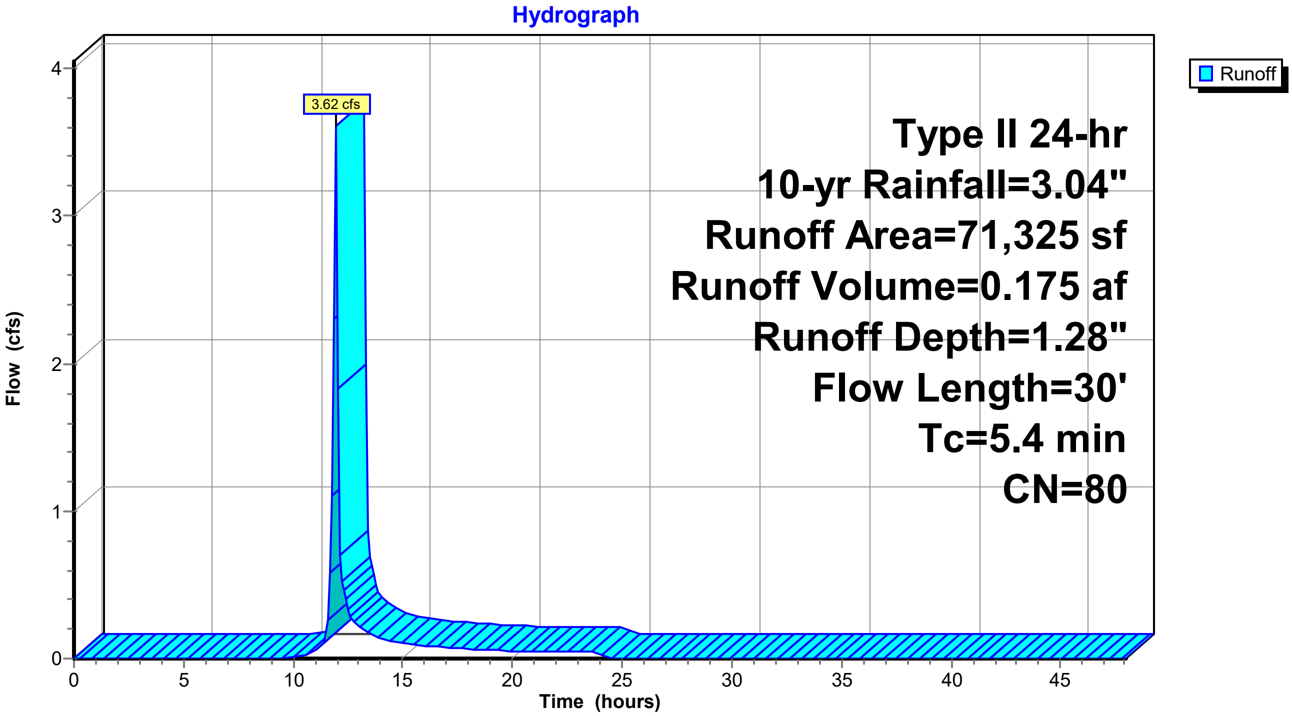
Runoff = 3.62 cfs @ 11.96 hrs, Volume= 0.175 af, Depth= 1.28"
Routed to Pond 34P : Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
71,325	80	>75% Grass cover, Good, HSG D
71,325		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	10	0.0100	0.05		**Sheet Flow, 10' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
1.8	20	0.2500	0.19		**Sheet Flow, 20' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
5.4	30	Total			

Subcatchment 28S: Area Overland to Bio-Retention Area



Summary for Subcatchment 29S: Area Overland to Dry Pond

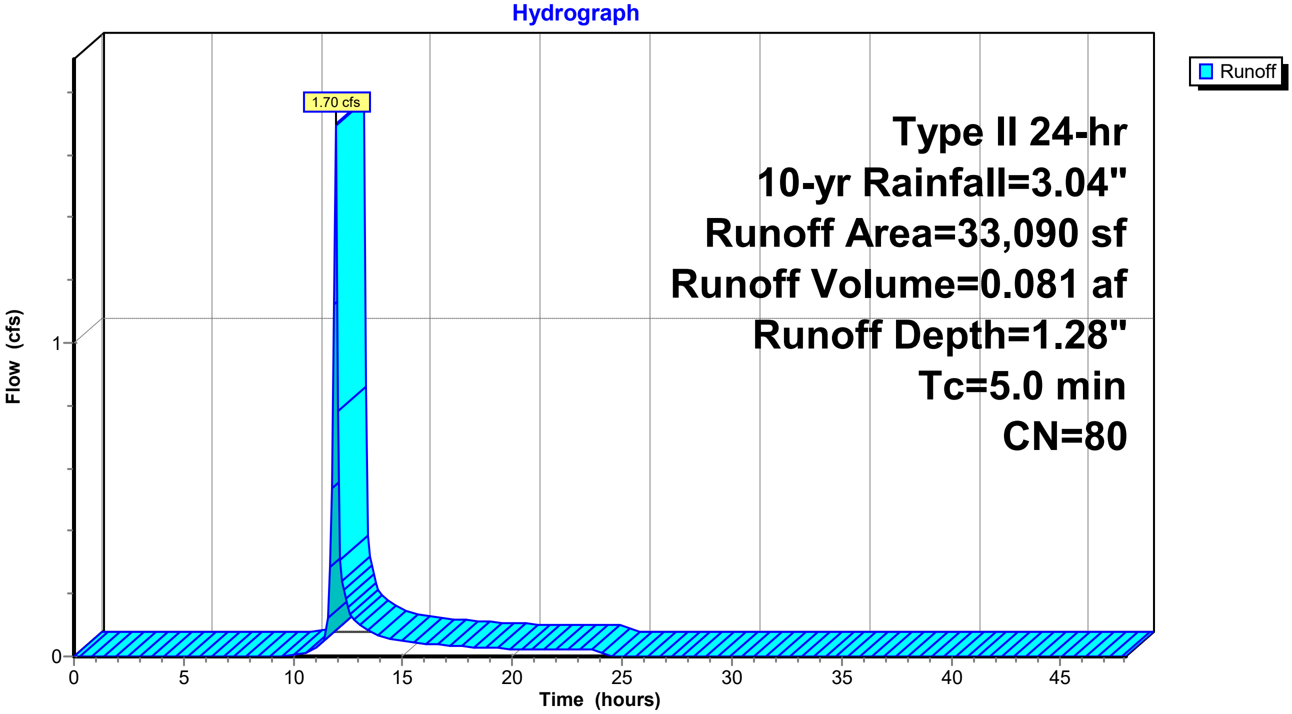
Runoff = 1.70 cfs @ 11.96 hrs, Volume= 0.081 af, Depth= 1.28"
Routed to Pond 35P : Dry Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (sf)	CN	Description
33,090	80	>75% Grass cover, Good, HSG D
33,090		100.00% Pervious Area

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

Subcatchment 29S: Area Overland to Dry Pond



Summary for Subcatchment E-5S: Contributing Watershed from East

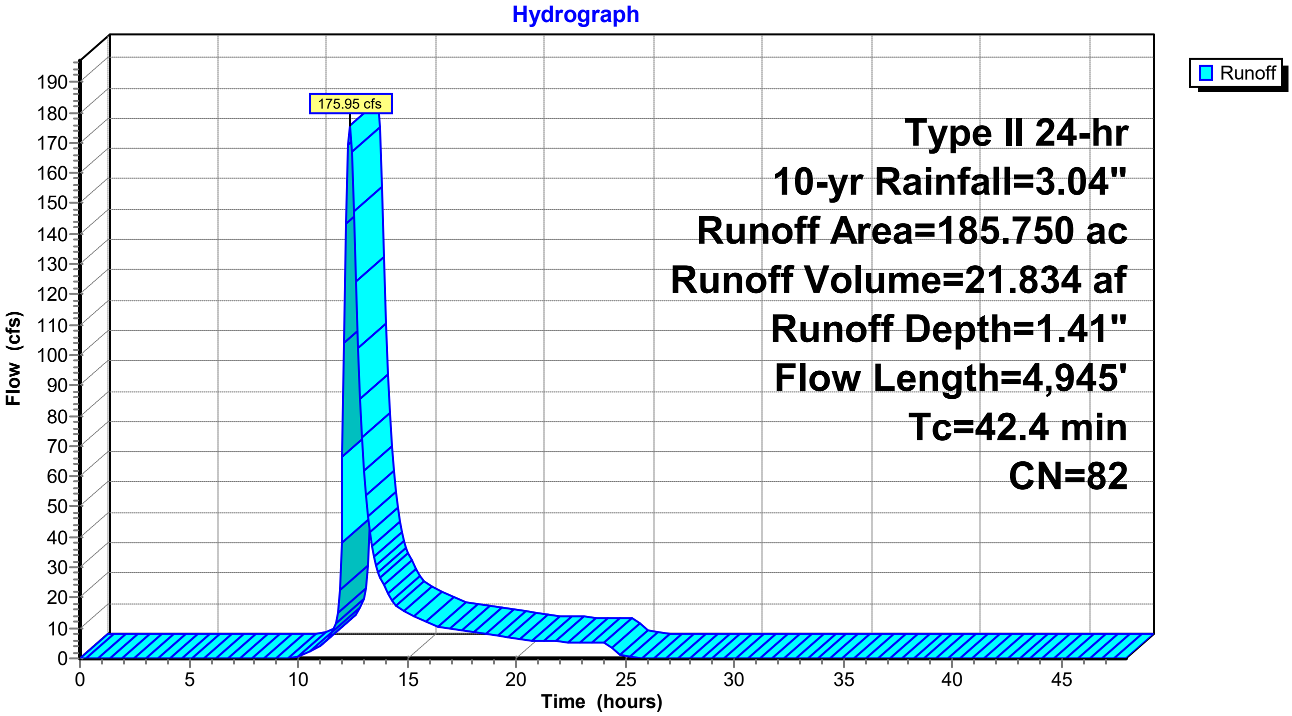
Runoff = 175.95 cfs @ 12.41 hrs, Volume= 21.834 af, Depth= 1.41"
Routed to Reach 5R : North Property Line Ditch (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (ac)	CN	Description
78.660	79	Woods, Fair, HSG D
2.970	98	Water Surface, 0% imp, HSG D
1.050	96	Gravel surface, HSG D
103.070	84	Pasture/grassland/range, Fair, HSG D
185.750	82	Weighted Average
185.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0350	0.16		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
14.2	1,000	0.0170	1.17		**Shallow Concentrated Flow, 1000' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
2.9	750	0.0130	4.31	430.96	**Trap/Vee/Rect Channel Flow, 750 Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.7	670	0.0120	4.14	414.05	**Trap/Vee/Rect Channel Flow, 670' Flow Through Woods** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.4	550	0.0100	3.78	377.98	**Trap/Vee/Rect Channel Flow, 550' Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
9.5	1,800	0.0070	3.16	316.24	**Trap/Vee/Rect Channel Flow, 1,800' Along Crosby Road** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
0.1	75	0.0200	16.02	154.14	**Pipe Channel, Crosby Road Cross Culvert** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
42.4	4,945	Total			

Subcatchment E-5S: Contributing Watershed from East



Summary for Subcatchment E-6S: Contributing Area from North

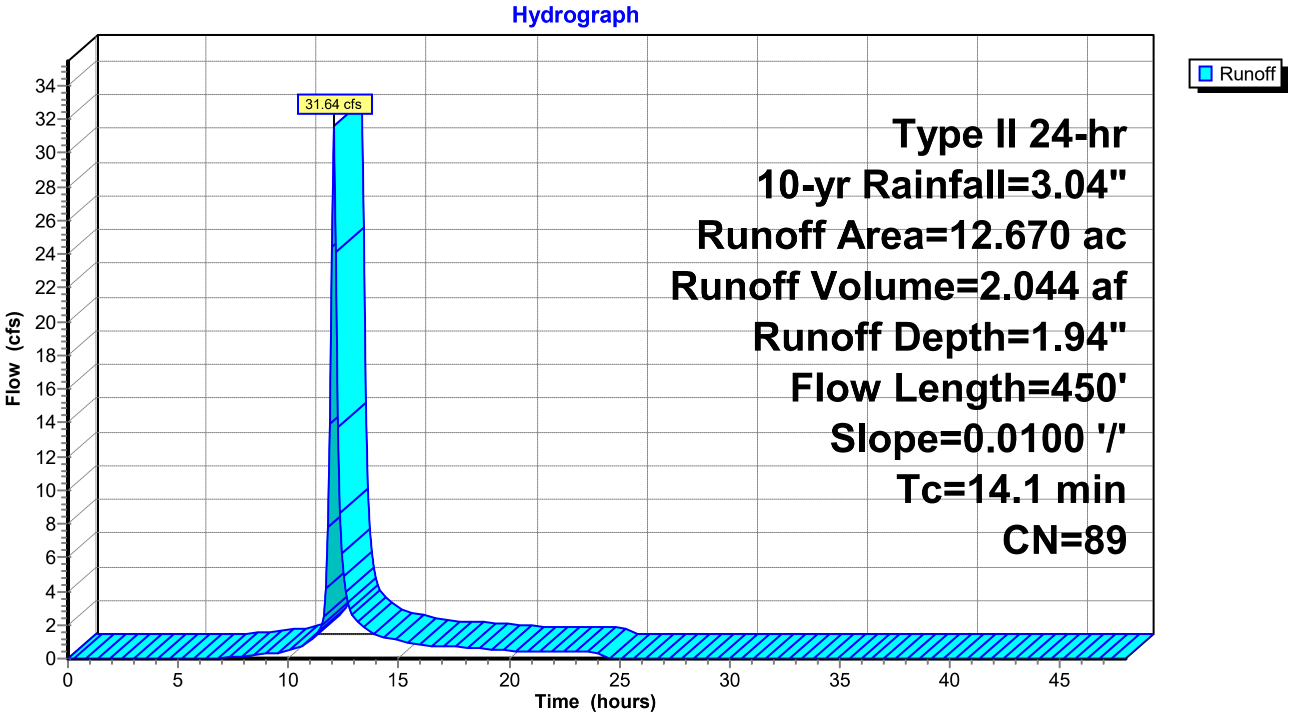
Runoff = 31.64 cfs @ 12.06 hrs, Volume= 2.044 af, Depth= 1.94"
Routed to Reach 5R : North Property Line Ditch (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Type II 24-hr 10-yr Rainfall=3.04"

Area (ac)	CN	Description
12.670	89	Row crops, straight row, Good, HSG D
12.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0100	0.22		**Sheet Flow, 100' Overland Flow** Cultivated: Residue<=20% n= 0.060 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
14.1	450	Total			

Subcatchment E-6S: Contributing Area from North



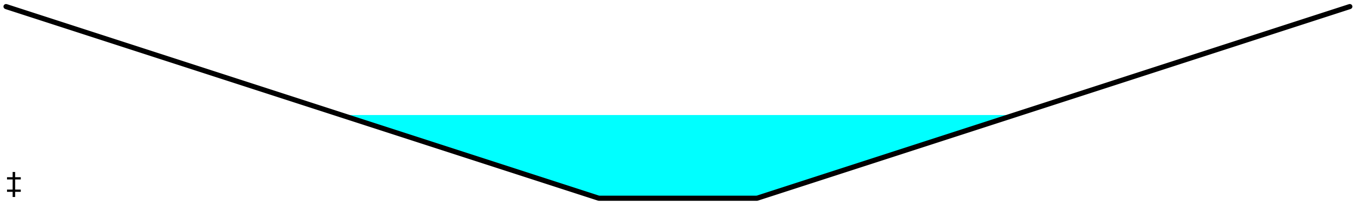
Summary for Reach 1R: Eastern Cut Off Swale

Inflow Area = 6.892 ac, 0.00% Impervious, Inflow Depth = 1.16" for 10-yr event
Inflow = 6.98 cfs @ 12.23 hrs, Volume= 0.665 af
Outflow = 6.46 cfs @ 12.32 hrs, Volume= 0.665 af, Atten= 7%, Lag= 5.0 min
Routed to Reach 2R : Central Cut Off Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Max. Velocity= 1.89 fps, Min. Travel Time= 6.2 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 18.4 min

Peak Storage= 2,394 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.65' , Surface Width= 8.51'
Bank-Full Depth= 1.50' Flow Area= 14.3 sf, Capacity= 43.86 cfs

2.00' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 5.0 '/' Top Width= 17.00'
Length= 700.0' Slope= 0.0050 '/'
Inlet Invert= 673.00', Outlet Invert= 669.50'



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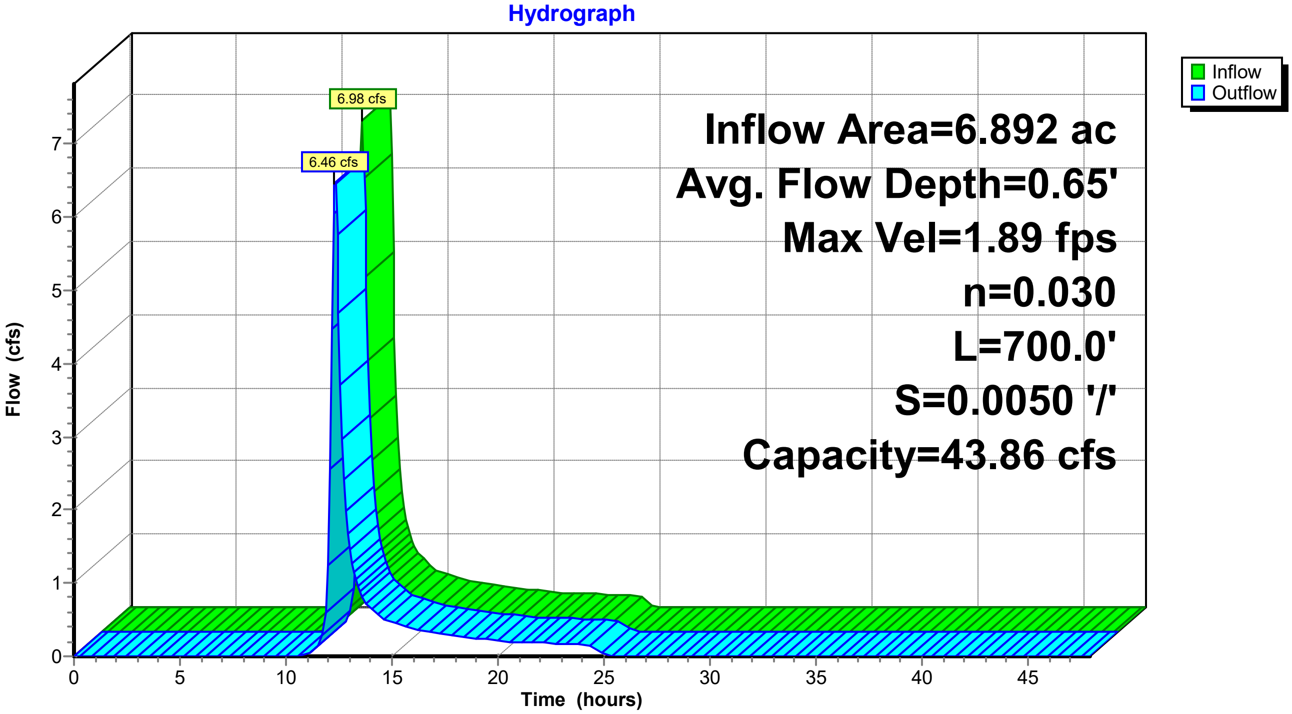
Reach 1R: Eastern Cut Off Swale



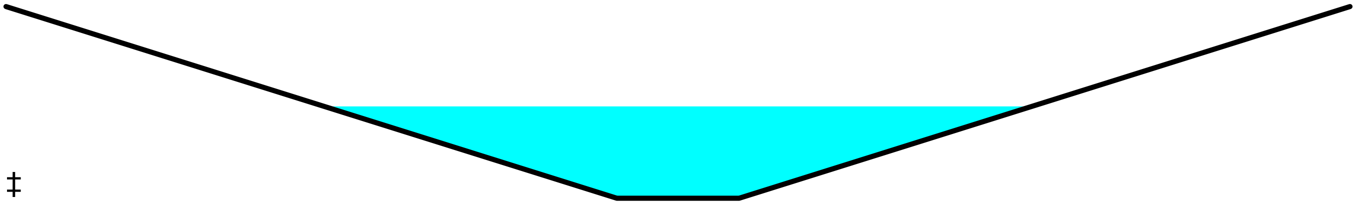
Summary for Reach 2R: Central Cut Off Swale

Inflow Area = 19.349 ac, 0.00% Impervious, Inflow Depth = 1.16" for 10-yr event
Inflow = 15.59 cfs @ 12.37 hrs, Volume= 1.866 af
Outflow = 15.32 cfs @ 12.42 hrs, Volume= 1.866 af, Atten= 2%, Lag= 3.3 min
Routed to Reach 3R : Western Cut Off Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Max. Velocity= 2.36 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 0.84 fps, Avg. Travel Time= 10.0 min

Peak Storage= 3,249 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.96' , Surface Width= 11.57'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 88.03 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 5.0 '/' Top Width= 22.00'
Length= 500.0' Slope= 0.0050 '/'
Inlet Invert= 669.50', Outlet Invert= 667.00'



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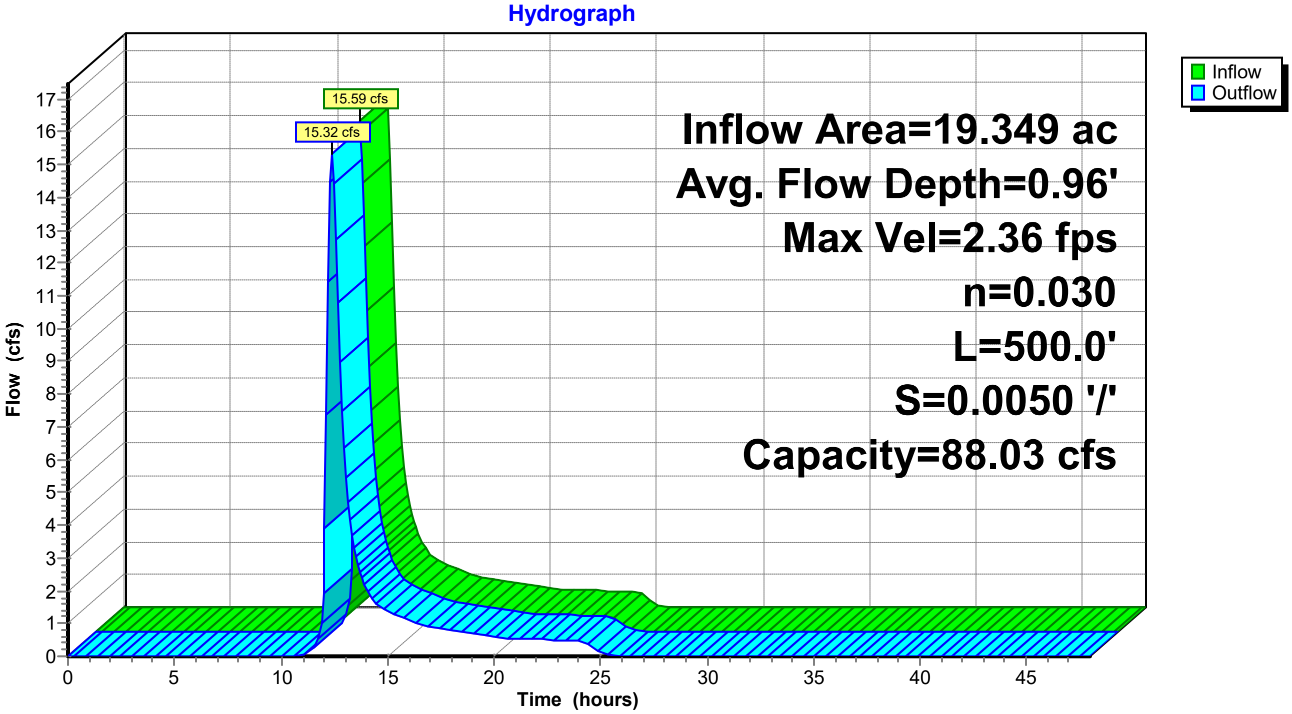
Reach 2R: Central Cut Off Swale



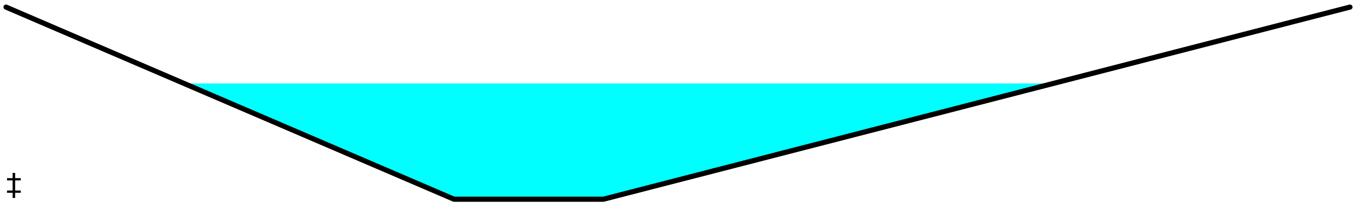
Summary for Reach 3R: Western Cut Off Swale

Inflow Area = 29.272 ac, 0.00% Impervious, Inflow Depth = 1.22" for 10-yr event
Inflow = 22.81 cfs @ 12.45 hrs, Volume= 2.978 af
Outflow = 22.46 cfs @ 12.50 hrs, Volume= 2.978 af, Atten= 1%, Lag= 3.2 min
Routed to Link 1L : West Property Line and Adjacent Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Max. Velocity= 2.73 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 0.93 fps, Avg. Travel Time= 10.7 min

Peak Storage= 4,938 cf @ 12.50 hrs
Average Depth at Peak Storage= 1.21' , Surface Width= 11.65'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 73.73 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 5.0 '/' Top Width= 18.00'
Length= 600.0' Slope= 0.0050 '/'
Inlet Invert= 667.00', Outlet Invert= 664.00'



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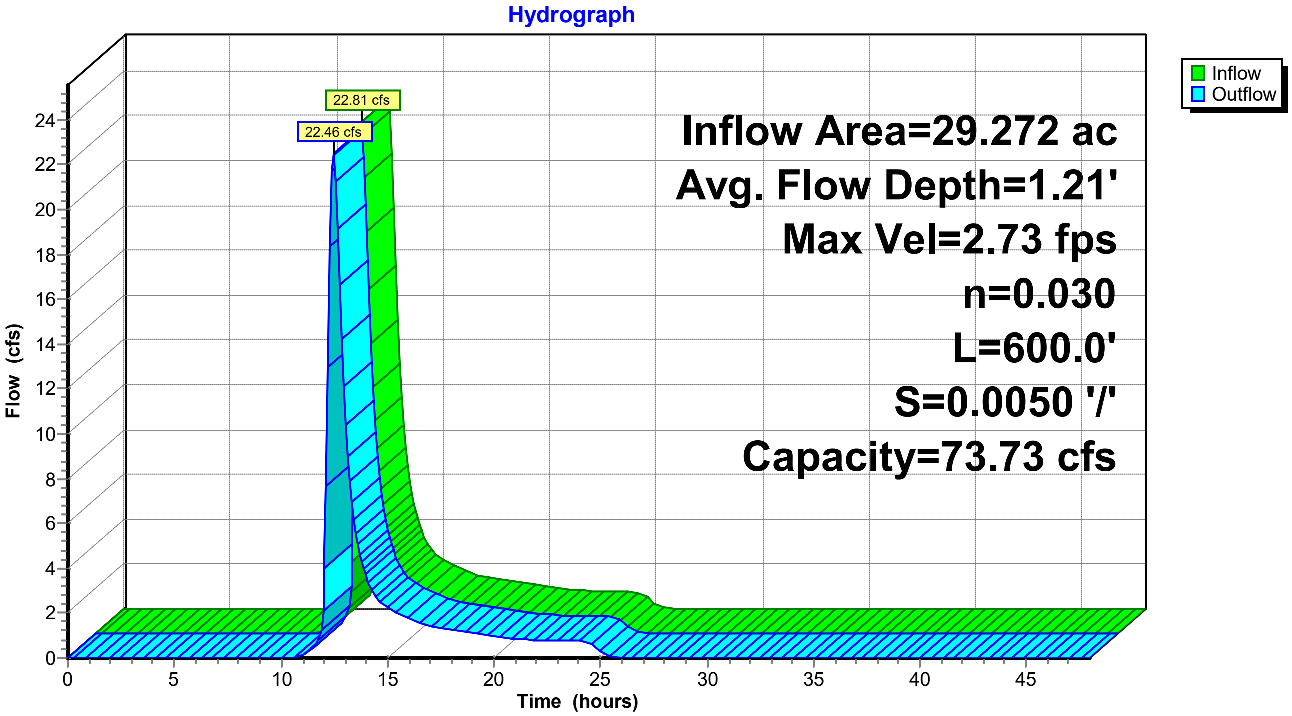
Reach 3R: Western Cut Off Swale



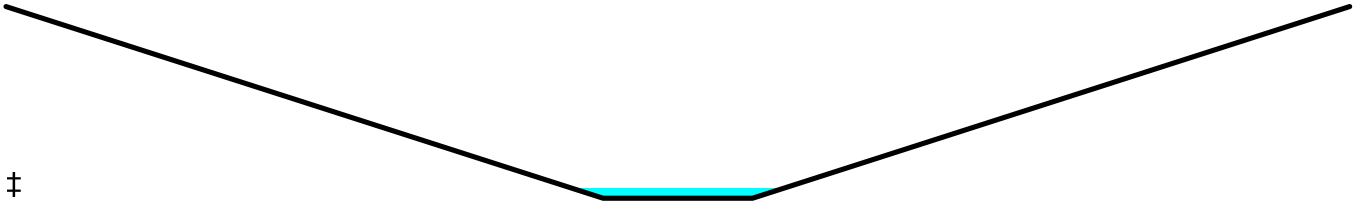
Summary for Reach 4R: Crosby Road Ditch

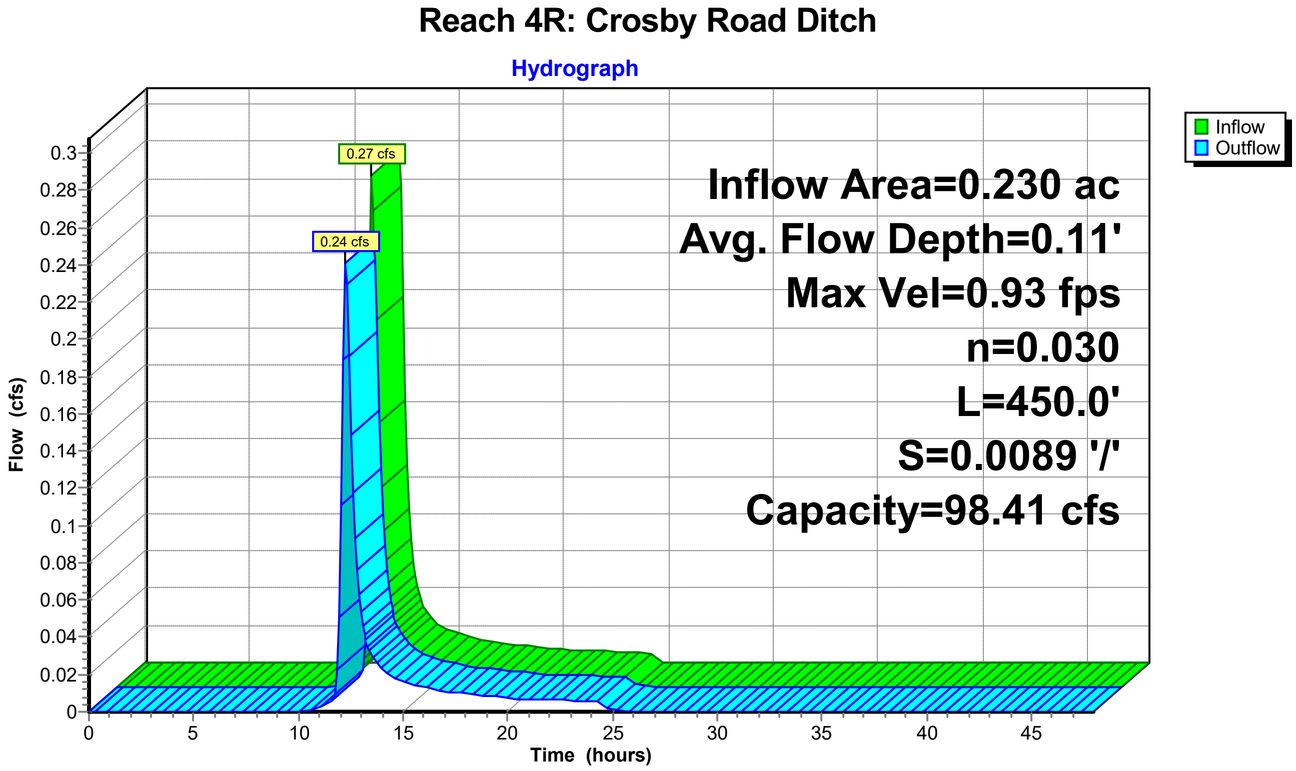
Inflow Area = 0.230 ac, 0.00% Impervious, Inflow Depth = 1.22" for 10-yr event
Inflow = 0.27 cfs @ 12.18 hrs, Volume= 0.023 af
Outflow = 0.24 cfs @ 12.27 hrs, Volume= 0.023 af, Atten= 12%, Lag= 5.7 min
Routed to Reach 5R : North Property Line Ditch (East)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Max. Velocity= 0.93 fps, Min. Travel Time= 8.0 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 20.0 min

Peak Storage= 116 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 2.85'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 98.41 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 450.0' Slope= 0.0089 '/'
Inlet Invert= 673.00', Outlet Invert= 669.00'





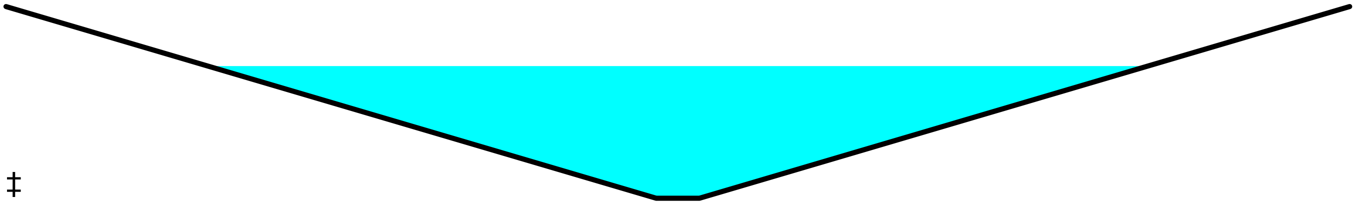
Summary for Reach 5R: North Property Line Ditch (East)

Inflow Area = 199.744 ac, 0.00% Impervious, Inflow Depth = 1.44" for 10-yr event
Inflow = 182.96 cfs @ 12.40 hrs, Volume= 24.002 af
Outflow = 181.99 cfs @ 12.44 hrs, Volume= 24.002 af, Atten= 1%, Lag= 2.3 min
Routed to Reach 6R : North Property Line Ditch (Central)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Max. Velocity= 3.87 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 1.39 fps, Avg. Travel Time= 8.0 min

Peak Storage= 31,509 cf @ 12.44 hrs
Average Depth at Peak Storage= 2.07' , Surface Width= 43.42'
Bank-Full Depth= 3.00' Flow Area= 96.0 sf, Capacity= 471.44 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 62.00'
Length= 670.0' Slope= 0.0055 '/'
Inlet Invert= 666.00', Outlet Invert= 662.30'



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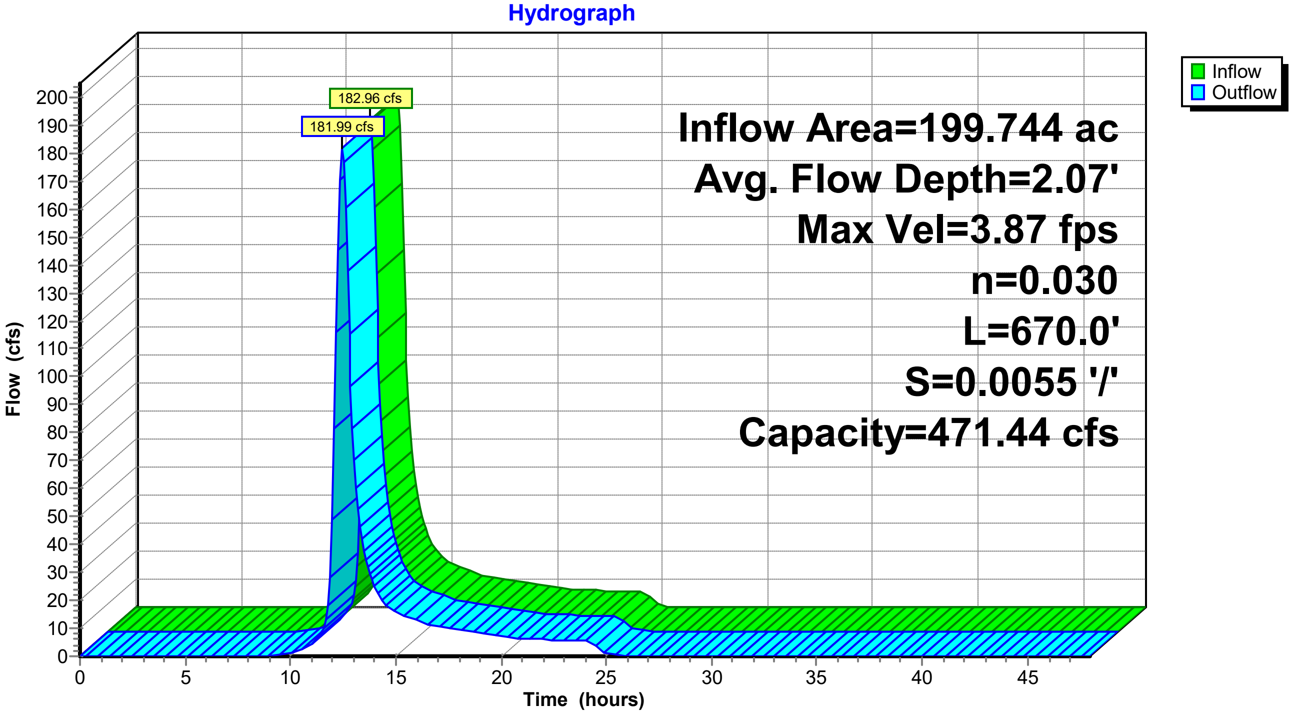
Reach 5R: North Property Line Ditch (East)



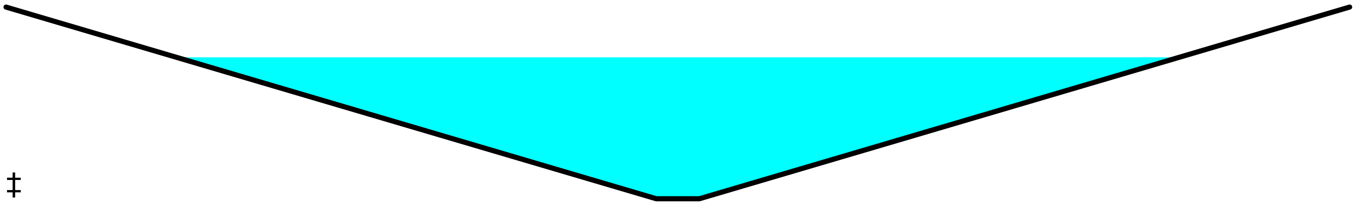
Summary for Reach 6R: North Property Line Ditch (Central)

Inflow Area = 201.045 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr event
Inflow = 183.70 cfs @ 12.43 hrs, Volume= 24.447 af
Outflow = 183.10 cfs @ 12.46 hrs, Volume= 24.447 af, Atten= 0%, Lag= 1.8 min
Routed to Reach 7R : North Property Line Ditch (West)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Max. Velocity= 3.43 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 0.85 fps, Avg. Travel Time= 9.8 min

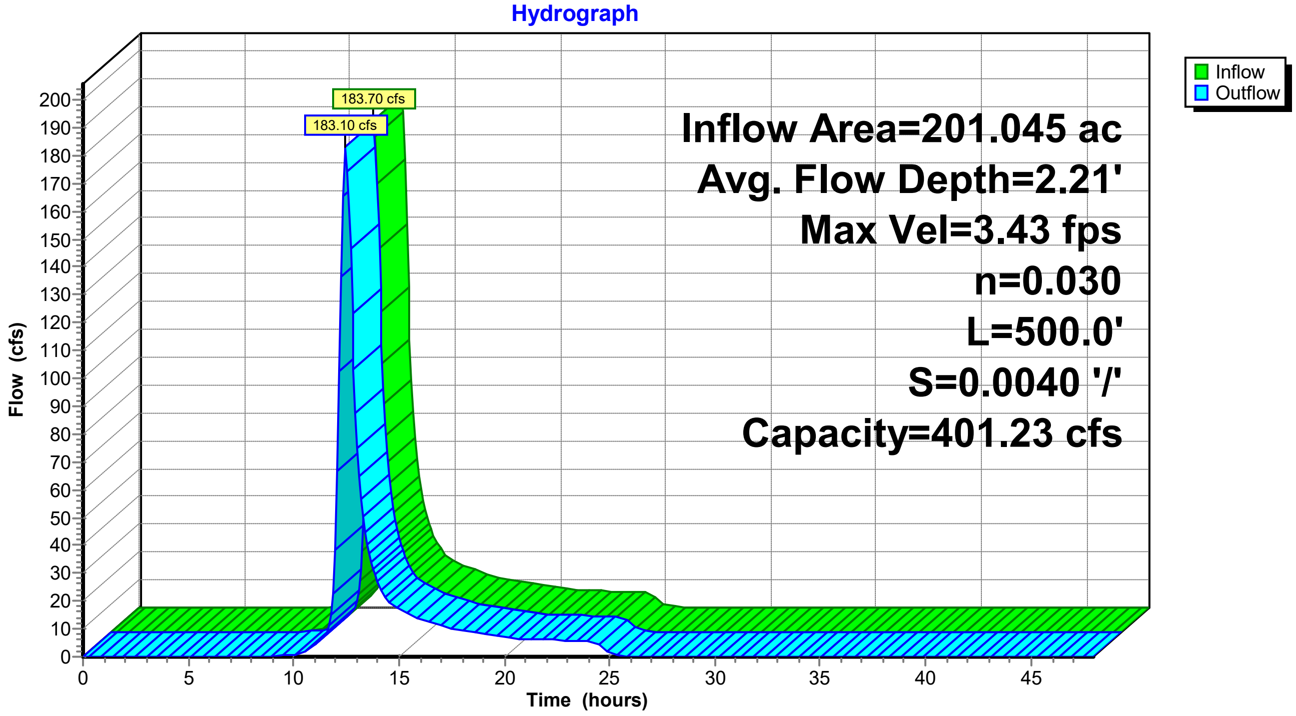
Peak Storage= 26,658 cf @ 12.46 hrs
Average Depth at Peak Storage= 2.21' , Surface Width= 46.23'
Bank-Full Depth= 3.00' Flow Area= 96.0 sf, Capacity= 401.23 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 62.00'
Length= 500.0' Slope= 0.0040 '/'
Inlet Invert= 662.30', Outlet Invert= 660.30'



‡

Reach 6R: North Property Line Ditch (Central)



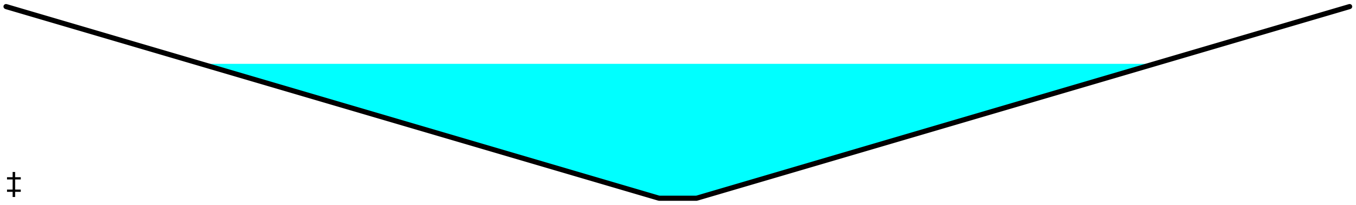
Summary for Reach 7R: North Property Line Ditch (West)

Inflow Area = 225.583 ac, 5.55% Impervious, Inflow Depth > 1.43" for 10-yr event
Inflow = 186.92 cfs @ 12.45 hrs, Volume= 26.868 af
Outflow = 185.59 cfs @ 12.49 hrs, Volume= 26.865 af, Atten= 1%, Lag= 2.3 min
Routed to Link 3L : Ditch at Northwest Corner of Site Discharging to Adjacent Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Max. Velocity= 2.84 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 10.9 min

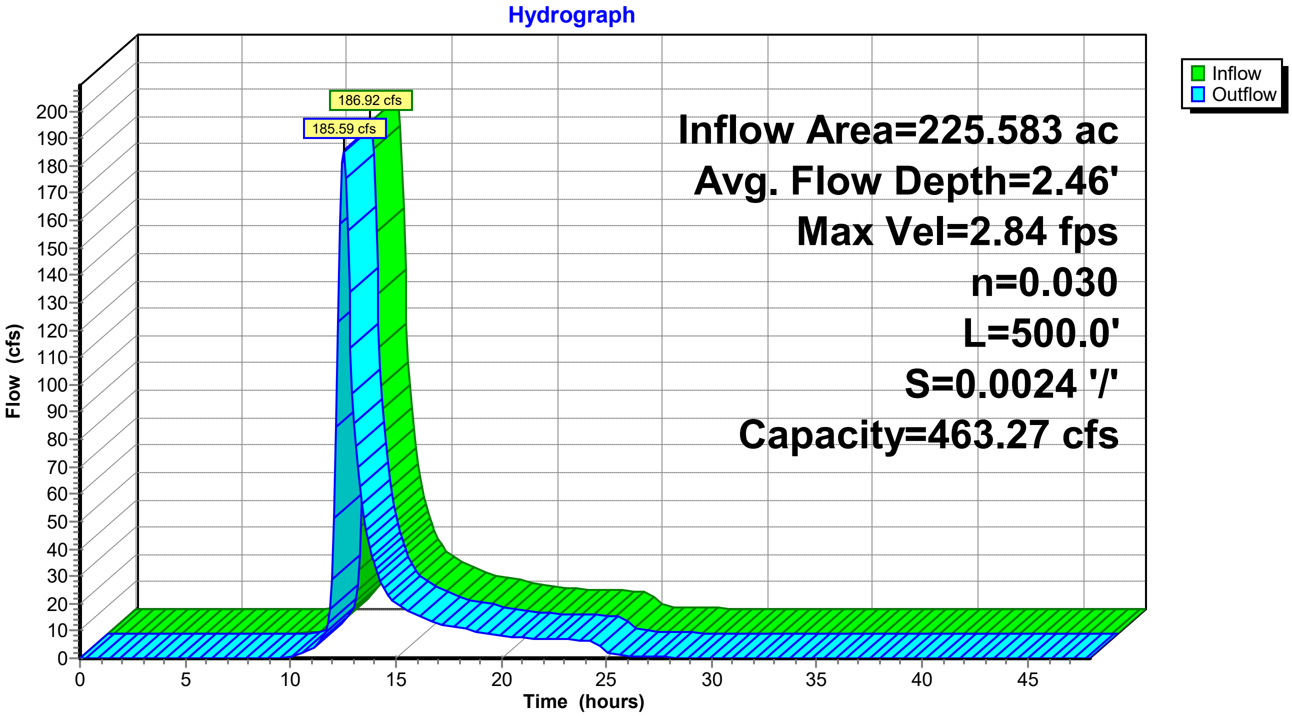
Peak Storage= 32,610 cf @ 12.49 hrs
Average Depth at Peak Storage= 2.46' , Surface Width= 51.12'
Bank-Full Depth= 3.50' Flow Area= 129.5 sf, Capacity= 463.27 cfs

2.00' x 3.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 72.00'
Length= 500.0' Slope= 0.0024 '/'
Inlet Invert= 660.30', Outlet Invert= 659.10'



‡

Reach 7R: North Property Line Ditch (West)



Summary for Reach 8R: Western Overflow Swale

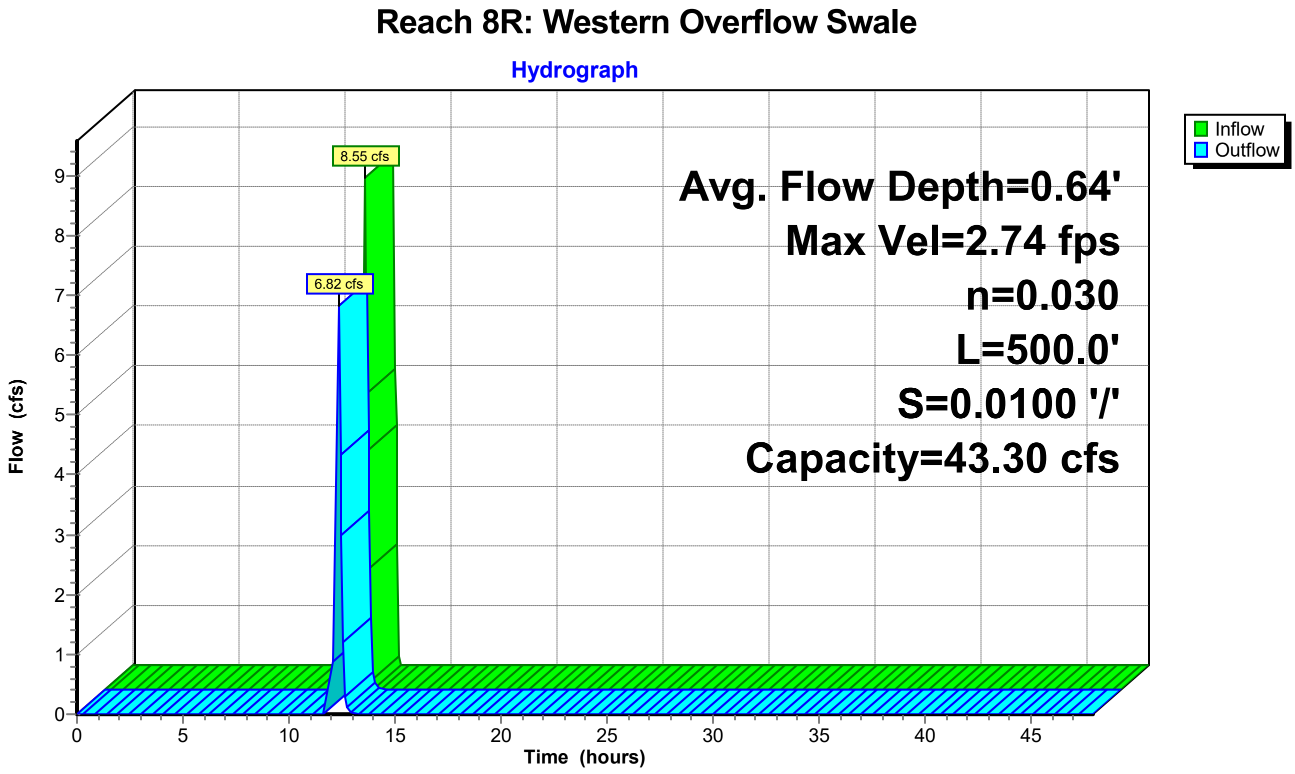
Inflow = 8.55 cfs @ 12.26 hrs, Volume= 0.145 af
Outflow = 6.82 cfs @ 12.34 hrs, Volume= 0.145 af, Atten= 20%, Lag= 4.6 min
Routed to Reach 7R : North Property Line Ditch (West)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Max. Velocity= 2.74 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 0.58 fps, Avg. Travel Time= 14.3 min

Peak Storage= 1,242 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.64' , Surface Width= 5.82'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 43.30 cfs

2.00' x 1.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 500.0' Slope= 0.0100 '/'
Inlet Invert= 665.00', Outlet Invert= 660.00'

‡



Summary for Pond 1P: CB#1

Inflow Area =	0.442 ac,	67.06% Impervious,	Inflow Depth = 2.20"	for 10-yr event	
Inflow =	1.27 cfs @	12.04 hrs,	Volume=	0.081 af	
Outflow =	1.27 cfs @	12.04 hrs,	Volume=	0.081 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.27 cfs @	12.04 hrs,	Volume=	0.081 af	

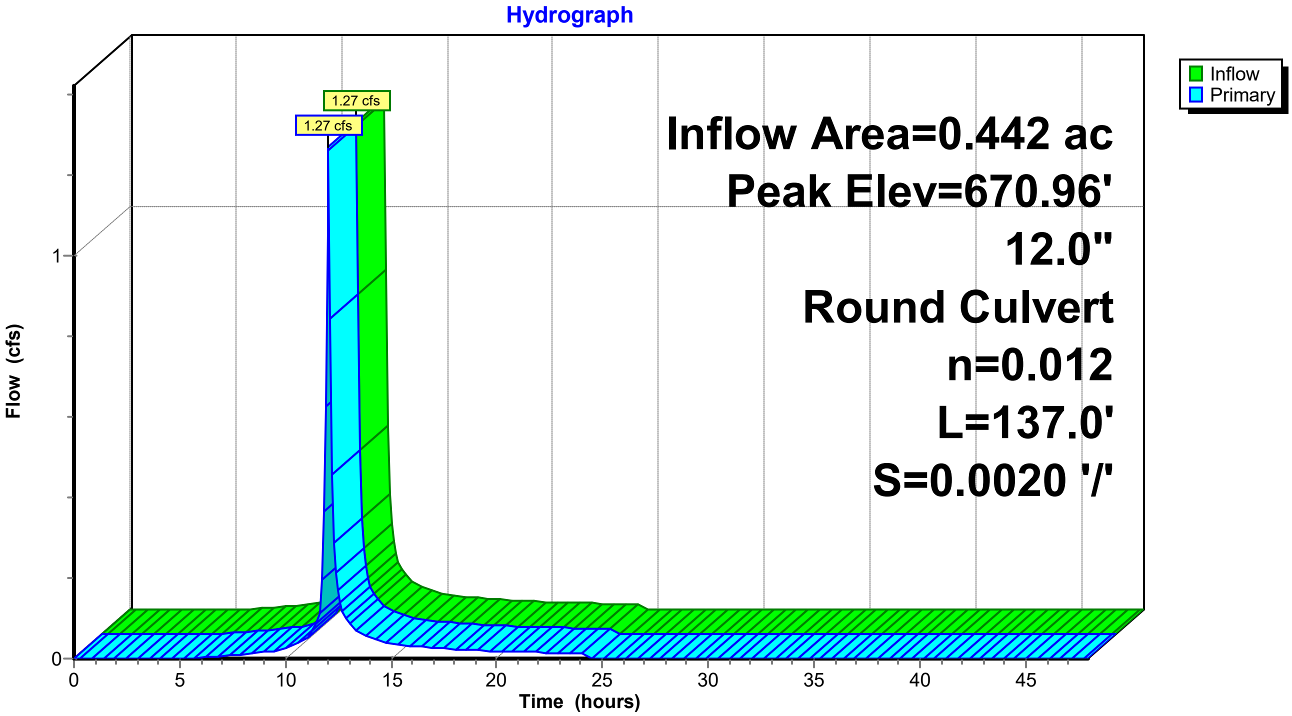
Routed to Pond 3P : CB#3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 670.96' @ 12.04 hrs
Flood Elev= 672.65'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.15'	**12.0" Round Culvert** L= 137.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.15' / 669.88' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.23 cfs @ 12.04 hrs HW=670.94' TW=669.99' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 1.23 cfs @ 2.53 fps)

Pond 1P: CB#1



Summary for Pond 3P: CB#3

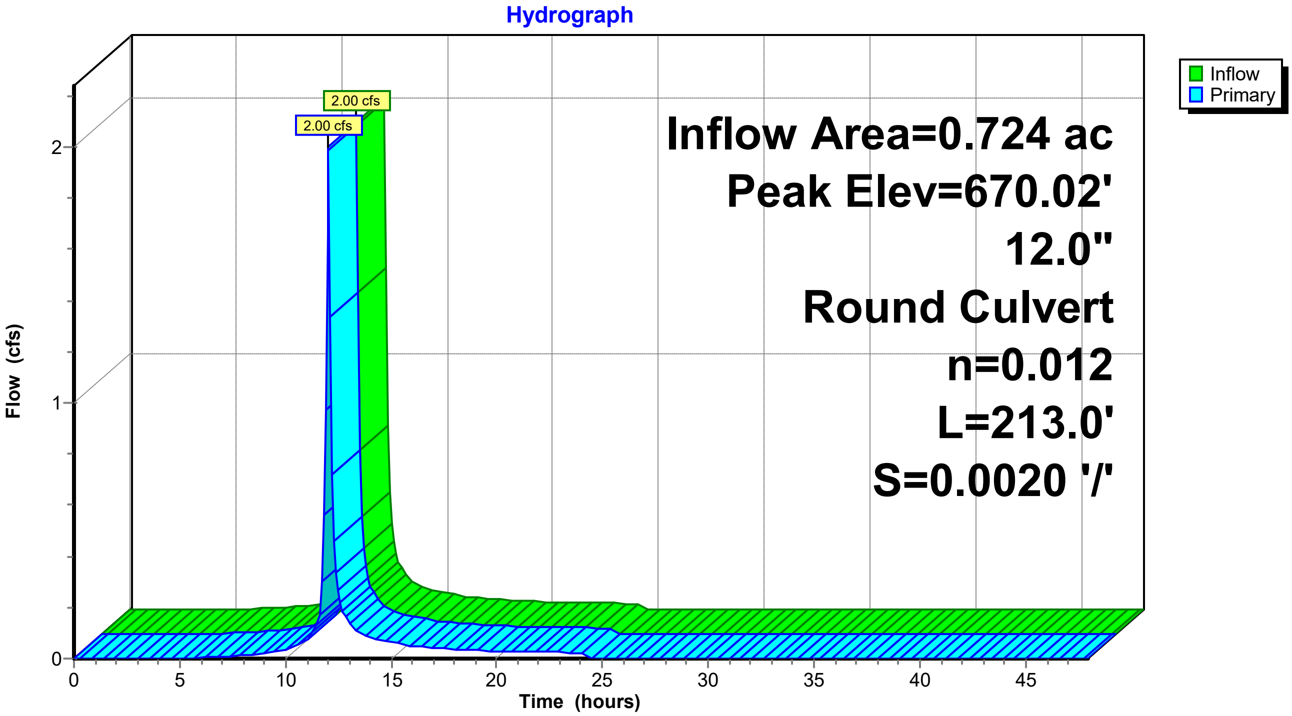
Inflow Area = 0.724 ac, 59.47% Impervious, Inflow Depth = 2.10" for 10-yr event
Inflow = 2.00 cfs @ 12.05 hrs, Volume= 0.127 af
Outflow = 2.00 cfs @ 12.05 hrs, Volume= 0.127 af, Atten= 0%, Lag= 0.0 min
Primary = 2.00 cfs @ 12.05 hrs, Volume= 0.127 af
Routed to Pond 5P : CB#5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 670.02' @ 12.05 hrs
Flood Elev= 672.65'

Device	Routing	Invert	Outlet Devices
#1	Primary	668.88'	**12.0" Round Culvert** L= 213.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 668.88' / 668.45' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.94 cfs @ 12.05 hrs HW=669.99' TW=668.04' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 1.94 cfs @ 2.78 fps)

Pond 3P: CB#3



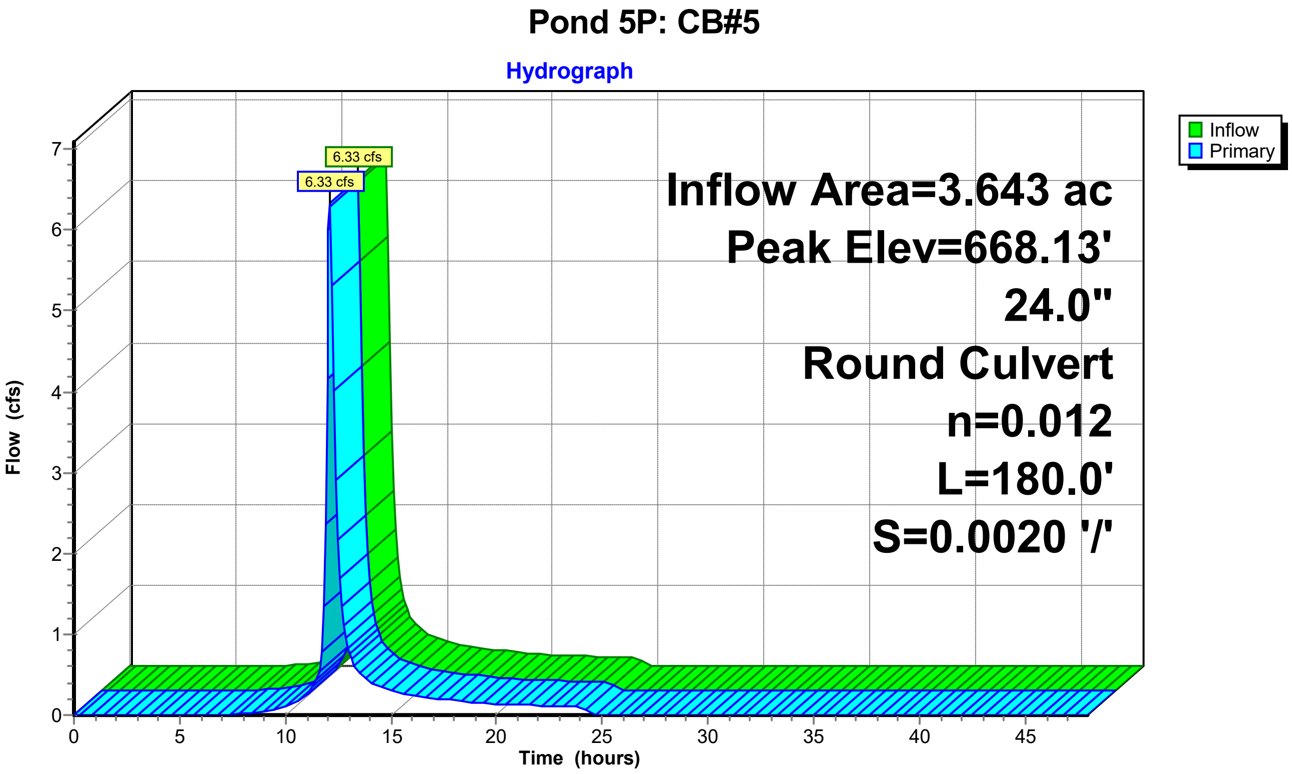
Summary for Pond 5P: CB#5

```
Inflow Area =       3.643 ac, 40.89% Impervious,  Inflow Depth =  1.81"   for  10-yr event
Inflow      =      6.33 cfs @  12.12 hrs,  Volume=         0.550 af
Outflow     =      6.33 cfs @  12.12 hrs,  Volume=         0.550 af,  Atten= 0%,  Lag= 0.0 min
Primary     =      6.33 cfs @  12.12 hrs,  Volume=         0.550 af
   Routed to Pond 33P : Subsurface Detention within Gravel Area
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 668.13' @ 12.12 hrs
Flood Elev= 670.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	666.71'	**24.0" Round Culvert** L= 180.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 666.71' / 666.35' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=6.20 cfs @ 12.12 hrs HW=668.11' TW=666.59' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 6.20 cfs @ 3.71 fps)



Summary for Pond 6P: YD#6

```
Inflow Area =        1.739 ac,  32.52% Impervious,  Inflow Depth =   1.70"    for  10-yr event
Inflow      =       2.82 cfs @  12.19 hrs,  Volume=          0.246 af
Outflow     =       2.82 cfs @  12.19 hrs,  Volume=          0.246 af,  Atten= 0%,  Lag= 0.0 min
Primary     =       2.82 cfs @  12.19 hrs,  Volume=          0.246 af
    Routed to Pond 8P : YD#8
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 668.80' @ 12.25 hrs Surf.Area= 1 sf Storage= 1 cf
Flood Elev= 669.95' Surf.Area= 10,725 sf Storage= 3,815 cf

Plug-Flow detention time= 0.0 min calculated for 0.245 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (839.6 - 839.6)

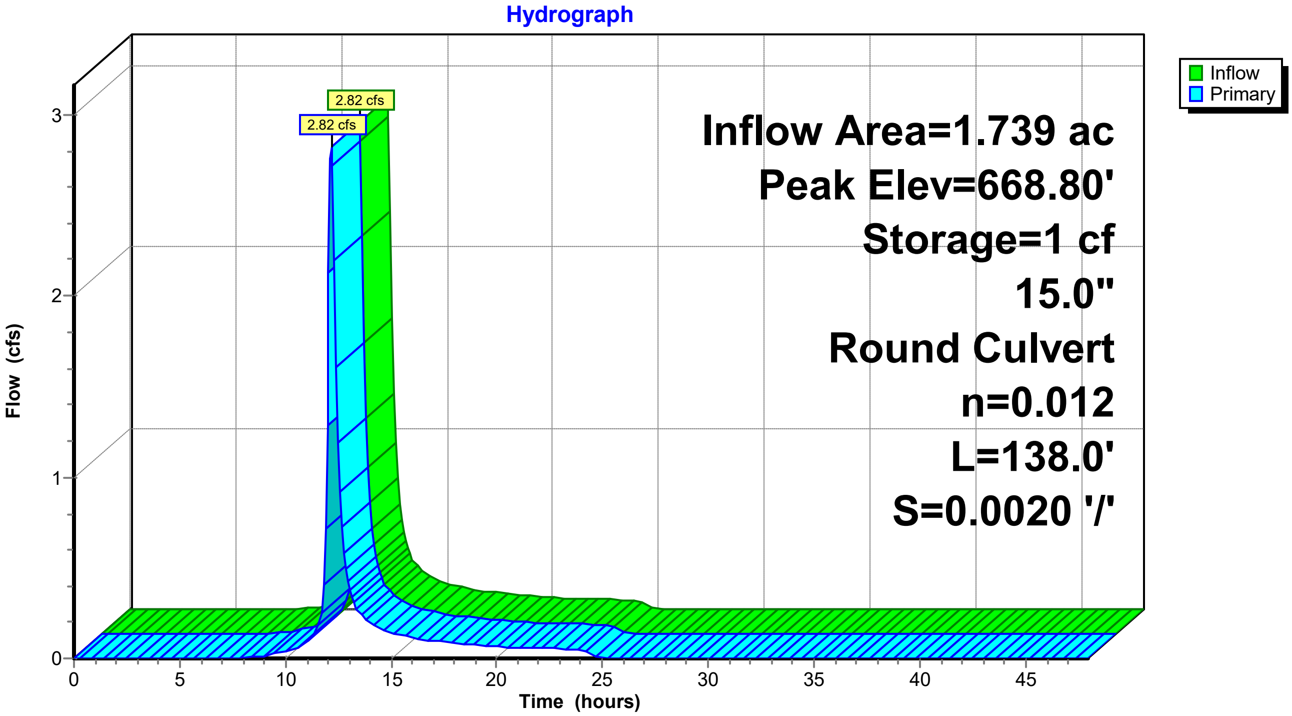
Volume	Invert	Avail.Storage	Storage Description
#1	667.37'	3,815 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
667.37	1	0	0
669.25	1	2	2
669.70	7,065	1,590	1,592
669.95	10,725	2,224	3,815

Device	Routing	Invert	Outlet Devices
#1	Primary	667.37'	**15.0" Round Culvert** L= 138.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 667.37' / 667.09' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=2.17 cfs @ 12.19 hrs HW=668.70' TW=668.47' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 2.17 cfs @ 2.06 fps)

Pond 6P: YD#6


Hydrograph
2.82 cfs
2.82 cfs
Inflow
Primary
Inflow Area=1.739 ac
Peak Elev=668.80'
Storage=1 cf
15.0"
Round Culvert
n=0.012
L=138.0'
S=0.0020 '/'
Flow (cfs)
0
1
2
3
Time (hours)
0
5
10
15
20
25
30
35
40
45

Summary for Pond 8P: YD#8

```
Inflow Area =         2.497 ac, 34.48% Impervious, Inflow Depth =   1.72"    for  10-yr event
Inflow      =        4.16 cfs @   12.18 hrs,  Volume=          0.358 af
Outflow     =        4.16 cfs @   12.18 hrs,  Volume=          0.358 af,  Atten= 0%,  Lag= 0.0 min
Primary     =        4.16 cfs @   12.18 hrs,  Volume=          0.358 af
    Routed to Pond 5P : CB#5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 668.49' @ 12.20 hrs   Surf.Area= 1 sf   Storage= 2 cf
Flood Elev= 669.90'   Surf.Area= 8,385 sf   Storage= 3,357 cf

Plug-Flow detention time= 0.0 min calculated for 0.357 af (100% of inflow)
Center-of-Mass det. time= 0.0 min ( 837.9 - 837.9 )

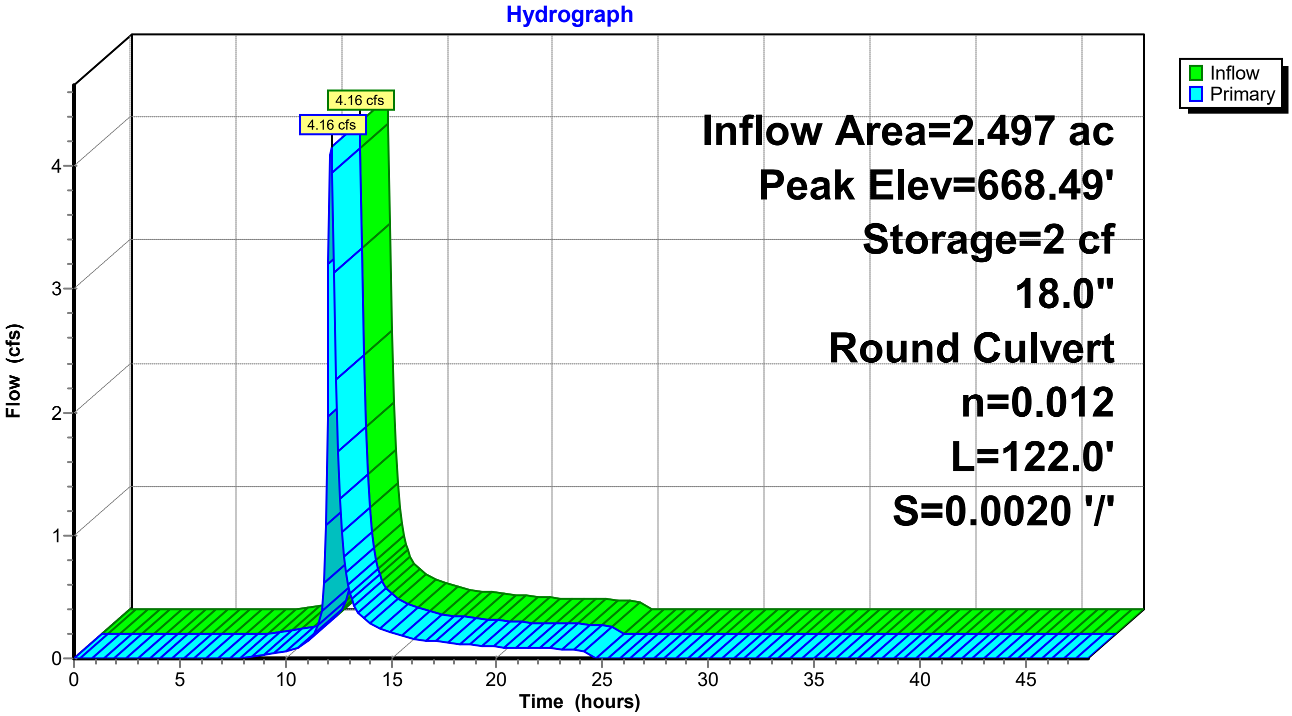
Volume        Invert     Avail.Storage   Storage Description
   #1         666.95'         3,357 cf   Custom Stage Data (Prismatic) Listed below (Recalc)

 Elevation          Surf.Area          Inc.Store          Cum.Store
    (feet)             (sq-ft)        (cubic-feet)       (cubic-feet)
    666.95                   1                   0                  0
    669.10                   1                   2                  2
    669.90               8,385               3,354              3,357

Device   Routing             Invert   Outlet Devices
   #1    Primary            666.95'   18.0"  Round Culvert
                                      L= 122.0'   CPP, square edge headwall,  Ke= 0.500
                                      Inlet / Outlet Invert= 666.95' / 666.71'   S= 0.0020 '/'   Cc= 0.900
                                      n= 0.012,  Flow Area= 1.77 sf

Primary OutFlow  Max=4.17 cfs @ 12.18 hrs  HW=668.47'  TW=668.08'   (Dynamic Tailwater)
└─1=Culvert  (Outlet Controls 4.17 cfs @ 2.90 fps)
```

Pond 8P: YD#8


Hydrograph
4.16 cfs
4.16 cfs
Inflow
Primary
Inflow Area=2.497 ac
Peak Elev=668.49'
Storage=2 cf
18.0"
Round Culvert
n=0.012
L=122.0'
S=0.0020 '/'
Flow (cfs)
0
1
2
3
4
0
5
10
15
20
25
30
35
40
45
Time (hours)

Summary for Pond 11P: YD#11

```
Inflow Area =        0.851 ac, 56.59% Impervious, Inflow Depth =  2.02"   for 10-yr event
Inflow      =        1.99 cfs @  12.09 hrs, Volume=          0.143 af
Outflow     =        1.99 cfs @  12.09 hrs, Volume=          0.143 af, Atten= 0%, Lag= 0.0 min
Primary     =        1.99 cfs @  12.09 hrs, Volume=          0.143 af
    Routed to Pond 15P : CB#15

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 668.23' @ 12.21 hrs  Surf.Area= 1 sf  Storage= 1 cf
Flood Elev= 669.70'  Surf.Area= 3,725 sf  Storage= 1,027 cf

Plug-Flow detention time= 0.0 min calculated for 0.143 af (100% of inflow)
Center-of-Mass det. time= 0.0 min ( 816.3 - 816.3 )
```

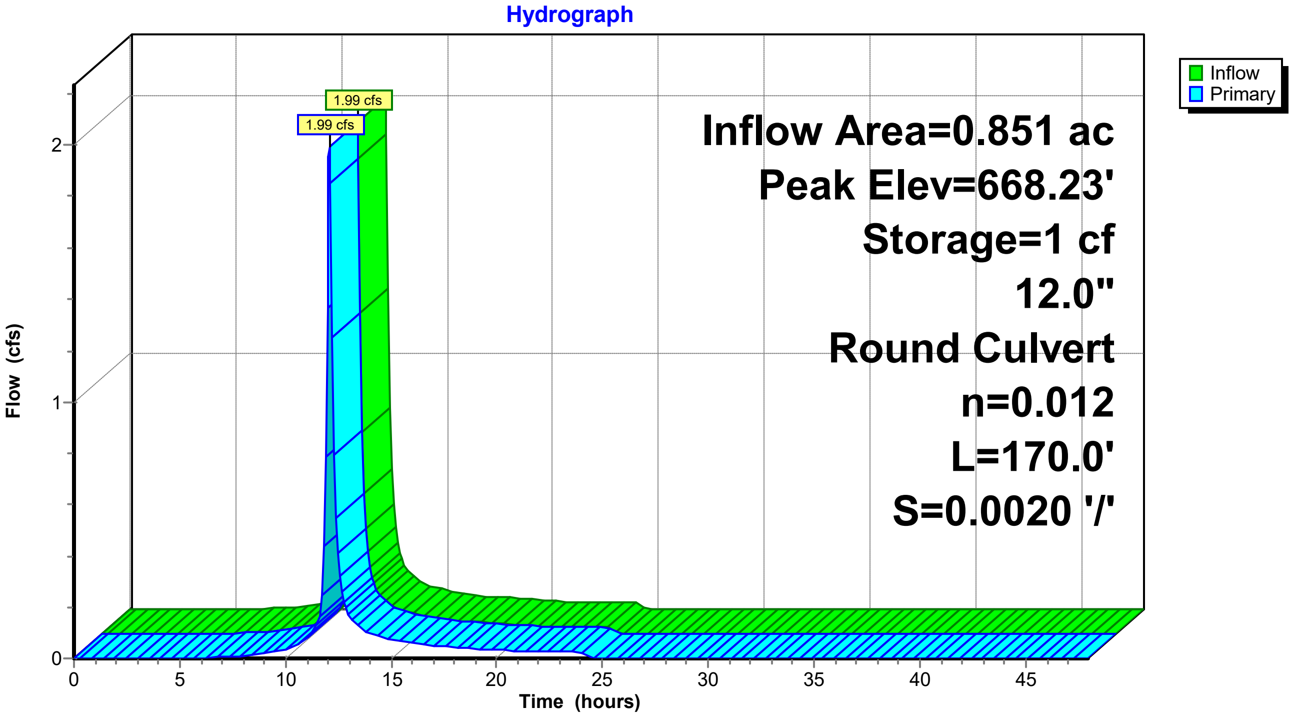
Volume	Invert	Avail.Storage	Storage Description
#1	667.04'	1,027 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
667.04	1	0	0
669.15	1	2	2
669.70	3,725	1,025	1,027

Device	Routing	Invert	Outlet Devices
#1	Primary	667.04'	**12.0" Round Culvert** L= 170.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 667.04' / 666.70' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.54 cfs @ 12.09 hrs HW=668.16' TW=667.78' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.54 cfs @ 2.19 fps)

Pond 11P: YD#11



Summary for Pond 13P: CB#13

```
Inflow Area =       0.858 ac,  68.58% Impervious,  Inflow Depth =   2.20"    for  10-yr event
Inflow      =       2.19 cfs @   12.08 hrs,  Volume=          0.157 af
Outflow     =       2.19 cfs @   12.09 hrs,  Volume=          0.157 af,  Atten= 0%,  Lag= 0.0 min
Primary     =       2.19 cfs @   12.09 hrs,  Volume=          0.157 af
    Routed to Pond 15P : CB#15

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 668.11' @ 12.24 hrs   Surf.Area= 4 sf   Storage= 8 cf
Flood Elev= 669.15'   Surf.Area= 5,345 sf   Storage= 1,597 cf

Plug-Flow detention time= 0.2 min calculated for 0.157 af (100% of inflow)
Center-of-Mass det. time= 0.2 min ( 806.8 - 806.6 )

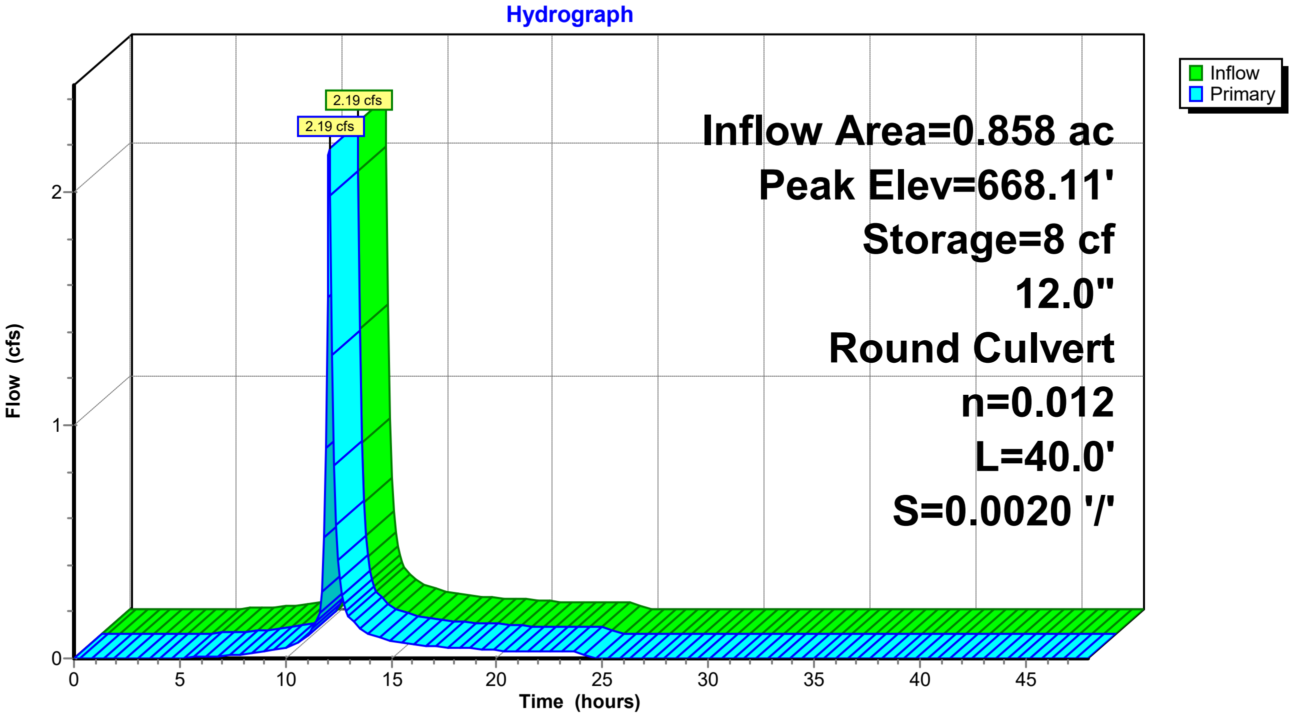
Volume        Invert     Avail.Storage   Storage Description
   #1         665.99'         1,597 cf   Custom Stage Data (Prismatic) Listed below (Recalc)

 Elevation         Surf.Area          Inc.Store        Cum.Store
    (feet)           (sq-ft)       (cubic-feet)     (cubic-feet)
    665.99                 4                  0                0
    668.40                 4                 10               10
    669.00             3,160                949              959
    669.15             5,345                638            1,597

Device   Routing            Invert   Outlet Devices
  #1     Primary           665.99'   12.0"  Round Culvert
                                     L= 40.0'   CPP, square edge headwall,  Ke= 0.500
                                     Inlet / Outlet Invert= 665.99' / 665.91'   S= 0.0020 '/'   Cc= 0.900
                                     n= 0.012,  Flow Area= 0.79 sf

Primary OutFlow  Max=0.22 cfs @ 12.09 hrs  HW=667.76'  TW=667.76'   (Dynamic Tailwater)
└─1=Culvert  (Inlet Controls 0.22 cfs @ 0.28 fps)
```

Pond 13P: CB#13



Summary for Pond 15P: CB#15

Inflow Area = 2.100 ac, 69.58% Impervious, Inflow Depth = 2.24" for 10-yr event
Inflow = 4.81 cfs @ 12.04 hrs, Volume= 0.392 af
Outflow = 4.81 cfs @ 12.04 hrs, Volume= 0.392 af, Atten= 0%, Lag= 0.0 min
Primary = 4.81 cfs @ 12.04 hrs, Volume= 0.392 af
Routed to Pond 18P : CB#18

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 668.01' @ 12.18 hrs Surf.Area= 4 sf Storage= 8 cf
Flood Elev= 669.20' Surf.Area= 4 sf Storage= 13 cf

Plug-Flow detention time= 0.1 min calculated for 0.391 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (797.7 - 797.6)

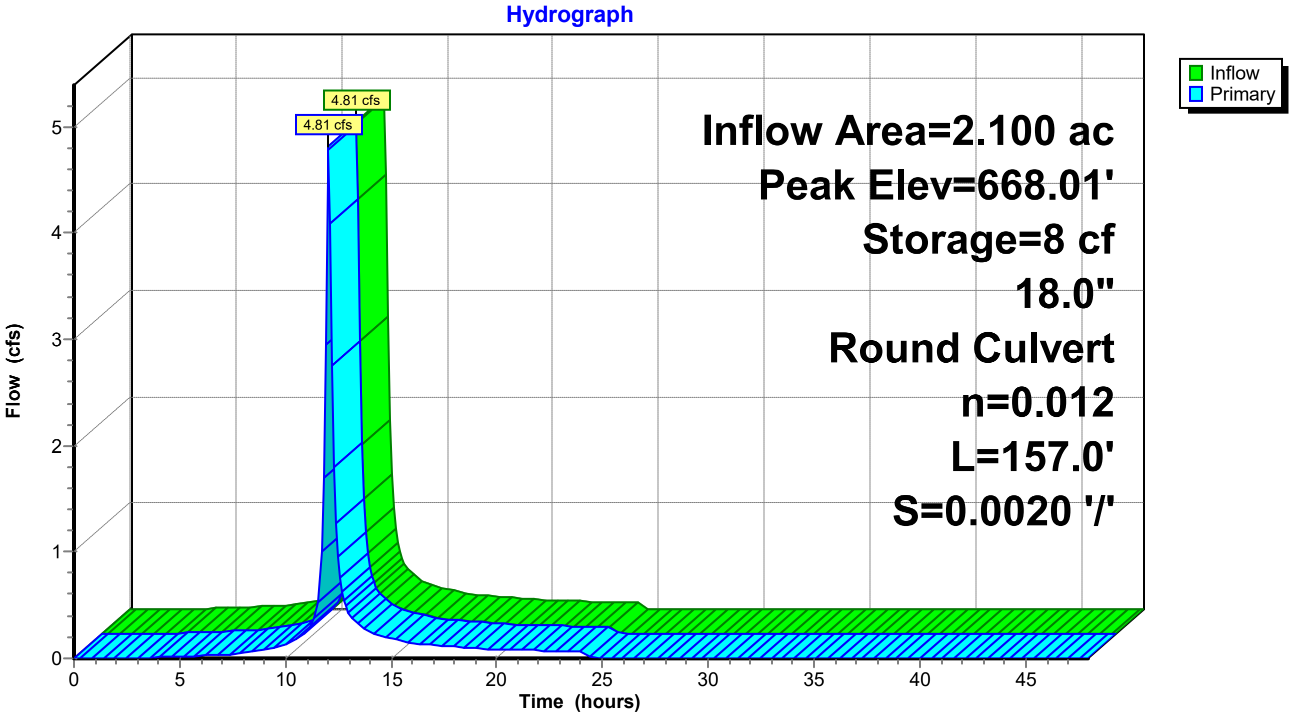
Volume	Invert	Avail.Storage	Storage Description
#1	665.91'	13 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
665.91	4	0	0
669.20	4	13	13

Device	Routing	Invert	Outlet Devices
#1	Primary	665.91'	**18.0" Round Culvert** L= 157.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 665.91' / 665.60' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=1.26 cfs @ 12.04 hrs HW=667.60' TW=667.57' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.26 cfs @ 0.79 fps)

Pond 15P: CB#15



Summary for Pond 18P: CB#18

Inflow Area = 2.561 ac, 59.75% Impervious, Inflow Depth = 2.08" for 10-yr event
Inflow = 5.26 cfs @ 12.06 hrs, Volume= 0.444 af
Outflow = 5.26 cfs @ 12.06 hrs, Volume= 0.444 af, Atten= 0%, Lag= 0.0 min
Primary = 5.26 cfs @ 12.06 hrs, Volume= 0.444 af
Routed to Pond 20P : CB#20

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 667.81' @ 12.12 hrs Surf.Area= 4 sf Storage= 9 cf
Flood Elev= 669.45' Surf.Area= 9,895 sf Storage= 3,251 cf

Plug-Flow detention time= 0.7 min calculated for 0.444 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (804.5 - 804.4)

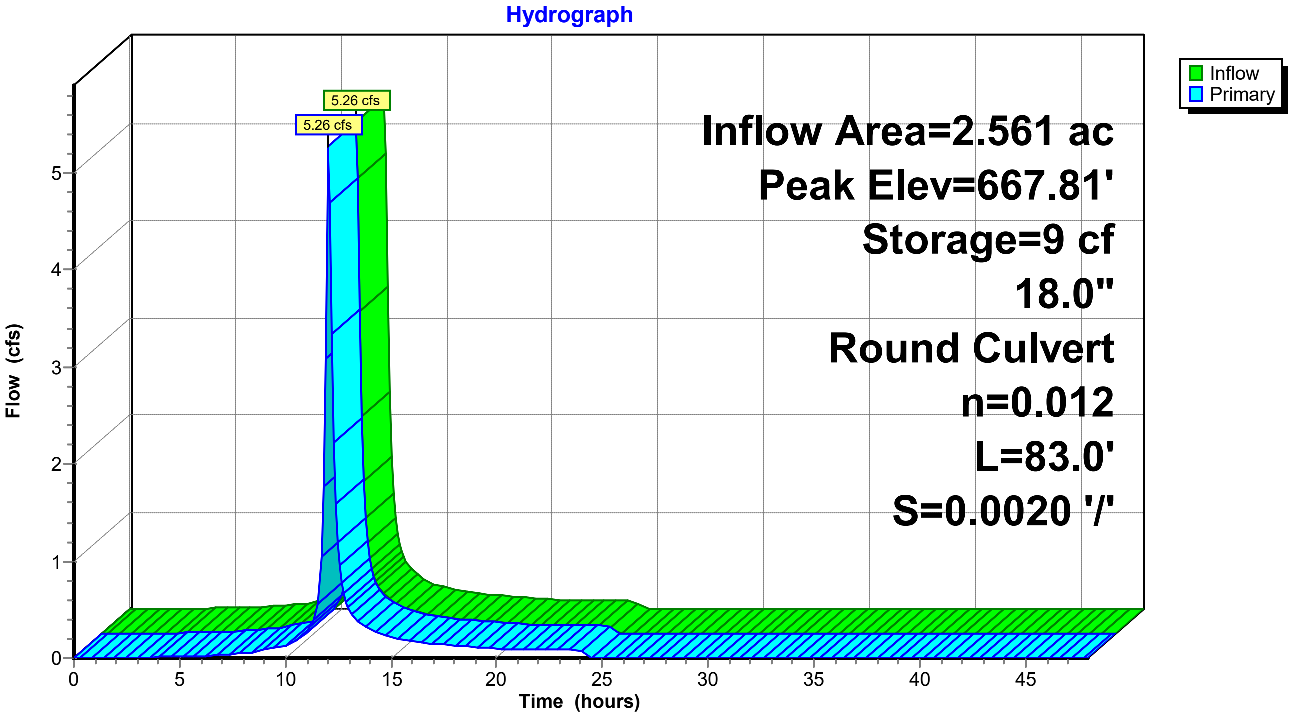
Volume	Invert	Avail.Storage	Storage Description
#1	665.60'	3,251 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
665.60	4	0	0
668.65	4	12	12
669.00	2,530	443	456
669.45	9,895	2,796	3,251

Device	Routing	Invert	Outlet Devices
#1	Primary	665.60'	**18.0" Round Culvert** L= 83.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 665.60' / 665.43' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=3.68 cfs @ 12.06 hrs HW=667.65' TW=667.46' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 3.68 cfs @ 2.08 fps)

Pond 18P: CB#18



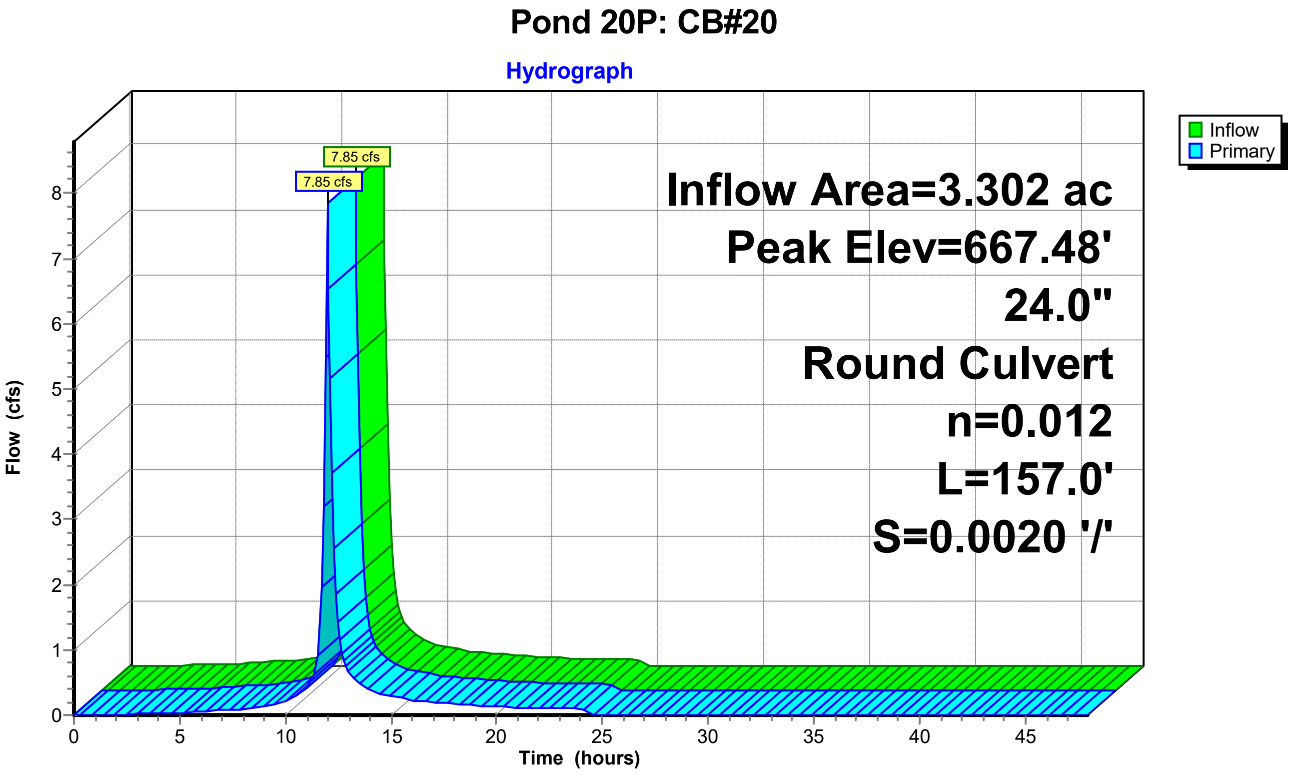
Summary for Pond 20P: CB#20

Inflow Area = 3.302 ac, 68.79% Impervious, Inflow Depth = 2.24" for 10-yr event
Inflow = 7.85 cfs @ 11.98 hrs, Volume= 0.617 af
Outflow = 7.85 cfs @ 11.98 hrs, Volume= 0.617 af, Atten= 0%, Lag= 0.0 min
Primary = 7.85 cfs @ 11.98 hrs, Volume= 0.617 af
Routed to Pond 24P : CB#24

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 667.48' @ 12.05 hrs
Flood Elev= 669.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	665.43'	**24.0" Round Culvert** L= 157.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 665.43' / 665.12' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=4.73 cfs @ 11.98 hrs HW=667.31' TW=667.14' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 4.73 cfs @ 2.00 fps)



Summary for Pond 22P: YD#22

Inflow Area = 0.624 ac, 27.67% Impervious, Inflow Depth = 1.41" for 10-yr event
Inflow = 0.88 cfs @ 12.17 hrs, Volume= 0.073 af
Outflow = 0.88 cfs @ 12.17 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min
Primary = 0.88 cfs @ 12.17 hrs, Volume= 0.073 af
Routed to Pond 24P : CB#24

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 667.40' @ 12.10 hrs Surf.Area= 1 sf Storage= 1 cf
Flood Elev= 669.45' Surf.Area= 17,680 sf Storage= 5,215 cf

Plug-Flow detention time= 0.0 min calculated for 0.073 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (851.7 - 851.7)

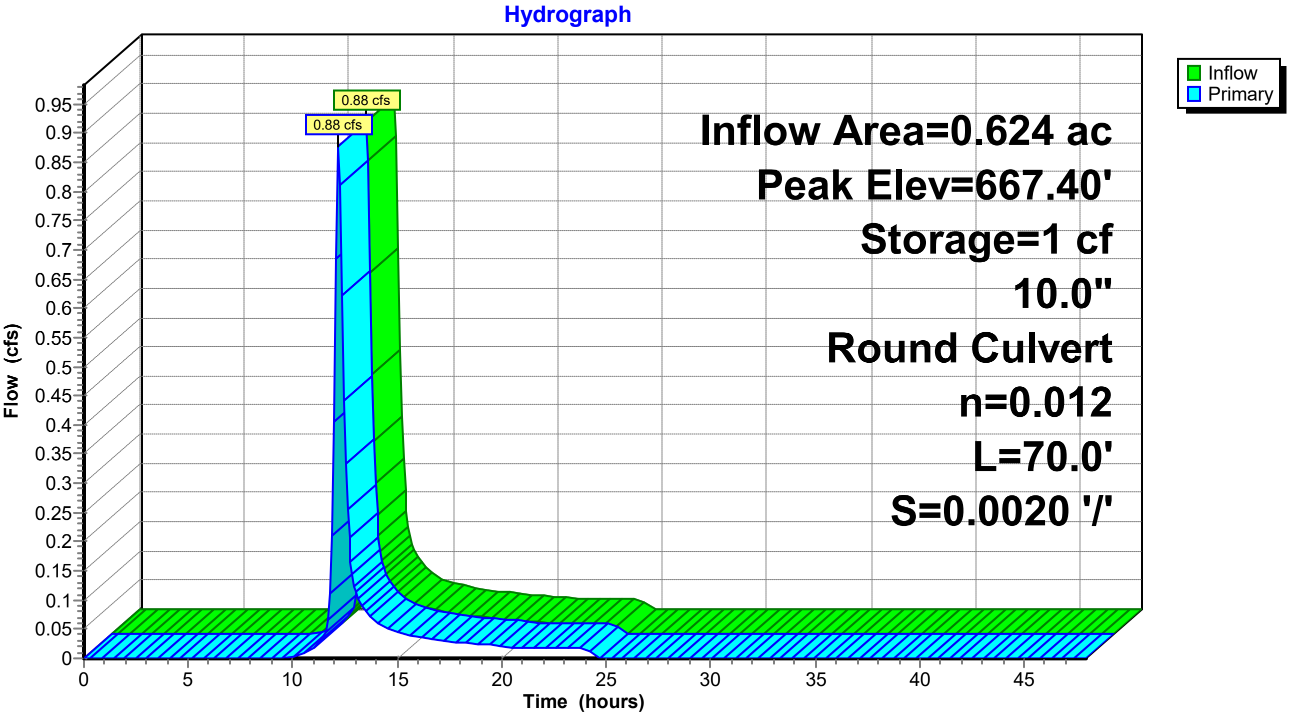
Volume	Invert	Avail.Storage	Storage Description
#1	666.65'	5,215 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
666.65	1	0	0
668.55	1	2	2
669.00	2,745	618	620
669.45	17,680	4,596	5,215

Device	Routing	Invert	Outlet Devices
#1	Primary	666.65'	**10.0" Round Culvert** L= 70.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 666.65' / 666.51' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=0.85 cfs @ 12.17 hrs HW=667.34' TW=666.87' (Dynamic Tailwater)
↰**1=Culvert** (Barrel Controls 0.85 cfs @ 2.39 fps)

Pond 22P: YD#22



Summary for Pond 24P: CB#24

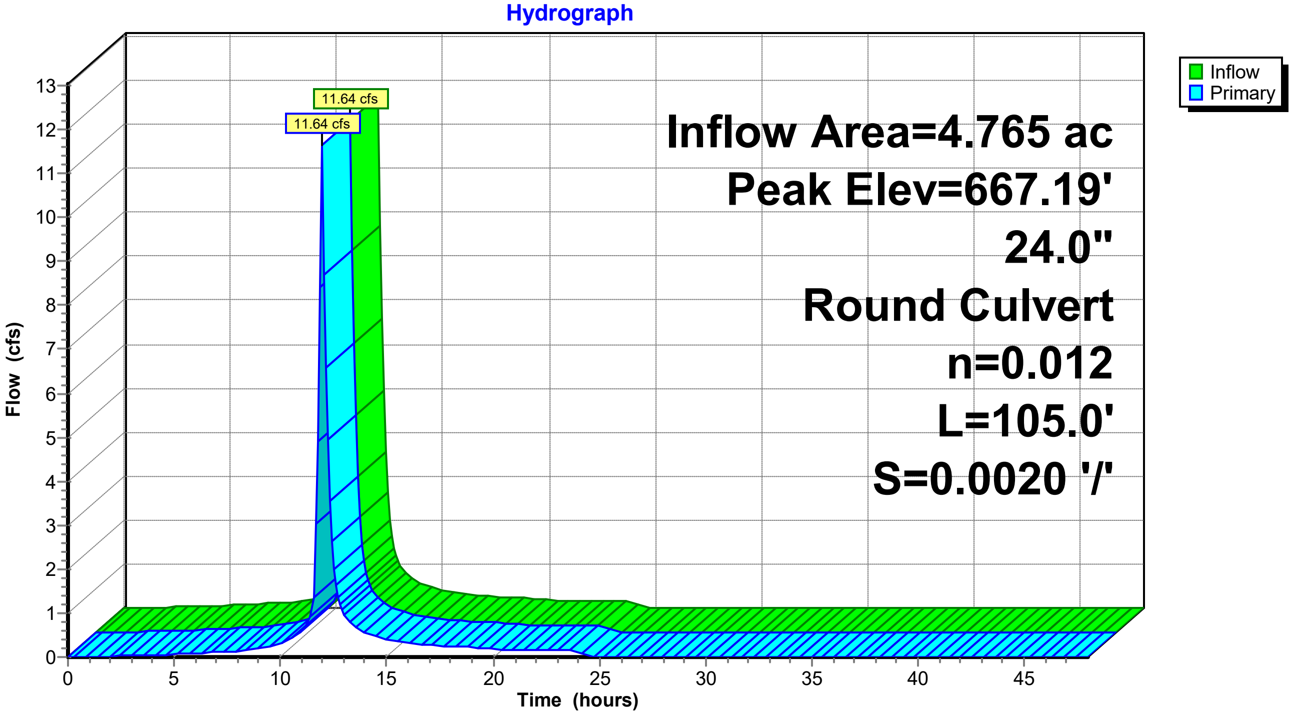
```
Inflow Area =       4.765 ac, 68.89% Impervious, Inflow Depth =  2.23"   for 10-yr event
Inflow      =      11.64 cfs @  11.97 hrs, Volume=        0.887 af
Outflow     =      11.64 cfs @  11.97 hrs, Volume=        0.887 af, Atten= 0%, Lag= 0.0 min
Primary     =      11.64 cfs @  11.97 hrs, Volume=        0.887 af
    Routed to Pond 33P : Subsurface Detention within Gravel Area
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 667.19' @ 11.97 hrs
Flood Elev= 669.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	665.12'	**24.0" Round Culvert** L= 105.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 665.12' / 664.91' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=11.58 cfs @ 11.97 hrs HW=667.18' TW=666.21' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 11.58 cfs @ 4.45 fps)

Pond 24P: CB#24



Summary for Pond 26P: CB#26

```
Inflow Area =         0.811 ac,  71.10% Impervious,  Inflow Depth =   2.29"    for  10-yr event
Inflow      =        2.14 cfs @   12.08 hrs,  Volume=          0.155 af
Outflow     =        2.14 cfs @   12.08 hrs,  Volume=          0.155 af,  Atten= 0%,  Lag= 0.0 min
Primary     =        2.14 cfs @   12.08 hrs,  Volume=          0.155 af
    Routed to Pond 28P : CB#28

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 667.13' @ 12.10 hrs   Surf.Area= 4 sf   Storage= 5 cf
Flood Elev= 669.00'   Surf.Area= 3,160 sf   Storage= 959 cf

Plug-Flow detention time= 1.4 min calculated for 0.155 af (100% of inflow)
Center-of-Mass det. time= 0.1 min ( 801.5 - 801.4 )

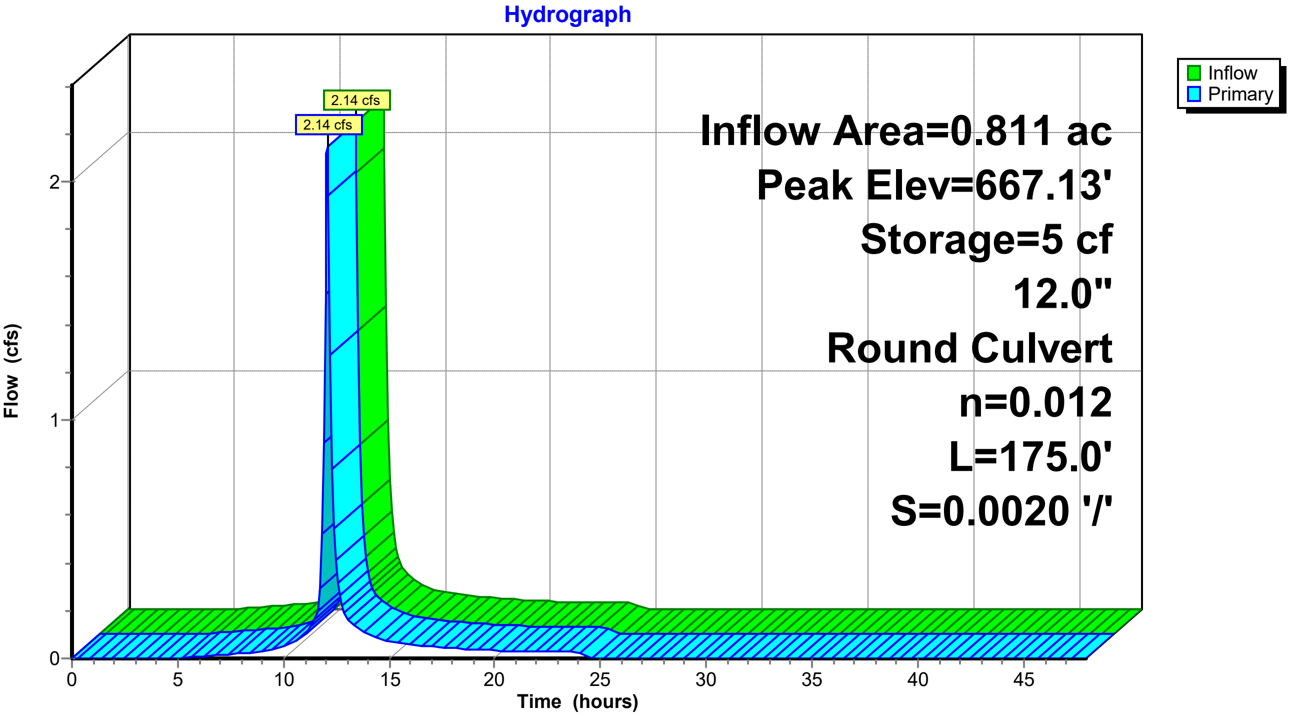
Volume       Invert     Avail.Storage   Storage Description
   #1        665.90'         1,597 cf   Custom Stage Data (Prismatic) Listed below (Recalc)

 Elevation          Surf.Area           Inc.Store        Cum.Store
    (feet)            (sq-ft)        (cubic-feet)     (cubic-feet)
    665.90                  4                   0                0
    668.40                  4                  10               10
    669.00              3,160                 949              959
    669.15              5,345                 638            1,597

Device   Routing          Invert   Outlet Devices
   #1    Primary         665.90'   12.0"  Round Culvert
                                   L= 175.0'   CPP, square edge headwall,  Ke= 0.500
                                   Inlet / Outlet Invert= 665.90' / 665.55'   S= 0.0020 '/'   Cc= 0.900
                                   n= 0.012,  Flow Area= 0.79 sf

Primary OutFlow  Max=1.92 cfs @ 12.08 hrs  HW=667.09'  TW=666.55'   (Dynamic Tailwater)
└─1=Culvert  (Outlet Controls 1.92 cfs @ 2.59 fps)
```

Pond 26P: CB#26



Summary for Pond 28P: CB#28

```
Inflow Area =         1.235 ac, 62.07% Impervious,  Inflow Depth =   2.14"    for  10-yr event
Inflow      =        2.99 cfs @   12.09 hrs,  Volume=          0.220 af
Outflow     =        2.99 cfs @   12.09 hrs,  Volume=          0.220 af,  Atten= 0%,  Lag= 0.0 min
Primary     =        2.99 cfs @   12.09 hrs,  Volume=          0.220 af
    Routed to Pond 30P : CB#30

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 666.98' @ 12.31 hrs   Surf.Area= 4 sf   Storage= 7 cf
Flood Elev= 669.75'   Surf.Area= 5,170 sf   Storage= 1,568 cf

Plug-Flow detention time= 0.1 min calculated for 0.220 af (100% of inflow)
Center-of-Mass det. time= 0.1 min ( 809.0 - 808.9 )

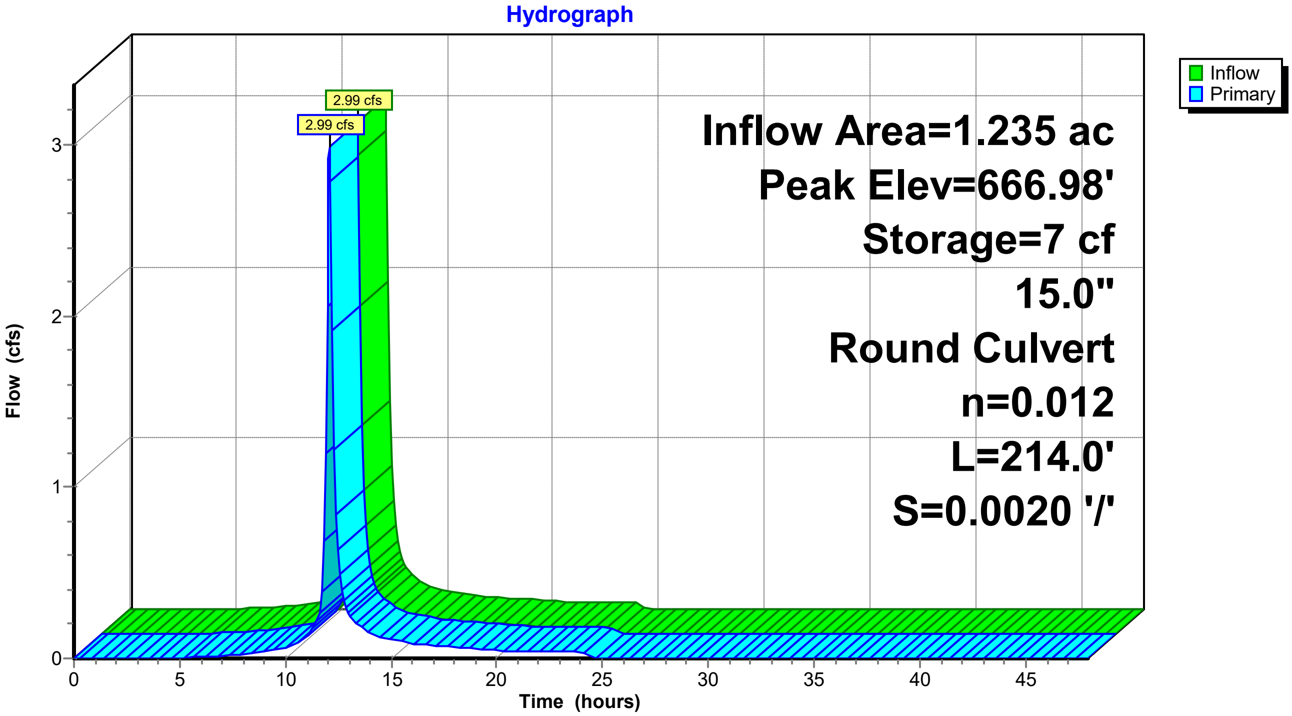
Volume        Invert    Avail.Storage   Storage Description
   #1         665.30'        1,568 cf   Custom Stage Data (Prismatic) Listed below (Recalc)

 Elevation         Surf.Area          Inc.Store         Cum.Store
    (feet)            (sq-ft)      (cubic-feet)      (cubic-feet)
    665.30                  4                 0                 0
    669.15                  4                15                15
    669.75              5,170             1,552             1,568

Device  Routing           Invert   Outlet Devices
   #1   Primary          665.30'   15.0"  Round Culvert
                                   L= 214.0'   CPP, square edge headwall,  Ke= 0.500
                                   Inlet / Outlet Invert= 665.30' / 664.87'   S= 0.0020 '/'   Cc= 0.900
                                   n= 0.012,  Flow Area= 1.23 sf

Primary OutFlow  Max=1.59 cfs @ 12.09 hrs  HW=666.57'  TW=666.38'   (Dynamic Tailwater)
└─1=Culvert  (Outlet Controls 1.59 cfs @ 1.59 fps)
```

Pond 28P: CB#28



Summary for Pond 30P: CB#30

Inflow Area = 1.904 ac, 48.38% Impervious, Inflow Depth = 1.93" for 10-yr event
Inflow = 4.03 cfs @ 12.11 hrs, Volume= 0.307 af
Outflow = 4.02 cfs @ 12.11 hrs, Volume= 0.307 af, Atten= 0%, Lag= 0.0 min
Primary = 4.02 cfs @ 12.11 hrs, Volume= 0.307 af
Routed to Pond 32P : CB#32

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 666.89' @ 12.25 hrs Surf.Area= 4 sf Storage= 9 cf
Flood Elev= 668.00' Surf.Area= 220 sf Storage= 19 cf

Plug-Flow detention time= 0.1 min calculated for 0.306 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (818.5 - 818.4)

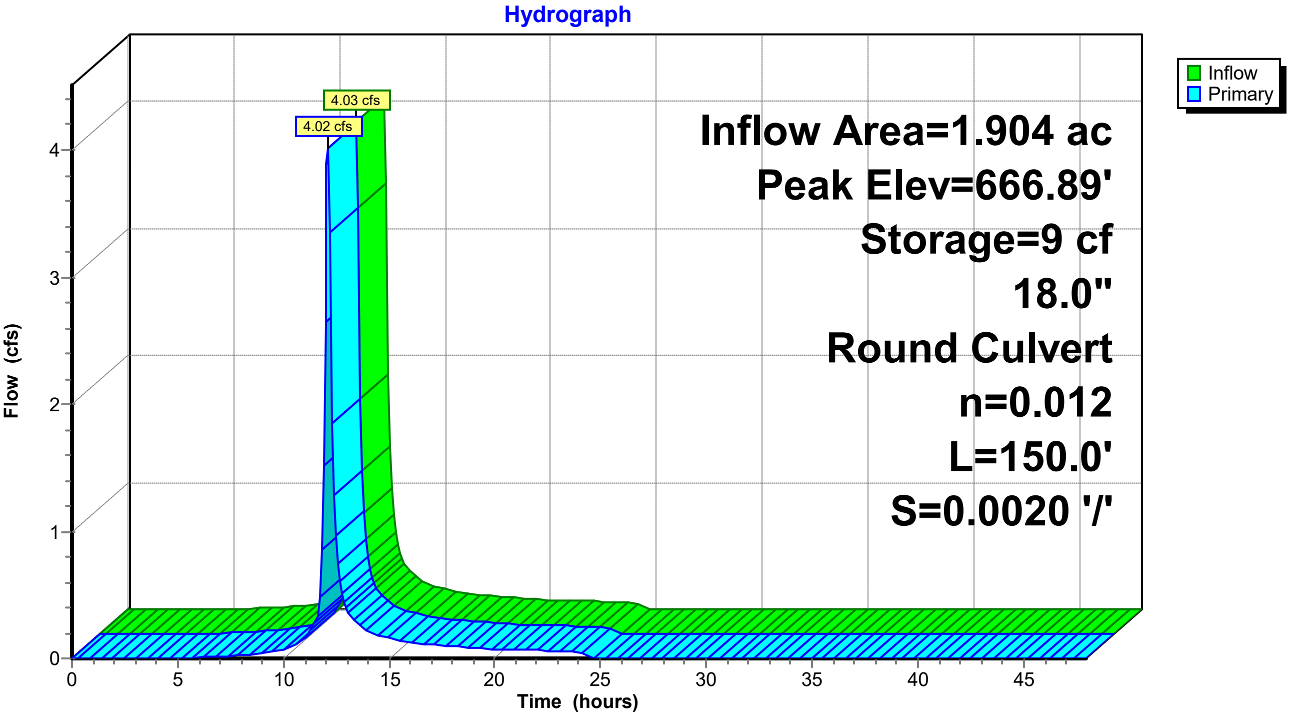
Volume	Invert	Avail.Storage	Storage Description
#1	664.68'	19 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
664.68	4	0	0
667.95	4	13	13
668.00	220	6	19

Device	Routing	Invert	Outlet Devices
#1	Primary	664.68'	**18.0" Round Culvert** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 664.68' / 664.38' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=0.00 cfs @ 12.11 hrs HW=666.45' TW=666.57' (Dynamic Tailwater)
↑**1=Culvert** (Controls 0.00 cfs)

Pond 30P: CB#30



Summary for Pond 32P: CB#32

```
Inflow Area =         2.627 ac, 62.59% Impervious, Inflow Depth =  2.17"   for 10-yr event
Inflow      =        5.90 cfs @  12.12 hrs, Volume=          0.476 af
Outflow     =        5.90 cfs @  12.12 hrs, Volume=          0.476 af, Atten= 0%, Lag= 0.0 min
Primary     =        5.90 cfs @  12.12 hrs, Volume=          0.476 af
    Routed to Pond 33P : Subsurface Detention within Gravel Area
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 666.73' @ 12.15 hrs Surf.Area= 4 sf Storage= 9 cf
Flood Elev= 668.00' Surf.Area= 5 sf Storage= 15 cf

Plug-Flow detention time= 0.1 min calculated for 0.475 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (800.8 - 800.7)

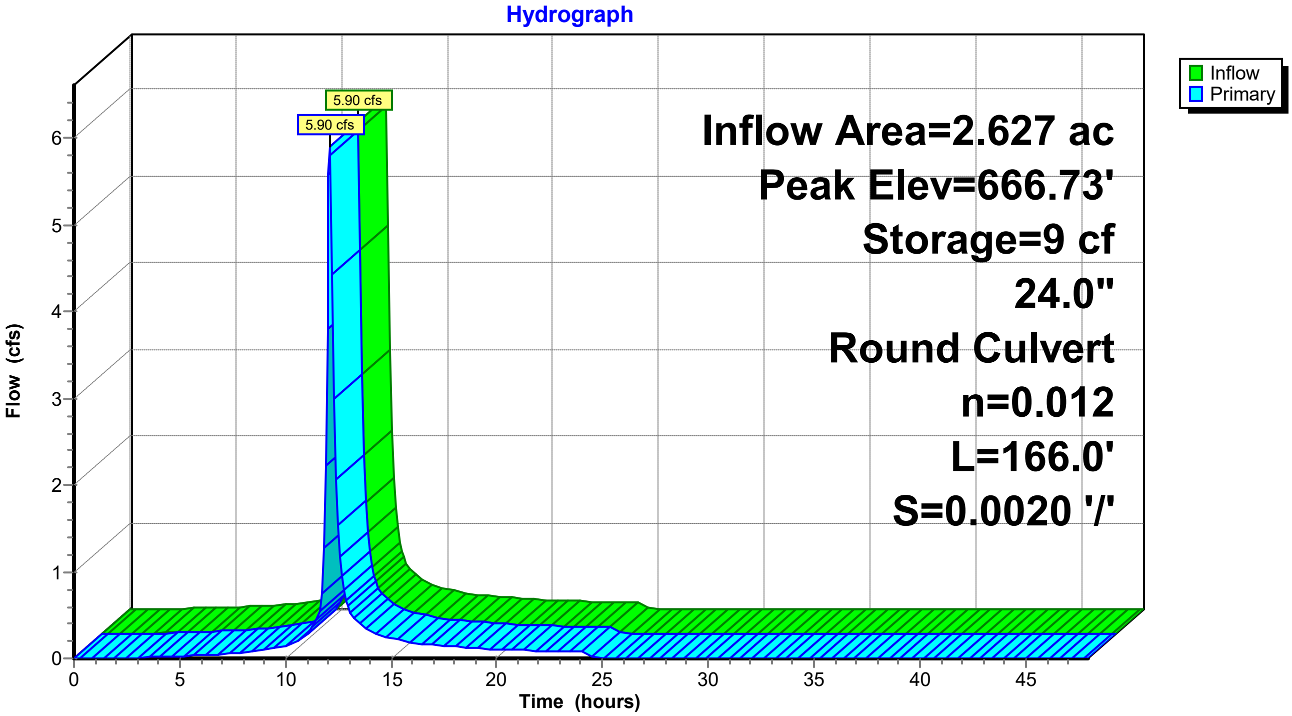
Volume	Invert	Avail.Storage	Storage Description
#1	664.38'	3,522 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
664.38	4	0	0
667.95	4	14	14
688.05	345	3,507	3,522

Device	Routing	Invert	Outlet Devices
#1	Primary	664.38'	**24.0" Round Culvert** L= 166.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 664.38' / 664.05' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=2.29 cfs @ 12.12 hrs HW=666.62' TW=666.59' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 2.29 cfs @ 0.81 fps)

Pond 32P: CB#32



Summary for Pond 33P: Subsurface Detention within Gravel Area

Inflow Area = 21.762 ac, 57.48% Impervious, Inflow Depth = 2.06" for 10-yr event
Inflow = 36.46 cfs @ 12.01 hrs, Volume= 3.729 af
Outflow = 34.68 cfs @ 12.09 hrs, Volume= 3.729 af, Atten= 5%, Lag= 4.5 min
Primary = 19.78 cfs @ 12.07 hrs, Volume= 2.198 af
Routed to Pond 53P : West Pre-Treatment to Bio-Retention Area
Secondary = 10.19 cfs @ 12.11 hrs, Volume= 1.288 af
Routed to Pond 55P : North Pre-Treatment to Bio-Retention Area
Tertiary = 6.16 cfs @ 12.29 hrs, Volume= 0.243 af
Routed to Pond 35P : Dry Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 666.68' @ 12.29 hrs Surf.Area= 8,430 sf Storage= 7,165 cf
Flood Elev= 668.95' Surf.Area= 129,465 sf Storage= 48,972 cf

Plug-Flow detention time= 3.9 min calculated for 3.722 af (100% of inflow)
Center-of-Mass det. time= 3.9 min (815.6 - 811.7)

Volume	Invert	Avail.Storage	Storage Description
#1	664.01'	9,879 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 30,436 cf Overall - 5,739 cf Embedded = 24,697 cf x 40.0% Voids
#2	664.01'	126 cf	**24.0" Round Pipe Storage** Inside #1 L= 40.0'
#3	664.01'	3,657 cf	**24.0" Round Pipe Storage** Inside #1 L= 1,164.0' S= 0.0020 '/'
#4	664.01'	1,421 cf	**18.0" Round Pipe Storage** Inside #1 L= 804.0' S= 0.0020 '/'
#5	665.61'	209 cf	**15.0" Round Pipe Storage** Inside #1 L= 170.0' S= 0.0020 '/'
#6	665.95'	202 cf	**12.0" Round Pipe Storage** Inside #1 L= 257.0' S= 0.0020 '/'
#7	666.46'	38 cf	**10.0" Round Pipe Storage** Inside #1 L= 69.0' S= 0.0020 '/'
#8	666.35'	88 cf	**10.0" Round Pipe Storage** Inside #1 L= 161.0' S= 0.0020 '/'
#9	668.03'	33,354 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 83,386 cf Overall x 40.0% Voids
		48,972 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
664.01	3	0	0
666.67	8,430	11,216	11,216
668.95	8,430	19,220	30,436

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
668.03	0	0	0
668.19	33,970	2,718	2,718
668.45	121,035	20,151	22,868
668.95	121,035	60,518	83,386

