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NEW CASTLE ASPHALT, LLC.

RENSSELAER PLANT CONSTRUCTION PROJECT

City of Rensselaer, Rensselaer County, New York

CONSTRUCTION

STORMWATER POLLUTION PREVENTION PLAN

For Compliance Under SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001)

PREPARED BY:

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May 31, 2011

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NEW CASTLE ASPHALT, LLC.
RENSSELAER PLANT CONSTRUCTION PROJECT

(A HOT ASPHALT MIXING FACILITY)

City of Rensselaer, Rensselaer County, New York

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STORMWATER POLLUTION PREVENTION PLAN

For The

Rensselaer Plant Construction Project

New Castle Asphalt, LLC
118 Button Road Waterford, New York 12188

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations."

____
Roderick J. Valente, Managing Partner
New Castle Asphalt, LLC

NEW CASTLE ASPHALT, LLC
RENSSELAER PLANT CONSTRUCTION PROJECT

CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

This Stormwater Pollution Prevention Plan has been prepared for New Castle Asphalt LLC's Rensselaer Plant Construction Project. The following report and plans are prepared as required by the City of Rensselaer City Code Section 145 Article I. As required, the Stormwater Pollution Prevention Plan has been prepared in accordance with the New York State Department of Environmental Conservation State Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Construction Activity, Permit No. GP-0-10-001, issued pursuant to Article 17, Titles 7, 8 and Article 70 of the Environmental Conservation Law. The General Permit is for a term beginning January1, 2010 and expires on January 28, 2015.

1.0 INTRODUCTION

The issuance of stormwater discharge permits is part of an effort by the United States Environmental Protection Agency (EPA) to maintain the Nation's water quality in accordance with the Clean Water Act. In New York, the Stormwater Permit Program is administered through the New York State Department of Environmental Conservation (NYS DEC). The NYS DEC has delegated implementation of the Construction Activity Permit Program to the local municipal level through conditions contained within the NYS DEC Municipal Separate Storm Sewer System (MS4) State Pollutant Discharge Elimination System Permit (SPDES), in this case the City of Rensselaer. In accordance with the City of Rensselaer City Code Section 145 Article I, the applicant must comply with the New York State (NYS) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (CA). New Castle Asphalt, LLC is required to develop and implement a Stormwater Pollution Prevention Plan (SWPPP) that is designed to minimize the effects of erosion and sedimentation caused during land disturbance activities as well as reduce potential stormwater pollution during the course of construction. Additionally, the SWPPP will address the minimum required stormwater design standards contained within the NYS DEC Stormwater Design

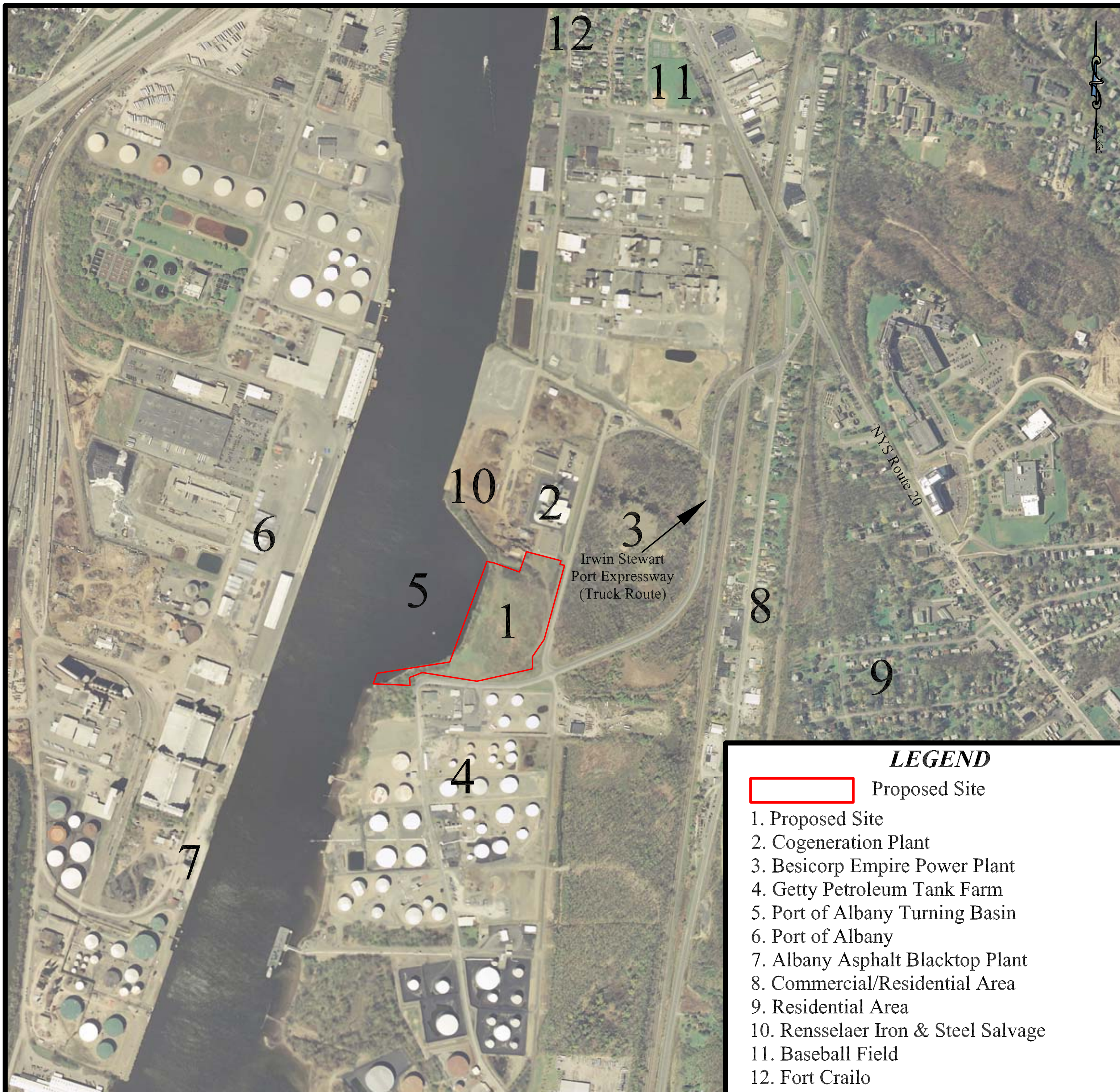
Manual (SDM), dated August 2010. The following report analyzes existing and proposed hydrologic conditions, discusses construction activities and materials, and evaluates potential pollutant sources for the New Castle Asphalt's Rensselaer Plant Construction Project. The SWPPP will also discuss operation and maintenance procedures and pollution prevention measures designed specifically to prevent sediments or pollutants from entering the stormwater conveyance system following the construction period.

1.1 Project Background

The project site is located along the western side of Riverside Avenue just north of the intersection of Riverside Avenue and the Irwin Stewart Port Expressway, as shown on the Site Location Map (see next page), in the City of Rensselaer, Rensselaer County. The site is accessed from Riverside Avenue via the Irwin Stewart Port Expressway from U.S. Route 20.

In general, the site grades gently from an approximate high elevation of 26 feet above mean sea level at the top of the bank along the Hudson River down to an elevation of approximately 18 feet along the active railroad spur on the east side of the property. The easternmost part of the site grades up slightly to elevation 19 feet towards Riverside Avenue. The property narrows in its southwestern portion near the 90 degree turn in Riverside Avenue. This part of the property grades to the steep bank of the Hudson River.

The proposed project includes site development activities to facilitate the erection and subsequent operation of a 400-ton per hour rotary counter-flow drum asphalt (blacktop) mixing facility. The mechanical facilities will include: cold-feed bins, conveyors, screens, a counter-flow rotary drum, an air emission control system, a liquid asphalt bulk storage facility, a bulk fuel storage facility (plant and equipment), a plant control room and an associated employee services/lab building with an on-site septic system. Utilities necessary for the operation of the hot asphalt mixing plant include: natural gas, electric and water. Ancillary components of the project include: construction of site access road,



New Castle Asphalt, LLC

Rensselaer Plant

City of Rensselaer, Rensselaer County, New York

LOCATION MAP
FOR CONSTRUCTION SWPPP

G-L Engineering, P.C.
8 Brunswick Road Troy, NY 12180
Phone: (518) 270-5920 Fax: (518) 270-5922

DETAILS

Date: 1/28/11
Scale: 1" = 1000'
Contour Interval: N/A
USGS Base: Albany 7.5', Troy South 7.5', Delmar 7.5', East Greenbush 7.5'
Project Manager: PHG
Drafted by: JWR
Checked by: PHG
Base Map(s):
1) 2007 One Foot Color Orthoimages from NYS GIS Clearinghouse

Scale: 1" = 1000'

1000 0 1000 2000

construction of a stormwater management system and creation of the stockpile and plant areas.

1.2 Surface Water Discharges Covered Under the Permit

Requirements under the current permit apply to stormwater discharges associated with construction of a new hot asphalt (blacktop) mixing facility. The stormwater management system has been designed to accommodate stormwater discharges expected from the site during construction activities. The stormwater system has also been designed to comply with current New York State Standards during the future operation of the facility. In addition to stormwater discharges, the current SPDES General Permit allows for the discharge of several incidental sources of surface water during construction. Of those allowed, it can be expected that surface water discharges from the following activities may be present during the construction period.

1. Vehicle washing operations, so long as the wash waters contain no detergents;
2. Dust control operations;
3. Building wash waters, so long as the wash waters contain no detergents;
4. Pavement wash waters, so long as the wash waters contain no detergents and the surface being washed contains no spills or all spills have been appropriately clean from the surface prior to washing;
5. Ground water and spring water, if they are encountered, so long as the waters contain no contamination;
6. Construction site de-watering water, so long as the waters contain no contamination;
7. Foundation & footer drain water, so long as the waters contain no contamination.

1.3 Potential Stormwater Contaminants

The following potential stormwater contaminants can be associated with construction of the hot asphalt mixing facility and are capable of impacting stormwater quality during the construction period: oil, grease, lubricants, coolants and other miscellaneous petroleum-based and non-petroleum-based fluids used in the operation and maintenance of heavy construction equipment.

Following construction of the hot asphalt mixing facility but prior to subsequent operation, it will be necessary to obtain a SPDES Multi-Sector General Permit for Stormwater Discharges Associated with an Industrial Activity. To do so, it will be necessary to prepare and implement a site specific Stormwater Pollution Prevention Plan (SWPPP) prepared in accordance with the SPDES Multi-Sector General Permit for Stormwater Discharges Associated with an Industrial Activity (MSGP). The MSGP SWPPP will describe all of the potential stormwater contaminants stored or used on-site and will provide a description of the Best Management Practices proposed to prevent potential contaminants from entering the stormwater management system.

1.4 Historic Preservation Information

The CA General Permit requires documentation that the proposed construction activity will not adversely affect any historic structures or properties. A search of the NYS Office of Parks, Recreation, and Historic Preservation (OPRHP) website database was performed for the site location. A map showing the results of the database search is included in Appendix B.

Additionally, a complete Phase B Archeology Study was preformed on the site. The results of the study can be found in Site Plan Application materials. The study indicates that no historic structures or properties will be negatively impacted by the construction or operation of the proposed hot asphalt mixing facility.

2.0 SOILS

The surface soils within the New Castle Asphalt Rensselaer Plant Construction Project Area are noted on the Site Plan Map (Existing Conditions) included in the Appendix. The United States Department of Agriculture, Natural Resources Conservation Service, Rensselaer County Soil Survey indicates the following soils exist, or existed prior to construction, on the property:

> Ue – Udorthents - The map unit consists of nearly level areas of material that were dredged from the Hudson River. In places, the material is deposited in small knolls or knobs. Slope is mostly 0 to 5 percent. The soils are deep, sandy, and moderately well drained to excessively well drained. The soils are too variable to have a typical profile. Texture is mostly loamy sand or sand with varying amounts of gravel. Gravelly layers are close to the surface in most places. The soils are flooded occasionally. Bedrock is generally at a depth greater than 10 feet. (Hydrologic Soil Group A)

Several test pits have been excavated across the site. Initial test pits were conducted to establish a baseline for the archeology study. Soils encountered during these initial test pits indicate the site's soil profile generally can be described as:

0-12"	Crushed Stone Parking Lot Area (Underlain by fabric)
12" – 24"	Organic to Inorganic Solid Waste Materials
24" – Varies	Level to Nearly Level Layered Silt/Clay Materials

Soil test pit results indicate on-site soils are composed of various layered lake silts and clays. Hydrologic Soils Group C or D (assume D soils).

Additional tests pits will need to be excavated as part of the site investigation work conducted to design the on-site sanitary wastewater system. Soil profiles will be documented at the time of the test pits.

3.0 GENERAL PERMIT REQUIREMENTS

The primary requirements of the SPDES General Permit for Stormwater Discharges from Construction Activity are addressed in the following parts.

3.1 Construction Erosion and Sediment Controls

3.1.1 Construction Phasing Plan

The following list of items has been assembled into groups to provide a construction schedule for completion of the project.

3.1.1.1 Tasks

Task 1 – Place construction/safety fencing along the site perimeter to protect existing vegetated areas that are to remain after construction as vegetated buffer areas.

Task 2 – Place temporary silt fence along the site perimeter. Initially place silt fence along the eastern perimeter of the site.

Task 3 – Re-construct existing crushed stone entrance area (eastern) from Riverside Avenue (approximately 1 acre). Construct a temporary roll-over berm at the top of the access road ramp. Place temporary construction entrance in location of permanent access road alignment.

Task 4 – Strip any topsoil from the initial areas of excavation and fill placement (approximately 0.5 acres). Include the eastern perimeter berm areas and the stormwater management area. Stockpile topsoil on-site within the perimeter silt fence area.

Task 5 - Excavate soil materials from the area to be used as the stormwater management ponds (approximately 2 acres). Construct stormwater inlet and outlet structures. The stormwater management system will be used as temporary stormwater holding basins for surface waters during construction. The basins will be allowed to temporarily discharge to the existing surface water drainage corridor for off-site discharge.

Task 6 – Use material excavated from Task 4 above, to construct the perimeter berm around the eastern perimeter of the stormwater management area.

Task 7 – Install perimeter silt fence along the north-eastern perimeter. Complete any necessary clearing of tree cover.

Task 8 – Strip topsoil along the northern perimeter berm area (approximately 1 acre). Stockpile topsoil within the perimeter silt fence.

Task 9 - Use material excavated under Task 5 above, to construct the perimeter berm around the northern site perimeter (approximately 2 acres). The top of the perimeter berm will be constructed to the elevations shown on the grading plan.

Task 10 – Stabilize outside edge of perimeter berm slopes surrounding the eastern perimeter. Stabilization shall be accomplished by the placement of four to six inches of topsoil, seeding, and mulching. A jute erosion control fabric will be used to permanently stabilize the outer slope of all perimeter berms. Topsoil, seed, mulch and jute erosion control fabrics will be placed as sections of the eastern perimeter berm are completed.

Task 11 – Place silt fence along the southern perimeter.

Task 12 – Strip any topsoil materials from the southern perimeter berm area (approximately 0.5 acres).

Task 13 – Stabilize outer slope of northern perimeter berm. Place four to six inches of topsoil, seed, mulch and jute erosion control fabric.

Task 14 – Following construction of the northern perimeter berm, excavation work in the plant area will be started (approximately 2 acres). Excavation work will begin along the eastern perimeter and will proceed in a western direction.

Task 15 – Re-grade eastern perimeter of proposed stockpile area. Stabilize areas at final elevations using Item 4 or Crushed Stone materials.

Task 16 – Soil materials excavated from the plant area, Task 14 above, will be used to construct the southern perimeter berm and to re-grade the southern portions of the site (approximately 2 acres). Materials will be placed along the eastern perimeter berm and fill work shall proceed in a western and southern direction up to the perimeter berm. As work areas within the site reach final grade, a top surface of Item 4 or crushed stone will be placed to stabilize the stockpile area.

Task 17 – As re-grading work is completed in the eastern stockpile area, work will be begin on the excavation and installation of the stormwater outlet system. All pipe work for the stormwater outlet system will begin at the existing manhole and proceed up the system to the stormwater detention pond (approximately 1 acre).

Task 18 – In conjunction with the installation of the stormwater outlet system, excavation and installation of the new natural gas service will begin. All soil materials excavated during installation of the natural gas service will be stockpiled within the existing perimeter silt fence.

Task 19 – Stabilize the outer slope of the southern perimeter using four to six inches of topsoil, seed, mulch and jute erosion control fabric.

Task 20 – Following completion of the southern perimeter berm, a second stabilized construction entrance will be constructed in the location of the western access road entrance area (approximately 1 acre). A roll-over curb will be installed at the crest of the access road alignment.

Task 21 – Place western perimeter silt fence.

Task 22 – Clear existing tree cover along the western site perimeter.

Task 23 – Strip topsoil from the western perimeter berm area (approximately 1 acre). As well, strip any topsoil from below fill areas along the western perimeter road and stockpile area.

Task 24 – A new electric service and the proposed water service will be constructed along the western access road alignment. All soil materials excavated from the electric and water services shall be stockpiled within the existing perimeter silt fence.

Task 25 – Use materials excavated from the plant area to complete re-grading and fill work along the western perimeter (approximately 2 acres).

Task 26 – Stabilize outer slope of western perimeter berm using four to six inches of topsoil, seed, mulch and a jute erosion control fabric.

Task 27 –Finish construction of the stormwater management pond systems. Excavate any soil materials contained within the pond system. Excavate pond system to final grade shown on grading plan. Stabilize pond system using four to six inches of topsoil, seed and mulch. Place jute erosion control fabric above waterline of all pond system.

Task 28 – Pave areas of the site that require concrete spill prevention pads.

Task 29 – Erect mechanical equipment for hot asphalt mixing facility. Install any associated structures such as: fuel tanks, asphalt tanks, additive tanks and any associated piping.

Task 30 – Complete all on-site paving activities to stabilize roadways.

Task 31 – Construct Lab Building and associated on-site septic system (approximately 1 acre). Stabilize on-site septic system as per Rensselaer County DOH requirements.

Task 32 – Remove any and all temporary erosion and sediment control measures, such as silt fence.

3.1.2 Erosion and Sediment Control Practices

Temporary erosion and sediment control practices required as part of the overall project have been included within the proposed construction schedule developed within the preceding section.

3.1.3 Temporary and Permanent Soil Stabilization Plan

The current SPDES General Permit for Stormwater Discharges from Construction Activity requires that all areas of soil disturbed by construction operations be stabilized either permanently or temporarily if no further disturbance will be conducted within a seven (7) day period. The construction schedule proposed for the project limits the disturbance created by each of the construction tasks to the minimum time period necessary for completion. The construction schedule outlines the progress of the work and an approximation of when final stabilization should be completed. Temporary topsoil, seed, and mulch specifications are included in Appendix D. Temporary measures will be necessary for the following work tasks:

3.1.3.1 Temporary Stormwater Holding Basins

Temporary stormwater holding basins will be constructed in the location of the final stormwater holding basins. Construction stormwater management basins will be developed from the final post-construction stormwater management basins. The sediment trap and final dry detention basin will be used to treat construction stormwater. In accordance with the NYS DEC Sediment and Erosion Control Guidelines construction stormwater control should provide roughly 3,600 cubic feet of storage per disturbed acre. Given the storage volume of the sediment trap and the dry detention basin below the primary outlets the construction disturbance should not exceed 4 acres at any one time.

3.1.3.2 Permanent Soil Stabilization

Permanent soil stabilization for the project will be undertaken upon final completion of each individual work task. The proposed construction schedule outlines the progress of the work tasks and when final stabilization should be completed. Topsoil, seed, and mulch specifications are included in Appendices E to detail the final stabilization procedure.

3.1.4 Temporary E&SC Material Specifications and Installation Details

Material specifications and installation details have been developed for each component of the proposed project. Temporary material specification sheets and installation details have been included in Appendix D.

3.1.5 Pollution Prevention Measures

During the course of construction the owner/operator and the contractor/subcontractor will be responsible for the upkeep and maintenance of the construction site. The construction site will be controlled to prevent incidents where construction operations can have an impact on receiving waters.

The owner and/or contractor will mitigate waste or litter materials present on the construction site on a daily basis. Litter and operational solid waste will be kept from entering any waterway or other water-bearing structure and controlled on site by the placement and use of on-site dumpsters. Dumpsters will be positioned near the construction operations and equipped with fully functional covers.

The owner and/or contractors will prevent construction chemicals and materials from entering any waterway or other water bearing structure. Construction chemicals, if required during construction, will be handled, stored and used as described within the manufacturers written instructions. At a minimum, all construction chemicals will be stored within a covered construction trailer or box container prior to their intended use. Any spills of construction chemicals during their use will be reported to the on-site construction manager and/or the site stormwater inspector. Any spills occurring during construction will be reported to NYSDEC as required and will be cleaned up according to directions from NYSDEC where applicable. All other spills will be cleaned up according to the manufacturer's directions.

Control of construction debris on the site will be undertaken by the contractor responsible for generating the construction debris. All construction debris will be properly contained on site during construction. A specific construction debris container will be provided during construction. Daily construction operations will include an end of day inspection for miscellaneous construction debris. All construction debris will be placed into the proper containers for disposal on a daily basis. All materials will be removed to an appropriate permitted solid waste disposal facility.

3.1.6 Discharges Associated w/ Industrial Activity

The proposed construction project does not include the temporary use of any industrial facilities such as temporary concrete mixing facilities or hot asphalt mixing facilities. The construction project is the development of a hot asphalt mixing facility.

3.1.7 Identify Non-Conformance w/ Technical Standard

There are no known variations from the design standard.

3.2 Post Construction Stormwater Management Practices

In accordance with Table 2 from Appendix B of the SPDES General Permit for Stormwater Discharges from Construction Activities, the proposed re-development project, construction of a hot asphalt mixing facility, is required to meet the design standards contained within the New York State DEC Stormwater Design Manual (SDM). The NYS SDM, in Chapter 3, provides a 5-step site planning methodology that must be followed in development of a site-specific SWPPP. The required site planning process is as follows:

1) Preserve Natural Features and Reduce Impervious Cover, then
2) Calculate Water Quality Volume for Proposed Site, then
3) Incorporate Green Infrastructure Techniques and Standard SMP’s with Runoff Reduction Volume (RRv) to eliminate or reduce the total proposed WQv, then
4) Use standard SMP’s to treat the remaining WQv, where applicable, then
5) Design for Volume and Rate Control Practices, where applicable.

Runoff Reduction, the primary component of the new design process, can be accomplished by infiltration, ground-water recharge, reuse, recycling or evaporation/evapotranspiration. This requirement can be accomplished by application of on-site Green Infrastructure techniques, standard SMP's with runoff reduction capacity, and good operation and maintenance. The SWPPP must demonstrate that all Green Infrastructure planning and design options were evaluated in an attempt to meet the runoff reduction requirement and must provide documentation if any components of this approach are not technically feasible. Projects that cannot meet the 100 percent runoff reduction requirement must provide a justification that evaluates each of the Green Infrastructure planning and reduction techniques, Chapter 5 of the SDM, and identifies the specific limitations of the site that make application of the technique technically infeasible.

Projects that cannot meet the Runoff Reduction criteria, at a minimum, must reduce a percentage of the Runoff Reduction Volume, for this site approximately 20 to 30 percent of the WQv. For projects identified as "hotspots", runoff reduction cannot be provided by infiltration, unless an enhanced treatment for the pollutant of concern is provided ahead of the infiltration practice.

There is only one exception to meeting the Runoff Reduction criteria (RRv), that is:

1) the RRv criteria is not required for re-development projects that meet the application criteria in Section 9.3.1.

In general, re-development project are expected to comply with the technical standards contained within the NYS DEC SDM. However, under circumstances where one of the re-development application criteria contained in 9.3.1 are met and the project utilizes the alternative sizing and selection of stormwater management controls contained within Chapter 9 of SDM, the SWPPP can be considered in compliance with the SDM.

The re-development criteria contained in Chapter 9 of the SDM are as follows:

1) An existing impervious area is disturbed and then reconstructed as either a pervious or an impervious surface, and

2) There is inadequate space for controlling stormwater runoff from the reconstructed area, or

3) The physical constraints of the site do not allow meeting the required elements of the standard practices.

The application criteria are not solely based upon the conditions of the disturbed area. In determining feasibility of siting SMP's, the entire site within the property boundaries must be considered.

The proposed project can be considered a re-development project meeting the re-development criteria of Chapter 9 Section 9.3.1. The following section describes in detail the Green Infrastructure techniques evaluated and the technical issues preventing the use of each.

Step 1 - Preserve Natural Features and Reduce Impervious Cover

A.1. Preservation of Undisturbed Areas

This green infrastructure practice requires the design engineer to delineate and place into permanent conservation areas undisturbed forested and native vegetated areas, riparian corridors, wetlands and natural terrain features.

The proposed site layout has taken into consideration all of the above listed site features; however, the project applicant is not the site owner and does not have the legal property rights to designate any area of the site as a permanent conservation area. The site layout chosen attempts to minimize disturbance within any existing forested and vegetated areas and limits disturbance of any natural terrain features. The drainage basin containing the site disturbance activities does not include any known wetlands or riparian corridors. A riparian corridor does exist in the drainage basin adjacent to the site disturbance activities, that riparian corridor has been isolated from the proposed site disturbance activities by a soil perimeter berm and will be maintained in an undisturbed condition.

A.2 Preservation of Buffers

This green infrastructure practice requires the design engineer to delineate and place into permanent conservation areas vegetated buffers along perennial streams, rivers, shorelines and wetlands.

The proposed project has been designed to avoid all of the sensitive areas listed. The drainage basin containing the site disturbance activities does not include any known wetlands or perennial streams, rivers or shorelines.

The project applicant is a leaseholder on the property and does not have the legal property rights to place land into permanent conservation areas. Additionally, the local community has an approved Local Waterfront Revitalization (LWR) Plan for the Hudson River riverfront area. The LWR plan requires the project sponsor to comply. The LWR plan calls for the waterfront lands to remain developable for marine-based industrial activity; thus, making it impracticable to preserve the riverfront areas under a permanent conservation mechanism.

The property is situated adjacent to the Hudson River; however, the project has been designed to limit the disturbed area within the drainage basin incident upon the Hudson River shoreline. As part of the project, a soil perimeter berm will be developed along the eastern crest of the river bank, isolating the project from the Hudson River corridor.

A.3 Reduce Clearing and Grading

This green infrastructure practice requires the design engineer to limit clearing and site grading activities to the minimum amount required to develop the proposed facility. Clearing and grading can be used to construct roadways, driveways, foundations, utilities and stormwater management facilities.

The proposed clearing and grading activities have been minimized to the greatest extent possible, while being able to develop the site in a manner consistent with the business aspirations of the leaseholders. Clearing and grading has been for the most part contained within the previously developed impervious area.

A.4 Less Sensitive Areas

This green infrastructure practice requires the design engineer to avoid sensitive areas such as floodplains, steep slopes, erodible soils, wetlands, mature forests and critical habitats by locating development in areas that will both fit the terrain and create the least impact from development.

The proposed site layout has taken into account the various sensitive areas located on the re-development parcel. The proposed site layout avoids any areas of known wetlands, steep slopes, erodible soils and critical habitat areas. The proposed project does have a minor impact on the local 100-year flood plain. The proposed project includes a soil perimeter berm and an access roadway developed at an elevation capable of preventing the project area from flooding, during a 100-year flood event (approximately elevation 19.5 feet amsl). As proposed a small section of the soil perimeter berm and access roadway will be constructed within the existing 100-year flood plain. Approximately 1,500 cubic yards of fill material will be placed within the 100-year flood plain along the eastern perimeter of the site. A small section (roughly 1.25 ac.) of tree-covered area will be cleared and graded to provide additional space for the industrial activity area and to provide an undisturbed location for an on-site septic treatment system. Clearing will be kept to the minimum amount required to construct the soil perimeter berm and access roadway, as well as the on-site septic treatment system.

A.5 Open Space Design

This green infrastructure practice requires the design engineer to use cluster design, open space design or conservation design to reduce impervious cover, preserve open space and protect water resources.

The site layout has been developed with the above listed design strategies in mind. The proposed site layout clusters the industrial develop within the central area of the site leaving the remaining areas of the site undisturbed. The final site layout, as shown on the project plan, maintains a vegetated green-space buffer surrounding the industrial activity area that is roughly 53 percent of the property. The undisturbed buffer along the Hudson River will help to protect water resources as well as preserve open space.

A.6 Soil Restoration

This green infrastructure practice requires the design engineer to restore the original properties and porosity of soil by deep tilling and amendment with compost to reduce the generation of stormwater runoff and enhance runoff reduction performance in post-construction practices.

The proposed project, re-development of an industrial land use, includes a soil perimeter berm and access roadway around the perimeter of the new industrial land use. All of the land area within the perimeter berm will be maintained as industrial use. No soil restoration work will be done within the proposed soil perimeter berm.

There are several locations on the property where past impervious areas will remain outside the proposed soil perimeter berm and access roadway. These areas are small sections of an old crushed stone parking area and old access roadways. These areas of crushed stone will be removed and the crushed stone materials will be used in the site re-development project. Following removal of the crushed stone materials, soil restoration activities will be completed prior to returning the areas to pervious grass covered open-space.

B. Reduction in Impervious Cover

This green infrastructure practice requires the design engineer to evaluate the possibilities of reducing the impervious cover created by paved travelways. The proposed site re-development activities are for an industrial land use, only those travelways necessary for efficient facility operation will be paved. The only additional pavement area is for the required off-street parking spaces dictated by local building codes.

B.1 Roadway Reduction

The roadway layout is completely controlled by minimum vehicle widths, truck turning radii and necessary vehicle movements required for efficient facility operation. All of the roadway widths are designed to accommodate heavy trucks. Only roadways along the primary travel path are to be paved. Access roadways to the stockpile area will be constructed of crushed stone materials.

B.2 Sidewalk Reduction

There are no paved sidewalks proposed as part of the project.

B.3 Driveway Reduction

Other than the paved primary access travelway, the only paved driveways relating to the project are the bypass driveway leading to the off-street parking area and the pass-through driveway leading to the petroleum loading/unloading facilities.

B.4 Cul-de-Sac Reduction

There are no paved cul-de-sacs proposed as part of the project.

B.5 Building Footprint Reduction

There is only one building proposed as a part of the project. The building footprint has been reduced to the minimum size required to suit the project. The only other building type structures proposed as part of the project are the petroleum storage facilities.

B.6 Parking Area Reduction

Parking requirements for the re-development project are controlled by the local land use plan. The proposed project must provide parking spaces for a maximum number of employees across two consecutive work shifts. The total parking space requirements are twelve (12). The proposed project does provide an additional set of parking spaces, three (3), near the lab building for daily use by state inspectors and lab personnel. Additionally, a concrete equipment parking area will be developed, three (3) spaces. The only other impermeable area will be developed at the petroleum loading/ unloading area.

Step 2 – Calculate Water Quality Volume

Water Quality volume calculations as required by the NYS DEC SDM are contained within Appendix Section F. The water quality volume calculations have been provided for the existing condition, the total proposed condition and a split in the two systems to demonstrate the actual proposed system. Outside of the proposed facility development, the eastern drainage basin water quality volume is reduced by nearly 80 percent, to roughly 5,280 cubic feet. Any additional reduction in the WQv outside the limits of the site will need to be undertaken by the City on City property, land area along Riverside Avenue at the base of the drainage basin.

Water Quality Volume has been calculated for the area internal to the soil perimeter berm. The design Water Quality Volume is approximately 18, 610 cubic feet.

Step 3 – Incorporate Green Infrastructure Techniques and Standard SMP's with Runoff Reduction Volume (RRv) to eliminate or reduce the total proposed WQv

C.1 Sheetflow to Riparian Buffers and Filter Strips

This green infrastructure practice allows the design engineer to direct stormwater to vegetated filter strips and undisturbed natural areas, such as riparian buffers or natural depressions for treatment by filtration and infiltration.

Stormwater from within the industrial activity area cannot be discharged to the surrounding surface areas without a Multi-Sector General Permit. To meet the discharge conditions of the MSGP, stormwater should not be discharged to the surrounding filtration and infiltration areas without prior pre-treatment. Therefore, no stormwater flow will be directed from within the industrial activity area to the surrounding land surfaces, riparian buffers or grass filter strips.

Stormwater from the outside surface of the soil perimeter containment berm along the western side of the project area will be directed by sheet flow to the forested riparian buffer area along the Hudson River. Stormwater flow from the outside surface of the soil perimeter containment berm along the northern side of the project area will be directed by sheet flow to a forested buffer area. Stormwater flow from the outside surface of the soil perimeter containment berm along the southwestern corner of the site will be directed to a natural vegetated filter area. Stormwater in the southwestern corner will be directed to the storm drainage system controlled by the City of Rensselaer. Stormwater flow from the outside surface of the remaining soil perimeter containment berm will be directed by sheet-flow or shallow flow to the surrounding naturally vegetated areas. Ultimately, most stormwater from the outside surface of the soil perimeter containment berm will be directed to the storm drainage system owned by the City of Rensselaer.

C.2 Vegetated Swale

This green infrastructure practice allows the design engineer to direct stormwater to a vegetated swale with low flow velocity for treatment by filtration and infiltration.

Stormwater from within the industrial activity area cannot be discharged to the surrounding surface areas without a Multi-Sector General Permit. To meet the discharge conditions of the MSGP, stormwater should not be discharged to the surrounding filtration and infiltration areas without prior pre-treatment. Therefore, no stormwater flow will be directed from within the industrial activity area to the surrounding land surfaces.

Stormwater flow from the outside surface of the perimeter containment berm will be directed by sheet flow or shallow flow to the surrounding naturally vegetated areas, will be allowed to pond and infiltrate in topographic depressions and will ultimately discharge overland to the storm drainage system owned by the City of Rensselaer, when necessary. There is no appropriate place on-site to utilize a vegetated swale.

C.3 Tree Planting/Tree Pit

This green infrastructure practice allows the design engineer to conserve existing trees or plant trees at new or re-development sites to reduce stormwater runoff, promote evapotranspiration, increase nutrient uptake, provide shading and thermal reductions, and to encourage wildlife habitat.

Stormwater from within the industrial activity area cannot be discharged to the surrounding surface areas without a Multi-Sector General Permit. To meet the discharge conditions of the MSGP, stormwater should not be discharged to the surrounding filtration and infiltration areas without prior pre-treatment. Therefore, no stormwater flow will be directed from within the industrial activity area to the surrounding land surfaces.

Several areas outside of the soil perimeter containment berm will be impacted during the construction phase of the project. It will be necessary to remove some existing tree cover from the industrial lot to re-develop the site. In total, approximately 54,000 square feet of tree covered ground surface (new growth) will be cleared. However, there are several locations where existing tree cover can and will be conserved. The main area of tree cover (older growth) to be maintained is along the western slope of the property along the Hudson River. Additionally, the small section of the site located along the southwestern perimeter will not be disturbed by construction activity, preserving existing tree cover. Finally, a small section of trees (new growth) along the northeastern perimeter of the site, approximately 6,500 square feet, will be left undisturbed.

Additionally, there are very limited areas on-site that are currently covered by grass that can be converted to tree cover by reforestation. The only area is along the southwestern perimeter near the overlook area. It is approximately 2,400 square feet in size and will be re-forested during the construction project.

C.4 Disconnection of Rooftop Runoff

This green infrastructure practice allows the design engineer to direct runoff from rooftop areas to designated pervious areas to reduce runoff volumes and rates. The practice may only be applied when “filtration/infiltration areas” are incorporated into the site design to receive runoff from rooftops.

There is a limited amount of rooftop proposed (roughly 675 sq. ft.) as part of the project. The rooftop is situated within the heavy industrial area. Therefore, rooftop runoff will not be infiltrated on-site prior to pre-treatment.

C.5 Stream Day-lighting

This green infrastructure practice allows the design engineer to day-light previously culverted or piped streams or drainageways to restore natural habitat, increase attenuation by increasing storage size, promote infiltration, and reduce pollutant loads where feasible.

There are no existing culverted drainageways located within the proposed re-development site. The only culverted drainageway is located adjacent to the site along

Riverside Avenue. It belongs to the City of Rensselaer. It will be used as the outfall structure for the proposed stormwater management system.

C.6 Rain Gardens

This green infrastructure practice allows the design engineer to manage and treat small volumes of stormwater runoff from impervious surfaces using a conditioned soil planting bed and planting materials to filter runoff stored within a shallow depression. Rain gardens are passive without an underdrain connected to the storm drain system. The storage volume of a rain garden is achieved within the gravel drainage layer, the conditioned soil media and ponding area above the bed. Rain gardens cannot be used to treat parking lot or roadway runoff. Treatment of these areas and other areas of increased pollutant loading should incorporate the design elements of a bioretention practice.

All of the impervious areas associated with the proposed project are considered a stormwater "hotspot". Hotspot stormwater should not be directed to infiltration practices without prior pre-treatment. No stormwater will be discharged from the active industrial activity areas to infiltration practices prior to being pre-treated for the pollutants of concern, petroleum.

C.7 Green Roofs

This green infrastructure practice allows the design engineer to reducing peak stormwater flows and attenuate stormwater runoff rates. The green roof system captures rainwater allowing evaporation or evapotranspiration.

There is a limited amount of rooftop area proposed as part of the project. As well, green roof systems do not work during the winter months of the year, in cold climates. No green roof systems will be developed for this seasonal industrial activity.

C.8 Stormwater Planters

This green infrastructure practice allows the design engineer to manage stormwater within small landscaped stormwater treatment devices which can be designed to infiltrate or filter stormwater. Three versions of stormwater planters include: contained planters, infiltration planters and flow-through planters. Stormwater planters are not designed to treat runoff from roadways or parking lots but are ideal for treating rooftop or courtyard runoff. Flow through and infiltration planters should not receive drainage from impervious areas greater than 15,000 square feet.

The majority of the proposed site is paved roadways and parking lots. In addition, the impervious area approaches 250,000 square feet in size. Therefore, stormwater planters are not proposed for use within the industrial activity area.

C.9 Rain Barrels and Cisterns

This green infrastructure practice allows the design engineer to capture and store stormwater runoff to be used later for lawn or landscape irrigation or can be filtered and used for non-potable water uses. Rain barrels are rooftop scale storage systems typically used in residential settings while cisterns are large-scale rain barrels used in commercial and industrial settings. Rain barrels and cisterns are used to treat rooftop runoff. In cold climates, cisterns will need to be protected from freezing or taken out of service during the winter months. Year round use of cisterns in cold climates is not recommended.

A small cistern could be utilized for collection of rooftop stormwater during the operating season. Stormwater collected from the rooftop area can be used as non-potable water in the on-site sanitary system. The cistern will need to be de-watered during the winter months while the site is non-operational and water re-use is very limited.

C.10 Porous Pavements

This green infrastructure practice allows the design engineer to use a broadly defined group of pervious pavements in roads, parking areas, sidewalks and plaza surfaces. Permeable pavements are designed to allow rainfall through the surface into an underlying reservoir where it can infiltrate, reducing stormwater runoff from the site.

Due to the high risk of clogging the pavement voids and underlying soils, permeable pavement should be limited in their use. Areas with high amounts of sediment-laden runoff and high traffic volumes are likely causes of system failure. High volume parking lots, particularly parking drive aisles, high dust areas, and areas with heavy equipment traffic, are not recommended for this practice. Permeable pavement infiltration areas should not be used to treat stormwater hotspots, or areas where land use or activities have the potential to generate highly contaminated runoff.

Due to the use of heavy equipment, high traffic volumes and the generation of sediment or dust, permeable pavements will not be used on-site. All stormwater from the paved areas of the site will be directed to the stormwater management system for treatment prior to discharge.

C.11 Stormwater Re-use

During the proposed site operations, it will be necessary to control the generation of fugitive dust. In accordance with the dust control plan generated for the site, stormwater collected in the stormwater treatment system will be available for use as a daily dust suppressant for the on-site haul roads. Water will be applied to the roadway surfaces, as needed, to eliminate the generation of fugitive dust. Depending on the time of year, stormwater re-use may be a significant component of the stormwater management program. Alternatively, there are times of the year when stormwater re-use will be minimal or non-existent.

C.12 Utilization of Standard SMP's with Runoff Reduction Capacity

C.12.1 Infiltration Practices (90% Reduction of WQv)

The standard SMP of infiltration cannot be used with stormwater generated within a "hotspot" area. Stormwater generated within "hotspot" areas must be pre-treated for the pollutants of concern prior to being discharged to an infiltration practice. Additionally, on-site soils are not capable of supporting full-scale infiltration practices (D soils, lake clays). Therefore, infiltration practices are not proposed as a part of the on-site stormwater management system.

C.12.2 Bioretention Practices (80% WQv Reduction - A and B Soils (No underdrain)/40 % WQv Reduction - C and D Soils (With underdrain)

The standard SMP of bioretention cannot be used with stormwater generated within "hotspot" areas. Bioretention practices are primarily an infiltration practice. All non-hotspot stormwater directed to a bioretention practice must be pre-treated by an open channel with a level spreader, a gravel diaphragm and a grass filter strip as well as being treated for any pollutants of concern. The limitations presented by bioretention make the use of these systems unavailable in the management of stormwater for the proposed project.

C.12.3 Dry Swale (40% A and B Soils / 20% C and D Soils)

Open channel systems are vegetated drainage channels designed to capture and treat the WQv within dry and wet cells formed by check dams or other means. Open channels swales require significant lengths to effectively treat the water quality volume. There is insufficient room on-site to use open channel systems.

Step 4 - Use Standard SMP's to treat the remaining WQv

Standard SMP's will be used to treat the remaining WQv not eliminated through Runoff Reduction techniques, such as Green Infrastructure or Standard SMP's with Runoff Reduction capacity. In accordance with the NYS DEC SDM standard SMP's include: Ponds, Wetlands, Infiltration Practices, Filtration and Open Channels. Stormwater from "hotspot" areas cannot be discharged to infiltration practices without first being treated for the pollutant of primary concern. Additionally, stormwater from "hotspot" areas should not be directly discharged to ponds or wetlands that are in direct contact with the groundwater table. Thus, the remaining WQv not eliminated by Runoff Reduction will be treated through the use of a standard SMP, Filtration. In accordance with Chapter 9 of the SDM, re-development projects which meet the re-development criteria must at a minimum treat 25 percent of the WQv through standard SMP's.

Use of standard SMP's is planned for the WQv not addressed as a component of the Runoff Reduction criteria. Stormwater incident upon the active industrial activity area will be directed to the stormwater management system by two grass-lined surface channels. Stormwater will be directed to an isolated sediment trap. From the sediment trap's primary discharge point, a set of inverted culvert pipes, stormwater (the WQv) will be directed to a surface sand filter prior to discharge from the site.

Step 5 - Design for Volume and Rate Control Practices

Standard SMP's, a dry detention basin, will be used to control the volume and discharge rate for storms larger than the WQv storm event. Channel protection, or the 1-year 24-hour storm event, will be held for the required 24-hour period. The 10-year and 100-year storms will be discharged to the City of Rensselaer Stormwater Management System at a rate lower than pre-development conditions.

3.2.1 Stormwater Management Structures

3.2.1.1 Stabilized/Paved Site Entrances

The main entrance and exit for the blacktop manufacturing operation will be permanently stabilized using asphalt materials for a distance of approximately 200 feet up to the locking gate providing access control to the site.

3.2.1.2 Stabilized Site Access Roadways

In conjunction with the asphalt pavement stabilized construction entrances, all of the on-site roadways and vehicle parking areas will be stabilized using a minimum of four inches of asphalt binder course as a surface pavement.

3.2.1.3 Stormwater Perimeter Berms

Stormwater perimeter berms will be constructed around the perimeter of the site to provide a means for control of stormwater. The berms will range in height and will be constructed using the soils excavated from the site. The berms will act to prevent the on-flow of stormwater to the site as well as collect all stormwater from within the site for treatment prior to final off-site discharge to the Hudson River.

3.2.1.4 Site Re-Grading Activities

The most extensive re-grading operations at the site will be focused along the plant and stockpile area. Along the northern perimeter, soils will be excavated to create a level space for the erection of the blacktop manufacturing plant. South of the plant area and adjacent to the stormwater management pond, the stockpile area shall be re-graded to create an outdoor storage area with a minimum two percent grade.

3.2.1.5 Stormwater Conveyance Structures

Two stormwater conveyance structures will be developed along the western perimeter of the stormwater management area. A shallow stone-lined, trapezoidal drainage channel will be located along the southern perimeter of the stormwater management area adjacent to the stockpile area. This structure will collect stormwater from the stockpile area and direct it toward the west to the sediment trap. In addition, a stone-lined, trapezoidal drainage swale will be located along the northern perimeter of the stormwater management area and will collect stormwater from the partially-paved blacktop plant area and direct it toward the sediment trap.

3.2.1.6 Sediment Trap

A small sediment trap (40’ x 90’) will be constructed along the northern side of the stormwater management area. The sediment trap is located between the unpaved stockpile area, the partially-paved blacktop plant area and the stormwater management system. Stormwater incident upon the site will be routed by overland flow to the drainage channels which discharge to the sedimentation trap. The sediment trap will discharge smaller storm events to a passive surface sand filter. Excess stormwater above the capacity of the sedimentation trap and the surface sand filter will be directed by overflow outlets to the stormwater management pond.

3.2.1.7 Stormwater Sand Filter

A passive sand filter will be constructed along the eastern perimeter of the stormwater management area. The sand filter will be the primary treatment mechanism for WQv storm events. WQv storm events will be directed to the sand filter from the sediment trap by a controlled outlet system. The 2,495 square foot surface sand filter will discharge treated stormwater to the surrounding stormwater culvert system. Excess stormwater above the capacity of the surface sand filter will be directed by an overflow outlet to the dry detention basin for volume and rate control prior to discharge.

3.2.1.8 Stormwater Management Basin

The stormwater management basin will be constructed to meet the acceptable design standards contained within the NYS Stormwater Design Manual. The 13,236 square foot basin will be the terminus for all excess stormwater collected and treated on-site. The basin has been designed to include outlets capable of controlling stormwater from the site under various design storms. All inlet and outlet features will be constructed with stone-lined entrance/exit channels. Discharge from the stormwater management basin will be directed to the existing stormwater drainage system for discharge off-site to the Hudson River. Discharge from the basin structure will be controlled at the outlet by construction of a low-level outlet, as well as an overflow outlet.

3.2.2 Permanent Material Specifications and Installation Details

Material specifications and installation details have been developed for each component of the proposed project. Permanent material specification sheets and installation details have been included in Appendix E.

3.2.3 Identify Non-Conformance w/ Technical Standard

There are no know locations where the proposed post-construction stormwater management system will not meet the design criteria establish within the New York State Department of Environmental Conservation's Stormwater Design Manual for re-development projects.

3.2.4 Summary of Sizing Criteria

3.2.4.1 Stormwater Conveyance Structures

Two trapezoidal stone-lined drainage channels will be constructed to convey stormwaters from their sub-catchment areas to the stormwater treatment devices. The first will be located along the southern side of the stormwater management area and will capture and convey surface waters after they flow across or are incident upon the unpaved outdoor storage area (stockpile area). The stone-lined conveyance structure will be a 1.5-foot deep trapezoidal channel with 3:1 side slopes and a five-foot bottom width. Design parameters are obtained from the Grassed Waterway Detail contained within the NYS Standards and Specification for Sediment and Erosion Control. In accordance with these standards, a stone-lined channel shall be designed using the 10-year 24-hour storm event. Stormwater routing was conducted using TR20 modeling developed by Hydrocad. Results from the modeling suggest that the channel during the design event will adequately handle a capacity of 52 cfs, which is well above the capacity required of approximately 35 cfs. Modeling results, however, determine that the channel would flow with a velocity of approximately 3.6 fps. Using the chart of Permissible Velocities for Selected Seed Mixtures contained within the NYS Standards and Specification for Sediment and Erosion Control (Page 3.25), any seed mixture should adequately handle the expected velocities on erosion resistant soils, such as the clayey soils present on this site. However, if easily eroded soils are encountered, mixed grasses, smooth brome grass or Kentucky blue grass should be used and a stone channel-lining should be installed along the bottom of the channel.

The second conveyance structure is located along the northern perimeter of the stormwater management area and it will collect and convey stormwater flowing across the blacktop plant area. Design parameters are obtained from the Grassed Waterway Detail contained within the NYS Standards and Specification for Sediment and Erosion Control. In accordance with these standards, a grass-lined channel shall be designed using the 10-year 24-hour storm event. Stormwater routing was conducted using TR20 modeling developed by Hydrocad. Results from the modeling suggest that the channel during the design event will adequately handle a capacity of 52 cfs. This is well above the capacity required of approximately 35 cfs. Modeling results, however, determine that the channel would flow with a velocity of approximately 3.6 fps. Using the chart of Permissible Velocities for Selected Seed Mixtures contained with the NYS Standards and Specification for Sediment and Erosion Control (Page 3.25), any seed mixture can adequately handle the expected velocities on erosion resistant soils, such as the clayey soils present on this site. However, if easily eroded soils are encountered, mixed grasses, smooth brome grass or Kentucky blue grass should be used and a stone channel-lining should be installed along the bottom of the channel.

3.2.4.2 Sediment Trap

An isolated single pond sediment trap will be constructed as part of the stormwater management system. The sediment trap will be located directly adjacent to the unpaved stockpile area and the partially-paved blacktop plant area. The sediment trap has been designed to meet the intent of the NYS DEC SDM. The sediment trap has been designed to contain twenty-five percent (25%) of the WQv storm event. The sediment trap will be developed with a low level outlet, a primary outlet and an overflow outlet. Low level and primary outlet will discharge to the sand filter. The overflow outlet will discharge to the dry detention basin.

3.2.4.3 Sand Filter

A surface sand filter will be constructed as part of the stormwater management system. The surface sand filter has been designed to meet the intent of the NYS DEC SDM. The surface sand filter will have a total surface area of 2,495 square feet. The extended detention provided above the surface sand filter is capable of containing the 1-Yr 24-hour storm event, providing Channel Protection as required by the NYS DEC SDM. The surface sand filter will discharge from the under-drain system to a manhole and culvert system connected to the existing City of Rensselaer Stormwater management System. During larger storms, excess stormwater above the capacity of the surface sand filter will be diverted to the dry detention facility for treatment prior to discharge. On-site re-use of stormwater as a dust control material will be withdrawn for the surface sand filter for re-use.

3.2.4.7 Stormwater Detention Basin

A stormwater dry detention basin will be constructed as part of the stormwater management system. The basin structure will be graded to meet all of the criteria outlined within the NYS Stormwater Design Manual. The new basin will be the overflow treatment device in the stormwater management system. Excess stormwater, above the WQv storm event, will be routed from the sediment trap to the dry detention pond. The pond system has been designed to provide internal slopes not exceeding 3:1. Sediment storage capacity has been included below the low-level spillway. The outlet device configuration is based upon use of a primary concrete drop structure with an open-grate outlet and a low-level outlet device. A valved two-inch diameter de-watering outlet will be placed at elevation 15 feet above msl. Small diameter orifice type outlets will be constructed in accordance with the NYS DEC SDM. The primary overflow outlet, a grated horizontal opening, will be set at elevation 20 feet amsl. The corresponding top of the impoundment structure is established at elevation 21 feet above msl. Stormwater routing of the critical storm events has been conducted using Hydrocad TR20 stormwater modeling. The results indicate the stormwater control system will function adequately for all expected storm events up to, and including, the 100-year 24-hour storm event. Results suggest the primary 2’ by 2’ open-grate outlet will adequately control the stormwater flows of the 100-year storm event. Full site modeling for post-construction stormwater control conditions, suggests the outfall and grading changes at the site will not exacerbate the stormwater flows within the sub-catchment containing the existing stormwater drainage system.

3.2.4.8 Hydrologic And Hydraulic Analysis For All Structural Components

Hydrologic analysis of the site has been prepared using Hydrocad TR20 modeling. Results of the hydrologic modeling are included in Appendix F. Hydraulic analysis of the proposed stormwater management structures has been completed in accordance with the NYS Stormwater Design Manual and/or the NYS Standards and Specification for Sediment and Erosion Control.

Appendix F contains several runs of the stormwater models. A pre-construction model has been developed to predict the existing conditions at the City of Rensselaer Stormwater management System given the current state of the un-used industrial property. Model results have been included for the WQv, 1-yr., 10-Yr and 100-Yr 24-Hour storm events. Additionally, the proposed conditions, after construction, have been provided. The models contain the same references to the Cityof Rensselaer Stormwater management System. The same storm events have been modeled. A summary of the pre and post development model results is provided.

4.0 INSPECTION SCHEDULE

In accordance with the New York State Standards and Specifications for Erosion and Sediment Control, New Castle Asphalt will inspect and ensure that the erosion and sediment controls identified in the SWPPP are being maintained in effective operating condition at all times. Also as required by this document, New Castle Asphalt will perform a site inspection following every storm event.

Under the SPDES General Construction Permit (GP-0-08-001), site inspections are required to be performed at least once every seven days by a qualified inspector[1]. The site inspection will include an evaluation of all erosion and sediment control practices to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved final stabilization, and all points of discharge from the construction site.

Following each inspection, the qualified inspector will prepare an inspection report, which will include and/or address, at a minimum, the following:

- Date and time of inspection;
- Name and title of person(s) performing inspection;
- A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of inspection;
- 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. Includes discharges from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;

[1] Qualified Inspector – A person that is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), licensed Landscape Architect, or other Department endorsed individual(s). It also means someone working under the direct supervision of the licensed Professional Engineer or licensed 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 an individual performing a site inspection has received four hours of training, endorsed by the Department, from a Soil and Water Conservation District, CPESC, Inc. or other Department endorsed entity in proper erosion and sediment control principles no later than two years from date this general permit is issued. After receiving the initial training, an individual working under the direct supervision of the licensed Professional Engineer or licensed Landscape Architect shall receive four hours of training every three years. 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.

- A description of the condition of all natural surface water bodies locted within, or immediately adjacent to, the property boundaries of the construction site which receive run-off from the disturbed areas. This shall include identification of any discharges of sediment to the surface water body;
- Identification of all erosion and sediment control practices that need repair or maintenance;
- Identification of all erosion and sediment control practices that were not installed properly or are not functioning as designed and need to be reinstalled or replaced;
- Description and sketch of areas that are disturbed at the time of the inspection and areas that have been stabilized (temporary and/or final) since the last inspection;
- Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards; and
- Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s).
- 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 copies of the photographs to the inspection report being maintained on-site within seven (7) days of the date of inspection. The qualified inspector shall take digital photographs, with date stamp, that clearly show the condition of the practices after the corrective actions has been completed. The qualified inspector shall attach paper copies of the photographs to the inspection report that documents the completion of the corrective action work within seven (7) days of that inspection.

Within one business day of the completion of an inspection, the qualified inspector will notify New Castle Asphalt and appropriate contractor (or subcontractor) of any corrective actions that need to be taken. The contractor (or subcontractor) shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.

All inspection reports will be signed by the qualified inspector. The inspection reports will be maintained on site with the SWPPP.

New Castle Asphalt will have a qualified professional[2] perform a final site inspection prior to submitting the NOT. The qualified professional will certify that all disturbed areas have achieved final stabilization; 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[3]" and "Post-Construction Stormwater Management Practice" certification statements on the NOT.

New Castle Asphalt will retain a copy of the General Permit GP-0-10-001, the NOI, MS4 Acceptance Letter, the NOI Acknowledgment Letter, the SWPPP and any inspection reports that were prepared in conjunction with this permit for a period of at least five years from the date that the site achieves final stabilization. This period may be extended by the Department, in its sole discretion, at any time upon written notification.

5.0 OPERATIONS AND MAINTENANCE PLAN

The following section describes the inspection and maintenance schedules for each of the stormwater treatment systems. Inspection and maintenance of these systems are the responsibility of New Castle Asphalt LLC, or the current property owner. Following

[2] Qualified Professional – A person that is knowledgeable in the principles and practices of stormwater management and treatment, such as a licensed Professional Engineer, licensed 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 in order to prepare a SWPPP that conforms to the Department's technical standard. 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.

[3] Final Stabilization means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty 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.

construction of the stormwater treatment system, monitoring (during the construction cycle) will be performed monthly and following all major storm events (>1 inch in 24 hours). After the construction cycle is complete, monitoring will be performed on a quarterly basis in accordance with a Multi-Section General Permit for Stormwater Discharges Associated with an Industrial Activity. Monitoring will verify that all stormwater management systems are working as intended. Dewatering times will be monitored and recorded to determine if maintenance activities are necessary. A logbook of all maintenance activities will be maintained on site.

5.1 Drainage Swale

As stated in the New York State Stormwater Management Design Manual, the following criteria are required as part of the maintenance for open channel systems:

- Sediment build-up within the bottom of the channel or filter strip is removed when 25% of the original WQ_V volume has been exceeded;
- Vegetation in dry swales is mowed as required during the growing season to maintain grass heights in the 4 to 6 inch range.

5.2 Stormwater Management Basins

As stated in the New York State Stormwater Management Design Manual, the following criteria are required as part of the maintenance for the stormwater managementsystem:

- The principal spillway shall be equipped with a removable trash rack, and must be generally accessible from dry land;
- Sediment removal in the sediment trap shall occur every five to six years or after 50% of total sediment trap capacity has been lost;
- As the basins collect stormwater runoff from the hot asphalt mixing facility (blacktop plant), the removed media will be examined for visual or odor indications of petroleum or chemical contamination. In the event of a noticeable sheen or odor, the material will be sampled, analyzed, and disposed of in accordance with current regulatory standards.

- Care should be exercised during basin drawdown to prevent rapid drawdown and minimize downstream discharge of sediments or anoxic water. The approving jurisdiction (NYSDEC and/or City of Rensselaer) should be notified before draining the basin;
- The basins shall not be drained during the spring season. Due to temperature stratification and high chloride concentrations at the bottom, the water may become highly acidic and anoxic and may cause negative downstream effects.

Contractor Certification Statement

" 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 most current version of the New York State Pollutant Discharge Elimination System (SPDES) general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standard. 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."

Specific Elements Contractor is Responsible For Implementing:

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Signed: ____________________________________
Name: _____________________________________
Title: ______________________________________
Date: ___________________________

Name of Contractor's Trained Individual Responsible for Implementation of SWPPP:

Name: ______________________________________
Title: _______________________________________

Name of Contracting Firm: ____
Address: ____
____
Telephone Number: ____

Name of Site: New Castle Asphalt Rensselaer Construction Project

APPENDIX A

1358331598

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-0-10-001

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)
New Castle Asphalt LLC

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

Owner/Operator Contact Person First Name
Roderick

Owner/Operator Mailing Address
118 Button Road

City
Waterford

State
NY

Zip
12188 -

Phone (Owner/Operator)
518-432-4470

Fax (Owner/Operator)
518-432-4901

Email (Owner/Operator)

FED TAX ID
27-3457889 (not required for individuals)

1863331599

Project Site Information

Project/Site Name

Rensslear Plant Construction Project

Street Address (NOT P.O. BOX)

Riverside Drive

Side of Street

○ **North** ○ **South** ○ **East** ● **West**

City/Town/Village (THAT ISSUES BUILDING PERMIT)

City of Rensselaer

State	Zip	County	DEC Region
NY	12144 -	Rensselaer	4

Name of Nearest Cross Street

Irwin Stewart Expressway

Distance to Nearest Cross Street (Feet)

0

Project In Relation to Cross Street

● **North** ○ **South** ○ **East** ○ **West**

Tax Map Numbers
Section-Block-Parcel

154-5-3

Tax Map Numbers

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

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

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

X Coordinates (Easting)	**Y Coordinates (Northing)**
602384	4791997

2. What is the nature of this construction project?

○ **New Construction**

● **Redevelopment with increase in imperviousness**

○ **Redevelopment with no increase in imperviousness**

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

Pre-Development Existing Land Use

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

Post-Development Future Land Use

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

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

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

5. Is this a project which does not require coverage under the General Permit (e.g. Project done under an Individual SPDES Permit, or department approved remediation)? ○ **Yes** ● **No**

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

7. In accordance with the larger common plan of development or sale, enter the total project site acreage, the acreage to be disturbed and the future impervious area (acreage)within the disturbed area. Round to the nearest tenth of an acre.

Total Site Acreage	**Acreage To Be Disturbed**	**Existing Impervious Area Within Disturbed**	**Future Impervious Area Within Disturbed**
12.142.4	6.16.1	6.16.1	5.65.6

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

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

A	**B**	**C**	**D**
%	%	%	100 %

10. Is this a phased project? ○ Yes ● No

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

Start Date		End Date
06/01/2011	-	09/01/2011

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

Name

Hudson River

12a. Type of waterbody identified in Question 12?

- ○ Wetland / State Jurisdiction On Site (Answer 12b)
- ○ Wetland / State Jurisdiction Off Site
- ○ Wetland / Federal Jurisdiction On Site (Answer 12b)
- ○ 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

12b. How was the wetland identified?

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

13. Has the surface waterbody(ies) in question 12 been identified as a 303(d) segment in Appendix E of GP-0-10-001? ○ Yes ● No

14. Is this project located in one of the Watersheds identified in Appendix C of GP-0-10-001? ○ Yes ● No

15. Is the project located in one of the watershed areas associated with AA and AA-S classified waters? **If no, skip question 16.** ○ Yes ● No

16. 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? **If Yes, what is the acreage to be disturbed?**

○ Yes ● No

____ . _

17. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area?

○ Yes ● No

18. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)?

● Yes ○ No ○ Unknown

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

City of Renselaer

20. Does any runoff from the site enter a sewer classified as a Combined Sewer?

○ Yes ● No ○ Unknown

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 Water Quality and Quantity Control components (Post-Construction Stormwater Management Practices) **(If No, skip questions 23 and 27-35)**

● Yes ○ No

23. Have the Water Quality and Quantity Control components of the SWPPP been developed in comformance with the current NYS Stormwater Management Design Manual ?

● Yes ○ No

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

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

SWPPP Preparer
G-L Engineering P.C.

Contact Name (Last, Space, First)
Visscher Mark

Mailing Address
8 Brunswick Road

City
Troy

State
NY

Zip
12180 -

Phone
518-270-5920

Fax
518-270-5922

Email
MVisscher@Griggs-Lang.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-0-10-001. 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
Mark

MI

Last Name
Visscher

Signature

Date
22/55/2011

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

Permanent Sediment Trap

Permanent Detention Basin

Water Quality and Quantity Control

Important: Completion of Questions 27-35 is not required if response to Question 22 is No.

Post-Construction Stormwater Management Practices

27. Indicate **all** Stormwater Management Practice(s) that will be installed/constructed on this site:

Ponds
- ○ **Micropool Extended Detention (P-1)**
- ○ **Wet Pond (P-2)**
- ○ **Wet Extended Detention (P-3)**
- ○ **Multiple Pond System (P-4)**
- ○ **Pocket Pond (P-5)**

Filtering
- ● **Surface Sand Filter (F-1)**
- ○ **Underground Sand Filter (F-2)**
- ○ **Perimeter Sand Filter (F-3)**
- ○ **Organic Filter (F-4)**
- ○ **Bioretention (F-5)**
- ○ **Other**

Alternative Practice
- ○ **Rain Garden**
- ○ **Cistern**
- ○ **Green Roof**
- ○ **Stormwater Planters**
- ○ **Permeable Paving (Modular Block)**

Wetlands
- ○ **Shallow Wetland (W-1)**
- ○ **Extended Detention Wetland (W-2)**
- ○ **Pond/Wetland System (W-3)**
- ○ **Pocket Wetland (W-4)**

Infiltration
- ○ **Infiltration Trench (I-1)**
- ○ **Infiltration Basin (I-2)**
- ○ **Dry Well (I-3)**
- ○ **Underground Infiltration System**

Open Channels
- ○ **Dry Swale (O-1)**
- ○ **Wet Swale (O-2)**

Verified Proprietary Practice
- ○ **Hydrodynamic**
- ○ **Wet Vault**
- ○ **Media Filter**

28. Describe other stormwater management practices not listed above or explain any deviations from the technical standards.

Sediment Trap prior to primary surface sand filter for WQv. Dry Detention Basin subsequent to sediment trap and sand filter for CPv and larger storm events.

29. 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

New Castle Asphalt LLC

2994331595

30. Provide the total water quality volume required and the total provided for the site.

WQv Required	WQv Provided
0 . 4 0 3 . 4 3 acre-feet	0 . 4 0 3 . 4 3 acre-feet

31. Provide the following Unified Stormwater Sizing Criteria for the site.

Total Channel Protection Storage Volume (CPv) - Extended detention of post-developed 1 year, 24 hour storm event

CPv Required	CPv Provided
0 . 8 0 8 . 8 8 acre-feet	0 . 8 0 8 . 8 8 acre-feet

31a. The need to provide for channel protection has been waived because:

● **Site discharges directly to fourth order stream or larger**

Total Overbank Flood Control Criteria (Qp) - Peak discharge rate for the 10 year storm

Pre-Development	Post-development
3 4 3 . 4 7 . 7 CFS	1 4 1 . 4 2 . 2 CFS

Total Extreme Flood Control Criteria (Qf) - Peak discharge rate for the 100 year storm

Pre-Development	Post-development
5 1 5 . 1 8 . 8 CFS	2 5 2 . 5 3 . 3 CFS

31b. The need to provide for flood control has been waived because:

● **Site discharges directly to fourth order stream or larger**

○ **Downstream analysis reveals that flood control is not required**

IMPORTANT: For questions 31 and 32, impervious area should be calculated considering the project site and all offsite areas that drain to the post-construction stormwater management practice(s). (Total Drainage Area = Project Site + Offsite areas)

32. Pre-Construction Impervious Area - As a percent of the Total Drainage Area enter the percentage of the existing impervious areas before construction begins. 60 %

33. Post-Construction Impervious Area - As a percent of the Total Drainage Area, enter the percentage of the future impervious areas that will be created/remain on the site after completion of construction. 59 %

34. Indicate the total number of post-construction stormwater management practices to be installed/constructed. 4

35. Provide the total number of stormwater discharge points from the site. (include discharges to either surface waters or to separate storm sewer systems) 1

36. Identify other DEC permits that are required for this project.

DEC Permits

- ● Air Pollution Control
- ○ Coastal Erosion
- ○ Hazardous Waste
- ○ Long Island Wells
- ○ Mined Land Reclamation
- ○ Other SPDES
- ○ Solid Waste
- ○ None
- ● Other: PBS
- ○ 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

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

38. Is this project subject to the requirements of a regulated, traditional land use control MS4? ● Yes ○ No
(If No, skip question 39)

39. 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

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

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.

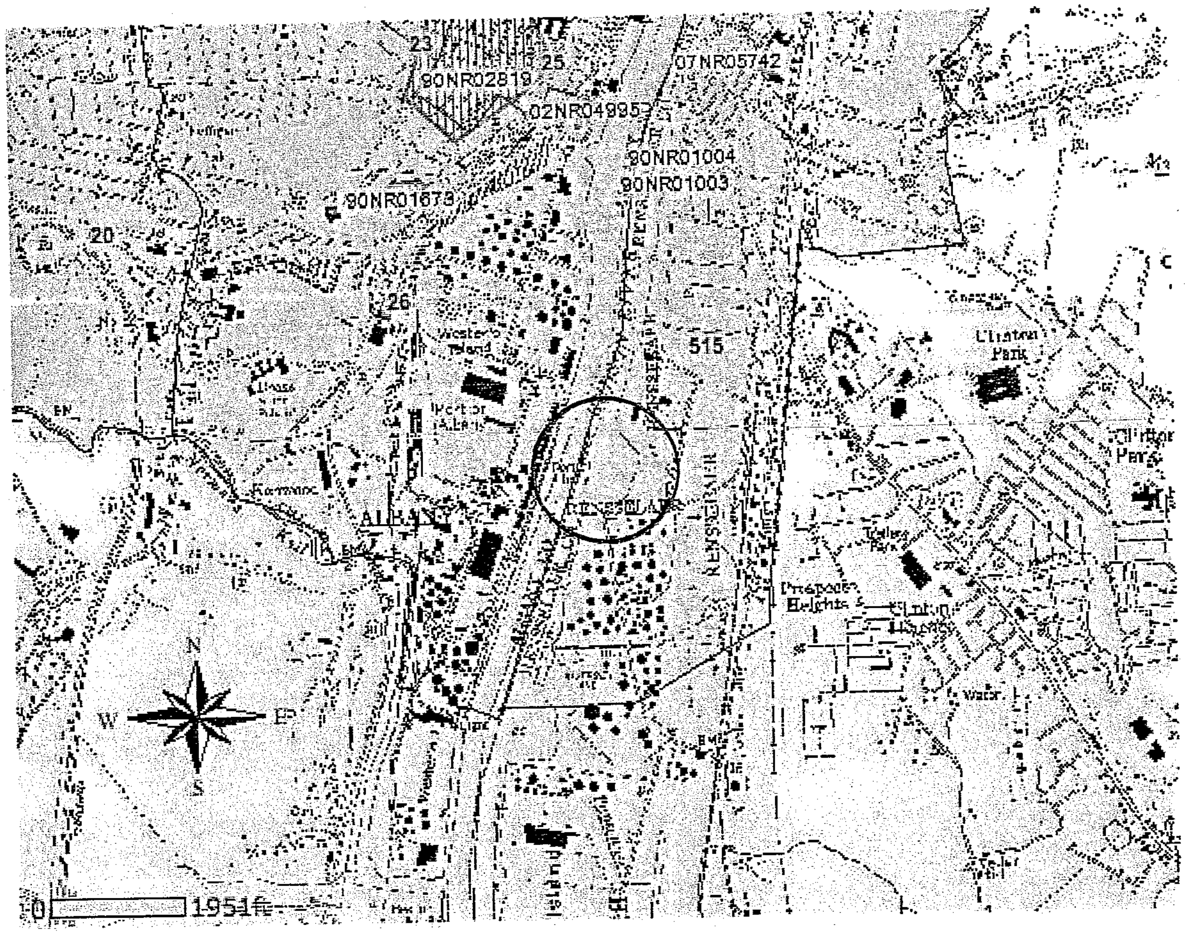
Print First Name: Roderick **MI:**

Print Last Name: Valente

Owner/Operator Signature:

Date: 2/15/2011

APPENDIX B


07NR05742
90NR02819
02NR04995
90NR01004
90NR01003
90NR01673
20
26
515
Clinton Park
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1951ft

APPENDIX C

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:	NEW CASTLE ASPHALT LLC
2. Contact Person:	Roderick Valente
3. Street Address:	118 Button Road
4. City/State/Zip:	Waterford NY 12188
II. Project Site Information	
5. Project/Site Name:	Rensselaer Plant Construction Project
6. Street Address:	Riverside Drive
7. City/State/Zip:	Rensselaer NY 12144
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:	
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:

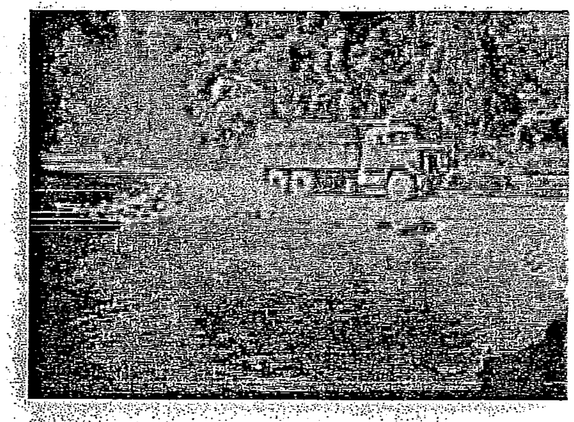
Signature:

Date:

VI. Additional Information

APPENDIX D

STANDARD AND SPECIFICATIONS FOR DUST CONTROL



Definition

The control of dust resulting from land-disturbing activities.

Purpose

To prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and traffic safety problems.

Conditions Where Practice Applies

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

Design Criteria

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

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

Construction Specifications

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

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

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

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

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

Sprinkling – The site may be sprayed with water until the surface is wet. This is especially effective on haul roads and access routes.

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

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

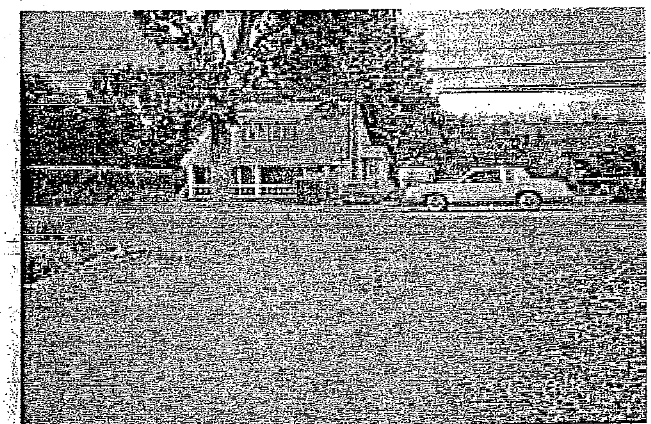
Windbreak – A silt fence or similar barrier can control air currents at intervals equal to ten times the barrier height. Preserve existing wind barrier vegetation as much as practical.

All Stormwater Pollution Prevention Plans must contain the NYS DEC issued "Conditions for Use" and "Application Instructions" for any polymers used on the site. This information can be obtained from the NYS DEC website.

Maintenance

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

STANDARD AND SPECIFICATIONS FOR STABILIZED CONSTRUCTION ENTRANCE



Definition

A stabilized pad of aggregate underlain with geotextile located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk, or parking area.

Purpose

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

Conditions Where Practice Applies

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

Design Criteria

See Figure 5A.35 on page 5A.76 for details.

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

Thickness: Not less than six (6) inches.

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

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

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

Criteria for Geotextile

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

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

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

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

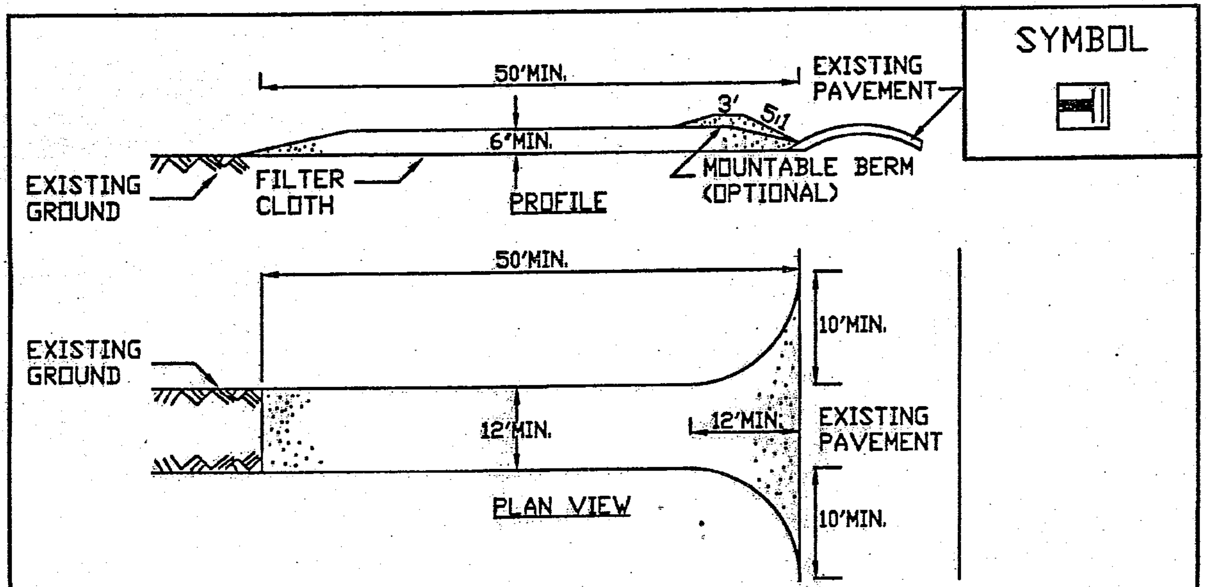
[3]Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

Maintenance

The entrance shall be maintained in a condition which will prevent tracking of sediment onto public rights-of-way or streets. This may require periodic top dressing with additional aggregate. All sediment spilled, dropped, or washed onto public rights-of-way must be removed immediately.

When necessary, wheels must be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with aggregate, which drains into an approved sediment-trapping device. All sediment shall be prevented from entering storm drains, ditches, or watercourses.

Figure 5A.35
Stabilized Construction Entrance

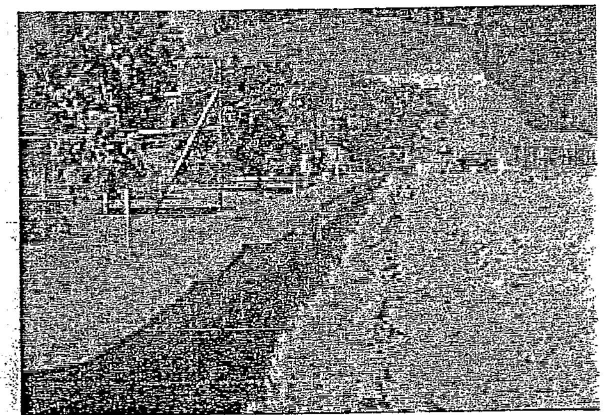


CONSTRUCTION SPECIFICATIONS

1. STONE SIZE - USE 1-4 INCH STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. GEOTEXTILE - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

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

STANDARD AND SPECIFICATIONS FOR SILT FENCE



Definition

A temporary barrier of geotextile fabric installed on the contours across a slope used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a silt fence is to reduce runoff velocity and effect deposition of transported sediment load. Limits imposed by ultraviolet stability of the fabric will dictate the maximum period the silt fence may be used (approximately one year).

Conditions Where Practice Applies

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

1. Maximum allowable slope lengths contributing runoff to a silt fence placed on a slope are:

Slope Steepness	Maximum Length (ft.)
2:1	25
3:1	50
4:1	75
5:1 or flatter	100

2. Maximum drainage area for overland flow to a silt fence shall not exceed ¼ acre per 100 feet of fence, with maximum ponding depth of 1.5 feet behind the fence; and

3. Erosion would occur in the form of sheet erosion; and

4. There is no concentration of water flowing to the barrier.

Design Criteria

Design computations are not required for installations of 1 month or less. Longer installation periods should be designed for expected runoff. All silt fences shall be placed as close to the areas as possible, but at least 10 feet from the toe of a slope to allow for maintenance and roll down. The area beyond the fence must be undisturbed or stabilized.

Sensitive areas to be protected by silt fence may need to be reinforced by using heavy wire fencing for added support to prevent collapse.

Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. A detail of the silt fence shall be shown on the plan. See Figure 5A.8 on page 5A.21 for details.

Criteria for Silt Fence Materials

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

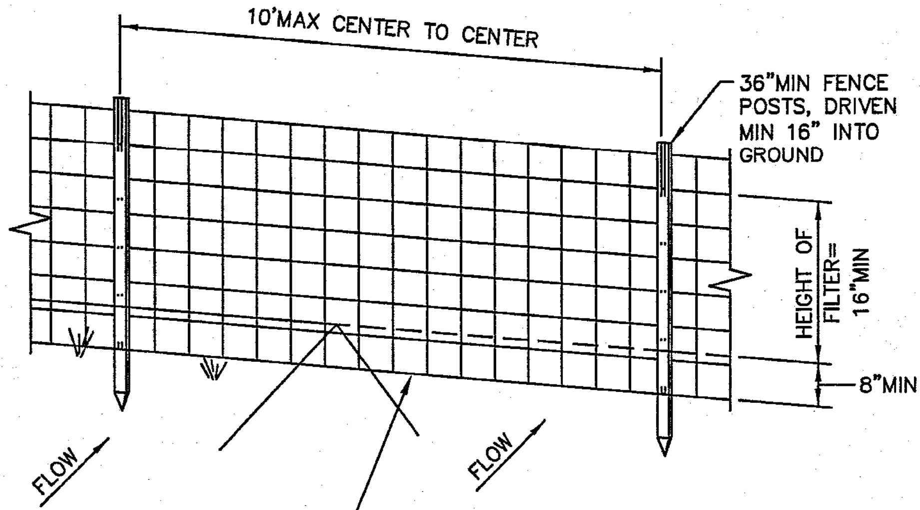
Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682

Mullen Burst Strength (PSI)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751 (modified)
Slurry Flow Rate (gal/min/sf)	0.3	
Equivalent Opening Size	40-80	US Std Sieve CW-02215
Ultraviolet Radiation Stability (%)	90	ASTM G-26

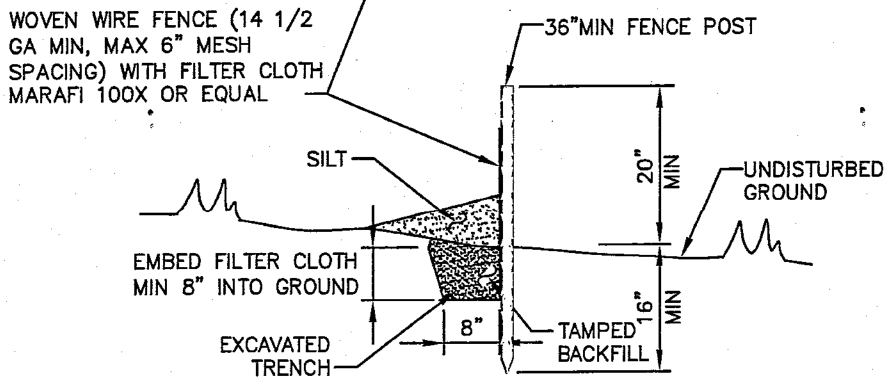
2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.0 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot.

3. Wire Fence (for fabricated units): Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.

4. Prefabricated Units: Envirofence, Geofab, or approved equal, may be used in lieu of the above method providing the unit is installed per details shown in Figure 5A.8.



PERSPECTIVE VIEW



SECTION

NOTES:

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY 6" AND FOLDED.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIALS REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
5. MAXIMUM DRAINAGE AREA FOR OVERLAND FLOW TO A SILT FENCE SHALL NOT EXCEED 1/2 ACRE PER 100 FEET OF FENCE.
6. SILT FENCE SHALL BE USED WHERE EROSION COULD OCCUR IN THE FORM OF SHEET EROSION.
7. SILT FENCE SHALL NOT BE USED WHEN A CONCENTRATION OF WATER IS FLOWING TO THE BARRIER.
8. MAXIMUM ALLOWABLE SLOPE LENGTHs CONTRIBUTING RUN-OFF TO A SILT FENCE ARE:

SLOPE STEEPNESS	MAXIMUM SLOPE LENGTH(FT)
2:1	50
3:1	75
4:1	125
5:1	175
FLATTER THAN 5:1	200

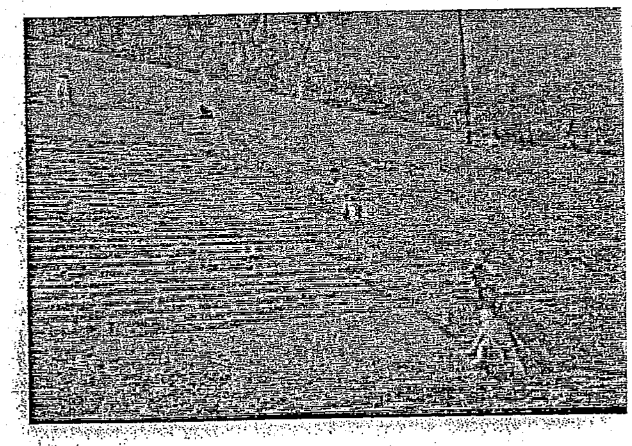
X / XXX

SILT FENCE INSTALLATION DETAIL

SCALE: NONE
CROSS REFERENCE:

APPENDIX E

STANDARD AND SPECIFICATIONS FOR LANDGRADING



Definition

Reshaping of the existing land surface in accordance with a plan as determined by engineering survey and layout.

Purpose

The purpose of a landgrading specification is to provide for erosion control and vegetative establishment on those areas where the existing land surface is to be reshaped by grading according to plan.

Design Criteria

The grading plan should be based upon the incorporation of building designs and street layouts that fit and utilize existing topography and desirable natural surrounding to avoid extreme grade modifications. Information submitted must provide sufficient topographic surveys and soil investigations to determine limitations that must be imposed on the grading operation related to slope stability, effect on adjacent properties and drainage patterns, measures for drainage and water removal, and vegetative treatment, etc.

Many counties have regulations and design procedures already established for land grading and cut and fill slopes. Where these requirements exist, they shall be followed.

The plan must show existing and proposed contours of the area(s) to be graded. The plan shall also include practices for erosion control, slope stabilization, safe disposal of runoff water and drainage, such as waterways, lined ditches, reverse slope benches (include grade and cross section), grade stabilization structures, retaining walls, and surface and subsurface drains. The plan shall also include phasing of these practices. The following shall be incorporated into the plan:

1. Provisions shall be made to safely conduct surface runoff to storm drains, protected outlets, or to stable water courses to ensure that surface runoff will not damage slopes or other graded areas; see standards and specifications for Grassed Waterway, Diversion, Grade Stabilization Structure.

2. Cut and fill slopes that are to be stabilized with grasses shall not be steeper than 2:1. When slopes exceed 2:1, special design and stabilization consideration are required and shall be adequately shown on the plans. (Note: Where the slope is to be mowed, the slope should be no steeper than 3:1, although 4:1 is preferred because of safety factors related to mowing steep slopes.)

3. Reverse slope benches or diversion shall be provided whenever the vertical interval (height) of any 2:1 slope exceeds 20 feet; for 3:1 slope it shall be increased to 30 feet and for 4:1 to 40 feet. Benches shall be located to divide the slope face as equally as possible and shall convey the water to a stable outlet. Soils, seeps, rock outcrops, etc., shall also be taken into consideration when designing benches.

   A. Benches shall be a minimum of six feet wide to provide for ease of maintenance.

   B. Benches shall be designed with a reverse slope of 6:1 or flatter to the toe of the upper slope and with a minimum of one foot in depth. Bench gradient to the outlet shall be between 2 percent and 3 percent, unless accompanied by appropriate design and computations.

   C. The flow length within a bench shall not exceed 800 feet unless accompanied by appropriate design and computations; see Standard and Specifications for Diversion on page 5B.1

4. Surface water shall be diverted from the face of all cut and/or fill slopes by the use of diversions, ditches and swales or conveyed downslope by the use of a designed structure, except where:

   A. The face of the slope is or shall be stabilized and the face of all graded slopes shall be protected from surface runoff until they are stabilized.

B. The face of the slope shall not be subject to any concentrated flows of surface water such as from natural drainage ways, graded swales, downspouts, etc.

C. The face of the slope will be protected by special erosion control materials, sod, gravel, riprap, or other stabilization method.

5. Cut slopes occurring in ripable rock shall be serrated as shown in Figure 5B.23 on page 5B.51. The serrations shall be made with conventional equipment as the excavation is made. Each step or serration shall be constructed on the contour and will have steps cut at nominal two-foot intervals with nominal three-foot horizontal shelves. These steps will vary depending on the slope ratio or the cut slope. The nominal slope line is 1 ½: 1. These steps will weather and act to hold moisture, lime, fertilizer, and seed thus producing a much quicker and longer-lived vegetative cover and better slope stabilization. Overland flow shall be diverted from the top of all serrated cut slopes and carried to a suitable outlet.

6. Subsurface drainage shall be provided where necessary to intercept seepage that would otherwise adversely affect slope stability or create excessively wet site conditions.

7. Slopes shall not be created so close to property lines as to endanger adjoining properties without adequately protecting such properties against sedimentation, erosion, slippage, settlement, subsidence, or other related damages.

8. Fill material shall be free of brush, rubbish, rocks, logs, stumps, building debris, and other objectionable material. It should be free of stones over two (2) inches in diameter where compacted by hand or mechanical tampers or over eight (8) inches in diameter where compacted by rollers or other equipment. Frozen material shall not be placed in the fill nor shall the fill material be placed on a frozen foundation.

9. Stockpiles, borrow areas, and spoil shall be shown on the plans and shall be subject to the provisions of this Standard and Specifications.

10. All disturbed areas shall be stabilized structurally or vegetatively in compliance with the Standard and Specifications for Critical Area Treatment in Section 3.

Construction Specifications

See Figures 5B.23 and 5B.24 for details.

1. All graded or disturbed areas, including slopes, shall be protected during clearing and construction in accordance with the erosion and sediment control plan until they are adequately stabilized.

2. All erosion and sediment control practices and measures shall be constructed, applied and maintained in accordance with the sediment control plan and the "New York Standards and Specifications for Erosion and Sediment Control."

3. Topsoil required for the establishment of vegetation shall be stockpiled in amount necessary to complete finished grading of all exposed areas.

4. Areas to be filled shall be cleared, grubbed, and stripped of topsoil to remove trees, vegetation, roots, or other objectionable material.

5. Areas that are to be topsoiled shall be scarified to a minimum depth of four inches prior to placement of topsoil.

6. All fills shall be compacted as required to reduce erosion, slippage, settlement, subsidence, or other related problems. Fill intended to support buildings, structures, and conduits, etc., shall be compacted in accordance with local requirements or codes.

7. All fill shall be placed and compacted in layers not to exceed 9 inches in thickness.

8. Except for approved landfills or nonstructural fills, fill material shall be free of frozen particles, brush, roots, sod, or other foreign objectionable materials that would interfere with, or prevent, construction of satisfactory fills.

9. Frozen material or soft, mucky or highly compressible materials shall not be incorporated into fill slopes or structural fills.

10. Fill shall not be placed on saturated or frozen surfaces.

11. All benches shall be kept free of sediment during all phases of development.

12. Seeps or springs encountered during construction shall be handled in accordance with the Standard and Specification for Subsurface Drain on page 5B.44 or other approved methods.

13. All graded areas shall be permanently stabilized immediately following finished grading.

14. Stockpiles, borrow areas, and spoil areas shall be shown on the plans and shall be subject to the provisions of this Standard and Specifications.

SECTION 310000

EARTHWORK

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Rip-Rap: Section 313700.

B. Corrugated Polyethylene Storm Drain Pipe: Section 334104.

C. Storm Drainage Structures, Frames & Covers: Section 334913.

D. Topsoil: Section 329120.

E. Seeding: Section 329219.

1.02 DEFINITIONS

A. The following terms shall have the meanings ascribed to them in this Article, wherever they appear in this Section.

1. Earth Excavation: The removal of all surface and subsurface material not classified as rock (as defined below).
2. Rock: Limestone, sandstone, shale, granite, and similar material in solid beds or masses in its original or stratified position which can be removed only by blasting operations, drilling, wedging, or use of pneumatic tools, and boulders with a volume greater than 1.0 cu yd. Concrete building foundations and concrete slabs, not indicated, with a volume greater than 1.0 cu yd shall be classified as rock.
    a. Materials which can be loosened with a pick or backhoe, frozen materials, soft laminated shale or hardpan, pavements, curbs, and similar materials shall be classified as earth excavation. Concrete building foundations and concrete slabs, where indicated, shall be classified as earth excavation. Masonry building foundations, whether indicated or not, shall be classified as earth excavation.
3. Subgrade Surface: Surface upon which subbase or topsoil is placed.
4. Subbase: Select granular material or subbase course Type 2 which is placed immediately beneath pavement or concrete slabs.
5. Foundation Bearing Grade: Grade/elevation at which the bottom-of-footings are constructed.
6. Maximum Density: The dry unit weight in pounds per cubic foot of the soil at "Optimum Moisture Content" when determined by ASTM D 698 (Standard Proctor), or ASTM D 1557 (Modified Proctor).
7. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

8. Landscaped Areas: Areas not covered by structures, walks, roads, paving, or parking.
9. Unauthorized Excavation: The removal of material below required elevation indicated on the Drawings or beyond lateral dimensions indicated or specified without specific written direction by the Owner's Representative.
10. Grading Limit Line (Shown on Drawings): Limits of grading, excavations and filling required for the work of this contract. Unless specifically noted otherwise, the Grading Limit Line and Contract Limit Line shall be considered the same.

1.03 SUBMITTALS

A. Product Data:
   1. Filter Fabric: Manufacturer's catalog sheets, specifications, and installation instructions.

B. Samples: Submit samples as follows. Take the samples in the presence of the Owner's Representative, and submit to the Owner's Representative the laboratory test results for gradation, proctors and soundness tests, when required. These tests shall be performed in accordance with ASTM standards, shall be performed and signed by a certified soils laboratory, and shall be submitted as part of the original submittal. At a minimum the samples taken shall be of the following quantities:
   1. Select Granular Material: 50 - 60 lb.
   2. Subbase Course Type 2: 50 - 60 lb.
   3. Selected Fill: 40 - 50 lb.
   4. Cushion Material: 30 lb.
   5. Crushed Stone: 30 lb.
   6. Pea Gravel: 40 – 50 lb.
   7. Embankment fill: 40 – 60 lb.

C. Quality Control Submittals:
   1. Excavation Procedure: Submit a lay out drawing or detailed outline of intended excavation procedure for the Owner's information. This submittal will not relieve the Contractor of responsibility for the successful performance of intended excavation methods.
   2. Subbase Materials: Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT Source, the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
   3. Other Aggregates: Name and location of source and soil laboratory test results.

1.04 PROJECT CONDITIONS

A. Protect existing trees and plants during performance of the Work unless otherwise indicated. Box trees and plants indicated to remain within the grading limit line with temporary steel fencing or solidly constructed wood barricades as required. Protect root systems from smothering. Do not store excavated material, or allow vehicular traffic or parking within the branch drip line. Restrict foot traffic to prevent excessive compaction of soil over root systems.

B. Cold Weather Requirements: When freezing temperatures are predicted, do not excavate to final required elevations for pipe, conduit or equipment requiring concrete work unless concrete can be placed immediately. Retain enough earth over the bottom elevation of excavations to prevent frost penetration.

C. Cold Weather Requirements:
1. Excavation: When freezing temperatures are anticipated, do not excavate to final required elevations for concrete work unless concrete can be placed immediately.
2. Backfilling: If backfill is being placed during freezing temperatures the backfilling operations shall be monitored by the Owner's Representative and the following procedures shall be followed:
   a. Frozen ground shall be removed in its entirety from beneath and five feet beyond the area of fill placement.
   b. The fill material placed shall consist of Selected Fill and shall be free of all frozen chunks that exceed four inches in size. The material transported to the project site shall only consist of material excavated from below the frost depth.
   c. At the end of the work day, the area of fill placement shall be covered with insulated blankets, or left unprotected. Other means of protection (hay, wood chips, etc.) may also be used for protection provided it is approved by the Owner's Representative.
   d. Following work day, remove the insulated blankets and/or strip the area of all frozen material as specified previously.
   e. Upon establishing the subgrade elevations, protect the grades with insulated blankets or place additional material that will adequately insulate the exposed earth surface from frost. This additional fill or protective material shall be stripped just prior to pouring concrete.

PART 2 PRODUCTS

2.01 MATERIALS

A. Select Granular Material: Stockpiled, sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation and material requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
2 inch	50.8	100
1/4 inch	6.35	30-65
No. 40	0.425	5-40
No. 200	0.075	0-10

1. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after four test cycles.
2. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
3. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a 1/2 inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than three times its least dimension.

B. Subbase Course Type 2: Stockpiled, crushed ledge rock or approved blast furnace slag. Comply with the gradation and material requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
2 inch	50.8	100
1/4 inch	6.35	25-60
No. 40	0.425	5-40
No. 200	0.075	0-10

1. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after four test cycles.
2. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
3. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a 1/2 inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than three times its least dimension.

C. Selected Fill: Sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
4 inch	101.6	100
No. 40	0.425	0-70
No. 200	0.075	0-15

D. Suitable Material (Fill and Backfill for Landscaped Areas): Material consisting of mineral soil (inorganic), blasted or broken rock and similar materials of natural or man-made origin, including mixtures thereof. Maximum particle size shall not exceed 2/3 of the specified layer thickness prior to compaction. NOTE: Material containing cinders, industrial waste, sludge, building rubble, land fill, muck, and peat shall be considered unsuitable for fill and backfill, except topsoil and organic silt may be used as suitable material in landscaped areas provided it is placed in the top layer of the subgrade surface.

E. Cushion Material: Shall consist of clean, hard, durable, uncoated particles, free from lumps of clay and all deleterious substances and shall meet the following gradation requirements:

Sieve Size		Percent Passing
Sieve Size	Size opening (mm)	
1/4 inch	6.35	100
No. 60	0.25	0-35
No. 100	0.15	0-10

F. Rip Rap: Fine, Light, Medium or Heavy Stone Filling that complies with DOT Article 620-2.02 for stone filling.

G. Pea Gravel: Comply with DOT Article 703-02 for screened gravel.

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1/2 inch	12.7	100
1/4 inch	6.35	90-100
1/8 inch	3.17	0-15
No. 200 Sieve	0.075	0-1

H. Marker Tape: FL Industries Blackburn/Holub's Type YT6, or Seton Nameplate Corporations Type 6 ELE, imprinted with message suited to item buried below.

I. Embankment Materials: Low permeability materials shall be a silt or clay type soil capable of being handled and compacted to achieve a minimum permeability of 1 x 10-5 cm/sec. The following materials or a mix thereof meeting the USCS soil classification system and achieving the required in-place permeability will be acceptable:

a. CH – silty clay, clay
b. CL – silty clay laom, clay loam

2.02 GEOTECHNICAL FABRICS

A. Filter Fabric (GeoTextile)

1. Drainage and Erosion Control: Amoco 1199 & 2019, Maccaferri MacTex MX140 & MX155, Mirafi 140N & 160N, Fiberweave 403 & 404 or equivalent.
2. Separation for foundation drains, underdrains, undercuts: Amoco 2002 & 2004, Contech Construction Products Inc. C-180, Synthetic Industries Geotex 250ST & 315ST, Mirafi Geolon HP570 & HP1500 or equivalent.
3. Separation/Stabilization beneath pavements: Amoco 4551, Bonded Fibers Products PN080, Maccaferri Gabions MacTex MX275 & 340, Mirafi 160N & 180N or equivalent.

2.03 BRICK AND MORTAR

A. Manhole Brick: Standard size, ASTM C 32, Grade MS.

B. Mortar Materials: Dry packaged, proportioned for Type M unit masonry mortar, complying with ASTM C 387.

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

A. Clear and grub the site within the Grading Limit Line (GLL) of trees, shrubs, brush, other prominent vegetation, debris, and obstructions except for those items indicated to remain. Completely remove stumps and roots protruding through the ground surface.

B. Fill depressions caused by the clearing and grubbing operations in accordance with the requirements for filling and backfilling, unless further excavation is indicated.

3.02 UNDERGROUND UTILITIES

A. Locate existing underground utilities prior to commencing excavation work. Determine exact utility locations by hand excavated test pits. Support and protect utilities to remain in place.

B. Do not interrupt existing utilities that are in service until temporary or new utilities are installed and operational.

C. Utilities to remain in service: Shall be re-routed as shown on the Contract Drawings.

D. Utilities abandoned beneath and five feet laterally beyond the structure's proposed footprint shall be removed in their entirety. Excavations required for their removal shall be backfilled and compacted as specified herein.

E. Utilities located outside the limits specified above may be abandoned in place provided their ends are adequately plugged as described below.
   1. Permanently close open ends of abandoned underground utilities exposed by excavations, which extend outside the limits of the area to be excavated.
   2. Close open ends of metallic conduit and pipe with threaded galvanized metal caps or plastic plugs or other approved method for the type of material and size of pipe. Do not use wood plugs.
   3. Close open ends of concrete and masonry utilities with concrete or flow-able fill.

3.03 EXCAVATION

A. Excavate earth as required for the Work.

B. Install and maintain all erosion and sedimentation controls during all earthwork operations as specified on the Contract Drawings or as directed by local officials. If the erosion and sedimentation controls specified by the local officials are more stringent than those specified on the Contract Drawings contact the Owner's Representative.

C. Maintain sides and slopes of excavations in a safe condition until completion of backfilling. Comply with Code of Federal Regulations Title 29 - Labor, Part 1926 (OSHA).

1. Trenches: Deposit excavated material on one side of trench only. Trim banks of excavated material to prevent cave-ins and prevent material from falling or sliding into trench. Keep a clear footway between excavated material and trench edge. Maintain areas to allow free drainage of surface water.

D. Stockpile excavated materials classified as suitable material where directed, until required for fill. Place, grade, and shape stockpiles for proper drainage as approved by the Owner's Representative.

E. Excavation for Structures: Conform to elevations, lines, and limits indicated. Excavate to a vertical tolerance of plus or minus 1 inch. Extend excavation a sufficient lateral distance to provide clearance to execute the Work.

F. Footings and Foundations: The foundation bearing grade shall be established just prior to constructing the concrete foundations when concrete is to bear on undisturbed soil.

G. Concrete Slabs, Floors and Bases: Excavate to the following depths below bottom of concrete for addition of select granular material:

1. Interior Floors: 6 inches unless otherwise indicated.
2. Exterior Slabs and Steps: 12 inches unless otherwise indicated.

H. Pipe Trenches and/or Bell and Spigot Pipe Trenches: Open only enough trench length to facilitate laying pipe sections. Unless otherwise indicated on the Drawings, excavate trenches approximately 24 inches wide plus the outside pipe diameter, equally divided on each side of pipe centerline. Cut trenches to cross section, elevation, profile, line, and grade indicated. Accurately grade and shape trench bottom for uniform bearing of pipe.

I. Conduit, Cable, Tubing and Piping (other than Bell and Spigot): Provide sufficient trench width for installation and to accommodate special backfill when specified.

J. Underground Structures: Excavate as required to install structure and to accommodate special backfill.

K. Open Ditches: Cut ditches to cross sections and grades indicated.

L. Pavement: Excavate to subgrade surface elevation.

M. Embankment Materials: Place embankment materials in layers not to exceed 8 inches in loose depth prior to compaction. Compacted materials shall be in the range of moisture and density values expected to yield the maximum hydraulic conductivity. Spreading and hauling equipment shall not be allowed as compaction equipment. The surface of each lift shall be scarified prior to placement of the subsequent lift.

N. Unauthorized Excavations: Unless otherwise directed, backfill unauthorized excavation under footings, foundation bases, and retaining walls with compacted select granular material without altering the required footing elevation. Elsewhere, backfill and compact unauthorized excavation as specified for authorized excavation of the same classification, unless otherwise directed by the Owner's Representative.

1. Unauthorized excavations under structural Work such as footings, foundation bases, and retaining walls shall be reported immediately to the Owner's Representative before any concrete or backfilling Work commences.

O. Notify the Owner's Representative upon completion of excavation operations. Do not proceed with the Work until the excavation is inspected and approved. Inspection of the excavation by the Owner's Representative will be made on 3 working days notice.

3.04 DEWATERING

A. Prevent surface and subsurface water from flowing into excavations and trenches and from flooding the site and surrounding area.

B. Do not allow water to accumulate in excavations or trenches. Remove water from all excavations immediately to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Furnish and maintain pumps, sumps, suction and discharge piping systems, and other system components necessary to convey the water away from the Site.

C. Convey water removed from excavations, and rain water, to collecting or run-off area. Cut and maintain temporary drainage ditches and provide other necessary diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.

D. Provide temporary controls to restrict the velocity of discharged water as necessary to prevent erosion and siltation of receiving areas.

3.05 PLACING FILTER FABRIC

A. Place and overlap filter fabric in accordance with the manufacturer's installation instructions, unless otherwise shown.

B. Cover tears and other damaged areas with additional filter fabric layer extending 3 feet beyond the damage.

C. Do not permit traffic or construction equipment directly on filter fabric.

D. Backfill over filter fabric within two weeks after placement. Backfill in accordance with the fabric manufacturer's instructions and in a manner to prevent damage to the fabric.

