Stormwater Pollution Prevention Plan

BAC PROPERTIES LLC SITE PLAN

Airport Drive, Town of Wappinger, New York

February 28, 2001

**REVISED February 20, 2023*

**Modified to bring to current Stormwater Regulations GP-0-20-001*

POVALL ENGINEERING, PLLC
3 Nancy Court, Suite #4
Wappingers Falls, New York 12590

Preparer of the SWPPP

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

Name: William H. Povall III, PE

Date: 02-20-23

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1 Executive Summary

This Stormwater Pollution Prevention Plan (SWPPP) and accompanying project plans have been prepared for the construction activities associated with BAC Properties LLC located in the Town of Wappinger, New York. The stormwater management, pollution prevention, and erosion and sediment control measures identified and detailed in this SWPPP and on the accompanying project plans have been designed in accordance with the requirements of the Town of Wappinger (Town) and the New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) Phase II technical standards.

The proposed project:

1. Is a redevelopment project with no net increase in impervious area.
2. Will treat a minimum of 75 percent of the water quality volume from the disturbed, existing impervious area through the implementation of a standard Stormwater Management Practice.
3. Maintains the existing drainage patterns, as much as possible.
4. Controls increases in the rate of stormwater runoff resulting from the proposed redevelopment without adversely affecting adjacent or downstream properties or receiving watercourses or bodies.
5. Reducing potential stormwater quality impacts and soil erosion resulting from stormwater runoff generated both during and after construction.

The pre- and post-development stormwater runoff conditions have been reviewed and evaluated. The proposed stormwater management facilities have been designed to provide both water quality and quantity controls. Stormwater runoff will be detained, treated, and released at a rate equal to or less than that which existed prior to redevelopment of the project site.

2 Project Description

The Applicant, BAC Properties, LLC, is seeking site plan re-approval for a second 19,400 square foot building (Building 2) with development consistent with the previously re-approved Site Plan dated October 5, 2009, and last revised November 30, 2011.

2.1 Pre-Redevelopment Conditions

The proposed redevelopment consists of a conversion of the existing gravel parking areas for construction of a second 19,440 square foot building (Building 2) consisting of 900 sq. ft. of office space, 5,580 sq. ft. for light manufacturing and 12,960 sq. ft. Additional proposed activities include regrading of existing parking areas for additional parking and other related appurtenances. The proposed project is considered a redevelopment per the 2015 New York State Stormwater Design Manual (NYSSWDM) with no net increase in existing impervious area. Redevelopment areas outside the paved and graveled sections will be landscaped and seeded for lawn.

The site consists of landscaped areas, existing stormwater control detention basin, a United States Army Corp of Engineers (USACOE) regulated watercourse (pond), Town of Wappinger regulated wetland, and impervious surfaces (i.e., pavement, gravel, and a building). The surrounding watershed consists of wooded forest and meadow in addition to commercial areas with accompanying roadways.

The stormwater runoff from the site flows in a northerly direction into either the existing detention pond, which then conveys stormwater runoff into the onsite existing pond and wetland area. The existing pond's primary outlet is a compound rectangular weir, which feeds directly into a concrete box culvert. Upon passing through the box culvert, the flow enters a stream bed and as the water elevation rises, the flow continues through twin 60" concrete culverts, which conveys the discharged stormwater under Airport Drive to an offsite location.

The existing impervious coverage onsite in the watershed is 3.89 acres in a total watershed of 93.129 acres. The proposed redevelopment area includes a net reduction of impervious cover with a total of 3.77 acres, a net reduction of 0.12 acres of impervious cover.

The site varies in elevation from 152 feet, at the lowest elevation at the invert of the box culvert pipes northern edge of the existing lot, to 172 feet, at the highest elevation along the southern property line. Slopes vary across the site and range from 1 to 25 percent.

2.2 Post-Redevelopment Conditions

The post redevelopment ground cover will consist of impervious surfaces (e.g., asphalt and gravel parking and roadways, building roofs), grass and landscaped areas and an improved stormwater management practice. Additional grass and landscaped areas will be added to the site. No additional impervious coverage will be added to the site.

The topography outside the developed area will remain unchanged. The lowest elevation will be 152 feet at the box culvert. The slopes outside the limits of disturbance will remain unchanged. The proposed slopes range from 1 to 5 percent in parking areas and 1 to approximately 33 percent in the stormwater practice.

The post redevelopment stormwater runoff conditions exhibits similar patterns to that of the pre redevelopment conditions. The proposed drainage improvements include expansion of the original detention basin volume and installation of two pre-treatment forebays at existing inlets. The detention basin modifications have been based upon the NYSSWDM pocket pond design. The forebays will pre-treat the stormwater runoff prior to entering the pocket pond. Additional wetland plantings are proposed in order to mitigate impacts of redevelopment. The introduction of native, non-invasive species to the surrounding parking area and detention basin will provide improved water quality controls by helping to reduce runoff velocities, volumes, pollutant loading, promote soil stabilization, and provide additional wildlife resources to the surrounding habitat. The proposed modifications are necessary in order to bring the existing stormwater management facility into compliance with 2015 NYS SWDM Chapter 9 specifications for water quality treatment.

2.3 Soil Survey Data

The United States Department of Agriculture (USDA) Soil Conservation Service Soil Survey for Dutchess County was reviewed. The surficial soil conditions for the study area are shown in Figure 2. The soil data for each of the soil types is summarized in Table 1 below.

Table 1: USDA Soil Data

Map Symbol	Description	Depth to Groundwater (ft)	Depth to Bedrock (in)	Hydrologic Soil Group
BeC	Bernardston silt loam, 8 to 15 percent slopes	1.5-2.0 (Feb-Apr)	> 60	C
HeA	Haven loam, nearly level	> 8	> 80	B
PwB	Pittstown silt loam, 3 to 8 percent slopes	> 6.5	15-30	C
Ca	Canandaigua silt loam	0	> 80	C/D
DwC	Dutchess-Cardigan complex, rolling, rocky	> 6.5	> 80	B

The Soil Conservation Service defines the hydrologic soil groups as follows:

- **Type A Soils**: Soils having a high infiltration rate and low runoff potential when thoroughly wet. These soils consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

- **Type B Soils**: Soils having a moderate infiltration rate when thoroughly wet and consists mainly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately course textures. These soils have a moderate rate of water transmission.

- **Type C Soils**: Soils having a low infiltration rate when thoroughly wet and consists chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine-to-fine texture. These soils have a low rate of water transmission.

- **Type D Soils**: Soils having a very low infiltration rate and high runoff potential when thoroughly wet. These soils consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very low rate of water transmission.

2.4 Groundwater, Surface Waters, and Wetlands

As shown in Table 1, the depth to groundwater generally ranges from approximately zero (0) feet (surface water present) to greater than eight (8) feet. The proposed disturbance area is located immediately adjacent to a Town of Wappinger Chapter 137 regulated Freshwater Wetland and associated buffer area. A portion of the stormwater management system is located within the 100-foot Town of Wappinger Wetland Buffer area. Previously disturbed areas account for approximately 0.81 acres. The proposed full buildout does not extend beyond the previously disturbed area. One (1) USACOE regulated watercourse (Wetland Classification PUBHh) is located outside of the proposed disturbed area but is within the drainage area. No NYSDEC Regulated Wetlands are located in the proposed area.

The proposed stormwater management facilities will treat the stormwater runoff generated from the proposed redevelopment prior to discharging and leaving the site in a controlled manner. Therefore, no adverse impacts to groundwater are anticipated as a result of the development.

2.5 Floodplains

The property is located within Zone X (other flood areas) according to the Flood Insurance Rate Map (FIRM) Town of Wappinger Panel 388 of 602, Community Panel Number 361387 and Map Number 36027C0388E effective date May 2, 2012. Zone X (other flood areas) is defined as "Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less then 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood".

The proposed development of the site is located wholly within Zone X. Therefore, the proposed project will not adversely impact any floodplains.

2.6 Historic Places

The parcel is not listed or eligible for listing on the State or National Register of Historic Places; and not adjacent to a place listed or eligible for listing on the State or National Register of Historic Places. Therefore, the proposed project will not adversely impact any places listed or eligible for listing on the State or National Register of Historic Places. Correspondence from NYS Office of Park, Recreation and Historical Preservation (SHPO) is included in Appendix J.

2.7 NYSDEC SPDES General Permit GP-0-20-001

The proposed project involves soil disturbance of one or more acres of land; including disturbances of less than one acre that are part of a larger common plan of development that will disturb one or more acres of land; and excludes routine maintenance activities. Therefore, coverage under the NYSDEC SPDES General Permit GP-0-20-001 is required (see Appendix A). In addition, the proposed project is located within a Municipal Separate Storm Sewer System (MS4); therefore, the Town of Wappinger must review and accept the SWPPP.

This SWPPP and accompanying project plans have been developed in accordance with the NYSDEC's technical standards. The completed NOI and signed "MS4 SWPPP Acceptance" form will be submitted to the NYSDEC prior to the commencement of construction in order to obtain coverage under the SPDES General Permit. Once coverage has been obtained, a copy shall be provided to the Town of Wappinger for their records. The NOI and "MS4 SWPPP Acceptance" form have been provided in Appendix B.

3 Construction Sequencing Schedule & Phasing

The purpose of the construction sequencing schedule and phasing plan is to reduce the overall disturbance and ensure that previously disturbed areas are re-established prior to construction in another portion of the site. The duration of the construction activities, including planned winter shutdowns, will be from May 1, 2023 to May 1, 2024.

The total area of the proposed project is 9.61 acres. The proposed project will be completed in a single phase. The construction sequencing is outlined on the accompanying plans and is provided below. The construction sequencing is as follows:

1. All temporary erosion and sediment control measures (e.g., stabilized construction entrances, silt fencing, storm drain inlet protection, etc.) shall be installed as shown on the project plans. Temporary erosion and sediment control measures shall be constructed, stabilized, and functional before site disturbance begins within their tributary areas. Wetlands and their associated buffer areas shall be marked with appropriate signage and temporary fence shall be installed to prevent access to these areas.

2. Stake out the locations of the limits of disturbance, proposed stormwater management pond improvements, and improvements (e.g., roadways, etc.).

3. Remove trees, stumps, and vegetation within the disturbance limits in accordance with the project plans. All stumps shall be stockpiled for either grinding in-place or removal from site. The stump pile shall be protected in accordance with the stockpile detail on the project plans as appropriate. Stump burial is prohibited.

4. Rough grade the site. Place surplus material in the temporary soil stockpile locations shown on the project plans.

5. Construct modifications to stormwater detention pond and associated forebays (which shall be utilized as temporary sediment basins). Install inlet and outlet protection measures (i.e., rip-rap overflow weir(s), culvert inlet/outlet protection, etc.) and stabilize the areas disturbed during the construction of the temporary sediment basin (forebays).

6. Construct all site utilities and utility service connections as shown on the project plans. Install inlet protection measures at all inlets and at the ends of all exposed stormwater pipes and rip-rap at the locations shown on the project plans.

7. Finish grading and stabilize all disturbed areas. All erosion and sediment control measures must be left in place to prevent sediment from entering the main stormwater pond. The Contractor shall clean all catch basins, manholes, and drainage lines of any accumulated silt and sediment prior to finalizing the infiltration area.

8. Finalize construction of the stormwater pond. Remove any accumulated silt and sediment from the forebay areas which were used as a temporary sediment basins during construction.

9. Remove all temporary erosion and sediment control measures. Immediately stabilize the areas disturbed during their removal. Establish permanent vegetative cover and install all landscaping and stormwater pond area plantings.

4 Erosion and Sediment Control Plan

This SWPPP and accompanying project plans identify both temporary and permanent erosion and sediment control measures, which have been designed in accordance with the *New York State Standards and Specifications for Erosion and Sediment Control*, latest revision. Temporary erosion and sediment control measures will be implemented during construction to minimize soil erosion and control sediment transport off-site. Permanent erosion and sediment control measures will be implemented after construction to control the quality and quantity of stormwater runoff from the developed site.

4.1 Erosion and Sediment Control Measures

Temporary erosion and sediment control measures to be utilized during construction generally include the following:

1. **Stabilized Construction Entrance** - Prior to construction, stabilized construction entrances shall be installed to reduce the tracking of sediment onto public roadways. Construction traffic must enter and exit the site at the stabilized construction entrance. The entrance shall be maintained in good condition, which will control tracking of sediment onto public rights-of-way or streets. When necessary, the placement of additional aggregate atop the filter fabric shall be done to assure the minimum thickness is maintained. All sediments and soils spilled, dropped, or washed onto the public rights-of-way must be removed immediately. Periodic inspection and needed maintenance shall be provided after each substantial rainfall event.

2. **Dust Control** - Water trucks shall be used, as needed, during construction to reduce dust generated on the site. Dust control must be provided by the general contractor to a degree that is acceptable to the owner/operator, and in compliance with the applicable local and state dust control requirements.

3. **Temporary Soil Stockpile** - Materials, such as topsoil, shall be temporarily stockpiled (if necessary) on the site during the construction process. Stockpiles shall be located in an area away from storm drainage, water bodies and/or courses, and shall be properly protected from erosion by a surrounding silt fence barrier or hay bales when located on paved areas.

4. **Silt Fencing** - Prior to the initiation of and during construction activities, silt fencing shall be established along the perimeter of all areas to be disturbed as a result of the construction which lie up gradient of water courses or adjacent properties. These barriers may extend into non-impact areas to ensure adequate protection of adjacent lands. Clearing and grubbing shall be performed only as necessary for the installation of the sediment control barrier. To ensure effectiveness of the silt fencing, daily inspections and inspections immediately after significant storm events shall be performed by site personnel. Maintenance of the fence shall be performed as needed.

5. **Temporary Seeding** - Within seven days after construction activity ceases on any particular area of the site, all disturbed areas where there shall not be construction for longer than 14 days shall be temporarily seeded and mulched to minimize erosion and sediment loss.

6. **Temporary Sediment Basin** – A temporary sediment basin shall be constructed to intercept sediment laden runoff, reduce the amount of sediment leaving the disturbed areas, and protect drainage ways, properties, and rights-of-way. Projects that have proposed stormwater ponds

can be used as temporary sediment basins during construction. Temporary sediment basins shall be inspected at least every seven calendar days. All damages caused by soil erosion and construction equipment shall be repaired upon discovery. Accumulated sediment shall be removed from the sediment basin/trap when it reaches 50 percent of the design capacity and shall not exceed 50 percent. Sediment shall not be placed downstream from the embankment, adjacent to a stream, or floodplain.

7. **Dewatering** - Dewatering, if required, shall not be discharged directly into wetlands, water courses, water bodies, and storm sewer systems. Proper methods and devices shall be utilized to the extent permitted by law, such as pumping water into temporary sediment basins, providing surge protection at the inlet and outlet of pumps, floating the intake of the pump, or other methods to minimize and retain the suspended solids.

Permanent erosion and sediment control measures to be utilized after construction generally include the following:

1. **Establishment of Permanent Vegetation** - Disturbed areas that are not covered by impervious surfaces shall be seeded in accordance with the accompanying plans. The type of seed, mulch, and maintenance measures shall be followed. All areas at final grade shall be seeded and mulched within seven (7) days after completion of the major construction activity. All seeded areas shall be protected with mulch and/or hay. Final site stabilization is achieved when all soil-disturbing activities at the site has been completed and a uniform, perennial vegetative cover with a density of 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.

2. **Final Seeding and Planting** - Final seeding and planting shall be installed as shown on the accompanying plans. Final seeding and planting will help minimize erosion and sediment loss.

3. **Rock Outlet Protection** - Rock outlet protection shall be installed at the locations as shown on the accompanying plans. The installation of rock outlet protection will reduce the depth, velocity, and energy of water, such that the flow will not erode the receiving water course or water body.

Specific erosion and sediment control measures, inspection frequency, and remediation procedures are provided in the subsequent sections and on the accompanying project plans.

4.2 Pollution Prevention Controls

Good housekeeping practices are designed to maintain a clean and orderly work environment. Good housekeeping measures shall be maintained throughout the construction process by those parties involved with the direct care and development of the site. The following measures should be implemented to control the possible exposure of harmful substances and materials to stormwater runoff:

1. Material resulting from the clearing and grubbing operation shall be stockpiled away from storm drainage, water bodies and/or watercourses and surrounded with adequate erosion and sediment control measures. Soil stockpile locations shall be exposed no longer than 14 days before seeding.

2. Equipment maintenance areas shall be protected from stormwater flows and shall be supplied with appropriate waste receptacles for spent chemicals, solvents, oils, greases, gasoline, and any pollutants that might contaminate the surrounding habitat and/or water supply. Equipment wash-down zones shall be located within areas draining to sediment control devices.

3. The use of detergents for large-scale (i.e., vehicles, buildings, pavement surfaces, etc.) washing is prohibited.

4. Material storage locations and facilities (i.e., covered storage areas, storage sheds, etc.) shall be located onsite and shall be stored according to the manufacturer's standards in a dedicated staging area. Chemicals, paints, solvents, fertilizers, and other toxic material must be stored in waterproof containers. Runoff containing such materials must be collected, removed from the site, treated and disposed at an approved solid waste or chemical disposal facility.

5. Hazardous spills shall be immediately contained to prevent pollutants from entering the surrounding habitat and/or water supply. Spill Kits shall be provided onsite and shall be displayed in a prominent location for ease of access and use. Spills greater than five (5) gallons shall be reported to the NYSDEC Response Unit at 1-800-457-7362. In addition, a record of the incident(s) and/or notifications shall be documented and attached to the SWPPP.

6. Portable sanitary waste facilities shall be provided onsite for workers and shall be properly maintained.

7. Dumpsters and/or debris containers shall be located onsite and shall be of adequate size to manage respective materials. Regular collection and disposal of wastes shall occur as required.

8. Temporary concrete washout facilities should be located a minimum of 50 feet from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking. A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities. When temporary concrete washout facilities are no longer required for the work, the hardened concrete shall be removed and disposed of. Materials used to construct the temporary concrete washout facilities shall be removed and disposed of. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and/or repaired, seeded, and mulched for final stabilization.

9. Non-stormwater components of site discharge must be clean water. Water used for construction, which discharges from the site, must originate from a public water supply or private well approved by the Health Department. Water used for construction that does not originate from an approved public supply must not discharge from the site. It can be retained in the ponds until it infiltrates and evaporates.

4.3 Site Log Book

The owner/operator shall maintain a record of all inspection reports in a site log book. Copies of the NYSDEC Acknowledgement of Receipt of the NOI; signed "MS4 SWPPP Acceptance" form (if applicable); and signed copies of the certification statements shall also be placed in the site log book. The site log book shall be maintained on site and be made available to the permitting authority upon request.

4.4 Pre-Construction Meeting, Inspection, and Certification

A pre-construction meeting shall be scheduled with the Town representative, the Qualified Professional, the owner or operator, the contractor, and the subcontractors to discuss responsibilities as they relate to the implementation of this SWPPP. The owner/operator shall set-up the pre-construction meeting. Pre-construction meeting documents have been provided in Appendix C.

Prior to the commencement of construction, the owner/operator or contractor shall contact the Qualified Professional once the erosion and sediment control measures have been installed. The Qualified Professional shall conduct an initial assessment of the site and certify that the appropriate erosion and sediment control measures and structures have been adequately installed and implemented in accordance with the SWPPP and plans. A copy of the completed pre-construction site assessment shall be placed in the site log book. A sample pre-construction site assessment form has been provided in Appendix D.

4.5 Construction Inspections and Maintenance

The contractor and his/her subcontractor(s) shall identify the trained individual(s) that will be responsible for the implementation and maintenance of the all erosion and sediment controls as required to achieve the proper erosion and sediment controls during construction. The trained individual(s) is required to have received four hours of NYSDEC endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other NYSDEC endorsed entity. After receiving the initial training, the trained individual(s) shall receive four (4) hours of training every three (3) years.

To ensure the stability and effectiveness of all protective measures and practices during construction, all erosion and sediment control measures employed shall be inspected by the Qualified Professional at least every seven (7) calendar days. The contractor's and/or subcontractor's trained individual(s) shall perform daily inspections of all erosion and sediment control measures at the beginning and end of the day. The trained individual(s) shall immediately correct any deficiencies noted during their inspection or during the Qualified Professional's inspections.

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 frequency of the inspections can be reduced. However, NYSDEC and Town must be notified prior to reducing the frequency of the inspections. If approved, the Qualified Professional shall conduct a site inspection at least once every 30 calendar days.

All inspections shall be performed in accordance with this SWPPP, accompanying project plans, latest revision of *New York State Standards and Specifications for Erosion and Sediment Control,* and procedures outlined in Appendix G of the latest revision of the *New York State Stormwater Management Design*

Manual. Inspection reports shall be prepared in accordance with this SWPPP, accompanying project plans, and NYSDEC SPDES General Permit GP-0-20-001. Inspection reports shall identify and document the maintenance of the erosion and sediment control measures. A sample inspection report has been provided in Appendix D.

Specific maintenance components, schedule frequency, inspection parameters and remediation procedures are provided on the accompanying project plans. Any adjustments or modifications to the maintenance plan shall be noted in the inspection reports and submitted to the Town for approval.

4.6 Final Site Inspection, Assessment, and Certification

Once construction is complete, the owner/operator shall have the Qualified Professional perform a final site inspection. The Qualified Professional shall certify that the site has undergone final stabilization. Final stabilization is defined as all soil disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of 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. A final site assessment form has been provided in Appendix D.

Cancellation of coverage under the NYSDEC SPDES General Permit GP-0-20-001 is accomplished by submitting a Notice of Termination (NOT). Failure to submit a NOT may result in the continued obligation to pay a yearly Regulatory Fee and/or may be cause for suspension of permit coverage. A blank NOT form has been provided in Appendix E.

5 Stormwater Management Plan

The goals of this Stormwater Management Plan are to:

1. Treat a minimum of 75 percent of the water quality volume from the disturbed existing impervious area through the implementation of a standard stormwater management practice.
2. Analyze the peak rate of runoff under pre- and post-development conditions.
3. Maintain the pre-development rate of runoff in order to minimize impacts to adjacent or downstream properties.
4. Minimize the impact of the quality of runoff exiting the site.

These objectives will be met by applying Best Management Practices (BMPs). Stormwater runoff from the proposed project will be collected and conveyed to the proposed stormwater management facilities. Stormwater runoff will be detained, treated, and released at a rate equal to or less than that which existed prior to development of the project site.

5.1 Process for Stormwater Site Planning and Practice Selection Compliance

5.1.1 Planning Practices

The following planning practices were incorporated into the planning, design and layout of the proposed redevelopment:

Preservation of Natural Features and Conservation
Preservation of natural features includes techniques to identify and preserve natural areas that can be used to protect water, habitat and vegetative resources. Conservation includes designing elements of the redevelopment in a way that the site design takes advantage of a site's natural features, preserves sensitive areas and identifies constraints and opportunities to prevent or reduce negative effects of a redevelopment. An evaluation of the preservation of natural features is provided in Table 2 below.

Table 2: Preservation of Natural Features and Conservation

Practice	Applied?	Application
Preservation of Undisturbed Areas	No	Considered and not applied
Preservation of Naturally Vegetated Buffers	Yes	Considered and applied
Reduction of Clearing and Grading	Yes	Considered and applied
Locating Development in Less Sensitive Areas	No	Considered and not applied
Open Space Design	No	Not applicable
Soil Restoration	Yes	Considered and applied

Preservation of Naturally Vegetated Buffers – A 100-foot buffer has been established around the Town regulated wetlands in accordance with the Town regulations. The majority of the buffer area will remain undisturbed, which will improve water quality, lower the velocity of discharged stormwater, promote soil stabilization, provide filtration of stormwater runoff into the underlying soils, and provide thermal reductions

Reduction of Clearing and Grading – Clearing and grading will be limited to the amount needed for the required roadways, parking lots and stormwater management facilities.

Soil Restoration - Restore the original properties and porosity of the soil by deep till and amendment with compost to reduce the generation of runoff and enhance the runoff reduction performance of practices such as grass channels, filter strips, and tree clusters.

5.1.2 Reduction of Impervious Cover

Reduction of impervious cover includes methods to reduce the amount of rooftops, parking lots, roadways, sidewalks and other surfaces that do not allow rain to infiltrate to the soil. An evaluation of the reduction of the impervious cover techniques is provided in Table 3 below.

Table 3: Reduction of Impervious Cover

Practice	Applied?	Application
Roadway Reduction	No	Considered and not applied
Sidewalk Reduction	Yes	Considered and applied
Driveway Reduction	No	Considered and applied
Building Footprint Reduction	No	Considered and not applied
Parking Reduction	Yes	Considered and applied

Sidewalk Reduction – Minimize the sidewalk lengths and widths to reduce site impervious area. A minimal area of sidewalks is proposed in the redevelopment.

Parking Reduction – Reduce imperviousness on parking lots by eliminating unneeded spaces, providing compact car space and efficient parking lanes, minimizing stall dimensions, using porous pavement in overflow parking areas, and using multi storied parking decks where appropriate.

5.1.3 Runoff Reduction Techniques

Green Infrastructure (GI) uses the natural features of the site and promote runoff reduction through managing runoff, promoting groundwater recharge, increasing losses through evapotranspiration and emulating existing hydrology. The following runoff reduction techniques were evaluated and incorporated into the planning, design and layout of the proposed redevelopment. An evaluation of the runoff reduction techniques is provided in Table 4 below.

Table 4: Evaluation of Runoff Reduction Techniques

Practice	Applied?	Application
Conservation of Natural Areas	No	This technique was not considered and not applied.
Sheet flow to Riparian Buffers or Filter Strips	No	This technique was not considered and not applied.
Vegetated Open Swale	No	Not applicable since there are no proposed swales.
Tree Planting/Tree Box	Yes	This technique was applied, the proposed project incorporates planting of a variety of new trees, however the area reduction credit was not applied.
Disconnection of Rooftop Runoff	No	This technique was not considered and not applied.
Stream Daylighting for Redevelopment Projects	No	This technique was not considered and not applied.
Rain Garden	No	This technique was not considered and not applied.
Green Roof	No	The proposed buildings will have a roof system that is not capable of supporting a green roof and they will be pitched roofs.
Stormwater Planter	No	This technique was not considered and not applied.
Rain Tank/Cistern	No	This technique was not considered and not applied.
Porous Pavement	No	This technique was not considered and not applied.

Tree Planting/ Tree Box – Plant or conserve trees to reduce stormwater runoff, increase nutrient uptake, and provide bank stabilization. Trees can be used for applications such as landscaping, stormwater management practice areas, conservation areas and erosion and sediment control.

Please note, although tree planting has been incorporated into the design, credit for runoff reduction has not been taken.

5.2 Soil Restoration

The soils within in the limits of disturbance are a majority of Type B soils. In accordance with Table 5.3 of the *New York State Stormwater Management Design Manual*, the soils shall be restored as outlined in Table 5 below:

Table 5: Soil Restoration

Type of Soil Disturbance	Soil Restoration Requirement	Comment
No soil disturbance (preservation of natural features)	Restoration not permitted	Protect from any ongoing construction activity
Minimal soil disturbance	Restoration not permitted	Clearing and grubbing activities
Areas where topsoil is stripped only (no change in grade)	Apply 6" of topsoil	Protect from any ongoing construction activity
Areas of cut or fill	Aerate and apply 6" of topsoil	Aeration includes the use of machines such as tractor-drawn implements with coulters making a narrow slit in the soils, a roller with many spikes making indentations in the soil, or prongs with function like a mini-subsoiler.
Heavy traffic areas on site (especially in a zone 5-25' around buildings but not within a 5' perimeter around foundation walls)	Apply full soil restoration (de-compaction and compost enhancement)	Deep rip the affected thickness of the exposed subsoil material, aggressively fracturing it before the protected topsoil is reapplied on site. De-compact simultaneously through the restored topsoil layer and the upper half of the affected subsoil.
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.	Protect from any ongoing construction activity

During periods of relatively low to moderate subsoil moisture, the disturbed soils are returned to rough grade and the following soil restoration steps are applied:

1. Apply 3-inches of compost over subsoil.
2. Till compost into subsoil to a depth of at least 12" using a cat-mounted ripper, tractor-mounted disc, or tiller, mixing and circulating air and compost into subsoils.
3. Rock-pick until uplifted stone/rock materials of 4-inches and larger size are cleaned off the site.
4. Apply topsoil to a depth of 6-inches.
5. Vegetate as required by the project plans.

5.3 Stormwater Management Facilities

The existing stormwater pond is located within HeA, class B soils. The proposed redevelopment activities include improving the existing stormwater detention pond to bring up to current NYSSWDM standards. The proposed pond improvements include a pocket pond design with two (2) pretreatment forebays that will be utilized as a Standard stormwater management practice which will control water quantity controls and provide water quality treatment. The proposed pond design will provide greater than the 75% of the WQv for the existing impervious area. The existing drainage pathways shall be maintained post redevelopment.

5.4 Hydrologic Analysis

The study area was made up of one subcatchment for pre redevelopment conditions and divided into four primary sub catchments for post redevelopment conditions. This was dictated by watershed conditions, methods of collection, conveyance, and points of discharge. Watershed delineations were defined using the United States Geological Service (USGS) 7.5-minute topographic maps, aerial photographs, a topographical survey, soil surveys, and site investigations.

HydroCAD, a Computer-Aided-Design (CAD) program, was used to analyze the hydrologic characteristics of the pre redevelopment watershed conditions, post-redevelopment watershed conditions, and proposed stormwater management systems. HydroCAD has the capability of computing hydrographs (which represents discharge rates characteristic of specified watershed conditions, precipitation, and geologic factors), combining hydrographs, and routing flows though pipes, streams, channels, and ponds.

5.4.1 Rainfall Data

Rainfall data utilized in the modeling and analysis was obtained from National Weather Service (NWS) Technical Paper 40 (TP-40), Rainfall Frequency Atlas of the U.S. Weather Bureau, published by the U.S. Department of Commerce. A Type III rainfall distribution was used to evaluate the pre- and post-development stormwater runoff conditions for the 1-, 10-, and 100-year 24-hour storm events for Dutchess County. Rainfall data specific to the portion of Dutchess County under consideration is provided in Table 6 below.

A Type III rainfall distribution was used to evaluate the pre- and post-development stormwater runoff conditions for the 1-, 10-, and 100-year 24-hour storm events for Dutchess County.

Table 6: Rainfall Data

Storm Event	24-Hour Rainfall
WQv	1.10 inches
1-year	2.80 inches
10-year	5.00 inches
100-year	8.00 inches

5.4.2 Design Point

The study area consists of an overall watershed that encompasses approximately 93.129 acres and contains the entire project site. The overall pre redevelopment watershed was analyzed as four subcatchments which drained to one Design Point (designated as DP-1). The post redevelopment area was divided into six separate primary subcatchments which drain to the same Design Point. This Design Point was analyzed by comparing the pre- and post-redevelopment conditions.

5.4.3 Pre- and Post-Redevelopment Watersheds

The pre redevelopment watershed boundaries are shown in Figure 3.1 and Figure 3.2. The post-redevelopment watershed boundaries are shown in Figure 4.1 and Figure 4.2. The offsite conditions are the same for both the pre- and post-development conditions.

Analysis of the pre- and post-redevelopment conditions considered existing drainage patterns, soil types, ground cover, and topography. The time of concentration for the subcatchment was calculated.

The results of the computer modeling for the pre- and post-redevelopment analysis were used to analyze the overall watershed prior to and after development of the project site. The pre- and post-development analysis is provided in Appendix G and Appendix H, respectively. A summary of the peak discharge rates for pre- and post-development is provided in Table 7.

5.4.4 Unified Stormwater Sizing Criteria

5.4.4.1 Water Quality Control

The proposed project is a redevelopment with no net increase in impervious area. The water quality treatment objective will be achieved by treating a minimum of 75% of the water quality volume from the disturbed impervious area through the use of a standard stormwater management practice. The existing stormwater detention pond will be improved as a pocket pond. Detailed design calculations have been provided in Appendix F. Stormwater runoff from redeveloped land is recognized as a significant contributor of pollution that can adversely affect the quality of the receiving waters. Treatment of stormwater runoff is important, since most runoff related water quality contaminants are transported during the initial stages of storm events. The water quality volumes have been determined based on the methodology described in the *NYS Stormwater Management Design Manual*, latest revision. The total water quality volume is provided in Table 7 below.

Table 7: Total Water Quality Volume

Pre-Redevelopment Water Quality Calculations			
Subcatchment	**Site Area (ac)**	**Impervious Area (ac)**	**WQv (cf)**
1B	5.86	3.86	15,042
1C	1.880	0.030	1,501
Total	**7.740**	**3.89**	**16,543**
Post Redevelopment Water Quality Calculations			
Subcatchment	**Site Area (ac)**	**Impervious Area (ac)**	**WQv (cf)**
1B	4.500	2.500	9,883
1C	1.880	0.030	1,501

1D	0.440	0.440	1,669
1E	0.920	0.800	3,059
Total	**7.740**	**3.770**	**16,112**

As shown in the above table, the total required water quality volume (WQv) for the pre-redevelopment is **16,543 cf**. A total of 75% of the pre-redevelopment water quality volume must be achieved through standard SMPs, SMPs with Runoff reduction volume or Runoff reduction techniques. The required WQv for the site is **12,407 cf.** The post redevelopment WQv was calculated to determine the appropriate size for the standard SMP (pocket pond). The required WQv for the design criteria was calculated to be **16,112 cf**.

Detailed design calculations have been provided in Appendix F.

5.4.4.2 Runoff Reduction Volume

Since the project is a redevelopment activity with no net increase in impervious cover, meeting the Runoff reduction volume (RRv) is not required for the redevelopment portion of the project.

5.4.4.3 Water Quantity Control

The proposed water quantity controls have been designed and sized to provide channel protection, overbank flood control, and extreme flood protection, where:

- Channel Protection Volume (CP_v) requirements are designed to protect stream channels from erosion. This is accomplished by providing 24-hour extended detention of the 1-year 24-hour storm event.

- Overbank Flood Control Volume (Qp) requirements are designed to prevent flow events that exceed the bankfull capacity of a channel, and therefore must spill over into the floodplain. This requires storage to assure that the post-development 10-year 24-hour peak discharge rates do not exceed pre-development rates.

- Extreme Flood Protection Volume (Qf) requirements are designed to:

    1. Prevent the increased risk of flood damage from large storm events.
    2. Maintain the boundaries of pre-redevelopment 100-year floodplain.
    3. Protect the physical integrity of the stormwater management practices. This requires storage to assure that the post-redevelopment 100-year 24-hour peak discharge rates do not exceed pre-development rates.

A comparison of the required and provided water quantity controls is provided in Table 8 below.

Table 8: Comparison of Required & Provided Water Quantity Controls

Water Quantity Parameter	Required (cf)	Provided (cf)
Channel Protection Volume	20,871	21,127
Overbank Flood Protection Volume	Not required, post is less than pre	
Extreme Flood Protection Volume	Not required, post is less than pre	

Design calculations have been provided in Appendix F & H.

5.4.5 Comparison of Peak Discharge Rates

A comparison of the pre- and post-redevelopment peak discharge rates is provided in Table 9 below.

Table 9: Comparison of Pre- & Post-Development Peak Discharge Rates

Storm Event	DP	Pre (cfs)	Post (cfs)	Difference
1-year	DP-1	13.68	13.14	-0.54
10-year	DP-1	48.91	48.84	-0.07
100-year	DP-1	105.32	105.01	-0.31

Comparison of the peak discharge rates for pre- and post-redevelopment watershed conditions demonstrates that the peak rate of runoff from the proposed redevelopment will remain the nearly the same or not be increased. Therefore, the proposed redevelopment will not adversely impact the downstream or adjacent properties, receiving water bodies or courses, or wetlands. The results of the computer modeling used to analyze the pre- and post-development watershed conditions are presented in Appendix G and Appendix H, respectively.

5.5 Hydraulic Analysis

Stormwater runoff from the proposed development will be collected and conveyed to the proposed improvements to the stormwater management facilities via the closed pipe network system. A hydraulic analysis of the proposed stormwater collection system was performed to ensure the system has the capacity to collect and convey the stormwater runoff associated with the 25-year storm.

HydroCAD, a Computer-Aided-Design (CAD) program, was used to perform a hydraulic analysis of the stormwater collection system. The Rational Method was used to calculate the peak surface runoff rate for the each of the drainage structures. A dynamic routing method was used, which allows each structure to respond to varying tailwater conditions.

The contributing drainage areas to each of the drainage structures were delineated and broken into impervious and pervious areas. A runoff coefficient of 0.90 was used for impervious areas and 0.40 for pervious areas. A rainfall intensity of 6.00 inches per hour was used for the 25-year storm in Dutchess County. The calculated time of concentration of six minutes was used for the drainage area.

Based upon the hydraulic analysis, the proposed stormwater collection system has adequate capacity to collect and convey the stormwater runoff associated with the 25-year storm. None of the proposed drainage structures surcharge above the proposed rim elevations. The proposed stormwater collection system hydraulic analysis has been provided in Appendix F.

6 Post Construction Requirements

6.1 Records and Archiving

Following construction, the owner/operator shall retain copies of the SWPPP, project plans, the complete construction site log book, and records of all data used to complete the NOI to be covered by this permit, for a period of at least three years from the date that the site is finally stabilized. This period may be extended by the NYSDEC, in its sole discretion, at any time upon written notification.

The owner/operator shall provide as-built plans for any stormwater management facilities and practices located on site after final construction is completed. The plan must show the final design specifications for all stormwater management facilities and must be certified by a New York State licensed land surveyor and a New York State licensed professional engineer.

6.2 Inspection and Maintenance

Post-construction inspections and maintenance shall be performed by BAC Properties LLC. Inspections and maintenance for the various site components and stormwater management facilities shall be performed in accordance with the accompanying project plans and this SWPPP.

A summary of the general site inspection and maintenance parameters is provided in Table 10 below. A summary of the stormwater management system inspection and maintenance parameters is provided in Table 11 below. Detailed post-construction inspections and maintenance procedures are provided in Appendix I.

Table 10: General Site Post-Construction Inspection and Maintenance

Maintenance Item	Frequency	Description of Inspection Parameters	Description of Remedy Procedures
Site Structures	Annual & After Major Storms	-Accumulated sediment in catch basin sumps -Accumulated debris and litter -Damage or fatigue of storm structures or associated components -Accumulation of pollutants, including oils or grease, in catch basin sumps	-Remove -Remove -Replace and/or repair, as necessary -Remove pollutants from catch basins. Replace and/or repair pollutant source.
Pavement	Biannual/ Annual	-Accumulated sediment in paved areas -Accumulated debris and litter	-Remove (sweep min. 2 times/year) -Remove
Embankments	Annual	-Differential settlement of embankments -Embankment erosion -Animal burrows -Cracking, bulging, or sliding of embankment	-Stabilize and restore to original specs - Stabilize and restore to original specs -Remove - Stabilize and restore to original specs
Grass and Landscaped areas	Annual	-Vegetation: 80% coverage + less than 15% invasive plant species -Unauthorized plantings -Undesirable vegetative growth -Accumulated debris and litter	-Restore original specs -Remove -Mow a min. of 3 times/year. May increase for aesthetic reasons. -Remove
Winter Maintenance	Monthly	-Accumulation of snow and ice on catch basins, inlet and outlet structures, and end sections -Stock piled snow near inlets and outlets -Remaining deicing materials	-Remove -Remove -Remove in early spring by sweeping
Swales	Monthly	-Erosion of side slopes -Formation of rills or gullies -Excess grass growth -Undesirable vegetative growth -Accumulated debris, litter, or sediment -Residual deicing materials (sand)	- Stabilize and restore to original specs -Repair and restore to original specs -Mow -Remove -Remove -Remove & replace any damaged vegetation

Table 11: Stormwater Detention Basin Post-Construction Inspection and Maintenance

Maintenance Item	Frequency	Description of Inspection Parameters	Description of Remedy Procedures
Detention Areas	Monthly	-Embankment erosion -Accumulated debris and litter -Dumped yard wastes -Standing water	-Stabilize and restore to original specs -Remove -Remove - Remove and replace filter media meeting original specifications
Pre-treatment Forebay	Biannual/ Annual	-Sediment marker in forebay	-Remove (once sediment accumulation is greater than 1')
Filter Bed	Annual	-Filter bed blocked or filled in -Water ponding for more than 48 hours	-Remove and replace filter media meeting original specifications
Outlet Structures	Annual & After Major Storm Events	-Catch basins and associated components in poor condition -Embankment erosion -Accumulated debris and sediment -Rip-rap failure	-Repair and/or replace -Stabilize and restore to original specs -Remove - Replace rip-rap as necessary
Vegetation	Monthly	-Vegetation: 80% coverage + 15% invasive species -Undesirable vegetation growth -Unauthorized plantings	-Restore to original specs as per planting plan -Remove -Remove

7 Conclusion

This Stormwater Pollution Prevention Plan for the for BAC Properties LLC Site Plan incorporates an Erosion and Sediment Control Plan and Stormwater Management Plan. The SWPPP identifies the measures to be implemented during construction to minimize soil erosion and control sediment transport off-site, and after construction to control the water quality and quantity of stormwater runoff from the developed site to minimize adverse effects to downstream conditions.

This Stormwater Pollution Prevention Plan has been developed in accordance with the requirements of the Town of Wappinger and the New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) Phase II technical standards. It is our opinion that the proposed project will not adversely impact adjacent or downstream properties, or receiving surface waters or wetlands, if the erosion and sediment control measures and stormwater management facilities are properly constructed, and maintained in accordance with the requirements outlined herein.

Figures

POVALL ENGINEERING, PLLC

WILLIAM H. POVALL III, P.E.
N.Y.S.P.E. LICENSE #075020

3 NANCY COURT, SUITE 4
WAPPINGERS FALLS, NY 12590

TEL.: (845) 897-8205
FAX: (845) 897-0042

SITE PLAN FOR BAC PROPERTIES, LLC

LOCATION MAP

TOWN OF WAPPINGER | DUTCHESS COUNTY, NEW YORK

JOB #: 2223
DATE: 02-20-23
SCALE: 1"=200'

FIG. 1

POVALL ENGINEERING, PLLC

WILLIAM H. POVALL III, P.E.
N.Y.S.P.E. LICENSE #075020

3 NANCY COURT, SUITE 4
WAPPINGERS FALLS, NY 12590

TEL.: (845) 897-8205
FAX: (845) 897-0042

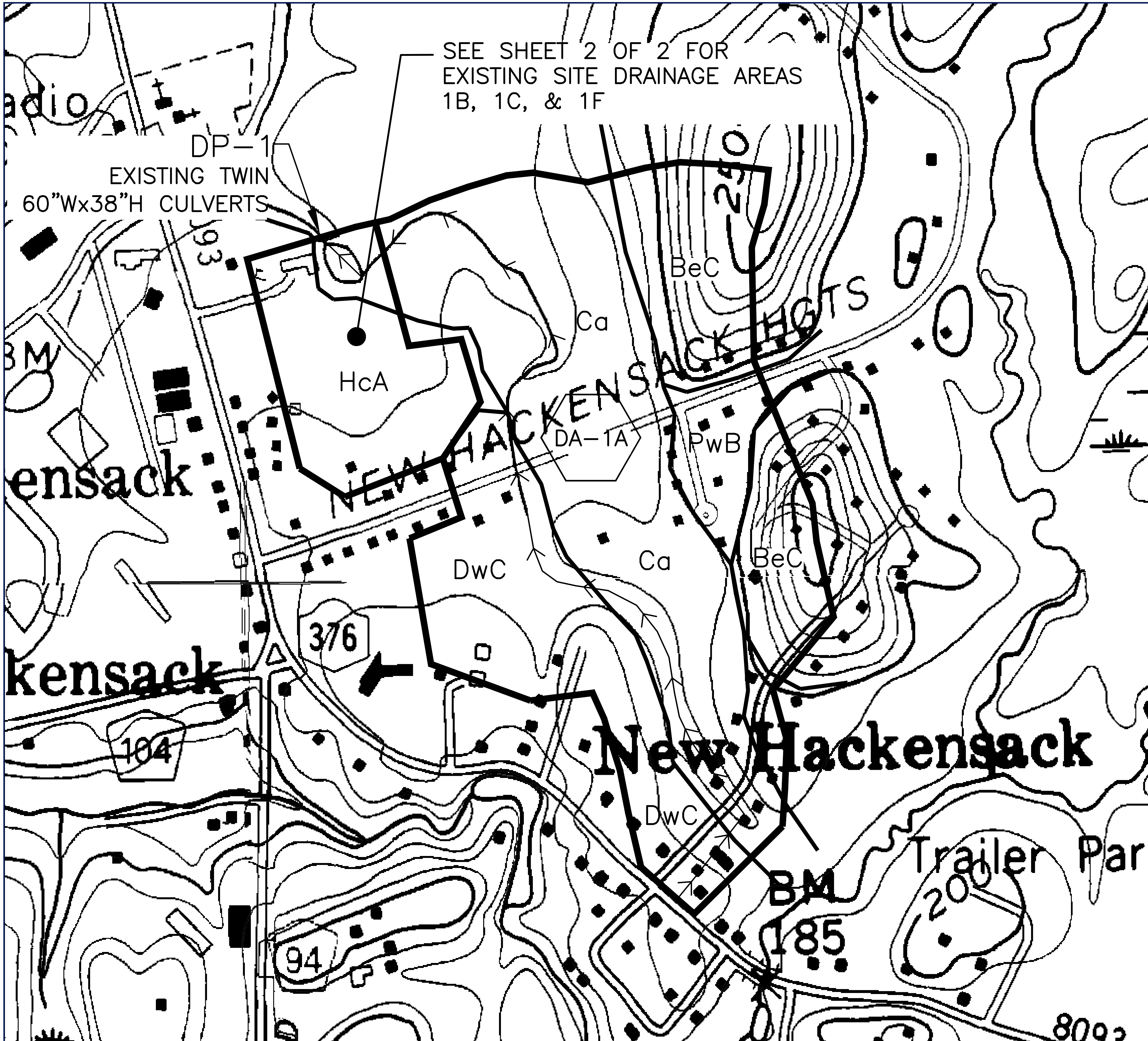
SITE PLAN FOR BAC PROPERTIES, LLC

SOILS MAP

TOWN OF WAPPINGER DUTCHESS COUNTY, NEW YORK

JOB #:	2223
DATE:	02-20-23
SCALE:	1"=200'

FIG. 2



LEGEND

	TIME OF CONCENTRATION
	EXISTING BASIN BOUNDARY
	EXISTING SOIL BOUNDARY
DA-1A	SUBCATCHMENT DESIGNATION
BeC	SOIL TYPE

SOIL TYPE FOR THE DRAINAGE SHED IS:

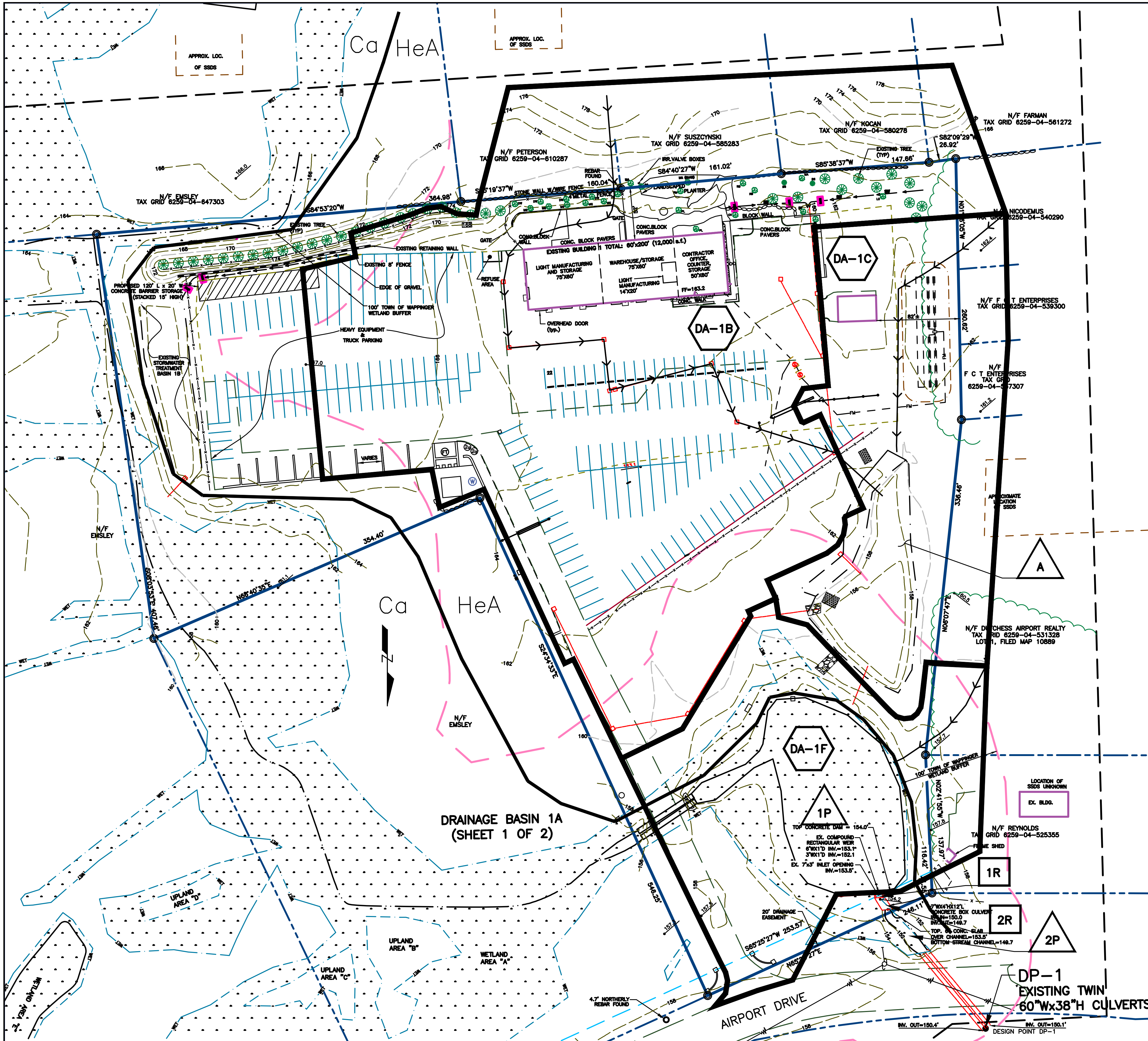
1. BERNARSTON SILT LOAM (BeC) – HYDROLOGICAL GROUP 'C'
2. HAVEN LOAM (HeA) – HYDROLOGICAL GROUP 'B'
3. PITTSTOWN SILT LOAM – (PwB) HYDROLOGICAL GROUP 'C'
4. CANANDAIGUA SILT LOAM – (Ca) HYDROLOGICAL GROUP 'D'
5. DUTCHESS COMPLEX – (DwC) HYDROLOGICAL GROUP 'B'

JOB No: 0826
DATE: 2-24-2011
SCALE: 1"=400'
SHEET 1 OF 2

PRE-DEVELOPMENT
DRAINAGE BASIN
PREPARED FOR
BAC PROPERTIES, LLC

WILLIAM H. POVALL III, P.E.
N.Y.S.P.E. LICENSE #075020
25 CORPORATE PARK DR., SUITE C.
HOPEWELL JUNCTION, NY 12533
TEL.: (845) 897-8205
FAX: (845) 897-0042

POVALL ENGINEERING, PLLC



LEGEND

TIME OF CONCENTRATION

DRAINAGE BASIN BOUNDARY

EXISTING SOIL BOUNDARY

DA–1C SUBCATCHMENT DESIGNATION

1R REACH DESIGNATION

A POND DESIGNATION

DESIGN POINT DP–1 DESIGN POINT

BeC SOIL TYPE

SOIL TYPE FOR THE DRAINAGE SHED IS:

1. BERNARSTON SILT LOAM (BeC) – HYDROLOGICAL GROUP 'C'
2. HAVEN LOAM (HeA) – HYDROLOGICAL GROUP 'B'
3. PITTSTOWN SILT LOAM – (PwB) HYDROLOGICAL GROUP 'C'
4. CANANDAIGUA SILT LOAM – (Ca) HYDROLOGICAL GROUP 'D'
5. DUTCHESS COMPLEX – (DwC) HYDROLOGICAL GROUP 'B'

JOB No: 0826

DATE: 2-24-2011

SCALE: 1"=100'

SHEET 2 OF 2

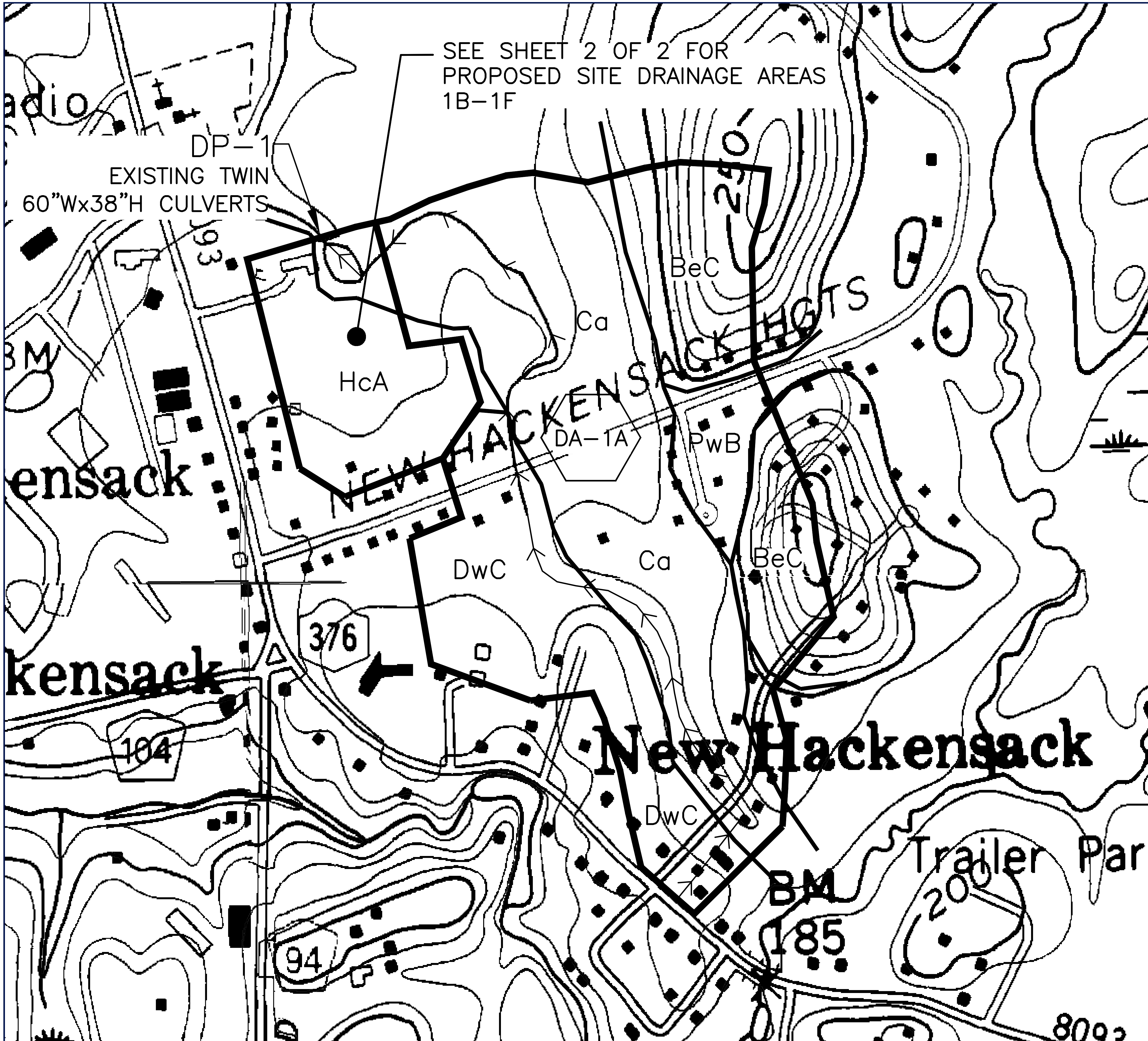
PRE-DEVELOPMENT DRAINAGE BASIN

PREPARED FOR

BAC PROPERTIES, LLC

WILLIAM H. POVALL III, P.E.
N.Y.S.P.E. LICENSE #075020
25 CORPORATE PARK DR., SUITE C.
HOPEWELL JUNCTION, NY 12533
TEL.: (845) 897-8205
FAX: (845) 897-0042

POVALL ENGINEERING, PLLC



LEGEND

- TIME OF CONCENTRATION
- DRAINAGE BASIN BOUNDARY
- EXISTING SOIL BOUNDARY
- DA–1A SUBCATCHMENT DESIGNATION
- BeC SOIL TYPE

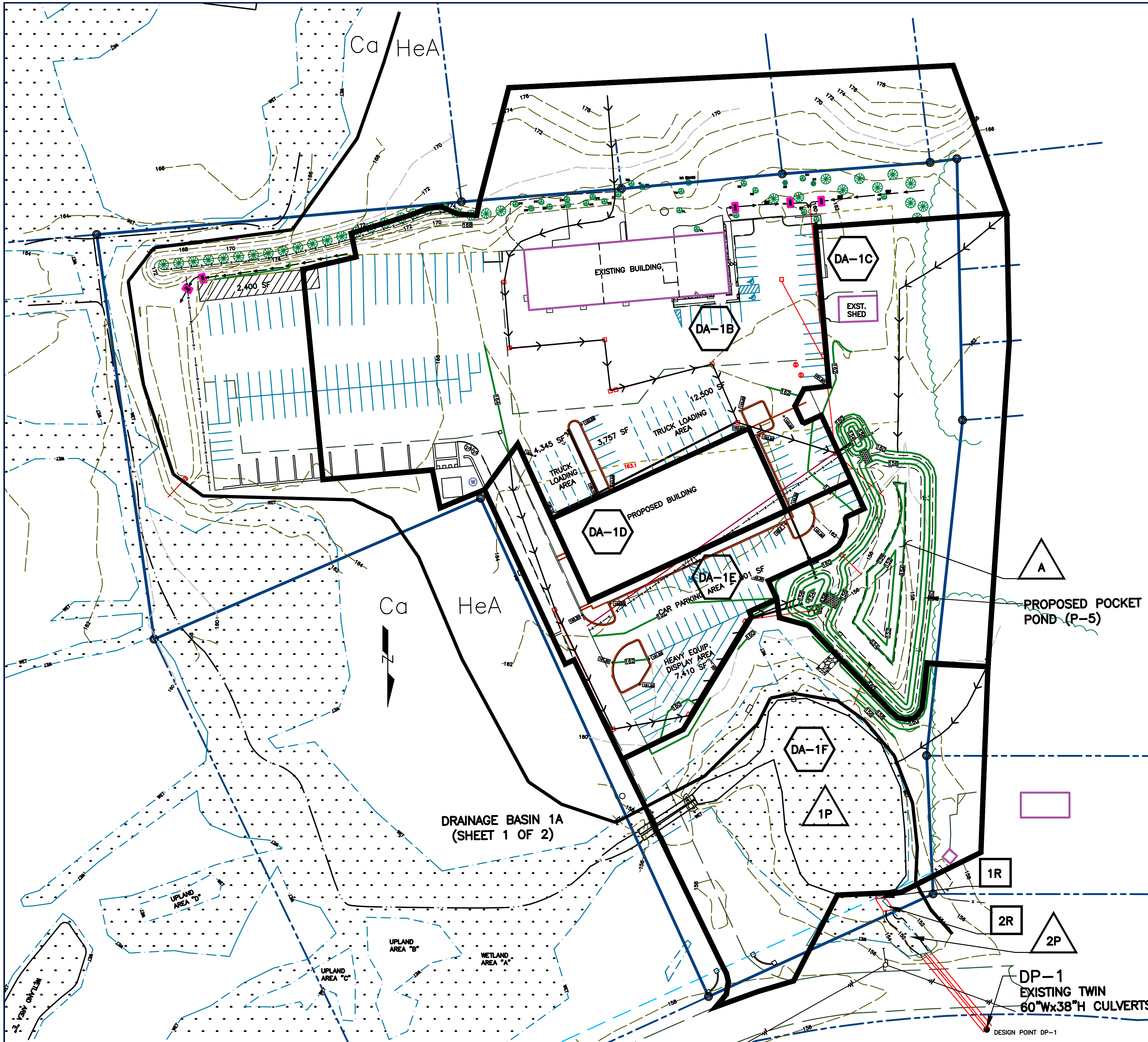
SOIL TYPE FOR THE DRAINAGE SHED IS:

1. BERNARSTON SILT LOAM (BeC) – HYDROLOGICAL GROUP 'C'
2. HAVEN LOAM (HeA) – HYDROLOGICAL GROUP 'B'
3. PITTSTOWN SILT LOAM – (PwB) HYDROLOGICAL GROUP 'C'
4. CANANDAIGUA SILT LOAM – (Ca) HYDROLOGICAL GROUP 'D'
5. DUTCHESS COMPLEX – (DwC) HYDROLOGICAL GROUP 'B'

JOB No: 0826
DATE: 6-17-2010
SCALE: 1"=400'
SHEET 1 OF 2

POST-DEVELOPMENT
DRAINAGE BASIN
PREPARED FOR
BAC PROPERTIES, LLC

WILLIAM H. POVALL III, P.E.
N.Y.S.P.E. LICENSE #075020
25 CORPORATE PARK DR., SUITE C,
HOPEWELL JUNCTION, NY 12533
TEL.: (845) 897-8205
FAX: (845) 897-0042
POVALL
ENGINEERING, PLLC



LEGEND

— · ·>— ·> — ·> —	TIME OF CONCENTRATION
━━━━	DRAINAGE BASIN BOUNDARY
────	EXISTING SOIL BOUNDARY
DA-1C	SUBCATCHMENT DESIGNATION
1R	REACH DESIGNATION
A	POND DESIGNATION
● DESIGN POINT DP-1	DESIGN POINT
BeC	SOIL TYPE

SOIL TYPE FOR THE DRAINAGE SHED IS:

1. BERNARSTON SILT LOAM (BeC) – HYDROLOGICAL GROUP 'C'
2. HAVEN LOAM (HeA) – HYDROLOGICAL GROUP 'B'
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4. CANANDAIGUA SILT LOAM – (Ca) HYDROLOGICAL GROUP 'D'
5. DUTCHESS COMPLEX – (DwC) HYDROLOGICAL GROUP 'B'

JOB No: 0826

DATE: 2-24-2011

SCALE: 1"=100'

SHEET 2 OF 2

POST-DEVELOPMENT DRAINAGE BASIN

PREPARED FOR

BAC PROPERTIES, LLC

WILLIAM H. POVALL III, P.E.
N.Y.S.P.E. LICENSE #075020

25 CORPORATE PARK DR., SUITE C.
HOPEWELL JUNCTION, NY 12533

TEL.: (845) 897-8205
FAX: (845) 897-0042

POVALL ENGINEERING, PLLC

Appendix A

NYSDEC SPDES General Permit

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 **<u>not</u>** authorized by this permit:

1. *Discharge*s after *construction activities* have been completed and the site has undergone *final stabilization*;

2. *Discharge*s that are mixed with sources of non-stormwater other than those expressly authorized under subsection E.3. of this Part and identified in the SWPPP required by this permit;

3. *Discharges* that are required to obtain an individual SPDES permit or another SPDES general permit pursuant to Part VII.K. of this permit;

4. *Construction activities* or *discharges* from *construction activities* that may adversely affect an *endangered or threatened species* unless the *owner or*

operator has obtained a permit issued pursuant to 6 NYCRR Part 182 for the project or the Department has issued a letter of non-jurisdiction for the project. All documentation necessary to demonstrate eligibility shall be maintained on site in accordance with Part II.D.2 of this permit;

5. *Discharges* which either cause or contribute to a violation of *water quality standards* adopted pursuant to the *ECL* and its accompanying regulations;

6. *Construction activities* for residential, commercial and institutional projects:

   a. Where the *discharge*s from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

   b. Which are undertaken on land with no existing *impervious cover*; and

   c. Which disturb one (1) or more acres of land designated on the current United States Department of Agriculture ("USDA") Soil Survey as Soil Slope Phase "D", (provided the map unit name is inclusive of slopes greater than 25%), or Soil Slope Phase "E" or "F" (regardless of the map unit name), or a combination of the three designations.

7. *Construction activities* for linear transportation projects and linear utility projects:

   a. Where the *discharge*s from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

   b. Which are undertaken on land with no existing *impervious cover*; and

   c. Which disturb two (2) or more acres of land designated on the current USDA Soil Survey as Soil Slope Phase "D" (provided the map unit name is inclusive of slopes greater than 25%), or Soil Slope Phase "E" or "F" (regardless of the map unit name), or a combination of the three designations.

8. *Construction activities* that have the potential to affect an *historic property*, unless there is documentation that such impacts have been resolved. The following documentation necessary to demonstrate eligibility with this requirement shall be maintained on site in accordance with Part II.D.2 of this permit and made available to the Department in accordance with Part VII.F of this permit:

    a. Documentation that the *construction activity* is not within an archeologically sensitive area indicated on the sensitivity map, and that the *construction activity* is not located on or immediately adjacent to a property listed or determined to be eligible for listing on the National or State Registers of Historic Places, and that there is no new permanent building on the *construction site* within the following distances from a building, structure, or object that is more than 50 years old, or if there is such a new permanent building on the *construction site* within those parameters that NYS Office of Parks, Recreation and Historic Preservation (OPRHP), a Historic Preservation Commission of a Certified Local Government, or a qualified preservation professional has determined that the building, structure, or object more than 50 years old is not historically/archeologically significant.

        - 1-5 acres of disturbance - 20 feet
        - 5-20 acres of disturbance - 50 feet
        - 20+ acres of disturbance - 100 feet, or

    b. DEC consultation form sent to OPRHP, and copied to the NYS DEC Agency Historic Preservation Officer (APO), and
        (i) the State Environmental Quality Review (SEQR) Environmental Assessment Form (EAF) with a negative declaration or the Findings Statement, with documentation of OPRHP's agreement with the resolution; or
        (ii) documentation from OPRHP that the *construction activity* will result in No Impact; or
        (iii) documentation from OPRHP providing a determination of No Adverse Impact; or
        (iv) a Letter of Resolution signed by the owner/operator, OPRHP and the DEC APO which allows for this *construction activity* to be eligible for coverage under the general permit in terms of the State Historic Preservation Act (SHPA); or

    c. Documentation of satisfactory compliance with Section 106 of the National Historic Preservation Act for a coterminous project area:

(i) No Affect
(ii) No Adverse Affect
(iii) Executed Memorandum of Agreement, or

d. Documentation that:

(i) SHPA Section 14.09 has been completed by NYS DEC or another state agency.

9. *Discharge*s from *construction activities* that are subject to an existing SPDES individual or general permit where a SPDES permit for *construction activity* has been terminated or denied; or where the *owner or operator* has failed to renew an expired individual permit.

Part II. PERMIT COVERAGE

A. How to Obtain Coverage

1. An *owner or operator* of a *construction activity* that is not subject to the requirements of a regulated, traditional land use control MS4 must first prepare a SWPPP in accordance with all applicable requirements of this permit and then submit a completed Notice of Intent (NOI) to the Department to be authorized to discharge under this permit.

2. An *owner or operator* of a *construction activity* that is subject to the requirements of a *regulated, traditional land use control MS4* must first prepare a SWPPP in accordance with all applicable requirements of this permit and then have the SWPPP reviewed and accepted by the *regulated, traditional land use control MS4* prior to submitting the NOI to the Department. The *owner or operator* shall have the “MS4 SWPPP Acceptance” form signed in accordance with Part VII.H., and then submit that form along with a completed NOI to the Department.

3. The requirement for an *owner or operator* to have its SWPPP reviewed and accepted by the *regulated, traditional land use control MS4* prior to submitting the NOI to the Department does not apply to an *owner or operator* that is obtaining permit coverage in accordance with the requirements in Part II.F. (Change of *Owner or Operator*) or where the *owner or operator* of the *construction activity* is the *regulated, traditional land use control MS4* . This exemption does not apply to *construction activities* subject to the New York City Administrative Code.

B. Notice of Intent (NOI) Submittal

1. Prior to December 21, 2020, an owner or operator shall use either the electronic (eNOI) or paper version of the NOI that the Department prepared. Both versions of the NOI are located on the Department's website (http://www.dec.ny.gov/). The paper version of the NOI shall be signed in accordance with Part VII.H. of this permit and submitted to the following address:

   NOTICE OF INTENT
   NYS DEC, Bureau of Water Permits
   625 Broadway, 4th Floor
   Albany, New York 12233-3505

2. Beginning December 21, 2020 and in accordance with EPA's 2015 NPDES Electronic Reporting Rule (40 CFR Part 127), the *owner or operator* must submit the NOI electronically using the *Department's* online NOI.

3. The *owner or operator* shall have the SWPPP preparer sign the "SWPPP Preparer Certification" statement on the NOI prior to submitting the form to the Department.

4. As of the date the NOI is submitted to the Department, the *owner or operator* shall make the NOI and SWPPP available for review and copying in accordance with the requirements in Part VII.F. of this permit.

C. Permit Authorization

1. An *owner or operator* shall not *commence construction activity* until their authorization to *discharge* under this permit goes into effect.

2. Authorization to *discharge* under this permit will be effective when the *owner or operator* has satisfied all of the following criteria:

   a. project review pursuant to the State Environmental Quality Review Act ("SEQRA") have been satisfied, when SEQRA is applicable. See the Department's website (http://www.dec.ny.gov/) for more information,

   b. where required, all necessary Department permits subject to the *Uniform Procedures Act ("UPA")* (see 6 NYCRR Part 621), or the equivalent from another New York State agency, have been obtained, unless otherwise notified by the Department pursuant to 6 NYCRR 621.3(a)(4). *Owners or operators* of *construction activities* that are required to obtain *UPA* permits must submit a preliminary SWPPP to the appropriate DEC Permit Administrator at the Regional Office listed in Appendix F at the time all other necessary *UPA* permit applications are submitted. The preliminary SWPPP must include sufficient information to demonstrate that the *construction activity* qualifies for authorization under this permit,

c. the final SWPPP has been prepared, and

d. a complete NOI has been submitted to the Department in accordance with the requirements of this permit.

3. An *owner or operator* that has satisfied the requirements of Part II.C.2 above will be authorized to *discharge* stormwater from their *construction activity* in accordance with the following schedule:

a. For *construction activities* that are not subject to the requirements of a *regulated, traditional land use control MS4*:

(i) Five (5) business days from the date the Department receives a complete electronic version of the NOI (eNOI) for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.; or

(ii) Sixty (60) business days from the date the Department receives a complete NOI (electronic or paper version) for *construction activities* with a SWPPP that has not been prepared in conformance with the design criteria in technical standard referenced in Part III.B.1. or, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C., the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, or;

(iii) Ten (10) business days from the date the Department receives a complete paper version of the NOI for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.

b. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*:

   (i) Five (5) business days from the date the Department receives both a complete electronic version of the NOI (eNOI) and signed "*MS4* SWPPP Acceptance" form, or

   (ii) Ten (10) business days from the date the Department receives both a complete paper version of the NOI and signed "MS4 SWPPP Acceptance" form.

4. Coverage under this permit authorizes stormwater *discharges* from only those areas of disturbance that are identified in the NOI. If an *owner or operator* wishes to have stormwater *discharges* from future or additional areas of disturbance authorized, they must submit a new NOI that addresses that phase of the development, unless otherwise notified by the Department. The *owner or operator* shall not *commence construction activity* on the future or additional areas until their authorization to *discharge* under this permit goes into effect in accordance with Part II.C. of this permit.

D. General Requirements For Owners or Operators With Permit Coverage

1. The *owner or operator* shall ensure that the provisions of the SWPPP are implemented from the *commencement of construction activity* until all areas of disturbance have achieved *final stabilization* and the Notice of Termination ("NOT") has been submitted to the Department in accordance with Part V. of this permit. This includes any changes made to the SWPPP pursuant to Part III.A.4. of this permit.

2. The *owner or operator* shall maintain a copy of the General Permit (GP-0-20-001), NOI, *NOI Acknowledgment Letter*, SWPPP, MS4 SWPPP Acceptance form, inspection reports, responsible contractor's or subcontractor's certification statement (see Part III.A.6.), and all documentation necessary to demonstrate eligibility with this permit at the *construction site* until all disturbed areas have achieved *final stabilization* and the NOT has been submitted to the Department. The documents must be maintained in a secure location, such as a job trailer, on-site construction office, or mailbox with lock. The secure location must be accessible during normal business hours to an individual performing a compliance inspection.

3. The *owner or operator* of a *construction activity* shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a *regulated, traditional land*

use control MS4, the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*). At a minimum, the *owner or operator* must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:

a. The *owner or operator* shall have a *qualified inspector* conduct **at least** two (2) site inspections in accordance with Part IV.C. of this permit every seven (7) calendar days, for as long as greater than five (5) acres of soil remain disturbed. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

b. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016.

c. The *owner or operator* shall prepare a phasing plan that defines maximum disturbed area per phase and shows required cuts and fills.

d. The *owner or operator* shall install any additional site-specific practices needed to protect water quality.

e. The *owner or operator* shall include the requirements above in their SWPPP.

4. In accordance with statute, regulations, and the terms and conditions of this permit, the Department may suspend or revoke an *owner's or operator's* coverage under this permit at any time if the Department determines that the SWPPP does not meet the permit requirements or consistent with Part VII.K..

5. Upon a finding of significant non-compliance with the practices described in the SWPPP or violation of this permit, the Department may order an immediate stop to all activity at the site until the non-compliance is remedied. The stop work order shall be in writing, describe the non-compliance in detail, and be sent to the *owner or operator*.

6. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*, the *owner or operator* shall notify the

regulated, traditional land use control MS4 in writing of any planned amendments or modifications to the post-construction stormwater management practice component of the SWPPP required by Part III.A. 4. and 5. of this permit. Unless otherwise notified by the *regulated, traditional land use control MS4*, the *owner or operator* shall have the SWPPP amendments or modifications reviewed and accepted by the *regulated, traditional land use control MS4* prior to commencing construction of the post-construction stormwater management practice.

E. Permit Coverage for Discharges Authorized Under GP-0-15-002

1. Upon renewal of SPDES General Permit for Stormwater Discharges from *Construction Activity* (Permit No. GP-0-15-002), an *owner or operator* of *a construction activity* with coverage under GP-0-15-002, as of the effective date of GP- 0-20-001, shall be authorized to *discharge* in accordance with GP- 0-20-001, unless otherwise notified by the Department.

   An *owner or operator* may continue to implement the technical/design components of the post-construction stormwater management controls provided that such design was done in conformance with the technical standards in place at the time of initial project authorization. However, they must comply with the other, non-design provisions of GP-0-20-001.

F. Change of Owner or Operator

1. When property ownership changes or when there is a change in operational control over the construction plans and specifications, the original *owner or operator* must notify the new *owner or operator*, in writing, of the requirement to obtain permit coverage by submitting a NOI with the Department. For *construction activities* subject to the requirements of a *regulated, traditional land use control MS4,* the original *owner or operator* must also notify the MS4, in writing, of the change in ownership at least 30 calendar days prior to the change in ownership.

2. Once the new *owner or operator* obtains permit coverage, the original *owner or operator* shall then submit a completed NOT with the name and permit identification number of the new *owner or operator* to the Department at the address in Part II.B.1. of this permit. If the original *owner or operator* maintains ownership of a portion of the *construction activity* and will disturb soil, they must maintain their coverage under the permit.

3. Permit coverage for the new *owner or operator* will be effective as of the date the Department receives a complete NOI, provided the original *owner or*

operator was not subject to a sixty (60) business day authorization period that has not expired as of the date the Department receives the NOI from the new *owner or operator*.

Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A. General SWPPP Requirements

1. A SWPPP shall be prepared and implemented by the *owner or operator* of each *construction activity* covered by this permit. The SWPPP must document the selection, design, installation, implementation and maintenance of the control measures and practices that will be used to meet the effluent limitations in Part I.B. of this permit and where applicable, the post-construction stormwater management practice requirements in Part I.C. of this permit. The SWPPP shall be prepared prior to the submittal of the NOI. The NOI shall be submitted to the Department prior to the *commencement of construction activity*. A copy of the completed, final NOI shall be included in the SWPPP.

2. The SWPPP shall describe the erosion and sediment control practices and where required, post-construction stormwater management practices that will be used and/or constructed to reduce the *pollutants* in stormwater *discharges* and to assure compliance with the terms and conditions of this permit. In addition, the SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater *discharges*.

3. All SWPPPs that require the post-construction stormwater management practice component shall be prepared by a *qualified professional* that is knowledgeable in the principles and practices of stormwater management and treatment.

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

    a. whenever the current provisions prove to be ineffective in minimizing *pollutants* in stormwater *discharges* from the site;

b. whenever there is a change in design, construction, or operation at the *construction site* that has or could have an effect on the *discharge* of *pollutants*;

c. to address issues or deficiencies identified during an inspection by the *qualified inspector,* the Department or other regulatory authority; and

d. to document the final construction conditions.

5. The Department may notify the *owner or operator* at any time that the SWPPP does not meet one or more of the minimum requirements of this permit. The notification shall be in writing and identify the provisions of the SWPPP that require modification. Within fourteen (14) calendar days of such notification, or as otherwise indicated by the Department, the *owner or operator* shall make the required changes to the SWPPP and submit written notification to the Department that the changes have been made. If the *owner or operator* does not respond to the Department's comments in the specified time frame, the Department may suspend the *owner's or operator's* coverage under this permit or require the *owner or operator* to obtain coverage under an individual SPDES permit in accordance with Part II.D.4. of this permit.

6. Prior to the *commencement of construction activity*, the *owner or operator* must identify the contractor(s) and subcontractor(s) that will be responsible for installing, constructing, repairing, replacing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP; and the contractor(s) and subcontractor(s) that will be responsible for constructing the post-construction stormwater management practices included in the SWPPP. The *owner or operator* shall have each of the contractors and subcontractors identify at least one person from their company that will be responsible for implementation of the SWPPP. This person shall be known as the *trained contractor.* The *owner or operator* shall ensure that at least one *trained contractor* is on site on a daily basis when soil disturbance activities are being performed.

   The *owner or operator* shall have each of the contractors and subcontractors identified above sign a copy of the following certification statement below before they commence any *construction activity*:

   "I hereby certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner or operator* must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater *discharge*s from *construction activities* and that it is unlawful for any person to cause or contribute to a violation of *water quality standards*. Furthermore, I am aware that there are significant penalties for submitting false information, that I do not believe to be true, including the possibility of fine and imprisonment for knowing violations"

In addition to providing the certification statement above, the certification page must also identify the specific elements of the SWPPP that each contractor and subcontractor will be responsible for and include the name and title of the person providing the signature; the name and title of the *trained contractor* responsible for SWPPP implementation; the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification statement is signed. The *owner or operator* shall attach the certification statement(s) to the copy of the SWPPP that is maintained at the *construction site*. If new or additional contractors are hired to implement measures identified in the SWPPP after construction has commenced, they must also sign the certification statement and provide the information listed above.

7. For projects where the Department requests a copy of the SWPPP or inspection reports, the *owner or operator* shall submit the documents in both electronic (PDF only) and paper format within five (5) business days, unless otherwise notified by the Department.