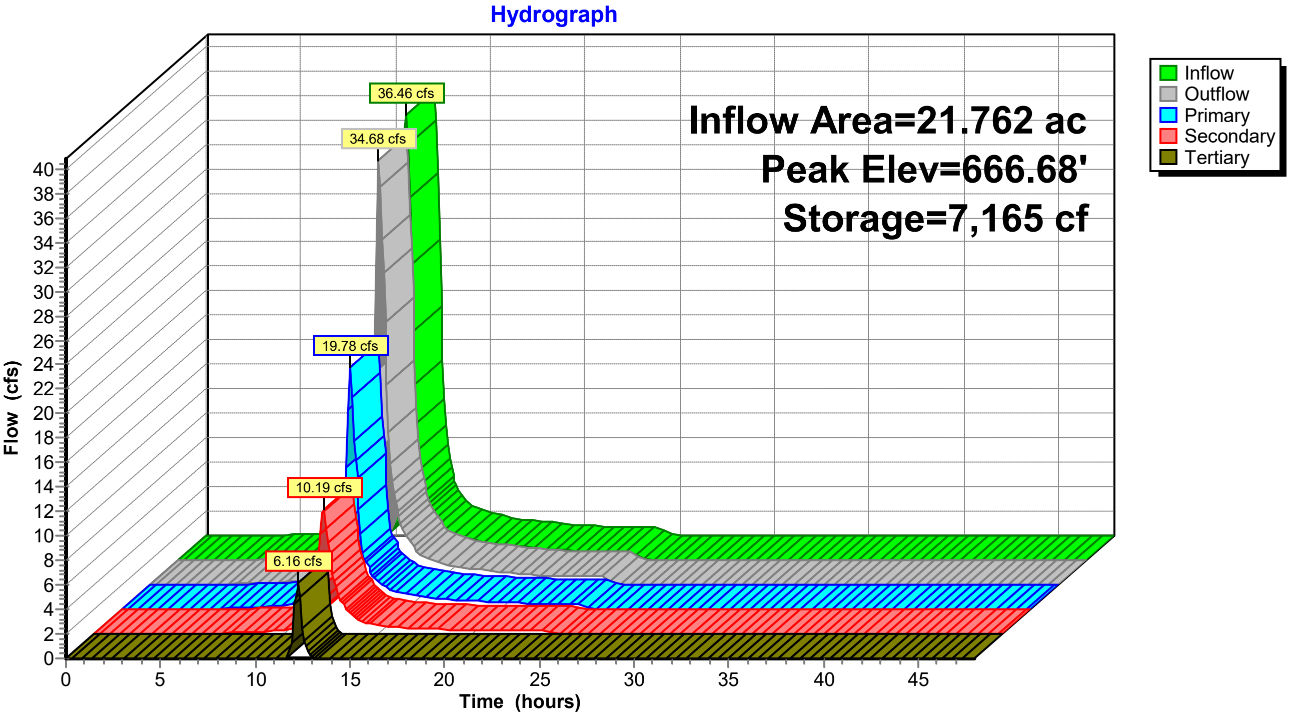
Device	Routing	Invert	Outlet Devices
#1	Primary	664.01'	**18.0" Round Culvert X 2.00** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 664.01' / 663.90' S= 0.0019 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	664.01'	**18.0" Round Culvert** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 664.01' / 663.90' S= 0.0019 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#3	Tertiary	665.71'	**18.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 665.71' / 664.71' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#4	Tertiary	666.05'	**15.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 666.05' / 665.05' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#5	Tertiary	666.39'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 666.39' / 665.39' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#6	Tertiary	666.56'	**10.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 666.56' / 665.56' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=16.72 cfs @ 12.07 hrs HW=666.56' TW=665.60' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 16.72 cfs @ 4.73 fps)

Secondary OutFlow Max=8.96 cfs @ 12.11 hrs HW=666.59' TW=665.48' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 8.96 cfs @ 5.07 fps)

Tertiary OutFlow Max=5.93 cfs @ 12.29 hrs HW=666.67' TW=663.66' (Dynamic Tailwater)
├─**3=Culvert** (Inlet Controls 3.96 cfs @ 3.33 fps)
├─**4=Culvert** (Inlet Controls 1.61 cfs @ 2.67 fps)
├─**5=Culvert** (Inlet Controls 0.32 cfs @ 1.79 fps)
└─**6=Culvert** (Inlet Controls 0.04 cfs @ 1.11 fps)

Pond 33P: Subsurface Detention within Gravel Area



Summary for Pond 34P: Bio-Retention Area

Inflow Area = 24.054 ac, 52.00% Impervious, Inflow Depth = 1.72" for 10-yr event
Inflow = 13.12 cfs @ 11.97 hrs, Volume= 3.442 af
Outflow = 8.97 cfs @ 13.25 hrs, Volume= 2.232 af, Atten= 32%, Lag= 76.5 min
Primary = 8.97 cfs @ 13.25 hrs, Volume= 2.232 af
Routed to Reach 7R : North Property Line Ditch (West)
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : North Property Line Ditch (West)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 664.32' @ 13.24 hrs Surf.Area= 58,100 sf Storage= 69,817 cf

Plug-Flow detention time= 372.8 min calculated for 2.232 af (65% of inflow)
Center-of-Mass det. time= 248.3 min (1,108.3 - 860.0)

Volume	Invert	Avail.Storage	Storage Description
#1	663.00'	95,677 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.00	48,935	0	0
663.25	50,025	12,370	12,370
663.50	51,115	12,643	25,013
664.00	56,110	26,806	51,819
664.75	60,845	43,858	95,677

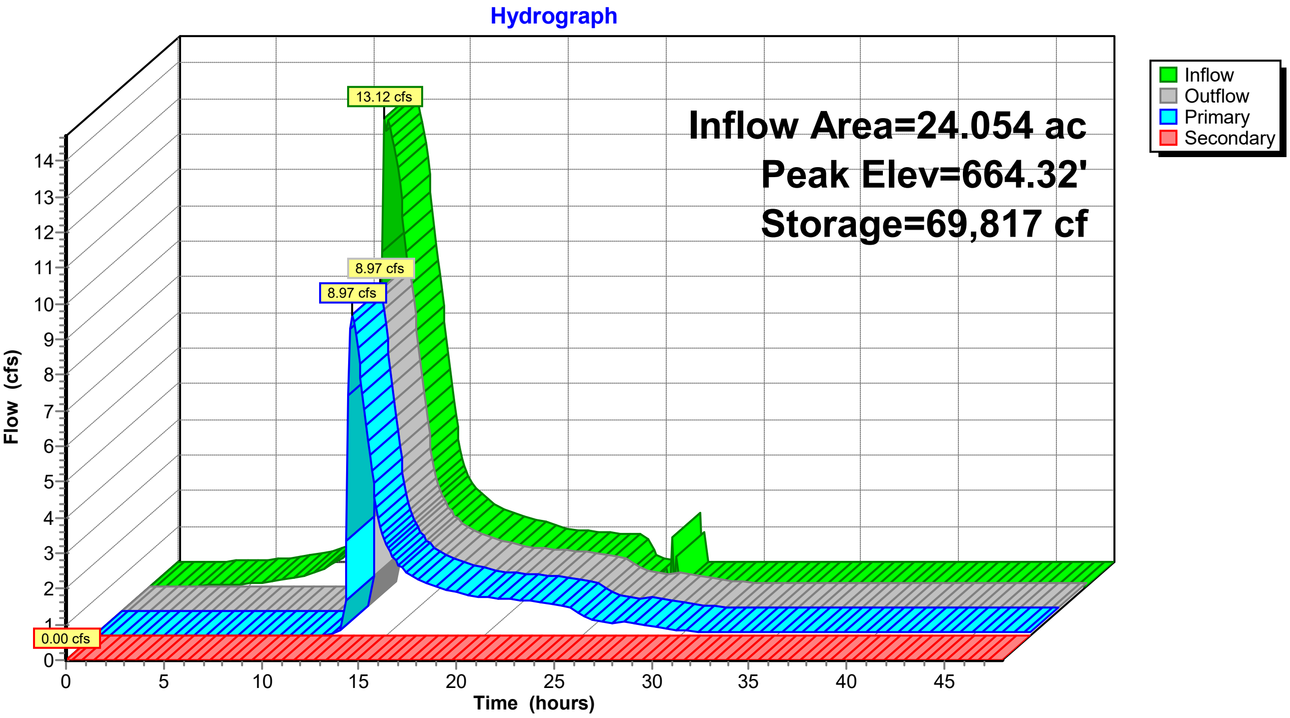
Device	Routing	Invert	Outlet Devices
#1	Primary	660.55'	**15.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.55' / 660.50' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Primary	660.55'	**15.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.55' / 660.50' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 1	660.56'	**4.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.56' / 660.55' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#4	Device 2	660.56'	**4.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.56' / 660.55' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#5	Device 3	663.00'	**0.500 in/hr Exfiltration X 0.50 over Surface area above 663.00'** Excluded Surface area = 48,935 sf
#6	Device 4	663.00'	**0.500 in/hr Exfiltration X 0.50 over Surface area above 663.00'** Excluded Surface area = 48,935 sf
#7	Device 3	664.10'	**4.0" Horiz. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#8	Device 4	664.10'	**4.0" Horiz. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#9	Device 1	664.25'	**1.4" x 4.5" Horiz. Orifice/Grate X 72.00** C= 0.600

Limited to weir flow at low heads
#10 Device 2 664.25' **1.4" x 4.5" Horiz. Orifice/Grate X 72.00** C= 0.600
Limited to weir flow at low heads
#11 Secondary 664.50' **100.0' long x 2.0' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50
Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88
2.85 3.07 3.20 3.32

Primary OutFlow Max=8.94 cfs @ 13.25 hrs HW=664.31' TW=661.96' (Dynamic Tailwater)
- **1=Culvert** (Passes 4.47 cfs of 9.07 cfs potential flow)
  - **3=Culvert** (Passes 0.64 cfs of 0.64 cfs potential flow)
    - **5=Exfiltration** (Exfiltration Controls 0.05 cfs)
    - **7=Orifice/Grate** (Orifice Controls 0.58 cfs @ 2.23 fps)
  - **9=Orifice/Grate** (Weir Controls 3.83 cfs @ 0.83 fps)
- **2=Culvert** (Passes 4.47 cfs of 9.07 cfs potential flow)
  - **4=Culvert** (Passes 0.64 cfs of 0.64 cfs potential flow)
    - **6=Exfiltration** (Exfiltration Controls 0.05 cfs)
    - **8=Orifice/Grate** (Orifice Controls 0.58 cfs @ 2.23 fps)
  - **10=Orifice/Grate** (Weir Controls 3.83 cfs @ 0.83 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=663.00' TW=660.30' (Dynamic Tailwater)
- **11=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 34P: Bio-Retention Area



Summary for Pond 35P: Dry Pond

```
Inflow Area =        0.760 ac,   0.00% Impervious,  Inflow Depth =   5.12"    for  10-yr event
Inflow      =        6.26 cfs @  12.28 hrs,  Volume=          0.324 af
Outflow     =        0.89 cfs @  14.12 hrs,  Volume=          0.324 af,  Atten= 86%,  Lag= 110.0 min
Primary     =        0.89 cfs @  14.12 hrs,  Volume=          0.324 af
    Routed to Reach 6R : North Property Line Ditch (Central)
Tertiary    =        0.00 cfs @   0.00 hrs,  Volume=          0.000 af
    Routed to Reach 6R : North Property Line Ditch (Central)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 664.07' @ 13.00 hrs   Surf.Area= 14,933 sf   Storage= 12,688 cf

Plug-Flow detention time= 247.2 min calculated for 0.324 af (100% of inflow)
Center-of-Mass det. time= 246.5 min ( 1,010.2 - 763.7 )

Volume       Invert    Avail.Storage   Storage Description
   #1        662.56'       49,313 cf   Custom Stage Data (Prismatic) Listed below (Recalc)

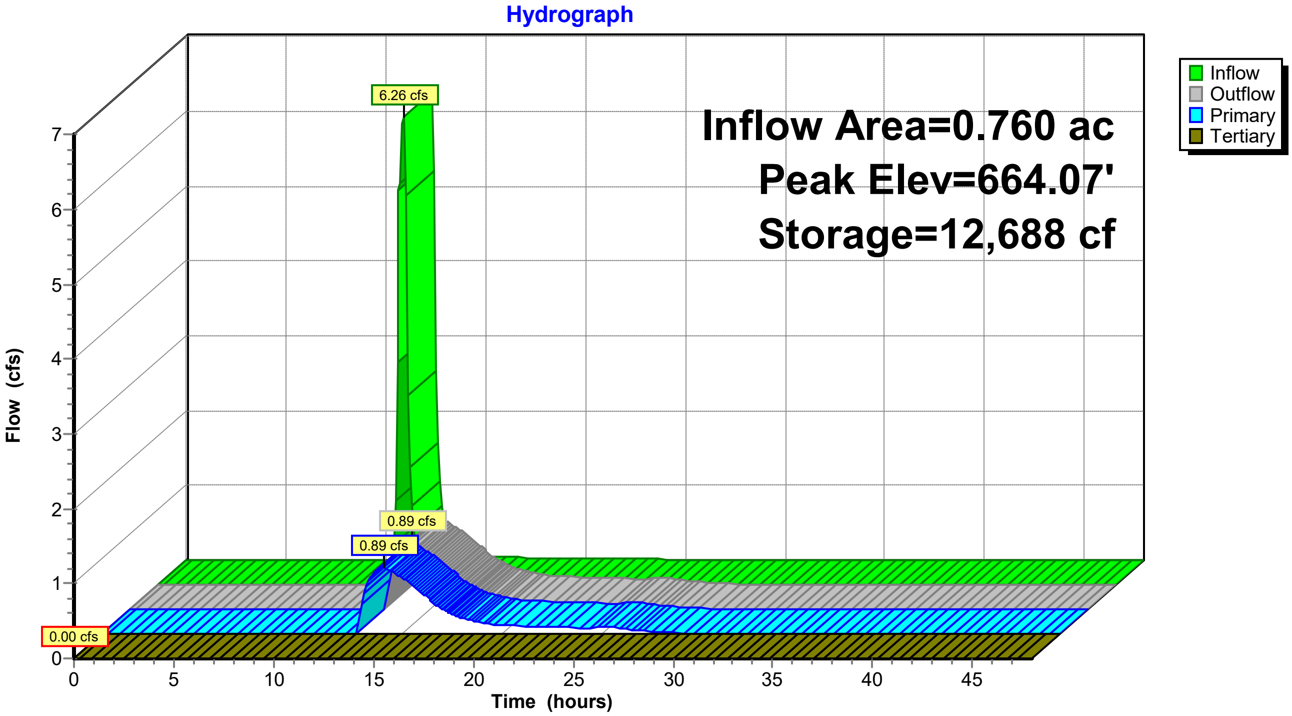
 Elevation          Surf.Area          Inc.Store          Cum.Store
    (feet)             (sq-ft)       (cubic-feet)       (cubic-feet)
    662.56                300                  0                  0
    663.00              5,985              1,383              1,383
    664.00             14,620             10,303             11,685
    665.00             19,235             16,928             28,613
    666.00             22,165             20,700             49,313

Device   Routing            Invert   Outlet Devices
   #1    Primary           662.56'   12.0"  Round Culvert
                                     L= 30.0'   CPP, square edge headwall,  Ke= 0.500
                                     Inlet / Outlet Invert= 662.56' / 662.50'   S= 0.0020 '/'   Cc= 0.900
                                     n= 0.012,  Flow Area= 0.79 sf
   #2    Device 1          662.56'   3.0" Vert. Orifice/Grate    C= 0.600   Limited to weir flow at low heads
   #3    Device 1          663.06'   6.0" Vert. Orifice/Grate    C= 0.600   Limited to weir flow at low heads
   #4    Device 1          665.20'   1.4" x 4.5" Horiz. Orifice/Grate X 72.00    C= 0.600
                                     Limited to weir flow at low heads
   #5    Tertiary          665.70'   100.0' long  x 2.0' breadth Broad-Crested Rectangular Weir
                                     Head (feet)  0.20  0.40  0.60  0.80  1.00  1.20  1.40  1.60  1.80  2.00
                                     2.50  3.00  3.50
                                     Coef. (English)  2.54  2.61  2.61  2.60  2.66  2.70  2.77  2.89  2.88
                                     2.85  3.07  3.20  3.32

Primary OutFlow  Max=0.90 cfs @ 14.12 hrs  HW=663.88'  TW=663.30'   (Dynamic Tailwater)
└─1=Culvert  (Passes 0.90 cfs of 2.63 cfs potential flow)
    ├─2=Orifice/Grate  (Orifice Controls 0.18 cfs @ 3.68 fps)
    ├─3=Orifice/Grate  (Orifice Controls 0.72 cfs @ 3.65 fps)
    └─4=Orifice/Grate  ( Controls 0.00 cfs)

Tertiary OutFlow  Max=0.00 cfs @ 0.00 hrs  HW=662.56'  TW=662.30'   (Dynamic Tailwater)
└─5=Broad-Crested Rectangular Weir  ( Controls 0.00 cfs)
```

Pond 35P: Dry Pond



Summary for Pond 38P: Level Spreader

```
Inflow Area =      22.210 ac,  56.32% Impervious,  Inflow Depth =   1.11"    for  10-yr event
Inflow      =       7.68 cfs @   12.19 hrs,  Volume=          2.048 af
Outflow     =       7.68 cfs @   12.19 hrs,  Volume=          2.048 af,  Atten= 0%,  Lag= 0.0 min
Primary     =       7.68 cfs @   12.19 hrs,  Volume=          2.048 af
    Routed to Pond 34P : Bio-Retention Area
Secondary =         0.00 cfs @    0.00 hrs,  Volume=          0.000 af
    Routed to Pond 34P : Bio-Retention Area

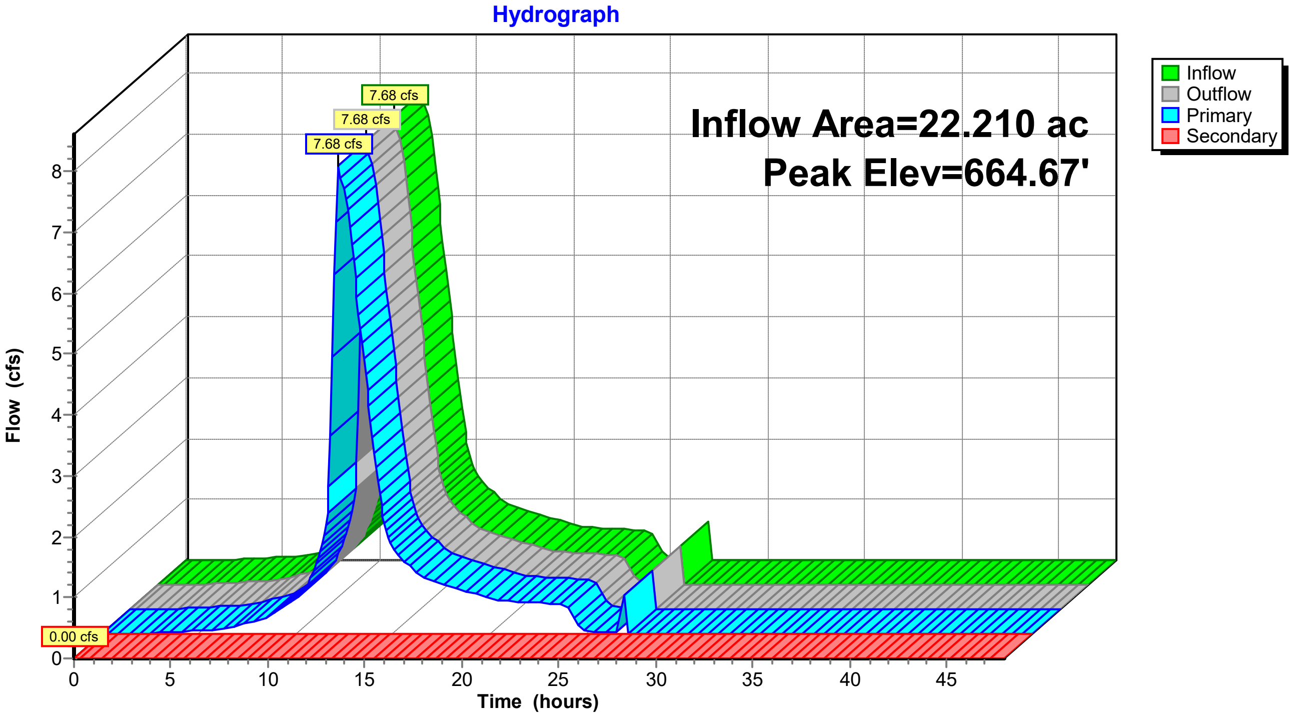
Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 664.67' @ 13.03 hrs
Flood Elev= 665.00'

Device  Routing          Invert   Outlet Devices
------------------------------------------------------------------------------
   #1   Primary         663.00'   0.3" Horiz. Orifice/Grate X 650.00    C= 0.600
                                  Limited to weir flow at low heads
   #2   Primary         663.32'   0.3" Vert. Orifice/Grate X 650.00    C= 0.600
                                  Limited to weir flow at low heads
   #3   Primary         663.32'   0.3" Vert. Orifice/Grate X 650.00    C= 0.600
                                  Limited to weir flow at low heads
   #4   Primary         663.94'   0.3" Vert. Orifice/Grate X 650.00    C= 0.600
                                  Limited to weir flow at low heads
   #5   Primary         663.94'   0.3" Vert. Orifice/Grate X 650.00    C= 0.600
                                  Limited to weir flow at low heads
   #6   Primary         664.25'   0.3" Horiz. Orifice/Grate X 650.00    C= 0.600
                                  Limited to weir flow at low heads
   #7   Secondary       664.90'   15.0" Horiz. Orifice/Grate    C= 0.600
                                  Limited to weir flow at low heads

Primary OutFlow  Max=7.38 cfs @ 12.19 hrs  HW=664.53'  TW=663.69'   (Dynamic Tailwater)
├─1=Orifice/Grate  (Orifice Controls 1.41 cfs @ 4.41 fps)
├─2=Orifice/Grate  (Orifice Controls 1.41 cfs @ 4.41 fps)
├─3=Orifice/Grate  (Orifice Controls 1.41 cfs @ 4.41 fps)
├─4=Orifice/Grate  (Orifice Controls 1.17 cfs @ 3.67 fps)
├─5=Orifice/Grate  (Orifice Controls 1.17 cfs @ 3.67 fps)
└─6=Orifice/Grate  (Orifice Controls 0.82 cfs @ 2.56 fps)

Secondary OutFlow  Max=0.00 cfs @ 0.00 hrs  HW=663.00'  TW=663.00'   (Dynamic Tailwater)
└─7=Orifice/Grate  ( Controls 0.00 cfs)
```

Pond 38P: Level Spreader



Summary for Pond 39P: Level Spreader

Inflow Area = 0.206 ac, 0.00% Impervious, Inflow Depth = 71.03" for 10-yr event
Inflow = 4.95 cfs @ 12.26 hrs, Volume= 1.219 af
Outflow = 4.95 cfs @ 12.26 hrs, Volume= 1.219 af, Atten= 0%, Lag= 0.0 min
Primary = 4.95 cfs @ 12.26 hrs, Volume= 1.218 af
Routed to Pond 34P : Bio-Retention Area
Secondary = 0.05 cfs @ 13.10 hrs, Volume= 0.001 af
Routed to Pond 34P : Bio-Retention Area

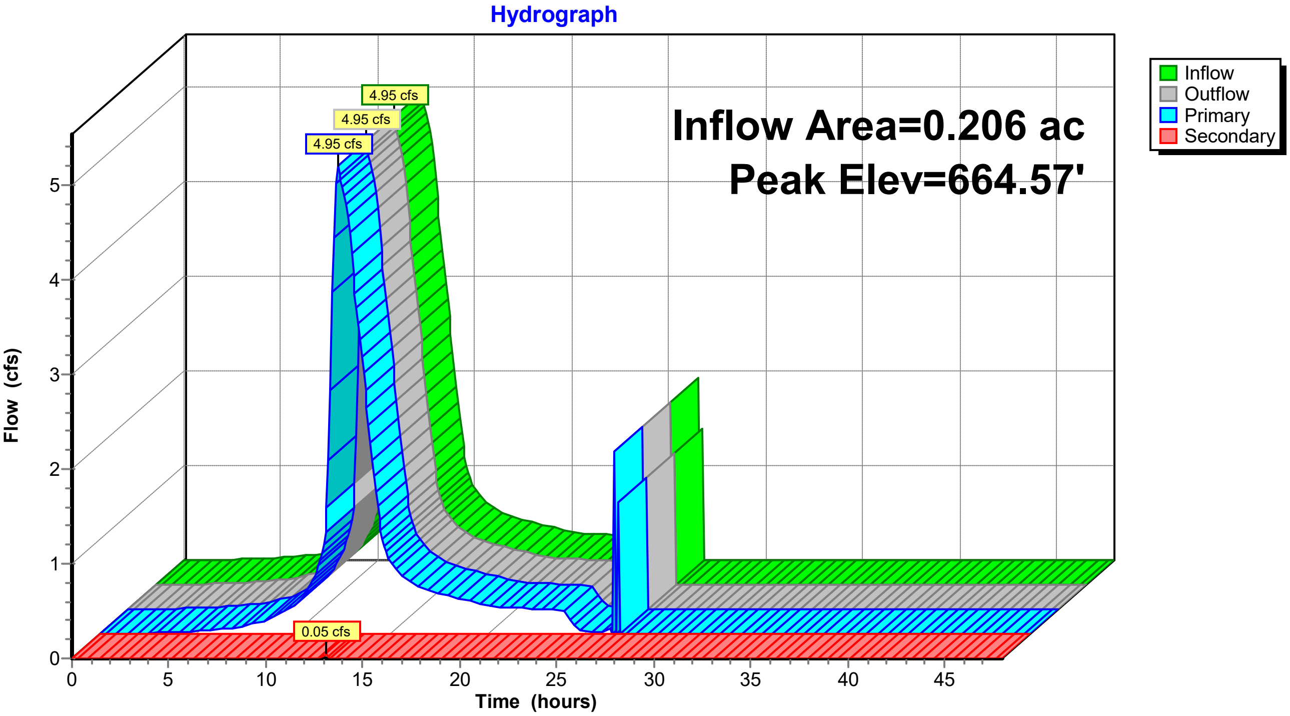
Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 664.57' @ 13.10 hrs
Flood Elev= 665.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	663.00'	**0.3" Horiz. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	663.25'	**0.3" Vert. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#3	Primary	663.25'	**0.3" Vert. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#4	Primary	663.75'	**0.3" Vert. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#5	Primary	663.75'	**0.3" Vert. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#6	Primary	664.00'	**0.3" Horiz. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#7	Secondary	664.55'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.74 cfs @ 12.26 hrs HW=664.27' TW=663.75' (Dynamic Tailwater)
├─**1=Orifice/Grate** (Orifice Controls 0.83 cfs @ 3.47 fps)
├─**2=Orifice/Grate** (Orifice Controls 0.83 cfs @ 3.47 fps)
├─**3=Orifice/Grate** (Orifice Controls 0.83 cfs @ 3.47 fps)
├─**4=Orifice/Grate** (Orifice Controls 0.82 cfs @ 3.44 fps)
├─**5=Orifice/Grate** (Orifice Controls 0.82 cfs @ 3.44 fps)
└─**6=Orifice/Grate** (Orifice Controls 0.60 cfs @ 2.51 fps)

Secondary OutFlow Max=0.05 cfs @ 13.10 hrs HW=664.57' TW=664.31' (Dynamic Tailwater)
└─**7=Orifice/Grate** (Weir Controls 0.05 cfs @ 0.48 fps)

Pond 39P: Level Spreader



Summary for Pond 53P: West Pre-Treatment to Bio-Retention Area

Inflow Area = 22.210 ac, 56.32% Impervious, Inflow Depth = 1.21" for 10-yr event
Inflow = 20.55 cfs @ 12.07 hrs, Volume= 2.245 af
Outflow = 16.10 cfs @ 12.26 hrs, Volume= 2.193 af, Atten= 22%, Lag= 11.5 min
Primary = 7.68 cfs @ 12.19 hrs, Volume= 2.048 af
Routed to Pond 38P : Level Spreader
Secondary = 8.55 cfs @ 12.26 hrs, Volume= 0.145 af
Routed to Reach 8R : Western Overflow Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 666.17' @ 12.27 hrs Surf.Area= 9,522 sf Storage= 17,804 cf

Plug-Flow detention time= 44.7 min calculated for 2.193 af (98% of inflow)
Center-of-Mass det. time= 30.4 min (853.3 - 823.0)

Volume	Invert	Avail.Storage	Storage Description
#1	663.00'	21,098 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

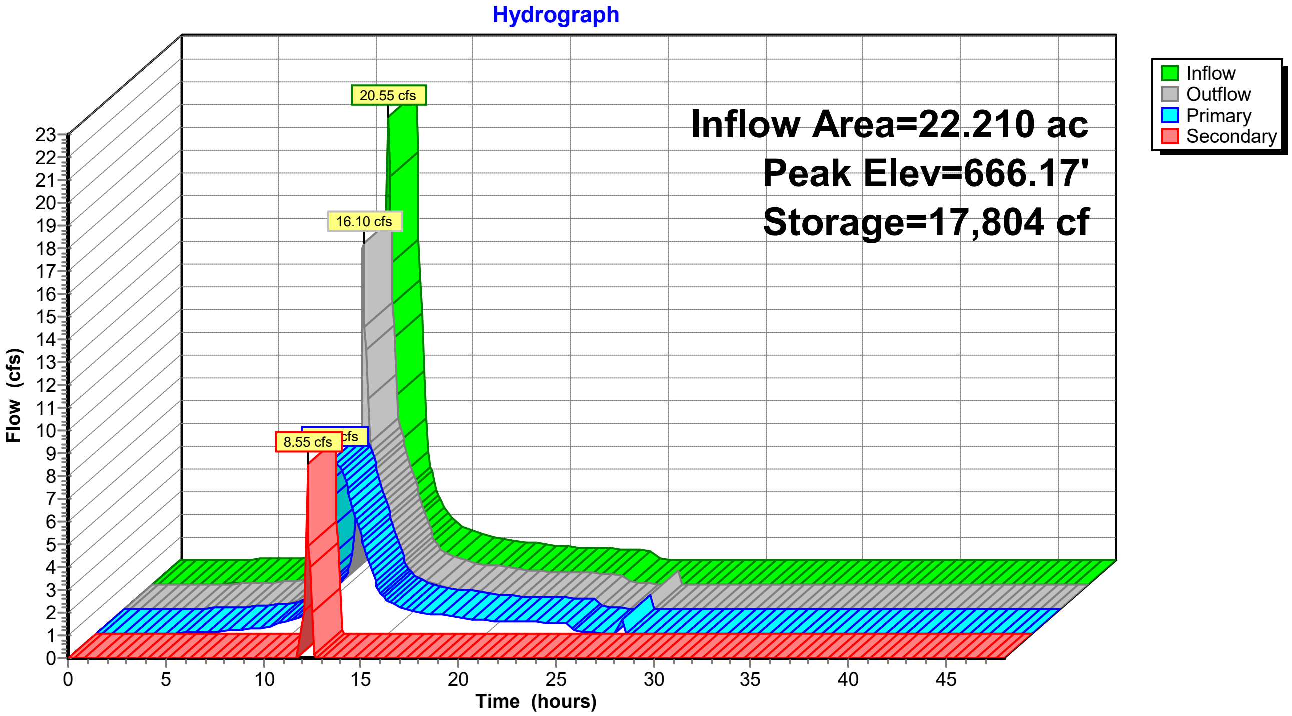
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.00	5	0	0
664.00	4,770	2,388	2,388
665.00	6,900	5,835	8,223
666.00	9,140	8,020	16,243
666.50	10,280	4,855	21,098

Device	Routing	Invert	Outlet Devices
#1	Primary	663.04'	**15.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 663.04' / 663.00' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	666.05'	**100.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=7.34 cfs @ 12.19 hrs HW=666.08' TW=664.53' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 7.34 cfs @ 5.99 fps)

Secondary OutFlow Max=7.53 cfs @ 12.26 hrs HW=666.15' TW=665.49' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 7.53 cfs @ 0.74 fps)

Pond 53P: West Pre-Treatment to Bio-Retention Area



Summary for Pond 55P: North Pre-Treatment to Bio-Retention Area

Inflow Area = 0.206 ac, 0.00% Impervious, Inflow Depth = 76.35" for 10-yr event
Inflow = 10.32 cfs @ 12.11 hrs, Volume= 1.310 af
Outflow = 8.36 cfs @ 12.32 hrs, Volume= 1.290 af, Atten= 19%, Lag= 12.5 min
Primary = 4.95 cfs @ 12.26 hrs, Volume= 1.219 af
Routed to Pond 39P : Level Spreader
Secondary = 3.49 cfs @ 12.32 hrs, Volume= 0.071 af
Routed to Reach 6R : North Property Line Ditch (Central)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs
Peak Elev= 665.92' @ 12.32 hrs Surf.Area= 4,375 sf Storage= 8,524 cf

Plug-Flow detention time= 44.4 min calculated for 1.290 af (98% of inflow)
Center-of-Mass det. time= 34.9 min (853.8 - 819.0)

Volume	Invert	Avail.Storage	Storage Description
#1	663.00'	11,188 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

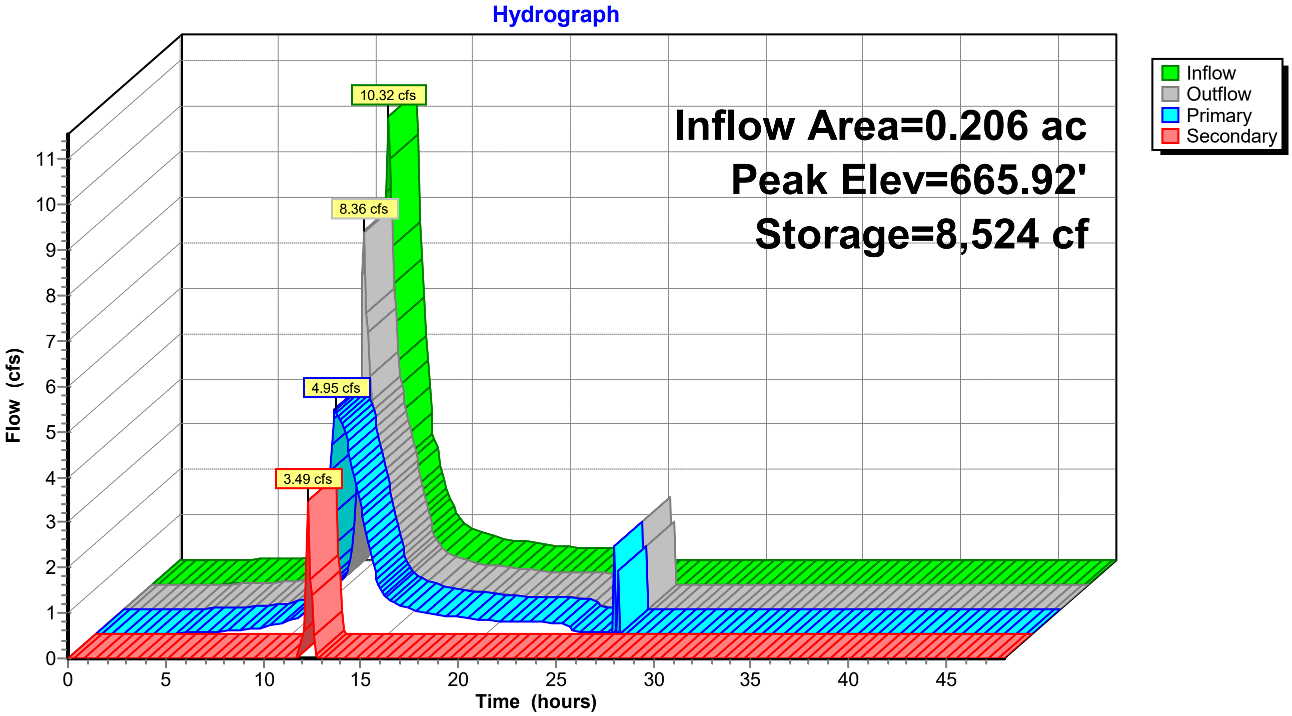
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.00	5	0	0
664.00	2,975	1,490	1,490
665.00	3,675	3,325	4,815
666.00	4,435	4,055	8,870
666.50	4,835	2,318	11,188

Device	Routing	Invert	Outlet Devices
#1	Primary	663.05'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 663.05' / 663.00' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Secondary	665.85'	**75.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=4.84 cfs @ 12.26 hrs HW=665.91' TW=664.27' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 4.84 cfs @ 6.16 fps)

Secondary OutFlow Max=3.33 cfs @ 12.32 hrs HW=665.92' TW=664.40' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 3.33 cfs @ 0.64 fps)

Pond 55P: North Pre-Treatment to Bio-Retention Area

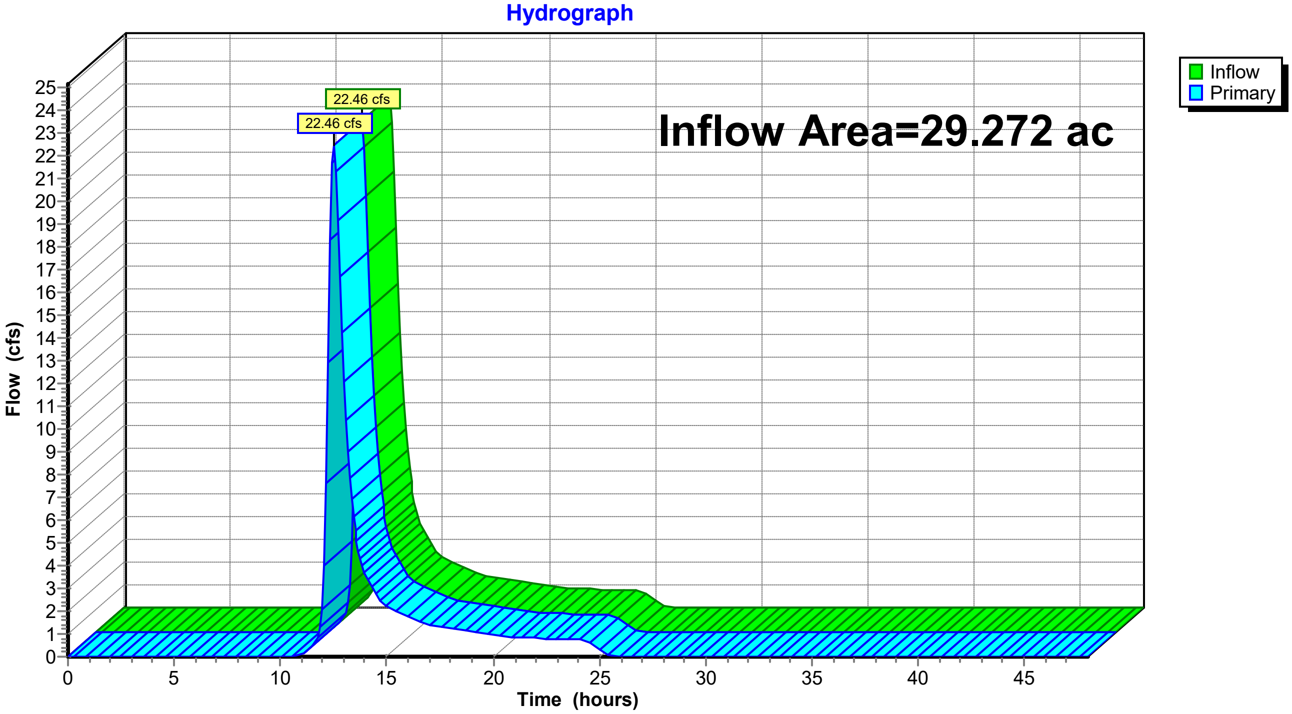


Summary for Link 1L: West Property Line and Adjacent Wetland

Inflow Area = 29.272 ac, 0.00% Impervious, Inflow Depth = 1.22" for 10-yr event
Inflow = 22.46 cfs @ 12.50 hrs, Volume= 2.978 af
Primary = 22.46 cfs @ 12.50 hrs, Volume= 2.978 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs

Link 1L: West Property Line and Adjacent Wetland

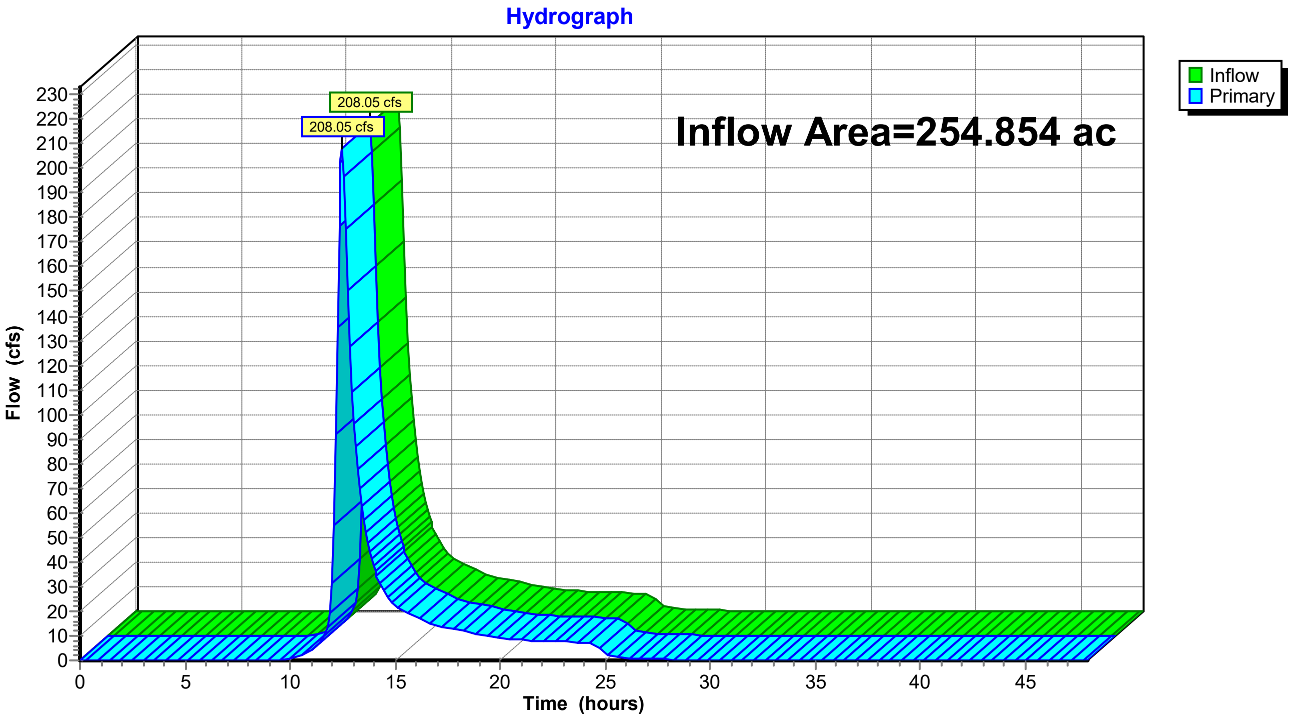


Summary for Link 2L: Total Discharge at Design Points

Inflow Area =	254.854 ac,	4.91% Impervious,	Inflow Depth > 1.41"	for 10-yr event
Inflow =	208.05 cfs @	12.49 hrs, Volume=	29.843 af	
Primary =	208.05 cfs @	12.49 hrs, Volume=	29.843 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs

Link 2L: Total Discharge at Design Points

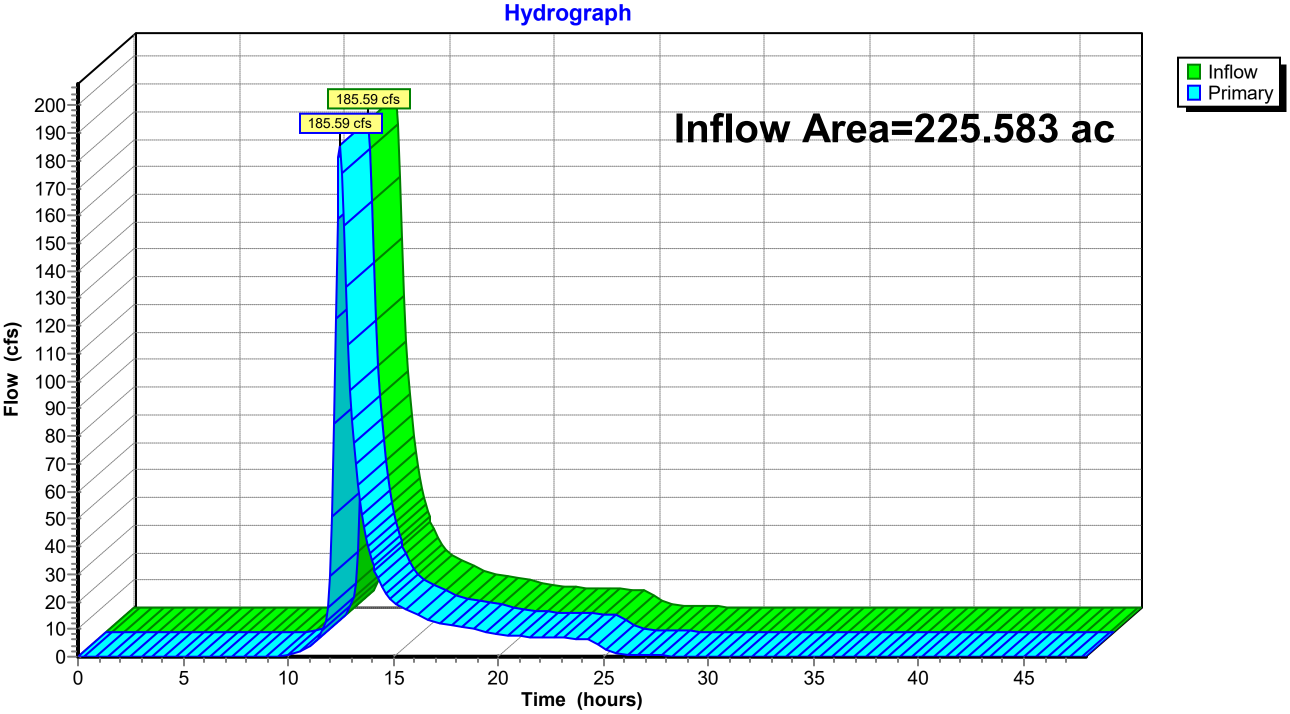


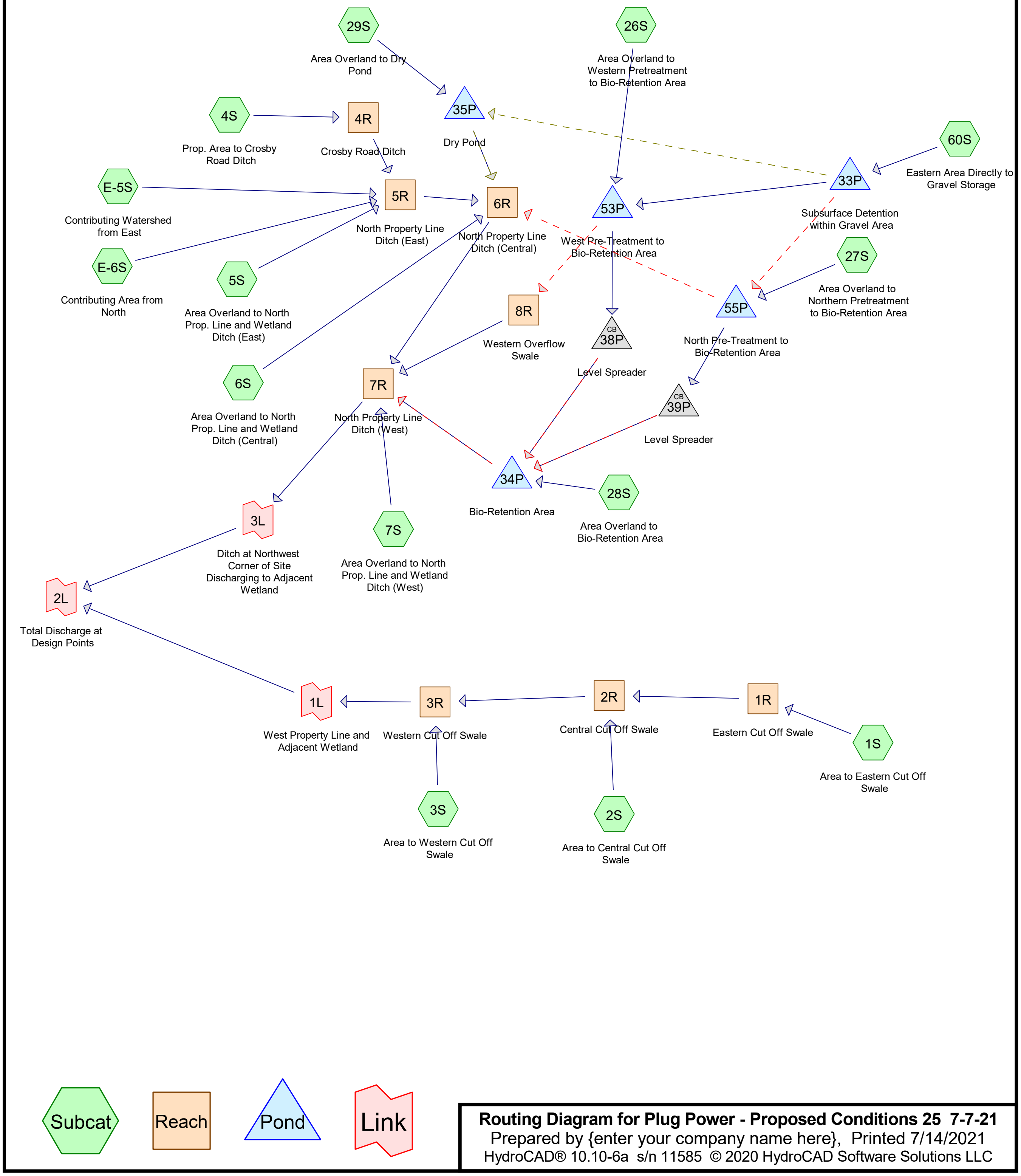
Summary for Link 3L: Ditch at Northwest Corner of Site Discharging to Adjacent Wetland

Inflow Area = 225.583 ac, 5.55% Impervious, Inflow Depth > 1.43" for 10-yr event
Inflow = 185.59 cfs @ 12.49 hrs, Volume= 26.865 af
Primary = 185.59 cfs @ 12.49 hrs, Volume= 26.865 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-47.97 hrs, dt= 0.09 hrs

Link 3L: Ditch at Northwest Corner of Site Discharging to Adjacent Wetland





Routing Diagram for Plug Power - Proposed Conditions 25 7-7-21
Prepared by {enter your company name here}, Printed 7/14/2021
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Project Notes

Defined 9 rainfall events from Gateway IDF

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.164	80	>75% Grass cover, Good, HSG D (26S, 27S, 28S, 29S, 60S)
2.119	77	Brush, Fair, HSG D (5S, 6S, 7S)
1.861	73	Brush, Good, HSG D (1S, 2S, 3S)
3.004	80	Gravel Storage Area, Good, HSG D (60S)
1.050	96	Gravel surface, HSG D (E-5S)
7.585	78	Meadow, non-grazed, HSG D (1S, 2S, 3S, 60S)
103.070	84	Pasture/grassland/range, Fair, HSG D (E-5S)
5.945	98	Paved parking, HSG D (60S)
5.115	98	Roofs, HSG D (60S)
15.560	89	Row crops, straight row, Good, HSG D (3S, E-6S)
1.449	98	Unconnected pavement, HSG D (60S)
2.970	98	Water Surface, 0% imp, HSG D (E-5S)
95.731	79	Woods, Fair, HSG D (1S, 2S, 3S, E-5S)
0.230	79	Woods/grass comb., Good, HSG D (4S)
254.854	**83**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
254.854	HSG D	1S, 2S, 3S, 4S, 5S, 6S, 7S, 26S, 27S, 28S, 29S, 60S, E-5S, E-6S
0.000	Other	
254.854		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	9.164	0.000	9.164	>75% Grass cover, Good	26S, 27S, 28S, 29S, 60S
0.000	0.000	0.000	2.119	0.000	2.119	Brush, Fair	5S, 6S, 7S
0.000	0.000	0.000	1.861	0.000	1.861	Brush, Good	1S, 2S, 3S
0.000	0.000	0.000	3.004	0.000	3.004	Gravel Storage Area, Good	60S
0.000	0.000	0.000	1.050	0.000	1.050	Gravel surface	E-5S
0.000	0.000	0.000	7.585	0.000	7.585	Meadow, non-grazed	1S, 2S, 3S, 60S
0.000	0.000	0.000	103.070	0.000	103.070	Pasture/grassland/range, Fair	E-5S
0.000	0.000	0.000	5.945	0.000	5.945	Paved parking	60S
0.000	0.000	0.000	5.115	0.000	5.115	Roofs	60S
0.000	0.000	0.000	15.560	0.000	15.560	Row crops, straight row, Good	3S, E-6S
0.000	0.000	0.000	1.449	0.000	1.449	Unconnected pavement	60S
0.000	0.000	0.000	2.970	0.000	2.970	Water Surface, 0% imp	E-5S
0.000	0.000	0.000	95.731	0.000	95.731	Woods, Fair	1S, 2S, 3S, E-5S
0.000	0.000	0.000	0.230	0.000	0.230	Woods/grass comb., Good	4S
0.000	**0.000**	**0.000**	**254.854**	**0.000**	**254.854**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	E-5S	0.00	0.00	75.0	0.0200	0.012	0.0	42.0	0.0
2	33P	664.01	663.90	57.0	0.0019	0.012	0.0	18.0	0.0
3	33P	664.01	663.90	57.0	0.0019	0.012	0.0	18.0	0.0
4	33P	665.71	664.71	50.0	0.0200	0.012	0.0	18.0	0.0
5	33P	666.05	665.05	50.0	0.0200	0.012	0.0	15.0	0.0
6	33P	666.39	665.39	50.0	0.0200	0.012	0.0	12.0	0.0
7	33P	666.56	665.56	50.0	0.0200	0.012	0.0	10.0	0.0
8	34P	660.55	660.50	25.0	0.0020	0.012	0.0	15.0	0.0
9	34P	660.55	660.50	25.0	0.0020	0.012	0.0	15.0	0.0
10	34P	660.56	660.55	5.0	0.0020	0.012	0.0	4.0	0.0
11	34P	660.56	660.55	5.0	0.0020	0.012	0.0	4.0	0.0
12	35P	662.56	662.50	30.0	0.0020	0.012	0.0	12.0	0.0
13	53P	663.04	663.00	20.0	0.0020	0.012	0.0	15.0	0.0
14	55P	663.05	663.00	25.0	0.0020	0.012	0.0	12.0	0.0

Time span=0.00-48.00 hrs, dt=0.59 hrs, 82 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area to Eastern Cut Off Runoff Area=300,195 sf 0.00% Impervious Runoff Depth=1.66"
Flow Length=625' Tc=27.5 min CN=78 Runoff=7.22 cfs 0.953 af

Subcatchment 2S: Area to Central Cut Off Runoff Area=542,635 sf 0.00% Impervious Runoff Depth=1.66"
Flow Length=1,100' Tc=42.2 min CN=78 Runoff=11.82 cfs 1.722 af

Subcatchment 3S: Area to Western Cut Off Runoff Area=432,245 sf 0.00% Impervious Runoff Depth=1.88"
Flow Length=1,100' Tc=51.3 min CN=81 Runoff=9.33 cfs 1.555 af

Subcatchment 4S: Prop. Area to Crosby Runoff Area=10,015 sf 0.00% Impervious Runoff Depth=1.73"
Flow Length=125' Slope=0.0100 '/' Tc=23.3 min CN=79 Runoff=0.24 cfs 0.033 af

Subcatchment 5S: Area Overland to North Runoff Area=47,675 sf 0.00% Impervious Runoff Depth=1.59"
Flow Length=140' Tc=11.7 min CN=77 Runoff=0.97 cfs 0.145 af

Subcatchment 6S: Area Overland to North Runoff Area=23,585 sf 0.00% Impervious Runoff Depth=1.59"
Flow Length=100' Tc=10.8 min CN=77 Runoff=0.50 cfs 0.072 af

Subcatchment 7S: Area Overland to North Runoff Area=21,065 sf 0.00% Impervious Runoff Depth=1.59"
Flow Length=170' Tc=14.9 min CN=77 Runoff=0.38 cfs 0.064 af

Subcatchment 26S: Area Overland to Runoff Area=19,545 sf 0.00% Impervious Runoff Depth=1.80"
Flow Length=45' Slope=0.0100 '/' Tc=12.2 min CN=80 Runoff=0.45 cfs 0.067 af

Subcatchment 27S: Area Overland to Runoff Area=8,970 sf 0.00% Impervious Runoff Depth=1.80"
Tc=5.0 min CN=80 Runoff=0.27 cfs 0.031 af

Subcatchment 28S: Area Overland to Runoff Area=71,325 sf 0.00% Impervious Runoff Depth=1.80"
Flow Length=30' Tc=5.4 min CN=80 Runoff=2.15 cfs 0.246 af

Subcatchment 29S: Area Overland to Dry Runoff Area=33,090 sf 0.00% Impervious Runoff Depth=1.80"
Tc=5.0 min CN=80 Runoff=1.01 cfs 0.114 af

Subcatchment 60S: Eastern Area Directly Runoff Area=21.761 ac 57.48% Impervious Runoff Depth=2.65"
Flow Length=330' Tc=30.2 min CN=90 Runoff=35.99 cfs 4.797 af

Subcatchment E-5S: Contributing Runoff Area=185.750 ac 0.00% Impervious Runoff Depth=1.96"
Flow Length=4,945' Tc=42.4 min CN=82 Runoff=211.21 cfs 30.299 af

Subcatchment E-6S: Contributing Area Runoff Area=12.670 ac 0.00% Impervious Runoff Depth=2.55"
Flow Length=450' Slope=0.0100 '/' Tc=14.1 min CN=89 Runoff=17.60 cfs 2.694 af

Reach 1R: Eastern Cut Off Swale Avg. Flow Depth=0.65' Max Vel=1.88 fps Inflow=7.22 cfs 0.953 af
n=0.030 L=700.0' S=0.0050 '/' Capacity=43.86 cfs Outflow=6.44 cfs 0.953 af

Reach 2R: Central Cut Off Swale Avg. Flow Depth=1.02' Max Vel=2.40 fps Inflow=18.26 cfs 2.675 af
n=0.030 L=500.0' S=0.0050 '/' Capacity=88.03 cfs Outflow=16.88 cfs 2.675 af

Reach 3R: Western Cut Off Swale Avg. Flow Depth=1.28' Max Vel=2.73 fps Inflow=26.21 cfs 4.229 af
n=0.030 L=600.0' S=0.0050 '/' Capacity=73.73 cfs Outflow=24.50 cfs 4.229 af

Reach 4R: Crosby Road Ditch Avg. Flow Depth=0.10' Max Vel=0.91 fps Inflow=0.24 cfs 0.033 af
n=0.030 L=450.0' S=0.0089 '/' Capacity=98.41 cfs Outflow=0.22 cfs 0.033 af

Reach 5R: North Property Line Ditch Avg. Flow Depth=2.22' Max Vel=4.00 fps Inflow=224.38 cfs 33.171 af
n=0.030 L=670.0' S=0.0055 '/' Capacity=471.44 cfs Outflow=211.68 cfs 33.171 af

Reach 6R: North Property Line Ditch Avg. Flow Depth=2.34' Max Vel=3.49 fps Inflow=212.72 cfs 33.864 af
n=0.030 L=500.0' S=0.0040 '/' Capacity=401.23 cfs Outflow=203.56 cfs 33.864 af

Reach 7R: North Property Line Ditch Avg. Flow Depth=2.58' Max Vel=2.84 fps Inflow=209.68 cfs 37.415 af
n=0.030 L=500.0' S=0.0024 '/' Capacity=463.27 cfs Outflow=201.27 cfs 37.412 af

Reach 8R: Western Overflow Swale Avg. Flow Depth=0.65' Max Vel=2.77 fps Inflow=7.18 cfs 0.505 af
n=0.030 L=500.0' S=0.0100 '/' Capacity=43.30 cfs Outflow=7.09 cfs 0.520 af

Pond 33P: Subsurface Detention within Peak Elev=666.59' Storage=6,710 cf Inflow=35.99 cfs 4.797 af
Primary=19.19 cfs 2.897 af Secondary=9.63 cfs 1.663 af Tertiary=3.81 cfs 0.283 af Outflow=32.55 cfs 4.843 af

Pond 34P: Bio-Retention Area Peak Elev=664.36' Storage=72,612 cf Inflow=14.76 cfs 4.185 af
Primary=10.36 cfs 2.967 af Secondary=0.00 cfs 0.000 af Outflow=10.36 cfs 2.967 af

Pond 35P: Dry Pond Peak Elev=664.23' Storage=15,110 cf Inflow=4.04 cfs 0.397 af
Primary=1.11 cfs 0.397 af Tertiary=0.00 cfs 0.000 af Outflow=1.11 cfs 0.397 af

Pond 38P: Level Spreader Peak Elev=664.75' Inflow=8.70 cfs 2.461 af
Primary=8.70 cfs 2.461 af Secondary=0.00 cfs 0.000 af Outflow=8.70 cfs 2.461 af

Pond 39P: Level Spreader Peak Elev=664.49' Inflow=5.64 cfs 1.478 af
Primary=5.64 cfs 1.478 af Secondary=0.00 cfs 0.000 af Outflow=5.64 cfs 1.478 af

Pond 53P: West Pre-Treatment to Peak Elev=666.30' Storage=19,043 cf Inflow=19.50 cfs 2.964 af
Primary=8.70 cfs 2.461 af Secondary=7.18 cfs 0.505 af Outflow=14.98 cfs 2.966 af

Pond 55P: North Pre-Treatment to Peak Elev=666.06' Storage=9,129 cf Inflow=9.70 cfs 1.694 af
Primary=5.64 cfs 1.478 af Secondary=4.44 cfs 0.224 af Outflow=9.39 cfs 1.701 af

Link 1L: West Property Line and Adjacent Wetland Inflow=24.50 cfs 4.229 af
Primary=24.50 cfs 4.229 af

Link 2L: Total Discharge at Design Points Inflow=226.52 cfs 41.642 af
Primary=226.52 cfs 41.642 af

Link 3L: Ditch at Northwest Corner of Site Discharging to Adjacent Inflow=201.27 cfs 37.412 af
Primary=201.27 cfs 37.412 af

Total Runoff Area = 254.854 ac Runoff Volume = 42.792 af Average Runoff Depth = 2.01"
95.09% Pervious = 242.345 ac 4.91% Impervious = 12.509 ac

Summary for Subcatchment 1S: Area to Eastern Cut Off Swale

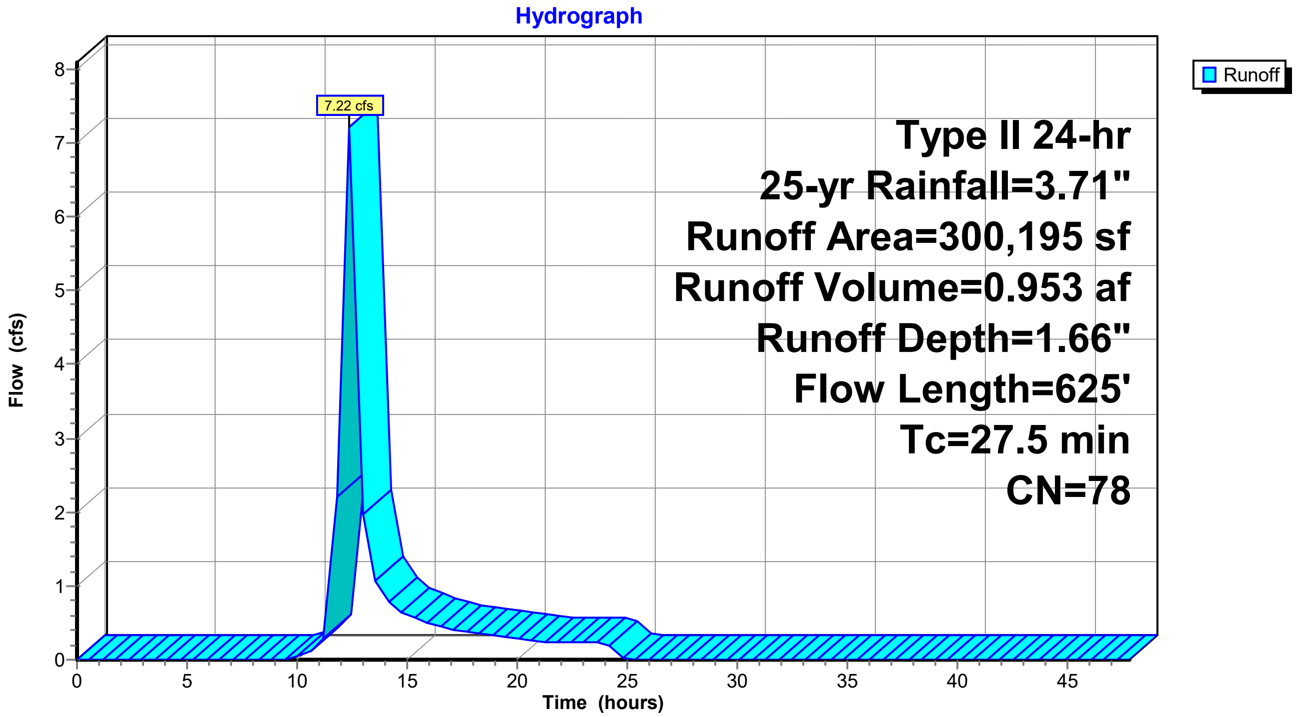
Runoff = 7.22 cfs @ 12.38 hrs, Volume= 0.953 af, Depth= 1.66"
Routed to Reach 1R : Eastern Cut Off Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
83,440	78	Meadow, non-grazed, HSG D
185,160	79	Woods, Fair, HSG D
31,595	73	Brush, Good, HSG D
300,195	78	Weighted Average
300,195		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0120	0.13		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.7	90	0.0150	0.86		**Shallow Concentrated Flow, 90' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
12.7	435	0.0130	0.57		**Shallow Concentrated Flow, 435' Shallow Conc. Flow** Woodland Kv= 5.0 fps
27.5	625	Total			

Subcatchment 1S: Area to Eastern Cut Off Swale



Summary for Subcatchment 2S: Area to Central Cut Off Swale

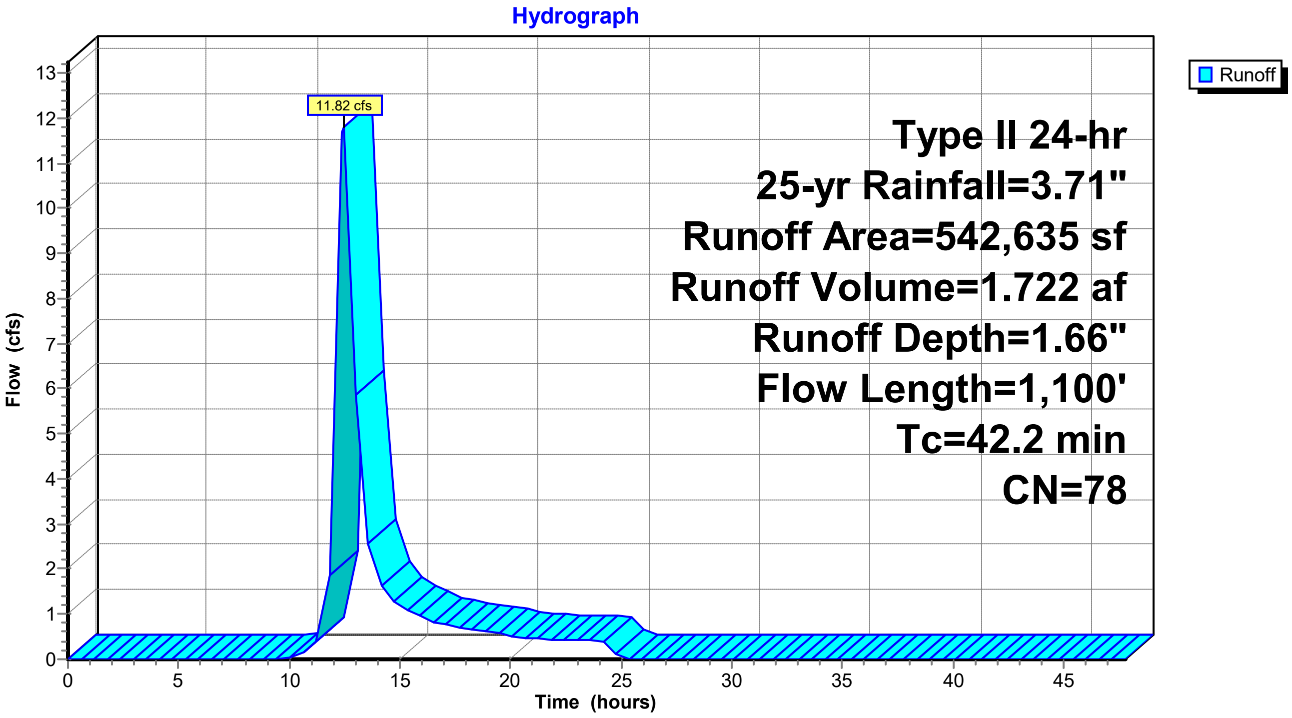
Runoff = 11.82 cfs @ 12.47 hrs, Volume= 1.722 af, Depth= 1.66"
Routed to Reach 2R : Central Cut Off Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
333,020	79	Woods, Fair, HSG D
189,965	78	Meadow, non-grazed, HSG D
19,650	73	Brush, Good, HSG D
542,635	78	Weighted Average
542,635		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
7.3	375	0.0150	0.86		**Shallow Concentrated Flow, 375' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
20.8	625	0.0100	0.50		**Shallow Concentrated Flow, 625' Shallow Conc. Flow** Woodland Kv= 5.0 fps
42.2	1,100	Total			

Subcatchment 2S: Area to Central Cut Off Swale



Summary for Subcatchment 3S: Area to Western Cut Off Swale

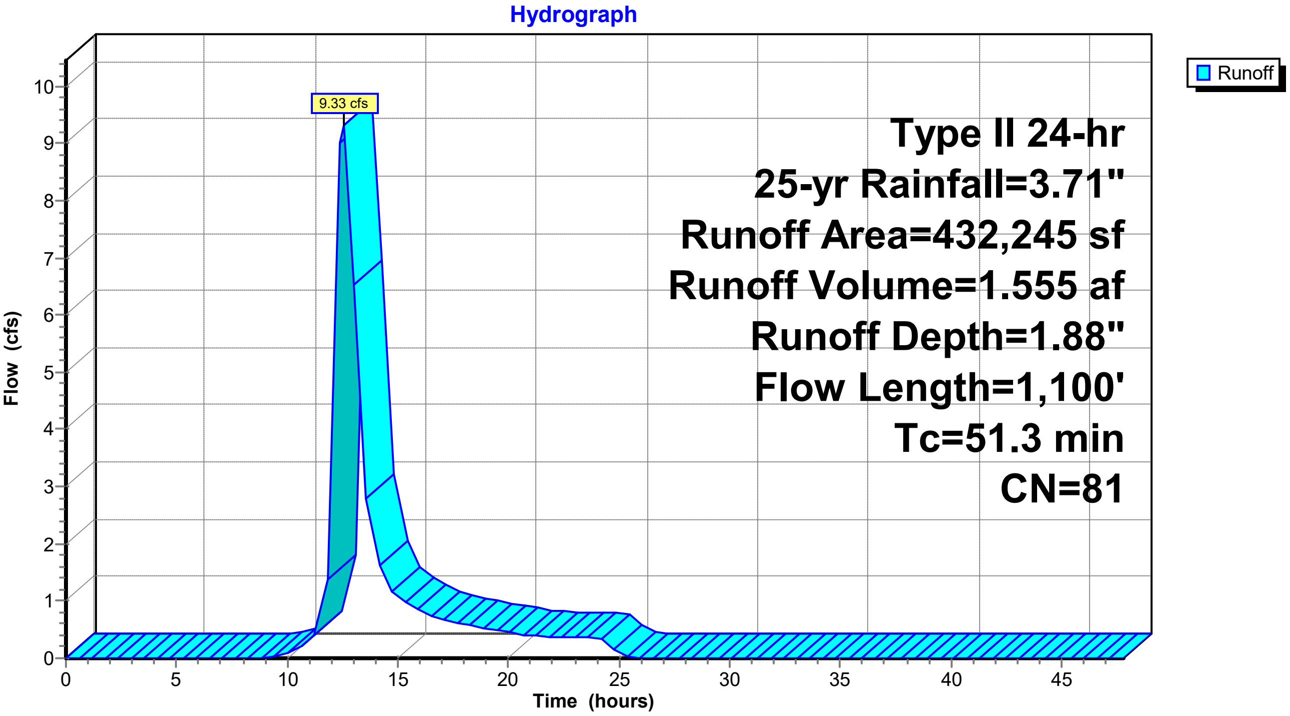
Runoff = 9.33 cfs @ 12.54 hrs, Volume= 1.555 af, Depth= 1.88"
Routed to Reach 3R : Western Cut Off Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
125,880	89	Row crops, straight row, Good, HSG D
51,080	78	Meadow, non-grazed, HSG D
225,445	79	Woods, Fair, HSG D
29,840	73	Brush, Good, HSG D
432,245	81	Weighted Average
432,245		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.1	100	0.0050	0.07		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
21.7	650	0.0100	0.50		**Shallow Concentrated Flow, 650' Shallow Conc. Flow** Woodland Kv= 5.0 fps
51.3	1,100	Total			

Subcatchment 3S: Area to Western Cut Off Swale



Summary for Subcatchment 4S: Prop. Area to Crosby Road Ditch

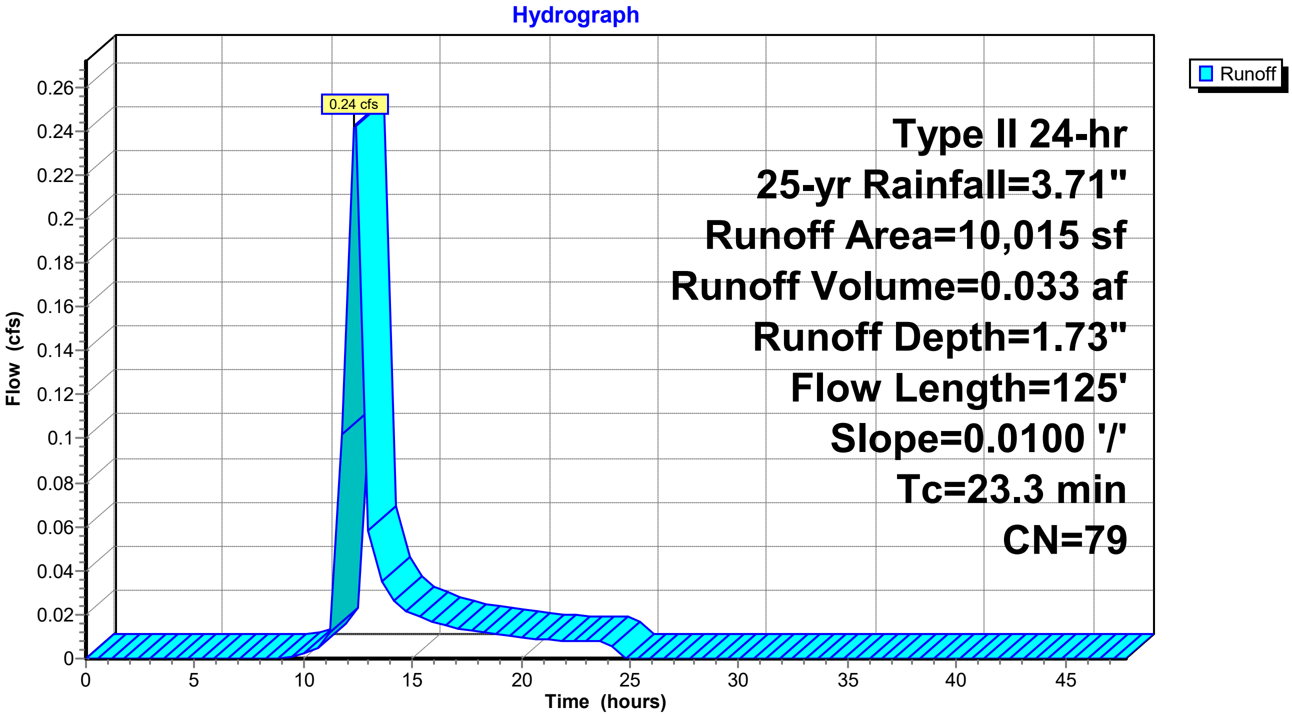
Runoff = 0.24 cfs @ 12.35 hrs, Volume= 0.033 af, Depth= 1.73"
Routed to Reach 4R : Crosby Road Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
10,015	79	Woods/grass comb., Good, HSG D
10,015		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	100	0.0100	0.07		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.3	25	0.0100	1.50		**Shallow Concentrated Flow, 25' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
23.3	125	Total			

Subcatchment 4S: Prop. Area to Crosby Road Ditch



Summary for Subcatchment 5S: Area Overland to North Prop. Line and Wetland Ditch (East)

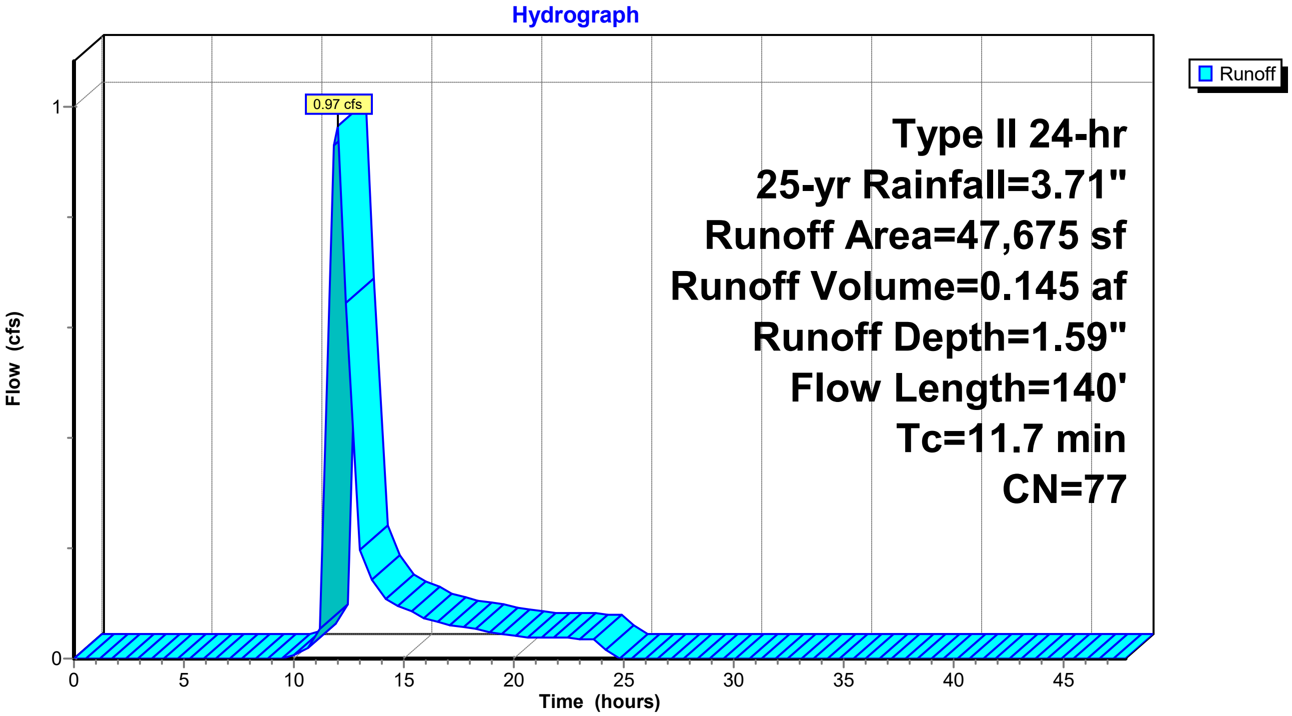
Runoff = 0.97 cfs @ 11.95 hrs, Volume= 0.145 af, Depth= 1.59"
Routed to Reach 5R : North Property Line Ditch (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
47,675	77	Brush, Fair, HSG D
47,675		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	100	0.0200	0.16		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.0	40	0.0100	0.70		**Shallow Concentrated Flow, 40' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
11.7	140	Total			

Subcatchment 5S: Area Overland to North Prop. Line and Wetland Ditch (East)



Summary for Subcatchment 6S: Area Overland to North Prop. Line and Wetland Ditch (Central)

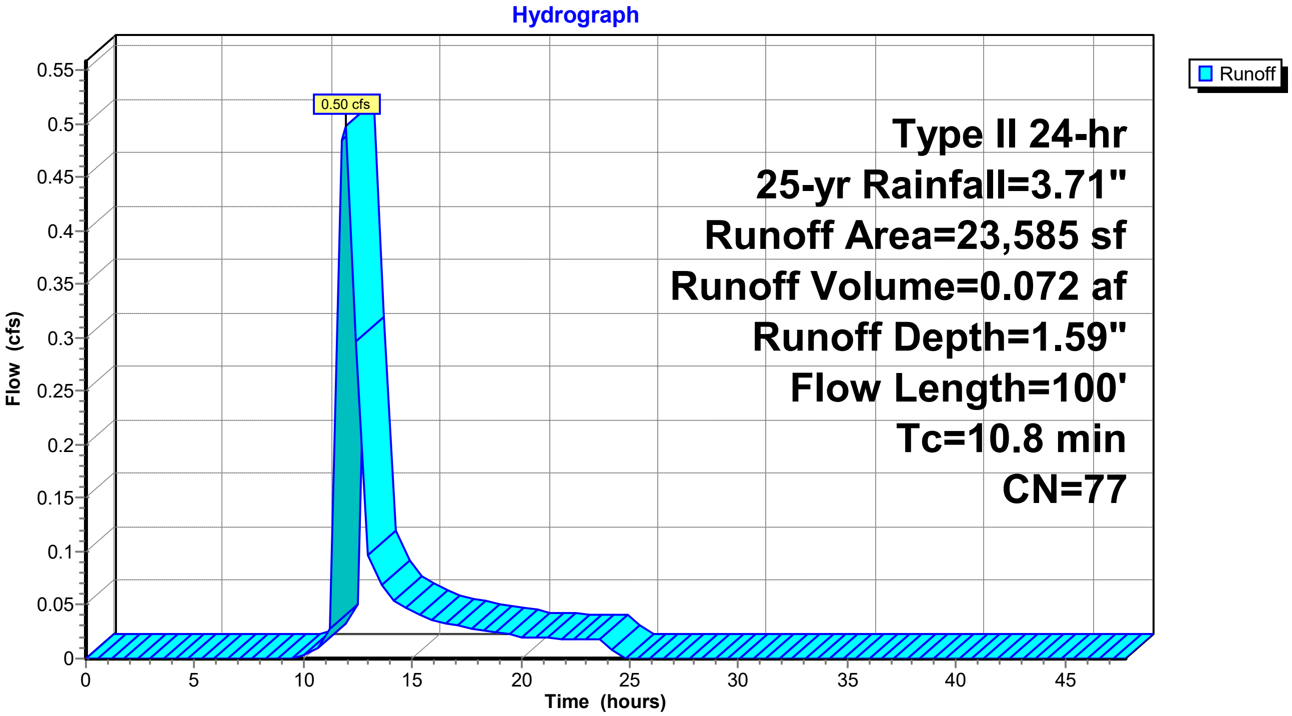
Runoff = 0.50 cfs @ 11.92 hrs, Volume= 0.072 af, Depth= 1.59"
Routed to Reach 6R : North Property Line Ditch (Central)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
23,585	77	Brush, Fair, HSG D
23,585		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	70	0.0100	0.11		**Sheet Flow, 70' Overland Flow** Range n= 0.130 P2= 2.14"
0.2	30	0.1000	2.21		**Shallow Concentrated Flow, 30' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
10.8	100	Total			

Subcatchment 6S: Area Overland to North Prop. Line and Wetland Ditch (Central)



Summary for Subcatchment 7S: Area Overland to North Prop. Line and Wetland Ditch (West)

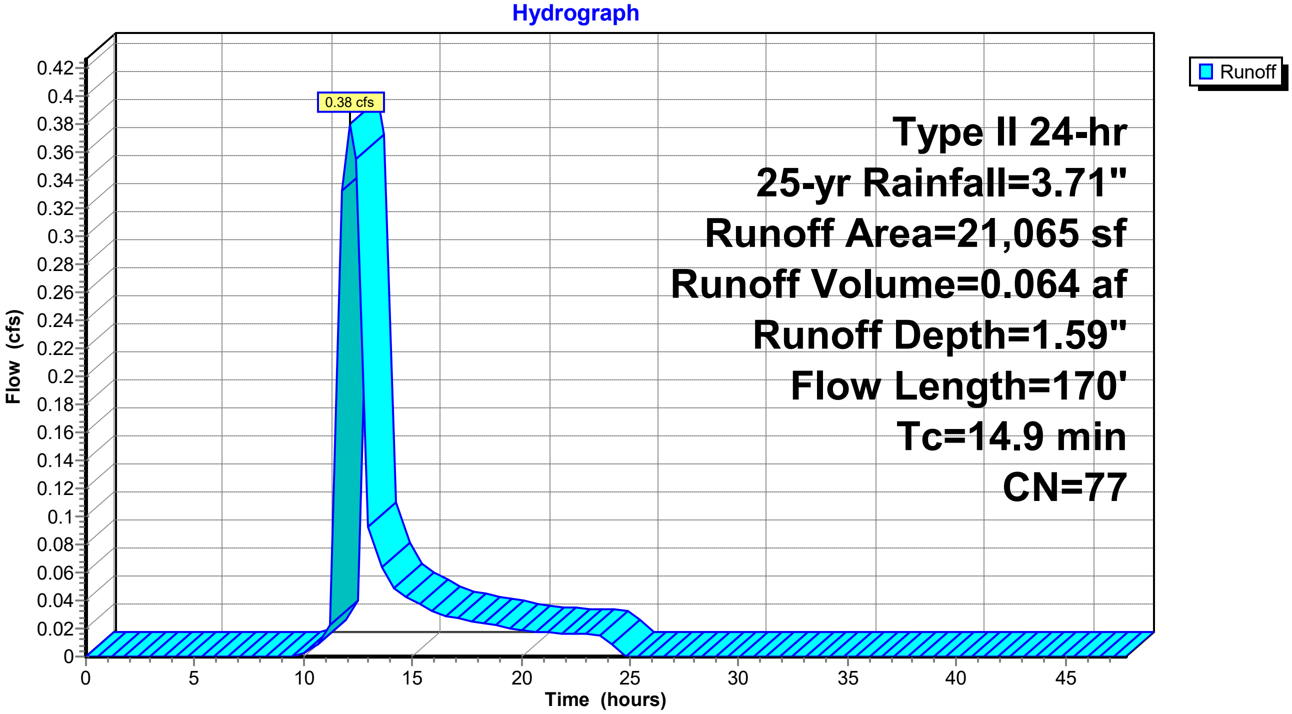
Runoff = 0.38 cfs @ 12.14 hrs, Volume= 0.064 af, Depth= 1.59"
Routed to Reach 7R : North Property Line Ditch (West)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
21,065	77	Brush, Fair, HSG D
21,065		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
0.8	70	0.0400	1.40		**Shallow Concentrated Flow, 70' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
14.9	170	Total			

Subcatchment 7S: Area Overland to North Prop. Line and Wetland Ditch (West)



Summary for Subcatchment 26S: Area Overland to Western Pretreatment to Bio-Retention Area

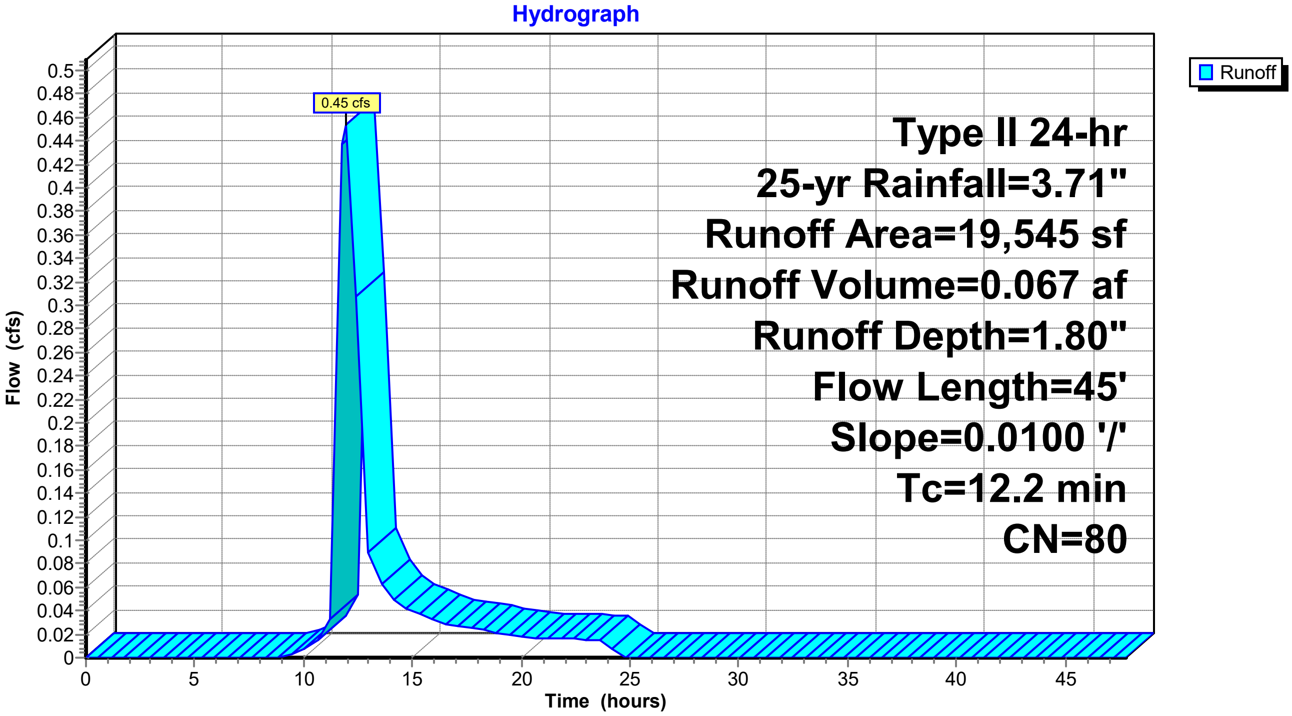
Runoff = 0.45 cfs @ 11.95 hrs, Volume= 0.067 af, Depth= 1.80"
Routed to Pond 53P : West Pre-Treatment to Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
19,545	80	>75% Grass cover, Good, HSG D
19,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	45	0.0100	0.06		**Sheet Flow, 45' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"

Subcatchment 26S: Area Overland to Western Pretreatment to Bio-Retention Area



Summary for Subcatchment 27S: Area Overland to Northern Pretreatment to Bio-Retention Area

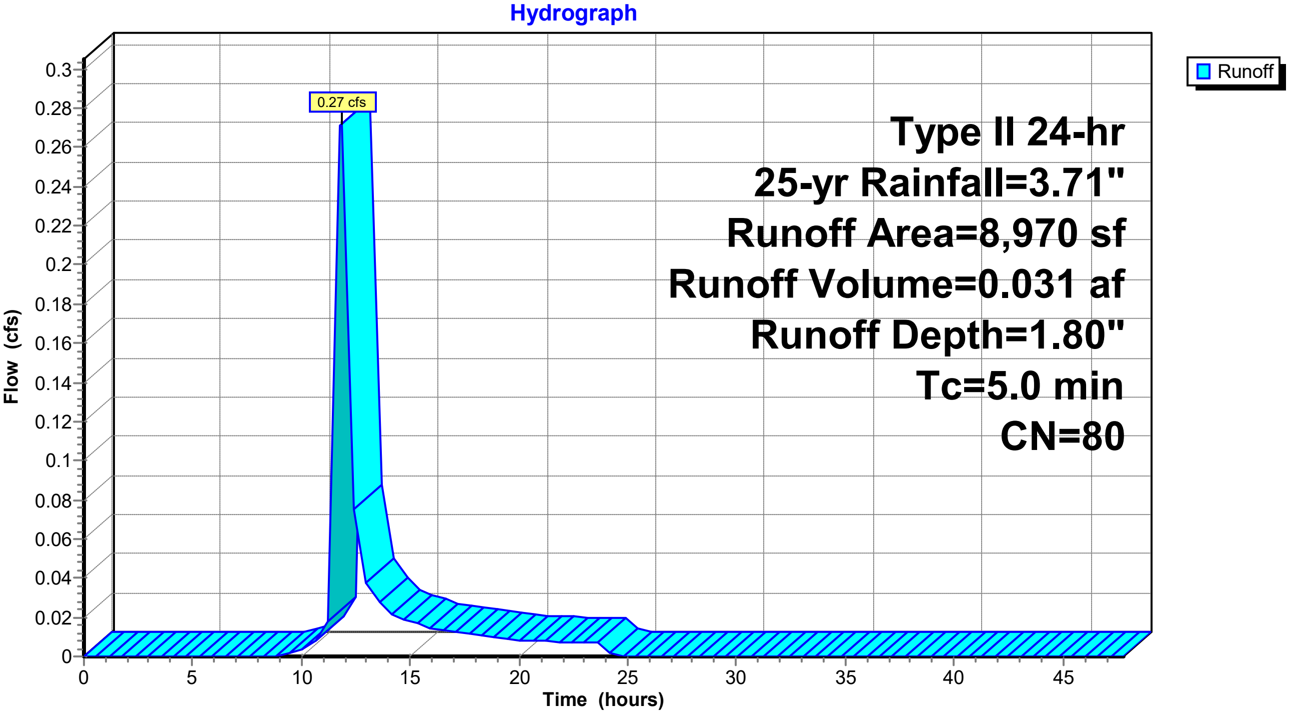
Runoff = 0.27 cfs @ 11.84 hrs, Volume= 0.031 af, Depth= 1.80"
Routed to Pond 55P : North Pre-Treatment to Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
8,970	80	>75% Grass cover, Good, HSG D
8,970		100.00% Pervious Area

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

Subcatchment 27S: Area Overland to Northern Pretreatment to Bio-Retention Area



Summary for Subcatchment 28S: Area Overland to Bio-Retention Area

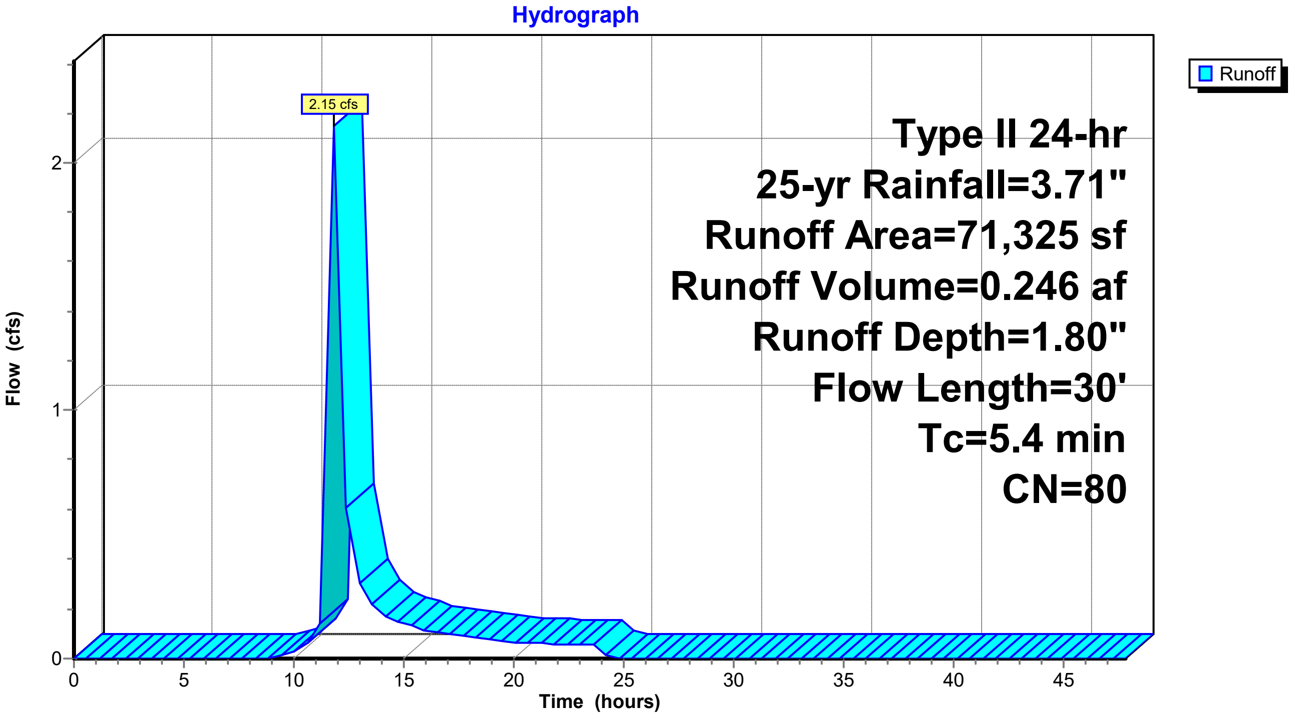
Runoff = 2.15 cfs @ 11.84 hrs, Volume= 0.246 af, Depth= 1.80"
Routed to Pond 34P : Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
71,325	80	>75% Grass cover, Good, HSG D
71,325		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	10	0.0100	0.05		**Sheet Flow, 10' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
1.8	20	0.2500	0.19		**Sheet Flow, 20' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
5.4	30	Total			

Subcatchment 28S: Area Overland to Bio-Retention Area



Summary for Subcatchment 29S: Area Overland to Dry Pond

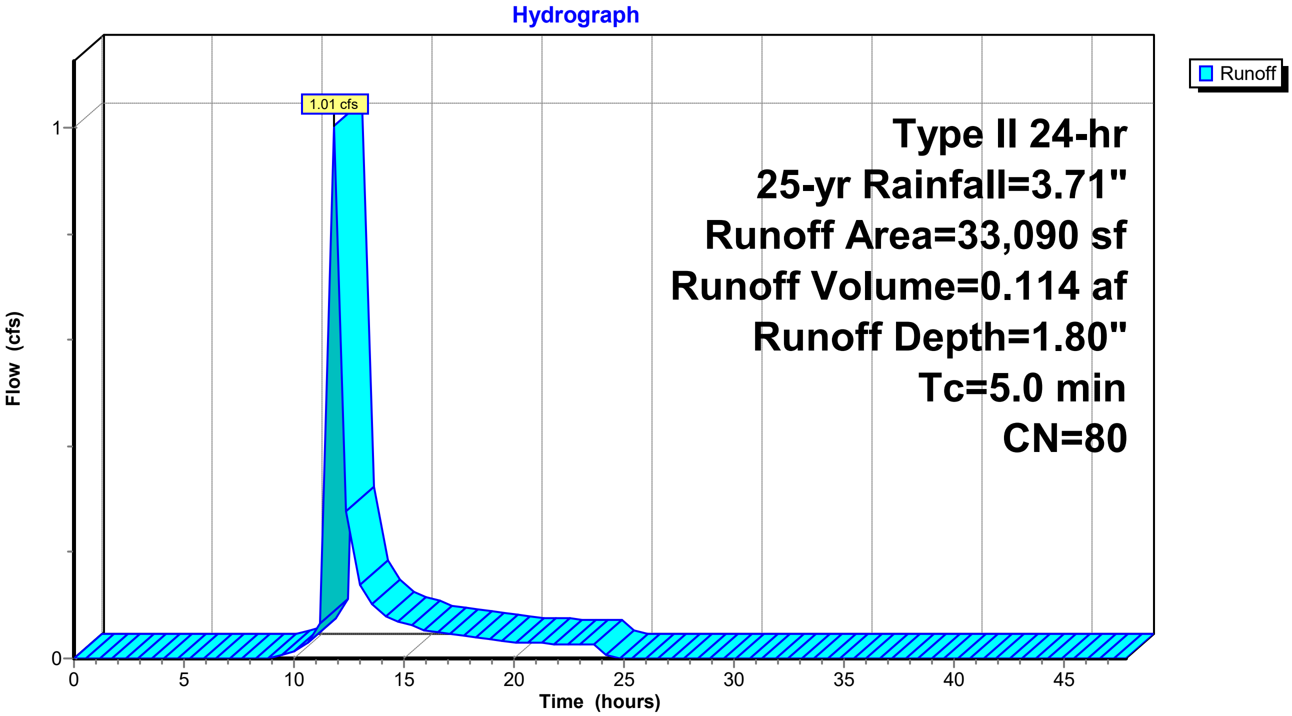
Runoff = 1.01 cfs @ 11.84 hrs, Volume= 0.114 af, Depth= 1.80"
Routed to Pond 35P : Dry Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (sf)	CN	Description
33,090	80	>75% Grass cover, Good, HSG D
33,090		100.00% Pervious Area

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

Subcatchment 29S: Area Overland to Dry Pond



Summary for Subcatchment 60S: Eastern Area Directly to Gravel Storage

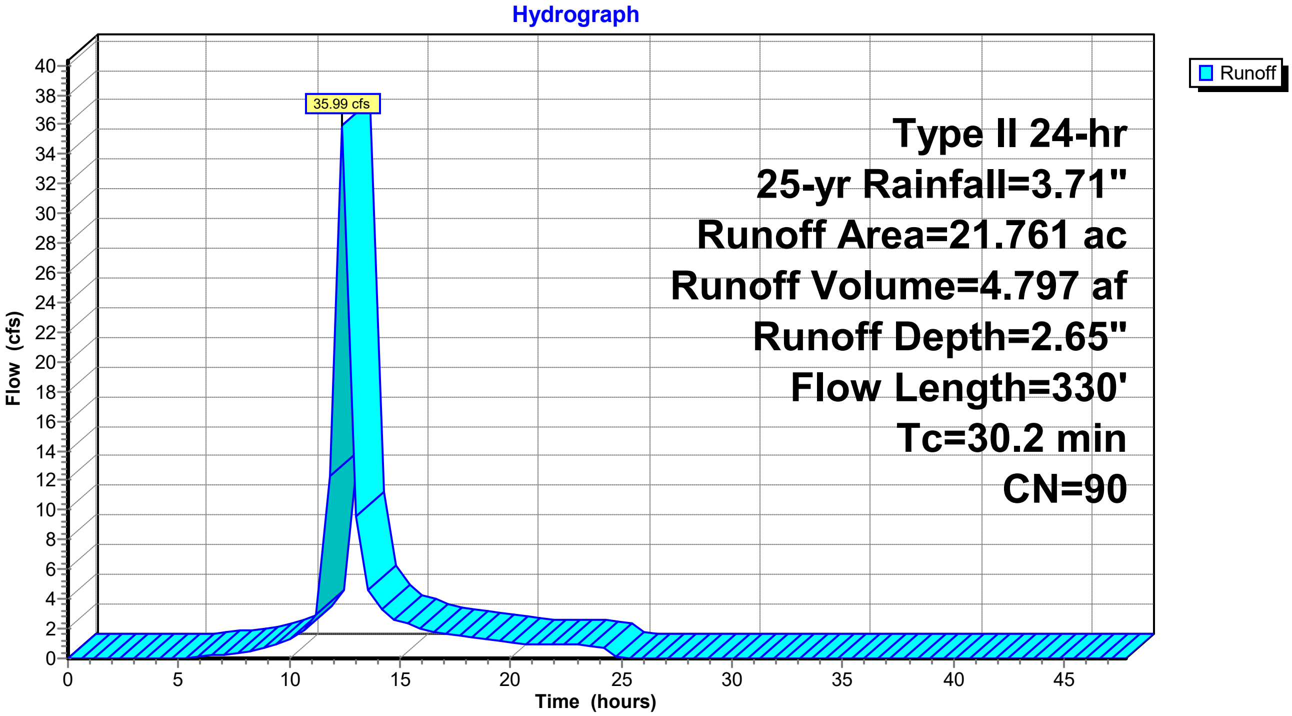
Runoff = 35.99 cfs @ 12.37 hrs, Volume= 4.797 af, Depth= 2.65"
Routed to Pond 33P : Subsurface Detention within Gravel Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

	Area (ac)	CN	Description
*	3.004	80	Gravel Storage Area, Good, HSG D
	5.945	98	Paved parking, HSG D
	5.115	98	Roofs, HSG D
	1.449	98	Unconnected pavement, HSG D
	6.112	80	>75% Grass cover, Good, HSG D
	0.136	78	Meadow, non-grazed, HSG D
	21.761	90	Weighted Average
	9.252		42.52% Pervious Area
	12.509		57.48% Impervious Area
	1.449		11.58% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	75	0.0130	0.08		**Sheet Flow, 75' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
12.3	25	0.0030	0.03		**Sheet Flow, 25' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.2	30	0.0300	2.60		**Shallow Concentrated Flow, 30' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
1.2	200	0.0200	2.87		**Shallow Concentrated Flow, 200' Shallow Conc. Flow** Paved Kv= 20.3 fps
30.2	330	Total			

Subcatchment 60S: Eastern Area Directly to Gravel Storage



Summary for Subcatchment E-5S: Contributing Watershed from East

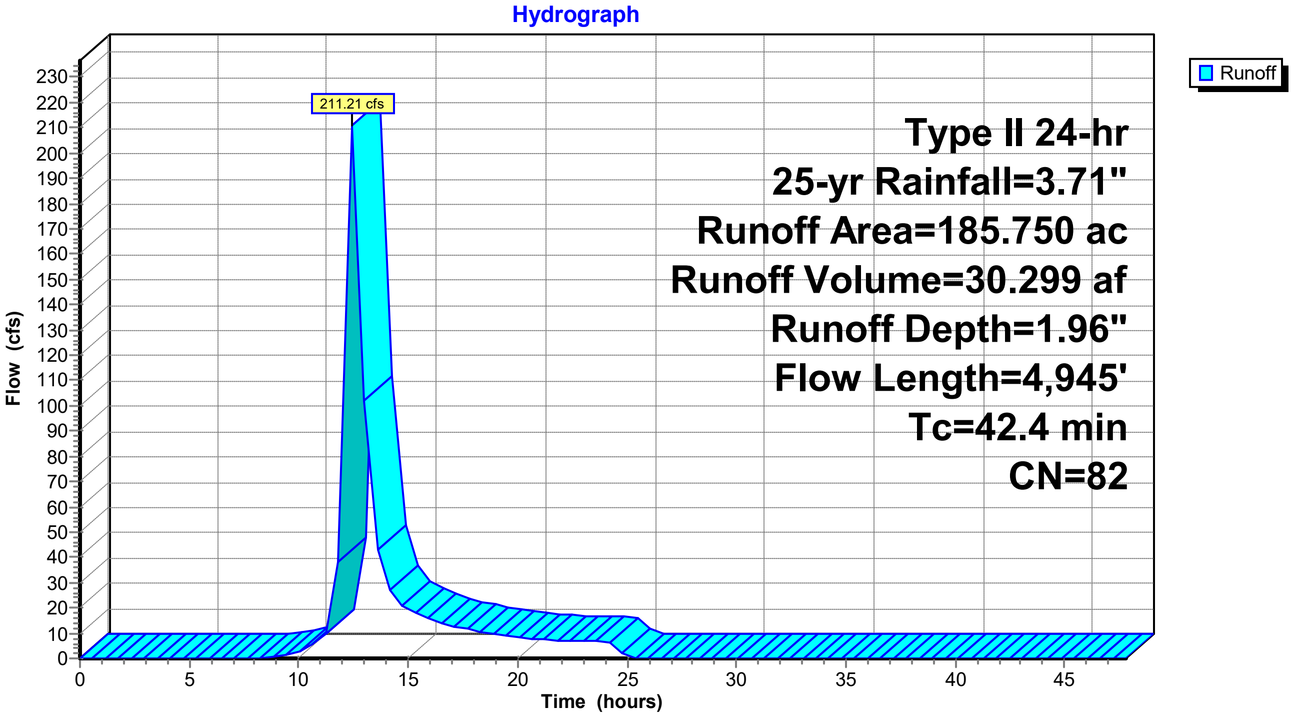
Runoff = 211.21 cfs @ 12.46 hrs, Volume= 30.299 af, Depth= 1.96"
Routed to Reach 5R : North Property Line Ditch (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (ac)	CN	Description
78.660	79	Woods, Fair, HSG D
2.970	98	Water Surface, 0% imp, HSG D
1.050	96	Gravel surface, HSG D
103.070	84	Pasture/grassland/range, Fair, HSG D
185.750	82	Weighted Average
185.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0350	0.16		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
14.2	1,000	0.0170	1.17		**Shallow Concentrated Flow, 1000' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
2.9	750	0.0130	4.31	430.96	**Trap/Vee/Rect Channel Flow, 750 Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.7	670	0.0120	4.14	414.05	**Trap/Vee/Rect Channel Flow, 670' Flow Through Woods** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.4	550	0.0100	3.78	377.98	**Trap/Vee/Rect Channel Flow, 550' Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
9.5	1,800	0.0070	3.16	316.24	**Trap/Vee/Rect Channel Flow, 1,800' Along Crosby Road** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
0.1	75	0.0200	16.02	154.14	**Pipe Channel, Crosby Road Cross Culvert** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
42.4	4,945	Total			

Subcatchment E-5S: Contributing Watershed from East



Summary for Subcatchment E-6S: Contributing Area from North

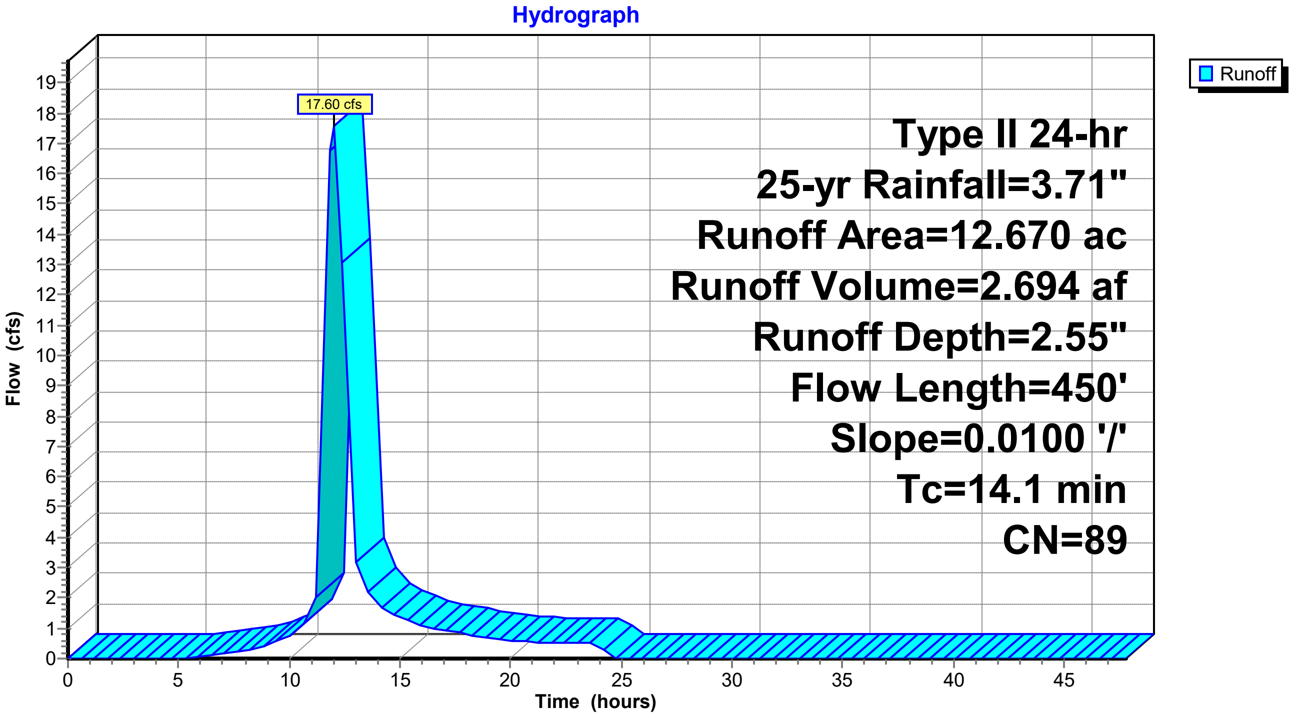
Runoff = 17.60 cfs @ 11.98 hrs, Volume= 2.694 af, Depth= 2.55"
Routed to Reach 5R : North Property Line Ditch (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Type II 24-hr 25-yr Rainfall=3.71"

Area (ac)	CN	Description
12.670	89	Row crops, straight row, Good, HSG D
12.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0100	0.22		**Sheet Flow, 100' Overland Flow** Cultivated: Residue<=20% n= 0.060 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
14.1	450	Total			

Subcatchment E-6S: Contributing Area from North



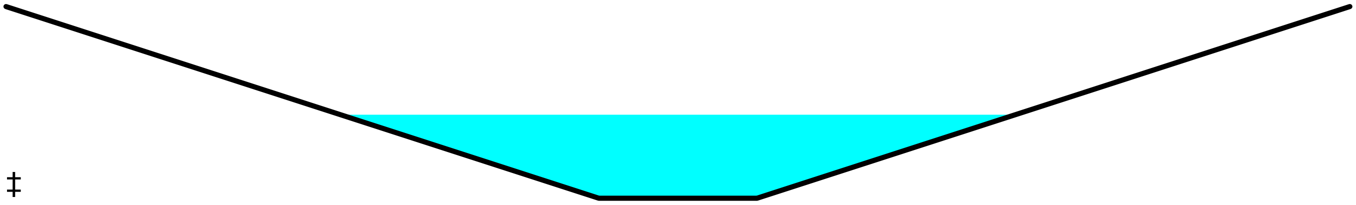
Summary for Reach 1R: Eastern Cut Off Swale

Inflow Area = 6.892 ac, 0.00% Impervious, Inflow Depth = 1.66" for 25-yr event
Inflow = 7.22 cfs @ 12.38 hrs, Volume= 0.953 af
Outflow = 6.44 cfs @ 12.47 hrs, Volume= 0.953 af, Atten= 11%, Lag= 5.0 min
Routed to Reach 2R : Central Cut Off Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Max. Velocity= 1.88 fps, Min. Travel Time= 6.2 min
Avg. Velocity = 0.69 fps, Avg. Travel Time= 17.0 min

Peak Storage= 2,396 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.65' , Surface Width= 8.54'
Bank-Full Depth= 1.50' Flow Area= 14.3 sf, Capacity= 43.86 cfs

2.00' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 5.0 '/' Top Width= 17.00'
Length= 700.0' Slope= 0.0050 '/'
Inlet Invert= 673.00', Outlet Invert= 669.50'



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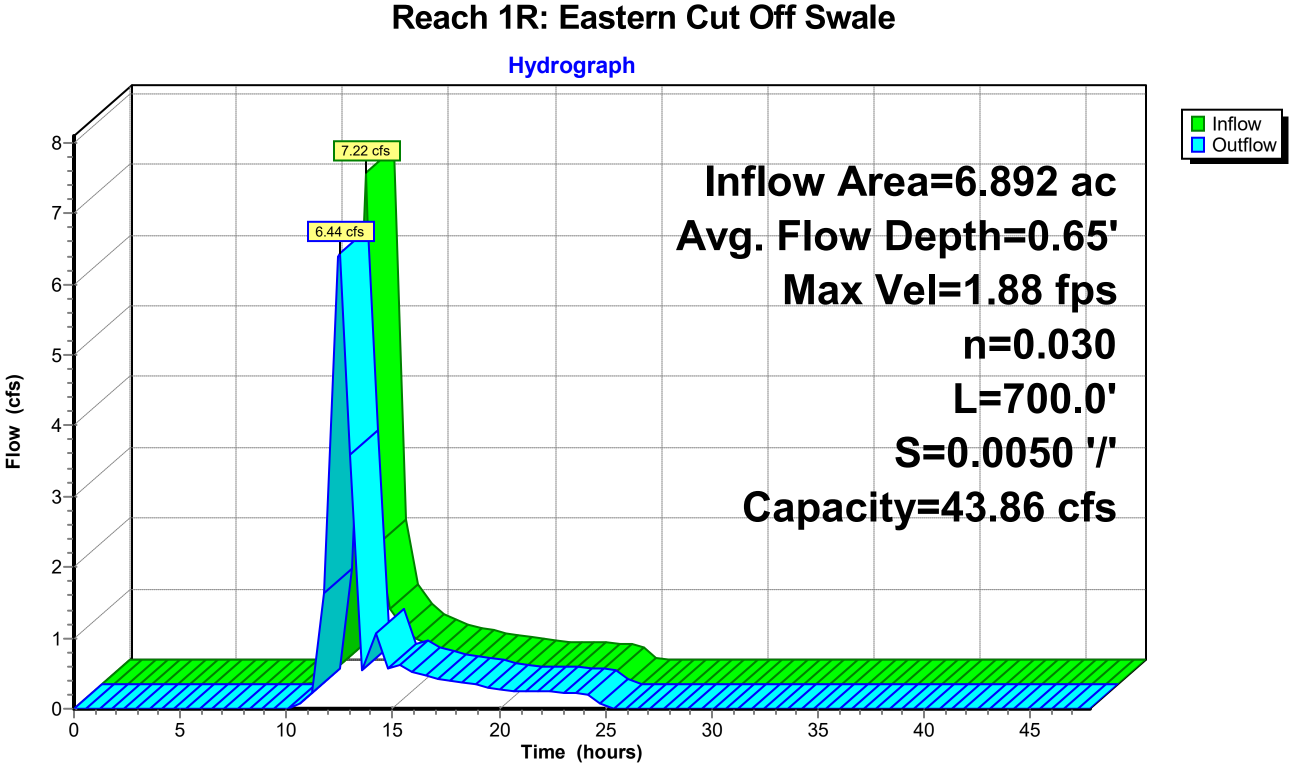


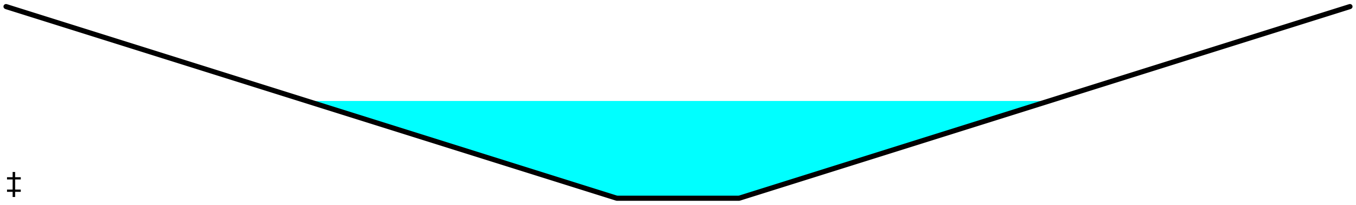
Summary for Reach 2R: Central Cut Off Swale

Inflow Area = 19.349 ac, 0.00% Impervious, Inflow Depth = 1.66" for 25-yr event
Inflow = 18.26 cfs @ 12.47 hrs, Volume= 2.675 af
Outflow = 16.88 cfs @ 12.54 hrs, Volume= 2.675 af, Atten= 8%, Lag= 4.3 min
Routed to Reach 3R : Western Cut Off Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Max. Velocity= 2.40 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 9.2 min

Peak Storage= 3,524 cf @ 12.55 hrs
Average Depth at Peak Storage= 1.02' , Surface Width= 12.15'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 88.03 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 5.0 '/' Top Width= 22.00'
Length= 500.0' Slope= 0.0050 '/'
Inlet Invert= 669.50', Outlet Invert= 667.00'



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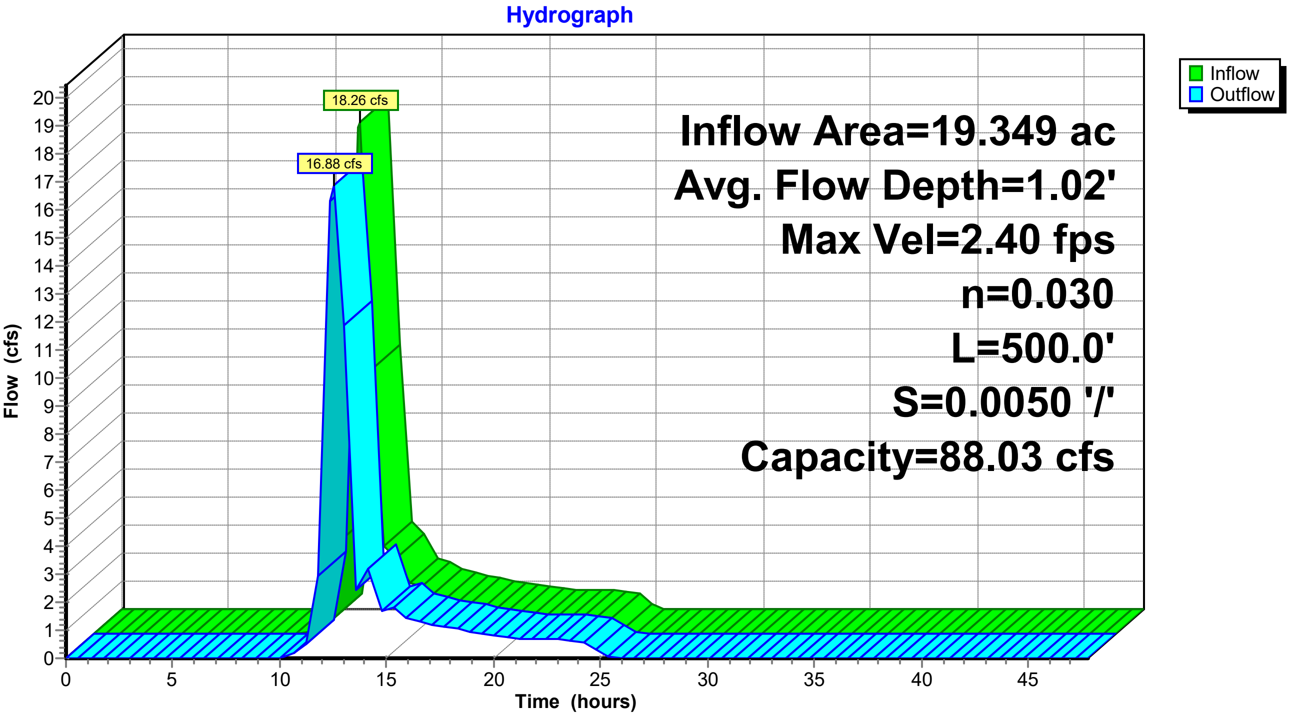
Reach 2R: Central Cut Off Swale