3.06 PLACING FILL AND BACKFILL

A. Surface Preparation of Fill Areas: Strip topsoil, remaining vegetation, and other deleterious materials prior to placement of fill. Remove all asphalt pavement in its entirety from areas requiring the placement of fill. Prior to placement of fill, smooth out and compact areas where wheel rutting has occurred due to stripping or earthwork operations.

B. Excavations: Backfill as promptly as practicable, but only after approval by the Owner's Representative. Do not backfill with excavated material unless it meets the requirements of this Section.

C. Place backfill and fill materials in layers not more than 8 inches thick in loose depth unless otherwise specified. Before compaction, moisten or aerate each layer as necessary to facilitate compaction to the required density. Do not place backfill or fill material on surfaces that are muddy, frozen, or covered with ice.
   1. Place fill and backfill against foundation walls, and in confined areas (such as trenches) not easily accessible by larger compaction equipment, in maximum 6-inch thick loose depth layers.

D. Prevent wedging action of backfill against structures by placing backfill uniformly around structure to approximately same elevation in each layer.

E. Under Exterior Concrete Slabs and Steps:
   1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
   2. Subbase Material: Place 12 inches of select granular material over subgrade surface.

F. Under Interior Concrete Slabs:
   1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
   2. Subbase Material: Place six inches of select granular material over subgrade surface.

G. Under Pavements and Walks:
1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
2. Subbase Material: Place as indicated.

H. Landscaped Areas: Place suitable material when required to complete fill or backfill areas up to subgrade surface elevation. Do not use material containing rocks over four inches in diameter within the top 12 inches of suitable material.

I. Plastic Underdrain Pipe in Trenches: Place pea gravel material a minimum of four inches deep under pipe, four inches on both sides, and four inches over top of pipe. Complete balance of backfill as specified.

J. Copper Tubing and Steel Gas Pipe in Trenches: Place cushion material a minimum of six inches deep under pipe, six inches on both sides, and 4 inches over top of pipe. Complete balance of backfill as specified.

K. Rigid Non-Metallic Conduit: Except where concrete encasement is required, place cushion material a minimum of four inches deep under conduit, four inches on both sides, and 12 inches over top of conduit. Complete balance of backfill as specified.

3.07 COMPACTION

A. Compact each layer of fill and backfill for the following area classifications to the percentage of maximum density specified below and at a moisture content suitable to obtain the required densities, but at not less than 3 percent drier or more than 2 percent wetter than the optimum content as determined by ASTM D 698 (Standard Proctor) or 1557 (Modified Proctor).
1. Structures (entire area within 10 feet outside perimeter): 95 percent.
2. Concrete Slabs and Steps: 95 percent.
3. Landscaped Areas: 90 percent.
4. Pavements and Walks: 95 percent.
5. Pipes and Tunnels: 95 percent.
6. Pipe Bedding: 95 percent.
7. Embankment Materials: 90 percent.

B. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and retested. If compaction cannot be achieved the material/layer shall be removed and replaced. No additional material may be placed over a compacted layer until the specified density is achieved.

3.08 GRADING

A. Rough Grading: Trim and grade area within the Grading Limit Line and excavations outside the limit line, required by this Contract, to a level of four inches below the finish grades indicated unless otherwise specified herein or where greater depths are indicated. Provide smooth uniform transition to adjacent areas.

B. Finish Grading: Finish surfaces free from irregular surface changes, and as follows:

1. Grassed Areas: Finish areas to receive topsoil to within 1 inch above or below the required subgrade surface elevations.
2. Walks and Pavements: Place and compact subbase material as specified. Shape surface of areas to required line, grade and cross section, with the finish surface not more than 1/2 inch above or below the required subbase elevation.
3. Building Slabs: Grade subbase material smooth and even, free of voids, compacted as specified to within 1/4 inch above or below required subbase elevation.

C. Spread approved topsoil directly upon prepared subgrade surface to a depth measuring 4 inches after natural settlement of the topsoil has occurred in areas to be seeded or to receive sod. Place to greater depth when necessary to adjust grades to required elevations.

1. Approved existing topsoil within the Grading Limit Line may be used. Provide additional topsoil from outside sources as required.

D. Finish topsoil surface free of depressions which will trap water, free of stones over 1 inch in any dimension, and free of debris.

3.09 RESTORATION

A. Restore pavements, walks, curbs, lawns, and other exterior surfaces damaged during performance of the Work to match the appearance and performance of existing corresponding surfaces as closely as practicable.

B. Topsoil and seed or sod damaged lawn areas outside the GLL and new lawn areas inside the GLL. Water as required until physical completion of the Work.

3.10 DISPOSAL OF EXCESS AND UNSUITABLE MATERIALS

A. Remove from property and dispose of excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements.

B. Transport excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements, to spoil areas on property designated by the Owner's Representative, and dispose of such materials as directed by Owner's Representative.

3.11 FIELD QUALITY CONTROL

A. Compaction Testing: Notify the Owner's Representative at least 3 working days in advance of all phases of filling and backfilling operations. Compaction testing shell be provided to the Owner's Representative to ascertain the compacted density of the fill and backfill materials. Compaction testing will be performed on certain layers of the fill and backfill as determined by the Owner's Representative. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.

3.12 PROTECTION

A. Protect graded areas from traffic and erosion, and keep them free of trash and debris.

END OF SECTION

STANDARD AND SPECIFICATIONS FOR LINED WATERWAY OR OUTLET

Definition

A waterway or outlet with a lining of concrete, stone, or other permanent material. The lined section extends up the side slopes to the designed depth. The earth above the permanent lining may be vegetated or otherwise protected.

Purpose

To provide for the disposal of concentrated runoff without damage from erosion or flooding, where grassed waterways would be inadequate due to high velocities.

Scope

This standard applies to waterways or outlets with linings of cast-in-place concrete, flagstone mortared in place, rock riprap, gabions, or similar permanent linings. It does not apply to irrigation ditch or canal linings, grassed waterways with stone centers or small lined sections that carry prolonged low flows, or to reinforced concrete channels. The maximum capacity of the waterway flowing at design depth shall not exceed 100 cubic feet per second.

Conditions Where Practice Applies

This practice applies where the following or similar conditions exist:

1. Concentrated runoff is such that a lining is required to control erosion.
2. Steep grades, wetness, prolonged base flow, seepage, or piping that would cause erosion.
3. The location is such that damage from use by people or animals precludes use of vegetated waterways or outlets.
4. Soils are highly erosive or other soil and climate conditions preclude using vegetation.
5. High value property or adjacent facilities warrant the extra cost to contain design runoff in a limited space.

Design Criteria

Capacity

1. The minimum capacity shall be adequate to carry the peak rate of runoff from a 10-year, 24-hour storm. Velocity shall be computed using Manning's equation with a coefficient of roughness "n" as follows:

Lined Material	"n"
Concrete (Type):	
Trowel Finish	0.015
Float Finish	0.019
Gunite	0.019
Flagstone	0.022
Riprap	Determine from Figure 5B.11 on page 5B.19
Gabion	0.030

2. Riprap gradation and filter (bedding) are generally designed in accordance with criteria set forth in the National Cooperative Highway Research Program Report 108, available from the University Microfilm International, 300 N. Ree Road, Ann Arbor, Michigan 48016, Publication No. PB-00839; or the Hydraulic Engineering Circular No. 11, prepared by the U.S. Bureau of Public Roads, available from Federal Highway Administration, 400 7th Street, S.W., Washington, D.C. 20590, HNG-31, or the procedure in the USDA-NRCS's Engineering Field Manual, Chapter 16.

Velocity

1. Maximum design velocity shall be as shown below. Except for short transition sections, flow with a channel gradient within the range of 0.7 to 1.3 of this

flow's critical slope must be avoided unless the channel is straight. Velocities exceeding critical will be restricted to straight reaches.

Design Flow Depth (ft.)	Maximum Velocity (ft./sec.)
0.0 – 0.5	25
0.5 – 1.0	15
Greater than 1.0	10

2. Waterways or outlets with velocities exceeding critical shall discharge into an energy dissipater to reduce velocity to less than critical, or to a velocity the downstream soil and vegetative conditions will allow.

Cross Section

The cross section shall be triangular, parabolic, or trapezoidal. Monolithic concrete or gabions may be rectangular.

Freeboard

The minimum freeboard for lined waterways or outlets shall be 0.25 feet above design high water in areas where erosion resistant vegetation cannot be grown adjacent to the paved side slopes. No freeboard is required where good vegetation can be grown and is maintained.

Side Slope

Steepest permissible side slopes, horizontal to vertical will be as follows:

1. Non-Reinforced Concrete
   Hand-placed, formed concrete
   Height of lining, 1.5 ft or less............Vertical
   Hand placed screened concrete or mortared In-place flagstone
   Height of lining, less than 2 ft............ 1 to 1
   Height of lining, more than 2 ft.......... 2 to 1
2. Slip form concrete:
   Height of lining, less than 3 ft........... 1 to 1
3. Rock Riprap.................................... 2 to 1
4. Gabions... Vertical
5. Pre-cast Concrete Sections................... Vertical

Lining Thickness

Minimum lining thickness shall be as follows:

1. Concrete...................4 in. (In most problem areas, shall be 5 in. with welded wire fabric reinforcing.)

2. Rock Riprap......1.5 x maximum stone size plus thickness of filter or bedding.
3. Flagstone............4 in. including mortar bed.

Related Structures

Side inlets, drop structures, and energy dissipaters shall meet the hydraulic and structural requirements of the site.

Filters or Bedding

Filters or bedding to prevent piping, reduce uplift pressure, and collect water will be used as required and will be designed in accordance with sound engineering principles. Weep holes and drains should be provided as needed.

Concrete

Concrete used for lining shall be so proportioned that it is plastic enough for thorough consolidation and stiff enough to stay in place on side slopes. A dense product will be required. A mix that can be certified as suitable to produce a minimum strength of at least 3,000 pounds per square inch will be required. Cement used shall be Portland Cement, Type I, II, IV, or V. Aggregate used shall have a maximum diameter of 1 ½ inches.

Weep holes should be provided in concrete footings and retaining walls to allow free drainage of water. Pipe used for weep holes shall be non-corrosive.

Mortar

Mortar used for mortared in-place flagstone shall consist of a mix of cement, sand, and water. Follow directions on the bag of mortar for proper mixing of mortar and water.

Contraction Joints

Contraction joints in concrete linings, where required, shall be formed transversely to a depth of about one third the thickness of the lining at a uniform spacing in the range of 10 to 15 feet.

Rock Riprap or Flagstone

Stone used for riprap or gabions shall be dense and hard enough to withstand exposure to air, water, freezing, and thawing. Flagstone shall be flat for ease of placement and have the strength to resist exposure and breaking. Rock riprap maximum size shall be as follows:

Velocity, f.p.s.	dmax, inches
5.0	6
8.5	12
10	18
12	24
15	36

A complete riprap gradations is provided in Table 5B.4, page 5B.38.

Cutoff Walls

Cutoff walls shall be used at the beginning and ending of concrete lining. For rock riprap lining, cutoff walls shall be keyed into the channel bottom and at both ends of the lining.

Construction Specifications

1. The foundation area shall be cleared of trees, stumps, roots, sod, loose rock, or other objectionable material.

2. The cross-section shall be excavated to the neat lines and grades as shown on the plans. Over-excavated areas shall be backfilled with moist soil compacted to the density of the surrounding material.

3. No abrupt deviations from design grade or horizontal alignment shall be permitted.

4. Concrete linings shall be placed to the thickness shown on the plans and finished in a workmanlike manner. Adequate precautions shall be taken to protect freshly placed concrete from extreme (hot or cold) temperatures, to ensure proper curing.

5. Filter bedding and rock riprap shall be placed to line and grade in the manner specified.
6. Construction operation shall be done in such a manner that erosion, air pollution, and water pollution will be minimized and held within legal limits. The completed job shall present a workmanlike appearance. All disturbed areas shall be vegetated or otherwise protected against soil erosion.

Maintenance

Pavement or lining should be maintained as built to prevent undermining and deterioration. Existing trees next to pavements should be removed, as roots can cause uplift damage.

Vegetation next to pavement should be maintained in good condition to prevent scouring if the pavement is overtopped. See Standard and Specifications for Permanent Critical Area Seeding on page 3.5.

SECTION 313700

RIPRAP

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 310000.

PART 2 PRODUCTS

2.01 BEDDING MATERIAL

A. Conform to DOT Paragraph 620-2.05 Bedding Material.

2.02 RIPRAP MATERIALS

A. Provide sound, durable, stone complying with the following requirements:
   1. Freeze-Thaw Test: A maximum of 10 percent loss, by weight, after 25 cycles of freezing and thawing.
   2. Magnesium Sulfate Soundness Test: A maximum 10 percent loss, by weight, after 10 cycles of the magnesium sulfate soundness test.

2.03 RIPRAP

A. End Dumped: Conform to DOT Figure 620-1, Stone Filling Gradation Requirements for Light Stone Filling.

B. Hand Placed: Stones shaped as nearly as practicable in the form of right rectangular prisms. Fifty percent, by weight, of the stones shall weigh in excess of 100 pounds each, and the remainder of the stones shall weigh from 50 to 100 pounds each.

PART 3 EXECUTION

3.01 PREPARATION

A. Clear proposed riprap area of brush, trees and stumps, and grade to a smooth surface.

3.02 BEDDING MATERIAL

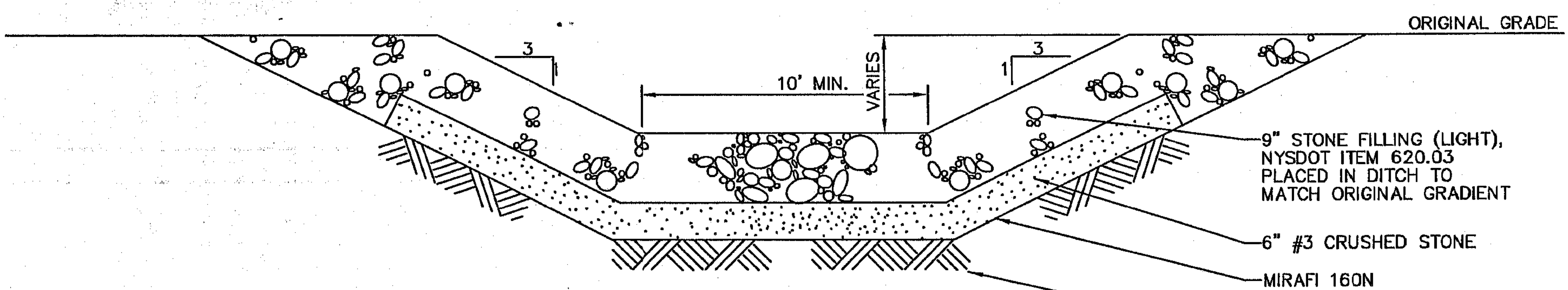
A. Spread a 6 inch layer of bedding material prior to placing riprap. Prevent mixing of bedding material with subgrade.

3.03 RIPRAP INSTALLATION

A. End Dumped: End dump riprap to conform with the lines, grades and thicknesses indicated. End dumped riprap shall be a well graded mass of variable size stones with no areas of uniform size material. Rearrange individual stones, if necessary, by hand or with mechanical equipment to obtain the specified results.

B. Hand Placed: Hand place riprap with the largest stones placed at the bottom of slope. Align stones to obtain a close fit and to minimize voids. Fill spaces between stones with spalls of suitable size.

END OF SECTION



STONE DRAINAGE SWALE

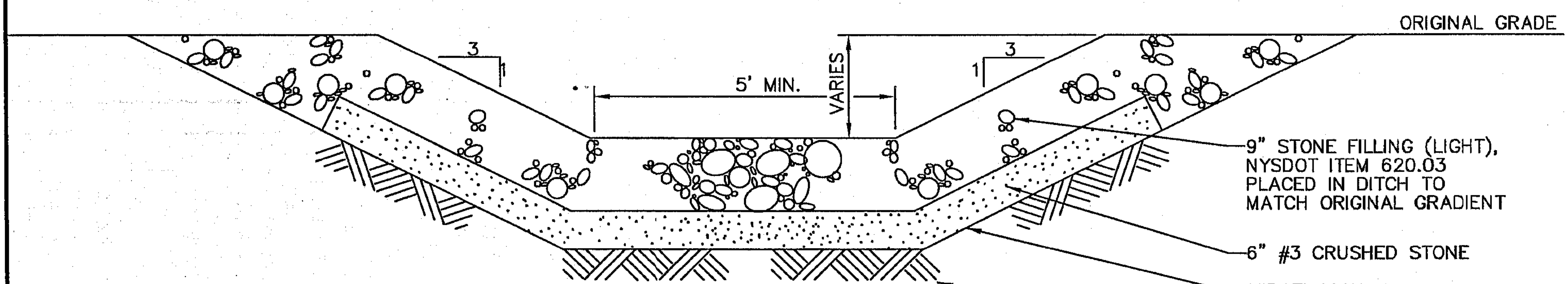
SCALE: NONE
CROSS REFERENCE:

G-L Engineering, P.C.
8 Brunswick Road, Troy, New York 12180
P (518) 270-5920 Fax: (518) 270-5922

New Castle Asphalt, LLC
Rensselaer Plant
City of Rensselaer, Rensselaer County, New York

Details for C ction SWPPP

DETAILS
Date: 1/14/11
Drafted by: MV/JWR



STONE DRAINAGE SWALE

SCALE: NONE
CROSS REFERENCE:

G-L Engineering, P.C. 8 Brunswick Road, Troy, New York 12180 P[illegible]518) 270-5920 Fax: (518) 270-5922	*New Castle Asphalt, LLC* *Rensselaer Plant* *City of Rensselaer, Rensselaer County, New York*	*Details* *for* *C[illegible]tion SWPPP*	*DETAILS* Date: 1/14/11 Drafted by: MV/JWR

SECTION 334913

STORM DRAINAGE STRUCTURES, FRAMES & COVERS

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 310000.

B. Corrugated Steel Pipe: Section 334102.

C. Polyethylene Storm Drain: Section 334104.

D. Plastic Drainage Pipe: Section 334105.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Obtain necessary permits from local Authorities. Ascertain and comply with local requirements for materials, construction and restoration of pavement.

1.03 SUBMITTALS

A. Shop Drawings: Show fabrication details and connections to adjacent Work.

B. Product Data: Manufacturer's catalog cuts, specifications, and installation instructions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Precast Reinforced Concrete Manholes:
   1. Riser Sections: ASTM C 478.
   2. Joints Between Riser Sections-One of the following:
      a. Rubber Gaskets: ASTM C 443.
      b. Butyl Joint Sealant: ConSeal CS-202 by Concrete Sealants, Inc., 8917 S. Palmer Rd., P. O. Box 176, New Carlisle, OH 45344, (513) 845-8776.
   3. Concrete for Precast Units: Air content 6 percent by volume with an allowable tolerance of plus or minus 1.5 percent. Minimum compressive strength of 4,000 psi after 28 days.
   4. Load Rating: AASHTO HS-20 with 30% impact and 130 lb/cf equivalent soil pressure.

3. Material:
   a. Cast iron: ASTM A48, Class 30B or 35B.
   b. Delivered to Site free of any coatings, unless otherwise specified.
4. Frames:
   a. Round with a 30-inch clear opening.
5. Covers:
   a. Round.
   b. Solid lid, top surface checkered and provided with suitable concealed lifting notches, and lettering cast into cover to indicate type of structure.
6. Grates:
   a. Round.
   b. Minimum open area: 232 sq inches.
   c. Bicycle safe.

7. Provide frames, covers, and gratings of the locking type when indicated on the drawings.
   a. Acceptable Locking Devices: Type J or Type H by Neenah Foundry Company, P. O. Box 729, Neenah, WI 54957, (414) 729-3661; Type A or Type B by Syracuse Casting Sales Corporation, P. O. Box 190, South Bay Rd., Cicero, NY 13039, (315) 699-2601.

8. Acceptable Manhole Frames and Covers: Pattern R-1557-A with platen cover by Neenah Foundry Company, P. O. Box 729, Neenah, WI 54957, (414) 729-3661; Pattern 1012A with platen cover by Syracuse Castings Sales Corp., P. O. Box 190, South Bay Rd., Cicero, NY 13039, (315) 699-2601.

9. Acceptable Catch Basin Frames and Gratings: Pattern R-2557-A frame with Pattern R-2580-A, Type G grate by Neenah Foundry Company, P. O. Box 729, Neenah, WI 54957, (414) 729-3661; Pattern 1012451XC frame with Pattern 1187025 grate by Syracuse Casting Sales Corp., P. O. Box 190, South Bay Rd., Cicero, NY 13039, (315) 699-2601.

G. Curb Inlet Frames, Grates and Curb Boxes:
1. Designed to meet AASHTO H20 wheel loading requirements. Manufacture, workmanship and certified proof-load tests shall conform to AASHTO M306-89-Standard Specification for Drainage Structure Castings.
2. Material:
   a. Cast iron: ASTM A 48, Class 30B or 35B.
   b. Delivered to the Site free of any coatings, unless otherwise specified.
3. Frames: Square top with round 36-inch OD base flange and integral stiffeners.
4. Grates:
   a. Rectangular.
   b. Bicycle safe.

B. Glass-Fiber Reinforced Polyester Manholes:
1. One-Piece Monolithic Unit: ASTM D 3753.
2. Nominal Inside Diameter: 48 inches.
3. Minimum Wall Thickness: 0.480 inch.
4. Concentric Cone Top:
   a. Minimum Clear Opening: 30 inches.
5. Load Rating: AASHTO HS-20 with 30% impact and 130 lb/cf equivalent soil pressure.
6. Acceptable Fiberglass Manhole Manufacturers: Containment Solutions, Inc., 5150 Jefferson Chemical Rd., Conroe, TX 77301, (888) 409-7731; L.F. Manufacturing, P.O. Box 578, Highway 290 East Giddings, Texas 78942, (800) 237-5791.

C. Precast Reinforced Square and Rectangular Concrete Structures:
1. Riser Sections: ASTM C890.
2. Keyed Joints:
   a. Joint Sealant - Select One:
      1) Mortar
      2) Rubber Gasket
      3) Butyl Joint Sealant
3. Load Rating: AASHTO HS-20 with 30% impact and 130 lb/cf equivalent soil pressure.
4. Concrete for Precast Units: Air content 6 percent by volume with an allowable tolerance of plus or minus 1.5 percent. Minimum compressive strength of 4,000 psi after 28 days.

D. Cast-in-Place Concrete for Manhole Invert Channels: Normal weight, air entrained concrete with a minimum compressive strength of 4,000 psi after 28 days.
1. Design Air Content: 6 percent by volume plus or minus 1.5 percent.
2. Cement: Minimum 610 pounds per cubic yard.
3. Slump: Between 2 and 3 inches.

E. Drop Piping:

1. Outside Drop:
   a. Ductile Iron Pipe: ANSI/ASTM A-746, Class 50.
   b. Polyvinyl Chloride Pipe: PVC compound ASTM D1784, Pipe ASTM D-3034, SDR-26.
2. Inside Drop:
   a. Polyvinyl Chloride Pipe: PVC compound ASTM D1784, Pipe ASTM D-3034, SDR-26.

F. Frames, Covers and Grates for Manholes and Catch Basins:
1. Design of each shall be the same throughout the project unless otherwise specified or indicated on the drawings.
2. Units shall meet AASHTO H20 wheel loading requirements. Manufacture, workmanship and certified proof-load tests shall conform to AASHTO M306-89-Standard Specification for Drainage Structure Castings.

5. Acceptable Curb Inlets: Pattern R-3010 with Type A grate by Neenah Foundry Company, P. O. Box 729, Neenah, WI 54957, (414) 729-3661; Pattern 2640 by Syracuse Castings Sales Corp., P. O. Box 190, South Bay Rd., Cicero, NY 13039, (315) 699-2601.

H. Drop Inlet Frames and Grates:
1. Designed to meet AASHTO H20 wheel loading requirements. Manufacture, workmanship and certified proof-load tests shall conform to AASHTO M306-89-Standard Specification for Drainage Structure Castings.
2. Material:
a. Cast iron: ASTM A 48, Class 30B or 35B.
b. Delivered to Site free of any coatings, unless otherwise specified.
3. Frames: Slab type, 24-inch square clear opening.
4. Grates:
a. Bicycle safe.
5. Acceptable Drop Inlet Frames and Grates: Pattern R-3562 by Neenah Foundry Company, P. O. Box 729, Neenah, WI 54957, (414) 729-3661; Pattern 1396440 frame with Pattern 1396040 grate by Syracuse Castings Sales Corp., P. O. Box 190, South Bay Rd., Cicero, NY 13039, (315) 699-2601.

I. Pipe-to-Manhole/Drainage Structure Connections-One of the following:
1. A-Lok Flexible Connector by A-Lok Products, Inc., 697 Main St., Tullytown, PA 19007, (215) 547-3366.
2. Lockjoint Flexible Connector by Chardon Rubber Company, 373 Washington St., Chardon, OH 44024, (216) 285-2161.
3. Kor-N-Seal Flexible Connector by NPC, Inc., 250 Elm St., Milford, NH 03055, (601) 673-8680.
4. Link-Seal Flexible Connector by Thunderline Link-Seal, Inc., 6525 Goforth St., Houston, TX 77021, (713) 747-8819.

J. Mortar: ASTM C 270, Type M.

PART 3 EXECUTION

3.01 PREPARATION

A. Sewer Lateral Openings in Precast and Cast-in-Place Concrete Risers: Provide openings and install pipe connectors in strict accordance with the recommendation of the connector manufacturer.

3.02 INSTALLATION

A. Construct concrete structures with precast reinforced riser sections to the dimensions shown. Seal joints between precast riser sections with material specified.
1. Wall thickness for circular structures 12 feet deep or less: 5 inches.

2. Wall thickness for circular structures greater than 12 feet deep: 6 inches.

B. Position tops of structures flush with finished grade, unless indicated otherwise on the drawings.

C. Form inverts in manholes on straight runs by the use of channel pipe. Form inverts in manholes at changes in direction or grade by making curved channels of concrete. Channels shall have a smooth surface free from irregularities.

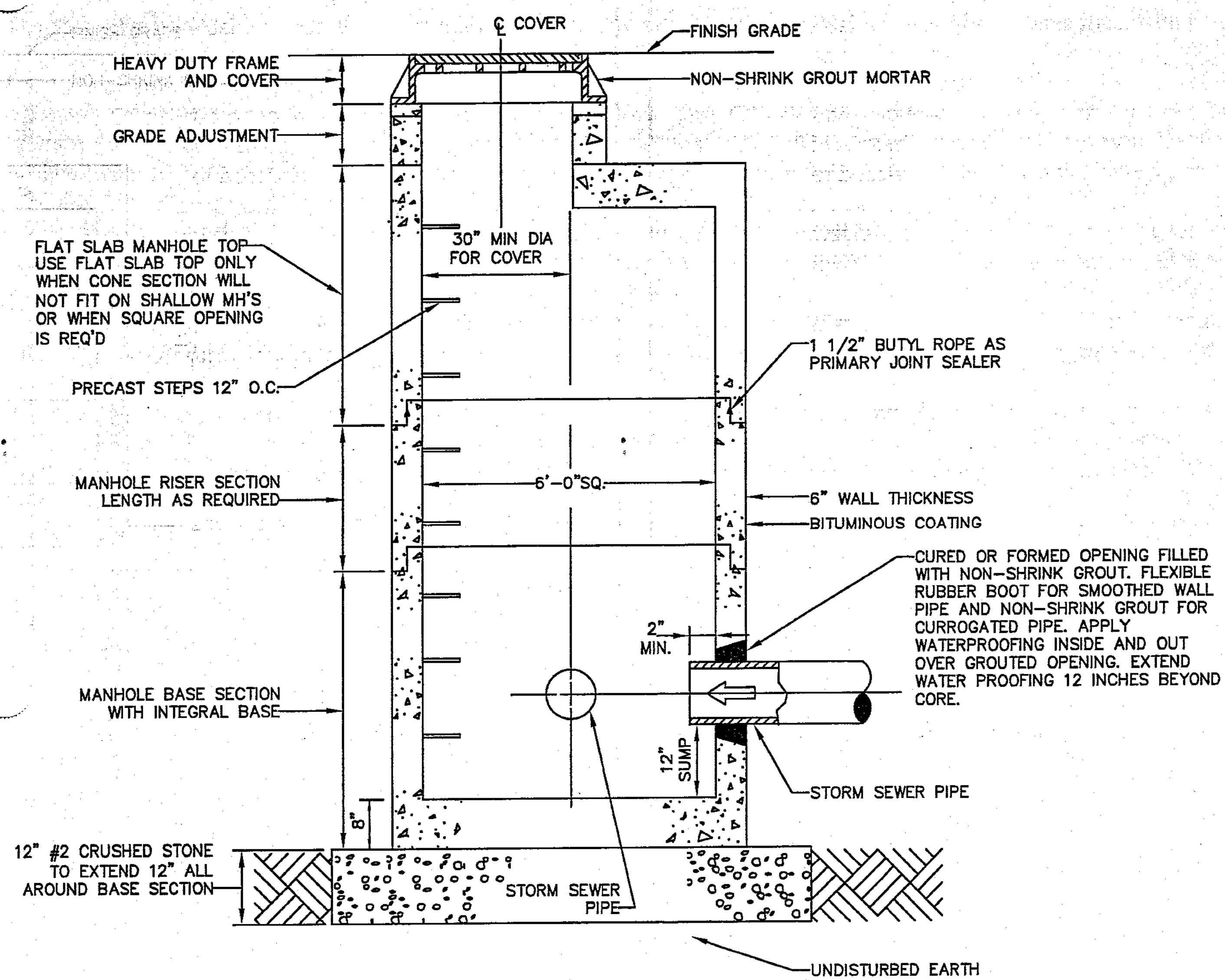
D. Cut laterals which will enter above the invert to correct length before installation. Do not cut after installation. Construct drops as shown.

E. Install glass-fiber reinforced polyester manholes as detailed on the Drawing and in accordance with the manufacturer's printed installation procedures.

F. Construct drop inlets of concrete or precast units.

G. Install curb inlets where indicated.

END OF SECTION



NOTES
1. USE ONLY WET-CAST UNITS. DRY-CAST NOT ACCEPTABLE
2. PROVIDE SHOP DRAWINGS FOR STRUCTURE, FRAME, COVER AND STEPS, INCLUDE PRODUCT LITERATURE FOR SEALER FOR REVIEW AND APPROVAL.

PRECAST CONCRETE STORM SEWER MANHOLE

SCALE: NONE
CROSS REFERENCE:

G-L Engineering, P.C. 8 Brunswick Road, Troy, New York 12180 Phone: (518) 270-5920 Fax: (518) 270-5922	*New Castle Asphalt, LLC* *Rensselaer Plant* *City of Rensselaer, Rensselaer County, New York*	*Details* *for* *Construction SWPPP*	***DETAILS*** Date: 1/14/11 Drafted by: MV/JWR

SECTION 334104

CORRUGATED POLYETHYLENE STORM DRAIN PIPE

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 310000.

1.02 SUBMITTALS

A. Product Data: Manufacturer's specifications (AASHTO M-252 or AASHTO M-294), including dimensions, allowable height of cover information, and installation instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Advanced Drainage Systems, Inc., 3300 Riverside Dr., Columbus, OH 43221; (614) 457-3051.

B. Hancor, Inc., 401 Olive St., Findlay, OH 45840; (800) 847-5880.

2.02 MATERIALS

A. Corrugated Polyethylene Pipe and Fittings: Conform to AASHTO M-252 (4 to 10-inch diameter) or AASHTO M-294 (12 to 36-inch diameter).
   1. Coefficient of Roughness (interior pipe surface): 0.020 maximum (Manning formula).
   2. Classification: Type C.
   3. Design Strength (all sizes): 50 feet allowable height of cover.
   4. Joint Couplings: Polyethylene Couplers; snap-on type or split collar through 24-inch diameter, screw-on type where applicable.
   5. Material Properties: High-density polyethylene meeting the requirements of ASTM D 3350, Cell Classification 324420C; or ASTM 1248, Type III, Class C, Category 4, Grade P33.

B. Corrugated Polyethylene Pipe (Smooth Interior): Conform to AASHTO M-294 (12 to 36-inch diameter).
   1. Coefficient of Roughness (interior pipe surface): 0.012 maximum (Manning formula).
   2. Classification: Type S.
   3. Minimum Pipe Stiffness Values:

DIAMETER	PIPE STIFFNESS (PER ASTM D 2412)
4", 6", 8", 10", 12"	50 psi
15"	42 psi
18"	40 psi
24"	34 psi
30"	28 psi
36"	22 psi

4. Joint Couplings: Polyethylene Couplers; snap-on type or split collar through 24-inch diameter, screw-on type where applicable.
   a. Corrugated to match pipe corrugations, width not less than one half pipe diameter.
   b. Split couplings shall engage an equal number of corrugations on each side of the joint.

5. Joint Couplings: Polyethylene, bell-and-spigot type couplers utilizing an elastomeric gasket conforming to ASTM F 477.

C. Fittings:
   1. High density polyethylene meeting the properties specified for the pipe.
   2. Either molded or fabricated.
   3. Designed specifically for the pipe furnished and manufactured by the pipe manufacturer.

D. Headwalls and End Sections: Galvanized steel manufactured from material meeting the requirements of AASHTO M-218.
   1. Conform to shape, dimensions, and thickness shown on the drawings.
   2. Use only extra length rod and lug-type, galvanized coupling band connectors.

E. Perforated Pipe: Conform to AASHTO M-252 or AASHTO M-294, Type SP with Class I perforations.

PART 3 EXECUTION

3.01 INSTALLATION

A. Laying: Lay pipe to indicated line and grade with a firm uniform bearing for the entire length of the pipe. Fill excess excavation with suitable materials and tamp.

B. Joints: Install coupling and fasten per manufacturer's instructions.

C. Connections:
   1. Make connections to existing pipe by using a galvanized steel "dimple"-type coupling. Remake damaged existing joints.
   2. Make connections to existing manholes and drainage structures by cutting into the floor or bench of the manhole or drainage structure and forming a new channel.

3. If the pipe, manholes or other structures with which connections are to be made have not yet been installed, install the pipe to a point directed by the Director's Representative and plug or cap the end in a satisfactory manner.

END OF SECTION

SECTION 334105

PLASTIC DRAINAGE PIPE (STORM DRAINAGE)

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 310000.

B. Manholes: Section 334913.

1.02 SUBMITTALS

A. Product Data: Manufacturer's specifications with all pertinent information regarding dimensions, fittings and installation instructions.

PART 2 PRODUCTS

2.01 GENERAL

A. Each length of pipe and each fitting shall be marked in accordance with the applicable ASTM Designation.

2.02 DRAINAGE PIPE AND FITTINGS

A. PVC Sewer Pipe and Fittings; (6 inches Diameter and Larger): SDR 35 and ASTM D 3034. Use minimum SDR 26 for all pond outlet piping.

B. ABS Sewer Pipe and Fittings: ASTM D 2751.

C. ABS Composite Sewer Pipe: ASTM D 2680.

D. Plastic Pipe (4 and 6 inches Diameter, Solid and Perforated) for Building Drains, Cleanout Pipes, Discharge Lines, Leaching Fields, Drain Tiles, etc: PVC meeting ASTM D 2729 or SR (Styrene Rubber) meeting ASTM D 2852.

2.03 SOLVENT CEMENTS

A. Solvent cement used for joining plastic pipe and fittings shall meet the following designations for the various types of plastic pipe listed.
1. PVC: ASTM D 2564.
2. ABS: ASTM D 2235.
3. SR: ASTM D 3122.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect all pipe and fittings before installation. Remove defective pipe and fittings from the site.

B. Do not backfill before installation is inspected by the Owner's Representative.

3.02 GENERAL

A. Install pipe in accordance with the manufacturer's recommendations and as specified in ASTM D 2321.

B. Join PVC pipe with solvent cemented joints as recommended by ASTM D 2855.

C. Use Cushion Material for bedding and backfill to the depth shown on the drawings..

D. Use No. 2 Coarse Aggregate for bedding and backfill to the depth shown on the drawings for perforated pipe.

3.03 INSTALLATION

A. Laying Pipe: Lay pipe to indicated line and grade with a firm uniform bearing for the entire length of the pipe. Excavate sufficient clearance at each bell or coupling to allow uniform bearing along the pipe barrel. Fill excess excavation with suitable material and tamp.

B. Joints:
1. Wipe inside of sockets and outside of pipe to be jointed, clean and dry.
2. Install rubber gaskets in accordance with the manufacturer's specifications.

C. Connections:
1. Make connections to existing manholes by cutting into the floor or bench of the manhole and forming a new channel.
2. If the pipe, manholes or other structures with which connection is to be made has not yet been installed, install the pipe to a point directed by the Owner's representative and plug or cap the end in a satisfactory manner.

D. Lay perforated pipe on a tamped bed of underdrain filter material.

E. Cleanouts:
1. Construct cleanouts at the locations shown and as detailed on the drawings.
2. Use PVC wyes, bends and pipe as indicated.
3. Extend cleanout piping to grade and terminate with deck plug installed in accordance with manufacturer's instructions.

4. Install deck plug flush with grade with grade and encase with 2500 psi - concrete pad as shown.

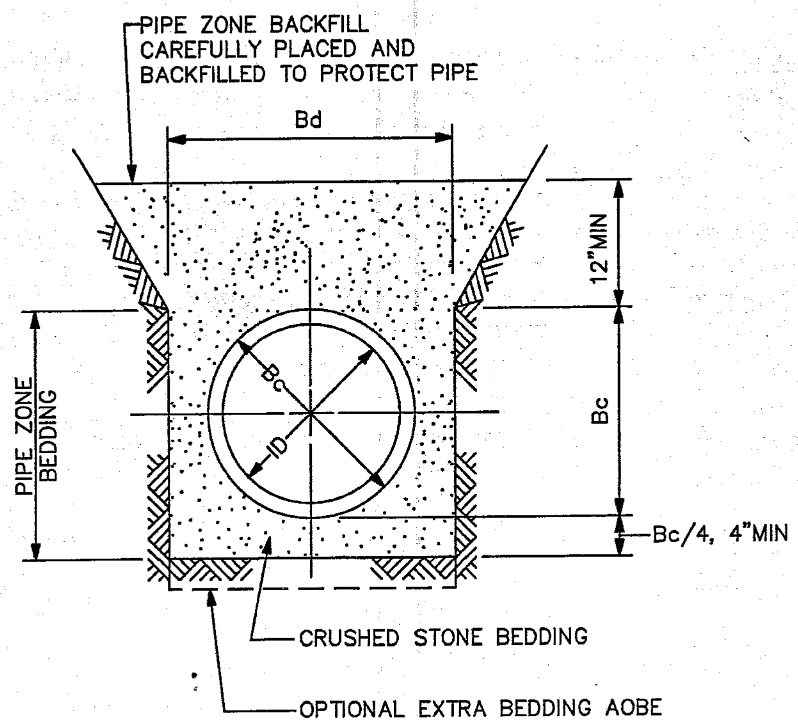
3.04 LEAKAGE TESTS

A. Prior to backfilling and laying additional pipe, test the first 100 feet of sewer construction for leakage.

1. Fill the sewer with water and maintain a head two feet above the highest section of Work being tested. Measure the quantity of leakage. When the sewer being tested is constructed in water bearing soil, the leakage test may, at the discretion of the Owner's representative, be made by measuring the quantity of infiltration into the sewer. The allowable leakage or infiltration shall not exceed 10 gallons per 24 hours per inch pipe diameter per 1000 feet of sewer being tested.
2. If air testing is used conform to the procedure described in ASTM C 828.

B. Additional leakage tests and a final test shall be performed as directed.

END OF SECTION



CORRUGATED HDPE PIPE						
PIPE DIMENSIONS[1.]			TRENCH DIMENSIONS			
NOMINAL SIZE	ID	Bc	ID/4	Bc/4	Bd(ft)	ROCK EXCAVATION BELOW PIPE (d)
6"	6"	7"	1.5"	6"	3.0'	6"
8"	8"	9"	2"	6"	3.0'	6"
10"	10"	12"	2.5"	6"	3.0'	6"
12"	12"	15"	3"	6"	3.0'	6"
15"	15"	18"	4"	6"	3.5'	6"
18"	18"	21"	5"	6"	3.5'	6"
24"	24"	28"	6"	8"	4.0'	6"
30"	30"	35"	8"	10"	4.5'	6"
36"	36"	41"	8"	10"	5.0'	6"

NOTE:

1. STORM SEWER PIPE TO BE SMOOTH WALL.
2. ALL SLEEVES SHALL BE WATERTIGHT.
3. GASKETS SHALL CONFORM TO ASTM F477.
4. GASKETS AND SLEEVES SHALL BE LUBRICATED AS RECOMMENDED BY THE MANUFACTURER.
5. FITTINGS SHALL BE IN CONFORMANCE WITH AAHTO M294.

STORM SEWER
CORRUGATED HDPE PIPE BEDDING

SCALE: NONE
CROSS REFERENCE:

G-L Engineering, P.C.
8 Brunswick Road, Troy, New York 12180
Phone: (518) 270-5920 Fax: (518) 270-5922

New Castle Asphalt, LLC
Rensselaer Plant
City of Rensselaer, Rensselaer County, New York

Details for Construction SWPPP

DETAILS
Date: 1/14/11
Drafted by: MV/JWR

APPENDIX F

C-L Engineering, P.C.
8 Brunswick Road
Troy, New York 12180
Phone: (518) 270-5920
Fax: (518) 270-5922

Project:
Subject:
Made by: | Checked by:
Sheet 1 of | Date: 6/1/11

TOTAL SITE AREA = 542,270 SQ. FT ± = 12.45 AC

EASTERN DRAINAGE (TO CITY SYSTEM) = 11.8 AC

EXISTING SITE: PAST INDUSTRIAL USE
RECENT USE: CONSTRUCTION PARKING / PRE-FABRICATION AREA

EASTERN BASIN ⇒ CRUSHED STONE AREA w/ DRIVEWAYS (2) = 264,050 SQ FT = 6.06 AC.

BIKE PATH	≅ 1395 × 5	=	6,975 SQ FT	0.21 AC
OVERLOOK	≅ 2050	=	2050 SQ FT	
RAILROAD	≅ 1320 × 10'	=	13200 SQ FT	0.30 AC
ROADWAY	≅ 1670 × 14	=	23380 SQ FT	0.54 AC
				7.11 AC

EXISTING WQV $= \frac{(0.95) R_v A}{12}$

$R_v = 0.05 + 0.009(I)$

$I = \frac{7.11}{11.8} = 60\%$

$R_v = 0.59$

$= \frac{(0.95)(0.59)(11.8)}{12}$

$= 0.55$ AC FT

$= 24,010$ CU FT

* CURRENTLY UNCONTROLLED - DISCHARGE TO CITY SYSTEM

C-L Engineering, P.C.
8 Brunswick Road
Troy, New York 12180
Phone: (518) 270-5920
Fax: (518) 270-5922

PROPOSED: RE-DEVELOPMENT CONDITIONS

PROPOSED SITE: INSIDE PERIMETER BERM = 247,375 sq FT = 5.67 AC
DRIVEWAY ① = 4,135 sq FT } 0.27 AC
DRIVEWAY ② = 7,410 sq FT
BIKE PATH } 0.21 AC
OVERLOOK
RAILROAD = 0.30 AC
ROADWAY = 0.54 AC

PROPOSED WQV @ EASTERN BASIN (TOTAL) 6.99 AC

$WQV = \frac{P Rv A}{12} = \frac{0.95(0.58)(11.8)}{12}$

$= 0.54$ AC-FT
$\approx 23,730$ CU. FT

$Rv = 0.05 + 0.009(I)$

$I = \frac{6.99}{11.8} = 59\%$

$Rv = 0.58$

OUTER AREA - EASTERN BASIN
$11.8 - 5.67 = 6.13$ AC

$WQV = (0.95($

IMPERVIOUS
DRIVEWAYS 0.27 AC
BIKE PATH } 0.21 AC
OVERLOOK
RAILROAD 0.30 AC
ROADWAY 0.54 AC
1.32 AC.

$Rv = 0.05 + 0.009(I)$
$I = \frac{1.32}{6.13} = 22\%$

$Rv = 0.248$

$WQV = \frac{0.95(0.248)(6.13)}{12}$

$= 0.120$ AC FT
$\approx 5,230$ CU.FT

REMAINING OUTSIDE PERIMETER BERM

≈ 78% REMAINING

G-L Engineering, P.C.
8 Brunswick Road
Troy, New York 12180
Phone: (518) 270-5920
Fax: (518) 270-5922

Project:
Subject:
Made by: | Checked by:
Sheet 3 of | Date: 6/1/11

PROPOSED: INSIDE BERM 247,375 SQ.FT = 5.67 AC

$WQV = \frac{0.95(0.95)(5.67 AC)}{12}$ $R_V = 0.05 + 0.009(100\%)$
$= 0.95$

$= 0.426$ AC. FT

$= 18,575$ CU. FT.

DESIGN WATER QUALITY VOLUME: 18,600 CU. FT.

* CHAPTER 9 NYS SDM REDEVELOPMENT CRITERIA APPLY:
SECTION 9.3.1 (1), (2) & (3).

SIZING CRITERIA (CHAPTER 9)

* A. I. NO INCREASE IN IMPERVIOUS AREA (APPROX. 2% REDUCTION TOTAL)
NO SIGNIFICANT HYDROLOGIC CHANGES TO OUTSIDE SYSTEM.

∴ 10-YEAR & 100 YEAR DISCHARGE RESTRICTIONS DO NOT APPLY

II. CPV IS RETAINED AS WELL + NO 24 HOUR DETENTION.

B. II. REDUCE 25% WQV WITH STANDARD SMP OR GREEN INFRASTRUCTURE.

B III OR, 75% WQV ALTERNATE.

C-L Engineering, P.C.
8 Brunswick Road
Troy, New York 12180
Phone: (518) 270-5920
Fax: (518) 270-5922

DESIGN WQV = 18,600 CU.FT.

SIZE CONVEYANCE SDM @ 2 YR 24 HR \ PEAK @ 10 YEAR 24 HR
* SEE HYDROCAD MODEL

DIRECT 100% STORMWATER TO PRE-TREATMENT

SIZE SEDIMENT TRAP @ 25% WQV (SDM - FILTER)
* PRIMARY OUTLET \ INVERTED SLOPE CULVERT (OIL SPILL CONTROL)
* LOW LEVEL - USE INVERTED ELBOW (OIL SPILL CONTROL)
* OVERFLOW TO CONTROLLED STRUCTURE, WEIR OUTLET

SIZE ⇒ 18,600 CU.FT * 0.25
= 4,650 CU.FT MINIMUM.

* ASSUME ≤ 75% IMPERVIOUS SITE

As @ OUTLET ELEVATION = 0.066 WQV = 1,230 SQ.FT.

ELEVATION 17.35 ⇒ 18.1' x 68.1' = 1232 SQ.FT
3.75:1 > 1.5:1 ✓

ELEVATION 20 FT ⇒ 2856 SQ.FT

VOLUME: 2044 x 2.65 = 5415 CU.FT > 4,650 CU.FT. ✓

SAND FILTER ⇒

MIN VOLUME = 75% WQV - 25% WQV = 50% WQV
= 9,300 CU.FT.

$A_{sf} = (WQV)(d_f) / [(k)(h_f + d_f)(t_f)]$

$= (18,600)(2') / [(3.5'/d)(2.5 + 2')(1.67)]$

$= 37200 / 26.3$

$= 1415$ SQ.FT   PROPOSED @ 15' = 2495 SQ.FT ✓

19' x (99 + 28)
19' x 127'   6.8:1 >

G-L Engineering, P.C.
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Troy, New York 12180
Phone: (518) 270-5920
Fax: (518) 270-5922

Project:	
Subject:	
Made by:	Checked by:
Sheet 5 of	Date: 6/1/11

Volume 15' = 2495 > 5200 * 5' = 26,000 CU. FT
20' = 7904

26,000 > 9,300 CU FT ✓

ByPass Peak Flows to Dry Basin For Peak Control

Summary of Stormwater Modeling Results

CB1				
Existing Condition				
WQv	0.83 cfs	11.93 Hr.	0.035 ac-ft	
1-Yr	3.10 cfs	11.92 Hr.	0.144 ac-ft	Overtop
10-Yr	6.16 cfs	11.92 Hr.	0.300 ac-ft	Overtop
100-Yr	8.85 cfs	11.92 Hr.	0.442 ac-ft	Overtop
Proposed Condition				
WQv	0.19 cfs	11.95 Hr.	0.009 ac-ft	
1-Yr	1.59 cfs	11.93 Hr.	0.068 ac-ft	
10-Yr	3.80 cfs	11.93 Hr.	0.169 ac-ft	Overtop
100-Yr	5.70 cfs	11.92 Hr.	0.266 ac-ft	Overtop
CB2				
Existing Condition				
WQv	1.13 cfs	11.93 Hr.	0.048 ac-ft	
1-Yr	4.43 cfs	11.93 Hr.	0.201 ac-ft	Overtop
10-Yr	8.82 cfs	11.93 Hr.	0.421 ac-ft	Overtop
100-Yr	12.39 cfs	11.92 Hr.	0.622 ac-ft	Overtop
Proposed Condition				
WQv	0.35 cfs	11.95 Hr.	0.016 ac-ft	
1-Yr	2.60 cfs	11.93 Hr.	0.112 ac-ft	
10-Yr	6.09 cfs	11.93 Hr.	0.273 ac-ft	Overtop
100-Yr	9.28 cfs	11.93 Hr.	0.428 ac-ft	Overtop
CB3				
Existing Condition				
WQv	1.27 cfs	11.93 Hr.	0.048 ac-ft	
1-Yr	5.15 cfs	11.93 Hr.	0.232 ac-ft	
10-Yr	10.09 cfs	11.92 Hr.	0.491 ac-ft	Overtop
100-Yr	14.58 cfs	11.92 Hr.	0.728 ac-ft	Overtop
Proposed Condition				
WQv	0.44 cfs	11.95 Hr.	0.021 ac-ft	
1-Yr	3.27 cfs	11.93 Hr.	0.141 ac-ft	
10-Yr	7.68 cfs	11.93 Hr.	0.344 ac-ft	Overtop
100-Yr	11.69 cfs	11.93 Hr.	0.540 ac-ft	Overtop

CB4

Existing Condition				
WQv	1.38 cfs	11.93 Hr.	0.059 ac-ft	
1-Yr	5.74 cfs	11.93 Hr.	0.258 ac-ft	
10-Yr	11.41 cfs	11.92 Hr.	0.551 ac-ft	Overtop
100-Yr	16.55 cfs	11.92 Hr.	0.821 ac-ft	Overtop
Proposed Condition				
WQv	0.54 cfs	11.95 Hr.	0.025 ac-ft	
1-Yr	3.88 cfs	11.93 Hr.	0.168 ac-ft	
10-Yr	9.03 cfs	11.93 Hr.	0.405 ac-ft	Overtop
100-Yr	13.70 cfs	11.93 Hr.	0.633 ac-ft	Overtop

CB5

Existing Condition				
WQv	2.55 cfs	12.14 Hr.	0.219 ac-ft	
1-Yr	14.93 cfs	12.11 Hr.	1.153 ac-ft	Overtop
10-Yr	33.23 cfs	12.11 Hr.	2.604 ac-ft	Overtop
100-Yr	49.69 cfs	12.11 Hr.	3.964 ac-ft	Overtop
Proposed Condition				
WQv	0.20 cfs	12.31 Hr.	0.030 ac-ft	
1-Yr	3.61 cfs	12.22 Hr.	0.356 ac-ft	
10-Yr	9.90 cfs	12.21 Hr.	0.941 ac-ft	Overtop
100-Yr	15.95 cfs	12.20 Hr.	1.522 ac-ft	Overtop

CB6

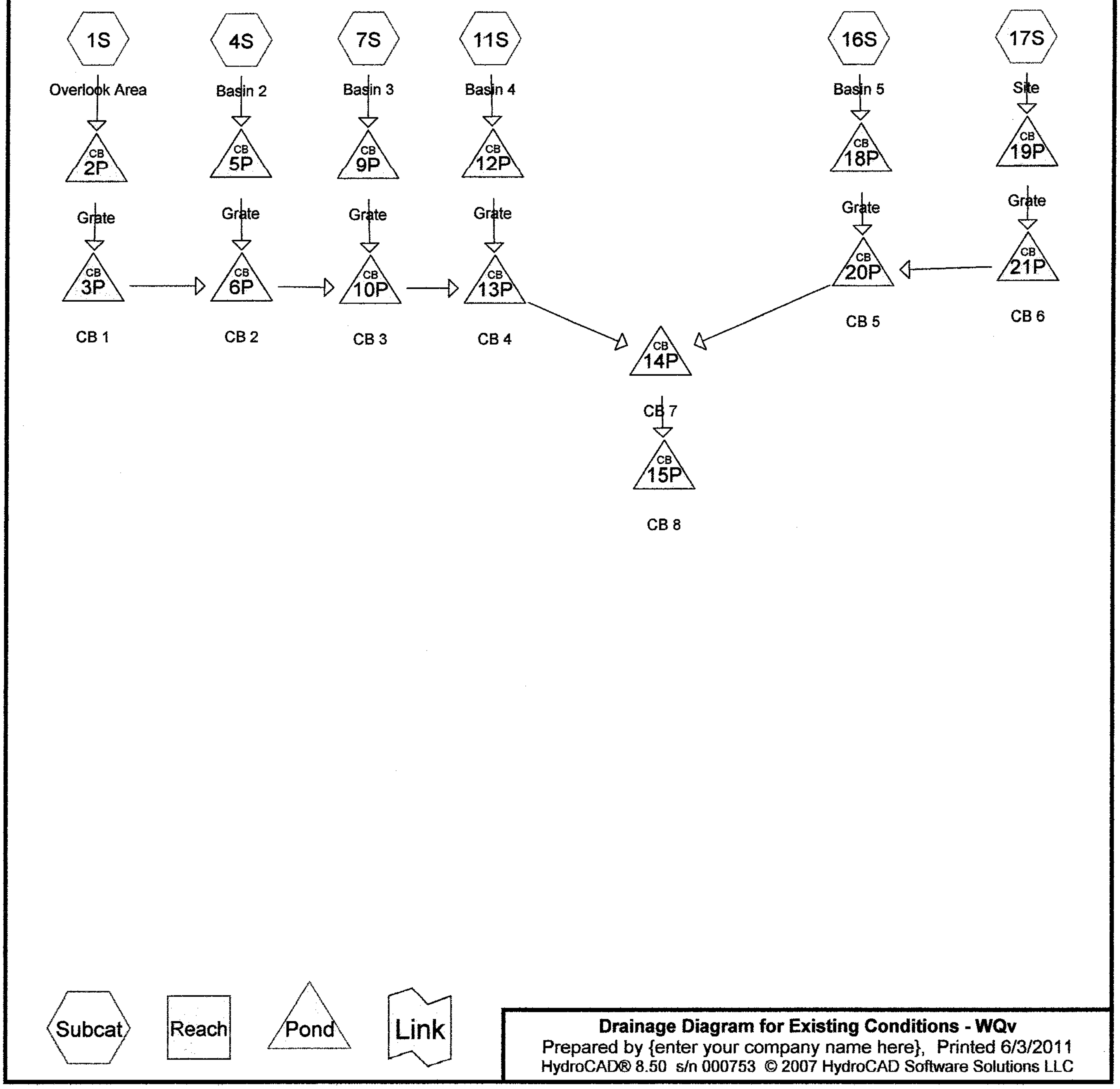
Existing Condition				
WQv	2.49 cfs	12.14 Hr.	0.201 ac-ft	
1-Yr	14.73 cfs	12.12 Hr.	1.080 ac-ft	Overtop
10-Yr	32.82 cfs	12.11 Hr.	2.452 ac-ft	Overtop
100-Yr	49.09 cfs	12.11 Hr.	3.739 ac-ft	Overtop
Proposed Condition				
WQv	0.19 cfs	12.31 Hr.	0.034 ac-ft	
1-Yr	3.53 cfs	12.22 Hr.	0.329 ac-ft	
10-Yr	9.73 cfs	12.21 Hr.	0.874 ac-ft	Overtop
100-Yr	15.69 cfs	12.20 Hr.	1.416 ac-ft	Overtop

CB7

Existing Condition			
WQv	2.74 cfs	12.13 Hr.	0.278 ac-ft
1-Yr	15.66 cfs	12.11 Hr.	1.411 ac-ft
10-Yr	34.69 cfs	12.10 Hr.	3.156 ac-ft
100-Yr	51.81 cfs	12.10 Hr.	4.785 ac-ft
Proposed Condition			
WQv	0.75 cfs	11.95 Hr	0.249 ac-ft
1-Yr	5.74 cfs	11.94 Hr.	1.320 ac-ft
10-Yr	14.21 cfs	11.94 Hr.	2.939 ac-ft
100-Yr	25.31 cfs	12.16 Hr	4.518 ac-ft

CB8

Existing Condition			
WQv	2.74 cfs	12.13 Hr.	0.278 ac-ft
1-Yr	15.66 cfs	12.11 Hr.	1.411 ac-ft
10-Yr	34.69 cfs	12.10 Hr.	3.156 ac-ft
100-Yr	51.81 cfs	12.10 Hr.	4.785 ac-ft
Proposed Condition			
WQv	0.75 cfs	11.95 Hr.	0.249 ac-ft
1-Yr	5.74 cfs	11.94 Hr.	1.320 ac-ft
10-Yr	14.21 cfs	11.94 Hr.	2.939 ac-ft
100-Yr	25.31 cfs	12.16 Hr.	4.518 ac-ft



Drainage Diagram for Existing Conditions - WQv
Prepared by {enter your company name here}, Printed 6/3/2011
HydroCAD® 8.50 s/n 000753 © 2007 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Overlook Area

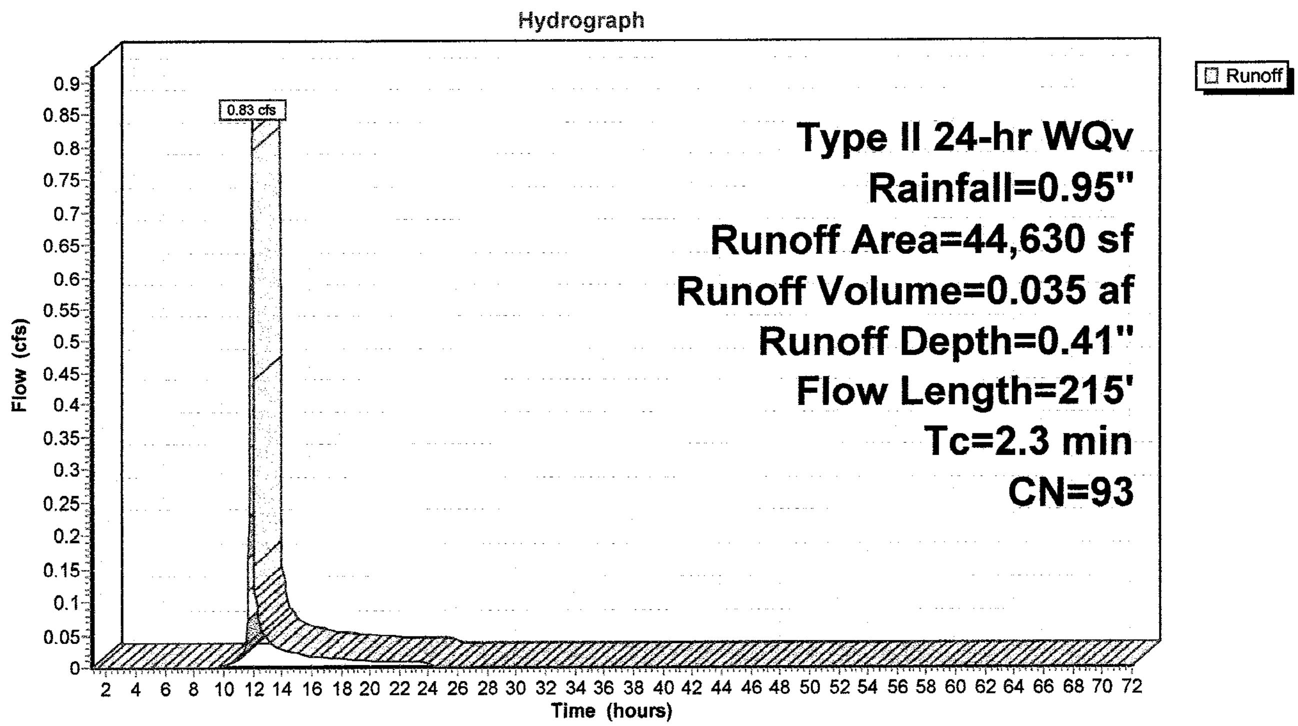
Runoff = 0.83 cfs @ 11.93 hrs, Volume= 0.035 af, Depth= 0.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.95"

Area (sf)	CN	Description
3,840	98	Paved parking & roofs
25,815	98	Paved parking & roofs
1,600	98	Paved parking & roofs
13,375	80	>75% Grass cover, Good, HSG D
44,630	93	Weighted Average
13,375		Pervious Area
31,255		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Upper Basin** Smooth surfaces n= 0.011 P2= 2.40"
1.0	120	0.0150	1.97		**Shallow Concentrated Flow, Crushed Stone Surface** Unpaved Kv= 16.1 fps
0.2	45	0.0550	3.52		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
2.3	215	Total			

Subcatchment 1S: Overlook Area



Summary for Subcatchment 4S: Basin 2

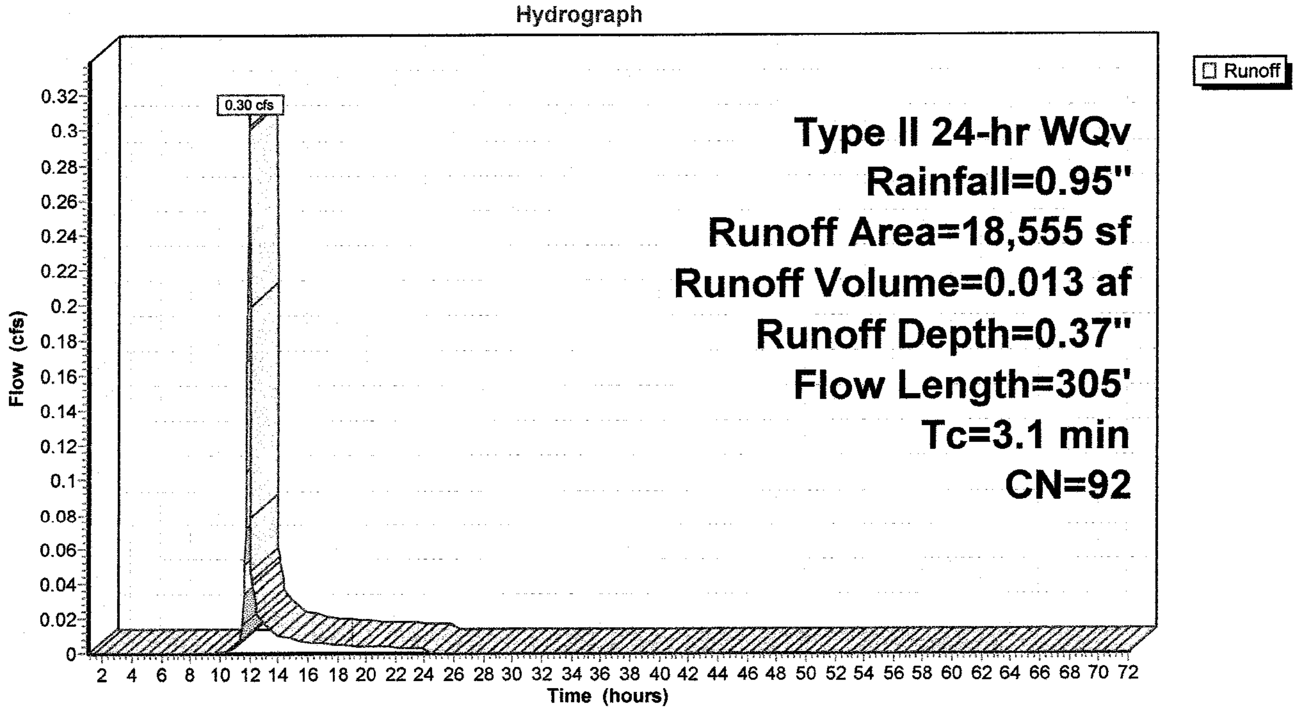
Runoff = 0.30 cfs @ 11.94 hrs, Volume= 0.013 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.95"

Area (sf)	CN	Description
1,800	98	Paved parking & roofs
8,795	98	Paved parking & roofs
1,500	98	Paved parking & roofs
6,460	80	>75% Grass cover, Good, HSG D
18,555	92	Weighted Average
6,460		Pervious Area
12,095		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
1.2	120	0.0100	1.61		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
0.2	50	0.0500	3.35		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
0.6	85	0.0250	2.37		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
3.1	305	Total			

Subcatchment 4S: Basin 2



Summary for Subcatchment 7S: Basin 3

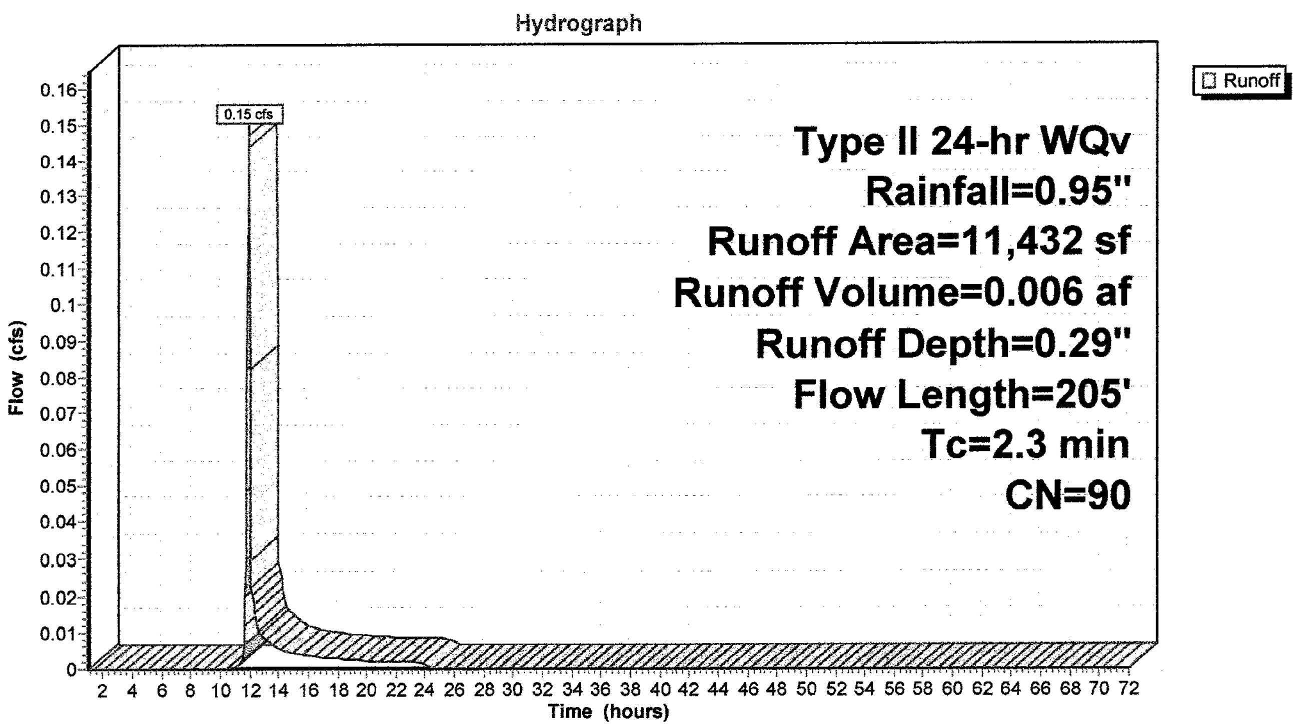
Runoff = 0.15 cfs @ 11.93 hrs, Volume= 0.006 af, Depth= 0.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.95"

Area (sf)	CN	Description
1,380	98	Paved parking & roofs
4,525	98	Paved parking & roofs
460	98	Paved parking & roofs
5,067	80	>75% Grass cover, Good, HSG D
11,432	90	Weighted Average
5,067		Pervious Area
6,365		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Basin 3** Smooth surfaces n= 0.011 P2= 2.40"
0.4	80	0.0550	3.52		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
0.8	75	0.0100	1.50		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
2.3	205	Total			

Subcatchment 7S: Basin 3



Summary for Subcatchment 11S: Basin 4

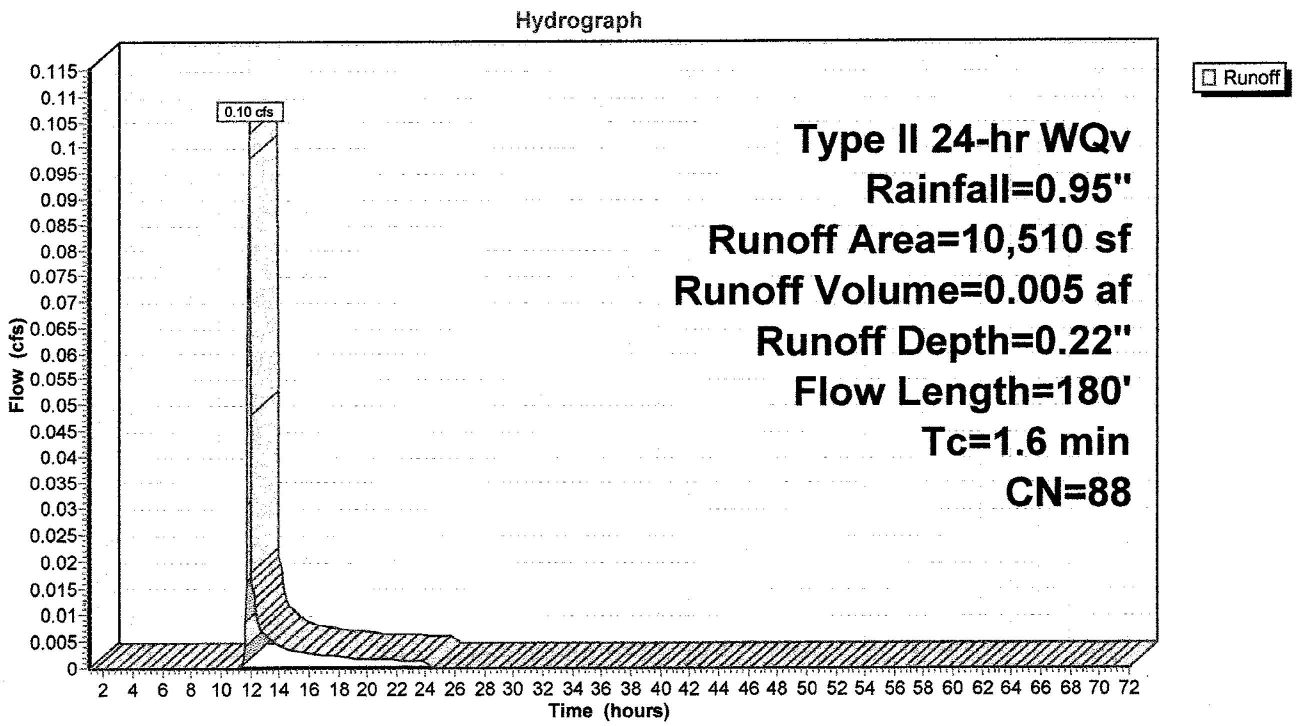
Runoff = 0.10 cfs @ 11.93 hrs, Volume= 0.005 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.95"

Area (sf)	CN	Description
1,560	98	Paved parking & roofs
2,340	98	Paved parking & roofs
750	98	Paved parking & roofs
5,860	80	>75% Grass cover, Good, HSG D
10,510	88	Weighted Average
5,860		Pervious Area
4,650		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.04		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
0.3	50	0.0300	2.79		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
0.5	80	0.0300	2.60		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
1.6	180	Total			

Subcatchment 11S: Basin 4



Summary for Subcatchment 16S: Basin 5

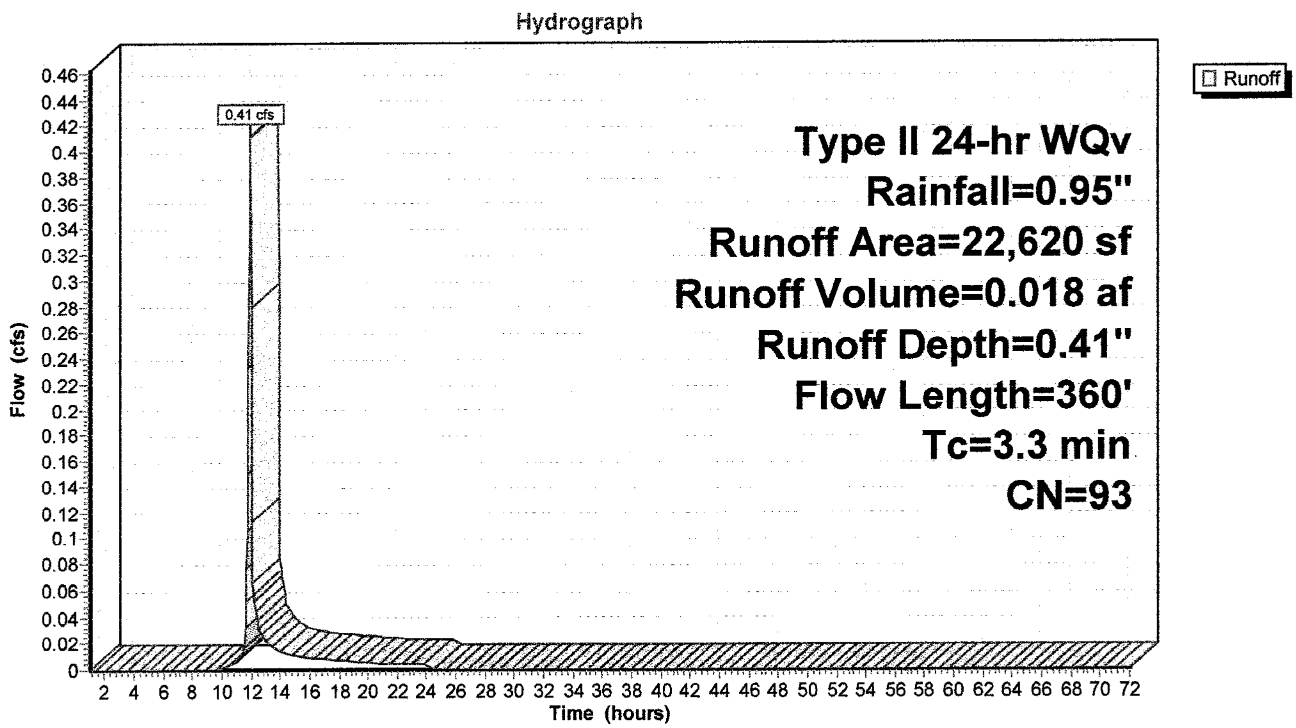
Runoff = 0.41 cfs @ 11.94 hrs, Volume= 0.018 af, Depth= 0.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.95"

Area (sf)	CN	Description
2,460	98	Paved parking & roofs
13,330	98	Paved parking & roofs
1,120	98	Paved parking & roofs
5,710	80	>75% Grass cover, Good, HSG D
22,620	93	Weighted Average
5,710		Pervious Area
16,910		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
1.2	160	0.0180	2.16		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
1.0	150	0.0300	2.60		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
3.3	360	Total			

Subcatchment 16S: Basin 5



Summary for Subcatchment 17S: Site

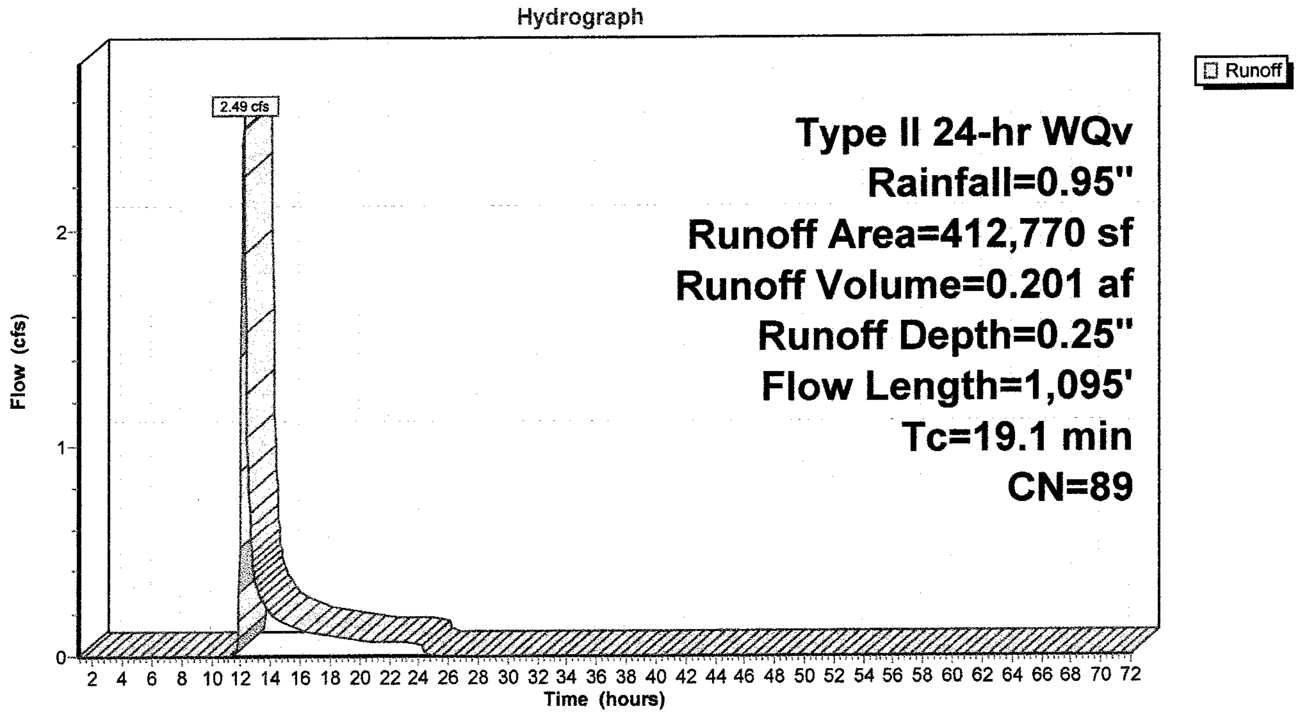
Runoff = 2.49 cfs @ 12.14 hrs, Volume= 0.201 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.95"

Area (sf)	CN	Description
8,940	98	Paved parking & roofs
181,580	98	Paved parking & roofs
4,530	98	Paved parking & roofs
63,830	82	Woods/grass comb., Fair, HSG D
153,890	80	>75% Grass cover, Good, HSG D
412,770	89	Weighted Average
217,720		Pervious Area
195,050		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.04		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
0.2	30	0.0200	2.28		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
4.1	450	0.0150	1.84		**Shallow Concentrated Flow, Meadow** Grassed Waterway Kv= 15.0 fps
14.0	565	0.0020	0.67		**Shallow Concentrated Flow, Tracks** Grassed Waterway Kv= 15.0 fps
19.1	1,095	Total			

Subcatchment 17S: Site



Summary for Pond 2P: Grate

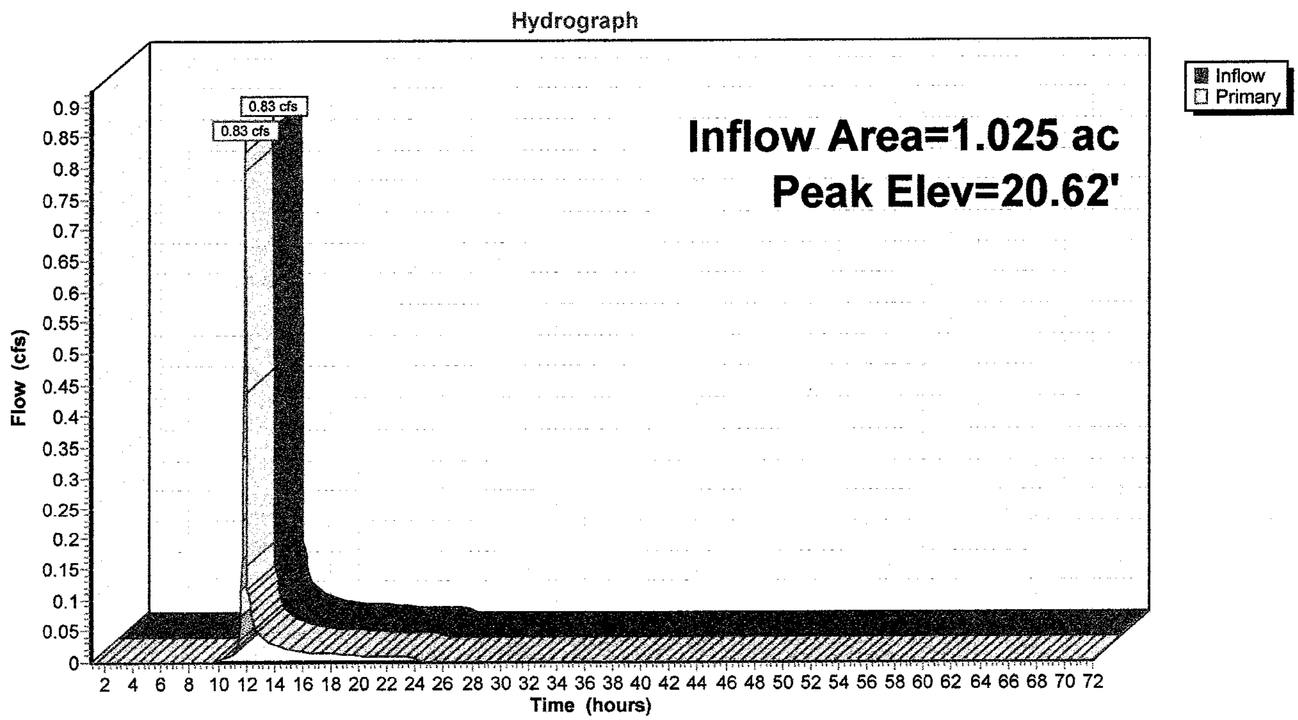
Inflow Area =	1.025 ac, 70.03% Impervious,	Inflow Depth = 0.41"	for WQv event	
Inflow =	0.83 cfs @	11.93 hrs, Volume=	0.035 af	
Outflow =	0.83 cfs @	11.93 hrs, Volume=	0.035 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.83 cfs @	11.93 hrs, Volume=	0.035 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 20.62' @ 11.93 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	20.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.78 cfs @ 11.93 hrs HW=20.61' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 0.78 cfs @ 1.10 fps)

Pond 2P: Grate



Summary for Pond 3P: CB 1

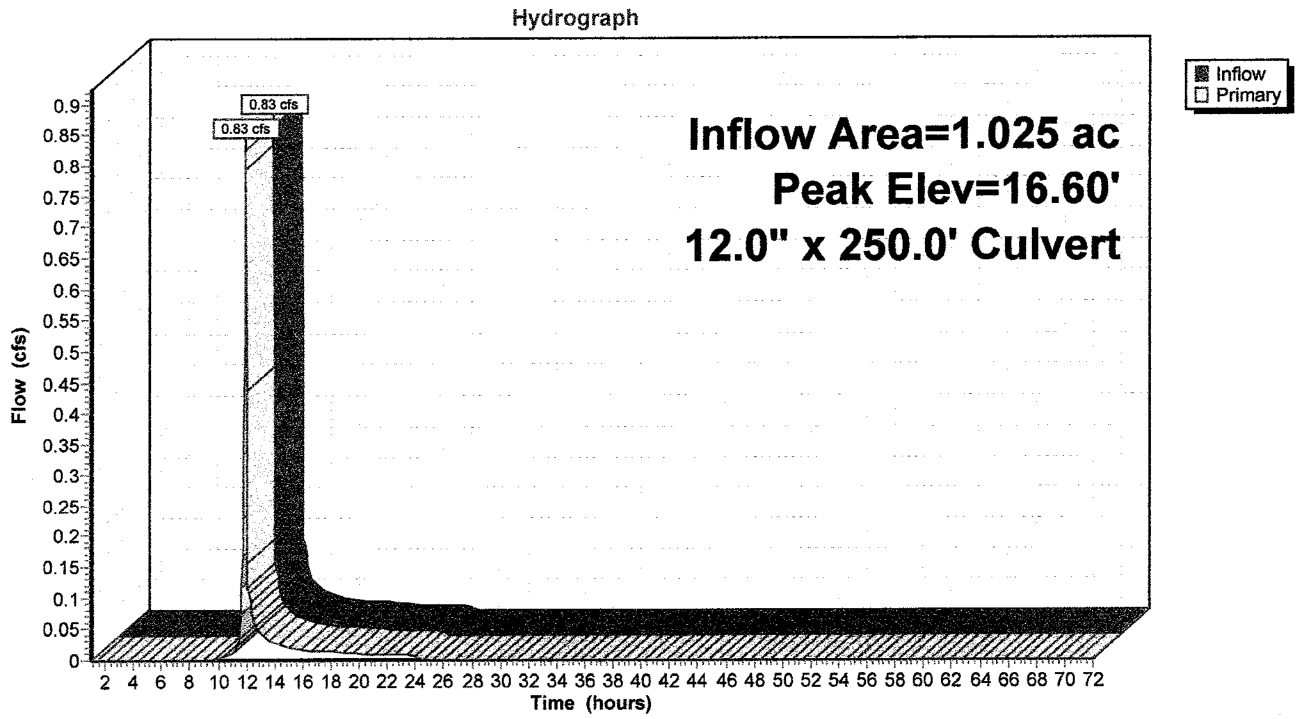
Inflow Area =	1.025 ac,	70.03% Impervious,	Inflow Depth = 0.41"	for WQv event	
Inflow =	0.83 cfs @	11.93 hrs,	Volume=	0.035 af	
Outflow =	0.83 cfs @	11.93 hrs,	Volume=	0.035 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.83 cfs @	11.93 hrs,	Volume=	0.035 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 16.60' @ 11.93 hrs
Flood Elev= 20.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	15.43'	**12.0" x 250.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 14.28' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.78 cfs @ 11.93 hrs HW=16.59' TW=16.50' (Fixed TW Elev= 16.50')
└─**1=Culvert** (Outlet Controls 0.78 cfs @ 1.07 fps)

Pond 3P: CB 1



Summary for Pond 5P: Grate

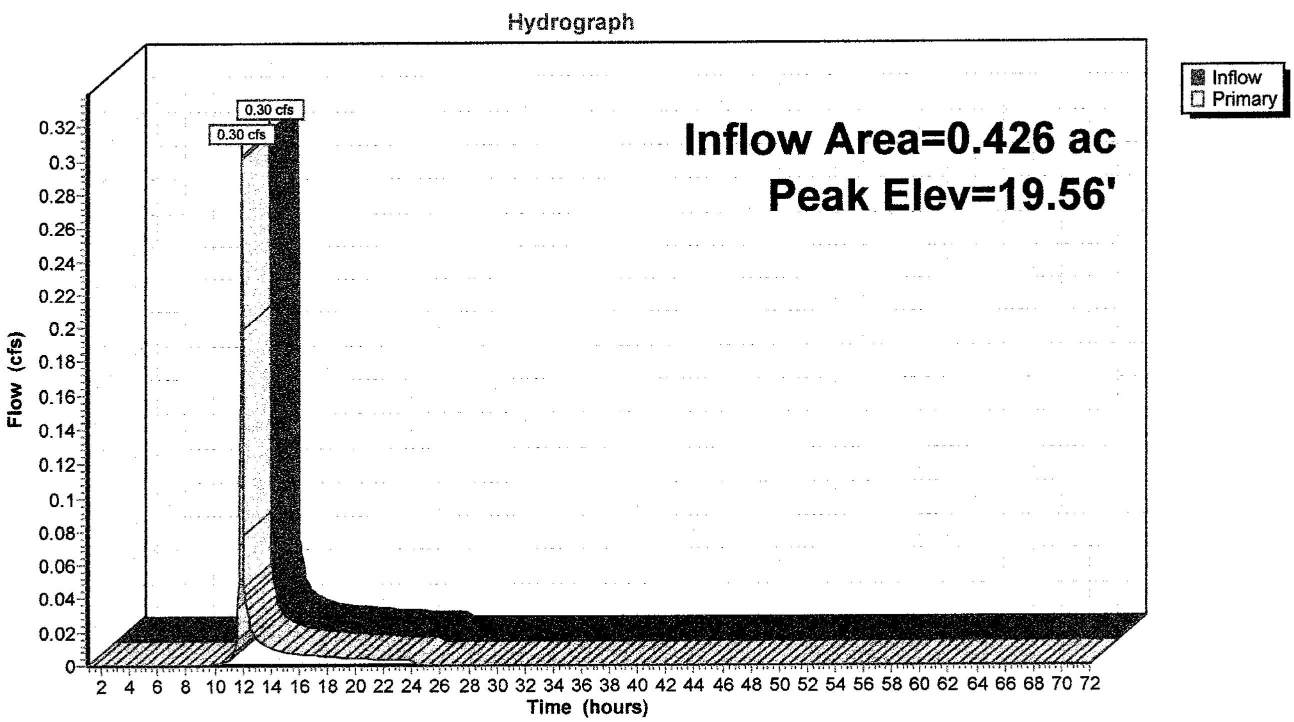
Inflow Area =	0.426 ac, 65.18% Impervious, Inflow Depth = 0.37" for WQv event			
Inflow =	0.30 cfs @	11.94 hrs, Volume=	0.013 af	
Outflow =	0.30 cfs @	11.94 hrs, Volume=	0.013 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.30 cfs @	11.94 hrs, Volume=	0.013 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 19.56' @ 11.94 hrs
Flood Elev= 20.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	19.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.29 cfs @ 11.94 hrs HW=19.56' (Free Discharge)
↑**1=Orifice/Grate** (Weir Controls 0.29 cfs @ 0.79 fps)

Pond 5P: Grate



Summary for Pond 6P: CB 2

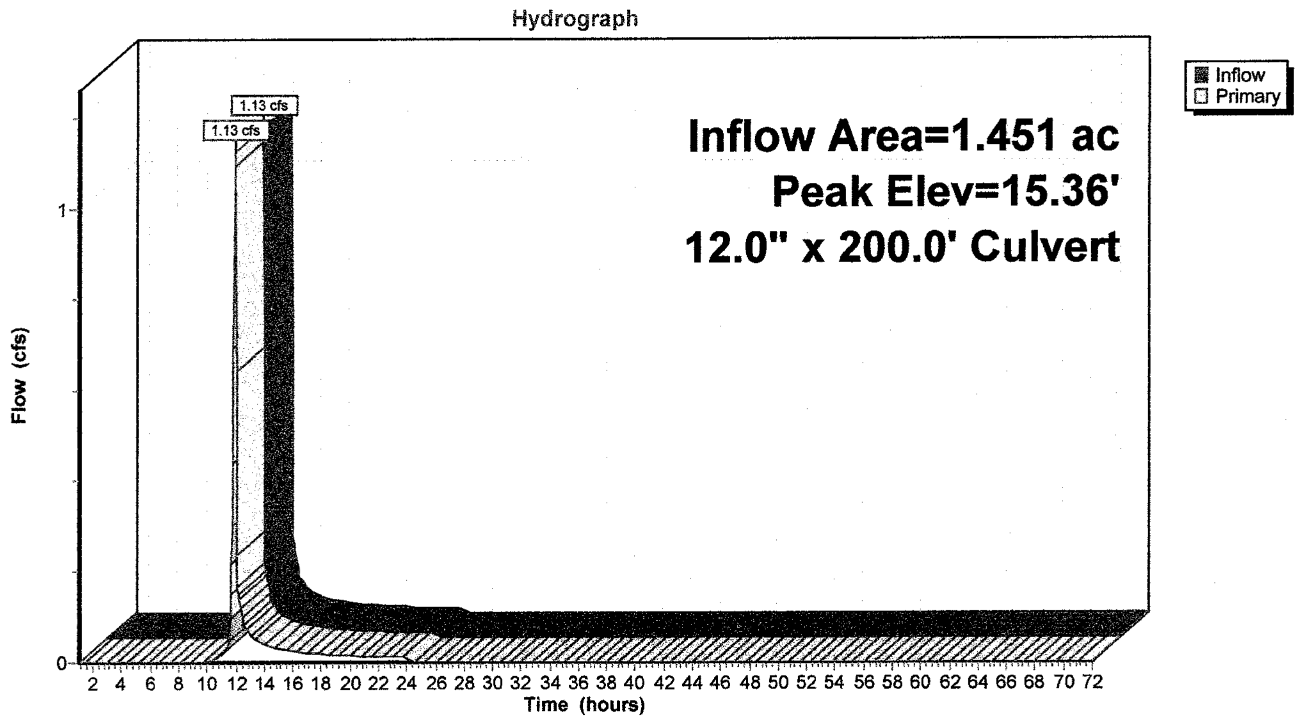
Inflow Area =	1.451 ac, 68.61% Impervious, Inflow Depth = 0.40" for WQv event				
Inflow =	1.13 cfs @	11.93 hrs,	Volume=	0.048 af	
Outflow =	1.13 cfs @	11.93 hrs,	Volume=	0.048 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.13 cfs @	11.93 hrs,	Volume=	0.048 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 15.36' @ 11.93 hrs
Flood Elev= 19.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.58'	**12.0" x 200.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.67' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=1.06 cfs @ 11.93 hrs HW=15.34' TW=14.94' (Fixed TW Elev= 14.94')
1=Culvert (Outlet Controls 1.06 cfs @ 2.30 fps)

Pond 6P: CB 2



Summary for Pond 9P: Grate

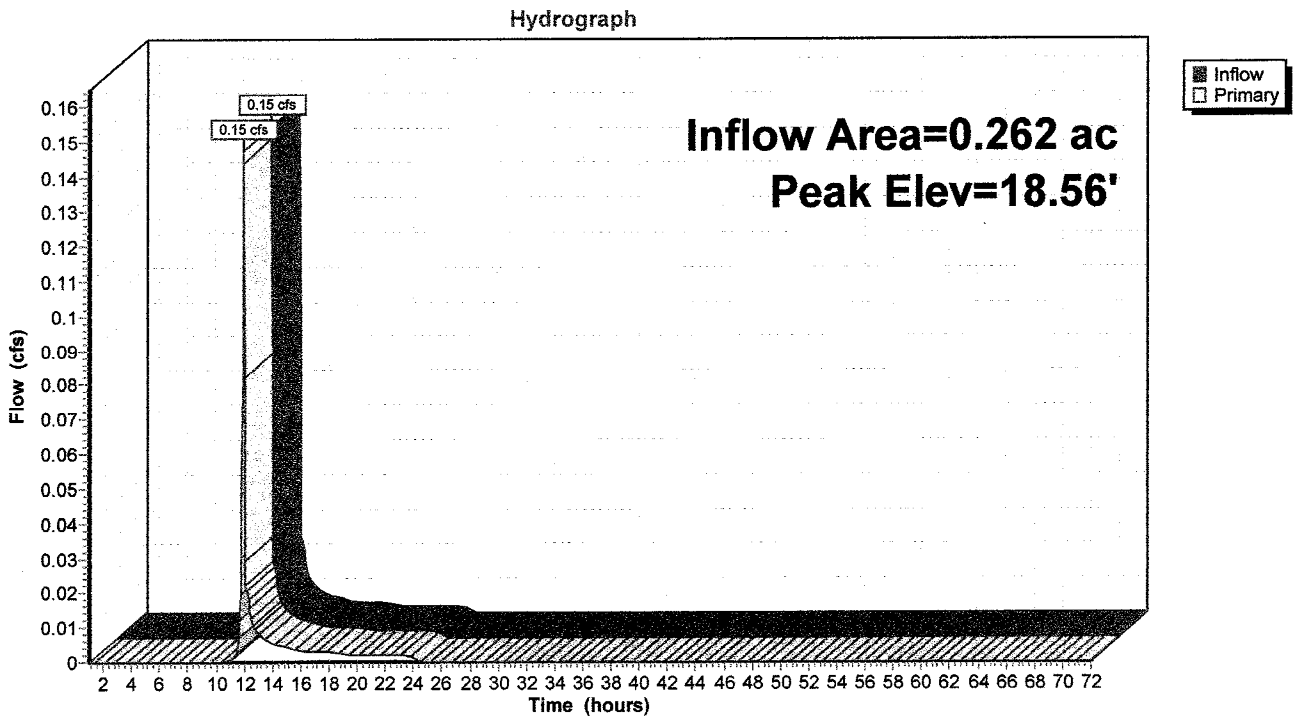
Inflow Area = 0.262 ac, 55.68% Impervious, Inflow Depth = 0.29" for WQv event
Inflow = 0.15 cfs @ 11.93 hrs, Volume= 0.006 af
Outflow = 0.15 cfs @ 11.93 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min
Primary = 0.15 cfs @ 11.93 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.56' @ 11.93 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**12.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.14 cfs @ 11.93 hrs HW=18.56' (Free Discharge)
1=Orifice/Grate (Weir Controls 0.14 cfs @ 0.78 fps)

Pond 9P: Grate



Summary for Pond 10P: CB 3

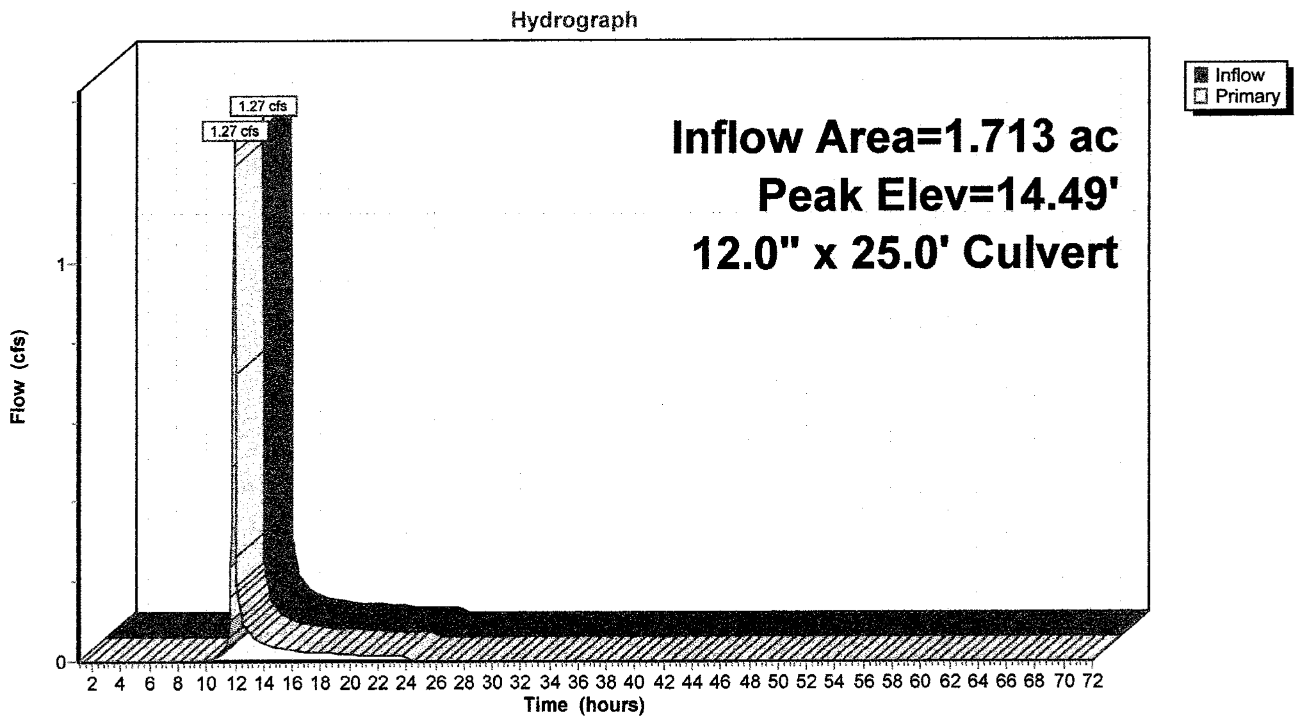
Inflow Area =	1.713 ac,	66.63% Impervious,	Inflow Depth = 0.38"	for WQv event
Inflow =	1.27 cfs @	11.93 hrs, Volume=	0.054 af	
Outflow =	1.27 cfs @	11.93 hrs, Volume=	0.054 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.27 cfs @	11.93 hrs, Volume=	0.054 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 14.49' @ 11.93 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.67'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.60' S= 0.0028 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=1.20 cfs @ 11.93 hrs HW=14.47' TW=14.30' (Fixed TW Elev= 14.30')
↑—**1=Culvert** (Outlet Controls 1.20 cfs @ 2.43 fps)

Pond 10P: CB 3



Summary for Pond 12P: Grate

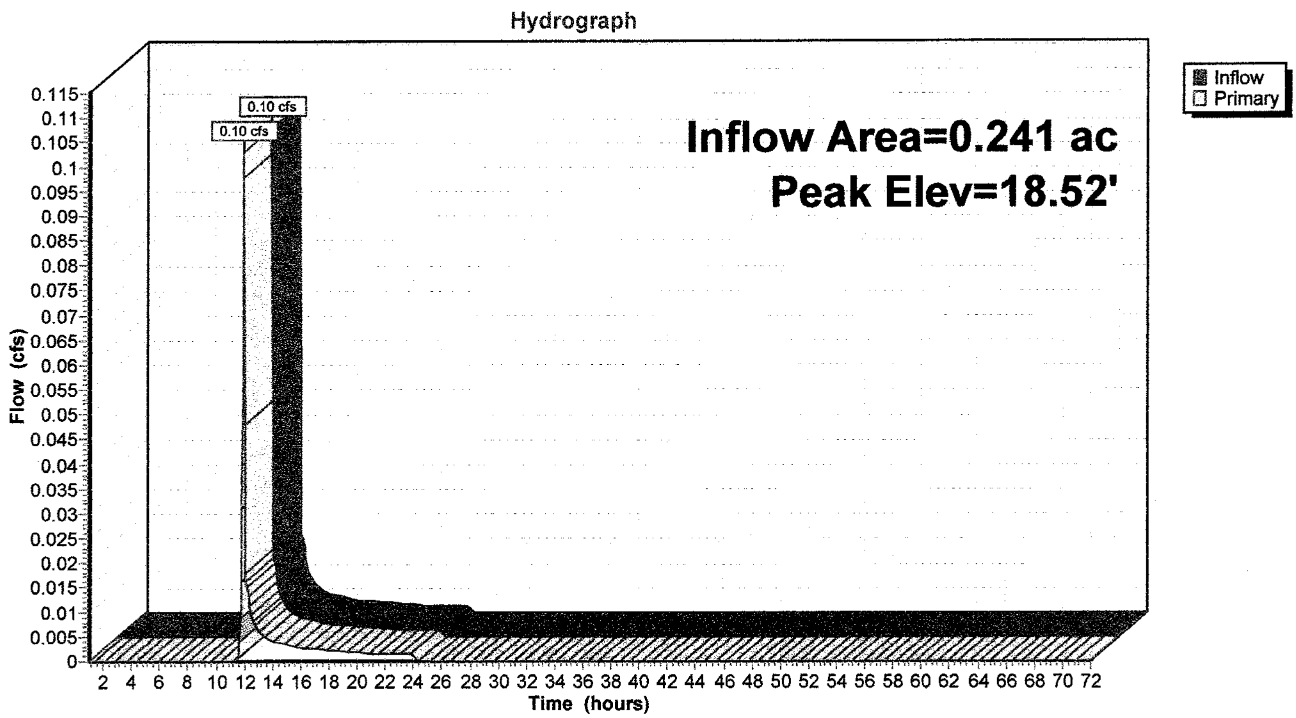
Inflow Area =	0.241 ac,	44.24% Impervious,	Inflow Depth = 0.22"	for WQv event	
Inflow =	0.10 cfs @	11.93 hrs,	Volume=	0.005 af	
Outflow =	0.10 cfs @	11.93 hrs,	Volume=	0.005 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.10 cfs @	11.93 hrs,	Volume=	0.005 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.52' @ 11.93 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**24.0" Horiz. Orifice/Grate X 2.00** Limited to weir flow C= 0.600