B. Required SWPPP Contents

1. Erosion and sediment control component - All SWPPPs prepared pursuant to this permit shall include erosion and sediment control practices designed in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016. Where erosion and sediment control practices are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must demonstrate *equivalence* to the technical standard. At a minimum, the erosion and sediment control component of the SWPPP shall include the following:

    a. Background information about the scope of the project, including the location, type and size of project

b. A site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map shall show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s); floodplain/floodway boundaries; wetlands and drainage patterns that could be affected by the *construction activity*; existing and final contours ; locations of different soil types with boundaries; material, waste, borrow or equipment storage areas located on adjacent properties; and location(s) of the stormwater *discharge*(s);

c. A description of the soil(s) present at the site, including an identification of the Hydrologic Soil Group (HSG);

d. A construction phasing plan and sequence of operations describing the intended order of *construction activities*, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance;

e. A description of the minimum erosion and sediment control practices to be installed or implemented for each *construction activity* that will result in soil disturbance. Include a schedule that identifies the timing of initial placement or implementation of each erosion and sediment control practice and the minimum time frames that each practice should remain in place or be implemented;

f. A temporary and permanent soil stabilization plan that meets the requirements of this general permit and the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of *final stabilization*;

g. A site map/construction drawing(s) showing the specific location(s), size(s), and length(s) of each erosion and sediment control practice;

h. The dimensions, material specifications, installation details, and operation and maintenance requirements for all erosion and sediment control practices. Include the location and sizing of any temporary sediment basins and structural practices that will be used to divert flows from exposed soils;

i. A maintenance inspection schedule for the contractor(s) identified in Part III.A.6. of this permit, to ensure continuous and effective operation of the erosion and sediment control practices. The maintenance inspection schedule shall be in accordance with the requirements in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016;

j. A description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a *pollutant* source in the stormwater *discharges*;

k. A description and location of any stormwater *discharges* associated with industrial activity other than construction at the site, including, but not limited to, stormwater *discharges* from asphalt plants and concrete plants located on the *construction site*; and

l. Identification of any elements of the design that are not in conformance with the design criteria in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

2. Post-construction stormwater management practice component – The *owner or operator* of any construction project identified in Table 2 of Appendix B as needing post-construction stormwater management practices shall prepare a SWPPP that includes practices designed in conformance with the applicable *sizing criteria* in Part I.C.2.a., c. or d. of this permit and the *performance criteria* in the technical standard, New York State Stormwater Management Design Manual dated January 2015

   Where post-construction stormwater management practices are not designed in conformance with the *performance criteria* in the technical standard, the *owner or operator* must include in the SWPPP the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

   The post-construction stormwater management practice component of the SWPPP shall include the following:

   a. Identification of all post-construction stormwater management practices to be constructed as part of the project. Include the dimensions, material specifications and installation details for each post-construction stormwater management practice;

b. A site map/construction drawing(s) showing the specific location and size of each post-construction stormwater management practice;

c. A Stormwater Modeling and Analysis Report that includes:
   (i) Map(s) showing pre-development conditions, including watershed/subcatchments boundaries, flow paths/routing, and design points;

   (ii) Map(s) showing post-development conditions, including watershed/subcatchments boundaries, flow paths/routing, design points and post-construction stormwater management practices;

   (iii) Results of stormwater modeling (i.e. hydrology and hydraulic analysis) for the required storm events. Include supporting calculations (model runs), methodology, and a summary table that compares pre and post-development runoff rates and volumes for the different storm events;

   (iv) Summary table, with supporting calculations, which demonstrates that each post-construction stormwater management practice has been designed in conformance with the *sizing criteria* included in the Design Manual;

   (v) Identification of any *sizing criteria* that is not required based on the requirements included in Part I.C. of this permit; and

   (vi) Identification of any elements of the design that are not in conformance with the *performance criteria* in the Design Manual. Include the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the Design Manual;

d. Soil testing results and locations (test pits, borings);

e. Infiltration test results, when required; and

f. An operations and maintenance plan that includes inspection and maintenance schedules and actions to ensure continuous and effective operation of each post-construction stormwater management practice. The plan shall identify the entity that will be responsible for the long term operation and maintenance of each practice.

3. Enhanced Phosphorus Removal Standards - All construction projects identified in Table 2 of Appendix B that are located in the watersheds identified in Appendix C shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the applicable *sizing criteria* in Part I.C.2. b., c. or d. of this permit and the *performance criteria,* Enhanced Phosphorus Removal Standards included in the Design Manual. At a minimum, the post-construction stormwater management practice component of the SWPPP shall include items 2.a - 2.f. above.

C. Required SWPPP Components by Project Type

Unless otherwise notified by the Department, *owners or operators* of *construction activities* identified in Table 1 of Appendix B are required to prepare a SWPPP that only includes erosion and sediment control practices designed in conformance with Part III.B.1 of this permit. *Owners or operators* of the *construction activities* identified in Table 2 of Appendix B shall prepare a SWPPP that also includes post-construction stormwater management practices designed in conformance with Part III.B.2 or 3 of this permit.

Part IV. INSPECTION AND MAINTENANCE REQUIREMENTS

A. General Construction Site Inspection and Maintenance Requirements

1. The *owner or operator* must ensure that all erosion and sediment control practices (including pollution prevention measures) and all post-construction stormwater management practices identified in the SWPPP are inspected and maintained in accordance with Part IV.B. and C. of this permit.

2. The terms of this permit shall not be construed to prohibit the State of New York from exercising any authority pursuant to the ECL, common law or federal law, or prohibit New York State from taking any measures, whether civil or criminal, to prevent violations of the laws of the State of New York or protect the public health and safety and/or the environment.

B. Contractor Maintenance Inspection Requirements

1. The *owner or operator* of each *construction activity* identified in Tables 1 and 2 of Appendix B shall have a *trained contractor* inspect the erosion and sediment control practices and pollution prevention measures being implemented within the active work area daily to ensure that they are being maintained in effective operating condition at all times. If deficiencies are identified, the contractor shall

begin implementing corrective actions within one business day and shall complete the corrective actions in a reasonable time frame.

2. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *trained contractor* can stop conducting the maintenance inspections. The *trained contractor* shall begin conducting the maintenance inspections in accordance with Part IV.B.1. of this permit as soon as soil disturbance activities resume.

3. For construction sites where soil disturbance activities have been shut down with partial project completion, the *trained contractor* can stop conducting the maintenance inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* <u>and</u> all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

C. Qualified Inspector Inspection Requirements

The *owner or operator* shall have a *qualified inspector* conduct site inspections in conformance with the following requirements:

[Note: The *trained contractor* identified in Part III.A.6. and IV.B. of this permit **cannot** conduct the *qualified inspector* site inspections unless they meet the *qualified inspector* qualifications included in Appendix A. In order to perform these inspections, the *trained contractor* would have to be a:

- licensed Professional Engineer,
- Certified Professional in Erosion and Sediment Control (CPESC),
- New York State Erosion and Sediment Control Certificate Program holder
- Registered Landscape Architect, or
- someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity].

1. A *qualified inspector* shall conduct site inspections for all *construction activities* identified in Tables 1 and 2 of Appendix B, <u>with the exception of</u>:

   a. the construction of a single family residential subdivision with 25% or less *impervious cover* at total site build-out that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and 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* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to the shutdown. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the *owner or operator* shall have the *qualified inspector* perform a final inspection and certify that all disturbed areas have achieved *final stabilization,* and all temporary, structural erosion and sediment control measures have been removed*;* and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice" certification statements on the NOT. The *owner or operator* shall then submit the completed NOT form to the address in Part II.B.1 of this permit.

e. For construction sites that directly *discharge* to one of the 303(d) segments listed in Appendix E or is located in one of the watersheds listed in Appendix C, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

3. At a minimum, the *qualified inspector* shall inspect all erosion and sediment control practices and pollution prevention measures to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved *final stabilization,* all points of *discharge* to natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the *construction site*, and all points of *discharge* from the *construction site*.

4. The *qualified inspector* shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:

a. Date and time of inspection;

b. Name and title of person(s) performing inspection;

c. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;

d. A description of the condition of the runoff at all points of *discharge* from the *construction site*. This shall include identification of any *discharges* of sediment from the *construction site*. Include *discharges* from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;

e. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the *construction site* which receive runoff from disturbed areas. This shall include identification of any *discharges* of sediment to the surface waterbody;

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

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

h. Description and sketch of areas with active soil disturbance activity, areas that have been disturbed but are inactive at the time of the inspection, and areas that have been stabilized (temporary and/or final) since the last inspection;

i. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards;

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

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

l. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven (7) calendar days of the date of the inspection. The *qualified inspector* shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven (7) calendar days of that inspection.

5. Within one business day of the completion of an inspection, the *qualified inspector* shall notify the *owner or operator* and appropriate contractor or subcontractor identified in Part III.A.6. of this permit of any corrective actions that need to be taken. The contractor or subcontractor shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.

6. All inspection reports shall be signed by the *qualified inspector.* Pursuant to Part II.D.2. of this permit, the inspection reports shall be maintained on site with the SWPPP.

Part V. TERMINATION OF PERMIT COVERAGE

A. Termination of Permit Coverage

1. An *owner or operator* that is eligible to terminate coverage under this permit must submit a completed NOT form to the address in Part II.B.1 of this permit. The NOT form shall be one which is associated with this permit, signed in accordance with Part VII.H of this permit.

2. An *owner or operator* may terminate coverage when one or more the following conditions have been met:

   a. Total project completion - All *construction activity* identified in the SWPPP has been completed; 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 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

<u>All definitions in this section are solely for the purposes of this permit.</u>

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 <u>not</u> located in one of the watersheds listed in Appendix C or <u>not</u> *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 <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E • 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

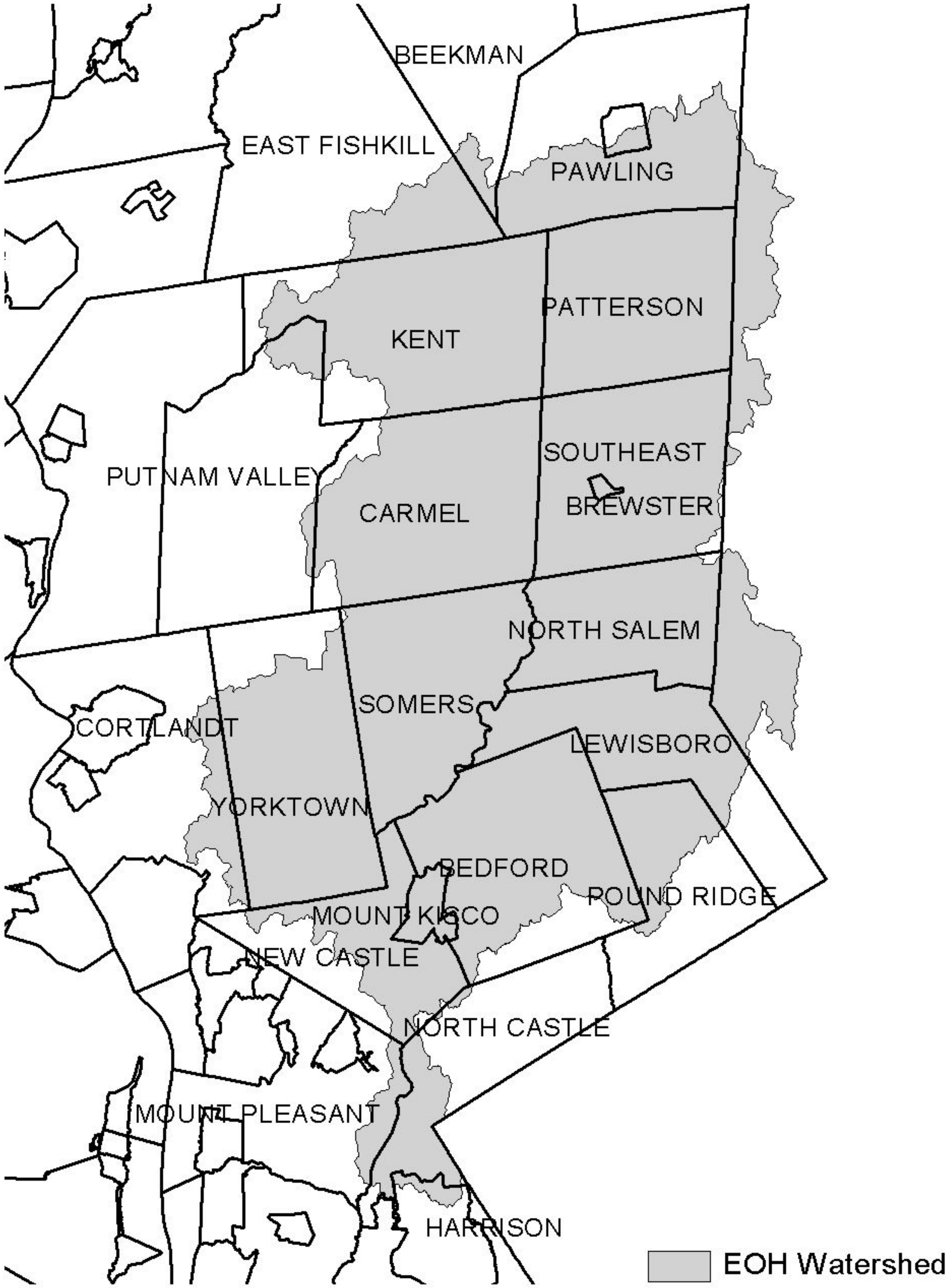


Figure 2 - Onondaga Lake Watershed

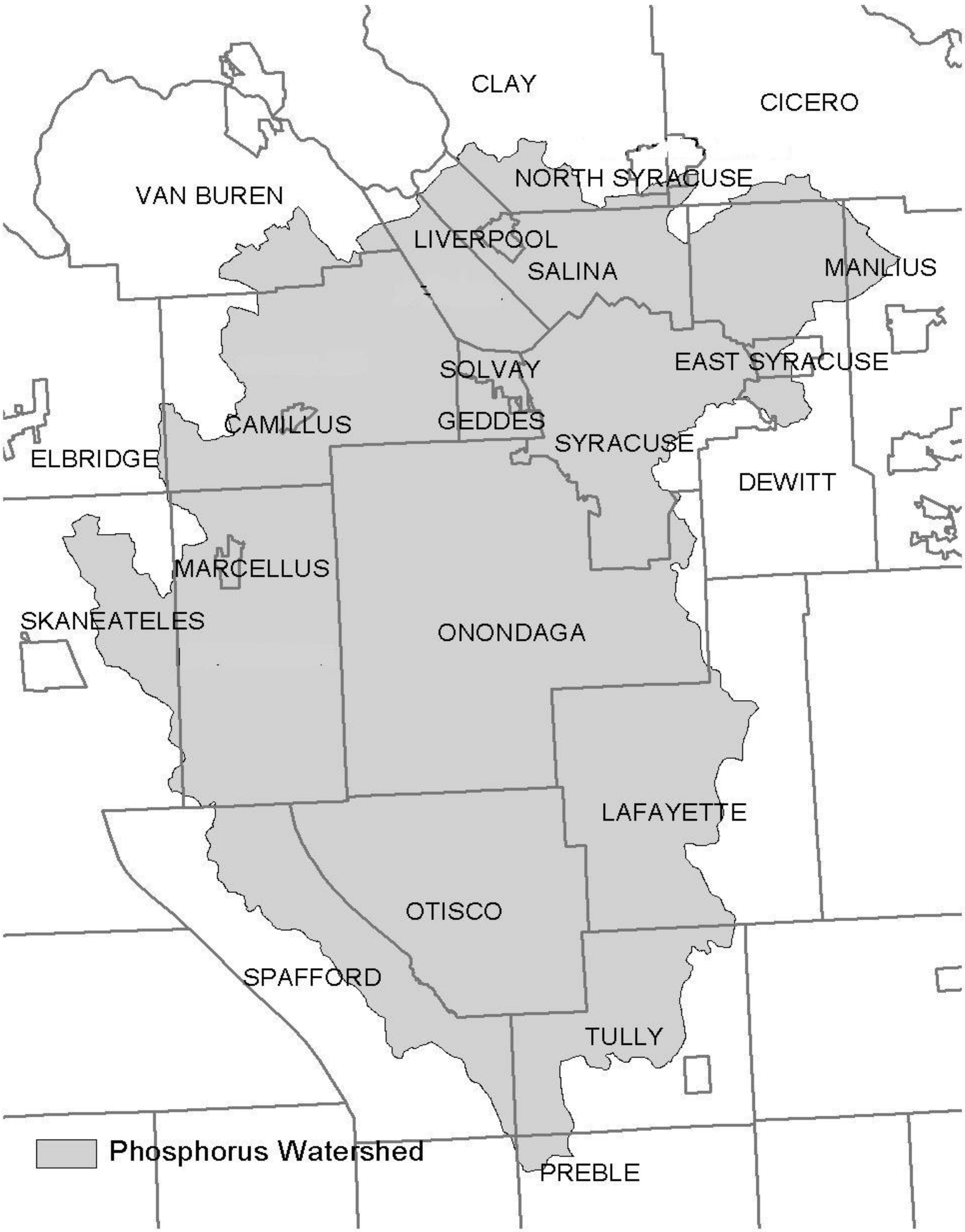


Figure 3 - Greenwood Lake Watershed

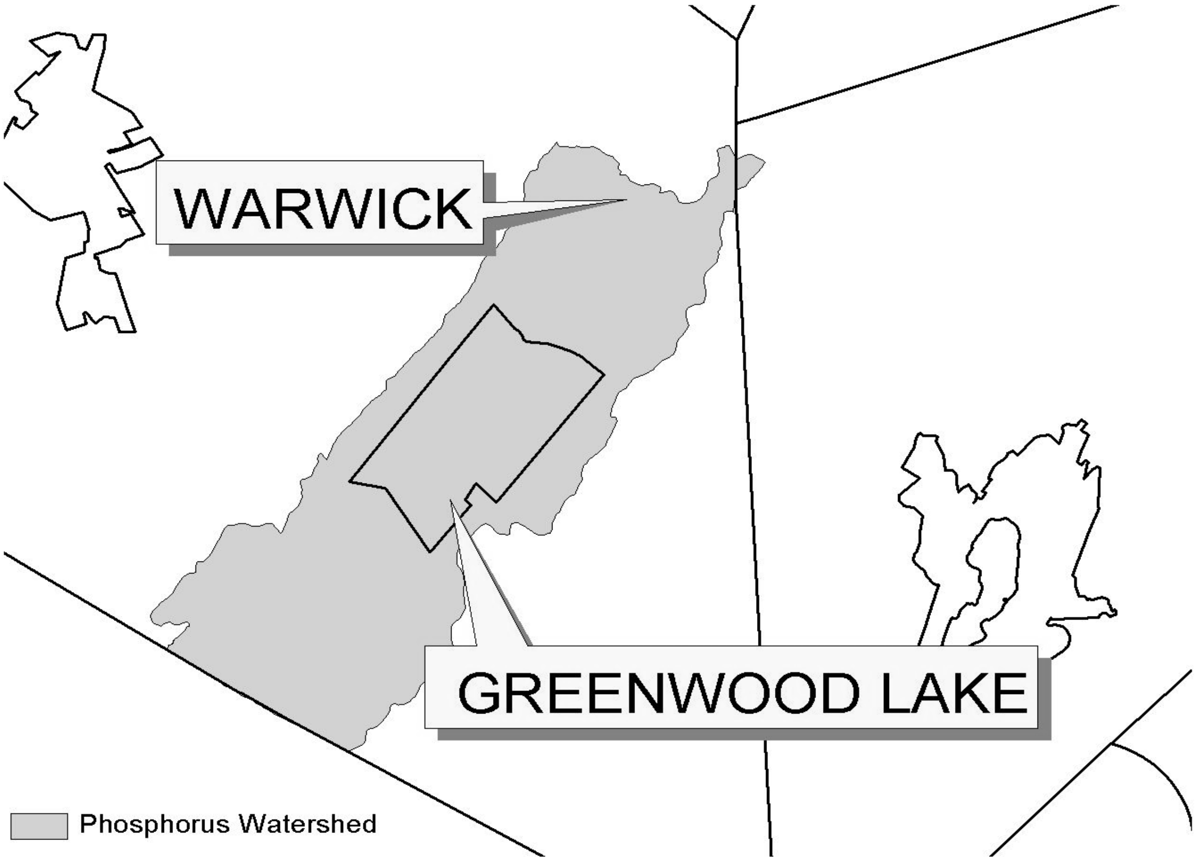
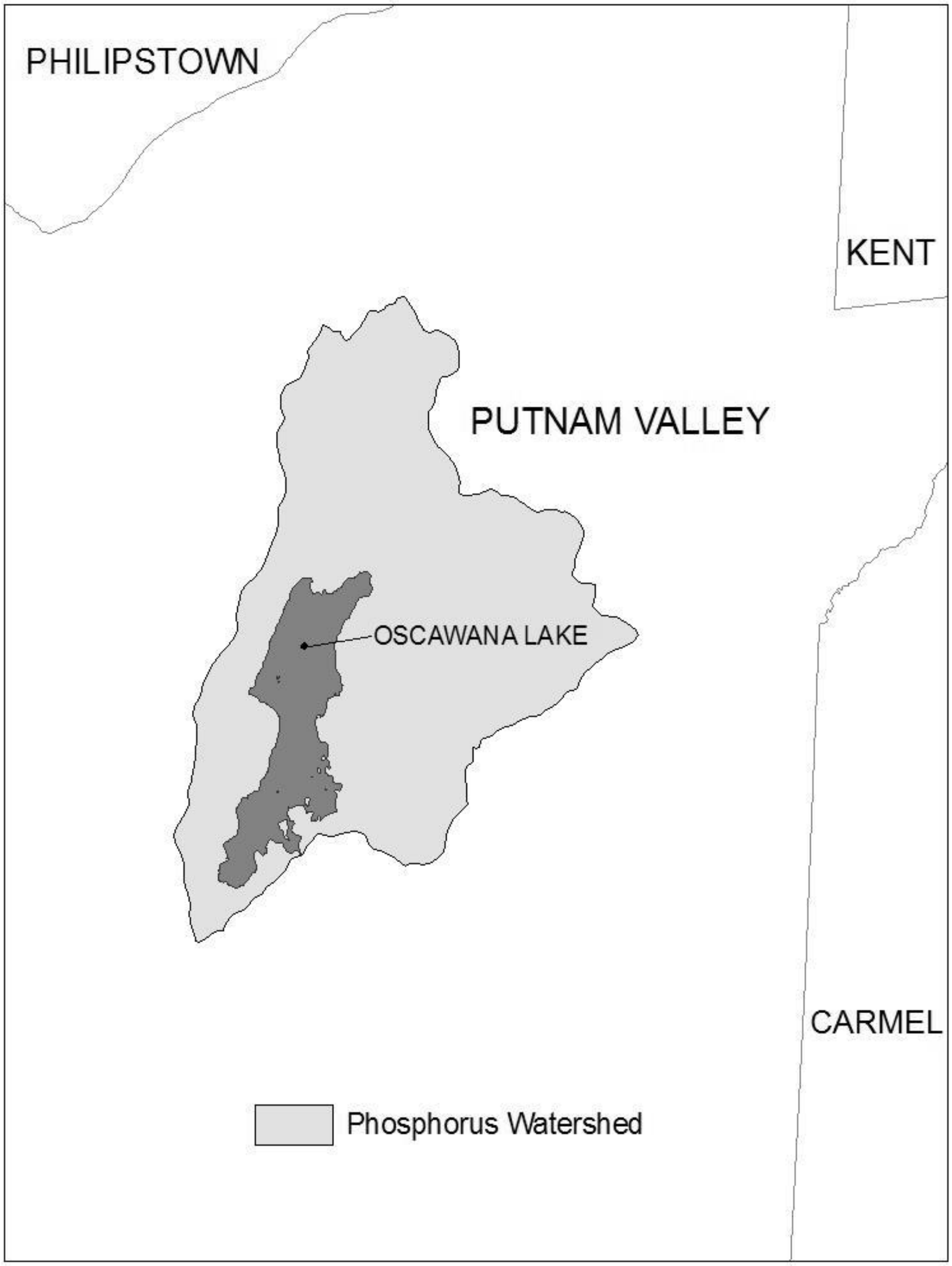
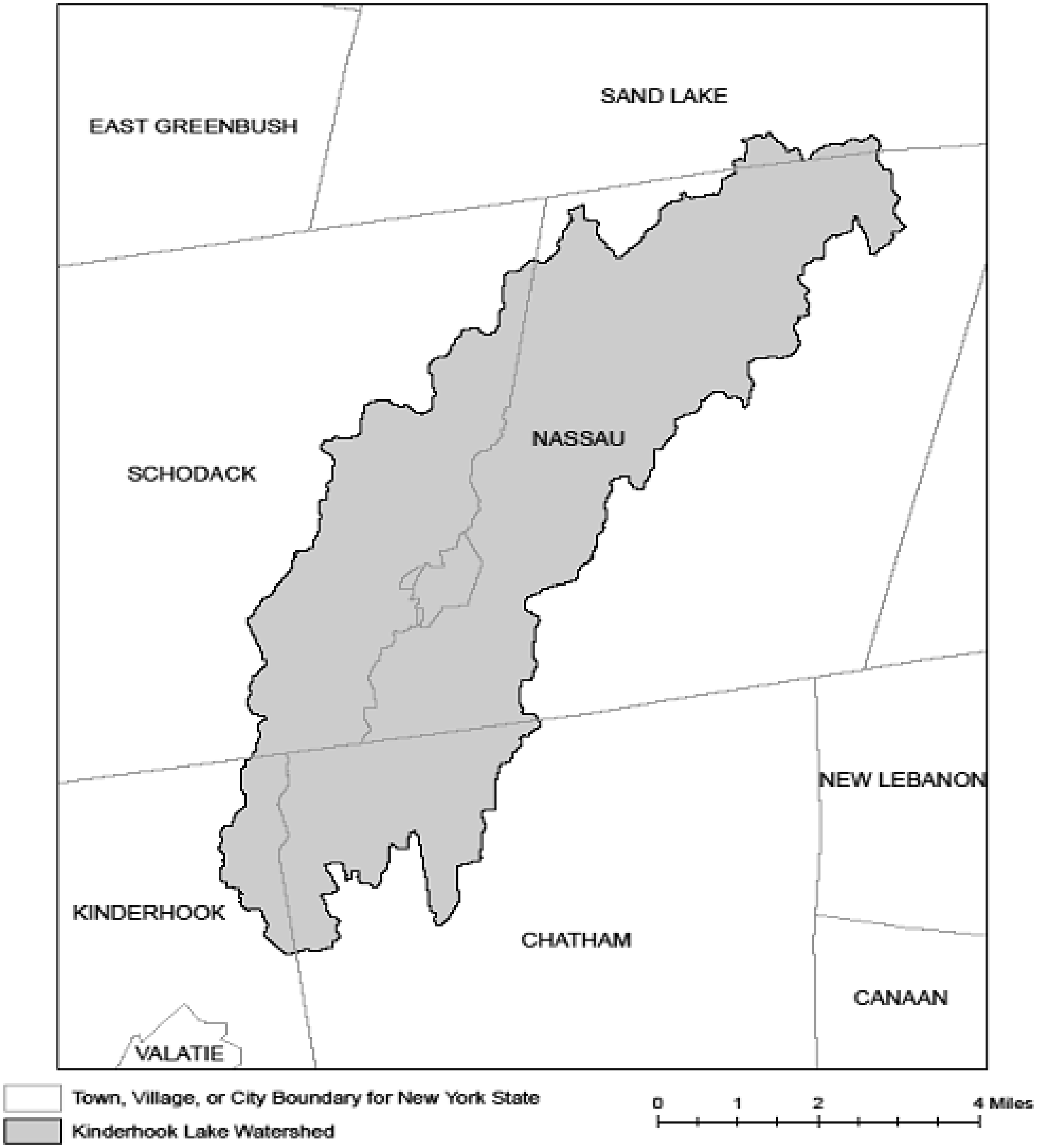


Figure 4 - Oscawana Lake Watershed



<u>Figure 5 - Kinderhook Lake Watershed</u>



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 B

MS4 SWPPP Acceptance Form
NYSDEC Notice of Intent (NOI)

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

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

for

Construction Activities Seeking Authorization Under SPDES General Permit

*(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)

I. Project Owner/Operator Information
1. Owner/Operator Name: BAC Properties, LLC
2. Contact Person: Brandon Ciccone
3. Street Address: 151 Daley Road
4. City/State/Zip: Poughkeepsie, NY 12603
II. Project Site Information
5. Project/Site Name: BAC Properties, LLC Full Build Out
6. Street Address: 30 Airport Drive
7. City/State/Zip: Wappingers Falls, NY 12590
III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information
8. SWPPP Reviewed by:
9. Title/Position:
10. Date Final SWPPP Reviewed and Accepted:
IV. Regulated MS4 Information
11. Name of MS4: Town of Wappinger
12. MS4 SPDES Permit Identification Number: NYR20A ______________________
13. Contact Person:
14. Street Address:
15. City/State/Zip:
16. Telephone Number:

(NYS DEC - MS4 SWPPP Acceptance Form - January 2010)

MS4 SWPPP Acceptance Form - continued

V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative

I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s).
Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.

Printed Name:

Title/Position:

Signature:

Date:

VI. Additional Information

0644089821

NOTICE OF INTENT

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

NYR ______ (for DEC use only)

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

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

-IMPORTANT-

RETURN THIS FORM TO THE ADDRESS ABOVE

OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)
BAC Properties, LLC

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
Ciccone

Owner/Operator Contact Person First Name
Brandon

Owner/Operator Mailing Address
151 Daley Road

City
Poughkeepsie

State
NY

Zip
12603 -

Phone (Owner/Operator)
845 4 622 8 2800

Fax (Owner/Operator)
845 4 631 2 4246

Email (Owner/Operator)
bciccone@benciccone.com

FED TAX ID
26 0 8503744 (not required for individuals)

6401089828

Project Site Information

Project/Site Name

BAC Properties, LLC Full Build Out

Street Address (NOT P.O. BOX)

30 Airport Drive

Side of Street

○ North ● South ○ East ○ West

City/Town/Village (THAT ISSUES BUILDING PERMIT)

Wappinger

State	Zip	County	DEC Region
NY	12590 -	Dutchess	3

Name of Nearest Cross Street

New Hackensack Road

Distance to Nearest Cross Street (Feet)

1056

Project In Relation to Cross Street

○ North ○ South ○ East ● West

Tax Map Numbers
Section-Block-Parcel

6259-04-578332

Tax Map Numbers

1. Provide the Geographic Coordinates for the project site. To do this, go to the NYSDEC Stormwater Interactive Map on the DEC website at:

https://gisservices.dec.ny.gov/gis/stormwater/

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located the centroid of your project site, go to the bottom right hand corner of the map for the X, Y coordinates. Enter the coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting)	Y Coordinates (Northing)
-7 3 8 7 2	4 1 6 2 7
Ex. -73.749	Ex. 42.652

2. What is the nature of this construction project?

○ **New Construction**

○ **Redevelopment with increase in impervious area**

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

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

Pre-Development Existing Land Use

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

Post-Development Future Land Use

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

Number of Lots:

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

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

Total Site Area	**Total Area To Be Disturbed**	**Existing Impervious Area To Be Disturbed**	**Future Impervious Area Within Disturbed Area**
9.69.6	7.77.7	3.93.9	3.83.8

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

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

A	**B**	**C**	**D**
0 %	80 %	0 %	20 %

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

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

Start Date 07/01/2023 - **End Date** 07/01/2024

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

Name

onsite wetland

9a. Type of waterbody identified in Question 9?

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

9b. How was the wetland identified?

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

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

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

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

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

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

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

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

Town of Wappinger

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

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

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

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

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

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

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

0251089825

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

● **Professional Engineer (P.E.)**

○ **Soil and Water Conservation District (SWCD)**

○ **Registered Landscape Architect (R.L.A)**

○ **Certified Professional in Erosion and Sediment Control (CPESC)**

○ **Owner/Operator**

○ **Other**

SWPPP Preparer

Povall Engineering, PLLC

Contact Name (Last, Space, First)

Povall, William

Mailing Address

3 NancyCourt, Suite 4

City

Wappingers Falls

State NY Zip 12590-

Phone 845-897-8205 Fax - -

Email

wendyp@povallengineering.com

whp@povallengineering.com

SWPPP Preparer Certification

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

First Name William **MI** H

Last Name Povall

Signature W. H Povall

Date 04/07/2023

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

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

Temporary Structural

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

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

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

Permanent Structural

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

Other

Post-construction Stormwater Management Practice (SMP) Requirements

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

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

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

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

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

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

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

Total WQv Required

0 . 20 8 . 25 8 5 **acre-feet**

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

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

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

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

	Selected	Total Contributing Area (acres)		Total Contributing Impervious Area(acres)
RR Techniques (Area Reduction)				
Conservation of Natural Areas (RR-1)	○	.	and/or	.
Sheetflow to Riparian Buffers/Filters Strips (RR-2)	○	.	and/or	.
Tree Planting/Tree Pit (RR-3)	●	.	and/or	.
Disconnection of Rooftop Runoff (RR-4)	○	.	and/or	.
RR Techniques (Volume Reduction)				
Vegetated Swale (RR-5)	○			.
Rain Garden (RR-6)	○			.
Stormwater Planter (RR-7)	○			.
Rain Barrel/Cistern (RR-8)	○			.
Porous Pavement (RR-9)	○			.
Green Roof (RR-10)	○			.
Standard SMPs with RRv Capacity				
Infiltration Trench (I-1)	○			.
Infiltration Basin (I-2)	○			.
Dry Well (I-3)	○			.
Underground Infiltration System (I-4)	○			.
Bioretention (F-5)	○			.
Dry Swale (O-1)	○			.
Standard SMPs				
Micropool Extended Detention (P-1)	○			.
Wet Pond (P-2)	○			.
Wet Extended Detention (P-3)	○			.
Multiple Pond System (P-4)	○			.
Pocket Pond (P-5)	●			3 . 73 7 7 7
Surface Sand Filter (F-1)	○			.
Underground Sand Filter (F-2)	○			.
Perimeter Sand Filter (F-3)	○			.
Organic Filter (F-4)	○			.
Shallow Wetland (W-1)	○			.
Extended Detention Wetland (W-2)	○			.
Pond/Wetland System (W-3)	○			.
Pocket Wetland (W-4)	○			.
Wet Swale (O-2)	○			.

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

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

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

Name ______________________________

Manufacturer ______________________________

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

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

Total RRv provided

___ . ___ **acre-feet**

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

○ **Yes** ○ **No**

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

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

Minimum RRv Required

___ . ___ **acre-feet**

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

○ **Yes** ○ **No**

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

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

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

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

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

WQv Provided

.544 **acre-feet**

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

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a). 0.544

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

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

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

CPv Required	**CPv Provided**
0.479 **acre-feet**	0.485 **acre-feet**

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

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

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

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

Total Overbank Flood Control Criteria (Qp)

Pre-Development	**Post-development**
48.91 **CFS**	48.84 **CFS**

Total Extreme Flood Control Criteria (Qf)

Pre-Development	**Post-development**
105.32 **CFS**	105.01 **CFS**

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

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

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed?

● Yes ○ No

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

BAC PROPERTIES LLC

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

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

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

41. Does this project require a US Army Corps of Engineers Wetland Permit? ○ Yes ● No
If Yes, Indicate Size of Impact. 0.0 0.0

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

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

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

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Owner/Operator Certification

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

Print First Name

Brandon

MI

Print Last Name

Ciccone

Owner/Operator Signature

Date

04/07/2023

Appendix C

Pre-Construction Meeting Documents

Pre-Construction Meeting Documents

Project Name ______________________________
Permit No. ______________ **Date of Authorization** ______________
Name of Operator ______________________________
Prime Contractor ______________________________

Preamble to Site Assessment and Inspections

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 (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.

1 "Qualified Professional" means a person knowledgeable in the principles and practices 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. Clearing that involves the cutting and removal of trees, brush using wheeled or tracked equipment is considered a construction activity that will result in soil disturbance. However, 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.
3 "Final Stabilization" means that all soil-disturbing activities have ceased and a uniform, perennial vegetative cover with a density of 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.

Owner's/Operator's Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluated the information submitted. Based on my inquiry of the persons 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 ____________________

Contractor's Certification

"I hereby certify 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 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 understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of State of New York and could subject me to criminal, civil and/or administrative proceedings."

Contracting Firm Name ______________________________

Address ______________________________

Phone ______________ **Fax** ______________

Name (please print) ______________________________

Title ______________________ **Date** ______________

Signature ______________________________

SWPPP Responsibilities ______________________________

____

____

____

Trained Individual Name (please print) ______________________________

Title ______________________ **Date** ______________

Signature ______________________________

SWPPP Responsibilities ______________________________

____

____

Note: All contractors involved with Stormwater related activities shall sign a contractor's certification form.

Subcontractor's Certification

"I hereby certify 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 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 understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of State of New York and could subject me to criminal, civil and/or administrative proceedings."

Subcontracting Firm Name ____________________

Address ____________________

Phone ____________________ **Fax** ____________________

Name (please print) ____________________

Title ____________________ **Date** ____________________

Signature ____________________

SWPPP Responsibilities ____________________

____

____

____

Trained Individual Name (please print) ____________________

Title ____________________ **Date** ____________________

Signature ____________________

SWPPP Responsibilities ____________________

____

____

Note: All contractors involved with Stormwater related activities shall sign a contractor's certification form.

Qualified Professional's Credentials and 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."

Firm Name ____

Name (please print) ____

Title ______________________________ **Date** ____________________

Address ____

Phone ____________________ **Email** ______________________________

Signature ____

"Qualified Professional" means a person knowledgeable in the principles and practices 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).

Pre-Construction Site Assessment Check List

1. Notice of Intent, SWPPP, and Contractors Certification:

Yes	No	NA	
☐	☐	☐	Has a Notice of Intent been filed with the NYSDEC?
☐	☐	☐	Is the SWPPP onsite? Where? ________________
☐	☐	☐	Is the Plan current? Latest revision date ________________
☐	☐	☐	Is a copy of the NOI Acknowledgement in the Site Log Book?
☐	☐	☐	Is a copy of the signed MS4 SWPPP Acceptance Form in the Site Log Book?
☐	☐	☐	Have all the certification statement been signed and copies placed in Site Log Book?

2. Resource Protection:

Yes	No	NA	
☐	☐	☐	Are construction limits clearly flagged or fenced?
☐	☐	☐	Have all important trees, onsite septic system adsorption fields, existing vegetated areas suitable for filter strips (especially in perimeter area) 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 onsite or in the vicinity of the site have been identified and protected.
☐	☐	☐	Appropriate practices to protect onsite 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 highways 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 intervals.
☐	☐	☐	Sediment/detention basin 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?________________

Appendix D

Sample Forms

CONSTRUCTION DURATION INSPECTIONS

SITE PLAN/SKETCH

______________________________________ ______________________________________

Qualified Professional (print name) **Qualified Professional Signature**

CONSTRUCTION DURATION INSPECTIONS

________________	________________	________________
Date of Inspection	**Weather**	**Time**

____

Soil Conditions (e.g., dry, wet, saturated)

____

Description of the condition of receiving waters at all points of discharge

________________	________________
Qualified Professional (print name)	**Qualified Professional Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

1. Maintaining Water Quality

Yes No NA

☐ ☐ ☐ 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, or globules or grease?
☐ ☐ ☐ All disturbance is within the limits of the approved plan.
☐ ☐ ☐ Have receiving lake/bay, stream, and/or wetland been impacted by silt form project?

2. Housekeeping

a. General Site Conditions:

Yes No NA

☐ ☐ ☐ 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 construction impacting the adjacent property?
☐ ☐ ☐ Is dust adequately controlled?

b. Temporary Stream Crossing:

Yes No NA

☐ ☐ ☐ 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 for vehicles and prevent sediment from entering stream during high flow.

3. Runoff Control Practices

a. Excavation Dewatering:

Yes No NA

☐ ☐ ☐ Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.
☐ ☐ ☐ Clean water from upstream pool is being pumped to downstream pool.
☐ ☐ ☐ Sediment laden water form work area is being discharged to a silt-trapping device.
☐ ☐ ☐ Constructed upstream berm with one-foot minimum freeboard.

CONSTRUCTION DURATION INSPECTIONS

Runoff Control Practices (continued)

b. Level Spreader:

Yes No NA

☐ ☐ ☐ Installed per plan?
☐ ☐ ☐ Constructed on undisturbed soil, not on fill, receiving only clean, non-sediment laden flow.
☐ ☐ ☐ Flow sheets out of level spreader without erosion on downstream edge.

c. Inceptor Dikes and Swales:

Yes No NA

☐ ☐ ☐ 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.

d. Stone Check Dam:

Yes No NA

☐ ☐ ☐ Is channel stable? (Flow is not eroding soil underneath or around structure).
☐ ☐ ☐ Check is in good condition (rocks in place and no permanent pools behind the structure).
☐ ☐ ☐ Has accumulated sediment been removed?

e. Rock Outlet Protection:

Yes No NA

☐ ☐ ☐ Installed per plan?
☐ ☐ ☐ Installed concurrently with pipe installation?

4. Soil Stabilization

a. Topsoil and Spoil Stockpiles:

Yes No NA

☐ ☐ ☐ Stockpiles are stabilized with vegetation and/or mulch.
☐ ☐ ☐ Sediment control is installed at the toe of the slope.

b. Revegetation:

Yes No NA

☐ ☐ ☐ Temporary seedings and mulch have been applied to idle areas.
☐ ☐ ☐ 4 inches minimum of topsoil has been applied under permanent seedings.

5. Sediment Control Practices

a. Stabilized Construction Entrance:

Yes No NA

☐ ☐ ☐ 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?

CONSTRUCTION DURATION INSPECTIONS

Sediment Control Practices (continued)

b. Silt Fence:

Yes No NA
☐ ☐ ☐ 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 6 inches minimum.
☐ ☐ ☐ Posts are stable, fabric is tight and without ripping or frayed areas.
Sediment accumulation is _______% of design capacity.

c. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated practices):

Yes No NA
☐ ☐ ☐ Installed concrete blocks lengthwise so open ends face outward, not upward.
☐ ☐ ☐ Placed wire screen between No. 3 crushed stone and concrete blocks.
☐ ☐ ☐ Drainage area is 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/posts with staples at max 8-inch spacing.
☐ ☐ ☐ Posts are stable; fabric is tight without rips or frayed areas.
Sediment accumulation is _______% of design capacity.

d. Temporary Sediment Trap:

Yes No NA
☐ ☐ ☐ Outlet structure is constructed per the approved plan or drawing.
☐ ☐ ☐ Geotextile fabric has been placed beneath rock fill.
Sediment accumulation is _______% of design capacity.

e. Temporary Sediment Basin:

Yes No NA
☐ ☐ ☐ Basin and outlet structure constructed per the approved plan.
☐ ☐ ☐ Basin side slopes are stabilized with seed/mulch.
☐ ☐ ☐ Drainage structure flushed and basin surface restored upon removal of sediment facility.
Sediment accumulation is _______% of design capacity.

CONSTRUCTION DURATION INSPECTIONS

Stormwater Pond Construction

a. Pre-Construction Materials and Equipment:

Yes No NA

☐ ☐ ☐ Pre-Construction Meeting.

a. Pipe and appurtenances on-site prior to construction and dimensions checked:

Yes No NA

☐ ☐ ☐ Material (including protective coating, if specified).
☐ ☐ ☐ Diameter.
☐ ☐ ☐ Dimensions of metal riser or precast concrete outlet structure.
☐ ☐ ☐ Required dimensions between water control structures (orifices, weirs, etc.) are in accordance with approved plans.
☐ ☐ ☐ Barrel stub for prefabricated pipe structures at proper angle for design barrel slope.
☐ ☐ ☐ Number and dimensions of prefabricated anti-seep collars.
☐ ☐ ☐ Watertight connectors and gaskets.
☐ ☐ ☐ Outlet drain valve.

☐ ☐ ☐ Project benchmark near pond site.
☐ ☐ ☐ Equipment for temporary de-watering.

b. Subgrade Preparation:

Yes No NA

☐ ☐ ☐ Area beneath embankment stripped of all vegetation, topsoil, and organic matter.

c. Pipe Spillway Installation

a. Bed preparation:

Yes No NA

☐ ☐ ☐ Installation trench excavated with specified side slopes.
☐ ☐ ☐ Stable, uniform, dry subgrade of relatively impervious material (If subgrade is wet, contractor shall have defined steps before proceeding with installation).
☐ ☐ ☐ Invert at proper elevation and grade.

b. Pipe placement (metal/plastic pipe):

Yes No NA

☐ ☐ ☐ Watertight connectors and gaskets properly installed.
☐ ☐ ☐ Anti-seep collars properly spaced and having watertight connections to pipe.
☐ ☐ ☐ Backfill placed and tamped by hand under “haunches” of pipe.
☐ ☐ ☐ Remaining backfill placed in max. 8 inch lifts using small power tamping equipment until 2 feet cover over pipe is reached.

CONSTRUCTION DURATION INSPECTIONS

Stormwater Pond Construction (continued)

c. Pipe placement (concrete pipe):

Yes No NA

☐ ☐ ☐ Pipe set on blocks or concrete slab for pouring of low cradle.
☐ ☐ ☐ Pipe installed with rubber gasket joints with no spalling in gasket interface area.
☐ ☐ ☐ Excavation for lower half of anti-seep collar(s) with reinforcing steel set.
☐ ☐ ☐ Entire area where anti-seep collar(s) will come in contact with pipe coated with mastic or other approved waterproof sealant.
☐ ☐ ☐ Low cradle and bottom half of anti-seep collar installed as monolithic pour and of an approved mix.
☐ ☐ ☐ Upper half of anti-seep collar(s) formed with reinforcing steel set.
☐ ☐ ☐ Concrete for collar of an approved mix and vibrated into place (protected from freezing while curing, if necessary).
☐ ☐ ☐ Forms stripped and collar inspected for honeycomb prior to backfilling. Parge if necessary.

d. Backfilling:

Yes No NA

☐ ☐ ☐ Fill placed in maximum 8 inch lifts.
☐ ☐ ☐ Backfill taken minimum 2 feet above top of antiseep collar elevation before traversing with heavy equipment.

d. Riser/Outlet Structure Installation:

a. Riser located within embankment (metal riser):

Yes No NA

☐ ☐ ☐ Riser base excavated or formed on stable subgrade to design dimensions.
☐ ☐ ☐ Set on blocks to design elevations and plumbed.
☐ ☐ ☐ Reinforcing bars placed at right angles and projecting into sides of riser.
☐ ☐ ☐ Concrete poured so as to fill inside of riser to invert of barrel.

b. Riser located within embankment (Pre-cast concrete structure):

Yes No NA

☐ ☐ ☐ Dry and stable subgrade.
☐ ☐ ☐ Riser base set to design elevation.
☐ ☐ ☐ If more than one section, no spalling in gasket interface area; gasket or approved caulking material placed securely.
☐ ☐ ☐ Watertight and structurally sound collar or gasket joint where structure connects to pipe spillway.

c. Riser located within embankment (poured concrete structure):

Yes No NA

☐ ☐ ☐ Footing excavated or formed on stable subgrade, to design dimensions with reinforcing steel set.
☐ ☐ ☐ Structure formed to design dimensions, with reinforcing steel set as per plan.
☐ ☐ ☐ Concrete of an approved mix and vibrated into place (protected from freezing while curing, if necessary).
☐ ☐ ☐ Forms stripped & inspected for "honeycomb" prior to backfilling; parge if necessary.

CONSTRUCTION DURATION INSPECTIONS

Stormwater Pond Construction (continued)

e. Embankment Construction:

Yes	No	NA	
☐	☐	☐	Fill material.
☐	☐	☐	Compaction.

a. Embankment:

Yes	No	NA	
☐	☐	☐	Fill placed in specified lifts and compacted with appropriate equipment.
☐	☐	☐	Constructed to design cross-section, side slopes and top width.
☐	☐	☐	Constructed to design elevation plus allowance for settlement.

f. Impounded Area Construction:

Yes	No	NA	
☐	☐	☐	Excavated / graded to design contours and side.
☐	☐	☐	Slopes Inlet pipes have adequate outfall protection.
☐	☐	☐	Forebay(s).
☐	☐	☐	Pond benches.

g. Earth Emergency Spillway Construction:

Yes	No	NA	
☐	☐	☐	Spillway located in cut or structurally stabilized with riprap, gabions, concrete, etc.
☐	☐	☐	Excavated to proper cross-section, side slopes and bottom width.
☐	☐	☐	Entrance channel, crest, and exit channel constructed to design grades and elevations.

h. Outlet Protection:

a. End section:

Yes	No	NA	
☐	☐	☐	Securely in place and properly backfilled.

b. Endwall:

Yes	No	NA	
☐	☐	☐	Footing excavated or formed on stable subgrade, to design dimensions and reinforcing steel set, if specified.
☐	☐	☐	Endwall formed to design dimensions with reinforcing steel set as per plan.
☐	☐	☐	Concrete of an approved mix and vibrated into place (protected from freezing, if necessary).
☐	☐	☐	Forms stripped and structure inspected for "honeycomb" prior to backfilling; parge if necessary

c. Riprap apron / channel:

Yes	No	NA	
☐	☐	☐	Apron / channel excavated to design crosssection with proper transition to existing ground.
☐	☐	☐	Filter fabric in place.
☐	☐	☐	Stone sized as per plan and uniformly place at the thickness specified.

CONSTRUCTION DURATION INSPECTIONS

Stormwater Pond Construction (continued)

i. Vegetative Stabilization:

Yes	No	NA	
☐	☐	☐	Approved seed mixture or sod.
☐	☐	☐	Proper surface preparation and required soil amendments.
☐	☐	☐	Excelsior mat or other stabilization, as per plan.

j. Miscellaneous:

Yes	No	NA	
☐	☐	☐	Drain for ponds having a permanent pool.
☐	☐	☐	Trash rack/anti-vortex device secured to outlet structure.
☐	☐	☐	Trash protection for low flow pipes, orifices, etc.
☐	☐	☐	Fencing (when required).
☐	☐	☐	Access road.
☐	☐	☐	Set aside for clean-out maintenance.

k. Stormwater Wetlands

Yes	No	NA	
☐	☐	☐	Adequate water balance.
☐	☐	☐	Variety of depth zones present.
☐	☐	☐	Approved pondscaping plan in place.
☐	☐	☐	Reinforcement budget for additional plantings.
☐	☐	☐	Plants and materials ordered 6 months prior to construction.
☐	☐	☐	Construction planned to allow for adequate planting and establishment of plant community (April-June planting window).
☐	☐	☐	Wetland buffer area preserved to maximum extent possible.

Comments:

____

____

____

____

____

____

____

MODIFICATIONS TO THE SWPPP

The SWPPP shall be amended whenever:

1. There is a significant change in design, construction, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the water of the United States and which has not otherwise been addressed in the SWPPP; or
2. The SWPPP proves to be ineffective in:
   a. Eliminating or significantly minimizing pollutants form sources identified in the SWPPP and as required by the General Permit; or
   b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

Modification and Reason:

CERTIFICATION OF FINAL SITE STABILIZATION

Check List:

Yes	No	NA	
☐	☐	☐	All Soil disturbing activities are complete.
☐	☐	☐	Temporary erosion and sediment control measures have been removed or will be removed at the appropriate time.
☐	☐	☐	All areas of the construction site not otherwise covered by a permanent pavement or structure have been stabilized with a uniform perennial vegetative cover with a density of 80% or equivalent measures have been employed.

Qualified Professional Certification:

I hereby certify that the site has undergone Final Stabilization. "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. Furthermore, all temporary erosion and sediment controls not specified for permanent erosion control have been removed.

____
Qualified Professional (print name)

____________________________________ __________________________
Qualified Professional Signature **Date**

Appendix E

NYSDEC Notice of Termination (NOT)

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: BAC Properties, LLC

2. Street Address: 151 Daley Road

3. City/State/Zip: Poughkeepsie, NY 12603

4. Contact Person: Brandon Ciccone — 4a.Telephone: 845-462-2800

4b. Contact Person E-Mail: bciccone@benciccone.com

II. Project Site Information

5. Project/Site Name: BAC Properties, LLC Full Build Out

6. Street Address: 30 Airport Drive

7. City/Zip: Town of Wappinger 12590

8. County: Dutchess

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:

Appendix F

Design Calculations

POVALL ENGINEERING, PLLC

25 Corporate Park Drive, Suite C
Hopewell Junction, NY 12533

P: (845) 897-8205
F: (845) 897-0042

Job No.:	0826	**Prepared By:**	CMZ	**Date:**	6/17/10	**Reviewed By:**	WHP
Job Name:	BAC Properties	**Revised By:**	*CMZ*	**Rev. Date:**	*2/24/11*	**Reviewed By:**	WHP
Location:	Airport Drive	**Municipality:**	Town of Wappinger			**County:**	Dutchess
Basis for Design:	NYSDEC "Stormwater Management Design Manual", April 2008 Edition						

WATER QUALITY VOLUME CALCULATIONS

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

WQ_v = Water Quality Volume (acre-feet)

P = 90% Rainfall Event Number = 1.10 inches

$R_v = 0.05+0.009(I)$; $R_{vmin} = 0.2$

I = impervious Cover (%)

A = Site Area in acres

Subcatchment	Site Area (ac)	Impervious Cover (ac)	I (%)	R_v	Inputted R_v	WQ_v (ac-ft)	WQ_v (cf)	Treatment Method
1B	4.500	2.500	55.56	0.550	0.550	0.2269	9,883	Pocket Pond
1C	1.880	0.030	1.60	0.064	0.200	0.0345	1,501	Pocket Pond
1D	0.440	0.440	100.00	0.950	0.950	0.0383	1,669	Pocket Pond
1E	0.920	0.800	86.96	0.833	0.833	0.0702	3,059	Pocket Pond

Req.Water Quality Volume for Pocket Pond = 16,112 cf

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Job Name:	BAC Properties	**Revised By:**	*CMZ*	**Rev. Date:**	*2/24/11*	**Reviewed By:**	WHP
Location:	Airport Drive	**Municipality:**	Town of Wappinger			**County:**	Dutchess
Basis for Design:	NYSDEC "Stormwater Management Design Manual", April 2008 Edition						

WATER QUANTITY VOLUME CALCULATIONS - POND A

Channel Protection Volume

A = 7.74 ac

CN = 79

Ia = 0.532

$P_{1\ yr\ storm}$ = 2.80 in

$Ia/P_{1\ yr\ storm}$ = 0.190

T_c = 6 min = 0.10 hours

q_u = 632 csm/in (from Exhibit 4-III of TR-55)

q_0/q_i = 0.035 (from Figure 8.5 of NYS Stormwater Mgt Design Manual)

Vs/Vr = 0.683 - 1.43(qo/qi) +1.64(qo/qi) 2 - 0.804(qo/qi) 3 (from Appendix B)
Where Vs equals channel protection storage (Cpv) and

$V_s/V_r = 0.683 - 1.43(q_o/q_i) + 1.64(q_o/q_i)^2 - 0.804(q_o/q_i)^3$

V_s/V_r = 0.635

$Q_{1\ yr\ storm}$ = 1.17 in (from HydroCAD 1 year storm runoff)

$V_s = C_{pv}$ = 0.48 ac-ft = 20,871.59 cf

Avg Release Rate = 0.24 cfs (rate to be release over 24 hour period)

Overbank Flood Protection Volume

q_0 = 48.91 cfs (pre-development)

q_i = 48.95 cfs (post-development w/out proposed modifications)

q_0/q_i = 0.999

$V_s/V_r = 0.683 - 1.43(q_o/q_i) + 1.64(q_o/q_i)^2 - 0.804(q_o/q_i)^3$

V_s/V_r = 0.089

$Q_{10\ yr\ storm}$ = 1.866 ac-ft = 81,283 cf (from HydroCAD 10 year storm runoff)

$V_s = Q_{pv}$ = 0.17 ac-ft = 7,271 cf

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Location:	Airport Drive	**Municipality:**	Town of Wappinger			**County:**	Dutchess
Basis for Design:	NYSDEC "Stormwater Management Design Manual", April 2008 Edition						

WATER QUANTITY VOLUME CALCULATIONS - POND A

Extreme Flood Protection Volume

q_0 = 105.32 cfs (pre-development)

q_i = 105.34 cfs (post-development w/out proposed modifications)

q_0/q_i = 1.000

$V_s/V_r = 0.683 - 1.43(q_o/q_i) + 1.64(q_o/q_i)^2 - 0.804(q_o/q_i)^3$

V_s/V_r = 0.089

$Q_{100\ yr\ storm}$ = 3.571 ac-ft = 155,553 cf (from HydroCAD 100 year storm runoff)

$V_s = Q_{fv}$ = 0.32 ac-ft = 13,861 cf

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Job Name:	BAC Properties	**Revised By:**	*CMZ*	**Rev. Date:**	*2/24/11*	**Reviewed By:**	WHP
Location:	Airport Drive	**Municipality:**	Town of Wappinger			**County:**	Dutchess
Basis for Design:	NYSDEC "Stormwater Management Design Manual", April 2008 Edition						

OUTLET CONTROL STRUCTURE SIZING - POND A

Water Quality Volume

Total Water Quality Volume =	16,112	cf =	0.370 ac-ft		
Stormwater Pond Type:	Pocket Pond (P-5)				
Required Forebay Volume =	10	% =	1,611.18 cf		
Required Permanent Pool Vol =	50	% =	8,055.88 cf, included the forebay volume		
Required Extended Det. Vol =	50	% =	8,055.88 cf (max)		
Req'ed Extended Det. 24 hr release rate =	0.093	cfs			
Provided Forebay Volume (FB-1) =	1,843	cf			
Provided Forebay Volume (FB-2) =	1,551	cf			
Total Provided Forebay Volume =	3,394	cf	is ≥ to required?	yes	
Required remaining Permanent Pool Vol =	4,661.88	cf			
Set Permanent Pool Elev @	155.75	ft			
Corresponding Volume =	23,697	cf			
Total Provided Permanent Pool Vol =	27,091	cf	is ≥ to required?	yes	
Set Extended Det. Elev @	155.96	ft			
Corresponding Volume =	1,269	cf	is ≤ to required?	yes	

Required WQv-ED Orifice and Elevation

Set invert Elev @	155.75 ft				
Average head =	0.11 ft				
Orifice Equation: Q =	$Q = CA(2gh)^{0.5}$				
C =	0.6				
g =	32.2 fps				
$A = Q/(C[(2gh)^{0.5}]$ =		0.060 sf			
$d = ((4A)/\pi)^{0.5}$ =		0.276 ft =		3.31	in
			use =	4.00	in orifice

$Q_{WQV\text{-}ED} = 0.420\ (h)^{0.5}$ where h = wsel - 155.917

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OUTLET CONTROL STRUCTURE SIZING - POND A

Required Channel Protection Orifice and Elevation

Required Channel Protection Vol = 20,871.59 cf
Req. Channel Protection Release Rate = 0.24 cfs

Set invert Cpv Elev @ 157.28 ft
Corresponding Volume = 21,127 cf   is $\geq$ to required?   yes

Set Cpv Orifice Elev @ 155.96 ft
Average head = 0.68 ft
Average WQv-ED orifice release rate = 0.347 cfs
Cpv-ED orifice release = -0.105 cfs

Head = 0.66 ft
Orifice Equation: Q = $Q = CA(2gh)^{0.5}$
C = 0.6
g = 32.2 fps
$A = Q/(C[(2gh)^{0.5}] =$ -0.027 sf

Note: No outlet necessary, since all of the stormwater is leaving through the low flow orifice.

Overbank Flood Protection Volume

Required Overbank Flood Protection Vol = 7,271 cf

Peak 10-year elev in proposed pond @ 157.81 ft
Corresponding Volume = 29,442 cf   is $\geq$ to required?   yes

Extreme Flood Protection Volume

Required Overbank Flood Protection Vol = 13,861 cf

Peak 10-year elev in proposed pond @ 158.51 ft
Corresponding Volume = 41,016 cf   is $\geq$ to required?   yes

Stage-Area-Storage for Pond A: Pocket Pond (P-5) (continued)

PEAK @ 157.81, CUM. STORAGE = 53,139 CF
VOL. ABOVE PERM POOL = 29,442 CF

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
157.24	15,505	44,219
157.26	15,536	44,522
157.28	15,566	44,824
157.30	15,596	45,126
157.32	15,626	45,429
157.34	15,656	45,731
157.36	15,687	46,033
157.38	15,717	46,336
157.40	15,747	46,638
157.42	15,777	46,940
157.44	15,807	47,243
157.46	15,838	47,545
157.48	15,868	47,848
157.50	15,898	48,150
157.52	15,928	48,452
157.54	15,958	48,755
157.56	15,989	49,057
157.58	16,019	49,359
157.60	16,049	49,662
157.62	16,079	49,964
157.64	16,109	50,266
157.66	16,140	50,569
157.68	16,170	50,871
157.70	16,200	51,173
157.72	16,230	51,476
157.74	16,260	51,778
157.76	16,291	52,081
157.78	16,321	52,383
157.80	16,351	52,685
157.82	16,381	52,988
157.84	16,411	53,290
157.86	16,442	53,592
157.88	16,472	53,895
157.90	16,502	54,197
157.92	16,532	54,499
157.94	16,562	54,802
157.96	16,593	55,104
157.98	16,623	55,406
158.00	16,653	55,709
158.02	16,693	56,062
158.04	16,734	56,415
158.06	16,774	56,768
158.08	16,815	57,121
158.10	16,855	57,474
158.12	16,896	57,827
158.14	16,936	58,181
158.16	16,977	58,534
158.18	17,017	58,887
158.20	17,058	59,240
158.22	17,098	59,593
158.24	17,139	59,946
158.26	17,179	60,299
158.28	17,220	60,652
158.30	17,260	61,005
158.32	17,301	61,358
158.34	17,341	61,712
158.36	17,382	62,065
158.38	17,422	62,418
158.40	17,463	62,771
158.42	17,503	63,124
158.44	17,544	63,477
158.46	17,584	63,830
158.48	17,625	64,183
158.50	17,665	64,536
158.52	17,705	64,890
158.54	17,746	65,243
158.56	17,786	65,596
158.58	17,827	65,949
158.60	17,867	66,302
158.62	17,908	66,655
158.64	17,948	67,008
158.66	17,989	67,361
158.68	18,029	67,714
158.70	18,070	68,068
158.72	18,110	68,421
158.74	18,151	68,774
158.76	18,191	69,127
158.78	18,232	69,480
158.80	18,272	69,833
158.82	18,313	70,186
158.84	18,353	70,539
158.86	18,394	70,892
158.88	18,434	71,245
158.90	18,475	71,599
158.92	18,515	71,952
158.94	18,556	72,305
158.96	18,596	72,658
158.98	18,637	73,011
159.00	18,677	73,364
159.02	18,720	73,759
159.04	18,763	74,154
159.06	18,806	74,549
159.08	18,849	74,943
159.10	18,892	75,338
159.12	18,935	75,733
159.14	18,977	76,128
159.16	19,020	76,523
159.18	19,063	76,917
159.20	19,106	77,312
159.22	19,149	77,707
159.24	19,192	78,102
159.26	19,235	78,497
159.28	19,278	78,891
159.30	19,321	79,286

Stage-Area-Storage for Pond A: Pocket Pond (P-5) (continued)

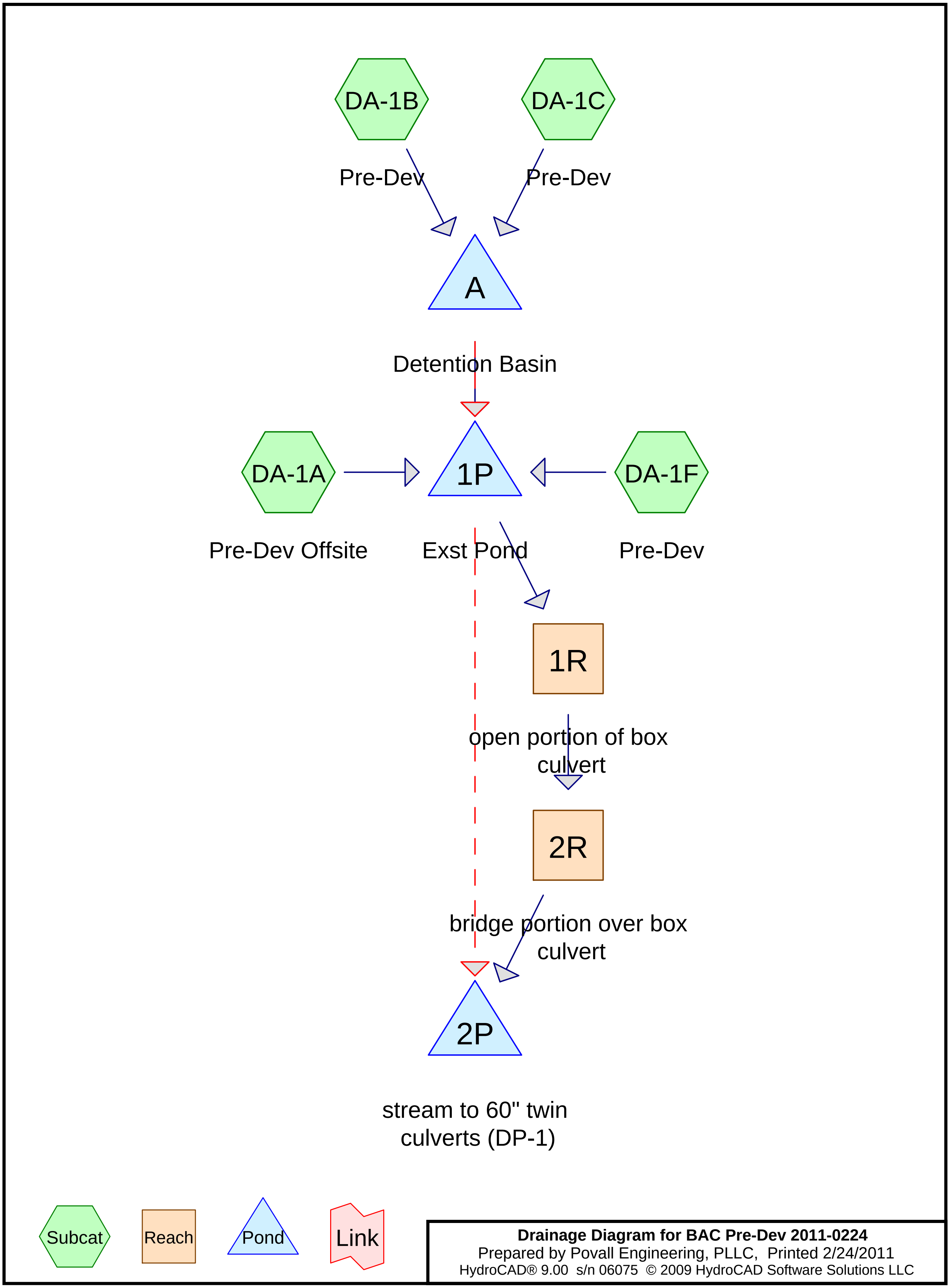
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
157.24	15,505	44,219	158.28	17,220	60,652
157.26	15,536	44,522	158.30	17,260	61,005
157.28	15,566	44,824	158.32	17,301	61,358
157.30	15,596	45,126	158.34	17,341	61,712
157.32	15,626	45,429	158.36	17,382	62,065
157.34	15,656	45,731	158.38	17,422	62,418
157.36	15,687	46,033	158.40	17,463	62,771
157.38	15,717	46,336	158.42	17,503	63,124
157.40	15,747	46,638	158.44	17,544	63,477
157.42	15,777	46,940	158.46	17,584	63,830
157.44	15,807	47,243	158.48	17,625	64,183
157.46	15,838	47,545	158.50	17,665	64,536
157.48	15,868	47,848	158.52	17,705	64,890
157.50	15,898	48,150	158.54	17,746	65,243
157.52	15,928	48,452	158.56	17,786	65,596
157.54	15,958	48,755	158.58	17,827	65,949
157.56	15,989	49,057	158.60	17,867	66,302
157.58	16,019	49,359	158.62	17,908	66,655
157.60	16,049	49,662	158.64	17,948	67,008
157.62	16,079	49,964	158.66	17,989	67,361
157.64	16,109	50,266	158.68	18,029	67,714
157.66	16,140	50,569	158.70	18,070	68,068
157.68	16,170	50,871	158.72	18,110	68,421
157.70	16,200	51,173	158.74	18,151	68,774
157.72	16,230	51,476	158.76	18,191	69,127
157.74	16,260	51,778	158.78	18,232	69,480
157.76	16,291	52,081	158.80	18,272	69,833
157.78	16,321	52,383	158.82	18,313	70,186
157.80	16,351	52,685	158.84	18,353	70,539
157.82	16,381	52,988	158.86	18,394	70,892
157.84	16,411	53,290	158.88	18,434	71,245
157.86	16,442	53,592	158.90	18,475	71,599
157.88	16,472	53,895	158.92	18,515	71,952
157.90	16,502	54,197	158.94	18,556	72,305
157.92	16,532	54,499	158.96	18,596	72,658
157.94	16,562	54,802	158.98	18,637	73,011
157.96	16,593	55,104	159.00	18,677	73,364
157.98	16,623	55,406	159.02	18,720	73,759
158.00	16,653	55,709	159.04	18,763	74,154
158.02	16,693	56,062	159.06	18,806	74,549
158.04	16,734	56,415	159.08	18,849	74,943
158.06	16,774	56,768	159.10	18,892	75,338
158.08	16,815	57,121	159.12	18,935	75,733
158.10	16,855	57,474	159.14	18,977	76,128
158.12	16,896	57,827	159.16	19,020	76,523
158.14	16,936	58,181	159.18	19,063	76,917
158.16	16,977	58,534	159.20	19,106	77,312
158.18	17,017	58,887	159.22	19,149	77,707
158.20	17,058	59,240	159.24	19,192	78,102
158.22	17,098	59,593	159.26	19,235	78,497
158.24	17,139	59,946	159.28	19,278	78,891
158.26	17,179	60,299	159.30	19,321	79,286

PEAK @ 158.51
CUM. STORAGE = 64713 CF
VOL. ABOVE PERM. POOL = 41,016 CF

Is this project subject to Chapter 9 of the NYS Design Manual?...			yes		
Design Point: 1			*Manually enter P, Total Area and Impervious Cover.*		
P= 1.10 *inch*					
Site Conditions					
Existing impervious area to be disturbed	3.89	acres			
Proposed impervious area	3.77	acres			
Is there an increase in impervious area?	-0.12	no			
Does the plan propose a reduction of existing impervious cover by a minimum of 25% of the total distrubed, impervious area?	3%	no	*Calculate water quality requirement.*		
Water Quality Volume for the Existing Impervious Area to be Disturbed					
Item	**Site Area (Acres)**	**Impervious Area (Acres)**	**Percent Impervious %**	**Rv**	**WQv**
Water Quality Calculation:	7.74	3.89	50	0.499	16,543
Treat 75% of Existing WQv:		**12,407**	**cf**		
Identify Runoff Reduction Techniques by Area					
Technique	**Total Contributing Area** (Acres)	**Contributing Impervious Area** (Acres)	**Notes**		
Conservation of Natural Areas			*minimum 10,000 sf*		
Riparian Buffers			*maximum contributing length 75 feet to 150*		
Filter Strips					
Tree Planting			*Up to 100 sf directly connected impervious*		
Total					
Recalculate WQv after application of Area Reduction Techniques					
	Total Area *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient**	**WQv** *(ft^3)*
Initial WQv	0.00	0.00	0%	0.05	0
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	**0.00**	**0.00**	0%	0.05	0
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and	0.00	0.00	0%	0.05	**0**
WQv reduced by Area Reduction techniques					0
Total Required Water Quality Volume					
Required WQv for Existing Impervious Area to be Disturbed		12,407	cf		
Proposed Conditions WQv Utilizing Standard SMPs		23,697	cf		
Is Proposed WQv > Required WQv?		yes			

Appendix G

Pre-Development HydroCAD Analysis



Drainage Diagram for BAC Pre-Dev 2011-0224
Prepared by Povall Engineering, PLLC, Printed 2/24/2011
HydroCAD® 9.00 s/n 06075 © 2009 HydroCAD Software Solutions LLC

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1A: Pre-Dev Offsite Runoff Area=82.599 ac 5.77% Impervious Runoff Depth=0.74"
Flow Length=3,950' Tc=147.5 min CN=73 Runoff=13.59 cfs 5.073 af

Subcatchment DA-1B: Pre-Dev Runoff Area=5.860 ac 42.66% Impervious Runoff Depth=1.22"
Flow Length=805' Tc=10.3 min CN=82 Runoff=7.18 cfs 0.597 af

Subcatchment DA-1C: Pre-Dev Runoff Area=1.880 ac 1.60% Impervious Runoff Depth=0.29"
Flow Length=293' Tc=25.0 min CN=61 Runoff=0.22 cfs 0.046 af

Subcatchment DA-1F: Pre-Dev Runoff Area=1.870 ac 35.83% Impervious Runoff Depth=0.93"
Flow Length=133' Tc=8.3 min CN=77 Runoff=1.80 cfs 0.146 af

Reach 1R: open portion of box culvert Avg. Depth=0.38' Max Vel=5.13 fps Inflow=13.68 cfs 5.861 af
n=0.017 L=3.5' S=0.0143 '/' Capacity=443.50 cfs Outflow=13.68 cfs 5.861 af

Reach 2R: bridge portion over box culvert Avg. Depth=0.34' Max Vel=5.78 fps Inflow=13.68 cfs 5.861 af
n=0.017 L=14.3' S=0.0210 '/' Capacity=421.44 cfs Outflow=13.68 cfs 5.861 af

Pond 1P: Exst Pond Peak Elev=153.29' Storage=29,930 cf Inflow=14.56 cfs 5.862 af
Primary=13.68 cfs 5.861 af Secondary=0.00 cfs 0.000 af Outflow=13.68 cfs 5.861 af

Pond 2P: stream to 60" twin culverts (DP-1) Peak Elev=151.54' Storage=1,535 cf Inflow=13.68 cfs 5.861 af
Outflow=13.68 cfs 5.861 af

Pond A: Detention Basin Peak Elev=156.54' Storage=8,546 cf Inflow=7.20 cfs 0.643 af
Primary=4.07 cfs 0.643 af Secondary=0.00 cfs 0.000 af Outflow=4.07 cfs 0.643 af

Total Runoff Area = 92.209 ac Runoff Volume = 5.862 af Average Runoff Depth = 0.76"
91.36% Pervious = 84.241 ac 8.64% Impervious = 7.969 ac

Summary for Subcatchment DA-1A: Pre-Dev Offsite

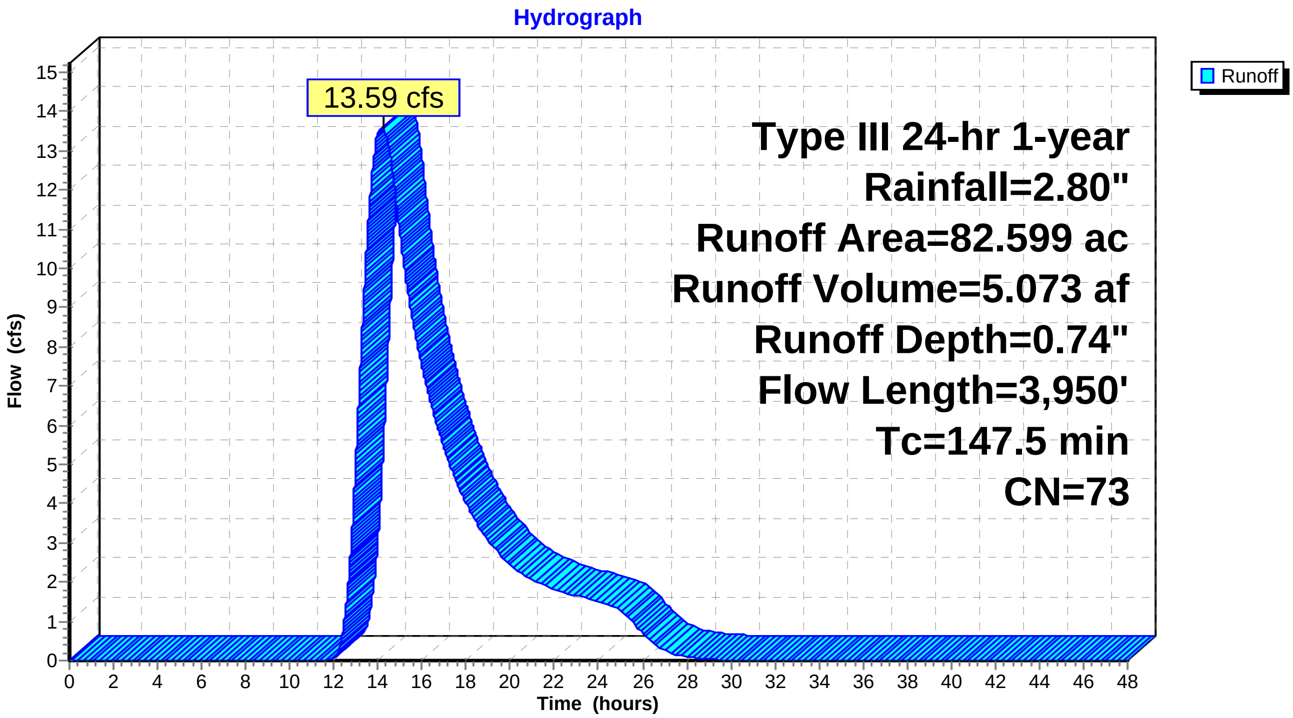
Runoff = 13.59 cfs @ 14.25 hrs, Volume= 5.073 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-year Rainfall=2.80"

Area (ac)	CN	Description
8.287	73	Woods, Fair, HSG C
5.037	76	Woods/grass comb., Fair, HSG C
21.037	60	Woods, Fair, HSG B
32.137	79	Woods, Fair, HSG D
0.187	98	Unconnected pavement, HSG C
6.037	80	1/2 acre lots, 25% imp, HSG C
0.337	98	Unconnected pavement, HSG B
6.037	70	1/2 acre lots, 25% imp, HSG B
0.467	98	Unconnected pavement, HSG D
3.036	85	1/2 acre lots, 25% imp, HSG D
82.599	73	Weighted Average
77.831		94.23% Pervious Area
4.768		5.77% Impervious Area
0.991		20.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
6.2	320	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
97.4	1,600	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.3	1,930	0.0050	1.06		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
147.5	3,950	Total			

Subcatchment DA-1A: Pre-Dev Offsite



Summary for Subcatchment DA-1B: Pre-Dev

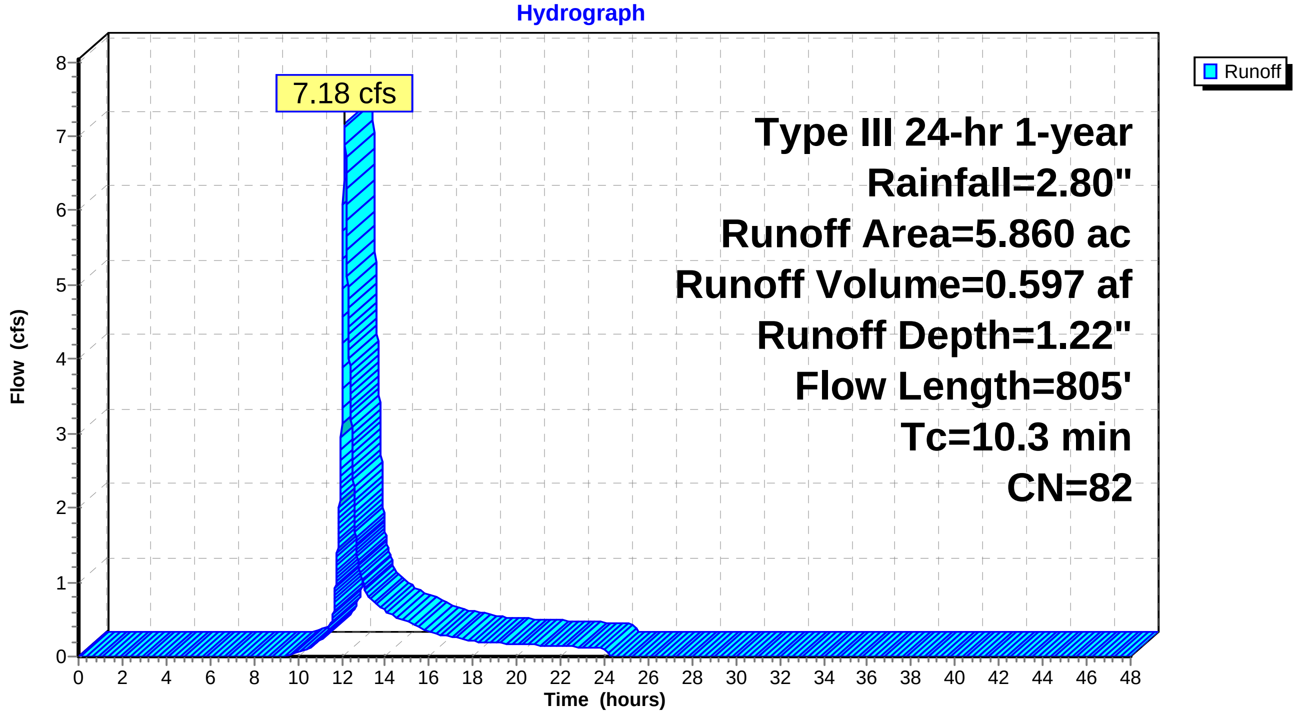
Runoff = 7.18 cfs @ 12.15 hrs, Volume= 0.597 af, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-year Rainfall=2.80"

Area (ac)	CN	Description
2.000	61	>75% Grass cover, Good, HSG B
0.300	98	Roofs, HSG B
2.200	98	Paved parking, HSG B
1.360	85	Gravel roads, HSG B
5.860	82	Weighted Average
3.360		57.34% Pervious Area
2.500		42.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.1200	0.25		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
1.9	125	0.0240	1.08		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	33	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	547	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
10.3	805	Total			

Subcatchment DA-1B: Pre-Dev



Summary for Subcatchment DA-1C: Pre-Dev

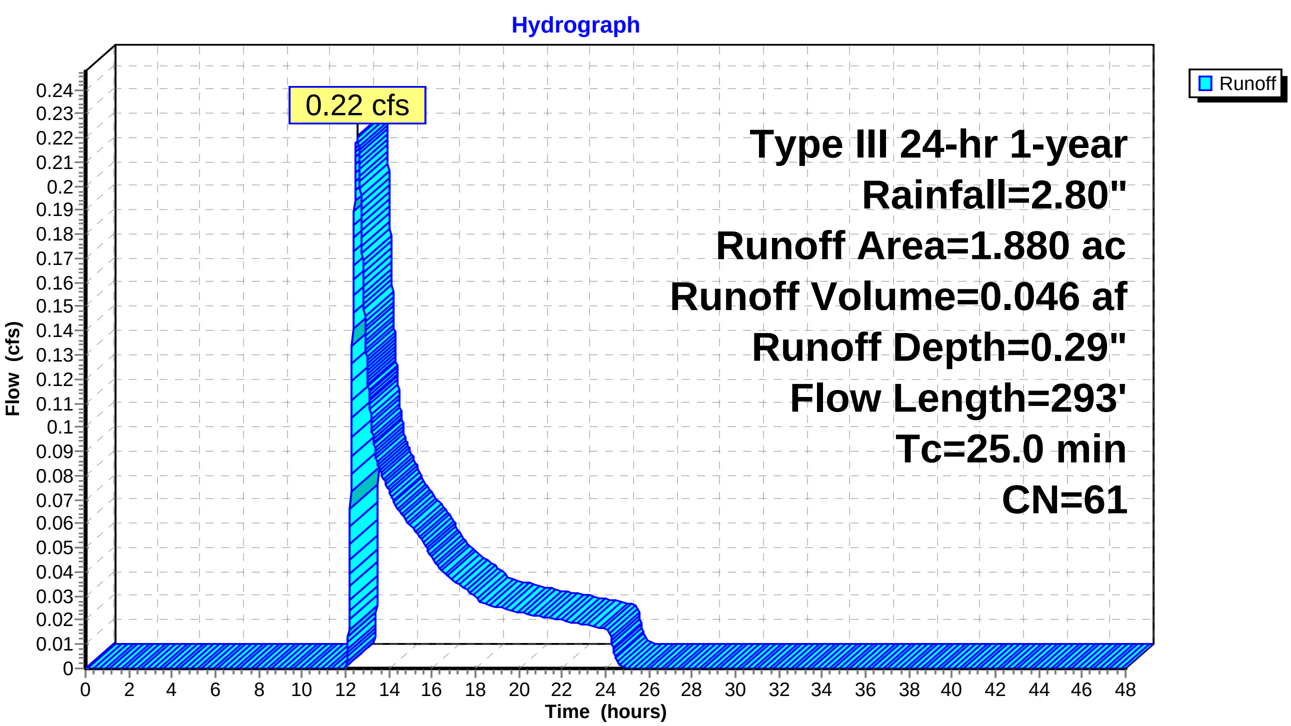
Runoff = 0.22 cfs @ 12.55 hrs, Volume= 0.046 af, Depth= 0.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-year Rainfall=2.80"

Area (ac)	CN	Description
0.400	60	Woods, Fair, HSG B
0.030	98	Unconnected pavement, HSG B
1.450	61	>75% Grass cover, Good, HSG B
1.880	61	Weighted Average
1.850		98.40% Pervious Area
0.030		1.60% Impervious Area
0.030		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	193	0.0104	0.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.0	293	Total			

Subcatchment DA-1C: Pre-Dev



Summary for Subcatchment DA-1F: Pre-Dev

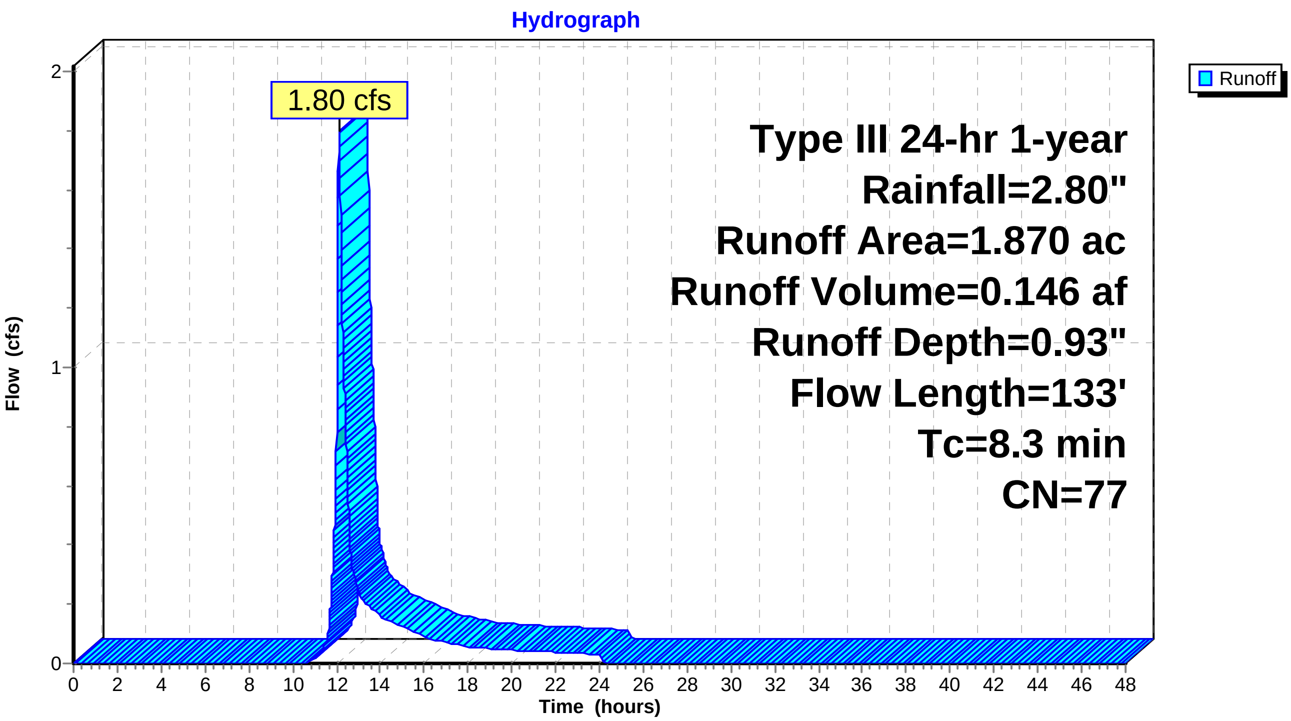
Runoff = 1.80 cfs @ 12.13 hrs, Volume= 0.146 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-year Rainfall=2.80"

Area (ac)	CN	Description
0.750	61	>75% Grass cover, Good, HSG B
0.170	98	Paved parking, HSG C
0.450	74	>75% Grass cover, Good, HSG C
0.500	98	Water Surface, HSG C
1.870	77	Weighted Average
1.200		64.17% Pervious Area
0.670		35.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.3	33	0.0910	2.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	133	Total			

Subcatchment DA-1F: Pre-Dev



Summary for Reach 1R: open portion of box culvert

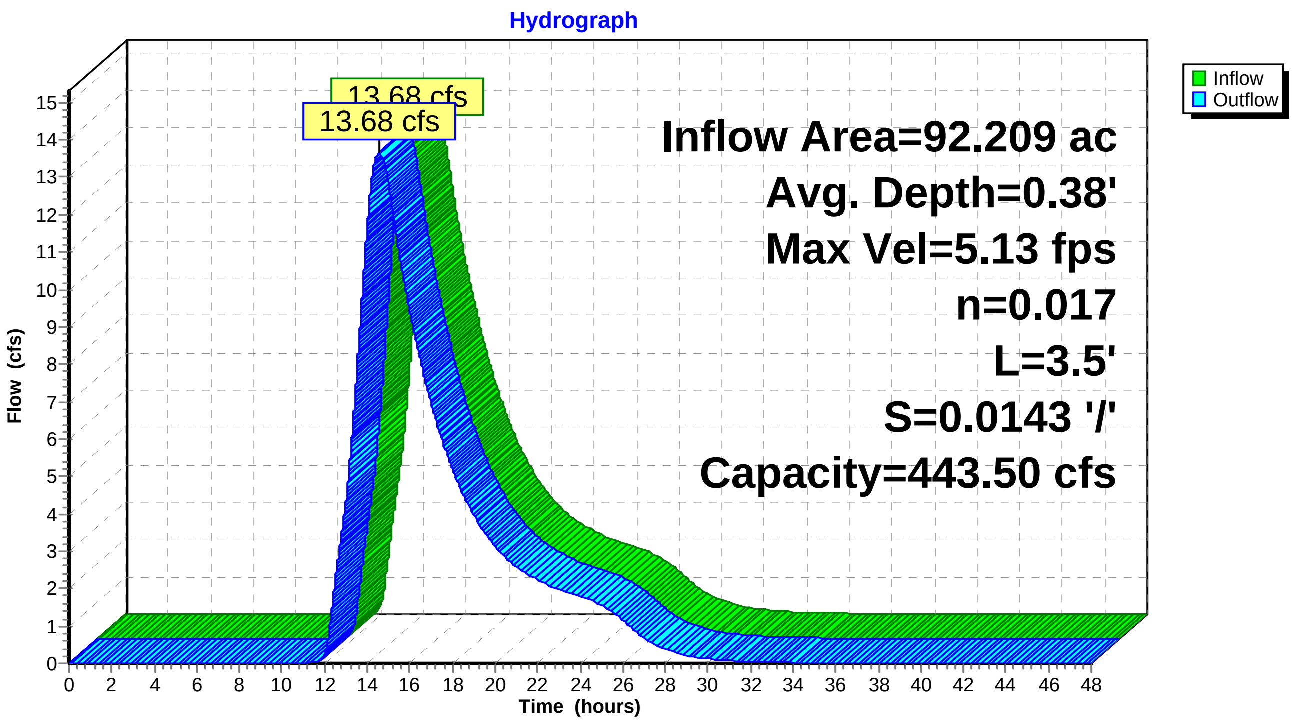
Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth > 0.76" for 1-year event
Inflow = 13.68 cfs @ 14.56 hrs, Volume= 5.861 af
Outflow = 13.68 cfs @ 14.56 hrs, Volume= 5.861 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.13 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.99 fps, Avg. Travel Time= 0.0 min

Peak Storage= 9 cf @ 14.56 hrs, Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 443.50 cfs

7.00' x 4.00' deep channel, n= 0.017 Concrete, unfinished
Length= 3.5' Slope= 0.0143 '/'
Inlet Invert= 150.05', Outlet Invert= 150.00'

Reach 1R: open portion of box culvert



Summary for Reach 2R: bridge portion over box culvert

box culvert - opening 7'Wx4'Hx12'L
adjusted height to account for wooden beams underneath the bridge.