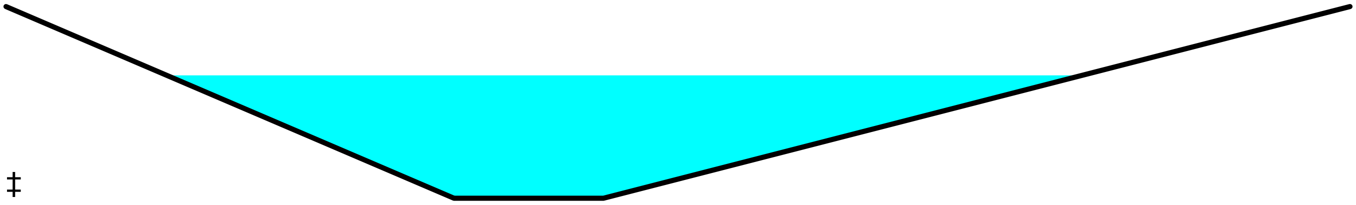
Summary for Reach 3R: Western Cut Off Swale

Inflow Area = 29.272 ac, 0.00% Impervious, Inflow Depth = 1.73" for 25-yr event
Inflow = 26.21 cfs @ 12.54 hrs, Volume= 4.229 af
Outflow = 24.50 cfs @ 12.65 hrs, Volume= 4.229 af, Atten= 7%, Lag= 6.7 min
Routed to Link 1L : West Property Line and Adjacent Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Max. Velocity= 2.73 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 1.01 fps, Avg. Travel Time= 9.9 min

Peak Storage= 5,341 cf @ 12.66 hrs
Average Depth at Peak Storage= 1.28' , Surface Width= 12.27'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 73.73 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 5.0 '/' Top Width= 18.00'
Length= 600.0' Slope= 0.0050 '/'
Inlet Invert= 667.00', Outlet Invert= 664.00'



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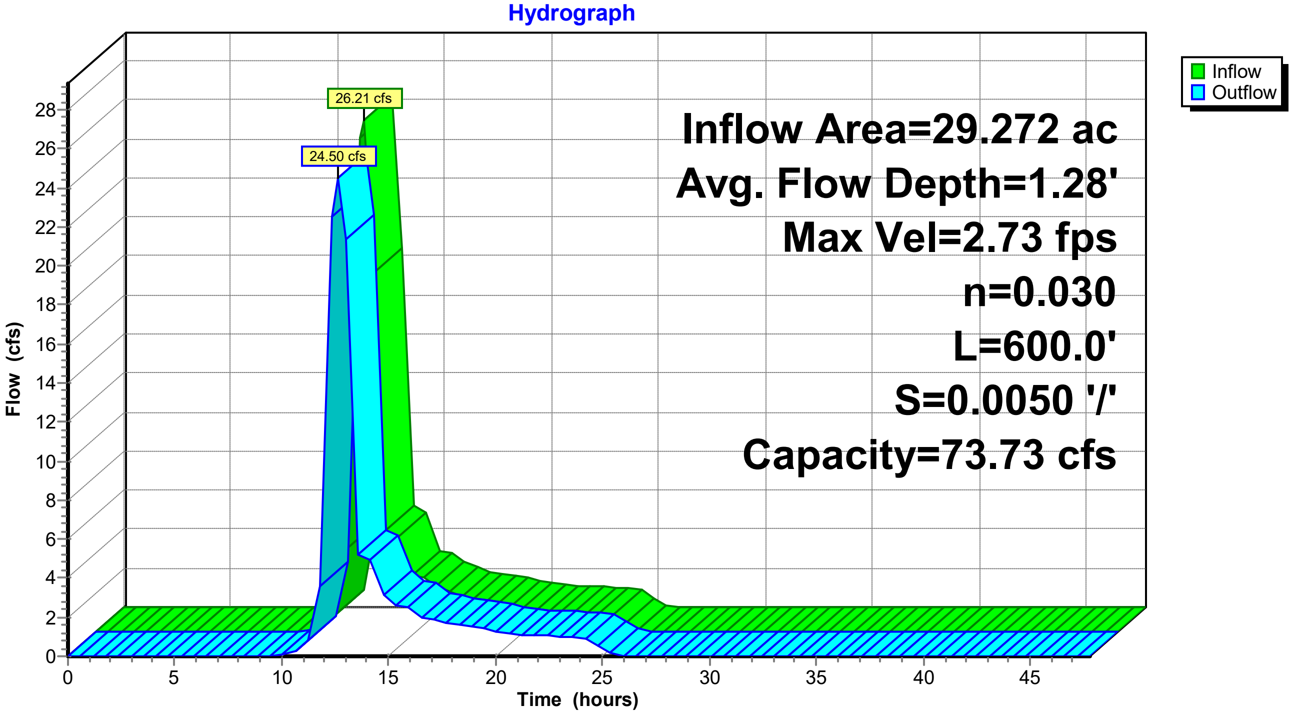
Reach 3R: Western Cut Off Swale



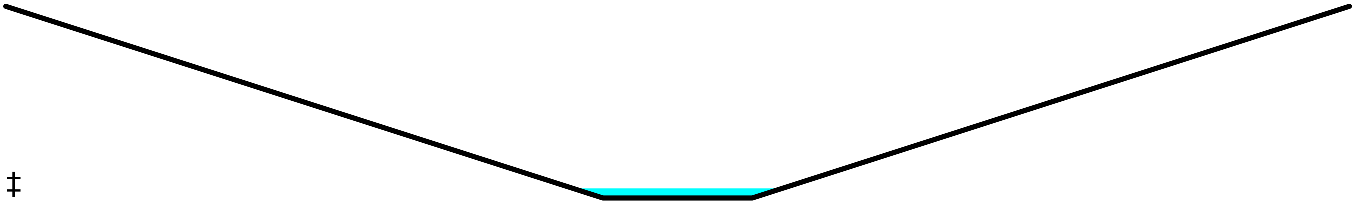
Summary for Reach 4R: Crosby Road Ditch

Inflow Area = 0.230 ac, 0.00% Impervious, Inflow Depth = 1.73" for 25-yr event
Inflow = 0.24 cfs @ 12.35 hrs, Volume= 0.033 af
Outflow = 0.22 cfs @ 12.44 hrs, Volume= 0.033 af, Atten= 9%, Lag= 5.7 min
Routed to Reach 5R : North Property Line Ditch (East)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Max. Velocity= 0.91 fps, Min. Travel Time= 8.3 min
Avg. Velocity = 0.39 fps, Avg. Travel Time= 19.1 min

Peak Storage= 110 cf @ 12.45 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 2.81'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 98.41 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 450.0' Slope= 0.0089 '/'
Inlet Invert= 673.00', Outlet Invert= 669.00'



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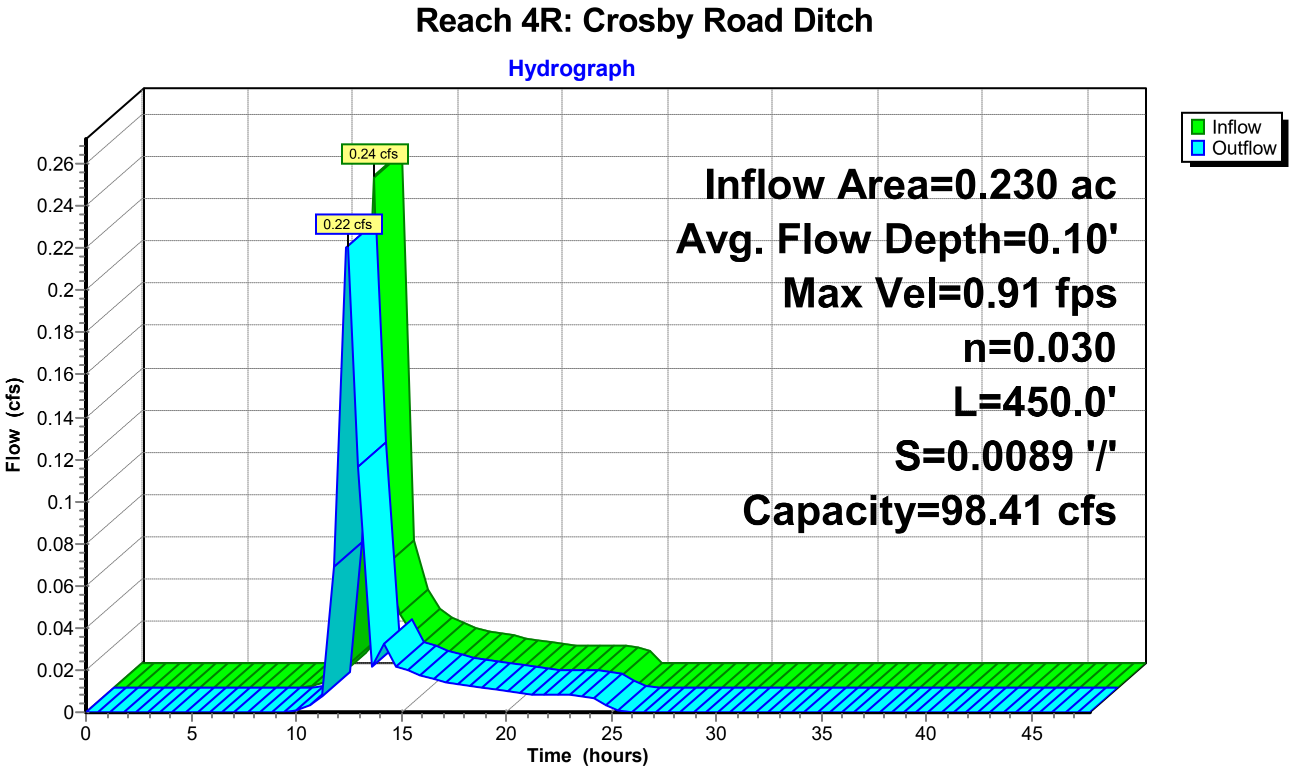


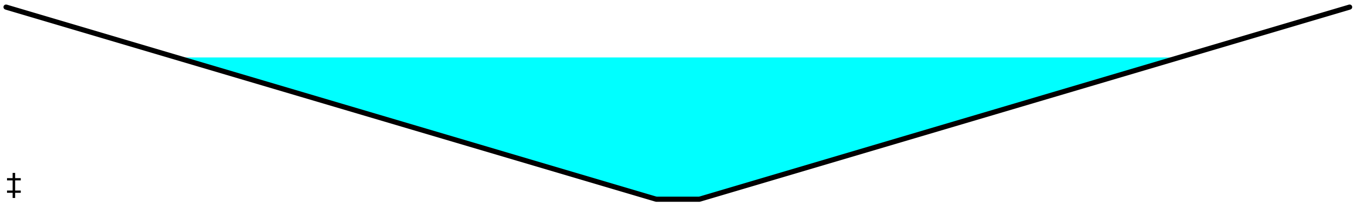
Summary for Reach 5R: North Property Line Ditch (East)

Inflow Area = 199.744 ac, 0.00% Impervious, Inflow Depth = 1.99" for 25-yr event
Inflow = 224.38 cfs @ 12.44 hrs, Volume= 33.171 af
Outflow = 211.68 cfs @ 12.49 hrs, Volume= 33.171 af, Atten= 6%, Lag= 3.0 min
Routed to Reach 6R : North Property Line Ditch (Central)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Max. Velocity= 4.00 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.49 fps, Avg. Travel Time= 7.5 min

Peak Storage= 35,455 cf @ 12.50 hrs
Average Depth at Peak Storage= 2.22' , Surface Width= 46.30'
Bank-Full Depth= 3.00' Flow Area= 96.0 sf, Capacity= 471.44 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 62.00'
Length= 670.0' Slope= 0.0055 '/'
Inlet Invert= 666.00', Outlet Invert= 662.30'



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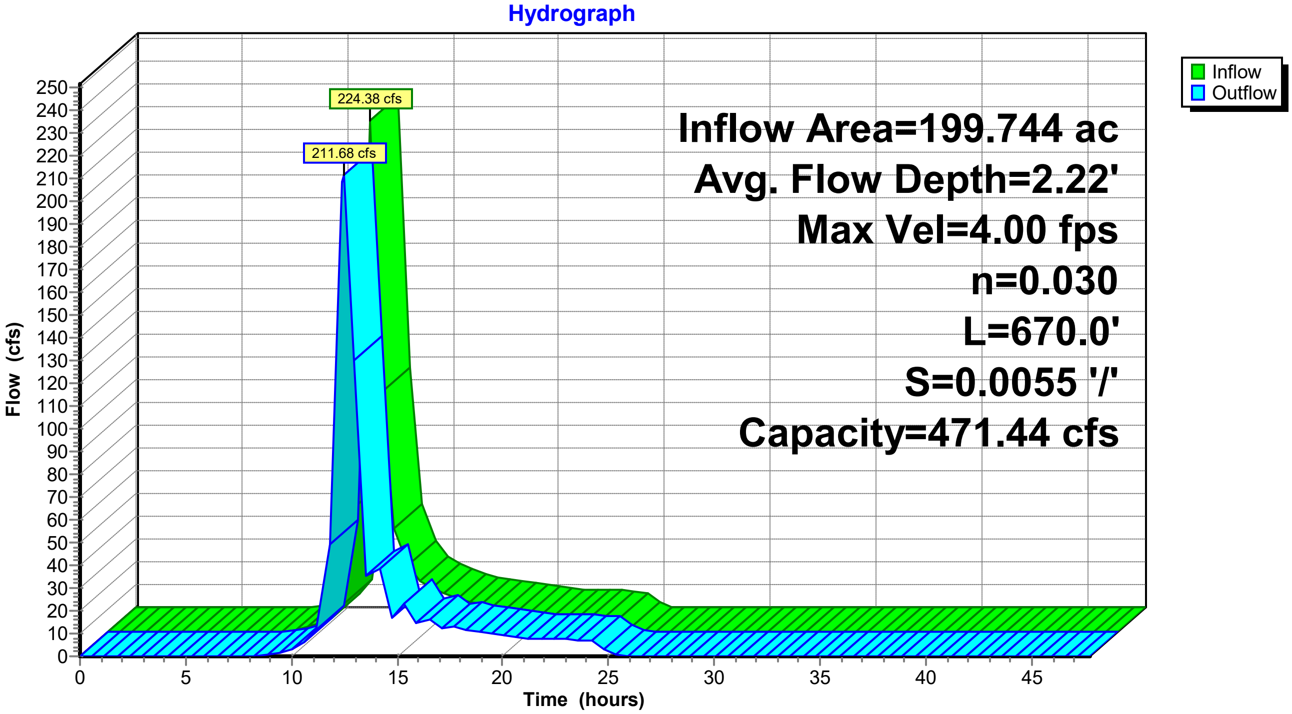
Reach 5R: North Property Line Ditch (East)



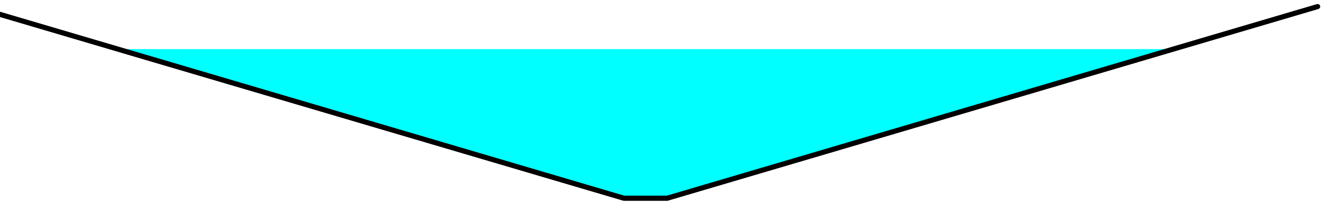
Summary for Reach 6R: North Property Line Ditch (Central)

Inflow Area = 201.045 ac, 0.00% Impervious, Inflow Depth = 2.02" for 25-yr event
Inflow = 212.72 cfs @ 12.50 hrs, Volume= 33.864 af
Outflow = 203.56 cfs @ 12.55 hrs, Volume= 33.864 af, Atten= 4%, Lag= 3.3 min
Routed to Reach 7R : North Property Line Ditch (West)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Max. Velocity= 3.49 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 0.89 fps, Avg. Travel Time= 9.3 min

Peak Storage= 29,094 cf @ 12.56 hrs
Average Depth at Peak Storage= 2.34' , Surface Width= 48.71'
Bank-Full Depth= 3.00' Flow Area= 96.0 sf, Capacity= 401.23 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 62.00'
Length= 500.0' Slope= 0.0040 '/'
Inlet Invert= 662.30', Outlet Invert= 660.30'



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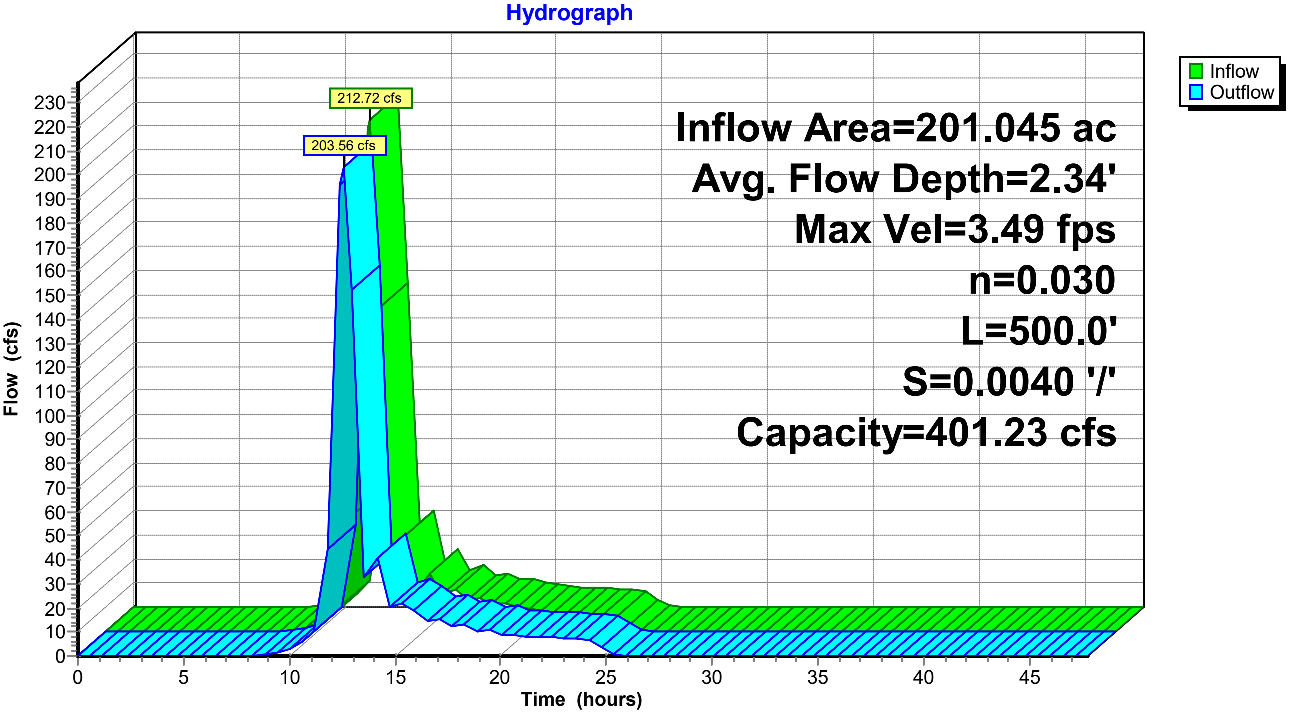
Reach 6R: North Property Line Ditch (Central)



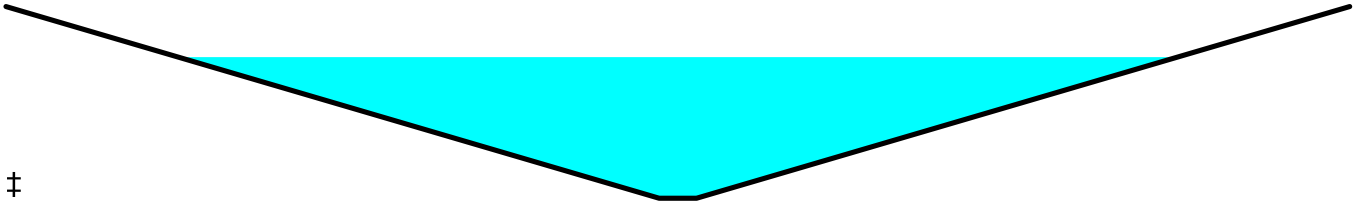
Summary for Reach 7R: North Property Line Ditch (West)

Inflow Area = 225.582 ac, 5.55% Impervious, Inflow Depth > 1.99" for 25-yr event
Inflow = 209.68 cfs @ 12.59 hrs, Volume= 37.415 af
Outflow = 201.27 cfs @ 12.69 hrs, Volume= 37.412 af, Atten= 4%, Lag= 5.9 min
Routed to Link 3L : Ditch at Northwest Corner of Site Discharging to Adjacent Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Max. Velocity= 2.84 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 0.86 fps, Avg. Travel Time= 9.7 min

Peak Storage= 35,017 cf @ 12.69 hrs
Average Depth at Peak Storage= 2.58' , Surface Width= 53.52'
Bank-Full Depth= 3.50' Flow Area= 129.5 sf, Capacity= 463.27 cfs

2.00' x 3.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 72.00'
Length= 500.0' Slope= 0.0024 '/'
Inlet Invert= 660.30', Outlet Invert= 659.10'



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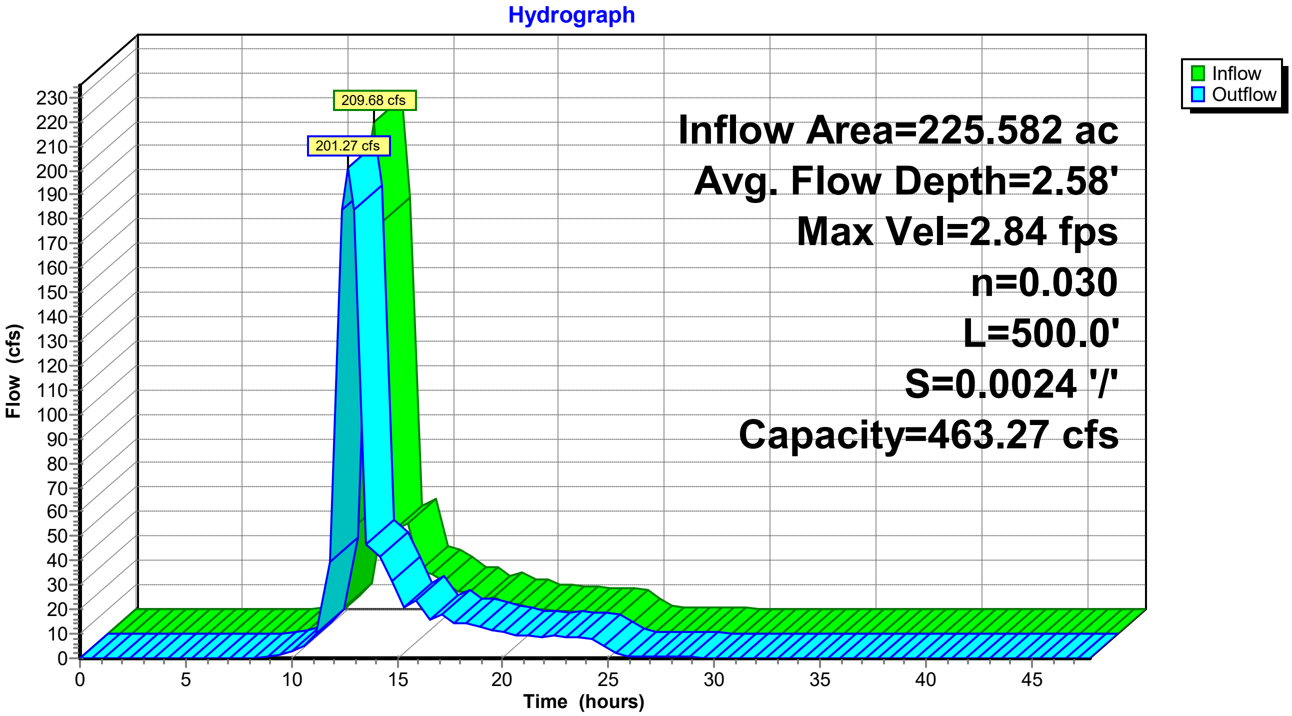
Reach 7R: North Property Line Ditch (West)



Summary for Reach 8R: Western Overflow Swale

Inflow	=	7.18 cfs @	12.89 hrs,	Volume=	0.505 af
Outflow	=	7.09 cfs @	12.93 hrs,	Volume=	0.520 af, Atten= 1%, Lag= 2.4 min

Routed to Reach 7R : North Property Line Ditch (West)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Max. Velocity= 2.77 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 2.15 fps, Avg. Travel Time= 3.9 min

Peak Storage= 1,281 cf @ 12.92 hrs
Average Depth at Peak Storage= 0.65' , Surface Width= 5.91'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 43.30 cfs

2.00' x 1.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 500.0' Slope= 0.0100 '/'
Inlet Invert= 665.00', Outlet Invert= 660.00'

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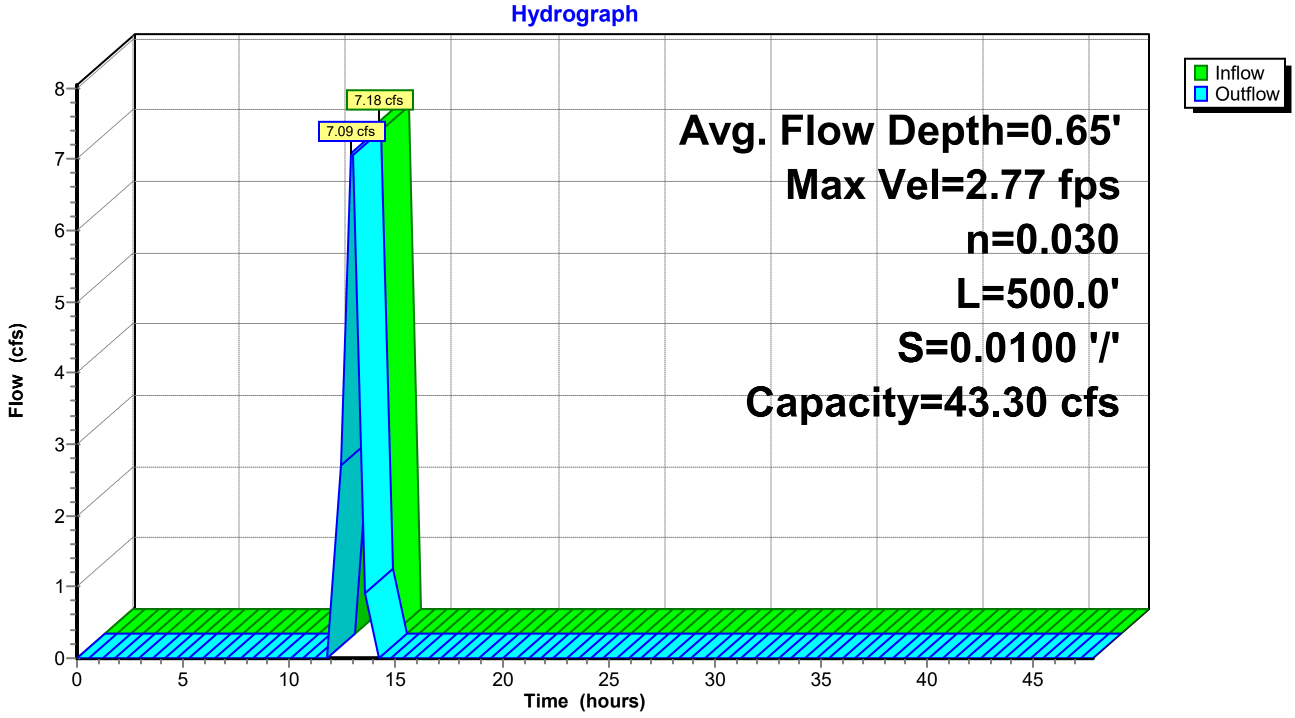
Reach 8R: Western Overflow Swale



Summary for Pond 33P: Subsurface Detention within Gravel Area

```
Inflow Area =        21.761 ac, 57.48% Impervious, Inflow Depth =  2.65"   for 25-yr event
Inflow      =       35.99 cfs @  12.37 hrs, Volume=          4.797 af
Outflow     =       32.55 cfs @  12.41 hrs, Volume=          4.843 af, Atten= 10%, Lag= 2.2 min
Primary     =       19.19 cfs @  12.38 hrs, Volume=          2.897 af
    Routed to Pond 53P : West Pre-Treatment to Bio-Retention Area
Secondary =          9.63 cfs @  12.44 hrs, Volume=          1.663 af
    Routed to Pond 55P : North Pre-Treatment to Bio-Retention Area
Tertiary    =        3.81 cfs @  12.48 hrs, Volume=          0.283 af
    Routed to Pond 35P : Dry Pond
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Peak Elev= 666.59' @ 12.60 hrs Surf.Area= 8,164 sf Storage= 6,710 cf
Flood Elev= 668.95' Surf.Area= 129,465 sf Storage= 48,972 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.5 min (825.6 - 821.1)

Volume	Invert	Avail.Storage	Storage Description
#1	664.01'	9,879 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 30,436 cf Overall - 5,739 cf Embedded = 24,697 cf x 40.0% Voids
#2	664.01'	126 cf	**24.0" Round Pipe Storage** Inside #1 L= 40.0'
#3	664.01'	3,657 cf	**24.0" Round Pipe Storage** Inside #1 L= 1,164.0' S= 0.0020 '/'
#4	664.01'	1,421 cf	**18.0" Round Pipe Storage** Inside #1 L= 804.0' S= 0.0020 '/'
#5	665.61'	209 cf	**15.0" Round Pipe Storage** Inside #1 L= 170.0' S= 0.0020 '/'
#6	665.95'	202 cf	**12.0" Round Pipe Storage** Inside #1 L= 257.0' S= 0.0020 '/'
#7	666.46'	38 cf	**10.0" Round Pipe Storage** Inside #1 L= 69.0' S= 0.0020 '/'
#8	666.35'	88 cf	**10.0" Round Pipe Storage** Inside #1 L= 161.0' S= 0.0020 '/'
#9	668.03'	33,354 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 83,386 cf Overall x 40.0% Voids
		48,972 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
664.01	3	0	0
666.67	8,430	11,216	11,216
668.95	8,430	19,220	30,436

```
 Elevation      Surf.Area      Inc.Store      Cum.Store
    (feet)        (sq-ft)   (cubic-feet)   (cubic-feet)
    668.03              0              0              0
    668.19         33,970          2,718          2,718
    668.45        121,035         20,151         22,868
    668.95        121,035         60,518         83,386

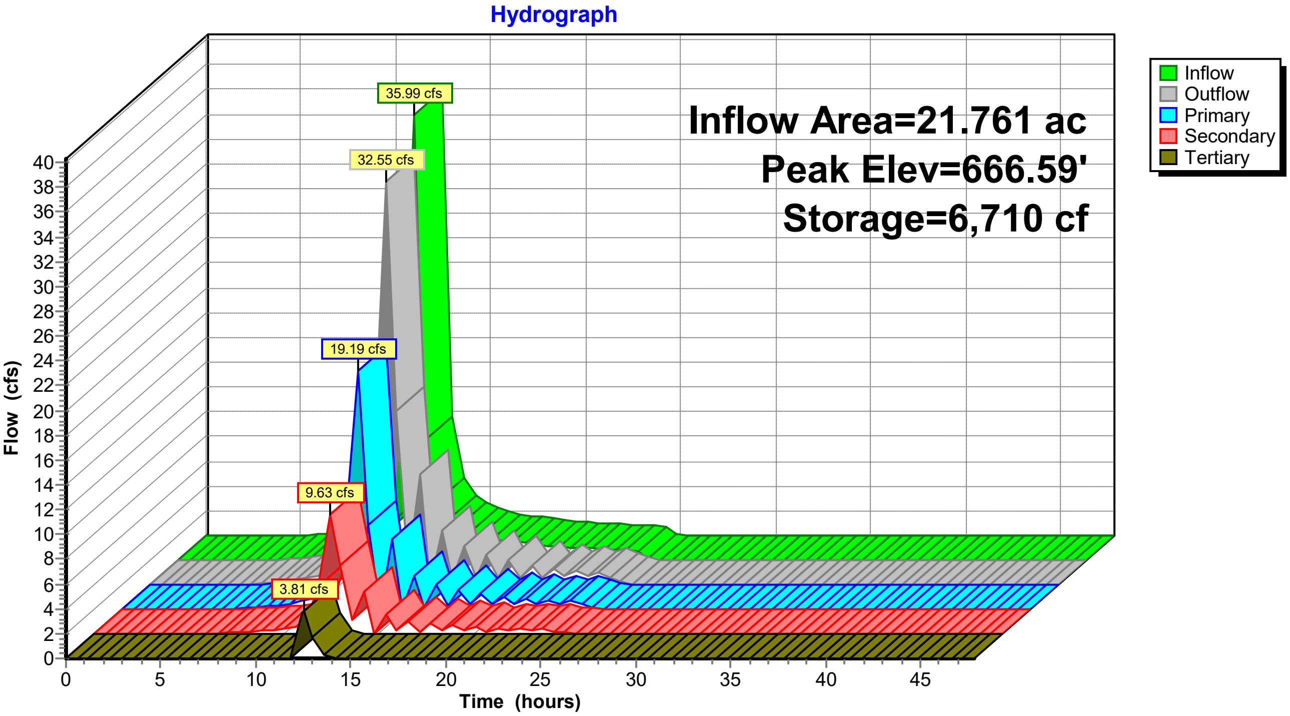
Device  Routing       Invert  Outlet Devices
   #1   Primary      664.01'  18.0"  Round Culvert X 2.00
                              L= 57.0'   CPP, square edge headwall,  Ke= 0.500
                              Inlet / Outlet Invert= 664.01' / 663.90'   S= 0.0019 '/'   Cc= 0.900
                              n= 0.012,  Flow Area= 1.77 sf
   #2   Secondary    664.01'  18.0"  Round Culvert
                              L= 57.0'   CPP, square edge headwall,  Ke= 0.500
                              Inlet / Outlet Invert= 664.01' / 663.90'   S= 0.0019 '/'   Cc= 0.900
                              n= 0.012,  Flow Area= 1.77 sf
   #3   Tertiary     665.71'  18.0"  Round Culvert
                              L= 50.0'   CPP, square edge headwall,  Ke= 0.500
                              Inlet / Outlet Invert= 665.71' / 664.71'   S= 0.0200 '/'   Cc= 0.900
                              n= 0.012,  Flow Area= 1.77 sf
   #4   Tertiary     666.05'  15.0"  Round Culvert
                              L= 50.0'   CPP, square edge headwall,  Ke= 0.500
                              Inlet / Outlet Invert= 666.05' / 665.05'   S= 0.0200 '/'   Cc= 0.900
                              n= 0.012,  Flow Area= 1.23 sf
   #5   Tertiary     666.39'  12.0"  Round Culvert
                              L= 50.0'   CPP, square edge headwall,  Ke= 0.500
                              Inlet / Outlet Invert= 666.39' / 665.39'   S= 0.0200 '/'   Cc= 0.900
                              n= 0.012,  Flow Area= 0.79 sf
   #6   Tertiary     666.56'  10.0"  Round Culvert
                              L= 50.0'   CPP, square edge headwall,  Ke= 0.500
                              Inlet / Outlet Invert= 666.56' / 665.56'   S= 0.0200 '/'   Cc= 0.900
                              n= 0.012,  Flow Area= 0.55 sf

Primary OutFlow  Max=10.60 cfs @ 12.38 hrs  HW=666.47'  TW=666.09'   (Dynamic Tailwater)
└─1=Culvert  (Inlet Controls 10.60 cfs @ 3.00 fps)

Secondary OutFlow  Max=6.64 cfs @ 12.44 hrs  HW=666.47'  TW=665.86'   (Dynamic Tailwater)
└─2=Culvert  (Inlet Controls 6.64 cfs @ 3.76 fps)

Tertiary OutFlow  Max=3.38 cfs @ 12.48 hrs  HW=666.46'  TW=663.66'   (Dynamic Tailwater)
├─3=Culvert  (Inlet Controls 2.60 cfs @ 2.95 fps)
├─4=Culvert  (Inlet Controls 0.76 cfs @ 2.18 fps)
├─5=Culvert  (Inlet Controls 0.02 cfs @ 0.89 fps)
└─6=Culvert  ( Controls 0.00 cfs)
```

Pond 33P: Subsurface Detention within Gravel Area



Summary for Pond 34P: Bio-Retention Area

Inflow Area = 24.053 ac, 52.01% Impervious, Inflow Depth = 2.09" for 25-yr event
Inflow = 14.76 cfs @ 12.50 hrs, Volume= 4.185 af
Outflow = 10.36 cfs @ 13.20 hrs, Volume= 2.967 af, Atten= 30%, Lag= 41.9 min
Primary = 10.36 cfs @ 13.20 hrs, Volume= 2.967 af
Routed to Reach 7R : North Property Line Ditch (West)
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : North Property Line Ditch (West)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Peak Elev= 664.36' @ 13.25 hrs Surf.Area= 58,403 sf Storage= 72,612 cf

Plug-Flow detention time= 334.9 min calculated for 2.967 af (71% of inflow)
Center-of-Mass det. time= 208.2 min (1,092.6 - 884.4)

Volume	Invert	Avail.Storage	Storage Description
#1	663.00'	95,677 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.00	48,935	0	0
663.25	50,025	12,370	12,370
663.50	51,115	12,643	25,013
664.00	56,110	26,806	51,819
664.75	60,845	43,858	95,677

Device	Routing	Invert	Outlet Devices
#1	Primary	660.55'	**15.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.55' / 660.50' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Primary	660.55'	**15.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.55' / 660.50' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 1	660.56'	**4.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.56' / 660.55' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#4	Device 2	660.56'	**4.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.56' / 660.55' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#5	Device 3	663.00'	**0.500 in/hr Exfiltration X 0.50 over Surface area above 663.00'** Excluded Surface area = 48,935 sf
#6	Device 4	663.00'	**0.500 in/hr Exfiltration X 0.50 over Surface area above 663.00'** Excluded Surface area = 48,935 sf
#7	Device 3	664.10'	**4.0" Horiz. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#8	Device 4	664.10'	**4.0" Horiz. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#9	Device 1	664.25'	**1.4" x 4.5" Horiz. Orifice/Grate X 72.00** C= 0.600

Limited to weir flow at low heads

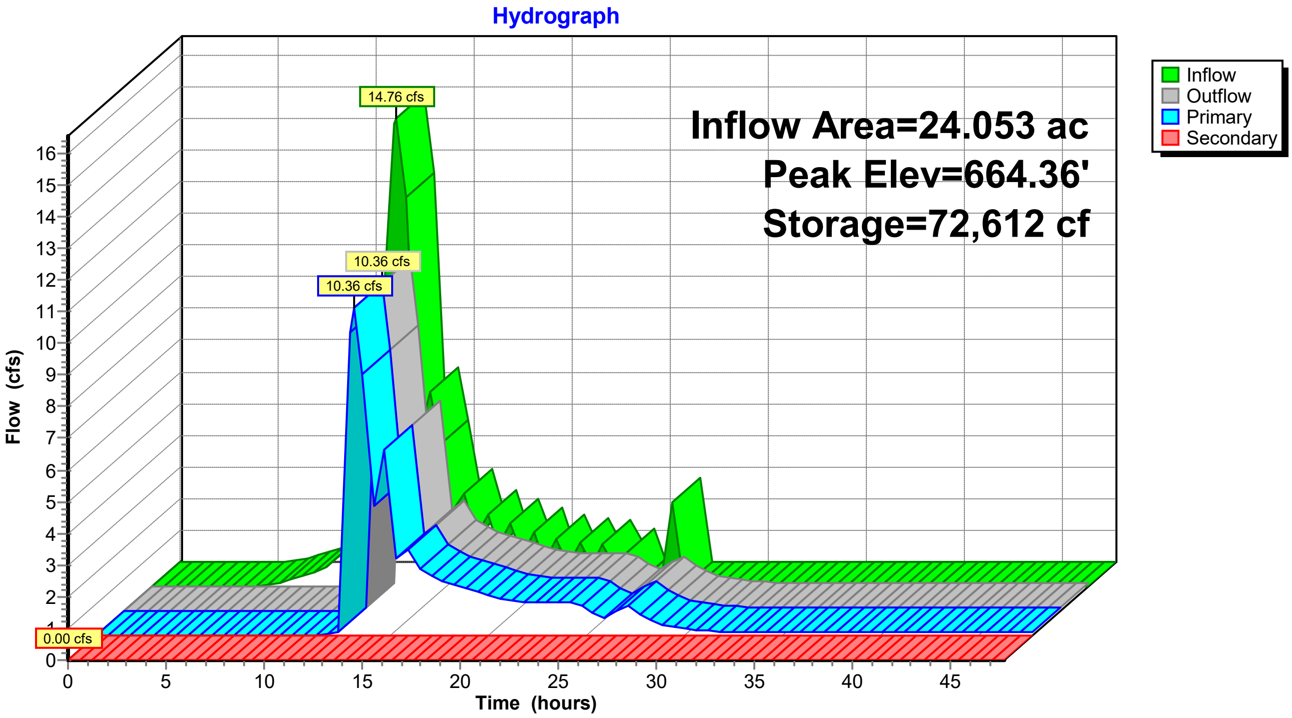
#10 Device 2 664.25' **1.4" x 4.5" Horiz. Orifice/Grate X 72.00** C= 0.600
Limited to weir flow at low heads

#11 Secondary 664.50' **100.0' long x 2.0' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50
Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88
2.85 3.07 3.20 3.32

Primary OutFlow Max=9.36 cfs @ 13.20 hrs HW=664.32' TW=662.36' (Dynamic Tailwater)
1=Culvert (Passes 4.68 cfs of 8.27 cfs potential flow)
  3=Culvert (Inlet Controls 0.59 cfs @ 6.74 fps)
    5=Exfiltration (Passes < 0.05 cfs potential flow)
    7=Orifice/Grate (Passes < 0.59 cfs potential flow)
  9=Orifice/Grate (Orifice Controls 4.09 cfs @ 1.30 fps)
2=Culvert (Passes 4.68 cfs of 8.27 cfs potential flow)
  4=Culvert (Inlet Controls 0.59 cfs @ 6.74 fps)
    6=Exfiltration (Passes < 0.05 cfs potential flow)
    8=Orifice/Grate (Passes < 0.59 cfs potential flow)
  10=Orifice/Grate (Orifice Controls 4.09 cfs @ 1.30 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=663.00' TW=660.30' (Dynamic Tailwater)
11=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 34P: Bio-Retention Area



Summary for Pond 35P: Dry Pond

Inflow Area = 0.760 ac, 0.00% Impervious, Inflow Depth = 6.28" for 25-yr event
Inflow = 4.04 cfs @ 12.44 hrs, Volume= 0.397 af
Outflow = 1.11 cfs @ 14.37 hrs, Volume= 0.397 af, Atten= 73%, Lag= 115.9 min
Primary = 1.11 cfs @ 14.37 hrs, Volume= 0.397 af
Routed to Reach 6R : North Property Line Ditch (Central)
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 6R : North Property Line Ditch (Central)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Peak Elev= 664.23' @ 13.75 hrs Surf.Area= 15,664 sf Storage= 15,110 cf

Plug-Flow detention time= 270.8 min calculated for 0.392 af (99% of inflow)
Center-of-Mass det. time= 272.8 min (1,051.1 - 778.3)

Volume	Invert	Avail.Storage	Storage Description
#1	662.56'	49,313 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

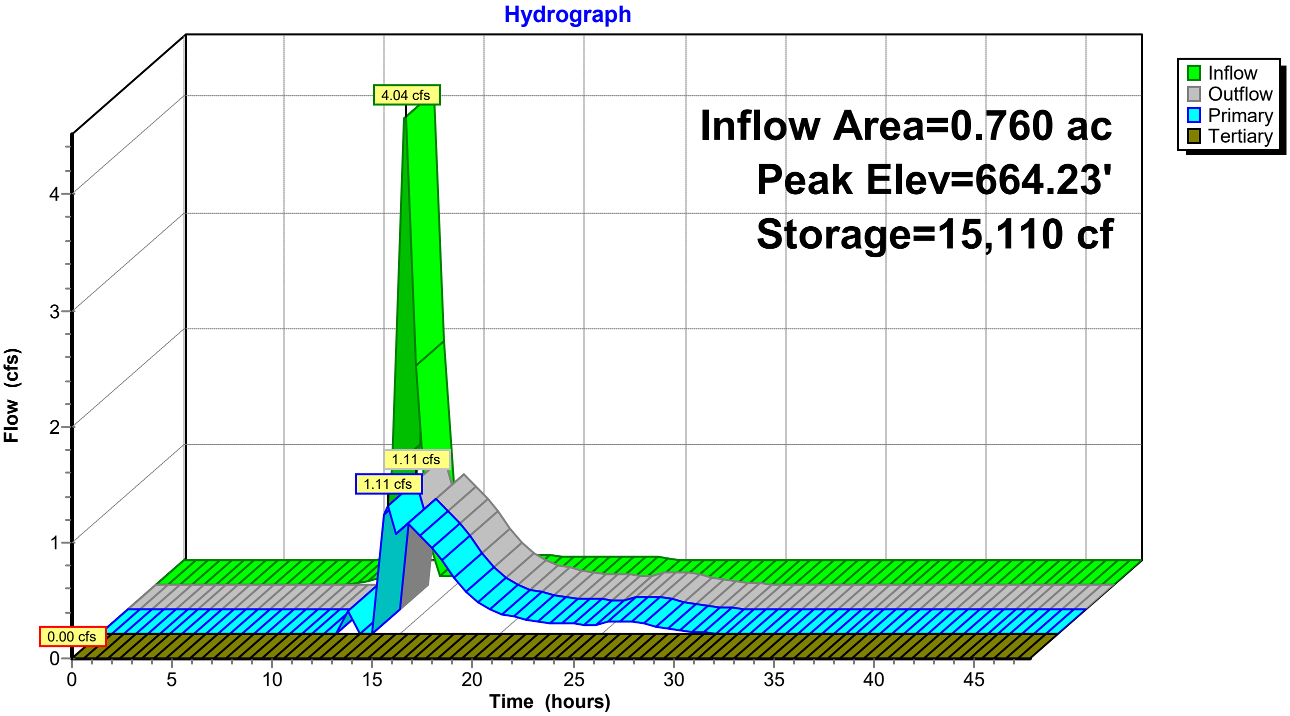
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
662.56	300	0	0
663.00	5,985	1,383	1,383
664.00	14,620	10,303	11,685
665.00	19,235	16,928	28,613
666.00	22,165	20,700	49,313

Device	Routing	Invert	Outlet Devices
#1	Primary	662.56'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 662.56' / 662.50' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	662.56'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	663.06'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	665.20'	**1.4" x 4.5" Horiz. Orifice/Grate X 72.00** C= 0.600 Limited to weir flow at low heads
#5	Tertiary	665.70'	**100.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=1.01 cfs @ 14.37 hrs HW=664.14' TW=663.41' (Dynamic Tailwater)
1=Culvert (Passes 1.01 cfs of 3.22 cfs potential flow)
  2=Orifice/Grate (Orifice Controls 0.20 cfs @ 4.10 fps)
  3=Orifice/Grate (Orifice Controls 0.81 cfs @ 4.10 fps)
  4=Orifice/Grate (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=662.56' TW=662.30' (Dynamic Tailwater)
5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 35P: Dry Pond



Summary for Pond 38P: Level Spreader

```
Inflow Area =       22.210 ac,  56.32% Impervious,  Inflow Depth =   1.33"    for  25-yr event
Inflow      =        8.70 cfs @   12.53 hrs,  Volume=           2.461 af
Outflow     =        8.70 cfs @   12.53 hrs,  Volume=           2.461 af,  Atten= 0%,  Lag= 0.0 min
Primary     =        8.70 cfs @   12.53 hrs,  Volume=           2.461 af
    Routed to Pond 34P : Bio-Retention Area
Secondary =          0.00 cfs @    0.00 hrs,  Volume=           0.000 af
    Routed to Pond 34P : Bio-Retention Area

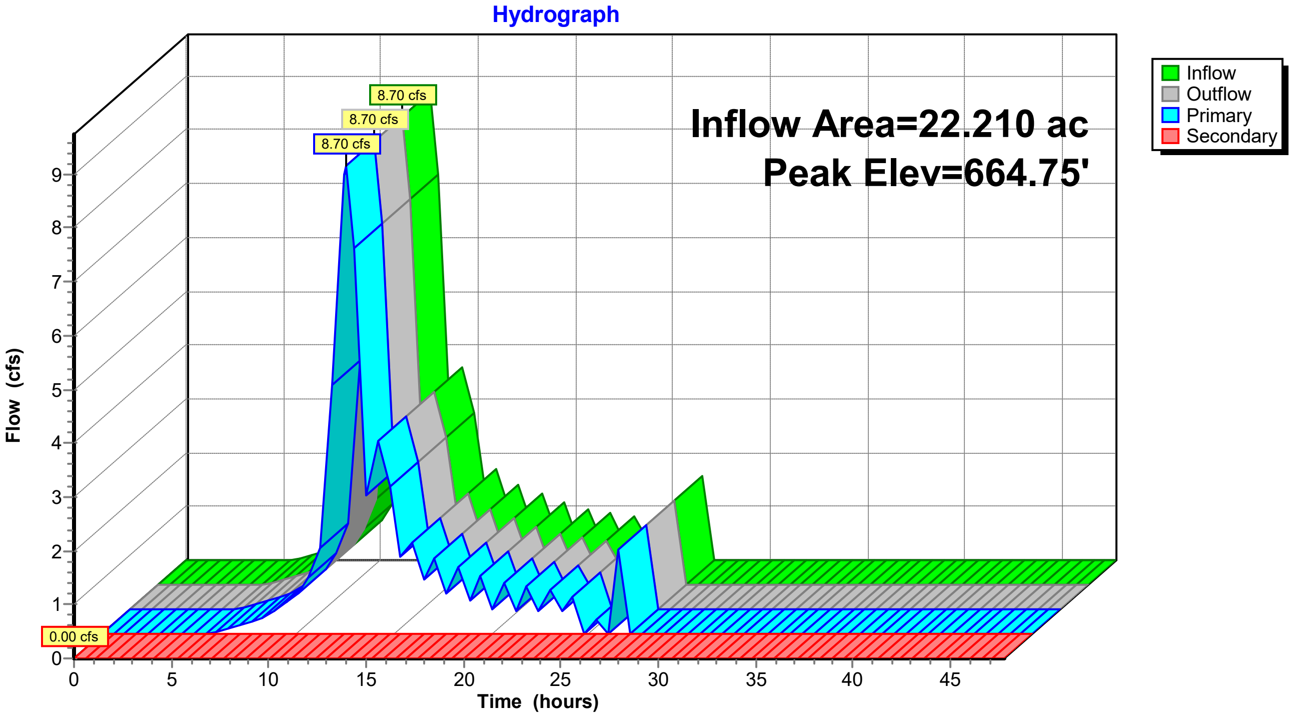
Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Peak Elev= 664.75' @ 12.67 hrs
Flood Elev= 665.00'

Device   Routing         Invert   Outlet Devices
   #1    Primary        663.00'   0.3" Horiz. Orifice/Grate X 650.00    C= 0.600
                                  Limited to weir flow at low heads
   #2    Primary        663.32'   0.3" Vert. Orifice/Grate X 650.00    C= 0.600
                                  Limited to weir flow at low heads
   #3    Primary        663.32'   0.3" Vert. Orifice/Grate X 650.00    C= 0.600
                                  Limited to weir flow at low heads
   #4    Primary        663.94'   0.3" Vert. Orifice/Grate X 650.00    C= 0.600
                                  Limited to weir flow at low heads
   #5    Primary        663.94'   0.3" Vert. Orifice/Grate X 650.00    C= 0.600
                                  Limited to weir flow at low heads
   #6    Primary        664.25'   0.3" Horiz. Orifice/Grate X 650.00    C= 0.600
                                  Limited to weir flow at low heads
   #7    Secondary      664.90'   15.0" Horiz. Orifice/Grate    C= 0.600
                                  Limited to weir flow at low heads

Primary OutFlow  Max=6.89 cfs @ 12.53 hrs  HW=664.67'  TW=664.09'   (Dynamic Tailwater)
├─1=Orifice/Grate  (Orifice Controls 1.18 cfs @ 3.69 fps)
├─2=Orifice/Grate  (Orifice Controls 1.18 cfs @ 3.69 fps)
├─3=Orifice/Grate  (Orifice Controls 1.18 cfs @ 3.69 fps)
├─4=Orifice/Grate  (Orifice Controls 1.18 cfs @ 3.69 fps)
├─5=Orifice/Grate  (Orifice Controls 1.18 cfs @ 3.69 fps)
└─6=Orifice/Grate  (Orifice Controls 1.00 cfs @ 3.14 fps)

Secondary OutFlow  Max=0.00 cfs @ 0.00 hrs  HW=663.00'  TW=663.00'   (Dynamic Tailwater)
└─7=Orifice/Grate  ( Controls 0.00 cfs)
```

Pond 38P: Level Spreader



Summary for Pond 39P: Level Spreader

```
Inflow Area =       0.206 ac,   0.00% Impervious,  Inflow Depth = 86.10"    for  25-yr event
Inflow      =      5.64 cfs @  12.57 hrs,  Volume=         1.478 af
Outflow     =      5.64 cfs @  12.57 hrs,  Volume=         1.478 af,  Atten= 0%,  Lag= 0.0 min
Primary     =      5.64 cfs @  12.57 hrs,  Volume=         1.478 af
    Routed to Pond 34P : Bio-Retention Area
Secondary =        0.00 cfs @   0.00 hrs,  Volume=         0.000 af
    Routed to Pond 34P : Bio-Retention Area

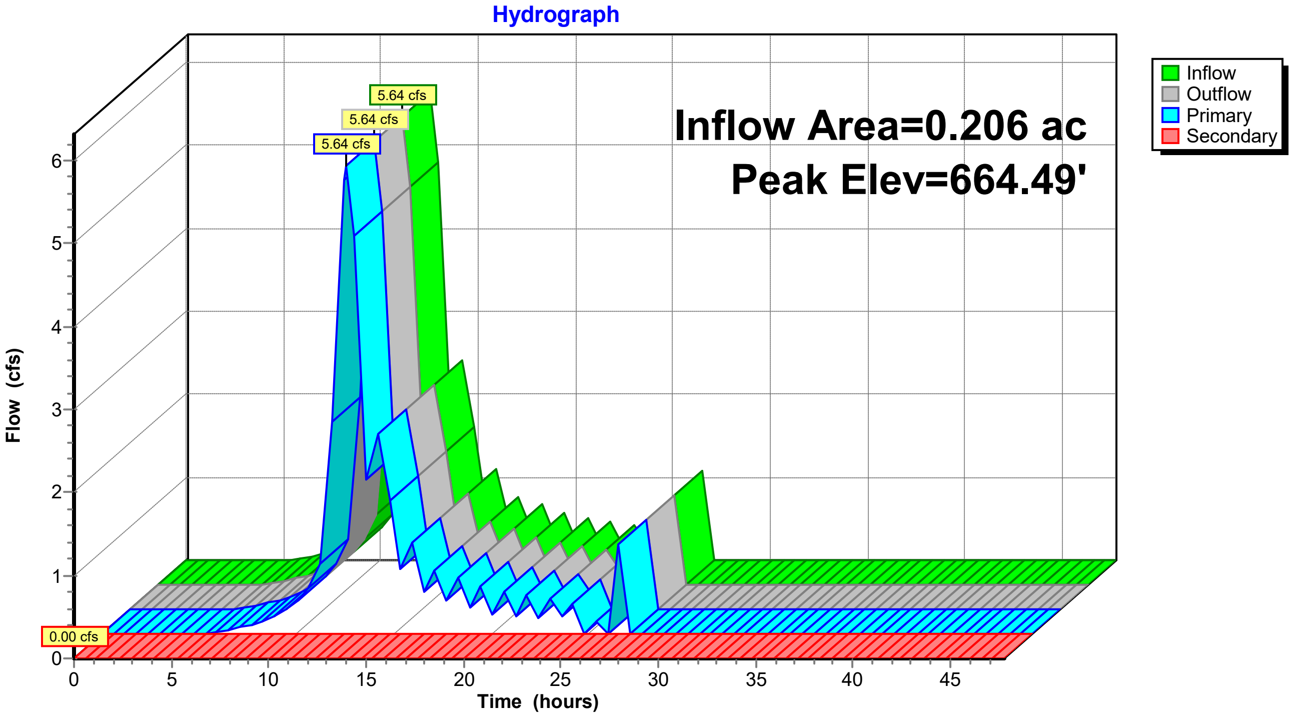
Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Peak Elev= 664.49' @ 13.07 hrs
Flood Elev= 665.75'

Device  Routing       Invert   Outlet Devices
    #1  Primary      663.00'   0.3" Horiz. Orifice/Grate X 488.00   C= 0.600
                               Limited to weir flow at low heads
    #2  Primary      663.25'   0.3" Vert. Orifice/Grate X 488.00   C= 0.600
                               Limited to weir flow at low heads
    #3  Primary      663.25'   0.3" Vert. Orifice/Grate X 488.00   C= 0.600
                               Limited to weir flow at low heads
    #4  Primary      663.75'   0.3" Vert. Orifice/Grate X 488.00   C= 0.600
                               Limited to weir flow at low heads
    #5  Primary      663.75'   0.3" Vert. Orifice/Grate X 488.00   C= 0.600
                               Limited to weir flow at low heads
    #6  Primary      664.00'   0.3" Horiz. Orifice/Grate X 488.00   C= 0.600
                               Limited to weir flow at low heads
    #7  Secondary    664.55'   18.0" Horiz. Orifice/Grate   C= 0.600
                               Limited to weir flow at low heads

Primary OutFlow  Max=3.59 cfs @ 12.57 hrs  HW=664.38'  TW=664.11'   (Dynamic Tailwater)
├─1=Orifice/Grate  (Orifice Controls 0.60 cfs @ 2.50 fps)
├─2=Orifice/Grate  (Orifice Controls 0.60 cfs @ 2.50 fps)
├─3=Orifice/Grate  (Orifice Controls 0.60 cfs @ 2.50 fps)
├─4=Orifice/Grate  (Orifice Controls 0.60 cfs @ 2.50 fps)
├─5=Orifice/Grate  (Orifice Controls 0.60 cfs @ 2.50 fps)
└─6=Orifice/Grate  (Orifice Controls 0.60 cfs @ 2.50 fps)

Secondary OutFlow  Max=0.00 cfs @ 0.00 hrs  HW=663.00'  TW=663.00'   (Dynamic Tailwater)
└─7=Orifice/Grate  ( Controls 0.00 cfs)
```

Pond 39P: Level Spreader



Summary for Pond 53P: West Pre-Treatment to Bio-Retention Area

Inflow Area = 22.210 ac, 56.32% Impervious, Inflow Depth = 1.60" for 25-yr event
Inflow = 19.50 cfs @ 12.38 hrs, Volume= 2.964 af
Outflow = 14.98 cfs @ 12.78 hrs, Volume= 2.966 af, Atten= 23%, Lag= 24.4 min
Primary = 8.70 cfs @ 12.53 hrs, Volume= 2.461 af
Routed to Pond 38P : Level Spreader
Secondary = 7.18 cfs @ 12.89 hrs, Volume= 0.505 af
Routed to Reach 8R : Western Overflow Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Peak Elev= 666.30' @ 12.70 hrs Surf.Area= 9,814 sf Storage= 19,043 cf

Plug-Flow detention time= 37.7 min calculated for 2.929 af (99% of inflow)
Center-of-Mass det. time= 39.0 min (868.7 - 829.7)

Volume	Invert	Avail.Storage	Storage Description
#1	663.00'	21,098 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

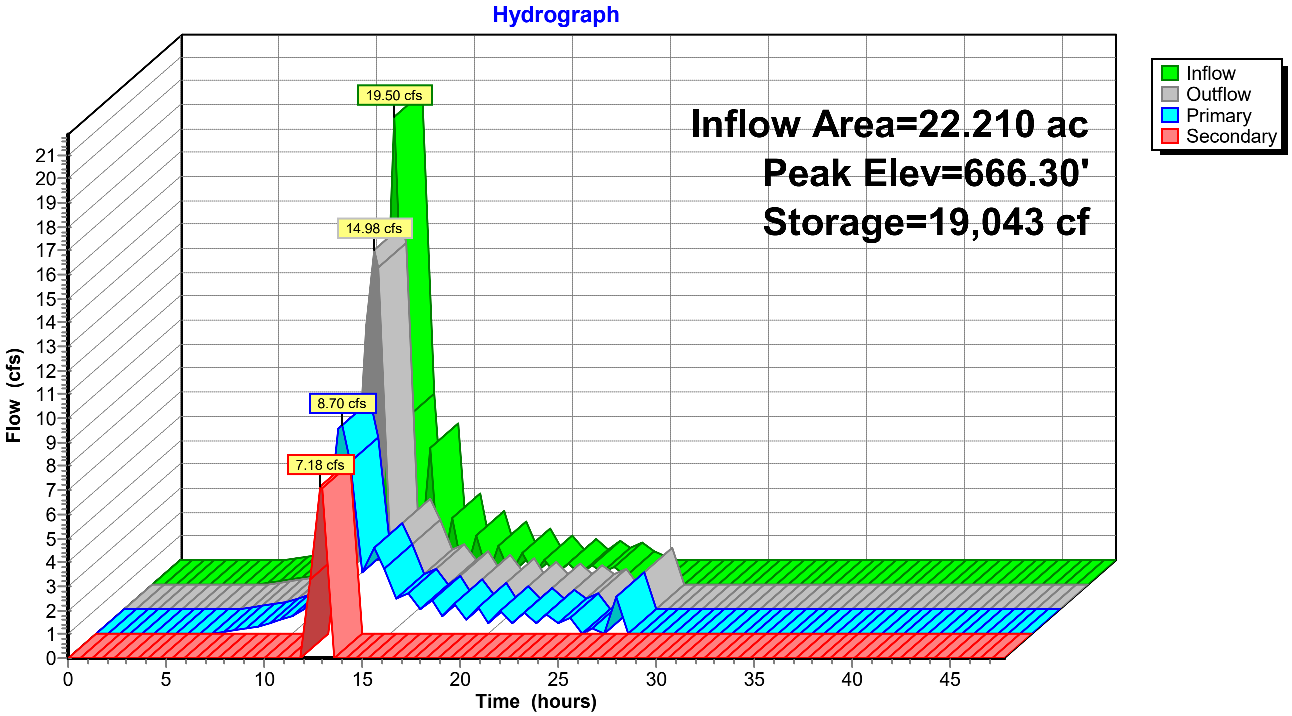
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.00	5	0	0
664.00	4,770	2,388	2,388
665.00	6,900	5,835	8,223
666.00	9,140	8,020	16,243
666.50	10,280	4,855	21,098

Device	Routing	Invert	Outlet Devices
#1	Primary	663.04'	**15.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 663.04' / 663.00' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	666.05'	**100.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=7.10 cfs @ 12.53 hrs HW=666.12' TW=664.67' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.10 cfs @ 5.79 fps)

Secondary OutFlow Max=6.42 cfs @ 12.89 hrs HW=666.14' TW=665.61' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 6.42 cfs @ 0.71 fps)

Pond 53P: West Pre-Treatment to Bio-Retention Area



Summary for Pond 55P: North Pre-Treatment to Bio-Retention Area

Inflow Area = 0.206 ac, 0.00% Impervious, Inflow Depth = 98.72" for 25-yr event
Inflow = 9.70 cfs @ 12.43 hrs, Volume= 1.694 af
Outflow = 9.39 cfs @ 12.88 hrs, Volume= 1.701 af, Atten= 3%, Lag= 26.7 min
Primary = 5.64 cfs @ 12.57 hrs, Volume= 1.478 af
Routed to Pond 39P : Level Spreader
Secondary = 4.44 cfs @ 12.98 hrs, Volume= 0.224 af
Routed to Reach 6R : North Property Line Ditch (Central)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs
Peak Elev= 666.06' @ 12.72 hrs Surf.Area= 4,482 sf Storage= 9,129 cf

Plug-Flow detention time= 36.1 min calculated for 1.680 af (99% of inflow)
Center-of-Mass det. time= 40.6 min (871.0 - 830.4)

Volume	Invert	Avail.Storage	Storage Description
#1	663.00'	11,188 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

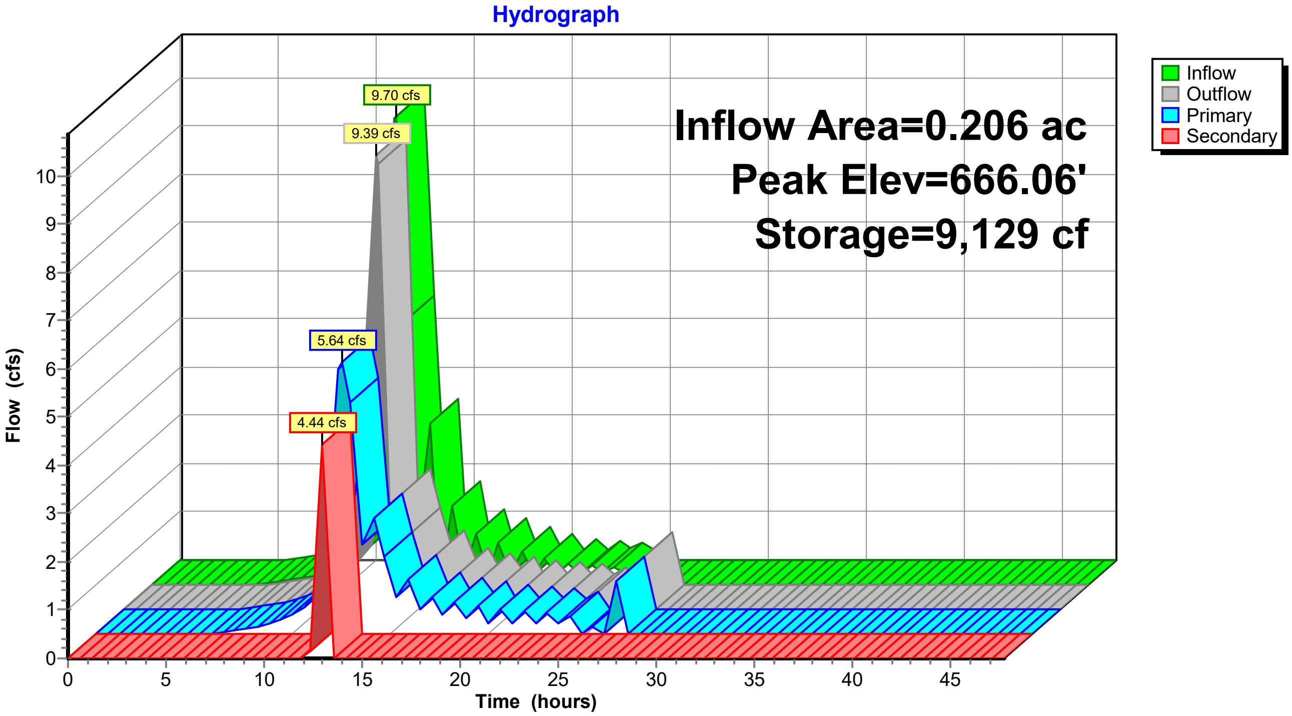
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.00	5	0	0
664.00	2,975	1,490	1,490
665.00	3,675	3,325	4,815
666.00	4,435	4,055	8,870
666.50	4,835	2,318	11,188

Device	Routing	Invert	Outlet Devices
#1	Primary	663.05'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 663.05' / 663.00' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Secondary	665.85'	**75.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=4.64 cfs @ 12.57 hrs HW=665.88' TW=664.38' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 4.64 cfs @ 5.90 fps)

Secondary OutFlow Max=4.39 cfs @ 12.98 hrs HW=665.93' TW=664.36' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 4.39 cfs @ 0.70 fps)

Pond 55P: North Pre-Treatment to Bio-Retention Area

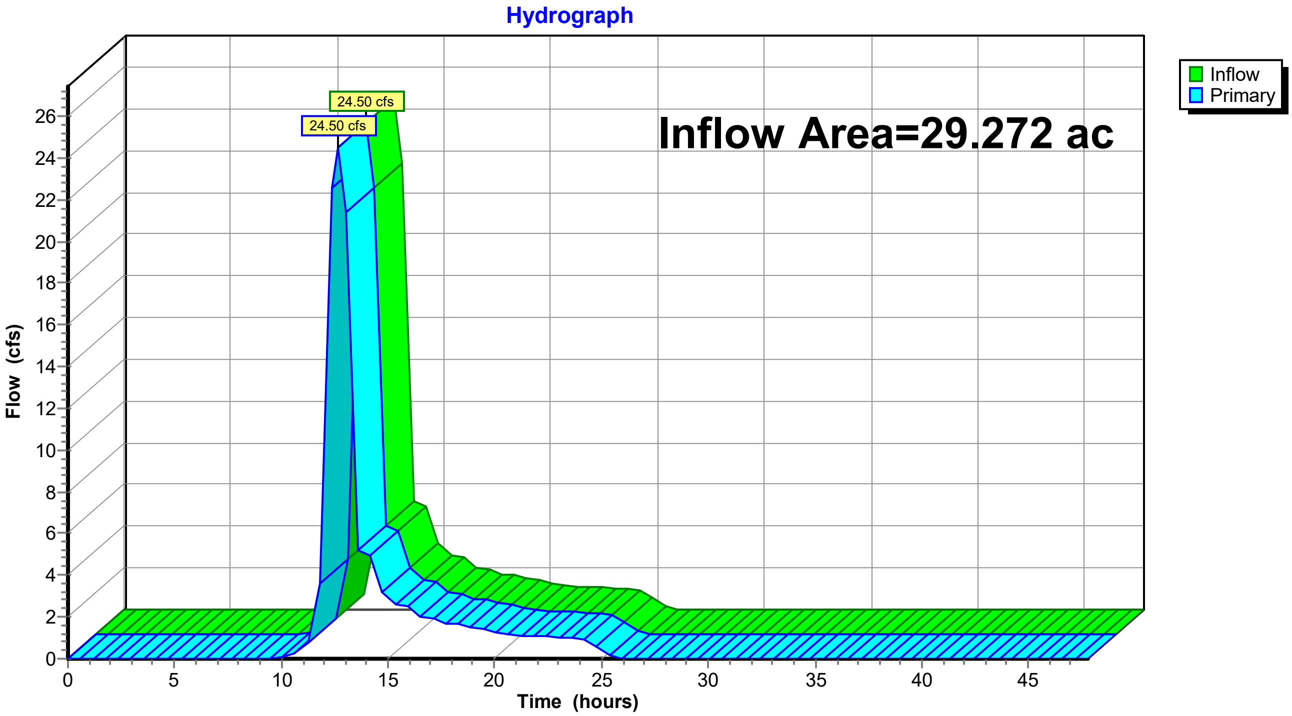


Summary for Link 1L: West Property Line and Adjacent Wetland

Inflow Area = 29.272 ac, 0.00% Impervious, Inflow Depth = 1.73" for 25-yr event
Inflow = 24.50 cfs @ 12.65 hrs, Volume= 4.229 af
Primary = 24.50 cfs @ 12.65 hrs, Volume= 4.229 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs

Link 1L: West Property Line and Adjacent Wetland

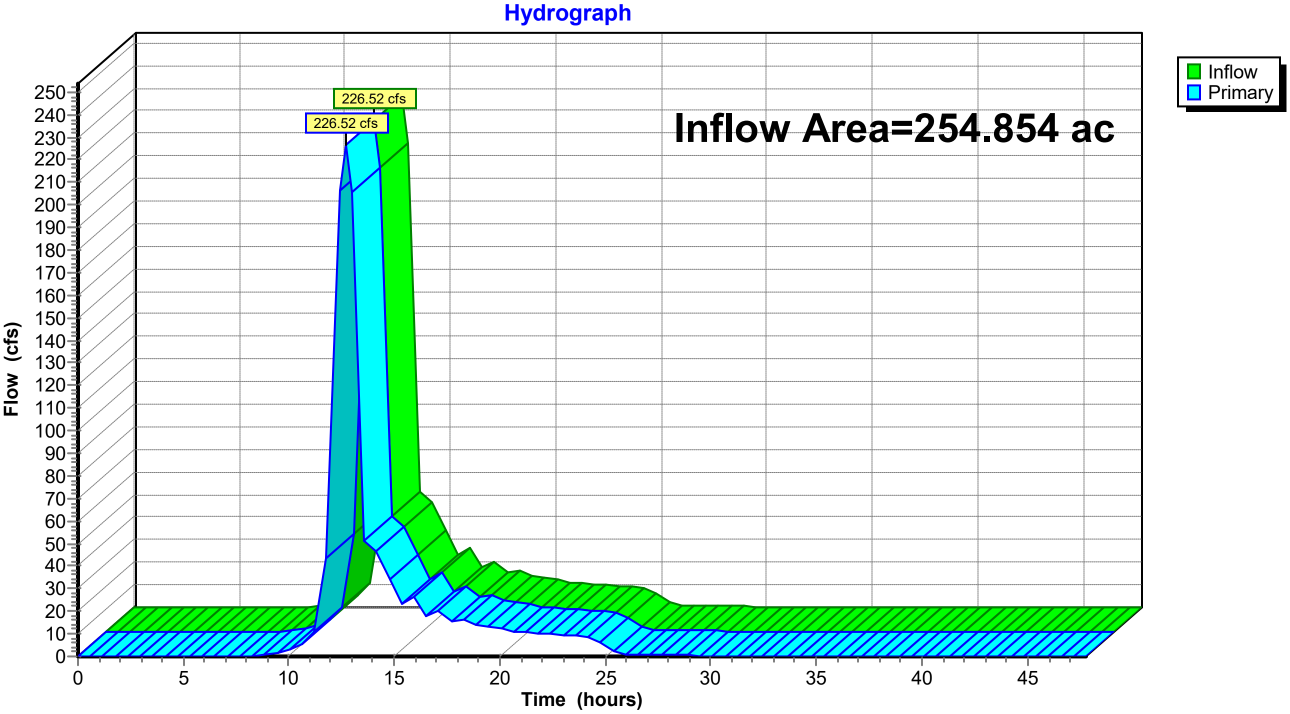


Summary for Link 2L: Total Discharge at Design Points

Inflow Area =	254.854 ac,	4.91% Impervious,	Inflow Depth > 1.96"	for 25-yr event	
Inflow =	226.52 cfs @	12.68 hrs,	Volume=	41.642 af	
Primary =	226.52 cfs @	12.68 hrs,	Volume=	41.642 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs

Link 2L: Total Discharge at Design Points

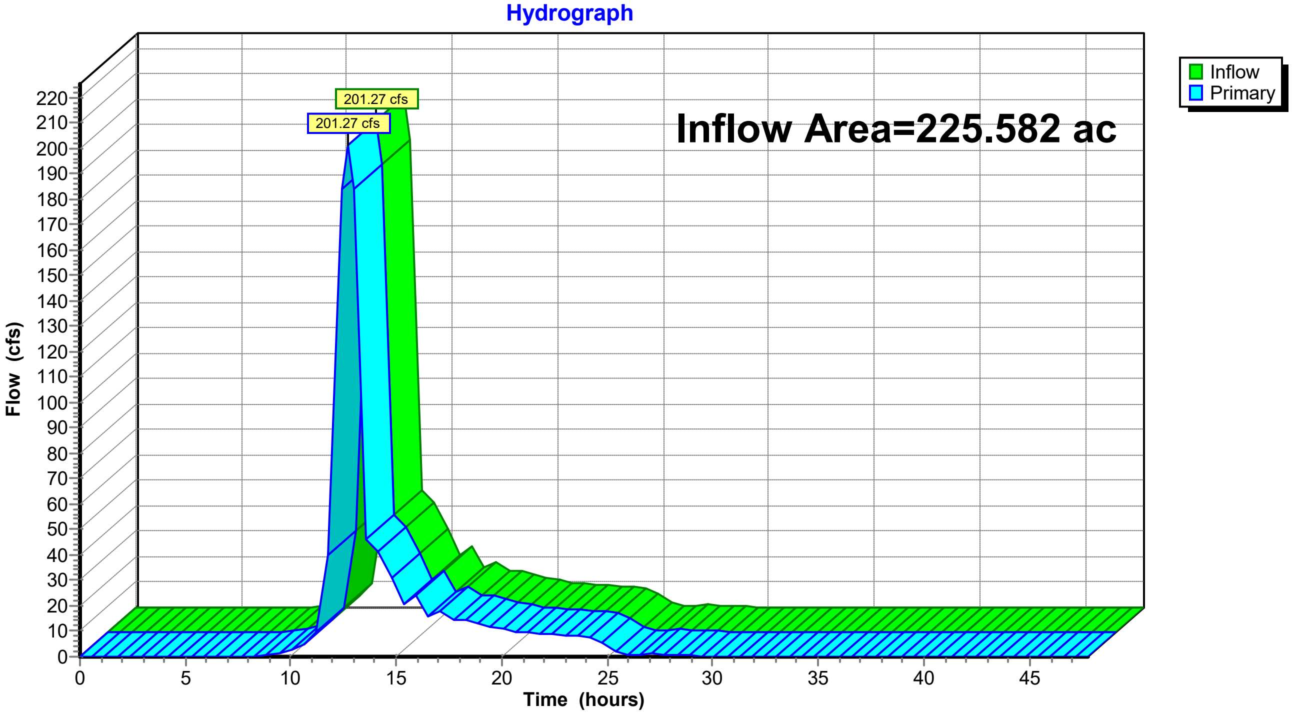


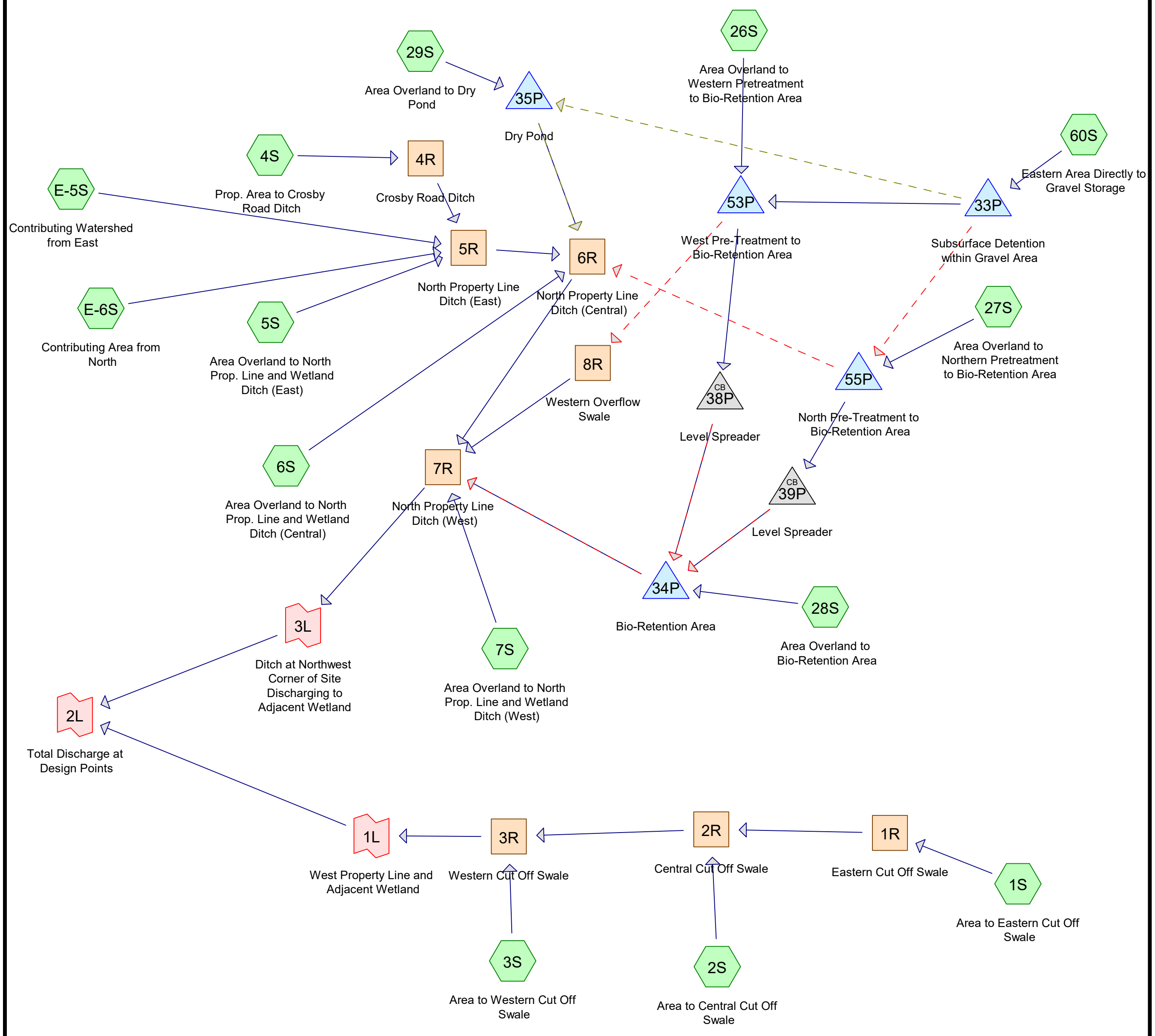
Summary for Link 3L: Ditch at Northwest Corner of Site Discharging to Adjacent Wetland

```
Inflow Area =      225.582 ac,    5.55% Impervious,  Inflow Depth >   1.99"    for  25-yr event
Inflow       =      201.27 cfs @   12.69 hrs,  Volume=          37.412 af
Primary      =      201.27 cfs @   12.69 hrs,  Volume=          37.412 af,  Atten= 0%,  Lag= 0.0 min
     Routed to Link 2L : Total Discharge at Design Points
```

Primary outflow = Inflow, Time Span= 0.00-47.79 hrs, dt= 0.59 hrs

Link 3L: Ditch at Northwest Corner of Site Discharging to Adjacent Wetland





Subcat
Reach
Pond
Link

Routing Diagram for Plug Power - Proposed Conditions 100 7-7-21
Prepared by {enter your company name here}, Printed 7/14/2021
HydroCAD® 10.10-6a s/n 11585 © 2020 HydroCAD Software Solutions LLC

Project Notes

Defined 9 rainfall events from Gateway IDF

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.164	80	>75% Grass cover, Good, HSG D (26S, 27S, 28S, 29S, 60S)
2.119	77	Brush, Fair, HSG D (5S, 6S, 7S)
1.861	73	Brush, Good, HSG D (1S, 2S, 3S)
3.004	80	Gravel Storage Area, Good, HSG D (60S)
1.050	96	Gravel surface, HSG D (E-5S)
7.585	78	Meadow, non-grazed, HSG D (1S, 2S, 3S, 60S)
103.070	84	Pasture/grassland/range, Fair, HSG D (E-5S)
5.945	98	Paved parking, HSG D (60S)
5.115	98	Roofs, HSG D (60S)
15.560	89	Row crops, straight row, Good, HSG D (3S, E-6S)
1.449	98	Unconnected pavement, HSG D (60S)
2.970	98	Water Surface, 0% imp, HSG D (E-5S)
95.731	79	Woods, Fair, HSG D (1S, 2S, 3S, E-5S)
0.230	79	Woods/grass comb., Good, HSG D (4S)
254.854	**83**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
254.854	HSG D	1S, 2S, 3S, 4S, 5S, 6S, 7S, 26S, 27S, 28S, 29S, 60S, E-5S, E-6S
0.000	Other	
254.854		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	9.164	0.000	9.164	>75% Grass cover, Good	26S, 27S, 28S, 29S, 60S
0.000	0.000	0.000	2.119	0.000	2.119	Brush, Fair	5S, 6S, 7S
0.000	0.000	0.000	1.861	0.000	1.861	Brush, Good	1S, 2S, 3S
0.000	0.000	0.000	3.004	0.000	3.004	Gravel Storage Area, Good	60S
0.000	0.000	0.000	1.050	0.000	1.050	Gravel surface	E-5S
0.000	0.000	0.000	7.585	0.000	7.585	Meadow, non-grazed	1S, 2S, 3S, 60S
0.000	0.000	0.000	103.070	0.000	103.070	Pasture/grassland/range, Fair	E-5S
0.000	0.000	0.000	5.945	0.000	5.945	Paved parking	60S
0.000	0.000	0.000	5.115	0.000	5.115	Roofs	60S
0.000	0.000	0.000	15.560	0.000	15.560	Row crops, straight row, Good	3S, E-6S
0.000	0.000	0.000	1.449	0.000	1.449	Unconnected pavement	60S
0.000	0.000	0.000	2.970	0.000	2.970	Water Surface, 0% imp	E-5S
0.000	0.000	0.000	95.731	0.000	95.731	Woods, Fair	1S, 2S, 3S, E-5S
0.000	0.000	0.000	0.230	0.000	0.230	Woods/grass comb., Good	4S
0.000	**0.000**	**0.000**	**254.854**	**0.000**	**254.854**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	E-5S	0.00	0.00	75.0	0.0200	0.012	0.0	42.0	0.0
2	33P	664.01	663.90	57.0	0.0019	0.012	0.0	18.0	0.0
3	33P	664.01	663.90	57.0	0.0019	0.012	0.0	18.0	0.0
4	33P	665.71	664.71	50.0	0.0200	0.012	0.0	18.0	0.0
5	33P	666.05	665.05	50.0	0.0200	0.012	0.0	15.0	0.0
6	33P	666.39	665.39	50.0	0.0200	0.012	0.0	12.0	0.0
7	33P	666.56	665.56	50.0	0.0200	0.012	0.0	10.0	0.0
8	34P	660.55	660.50	25.0	0.0020	0.012	0.0	15.0	0.0
9	34P	660.55	660.50	25.0	0.0020	0.012	0.0	15.0	0.0
10	34P	660.56	660.55	5.0	0.0020	0.012	0.0	4.0	0.0
11	34P	660.56	660.55	5.0	0.0020	0.012	0.0	4.0	0.0
12	35P	662.56	662.50	30.0	0.0020	0.012	0.0	12.0	0.0
13	53P	663.04	663.00	20.0	0.0020	0.012	0.0	15.0	0.0
14	55P	663.05	663.00	25.0	0.0020	0.012	0.0	12.0	0.0

Time span=0.00-48.00 hrs, dt=0.03 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area to Eastern Cut Off Runoff Area=300,195 sf 0.00% Impervious Runoff Depth=2.72"
Flow Length=625' Tc=27.5 min CN=78 Runoff=17.17 cfs 1.562 af

Subcatchment 2S: Area to Central Cut Off Runoff Area=542,635 sf 0.00% Impervious Runoff Depth=2.72"
Flow Length=1,100' Tc=42.2 min CN=78 Runoff=23.23 cfs 2.824 af

Subcatchment 3S: Area to Western Cut Off Runoff Area=432,245 sf 0.00% Impervious Runoff Depth=2.99"
Flow Length=1,100' Tc=51.3 min CN=81 Runoff=17.84 cfs 2.476 af

Subcatchment 4S: Prop. Area to Crosby Runoff Area=10,015 sf 0.00% Impervious Runoff Depth=2.81"
Flow Length=125' Slope=0.0100 '/' Tc=23.3 min CN=79 Runoff=0.66 cfs 0.054 af

Subcatchment 5S: Area Overland to North Runoff Area=47,675 sf 0.00% Impervious Runoff Depth=2.63"
Flow Length=140' Tc=11.7 min CN=77 Runoff=4.16 cfs 0.240 af

Subcatchment 6S: Area Overland to North Runoff Area=23,585 sf 0.00% Impervious Runoff Depth=2.63"
Flow Length=100' Tc=10.8 min CN=77 Runoff=2.12 cfs 0.119 af

Subcatchment 7S: Area Overland to North Runoff Area=21,065 sf 0.00% Impervious Runoff Depth=2.63"
Flow Length=170' Tc=14.9 min CN=77 Runoff=1.65 cfs 0.106 af

Subcatchment 26S: Area Overland to Runoff Area=19,545 sf 0.00% Impervious Runoff Depth=2.90"
Flow Length=45' Slope=0.0100 '/' Tc=12.2 min CN=80 Runoff=1.84 cfs 0.108 af

Subcatchment 27S: Area Overland to Runoff Area=8,970 sf 0.00% Impervious Runoff Depth=2.90"
Tc=5.0 min CN=80 Runoff=1.09 cfs 0.050 af

Subcatchment 28S: Area Overland to Runoff Area=71,325 sf 0.00% Impervious Runoff Depth=2.90"
Flow Length=30' Tc=5.4 min CN=80 Runoff=8.52 cfs 0.396 af

Subcatchment 29S: Area Overland to Dry Runoff Area=33,090 sf 0.00% Impervious Runoff Depth=2.90"
Tc=5.0 min CN=80 Runoff=4.00 cfs 0.184 af

Subcatchment 60S: Eastern Area Directly Runoff Area=21.761 ac 57.48% Impervious Runoff Depth=3.89"
Flow Length=330' Tc=30.2 min CN=90 Runoff=71.38 cfs 7.047 af

Subcatchment E-5S: Contributing Runoff Area=185.750 ac 0.00% Impervious Runoff Depth=3.09"
Flow Length=4,945' Tc=42.4 min CN=82 Runoff=394.62 cfs 47.800 af

Subcatchment E-6S: Contributing Area Runoff Area=12.670 ac 0.00% Impervious Runoff Depth=3.78"
Flow Length=450' Slope=0.0100 '/' Tc=14.1 min CN=89 Runoff=61.53 cfs 3.993 af

Reach 1R: Eastern Cut Off Swale Avg. Flow Depth=0.98' Max Vel=2.40 fps Inflow=17.17 cfs 1.562 af
n=0.030 L=700.0' S=0.0050 '/' Capacity=43.86 cfs Outflow=16.34 cfs 1.562 af

Reach 2R: Central Cut Off Swale Avg. Flow Depth=1.41' Max Vel=2.97 fps Inflow=38.46 cfs 4.386 af
n=0.030 L=500.0' S=0.0050 '/' Capacity=88.03 cfs Outflow=38.03 cfs 4.386 af

```
Reach 3R: Western Cut Off Swale        Avg. Flow Depth=1.76'   Max Vel=3.41 fps   Inflow=54.69 cfs  6.862 af
                                 n=0.030   L=600.0'   S=0.0050 '/'   Capacity=73.73 cfs   Outflow=54.22 cfs  6.862 af

Reach 4R: Crosby Road Ditch             Avg. Flow Depth=0.18'   Max Vel=1.25 fps   Inflow=0.66 cfs  0.054 af
                                  n=0.030   L=450.0'   S=0.0089 '/'   Capacity=98.41 cfs   Outflow=0.61 cfs  0.054 af

Reach 5R: North Property Line Ditch  Avg. Flow Depth=2.83'   Max Vel=4.73 fps   Inflow=408.28 cfs  52.086 af
                              n=0.030   L=670.0'   S=0.0055 '/'   Capacity=471.44 cfs   Outflow=405.66 cfs  52.086 af

Reach 6R: North Property Line Ditch  Avg. Flow Depth=3.03'   Max Vel=4.21 fps   Inflow=414.39 cfs  53.917 af
                              n=0.030   L=500.0'   S=0.0040 '/'   Capacity=401.23 cfs   Outflow=413.15 cfs  53.917 af

Reach 7R: North Property Line Ditch  Avg. Flow Depth=3.41'   Max Vel=3.52 fps   Inflow=436.70 cfs  58.790 af
                              n=0.030   L=500.0'   S=0.0024 '/'   Capacity=463.27 cfs   Outflow=434.63 cfs  58.788 af

Reach 8R: Western Overflow Swale       Avg. Flow Depth=1.00'   Max Vel=3.53 fps   Inflow=17.66 cfs  0.744 af
                                 n=0.030   L=500.0'   S=0.0100 '/'   Capacity=43.30 cfs   Outflow=17.62 cfs  0.744 af

Pond 33P: Subsurface Detention within     Peak Elev=668.28'  Storage=16,190 cf   Inflow=71.38 cfs  7.047 af
Primary=24.37 cfs  3.747 af   Secondary=12.90 cfs  2.145 af   Tertiary=26.42 cfs  1.155 af   Outflow=63.69 cfs  7.047 af

Pond 34P: Bio-Retention Area              Peak Elev=664.36'  Storage=72,297 cf   Inflow=17.35 cfs  5.244 af
                         Primary=11.07 cfs  4.024 af   Secondary=0.00 cfs  0.000 af   Outflow=11.07 cfs  4.024 af

Pond 35P: Dry Pond                        Peak Elev=665.80'  Storage=44,951 cf   Inflow=26.85 cfs  1.339 af
                            Primary=4.52 cfs  1.207 af   Tertiary=8.10 cfs  0.132 af   Outflow=10.95 cfs  1.339 af

Pond 38P: Level Spreader                                Peak Elev=664.87'   Inflow=7.23 cfs  3.061 af
                          Primary=7.23 cfs  3.061 af   Secondary=0.00 cfs  0.000 af   Outflow=7.23 cfs  3.061 af

Pond 39P: Level Spreader                                Peak Elev=664.65'   Inflow=4.59 cfs  1.787 af
                          Primary=4.59 cfs  1.738 af   Secondary=0.47 cfs  0.048 af   Outflow=4.59 cfs  1.787 af

Pond 53P: West Pre-Treatment to           Peak Elev=666.23'  Storage=18,392 cf   Inflow=24.76 cfs  3.855 af
                         Primary=7.23 cfs  3.061 af   Secondary=17.66 cfs  0.744 af   Outflow=24.73 cfs  3.805 af

Pond 55P: North Pre-Treatment to           Peak Elev=665.98'  Storage=8,781 cf   Inflow=13.02 cfs  2.194 af
                          Primary=4.59 cfs  1.787 af   Secondary=8.56 cfs  0.373 af   Outflow=13.01 cfs  2.159 af

Link 1L: West Property Line and Adjacent Wetland                               Inflow=54.22 cfs  6.862 af
                                                                              Primary=54.22 cfs  6.862 af

Link 2L: Total Discharge at Design Points                                    Inflow=488.49 cfs  65.650 af
                                                                            Primary=488.49 cfs  65.650 af

Link 3L: Ditch at Northwest Corner of Site Discharging to Adjacent           Inflow=434.63 cfs  58.788 af
                                                                            Primary=434.63 cfs  58.788 af