Primary OutFlow Max=0.10 cfs @ 11.93 hrs HW=18.52' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 0.10 cfs @ 0.43 fps)

Pond 12P: Grate



Summary for Pond 13P: CB 4

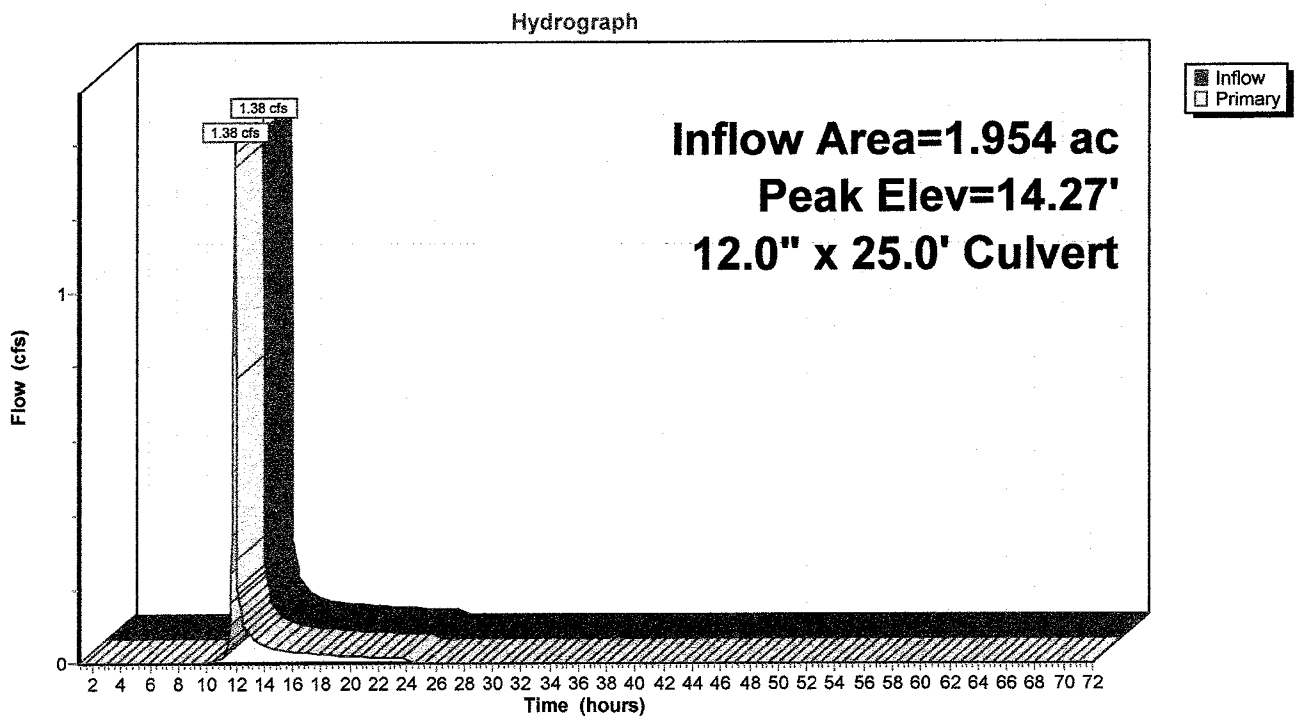
Inflow Area =	1.954 ac,	63.86% Impervious,	Inflow Depth = 0.36"	for WQv event
Inflow =	1.38 cfs @	11.93 hrs, Volume=	0.059 af	
Outflow =	1.38 cfs @	11.93 hrs, Volume=	0.059 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.38 cfs @	11.93 hrs, Volume=	0.059 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 14.27' @ 11.93 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.60'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.40' S= 0.0080 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=1.30 cfs @ 11.93 hrs HW=14.25' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 1.30 cfs @ 3.43 fps)

Pond 13P: CB 4



Summary for Pond 14P: CB 7

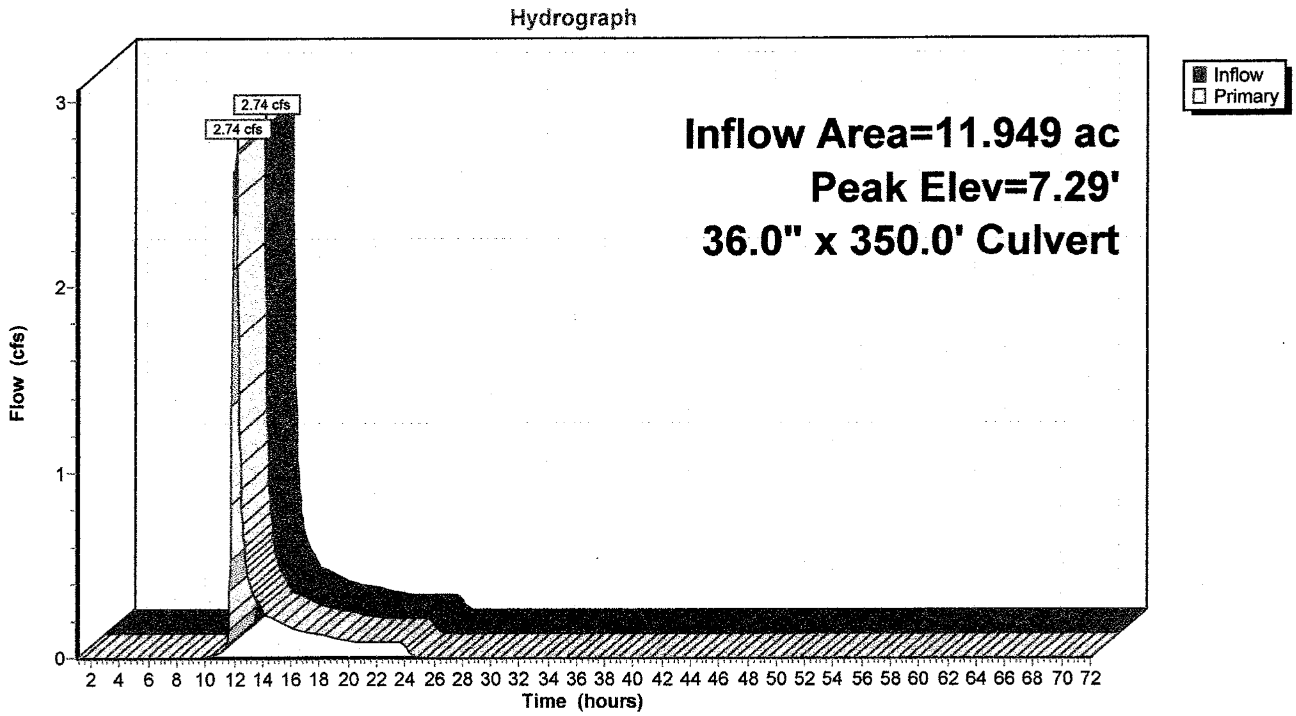
Inflow Area =	11.949 ac, 51.17% Impervious, Inflow Depth = 0.28" for WQv event			
Inflow =	2.74 cfs @	12.13 hrs, Volume=	0.278 af	
Outflow =	2.74 cfs @	12.13 hrs, Volume=	0.278 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.74 cfs @	12.13 hrs, Volume=	0.278 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 7.29' @ 12.13 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	6.30'	**36.0" x 350.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 5.37' S= 0.0027 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=2.69 cfs @ 12.13 hrs HW=7.28' TW=7.00' (Fixed TW Elev= 7.00')
↑—**1=Culvert** (Outlet Controls 2.69 cfs @ 1.99 fps)

Pond 14P: CB 7



Summary for Pond 15P: CB 8

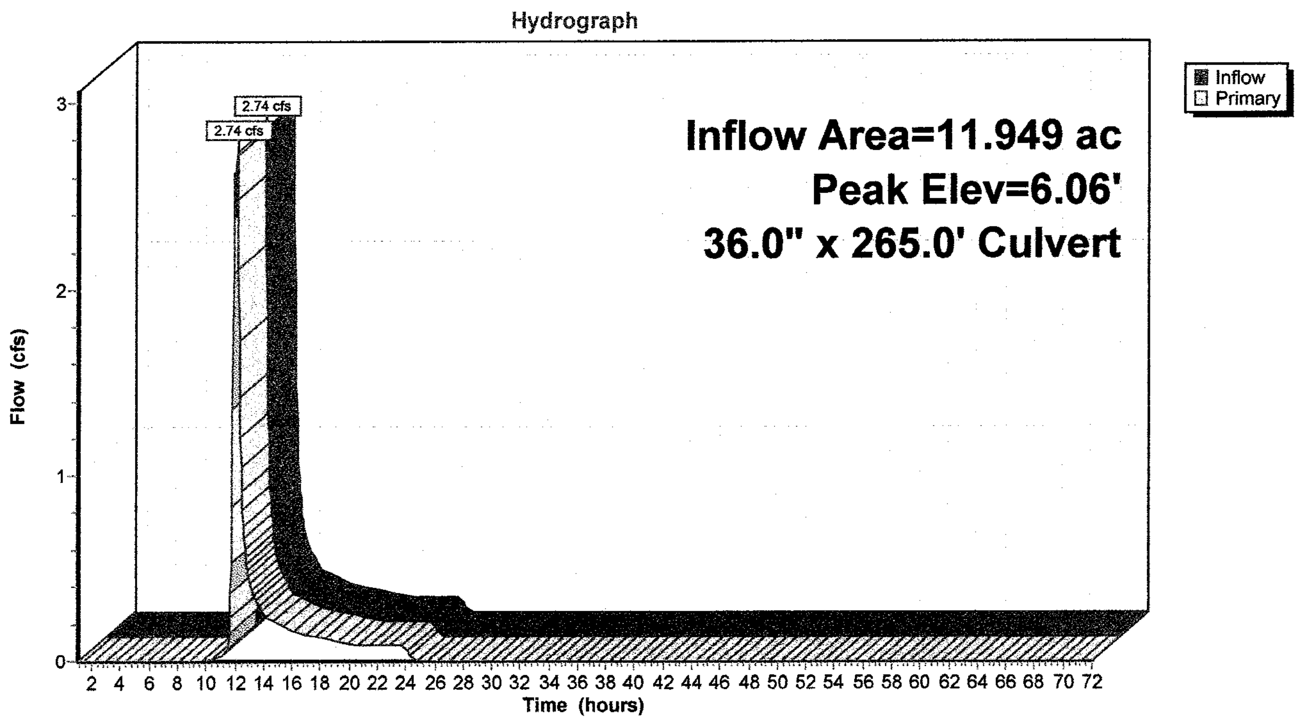
Inflow Area = 11.949 ac, 51.17% Impervious, Inflow Depth = 0.28" for WQv event
Inflow = 2.74 cfs @ 12.13 hrs, Volume= 0.278 af
Outflow = 2.74 cfs @ 12.13 hrs, Volume= 0.278 af, Atten= 0%, Lag= 0.0 min
Primary = 2.74 cfs @ 12.13 hrs, Volume= 0.278 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 6.06' @ 12.13 hrs
Flood Elev= 22.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5.37'	**36.0" x 265.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 4.68' S= 0.0026 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=2.69 cfs @ 12.13 hrs HW=6.06' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 2.69 cfs @ 3.30 fps)

Pond 15P: CB 8



Summary for Pond 18P: Grate

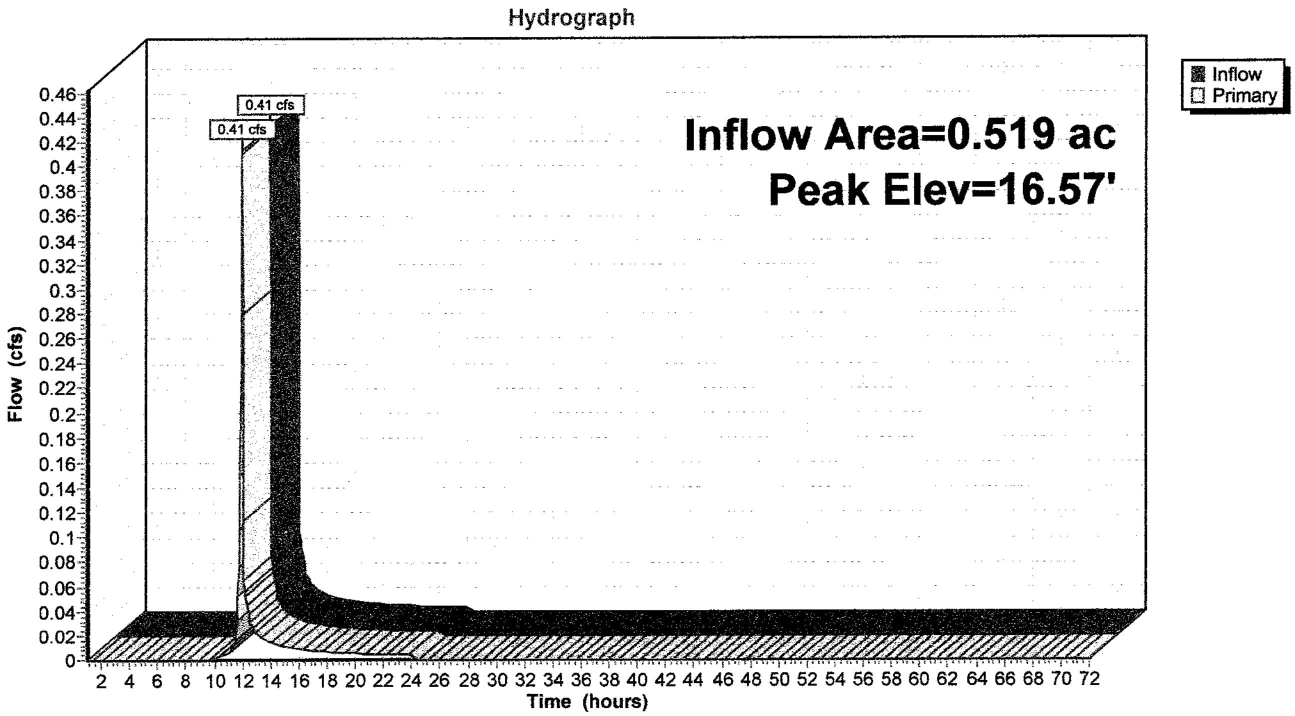
Inflow Area = 0.519 ac, 74.76% Impervious, Inflow Depth = 0.41" for WQv event
Inflow = 0.41 cfs @ 11.94 hrs, Volume= 0.018 af
Outflow = 0.41 cfs @ 11.94 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min
Primary = 0.41 cfs @ 11.94 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 16.57' @ 11.94 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	16.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.40 cfs @ 11.94 hrs HW=16.57' (Free Discharge)
1=Orifice/Grate (Weir Controls 0.40 cfs @ 0.88 fps)

Pond 18P: Grate



Summary for Pond 19P: Grate

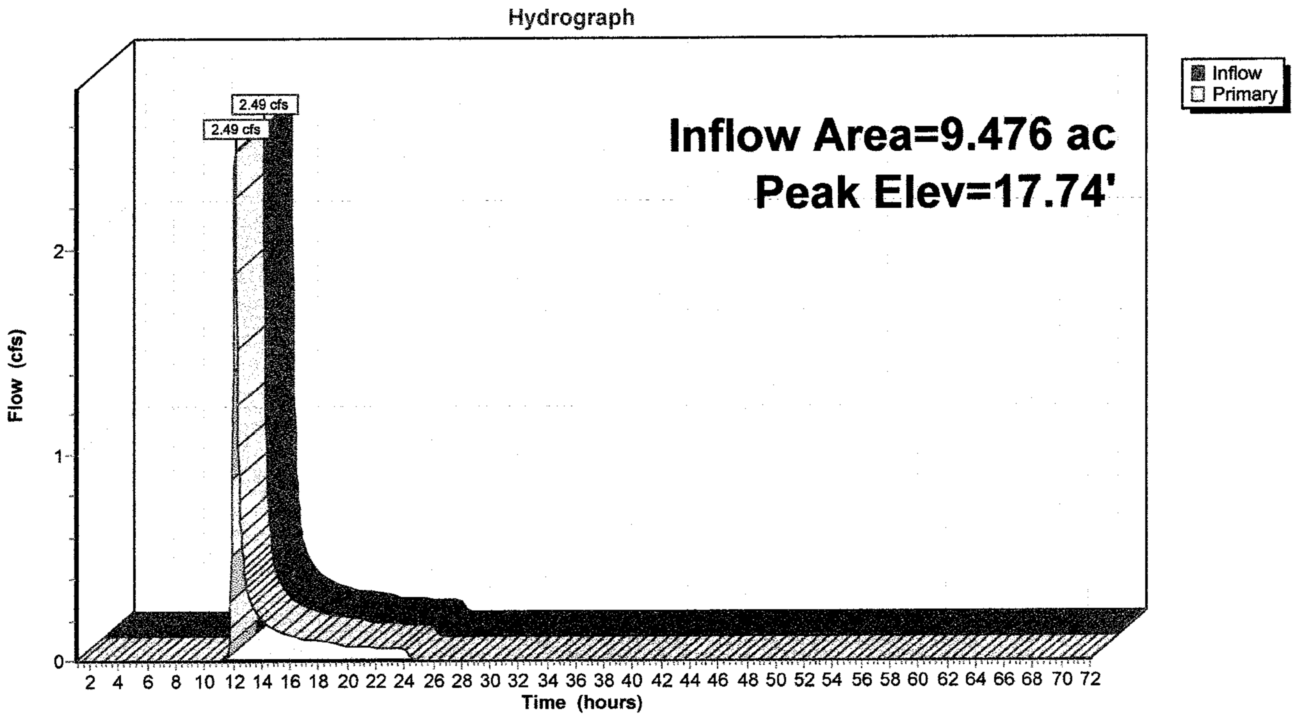
Inflow Area = 9.476 ac, 47.25% Impervious, Inflow Depth = 0.25" for WQv event
Inflow = 2.49 cfs @ 12.14 hrs, Volume= 0.201 af
Outflow = 2.49 cfs @ 12.14 hrs, Volume= 0.201 af, Atten= 0%, Lag= 0.0 min
Primary = 2.49 cfs @ 12.14 hrs, Volume= 0.201 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 17.74' @ 12.14 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	17.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=2.46 cfs @ 12.14 hrs HW=17.74' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 2.46 cfs @ 1.61 fps)

Pond 19P: Grate



Summary for Pond 20P: CB 5

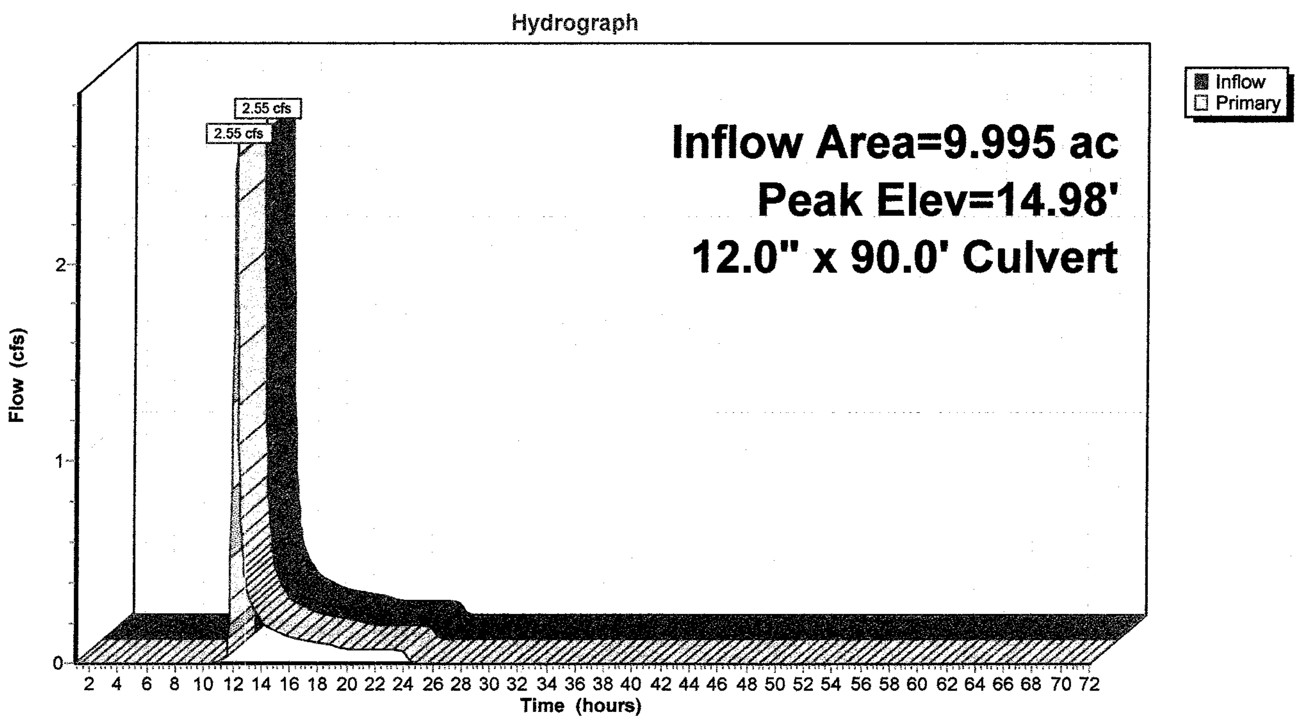
Inflow Area =	9.995 ac,	48.68% Impervious,	Inflow Depth = 0.26"	for WQv event
Inflow =	2.55 cfs @	12.14 hrs, Volume=	0.219 af	
Outflow =	2.55 cfs @	12.14 hrs, Volume=	0.219 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.55 cfs @	12.14 hrs, Volume=	0.219 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 14.98' @ 12.14 hrs
Flood Elev= 16.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.80'	**12.0" x 90.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.57' S= 0.0026 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=2.52 cfs @ 12.14 hrs HW=14.96' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 2.52 cfs @ 3.46 fps)

Pond 20P: CB 5



Summary for Pond 21P: CB 6

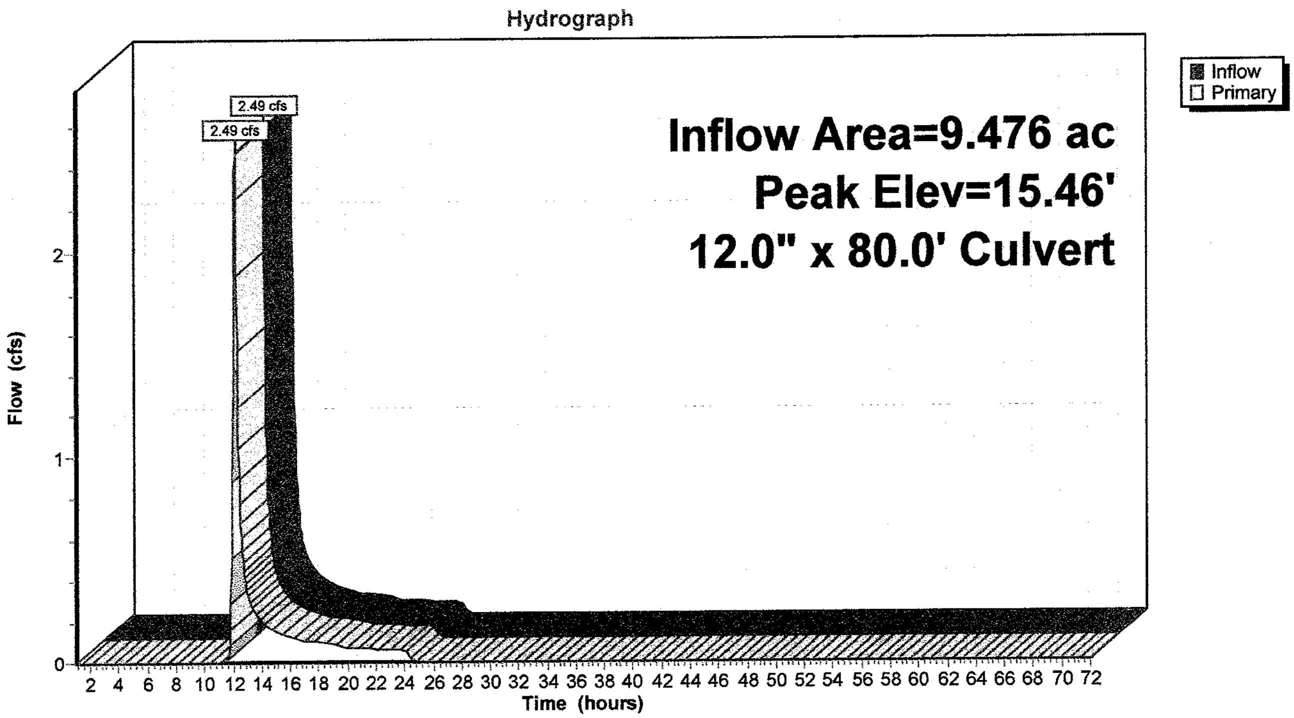
Inflow Area =	9.476 ac,	47.25% Impervious,	Inflow Depth = 0.25"	for WQv event
Inflow =	2.49 cfs @	12.14 hrs, Volume=	0.201 af	
Outflow =	2.49 cfs @	12.14 hrs, Volume=	0.201 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.49 cfs @	12.14 hrs, Volume=	0.201 af	

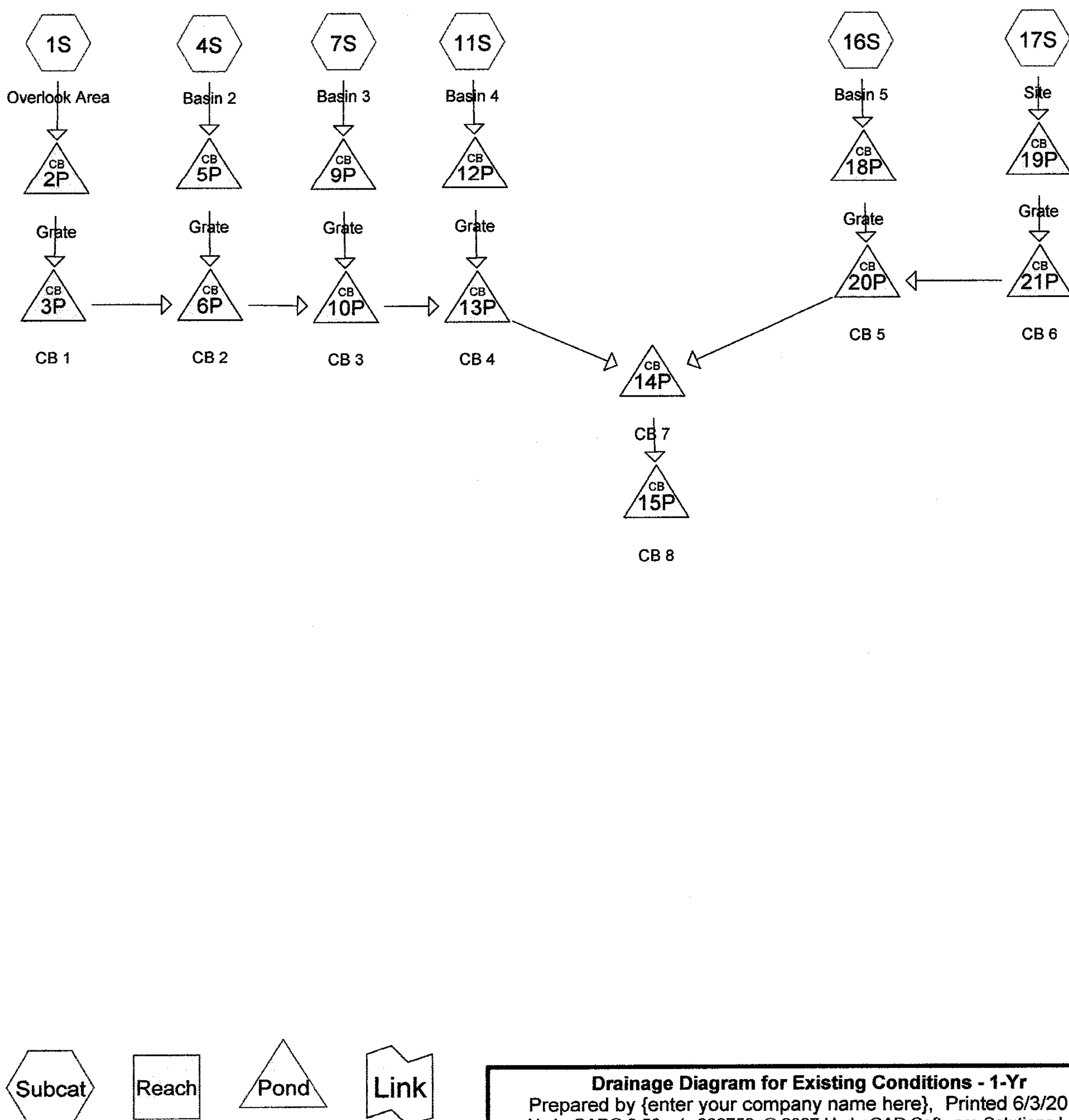
Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 15.46' @ 12.14 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.80' S= 0.0025 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=2.46 cfs @ 12.14 hrs HW=15.45' TW=15.00' (Fixed TW Elev= 15.00')
↑—**1=Culvert** (Outlet Controls 2.46 cfs @ 3.13 fps)

Pond 21P: CB 6





Drainage Diagram for Existing Conditions - 1-Yr
Prepared by {enter your company name here}, Printed 6/3/2011
HydroCAD® 8.50 s/n 000753 © 2007 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Overlook Area

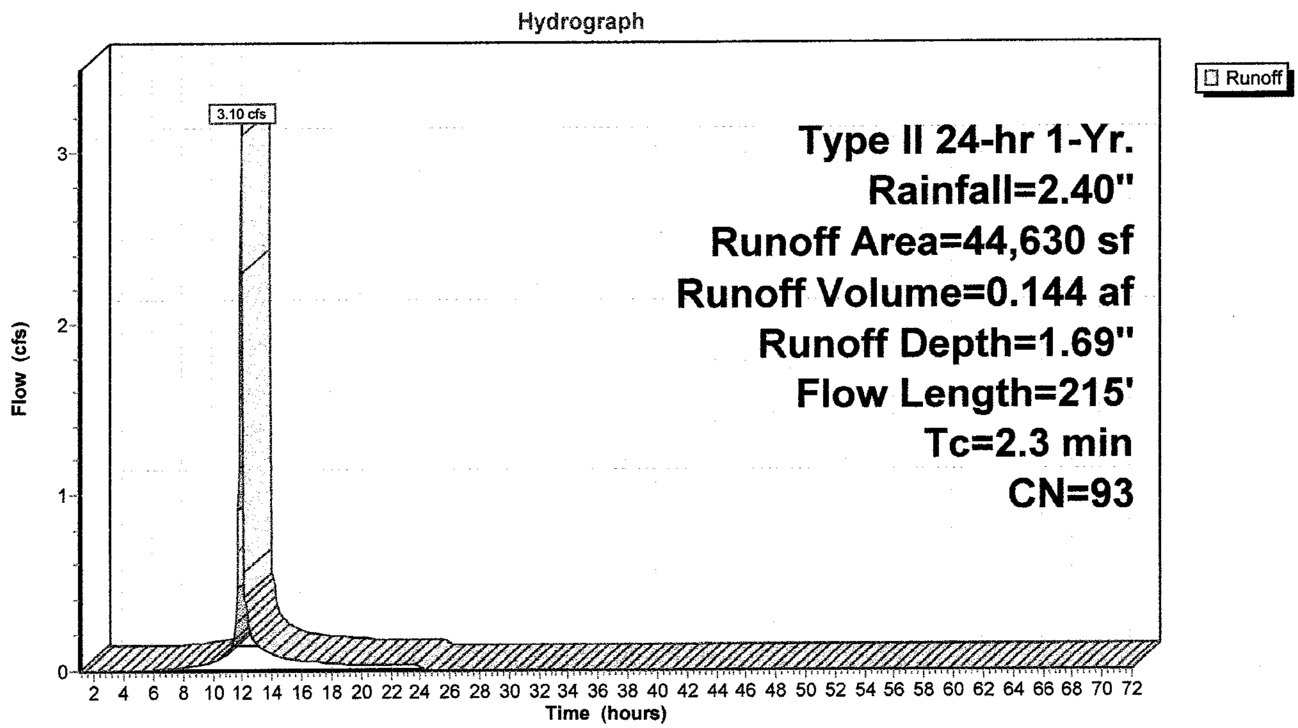
Runoff = 3.10 cfs @ 11.92 hrs, Volume= 0.144 af, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Yr. Rainfall=2.40"

Area (sf)	CN	Description
3,840	98	Paved parking & roofs
25,815	98	Paved parking & roofs
1,600	98	Paved parking & roofs
13,375	80	>75% Grass cover, Good, HSG D
44,630	93	Weighted Average
13,375		Pervious Area
31,255		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Upper Basin** Smooth surfaces n= 0.011 P2= 2.40"
1.0	120	0.0150	1.97		**Shallow Concentrated Flow, Crushed Stone Surface** Unpaved Kv= 16.1 fps
0.2	45	0.0550	3.52		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
2.3	215	Total			

Subcatchment 1S: Overlook Area



Summary for Subcatchment 4S: Basin 2

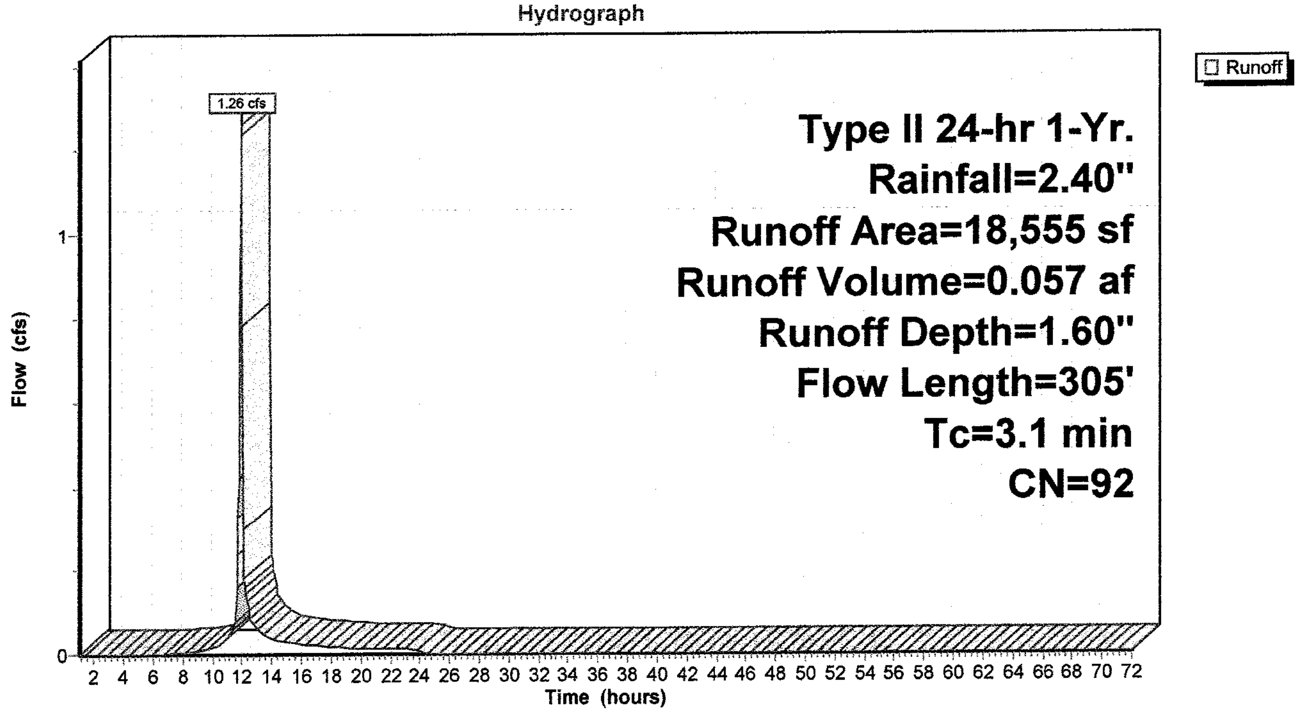
Runoff = 1.26 cfs @ 11.93 hrs, Volume= 0.057 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Yr. Rainfall=2.40"

Area (sf)	CN	Description
1,800	98	Paved parking & roofs
8,795	98	Paved parking & roofs
1,500	98	Paved parking & roofs
6,460	80	>75% Grass cover, Good, HSG D
18,555	92	Weighted Average
6,460		Pervious Area
12,095		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
1.2	120	0.0100	1.61		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
0.2	50	0.0500	3.35		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
0.6	85	0.0250	2.37		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
3.1	305	Total			

Subcatchment 4S: Basin 2



Summary for Subcatchment 7S: Basin 3

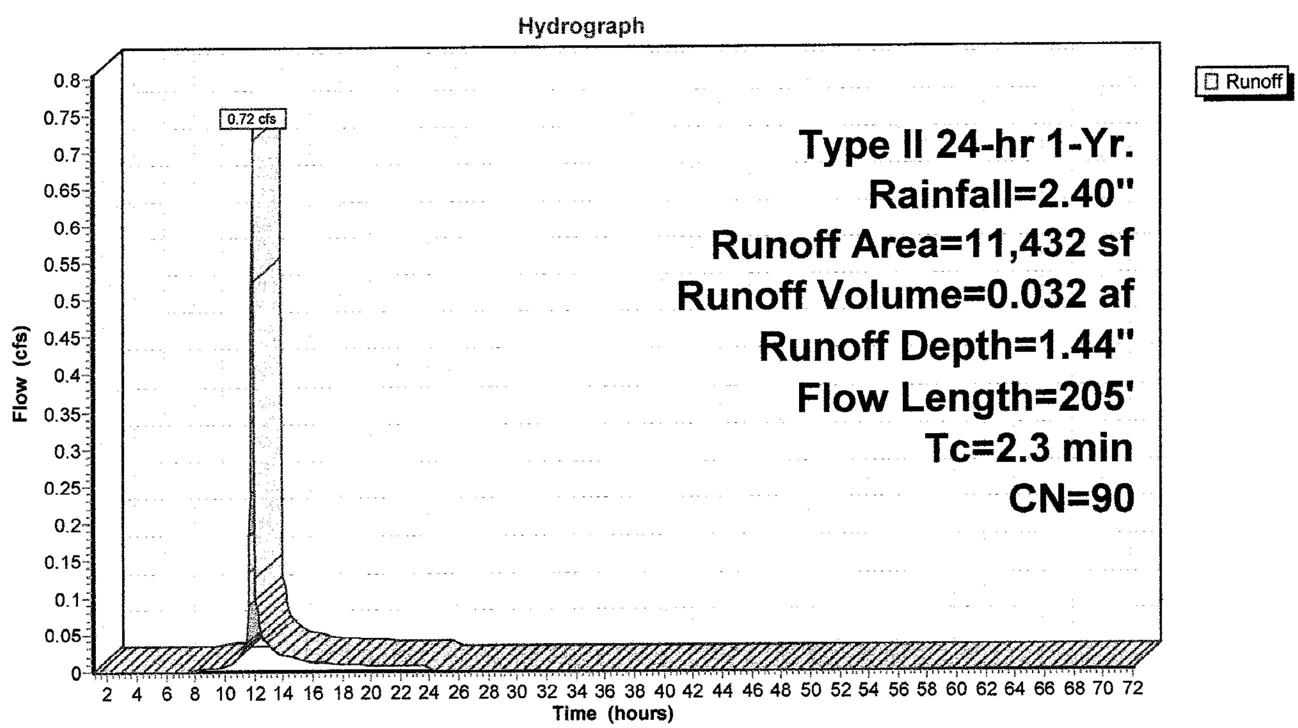
Runoff = 0.72 cfs @ 11.93 hrs, Volume= 0.032 af, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Yr. Rainfall=2.40"

Area (sf)	CN	Description
1,380	98	Paved parking & roofs
4,525	98	Paved parking & roofs
460	98	Paved parking & roofs
5,067	80	>75% Grass cover, Good, HSG D
11,432	90	Weighted Average
5,067		Pervious Area
6,365		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Basin 3** Smooth surfaces n= 0.011 P2= 2.40"
0.4	80	0.0550	3.52		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
0.8	75	0.0100	1.50		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
2.3	205	Total			

Subcatchment 7S: Basin 3



Summary for Subcatchment 11S: Basin 4

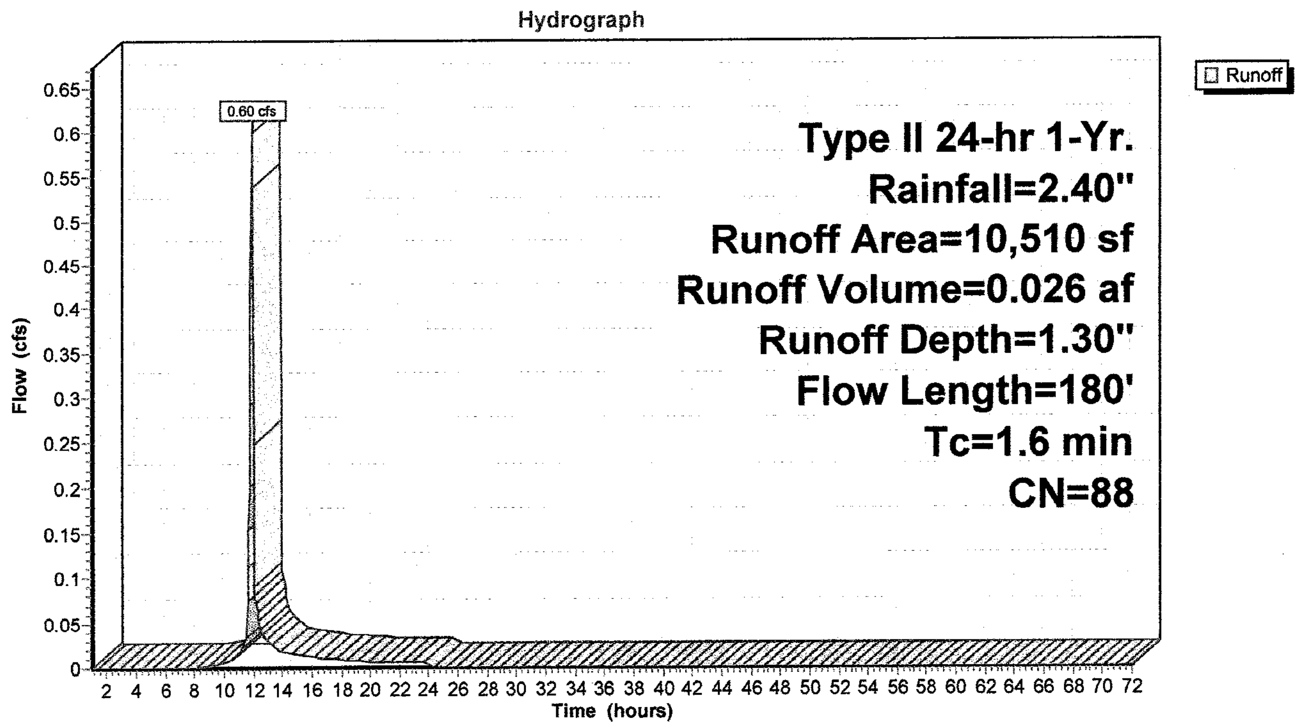
Runoff = 0.60 cfs @ 11.91 hrs, Volume= 0.026 af, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Yr. Rainfall=2.40"

Area (sf)	CN	Description
1,560	98	Paved parking & roofs
2,340	98	Paved parking & roofs
750	98	Paved parking & roofs
5,860	80	>75% Grass cover, Good, HSG D
10,510	88	Weighted Average
5,860		Pervious Area
4,650		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.04		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
0.3	50	0.0300	2.79		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
0.5	80	0.0300	2.60		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
1.6	180	Total			

Subcatchment 11S: Basin 4



Summary for Subcatchment 16S: Basin 5

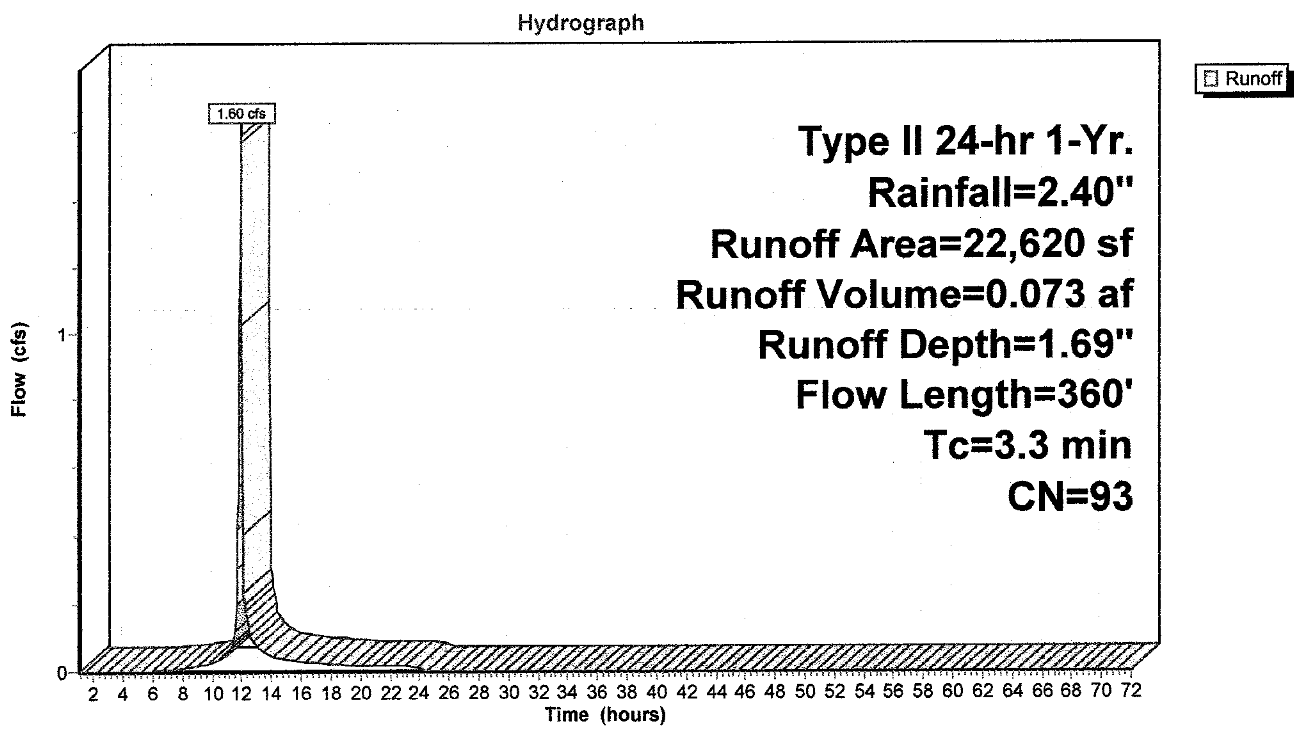
Runoff = 1.60 cfs @ 11.94 hrs, Volume= 0.073 af, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Yr. Rainfall=2.40"

Area (sf)	CN	Description
2,460	98	Paved parking & roofs
13,330	98	Paved parking & roofs
1,120	98	Paved parking & roofs
5,710	80	>75% Grass cover, Good, HSG D
22,620	93	Weighted Average
5,710		Pervious Area
16,910		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
1.2	160	0.0180	2.16		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
1.0	150	0.0300	2.60		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
3.3	360	Total			

Subcatchment 16S: Basin 5



Summary for Subcatchment 17S: Site

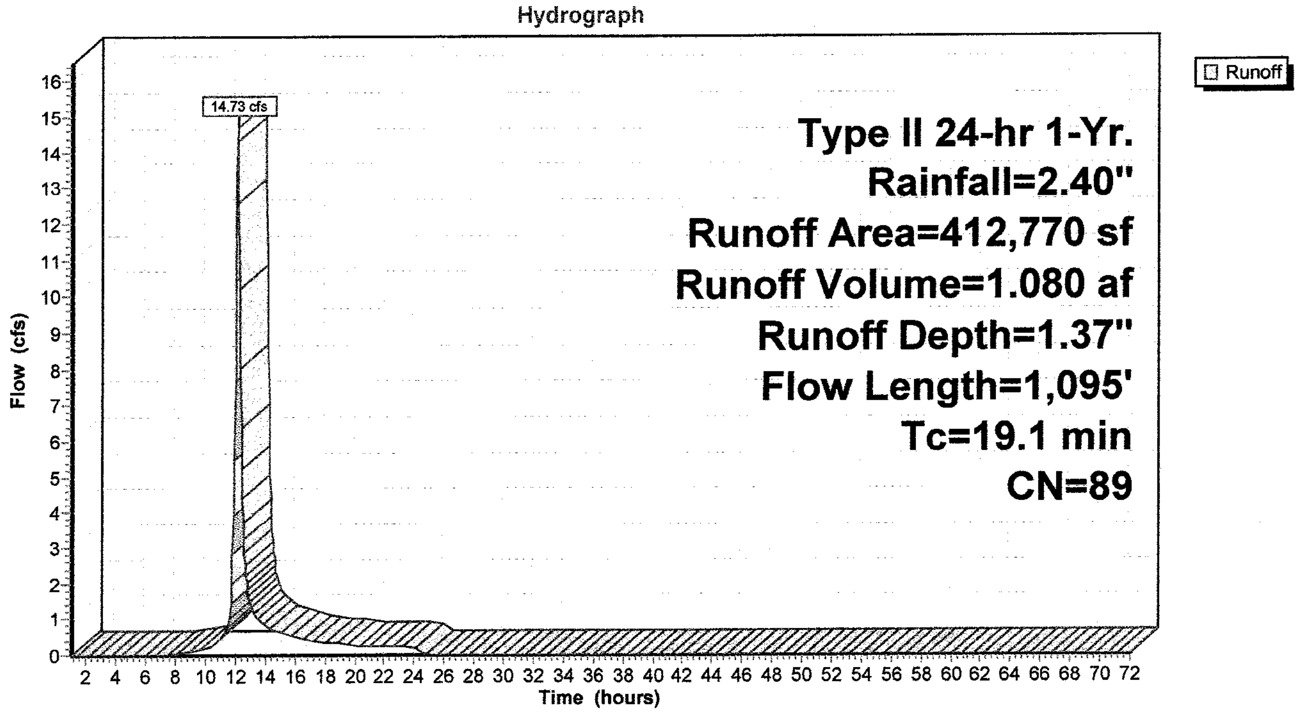
Runoff = 14.73 cfs @ 12.12 hrs, Volume= 1.080 af, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Yr. Rainfall=2.40"

Area (sf)	CN	Description
8,940	98	Paved parking & roofs
181,580	98	Paved parking & roofs
4,530	98	Paved parking & roofs
63,830	82	Woods/grass comb., Fair, HSG D
153,890	80	>75% Grass cover, Good, HSG D
412,770	89	Weighted Average
217,720		Pervious Area
195,050		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.04		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
0.2	30	0.0200	2.28		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
4.1	450	0.0150	1.84		**Shallow Concentrated Flow, Meadow** Grassed Waterway Kv= 15.0 fps
14.0	565	0.0020	0.67		**Shallow Concentrated Flow, Tracks** Grassed Waterway Kv= 15.0 fps
19.1	1,095	Total			

Subcatchment 17S: Site



Summary for Pond 2P: Grate

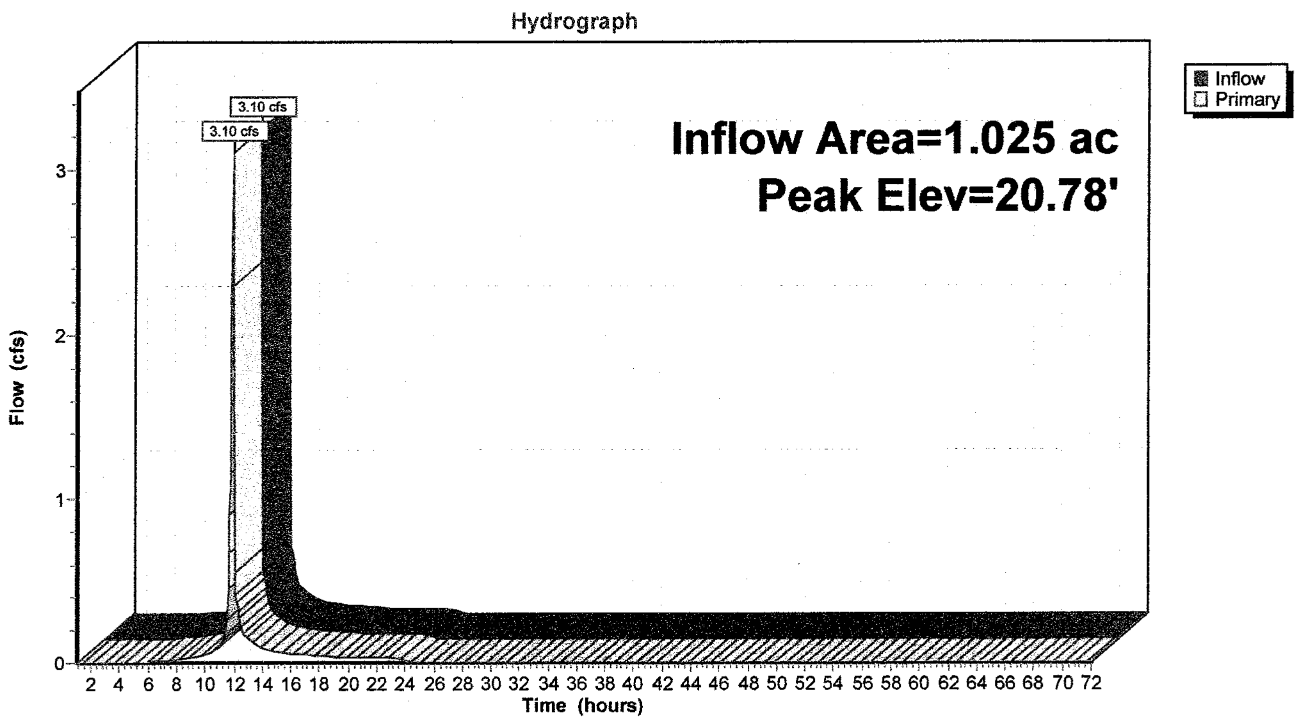
Inflow Area = 1.025 ac, 70.03% Impervious, Inflow Depth = 1.69" for 1-Yr. event
Inflow = 3.10 cfs @ 11.92 hrs, Volume= 0.144 af
Outflow = 3.10 cfs @ 11.92 hrs, Volume= 0.144 af, Atten= 0%, Lag= 0.0 min
Primary = 3.10 cfs @ 11.92 hrs, Volume= 0.144 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 20.78' @ 11.92 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices		
#1	Primary	20.50'	**24.0" Horiz. Orifice/Grate**	Limited to weir flow	C= 0.600

Primary OutFlow Max=3.00 cfs @ 11.92 hrs HW=20.78' (Free Discharge)
1=Orifice/Grate (Weir Controls 3.00 cfs @ 1.72 fps)

Pond 2P: Grate



Summary for Pond 3P: CB 1

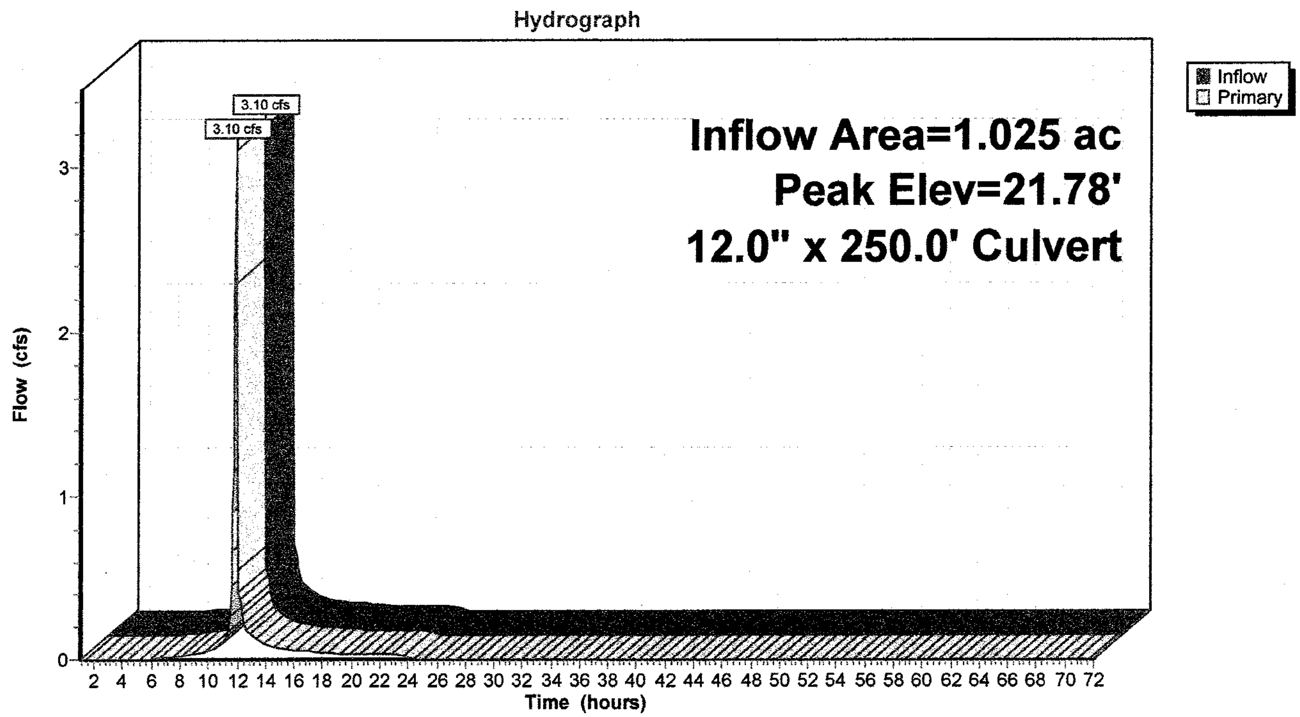
Inflow Area =	1.025 ac,	70.03% Impervious,	Inflow Depth = 1.69"	for 1-Yr. event
Inflow =	3.10 cfs @	11.92 hrs, Volume=	0.144 af	
Outflow =	3.10 cfs @	11.92 hrs, Volume=	0.144 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.10 cfs @	11.92 hrs, Volume=	0.144 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 21.78' @ 11.92 hrs
Flood Elev= 20.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	15.43'	**12.0" x 250.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 14.28' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=3.00 cfs @ 11.92 hrs HW=21.70' TW=20.30' (Fixed TW Elev= 20.30')
1=Culvert (Outlet Controls 3.00 cfs @ 3.82 fps)

Pond 3P: CB 1



Summary for Pond 5P: Grate

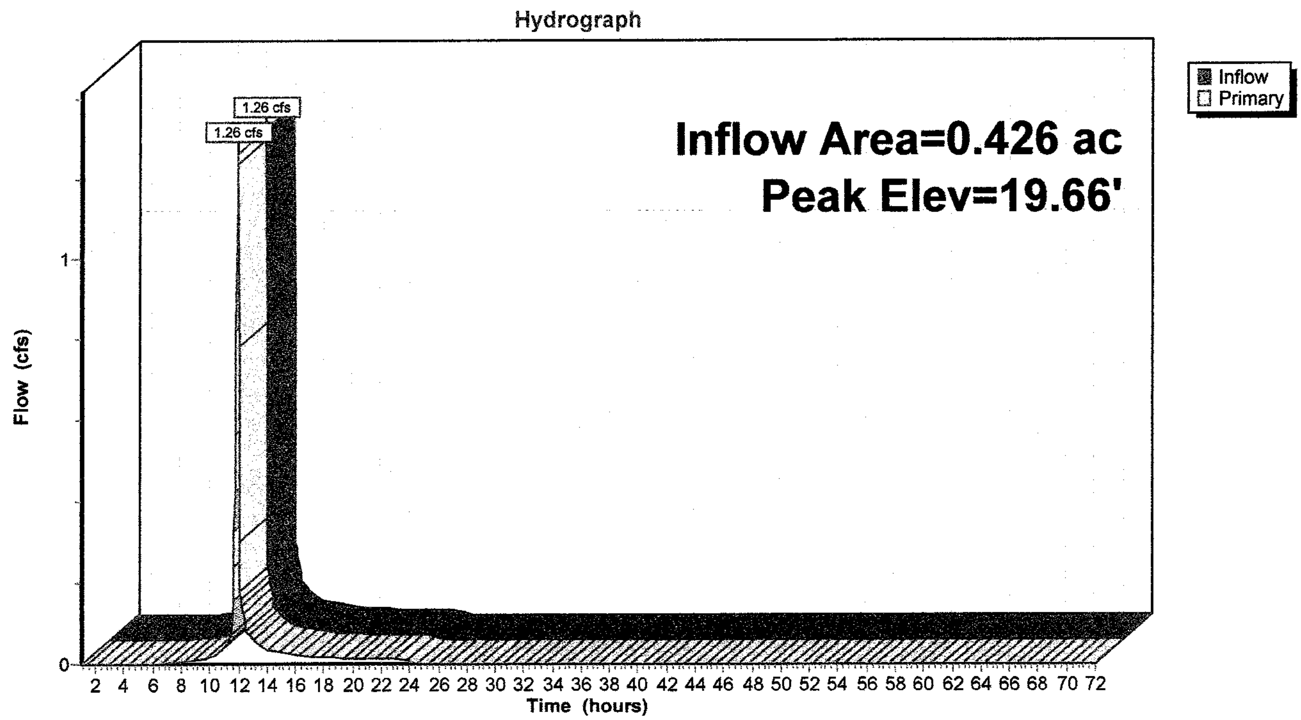
Inflow Area =	0.426 ac, 65.18% Impervious, Inflow Depth = 1.60" for 1-Yr. event			
Inflow =	1.26 cfs @	11.93 hrs, Volume=	0.057 af	
Outflow =	1.26 cfs @	11.93 hrs, Volume=	0.057 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.26 cfs @	11.93 hrs, Volume=	0.057 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 19.66' @ 11.93 hrs
Flood Elev= 20.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	19.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=1.20 cfs @ 11.93 hrs HW=19.65' (Free Discharge)
└─**1=Orifice/Grate** (Weir Controls 1.20 cfs @ 1.27 fps)

Pond 5P: Grate



Summary for Pond 6P: CB 2

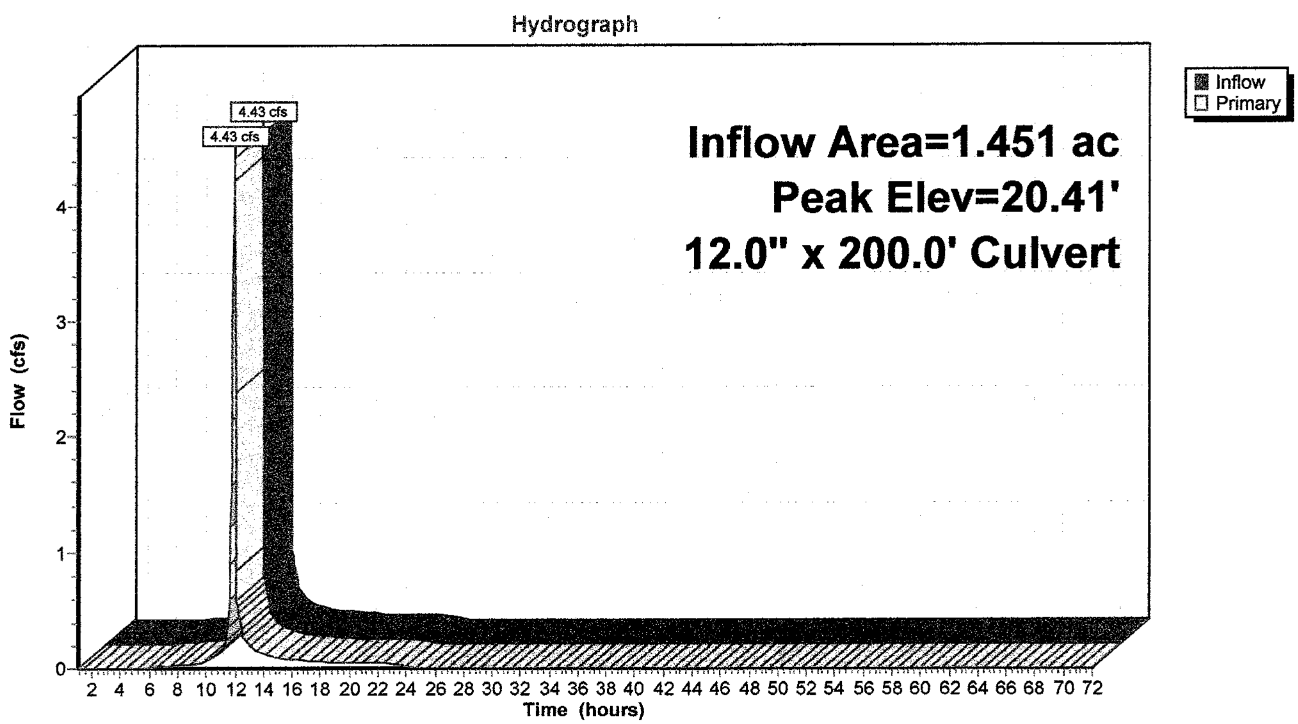
Inflow Area = 1.451 ac, 68.61% Impervious, Inflow Depth = 1.66" for 1-Yr. event
Inflow = 4.43 cfs @ 11.93 hrs, Volume= 0.201 af
Outflow = 4.43 cfs @ 11.93 hrs, Volume= 0.201 af, Atten= 0%, Lag= 0.0 min
Primary = 4.43 cfs @ 11.93 hrs, Volume= 0.201 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 20.41' @ 11.93 hrs
Flood Elev= 19.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.58'	**12.0" x 200.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.67' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=4.19 cfs @ 11.93 hrs HW=20.20' TW=17.90' (Fixed TW Elev= 17.90')
↑—**1=Culvert** (Outlet Controls 4.19 cfs @ 5.33 fps)

Pond 6P: CB 2



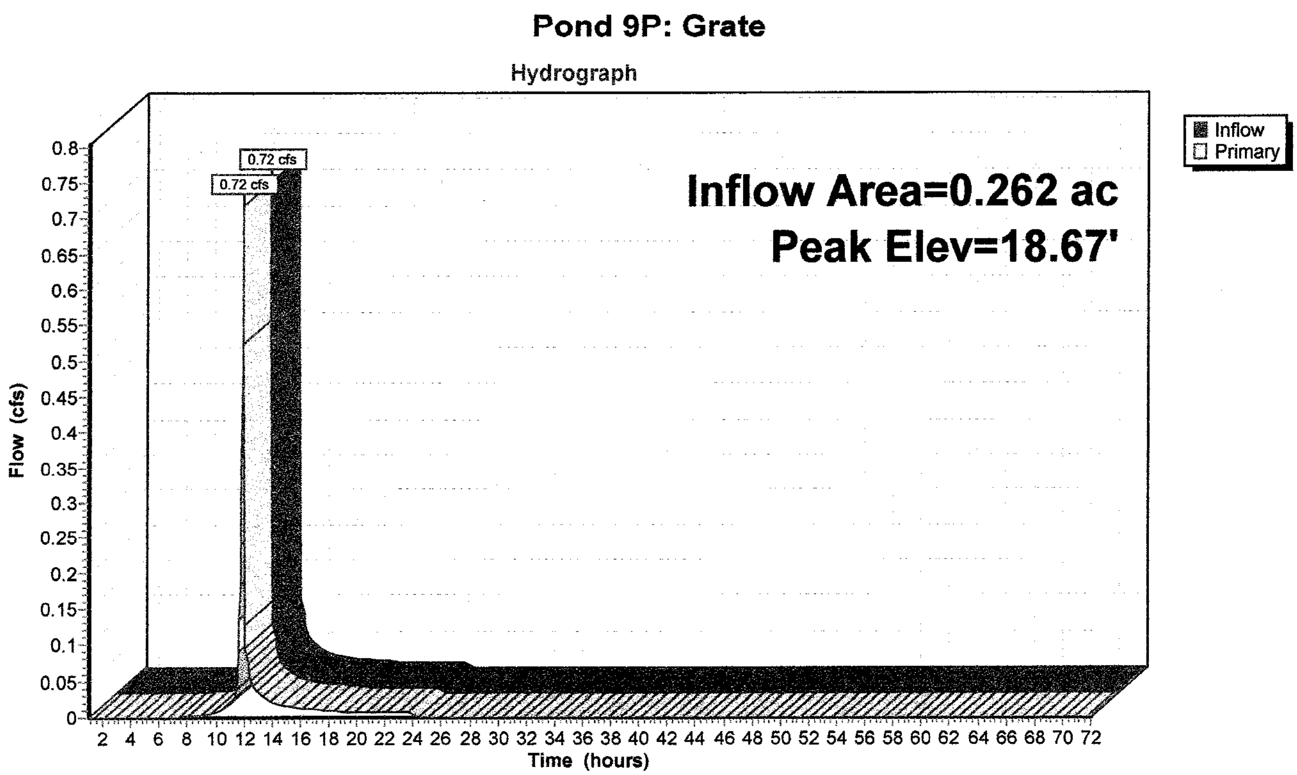
Summary for Pond 9P: Grate

Inflow Area =	0.262 ac,	55.68% Impervious,	Inflow Depth = 1.44"	for 1-Yr. event	
Inflow =	0.72 cfs @	11.93 hrs,	Volume=	0.032 af	
Outflow =	0.72 cfs @	11.93 hrs,	Volume=	0.032 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.72 cfs @	11.93 hrs,	Volume=	0.032 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.67' @ 11.93 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**12.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.68 cfs @ 11.93 hrs HW=18.66' (Free Discharge)
└─**1=Orifice/Grate** (Weir Controls 0.68 cfs @ 1.32 fps)



Summary for Pond 10P: CB 3

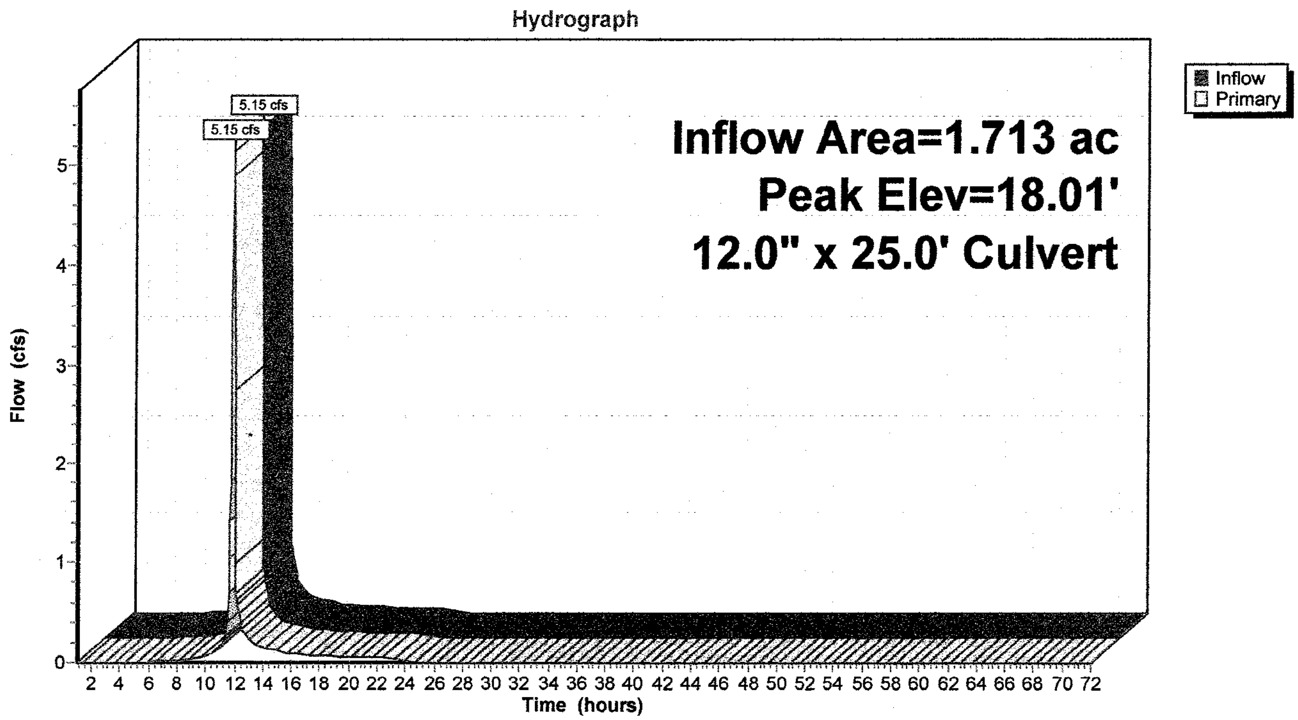
Inflow Area =	1.713 ac,	66.63% Impervious,	Inflow Depth = 1.63"	for 1-Yr. event	
Inflow =	5.15 cfs @	11.93 hrs,	Volume=	0.232 af	
Outflow =	5.15 cfs @	11.93 hrs,	Volume=	0.232 af,	Atten= 0%, Lag= 0.0 min
Primary =	5.15 cfs @	11.93 hrs,	Volume=	0.232 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.01' @ 11.93 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.67'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.60' S= 0.0028 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=4.87 cfs @ 11.93 hrs HW=17.86' TW=16.20' (Fixed TW Elev= 16.20')
1=Culvert (Inlet Controls 4.87 cfs @ 6.20 fps)

Pond 10P: CB 3



Summary for Pond 12P: Grate

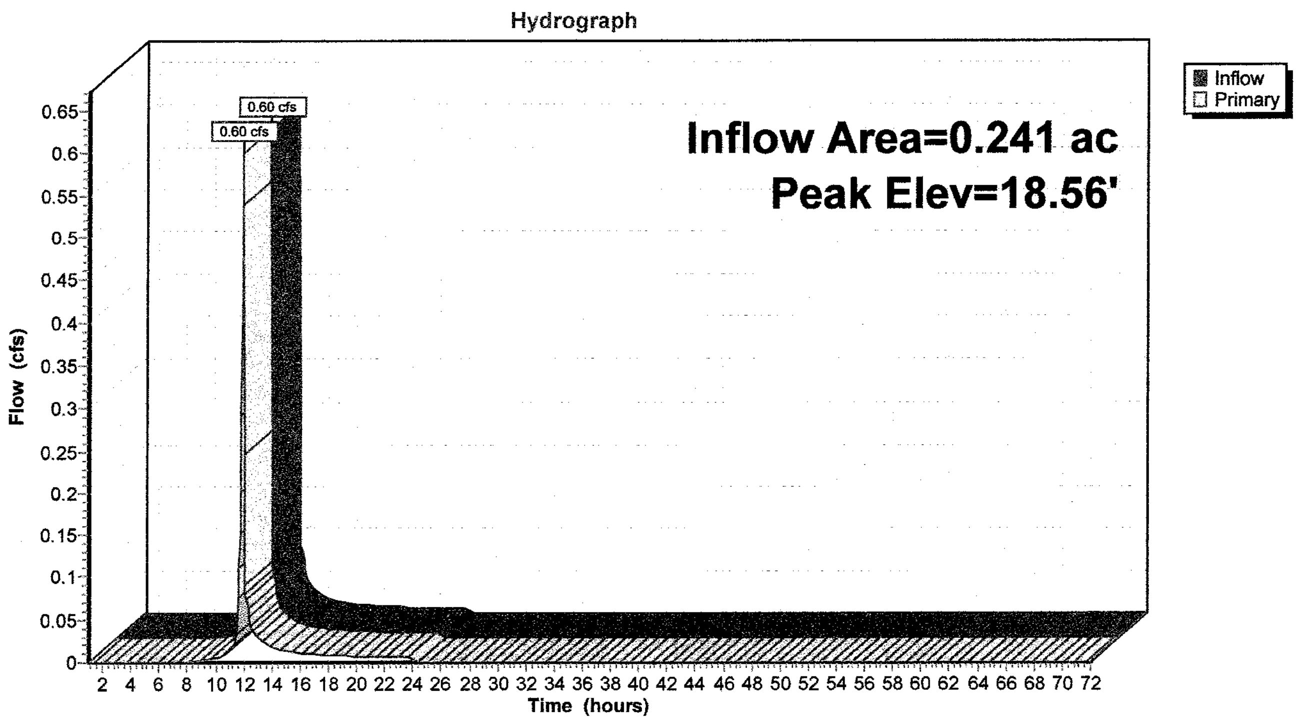
Inflow Area = 0.241 ac, 44.24% Impervious, Inflow Depth = 1.30" for 1-Yr. event
Inflow = 0.60 cfs @ 11.91 hrs, Volume= 0.026 af
Outflow = 0.60 cfs @ 11.91 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min
Primary = 0.60 cfs @ 11.91 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.56' @ 11.91 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**24.0" Horiz. Orifice/Grate X 2.00** Limited to weir flow C= 0.600

Primary OutFlow Max=0.58 cfs @ 11.91 hrs HW=18.56' (Free Discharge)
1=Orifice/Grate (Weir Controls 0.58 cfs @ 0.79 fps)

Pond 12P: Grate



Summary for Pond 13P: CB 4

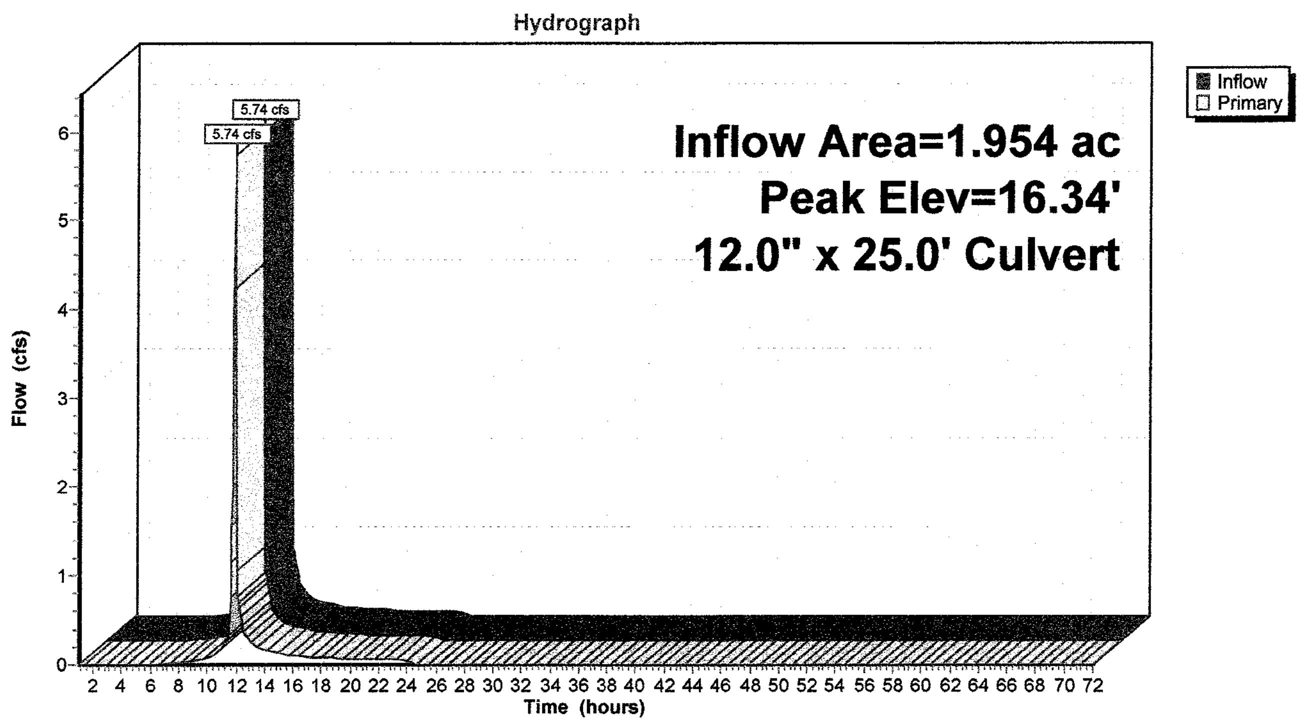
Inflow Area = 1.954 ac, 63.86% Impervious, Inflow Depth = 1.59" for 1-Yr. event
Inflow = 5.74 cfs @ 11.93 hrs, Volume= 0.258 af
Outflow = 5.74 cfs @ 11.93 hrs, Volume= 0.258 af, Atten= 0%, Lag= 0.0 min
Primary = 5.74 cfs @ 11.93 hrs, Volume= 0.258 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 16.34' @ 11.93 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.60'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.40' S= 0.0080 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=5.43 cfs @ 11.93 hrs HW=16.16' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 5.43 cfs @ 6.91 fps)

Pond 13P: CB 4



Summary for Pond 14P: CB 7

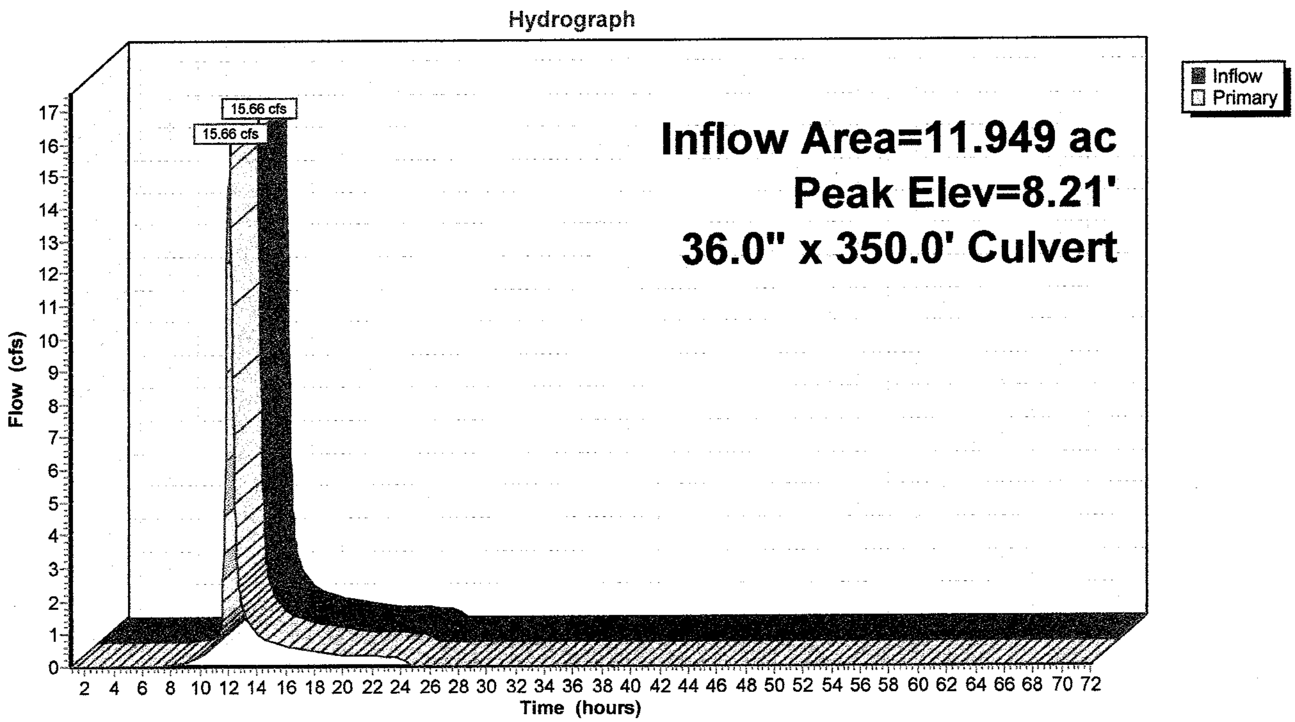
Inflow Area =	11.949 ac,	51.17% Impervious,	Inflow Depth = 1.42"	for 1-Yr. event	
Inflow =	15.66 cfs @	12.11 hrs,	Volume=	1.411 af	
Outflow =	15.66 cfs @	12.11 hrs,	Volume=	1.411 af,	Atten= 0%, Lag= 0.0 min
Primary =	15.66 cfs @	12.11 hrs,	Volume=	1.411 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 8.21' @ 12.11 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	6.30'	**36.0" x 350.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 5.37' S= 0.0027 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=15.54 cfs @ 12.11 hrs HW=8.20' TW=7.15' (Fixed TW Elev= 7.15')
↑—**1=Culvert** (Outlet Controls 15.54 cfs @ 4.69 fps)

Pond 14P: CB 7



Summary for Pond 15P: CB 8

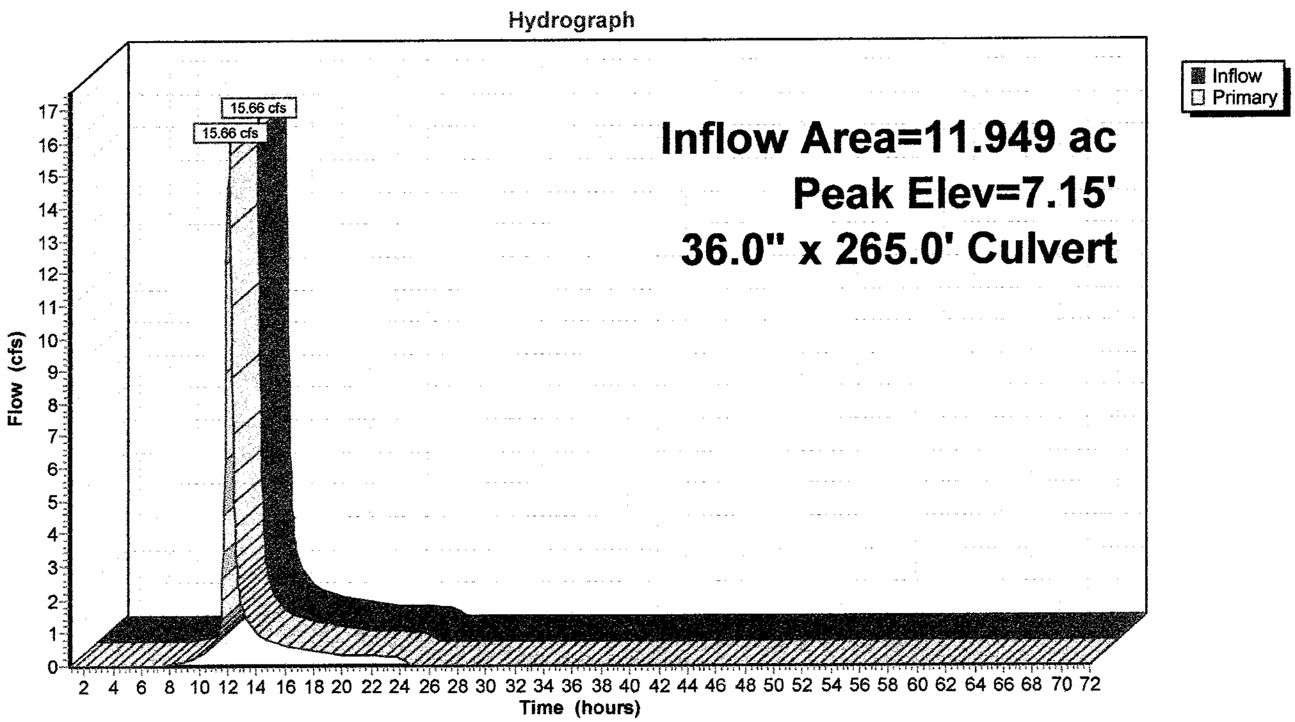
Inflow Area =	11.949 ac,	51.17% Impervious,	Inflow Depth = 1.42"	for 1-Yr. event	
Inflow =	15.66 cfs @	12.11 hrs,	Volume=	1.411 af	
Outflow =	15.66 cfs @	12.11 hrs,	Volume=	1.411 af,	Atten= 0%, Lag= 0.0 min
Primary =	15.66 cfs @	12.11 hrs,	Volume=	1.411 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 7.15' @ 12.11 hrs
Flood Elev= 22.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5.37'	**36.0" x 265.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 4.68' S= 0.0026 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=15.53 cfs @ 12.11 hrs HW=7.14' (Free Discharge)
1=Culvert (Barrel Controls 15.53 cfs @ 5.13 fps)

Pond 15P: CB 8



Summary for Pond 18P: Grate

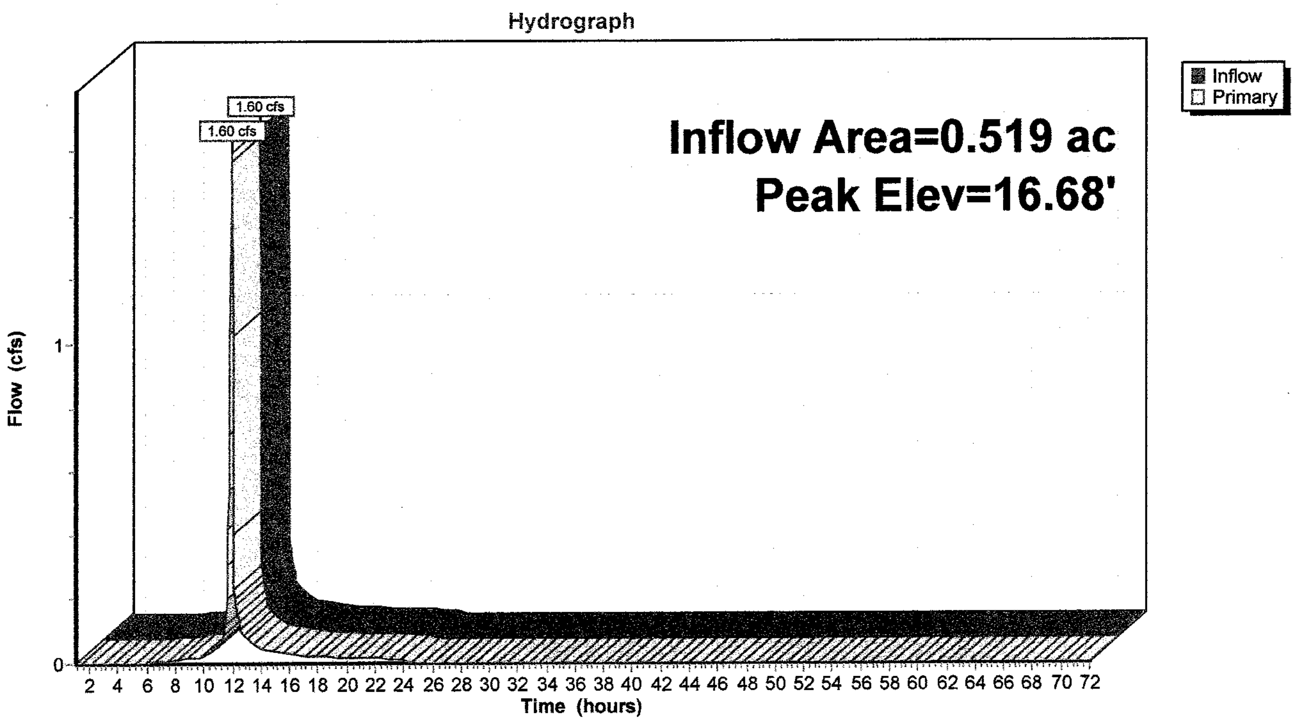
Inflow Area =	0.519 ac, 74.76% Impervious, Inflow Depth = 1.69" for 1-Yr. event				
Inflow =	1.60 cfs @	11.94 hrs,	Volume=	0.073 af	
Outflow =	1.60 cfs @	11.94 hrs,	Volume=	0.073 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.60 cfs @	11.94 hrs,	Volume=	0.073 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 16.68' @ 11.94 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	16.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=1.53 cfs @ 11.94 hrs HW=16.68' (Free Discharge)
↑**1=Orifice/Grate** (Weir Controls 1.53 cfs @ 1.37 fps)

Pond 18P: Grate



Summary for Pond 19P: Grate

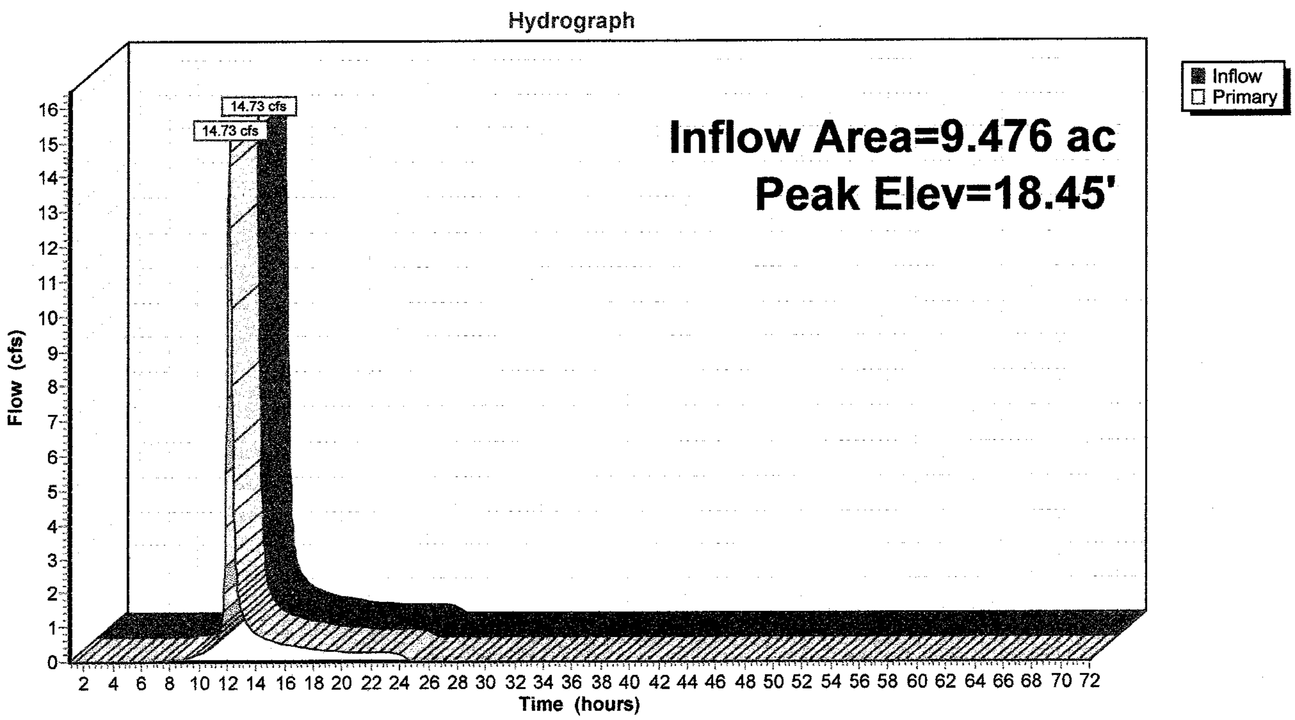
Inflow Area =	9.476 ac,	47.25% Impervious,	Inflow Depth = 1.37"	for 1-Yr. event	
Inflow =	14.73 cfs @	12.12 hrs,	Volume=	1.080 af	
Outflow =	14.73 cfs @	12.12 hrs,	Volume=	1.080 af,	Atten= 0%, Lag= 0.0 min
Primary =	14.73 cfs @	12.12 hrs,	Volume=	1.080 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.45' @ 12.12 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	17.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=14.53 cfs @ 12.12 hrs HW=18.42' (Free Discharge)
↑—**1=Orifice/Grate** (Orifice Controls 14.53 cfs @ 4.62 fps)

Pond 19P: Grate



Summary for Pond 20P: CB 5

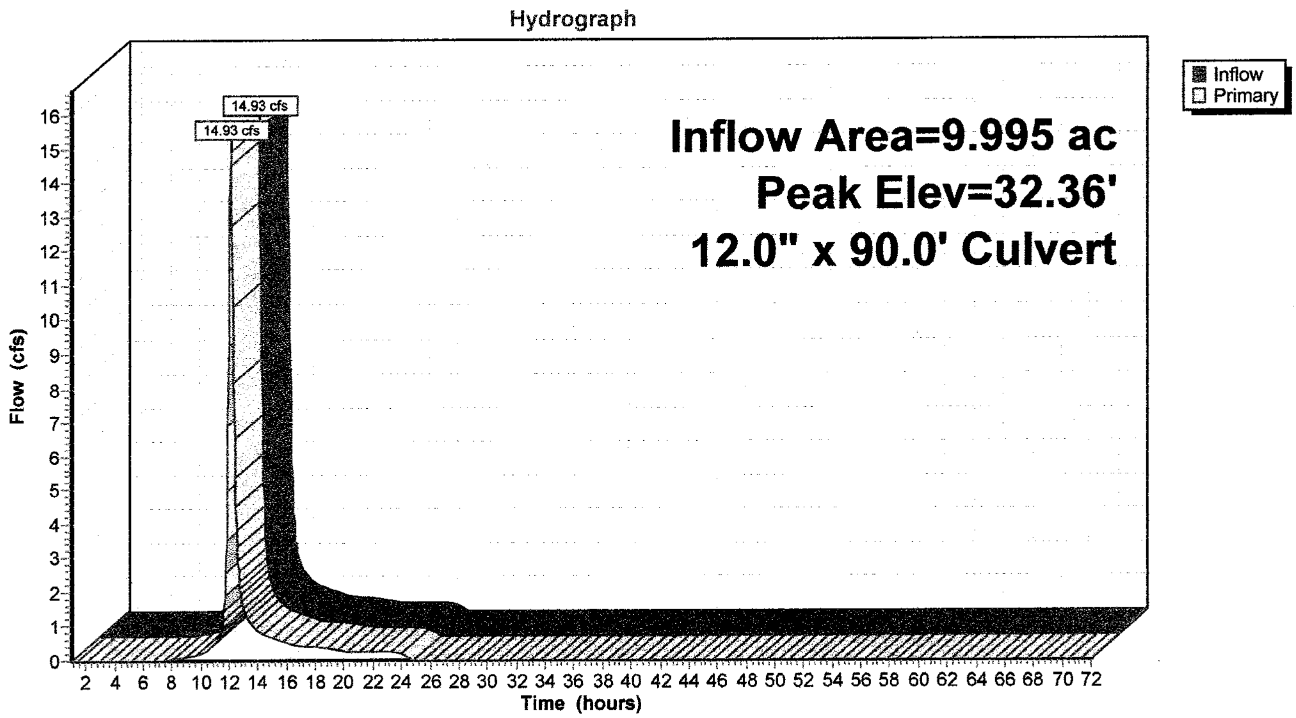
Inflow Area =	9.995 ac, 48.68% Impervious,	Inflow Depth = 1.38"	for 1-Yr. event	
Inflow =	14.93 cfs @	12.11 hrs, Volume=	1.153 af	
Outflow =	14.93 cfs @	12.11 hrs, Volume=	1.153 af,	Atten= 0%, Lag= 0.0 min
Primary =	14.93 cfs @	12.11 hrs, Volume=	1.153 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 32.36' @ 12.11 hrs
Flood Elev= 16.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.80'	**12.0" x 90.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.57' S= 0.0026 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=14.76 cfs @ 12.11 hrs HW=31.96' (Free Discharge)
↑**1=Culvert** (Barrel Controls 14.76 cfs @ 18.79 fps)

Pond 20P: CB 5



Summary for Pond 21P: CB 6

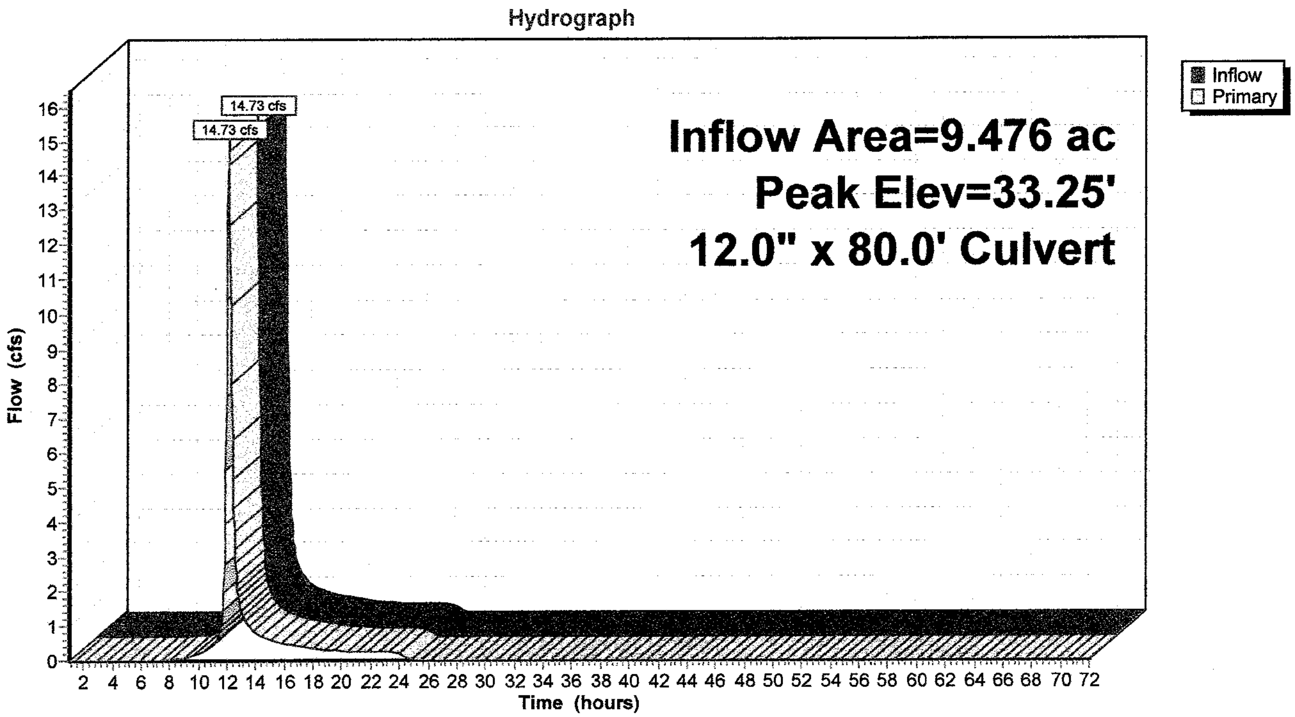
Inflow Area =	9.476 ac,	47.25% Impervious,	Inflow Depth = 1.37"	for 1-Yr. event	
Inflow =	14.73 cfs @	12.12 hrs,	Volume=	1.080 af	
Outflow =	14.73 cfs @	12.12 hrs,	Volume=	1.080 af,	Atten= 0%, Lag= 0.0 min
Primary =	14.73 cfs @	12.12 hrs,	Volume=	1.080 af	