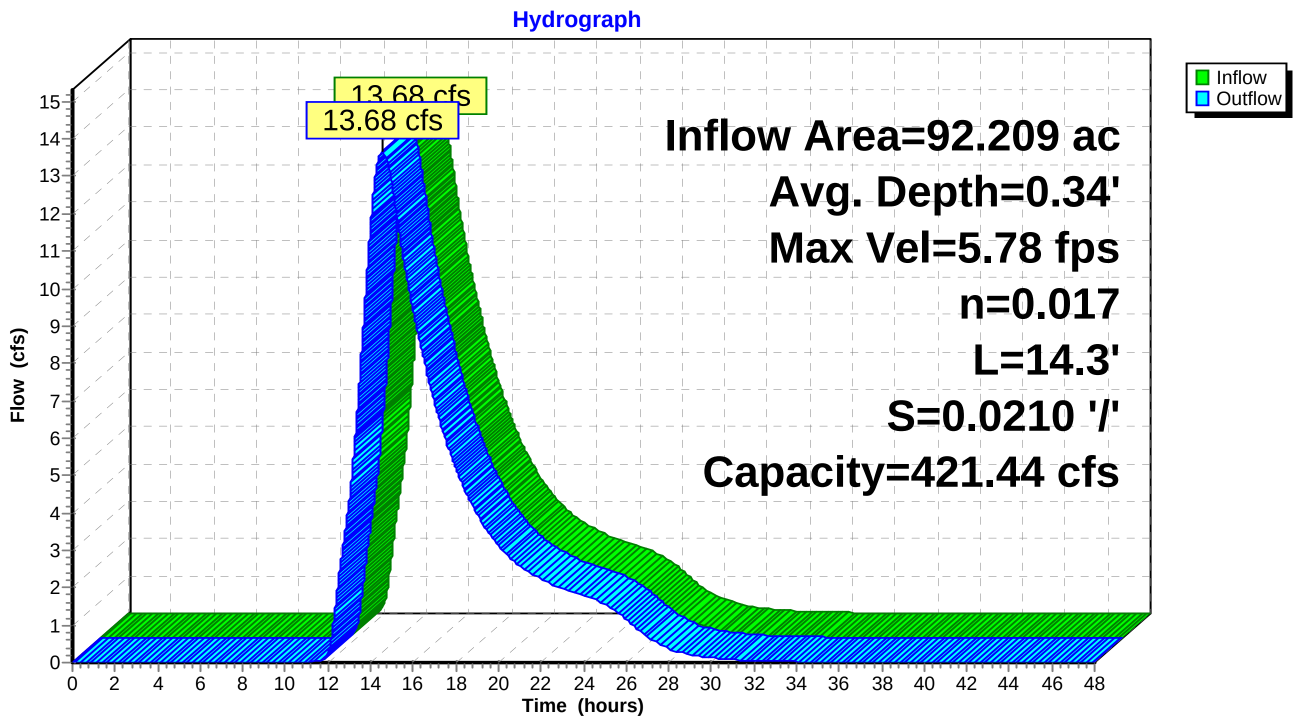
Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth > 0.76" for 1-year event
Inflow = 13.68 cfs @ 14.56 hrs, Volume= 5.861 af
Outflow = 13.68 cfs @ 14.56 hrs, Volume= 5.861 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.78 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.20 fps, Avg. Travel Time= 0.1 min

Peak Storage= 34 cf @ 14.56 hrs, Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 3.33', Capacity at Bank-Full= 421.44 cfs

7.00' x 3.33' deep channel, n= 0.017 Concrete, unfinished
Length= 14.3' Slope= 0.0210 '/'
Inlet Invert= 150.00', Outlet Invert= 149.70'

Reach 2R: bridge portion over box culvert



Summary for Pond 1P: Exst Pond

Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 0.76" for 1-year event
Inflow = 14.56 cfs @ 14.10 hrs, Volume= 5.862 af
Outflow = 13.68 cfs @ 14.56 hrs, Volume= 5.861 af, Atten= 6%, Lag= 27.7 min
Primary = 13.68 cfs @ 14.56 hrs, Volume= 5.861 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 153.29' @ 14.56 hrs Surf.Area= 28,659 sf Storage= 29,930 cf
Flood Elev= 156.00' Surf.Area= 48,106 sf Storage= 132,693 cf

Plug-Flow detention time= 49.4 min calculated for 5.860 af (100% of inflow)
Center-of-Mass det. time= 49.3 min (1,037.9 - 988.6)

Volume	Invert	Avail.Storage	Storage Description
#1	152.10'	132,693 cf	**existing pond (Irregular)** Listed below (Recalc)

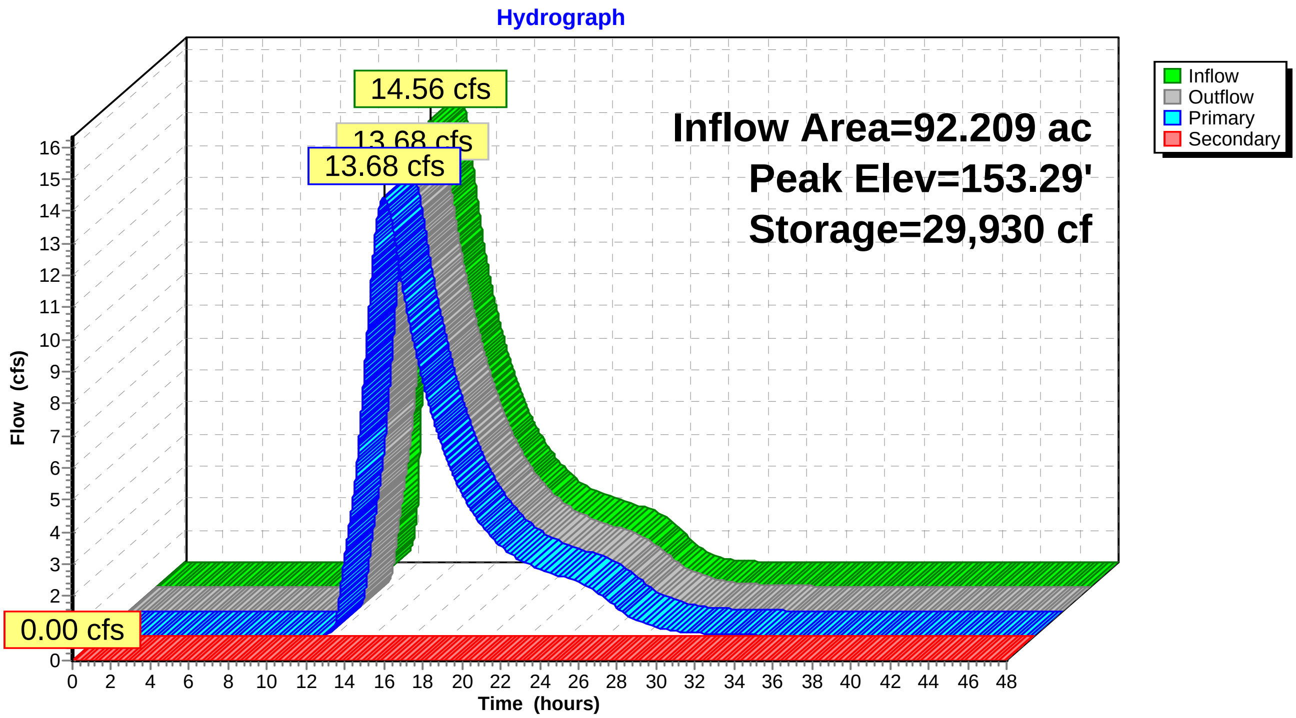
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
152.10	21,607	727.8	0	0	21,607
154.00	33,288	897.6	51,752	51,752	43,624
156.00	48,106	962.7	80,941	132,693	53,439

Device	Routing	Invert	Outlet Devices
#1	Primary	152.10'	**compound weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 1.00 1.00 2.00 2.00 Width (feet) 3.00 3.00 0.00 6.00 6.00 0.00
#2	Secondary	154.20'	**96.0' long x 14.0' breadth Bridge (overflow weir)** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=13.68 cfs @ 14.56 hrs HW=153.29' TW=150.43' (Dynamic Tailwater)
└─**1=compound weir** (Weir Controls 13.68 cfs @ 3.28 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=152.10' TW=150.72' (Dynamic Tailwater)
└─**2=Bridge (overflow weir)** (Controls 0.00 cfs)

Pond 1P: Exst Pond



Summary for Pond 2P: stream to 60" twin culverts (DP-1)

Water will sit in stream channel until it reaches a minimum elevation of 150.72, since that is the lowest elevation of one of the 60" culverts. Therefore, this elevation was used as the starting elevation for the modeling of the stream and 60" twin culverts.

Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth > 0.76" for 1-year event
Inflow = 13.68 cfs @ 14.56 hrs, Volume= 5.861 af
Outflow = 13.68 cfs @ 14.57 hrs, Volume= 5.861 af, Atten= 0%, Lag= 0.6 min
Primary = 13.68 cfs @ 14.57 hrs, Volume= 5.861 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 150.72' Surf.Area= 852 sf Storage= 735 cf
Peak Elev= 151.54' @ 14.57 hrs Surf.Area= 1,093 sf Storage= 1,535 cf (800 cf above start)

Plug-Flow detention time= 5.5 min calculated for 5.843 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (1,039.7 - 1,038.0)

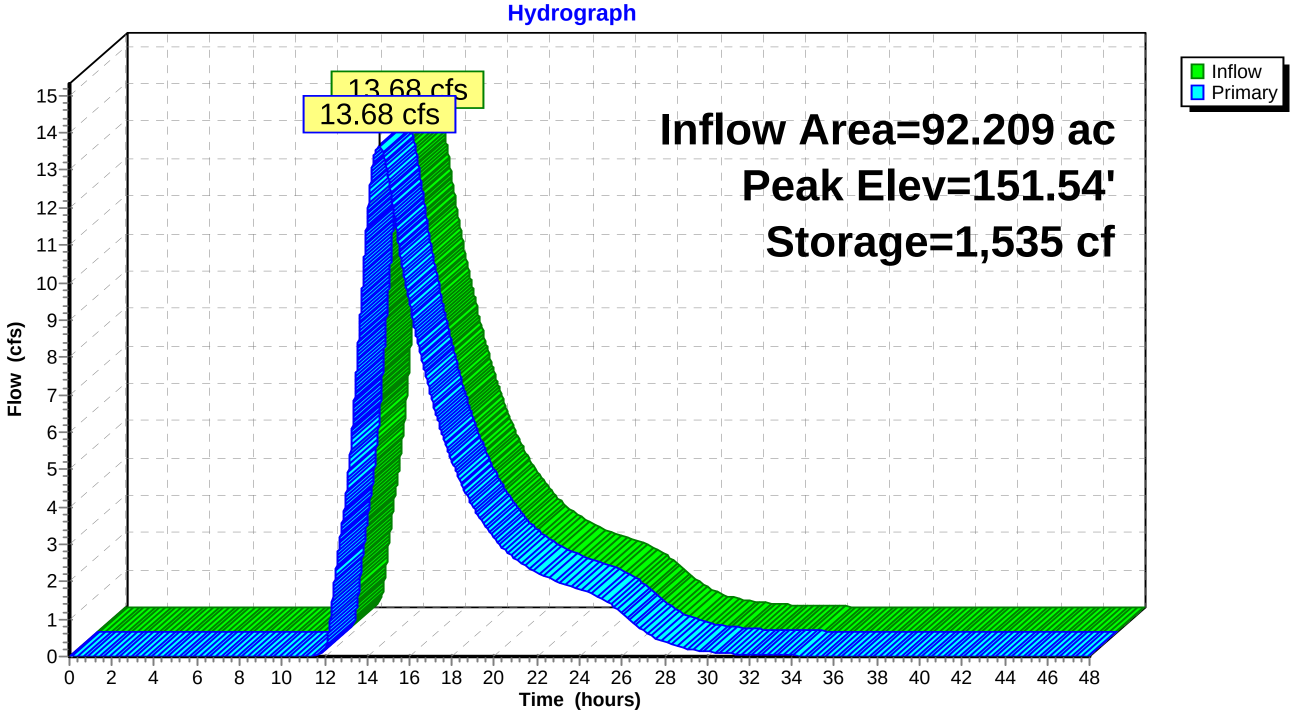
Volume	Invert	Avail.Storage	Storage Description
#1	149.70'	6,090 cf	**existing stream (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
149.70	596	131.8	0	0	596
152.00	1,239	152.2	2,066	2,066	1,161
154.00	2,902	266.7	4,025	6,090	5,001

Device	Routing	Invert	Outlet Devices
#1	Primary	150.72'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.10' S= 0.0063 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#2	Primary	150.77'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.40' S= 0.0038 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=13.68 cfs @ 14.57 hrs HW=151.54' (Free Discharge)
1=Culvert (Barrel Controls 7.87 cfs @ 4.71 fps)
2=Culvert (Barrel Controls 5.81 cfs @ 3.81 fps)

Pond 2P: stream to 60" twin culverts (DP-1)



Summary for Pond A: Detention Basin

Grate: Campbell Foundry Model # 3433.
Existing rip-rap for weir is 10 foot wide and will remain.

Inflow Area = 7.740 ac, 32.69% Impervious, Inflow Depth = 1.00" for 1-year event
Inflow = 7.20 cfs @ 12.15 hrs, Volume= 0.643 af
Outflow = 4.07 cfs @ 12.37 hrs, Volume= 0.643 af, Atten= 43%, Lag= 13.4 min
Primary = 4.07 cfs @ 12.37 hrs, Volume= 0.643 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 155.75' Surf.Area= 5,015 sf Storage= 3,316 cf
Peak Elev= 156.54' @ 12.37 hrs Surf.Area= 6,757 sf Storage= 8,546 cf (5,231 cf above start)
Flood Elev= 158.00' Surf.Area= 10,003 sf Storage= 19,772 cf (16,457 cf above start)

Plug-Flow detention time= 106.8 min calculated for 0.567 af (88% of inflow)
Center-of-Mass det. time= 28.3 min (882.7 - 854.4)

Volume	Invert	Avail.Storage	Storage Description
#1	155.00'	19,772 cf	**detention basin (Irregular)**Listed below

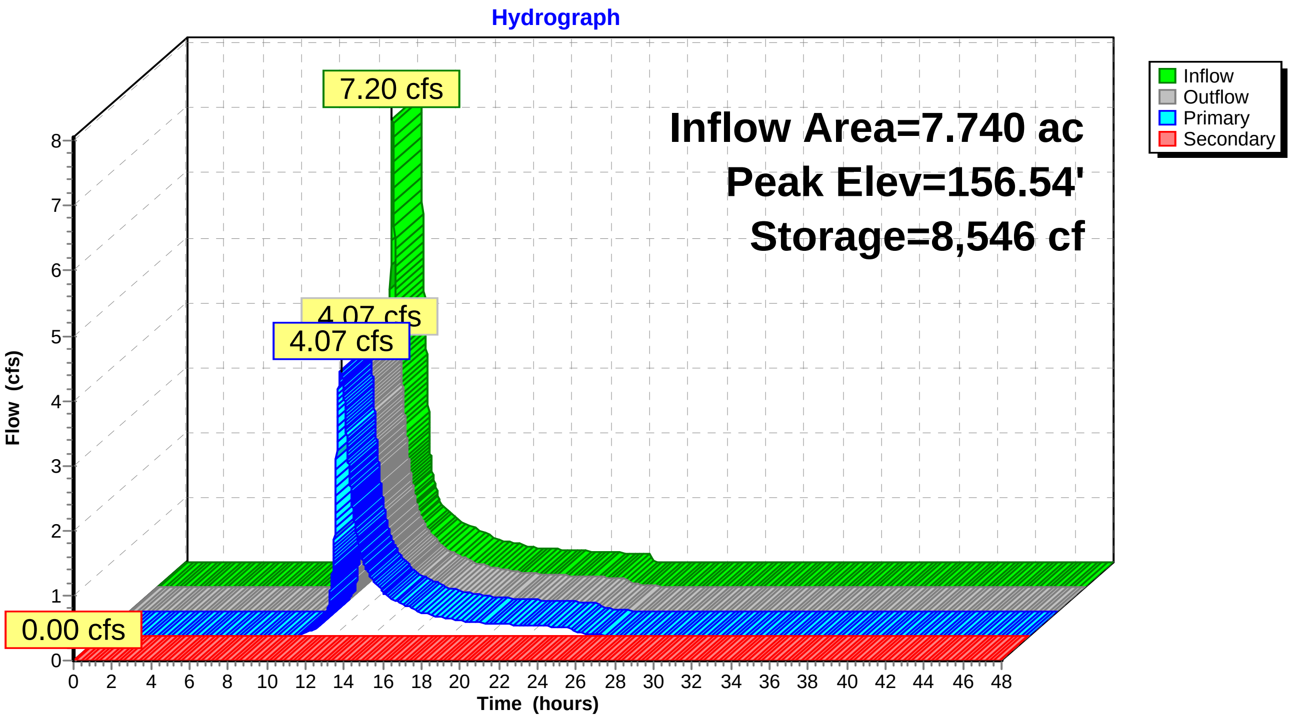
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
155.00	3,369	252.3	0	0	3,369
156.00	5,564	319.6	4,421	4,421	6,445
158.00	10,003	509.1	15,352	19,772	18,969

Device	Routing	Invert	Outlet Devices
#1	Primary	154.09'	**24.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 153.40' S= 0.0168 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	155.75'	**22.0" W x 9.0" H Vert. Slot** C= 0.600
#3	Device 1	157.00'	**12.0" W x 9.0" H Vert. Slots X 2.00** C= 0.600
#4	Device 1	158.50'	**36.0" x 55.5" Horiz. Grate X 4.00 columns** X 8 rows C= 0.600 in 1.3" x 6.5" Grate Limited to weir flow at low heads
#5	Secondary	157.00'	**10.0' long x 29.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.07 cfs @ 12.37 hrs HW=156.54' TW=152.40' (Dynamic Tailwater)
└─**1=Culvert** (Passes 4.07 cfs of 18.20 cfs potential flow)
  ├─**2=Slot** (Orifice Controls 4.07 cfs @ 2.96 fps)
  ├─**3=Slots** (Controls 0.00 cfs)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=155.75' TW=152.10' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond A: Detention Basin



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1A: Pre-Dev Offsite Runoff Area=82.599 ac 5.77% Impervious Runoff Depth=1.18"
Flow Length=3,950' Tc=147.5 min CN=73 Runoff=23.02 cfs 8.120 af

Subcatchment DA-1B: Pre-Dev Runoff Area=5.860 ac 42.66% Impervious Runoff Depth=1.78"
Flow Length=805' Tc=10.3 min CN=82 Runoff=10.58 cfs 0.871 af

Subcatchment DA-1C: Pre-Dev Runoff Area=1.880 ac 1.60% Impervious Runoff Depth=0.57"
Flow Length=293' Tc=25.0 min CN=61 Runoff=0.57 cfs 0.090 af

Subcatchment DA-1F: Pre-Dev Runoff Area=1.870 ac 35.83% Impervious Runoff Depth=1.43"
Flow Length=133' Tc=8.3 min CN=77 Runoff=2.84 cfs 0.223 af

Reach 1R: open portion of box culvert Avg. Depth=0.54' Max Vel=6.27 fps Inflow=23.50 cfs 9.301 af
n=0.017 L=3.5' S=0.0143 '/' Capacity=443.50 cfs Outflow=23.50 cfs 9.301 af

Reach 2R: bridge portion over box culvert Avg. Depth=0.47' Max Vel=7.08 fps Inflow=23.50 cfs 9.301 af
n=0.017 L=14.3' S=0.0210 '/' Capacity=421.44 cfs Outflow=23.50 cfs 9.301 af

Pond 1P: Exst Pond Peak Elev=153.67' Storage=41,076 cf Inflow=24.41 cfs 9.303 af
Primary=23.50 cfs 9.301 af Secondary=0.00 cfs 0.000 af Outflow=23.50 cfs 9.301 af

Pond 2P: stream to 60" twin culverts (DP-1) Peak Elev=151.81' Storage=1,831 cf Inflow=23.50 cfs 9.301 af
Outflow=23.50 cfs 9.301 af

Pond A: Detention Basin Peak Elev=156.89' Storage=11,291 cf Inflow=10.72 cfs 0.960 af
Primary=5.75 cfs 0.960 af Secondary=0.00 cfs 0.000 af Outflow=5.75 cfs 0.960 af

Total Runoff Area = 92.209 ac Runoff Volume = 9.303 af Average Runoff Depth = 1.21"
91.36% Pervious = 84.241 ac 8.64% Impervious = 7.969 ac

Summary for Subcatchment DA-1A: Pre-Dev Offsite

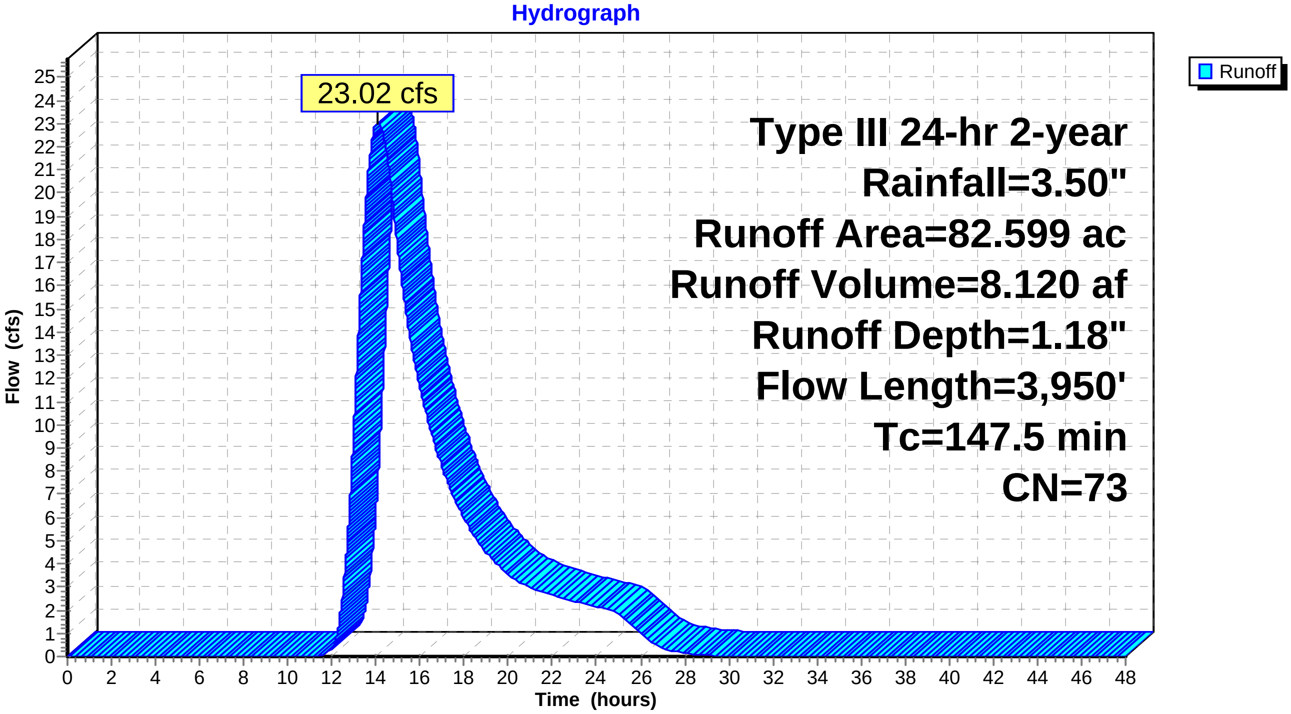
Runoff = 23.02 cfs @ 14.09 hrs, Volume= 8.120 af, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.50"

Area (ac)	CN	Description
8.287	73	Woods, Fair, HSG C
5.037	76	Woods/grass comb., Fair, HSG C
21.037	60	Woods, Fair, HSG B
32.137	79	Woods, Fair, HSG D
0.187	98	Unconnected pavement, HSG C
6.037	80	1/2 acre lots, 25% imp, HSG C
0.337	98	Unconnected pavement, HSG B
6.037	70	1/2 acre lots, 25% imp, HSG B
0.467	98	Unconnected pavement, HSG D
3.036	85	1/2 acre lots, 25% imp, HSG D
82.599	73	Weighted Average
77.831		94.23% Pervious Area
4.768		5.77% Impervious Area
0.991		20.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
6.2	320	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
97.4	1,600	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.3	1,930	0.0050	1.06		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
147.5	3,950	Total			

Subcatchment DA-1A: Pre-Dev Offsite



Summary for Subcatchment DA-1B: Pre-Dev

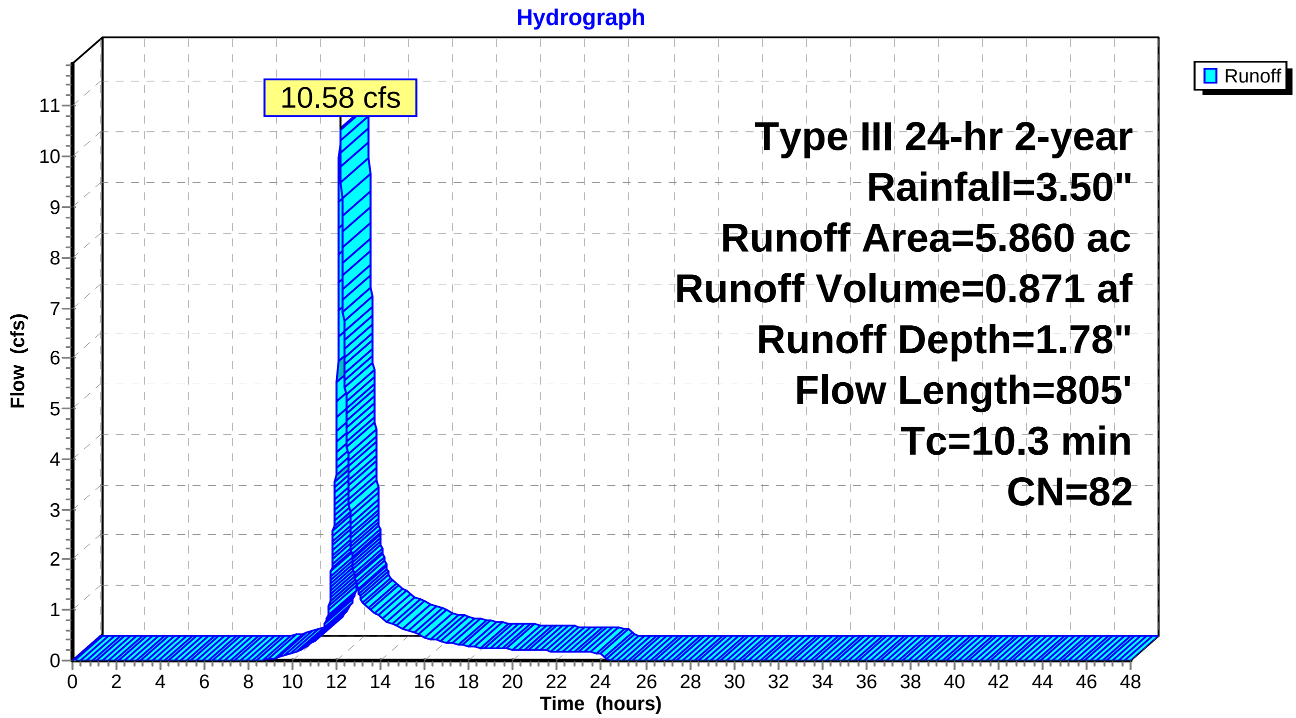
Runoff = 10.58 cfs @ 12.14 hrs, Volume= 0.871 af, Depth= 1.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.50"

Area (ac)	CN	Description
2.000	61	>75% Grass cover, Good, HSG B
0.300	98	Roofs, HSG B
2.200	98	Paved parking, HSG B
1.360	85	Gravel roads, HSG B
5.860	82	Weighted Average
3.360		57.34% Pervious Area
2.500		42.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.1200	0.25		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
1.9	125	0.0240	1.08		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	33	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	547	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
10.3	805	Total			

Subcatchment DA-1B: Pre-Dev



Summary for Subcatchment DA-1C: Pre-Dev

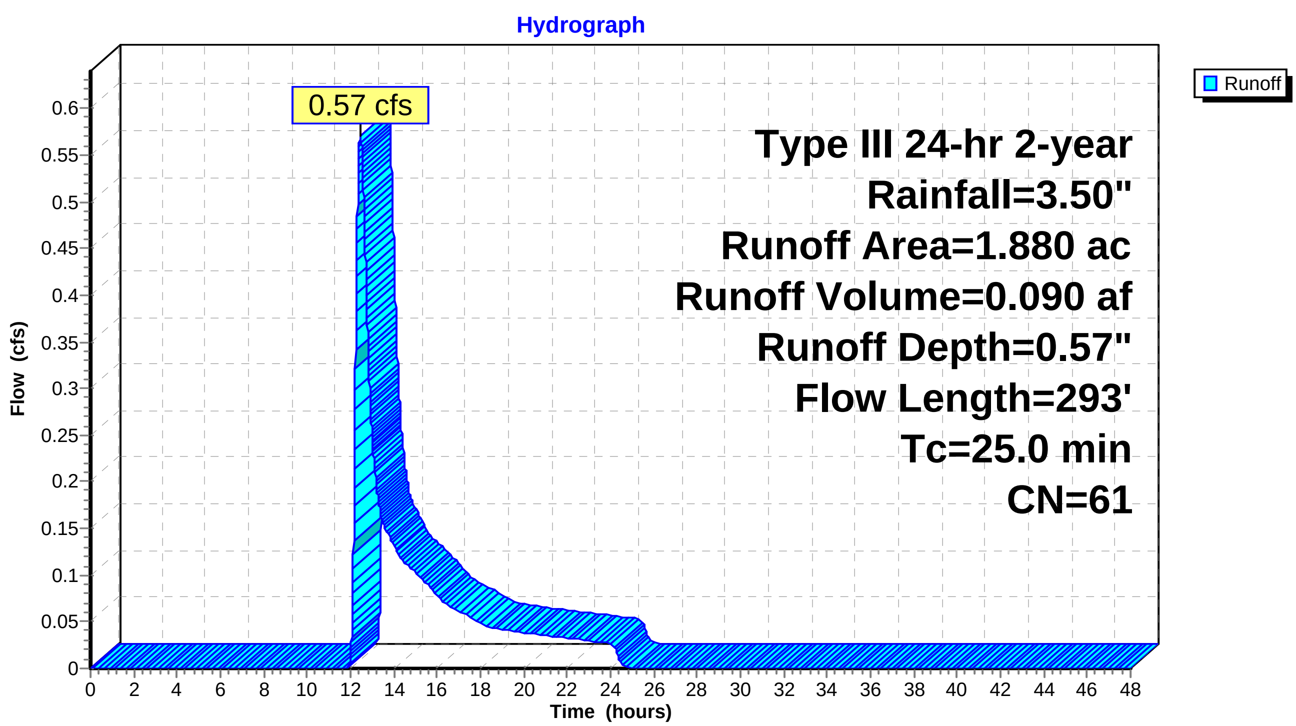
Runoff = 0.57 cfs @ 12.45 hrs, Volume= 0.090 af, Depth= 0.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.50"

Area (ac)	CN	Description
0.400	60	Woods, Fair, HSG B
0.030	98	Unconnected pavement, HSG B
1.450	61	>75% Grass cover, Good, HSG B
1.880	61	Weighted Average
1.850		98.40% Pervious Area
0.030		1.60% Impervious Area
0.030		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	193	0.0104	0.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.0	293	Total			

Subcatchment DA-1C: Pre-Dev



Summary for Subcatchment DA-1F: Pre-Dev

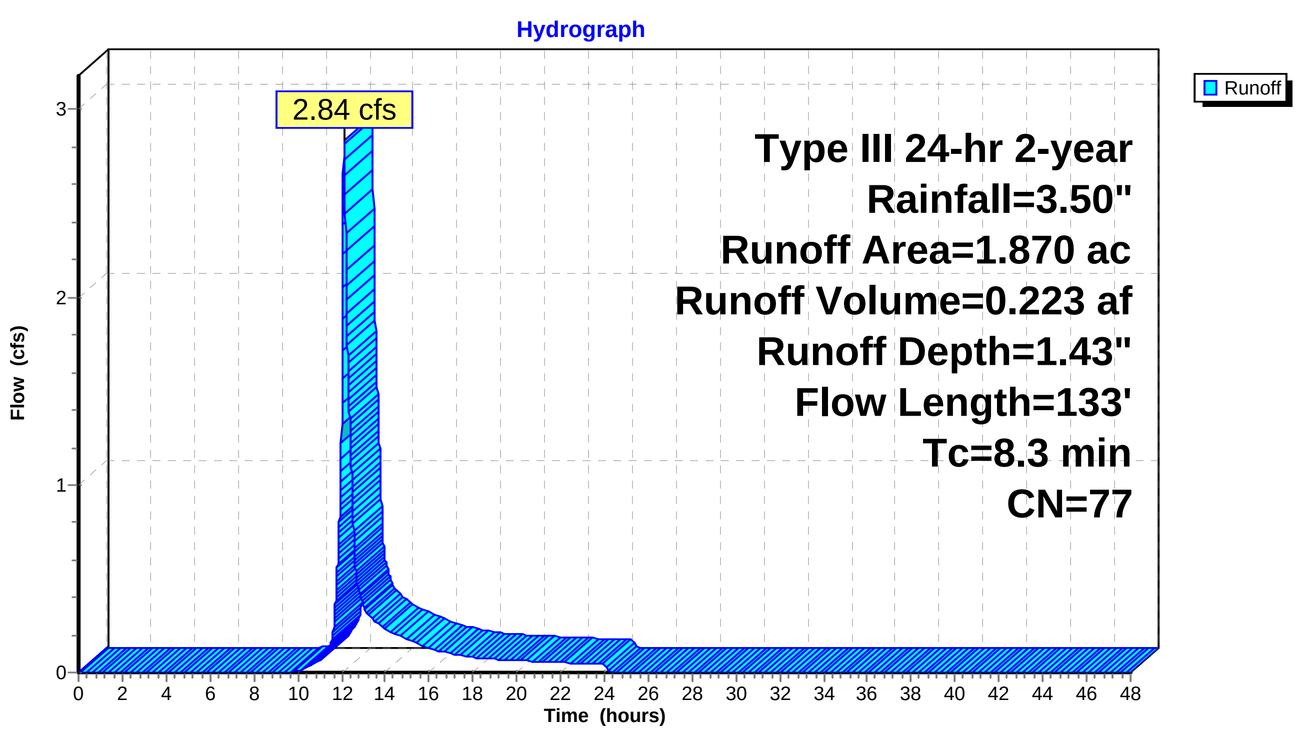
Runoff = 2.84 cfs @ 12.12 hrs, Volume= 0.223 af, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.50"

Area (ac)	CN	Description
0.750	61	>75% Grass cover, Good, HSG B
0.170	98	Paved parking, HSG C
0.450	74	>75% Grass cover, Good, HSG C
0.500	98	Water Surface, HSG C
1.870	77	Weighted Average
1.200		64.17% Pervious Area
0.670		35.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.3	33	0.0910	2.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	133	Total			

Subcatchment DA-1F: Pre-Dev



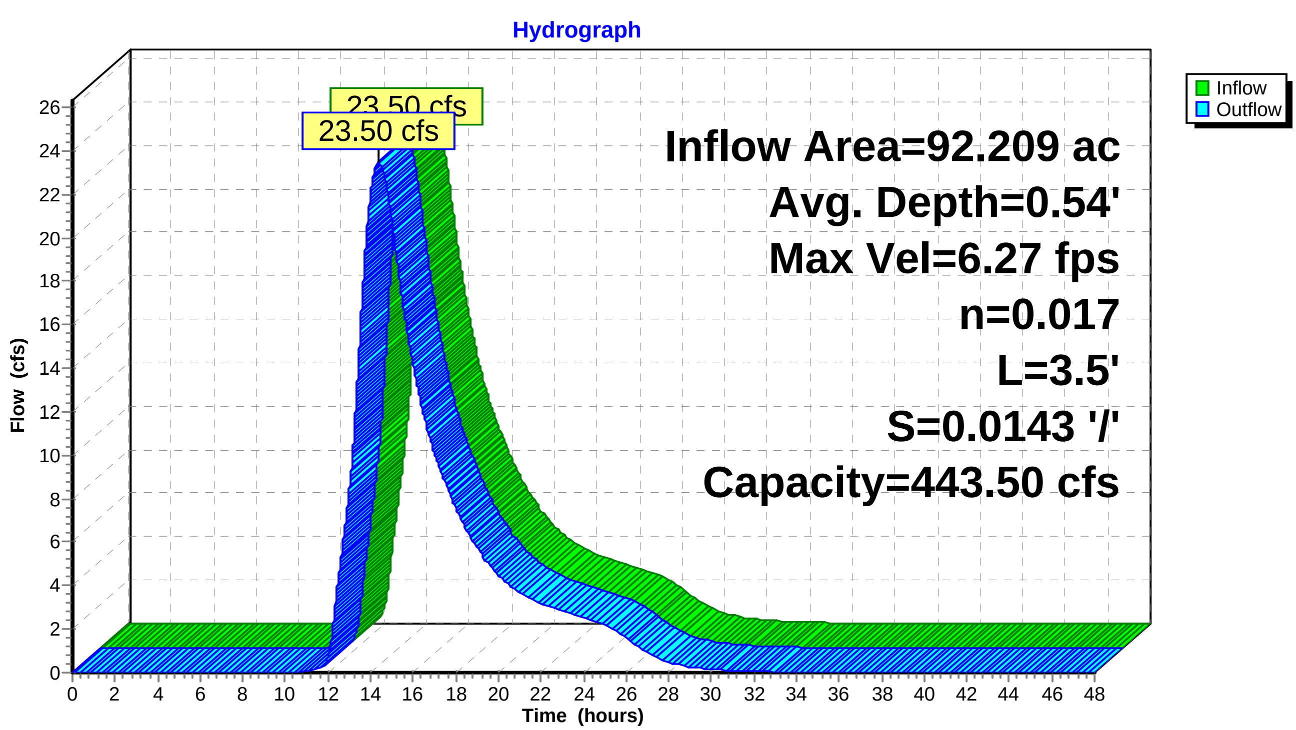
Summary for Reach 1R: open portion of box culvert

Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 1.21" for 2-year event
Inflow = 23.50 cfs @ 14.38 hrs, Volume= 9.301 af
Outflow = 23.50 cfs @ 14.38 hrs, Volume= 9.301 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.27 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.20 fps, Avg. Travel Time= 0.0 min

Peak Storage= 13 cf @ 14.38 hrs, Average Depth at Peak Storage= 0.54'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 443.50 cfs

7.00' x 4.00' deep channel, n= 0.017 Concrete, unfinished
Length= 3.5' Slope= 0.0143 '/'
Inlet Invert= 150.05', Outlet Invert= 150.00'



Summary for Reach 2R: bridge portion over box culvert

box culvert - opening 7'Wx4'Hx12'L
adjusted height to account for wooden beams underneath the bridge.

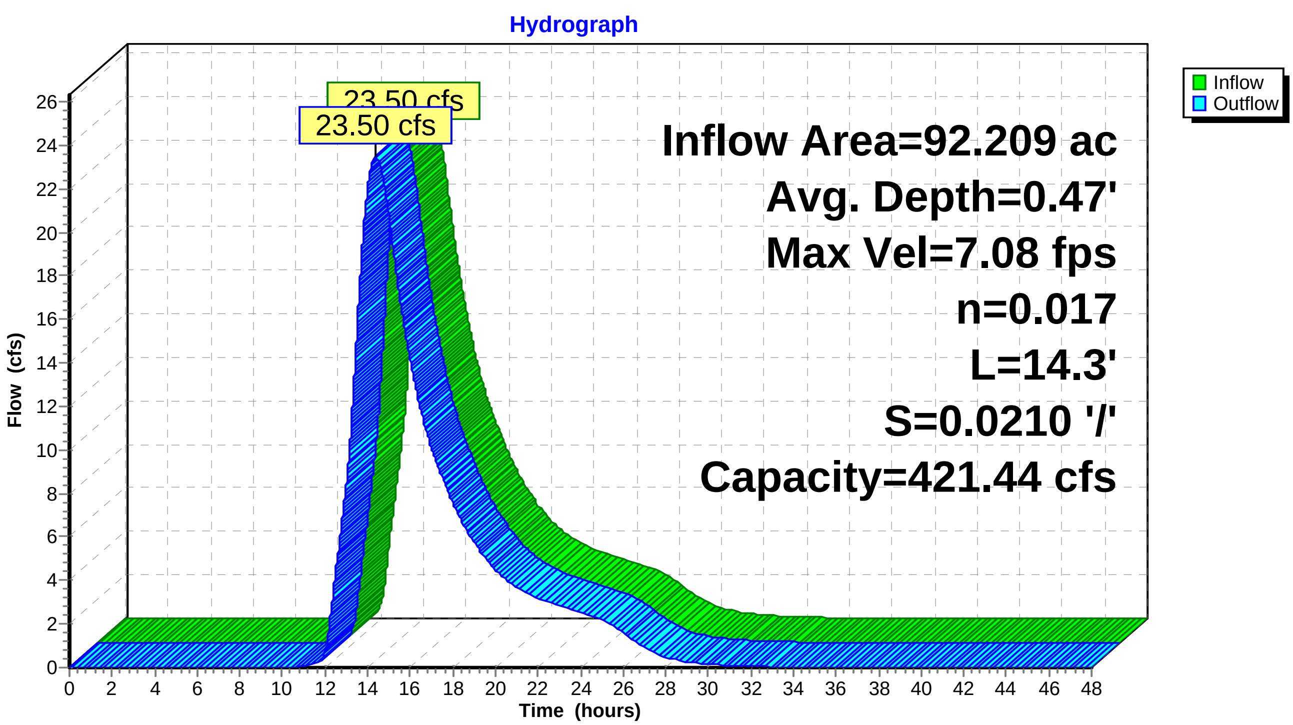
Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 1.21" for 2-year event
Inflow = 23.50 cfs @ 14.38 hrs, Volume= 9.301 af
Outflow = 23.50 cfs @ 14.38 hrs, Volume= 9.301 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.08 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.44 fps, Avg. Travel Time= 0.1 min

Peak Storage= 47 cf @ 14.38 hrs, Average Depth at Peak Storage= 0.47'
Bank-Full Depth= 3.33', Capacity at Bank-Full= 421.44 cfs

7.00' x 3.33' deep channel, n= 0.017 Concrete, unfinished
Length= 14.3' Slope= 0.0210 '/'
Inlet Invert= 150.00', Outlet Invert= 149.70'

Reach 2R: bridge portion over box culvert



Summary for Pond 1P: Exst Pond

Inflow Area =	92.209 ac,	8.64% Impervious, Inflow Depth =	1.21"	for 2-year event
Inflow =	24.41 cfs @	14.09 hrs, Volume=	9.303 af	
Outflow =	23.50 cfs @	14.38 hrs, Volume=	9.301 af, Atten= 4%, Lag= 17.9 min	
Primary =	23.50 cfs @	14.38 hrs, Volume=	9.301 af	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 153.67' @ 14.38 hrs Surf.Area= 31,067 sf Storage= 41,076 cf
Flood Elev= 156.00' Surf.Area= 48,106 sf Storage= 132,693 cf

Plug-Flow detention time= 41.9 min calculated for 9.301 af (100% of inflow)
Center-of-Mass det. time= 41.7 min (1,016.6 - 974.9)

Volume	Invert	Avail.Storage	Storage Description
#1	152.10'	132,693 cf	**existing pond (Irregular)** Listed below (Recalc)

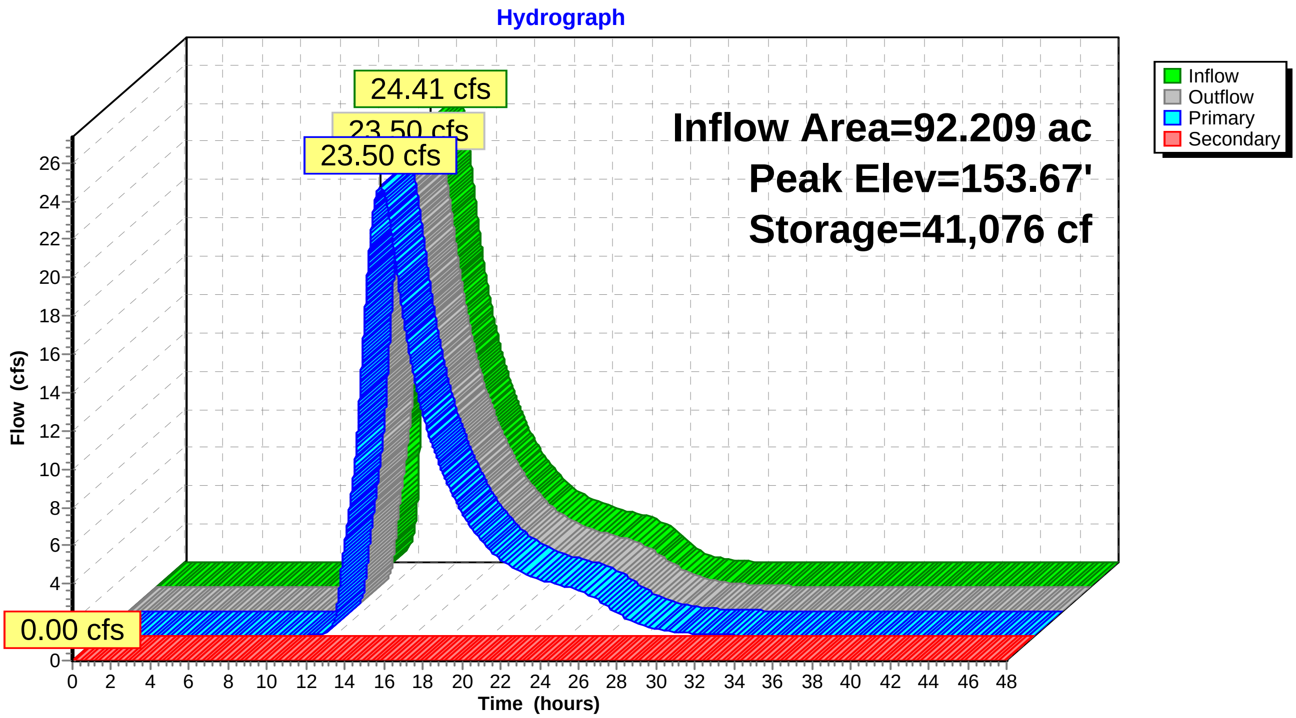
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
152.10	21,607	727.8	0	0	21,607
154.00	33,288	897.6	51,752	51,752	43,624
156.00	48,106	962.7	80,941	132,693	53,439

Device	Routing	Invert	Outlet Devices
#1	Primary	152.10'	**compound weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 1.00 1.00 2.00 2.00 Width (feet) 3.00 3.00 0.00 6.00 6.00 0.00
#2	Secondary	154.20'	**96.0' long x 14.0' breadth Bridge (overflow weir)** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=23.50 cfs @ 14.38 hrs HW=153.67' TW=150.59' (Dynamic Tailwater)
└─**1=compound weir** (Weir Controls 23.50 cfs @ 3.67 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=152.10' TW=150.72' (Dynamic Tailwater)
└─**2=Bridge (overflow weir)** (Controls 0.00 cfs)

Pond 1P: Exst Pond



Summary for Pond 2P: stream to 60" twin culverts (DP-1)

Water will sit in stream channel until it reaches a minimum elevation of 150.72, since that is the lowest elevation of one of the 60" culverts. Therefore, this elevation was used as the starting elevation for the modeling of the stream and 60" twin culverts.

Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 1.21" for 2-year event
Inflow = 23.50 cfs @ 14.38 hrs, Volume= 9.301 af
Outflow = 23.50 cfs @ 14.39 hrs, Volume= 9.301 af, Atten= 0%, Lag= 0.5 min
Primary = 23.50 cfs @ 14.39 hrs, Volume= 9.301 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 150.72' Surf.Area= 852 sf Storage= 735 cf
Peak Elev= 151.81' @ 14.39 hrs Surf.Area= 1,176 sf Storage= 1,831 cf (1,096 cf above start)

Plug-Flow detention time= 4.0 min calculated for 9.284 af (100% of inflow)
Center-of-Mass det. time= 1.3 min (1,018.0 - 1,016.7)

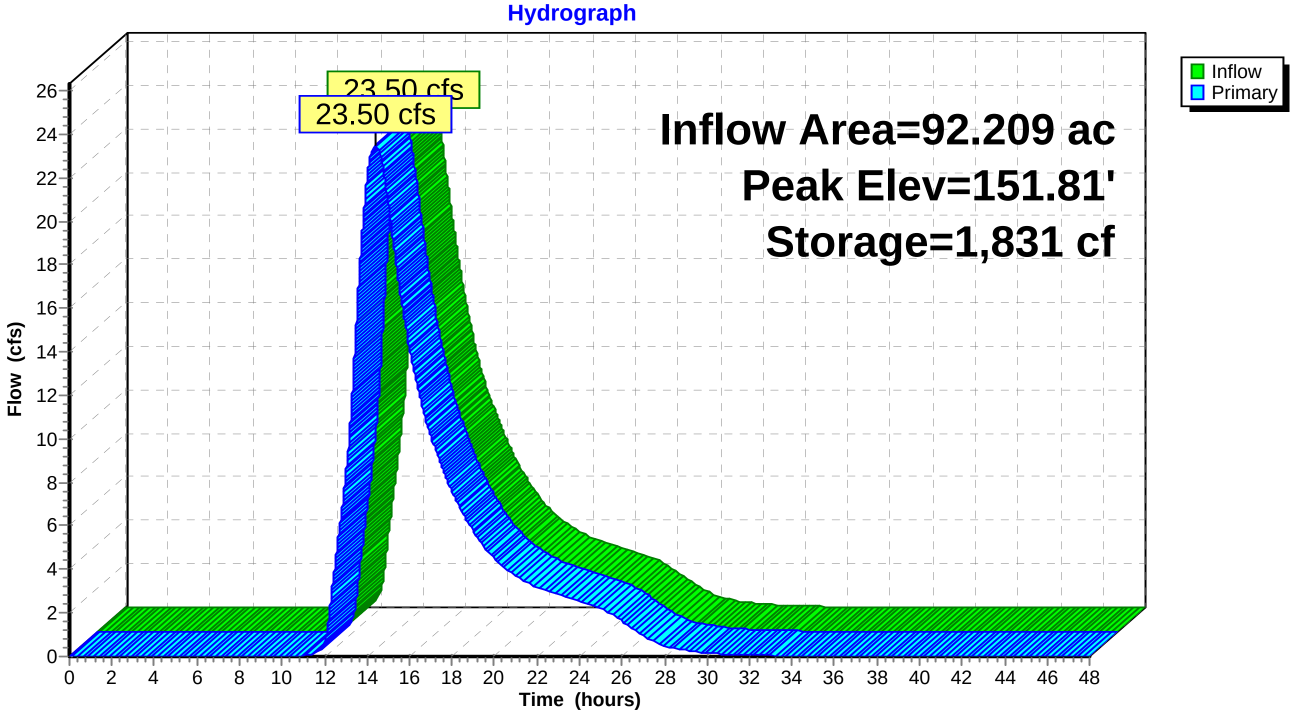
Volume	Invert	Avail.Storage	Storage Description
#1	149.70'	6,090 cf	**existing stream (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
149.70	596	131.8	0	0	596
152.00	1,239	152.2	2,066	2,066	1,161
154.00	2,902	266.7	4,025	6,090	5,001

Device	Routing	Invert	Outlet Devices
#1	Primary	150.72'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.10' S= 0.0063 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#2	Primary	150.77'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.40' S= 0.0038 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=23.50 cfs @ 14.39 hrs HW=151.81' (Free Discharge)
└─**1=Culvert** (Barrel Controls 13.24 cfs @ 5.31 fps)
└─**2=Culvert** (Barrel Controls 10.26 cfs @ 4.40 fps)

Pond 2P: stream to 60" twin culverts (DP-1)



Summary for Pond A: Detention Basin

Grate: Campbell Foundry Model # 3433.
Existing rip-rap for weir is 10 foot wide and will remain.

Inflow Area = 7.740 ac, 32.69% Impervious, Inflow Depth = 1.49" for 2-year event
Inflow = 10.72 cfs @ 12.15 hrs, Volume= 0.960 af
Outflow = 5.75 cfs @ 12.40 hrs, Volume= 0.960 af, Atten= 46%, Lag= 15.0 min
Primary = 5.75 cfs @ 12.40 hrs, Volume= 0.960 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 155.75' Surf.Area= 5,015 sf Storage= 3,316 cf
Peak Elev= 156.89' @ 12.40 hrs Surf.Area= 7,550 sf Storage= 11,291 cf (7,975 cf above start)
Flood Elev= 158.00' Surf.Area= 10,003 sf Storage= 19,772 cf (16,457 cf above start)

Plug-Flow detention time= 83.1 min calculated for 0.884 af (92% of inflow)
Center-of-Mass det. time= 26.7 min (870.6 - 844.0)

Volume	Invert	Avail.Storage	Storage Description
#1	155.00'	19,772 cf	**detention basin (Irregular)**Listed below

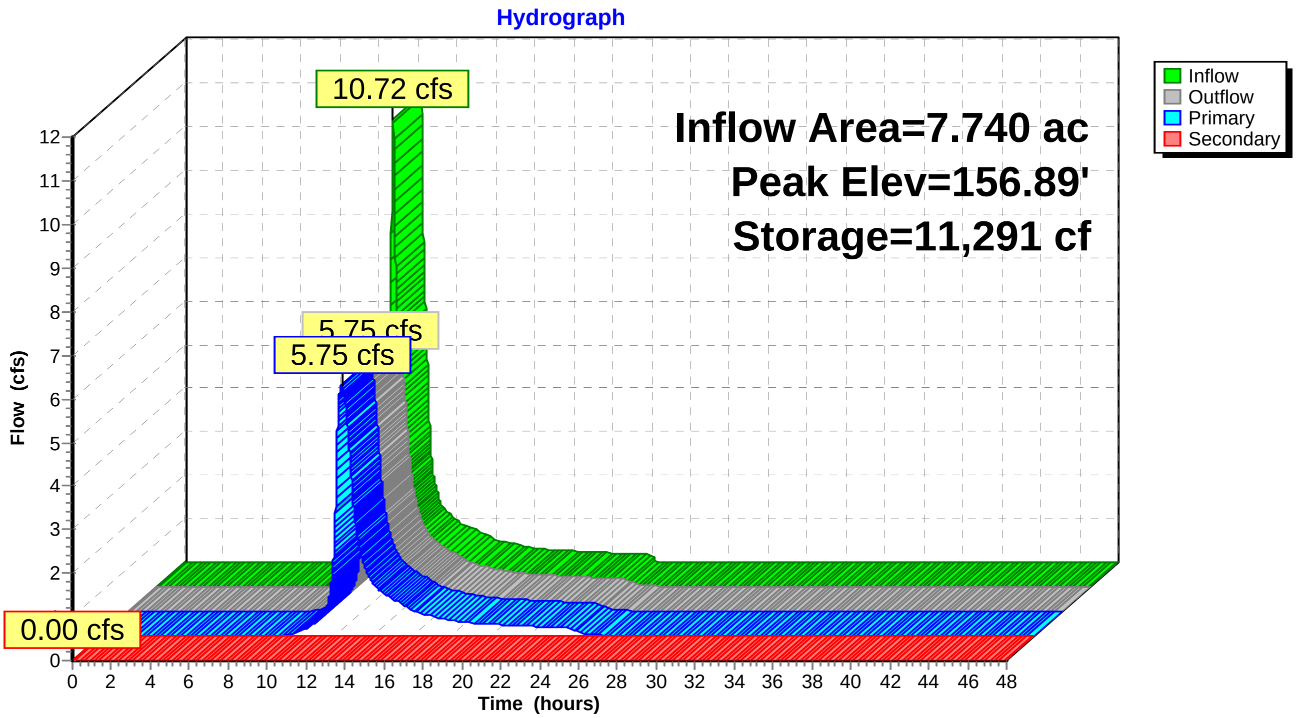
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
155.00	3,369	252.3	0	0	3,369
156.00	5,564	319.6	4,421	4,421	6,445
158.00	10,003	509.1	15,352	19,772	18,969

Device	Routing	Invert	Outlet Devices
#1	Primary	154.09'	**24.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 153.40' S= 0.0168 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	155.75'	**22.0" W x 9.0" H Vert. Slot** C= 0.600
#3	Device 1	157.00'	**12.0" W x 9.0" H Vert. Slots X 2.00** C= 0.600
#4	Device 1	158.50'	**36.0" x 55.5" Horiz. Grate X 4.00 columns** X 8 rows C= 0.600 in 1.3" x 6.5" Grate Limited to weir flow at low heads
#5	Secondary	157.00'	**10.0' long x 29.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=5.75 cfs @ 12.40 hrs HW=156.89' TW=152.61' (Dynamic Tailwater)
└─**1=Culvert** (Passes 5.75 cfs of 20.32 cfs potential flow)
  ├─**2=Slot** (Orifice Controls 5.75 cfs @ 4.18 fps)
  ├─**3=Slots** (Controls 0.00 cfs)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=155.75' TW=152.10' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond A: Detention Basin



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1A: Pre-Dev Offsite Runoff Area=82.599 ac 5.77% Impervious Runoff Depth=2.28"
Flow Length=3,950' Tc=147.5 min CN=73 Runoff=46.85 cfs 15.697 af

Subcatchment DA-1B: Pre-Dev Runoff Area=5.860 ac 42.66% Impervious Runoff Depth=3.08"
Flow Length=805' Tc=10.3 min CN=82 Runoff=18.28 cfs 1.504 af

Subcatchment DA-1C: Pre-Dev Runoff Area=1.880 ac 1.60% Impervious Runoff Depth=1.37"
Flow Length=293' Tc=25.0 min CN=61 Runoff=1.68 cfs 0.214 af

Subcatchment DA-1F: Pre-Dev Runoff Area=1.870 ac 35.83% Impervious Runoff Depth=2.62"
Flow Length=133' Tc=8.3 min CN=77 Runoff=5.31 cfs 0.409 af

Reach 1R: open portion of box culvert Avg. Depth=0.79' Max Vel=7.78 fps Inflow=42.80 cfs 17.462 af
n=0.017 L=3.5' S=0.0143 '/' Capacity=443.50 cfs Outflow=42.80 cfs 17.462 af

Reach 2R: bridge portion over box culvert Avg. Depth=0.69' Max Vel=8.80 fps Inflow=42.80 cfs 17.462 af
n=0.017 L=14.3' S=0.0210 '/' Capacity=421.44 cfs Outflow=42.80 cfs 17.462 af

Pond 1P: Exst Pond Peak Elev=154.28' Storage=61,459 cf Inflow=49.28 cfs 17.824 af
Primary=42.80 cfs 17.462 af Secondary=6.10 cfs 0.360 af Outflow=48.91 cfs 17.822 af

Pond 2P: stream to 60" twin culverts Peak Elev=152.33' Storage=2,507 cf Inflow=48.91 cfs 17.822 af
Outflow=48.91 cfs 17.822 af

Pond A: Detention Basin Peak Elev=157.37' Storage=14,950 cf Inflow=19.07 cfs 1.718 af
Primary=8.82 cfs 1.570 af Secondary=6.11 cfs 0.148 af Outflow=14.93 cfs 1.718 af

Total Runoff Area = 92.209 ac Runoff Volume = 17.824 af Average Runoff Depth = 2.32"
91.36% Pervious = 84.241 ac 8.64% Impervious = 7.969 ac

Summary for Subcatchment DA-1A: Pre-Dev Offsite

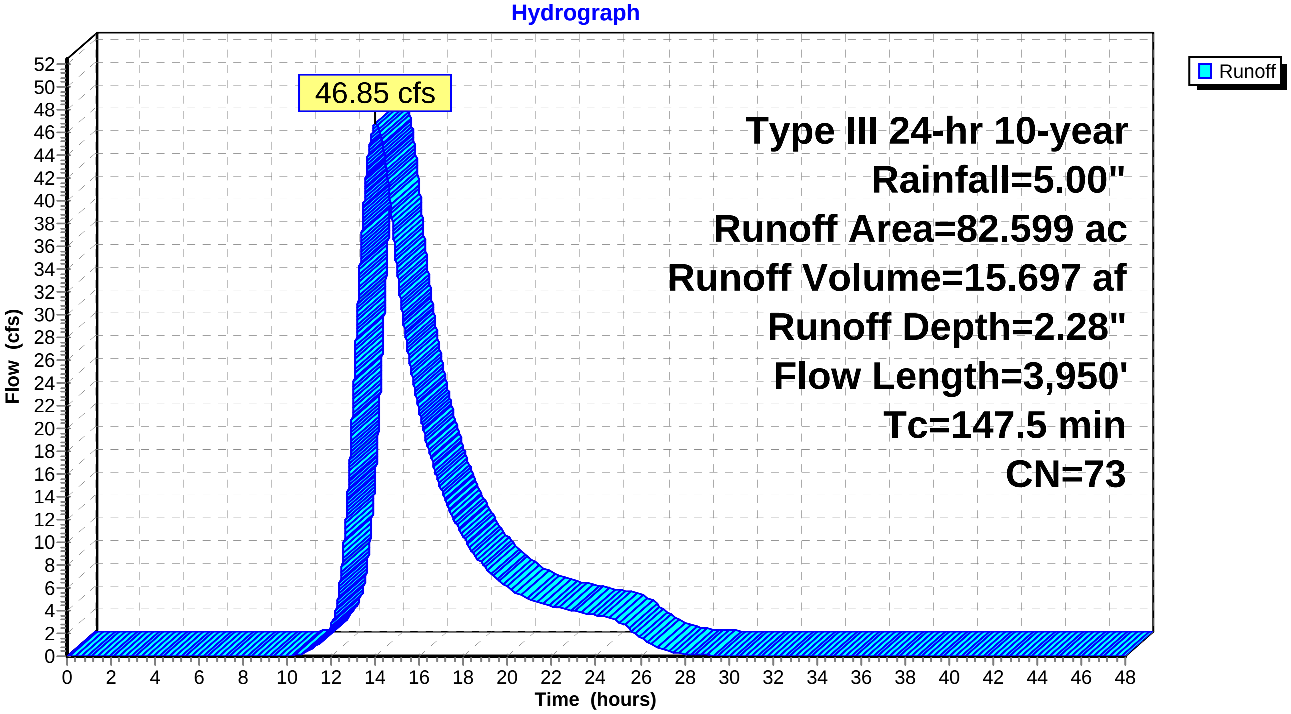
Runoff = 46.85 cfs @ 13.93 hrs, Volume= 15.697 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.00"

Area (ac)	CN	Description
8.287	73	Woods, Fair, HSG C
5.037	76	Woods/grass comb., Fair, HSG C
21.037	60	Woods, Fair, HSG B
32.137	79	Woods, Fair, HSG D
0.187	98	Unconnected pavement, HSG C
6.037	80	1/2 acre lots, 25% imp, HSG C
0.337	98	Unconnected pavement, HSG B
6.037	70	1/2 acre lots, 25% imp, HSG B
0.467	98	Unconnected pavement, HSG D
3.036	85	1/2 acre lots, 25% imp, HSG D
82.599	73	Weighted Average
77.831		94.23% Pervious Area
4.768		5.77% Impervious Area
0.991		20.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
6.2	320	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
97.4	1,600	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.3	1,930	0.0050	1.06		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
147.5	3,950	Total			

Subcatchment DA-1A: Pre-Dev Offsite



Summary for Subcatchment DA-1B: Pre-Dev

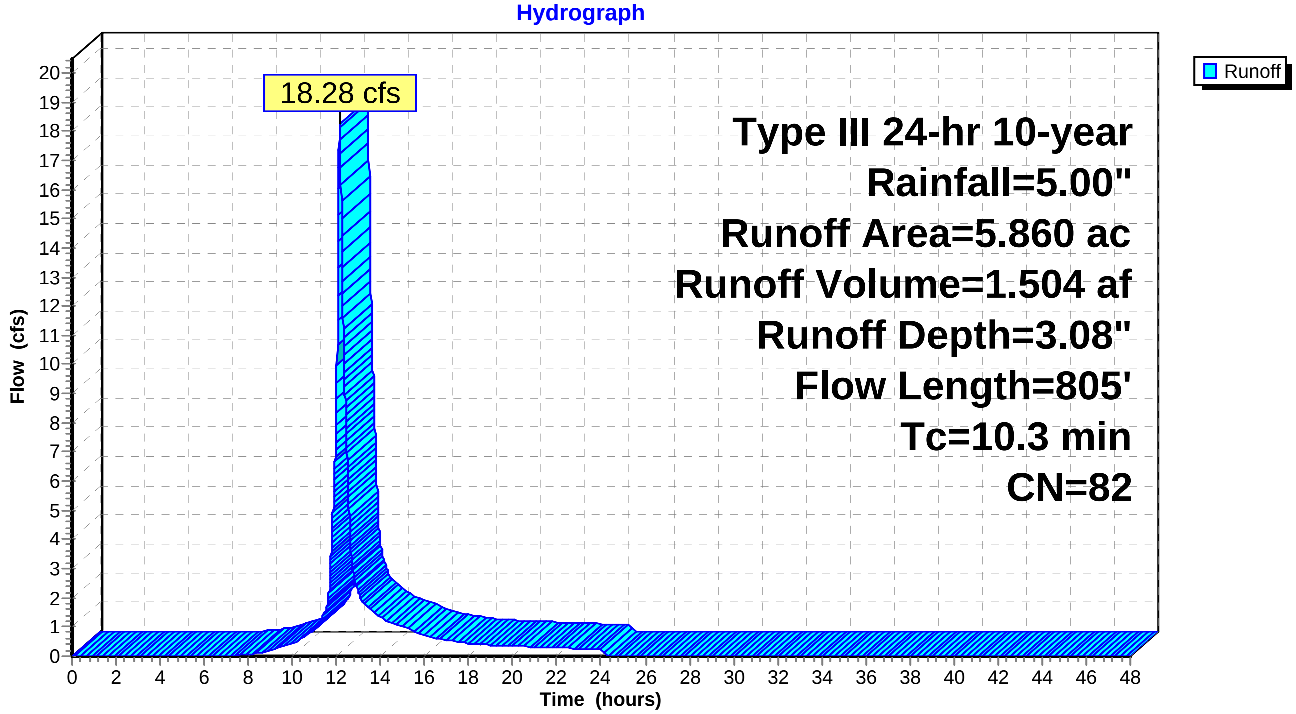
Runoff = 18.28 cfs @ 12.14 hrs, Volume= 1.504 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.00"

Area (ac)	CN	Description
2.000	61	>75% Grass cover, Good, HSG B
0.300	98	Roofs, HSG B
2.200	98	Paved parking, HSG B
1.360	85	Gravel roads, HSG B
5.860	82	Weighted Average
3.360		57.34% Pervious Area
2.500		42.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.1200	0.25		**Sheet Flow,**
					Grass: Dense n= 0.240 P2= 3.50"
1.9	125	0.0240	1.08		**Shallow Concentrated Flow,**
					Short Grass Pasture Kv= 7.0 fps
0.2	33	0.0240	3.14		**Shallow Concentrated Flow,**
					Paved Kv= 20.3 fps
1.5	547	0.0100	5.94	10.50	**Pipe Channel,**
					18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'
					n= 0.013 Corrugated PE, smooth interior
10.3	805	Total			