                Total Runoff Area = 254.854 ac   Runoff Volume = 66.958 af   Average Runoff Depth = 3.15"
                                                 95.09% Pervious = 242.345 ac   4.91% Impervious = 12.509 ac
```

Summary for Subcatchment 1S: Area to Eastern Cut Off Swale

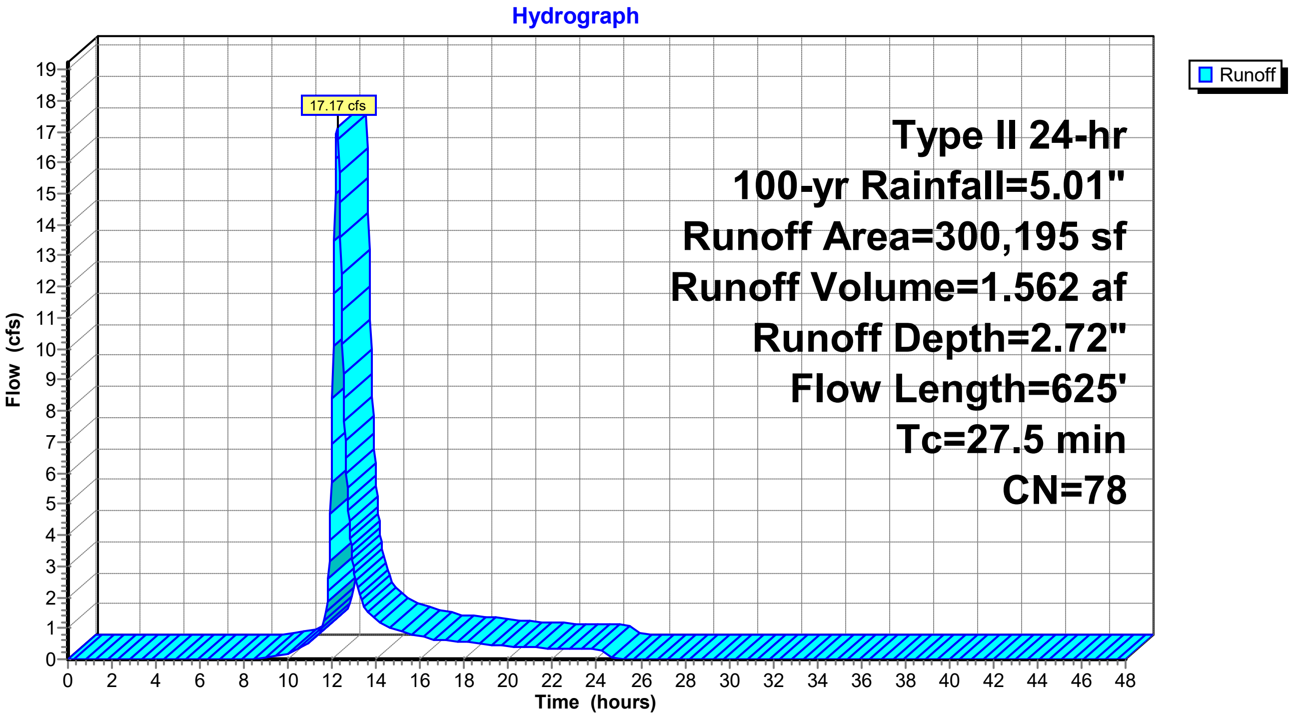
Runoff = 17.17 cfs @ 12.21 hrs, Volume= 1.562 af, Depth= 2.72"
Routed to Reach 1R : Eastern Cut Off Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
83,440	78	Meadow, non-grazed, HSG D
185,160	79	Woods, Fair, HSG D
31,595	73	Brush, Good, HSG D
300,195	78	Weighted Average
300,195		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0120	0.13		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.7	90	0.0150	0.86		**Shallow Concentrated Flow, 90' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
12.7	435	0.0130	0.57		**Shallow Concentrated Flow, 435' Shallow Conc. Flow** Woodland Kv= 5.0 fps
27.5	625	Total			

Subcatchment 1S: Area to Eastern Cut Off Swale



Summary for Subcatchment 2S: Area to Central Cut Off Swale

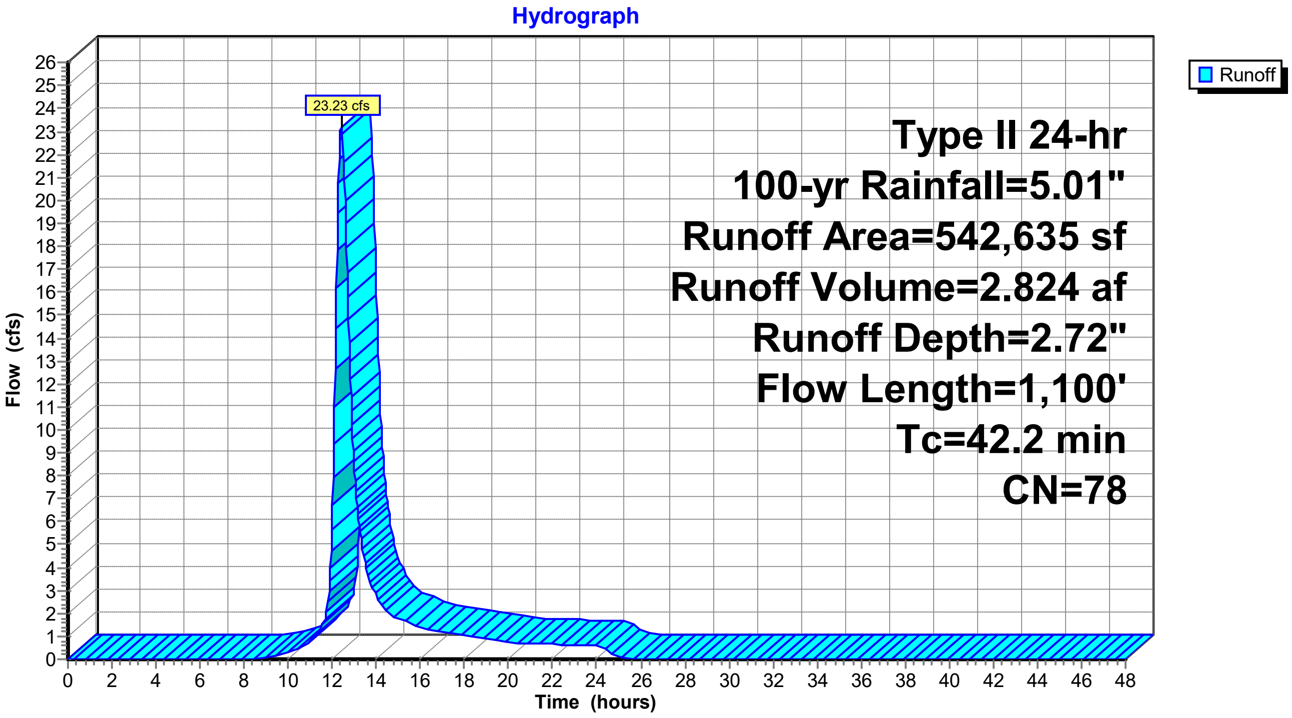
Runoff = 23.23 cfs @ 12.40 hrs, Volume= 2.824 af, Depth= 2.72"
Routed to Reach 2R : Central Cut Off Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
333,020	79	Woods, Fair, HSG D
189,965	78	Meadow, non-grazed, HSG D
19,650	73	Brush, Good, HSG D
542,635	78	Weighted Average
542,635		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
7.3	375	0.0150	0.86		**Shallow Concentrated Flow, 375' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
20.8	625	0.0100	0.50		**Shallow Concentrated Flow, 625' Shallow Conc. Flow** Woodland Kv= 5.0 fps
42.2	1,100	Total			

Subcatchment 2S: Area to Central Cut Off Swale



Summary for Subcatchment 3S: Area to Western Cut Off Swale

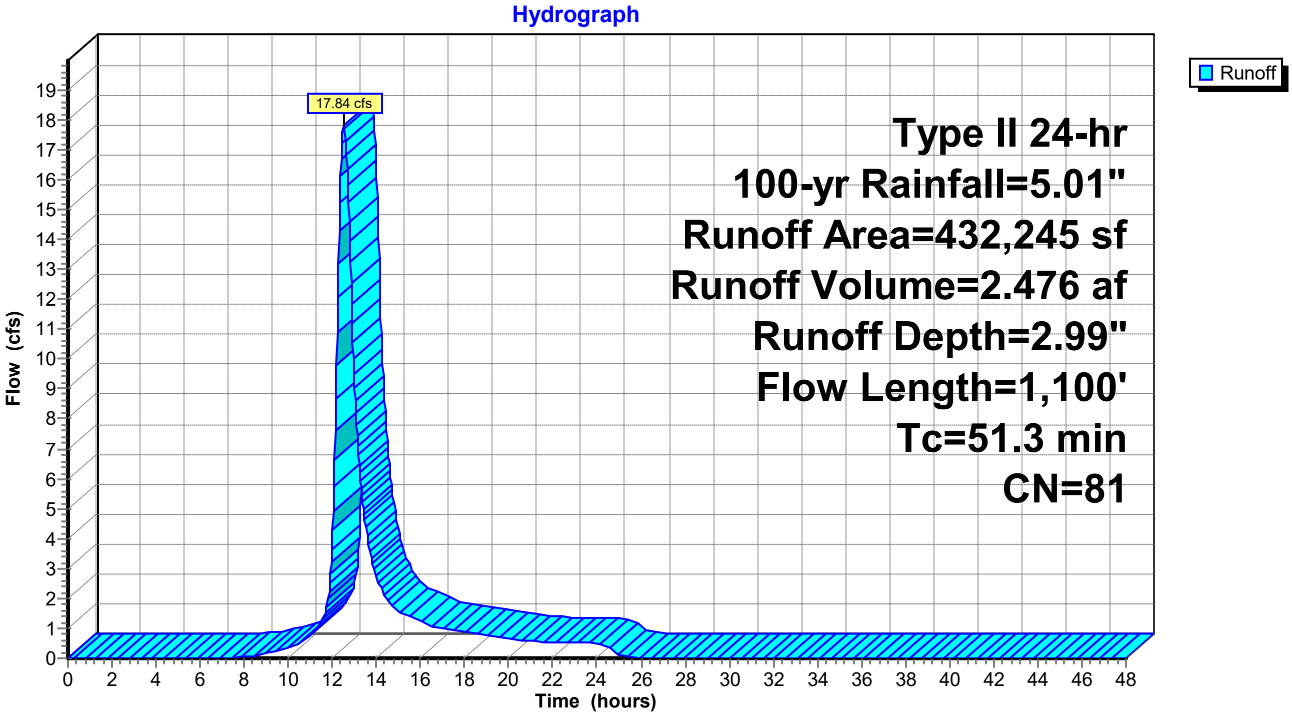
Runoff = 17.84 cfs @ 12.49 hrs, Volume= 2.476 af, Depth= 2.99"
Routed to Reach 3R : Western Cut Off Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
125,880	89	Row crops, straight row, Good, HSG D
51,080	78	Meadow, non-grazed, HSG D
225,445	79	Woods, Fair, HSG D
29,840	73	Brush, Good, HSG D
432,245	81	Weighted Average
432,245		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.1	100	0.0050	0.07		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
21.7	650	0.0100	0.50		**Shallow Concentrated Flow, 650' Shallow Conc. Flow** Woodland Kv= 5.0 fps
51.3	1,100	Total			

Subcatchment 3S: Area to Western Cut Off Swale



Summary for Subcatchment 4S: Prop. Area to Crosby Road Ditch

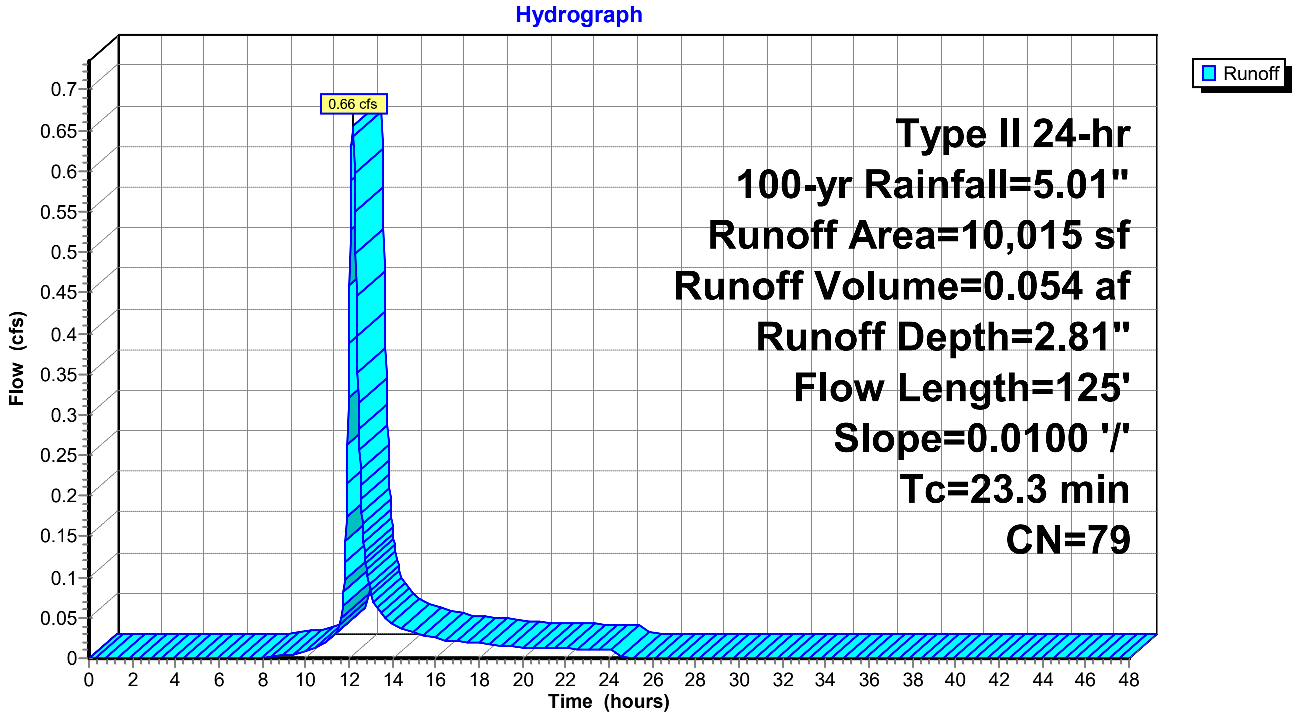
Runoff = 0.66 cfs @ 12.16 hrs, Volume= 0.054 af, Depth= 2.81"
Routed to Reach 4R : Crosby Road Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
10,015	79	Woods/grass comb., Good, HSG D
10,015		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	100	0.0100	0.07		**Sheet Flow, 100' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.3	25	0.0100	1.50		**Shallow Concentrated Flow, 25' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
23.3	125	Total			

Subcatchment 4S: Prop. Area to Crosby Road Ditch



Summary for Subcatchment 5S: Area Overland to North Prop. Line and Wetland Ditch (East)

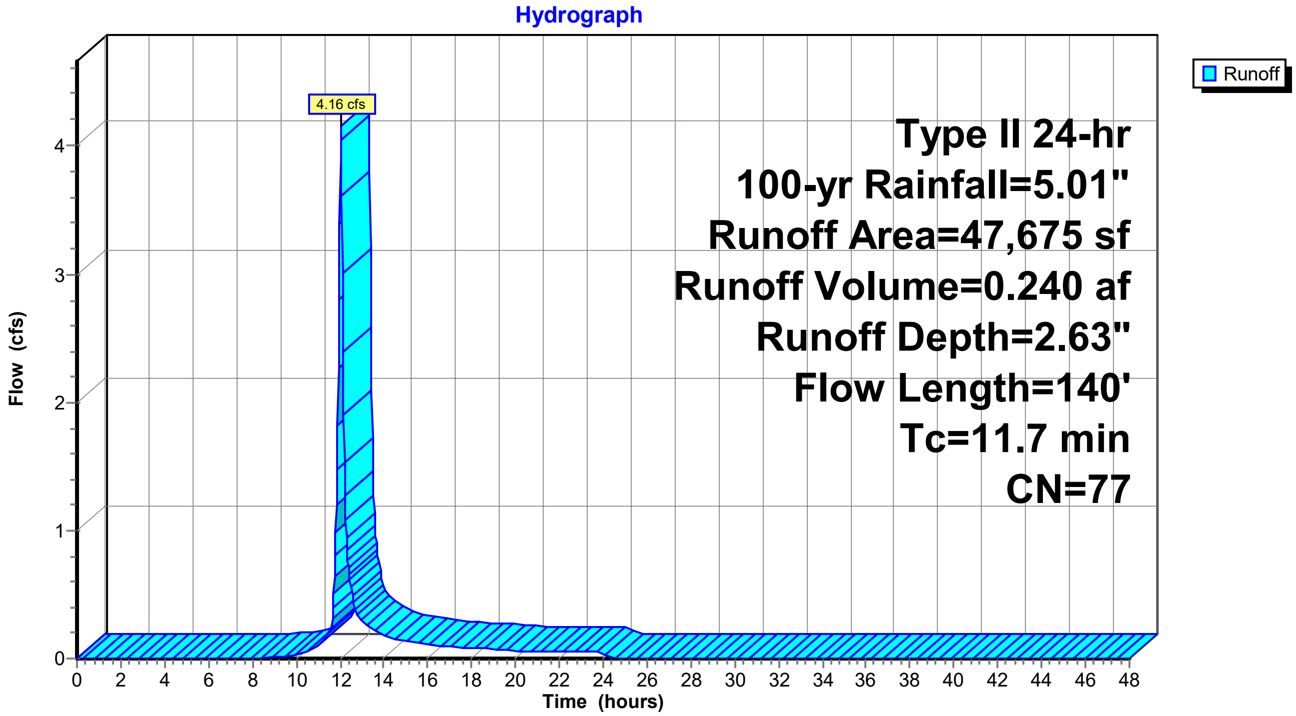
Runoff = 4.16 cfs @ 12.04 hrs, Volume= 0.240 af, Depth= 2.63"
Routed to Reach 5R : North Property Line Ditch (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
47,675	77	Brush, Fair, HSG D
47,675		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	100	0.0200	0.16		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
1.0	40	0.0100	0.70		**Shallow Concentrated Flow, 40' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
11.7	140	Total			

Subcatchment 5S: Area Overland to North Prop. Line and Wetland Ditch (East)



Summary for Subcatchment 6S: Area Overland to North Prop. Line and Wetland Ditch (Central)

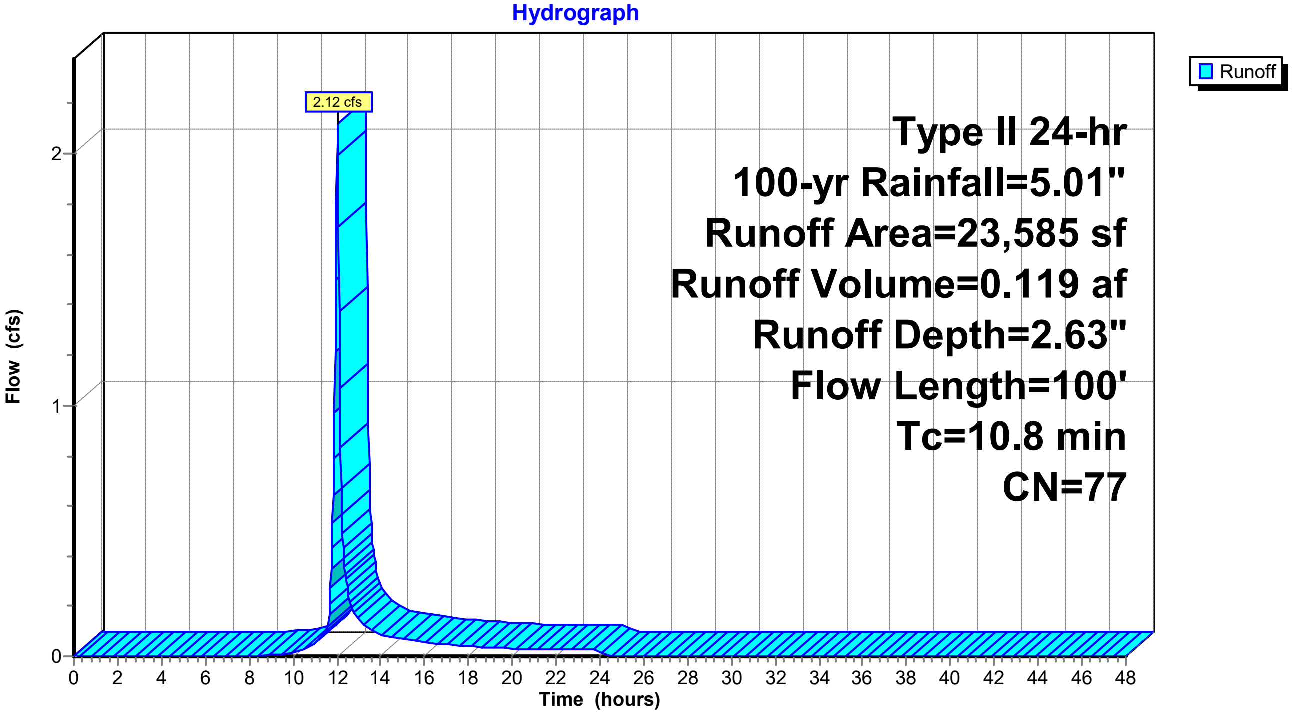
Runoff = 2.12 cfs @ 12.03 hrs, Volume= 0.119 af, Depth= 2.63"
Routed to Reach 6R : North Property Line Ditch (Central)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
23,585	77	Brush, Fair, HSG D
23,585		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	70	0.0100	0.11		**Sheet Flow, 70' Overland Flow** Range n= 0.130 P2= 2.14"
0.2	30	0.1000	2.21		**Shallow Concentrated Flow, 30' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
10.8	100	Total			

Subcatchment 6S: Area Overland to North Prop. Line and Wetland Ditch (Central)



Summary for Subcatchment 7S: Area Overland to North Prop. Line and Wetland Ditch (West)

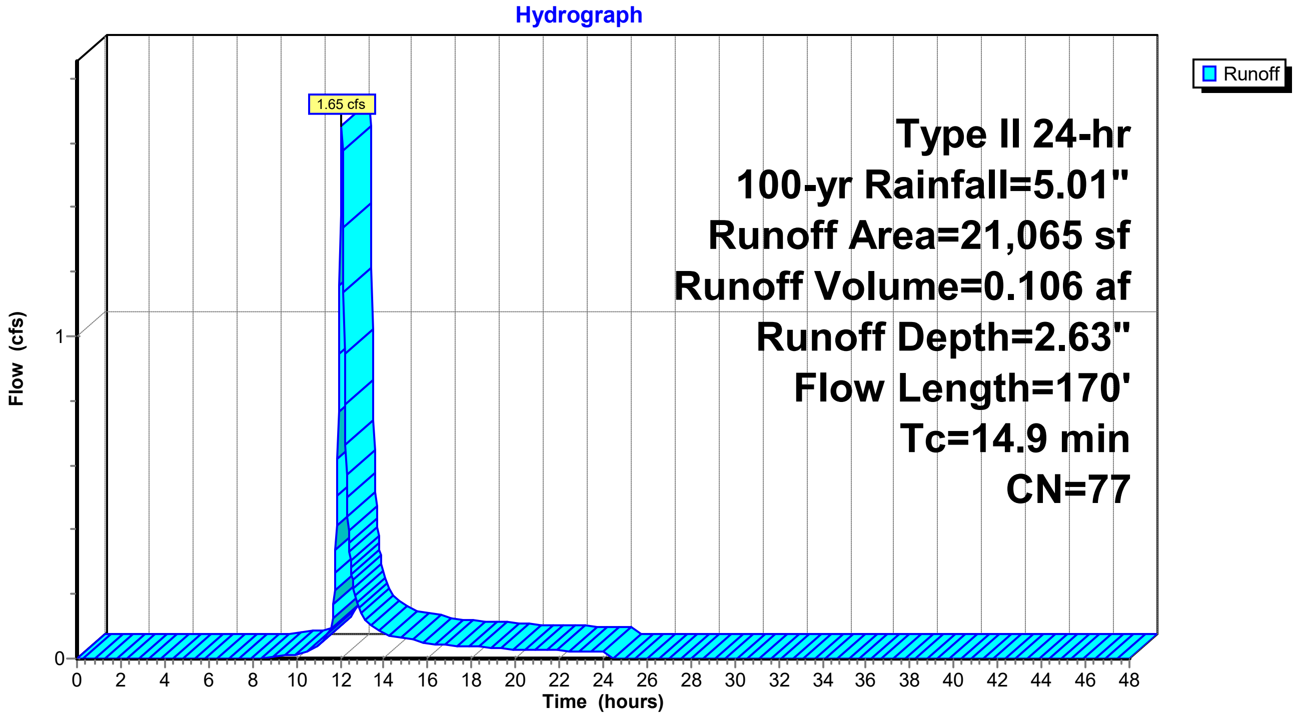
Runoff = 1.65 cfs @ 12.07 hrs, Volume= 0.106 af, Depth= 2.63"
Routed to Reach 7R : North Property Line Ditch (West)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
21,065	77	Brush, Fair, HSG D
21,065		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, 100' Overland Flow** Range n= 0.130 P2= 2.14"
0.8	70	0.0400	1.40		**Shallow Concentrated Flow, 70' Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
14.9	170	Total			

Subcatchment 7S: Area Overland to North Prop. Line and Wetland Ditch (West)



Summary for Subcatchment 26S: Area Overland to Western Pretreatment to Bio-Retention Area

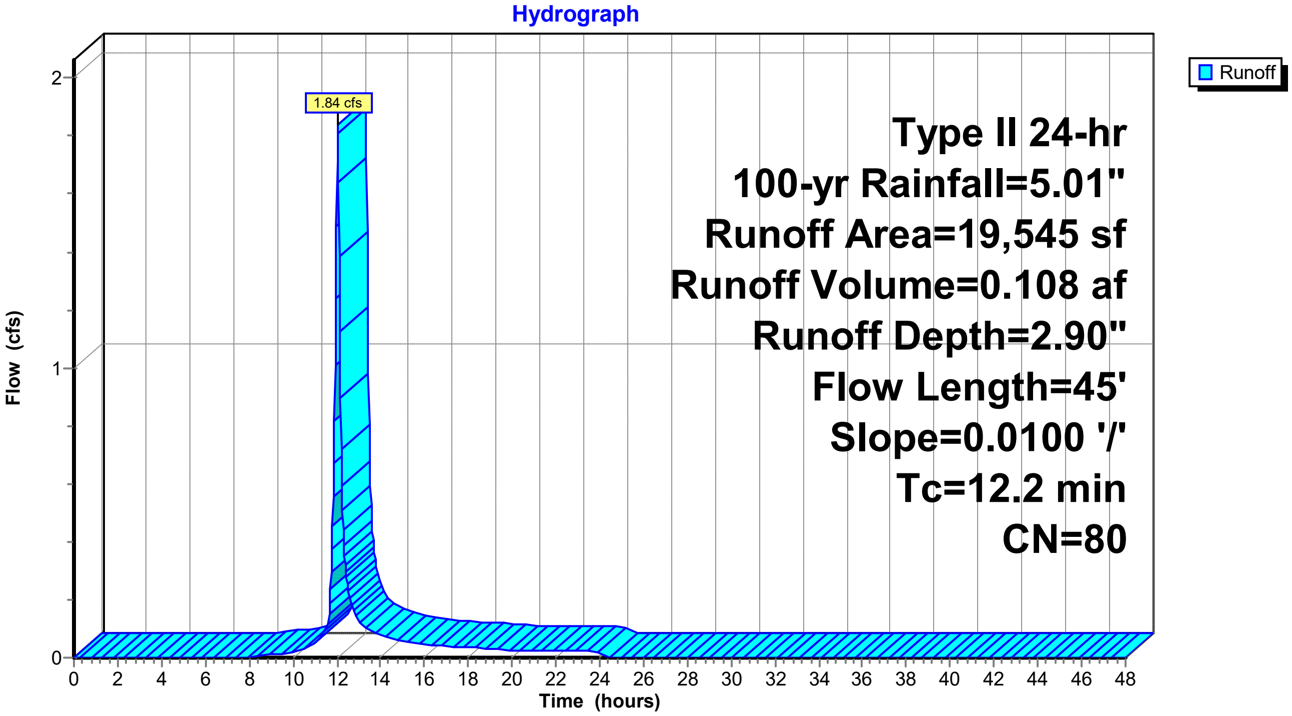
Runoff = 1.84 cfs @ 12.04 hrs, Volume= 0.108 af, Depth= 2.90"
Routed to Pond 53P : West Pre-Treatment to Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
19,545	80	>75% Grass cover, Good, HSG D
19,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	45	0.0100	0.06		**Sheet Flow, 45' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"

Subcatchment 26S: Area Overland to Western Pretreatment to Bio-Retention Area



Summary for Subcatchment 27S: Area Overland to Northern Pretreatment to Bio-Retention Area

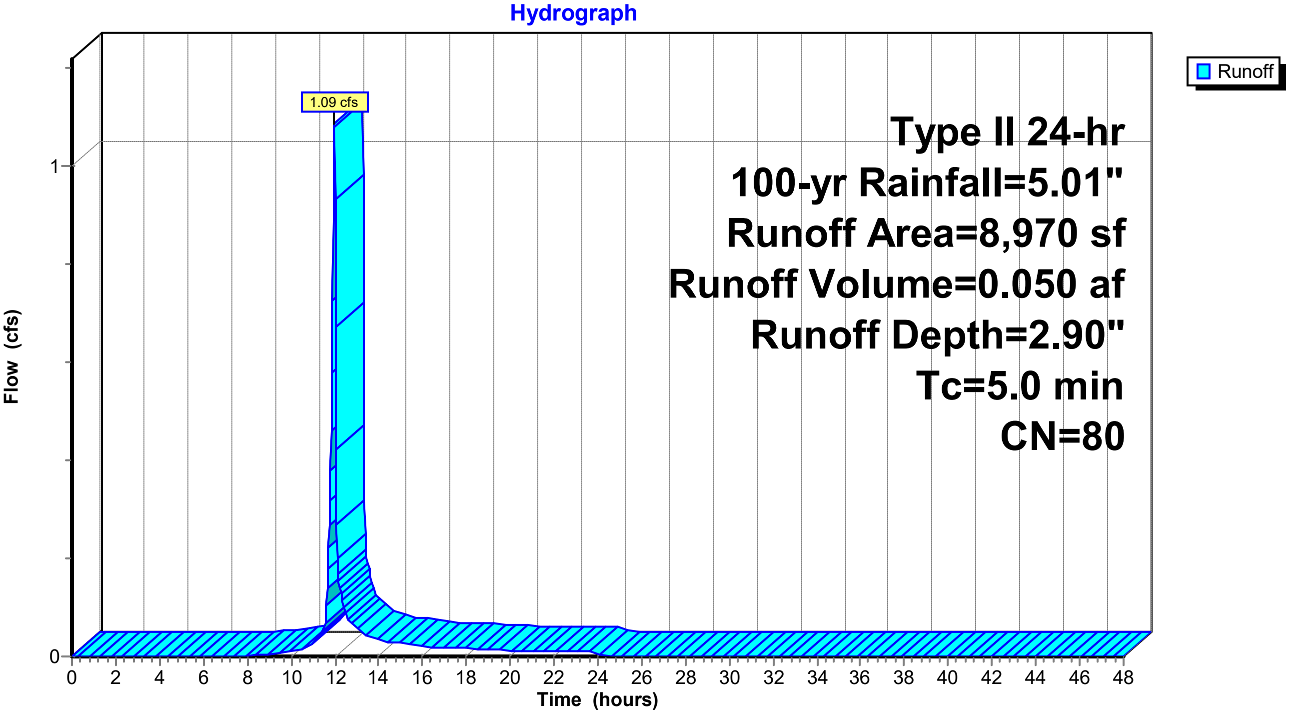
Runoff = 1.09 cfs @ 11.96 hrs, Volume= 0.050 af, Depth= 2.90"
Routed to Pond 55P : North Pre-Treatment to Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
8,970	80	>75% Grass cover, Good, HSG D
8,970		100.00% Pervious Area

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

Subcatchment 27S: Area Overland to Northern Pretreatment to Bio-Retention Area



Summary for Subcatchment 28S: Area Overland to Bio-Retention Area

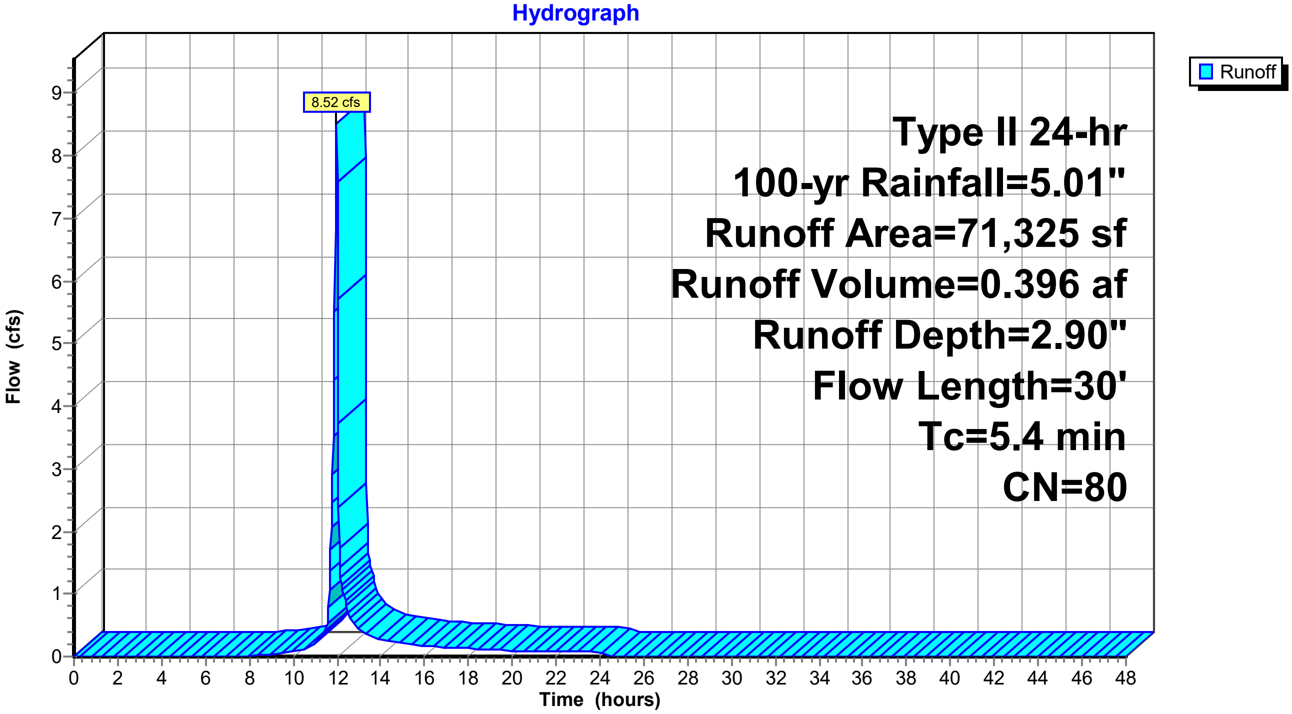
Runoff = 8.52 cfs @ 11.97 hrs, Volume= 0.396 af, Depth= 2.90"
Routed to Pond 34P : Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
71,325	80	>75% Grass cover, Good, HSG D
71,325		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	10	0.0100	0.05		**Sheet Flow, 10' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
1.8	20	0.2500	0.19		**Sheet Flow, 20' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
5.4	30	Total			

Subcatchment 28S: Area Overland to Bio-Retention Area



Summary for Subcatchment 29S: Area Overland to Dry Pond

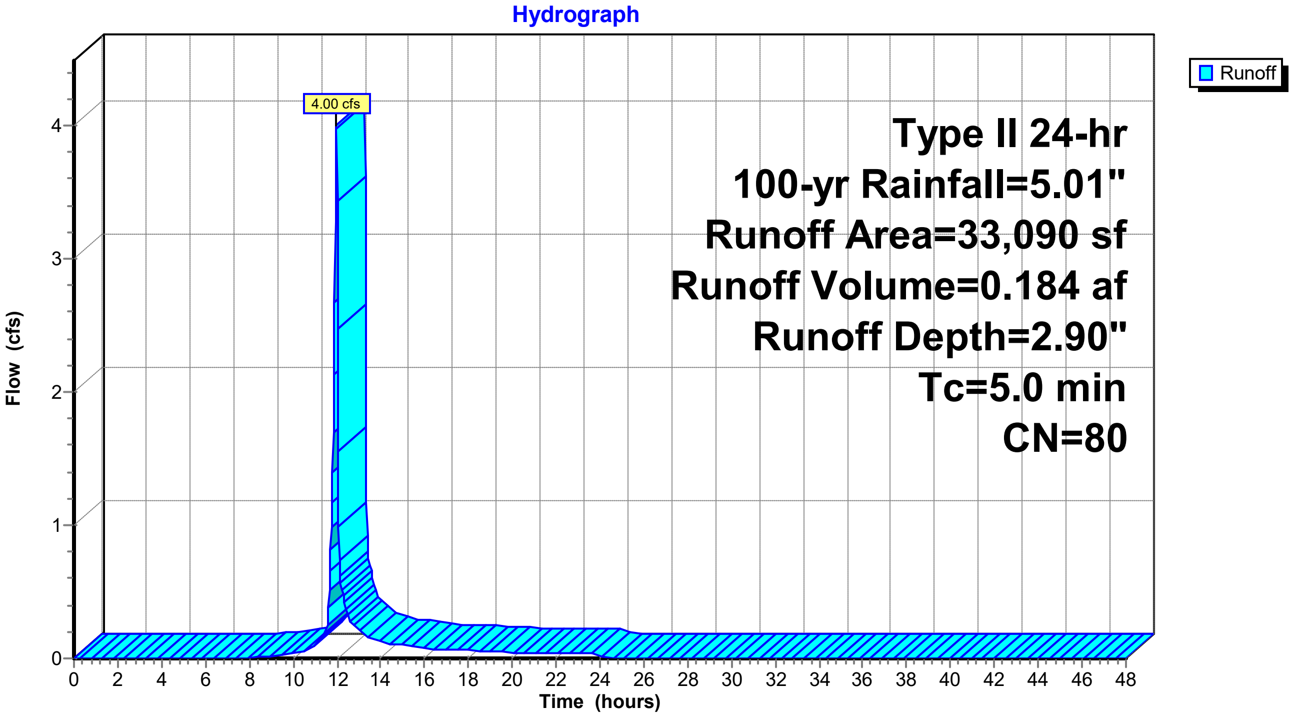
Runoff = 4.00 cfs @ 11.96 hrs, Volume= 0.184 af, Depth= 2.90"
Routed to Pond 35P : Dry Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (sf)	CN	Description
33,090	80	>75% Grass cover, Good, HSG D
33,090		100.00% Pervious Area

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

Subcatchment 29S: Area Overland to Dry Pond



Summary for Subcatchment 60S: Eastern Area Directly to Gravel Storage

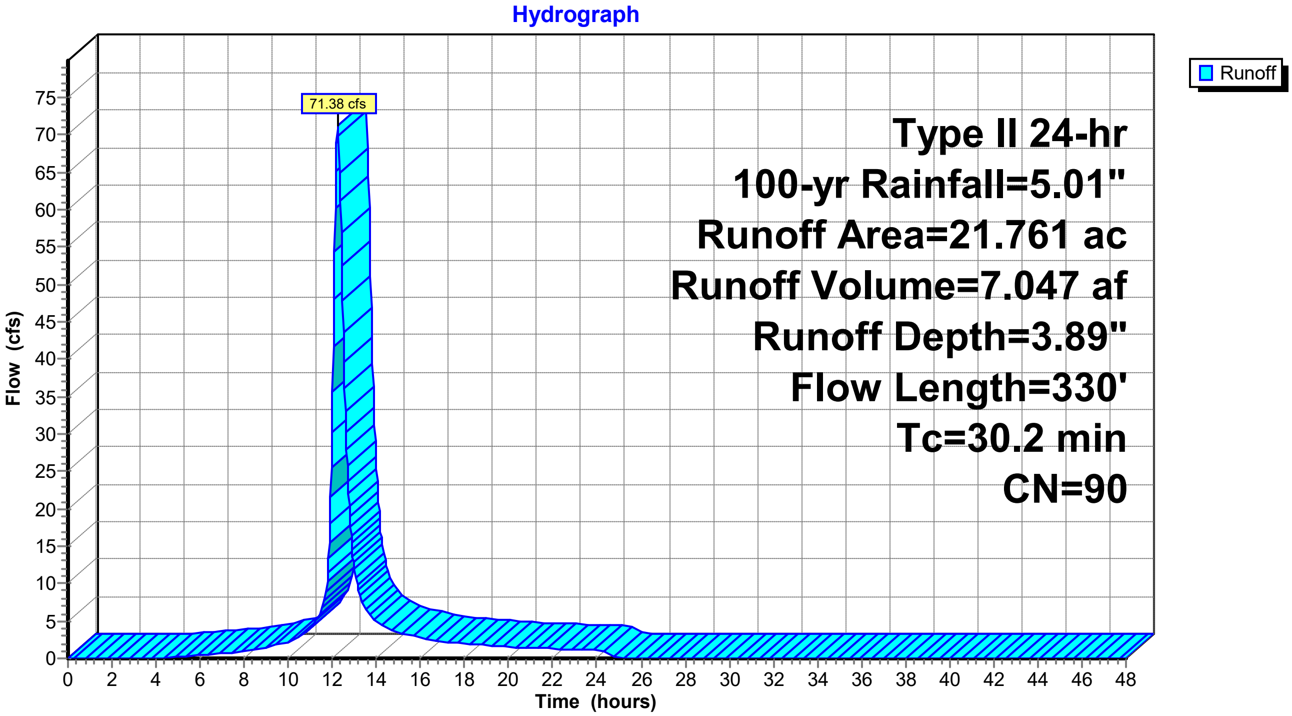
Runoff = 71.38 cfs @ 12.24 hrs, Volume= 7.047 af, Depth= 3.89"
Routed to Pond 33P : Subsurface Detention within Gravel Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

	Area (ac)	CN	Description
*	3.004	80	Gravel Storage Area, Good, HSG D
	5.945	98	Paved parking, HSG D
	5.115	98	Roofs, HSG D
	1.449	98	Unconnected pavement, HSG D
	6.112	80	>75% Grass cover, Good, HSG D
	0.136	78	Meadow, non-grazed, HSG D
	21.761	90	Weighted Average
	9.252		42.52% Pervious Area
	12.509		57.48% Impervious Area
	1.449		11.58% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	75	0.0130	0.08		**Sheet Flow, 75' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
12.3	25	0.0030	0.03		**Sheet Flow, 25' Overland Flow** Grass: Dense n= 0.240 P2= 2.14"
0.2	30	0.0300	2.60		**Shallow Concentrated Flow, 30' Shallow Conc. Flow** Grassed Waterway Kv= 15.0 fps
1.2	200	0.0200	2.87		**Shallow Concentrated Flow, 200' Shallow Conc. Flow** Paved Kv= 20.3 fps
30.2	330	Total			

Subcatchment 60S: Eastern Area Directly to Gravel Storage



Summary for Subcatchment E-5S: Contributing Watershed from East

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Runoff      =      394.62 cfs @   12.39 hrs,  Volume=         47.800 af,  Depth=  3.09"
    Routed to Reach 5R : North Property Line Ditch (East)
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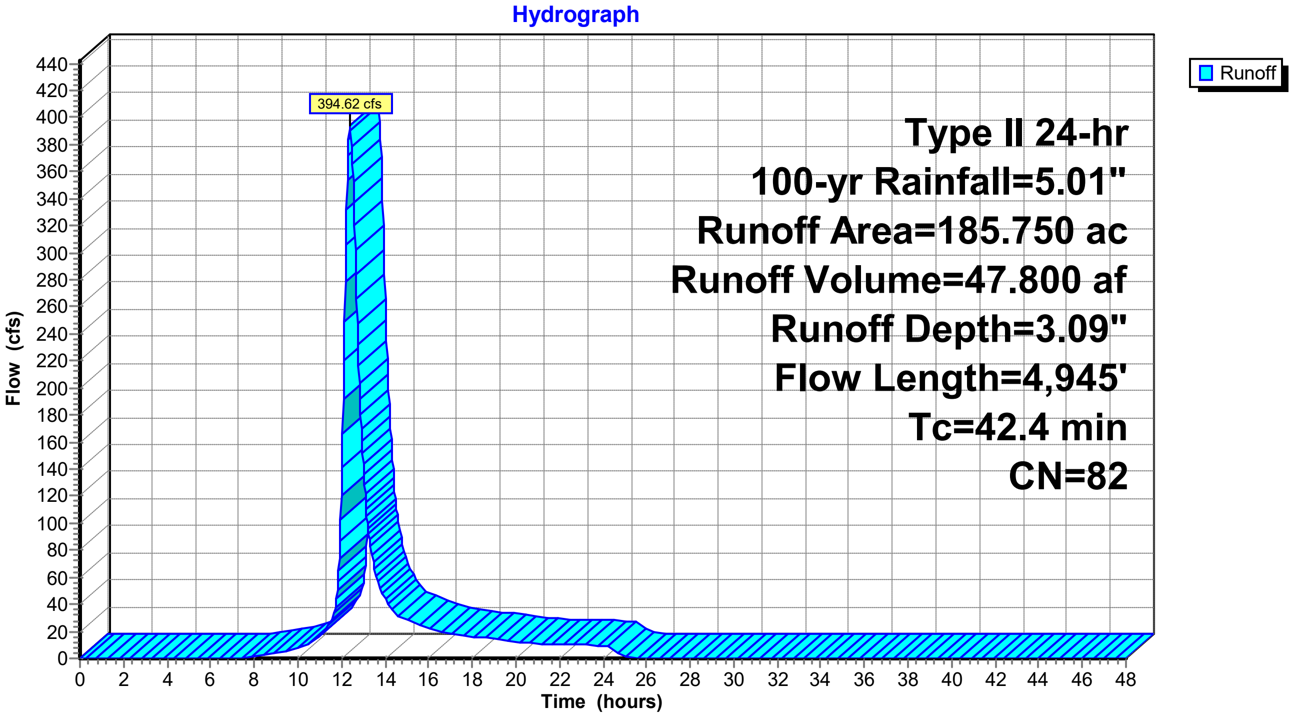
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (ac)	CN	Description
78.660	79	Woods, Fair, HSG D
2.970	98	Water Surface, 0% imp, HSG D
1.050	96	Gravel surface, HSG D
103.070	84	Pasture/grassland/range, Fair, HSG D
185.750	82	Weighted Average
185.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0350	0.16		**Sheet Flow, 100' Overland Flow** Cultivated: Residue>20% n= 0.170 P2= 2.14"
14.2	1,000	0.0170	1.17		**Shallow Concentrated Flow, 1000' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
2.9	750	0.0130	4.31	430.96	**Trap/Vee/Rect Channel Flow, 750 Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.7	670	0.0120	4.14	414.05	**Trap/Vee/Rect Channel Flow, 670' Flow Through Woods** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
2.4	550	0.0100	3.78	377.98	**Trap/Vee/Rect Channel Flow, 550' Flow Through Ag Field** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
9.5	1,800	0.0070	3.16	316.24	**Trap/Vee/Rect Channel Flow, 1,800' Along Crosby Road** Bot.W=50.00' D=1.00' Z= 50.0 '/' Top.W=150.00' n= 0.030 Earth, grassed & winding
0.1	75	0.0200	16.02	154.14	**Pipe Channel, Crosby Road Cross Culvert** 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
42.4	4,945	Total			

Subcatchment E-5S: Contributing Watershed from East



Summary for Subcatchment E-6S: Contributing Area from North

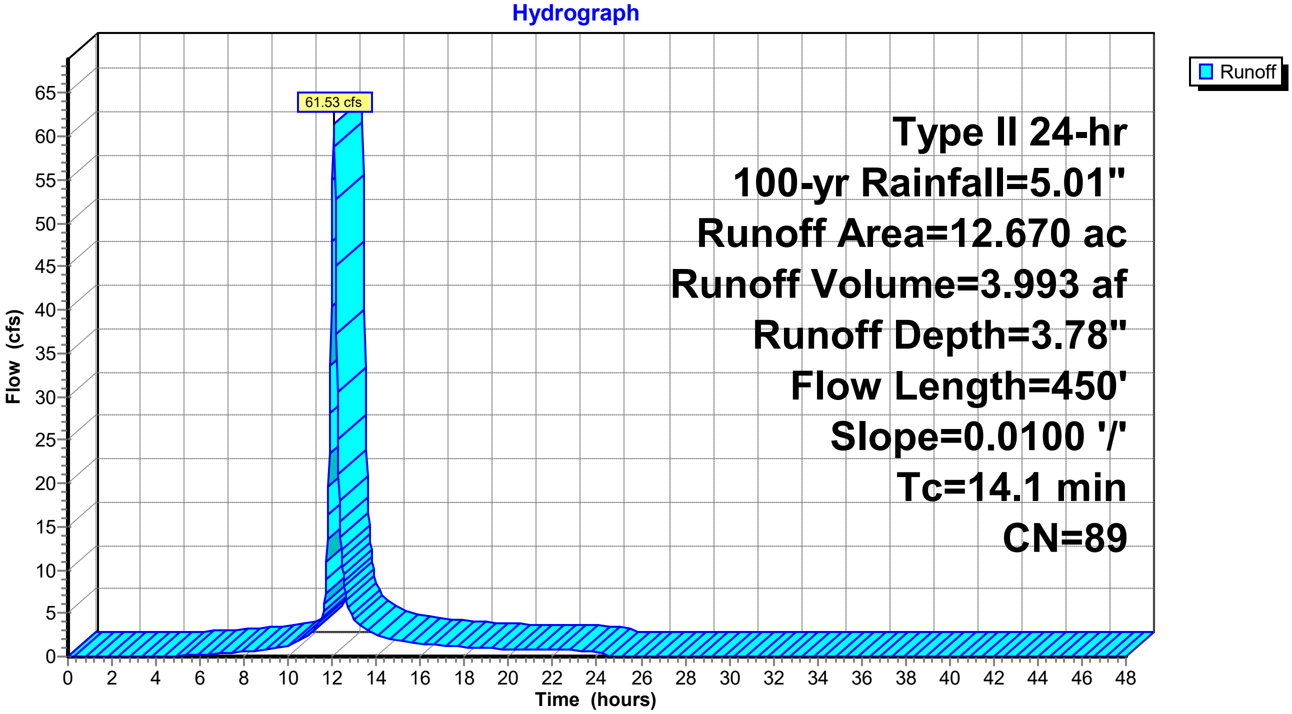
Runoff = 61.53 cfs @ 12.06 hrs, Volume= 3.993 af, Depth= 3.78"
Routed to Reach 5R : North Property Line Ditch (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type II 24-hr 100-yr Rainfall=5.01"

Area (ac)	CN	Description
12.670	89	Row crops, straight row, Good, HSG D
12.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0100	0.22		**Sheet Flow, 100' Overland Flow** Cultivated: Residue<=20% n= 0.060 P2= 2.14"
6.5	350	0.0100	0.90		**Shallow Concentrated Flow, 350' Shallow Conc. Flow** Cultivated Straight Rows Kv= 9.0 fps
14.1	450	Total			

Subcatchment E-6S: Contributing Area from North



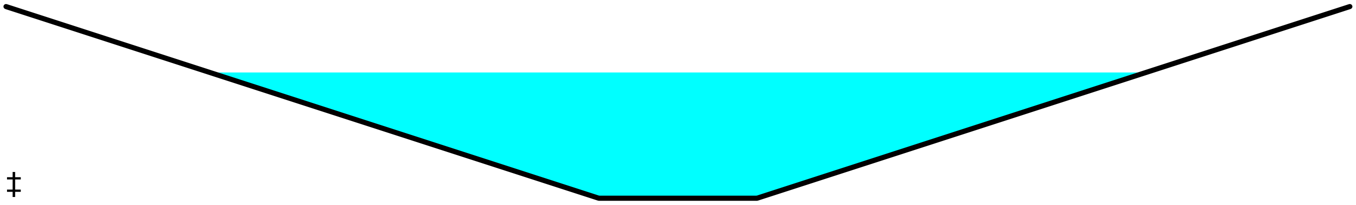
Summary for Reach 1R: Eastern Cut Off Swale

Inflow Area = 6.892 ac, 0.00% Impervious, Inflow Depth = 2.72" for 100-yr event
Inflow = 17.17 cfs @ 12.21 hrs, Volume= 1.562 af
Outflow = 16.34 cfs @ 12.28 hrs, Volume= 1.562 af, Atten= 5%, Lag= 3.8 min
Routed to Reach 2R : Central Cut Off Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 2.40 fps, Min. Travel Time= 4.9 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 15.3 min

Peak Storage= 4,773 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.98' , Surface Width= 11.85'
Bank-Full Depth= 1.50' Flow Area= 14.3 sf, Capacity= 43.86 cfs

2.00' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 5.0 '/' Top Width= 17.00'
Length= 700.0' Slope= 0.0050 '/'
Inlet Invert= 673.00', Outlet Invert= 669.50'



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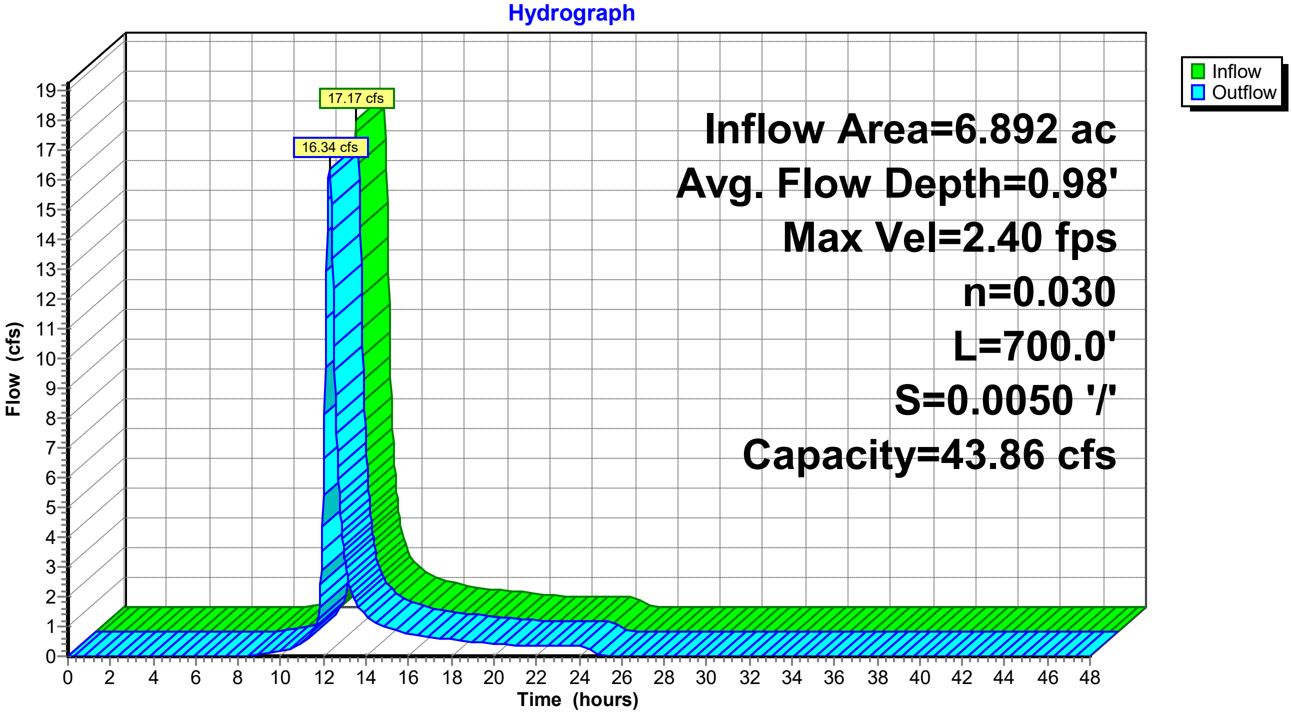
Reach 1R: Eastern Cut Off Swale



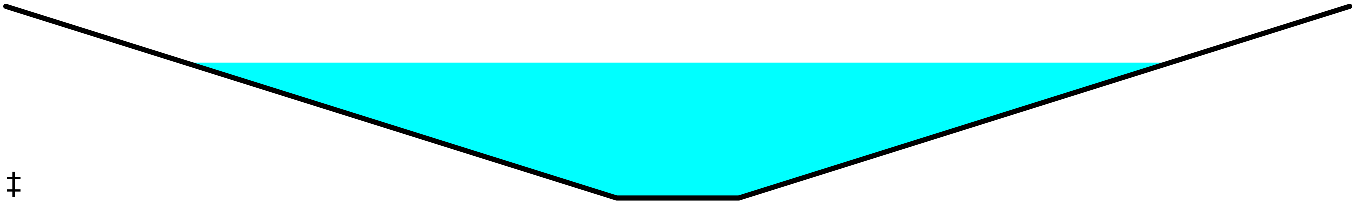
Summary for Reach 2R: Central Cut Off Swale

Inflow Area = 19.349 ac, 0.00% Impervious, Inflow Depth = 2.72" for 100-yr event
Inflow = 38.46 cfs @ 12.33 hrs, Volume= 4.386 af
Outflow = 38.03 cfs @ 12.37 hrs, Volume= 4.386 af, Atten= 1%, Lag= 2.3 min
Routed to Reach 3R : Western Cut Off Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 2.97 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.00 fps, Avg. Travel Time= 8.3 min

Peak Storage= 6,404 cf @ 12.37 hrs
Average Depth at Peak Storage= 1.41' , Surface Width= 16.13'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 88.03 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 5.0 '/' Top Width= 22.00'
Length= 500.0' Slope= 0.0050 '/'
Inlet Invert= 669.50', Outlet Invert= 667.00'



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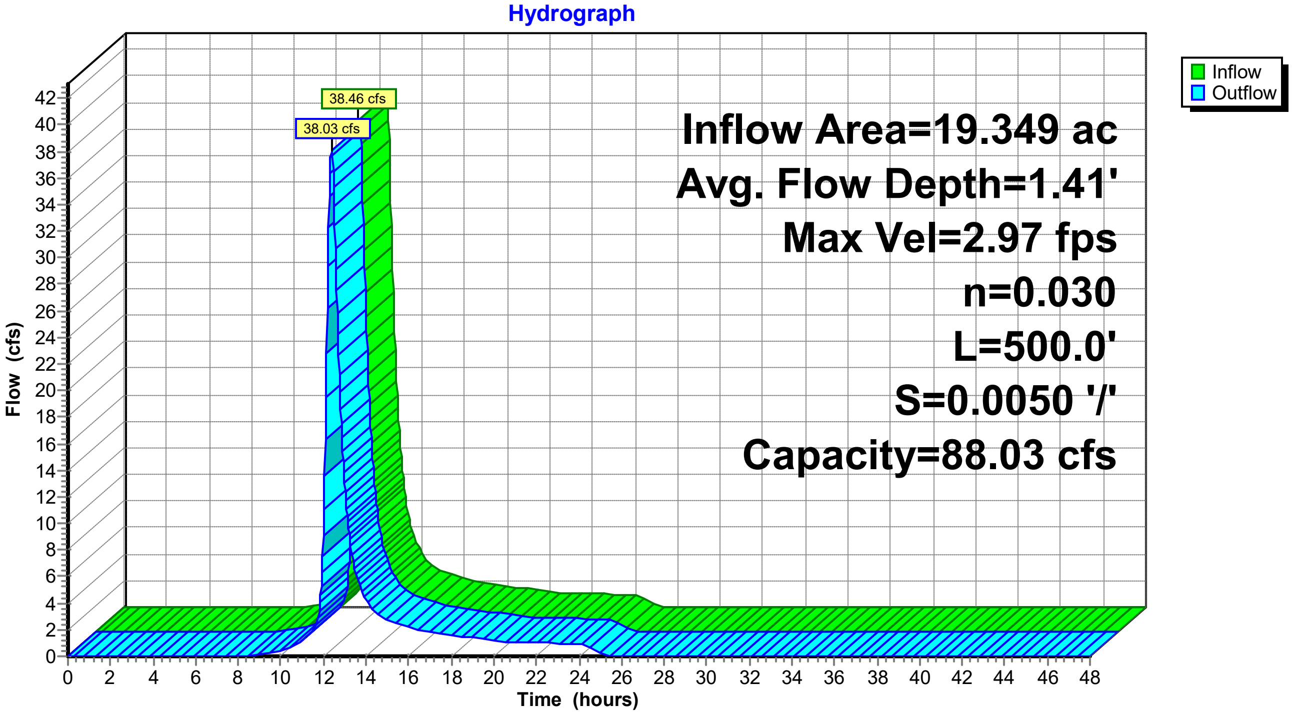
Reach 2R: Central Cut Off Swale



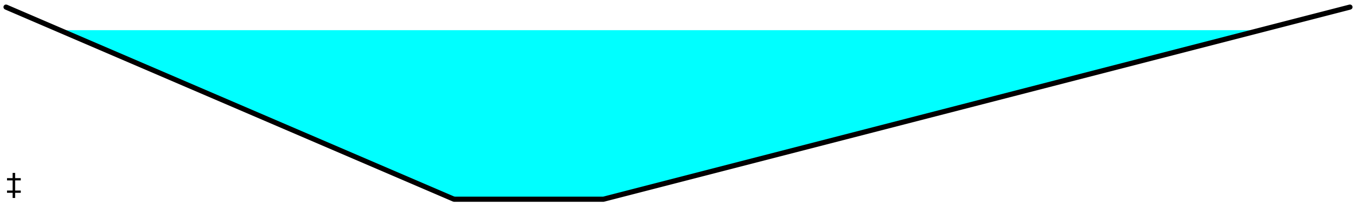
Summary for Reach 3R: Western Cut Off Swale

Inflow Area = 29.272 ac, 0.00% Impervious, Inflow Depth = 2.81" for 100-yr event
Inflow = 54.69 cfs @ 12.40 hrs, Volume= 6.862 af
Outflow = 54.22 cfs @ 12.44 hrs, Volume= 6.862 af, Atten= 1%, Lag= 2.4 min
Routed to Link 1L : West Property Line and Adjacent Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 3.41 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 1.11 fps, Avg. Travel Time= 9.0 min

Peak Storage= 9,535 cf @ 12.44 hrs
Average Depth at Peak Storage= 1.76' , Surface Width= 16.07'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 73.73 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 5.0 '/' Top Width= 18.00'
Length= 600.0' Slope= 0.0050 '/'
Inlet Invert= 667.00', Outlet Invert= 664.00'



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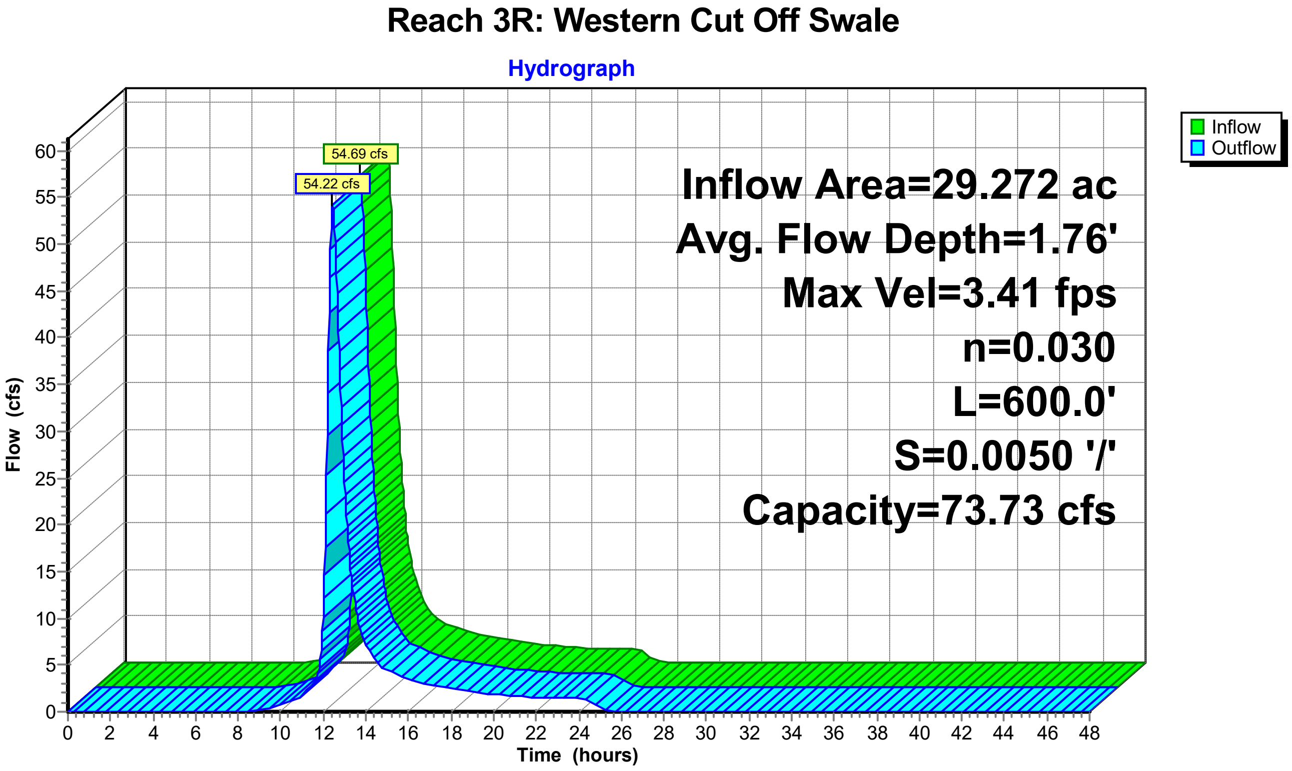


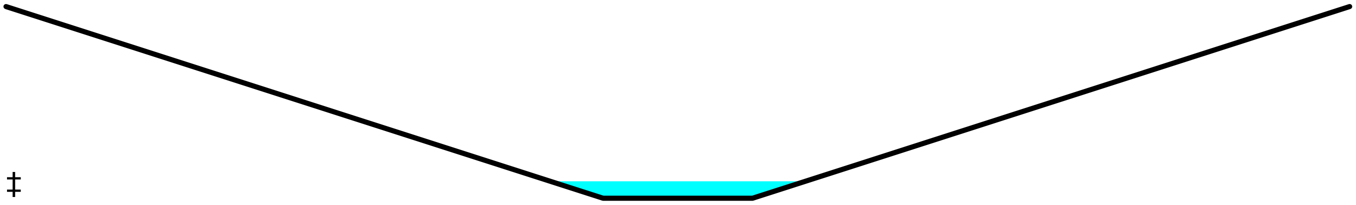
Summary for Reach 4R: Crosby Road Ditch

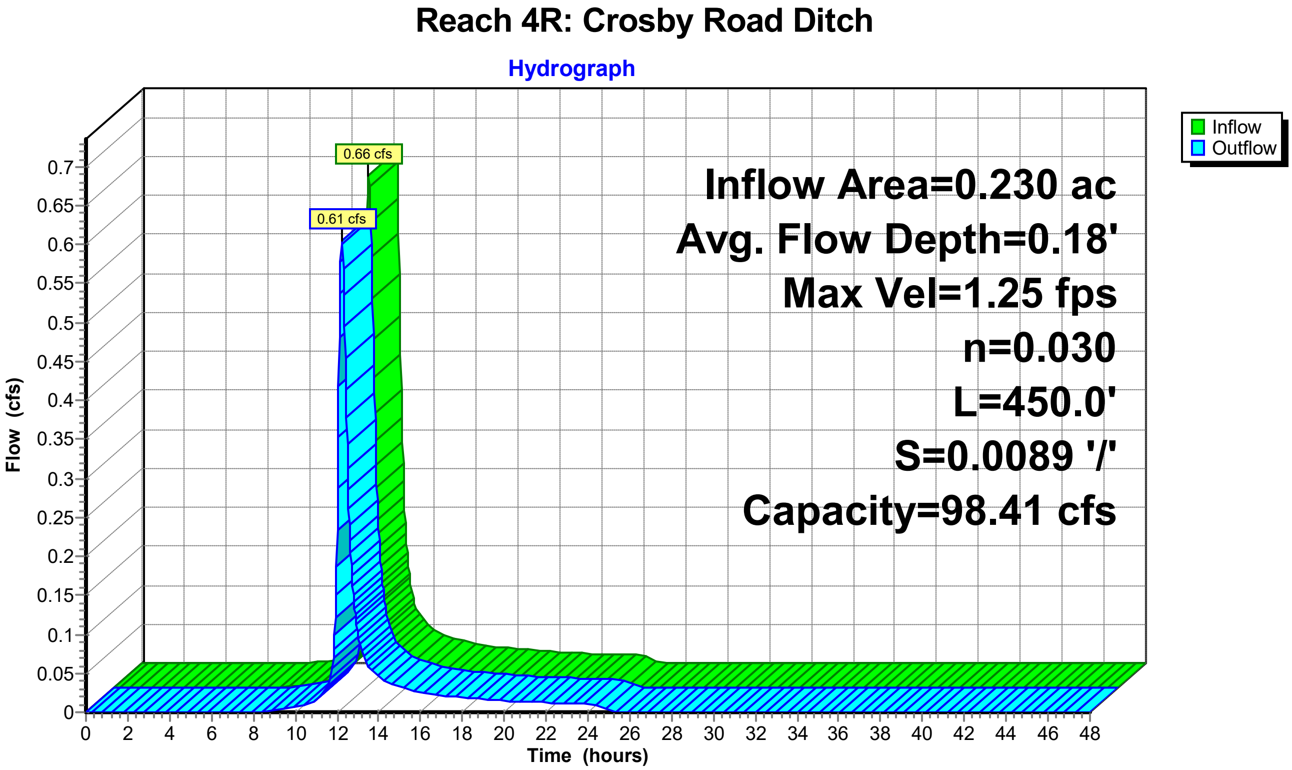
Inflow Area = 0.230 ac, 0.00% Impervious, Inflow Depth = 2.81" for 100-yr event
Inflow = 0.66 cfs @ 12.16 hrs, Volume= 0.054 af
Outflow = 0.61 cfs @ 12.23 hrs, Volume= 0.054 af, Atten= 8%, Lag= 4.2 min
Routed to Reach 5R : North Property Line Ditch (East)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 1.25 fps, Min. Travel Time= 6.0 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 17.9 min

Peak Storage= 217 cf @ 12.23 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 3.42'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 98.41 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 450.0' Slope= 0.0089 '/'
Inlet Invert= 673.00', Outlet Invert= 669.00'





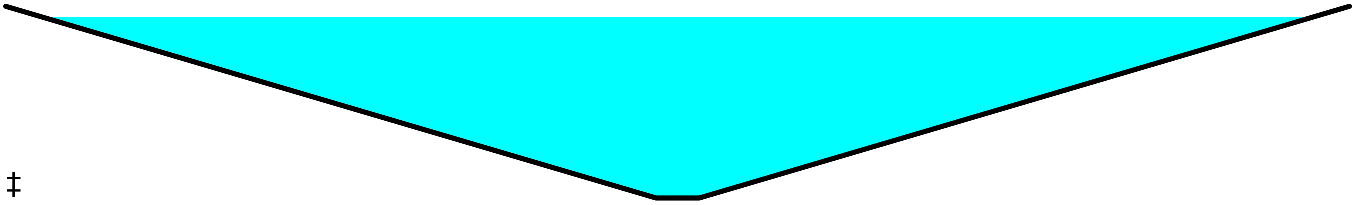
Summary for Reach 5R: North Property Line Ditch (East)

Inflow Area = 199.744 ac, 0.00% Impervious, Inflow Depth = 3.13" for 100-yr event
Inflow = 408.28 cfs @ 12.38 hrs, Volume= 52.086 af
Outflow = 405.66 cfs @ 12.41 hrs, Volume= 52.086 af, Atten= 1%, Lag= 1.7 min
Routed to Reach 6R : North Property Line Ditch (Central)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 4.73 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 1.65 fps, Avg. Travel Time= 6.8 min

Peak Storage= 57,465 cf @ 12.41 hrs
Average Depth at Peak Storage= 2.83' , Surface Width= 58.61'
Bank-Full Depth= 3.00' Flow Area= 96.0 sf, Capacity= 471.44 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 62.00'
Length= 670.0' Slope= 0.0055 '/'
Inlet Invert= 666.00', Outlet Invert= 662.30'



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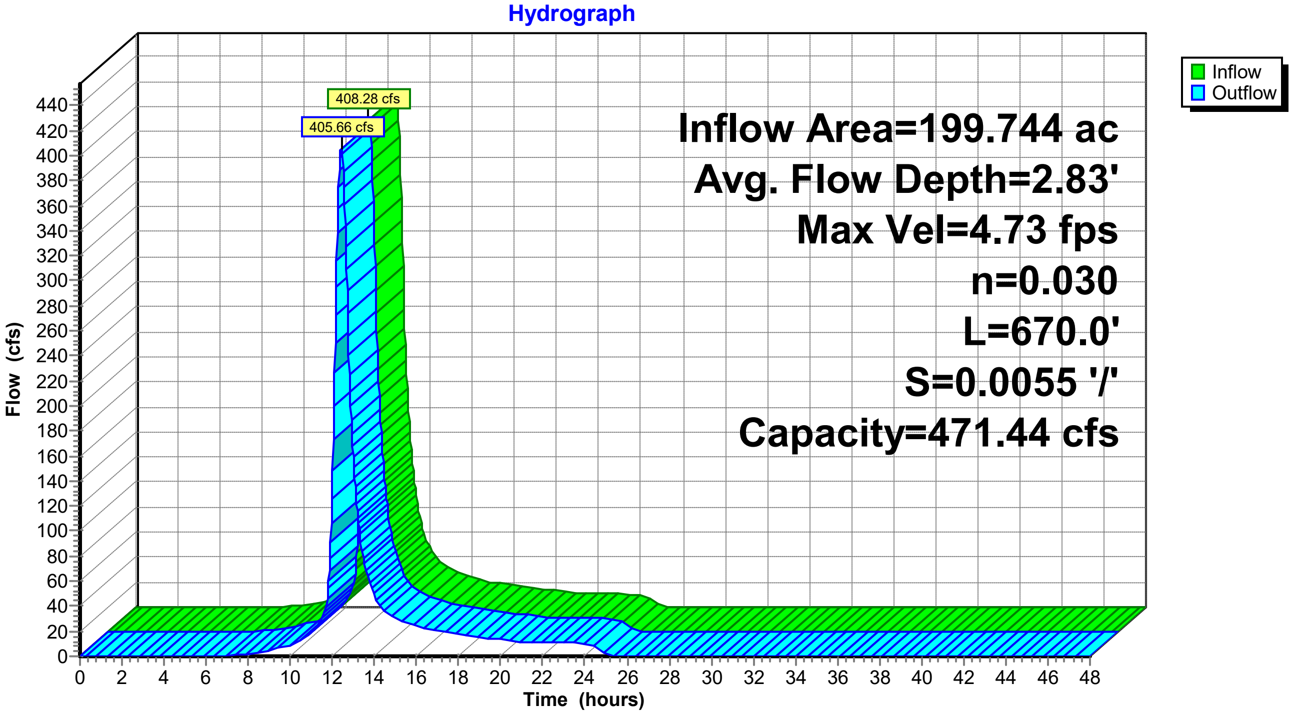
Reach 5R: North Property Line Ditch (East)



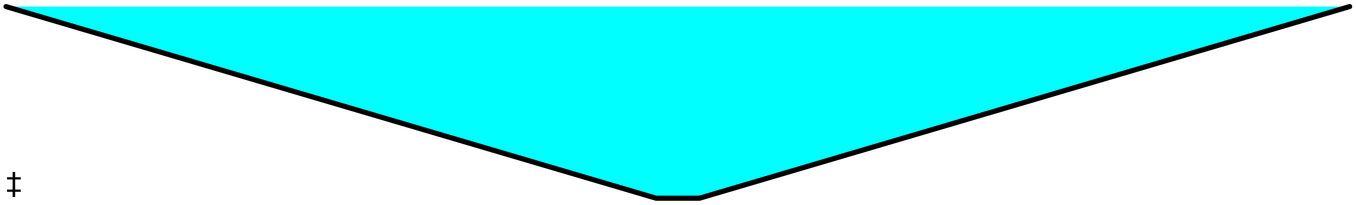
Summary for Reach 6R: North Property Line Ditch (Central)

Inflow Area = 201.045 ac, 0.00% Impervious, Inflow Depth = 3.22" for 100-yr event
Inflow = 414.39 cfs @ 12.41 hrs, Volume= 53.917 af
Outflow = 413.15 cfs @ 12.44 hrs, Volume= 53.917 af, Atten= 0%, Lag= 1.6 min
Routed to Reach 7R : North Property Line Ditch (West)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 4.21 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.01 fps, Avg. Travel Time= 8.3 min

Peak Storage= 49,073 cf @ 12.44 hrs
Average Depth at Peak Storage= 3.03' , Surface Width= 62.70'
Bank-Full Depth= 3.00' Flow Area= 96.0 sf, Capacity= 401.23 cfs

2.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 62.00'
Length= 500.0' Slope= 0.0040 '/'
Inlet Invert= 662.30', Outlet Invert= 660.30'



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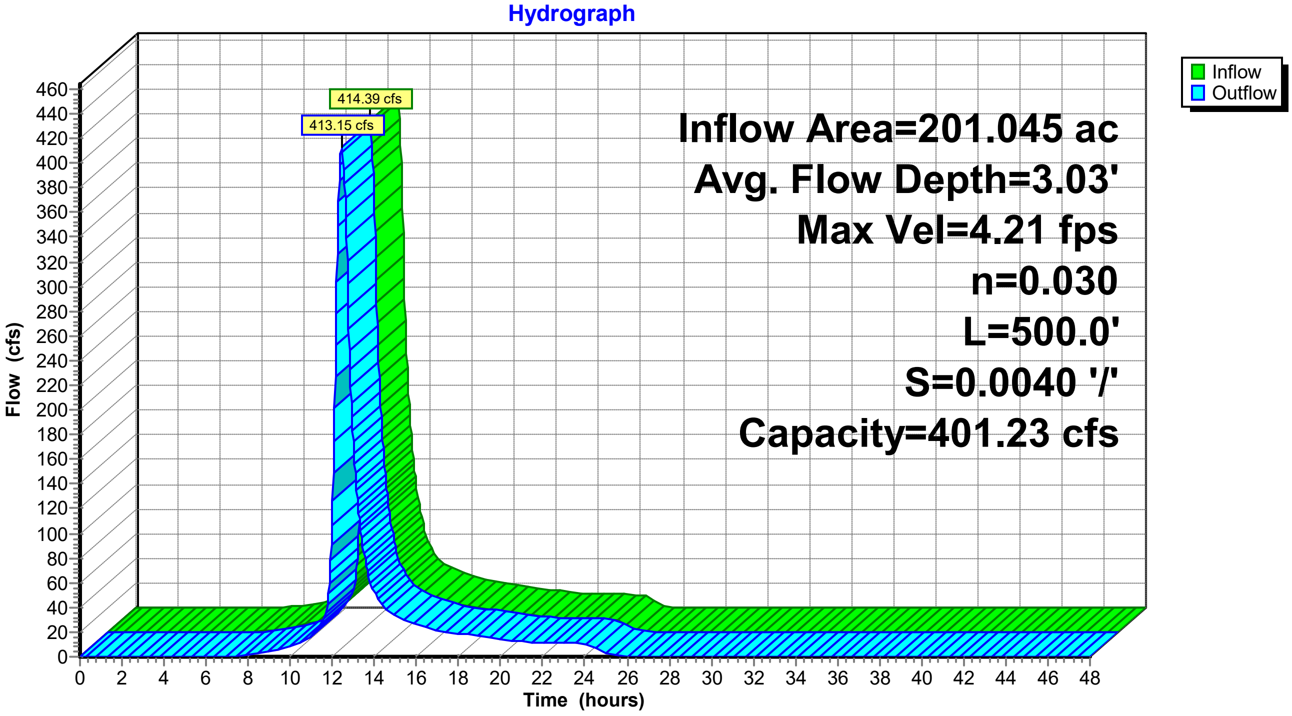
Reach 6R: North Property Line Ditch (Central)



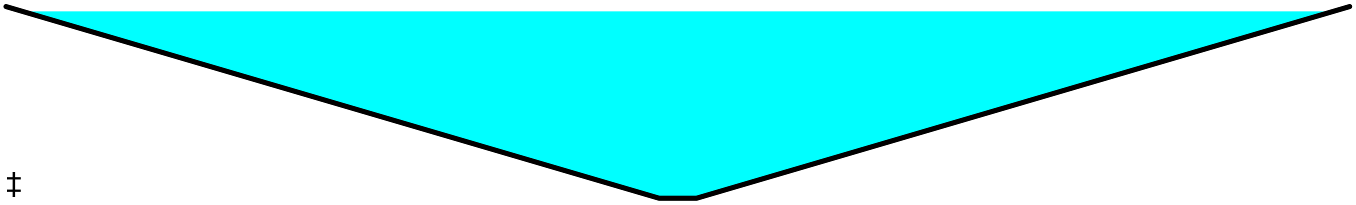
Summary for Reach 7R: North Property Line Ditch (West)

Inflow Area = 225.582 ac, 5.55% Impervious, Inflow Depth > 3.13" for 100-yr event
Inflow = 436.70 cfs @ 12.45 hrs, Volume= 58.790 af
Outflow = 434.63 cfs @ 12.48 hrs, Volume= 58.788 af, Atten= 0%, Lag= 1.7 min
Routed to Link 3L : Ditch at Northwest Corner of Site Discharging to Adjacent Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 3.52 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 8.9 min

Peak Storage= 61,724 cf @ 12.48 hrs
Average Depth at Peak Storage= 3.41' , Surface Width= 70.30'
Bank-Full Depth= 3.50' Flow Area= 129.5 sf, Capacity= 463.27 cfs

2.00' x 3.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 72.00'
Length= 500.0' Slope= 0.0024 '/'
Inlet Invert= 660.30', Outlet Invert= 659.10'



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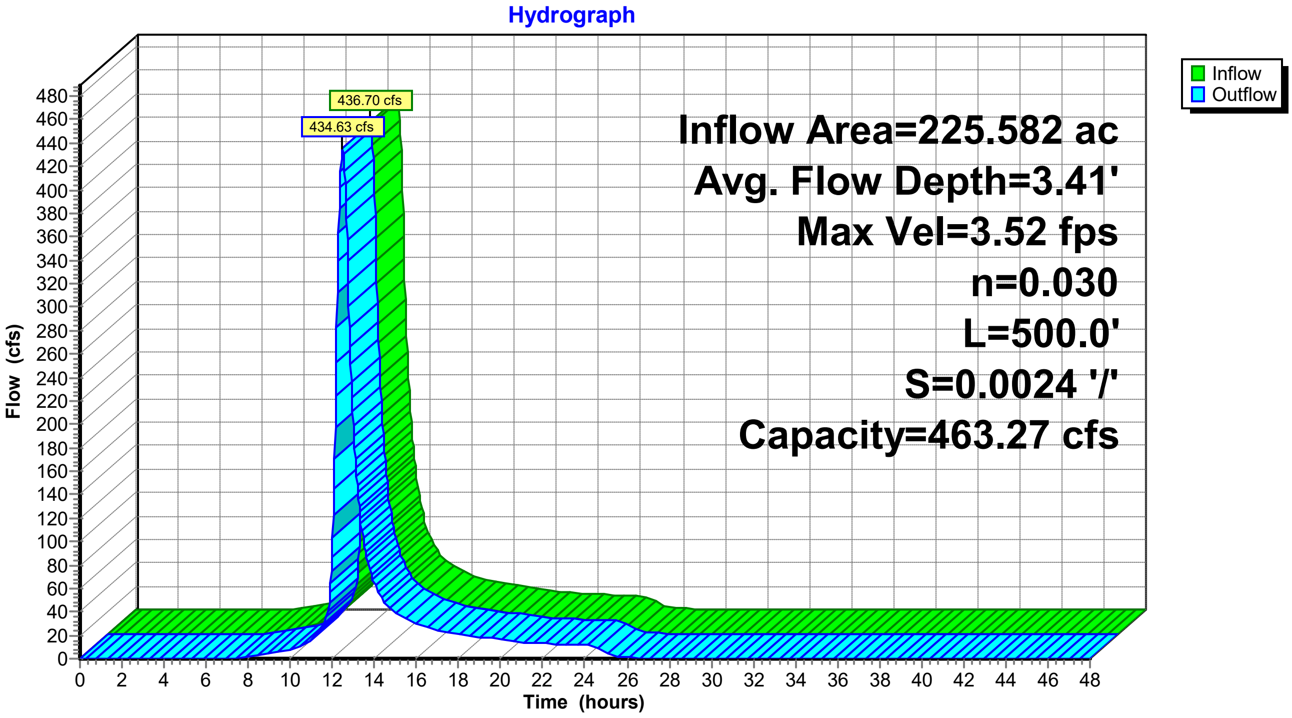
Reach 7R: North Property Line Ditch (West)



Summary for Reach 8R: Western Overflow Swale

Inflow = 17.66 cfs @ 12.35 hrs, Volume= 0.744 af
Outflow = 17.62 cfs @ 12.38 hrs, Volume= 0.744 af, Atten= 0%, Lag= 1.9 min
Routed to Reach 7R : North Property Line Ditch (West)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 3.53 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 9.2 min

Peak Storage= 2,499 cf @ 12.38 hrs
Average Depth at Peak Storage= 1.00' , Surface Width= 8.00'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 43.30 cfs

2.00' x 1.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 500.0' Slope= 0.0100 '/'
Inlet Invert= 665.00', Outlet Invert= 660.00'

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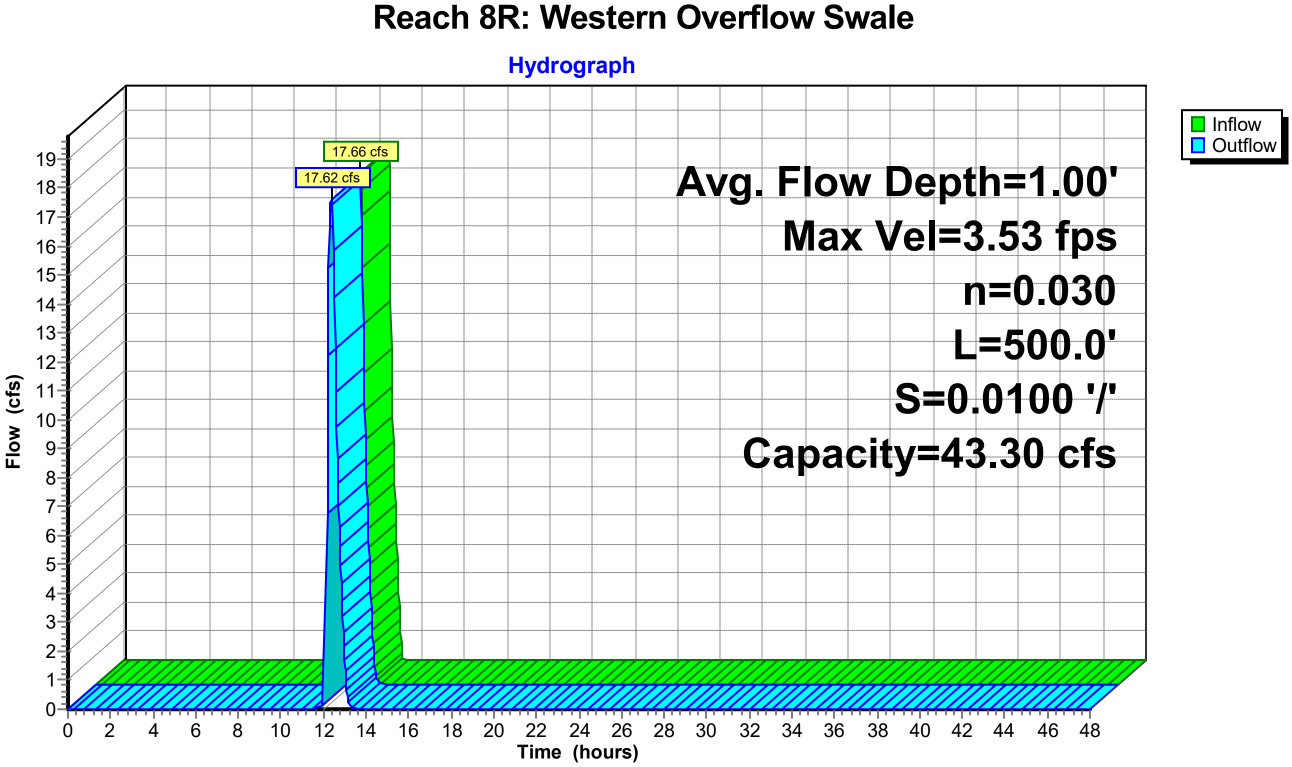

Summary for Pond 33P: Subsurface Detention within Gravel Area

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Inflow Area =       21.761 ac, 57.48% Impervious, Inflow Depth =  3.89"   for 100-yr event
Inflow      =       71.38 cfs @  12.24 hrs, Volume=          7.047 af
Outflow     =       63.69 cfs @  12.34 hrs, Volume=          7.047 af, Atten= 11%, Lag= 6.3 min
Primary     =       24.37 cfs @  12.34 hrs, Volume=          3.747 af
    Routed to Pond 53P : West Pre-Treatment to Bio-Retention Area
Secondary =         12.90 cfs @  12.34 hrs, Volume=          2.145 af
    Routed to Pond 55P : North Pre-Treatment to Bio-Retention Area
Tertiary    =       26.42 cfs @  12.34 hrs, Volume=          1.155 af
    Routed to Pond 35P : Dry Pond
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 668.28' @ 12.34 hrs Surf.Area= 72,295 sf Storage= 16,190 cf
Flood Elev= 668.95' Surf.Area= 129,465 sf Storage= 48,972 cf

Plug-Flow detention time= 4.1 min calculated for 7.047 af (100% of inflow)
Center-of-Mass det. time= 3.7 min (813.6 - 809.9)

Volume	Invert	Avail.Storage	Storage Description
#1	664.01'	9,879 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 30,436 cf Overall - 5,739 cf Embedded = 24,697 cf x 40.0% Voids
#2	664.01'	126 cf	**24.0" Round Pipe Storage** Inside #1 L= 40.0'
#3	664.01'	3,657 cf	**24.0" Round Pipe Storage** Inside #1 L= 1,164.0' S= 0.0020 '/'
#4	664.01'	1,421 cf	**18.0" Round Pipe Storage** Inside #1 L= 804.0' S= 0.0020 '/'
#5	665.61'	209 cf	**15.0" Round Pipe Storage** Inside #1 L= 170.0' S= 0.0020 '/'
#6	665.95'	202 cf	**12.0" Round Pipe Storage** Inside #1 L= 257.0' S= 0.0020 '/'
#7	666.46'	38 cf	**10.0" Round Pipe Storage** Inside #1 L= 69.0' S= 0.0020 '/'
#8	666.35'	88 cf	**10.0" Round Pipe Storage** Inside #1 L= 161.0' S= 0.0020 '/'
#9	668.03'	33,354 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 83,386 cf Overall x 40.0% Voids
		48,972 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
664.01	3	0	0
666.67	8,430	11,216	11,216
668.95	8,430	19,220	30,436

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
668.03	0	0	0
668.19	33,970	2,718	2,718
668.45	121,035	20,151	22,868
668.95	121,035	60,518	83,386

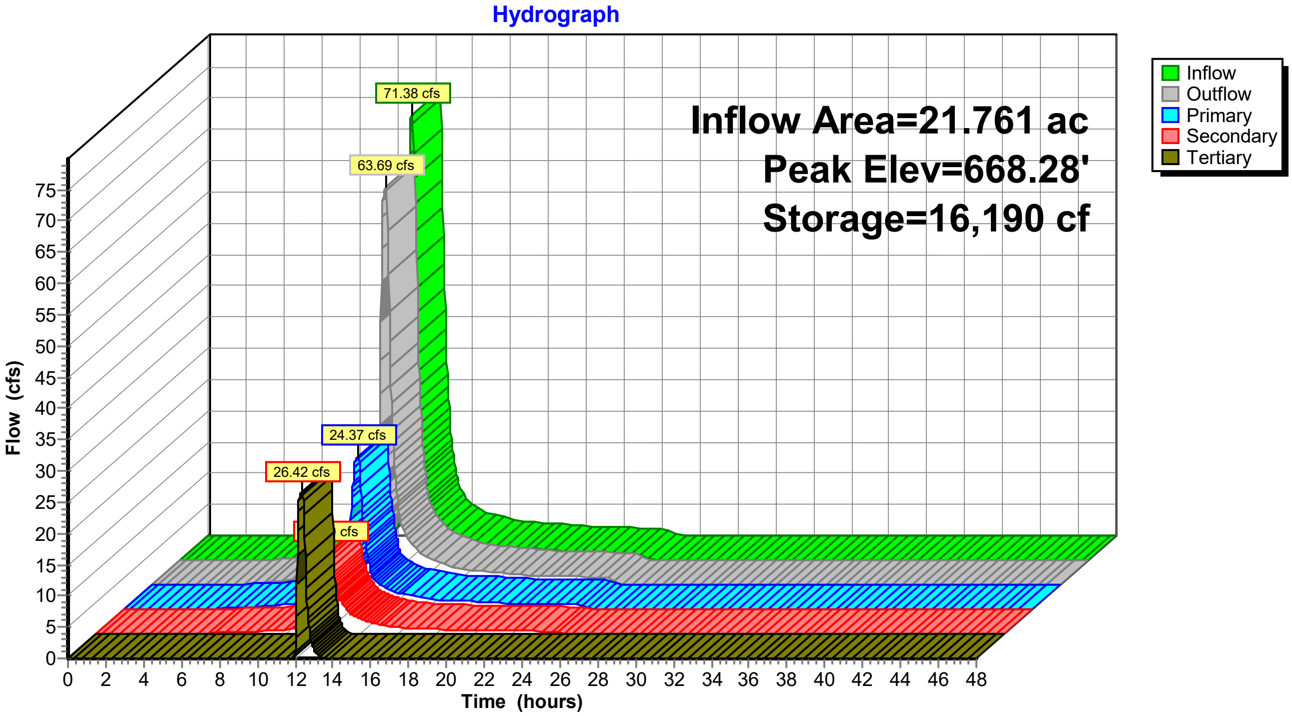
Device	Routing	Invert	Outlet Devices
#1	Primary	664.01'	**18.0" Round Culvert X 2.00** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 664.01' / 663.90' S= 0.0019 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	664.01'	**18.0" Round Culvert** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 664.01' / 663.90' S= 0.0019 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#3	Tertiary	665.71'	**18.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 665.71' / 664.71' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#4	Tertiary	666.05'	**15.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 666.05' / 665.05' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#5	Tertiary	666.39'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 666.39' / 665.39' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#6	Tertiary	666.56'	**10.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 666.56' / 665.56' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=24.36 cfs @ 12.34 hrs HW=668.28' TW=666.23' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 24.36 cfs @ 6.89 fps)

Secondary OutFlow Max=12.90 cfs @ 12.34 hrs HW=668.28' TW=665.98' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 12.90 cfs @ 7.30 fps)

Tertiary OutFlow Max=26.40 cfs @ 12.34 hrs HW=668.28' TW=664.93' (Dynamic Tailwater)
├─**3=Culvert** (Inlet Controls 11.47 cfs @ 6.49 fps)
├─**4=Culvert** (Inlet Controls 7.48 cfs @ 6.10 fps)
├─**5=Culvert** (Inlet Controls 4.45 cfs @ 5.67 fps)
└─**6=Culvert** (Inlet Controls 3.00 cfs @ 5.49 fps)

Pond 33P: Subsurface Detention within Gravel Area



Summary for Pond 34P: Bio-Retention Area

Inflow Area = 24.053 ac, 52.01% Impervious, Inflow Depth = 2.62" for 100-yr event
Inflow = 17.35 cfs @ 11.98 hrs, Volume= 5.244 af
Outflow = 11.07 cfs @ 13.20 hrs, Volume= 4.024 af, Atten= 36%, Lag= 73.3 min
Primary = 11.07 cfs @ 13.20 hrs, Volume= 4.024 af
Routed to Reach 7R : North Property Line Ditch (West)
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : North Property Line Ditch (West)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 664.36' @ 13.11 hrs Surf.Area= 58,369 sf Storage= 72,297 cf

Plug-Flow detention time= 269.3 min calculated for 4.021 af (77% of inflow)
Center-of-Mass det. time= 164.3 min (1,036.1 - 871.8)

Volume	Invert	Avail.Storage	Storage Description
#1	663.00'	95,677 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.00	48,935	0	0
663.25	50,025	12,370	12,370
663.50	51,115	12,643	25,013
664.00	56,110	26,806	51,819
664.75	60,845	43,858	95,677

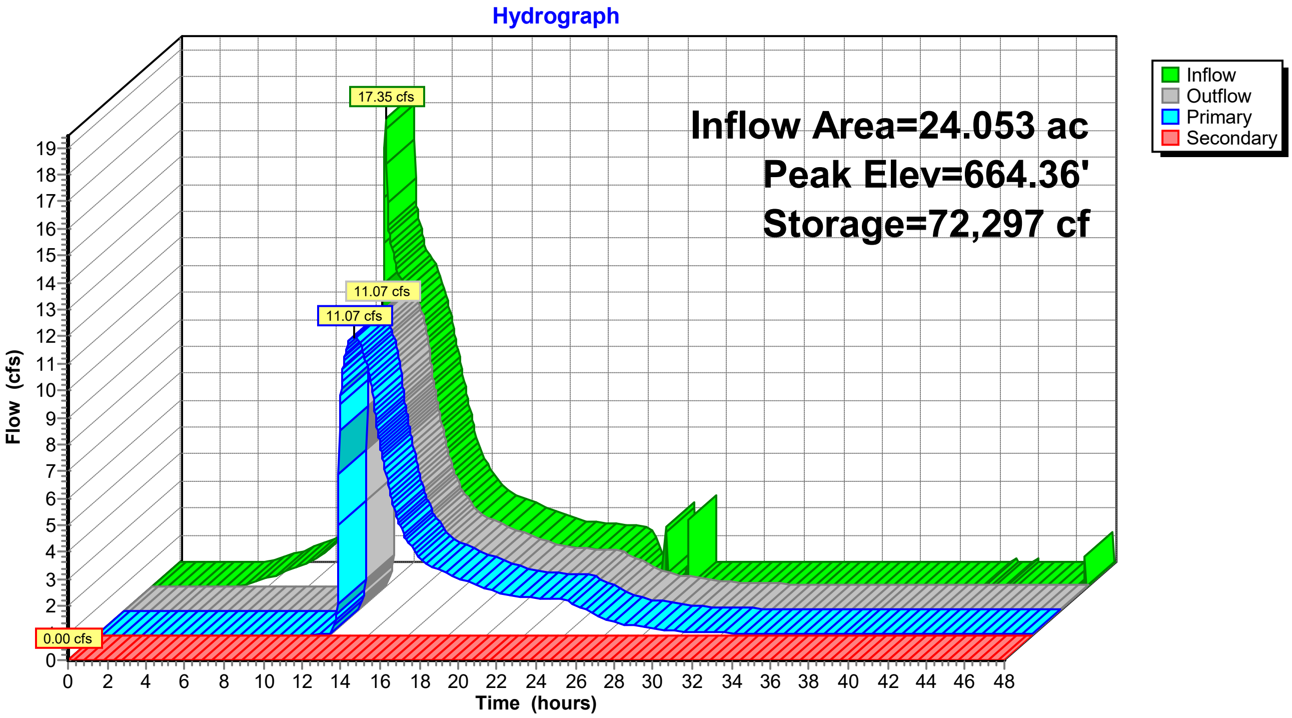
Device	Routing	Invert	Outlet Devices
#1	Primary	660.55'	**15.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.55' / 660.50' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Primary	660.55'	**15.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.55' / 660.50' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 1	660.56'	**4.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.56' / 660.55' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#4	Device 2	660.56'	**4.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.56' / 660.55' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#5	Device 3	663.00'	**0.500 in/hr Exfiltration X 0.50 over Surface area above 663.00'** Excluded Surface area = 48,935 sf
#6	Device 4	663.00'	**0.500 in/hr Exfiltration X 0.50 over Surface area above 663.00'** Excluded Surface area = 48,935 sf
#7	Device 3	664.10'	**4.0" Horiz. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#8	Device 4	664.10'	**4.0" Horiz. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#9	Device 1	664.25'	**1.4" x 4.5" Horiz. Orifice/Grate X 72.00** C= 0.600

Limited to weir flow at low heads
#10 Device 2 664.25' **1.4" x 4.5" Horiz. Orifice/Grate X 72.00** C= 0.600
Limited to weir flow at low heads
#11 Secondary 664.50' **100.0' long x 2.0' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50
Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88
2.85 3.07 3.20 3.32

Primary OutFlow Max=11.08 cfs @ 13.20 hrs HW=664.36' TW=662.51' (Dynamic Tailwater)
1=Culvert (Passes 5.54 cfs of 8.03 cfs potential flow)
  3=Culvert (Inlet Controls 0.57 cfs @ 6.54 fps)
    5=Exfiltration (Passes < 0.05 cfs potential flow)
    7=Orifice/Grate (Passes < 0.64 cfs potential flow)
  9=Orifice/Grate (Orifice Controls 4.97 cfs @ 1.58 fps)
2=Culvert (Passes 5.54 cfs of 8.03 cfs potential flow)
  4=Culvert (Inlet Controls 0.57 cfs @ 6.54 fps)
    6=Exfiltration (Passes < 0.05 cfs potential flow)
    8=Orifice/Grate (Passes < 0.64 cfs potential flow)
  10=Orifice/Grate (Orifice Controls 4.97 cfs @ 1.58 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=663.00' TW=660.30' (Dynamic Tailwater)
11=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 34P: Bio-Retention Area



Summary for Pond 35P: Dry Pond

Inflow Area = 0.760 ac, 0.00% Impervious, Inflow Depth = 21.15" for 100-yr event
Inflow = 26.85 cfs @ 12.34 hrs, Volume= 1.339 af
Outflow = 10.95 cfs @ 12.61 hrs, Volume= 1.339 af, Atten= 59%, Lag= 16.7 min
Primary = 4.52 cfs @ 13.49 hrs, Volume= 1.207 af
Routed to Reach 6R : North Property Line Ditch (Central)
Tertiary = 8.10 cfs @ 12.61 hrs, Volume= 0.132 af
Routed to Reach 6R : North Property Line Ditch (Central)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 665.80' @ 12.61 hrs Surf.Area= 21,581 sf Storage= 44,951 cf

Plug-Flow detention time= 208.6 min calculated for 1.339 af (100% of inflow)
Center-of-Mass det. time= 208.5 min (962.5 - 754.0)

Volume	Invert	Avail.Storage	Storage Description
#1	662.56'	49,313 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

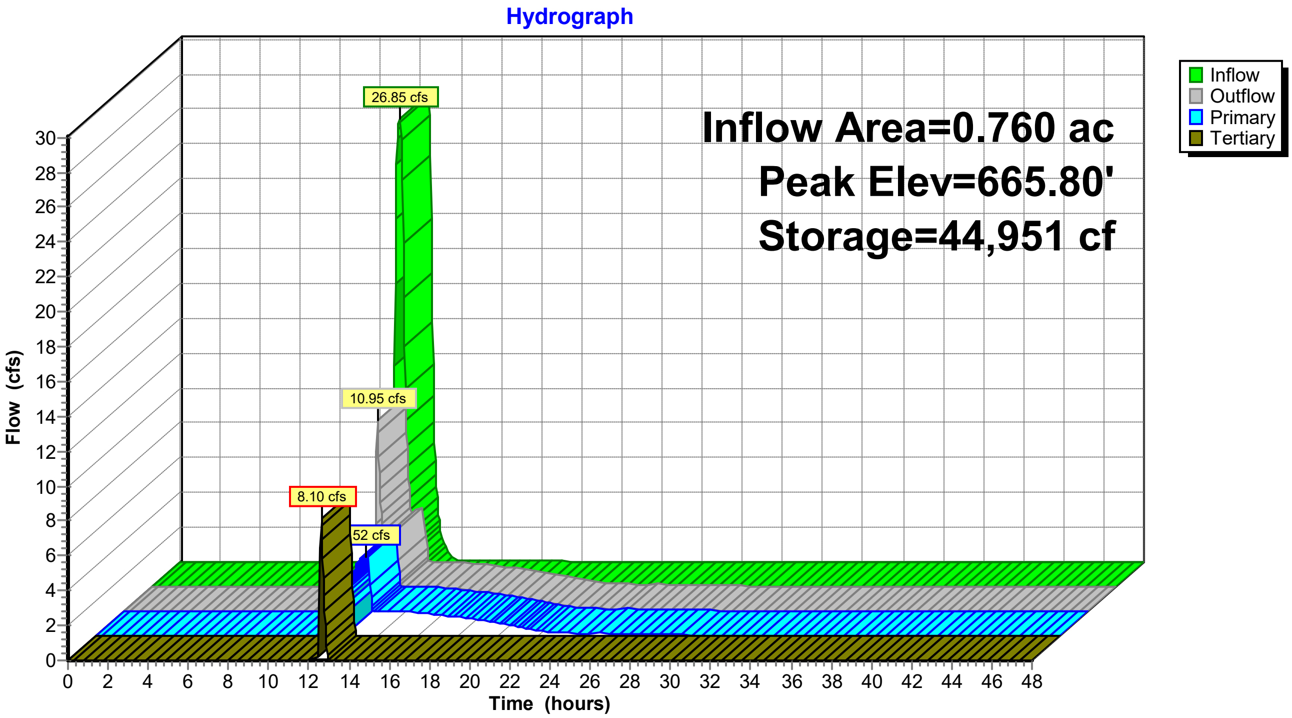
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
662.56	300	0	0
663.00	5,985	1,383	1,383
664.00	14,620	10,303	11,685
665.00	19,235	16,928	28,613
666.00	22,165	20,700	49,313

Device	Routing	Invert	Outlet Devices
#1	Primary	662.56'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 662.56' / 662.50' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	662.56'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	663.06'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	665.20'	**1.4" x 4.5" Horiz. Orifice/Grate X 72.00** C= 0.600 Limited to weir flow at low heads
#5	Tertiary	665.70'	**100.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=4.56 cfs @ 13.49 hrs HW=665.38' TW=663.92' (Dynamic Tailwater)
↑└─**1=Culvert** (Inlet Controls 4.56 cfs @ 5.80 fps)
  ↑├─**2=Orifice/Grate** (Passes < 0.28 cfs potential flow)
  ├─**3=Orifice/Grate** (Passes < 1.14 cfs potential flow)
  └─**4=Orifice/Grate** (Passes < 6.35 cfs potential flow)

Tertiary OutFlow Max=7.90 cfs @ 12.61 hrs HW=665.80' TW=665.19' (Dynamic Tailwater)
↑└─**5=Broad-Crested Rectangular Weir** (Weir Controls 7.90 cfs @ 0.80 fps)

Pond 35P: Dry Pond



Summary for Pond 38P: Level Spreader

```
Inflow Area =        22.210 ac,  56.32% Impervious,  Inflow Depth =   1.65"    for  100-yr event
Inflow      =          7.23 cfs @  12.17 hrs,  Volume=          3.061 af
Outflow     =          7.23 cfs @  12.17 hrs,  Volume=          3.061 af,  Atten= 0%,  Lag= 0.0 min
Primary     =          7.23 cfs @  12.17 hrs,  Volume=          3.061 af
    Routed to Pond 34P : Bio-Retention Area
Secondary =            0.00 cfs @   0.00 hrs,  Volume=          0.000 af
    Routed to Pond 34P : Bio-Retention Area

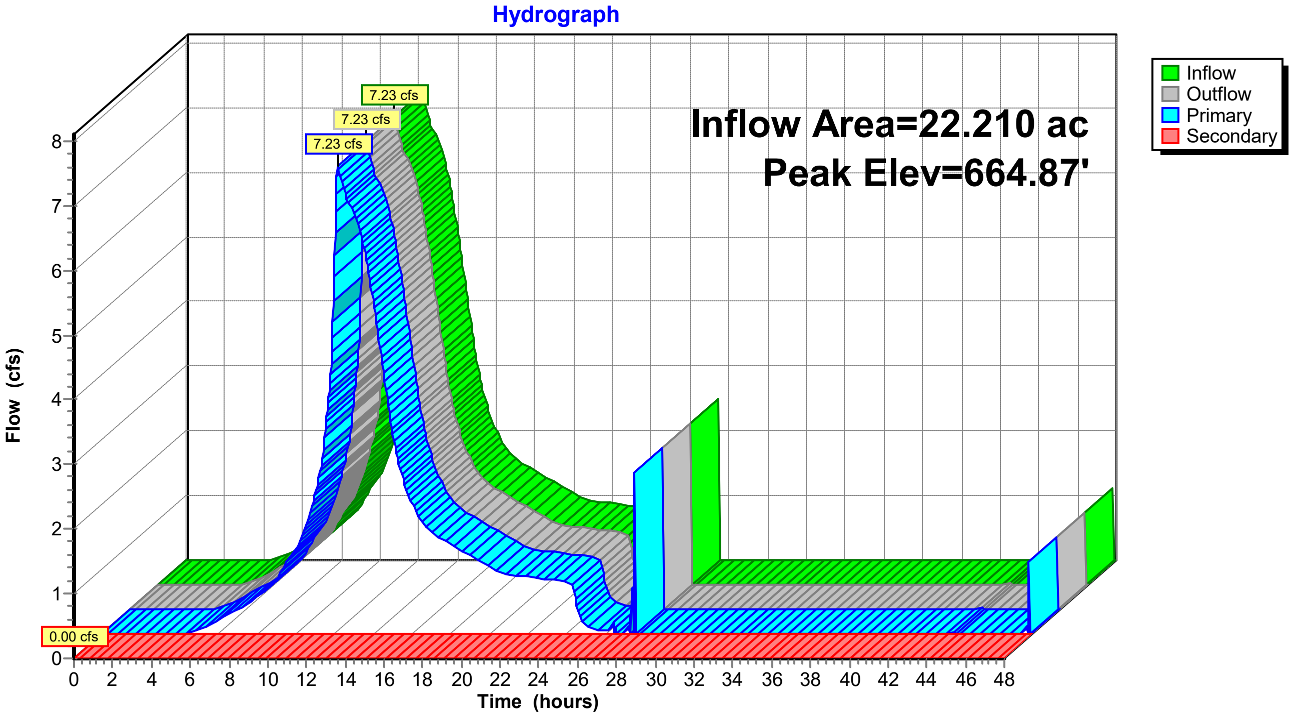
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 664.87' @ 12.71 hrs
Flood Elev= 665.00'

Device  Routing          Invert   Outlet Devices
    #1  Primary         663.00'   0.3" Horiz. Orifice/Grate X 650.00   C= 0.600
                                  Limited to weir flow at low heads
    #2  Primary         663.32'   0.3" Vert. Orifice/Grate X 650.00   C= 0.600
                                  Limited to weir flow at low heads
    #3  Primary         663.32'   0.3" Vert. Orifice/Grate X 650.00   C= 0.600
                                  Limited to weir flow at low heads
    #4  Primary         663.94'   0.3" Vert. Orifice/Grate X 650.00   C= 0.600
                                  Limited to weir flow at low heads
    #5  Primary         663.94'   0.3" Vert. Orifice/Grate X 650.00   C= 0.600
                                  Limited to weir flow at low heads
    #6  Primary         664.25'   0.3" Horiz. Orifice/Grate X 650.00   C= 0.600
                                  Limited to weir flow at low heads
    #7  Secondary       664.90'   15.0" Horiz. Orifice/Grate   C= 0.600
                                  Limited to weir flow at low heads

Primary OutFlow  Max=7.11 cfs @ 12.17 hrs  HW=664.73'  TW=664.11'   (Dynamic Tailwater)
├─1=Orifice/Grate  (Orifice Controls 1.21 cfs @ 3.79 fps)
├─2=Orifice/Grate  (Orifice Controls 1.21 cfs @ 3.79 fps)
├─3=Orifice/Grate  (Orifice Controls 1.21 cfs @ 3.79 fps)
├─4=Orifice/Grate  (Orifice Controls 1.21 cfs @ 3.79 fps)
├─5=Orifice/Grate  (Orifice Controls 1.21 cfs @ 3.79 fps)
└─6=Orifice/Grate  (Orifice Controls 1.06 cfs @ 3.32 fps)