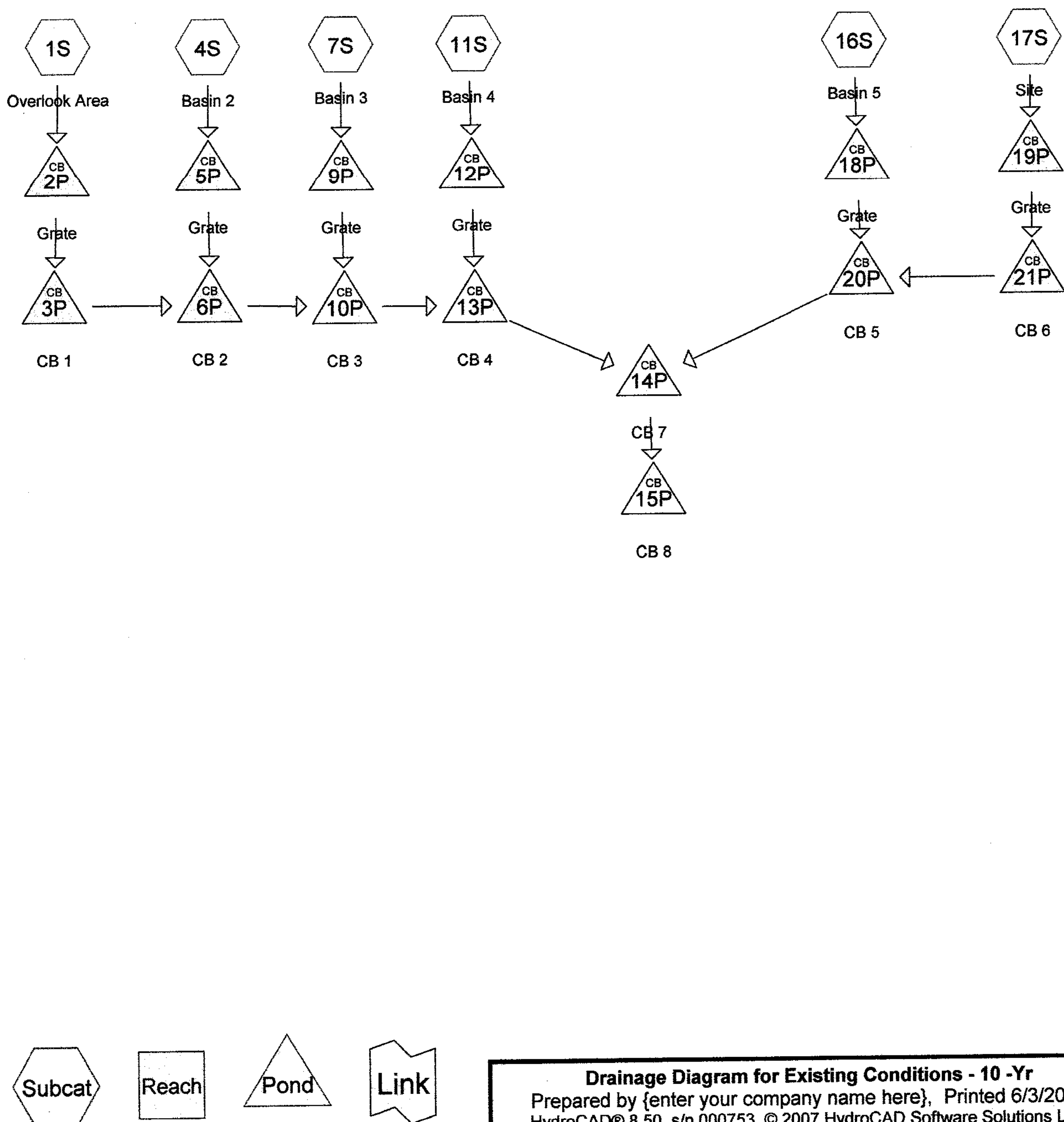
Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 33.25' @ 12.12 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.80' S= 0.0025 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=14.53 cfs @ 12.12 hrs HW=32.83' TW=16.97' (Fixed TW Elev= 16.97')
↑—**1=Culvert** (Outlet Controls 14.53 cfs @ 18.50 fps)

Pond 21P: CB 6





Drainage Diagram for Existing Conditions - 10 -Yr
Prepared by {enter your company name here}, Printed 6/3/2011
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Summary for Subcatchment 1S: Overlook Area

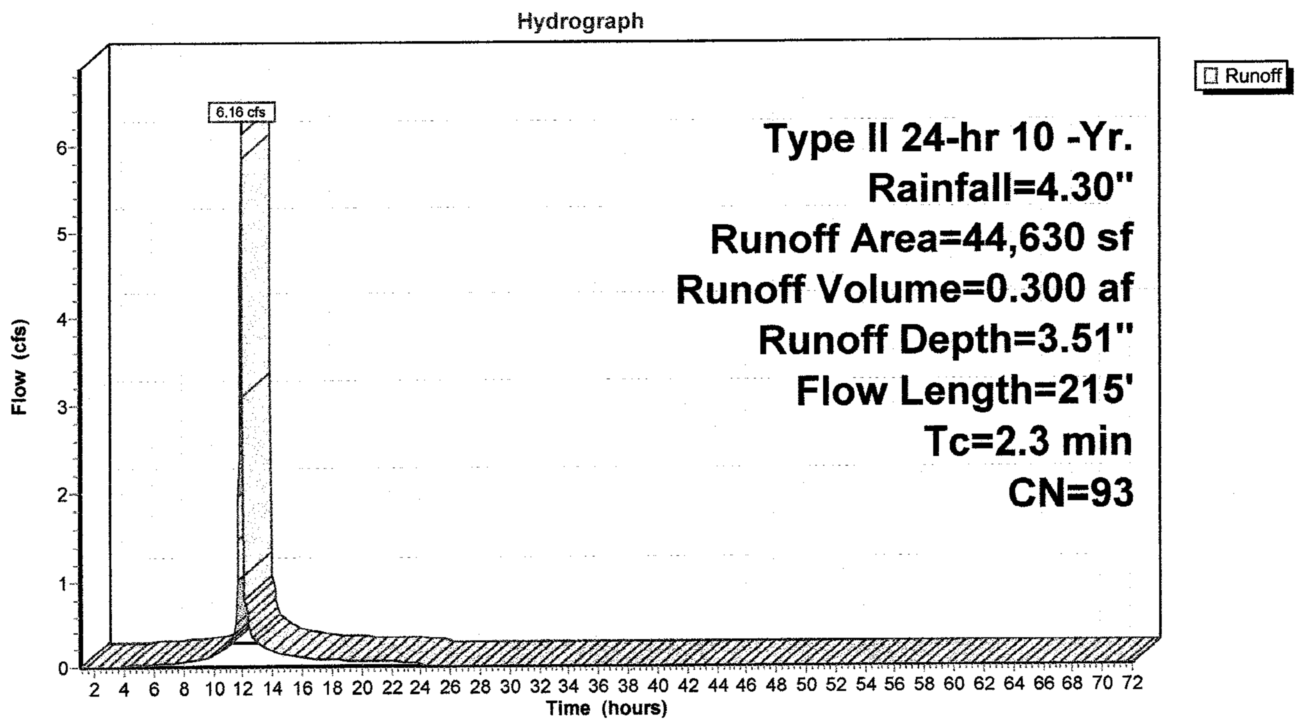
Runoff = 6.16 cfs @ 11.92 hrs, Volume= 0.300 af, Depth= 3.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 -Yr. Rainfall=4.30"

Area (sf)	CN	Description
3,840	98	Paved parking & roofs
25,815	98	Paved parking & roofs
1,600	98	Paved parking & roofs
13,375	80	>75% Grass cover, Good, HSG D
44,630	93	Weighted Average
13,375		Pervious Area
31,255		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Upper Basin** Smooth surfaces n= 0.011 P2= 2.40"
1.0	120	0.0150	1.97		**Shallow Concentrated Flow, Crushed Stone Surface** Unpaved Kv= 16.1 fps
0.2	45	0.0550	3.52		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
2.3	215	Total			

Subcatchment 1S: Overlook Area



Summary for Subcatchment 4S: Basin 2

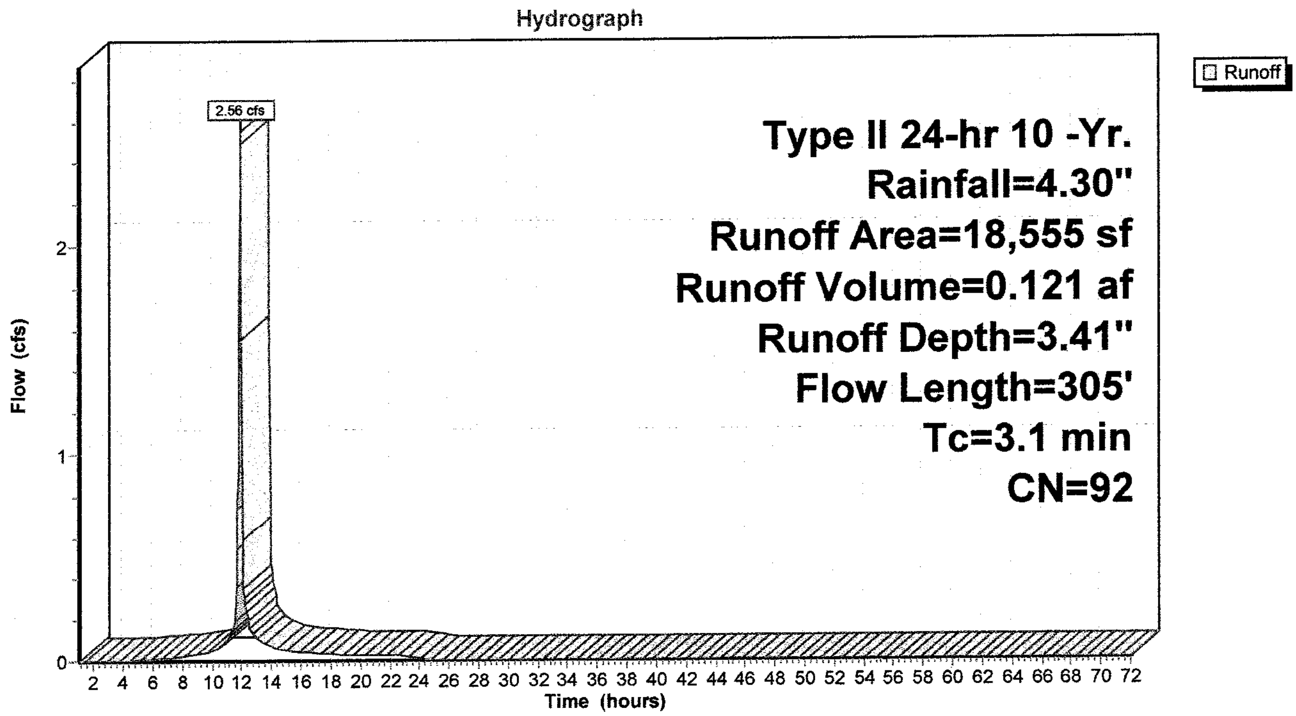
Runoff = 2.56 cfs @ 11.93 hrs, Volume= 0.121 af, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 -Yr. Rainfall=4.30"

Area (sf)	CN	Description
1,800	98	Paved parking & roofs
8,795	98	Paved parking & roofs
1,500	98	Paved parking & roofs
6,460	80	>75% Grass cover, Good, HSG D
18,555	92	Weighted Average
6,460		Pervious Area
12,095		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
1.2	120	0.0100	1.61		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
0.2	50	0.0500	3.35		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
0.6	85	0.0250	2.37		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
3.1	305	Total			

Subcatchment 4S: Basin 2



Summary for Subcatchment 7S: Basin 3

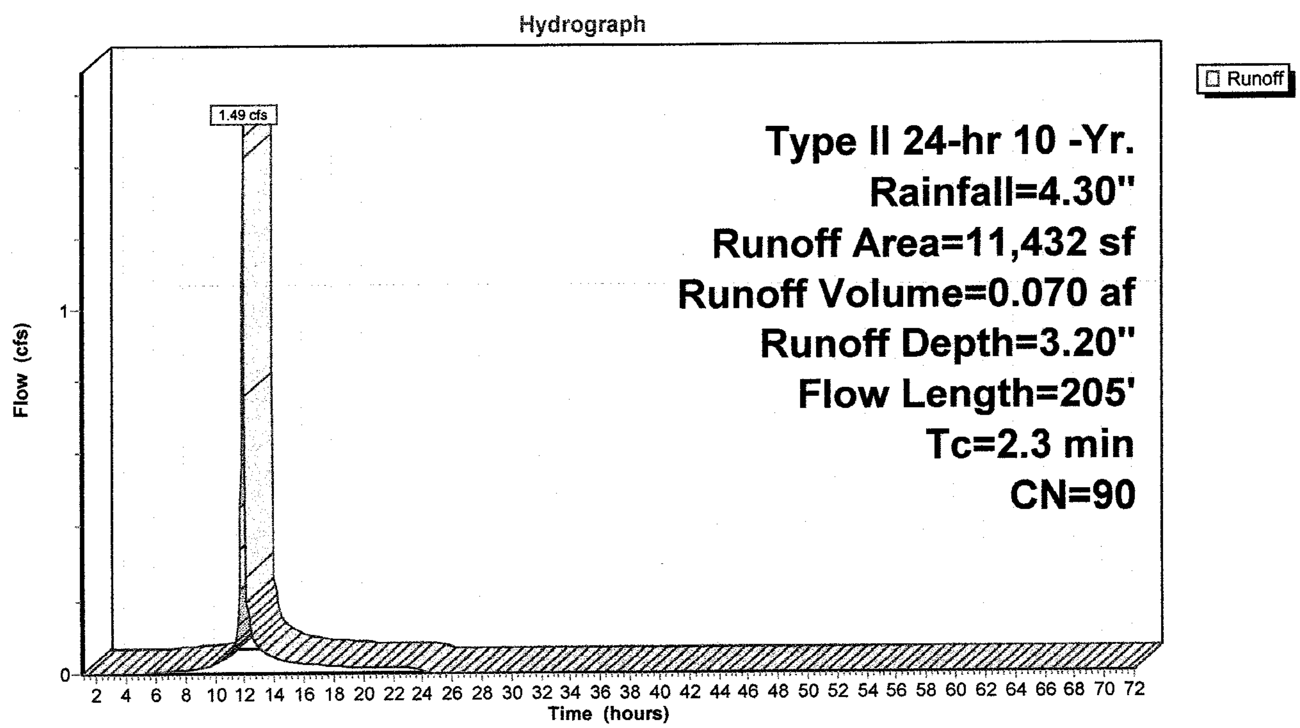
Runoff = 1.49 cfs @ 11.92 hrs, Volume= 0.070 af, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 -Yr. Rainfall=4.30"

Area (sf)	CN	Description
1,380	98	Paved parking & roofs
4,525	98	Paved parking & roofs
460	98	Paved parking & roofs
5,067	80	>75% Grass cover, Good, HSG D
11,432	90	Weighted Average
5,067		Pervious Area
6,365		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Basin 3** Smooth surfaces n= 0.011 P2= 2.40"
0.4	80	0.0550	3.52		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
0.8	75	0.0100	1.50		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
2.3	205	Total			

Subcatchment 7S: Basin 3



Summary for Subcatchment 11S: Basin 4

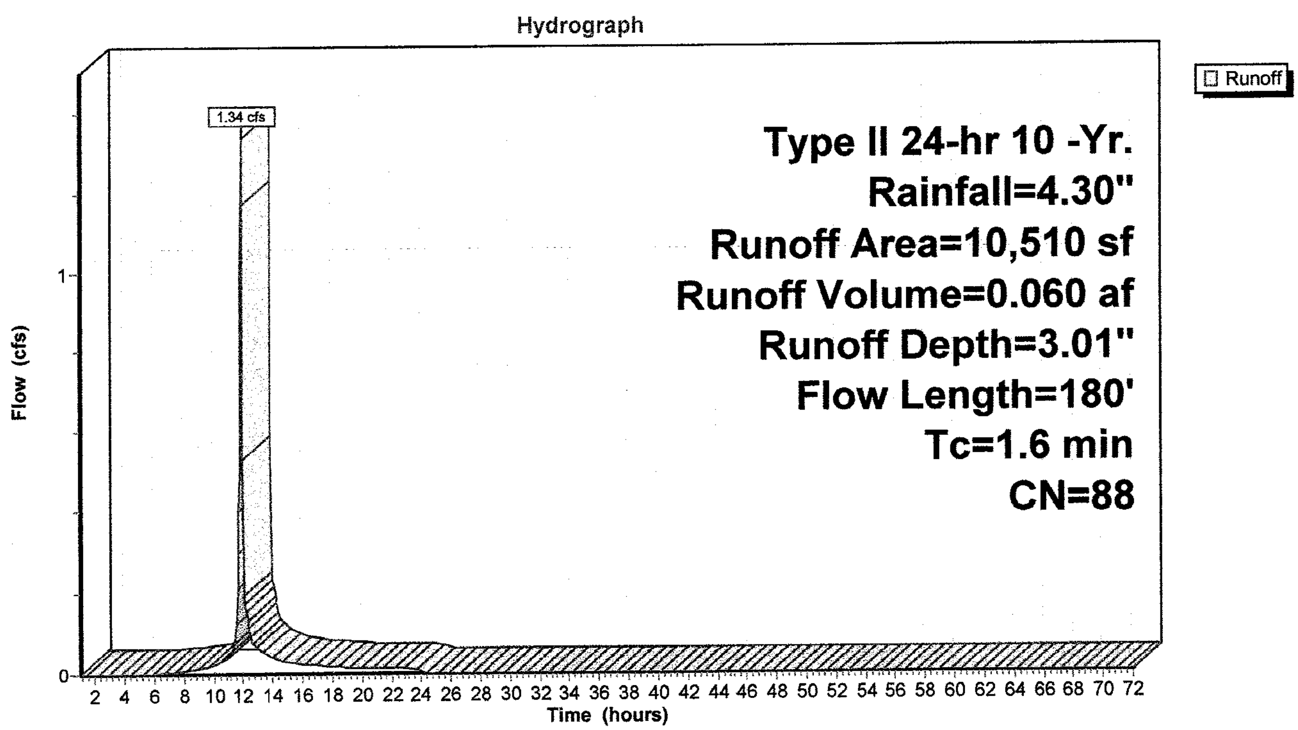
Runoff = 1.34 cfs @ 11.91 hrs, Volume= 0.060 af, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 -Yr. Rainfall=4.30"

Area (sf)	CN	Description
1,560	98	Paved parking & roofs
2,340	98	Paved parking & roofs
750	98	Paved parking & roofs
5,860	80	>75% Grass cover, Good, HSG D
10,510	88	Weighted Average
5,860		Pervious Area
4,650		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.04		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
0.3	50	0.0300	2.79		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
0.5	80	0.0300	2.60		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
1.6	180	Total			

Subcatchment 11S: Basin 4



Summary for Subcatchment 16S: Basin 5

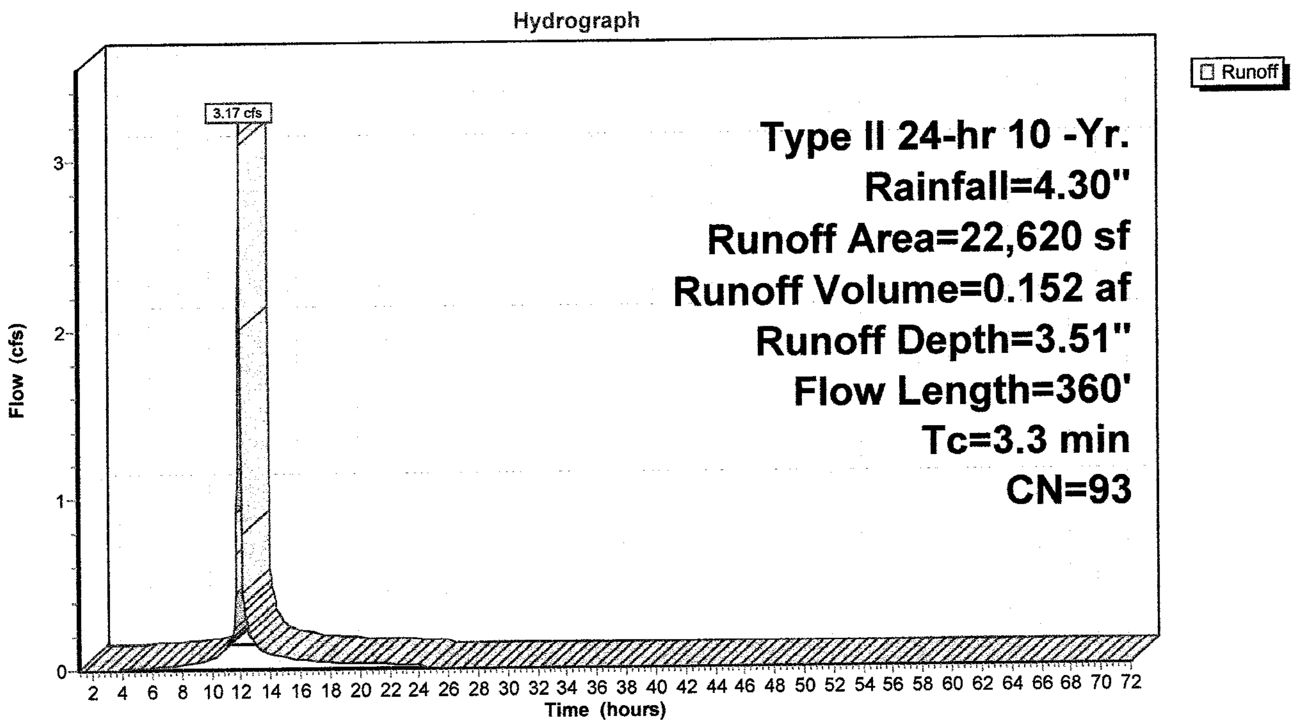
Runoff = 3.17 cfs @ 11.93 hrs, Volume= 0.152 af, Depth= 3.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 -Yr. Rainfall=4.30"

Area (sf)	CN	Description
2,460	98	Paved parking & roofs
13,330	98	Paved parking & roofs
1,120	98	Paved parking & roofs
5,710	80	>75% Grass cover, Good, HSG D
22,620	93	Weighted Average
5,710		Pervious Area
16,910		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
1.2	160	0.0180	2.16		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
1.0	150	0.0300	2.60		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
3.3	360	Total			

Subcatchment 16S: Basin 5



Summary for Subcatchment 17S: Site

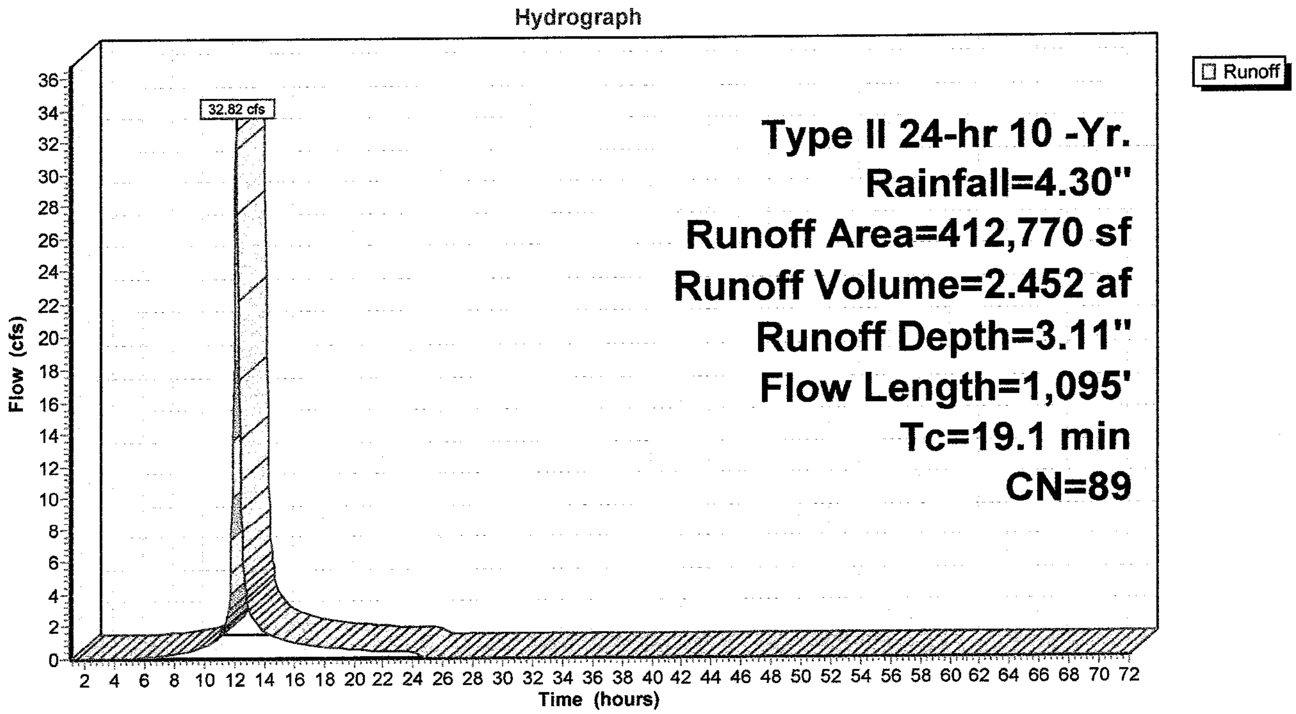
Runoff = 32.82 cfs @ 12.11 hrs, Volume= 2.452 af, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 -Yr. Rainfall=4.30"

Area (sf)	CN	Description
8,940	98	Paved parking & roofs
181,580	98	Paved parking & roofs
4,530	98	Paved parking & roofs
63,830	82	Woods/grass comb., Fair, HSG D
153,890	80	>75% Grass cover, Good, HSG D
412,770	89	Weighted Average
217,720		Pervious Area
195,050		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.04		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
0.2	30	0.0200	2.28		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
4.1	450	0.0150	1.84		**Shallow Concentrated Flow, Meadow** Grassed Waterway Kv= 15.0 fps
14.0	565	0.0020	0.67		**Shallow Concentrated Flow, Tracks** Grassed Waterway Kv= 15.0 fps
19.1	1,095	Total			

Subcatchment 17S: Site



Summary for Pond 2P: Grate

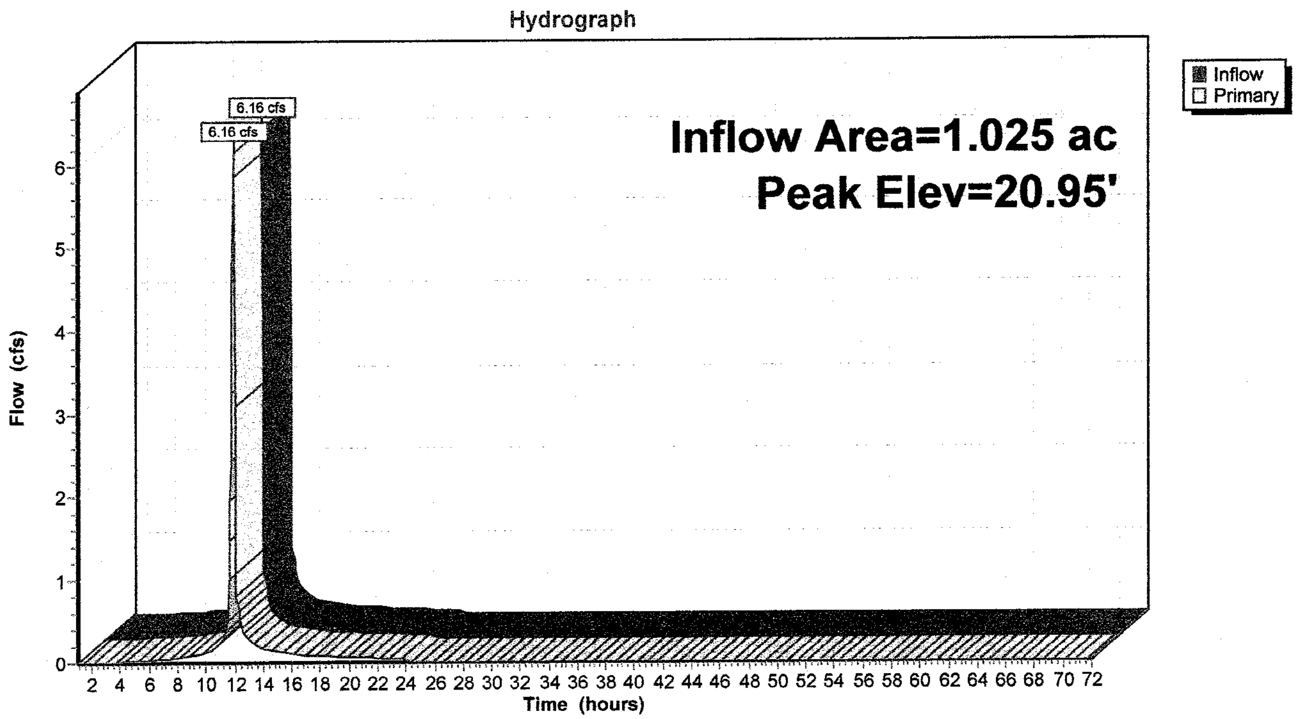
Inflow Area = 1.025 ac, 70.03% Impervious, Inflow Depth = 3.51" for 10 -Yr. event
Inflow = 6.16 cfs @ 11.92 hrs, Volume= 0.300 af
Outflow = 6.16 cfs @ 11.92 hrs, Volume= 0.300 af, Atten= 0%, Lag= 0.0 min
Primary = 6.16 cfs @ 11.92 hrs, Volume= 0.300 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 20.95' @ 11.92 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	20.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=5.97 cfs @ 11.92 hrs HW=20.94' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 5.97 cfs @ 2.17 fps)

Pond 2P: Grate



Summary for Pond 3P: CB 1

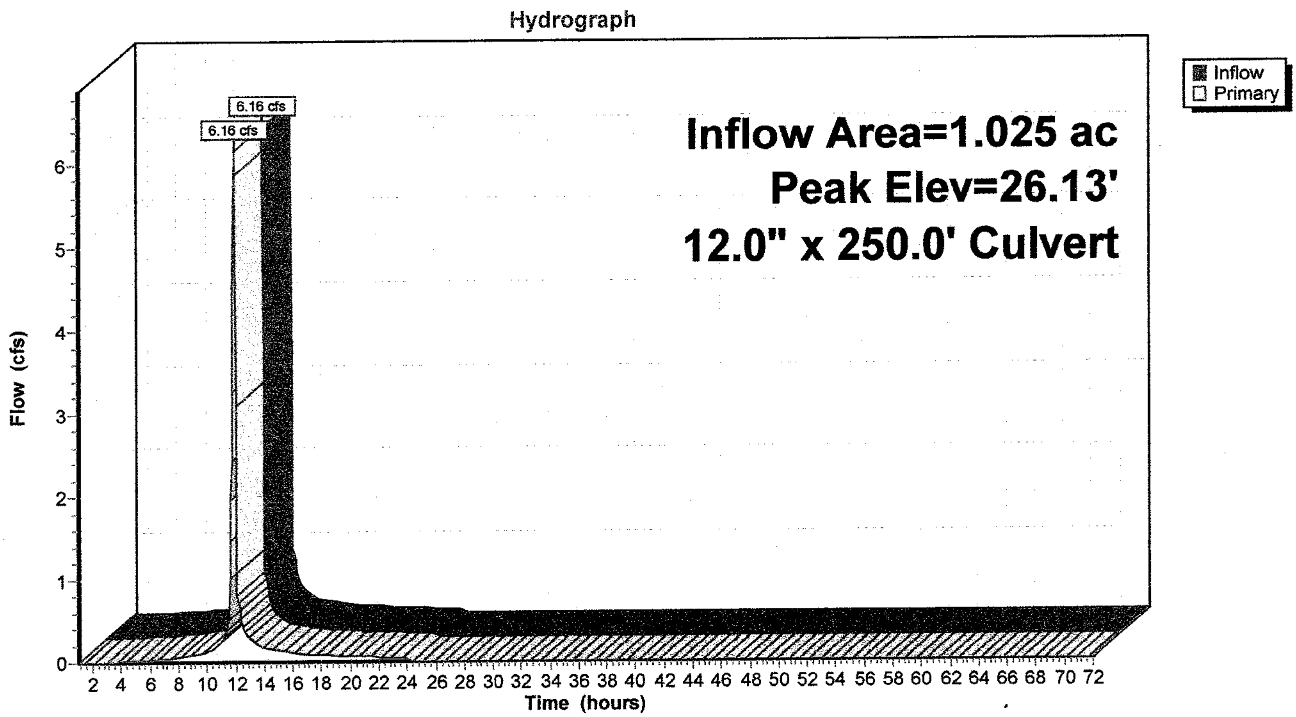
Inflow Area = 1.025 ac, 70.03% Impervious, Inflow Depth = 3.51" for 10 -Yr. event
Inflow = 6.16 cfs @ 11.92 hrs, Volume= 0.300 af
Outflow = 6.16 cfs @ 11.92 hrs, Volume= 0.300 af, Atten= 0%, Lag= 0.0 min
Primary = 6.16 cfs @ 11.92 hrs, Volume= 0.300 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 26.13' @ 11.92 hrs
Flood Elev= 20.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	15.43'	**12.0" x 250.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 14.28' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=5.97 cfs @ 11.92 hrs HW=25.81' TW=20.30' (Fixed TW Elev= 20.30')
1=Culvert (Outlet Controls 5.97 cfs @ 7.60 fps)

Pond 3P: CB 1



Summary for Pond 5P: Grate

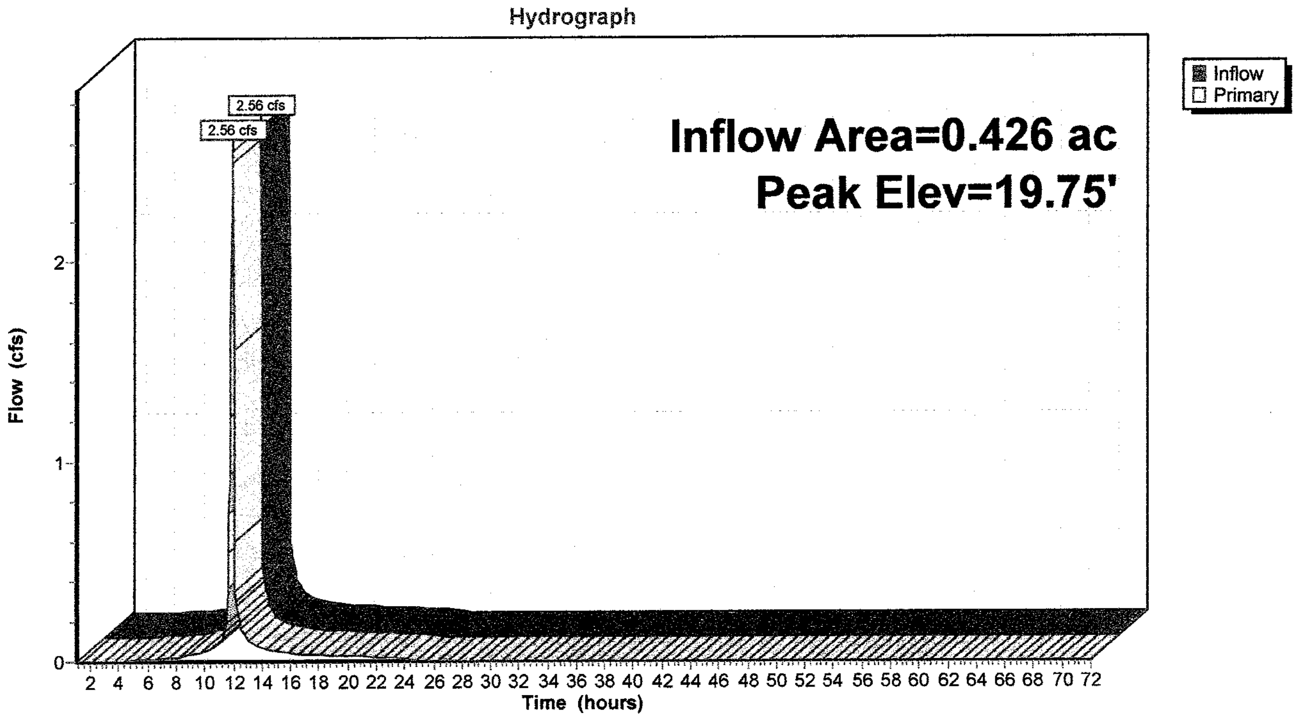
Inflow Area =	0.426 ac, 65.18% Impervious, Inflow Depth = 3.41"	for 10 -Yr. event
Inflow =	2.56 cfs @ 11.93 hrs, Volume=	0.121 af
Outflow =	2.56 cfs @ 11.93 hrs, Volume=	0.121 af, Atten= 0%, Lag= 0.0 min
Primary =	2.56 cfs @ 11.93 hrs, Volume=	0.121 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 19.75' @ 11.93 hrs
Flood Elev= 20.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	19.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=2.43 cfs @ 11.93 hrs HW=19.74' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 2.43 cfs @ 1.61 fps)

Pond 5P: Grate



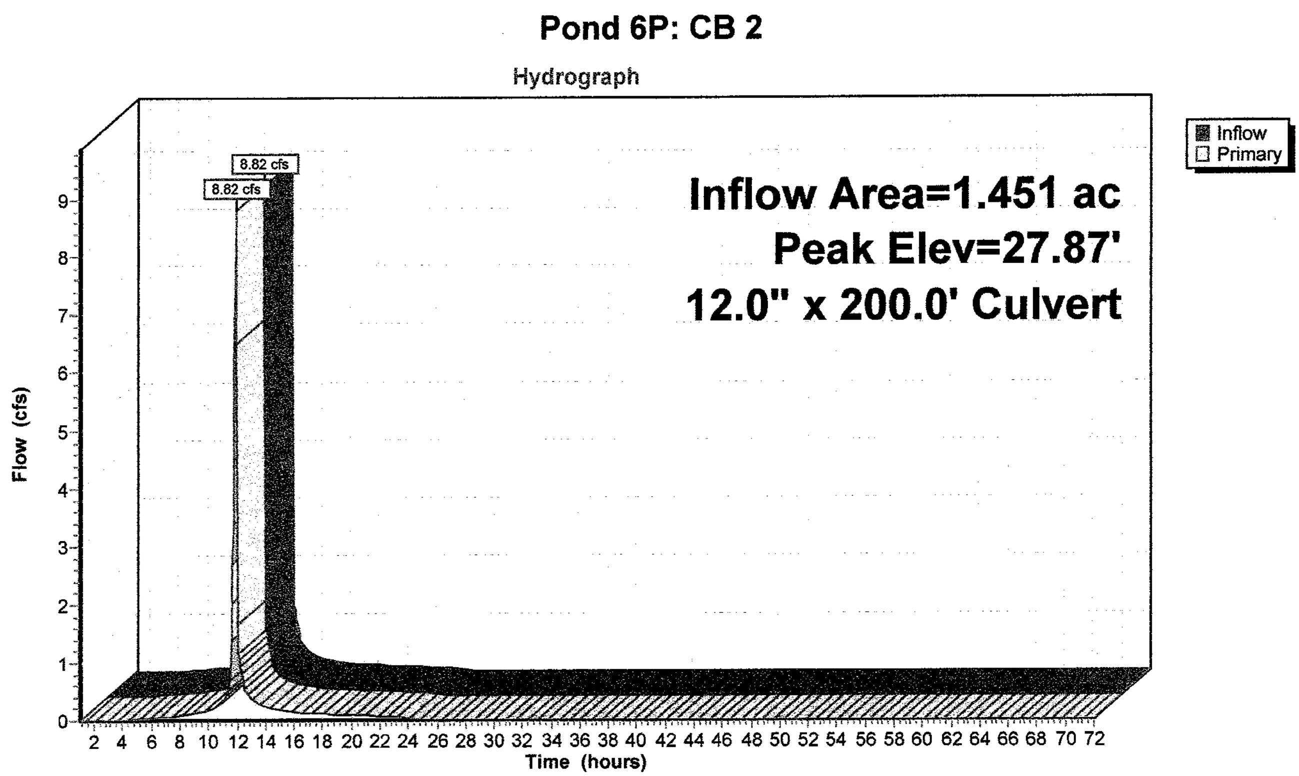
Summary for Pond 6P: CB 2

Inflow Area =	1.451 ac,	68.61% Impervious,	Inflow Depth = 3.48"	for 10 -Yr. event	
Inflow =	8.82 cfs @	11.93 hrs,	Volume=	0.421 af	
Outflow =	8.82 cfs @	11.93 hrs,	Volume=	0.421 af,	Atten= 0%, Lag= 0.0 min
Primary =	8.82 cfs @	11.93 hrs,	Volume=	0.421 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 27.87' @ 11.93 hrs
Flood Elev= 19.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.58'	**12.0" x 200.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.67' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=8.36 cfs @ 11.93 hrs HW=27.07' TW=17.90' (Fixed TW Elev= 17.90')
1=Culvert (Outlet Controls 8.36 cfs @ 10.64 fps)



Summary for Pond 9P: Grate

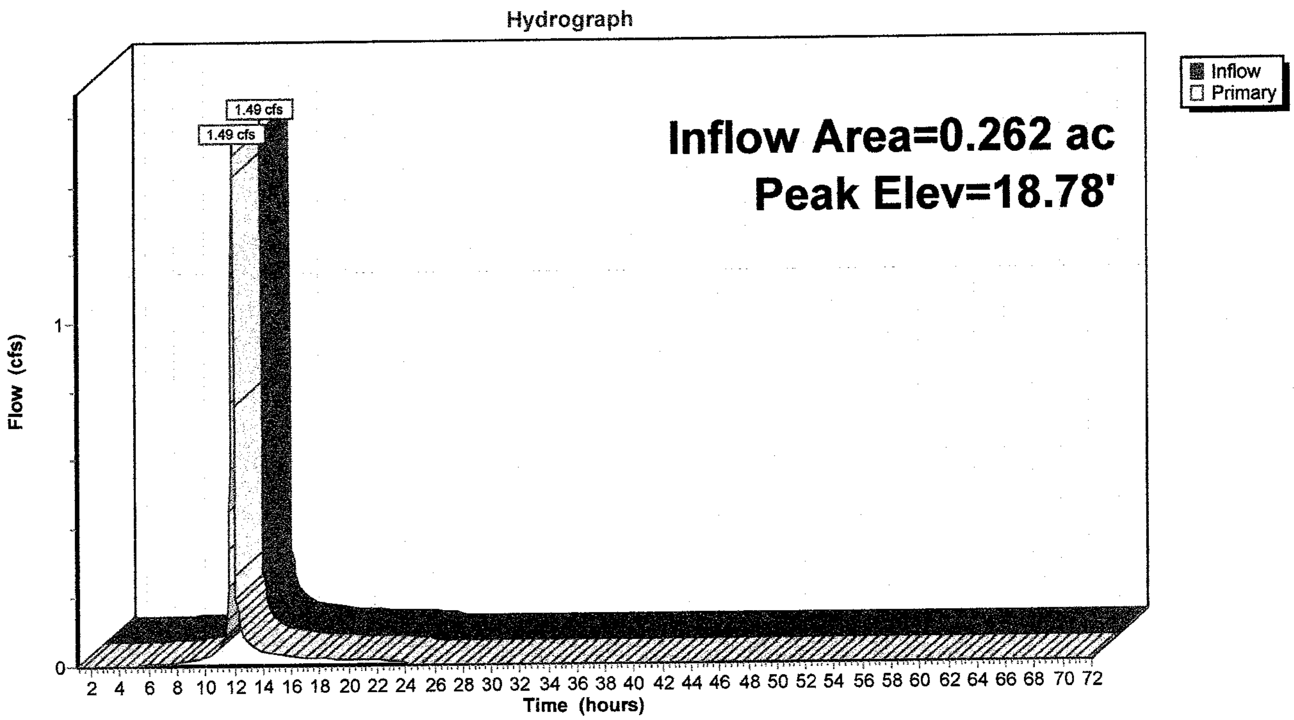
Inflow Area =	0.262 ac, 55.68% Impervious, Inflow Depth = 3.20"	for 10 -Yr. event	
Inflow =	1.49 cfs @ 11.92 hrs, Volume=	0.070 af	
Outflow =	1.49 cfs @ 11.92 hrs, Volume=	0.070 af, Atten= 0%, Lag= 0.0 min	
Primary =	1.49 cfs @ 11.92 hrs, Volume=	0.070 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.78' @ 11.92 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**12.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=1.44 cfs @ 11.92 hrs HW=18.77' (Free Discharge)
↑1=Orifice/Grate (Weir Controls 1.44 cfs @ 1.70 fps)

Pond 9P: Grate



Summary for Pond 10P: CB 3

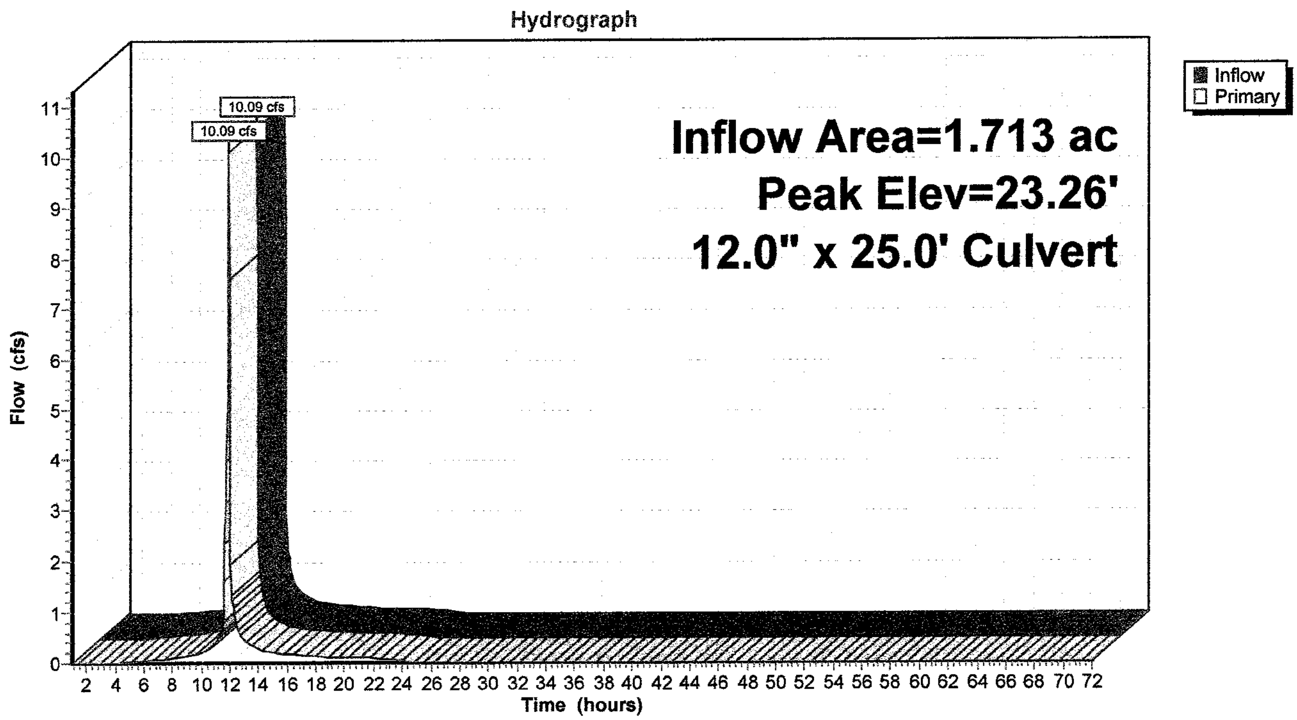
Inflow Area = 1.713 ac, 66.63% Impervious, Inflow Depth = 3.44" for 10 -Yr. event
Inflow = 10.09 cfs @ 11.92 hrs, Volume= 0.491 af
Outflow = 10.09 cfs @ 11.92 hrs, Volume= 0.491 af, Atten= 0%, Lag= 0.0 min
Primary = 10.09 cfs @ 11.92 hrs, Volume= 0.491 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 23.26' @ 11.92 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.67'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.60' S= 0.0028 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=9.79 cfs @ 11.92 hrs HW=22.91' TW=16.20' (Fixed TW Elev= 16.20')
1=Culvert (Inlet Controls 9.79 cfs @ 12.47 fps)

Pond 10P: CB 3



Summary for Pond 12P: Grate

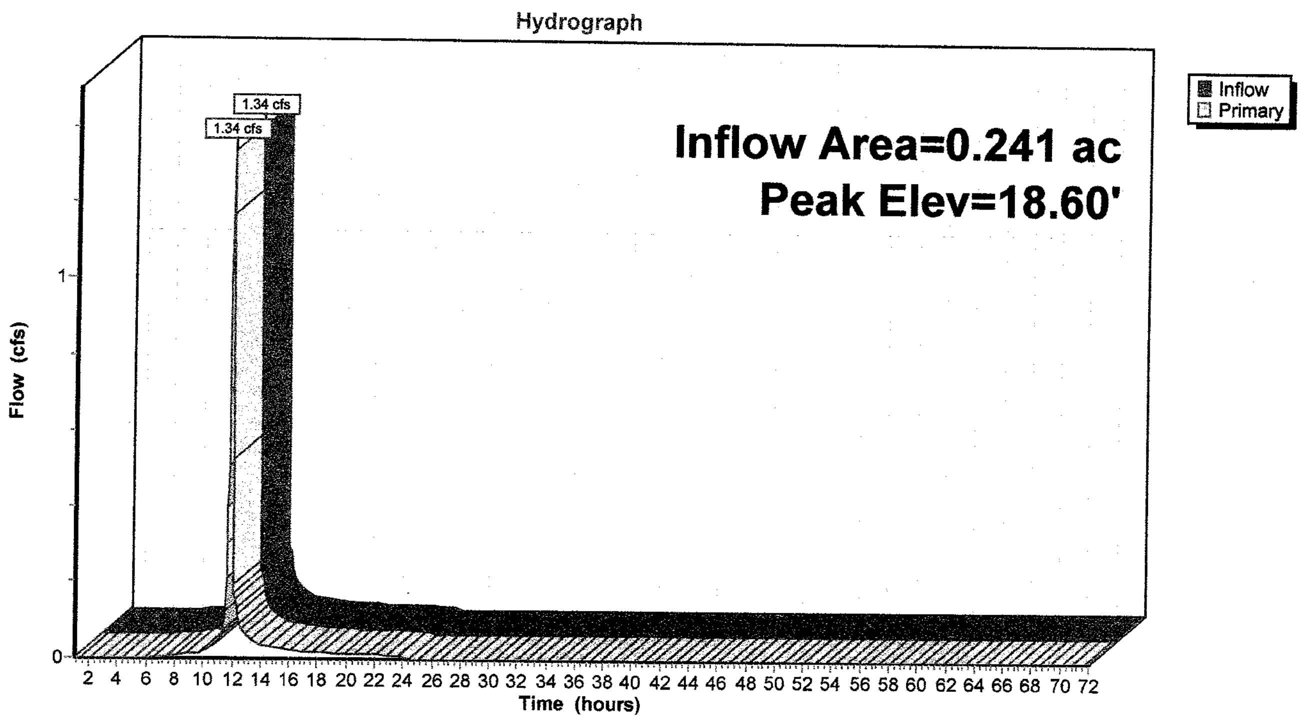
Inflow Area = 0.241 ac, 44.24% Impervious, Inflow Depth = 3.01" for 10 -Yr. event
Inflow = 1.34 cfs @ 11.91 hrs, Volume= 0.060 af
Outflow = 1.34 cfs @ 11.91 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min
Primary = 1.34 cfs @ 11.91 hrs, Volume= 0.060 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.60' @ 11.91 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**24.0" Horiz. Orifice/Grate X 2.00** Limited to weir flow C= 0.600

Primary OutFlow Max=1.31 cfs @ 11.91 hrs HW=18.60' (Free Discharge)
└—**1=Orifice/Grate** (Weir Controls 1.31 cfs @ 1.04 fps)

Pond 12P: Grate



Summary for Pond 13P: CB 4

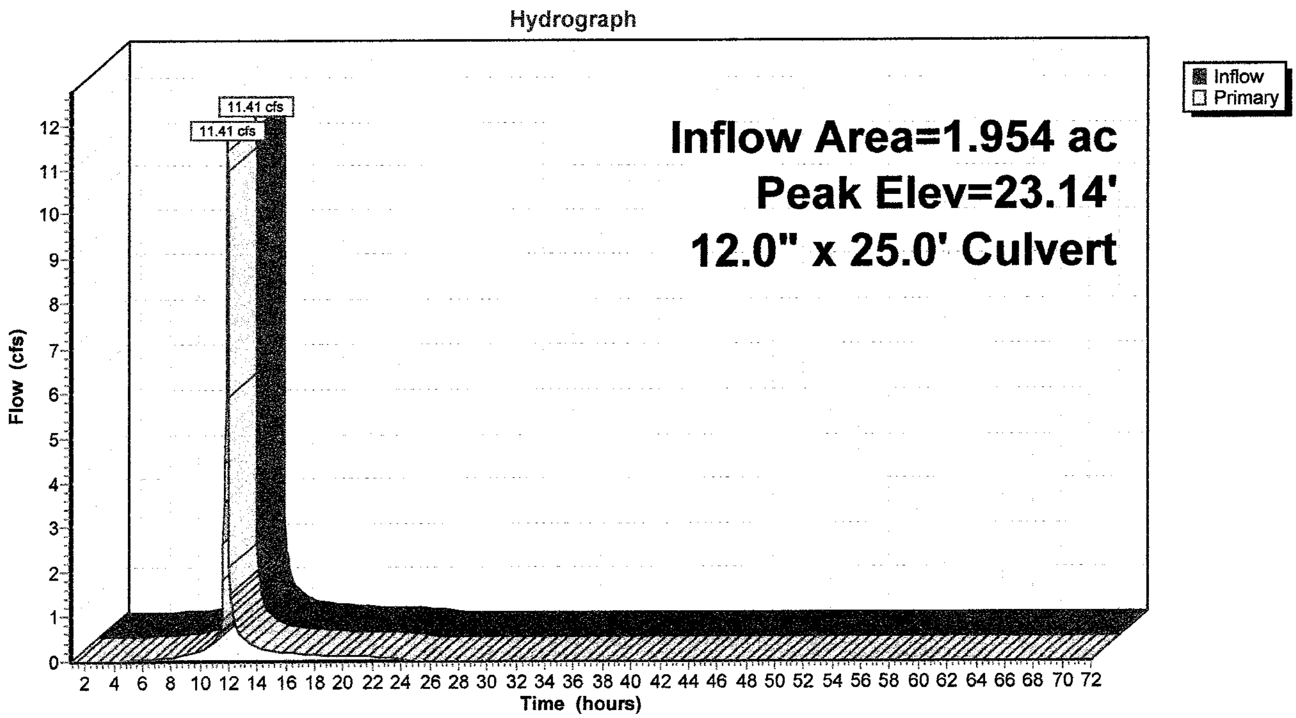
Inflow Area =	1.954 ac,	63.86% Impervious,	Inflow Depth = 3.39"	for 10 -Yr. event	
Inflow =	11.41 cfs @	11.92 hrs,	Volume=	0.551 af	
Outflow =	11.41 cfs @	11.92 hrs,	Volume=	0.551 af,	Atten= 0%, Lag= 0.0 min
Primary =	11.41 cfs @	11.92 hrs,	Volume=	0.551 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 23.14' @ 11.92 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.60'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.40' S= 0.0080 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=11.06 cfs @ 11.92 hrs HW=22.65' (Free Discharge)
1=Culvert (Inlet Controls 11.06 cfs @ 14.08 fps)

Pond 13P: CB 4



Summary for Pond 14P: CB 7

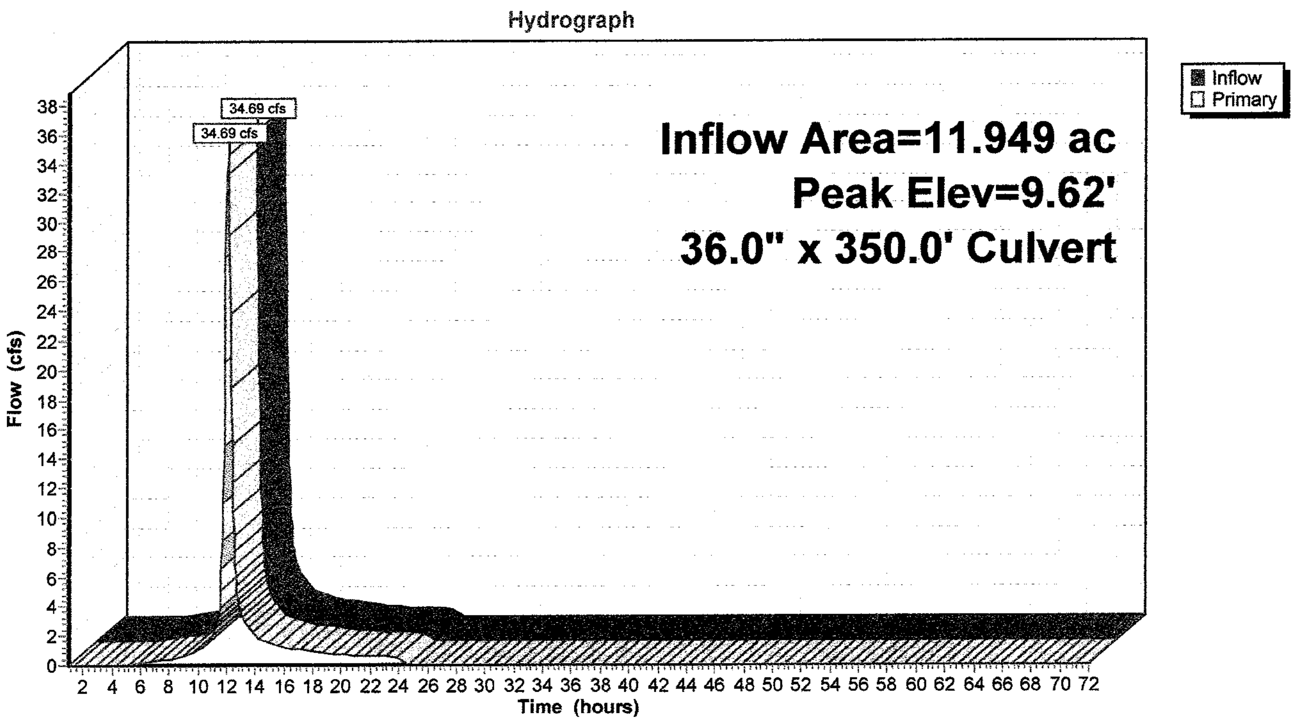
Inflow Area = 11.949 ac, 51.17% Impervious, Inflow Depth = 3.17" for 10 -Yr. event
Inflow = 34.69 cfs @ 12.10 hrs, Volume= 3.156 af
Outflow = 34.69 cfs @ 12.10 hrs, Volume= 3.156 af, Atten= 0%, Lag= 0.0 min
Primary = 34.69 cfs @ 12.10 hrs, Volume= 3.156 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 9.62' @ 12.10 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	6.30'	**36.0" x 350.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 5.37' S= 0.0027 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=34.57 cfs @ 12.10 hrs HW=9.61' TW=8.35' (Fixed TW Elev= 8.35')
↑—**1=Culvert** (Outlet Controls 34.57 cfs @ 5.53 fps)

Pond 14P: CB 7



Summary for Pond 15P: CB 8

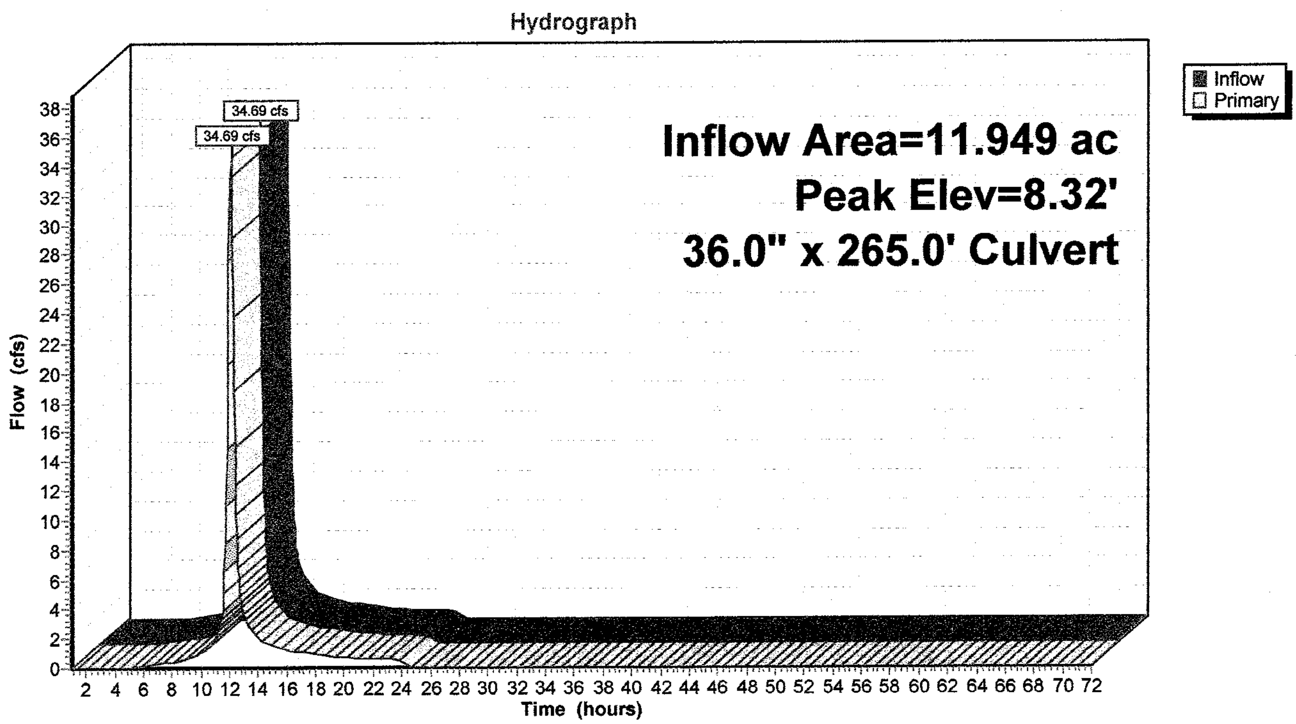
Inflow Area = 11.949 ac, 51.17% Impervious, Inflow Depth = 3.17" for 10 -Yr. event
Inflow = 34.69 cfs @ 12.10 hrs, Volume= 3.156 af
Outflow = 34.69 cfs @ 12.10 hrs, Volume= 3.156 af, Atten= 0%, Lag= 0.0 min
Primary = 34.69 cfs @ 12.10 hrs, Volume= 3.156 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 8.32' @ 12.10 hrs
Flood Elev= 22.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5.37'	**36.0" x 265.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 4.68' S= 0.0026 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=34.57 cfs @ 12.10 hrs HW=8.31' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 34.57 cfs @ 6.20 fps)

Pond 15P: CB 8



Summary for Pond 18P: Grate

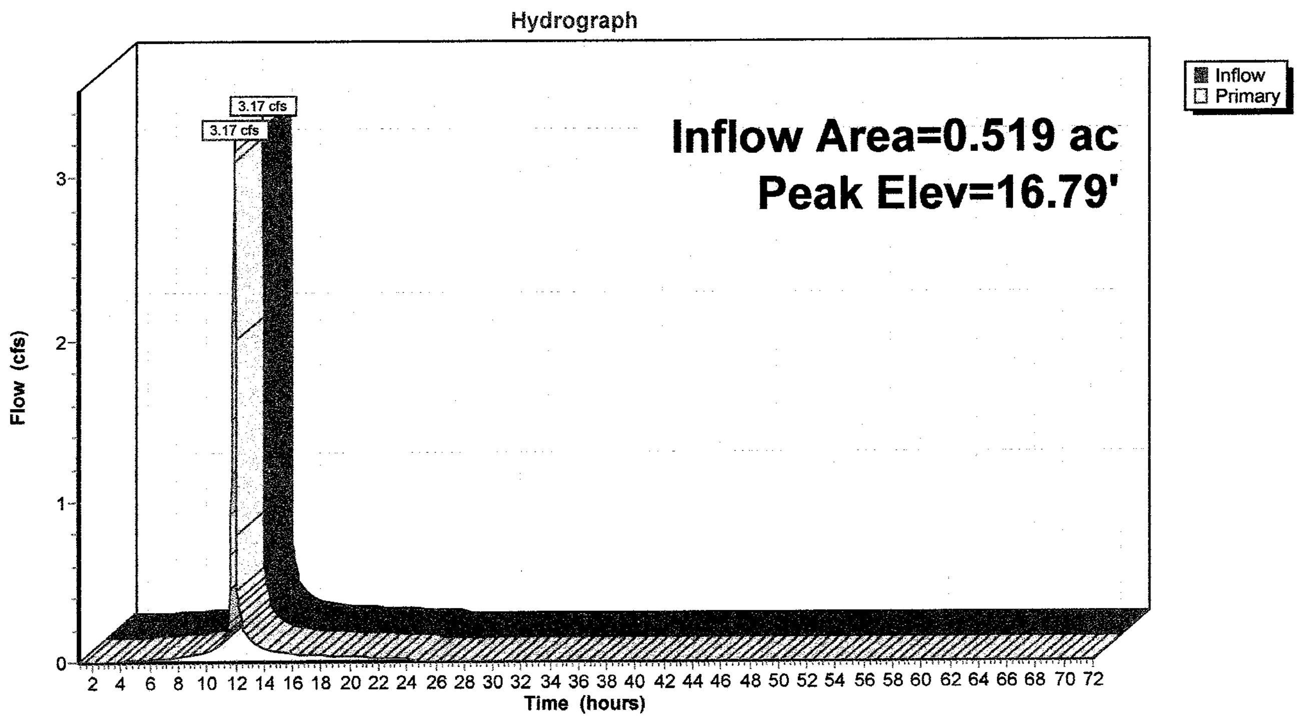
Inflow Area =	0.519 ac, 74.76% Impervious,	Inflow Depth = 3.51"	for 10 -Yr. event
Inflow =	3.17 cfs @ 11.93 hrs,	Volume=	0.152 af
Outflow =	3.17 cfs @ 11.93 hrs,	Volume=	0.152 af, Atten= 0%, Lag= 0.0 min
Primary =	3.17 cfs @ 11.93 hrs,	Volume=	0.152 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 16.79' @ 11.93 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	16.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=3.02 cfs @ 11.93 hrs HW=16.78' (Free Discharge)
1=Orifice/Grate (Weir Controls 3.02 cfs @ 1.73 fps)

Pond 18P: Grate



Summary for Pond 19P: Grate

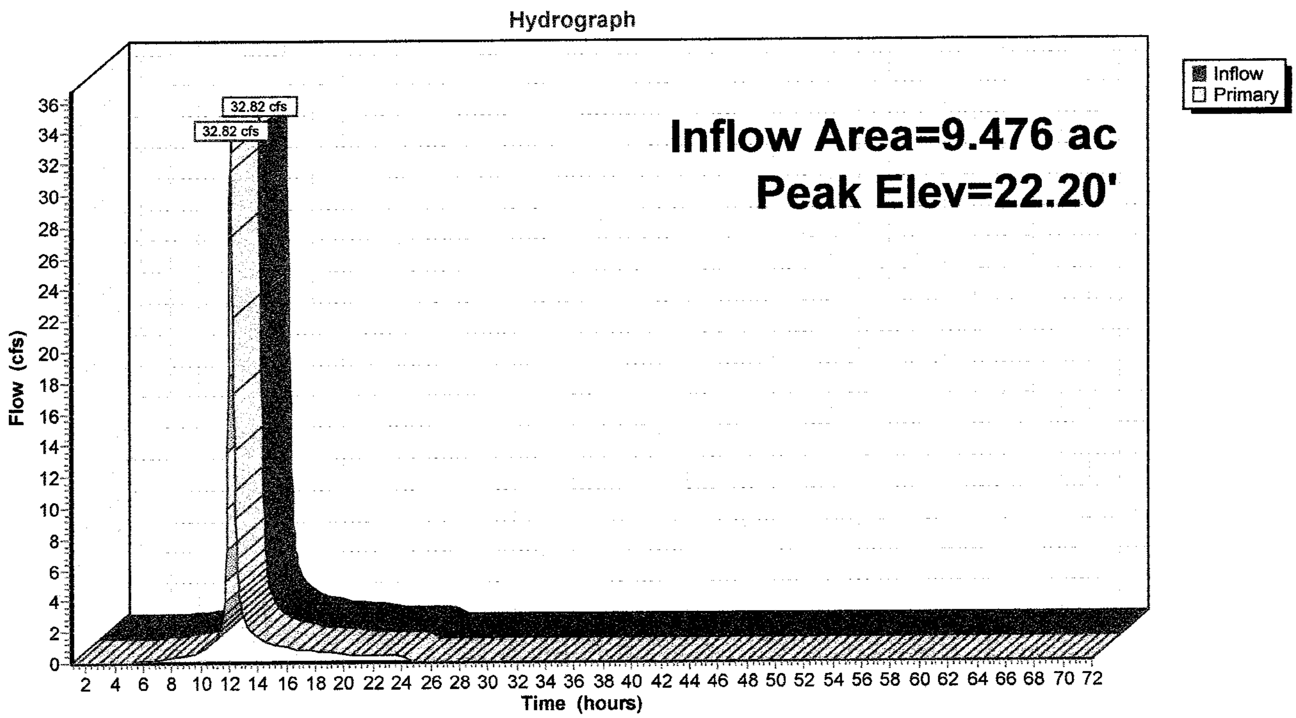
Inflow Area = 9.476 ac, 47.25% Impervious, Inflow Depth = 3.11" for 10 -Yr. event
Inflow = 32.82 cfs @ 12.11 hrs, Volume= 2.452 af
Outflow = 32.82 cfs @ 12.11 hrs, Volume= 2.452 af, Atten= 0%, Lag= 0.0 min
Primary = 32.82 cfs @ 12.11 hrs, Volume= 2.452 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.20' @ 12.11 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	17.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=32.49 cfs @ 12.11 hrs HW=22.11' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 32.49 cfs @ 10.34 fps)

Pond 19P: Grate



Summary for Pond 20P: CB 5

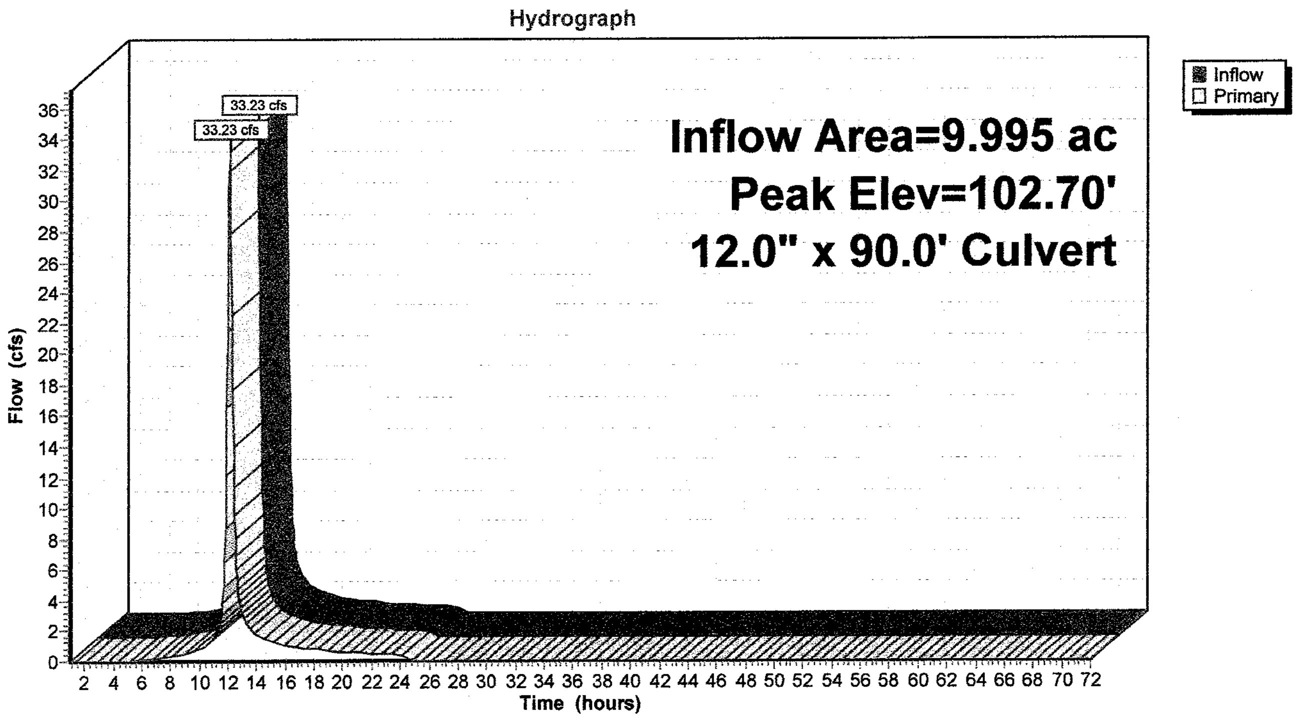
Inflow Area = 9.995 ac, 48.68% Impervious, Inflow Depth = 3.13" for 10 -Yr. event
Inflow = 33.23 cfs @ 12.11 hrs, Volume= 2.604 af
Outflow = 33.23 cfs @ 12.11 hrs, Volume= 2.604 af, Atten= 0%, Lag= 0.0 min
Primary = 33.23 cfs @ 12.11 hrs, Volume= 2.604 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 102.70' @ 12.11 hrs
Flood Elev= 16.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.80'	**12.0" x 90.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.57' S= 0.0026 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=32.96 cfs @ 12.11 hrs HW=101.33' (Free Discharge)
└─**1=Culvert** (Barrel Controls 32.96 cfs @ 41.97 fps)

Pond 20P: CB 5



Summary for Pond 21P: CB 6

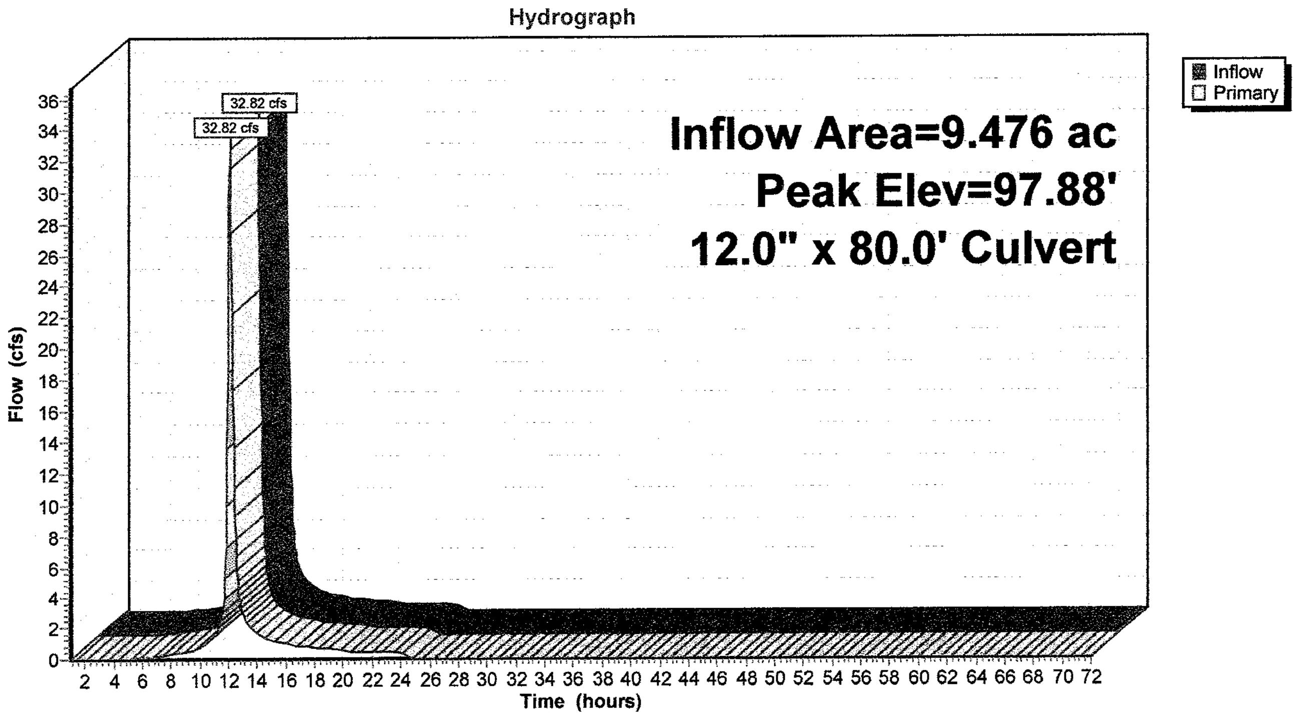
Inflow Area = 9.476 ac, 47.25% Impervious, Inflow Depth = 3.11" for 10 -Yr. event
Inflow = 32.82 cfs @ 12.11 hrs, Volume= 2.452 af
Outflow = 32.82 cfs @ 12.11 hrs, Volume= 2.452 af, Atten= 0%, Lag= 0.0 min
Primary = 32.82 cfs @ 12.11 hrs, Volume= 2.452 af

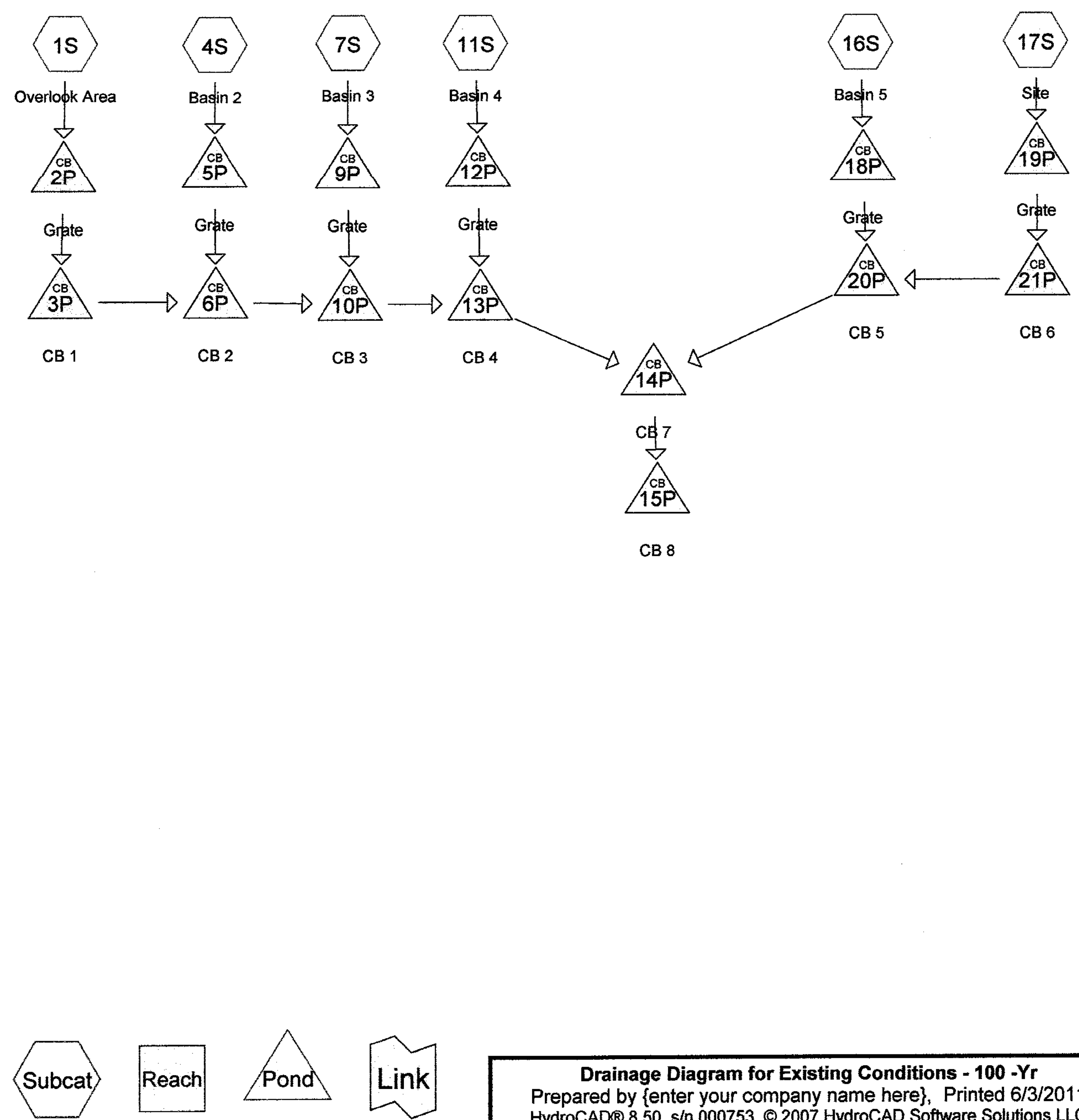
Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 97.88' @ 12.11 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.80' S= 0.0025 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=32.49 cfs @ 12.11 hrs HW=96.30' TW=16.97' (Fixed TW Elev= 16.97')
1=Culvert (Outlet Controls 32.49 cfs @ 41.36 fps)

Pond 21P: CB 6





Drainage Diagram for Existing Conditions - 100 -Yr
Prepared by {enter your company name here}, Printed 6/3/2011
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Summary for Subcatchment 1S: Overlook Area

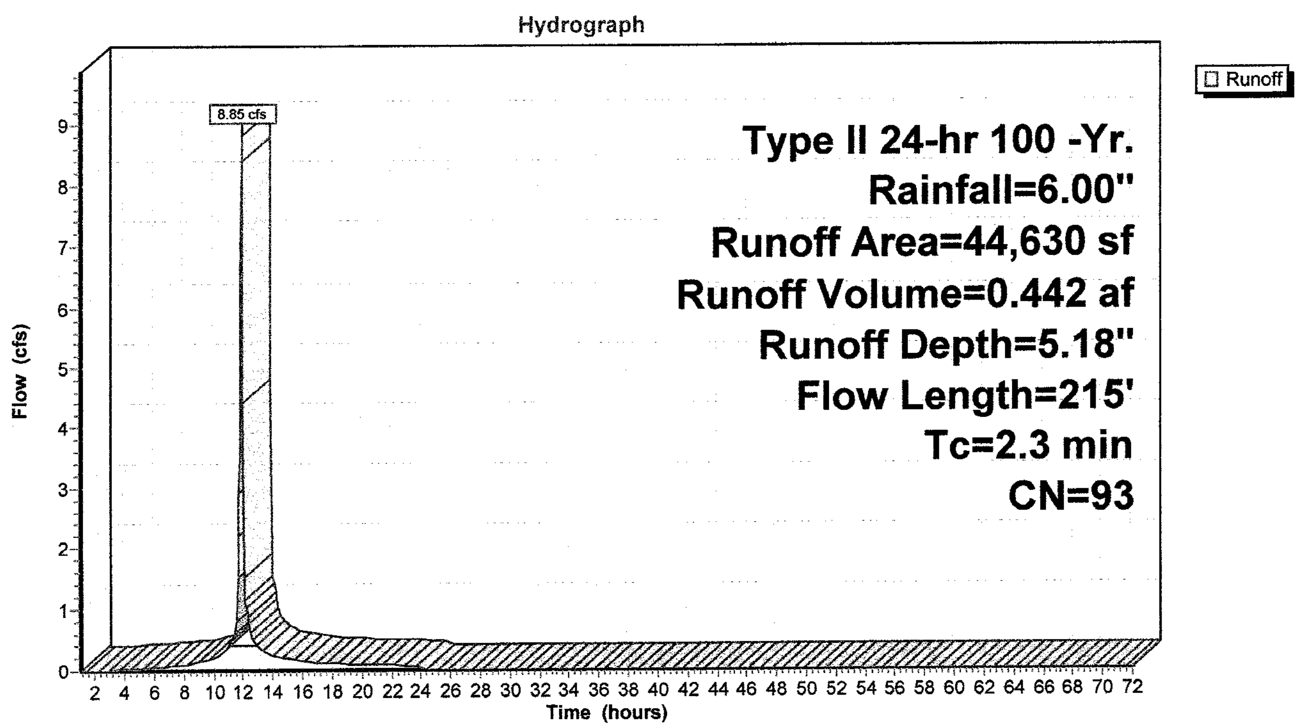
Runoff = 8.85 cfs @ 11.92 hrs, Volume= 0.442 af, Depth= 5.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 -Yr. Rainfall=6.00"

Area (sf)	CN	Description
3,840	98	Paved parking & roofs
25,815	98	Paved parking & roofs
1,600	98	Paved parking & roofs
13,375	80	>75% Grass cover, Good, HSG D
44,630	93	Weighted Average
13,375		Pervious Area
31,255		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Upper Basin** Smooth surfaces n= 0.011 P2= 2.40"
1.0	120	0.0150	1.97		**Shallow Concentrated Flow, Crushed Stone Surface** Unpaved Kv= 16.1 fps
0.2	45	0.0550	3.52		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
2.3	215	Total			

Subcatchment 1S: Overlook Area



Summary for Subcatchment 4S: Basin 2

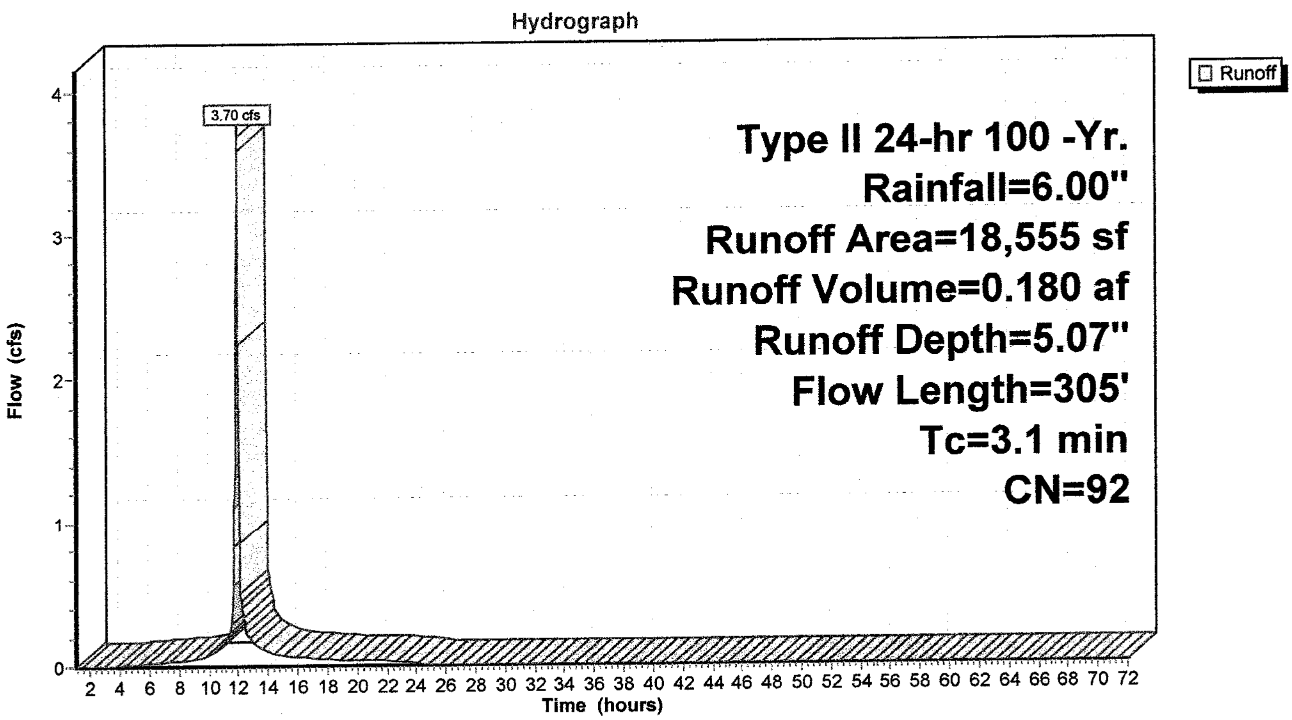
Runoff = 3.70 cfs @ 11.93 hrs, Volume= 0.180 af, Depth= 5.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 -Yr. Rainfall=6.00"

Area (sf)	CN	Description
1,800	98	Paved parking & roofs
8,795	98	Paved parking & roofs
1,500	98	Paved parking & roofs
6,460	80	>75% Grass cover, Good, HSG D
18,555	92	Weighted Average
6,460		Pervious Area
12,095		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
1.2	120	0.0100	1.61		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
0.2	50	0.0500	3.35		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
0.6	85	0.0250	2.37		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
3.1	305	Total			

Subcatchment 4S: Basin 2



Summary for Subcatchment 7S: Basin 3

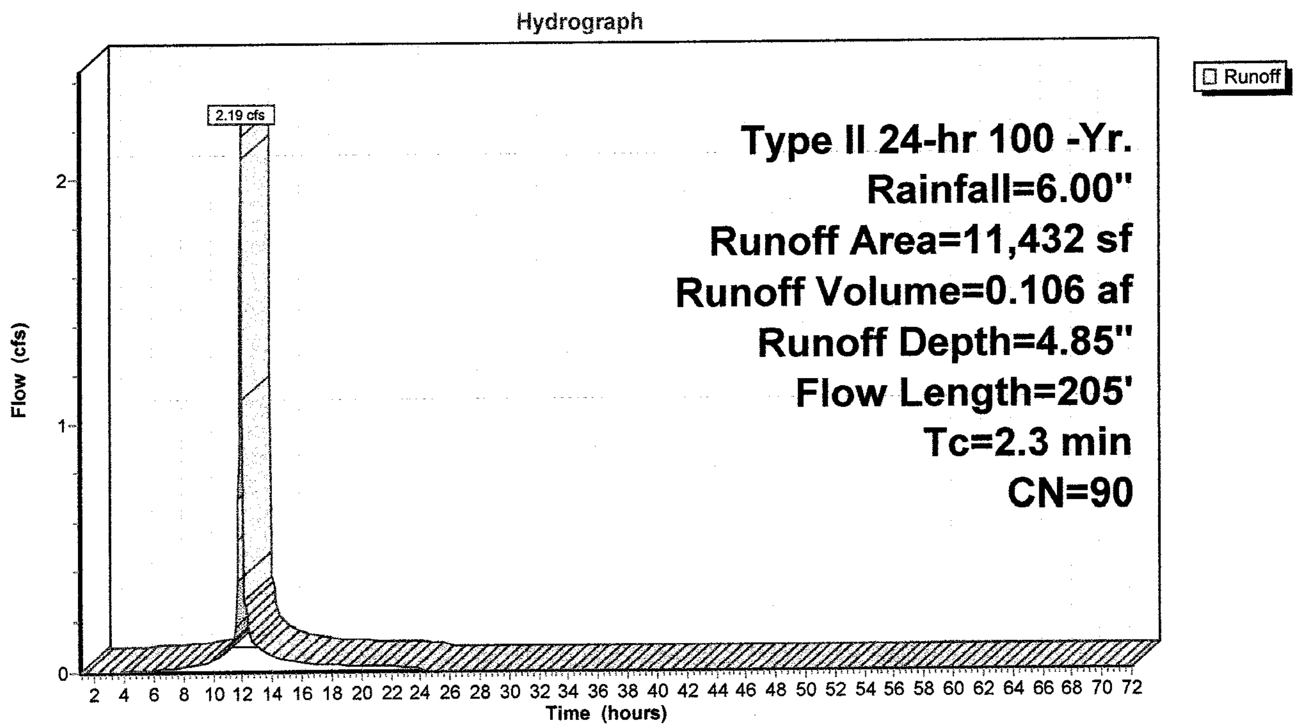
Runoff = 2.19 cfs @ 11.92 hrs, Volume= 0.106 af, Depth= 4.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 -Yr. Rainfall=6.00"

Area (sf)	CN	Description
1,380	98	Paved parking & roofs
4,525	98	Paved parking & roofs
460	98	Paved parking & roofs
5,067	80	>75% Grass cover, Good, HSG D
11,432	90	Weighted Average
5,067		Pervious Area
6,365		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Basin 3** Smooth surfaces n= 0.011 P2= 2.40"
0.4	80	0.0550	3.52		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
0.8	75	0.0100	1.50		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
2.3	205	Total			

Subcatchment 7S: Basin 3



Summary for Subcatchment 11S: Basin 4

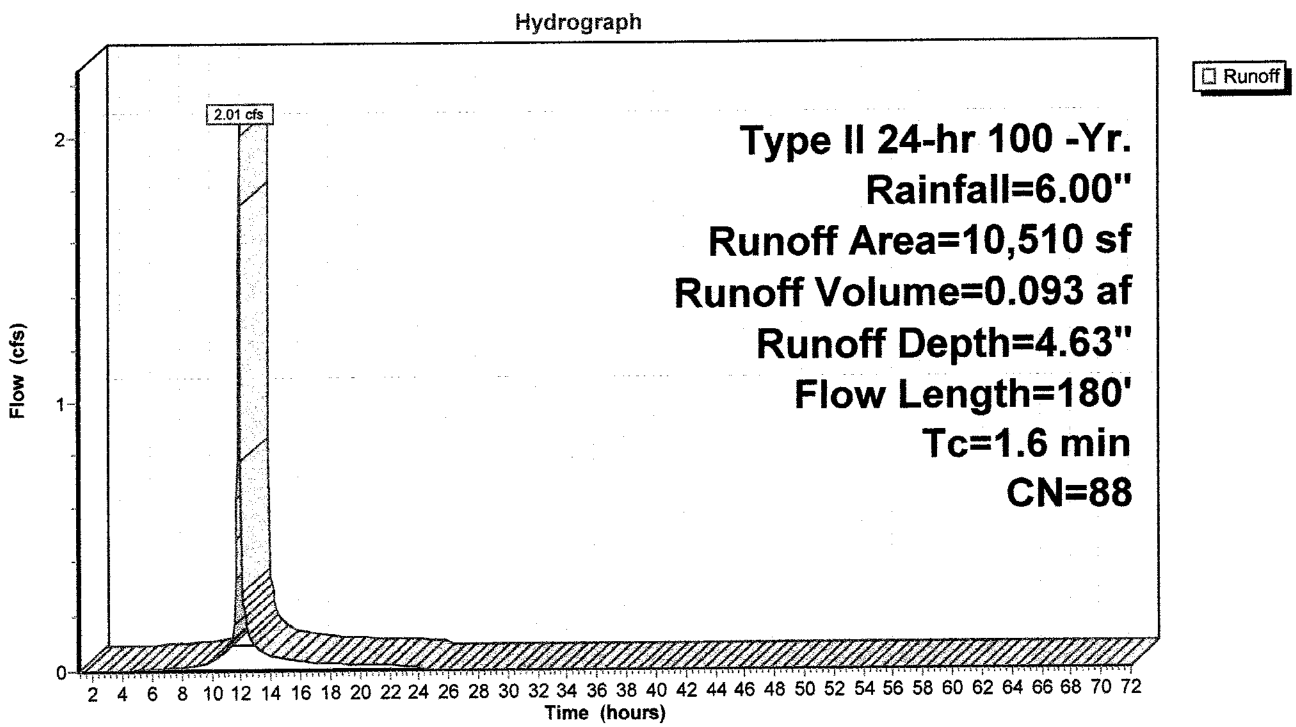
Runoff = 2.01 cfs @ 11.91 hrs, Volume= 0.093 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 -Yr. Rainfall=6.00"

Area (sf)	CN	Description
1,560	98	Paved parking & roofs
2,340	98	Paved parking & roofs
750	98	Paved parking & roofs
5,860	80	>75% Grass cover, Good, HSG D
10,510	88	Weighted Average
5,860		Pervious Area
4,650		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.04		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
0.3	50	0.0300	2.79		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
0.5	80	0.0300	2.60		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
1.6	180	Total			

Subcatchment 11S: Basin 4



Summary for Subcatchment 16S: Basin 5

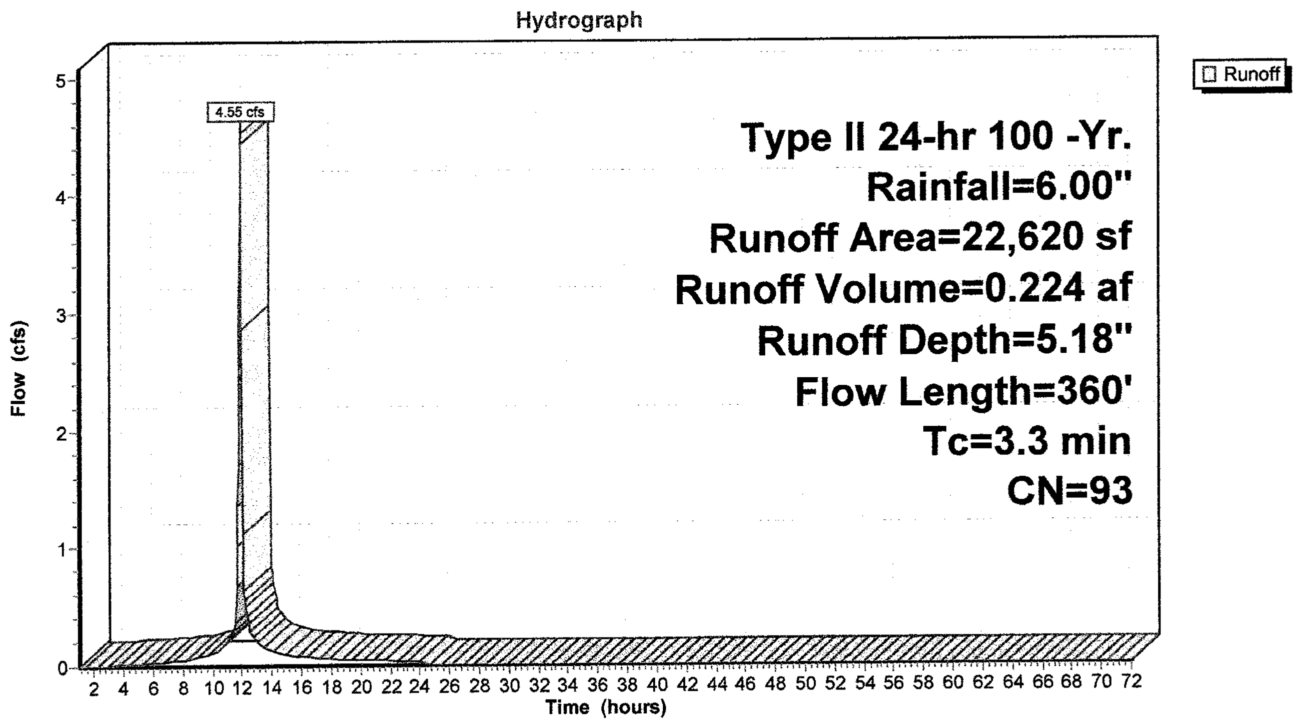
Runoff = 4.55 cfs @ 11.93 hrs, Volume= 0.224 af, Depth= 5.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 -Yr. Rainfall=6.00"

Area (sf)	CN	Description
2,460	98	Paved parking & roofs
13,330	98	Paved parking & roofs
1,120	98	Paved parking & roofs
5,710	80	>75% Grass cover, Good, HSG D
22,620	93	Weighted Average
5,710		Pervious Area
16,910		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	50	0.0100	0.79		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
1.2	160	0.0180	2.16		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
1.0	150	0.0300	2.60		**Shallow Concentrated Flow, Outer Slope** Grassed Waterway Kv= 15.0 fps
3.3	360	Total			

Subcatchment 16S: Basin 5



Summary for Subcatchment 17S: Site

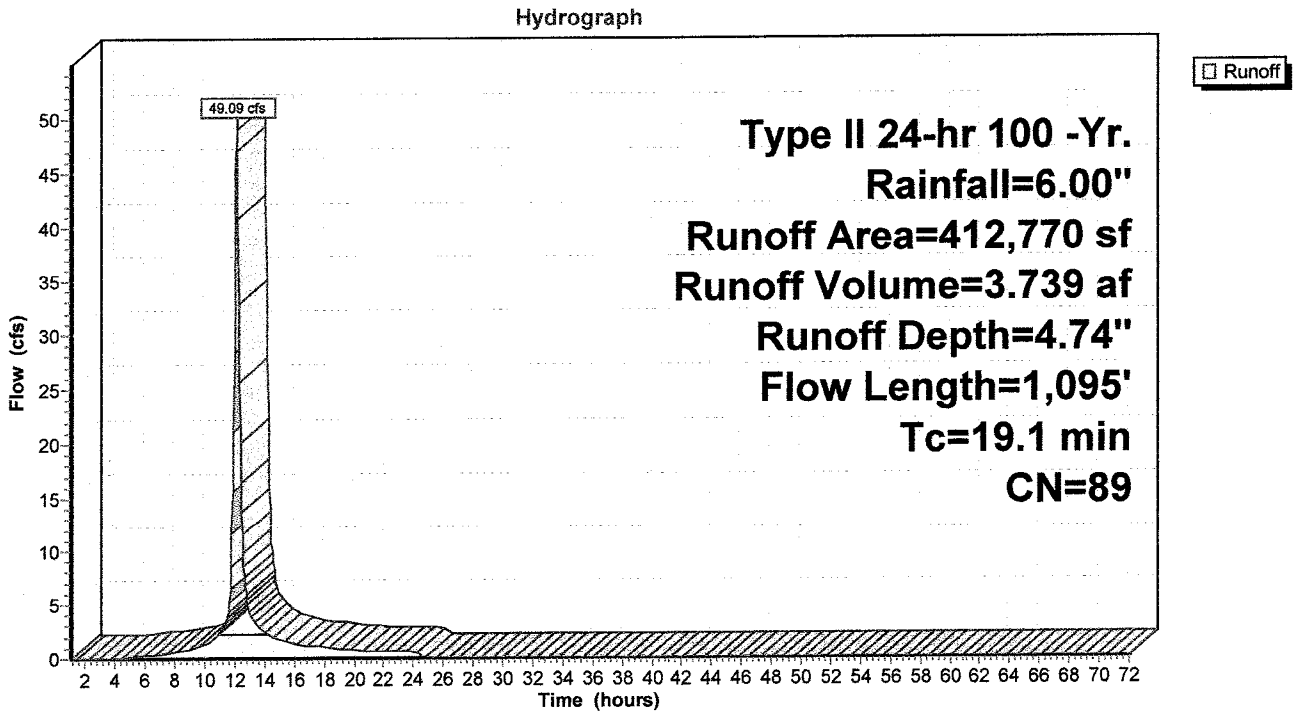
Runoff = 49.09 cfs @ 12.11 hrs, Volume= 3.739 af, Depth= 4.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 -Yr. Rainfall=6.00"

Area (sf)	CN	Description
8,940	98	Paved parking & roofs
181,580	98	Paved parking & roofs
4,530	98	Paved parking & roofs
63,830	82	Woods/grass comb., Fair, HSG D
153,890	80	>75% Grass cover, Good, HSG D
412,770	89	Weighted Average
217,720		Pervious Area
195,050		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.04		**Sheet Flow, Crushed Stone** Smooth surfaces n= 0.011 P2= 2.40"
0.2	30	0.0200	2.28		**Shallow Concentrated Flow, Crushed Stone** Unpaved Kv= 16.1 fps
4.1	450	0.0150	1.84		**Shallow Concentrated Flow, Meadow** Grassed Waterway Kv= 15.0 fps
14.0	565	0.0020	0.67		**Shallow Concentrated Flow, Tracks** Grassed Waterway Kv= 15.0 fps
19.1	1,095	Total			