Subcatchment DA-1B: Pre-Dev



Summary for Subcatchment DA-1C: Pre-Dev

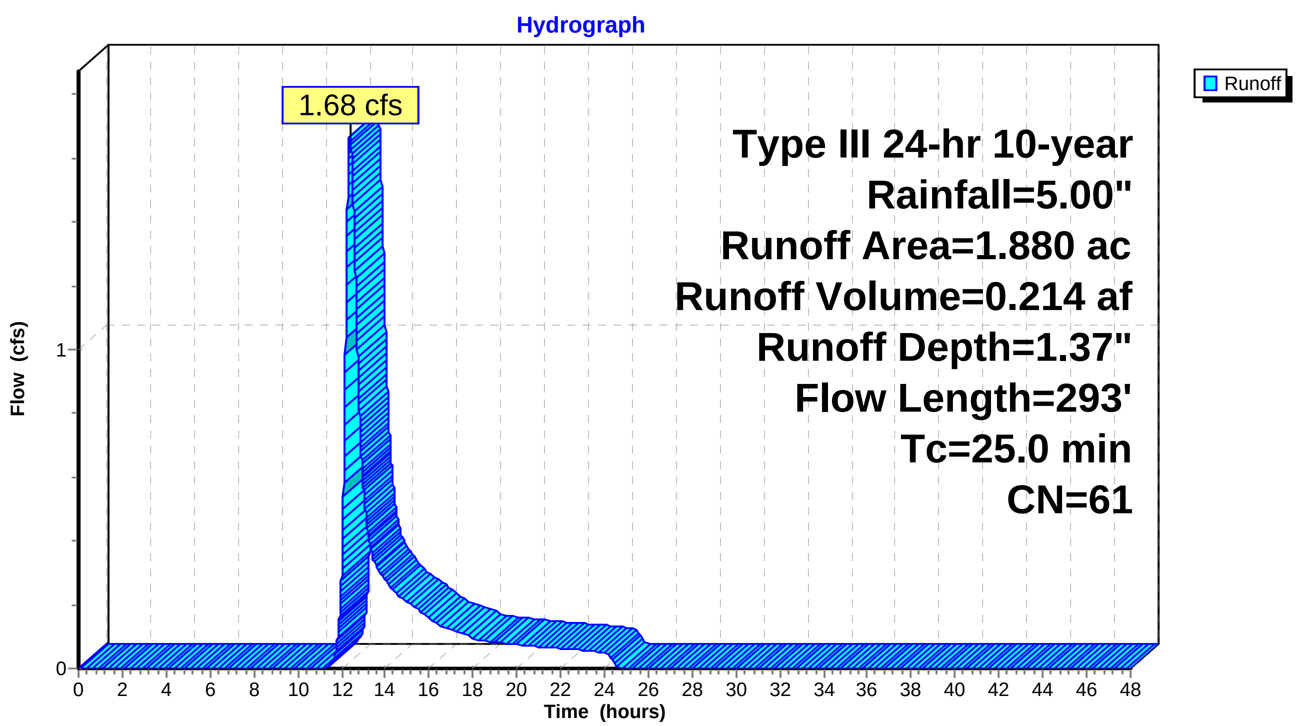
Runoff = 1.68 cfs @ 12.39 hrs, Volume= 0.214 af, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.00"

Area (ac)	CN	Description
0.400	60	Woods, Fair, HSG B
0.030	98	Unconnected pavement, HSG B
1.450	61	>75% Grass cover, Good, HSG B
1.880	61	Weighted Average
1.850		98.40% Pervious Area
0.030		1.60% Impervious Area
0.030		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	193	0.0104	0.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.0	293	Total			

Subcatchment DA-1C: Pre-Dev



Summary for Subcatchment DA-1F: Pre-Dev

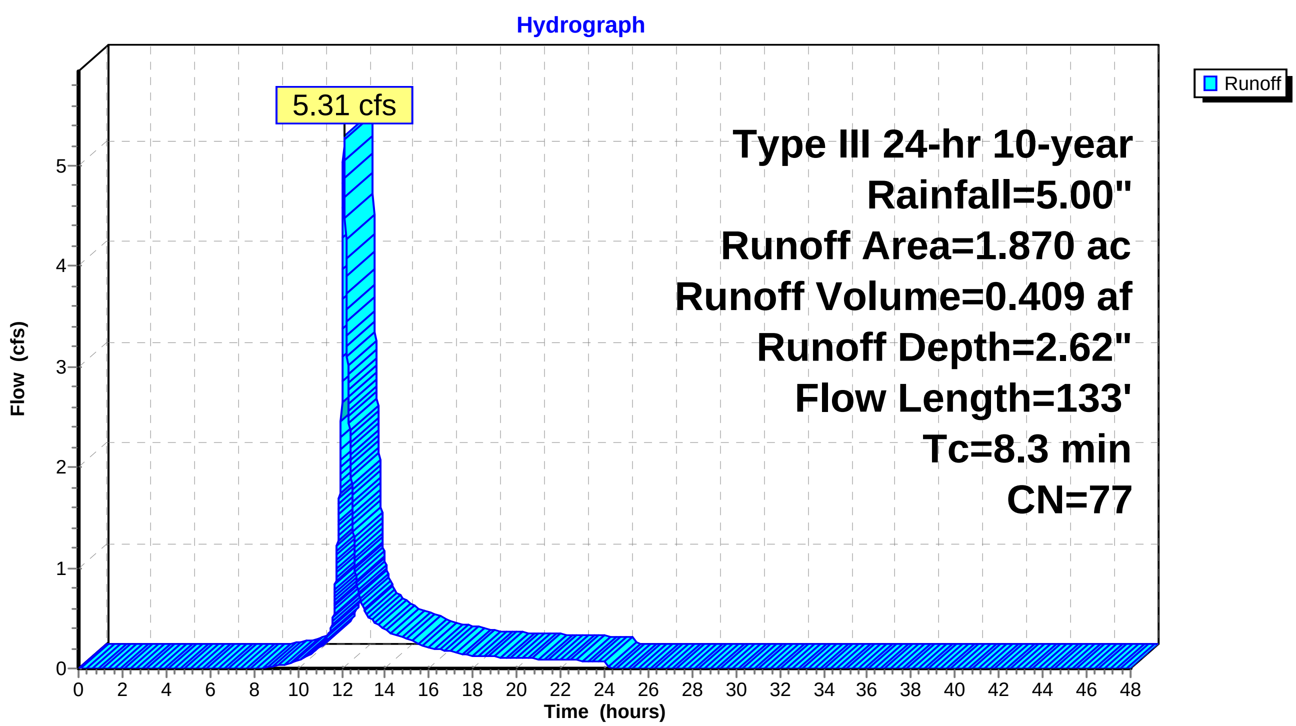
Runoff = 5.31 cfs @ 12.12 hrs, Volume= 0.409 af, Depth= 2.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.00"

Area (ac)	CN	Description
0.750	61	>75% Grass cover, Good, HSG B
0.170	98	Paved parking, HSG C
0.450	74	>75% Grass cover, Good, HSG C
0.500	98	Water Surface, HSG C
1.870	77	Weighted Average
1.200		64.17% Pervious Area
0.670		35.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.3	33	0.0910	2.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	133	Total			

Subcatchment DA-1F: Pre-Dev



Summary for Reach 1R: open portion of box culvert

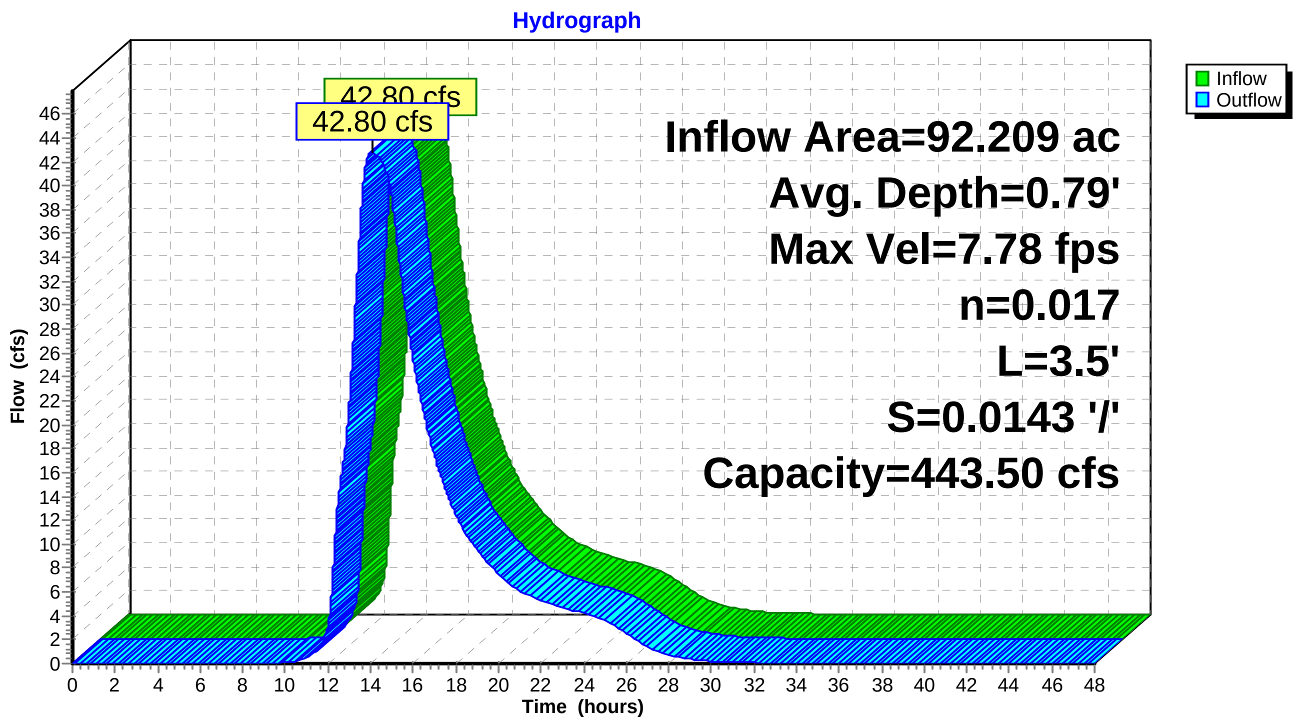
Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 2.27" for 10-year event
Inflow = 42.80 cfs @ 14.06 hrs, Volume= 17.462 af
Outflow = 42.80 cfs @ 14.06 hrs, Volume= 17.462 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.78 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.55 fps, Avg. Travel Time= 0.0 min

Peak Storage= 19 cf @ 14.06 hrs, Average Depth at Peak Storage= 0.79'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 443.50 cfs

7.00' x 4.00' deep channel, n= 0.017 Concrete, unfinished
Length= 3.5' Slope= 0.0143 '/'
Inlet Invert= 150.05', Outlet Invert= 150.00'

Reach 1R: open portion of box culvert



Summary for Reach 2R: bridge portion over box culvert

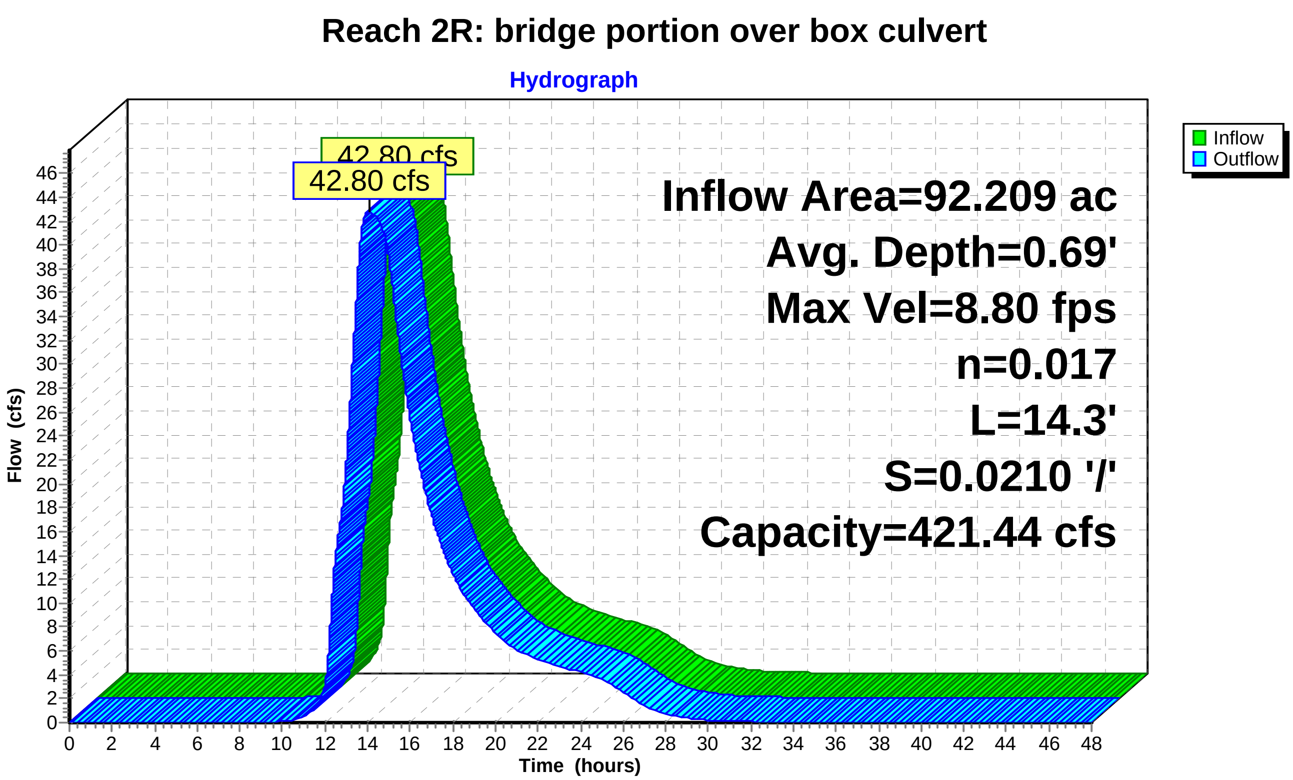
box culvert - opening 7'Wx4'Hx12'L
adjusted height to account for wooden beams underneath the bridge.

Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 2.27" for 10-year event
Inflow = 42.80 cfs @ 14.06 hrs, Volume= 17.462 af
Outflow = 42.80 cfs @ 14.06 hrs, Volume= 17.462 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.80 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.84 fps, Avg. Travel Time= 0.1 min

Peak Storage= 70 cf @ 14.06 hrs, Average Depth at Peak Storage= 0.69'
Bank-Full Depth= 3.33', Capacity at Bank-Full= 421.44 cfs

7.00' x 3.33' deep channel, n= 0.017 Concrete, unfinished
Length= 14.3' Slope= 0.0210 '/'
Inlet Invert= 150.00', Outlet Invert= 149.70'



Summary for Pond 1P: Exst Pond

Inflow Area =	92.209 ac,	8.64% Impervious, Inflow Depth = 2.32"	for 10-year event	
Inflow =	49.28 cfs @	13.93 hrs, Volume=	17.824 af	
Outflow =	48.91 cfs @	14.06 hrs, Volume=	17.822 af,	Atten= 1%, Lag= 7.4 min
Primary =	42.80 cfs @	14.06 hrs, Volume=	17.462 af	
Secondary =	6.10 cfs @	14.06 hrs, Volume=	0.360 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 154.28' @ 14.06 hrs Surf.Area= 35,222 sf Storage= 61,459 cf
Flood Elev= 156.00' Surf.Area= 48,106 sf Storage= 132,693 cf

Plug-Flow detention time= 32.7 min calculated for 17.819 af (100% of inflow)
Center-of-Mass det. time= 32.8 min (989.1 - 956.3)

Volume	Invert	Avail.Storage	Storage Description
#1	152.10'	132,693 cf	**existing pond (Irregular)**Listed below (Recalc)

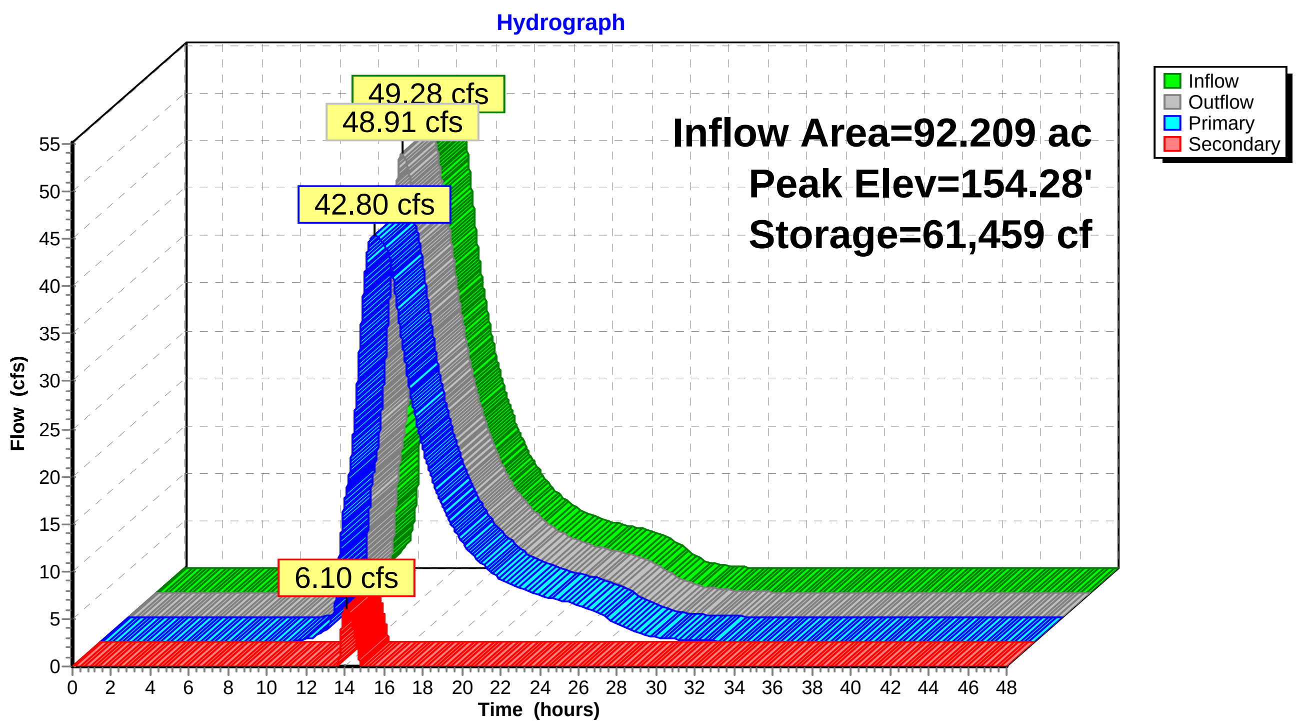
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
152.10	21,607	727.8	0	0	21,607
154.00	33,288	897.6	51,752	51,752	43,624
156.00	48,106	962.7	80,941	132,693	53,439

Device	Routing	Invert	Outlet Devices
#1	Primary	152.10'	**compound weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 1.00 1.00 2.00 2.00 Width (feet) 3.00 3.00 0.00 6.00 6.00 0.00
#2	Secondary	154.20'	**96.0' long x 14.0' breadth Bridge (overflow weir)** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=42.80 cfs @ 14.06 hrs HW=154.28' TW=150.84' (Dynamic Tailwater)
└─**1=compound weir** (Orifice Controls 42.80 cfs @ 4.76 fps)

Secondary OutFlow Max=6.10 cfs @ 14.06 hrs HW=154.28' TW=152.33' (Dynamic Tailwater)
└─**2=Bridge (overflow weir)** (Weir Controls 6.10 cfs @ 0.76 fps)

Pond 1P: Exst Pond



Summary for Pond 2P: stream to 60" twin culverts (DP-1)

Water will sit in stream channel until it reaches a minimum elevation of 150.72, since that is the lowest elevation of one of the 60" culverts. Therefore, this elevation was used as the starting elevation for the modeling of the stream and 60" twin culverts.

Inflow Area =	92.209 ac,	8.64% Impervious, Inflow Depth = 2.32"	for 10-year event	
Inflow =	48.91 cfs @	14.06 hrs, Volume=	17.822 af	
Outflow =	48.91 cfs @	14.06 hrs, Volume=	17.822 af,	Atten= 0%, Lag= 0.5 min
Primary =	48.91 cfs @	14.06 hrs, Volume=	17.822 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 150.72' Surf.Area= 852 sf Storage= 735 cf
Peak Elev= 152.33' @ 14.06 hrs Surf.Area= 1,463 sf Storage= 2,507 cf (1,772 cf above start)

Plug-Flow detention time= 2.4 min calculated for 17.801 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (990.1 - 989.2)

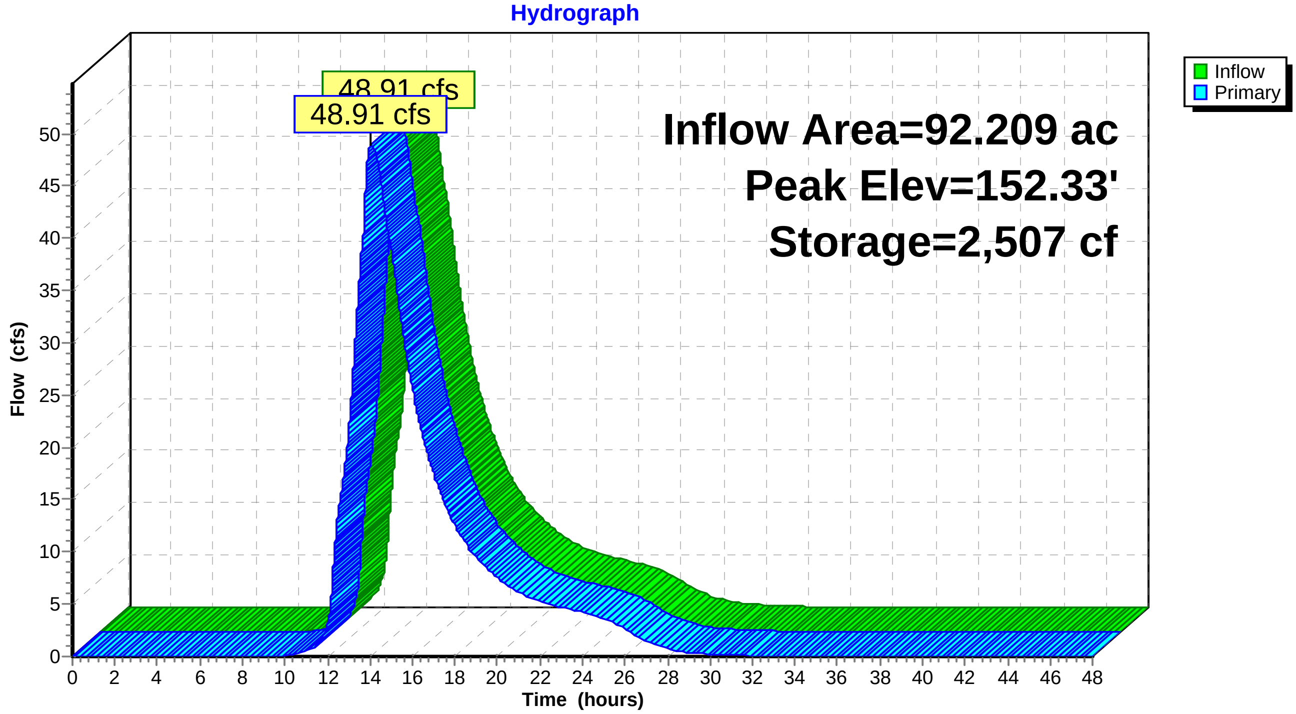
Volume	Invert	Avail.Storage	Storage Description
#1	149.70'	6,090 cf	**existing stream (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
149.70	596	131.8	0	0	596
152.00	1,239	152.2	2,066	2,066	1,161
154.00	2,902	266.7	4,025	6,090	5,001

Device	Routing	Invert	Outlet Devices
#1	Primary	150.72'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.10' S= 0.0063 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#2	Primary	150.77'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.40' S= 0.0038 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=48.91 cfs @ 14.06 hrs HW=152.33' (Free Discharge)
1=Culvert (Barrel Controls 26.86 cfs @ 6.21 fps)
2=Culvert (Barrel Controls 22.05 cfs @ 5.32 fps)

Pond 2P: stream to 60" twin culverts (DP-1)



Summary for Pond A: Detention Basin

Grate: Campbell Foundry Model # 3433.
Existing rip-rap for weir is 10 foot wide and will remain.

Inflow Area = 7.740 ac, 32.69% Impervious, Inflow Depth = 2.66" for 10-year event
Inflow = 19.07 cfs @ 12.14 hrs, Volume= 1.718 af
Outflow = 14.93 cfs @ 12.25 hrs, Volume= 1.718 af, Atten= 22%, Lag= 6.0 min
Primary = 8.82 cfs @ 12.25 hrs, Volume= 1.570 af
Secondary = 6.11 cfs @ 12.25 hrs, Volume= 0.148 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 155.75' Surf.Area= 5,015 sf Storage= 3,316 cf
Peak Elev= 157.37' @ 12.25 hrs Surf.Area= 8,609 sf Storage= 14,950 cf (11,634 cf above start)
Flood Elev= 158.00' Surf.Area= 10,003 sf Storage= 19,772 cf (16,457 cf above start)

Plug-Flow detention time= 58.8 min calculated for 1.642 af (96% of inflow)
Center-of-Mass det. time= 23.1 min (852.1 - 829.0)

Volume	Invert	Avail.Storage	Storage Description
#1	155.00'	19,772 cf	**detention basin (Irregular)**Listed below

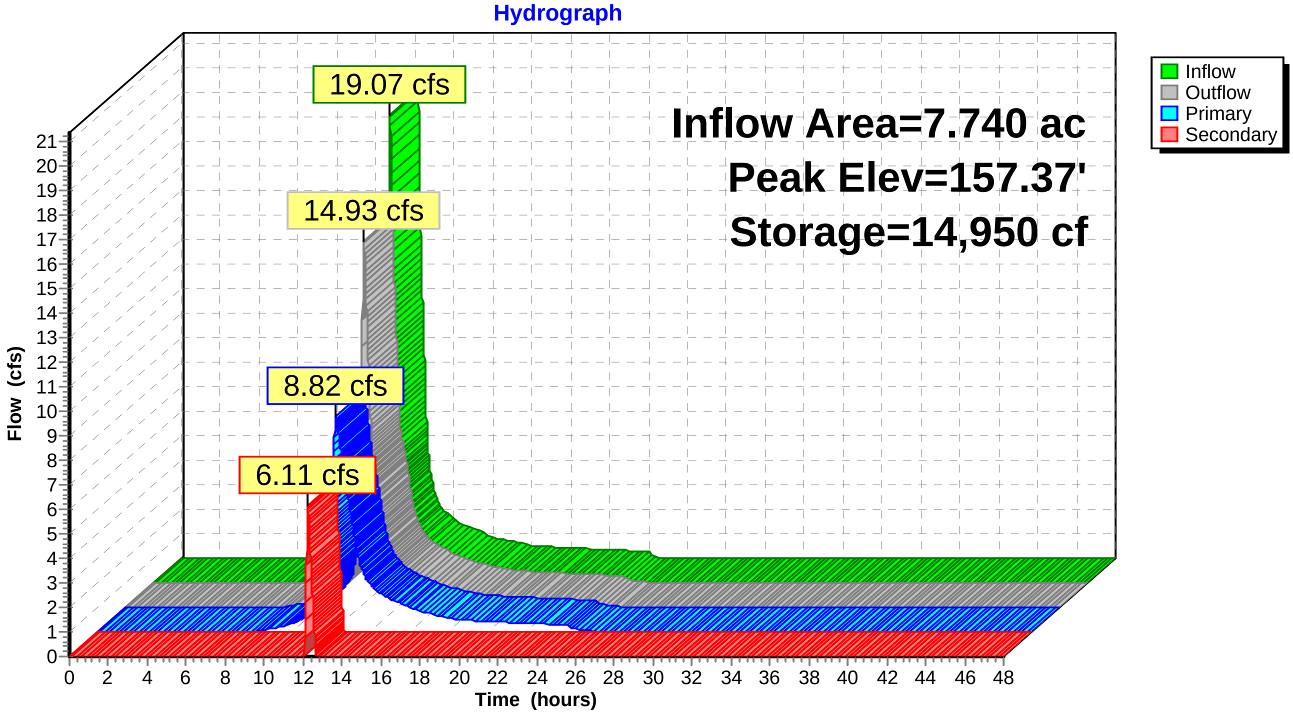
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
155.00	3,369	252.3	0	0	3,369
156.00	5,564	319.6	4,421	4,421	6,445
158.00	10,003	509.1	15,352	19,772	18,969

Device	Routing	Invert	Outlet Devices
#1	Primary	154.09'	**24.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 153.40' S= 0.0168 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	155.75'	**22.0" W x 9.0" H Vert. Slot** C= 0.600
#3	Device 1	157.00'	**12.0" W x 9.0" H Vert. Slots X 2.00** C= 0.600
#4	Device 1	158.50'	**36.0" x 55.5" Horiz. Grate X 4.00 columns** X 8 rows C= 0.600 in 1.3" x 6.5" Grate Limited to weir flow at low heads
#5	Secondary	157.00'	**10.0' long x 29.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=8.82 cfs @ 12.25 hrs HW=157.37' TW=152.97' (Dynamic Tailwater)
└─**1=Culvert** (Passes 8.82 cfs of 22.85 cfs potential flow)
  ├─**2=Slot** (Orifice Controls 7.36 cfs @ 5.36 fps)
  ├─**3=Slots** (Orifice Controls 1.45 cfs @ 1.96 fps)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=6.11 cfs @ 12.25 hrs HW=157.37' TW=152.97' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Weir Controls 6.11 cfs @ 1.64 fps)

Pond A: Detention Basin



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1A: Pre-Dev Offsite Runoff Area=82.599 ac 5.77% Impervious Runoff Depth=3.09"
Flow Length=3,950' Tc=147.5 min CN=73 Runoff=64.33 cfs 21.260 af

Subcatchment DA-1B: Pre-Dev Runoff Area=5.860 ac 42.66% Impervious Runoff Depth=3.99"
Flow Length=805' Tc=10.3 min CN=82 Runoff=23.55 cfs 1.947 af

Subcatchment DA-1C: Pre-Dev Runoff Area=1.880 ac 1.60% Impervious Runoff Depth=2.01"
Flow Length=293' Tc=25.0 min CN=61 Runoff=2.57 cfs 0.314 af

Subcatchment DA-1F: Pre-Dev Runoff Area=1.870 ac 35.83% Impervious Runoff Depth=3.48"
Flow Length=133' Tc=8.3 min CN=77 Runoff=7.04 cfs 0.542 af

Reach 1R: open portion of box culvert Avg. Depth=0.82' Max Vel=7.94 fps Inflow=45.47 cfs 21.748 af
n=0.017 L=3.5' S=0.0143 '/' Capacity=443.50 cfs Outflow=45.47 cfs 21.748 af

Reach 2R: bridge portion over box culvert Avg. Depth=0.72' Max Vel=8.99 fps Inflow=45.47 cfs 21.748 af
n=0.017 L=14.3' S=0.0210 '/' Capacity=421.44 cfs Outflow=45.47 cfs 21.748 af

Pond 1P: Exst Pond Peak Elev=154.39' Storage=65,397 cf Inflow=67.39 cfs 24.063 af
Primary=45.47 cfs 21.748 af Secondary=21.66 cfs 2.313 af Outflow=67.13 cfs 24.061 af

Pond 2P: stream to 60" twin culverts Peak Elev=152.64' Storage=3,007 cf Inflow=67.13 cfs 24.061 af
Outflow=67.12 cfs 24.061 af

Pond A: Detention Basin Peak Elev=157.56' Storage=16,367 cf Inflow=24.88 cfs 2.261 af
Primary=10.56 cfs 1.952 af Secondary=11.20 cfs 0.309 af Outflow=21.77 cfs 2.261 af

Total Runoff Area = 92.209 ac Runoff Volume = 24.063 af Average Runoff Depth = 3.13"
91.36% Pervious = 84.241 ac 8.64% Impervious = 7.969 ac

Summary for Subcatchment DA-1A: Pre-Dev Offsite

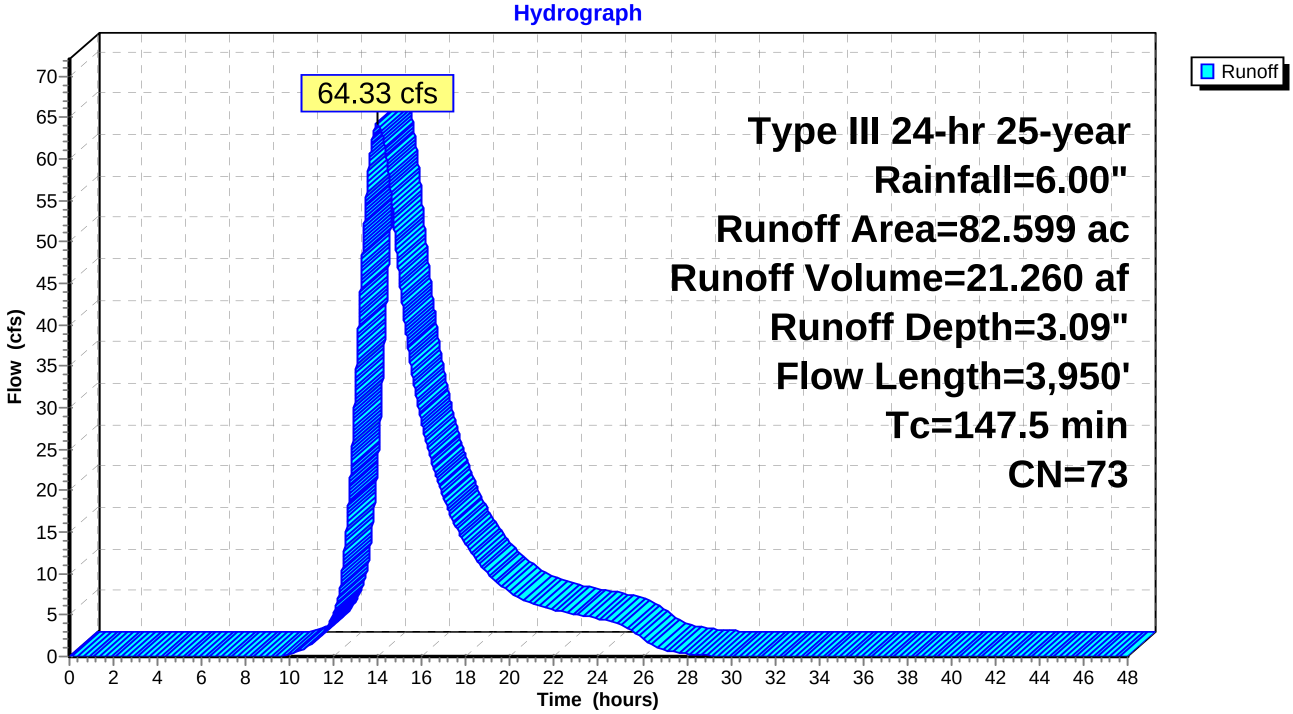
Runoff = 64.33 cfs @ 13.93 hrs, Volume= 21.260 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.00"

Area (ac)	CN	Description
8.287	73	Woods, Fair, HSG C
5.037	76	Woods/grass comb., Fair, HSG C
21.037	60	Woods, Fair, HSG B
32.137	79	Woods, Fair, HSG D
0.187	98	Unconnected pavement, HSG C
6.037	80	1/2 acre lots, 25% imp, HSG C
0.337	98	Unconnected pavement, HSG B
6.037	70	1/2 acre lots, 25% imp, HSG B
0.467	98	Unconnected pavement, HSG D
3.036	85	1/2 acre lots, 25% imp, HSG D
82.599	73	Weighted Average
77.831		94.23% Pervious Area
4.768		5.77% Impervious Area
0.991		20.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
6.2	320	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
97.4	1,600	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.3	1,930	0.0050	1.06		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
147.5	3,950	Total			

Subcatchment DA-1A: Pre-Dev Offsite



Summary for Subcatchment DA-1B: Pre-Dev

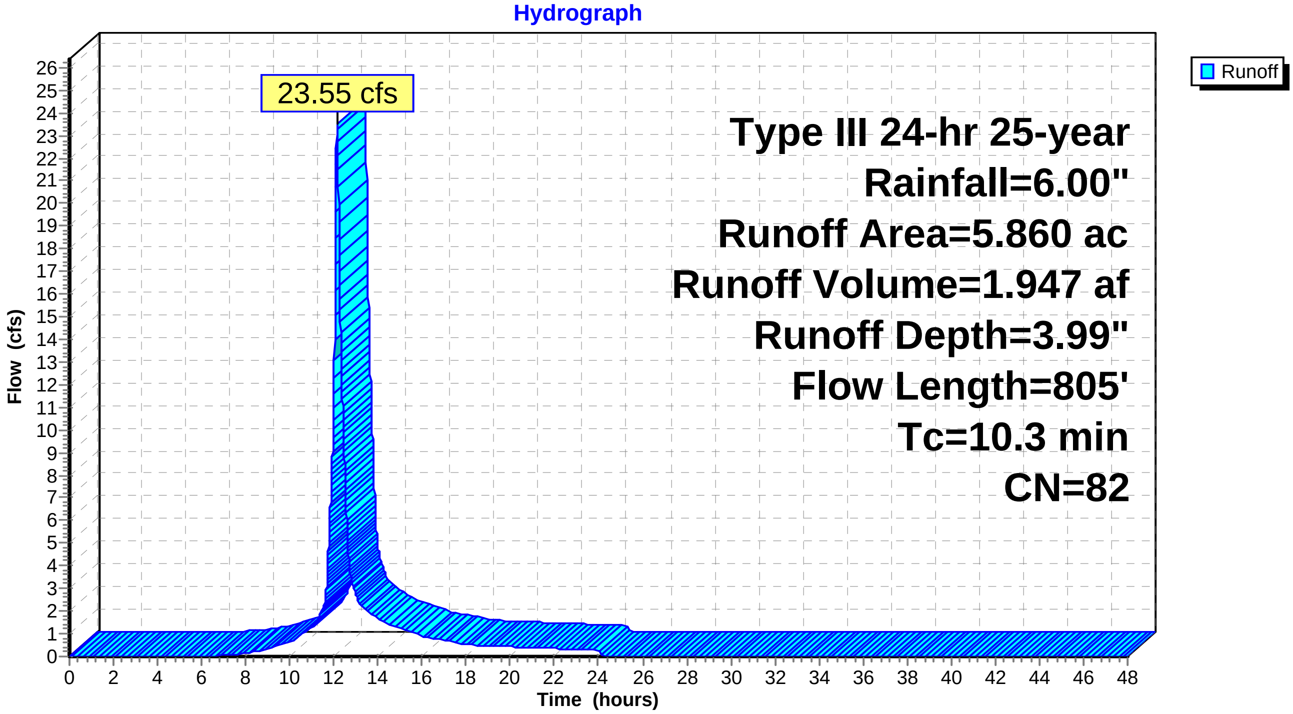
Runoff = 23.55 cfs @ 12.14 hrs, Volume= 1.947 af, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.00"

Area (ac)	CN	Description
2.000	61	>75% Grass cover, Good, HSG B
0.300	98	Roofs, HSG B
2.200	98	Paved parking, HSG B
1.360	85	Gravel roads, HSG B
5.860	82	Weighted Average
3.360		57.34% Pervious Area
2.500		42.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.1200	0.25		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
1.9	125	0.0240	1.08		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	33	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	547	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
10.3	805	Total			

Subcatchment DA-1B: Pre-Dev



Summary for Subcatchment DA-1C: Pre-Dev

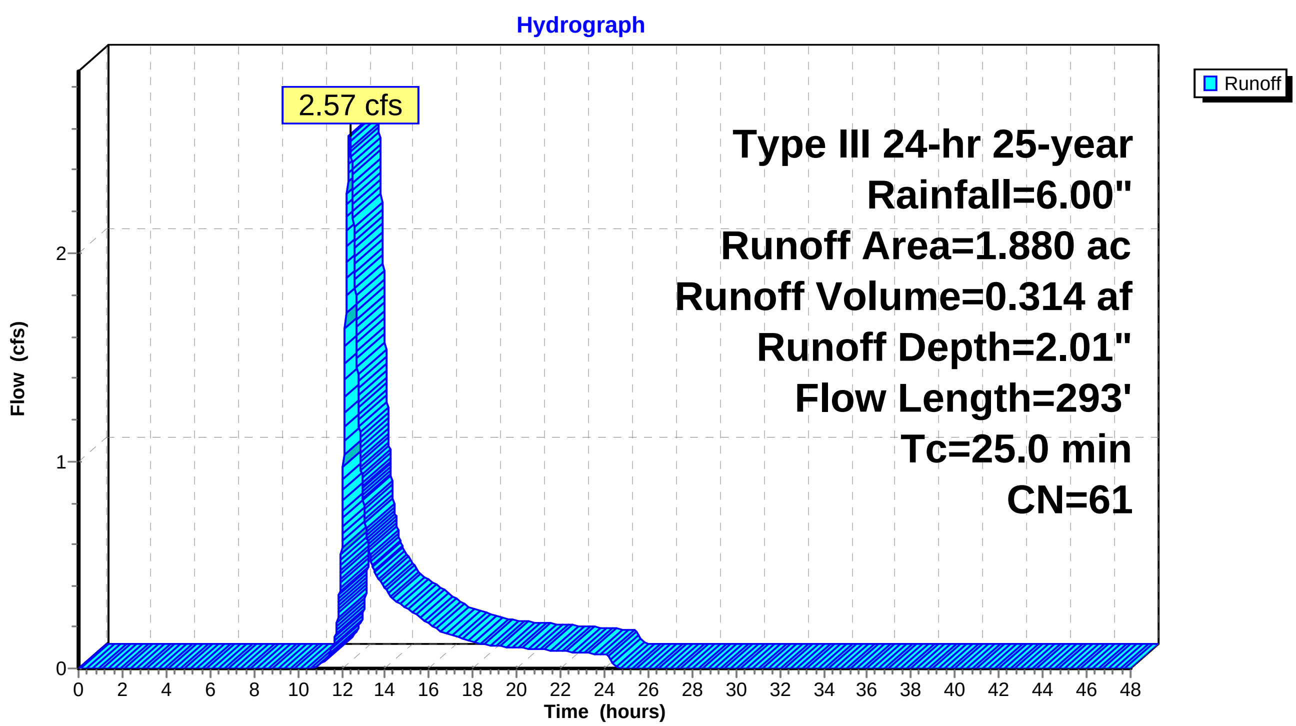
Runoff = 2.57 cfs @ 12.37 hrs, Volume= 0.314 af, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.00"

Area (ac)	CN	Description
0.400	60	Woods, Fair, HSG B
0.030	98	Unconnected pavement, HSG B
1.450	61	>75% Grass cover, Good, HSG B
1.880	61	Weighted Average
1.850		98.40% Pervious Area
0.030		1.60% Impervious Area
0.030		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	193	0.0104	0.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.0	293	Total			

Subcatchment DA-1C: Pre-Dev



Summary for Subcatchment DA-1F: Pre-Dev

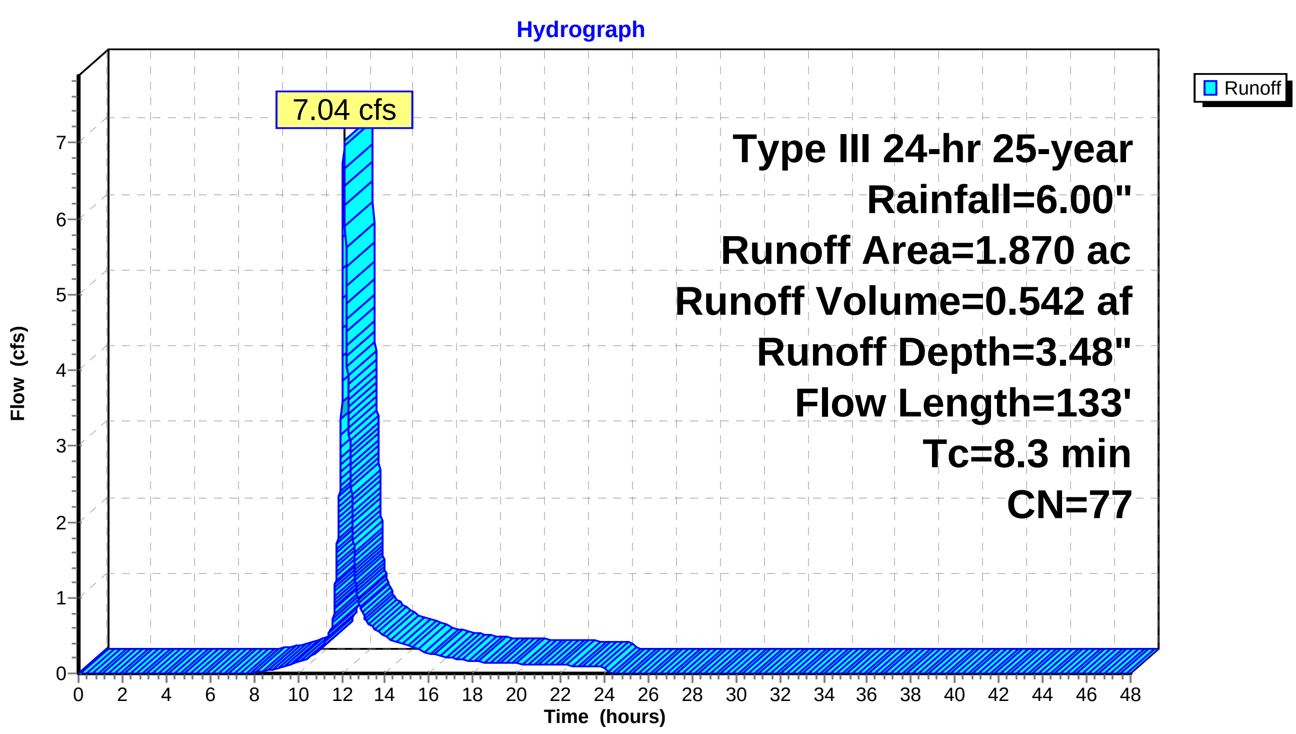
Runoff = 7.04 cfs @ 12.12 hrs, Volume= 0.542 af, Depth= 3.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.00"

Area (ac)	CN	Description
0.750	61	>75% Grass cover, Good, HSG B
0.170	98	Paved parking, HSG C
0.450	74	>75% Grass cover, Good, HSG C
0.500	98	Water Surface, HSG C
1.870	77	Weighted Average
1.200		64.17% Pervious Area
0.670		35.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.3	33	0.0910	2.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	133	Total			

Subcatchment DA-1F: Pre-Dev



Summary for Reach 1R: open portion of box culvert

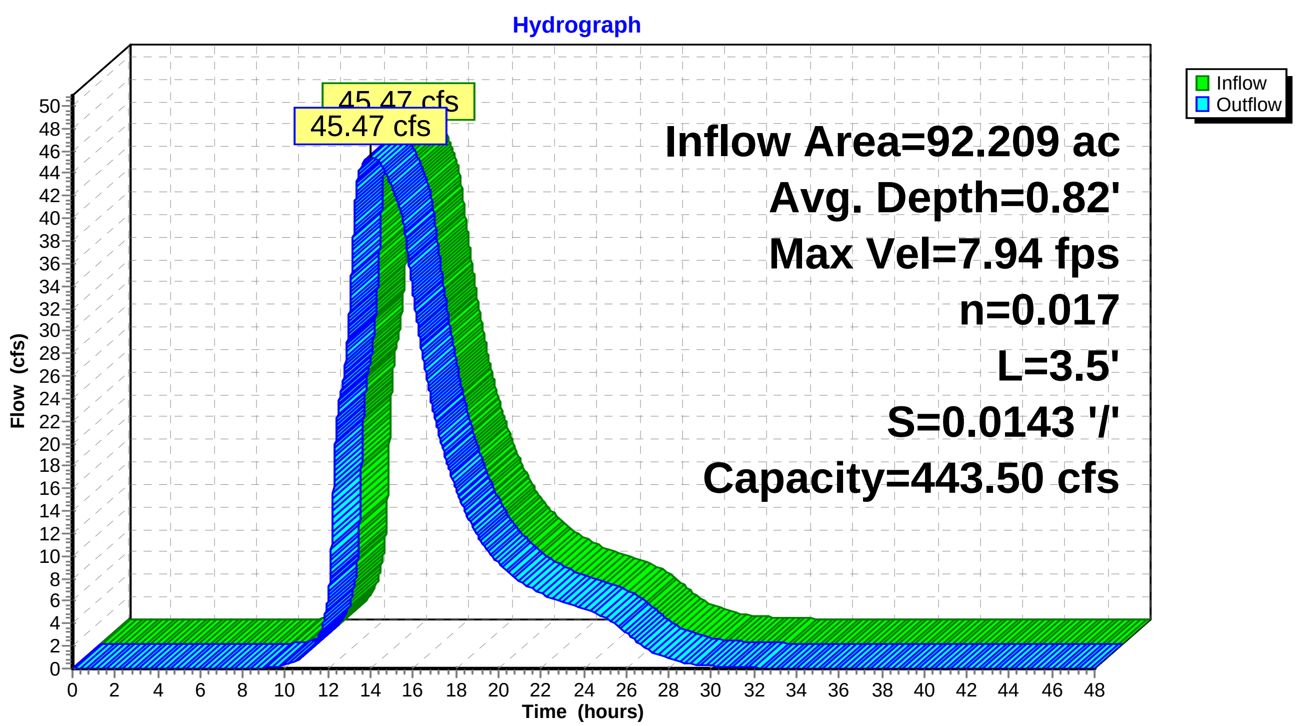
Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 2.83" for 25-year event
Inflow = 45.47 cfs @ 13.98 hrs, Volume= 21.748 af
Outflow = 45.47 cfs @ 13.98 hrs, Volume= 21.748 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.94 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.72 fps, Avg. Travel Time= 0.0 min

Peak Storage= 20 cf @ 13.98 hrs, Average Depth at Peak Storage= 0.82'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 443.50 cfs

7.00' x 4.00' deep channel, n= 0.017 Concrete, unfinished
Length= 3.5' Slope= 0.0143 '/'
Inlet Invert= 150.05', Outlet Invert= 150.00'

Reach 1R: open portion of box culvert



Summary for Reach 2R: bridge portion over box culvert

box culvert - opening 7'Wx4'Hx12'L
adjusted height to account for wooden beams underneath the bridge.

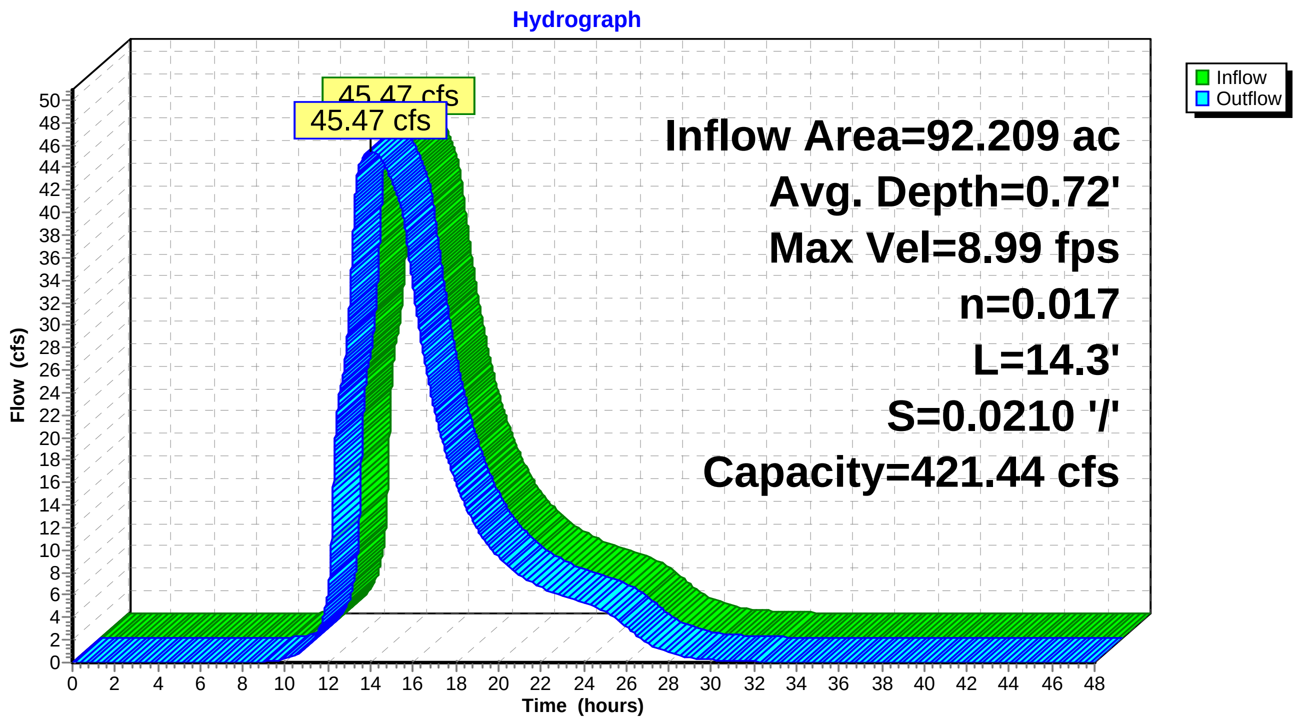
Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 2.83" for 25-year event
Inflow = 45.47 cfs @ 13.98 hrs, Volume= 21.748 af
Outflow = 45.47 cfs @ 13.98 hrs, Volume= 21.748 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.99 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.03 fps, Avg. Travel Time= 0.1 min

Peak Storage= 72 cf @ 13.98 hrs, Average Depth at Peak Storage= 0.72'
Bank-Full Depth= 3.33', Capacity at Bank-Full= 421.44 cfs

7.00' x 3.33' deep channel, n= 0.017 Concrete, unfinished
Length= 14.3' Slope= 0.0210 '/'
Inlet Invert= 150.00', Outlet Invert= 149.70'

Reach 2R: bridge portion over box culvert



Summary for Pond 1P: Exst Pond

Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 3.13" for 25-year event
Inflow = 67.39 cfs @ 13.93 hrs, Volume= 24.063 af
Outflow = 67.13 cfs @ 13.98 hrs, Volume= 24.061 af, Atten= 0%, Lag= 2.9 min
Primary = 45.47 cfs @ 13.98 hrs, Volume= 21.748 af
Secondary = 21.66 cfs @ 13.98 hrs, Volume= 2.313 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 154.39' @ 13.98 hrs Surf.Area= 35,992 sf Storage= 65,397 cf
Flood Elev= 156.00' Surf.Area= 48,106 sf Storage= 132,693 cf

Plug-Flow detention time= 28.6 min calculated for 24.056 af (100% of inflow)
Center-of-Mass det. time= 28.6 min (976.5 - 947.9)

Volume	Invert	Avail.Storage	Storage Description
#1	152.10'	132,693 cf	**existing pond (Irregular)**Listed below (Recalc)

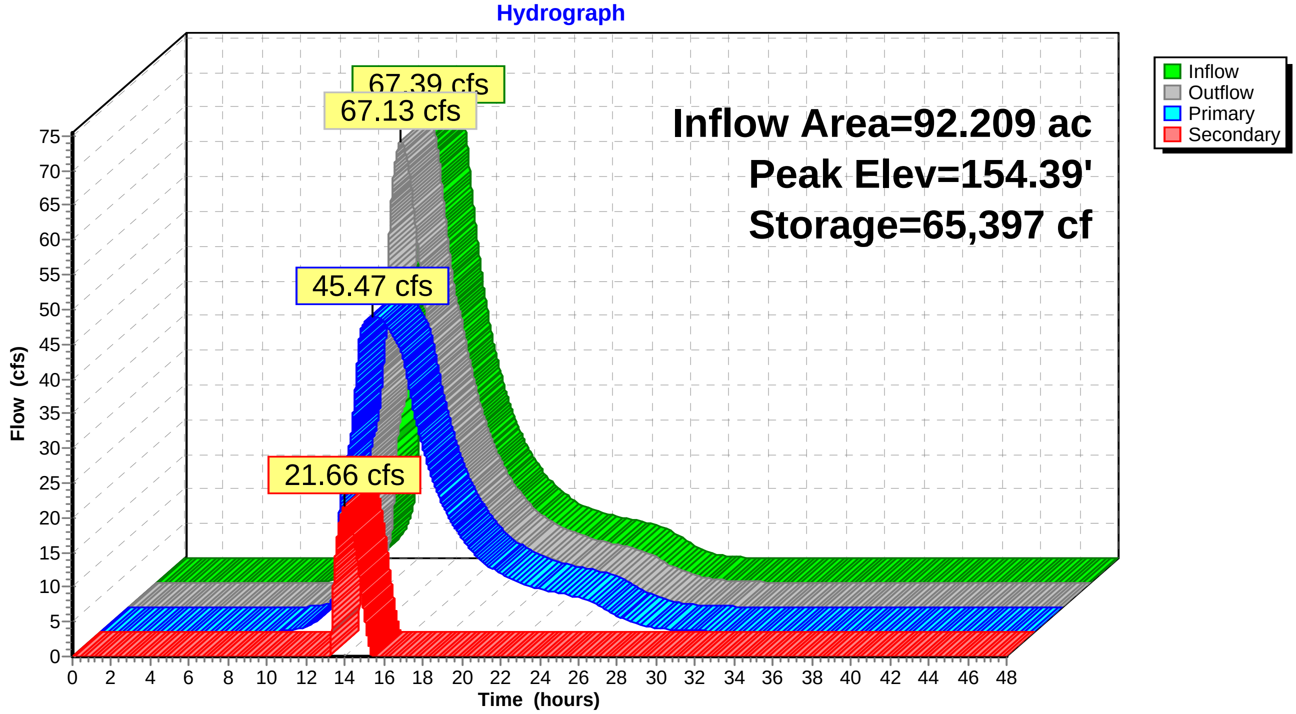
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
152.10	21,607	727.8	0	0	21,607
154.00	33,288	897.6	51,752	51,752	43,624
156.00	48,106	962.7	80,941	132,693	53,439

Device	Routing	Invert	Outlet Devices
#1	Primary	152.10'	**compound weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 1.00 1.00 2.00 2.00 Width (feet) 3.00 3.00 0.00 6.00 6.00 0.00
#2	Secondary	154.20'	**96.0' long x 14.0' breadth Bridge (overflow weir)** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=45.47 cfs @ 13.98 hrs HW=154.39' TW=150.87' (Dynamic Tailwater)
└─**1=compound weir** (Orifice Controls 45.47 cfs @ 5.05 fps)

Secondary OutFlow Max=21.66 cfs @ 13.98 hrs HW=154.39' TW=152.64' (Dynamic Tailwater)
└─**2=Bridge (overflow weir)** (Weir Controls 21.66 cfs @ 1.16 fps)

Pond 1P: Exst Pond



Summary for Pond 2P: stream to 60" twin culverts (DP-1)

Water will sit in stream channel until it reaches a minimum elevation of 150.72, since that is the lowest elevation of one of the 60" culverts. Therefore, this elevation was used as the starting elevation for the modeling of the stream and 60" twin culverts.

Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 3.13" for 25-year event
Inflow = 67.13 cfs @ 13.98 hrs, Volume= 24.061 af
Outflow = 67.12 cfs @ 13.99 hrs, Volume= 24.061 af, Atten= 0%, Lag= 0.5 min
Primary = 67.12 cfs @ 13.99 hrs, Volume= 24.061 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 150.72' Surf.Area= 852 sf Storage= 735 cf
Peak Elev= 152.64' @ 13.99 hrs Surf.Area= 1,698 sf Storage= 3,007 cf (2,272 cf above start)

Plug-Flow detention time= 1.9 min calculated for 24.039 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (977.4 - 976.5)

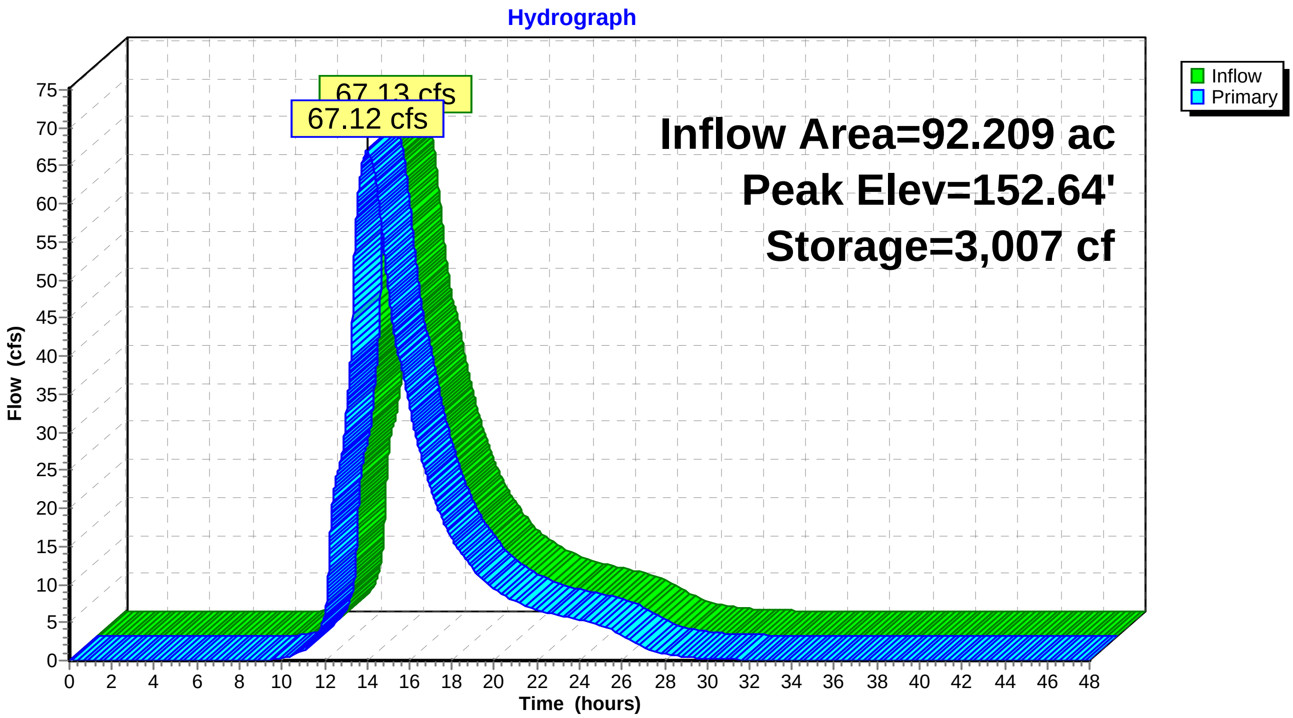
Volume	Invert	Avail.Storage	Storage Description
#1	149.70'	6,090 cf	**existing stream (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
149.70	596	131.8	0	0	596
152.00	1,239	152.2	2,066	2,066	1,161
154.00	2,902	266.7	4,025	6,090	5,001

Device	Routing	Invert	Outlet Devices
#1	Primary	150.72'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.10' S= 0.0063 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#2	Primary	150.77'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.40' S= 0.0038 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=67.12 cfs @ 13.99 hrs HW=152.64' (Free Discharge)
1=Culvert (Barrel Controls 36.48 cfs @ 6.64 fps)
2=Culvert (Barrel Controls 30.64 cfs @ 5.77 fps)

Pond 2P: stream to 60" twin culverts (DP-1)



Summary for Pond A: Detention Basin

Grate: Campbell Foundry Model # 3433.
Existing rip-rap for weir is 10 foot wide and will remain.

Inflow Area = 7.740 ac, 32.69% Impervious, Inflow Depth = 3.51" for 25-year event
Inflow = 24.88 cfs @ 12.14 hrs, Volume= 2.261 af
Outflow = 21.77 cfs @ 12.21 hrs, Volume= 2.261 af, Atten= 13%, Lag= 4.0 min
Primary = 10.56 cfs @ 12.21 hrs, Volume= 1.952 af
Secondary = 11.20 cfs @ 12.21 hrs, Volume= 0.309 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 155.75' Surf.Area= 5,015 sf Storage= 3,316 cf
Peak Elev= 157.56' @ 12.21 hrs Surf.Area= 9,018 sf Storage= 16,367 cf (13,051 cf above start)
Flood Elev= 158.00' Surf.Area= 10,003 sf Storage= 19,772 cf (16,457 cf above start)

Plug-Flow detention time= 50.1 min calculated for 2.185 af (97% of inflow)
Center-of-Mass det. time= 21.3 min (843.2 - 821.9)

Volume	Invert	Avail.Storage	Storage Description
#1	155.00'	19,772 cf	**detention basin (Irregular)**Listed below

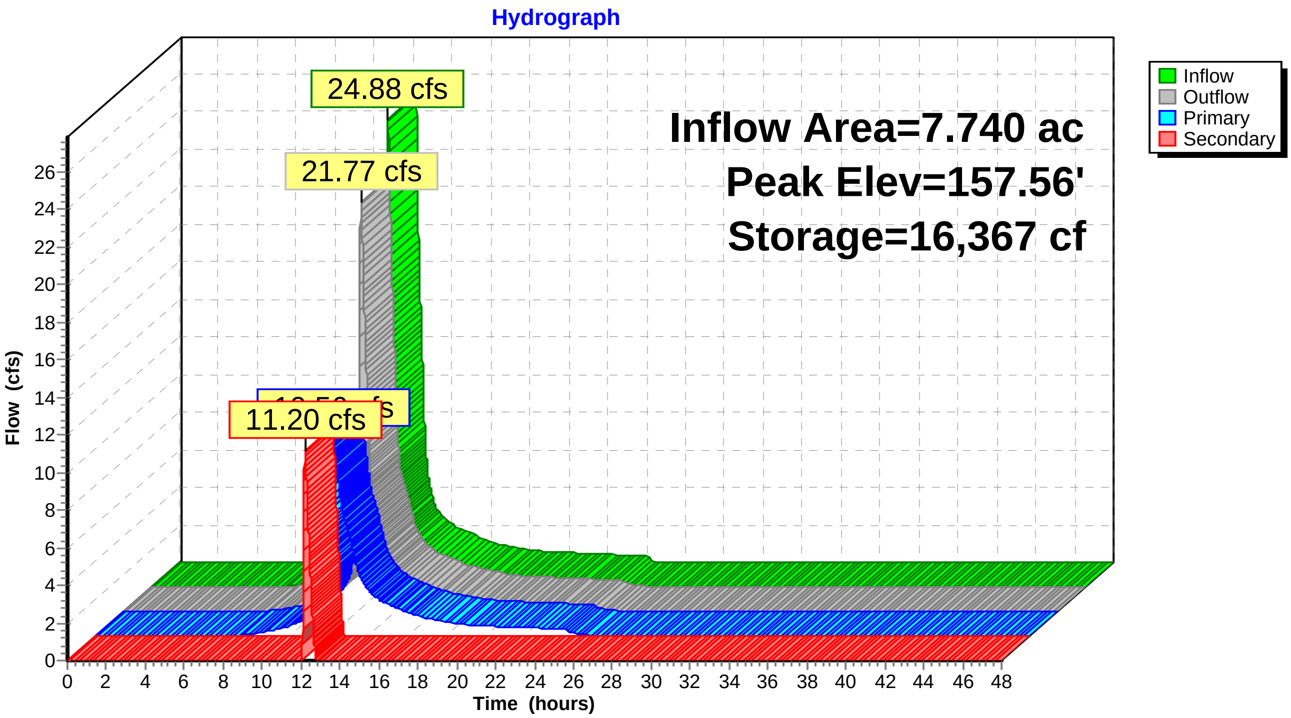
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
155.00	3,369	252.3	0	0	3,369
156.00	5,564	319.6	4,421	4,421	6,445
158.00	10,003	509.1	15,352	19,772	18,969

Device	Routing	Invert	Outlet Devices
#1	Primary	154.09'	**24.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 153.40' S= 0.0168 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	155.75'	**22.0" W x 9.0" H Vert. Slot** C= 0.600
#3	Device 1	157.00'	**12.0" W x 9.0" H Vert. Slots X 2.00** C= 0.600
#4	Device 1	158.50'	**36.0" x 55.5" Horiz. Grate X 4.00 columns** X 8 rows C= 0.600 in 1.3" x 6.5" Grate Limited to weir flow at low heads
#5	Secondary	157.00'	**10.0' long x 29.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=10.56 cfs @ 12.21 hrs HW=157.56' TW=153.29' (Dynamic Tailwater)
└─**1=Culvert** (Passes 10.56 cfs of 23.75 cfs potential flow)
  ├─**2=Slot** (Orifice Controls 7.90 cfs @ 5.74 fps)
  ├─**3=Slots** (Orifice Controls 2.66 cfs @ 2.39 fps)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=11.20 cfs @ 12.21 hrs HW=157.56' TW=153.29' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Weir Controls 11.20 cfs @ 2.01 fps)

Pond A: Detention Basin



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1A: Pre-Dev Offsite Runoff Area=82.599 ac 5.77% Impervious Runoff Depth=4.81"
Flow Length=3,950' Tc=147.5 min CN=73 Runoff=101.16 cfs 33.108 af

Subcatchment DA-1B: Pre-Dev Runoff Area=5.860 ac 42.66% Impervious Runoff Depth=5.86"
Flow Length=805' Tc=10.3 min CN=82 Runoff=34.15 cfs 2.862 af

Subcatchment DA-1C: Pre-Dev Runoff Area=1.880 ac 1.60% Impervious Runoff Depth=3.44"
Flow Length=293' Tc=25.0 min CN=61 Runoff=4.59 cfs 0.540 af

Subcatchment DA-1F: Pre-Dev Runoff Area=1.870 ac 35.83% Impervious Runoff Depth=5.27"
Flow Length=133' Tc=8.3 min CN=77 Runoff=10.60 cfs 0.822 af

Reach 1R: open portion of box culvert Avg. Depth=0.86' Max Vel=8.17 fps Inflow=49.19 cfs 28.768 af
n=0.017 L=3.5' S=0.0143 '/' Capacity=443.50 cfs Outflow=49.19 cfs 28.768 af

Reach 2R: bridge portion over box culvert Avg. Depth=0.76' Max Vel=9.25 fps Inflow=49.19 cfs 28.768 af
n=0.017 L=14.3' S=0.0210 '/' Capacity=421.44 cfs Outflow=49.19 cfs 28.768 af

Pond 1P: Exst Pond Peak Elev=154.56' Storage=71,611 cf Inflow=105.59 cfs 37.331 af
Primary=49.19 cfs 28.768 af Secondary=56.14 cfs 8.561 af Outflow=105.33 cfs 37.329 af

Pond 2P: stream to 60" twin culverts Peak Elev=153.24' Storage=4,167 cf Inflow=105.33 cfs 37.329 af
Outflow=105.32 cfs 37.329 af

Pond A: Detention Basin Peak Elev=157.85' Storage=18,596 cf Inflow=36.75 cfs 3.401 af
Primary=13.48 cfs 2.712 af Secondary=20.55 cfs 0.689 af Outflow=34.03 cfs 3.401 af

Total Runoff Area = 92.209 ac Runoff Volume = 37.331 af Average Runoff Depth = 4.86"
91.36% Pervious = 84.241 ac 8.64% Impervious = 7.969 ac

Summary for Subcatchment DA-1A: Pre-Dev Offsite

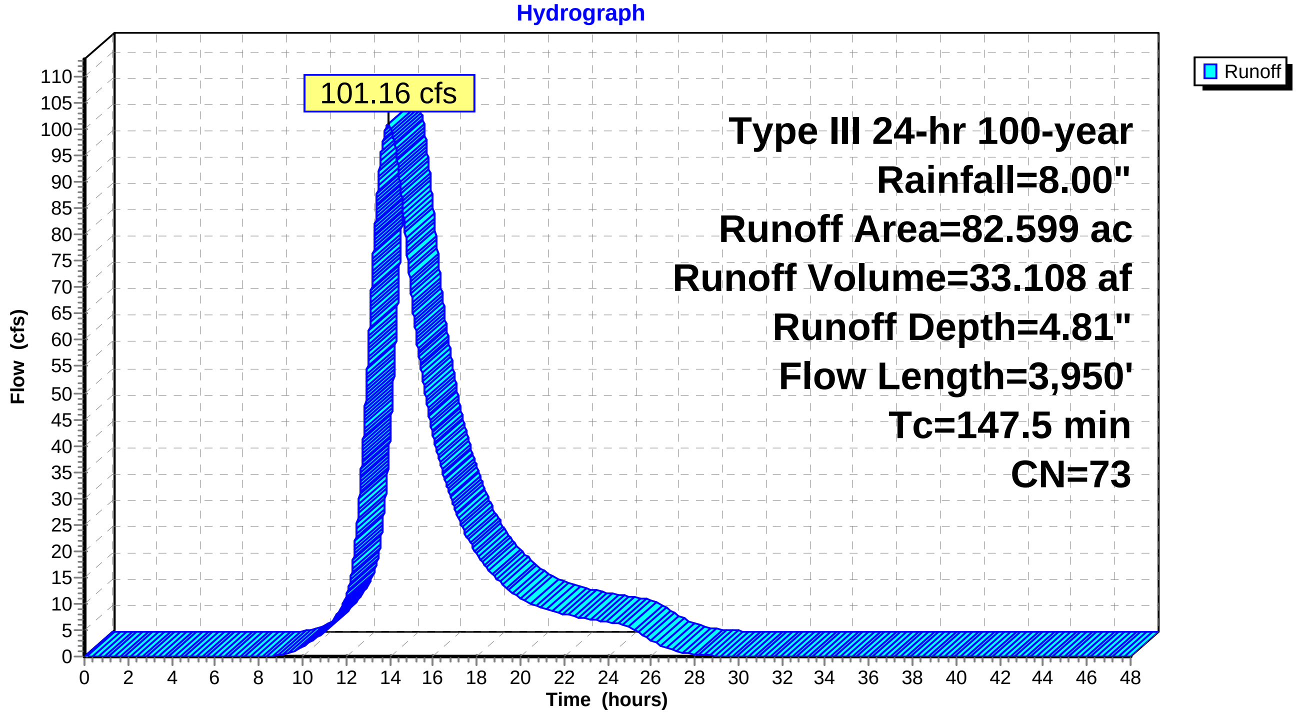
Runoff = 101.16 cfs @ 13.93 hrs, Volume= 33.108 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.00"

Area (ac)	CN	Description
8.287	73	Woods, Fair, HSG C
5.037	76	Woods/grass comb., Fair, HSG C
21.037	60	Woods, Fair, HSG B
32.137	79	Woods, Fair, HSG D
0.187	98	Unconnected pavement, HSG C
6.037	80	1/2 acre lots, 25% imp, HSG C
0.337	98	Unconnected pavement, HSG B
6.037	70	1/2 acre lots, 25% imp, HSG B
0.467	98	Unconnected pavement, HSG D
3.036	85	1/2 acre lots, 25% imp, HSG D
82.599	73	Weighted Average
77.831		94.23% Pervious Area
4.768		5.77% Impervious Area
0.991		20.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
6.2	320	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
97.4	1,600	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.3	1,930	0.0050	1.06		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
147.5	3,950	Total			

Subcatchment DA-1A: Pre-Dev Offsite



Summary for Subcatchment DA-1B: Pre-Dev

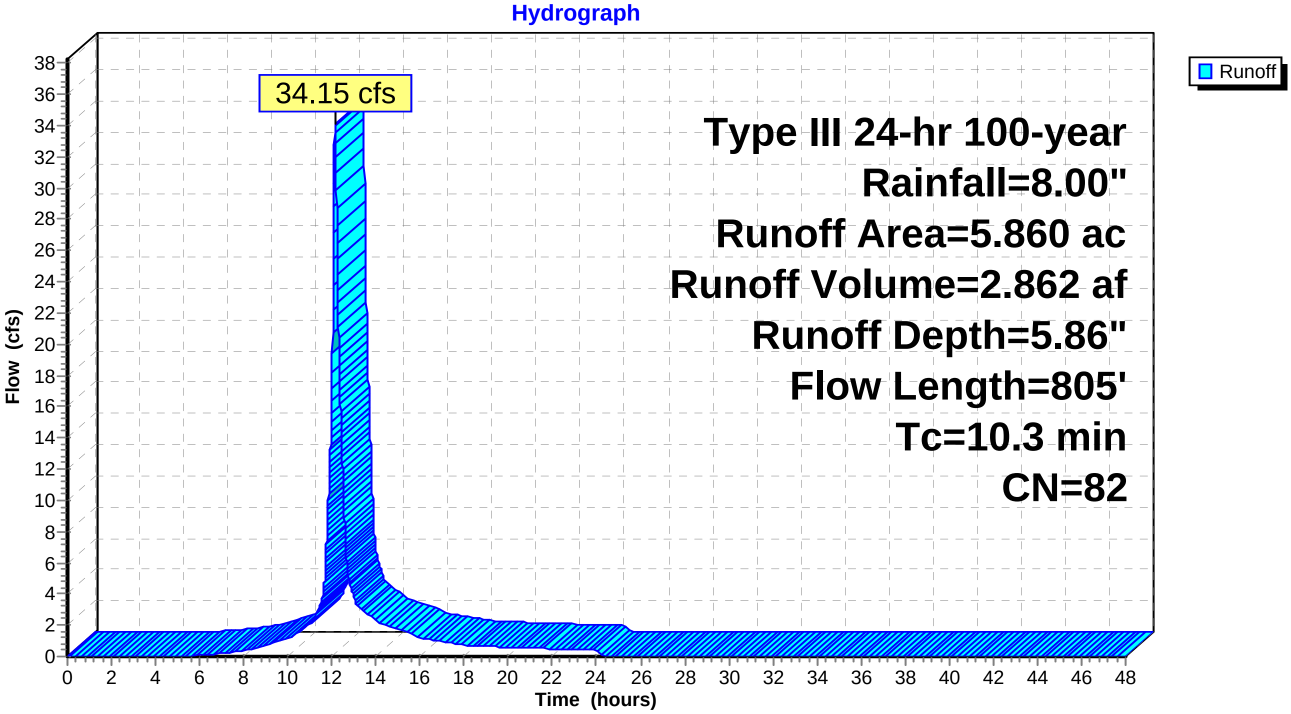
Runoff = 34.15 cfs @ 12.14 hrs, Volume= 2.862 af, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.00"

Area (ac)	CN	Description
2.000	61	>75% Grass cover, Good, HSG B
0.300	98	Roofs, HSG B
2.200	98	Paved parking, HSG B
1.360	85	Gravel roads, HSG B
5.860	82	Weighted Average
3.360		57.34% Pervious Area
2.500		42.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.1200	0.25		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
1.9	125	0.0240	1.08		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	33	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	547	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
10.3	805	Total			

Subcatchment DA-1B: Pre-Dev



Summary for Subcatchment DA-1C: Pre-Dev

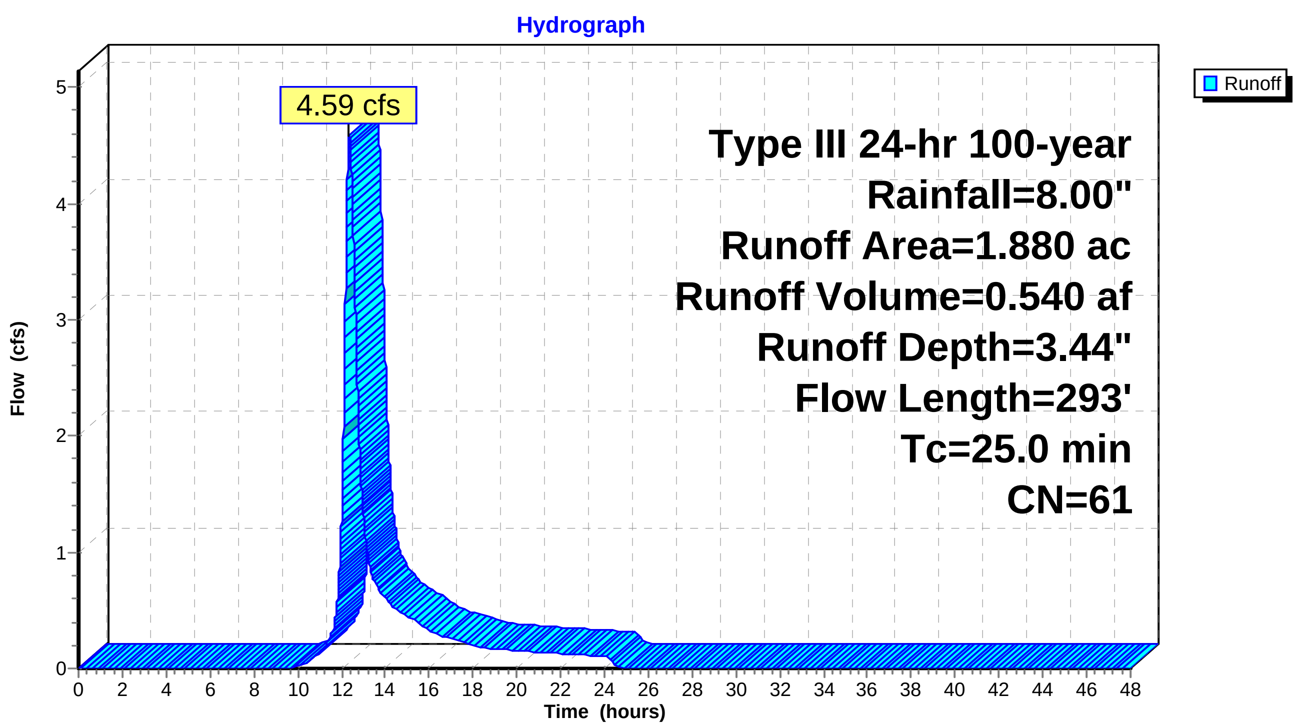
Runoff = 4.59 cfs @ 12.36 hrs, Volume= 0.540 af, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.00"

Area (ac)	CN	Description
0.400	60	Woods, Fair, HSG B
0.030	98	Unconnected pavement, HSG B
1.450	61	>75% Grass cover, Good, HSG B
1.880	61	Weighted Average
1.850		98.40% Pervious Area
0.030		1.60% Impervious Area
0.030		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	193	0.0104	0.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.0	293	Total			

Subcatchment DA-1C: Pre-Dev



Summary for Subcatchment DA-1F: Pre-Dev

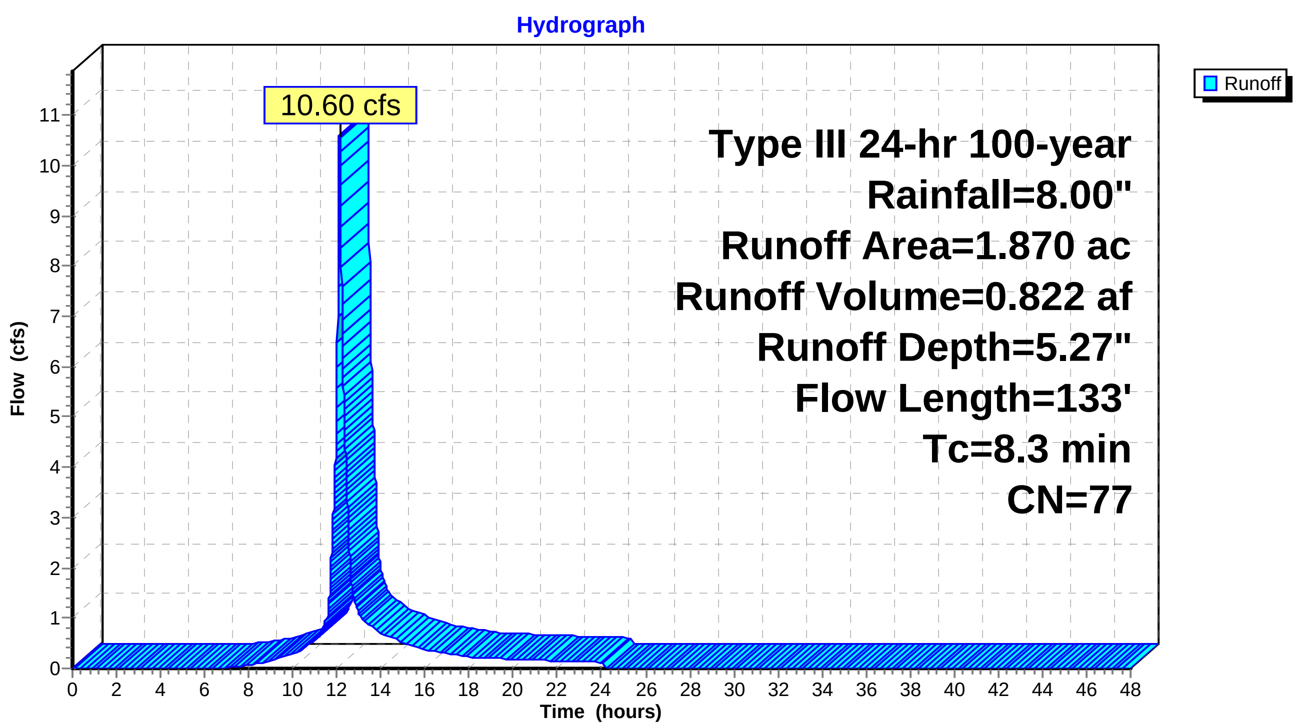
Runoff = 10.60 cfs @ 12.12 hrs, Volume= 0.822 af, Depth= 5.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.00"

Area (ac)	CN	Description
0.750	61	>75% Grass cover, Good, HSG B
0.170	98	Paved parking, HSG C
0.450	74	>75% Grass cover, Good, HSG C
0.500	98	Water Surface, HSG C
1.870	77	Weighted Average
1.200		64.17% Pervious Area
0.670		35.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.3	33	0.0910	2.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	133	Total			

Subcatchment DA-1F: Pre-Dev



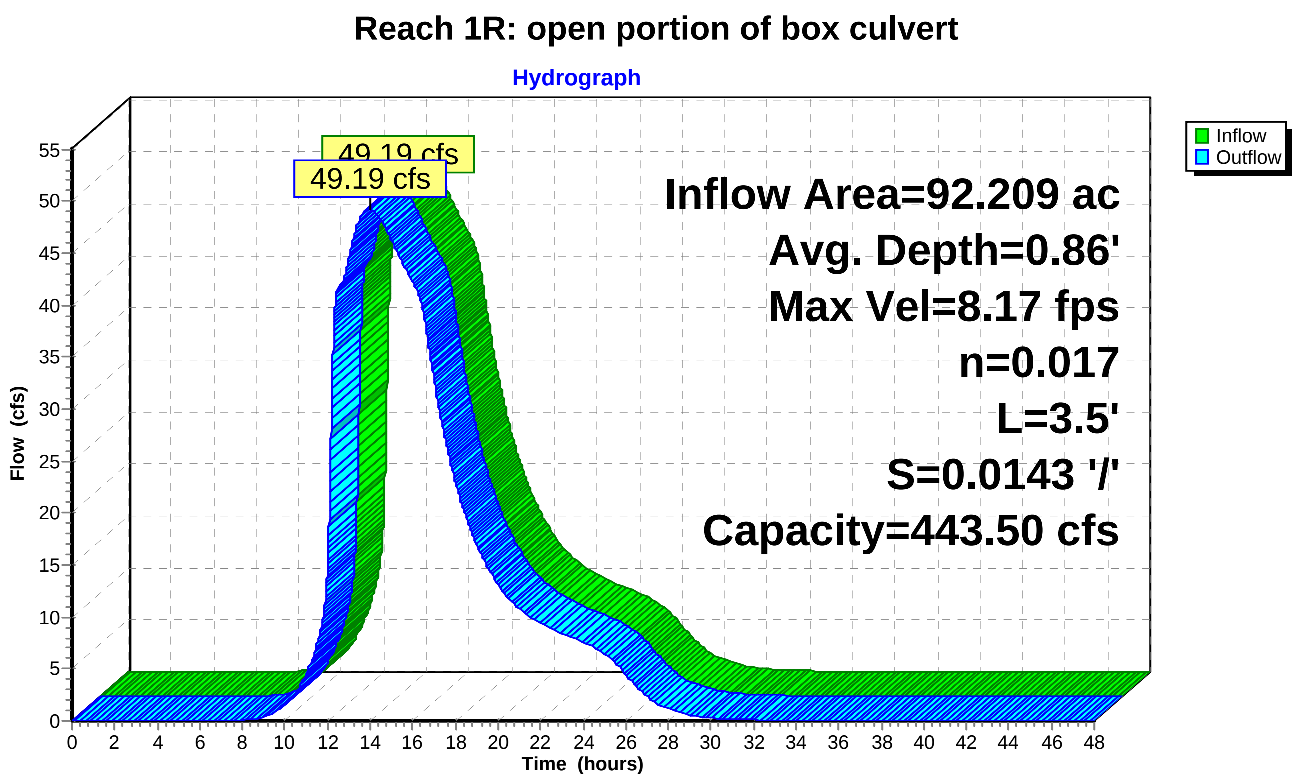
Summary for Reach 1R: open portion of box culvert

Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 3.74" for 100-year event
Inflow = 49.19 cfs @ 13.95 hrs, Volume= 28.768 af
Outflow = 49.19 cfs @ 13.95 hrs, Volume= 28.768 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.17 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.97 fps, Avg. Travel Time= 0.0 min

Peak Storage= 21 cf @ 13.95 hrs, Average Depth at Peak Storage= 0.86'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 443.50 cfs

7.00' x 4.00' deep channel, n= 0.017 Concrete, unfinished
Length= 3.5' Slope= 0.0143 '/'
Inlet Invert= 150.05', Outlet Invert= 150.00'



Summary for Reach 2R: bridge portion over box culvert

box culvert - opening 7'Wx4'Hx12'L
adjusted height to account for wooden beams underneath the bridge.