Secondary OutFlow  Max=0.00 cfs @ 0.00 hrs  HW=663.00'  TW=663.00'   (Dynamic Tailwater)
└─7=Orifice/Grate  ( Controls 0.00 cfs)
```

Pond 38P: Level Spreader



Summary for Pond 39P: Level Spreader

Inflow Area = 0.206 ac, 0.00% Impervious, Inflow Depth =104.11" for 100-yr event
Inflow = 4.59 cfs @ 12.18 hrs, Volume= 1.787 af
Outflow = 4.59 cfs @ 12.18 hrs, Volume= 1.787 af, Atten= 0%, Lag= 0.0 min
Primary = 4.59 cfs @ 12.18 hrs, Volume= 1.738 af
Routed to Pond 34P : Bio-Retention Area
Secondary = 0.47 cfs @ 12.91 hrs, Volume= 0.048 af
Routed to Pond 34P : Bio-Retention Area

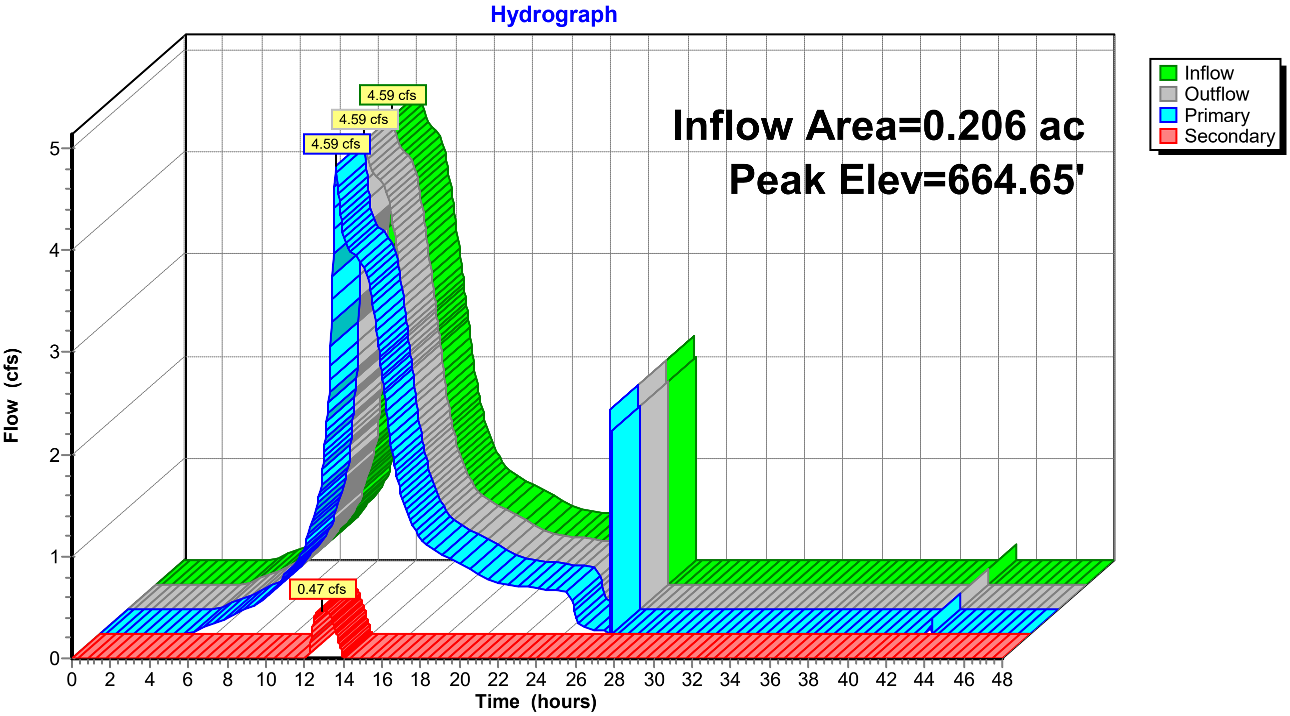
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 664.65' @ 12.91 hrs
Flood Elev= 665.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	663.00'	**0.3" Horiz. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	663.25'	**0.3" Vert. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#3	Primary	663.25'	**0.3" Vert. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#4	Primary	663.75'	**0.3" Vert. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#5	Primary	663.75'	**0.3" Vert. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#6	Primary	664.00'	**0.3" Horiz. Orifice/Grate X 488.00** C= 0.600 Limited to weir flow at low heads
#7	Secondary	664.55'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.46 cfs @ 12.18 hrs HW=664.53' TW=664.11' (Dynamic Tailwater)
├─**1=Orifice/Grate** (Orifice Controls 0.74 cfs @ 3.10 fps)
├─**2=Orifice/Grate** (Orifice Controls 0.74 cfs @ 3.10 fps)
├─**3=Orifice/Grate** (Orifice Controls 0.74 cfs @ 3.10 fps)
├─**4=Orifice/Grate** (Orifice Controls 0.74 cfs @ 3.10 fps)
├─**5=Orifice/Grate** (Orifice Controls 0.74 cfs @ 3.10 fps)
└─**6=Orifice/Grate** (Orifice Controls 0.74 cfs @ 3.10 fps)

Secondary OutFlow Max=0.47 cfs @ 12.91 hrs HW=664.65' TW=664.36' (Dynamic Tailwater)
└─**7=Orifice/Grate** (Weir Controls 0.47 cfs @ 1.02 fps)

Pond 39P: Level Spreader



Summary for Pond 53P: West Pre-Treatment to Bio-Retention Area

Inflow Area = 22.210 ac, 56.32% Impervious, Inflow Depth = 2.08" for 100-yr event
Inflow = 24.76 cfs @ 12.32 hrs, Volume= 3.855 af
Outflow = 24.73 cfs @ 12.34 hrs, Volume= 3.805 af, Atten= 0%, Lag= 1.1 min
Primary = 7.23 cfs @ 12.17 hrs, Volume= 3.061 af
Routed to Pond 38P : Level Spreader
Secondary = 17.66 cfs @ 12.35 hrs, Volume= 0.744 af
Routed to Reach 8R : Western Overflow Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 666.23' @ 12.35 hrs Surf.Area= 9,661 sf Storage= 18,392 cf

Plug-Flow detention time= 34.5 min calculated for 3.803 af (99% of inflow)
Center-of-Mass det. time= 27.0 min (853.7 - 826.7)

Volume	Invert	Avail.Storage	Storage Description
#1	663.00'	21,098 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

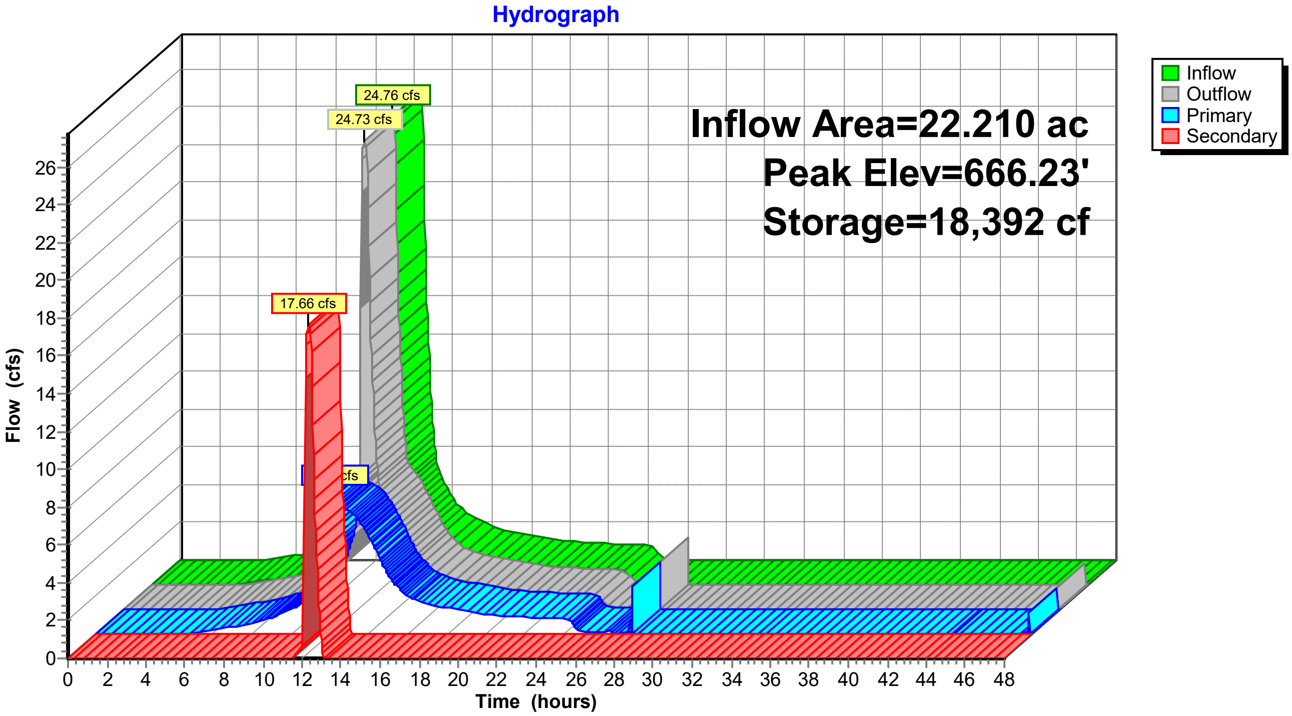
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.00	5	0	0
664.00	4,770	2,388	2,388
665.00	6,900	5,835	8,223
666.00	9,140	8,020	16,243
666.50	10,280	4,855	21,098

Device	Routing	Invert	Outlet Devices
#1	Primary	663.04'	**15.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 663.04' / 663.00' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	666.05'	**100.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=7.17 cfs @ 12.17 hrs HW=666.20' TW=664.73' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.17 cfs @ 5.84 fps)

Secondary OutFlow Max=17.66 cfs @ 12.35 hrs HW=666.23' TW=666.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 17.66 cfs @ 0.99 fps)

Pond 53P: West Pre-Treatment to Bio-Retention Area



Summary for Pond 55P: North Pre-Treatment to Bio-Retention Area

Inflow Area = 0.206 ac, 0.00% Impervious, Inflow Depth =127.88" for 100-yr event
Inflow = 13.02 cfs @ 12.33 hrs, Volume= 2.194 af
Outflow = 13.01 cfs @ 12.35 hrs, Volume= 2.159 af, Atten= 0%, Lag= 0.8 min
Primary = 4.59 cfs @ 12.18 hrs, Volume= 1.787 af
Routed to Pond 39P : Level Spreader
Secondary = 8.56 cfs @ 12.36 hrs, Volume= 0.373 af
Routed to Reach 6R : North Property Line Ditch (Central)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 665.98' @ 12.36 hrs Surf.Area= 4,420 sf Storage= 8,781 cf
Flood Elev= 666.50' Surf.Area= 4,835 sf Storage= 11,188 cf

Plug-Flow detention time= 31.0 min calculated for 2.159 af (98% of inflow)
Center-of-Mass det. time= 21.1 min (849.1 - 827.9)

Volume	Invert	Avail.Storage	Storage Description
#1	663.00'	11,188 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

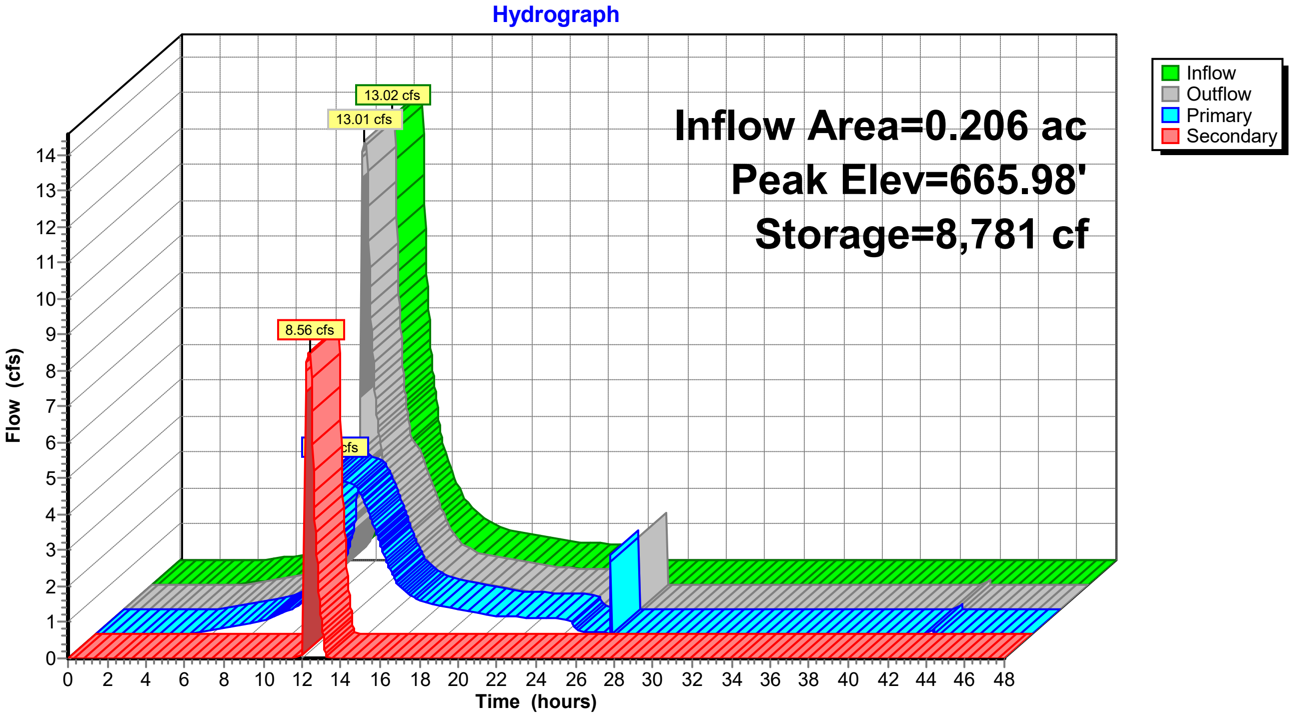
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.00	5	0	0
664.00	2,975	1,490	1,490
665.00	3,675	3,325	4,815
666.00	4,435	4,055	8,870
666.50	4,835	2,318	11,188

Device	Routing	Invert	Outlet Devices
#1	Primary	663.05'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 663.05' / 663.00' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Secondary	665.85'	**75.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=4.54 cfs @ 12.18 hrs HW=665.97' TW=664.53' (Dynamic Tailwater)
⮤**1=Culvert** (Inlet Controls 4.54 cfs @ 5.78 fps)

Secondary OutFlow Max=8.56 cfs @ 12.36 hrs HW=665.98' TW=665.29' (Dynamic Tailwater)
⮤**2=Broad-Crested Rectangular Weir** (Weir Controls 8.56 cfs @ 0.88 fps)

Pond 55P: North Pre-Treatment to Bio-Retention Area

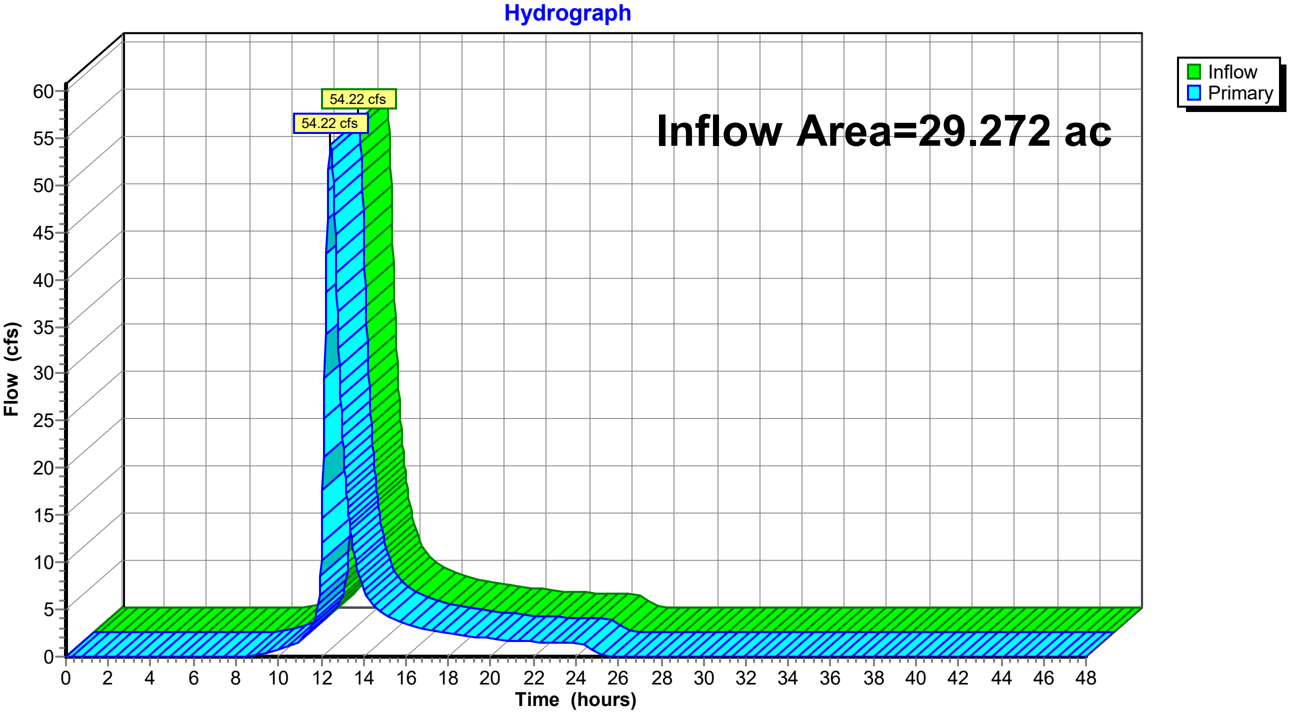


Summary for Link 1L: West Property Line and Adjacent Wetland

Inflow Area = 29.272 ac, 0.00% Impervious, Inflow Depth = 2.81" for 100-yr event
Inflow = 54.22 cfs @ 12.44 hrs, Volume= 6.862 af
Primary = 54.22 cfs @ 12.44 hrs, Volume= 6.862 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link 1L: West Property Line and Adjacent Wetland

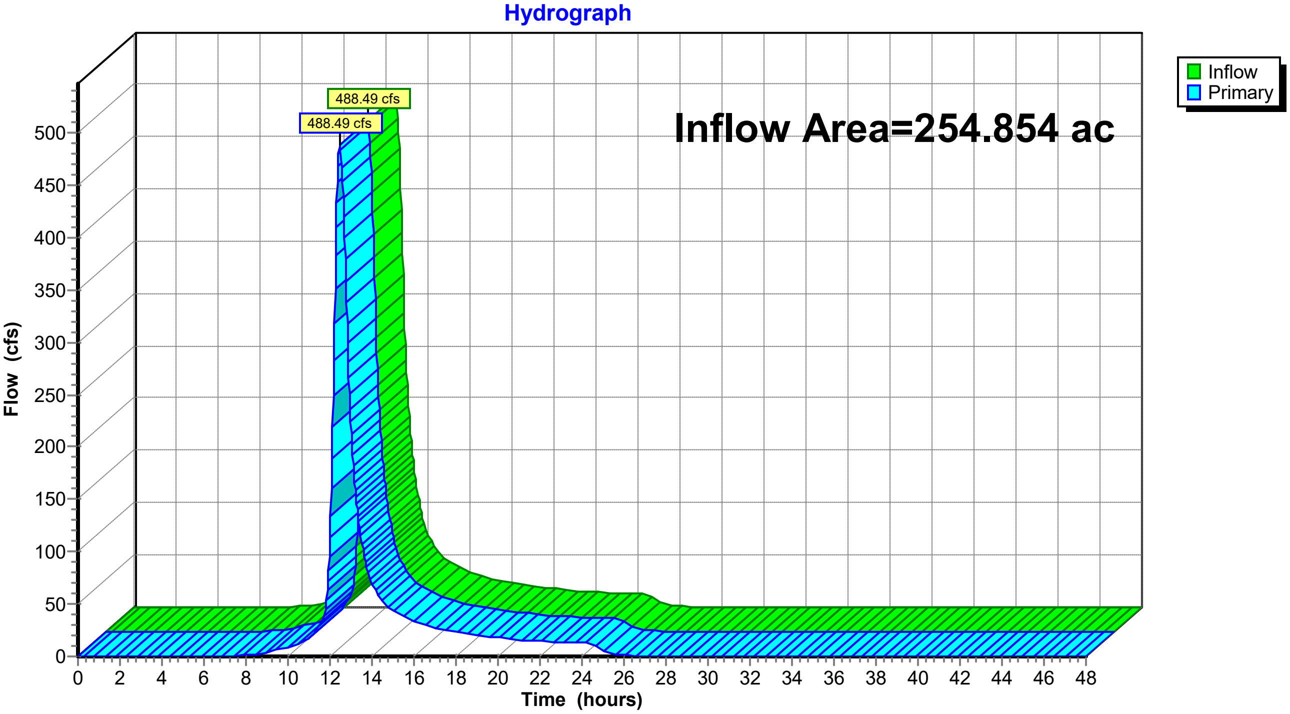


Summary for Link 2L: Total Discharge at Design Points

Inflow Area =	254.854 ac,	4.91% Impervious,	Inflow Depth > 3.09"	for 100-yr event	
Inflow =	488.49 cfs @	12.48 hrs,	Volume=	65.650 af	
Primary =	488.49 cfs @	12.48 hrs,	Volume=	65.650 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link 2L: Total Discharge at Design Points

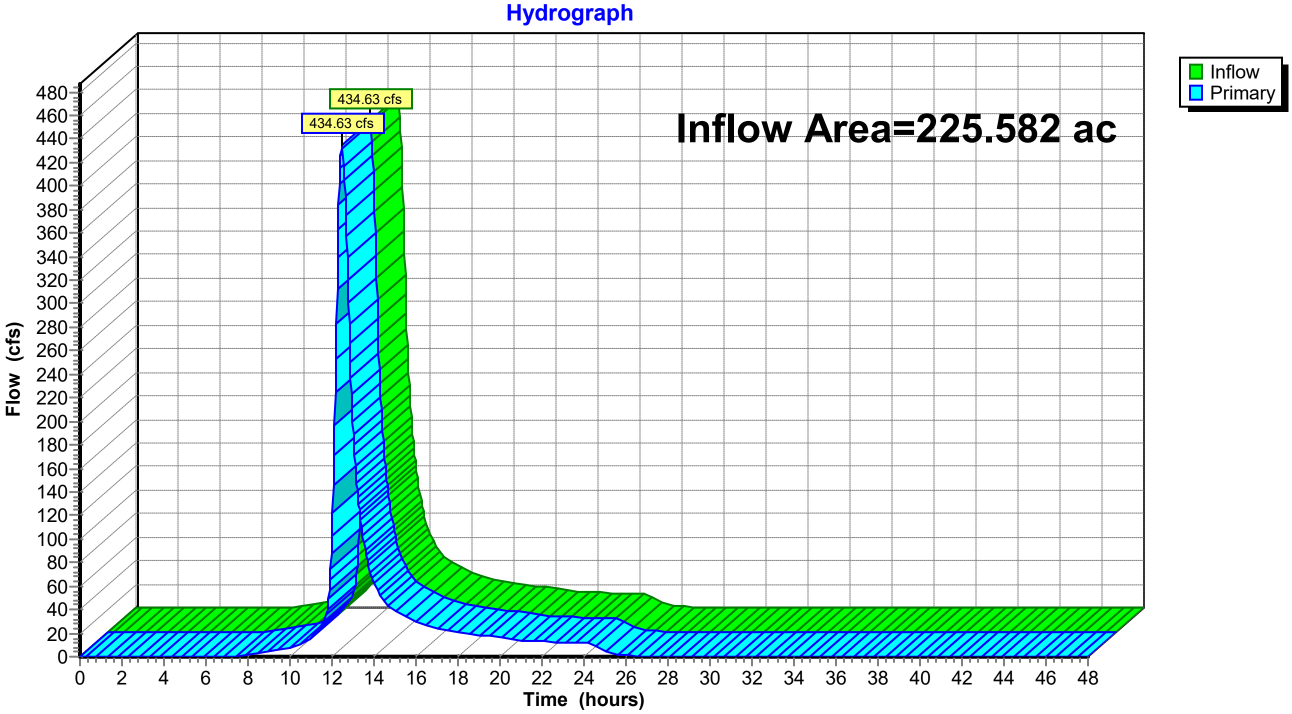


Summary for Link 3L: Ditch at Northwest Corner of Site Discharging to Adjacent Wetland

Inflow Area = 225.582 ac, 5.55% Impervious, Inflow Depth > 3.13" for 100-yr event
Inflow = 434.63 cfs @ 12.48 hrs, Volume= 58.788 af
Primary = 434.63 cfs @ 12.48 hrs, Volume= 58.788 af, Atten= 0%, Lag= 0.0 min
Routed to Link 2L : Total Discharge at Design Points

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs

Link 3L: Ditch at Northwest Corner of Site Discharging to Adjacent Wetland



Appendix A-3

Drainage Calculations
WQv, RRv & CPv Calculations

INVICTUS
Civil Engineering, P.C.
4759 N 5th Street
Lewiston, NY 14092
(716) 946-2415

Project #: 21-1002 Calc. By: RJH Date: 7-9-21
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Rev By: ________ Date: ________
Project: GATEWAY - PLUG POWER

WATER QUALITY VOLUME (WQ_V) CALCS:

SITE DRAINAGE AREA (EXCL. R.O.W.) = 29.096 AC.

TOTAL PROPOSED IMPERVIOUS = 15.513 AC.

OFF-SITE CONTRIBUTING DRAINAGE AREA = 27.338 AC. (0.00 AC. IMP.)

$$WQ_V = \frac{(P)(R_V)(A)}{12}$$ WHERE: P = 90% ANNUAL RAINFALL EVENT NO. = 1.00

$$= \frac{(1.00)(0.298)(56.434)}{12}$$

$$R_V = 0.05 + 0.009(I) = 0.05 + 0.009(27.5) = 0.298$$

$$I = \frac{15.513\text{ AC}}{56.434\text{ AC}} = 27.5\%$$

$$= \boxed{1.401\text{ AC-FT}}$$

A = CONTRIBUTING DRAINAGE AREA = 56.434 AC.

A CUT-OFF SWALE WILL BE CONSTRUCTED TO DIRECT OFF-SITE FLOW FROM THE SOUTH AROUND THE SITE TO THE WEST. THEREFORE THAT AREA (CONTAINING NO IMPERVIOUS COVER) CAN BE SUBTRACTED FROM THE CONTRIBUTING AREA FOR THE WQV CALCULATIONS.

IN ADDITION, PERIMETER VEGETATED AREAS OF THE SITE DO NOT RECEIVE RUNOFF FROM THE DEVELOPED SITE AND DRAIN OVERLAND TO EXISTING WETLAND AREAS TO THE WEST AND NORTHWEST OF THE SITE. THOSE AREAS CAN ALSO BE SUBTRACTED FROM THE CONTRIBUTING AREA FOR THE WQV CALCULATIONS

TOTAL AREA TO SOUTH CUT-OFF SWALE = 29.272 AC.
ADDITIONAL VEGETATED AREA DRAINING OVERLAND OFF SITE = 2.349 AC.

∴ THE CONTRIBUTING AREA IS REDUCED TO 56.434 - 29.272 - 2.349 = 24.813 AC.
WQV IS RECALCULATED AS FOLLOWS:

$$WQ_V = \frac{(P)(R_V)(A)}{12}$$

$$P = 1.00$$

$$R_V = 0.05 + 0.009(I) = 0.05 + 0.009(62.5) = 0.613$$

$$I = \frac{15.513}{24.813} = 62.5\%$$

$$= \frac{(1.00)(0.613)(24.813)}{12}$$

$$= \boxed{1.268\text{ AC-FT}}$$

A = 24.813 AC IMP. = 15.513 AC.

Project #: 21-1002 Calc. By: RJH Date: 7-9-21
Page 2 of 6 Check By: ______ Date: ______
Rev By: ______ Date: ______
Project: GATEWAY - PLUG POWER

RUNOFF REDUCTION VOLUME (RRv)

$RR_V = \frac{(P)(R_V^*)(A_i)}{12}$ WHERE: $P = 1.00$

$R_V = 0.05 + 0.009(I)$ $I = 100\%$

$= 0.05 + 0.009(100)$

$= 0.95$

$= \frac{(1.00)(0.95)(3.056)}{12}$

$= \boxed{0.242 \text{ AC-FT}}$

$A_i = (s)(A_{ic}) = (0.2)(15.280 \text{ AC}) = 3.056 \text{ AC.}$

S = SPECIFIC REDUCTION FACTOR = 0.2 FOR "D" SOILS

A_{ic} = AREA OF NEW IMPERVIOUS = 15.280 AC.

EXIST. IMPERVIOUS = 0.233 AC

PROP. IMPERVIOUS = 15.513 AC.

BIO-RETENTION AREA SIZING:

$A_f = \frac{(WQ_V)(d_f)}{[(K)(h_f + d_f)(t_f)]}$ WHERE: A_f = AREA OF BIO-RETENTION REQUIRED

$WQ_V = 1.268 \text{ AC-FT} = 55,234 \text{ FT}^3$

$A_f = \frac{(55,234)(2.5)}{[(0.5)(0.25 + 2.5)(2)]}$

d_f = DEPTH OF SOIL MEDIA = 2.5 FT

K = HYDRAULIC CONDUCTIVITY = 0.5 FT/DAY

$A_f = \frac{138085}{2.75} = \boxed{50,213 \text{ FT}^2}$

h_f = AVE. HEIGHT OF PONDING = 0.25 FT

t_f = TIME TO FILTER = 2 DAYS

BIO-RETENTION AREA PROVIDED = $\boxed{50,275 \text{ FT}^2}$

WQv PROVIDED:

$A_f = \frac{(WQ_V)(d_f)}{[(K)(h_f + d_f)(t_f)]}$

$50275 = \frac{(WQ_V)(2.5)}{[(0.5)(0.25 + 2.5)(2)]}$

$WQ_V = 55,303 \text{ FT}^3 = \boxed{1.270 \text{ AC-FT}}$

PER TABLE 3.5 IN THE NYS STORMWATER MANAGEMENT DESIGN MANUAL, A BIO-RETENTION PRACTICE CAN UTILIZE 40% OF THE WQv PROVIDED BY THE TECHNIQUE TOWARD MEETING THE RRv REQUIREMENT.

$\therefore RR_V$ PROVIDED $= (6.40)(1.270 \text{ AC-FT}) = \boxed{0.508 \text{ AC-FT}}$

PRETREATMENT:

ACCORDING TO SECTION 6.4.3 "PRETREATMENT" OF THE NYS STORMWATER MANAGEMENT DESIGN MANUAL, DRY OR WET PRETREATMENT SHALL BE PROVIDED PRIOR TO FILTER MEDIA EQUIVALENT TO AT LEAST 25% OF THE COMPUTED WQv. THE TYPICAL METHOD IS A SEDIMENTATION BASIN. THE REQUIRED SEDIMENTATION BASIN AREA IS COMPUTED USING THE FOLLOWING EQUATION:

$$A_S = (0.066)(WQ_V)\ FT^2 \text{ FOR } I \leq 75\%$$

WQ_V REQUIRED = 1.268 AC-FT = 55,234 FT^3

THERE ARE TWO DISCHARGE PIPES TO THE WESTERN SEDIMENT BASIN AND ONE DISCHARGE PIPE TO THE NORTH SEDIMENT BASIN.

∴ AREA PRETREATMENT WEST = $(0.066)(0.67)(55,234\ FT^3) = 2442\ FT^2$
AREA PRETREATMENT NORTH = $(0.066)(0.33)(55,234\ FT^3) = 1,203\ FT^2$

TOTAL PRETREATMENT = $(0.25)(55,234\ FT^3) = 13,809\ FT^3$

∴ PRETREATMENT WEST = $(0.67)(13,809\ FT^3) = 9,252\ FT^3$
PRETREATMENT NORTH = $(0.33)(13,809\ FT^3) = 4,557\ FT^3$

WEST SEDIMENT BASIN	NORTH SEDIMENT BASIN
AREA = $4,770\ FT^2 \geq 2,442\ FT^2$	AREA = $2,977\ FT^2 \geq 1,203\ FT^2$
WQ_V PROVIDED = $10,166\ FT^3 \geq 9,252\ FT^3$	WQ_V PROVIDED = $5,452\ FT^3 \geq 4,557\ FT^3$

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LEVEL SPREADER SIZING:

WEST LEVEL SPREADER (38P)

DESIGN 200 L.F. 15" PERF. HDPE
MUST PASS 10-YEAR STORM: FLOW = 7.68 cfs HW = 664.67

⇒ DETERMINE OUTFLOW FROM ONE PERFORATION:

$Q_p = C_d A \sqrt{2gh}$ WHERE:

$Q_p = (0.6)(0.000534)\sqrt{(2)(32.2)(1.04)}$

$= 0.002622 \text{ FT}^3/\text{SEC/PERF.}$

Q_p = FREE OUTFALL FLOW RATE THRU ONE PERF. (FT^3/SEC)
C_d = COEFF. OF DISCHARGE = 0.6
A = X-SECTIONAL AREA OF ONE PERFORATION
$= \pi r^2 = \pi (0.1565 \text{ IN})^2 = 0.076945 \text{ IN}^2$
$= 0.000534 \text{ FT}^2$
g = GRAVITATIONAL CONSTANT = 32.2 FT/SEC^2
h = HEIGHT OF WATER ABOVE PERFORATION
INV. = 633.0 HW = 664.67
USE 1/2 PIPE DIA = 7.5" = 0.63' + 633 = 633.63
∴ h = 664.67 − 633.63 = 1.04'

⇒ DETERMINE NO. PERF. /FT

MIN. INLET AREA = $1.5 \text{ IN}^2/\text{FT}$
$= 0.00972 \text{ FT}^2/\text{FT}$

NO. PERF./FT = $0.00972 \text{ FT}^2/\text{FT} \,/\, 0.000534 \text{ FT}^2$
= 18.2 PERF./FT.

⇒ DETERMINE FLOW/FT

$(0.002622 \text{ FT}^3/\text{SEC/PERF.})(18.2 \text{ PERF./FT}) = 0.048 \text{ FT}^3/\text{SEC/FT}$

⇒ DETERMINE FLOW FOR 200 L.F. 15" PERF. HDPE

$(0.048 \text{ FT}^3/\text{SEC/FT})(200 \text{ L.F.}) = 9.6 \text{ FT}^3/\text{SEC} \geq 7.72 \text{ FT}^3/\text{SEC.}$

⇒ CHECK 100-YR STORM: FLOW = $7.23 \text{ FT}^3/\text{SEC}$ HW = 664.87
∴ h = 664.87 − 663.63 = 1.24 FT

$Q_p = (0.6)(0.000534)\sqrt{(2)(32.2)(1.24)}$
$= 0.002860 \text{ FT}^3/\text{SEC/PERF.}$

FLOW PER FOOT = $(0.00286 \text{ FT}^3/\text{SEC/PERF.})(18.2 \text{ PERF/FT}) = 0.052 \text{ FT}^3/\text{SEC/FT}$

FLOW FOR 200 L.F. 15" PERF. HDPE = $(0.052 \text{ FT}^3/\text{SEC/FT})(200 \text{ FT}) = 10.4 \text{ FT}^3/\text{SEC}$
$\geq 7.23 \text{ FT}^3/\text{SEC.}$

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LEVEL SPREADER SIZING (CONT.):

NORTH LEVEL SPREADER (39P)

DESIGN 150 L.F. 12" PERF. HDPE
MUST PASS 10-YR STORM: FLOW = 4.95 cfs HW = 664.57

$Q_p = C_d A \sqrt{2gh}$ $C_d = 0.6$

$Q_p = (0.6)(0.000534)\sqrt{(2)(32.2)(1.07)}$ $A = 0.000534$ FT²

$= 0.002660$ FT³/SEC/PERF. $g = 32.2$ FT/SEC²

⇒ DETERMINE NO. PERF./FT
MIN. INLET AREA = 1.5 IN²/FT
= 0.00972 FT²/FT

h = HEIGHT OF WATER ABOVE PERFORATION
INV. = 633 HW = 664.57
USE 1/2 PIPE DIA = 6" = 0.5' + 633.0 = 633.50
∴ h = 664.57 - 663.50 = 1.07'

NO. PERF./FT = 0.00972 FT²/FT / 0.000534 FT²
= 18.2 PERF./FT

⇒ DETERMINE FLOW/FT

(0.002660 FT³/SEC/PERF.)(18.2 PERF/FT) = 0.048 FT³/SEC/FT

⇒ DETERMINE FLOW FOR 150 L.F. 12" PERF. HDPE

(0.048 FT³/SEC/FT)(150 FT) = 7.20 FT³/SEC ≥ 4.95 FT³/SEC

⇒ CHECK 100-YR STORM: FLOW = 4.59 FT³/SEC HW = 664.65
∴ h = 664.65 - 663.50 = 1.15 FT

$Q_p = (0.6)(0.000534)\sqrt{(2)(32.2)(1.15)}$
$= 0.002757$ FT³/SEC/PERF.

FLOW PER FOOT = (0.002757 FT³/SEC/PERF)(18.2 PERF/FT) = 0.050 FT³/SEC/FT

FLOW FOR 150 L.F. 12" PERF. HDPE = (0.050 FT³/SEC/FT)(150 FT) = 7.50 FT³/SEC
≥ 4.59 FT³/SEC

INVICTUS
Civil Engineering, P.C.
4759 N 5th Street
Lewiston, NY 14092
(716) 946-2415

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STREAM CHANNEL PROTECTION VOLUME (CP_v)

CONTRIBUTING AREA = 24.813 AC. $P_{1YR} = 1.82''$ $CN = 89$

$Ia = \frac{200}{CN} - 2 = \frac{200}{89} - 2 = 0.247$ $Ia/P = \frac{0.247}{1.82} = 0.136$

$CN = \frac{1000}{10+S}$ $89 = \frac{1000}{10+S}$ $890 + 89S = 1000$ $89S = 110$ $S = 1.24$

$Q_{INCHES} = \frac{(P-0.2S)^2}{P+0.8S} = \frac{[1.62-(0.2)(1.24)]^2}{1.82+(0.8)(1.24)} = \frac{2.47}{2.81} = 0.88$ INCHES

$T_c = \underset{(13S)}{30.2\text{ MIN}} = 0.50$ HR

⇒ USING EXHIBIT 4-11 FROM TR-55 W/ $Ia/P = 0.136$ & T_c - 0.5 HR.
FIND q_u = 500 CSM/IN

⇒ USING FIGURE 8.5 FROM THE N.Y.S. STORMWATER MANAGEMENT DESIGN MANUAL FOR T = 24 HRS & q_u = 500 CSM/IN, FIND $q_o/q_i = 0.038$

⇒ DETERMINE CHANNEL PROTECTION STORAGE (V_s) OR (CP_v):

$$V_s/V_r = 0.682 - 1.43(q_o/q_i) + 1.64(q_o/q_i)^2 - 0.804(q_o/q_i)^3$$
$$= 0.682 - 1.43(0.038) + 1.64(0.038)^2 - 0.804(0.038)^3$$
$$= 0.682 - 0.054 + 0.002 - 0.000 = 0.630$$

SOLVE FOR $V_s = CP_v = 0.630\,V_r$ WHERE $V_r = 0.88$ IN

$$CP_v = (0.630)(0.88\text{ IN})\left(\frac{1\text{ FT}}{12\text{ IN}}\right)(43560\text{ FT}^2/\text{AC})(24.813\text{ AC}) = 49935\text{ FT}^3$$
$$= 1.15\text{ AC-FT}$$

⇒ DEFINE THE AVERAGE RELEASE RATE:

RELEASE 49,935 FT^3 OVER 24 HRS.

$49{,}935\text{ FT}^3/(24\text{ HRS})(3600\text{ SEC/HR}) = \boxed{0.58\text{ FT}^3/\text{SEC}}$

BIO-RETENTION AREA DISCHARGE FOR 1YR STORM = $\boxed{0.53\text{ FT}^3/\text{SEC}}$
CP_v PROVIDED = 61,848 FT^3 = 1.42 AC-FT

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.164	80	>75% Grass cover, Good, HSG D (8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 17S, 19S, 21S, 22S, 23S, 24S, 26S, 27S, 28S, 29S)
3.004	80	Gravel Storage Area, Good, HSG D (13S, 21S)
0.136	78	Meadow, non-grazed, HSG D (24S)
5.945	98	Paved parking, HSG D (8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 21S, 22S, 23S, 24S, 25S)
5.115	98	Roofs, HSG D (8S, 9S, 11S, 12S, 13S, 14S, 15S, 16S, 18S, 20S, 21S)
1.449	98	Unconnected pavement, HSG D (13S, 17S, 19S, 21S, 23S)
24.813	**89**	**TOTAL AREA**

Exhibit 4-II: Unit peak discharge (q_u) for SCS type II rainfall distribution

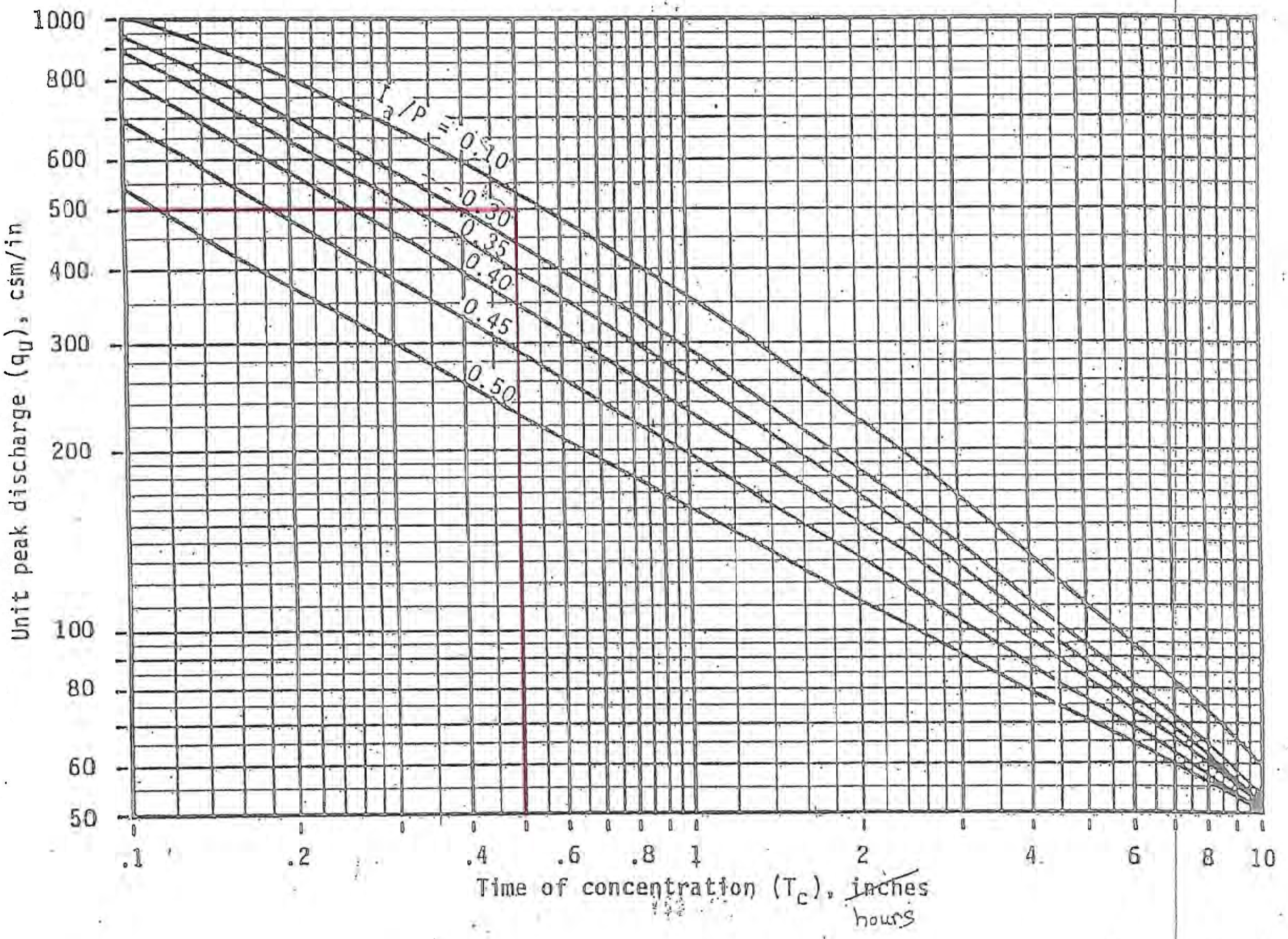
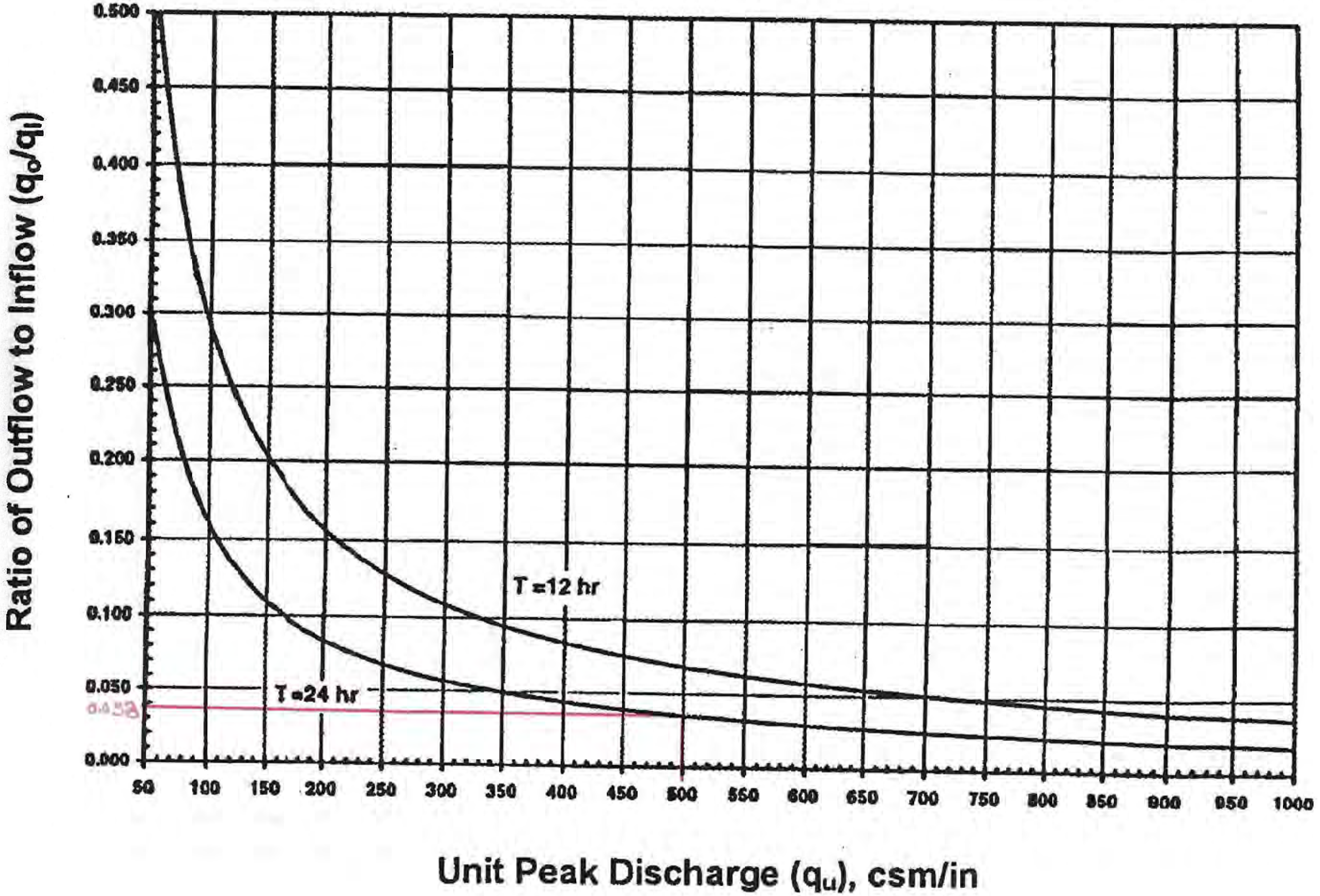


Figure 8.5 Detention Time vs. Discharge Ratios (Source: MDE, 2000)



Appendix B

General Permit No. GP-0-20-001

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

1-23-20

Authorized Signature

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

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 **not** 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* 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. 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, with the exception of:

   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 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;

   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 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;

   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* <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. 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,* <u>and</u> 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; and all areas of disturbance have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and 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; <u>and</u> all areas disturbed as of the project shutdown date 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 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* and 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

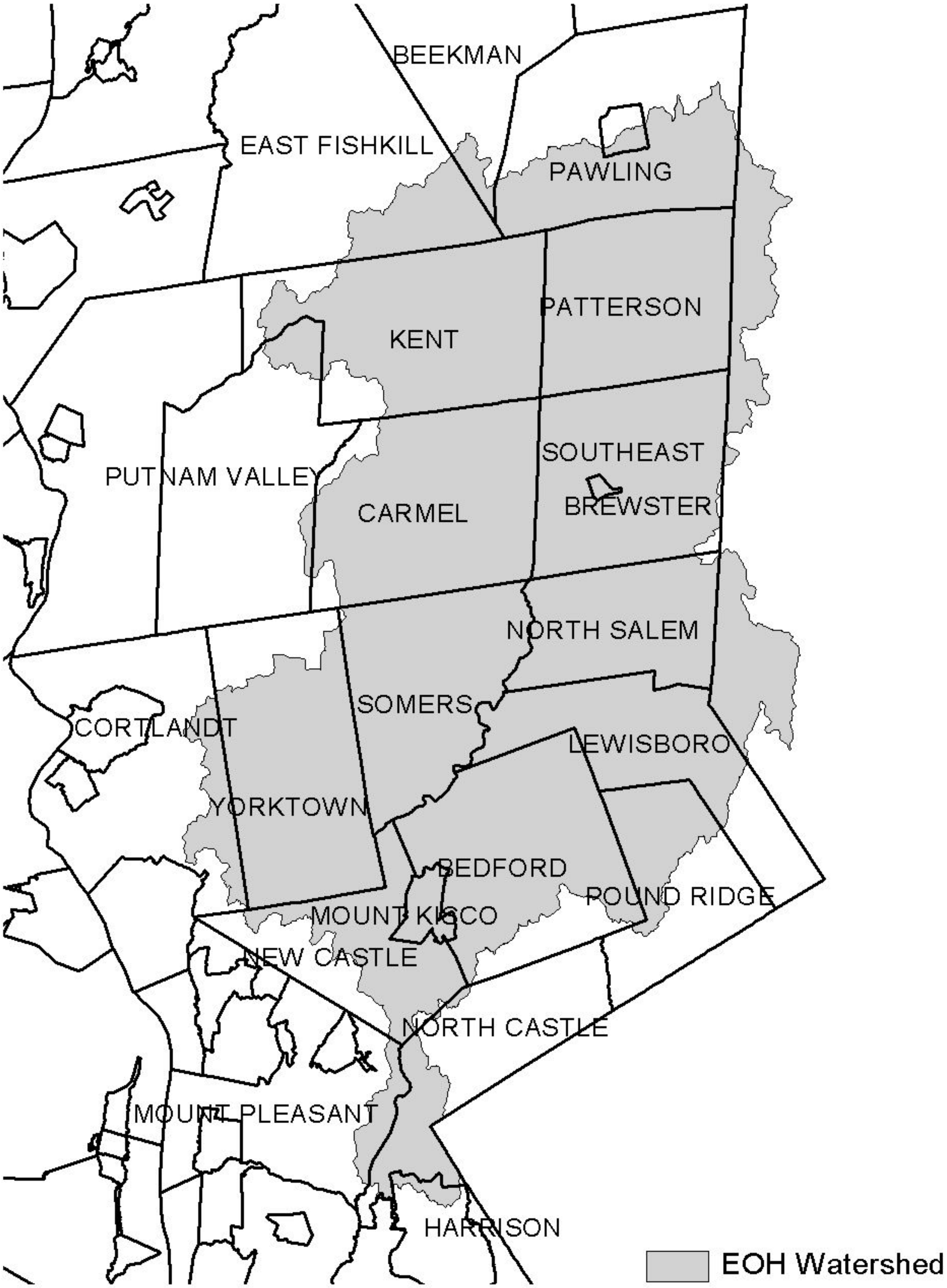


Figure 2 - Onondaga Lake Watershed

Figure 3 - Greenwood Lake Watershed

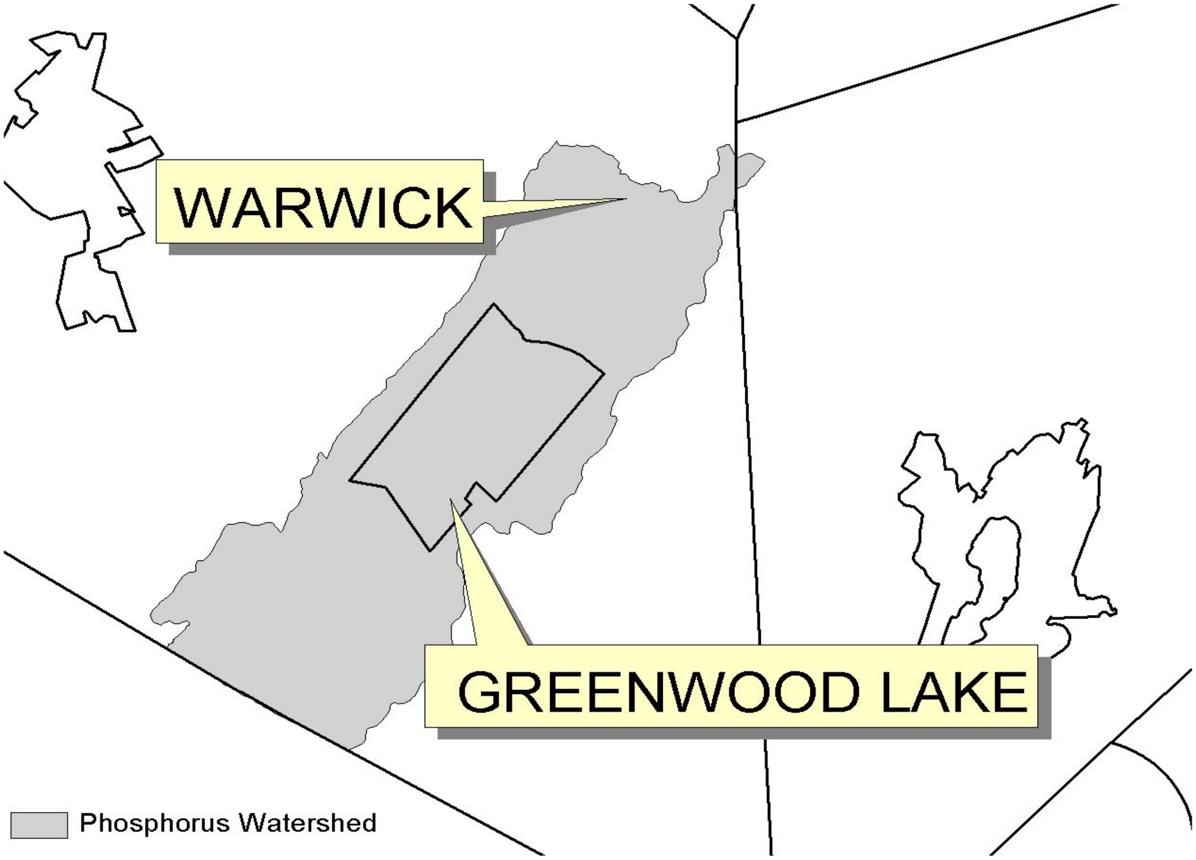


Figure 4 - Oscawana Lake Watershed

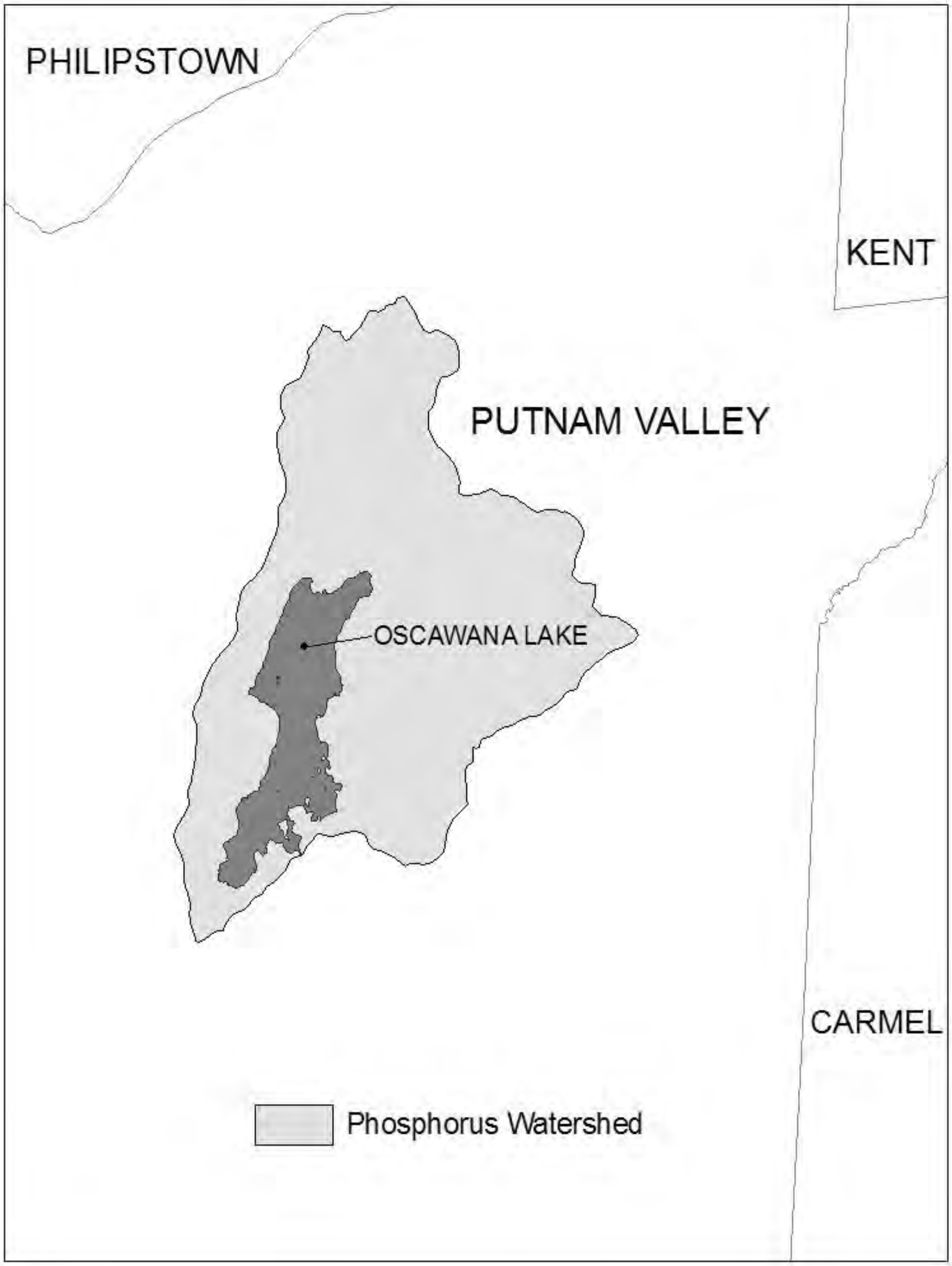
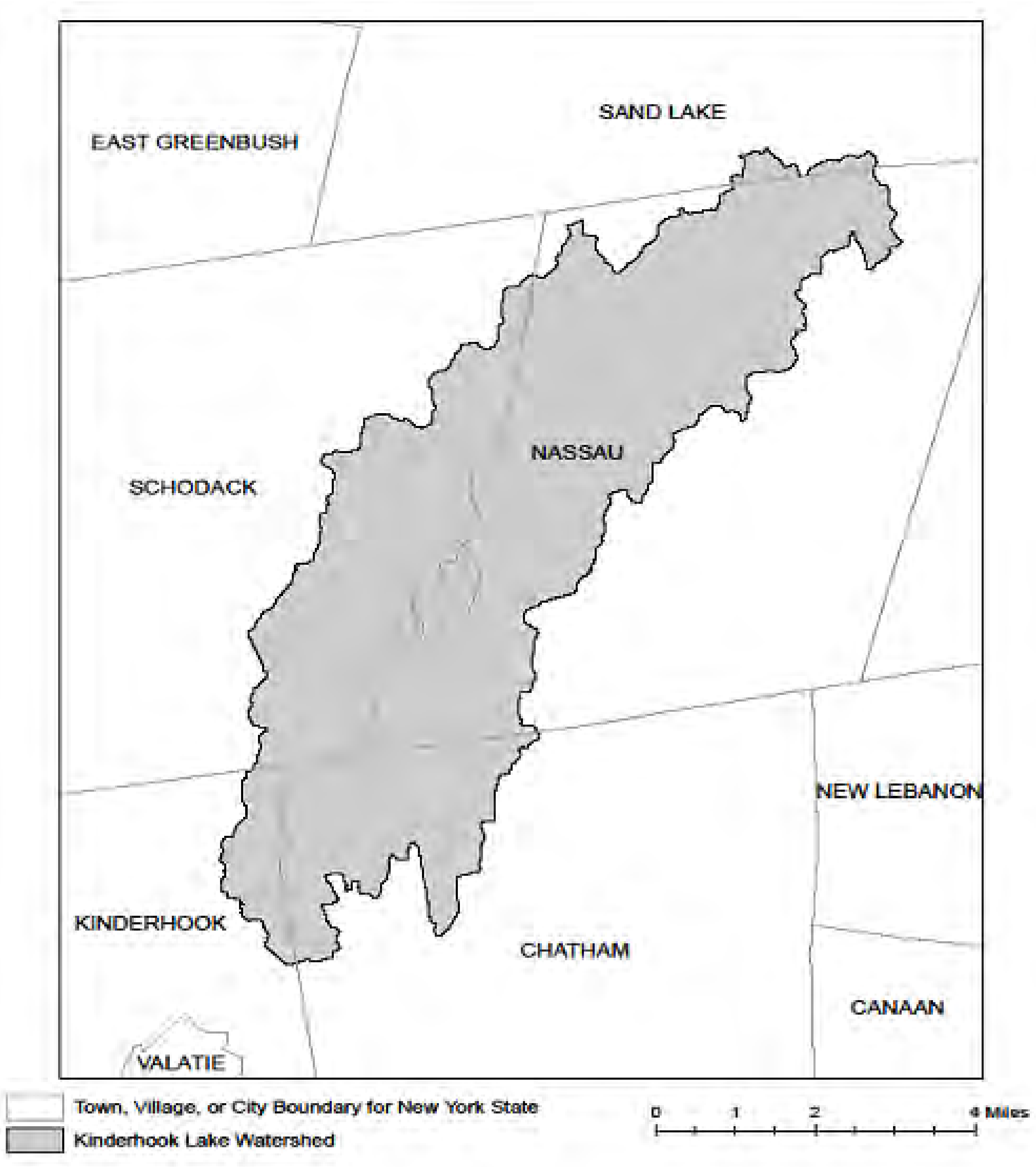


Figure 5 - Kinderhook Lake Watershed



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 C

Notice of Intent (eNOI)

NOI for coverage under Stormwater General Permit for Construction Activity

version 1.30

(Submission #: HP8-VR76-YYJH4, version 1)

Details

Originally Started By	Richard Haight
Submission ID	HP8-VR76-YYJH4
Submission Reason	New
Status	Draft
Active Steps	Form Submitted

Form Input

Owner/Operator Information

Owner/Operator Name (Company/Private Owner/Municipality/Agency/Institution, etc.)
Plug Power

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
Brophy

Owner/Operator Contact Person First Name
Brenor

Owner/Operator Mailing Address
968 Albany Shaker Road

City
Latham

State
New York

Zip
12110

Phone
408 823-6566

Email
brbrophy@plugpower.com

Federal Tax ID
22-3672377

Project Location

Project/Site Name
Plug Power Hydrogen Production Facility (STAMP Project Gateway)

Street Address (Not P.O. Box)
6840 Crosby Road

Side of Street
West

City/Town/Village (THAT ISSUES BUILDING PERMIT)
Alabama

State
NY

Zip
14013

DEC Region
8

County
GENESEE

Name of Nearest Cross Street
STAMP Drive

Distance to Nearest Cross Street (Feet)
1435

Project In Relation to Cross Street
South

Tax Map Numbers Section-Block-Parcel
10-1-42

Tax Map Numbers
NONE PROVIDED

1. Coordinates

Provide the Geographic Coordinates for the project site. The two methods are:
- Navigate to the project location on the map (below) and click to place a marker and obtain the XY coordinates.
- The "Find Me" button will provide the lat/long for the person filling out this form. Then pan the map to the correct location and click the map to place a marker and obtain the XY coordinates.

Navigate to your location and click on the map to get the X,Y coordinates
43.082739642240895,-78.40548446174046

Project Details

2. What is the nature of this project?
New Construction

3. Select the predominant land use for both pre and post development conditions.

Pre-Development Existing Landuse
Cultivated Land

Post-Development Future Land Use
Industrial

3a. If Single Family Subdivision was selected in question 3, enter the number of subdivision lots.
NONE PROVIDED

---

4. In accordance with the larger common plan of development or sale, enter the total project site acreage, the acreage to be disturbed and the future impervious area (acreage)within the disturbed area.

*** ROUND TO THE NEAREST TENTH OF AN ACRE. ***

Total Site Area (acres)
29.1

Total Area to be Disturbed (acres)
27.0

Existing Impervious Area to be Disturbed (acres)
0.2

Future Impervious Area Within Disturbed Area (acres)
15.5

5. Do you plan to disturb more than 5 acres of soil at any one time?
Yes

---

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

A (%)
0

B (%)
0

C (%)
0

D (%)
100

7. Is this a phased project?
Yes

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

Start Date
9/1/2021

End Date
12/31/2023

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.
Un-named Tributary Wetland

9a. Type of waterbody identified in question 9?
Wetland/Federal Jurisdiction On Site (Answer 9b)

Other Waterbody Type Off Site Description
NONE PROVIDED

9b. If "wetland" was selected in 9A, how was the wetland identified?
Delineated by Consultant

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

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

12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters?
No

If No, skip question 13.

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey?
No

If Yes, what is the acreage to be disturbed?
NONE PROVIDED

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

15. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)?
Yes

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

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

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

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

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

Required SWPPP Components

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)?
Yes

22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)?
Yes

If you answered No in question 22, skip question 23 and the Post-construction Criteria and Post-construction SMP Identification sections.

23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual?
Yes

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:
Professional Engineer (P.E.)

SWPPP Preparer
Richard J. Haight, P.E. - Invictus Civil Engineering, P.C.

Contact Name (Last, Space, First)
Haight, Richard

Mailing Address
4759 N 5TH ST

City
LEWISTON

State
NY

Zip
14092

Phone
17169462415

Email
rhaight@invictuscivilengineering.com

Download SWPPP Preparer Certification Form
Please take the following steps to prepare and upload your preparer certification form:

1) Click on the link below to download a blank certification form
2) The certified SWPPP preparer should sign this form

3) Scan the signed form
4) Upload the scanned document
Download SWPPP Preparer Certification Form

Please upload the SWPPP Preparer Certification

> Plug Power SWPPP Preparer Signature Form.pdf - 05/20/2021 04:24 PM
> **Comment**
> NONE PROVIDED

Erosion & Sediment Control Criteria

25. Has a construction sequence schedule for the planned management practices been prepared?
Yes

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

Temporary Structural
Check Dams
Dust Control
Silt Fence
Stabilized Construction Entrance
Storm Drain Inlet Protection

Biotechnical
None

Vegetative Measures
Protecting Vegetation
Seeding
Topsoiling
Mulching

Permanent Structural
Rock Outlet Protection

Other
NONE PROVIDED

Post-Construction Criteria

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

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.
Preservation of Buffers
Locating Development in Less Sensitive Areas

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).
All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout). (Acre-feet)
1.268

29. Post-construction SMP Identification
Use the Post-construction SMP Identification section to identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity that were used to reduce the Total WQv Required (#28).

Identify the SMPs to be used by providing the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use the Post-Construction SMP Identification section to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29. (acre-feet)
0.508

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28)?
No

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

32. Provide the Minimum RRv required based on HSG. [Minimum RRv Required = (P) (0.95) (Ai) / 12, Ai=(s) (Aic)] (acre-feet)
0.242

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

If Yes, go to question 33.

Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.

If No, sizing criteria has not been met; therefore, NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. SMPs

Use the Post-construction SMP Identification section to identify the Standard SMPs and, if applicable, the Alternative SMPs to be used to treat the remaining total WQv (=Total WQv Required in #28 - Total RRv Provided in #30).

Also, provide the total impervious area that contributes runoff to each practice selected.

NOTE: Use the Post-construction SMP Identification section to identify the SMPs used on Redevelopment projects.

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

0.762

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

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

1.270

35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)?

Yes

If Yes, go to question 36.

If No, sizing criteria has not been met; therefore, NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

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

CPv Required (acre-feet)

1.15

CPv Provided (acre-feet)

1.42

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

NONE PROVIDED

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

Overbank Flood Control Criteria (Qp)

Pre-Development (CFS)
231.84

Post-Development (CFS)
208.05

Total Extreme Flood Control Criteria (Qf)

Pre-Development (CFS)
511.81

Post-Development (CFS)
488.49

37a. The need to meet the Qp and Qf criteria has been waived because:
NONE PROVIDED

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed?
Yes

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

39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). (See question #32a) This space can also be used for other pertinent project information.
The site limitations for not reducing 100% of the WQv are soils with an infiltration rate less than 0.5 inches/hour.

Post-Construction SMP Identification

Runoff Reduction (RR) Techniques, Standard Stormwater Management Practices (SMPs) and Alternative SMPs

Identify the Post-construction SMPs to be used by providing the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

RR Techniques (Area Reduction)

Round to the nearest tenth

Total Contributing Acres for Conservation of Natural Area (RR-1)
NONE PROVIDED

Total Contributing Impervious Acres for Conservation of Natural Area (RR-1)
0.000

Total Contributing Acres for Sheetflow to Riparian Buffers/Filter Strips (RR-2)
4.283

Total Contributing Impervious Acres for Sheetflow to Riparian Buffers/Filter Strips (RR-2)
0.000

Total Contributing Acres for Tree Planting/Tree Pit (RR-3)
0.000

Total Contributing Impervious Acres for Tree Planting/Tree Pit (RR-3)
0.000

Total Contributing Acres for Disconnection of Rooftop Runoff (RR-4)
0.000

RR Techniques (Volume Reduction)

Total Contributing Impervious Acres for Disconnection of Rooftop Runoff (RR-4)
0.000

Total Contributing Impervious Acres for Vegetated Swale (RR-5)
0.000

Total Contributing Impervious Acres for Rain Garden (RR-6)
0.000

Total Contributing Impervious Acres for Stormwater Planter (RR-7)
0.000

Total Contributing Impervious Acres for Rain Barrel/Cistern (RR-8)
0.000

Total Contributing Impervious Acres for Porous Pavement (RR-9)
0.000

Total Contributing Impervious Acres for Green Roof (RR-10)
0.000

Standard SMPs with RRv Capacity

Total Contributing Impervious Acres for Infiltration Trench (I-1)
0.000

Total Contributing Impervious Acres for Infiltration Basin (I-2)
0.000

Total Contributing Impervious Acres for Dry Well (I-3)
0.000

Total Contributing Impervious Acres for Underground Infiltration System (I-4)
0.000

Total Contributing Impervious Acres for Bioretention (F-5)
15.513

Total Contributing Impervious Acres for Dry Swale (O-1)
0.000

Standard SMPs

Total Contributing Impervious Acres for Micropool Extended Detention (P-1)
0.000

Total Contributing Impervious Acres for Wet Pond (P-2)
0.000

Total Contributing Impervious Acres for Wet Extended Detention (P-3)
0.000

Total Contributing Impervious Acres for Multiple Pond System (P-4)
0.000

Total Contributing Impervious Acres for Pocket Pond (P-5)
0.000

Total Contributing Impervious Acres for Surface Sand Filter (F-1)
0.000

Total Contributing Impervious Acres for Underground Sand Filter (F-2)
0.000

Total Contributing Impervious Acres for Perimeter Sand Filter (F-3)
0.000

Total Contributing Impervious Acres for Organic Filter (F-4)
0.000

Total Contributing Impervious Acres for Shallow Wetland (W-1)
0.000

Total Contributing Impervious Acres for Extended Detention Wetland (W-2)
0.000

Total Contributing Impervious Acres for Pond/Wetland System (W-3)
0.000

Total Contributing Impervious Acres for Pocket Wetland (W-4)
0.000

Total Contributing Impervious Acres for Wet Swale (O-2)
0.000

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

Total Contributing Impervious Area for Hydrodynamic
0.000

Total Contributing Impervious Area for Wet Vault
0.000

Total Contributing Impervious Area for Media Filter
0.000

"Other" Alternative SMP?
0.000

Total Contributing Impervious Area for "Other"
0.000

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

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

Manufacturer of Alternative SMP
NONE PROVIDED

Name of Alternative SMP
NONE PROVIDED

Other Permits

40. Identify other DEC permits, existing and new, that are required for this project/facility.
None

If SPDES Multi-Sector GP, then give permit ID
NONE PROVIDED

If Other, then identify
NONE PROVIDED

41. Does this project require a US Army Corps of Engineers Wetland Permit?
No

If "Yes," then indicate Size of Impact, in acres, to the nearest tenth
NONE PROVIDED

42. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned.
NONE PROVIDED

MS4 SWPPP Acceptance

43. Is this project subject to the requirements of a regulated, traditional land use control MS4?
No

If No, skip question 44

44. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI?
NONE PROVIDED

MS4 SWPPP Acceptance Form Download
Download form from the link below. Complete, sign, and upload.
MS4 SWPPP Acceptance Form

MS4 Acceptance Form Upload

> NONE PROVIDED
> **Comment**
> NONE PROVIDED

Owner/Operator Certification

Owner/Operator Certification Form Download
Download the certification form by clicking the link below. Complete, sign, scan, and upload the form.

Owner/Operator Certification Form (PDF, 45KB)

Upload Owner/Operator Certification Form

> NONE PROVIDED
> **Comment**
> NONE PROVIDED

Attachments

Date	Attachment Name	Context	User
5/20/2021 4:24 PM	Plug Power SWPPP Preparer Signature Form.pdf	Attachment	Richard Haight

Status History

	User	Processing Status
5/20/2021 3:02:25 PM	Richard Haight	Draft

Processing Steps

Step Name	Assigned To/Completed By	Date Completed
Form Submitted		
Under Review	DAVID GASPER	

Appendix D

Notice of Termination (NOT) Form

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

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

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

I. Owner or Operator Information

1. Owner/Operator Name:

2. Street Address:

3. City/State/Zip:

4. Contact Person:

4a.Telephone:

4b. Contact Person E-Mail:

II. Project Site Information

5. Project/Site Name:

6. Street Address:

7. City/Zip:

8. County:

III. Reason for Termination

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

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

9c. ☐ Other (Explain on Page 2)

IV. Final Site Information:

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

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

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

____

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

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

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

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

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

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

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

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

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

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

V. Additional Information/Explanation:

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

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

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

Printed Name:

Title/Position:

Signature:

Date:

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

VII. Qualified Inspector Certification - Final Stabilization:

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

Printed Name:

Title/Position:

Signature:	Date:

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

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

Printed Name:

Title/Position:

Signature:	Date:

IX. Owner or Operator Certification

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

Printed Name:

Title/Position:

Signature:	Date:

(NYS DEC Notice of Termination - January 2015)

Appendix E

Contractor Certification Forms

CONTRACTOR'S CERTIFICATION STATEMENT

All contractors that will be responsible for installing, constructing, repairing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP; and the contractors that will be responsible for the construction of all post-construction storm water management practices included in the SWPPP must sign the following certification statement before commencing 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"

Site Location:____

Name:____

Company:________________________**Title:**________________

Company Address:______________________________________

____

Company Telephone:________________ **Fax:**________________

Signature:________________________**Date:**________________

Elements of SWPPP responsible for: ____________________________

____

Trained Individual Responsible for Implementation:________________

Title:____

SUBCONTRACTOR'S CERTIFICATION STATEMENT

All subcontractors that will be responsible for installing, constructing, repairing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP; and the subcontractors that will be responsible for the construction of all post-construction storm water management practices included in the SWPPP must sign the following certification statement before commencing 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 *discharges* from *construction activities* and that it is unlawful for any person to cause or contribute to a violation of *water quality standards*. Furthermore, I am aware that there are significant penalties for submitting false information, that I do not believe to be true, including the possibility of fine and imprisonment for knowing violations"

Site Location:____

Name:____

Company:______________________**Title:**__________________

Company Address:____________________________________

____

Company Telephone:________________ **Fax:**__________________

Signature:________________________**Date:**_________________

Elements of SWPPP responsible for: ____________________________

____

Trained Individual Responsible for Implementation:__________________

Title:____

Appendix F
NYSDEC Phase II SPDES Letter (folder for insert)

Appendix G

Soil Erosion & Sediment Control Details and Specifications

STANDARD AND SPECIFICATIONS FOR TEMPORARY CONSTRUCTION AREA SEEDING

Definition & Scope

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

Conditions Where Practice Applies

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

Criteria

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

Fertilizer or lime are not typically used for temporary seedings.

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

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

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

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

STANDARD AND SPECIFICATIONS FOR PERMANENT CONSTRUCTION AREA PLANTING

Definition & Scope

Establishing **permanent** grasses with other forbs and/or shrubs to provide a minimum 80% perennial vegetative cover on areas disturbed by construction and critical areas to reduce erosion and sediment transport. Critical areas may include but are not limited to steep excavated cut or fill slopes as well as eroding or denuded natural slopes and areas subject to erosion.

Conditions Where Practice Applies

This practice applies to all disturbed areas void of, or having insufficient, cover to prevent erosion and sediment transport. See additional standards for special situations such as sand dunes and sand and gravel pits.

Criteria

All water control measures will be installed as needed prior to final grading and seedbed preparation. Any severely compacted sections will require chiseling or disking to provide an adequate rooting zone, to a minimum depth of 12”, see Soil Restoration Standard. The seedbed must be prepared to allow good soil to seed contact, with the soil not too soft and not too compact. Adequate soil moisture must be present to accomplish this. If surface is powder dry or sticky wet, postpone operations until moisture changes to a favorable condition. If seeding is accomplished within 24 hours of final grading, additional scarification is generally not needed, especially on ditch or stream banks. Remove all stones and other debris from the surface that are greater than 4 inches, or that will interfere with future mowing or maintenance.

Soil amendments should be incorporated into the upper 2 inches of soil when feasible. **The soil should be tested to determine the amounts of amendments needed.** Apply ground agricultural limestone to attain a pH of 6.0 in the upper 2 inches of soil. If soil must be fertilized before results of a soil test can be obtained to determine fertilizer needs, apply commercial fertilizer at 600 lbs. per acre of 5-5-10 or equivalent. If manure is used, apply a quantity to meet the nutrients of the above fertilizer. This requires an appropriate manure analysis prior to applying to the site. Do not use manure on sites to be planted with birdsfoot trefoil or in the path of concentrated water flow.

Seed mixtures may vary depending on location within the state and time of seeding. Generally, warm season grasses should only be seeded during early spring, April to May. These grasses are primarily used for vegetating excessively drained sands and gravels. See Standard and Specification for Sand and Gravel Mine Reclamation. Other grasses may be seeded any time of the year when the soil is not frozen and is workable. When legumes such as birdsfoot trefoil are included, spring seeding is preferred. See Table 4.4, “Permanent Construction Area Planting Mixture Recommendations” for additional seed mixtures.

General Seed Mix:	**Variety**	**lbs./ acre**	**lbs/1000 sq. ft.**
Red Clover[1] OR	Acclaim, Rally, Red Head II, Renegade	8[2]	0.20
Common white clover[1]	Common	8	0.20
PLUS			
Creeping Red Fescue	Common	20	0.45
PLUS			
Smooth Bromegrass OR	Common	2	0.05
Ryegrass (perennial)	Pennfine/Linn	5	0.10

[1] add inoculant immediately prior to seeding

[2] Mix 4 lbs each of Empire and Pardee OR 4 lbs of Birdsfoot and 4 lbs white clover per acre. All seeding rates are given for Pure Live Seed (PLS)

Pure Live Seed, or (PLS) refers to the amount of live seed in a lot of bulk seed. Information on the seed bag label includes the type of seed, supplier, test date, source of seed, purity, and germination. Purity is the percentage of pure seed. Germination is the percentage of pure seed that will produce normal plants when planted under favorable conditions.

To compute Pure Live Seed multiply the "germination percent" times the "purity" and divide that by 100 to get Pure Live Seed.

$$\text{Pure Live Seed (PLS)} = \frac{\%\,\text{Germination} \times \%\,\text{Purity}}{100}$$

For example, the PLS for a lot of Kentucky Blue grass with 75% purity and 96% germination would be calculated as follows:

$$\frac{(96) \times (75)}{100} = 72\%\ \text{Pure Live Seed}$$

For 10lbs of PLS from this lot =

$$\frac{10}{0.72} = 13.9\ \text{lbs}$$

Therefore, 13.9 lbs of seed is the actual weight needed to meet 10lbs PSL from this specific seed lot.

Time of Seeding: The optimum timing for the general seed mixture is early spring. Permanent seedings may be made any time of year if properly mulched and adequate moisture is provided. Late June through early August is not a good time to seed, but may facilitate covering the land without additional disturbance if construction is completed. Portions of the seeding may fail due to drought and heat. These areas may need reseeding in late summer/fall or the following spring.

Method of seeding: Broadcasting, drilling, cultipack type seeding, or hydroseeding are acceptable methods. Proper soil to seed contact is key to successful seedings.

Mulching: Mulching is essential to obtain a uniform stand of seeded plants. Optimum benefits of mulching new seedings are obtained with the use of small grain straw applied at a rate of 2 tons per acre, and anchored with a netting or tackifier. See the Standard and Specifications for Mulching for choices and requirements.

Irrigation: Watering may be essential to establish a new seeding when a drought condition occurs shortly after a new seeding emerges. Irrigation is a specialized practice and care must be taken not to exceed the application rate for the soil or subsoil. When disconnecting irrigation pipe, be sure pipes are drained in a safe manor, not creating an erosion concern.

80% Perennial Vegetative Cover

50% Perennial Vegetative Cover

Table 4.4
Permanent Construction Area Planting Mixture Recommendations

Seed Mixture	Variety	Rate in lbs./acre (PLS)	Rate in lbs./ 1, 000 ft^2
Mix #1			
Creeping red fescue	Ensylva, Pennlawn, Boreal	10	.25
Perennial ryegrass	Pennfine, Linn	10	.25
*This mix is used extensively for shaded areas.			
Mix #2			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	20	.50
*This rate is in pure live seed, this would be an excellent choice along the upland edge of a wetland to filter runoff and provide wildlife benefits. In areas where erosion may be a problem, a companion seeding of sand lovegrass should be added to provide quick cover at a rate of 2 lbs. per acre (0.05 lbs. per 1000 sq. ft.).			
Mix #3			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	4	.10
Big bluestem	Niagara	4	.10
Little bluestem	Aldous or Camper	2	.05
Indiangrass	Rumsey	4	.10
Coastal panicgrass	Atlantic	2	.05
Sideoats grama	El Reno or Trailway	2	.05
Wildflower mix		.50	.01
*This mix has been successful on sand and gravel plantings. It is very difficult to seed without a warm season grass seeder such as a Truax seed drill. Broadcasting this seed is very difficult due to the fluffy nature of some of the seed, such as bluestems and indiangrass.			
Mix #4			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	10	.25
Coastal panicgrass	Atlantic	10	.25
*This mix is salt tolerant, a good choice along the upland edge of tidal areas and roadsides.			
Mix #5			
Saltmeadow cordgrass (Spartina patens)—This grass is used for tidal shoreline protection and tidal marsh restoration. It is planted by vegetative stem divisions. 'Cape' American beachgrass can be planted for sand dune stabilization above the saltmeadow cordgrass zone.			
Mix #6			
Creeping red fescue	Ensylva, Pennlawn, Boreal	20	.45
Chewings Fescue	Common	20	.45
Perennial ryegrass	Pennfine, Linn	5	.10
Red Clover	Common	10	.45
*General purpose erosion control mix. Not to be used for a turf planting or play grounds.			

STANDARD AND SPECIFICATIONS FOR STABILIZED CONSTRUCTION ACCESS

Definition & Scope

A stabilized pad of aggregate underlain with geotextile located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk, or parking area. The purpose of stabilized construction access is to reduce or eliminate the tracking of sediment onto public rights-of-way or streets.

Conditions Where Practice Applies

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

Design Criteria

See Figure 2.1 on page 2.31 for details.

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

Thickness: Not less than six (6) inches.

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

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

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

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

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

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

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

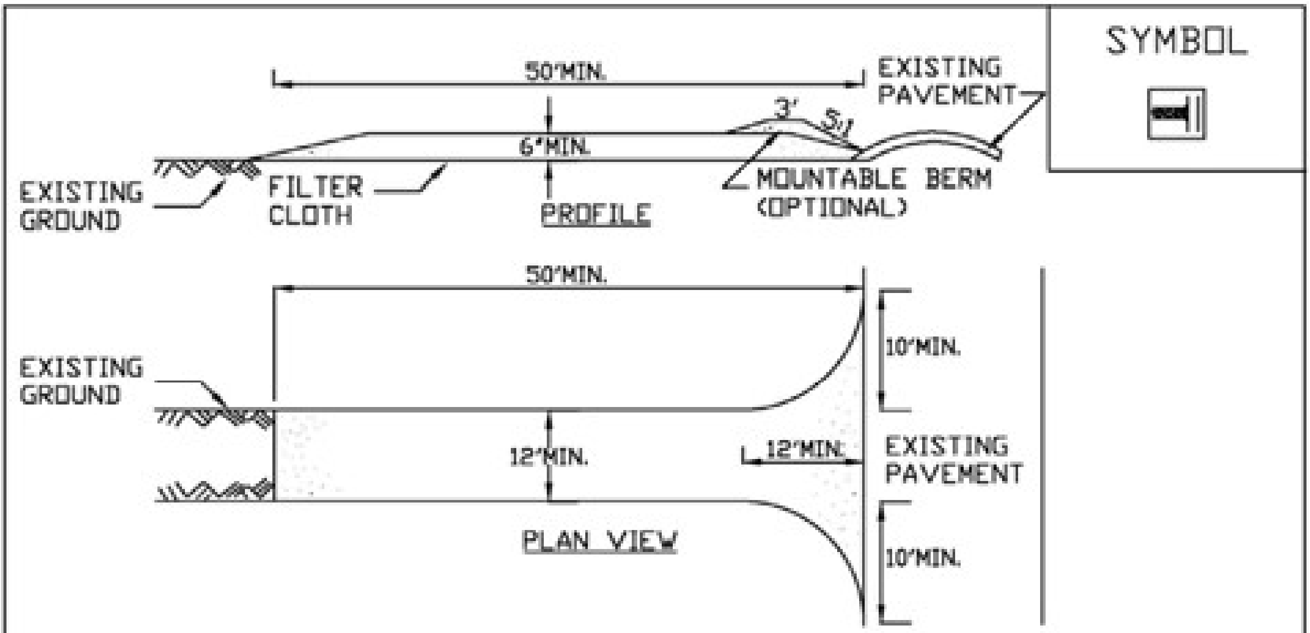
[3] Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

Maintenance

The access shall be maintained in a condition which will prevent tracking of sediment onto public rights-of-way or streets. This may require periodic top dressing with additional aggregate. All sediment spilled, dropped, or washed onto public rights-of-way must be removed immediately.

When necessary, wheels must be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with aggregate, which drains into an approved sediment-trapping device. All sediment shall be prevented from entering storm drains, ditches, or watercourses.

Figure 2.1
Stabilized Construction Access



CONSTRUCTION SPECIFICATIONS

1. STONE SIZE - USE 1-4 INCH STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. GEOTEXTILE - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ACCESS SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

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

STABILIZED
CONSTRUCTION
ACCESS

STANDARD AND SPECIFICATIONS FOR SILT FENCE

Definition & Scope

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

Conditions Where Practice Applies

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

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

Design Criteria

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

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

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

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

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

Criteria for Silt Fence Materials

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

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

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

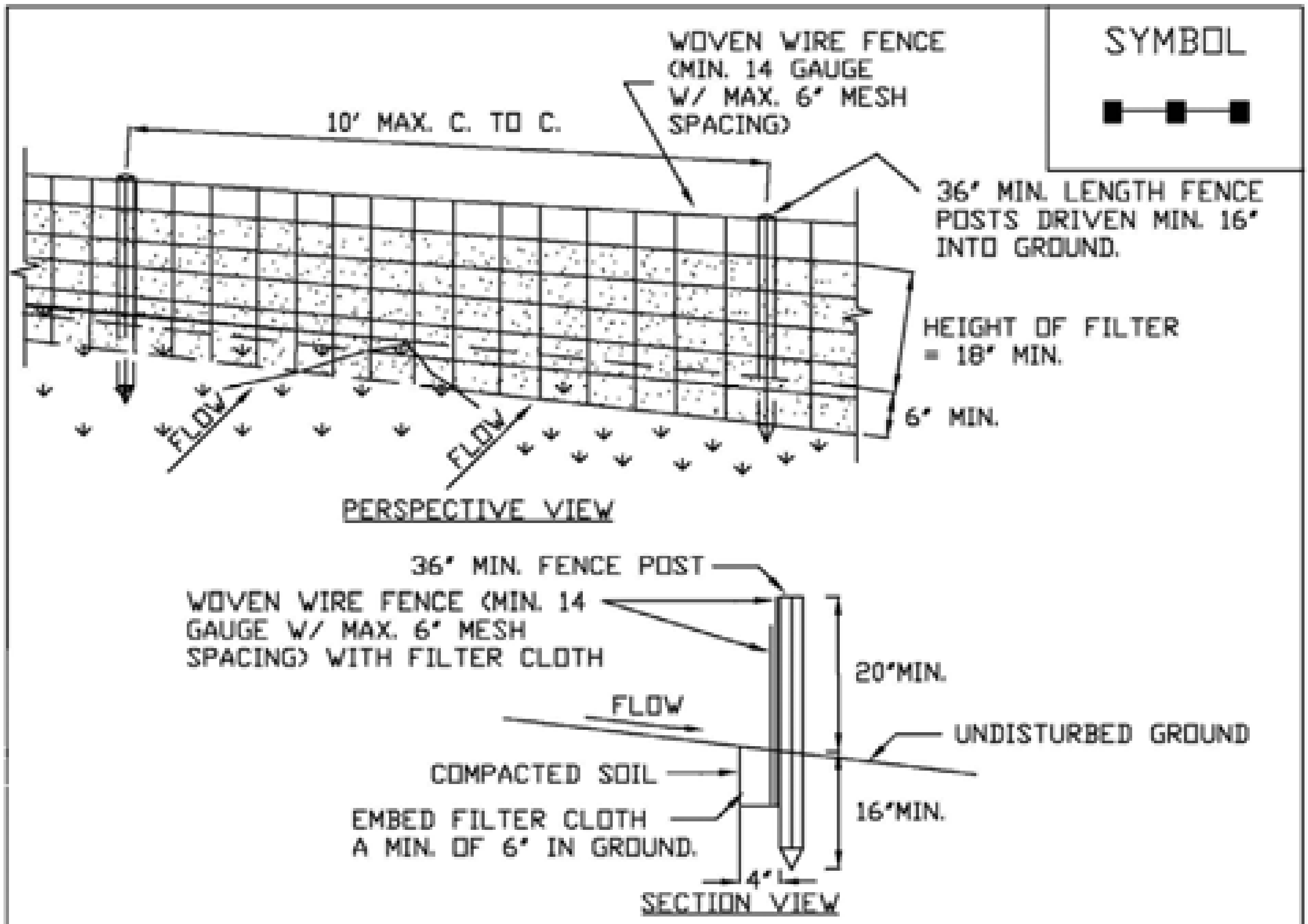
3. Wire Fence for reinforced silt fence: Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.

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

Reinforced Silt Fence

Super Silt Fence

Figure 5.30
Reinforced Silt Fence



CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL MEET THE MINIMUM REQUIREMENTS SHOWN.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

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

REINFORCED
SILT FENCE

STANDARD AND SPECIFICATIONS FOR COMPOST FILTER SOCK

Definition & Scope

A **temporary** sediment control practice composed of a degradable geotextile mesh tube filled with compost filter media to filter sediment and other pollutants associated with construction activity to prevent their migration offsite.

Condition Where Practice Applies

Compost filter socks can be used in many construction site applications where erosion will occur in the form of sheet erosion and there is no concentration of water flowing to the sock. In areas with steep slopes and/or rocky terrain, soil conditions must be such that good continuous contact between the sock and the soil is maintained throughout its length. For use on impervious surfaces such as road pavement or parking areas, proper anchorage must be provided to prevent shifting of the sock or separation of the contact between the sock and the pavement. Compost filter socks are utilized both at the site perimeter as well as within the construction areas. These socks may be filled after placement by blowing compost into the tube pneumatically, or filled at a staging location and moved into its designed location.

Design Criteria

1. Compost filter socks will be placed on the contour with both terminal ends of the sock extended 8 feet upslope at a 45 degree angle to prevent bypass flow.
2. Diameters designed for use shall be 12" – 32" except that 8" diameter socks may be used for residential lots to control areas less than 0.25 acres.
3. The flat dimension of the sock shall be at least 1.5 times the nominal diameter.
4. The **Maximum Slope Length** (in feet) above a compost filter sock shall not exceed the following limits:

Dia. (in.)	Slope %						
	2	5	10	20	25	33	50
8	225*	200	100	50	20	—	—
12	250	225	125	65	50	40	25
18	275	250	150	70	55	45	30
24	350	275	200	130	100	60	35
32	450	325	275	150	120	75	50

* Length in feet

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

7. Compost filter socks shall be anchored in earth with 2” x 2” wooden stakes driven 12” into the soil on 10 foot centers on the centerline of the sock. On uneven terrain, effective ground contact can be enhanced by the placement of a fillet of filter media on the disturbed area side of the compost sock.
8. All specific construction details and material specifications shall appear on the erosion and sediment control constructions drawings when compost filter socks are included in the plan.

Maintenance

1. Traffic shall not be permitted to cross filter socks.
2. Accumulated sediment shall be removed when it reaches half the above ground height of the sock and disposed of in accordance with the plan.
3. Socks shall be inspected weekly and after each runoff event. Damaged socks shall be repaired in the manner required by the manufacturer or replaced within 24 hours of inspection notification.
4. Biodegradable filter socks shall be replaced after 6 months; photodegradable filter socks after 1 year. Polypropylene socks shall be replaced according to the manufacturer’s recommendations.
5. Upon stabilization of the area contributory to the sock, stakes shall be removed. The sock may be left in place and vegetated or removed in accordance with the stabilization plan. For removal the mesh can be cut and the compost spread as an additional mulch to act as a soil supplement.

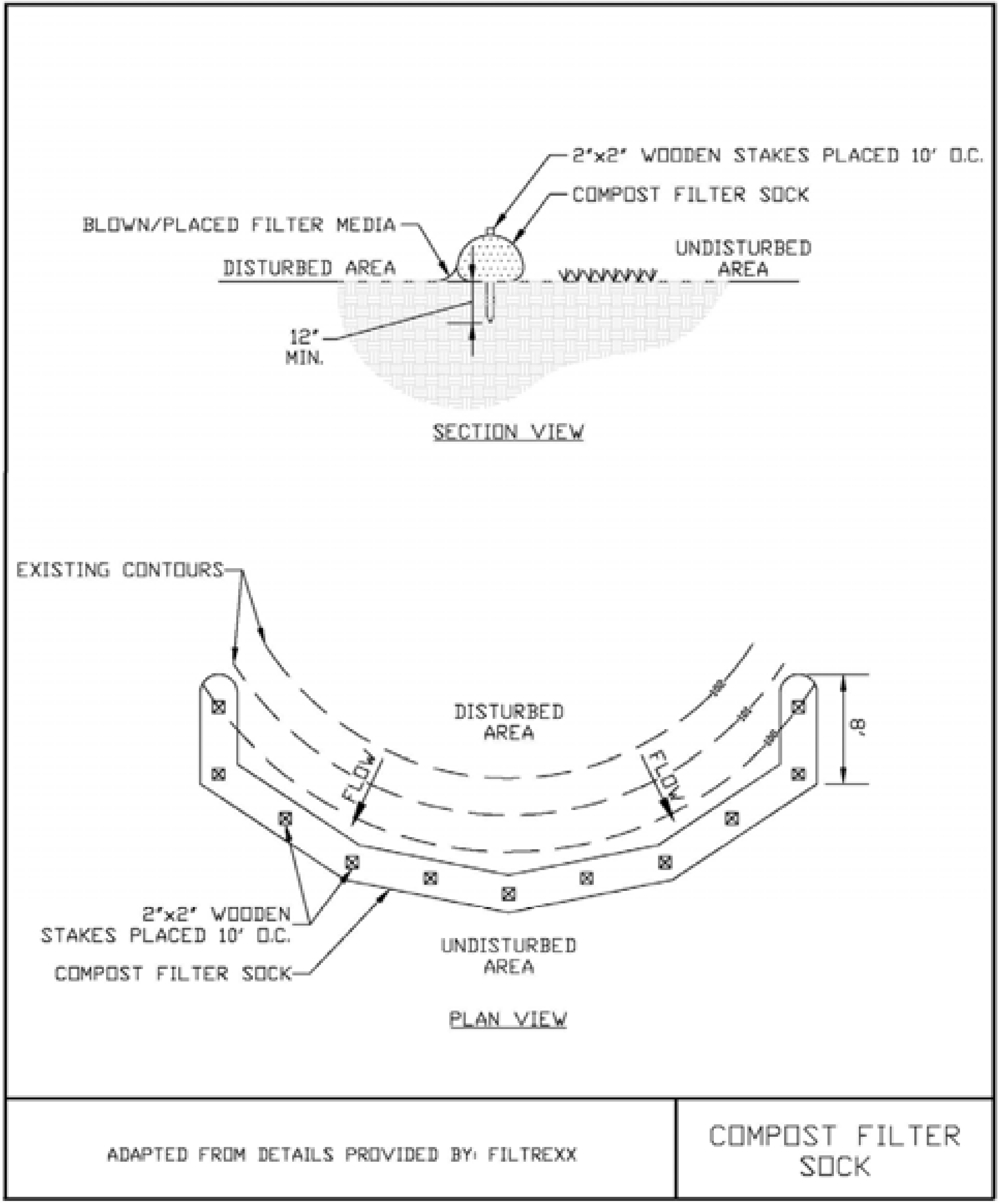
Table 5.1 - Compost Sock Fabric Minimum Specifications Table

Material Type	**3 mil HDPE**	**5 mil HDPE**	**5 mil HDPE**	**Multi-Filament Polypropylene (MFPP)**	**Heavy Duty Multi-Filament Polypropylene (HDMFPP)**
Material Characteristics	Photodegradable	Photodegradable	Biodegradable	Photodegradable	Photodegradable
Sock Diameters	12” 18”	12” 18” 24” 32”	12” 18” 24” 32”	12” 18” 24” 32”	12” 18” 24” 32”
Mesh Opening	3/8”	3/8”	3/8”	3/8”	1/8”
Tensile Strength		26 psi	26 psi	44 psi	202 psi
Ultraviolet Stability % Original Strength (ASTM G-155)	23% at 1000 hr.	23% at 1000 hr.		100% at 1000 hr.	100% at 1000 hr.
Minimum Functional Longevity	6 months	9 months	6 months	1 year	2 years

Table 5.2 - Compost Standards Table

Organic matter content	25% - 100% (dry weight)
Organic portion	Fibrous and elongated
pH	6.0 – 8.0
Moisture content	30% - 60%
Particle size	100% passing a 1” screen and 10 - 50% passing a 3/8” screen
Soluble salt concentration	5.0 dS/m (mmhos/cm) maximum

Figure 5.2
Compost Filter Sock



STANDARD AND SPECIFICATIONS FOR FIBER ROLL

Definition & Scope

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

Conditions Where Practice Applies

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

Design Criteria

1. The roll is placed in a shallow trench dug below baseflow or in a 4 inch trench on the slope contour and anchored by 2” x 2”, 3-foot long posts driven on each side of the roll (see Figure 4.8).
2. The roll is contained by a 9-gauge non-galvanized wire placed over the roll from post to post. Braided nylon rope (1/8" thick) may be used.
3. The anchor posts shall be spaced laterally 4 feet on center on both sides of the roll and driven down to the top of the roll.
4. Soil is placed behind the roll and planted with suitable herbaceous or woody vegetation. If the roll will be continuously saturated, wetland plants may be planted into voids created in the upper surface of the roll.
5. Where water levels may fall below the bottom edge of the roll, a brush layer of willow should be installed so as to lay across the top edge of the roll.
6. Where fiber rolls are used to reduce sheet flow on slopes they should be at least 12” in diameter and spaced according to the straw bale dike standard for sediment control.

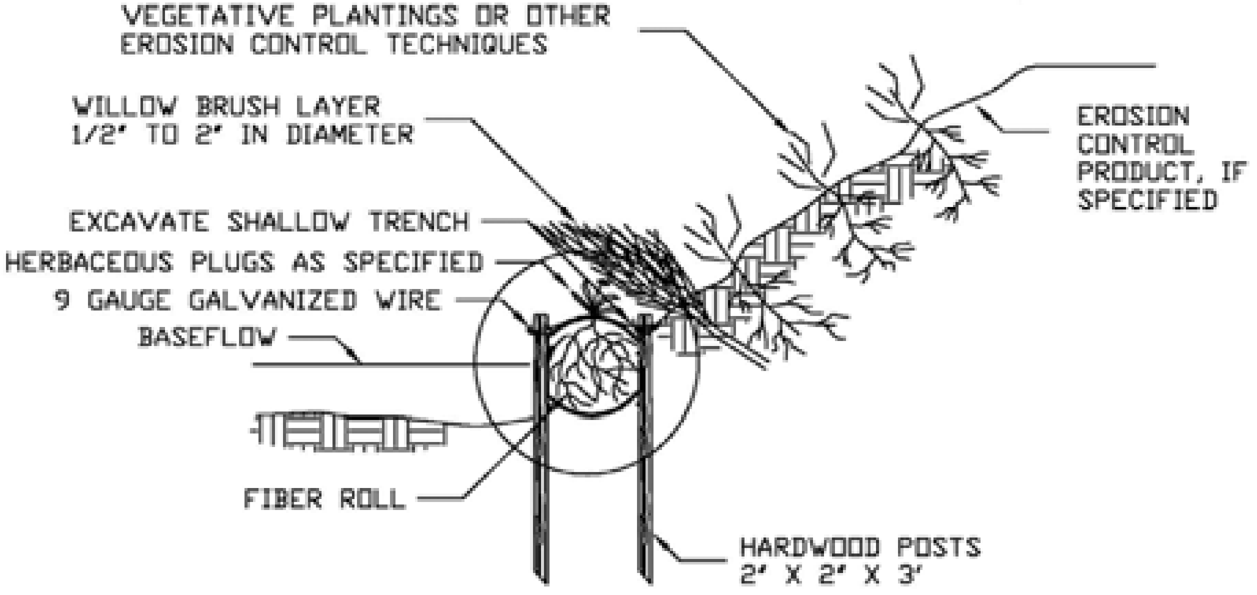
Maintenance

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

Figure 4.8
Fiber Roll

SYMBOL

FR



CROSS SECTION
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

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

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FIBER ROLL

STANDARD AND SPECIFICATIONS FOR CONCRETE TRUCK WASHOUT

Definition & Scope

A temporary excavated or above ground lined constructed pit where concrete truck mixers and equipment can be washed after their loads have been discharged, to prevent highly alkaline runoff from entering storm drainage systems or leaching into soil.

Conditions Where Practice Applies

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

Design Criteria

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

Location: Locate the facility a minimum of 100 feet from drainage swales, storm drain inlets, wetlands, streams and other surface waters. Prevent surface water from entering the structure except for the access road. Provide appropriate access with a gravel access road sloped down to the structure. Signs shall be placed to direct drivers to the facility after their load is discharged.

Liner: All washout facilities will be lined to prevent leaching of liquids into the ground. The liner shall be plastic sheeting with a minimum thickness of 10 mils with no holes or tears, and anchored beyond the top of the pit with an earthen berm, sand bags, stone, or other structural appurtenance except at the access point.

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

Maintenance

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

STANDARD AND SPECIFICATIONS FOR CHECK DAM

Definition & Scope

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

Conditions Where Practice Applies

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

Design Criteria

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

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

Side Slopes: Shall be 2:1 or flatter.

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

Therefore:

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

Where:

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

Example:

For a channel with a 4% slope and 2 ft. high stone check dams, they are spaced as follows:

$$S = \frac{2\ \text{ft}}{0.04\ \frac{\text{ft}}{\text{ft}}} = 50\ \text{ft}$$

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

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

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

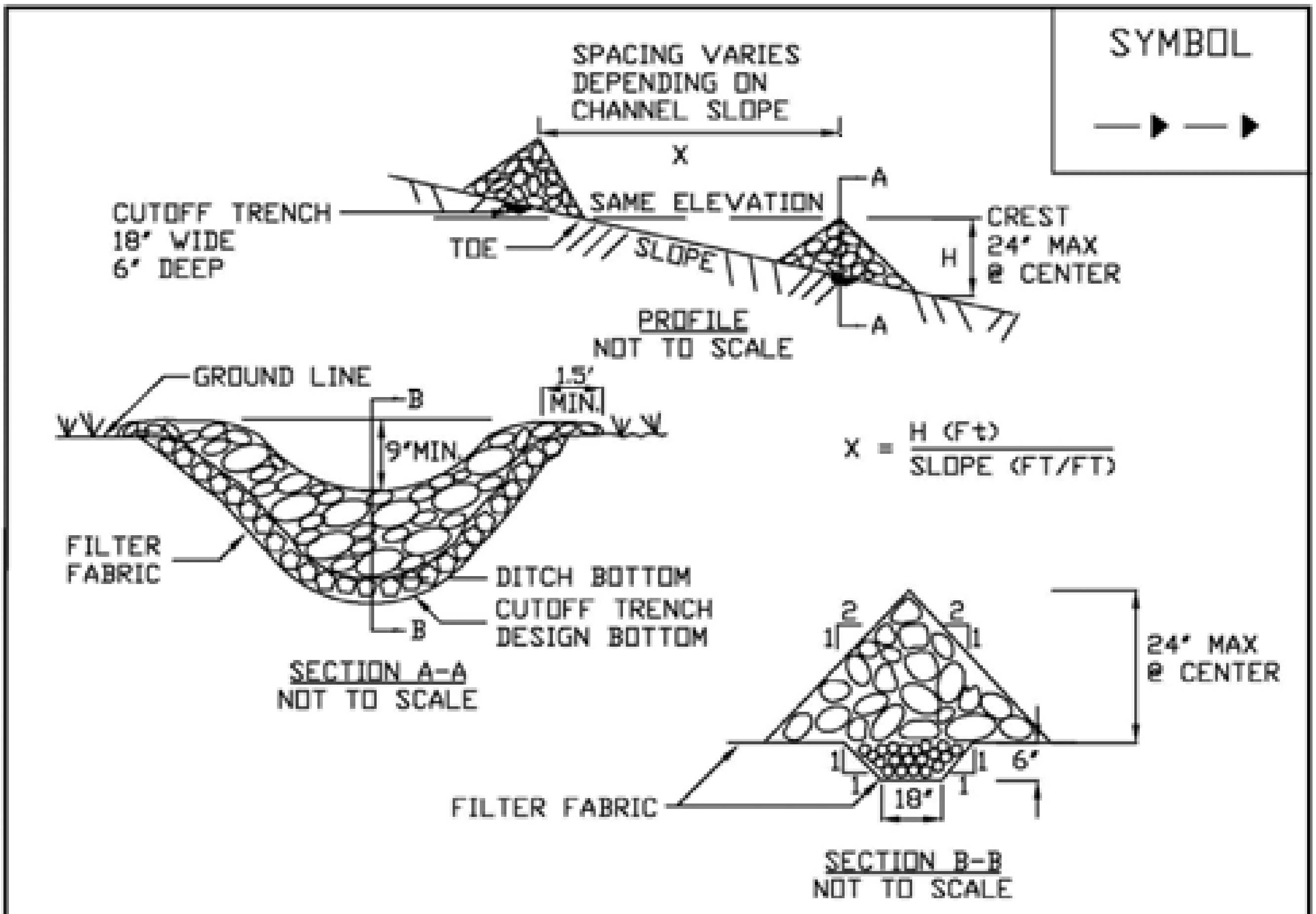
For filter sock or fiber roll check dams: The check dams will be anchored by staking the dam to the earth contact surface. The dam will extend to the top of the bank. The check dam will have a splash apron of NYS DOT #2 crushed stone extending a minimum 3 feet downstream from the dam and 1 foot up the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

Maintenance

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

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

Figure 3.1
Stone Check Dam Detail



CONSTRUCTION SPECIFICATIONS

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

MAXIMUM DRAINAGE AREA 2 ACRES.

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STONE CHECK DAM

STANDARD AND SPECIFICATIONS FOR DEWATERING SUMP PIT

Definition & Scope

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

Conditions Where Practice Applies

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

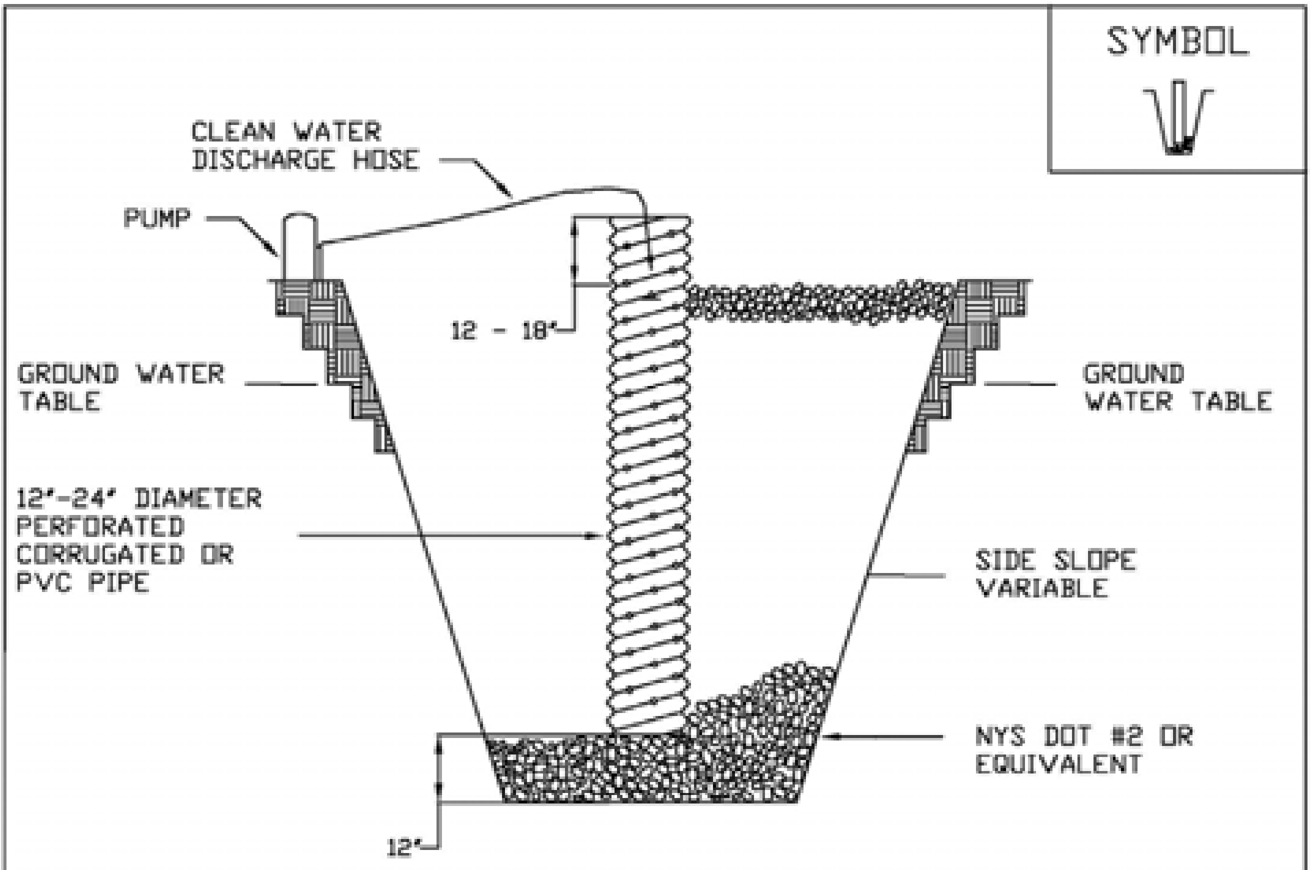
Design Criteria

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

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

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

Figure 3.3
Dewatering Sump Pit Detail



CONSTRUCTION SPECIFICATIONS

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

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DEWATERING
SUMP PIT

STANDARD AND SPECIFICATIONS FOR DUST CONTROL

Definition & Scope

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

Conditions Where Practice Applies

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

Design Criteria

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

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

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

Construction Specifications

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

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

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

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

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

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

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

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

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

Maintenance

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

STANDARD AND SPECIFICATIONS FOR GRASSED WATERWAY

Definition & Scope

A natural or **permanent** man-made channel of parabolic or trapezoidal cross-section that is below adjacent ground level and is stabilized by suitable vegetation. The flow channel is normally wide and shallow and conveys the runoff down the slope without causing damage by erosion.

Conditions Where Practice Applies

Grass waterways are used where added vegetative protection is needed to control erosion resulting from concentrated runoff.

Design Criteria

Capacity

The minimum capacity shall be that required to confine the peak rate of runoff expected from a 10-year 24 hour frequency rainfall event or a higher frequency corresponding to the hazard involved. This requirement for confinement may be waived on slopes of less than one (1) percent where out-of-bank flow will not cause erosion or property damage.

Peak rates of runoff values used in determining the capacity requirements shall be computed by appropriate methods. Where there is base flow, it shall be handled by a stone center, subsurface drain, or other suitable means since sustained wetness usually prevents adequate vegetative cover. The cross-sectional area of the stone center or subsurface drain size to be provided shall be determined by using a flow rate of 0.1 cfs/acre or by actual measurement of the maximum base flow.

Velocity

Please see Table 3.1, Diversion Maximum Permissible Design Velocities on page 3.10, for seed, soil, and velocity variables.

Cross Section

The design water surface elevation of a grassed waterway receiving water from diversions or other tributary channels shall be equal to or less than the design water surface elevation in the diversion or other tributary channels.

The top width of parabolic waterways shall not exceed 30 feet and the bottom width of trapezoidal waterways shall not exceed 15 feet unless multiple or divided waterways, stone center, or other means are provided to control meandering of low flows.

Structural Measures

In cases where grade or erosion problems exist, special control measures may be needed such as lined waterways (see page 3.27), or grade stabilization measures (see page 3.21). Where needed, these measures will be supported by adequate design computations. For typical cross sections of waterways with riprap sections or stone centers, refer to Figure 3.8 on page 3.24.

The design procedures for parabolic and trapezoidal channels are available in the NRCS Engineering Field Handbook. Figure 3.9 on page 3.25 also provides a design chart for parabolic waterway.

Outlets

Each waterway shall have a stable outlet. The outlet may be another waterway, a stabilized open channel, grade stabilization structure, etc. In all cases, the outlet must discharge in such a manner as not to cause erosion. Outlets shall be constructed and stabilized prior to the operation of the waterway.

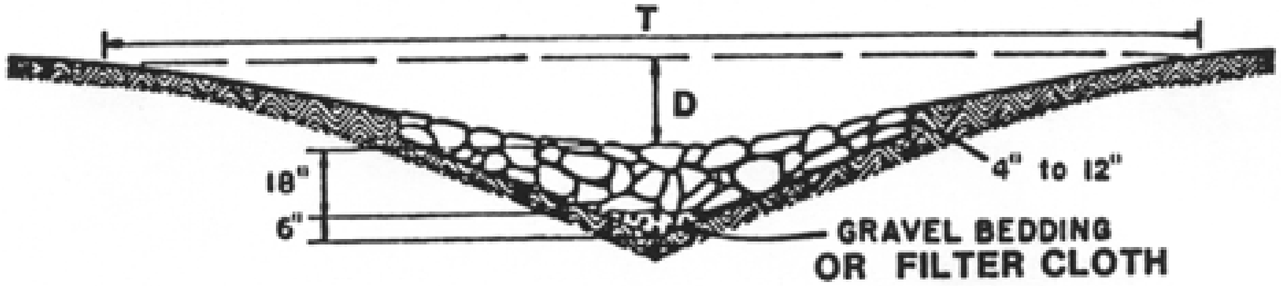
Stabilization

Waterways shall be stabilized in accordance with the appropriate vegetative stabilization standard and specifications, and will be dependent on such factors as slope, soil class, etc. See standard for Vegetating Waterways on Page 4.78.

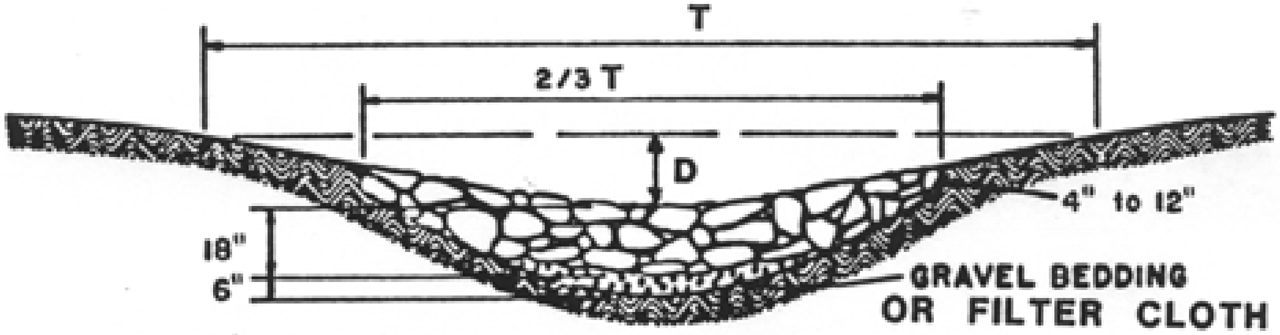
Construction Specifications

See Figure 3.10 on page 3.26 for details.

Figure 3.8
Typical Waterway Cross Sections Details



Waterway with stone center drain. "V" section shaped by motor grader.



Waterway with stone center drain. Rounded section shaped by bulldozer.

Figure 3.9
Parabolic Waterway Design Chart (USDA - NRCS)

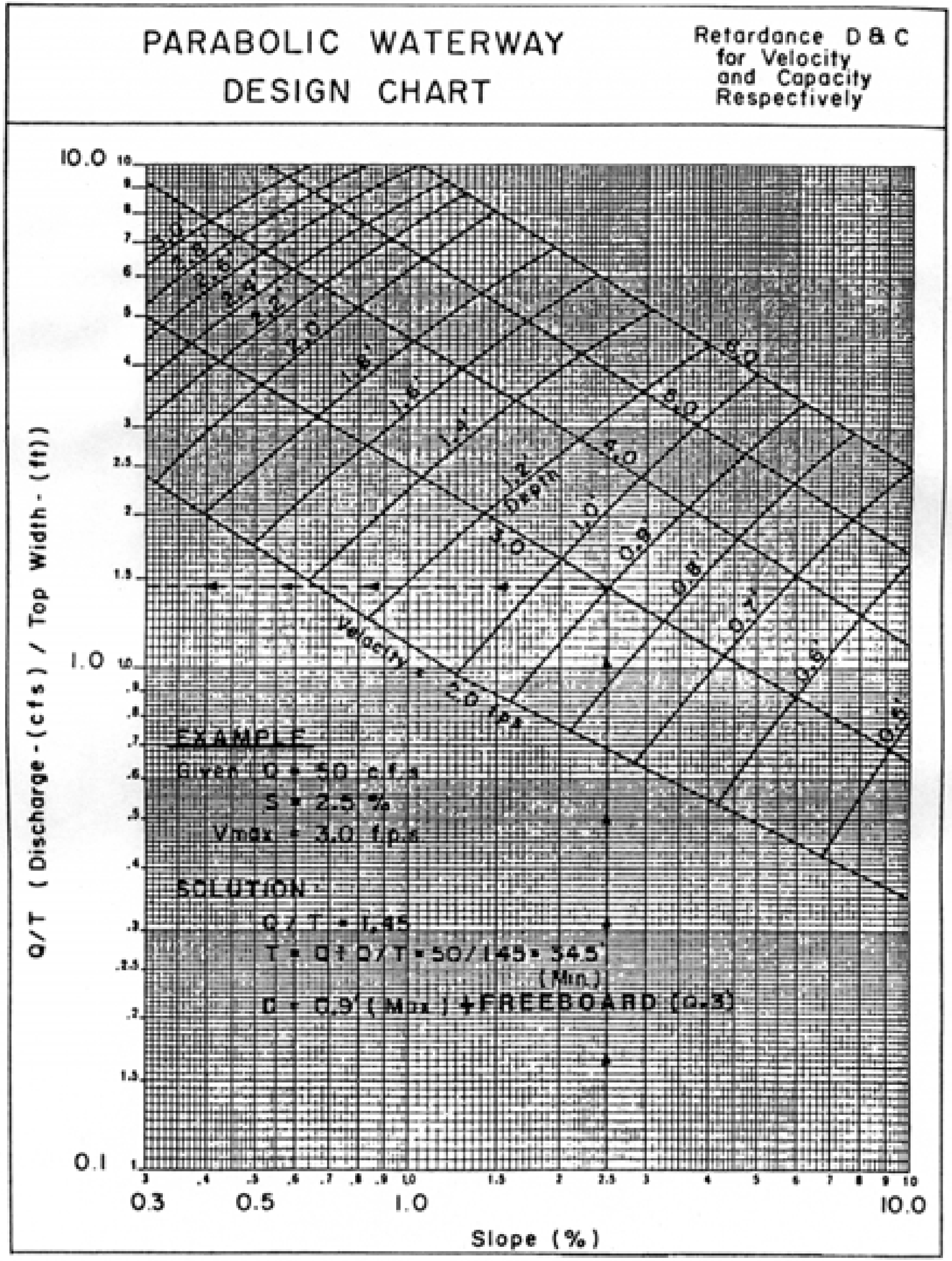
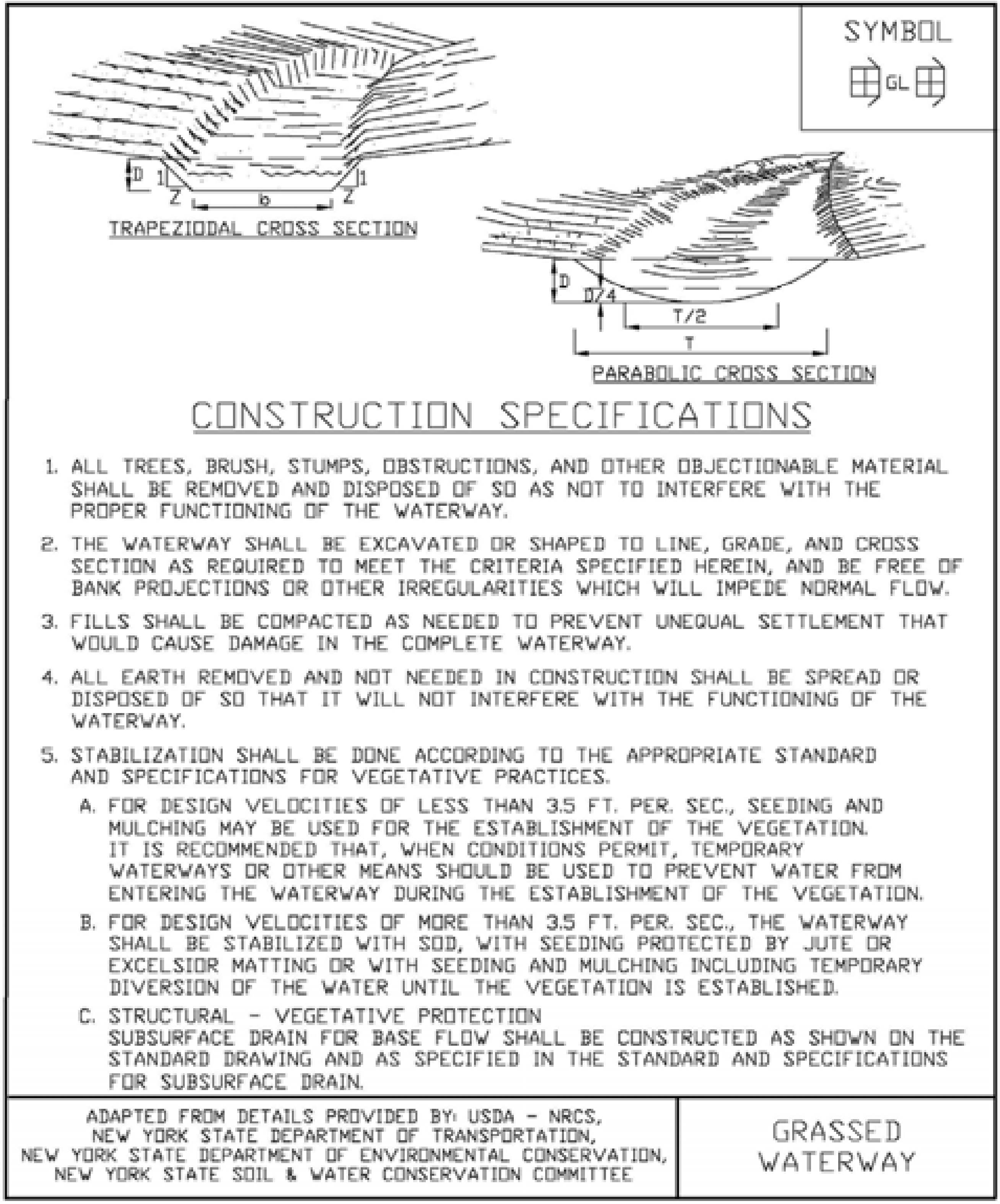


Figure 3.10
Grassed Waterway Detail



CONSTRUCTION SPECIFICATIONS

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

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GRASSED
WATERWAY

STANDARD AND SPECIFICATIONS FOR STORM DRAIN INLET PROTECTION

Definition & Scope

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

Conditions Where Practice Applies

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

Types of Storm Drain Inlet Practices

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

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

Design Criteria

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

Type I – Excavated Drop Inlet Protection

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

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

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

Type II – Fabric Drop Inlet Protection

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

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

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

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

Type III – Stone and Block Drop Inlet Protection

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

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

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

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

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

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

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

Type IV – Paved Surface Inlet Protection

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

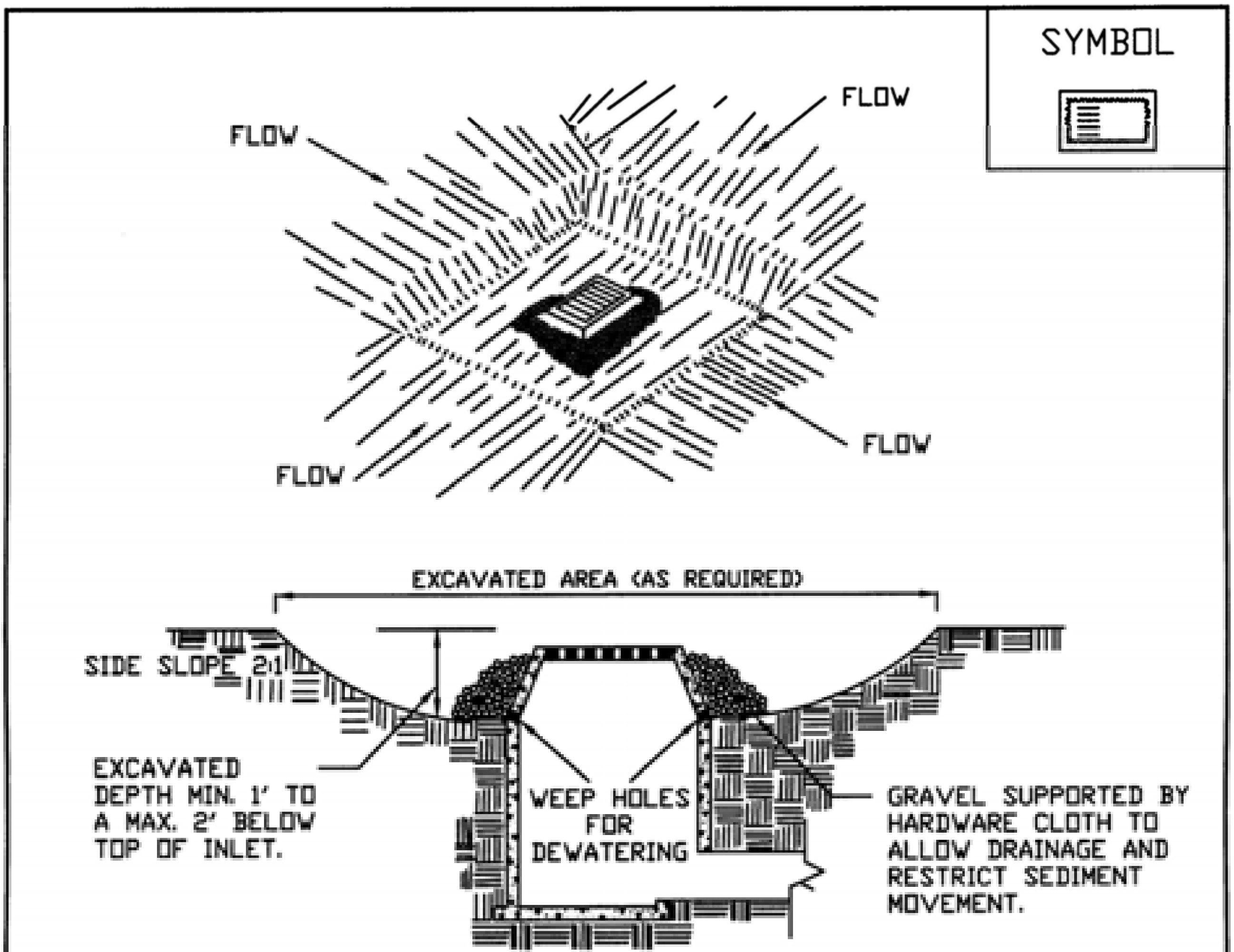
The drainage area should be limited to 1 acre at the drain inlet. All practices will be placed at the inlet perimeter or beyond to maximize the flow capacity of the inlet. Practices shall be weighted, braced, tied, or otherwise anchored to prevent movement or shifting of location on paved surfaces. Traffic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

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

Type V - Manufactured Insert Inlet Protection

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

Figure 5.31
Excavated Drop Inlet Protection



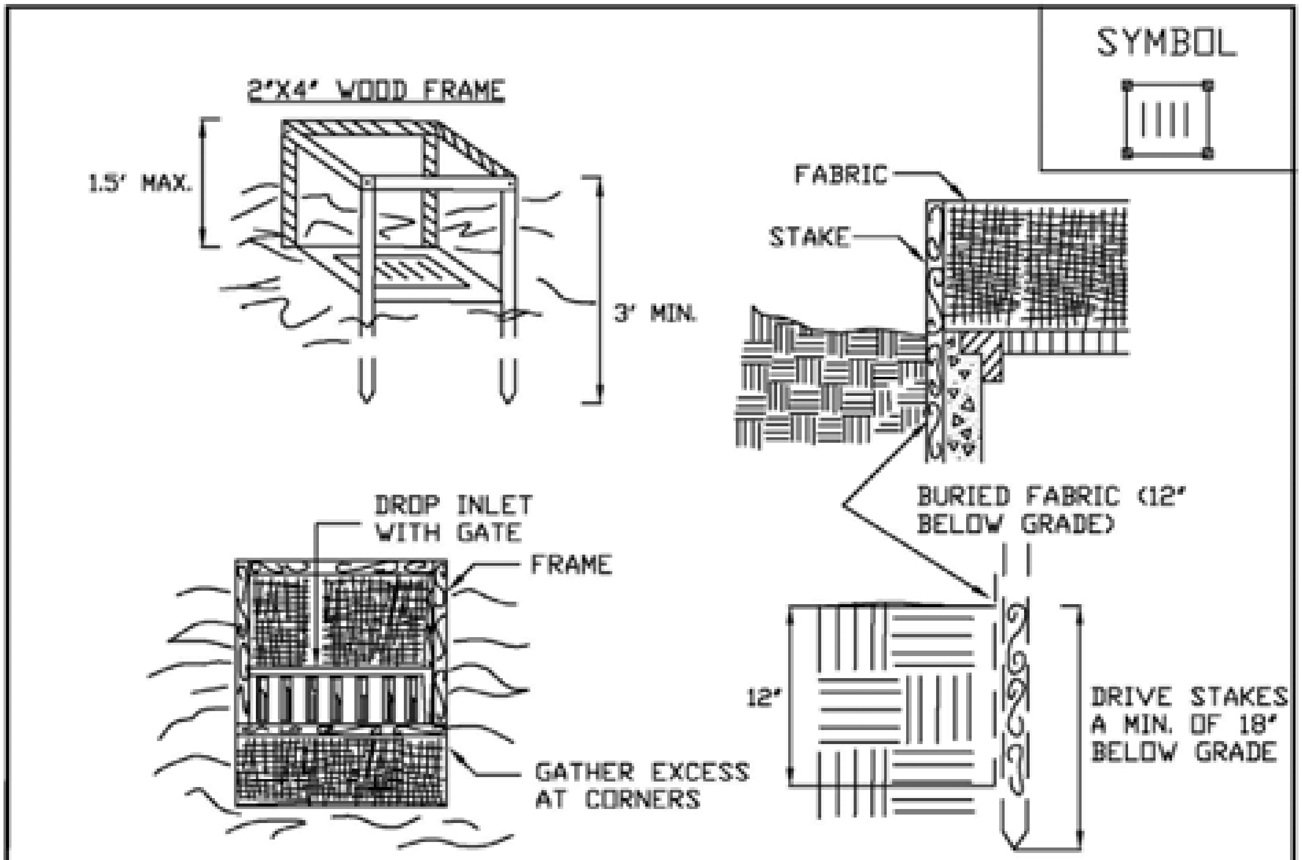
CONSTRUCTION SPECIFICATIONS

1. CLEAR THE AREA OF ALL DEBRIS THAT WILL HINDER EXCAVATION.
2. GRADE APPROACH TO THE INLET UNIFORMLY AROUND THE BASIN.
3. WEEP HOLES SHALL BE PROTECTED BY GRAVEL.
4. UPON STABILIZATION OF CONTRIBUTING DRAINAGE AREA, SEAL WEEP HOLES, FILL EXCAVATION WITH STABLE SOIL TO FINAL GRADE, COMPACT IT PROPERLY AND STABILIZE WITH PERMANENT SEEDING.

MAXIMUM DRAINAGE AREA 1 ACRE

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

Figure 5.32
Fabric Drop Inlet Protection



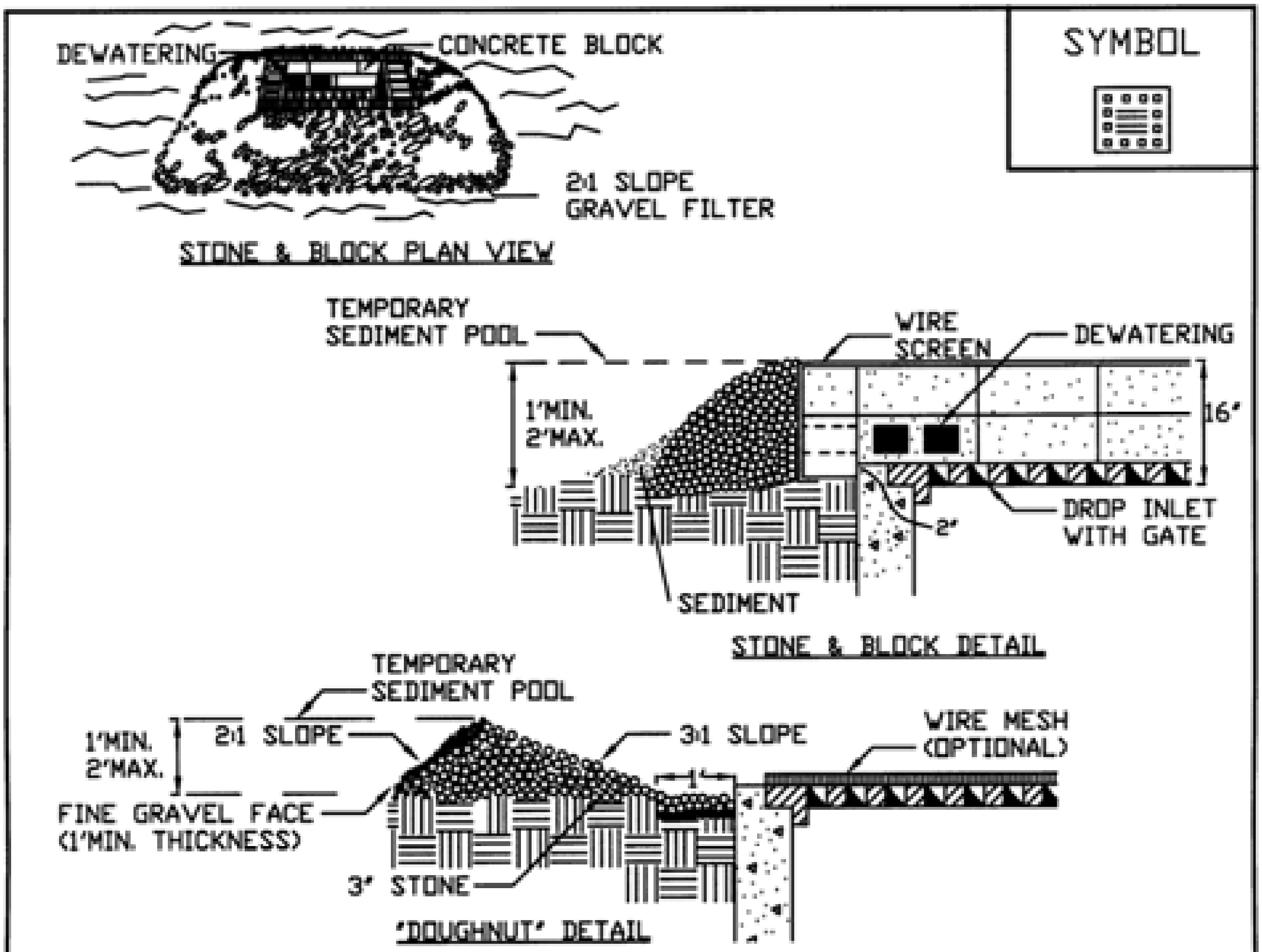
CONSTRUCTION SPECIFICATIONS

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

MAXIMUM DRAINAGE AREA 1 ACRE

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

Figure 5.33
Stone & Block Drop Inlet Protection



CONSTRUCTION SPECIFICATIONS

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

MAXIMUM DRAINAGE AREA 1 ACRE

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STONE & BLOCK
DROP INLET
PROTECTION

STANDARD AND SPECIFICATIONS FOR LANDGRADING

Definition & Scope

Permanent reshaping of the existing land surface by grading in accordance with an engineering topographic plan and specification to provide for erosion control and vegetative establishment on disturbed, reshaped areas.

Design Criteria

The grading plan should be based upon the incorporation of building designs and street layouts that fit and utilize existing topography and desirable natural surrounding to avoid extreme grade modifications. Information submitted must provide sufficient topographic surveys and soil investigations to determine limitations that must be imposed on the grading operation related to slope stability, effect on adjacent properties and drainage patterns, measures for drainage and water removal, and vegetative treatment, etc.

Many municipalities and counties have regulations and design procedures already established for land grading and cut and fill slopes. Where these requirements exist, they shall be followed.

The plan must show existing and proposed contours of the area(s) to be graded. The plan shall also include practices for erosion control, slope stabilization, safe disposal of runoff water and drainage, such as waterways, lined ditches, reverse slope benches (include grade and cross section), grade stabilization structures, retaining walls, and surface and subsurface drains. The plan shall also include phasing of these practices. The following shall be incorporated into the plan:

1. Provisions shall be made to safely convey surface runoff to storm drains, protected outlets, or to stable water courses to ensure that surface runoff will not damage slopes or other graded areas; see standards and specifications for Grassed Waterway, Diversion, or Grade Stabilization Structure.

2. Cut and fill slopes that are to be stabilized with grasses shall not be steeper than 2:1. When slopes exceed 2:1, special design and stabilization consideration are required and shall be adequately shown on the plans. (Note: Where the slope is to be mowed, the slope should be no steeper than 3:1, although 4:1 is preferred because of safety factors related to mowing steep slopes.)

3. Reverse slope benches or diversion shall be provided whenever the vertical interval (height) of any 2:1 slope exceeds 20 feet; for 3:1 slope it shall be increased to 30 feet and for 4:1 to 40 feet. Benches shall be located to divide the slope face as equally as possible and shall convey the water to a stable outlet. Soils, seeps, rock outcrops, etc., shall also be taken into consideration when designing benches.

   A. Benches shall be a minimum of six feet wide to provide for ease of maintenance.

   B. Benches shall be designed with a reverse slope of 6:1 or flatter to the toe of the upper slope and with a minimum of one foot in depth. Bench gradient to the outlet shall be between 2 percent and 3 percent, unless accompanied by appropriate design and computations.

   C. The flow length within a bench shall not exceed 800 feet unless accompanied by appropriate design and computations; see Standard and Specifications for Diversion on page 3.9

4. Surface water shall be diverted from the face of all cut and/or fill slopes by the use of diversions, ditches and swales or conveyed downslope by the use of a designed structure, except where:

   A. The face of the slope is or shall be stabilized and the face of all graded slopes shall be protected from surface runoff until they are stabilized.

   B. The face of the slope shall not be subject to any concentrated flows of surface water such as from natural drainage ways, graded ditches, downspouts, etc.

   C. The face of the slope will be protected by anchored stabilization matting, sod, gravel, riprap, or other stabilization method.

5. Cut slopes occurring in ripable rock shall be serrated as shown in Figure 4.9 on page 4.26. The serrations shall be made with conventional equipment as the excavation is made. Each step or serration shall be constructed on the contour and will have steps cut at nominal two-foot intervals with nominal three-foot horizontal shelves. These steps will vary depending on the slope ratio or the cut slope. The nominal slope line is 1 ½: 1. These steps will weather and act to hold moisture, lime, fertilizer, and seed thus producing a much quicker and longer-lived vegetative cover and better slope stabilization. Overland flow shall be diverted from the top of all serrated cut slopes and carried to a suitable outlet.

6. Subsurface drainage shall be provided where necessary to intercept seepage that would otherwise adversely affect slope stability or create excessively wet site conditions.

7. Slopes shall not be created so close to property lines as to endanger adjoining properties without adequately protecting such properties against sedimentation, erosion, slippage, settlement, subsidence, or other related damages.

8. Fill material shall be free of brush, rubbish, rocks, logs, stumps, building debris, and other objectionable material. It should be free of stones over two (2) inches in diameter where compacted by hand or mechanical tampers or over eight (8) inches in diameter where compacted by rollers or other equipment. Frozen material shall not be placed in the fill nor shall the fill material be placed on a frozen foundation.

9. Stockpiles, borrow areas, and spoil shall be shown on the plans and shall be subject to the provisions of this Standard and Specifications.

10. All disturbed areas shall be stabilized structurally or vegetatively in compliance with the Permanent Construction Area Planting Standard on page 4.42.

Construction Specifications

See Figures 4.9 and 4.10 for details.

1. All graded or disturbed areas, including slopes, shall be protected during clearing and construction in accordance with the erosion and sediment control plan until they are adequately stabilized.

2. All erosion and sediment control practices and measures shall be constructed, applied and maintained in accordance with the erosion and sediment control plan and these standards.

3. Topsoil required for the establishment of vegetation shall be stockpiled in amount necessary to complete finished grading of all exposed areas.

4. Areas to be filled shall be cleared, grubbed, and stripped of topsoil to remove trees, vegetation, roots, or other objectionable material.

5. Areas that are to be topsoiled shall be scarified to a minimum depth of four inches prior to placement of topsoil.

6. All fills shall be compacted as required to reduce erosion, slippage, settlement, subsidence, or other related problems. Fill intended to support buildings, structures, and conduits, etc., shall be compacted in accordance with local requirements or codes.

7. All fill shall be placed and compacted in layers not to exceed 9 inches in thickness.

8. Except for approved landfills or nonstructural fills, fill material shall be free of frozen particles, brush, roots, sod, or other foreign objectionable materials that would interfere with, or prevent, construction of satisfactory fills.

9. Frozen material or soft, mucky or highly compressible materials shall not be incorporated into fill slopes or structural fills.

10. Fill shall not be placed on saturated or frozen surfaces.

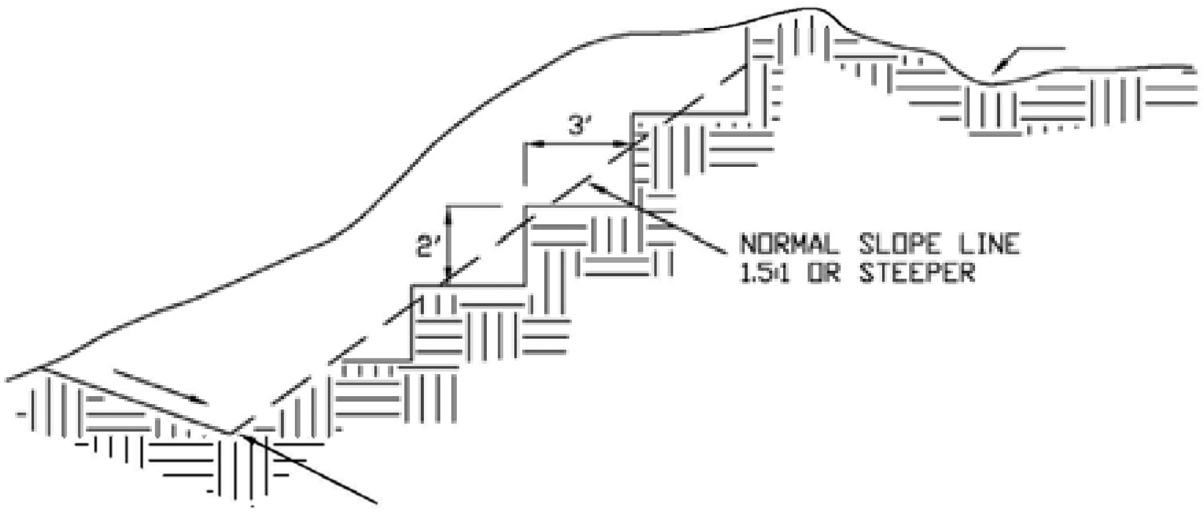
11. All benches shall be kept free of sediment during all phases of development.

12. Seeps or springs encountered during construction shall be handled in accordance with the Standard and Specification for Subsurface Drain on page 3.48 or other approved methods.

13. All graded areas shall be permanently stabilized immediately following finished grading.

14. Stockpiles, borrow areas, and spoil areas shall be shown on the plans and shall be subject to the provisions of this Standard and Specifications.

Figure 4.9
Typical Section of Serrated Cut Slope



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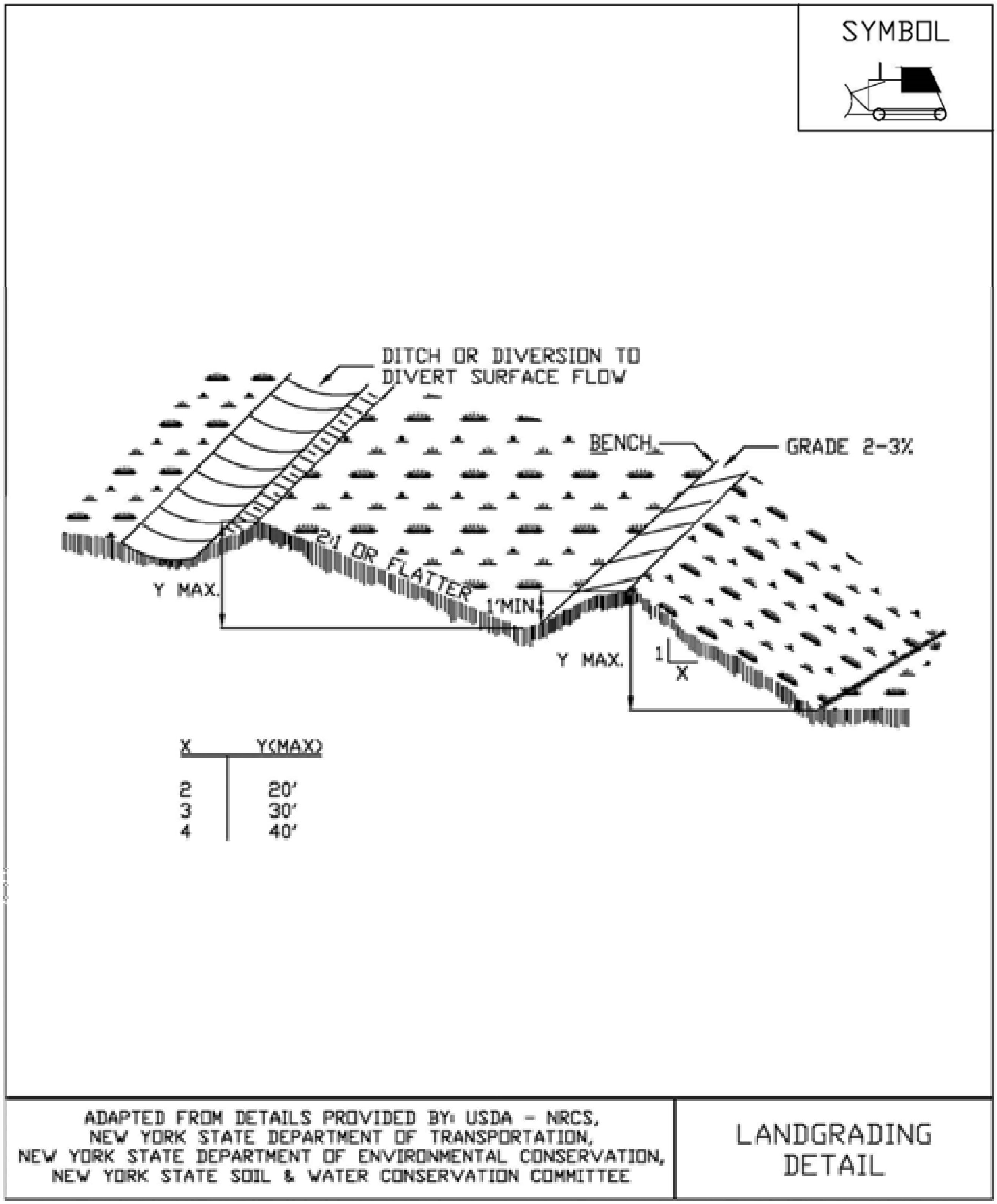
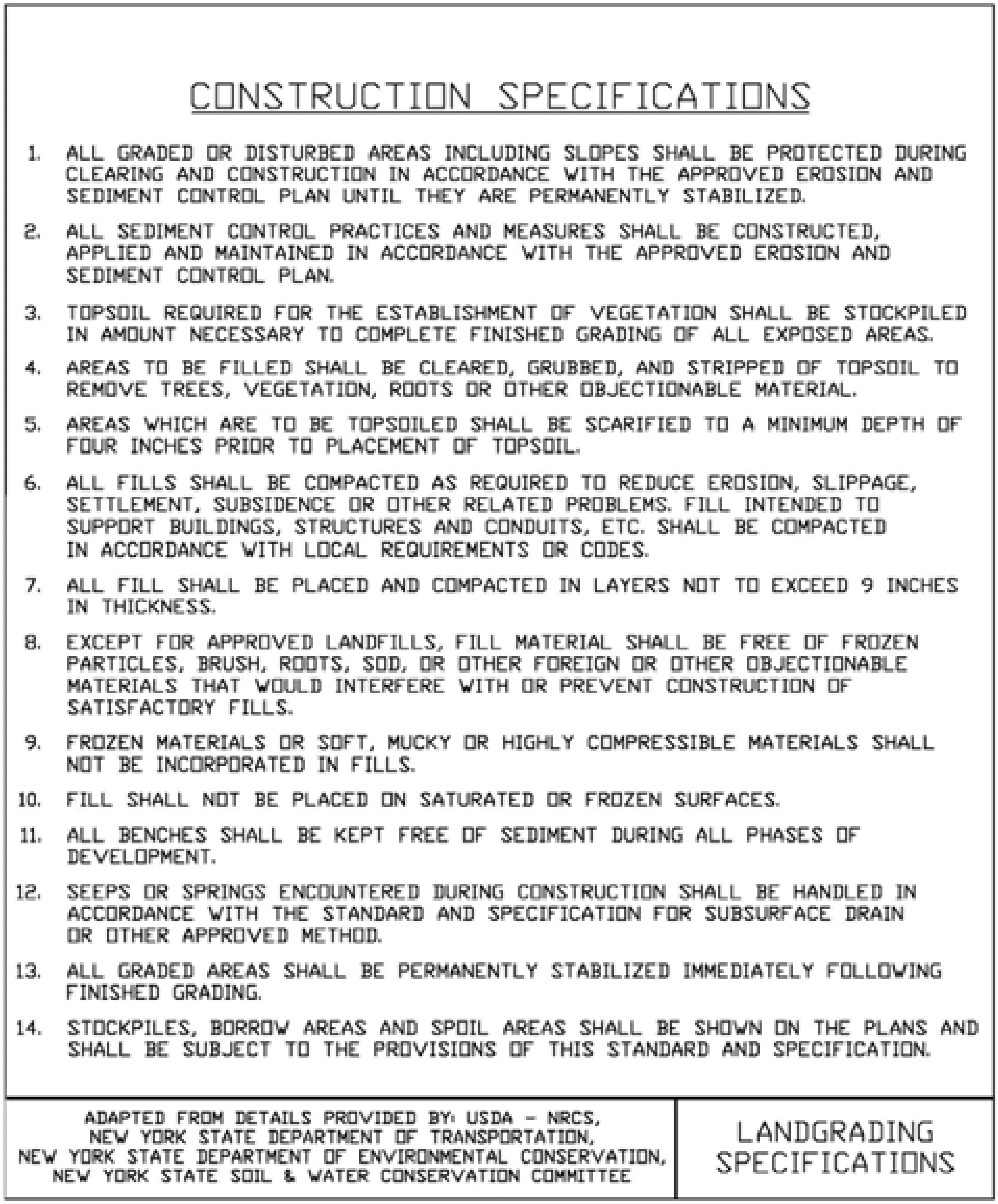
TYPICAL SECTION OF SERRATED CUT SLOPE

Figure 4.10
Landgrading



X	Y(MAX)
2	20'
3	30'
4	40'

Figure 4.11
Landgrading - Construction Specifications



CONSTRUCTION SPECIFICATIONS

1. ALL GRADED OR DISTURBED AREAS INCLUDING SLOPES SHALL BE PROTECTED DURING CLEARING AND CONSTRUCTION IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN UNTIL THEY ARE PERMANENTLY STABILIZED.
2. ALL SEDIMENT CONTROL PRACTICES AND MEASURES SHALL BE CONSTRUCTED, APPLIED AND MAINTAINED IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
3. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED IN AMOUNT NECESSARY TO COMPLETE FINISHED GRADING OF ALL EXPOSED AREAS.
4. AREAS TO BE FILLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS OR OTHER OBJECTIONABLE MATERIAL.
5. AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF FOUR INCHES PRIOR TO PLACEMENT OF TOPSOIL.
6. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.
7. ALL FILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS.
8. EXCEPT FOR APPROVED LANDFILLS, FILL MATERIAL SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
9. FROZEN MATERIALS OR SOFT, MUCKY OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED IN FILLS.
10. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.
11. ALL BENCHES SHALL BE KEPT FREE OF SEDIMENT DURING ALL PHASES OF DEVELOPMENT.
12. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD.
13. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY FOLLOWING FINISHED GRADING.
14. STOCKPILES, BORROW AREAS AND SPOIL AREAS SHALL BE SHOWN ON THE PLANS AND SHALL BE SUBJECT TO THE PROVISIONS OF THIS STANDARD AND SPECIFICATION.

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LANDGRADING
SPECIFICATIONS

STANDARD AND SPECIFICATIONS FOR SURFACE ROUGHENING

Definition & Scope

Roughening a bare soil surface whether through creating horizontal grooves across a slope, stair-stepping, or tracking with construction equipment to aid the establishment of vegetative cover from seed, to reduce runoff velocity and increase infiltration, and to reduce erosion and provide for trapping of sediment.

Conditions Where Practice Applies

All construction slopes require surface roughening to facilitate stabilization with vegetation, particularly slopes steeper than 3:1.

Design Criteria

There are many different methods to achieve a roughened soil surface on a slope. No specific design criteria is required. However, the selection of the appropriate method depends on the type of slope. Methods include tracking, grooving, and stair-stepping. Steepness, mowing requirements, and/or a cut or fill slope operation are all factors considered in choosing a roughening method.

Construction Specifications

1. Cut Slope, No mowing.

   A. Stair-step grade or groove cut slopes with a gradient steeper than 3:1 (Figure 4.18).

   B. Use stair-step grading on any erodible material soft enough to be ripped with a bulldozer. Slopes of soft rock with some soil are particularly suited to stair-step grading.

   C. Make the vertical cut distance less than the horizontal distance, and slightly slope the horizontal position of the "step" to the vertical wall.

   D. Do not make vertical cuts more than 2 feet in soft materials or 3 feet in rocky materials.

Grooving uses machinery to create a series of ridges and depressions that run perpendicular to the slope following the contour. Groove using any appropriate implement that can be safely operated on the slope, such as disks, tillers, spring harrows, or the teeth of a front-end loader bucket. Do not make the grooves less than 3 inches deep or more than 15 inches apart.

2. Fill Slope, No mowing

   A. Place fill to create slopes with a gradient no steeper than 2:1 in lifts 9 inches or less and properly compacted. Ensure the face of the slope consists of loose, uncompacted fill 4 to 6 inches deep. Use grooving as described above to roughen the slope, if necessary.

   B. Do not back blade or scrape the final slope face.

3. Cuts/Fills, Mowed Maintenance

   A. Make mowed slopes no steeper than 3:1.

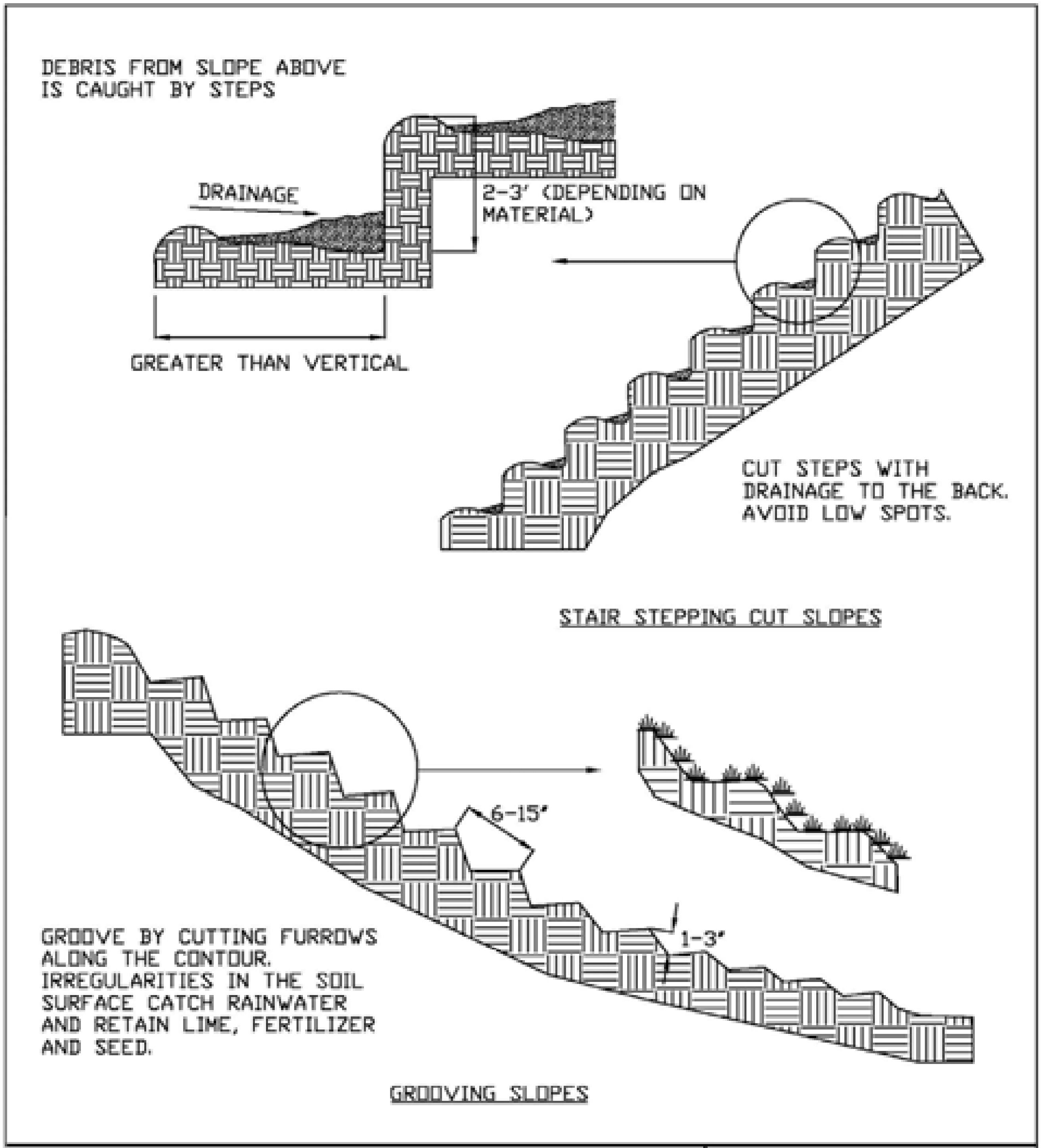
   B. Roughen these areas to shallow grooves by normal tilling, disking, harrowing, or use of cultipacker-seeder. Make the final pass of such tillage equipment on the contour.

   C. Make grooves at least 1 inch deep and a maximum of 10 inches apart.

   D. Excessive roughness is undesirable where mowing is planned.

Tracking should be used primarily in sandy soils to avoid undue compaction of the soil surface. Tracking is generally not as effective as the other roughening methods described. (It has been used as a method to track down mulch.) Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Do not back-blade during the final grading operation.

Figure 4.18
Surface Roughening



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SURFACE
ROUGHENING
DETAILS

STANDARD AND SPECIFICATIONS FOR SOIL RESTORATION

Definition & Scope

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

Conditions Where Practice Applies

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

Design Criteria

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

Specification for Full Soil Restoration

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

1. Apply 3 inches of compost over subsoil. The compost shall be well decomposed (matured at least 3 months), weed-free, organic matter. It shall be aerobically composted, possess no objectionable odors, and contain less than 1%, by dry weight, of man-made foreign matter. The physical parameters of the compost shall meet the standards listed in Table 5.2 - Compost Standards Table, except for "Particle Size" 100% will pass the 1/2" sieve. **Note: All biosolids compost produced in New York State (or approved for importation) must meet NYS DEC's 6 NYCRR Part 360 (Solid Waste Management Facilities) requirements. The Part 360 requirements are equal to or more stringent than 40 CFR Part 503 which ensure safe standards for pathogen reduction and heavy metals content.**

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

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

Maintenance

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

Table 4.6
Soil Restoration Requirements

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

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

STANDARD AND SPECIFICATIONS FOR TOPSOILING

Definition & Scope

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

Conditions Where Practice Applies

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

Design Criteria

1. Preserve existing topsoil in place where possible, thereby reducing the need for added topsoil.
2. Conserve by stockpiling topsoil and friable fine textured subsoils that must be stripped from the excavated site and applied after final grading where vegetation will be established. Topsoil stockpiles must be stabilized. Stockpile surfaces can be stabilized by vegetation, geotextile or plastic covers. This can be aided by orientating the stockpile lengthwise into prevailing winds.
3. Refer to USDA Natural Resource Conservation Service soil surveys or soil interpretation record sheets for further soil texture information for selecting appropriate design topsoil depths.

Site Preparation

1. As needed, install erosion and sediment control practices such as diversions, channels, sediment traps, and stabilizing measures, or maintain if already installed.
2. Complete rough grading and final grade, allowing for depth of topsoil to be added.
3. Scarify all compact, slowly permeable, medium and fine textured subsoil areas. Scarify at approximately right angles to the slope direction in soil areas that are steeper than 5 percent. Areas that have been overly compacted shall be decompacted in accordance with the Soil Restoration Standard.
4. Remove refuse, woody plant parts, stones over 3 inches in diameter, and other litter.

Topsoil Materials

1. Topsoil shall have at least 6 percent by weight of fine textured stable organic material, and no greater than 20 percent. Muck soil shall not be considered topsoil.
2. Topsoil shall have not less than 20 percent fine textured material (passing the NO. 200 sieve) and not more than 15 percent clay.
3. Topsoil treated with soil sterilants or herbicides shall be so identified to the purchaser.
4. Topsoil shall be relatively free of stones over 1 1/2 inches in diameter, trash, noxious weeds such as nut sedge and quackgrass, and will have less than 10 percent gravel.
5. Topsoil containing soluble salts greater than 500 parts per million shall not be used.
6. Topsoil may be manufactured as a mixture of a mineral component and organic material such as compost.

Application and Grading

1. Topsoil shall be distributed to a uniform depth over the area. It shall not be placed when it is partly frozen, muddy, or on frozen slopes or over ice, snow, or standing water puddles.
2. Topsoil placed and graded on slopes steeper than 5 percent shall be promptly fertilized, seeded, mulched, and stabilized by “tracking” with suitable equipment.
3. Apply topsoil in the amounts shown in Table 4.7 below:

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

STANDARD AND SPECIFICATIONS FOR MULCHING

Definition and Scope

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

Conditions Where Practice Applies

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

Criteria

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

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

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

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

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

Select appropriate mulch anchoring material.

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

Table 4.2
Guide to Mulch Materials, Rates, and Uses

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

Table 4.3
Mulch Anchoring Guide

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

STANDARD AND SPECIFICATIONS FOR TREES, SHRUBS, AND VINES

Definition & Scope

Establishing trees, shrubs, and vines or selectively reducing stand density and trimming woody plants to protect the soil and plant resources, improve an area for recreation and increase the attractiveness and usefulness of areas.

Conditions Where Practice Applies

On any area planned for recreation or landscape use such as yard areas, leisure areas, picnic areas, and park lands providing outdoor recreational opportunities.

Criteria and Specifications

1. Planting nursery stock

   A. Select species to serve the intended purpose. See Appendix G, Table G.1**,** "Trees Suitable for Landscape and Conservation Plantings in New York." Where planting of trees is to be done in recreation areas, use those species resistant to compaction listed in Table G.2, "Susceptibility of Tree Species to Compaction" whenever possible.

   B. Plant Materials

   1) Plants shall conform to the species, variety, size, number, and conditions as stated in a conservation plan or on a plant list shown on landscape drawings. "American Standard for Nursery Stock," by American Association of Nurserymen, shall be used to develop the plant list for landscape drawings and to check quality of plant materials.

   2) Durable, legible labels with the scientific and common name and cultivar shall be securely attached to plants, bundles of seedlings, containers, and/or flats.

   C. Plant Protection

   Prior to delivery, the trunk, branches, and foliage of the plants shall be sprayed with non-toxic antidesiccant, applied according to the manufacturer's recommendations. This does not apply to state nursery seedlings.

   D. Planting Time

   Deciduous trees and shrubs: April 1 to June 1 and October 15 to December 15. Evergreen trees and shrubs: April 1 to June 1 and September 1 to November 15.

   E. Spacing

   Plant all trees and shrubs well back from buildings to allow for mature crown size. The following are guides for planning:

Large Trees	50-60 feet apart
Small Trees	20-30 feet apart
Columnar Species	6-8 feet apart
Hedges	1-4 feet apart
Shrubs	For clumps, plan spacing so mature shrubs will be touching or overlapping by only 1 or 2 feet

   F. Site Preparation

   1) Individual sites for planting seedlings can be prepared by scalping the sod away from a four foot square area where the seedling is to be planted.

   2) All planting beds shall be cultivated to a depth of 8 inches, or chemically treated for weed control. Remove objectionable objects that will interfere with maintenance of site.

   G. Planting

   1) Plants shall be located as shown on plans and/or drawings and, where necessary, located on the site by stakes, flags or other means.

   2) Prior to planting, remove galvanized wire basket securing root ball, untie and roll down burlap covering from around the stem.

3) The plants shall be set upright in holes as illustrated in Figure G.1 in Appendix G.

4) All plants shall be thoroughly watered on the same day of planting. Plants that have settled shall be reset to grade.

H. Wrapping

Immediately after planting, wrap deciduous tree trunks from the bottom to the first limb with a 4 inch wide bituminous impregnated, insect resistant tape or paper manufactured for that purpose. Tie with jute (bag strings) at top and bottom. The wrap should be removed per nursery recommendations.

I. Mulching

Mulch the disturbed area around individual trees and shrubs with a 2-3" layer of wood chips. Pull wood chips 1 inch away from the base of shrubs to avoid fungus development.

J. Pruning

After planting, prune to remove injured twigs and branches. The natural shape of the plant should not be changed.

K. Cleanup and Maintenance

1) After all work is complete, all excess soil, peat moss, debris, etc., shall be removed from the site.

2) Water plants two weeks after planting. For two years, water plants every two weeks during dry periods, which exceed three weeks without a good soaking rain, or water as needed in accordance with local conditions. Shrubs may require 5 to 10 gallons and trees, 20 to 30 gallons for each watering.

3) Remove trunk wrap per nursery recommendation.

2. Transplanting "Wild" Stock

Successful transplanting of wild stock will require heavy equipment and considerable labor as a large weight of soil must be moved with the roots.

A. Select trees and shrubs with good form and full crowns.

B. Transplant only when plants are dormant and soil is moist. Wrap soil ball with burlap to prevent soil from separating from roots.

C. Table 4.8 shows minimum diameter and approximate weight of soil ball that must be moved with each size plant.

D. Plant and maintain as described above for nursery stock.

PRUNING AND THINNING

Use	Cleared Width Each Side of Trail Tread (ft.)	Cleared Height (ft.)
<u>TRAILS</u>		
Hiking	1	8
Bicycle	2	10
Motorbike	2	10
Horse	2	12
X-Country Ski	Total: 3-12	12[1]
Snowmobile	Total: 6-12	12[1]
<u>PICNIC & CAMPING AREAS</u>		
Campfire/Grill	10 ft. diam.	15

[1] Includes allowance for snow depth and snow load on branches

1. Pruning

A. Remove trees, limbs, and limb stubs to the above widths and heights specified for the intended use.

B. Remove dead, diseased, or dying limbs that may fall.

C. Do not remove more than one-third of the live crown of a tree in a year.

D. Cut limbs flush to the branch bark ridge.

E. Use the 3 or 4 cut pruning method on all branches over 2 inches in diameter: First cut about one-third the way through the underside of the limb (about 6-12 inches from the tree trunk). Then (approximately an inch further out) make a second cut through the limb from the upper side. When the branch is removed, there is no splintering of the main tree trunk. Remove the stub. If the branch is larger than 5-6 inches in diameter, use the four cut system. Cuts 1 and 2 remain the same and cut 3 should be from the underside of the limb, on the outside of the branch collar. Cut 4 should be from the top and in alignment with the 3rd cut. Cut 3 should be 1/4 to 1/3 the way through the limb. This will prevent the bark from peeling down the trunk. Do not paint the cut surface.

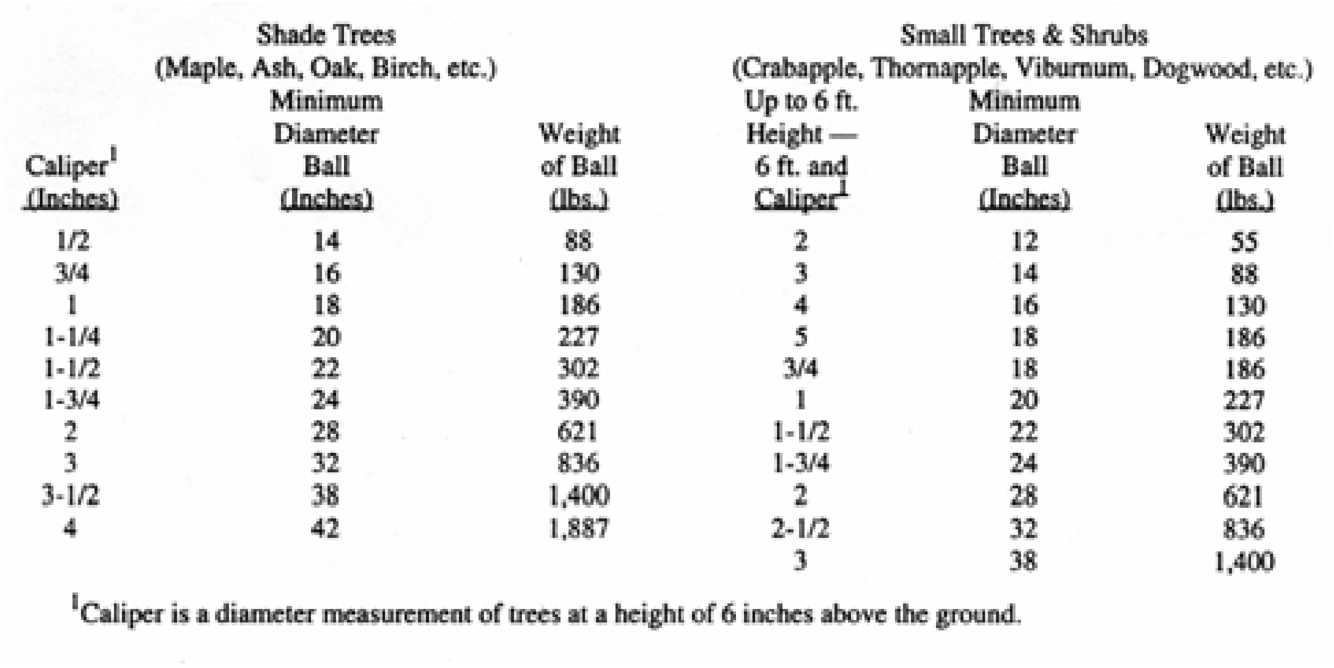
2. Thinning

   A. Remove dead, diseased, dying, poorly anchored, or ice damaged trees that pose a hazard to recreationists or that interfere with intended use.

   B. To maintain grass cover in a wooded area, thin according to formula Dx3 (average diameter of the trunk of overstory trees, in inches, times three—the answer is the spacing between trees to be left, in feet). For example, for trees with average diameter of 6 inches, spacing after thinning should leave trees 18 feet apart on average. Crown cover after thinning should be about 50 percent.

   C. Selectively thin as needed to favor those trees that are most "resistant" to compaction around their roots. See Table G.2**,** "Susceptibility of Tree Species to Compaction" in Appendix G. If the soil on the site is naturally well drained, those species in the "intermediate" group may also be favored.

Table 4.8
Size and Weight of Earth Ball Required to Transplant Wild Stock



	Shade Trees (Maple, Ash, Oak, Birch, etc.)		Small Trees & Shrubs (Crabapple, Thornapple, Viburnum, Dogwood, etc.)		
Caliper[1] (Inches)	Minimum Diameter Ball (Inches)	Weight of Ball (lbs.)	Up to 6 ft. Height — 6 ft. and Caliper[1]	Minimum Diameter Ball (Inches)	Weight of Ball (lbs.)
1/2	14	88	2	12	55
3/4	16	130	3	14	88
1	18	186	4	16	130
1-1/4	20	227	5	18	186
1-1/2	22	302	3/4	18	186
1-3/4	24	390	1	20	227
2	28	621	1-1/2	22	302
3	32	836	1-3/4	24	390
3-1/2	38	1,400	2	28	621
4	42	1,887	2-1/2	32	836
			3	38	1,400

[1] Caliper is a diameter measurement of trees at a height of 6 inches above the ground.

STANDARD AND SPECIFICATIONS FOR VEGETATING WATERWAYS

Definition & Scope

Waterways are a **permanently** constructed conveyance channel, shaped or graded. They are vegetated for the safe transport of excess surface water from construction sites and urban areas without damage from erosion.

Conditions Where Practice Applies

This standard applies to vegetating waterways and similar water carrying structures.

Supplemental measures may be required with this practice. These may include: subsurface drainage to permit the growth of suitable vegetation and to eliminate wet spots; a section stabilized with asphalt, stone, or other suitable means; or additional storm drains to handle snowmelt or storm runoff.

Retardance factors for determining waterway dimensions are shown in Table 3.1 on page 3.10 and "Maximum Permissible Velocities for Selected Grass and Legume Mixtures" (See Table 4.10 on page 4.79).

Design Criteria

Waterways or outlets shall be protected against erosion by vegetative means as soon after construction as practical. Vegetation must be well established before diversions or other channels are outletted into them. Consideration should be given to the use of turf reinforcement mats, excelsior matting, other rolled erosion control products, or sodding of channels to provide erosion protection as soon after construction as possible. It is strongly recommended that the center line of the waterway be protected with one of the above materials to avoid center gullies and to protect seedlings from erosion before establishment.

1. Liming, fertilizing, and seedbed preparation.
    A. Lime to pH 6.5.
    B. **The soil should be tested to determine the amounts of amendments needed.** If the soil must be fertilized before results of a soil test can be obtained to determine fertilizer needs, apply commercial fertilizer at 1.0 lbs/1,000 sq. ft. of N, P_2O_5, and K_2O.
    C. Lime and fertilizer shall be mixed thoroughly into the seedbed during preparation.
    D. Channels, except for paved section, shall have at least 4 inches of topsoil.
    E. Remove stones and other obstructions that will hinder maintenance.
2. Timing of Seeding.
    A. Early spring and late August are best.
    B. Temporary cover to protect from erosion is recommended during periods when seedings may fail.
3. Seed Mixtures:

Mixtures	Rate per Acre (lbs)	Rate per 1,000 sq. ft. (lbs)
A. White clover or ladino clover[1]	8	0.20
Smooth bromegrass	20	0.45
Creeping red fescue[2]	2	0.05
Total	30	0.70
OR		
B. Smooth bromegass[3]	25	0.60
Creeping red fescue	20	0.50
Perennial ryegrass	10	0.20
Total	55	1.30

[1] Inoculate with appropriate inoculum immediately prior to seeding. Ladino or birdsfoot trefoil may be substituted for common white clover and seeded at the same rate.

[2] Perennial ryegrass may be substituted for the creeping red fescue but increase seeding rate to 5 lbs/acre (0.1 lb/1,000 sq. ft).

[3] Use this mixture in areas which are mowed frequently. Common white clover may be added if desired and seeded at 8 lbs/acre (0.2 lb/1,000 sq. ft.)

4. Seeding

Select the appropriate seed mixture and apply uniformly over the area. Rolling or cultipacking across the waterway is desirable.

Waterway centers or crucial areas may be sodded. Refer to the standard and specification for Stabilization with Sod. Be sure sod is securely anchored using staples or stakes.

5. Mulching

All seeded areas will be mulched. Channels more than 300 feet long, and/or where the slope is 5 percent or more, must have the mulch securely anchored. Refer to the standard and specifications for Mulching for details.

6. Maintenance

Fertilize, lime, and mow as needed to maintain dense protective vegetative cover.

Waterways shall not be used for roadways.

If rills develop in the centerline of a waterway, prompt attention is required to avoid the formation of gullies. Either stone and/or compacted soil fill with excelsior or filter fabric as necessary may be used during the establishment phase. See Figure 4.25, Rill Maintenance Measures. Spacing between rill maintenance barriers shall not exceed 100 feet.

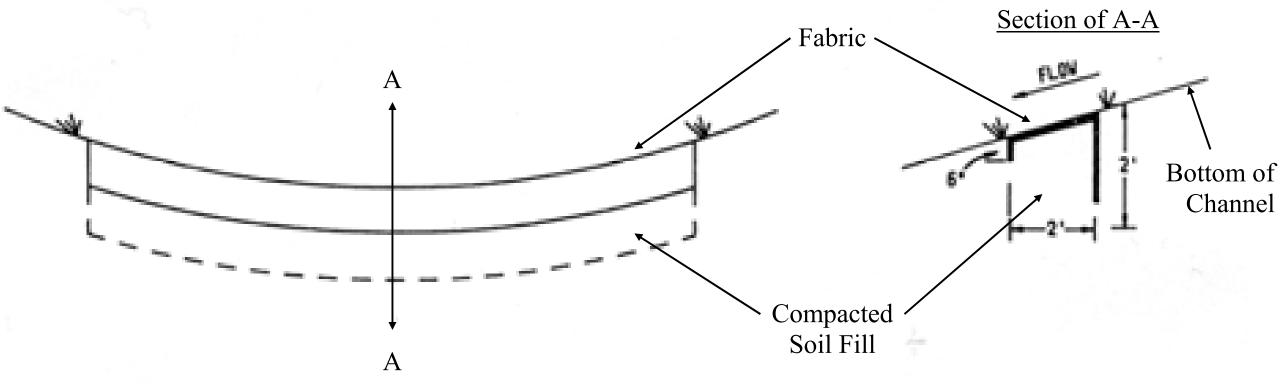
Table 4.10
Maximum Permissible Velocities for Selected Seed Mixtures

Cover	**Slope Range [2] (%)**	**Permissible Velocity [1]**	
		Erosion-resistant Soils (ft. per sec.) K=0.10 - 0.35 [3]	**Easily Eroded Soils (ft. per sec.) K=0.36 - 0.80**
Smooth Bromegrass Hard Fescue	0-5 5-10 Over 10	7 6 5	5 4 3
Grass Mixtures	[2] 0-5 5-10	5 4	4 3
White/Red Clover Alfalfa Red Fescue	[4] 0-5	3.5	2.5

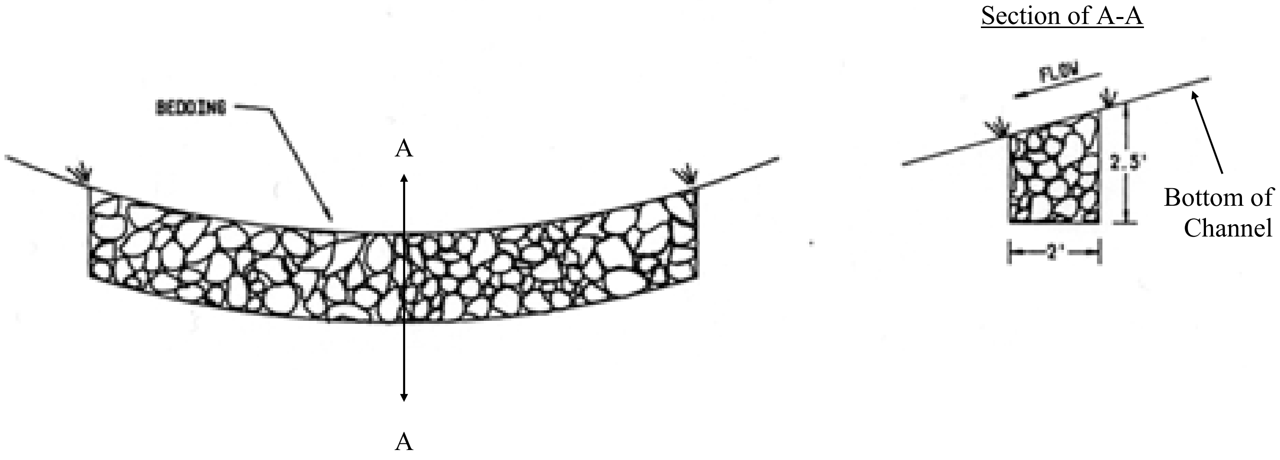
[1] Use velocities exceeding 5 feet per second only where good covers and proper maintenance can be obtained.
[2] Do not use on slopes steeper than 10 percent except for vegetated side slopes in combination with a stone, concrete, or highly resistant vegetative center section.
[3] K is the soil erodibility factor used in the Revised Universal Soil Loss Equation. Visit Appendix A or consult the appropriate USDA-NRCS technical guide for K values for New York State soils.
[4] Do not use on slopes steeper than 5 percent except for vegetated side slopes in combination with a stone, concrete, or highly resistant vegetative center section.
[5] Annuals - use on mild slopes or as temporary protection until permanent covers are established.
[6] Use on slopes steeper than 5 percent is not recommended.

Figure 4.25
Rill Maintenance Measures

Filter Fabric



Stone



STANDARD AND SPECIFICATIONS FOR ROCK OUTLET PROTECTION

Definition & Scope

A **permanent** section of rock protection placed at the outlet end of the culverts, conduits, or channels to reduce the depth, velocity, and energy of water, such that the flow will not erode the receiving downstream reach.

Conditions Where Practice Applies

This practice applies where discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This applies to:

1. Culvert outlets of all types.
2. Pipe conduits from all sediment basins, dry storm water ponds, and permanent type ponds.
3. New channels constructed as outlets for culverts and conduits.

Design Criteria

The design of rock outlet protection depends entirely on the location. Pipe outlet at the top of cuts or on slopes steeper than 10 percent, cannot be protected by rock aprons or riprap sections due to re-concentration of flows and high velocities encountered after the flow leaves the apron.

Many counties and state agencies have regulations and design procedures already established for dimensions, type and size of materials, and locations where outlet protection is required. Where these requirements exist, they shall be followed.

Tailwater Depth

The depth of tailwater immediately below the pipe outlet must be determined for the design capacity of the pipe. If the tailwater depth is less than half the diameter of the outlet pipe, and the receiving stream is wide enough to accept divergence of the flow, it shall be classified as a Minimum Tailwater Condition; see Figure 3.16 on page 3.42 as an example. If the tailwater depth is greater than half the pipe diameter and the receiving stream will continue to confine the flow, it shall be classified as a Maximum Tailwater Condition; see Figure 3.17 on page 3.43 as an example. Pipes which outlet onto flat areas with no defined channel may be assumed to have a Minimum Tailwater Condition; see Figure 3.16 on page 3.42 as an example.

Apron Size

The apron length and width shall be determined from the curves according to the tailwater conditions:

Minimum Tailwater – Use Figure 3.16 on page 3.42
Maximum Tailwater – Use Figure 3.17 on page 3.43

If the pipe discharges directly into a well defined channel, the apron shall extend across the channel bottom and up the channel banks to an elevation one foot above the maximum tailwater depth or to the top of the bank, whichever is less.

The upstream end of the apron, adjacent to the pipe, shall have a width two (2) times the diameter of the outlet pipe, or conform to pipe end section if used.

Bottom Grade

The outlet protection apron shall be constructed with no slope along its length. There shall be no overfall at the end of the apron. The elevation of the downstream end of the apron shall be equal to the elevation of the receiving channel or adjacent ground.

Alignment

The outlet protection apron shall be located so that there are no bends in the horizontal alignment.

Materials

The outlet protection may be done using rock riprap, grouted riprap, or gabions. Outlets constructed on the bank of a stream or wetland shall not use grouted rip-rap, gabions or concrete.

Riprap shall be composed of a well-graded mixture of rock size so that 50 percent of the pieces, by weight, shall be larger than the d_{50} size determined by using the charts. A well-graded mixture, as used herein, is defined as a mixture composed primarily of larger rock sizes, but with a sufficient mixture of other sizes to fill the smaller voids between the rocks. The diameter of the largest rock size in such a mixture shall be 1.5 times the d_{50} size.

Thickness

The minimum thickness of the riprap layer shall be 1.5 times the maximum rock diameter for d_{50} of 15 inches or less; and 1.2 times the maximum rock size for d_{50} greater than 15 inches. The following chart lists some examples:

D_{50} (inches)	d_{max} (inches)	Minimum Blanket Thickness (inches)