Subcatchment 17S: Site



Summary for Pond 2P: Grate

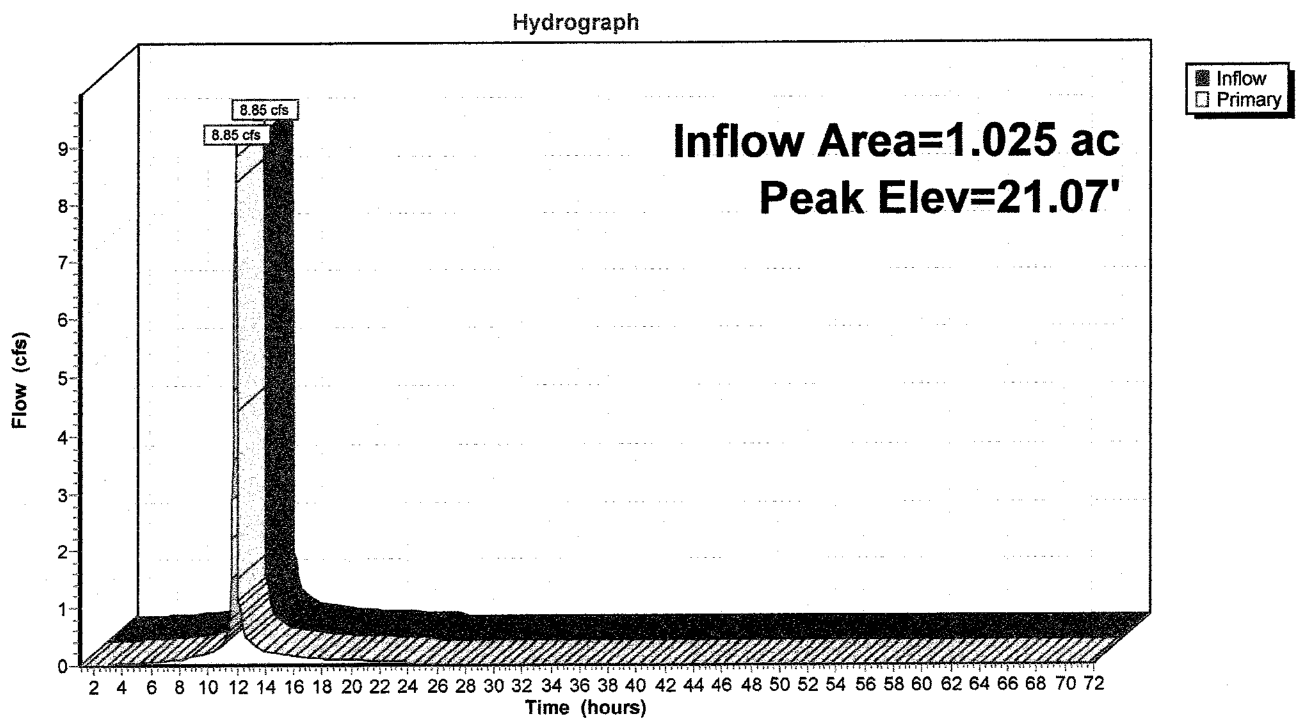
Inflow Area = 1.025 ac, 70.03% Impervious, Inflow Depth = 5.18" for 100 -Yr. event
Inflow = 8.85 cfs @ 11.92 hrs, Volume= 0.442 af
Outflow = 8.85 cfs @ 11.92 hrs, Volume= 0.442 af, Atten= 0%, Lag= 0.0 min
Primary = 8.85 cfs @ 11.92 hrs, Volume= 0.442 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 21.07' @ 11.92 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	20.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=8.58 cfs @ 11.92 hrs HW=21.06' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 8.58 cfs @ 2.44 fps)

Pond 2P: Grate



Summary for Pond 3P: CB 1

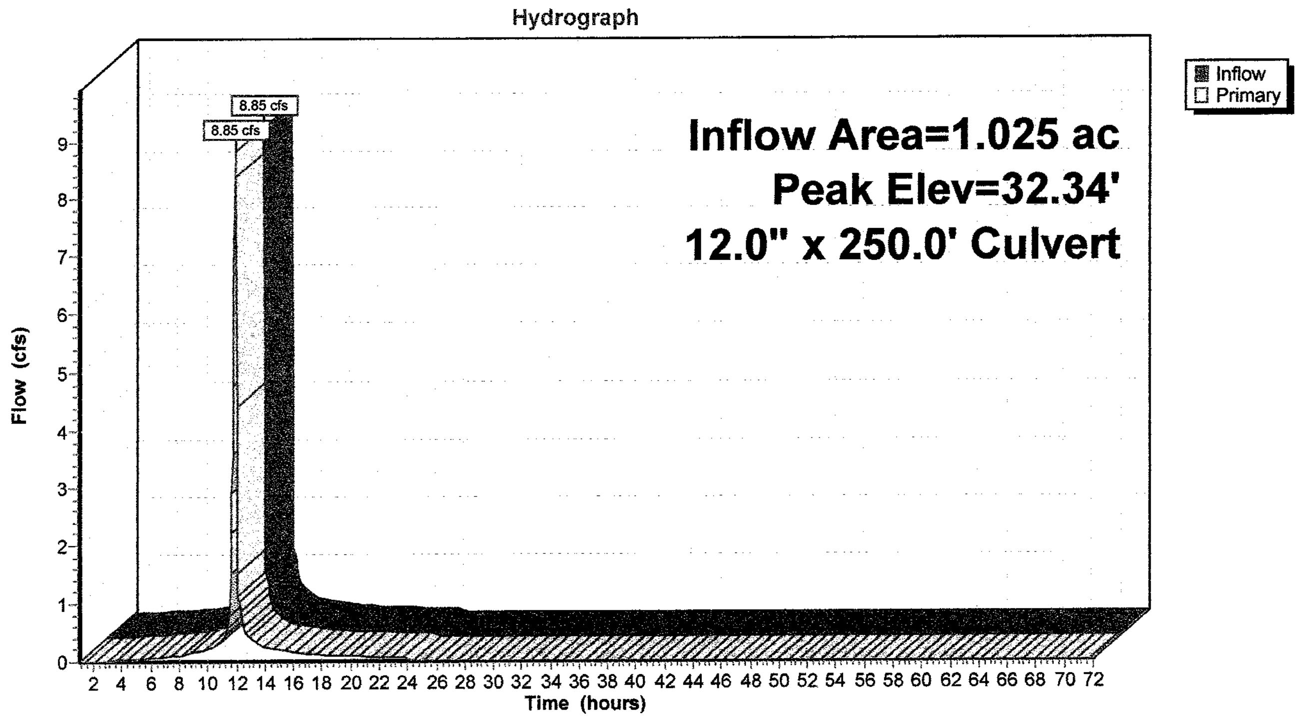
Inflow Area =	1.025 ac,	70.03% Impervious,	Inflow Depth =	5.18"	for 100 -Yr. event
Inflow =	8.85 cfs @	11.92 hrs,	Volume=	0.442 af	
Outflow =	8.85 cfs @	11.92 hrs,	Volume=	0.442 af,	Atten= 0%, Lag= 0.0 min
Primary =	8.85 cfs @	11.92 hrs,	Volume=	0.442 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 32.34' @ 11.92 hrs
Flood Elev= 20.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	15.43'	**12.0" x 250.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 14.28' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=8.58 cfs @ 11.92 hrs HW=31.70' TW=20.30' (Fixed TW Elev= 20.30')
↑—**1=Culvert** (Outlet Controls 8.58 cfs @ 10.93 fps)

Pond 3P: CB 1



Summary for Pond 5P: Grate

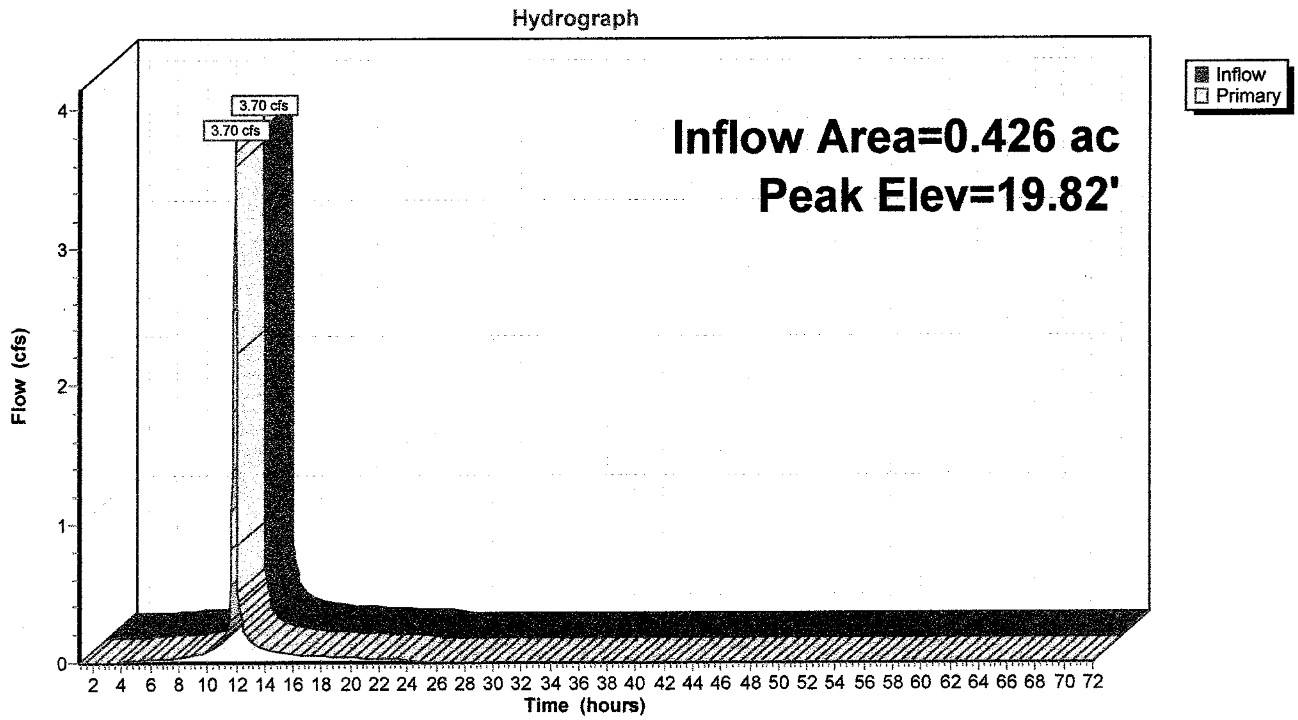
Inflow Area = 0.426 ac, 65.18% Impervious, Inflow Depth = 5.07" for 100 -Yr. event
Inflow = 3.70 cfs @ 11.93 hrs, Volume= 0.180 af
Outflow = 3.70 cfs @ 11.93 hrs, Volume= 0.180 af, Atten= 0%, Lag= 0.0 min
Primary = 3.70 cfs @ 11.93 hrs, Volume= 0.180 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 19.82' @ 11.93 hrs
Flood Elev= 20.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	19.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=3.52 cfs @ 11.93 hrs HW=19.81' (Free Discharge)
1=Orifice/Grate (Weir Controls 3.52 cfs @ 1.82 fps)

Pond 5P: Grate



Summary for Pond 6P: CB 2

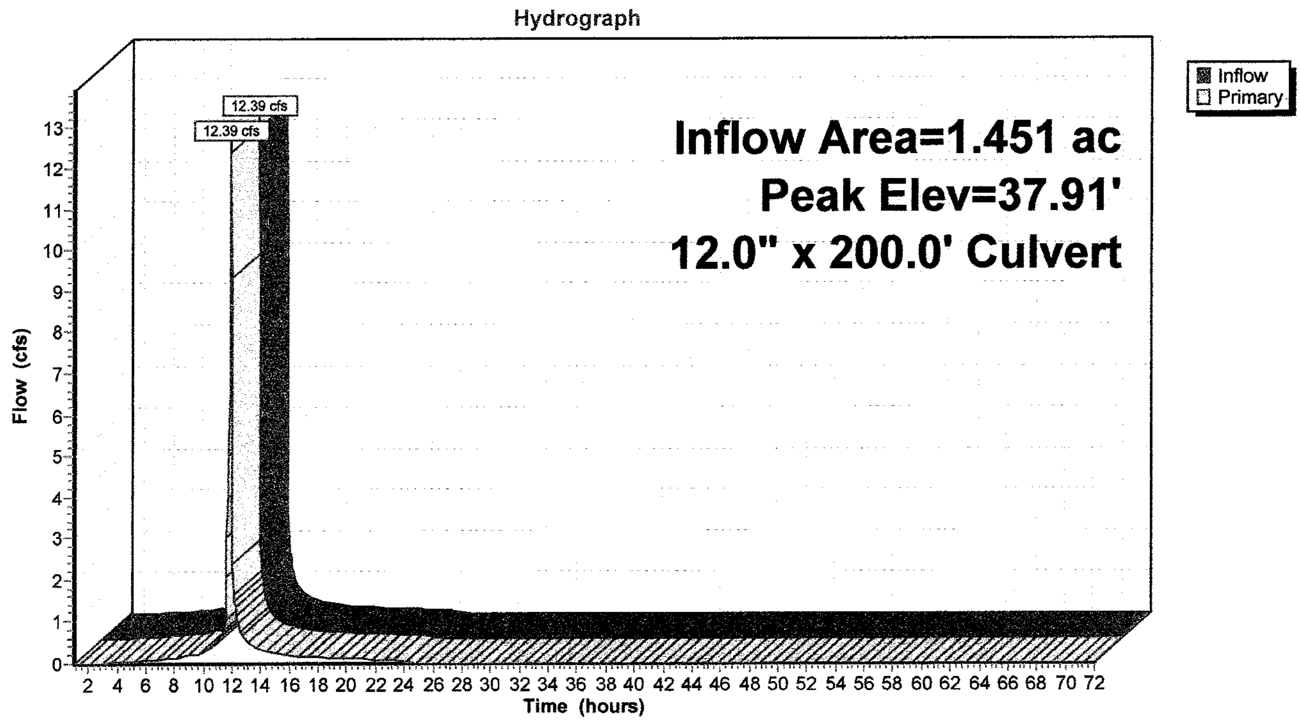
Inflow Area = 1.451 ac, 68.61% Impervious, Inflow Depth = 5.15" for 100 -Yr. event
Inflow = 12.39 cfs @ 11.92 hrs, Volume= 0.622 af
Outflow = 12.39 cfs @ 11.92 hrs, Volume= 0.622 af, Atten= 0%, Lag= 0.0 min
Primary = 12.39 cfs @ 11.92 hrs, Volume= 0.622 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 37.91' @ 11.92 hrs
Flood Elev= 19.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.58'	**12.0" x 200.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.67' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=12.03 cfs @ 11.92 hrs HW=36.91' TW=17.90' (Fixed TW Elev= 17.90')
1=Culvert (Outlet Controls 12.03 cfs @ 15.32 fps)

Pond 6P: CB 2



Summary for Pond 9P: Grate

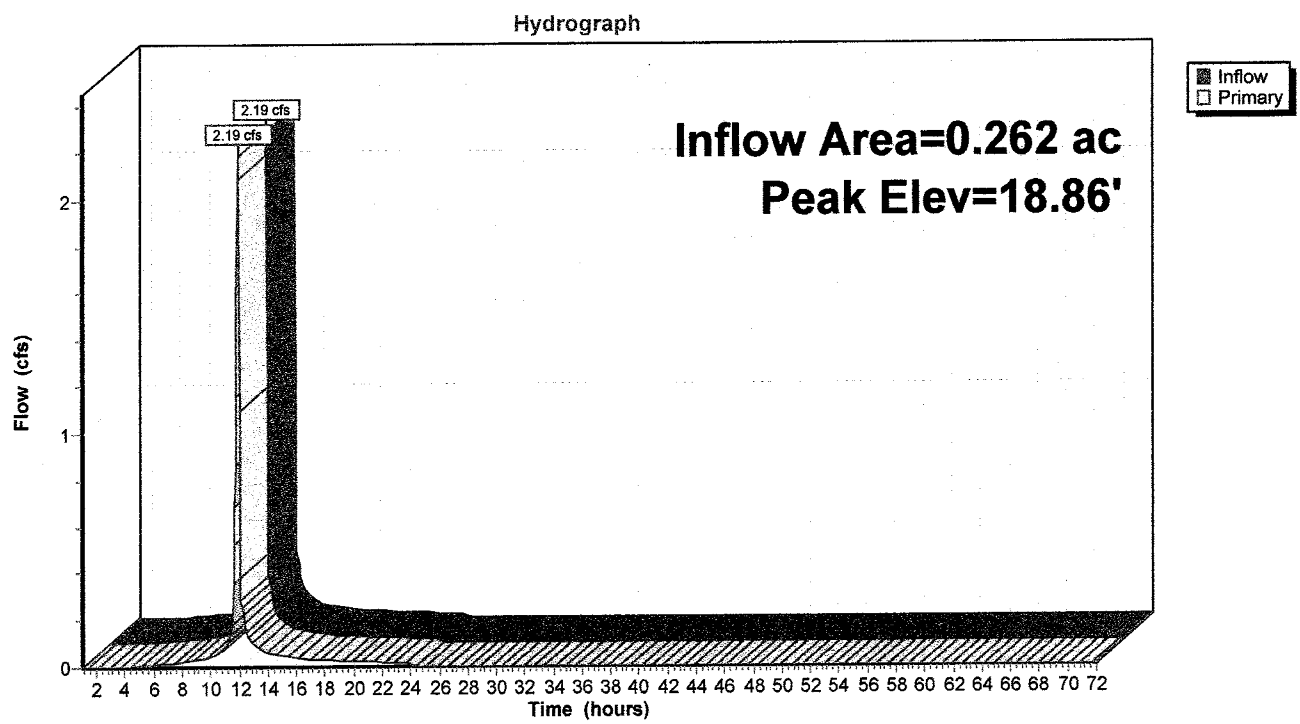
Inflow Area =	0.262 ac, 55.68% Impervious, Inflow Depth = 4.85" for 100 -Yr. event				
Inflow =	2.19 cfs @	11.92 hrs,	Volume=	0.106 af	
Outflow =	2.19 cfs @	11.92 hrs,	Volume=	0.106 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.19 cfs @	11.92 hrs,	Volume=	0.106 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.86' @ 11.92 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**12.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=2.12 cfs @ 11.92 hrs HW=18.85' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 2.12 cfs @ 1.93 fps)

Pond 9P: Grate



Summary for Pond 10P: CB 3

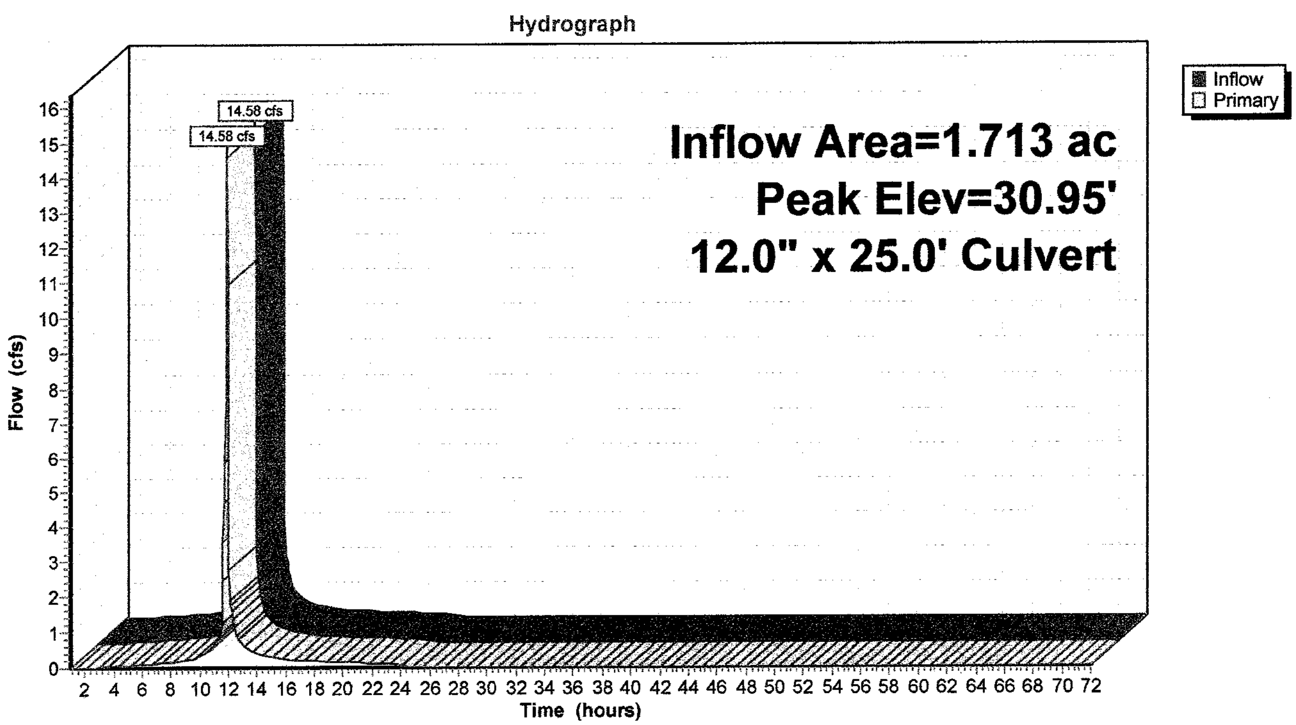
Inflow Area = 1.713 ac, 66.63% Impervious, Inflow Depth = 5.10" for 100 -Yr. event
Inflow = 14.58 cfs @ 11.92 hrs, Volume= 0.728 af
Outflow = 14.58 cfs @ 11.92 hrs, Volume= 0.728 af, Atten= 0%, Lag= 0.0 min
Primary = 14.58 cfs @ 11.92 hrs, Volume= 0.728 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 30.95' @ 11.92 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.67'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.60' S= 0.0028 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=14.15 cfs @ 11.92 hrs HW=30.20' TW=16.20' (Fixed TW Elev= 16.20')
↑—**1=Culvert** (Inlet Controls 14.15 cfs @ 18.01 fps)

Pond 10P: CB 3



Summary for Pond 12P: Grate

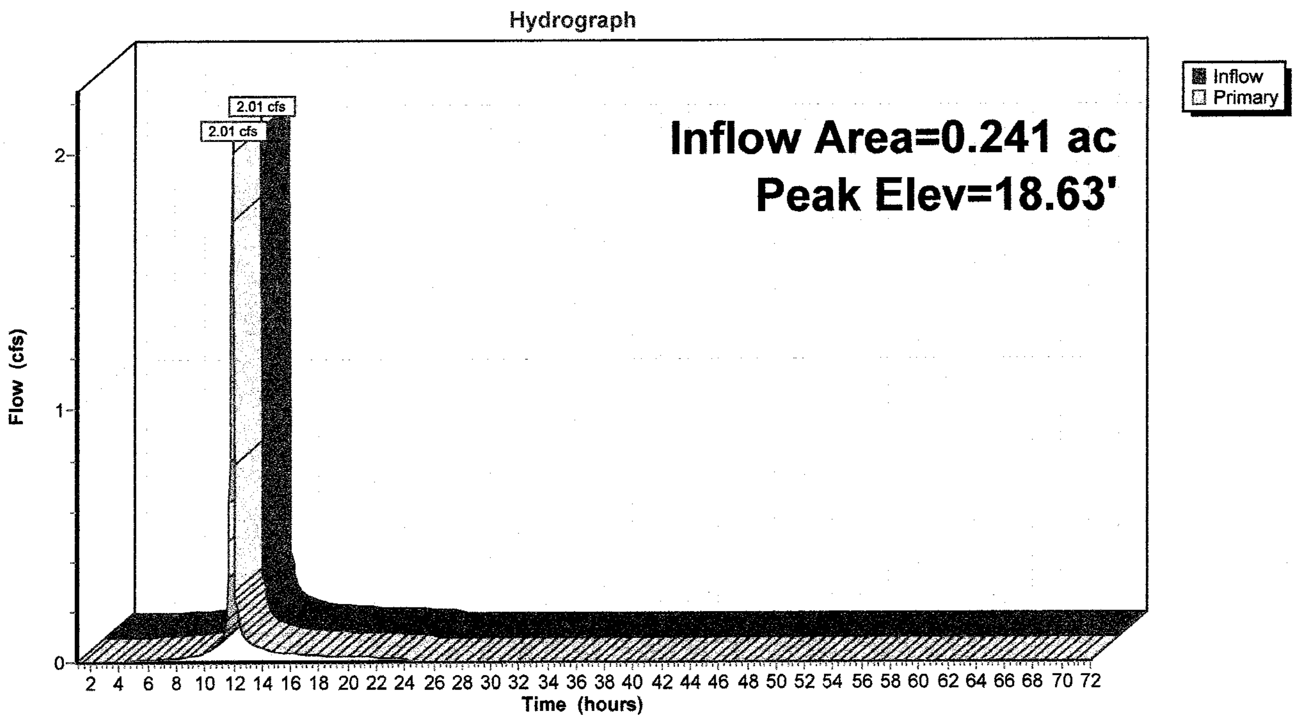
Inflow Area =	0.241 ac, 44.24% Impervious,	Inflow Depth = 4.63"	for 100 -Yr. event	
Inflow =	2.01 cfs @	11.91 hrs, Volume=	0.093 af	
Outflow =	2.01 cfs @	11.91 hrs, Volume=	0.093 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.01 cfs @	11.91 hrs, Volume=	0.093 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.63' @ 11.91 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**24.0" Horiz. Orifice/Grate X 2.00** Limited to weir flow C= 0.600

Primary OutFlow Max=1.96 cfs @ 11.91 hrs HW=18.63' (Free Discharge)
└─**1=Orifice/Grate** (Weir Controls 1.96 cfs @ 1.19 fps)

Pond 12P: Grate



Summary for Pond 13P: CB 4

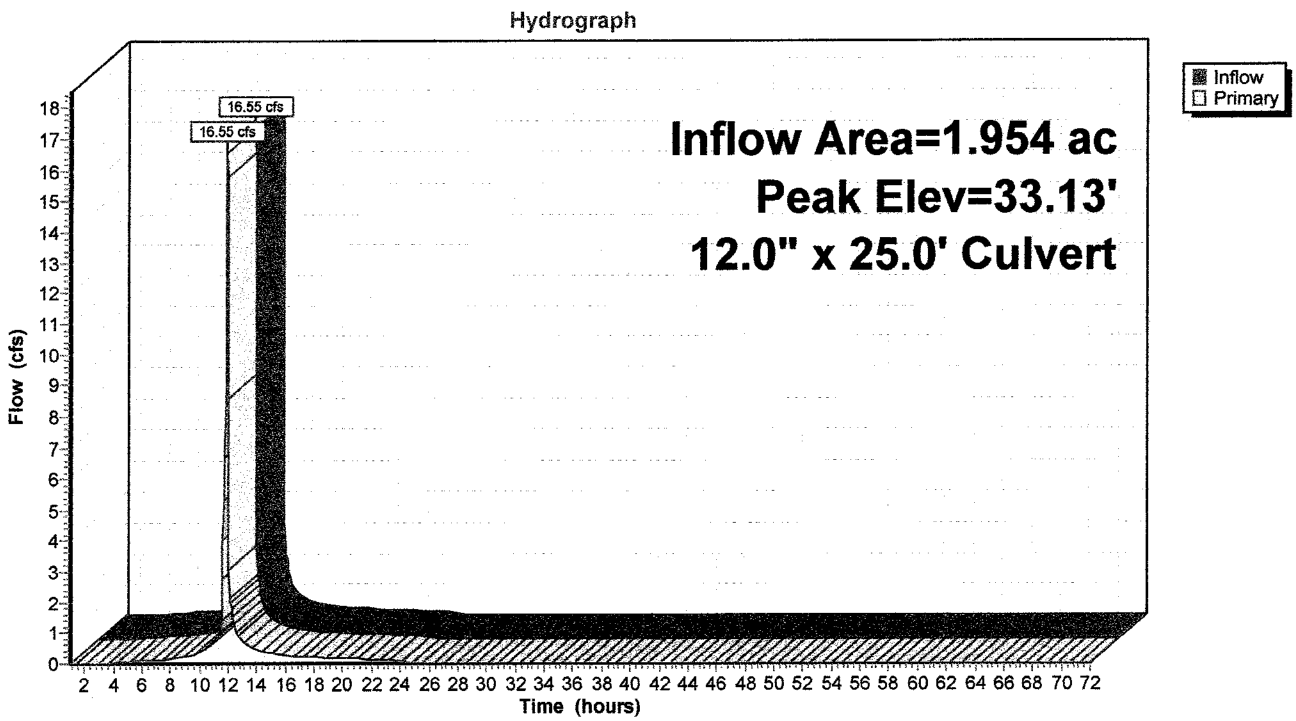
Inflow Area = 1.954 ac, 63.86% Impervious, Inflow Depth = 5.04" for 100 -Yr. event
Inflow = 16.55 cfs @ 11.92 hrs, Volume= 0.821 af
Outflow = 16.55 cfs @ 11.92 hrs, Volume= 0.821 af, Atten= 0%, Lag= 0.0 min
Primary = 16.55 cfs @ 11.92 hrs, Volume= 0.821 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 33.13' @ 11.92 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.60'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.40' S= 0.0080 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=16.05 cfs @ 11.92 hrs HW=32.11' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 16.05 cfs @ 20.43 fps)

Pond 13P: CB 4



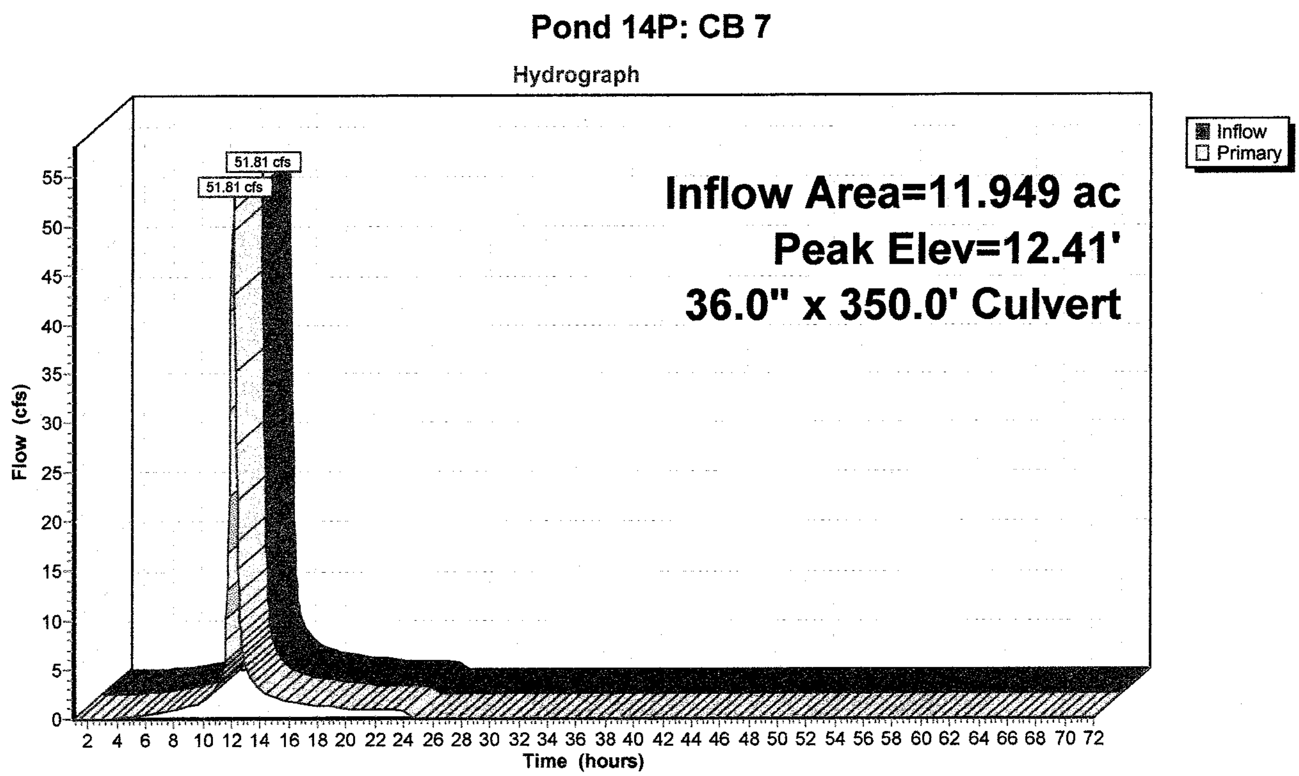
Summary for Pond 14P: CB 7

Inflow Area = 11.949 ac, 51.17% Impervious, Inflow Depth = 4.81" for 100 -Yr. event
Inflow = 51.81 cfs @ 12.10 hrs, Volume= 4.785 af
Outflow = 51.81 cfs @ 12.10 hrs, Volume= 4.785 af, Atten= 0%, Lag= 0.0 min
Primary = 51.81 cfs @ 12.10 hrs, Volume= 4.785 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 12.41' @ 12.10 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	6.30'	**36.0" x 350.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 5.37' S= 0.0027 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=51.71 cfs @ 12.10 hrs HW=12.40' TW=9.90' (Fixed TW Elev= 9.90')
1=Culvert (Outlet Controls 51.71 cfs @ 7.32 fps)



Summary for Pond 15P: CB 8

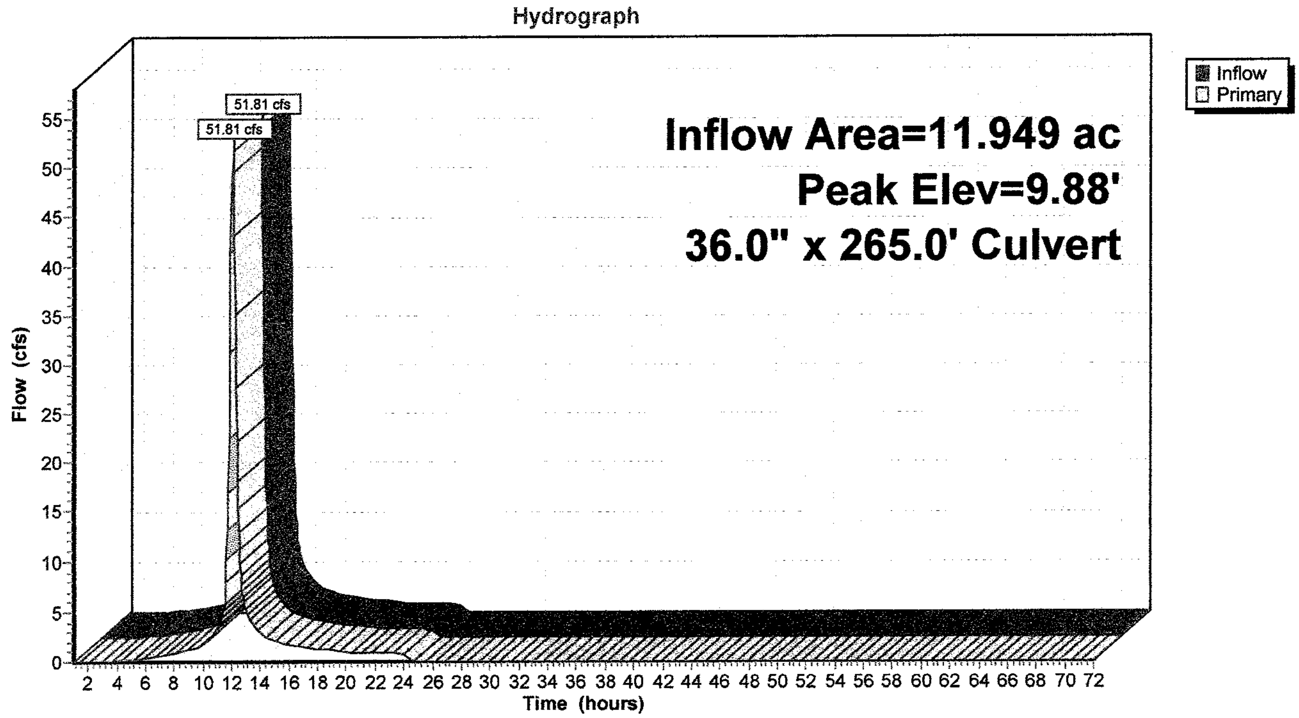
Inflow Area = 11.949 ac, 51.17% Impervious, Inflow Depth = 4.81" for 100 -Yr. event
Inflow = 51.81 cfs @ 12.10 hrs, Volume= 4.785 af
Outflow = 51.81 cfs @ 12.10 hrs, Volume= 4.785 af, Atten= 0%, Lag= 0.0 min
Primary = 51.81 cfs @ 12.10 hrs, Volume= 4.785 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 9.88' @ 12.10 hrs
Flood Elev= 22.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5.37'	**36.0" x 265.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 4.68' S= 0.0026 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=51.71 cfs @ 12.10 hrs HW=9.87' (Free Discharge)
└─**1=Culvert** (Barrel Controls 51.71 cfs @ 7.32 fps)

Pond 15P: CB 8



Summary for Pond 18P: Grate

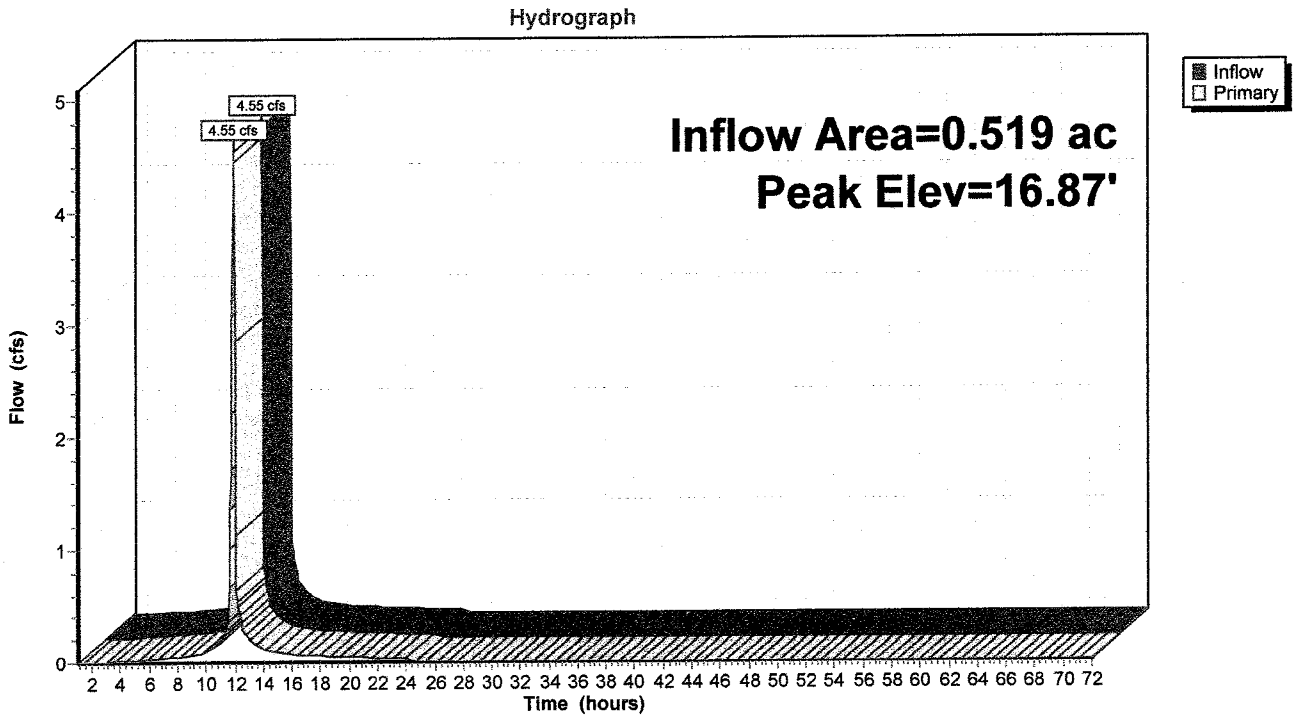
Inflow Area = 0.519 ac, 74.76% Impervious, Inflow Depth = 5.18" for 100 -Yr. event
Inflow = 4.55 cfs @ 11.93 hrs, Volume= 0.224 af
Outflow = 4.55 cfs @ 11.93 hrs, Volume= 0.224 af, Atten= 0%, Lag= 0.0 min
Primary = 4.55 cfs @ 11.93 hrs, Volume= 0.224 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 16.87' @ 11.93 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	16.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=4.33 cfs @ 11.93 hrs HW=16.85' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 4.33 cfs @ 1.95 fps)

Pond 18P: Grate



Summary for Pond 19P: Grate

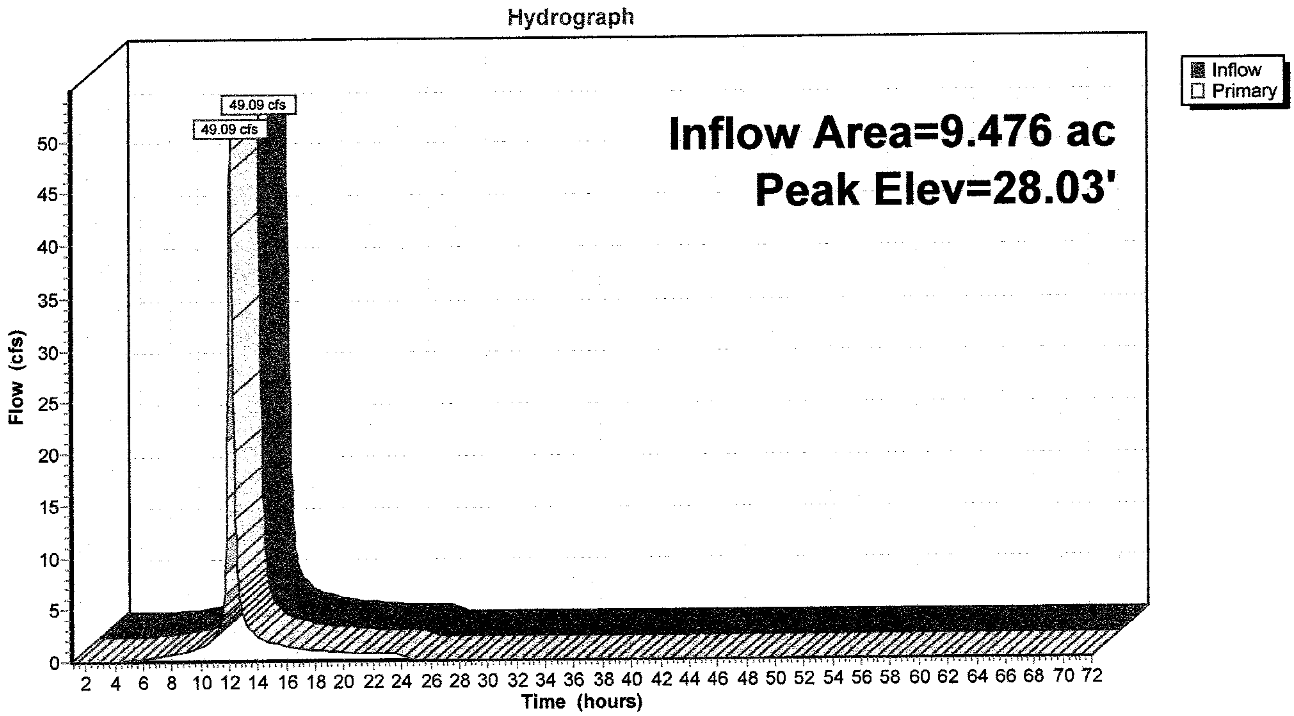
Inflow Area =	9.476 ac, 47.25% Impervious,	Inflow Depth = 4.74"	for 100 -Yr. event
Inflow =	49.09 cfs @ 12.11 hrs,	Volume= 3.739 af	
Outflow =	49.09 cfs @ 12.11 hrs,	Volume= 3.739 af,	Atten= 0%, Lag= 0.0 min
Primary =	49.09 cfs @ 12.11 hrs,	Volume= 3.739 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 28.03' @ 12.11 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	17.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=48.68 cfs @ 12.11 hrs HW=27.85' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 48.68 cfs @ 15.49 fps)

Pond 19P: Grate



Summary for Pond 20P: CB 5

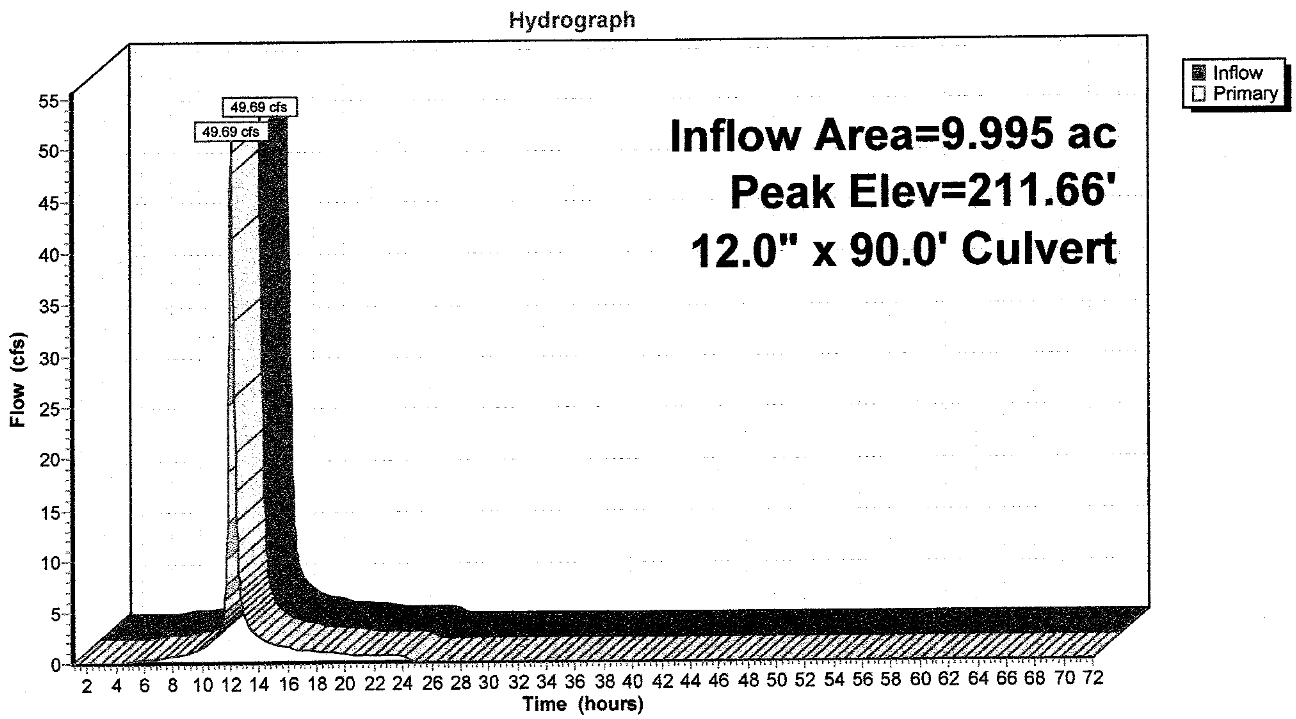
Inflow Area = 9.995 ac, 48.68% Impervious, Inflow Depth = 4.76" for 100 -Yr. event
Inflow = 49.69 cfs @ 12.11 hrs, Volume= 3.964 af
Outflow = 49.69 cfs @ 12.11 hrs, Volume= 3.964 af, Atten= 0%, Lag= 0.0 min
Primary = 49.69 cfs @ 12.11 hrs, Volume= 3.964 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 211.66' @ 12.11 hrs
Flood Elev= 16.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.80'	**12.0" x 90.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.57' S= 0.0026 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=49.37 cfs @ 12.11 hrs HW=209.22' (Free Discharge)
↑**1=Culvert** (Barrel Controls 49.37 cfs @ 62.86 fps)

Pond 20P: CB 5



Summary for Pond 21P: CB 6

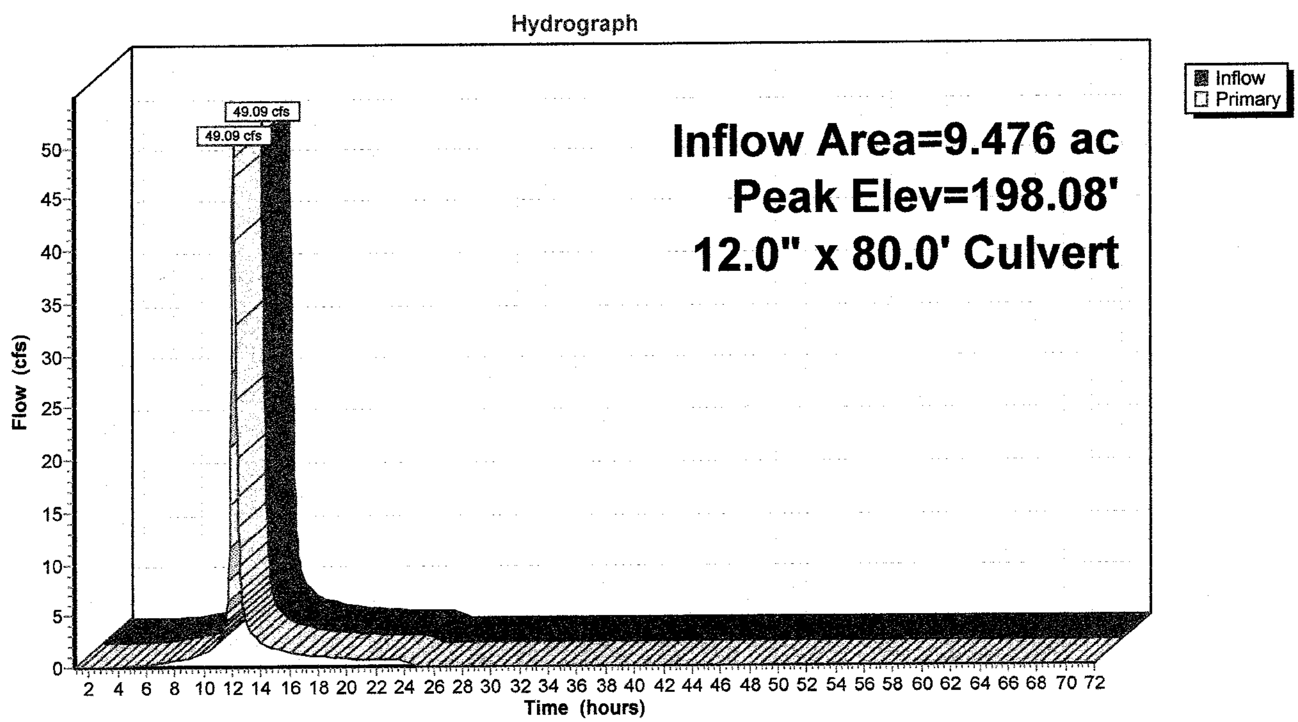
Inflow Area = 9.476 ac, 47.25% Impervious, Inflow Depth = 4.74" for 100 -Yr. event
Inflow = 49.09 cfs @ 12.11 hrs, Volume= 3.739 af
Outflow = 49.09 cfs @ 12.11 hrs, Volume= 3.739 af, Atten= 0%, Lag= 0.0 min
Primary = 49.09 cfs @ 12.11 hrs, Volume= 3.739 af

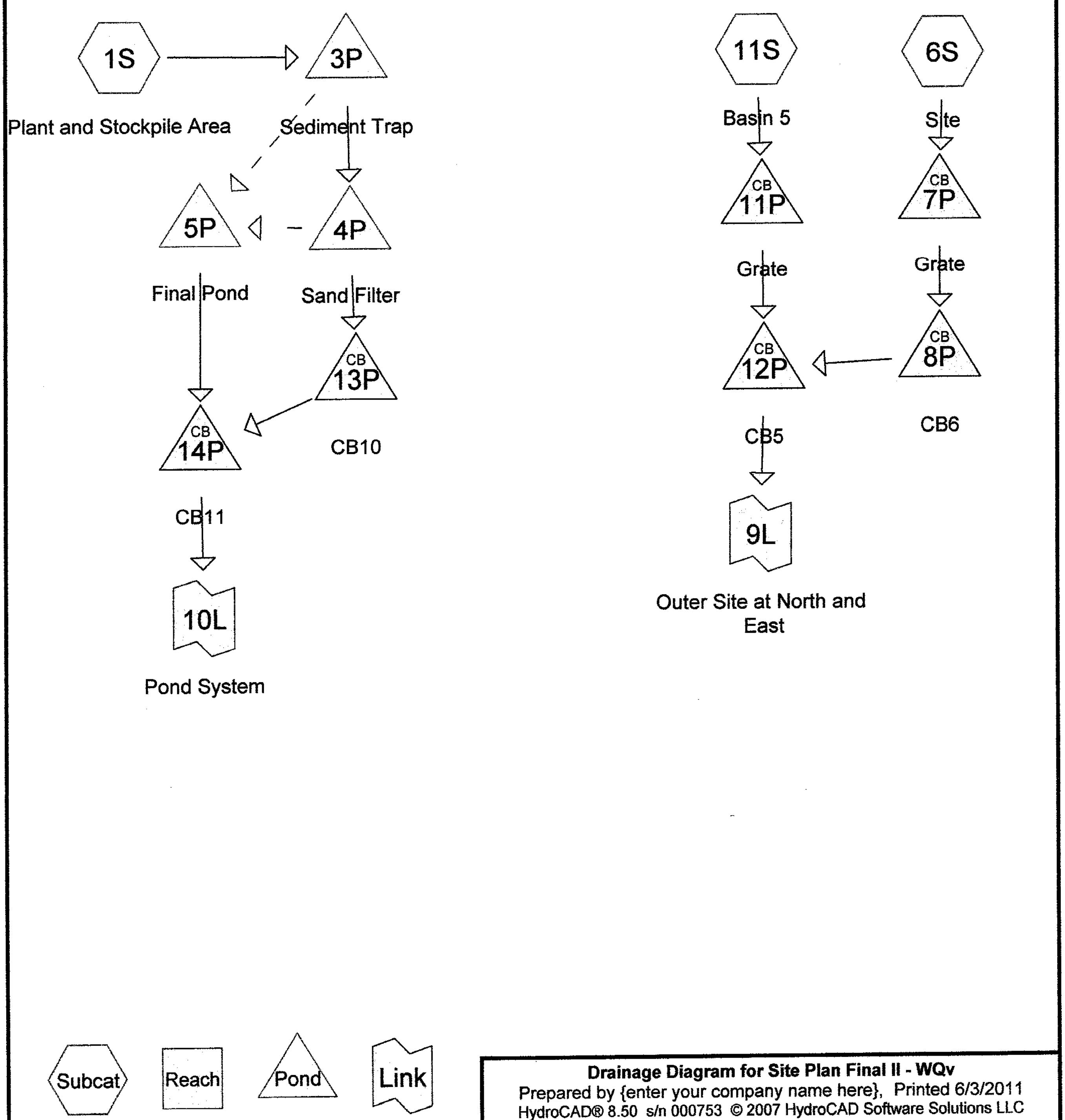
Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 198.08' @ 12.11 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.80' S= 0.0025 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=48.68 cfs @ 12.11 hrs HW=195.08' TW=16.97' (Fixed TW Elev= 16.97')
↑—**1=Culvert** (Outlet Controls 48.68 cfs @ 61.98 fps)

Pond 21P: CB 6





Drainage Diagram for Site Plan Final II - WQv
Prepared by {enter your company name here}, Printed 6/3/2011
HydroCAD® 8.50 s/n 000753 © 2007 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Plant and Stockpile Area

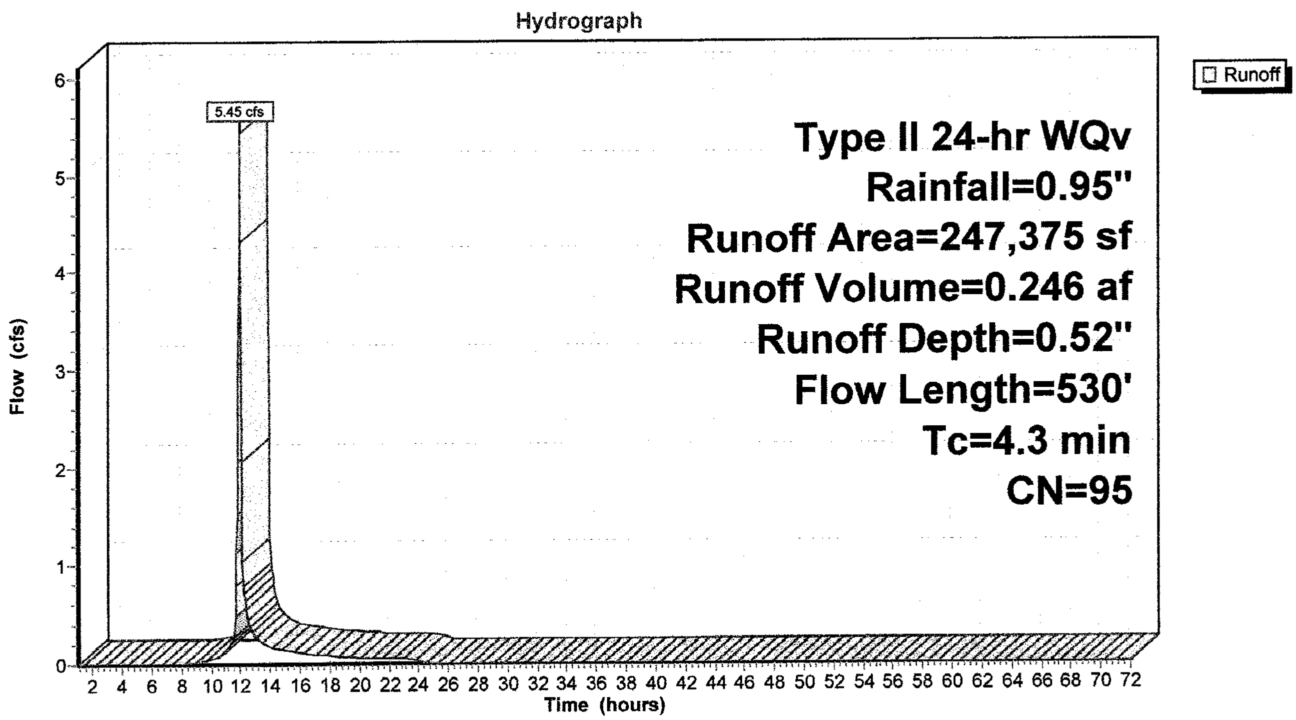
Runoff = 5.45 cfs @ 11.95 hrs, Volume= 0.246 af, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.95"

Area (sf)	CN	Description
247,375	95	Urban commercial, 85% imp, HSG D
37,106		Pervious Area
210,269		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0200	1.19		**Sheet Flow, Top of Stockpile Area** Smooth surfaces n= 0.011 P2= 2.40"
2.0	280	0.0200	2.28		**Shallow Concentrated Flow, Stockpile Area** Unpaved Kv= 16.1 fps
0.9	150	0.0100	2.94	41.89	**Trap/Vee/Rect Channel Flow, Stockpile Perimeter** Bot.W=5.00' D=1.50' Z= 3.0 '/' Top.W=14.00' n= 0.050 Earth, cobble bottom, clean sides
4.3	530	Total			

Subcatchment 1S: Plant and Stockpile Area



Summary for Subcatchment 6S: Site

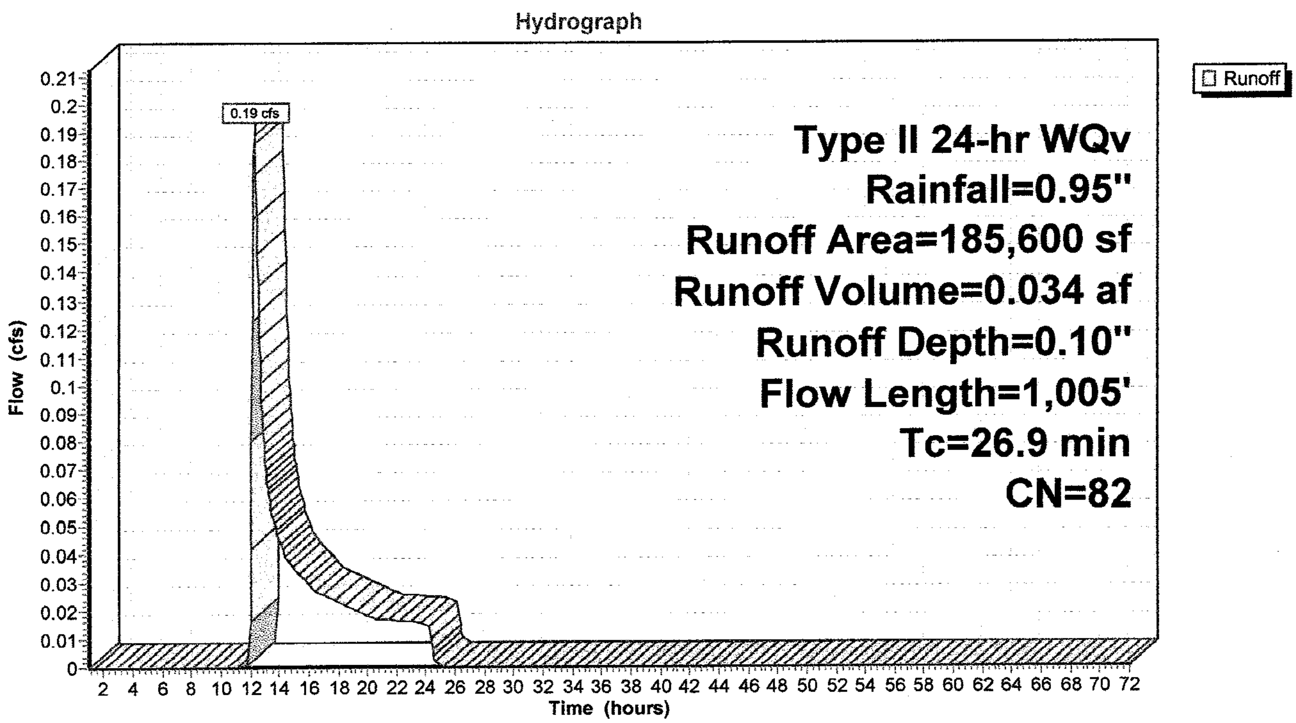
Runoff = 0.19 cfs @ 12.31 hrs, Volume= 0.034 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.95"

Area (sf)	CN	Description
8,940	98	Paved parking & roofs
4,530	98	Paved parking & roofs
18,240	82	Woods/grass comb., Poor, HSG C
153,890	80	>75% Grass cover, Good, HSG D
185,600	82	Weighted Average
172,130		Pervious Area
13,470		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.3300	0.22		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
11.4	420	0.0150	0.61		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
14.0	565	0.0020	0.67		**Shallow Concentrated Flow, Tracks** Grassed Waterway Kv= 15.0 fps
26.9	1,005	Total			

Subcatchment 6S: Site



Summary for Subcatchment 11S: Basin 5

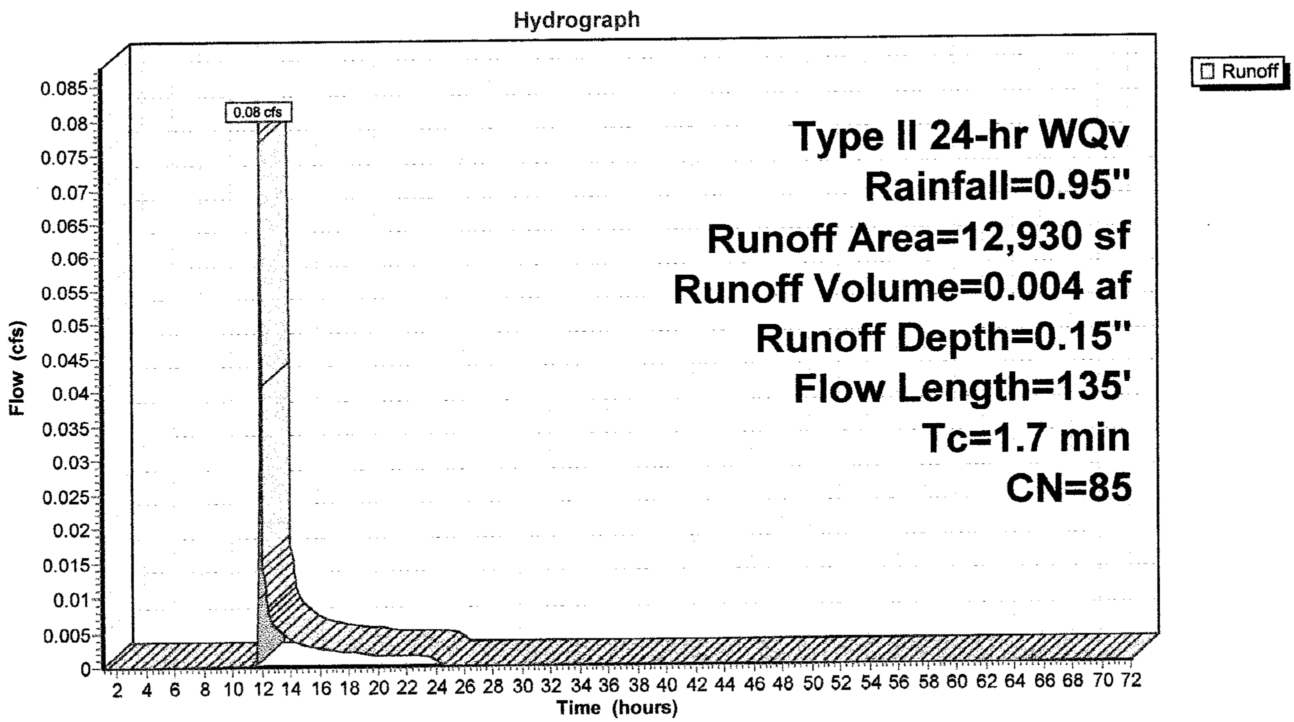
Runoff = 0.08 cfs @ 11.94 hrs, Volume= 0.004 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.95"

Area (sf)	CN	Description
2,460	98	Paved parking & roofs
1,120	98	Paved parking & roofs
9,350	80	>75% Grass cover, Good, HSG D
12,930	85	Weighted Average
9,350		Pervious Area
3,580		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	10	0.3300	0.20		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
0.8	125	0.0280	2.51		**Shallow Concentrated Flow, Outer Area** Grassed Waterway Kv= 15.0 fps
1.7	135	Total			

Subcatchment 11S: Basin 5



Summary for Pond 3P: Sediment Trap

Inflow Area = 5.679 ac, 85.00% Impervious, Inflow Depth = 0.52" for WQv event
Inflow = 5.45 cfs @ 11.95 hrs, Volume= 0.246 af
Outflow = 4.32 cfs @ 12.00 hrs, Volume= 0.185 af, Atten= 21%, Lag= 3.0 min
Primary = 4.32 cfs @ 12.00 hrs, Volume= 0.185 af
Secondary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 17.35' Surf.Area= 1,162 sf Storage= 1,168 cf
Peak Elev= 19.31' @ 12.00 hrs Surf.Area= 2,302 sf Storage= 4,495 cf (3,327 cf above start)
Flood Elev= 21.00' Surf.Area= 3,600 sf Storage= 9,449 cf (8,281 cf above start)

Plug-Flow detention time= 180.1 min calculated for 0.159 af (64% of inflow)
Center-of-Mass det. time= 45.6 min (867.2 - 821.6)

Volume	Invert	Avail.Storage	Storage Description
#1	16.00'	9,449 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

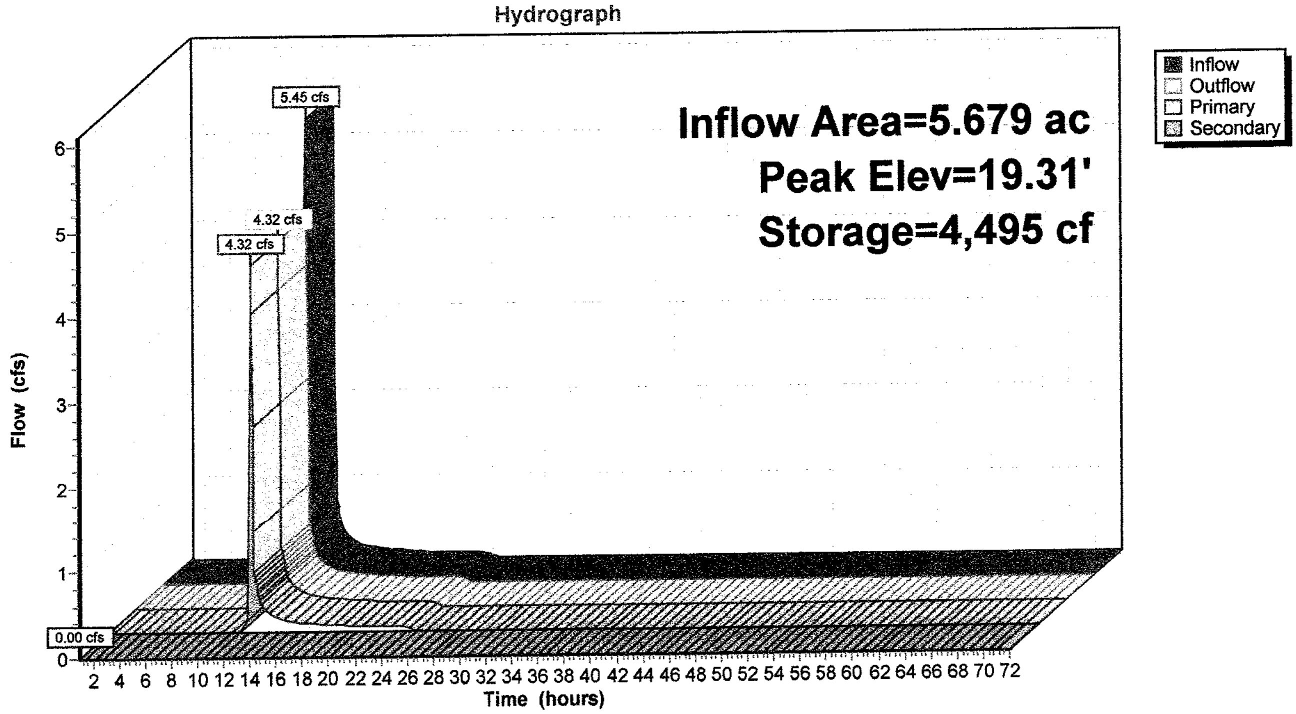
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
16.00	600	140.0	0	0	600
21.00	3,600	260.0	9,449	9,449	4,548

Device	Routing	Invert	Outlet Devices
#1	Primary	15.00'	**12.0" x 40.0' long Culvert** CPP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 15.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	18.50'	**12.0" x 25.0' long Culvert X 2.00** CPP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 18.50' S= 0.0000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#3	Secondary	20.00'	**30.0' long x 21.0' 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
#4	Device 1	17.35'	**12.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=4.32 cfs @ 12.00 hrs HW=19.31' TW=19.00' (Fixed TW Elev= 19.00')
1=Culvert (Inlet Controls 1.85 cfs @ 2.35 fps)
4=Orifice/Grate (Passes 1.85 cfs of 2.10 cfs potential flow)
2=Culvert (Barrel Controls 2.47 cfs @ 2.49 fps)

Secondary OutFlow Max=0.00 cfs @ 1.00 hrs HW=17.35' (Free Discharge)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 3P: Sediment Trap



Summary for Pond 4P: Sand Filter

Inflow Area = 5.679 ac, 85.00% Impervious, Inflow Depth = 0.39" for WQv event
Inflow = 4.32 cfs @ 12.00 hrs, Volume= 0.185 af
Outflow = 0.17 cfs @ 14.06 hrs, Volume= 0.185 af, Atten= 96%, Lag= 123.4 min
Primary = 0.17 cfs @ 14.06 hrs, Volume= 0.185 af
Secondary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 16.29' @ 14.06 hrs Surf.Area= 3,578 sf Storage= 3,887 cf
Flood Elev= 21.00' Surf.Area= 9,202 sf Storage= 32,977 cf

Plug-Flow detention time= 277.9 min calculated for 0.185 af (100% of inflow)
Center-of-Mass det. time= 277.9 min (1,145.0 - 867.2)

Volume	Invert	Avail.Storage	Storage Description
#1	15.00'	32,977 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

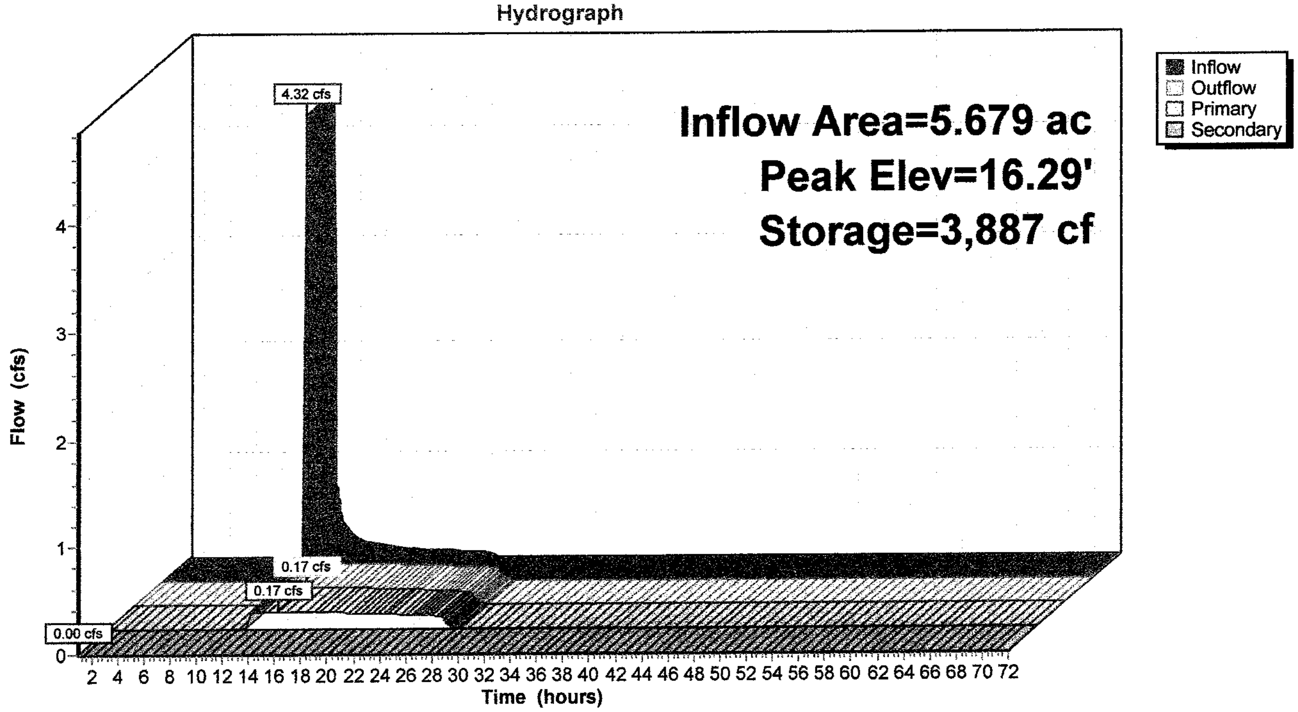
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
15.00	2,495	300.0	0	0	2,495
21.00	9,202	444.0	32,977	32,977	11,308

Device	Routing	Invert	Outlet Devices
#1	Primary	15.00'	**2.000 in/hr Exfiltration over Horizontal area**
#2	Secondary	20.00'	**10.0' long x 27.0' 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=0.17 cfs @ 14.06 hrs HW=16.29' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Secondary OutFlow Max=0.00 cfs @ 1.00 hrs HW=15.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: Sand Filter



Summary for Pond 5P: Final Pond

Inflow	=	0.00 cfs @	1.00 hrs, Volume=	0.000 af
Outflow	=	0.00 cfs @	1.00 hrs, Volume=	0.000 af, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	1.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 17.00' Surf.Area= 7,024 sf Storage= 11,593 cf
Peak Elev= 17.00' @ 1.00 hrs Surf.Area= 7,024 sf Storage= 11,593 cf
Flood Elev= 21.00' Surf.Area= 13,236 sf Storage= 51,462 cf (39,870 cf above start)

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

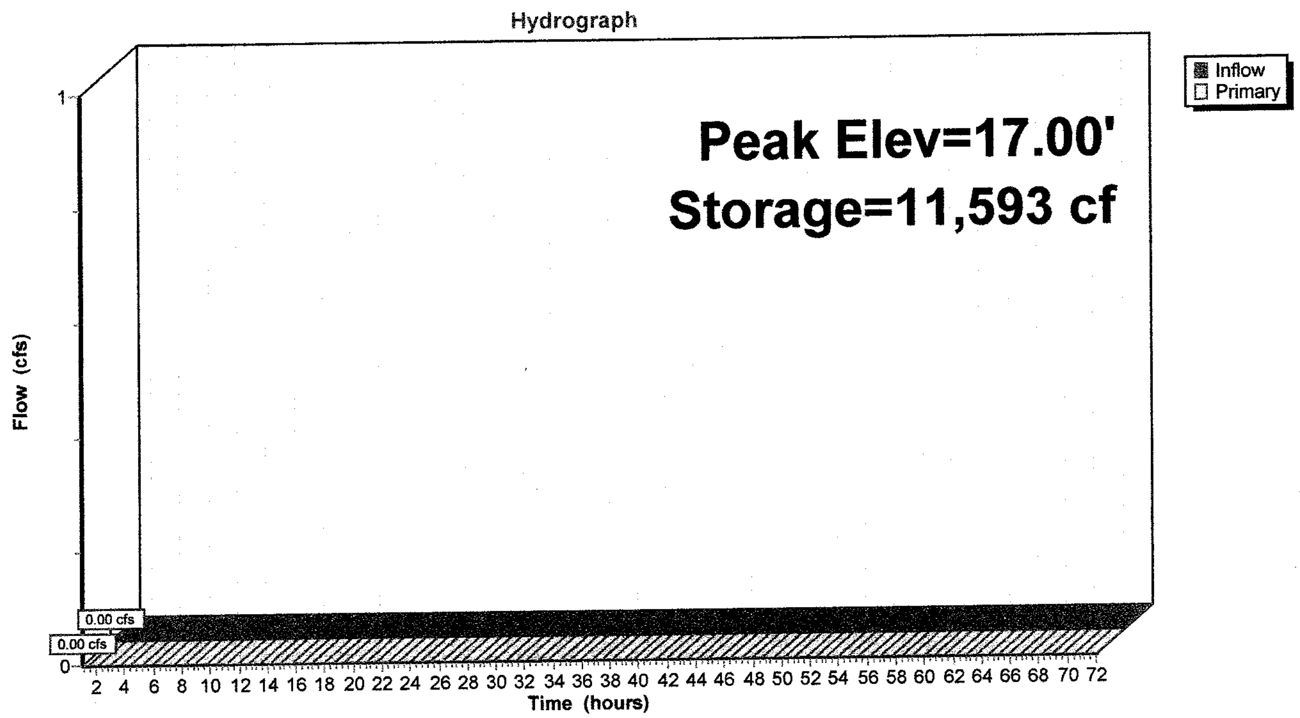
Volume	Invert	Avail.Storage	Storage Description
#1	15.00'	51,462 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
15.00	4,650	378.0	0	0	4,650
21.00	13,236	536.0	51,462	51,462	16,465

Device	Routing	Invert	Outlet Devices
#1	Device 2	20.00'	**2.00' x 2.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#2	Primary	12.00'	**18.0" x 20.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 11.80' S= 0.0100 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior
#3	Device 2	15.00'	**6.0" x 50.0' long Culvert** CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 14.50' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#4	Device 3	17.00'	**2.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=17.00' TW=12.05' (Fixed TW Elev= 12.05')
└─**2=Culvert** (Passes 0.00 cfs of 17.54 cfs potential flow)
  ├─**1=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Culvert** (Passes 0.00 cfs of 0.99 cfs potential flow)
    └─**4=Orifice/Grate** (Controls 0.00 cfs)

Pond 5P: Final Pond



Summary for Pond 7P: Grate

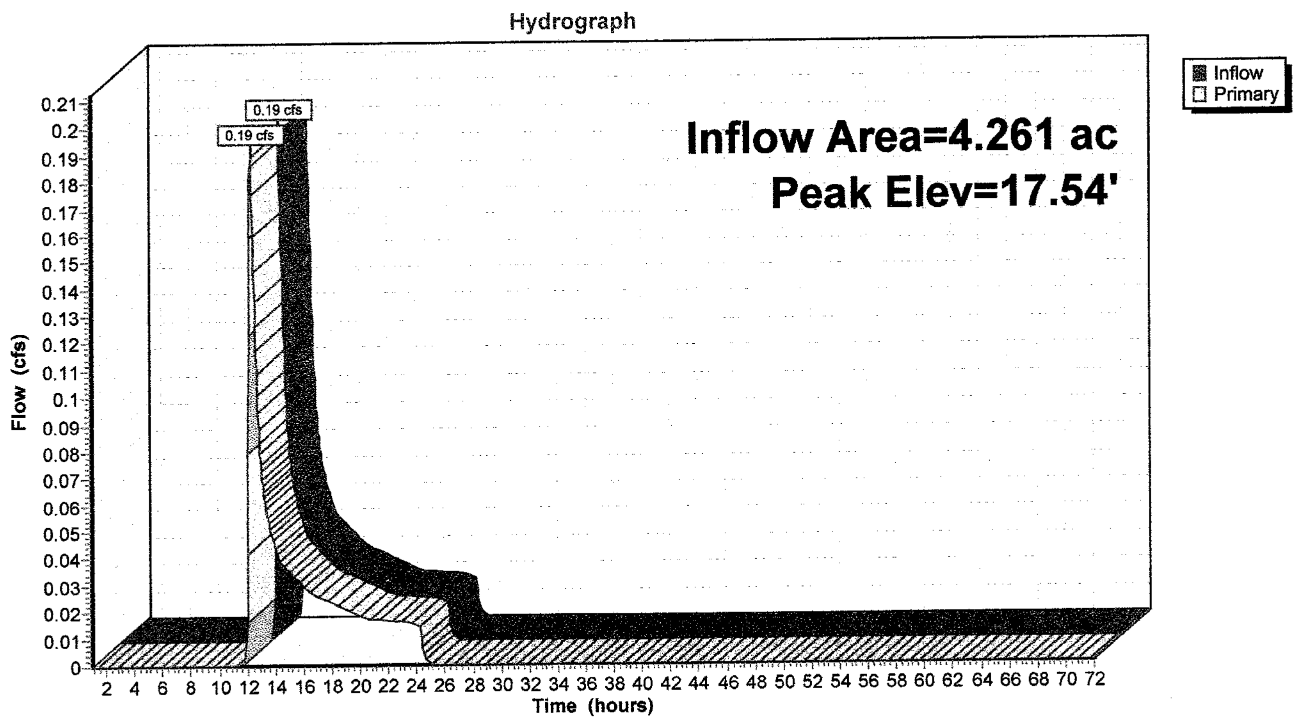
Inflow Area = 4.261 ac, 7.26% Impervious, Inflow Depth = 0.10" for WQv event
Inflow = 0.19 cfs @ 12.31 hrs, Volume= 0.034 af
Outflow = 0.19 cfs @ 12.31 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min
Primary = 0.19 cfs @ 12.31 hrs, Volume= 0.034 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 17.54' @ 12.31 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	17.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.19 cfs @ 12.31 hrs HW=17.54' (Free Discharge)
1=Orifice/Grate (Weir Controls 0.19 cfs @ 0.68 fps)

Pond 7P: Grate



Summary for Pond 8P: CB6

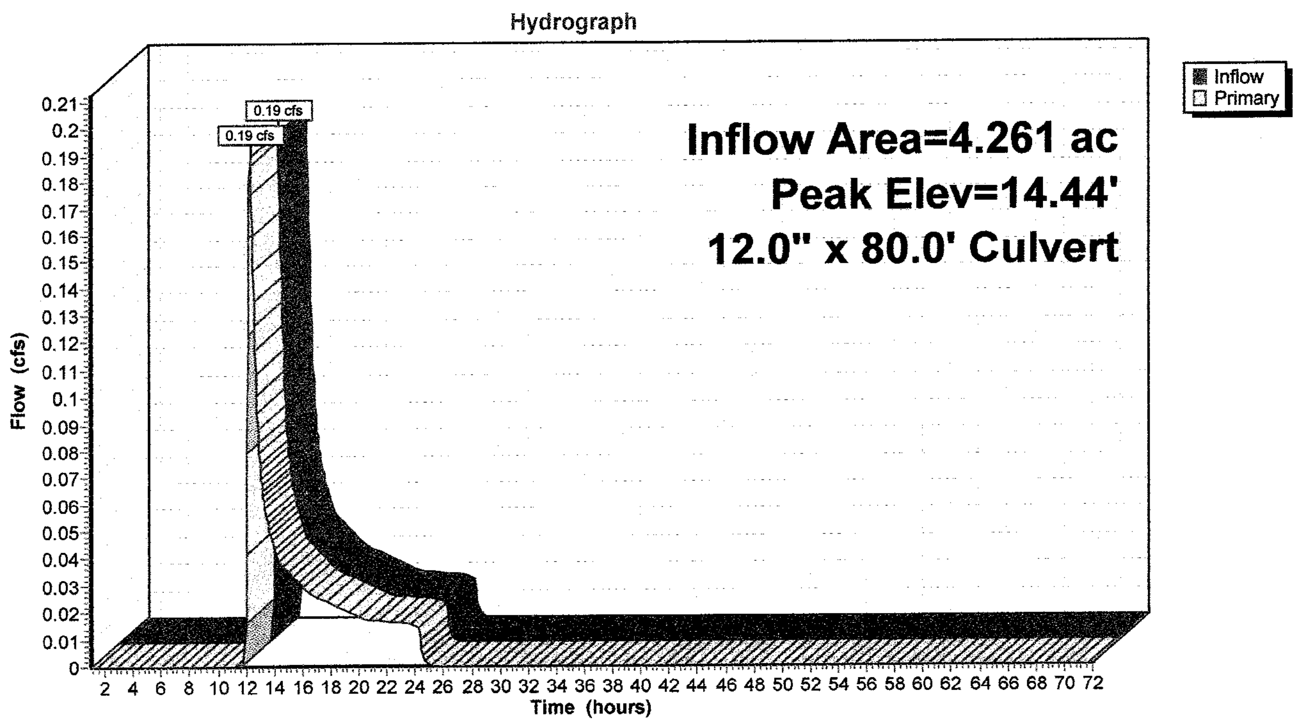
Inflow Area =	4.261 ac,	7.26% Impervious,	Inflow Depth = 0.10"	for WQv event	
Inflow =	0.19 cfs @	12.31 hrs,	Volume=	0.034 af	
Outflow =	0.19 cfs @	12.31 hrs,	Volume=	0.034 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.19 cfs @	12.31 hrs,	Volume=	0.034 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 14.44' @ 12.31 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.80' S= 0.0025 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.19 cfs @ 12.31 hrs HW=14.44' TW=14.40' (Fixed TW Elev= 14.40')
1=Culvert (Outlet Controls 0.19 cfs @ 0.85 fps)

Pond 8P: CB6



Summary for Pond 11P: Grate

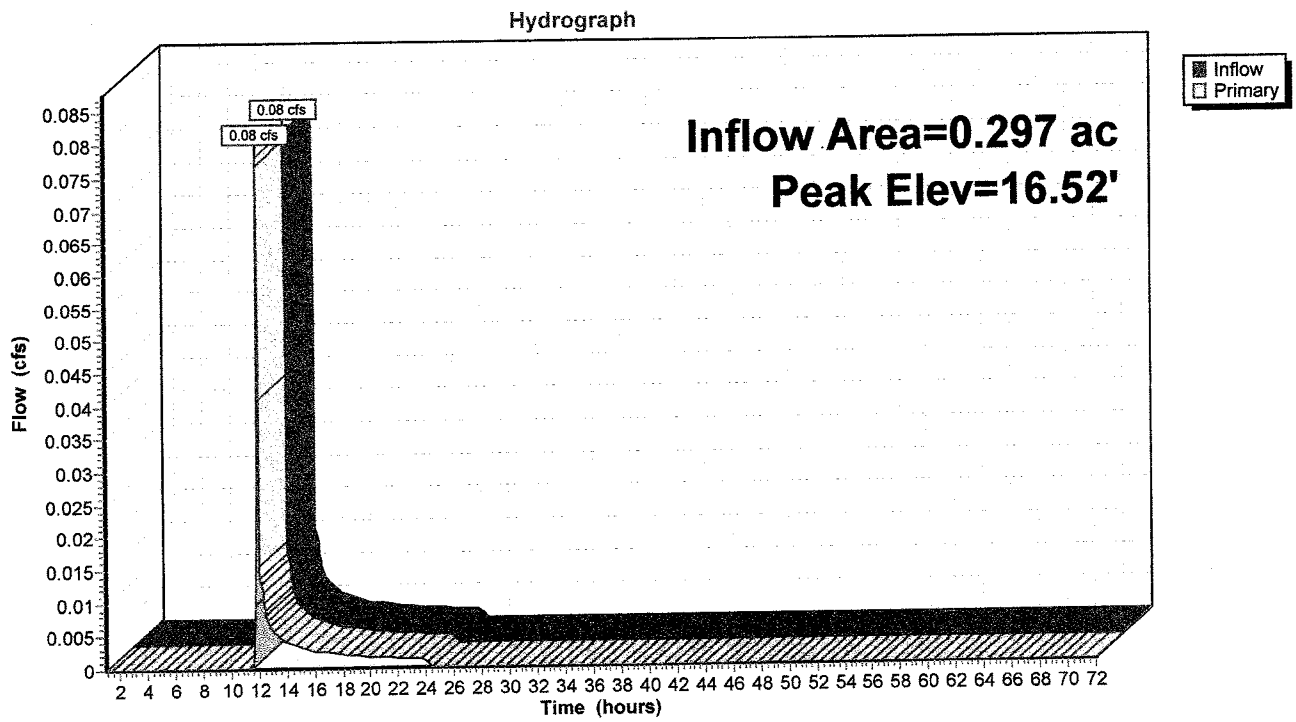
Inflow Area =	0.297 ac, 27.69% Impervious,	Inflow Depth = 0.15"	for WQv event	
Inflow =	0.08 cfs @	11.94 hrs, Volume=	0.004 af	
Outflow =	0.08 cfs @	11.94 hrs, Volume=	0.004 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.08 cfs @	11.94 hrs, Volume=	0.004 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 16.52' @ 11.94 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	16.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.07 cfs @ 11.94 hrs HW=16.52' (Free Discharge)
↑**1=Orifice/Grate** (Weir Controls 0.07 cfs @ 0.49 fps)

Pond 11P: Grate



Summary for Pond 12P: CB5

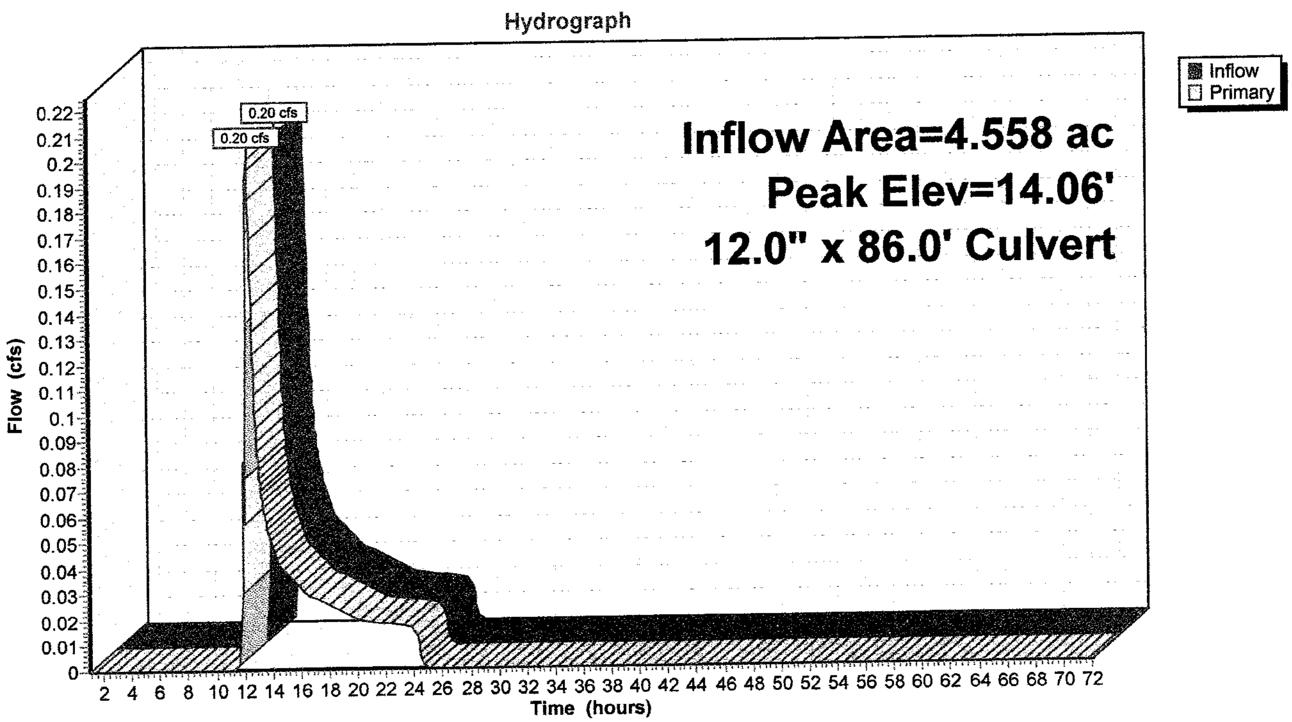
Inflow Area =	4.558 ac,	8.59% Impervious,	Inflow Depth = 0.10"	for WQv event	
Inflow =	0.20 cfs @	12.31 hrs,	Volume=	0.038 af	
Outflow =	0.20 cfs @	12.31 hrs,	Volume=	0.038 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.20 cfs @	12.31 hrs,	Volume=	0.038 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 14.06' @ 12.31 hrs
Flood Elev= 16.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.80'	**12.0" x 86.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.57' S= 0.0027 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.20 cfs @ 12.31 hrs HW=14.06' (Free Discharge)
1=Culvert (Barrel Controls 0.20 cfs @ 1.82 fps)

Pond 12P: CB5



Summary for Pond 13P: CB10

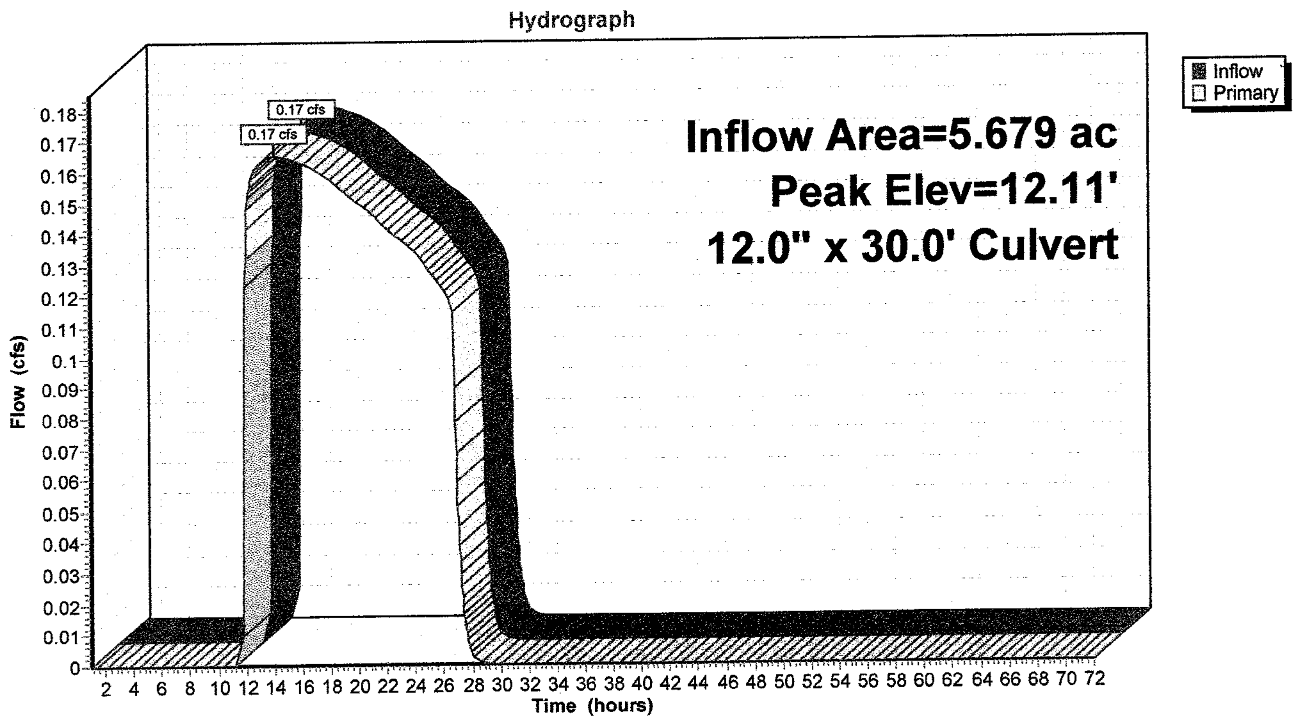
Inflow Area =	5.679 ac, 85.00% Impervious,	Inflow Depth = 0.39"	for WQv event
Inflow =	0.17 cfs @ 14.06 hrs,	Volume=	0.185 af
Outflow =	0.17 cfs @ 14.06 hrs,	Volume=	0.185 af, Atten= 0%, Lag= 0.0 min
Primary =	0.17 cfs @ 14.06 hrs,	Volume=	0.185 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 12.11' @ 14.06 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	11.80'	**12.0" x 30.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 10.80' S= 0.0333 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.16 cfs @ 14.06 hrs HW=12.11' TW=12.05' (Fixed TW Elev= 12.05')
1=Culvert (Outlet Controls 0.16 cfs @ 1.17 fps)

Pond 13P: CB10



Summary for Pond 14P: CB11

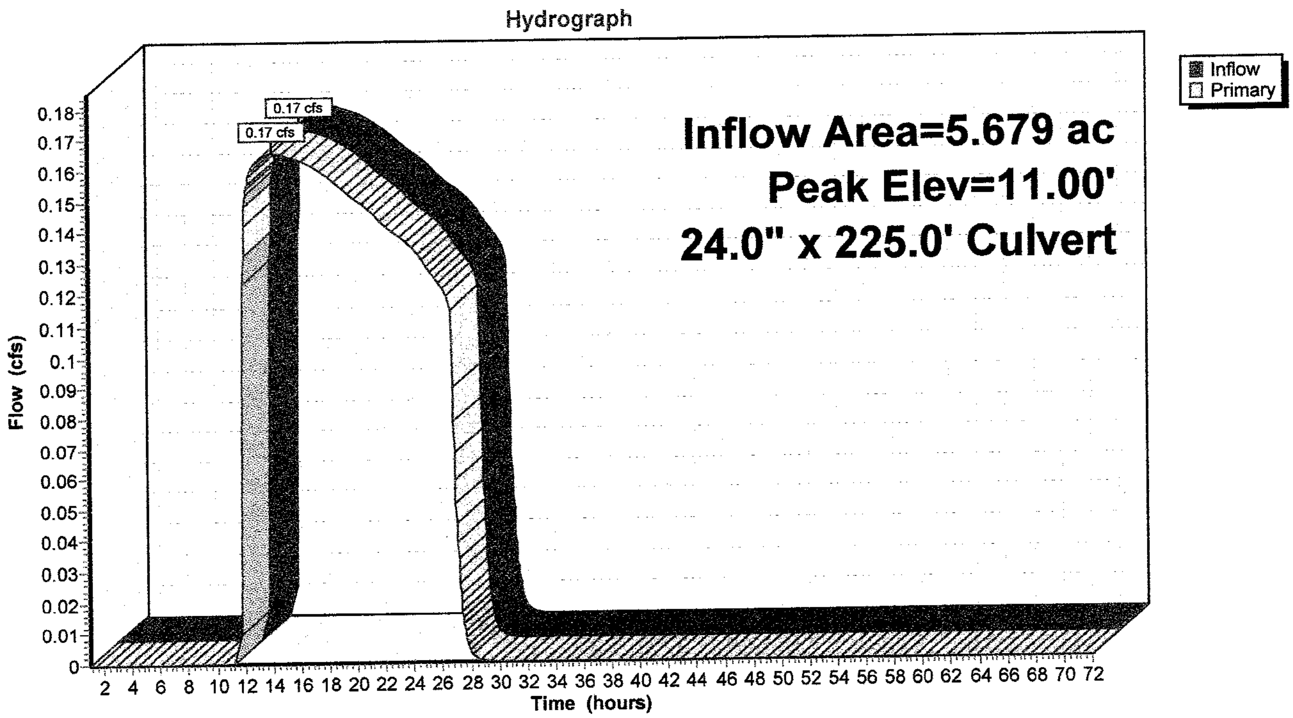
Inflow Area =	5.679 ac,	85.00% Impervious,	Inflow Depth = 0.39"	for WQv event	
Inflow =	0.17 cfs @	14.06 hrs,	Volume=	0.185 af	
Outflow =	0.17 cfs @	14.06 hrs,	Volume=	0.185 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.17 cfs @	14.06 hrs,	Volume=	0.185 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 11.00' @ 14.06 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	10.80'	**24.0" x 225.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 8.55' S= 0.0100 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior

Primary OutFlow Max=0.16 cfs @ 14.06 hrs HW=11.00' (Free Discharge)
↑—1=Culvert (Barrel Controls 0.16 cfs @ 1.55 fps)

Pond 14P: CB11

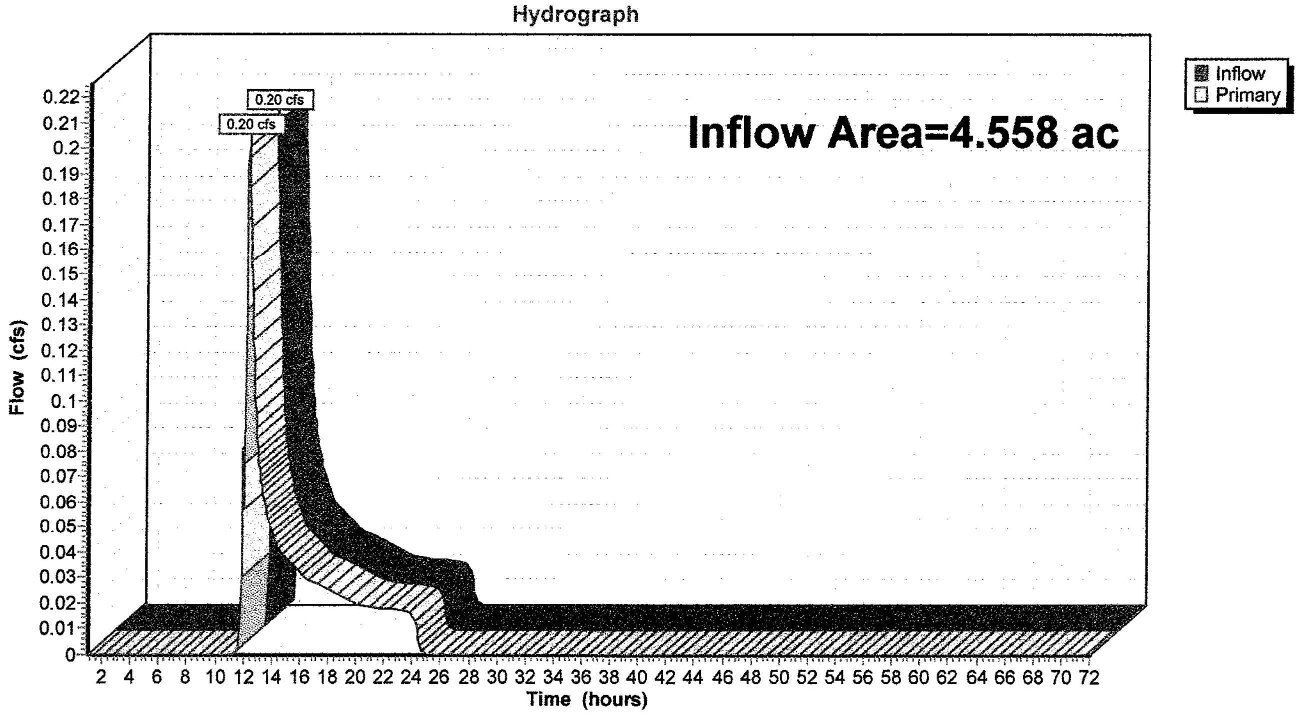


Summary for Link 9L: Outer Site at North and East

Inflow Area =	4.558 ac,	8.59% Impervious,	Inflow Depth = 0.10"	for WQv event
Inflow =	0.20 cfs @	12.31 hrs, Volume=	0.038 af	
Primary =	0.20 cfs @	12.31 hrs, Volume=	0.038 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link 9L: Outer Site at North and East