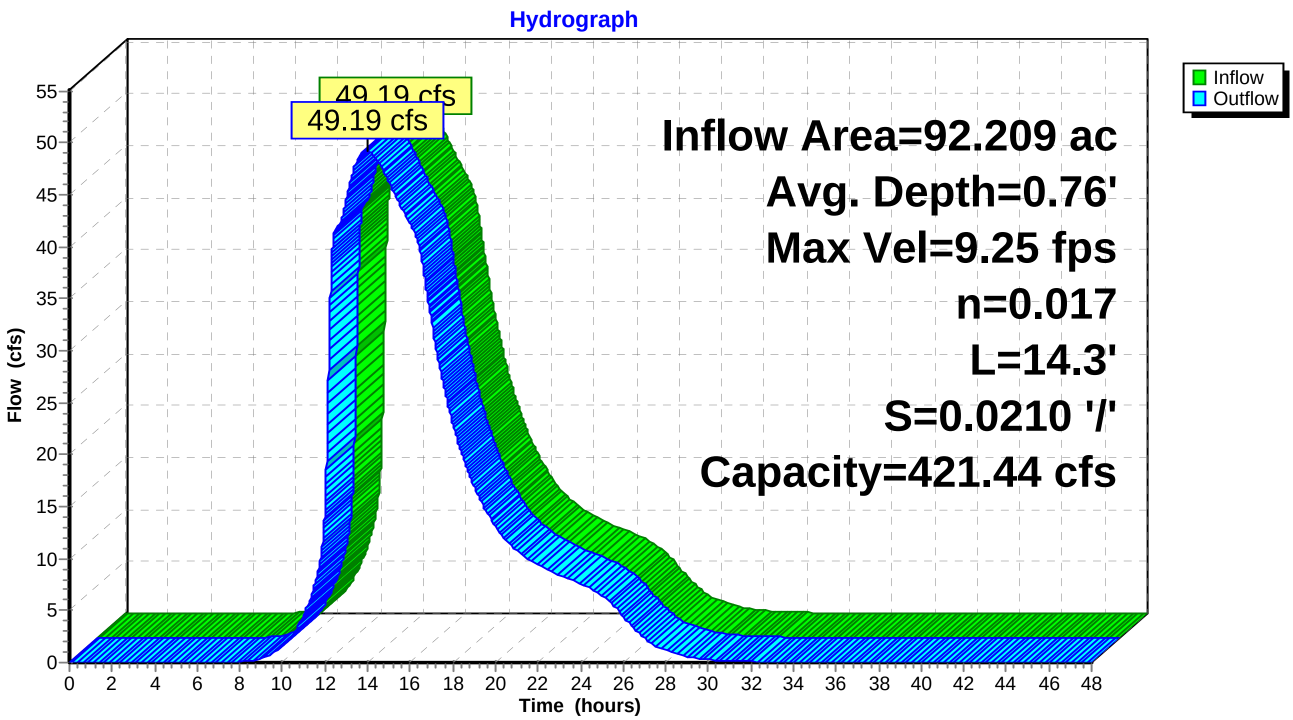
Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 3.74" for 100-year event
Inflow = 49.19 cfs @ 13.95 hrs, Volume= 28.768 af
Outflow = 49.19 cfs @ 13.95 hrs, Volume= 28.768 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.25 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.31 fps, Avg. Travel Time= 0.1 min

Peak Storage= 76 cf @ 13.95 hrs, Average Depth at Peak Storage= 0.76'
Bank-Full Depth= 3.33', Capacity at Bank-Full= 421.44 cfs

7.00' x 3.33' deep channel, n= 0.017 Concrete, unfinished
Length= 14.3' Slope= 0.0210 '/'
Inlet Invert= 150.00', Outlet Invert= 149.70'

Reach 2R: bridge portion over box culvert



Summary for Pond 1P: Exst Pond

Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 4.86" for 100-year event
Inflow = 105.59 cfs @ 13.93 hrs, Volume= 37.331 af
Outflow = 105.33 cfs @ 13.95 hrs, Volume= 37.329 af, Atten= 0%, Lag= 1.5 min
Primary = 49.19 cfs @ 13.95 hrs, Volume= 28.768 af
Secondary = 56.14 cfs @ 13.95 hrs, Volume= 8.561 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 154.56' @ 13.95 hrs Surf.Area= 37,190 sf Storage= 71,611 cf
Flood Elev= 156.00' Surf.Area= 48,106 sf Storage= 132,693 cf

Plug-Flow detention time= 23.0 min calculated for 37.322 af (100% of inflow)
Center-of-Mass det. time= 23.1 min (958.7 - 935.6)

Volume	Invert	Avail.Storage	Storage Description
#1	152.10'	132,693 cf	**existing pond (Irregular)**Listed below (Recalc)

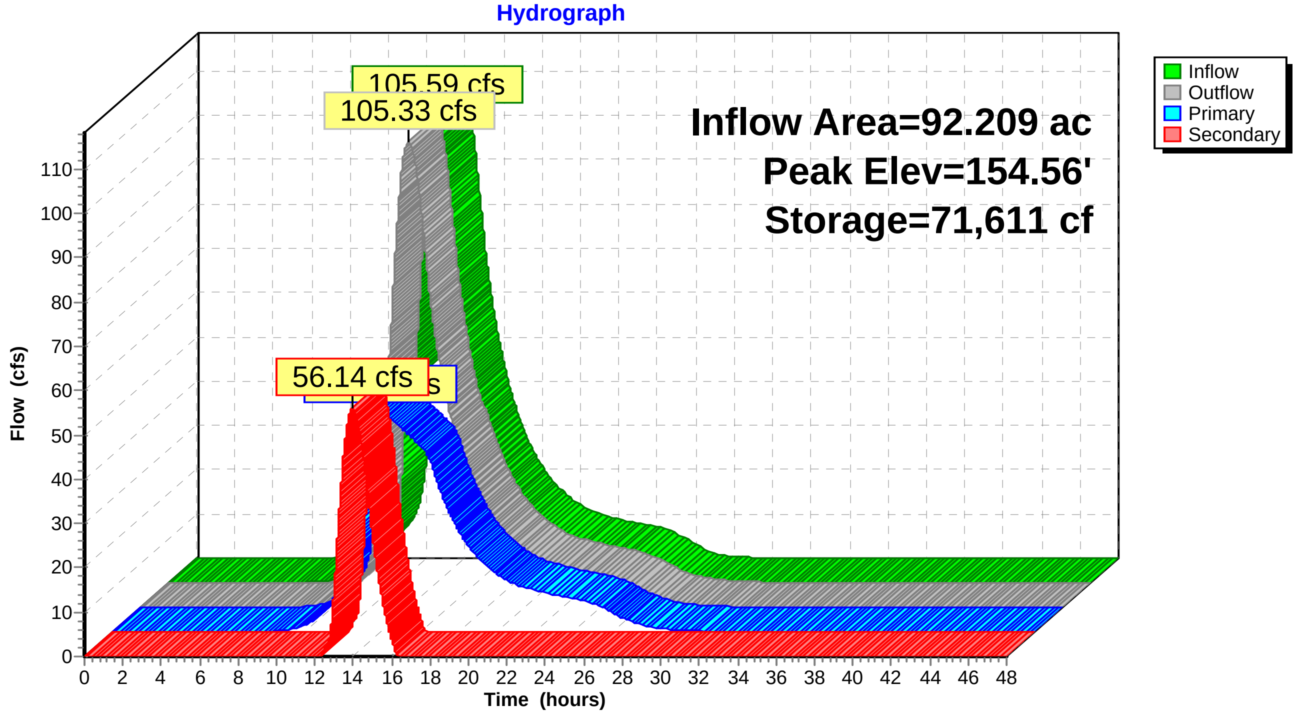
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
152.10	21,607	727.8	0	0	21,607
154.00	33,288	897.6	51,752	51,752	43,624
156.00	48,106	962.7	80,941	132,693	53,439

Device	Routing	Invert	Outlet Devices
#1	Primary	152.10'	**compound weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 1.00 1.00 2.00 2.00 Width (feet) 3.00 3.00 0.00 6.00 6.00 0.00
#2	Secondary	154.20'	**96.0' long x 14.0' breadth Bridge (overflow weir)** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=49.19 cfs @ 13.95 hrs HW=154.56' TW=150.91' (Dynamic Tailwater)
└─**1=compound weir** (Orifice Controls 49.19 cfs @ 5.47 fps)

Secondary OutFlow Max=56.14 cfs @ 13.95 hrs HW=154.56' TW=153.24' (Dynamic Tailwater)
└─**2=Bridge (overflow weir)** (Weir Controls 56.14 cfs @ 1.61 fps)

Pond 1P: Exst Pond



Summary for Pond 2P: stream to 60" twin culverts (DP-1)

Water will sit in stream channel until it reaches a minimum elevation of 150.72, since that is the lowest elevation of one of the 60" culverts. Therefore, this elevation was used as the starting elevation for the modeling of the stream and 60" twin culverts.

Inflow Area = 92.209 ac, 8.64% Impervious, Inflow Depth = 4.86" for 100-year event
Inflow = 105.33 cfs @ 13.95 hrs, Volume= 37.329 af
Outflow = 105.32 cfs @ 13.96 hrs, Volume= 37.329 af, Atten= 0%, Lag= 0.6 min
Primary = 105.32 cfs @ 13.96 hrs, Volume= 37.329 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 150.72' Surf.Area= 852 sf Storage= 735 cf
Peak Elev= 153.24' @ 13.96 hrs Surf.Area= 2,190 sf Storage= 4,167 cf (3,432 cf above start)

Plug-Flow detention time= 1.5 min calculated for 37.304 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (959.4 - 958.7)

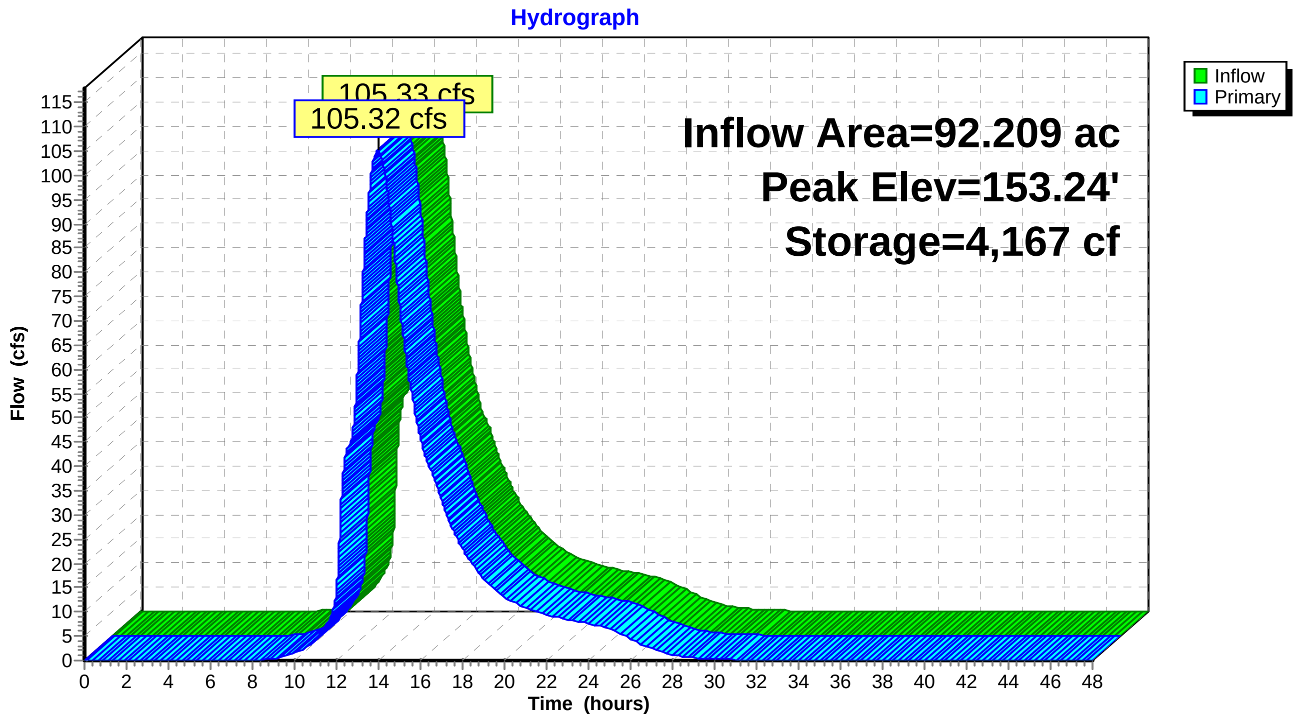
Volume	Invert	Avail.Storage	Storage Description
#1	149.70'	6,090 cf	**existing stream (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
149.70	596	131.8	0	0	596
152.00	1,239	152.2	2,066	2,066	1,161
154.00	2,902	266.7	4,025	6,090	5,001

Device	Routing	Invert	Outlet Devices
#1	Primary	150.72'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.10' S= 0.0063 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#2	Primary	150.77'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.40' S= 0.0038 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=105.31 cfs @ 13.96 hrs HW=153.24' (Free Discharge)
1=Culvert (Barrel Controls 56.44 cfs @ 7.30 fps)
2=Culvert (Barrel Controls 48.88 cfs @ 6.48 fps)

Pond 2P: stream to 60" twin culverts (DP-1)



Summary for Pond A: Detention Basin

Grate: Campbell Foundry Model # 3433.
Existing rip-rap for weir is 10 foot wide and will remain.

Inflow Area = 7.740 ac, 32.69% Impervious, Inflow Depth = 5.27" for 100-year event
Inflow = 36.75 cfs @ 12.14 hrs, Volume= 3.401 af
Outflow = 34.03 cfs @ 12.19 hrs, Volume= 3.401 af, Atten= 7%, Lag= 2.9 min
Primary = 13.48 cfs @ 12.19 hrs, Volume= 2.712 af
Secondary = 20.55 cfs @ 12.19 hrs, Volume= 0.689 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 155.75' Surf.Area= 5,015 sf Storage= 3,316 cf
Peak Elev= 157.85' @ 12.19 hrs Surf.Area= 9,663 sf Storage= 18,596 cf (15,281 cf above start)
Flood Elev= 158.00' Surf.Area= 10,003 sf Storage= 19,772 cf (16,457 cf above start)

Plug-Flow detention time= 39.8 min calculated for 3.324 af (98% of inflow)
Center-of-Mass det. time= 18.9 min (830.4 - 811.5)

Volume	Invert	Avail.Storage	Storage Description
#1	155.00'	19,772 cf	**detention basin (Irregular)**Listed below

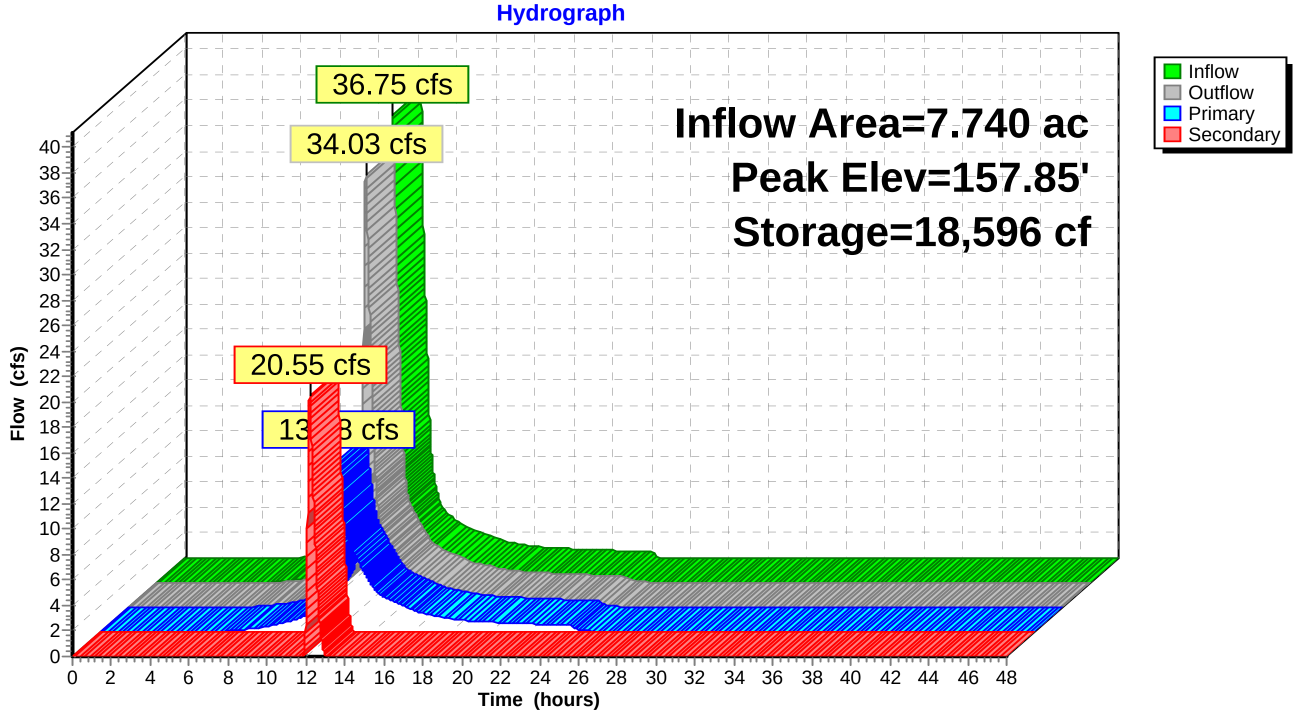
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
155.00	3,369	252.3	0	0	3,369
156.00	5,564	319.6	4,421	4,421	6,445
158.00	10,003	509.1	15,352	19,772	18,969

Device	Routing	Invert	Outlet Devices
#1	Primary	154.09'	**24.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 153.40' S= 0.0168 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	155.75'	**22.0" W x 9.0" H Vert. Slot** C= 0.600
#3	Device 1	157.00'	**12.0" W x 9.0" H Vert. Slots X 2.00** C= 0.600
#4	Device 1	158.50'	**36.0" x 55.5" Horiz. Grate X 4.00 columns** X 8 rows C= 0.600 in 1.3" x 6.5" Grate Limited to weir flow at low heads
#5	Secondary	157.00'	**10.0' long x 29.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.48 cfs @ 12.19 hrs HW=157.85' TW=153.89' (Dynamic Tailwater)
└─**1=Culvert** (Passes 13.48 cfs of 25.11 cfs potential flow)
  ├─**2=Slot** (Orifice Controls 8.67 cfs @ 6.30 fps)
  ├─**3=Slots** (Orifice Controls 4.81 cfs @ 3.20 fps)
  └─**4=Grate** (Controls 0.00 cfs)

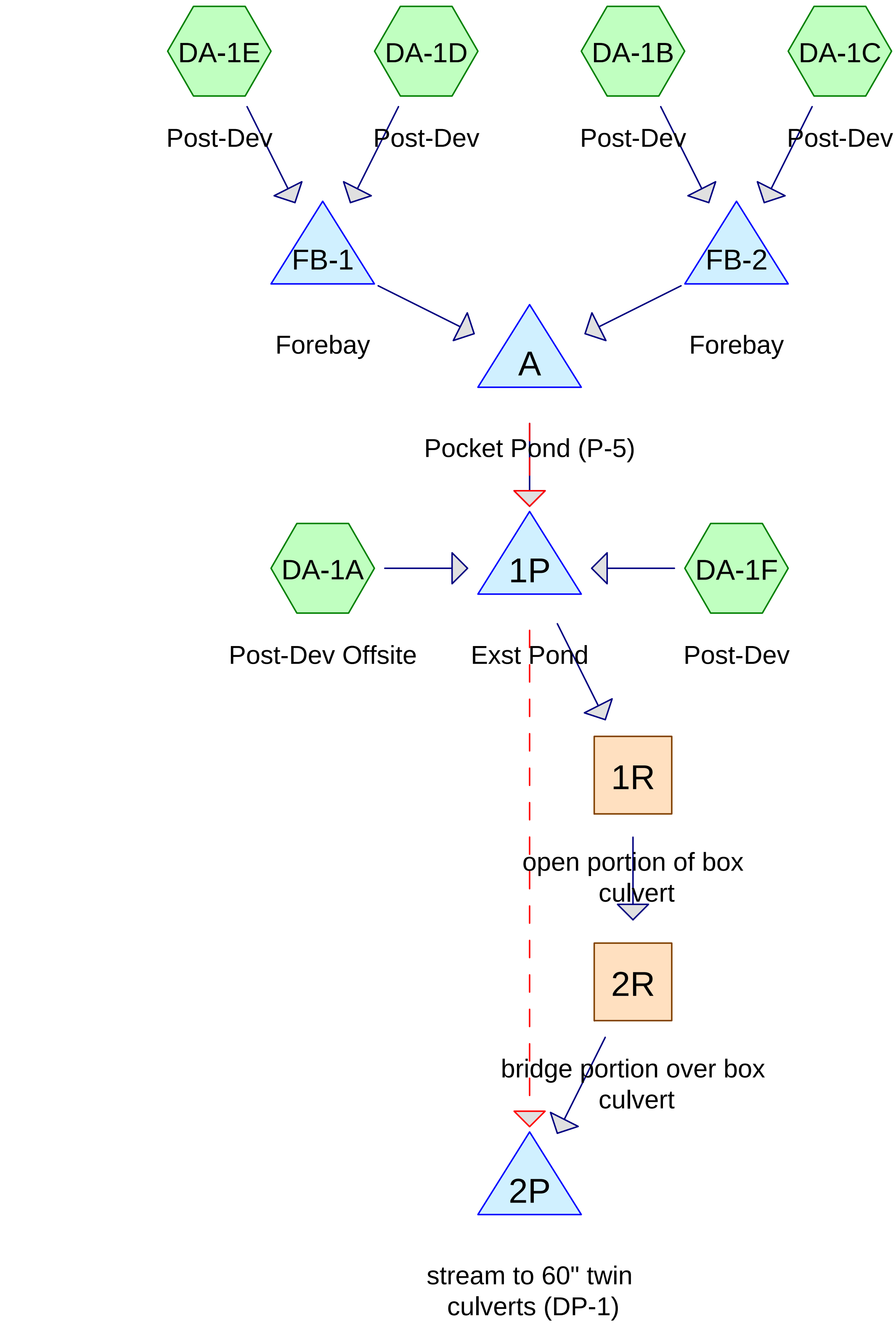
Secondary OutFlow Max=20.54 cfs @ 12.19 hrs HW=157.85' TW=153.89' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Weir Controls 20.54 cfs @ 2.43 fps)

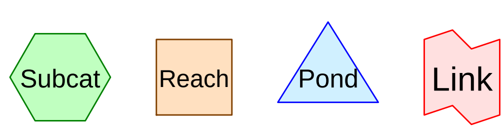
Pond A: Detention Basin



Appendix H

Post-Development HydroCAD Analysis





Drainage Diagram for BAC Post-Dev 2011-0224
Prepared by Povall Engineering, PLLC, Printed 2/24/2011
HydroCAD® 9.00 s/n 06075 © 2009 HydroCAD Software Solutions LLC

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1A: Post-Dev Offsite Runoff Area=82.599 ac 5.77% Impervious Runoff Depth=0.74"
Flow Length=3,950' Tc=147.5 min CN=73 Runoff=13.59 cfs 5.073 af

Subcatchment DA-1B: Post-Dev Runoff Area=4.500 ac 55.56% Impervious Runoff Depth=1.22"
Flow Length=759' Tc=10.2 min CN=82 Runoff=5.53 cfs 0.459 af

Subcatchment DA-1C: Post-Dev Runoff Area=1.880 ac 1.60% Impervious Runoff Depth=0.29"
Flow Length=293' Tc=25.0 min CN=61 Runoff=0.22 cfs 0.046 af

Subcatchment DA-1D: Post-Dev Runoff Area=0.440 ac 100.00% Impervious Runoff Depth=2.57"
Tc=6.0 min CN=98 Runoff=1.19 cfs 0.094 af

Subcatchment DA-1E: Post-Dev Runoff Area=0.920 ac 86.96% Impervious Runoff Depth=2.06"
Flow Length=534' Tc=6.0 min CN=93 Runoff=2.17 cfs 0.158 af

Subcatchment DA-1F: Post-Dev Runoff Area=1.870 ac 35.83% Impervious Runoff Depth=0.93"
Flow Length=133' Tc=8.3 min CN=77 Runoff=1.80 cfs 0.146 af

Reach 1R: open portion of box culvert Avg. Depth=0.37' Max Vel=5.05 fps Inflow=13.14 cfs 5.941 af
n=0.017 L=3.5' S=0.0143 '/' Capacity=443.50 cfs Outflow=13.14 cfs 5.941 af

Reach 2R: bridge portion over box culvert Avg. Depth=0.33' Max Vel=5.69 fps Inflow=13.14 cfs 5.941 af
n=0.017 L=14.3' S=0.0210 '/' Capacity=421.44 cfs Outflow=13.14 cfs 5.941 af

Pond 1P: Exst Pond Peak Elev=153.27' Storage=29,247 cf Inflow=14.19 cfs 5.951 af
Primary=13.14 cfs 5.941 af Secondary=0.00 cfs 0.000 af Outflow=13.14 cfs 5.941 af

Pond 2P: stream to 60" twin culverts (DP-1) Peak Elev=151.53' Storage=1,517 cf Inflow=13.14 cfs 5.941 af
Outflow=13.14 cfs 5.940 af

Pond A: Pocket Pond (P-5) Peak Elev=157.11' Storage=42,247 cf Inflow=8.45 cfs 0.757 af
Primary=0.46 cfs 0.732 af Secondary=0.00 cfs 0.000 af Outflow=0.46 cfs 0.732 af

Pond FB-1: Forebay Peak Elev=158.20' Storage=2,066 cf Inflow=3.36 cfs 0.252 af
Outflow=3.32 cfs 0.252 af

Pond FB-2: Forebay Peak Elev=158.34' Storage=1,811 cf Inflow=5.55 cfs 0.505 af
Outflow=5.53 cfs 0.505 af

Total Runoff Area = 92.209 ac Runoff Volume = 5.976 af Average Runoff Depth = 0.78"
90.01% Pervious = 83.001 ac 9.99% Impervious = 9.208 ac

Summary for Subcatchment DA-1A: Post-Dev Offsite

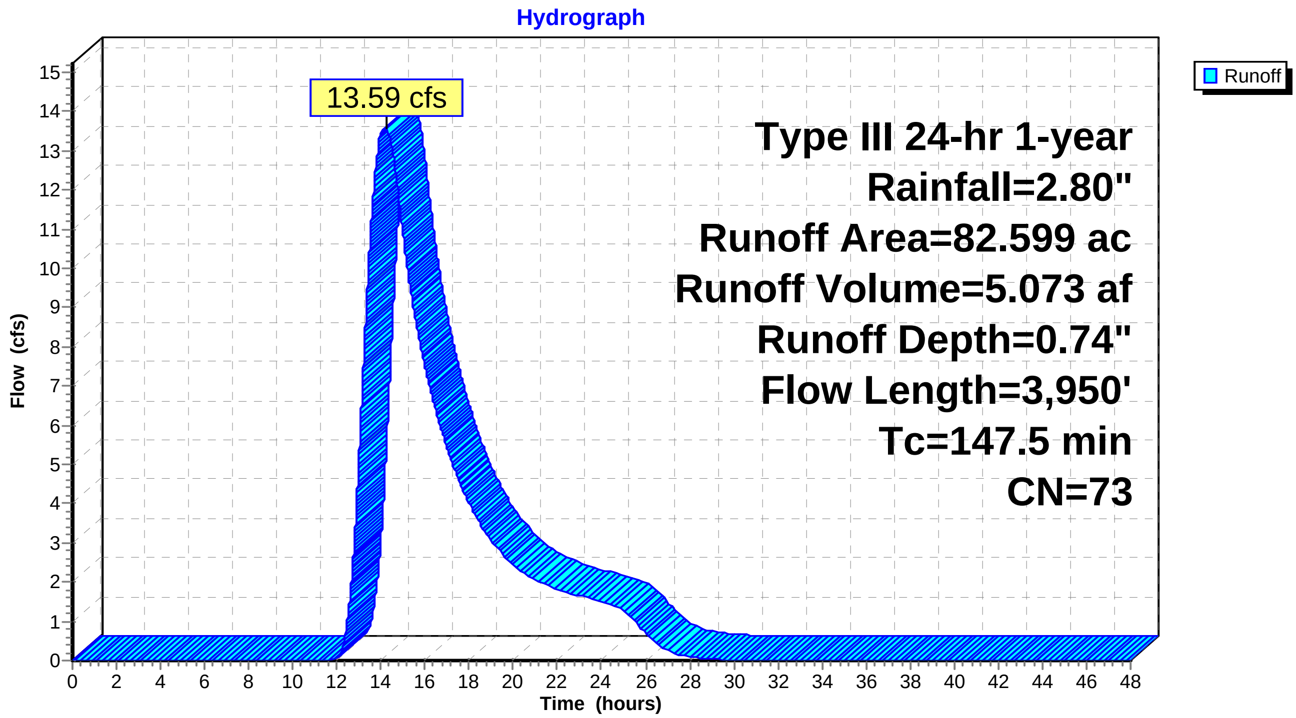
Runoff = 13.59 cfs @ 14.25 hrs, Volume= 5.073 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-year Rainfall=2.80"

Area (ac)	CN	Description
8.287	73	Woods, Fair, HSG C
5.037	76	Woods/grass comb., Fair, HSG C
21.037	60	Woods, Fair, HSG B
32.137	79	Woods, Fair, HSG D
0.187	98	Unconnected pavement, HSG C
6.037	80	1/2 acre lots, 25% imp, HSG C
0.337	98	Unconnected pavement, HSG B
6.037	70	1/2 acre lots, 25% imp, HSG B
0.467	98	Unconnected pavement, HSG D
3.036	85	1/2 acre lots, 25% imp, HSG D
82.599	73	Weighted Average
77.831		94.23% Pervious Area
4.768		5.77% Impervious Area
0.991		20.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
6.2	320	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
97.4	1,600	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.3	1,930	0.0050	1.06		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
147.5	3,950	Total			

Subcatchment DA-1A: Post-Dev Offsite



Summary for Subcatchment DA-1B: Post-Dev

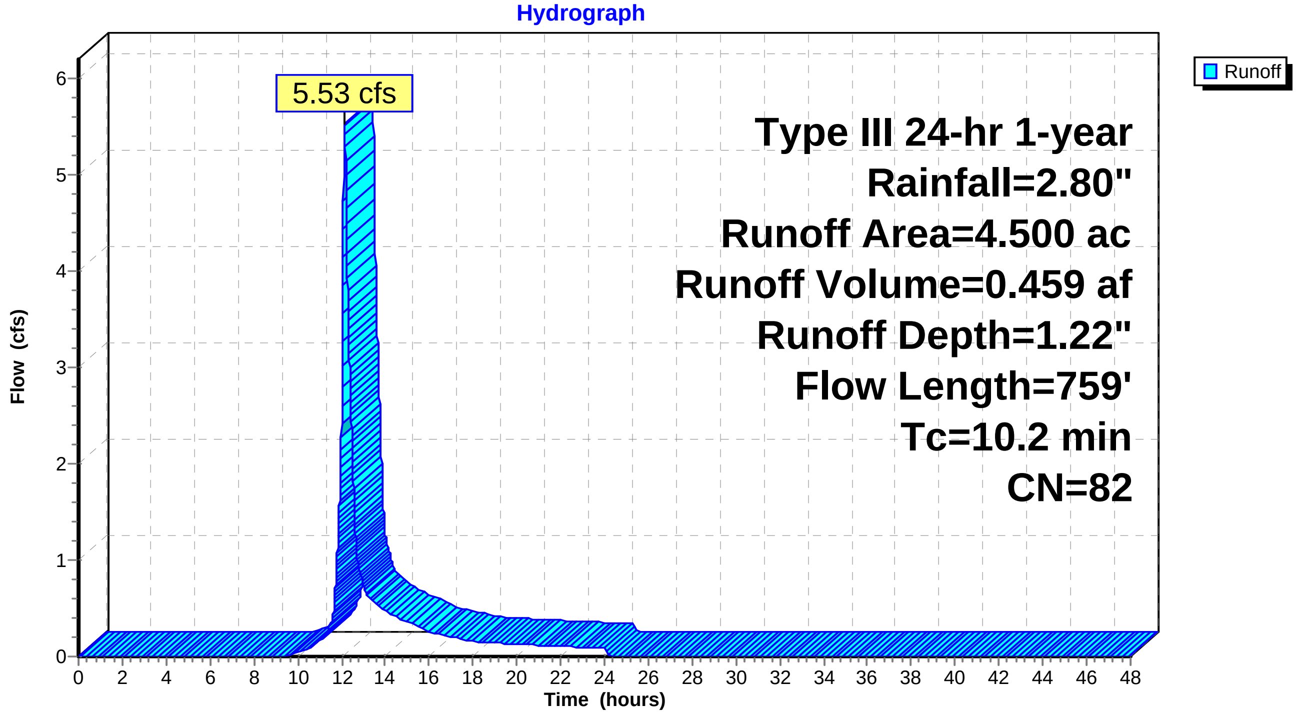
Runoff = 5.53 cfs @ 12.15 hrs, Volume= 0.459 af, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-year Rainfall=2.80"

Area (ac)	CN	Description
2.000	61	>75% Grass cover, Good, HSG B
0.300	98	Roofs, HSG B
2.200	98	Paved parking, HSG B
4.500	82	Weighted Average
2.000		44.44% Pervious Area
2.500		55.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.1200	0.25		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
1.9	125	0.0240	1.08		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	33	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	501	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
10.2	759	Total			

Subcatchment DA-1B: Post-Dev



Summary for Subcatchment DA-1C: Post-Dev

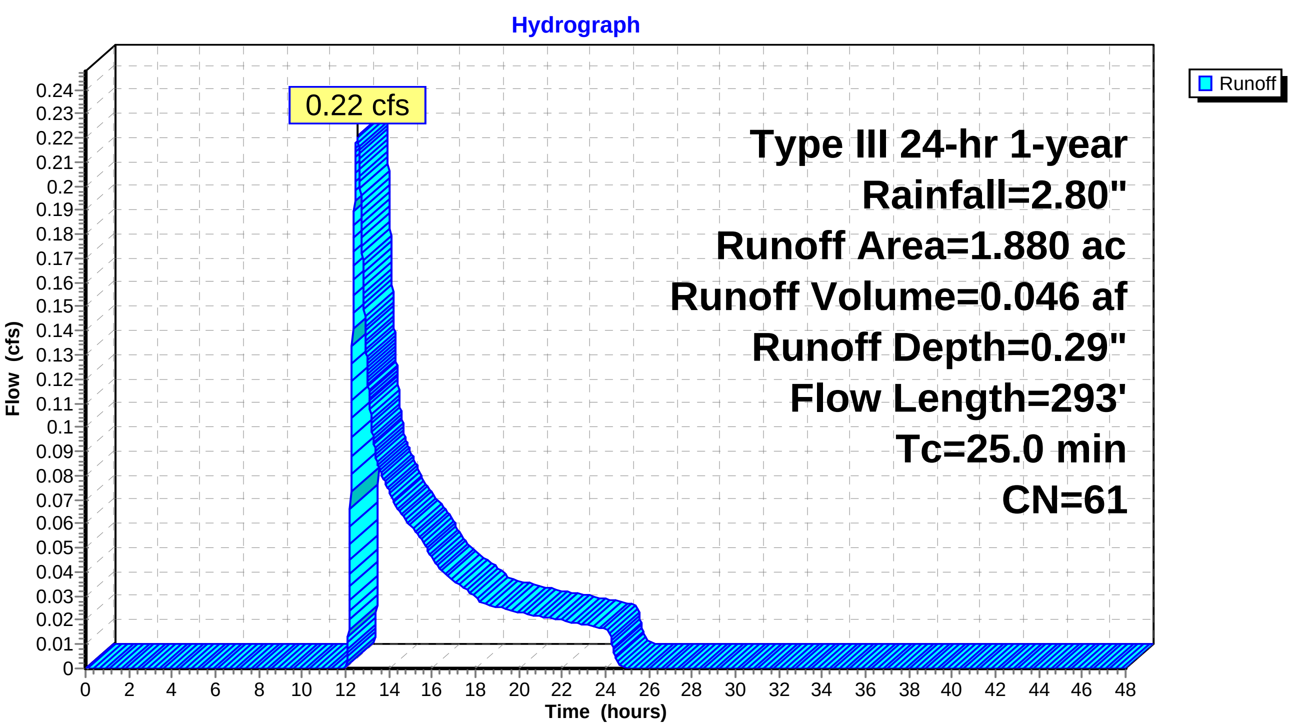
Runoff = 0.22 cfs @ 12.55 hrs, Volume= 0.046 af, Depth= 0.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-year Rainfall=2.80"

Area (ac)	CN	Description
0.400	60	Woods, Fair, HSG B
0.030	98	Unconnected pavement, HSG B
1.450	61	>75% Grass cover, Good, HSG B
1.880	61	Weighted Average
1.850		98.40% Pervious Area
0.030		1.60% Impervious Area
0.030		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	193	0.0104	0.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.0	293	Total			

Subcatchment DA-1C: Post-Dev



Summary for Subcatchment DA-1D: Post-Dev

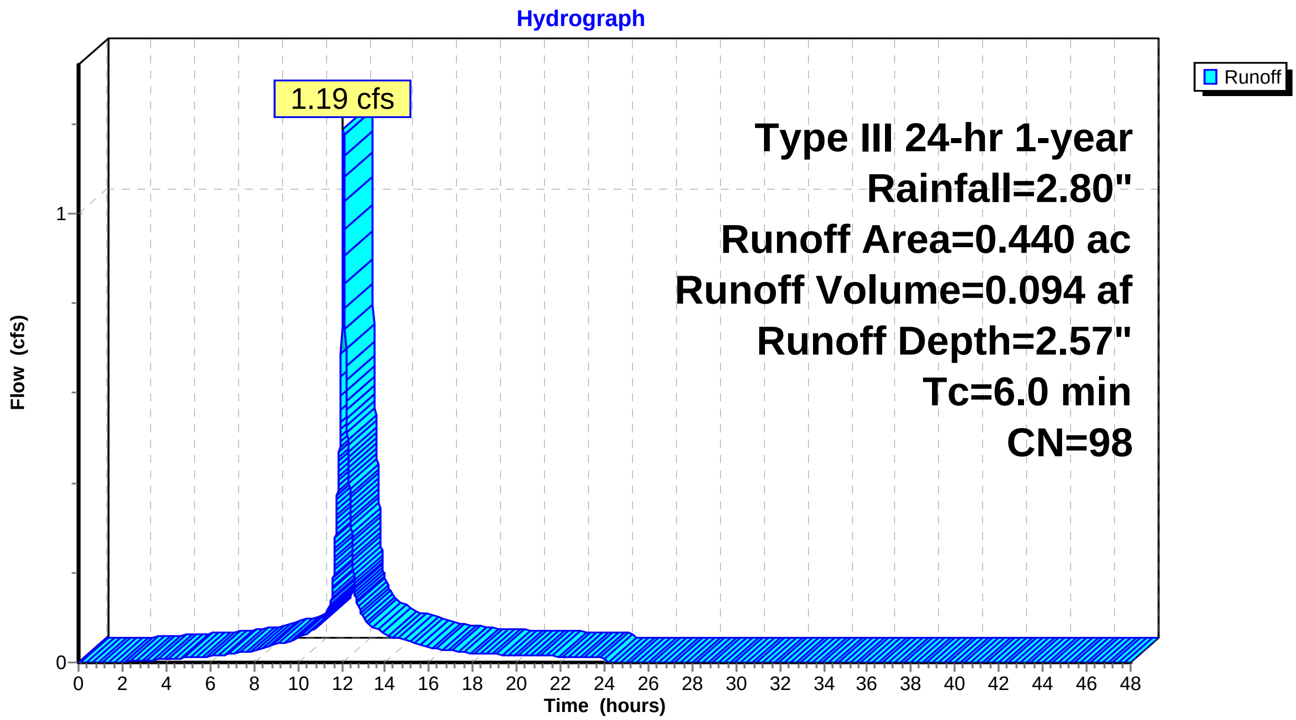
Runoff = 1.19 cfs @ 12.08 hrs, Volume= 0.094 af, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-year Rainfall=2.80"

Area (ac)	CN	Description
0.440	98	Roofs, HSG B
0.440		100.00% Impervious Area

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

Subcatchment DA-1D: Post-Dev



Summary for Subcatchment DA-1E: Post-Dev

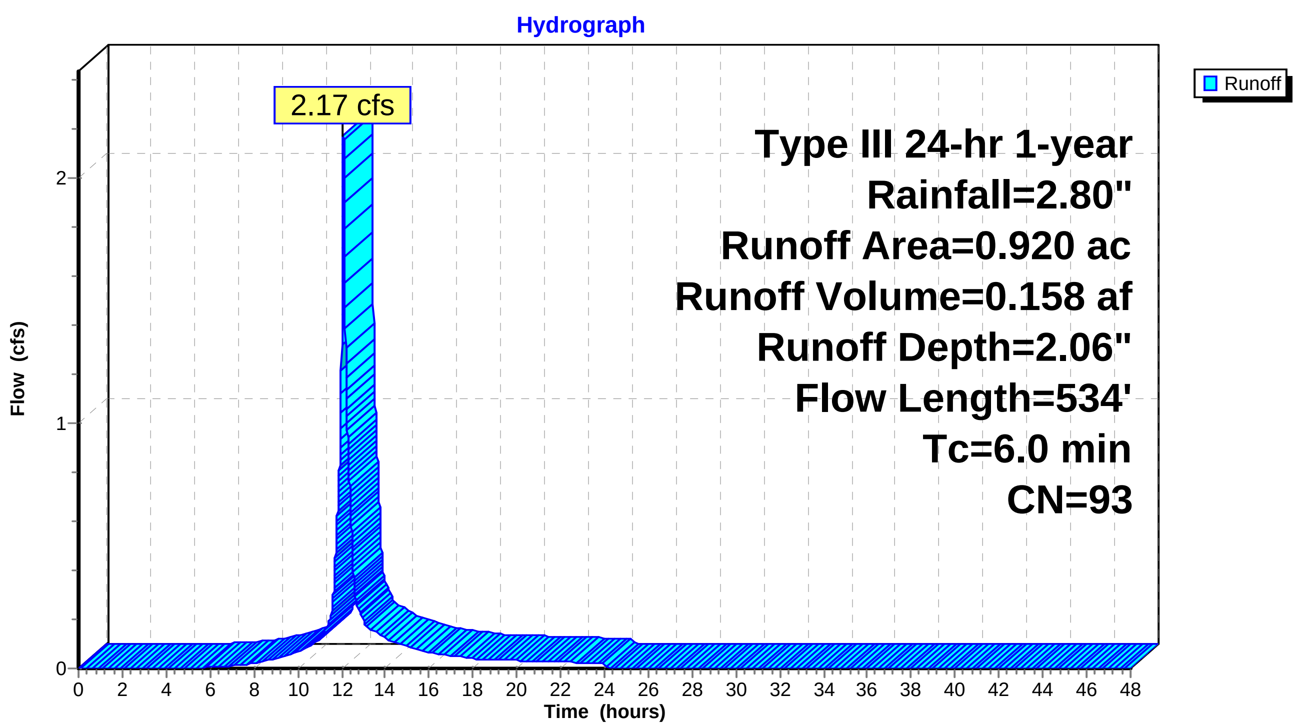
Runoff = 2.17 cfs @ 12.09 hrs, Volume= 0.158 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-year Rainfall=2.80"

Area (ac)	CN	Description
0.120	61	>75% Grass cover, Good, HSG B
0.800	98	Paved parking, HSG B
0.920	93	Weighted Average
0.120		13.04% Pervious Area
0.800		86.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0125	1.19		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
0.4	59	0.0125	2.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.1	375	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
2.9	534	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-1E: Post-Dev



Summary for Subcatchment DA-1F: Post-Dev

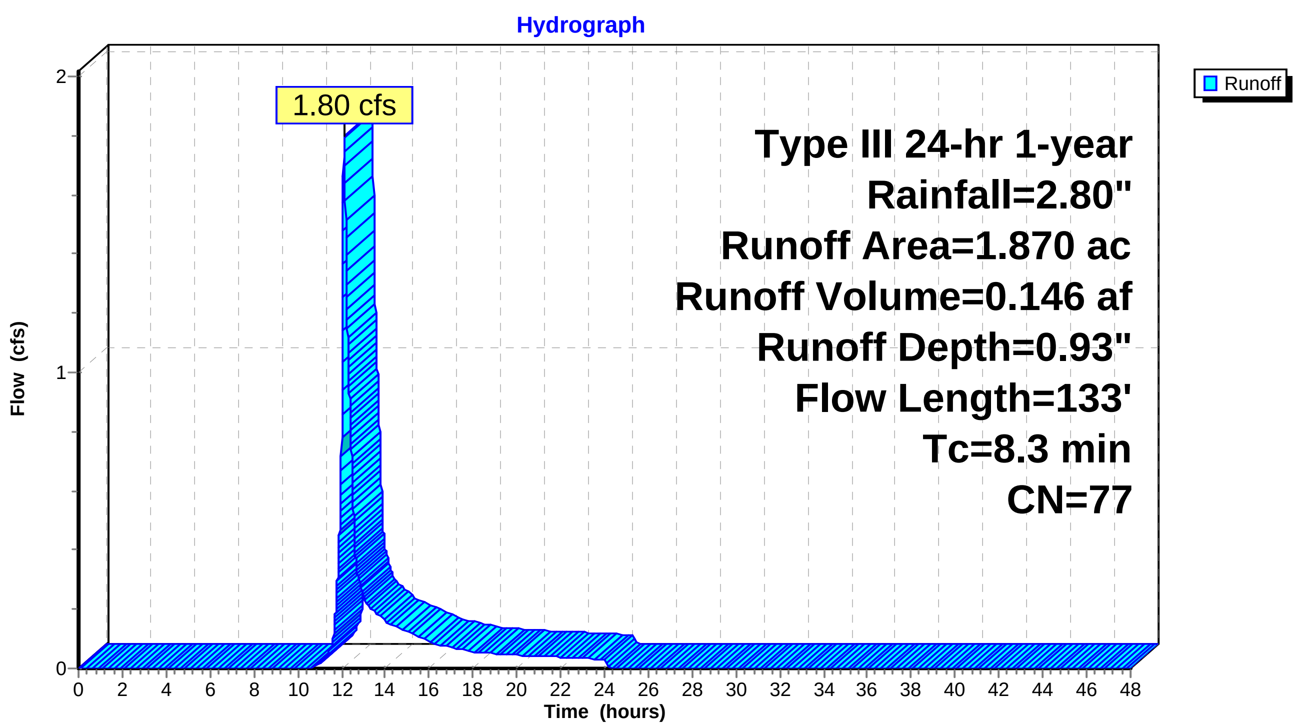
Runoff = 1.80 cfs @ 12.13 hrs, Volume= 0.146 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-year Rainfall=2.80"

Area (ac)	CN	Description
0.750	61	>75% Grass cover, Good, HSG B
0.170	98	Paved parking, HSG C
0.450	74	>75% Grass cover, Good, HSG C
0.500	98	Water Surface, HSG C
1.870	77	Weighted Average
1.200		64.17% Pervious Area
0.670		35.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.3	33	0.0910	2.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	133	Total			

Subcatchment DA-1F: Post-Dev



Summary for Reach 1R: open portion of box culvert

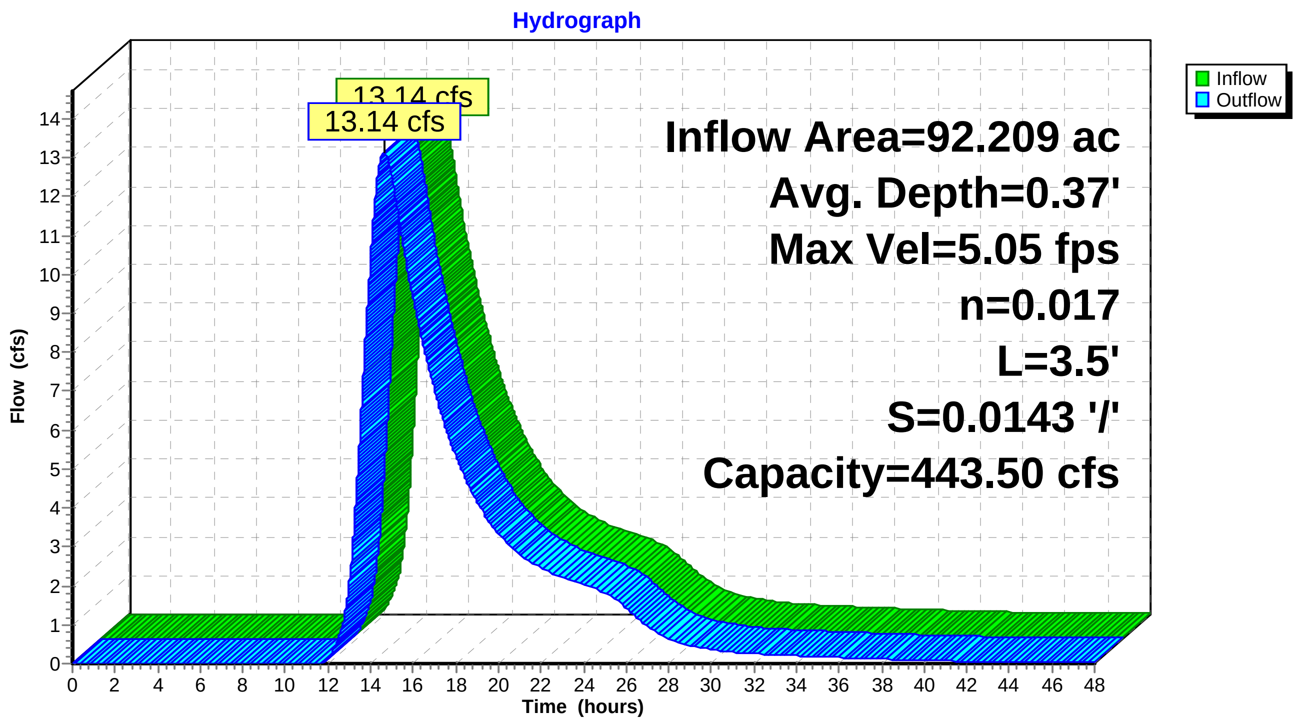
Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 0.77" for 1-year event
Inflow = 13.14 cfs @ 14.64 hrs, Volume= 5.941 af
Outflow = 13.14 cfs @ 14.64 hrs, Volume= 5.941 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.05 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.97 fps, Avg. Travel Time= 0.0 min

Peak Storage= 9 cf @ 14.64 hrs, Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 443.50 cfs

7.00' x 4.00' deep channel, n= 0.017 Concrete, unfinished
Length= 3.5' Slope= 0.0143 '/'
Inlet Invert= 150.05', Outlet Invert= 150.00'

Reach 1R: open portion of box culvert



Summary for Reach 2R: bridge portion over box culvert

box culvert - opening 7'Wx4'Hx12'L
adjusted height to account for wooden beams underneath the bridge.

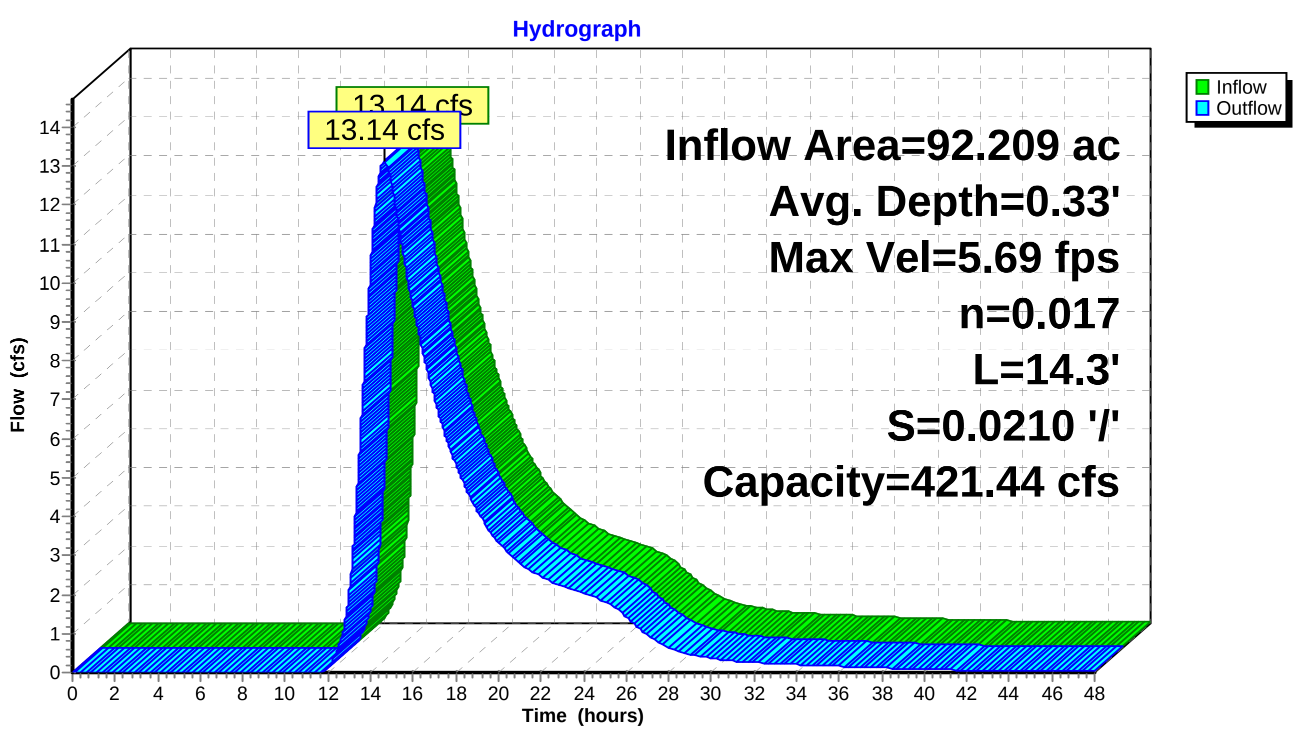
Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 0.77" for 1-year event
Inflow = 13.14 cfs @ 14.64 hrs, Volume= 5.941 af
Outflow = 13.14 cfs @ 14.64 hrs, Volume= 5.941 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.69 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.18 fps, Avg. Travel Time= 0.1 min

Peak Storage= 33 cf @ 14.64 hrs, Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 3.33', Capacity at Bank-Full= 421.44 cfs

7.00' x 3.33' deep channel, n= 0.017 Concrete, unfinished
Length= 14.3' Slope= 0.0210 '/'
Inlet Invert= 150.00', Outlet Invert= 149.70'

Reach 2R: bridge portion over box culvert



Summary for Pond 1P: Exst Pond

There are two different crest bredth lengths, so shorter length was taken.

Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 0.77" for 1-year event
Inflow = 14.19 cfs @ 14.25 hrs, Volume= 5.951 af
Outflow = 13.14 cfs @ 14.64 hrs, Volume= 5.941 af, Atten= 7%, Lag= 23.3 min
Primary = 13.14 cfs @ 14.64 hrs, Volume= 5.941 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 153.27' @ 14.64 hrs Surf.Area= 28,508 sf Storage= 29,247 cf
Flood Elev= 156.00' Surf.Area= 48,106 sf Storage= 132,693 cf

Plug-Flow detention time= 52.5 min calculated for 5.941 af (100% of inflow)
Center-of-Mass det. time= 49.8 min (1,098.8 - 1,049.1)

Volume	Invert	Avail.Storage	Storage Description
#1	152.10'	132,693 cf	**existing pond (Irregular)** Listed below (Recalc)

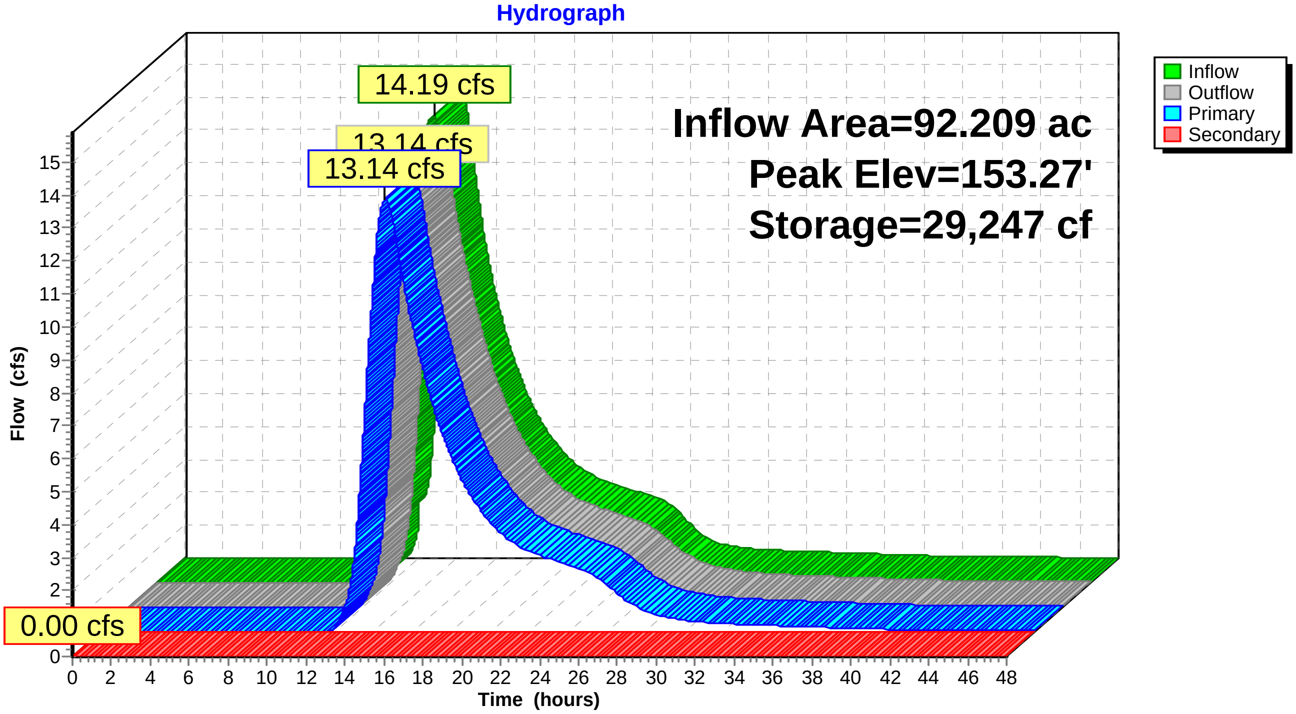
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
152.10	21,607	727.8	0	0	21,607
154.00	33,288	897.6	51,752	51,752	43,624
156.00	48,106	962.7	80,941	132,693	53,439

Device	Routing	Invert	Outlet Devices
#1	Primary	152.10'	**compound weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 1.00 1.00 2.00 2.00 Width (feet) 3.00 3.00 0.00 6.00 6.00 0.00
#2	Secondary	154.20'	**96.0' long x 14.0' breadth bridge (overflow weir)** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=13.14 cfs @ 14.64 hrs HW=153.27' TW=150.42' (Dynamic Tailwater)
1=compound weir (Weir Controls 13.14 cfs @ 3.26 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=152.10' TW=150.72' (Dynamic Tailwater)
2=bridge (overflow weir) (Controls 0.00 cfs)

Pond 1P: Exst Pond



Summary for Pond 2P: stream to 60" twin culverts (DP-1)

Water will sit in stream channel until it reaches a minimum elevation of 150.72, since that is the lowest elevation of one of the 60" culverts. Therefore, this elevation was used as the starting elevation for the modeling of the stream and 60" twin culverts.

Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 0.77" for 1-year event
Inflow = 13.14 cfs @ 14.64 hrs, Volume= 5.941 af
Outflow = 13.14 cfs @ 14.65 hrs, Volume= 5.940 af, Atten= 0%, Lag= 0.6 min
Primary = 13.14 cfs @ 14.65 hrs, Volume= 5.940 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 150.72' Surf.Area= 852 sf Storage= 735 cf
Peak Elev= 151.53' @ 14.65 hrs Surf.Area= 1,088 sf Storage= 1,517 cf (783 cf above start)

Plug-Flow detention time= 7.5 min calculated for 5.922 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (1,100.5 - 1,098.9)

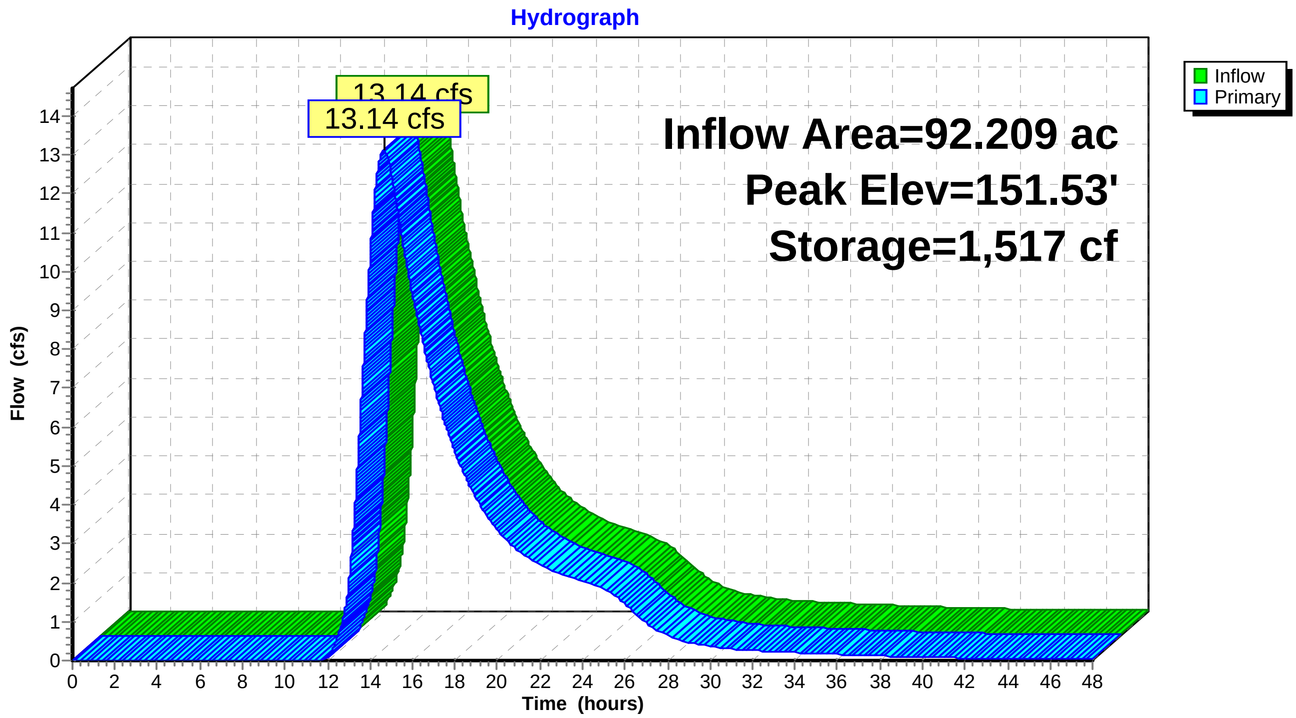
Volume	Invert	Avail.Storage	Storage Description
#1	149.70'	6,090 cf	**existing stream (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
149.70	596	131.8	0	0	596
152.00	1,239	152.2	2,066	2,066	1,161
154.00	2,902	266.7	4,025	6,090	5,001

Device	Routing	Invert	Outlet Devices
#1	Primary	150.72'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.10' S= 0.0063 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#2	Primary	150.77'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.40' S= 0.0038 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=13.14 cfs @ 14.65 hrs HW=151.53' (Free Discharge)
└─**1=Culvert** (Barrel Controls 7.57 cfs @ 4.67 fps)
└─**2=Culvert** (Barrel Controls 5.57 cfs @ 3.77 fps)

Pond 2P: stream to 60" twin culverts (DP-1)



Summary for Pond A: Pocket Pond (P-5)

Grate: Campbell Foundry Model # 3433.
Existing rip-rap for weir is 10 foot wide and will remain.