4	6	9
6	9	14
9	14	20
12	18	27
15	22	32
18	27	32
21	32	38
24	36	43

Rock Quality

Rock for riprap shall consist of field rock or rough unhewn quarry rock. The rock shall be hard and angular and of a quality that will not disintegrate on exposure to water or weathering. The specific gravity of the individual rocks shall be at least 2.5.

Filter

A filter is a layer of material placed between the riprap and the underlying soil surface to prevent soil movement into and through the riprap. Riprap shall have a filter placed under it in all cases.

A filter can be of two general forms: a gravel layer or a plastic filter cloth. The plastic filter cloth can be woven or non-woven monofilament yarns, and shall meet these base requirements: thickness 20-60 mils, grab strength 90-120 lbs; and shall conform to ASTM D-1777 and ASTM D-1682.

Gravel filter blanket, when used, shall be designed by comparing particle sizes of the overlying material and the base material. Design criteria are available in Standard and Specification for Anchored Slope and Channel Stabilization on page 4.7.

Gabions

Gabions shall be made of hexagonal triple twist mesh with heavily galvanized steel wire. The maximum linear dimension of the mesh opening shall not exceed 4 ½ inches and the area of the mesh opening shall not exceed 10 square inches.

Gabions shall be fabricated in such a manner that the sides, ends, and lid can be assembled at the construction site into a rectangular basket of the specified sizes. Gabions shall be of single unit construction and shall be installed according to manufacturer's recommendations.

The area on which the gabion is to be installed shall be graded as shown on the drawings. Foundation conditions shall be the same as for placing rock riprap, and filter cloth shall be placed under all gabions. Where necessary, key, or tie, the structure into the bank to prevent undermining of the main gabion structure.

Maintenance

Once a riprap outlet has been installed, the maintenance needs are very low. It should be inspected after high flows for evidence of scour beneath the riprap or for dislodged rocks. Repairs should be made immediately.

Design Procedure

1. Investigate the downstream channel to assure that nonerosive velocities can be maintained.
2. Determine the tailwater condition at the outlet to establish which curve to use.
3. Use the appropriate chart with the design discharge to determine the riprap size and apron length required. It is noted that references to pipe diameters in the charts are based on full flow. For other than full pipe flow, the parameters of depth of flow and velocity must be used to adjust the design discharges.
4. Calculate apron width at the downstream end if a flare section is to be employed.

Design Examples are demonstrated in Appendix B.

Construction Specifications

1. The subgrade for the filter, riprap, or gabion shall be prepared to the required lines and grades. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.
2. The rock or gravel shall conform to the specified grad-

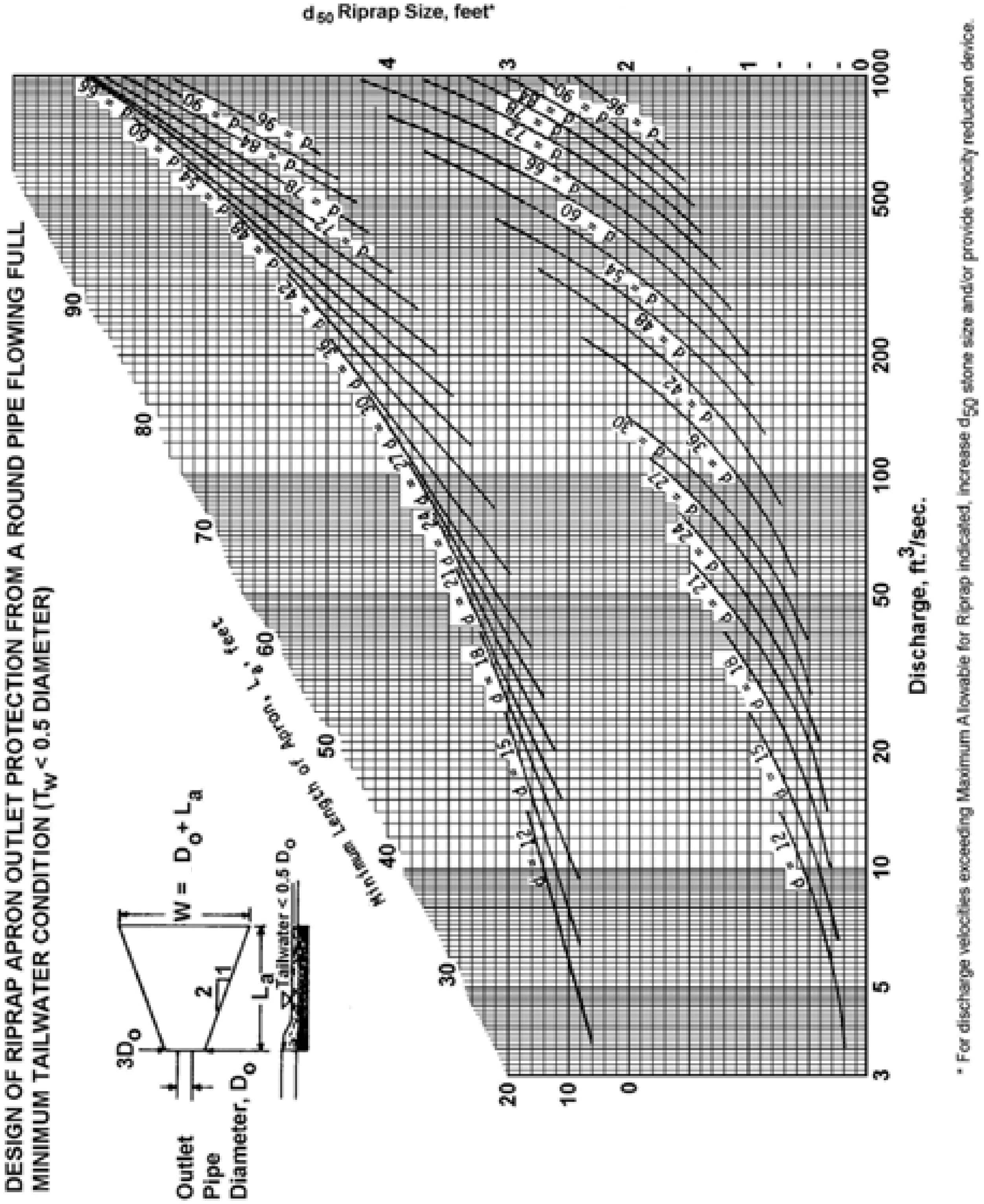
ing limits when installed respectively in the riprap or filter.

3. Filter cloth shall be protected from punching, cutting, or tearing. Any damage other than an occasional small hole shall be repaired by placing another piece of cloth over the damaged part or by completely replacing the cloth. All overlaps, whether for repairs or for joining two pieces of cloth shall be a minimum of one foot.

4. Rock for the riprap or gabion outlets may be placed by equipment. Both shall each be constructed to the full course thickness in one operation and in such a manner as to avoid displacement of underlying materials. The rock for riprap or gabion outlets shall be delivered and placed in a manner that will ensure that it is reasonably homogenous with the smaller rocks and spalls filling the voids between the larger rocks. Riprap shall be placed in a manner to prevent damage to the filter blanket or filter cloth. Hand placement will be required to the extent necessary to prevent damage to the permanent works.

Figure 3.16

Outlet Protection Design—Minimum Tailwater Condition Chart (Design of Outlet Protection from a Round Pipe Flowing Full, Minimum Tailwater Condition: $T_w < 0.5D_o$) (USDA - NRCS)



* For discharge velocities exceeding Maximum Allowable for Riprap indicated, increase d_{50} stone size and/or provide velocity reduction device.

Figure 3.17
Outlet Protection Design—Maximum Tailwater Condition Chart (Design of Outlet Protection from a Round Pipe Flowing Full, Maximum Tailwater Condition: $T_w \geq 0.5D_o$) (USDA - NRCS)

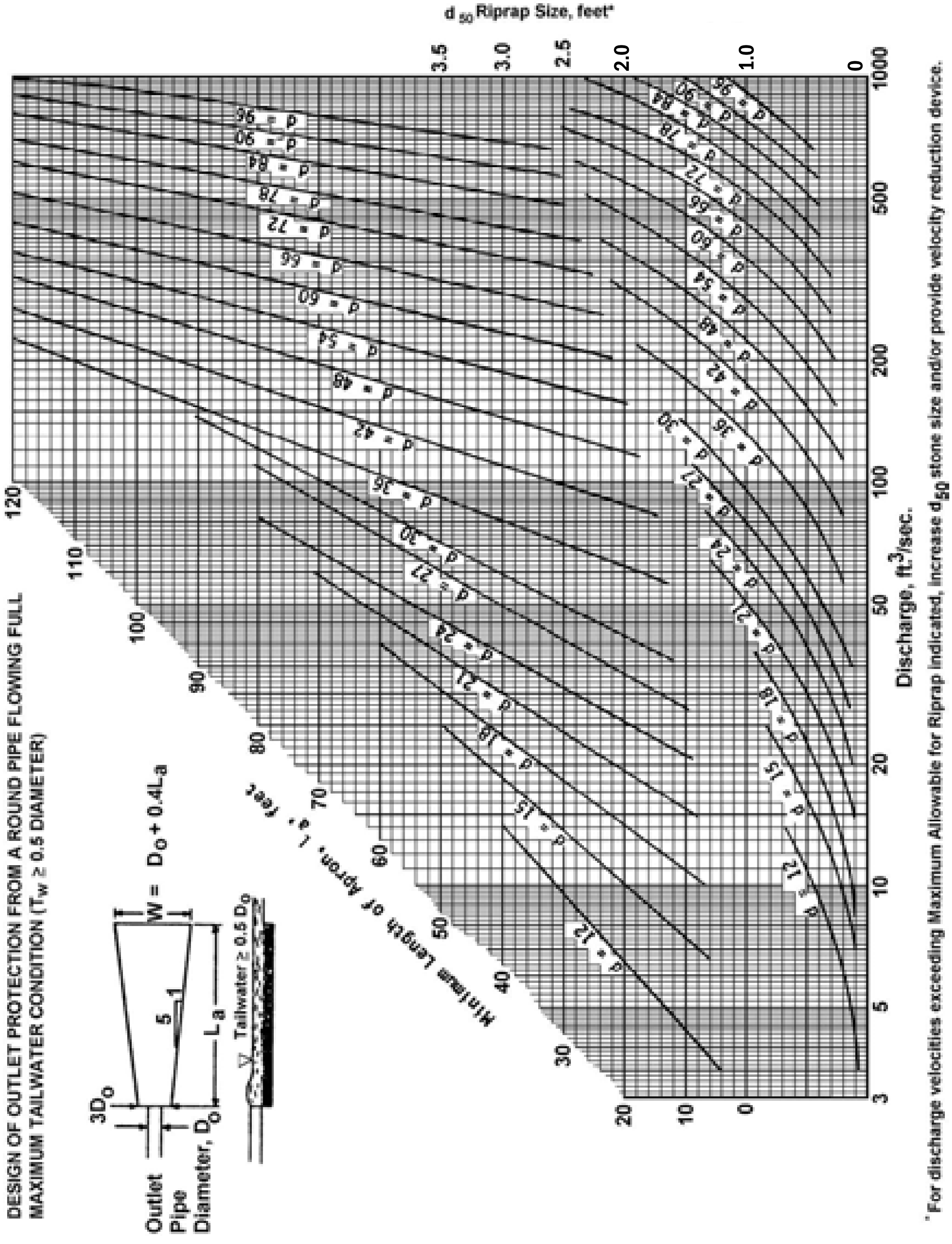
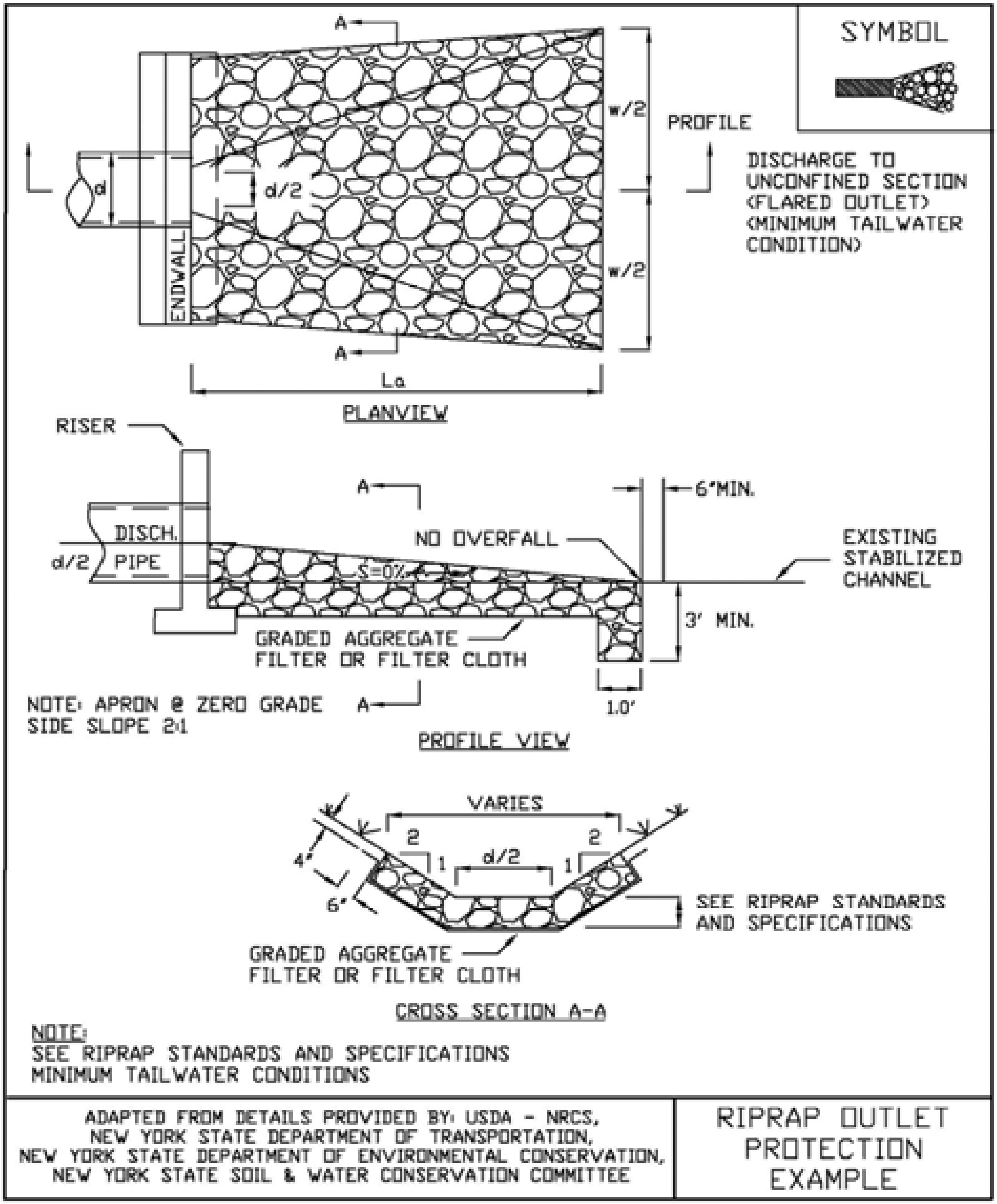


Figure 3.18
Riprap Outlet Protection Detail (1)



NOTE: APRON @ ZERO GRADE
SIDE SLOPE 2:1

NOTE:
SEE RIPRAP STANDARDS AND SPECIFICATIONS
MINIMUM TAILWATER CONDITIONS

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

RIPRAP OUTLET
PROTECTION
EXAMPLE

Figure 3.19
Riprap Outlet Protection Detail (2)

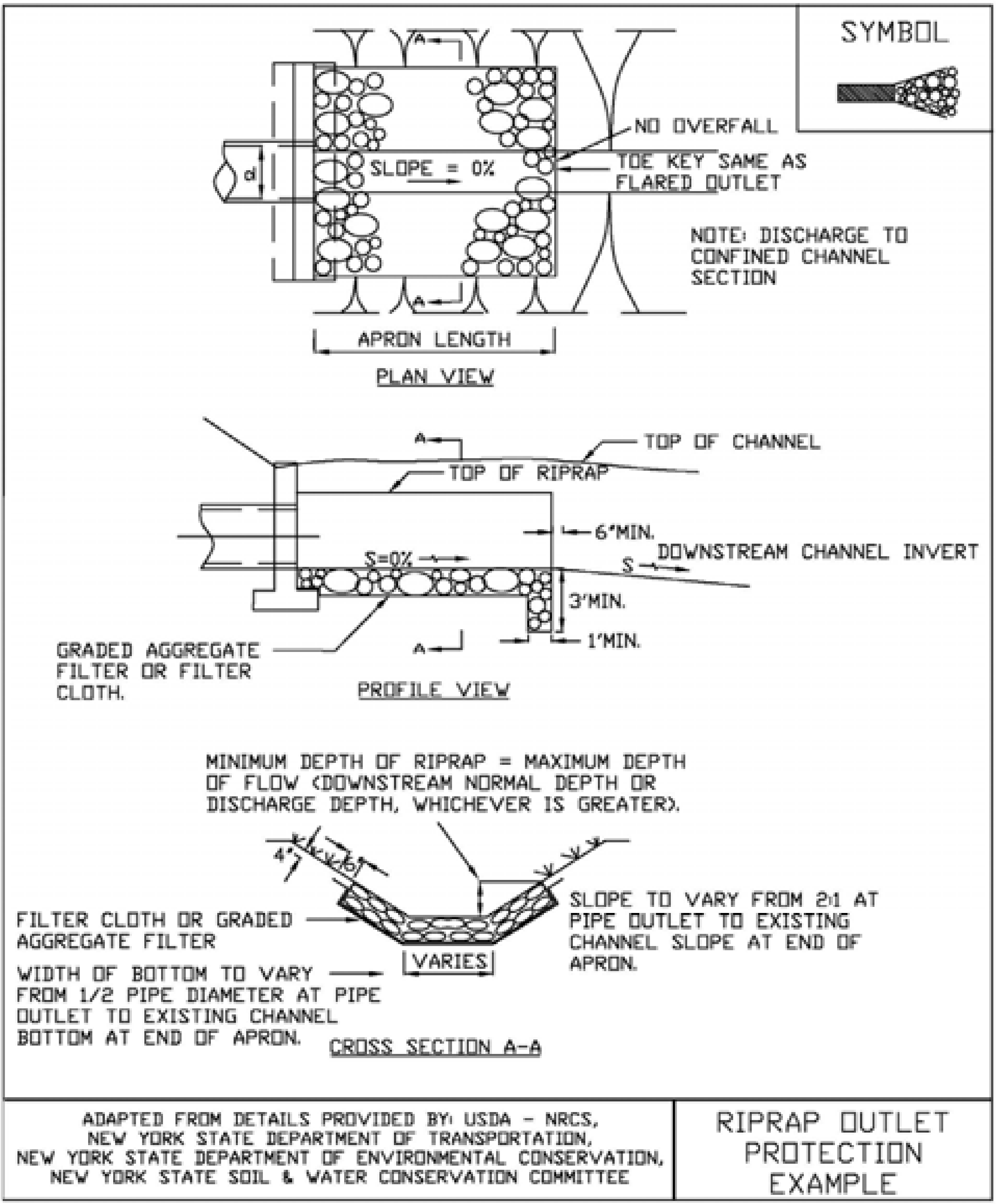
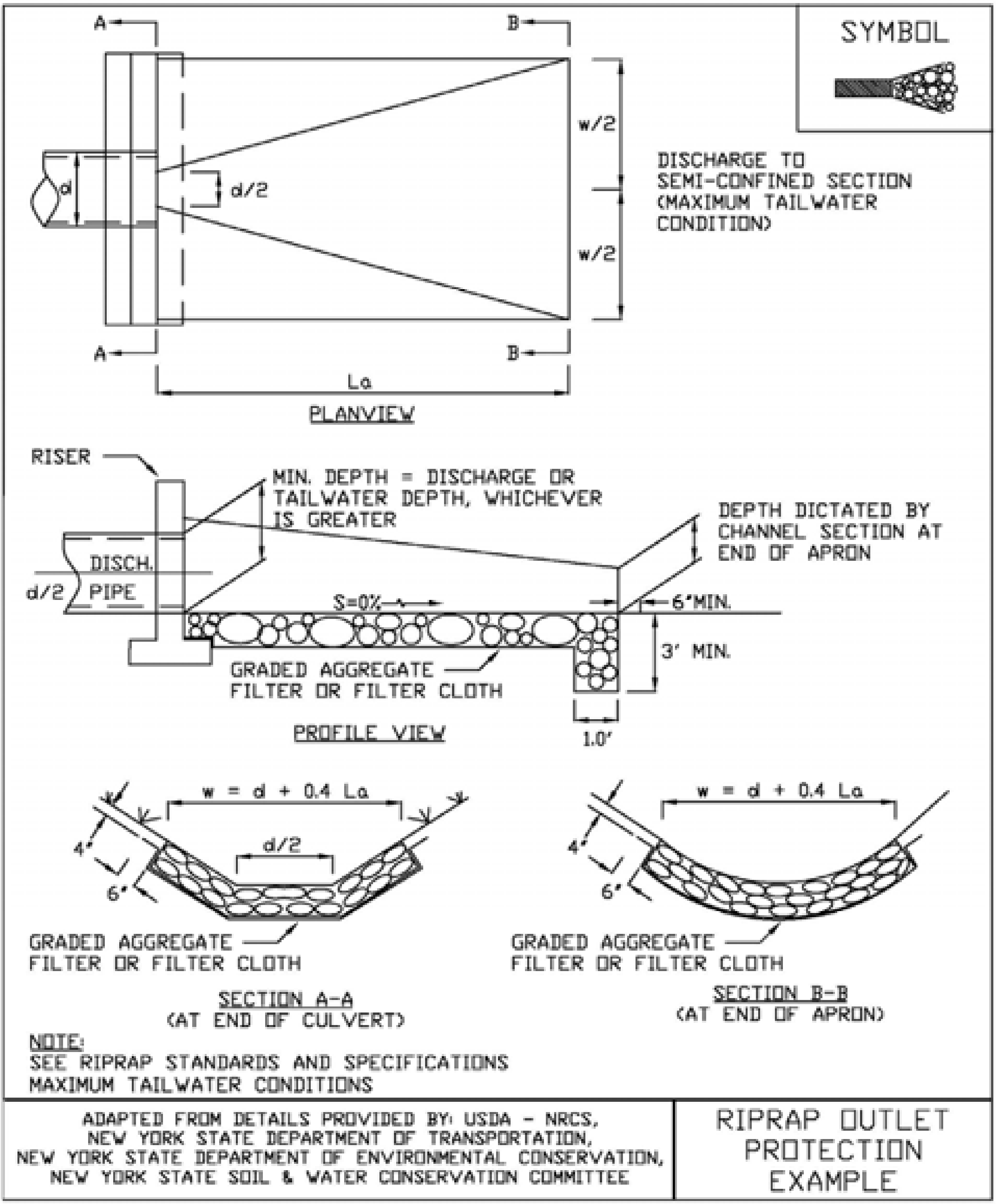


Figure 3.20
Riprap Outlet Protection Detail (3)



NOTE:
SEE RIPRAP STANDARDS AND SPECIFICATIONS
MAXIMUM TAILWATER CONDITIONS

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

RIPRAP OUTLET
PROTECTION
EXAMPLE

STANDARD AND SPECIFICATIONS FOR SITE POLLUTION PREVENTION

Definition & Scope

A collection of management practices intended to control non-sediment pollutants associated with construction activities to prevent the generation of pollutants due to improper handling, storage, and spills and prevent the movement of toxic substances from the site into surface waters.

Conditions Where Practice Applies

On all construction sites where the earth disturbance exceeds 5,000 square feet, and involves the use of fertilizers, pesticides, petroleum based chemicals, fuels and lubricants, as well as sealers, paints, cleared woody vegetation, garbage, and sanitary wastes.

Design Criteria

The variety of pollutants on a particular site and the severity of their impacts depend on factors such as the nature of the construction activity, the physical characteristics of the construction site, and the proximity of water bodies and conveyances to the pollutant source.

1. All state and federal regulations shall be followed for the storage, handling, application, usage, and disposal of pesticides, fertilizers, and petroleum products.

2. Vehicle and construction equipment staging and maintenance areas will be located away from all drainage ways with their parking areas graded so the runoff from these areas is collected, contained and treated prior to discharge from the site.

3. Provide sanitary facilities for on-site personnel.

4. Store, cover, and isolate construction materials including topsoil, and chemicals, to prevent runoff of pollutants and contamination of groundwater and surface waters.

5. Develop and implement a spill prevention and control plan. The plan should include NYSDEC's spill reporting and initial notification requirements.

6. Provide adequate disposal for solid waste including woody debris, stumps, and other construction waste and include these methods and directions in the construction details on the site construction drawings. Fill, woody debris, stumps and construction waste shall not be placed in regulated wetlands, streams or other surface waters.

7. Distribute or post informational material regarding proper handling, spill response, spill kit location, and emergency actions to be taken, to all construction personnel.

8. Refueling equipment shall be located at least 100 feet from all wetlands, streams and other surface waters.

STANDARD AND SPECIFICATIONS FOR WINTER STABILIZATION

Definition & Scope

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

Conditions Where Practice Applies

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

Design Criteria

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

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

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

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

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

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

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

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

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

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

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

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

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

Maintenance

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

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

Appendix H

Inspection Forms, Checklists and Maintenance Guidelines

I. PRE-CONSTRUCTION MEETING DOCUMENTS

Project Name ____

Permit No. ______________________________ **Date of Authorization** ______________

Name of Operator ____

Prime Contractor ____

a. Preamble to Site Assessment and Inspections -The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified professional[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements.

When construction starts, site inspections shall be conducted by the qualified professional at least every 7 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater (Construction Duration Inspections). The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request. The Operator shall post at the site, in a publicly accessible location, a summary of the site inspection activities on a monthly basis (Monthly Summary Report).

The operator shall also prepare a written summary of compliance with this general permit at a minimum frequency of every three months (Operator's Compliance Response Form), while coverage exists. The summary should address the status of achieving each component of the SWPPP.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified professional perform a final site inspection. The qualified professional shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

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[1] "Qualified Professional means a person knowledgeable in the principles and practice of erosion and sediment controls, such as a Certified Professional in Erosion and Sediment Control (CPESC), soil scientist, licensed engineer or someone working under the direction and supervision of a licensed engineer (person must have experience in the principles and practices of erosion and sediment control).

[2] "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.

[3] "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

b. Operators Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. Further, I hereby certify that the SWPPP meets all Federal, State, and local erosion and sediment control requirements. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law. "

Name (please print):____

Title ______________________________________**Date:**_______________

Address: ____

Phone: ____________ **Email:**______________________________________

Signature:____

c. Qualified Professional's Credentials & Certification

“ I hereby certify that I meet the criteria set forth in the General Permit to conduct site inspections for this project and that the appropriate erosion and sediment controls described in the SWPPP and as described in the following Pre-construction Site Assessment Checklist have been adequately installed or implemented, ensuring the overall preparedness of this site for the commencement of construction.”

Name (please print):____

Title ______________________________________**Date:**_______________

Address: ____

Phone: ____________ **Email:**______________________________________

Signature:____

d. Pre-construction Site Assessment Checklist (NOTE: Provide comments below as necessary)

1. Notice of Intent, SWPPP, and Contractors Certification:

Yes No NA
[ ] [ ] [ ] Has a Notice of Intent been filed with the NYS Department of Conservation?
[ ] [ ] [ ] Is the SWPPP on-site? Where?_____________________________
[ ] [ ] [ ] Is the Plan current? What is the latest revision date?______________
[ ] [ ] [ ] Is a copy of the NOI (with brief description) onsite? Where?______________
[ ] [ ] [ ] Have all contractors involved with stormwater related activities signed a contractor’s certification?

Pre-construction Site Assessment Checklist (continued)

2. Resource Protection

Yes No NA

[ ] [ ] [ ] Are construction limits clearly flagged or fenced?

[ ] [ ] [ ] Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.

[ ] [ ] [ ] Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection

Yes No NA

[ ] [ ] [ ] Clean stormwater runoff has been diverted from areas to be disturbed.

[ ] [ ] [ ] Bodies of water located either on site or in the vicinity of the site have been identified and protected.

[ ] [ ] [ ] Appropriate practices to protect on-site or downstream surface water are installed.

[ ] [ ] [ ] Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Entrance

Yes No NA

[ ] [ ] [ ] A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.

[ ] [ ] [ ] Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.

[ ] [ ] [ ] Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Perimeter Sediment Controls

Yes No NA

[ ] [ ] [ ] Silt fence material and installation comply with the standard drawing and specifications.

[ ] [ ] [ ] Silt fences are installed at appropriate spacing intervals

[ ] [ ] [ ] Sediment/detention basin was installed as first land disturbing activity.

[ ] [ ] [ ] Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials

Yes No NA

[ ] [ ] [ ] The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.

[ ] [ ] [ ] The plan is contained in the SWPPP on page ______

[ ] [ ] [ ] Appropriate materials to control spills are onsite. Where? __________________

II. CONSTRUCTION DURATION INSPECTIONS

a. Directions:
Inspection Forms will be filled out during the entire construction phase of the project.
Required Elements:

(1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

(2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

(3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;

Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);

(5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and

(6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

Project:		**Date:**	
Job No.:		**Time of inspection:**	
Contractor:		**Weather conditions:**	
Inspector (Print name):		**Temperature:**	
Permit ID No.		**Wind:**	
		Soil Conditions:	

SUGGESTED E&SC REMEDIAL WORK BASED ON CURRENT INSPECTION:

MOIFICATIONS TO THE SWPP BASED ON CURRENT INSPECTION:

Modification and reason:

Refer to attached site plan sketch for summary of observed site conditions (page 2).
Refer to attached inspection checklist (pages 3 to 6) for items inspected.

Project:		**Date:**	
Job No.:		**Client:**	

SITE SKETCH

Project:		**Date:**	
Job No.:		**Client:**	

INSPECTION CHECKLIST

Maintaining Water quality

Yes	No	N/A	
☐	☐	☐	Is there an increase in turbidity causing a substantial visible? Contrast to natural conditions?
☐	☐	☐	Is there residue from oil and floating substances, visible oil film, oil globules or grease
☐	☐	☐	Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Housekeeping

1. General Site conditions

Yes	No	N/A	
☐	☐	☐	Is construction site litter and debris appropriately managed?
☐	☐	☐	Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained.
☐	☐	☐	Is all disturbance within the limits of the approved plans? (i.e. no construction impacts to the adjacent property)?
☐	☐	☐	Is dust adequately controlled?

2. Temporary Stream crossing

Yes	No	N/A	
☐	☐	☐	Maximum diameter pipes necessary to span creek without dredging are installed.
☐	☐	☐	Installed non-woven geotextile fabric beneath approaches.
☐	☐	☐	Is fill composed of aggregate (no earth or soil)?
☐	☐	☐	Rock on approaches is clean enough to remove mud from vehicles and prevent sediment from entering stream during high flow.

Project:		**Date:**	
Job No.:		**Client:**	

Runoff Control practices

1. Excavation Dewatering

Yes No N/A

☐ ☐ ☐ Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.

☐ ☐ ☐ Clean water from upstream pool is being pumped to the downstream pool.

☐ ☐ ☐ Sediment laden water from work area is being discharged to a silt-trapping device.

☐ ☐ ☐ Constructed upstream berm with one-foot minimum freeboard.

2. Level Spreader

Yes No N/A

☐ ☐ ☐ Installed per plan.

☐ ☐ ☐ Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.

☐ ☐ ☐ Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales

Yes No N/A

☐ ☐ ☐ Installed per plan with minimum side slopes @ 2H:1V or flatter.

☐ ☐ ☐ Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.

☐ ☐ ☐ Sediment-laden runoff directed to sediment trapping structure.

4. Stone check Dam

Yes No N/A

☐ ☐ ☐ Is channel stable? (flow is not eroding soil underneath or around the structure).

☐ ☐ ☐ Check is in good condition (rocks in place and no permanent pools behind the structure).

☐ ☐ ☐ Has accumulated sediment been removed?

Project:		**Date:**	
Job No.:		**Client:**	

5. Rock Outlet protection

Yes	**No**	**N/A**	
☐	☐	☐	Installed per plan
☐	☐	☐	Installed concurrently with pipe installation.

Soil stabilization

1. Topsoil and Spoil Stockpiles.

Yes	**No**	**N/A**	
☐	☐	☐	Stockpiles are stabilized with vegetation and/or mulch.
☐	☐	☐	Sediment control is installed at the toe of the slope.

2. Revegetation

Yes	**No**	**N/A**	
☐	☐	☐	Temporary seedings and mulch have been applied to idle areas.
☐	☐	☐	Four (4) inches minimum of topsoil has been applied under permanent seedings.

Sediment Control

1. Stabilize Construction Entrance.

Yes	**No**	**N/A**	
☐	☐	☐	Stone is clean enough to effectively remove mud from vehicles.
☐	☐	☐	Installed per standards and specifications?
☐	☐	☐	Does all traffic use the stabilized entrance to enter and leave site?
☐	☐	☐	Is adequate drainage provided to prevent ponding at entrance?

2. Silt Fence.

Yes	**No**	**N/A**	
☐	☐	☐	Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
☐	☐	☐	Joints constructed by wrapping the two ends together for continuous support.
☐	☐	☐	Fabric buried six (6) inches minimum.
☐	☐	☐	Posts are stable, fabric is tight and without rips or frayed areas. Sediment accumulation is __%__ of capacity.

Project:		**Date:**	
Job No.:		**Client:**	

3. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or Excavated Practices).

Yes	**No**	**N/A**	
☐	☐	☐	Installed concrete blocks lengthwise so open ends face outward, not upward.
☐	☐	☐	Place wire screen between No.3 crushed stone and concrete blocks.
☐	☐	☐	Drainage area is one (1) acre or less.
☐	☐	☐	Excavated area is 900 cubic feet.
☐	☐	☐	Excavated side slopes should be 2:1.
☐	☐	☐	2' x 4' frame is constructed and structurally sound.
☐	☐	☐	Posts 3-foot maximum spacing between posts.
☐	☐	☐	Fabric is embedded 1 to 1.5 feet below ground and secured to frame/post with staples at max 8-inch spacing.
☐	☐	☐	Posts are stable, fabric is tight and without rips or frayed areas. Sediment accumulation __%of design capacity.

4. Temporary Sediment Trap

Yes	**No**	**N/A**	
☐	☐	☐	Outlet structure is constructed per the approved plan or drawing.
☐	☐	☐	Geotextile fabric has been placed beneath rock fill. Sediment Accumulation is _____% of design capacity.

5. Temporary Sediment Basin

Yes	**No**	**N/A**	
☐	☐	☐	Basin and outlet structure constructed per the approved plan.
☐	☐	☐	Basin side slopes are stabilized with seed/mulch.
☐	☐	☐	Drainage structure flushed and basin restored upon removal of Sediment basin facility. Sediment accumulation __% of design capacity.

Project:		**Date:**	
Job No.:		**Client:**	

Additional Field Observations/Comments:

Qualified Professional Verification:
“I acknowledge that, to the best of my knowledge, all information provided within this inspection report is accurate and complete”.

Qualified Professional (print name): ___________________________________

(signature): ___________________________________

PHOTOGRAPHS OF SITE E&S DEFICIENCIES:

H.2 Bioretention

Planting Soil Bed Characteristics

The characteristics of the soil for the bioretention facility are perhaps as important as the facility location, size, and treatment volume. The soil must be permeable enough to allow runoff to filter through the media, while having characteristics suitable to promote and sustain a robust vegetative cover crop. In addition, much of the nutrient pollutant uptake (nitrogen and phosphorus) is accomplished through adsorption and microbial activity within the soil profile. Therefore, the soils must balance soil chemistry and physical properties to support biotic communities above and below ground.

The planting soil should be a sandy loam, loamy sand, loam (USDA), or a loam/sand mix (should contain a minimum 35 to 60% sand, by volume). The clay content for these soils should by less than 25% by volume. Soils should fall within the SM, or ML classifications of the Unified Soil Classification System (USCS). A permeability of at least 1.0 feet per day (0.5"/hr) is required (a conservative value of 0.5 feet per day is used for design). The soil should be free of stones, stumps, roots, or other woody material over 1" in diameter. Brush or seeds from noxious weeds. Placement of the planting soil should be in lifts of 12 to 18", loosely compacted (tamped lightly with a dozer or backhoe bucket). The specific characteristics are presented in Table H.2.

Table H.2 Planting Soil Characteristics

Parameter	Value
PH range	5.2 to 7.00
Organic matter	1.5 to 4.0%
Magnesium	35 lbs. per acre, minimum
Phosphorus (P_2O_5)	75 lbs. per acre, minimum
Potassium (K_2O)	85 lbs. per acre, minimum
Soluble salts	≤ 500 ppm
Clay	10 to 25%
Silt	30 to 55%
Sand	35 to 60%

Mulch Layer

The mulch layer plays an important role in the performance of the bioretention system. The mulch layer helps maintain soil moisture and avoid surface sealing which reduces permeability. Mulch helps prevent erosion, and provides a micro-environment suitable for soil biota at the mulch/soil interface. It also serves as a pretreatment layer, trapping the finer sediments which remain suspended after the primary pretreatment.

The mulch layer should be standard landscape style, single or double, shredded hardwood mulch or chips. The mulch layer should be well aged (stockpiled or stored for at least 12 months), uniform in color, and free of other materials, such as weed seeds, soil, roots, etc. The mulch should be applied to a maximum depth of three inches. Grass clippings should not be used as a mulch material.

Planting Plan Guidance

Plant material selection should be based on the goal of simulating a terrestrial forested community of native species. Bioretention simulates an ecosystem consisting of an upland-oriented community dominated by trees, but having a distinct community, or sub-canopy, of understory trees, shrubs and herbaceous materials. The intent is to establish a diverse, dense plant cover to treat stormwater runoff and withstand urban stresses from insect and disease infestations, drought, temperature, wind, and exposure.

The proper selection and installation of plant materials is key to a successful system. There are essentially three zones within a bioretention facility (Figure H.1). The lowest elevation supports plant species adapted to standing and fluctuating water levels. The middle elevation supports a slightly drier group of plants, but still tolerates fluctuating water levels. The outer edge is the highest elevation and generally supports plants adapted to dryer conditions. When using Table A.5 to identify species, use the following guideline:

Lowest Zone:	Zones 2-3
Middle Zone:	Zones 3-4
Outer Zone:	Zones 5-6

The layout of plant material should be flexible, but should follow the general principals described in Table H.3. The objective is to have a system which resembles a random and natural plant layout, while maintaining optimal conditions for plant establishment and growth.

Figure H.1 Planting Zones for Bioretention Facilities

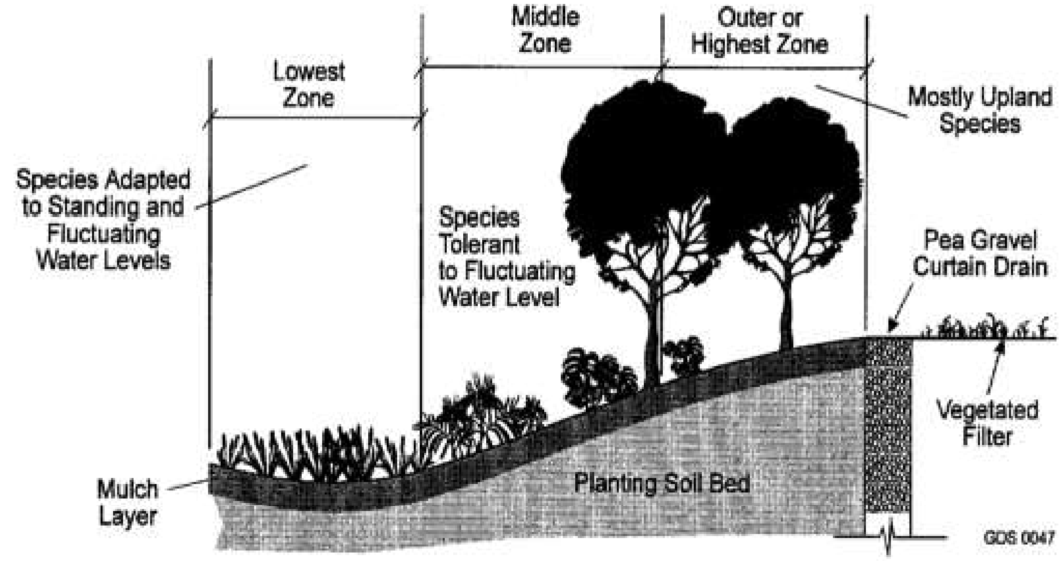


Table H.3 Planting Plan Design Considerations
Native plant species should be specified over exotic or foreign species.
Appropriate vegetation should be selected based on the zone of hydric tolerance (see Figure H.1).
Species layout should generally be random and natural.
A canopy should be established with an understory of shrubs and herbaceous materials.
Woody vegetation should not be specified in the vicinity of inflow locations.
Trees should be planted primarily along the perimeter of the bioretention area.
Urban stressors (e.g., wind, sun, exposure, insect and disease infestation, drought) should be considered when laying out the planting plan.
Noxious weeds should not be specified.
Aesthetics and visual characteristics should be a prime consideration.
Traffic and safety issues must be considered.
Existing and proposed utilities must be identified and considered.

Plant Material Guidance

Plant materials should conform to the American Standard Nursery Stock, published by the American Association of Nurserymen, and should be selected from certified, reputable nurseries. Planting specifications should be prepared by the designer and should include a sequence of construction, a description of the contractor's responsibilities, a planting schedule and installation specifications, initial maintenance, and a warranty period and expectations of plant survival. Table H.4 presents some typical issues for planting specifications.

Table H.4 Planting Specification Issues for Bioretention Areas

Specification Element	Elements
Sequence of Construction	Describe site preparation activities, soil amendments, etc.; address erosion and sediment control procedures; specify step-by-step procedure for plant installation through site clean-up.
Contractor's Responsibilities	Specify the contractors responsibilities, such as watering, care of plant material during transport, timeliness of installation, repairs due to vandalism, etc.
Planting Schedule and Specifications	Specify the materials to be installed, the type of materials (e.g., B&B, bare root, containerized); time of year of installations, sequence of installation of types of plants; fertilization, stabilization seeding, if required; watering and general care.
Maintenance	Specify inspection periods; mulching frequency (annual mulching is most common); removal and replacement of dead and diseased vegetation; treatment of diseased trees; watering schedule after initial installation (once per day for 14 days is common); repair and replacement of staking and wires.
Warranty	Specify the warranty period, the required survival rate, and expected condition of plant species at the end of the warranty period.

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)

Plant Name	Zone	Form	Available	Inundation Tolerance	Wildlife Value	Notes
Trees and Shrubs						
American Elm *(Ulmus americana)*	4,5,6	Dec. Tree	yes	Irregular-seasonal saturation	High. Food (seeds,browsing), cover, nesting for birds & mammals	Susceptible to diesease (short-lived). Sun to full shade, tolerates drought and wind/ice damage.
Arrowwood Viburrium *(Viburrium dentatum)*	3,4	Dec. Shrub	yes	yes	High. Songbirds and mammals	Grows best in sun to partial shade
Bald Cypress *(Taxodium distichum)*	3,4	Dec. Tree	yes	yes	Little food value, but good perching site for waterfowl	Forested Coastal Plain. North of normal range. Tolerates drought.
Bayberry *(Myrica pensylvanica)*	4,5,6	Dec. Shrub	yes	yes	High. Nesting, food, cover. Berries last into winter	Coastal Plain only. Roots fix N_2 Tolerates slightly acidic soils.
Black Ash *(Fraxinus nigra)*	3,4,5	Dec. Tree	yes	Irregular-seasonal saturation	High. Food (seeds, sap), cover, nesting for birds & mammals. Fruit persists in winter	Rapid growth. Requires full sun. Susceptible to wind/ice damage & disease. Tolerates drought and infrequent flooding by salt water.
Black Cherry *(Prunus serotina)*	5,6	Dec. Tree	yes	no	High. Food	Moist soils or wet bottomland areas
Blackgum or Sourgum *(Nyssa sylvatica)*	4,5,6	Dec. Tree	yes	yes	High. Songbirds, egrets, herons, raccoons, owls	Can be difficult to transplant. Prefers sun to partial shade
Black Willow *(Salix nigra)*	3,4,5	Dec. Tree	yes	yes	High. Browsing and cavity nesters.	Rapid growth, stabilizes stream-banks. Full sun
Buttonbush *(Cepahlanthus occidentalis)*	2,3,4,5	Dec. Shrub	yes	yes	High. Ducks and shorebirds. Seeds, nectar and nesting.	Full sun to partial shade. Will grow in dry areas.
Common Spice Bush *(Lindera benzoin)*	3,4,5	Dec. Shrub	yes	yes	Very high. Songbirds	Shade and rich soils. Tolerates acidic soils. Good understory species

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)

Plant Name	Zone	Form	Available	Inundation Tolerance	Wildlife Value	Notes
Eastern Cottonwood *(Populus deltoides)*	4,5	Dec. Tree	yes	yes	Moderate. Cover, food.	Shallow rooted, subject to windthrow. Invasive roots. Rapid growth.
Eastern Hemlock *(Tsuga canadensis)*	5,6	Conif. Tree	yes	yes	Moderate. Mostly cover and some food	Tolerates all sun/shade conditions. Tolerates acidic soil.
Eastern Red Cedar *(Juniperus virginiana)*	4,5,6	Conif. Tree	yes	no	High. Fruit for birds. Some cover.	Full sun to partial shade. Common in wetlands, shrub bogs and edge of stream
Elderberry *(Sambucus canadensis)*	3,4,5,6	Dec. Shrub	yes	yes	Extremely high. Food and cover, birds and mammals.	Full sun to partial shade.
Green Ash, Red Ash *(Fraxinus pennsylvania)*	4,5	Dec. Tree	yes	yes	Moderate. Songbirds.	Rapid growing streambank stabilizer. Full sun to partial shade.
Hackenberry *(Celtis occidentalis)*	5,6	Dec. Tree	yes	some	High. Food and cover	Full sun to partial shade.
Larch, Tamarack *(Larix latricina)*	3,4	Conif. Tree	no	yes	Low. Nest tree and seeds.	Rapid initial growth. Full sun, acidic boggy soil.
Pin Oak *(Quercus palustris)*	3,4,5,6	Dec. Tree	yes	yes	High. Tolerates acidic soil	Gypsy moth target. Prefers well drained, sandy soils.
Red Choke Berry *(Pyrus arbutifolia)*	3,4,5	Dec. Shrub	no	yes	Moderate. Songbirds.	Bank stabilizer. Partial sun.
Red Maple *(Acer rubrum)*	3,4,5,6	Dec. Tree	yes	yes	High seeds and browse. Tolerates acidic soil.	Rapid growth.
River Birch *(Betula nigra)*	3,4,5	Dec. Tree	yes	yes	Low. Good for cavity nesters.	Bank erosion control. Full sun.
Shadowbush, Serviceberry *(Amelanchier*	4,5,6	Dec. Shrub	yes	yes	High. Nesting, cover, food. Birds and	Prefers partial shade. Common in forested

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)

Plant Name	Zone	Form	Available	Inundation Tolerance	Wildlife Value	Notes
canadensis)					mammals.	wetlands and upland woods.
Silky Dogwood *(Cornus amomium)*	3,4,5	Dec. Shrub	yes	yes	High. Songbirds, mammals.	Shade and drought tolerant. Good bank stabilizer.
Slippery Elm *(Ulnus rubra)*	3,4,5	Dec. Tree	rare	yes	High. Food (seeds, buds) for birds & mammals (browse). Nesting	Rapid growth, no salinity tolerance. Tolerant to shade and drought.
Smooth Alder *(Alnus serrulata)*	3,4,5	Dec. Tree	no	yes	High. Food, cover.	Rapid growth. Stabilizes streambanks.
Speckled Alder *(Alnus rugosa)*	3,4	Dec. Shrub	yes	yes	High. Cover, browse for deer, seeds for bird.	
Swamp White Oak *(Quercus bicolor)*	3,4,5	Dec. Tree	yes	yes	High. Mast	Full sun to partial shade. Good bottomland tree.
Swamp Rose *(Rosa Palustrus)*	3,4	Dec. Shrub		Irregular, seasonal, or regularly saturated	High. Food (hips) for birds including turkey, ruffed grouse and mammals. Fox cover.	Prefers full sun. Easy to establish. Low salt tolerance.
Sweetgum *(Liquidambar styraciflua)*	4,5,6	Dec. Tree	yes	yes	Moderate. Songbirds	Tolerates acid or clay soils. Sun to partial shade.
Sycamore *(Platanus occidentalis)*	4,5,6,	Dec. Tree	yes	yes	Low. Food, cavities for nesting.	Rapid growth. Common in floodplains and alluvial woodlands.
Tulip Tree *(Liriodendron tulipifera)*	5,6	Dec. Tree	yes	no	Moderate. Seeds and nest sites	Full sun to partial shade. Well drained soils. Rapid growth.
Tupelo *(Nyssa sylvatica vari biflora)*	3,4,5	Dec. Tree	yes	yes	High. Seeds and nest sites	Ornamental

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)

Plant Name	Zone	Form	Available	Inundation Tolerance	Wildlife Value	Notes
White Ash *(Fraxinus americana)*	5,6	Dec. Tree	yes	no	High. Food	All sunlight conditions. Well drained soils.
Winterberry *(Ilex verticillata)*	3,4,5	Dec. Shrub	yes	yes	High. Cover and fruit for birds. Holds berries into winter.	Full sun to partial shade. Seasonally flooded areas.
Witch Hazel *(Hamamelis virginiana)*	4,5	Dec. Shrub	yes	no	Low. Food for squirrels, deer, and ruffed grouse.	Prefers shade. Ornamental.
Herbaceous Plants						
Arrow arum *(Peltandra virginica)*	2,3	Emergent	yes	up to 1 ft.	High. Berries are eaten by wood ducks.	Full sun to partial shade.
Arrowhead, Duck Potato *(Saggitaria latifolia)*	2,3	Emergent	yes	up to 1 ft.	Moderate. Tubers and seeds eaten by ducks.	Aggressive colonizer.
Big Bluestem (*Andropogon gerardi*)	4,5	Perimeter	yes	Irregular or seasonal inundation.	High. Seeds for songbirds. Food for deer	Requires full sun.
Birdfoot deervetch (*Lotus Corniculatus*)	4,5,6	Perimeter	yes	Infrequent inundation	High. Food for birds.	Full sun. Nitrogen fixer.
Blue Flag Iris *(Iris versicolor)*	2,3	Emergent	yes	Regular or permanently, up to ½ ft or saturated	Moderate. Food muskrat and wildfowl. Cover, marshbirds	Slow growth. Full sun to partial shade. Tolerates clay. Fresh to moderately brackish water.
Blue Joint (*Calamagrotis canadensis*)	2,3,4	Emergent	yes	Regular or permanent inundation up to 0.5 ft.	Moderate. Food for game birds and moose.	Tolerates partial shade
Broomsedge *(Andropogon virginicus)*	2,3	Perimeter	yes	up to 3 in.	High. Songbirds and browsers. Winter food and cover.	Tolerant of fluctuation water levels & partial shade.
Bushy Beardgrass *(Andropogon glomeratus)*	2,3	Emergent	yes	up to 1 ft.		Requires full sun.
Cardinal flower (*Lobelia cardinalis*)	4,5,6	Perimeter	yes	Some. Tolerates saturation up to 100% of season.	High. Nectar for hummingbird, oriole, butterflies.	Tolerates partial shade

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)

Plant Name	Zone	Form	Available	Inundation Tolerance	Wildlife Value	Notes
Cattail *(Typha sp.)*	2,3	Emergent	yes	up to 1 ft.	Low. Except as cover	Aggressive. May eliminate other species. Volunteer. High pollutant treatment
Coontail *(Ceratophyllum demersum)*	1	Submergent	no	yes	Low food value. Good habitat and shelter for fish and invertebrates.	Free floating SAV. Shade tolerant. Rapid growth.
Common Three-Square *(Scirpus pungens)*	2	Emergent	yes	up to 6 in.	High. Seeds, cover. Waterfowl and fish.	High metal removal.
Duckweed *(Lemma sp.)*	1,2	Submergent/ Emergent	yes	yes	High. Food for waterfowl and fish.	High metal removal.
Fowl mannagrass (*Glyceria striata*)	4,5	Perimeter	yes	Irregular or seasonal inundation	High. Food for waterfowl, muskrat, and deer.	Partial to full shade.
Hardstem Bulrush *(Scirpus acutus)*	2	Emergent	yes	up to 3 ft.	High. Cover, food (achenes, rhizomes) ducks, geese, muskrat, fish. Nesting for bluegill and bass.	Quick to establish, fresh to brackish. Good for sediment stabilization and erosion control.
Giant Burreed *(Sparganium eurycarpum)*	2,3	Emergent	rare	Regular to permanently inundated. up to 1 ft.	High. Food (seeds, plant) waterfowl, beaver & other mammals. Cover for marshbirds, waterfowl.	Rapid spreading . Tolerates partial sun. Good for shoreline stabilization.. Salinity <0.5 ppt
Lizard's Tail *(Saururus cernuus)*	2	Emergent	yes	up to 1 ft.	Low, except wood ducks.	Rapid growth. Shade tolerant
Long-leaved Pond Weed *(Potamogeton nodosus)*	1,2	Rooted submerged aquatic	yes	up to 1-6 ft. depending on turbidity	High. Food (seeds, roots) waterfowl, aquatic fur-bearers, deer, moose. Habitat for fish	Rapid spread. Salinity <0.5 ppt. Flowers float on surface, Aug.-Sept.

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)						
Plant Name	**Zone**	**Form**	**Available**	**Inundation Tolerance**	**Wildlife Value**	**Notes**
Marsh Hibiscus *(Hibiscus moscheutos)*	2,3	Emergent	yes	up to 3 in.	Low. Nectar.	Full sun. Can tolerate periodic dryness.
Pickerelweed *(Pontederia cordata)*	2,3	Emergent	yes	up to 1 ft.	Moderate. Ducks. Nectar for butterflies.	Full sun to partial shade.
Pond Weed, Sago *(Potamogeton pectinatus*	1	Submergent	yes	yes	Extremely high. Waterfowl, marsh and shorebirds.	Removes heavy metals.
Redtop (*Agrostis alba*)	3,4,5	Perimeter	yes	Up to 25% of season	Moderate. Rabbits and some birds.	Quickly established but not highly competitive.
Rice Cutgrass *(Leersia oryzoides)*	2,3	Emergent	yes	up to 3 in.	High. Food and cover.	Full sun although tolerant of shade. Shoreline stabilization.
Sedges *(Carex spp.)*	2,3	Emergent	yes	up to 3 in.	High waterfowl, songbirds.	Many wetland and upland species.
Tufted Hairgrass (*Deschampsia caespitosa*)	3,4,5	Perimeter	yes	Regular to irregular inundation.	High.	Full sun. May become invasive.
Soft-stem Bulrush *(Scirpus validus)*	2,3	Emergent	yes	up to 1 ft.	Moderate. Good cover and food.	Full sun. Aggressive colonizer. High pollutant removal.
Smartweed *(Polygonum spp.)*	2,3,4	Emergent	yes	up to 1 ft.	High. Waterfowl, songbirds. Seeds and cover.	Fast colonizer. Avoid weedy aliens such as *P. perfoliatum.*
Soft Rush *(Juncus effusus)*	2,3,4	Emergent	yes	up to 3 in.	Moderate.	Tolerates wet or dry conditions.
Spatterdock *(Nuphar luteum)*	2	Emergent	yes	up to 3 ft.	Moderate for food but high for cover.	Fast colonizer. Tolerant of fluctuating water levels.
Switchgrass *(Panicum virgatum)*	2,3,4,5,6	Perimeter	yes	up to 3 in.	High. Seeds, cover for waterfowl, songbirds.	Tolerates wet/dry conditions.

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)

Plant Name	Zone	Form	Available	Inundation Tolerance	Wildlife Value	Notes
Sweet Flag *(Acorus calamus)*	2,3	Herbaceous	yes	up to 3 in.	Low.	Tolerant of dry periods. Not a rapid colonizer. Tolerates acidic conditions.
Waterweed *(Elodea canadensis)*	1	Submergent	yes	yes	Low.	Good water oxygenator. High nutrient, copper, manganese and chromium removal.
Wild Celery *(Valisneria americana)*	1	Submergent	yes	yes	High. Food for waterfowl. Habitat for fish and invertebrates.	Tolerant of murkey water and high nutrient loads.
Wild Rice *(Zizania aquatica)*	2	Emergent	yes	up to 1 ft.	High. Food for birds.	Prefers full sun
Wool Grass *(Scirpus cyperinus)*	2,3	Emergent	yes	Irregularly to seasonally indundated	Moderate. Cover, Food.	Requires full sun. Can tolerate acidic soils, drought. Colonizes disturbed areas, moderate growth.

Bioretention Operation, Maintenance and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	**SATISFACTORY / UNSATISFACTORY**	**COMMENTS**
1. Debris Cleanout (Monthly)		
Bioretention and contributing areas clean of debris		
No dumping of yard wastes into practice		
Litter (branches, etc.) have been removed		
2. Vegetation (Monthly)		
Plant height not less than design water depth		
Fertilized per specifications		
Plant composition according to approved plans		
No placement of inappropriate plants		
Grass height not greater than 6 inches		
No evidence of erosion		
3. Check Dams/Energy Dissipaters/Sumps (Annual, After Major Storms)		
No evidence of sediment buildup		

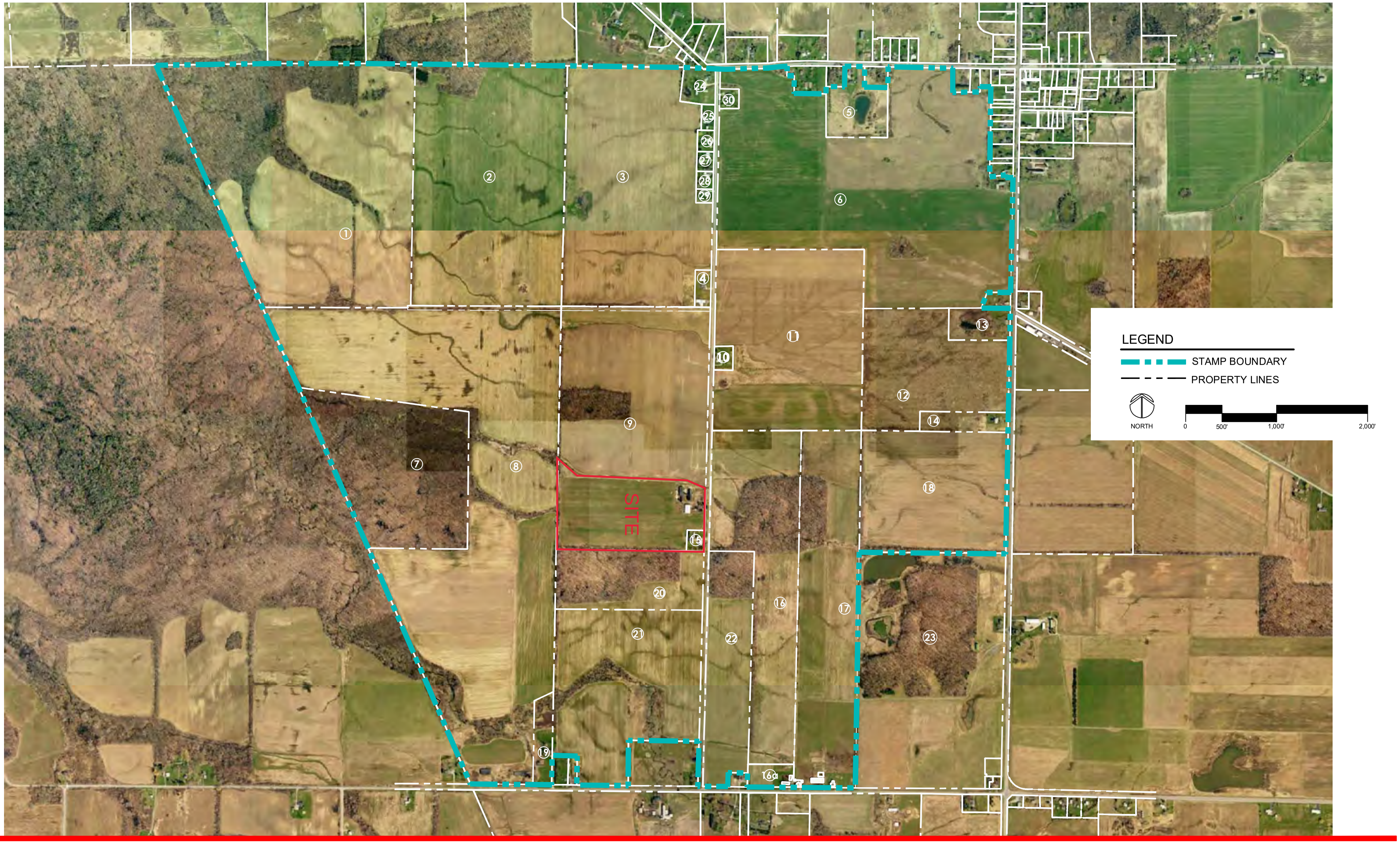
MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Sumps should not be more than 50% full of sediment		
No evidence of erosion at downstream toe of drop structure		
4. Dewatering (Monthly)		
Dewaters between storms		
No evidence of standing water		
5. Sediment Deposition (Annual)		
Swale clean of sediments		
Sediments should not be > 20% of swale design depth		
6. Outlet/Overflow Spillway (Annual, After Major Storms)		
Good condition, no need for repair		
No evidence of erosion		
No evidence of any blockages		
7. Integrity of Filter Bed (Annual)		
Filter bed has not been blocked or filled inappropriately		

Comments:

Actions to be Taken:

Appendix I

SEQR



ATTACHMENT 2 - STAMP SITE PARCELS

WNY SCIENCE AND TECHNOLOGY ADVANCED MANUFACTURING PARK (STAMP)

FEBRUARY 2016

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Attachment 1

STAMP Cultural Resource Investigation Status Table

2/23/2017

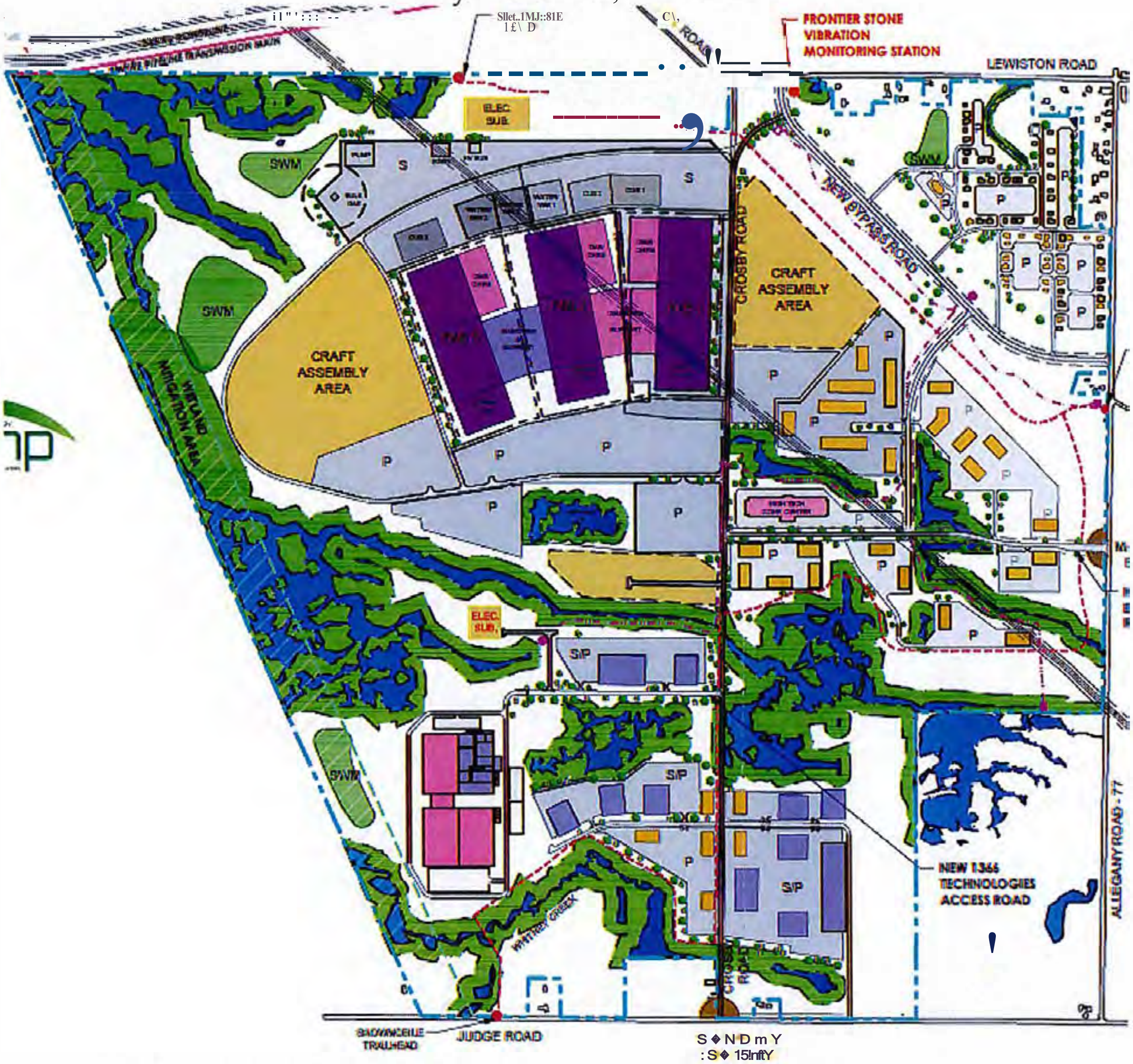
ON-SITE	COMPLETE	UNDERWAY	REQUIRED - PRIORITY	LOW PRIORITY	NOT REQUIRED	CLEARED	NOTES
Phase IA	Parcels 1-4, 6, 8-12, 14-18, 22-23, 25-26, 28-30	None	Parcels 5, 13, 20-21, 24, 27	Parcel 19	Parcel 7, 23	See Below	Remaining parcels are not currently owned by EDC. Parcel 7 is all wetland, no disturbance. Parcel 23 is no longer part of STAMP Site (John White WMA).
Phase IB	Parcels 1-4, 6, 8-12, 14-18, 22-23, 25-26, 28-30	None	Parcels 5, 13, 20-21, 24, 27	Parcel 19	Parcel 7, 23	Parcels 4, 9-10, 12, 14-15, 18, 22, 25-26, 28-30	27 Phase II Sites were identified during on-site Phase IB Investigation. Parcel 9 fully cleared when Phase III on Site 3 approved by SHPO
Phase II	Sites 3-7, 23	Sites 1-2, 8-15, 17-21, 24, 27	Underway	Underway	Sites 16, 22, 25	Sites 4,7, 23	Fieldwork to be completed on all Phase II Sites currently underway in March 2017, reports by May 2017, Phase III Sites will be identified
Phase III	Sites 3 and 6	None	Site 5 and any resulting from Phase II Sites currently underway	None	None	None	Reports for Sites 3 and 6 currently being reviewed. A programmatic agreement may be required for final review and approval of data recovery at complete and future Phase III sites

OFF-SITE	COMPLETE	UNDERWAY	REQUIRED - PRIORITY	LOW PRIORITY	NOT REQUIRED	CLEARED	NOTES
Phase IA	Water Phase 1 and 2, Sanitary Sewer	None	None	None	None	See Below	
Phase IB	Water Phase 1	Water Phase 2 and Sanitary Sewer	None	None	None	Water Phase 1	Portions of Water Phase 2 and Sanitary Sewer require work on federal property, permitting ongoing, projected fieldwork in March 2017
Phase II			UNKNOWN	UNKNOWN	UNKNOWN		
Phase III			UNKNOWN	UNKNOWN	UNKNOWN		

See STAMP Cultural Resource Inventory Update Memo and Maps for details.

New York State Environmental Quality Review Act
Lead Agency Amended Findings Statement
for the
Western New York Science & Technology Advanced Manufacturing Park (STAMP)
July, 2016

Town of Alabama
County of Genesee, New York



Lead Agency and Project Sponsor:

Genesee County Economic Development Center (GCEDC)

NEW YORK STATE ENVIRONMENTAL QUALITY REVIEW ACT

GENESEE COUNTY ECONOMIC DEVELOPMENT CENTER

AMENDED FINDINGS STATEMENT

WESTERN NEW YORK SCIENCE & TECHNOLOGY ADVANCED MANUFACTURING PARK (STAMP)

This document is an amended Findings Statement prepared pursuant to the New York State Environmental Quality Review Act, Article 8 of the Environmental Conservation Law and the regulations promulgated thereto at 6 N.Y.C.R.R. Part 617 (collectively referred to as **"SEQRA")** by the Genesee County Industrial Development Agency d/b/a the Genesee County Economic Development Corporation **("GCEDC")** as Lead Agency for the proposed Western New York Science & Technology Advanced Manufacturing Park **("STAMP"** or the **"Project")** an advanced manufacturing technology campus on approximately 1,262 acres located on the west side of New York State Route 63/77, approximately five miles north of the I-90/New York State Thruway **("Site")** in the Town of Alabama, New York **("Town").** The GCEDC is the Project Sponsor and hereby approves the Project as modified and recommits to undertaking the Project.

This Amended Findings Statement draws upon the matters set forth in the SEQRA record, including the generic environmental impact statement consisting of the Draft Generic Environmental Impact Statement **("DGEIS")** accepted by the GCEDC on April 14, 2011, the Final Generic Envfronmental Impact Statement **("FGEIS")** accepted by the GCEDC on January 19, 2012, as well as the public comments on the DGEIS received at the May 12, 2011 public hearing and during the public comment period which was conducted from April 21, 2011 through June 23, 2011. (Collectively, the DGEIS and the FGEIS are referred to as the **"GEIS").** A smart growth impact statement pursuant to the State Smart Growth Public Infrastructure Policy Act was completed separately from the GEIS in February, 2012.

The purposes of the STAMP GEIS was to identify and evaluate the potential significant adverse environmental impacts of STAMP, compare the reasonable alternatives, and, where applicable, to identify reasonable mitigation measures to reduce the effect of those impacts to the maximum extent practicable, while weighing the substantial potential social and economic benefits of STAMP. The GCEDC, as lead agency, issued a written Findings Statement **("GCEDC Findings")** on March 12, 2012 approving the Project and committing to undertake it.

There have been a number of changes contemplated to STAMP since the completion of the GEIS including changes to sewer service for STAMP (wastewater from STAMP will now be routed to the Village of Medina Waste Water Treatment Facility **("Medina WWTF"))** and revisions to the STAMP Master Plan (collectively, all changes are referred to as the **"Project Changes").** In addition, 1366 Technologies Inc., **("1366 Technologies")** has recently committed to become the first tenant of STAMP with the construction and operation of a large scale advanced manufacturing facility in the southwest corner of the Site **("1366 Facility").** Certain infrastructure including sewer, water, electrical and natural gas must be extended to the Site in conjunction with the 1366 Facility **("STAMP Track I Infrastructure").**

In light of the proposed 1366 Facility and the Project Changes, the GCEDC has conducted an updated environmental review of the Project to determine whether the 1366 Facility and/or the Project Changes will result in any significant adverse environmental impacts which were not addressed in the GEIS or the GCEDC Findings **("SEQRA Update").** This process began with the GCEDC issuing notice of its intent to formally re-establish its Lead Agency status for the purpose of conducting this SEQRA Update in March, 2016. No interested or involved agencies objected to the GCEDC's intent to formally re-establish its Lead Agency status for the Project. Accordingly, the GCEDC became Lead Agency for purposes of this SEQRA Update in April, 2016.

The GCEDC Findings establish the procedures for the SEQRA Update. Specifically, the GCEDC Findings provide:

> Final designs for less-defined Project components, as well as any proposed changes to the more well-defined elements (hereinafter referred to "Future Project Use(s)"), may require further evaluation pursuant to SEQRA. GCEDC, as lead agency, will be responsible for performing an environmental determination on Future Project Uses pursuant to SEQRA, and will consider Future Project Uses proposals in relation to: (i) the DGEIS: (ii) the FGEIS; and (iii) this Findings Statement.
>
> Upon development of specific site plans, simultaneously with review by the Town of Alabama Planning Board for site plan approval, GCEDC shall determine if the environmental impacts associated with such Future Project Uses have been adequately addressed in the DGEIS, the FGEIS and this Findings Statement, taking into account whether the Future Project Uses exceed any of the thresholds set forth herein. Such a determination must be made before any site plans for Future Project Uses are approved by the Planning Board.
>
> In the event that GCEDC determines that:
>
> 1. the Future Project Uses would be carried out in conformance with the conditions and thresholds set forth in this Section 10, then no further SEQRA compliance will be required;
> 2. the Future Project Uses would be carried out in conformance with the conditions and thresholds set forth in this Section 10, but are not addressed or are not adequately addressed in the DGEIS, the FGEIS or this Findings Statement, then an amended Findings Statement will be prepared;
> 3. the Future Project Uses are not addressed or are not adequately addressed in the DGEIS, the FGEIS or this Findings Statement, but the proposal does not exceed any of the conditions or thresholds set forth in this Section 10, or the proposal does exceed a threshold set forth in this Section 10, but would not result in any

potential significant adverse environmental impacts, then a Negative Declaration will be prepared pursuant to 6 N.Y.C.R.R. § 617.10(d)(3); or

4. the Future Project Uses are not addressed or are not adequately addressed in the DGEIS, the FGEIS or this Findings Statement for the Project and/or the proposed use would exceed the conditions or thresholds set forth in this Section 10 and may have one or more potential significant adverse environmental impacts, then a supplement to the FGEIS will be prepared.

A. Description of Action

1. GEIS Project Description

Per the FGEIS and the GCEDC Findings, STAMP was proposed to be located on 1,243.40 acres of land. STAMP's GEIS master plan **("GEIS Master Plan")** provided for the development of a high technology campus accommodating over 6 million square feet of advanced technology manufacturing and related uses providing direct employment of an estimated 9,330 people. Phase 1 of the GEIS Master Plan involved attempting to attract an anchor tenant technology manufacturing facility comprised of approximately 1 million square feet.

Per the FGEIS and the GCEDC Findings, the basic and overall purpose of the Project was defined as the development of an advanced manufacturing technology center in Genesee County **("County").** The Project was designed to target green-technology and advanced manufacturing companies involved in developing and manufacturing clean technology, renewable energy and/or energy efficient products. These companies were to include semi-conductor manufacturers, photovoltaic solar cell manufacturers, flat panel display manufacturers including medical imaging display, bio-pharmaceutical/ nanotechnology-enabled industries, and green technology research and development for energy efficient building products.

2. 1366 Technologies

As mentioned earlier, STAMP has secured its first tenant for the Project, 1366 Technologies, which plans to construct a large scale commercial manufacturing facility that will use a proprietary manufacturing process for making silicon wafers, whereby they produce multi-crystalline silicon wafers for solar cells at substantially lower costs and with less waste than current processes. Since silicon wafers are the largest cost component in the manufacture of silicon photovoltaic modules used in solar cells, this new process is anticipated to reduce the overall cost of solar power.

The 1366 Facility will be located in the southwest corner of the Site on a 105-acre site **("1366 Parcels")** which includes 41.1 acres of buildable area. The 1366 Facility is proposed to be built-out in phases. The first phase will include an approximate 150,000+/- sf facility that will initially produce 250MW of silicon wafers annually. The 1366 Facility would be quickly expanded over several years to allow for growth to 600,000+/- square feet to allow for 1 GW of silicon wafer production annually with up to 1,000 employees and approximately $700 million in total investment.

The 1366 Facility will be constructed, in part, with loan guarantees from the USDOE. The initial phase of the 1366 Facility is anticipated to commence operation in 2017, with full project build out expected by 2021.

3. Contemplated Project Changes Since 2012

As noted above, since the completion of the GEIS process in 2012, there have been a number of Project Changes summarized below.

a. Master Plan Changes/Updates

Since the completion of the GEIS, there have been a number of changes developed to the GEIS Master Plan as reflected in an updated master plan **("Updated Master Plan")** which retains the large green buffer around the majority of the perimeter of the Site and preservation of natural features across the Site within three different zones of development connected by internal walking/biking trails. In the Update Master Plan, more refinement has been added to the layout for the Fabs Complex and the 1366 Facility has been added to the campus in the southwest quadrant of the Site. Specific changes are described below.

(1) Changes to the Site Plan Layout

There are four major changes to the Site Plan layout as reflected in the Updated Master Plan. The first involves reductions in on-Site impacts to aquatic resources. Wetland impacts have been reduced to approximately 4.48 acres of federally regulated wetlands and 3.34 of non-jurisdictional wetlands (total of 7.82 acres). On-Site stream corridor impacts have also been reduced from 9,595 linear feet to approximately 9,446 linear feet.

The second change involves utility re-routing. The existing 115 kV power line that traverses the Site (from northwest quadrant to southeast/central area of Site) will be relocated to the perimeter of the Site. Electric service to 1366 Technologies will be run from the existing line south of the new access road into the Site from Route 63/77 ("Main Access Road") to the proposed electric substation north of the 1366 Parcels. Also, natural gas and sewer will be brought into the Site along the future Bypass Road/Connector Road right-of-way.

The third change involves realignment of the Main Access Road into the Site which has been straightened somewhat to run more directly to Crosby Road. This shift minimizes wetland impacts (.23 acres) while allowing for a larger development footprint north of the Main Access Road on the west side of Crosby Road.

The fourth change involves the relocation of the Bypass Road and realignment of the Connector Road between the Bypass Road and the Main Access Road. The Bypass Road has been moved southwest to a flat area atop the ridge line that runs along the northeast quadrant of the Site. These realignments result in a small expansion of TD3 and slight reduction to TDl and TD2.

(2) Changes to the TD Zoning Boundaries, Buffers and Regulations

The GCEDC has proposed modifications to the TD zoning regulations to clarify the intent of the Town of Alabama Town Board ("Town Board") with regard to zoning for the Site including: buffer use clarifications, the elimination of the 300-foot buffer along the northern side of the Site, the elimination of the 300-foot buffer on the interior of the Site between TD1/TD2 and TD3, the elimination of the 300-foot buffer for 500 linear feet on each side of the Main Access Road and that this area be zoned TD2, and the addition of solar panels as a special use permit in TDl and TD2. The GCEDC is proposing some minor changes to the TD district lines.

(3) Timing and Other Changes to the GEIS Master Plan

There are a number of other changes contemplated to the GEIS Master Plan. First, the GCEDC is accelerating the construction of this Main Access Road which will be completed in conjunction with the development of the 1366 Facility. In addition, the GCEDC has expanded the footprint of the Site to include all of the residential properties in the north-central area of STAMP along Crosby Road (except for the northern-most parcel at the intersection of Crosby Road and Lewiston Road). With these changes, the Site is now 1,262 acres. The GCEDC has requested that the Town Board rezone these residential parcels to TDl.

b. Demolition of the Houses Along Crosby Road

As a result of the expansion of the footprint of the Site to include all of the residential properties in the north-central section of STAMP along Crosby Road, six additional existing houses on Crosby Road are now proposed for demolition following acquisition by the GCEDC.

c. The Town Water Project

In order to extend water service to the Site, the GCEDC has entered into the Incentive Zoning Agreement ("IZA") with the Town, which, among other things, commits the GCEDC to design and install the a municipal water project ("Town Water Project") which has a currently estimated capital cost of $7,824,570 and will serve approximately 433 households in the Town. The GCEDC has agreed to include the Town Water Project within the scope of this SEQR Update.

d. Water Service for STAMP

Water required for the Project will be provided to the Site via a new 12 inch tran mission water main to be constructed along Judge Road and a portion of Route 63/77 between the Village of Oakfield and the Site. This main will be constructed in conjunction with the Town Water Project and will be owned and maintained by the Town.

e. Sewer Service for STAMP

The Village of Medina Wastewater Treatment Facility **("Medina WWTF")** has been selected as the preferred sanitary sewer effluent treatment alternative The Medina WWTF is approximately twelve miles north of the STAMP, and the route from the STAMP site to the Village of Medina has been established with input from the Village of Medina, Orleans County and the Town of Shelby. The Medina WWTF can handle approximately 1 MGD of sewage from

STAMP without significant upgrades to its treatment plant. Ultimately, with upgrades, it is anticipated that the Medina WWTF would be able to handle up to 2.5 MGD of sewage from STAMP.

f. The Northern Long Eared Bat

The northern long-eared bat **("NLE Bat")** has recently been listed as a Threatened Species under State and Federal law. Potential impacts to the NLE Bat are being re-evaluated based on this species new listing as a Threatened Species.

B. Analysis of Environmental Impacts

This section provides an analysis of the environmental impacts of the 1366 Facility and the Project Changes relative to the environmental impacts identified and analyzed in the DGEIS, the FGEIS and the GCEDC's Findings (collectively referred to herein as **"GEIS/Findings").**

1. Impacts on Geology and Topography

a. The 1366 Facility

Because the 1366 Parcels and surrounding area are generally flat, consistent with the analysis in the GEIS/Findings, construction of the 1366 Facility and related infrastructure improvements will not require major alterations to the natural topography of the 1366 Parcels. Some of the topography on the Site will require slight grading and redistribution of soil material. Consistent with the GEIS/Findings, grading is anticipated to be balanced such that the amount of cut required by the development of the 1366 Facility and related infrastructure improvements will be approximately equal to the amount of fill required. Accordingly, the impacts to geology and topography from the construction and operation of the 1366 Facility and related infrastructure improvements are adequately addressed in the GEIS/Findings.

b. The Project Changes

(1) Master Plan Changes/Updates

Generally, there are no material impacts to geology and topography associated with the Master Plan Changes/Updates. The changes to the utility runs and the realignment of both the Main Access Road and Bypass Road will result in minor changes to grading plans on-Site as physical improvements are relocated. However, these changes will reduce earthwork and soil disturbance at the Site. Similarly, adjustments to the zoning regulations may result in minor changes to grading plans on-Site as some boundaries and buffers are reduced and/or relocated. The inclusion of the residential properties on the north end of Crosby Road will result in minor changes to grading plans on-Site as physical improvements are relocated. All of these changes are minor and well within the scope of actions analyzed in the GEIS/Findings.

(2) Demolition of the Houses Along Crosby Road

There are no material impacts to geology and topography associated with the demolition of the houses along Crosby Road that were not addressed in the GEIS/Findings. Following the completion of demolition, each house site will be appropriately re-graded with no anticipated changes to topography. To the extent any of the houses have basements, any subsurface improvements will be removed, and clean fill will be added to ensure level grading.

(3) The Town Water Project

There are no material impacts to geology and topography associated with the Town Water Project that were not addressed in the GEIS/Findings. Installation of water related infrastructure will be along public roads via a combination of open cut method and directional drill method. These installations will result in temporary impacts to geography and topography that were analyzed in the GEIS/Findings.

(4) Water Service for STAMP

There are no material impacts to geology and topography associated with water service for STAMP that were not addressed in the GEIS/Findings. As with the Town Water Project, on-Site installation of water related infrastructure will be along current and/or future roads via a combination of open cut method and directional drill method. These installations will result in temporary impacts that were analyzed in the GEIS/Findings.

(5) Sewer Service for STAMP

There are no material impacts to geology and topography associated with sewer service for STAMP that were not addressed in the GEIS/Findings. Installation of sewer related infrastructure will be along public roads via a combination of open cut method and directional drill method. However, all installation routes will be re-graded to match original topography after infrastructure installation. Thus, these installations will result in temporary impacts that are consistent with impacts from other infrastructure installations that were analyzed in the GEIS/Findings.

2. Impacts on Water Resources

a. The 1366 Facility

Construction of the 1366 Facility and related infrastructure improvements will avoid any physical disturbance of surface water resources, including Whitney Creek and the three jurisdictional wetlands on the 1366 Parcels. Moreover, all of these surface waters present on the 1366 Parcels, plus a 100 foot buffer, will be deed restricted to prevent future development.

Construction will require the clearing and filling of portions of the Site which will expose un-vegetated soil to the elements. This creates the potential for erosion and sedimentation due to storm water passing through un-vegetated areas or construction areas with exposed soils, which could result in degradation of water quality in Whitney Creek and other surface waters in the area. Consistent with the analysis in the DGEIS/Findings, best management practices will be employed to minimize impacts to streams and other water resources during construction and operation of the 1366 Facility. In addition, as required by the *New York Storm water Management Design Manual* (January 2015), one or more point source treatment practices, such as rain gardens for roof drainage, bio-retention swales, or infiltration trenches for parking areas, and a variety of other practices, shall be incorporated into the design of the 1366 Facility.

b. The Project Changes

(1) Master Plan Changes/Updates

The STAMP Updated Master Plan shows a reduction in wetland impacts as compared to the GEIS Master Plan. Accordingly, the impacts to water resources from the changes to the Master Plan Changes/Updates are adequately addressed in the GEIS/Findings.

(2) Demolition of the Houses Along Crosby Road

There are no material impacts to water resources associated with the demolition of the houses along Crosby Road that were not addressed in the GEIS/Findings. These houses are not proximate to any water resources.

(3) The Town Water Project

There are no material impacts to water resources associated with the Town Water Project that were not addressed in the GEIS/Findings. In terms any potential impact due to construction activities, directional drilling will be implemented on any stream or wetland crossing, and a SWPPP will discuss plans for any trenching and erosion control details.

(4) Water Service for STAMP

There are no material impacts to water resources associated with water service for STAMP that were not addressed in the GEIS/Findings.

(5) Sewer Service for STAMP

The sewer line to Medina will cross the Iroquois National Wildlife Refuge along the Route 63 public right-of-way. This area has large wetlands and several stream crossings. In order to ensure protection of water resources, the GCEDC will employ directional drilling methods. Based on existing soils conditions and the physical limitations with the directional drill equipment, each directional drill set up will be staged a maximum of approximately 1,000 feet. The force main will be installed by directional drill method between each staging area. Thus, the installation of the sewer main will have minimal temporary impacts to less than 0.5 acre of wetland and will not adversely impact water resources along the installation route. If anything, the routing of sewer lines to the Medina WWTF will be beneficial to local water resources by removing proposed treated discharges from nearby streams, including Whitney Creek, Tonawanda Creek, Oak Orchard Creek and/or other small tributaries in the area.

3. Impacts on Air Resources

a. The 1366 Facility

The 1366 Facility will require a State Facility Permit from NYSDEC, and therefore, must satisfy the requirements set forth in the GEIS/Findings including NYSDEC's Air Guide-1, which was developed to evaluate the short-term and annual impacts from sources of air emissions in the state. The 1366 Facility will include state-of-the-art emission control equipment as a necessary function of its operations, as determined by the State Air Permit. Air Emission Scrubbing will take the form of a wet scrubber installed to treat hazardous and environmental gas emissions from certain processes. Further, all equipment using hazardous gases is designed to fail into a safe state, preventing emissions. Overall emissions of air pollutants from the 1366 Facility will comply with the thresholds for air emissions set forth in the GEIS/Findings.

b. The Project Changes

(1) Master Plan Changes/Updates

The Master Plan Changes/Updates have no impacts upon air resources. These changes do not result in larger developable areas or more building square footages. In fact, open space actually increases under the Updated Master Plan. Further, the building square footage threshold established in the GEIS/Findings (6,130,000 sf) has not changed.

(2) Demolition of the Houses Along Crosby Road

There will be minor temporary impacts to air resources associated with the demolition of the houses along Crosby Road. These impacts will be minimized through the utilization of appropriate dust control measures including wetting of materials during demolition consistent with construction related impacts associated with the demolition of other structures on-Site addressed in the GEIS/Findings.

(3) Town Water /STAMP Water & Sewer Service

There are no material impacts to air resources associated with the Town Water Project and/or water or sewer service for STAMP that were not addressed in the GEIS/Findings.

4. Impacts on Terrestrial and Aquatic Ecology

a. The 1366 Facility

The 1366 Facility will replace active agricultural fields with a high-technology manufacturing plant and supporting facilities, such as access roads and parking lots, utilities, etc. However, existing forested areas adjacent to the 1366 Parcels, such as the riparian forest adjacent to Whitney Creek, and wetland areas will be preserved along with a 100-foot buffer. Although limited tree cutting may be required on the 1366 Parcels, tree plantings of native species will be included as part of the overall landscaping of the 1366 Parcels, leading to a net increase in the number of trees. Finally, GCEDC is proposing deed restrictions and/or conservation easements to further protect wetlands in accordance with the goals and policies of the STAMP Long-Term Land Management Plan **("LTMP").** Accordingly, the impacts to terrestrial and aquatic ecology from the construction and operation of the 1366 Facility and related infrastructure improvements are adequately addressed in the GEIS/Findings.[1]

b. The Project Changes

(1) Master Plan Changes/Updates

As discussed above in the water resources analysis, the overall changes to the Master Plan Changes/Updates in a net reduction in wetland and aquatic resource impacts from the scope of actions analyzed in the GEIS/Findings. Additionally, these changes do not result in larger developable areas or more building square footages.

(2) Demolition of the Houses Along Crosby Road

There are no material impacts to terrestrial and aquatic ecology associated with the demolition of the houses along Crosby Road that were not addressed in the GEIS/Findings.

(3) The Town Water Project

There are no material impacts to terrestrial and aquatic ecology associated with the Town Water Project that were not addressed in the GEIS/Findings. Any potential impacts to terrestrial and aquatic ecology due to construction activities in connection with the Town Water Project will be minor, and temporary in nature.

(4) Water Service for STAMP

There are no material impacts to terrestrial and aquatic ecology associated with water service for STAMP that were not addressed in the GEIS/Findings. Accordingly, the impacts to terrestrial and aquatic ecology from water service for STAMP are adequately addressed in the GEIS/Findings.

(5) Sewer Service for STAMP

There are generally no material impacts to terrestrial and aquatic ecology associated with the sewer service for STAMP that were not addressed in the GEIS/Findings. One exception to this general characterization of aquatic resources within the sewer route is Oak Orchard Creek and the associated wetlands to the south of Oak Orchard Creek's intersection with Route 63. This wetland area is owned by USFWS (Iroquois National Wildlife Refuge) and is part of a large complex system that includes riparian, emergent, and forested wetlands. While evidence of disturbance exists, the system as a whole is high quality, federally protected, and linked to mapped significant natural communities and potential occurrence of rare, threatened, and endangered species. The sewer project will disturb only areas within and/or immediately

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[1] Please note, potential impacts to the NLE Bat are addressed in a separate analysis herein.

adjacent to an existing DOT right-of-way. Wetlands within or adjacent to this proposed area of disturbance are fragmented edges of the larger system.

In order the ensure the construction of the sewer line across the Iroquois National Wildlife Refuge along the Route 63 public right-of-way will not adversely impact these resources, the force main will be installed by directional drill method which will limit ground disturbance and potential impacts significantly. Accordingly, any potential impacts to terrestrial and aquatic ecology due to construction activities in connection with the Sewer Service for STAMP will be minor, and temporary in nature.

c. The Northern Long Eared Bat

As discussed above, the NLE Bat has recently been listed as a Threatened Species under State and Federal law and potential NLE Bat habitat is present at the Site and within the offsite utility Project areas. A field review of on-Site habitat suitable for the NLE Bat was conducted in November, 2015, taking into account areas of potential disturbance associated with construction planned for the 1366 Facility, including construction of the entry road, substation and utility areas. Project activities require the removal of trees greater than 3" DBH along the first section of the proposed access road west of Route 63/77, where hedgerows are crossed by the access roads and utilities, and along Crosby Road on residential parcels.

Additional field review was conducted at the site in May, 2016. A Phase 1 Summer Habitat Assessment was completed including data collection at a representative sample sites. Very few trees within the Project area are ideally suited for summer bat habitat due to a paucity of trees with exfoliating bark and no suitable snags. Further, the Project area is not near known maternity sites and are not located within 0.25 mile of a known hibernaculum according to a review of known sites.

To ensure that the future development activities will not have any material impacts to the NLE Bat, any necessary tree removal will be scheduled outside of the pup season (June 1-July 31) and, where possible, within the hibernation period (October 31 - March 31). The Project location and planned construction schedule put the Project within the category of "excepted from incidental taking prohibitions" in the final 4(d) rule. In this case, the determination is that acthtities "may affect" but are not likely to adversely affect and/or will not cause a prohibited taking. Thus, future on-Site development activities will not have an adverse impact upon the NLE Bat and the listing of the NLE Bat as a Threatened Species under State and Federal law will have no material impacts to terrestrial and aquatic ecology in conjunction with the Project.

In terms of off-Site development associated with water and sewer infrastructure, a desktop and field review were conducted in December, 2015 and May, 2016 in support of the development of an aquatic resource and ecology investigation report.

The majority of the off-site infrastructure (water and sewer) project areas are upland consisting of previously disturbed areas including road shoulders, mowed lawn and mowed lawn with trees, cropland, excavated ditches, culverts, and brushy cleared land. A smaller portion ofthe project area, primarily at stream and wetland crossings, consists of intermittent and perennial streams and wetlands. One exception to this general characterization of aquatic resources within the sewer route is Oak Orchard Creek and the associated wetlands to the south of Oak Orchard Creek's intersection with Route 63.

To ensure that the installation of the off-site infrastructure will not have any material impacts to the NLE Bat, any necessary tree removal will be scheduled outside of the pup season (June 1 - July 31) and, where possible, within the hibernation period (October 31 - March 31). The Site location and planned construction schedule put the Project within the category of "excepted from incidental taking prohibitions" in the final 4(d) rule. In this case, the determination is that activities "may affect" but are not likely to adversely affect and/or will not cause a prohibited taking. Thus, the installation of the off-site infrastructure will not have an adverse impact upon the NLE Bat.

5. Impacts on Technology Industry Health and Safety

a. The 1366 Facility

Several plans for chemical storage/ handling may be required for the 1366 Facility including:

- Small Quantity Generators or Large Quantity Generators permit from NYSDEC for hazardous waste.
- USEPA Hazardous Waste Registration with NYSDEC.
- Emergency Planning and Community Right-to-Know Act.
- SARA Title III Inventory Reporting.
- EPCRA Toxic Release Reporting (Form R).
- NYSDOT Hazmat Registration and Security Plan.
- Flammable storage and use permits from local fire departments.

1366 Technologies will provide a Hazardous Materials Inventory Statement and a 1366 Facility Specific Hazardous Materials Management Plan to the Town of Alabama Fire Department. Additionally, all hazardous materials at the 1366 Facility will be transported, handled, stored and disposed of in accordance with:

- Applicable requirements set forth in the Hazardous Substance Bulk Storage Program and/or the Petroleum Bulk Storage Program.
- Applicable requirements set forth in all DOT requirements.
- Applicable SPCC rules.
- Applicable requirements of the Uniform Fire and Building Codes.
- Applicable OSHA and/or RCRA regulations.

b. The Project Changes

(1) Master Plan Changes/Updates

There are no Master Plan Changes/Updates that will impact technology industry health and safety.

(2) Demolition of the Houses Along Crosby Road

There are no material impacts to health and safety associated with the demolition of the houses along Crosby Road that were not addressed in the GEIS/Findings. All asbestos and other potentially hazardous materials, such as mercury thermostats, fluorescent lights or miscellaneous cleaners, will be removed from the structures prior to demolition, properly packaged and disposed of in accordance with applicable laws. Demolition contractors will employ wet methods and other engineering controls during demolition to minimize airborne particulate emissions. The GCEDC will comply with all applicable laws and will implement proper protocols during the demolition period to minimize potential impacts from demolition activities.

(3) Town Water /STAMP Water & Sewer Service

There are no material impacts to health and safety associated with the Town Water Project, water service for STAMP and/or sewer service for STAMP that were not addressed in the GEIS/Findings.

6. Impacts on Traffic and Transportation

a. The 1366 Facility

Transportation access to the 1366 Parcels will be via an access road to Crosby Road (secondary access), with a main access to/from NY State Route 63/77. At full build out (1 GW), the 1366 Facility will generate an average of 2,486 trips per day including 86 truck trips per day, and will operate 24 hours a day, 7 days a week.

For the initial phase of development of the 1366 Facility (250 MW), the 1366 Facility will generate an average of 622 trips per day including 22 truck trips per day. The highest anticipated peak hour for the initial phase is approximately 240 trips per hour. Based on these traffic estimates, the Phase I build out of 1366 Technologies will result in less traffic than the Phase I build out assumed in the GEIS, however, its full build out will be more than the Phase I GEIS build out. Full build out will still remain below the 70% threshold.

An updated traffic impact analysis was conducted because of the acceleration of the installation of the Main Access Road. Instead of utilizing two access point at either end of Crosby Road to enter the Site, the acceleration of the construction of the Main Access Road means that traffic entering the Site will be through a single entry point. The updated Traffic Impact Analysis concluded that a left turn lane on Route 63/ 77 to access the Site is warranted. Thus, a northbound left turn lane on Route 63/ 77 will be implemented. This turn lane was identified as a necessary future improvement in the GEIS/Findings.

b. The Project Changes

(1) Master Plan Changes/Updates

The realignment of the Bypass Road will improve traffic flow due to better intersection designs. The other changes to the site plan layout do not result in larger developable areas or more building square footages. Further, the building square footage threshold established in the GEIS/Findings (6,130,000 sf) has not changed.

(2) Demolition of the Houses Along Crosby Road

There are no material impacts to traffic and transportation associated with the demolition of the houses along Crosby Road that were not addressed in the GEIS/Findings.

(3) Town Water /STAMP Water & Sewer Service

The construction and excavation work associated with the installation of the water and sewer mains and related facilities will require the transportation of construction materials, including loads of water piping, gravel, topsoil and related construction materials. There will also be minor impacts because the water infrastructure will be installed within existing road right-of-ways requiring lane closures and traffic re-routing. These impacts will be minor and temporary and are within the scope of construction activities analyzed in the GEIS/Findings.

7. Impacts to Land Use and Zoning

a. The 1366 Facility

The construction of the 1366 Facility and related infrastructure improvements will convert existing croplands within a portion of the Site into a modern, high-technology manufacturing facility and related support infrastructure. The 1366 Parcels are approximately 105 acres in size. A large percentage of the 1366 Parcels will be preserved for open space, consisting of landscaping and protection of environmentally-sensitive resources. The entire Site has been rezoned by the Town Board to TD1 to accommodate the kinds of development (advanced high technology and research focused on renewable energy) envisioned for STAMP, such as the 1366 Facility. The 1366 Facility will be developed pursuant to and consistent with the TD1 requirements as established under the IZA with the Town. Further, the 1366 Facility will comply with all zoning regulations in TD1 such as minimum lot size, maximum building height, maximum lot coverage, parking requirements and signage requirements.

b. The Project Changes

(1) Master Plan Changes/Updates

In terms of changes to the site plan layout, the realignment of the Bypass Road and the connector road to the Main Access Road will have a small impact on land use and zoning. Specifically, TD3 will increase in size from approximately 72.3 acres to 89.4 while TD1 and TD2 will decrease in size. However, the density of the build out in each of the districts will not change.

In terms of the buffer use clarifications, all of the uses included in the clarifications were identified as permitted uses in the GEIS/Findings. Thus, there are no impacts to land use and zoning from the buffer use clarifications that were not analyzed and addressed in the GEIS/Findings.

In terms of the elimination of the 300-foot buffer along the northern side of the Site, this area is already buffered from public rights-of-way by adjacent agricultural lands and utility infrastructure. Thus, there are no impacts to land use and zoning from the buffer use clarifications that were not analyzed and addressed in the GEIS/Findings.

In terms of the elimination of the 300-foot buffer on the interior of the Site between TD1/TD2 and TD3, this change creates the possibility of a minor visual impact to the Hamlet as buildings at the top of the ridgeline, which is within the buffer area, may be visible to the Hamlet. In order to address and mitigate this, the GCEDC is proposing new minimum setbacks from the Bypass Road, which has been relocated atop the ridgeline, to ensure that buildings are adequately setback from the ridgeline. The new setbacks along the Bypass Road are actually more restrictive than the current buffer, except for a very small area, approximately 1.3 acres, in the area where the Bypass Road meets Lewiston Road.

In terms of the elimination of the 300-foot buffer for 500 linear feet on each side of the Main Access Road, this too, will create visual impacts as structures associated with the Project are developed along Route 63/77. In order to mitigate this issue, the GCEDC and the Town have agreed to work together on revised design guidelines for this area to ensure the construction of high quality, attractive buildings.

In terms of adding solar panels as a special use permit in TDl and TD2, this change will have no significant impact on land use or zoning, particularly because it is simply adding to the previously included cell towers and windmills as other uses by special use permits.

In terms of the addition of the residential houses on the north end of Crosby Road, this change will result in an important but minor change to land use in the overall context of the Project. Specifically, these properties will be rezoned from A-R to TDl. With the exception of one property along Lewiston Road, all of the properties along Crosby have been/will be acquired and demolished. At the request of the Town, a setback of 30 feet from Crosby Road for construction of new structures within the area to be rezoned will be established.

c. Demolition of the Houses Along Crosby Road

The demolition of the houses along Crosby Road will result in permanent conversion of each of the six {6) parcels of land from residential use to technology manufacturing. This will result in an important but minor change to land use in the overall context of the Project.

d. The Town Water Project

There are no material impacts to land use and zoning associated with the Town Water Project that were not addressed in the GEIS/Findings. It is, however noted, that the Town Water

Project is being fully paid for by funds secured by the GCEDC per the terms of the IZA. This funding obligation was discussed extensively in the GEIS/Findings.

e. STAMP Water & Sewer Service

There are no material impacts to land use and zoning associated with water service and/or sewer service for STAMP that were not addressed in the GEIS/Findings.

8. Impacts to Utilities

a. The 1366 Facility

Although the plans for providing Phase 1 water and sewer for the Project have changed since the completion of the GEIS/Findings, the utility needs for the 1366 Facility are well within the thresholds analyzed in the GEIS/Findings and which are currently available. Specifically, the GEIS/Findings analyzed obtaining up to 3 MGD of water from the County and 1366 Technologies' water consumption needs will not exceed 800,000 GPD. In terms of sewer, the Medina WWTF can handle approximately 1 MGD without any significant upgrades and 1366 Technologies' sewer needs will not exceed 600,000 GPD. Additionally, electric, gas and telecom infrastructure will be sufficient with the extensions to the Site identified in the GEIS/Findings, to meet the needs of the 1366 Facility.

b. The Project Changes

(1) Master Plan Changes/Updates

The Master Plan Changes/Updates will not result in larger developable areas or more building square footages. While the utility rerouting portion of the site plan changes will have an impact upon the physical location of utility corridors, there are no impacts to utilities associated with the utility rerouting.

(2) Demolition of the Houses Along Crosby Road

There are no material impacts to utilities associated with the demolition of the houses along Crosby Road that were not addressed in the GEIS/Findings.

(3) The Town Water Project

Adequate water volumes for the long-planned Town Water Project are available from Genesee County. The Town system and STAMP are being designed to provide at a minimum, 100,000 GPD for the Town, 150,000 GPD to Lamb Farms, and 200,000 GPD for the STAMP Site totaling 450,000 GPD. Supply needs significantly higher than 450,000 GPD will require construction of an additional transmission main to Pembroke, consistent with the analysis in the GEIS/Findings and as recently confirmed with Genesee County.

(4) Water Service for STAMP

Consistent with the Water Service Preliminary Report, attached as *Appendix N* to the DGEIS, a phased approach to water supply is being applied at STAMP. Also, consistent with the Water

Service Preliminary Report, water supply for Phase 1 of STAMP (1 MGD) will be supplied by Genesee County.

(5) Sewer Service for STAMP

The Medina WWTF is currently permitted for 4.5 MGD of capacity while actual discharges average between 1.5 MGD and 2.2 MGD. A detailed peak flow analysis was undertaken which confirms that the Medina WWTF has capacity to accommodate an additional 1 MGD.

9. Impacts to Community Facilities

a. The 1366 Facility

The 1366 Facility will maintain its own internal fire suppression system that will consist of wet sprinkler systems, foam fire suppression system, clean agent style fire suppression system, early suppression, fast response system, deflagration venting, smoke control, toxic/ flammable gas detection system, on-site fire hydrants, and fire department hose valves. Based upon available information, the Alabama Fire Department **("AFD")** will not require additional resources to protect the 1366 Facility; however, periodic training will be provided to volunteers of the AFD and other pertinent emergency service providers regarding responding to any emergency calls from the 1366 Facility and chemical-specific aspects of the facility. This kind of coordination and training is routinely provided by technology manufacturing companies and is consistent with analysis provided in the GEIS/Findings.

In terms of waste generation, the 1366 Facility will not exceed volumes analyzed in the GEIS/Findings. In terms of impacts to public lands and recreation, for the reasons identified in the GEIS/Findings, the 1366 Facility will not have an impact upon open space or recreation.

In terms of an emergency action plan, 1366 Technologies' emergency action plan will be prepared and submitted to the Town in conjunction with 1366 Technologies' site plan application. This approach is consistent with the requirements set out in both the GCEDC Findings, the Town Board Findings and the Emergency Services Impact Analysis, and will ensure no impacts to emergency services that were not previously addressed in the GEIS/Findings.

b. The Pr ject Changes

(1) Master Plan Changes/Updates

There are no Master Plan Changes/Updates that will impact community facilities. The site plan changes do not result in larger developable areas or increased building square footages. In addition, the Town will have no responsibility for maintaining any portion of the Site.

(2) Demolition of the Houses Along Crosby Road

There will be a relatively small volume of construction and demolition debris generated by the demolition of the houses along the north end Crosby Road and their supporting structures, but all construction and demolition waste will be properly disposed of at approved disposal facilities.

(3) The Town Water Project

There are no material impacts to community facilities associated with the Town Water Project that were not addressed in the GEIS/Findings.

(4) Water Service for STAMP

There are no material impacts to community facilities associated with water service for STAMP that were not addressed in the GEIS/Findings.

(5) Sewer Service for STAMP

There are no material impacts to community facilities associated with sewer service for STAMP. The Medina WWTF is currently permitted for 4.5 MGD of capacity. Actual discharges average between 1.5 MGD and 2.2 MGD. A detailed peak flow analysis was undertaken to confirm that the Medina WWTF has the capacity to treat up to 1 MGD of wastewater from STAMP during peak periods. Flow monitoring for sections of the Village of Medina was implemented during the sanitary sewer route analysis.

10. Impacts to Community Character and Demographics

a. Aesthetics

(1) The 1366 Facility

The 1366 Facility and related infrastructure improvements will be designed and constructed in a low density setting consistent with the design philosophy of STAMP and will be constructed consistent with existing STAMP design guidelines. The required 400-foot buffer will be maintained along the western boundary of the 1366 Parcels to ensure adequate screening on the 1366 Facility from the lands of the Tonawanda Seneca Nation ("Nation"). Existing hedgerows on the Site will generally be maintained and will help ensure that the 1366 Facility is not materially visible from any existing public rights of way. In addition, all exterior lighting for the 1366 Facility will be directed downward to minimize the amount of light that spills beyond the boundaries of the 1366 Parcels.

(2) The Project Changes

(i) Master Plan Changes/Updates

The Main Access Road into the Site from Route 63/77 had a significant curve to the north in the GEIS Master Plan. In the Updated Master Plan, the alignment has been straightened somewhat to run more directly to Crosby Road. Nonetheless, a curve in the Main Access Road has been maintained to provide a more interesting visual context from the Main Access Road entrance looking towards the interior of the Site.

The elimination of the 300-foot buffer on the interior ofthe Site between TD1/TD2 and TD3, creates the possibility of a minor visual impact to the Hamlet as buildings at the top of the ridgeline, which is within the buffer area, may be visible to the Hamlet. In order to address and mitigate this, the GCEDC is proposing new minimum setbacks from the Bypass Road, which has been relocated atop the ridgeline, to ensure that buildings are adequately setback from the ridgeline. The new setbacks along the Bypass Road are actually more restrictive than the current buffer, except for a very small area, approximately 1.3 acres, in the area where the Bypass Road meets Lewiston Road.

The elimination of the 300-foot buffer for 500 linear feet on each side of the Main Access Road will create visual impacts as structures associated with the Project are developed along Route 63/77. In order to mitigate this issue, the GCEDC and the Town will work together on revised design guidelines for this area to ensure the construction of high quality, attractive buildings along Route 63/77.

The incorporation of the residential properties at the north end of Crosby into the Project make it possible for buildings in TDl to move closer to the Hamlet than was evaluated in the GEIS. In order to mitigate this issue, the GCEDC is proposing new setback of thirty (30) feet from this section of Crosby Road. In addition, in order to ensure that there are no visual impacts that were not addressed in the GEIS/Findings, if and when specific buildings are proposed in locations along the north end of Crosby Road closer to the Hamlet than what was evaluated in the GEIS, subsequent visual impact analysis would have to be completed at that time.

(ii) Demolition of the Houses Along Crosby Road

The demolition of the six residential structures along the north end of Crosby Road and their supporting structures will change the visual character of the area. However, the removal of these structures is considered a minor impact to aesthetics. In addition, these parcels will be incorporated into the Site and the TD Buffer and the Ag/Res Buffer will mitigate the visual impacts from the construction of new structures on these parcels consistent with the visual impact analysis in the GEIS/Findings.

(iii) The Town Water Project

During installation of the water mains and related facilities, large equipment and materials will be located temporarily in proximity to the installation routes. All such impacts are short-term and limited and well within the scope of activities analyzed in the GEIS/Findings.

(iv) STAMP Water & Sewer Service

During installation of the force main and related facilities, large equipment and materials will be located temporarily in proximity to the installation routes. All such impacts are short-term and limited.

b. Noise

(1) The 1366 Facility

Based on operations at 1366 Newton Massachusetts facility and other manufacturing facilities of a similar nature, the types of manufacturing operations that will occur at the 1366 Facility will not generate excessive noise and the 1366 Facility will not generate any noise in excess of the limits set forth in the GEIS/Findings.

(2) The Project Changes

(i) Master Plan Changes/Updates

The changes to the TD zoning boundaries and buffers and the incorporation of the residential properties on the north end of Crosby Road will bring some development closer to the STAMP boundary. However, there will be no changes to the noise limits set for the STAMP boundaries in the GEIS/Findings. Future uses within these areas that were previously undevelopable will have to comply with these noise limits.

(ii) Demolition of the Houses Along Crosby Road

It is anticipated that the demolition of the structures will temporarily generate noise that exceeds background levels. The intermittent noise associated with construction vehicles and equipment will be short-term and temporary in nature. Demolition activities will be limited to daylight working hours, when noise sensitivity is typically lowest. Construction activities will comply with applicable noise ordinances and laws.

(iii) Town Water /STAMP Water & Sewer Service

During installation of the water and sewer mains and related facilities, noise levels will temporarily increase during construction. All such impacts, which will take place during daylight working hours, when noise sensitivity is typically lowest, are well within the scope of construction activities analyzed in the GEIS/Findings.

c. Socioeconomics

(1) The 1366 Facility

Based on the experiences of two similar developments in Oregon and in eastern New York, the STAMP GEIS anticipated that the overall development ofthe Project would have positive effects on educational levels, per capita personal and household incomes, unemployment, industrial employment and percentage of working age population employed when compared to existing socioeconomic conditions. These effects may spur new or expanded programs of educational, cultural and community service institutions in the region. In addition to employment growth, the 1366 Facility will contribute to the overall population increases in the communities surrounding the Site. This growth is well within the thresholds considered in the GEIS/Findings for the Project. At full build-out and maximum production, the 1366 Facility will employ approximately 1,000 people.

The Town has expressed concern about the impacts of an enhanced payment in lieu of taxes **("PILOT")** associated with Phase **1** of the 1366 Facility build out. Specifically, Phase 1 of the 1366 Facility will receive a full abatement on all property taxes for a period of 5 years followed by 50% tax equivalent payments in years 6 through 10. In 2012, prior to approving the IZA, the Town completed a fiscal impact analysis in order to better understand the potential fiscal impacts of the Project relative to Town finances. The analysis identifies potential increases associated with Town spending in certain areas including planning and code enforcement, infrastructure, administration, emergency services, highways and courts. However, the analysis explains that increases in spending will be offset by increased PILOT and tax revenues from the Project. While the analysis was based upon a standard PILOT for 1366 Technologies which provides for a graduated increase to full assessed value over 10 years (20% increase every two years), the enhanced PILOT for Phase 1 of 1366 Technologies' build out will not significantly alter the fiscal impact analysis or the underlying assumptions. This is because the overall impact of the enhanced PILOT will only reduce a portion of PILOT/tax payments from 1366 Technologies to the Town (Phase 1 only). Moreover, the Town is working to establish a fee schedule that will be imposed on all projects to cover the Town's costs from project review through construction. Thus, as noted in the fiscal impact analysis, tax rates in the Town will decrease significantly as revenue from the Project increases over time, particularly as 1366 Technologies proceeds to expand to 1 GW (future phases of 1366 Facility are anticipated to be subject to standard a PILOT).

(2) The Project Changes

(i) Master Plan Changes/Updates

The Master Plan Changes/Updates will have no impact upon socioeconomics.

(ii) Demolition of the Houses Along Crosby Road

The demolition of the six houses along the north end of Crosby Road will remove a limited amount of residential development from the Town. This is a very minor impact to socioeconomics and consistent with impacts analyzed in the GEIS/Findings.

(iii) Town Water /STAMP Water & Sewer Service

The Town Water Project is expected to have a positive socioeconomic benefit upon the Town by dramatically expanding the availability of public water to existing households within the Town. These benefits are consistent with and will build upon the socioeconomic benefits of the Project as a whole.

11. Impacts on Historic and Archaeological Resources

a. The 1366 Facility