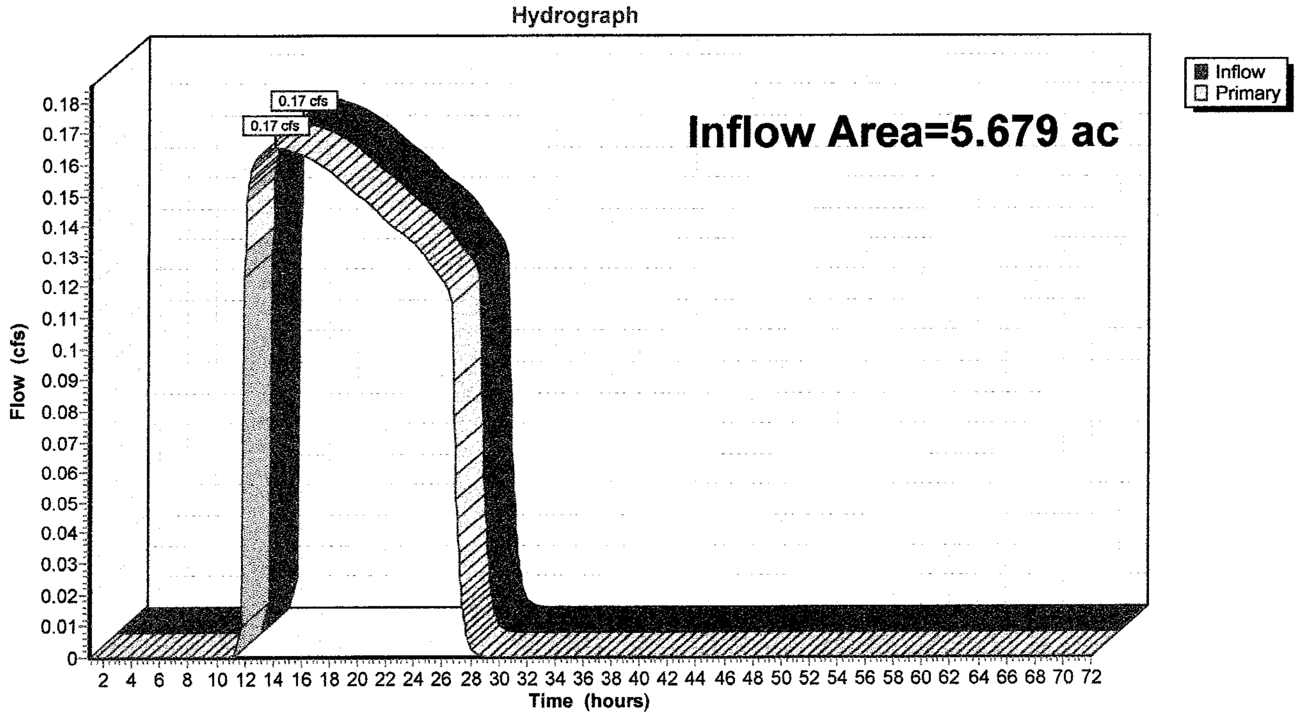


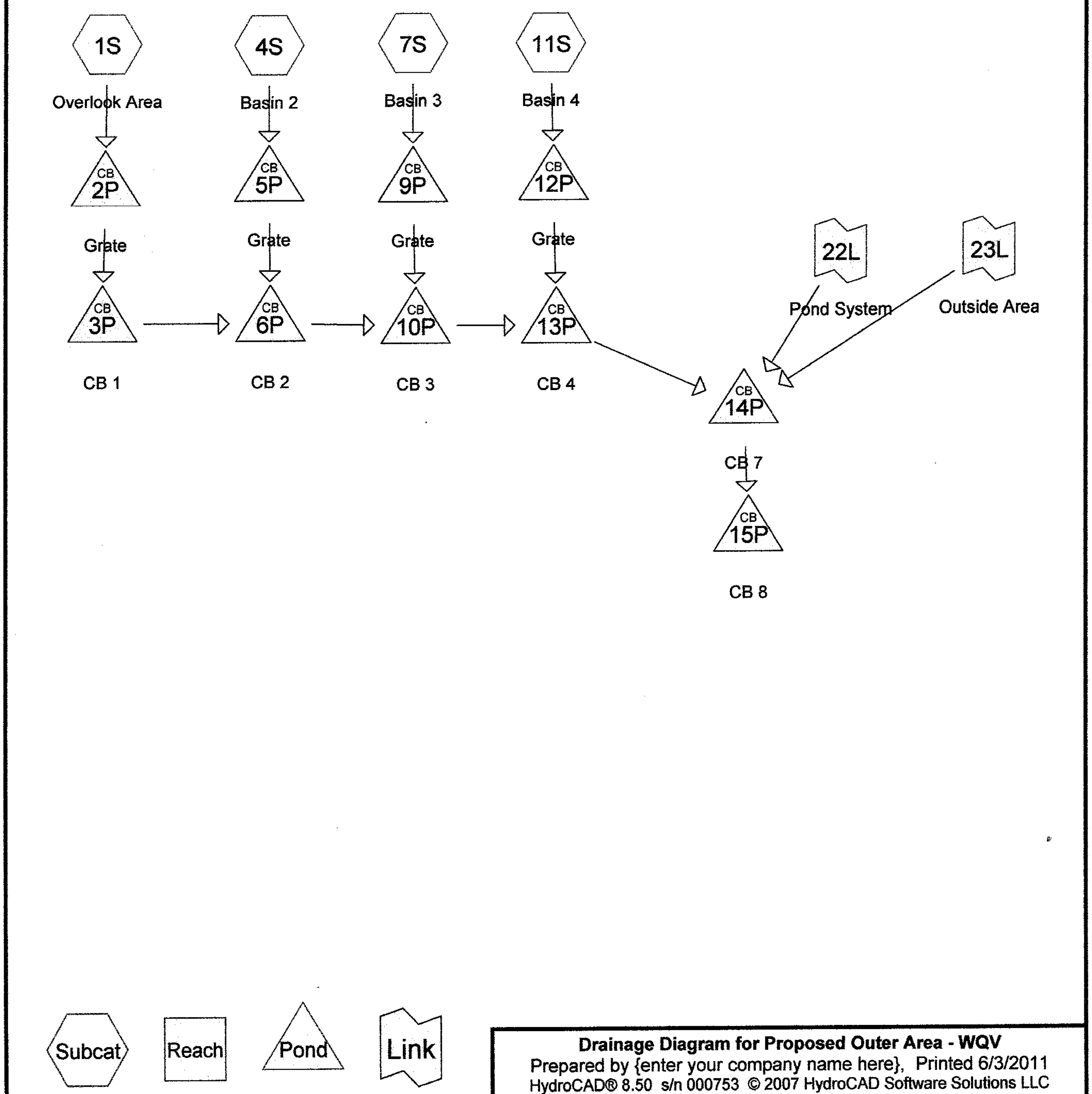
Summary for Link 10L: Pond System

Inflow Area =	5.679 ac,	85.00% Impervious,	Inflow Depth = 0.39"	for WQv event
Inflow =	0.17 cfs @	14.06 hrs, Volume=	0.185 af	
Primary =	0.17 cfs @	14.06 hrs, Volume=	0.185 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link 10L: Pond System





Drainage Diagram for Proposed Outer Area - WQV
Prepared by {enter your company name here}, Printed 6/3/2011
HydroCAD® 8.50 s/n 000753 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.103	80	>75% Grass cover, Good, HSG D (1S,4S,7S,11S)
0.616	98	Paved parking & roofs (1S,4S,7S,11S)
1.719		**TOTAL AREA**

Summary for Subcatchment 1S: Overlook Area

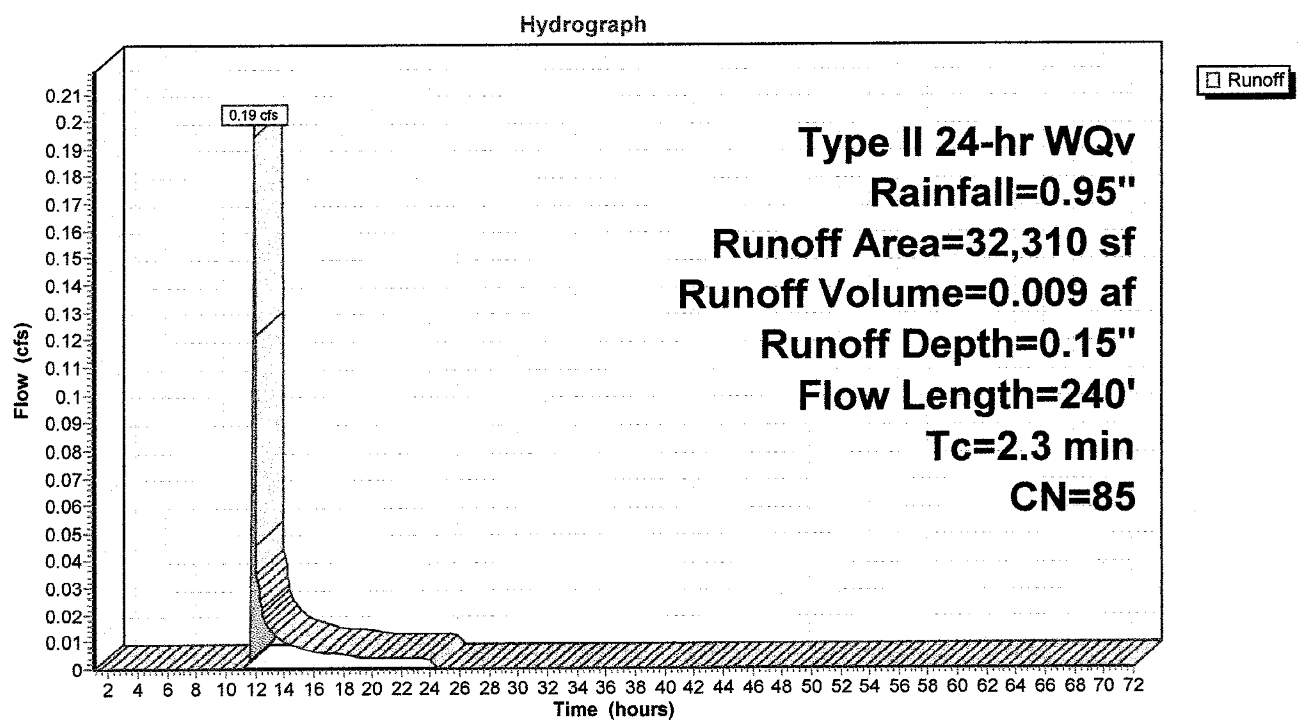
Runoff = 0.19 cfs @ 11.95 hrs, Volume= 0.009 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.95"

Area (sf)	CN	Description
3,300	98	Paved parking & roofs
3,510	98	Paved parking & roofs
950	98	Paved parking & roofs
22,565	80	>75% Grass cover, Good, HSG D
1,985	98	Paved parking & roofs
32,310	85	Weighted Average
22,565		Pervious Area
9,745		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	5	0.3300	0.17		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
1.8	235	0.0200	2.12		**Shallow Concentrated Flow, Vegetated Surface** Grassed Waterway Kv= 15.0 fps
2.3	240	Total			

Subcatchment 1S: Overlook Area



Summary for Subcatchment 4S: Basin 2

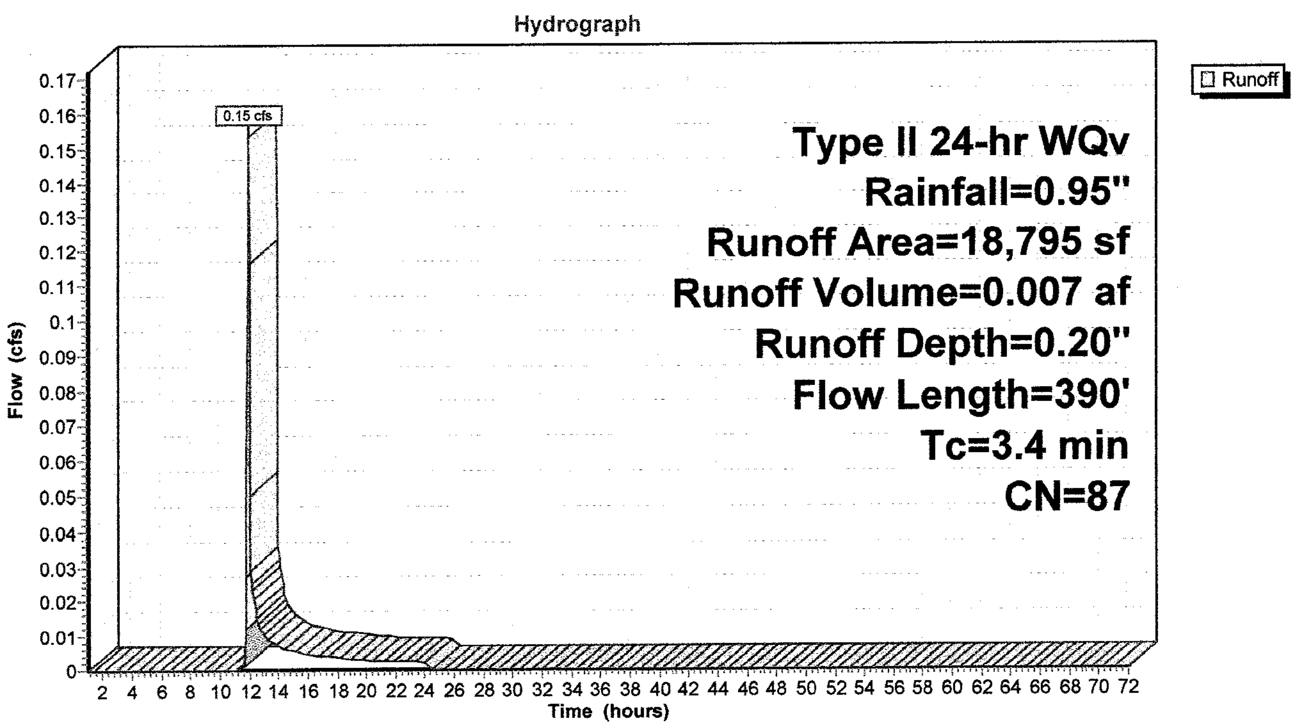
Runoff = 0.15 cfs @ 11.95 hrs, Volume= 0.007 af, Depth= 0.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.95"

Area (sf)	CN	Description
2,400	98	Paved parking & roofs
3,510	98	Paved parking & roofs
1,800	98	Paved parking & roofs
11,085	80	>75% Grass cover, Good, HSG D
18,795	87	Weighted Average
11,085		Pervious Area
7,710		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	15	0.0050	0.47		**Sheet Flow, Driveway** Smooth surfaces n= 0.011 P2= 2.40"
1.6	225	0.0260	2.42		**Shallow Concentrated Flow, Berm** Grassed Waterway Kv= 15.0 fps
1.3	150	0.0167	1.94		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
3.4	390	Total			

Subcatchment 4S: Basin 2



Summary for Subcatchment 7S: Basin 3

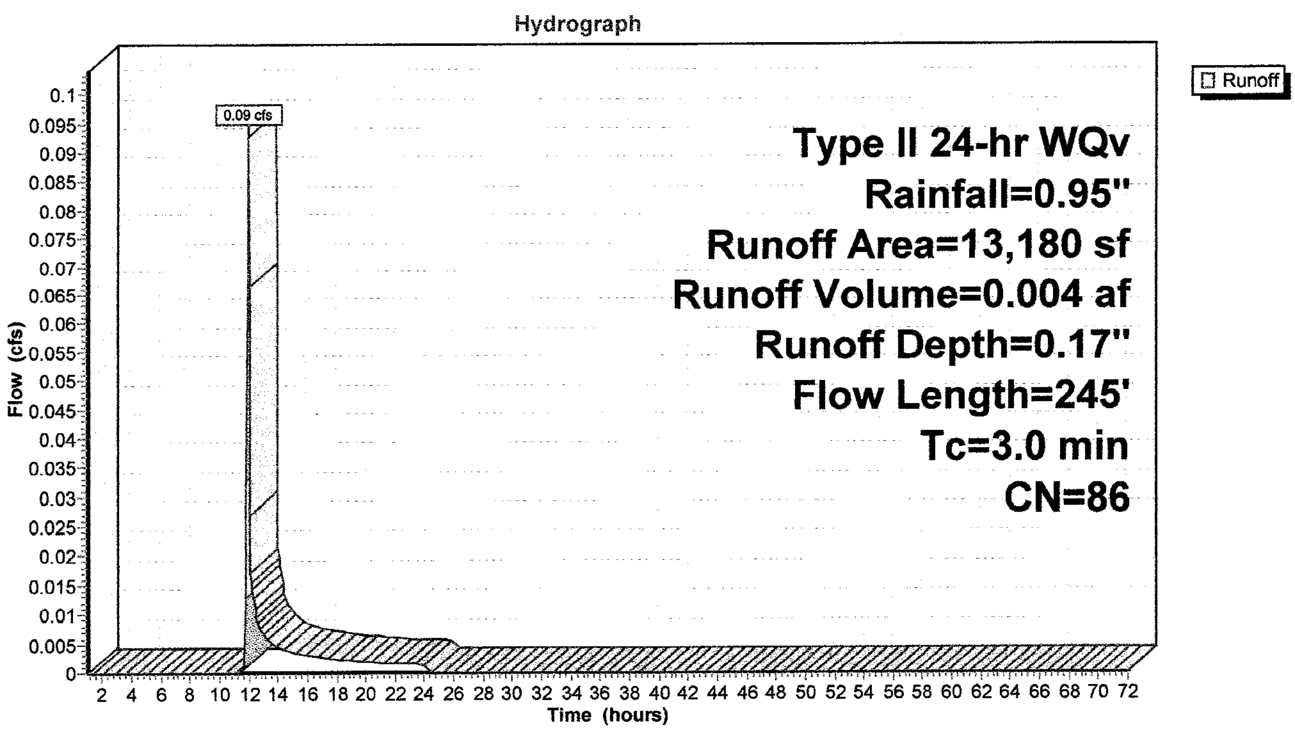
Runoff = 0.09 cfs @ 11.95 hrs, Volume= 0.004 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.95"

Area (sf)	CN	Description
1,440	98	Paved parking & roofs
2,565	98	Paved parking & roofs
475	98	Paved parking & roofs
8,700	80	>75% Grass cover, Good, HSG D
13,180	86	Weighted Average
8,700		Pervious Area
4,480		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	10	0.3300	0.20		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
1.3	160	0.0200	2.12		**Shallow Concentrated Flow, Driveway Channel** Grassed Waterway Kv= 15.0 fps
0.8	75	0.0100	1.50		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
3.0	245	Total			

Subcatchment 7S: Basin 3



Summary for Subcatchment 11S: Basin 4

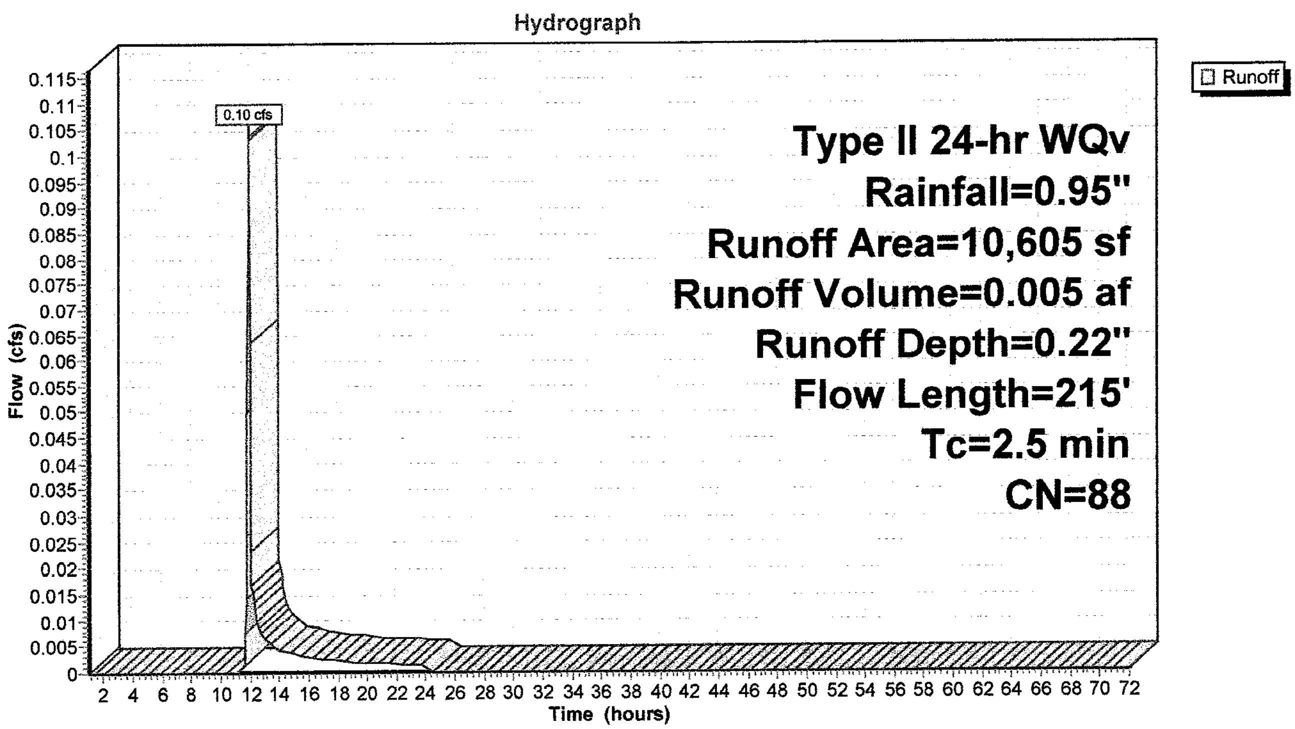
Runoff = 0.10 cfs @ 11.94 hrs, Volume= 0.005 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=0.95"

Area (sf)	CN	Description
1,500	98	Paved parking & roofs
2,565	98	Paved parking & roofs
840	98	Paved parking & roofs
5,700	80	>75% Grass cover, Good, HSG D
10,605	88	Weighted Average
5,700		Pervious Area
4,905		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	10	0.3300	0.20		**Sheet Flow, Driveway** Grass: Dense n= 0.240 P2= 2.40"
1.2	150	0.0200	2.12		**Shallow Concentrated Flow, Driveway Channel** Grassed Waterway Kv= 15.0 fps
0.4	55	0.0200	2.12		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
2.5	215	Total			

Subcatchment 11S: Basin 4



Summary for Pond 2P: Grate

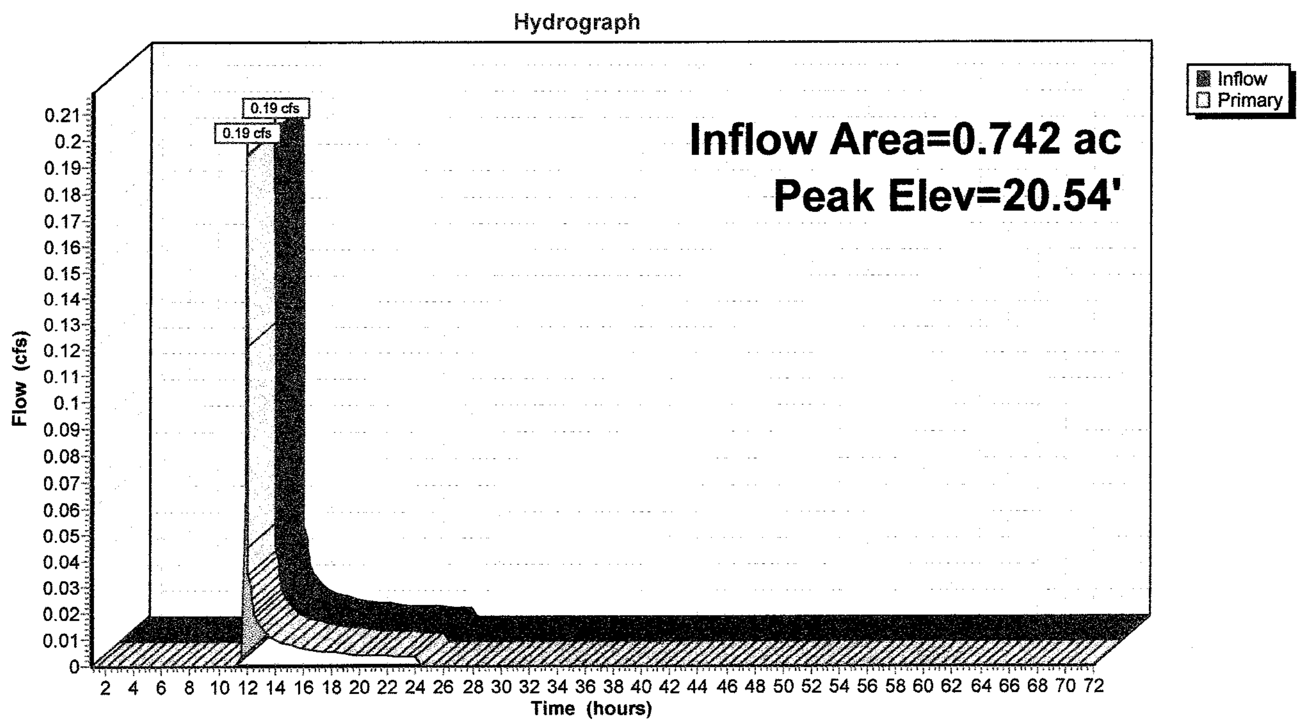
Inflow Area =	0.742 ac,	30.16% Impervious,	Inflow Depth = 0.15"	for WQv event	
Inflow =	0.19 cfs @	11.95 hrs,	Volume=	0.009 af	
Outflow =	0.19 cfs @	11.95 hrs,	Volume=	0.009 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.19 cfs @	11.95 hrs,	Volume=	0.009 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 20.54' @ 11.95 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	20.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.19 cfs @ 11.95 hrs HW=20.54' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 0.19 cfs @ 0.69 fps)

Pond 2P: Grate



Summary for Pond 3P: CB 1

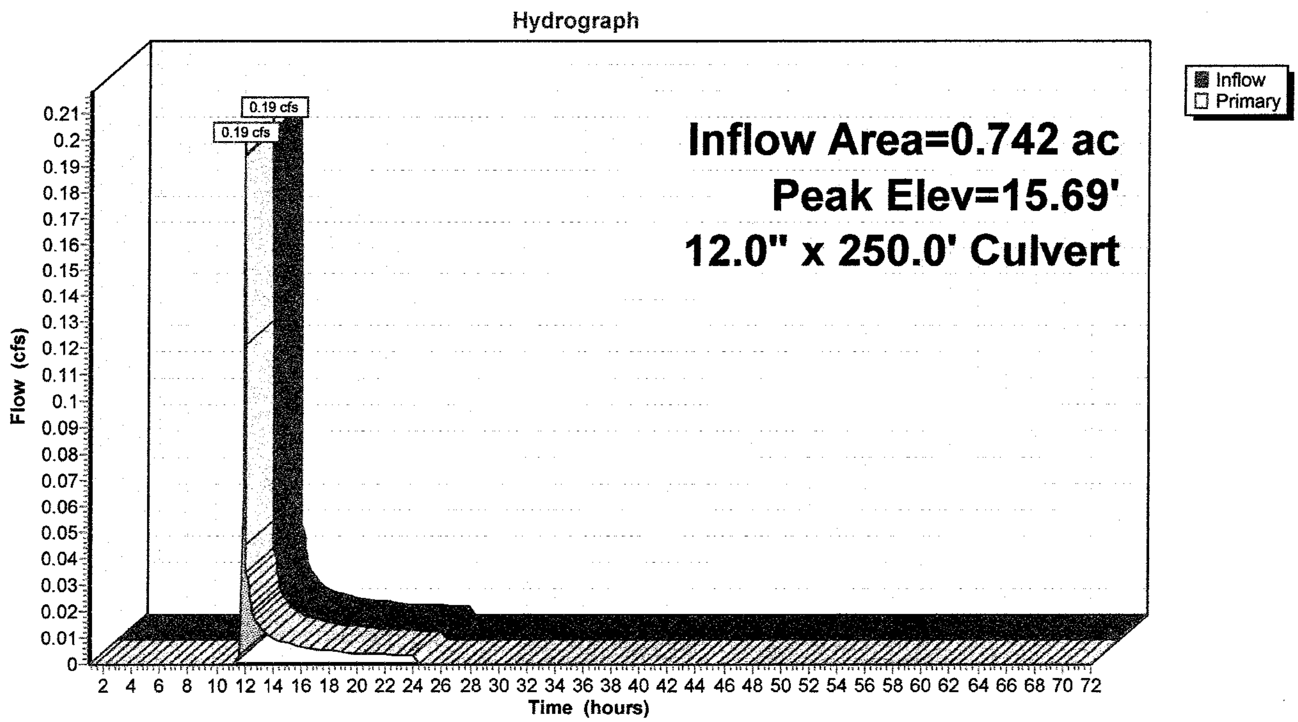
Inflow Area = 0.742 ac, 30.16% Impervious, Inflow Depth = 0.15" for WQv event
Inflow = 0.19 cfs @ 11.95 hrs, Volume= 0.009 af
Outflow = 0.19 cfs @ 11.95 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min
Primary = 0.19 cfs @ 11.95 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 15.69' @ 11.95 hrs
Flood Elev= 20.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	15.43'	**12.0" x 250.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 14.28' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.19 cfs @ 11.95 hrs HW=15.69' TW=15.00' (Fixed TW Elev= 15.00')
↑—**1=Culvert** (Outlet Controls 0.19 cfs @ 1.76 fps)

Pond 3P: CB 1



Summary for Pond 5P: Grate

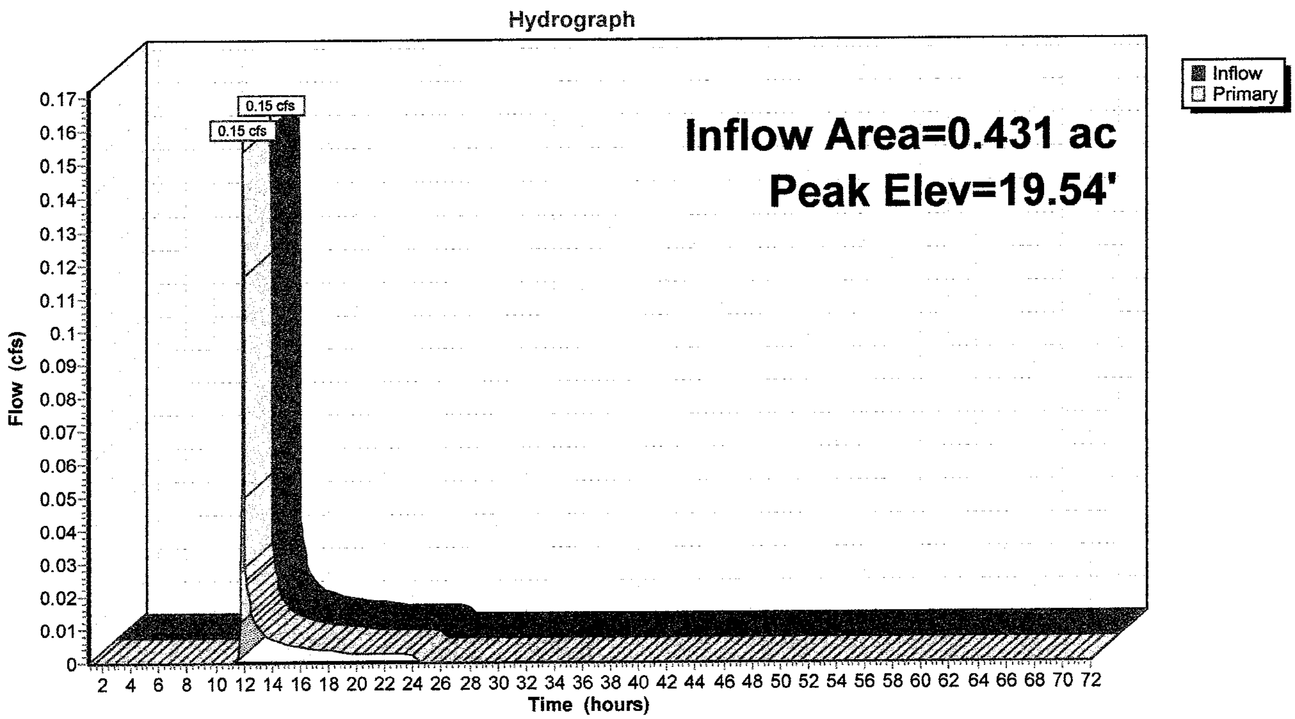
Inflow Area =	0.431 ac,	41.02% Impervious,	Inflow Depth = 0.20"	for WQv event	
Inflow =	0.15 cfs @	11.95 hrs,	Volume=	0.007 af	
Outflow =	0.15 cfs @	11.95 hrs,	Volume=	0.007 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.15 cfs @	11.95 hrs,	Volume=	0.007 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 19.54' @ 11.95 hrs
Flood Elev= 20.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	19.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.15 cfs @ 11.95 hrs HW=19.54' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 0.15 cfs @ 0.64 fps)

Pond 5P: Grate



Summary for Pond 6P: CB 2

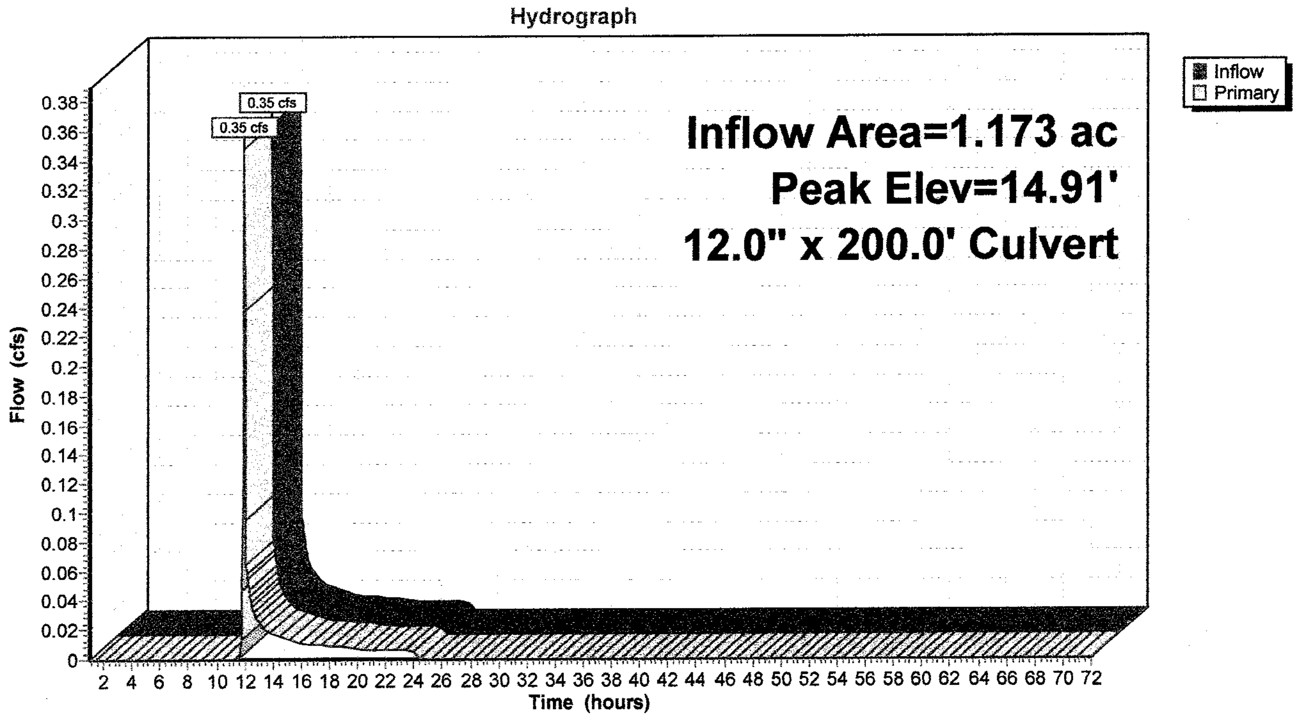
Inflow Area =	1.173 ac,	34.16% Impervious,	Inflow Depth = 0.17"	for WQv event		
Inflow =	0.35 cfs @	11.95 hrs,	Volume=	0.016 af		
Outflow =	0.35 cfs @	11.95 hrs,	Volume=	0.016 af,	Atten= 0%,	Lag= 0.0 min
Primary =	0.35 cfs @	11.95 hrs,	Volume=	0.016 af		

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 14.91' @ 11.95 hrs
Flood Elev= 19.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.58'	**12.0" x 200.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.67' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.34 cfs @ 11.95 hrs HW=14.91' TW=14.15' (Fixed TW Elev= 14.15')
↑—**1=Culvert** (Outlet Controls 0.34 cfs @ 2.29 fps)

Pond 6P: CB 2



Summary for Pond 9P: Grate

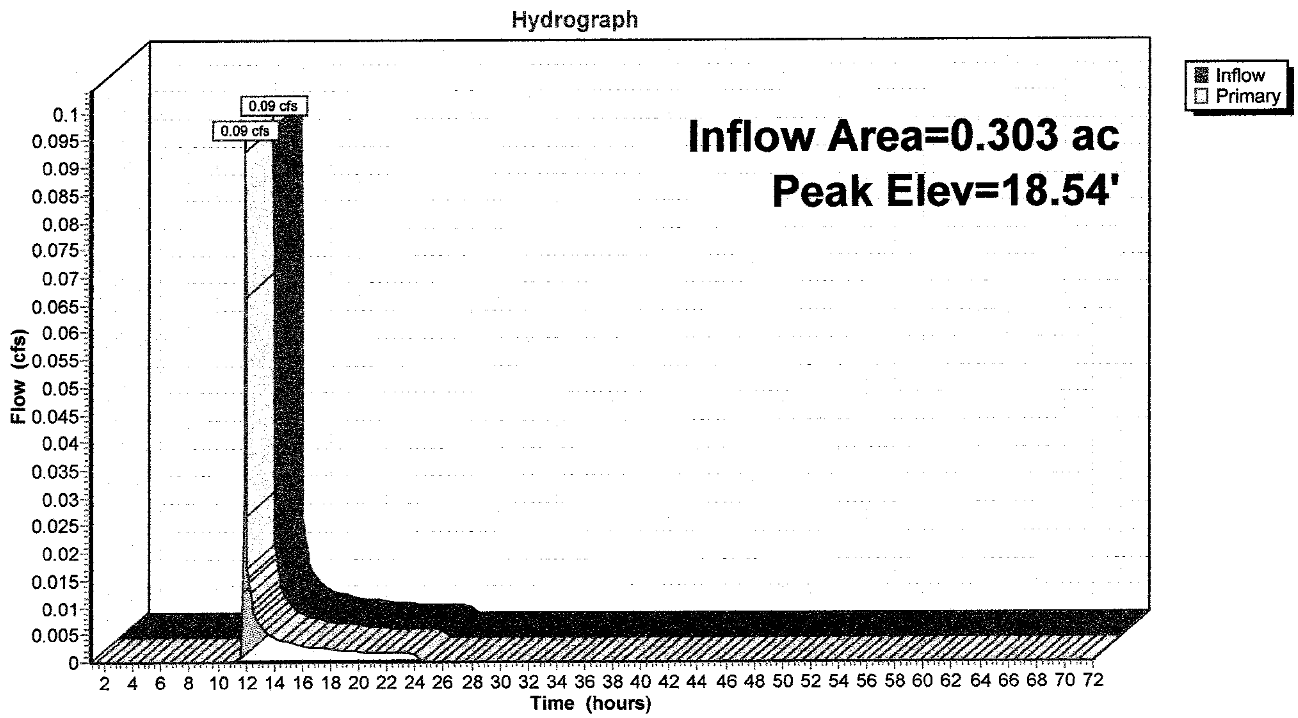
Inflow Area = 0.303 ac, 33.99% Impervious, Inflow Depth = 0.17" for WQv event
Inflow = 0.09 cfs @ 11.95 hrs, Volume= 0.004 af
Outflow = 0.09 cfs @ 11.95 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min
Primary = 0.09 cfs @ 11.95 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.54' @ 11.95 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**12.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.09 cfs @ 11.95 hrs HW=18.54' (Free Discharge)
1=Orifice/Grate (Weir Controls 0.09 cfs @ 0.68 fps)

Pond 9P: Grate



Summary for Pond 10P: CB 3

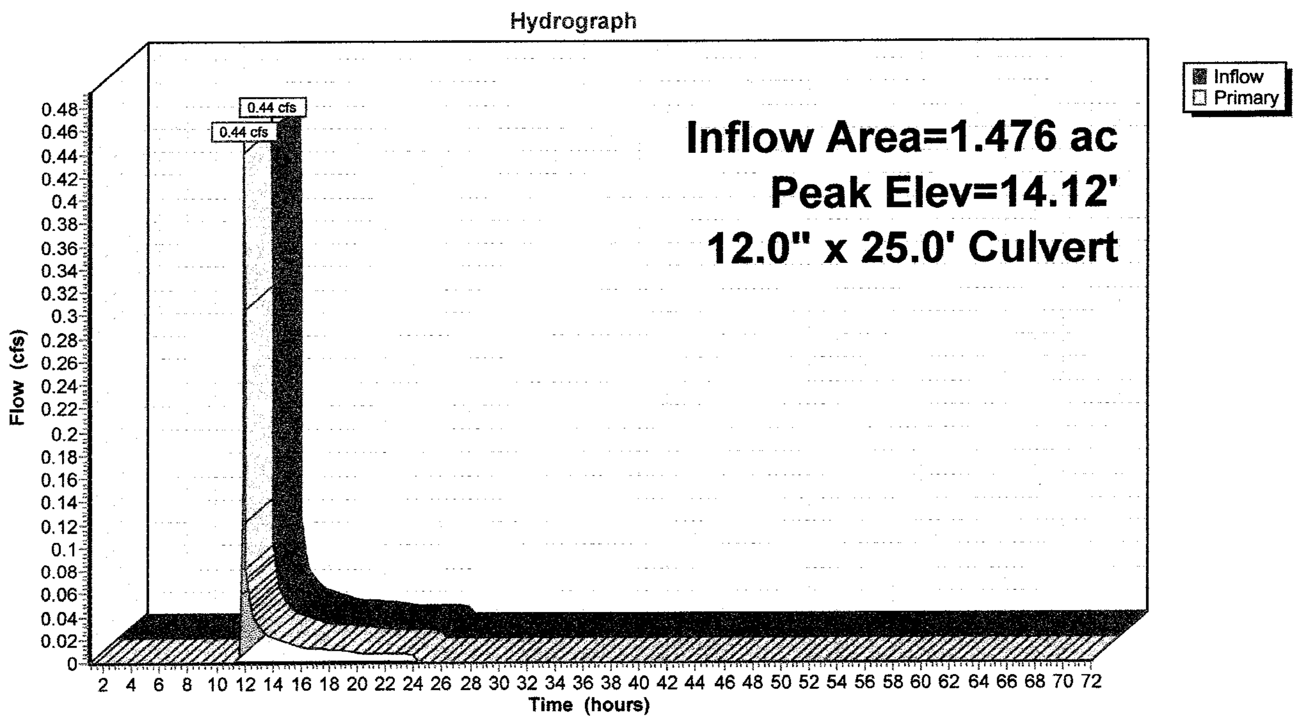
Inflow Area = 1.476 ac, 34.12% Impervious, Inflow Depth = 0.17" for WQv event
Inflow = 0.44 cfs @ 11.95 hrs, Volume= 0.021 af
Outflow = 0.44 cfs @ 11.95 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min
Primary = 0.44 cfs @ 11.95 hrs, Volume= 0.021 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 14.12' @ 11.95 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.67'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.60' S= 0.0028 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.44 cfs @ 11.95 hrs HW=14.12' TW=14.00' (Fixed TW Elev= 14.00')
↑—**1=Culvert** (Outlet Controls 0.44 cfs @ 1.87 fps)

Pond 10P: CB 3



Summary for Pond 12P: Grate

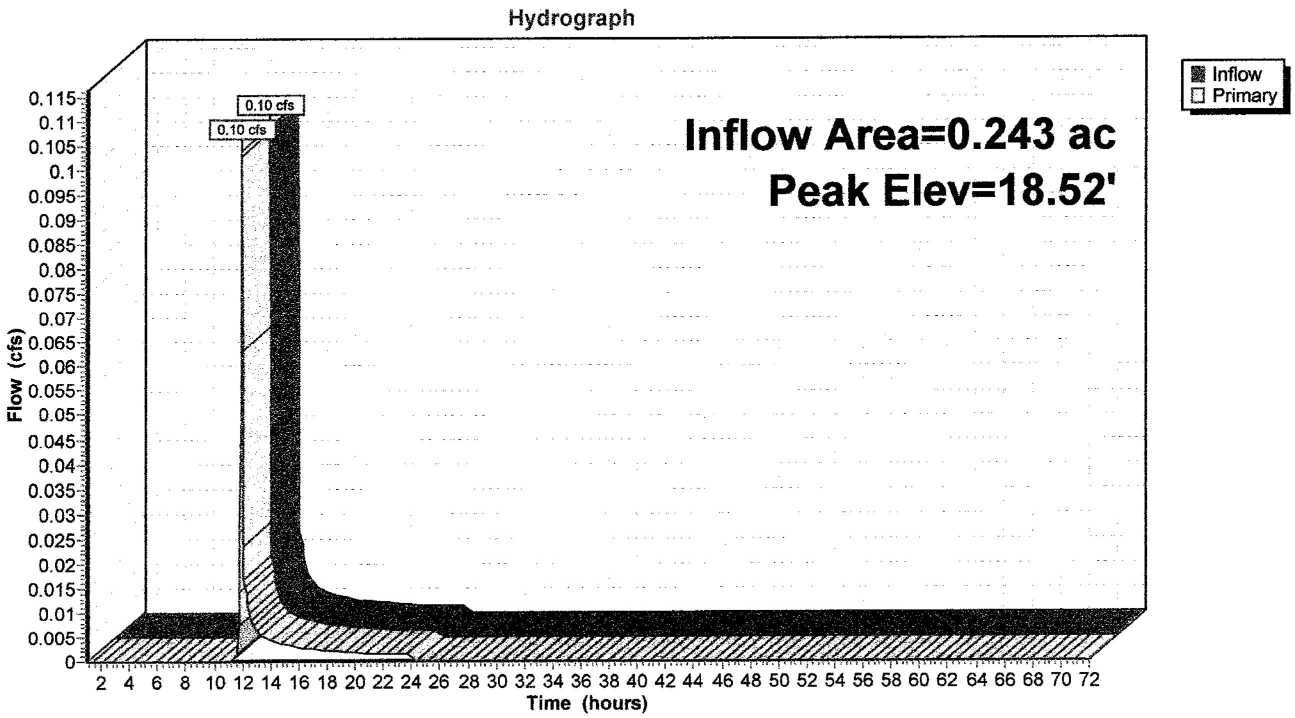
Inflow Area = 0.243 ac, 46.25% Impervious, Inflow Depth = 0.22" for WQv event
Inflow = 0.10 cfs @ 11.94 hrs, Volume= 0.005 af
Outflow = 0.10 cfs @ 11.94 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min
Primary = 0.10 cfs @ 11.94 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.52' @ 11.94 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**24.0" Horiz. Orifice/Grate X 2.00** Limited to weir flow C= 0.600

Primary OutFlow Max=0.10 cfs @ 11.94 hrs HW=18.52' (Free Discharge)
1=Orifice/Grate (Weir Controls 0.10 cfs @ 0.44 fps)

Pond 12P: Grate



Summary for Pond 13P: CB 4

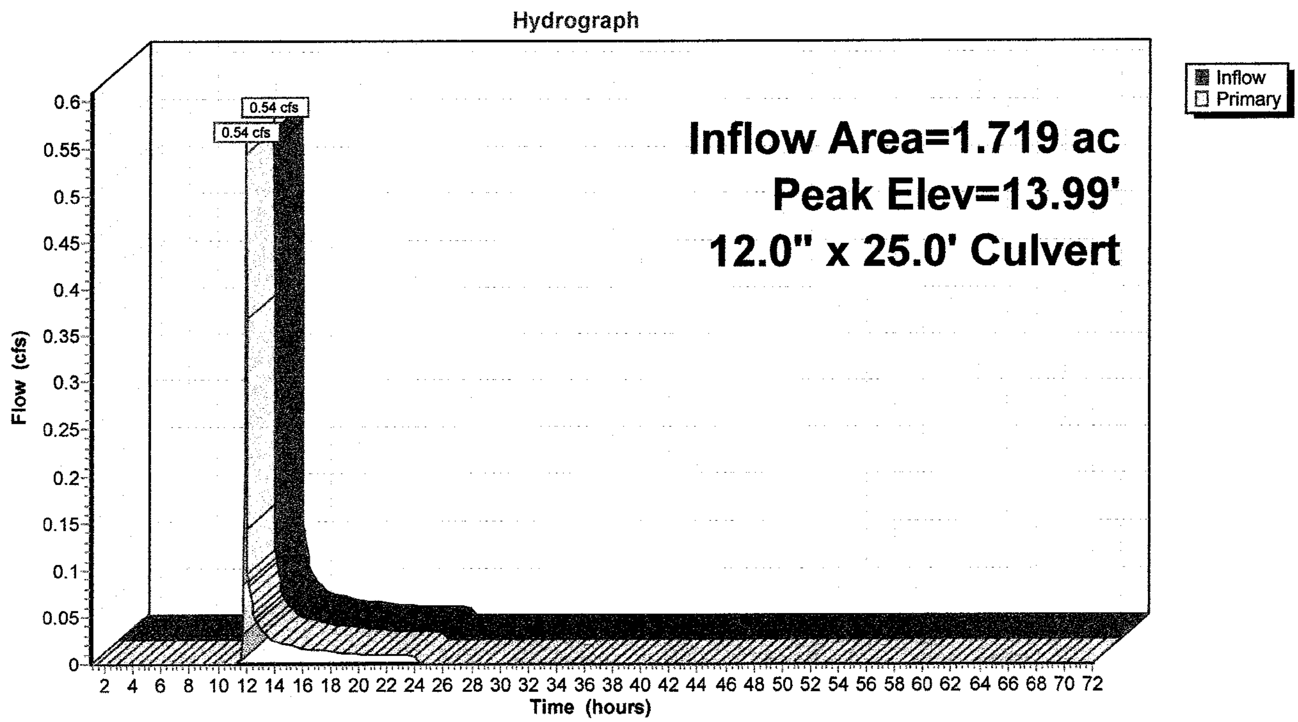
Inflow Area =	1.719 ac,	35.84% Impervious,	Inflow Depth = 0.18"	for WQv event	
Inflow =	0.54 cfs @	11.95 hrs,	Volume=	0.025 af	
Outflow =	0.54 cfs @	11.95 hrs,	Volume=	0.025 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.54 cfs @	11.95 hrs,	Volume=	0.025 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 13.99' @ 11.95 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.60'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.40' S= 0.0080 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.53 cfs @ 11.95 hrs HW=13.98' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.53 cfs @ 2.87 fps)

Pond 13P: CB 4



Summary for Pond 14P: CB 7

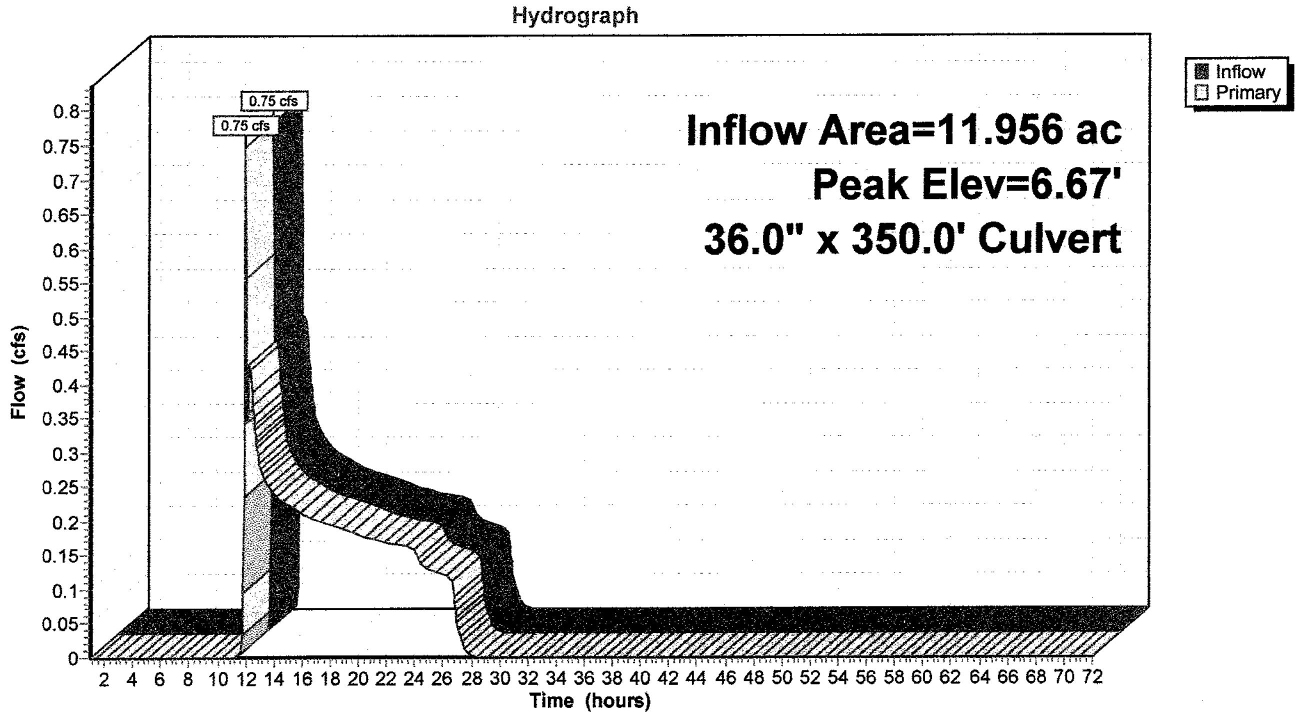
Inflow Area =	11.956 ac, 48.80% Impervious,	Inflow Depth = 0.25"	for WQv event	
Inflow =	0.75 cfs @ 11.95 hrs,	Volume=	0.249 af	
Outflow =	0.75 cfs @ 11.95 hrs,	Volume=	0.249 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.75 cfs @ 11.95 hrs,	Volume=	0.249 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 6.67' @ 11.95 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	6.30'	**36.0" x 350.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 5.37' S= 0.0027 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.74 cfs @ 11.95 hrs HW=6.67' TW=5.75' (Fixed TW Elev= 5.75')
1=Culvert (Outlet Controls 0.74 cfs @ 2.24 fps)

Pond 14P: CB 7



Summary for Pond 15P: CB 8

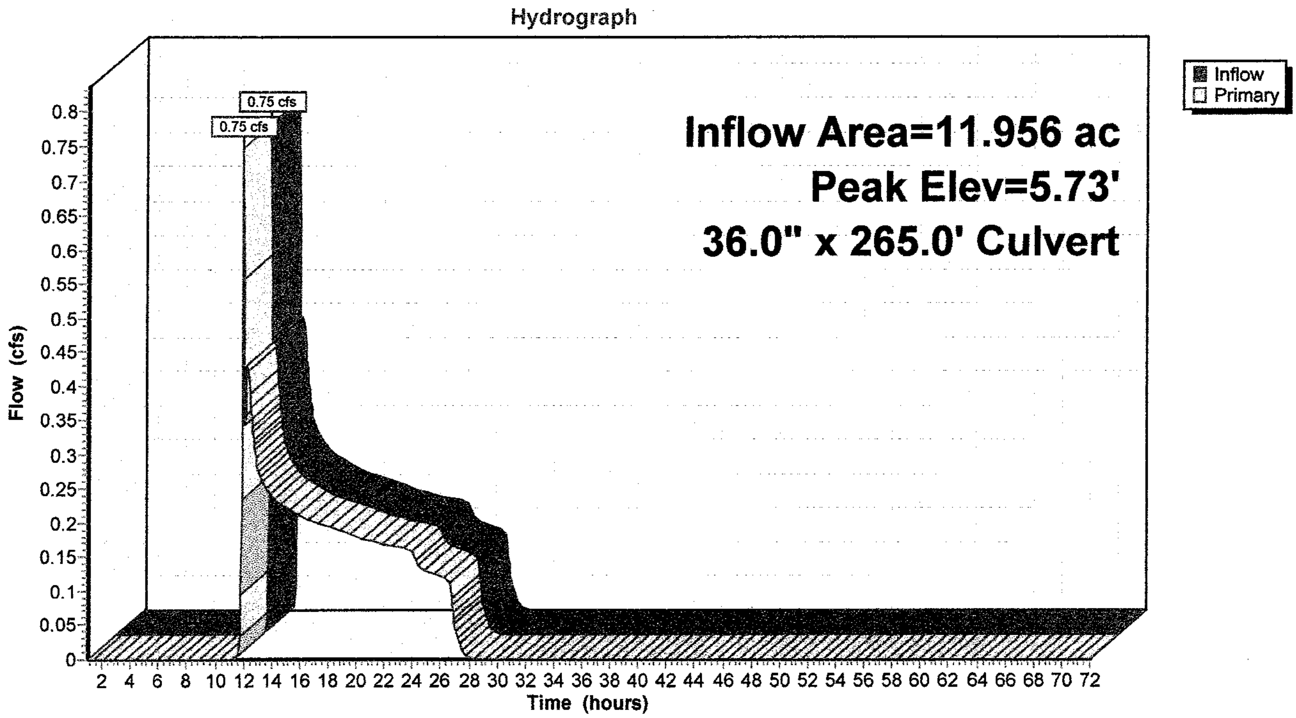
Inflow Area =	11.956 ac, 48.80% Impervious, Inflow Depth = 0.25"	for WQv event
Inflow =	0.75 cfs @ 11.95 hrs, Volume=	0.249 af
Outflow =	0.75 cfs @ 11.95 hrs, Volume=	0.249 af, Atten= 0%, Lag= 0.0 min
Primary =	0.75 cfs @ 11.95 hrs, Volume=	0.249 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 5.73' @ 11.95 hrs
Flood Elev= 22.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5.37'	**36.0" x 265.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 4.68' S= 0.0026 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.72 cfs @ 11.95 hrs HW=5.73' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.72 cfs @ 2.29 fps)

Pond 15P: CB 8



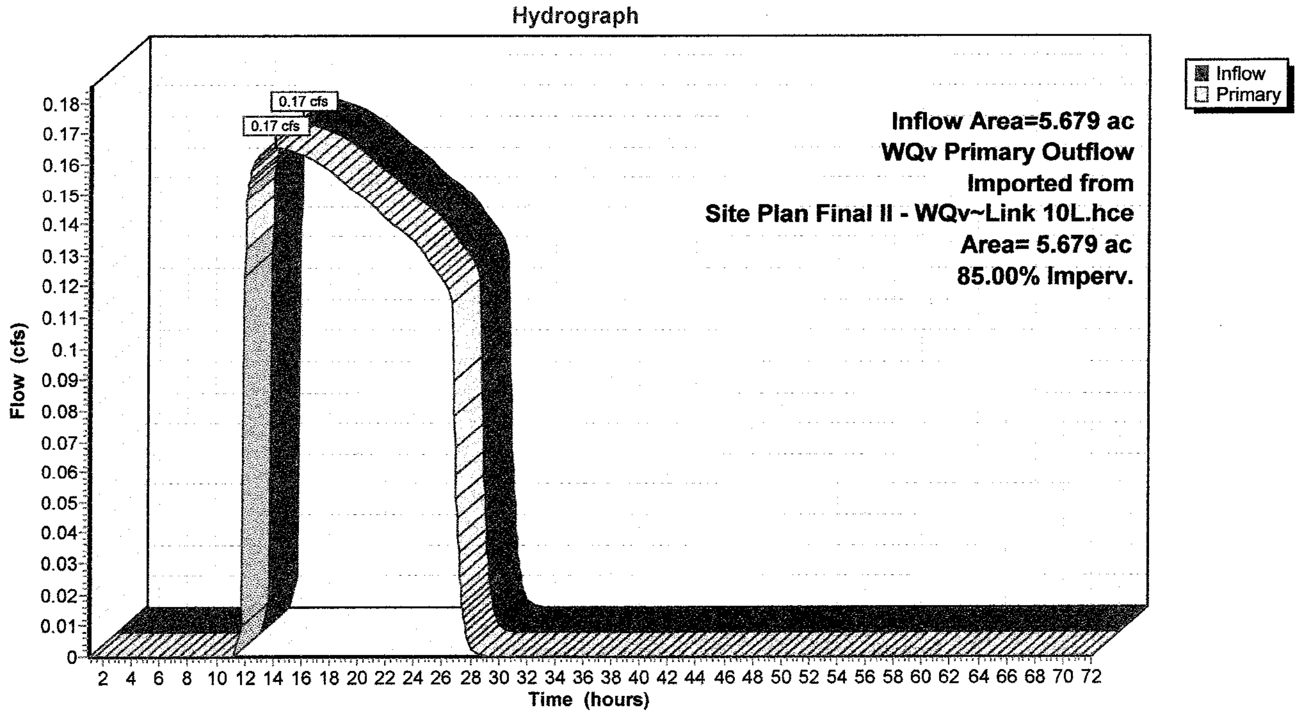
Summary for Link 22L: Pond System

Inflow Area =	5.679 ac, 85.00% Impervious, Inflow Depth = 0.39"	for WQv event	
Inflow =	0.17 cfs @ 14.06 hrs, Volume=	0.185 af	
Primary =	0.17 cfs @ 14.06 hrs, Volume=	0.185 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

WQv Primary Outflow Imported from Site Plan Final II - WQv~Link 10L.hce

Link 22L: Pond System



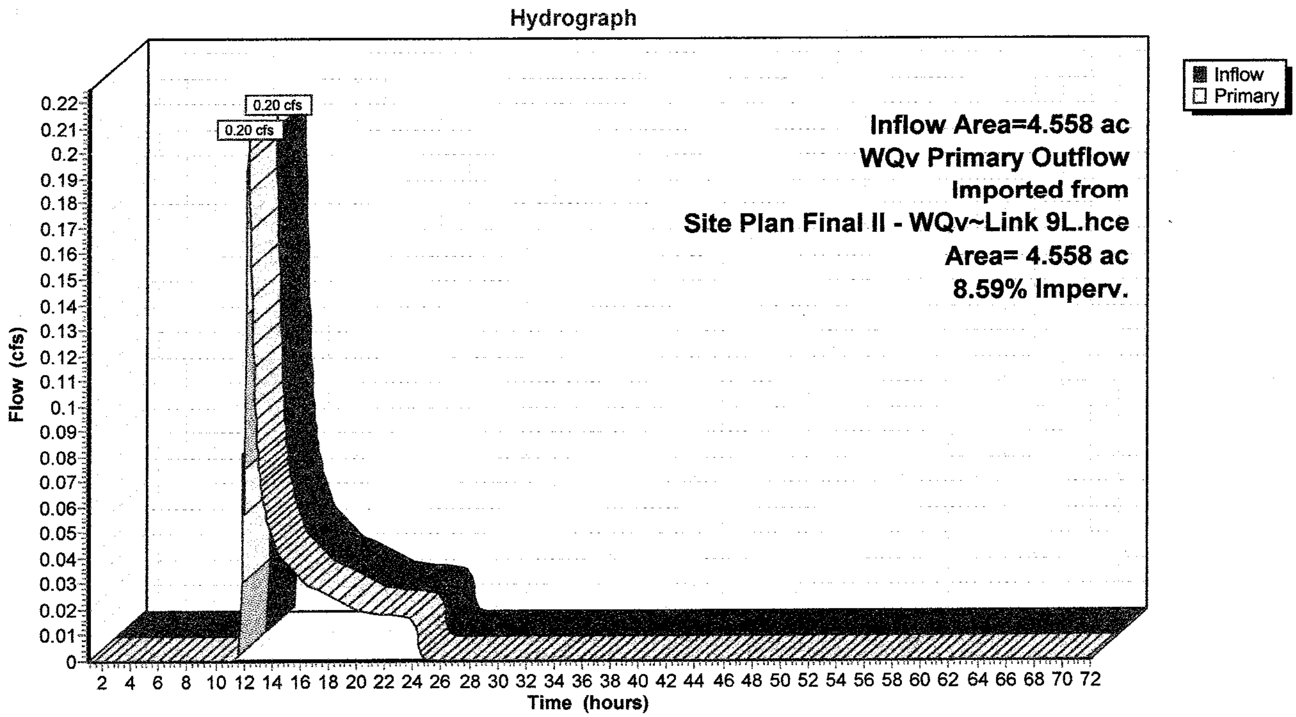
Summary for Link 23L: Outside Area

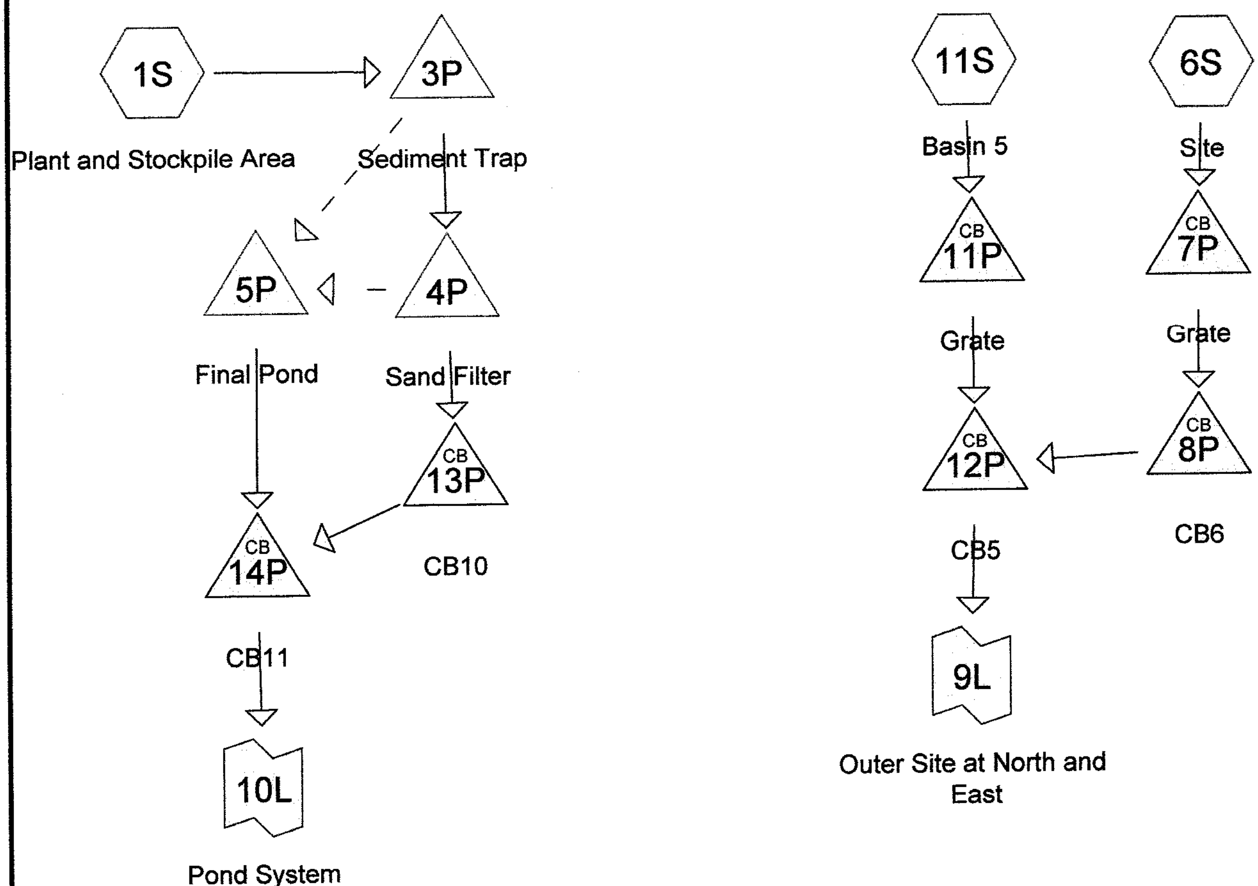
Inflow Area =	4.558 ac,	8.59% Impervious,	Inflow Depth = 0.10"	for WQv event	
Inflow =	0.20 cfs @	12.31 hrs,	Volume=	0.038 af	
Primary =	0.20 cfs @	12.31 hrs,	Volume=	0.038 af,	Atten= 0%, Lag= 0.0 min

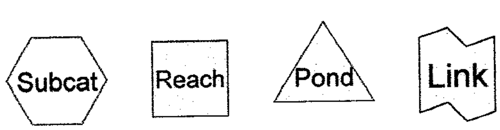
Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

WQv Primary Outflow Imported from Site Plan Final II - WQv~Link 9L.hce

Link 23L: Outside Area







Drainage Diagram for Site Plan Final II - 1 Yr
Prepared by {enter your company name here}, Printed 6/3/2011
HydroCAD® 8.50 s/n 000753 © 2007 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Plant and Stockpile Area

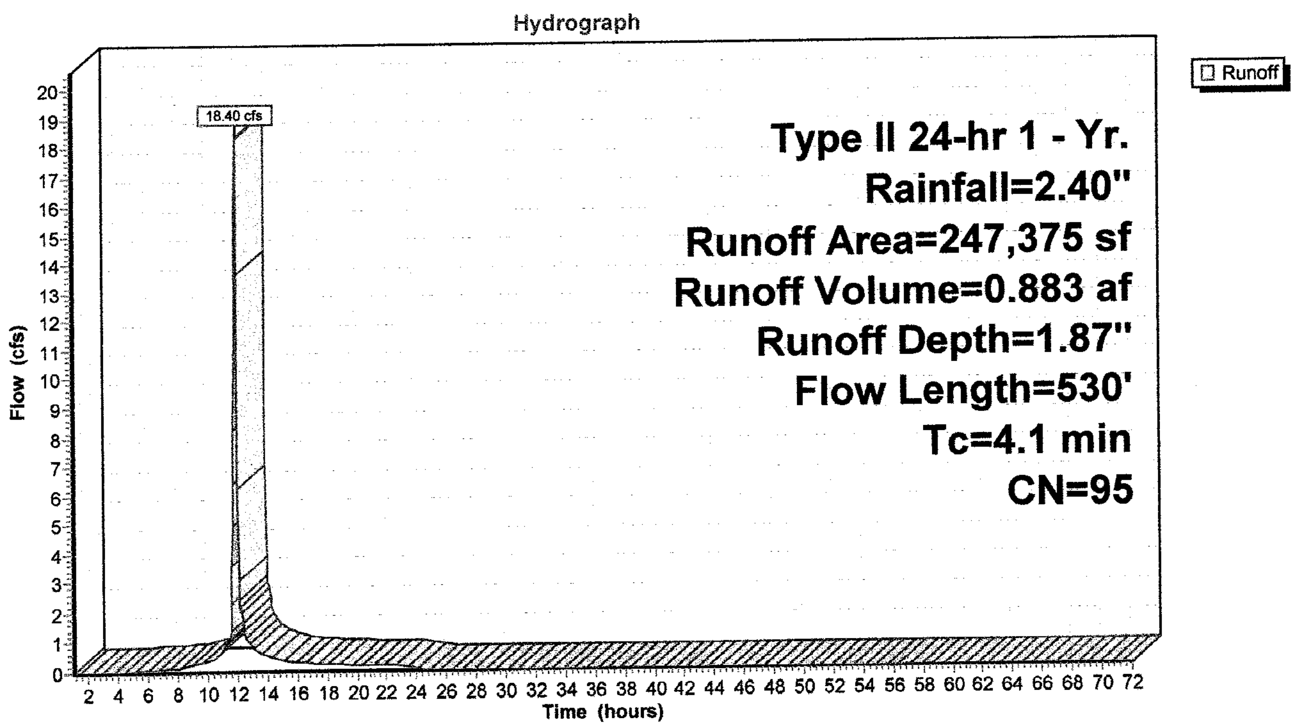
Runoff = 18.40 cfs @ 11.94 hrs, Volume= 0.883 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 - Yr. Rainfall=2.40"

Area (sf)	CN	Description
247,375	95	Urban commercial, 85% imp, HSG D
37,106		Pervious Area
210,269		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0200	1.19		**Sheet Flow, Top of Stockpile Area** Smooth surfaces n= 0.011 P2= 2.40"
2.0	280	0.0200	2.28		**Shallow Concentrated Flow, Stockpile Area** Unpaved Kv= 16.1 fps
0.7	150	0.0100	3.67	52.36	**Trap/Vee/Rect Channel Flow, Stockpile Perimeter** Bot.W=5.00' D=1.50' Z= 3.0 '/' Top.W=14.00' n= 0.040 Earth, cobble bottom, clean sides
4.1	530	Total			

Subcatchment 1S: Plant and Stockpile Area



Summary for Subcatchment 6S: Site

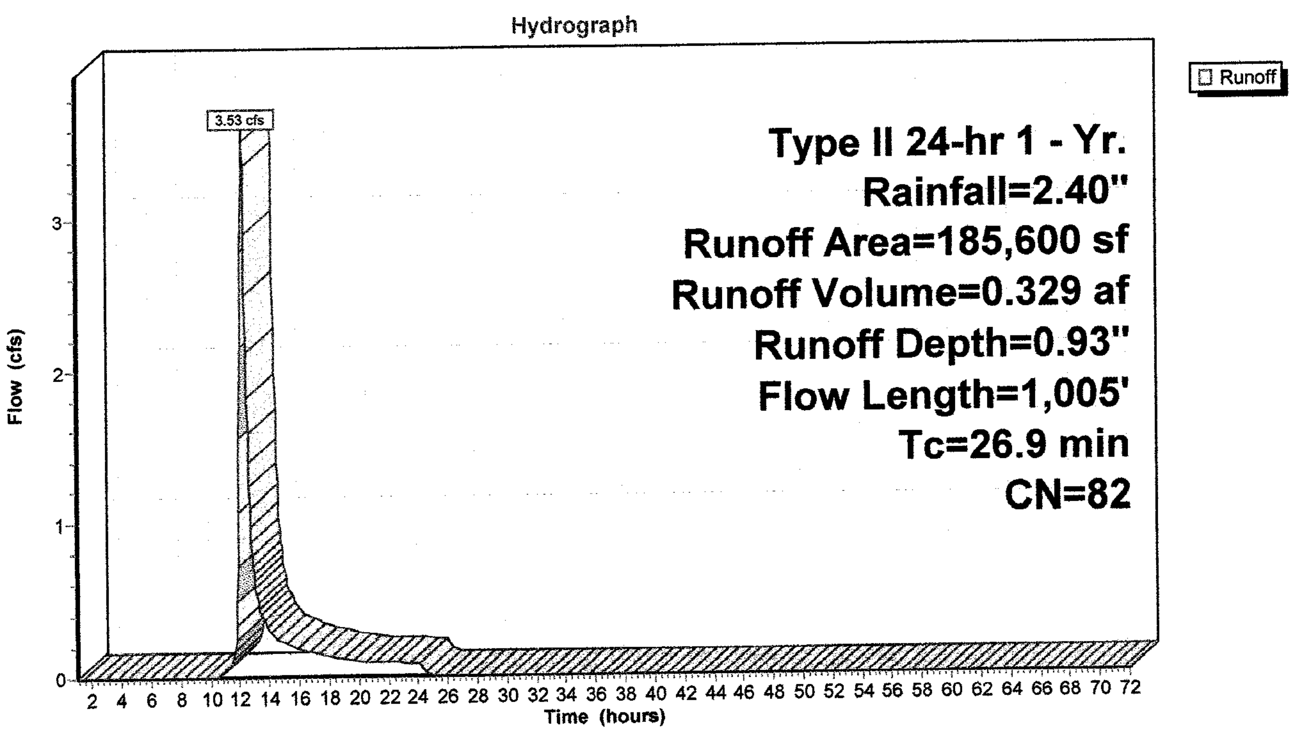
Runoff = 3.53 cfs @ 12.22 hrs, Volume= 0.329 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 - Yr. Rainfall=2.40"

Area (sf)	CN	Description
8,940	98	Paved parking & roofs
4,530	98	Paved parking & roofs
18,240	82	Woods/grass comb., Poor, HSG C
153,890	80	>75% Grass cover, Good, HSG D
185,600	82	Weighted Average
172,130		Pervious Area
13,470		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.3300	0.22		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
11.4	420	0.0150	0.61		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
14.0	565	0.0020	0.67		**Shallow Concentrated Flow, Tracks** Grassed Waterway Kv= 15.0 fps
26.9	1,005	Total			

Subcatchment 6S: Site



Summary for Subcatchment 11S: Basin 5

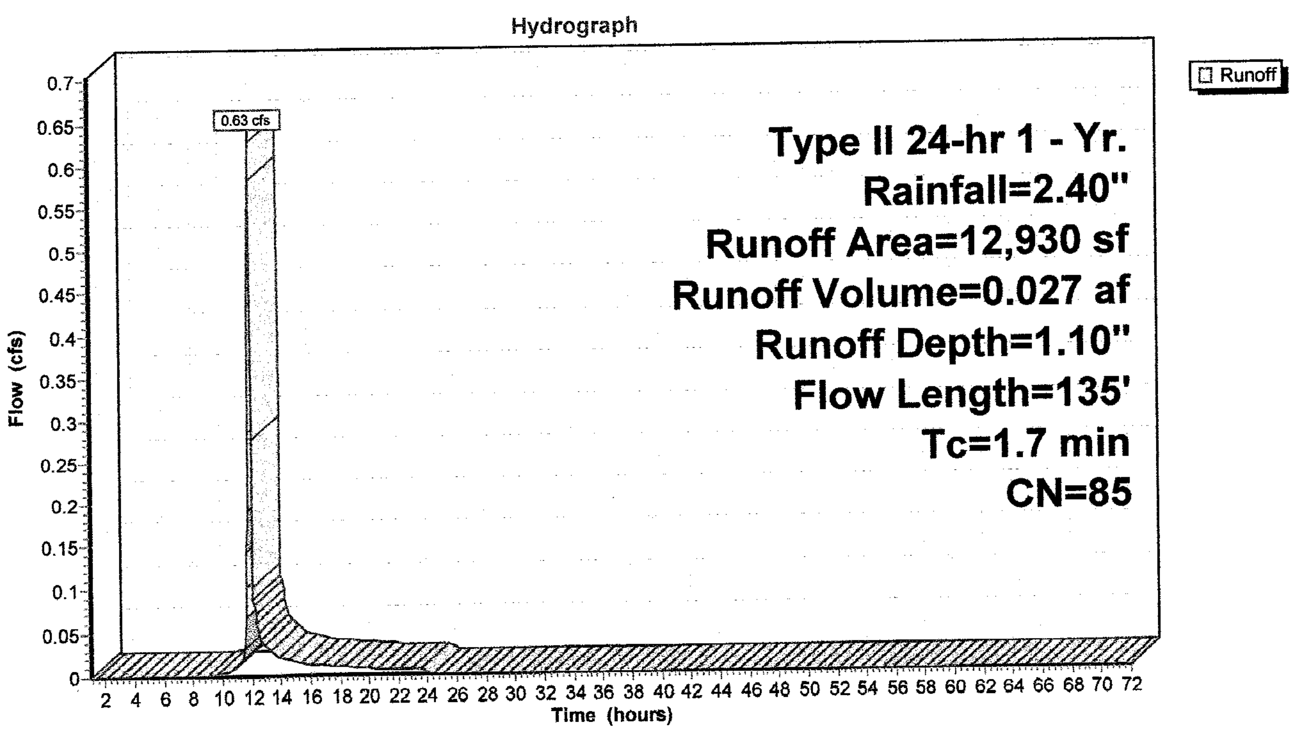
Runoff = 0.63 cfs @ 11.92 hrs, Volume= 0.027 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 - Yr. Rainfall=2.40"

Area (sf)	CN	Description
2,460	98	Paved parking & roofs
1,120	98	Paved parking & roofs
9,350	80	>75% Grass cover, Good, HSG D
12,930	85	Weighted Average
9,350		Pervious Area
3,580		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	10	0.3300	0.20		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
0.8	125	0.0280	2.51		**Shallow Concentrated Flow, Outer Area** Grassed Waterway Kv= 15.0 fps
1.7	135	Total			

Subcatchment 11S: Basin 5



Summary for Pond 3P: Sediment Trap

Inflow Area = 5.679 ac, 85.00% Impervious, Inflow Depth = 1.87" for 1 - Yr. event
Inflow = 18.40 cfs @ 11.94 hrs, Volume= 0.883 af
Outflow = 17.74 cfs @ 11.95 hrs, Volume= 0.797 af, Atten= 4%, Lag= 0.7 min
Primary = 8.58 cfs @ 11.95 hrs, Volume= 0.695 af
Secondary = 9.17 cfs @ 11.95 hrs, Volume= 0.102 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 17.35' Surf.Area= 1,162 sf Storage= 1,168 cf
Peak Elev= 20.23' @ 11.95 hrs Surf.Area= 2,977 sf Storage= 6,935 cf (5,767 cf above start)
Flood Elev= 21.00' Surf.Area= 3,600 sf Storage= 9,449 cf (8,281 cf above start)

Plug-Flow detention time= 95.3 min calculated for 0.770 af (87% of inflow)
Center-of-Mass det. time= 28.6 min (813.9 - 785.3)

Volume	Invert	Avail.Storage	Storage Description
#1	16.00'	9,449 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

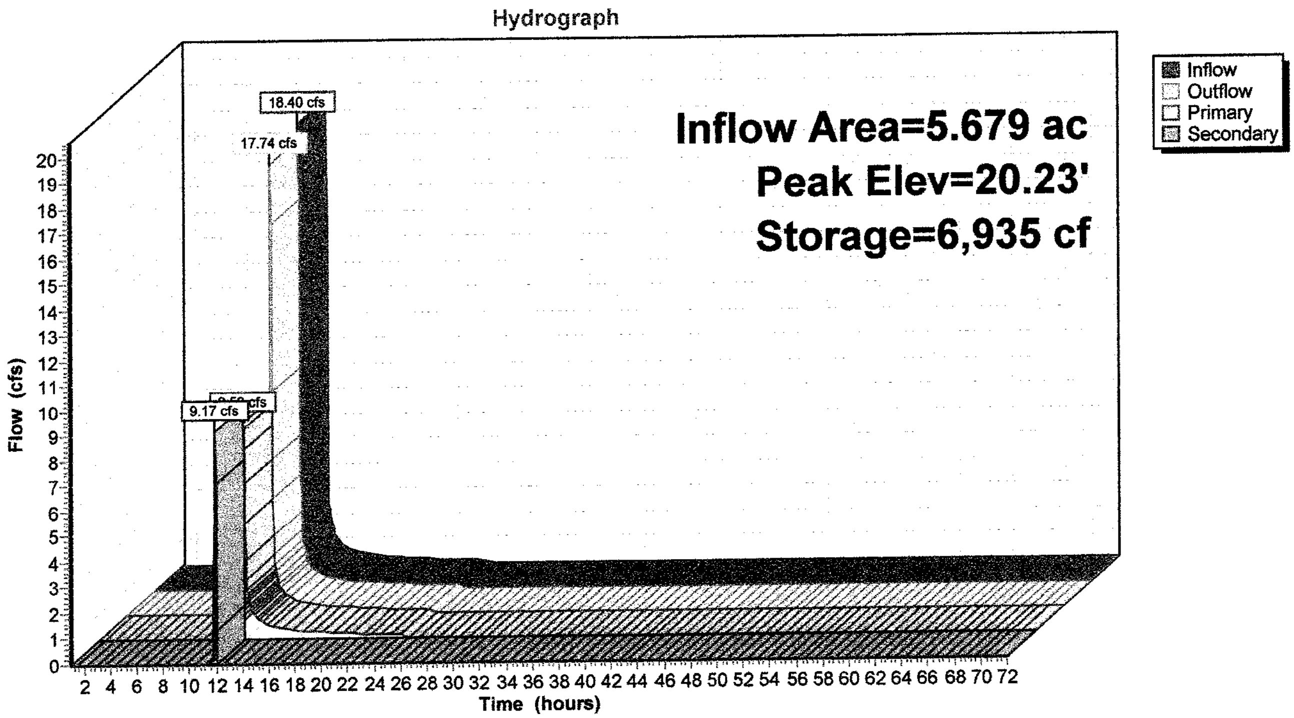
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
16.00	600	140.0	0	0	600
21.00	3,600	260.0	9,449	9,449	4,548

Device	Routing	Invert	Outlet Devices
#1	Primary	15.00'	**12.0" x 40.0' long Culvert** CPP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 15.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	18.50'	**12.0" x 25.0' long Culvert X 2.00** CPP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 18.50' S= 0.0000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#3	Secondary	20.00'	**30.0' long x 21.0' 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
#4	Device 1	17.35'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=8.56 cfs @ 11.95 hrs HW=20.23' TW=19.50' (Fixed TW Elev= 19.50')
1=Culvert (Inlet Controls 2.85 cfs @ 3.63 fps)
4=Orifice/Grate (Passes 2.85 cfs of 3.23 cfs potential flow)
2=Culvert (Inlet Controls 5.71 cfs @ 3.63 fps)

Secondary OutFlow Max=8.95 cfs @ 11.95 hrs HW=20.23' TW=16.75' (Fixed TW Elev= 16.75')
3=Broad-Crested Rectangular Weir (Weir Controls 8.95 cfs @ 1.29 fps)

Pond 3P: Sediment Trap



Summary for Pond 4P: Sand Filter

Inflow Area = 5.679 ac, 85.00% Impervious, Inflow Depth = 1.47" for 1 - Yr. event
Inflow = 8.58 cfs @ 11.95 hrs, Volume= 0.695 af
Outflow = 0.32 cfs @ 15.90 hrs, Volume= 0.695 af, Atten= 96%, Lag= 236.7 min
Primary = 0.32 cfs @ 15.90 hrs, Volume= 0.695 af
Secondary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 19.31' @ 15.90 hrs Surf.Area= 6,886 sf Storage= 19,437 cf

Plug-Flow detention time= 756.4 min calculated for 0.695 af (100% of inflow)
Center-of-Mass det. time= 756.3 min (1,584.3 - 828.1)

Volume	Invert	Avail.Storage	Storage Description
#1	15.00'	32,977 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

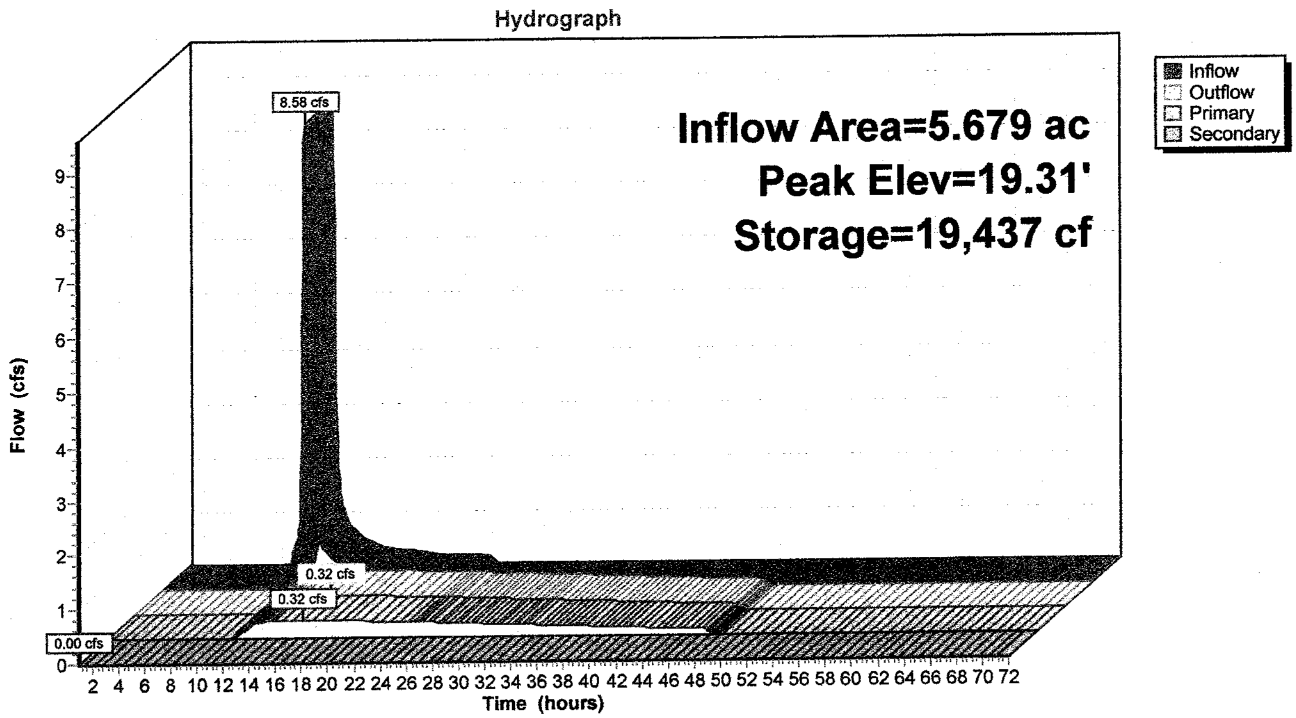
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
15.00	2,495	300.0	0	0	2,495
21.00	9,202	444.0	32,977	32,977	11,308

Device	Routing	Invert	Outlet Devices
#1	Primary	15.00'	**2.000 in/hr Exfiltration over Horizontal area**
#2	Secondary	20.00'	**10.0' long x 27.0' 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=0.32 cfs @ 15.90 hrs HW=19.31' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.32 cfs)

Secondary OutFlow Max=0.00 cfs @ 1.00 hrs HW=15.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: Sand Filter



Summary for Pond 5P: Final Pond

Inflow	=	9.17 cfs @	11.95 hrs, Volume=	0.102 af
Outflow	=	0.08 cfs @	12.10 hrs, Volume=	0.102 af, Atten= 99%, Lag= 8.8 min
Primary	=	0.08 cfs @	12.10 hrs, Volume=	0.102 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 17.00' Surf.Area= 7,024 sf Storage= 11,593 cf
Peak Elev= 17.59' @ 12.10 hrs Surf.Area= 7,818 sf Storage= 15,971 cf (4,378 cf above start)
Flood Elev= 21.00' Surf.Area= 13,236 sf Storage= 51,462 cf (39,870 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 616.3 min (1,333.5 - 717.2)

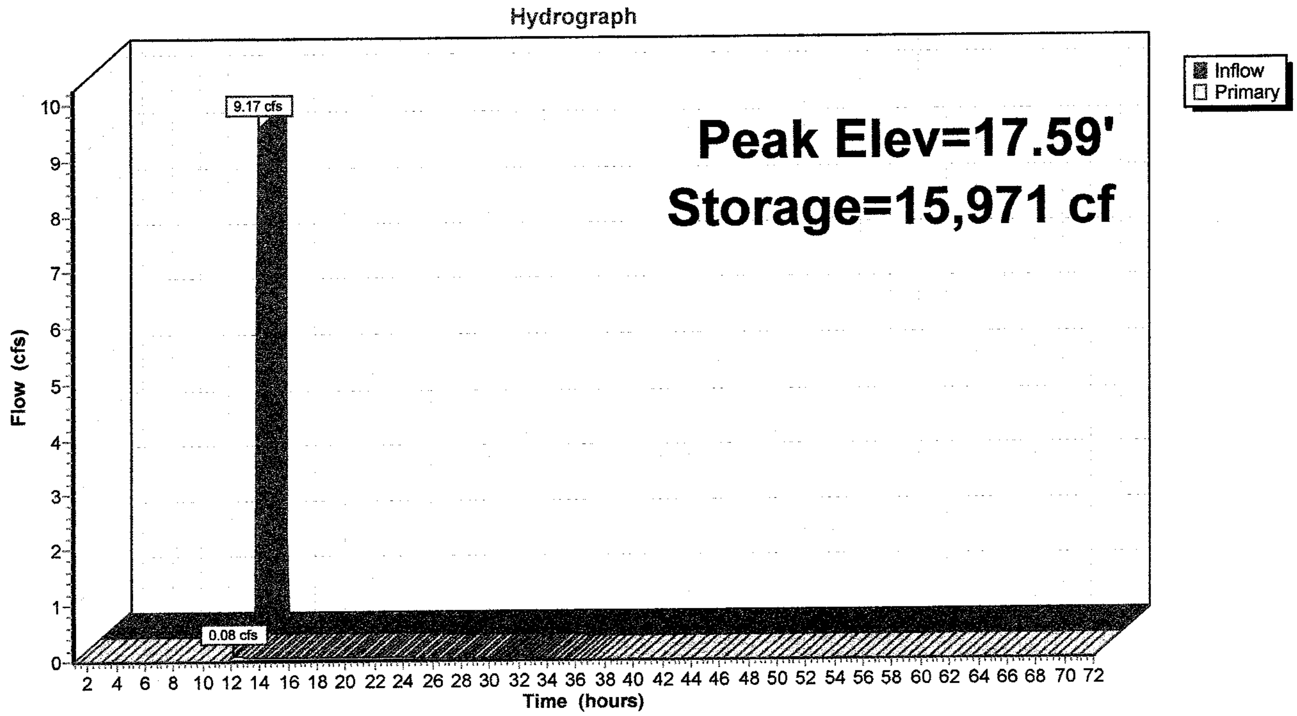
Volume	Invert	Avail.Storage	Storage Description
#1	15.00'	51,462 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
15.00	4,650	378.0	0	0	4,650
21.00	13,236	536.0	51,462	51,462	16,465

Device	Routing	Invert	Outlet Devices
#1	Device 2	20.00'	**2.00' x 2.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#2	Primary	12.00'	**18.0" x 20.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 11.80' S= 0.0100 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior
#3	Device 2	15.00'	**6.0" x 50.0' long Culvert** CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 14.50' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#4	Device 3	17.00'	**2.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.08 cfs @ 12.10 hrs HW=17.59' TW=12.10' (Fixed TW Elev= 12.10')
↑—**2=Culvert** (Passes 0.08 cfs of 18.72 cfs potential flow)
  ↑—**1=Orifice/Grate** (Controls 0.00 cfs)
  └—**3=Culvert** (Passes 0.08 cfs of 1.14 cfs potential flow)
    ↑—**4=Orifice/Grate** (Orifice Controls 0.08 cfs @ 3.70 fps)

Pond 5P: Final Pond



Summary for Pond 7P: Grate

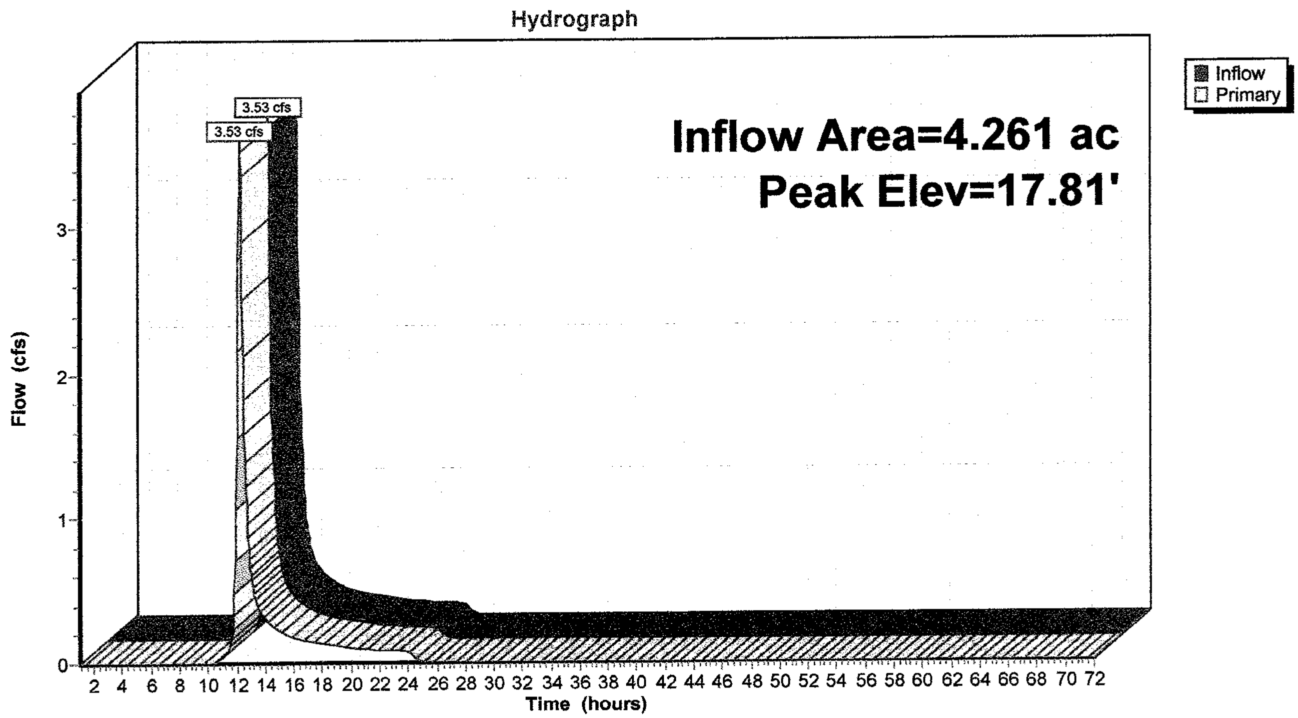
Inflow Area =	4.261 ac,	7.26% Impervious,	Inflow Depth = 0.93"	for 1 - Yr. event	
Inflow =	3.53 cfs @	12.22 hrs,	Volume=	0.329 af	
Outflow =	3.53 cfs @	12.22 hrs,	Volume=	0.329 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.53 cfs @	12.22 hrs,	Volume=	0.329 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 17.81' @ 12.22 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	17.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=3.50 cfs @ 12.22 hrs HW=17.81' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 3.50 cfs @ 1.81 fps)

Pond 7P: Grate



Summary for Pond 8P: CB6

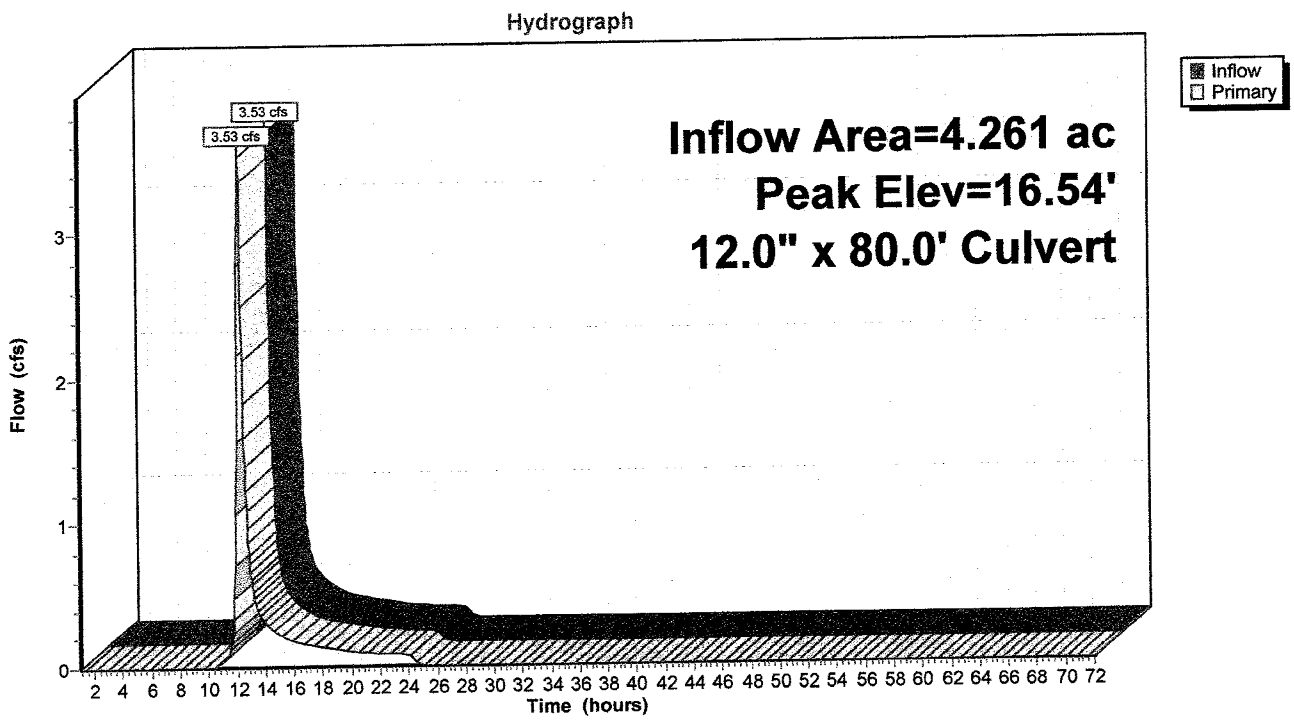
Inflow Area =	4.261 ac,	7.26% Impervious,	Inflow Depth =	0.93"	for 1 - Yr. event
Inflow =	3.53 cfs @	12.22 hrs,	Volume=	0.329 af	
Outflow =	3.53 cfs @	12.22 hrs,	Volume=	0.329 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.53 cfs @	12.22 hrs,	Volume=	0.329 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 16.54' @ 12.22 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.80' S= 0.0025 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=3.50 cfs @ 12.22 hrs HW=16.52' TW=15.60' (Fixed TW Elev= 15.60')
1=Culvert (Outlet Controls 3.50 cfs @ 4.46 fps)