Inflow Area = 7.740 ac, 48.71% Impervious, Inflow Depth = 1.17" for 1-year event
Inflow = 8.45 cfs @ 12.13 hrs, Volume= 0.757 af
Outflow = 0.46 cfs @ 15.68 hrs, Volume= 0.732 af, Atten= 95%, Lag= 212.8 min
Primary = 0.46 cfs @ 15.68 hrs, Volume= 0.732 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 155.75' Surf.Area= 13,223 sf Storage= 22,302 cf
Peak Elev= 157.11' @ 15.68 hrs Surf.Area= 15,308 sf Storage= 42,247 cf (19,946 cf above start)
Flood Elev= 160.00' Surf.Area= 20,823 sf Storage= 93,104 cf (70,803 cf above start)

Plug-Flow detention time= 1,285.8 min calculated for 0.220 af (29% of inflow)
Center-of-Mass det. time= 553.1 min (1,387.0 - 833.9)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	93,104 cf	**pocket pond (Irregular)** Listed below

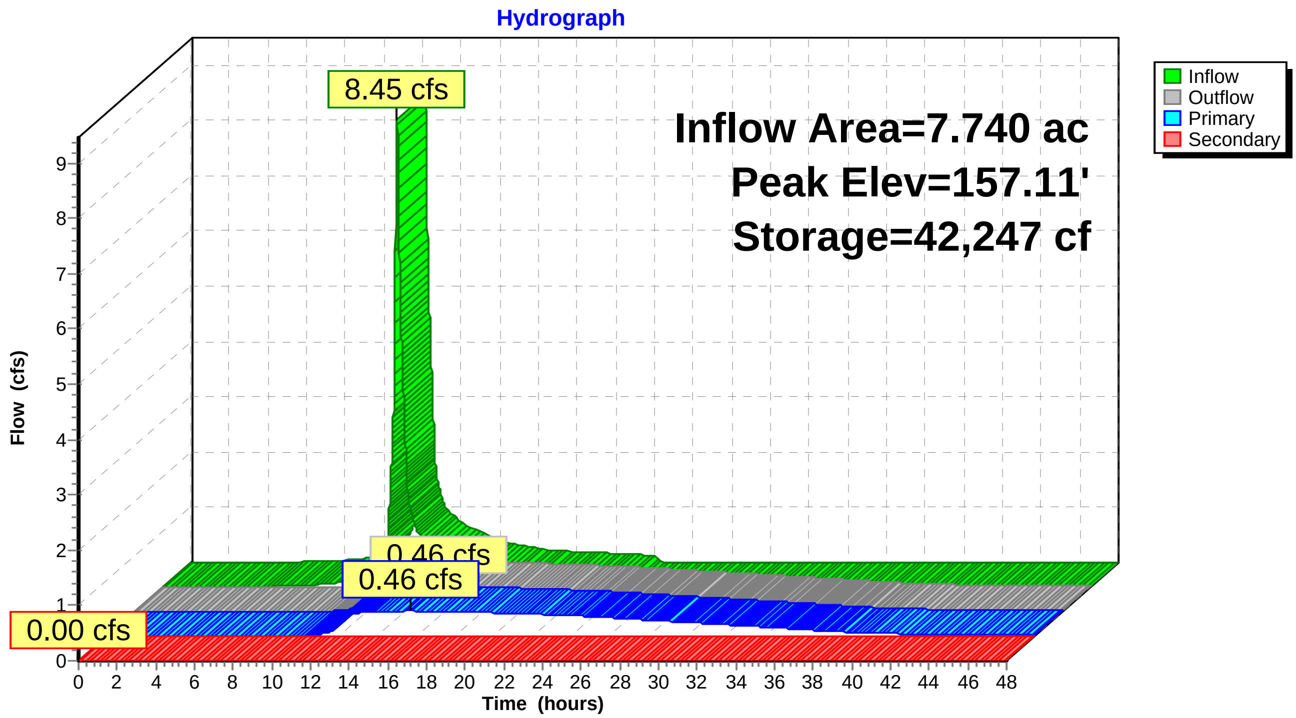
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
151.00	71	155.0	0	0	71
152.00	1,449	208.7	614	614	1,636
154.00	3,771	398.6	5,038	5,652	10,833
154.36	4,394	413.9	1,468	7,120	11,833
154.86	11,762	609.2	3,891	11,011	27,736
156.00	13,633	583.6	14,462	25,473	30,259
158.00	16,653	616.5	30,236	55,709	33,622
159.00	18,677	647.0	17,655	73,364	36,753
160.00	20,823	673.7	19,740	93,104	39,636

Device	Routing	Invert	Outlet Devices
#1	Primary	154.09'	**24.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 153.40' S= 0.0168 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	155.75'	**4.0" Vert. Orifice** C= 0.600
#3	Device 1	157.25'	**24.0" W x 9.0" H Vert. Slots (side) X 2.00** C= 0.600
#4	Device 1	157.25'	**36.0" W x 9.0" H Vert. Slot (front)** C= 0.600
#5	Device 1	158.50'	**36.0" x 55.5" Horiz. Grate X 4.00 columns** X 8 rows C= 0.600 in 1.3" x 6.5" Grate Limited to weir flow at low heads
#6	Secondary	159.00'	**153.0 deg x 10.0' long x 1.00' rise Trap Weir** C= 2.47

Primary OutFlow Max=0.46 cfs @ 15.68 hrs HW=157.11' TW=153.13' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.46 cfs of 21.50 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.46 cfs @ 5.26 fps)
  ├─**3=Slots (side)** (Controls 0.00 cfs)
  ├─**4=Slot (front)** (Controls 0.00 cfs)
  └─**5=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=155.75' TW=152.10' (Dynamic Tailwater)
└─**6=Trap Weir** (Controls 0.00 cfs)

Pond A: Pocket Pond (P-5)



Summary for Pond FB-1: Forebay

Inflow Area = 1.360 ac, 91.18% Impervious, Inflow Depth = 2.23" for 1-year event
Inflow = 3.36 cfs @ 12.08 hrs, Volume= 0.252 af
Outflow = 3.32 cfs @ 12.10 hrs, Volume= 0.252 af, Atten= 1%, Lag= 0.8 min
Primary = 3.32 cfs @ 12.10 hrs, Volume= 0.252 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 158.00' Surf.Area= 1,052 sf Storage= 1,843 cf
Peak Elev= 158.20' @ 12.10 hrs Surf.Area= 1,130 sf Storage= 2,066 cf (223 cf above start)
Flood Elev= 160.00' Surf.Area= 1,772 sf Storage= 4,707 cf (2,864 cf above start)

Plug-Flow detention time= 114.9 min calculated for 0.210 af (83% of inflow)
Center-of-Mass det. time= 2.6 min (785.7 - 783.2)

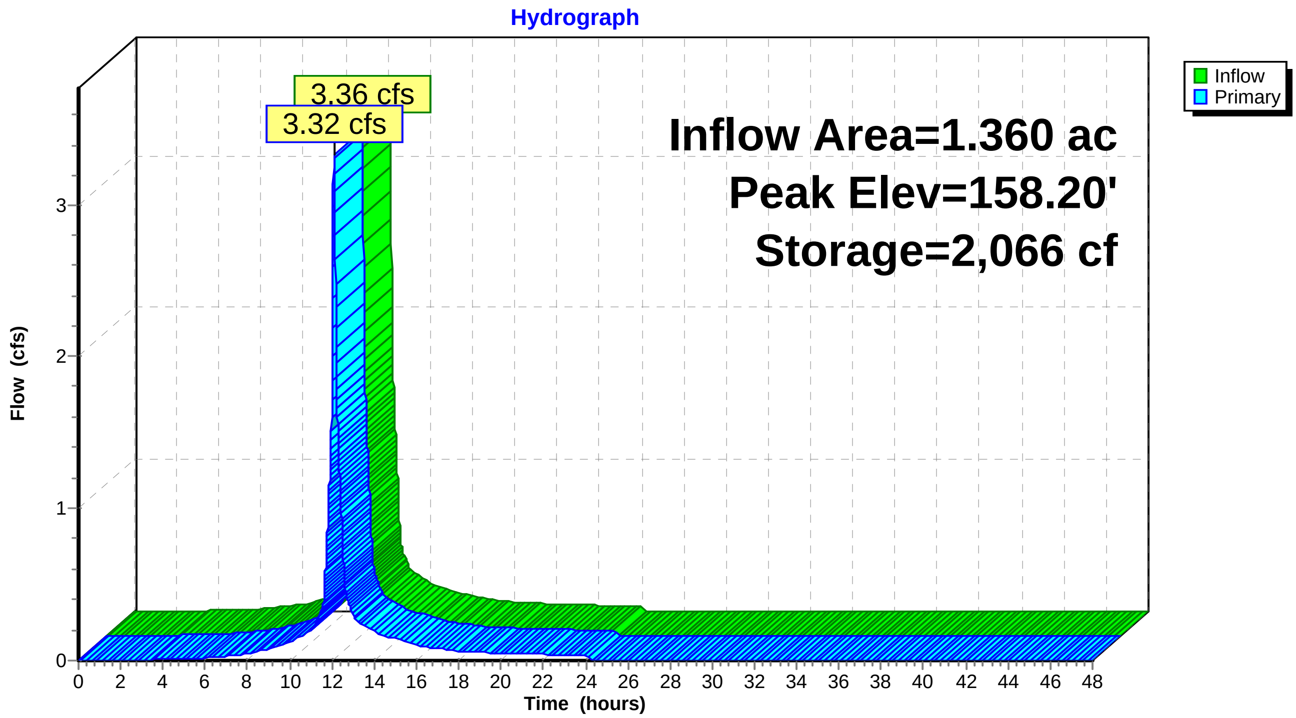
Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	4,707 cf	**Forebay (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
154.00	48	34.2	0	0	48
156.00	426	86.7	411	411	567
158.00	1,052	124.1	1,432	1,843	1,229
159.00	1,460	143.2	1,250	3,093	1,657
160.00	1,772	163.3	1,613	4,707	2,171

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**153.0 deg x 11.0' long x 1.50' rise Trap Weir** C= 2.47

Primary OutFlow Max=3.32 cfs @ 12.10 hrs HW=158.20' TW=156.28' (Dynamic Tailwater)
↑—**1=Trap Weir** (Weir Controls 3.32 cfs @ 1.37 fps)

Pond FB-1: Forebay



Summary for Pond FB-2: Forebay

Inflow Area = 6.380 ac, 39.66% Impervious, Inflow Depth = 0.95" for 1-year event
Inflow = 5.55 cfs @ 12.15 hrs, Volume= 0.505 af
Outflow = 5.53 cfs @ 12.16 hrs, Volume= 0.505 af, Atten= 0%, Lag= 0.6 min
Primary = 5.53 cfs @ 12.16 hrs, Volume= 0.505 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 158.00' Surf.Area= 735 sf Storage= 1,551 cf
Peak Elev= 158.34' @ 12.16 hrs Surf.Area= 808 sf Storage= 1,811 cf (261 cf above start)
Flood Elev= 160.00' Surf.Area= 1,137 sf Storage= 3,445 cf (1,894 cf above start)

Plug-Flow detention time= 51.7 min calculated for 0.469 af (93% of inflow)
Center-of-Mass det. time= 1.6 min (858.0 - 856.4)

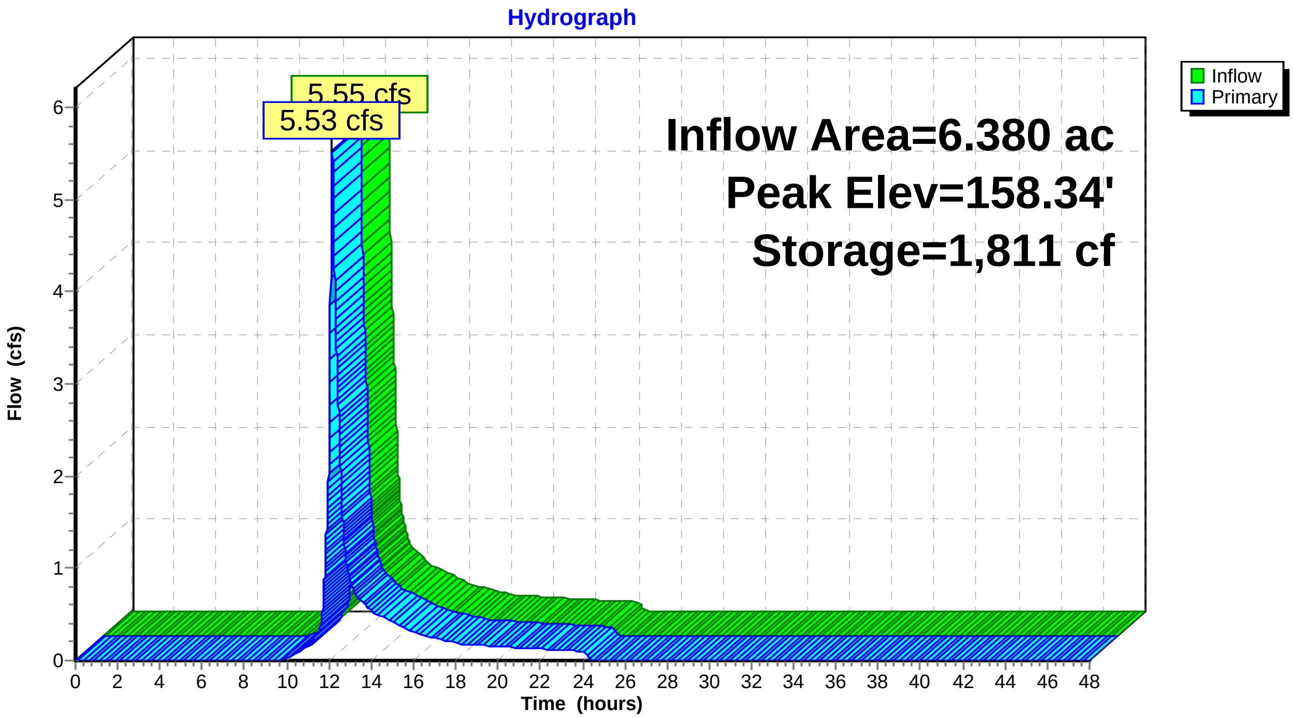
Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	3,445 cf	**forebay (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
154.00	113	50.1	0	0	113
156.00	374	77.5	462	462	419
158.00	735	103.4	1,089	1,551	834
159.00	962	116.9	846	2,397	1,095
160.00	1,137	100.3	1,048	3,445	1,401

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**153.0 deg x 8.0' long x 1.50' rise Trap Weir** C= 2.47

Primary OutFlow Max=5.53 cfs @ 12.16 hrs HW=158.34' TW=156.39' (Dynamic Tailwater)
└─**1=Trap Weir** (Weir Controls 5.53 cfs @ 1.74 fps)

Pond FB-2: Forebay



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1A: Post-Dev Offsite Runoff Area=82.599 ac 5.77% Impervious Runoff Depth=1.18"
Flow Length=3,950' Tc=147.5 min CN=73 Runoff=23.02 cfs 8.120 af

Subcatchment DA-1B: Post-Dev Runoff Area=4.500 ac 55.56% Impervious Runoff Depth=1.78"
Flow Length=759' Tc=10.2 min CN=82 Runoff=8.15 cfs 0.668 af

Subcatchment DA-1C: Post-Dev Runoff Area=1.880 ac 1.60% Impervious Runoff Depth=0.57"
Flow Length=293' Tc=25.0 min CN=61 Runoff=0.57 cfs 0.090 af

Subcatchment DA-1D: Post-Dev Runoff Area=0.440 ac 100.00% Impervious Runoff Depth=3.27"
Tc=6.0 min CN=98 Runoff=1.50 cfs 0.120 af

Subcatchment DA-1E: Post-Dev Runoff Area=0.920 ac 86.96% Impervious Runoff Depth=2.73"
Flow Length=534' Tc=6.0 min CN=93 Runoff=2.84 cfs 0.210 af

Subcatchment DA-1F: Post-Dev Runoff Area=1.870 ac 35.83% Impervious Runoff Depth=1.43"
Flow Length=133' Tc=8.3 min CN=77 Runoff=2.84 cfs 0.223 af

Reach 1R: open portion of box culvert Avg. Depth=0.53' Max Vel=6.25 fps Inflow=23.35 cfs 9.389 af
n=0.017 L=3.5' S=0.0143 '/' Capacity=443.50 cfs Outflow=23.35 cfs 9.389 af

Reach 2R: bridge portion over box culvert Avg. Depth=0.47' Max Vel=7.06 fps Inflow=23.35 cfs 9.389 af
n=0.017 L=14.3' S=0.0210 '/' Capacity=421.44 cfs Outflow=23.35 cfs 9.389 af

Pond 1P: Exst Pond Peak Elev=153.66' Storage=40,921 cf Inflow=24.40 cfs 9.401 af
Primary=23.35 cfs 9.389 af Secondary=0.00 cfs 0.000 af Outflow=23.35 cfs 9.389 af

Pond 2P: stream to 60" twin culverts (DP-1) Peak Elev=151.80' Storage=1,827 cf Inflow=23.35 cfs 9.389 af
Outflow=23.35 cfs 9.388 af

Pond A: Pocket Pond (P-5) Peak Elev=157.40' Storage=46,580 cf Inflow=12.03 cfs 1.088 af
Primary=1.77 cfs 1.058 af Secondary=0.00 cfs 0.000 af Outflow=1.77 cfs 1.058 af

Pond FB-1: Forebay Peak Elev=158.24' Storage=2,107 cf Inflow=4.34 cfs 0.329 af
Outflow=4.29 cfs 0.329 af

Pond FB-2: Forebay Peak Elev=158.43' Storage=1,888 cf Inflow=8.29 cfs 0.758 af
Outflow=8.28 cfs 0.758 af

Total Runoff Area = 92.209 ac Runoff Volume = 9.430 af Average Runoff Depth = 1.23"
90.01% Pervious = 83.001 ac 9.99% Impervious = 9.208 ac

Summary for Subcatchment DA-1A: Post-Dev Offsite

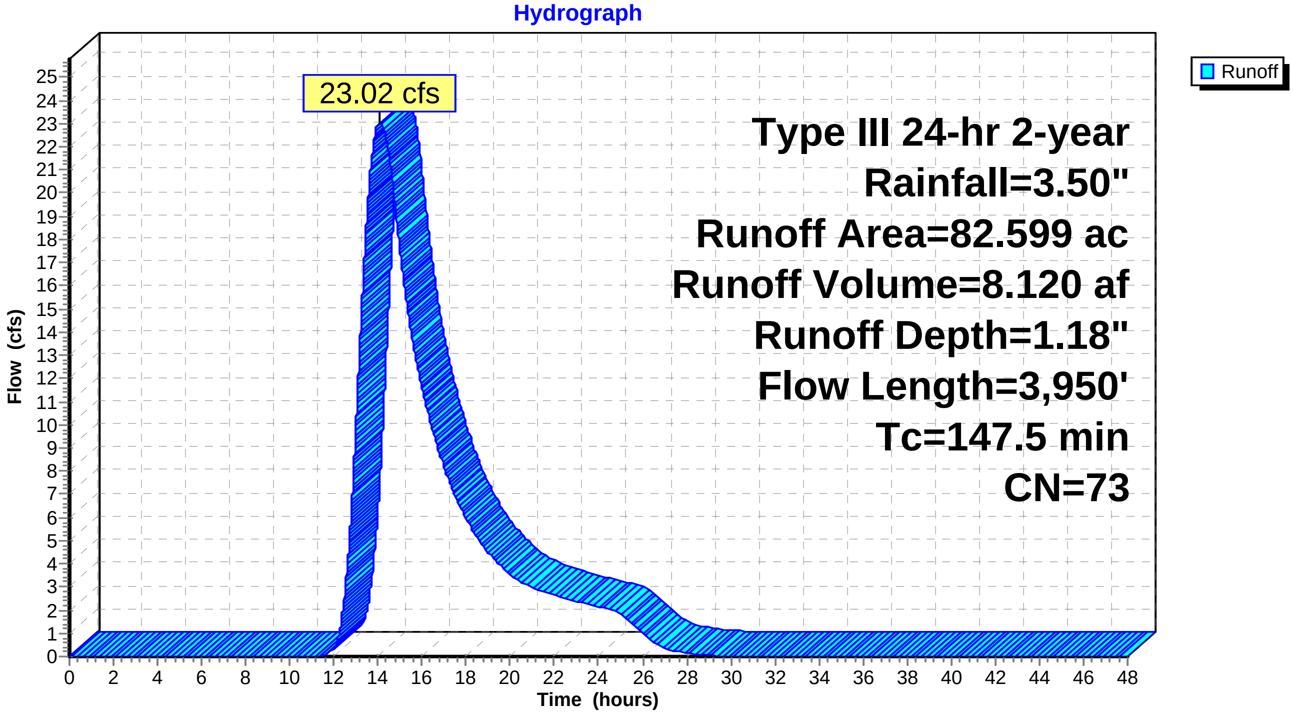
Runoff = 23.02 cfs @ 14.09 hrs, Volume= 8.120 af, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.50"

Area (ac)	CN	Description
8.287	73	Woods, Fair, HSG C
5.037	76	Woods/grass comb., Fair, HSG C
21.037	60	Woods, Fair, HSG B
32.137	79	Woods, Fair, HSG D
0.187	98	Unconnected pavement, HSG C
6.037	80	1/2 acre lots, 25% imp, HSG C
0.337	98	Unconnected pavement, HSG B
6.037	70	1/2 acre lots, 25% imp, HSG B
0.467	98	Unconnected pavement, HSG D
3.036	85	1/2 acre lots, 25% imp, HSG D
82.599	73	Weighted Average
77.831		94.23% Pervious Area
4.768		5.77% Impervious Area
0.991		20.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
6.2	320	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
97.4	1,600	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.3	1,930	0.0050	1.06		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
147.5	3,950	Total			

Subcatchment DA-1A: Post-Dev Offsite



Summary for Subcatchment DA-1B: Post-Dev

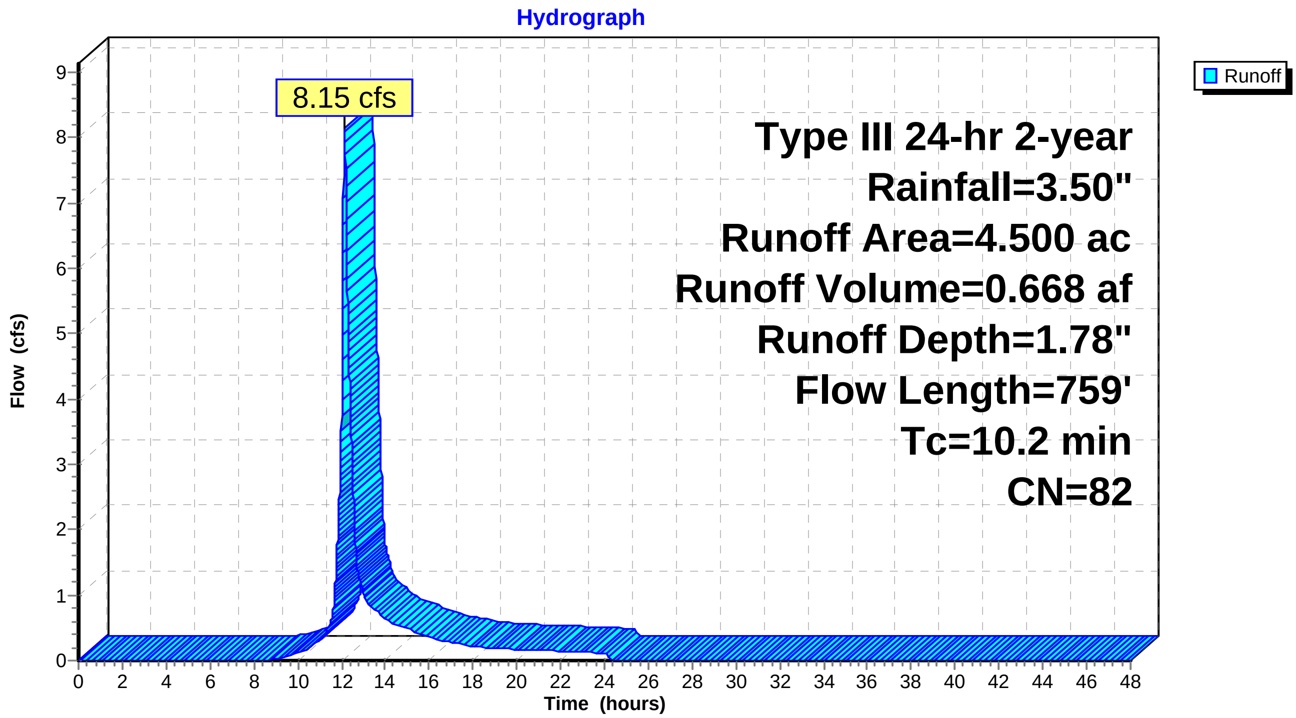
Runoff = 8.15 cfs @ 12.14 hrs, Volume= 0.668 af, Depth= 1.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.50"

Area (ac)	CN	Description
2.000	61	>75% Grass cover, Good, HSG B
0.300	98	Roofs, HSG B
2.200	98	Paved parking, HSG B
4.500	82	Weighted Average
2.000		44.44% Pervious Area
2.500		55.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.1200	0.25		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
1.9	125	0.0240	1.08		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	33	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	501	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
10.2	759	Total			

Subcatchment DA-1B: Post-Dev



Summary for Subcatchment DA-1C: Post-Dev

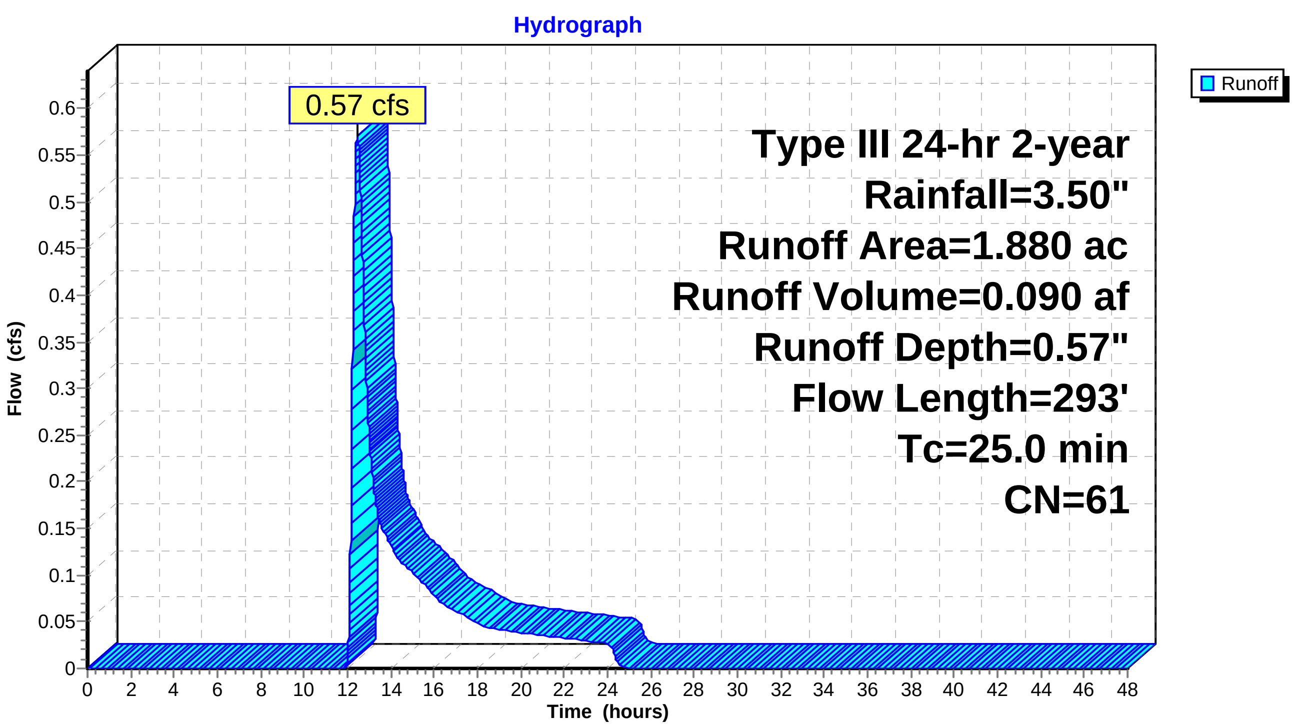
Runoff = 0.57 cfs @ 12.45 hrs, Volume= 0.090 af, Depth= 0.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.50"

Area (ac)	CN	Description
0.400	60	Woods, Fair, HSG B
0.030	98	Unconnected pavement, HSG B
1.450	61	>75% Grass cover, Good, HSG B
1.880	61	Weighted Average
1.850		98.40% Pervious Area
0.030		1.60% Impervious Area
0.030		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	193	0.0104	0.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.0	293	Total			

Subcatchment DA-1C: Post-Dev



Summary for Subcatchment DA-1D: Post-Dev

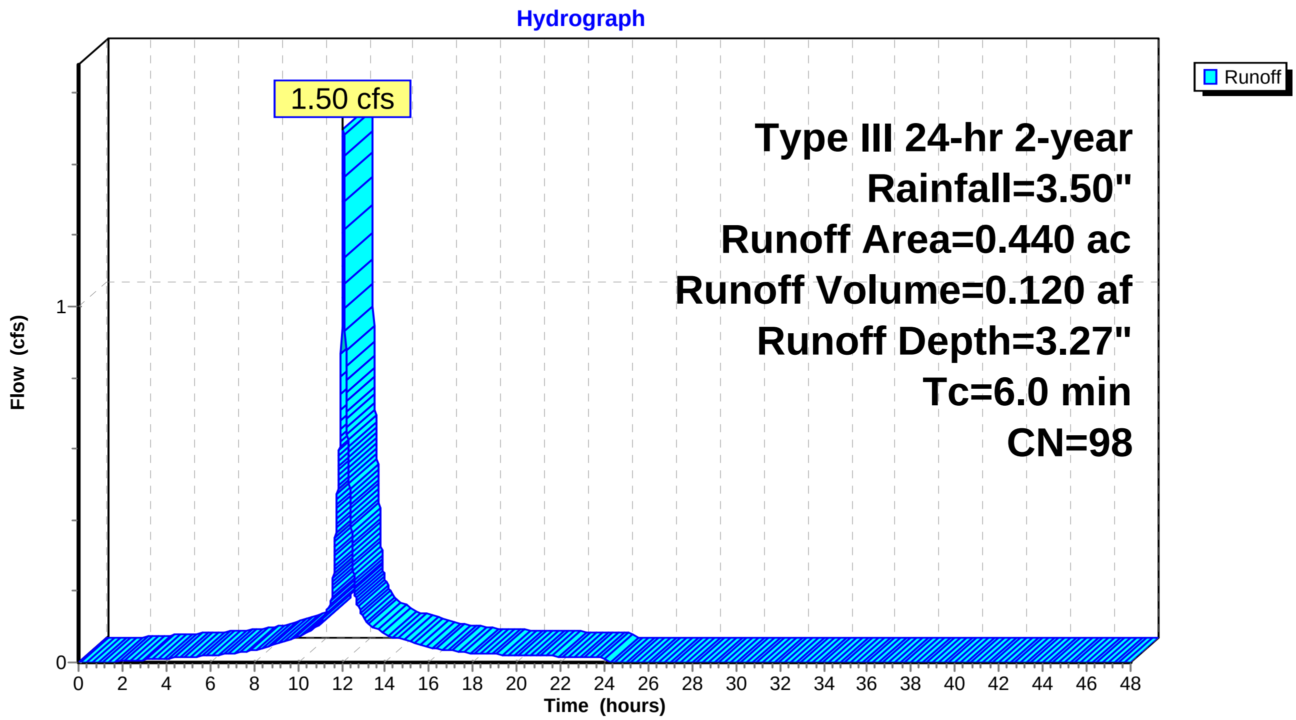
Runoff = 1.50 cfs @ 12.08 hrs, Volume= 0.120 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.50"

Area (ac)	CN	Description
0.440	98	Roofs, HSG B
0.440		100.00% Impervious Area

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

Subcatchment DA-1D: Post-Dev



Summary for Subcatchment DA-1E: Post-Dev

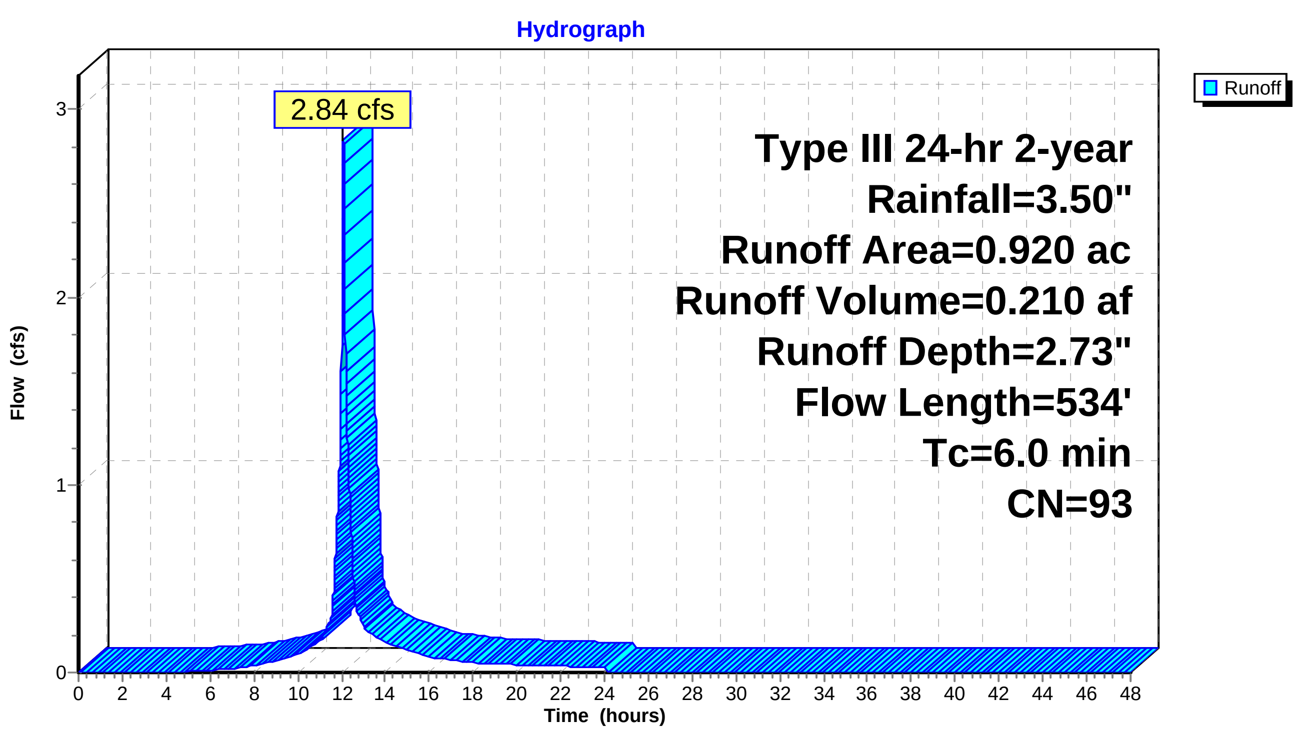
Runoff = 2.84 cfs @ 12.08 hrs, Volume= 0.210 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.50"

Area (ac)	CN	Description
0.120	61	>75% Grass cover, Good, HSG B
0.800	98	Paved parking, HSG B
0.920	93	Weighted Average
0.120		13.04% Pervious Area
0.800		86.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0125	1.19		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
0.4	59	0.0125	2.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.1	375	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
2.9	534	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-1E: Post-Dev



Summary for Subcatchment DA-1F: Post-Dev

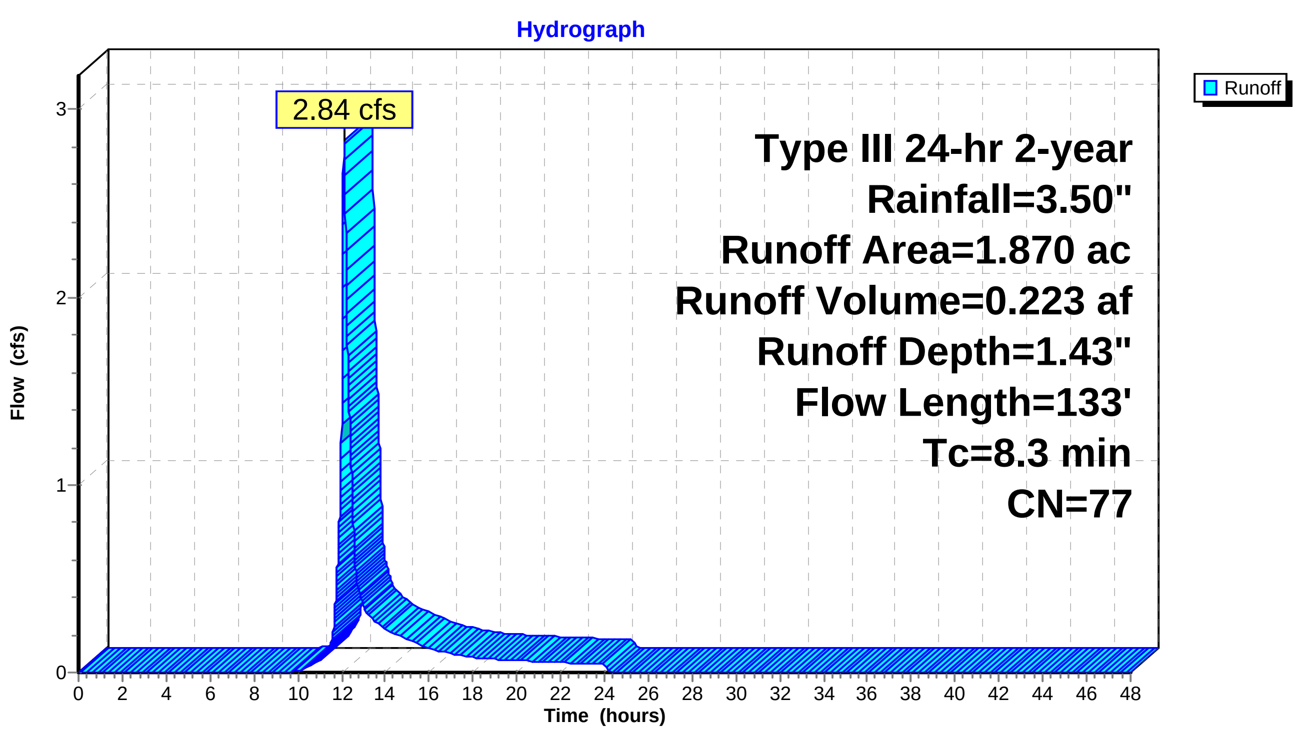
Runoff = 2.84 cfs @ 12.12 hrs, Volume= 0.223 af, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.50"

Area (ac)	CN	Description
0.750	61	>75% Grass cover, Good, HSG B
0.170	98	Paved parking, HSG C
0.450	74	>75% Grass cover, Good, HSG C
0.500	98	Water Surface, HSG C
1.870	77	Weighted Average
1.200		64.17% Pervious Area
0.670		35.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.3	33	0.0910	2.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	133	Total			

Subcatchment DA-1F: Post-Dev



Summary for Reach 1R: open portion of box culvert

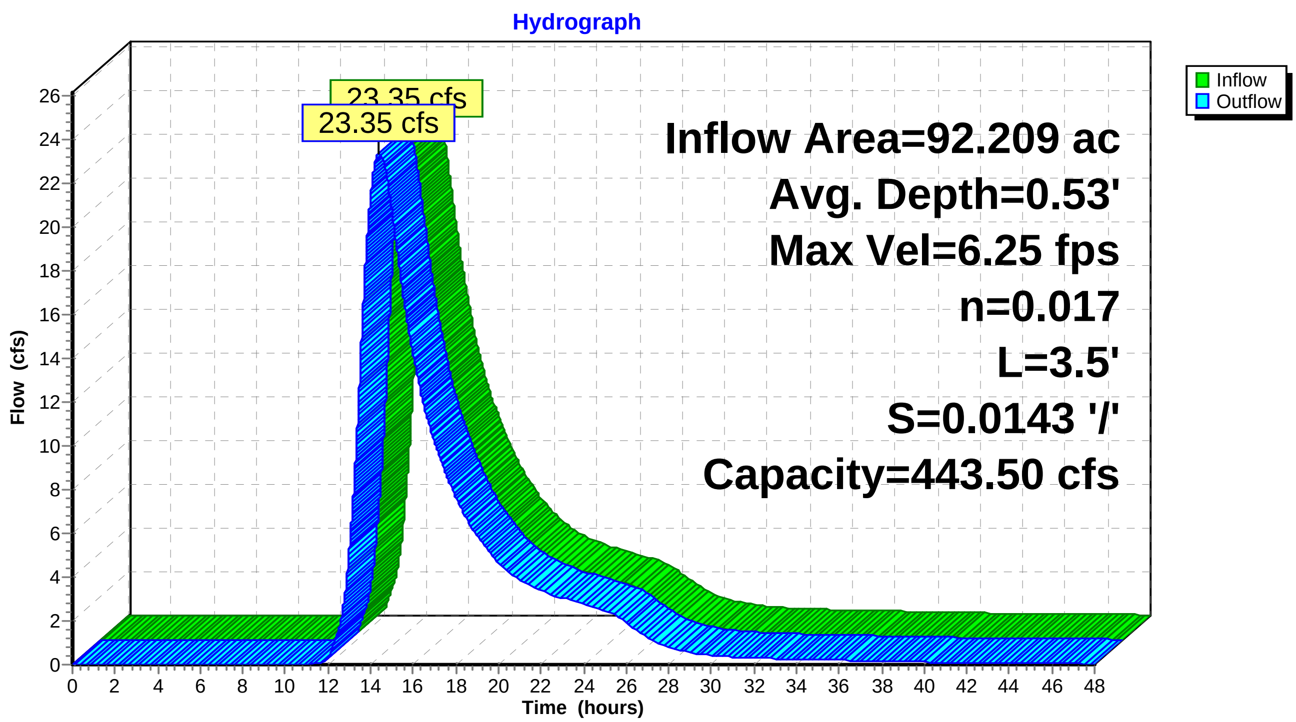
Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 1.22" for 2-year event
Inflow = 23.35 cfs @ 14.42 hrs, Volume= 9.389 af
Outflow = 23.35 cfs @ 14.42 hrs, Volume= 9.389 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.25 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.17 fps, Avg. Travel Time= 0.0 min

Peak Storage= 13 cf @ 14.42 hrs, Average Depth at Peak Storage= 0.53'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 443.50 cfs

7.00' x 4.00' deep channel, n= 0.017 Concrete, unfinished
Length= 3.5' Slope= 0.0143 '/'
Inlet Invert= 150.05', Outlet Invert= 150.00'

Reach 1R: open portion of box culvert



Summary for Reach 2R: bridge portion over box culvert

box culvert - opening 7'Wx4'Hx12'L
adjusted height to account for wooden beams underneath the bridge.

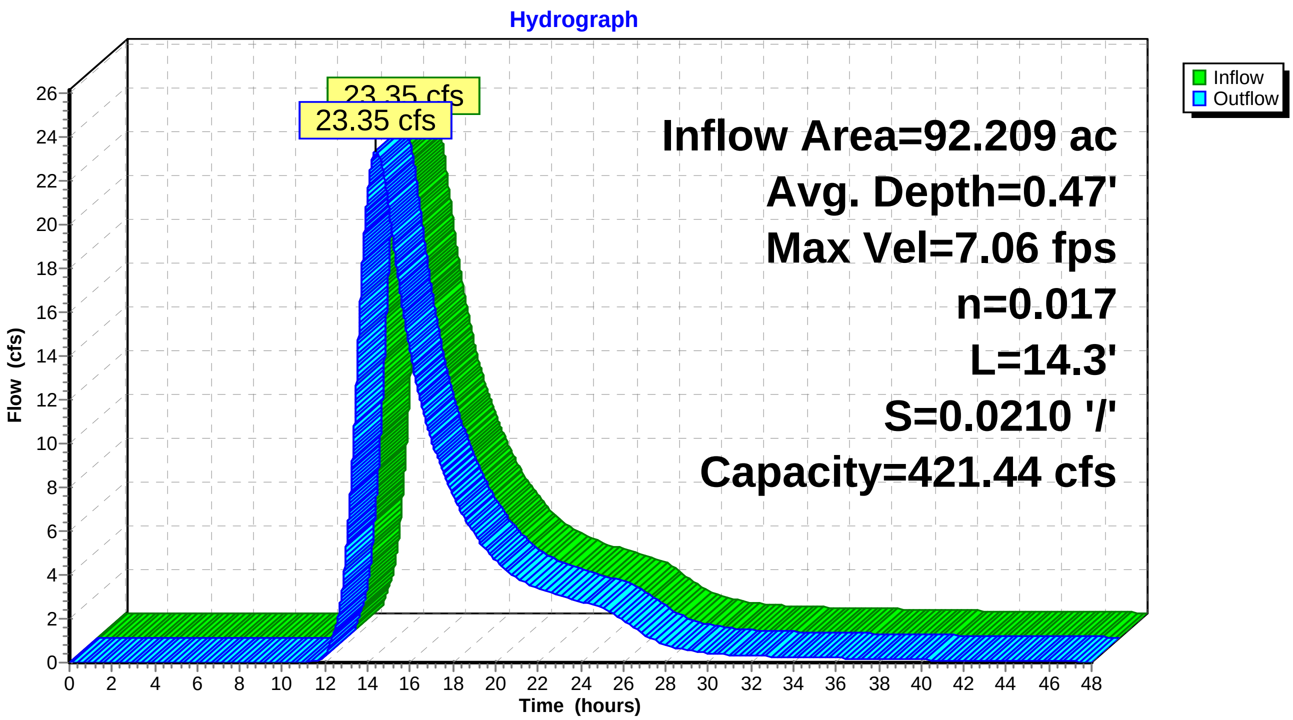
Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 1.22" for 2-year event
Inflow = 23.35 cfs @ 14.42 hrs, Volume= 9.389 af
Outflow = 23.35 cfs @ 14.42 hrs, Volume= 9.389 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.06 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.41 fps, Avg. Travel Time= 0.1 min

Peak Storage= 47 cf @ 14.42 hrs, Average Depth at Peak Storage= 0.47'
Bank-Full Depth= 3.33', Capacity at Bank-Full= 421.44 cfs

7.00' x 3.33' deep channel, n= 0.017 Concrete, unfinished
Length= 14.3' Slope= 0.0210 '/'
Inlet Invert= 150.00', Outlet Invert= 149.70'

Reach 2R: bridge portion over box culvert



Summary for Pond 1P: Exst Pond

There are two different crest bredth lengths, so shorter length was taken.

Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 1.22" for 2-year event
Inflow = 24.40 cfs @ 14.09 hrs, Volume= 9.401 af
Outflow = 23.35 cfs @ 14.42 hrs, Volume= 9.389 af, Atten= 4%, Lag= 19.8 min
Primary = 23.35 cfs @ 14.42 hrs, Volume= 9.389 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 153.66' @ 14.42 hrs Surf.Area= 31,034 sf Storage= 40,921 cf
Flood Elev= 156.00' Surf.Area= 48,106 sf Storage= 132,693 cf

Plug-Flow detention time= 44.1 min calculated for 9.387 af (100% of inflow)
Center-of-Mass det. time= 42.0 min (1,065.1 - 1,023.1)

Volume	Invert	Avail.Storage	Storage Description
#1	152.10'	132,693 cf	**existing pond (Irregular)**Listed below (Recalc)

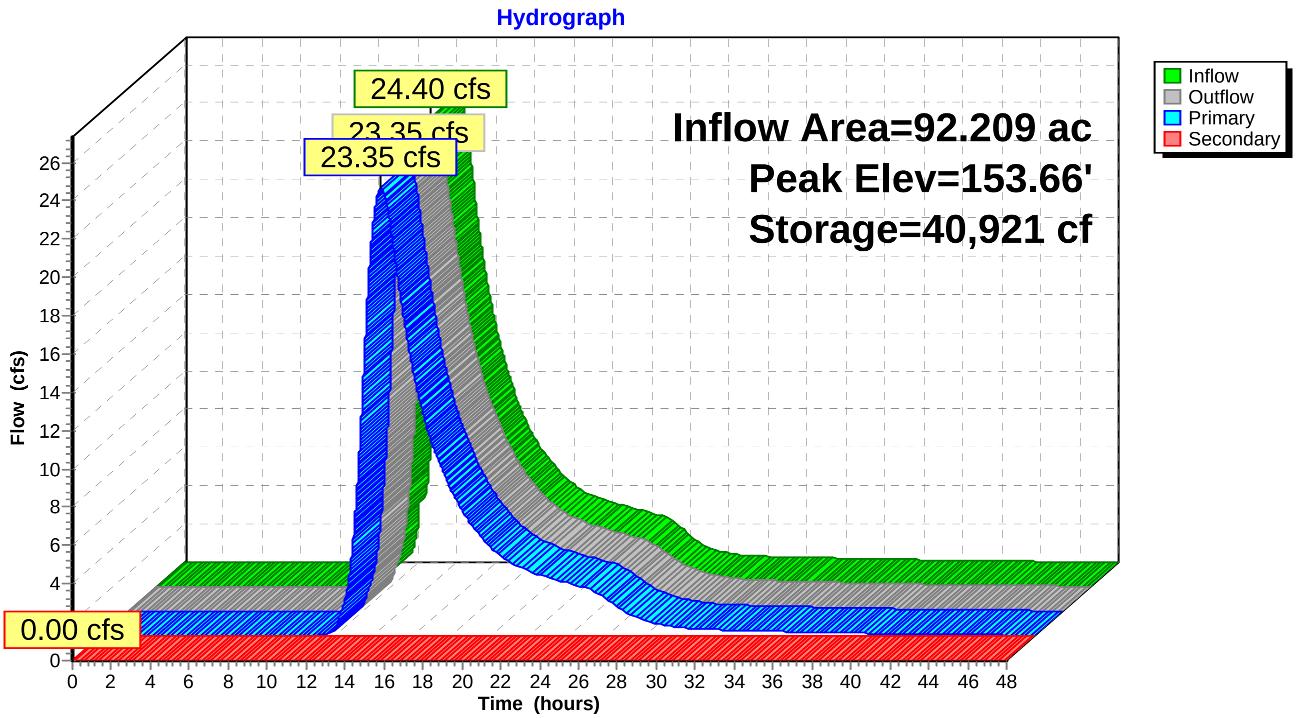
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
152.10	21,607	727.8	0	0	21,607
154.00	33,288	897.6	51,752	51,752	43,624
156.00	48,106	962.7	80,941	132,693	53,439

Device	Routing	Invert	Outlet Devices
#1	Primary	152.10'	**compound weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 1.00 1.00 2.00 2.00 Width (feet) 3.00 3.00 0.00 6.00 6.00 0.00
#2	Secondary	154.20'	**96.0' long x 14.0' breadth bridge (overflow weir)** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=23.35 cfs @ 14.42 hrs HW=153.66' TW=150.58' (Dynamic Tailwater)
└─**1=compound weir** (Weir Controls 23.35 cfs @ 3.66 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=152.10' TW=150.72' (Dynamic Tailwater)
└─**2=bridge (overflow weir)** (Controls 0.00 cfs)

Pond 1P: Exst Pond



Summary for Pond 2P: stream to 60" twin culverts (DP-1)

Water will sit in stream channel until it reaches a minimum elevation of 150.72, since that is the lowest elevation of one of the 60" culverts. Therefore, this elevation was used as the starting elevation for the modeling of the stream and 60" twin culverts.

Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 1.22" for 2-year event
Inflow = 23.35 cfs @ 14.42 hrs, Volume= 9.389 af
Outflow = 23.35 cfs @ 14.43 hrs, Volume= 9.388 af, Atten= 0%, Lag= 0.5 min
Primary = 23.35 cfs @ 14.43 hrs, Volume= 9.388 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 150.72' Surf.Area= 852 sf Storage= 735 cf
Peak Elev= 151.80' @ 14.43 hrs Surf.Area= 1,174 sf Storage= 1,827 cf (1,092 cf above start)

Plug-Flow detention time= 5.2 min calculated for 9.371 af (100% of inflow)
Center-of-Mass det. time= 1.3 min (1,066.4 - 1,065.1)

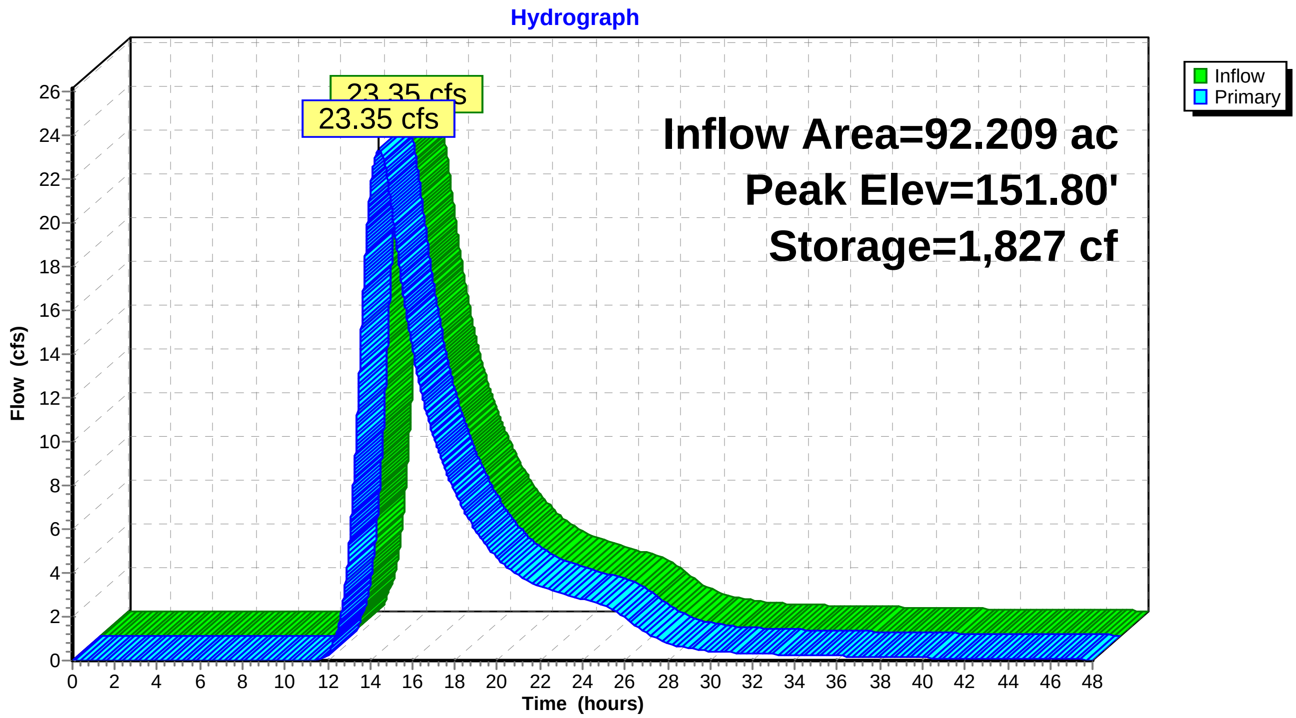
Volume	Invert	Avail.Storage	Storage Description
#1	149.70'	6,090 cf	**existing stream (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
149.70	596	131.8	0	0	596
152.00	1,239	152.2	2,066	2,066	1,161
154.00	2,902	266.7	4,025	6,090	5,001

Device	Routing	Invert	Outlet Devices
#1	Primary	150.72'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.10' S= 0.0063 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#2	Primary	150.77'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.40' S= 0.0038 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=23.35 cfs @ 14.43 hrs HW=151.80' (Free Discharge)
1=Culvert (Barrel Controls 13.16 cfs @ 5.30 fps)
2=Culvert (Barrel Controls 10.19 cfs @ 4.40 fps)

Pond 2P: stream to 60" twin culverts (DP-1)



Summary for Pond A: Pocket Pond (P-5)

Grate: Campbell Foundry Model # 3433.
Existing rip-rap for weir is 10 foot wide and will remain.

Inflow Area = 7.740 ac, 48.71% Impervious, Inflow Depth = 1.69" for 2-year event
Inflow = 12.03 cfs @ 12.13 hrs, Volume= 1.088 af
Outflow = 1.77 cfs @ 12.96 hrs, Volume= 1.058 af, Atten= 85%, Lag= 49.6 min
Primary = 1.77 cfs @ 12.96 hrs, Volume= 1.058 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 155.75' Surf.Area= 13,223 sf Storage= 22,302 cf
Peak Elev= 157.40' @ 12.96 hrs Surf.Area= 15,741 sf Storage= 46,580 cf (24,279 cf above start)
Flood Elev= 160.00' Surf.Area= 20,823 sf Storage= 93,104 cf (70,803 cf above start)

Plug-Flow detention time= 995.8 min calculated for 0.546 af (50% of inflow)
Center-of-Mass det. time= 481.5 min (1,308.3 - 826.8)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	93,104 cf	**pocket pond (Irregular)**Listed below

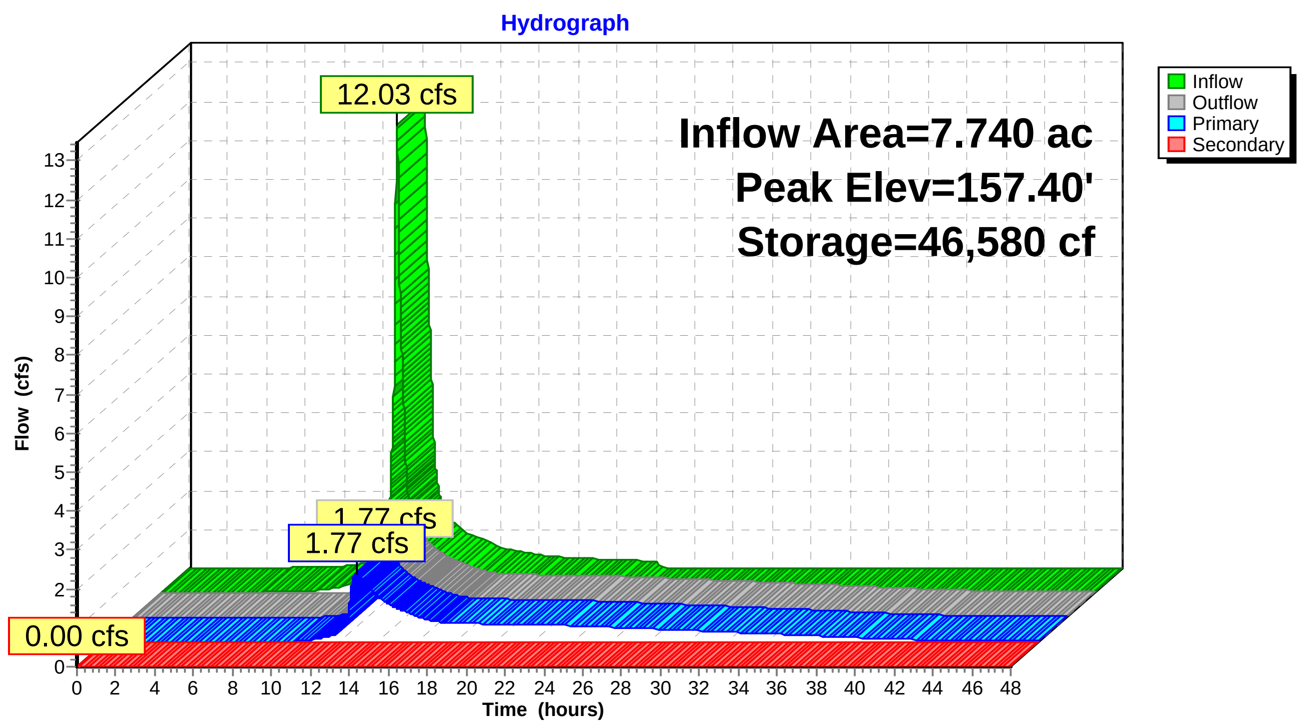
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
151.00	71	155.0	0	0	71
152.00	1,449	208.7	614	614	1,636
154.00	3,771	398.6	5,038	5,652	10,833
154.36	4,394	413.9	1,468	7,120	11,833
154.86	11,762	609.2	3,891	11,011	27,736
156.00	13,633	583.6	14,462	25,473	30,259
158.00	16,653	616.5	30,236	55,709	33,622
159.00	18,677	647.0	17,655	73,364	36,753
160.00	20,823	673.7	19,740	93,104	39,636

Device	Routing	Invert	Outlet Devices
#1	Primary	154.09'	**24.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 153.40' S= 0.0168 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	155.75'	**4.0" Vert. Orifice** C= 0.600
#3	Device 1	157.25'	**24.0" W x 9.0" H Vert. Slots (side) X 2.00** C= 0.600
#4	Device 1	157.25'	**36.0" W x 9.0" H Vert. Slot (front)** C= 0.600
#5	Device 1	158.50'	**36.0" x 55.5" Horiz. Grate X 4.00 columns** X 8 rows C= 0.600 in 1.3" x 6.5" Grate Limited to weir flow at low heads
#6	Secondary	159.00'	**153.0 deg x 10.0' long x 1.00' rise Trap Weir** C= 2.47

Primary OutFlow Max=1.77 cfs @ 12.96 hrs HW=157.40' TW=152.71' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.77 cfs of 22.97 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.51 cfs @ 5.86 fps)
  ├─**3=Slots (side)** (Orifice Controls 0.72 cfs @ 1.23 fps)
  ├─**4=Slot (front)** (Orifice Controls 0.54 cfs @ 1.23 fps)
  └─**5=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=155.75' TW=152.10' (Dynamic Tailwater)
└─**6=Trap Weir** (Controls 0.00 cfs)

Pond A: Pocket Pond (P-5)



Summary for Pond FB-1: Forebay

Inflow Area = 1.360 ac, 91.18% Impervious, Inflow Depth = 2.91" for 2-year event
Inflow = 4.34 cfs @ 12.08 hrs, Volume= 0.329 af
Outflow = 4.29 cfs @ 12.10 hrs, Volume= 0.329 af, Atten= 1%, Lag= 0.7 min
Primary = 4.29 cfs @ 12.10 hrs, Volume= 0.329 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 158.00' Surf.Area= 1,052 sf Storage= 1,843 cf
Peak Elev= 158.24' @ 12.10 hrs Surf.Area= 1,144 sf Storage= 2,107 cf (264 cf above start)
Flood Elev= 160.00' Surf.Area= 1,772 sf Storage= 4,707 cf (2,864 cf above start)

Plug-Flow detention time= 99.1 min calculated for 0.287 af (87% of inflow)
Center-of-Mass det. time= 2.4 min (779.3 - 776.9)

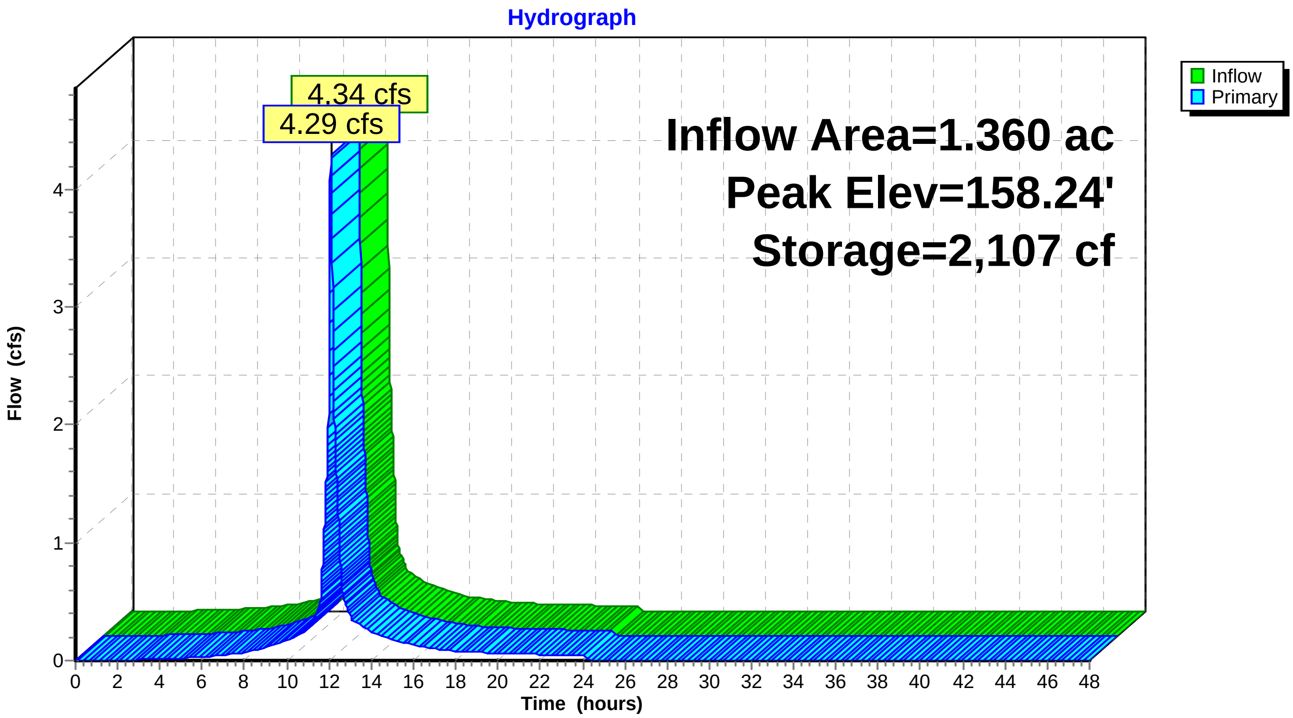
Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	4,707 cf	**Forebay (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
154.00	48	34.2	0	0	48
156.00	426	86.7	411	411	567
158.00	1,052	124.1	1,432	1,843	1,229
159.00	1,460	143.2	1,250	3,093	1,657
160.00	1,772	163.3	1,613	4,707	2,171

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**153.0 deg x 11.0' long x 1.50' rise Trap Weir** C= 2.47

Primary OutFlow Max=4.29 cfs @ 12.10 hrs HW=158.24' TW=156.52' (Dynamic Tailwater)
└─**1=Trap Weir** (Weir Controls 4.29 cfs @ 1.49 fps)

Pond FB-1: Forebay



Summary for Pond FB-2: Forebay

Inflow Area = 6.380 ac, 39.66% Impervious, Inflow Depth = 1.43" for 2-year event
Inflow = 8.29 cfs @ 12.15 hrs, Volume= 0.758 af
Outflow = 8.28 cfs @ 12.15 hrs, Volume= 0.758 af, Atten= 0%, Lag= 0.5 min
Primary = 8.28 cfs @ 12.15 hrs, Volume= 0.758 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 158.00' Surf.Area= 735 sf Storage= 1,551 cf
Peak Elev= 158.43' @ 12.15 hrs Surf.Area= 829 sf Storage= 1,888 cf (338 cf above start)
Flood Elev= 160.00' Surf.Area= 1,137 sf Storage= 3,445 cf (1,894 cf above start)

Plug-Flow detention time= 37.5 min calculated for 0.723 af (95% of inflow)
Center-of-Mass det. time= 1.4 min (847.5 - 846.0)

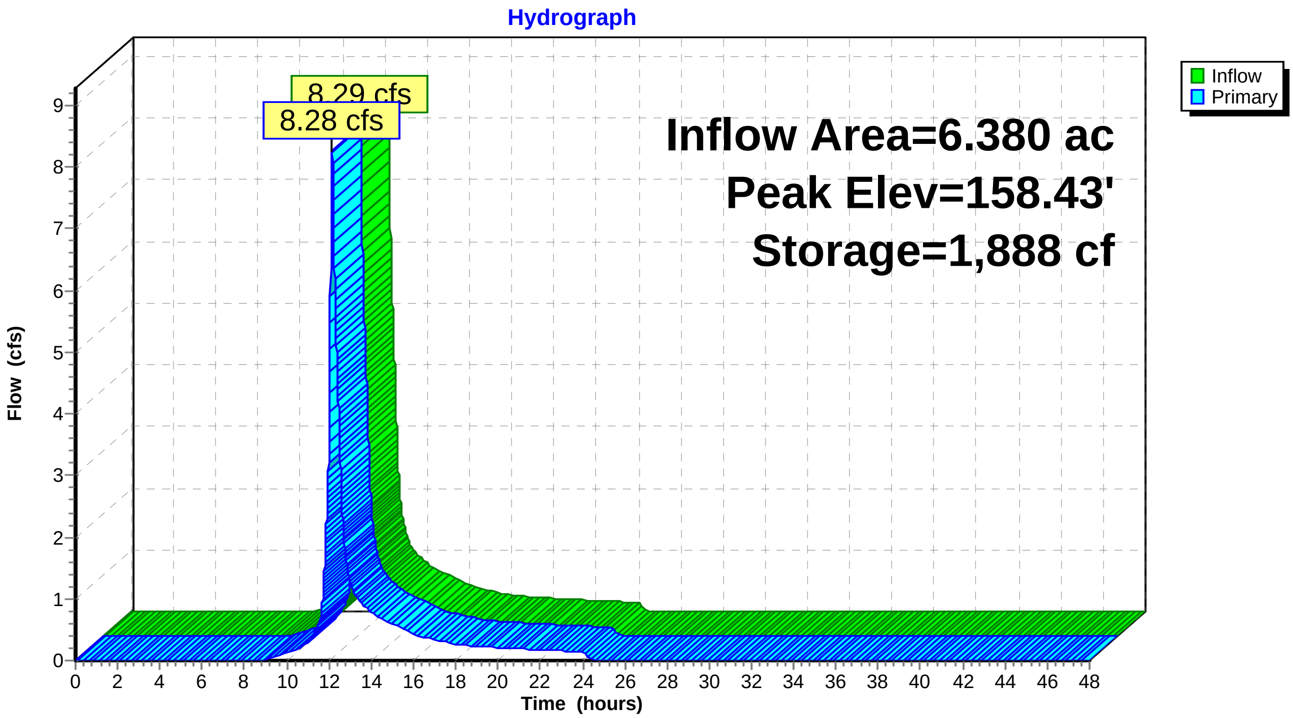
Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	3,445 cf	**forebay (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
154.00	113	50.1	0	0	113
156.00	374	77.5	462	462	419
158.00	735	103.4	1,089	1,551	834
159.00	962	116.9	846	2,397	1,095
160.00	1,137	100.3	1,048	3,445	1,401

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**153.0 deg x 8.0' long x 1.50' rise Trap Weir** C= 2.47

Primary OutFlow Max=8.27 cfs @ 12.15 hrs HW=158.43' TW=156.68' (Dynamic Tailwater)
└─**1=Trap Weir** (Weir Controls 8.27 cfs @ 1.95 fps)

Pond FB-2: Forebay



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1A: Post-Dev Offsite Runoff Area=82.599 ac 5.77% Impervious Runoff Depth=2.28"
Flow Length=3,950' Tc=147.5 min CN=73 Runoff=46.85 cfs 15.697 af

Subcatchment DA-1B: Post-Dev Runoff Area=4.500 ac 55.56% Impervious Runoff Depth=3.08"
Flow Length=759' Tc=10.2 min CN=82 Runoff=14.08 cfs 1.155 af

Subcatchment DA-1C: Post-Dev Runoff Area=1.880 ac 1.60% Impervious Runoff Depth=1.37"
Flow Length=293' Tc=25.0 min CN=61 Runoff=1.68 cfs 0.214 af

Subcatchment DA-1D: Post-Dev Runoff Area=0.440 ac 100.00% Impervious Runoff Depth=4.76"
Tc=6.0 min CN=98 Runoff=2.15 cfs 0.175 af

Subcatchment DA-1E: Post-Dev Runoff Area=0.920 ac 86.96% Impervious Runoff Depth=4.20"
Flow Length=534' Tc=6.0 min CN=93 Runoff=4.26 cfs 0.322 af

Subcatchment DA-1F: Post-Dev Runoff Area=1.870 ac 35.83% Impervious Runoff Depth=2.62"
Flow Length=133' Tc=8.3 min CN=77 Runoff=5.31 cfs 0.409 af

Reach 1R: open portion of box culvert Avg. Depth=0.79' Max Vel=7.78 fps Inflow=42.79 cfs 17.573 af
n=0.017 L=3.5' S=0.0143 '/' Capacity=443.50 cfs Outflow=42.79 cfs 17.572 af

Reach 2R: bridge portion over box culvert Avg. Depth=0.69' Max Vel=8.80 fps Inflow=42.79 cfs 17.572 af
n=0.017 L=14.3' S=0.0210 '/' Capacity=421.44 cfs Outflow=42.79 cfs 17.572 af

Pond 1P: Exst Pond Peak Elev=154.28' Storage=61,440 cf Inflow=49.22 cfs 17.938 af
Primary=42.79 cfs 17.573 af Secondary=6.05 cfs 0.351 af Outflow=48.84 cfs 17.923 af

Pond 2P: stream to 60" twin culverts Peak Elev=152.33' Storage=2,505 cf Inflow=48.84 cfs 17.923 af
Outflow=48.84 cfs 17.922 af

Pond A: Pocket Pond (P-5) Peak Elev=157.81' Storage=52,902 cf Inflow=20.37 cfs 1.866 af
Primary=10.11 cfs 1.832 af Secondary=0.00 cfs 0.000 af Outflow=10.11 cfs 1.832 af

Pond FB-1: Forebay Peak Elev=158.31' Storage=2,186 cf Inflow=6.41 cfs 0.496 af
Outflow=6.36 cfs 0.496 af

Pond FB-2: Forebay Peak Elev=158.61' Storage=2,041 cf Inflow=14.86 cfs 1.369 af
Outflow=14.84 cfs 1.369 af

Total Runoff Area = 92.209 ac Runoff Volume = 17.971 af Average Runoff Depth = 2.34"
90.01% Pervious = 83.001 ac 9.99% Impervious = 9.208 ac

Summary for Subcatchment DA-1A: Post-Dev Offsite

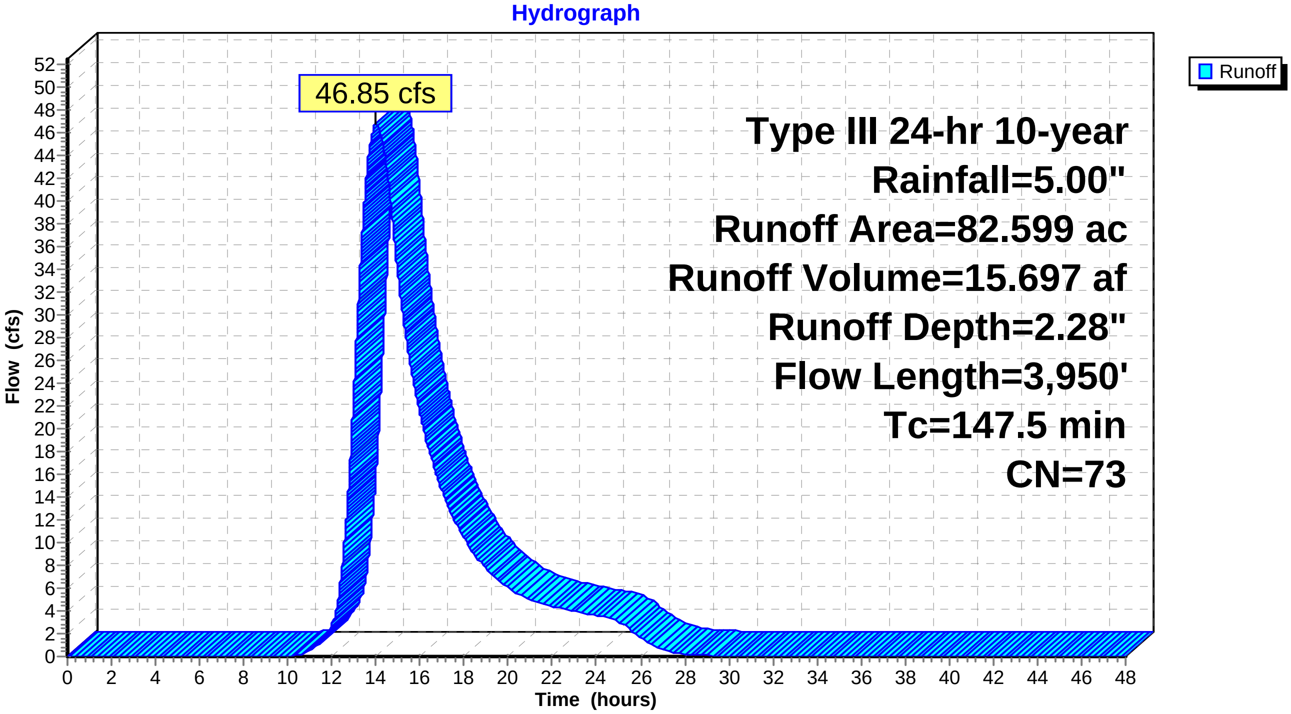
Runoff = 46.85 cfs @ 13.93 hrs, Volume= 15.697 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.00"

Area (ac)	CN	Description
8.287	73	Woods, Fair, HSG C
5.037	76	Woods/grass comb., Fair, HSG C
21.037	60	Woods, Fair, HSG B
32.137	79	Woods, Fair, HSG D
0.187	98	Unconnected pavement, HSG C
6.037	80	1/2 acre lots, 25% imp, HSG C
0.337	98	Unconnected pavement, HSG B
6.037	70	1/2 acre lots, 25% imp, HSG B
0.467	98	Unconnected pavement, HSG D
3.036	85	1/2 acre lots, 25% imp, HSG D
82.599	73	Weighted Average
77.831		94.23% Pervious Area
4.768		5.77% Impervious Area
0.991		20.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
6.2	320	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
97.4	1,600	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.3	1,930	0.0050	1.06		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
147.5	3,950	Total			

Subcatchment DA-1A: Post-Dev Offsite



Summary for Subcatchment DA-1B: Post-Dev

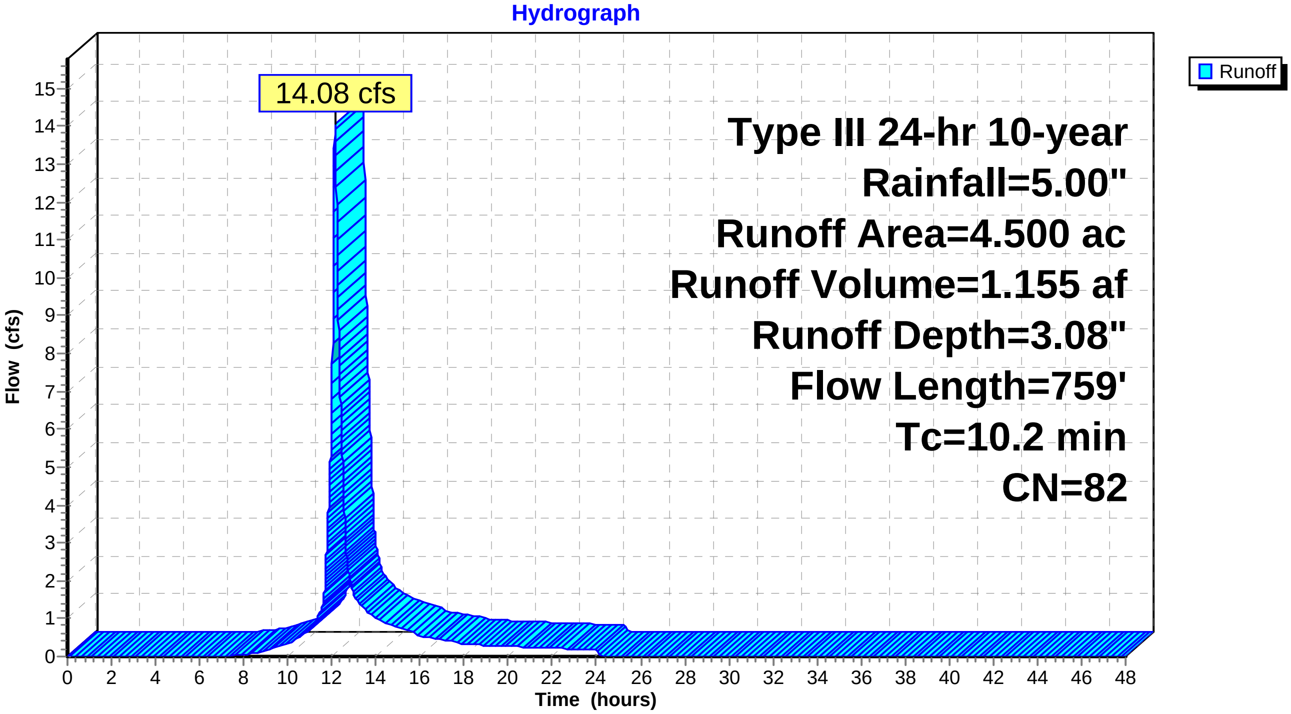
Runoff = 14.08 cfs @ 12.14 hrs, Volume= 1.155 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.00"

Area (ac)	CN	Description
2.000	61	>75% Grass cover, Good, HSG B
0.300	98	Roofs, HSG B
2.200	98	Paved parking, HSG B
4.500	82	Weighted Average
2.000		44.44% Pervious Area
2.500		55.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.1200	0.25		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
1.9	125	0.0240	1.08		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	33	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	501	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
10.2	759	Total			

Subcatchment DA-1B: Post-Dev



Summary for Subcatchment DA-1C: Post-Dev

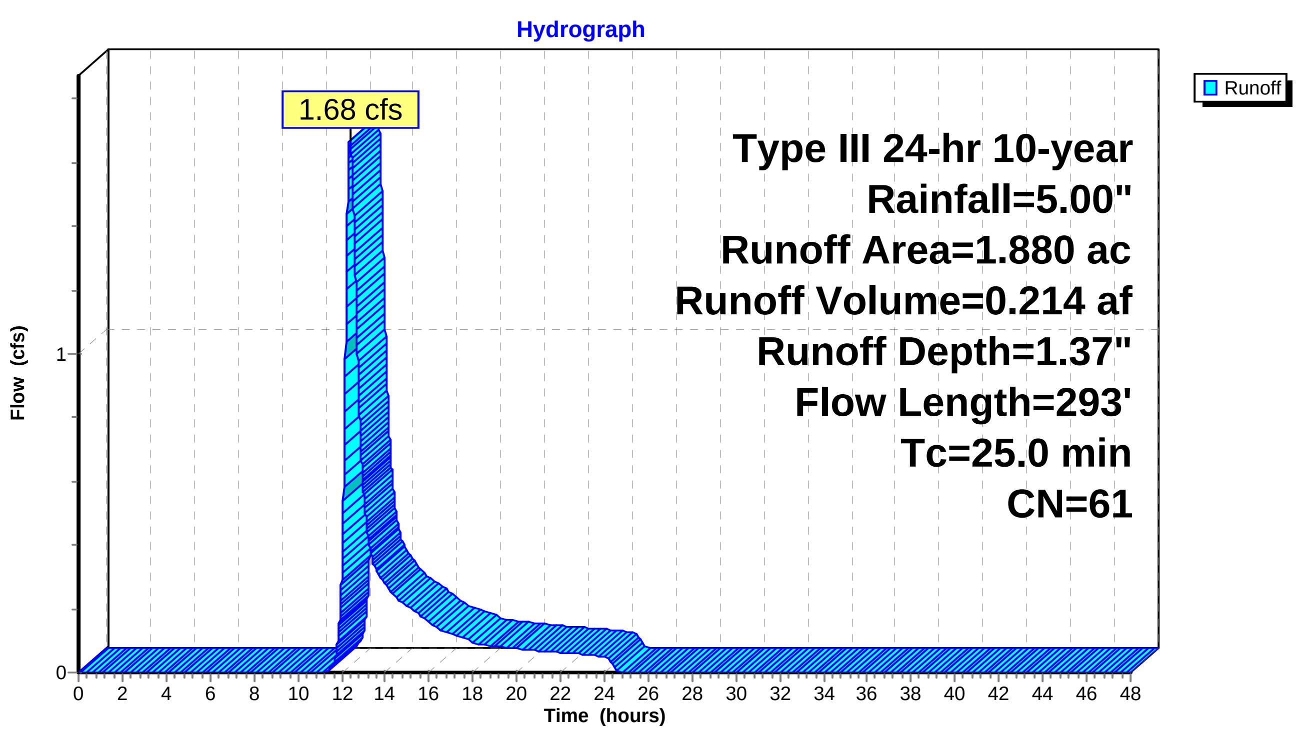
Runoff = 1.68 cfs @ 12.39 hrs, Volume= 0.214 af, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.00"

Area (ac)	CN	Description
0.400	60	Woods, Fair, HSG B
0.030	98	Unconnected pavement, HSG B
1.450	61	>75% Grass cover, Good, HSG B
1.880	61	Weighted Average
1.850		98.40% Pervious Area
0.030		1.60% Impervious Area
0.030		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	193	0.0104	0.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.0	293	Total			

Subcatchment DA-1C: Post-Dev



Summary for Subcatchment DA-1D: Post-Dev

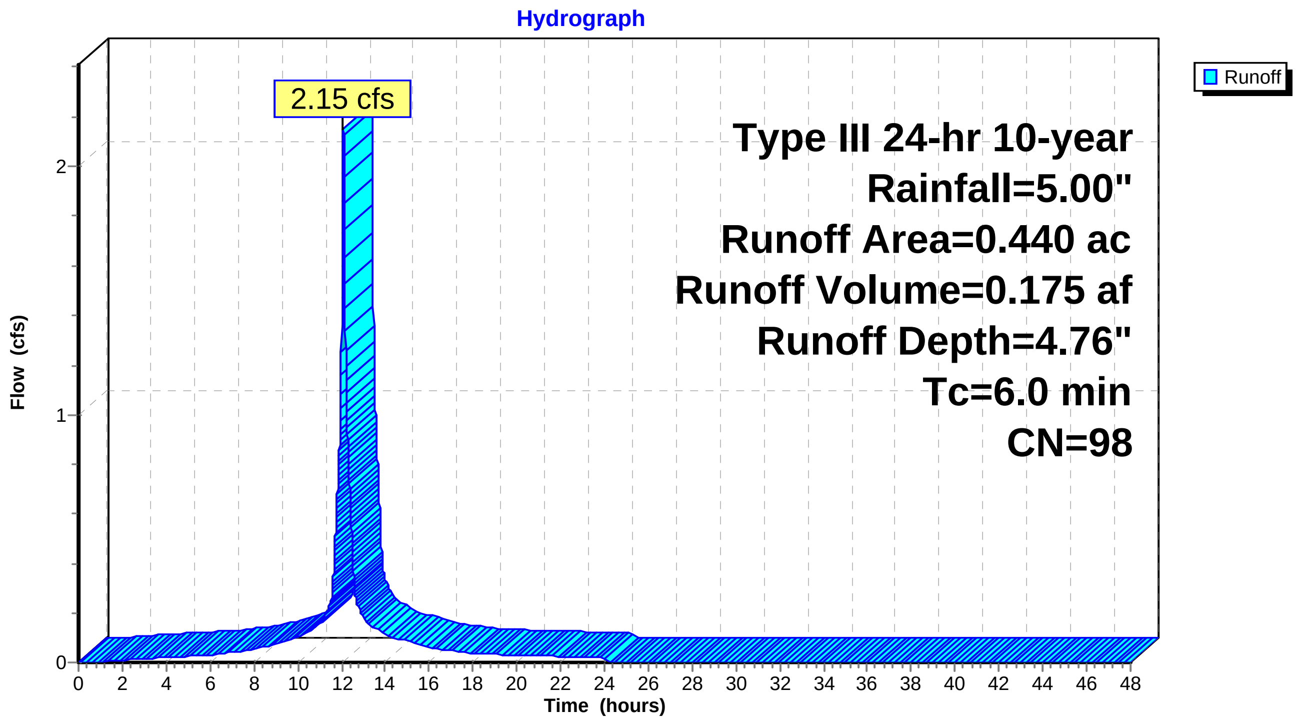
Runoff = 2.15 cfs @ 12.08 hrs, Volume= 0.175 af, Depth= 4.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.00"