Phase 1B studies have been completed on the 1366 Parcels and along any planned access roads and utility support areas for the 1366 Facility. As a result of the Phase 1B work, five archeological sites of potential National Register eligibility, have been identified which could be impacted by the 1366 Facility. Phase II investigations were completed at all five locations. Of these, two identified as requiring further analysis (Archaeological Sites 3 and 6). Thus, a Phase Ill scope of work was proposed and approved by SHPO for both of these sites and was recently completed. No construction activities will take place in the vicinity of Archeological Sites 3 or 6 until the Phase Ill work is accepted as complete by SHPO.

It is also noted that a Programmatic Agreement between the GCEDC, USACE, and SHPO, initiated by an application for Joint Permit made to USACE, is under development and will stipulate measures to be taken as the Project moves forward to avoid, minimize and/or mitigate the potential adverse effect on cultural resources consistent with the GEIS/Findings. The 1366 Facility will comply with the stipulations of the Programmatic Agreement to the extent necessary, once it is finalized.

b. The Project Changes

(1) Master Plan Changes/Updates

There are no Master Plan Changes/Updates that will impact historic or archeological resources that will not be addressed through the programmatic agreement.

(2) Demolition of the Houses Along Crosby Road

None of the six houses along the north end of Crosby Road are historic. Moreover, prior to redevelopment of these parcels, the GCEDC will comply with the stipulations of the Programmatic Agreement. To date, Phase IB field investigations are complete for four of the six parcels. Additional survey work will be undertaken as necessary consistent with the requirements of the Programmatic Agreement once it is finalized.

(3) The Town Water Project

A Phase 1A Cultural Resource investigation was completed for the water route by Deuel Archaeology & CRM in December 2015. It was recommended that a Phase 18 subsurface investigation, in the form of shovel testing be conducted for the archeologically sensitive areas. SHPO indicated in their February 25, 2016 letter, they concur with the Phase 1B testing recommendation and concluded they have no building/structural concerns. A specific scope for the Phase 1B investigation was developed by the GCEDC in consultation with SHPO and Phase 1B work is currently underway. Upon completion of the Phase 1B work, additional survey work will be undertaken as necessary consistent with the requirements of the Programmatic Agreement.

(4) Water Service for STAMP

There are no material impacts to historic or archeological resources associated with water service for STAMP that were not addressed in the GEIS/Findings. Accordingly, the impacts to historic or archeological resources from water service for STAMP are adequately addressed in the GEIS/Findings.

(5) Sewer Service for STAMP

A Phase 1A Cultural Resource investigation was completed for the sewer route by Deuel Archaeology & CRM in December 2015. It was recommended that a Phase 18 subsurface investigation, in the form of shovel testing be conducted for the archeologically sensitive areas. SHPO indicated in their February 25, 2016 letter, they concur with the Phase 1B testing recommendation and concluded they have no building/structural concerns. A specific scope for the Phase 1B investigation has been developed by the GCEDC in consultation with SHPO and the Phase 18 work is currently underway. Upon completion of the Phase 1B work, additional survey work will be undertaken as necessary consistent with the requirements of the Programmatic Agreement.

12. Impacts on Agricultural Resources

a. The 1366 Facility

The development of the 1366 Facility and related infrastructure improvements will displace active agriculture land on the Site with a modern, high-technology manufacturing facility that will consist of a main building and supporting facilities, such as access drives, parking lots, utilities and landscaping. However, the development of the agricultural lands on the 1366 Parcels was thoroughly analyzed in the GEIS/Findings.

b. The Project Changes

(1) Master Plan Changes/Updates

There are no Master Plan Changes/Updates that will impact agricultural resources. The GEIS assumed all agricultural lands within the Project area would eventually be developed.

(2) Demolition of the Houses Along Crosby Road

There are no material impacts to agricultural resources associated with the demolition of the houses along Crosby Road that were not addressed in the GEIS/Findings.

(3) The Town Water Project

There are no material impacts to agricultural resources associated with the Town Water Project that were not addressed in the GEIS/Findings. In fact, the availability of public water for farming activities may prove to be a benefit to agricultural activities within the Town. In addition, the Project, which included the Town Water Project, has already received approval for STAMP from the NYS Department of Agriculture in January, 2014.

(4) Water Service for STAMP

There are no material impacts to agricultural resources associated with water service for STAMP that were not addressed in the GEIS/Findings.

(5) Sewer Service for STAMP

There are no material impacts to agricultural resources associated with sewer service for STAMP. Accordingly, the impacts to agricultural resources from sewer service for STAMP are adequately addressed in the GEIS/Findings. Nonetheless, GCEDC plans to coordinate with NYS Department of Agriculture to ensure no further agency review is necessary in connection with construction of sewer service for STAMP as this aspect of the Project was unknown at the time that the GCEDC received its certification for the Project.

13. Short Term Construction Impacts

a. The 1366 Facility

Construction of the 1366 Facility and related infrastructure improvements has the potential to result in air quality impacts that will generally consist of fugitive dust and mobile source emissions from construction vehicles and equipment. In addition, construction activities would involve the use of heavy machinery and vehicles that generally produce noise in excess of background noise levels. However, these activities would occur during daylight hours, when noise sensitivity is lowest. All of the construction related impacts associated with the 1366 Facility are well within the contemplated thresholds analyzed in the GEIS/Findings.

b. The Project Changes

(1) Master Plan Changes/Updates

There are no short-term construction related impacts associated with the Master Plan Changes/Updates that were not addressed in the GEIS/Findings.

(2) Demolition of the Houses Along Crosby Road

As analyzed in the GEIS/Findings, demolition of existing structures will result in short-term impacts to the environment. These impacts may include increased noise and odor, as well as a short-term impact to air associated with structure demolition, soil disturbances and truck movement. Also, during the demolition process, construction personnel are likely to encounter a number of physical hazards that are typically associated with commercial construction. However, as explained in the GEIS/Findings, all construction and demolition will take place within the boundaries of the Site. Thus, the general public's exposure to any Site hazards will be limited. Additionally, the Project will minimize risks to construction personnel by fully complying with applicable OSHA and New York State Labor Law requirements.

(3) Town Water /STAMP Water & Sewer Service

During installation of the water and sewer mains and related facilities, air and water quality may be temporarily impacted by construction activities and equipment. Noise levels will also temporarily increase during construction. All such impacts are well within the scope of construction activities analyzed in the GEIS/Findings.

14. Future Conditions and Thresholds

a. The 1366 Facility

The 1366 Facility and related infrastructure improvements do not exceed any of the conditions and thresholds set forth in the GEIS/Findings. Specifically:

- The 1366 Facility and related infrastructure improvements will not cause an exceedance of the maximum buildable Site area established (618.18 acres);

- The 1366 Facility and related infrastructure improvements will not cause an exceedance of the maximum building square footage;

- The 1366 Facility and related infrastructure improvements will not cause an exceedance of wetland impacts examined in the GEIS/Findings;

- The 1366 Facility and related infrastructure improvements will be constructed in compliance with the zoning regulations established by the STAMP TD;

- The 1366 Facility and related infrastructure improvements will not cause traffic trip generation in exceedance of 70% of projected trips established in the GEIS/Findings; and

- The 1366 Facility and related infrastructure improvements will not cause an exceedance of any utility loads established for the Project in the GEIS/Findings.

b. The Project Changes

(1) Master Plan Changes/Updates

None of the Master Plan Changes/Updates exceed any of the conditions and thresholds set forth in the GEIS/Findings.

(2) Demolition of the Houses Along Crosby Road

The demolition of the houses along Crosby Road will not exceed any of the conditions and thresholds set forth in the GEIS/Findings.

(3) The Town Water Project

The Town Water Project will not exceed any of the conditions and thresholds set forth in the GEIS/Findings.

(4) Water Service for STAMP

The water service for STAMP will not exceed any of the conditions and thresholds set forth in the GEIS/Findings.

(5) Sewer Service for STAMP

The sewer service for STAMP, which will now be provided via a force main to the Medina WWTF rather than via an on-Site WWTP, although a different method that was contemplated in the GEIS/Findings, will not exceed any of the conditions and thresholds set forth in the GEIS/Findings. The threshold for sewer will be reduced from 3.0 MGD to 1.0 MGD, as this is the volume that the Medina WWTF can handle without significant upgrades to its treatment plant.

15. Incomplete GEIS/Findings Mitigation

a. Long Term Management Plan

As part of GCEDC's plan for mitigation to avoid and/or minimize any potential impacts to the terrestrial and aquatic ecologies, the GCEDC Findings required the preparation of a LTMP. Town Board Findings required preparation of the LTMP prior to any site plan approvals for use in the review offuture Site development. To date, the LTMP has not be finalized, and it is not anticipated that it will be complete prior to initial Site Plan approvals for the Project. In order to ensure that there are no adverse impacts associated with the development of the 1366 Parcels, the GCEDC has proposed deed restrictions and/or conservation easements to further protect wetlands in accordance with the goals of the LTMP. This is being implemented relative to the 1366 Parcels even though the LTMP is still being developed. These restrictions will help to protect wetlands on the Site from being impacted by future development. The GCEDC will also work closely with the Town, and will undertake site plan review for any component of the Project in accordance with the goals set forth by the LTMP.

b. Farmland Protection Plan

The GCEDC Findings and the Town Board Findings require the GCEDC to assist the Town with implementing one or more strategies in the FPSR. To date, a committee has been formed, and is in the early stages of development and exploration of options and programs as outlined in the DGEIS, the FPSR and other sources. The formation of this committee was identified as a protection strategy in the FPSR and thus, the Town has now implemented at least one protection strategy from the FPSR. Nonetheless, the GCEDC will continue to work with the Town to advance farmland protection in the Town.

c. Comprehensive Plan Update

As agreed upon in the IZA, the GCEDC is tasked with assisting the Town with updating its comprehensive plan. To date, the GCEDC has secured a grant on behalf of the Town in order to cover a portion of the cost for the update, which is anticipated to be completed in full in 2016. The need for a comprehensive plan update emerged from the Town's concerns about potential long-term development pressure from STAMP on the rest of the Town. The implementation of the first phase of the 1366 Facility will produce limited development pressure on the Town. Moreover, the Town has imposed a moratorium on the issuance of commercial building permits outside of the Site until the co'mprehensive plan update is complete. Thus, there will be no adverse impacts from moving forward with initial development at STAMP before the comprehensive plan update has been completed.

d. Design Guidelines

Design standards for buildings to be constructed at STAMP have been discussed between the Town and the GCEDC for several years. In the FGEIS, in response to a comment about design guidelines, the GCEDC noted an intent to form an Architectural Review Committee that would develop design standards for the Site. In the IZA, the Town zoning regulations for the Site provide that any development within any Technology District shall conform to the Town of Alabama's Design Guidelines.

Since the Town adopted its Design Guidelines for STAMP, the GCEDC has formed an Architectural Review Committee comprised of a representative from GCEDC and an architect from GCEDC's engineering firm, Clark Patterson & Lee. A representative from the County Department of Planning also serves on the Committee. In order to help the community understand what specific types of buildings may be constructed at STAMP consistent with the Town's design guidelines, the Committee has developed a series of photographic renderings with explanatory narrative for each of the three TD districts at the Site. In order to ensure that there are no adverse impacts resulting from moving forward with initial development at STAMP prior to development of more specific design guidelines, the Town and the GCEDC have agreed to work closely with 1366 Technologies through the site plan review process to develop a site plan that is consistent with the goals that both the Town and the GCEDC seek to achieve through more specific design guidelines. For the 1366 Facility, particular attention will be paid to building materials visible from public rights of way and landscaping and screening measures.

16. Unavoidable Adverse Impacts

a. The 1366 Facility

The development of the 1366 Facility and related infrastructure improvements will result in several unavoidable adverse impacts including short-term unavoidable construction impacts, use of real property, loss of agricultural use on the Site, consumption of energy and the resources that go into making that energy, altered habitats on-Site, and impacts to existing traffic patterns. These impacts are consistent with the analysis of unavoidable adverse impacts in the GEIS/Findings.

b. The Project Changes

(1) Master Plan Changes/Updates

The Master Plan Changes/Updates will not result in any material changes to unavoidable adverse impacts as discussed in the GEIS/Findings.

(2) Demolition of the Houses Along Crosby Road

The demolition of the houses along Crosby Road will result in some unavoidable adverse impacts including short-term unavoidable construction impacts, use of real property and consumption of energy. These impacts are consistent with the analysis of unavoidable adverse impacts in the GEIS/Findings.

(3) The Town Water Project

The installation of the Town Water Project will result in several unavoidable adverse impacts including short-term unavoidable construction impacts, use of real property, impacts to water resources and consumption of energy and the resources that go into making that energy. These impacts are consistent with the analysis of unavoidable adverse impacts in the GEIS/Findings.

(4) **Water Service for STAMP**

The consumption of water supplies for STAMP is consistent with the analysis of unavoidable adverse impacts in the GEIS/Findings.

(5) **Sewer Service for STAMP**

The installation of sewer service for STAMP will result in several unavoidable adverse impacts including short-term unavoidable construction impacts, use of real property, impacts to water resources and consumption of energy and the resources that go into making that energy. These impacts are consistent with the analysis of unavoidable adverse impacts in the GEIS/Findings.

C. Findings

A thorough analysis of the environmental impacts of the 1366 Facility and the Project Changes relative to the environmental impacts identified and analyzed in the GEIS/Findings demonstrate that:

1. The impacts associated with the construction and operation of the 1366 Facility and related infrastructure improvements have been adequately analyzed in the GEIS/Findings and will be carried out in conformance with the conditions and thresholds set forth in the GEIS/Findings.

2. The impacts associated with the Master Plan Changes/Updates have been adequately analyzed in the GEIS/Findings and will be carried out in conformance with the conditions and thresholds set forth in the GEIS/Findings.

3. The impacts associated with the Demolition of the houses along Crosby Road have been adequately analyzed in the GEIS/Findings and will be carried out in conformance with the conditions and thresholds set forth in the GEIS/Findings.

4. The impacts associated with the Town Water Project were not analyzed in the GEIS/Findings. However, as detailed in this Amended Findings Statement, there will be no significant adverse environmental impacts associated with the Town Water Project and the Town Water Project will be carried out in conformance with the conditions and thresholds set forth in the GEIS/Findings.

5. The impacts associated with the water service for STAMP have been adequately analyzed in the GEIS/Findings and will be carried out in conformance with the conditions and thresholds set forth in the GEIS/Findings.

6. The impacts associated with the sewer service for STAMP were not analyzed in the GEIS/Findings. However, as detailed in this Amended Findings Statement, there will be no significant adverse environmental impacts associated with providing sewer service for STAMP from the Medina WWTP and Sewer Service for STAMP will be carried out in conformance with the conditions and thresholds set forth in the GEIS/Findings and as modified by this Amended Findings Statement.

7. The impacts associated with the listing of the NLE Bat as a threatened species were not analyzed in the GEIS/Findings. However, as detailed in this Amended Findings Statement, there will be no significant adverse impacts to the NLE Bat as a result of the Project and the listing of the NLE Bat as a Threatened Species under State and Federal law does not exceed any of the conditions and thresholds set forth in the GEIS/Findings.

8. Having considered the GCEDC Findings and this Amended Findings Statement for the Western New York Science & Technology Advanced Manufacturing Park (STAMP), and having considered the preceding relevant environmental impacts, facts and conclusions relied upon to meet the requirements of 6 N.Y.C.R.R. § 617.11, and having weighed and balanced the relevant impacts with social, economic and other considerations, this Amended Findings Statement recertifies that:

(i) The requirements of 6 N.Y.C.R.R. Part 617 have been met; and

(ii) Consistent with the social, economic and other essential considerations from among the reasonable alternatives available, the action remains one which avoids or minimizes adverse environmental effects to the maximum extent practicable, and that adverse environmental impacts will be avoided or minimized to the maximum extent practicable by incorporating as conditions to the decision those mitigative measures which were identified as practicable.

Genesee County Economic Development Center
Name of Agency

Signature of Responsible Official

Mark A. Masse, CPA
Name of Responsible Official

Senior Vice President of Operations
Title of Responsible Official

July 14, 2016
Date

99 MedTech Drive, Suite 106, Batavia, New York 14020
Address of Agency

lead Agency Contact:
Mark A. Masse, CPA
Senior Vice President of Operations
Genesee County Economic Development Center
99 MedTech Drive
Suite 106
Batavia, NY 14020
Phone: (585) 343-4866, ext. 17
Fax: (585) 343-0848
Email: mmasse@gcedc.com

Full Environmental Assessment Form
Part 1 - Project and Setting

Instructions for Completing Part 1

Part 1 is to be completed by the applicant or project sponsor. Responses become part of the application for approval or funding, are subject to public review, and may be subject to further verification.

Complete Part 1 based on information currently available. If additional research or investigation would be needed to fully respond to any item, please answer as thoroughly as possible based on current information; indicate whether missing information does not exist, or is not reasonably available to the sponsor; and, when possible, generally describe work or studies which would be necessary to update or fully develop that information.

Applicants/sponsors must complete all items in Sections A & B. In Sections C, D & E, most items contain an initial question that must be answered either "Yes" or "No". If the answer to the initial question is "Yes", complete the sub-questions that follow. If the answer to the initial question is "No", proceed to the next question. Section F allows the project sponsor to identify and attach any additional information. Section G requires the name and signature of the applicant or project sponsor to verify that the information contained in Part 1is accurate and complete.

A. Project and Applicant/Sponsor Information.

Name of Action or Project: Gateway Project

Project Location (describe, and attach a general location map): 6840 Crosby Road, Alabama, NY 14013

Brief Description of Proposed Action (include purpose or need):
This project will be an 80 ton-per-day green hydrogen production facility, built in two 40 ton-per-day phases. The hydrogen is produced by electrolysis using clean hydropower. The process produces no pollution and creates essentially no waste. The facility will include an approximately 42,000 sq-ft building housing the hydrogen production equipment, a small control building and an approximately 10,000 sq-ft building housing office space, a conference room, facility restrooms, employee breakroom and maintenance shop. Additional equipment located outside includes cooling units, electrical transformers & cabinets, an electrical substation, tanks, pumps, compressors, liquefaction cold-boxes and a filling facility for transport tankers that pick up the liquid hydrogen product for delivery. There will be a small employee 20-space parking lot, a truck trailer parking area with space for 5 to 10 40' trailers. Roadways and parking lots will use an impervious surface such as concrete or asphalt, equipment and tanks will be on concrete pads all other areas wherever possible will retain a permeable cover such as grass or gravel. A small retention pond will be constructed to hold stormwater run-off. Phase 2 starts after phase 1 commissioning.

Name of Applicant/Sponsor: Gateway Project
Telephone:
E-Mail:
Address: 6840 Crosby Road
City/PO: Alabama
State: NY
Zip Code: 14013

Project Contact (if not same as sponsor; give name and title/role): Brenor Brophy, Vice President Project Development
Telephone: (408) 823-6566
E-Mail: brbrophy@plugpower.com
Address: 968 Albany Shaker Road
City/PO: Latham
State: NY
Zip Code: 12110

Property Owner (if not same as sponsor):
Telephone:
E-Mail:
Address:
City/PO:
State:
Zip Code:

B. Government Approvals

B. Government Approvals, Funding, or Sponsorship. ("Funding" includes grants, loans, tax relief, and any other forms of financial assistance.)

Government Entity	If Yes: Identify Agency and Approval(s) Required	Application Date (Actual or projected)
a. City Counsel, Town Board, or Village Board of Trustees ☐Yes☒No		
b. City, Town or Village Planning Board or Commission ☒Yes☐No	Town of Alabama Planning Board	
c. City, Town or Village Zoning Board of Appeals ☐Yes☒No		
d. Other local agencies ☐Yes☐No		
e. County agencies ☒Yes☐No	Genesee County Dept. of Health Genesee County Planning Board	
f. Regional agencies ☐Yes☐No		
g. State agencies ☒Yes☐No	NYSDEC, SWPPP, NYPA	
h. Federal agencies ☐Yes☐No		

i. Coastal Resources.

i. Is the project site within a Coastal Area, or the waterfront area of a Designated Inland Waterway? ☐Yes☒No

ii. Is the project site located in a community with an approved Local Waterfront Revitalization Program? ☐Yes☒No

iii. Is the project site within a Coastal Erosion Hazard Area? ☐Yes☒No

C. Planning and Zoning

C.1. Planning and zoning actions.

Will administrative or legislative adoption, or amendment of a plan, local law, ordinance, rule or regulation be the only approval(s) which must be granted to enable the proposed action to proceed? ☐Yes☒No

- **If Yes,** complete sections C, F and G.
- **If No,** proceed to question C.2 and complete all remaining sections and questions in Part 1

C.2. Adopted land use plans.

a. Do any municipally- adopted (city, town, village or county) comprehensive land use plan(s) include the site where the proposed action would be located? ☒Yes☐No

If Yes, does the comprehensive plan include specific recommendations for the site where the proposed action would be located? ☒Yes☐No

b. Is the site of the proposed action within any local or regional special planning district (for example: Greenway; Brownfield Opportunity Area (BOA); designated State or Federal heritage area; watershed management plan; or other?) ☐Yes☒No

If Yes, identify the plan(s):

c. Is the proposed action located wholly or partially within an area listed in an adopted municipal open space plan, or an adopted municipal farmland protection plan? ☒Yes☐No

If Yes, identify the plan(s):

Genesee County

C.3. Zoning

a. Is the site of the proposed action located in a municipality with an adopted zoning law or ordinance. ☒ Yes ☐ No

If Yes, what is the zoning classification(s) including any applicable overlay district?

Technology District 1

b. Is the use permitted or allowed by a special or conditional use permit? ☒ Yes ☐ No

c. Is a zoning change requested as part of the proposed action? ☐ Yes ☐ No

If Yes,

i. What is the proposed new zoning for the site? ____

C.4. Existing community services.

a. In what school district is the project site located? Oakfield - Alabama

b. What police or other public protection forces serve the project site?

Genesee County Sheriff

c. Which fire protection and emergency medical services serve the project site?

Alabama Fire Dept., Genesee County EMS, Mercyflight Ambulance

d. What parks serve the project site?

N/A

D. Project Details

D.1. Proposed and Potential Development

a. What is the general nature of the proposed action (e.g., residential, industrial, commercial, recreational; if mixed, include all components)?

Industrial

b. a. Total acreage of the site of the proposed action? 53.9 acres

b. Total acreage to be physically disturbed? 24.9 acres

c. Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor? 53.9 acres

c. Is the proposed action an expansion of an existing project or use? ☐ Yes ☒ No

i. If Yes, what is the approximate percentage of the proposed expansion and identify the units (e.g., acres, miles, housing units, square feet)? % ____ Units: ____

d. Is the proposed action a subdivision, or does it include a subdivision? ☒ Yes ☐ No

If Yes,

i. Purpose or type of subdivision? (e.g., residential, industrial, commercial; if mixed, specify types)

Industrial

ii. Is a cluster/conservation layout proposed? ☐ Yes ☒ No

iii. Number of lots proposed? 1

iv. Minimum and maximum proposed lot sizes? Minimum 53.9 ac Maximum N/A

e. Will the proposed action be constructed in multiple phases? ☒ Yes ☐ No

i. If No, anticipated period of construction: ____ months

ii. If Yes:

- Total number of phases anticipated 2
- Anticipated commencement date of phase 1 (including demolition) 3 month 2022 year
- Anticipated completion date of final phase 6 month 2023 year
- Generally describe connections or relationships among phases, including any contingencies where progress of one phase may determine timing or duration of future phases: Phase 2 will follow on substation and distribution line built for phase 1. We will complete phase 1 and bring online before commencing construction on phase 2.

f. Does the project include new residential uses? ☐Yes ☒No

If Yes, show numbers of units proposed.

	One Family	Two Family	Three Family	Multiple Family (four or more)
Initial Phase				
At completion of all phases				

g. Does the proposed action include new non-residential construction (including expansions)? ☒Yes ☐No

If Yes,

i. Total number of structures 3

ii. Dimensions (in feet) of largest proposed structure: 30' height; 100' width; and 700' length

iii. Approximate extent of building space to be heated or cooled: 42,000 square feet

h. Does the proposed action include construction or other activities that will result in the impoundment of any liquids, such as creation of a water supply, reservoir, pond, lake, waste lagoon or other storage? ☒Yes ☐No

If Yes,

i. Purpose of the impoundment: Stormwater Pond

ii. If a water impoundment, the principal source of the water: ☐ Ground water ☐ Surface water streams ☒Other specify: Stormwater

iii. If other than water, identify the type of impounded/contained liquids and their source. N/A

iv. Approximate size of the proposed impoundment. Volume: ____ million gallons; surface area: 2 acres

v. Dimensions of the proposed dam or impounding structure: 8 height; 100 length

vi. Construction method/materials for the proposed dam or impounding structure (e.g., earth fill, rock, wood, concrete): Earthfill

D.2. Project Operations

a. Does the proposed action include any excavation, mining, or dredging, during construction, operations, or both? (Not including general site preparation, grading or installation of utilities or foundations where all excavated materials will remain onsite) ☐Yes ☒No

If Yes:

i .What is the purpose of the excavation or dredging?

ii. How much material (including rock, earth, sediments, etc.) is proposed to be removed from the site?

- Volume (specify tons or cubic yards):
- Over what duration of time?

iii. Describe nature and characteristics of materials to be excavated or dredged, and plans to use, manage or dispose of them.

iv. Will there be onsite dewatering or processing of excavated materials? ☐Yes ☐No

If yes, describe.

v. What is the total area to be dredged or excavated? ____ acres

vi. What is the maximum area to be worked at any one time? ____ acres

vii. What would be the maximum depth of excavation or dredging? ____ feet

viii. Will the excavation require blasting? ☐Yes ☐No

ix. Summarize site reclamation goals and plan:

b. Would the proposed action cause or result in alteration of, increase or decrease in size of, or encroachment into any existing wetland, waterbody, shoreline, beach or adjacent area? ☐Yes ☒No

If Yes:

i. Identify the wetland or waterbody which would be affected (by name, water index number, wetland map number or geographic description):

ii. Describe how the proposed action would affect that waterbody or wetland, e.g. excavation, fill, placement of structures, or alteration of channels, banks and shorelines. Indicate extent of activities, alterations and additions in square feet or acres: __________

iii. Will the proposed action cause or result in disturbance to bottom sediments? ☐Yes ☐No

If Yes, describe: __________

iv. Will the proposed action cause or result in the destruction or removal of aquatic vegetation? ☐Yes ☐No

If Yes:

- acres of aquatic vegetation proposed to be removed: __________
- expected acreage of aquatic vegetation remaining after project completion: __________
- purpose of proposed removal (e.g. beach clearing, invasive species control, boat access): __________
- proposed method of plant removal: __________
- if chemical/herbicide treatment will be used, specify product(s): __________

v. Describe any proposed reclamation/mitigation following disturbance: __________

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c. Will the proposed action use, or create a new demand for water? ☒Yes ☐No

If Yes:

i. Total anticipated water usage/demand per day: 280,000 gallons/day

ii. Will the proposed action obtain water from an existing public water supply? ☒Yes ☐No

If Yes:

- Name of district or service area: STAMP Site via agreement with Genesee County
- Does the existing public water supply have capacity to serve the proposal? ☐Yes ☒No
- Is the project site in the existing district? ☐Yes ☒No
- Is expansion of the district needed? ☐Yes ☒No
- Do existing lines serve the project site? ☐Yes ☒No

iii. Will line extension within an existing district be necessary to supply the project? ☒Yes ☐No

If Yes:

- Describe extensions or capacity expansions proposed to serve this project: New Pembroke water line under construction will provide additional capacit; New water line from STAMP entrance to site to be constructed.
- Source(s) of supply for the district: Genesee County

iv. Is a new water supply district or service area proposed to be formed to serve the project site? ☐Yes ☒No

If, Yes:

- Applicant/sponsor for new district: __________
- Date application submitted or anticipated: __________
- Proposed source(s) of supply for new district: __________

v. If a public water supply will not be used, describe plans to provide water supply for the project: __________

vi. If water supply will be from wells (public or private), what is the maximum pumping capacity: _______ gallons/minute.

---

d. Will the proposed action generate liquid wastes? ☒Yes ☐No

If Yes:

i. Total anticipated liquid waste generation per day: 70,500 gallons/day

ii. Nature of liquid wastes to be generated (e.g., sanitary wastewater, industrial; if combination, describe all components and approximate volumes or proportions of each): Sanitary wastewater 500 GPD; Reject water from RO system @25% rejection <=70,000 GPD, amount is seasonal as we will use some reject water for cooling in summer.

iii. Will the proposed action use any existing public wastewater treatment facilities? ☐Yes ☒No

If Yes:

- Name of wastewater treatment plant to be used: __________
- Name of district: __________
- Does the existing wastewater treatment plant have capacity to serve the project? ☐Yes ☐No
- Is the project site in the existing district? ☐Yes ☐No
- Is expansion of the district needed? ☐Yes ☐No

- Do existing sewer lines serve the project site? ☐Yes☐No
- Will a line extension within an existing district be necessary to serve the project? ☐Yes☐No

  If Yes:
  - Describe extensions or capacity expansions proposed to serve this project: ______

iv. Will a new wastewater (sewage) treatment district be formed to serve the project site? ☐Yes☒No

If Yes:
- Applicant/sponsor for new district: ______
- Date application submitted or anticipated: ______
- What is the receiving water for the wastewater discharge? ______

v. If public facilities will not be used, describe plans to provide wastewater treatment for the project, including specifying proposed receiving water (name and classification if surface discharge or describe subsurface disposal plans):

STAMP has application pending w/ NYSDEC for new WWTF at STAMP site

vi. Describe any plans or designs to capture, recycle or reuse liquid waste: ______

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e. Will the proposed action disturb more than one acre and create stormwater runoff, either from new point sources (i.e. ditches, pipes, swales, curbs, gutters or other concentrated flows of stormwater) or non-point source (i.e. sheet flow) during construction or post construction? ☒Yes☐No

If Yes:

i. How much impervious surface will the project create in relation to total size of project parcel?

_____ Square feet or 2 acres (impervious surface)
_____ Square feet or 53.9 acres (parcel size)

ii. Describe types of new point sources. Parking lots, internal roadways, concrete pads for equipment

iii. Where will the stormwater runoff be directed (i.e. on-site stormwater management facility/structures, adjacent properties, groundwater, on-site surface water or off-site surface waters)?

Onsite stormwater management facility

- If to surface waters, identify receiving water bodies or wetlands: ______
- Will stormwater runoff flow to adjacent properties? ☐Yes☒No

iv. Does the proposed plan minimize impervious surfaces, use pervious materials or collect and re-use stormwater? ☒Yes☐No

---

f. Does the proposed action include, or will it use on-site, one or more sources of air emissions, including fuel combustion, waste incineration, or other processes or operations? ☒Yes☐No

If Yes, identify:

i. Mobile sources during project operations (e.g., heavy equipment, fleet or delivery vehicles)

Trucks

ii. Stationary sources during construction (e.g., power generation, structural heating, batch plant, crushers)

None

iii. Stationary sources during operations (e.g., process emissions, large boilers, electric generation)

None

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g. Will any air emission sources named in D.2.f (above), require a NY State Air Registration, Air Facility Permit, or Federal Clean Air Act Title IV or Title V Permit? ☐Yes☒No

If Yes:

i. Is the project site located in an Air quality non-attainment area? (Area routinely or periodically fails to meet ambient air quality standards for all or some parts of the year) ☐Yes☐No

ii. In addition to emissions as calculated in the application, the project will generate:
- ______Tons/year (short tons) of Carbon Dioxide (CO_2)
- ______Tons/year (short tons) of Nitrous Oxide (N_2O)
- ______Tons/year (short tons) of Perfluorocarbons (PFCs)
- ______Tons/year (short tons) of Sulfur Hexafluoride (SF_6)
- ______Tons/year (short tons) of Carbon Dioxide equivalent of Hydroflourocarbons (HFCs)
- ______Tons/year (short tons) of Hazardous Air Pollutants (HAPs)

h. Will the proposed action generate or emit methane (including, but not limited to, sewage treatment plants, landfills, composting facilities)? ☐Yes ☒No

If Yes:

i. Estimate methane generation in tons/year (metric): ____

ii. Describe any methane capture, control or elimination measures included in project design (e.g., combustion to generate heat or electricity, flaring): ____

i. Will the proposed action result in the release of air pollutants from open-air operations or processes, such as quarry or landfill operations? ☐Yes ☒No

If Yes: Describe operations and nature of emissions (e.g., diesel exhaust, rock particulates/dust): ____

j. Will the proposed action result in a substantial increase in traffic above present levels or generate substantial new demand for transportation facilities or services? ☐Yes ☒No

If Yes:

i. When is the peak traffic expected (Check all that apply): ☐ Morning ☐ Evening ☐Weekend ☐ Randomly between hours of ____ to ____.

ii. For commercial activities only, projected number of truck trips/day and type (e.g., semi trailers and dump trucks): Tanker trucks - 16 per day

iii. Parking spaces: Existing 0 Proposed 20 Net increase/decrease 20

iv. Does the proposed action include any shared use parking? ☒Yes ☐No

v. If the proposed action includes any modification of existing roads, creation of new roads or change in existing access, describe: Reconstruction of Crosby Road, new access road to faclity.

vi. Are public/private transportation service(s) or facilities available within ½ mile of the proposed site? ☐Yes ☒No

vii Will the proposed action include access to public transportation or accommodations for use of hybrid, electric or other alternative fueled vehicles? ☒Yes ☐No

viii. Will the proposed action include plans for pedestrian or bicycle accommodations for connections to existing pedestrian or bicycle routes? ☐Yes ☒No

k. Will the proposed action (for commercial or industrial projects only) generate new or additional demand for energy? ☒Yes ☐No

If Yes:

i. Estimate annual electricity demand during operation of the proposed action: 112MW phase 1; 225MW phase 2

ii. Anticipated sources/suppliers of electricity for the project (e.g., on-site combustion, on-site renewable, via grid/local utility, or other): Grid - Hydropower

iii. Will the proposed action require a new, or an upgrade, to an existing substation? ☒Yes ☐No
New STAMP substation to be constructed

l. Hours of operation. Answer all items which apply.

i. During Construction:

- Monday - Friday: 7am to 5pm
- Saturday: None
- Sunday: None
- Holidays: None

ii. During Operations:

- Monday - Friday: 24 Hours
- Saturday: 24 Hours
- Sunday: 24 Hours
- Holidays: 24 Hours

m. Will the proposed action produce noise that will exceed existing ambient noise levels during construction, operation, or both? ☒ Yes ☐ No

If yes:

i. Provide details including sources, time of day and duration:

During construction, just construction noise sources such as trucks and excavators

In operation, 12 compressors: 90dB at compressor, 25.4dB at STAMP boundary (1700' at closest)

ii. Will the proposed action remove existing natural barriers that could act as a noise barrier or screen? ☐ Yes ☒ No

Describe:

n. Will the proposed action have outdoor lighting? ☒ Yes ☐ No

If yes:

i. Describe source(s), location(s), height of fixture(s), direction/aim, and proximity to nearest occupied structures:

Perimeter lighting on 10-20' poles, lighting on equipment skids and at building exits. Lighting in parking area. Downward-facing high-efficiency LED lights, dark-sky compliant.

ii. Will proposed action remove existing natural barriers that could act as a light barrier or screen? ☐ Yes ☒ No

Describe:

o. Does the proposed action have the potential to produce odors for more than one hour per day? ☐ Yes ☒ No

If Yes, describe possible sources, potential frequency and duration of odor emissions, and proximity to nearest occupied structures:

p. Will the proposed action include any bulk storage of petroleum (combined capacity of over 1,100 gallons) or chemical products 185 gallons in above ground storage or any amount in underground storage? ☐ Yes ☒ No

If Yes:

i. Product(s) to be stored

ii. Volume(s) ______ per unit time ____________ (e.g., month, year)

iii. Generally, describe the proposed storage facilities:

q. Will the proposed action (commercial, industrial and recreational projects only) use pesticides (i.e., herbicides, insecticides) during construction or operation? ☐ Yes ☒ No

If Yes:

i. Describe proposed treatment(s):

ii. Will the proposed action use Integrated Pest Management Practices? ☐ Yes ☐ No

r. Will the proposed action (commercial or industrial projects only) involve or require the management or disposal of solid waste (excluding hazardous materials)? ☒ Yes ☐ No

If Yes:

i. Describe any solid waste(s) to be generated during construction or operation of the facility:

- Construction: 1 tons per month (unit of time)
- Operation : 0.25 tons per Year (unit of time)

ii. Describe any proposals for on-site minimization, recycling or reuse of materials to avoid disposal as solid waste:

- Construction:
- Operation:

iii. Proposed disposal methods/facilities for solid waste generated on-site:

- Construction: Dumpster
- Operation: Typical Commercial Trash Receptical

s. Does the proposed action include construction or modification of a solid waste management facility? ☐ Yes ☒ No
If Yes:
i. Type of management or handling of waste proposed for the site (e.g., recycling or transfer station, composting, landfill, or other disposal activities): ____
ii. Anticipated rate of disposal/processing:
- ____ Tons/month, if transfer or other non-combustion/thermal treatment, or
- ____ Tons/hour, if combustion or thermal treatment

iii. If landfill, anticipated site life: ____ years

t. Will the proposed action at the site involve the commercial generation, treatment, storage, or disposal of hazardous waste? ☐ Yes ☒ No
If Yes:
i. Name(s) of all hazardous wastes or constituents to be generated, handled or managed at facility: ____
ii. Generally describe processes or activities involving hazardous wastes or constituents: ____
iii. Specify amount to be handled or generated ____ tons/month
iv. Describe any proposals for on-site minimization, recycling or reuse of hazardous constituents: ____
v. Will any hazardous wastes be disposed at an existing offsite hazardous waste facility? ☐ Yes ☐ No
If Yes: provide name and location of facility: ____
If No: describe proposed management of any hazardous wastes which will not be sent to a hazardous waste facility: ____

E. Site and Setting of Proposed Action

E.1. Land uses on and surrounding the project site

a. Existing land uses.
i. Check all uses that occur on, adjoining and near the project site.
☐ Urban ☐ Industrial ☐ Commercial ☐ Residential (suburban) ☒ Rural (non-farm)
☐ Forest ☒ Agriculture ☐ Aquatic ☐ Other (specify): ____
ii. If mix of uses, generally describe: ____

b. Land uses and covertypes on the project site.

Land use or Covertype	Current Acreage	Acreage After Project Completion	Change (Acres +/-)
• Roads, buildings, and other paved or impervious surfaces	+/- 0.25	+/- 2.25	+ 2.0
• Forested	+/- 10.0	+/- 10.0	0.0
• Meadows, grasslands or brushlands (non-agricultural, including abandoned agricultural)	41.95	37.95	-4.0
• Agricultural (includes active orchards, field, greenhouse etc.)	0	0	0
• Surface water features (lakes, ponds, streams, rivers, etc.)	0	+/- 2.0	+2.0
• Wetlands (freshwater or tidal)	+/- 1.7	+/- 1.7	0.0
• Non-vegetated (bare rock, earth or fill)	0	0	0
• Other Describe: ____			

c. Is the project site presently used by members of the community for public recreation? ☐ Yes ☒ No

i. If Yes: explain: __________

d. Are there any facilities serving children, the elderly, people with disabilities (e.g., schools, hospitals, licensed day care centers, or group homes) within 1500 feet of the project site? ☐ Yes ☒ No

If Yes,

i. Identify Facilities:

____

e. Does the project site contain an existing dam? ☐ Yes ☒ No

If Yes:

i. Dimensions of the dam and impoundment:

- Dam height: __________ feet
- Dam length: __________ feet
- Surface area: __________ acres
- Volume impounded: __________ gallons OR acre-feet

ii. Dam's existing hazard classification: __________

iii. Provide date and summarize results of last inspection:

____

f. Has the project site ever been used as a municipal, commercial or industrial solid waste management facility, or does the project site adjoin property which is now, or was at one time, used as a solid waste management facility? ☐ Yes ☒ No

If Yes:

i. Has the facility been formally closed? ☐ Yes ☐ No

- If yes, cite sources/documentation: __________

ii. Describe the location of the project site relative to the boundaries of the solid waste management facility:

____

iii. Describe any development constraints due to the prior solid waste activities: __________

g. Have hazardous wastes been generated, treated and/or disposed of at the site, or does the project site adjoin property which is now or was at one time used to commercially treat, store and/or dispose of hazardous waste? ☐ Yes ☒ No

If Yes:

i. Describe waste(s) handled and waste management activities, including approximate time when activities occurred:

____

h. Potential contamination history. Has there been a reported spill at the proposed project site, or have any remedial actions been conducted at or adjacent to the proposed site? ☒ Yes ☐ No

If Yes:

i. Is any portion of the site listed on the NYSDEC Spills Incidents database or Environmental Site Remediation database? Check all that apply: ☒ Yes ☐ No

☒ Yes – Spills Incidents database Provide DEC ID number(s): 15105158

☐ Yes – Environmental Site Remediation database Provide DEC ID number(s): __________

☐ Neither database

ii. If site has been subject of RCRA corrective activities, describe control measures: N/A

iii. Is the project within 2000 feet of any site in the NYSDEC Environmental Site Remediation database? ☐ Yes ☒ No

If yes, provide DEC ID number(s): __________

iv. If yes to (i), (ii) or (iii) above, describe current status of site(s):

Record Closed

v. Is the project site subject to an institutional control limiting property uses? ☐ Yes ☒ No

- If yes, DEC site ID number: ______
- Describe the type of institutional control (e.g., deed restriction or easement): ______
- Describe any use limitations: ______
- Describe any engineering controls: ______
- Will the project affect the institutional or engineering controls in place? ☐ Yes ☐ No
- Explain: ______

E.2. Natural Resources On or Near Project Site

a. What is the average depth to bedrock on the project site? >6.5 feet

b. Are there bedrock outcroppings on the project site? ☐ Yes ☒ No
If Yes, what proportion of the site is comprised of bedrock outcroppings? ______ %

c. Predominant soil type(s) present on project site:

Odessa Silt Loam	63 %
Lakemont Silty Clay	14 %
Collomer Silt Loam	12 %

d. What is the average depth to the water table on the project site? Average: ______ feet

e. Drainage status of project site soils:

☐ Well Drained:	0 % of site
☐ Moderately Well Drained:	12 % of site
☐ Poorly Drained	88 % of site

f. Approximate proportion of proposed action site with slopes:

☐ 0-10%:	100 % of site
☐ 10-15%:	0 % of site
☐ 15% or greater:	0 % of site

g. Are there any unique geologic features on the project site? ☐ Yes ☒ No
If Yes, describe: ______

h. Surface water features.

i. Does any portion of the project site contain wetlands or other waterbodies (including streams, rivers, ponds or lakes)? ☒ Yes ☐ No

ii. Do any wetlands or other waterbodies adjoin the project site? ☒ Yes ☐ No

If Yes to either *i* or *ii*, continue. If No, skip to E.2.i.

iii. Are any of the wetlands or waterbodies within or adjoining the project site regulated by any federal, state or local agency? ☒ Yes ☐ No

iv. For each identified regulated wetland and waterbody on the project site, provide the following information:

- Streams: Name 837-78, 847-687 Classification C
- Lakes or Ponds: Name ______ Classification ______
- Wetlands: Name Federal Waters Approximate Size ______
- Wetland No. (if regulated by DEC) ______

v. Are any of the above water bodies listed in the most recent compilation of NYS water quality-impaired waterbodies? ☐ Yes ☒ No

If yes, name of impaired water body/bodies and basis for listing as impaired: N/A

i. Is the project site in a designated Floodway? ☐ Yes ☒ No

j. Is the project site in the 100-year Floodplain? ☐ Yes ☒ No

k. Is the project site in the 500-year Floodplain? ☐ Yes ☒ No

l. Is the project site located over, or immediately adjoining, a primary, principal or sole source aquifer? ☐ Yes ☒ No
If Yes:
i. Name of aquifer: ______

m. Identify the predominant wildlife species that occupy or use the project site:
Whitetailed Deer
Squirrels and other mammals
Common song birds

n. Does the project site contain a designated significant natural community? ☐ Yes ☒ No
If Yes:
i. Describe the habitat/community (composition, function, and basis for designation):
ii. Source(s) of description or evaluation:
iii. Extent of community/habitat:

- Currently: acres
- Following completion of project as proposed: acres
- Gain or loss (indicate + or -): acres

o. Does project site contain any species of plant or animal that is listed by the federal government or NYS as endangered or threatened, or does it contain any areas identified as habitat for an endangered or threatened species? ☐ Yes ☒ No
If Yes:
i. Species and listing (endangered or threatened):

p. Does the project site contain any species of plant or animal that is listed by NYS as rare, or as a species of special concern? ☐ Yes ☒ No
If Yes:
i. Species and listing:

q. Is the project site or adjoining area currently used for hunting, trapping, fishing or shell fishing? ☐ Yes ☒ No
If yes, give a brief description of how the proposed action may affect that use:

E.3. Designated Public Resources On or Near Project Site

a. Is the project site, or any portion of it, located in a designated agricultural district certified pursuant to Agriculture and Markets Law, Article 25-AA, Section 303 and 304? ☐ Yes ☒ No
If Yes, provide county plus district name/number:

b. Are agricultural lands consisting of highly productive soils present? ☐ Yes ☒ No
i. If Yes: acreage(s) on project site?
ii. Source(s) of soil rating(s):

c. Does the project site contain all or part of, or is it substantially contiguous to, a registered National Natural Landmark? ☐ Yes ☒ No
If Yes:
i. Nature of the natural landmark: ☐ Biological Community ☐ Geological Feature
ii. Provide brief description of landmark, including values behind designation and approximate size/extent:

d. Is the project site located in or does it adjoin a state listed Critical Environmental Area? ☐ Yes ☒ No
If Yes:
i. CEA name:
ii. Basis for designation:
iii. Designating agency and date:

e. Does the project site contain, or is it substantially contiguous to, a building, archaeological site, or district which is listed on the National or State Register of Historic Places, or that has been determined by the Commissioner of the NYS Office of Parks, Recreation and Historic Preservation to be eligible for listing on the State Register of Historic Places? ☐ Yes ☒ No

If Yes:

i. Nature of historic/archaeological resource: ☐ Archaeological Site ☐ Historic Building or District

ii. Name: ____________________

iii. Brief description of attributes on which listing is based: ____________________

f. Is the project site, or any portion of it, located in or adjacent to an area designated as sensitive for archaeological sites on the NY State Historic Preservation Office (SHPO) archaeological site inventory? ☒ Yes ☐ No

g. Have additional archaeological or historic site(s) or resources been identified on the project site? ☒ Yes ☐ No

If Yes:

i. Describe possible resource(s): Phase 1-3 have been completed on site and site has been cleared by SHPO

ii. Basis for identification: ____________________

h. Is the project site within fives miles of any officially designated and publicly accessible federal, state, or local scenic or aesthetic resource? ☐ Yes ☒ No

If Yes:

i. Identify resource: ____________________

ii. Nature of, or basis for, designation (e.g., established highway overlook, state or local park, state historic trail or scenic byway, etc.): ____________________

iii. Distance between project and resource: __________ miles.

i. Is the project site located within a designated river corridor under the Wild, Scenic and Recreational Rivers Program 6 NYCRR 666? ☐ Yes ☒ No

If Yes:

i. Identify the name of the river and its designation: ____________________

ii. Is the activity consistent with development restrictions contained in 6NYCRR Part 666? ☐ Yes ☐ No

F. Additional Information

Attach any additional information which may be needed to clarify your project.

If you have identified any adverse impacts which could be associated with your proposal, please describe those impacts plus any measures which you propose to avoid or minimize them.

G. Verification

I certify that the information provided is true to the best of my knowledge.

Applicant/Sponsor Name Brenor Brophy

Date December 30, 2020

Signature ____________________

Title Vice President Project Development

PRINT FORM

Genesee
County
Economic
Development
Center

GCEDC Board Meeting
Thursday, February 4, 2021
Location: Electronically
4:00 PM

GCEDC MINUTES

Attendance

Board Members: C. Yunker, T. Bender, C. Klotzbach, P. Battaglia, P. Zeliff, A. Vanderhoof, M. Gray

Staff: L. Farrell, M. Masse, L. Casey, J. Krencik, S. Hyde, C. Suozzi, P. Kennett

Guests: D. Cunningham (GGLDC Board Member), S. Noble-Moag (GGLDC Board Member), M. Wiater (GGLDC Board Member), G. Torrey (GGLDC Board Member), R. Gaenzle (Harris Beach), P. Williams (LandPro Equipment), D. Ciurzynski (Ciurzynski Consulting, LLC), M. Landers (County Manager)

Absent:

1.0 Call to Order

P. Zeliff called the meeting to order at 4:03 p.m. via conference call / video conference.

Because of the Novel Coronavirus (COVID-19) Emergency and State and Federal bans on large meetings or gatherings and pursuant to Governor Cuomo's Executive Order 202.1 issued on March 12, 2020 suspending the Open Meetings Law, this Meeting is being held electronically via conference call / video conference instead of a public meeting open for the public to attend in person.

Presentation – D. Ciurzynski and P. Williams provided an overview of the LandPro Equipment, LLC project. LandPro Equipment, LLC will acquire and develop a 14-acre parcel in the Town of Batavia to construct a 50,000 square-foot facility for a full-service John Deere Agriculture and Turf Dealership. Ninety-five percent of the facility will be used for parts, service, and training, with 5% used for retail.

D. Ciurzynski and P. Williams left the meeting at 4:13.

1.1 Enter Executive Session

C. Yunker made a motion to enter executive session under the Public Officers Law, Article 7, Open Meetings Law Section 105, at 4:14 p.m. for the following reasons:

1. The medical, financial, credit or employment history of a particular person or corporation, or matters leading to the appointment, employment, promotion, demotion, discipline, suspension, dismissal or removal of a particular person or corporation.

The motion was seconded by T. Bender and approved by all members present.

1.2 Enter Public Session

C. Klotzbach made a motion to enter back into public session at 4:55 p.m., seconded by P. Battaglia and approved by all members present.

2.0 Chairman's Report & Activities

2.1 Upcoming Meetings:

Next Scheduled Board Meeting: Thursday, March 4th at 4:00 p.m.
Audit & Finance Committee Meeting: Tuesday, March 2nd at 8:30 a.m.
STAMP Committee Meeting: : Tuesday, March 2nd at 10:30 a.m.
Governance & Nominating Committee Meeting: Thursday, March 4th at 3:00 p.m.
CANCELLED: Annual Meeting: Friday, March 5th at 12:00 p.m.

2.2 Agenda Additions / Deletions / Other Business-

M. Gray made a motion to table agenda item 4.4 Cyber Insurance; the motion was seconded by A. Vanderhoof. Roll call resulted as follows:

P. Battaglia - Yes
T. Bender - Yes
C. Klotzbach - Yes
A. Vanderhoof – Yes
C. Yunker - Yes
P. Zeliff - Yes
M. Gray - Yes

The item was approved as presented.

2.3 Minutes: January 7, 2021

M. Gray made a motion to approve the January 7, 2021 minutes as presented; the motion was seconded by T. Bender. Roll call resulted as follows:

P. Battaglia - Yes
T. Bender - Yes
C. Klotzbach - Yes
A. Vanderhoof – Yes
C. Yunker - Yes
P. Zeliff - Yes
M. Gray - Yes

The item was approved as presented.

3.0 Report of Management

3.1 LandPro Equipment, LLC – Initial Resolution - LandPro Equipment LLC will acquire and develop a 14-acre parcel in the town of Batavia, including the construction of a 50,000 square-foot facility for a full-service John Deere Agriculture and Turf Dealership. 95% of the facility will be used for parts, service, and training, with 5% used for retail.

The company pledges to create 5 new jobs and retain 62 existing jobs as part of the $7 million project. The facility will service a customer base within a 50-mile radius of Batavia, NY and expand workforce training programs for the benefit of the company and Genesee County's workforce.

The project will produce an estimated $5.3 million in regional and state benefits, including $4.8 million in estimated temporary (construction) and ongoing payroll for the 5 new jobs, $237,000 in property tax revenue and $121,000 in sales tax revenue during the incentives period.The company has requested property, sales and mortgage tax abatements totaling $731,000.

A public hearing will be held as benefits are estimated to be over $100,000

Resolution No. 02/2021 - 01

RESOLUTION OF THE GENESEE COUNTY INDUSTRIAL DEVELOPMENT AGENCY D/B/A GENESEE COUNTY ECONOMIC DEVELOPMENT CENTER (THE "AGENCY") (i) ACCEPTING AN APPLICATION WITH RESPECT TO A CERTAIN PROJECT (AS DEFINED BELOW, THE "PROJECT") FOR THE BENEFIT OF LANDPRO EQUIPMENT LLC, (ii) AUTHORIZING A PUBLIC HEARING WITH RESPECT TO THE PROJECT, AND (iii) DESCRIBING THE FORMS OF FINANCIAL ASSISTANCE BEING CONTEMPLATED BY THE AGENCY WITH RESPECT TO THE PROJECT.

P. Battaglia made a motion to accept initial resolution #02/2021-01, authorizing the scheduling of a public hearing; the motion was seconded by A. Vanderhoof. Roll call resulted as follows:

P. Battaglia -	Yes	C. Yunker -	Yes
T. Bender -	Yes	P. Zeliff -	Yes
C. Klotzbach -	Yes	M. Gray -	Absent
A. Vanderhoof –	Absent		

The item was approved as presented.

S. Hyde outlined a report on employment metrics which the Economic Recovery Task Force has been tracking since the beginning of the pandemic. From the end of of March 2020 to the end of April 2020, 2300 jobs were lost in Genesee County. This is a decrease of 10.4%. By the end of 2020, jobs were down by only 800. This is a recovery of 65% of jobs lost. The leisure and hospitality sector was impacted the most, down by 44%. It has experienced the least amount of recovery as it is still down by 35%.

4.0 Audit & Finance Committee

4.1 December 2020 Unaudited Financial Statements- L. Farrell noted the following:

- On the Balance sheet, restricted cash decreased. In December, we had a large draw on our ESD grants using our imprest cash funds. We are still waiting to receive approximately $2M into the imprest account for the $8M ESD grant, which the Comptroller's office approved on 1/4/2021.
- Pre-paid expenses increased. In December, the annual New York State Retirement invoice was paid. This payment covers through March 31, 2021
- Accounts payable increased which includes STAMP payables. The next round of GURFs are in process which included 2020 expenditures that will be paid in 2021.
- On the P&L, we closed on three solar projects, including Townline Batavia Solar and both Knapp solar projects. Fee revenue is almost double what we budgeted for 2020.
- Revenues are over budget, while most operating expenses are under budget.

This was recommended for approval by the Committee.

M. Gray made a motion to approve the December 2020 Unaudited Financial Statements as presented; the motion was seconded by A. Vanderhoof. Roll call resulted as follows:

P. Battaglia - Yes
T. Bender - Yes
C. Klotzbach - Yes
A. Vanderhoof – Yes
C. Yunker - Yes
P. Zeliff - Yes
M. Gray - Yes

The item was approved as presented.

4.2 General Liability Insurance – The Board previously approved extending insurance coverage with Selective Insurance through the end of February 2021 while Tompkins worked on obtaining alternative insurance proposals. Tompkins went out to bid for the Agency's 2021 insurance renewal. Other markets were explored as listed in the Board packet materials, but they were unable to find another carrier that was able to meet the GCEDC's needs at an affordable rate. The total premium proposed by Selective is within the amounts included in the EDC and LDC budgets.

This was recommended for approval by the Committee.

M. Gray made a motion to approve general liability insurance with Selective as presented; the motion was seconded by A. Vanderhoof. Roll call resulted as follows:

P. Battaglia - Yes
T. Bender - Yes
C. Klotzbach - Yes
A. Vanderhoof – Yes
C. Yunker - Yes
P. Zeliff - Yes
M. Gray - Yes

The item was approved as presented.

4.3 D & O Insurance – Lawley Insurance has provided us with a proposal for renewal of our current Directors & Officers/Employment Practices Liability Insurance with Travelers. The renewal price reflects an overall price increase of only $528 ($264/entity) compared to the current policy. The current policy expires on 2/23/2021.

The cost of this policy would be split between GCEDC and GGLDC ($5,496/entity) and is within each entity's budget for 2021.

Coverage for the new Water and Sewer Works Transportation Corporations has not been included in this proposal. These entities can be added when we have more information to provide.

This was recommended for approval by the Committee.

M. Gray made a motion to approve the renewal of D & O insurance with Travelers as presented; the motion was seconded by P. Battaglia. Roll call resulted as follows:

P. Battaglia - Yes
T. Bender - Yes
C. Klotzbach - Yes
A. Vanderhoof – Yes
C. Yunker - Yes
P. Zeliff - Yes
M. Gray - Yes

The item was approved as presented.

4.4. Cyber Insurance – This agenda item was tabled.

4.5 Change Order for Corfu WWTF Expansion – In December of 2019, the GGLDC accepted the bid received from STC Construction for a Base Bid amount of $4,861,000 and authorizing Change Order No. 1 with a deduct amount of $500,000.

The GGLDC also accepted the bid received from Concord Electric for a Base Bid amount of $393,000.

The GGLDC committed the cash on hand in restricted BETP account as of 9/30/19 - $556,001 (plus any interest earned it the account up to the date of disbursement) and future CBA payments (9 years at $93,000 per year) unless the debt is paid off early).

The work on the WWTF is almost complete, and there are two additional change orders presented today. One change order from STC and one from Concord Electric.

The town of Pembroke has passed a bonding resolution that will cover the increase in cost as a result of the change orders and is not asking the GGLDC for any additional funds. No additional fund commitment is requested.

This was recommended for approval by the Committee.

P. Zeliff made a motion to approve of the change orders for STC Construction, Inc and Concord Electric as presented with no additional commitment of funds; the motion was seconded by P. Battaglia. Roll call resulted as follows:

P. Battaglia -	Yes	C. Yunker -	Yes
T. Bender -	Yes	P. Zeliff -	Yes
C. Klotzbach -	Yes	M. Gray -	Yes
A. Vanderhoof –	Yes		

The item was approved as presented.

5.0 Governance & Nominating Committee – C. Yunker

5.1 Authority Self-Evaluation of Prior Year Performance - Public Authorities are required to perform a self-evaluation of prior year's goals/measurements annually. This report shows the results against the goals and measurements that were set for 2020. This report will be submitted into PARIS.

C. Yunker reviewed the highlights of the Authority self-evaluation that the Committee discussed in detail. The Agency set a goal of capital investment commitment of $32M for 2020. The actual result from projects was $83M for 2020. The Agency also pledged to create 90 jobs from projects in 2020. These projects resulted in 78 jobs pledged in 2020 but did not include jobs related to the Rochester Regional Health bond transaction because they failed to report.

This was recommended for approval by the Committee.

C. Yunker made a motion to approve the Authority Self-Evaluation of Prior Year Performance; the motion was seconded by P. Battaglia. Roll call resulted as follows:

P. Battaglia -	Yes	C. Yunker -	Yes
T. Bender -	Yes	P. Zeliff -	Yes
C. Klotzbach -	Yes	M. Gray -	Yes
A. Vanderhoof –	Yes		

The item was approved as presented.

5.2 Mission Statement & Measurement Report - The Authority's Board must annually review the authority's mission statement and performance goals to ensure that its mission has not changed and that the authority's performance goals continue to support its mission. This report will be posted to the website and submitted into PARIS.

C. Yunker reviewed the highlights of the Mission Statement and Measuremtn Report that the Committee discussed in detail. The Committee recommends that the Agency set a goal of capital investment commitment of $35M for 2021, which does not include any Mega projects (over $50M capital investment commitment). The Committee also recommends the Agency set a job creation goal of 90 jobs from projects in 2021. The other suggested goals are over-arching goals that the entire staff can work towards achieving and are still consistent with the Agency's mission.

This was recommended for approval by the Committee.

C. Yunker made a motion to approve the Mission Statement & Measurement Report with the amendment that the capital investment commitment excludes any Mega project(s); the motion was seconded by P. Battaglia. Roll call resulted as follows:

P. Battaglia - Yes
T. Bender - Yes
C. Klotzbach - Yes
A. Vanderhoof – Yes
C. Yunker - Yes
P. Zeliff - Yes
M. Gray - Yes

The item was approved as presented.

6.0 STAMP Committee – P. Zeliff

6.1 Phillips Lytle Proposal – STAMP Main Substation – The proposal from Phillips Lytle is to provide legal, regulatory, and overall planning support from their energy law and consulting practice at Phillips Lytle. This is to foster completion of the design and engineering of the STAMP Main substation and related interconnection studies as well as to advance necessary ownership, operations and maintenance, regulatory and pricing models to enable the bidding, construction and operations of the 345V to 115V main substation at STAMP.

Fund commitment: Not to exceed $40,000 from Empire State Development's GCEDC STAMP Capital (Project #132,367)

This was recommended for approval by the Committee.

P. Zeliff made a motion to approve the Phillips Lytle proposal not to exceed $40,000; the motion was seconded by C. Klotzbach. Roll call resulted as follows:

P. Battaglia - Yes
T. Bender - Yes
C. Klotzbach - Yes
A. Vanderhoof – Yes
C. Yunker - Yes
P. Zeliff - Yes
M. Gray - Yes

The item was approved as presented.

6.2 Project Gateway SEQR – M. Masse provided an update on SEQR concerning Project Gateway. The GCEDC was lead agency when the original Environment Impact Study (EIS) was completed on the STAMP site in 2012. Since the original EIS, there have been additional updates and the GCEDC remained lead agency for these as well. On January 4, 2021, the GCEDC sent letters indicating intent to maintain lead agency status regarding Project Gateway to all interested and involved parties. The GCEDC received two affirmations consenting lead agency status and no other responses. As a result, after 30 days, the GCEDC is lead agency. As lead agency the GCEDC is required to evaluate whether there are adverse environmental impacts because of Project Gateway that have not been previously evaluated in the STAMP environmental record. After careful review, it was determined that there are no significant adverse environmental impacts that would be created by this project that had not previously been analyzed. No mitigation is necessary if Project Gateway commits to the best practices outlined in the EIS. The GCEDC is in a position to adopt the resolution included with Committee and Board materials.

This was recommended for approval by the Committee.

Resolution No. 02/2021 – 02

RESOLUTION OF THE GENESEE COUNTY INDUSTRIAL DEVELOPEMNT AGENCY D/B/A GENESEE COUNTY ECONOMIC DEVELOPMENT CENTER PURSUANT TO THE STATE ENVIRONMENTAL QUALITY REVIEW ACT CONCERNING PROJECT GATEWAY - PROPOSED FUTURE USE OF A PORTION OF THE WESTERN NEW YORK SCIENCE & TECHNOLOGY ADVANCED MANUFACTURING PARK

P. Zeliff made a motion to approve Resolution #02/2021-02 as presented; the motion was seconded by C. Yunker. Roll call resulted as follows:

P. Battaglia -	Yes	C. Yunker -	Yes
T. Bender -	Yes	P. Zeliff -	Yes
C. Klotzbach -	Yes	M. Gray -	Yes
A. Vanderhoof –	Yes		

The item was approved as presented.

7.0 Empoyment & Compensation – T. Bender

7.1 CEO Merit / COLA – This was recommended for approval by the Committee.

T. Bender made a motion to approve a CEO Merit /COLA Adjustment of 1.5%; the motion was seconded by A. Vanderhoof. Roll call resulted as follows:

P. Battaglia -	Yes	C. Yunker -	Yes
T. Bender -	Yes	P. Zeliff -	Yes
C. Klotzbach -	Yes	M. Gray -	Yes
A. Vanderhoof –	Yes		

The item was approved as presented.

8.0 Housing Committee – P. Battaglia

8.1 Nothing at this time.

9.0 Other Business

10.0 Adjournment

As there was no further business, T. Bender made a motion to adjourn at 5:14 p.m., which was seconded by A. Vanderhoof and passed unanimously.

Appendix J

NYS Stormwater Management Design Manual Appendix H

H.1 Ponds and Wetlands

For areas that are to be planted within a stormwater pond, it is necessary to determine what type of hydrologic zones will be created within the pond. The following six zones describe the different conditions encountered in stormwater management facilities. Every facility does not necessarily reflect all of these zones. The hydrologic zones designate the degree of tolerance the plant exhibits to differing degrees of inundation by water.

Table H.5 at the end of this appendix designates appropriate zones for each plant. There may be other zones listed outside of these brackets. The plant materials may occur within these zones, but are not typically found in them. Plants suited for specific hydrologic conditions may perish when those conditions change, exposing the soil, and therefore, increasing the chance for erosion.

Each zone has its own set of plant selection criteria based on the hydrology of the zone, the stormwater functions required of the plant and the desired landscape effect. The hydrologic zones are as follows:

Table H.1 Hydrologic Zones

Zone #	Zone Description	Hydrologic Conditions
Zone 1	Deep Water Pool	1-6 feet deep Permanent Pool
Zone 2	Shallow Water Bench	6 inches to 1 foot deep
Zone 3	Shoreline Fringe	Regularly inundated
Zone 4	Riparian Fringe	Periodically inundated
Zone 5	Floodplain Terrace	Infrequently inundated
Zone 6	Upland Slopes	Seldom or never inundated

Zone 1: Deep Water Area *(1- 6 Feet)*

Ponds and wetlands both have deep pool areas that comprise Zone 1. These pools range from one to six feet in depth, and are best colonized by submergent plants, if at all.

This pondscaping zone has not been routinely planted for several reasons. First, the availability of plant materials that can survive and grow in this zone is limited, and it is also feared that plants could clog the stormwater facility outlet structure. In many cases, these plants will gradually become established through natural recolonization (e.g., transport of plant fragments from other ponds via the feet and legs of waterfowl). If submerged plant material becomes more commercially available and clogging concerns are addressed, this area can be planted. The function of the planting is to reduce resedimentation and improve oxidation while creating a greater aquatic habitat.

- Plant material must be able to withstand constant inundation of water of one foot or greater in depth.
- Plants may be submerged partially or entirely.
- Plants should be able to enhance pollutant uptake.
- Plants may provide food and cover for waterfowl, desirable insects, and other aquatic life.

Zone 2: Shallow Water Bench *(Normal Pool To 1 Foot)*

Zone 2 includes all areas that are inundated below the normal pool to a depth of one foot, and is the primary area where emergent plants will grow in a stormwater wetlands. Zone 2 also coincides with the aquatic bench found in stormwater ponds. This zone offers ideal conditions for the growth of many emergent wetland species. These areas may be located at the edge of the pond or on low mounds of earth located below the surface of the water within the pond. When planted, Zone 2 can be an important habitat for many aquatic and nonaquatic animals, creating a diverse food chain. This food chain includes predators, allowing a natural regulation of mosquito populations, thereby reducing the need for insecticidal applications.

- Plant material must be able to withstand constant inundation of water to depths between six inches and one foot deep.
- Plants will be partially submerged.
- Plants should be able to enhance pollutant uptake.
- Plants may provide food and cover for waterfowl, desirable insects and other aquatic life.

Plants will stabilize the bottom of the pond, as well as the edge of the pond, absorbing wave impacts and reducing erosion, when water level fluctuates. Plant also slow water velocities and increase sediment deposition rates. Plants can reduce resuspension of sediments caused by the wind. Plants can also soften the engineered contours of the pond, and can conceal drawdowns during dry weather.

Zone 3: Shoreline Fringe *(Regularly Inundated)*

Zone 3 encompasses the shoreline of a pond or wetland, and extends vertically about one foot in elevation from the normal pool. This zone includes the safety bench of a pond, and may also be periodically inundated if storm events are subject to extended detention. This zone occurs in a wet pond or shallow marsh and can be the most difficult to establish since plants must be able to withstand inundation of water during storms, when wind might blow water into the area, or the occasional drought during the summer. In order to stabilize the soil in this zone, Zone 3 must have a vigorous cover.

- Plants should stabilize the shoreline to minimize erosion caused by wave and wind action or water fluctuation.
- Plant material must be able to withstand occasional inundation of water. Plants will be partially submerged at this time.
- Plant material should, whenever possible, shade the shoreline, especially the southern exposure. This will help to reduce the water temperature.

- Plants should be able to enhance pollutant uptake.
- Plants may provide food and cover for waterfowl, songbirds, and wildlife. Plants could also be selected and located to control overpopulation of waterfowl.
- Plants should be located to reduce human access, where there are potential hazards, but should not block the maintenance access.
- Plants should have very low maintenance requirements, since they may be difficult or impossible to reach.
- Plants should be resistant to disease and other problems which require chemical applications (since chemical application is not advised in stormwater ponds).

Zone 4: Riparian Fringe *(Periodically Inundated)*

Zone 4 extends from one to four feet in elevation above the normal pool. Plants in this zone are subject to periodic inundation after storms, and may experience saturated or partly saturated soil conditions. Nearly all of the temporary ED area is included within this zone.

- Plants must be able to withstand periodic inundation of water after storms, as well as occasional drought during the warm summer months.
- Plants should stabilize the ground from erosion caused by run-off.
- Plants should shade the low flow channel to reduce the pool warming whenever possible.
- Plants should be able to enhance pollutant uptake.
- Plant material should have very low maintenance, since they may be difficult or impossible to access.
- Plants may provide food and cover for waterfowl, songbirds and wildlife. Plants may also be selected and located to control overpopulation of waterfowl.
- Plants should be located to reduce pedestrian access to the deeper pools.

Zone 5: Floodplain Terrace *(Infrequently Inundated)*

Zone 5 is periodically inundated by flood waters that quickly recedes in a day or less. Operationally, Zone 5 extends from the maximum two year or Cpv water surface elevation up to the 10 or 100 year maximum water surface elevation. Key landscaping objectives for Zone 5 are to stabilize the steep slopes characteristic of this zone, and establish a low maintenance, natural vegetation.

- Plant material should be able to withstand occasional but brief inundation during storms, although typical moisture conditions may be moist, slightly wet, or even swing entirely to drought conditions during the dry weather periods.
- Plants should stabilize the basin slopes from erosion.
- Ground cover should be very low maintenance, since they may be difficult to access on steep slopes or if frequency of mowing is limited. A dense tree cover may help reduce maintenance and discourage resident geese.
- Plants may provide food and cover for waterfowl, songbirds, and wildlife.

- Placement of plant material in Zone 5 is often critical, as it often creates a visual focal point and provides structure and shade for a greater variety of plants.

Zone 6: Upland Slopes *(Seldom or Never Inundated)*

The last zone extends above the maximum 100 year water surface elevation, and often includes the outer buffer of a pond or wetland. Unlike other zones, this upland area may have sidewalks, bike paths, retaining walls, and maintenance access roads. Care should be taken to locate plants so they will not overgrow these routes or create hiding places that might make the area unsafe.

- Plant material is capable of surviving the particular conditions of the site. Thus, it is not necessary to select plant material that will tolerate any inundation. Rather, plant selections should be made based on soil condition, light, and function within the landscape.
- Ground covers should emphasize infrequent mowing to reduce the cost of maintaining this landscape.
- Placement of plants in Zone 6 is important since they are often used to create a visual focal point, frame a desirable view, screen undesirable views, serve as a buffer, or provide shade to allow a greater variety of plant materials. Particular attention should be paid to seasonal color and texture of these plantings.

H.2 Bioretention

Planting Soil Bed Characteristics

The characteristics of the soil for the bioretention facility are perhaps as important as the facility location, size, and treatment volume. The soil must be permeable enough to allow runoff to filter through the media, while having characteristics suitable to promote and sustain a robust vegetative cover crop. In addition, much of the nutrient pollutant uptake (nitrogen and phosphorus) is accomplished through adsorption and microbial activity within the soil profile. Therefore, the soils must balance soil chemistry and physical properties to support biotic communities above and below ground.

The planting soil should be a sandy loam, loamy sand, loam (USDA), or a loam/sand mix (should contain a minimum 35 to 60% sand, by volume). The clay content for these soils should by less than 25% by volume. Soils should fall within the SM, or ML classifications of the Unified Soil Classification System (USCS). A permeability of at least 1.0 feet per day (0.5"/hr) is required (a conservative value of 0.5 feet per day is used for design). The soil should be free of stones, stumps, roots, or other woody material over 1" in diameter. Brush or seeds from noxious weeds. Placement of the planting soil should be in lifts of 12 to 18", loosely compacted (tamped lightly with a dozer or backhoe bucket). The specific characteristics are presented in Table H.2.

Table H.2 Planting Soil Characteristics

Parameter	Value
PH range	5.2 to 7.00
Organic matter	1.5 to 4.0%
Magnesium	35 lbs. per acre, minimum
Phosphorus (P_2O_5)	75 lbs. per acre, minimum
Potassium (K_2O)	85 lbs. per acre, minimum
Soluble salts	≤ 500 ppm
Clay	10 to 25%
Silt	30 to 55%
Sand	35 to 60%

Mulch Layer

The mulch layer plays an important role in the performance of the bioretention system. The mulch layer helps maintain soil moisture and avoid surface sealing which reduces permeability. Mulch helps prevent erosion, and provides a micro-environment suitable for soil biota at the mulch/soil interface. It also serves as a pretreatment layer, trapping the finer sediments which remain suspended after the primary pretreatment.

The mulch layer should be standard landscape style, single or double, shredded hardwood mulch or chips. The mulch layer should be well aged (stockpiled or stored for at least 12 months), uniform in color, and free of other materials, such as weed seeds, soil, roots, etc. The mulch should be applied to a maximum depth of three inches. Grass clippings should not be used as a mulch material.

Planting Plan Guidance

Plant material selection should be based on the goal of simulating a terrestrial forested community of native species. Bioretention simulates an ecosystem consisting of an upland-oriented community dominated by trees, but having a distinct community, or sub-canopy, of understory trees, shrubs and herbaceous materials. The intent is to establish a diverse, dense plant cover to treat stormwater runoff and withstand urban stresses from insect and disease infestations, drought, temperature, wind, and exposure.

The proper selection and installation of plant materials is key to a successful system. There are essentially three zones within a bioretention facility (Figure H.1). The lowest elevation supports plant species adapted to standing and fluctuating water levels. The middle elevation supports a slightly drier group of plants, but still tolerates fluctuating water levels. The outer edge is the highest elevation and generally supports plants adapted to dryer conditions. When using Table A.5 to identify species, use the following guideline:

Lowest Zone: Zones 2-3

Middle Zone: Zones 3-4

Outer Zone: Zones 5-6

The layout of plant material should be flexible, but should follow the general principals described in Table H.3. The objective is to have a system which resembles a random and natural plant layout, while maintaining optimal conditions for plant establishment and growth.

Figure H.1 Planting Zones for Bioretention Facilities

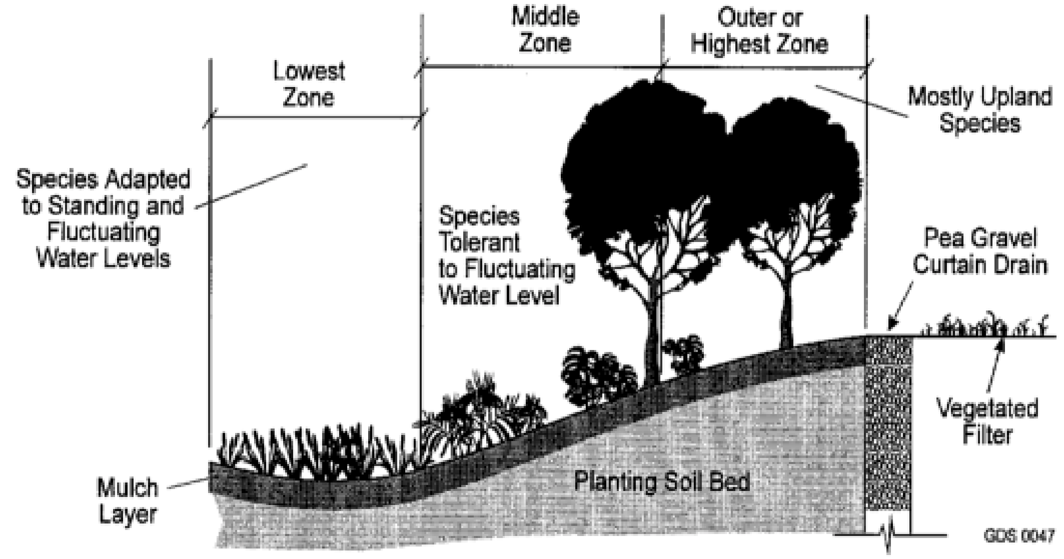


Table H.3 Planting Plan Design Considerations
Native plant species should be specified over exotic or foreign species.
Appropriate vegetation should be selected based on the zone of hydric tolerance (see Figure H.1).
Species layout should generally be random and natural.
A canopy should be established with an understory of shrubs and herbaceous materials.
Woody vegetation should not be specified in the vicinity of inflow locations.
Trees should be planted primarily along the perimeter of the bioretention area.
Urban stressors (e.g., wind, sun, exposure, insect and disease infestation, drought) should be considered when laying out the planting plan.
Noxious weeds should not be specified.
Aesthetics and visual characteristics should be a prime consideration.
Traffic and safety issues must be considered.
Existing and proposed utilities must be identified and considered.

Plant Material Guidance

Plant materials should conform to the American Standard Nursery Stock, published by the American Association of Nurserymen, and should be selected from certified, reputable nurseries. Planting specifications should be prepared by the designer and should include a sequence of construction, a description of the contractor's responsibilities, a planting schedule and installation specifications, initial maintenance, and a warranty period and expectations of plant survival. Table H.4 presents some typical issues for planting specifications.

Table H.4 Planting Specification Issues for Bioretention Areas

Specification Element	Elements
Sequence of Construction	Describe site preparation activities, soil amendments, etc.; address erosion and sediment control procedures; specify step-by-step procedure for plant installation through site clean-up.
Contractor's Responsibilities	Specify the contractors responsibilities, such as watering, care of plant material during transport, timeliness of installation, repairs due to vandalism, etc.
Planting Schedule and Specifications	Specify the materials to be installed, the type of materials (e.g., B&B, bare root, containerized); time of year of installations, sequence of installation of types of plants; fertilization, stabilization seeding, if required; watering and general care.
Maintenance	Specify inspection periods; mulching frequency (annual mulching is most common); removal and replacement of dead and diseased vegetation; treatment of diseased trees; watering schedule after initial installation (once per day for 14 days is common); repair and replacement of staking and wires.
Warranty	Specify the warranty period, the required survival rate, and expected condition of plant species at the end of the warranty period.

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)						
Plant Name	**Zone**	**Form**	**Available**	**Inundation Tolerance**	**Wildlife Value**	**Notes**
Trees and Shrubs						
American Elm *(Ulmus americana)*	4,5,6	Dec. Tree	yes	Irregular-seasonal saturation	High. Food (seeds,browsing), cover, nesting for birds & mammals	Susceptible to diesease (short-lived). Sun to full shade, tolerates drought and wind/ice damage.
Arrowwood Viburrium *(Viburrium dentatum)*	3,4	Dec. Shrub	yes	yes	High. Songbirds and mammals	Grows best in sun to partial shade
Bald Cypress *(Taxodium distichum)*	3,4	Dec. Tree	yes	yes	Little food value, but good perching site for waterfowl	Forested Coastal Plain. North of normal range. Tolerates drought.
Bayberry *(Myrica pensylvanica)*	4,5,6	Dec. Shrub	yes	yes	High. Nesting, food, cover. Berries last into winter	Coastal Plain only. Roots fix N_2 Tolerates slightly acidic soils.
Black Ash *(Fraxinus nigra)*	3,4,5	Dec. Tree	yes	Irregular-seasonal saturation	High. Food (seeds, sap), cover, nesting for birds & mammals. Fruit persists in winter	Rapid growth. Requires full sun. Susceptible to wind/ice damage & disease. Tolerates drought and infrequent flooding by salt water.
Black Cherry *(Prunus serotina)*	5,6	Dec. Tree	yes	no	High. Food	Moist soils or wet bottomland areas
Blackgum or Sourgum *(Nyssa sylvatica)*	4,5,6	Dec. Tree	yes	yes	High. Songbirds, egrets, herons, raccoons, owls	Can be difficult to transplant. Prefers sun to partial shade
Black Willow *(Salix nigra)*	3,4,5	Dec. Tree	yes	yes	High. Browsing and cavity nesters.	Rapid growth, stabilizes stream-banks. Full sun
Buttonbush *(Cepahlanthus occidentalis)*	2,3,4,5	Dec. Shrub	yes	yes	High. Ducks and shorebirds. Seeds, nectar and nesting.	Full sun to partial shade. Will grow in dry areas.
Common Spice Bush *(Lindera benzoin)*	3,4,5	Dec. Shrub	yes	yes	Very high. Songbirds	Shade and rich soils. Tolerates acidic soils. Good understory species

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)

Plant Name	Zone	Form	Available	Inundation Tolerance	Wildlife Value	Notes
Eastern Cottonwood *(Populus deltoides)*	4,5	Dec. Tree	yes	yes	Moderate. Cover, food.	Shallow rooted, subject to windthrow. Invasive roots. Rapid growth.
Eastern Hemlock *(Tsuga canadensis)*	5,6	Conif. Tree	yes	yes	Moderate. Mostly cover and some food	Tolerates all sun/shade conditions. Tolerates acidic soil.
Eastern Red Cedar *(Juniperus virginiana)*	4,5,6	Conif. Tree	yes	no	High. Fruit for birds. Some cover.	Full sun to partial shade. Common in wetlands, shrub bogs and edge of stream
Elderberry *(Sambucus canadensis)*	3,4,5,6	Dec. Shrub	yes	yes	Extremely high. Food and cover, birds and mammals.	Full sun to partial shade.
Green Ash, Red Ash *(Fraxinus pennsylvania)*	4,5	Dec. Tree	yes	yes	Moderate. Songbirds.	Rapid growing streambank stabilizer. Full sun to partial shade.
Hackenberry *(Celtis occidentalis)*	5,6	Dec. Tree	yes	some	High. Food and cover	Full sun to partial shade.
Larch, Tamarack *(Larix latricina)*	3,4	Conif. Tree	no	yes	Low. Nest tree and seeds.	Rapid initial growth. Full sun, acidic boggy soil.
Pin Oak *(Quercus palustris)*	3,4,5,6	Dec. Tree	yes	yes	High. Tolerates acidic soil	Gypsy moth target. Prefers well drained, sandy soils.
Red Choke Berry *(Pyrus arbutifolia)*	3,4,5	Dec. Shrub	no	yes	Moderate. Songbirds.	Bank stabilizer. Partial sun.
Red Maple *(Acer rubrum)*	3,4,5,6	Dec. Tree	yes	yes	High seeds and browse. Tolerates acidic soil.	Rapid growth.
River Birch *(Betula nigra)*	3,4,5	Dec. Tree	yes	yes	Low. Good for cavity nesters.	Bank erosion control. Full sun.
Shadowbush, Serviceberry *(Amelanchier*	4,5,6	Dec. Shrub	yes	yes	High. Nesting, cover, food. Birds and	Prefers partial shade. Common in forested

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)

Plant Name	Zone	Form	Available	Inundation Tolerance	Wildlife Value	Notes
canadensis)					mammals.	wetlands and upland woods.
Silky Dogwood *(Cornus amomium)*	3,4,5	Dec. Shrub	yes	yes	High. Songbirds, mammals.	Shade and drought tolerant. Good bank stabilizer.
Slippery Elm *(Ulnus rubra)*	3,4,5	Dec. Tree	rare	yes	High. Food (seeds, buds) for birds & mammals (browse). Nesting	Rapid growth, no salinity tolerance. Tolerant to shade and drought.
Smooth Alder *(Alnus serrulata)*	3,4,5	Dec. Tree	no	yes	High. Food, cover.	Rapid growth. Stabilizes streambanks.
Speckled Alder *(Alnus rugosa)*	3,4	Dec. Shrub	yes	yes	High. Cover, browse for deer, seeds for bird.	
Swamp White Oak *(Quercus bicolor)*	3,4,5	Dec. Tree	yes	yes	High. Mast	Full sun to partial shade. Good bottomland tree.
Swamp Rose *(Rosa Palustrus)*	3,4	Dec. Shrub		Irregular, seasonal, or regularly saturated	High. Food (hips) for birds including turkey, ruffed grouse and mammals. Fox cover.	Prefers full sun. Easy to establish. Low salt tolerance.
Sweetgum *(Liquidambar styraciflua)*	4,5,6	Dec. Tree	yes	yes	Moderate. Songbirds	Tolerates acid or clay soils. Sun to partial shade.
Sycamore *(Platanus occidentalis)*	4,5,6,	Dec. Tree	yes	yes	Low. Food, cavities for nesting.	Rapid growth. Common in floodplains and alluvial woodlands.
Tulip Tree *(Liriodendron tulipifera)*	5,6	Dec. Tree	yes	no	Moderate. Seeds and nest sites	Full sun to partial shade. Well drained soils. Rapid growth.
Tupelo *(Nyssa sylvatica vari biflora)*	3,4,5	Dec. Tree	yes	yes	High. Seeds and nest sites	Ornamental

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)

Plant Name	Zone	Form	Available	Inundation Tolerance	Wildlife Value	Notes
White Ash *(Fraxinus americana)*	5,6	Dec. Tree	yes	no	High. Food	All sunlight conditions. Well drained soils.
Winterberry *(Ilex verticillata)*	3,4,5	Dec. Shrub	yes	yes	High. Cover and fruit for birds. Holds berries into winter.	Full sun to partial shade. Seasonally flooded areas.
Witch Hazel *(Hamamelis virginiana)*	4,5	Dec. Shrub	yes	no	Low. Food for squirrels, deer, and ruffed grouse.	Prefers shade. Ornamental.
Herbaceous Plants						
Arrow arum *(Peltandra virginica)*	2,3	Emergent	yes	up to 1 ft.	High. Berries are eaten by wood ducks.	Full sun to partial shade.
Arrowhead, Duck Potato *(Saggitaria latifolia)*	2,3	Emergent	yes	up to 1 ft.	Moderate. Tubers and seeds eaten by ducks.	Aggressive colonizer.
Big Bluestem (*Andropogon gerardi*)	4,5	Perimeter	yes	Irregular or seasonal inundation.	High. Seeds for songbirds. Food for deer	Requires full sun.
Birdfoot deervetch (*Lotus Corniculatus*)	4,5,6	Perimeter	yes	Infrequent inundation	High. Food for birds.	Full sun. Nitrogen fixer.
Blue Flag Iris *(Iris versicolor)*	2,3	Emergent	yes	Regular or permanently, up to ½ ft or saturated	Moderate. Food muskrat and wildfowl. Cover, marshbirds	Slow growth. Full sun to partial shade. Tolerates clay. Fresh to moderately brackish water.
Blue Joint (*Calamagrotis canadensis*)	2,3,4	Emergent	yes	Regular or permanent inundation up to 0.5 ft.	Moderate. Food for game birds and moose.	Tolerates partial shade
Broomsedge *(Andropogon virginicus)*	2,3	Perimeter	yes	up to 3 in.	High. Songbirds and browsers. Winter food and cover.	Tolerant of fluctuation water levels & partial shade.
Bushy Beardgrass *(Andropogon glomeratus)*	2,3	Emergent	yes	up to 1 ft.		Requires full sun.
Cardinal flower (*Lobelia cardinalis*)	4,5,6	Perimeter	yes	Some. Tolerates saturation up to 100% of season.	High. Nectar for hummingbird, oriole, butterflies.	Tolerates partial shade

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)

Plant Name	Zone	Form	Available	Inundation Tolerance	Wildlife Value	Notes
Cattail *(Typha sp.)*	2,3	Emergent	yes	up to 1 ft.	Low. Except as cover	Aggressive. May eliminate other species. Volunteer. High pollutant treatment
Coontail *(Ceratophyllum demersum)*	1	Submergent	no	yes	Low food value. Good habitat and shelter for fish and invertebrates.	Free floating SAV. Shade tolerant. Rapid growth.
Common Three-Square *(Scirpus pungens)*	2	Emergent	yes	up to 6 in.	High. Seeds, cover. Waterfowl and fish.	High metal removal.
Duckweed *(Lemma sp.)*	1,2	Submergent/ Emergent	yes	yes	High. Food for waterfowl and fish.	High metal removal.
Fowl mannagrass (*Glyceria striata*)	4,5	Perimeter	yes	Irregular or seasonal inundation	High. Food for waterfowl, muskrat, and deer.	Partial to full shade.
Hardstem Bulrush *(Scirpus acutus)*	2	Emergent	yes	up to 3 ft.	High. Cover, food (achenes, rhizomes) ducks, geese, muskrat, fish. Nesting for bluegill and bass.	Quick to establish, fresh to brackish. Good for sediment stabilization and erosion control.
Giant Burreed *(Sparganium eurycarpum)*	2,3	Emergent	rare	Regular to permanently inundated. up to 1 ft.	High. Food (seeds, plant) waterfowl, beaver & other mammals. Cover for marshbirds, waterfowl.	Rapid spreading . Tolerates partial sun. Good for shoreline stabilization.. Salinity <0.5 ppt
Lizard's Tail *(Saururus cernuus)*	2	Emergent	yes	up to 1 ft.	Low, except wood ducks.	Rapid growth. Shade tolerant
Long-leaved Pond Weed *(Potamogeton nodosus)*	1,2	Rooted submerged aquatic	yes	up to 1-6 ft. depending on turbidity	High. Food (seeds, roots) waterfowl, aquatic fur-bearers, deer, moose. Habitat for fish	Rapid spread. Salinity <0.5 ppt. Flowers float on surface, Aug.-Sept.

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)

Plant Name	Zone	Form	Available	Inundation Tolerance	Wildlife Value	Notes
Marsh Hibiscus *(Hibiscus moscheutos)*	2,3	Emergent	yes	up to 3 in.	Low. Nectar.	Full sun. Can tolerate periodic dryness.
Pickerelweed *(Pontederia cordata)*	2,3	Emergent	yes	up to 1 ft.	Moderate. Ducks. Nectar for butterflies.	Full sun to partial shade.
Pond Weed, Sago *(Potamogeton pectinatus*	1	Submergent	yes	yes	Extremely high. Waterfowl, marsh and shorebirds.	Removes heavy metals.
Redtop (*Agrostis alba*)	3,4,5	Perimeter	yes	Up to 25% of season	Moderate. Rabbits and some birds.	Quickly established but not highly competitive.
Rice Cutgrass *(Leersia oryzoides)*	2,3	Emergent	yes	up to 3 in.	High. Food and cover.	Full sun although tolerant of shade. Shoreline stabilization.
Sedges *(Carex spp.)*	2,3	Emergent	yes	up to 3 in.	High waterfowl, songbirds.	Many wetland and upland species.
Tufted Hairgrass (*Deschampsia caespitosa*)	3,4,5	Perimeter	yes	Regular to irregular inundation.	High.	Full sun. May become invasive.
Soft-stem Bulrush *(Scirpus validus)*	2,3	Emergent	yes	up to 1 ft.	Moderate. Good cover and food.	Full sun. Aggressive colonizer. High pollutant removal.
Smartweed *(Polygonum spp.)*	2,3,4	Emergent	yes	up to 1 ft.	High. Waterfowl, songbirds. Seeds and cover.	Fast colonizer. Avoid weedy aliens such as *P. perfoliatum.*
Soft Rush *(Juncus effusus)*	2,3,4	Emergent	yes	up to 3 in.	Moderate.	Tolerates wet or dry conditions.
Spatterdock *(Nuphar luteum)*	2	Emergent	yes	up to 3 ft.	Moderate for food but high for cover.	Fast colonizer. Tolerant of fluctuating water levels.
Switchgrass *(Panicum virgatum)*	2,3,4,5,6	Perimeter	yes	up to 3 in.	High. Seeds, cover for waterfowl, songbirds.	Tolerates wet/dry conditions.

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)

Plant Name	Zone	Form	Available	Inundation Tolerance	Wildlife Value	Notes
Sweet Flag *(Acorus calamus)*	2,3	Herbaceous	yes	up to 3 in.	Low.	Tolerant of dry periods. Not a rapid colonizer. Tolerates acidic conditions.
Waterweed *(Elodea canadensis)*	1	Submergent	yes	yes	Low.	Good water oxygenator. High nutrient, copper, manganese and chromium removal.
Wild Celery *(Valisneria americana)*	1	Submergent	yes	yes	High. Food for waterfowl. Habitat for fish and invertebrates.	Tolerant of murkey water and high nutrient loads.
Wild Rice *(Zizania aquatica)*	2	Emergent	yes	up to 1 ft.	High. Food for birds.	Prefers full sun