Pond 8P: CB6



Summary for Pond 11P: Grate

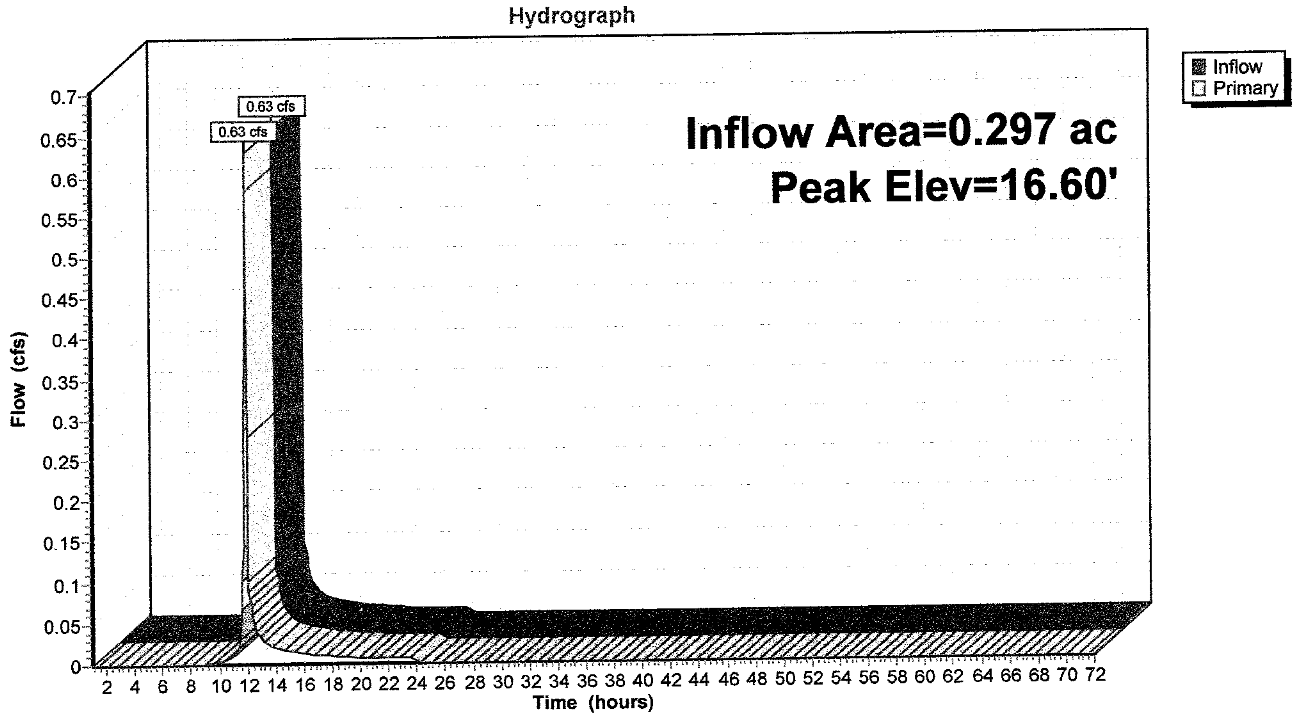
Inflow Area =	0.297 ac,	27.69% Impervious,	Inflow Depth = 1.10"	for 1 - Yr. event	
Inflow =	0.63 cfs @	11.92 hrs,	Volume=	0.027 af	
Outflow =	0.63 cfs @	11.92 hrs,	Volume=	0.027 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.63 cfs @	11.92 hrs,	Volume=	0.027 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 16.60' @ 11.92 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	16.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.60 cfs @ 11.92 hrs HW=16.60' (Free Discharge)
↑—1=Orifice/Grate (Weir Controls 0.60 cfs @ 1.01 fps)

Pond 11P: Grate



Summary for Pond 12P: CB5

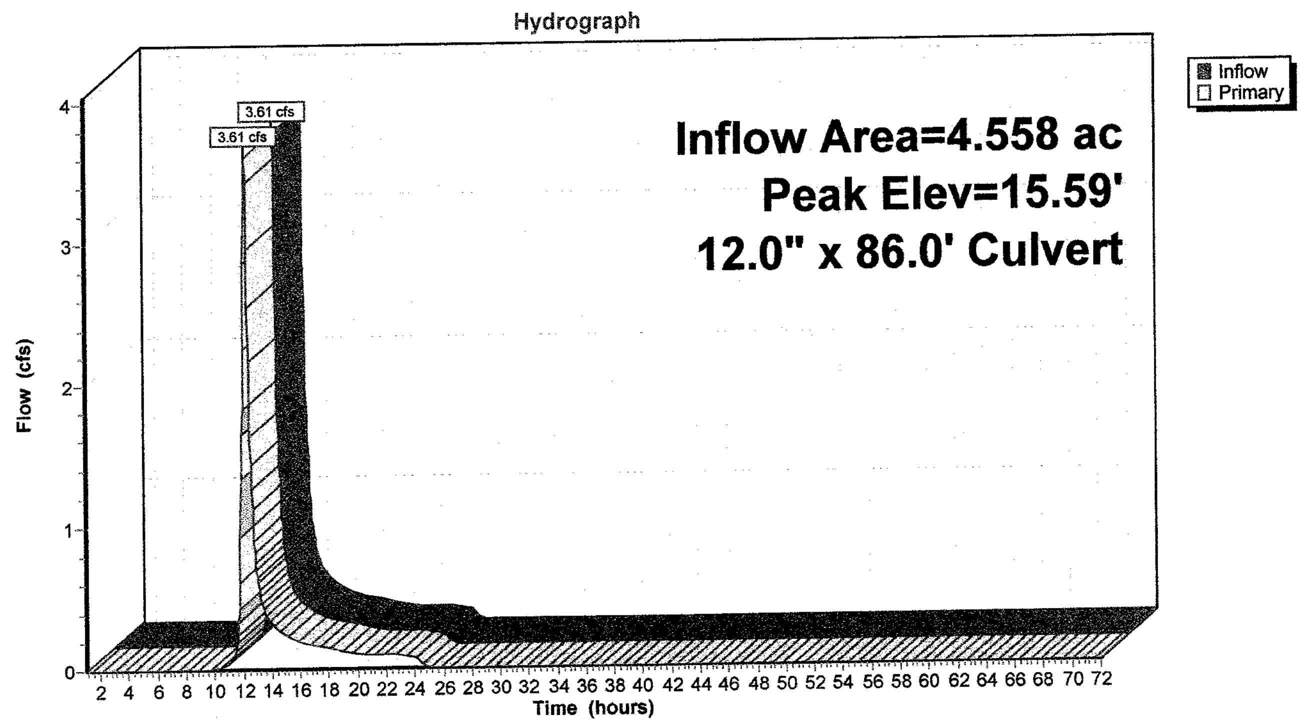
Inflow Area = 4.558 ac, 8.59% Impervious, Inflow Depth = 0.94" for 1 - Yr. event
Inflow = 3.61 cfs @ 12.22 hrs, Volume= 0.356 af
Outflow = 3.61 cfs @ 12.22 hrs, Volume= 0.356 af, Atten= 0%, Lag= 0.0 min
Primary = 3.61 cfs @ 12.22 hrs, Volume= 0.356 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 15.59' @ 12.22 hrs
Flood Elev= 16.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.80'	**12.0" x 86.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.57' S= 0.0027 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=3.58 cfs @ 12.22 hrs HW=15.57' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 3.58 cfs @ 4.56 fps)

Pond 12P: CB5



Summary for Pond 13P: CB10

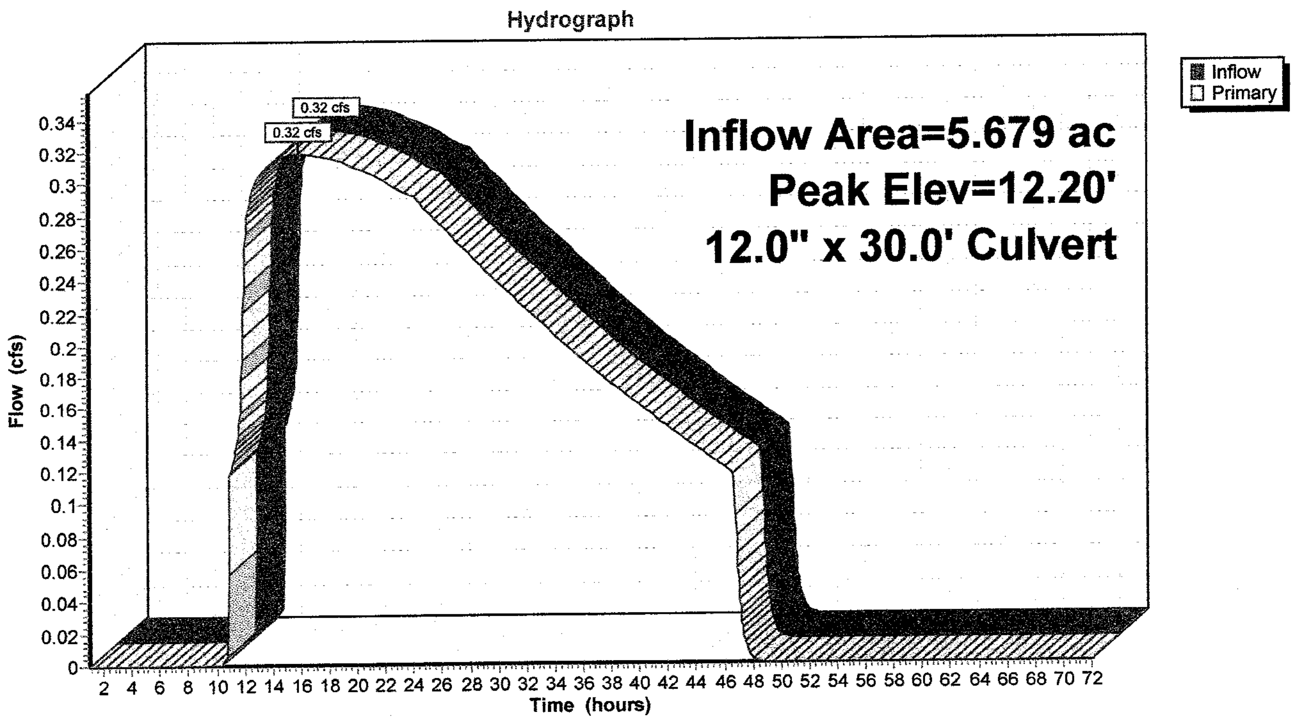
Inflow Area =	5.679 ac, 85.00% Impervious,	Inflow Depth = 1.47"	for 1 - Yr. event
Inflow =	0.32 cfs @ 15.90 hrs,	Volume= 0.695 af	
Outflow =	0.32 cfs @ 15.90 hrs,	Volume= 0.695 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.32 cfs @ 15.90 hrs,	Volume= 0.695 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 12.20' @ 15.90 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	11.80'	**12.0" x 30.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 10.80' S= 0.0333 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.31 cfs @ 15.90 hrs HW=12.20' TW=12.10' (Fixed TW Elev= 12.10')
1=Culvert (Outlet Controls 0.31 cfs @ 1.60 fps)

Pond 13P: CB10



Summary for Pond 14P: CB11

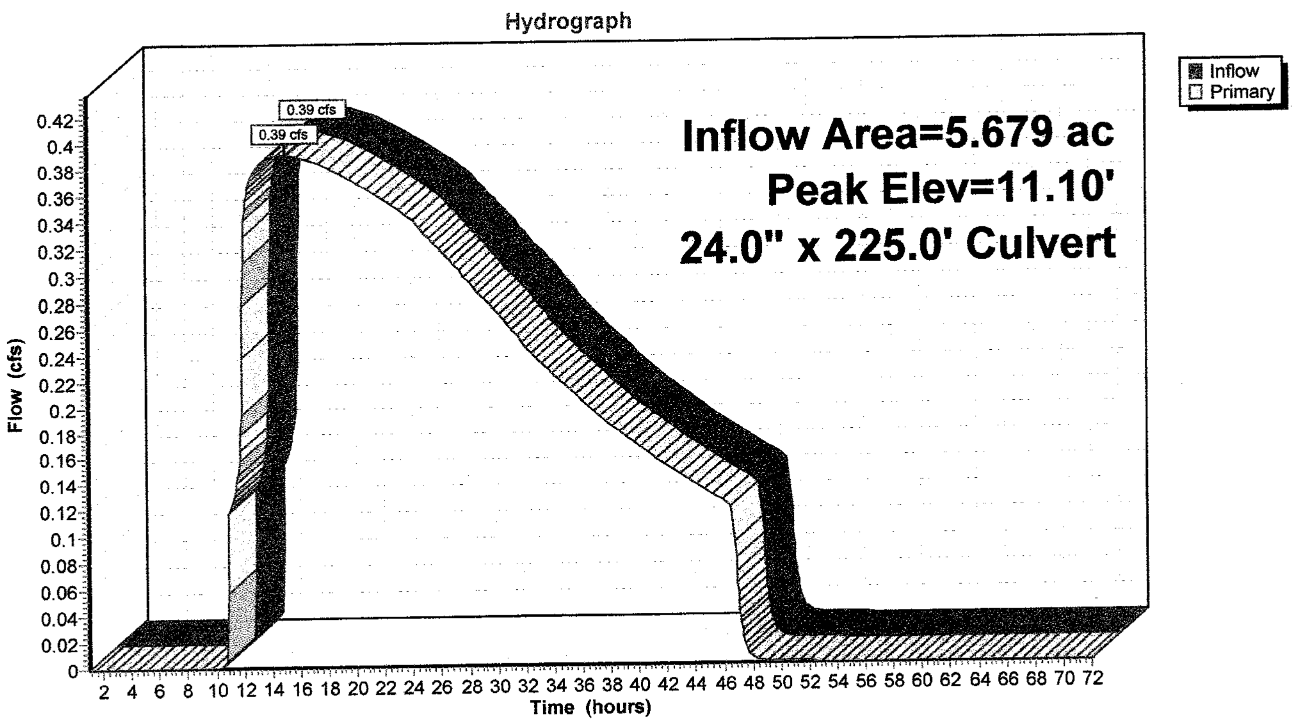
Inflow Area = 5.679 ac, 85.00% Impervious, Inflow Depth = 1.68" for 1 - Yr. event
Inflow = 0.39 cfs @ 14.99 hrs, Volume= 0.797 af
Outflow = 0.39 cfs @ 14.99 hrs, Volume= 0.797 af, Atten= 0%, Lag= 0.0 min
Primary = 0.39 cfs @ 14.99 hrs, Volume= 0.797 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 11.10' @ 14.99 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	10.80'	**24.0" x 225.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 8.55' S= 0.0100 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior

Primary OutFlow Max=0.39 cfs @ 14.99 hrs HW=11.10' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 0.39 cfs @ 2.01 fps)

Pond 14P: CB11

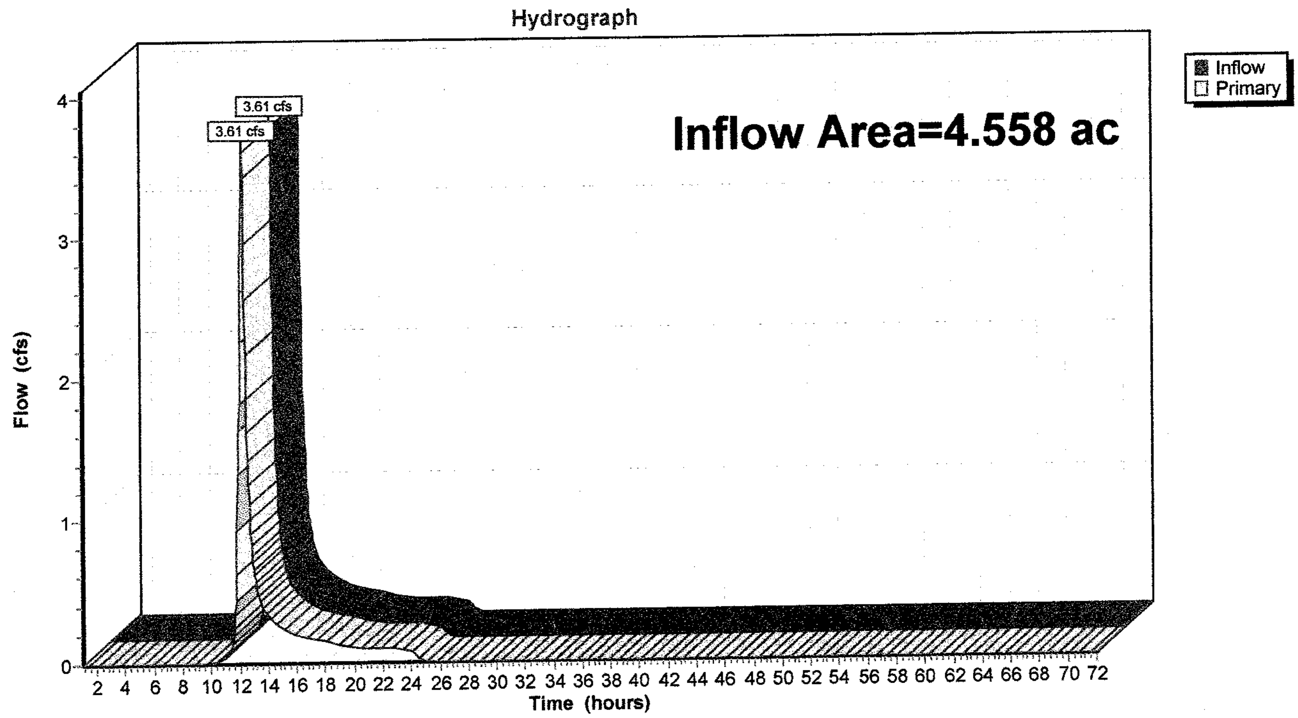


Summary for Link 9L: Outer Site at North and East

Inflow Area =	4.558 ac,	8.59% Impervious, Inflow Depth = 0.94"	for 1 - Yr. event	
Inflow =	3.61 cfs @	12.22 hrs, Volume=	0.356 af	
Primary =	3.61 cfs @	12.22 hrs, Volume=	0.356 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link 9L: Outer Site at North and East

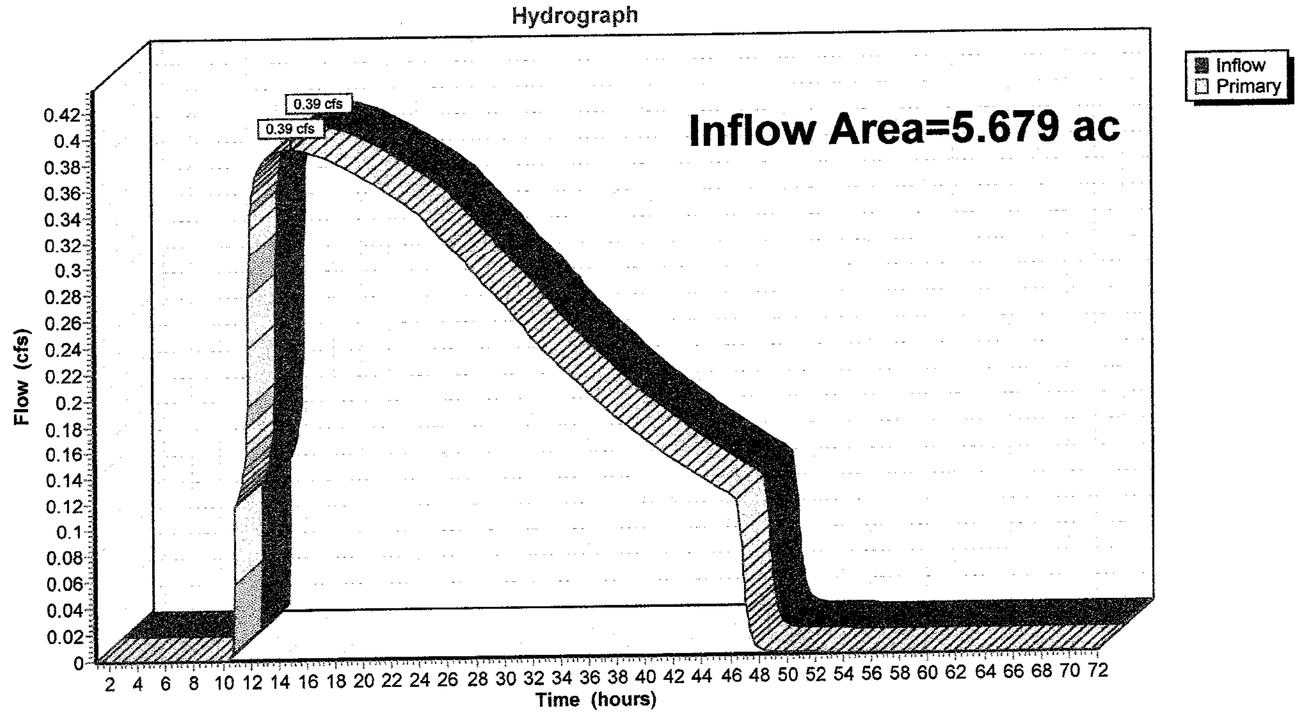


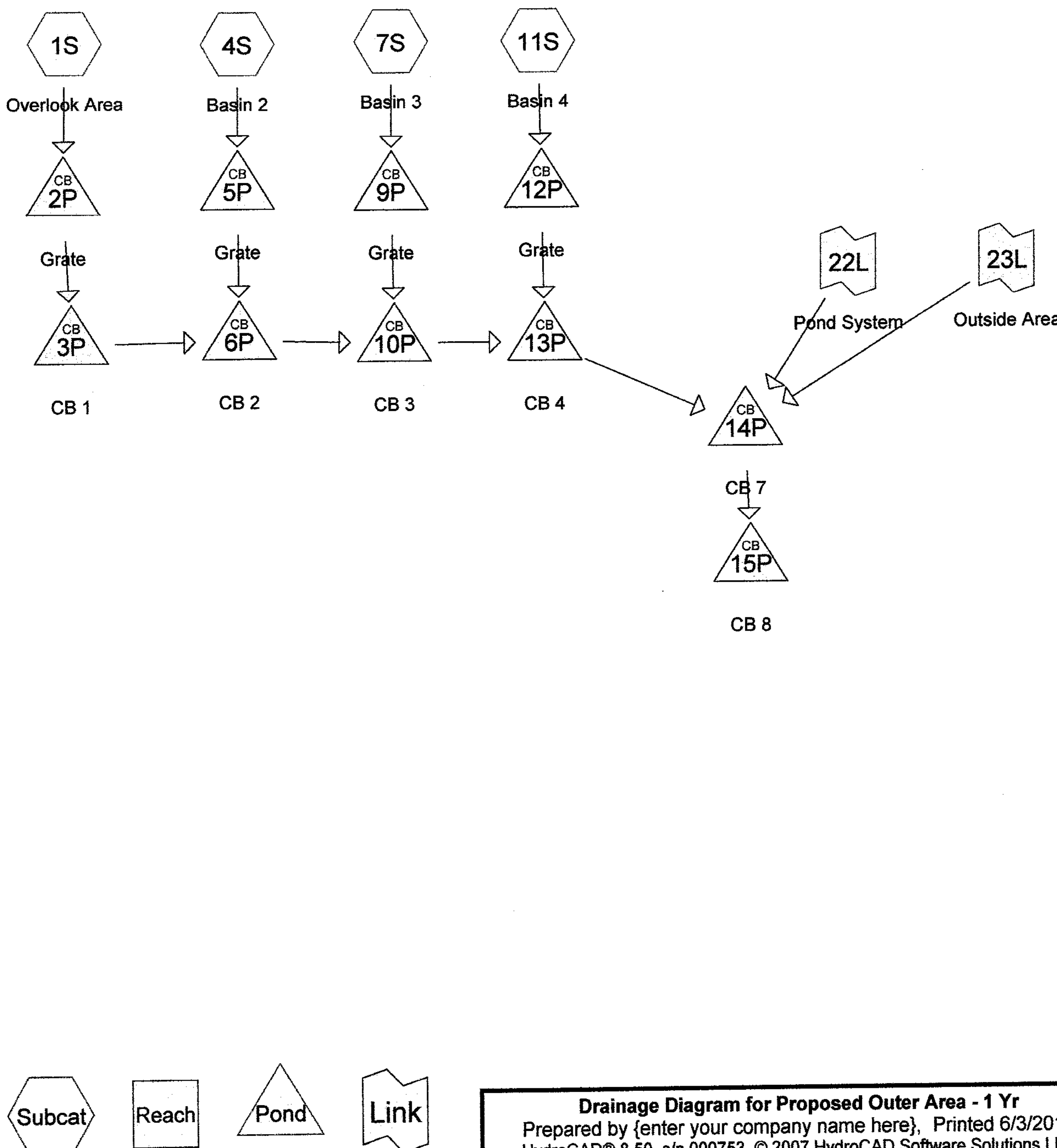
Summary for Link 10L: Pond System

Inflow Area =	5.679 ac,	85.00% Impervious,	Inflow Depth = 1.68"	for 1 - Yr. event
Inflow =	0.39 cfs @	14.99 hrs,	Volume=	0.797 af
Primary =	0.39 cfs @	14.99 hrs,	Volume=	0.797 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link 10L: Pond System





Drainage Diagram for Proposed Outer Area - 1 Yr
Prepared by {enter your company name here}, Printed 6/3/2011
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Summary for Subcatchment 1S: Overlook Area

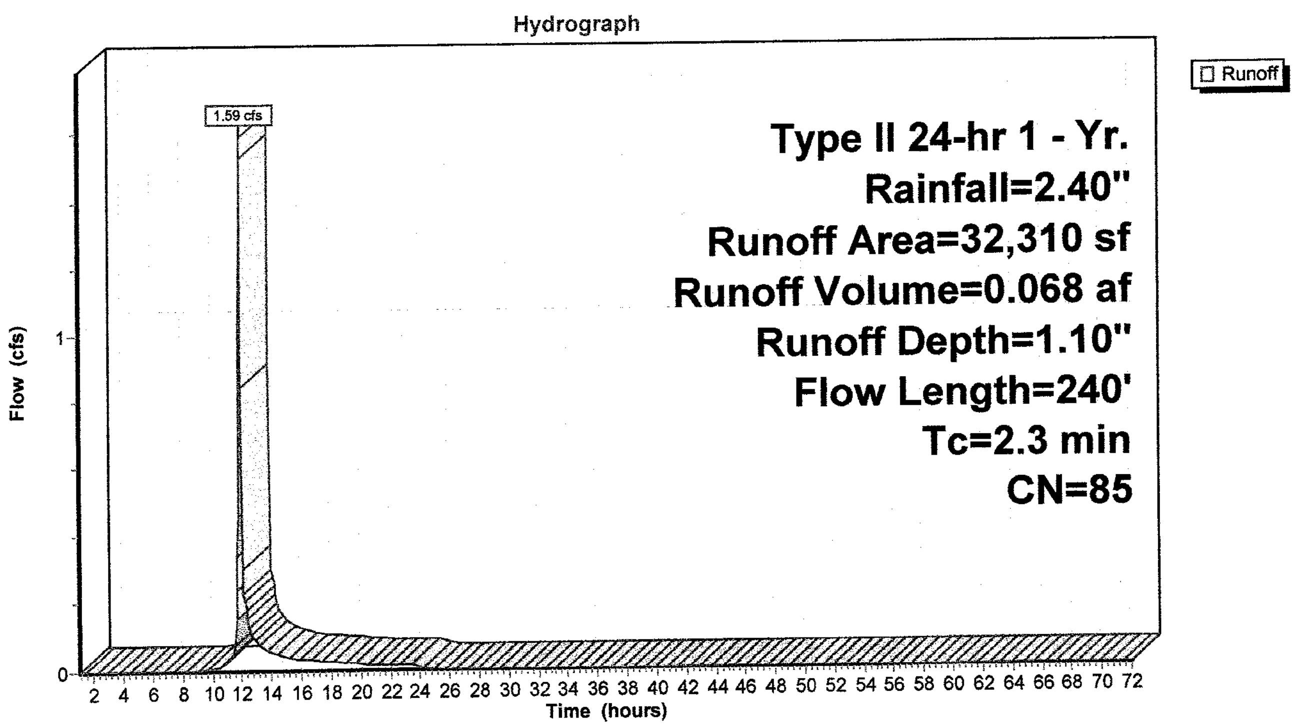
Runoff = 1.59 cfs @ 11.93 hrs, Volume= 0.068 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 - Yr. Rainfall=2.40"

Area (sf)	CN	Description
3,300	98	Paved parking & roofs
3,510	98	Paved parking & roofs
950	98	Paved parking & roofs
22,565	80	>75% Grass cover, Good, HSG D
1,985	98	Paved parking & roofs
32,310	85	Weighted Average
22,565		Pervious Area
9,745		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	5	0.3300	0.17		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
1.8	235	0.0200	2.12		**Shallow Concentrated Flow, Vegetated Surface** Grassed Waterway Kv= 15.0 fps
2.3	240	Total			

Subcatchment 1S: Overlook Area



Summary for Subcatchment 4S: Basin 2

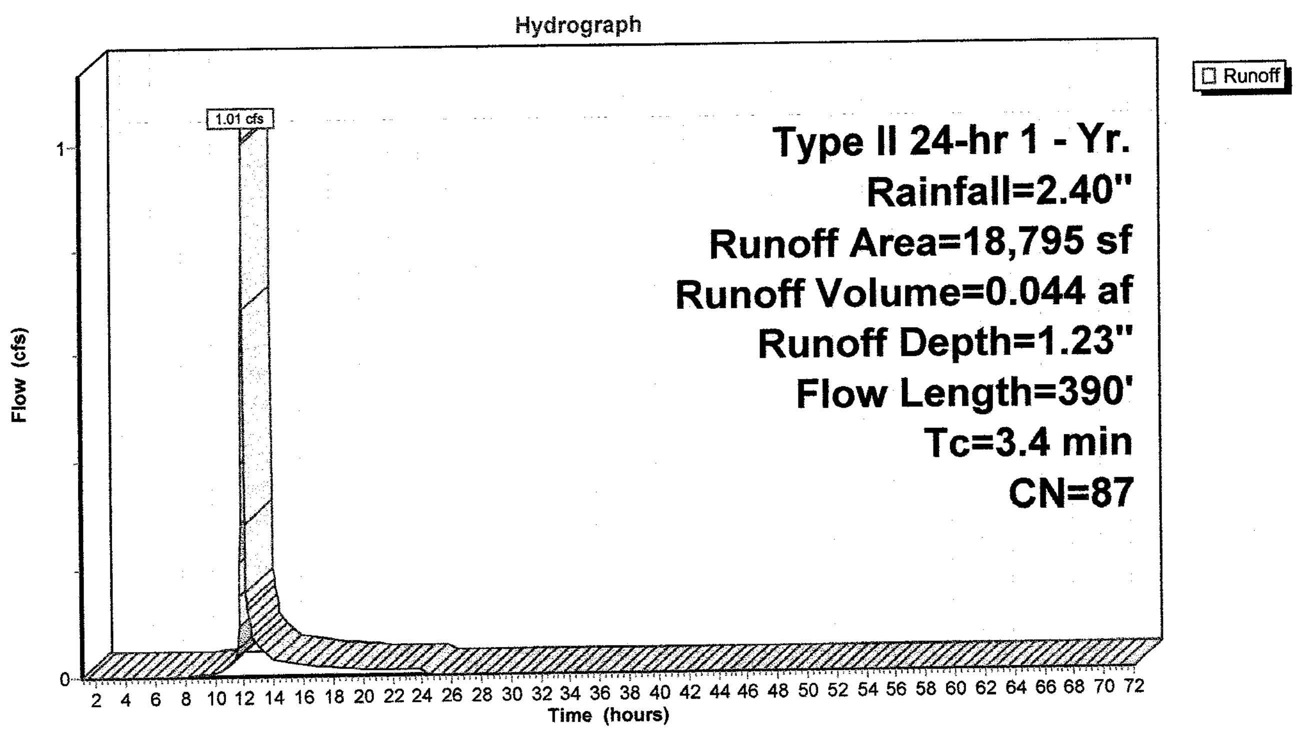
Runoff = 1.01 cfs @ 11.94 hrs, Volume= 0.044 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 - Yr. Rainfall=2.40"

Area (sf)	CN	Description
2,400	98	Paved parking & roofs
3,510	98	Paved parking & roofs
1,800	98	Paved parking & roofs
11,085	80	>75% Grass cover, Good, HSG D
18,795	87	Weighted Average
11,085		Pervious Area
7,710		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	15	0.0050	0.47		**Sheet Flow, Driveway** Smooth surfaces n= 0.011 P2= 2.40"
1.6	225	0.0260	2.42		**Shallow Concentrated Flow, Berm** Grassed Waterway Kv= 15.0 fps
1.3	150	0.0167	1.94		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
3.4	390	Total			

Subcatchment 4S: Basin 2



Summary for Subcatchment 7S: Basin 3

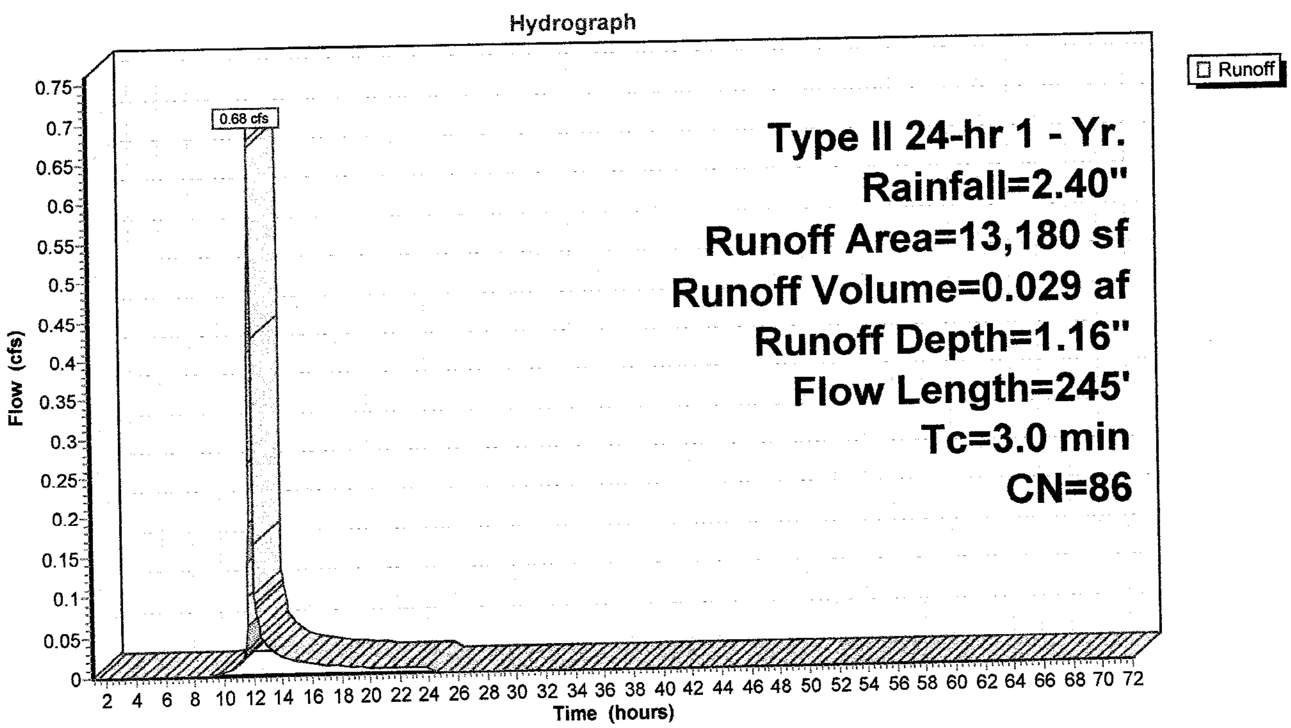
Runoff = 0.68 cfs @ 11.94 hrs, Volume= 0.029 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 - Yr. Rainfall=2.40"

Area (sf)	CN	Description
1,440	98	Paved parking & roofs
2,565	98	Paved parking & roofs
475	98	Paved parking & roofs
8,700	80	>75% Grass cover, Good, HSG D
13,180	86	Weighted Average
8,700		Pervious Area
4,480		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	10	0.3300	0.20		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
1.3	160	0.0200	2.12		**Shallow Concentrated Flow, Driveway Channel** Grassed Waterway Kv= 15.0 fps
0.8	75	0.0100	1.50		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
3.0	245	Total			

Subcatchment 7S: Basin 3



Summary for Subcatchment 11S: Basin 4

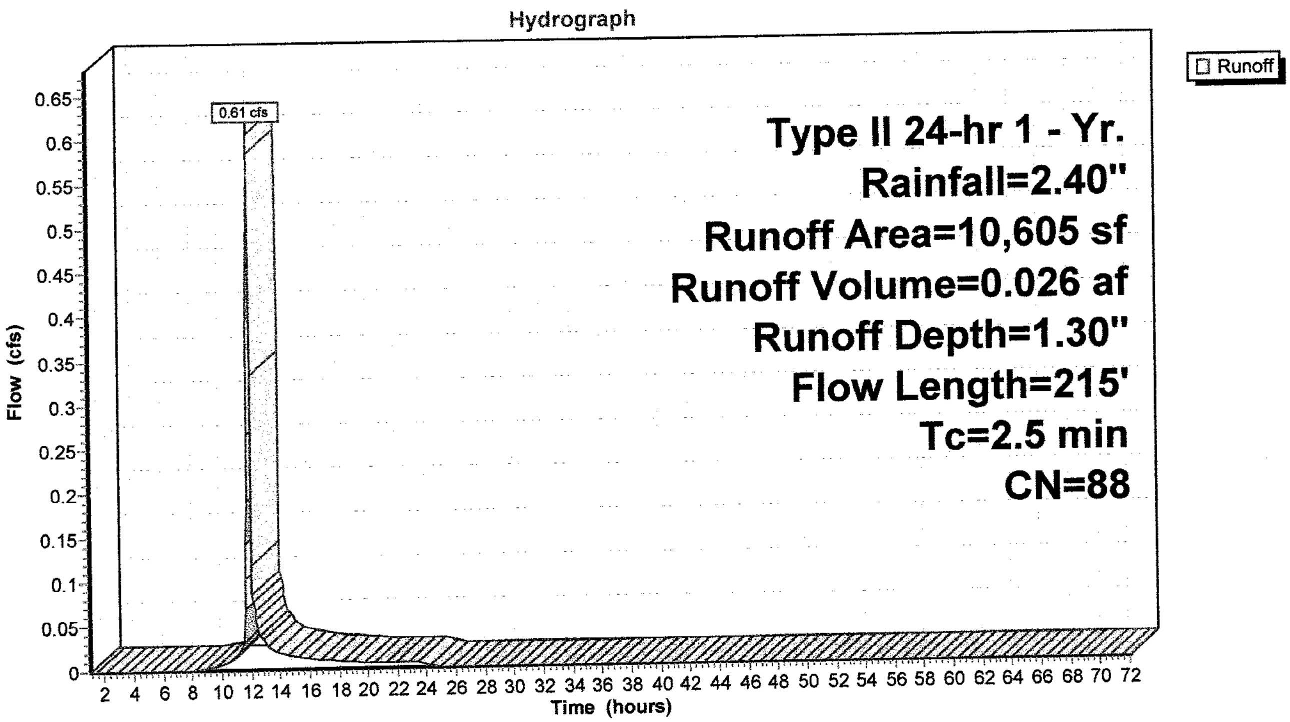
Runoff = 0.61 cfs @ 11.93 hrs, Volume= 0.026 af, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 - Yr. Rainfall=2.40"

Area (sf)	CN	Description
1,500	98	Paved parking & roofs
2,565	98	Paved parking & roofs
840	98	Paved parking & roofs
5,700	80	>75% Grass cover, Good, HSG D
10,605	88	Weighted Average
5,700		Pervious Area
4,905		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	10	0.3300	0.20		**Sheet Flow, Driveway** Grass: Dense n= 0.240 P2= 2.40"
1.2	150	0.0200	2.12		**Shallow Concentrated Flow, Driveway Channel** Grassed Waterway Kv= 15.0 fps
0.4	55	0.0200	2.12		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
2.5	215	Total			

Subcatchment 11S: Basin 4



Summary for Pond 2P: Grate

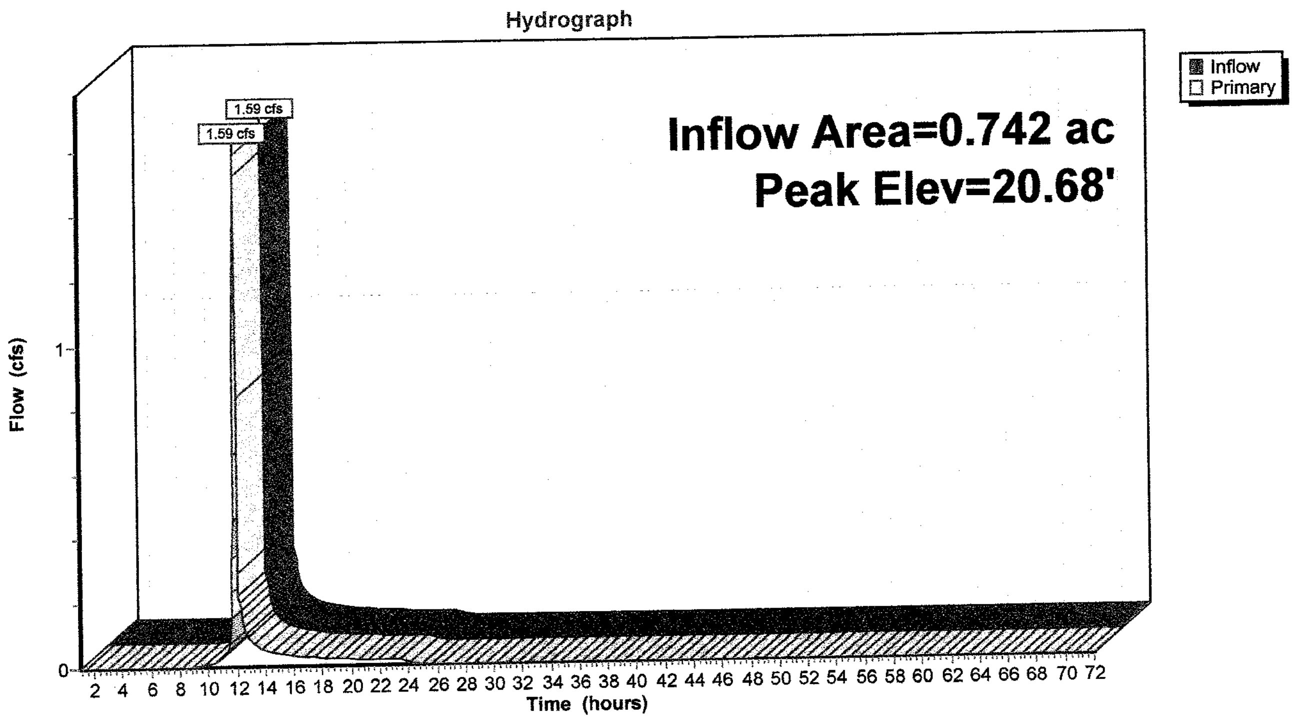
Inflow Area =	0.742 ac, 30.16% Impervious,	Inflow Depth = 1.10"	for 1 - Yr. event
Inflow =	1.59 cfs @ 11.93 hrs, Volume=	0.068 af	
Outflow =	1.59 cfs @ 11.93 hrs, Volume=	0.068 af, Atten= 0%, Lag= 0.0 min	
Primary =	1.59 cfs @ 11.93 hrs, Volume=	0.068 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 20.68' @ 11.93 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	20.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=1.50 cfs @ 11.93 hrs HW=20.67' (Free Discharge)
↑**1=Orifice/Grate** (Weir Controls 1.50 cfs @ 1.37 fps)

Pond 2P: Grate



Summary for Pond 3P: CB 1

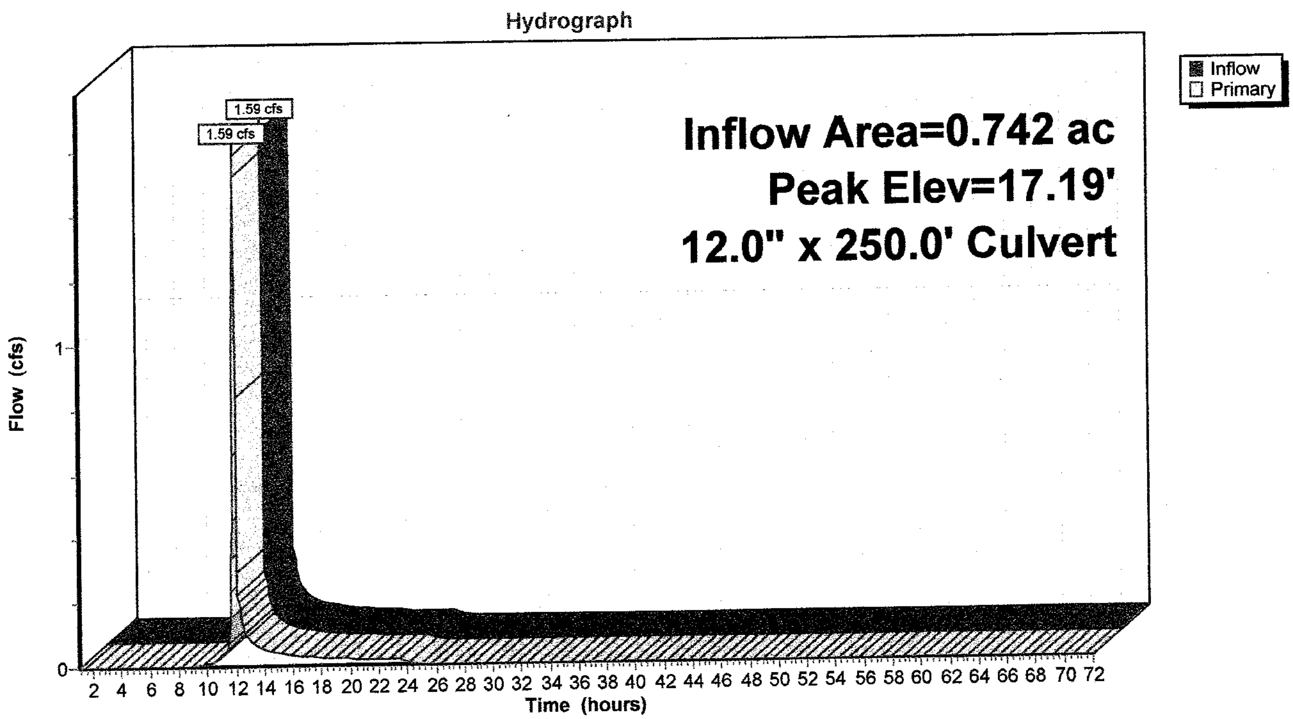
Inflow Area =	0.742 ac, 30.16% Impervious,	Inflow Depth = 1.10"	for 1 - Yr. event	
Inflow =	1.59 cfs @	11.93 hrs, Volume=	0.068 af	
Outflow =	1.59 cfs @	11.93 hrs, Volume=	0.068 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.59 cfs @	11.93 hrs, Volume=	0.068 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 17.19' @ 11.93 hrs
Flood Elev= 20.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	15.43'	**12.0" x 250.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 14.28' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=1.50 cfs @ 11.93 hrs HW=17.16' TW=16.81' (Fixed TW Elev= 16.81')
↑—**1=Culvert** (Outlet Controls 1.50 cfs @ 1.91 fps)

Pond 3P: CB 1



Summary for Pond 5P: Grate

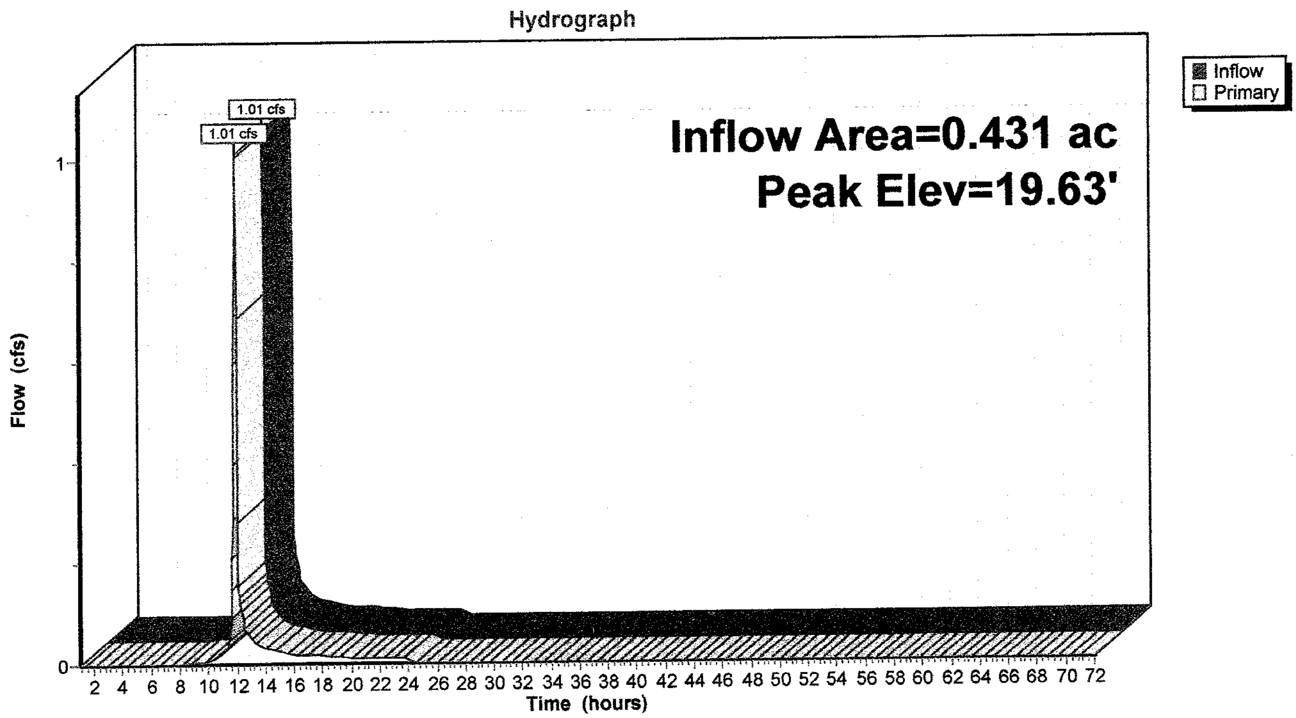
Inflow Area =	0.431 ac,	41.02% Impervious,	Inflow Depth = 1.23"	for 1 - Yr. event	
Inflow =	1.01 cfs @	11.94 hrs,	Volume=	0.044 af	
Outflow =	1.01 cfs @	11.94 hrs,	Volume=	0.044 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.01 cfs @	11.94 hrs,	Volume=	0.044 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 19.63' @ 11.94 hrs
Flood Elev= 20.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	19.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.98 cfs @ 11.94 hrs HW=19.63' (Free Discharge)
↑—1=Orifice/Grate (Weir Controls 0.98 cfs @ 1.18 fps)

Pond 5P: Grate



Summary for Pond 6P: CB 2

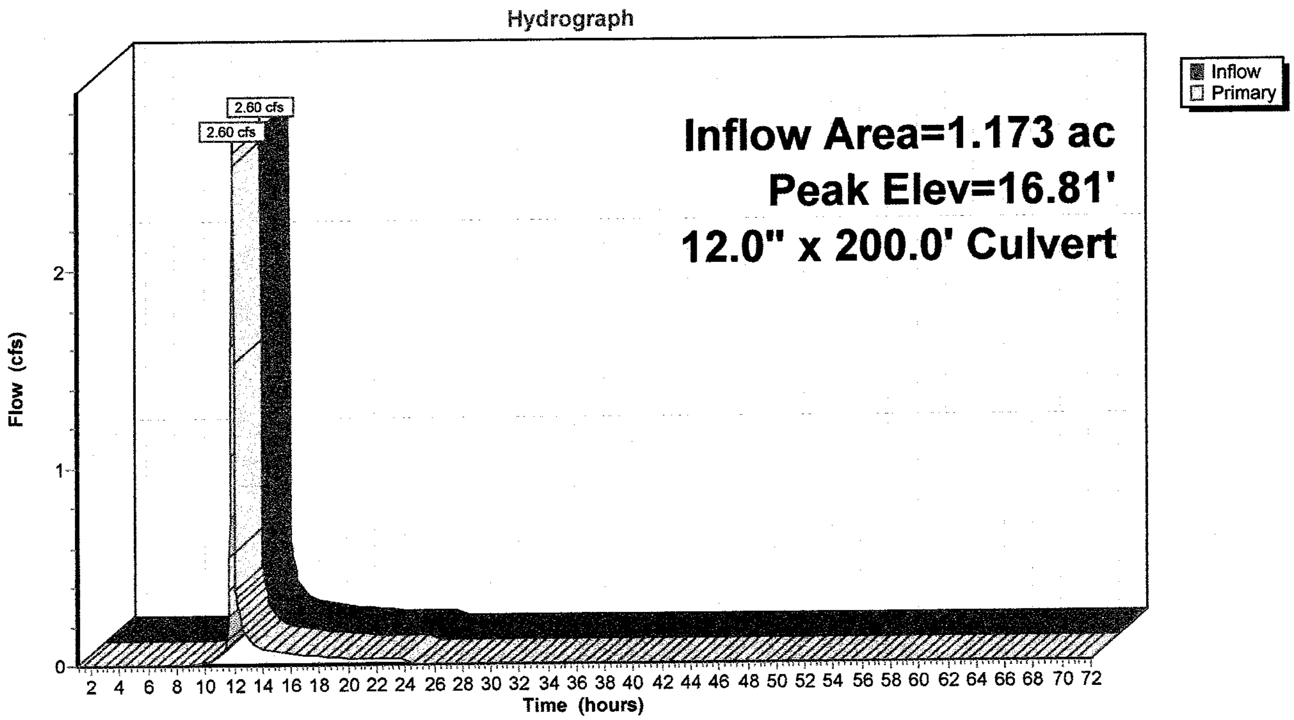
Inflow Area =	1.173 ac,	34.16% Impervious,	Inflow Depth = 1.15"	for 1 - Yr. event	
Inflow =	2.60 cfs @	11.93 hrs,	Volume=	0.112 af	
Outflow =	2.60 cfs @	11.93 hrs,	Volume=	0.112 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.60 cfs @	11.93 hrs,	Volume=	0.112 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 16.81' @ 11.94 hrs
Flood Elev= 19.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.58'	**12.0" x 200.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.67' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=2.46 cfs @ 11.93 hrs HW=16.74' TW=15.94' (Fixed TW Elev= 15.94')
1=Culvert (Outlet Controls 2.46 cfs @ 3.14 fps)

Pond 6P: CB 2



Summary for Pond 9P: Grate

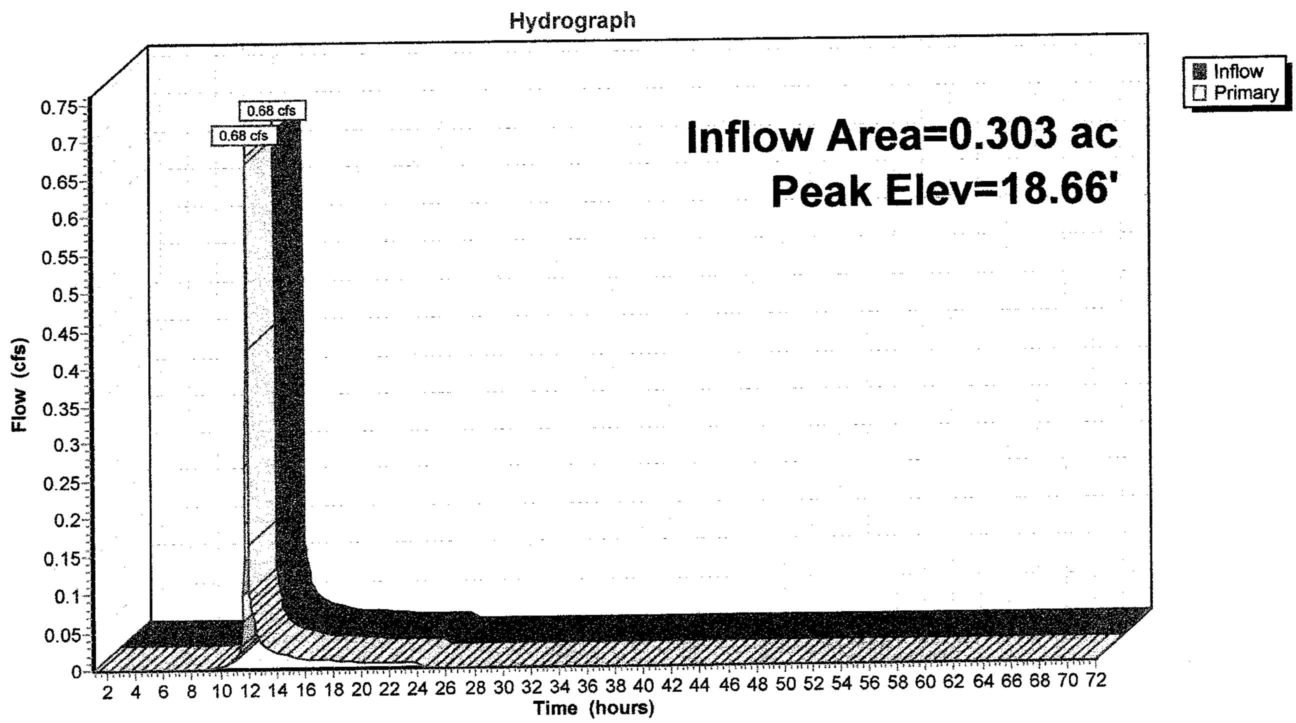
Inflow Area =	0.303 ac, 33.99% Impervious, Inflow Depth = 1.16"	for 1 - Yr. event	
Inflow =	0.68 cfs @ 11.94 hrs, Volume=	0.029 af	
Outflow =	0.68 cfs @ 11.94 hrs, Volume=	0.029 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.68 cfs @ 11.94 hrs, Volume=	0.029 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.66' @ 11.94 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**12.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.65 cfs @ 11.94 hrs HW=18.66' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 0.65 cfs @ 1.30 fps)

Pond 9P: Grate



Summary for Pond 10P: CB 3

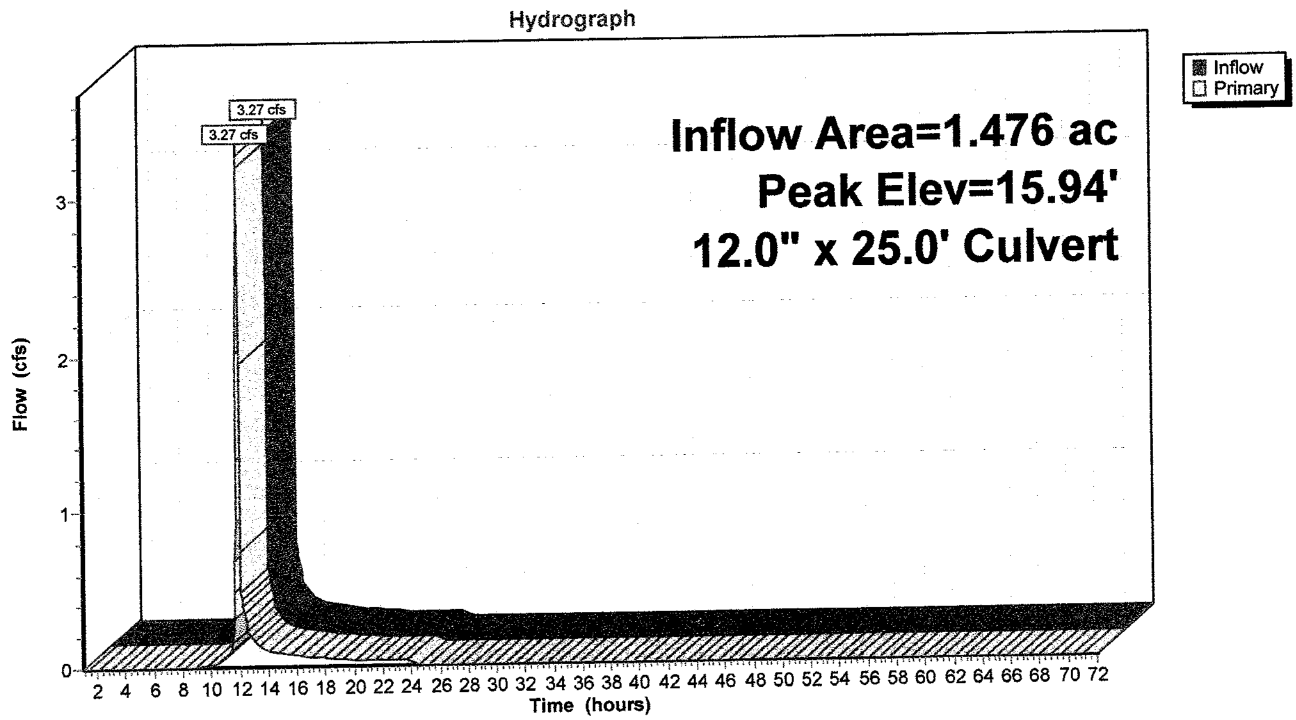
Inflow Area =	1.476 ac,	34.12% Impervious,	Inflow Depth = 1.15"	for 1 - Yr. event	
Inflow =	3.27 cfs @	11.93 hrs,	Volume=	0.141 af	
Outflow =	3.27 cfs @	11.93 hrs,	Volume=	0.141 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.27 cfs @	11.93 hrs,	Volume=	0.141 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 15.94' @ 11.94 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.67'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.60' S= 0.0028 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=3.11 cfs @ 11.93 hrs HW=15.88' TW=15.20' (Fixed TW Elev= 15.20')
↑—**1=Culvert** (Inlet Controls 3.11 cfs @ 3.96 fps)

Pond 10P: CB 3



Summary for Pond 12P: Grate

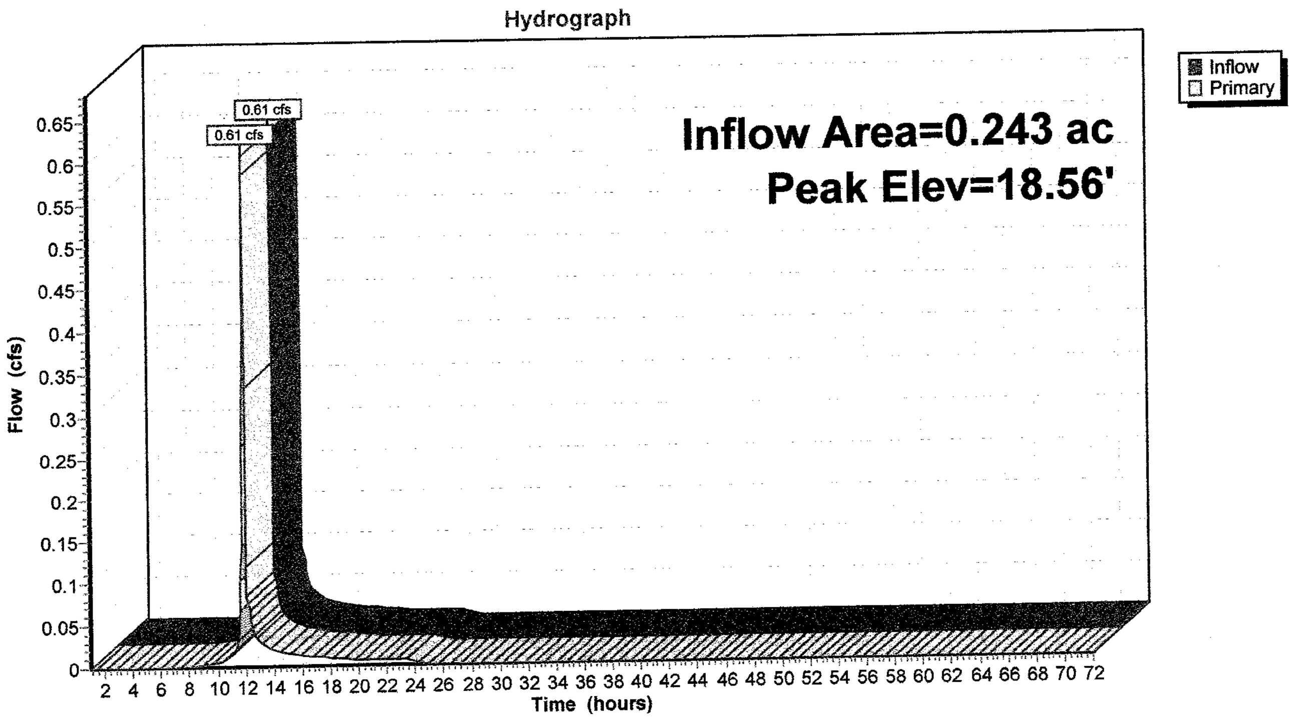
Inflow Area =	0.243 ac, 46.25% Impervious,	Inflow Depth = 1.30"	for 1 - Yr. event	
Inflow =	0.61 cfs @	11.93 hrs, Volume=	0.026 af	
Outflow =	0.61 cfs @	11.93 hrs, Volume=	0.026 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.61 cfs @	11.93 hrs, Volume=	0.026 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.56' @ 11.93 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**24.0" Horiz. Orifice/Grate X 2.00** Limited to weir flow C= 0.600

Primary OutFlow Max=0.57 cfs @ 11.93 hrs HW=18.56' (Free Discharge)
1=Orifice/Grate (Weir Controls 0.57 cfs @ 0.79 fps)

Pond 12P: Grate



Summary for Pond 13P: CB 4

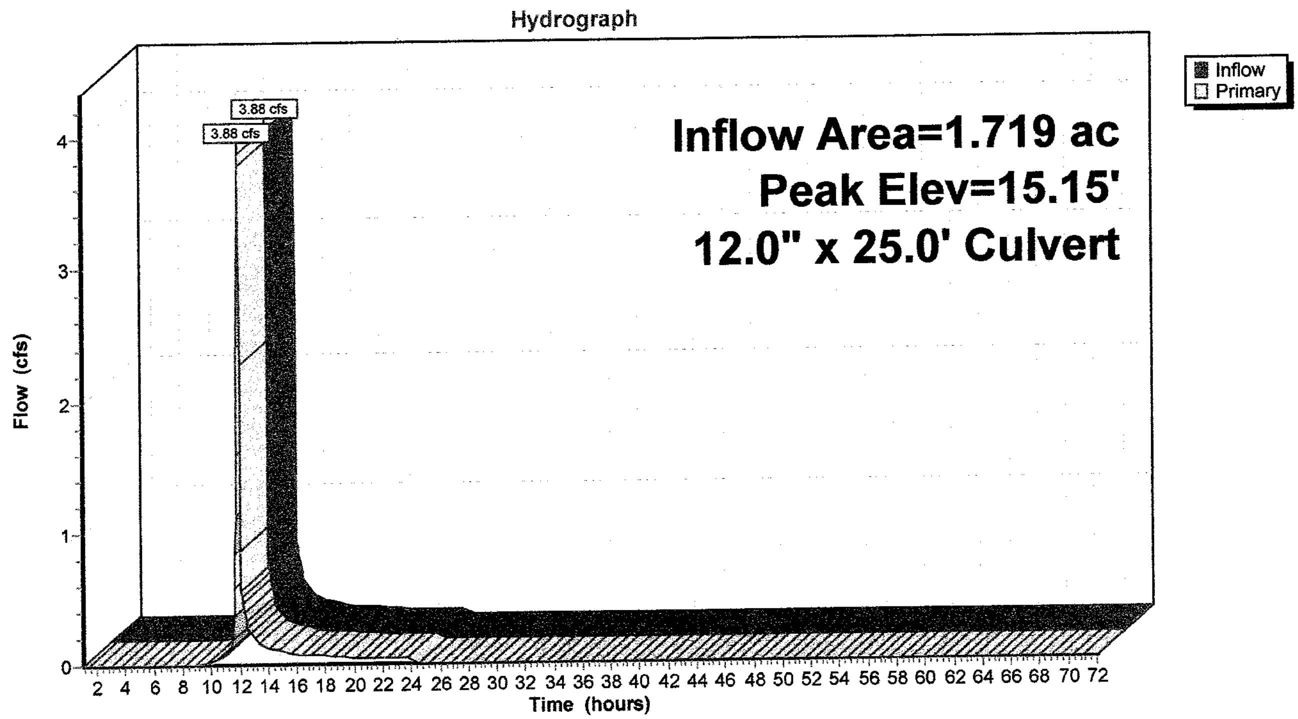
Inflow Area =	1.719 ac,	35.84% Impervious,	Inflow Depth = 1.17"	for 1 - Yr. event
Inflow =	3.88 cfs @	11.93 hrs,	Volume=	0.168 af
Outflow =	3.88 cfs @	11.93 hrs,	Volume=	0.168 af, Atten= 0%, Lag= 0.0 min
Primary =	3.88 cfs @	11.93 hrs,	Volume=	0.168 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 15.15' @ 11.93 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.60'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.40' S= 0.0080 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=3.69 cfs @ 11.93 hrs HW=15.07' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 3.69 cfs @ 4.69 fps)

Pond 13P: CB 4



Summary for Pond 14P: CB 7

Inflow Area = 11.956 ac, 48.80% Impervious, Inflow Depth = 1.32" for 1 - Yr. event
Inflow = 5.74 cfs @ 11.94 hrs, Volume= 1.320 af
Outflow = 5.74 cfs @ 11.94 hrs, Volume= 1.320 af, Atten= 0%, Lag= 0.0 min
Primary = 5.74 cfs @ 11.94 hrs, Volume= 1.320 af

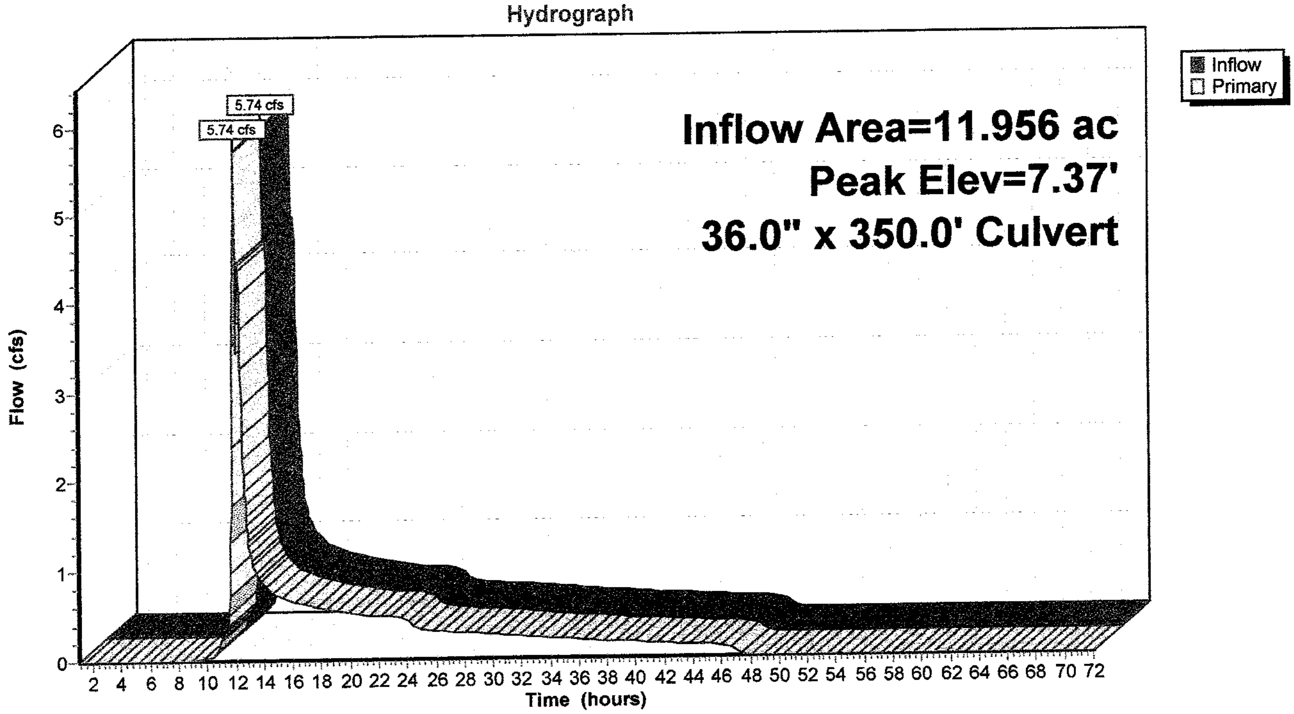
Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 7.37' @ 11.94 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	6.30'	**36.0" x 350.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 5.37' S= 0.0027 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=5.58 cfs @ 11.94 hrs HW=7.36' TW=6.40' (Fixed TW Elev= 6.40')
1=Culvert (Outlet Controls 5.58 cfs @ 3.75 fps)

Pond 14P: CB 7

Hydrograph



Summary for Pond 15P: CB 8

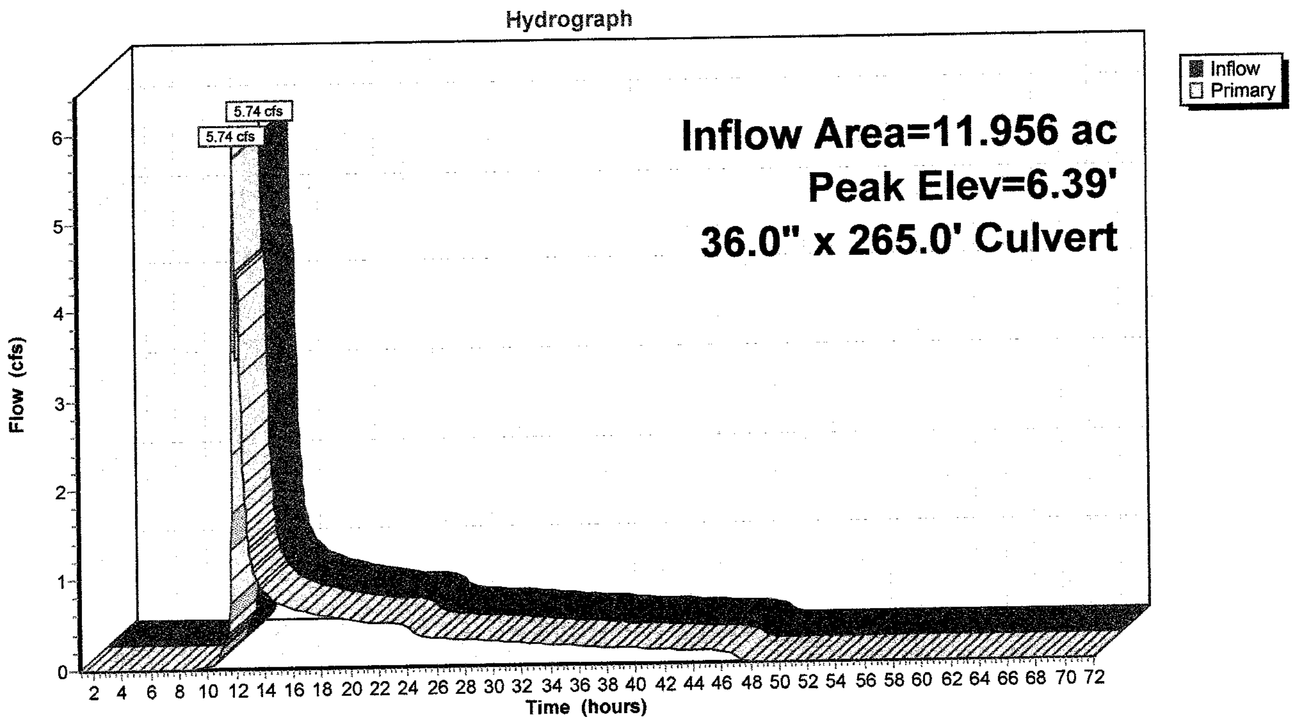
Inflow Area = 11.956 ac, 48.80% Impervious, Inflow Depth = 1.32" for 1 - Yr. event
Inflow = 5.74 cfs @ 11.94 hrs, Volume= 1.320 af
Outflow = 5.74 cfs @ 11.94 hrs, Volume= 1.320 af, Atten= 0%, Lag= 0.0 min
Primary = 5.74 cfs @ 11.94 hrs, Volume= 1.320 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 6.39' @ 11.94 hrs
Flood Elev= 22.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5.37'	**36.0" x 265.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 4.68' S= 0.0026 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=5.59 cfs @ 11.94 hrs HW=6.38' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 5.59 cfs @ 4.00 fps)

Pond 15P: CB 8



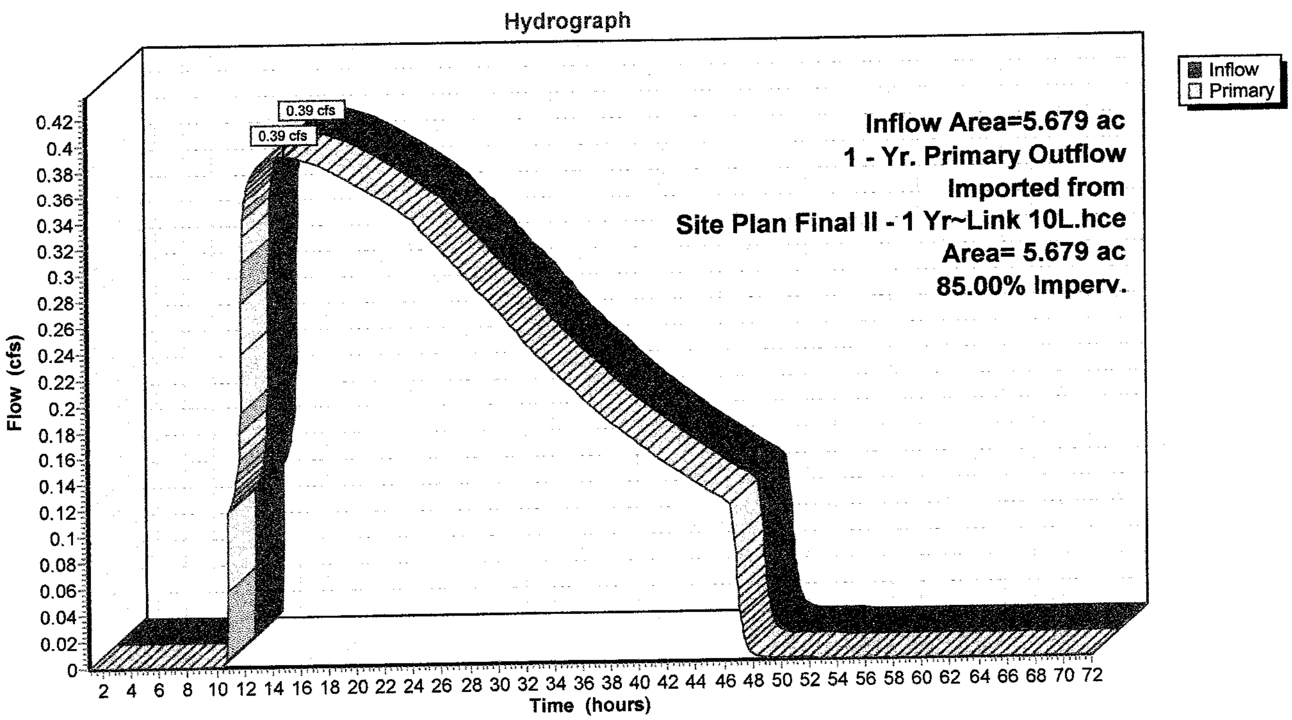
Summary for Link 22L: Pond System

Inflow Area =	5.679 ac, 85.00% Impervious,	Inflow Depth = 1.68"	for 1 - Yr. event
Inflow =	0.39 cfs @ 14.99 hrs,	Volume=	0.797 af
Primary =	0.39 cfs @ 14.99 hrs,	Volume=	0.797 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

1 - Yr. Primary Outflow Imported from Site Plan Final II - 1 Yr~Link 10L.hce

Link 22L: Pond System



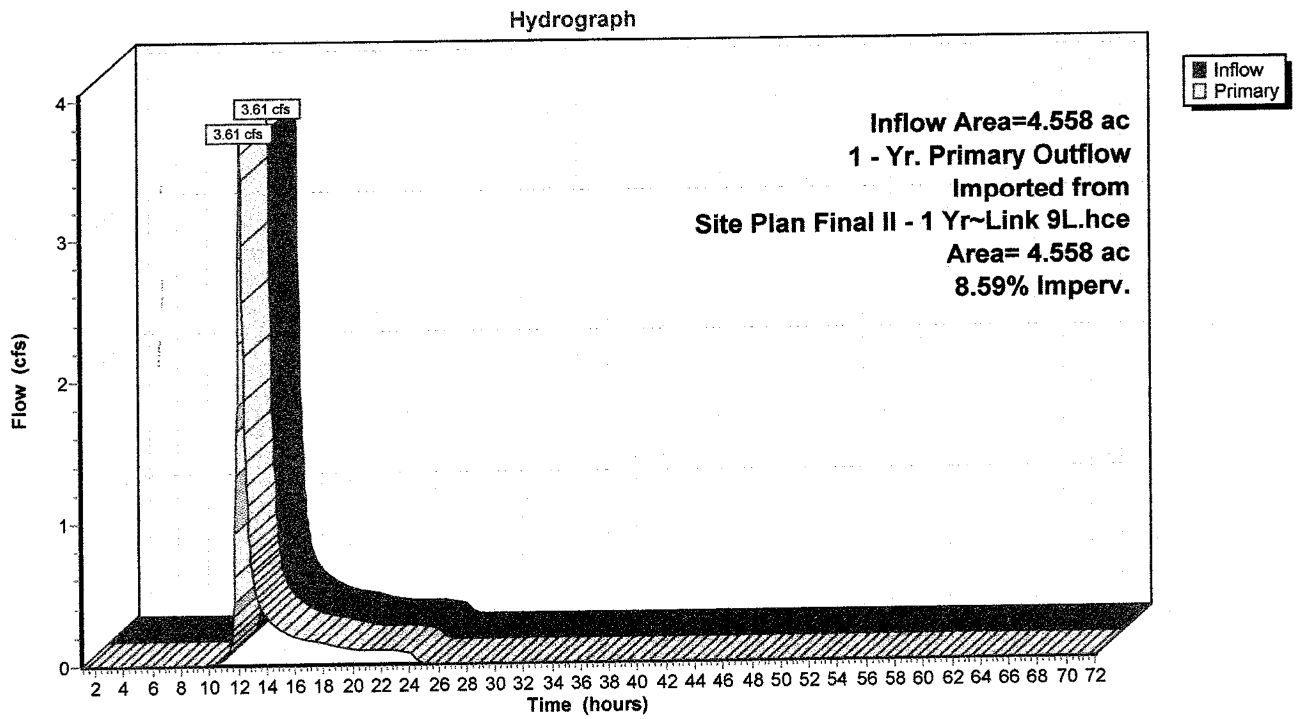
Summary for Link 23L: Outside Area

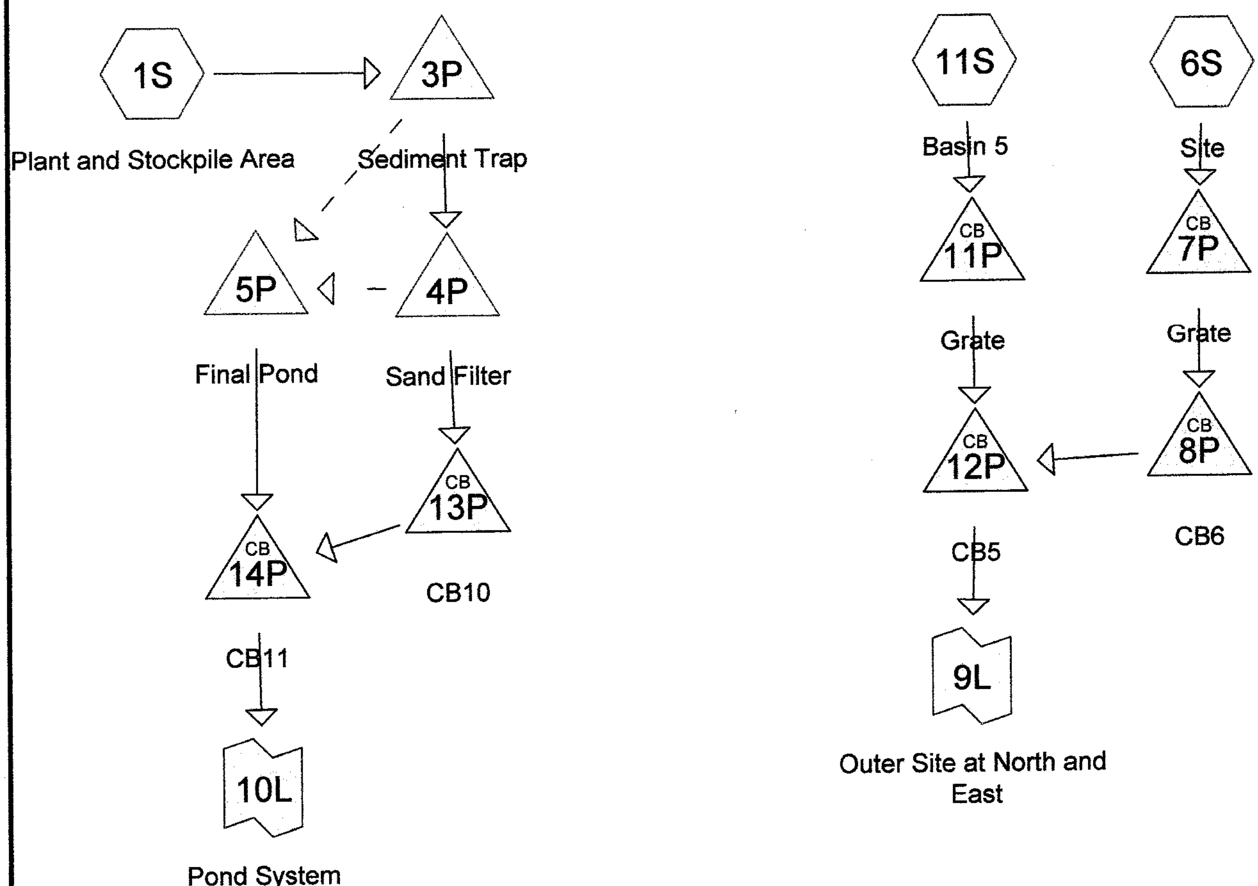
Inflow Area =	4.558 ac,	8.59% Impervious,	Inflow Depth = 0.94"	for 1 - Yr. event
Inflow =	3.61 cfs @	12.22 hrs, Volume=	0.356 af	
Primary =	3.61 cfs @	12.22 hrs, Volume=	0.356 af,	Atten= 0%, Lag= 0.0 min

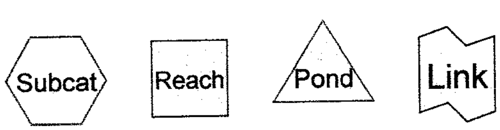
Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

1 - Yr. Primary Outflow Imported from Site Plan Final II - 1 Yr~Link 9L.hce

Link 23L: Outside Area







Drainage Diagram for Site Plan Final II - 10 Yr
Prepared by {enter your company name here}, Printed 6/3/2011
HydroCAD® 8.50 s/n 000753 © 2007 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Plant and Stockpile Area

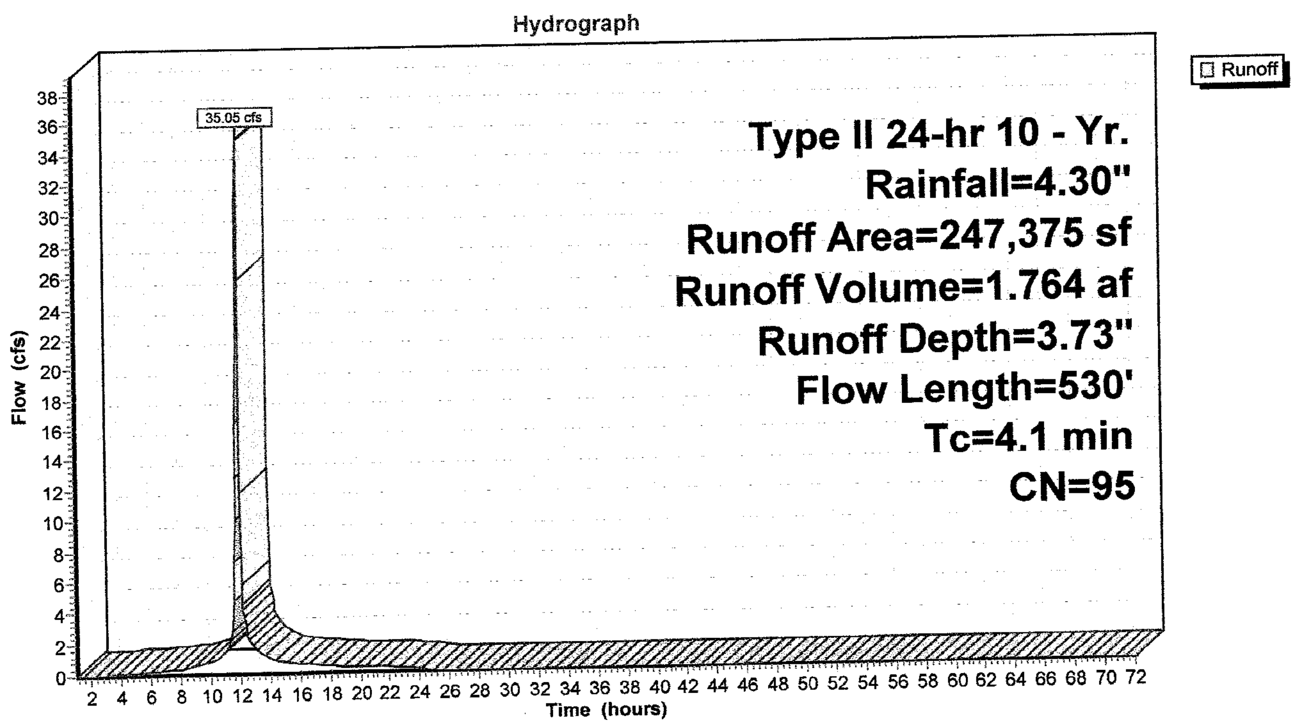
Runoff = 35.05 cfs @ 11.94 hrs, Volume= 1.764 af, Depth= 3.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 - Yr. Rainfall=4.30"

Area (sf)	CN	Description
247,375	95	Urban commercial, 85% imp, HSG D
37,106		Pervious Area
210,269		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0200	1.19		**Sheet Flow, Top of Stockpile Area** Smooth surfaces n= 0.011 P2= 2.40"
2.0	280	0.0200	2.28		**Shallow Concentrated Flow, Stockpile Area** Unpaved Kv= 16.1 fps
0.7	150	0.0100	3.67	52.36	**Trap/Vee/Rect Channel Flow, Stockpile Perimeter** Bot.W=5.00' D=1.50' Z= 3.0 '/' Top.W=14.00' n= 0.040 Earth, cobble bottom, clean sides
4.1	530	Total			

Subcatchment 1S: Plant and Stockpile Area



Summary for Subcatchment 6S: Site

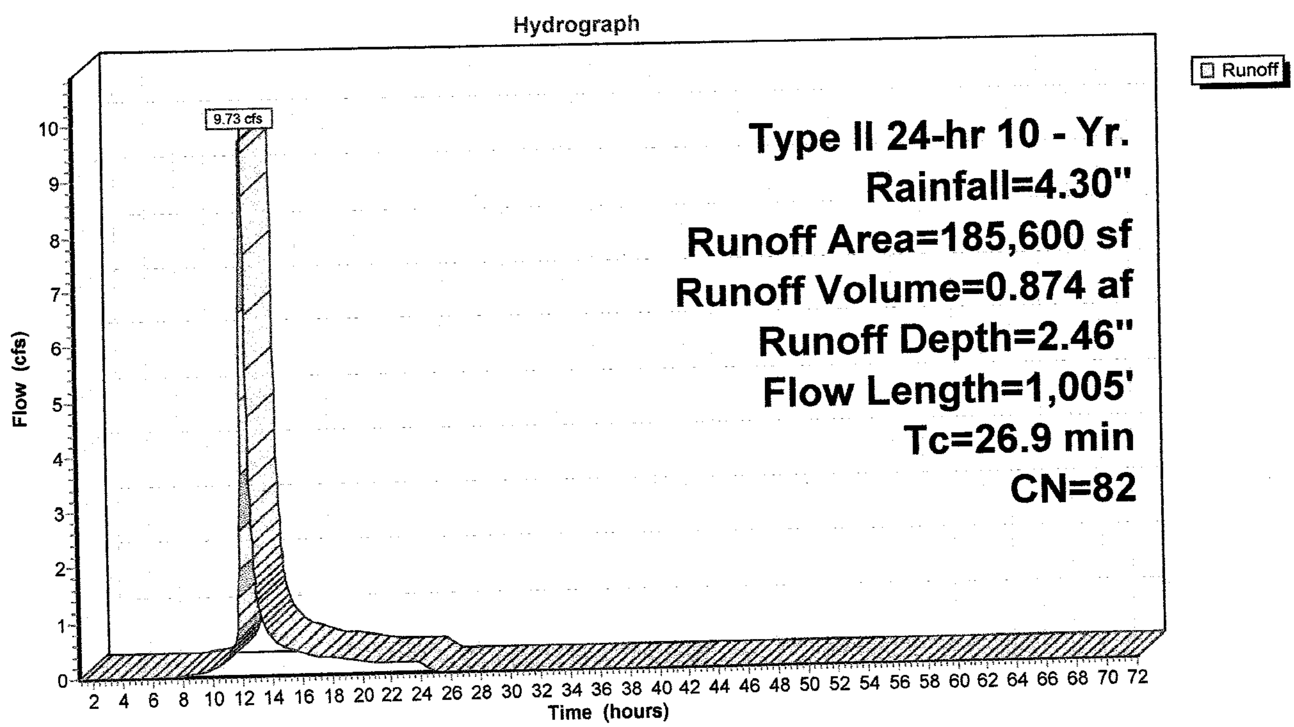
Runoff = 9.73 cfs @ 12.21 hrs, Volume= 0.874 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 - Yr. Rainfall=4.30"

Area (sf)	CN	Description
8,940	98	Paved parking & roofs
4,530	98	Paved parking & roofs
18,240	82	Woods/grass comb., Poor, HSG C
153,890	80	>75% Grass cover, Good, HSG D
185,600	82	Weighted Average
172,130		Pervious Area
13,470		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.3300	0.22		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
11.4	420	0.0150	0.61		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
14.0	565	0.0020	0.67		**Shallow Concentrated Flow, Tracks** Grassed Waterway Kv= 15.0 fps
26.9	1,005	Total			

Subcatchment 6S: Site



Summary for Subcatchment 11S: Basin 5

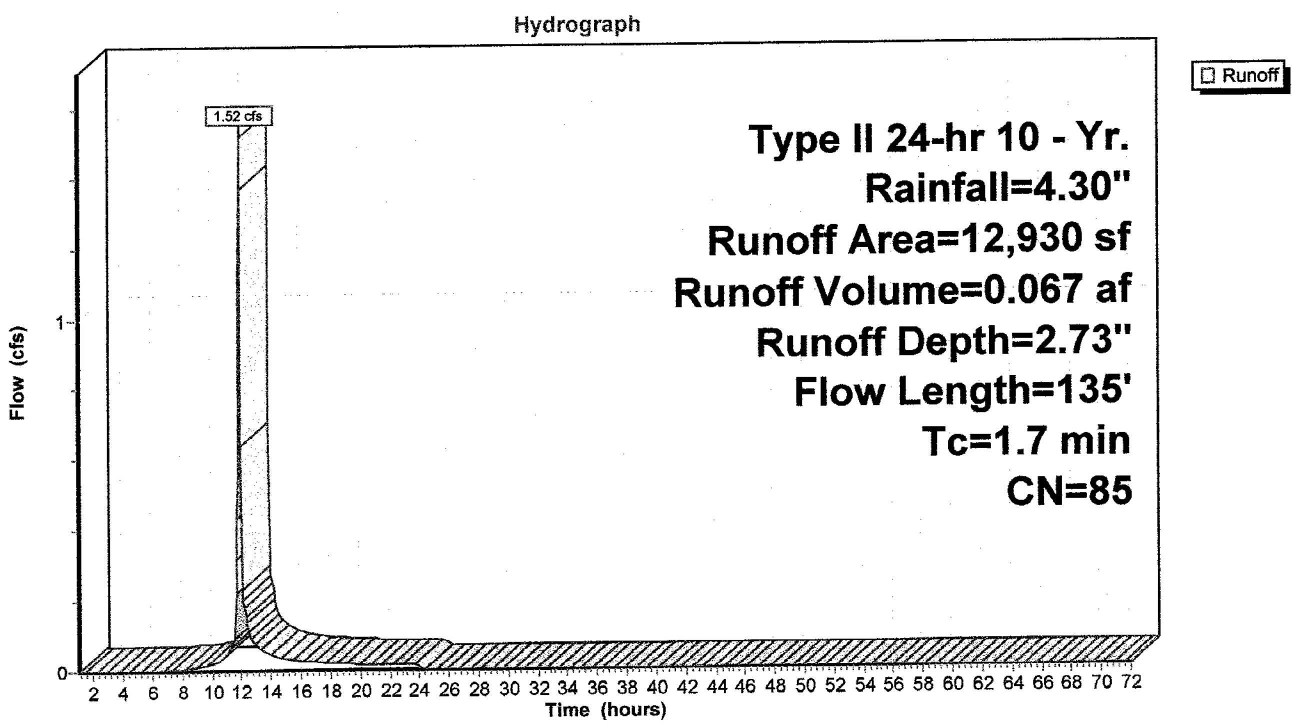
Runoff = 1.52 cfs @ 11.91 hrs, Volume= 0.067 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 - Yr. Rainfall=4.30"

Area (sf)	CN	Description
2,460	98	Paved parking & roofs
1,120	98	Paved parking & roofs
9,350	80	>75% Grass cover, Good, HSG D
12,930	85	Weighted Average
9,350		Pervious Area
3,580		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	10	0.3300	0.20		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
0.8	125	0.0280	2.51		**Shallow Concentrated Flow, Outer Area** Grassed Waterway Kv= 15.0 fps
1.7	135	Total			

Subcatchment 11S: Basin 5



Summary for Pond 3P: Sediment Trap

Inflow Area = 5.679 ac, 85.00% Impervious, Inflow Depth = 3.73" for 10 - Yr. event
Inflow = 35.05 cfs @ 11.94 hrs, Volume= 1.764 af
Outflow = 34.25 cfs @ 11.95 hrs, Volume= 1.650 af, Atten= 2%, Lag= 0.5 min
Primary = 7.29 cfs @ 11.95 hrs, Volume= 1.119 af
Secondary = 26.96 cfs @ 11.95 hrs, Volume= 0.532 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 17.35' Surf.Area= 1,162 sf Storage= 1,168 cf
Peak Elev= 20.48' @ 11.95 hrs Surf.Area= 3,171 sf Storage= 7,690 cf (6,522 cf above start)
Flood Elev= 21.00' Surf.Area= 3,600 sf Storage= 9,449 cf (8,281 cf above start)

Plug-Flow detention time= 73.3 min calculated for 1.622 af (92% of inflow)
Center-of-Mass det. time= 25.9 min (792.9 - 767.0)

Volume	Invert	Avail.Storage	Storage Description
#1	16.00'	9,449 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

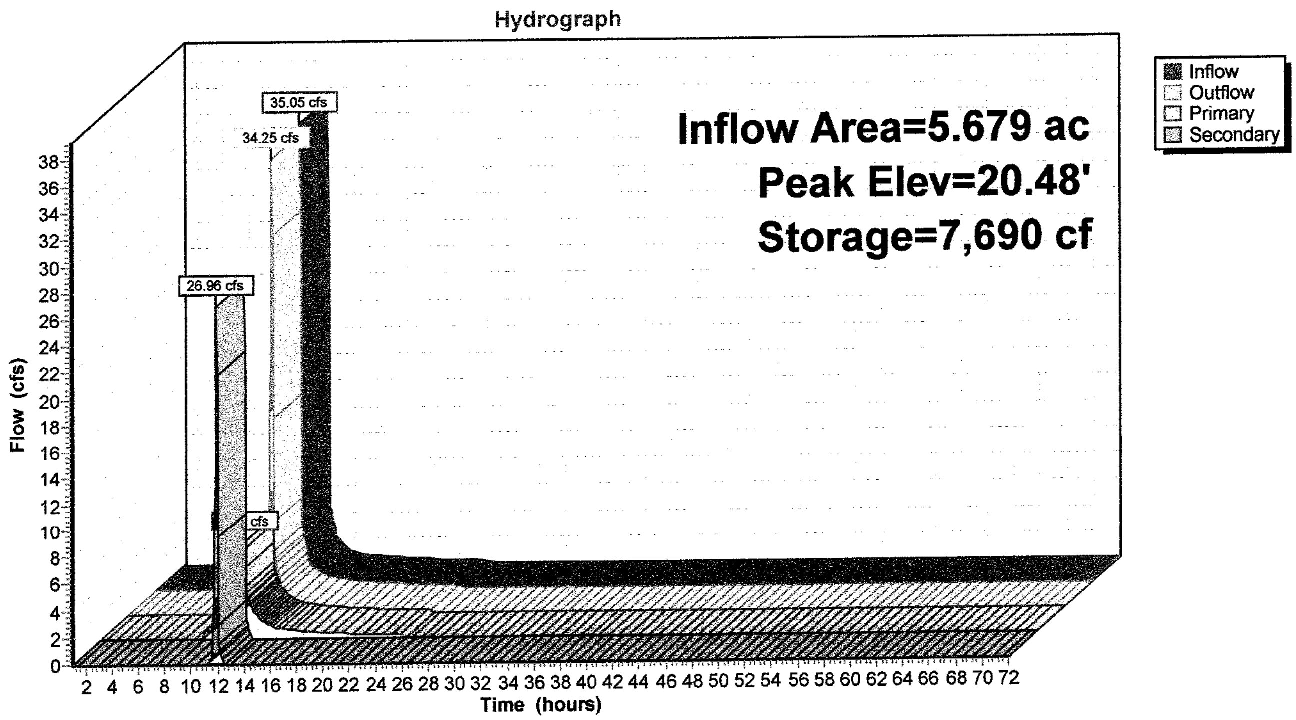
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
16.00	600	140.0	0	0	600
21.00	3,600	260.0	9,449	9,449	4,548

Device	Routing	Invert	Outlet Devices
#1	Primary	15.00'	**12.0" x 40.0' long Culvert** CPP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 15.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	18.50'	**12.0" x 25.0' long Culvert X 2.00** CPP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 18.50' S= 0.0000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#3	Secondary	20.00'	**30.0' long x 21.0' 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
#4	Device 1	17.35'	**12.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=7.29 cfs @ 11.95 hrs HW=20.48' TW=19.95' (Fixed TW Elev= 19.95')
1=Culvert (Inlet Controls 2.43 cfs @ 3.09 fps)
4=Orifice/Grate (Passes 2.43 cfs of 2.75 cfs potential flow)
2=Culvert (Inlet Controls 4.86 cfs @ 3.09 fps)

Secondary OutFlow Max=26.93 cfs @ 11.95 hrs HW=20.48' TW=19.95' (Fixed TW Elev= 19.95')
3=Broad-Crested Rectangular Weir (Weir Controls 26.93 cfs @ 1.87 fps)

Pond 3P: Sediment Trap



Summary for Pond 4P: Sand Filter

Inflow Area = 5.679 ac, 85.00% Impervious, Inflow Depth = 2.36" for 10 - Yr. event
Inflow = 7.29 cfs @ 11.95 hrs, Volume= 1.119 af
Outflow = 1.32 cfs @ 13.31 hrs, Volume= 1.119 af, Atten= 82%, Lag= 81.7 min
Primary = 0.37 cfs @ 13.31 hrs, Volume= 0.942 af
Secondary = 0.95 cfs @ 13.31 hrs, Volume= 0.177 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 20.11' @ 13.31 hrs Surf.Area= 7,936 sf Storage= 25,334 cf