Area (ac)	CN	Description
0.440	98	Roofs, HSG B
0.440		100.00% Impervious Area

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

Subcatchment DA-1D: Post-Dev



Summary for Subcatchment DA-1E: Post-Dev

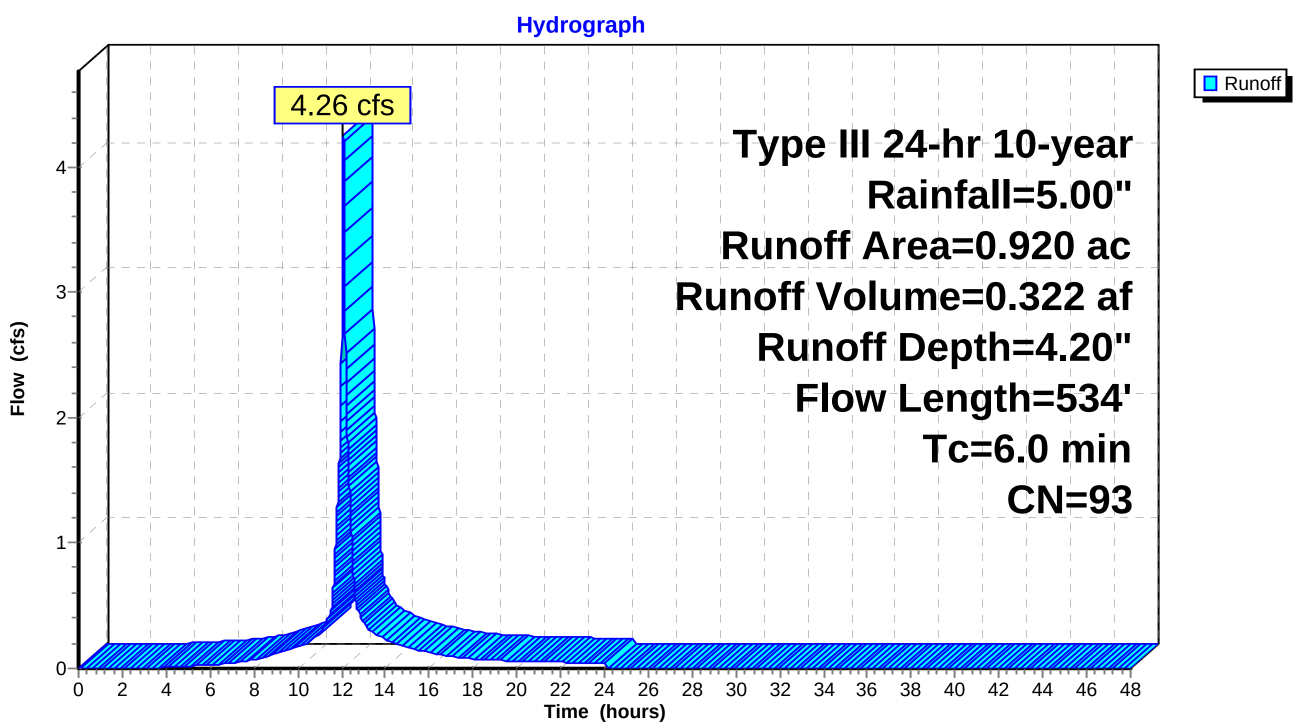
Runoff = 4.26 cfs @ 12.08 hrs, Volume= 0.322 af, Depth= 4.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.00"

Area (ac)	CN	Description
0.120	61	>75% Grass cover, Good, HSG B
0.800	98	Paved parking, HSG B
0.920	93	Weighted Average
0.120		13.04% Pervious Area
0.800		86.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0125	1.19		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
0.4	59	0.0125	2.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.1	375	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
2.9	534	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-1E: Post-Dev



Summary for Subcatchment DA-1F: Post-Dev

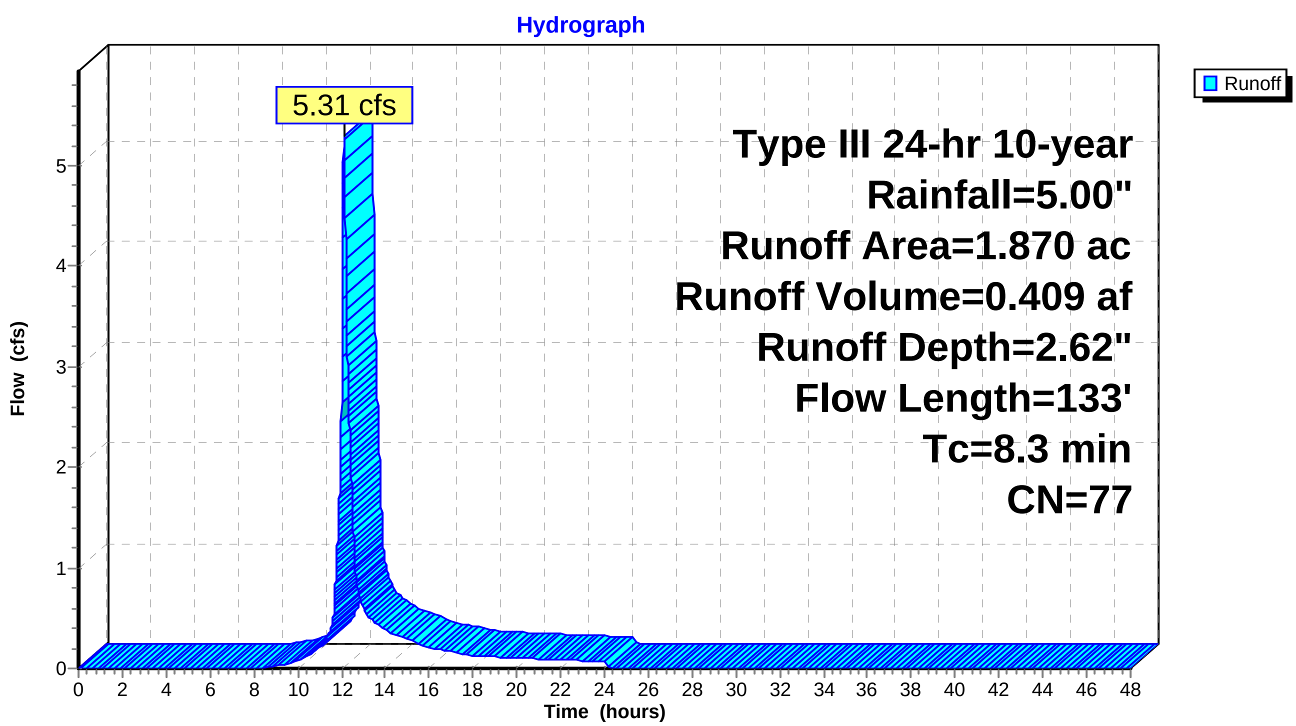
Runoff = 5.31 cfs @ 12.12 hrs, Volume= 0.409 af, Depth= 2.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.00"

Area (ac)	CN	Description
0.750	61	>75% Grass cover, Good, HSG B
0.170	98	Paved parking, HSG C
0.450	74	>75% Grass cover, Good, HSG C
0.500	98	Water Surface, HSG C
1.870	77	Weighted Average
1.200		64.17% Pervious Area
0.670		35.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.3	33	0.0910	2.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	133	Total			

Subcatchment DA-1F: Post-Dev



Summary for Reach 1R: open portion of box culvert

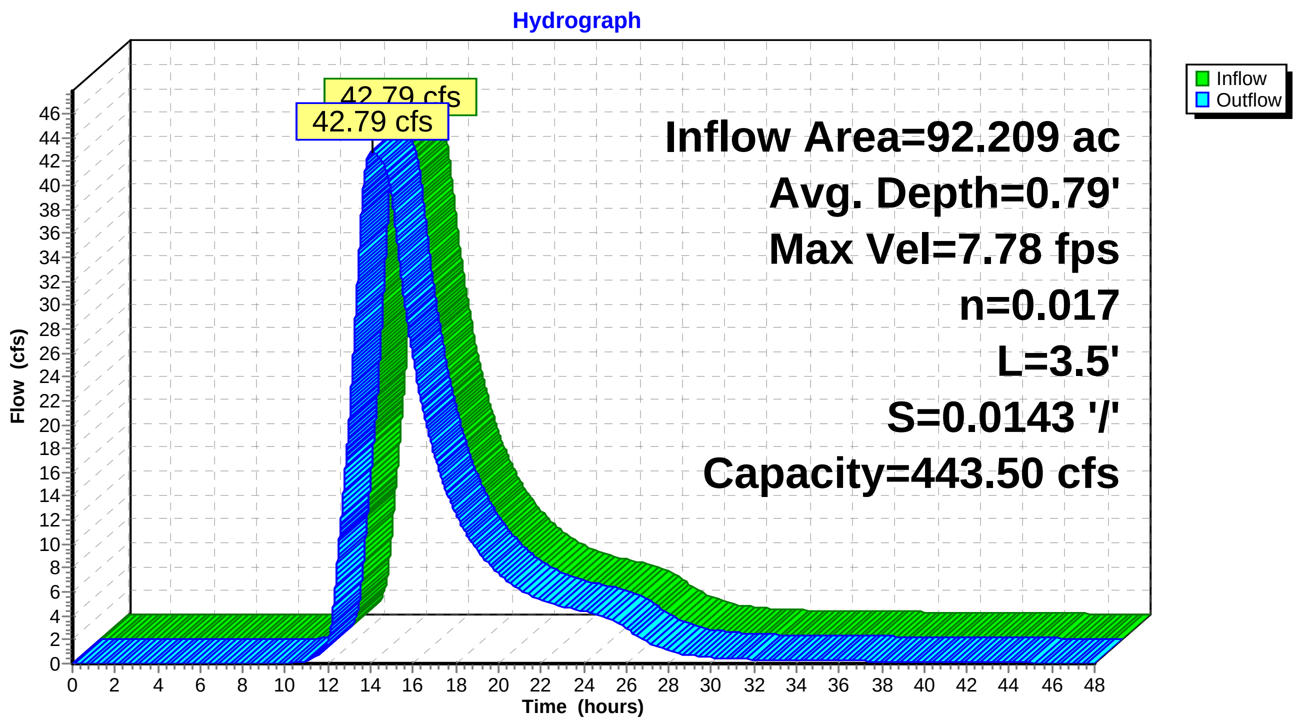
Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 2.29" for 10-year event
Inflow = 42.79 cfs @ 14.07 hrs, Volume= 17.573 af
Outflow = 42.79 cfs @ 14.07 hrs, Volume= 17.572 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.78 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.51 fps, Avg. Travel Time= 0.0 min

Peak Storage= 19 cf @ 14.07 hrs, Average Depth at Peak Storage= 0.79'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 443.50 cfs

7.00' x 4.00' deep channel, n= 0.017 Concrete, unfinished
Length= 3.5' Slope= 0.0143 '/'
Inlet Invert= 150.05', Outlet Invert= 150.00'

Reach 1R: open portion of box culvert



Summary for Reach 2R: bridge portion over box culvert

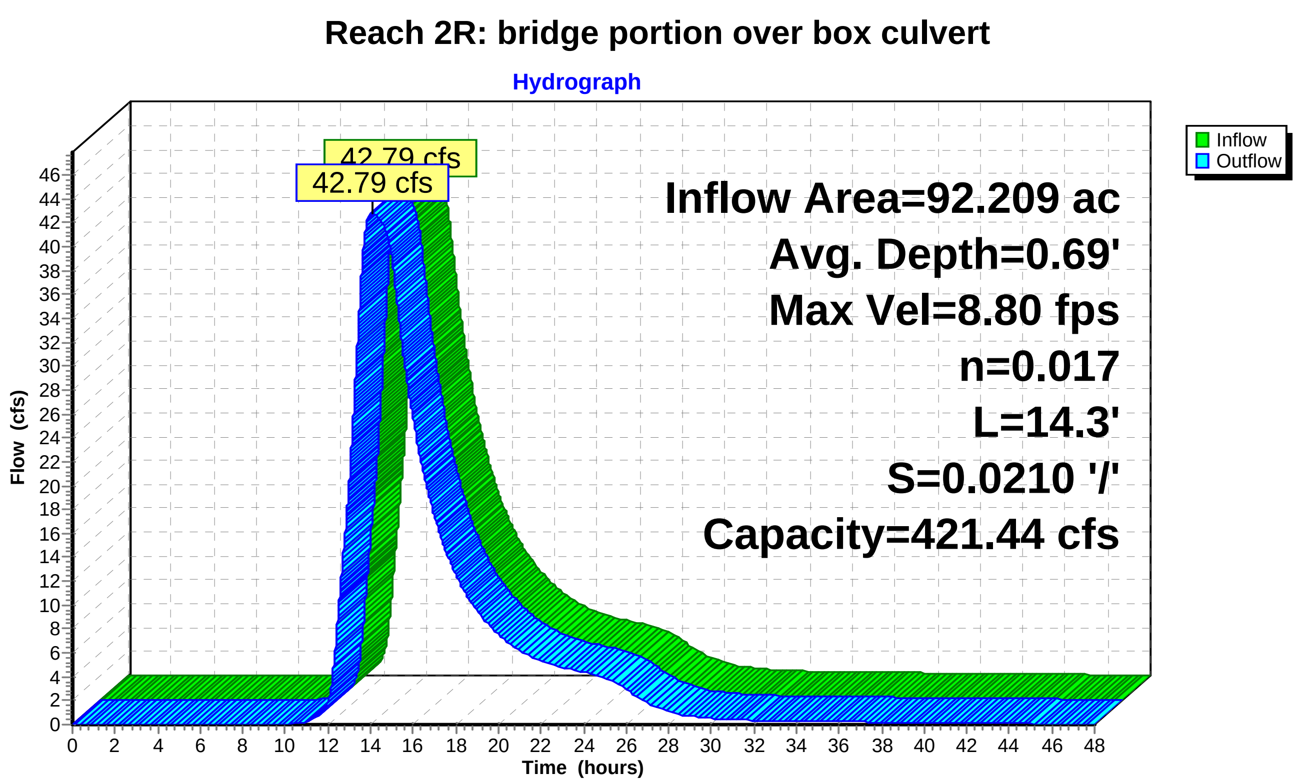
box culvert - opening 7'Wx4'Hx12'L
adjusted height to account for wooden beams underneath the bridge.

Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 2.29" for 10-year event
Inflow = 42.79 cfs @ 14.07 hrs, Volume= 17.572 af
Outflow = 42.79 cfs @ 14.07 hrs, Volume= 17.572 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.80 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.80 fps, Avg. Travel Time= 0.1 min

Peak Storage= 70 cf @ 14.07 hrs, Average Depth at Peak Storage= 0.69'
Bank-Full Depth= 3.33', Capacity at Bank-Full= 421.44 cfs

7.00' x 3.33' deep channel, n= 0.017 Concrete, unfinished
Length= 14.3' Slope= 0.0210 '/'
Inlet Invert= 150.00', Outlet Invert= 149.70'



Summary for Pond 1P: Exst Pond

There are two different crest bredth lengths, so shorter length was taken.

Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 2.33" for 10-year event
Inflow = 49.22 cfs @ 13.93 hrs, Volume= 17.938 af
Outflow = 48.84 cfs @ 14.07 hrs, Volume= 17.923 af, Atten= 1%, Lag= 8.1 min
Primary = 42.79 cfs @ 14.07 hrs, Volume= 17.573 af
Secondary = 6.05 cfs @ 14.07 hrs, Volume= 0.351 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 154.28' @ 14.07 hrs Surf.Area= 35,219 sf Storage= 61,440 cf
Flood Elev= 156.00' Surf.Area= 48,106 sf Storage= 132,693 cf

Plug-Flow detention time= 34.3 min calculated for 17.923 af (100% of inflow)
Center-of-Mass det. time= 32.9 min (1,017.7 - 984.8)

Volume	Invert	Avail.Storage	Storage Description
#1	152.10'	132,693 cf	**existing pond (Irregular)** Listed below (Recalc)

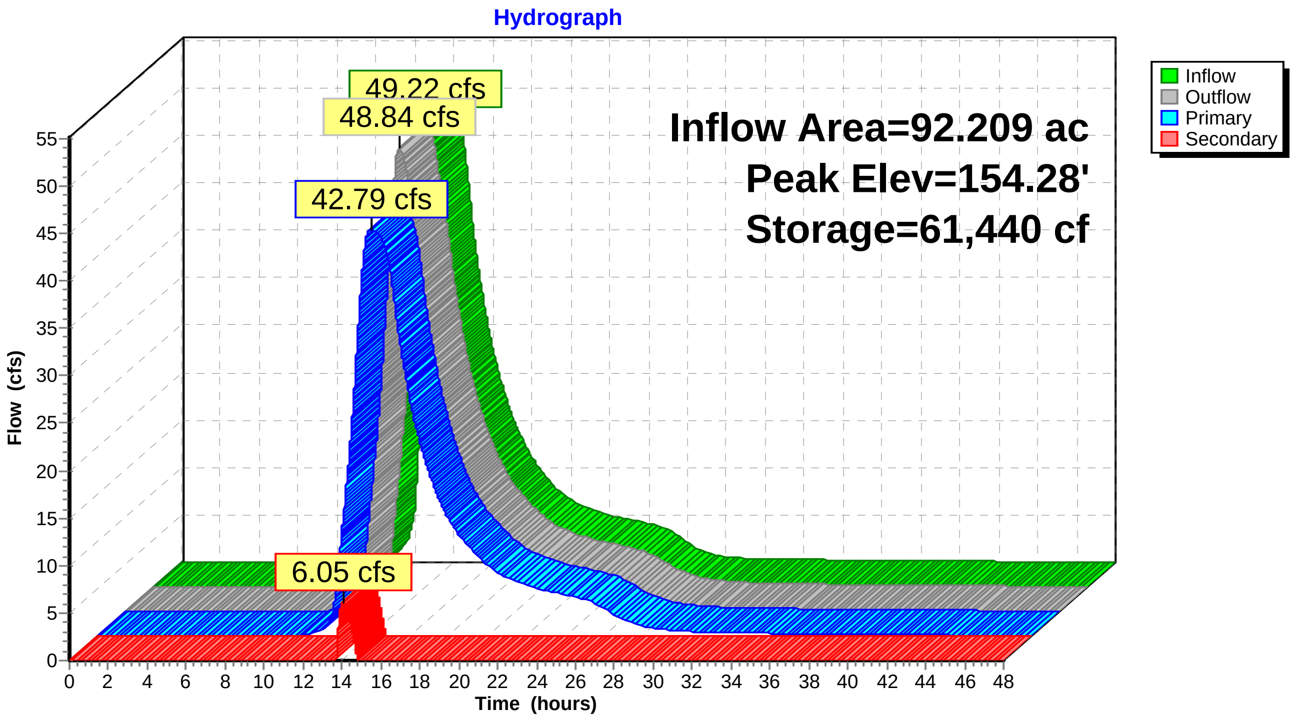
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
152.10	21,607	727.8	0	0	21,607
154.00	33,288	897.6	51,752	51,752	43,624
156.00	48,106	962.7	80,941	132,693	53,439

Device	Routing	Invert	Outlet Devices
#1	Primary	152.10'	**compound weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 1.00 1.00 2.00 2.00 Width (feet) 3.00 3.00 0.00 6.00 6.00 0.00
#2	Secondary	154.20'	**96.0' long x 14.0' breadth bridge (overflow weir)** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=42.79 cfs @ 14.07 hrs HW=154.28' TW=150.84' (Dynamic Tailwater)
└─**1=compound weir** (Orifice Controls 42.79 cfs @ 4.75 fps)

Secondary OutFlow Max=6.05 cfs @ 14.07 hrs HW=154.28' TW=152.33' (Dynamic Tailwater)
└─**2=bridge (overflow weir)** (Weir Controls 6.05 cfs @ 0.76 fps)

Pond 1P: Exst Pond



Summary for Pond 2P: stream to 60" twin culverts (DP-1)

Water will sit in stream channel until it reaches a minimum elevation of 150.72, since that is the lowest elevation of one of the 60" culverts. Therefore, this elevation was used as the starting elevation for the modeling of the stream and 60" twin culverts.

Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 2.33" for 10-year event
Inflow = 48.84 cfs @ 14.07 hrs, Volume= 17.923 af
Outflow = 48.84 cfs @ 14.08 hrs, Volume= 17.922 af, Atten= 0%, Lag= 0.5 min
Primary = 48.84 cfs @ 14.08 hrs, Volume= 17.922 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 150.72' Surf.Area= 852 sf Storage= 735 cf
Peak Elev= 152.33' @ 14.08 hrs Surf.Area= 1,462 sf Storage= 2,505 cf (1,770 cf above start)

Plug-Flow detention time= 3.1 min calculated for 17.901 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (1,018.7 - 1,017.8)

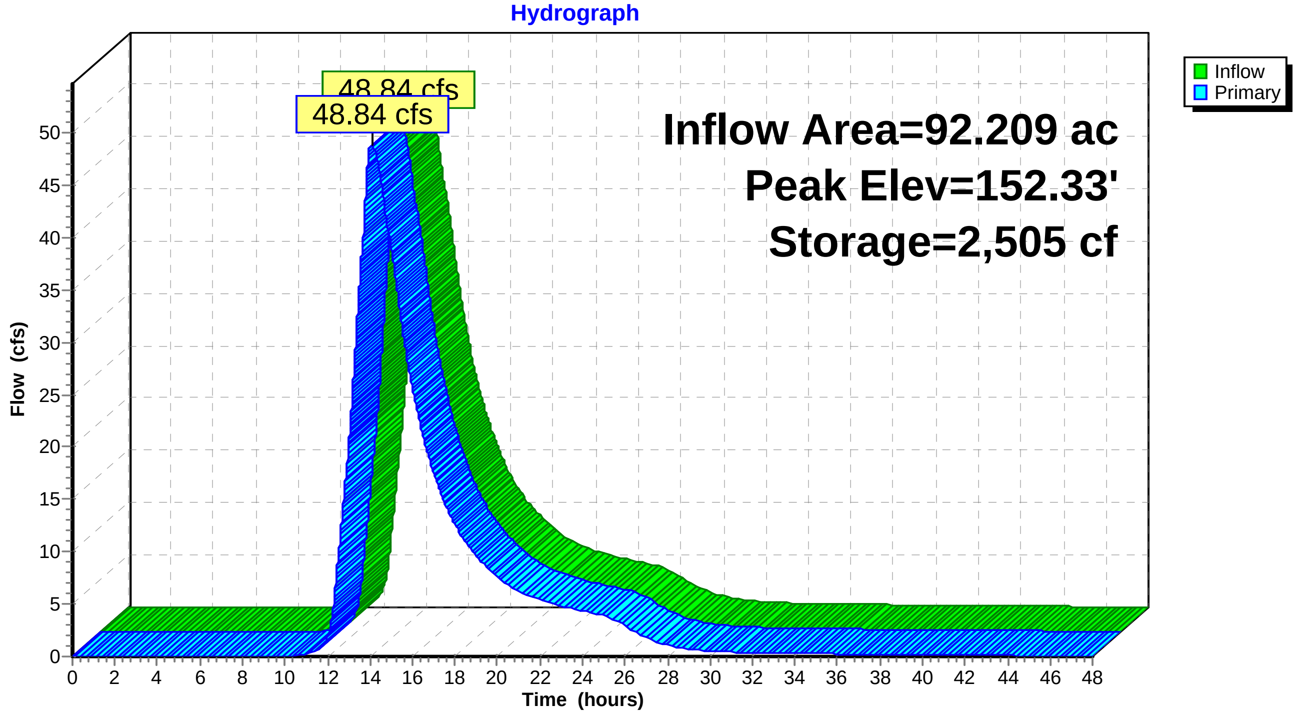
Volume	Invert	Avail.Storage	Storage Description
#1	149.70'	6,090 cf	**existing stream (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
149.70	596	131.8	0	0	596
152.00	1,239	152.2	2,066	2,066	1,161
154.00	2,902	266.7	4,025	6,090	5,001

Device	Routing	Invert	Outlet Devices
#1	Primary	150.72'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.10' S= 0.0063 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#2	Primary	150.77'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.40' S= 0.0038 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=48.84 cfs @ 14.08 hrs HW=152.33' (Free Discharge)
├─**1=Culvert** (Barrel Controls 26.82 cfs @ 6.21 fps)
└─**2=Culvert** (Barrel Controls 22.01 cfs @ 5.32 fps)

Pond 2P: stream to 60" twin culverts (DP-1)



Summary for Pond A: Pocket Pond (P-5)

Grate: Campbell Foundry Model # 3433.
Existing rip-rap for weir is 10 foot wide and will remain.

Inflow Area = 7.740 ac, 48.71% Impervious, Inflow Depth = 2.89" for 10-year event
Inflow = 20.37 cfs @ 12.13 hrs, Volume= 1.866 af
Outflow = 10.11 cfs @ 12.41 hrs, Volume= 1.832 af, Atten= 50%, Lag= 16.7 min
Primary = 10.11 cfs @ 12.41 hrs, Volume= 1.832 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 155.75' Surf.Area= 13,223 sf Storage= 22,302 cf
Peak Elev= 157.81' @ 12.41 hrs Surf.Area= 16,373 sf Storage= 52,902 cf (30,601 cf above start)
Flood Elev= 160.00' Surf.Area= 20,823 sf Storage= 93,104 cf (70,803 cf above start)

Plug-Flow detention time= 573.4 min calculated for 1.320 af (71% of inflow)
Center-of-Mass det. time= 322.2 min (1,137.9 - 815.7)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	93,104 cf	**pocket pond (Irregular)**Listed below

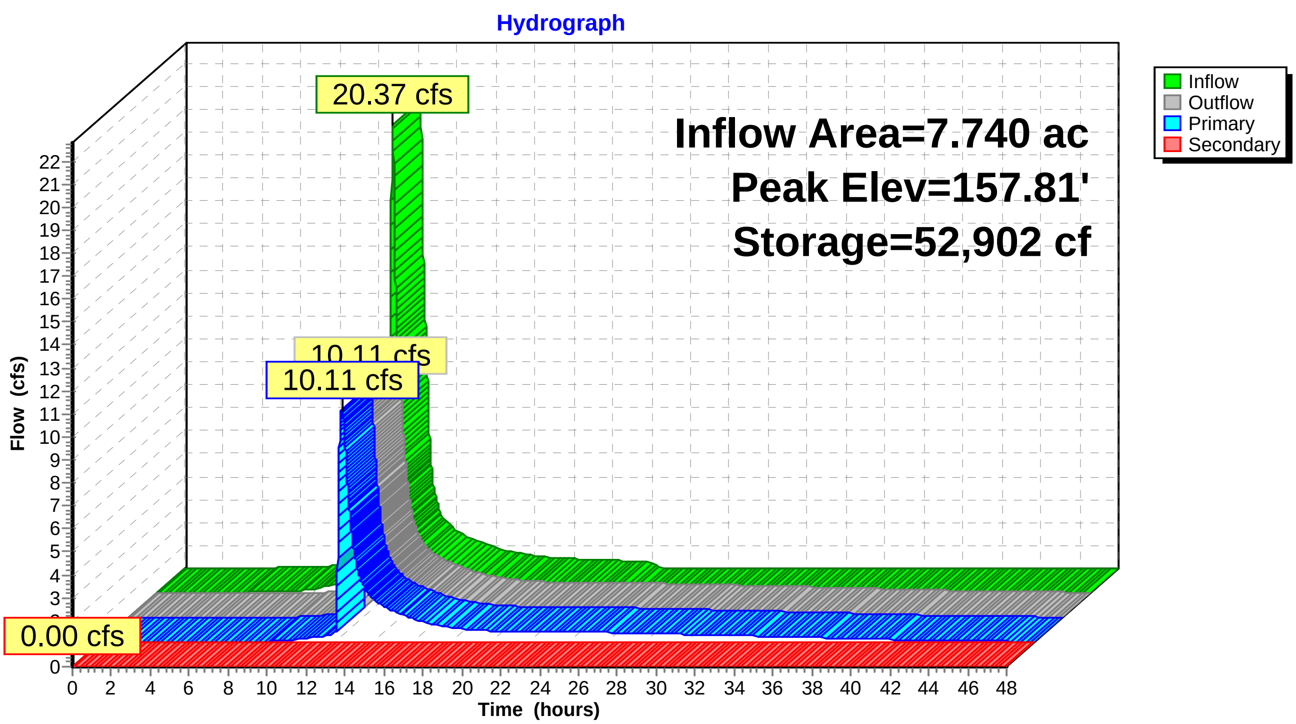
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
151.00	71	155.0	0	0	71
152.00	1,449	208.7	614	614	1,636
154.00	3,771	398.6	5,038	5,652	10,833
154.36	4,394	413.9	1,468	7,120	11,833
154.86	11,762	609.2	3,891	11,011	27,736
156.00	13,633	583.6	14,462	25,473	30,259
158.00	16,653	616.5	30,236	55,709	33,622
159.00	18,677	647.0	17,655	73,364	36,753
160.00	20,823	673.7	19,740	93,104	39,636

Device	Routing	Invert	Outlet Devices
#1	Primary	154.09'	**24.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 153.40' S= 0.0168 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	155.75'	**4.0" Vert. Orifice** C= 0.600
#3	Device 1	157.25'	**24.0" W x 9.0" H Vert. Slots (side) X 2.00** C= 0.600
#4	Device 1	157.25'	**36.0" W x 9.0" H Vert. Slot (front)** C= 0.600
#5	Device 1	158.50'	**36.0" x 55.5" Horiz. Grate X 4.00 columns** X 8 rows C= 0.600 in 1.3" x 6.5" Grate Limited to weir flow at low heads
#6	Secondary	159.00'	**153.0 deg x 10.0' long x 1.00' rise Trap Weir** C= 2.47

Primary OutFlow Max=10.10 cfs @ 12.41 hrs HW=157.81' TW=152.96' (Dynamic Tailwater)
└─**1=Culvert** (Passes 10.10 cfs of 24.97 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.58 cfs @ 6.63 fps)
  ├─**3=Slots (side)** (Orifice Controls 5.44 cfs @ 2.41 fps)
  ├─**4=Slot (front)** (Orifice Controls 4.08 cfs @ 2.41 fps)
  └─**5=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=155.75' TW=152.10' (Dynamic Tailwater)
└─**6=Trap Weir** (Controls 0.00 cfs)

Pond A: Pocket Pond (P-5)



Summary for Pond FB-1: Forebay

Inflow Area = 1.360 ac, 91.18% Impervious, Inflow Depth = 4.38" for 10-year event
Inflow = 6.41 cfs @ 12.08 hrs, Volume= 0.496 af
Outflow = 6.36 cfs @ 12.09 hrs, Volume= 0.496 af, Atten= 1%, Lag= 0.6 min
Primary = 6.36 cfs @ 12.09 hrs, Volume= 0.496 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 158.00' Surf.Area= 1,052 sf Storage= 1,843 cf
Peak Elev= 158.31' @ 12.09 hrs Surf.Area= 1,171 sf Storage= 2,186 cf (343 cf above start)
Flood Elev= 160.00' Surf.Area= 1,772 sf Storage= 4,707 cf (2,864 cf above start)

Plug-Flow detention time= 77.4 min calculated for 0.454 af (91% of inflow)
Center-of-Mass det. time= 2.1 min (769.7 - 767.6)

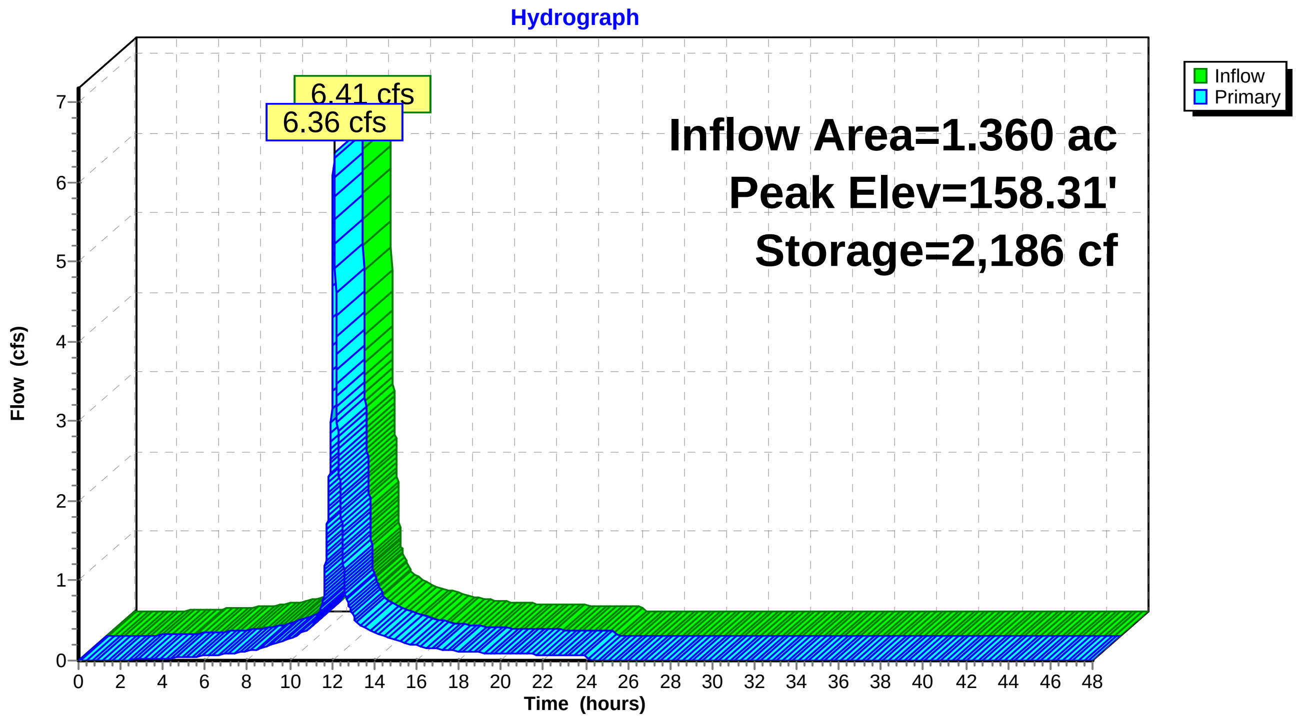
Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	4,707 cf	**Forebay (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
154.00	48	34.2	0	0	48
156.00	426	86.7	411	411	567
158.00	1,052	124.1	1,432	1,843	1,229
159.00	1,460	143.2	1,250	3,093	1,657
160.00	1,772	163.3	1,613	4,707	2,171

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**153.0 deg x 11.0' long x 1.50' rise Trap Weir** C= 2.47

Primary OutFlow Max=6.35 cfs @ 12.09 hrs HW=158.31' TW=157.14' (Dynamic Tailwater)
└─**1=Trap Weir** (Weir Controls 6.35 cfs @ 1.68 fps)

Pond FB-1: Forebay



Summary for Pond FB-2: Forebay

Inflow Area = 6.380 ac, 39.66% Impervious, Inflow Depth = 2.58" for 10-year event
Inflow = 14.86 cfs @ 12.14 hrs, Volume= 1.369 af
Outflow = 14.84 cfs @ 12.15 hrs, Volume= 1.369 af, Atten= 0%, Lag= 0.4 min
Primary = 14.84 cfs @ 12.15 hrs, Volume= 1.369 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 158.00' Surf.Area= 735 sf Storage= 1,551 cf
Peak Elev= 158.61' @ 12.15 hrs Surf.Area= 870 sf Storage= 2,041 cf (491 cf above start)
Flood Elev= 160.00' Surf.Area= 1,137 sf Storage= 3,445 cf (1,894 cf above start)

Plug-Flow detention time= 23.6 min calculated for 1.333 af (97% of inflow)
Center-of-Mass det. time= 1.2 min (832.3 - 831.1)

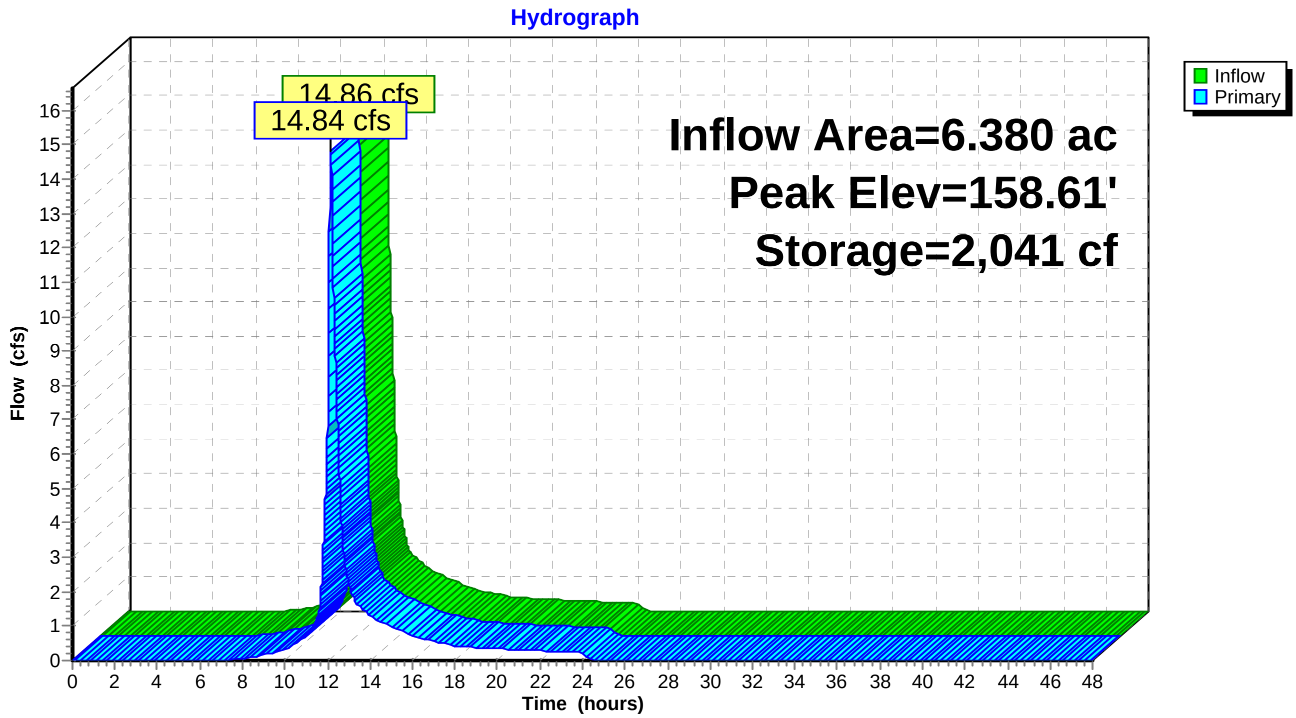
Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	3,445 cf	**forebay (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
154.00	113	50.1	0	0	113
156.00	374	77.5	462	462	419
158.00	735	103.4	1,089	1,551	834
159.00	962	116.9	846	2,397	1,095
160.00	1,137	100.3	1,048	3,445	1,401

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**153.0 deg x 8.0' long x 1.50' rise Trap Weir** C= 2.47

Primary OutFlow Max=14.83 cfs @ 12.15 hrs HW=158.61' TW=157.41' (Dynamic Tailwater)
└─**1=Trap Weir** (Weir Controls 14.83 cfs @ 2.30 fps)

Pond FB-2: Forebay



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1A: Post-Dev Offsite Runoff Area=82.599 ac 5.77% Impervious Runoff Depth=3.09"
Flow Length=3,950' Tc=147.5 min CN=73 Runoff=64.33 cfs 21.260 af

Subcatchment DA-1B: Post-Dev Runoff Area=4.500 ac 55.56% Impervious Runoff Depth=3.99"
Flow Length=759' Tc=10.2 min CN=82 Runoff=18.14 cfs 1.495 af

Subcatchment DA-1C: Post-Dev Runoff Area=1.880 ac 1.60% Impervious Runoff Depth=2.01"
Flow Length=293' Tc=25.0 min CN=61 Runoff=2.57 cfs 0.314 af

Subcatchment DA-1D: Post-Dev Runoff Area=0.440 ac 100.00% Impervious Runoff Depth=5.76"
Tc=6.0 min CN=98 Runoff=2.59 cfs 0.211 af

Subcatchment DA-1E: Post-Dev Runoff Area=0.920 ac 86.96% Impervious Runoff Depth=5.18"
Flow Length=534' Tc=6.0 min CN=93 Runoff=5.19 cfs 0.397 af

Subcatchment DA-1F: Post-Dev Runoff Area=1.870 ac 35.83% Impervious Runoff Depth=3.48"
Flow Length=133' Tc=8.3 min CN=77 Runoff=7.04 cfs 0.542 af

Reach 1R: open portion of box culvert Avg. Depth=0.82' Max Vel=7.94 fps Inflow=45.45 cfs 21.880 af
n=0.017 L=3.5' S=0.0143 '/' Capacity=443.50 cfs Outflow=45.45 cfs 21.880 af

Reach 2R: bridge portion over box culvert Avg. Depth=0.72' Max Vel=8.99 fps Inflow=45.45 cfs 21.880 af
n=0.017 L=14.3' S=0.0210 '/' Capacity=421.44 cfs Outflow=45.45 cfs 21.880 af

Pond 1P: Exst Pond Peak Elev=154.39' Storage=65,378 cf Inflow=67.29 cfs 24.184 af
Primary=45.45 cfs 21.880 af Secondary=21.57 cfs 2.289 af Outflow=67.02 cfs 24.169 af

Pond 2P: stream to 60" twin culverts Peak Elev=152.64' Storage=3,004 cf Inflow=67.02 cfs 24.169 af
Outflow=67.02 cfs 24.167 af

Pond A: Pocket Pond (P-5) Peak Elev=158.05' Storage=56,542 cf Inflow=26.14 cfs 2.418 af
Primary=16.38 cfs 2.382 af Secondary=0.00 cfs 0.000 af Outflow=16.38 cfs 2.382 af

Pond FB-1: Forebay Peak Elev=158.35' Storage=2,233 cf Inflow=7.78 cfs 0.609 af
Outflow=7.73 cfs 0.609 af

Pond FB-2: Forebay Peak Elev=158.72' Storage=2,133 cf Inflow=19.47 cfs 1.809 af
Outflow=19.44 cfs 1.809 af

Total Runoff Area = 92.209 ac Runoff Volume = 24.220 af Average Runoff Depth = 3.15"
90.01% Pervious = 83.001 ac 9.99% Impervious = 9.208 ac

Summary for Subcatchment DA-1A: Post-Dev Offsite

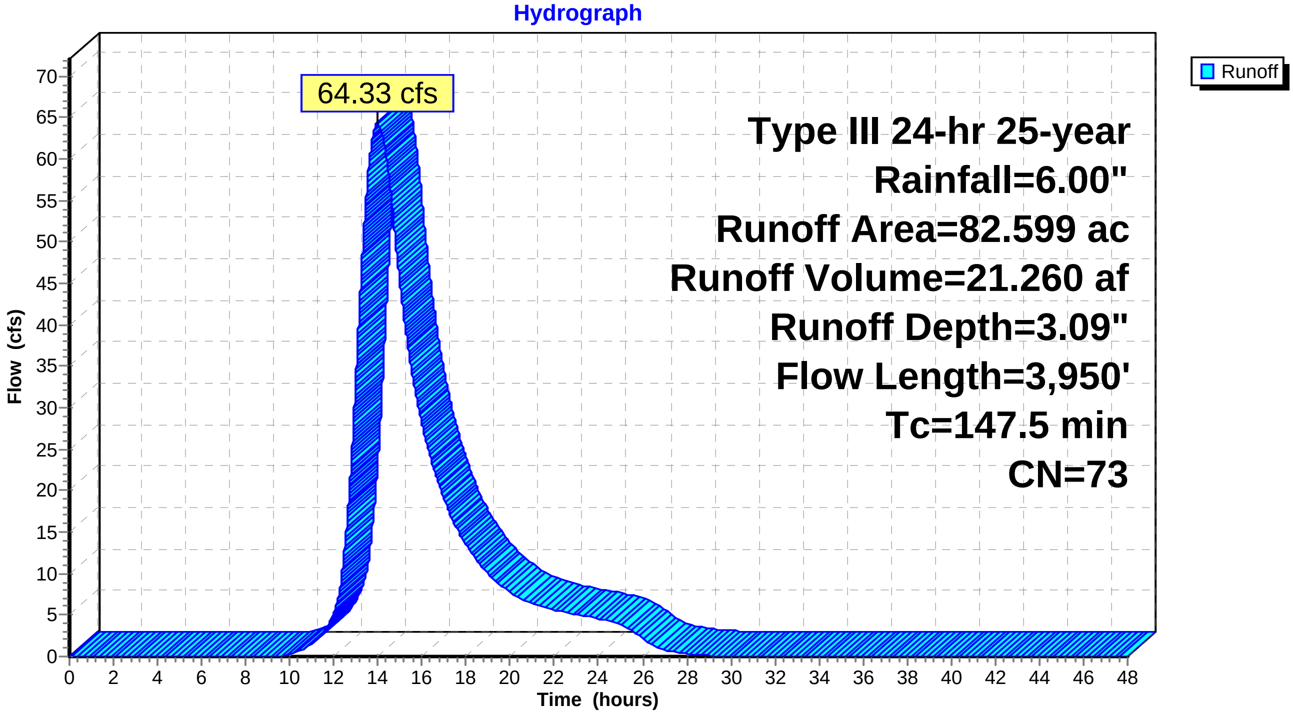
Runoff = 64.33 cfs @ 13.93 hrs, Volume= 21.260 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.00"

Area (ac)	CN	Description
8.287	73	Woods, Fair, HSG C
5.037	76	Woods/grass comb., Fair, HSG C
21.037	60	Woods, Fair, HSG B
32.137	79	Woods, Fair, HSG D
0.187	98	Unconnected pavement, HSG C
6.037	80	1/2 acre lots, 25% imp, HSG C
0.337	98	Unconnected pavement, HSG B
6.037	70	1/2 acre lots, 25% imp, HSG B
0.467	98	Unconnected pavement, HSG D
3.036	85	1/2 acre lots, 25% imp, HSG D
82.599	73	Weighted Average
77.831		94.23% Pervious Area
4.768		5.77% Impervious Area
0.991		20.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
6.2	320	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
97.4	1,600	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.3	1,930	0.0050	1.06		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
147.5	3,950	Total			

Subcatchment DA-1A: Post-Dev Offsite



Summary for Subcatchment DA-1B: Post-Dev

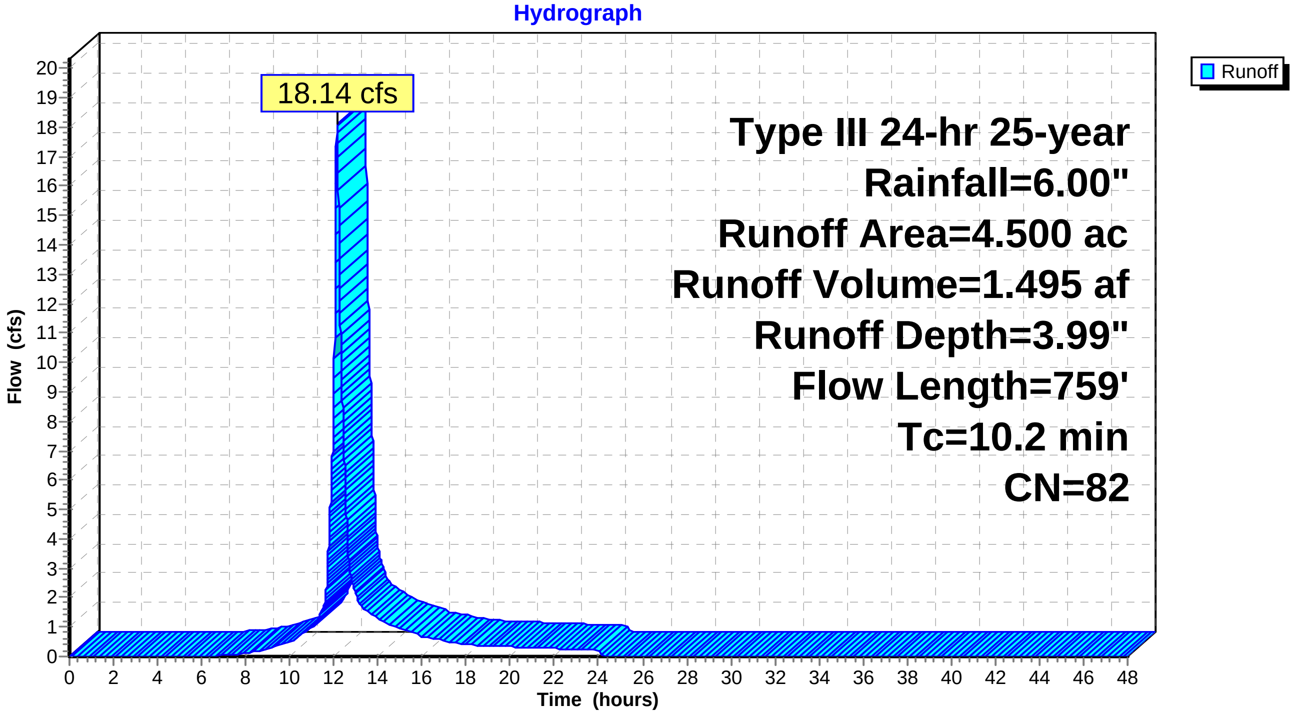
Runoff = 18.14 cfs @ 12.14 hrs, Volume= 1.495 af, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.00"

Area (ac)	CN	Description
2.000	61	>75% Grass cover, Good, HSG B
0.300	98	Roofs, HSG B
2.200	98	Paved parking, HSG B
4.500	82	Weighted Average
2.000		44.44% Pervious Area
2.500		55.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.1200	0.25		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
1.9	125	0.0240	1.08		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	33	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	501	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
10.2	759	Total			

Subcatchment DA-1B: Post-Dev



Summary for Subcatchment DA-1C: Post-Dev

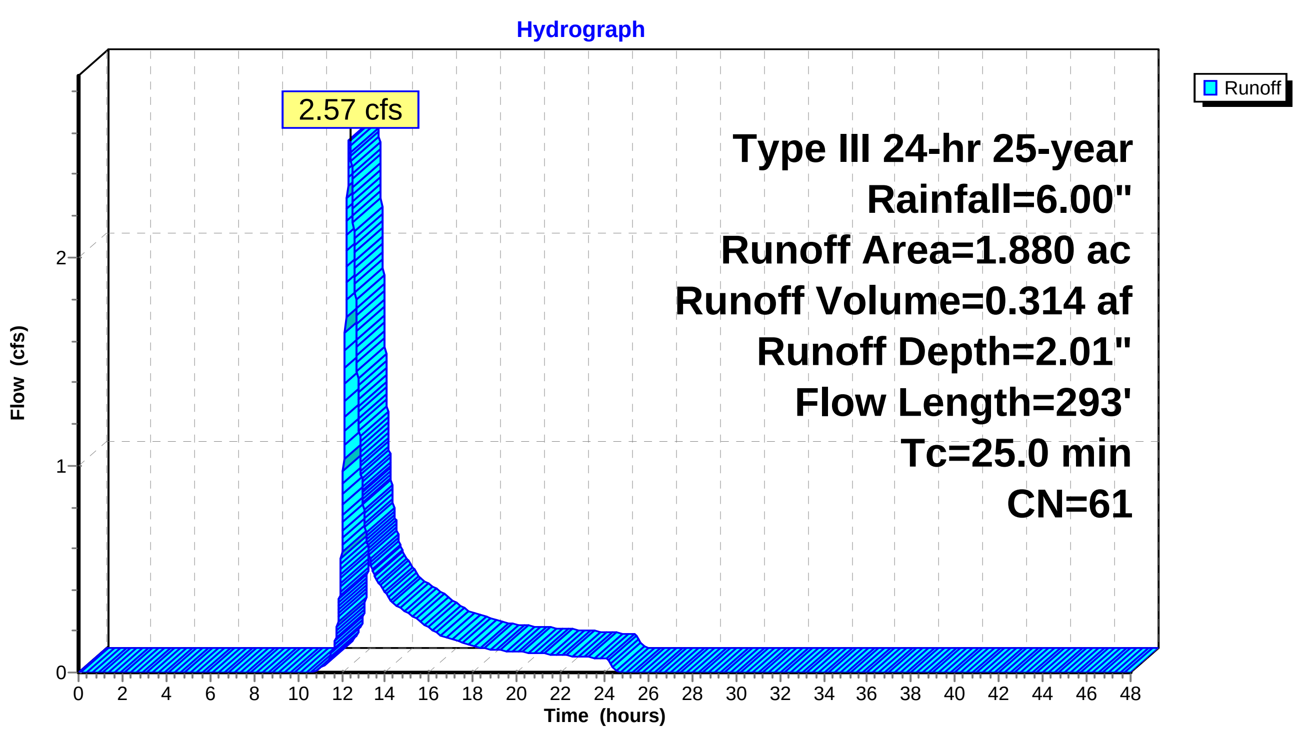
Runoff = 2.57 cfs @ 12.37 hrs, Volume= 0.314 af, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.00"

Area (ac)	CN	Description
0.400	60	Woods, Fair, HSG B
0.030	98	Unconnected pavement, HSG B
1.450	61	>75% Grass cover, Good, HSG B
1.880	61	Weighted Average
1.850		98.40% Pervious Area
0.030		1.60% Impervious Area
0.030		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	193	0.0104	0.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.0	293	Total			

Subcatchment DA-1C: Post-Dev



Summary for Subcatchment DA-1D: Post-Dev

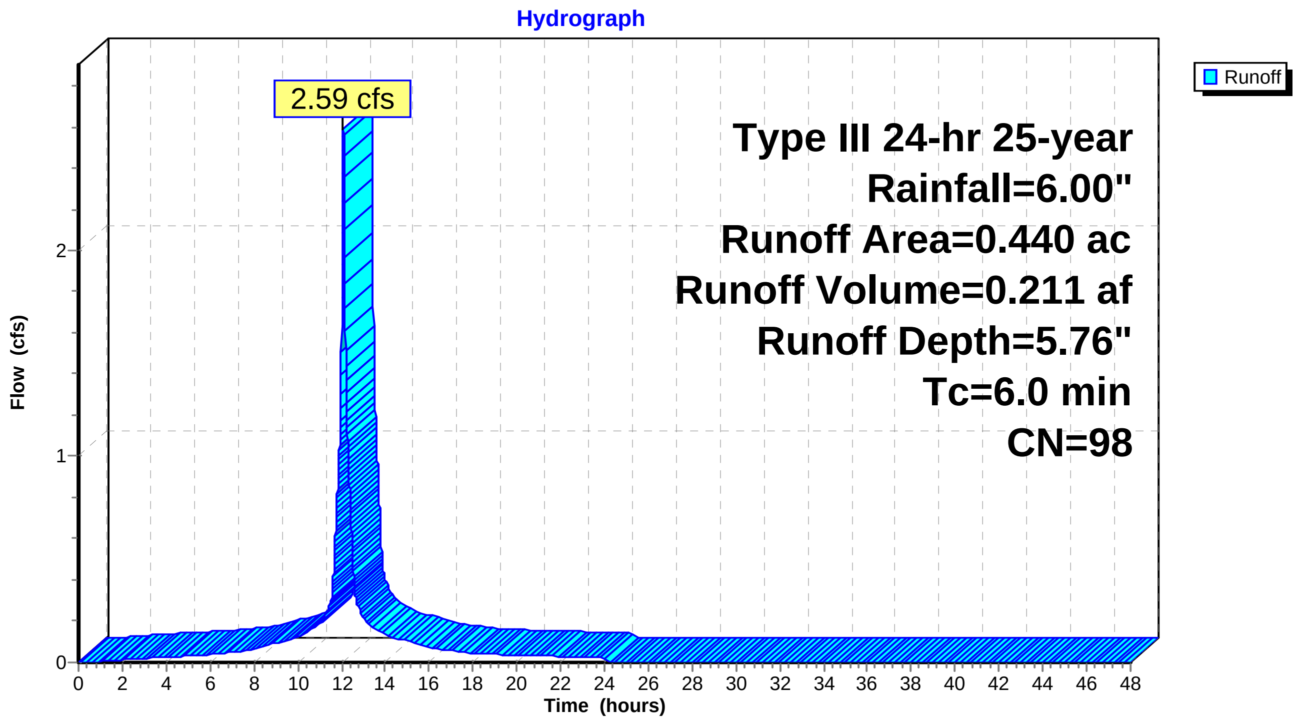
Runoff = 2.59 cfs @ 12.08 hrs, Volume= 0.211 af, Depth= 5.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.00"

Area (ac)	CN	Description
0.440	98	Roofs, HSG B
0.440		100.00% Impervious Area

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

Subcatchment DA-1D: Post-Dev



Summary for Subcatchment DA-1E: Post-Dev

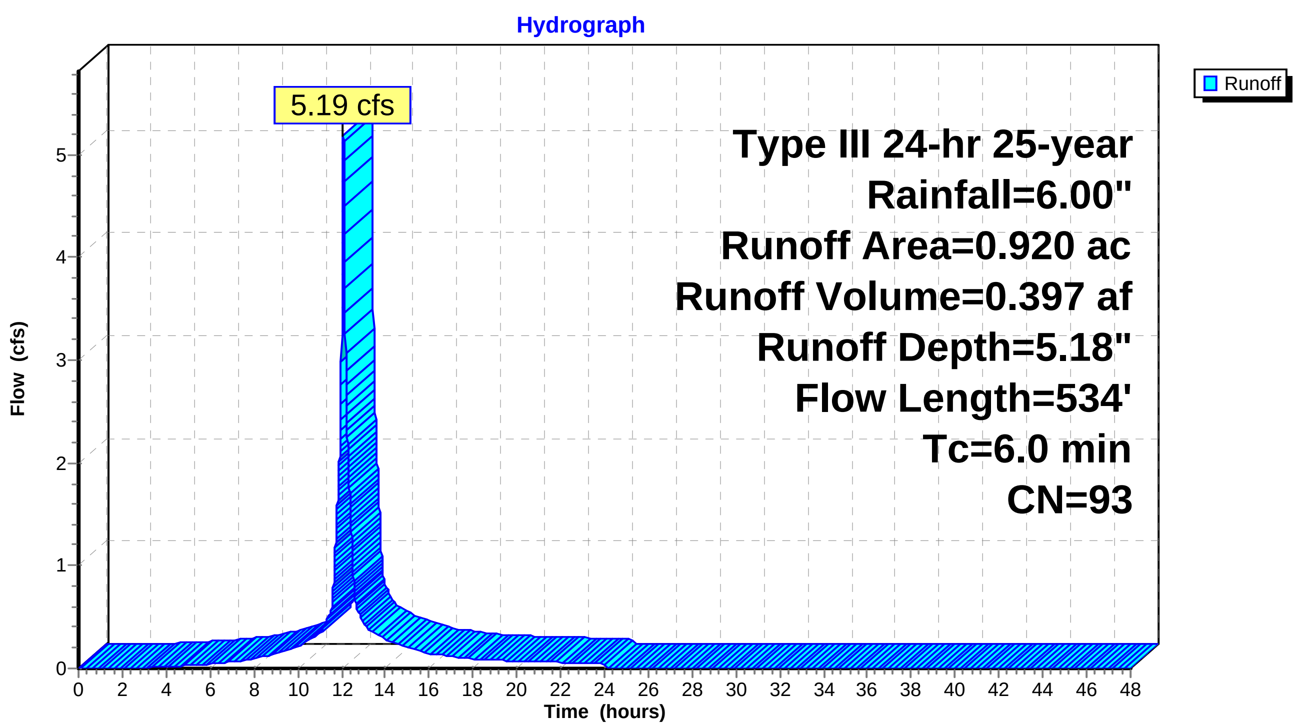
Runoff = 5.19 cfs @ 12.08 hrs, Volume= 0.397 af, Depth= 5.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.00"

Area (ac)	CN	Description
0.120	61	>75% Grass cover, Good, HSG B
0.800	98	Paved parking, HSG B
0.920	93	Weighted Average
0.120		13.04% Pervious Area
0.800		86.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0125	1.19		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
0.4	59	0.0125	2.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.1	375	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
2.9	534	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-1E: Post-Dev



Summary for Subcatchment DA-1F: Post-Dev

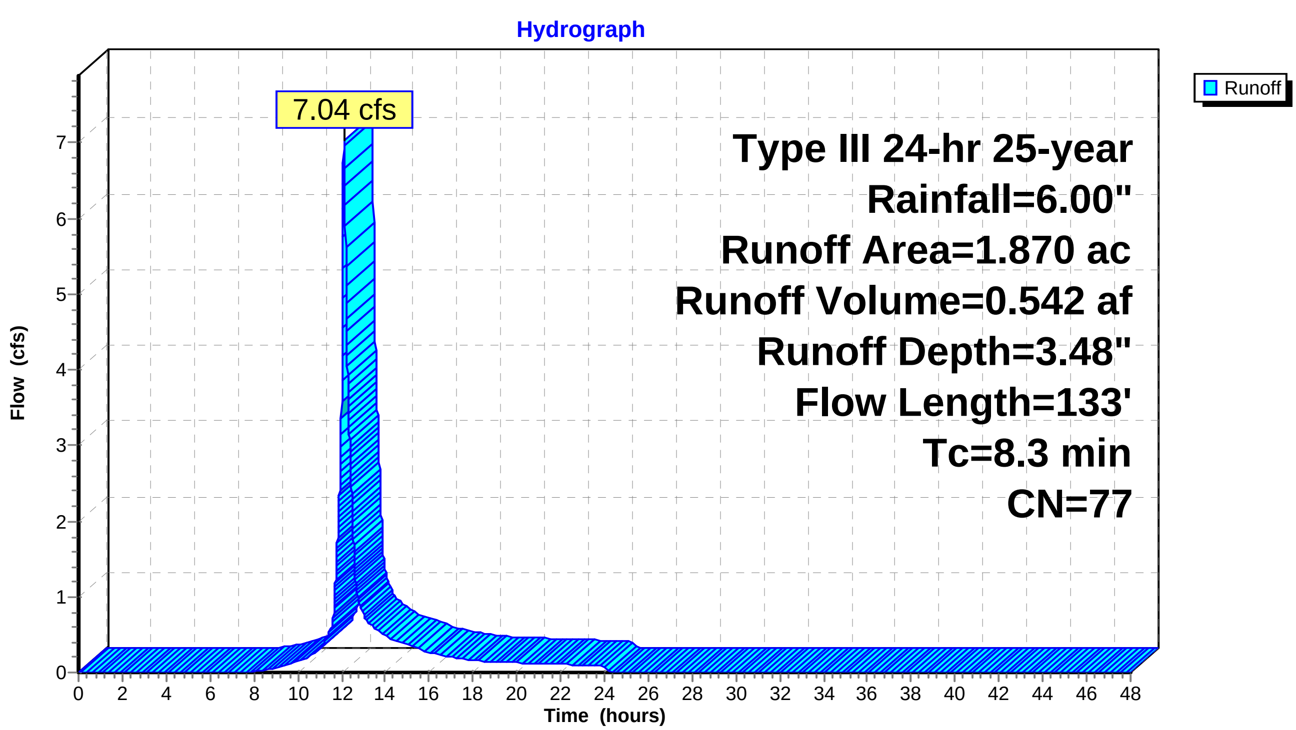
Runoff = 7.04 cfs @ 12.12 hrs, Volume= 0.542 af, Depth= 3.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.00"

Area (ac)	CN	Description
0.750	61	>75% Grass cover, Good, HSG B
0.170	98	Paved parking, HSG C
0.450	74	>75% Grass cover, Good, HSG C
0.500	98	Water Surface, HSG C
1.870	77	Weighted Average
1.200		64.17% Pervious Area
0.670		35.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.3	33	0.0910	2.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	133	Total			

Subcatchment DA-1F: Post-Dev



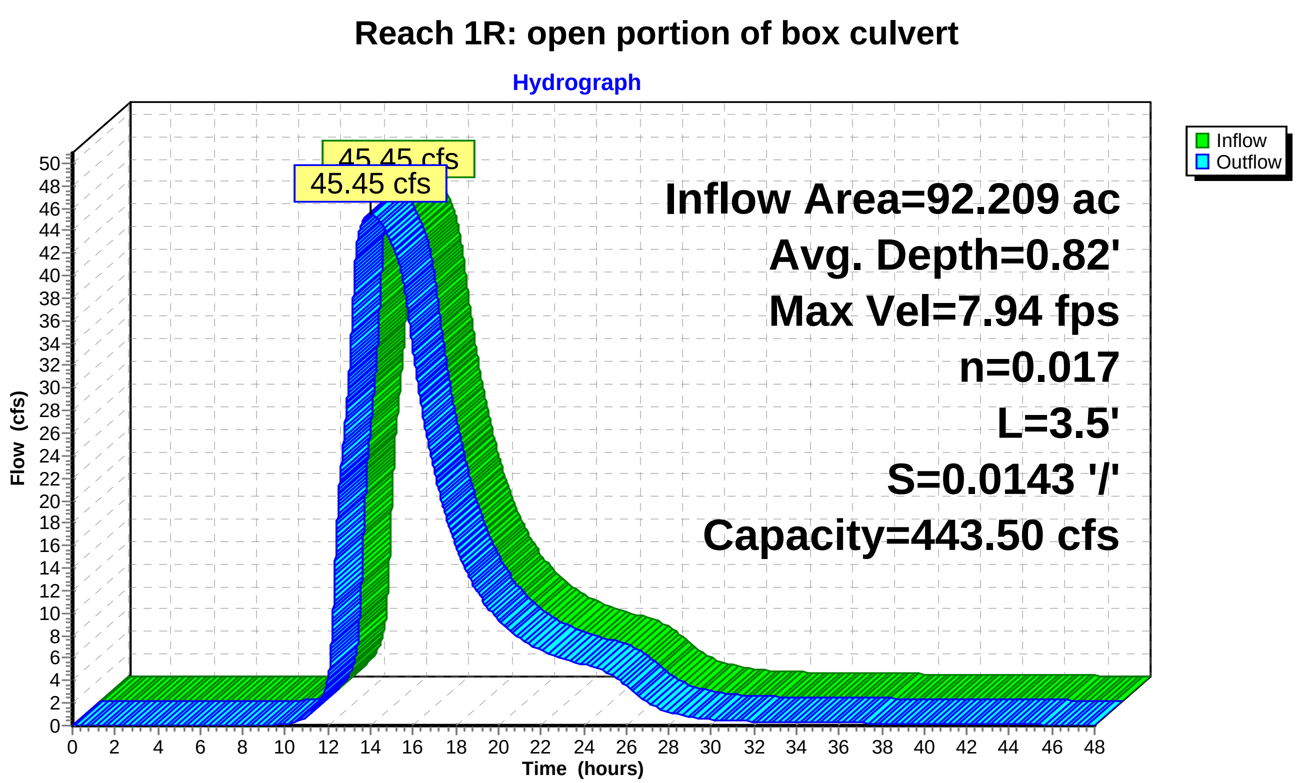
Summary for Reach 1R: open portion of box culvert

Inflow Area =	92.209 ac,	9.99% Impervious, Inflow Depth > 2.85"	for 25-year event	
Inflow =	45.45 cfs @	13.98 hrs, Volume=	21.880 af	
Outflow =	45.45 cfs @	13.98 hrs, Volume=	21.880 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.94 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.67 fps, Avg. Travel Time= 0.0 min

Peak Storage= 20 cf @ 13.98 hrs, Average Depth at Peak Storage= 0.82'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 443.50 cfs

7.00' x 4.00' deep channel, n= 0.017 Concrete, unfinished
Length= 3.5' Slope= 0.0143 '/'
Inlet Invert= 150.05', Outlet Invert= 150.00'



Summary for Reach 2R: bridge portion over box culvert

box culvert - opening 7'Wx4'Hx12'L
adjusted height to account for wooden beams underneath the bridge.

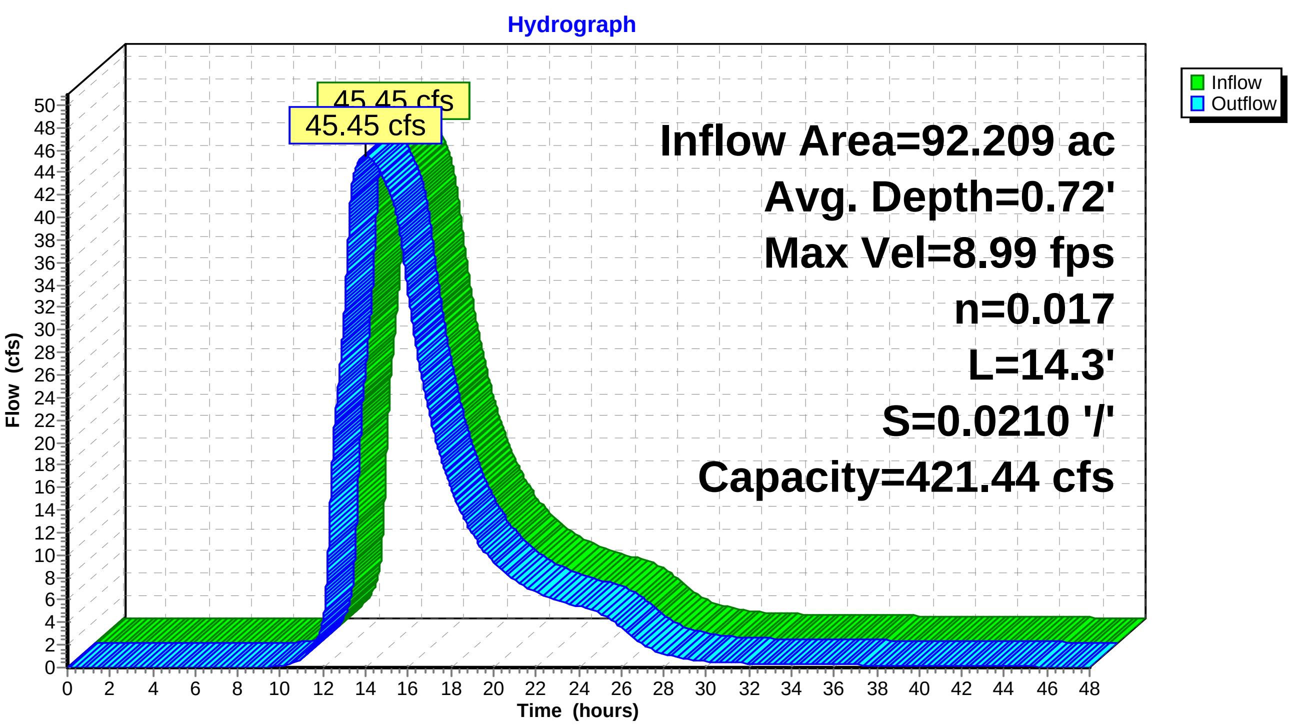
Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 2.85" for 25-year event
Inflow = 45.45 cfs @ 13.98 hrs, Volume= 21.880 af
Outflow = 45.45 cfs @ 13.98 hrs, Volume= 21.880 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.99 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.98 fps, Avg. Travel Time= 0.1 min

Peak Storage= 72 cf @ 13.98 hrs, Average Depth at Peak Storage= 0.72'
Bank-Full Depth= 3.33', Capacity at Bank-Full= 421.44 cfs

7.00' x 3.33' deep channel, n= 0.017 Concrete, unfinished
Length= 14.3' Slope= 0.0210 '/'
Inlet Invert= 150.00', Outlet Invert= 149.70'

Reach 2R: bridge portion over box culvert



Summary for Pond 1P: Exst Pond

There are two different crest bredth lengths, so shorter length was taken.

Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 3.15" for 25-year event
Inflow = 67.29 cfs @ 13.93 hrs, Volume= 24.184 af
Outflow = 67.02 cfs @ 13.98 hrs, Volume= 24.169 af, Atten= 0%, Lag= 3.0 min
Primary = 45.45 cfs @ 13.98 hrs, Volume= 21.880 af
Secondary = 21.57 cfs @ 13.98 hrs, Volume= 2.289 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 154.39' @ 13.98 hrs Surf.Area= 35,988 sf Storage= 65,378 cf
Flood Elev= 156.00' Surf.Area= 48,106 sf Storage= 132,693 cf

Plug-Flow detention time= 29.7 min calculated for 24.164 af (100% of inflow)
Center-of-Mass det. time= 28.6 min (998.7 - 970.1)

Volume	Invert	Avail.Storage	Storage Description
#1	152.10'	132,693 cf	**existing pond (Irregular)**Listed below (Recalc)

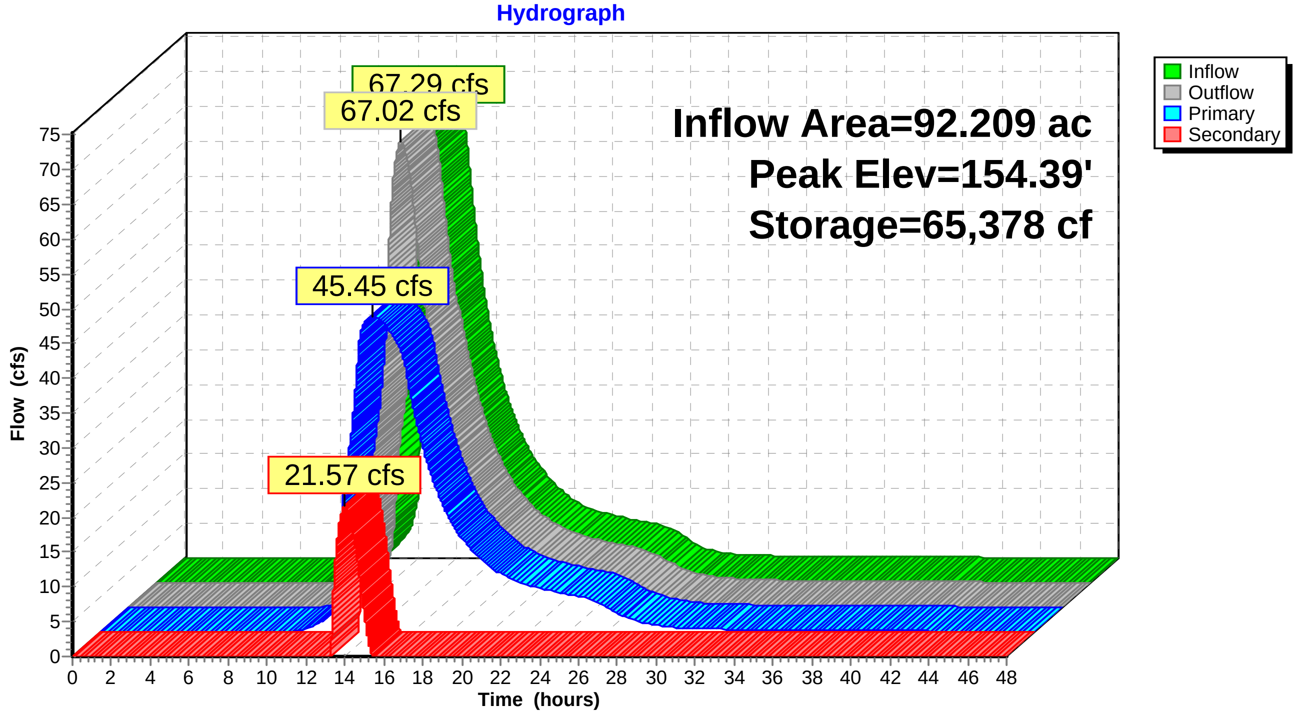
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
152.10	21,607	727.8	0	0	21,607
154.00	33,288	897.6	51,752	51,752	43,624
156.00	48,106	962.7	80,941	132,693	53,439

Device	Routing	Invert	Outlet Devices
#1	Primary	152.10'	**compound weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 1.00 1.00 2.00 2.00 Width (feet) 3.00 3.00 0.00 6.00 6.00 0.00
#2	Secondary	154.20'	**96.0' long x 14.0' breadth bridge (overflow weir)** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=45.45 cfs @ 13.98 hrs HW=154.39' TW=150.87' (Dynamic Tailwater)
└─**1=compound weir** (Orifice Controls 45.45 cfs @ 5.05 fps)

Secondary OutFlow Max=21.57 cfs @ 13.98 hrs HW=154.39' TW=152.64' (Dynamic Tailwater)
└─**2=bridge (overflow weir)** (Weir Controls 21.57 cfs @ 1.16 fps)

Pond 1P: Exst Pond



Summary for Pond 2P: stream to 60" twin culverts (DP-1)

Water will sit in stream channel until it reaches a minimum elevation of 150.72, since that is the lowest elevation of one of the 60" culverts. Therefore, this elevation was used as the starting elevation for the modeling of the stream and 60" twin culverts.

Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 3.15" for 25-year event
Inflow = 67.02 cfs @ 13.98 hrs, Volume= 24.169 af
Outflow = 67.02 cfs @ 13.99 hrs, Volume= 24.167 af, Atten= 0%, Lag= 0.5 min
Primary = 67.02 cfs @ 13.99 hrs, Volume= 24.167 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 150.72' Surf.Area= 852 sf Storage= 735 cf
Peak Elev= 152.64' @ 13.99 hrs Surf.Area= 1,697 sf Storage= 3,004 cf (2,269 cf above start)

Plug-Flow detention time= 2.5 min calculated for 24.151 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (999.6 - 998.7)

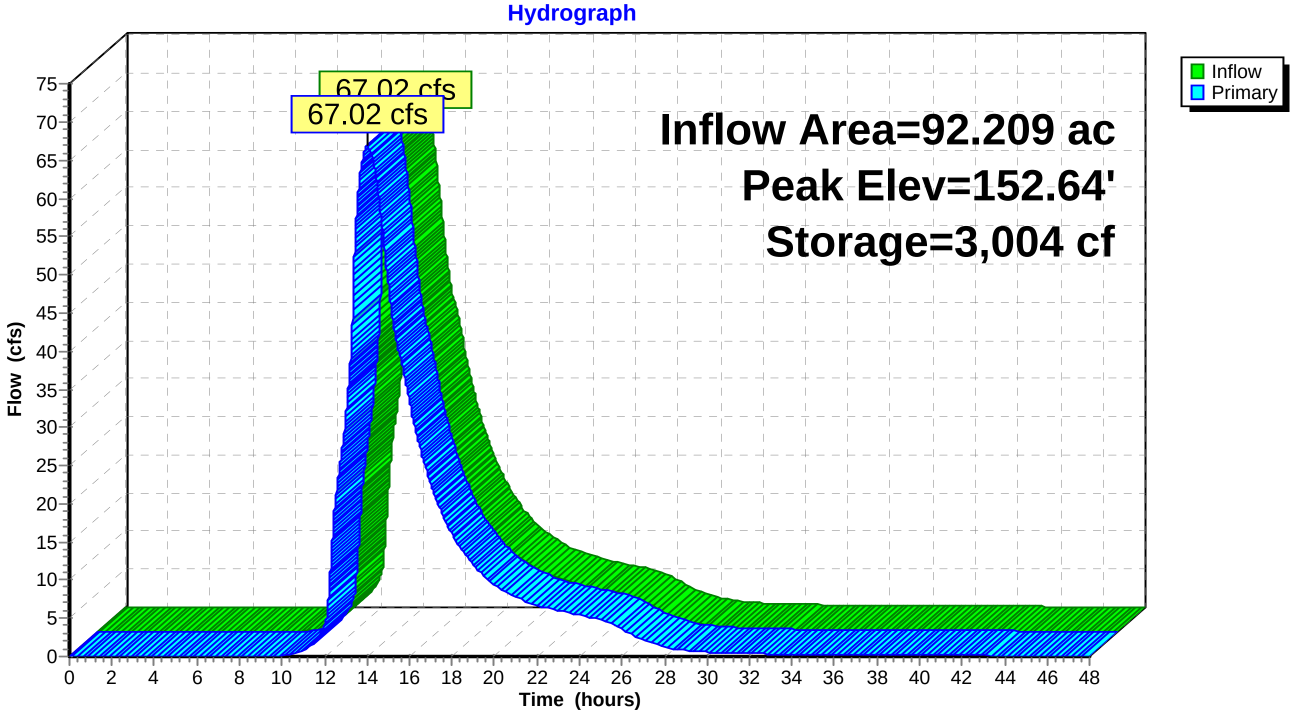
Volume	Invert	Avail.Storage	Storage Description
#1	149.70'	6,090 cf	**existing stream (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
149.70	596	131.8	0	0	596
152.00	1,239	152.2	2,066	2,066	1,161
154.00	2,902	266.7	4,025	6,090	5,001

Device	Routing	Invert	Outlet Devices
#1	Primary	150.72'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.10' S= 0.0063 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#2	Primary	150.77'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.40' S= 0.0038 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=67.02 cfs @ 13.99 hrs HW=152.64' (Free Discharge)
├─**1=Culvert** (Barrel Controls 36.43 cfs @ 6.64 fps)
└─**2=Culvert** (Barrel Controls 30.59 cfs @ 5.77 fps)

Pond 2P: stream to 60" twin culverts (DP-1)



Summary for Pond A: Pocket Pond (P-5)

Grate: Campbell Foundry Model # 3433.
Existing rip-rap for weir is 10 foot wide and will remain.

```
Inflow Area =      7.740 ac, 48.71% Impervious, Inflow Depth =  3.75"   for 25-year event
Inflow     =     26.14 cfs @  12.13 hrs, Volume=         2.418 af
Outflow    =     16.38 cfs @  12.31 hrs, Volume=         2.382 af, Atten= 37%, Lag= 10.7 min
Primary    =     16.38 cfs @  12.31 hrs, Volume=         2.382 af
Secondary =       0.00 cfs @   0.00 hrs, Volume=         0.000 af
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 155.75' Surf.Area= 13,223 sf Storage= 22,302 cf
Peak Elev= 158.05' @ 12.31 hrs Surf.Area= 16,749 sf Storage= 56,542 cf (34,240 cf above start)
Flood Elev= 160.00' Surf.Area= 20,823 sf Storage= 93,104 cf (70,803 cf above start)

Plug-Flow detention time= 443.7 min calculated for 1.870 af (77% of inflow)
Center-of-Mass det. time= 263.8 min (1,073.9 - 810.1)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	93,104 cf	**pocket pond (Irregular)**Listed below

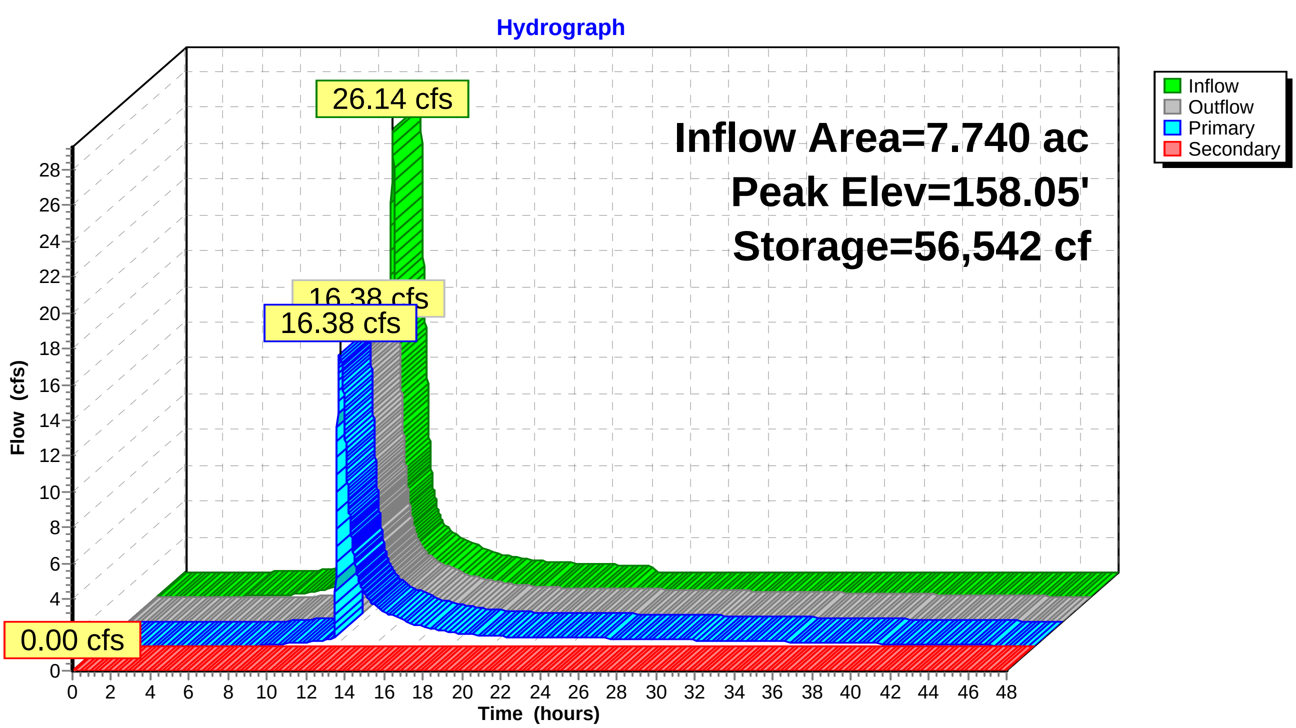
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
151.00	71	155.0	0	0	71
152.00	1,449	208.7	614	614	1,636
154.00	3,771	398.6	5,038	5,652	10,833
154.36	4,394	413.9	1,468	7,120	11,833
154.86	11,762	609.2	3,891	11,011	27,736
156.00	13,633	583.6	14,462	25,473	30,259
158.00	16,653	616.5	30,236	55,709	33,622
159.00	18,677	647.0	17,655	73,364	36,753
160.00	20,823	673.7	19,740	93,104	39,636

Device	Routing	Invert	Outlet Devices
#1	Primary	154.09'	**24.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 153.40' S= 0.0168 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	155.75'	**4.0" Vert. Orifice** C= 0.600
#3	Device 1	157.25'	**24.0" W x 9.0" H Vert. Slots (side) X 2.00** C= 0.600
#4	Device 1	157.25'	**36.0" W x 9.0" H Vert. Slot (front)** C= 0.600
#5	Device 1	158.50'	**36.0" x 55.5" Horiz. Grate X 4.00 columns** X 8 rows C= 0.600 in 1.3" x 6.5" Grate Limited to weir flow at low heads
#6	Secondary	159.00'	**153.0 deg x 10.0' long x 1.00' rise Trap Weir** C= 2.47

Primary OutFlow Max=16.38 cfs @ 12.31 hrs HW=158.05' TW=153.26' (Dynamic Tailwater)
1=Culvert (Passes 16.38 cfs of 26.01 cfs potential flow)
2=Orifice (Orifice Controls 0.61 cfs @ 7.03 fps)
3=Slots (side) (Orifice Controls 9.01 cfs @ 3.00 fps)
4=Slot (front) (Orifice Controls 6.76 cfs @ 3.00 fps)
5=Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=155.75' TW=152.10' (Dynamic Tailwater)
6=Trap Weir (Controls 0.00 cfs)

Pond A: Pocket Pond (P-5)



Summary for Pond FB-1: Forebay

Inflow Area = 1.360 ac, 91.18% Impervious, Inflow Depth = 5.37" for 25-year event
Inflow = 7.78 cfs @ 12.08 hrs, Volume= 0.609 af
Outflow = 7.73 cfs @ 12.09 hrs, Volume= 0.609 af, Atten= 1%, Lag= 0.6 min
Primary = 7.73 cfs @ 12.09 hrs, Volume= 0.609 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 158.00' Surf.Area= 1,052 sf Storage= 1,843 cf
Peak Elev= 158.35' @ 12.09 hrs Surf.Area= 1,187 sf Storage= 2,233 cf (390 cf above start)
Flood Elev= 160.00' Surf.Area= 1,772 sf Storage= 4,707 cf (2,864 cf above start)

Plug-Flow detention time= 67.8 min calculated for 0.566 af (93% of inflow)
Center-of-Mass det. time= 2.0 min (765.3 - 763.3)

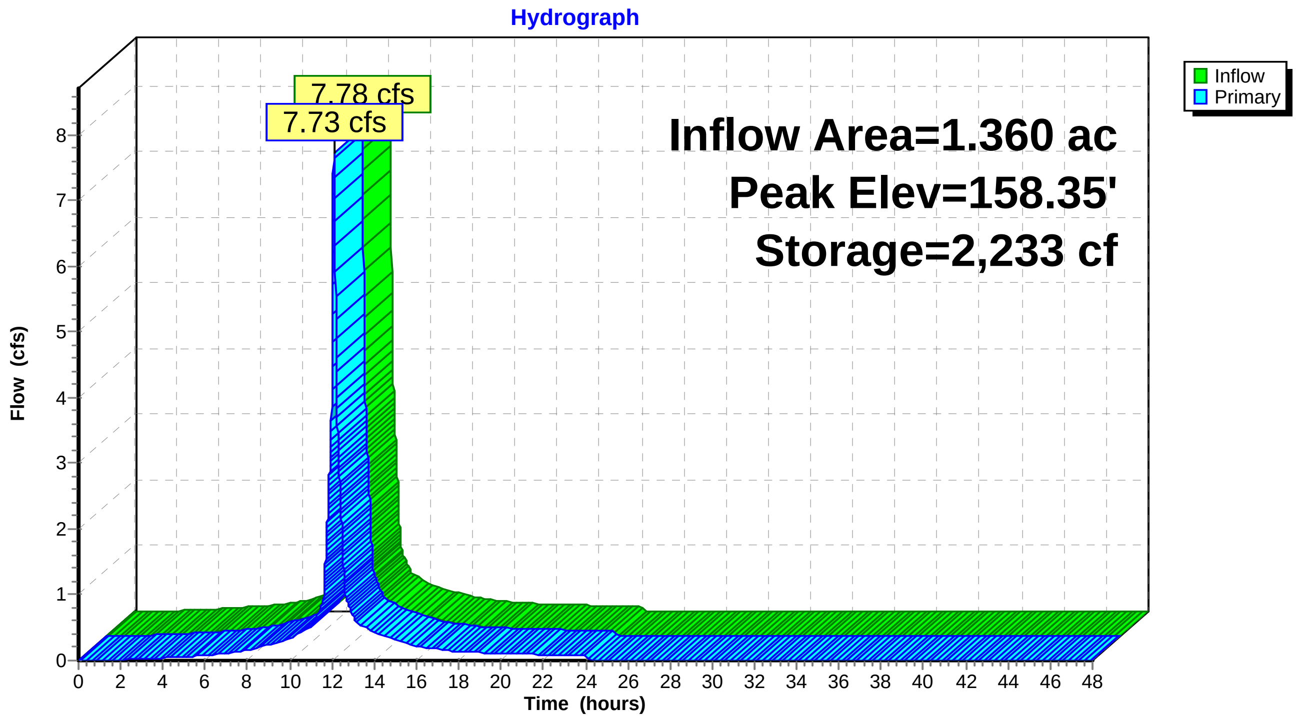
Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	4,707 cf	**Forebay (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
154.00	48	34.2	0	0	48
156.00	426	86.7	411	411	567
158.00	1,052	124.1	1,432	1,843	1,229
159.00	1,460	143.2	1,250	3,093	1,657
160.00	1,772	163.3	1,613	4,707	2,171

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**153.0 deg x 11.0' long x 1.50' rise Trap Weir** C= 2.47

Primary OutFlow Max=7.71 cfs @ 12.09 hrs HW=158.35' TW=157.59' (Dynamic Tailwater)
└─**1=Trap Weir** (Weir Controls 7.71 cfs @ 1.78 fps)

Pond FB-1: Forebay



Summary for Pond FB-2: Forebay

Inflow Area = 6.380 ac, 39.66% Impervious, Inflow Depth = 3.40" for 25-year event
Inflow = 19.47 cfs @ 12.14 hrs, Volume= 1.809 af
Outflow = 19.44 cfs @ 12.15 hrs, Volume= 1.809 af, Atten= 0%, Lag= 0.4 min
Primary = 19.44 cfs @ 12.15 hrs, Volume= 1.809 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 158.00' Surf.Area= 735 sf Storage= 1,551 cf
Peak Elev= 158.72' @ 12.15 hrs Surf.Area= 894 sf Storage= 2,133 cf (583 cf above start)
Flood Elev= 160.00' Surf.Area= 1,137 sf Storage= 3,445 cf (1,894 cf above start)

Plug-Flow detention time= 19.1 min calculated for 1.774 af (98% of inflow)
Center-of-Mass det. time= 1.1 min (825.2 - 824.1)

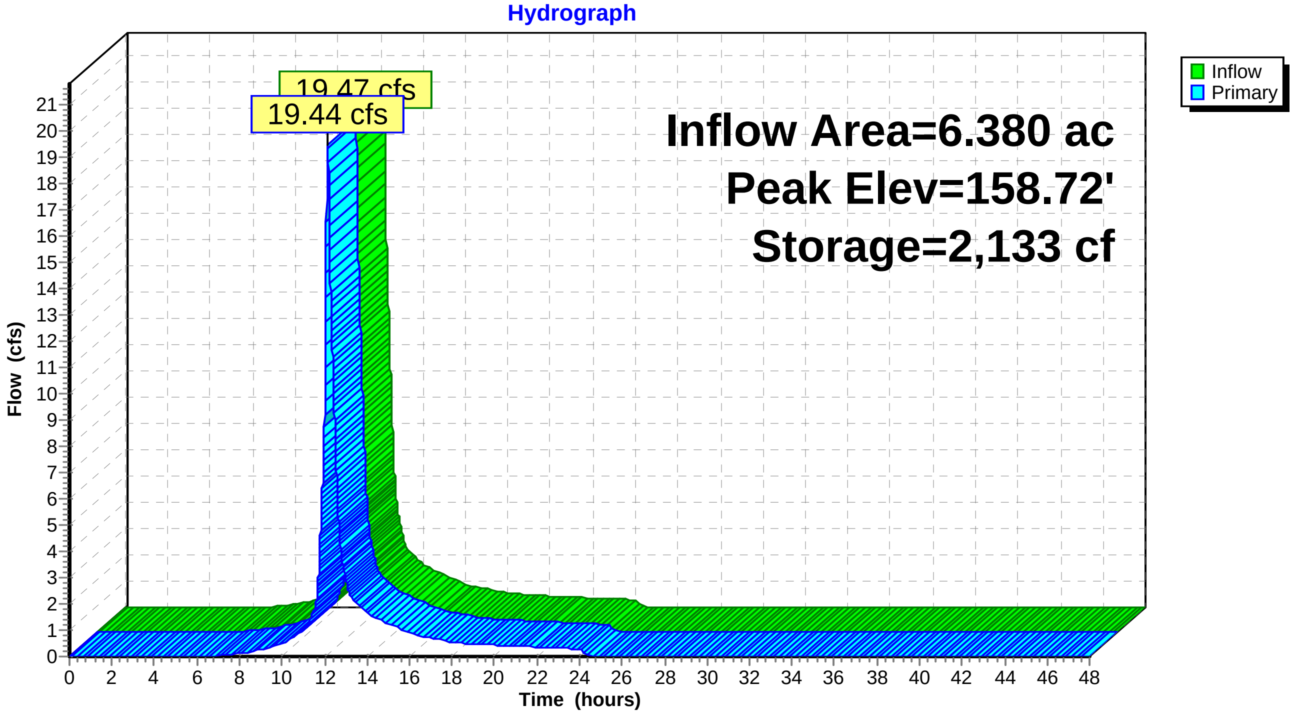
Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	3,445 cf	**forebay (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
154.00	113	50.1	0	0	113
156.00	374	77.5	462	462	419
158.00	735	103.4	1,089	1,551	834
159.00	962	116.9	846	2,397	1,095
160.00	1,137	100.3	1,048	3,445	1,401

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**153.0 deg x 8.0' long x 1.50' rise Trap Weir** C= 2.47

Primary OutFlow Max=19.43 cfs @ 12.15 hrs HW=158.72' TW=157.83' (Dynamic Tailwater)
└─**1=Trap Weir** (Weir Controls 19.43 cfs @ 2.47 fps)

Pond FB-2: Forebay



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1A: Post-Dev Offsite Runoff Area=82.599 ac 5.77% Impervious Runoff Depth=4.81"
Flow Length=3,950' Tc=147.5 min CN=73 Runoff=101.16 cfs 33.108 af

Subcatchment DA-1B: Post-Dev Runoff Area=4.500 ac 55.56% Impervious Runoff Depth=5.86"
Flow Length=759' Tc=10.2 min CN=82 Runoff=26.31 cfs 2.197 af

Subcatchment DA-1C: Post-Dev Runoff Area=1.880 ac 1.60% Impervious Runoff Depth=3.44"
Flow Length=293' Tc=25.0 min CN=61 Runoff=4.59 cfs 0.540 af

Subcatchment DA-1D: Post-Dev Runoff Area=0.440 ac 100.00% Impervious Runoff Depth=7.76"
Tc=6.0 min CN=98 Runoff=3.46 cfs 0.285 af

Subcatchment DA-1E: Post-Dev Runoff Area=0.920 ac 86.96% Impervious Runoff Depth=7.16"
Flow Length=534' Tc=6.0 min CN=93 Runoff=7.05 cfs 0.549 af

Subcatchment DA-1F: Post-Dev Runoff Area=1.870 ac 35.83% Impervious Runoff Depth=5.27"
Flow Length=133' Tc=8.3 min CN=77 Runoff=10.60 cfs 0.822 af

Reach 1R: open portion of box culvert Avg. Depth=0.86' Max Vel=8.16 fps Inflow=49.17 cfs 28.812 af
n=0.017 L=3.5' S=0.0143 '/' Capacity=443.50 cfs Outflow=49.17 cfs 28.812 af

Reach 2R: bridge portion over box culvert Avg. Depth=0.76' Max Vel=9.25 fps Inflow=49.17 cfs 28.812 af
n=0.017 L=14.3' S=0.0210 '/' Capacity=421.44 cfs Outflow=49.17 cfs 28.812 af

Pond 1P: Exst Pond Peak Elev=154.56' Storage=71,566 cf Inflow=105.29 cfs 37.464 af
Primary=49.17 cfs 28.812 af Secondary=55.85 cfs 8.636 af Outflow=105.02 cfs 37.448 af

Pond 2P: stream to 60" twin culverts Peak Elev=153.24' Storage=4,157 cf Inflow=105.02 cfs 37.448 af
Outflow=105.01 cfs 37.446 af

Pond A: Pocket Pond (P-5) Peak Elev=158.51' Storage=64,727 cf Inflow=37.52 cfs 3.571 af
Primary=24.29 cfs 3.534 af Secondary=0.00 cfs 0.000 af Outflow=24.29 cfs 3.534 af

Pond FB-1: Forebay Peak Elev=158.53' Storage=2,451 cf Inflow=10.50 cfs 0.834 af
Outflow=10.40 cfs 0.834 af

Pond FB-2: Forebay Peak Elev=158.91' Storage=2,315 cf Inflow=28.89 cfs 2.737 af
Outflow=28.76 cfs 2.737 af

Total Runoff Area = 92.209 ac Runoff Volume = 37.501 af Average Runoff Depth = 4.88"
90.01% Pervious = 83.001 ac 9.99% Impervious = 9.208 ac

Summary for Subcatchment DA-1A: Post-Dev Offsite

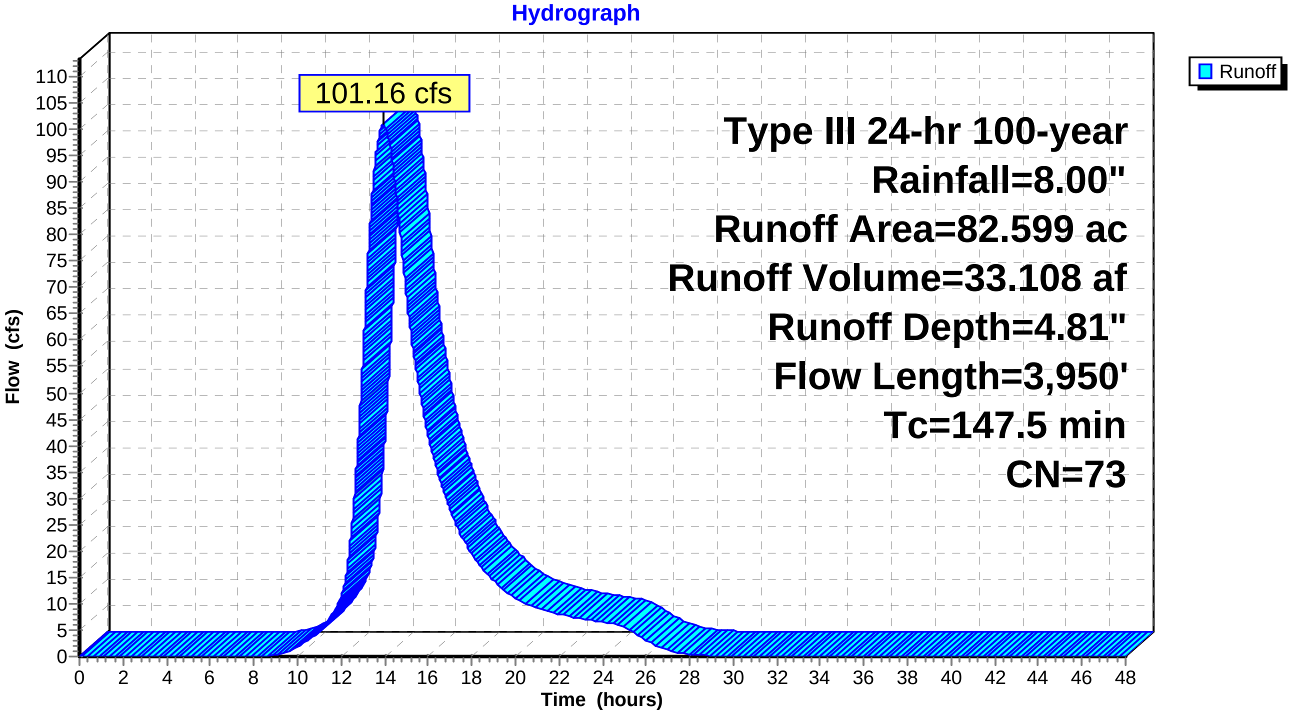
Runoff = 101.16 cfs @ 13.93 hrs, Volume= 33.108 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.00"

Area (ac)	CN	Description
8.287	73	Woods, Fair, HSG C
5.037	76	Woods/grass comb., Fair, HSG C
21.037	60	Woods, Fair, HSG B
32.137	79	Woods, Fair, HSG D
0.187	98	Unconnected pavement, HSG C
6.037	80	1/2 acre lots, 25% imp, HSG C
0.337	98	Unconnected pavement, HSG B
6.037	70	1/2 acre lots, 25% imp, HSG B
0.467	98	Unconnected pavement, HSG D
3.036	85	1/2 acre lots, 25% imp, HSG D
82.599	73	Weighted Average
77.831		94.23% Pervious Area
4.768		5.77% Impervious Area
0.991		20.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
6.2	320	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
97.4	1,600	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.3	1,930	0.0050	1.06		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
147.5	3,950	Total			

Subcatchment DA-1A: Post-Dev Offsite



Summary for Subcatchment DA-1B: Post-Dev

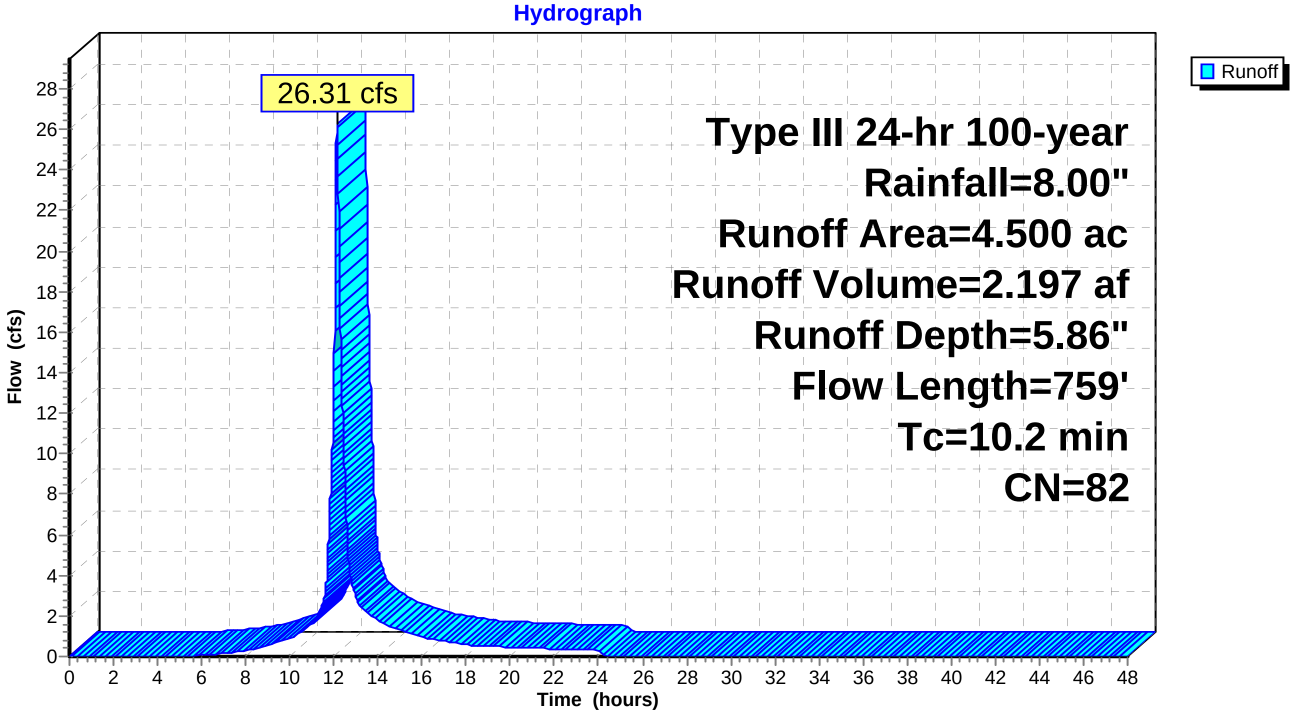
Runoff = 26.31 cfs @ 12.14 hrs, Volume= 2.197 af, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.00"

Area (ac)	CN	Description
2.000	61	>75% Grass cover, Good, HSG B
0.300	98	Roofs, HSG B
2.200	98	Paved parking, HSG B
4.500	82	Weighted Average
2.000		44.44% Pervious Area
2.500		55.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.1200	0.25		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
1.9	125	0.0240	1.08		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	33	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	501	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
10.2	759	Total			

Subcatchment DA-1B: Post-Dev



Summary for Subcatchment DA-1C: Post-Dev

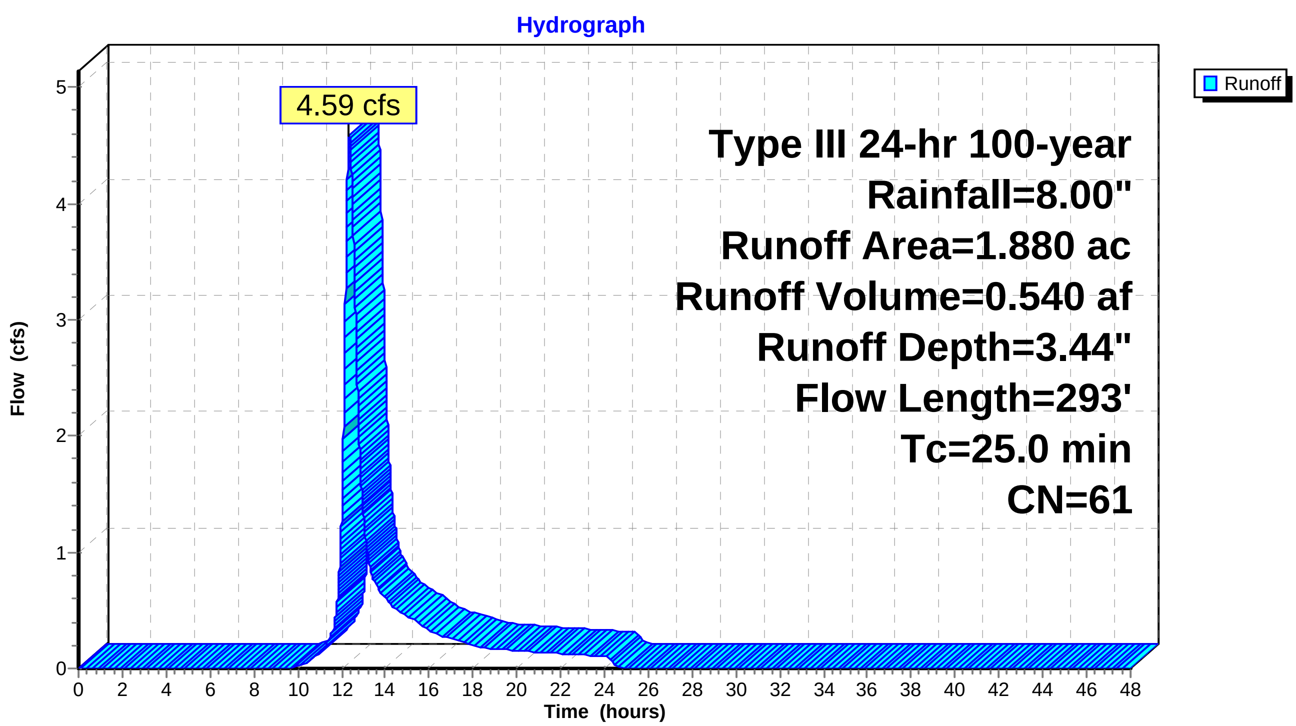
Runoff = 4.59 cfs @ 12.36 hrs, Volume= 0.540 af, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.00"

Area (ac)	CN	Description
0.400	60	Woods, Fair, HSG B
0.030	98	Unconnected pavement, HSG B
1.450	61	>75% Grass cover, Good, HSG B
1.880	61	Weighted Average
1.850		98.40% Pervious Area
0.030		1.60% Impervious Area
0.030		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	193	0.0104	0.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.0	293	Total			

Subcatchment DA-1C: Post-Dev



Summary for Subcatchment DA-1D: Post-Dev

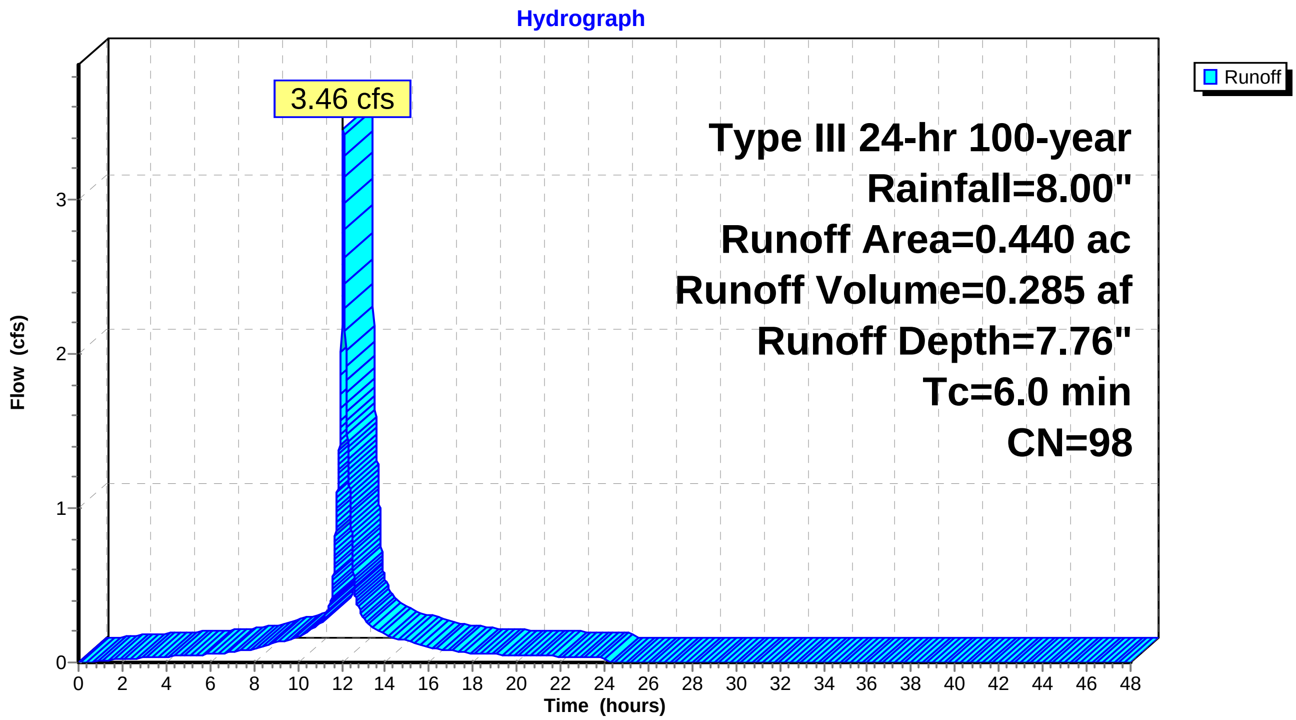
Runoff = 3.46 cfs @ 12.08 hrs, Volume= 0.285 af, Depth= 7.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.00"

Area (ac)	CN	Description
0.440	98	Roofs, HSG B
0.440		100.00% Impervious Area

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

Subcatchment DA-1D: Post-Dev



Summary for Subcatchment DA-1E: Post-Dev

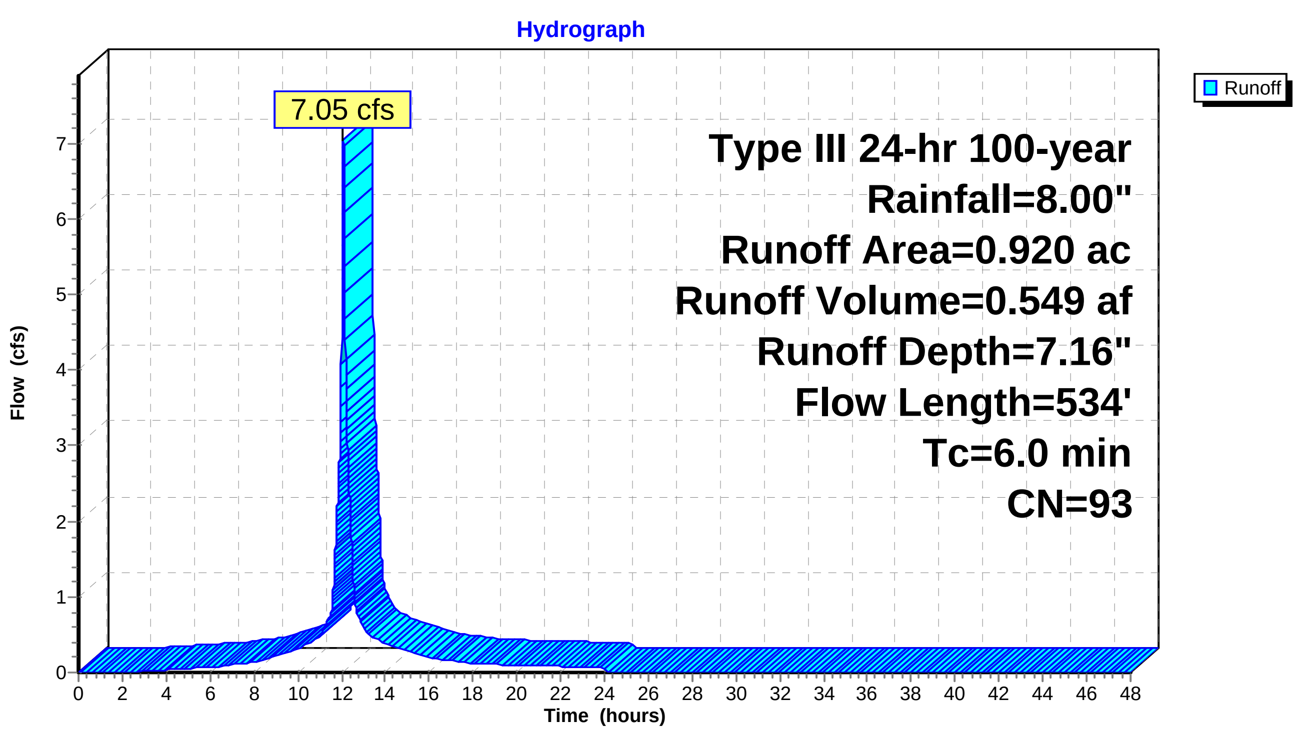
Runoff = 7.05 cfs @ 12.08 hrs, Volume= 0.549 af, Depth= 7.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.00"

Area (ac)	CN	Description
0.120	61	>75% Grass cover, Good, HSG B
0.800	98	Paved parking, HSG B
0.920	93	Weighted Average
0.120		13.04% Pervious Area
0.800		86.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0125	1.19		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
0.4	59	0.0125	2.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.1	375	0.0100	5.94	10.50	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
2.9	534	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-1E: Post-Dev



Summary for Subcatchment DA-1F: Post-Dev

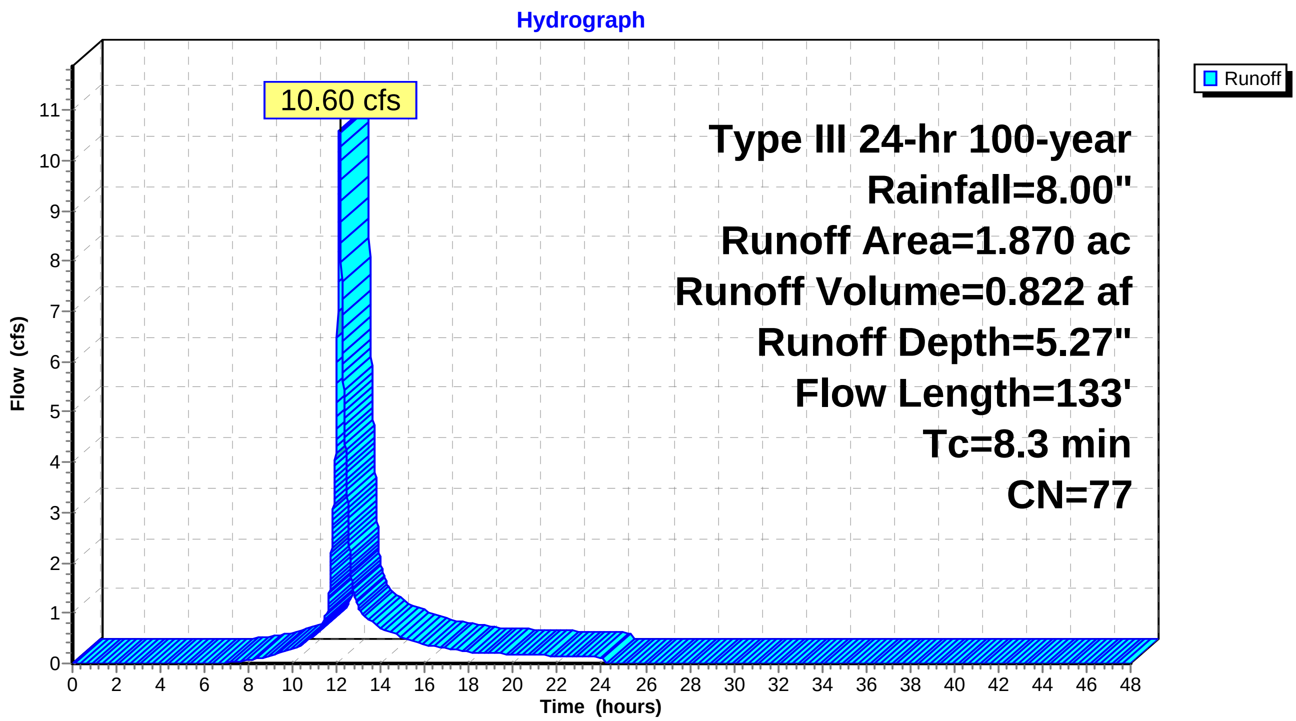
Runoff = 10.60 cfs @ 12.12 hrs, Volume= 0.822 af, Depth= 5.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.00"

Area (ac)	CN	Description
0.750	61	>75% Grass cover, Good, HSG B
0.170	98	Paved parking, HSG C
0.450	74	>75% Grass cover, Good, HSG C
0.500	98	Water Surface, HSG C
1.870	77	Weighted Average
1.200		64.17% Pervious Area
0.670		35.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.3	33	0.0910	2.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	133	Total			

Subcatchment DA-1F: Post-Dev



Summary for Reach 1R: open portion of box culvert

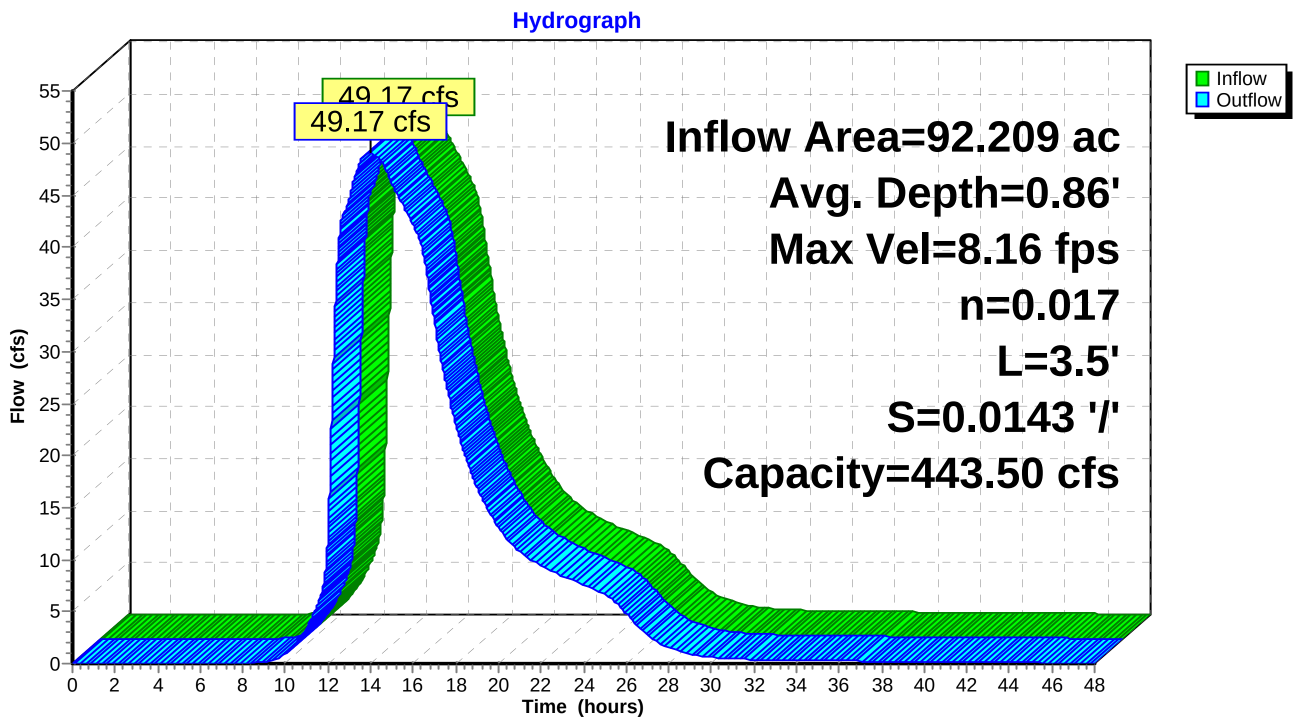
Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 3.75" for 100-year event
Inflow = 49.17 cfs @ 13.96 hrs, Volume= 28.812 af
Outflow = 49.17 cfs @ 13.96 hrs, Volume= 28.812 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.16 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.92 fps, Avg. Travel Time= 0.0 min

Peak Storage= 21 cf @ 13.96 hrs, Average Depth at Peak Storage= 0.86'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 443.50 cfs

7.00' x 4.00' deep channel, n= 0.017 Concrete, unfinished
Length= 3.5' Slope= 0.0143 '/'
Inlet Invert= 150.05', Outlet Invert= 150.00'

Reach 1R: open portion of box culvert



Summary for Reach 2R: bridge portion over box culvert

box culvert - opening 7'Wx4'Hx12'L
adjusted height to account for wooden beams underneath the bridge.

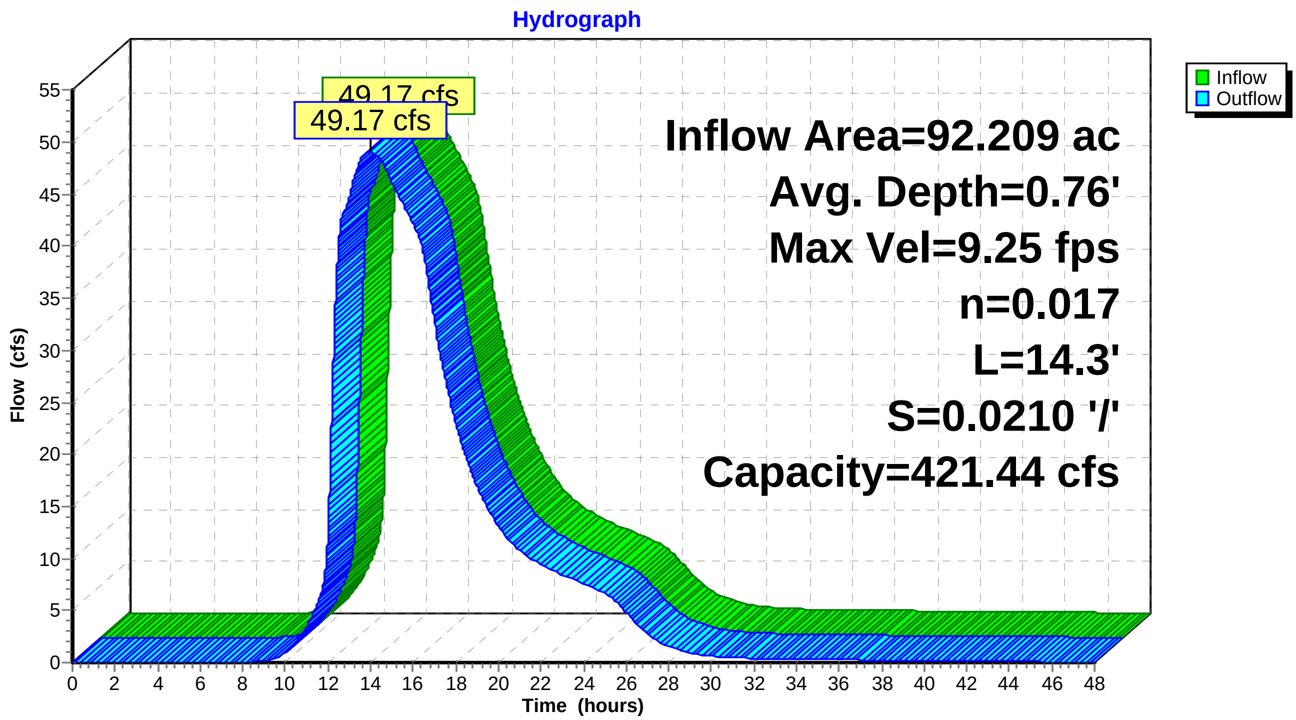
Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 3.75" for 100-year event
Inflow = 49.17 cfs @ 13.96 hrs, Volume= 28.812 af
Outflow = 49.17 cfs @ 13.96 hrs, Volume= 28.812 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.25 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.27 fps, Avg. Travel Time= 0.1 min

Peak Storage= 76 cf @ 13.96 hrs, Average Depth at Peak Storage= 0.76'
Bank-Full Depth= 3.33', Capacity at Bank-Full= 421.44 cfs

7.00' x 3.33' deep channel, n= 0.017 Concrete, unfinished
Length= 14.3' Slope= 0.0210 '/'
Inlet Invert= 150.00', Outlet Invert= 149.70'

Reach 2R: bridge portion over box culvert



Summary for Pond 1P: Exst Pond

There are two different crest bredth lengths, so shorter length was taken.

Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 4.88" for 100-year event
Inflow = 105.29 cfs @ 13.93 hrs, Volume= 37.464 af
Outflow = 105.02 cfs @ 13.96 hrs, Volume= 37.448 af, Atten= 0%, Lag= 1.6 min
Primary = 49.17 cfs @ 13.96 hrs, Volume= 28.812 af
Secondary = 55.85 cfs @ 13.96 hrs, Volume= 8.636 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 154.56' @ 13.96 hrs Surf.Area= 37,181 sf Storage= 71,566 cf
Flood Elev= 156.00' Surf.Area= 48,106 sf Storage= 132,693 cf

Plug-Flow detention time= 23.7 min calculated for 37.440 af (100% of inflow)
Center-of-Mass det. time= 23.0 min (973.7 - 950.7)

Volume	Invert	Avail.Storage	Storage Description
#1	152.10'	132,693 cf	**existing pond (Irregular)** Listed below (Recalc)

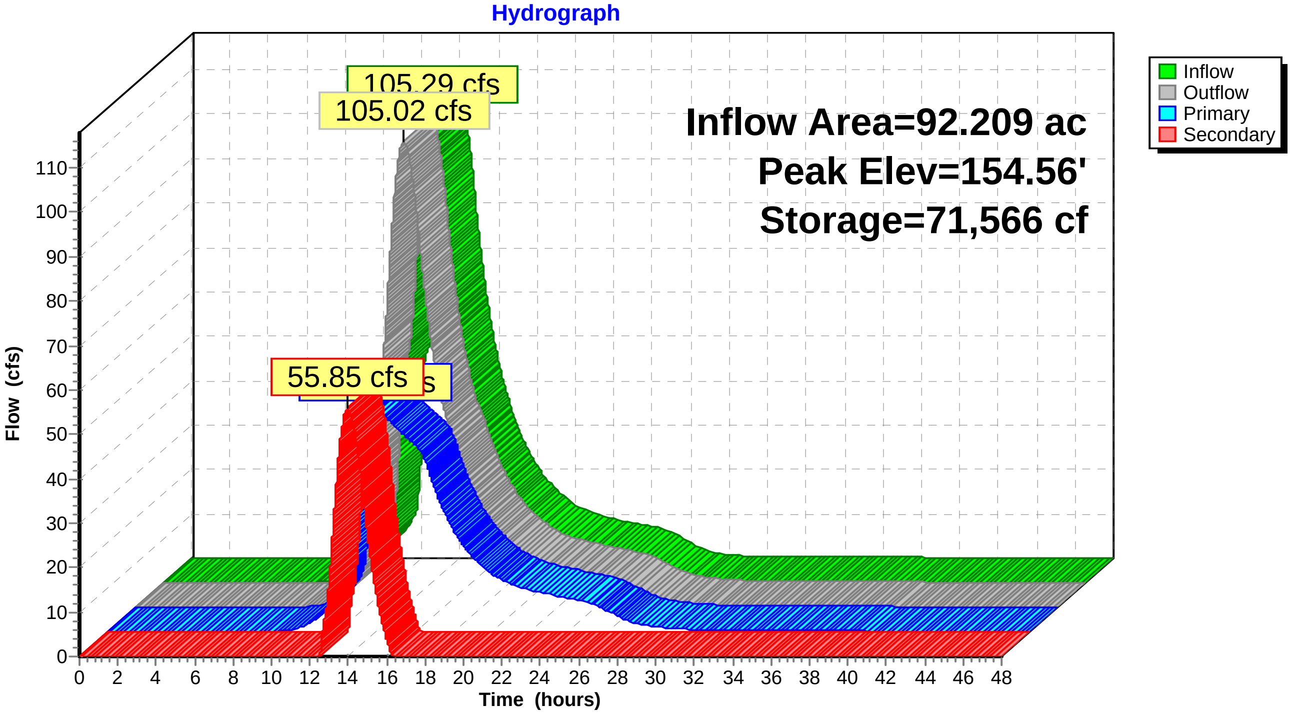
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
152.10	21,607	727.8	0	0	21,607
154.00	33,288	897.6	51,752	51,752	43,624
156.00	48,106	962.7	80,941	132,693	53,439

Device	Routing	Invert	Outlet Devices
#1	Primary	152.10'	**compound weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 1.00 1.00 2.00 2.00 Width (feet) 3.00 3.00 0.00 6.00 6.00 0.00
#2	Secondary	154.20'	**96.0' long x 14.0' breadth bridge (overflow weir)** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=49.16 cfs @ 13.96 hrs HW=154.56' TW=150.91' (Dynamic Tailwater)
└─**1=compound weir** (Orifice Controls 49.16 cfs @ 5.46 fps)

Secondary OutFlow Max=55.85 cfs @ 13.96 hrs HW=154.56' TW=153.24' (Dynamic Tailwater)
└─**2=bridge (overflow weir)** (Weir Controls 55.85 cfs @ 1.60 fps)

Pond 1P: Exst Pond



Summary for Pond 2P: stream to 60" twin culverts (DP-1)

Water will sit in stream channel until it reaches a minimum elevation of 150.72, since that is the lowest elevation of one of the 60" culverts. Therefore, this elevation was used as the starting elevation for the modeling of the stream and 60" twin culverts.

Inflow Area = 92.209 ac, 9.99% Impervious, Inflow Depth > 4.87" for 100-year event
Inflow = 105.02 cfs @ 13.96 hrs, Volume= 37.448 af
Outflow = 105.01 cfs @ 13.97 hrs, Volume= 37.446 af, Atten= 0%, Lag= 0.6 min
Primary = 105.01 cfs @ 13.97 hrs, Volume= 37.446 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 150.72' Surf.Area= 852 sf Storage= 735 cf
Peak Elev= 153.24' @ 13.97 hrs Surf.Area= 2,185 sf Storage= 4,157 cf (3,422 cf above start)

Plug-Flow detention time= 1.8 min calculated for 37.421 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (974.5 - 973.8)

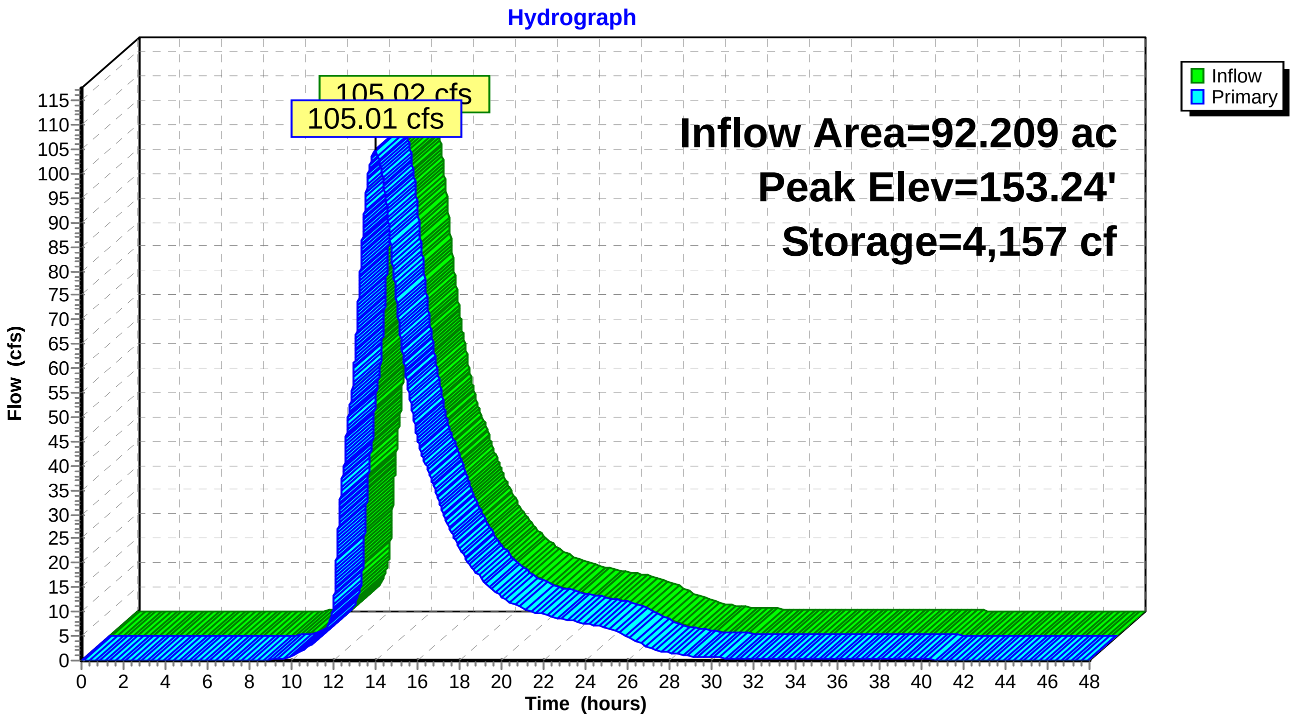
Volume	Invert	Avail.Storage	Storage Description
#1	149.70'	6,090 cf	**existing stream (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
149.70	596	131.8	0	0	596
152.00	1,239	152.2	2,066	2,066	1,161
154.00	2,902	266.7	4,025	6,090	5,001

Device	Routing	Invert	Outlet Devices
#1	Primary	150.72'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.10' S= 0.0063 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#2	Primary	150.77'	**60.0" W x 38.0" H, R=42.0" Elliptical Culvert** L= 98.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 150.40' S= 0.0038 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=105.00 cfs @ 13.97 hrs HW=153.24' (Free Discharge)
├─**1=Culvert** (Barrel Controls 56.28 cfs @ 7.30 fps)
└─**2=Culvert** (Barrel Controls 48.73 cfs @ 6.47 fps)

Pond 2P: stream to 60" twin culverts (DP-1)



Summary for Pond A: Pocket Pond (P-5)

Grate: Campbell Foundry Model # 3433.
Existing rip-rap for weir is 10 foot wide and will remain.

Inflow Area = 7.740 ac, 48.71% Impervious, Inflow Depth = 5.54" for 100-year event
Inflow = 37.52 cfs @ 12.13 hrs, Volume= 3.571 af
Outflow = 24.29 cfs @ 12.30 hrs, Volume= 3.534 af, Atten= 35%, Lag= 10.5 min
Primary = 24.29 cfs @ 12.30 hrs, Volume= 3.534 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 155.75' Surf.Area= 13,223 sf Storage= 22,302 cf
Peak Elev= 158.51' @ 12.30 hrs Surf.Area= 17,687 sf Storage= 64,727 cf (42,425 cf above start)
Flood Elev= 160.00' Surf.Area= 20,823 sf Storage= 93,104 cf (70,803 cf above start)

Plug-Flow detention time= 309.5 min calculated for 3.022 af (85% of inflow)
Center-of-Mass det. time= 193.4 min (995.1 - 801.7)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	93,104 cf	**pocket pond (Irregular)** Listed below

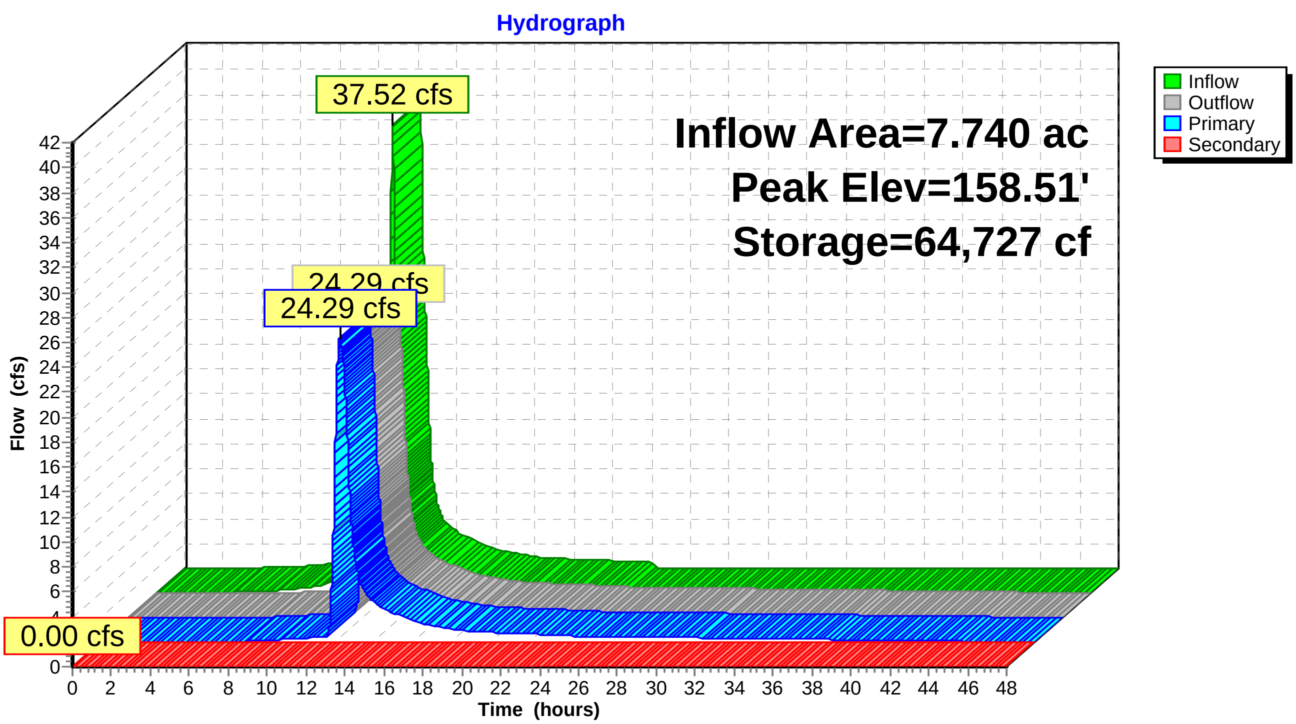
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
151.00	71	155.0	0	0	71
152.00	1,449	208.7	614	614	1,636
154.00	3,771	398.6	5,038	5,652	10,833
154.36	4,394	413.9	1,468	7,120	11,833
154.86	11,762	609.2	3,891	11,011	27,736
156.00	13,633	583.6	14,462	25,473	30,259
158.00	16,653	616.5	30,236	55,709	33,622
159.00	18,677	647.0	17,655	73,364	36,753
160.00	20,823	673.7	19,740	93,104	39,636

Device	Routing	Invert	Outlet Devices
#1	Primary	154.09'	**24.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 153.40' S= 0.0168 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	155.75'	**4.0" Vert. Orifice** C= 0.600
#3	Device 1	157.25'	**24.0" W x 9.0" H Vert. Slots (side) X 2.00** C= 0.600
#4	Device 1	157.25'	**36.0" W x 9.0" H Vert. Slot (front)** C= 0.600
#5	Device 1	158.50'	**36.0" x 55.5" Horiz. Grate X 4.00 columns** X 8 rows C= 0.600 in 1.3" x 6.5" Grate Limited to weir flow at low heads
#6	Secondary	159.00'	**153.0 deg x 10.0' long x 1.00' rise Trap Weir** C= 2.47

Primary OutFlow Max=24.29 cfs @ 12.30 hrs HW=158.51' TW=153.93' (Dynamic Tailwater)
└─**1=Culvert** (Passes 24.29 cfs of 27.98 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.68 cfs @ 7.76 fps)
  ├─**3=Slots (side)** (Orifice Controls 13.49 cfs @ 4.50 fps)
  ├─**4=Slot (front)** (Orifice Controls 10.12 cfs @ 4.50 fps)
  └─**5=Grate** (Weir Controls 0.00 cfs @ 0.34 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=155.75' TW=152.10' (Dynamic Tailwater)
└─**6=Trap Weir** (Controls 0.00 cfs)

Pond A: Pocket Pond (P-5)



Summary for Pond FB-1: Forebay

Inflow Area = 1.360 ac, 91.18% Impervious, Inflow Depth = 7.36" for 100-year event
Inflow = 10.50 cfs @ 12.08 hrs, Volume= 0.834 af
Outflow = 10.40 cfs @ 12.09 hrs, Volume= 0.834 af, Atten= 1%, Lag= 0.4 min
Primary = 10.40 cfs @ 12.09 hrs, Volume= 0.834 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 158.00' Surf.Area= 1,052 sf Storage= 1,843 cf
Peak Elev= 158.53' @ 12.31 hrs Surf.Area= 1,259 sf Storage= 2,451 cf (608 cf above start)
Flood Elev= 160.00' Surf.Area= 1,772 sf Storage= 4,707 cf (2,864 cf above start)

Plug-Flow detention time= 54.8 min calculated for 0.791 af (95% of inflow)
Center-of-Mass det. time= 2.0 min (759.1 - 757.1)

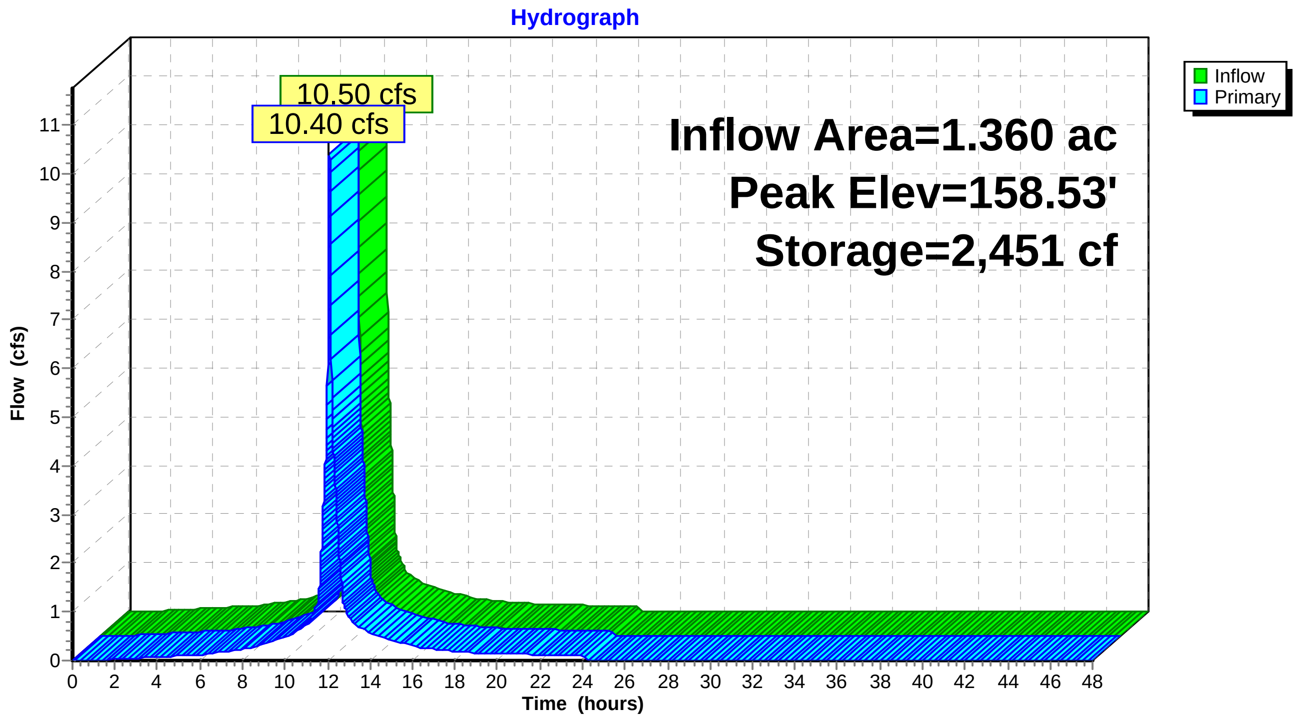
Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	4,707 cf	**Forebay (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
154.00	48	34.2	0	0	48
156.00	426	86.7	411	411	567
158.00	1,052	124.1	1,432	1,843	1,229
159.00	1,460	143.2	1,250	3,093	1,657
160.00	1,772	163.3	1,613	4,707	2,171

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**153.0 deg x 11.0' long x 1.50' rise Trap Weir** C= 2.47

Primary OutFlow Max=10.27 cfs @ 12.09 hrs HW=158.42' TW=158.10' (Dynamic Tailwater)
└─**1=Trap Weir** (Weir Controls 10.27 cfs @ 1.91 fps)

Pond FB-1: Forebay



Summary for Pond FB-2: Forebay

Inflow Area = 6.380 ac, 39.66% Impervious, Inflow Depth = 5.15" for 100-year event
Inflow = 28.89 cfs @ 12.14 hrs, Volume= 2.737 af
Outflow = 28.76 cfs @ 12.15 hrs, Volume= 2.737 af, Atten= 0%, Lag= 0.3 min
Primary = 28.76 cfs @ 12.15 hrs, Volume= 2.737 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 158.00' Surf.Area= 735 sf Storage= 1,551 cf
Peak Elev= 158.91' @ 12.16 hrs Surf.Area= 941 sf Storage= 2,315 cf (764 cf above start)
Flood Elev= 160.00' Surf.Area= 1,137 sf Storage= 3,445 cf (1,894 cf above start)

Plug-Flow detention time= 13.9 min calculated for 2.701 af (99% of inflow)
Center-of-Mass det. time= 1.0 min (814.7 - 813.7)

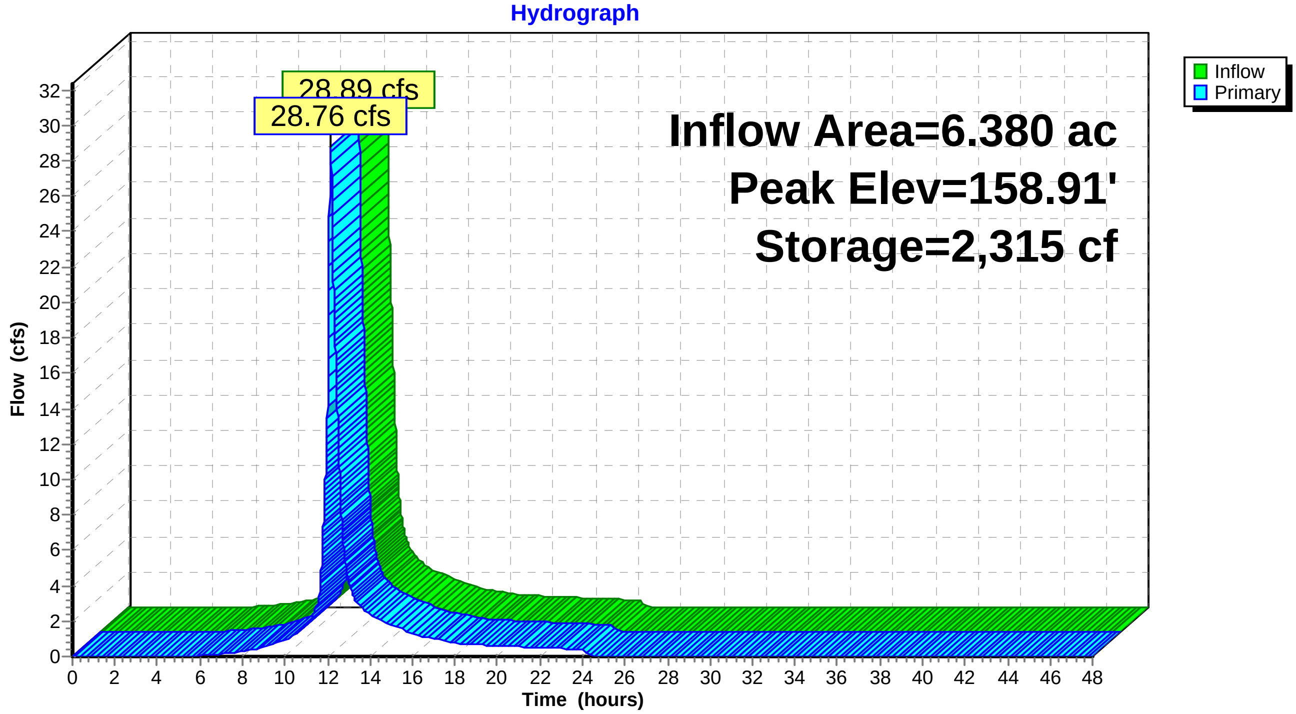
Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	3,445 cf	**forebay (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
154.00	113	50.1	0	0	113
156.00	374	77.5	462	462	419
158.00	735	103.4	1,089	1,551	834
159.00	962	116.9	846	2,397	1,095
160.00	1,137	100.3	1,048	3,445	1,401

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**153.0 deg x 8.0' long x 1.50' rise Trap Weir** C= 2.47

Primary OutFlow Max=28.49 cfs @ 12.15 hrs HW=158.91' TW=158.31' (Dynamic Tailwater)
└─**1=Trap Weir** (Weir Controls 28.49 cfs @ 2.65 fps)

Pond FB-2: Forebay



Appendix I

Post-Construction Inspections and Maintenance

STORMWATER MAINTENANCE NOTES:

1. THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR ALL INSPECTIONS AND MAINTENANCE OF ALL STORMWATER MANAGEMENT FACILITIES/BASINS.
2. THE OWNERS DESIGNATED PROFESSIONALS SHALL PERFORM ALL STORMWATER MANAGEMENT RELATED INSPECTIONS AND PREPARE ALL NECESSARY REPORTS TO THE SATISFACTION OF THE TOWN ENGINEER AND TOWN STORMWATER MANAGEMENT OFFICER. ALL INSPECTIONS SHALL BE CONDUCTED IN ACCORDANCE WITH THIS PLAN AND PROCEDURES OUTLINED IN APPENDIX G OF THE LATEST REVISION OF THE NEW YORK STATE STORMWATER MANAGEMENT DESIGN MANUAL. MAINTENANCE OF THE STORMWATER MANAGEMENT FACILITIES SHALL BE PERFORMED IN ACCORDANCE WITH THE INSPECTION REPORTS, THE SUBDIVISION PLANS, AND THE STORMWATER MAINTENANCE TABLE BELOW. ANY ADJUSTMENTS OR MODIFICATIONS SHALL BE NOTED IN THE INSPECTION REPORTS AND SUBMITTED TO THE TOWN STORMWATER MANAGEMENT OFFICER FOR ACCEPTANCE.
3. ALL PLANTING INSPECTIONS AND MAINTENANCE SHALL BE PERFORMED AS PER THE STORMWATER MAINTENANCE TABLE LISTED BELOW. AN INSPECTION REPORT SHALL BE PREPARED BY THE OWNER/DEVELOPER'S DESIGNATED PROFESSIONAL AND SUBMITTED TO THE OWNER/DEVELOPER FOR HIS RECORDS. THE OWNER/DEVELOPER SHALL PROVIDE THE TOWN OF WAPPINGER ZONING ADMINISTRATOR AND/OR TOWN STORMWATER MANAGEMENT OFFICER WITH A COPY OF SUCH REPORTS UPON REQUEST. THE OWNER WILL BE RESPONSIBLE FOR ALL EXPENSES NECESSARY FOR INSPECTIONS AND MAINTENANCE OF STORMWATER MANAGEMENT FACILITY PLANTINGS. ANY ADJUSTMENTS OR MODIFICATIONS SHALL BE NOTED IN THE INSPECTION REPORTS AND SUBMITTED TO THE TOWN STORMWATER MANAGEMENT OFFICER FOR ACCEPTANCE.

STORMWATER MAINTENANCE TABLE

MAINTENANCE ITEM	FREQUENCY	DESCRIPTION OF INSPECTION PARAMETERS	DESCRIPTION OF REMEDY PROCEDURES
1) EMBANKMENT AND OVERFLOW WEIR	ANNUAL & AFTER MAJOR STORMS	FIELD REPRESENTATIVE SHALL INSPECT FOR THE FOLLOWING: –VEGETATION – 80% COVERAGE + LESS THAN 15% INVASIVE PLANT SPECIES –EMBANKMENT EROSION –ANIMAL BURROWS –UNAUTHORIZED PLANTINGS –CRACKING, BULGING, OR SLIDING OF DAM –FUNCTION OF POND DRAIN –SEEPS AND LEAKS OF DOWNSTREAM FACE –RIP–RAP FAILURE –VERTICAL ALIGNMENT OF TOP OF DAM "AS BUILT" –SPILLWAY WEIR EROSION AND DEBRIS	MAINTENANCE/REPAIR REPRESENTATIVE SHALL REPAIR RESPECTIVE DEFICIENCY AS FOLLOWS: –RESTORE TO ORIGINAL SPECIFICATIONS AS PER PLANTING PLAN –REPLACE RIP–RAP AS NECESSARY, SCARIFY SEED & MULCH –REMOVE –REMOVE –STABILIZE AND RESTORE TO ORIGINAL SPECIFICATIONS –CLEAN AS NECESSARY –STABILIZE & REPAIR ANY BREACH ALONG EMBANKMENTS –RESTORE RIP–RAP COVER AS NECESSARY –ADD/REMOVE MATERIAL AND STABILIZE TO ORIGINAL DESIGN SPECIFICATIONS –CLEAN DEBRIS & ADD RIP–RAP AS NECESSARY
2) PERMANENT POOL	MONTHLY	FIELD REPRESENTATIVE SHALL INSPECT FOR THE FOLLOWING: –UNDESIRABLE VEGETATIVE GROWTH –FLOATING OR FLOATABLE DEBRIS –VISIBLE POLLUTION –SHORELINE PROBLEM	MAINTENANCE/REPAIR REPRESENTATIVE SHALL REPAIR RESPECTIVE DEFICIENCY AS FOLLOWS: –REMOVE –REMOVE –REMOVE –STABILIZE AND RESTORE TO ORIGINAL SPECIFICATION
3) SEDIMENT FOREBAY	MONTHLY	FIELD REPRESENTATIVE SHALL INSPECT FOR THE FOLLOWING: –SEDIMENTATION GREATER THAN 50% OF TOTAL DEPTH BETWEEN BOTTOM OF POND ELEVATIONS AND SPILLWAY ELEVATIONS SHOWN ON PLANS	MAINTENANCE/REPAIR REPRESENTATIVE SHALL REPAIR RESPECTIVE DEFICIENCY AS FOLLOWS: –REMOVE SEDIMENT FROM FOREBAY, AND DISPOSE
4) WETLAND PLANTINGS	ANNUALLY	FIELD REPRESENTATIVE SHALL INSPECT FOR THE FOLLOWING: –SURVIVAL OF DESIRED WETLAND PLANTS –80% COVERAGE OF WETLAND PLANTS + LESS THAN 15% INVASIVE PLANT SPECIES AFTER 2ND GROWING SEASON –DISTRIBUTION OF PLANTS AS PER LANDSCAPING PLAN –ANY EVIDENCE OF UNDESIRABLE INVASIVE SPECIES –MAINTENANCE OF ADEQUATE WATER DEPTHS PLANT SPECIES –CHOKING OF PLANTS DUE TO EXCESSIVE SEDIMENT DEPTHS –EUTROPHICATION LEVEL OF THE POND/WETLAND AREA	MAINTENANCE/REPAIR REPRESENTATIVE SHALL REPAIR RESPECTIVE DEFICIENCY AS FOLLOWS: –RE–PLANT WETLAND SPECIES AS NECESSARY –RESTORE AS NECESSARY –RE–DISTRIBUTE AS NECESSARY –REMOVE –CLEAN OUTLETS TO RESTORE APPROPRIATE WATER LEVELS –REMOVE POND SEDIMENT AS NECESSARY –RESTORE EUTROPHICATION LEVEL AS NECESSARY
5) MISCELLANEOUS	MONTHLY	FIELD REPRESENTATIVE SHALL INSPECT FOR THE FOLLOWING: –ANY ENCROACHMENT INTO THE POND AREA –COMPLAINTS FROM RESIDENTS –POND AESTHETICS (GRAFFITTI, LACK OF GRASS COVER, ETC.) –SIGNS OF HYDROCARBON BUILD–UP –ANY POSSIBLE PUBLIC HAZARDS	MAINTENANCE/REPAIR REPRESENTATIVE SHALL REPAIR RESPECTIVE DEFICIENCY AS FOLLOWS: –REMOVE/REMEDY AS NEEDED –NOTE COMPLAINT AND DISCUSS WITH OWNER AND ENGINEER AS NEEDED –REMOVE ANY GRAFFITTI AND SCARIFY, SEED AND MULCH AS NEEDED –REMOVE –NOTIFY TOWN AND DISCUSS WITH OWNER AND TOWN AS NECESSARY

Appendix J

NYS Parks, Recreation and Historic Preservation Correspondence

New York State
Parks, Recreation and
Historic Preservation

KATHY HOCHUL
Governor

ERIK KULLESEID
Commissioner

January 05, 2023

Wendy Przetakiewicz
Povall Engineering, PLLC
3 Nancy Court, Suite 4
Wappingers Falls, NY 12590

Re: SEQRA
Site Plan for BAC Properties, LLC Full Build Out
30 Airport Dr, Wappingers Falls, NY 12590
22PR09377
Job No. 2223

Dear Wendy Przetakiewicz:

Thank you for requesting the comments of the Office of Parks, Recreation and Historic Preservation (OPRHP). We have reviewed the project in accordance with the New York State Historic Preservation Act of 1980 (Section 14.09 of the New York Parks, Recreation and Historic Preservation Law). These comments are those of the OPRHP and relate only to Historic/Cultural resources. They do not include potential environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8) and its implementing regulations (6 NYCRR Part 617).

Based upon this review, it is the opinion of OPRHP that no properties, including archaeological and/or historic resources, listed in or eligible for the New York State and National Registers of Historic Places will be impacted by this project.

If further correspondence is required regarding this project, please be sure to refer to the OPRHP Project Review (PR) number noted above.

Sincerely,

Roger Daniel Mackay

R. Daniel Mackay

Deputy Commissioner for Historic Preservation
Division for Historic Preservation

rev: J. Carter