Wool Grass *(Scirpus cyperinus)*	2,3	Emergent	yes	Irregularly to seasonally indundated	Moderate. Cover, Food.	Requires full sun. Can tolerate acidic soils, drought. Colonizes disturbed areas, moderate growth.

Appendix K
Stormwater Control Facility Maintenance Agreement

Town of Alabama

STORMWATER CONTROL FACILITY
MAINTENANCE AGREEMENT

Whereas, the Town of Alabama (“Town”) and the ___________________ (“facility owner”) want to enter into an agreement to provide for the long term maintenance and continuation of stormwater control measures approved by the Town for the below named project, and

Whereas, the Town and the facility owner desire that the stormwater control measures be built in accordance with the approved project plans and thereafter be maintained, cleaned, repaired, replaced and continued in perpetuity in order to ensure optimum performance of the components. Therefore, the Town and the facility owner agree as follows:

1. This agreement binds the Town and the facility owner, its successors and assigns, to the maintenance provisions depicted in the approved project plans which are attached as Schedule A of this agreement.

2. The facility owner shall maintain, clean, repair, replace and continue the stormwater control measures depicted in Schedule A as necessary to ensure optimum performance of the measures to design specifications. The stormwater control measures shall include, but shall not be limited to, the following: drainage ditches, swales, dry wells, infiltrators, drop inlets, pipes, culverts, soil absorption devices and retention ponds.

3. The facility owner shall be responsible for all expenses related to the maintenance of the stormwater control measures and shall establish a means for the collection and distribution of expenses among parties for any commonly owned facilities.

4. The facility owner shall provide for the periodic inspection of the stormwater control measures, not less than once in every five-year period, to determine the condition and integrity of the measures. Such inspection shall be performed by a Professional Engineer licensed by the State of New York. The inspecting engineer shall prepare and submit to the Town within 30 days of the inspection, a written report of the findings including recommendations for those actions necessary for the continuation of the stormwater control measures.

5. The facility owner shall not authorize, undertake or permit alteration, abandonment, modification or discontinuation of the stormwater control measures except in accordance with written approval of the Town.

6. The facility owner shall undertake necessary repairs and replacement of the stormwater control measures at the direction of the Town or in accordance with the recommendations of the inspecting engineer.

7. The facility owner shall provide to the Town within 30 days of the date of this agreement, a security for the maintenance and continuation for the stormwater control measures in the form of (a Bond, letter of credit or escrow account).

8. This agreement shall be recorded in the Office of the County Clerk, County of Niagara together with the deed for the common property and shall be included in the offering plan and/or prospectus approved pursuant to ___________________.

9. If ever the Town determines that the facility owner has failed to construct or maintain the stormwater control measures in accordance with the project plan or has failed to undertake corrective action specified by the Town or by the inspecting engineer, the Town is authorized to undertake such steps as reasonably necessary for the preservation, continuation or maintenance of the stormwater control measures and to affix the expenses thereof as a lien against the property.

10. The agreement is effective ____________________.

____ ____

Town of Alabama Facility Owner

Appendix L

Project Related Correspondence

Power
People
Incentives
Genesee
County
Economic
Development
Center

May 24, 2021

Mr. Bill McGorry
Town of Alabama Planning Board Chair
2218 Judge Road
Oakfield, New York 14125

Dear Mr. McGorry:

The Genesee County Industrial Development Agency d/b/a Genesee County Economic Development Center (GCEDC) is the current owner of the ±97.70 acre parcel with the tax mad ID of 10.-1-42 along Crosby Road within the Western New York Science and Technology Advanced Manufacturing Park (STAMP) located in the Town of Alabama, New York. The GCEDC is currently in the final stages of closing the sale of approximately +/- 29.884 acres to be subdivided out of the aforementioned property to Plug Power.

The intent of this letter is to authorize Scheid Architectural, PLLC to represent and act as Plug Power's agent for the purpose, and through the process of, Town of Alabama and Genesee County Planning Board Site Plan Submission & Approval.

If you have any questions or comments please do not hesitate to contact myself or Scheid Architectural, PLLC as indicated on the attached planning board submission package. We appreciate your time and consideration to this matter.

Sincerely,

Mark Masse
Senior Vice President of Operations
Genesee County Industrial Development
Agency d/b/a Genesee County Economic
Development Center

Appendix M
Geotechnical Report

GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC

Civil • Geotechnical
Structural • Architecture
Material Testing • Consulting

Power Plug Hydrogen Production Facility
WNY STAMP
Crosby Road, Alabama, New York

Geotechnical Engineering Report

GGEA 21-1009

Prepared for:
Scheid Architectural, PLLC
111 Elmwood Avenue
Buffalo, New York 14094

Prepared by:
Glynn Group Engineering & Architecture, PLLC
415 South Transit Street
Lockport, New York 14094

MARK W. GLYNN
LICENSE NO. 057491
3.19.2021

March 18, 2021

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 SCOPE

This report provides subsurface exploration data and geotechnical recommendations for the proposed development of the Power Plug Hydrogen Production Facility on a +/- 29.4 acre site on Crosby Road in the Town of Alabama, New York. Specifically, Glynn Group Engineering & Architecture, PLLC (GGEA) has provided the following scope of services:

1. Performed a site visit to examine site topography and establish a representative grid pattern of fifteen (15) soil boring locations throughout the property limits.
2. Cleared subsurface utilities with Dig Safely New York.
3. Mobilized drilling subcontractor, Earth Dimensions Inc. (EDI), with a tracked ATV drill rig and support crew to perform SPT soil borings at each location in accordance with ASTM D-1586 "Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils".
4. Provided soil boring logs, prepared by EDI, to include SPT data, N values, soil classification, refusal depth and groundwater conditions.
5. Installed temporary 1.0 inch diameter PVC piezometers at two (2) locations to assess existing groundwater conditions.
6. Performed a secondary site visit to collect groundwater data.
7. Provided laboratory testing consisting of visual classification, moisture content, Atterberg Limits and grain size analysis to establish index properties of select recovered soil samples.
8. Prepared a geotechnical report in accordance with the 2020 Building Code of New York State to include foundation recommendations, allowable bearing capacity, estimated total and differential settlement, seismic site class and design category, backfill materials, groundwater mitigation, expansive soil mitigation, liquefaction mitigation, slab on grade recommendations, pavement recommendations and construction recommendations.

1.2 CONTRACT

GGEA performed this study in accordance with a written proposal to Scheid Architectural dated February 2, 2021. GGEA received the notice to proceed via signed contract from Mr. James B. Gannon, AIA on February 3, 2021. All services provided by GGEA are subject to the Standard Terms and Conditions included in the February 2, 2021 geotechnical proposal.

1.3 EXCLUSIONS

The project efforts exercised by GGEA include geotechnical analysis, design recommendations and the preparation of this report. The scope of this report specifically excludes any review of former site use, in particular, environmental or pollution related concerns.

2.0 PROJECT BACKGROUND

2.1 SITE DESCRIPTION AND PROPOSED IMPROVEMENTS

The property is located on the west side of Crosby Road approximately 0.93 miles south of Lewiston Road on the southern portion of the property identified as SBL# 18200010-1-42. The portion of the property that is to contain the Power Plug Hydrogen Production Facility encompasses approximately 29.36 acres and is bound by a drainage tributary to the north, a farm field and hedge row to the west, undeveloped woodland to the south and Crosby Road to the east. Address 6480 Crosby Road is located at the southeast corner of the property. The majority of the site is covered by farm field, varying in elevation from approximately 663 at the northern perimeter to 673 at the high point in the approximate center. An existing barn is located near the gated entrance on the east side of the property. Historical aerial imagery indicates several other former structures north of the existing barn and on the 6480 property at the southeast corner of the site. Refer to the Project Location Plan included in Appendix B.

Based on the Concept Site Plan C1 prepared by Scheid Architectural, the proposed development is to include a 15,000 square foot O & M Building with 22 associated parking stalls, a 40,000 square foot tanker truck staging area, a 22,500 square foot electrical substation, a 1,600 square foot water treatment plant, a 26,100 square foot electrolyzer building, three 17,500 square foot liquefiers, two 50 foot diameter spheres, a 176,256 square foot Phase II expansion building and a perimeter truck loop. Considering the site development was in the concept stage at the time of this report, the subsurface exploration was performed in a grid pattern to produce a generalized soil profile across the site. Refer to the Subsurface Exploration Location Plan included in Appendix C.

2.2 GEOLOGIC SETTING

The underlying geological conditions at the site are the result of the last glacial advance of the Pleistocene Epoch, referred to as the Wisconsinan Glacial Stage, which ended approximately 12,000 years ago. As the glacier advanced over the Western New York terrain, the ice mass carved, crushed and transported the underlying soil and rock to form glacial till, which typically consists of an unstratified dense matrix of silt, sand, rock and clay deposited directly by the ice. Sediment was also transported and deposited by the glacial meltwater as stratified drift. As the climate warmed and the glacier retreated, vast quantities of meltwater were generated, which became impounded by the receding glacier and local topography to create proglacial lakes throughout much of the area. As a result of elevated waters within Lake Erie, the Niagara River overflowed to create Glacial Lake Tonawanda, which extended from the northern end of Grand Island eastward through the Town of Alabama. Lake Tonawanda drained northward to Glacial Lake Iroquois (ancestral Lake Ontario) through a series of channels. Once the elevated water levels in Lake Erie receded, Lake Tonawanda was no longer fed by the Niagara River and the lake eventually dried up, with the exception of the "Alabama Swamps" (Oak Orchard and Tonawanda Wildlife Management Areas), which remain.

The Crosby Road site is located southeast of the Alabama Swamps and includes a variety of deposits associated with Wisconsinan glaciation including glacial till, glacial drift, glacial outwash, glacio-lacustrine deposits and slackwater sediments. Shale bedrock of the Upper Silurian Salina Group is located at a depth of approximately 28 to 38 feet below existing grade.

3.0 FIELD EXPLORATION AND ANALYSIS

3.1 METHODOLOGY

The subsurface exploration consisted of fifteen (15) soil borings established in a grid pattern to provide a representative profile of subsurface conditions throughout the site. GGEA performed an initial site visit on February 4, 2021 to stake the soil boring locations in the field in general accordance with a preliminary plan prepared by GGEA. Upon the completion of drilling efforts, the as-drilled boring locations were surveyed by Frandina Engineering and Land Surveying, PC and provided to GGEA in a KML file, which GGEA used to prepare the Subsurface Exploration Location Plan included in Appendix C. Ground surface elevations identified on the soil boring logs and in this report were estimated by GGEA based on the 2010 STAMP Base Map provided by Scheid Architectural.

EDI mobilized a track mounted ATV drill rig to the site on February 15, 2021 to perform the subsurface exploration and completed drilling operations on February 18, 2021. Soil boring and sampling operations were performed using hollow stem augers to advance through overburden materials in accordance with ASTM D-1586 "Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils". Resistance values, or blow counts, were recorded for each six-inch advancement of a twenty-four inch long, two inch diameter split spoon sampler. "N" values were calculated by totaling the resistance values for the 6/12 and 12/18 inch intervals. All data recorded during drilling operations can be found on the soil boring logs included in Appendix A.

Retrieved soil samples were logged and visually classified by EDI in accordance with the ASEE System of Definition for Visual Identification of Soils (Burmister Classification System) and ASTM D-2488 "Standard Practice for Description and Identification of Soils (Visual – Manual Procedure)". Recovered soil samples were visually examined by GGEA to verify Unified Soil Classification System (USCS) classifications in accordance with ASTM D-2488 "Description and Identification of Soils (Visual-Manual Procedure)" and select samples were subjected to laboratory testing to establish USCS classifications in accordance with ASTM D-2487 "Classification of Soils for Engineering Purposes". Discrepancies observed between classifications noted on the soil boring logs and those identified in this report are due to testing and examination in the GGEA laboratory, which allows for the collection of specific gradation and index property data that was not discerned from visual classification in the field, as well as the assignment of USCS classifications.

3.2 SUBSURFACE CONDITIONS

The majority of the soil borings were advanced to a depth of 15.0 feet below existing grade, with the exception of borings B-5 and B-15, which were advanced to bedrock refusal at depths of 29.0 feet and 39.4 feet, respectively. Rock was initially encountered at a depth of 28.0 feet in boring B-5 and 38.0 feet in boring B-15, however the surface was weathered, providing for auger advancement through the upper foot. Split spoon refusal was encountered at a depth of 14.4 feet in boring B-2 on a presumed cobble or boulder.

The borings revealed a complex soil stratigraphy of integrated cohesive and granular soils from multiple depositional environments. Subsurface conditions have been summarized for each boring location as follows:

B-1 (surface elevation 664.0)

0.0 – 2.0 ft	Brown, moist, loose, sandy silt (ML), trace of gravel, slackwater sediment. N value of 6.
2.0 – 8.0 ft	Brown, moist, very stiff, lean clay (CL), trace of gravel, slackwater sediment. N values range from 24 to 32.
8.0 – 13.0 ft	Gray, extremely moist, compact to dense, sandy silt (ML) slackwater sediment. N values range from 14 to 39.
13.0 – 15.0	Gray, moist, compact, sandy silt with gravel (ML) glacial till. N value of 26.

B-2 (surface elevation 666.5)

0.0 – 2.0 ft	Brown, extremely moist, firm, lean clay (CL), trace of gravel, slackwater sediment. N value of 9.
2.0 – 5.2 ft	Brown, moist, very stiff to stiff, lean clay (CL), trace of gravel, slackwater sediment. N values range from 22 to 12.
5.2 – 7.0 ft	Light brown, extremely moist, compact, sandy silt (ML) slackwater sediment. N value of 12.
7.0 – 13.0 ft	Brown, moist, very dense, silty sand with gravel (SM) glacial till. N values of > 50.
13.0 – 14.4 ft	Gray, moist, very dense, silty sand with gravel (SM) glacial till. N value of > 50. Spoon refusal encountered at 14.4 feet.

B-3 (surface elevation 667.0)

0.0 – 0.7 ft	Dark brown, extremely moist, topsoil.
0.7 – 4.0 ft	Brown, extremely moist, firm, sandy silty clay (CL-ML), trace of gravel, slackwater sediment. N values range from 6 to 7.
4.0 – 6.0 ft	Light grayish brown, extremely moist, compact, silty sand with gravel (SM) glacial till. N value of 19.
6.0 – 13.0 ft	Light grayish brown, moist, very dense, silty sand with gravel (SM) glacial till.
13.0 – 15.0 ft	Gray, moist, very dense, silty sand with gravel (SM) glacial till.

B-4 (surface elevation 665.5)

0.0 – 0.2 ft	Brown, extremely moist, loose, sandy silt (ML), trace of gravel, slackwater sediment. N value of 5.
2.0 – 4.6 ft	Light brown, moist, very stiff, lean clay with gravel (CL) slackwater sediment. N value of 18.
4.6 – 4.8 ft	Brown, wet, compact, sandy silt (ML), trace of gravel, slackwater sediment.
4.8 – 6.8 ft	Brown, moist, very stiff, lean clay (CL), trace of gravel, slackwater sediment. N value of 19.

6.8 – 7.7 ft	Brown, extremely moist, compact, sandy silt (ML) slackwater sediment. N value of 13.
7.7 – 9.4 ft	Gray, wet, loose, sandy silt (ML) slackwater sediment. N value of 10.
9.4 – 13.0 ft	Gray, wet, loose, sandy silt with gravel (ML) glacial drift. N value of 10.
13.0 – 15.0 ft	Gray, moist, very dense, silty sand with gravel (SM) glacial till. N value of 53.

B-5 (surface elevation 672.5)

0.0 – 0.7 ft	Dark brown, extremely moist, topsoil.
0.7 – 2.0 ft	Reddish brown, extremely moist, firm, lean clay (CL), slackwater sediment. N value of 7.
2.0 – 3.8 ft	Brown, moist, loose, sandy silt (ML), trace of gravel, slackwater sediment. N value of 8.
3.8 – 10.0 ft	Brown, moist, compact, sandy silt with gravel (ML) glacial drift. N values range from 19 to 28.
10.0 – 13.0 ft	Brown, moist, dense, sandy silt with gravel (ML) glacial till. N value of 45.
13.0 – 23.8 ft	Gray, moist, dense to very dense, sandy silt with gravel (ML) glacial till. N values range from 42 to > 50.
23.8 – 28.0 ft	Gray, wet, compact, silty gravel with sand (GM). N value of 18.
28.0 – 29.0 ft	Weathered shale rock.
> 29.0 ft	Shale bedrock.

B-6 (surface elevation 672.5)

0.0 – 0.5 ft	Dark brown, extremely moist, topsoil.
0.5 – 2.7 ft	Brown, extremely moist, firm, sandy silty clay (CL-ML) slackwater sediment. N value of 5.
2.7 – 13.0 ft	Light grayish brown, extremely moist, stiff to very stiff, silty clay with gravel (CL-ML) glacial drift. N values range from 9 to 21.
13.0 – 15.0 ft	Gray, wet, very stiff, sandy silty clay with gravel (CL-ML) glacial drift.

B-7 (surface elevation 666.5)

0.0 – 0.5 ft	Dark brown, extremely moist, topsoil.
0.5 – 2.0 ft	Brown, moist, loose, sandy silt (ML), trace of gravel, slackwater sediment. N value of 4.
2.0 – 6.0 ft	Brown, moist, stiff, lean clay (CL) slackwater sediment. N value of 15.
6.0 – 11.4 ft	Brown, extremely moist, compact, sandy silt with gravel (ML) glacial drift. N values range from 13 to 21.

11.4 – 15.0 ft	Gray, moist, compact, sandy silt with gravel (ML) glacial till. N value of 17.

B-8 (surface elevation 669.5)

0.0 – 0.7 ft	Dark brown, extremely moist, topsoil.
0.7 – 2.0 ft	Reddish brown, extremely moist, firm, lean clay (CL) slackwater sediment. N value of 5.
2.0 – 6.7 ft	Reddish brown, moist, very stiff, lean clay (CL), trace of gravel, slackwater sediment. N values range from 17 to 24.
6.7 – 11.7 ft	Olive brown, extremely moist, compact, sandy silt (ML). N values range from 13 to 27.
11.7 – 13.0 ft	Light grayish brown, extremely moist, compact, sandy silt with gravel (ML) glacial drift.
13.0 – 15.0 ft	Gray, wet, stiff, sandy silty clay with gravel (CL-ML) glacial drift. N value of 11.

B-9 (surface elevation 671.5)

0.0 – 0.7 ft	Dark brown, extremely moist, topsoil.
0.7 – 2.0 ft	Reddish brown, moist, firm, lean clay (CL) slackwater sediment. N value of 6.
2.0 – 5.5 ft	Brown, moist, very stiff, lean clay (CL), trace of gravel, slackwater sediment. N values range from 26 to 33.
5.5 – 10.4 ft	Brown, moist, very dense to dense, silty sand with gravel (SM) glacial till. N values range from 63 to 45.
10.4 – 13.0 ft	Gray, extremely moist, very stiff, sandy silty clay with gravel (CL-ML) glacial till. N value of 24.
13.0 – 15.0 ft	Gray, moist, compact, sandy silt with gravel (ML) glacial till. N value of 26.

B-10 (surface elevation 666.5)

0.0 – 2.0 ft	Dark brown, extremely moist, loose, sandy silt (ML), trace of gravel, slackwater sediment. N value of 4.
2.0 – 13.0 ft	Brown, moist to extremely moist below 10.0 feet, stiff to hard, lean clay (CL), trace of gravel, slackwater sediment. N values range from 34 to 18.
13.0 – 15.0 ft	Gray, extremely moist, firm, sandy silty clay with gravel (CL-ML) glacial till. N value of 8.

B-11 (surface elevation 672.0)

0.0 – 0.8 ft	Dark brown, extremely moist, topsoil.
0.8 – 2.0 ft	Reddish brown, extremely moist, firm, lean clay (CL) slackwater sediment. N value of 6.

2.0 – 9.0 ft	Reddish brown, extremely moist, very stiff, lean clay (CL), trace of gravel. N values range from 26 to 30.
9.0 – 13.0 ft	Reddish brown, extremely moist, stiff to firm, lean clay (CL) slackwater sediment. N values range from 13 to 8.
13.0 – 15.0 ft	Gray, moist, dense, sandy silt with gravel (ML) glacial till. N value of 43.

B-12 (surface elevation 669.5)

0.0 – 0.4 ft	Dark brown, extremely moist, topsoil.
0.4 – 2.0 ft	Reddish brown, moist, soft, lean clay (CL), slackwater sediment. N value of 4.
2.0 – 6.8 ft	Reddish brown, moist, very stiff, lean clay (CL), trace of gravel, slackwater sediment. N values range from 20 to 24.
6.8 – 7.2 ft	Reddish brown, distinctly mottled, extremely moist, stiff, silty clay (CL-ML), trace of gravel, slackwater sediment. N value of 12.
7.2 – 8.7 ft	Brown, extremely moist, compact, silty sand with gravel (SM) outwash. N value of 12.
8.7 – 13.0 ft	Light grayish brown, extremely moist, very dense, silty sand with gravel (SM) glacial till. N value of 75.
13.0 – 15.0 ft	Brownish gray, extremely moist, dense, silty sand with gravel (SM). N value of 37.

B-13 (surface elevation 670.5)

0.0 – 2.5 ft	Dark brown, moist, compact, sandy silt (ML) FILL, trace of concrete debris and organics. N value of 13.
2.5 – 13.0 ft	Brown, moist, very stiff to hard, lean clay (CL), trace of gravel, slackwater sediment. N values range from 26 to 38.
13.0 – 15.0 ft	Brownish gray, extremely moist, stiff, lean clay (CL), trace of gravel, slackwater sediment. N value of 10.

B-14 (surface elevation 672.5)

0.0 – 0.5 ft	Dark brown, extremely moist, topsoil.
0.5 – 3.0 ft	Brown, moist, firm, lean clay (CL), trace of gravel, slackwater sediment. N value of 7.
3.0 – 13.0 ft	Light brown, moist, very stiff, lean clay (CL), trace of gravel, slackwater sediment. N values range from 19 to 27.
13.0 – 15.0 ft	Brown, extremely moist, firm, lean clay (CL), trace of gravel, slackwater sediment. N values of 7.

B-15 (surface elevation 673.0)

0.0 – 0.7 ft	Dark brown, extremely moist, topsoil.
0.7 – 1.5 ft	Brown, faintly mottled, extremely moist, firm, silty clay (CL-ML) slackwater sediment. N value of 6.
1.5 – 3.5 ft	Brown, moist, compact, sandy silt (ML) slackwater sediment. N value of 25.
3.5 – 5.0 ft	Reddish brown, moist, very stiff, lean clay (CL) slackwater sediment. N value of 27.
5.0 – 5.3 ft	Brown, wet, compact, silty sand (SM) fluvial sediment.
5.3 – 10.0 ft	Reddish brown, moist, hard, lean clay (CL), trace of gravel, slackwater sediment. N values range from 36 to 38.
10.0 – 23.0 ft	Grayish brown, extremely moist, very stiff to stiff, lean clay (CL), trace of gravel, slackwater sediment. N values range from 20 to 10.
23.0 – 28.0 ft	Brownish gray, extremely moist, compact, silty sand with gravel (SM) glacial drift. N value of 24.
28.0 – 33.0 ft	Gray, wet, compact, silty sand with gravel (SM) glacial drift. N value of 21.
33.0 – 38.0 ft	Gray, wet, dense, silty gravel with sand (GM) glacial drift. N value of 33.
38.0 – 39.4 ft	Weathered shale rock.
> 39.4 ft	Shale bedrock.

It is GGEA's opinion the extent of this exploration was sufficient to accurately characterize the subsurface conditions and provide information necessary for the preparation of this report. The soil borings portray the subsurface conditions encountered at the soil boring locations at the time of exploration. The stratification lines shown on the soil boring logs are approximate, whereas in-situ the changes between strata may be more gradual. Specific subsurface conditions can be found on the soil boring logs included in Appendix A.

3.3 GROUNDWATER

Upon the completion of drilling efforts, groundwater was measured within the augers at the following locations and depths: 14.3 feet below ground surface (bgs) at boring B-5, 10.5 feet bgs at boring B-6, 11.5 feet bgs at boring B-8 and 9.0 feet bgs at boring B-15. Groundwater was not encountered in the augers at the remaining boring locations. The augers did not remain in the ground for a prolonged period of time to allow groundwater to migrate through the soils and stabilized within the augers. However, the recovered soil samples from most boring locations, regardless of measured groundwater depth, exhibited a change in color from brown to gray at approximately 13.0 feet. The exception to this is boring B-1, where soils become gray at a depth of 8.0 feet, boring B-4 were soils become gray at a depth of 7.7 feet, boring B-7 where soils become gray at 11.4 feet, boring B-9 where soils become gray at depth of 10.4 feet and boring B-15 where soils become gray/wet at a depth of 28.0 feet. This transition depth is believed to be indicative of the stabilized groundwater elevation (groundwater table) throughout the site during much of the year, which is represented by the "estimated GW depth" dashed line on the Elevation Profile included in Appendix G.

Piezometers were installed by EDI at borings B-4 and B-12 to provide additional groundwater data. The piezometers were installed using 1.0 inch diameter PVC pipe with slotted screens from 8.0 to 13.0 feet and bentonite seals from 4.0 to 6.0 feet. Multiple well volumes were bailed from the piezometers by EDI after installation. GGEA visited the site on February 25, 2020 and measured groundwater depths within the piezometers of 3.7 feet below existing grade at B-4 and 2.4 feet below existing grade at B-12. This is significantly above the estimated stabilized groundwater depth of 13.0 feet. However, boring B-4 identified wet granular strata from 4.6 to 4.8 feet, 7.7 to 9.4 feet and 9.4 to 13.0 feet. Likewise, boring B-12 identified extremely moist granular strata from 7.2 to 8.7 feet and 8.7 to 13.0 feet. Considering the complex stratigraphy at this site, the high groundwater elevations measured in B-4 and B-12 are believed to be indicative of seasonal perched conditions within the upper granular soil strata.

The heterogeneous nature of the soil deposits in combination with the surface topography and adjacent drainage tributary/wetland along the norther perimeter of the site provide for multiple groundwater regimes and seasonally perched conditions. To fully understand the groundwater conditions at this site, an extensive groundwater study utilizing multiple piezometer clusters at several locations with screened intervals at specific depths to isolate individual soil stratum would be required. Although piezometers were installed at borings B-4 and B-12 to provide supplemental groundwater data beyond that of standard SPT sampling, the screened intervals within the piezometers intercepted perched groundwater conditions in multiple soil strata.

The groundwater condition encountered at boring B-15 was unique to the site, such that groundwater did not enter the augers until the sample was taken at 28.0 feet, resulting in a stabilized elevation at 9.0 feet bgs upon the completion of drilling efforts. This is the result of the groundwater being capped under pressure at depth by the overlying cohesive soil strata.

Notwithstanding the above discussion, GGEA found an existing 6 inch diameter steel cased open well at the approximate center of the site (identified as "Existing Well" on Boring Location Plans S2A and S2B). The groundwater depth was measured by GGEA at a depth of 12.5 feet below existing grade on February 25, 2020.

3.4 LABORATORY ANALYSIS

Select soil samples from representative strata were subjected to geotechnical laboratory testing to establish USCS classifications and index properties. Testing consisted of Grain Size Analysis (ASTM D-422), Atterberg Limits (ASTM D-4318) and Natural Moisture Content (ASTM D-2216). Specific laboratory test reports have been included in Appendix D, however laboratory test results have been summarized in the following table:

Lab No.	Boring No.	Depth (ft)	USCS	NMC (%)	LL	PL	PI
21-01	B-4	0.0 - 2.0	CL	21.2	41	18	23
21-02	B-4	8.0 - 10.0	ML	12.9	NV	NP	NP
21-03	B-5	4.0 - 8.0	CL	14.5	24	15	9
21-04	B-6	4.0 - 8.0	SC	10.6	21	12	9
21-05	B-7	2.0 - 6.0	CL	16.6	35	17	18
21-06	B-11	4.0 - 8.0	CL	15.4	31	14	17
21-07	B-15	6.0 - 10.0	CL	14.9	31	16	15

USCS = Unified Soil Classification System
NMC = Natural Moisture Content
NV = Non-Viscous
PI = Plasticity Index
PL = Plastic Limit
NP = Non-Plastic
LL = Liquid Limit

4.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

4.1 FOUNDATIONS

Although the encountered subsurface conditions throughout the site are highly variable in regards to soil composition and stratigraphy, the soils were found to be of good structural quality at all boring locations. The subsurface conditions will provide for the construction of shallow foundation systems consisting of standard reinforced concrete strip and spread footings bearing below frost depth (> 42 inches below final grade). Based on conditions encountered at borings B-3, B-5 and B-6, foundations should be advance to a minimum depth of 4.0 feet below existing grade to engage competent native soils. Although the soils are of good structural quality, the primary obstacle to shallow foundation construction will be perched groundwater within surficial granular soils. To minimize the potential for groundwater related construction issues, foundation construction is recommended throughout summer and early fall.

The concept site plan provided by Schied Architectural identifies multiple buildings throughout the site, all of which are presumed to have slab on grade first floors, perimeter frost walls with strip footings and interior columns with pedestals and spread footings. Foundation drainage is not anticipated for slab on grade construction pending final grade is above that of existing. In the event a building is designed to have a basement, a foundation drainage and sump pump system will be required.

The borings located along the northern end of the site were located within the footprint of the proposed stormwater detention area and have been omitted in regards to foundation analysis. Although high N values were encountered throughout the majority of the soil strata at the remaining boring locations, the limiting factor governing allowable bearing capacity will be the firm (N= 8) lean clay (CL) encountered from 10.0 – 13.0 feet at boring B-11 and the compact (N=12) sandy silt (ML) encountered at B-2 from 5.2 to 7.0 feet. Based on standard geotechnical equations and Boussinesq pressure distribution, GGEA recommends limiting the net allowable bearing capacity for shallow foundation construction to 4,000 psf for continuous strip footings and 5,000 psf for square spread footings.

4.2 SLAB ON GRADE

Concrete slabs should be designed and constructed in accordance with the following recommendations:

1. All slabs should be designed using a recognized standard procedure, such as identified in the text "Designing Floor Slabs on Grade" by Ringo and Anderson (ISBN 0-924659-34-3). The thickness of the concrete slab should be determined based on the intended usage and proposed equipment traffic.
2. Remove topsoil, poor quality existing fill and poor quality subsoil. Based on the conditions encountered at the soil boring locations, removal to a depth of 24 to 30 inches below existing grade is anticipated to expose competent subgrade.
3. Compact the exposed subgrade thoroughly with a smooth drum vibratory roller to produce a uniform density throughout. The top surface of the subgrade should be pitched to drain to prevent ponding of stormwater.
4. Proof roll the exposed subgrade with a fully loaded 10-wheel dump truck weighing at least 30 tons or a smooth drum roller having an effective force of at least 600 pounds per linear inch of roller width. Any area exhibiting weaving, yielding, rutting or boiling should be reworked and compacted to produce an acceptable response *or* over excavated and replaced with Structural Fill. The depth of the undercut and type of Structural Fill will depend on the bearing condition at the base of the undercut, the weather at the time of construction and the soil material encountered.
5. After proof rolling of the prepared subgrade is successfully performed (including overexcavation and replacement of failing areas), Select Structural Fill granular base should be installed and compacted to 95 % modified proctor. This thickness of the granular base layer should be dictated by the slab on grade design (to be prepared by others). GGEA recommends a minimum granular base thickness of 8 inches. In the event the design subgrade elevation is significantly higher than the proof rolled subgrade elevation, the subgrade may be reconstructed to the design elevation using Structural Fill prior to placing Select Structural Fill.
6. Install the concrete slab designed for a modulus of subgrade reaction not to exceed 150 pci.
7. The installation of a vapor barrier and specification of the concrete finish technique is at the discretion of the architect.
8. Proper joint spacing and reinforcing steel spacing/placement will be critical to the long term performance of slab. The Portland Cement Association recommends joint spacing in feet should be two to three times the slab thickness in inches.

Although not required for design, if the granular base is to be used as working surface for an extended period of time prior to concrete placement, the installation of a separation and reinforcement geotextile should be considered between the soil subgrade and granular base. GGEA recommends a woven geotextile such as US Fabrics US 250 (or equivalent). Any granular base that becomes contaminated with soil as a result of repeated construction traffic should be removed and replaced prior to placing concrete.

4.3 FLEXIBLE PAVEMENT

Flexible pavement is presumed to be installed throughout the perimeter truck loop, entrance driveway, truck scales, tanker staging area and car parking area. With the exception of the 22 parking stalls identified south of the O&M building, installed pavement should be of sufficient strength to support repeated truck traffic. GGEA provides recommendations for the construction of flexible asphalt pavement as follows:

1. Remove topsoil, poor quality existing fill and poor quality subsoil. Removal to a depth of 24 to 36 inches below existing grade is anticipated. Soft, wet, saturated conditions may be encountered, especially along the truck loop at the northern end of the site. Depending on the design final grade, the installation of Surge Stone should be considered if soft subgrade and wet conditions are encountered.

2. Compact the exposed subgrade thoroughly with a smooth drum vibratory roller to produce a uniform density throughout the subgrade. The top surface of the subgrade should be pitched to drain to prevent ponding of stormwater.

3. After the exposed subgrade is thoroughly densified, proof roll the subgrade with a fully loaded 10-wheel dump truck weighing at least 30 tons or a smooth drum roller having an effective force of at least 600 pounds per linear inch of roller width. Any area exhibiting weaving, yielding, rutting or boiling should be reworked and compacted to produce an acceptable response *or* over excavated and replaced with Structural Fill. The depth of the undercut and type of Structural Fill will depend on the soil material encountered, weather conditions at the time of construction and the bearing conditions at the base of the undercut.

4. Install a granular base layer composed of properly placed and compacted Select Structural Fill. Compact the Select Structural Fill to 95 % of modified proctor (ASTM D-1557).

5. If the design dictates, install subsurface utilities. Special attention should be directed at the compaction of Select Structural Fill around catch basins and associated piping. Failure to properly compact the stone around catch basins and over piping will likely result in pavement settlement in these areas, poor drainage and ponding of stormwater.

6. Construct a flexible pavement system consisting of asphalt binder followed by asphalt top. GGEA provides recommended pavement sections as follows:

   Light Duty (primarily car traffic)
      10 inches Select Structural Fill
      2.5 inches of asphalt concrete binder (2008 NYSDOT item number 403.138902)
      1.0 inch of asphalt concrete top (2008 NYSDOT item number 403.178902 or 403.198902)

   Heavy Duty (mixed truck and car traffic)
      12 inches Select Structural Fill
      3.0 inches of asphalt concrete binder (2008 NYSDOT item number 403.138902)
      1.5 inch of asphalt concrete top (2008 NYSDOT item number 403.178902 or 403.198902)

The cohesive native soils may become soft if exposed to moisture, which will contaminate the Select Structural Fill granular base over time through repeated loading if the granular base is placed directly over the cohesive soil subgrade. The installation of a separation and stabilization geotextile is recommended to maintain the integrity of the crushed stone granular base and to provide additional support. The need for geotextile should be determined by the site geotechnical engineer in the field based on conditions exposed after proof rolling. GGEA recommends a woven geotextile such as US Fabrics US 250 (or equivalent) beneath light duty pavement and US Fabrics US 315 (or equivalent) beneath heavy duty pavement. Any stone material that becomes contaminated with soil should be replaced prior to paving. Failure to remove fine-grained soils from the stone base may cause pavement distress in the form of heaving resulting from freeze thaw effects.

Given the high volume of truck traffic anticipated throughout the paved areas of this site, proper subgrade preparation is critical to the long term performance of the pavement system. The skill of the site development contractor, weather conditions during construction and drainage control of snowmelt and surface runoff will influence the structural integrity of the subgrade significantly. The incorporation of a triaxial geogrid (Tensar TX or equivalent) into the pavement design should be considered if unfavorable subgrade conditions are encountered. The geogrid will provide added strength and increase the service life of the pavement. Likewise, the installation of Surge Stone or additional Select Structural Fill may be necessary.

In the event there is a prolonged time period between binder and top placement, such that daily construction activities occur over the binder surface, the surface must be power washed, not just swept, and a tack coat should be applied prior to installation of the top course. In addition, any yielding area of pavement binder should be removed and replaced prior to application of the top course.

4.4 EXCAVATION, BACKFILL, RETAINING WALLS AND STORMWATER PONDS

The soils encountered within the construction depth of this project consist primarily of loose to compact granular soils and firm to very stiff cohesive soils. Excavation through these materials can be accomplished with minimal effort from standard excavation equipment.

The soils encountered at this site should be classified by an OSHA competent person in accordance with 29 CFR, Part 1926, OSHA Subpart P, "Excavations and Trenches" prior to and during excavation. From the testing and exploration program, GGEA estimates the site soils within the construction depth of this project can be classified as Type C under the OSHA classification guidelines. However, this classification may change depending on other site criteria and moisture conditions at the time of construction. An OSHA competent person should judge the potential need for excavation bracing and excavation geometry in the field.

Utility excavations can be accomplished with minimal effort, however a trench box will be required for excavations that cannot maintain OSHA Type C geometry (1.0 vertical : 1.5 horizontal). The trench box shall extend a minimum of 18 inches above the vertical sidewall portion of the excavation.

In the event groundwater is encountered within foundation or utility excavations, control should be provided via temporary external sumps and suction pumps.

Backfill placed in structurally loaded areas (pavement, sidewalk, slab) should consist of properly placed and compacted Select Structural Fill. Backfill placed in non-structural landscaped areas may consist of compacted Common Fill or Structural Fill. Excavated native soils may be repurposed as Common Fill pending they are free of topsoil. Excavated native soils may be repurposed as Structural Fill if silt (ML) soils are segregated during the excavation process, however given the complex stratigraphy at this site, significant effort on the part of the contractor will be required to segregate ML soils. ML soils are undesirable due to the potential for frost heave.

In place density testing should be performed at a rate of one test per 50 feet of trench or 2500 square feet of area per lift, at a minimum of one test per day of placement. Specifications regarding Common Fill, Structural Fill, Select Structural Fill and Flowable Fill are included in Appendix F. Engineered Fill is defined as Flowable Fill or Select Structural Fill.

Retaining walls should be backfilled with Structural Fill or Select Structural Fill compacted to 95% of modified proctor (ASTM D1557) density within 2 % of optimum moisture content. Clean poorly graded drainage stone should be installed directly behind the wall to allow for hydrostatic pressure relief through weeps or drain tile at the base. The drainage stone should be wrapped in a separation and filtration geotextile such as US 120NW or equivalent. The subgrade at the base of the retaining wall should be prepared in accordance with typical foundation subgrade protocols and the allowable bearing capacity should be limited to 4,000 psf. GGEA provides the following estimated design parameters for native soils and compacted Select Structural Fill:

Native lean clay (CL)

moist unit weight = 120 pcf

friction angle = 0^0 undrained, 28^0 drained

cohesion = 2,000 psf undrained, 0 psf drained

Rankine theory
at rest pressure coefficient (Ko) = 0.53
active pressure coefficient (Ka) = 0.36
passive pressure coefficient (Kp) = 2.76

2020 NYS Building Code Table 1610.1 Lateral Soil Load
at rest pressure = 100 psf/ft of depth
active pressure = 60 psf/ft of depth

Native silty sand (SM)

moist unit weight = 120 pcf

friction angle = 34^0

Rankine theory

at rest pressure coefficient (Ko) = 0.44
active pressure coefficient (Ka) = 0.28
passive pressure coefficient (Kp) = 3.54

2020 NYS Building Code Table 1610.1 Lateral Soil Load
at rest pressure = 60 psf/ft of depth
active pressure = 45 psf/ft of depth

Select Structural Fill

moist unit weight = 145 pcf

friction angle = 40 degrees

Rankine theory
at rest pressure coefficient (Ko) = 0.36
active pressure coefficient (Ka) = 0.22
passive pressure coefficient (Kp) = 4.60

2020 NYS Building Code Table 1610.1 Lateral Soil Load
at rest pressure = 60 psf/ft of depth
active pressure = 30 psf/ft of depth

Stormwater retention basins are to be located along the northern end of the site adjacent to the existing drainage tributary and at the eastern end of the site, east of the tanker staging area and north of the O&M building. The subsurface conditions along the northern end of the site are represented by borings B-1, B-4, B-7, B-10 and B-13. The subsurface conditions east of the tanker staging area and north of the O&M building are represented by boring B-14. Cohesive soil strata of varying thickness were encountered at all boring locations, with the thickness of the cohesive soil deposits increasing significantly to the east.

If the goal is to maintain a consistent water level within the basins, the surface of the basins should be tracked with a dozer and compacted with a sheep's foot or pad foot roller once the desired shape is constructed. Cohesive soils should be used to line areas where granular soils are exposed. Kneading the cohesive soil along the bottoms and sides of the basins with a sheep's foot or pad foot roller will help to create a relatively impermeable liner and maintain a consistent water level when full.

If the goal is to allow for infiltration, compaction of the basins should not be performed. Infiltration will likely be more successful on the western half of the site where more granular strata were encountered. However, infiltration will likely only occur during summer months and significant seasonal water level fluctuations are anticipated within the basins throughout the year.

4.5 EXPANSIVE SOIL MITIGATION

Some cohesive soils undergo volumetric change (shrinkage and swelling) with changes in moisture content and degree of saturation, which are commonly referred to as expansive soils. This condition primarily occurs with fat clay (CH) soil, which is a cohesive soil that exhibits a liquid limit of 50 or greater. The liquid limit is the water content, in percent, of a soil that defines the boundary between the plastic and viscous fluid states.

Laboratory testing revealed cohesive soils to have liquid limits ranging from 21 to 41, plastic limits ranging from 12 to 18 and plasticity indices ranging from 9 to 23, providing for an estimated low potential for expansion and volumetric change.

4.6 LIQUEFACTION MITIGATION

Liquefaction is the process where saturated cohesionless (granular) soils, specifically, loose sands and silts, transform from a solid into a liquid as a result of an increase in the pore water pressure caused by repeated disturbance such as experienced during seismic events. Liquefaction results in an immediate loss of shear strength and bearing capacity, causing total and differential settling of the overlying structure.

The granular soil strata encountered within the exploration depth of this project did not exhibit loose relative densities of significant concern to promote liquefaction.

4.7 SETTLEMENT

The subsurface conditions encountered within the exploration locations associated with this report were found to be of good structural quality and will provide adequate support for shallow foundation systems designed in accordance with the allowable bearing capacities presented in Section 4.1 and constructed in accordance with the recommendations presented in Section 4.9. Total settlement is estimated to be less than 1.0 inch and differential settlement is estimated to be less than 0.5 inches, pending proper construction practices are implemented.

4.8 SEISMIC SITE CLASS AND DESIGN CATEGORY

In accordance with Section 1613 (Earthquake Loads) of the 2020 NYS Building Code, GGEA has classified the site as Seismic Site Class D. The site classification is based on the summation of N values for the upper 100 feet of boring B-15 in accordance with ASCE 7-16 Equation 20.4-2. The design spectral response accelerations have been calculated as 0.193 g for the short period design spectral response acceleration (S_{DS}) and 0.075 g for the one second design spectral response acceleration (S_{D1}). In accordance with tables 1613.2.5(1) and 1613.2.5(2), using Risk Category II, the site is classified as Seismic Design Category B. Calculations have been provided in Appendix E.

4.9 GENERAL CONSTRUCTION RECOMMENDATIONS

GGEA provides general construction recommendations as follows:

1. Exposed bearing grades should be compacted to densify any soil that may have been disturbed by the excavation process. Compaction should be performed by "knuckling" with the underside of the excavator bucket. Densification of the subgrade will assure the development of the anticipated bearing strength and reduce settlement potential.

2. Fine grained soils, such as those encountered within the proposed construction depth for this project, may lose considerable strength and bearing capacity if subjected to prolonged saturation. The accumulation of stormwater and/or perched groundwater within foundation excavations and subsequent deterioration of the foundation subgrade during construction should not be permitted. The foundation excavations should include temporary sumps located outside of the building footprint to permit water removal by means of suction pumps during construction. Likewise, water should not be permitted to accumulate in the foundation excavation after footings have been constructed and prior to backfilling. Care should be exercised to not allow pumped water to recycle back to into the excavations. Mud mats should be considered if the subgrade integrity cannot be maintained.
3. If additional undercut is necessary during foundation excavation, the bottom should be graded to a uniform elevation and gradually sloped or stepped back to the design elevation. Undercut "pockets" should be avoided.
4. Conformance to OSHA standards is mandatory during excavation and trench work.
5. Topsoil and organic soils should be removed from all load bearing areas.
6. Foundations should be constructed at a depth of greater than 3.5 feet below final grade to comply with regional frost depth requirements.
7. No fill material or concrete should be placed in water, over saturated subgrade or over frozen subgrade.
8. The foundation bearing grade should not be allowed to freeze either prior to or after placement of concrete. Insulating blankets should be used to cover bearing grades plus a one foot perimeter outside forms and constructed footings until backfill is placed.
9. Grading and contouring efforts should take care to address existing site drainage conditions and mitigate any conflicts with the proposed site development.
10. Continuous footings and associated wall loads should be proportioned to create nearly equal contact pressures throughout, which will serve to minimize differential settlement. Likewise, square spread footings and associated column loads should be proportioned to create nearly equal contact pressures at all locations.

4.10 CONCLUSION

This completes the geotechnical report for the proposed Power Plug Hydrogen Production Facility on Crosby Road in the Town of Alabama, New York. This report has been prepared based on the encountered subsurface conditions at the soil boring locations and pertinent data supplied by Scheid Architectural. Considering the preliminary stage of the project and the generalized grid pattern of the SPT soil boring exploration performed, further exploration and testing may be prudent to provide supplemental data to refine the information presented herein. Please contact GGEA if major project changes are made, if additional services are requested or if encountered soils differ from conditions noted in this report.

Sincerely,
G. Edward Lover, P.G.
Senior Geologist
/gel

Mark W. Glynn, P.E.
Consulting Engineer, Principal

3-19-2021

GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC

Appendix A

Subsurface Exploration Logs

Power Plug Hydrogen Production Facility
WNY STAMP
Crosby Road, Alabama, New York

Geotechnical Engineering Report

GGEA 21-1009

March 18, 2021

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations
1091 Jamison Road • Elma, NY 14059
(716) 655-1717 • EDI@earthdimensions.com

9A10d HOLE NO. BH-1-21 SURF. ELEVATION 664.0

PROJECT SI - Crosby Road LOCATION _

Town of Alabama, Genesee County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 02/17/21 COMPLETED 02/17/21

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1 16	1	2	4	7	6		Moist brown (SANDY-SILT) with 3 to 7% gravel, trace to little sand, trace clay, loose, blocky soil strucutre, (ML). grades downward to 2.0	Coarse silty slackwater sediment with trace to little sand, trace clay and gravel to 2.0 feet over clayey slackwater sediment with trace sand and gravel to 8.0 feet over coarse silty slackwater sediment with trace to little sand, trace clay to 13.0 feet over coarse silty glacial till with little sand and gravel to end of boring. Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to end of boring at 15.0 feet. Bore hole was backfilled with cuttings to ground surface upon completion. No water at completion.
	2 18	8	10	16	21	26		Moist brown (SILTY-CLAY) with 3 to 7% gravel, trace sand, very stiff, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).	
5	3 19	5	10	14	20	24			
	4 21	7	12	20	25	32		grades downward to 8.0	
10	5 16	5	6	8	10	14		Extremely moist to wet gray (SANDY-SILT) with trace to little sand, trace clay, compact, thinly bedded, (ML).	
	6 6	9	15	24	22	39		grades downward to 13.0	
15	7 10	10	12	14	16	26		Moist gray (SANDY-SILT) with 10 to 20% gravel, little sand, compact, massive soil structure, (ML). 15.0	
20								Boring completed at 15.0 feet.	

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Jason Kryszak, (cns)

SHEET 1 OF 1

EARTH DIMENSIONS, INC.
Soil and Hydrogeologic Investigations • Wetland Delineations
1091 Jamison Road • Elma, NY 14059
(716) 655-1717 • EDI@earthdimensions.com

9A10d
HOLE NO. BH-2-21
SURF. ELEVATION 666.5

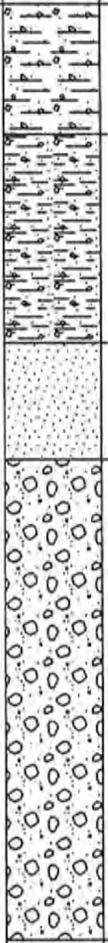
PROJECT SI – Crosby Road
Town of Alabama, Genesee County, NY
LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC
DATE STARTED 02/17/21
COMPLETED 02/17/21

DEPTH IN FT

BLOWS ON SAMPLER

SN REC	0/6	6/12	12/18	18/24	N
1 14	2	3	6	5	9
2 17	4	11	11	14	22
3 13	4	5	7	10	12
4 20	5	15	39	47	54
5 19	19	41	50/5		
6 10	39	50/4			
7 16	18	53	50/5		



DESCRIPTION AND CLASSIFICATION

Moist to extremely moist brown (CLAYEY-SILT) with 3 to 7% gravel, some clay, trace sand, firm to stiff, blocky soil structure, (CL).

grades downward to 2.0

Moist brown (SILTY-CLAY) with 3 to 7% gravel, trace sand, very stiff, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).

grades downward to 5.2

Extremely moist light brown (SANDY-SILT) with trace to little sand, trace clay, compact, thinly bedded, (ML).

grades downward to 7.0

Moist brown, gray below 13.0 feet, (SILTY-SAND) with 15 to 25% gravel, occasional cobble, trace to little silt, very dense, massive soil structure, (SM).

14.4

Split spoon refusal at 14.4 feet.

WATER TABLE AND REMARKS

Silty slackwater sediment with some clay, trace sand and gravel to 2.0 feet over clayey slackwater sediment with trace sand and gravel to 5.2 feet over coarse silty slackwater sediment with trace to little sand, trace clay to 7.0 feet over sandy glacial till with little to some gravel, trace to little silt to split spoon refusal.

Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to split spoon refusal at 14.4 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

No water at completion.

5

10

15

20

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Jason Kryszak. (cns)

SHEET 1 OF 1

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Soil and Hydrogeologic Investigations • Wetland Delineations
1091 Jamison Road • Elma, NY 14059
(716) 655-1717 • EDI@earthdimensions.com

9A10d

HOLE NO. BH-3-21

SURF. ELEVATION 667.0

PROJECT SI - Crosby Road
Town of Alabama, Genesee County, NY

LOCATION -

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/16/21

COMPLETED 02/16/21

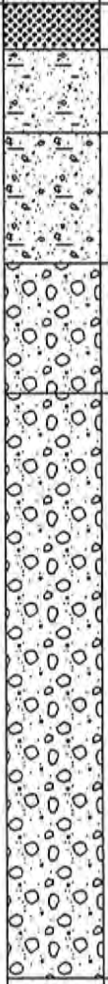
DEPTH IN FT

BLOWS ON SAMPLER

SN	REC	0/6	6/12	12/18	18/24	N
1	18	1	3	3	3	6
2	20	3	2	5	7	7
3	22	6	9	10	21	19
4	20	40	32	33	50/5	65
5	10	25	50/4			
6	10	34	50/5			
7	24	29	43	35	41	78

Depth scale: 5, 10, 15, 20

LITH



DESCRIPTION AND CLASSIFICATION

Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, very loose, granular soil structure, (ML).

0.7

Extremely moist brown (SAND-SILT-CLAY) with 0 to 3% gravel, little mostly fine size sand and clay, firm, blocky soil structure, (ML-CL).

grades downward to 2.0

Extremely moist brown (SAND-SILT-CLAY) with 5 to 10% gravel, little sand, trace to little clay, firm, stiff below 3.0 feet, massive soil structure, (SM).

grades downward to 4.0

Extremely moist light grayish brown gravelly (SILTY-SAND) with 15 to 25% gravel, little silt, compact, massive soil structure, (SM).

grades downward to 6.0

Extremely moist light grayish brown, gray below 13.0 feet, gravelly (SILTY-SAND) with 20 to 40% gravel, occasional cobble, little silt, very dense with brittle consistence, massive soil structure, (SM).

15.0

Boring completed at 15.0 feet.

WATER TABLE AND REMARKS

Coarse silty topsoil with little sand and organic matter to 0.2 feet over silty slackwater sediment with little sand and clay, trace gravel to 2.0 feet over silty glacial drift with litle sand, trace to little clay, trace gravel to 4.0 feet over sandy glacial till with little to some gravel, little silt to 6.0 feet over sandy glacial till with some gravel, little silt with an occasional cobble to end of boring.

Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 10.9 feet and 5.0-foot interval sampling to end of boring at 15.0 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

No water at completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron. (cns)

SHEET 1 OF 1

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations
1091 Jamison Road • Elma, NY 14059
(716) 655-1717 • EDI@earthdimensions.com

9A10d

HOLE NO. BH-4-21

SURF. ELEVATION 665.5

PROJECT SI - Crosby Road
Town of Alabama, Genesee County, NY

LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC

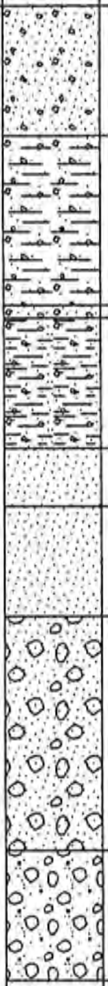
DATE STARTED 02/18/21

COMPLETED 02/18/21

DEPTH IN FT

BLOWS ON SAMPLER

SN REC	0/6	6/12	12/18	18/24	N
1 14	1	2	3	5	5
2 16	4	8	10	15	18
3 24	7	9	10	16	19
4 23	4	6	7	7	13
5 13	5	5	5	7	10
6 14	2	4	6	9	10
7 24	10	20	33	22	53



DESCRIPTION AND CLASSIFICATION

Extremely moist brown (CLAYEY-SILT) with 3 to 7% gravel, little sand, trace organic matter, loose, blocky soil structure, (CL).

grades downward to 2.0

Moist light brown (CLAYEY-SILT) with 5 to 15% gravel, little to some clay, trace sand, very stiff, blocky soil structure, (ML-CL).

clear transition to 4.6

Wet brown (SANDY-SILT) with 3 to 7% gravel, little sand, compact, thinly bedded, (ML).

clear transition to 4.8

Moist brown (SILTY-CLAY) with 3 to 7% gravel, trace sand, very stiff, thinly laminated with very thin coarse silt lenses, (CL).

clear transition to 6.8

Extremely moist brown (SANDY-SILT) with trace to little sand, trace clay, loose, thinly bedded, (ML).

grades downward to 7.7

Extremely moist to wet gray (SANDY-SILT) with trace to little sand, compact, thinly bedded, (ML).

grades downward to 9.4

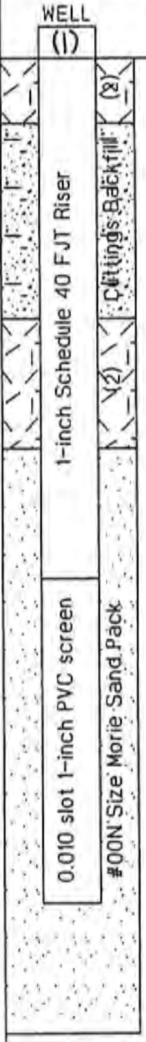
Extremely moist to wet gray (SANDY-SILT) with 10 to 20% gravel, little to some sand, loose, massive soil structure, (ML).

grades downward to 13.0

Moist gray (SILTY-SAND) with 10 to 20% gravel, little silt, very dense, massive soil structure, (SM).

15.0

Boring completed at 15.0 feet.



WATER TABLE AND REMARKS

← 1.0'

(1) Approximately 2.0 feet of 1-inch PVC stickup

(2) Bentonite Seal

← 4.0'

← 6.0'

← 8.0'

Coarse silty slackwater sediment with little sand, trace organic matter and gravel to 2.0 feet over silty slackwater sediment with little to some clay, trace to little gravel, trace sand to 4.6 feet over coarse silty slackwater sediment with little sand, trace gravel to 4.8 feet over clayey slackwater sediment with trace

← 13.0'

sand and gravel to 6.8 feet over coarse silty slackwater sediment with trace to little sand, trace

← 15.0'

clay to 7.7 feet over coarse silty slackwater sediment with trace to little sand, trace gravel to 9.4 feet over coarse silty glacial drift with little to some sand, little gravel to 13.0 feet over sandy glacial till with little silt and gravel to end of boring.

5
10
15
20

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Jason Kryszak. (cns)

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9A10d

HOLE NO. BH-4-21

SURF. ELEVATION 665.5

PROJECT SI - Crosby Road
Town of Alabama, Genesee County, NY

LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/18/21

COMPLETED 02/18/21

DEPTH IN FT

BLOWS ON SAMPLER

	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
										Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to end of boring at 15.0 feet. A 1-inch standpipe piezometer was installed in completed bore hole at completion. No water in bore hole upon completion.
25										
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Jason Kryszak, (cns)

SHEET 2 OF 2

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9A10d

HOLE NO. BH-5-21

SURF. ELEVATION 672.5

PROJECT SI – Crosby Road
Town of Alabama, Genesee County, NY

LOCATION –

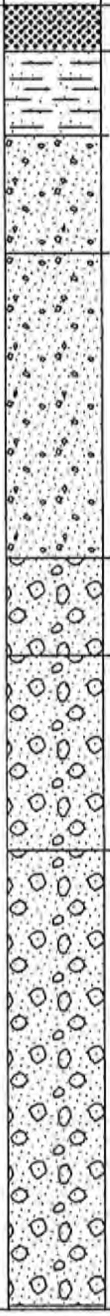
CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/17/21

COMPLETED 02/17/21

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N
	1 13	2	2	5	5	7
	2 21	2	3	5	7	8
5	3 19	7	9	10	12	19
	4 18	9	11	12	15	23
10	5 16	5	10	18	24	28
	6 20	19	21	24	34	45
15	7 15	23	18	24	33	42
	8 8	48	50/3			
20						

LITH



DESCRIPTION AND CLASSIFICATION

Extremely moist dark brown (SANDY-SILT) topsoil with little sand, trace to little organic matter, trace clay, very loose, granular soil structure, (ML).

0.7

Moist to extremely moist reddish brown (CLAYEY-SILT) with some clay, trace sand, firm, blocky soil structure, (CL).

grades downward to 2.0

Moist brown (SANDY-SILT) with 3 to 7% gravel, trace to little sand, trace clay, loose, thinly bedded, (ML).

grades downward to 3.8

Moist brown (CLAYEY-SILT) with 5 to 15% gravel, little sand, compact, weakly thinly bedded to massive soil structure, (CL).

grades downward to 8.5

Moist brown (SANDY-SILT) with 10 to 20% gravel, little sand, compact, massive soil structure, (ML).

grades downward to 10.0

Moist brown (SANDY-SILT) with 15 to 25% gravel, little sand, dense, massive soil structure, (ML).

grades downward to 13.0

Moist gray (SANDY-SILT) with 15 to 25% gravel, occasional cobble, little sand, dense to very dense, massive soil structure, (ML).

WATER TABLE AND REMARKS

Coarse silty topsoil with little sand, trace to little organic matter, trace clay to 0.7 feet over silty slackwater sediment with some clay, trace sand to 2.0 feet over silty slackwater sediment with little sand, trace clay and gravel to 3.8 feet over coarse silty glacial drift with little sand, trace to little gravel to 8.5 feet over coarse silty glacial drift with little sand and gravel to 10.0 feet over coarse silty glacial till with little to some gravel, little sand to 23.8 feet over water sorted and deposited sand and gravel with trace silt to 28.0 feet over apparent shale bedrock to auger refusal.

Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to auger refusal at 29.0 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

▼ Water level at 14.3 feet below ground surface upon completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Jason Kryszak, (kad)

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9A10d

HOLE NO. BH-5-21

SURF. ELEVATION 672.5

PROJECT SI - Crosby Road
Town of Alabama, Genesee County, NY

LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/17/21

COMPLETED 02/17/21

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
								Moist gray (SANDY-SILT) with 15 to 25% gravel, occasional cobble, little sand, dense to very dense, massive soil structure, (ML).	
								grades downward to 23.8	
	9 23	5	8	10	8	18		Wet gray very gravelly (SAND) with 40 to 60% gravel, trace silt, compact, stratified, (SW).	
25									
								grades downward to 28.0	
	10 2	50/3						Mostly dark gray shale stone fragments, soft.	
								29.0	
30								Advanced augers to refusal at 29.0 feet.	
35									
40									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Jason Kryszak, (kad)

SHEET 2 OF 2

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9A10d

HOLE NO. BH-6-21

SURF. ELEVATION 672.5

PROJECT SI - Crosby Road
Town of Alabama, Genesee County, NY

LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/16/21

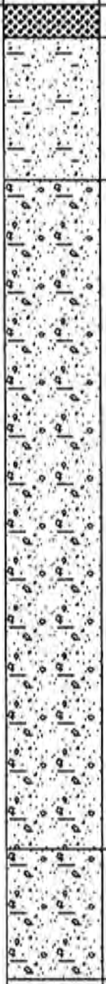
COMPLETED 02/16/21

DEPTH IN FT

BLOWS ON SAMPLER

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N
	1 17	1	2	3	5	5
	2 20	3	3	6	9	9
5	3 11	8	9	12	40	21
	4 18	4	7	7	5	14
10	5 21	4	6	10	12	16
	6 18	5	8	13	11	21
15	7 10	8	11	13	12	24
20						

LITH



DESCRIPTION AND CLASSIFICATION

Extremely moist dark brown (SANDY-SILT) topsoil with little sand, trace to little organic matter, trace clay, very loose, granular soil structure, (ML).

0.5

Extremely moist brown (SAND-SILT-CLAY) with little mostly fine size sand and clay, firm, blocky soil structure, (ML-CL).

2.7

Extremely moist light grayish brown (SILTY-SAND) with 5 to 15% gravel, little sand and clay, stiff and very stiff, massive soil structure, (SM).

grades downward to 13.0

Extremely moist to wet gray (SAND-SILT-CLAY) with 5 to 15% gravel, little sand and clay, very stiff, massive soil structure, (ML-CL).

15.0

Boring completed at 15.0 feet.

WATER TABLE AND REMARKS

Coarse silty topsoil with little sand, trace to little organic matter, trace clay to 0.5 feet over silty slackwater sediment with little sand and clay to 2.7 feet over silty glacial drift with little sand and clay, trace to little gravel to end of boring.

▼ Water level at 10.5 feet below ground surface at completion.

Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to end of boring at 15.0 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron. (cns)

SHEET 1 OF 1

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9A10d

HOLE NO. BH-7-21

SURF. ELEVATION 666.5

PROJECT SI – Crosby Road
Town of Alabama, Genesee County, NY

LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/18/21

COMPLETED 02/18/21

DEPTH IN FT

BLOWS ON SAMPLER

SN	REC	0/6	6/12	12/18	18/24	N
1	15	1	2	2	5	4
2	20	4	6	9	13	15
3	21	3	6	9	12	15
4	24	4	6	8	7	14
5	16	4	5	8	14	13
6	18	4	7	14	16	21
7	19	6	7	10	8	17

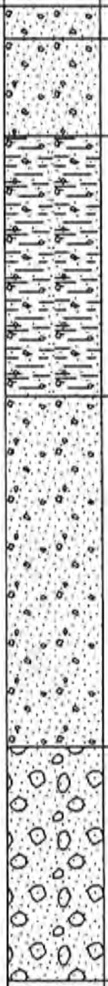
5

10

15

20

LITH



DESCRIPTION AND CLASSIFICATION

Extremely moist brown (SANDY-SILT) topsoil with 3 to 7% gravel, little sand, trace to little organic matter, very loose, blocky soil structure, (ML).

0.5

Moist brown (SANDY-SILT) with 3 to 7% gravel, trace to little sand, trace clay, loose, blocky soil structure, (ML).

grades downward to 2.0

Moist brown (SILTY-CLAY) with 3 to 7% gravel, trace sand, stiff, thinly laminated with very thin coarse silt lenses and nealry vertical gray desiccation cracks, (CL).

grades downward to 6.0

Extremely moist brown (SANDY-SILT) with 5 to 15% gravel, little to some sand, compact, massive soil structure, (ML).

grades downward to 11.4

Moist gray (SANDY-SILT) with 15 to 25% gravel, little sand, compact, massive soil structure, (ML).

15.0

Boring completed at 15.0 feet.

WATER TABLE AND REMARKS

Coarse silty topsoil with little sand, trace to little organic matter, trace gravel to 0.5 feet over coarse silty slackwater sediment with trace to little sand, trace clay and gravel to 2.0 feet over clayey slackwater sediment with trace sand and gravel to 6.0 feet over coarse silty glacial drift with little to some sand, trace to little gravel to 11.4 feet over coarse silty glacial till with little to some gravel, little sand to end of boring.

Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to end of boring at 15.0 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

No water at completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron. (cns)

SHEET 1 OF 1

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9A10d

HOLE NO. BH-8-21

SURF. ELEVATION 669.5

PROJECT SI - Crosby Road
Town of Alabama, Genesee County, NY

LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/16/21

COMPLETED 02/16/21

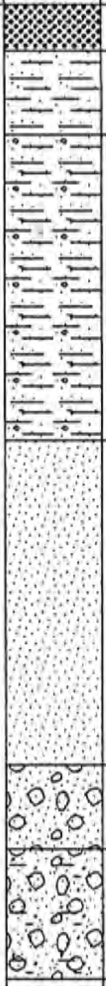
DEPTH IN FT

BLOWS ON SAMPLER

SN REC	0/6	6/12	12/18	18/24	N
1 16	1	1	4	4	5
2 20	4	7	10	12	17
3 24	8	10	14	18	24
4 24	6	6	10	11	16
5 22	5	6	7	6	13
6 17	7	16	11	9	27
7 15	4	5	6	8	11

Depth scale: 5, 10, 15, 20

LITH



DESCRIPTION AND CLASSIFICATION

Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, trace clay, very loose, granular soil structure, (ML). 0.7

Extremely moist to moist reddish brown (CLAYEY-SILT) with some clay, trace sand, firm, blocky soil structure, (CL).

grades downward to 2.0

Moist reddish brown (CLAYEY-SILT) with 0 to 3% gravel, some clay, trace sand, very stiff, weakly thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).

clear transition to 6.7

Extremely moist olive brown (SANDY-SILT) with little mostly fine size sand, trace clay, compact, thinly bedded with an occasional thin (SILTY-CLAY) lense, (ML) with an occasional thin (CL) interbed.

clear transition to 11.7

Extremely moist light grayish brown gravelly (SANDY-SILT) with 15 to 25% gravel, little sand, trace clay, compact, massive soil structure, (ML).

grades downward to 13.0

Wet gray (SAND-SILT-CLAY) with 10 to 20% gravel, little sand and clay, stiff, massive soil structure, (ML-CL).

15.0

Boring completed at 15.0 feet.

WATER TABLE AND REMARKS

Coarse silty topsoil with little sand and organic matter, trace clay to 0.7 feet over clayey slackwater sediment with trace sand to 2.0 feet over clayey slackwater sediment with trace sand and gravel to 6.7 feet over coarse silty slackwater sediment with little sand and an occasional thin clay lense to 11.7 feet over coarse silty glacial drift with little to some gravel, little sand and clay to 13.0 feet over silty glacial drift with little sand, gravel, and clay to end of boring.

⊻ Water level at 11.5 feet below ground surface upon completion.

Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to end of boring at 15.0 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron. (cns.kad)

SHEET 1 OF 1

EARTH DIMENSIONS, INC.

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9A10d

HOLE NO. BH-9-21

SURF. ELEVATION 671.5

PROJECT SI - Crosby Road
Town of Alabama, Genesee County, NY

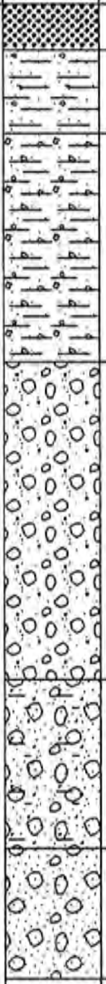
LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/16/21 COMPLETED 02/16/21

DEPTH IN FT	SN / REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N
	1 / 18	1	2	4	7	6
	2 / 22	7	11	15	17	26
5	3 / 24	8	13	20	20	33
	4 / 18	14	22	41	40	63
10	5 / 24	17	21	24	25	45
	6 / 20	11	11	13	11	24
15	7 / 24	7	10	16	21	26
20						

LITH



DESCRIPTION AND CLASSIFICATION

Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, trace clay, very loose, granular soil structure, (ML). 0.7

Moist reddish brown (CLAYEY-SILT) with 0 to 3% gravel, some clay, stiff, blocky soil structure, (CL).

grades downward to 2.0

Moist brown to reddish brown (CLAYEY-SILT) with 3 to 7% gravel, some clay, trace sand, very stiff, hard below 5.5 feet, weakly thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).

clear transition to 5.5

Moist to extremely moist brown to light grayish brown gravelly (SILTY-SAND) with 20 to 40% gravel, occasional cobble, little silt, very dense and dense, massive soil structure, (SM).

clear transition to 10.4

Extremely moist gray gravelly (SAND-SILT-CLAY) with 15 to 25% gravel, little to some sand, trace to little clay, very stiff, massive soil structure, (ML-CL) tending toward (SC).

grades downward to 13.0

Extremely moist brownish gray to gray gravelly (SANDY-SILT) with 15 to 25% gravel, little sand, trace clay, compact, massive soil structure, (ML). 15.0

Boring completed at 15.0 feet.

WATER TABLE AND REMARKS

Coarse silty topsoil with little sand and organic matter, trace clay to 0.7 feet over clayey slackwater sediment with trace sand and gravel to 5.5 feet over sandy glacial till with some sand, little silt with an occasional cobble to 10.4 feet over silty glacial till with little to some sand and gravel, trace to little clay to 13.0 feet over coarse silty glacial till with little to some gravel, little sand, trace clay to end of boring.

Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to end of boring at 15.0 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

No water at completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns,kad)

SHEET 1 OF 1

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9A10d

HOLE NO. BH-10-21

SURF. ELEVATION 666.5

PROJECT SI - Crosby Road
Town of Alabama, Genesee County, NY

LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/18/21

COMPLETED 02/18/21

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION
	1 12	1	2	2	5	4		Moist to extremely moist brown (SANDY-SILT) with 3 to 7% gravel, little sand, trace organic matter, loose, blocky soil structure, (ML). 2.0
	2 20	10	12	18	20	30		Moist, extremely moist below 10.0 feet, brown (SILTY-CLAY) with 3 to 7% gravel, trace sand, very stiff to hard, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).
5	3 20	7	11	18	18	29		
	4 23	8	10	12	17	22		
10	5 24	12	16	18	20	34		
	6 24	7	8	10	10	18		grades downward to 13.0
15	7 24	4	4	4	4	8		Extremely moist gray (SAND-SILT-CLAY) with 5 to 15% gravel, little sand and clay, firm, massive soil structure, (ML-CL). 15.0
20								Boring completed at 15.0 feet.

BLOWS ON SAMPLER

WATER TABLE AND REMARKS

Coarse silty slackwater sediment with little sand, trace gravel and organic matter to 2.0 feet over clayey slackwater sediment with trace sand and gravel to 13.0 feet over silty glacial drift with little sand and clay, trace to little gravel to end of boring.

Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to end of boring at 15.0 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

No water at completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Jason Kryszak, (cns)

SHEET 1 OF 1

EARTH DIMENSIONS, INC.

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9A10d

HOLE NO. BH-11-21

SURF. ELEVATION 672.0

PROJECT SI - Crosby Road

Town of Alabama, Genesee County, NY

LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/16/21

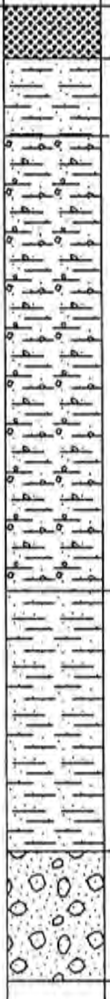
COMPLETED 02/16/21

DEPTH IN FT

BLOWS ON SAMPLER

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N
	1 19	1	2	4	7	6
	2 22	8	12	15	20	27
5	3 24	8	9	17	20	26
	4 24	8	12	18	26	30
10	5 24	6	5	8	12	13
	6 15	4	4	4	6	8
15	7 20	8	23	20	20	43
20						

LITH



DESCRIPTION AND CLASSIFICATION

Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, trace clay, very loose, granular soil structure, (ML).

0.8

Extremely moist reddish brown (CLAYEY-SILT) with some clay, trace sand, firm, blocky soil structure, (CL).

grades downward to 2.0

Extremely moist to moist reddish brown (CLAYEY-SILT) with 3 to 7% gravel, some clay, trace sand, very stiff, weakly thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).

9.0

Alternating layers of extremely moist reddish brown (CLAYEY-SILT) with some clay, trace sand and extremely moist light brownish gray (SANDY-SILT) with little mostly fine size sand, stiff, thinly laminated and thinly bedded, alternating layers of (CL) and (ML).

grades downward to 13.0

Extremely moist gray gravelly (SANDY-SILT) with 20 to 40% gravel, little sand, dense, massive soil structure, (ML).

15.0

Boring completed at 15.0 feet.

WATER TABLE AND REMARKS

Coarse silty topsoil with little sand and organic matter, trace clay to 0.8 feet over clayey slackwater sediment with trace clay to 2.0 feet over clayey slackwater sediment with trace sand and gravel to 9.0 feet over alternating layers of clayey slackwater sediment with trace sand and coarse silty slackwater sediment with little sand to 13.0 feet over coarse silty glacial till with some gravel, little sand to end of boring.

Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to end of boring at 15.0 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

No water at completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns,kad)

SHEET 1 OF 1

EARTH DIMENSIONS, INC.

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1091 Jamison Road • Elma, NY 14059
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9A10d

HOLE NO. BH-12-21

SURF. ELEVATION 669.5

PROJECT SI - Crosby Road
Town of Alabama, Genesee County, NY

LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/15/21

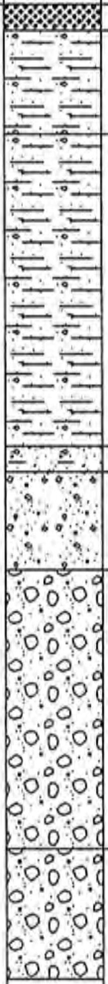
COMPLETED 02/15/21

DEPTH IN FT

BLOWS ON SAMPLER

SN REC	0/6	6/12	12/18	18/24	N
1 14	1	2	2	4	4
2 22	7	9	11	14	20
3 24	9	8	16	14	24
4 20	4	6	6	8	12
5 22	10	27	48	33	75
6 2	36	50/2			
7 18	15	19	18	22	37

LITH



DESCRIPTION AND CLASSIFICATION

Wet to extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, trace clay, very loose, granular soil structure, (ML). 0.4

Moist reddish brown (CLAYEY-SILT) with 0 to 3% gravel, some clay, trace sand, very soft, blocky soil structure, (CL).

grades downward to 2.0

Moist reddish brown (CLAYEY-SILT) with 0 to 3% gravel, some clay, trace sand, very stiff, weakly thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).

clear transition to 6.8

Extremely moist distinctly mottled alternating layers of reddish brown and grayish brown (SAND-SILT-CLAY) with 0 to 3% gravel, little sand and clay, stiff, thinly bedded and thinly laminated, (ML-CL).

clear transition to 7.2

Extremely moist brown (SILTY-SAND) with 5 to 10% gravel, some silt, compact, weakly stratified to massive soil structure, (SM).

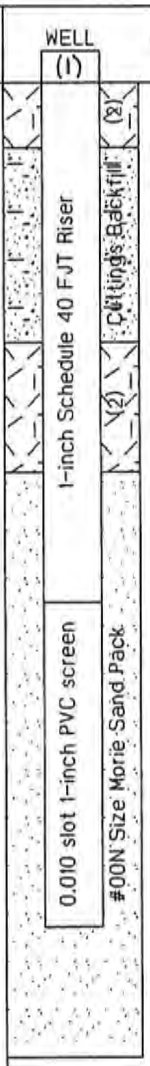
clear transition to 8.7

Extremely moist light grayish brown gravelly (SILTY-SAND) with 15 to 25% gravel, occasional cobble, little silt, very dense, massive soil structure, (SM).

grades downward to 13.0

Extremely moist brownish gray gravelly (SILTY-SAND) with 20 to 40% gravel, little silt, dense, massive soil structure, (SM).

WELL



WATER TABLE AND REMARKS

(1) Approximately 2.0 feet of 1-inch PVC stickup

(2) Bentonite Seal

Coarse silty topsoil with little sand and organic matter, trace clay to 0.4 feet over clayey slackwater sediment with trace sand and gravel to 6.8 feet over silty slackwater sediment with little sand and clay, trace gravel to 7.2 feet over water sorted and deposited sand with some silt, trace gravel to 8.7 feet over sandy glacial till with little to some gravel, little silt with an occasional cobble to 13.0 feet over sandy glacial till with some gravel, little silt and an occasional cobble to end of boring.

Note: Cobble at 10.0 feet.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron. (cns)

SHEET 1 OF 2

EARTH DIMENSIONS, INC.
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(716) 655-1717 • EDI@earthdimensions.com

9A10d

HOLE NO. BH-12-21

SURF. ELEVATION 669.5

PROJECT SI - Crosby Road
Town of Alabama, Genesee County, NY

LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/15/21

COMPLETED 02/15/21

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
								Extremely moist brownish gray gravelly (SILTY-SAND) with 20 to 40% gravel, little silt, dense, massive soil structure, (SM). 15.0 Boring completed at 15.0 feet.		Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to end of boring at 15.0 feet. A 1-inch standpipe piezometer was installed in completed bore hole at completion. No water at completion.
25										
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron. (cns)

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9A10d

HOLE NO. BH-13-21

SURF. ELEVATION 670.5

PROJECT SI - Crosby Road
Town of Alabama, Genesee County, NY

LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/18/21

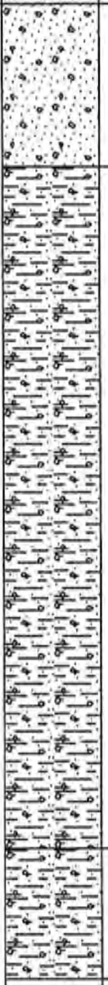
COMPLETED 02/18/21

DEPTH IN FT / BLOWS ON SAMPLER

SN REC	0/6	6/12	12/18	18/24	N
1 8	3	5	8	11	13
2 3	6	15	11	20	26
3 12	8	15	17	23	32
4 20	12	18	20	26	38
5 20	10	15	23	25	38
6 21	9	19	17	23	36
7 24	3	4	6	7	10

Depth scale: 5, 10, 15, 20

LITH



DESCRIPTION AND CLASSIFICATION

Moist dark brown (SANDY-SILT) fill with 3 to 7% gravel, little sand, trace organic matter and concrete debris, loose, massive soil structure, (ML). 2.5

Moist brown (SILTY-CLAY) with 3 to 7% gravel, trace sand, very stiff to hard, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).

grades downward to 13.0

Extremely moist brownish gray (SILTY-CLAY) with 3 to 7% gravel, trace sand, firm, thinly laminated with very thin coarse silt lenses, (CL). 15.0

Boring completed at 15.0 feet.

WATER TABLE AND REMARKS

Coarse silty soil fill with little sand, trace organic matter, concrete debris, and gravel to 2.5 feet over clayey slackwater sediment with trace sand and gravel to end of boring.

Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to end of boring at 15.0 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

No water at completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns)

SHEET 1 OF 1

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9A10d

HOLE NO. BH-14-21

SURF. ELEVATION 672.5

PROJECT SI - Crosby Road

Town of Alabama, Genesee County, NY

LOCATION _

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/17/21

COMPLETED 02/17/21

DEPTH IN FT

BLOWS ON SAMPLER

SN REC	0/6	6/12	12/18	18/24	N
1 13	1	2	5	3	7
2 19	6	8	11	19	19
3 20	7	10	15	17	25
4 22	9	12	15	16	27
5 20	6	11	15	16	26
6 23	6	12	13	14	25
7 24	2	3	4	3	7

Depth scale: 5, 10, 15, 20

LITH

DESCRIPTION AND CLASSIFICATION

Extremely moist dark brown to brown (SANDY-SILT) topsoil with little sand and organic matter, very loose, massive soil structure, (ML).

0.5

Moist brown (CLAYEY-SILT) with 3 to 7% gravel, some clay, trace sand, blocky soil structure, firm, (CL).

grades downward to 3.0

Moist light brown (SILTY-CLAY) with 3 to 7% gravel, trace sand, very stiff, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).

grades downward to 13.0

Extremely moist brown (SILTY-CLAY) with 3 to 7% gravel, trace sand, firm, thinly laminated with very thin coarse silt lenses, (CL).

15.0

Boring completed at 15.0 feet.

WATER TABLE AND REMARKS

Coarse silty topsoil with little sand and organic matter to 0.5 feet over silty slackwater sediment with some clay, trace sand and gravel to 3.0 feet over clayey slackwater sediment with trace sand and gravel to end of boring.

Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to end of boring at 15.0 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

No water at completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Jason Kryszak. (cns)

SHEET 1 OF 1

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9A10d

HOLE NO. BH-15-21

SURF. ELEVATION 673.0

PROJECT SI - Crosby Road
Town of Alabama, Genesee County, NY

LOCATION –

CLIENT Glynn Group Engineering & Architecture, PLLC

DATE STARTED 02/15/21

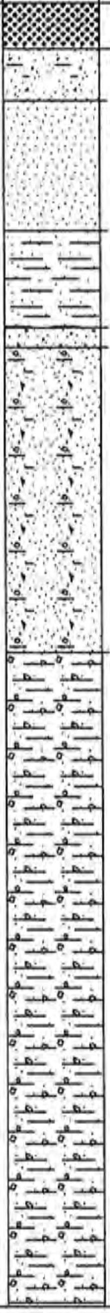
COMPLETED 02/15/21

DEPTH IN FT

BLOWS ON SAMPLER

DEPTH IN FT	SN	REC	0/6	6/12	12/18	18/24	N
	1	16	1	2	4	7	6
	2	21	8	11	14	12	25
5	3	24	9	12	15	18	27
	4	24	10	15	21	27	36
10	5	24	11	16	22	21	38
	6	24	5	8	12	12	20
15	7	24	4	5	5	7	10
20	8	24	3	4	6	7	10

LITH



DESCRIPTION AND CLASSIFICATION

Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, trace clay, very loose, granular soil structure, (ML). 0.7

Extremely moist to moist faintly mottled brown (SAND-SILT-CLAY) with little to some clay, trace to little sand, firm, blocky soil structure, (ML-CL).

clear transition to 1.5

Moist brown (SANDY-SILT) with little mostly fine size sand, trace clay, compact, thinly bedded, (ML).

clear transition to 3.5

Moist reddish brown (CLAYEY-SILT) with some clay, trace sand, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).

clear transition to 5.0

Wet brown (SILTY-SAND) with mostly fine size sand, some silt, compact, thinly bedded, (SM).

clear transition to 5.3

Mosit reddish brown to grayish brown (CLAYEY-SILT) with 0 to 3% gravel, trace sand, hard, weakly thinly laminated, (CL).

grades downward to 10.0

Extremely moist grayish brown (CLAYEY-SILT) with 3 to 7% gravel, some clay, trace sand, stiff, weakly thinly laminated to massive soil structure, (CL).

WATER TABLE AND REMARKS

Coarse silty topsoil with little sand and organic matter, trace clay to 0.7 feet over silty slackwater sediment with little to some clay, trace to little sand to 1.5 feet over coarse silty slackwater sediment with little sand, trace clay to 3.5 feet over clayey slackwater sediment with trace sand to 5.0 feet over water sorted and deposited sand with some silt to 5.3 feet over clayey slackwater sediment with trace sand and gravel to 10.0 feet over clayey slackwater sediment with trace sand and gravel to 23.0 feet over coarse silty glacial drift with some gravel, little sand and clay to 28.0 feet over water sorted and deposited sand with some gravel, little silt to 33.0 feet over water sorted and deposited sand and fine size shale stone fragments, little silt to 38.0 feet over apparent shale bedrock to auger refusal.

Note: Advanced bore hole with 2 1/4" ID x 6" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to auger refusal at 39.4 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

Note: No water in bore hole prior to taking sample number 10. Water level at 9.0 feet below ground surface at completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron. (cns)

SHEET 1 OF 2

9A10d HOLE NO. BH-15-21 SURF. ELEVATION 673.0

PROJECT SI – Crosby Road LOCATION _

Town of Alabama, Genesee County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 02/15/21 COMPLETED 02/15/21

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
								Extremely moist grayish brown (CLAYEY-SILT) with 3 to 7% gravel, some clay, trace sand, stiff, weakly thinly laminated to massive soil structure, (CL). grades downward to 23.0	
25	9 10	5	11	13	12	24		Extremely moist brownish gray gravelly (SANDY-SILT) with 20 to 40% gravel, little sand, trace clay, compact, massive soil structure, (SM). grades downward to 28.0	
30	10 10	7	9	12	18	21		Wet gray gravelly (SILTY-SAND) with 20 to 40% gravel, little silt, compact, weakly stratified to massive soil structure, (SM). grades downward to 33.0	
35	11 15	12	16	17	28	33		Wet gray very gravelly (SILTY-SAND) with 40 to 60% mostly fine size angular gravel, trace to little silt, dense, weakly stratified, (SM), (GM). 38.0	
	12 4	50/5						Gray shale stone fragments, moderately soft. 39.4	
40								Advanced augers to refusal at 39.4 feet.	

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns)

Appendix B

Project Location Plan

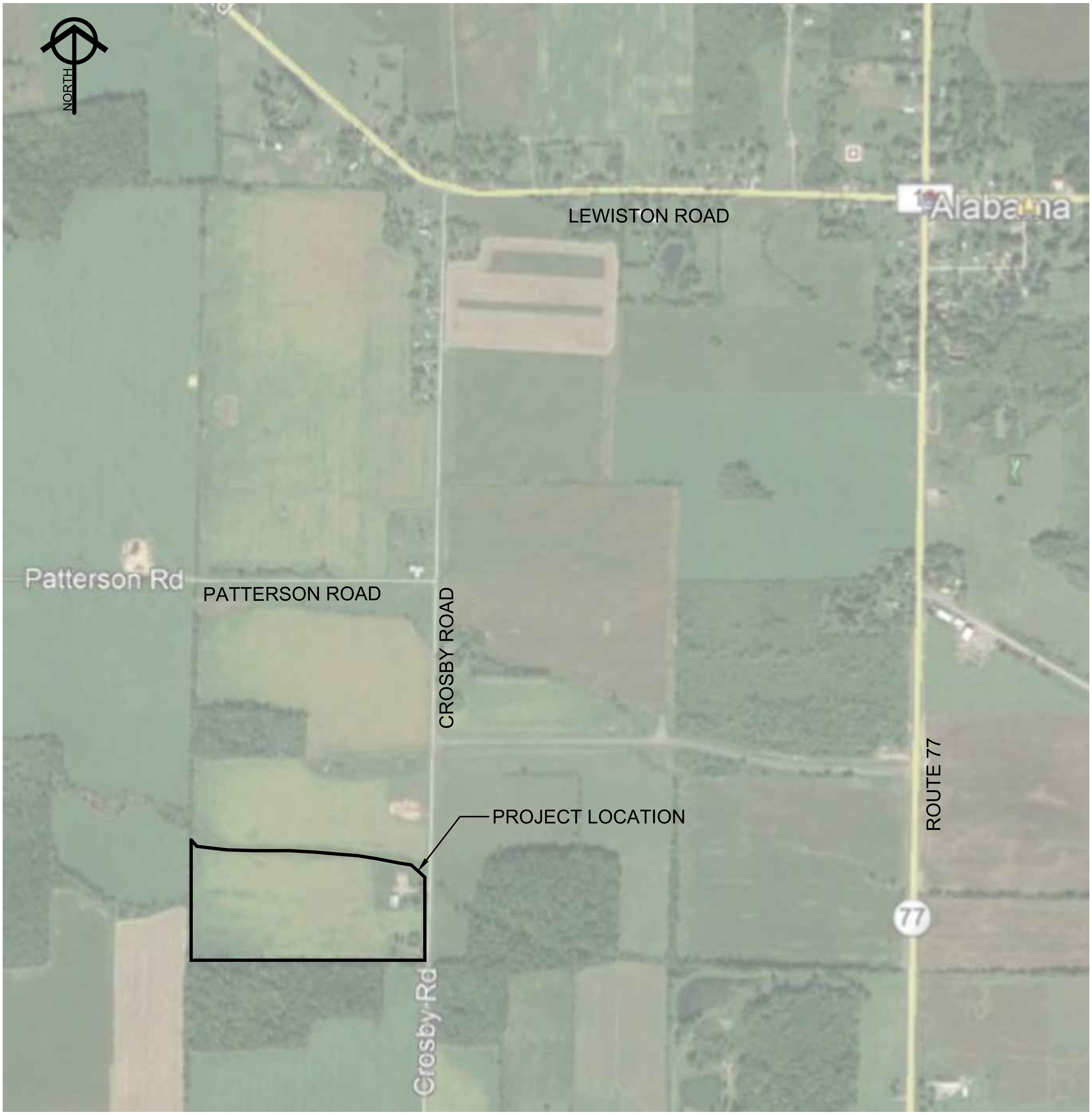
Power Plug Hydrogen Production Facility
WNY STAMP
Crosby Road, Alabama, New York

Geotechnical Engineering Report

GGEA 21-1009

March 18, 2021

GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC



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GLYNN GEOTECHNICAL ENGINEERING
415 S. TRANSIT STREET
LOCKPORT, NEW YORK 14094
VOICE (716) 625 - 6933 / FAX (716) 625-6983
www.glynngroup.com

PROJECT: STAMP, CROSBY RD, ALABAMA

SUBJECT: PROJECT LOCATION PLAN

CLIENT: SCHEID ARCHITECTURAL

PROJ. NO.:	SCALE:	DATE:	BY:
21-1009	1" = 1000'	03.08.21	GEL

SHEET NO.: S1

Appendix C

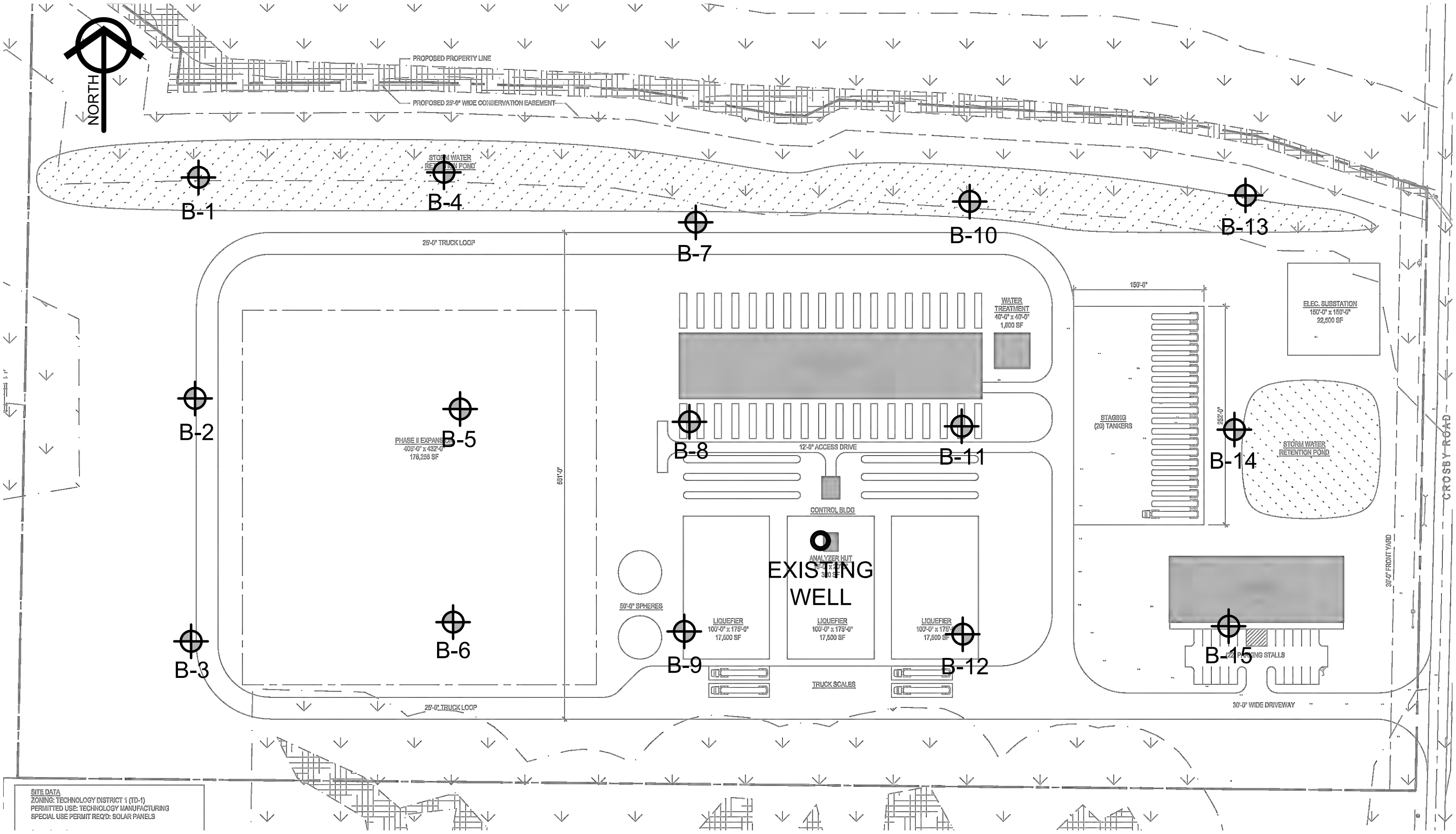
Subsurface Exploration Location Plan

Power Plug Hydrogen Production Facility
WNY STAMP
Crosby Road, Alabama, New York

Geotechnical Engineering Report

GGEA 21-1009

March 18, 2021



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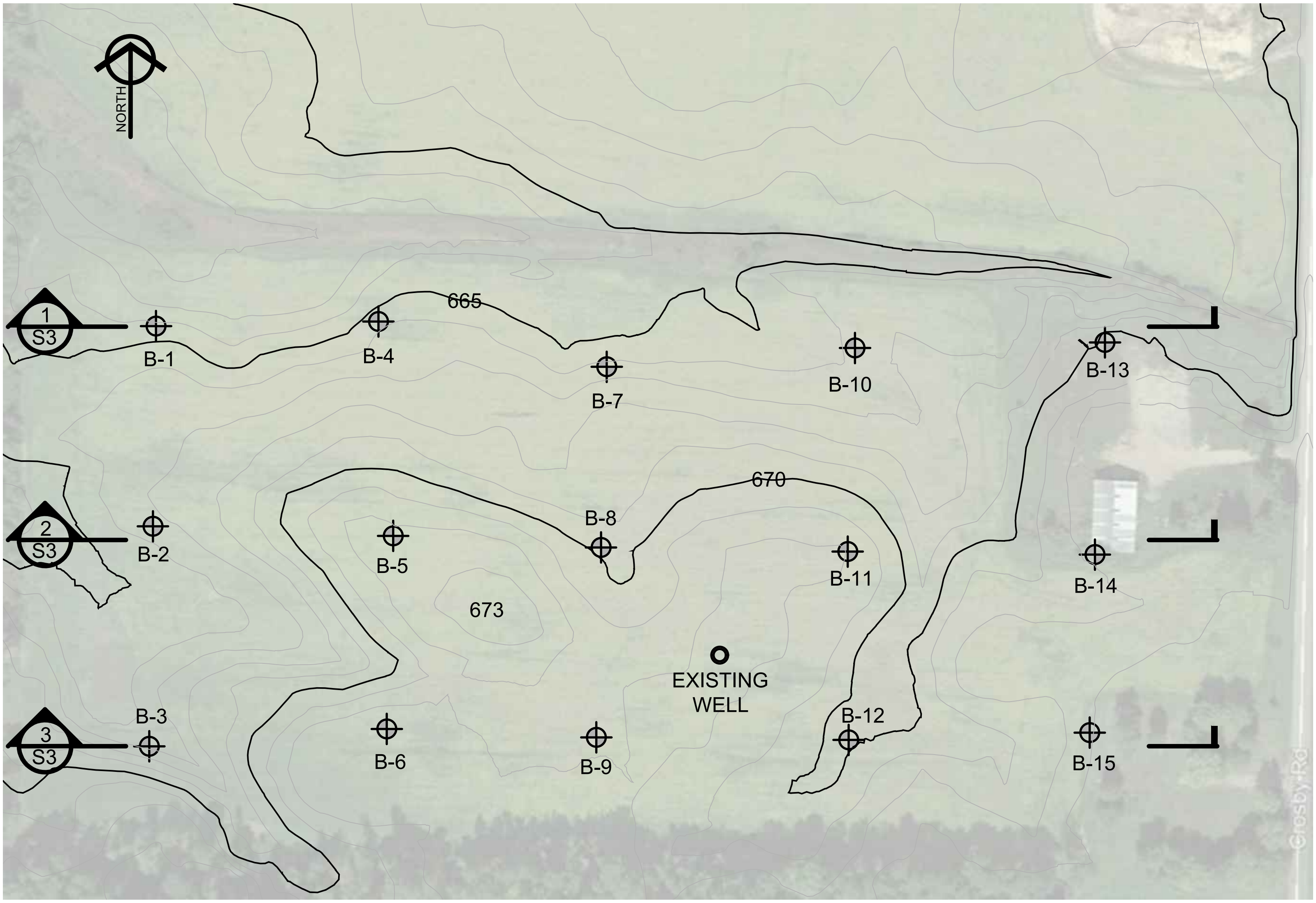
PROJECT: STAMP, CROSBY RD, ALABAMA

SUBJECT: BORING LOCATION PLAN

CLIENT: SCHEID ARCHITECTURAL

PROJ. NO.:	SCALE:	DATE:	BY:
21-1009	1"= 200'-0"	02.02.21	GEL

SHEET NO.: S2A



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PROJECT: STAMP, CROSBY RD, ALABAMA

SUBJECT: BORING LOCATION PLAN

CLIENT: SCHEID ARCHITECTURAL

PROJ. NO.:	SCALE:	DATE:	BY:
21-1009	1"= 200'-0"	02.04.21	GEL

SHEET NO.: S2B

Appendix D

Laboratory Analysis

Power Plug Hydrogen Production Facility
WNY STAMP
Crosby Road, Alabama, New York

Geotechnical Engineering Report

GGEA 21-1009

March 18, 2021

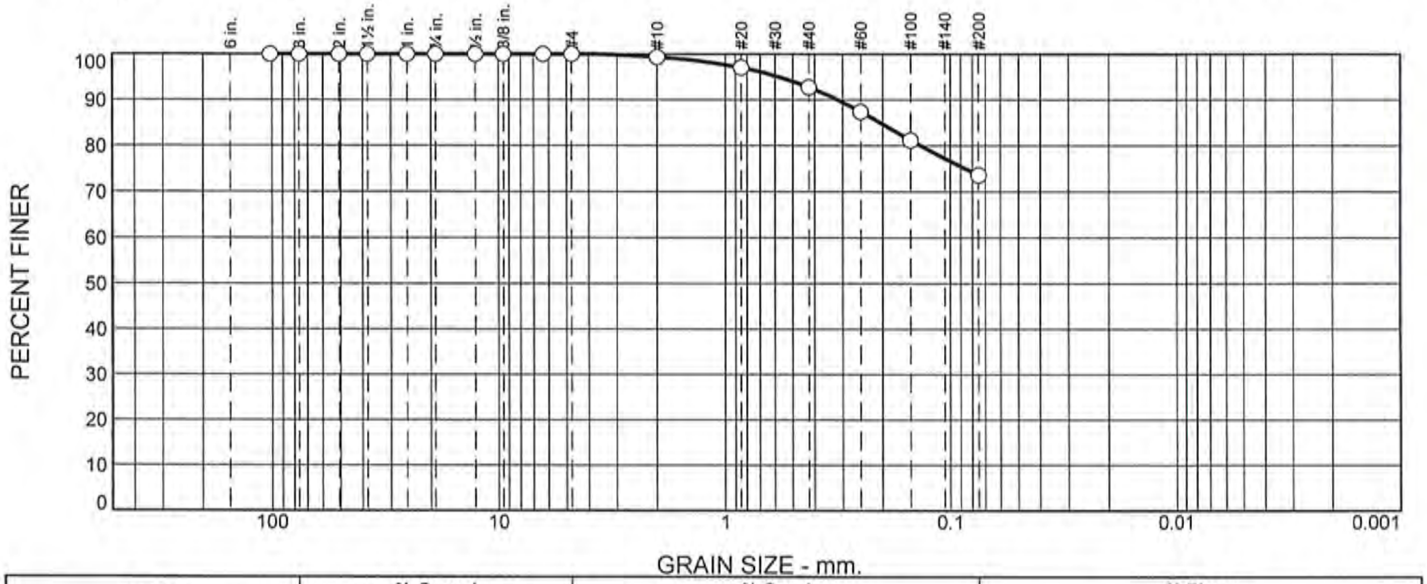
GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC

Civil • Geotechnical
Structural • Architecture
Material Testing • Consulting

GRAIN SIZE ANALYSIS
ASTM D-422

Project: Power Plug Hydrogen Production Facility **Project No.:** 21-1009
Client: Scheid Architectural PLLC

Location: B-4 (S1)
Sample Number: 21-01 **Depth:** 0.0 - 2.0 ft **Date:** 3-9-2021



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.7	6.6	19.1	73.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
1/4"	100.0		
#4	100.0		
#10	99.3		
#20	97.0		
#40	92.7		
#60	87.4		
#100	81.2		
#200	73.6		

* (no specification provided)

Material Description

lean clay with sand

Atterberg Limits

PL= 18 LL= 41 PI= 23

Coefficients

D_{85}= 0.2050 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(16)

Remarks

Natural Moisture Content = 21.2 %

Figure

Reported/Reviewed by

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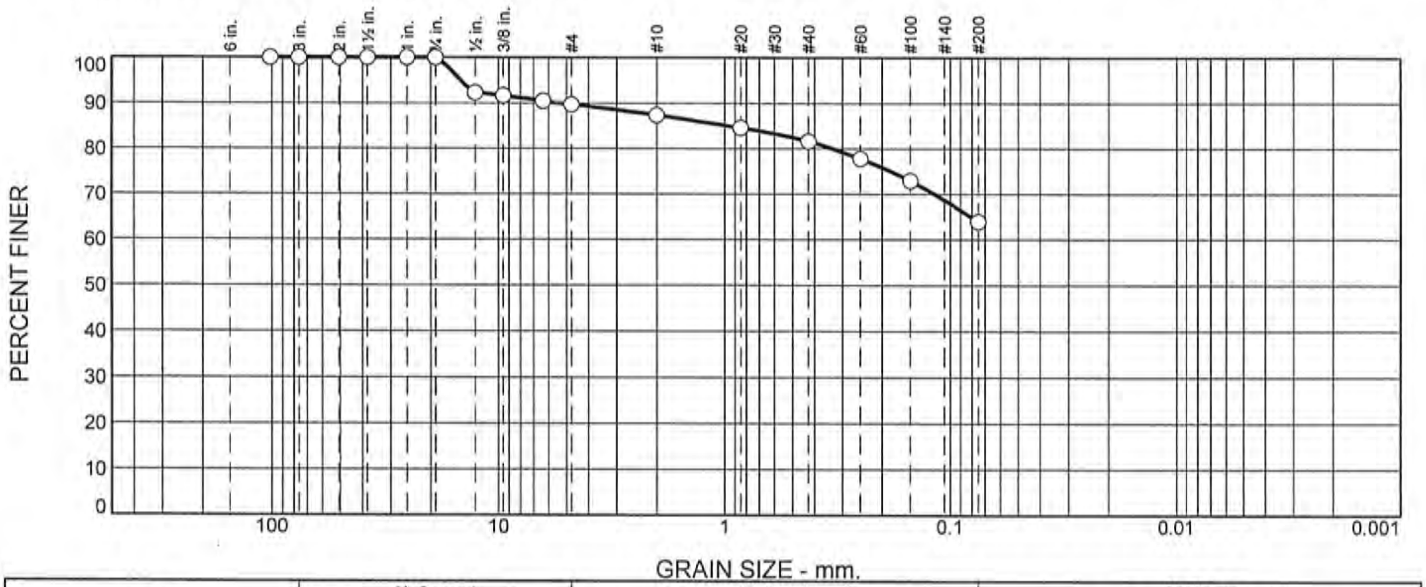
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Power Plug Hydrogen Production Facility **Project No.:** 21-1009

Client: Scheid Architectural PLLC

Location: B-4 (S5)
Sample Number: 21-02 **Depth:** 8.0 - 10.0 ft **Date:** 3-9-2021



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	10.3	2.3	5.8	17.6	64.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	92.3		
3/8"	91.6		
1/4"	90.5		
#4	89.7		
#10	87.4		
#20	84.6		
#40	81.6		
#60	77.8		
#100	73.0		
#200	64.0		

* (no specification provided)

Material Description

sandy silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= 0.9567 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Natural Moisture Content = 12.9 %

Figure

Reported/Reviewed by

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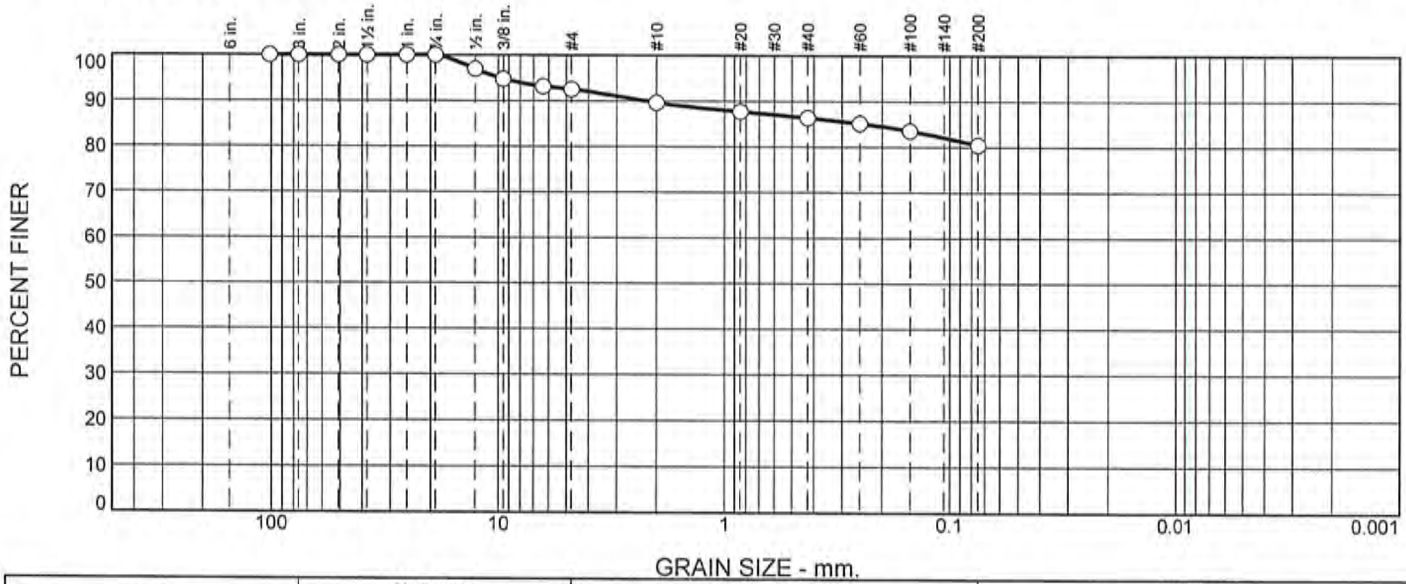
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Power Plug Hydrogen Production Facility **Project No.:** 21-1009

Client: Scheid Architectural PLLC

Location: B-5 (S3, S4)
Sample Number: 21-03 **Depth:** 4.0 - 8.0 ft **Date:** 3-9-2021



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.5	2.9	3.2	5.9	80.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	96.9		
3/8"	94.8		
1/4"	93.2		
#4	92.5		
#10	89.6		
#20	87.7		
#40	86.4		
#60	85.2		
#100	83.6		
#200	80.5		

* (no specification provided)

Material Description

lean clay with sand

Atterberg Limits

PL= 15 LL= 24 PI= 9

Coefficients

D_{85}= 0.2335 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(5)

Remarks

Natural Moisture Content = 14.5 %

Figure

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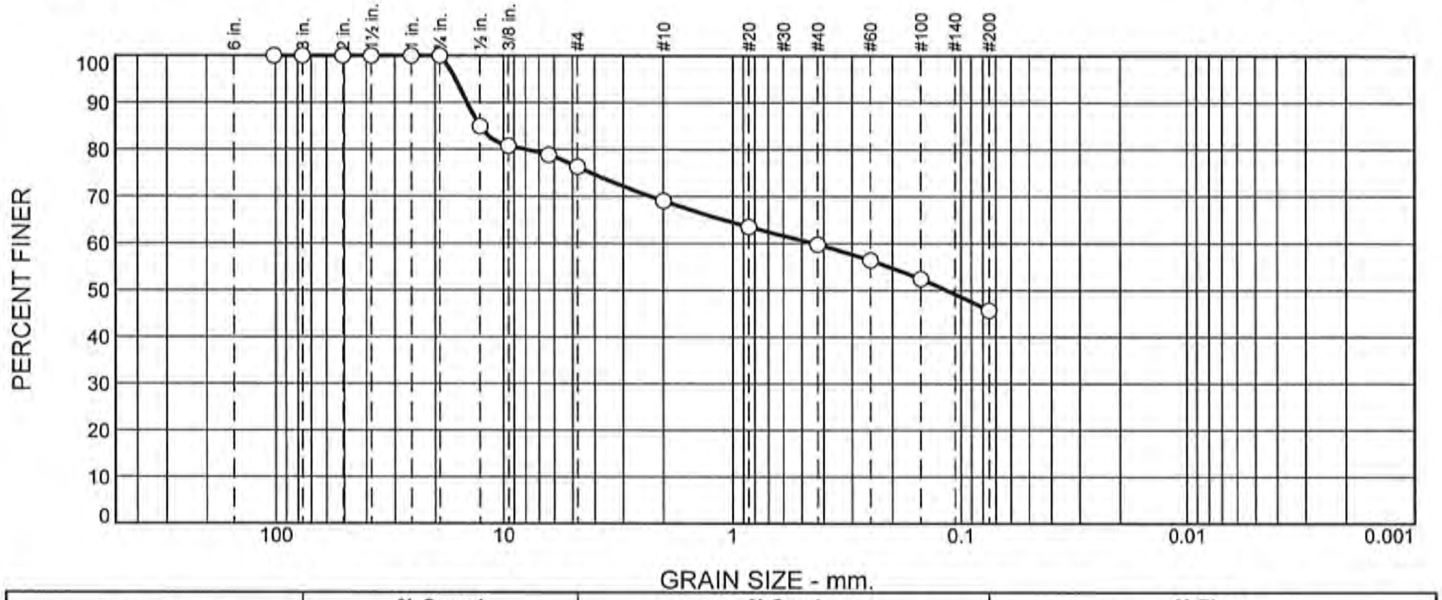
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Power Plug Hydrogen Production Facility **Project No.:** 21-1009
Client: Scheid Architectural PLLC

Location: B-6 (S3, S4)
Sample Number: 21-04 **Depth:** 4.0 - 8.0 ft **Date:** 3-9-2021



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	23.7	7.2	9.3	14.1	45.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	85.0		
3/8"	80.8		
1/4"	78.9		
#4	76.3		
#10	69.1		
#20	63.5		
#40	59.8		
#60	56.4		
#100	52.4		
#200	45.7		

* (no specification provided)

Material Description

clayey sand with gravel

Atterberg Limits

PL= 12 LL= 21 PI= 9

Coefficients

D_{85}= 12.7082 D_{60}= 0.4426 D_{50}= 0.1152
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SC AASHTO= A-4(1)

Remarks

Natural Moisture Content = 10.6 %

Figure

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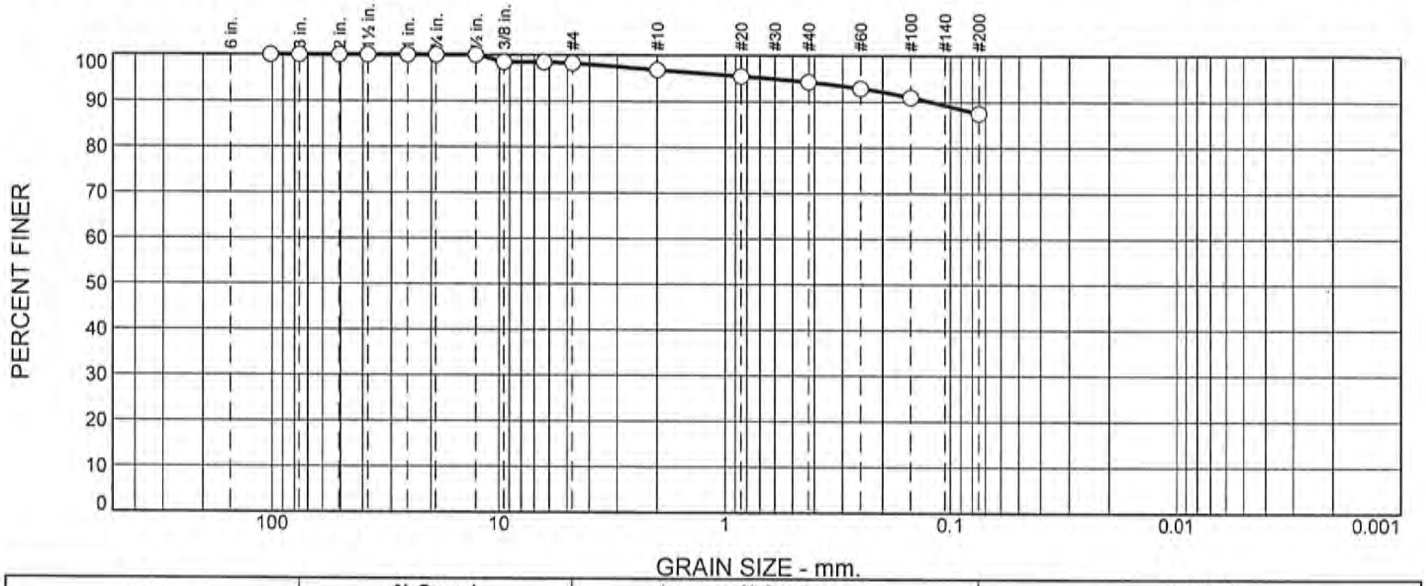
Reported/Reviewed by

GRAIN SIZE ANALYSIS
ASTM D-422

Project: Power Plug Hydrogen Production Facility **Project No.:** 21-1009

Client: Scheid Architectural PLLC

Location: B-7 (S2, S3)
Sample Number: 21-05 **Depth:** 2.0 - 6.0 ft **Date:** 3-9-2021



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.8	1.4	2.6	6.7	87.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	98.4		
1/4"	98.4		
#4	98.2		
#10	96.8		
#20	95.5		
#40	94.2		
#60	92.9		
#100	91.0		
#200	87.5		

* (no specification provided)

Material Description

lean clay

Atterberg Limits

PL= 17 LL= 35 PI= 18

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-6(15)

Remarks

Natural Moisture Content = 16.6 %

Figure

Reported/Reviewed by

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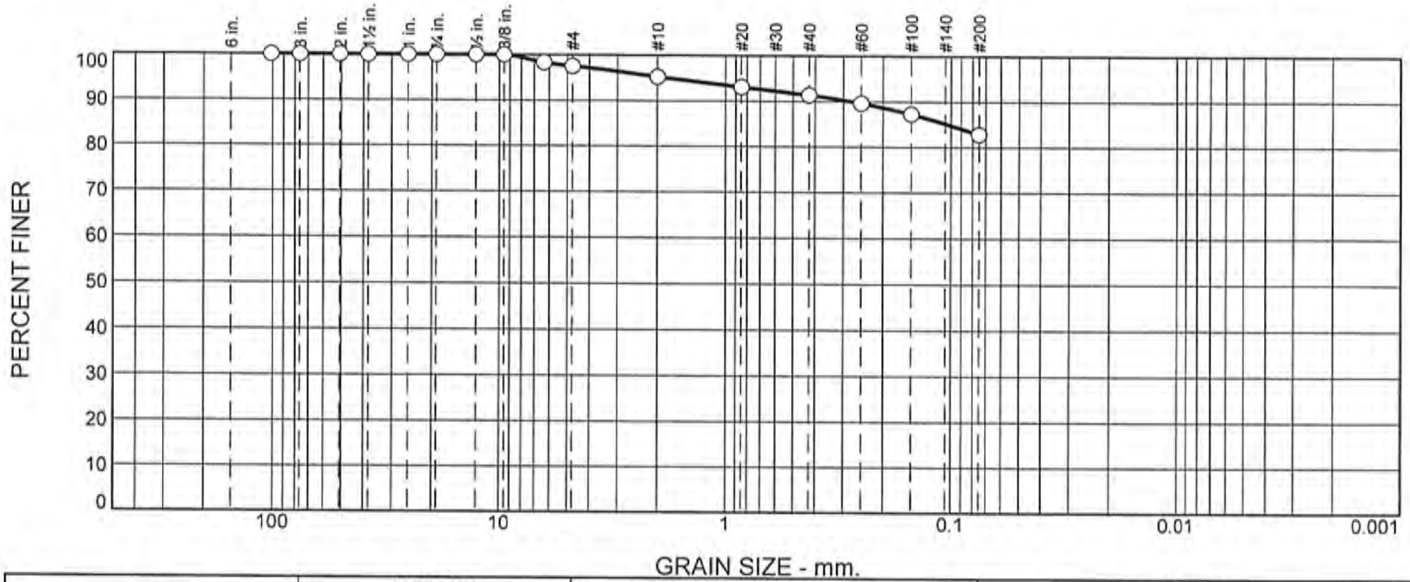
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Power Plug Hydrogen Production Facility **Project No.:** 21-1009

Client: Scheid Architectural PLLC

Location: B-11 (S3, S4)
Sample Number: 21-06 **Depth:** 4.0 - 8.0 ft **Date:** 3-9-2021



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.5	2.2	4.0	8.5	82.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
1/4"	98.3		
#4	97.5		
#10	95.3		
#20	93.1		
#40	91.3		
#60	89.6		
#100	87.3		
#200	82.8		

* (no specification provided)

Material Description

lean clay with sand

Atterberg Limits

PL= 14 LL= 31 PI= 17

Coefficients

D_{85}= 0.1032 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-6(12)

Remarks

Natural Moisture Content = 15.4 %

Figure

Reported/Reviewed by

GRAIN SIZE ANALYSIS

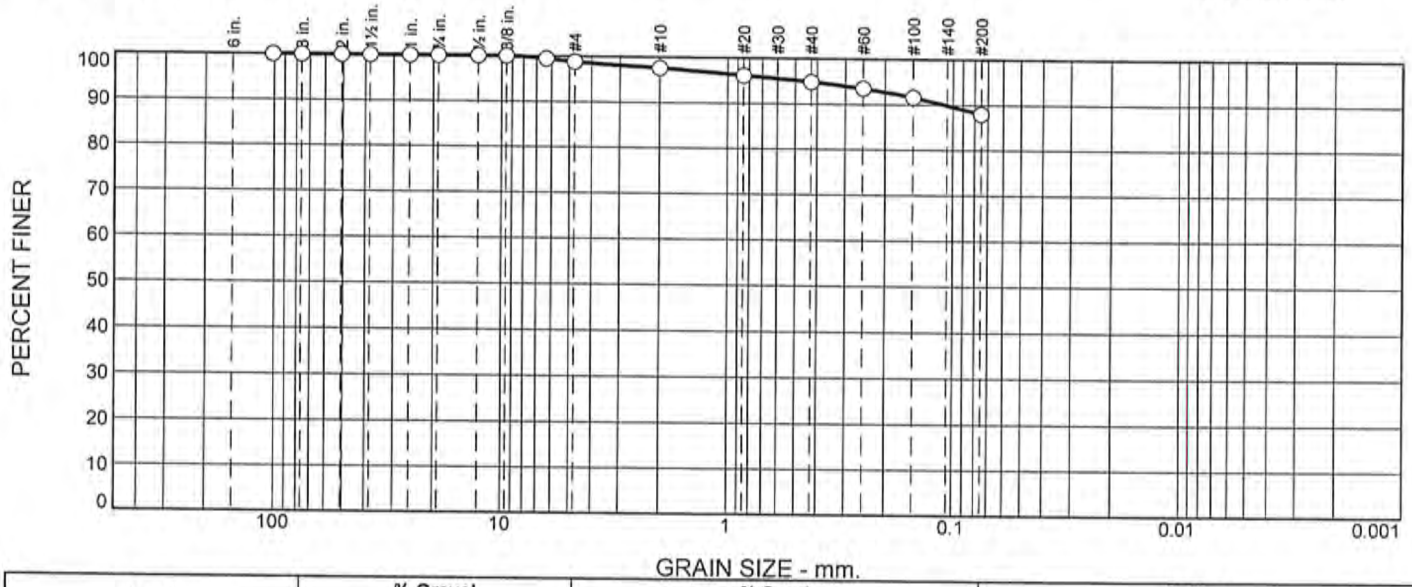
ASTM D-422

Project: Power Plug Hydrogen Production Facility

Project No.: 21-1009

Client: Scheid Architectural PLLC

Location: B-15 (S4, S5)
Sample Number: 21-07
Depth: 6.0 - 10.0 ft
Date: 3-9-2021



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.2	1.2	2.7	6.9	88.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1-0"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
1/4"	99.4		
#4	98.8		
#10	97.6		
#20	96.1		
#40	94.9		
#60	93.5		
#100	91.6		
#200	88.0		

* (no specification provided)

Material Description

lean clay

Atterberg Limits

PL= 16
LL= 31
PI= 15

Coefficients

D_{85}=
D_{60}=
D_{50}=
D_{30}=
D_{15}=
D_{10}=
C_u=
C_c=

Classification

USCS= CL
AASHTO= A-6(12)

Remarks

Natural Moisture Content = 14.9 %

Figure

Reported/Reviewed by

Appendix E

Seismic Site Class and Design Category

Power Plug Hydrogen Production Facility
WNY STAMP
Crosby Road, Alabama, New York

Geotechnical Engineering Report

GGEA 21-1009

March 18, 2021

GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC

Project : Power Plug Hydrogen Production Facility
Client: Scheid Architectural
GGEA # : 21-1009
Date: 03.09.21

B-15

Depth (di)	N Value (Ni)
2	6
8	30
2	20
11	10
15	26
62	100

ASCE 7-16
Equation 20.4-2

$$\frac{100}{\sum \frac{di}{Ni}}$$

$N = \boxed{33.4}$

ASCE 7-16
Table 20.3-1

$15 < N < 50$

SITE CLASS D

2020 NYS Code Section 1613

$F_a = \boxed{1.6}$ Site coefficient Table 1613.2.3(1)

$F_v = \boxed{2.4}$ Site coefficient Table 1613.2.3(2)

$S_s = \boxed{0.181}$ Mapped accelerations short periods Figure 1613.2.1(1)

$S_1 = \boxed{0.047}$ Mapped accelerations 1 sec period Figure 1613.2.1(2)

$S_{MS} = \boxed{0.290}$ Maximum spectral response short periods equation 16-36

$S_{M1} = \boxed{0.113}$ Maximum spectral response 1 sec periods equation 16-37

$S_{DS} = \boxed{0.193}$ Design spectral response short periods equation 16-38

$S_{D1} = \boxed{0.075}$ Design spectral response 1 sec periods equation 16-39

Risk Category = $\boxed{II}$ Table 1604.5

Seismic Design Category = $\boxed{B}$ Table 1613.2.5(1)
Table 1613.2.5(2)

Appendix F

Fill Specifications

Power Plug Hydrogen Production Facility
WNY STAMP
Crosby Road, Alabama, New York

Geotechnical Engineering Report

GGEA 21-1009

March 18, 2021

Common Fill

All soil and/or crushed rock material with the exception of those with USCS classifications of CH, MH, OH, and OL.

Place material in 12 inch lifts (loose) and compact to 90 % of modified proctor (ASTM D-1557) maximum dry density within 2 % of optimum moisture content.

The material should be compacted using a smooth drum vibratory roller (for large applications) or a reversible vibratory plate tamper (for smaller applications) such as a Bomag BPR 35/60 or similar (weight > 400 lbs).

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Structural Fill

All soil and/or crushed rock material with the exception of those with USCS classifications of CH, MH, OH, OL, ML and CL-ML.

Place material in 9 inch lifts (loose) and compact to 95 % of modified proctor (ASTM D-1557) maximum dry density within 2 % of optimum moisture content.

The material should be compacted using a smooth drum vibratory roller (for large applications) or a reversible vibratory plate tamper (for smaller applications) such as a Bomag BPR 35/60 or similar (weight > 400 lbs).

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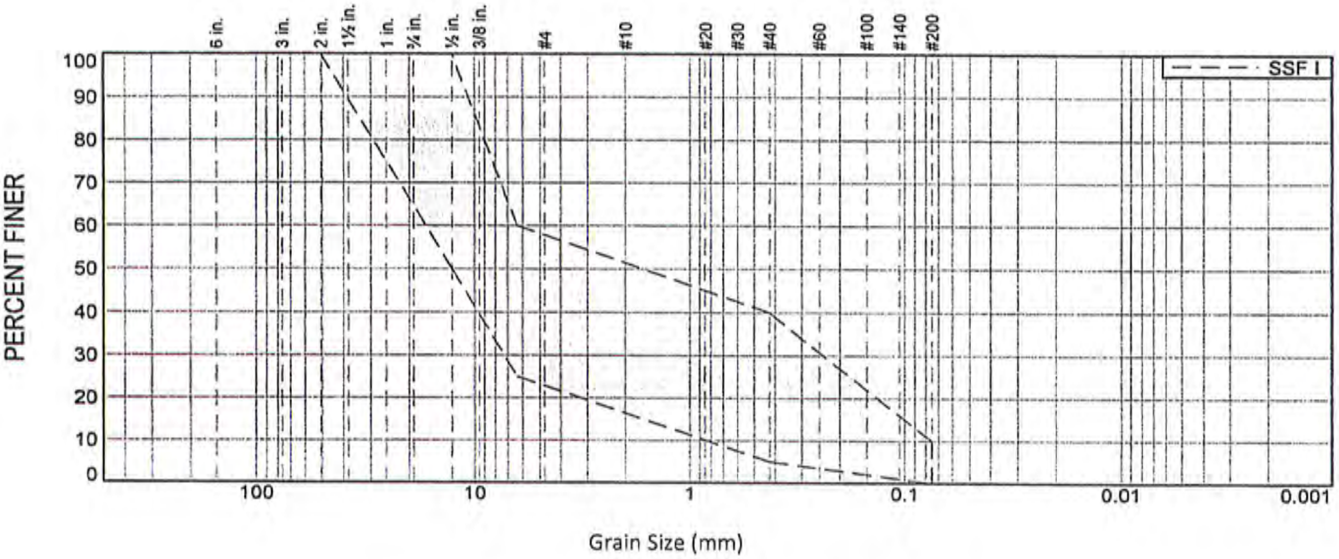
Select Structural Fill

NYSDOT Item No. 304.12 Subbase Course, Type 2

Sieve Size	Required % Passing
2 inch	100
1/4 inch	25 - 60
No. 40	5 - 40
No. 200	0 - 10



In addition to the above specification, material shall also meet the well graded qualifications of ASTM D-2487, such that USCS classification = GW, GW-GM, SW or SW-SM.

Place material in 9 inch lifts (loose) and compact to 95 % of modified proctor (ASTM D-1557) maximum dry density within 2 % of optimum moisture content.

The material should be compacted using a smooth drum vibratory roller (for large applications) or a reversible vibratory plate tamper (for smaller applications) such as a Bomag BPR 35/60 or similar (weight > 400 lbs).

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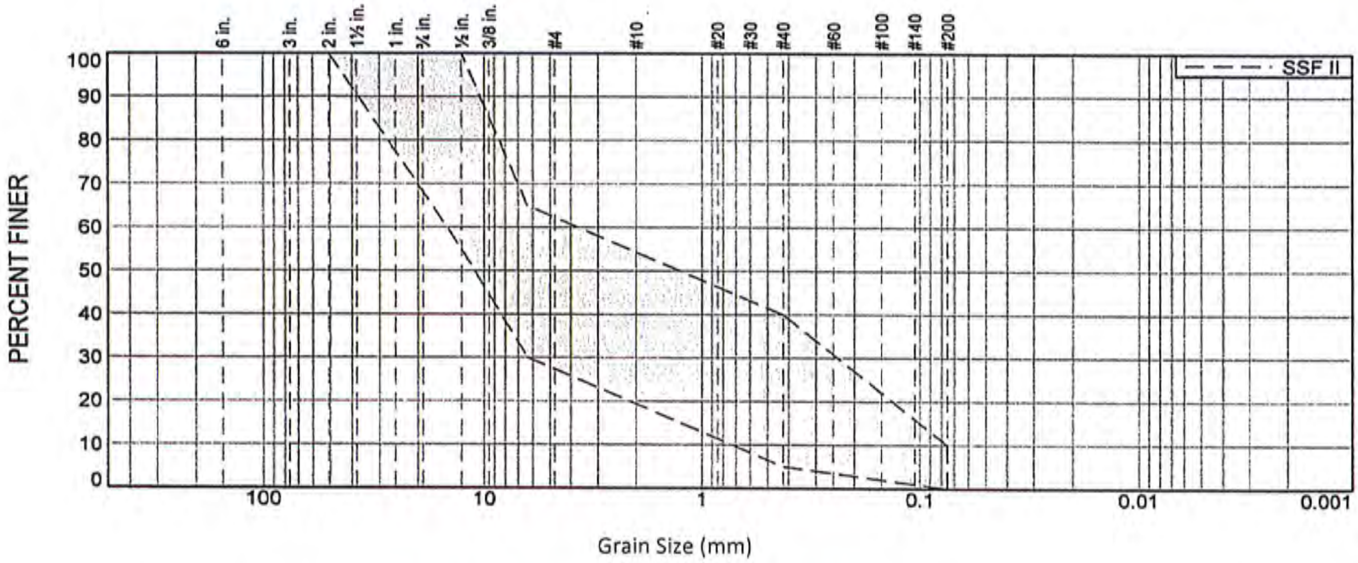
Select Structural Fill

NYSDOT Item No. 304.14 Subbase Course, Type 4

Sieve Size	Required % Passing
2 inch	100
1/4 inch	30 - 65
No. 40	5 - 40
No. 200	0 - 10



In addition to the above specification, material shall also meet the well graded qualifications of ASTM D-2487, such that USCS classification = GW, GW-GM, SW or SW-SM.

Place material in 9 inch lifts (loose) and compact to 95 % of modified proctor (ASTM D-1557) maximum dry density within 2 % of optimum moisture content.

The material should be compacted using a smooth drum vibratory roller (for large applications) or a reversible vibratory plate tamper (for smaller applications) such as a Bomag BPR 35/60 or similar (weight > 400 lbs).

Flowable Fill

Controlled Low Strength Material (CLSM).

Typically a fly ash based pozzolanic fill manufactured by local concrete plants.

Minimum 28 day compressive strength = 100 psi.

May include fine aggregate.

The material should be placed in separate lifts not to exceed 30 inches in depth and each lift should be allowed to fully cure (monitor for shrinkage and/or desiccation) prior to placing subsequent lifts or applying load.

CLSM should not be used within 42 inches of final grade due to potential freeze/thaw susceptibility and should not be used if the excavation contains standing water or is subject to groundwater infiltration.

Appendix G

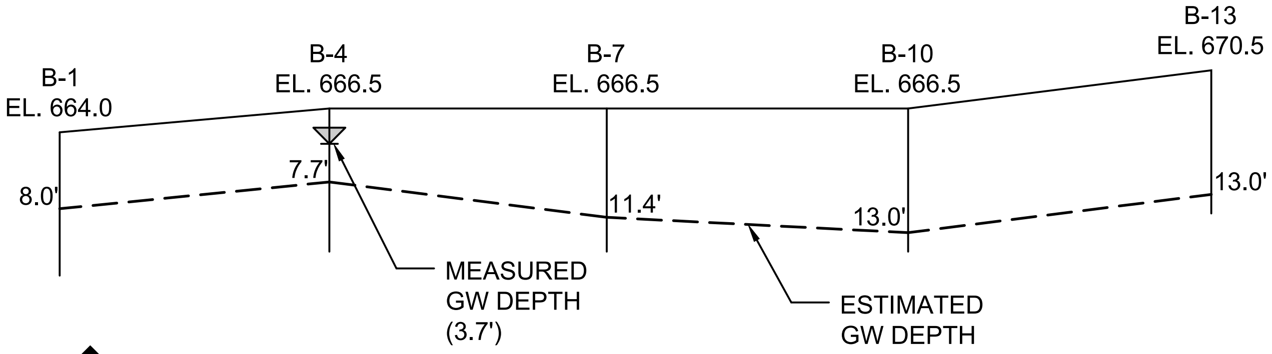
Elevation Profile

Power Plug Hydrogen Production Facility
WNY STAMP
Crosby Road, Alabama, New York

Geotechnical Engineering Report

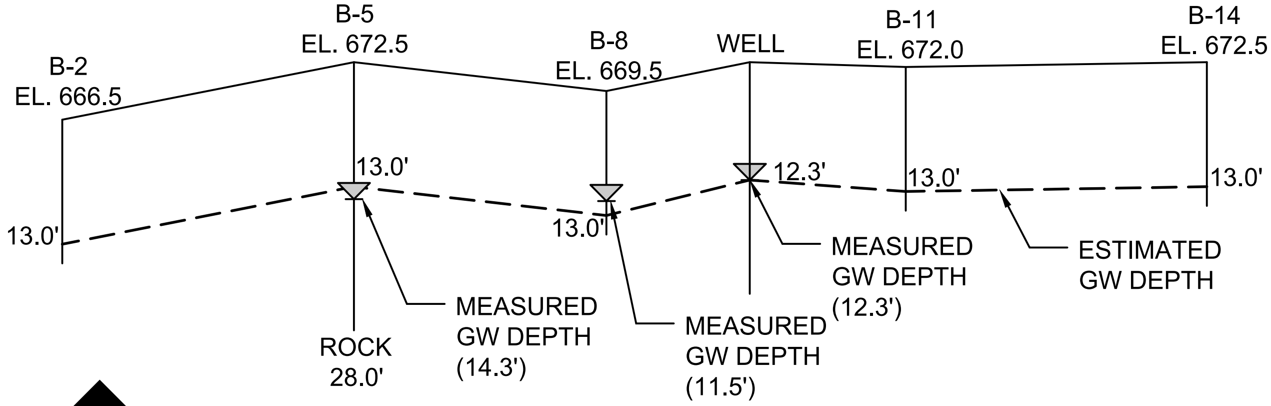
GGEA 21-1009

March 18, 2021



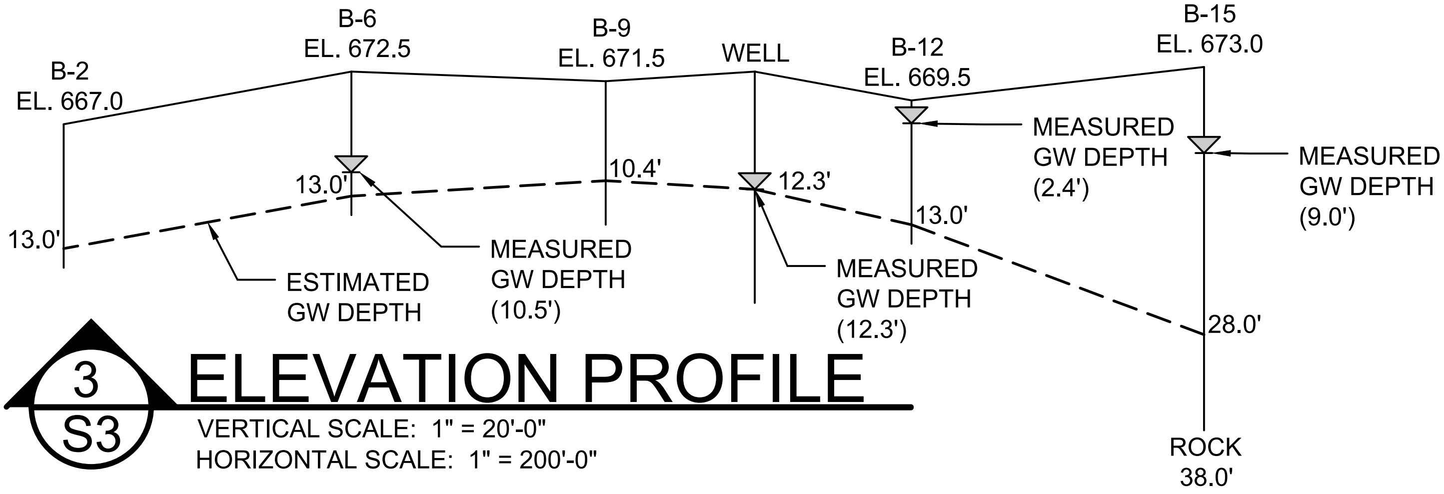
1 S3 ELEVATION PROFILE

VERTICAL SCALE: 1" = 20'-0"
HORIZONTAL SCALE: 1" = 200'-0"



2 S3 ELEVATION PROFILE

VERTICAL SCALE: 1" = 20'-0"
HORIZONTAL SCALE: 1" = 200'-0"



3 S3 ELEVATION PROFILE

VERTICAL SCALE: 1" = 20'-0"
HORIZONTAL SCALE: 1" = 200'-0"

GGE
ENGINEERING • DESIGN
GLYNN GEOTECHNICAL ENGINEERING
415 S. TRANSIT STREET
LOCKPORT, NEW YORK 14094
VOICE (716) 625 - 6933 / FAX (716) 625-6983
www.glynngroup.com

PROJECT: STAMP, CROSBY RD, ALABAMA
SUBJECT: ELEVATION/GW PROFILE
CLIENT: SCHEID ARCHITECTURAL

PROJ. NO.:	SCALE:	DATE:	BY:
21-1009	NA	03.09.21	GEL

SHEET NO.: S3

Appendix N

Project Drawings