Plug-Flow detention time= 727.4 min calculated for 1.119 af (100% of inflow)
Center-of-Mass det. time= 727.2 min (1,557.0 - 829.8)

Volume	Invert	Avail.Storage	Storage Description
#1	15.00'	32,977 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

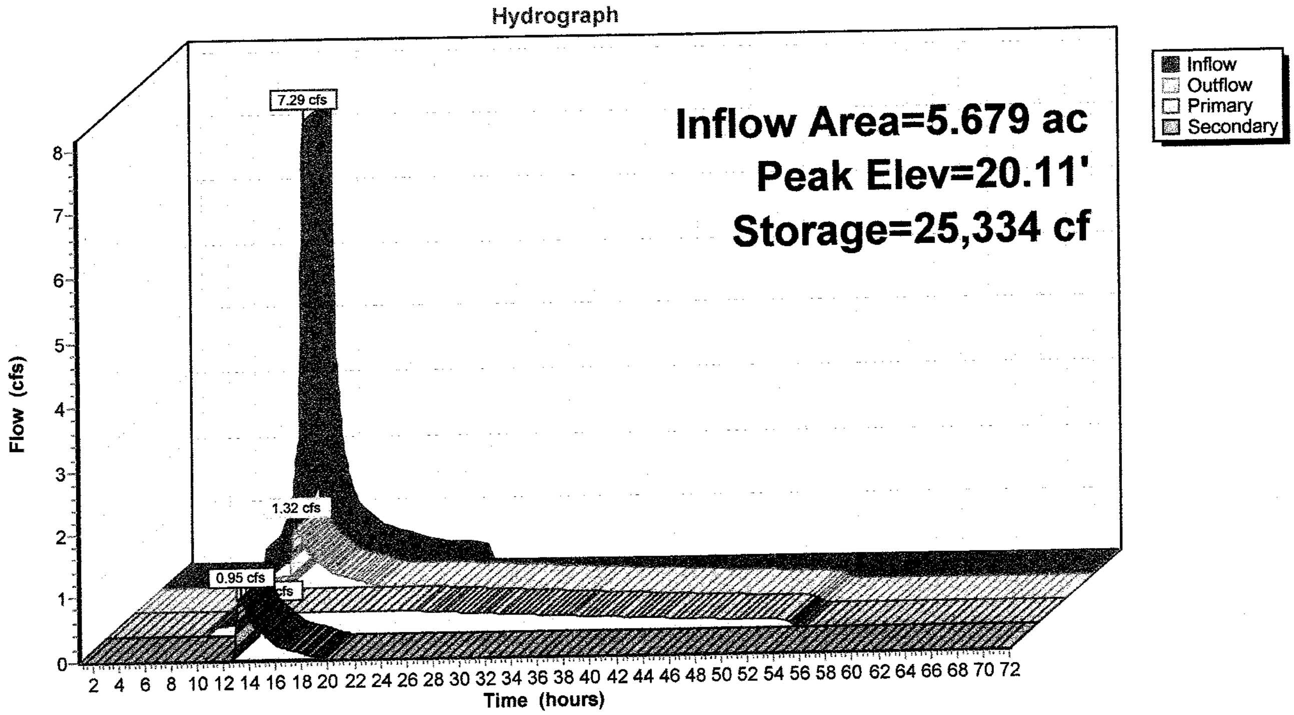
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
15.00	2,495	300.0	0	0	2,495
21.00	9,202	444.0	32,977	32,977	11,308

Device	Routing	Invert	Outlet Devices
#1	Primary	15.00'	**2.000 in/hr Exfiltration over Horizontal area**
#2	Secondary	20.00'	**10.0' long x 27.0' 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=0.37 cfs @ 13.31 hrs HW=20.11' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.37 cfs)

Secondary OutFlow Max=0.94 cfs @ 13.31 hrs HW=20.11' TW=20.00' (Fixed TW Elev= 20.00')
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.94 cfs @ 0.88 fps)

Pond 4P: Sand Filter



Summary for Pond 5P: Final Pond

Inflow	=	26.96 cfs @ 11.95 hrs,	Volume=	0.708 af
Outflow	=	0.18 cfs @ 16.73 hrs,	Volume=	0.650 af, Atten= 99%, Lag= 287.0 min
Primary	=	0.18 cfs @ 16.73 hrs,	Volume=	0.650 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 17.00' Surf.Area= 7,024 sf Storage= 11,593 cf
Peak Elev= 19.94' @ 16.73 hrs Surf.Area= 11,393 sf Storage= 38,374 cf (26,781 cf above start)
Flood Elev= 21.00' Surf.Area= 13,236 sf Storage= 51,462 cf (39,870 cf above start)

Plug-Flow detention time= 2,192.2 min calculated for 0.384 af (54% of inflow)
Center-of-Mass det. time= 1,474.8 min (2,232.3 - 757.6)

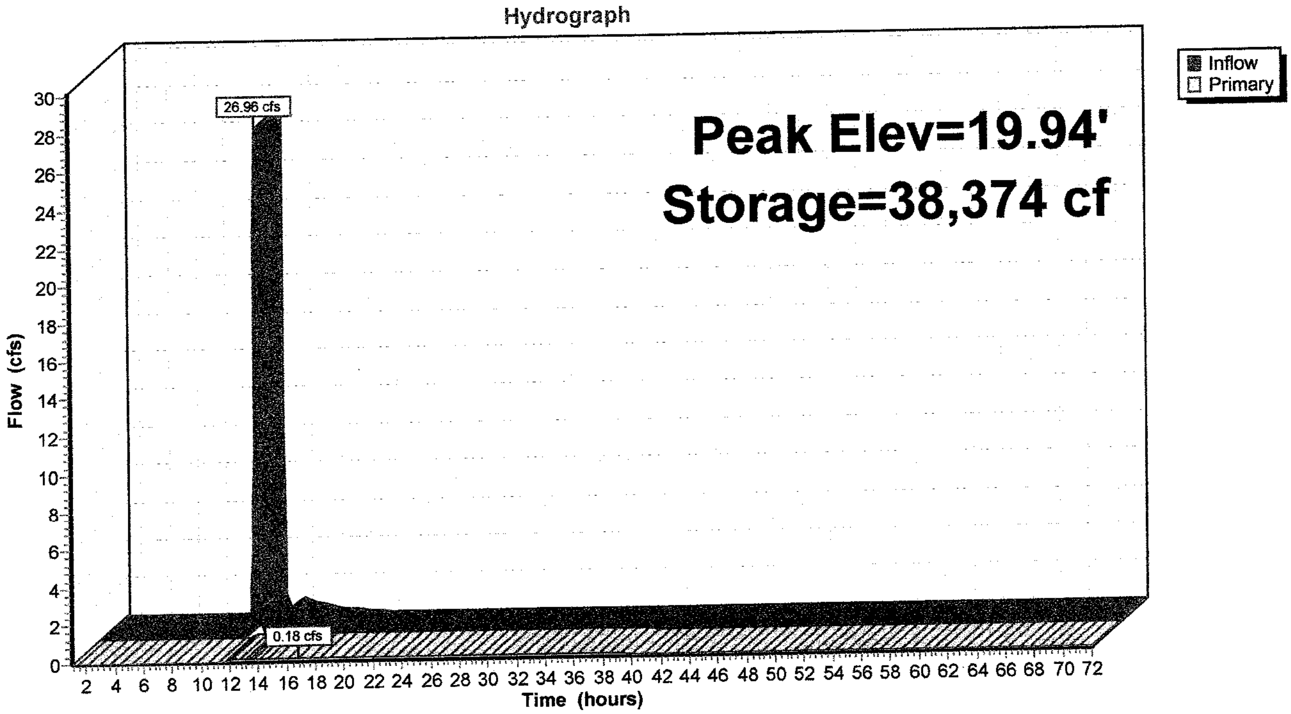
Volume	Invert	Avail.Storage	Storage Description
#1	15.00'	51,462 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
15.00	4,650	378.0	0	0	4,650
21.00	13,236	536.0	51,462	51,462	16,465

Device	Routing	Invert	Outlet Devices
#1	Device 2	20.00'	**2.00' x 2.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#2	Primary	12.00'	**18.0" x 20.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 11.80' S= 0.0100 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior
#3	Device 2	15.00'	**6.0" x 50.0' long Culvert** CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 14.50' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#4	Device 3	17.00'	**2.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=0.18 cfs @ 16.73 hrs HW=19.94' TW=12.10' (Fixed TW Elev= 12.10')
└─**2=Culvert** (Passes 0.18 cfs of 22.81 cfs potential flow)
  ├─**1=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Culvert** (Passes 0.18 cfs of 1.62 cfs potential flow)
    └─**4=Orifice/Grate** (Orifice Controls 0.18 cfs @ 8.25 fps)

Pond 5P: Final Pond



Summary for Pond 7P: Grate

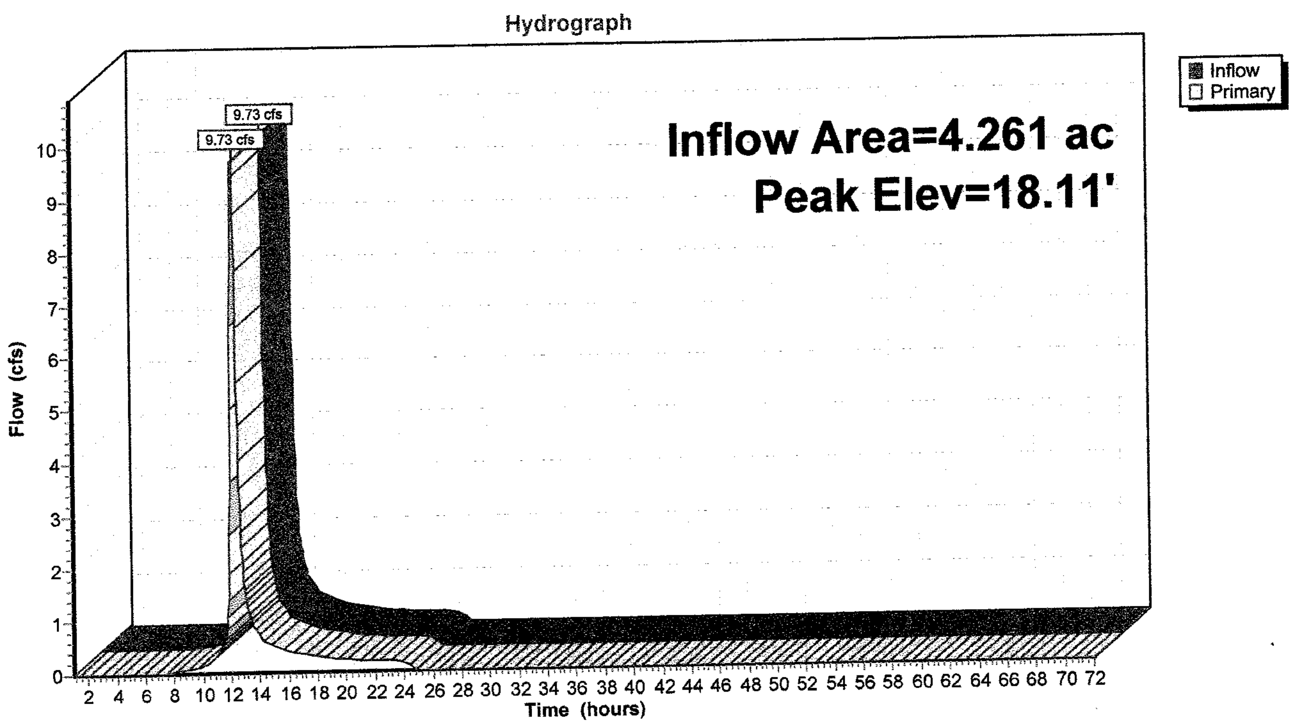
Inflow Area =	4.261 ac,	7.26% Impervious,	Inflow Depth = 2.46"	for 10 - Yr. event	
Inflow =	9.73 cfs @	12.21 hrs,	Volume=	0.874 af	
Outflow =	9.73 cfs @	12.21 hrs,	Volume=	0.874 af,	Atten= 0%, Lag= 0.0 min
Primary =	9.73 cfs @	12.21 hrs,	Volume=	0.874 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.11' @ 12.21 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	17.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=9.69 cfs @ 12.21 hrs HW=18.11' (Free Discharge)
↑—1=Orifice/Grate (Weir Controls 9.69 cfs @ 2.54 fps)

Pond 7P: Grate



Summary for Pond 8P: CB6

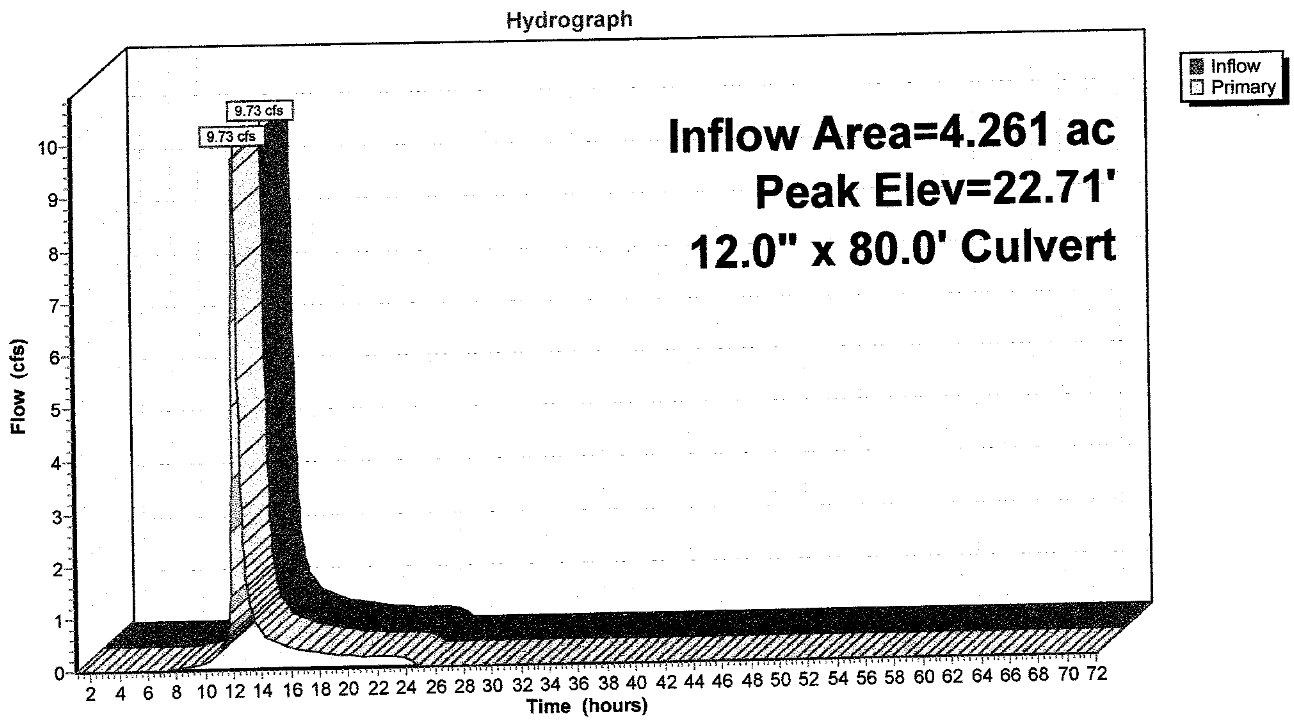
Inflow Area =	4.261 ac,	7.26% Impervious,	Inflow Depth = 2.46"	for 10 - Yr. event
Inflow =	9.73 cfs @	12.21 hrs, Volume=	0.874 af	
Outflow =	9.73 cfs @	12.21 hrs, Volume=	0.874 af,	Atten= 0%, Lag= 0.0 min
Primary =	9.73 cfs @	12.21 hrs, Volume=	0.874 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.71' @ 12.21 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.80' S= 0.0025 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=9.69 cfs @ 12.21 hrs HW=22.65' TW=15.60' (Fixed TW Elev= 15.60')
1=Culvert (Outlet Controls 9.69 cfs @ 12.33 fps)

Pond 8P: CB6



Summary for Pond 11P: Grate

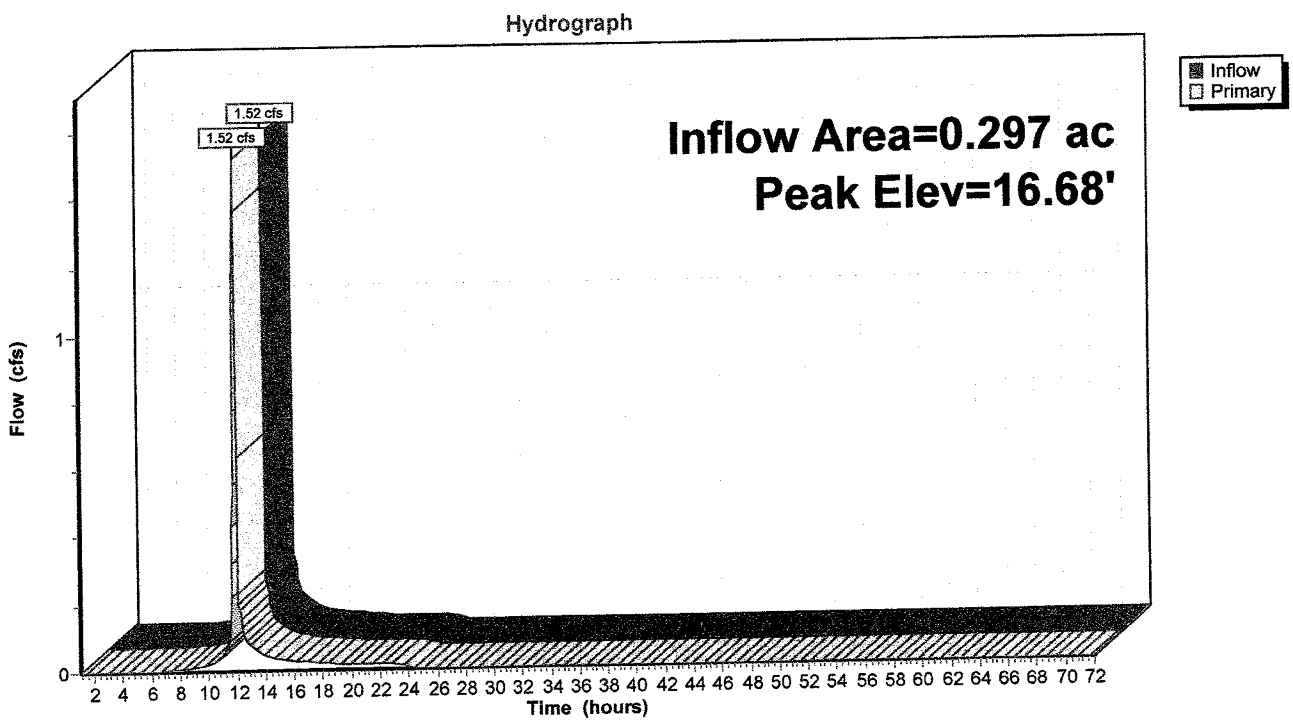
Inflow Area =	0.297 ac, 27.69% Impervious,	Inflow Depth = 2.73"	for 10 - Yr. event
Inflow =	1.52 cfs @ 11.91 hrs,	Volume=	0.067 af
Outflow =	1.52 cfs @ 11.91 hrs,	Volume=	0.067 af, Atten= 0%, Lag= 0.0 min
Primary =	1.52 cfs @ 11.91 hrs,	Volume=	0.067 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 16.68' @ 11.91 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	16.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=1.47 cfs @ 11.91 hrs HW=16.67' (Free Discharge)
↑**1=Orifice/Grate** (Weir Controls 1.47 cfs @ 1.36 fps)

Pond 11P: Grate



Summary for Pond 12P: CB5

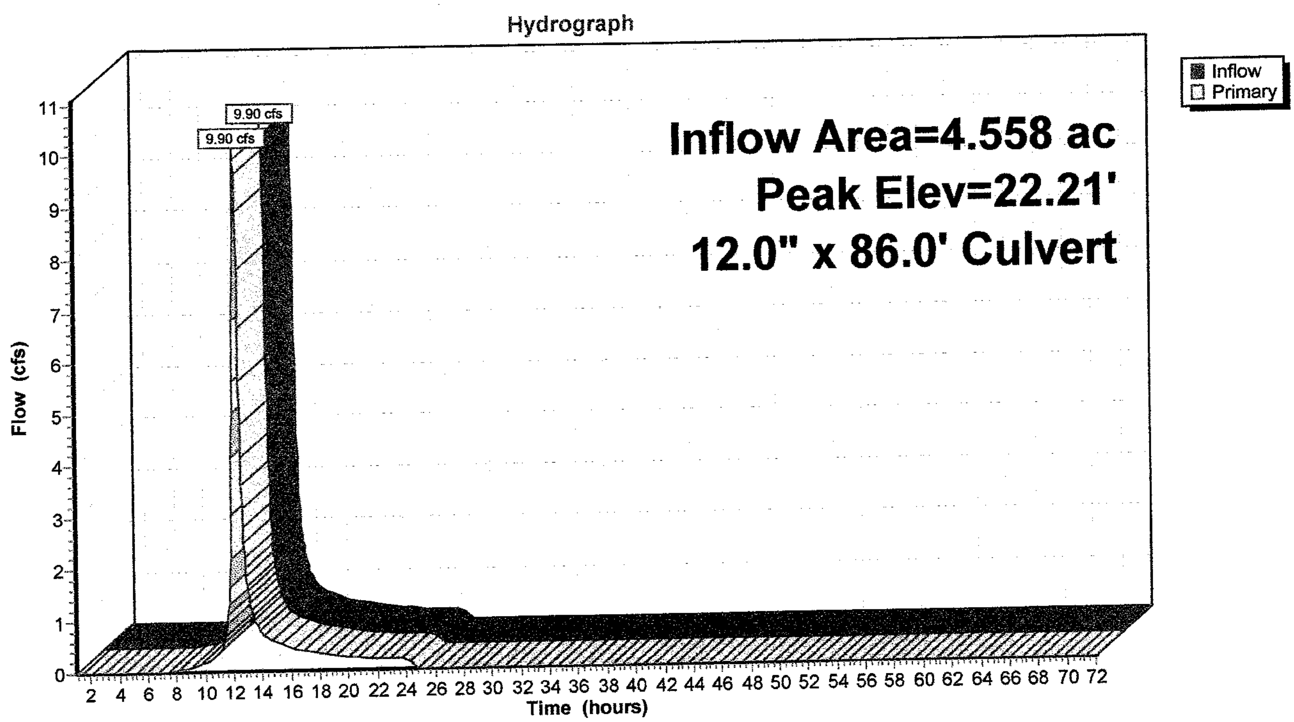
Inflow Area =	4.558 ac,	8.59% Impervious,	Inflow Depth =	2.48"	for 10 - Yr. event
Inflow =	9.90 cfs @	12.21 hrs,	Volume=	0.941 af	
Outflow =	9.90 cfs @	12.21 hrs,	Volume=	0.941 af,	Atten= 0%, Lag= 0.0 min
Primary =	9.90 cfs @	12.21 hrs,	Volume=	0.941 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.21' @ 12.21 hrs
Flood Elev= 16.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.80'	**12.0" x 86.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.57' S= 0.0027 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=9.86 cfs @ 12.21 hrs HW=22.16' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 9.86 cfs @ 12.56 fps)

Pond 12P: CB5



Summary for Pond 13P: CB10

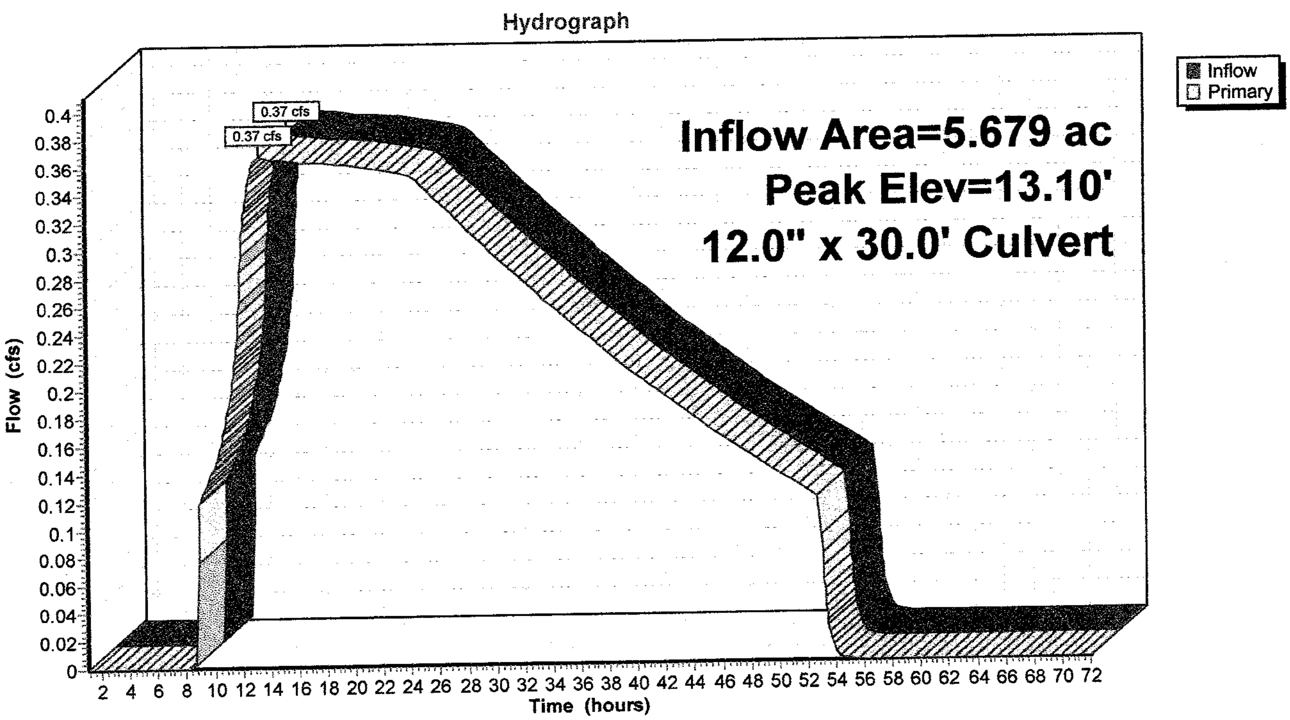
Inflow Area =	5.679 ac, 85.00% Impervious,	Inflow Depth = 1.99"	for 10 - Yr. event	
Inflow =	0.37 cfs @	13.31 hrs, Volume=	0.942 af	
Outflow =	0.37 cfs @	13.31 hrs, Volume=	0.942 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.37 cfs @	13.31 hrs, Volume=	0.942 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 13.10' @ 13.31 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	12.80'	**12.0" x 30.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 11.80' S= 0.0333 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.36 cfs @ 13.31 hrs HW=13.10' TW=11.15' (Fixed TW Elev= 11.15')
↑—**1=Culvert** (Inlet Controls 0.36 cfs @ 1.86 fps)

Pond 13P: CB10



Summary for Pond 14P: CB11

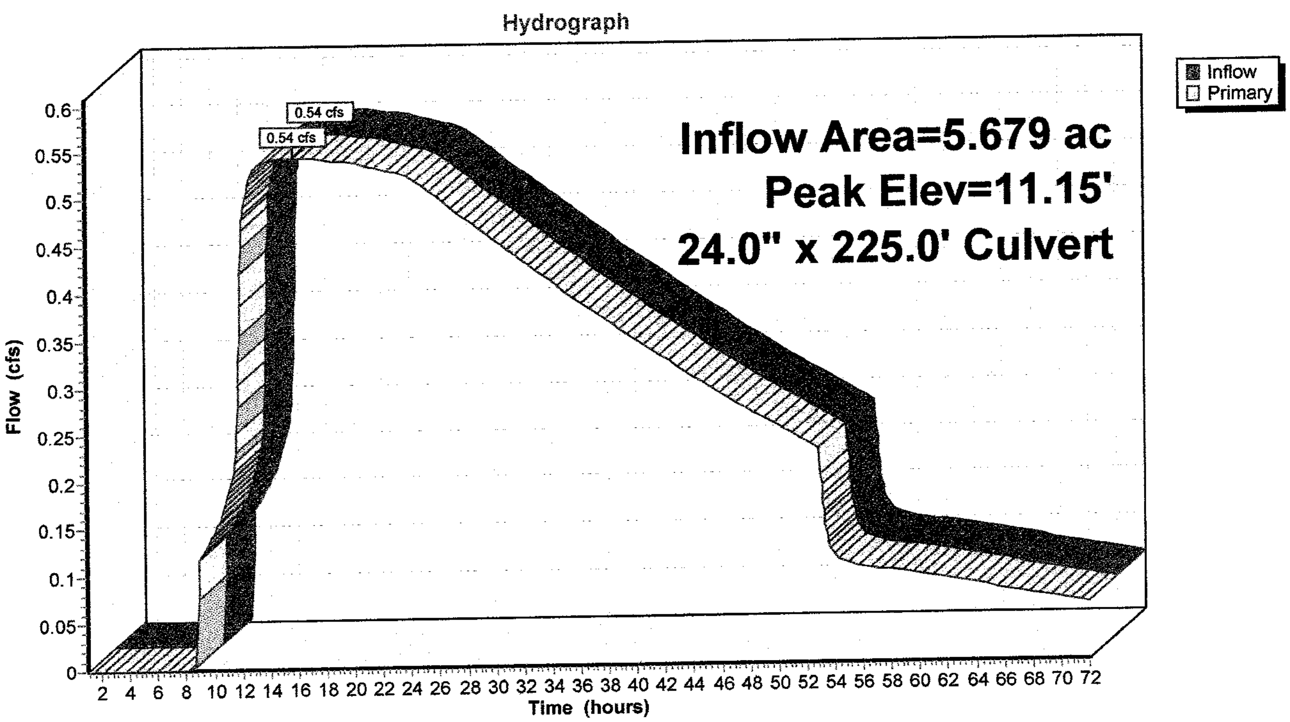
Inflow Area =	5.679 ac,	85.00% Impervious,	Inflow Depth > 3.36"	for 10 - Yr. event	
Inflow =	0.54 cfs @	15.76 hrs,	Volume=	1.592 af	
Outflow =	0.54 cfs @	15.76 hrs,	Volume=	1.592 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.54 cfs @	15.76 hrs,	Volume=	1.592 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 11.15' @ 15.76 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	10.80'	**24.0" x 225.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 8.55' S= 0.0100 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior

Primary OutFlow Max=0.53 cfs @ 15.76 hrs HW=11.15' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 0.53 cfs @ 2.20 fps)

Pond 14P: CB11

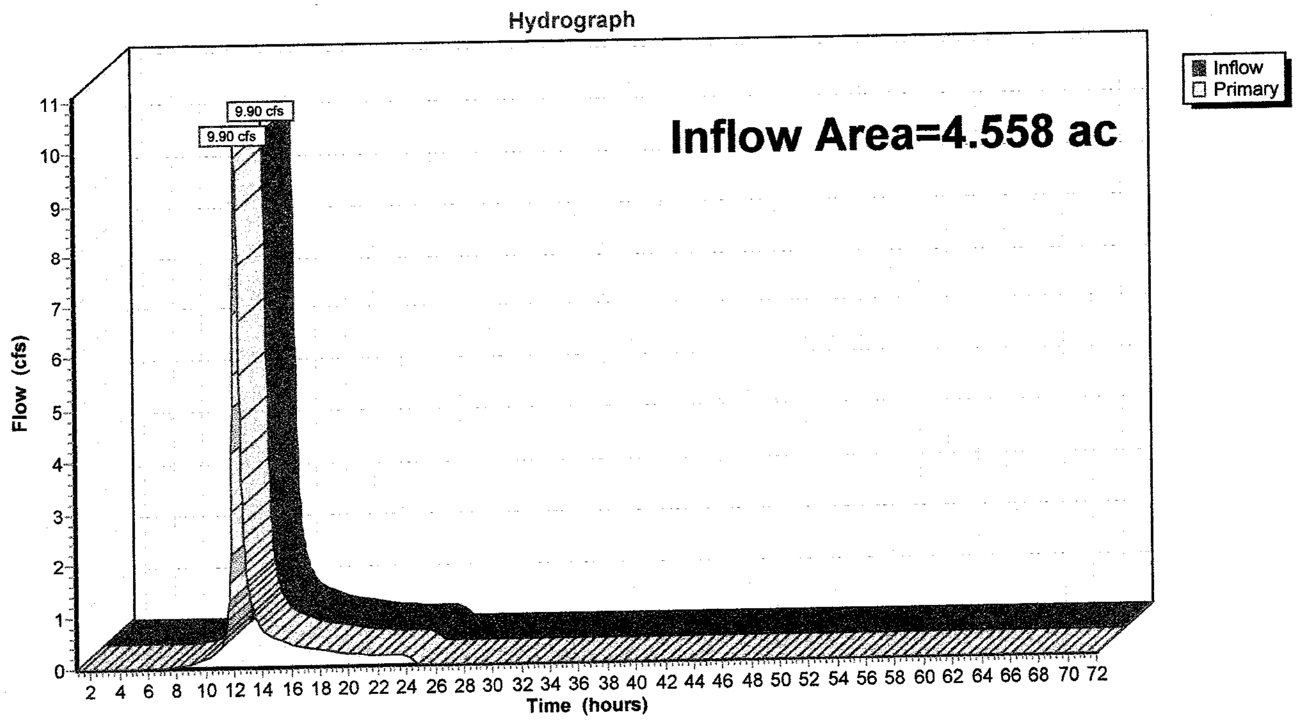


Summary for Link 9L: Outer Site at North and East

Inflow Area =	4.558 ac,	8.59% Impervious,	Inflow Depth = 2.48"	for 10 - Yr. event
Inflow =	9.90 cfs @	12.21 hrs, Volume=	0.941 af	
Primary =	9.90 cfs @	12.21 hrs, Volume=	0.941 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link 9L: Outer Site at North and East

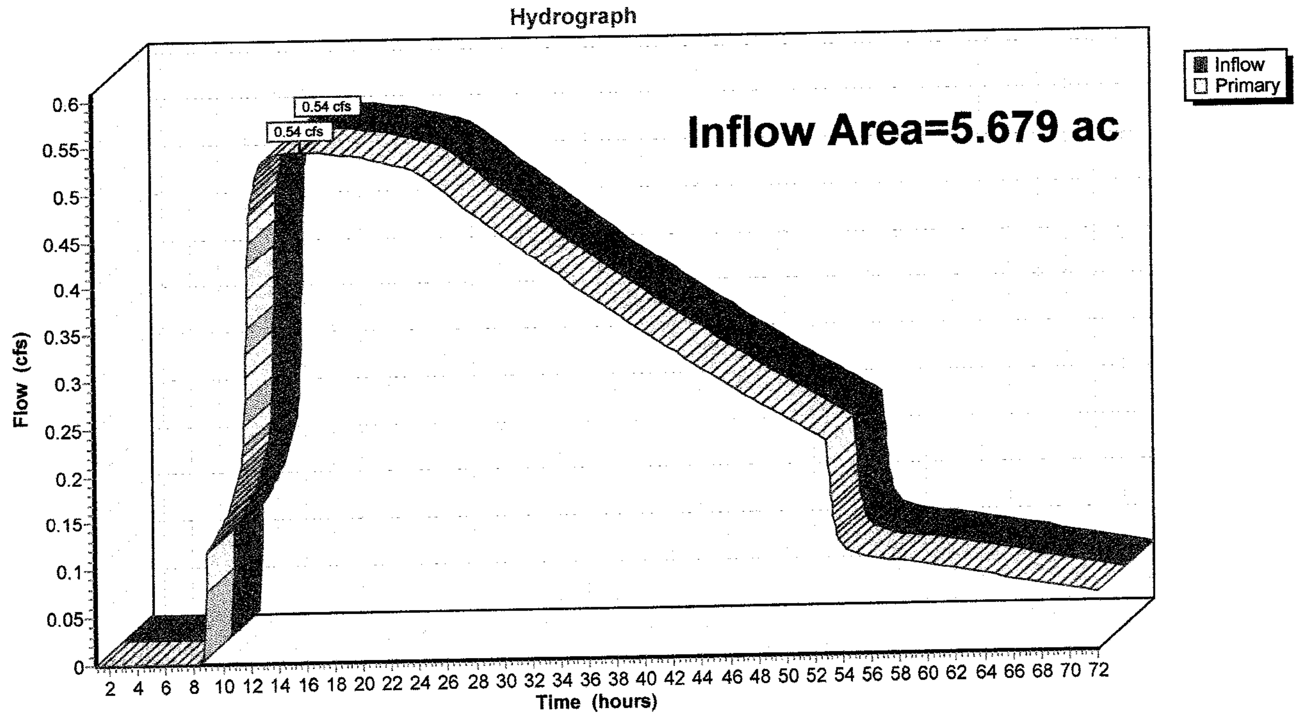


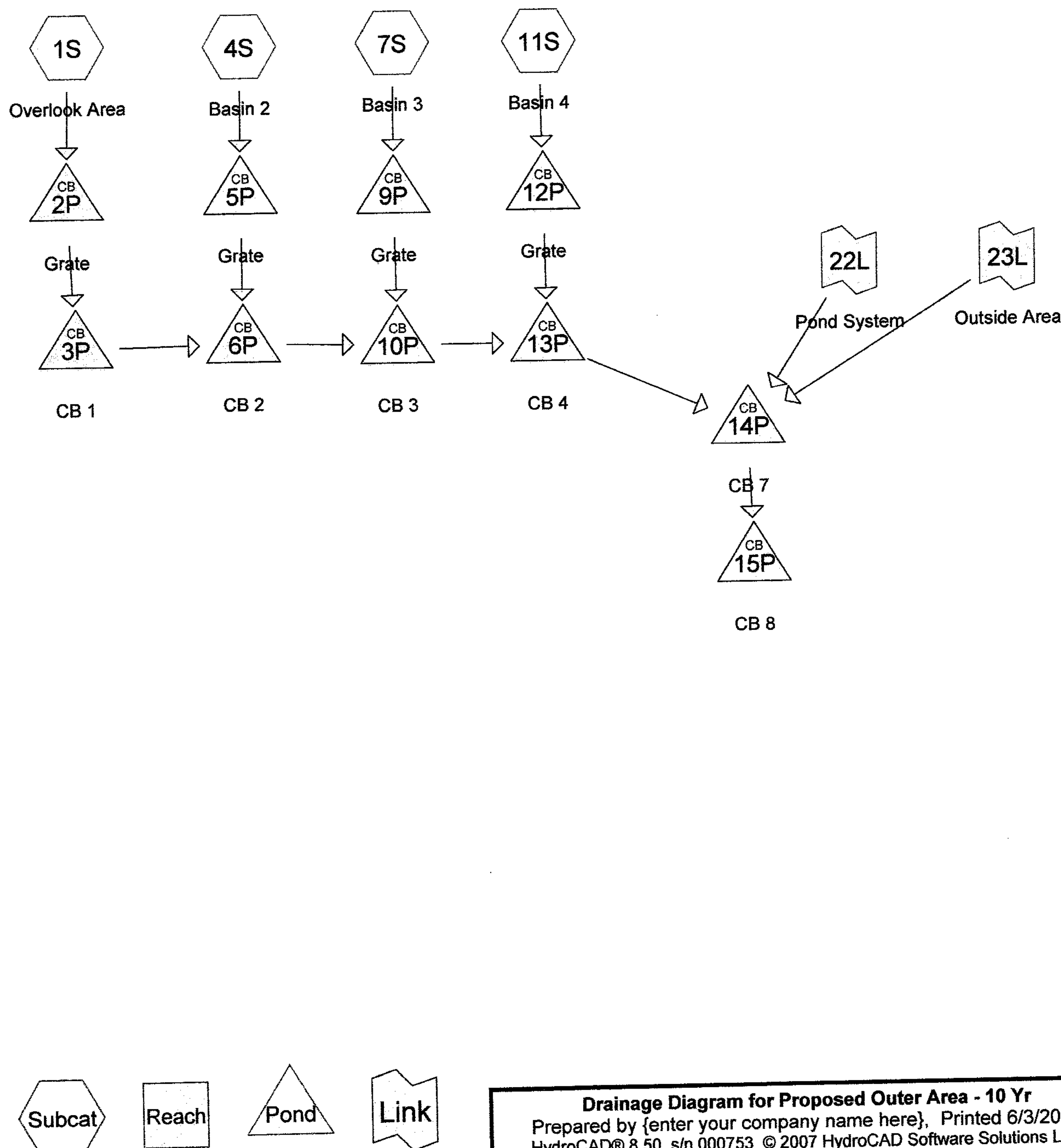
Summary for Link 10L: Pond System

Inflow Area =	5.679 ac,	85.00% Impervious, Inflow Depth > 3.36" for 10 - Yr. event		
Inflow =	0.54 cfs @	15.76 hrs, Volume=	1.592 af	
Primary =	0.54 cfs @	15.76 hrs, Volume=	1.592 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link 10L: Pond System





Drainage Diagram for Proposed Outer Area - 10 Yr
Prepared by {enter your company name here}, Printed 6/3/2011
HydroCAD® 8.50 s/n 000753 © 2007 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Overlook Area

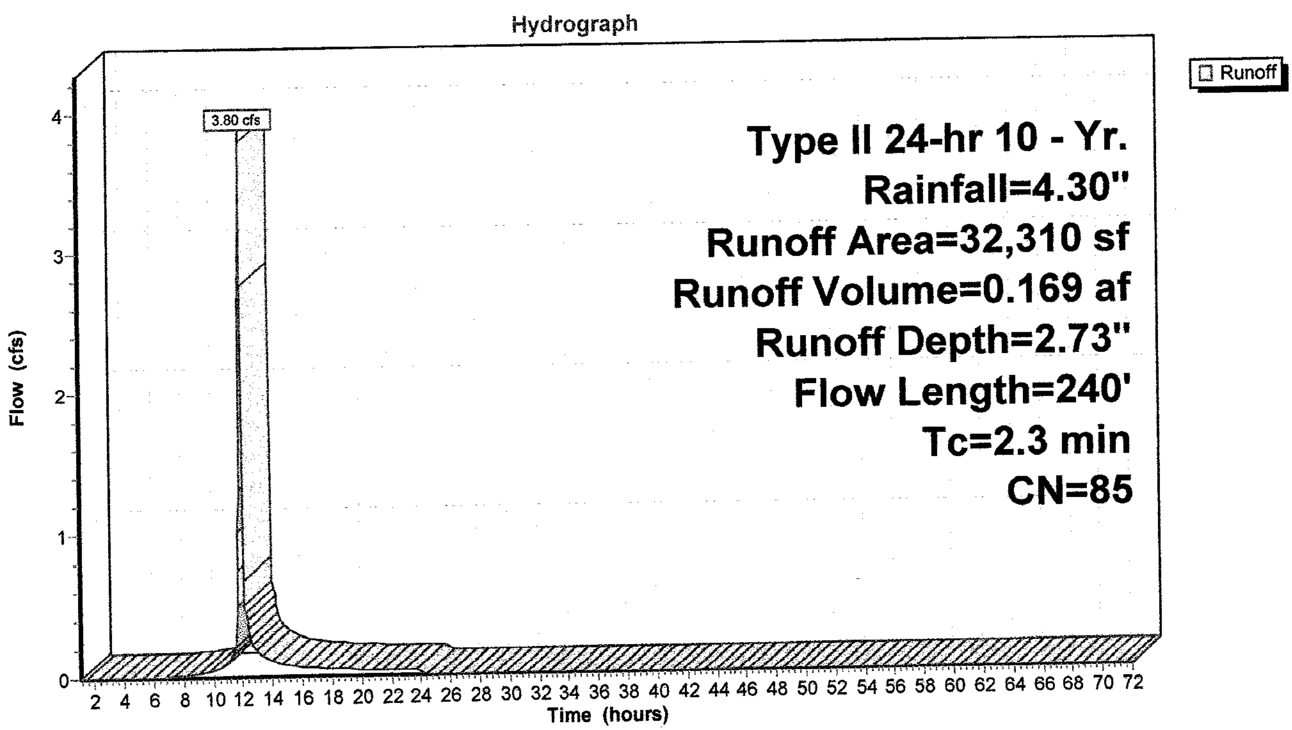
Runoff = 3.80 cfs @ 11.93 hrs, Volume= 0.169 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 - Yr. Rainfall=4.30"

Area (sf)	CN	Description
3,300	98	Paved parking & roofs
3,510	98	Paved parking & roofs
950	98	Paved parking & roofs
22,565	80	>75% Grass cover, Good, HSG D
1,985	98	Paved parking & roofs
32,310	85	Weighted Average
22,565		Pervious Area
9,745		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	5	0.3300	0.17		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
1.8	235	0.0200	2.12		**Shallow Concentrated Flow, Vegetated Surface** Grassed Waterway Kv= 15.0 fps
2.3	240	Total			

Subcatchment 1S: Overlook Area



Summary for Subcatchment 4S: Basin 2

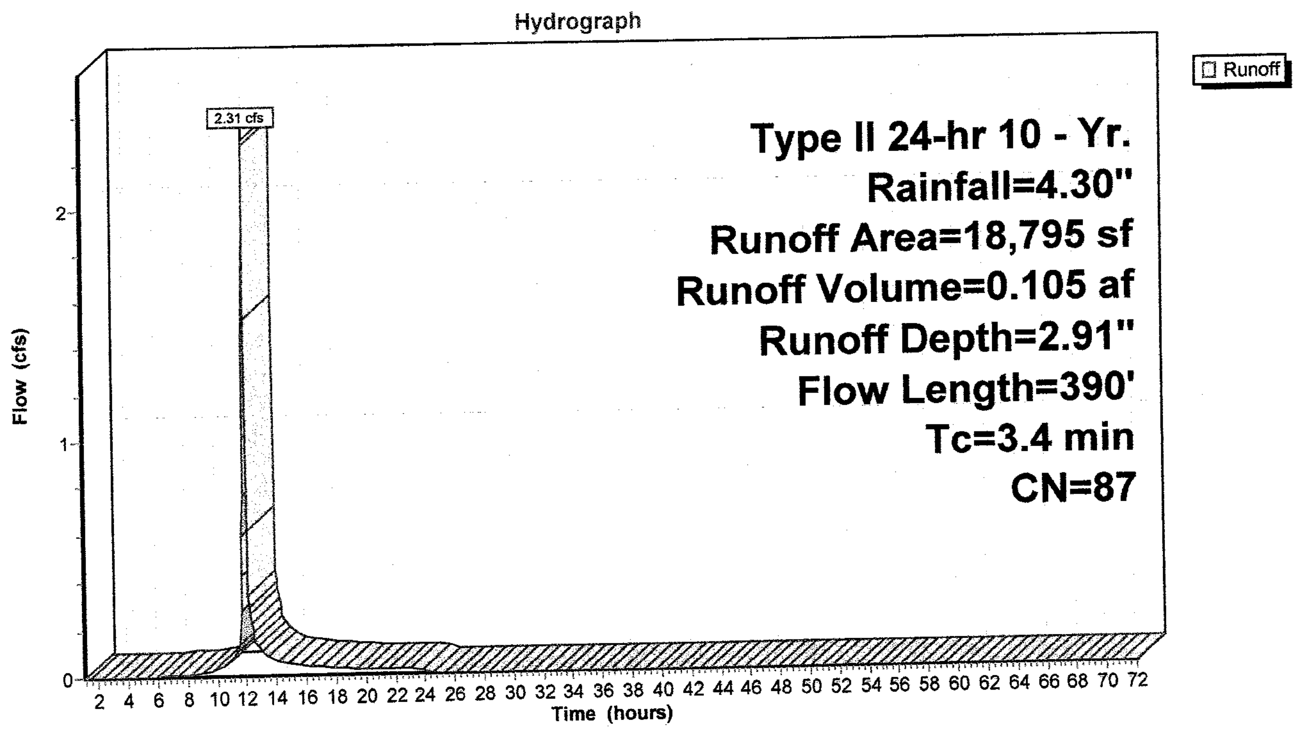
Runoff = 2.31 cfs @ 11.94 hrs, Volume= 0.105 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 - Yr. Rainfall=4.30"

Area (sf)	CN	Description
2,400	98	Paved parking & roofs
3,510	98	Paved parking & roofs
1,800	98	Paved parking & roofs
11,085	80	>75% Grass cover, Good, HSG D
18,795	87	Weighted Average
11,085		Pervious Area
7,710		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	15	0.0050	0.47		**Sheet Flow, Driveway** Smooth surfaces n= 0.011 P2= 2.40"
1.6	225	0.0260	2.42		**Shallow Concentrated Flow, Berm** Grassed Waterway Kv= 15.0 fps
1.3	150	0.0167	1.94		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
3.4	390	Total			

Subcatchment 4S: Basin 2



Summary for Subcatchment 7S: Basin 3

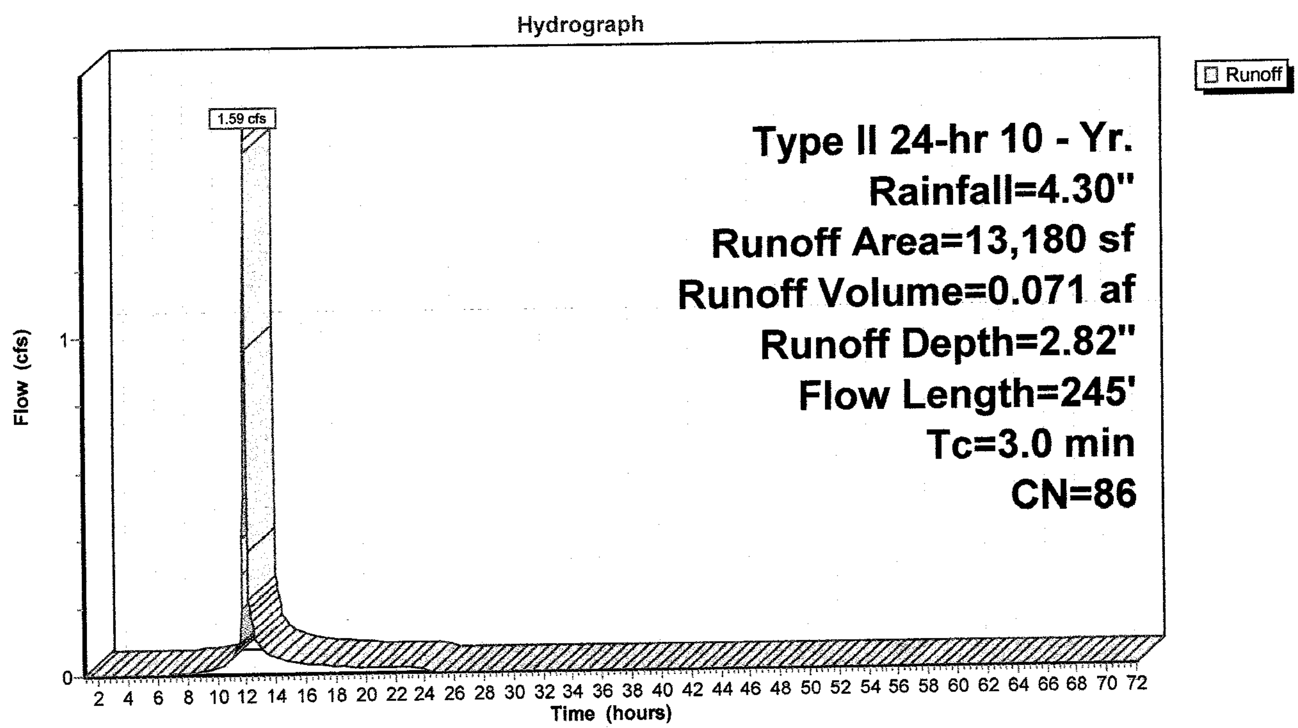
Runoff = 1.59 cfs @ 11.93 hrs, Volume= 0.071 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 - Yr. Rainfall=4.30"

Area (sf)	CN	Description
1,440	98	Paved parking & roofs
2,565	98	Paved parking & roofs
475	98	Paved parking & roofs
8,700	80	>75% Grass cover, Good, HSG D
13,180	86	Weighted Average
8,700		Pervious Area
4,480		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	10	0.3300	0.20		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
1.3	160	0.0200	2.12		**Shallow Concentrated Flow, Driveway Channel** Grassed Waterway Kv= 15.0 fps
0.8	75	0.0100	1.50		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
3.0	245	Total			

Subcatchment 7S: Basin 3



Summary for Subcatchment 11S: Basin 4

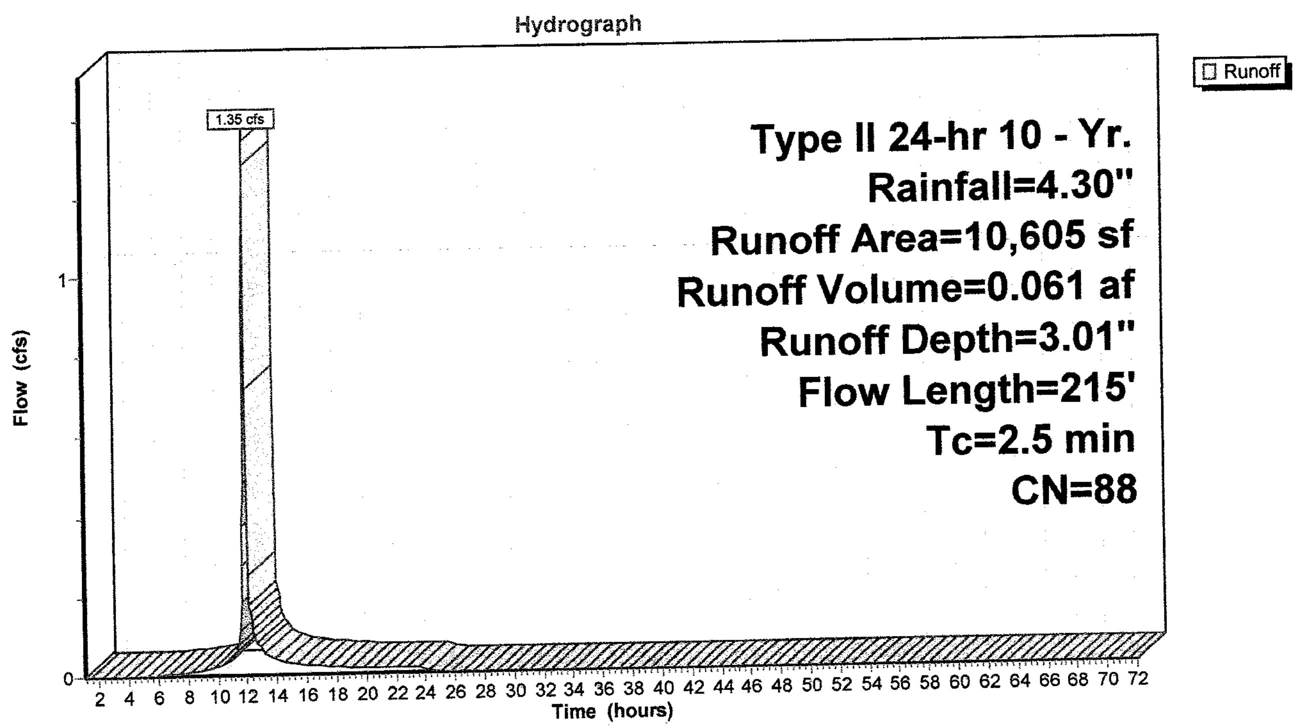
Runoff = 1.35 cfs @ 11.93 hrs, Volume= 0.061 af, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 - Yr. Rainfall=4.30"

Area (sf)	CN	Description
1,500	98	Paved parking & roofs
2,565	98	Paved parking & roofs
840	98	Paved parking & roofs
5,700	80	>75% Grass cover, Good, HSG D
10,605	88	Weighted Average
5,700		Pervious Area
4,905		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	10	0.3300	0.20		**Sheet Flow, Driveway** Grass: Dense n= 0.240 P2= 2.40"
1.2	150	0.0200	2.12		**Shallow Concentrated Flow, Driveway Channel** Grassed Waterway Kv= 15.0 fps
0.4	55	0.0200	2.12		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
2.5	215	Total			

Subcatchment 11S: Basin 4



Summary for Pond 2P: Grate

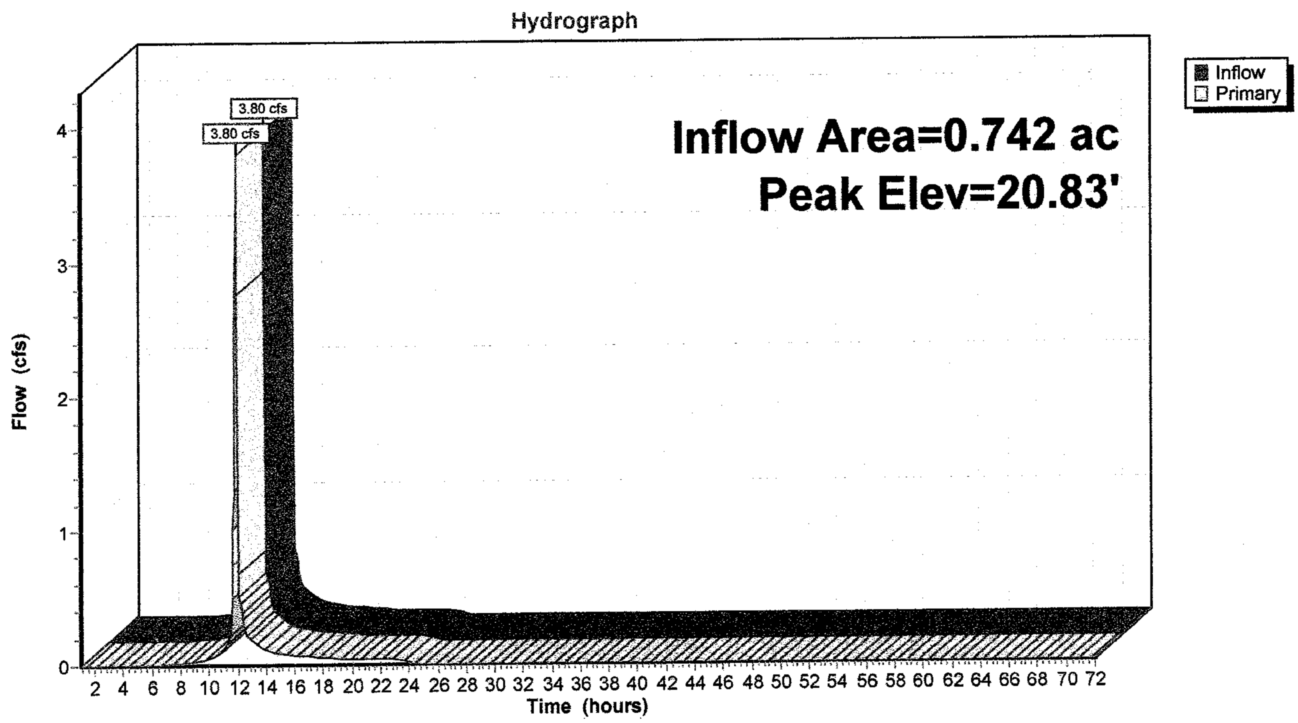
Inflow Area =	0.742 ac,	30.16% Impervious,	Inflow Depth = 2.73"	for 10 - Yr. event
Inflow =	3.80 cfs @	11.93 hrs, Volume=	0.169 af	
Outflow =	3.80 cfs @	11.93 hrs, Volume=	0.169 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.80 cfs @	11.93 hrs, Volume=	0.169 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 20.83' @ 11.93 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	20.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=3.59 cfs @ 11.93 hrs HW=20.81' (Free Discharge)
1=Orifice/Grate (Weir Controls 3.59 cfs @ 1.83 fps)

Pond 2P: Grate



Summary for Pond 3P: CB 1

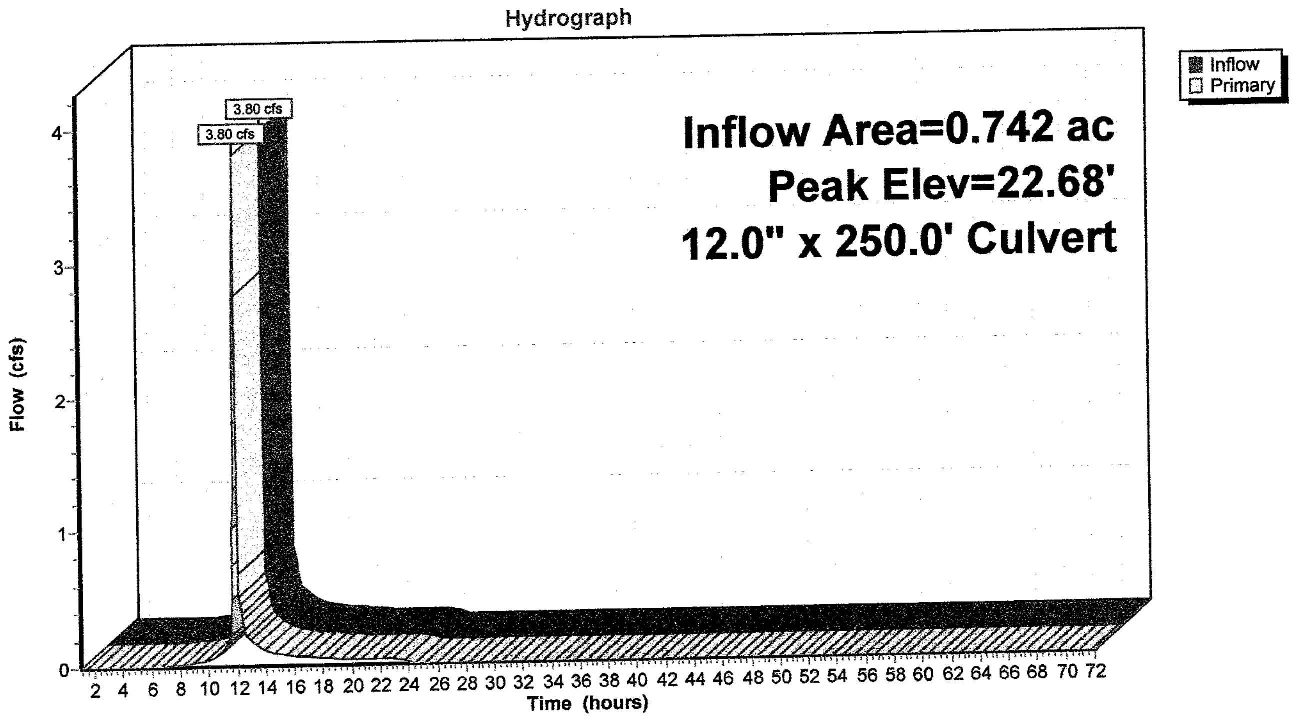
Inflow Area =	0.742 ac, 30.16% Impervious,	Inflow Depth = 2.73"	for 10 - Yr. event
Inflow =	3.80 cfs @ 11.93 hrs,	Volume= 0.169 af	
Outflow =	3.80 cfs @ 11.93 hrs,	Volume= 0.169 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.80 cfs @ 11.93 hrs,	Volume= 0.169 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.68' @ 11.93 hrs
Flood Elev= 20.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	15.43'	**12.0" x 250.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 14.28' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=3.59 cfs @ 11.93 hrs HW=22.50' TW=20.50' (Fixed TW Elev= 20.50')
↑—**1=Culvert** (Outlet Controls 3.59 cfs @ 4.58 fps)

Pond 3P: CB 1



Summary for Pond 5P: Grate

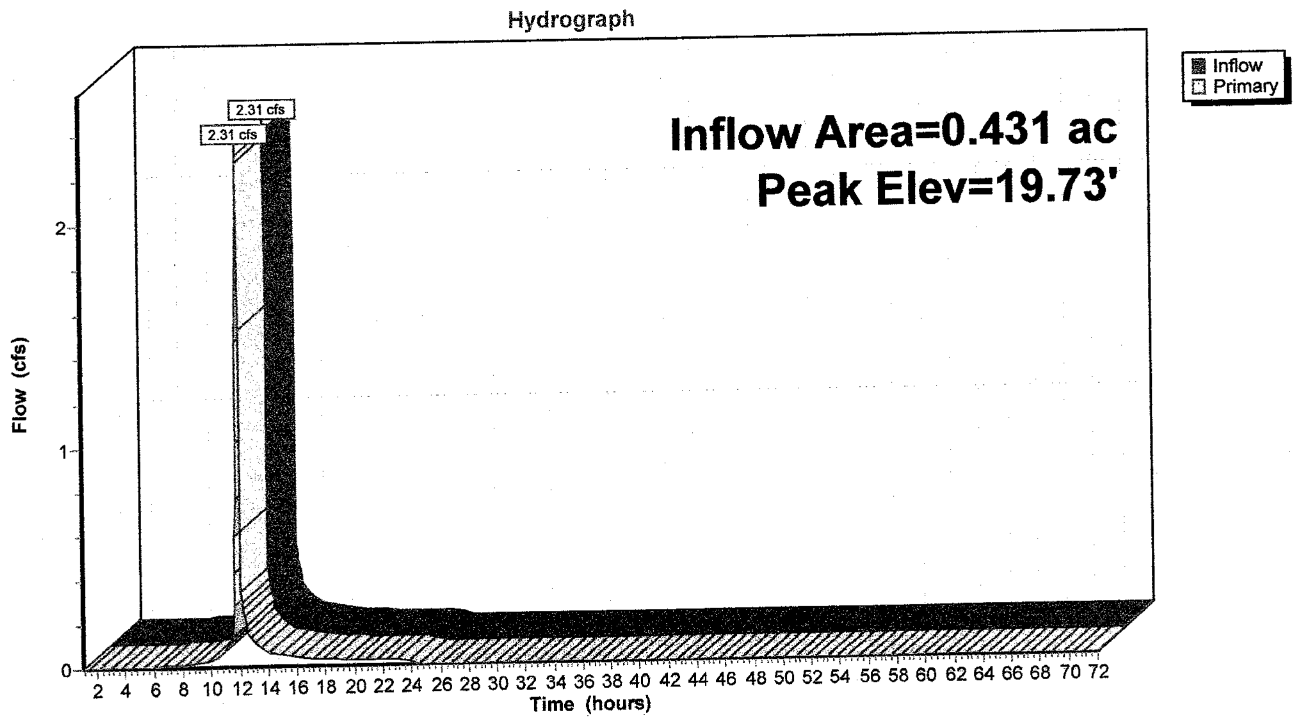
Inflow Area = 0.431 ac, 41.02% Impervious, Inflow Depth = 2.91" for 10 - Yr. event
Inflow = 2.31 cfs @ 11.94 hrs, Volume= 0.105 af
Outflow = 2.31 cfs @ 11.94 hrs, Volume= 0.105 af, Atten= 0%, Lag= 0.0 min
Primary = 2.31 cfs @ 11.94 hrs, Volume= 0.105 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 19.73' @ 11.94 hrs
Flood Elev= 20.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	19.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=2.21 cfs @ 11.94 hrs HW=19.73' (Free Discharge)
↑—1=Orifice/Grate (Weir Controls 2.21 cfs @ 1.56 fps)

Pond 5P: Grate



Summary for Pond 6P: CB 2

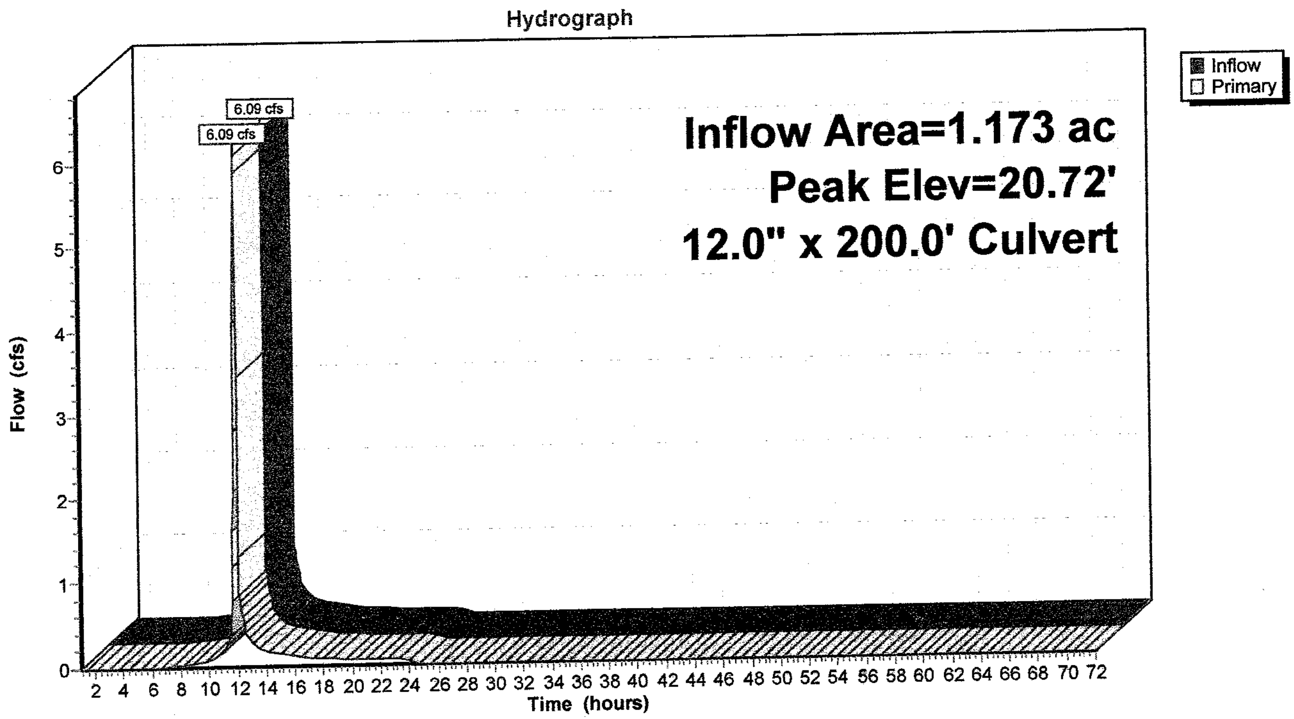
Inflow Area =	1.173 ac,	34.16% Impervious,	Inflow Depth = 2.80"	for 10 - Yr. event	
Inflow =	6.09 cfs @	11.93 hrs,	Volume=	0.273 af	
Outflow =	6.09 cfs @	11.93 hrs,	Volume=	0.273 af,	Atten= 0%, Lag= 0.0 min
Primary =	6.09 cfs @	11.93 hrs,	Volume=	0.273 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 20.72' @ 11.93 hrs
Flood Elev= 19.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.58'	**12.0" x 200.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.67' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=5.77 cfs @ 11.93 hrs HW=20.31' TW=15.94' (Fixed TW Elev= 15.94')
↑1=Culvert (Outlet Controls 5.77 cfs @ 7.35 fps)

Pond 6P: CB 2



Summary for Pond 9P: Grate

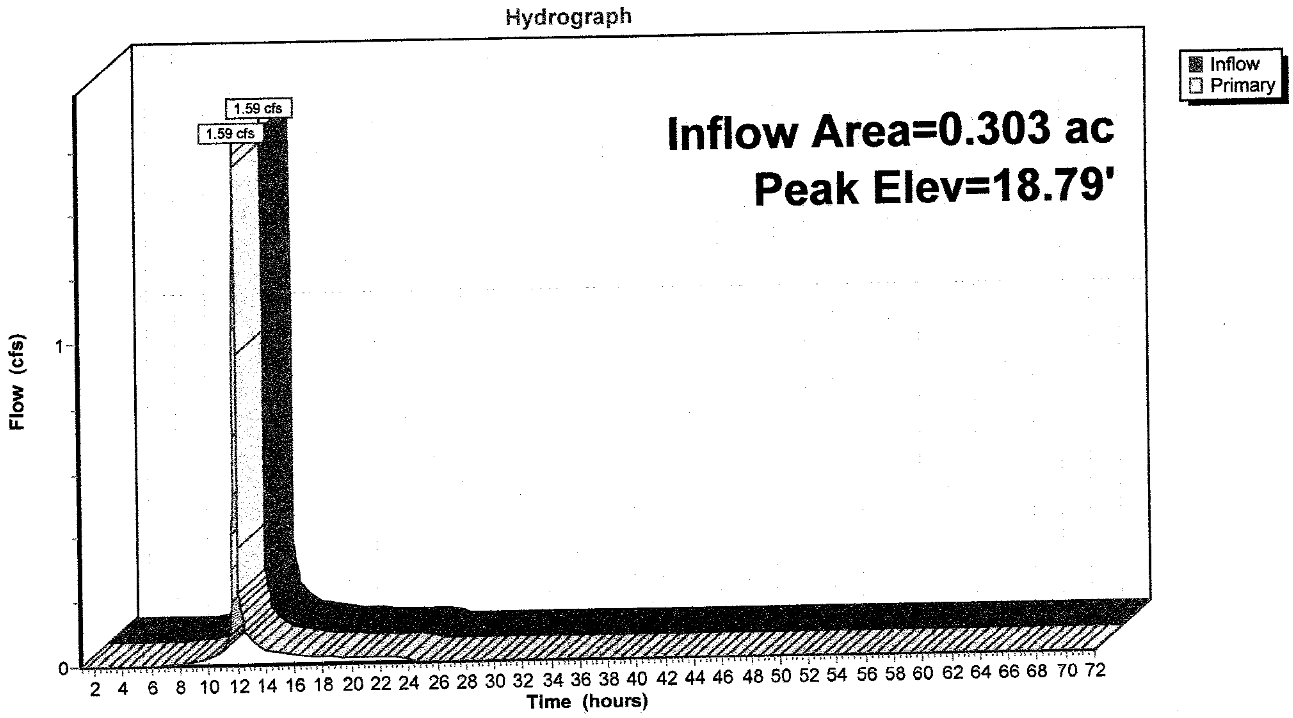
Inflow Area =	0.303 ac, 33.99% Impervious,	Inflow Depth = 2.82"	for 10 - Yr. event
Inflow =	1.59 cfs @ 11.93 hrs,	Volume=	0.071 af
Outflow =	1.59 cfs @ 11.93 hrs,	Volume=	0.071 af, Atten= 0%, Lag= 0.0 min
Primary =	1.59 cfs @ 11.93 hrs,	Volume=	0.071 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.79' @ 11.93 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**12.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=1.51 cfs @ 11.93 hrs HW=18.78' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 1.51 cfs @ 1.73 fps)

Pond 9P: Grate



Summary for Pond 10P: CB 3

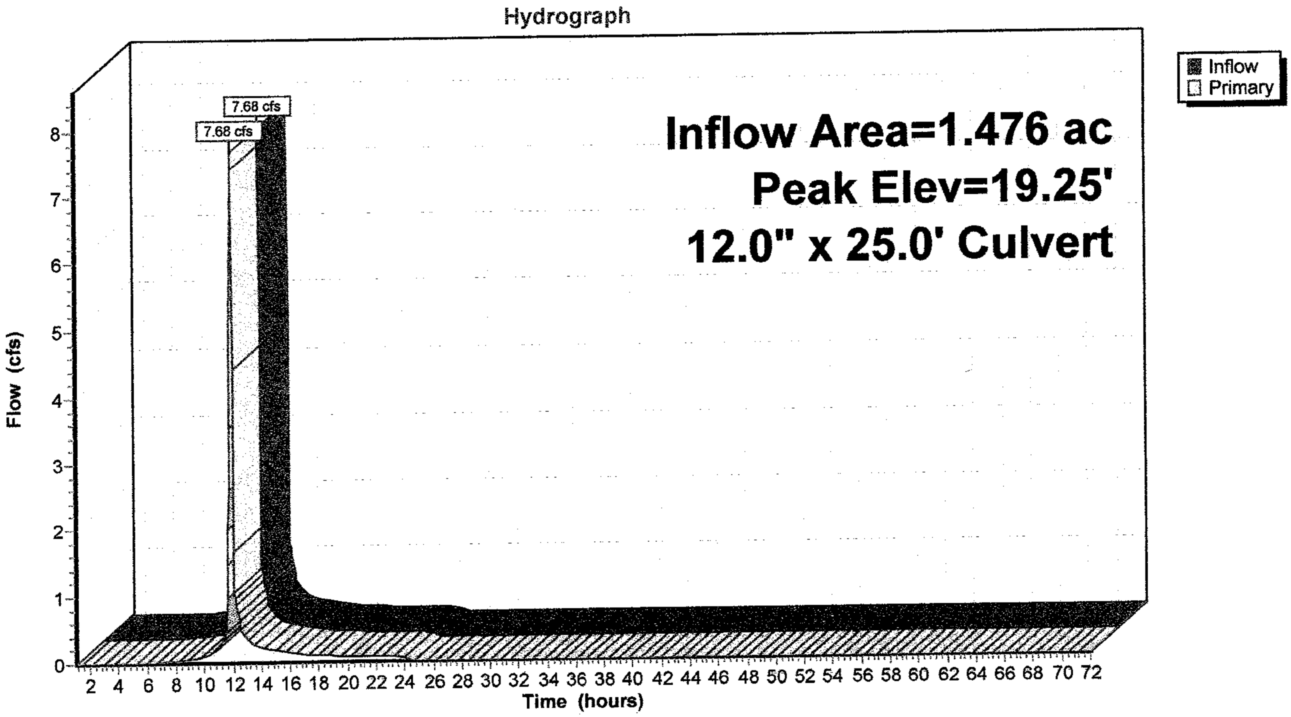
Inflow Area =	1.476 ac,	34.12% Impervious,	Inflow Depth = 2.80"	for 10 - Yr. event
Inflow =	7.68 cfs @	11.93 hrs,	Volume=	0.344 af
Outflow =	7.68 cfs @	11.93 hrs,	Volume=	0.344 af, Atten= 0%, Lag= 0.0 min
Primary =	7.68 cfs @	11.93 hrs,	Volume=	0.344 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 19.25' @ 11.93 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.67'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.60' S= 0.0028 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=7.28 cfs @ 11.93 hrs HW=18.91' TW=15.20' (Fixed TW Elev= 15.20')
1=Culvert (Inlet Controls 7.28 cfs @ 9.27 fps)

Pond 10P: CB 3



Summary for Pond 12P: Grate

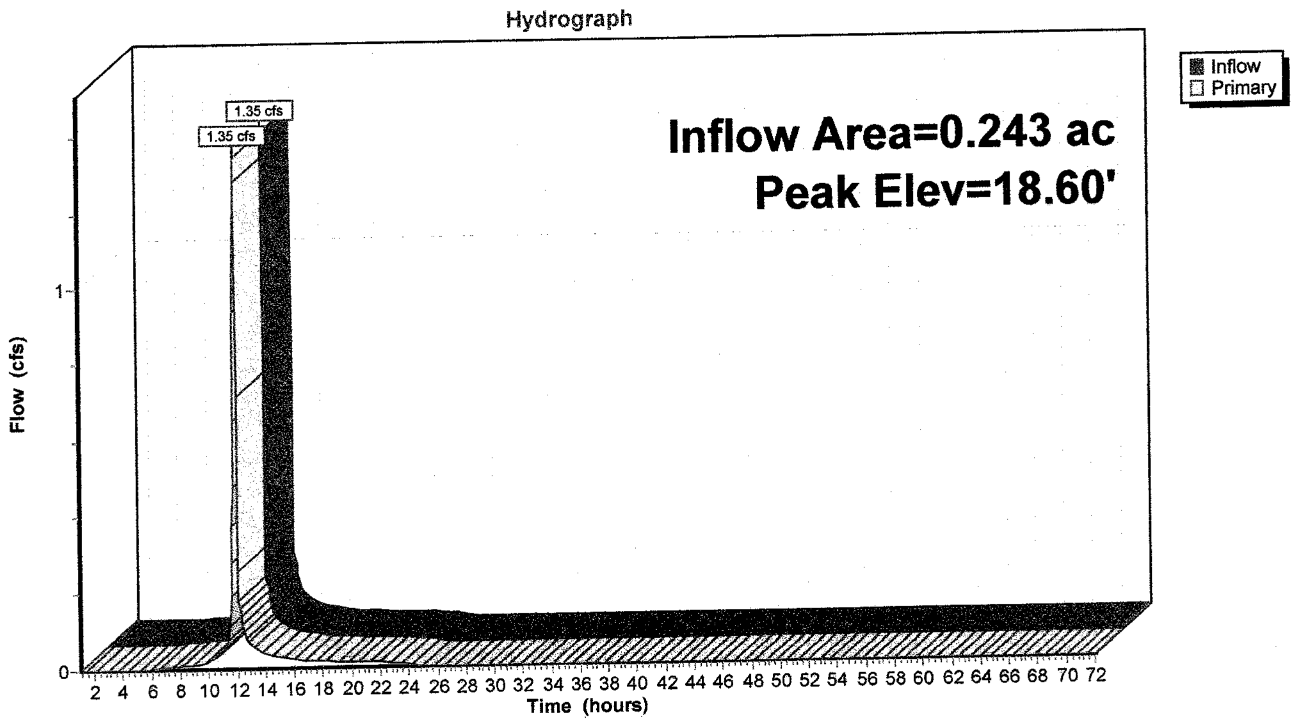
Inflow Area =	0.243 ac, 46.25% Impervious,	Inflow Depth = 3.01"	for 10 - Yr. event
Inflow =	1.35 cfs @ 11.93 hrs,	Volume=	0.061 af
Outflow =	1.35 cfs @ 11.93 hrs,	Volume=	0.061 af, Atten= 0%, Lag= 0.0 min
Primary =	1.35 cfs @ 11.93 hrs,	Volume=	0.061 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.60' @ 11.93 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**24.0" Horiz. Orifice/Grate X 2.00** Limited to weir flow C= 0.600

Primary OutFlow Max=1.27 cfs @ 11.93 hrs HW=18.60' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 1.27 cfs @ 1.03 fps)

Pond 12P: Grate



Summary for Pond 13P: CB 4

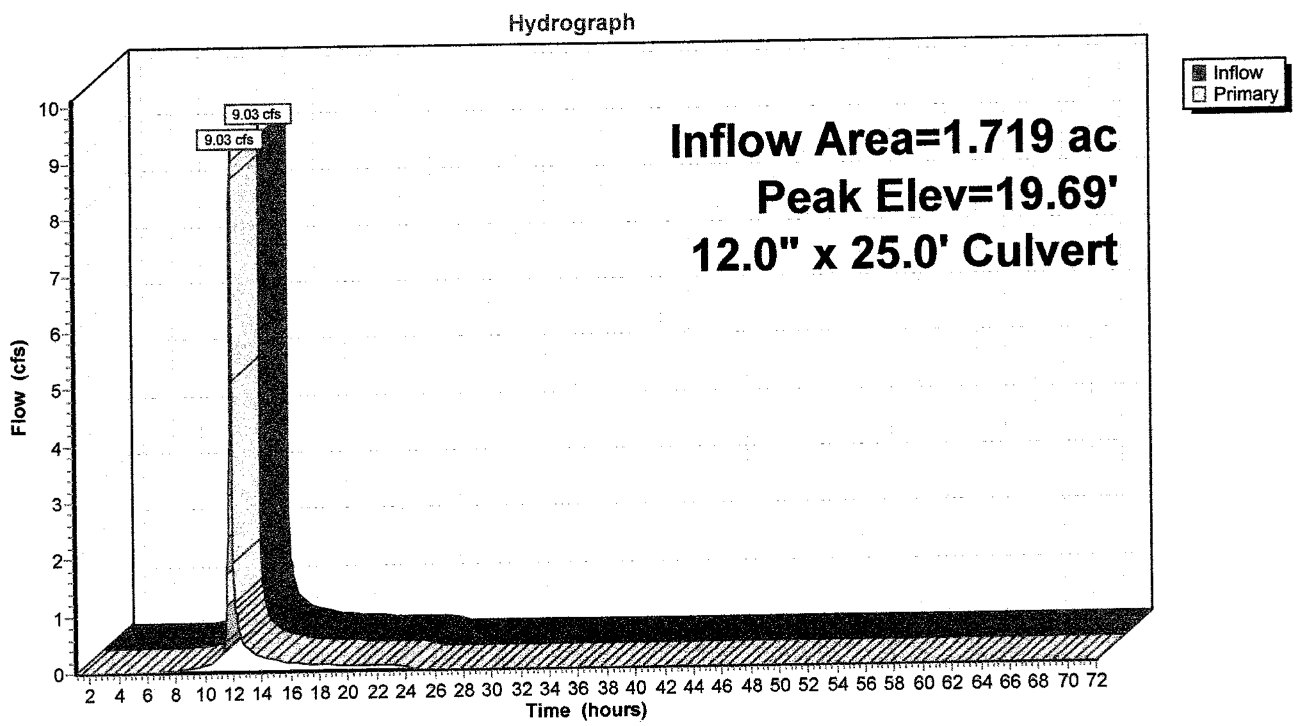
Inflow Area =	1.719 ac, 35.84% Impervious,	Inflow Depth = 2.83"	for 10 - Yr. event	
Inflow =	9.03 cfs @	11.93 hrs, Volume=	0.405 af	
Outflow =	9.03 cfs @	11.93 hrs, Volume=	0.405 af,	Atten= 0%, Lag= 0.0 min
Primary =	9.03 cfs @	11.93 hrs, Volume=	0.405 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 19.69' @ 11.93 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.60'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.40' S= 0.0080 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=8.55 cfs @ 11.93 hrs HW=19.21' (Free Discharge)
1=Culvert (Inlet Controls 8.55 cfs @ 10.89 fps)

Pond 13P: CB 4



Summary for Pond 14P: CB 7

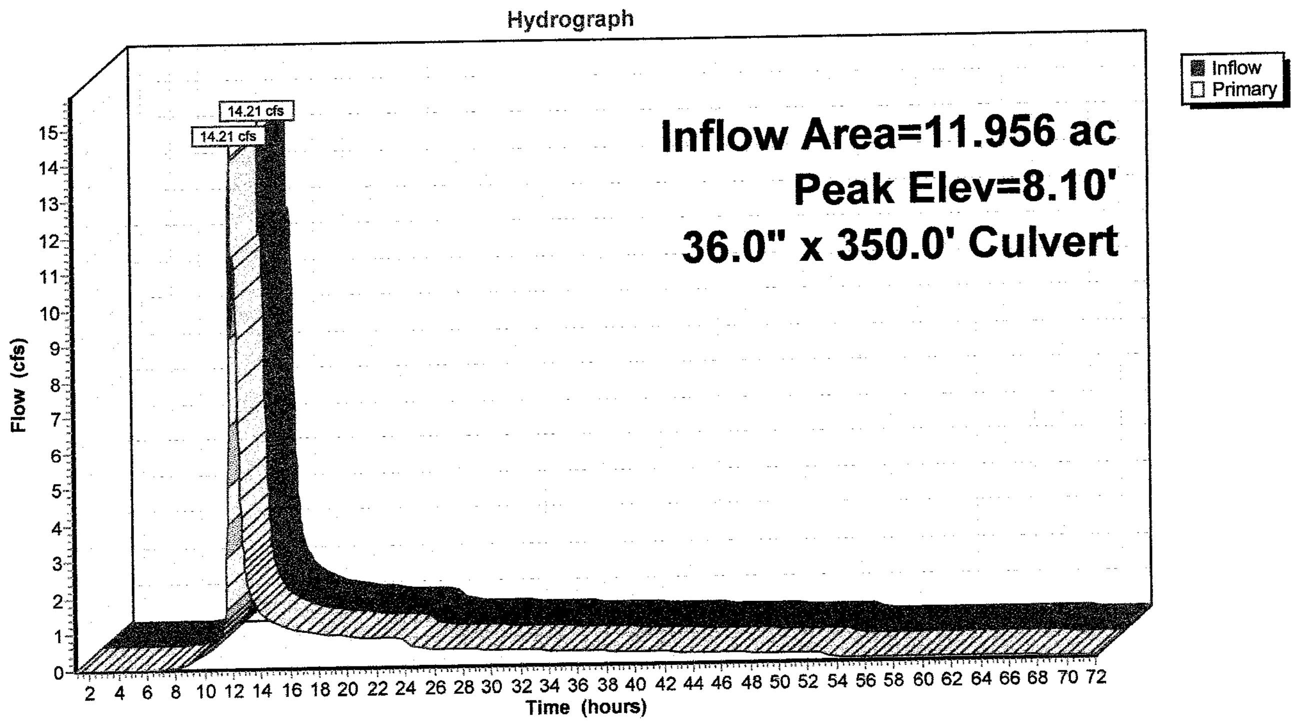
Inflow Area = 11.956 ac, 48.80% Impervious, Inflow Depth > 2.95" for 10 - Yr. event
Inflow = 14.21 cfs @ 11.94 hrs, Volume= 2.939 af
Outflow = 14.21 cfs @ 11.94 hrs, Volume= 2.939 af, Atten= 0%, Lag= 0.0 min
Primary = 14.21 cfs @ 11.94 hrs, Volume= 2.939 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 8.10' @ 11.94 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	6.30'	**36.0" x 350.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 5.37' S= 0.0027 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=13.88 cfs @ 11.94 hrs HW=8.08' TW=7.05' (Fixed TW Elev= 7.05')
1=Culvert (Outlet Controls 13.88 cfs @ 4.57 fps)

Pond 14P: CB 7



Summary for Pond 15P: CB 8

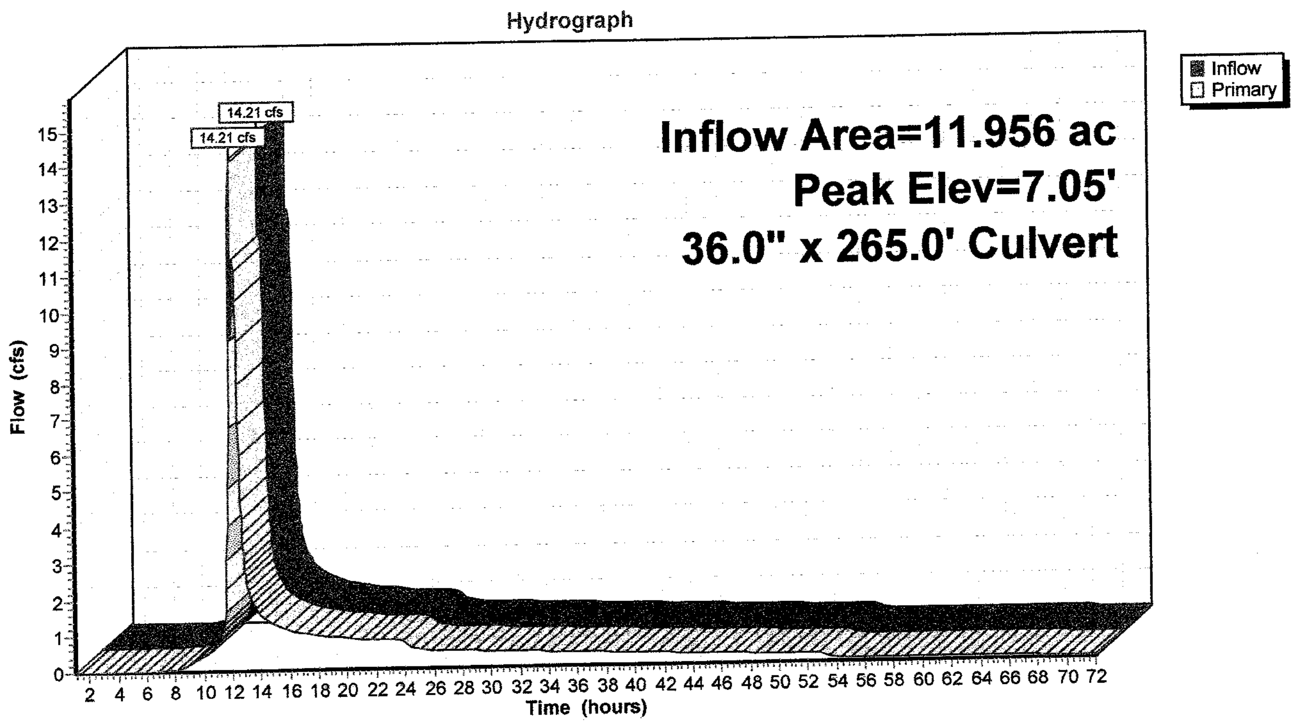
Inflow Area = 11.956 ac, 48.80% Impervious, Inflow Depth > 2.95" for 10 - Yr. event
Inflow = 14.21 cfs @ 11.94 hrs, Volume= 2.939 af
Outflow = 14.21 cfs @ 11.94 hrs, Volume= 2.939 af, Atten= 0%, Lag= 0.0 min
Primary = 14.21 cfs @ 11.94 hrs, Volume= 2.939 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 7.05' @ 11.94 hrs
Flood Elev= 22.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5.37'	**36.0" x 265.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 4.68' S= 0.0026 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=13.88 cfs @ 11.94 hrs HW=7.03' (Free Discharge)
1=Culvert (Barrel Controls 13.88 cfs @ 5.00 fps)

Pond 15P: CB 8



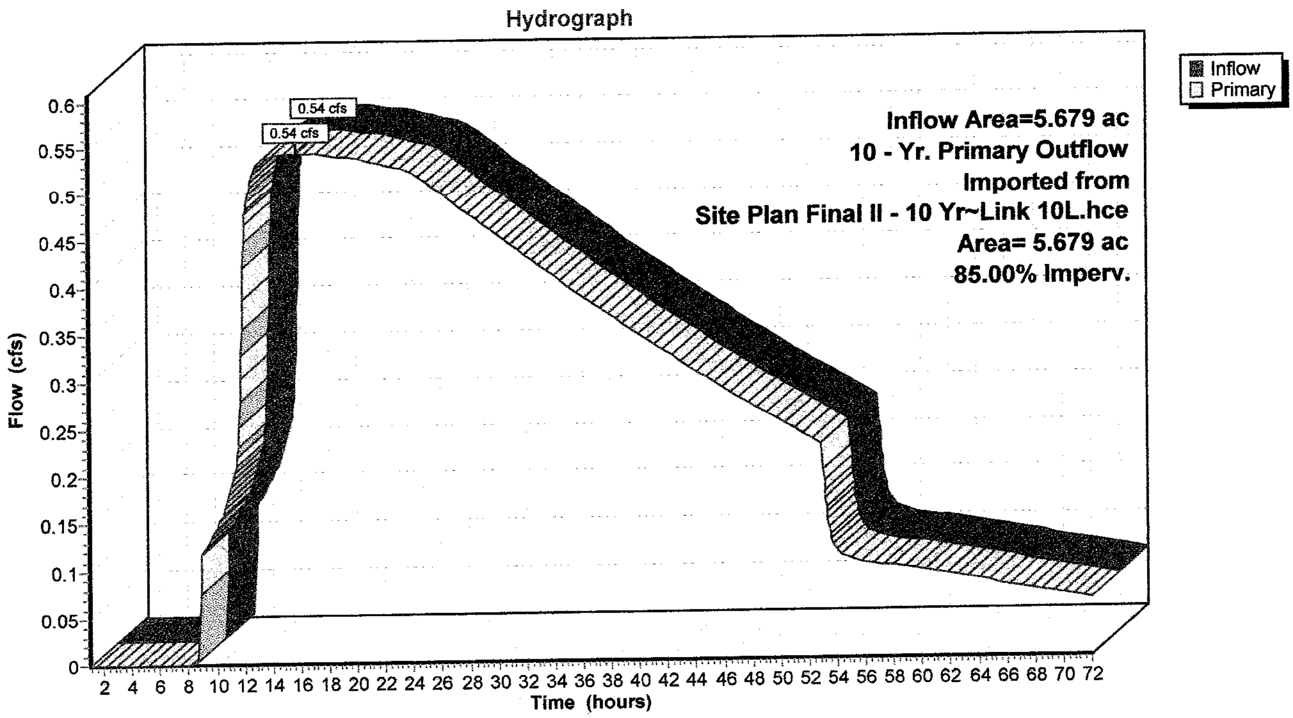
Summary for Link 22L: Pond System

Inflow Area =	5.679 ac, 85.00% Impervious,	Inflow Depth > 3.36"	for 10 - Yr. event	
Inflow =	0.54 cfs @ 15.76 hrs,	Volume=	1.592 af	
Primary =	0.54 cfs @ 15.76 hrs,	Volume=	1.592 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

10 - Yr. Primary Outflow Imported from Site Plan Final II - 10 Yr~Link 10L.hce

Link 22L: Pond System



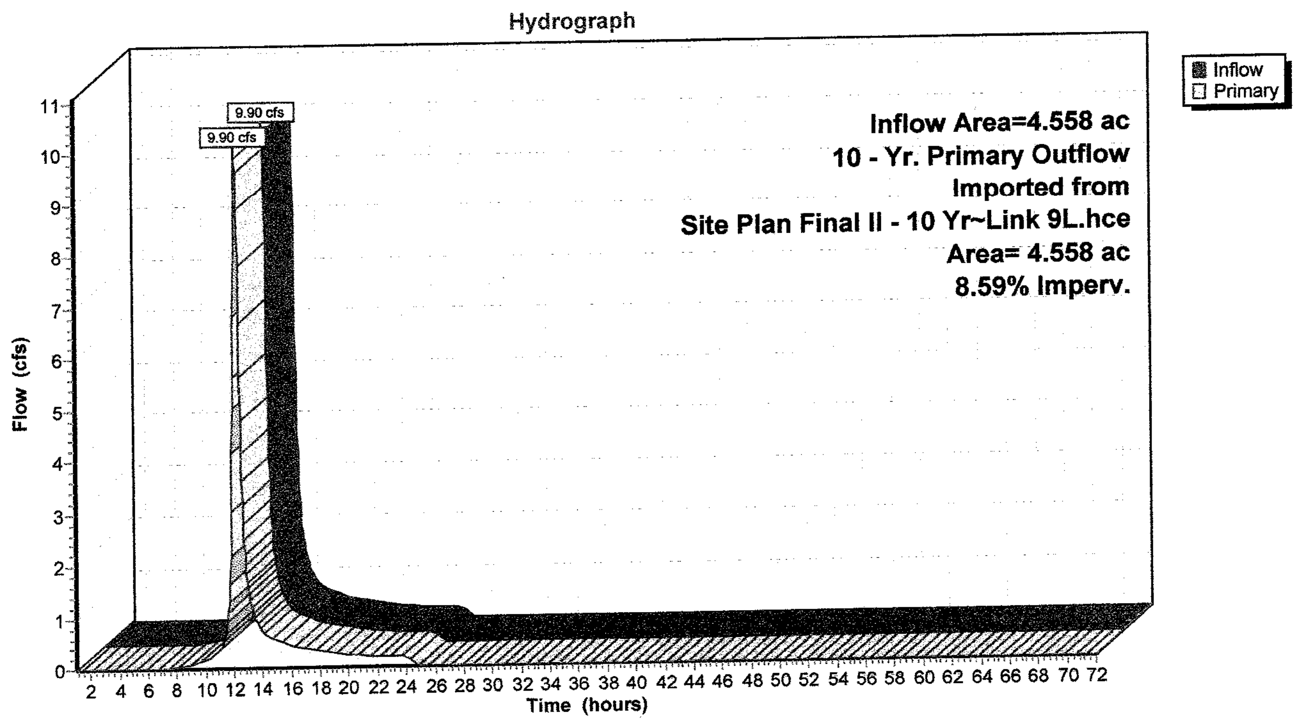
Summary for Link 23L: Outside Area

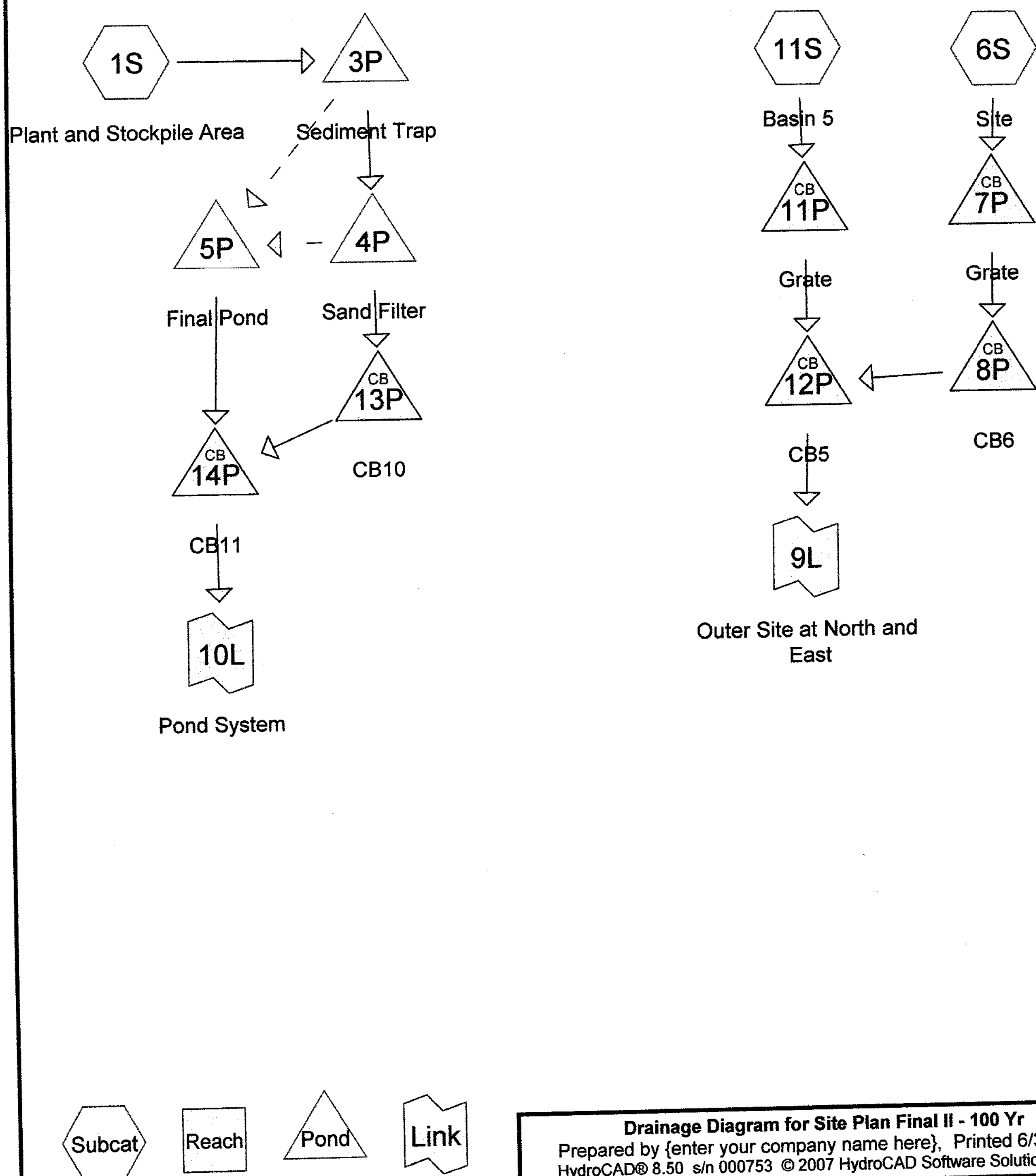
Inflow Area =	4.558 ac,	8.59% Impervious,	Inflow Depth = 2.48"	for 10 - Yr. event
Inflow =	9.90 cfs @	12.21 hrs, Volume=	0.941 af	
Primary =	9.90 cfs @	12.21 hrs, Volume=	0.941 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

10 - Yr. Primary Outflow Imported from Site Plan Final II - 10 Yr~Link 9L.hce

Link 23L: Outside Area





Drainage Diagram for Site Plan Final II - 100 Yr
Prepared by {enter your company name here}, Printed 6/3/2011
HydroCAD® 8.50 s/n 000753 © 2007 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Plant and Stockpile Area

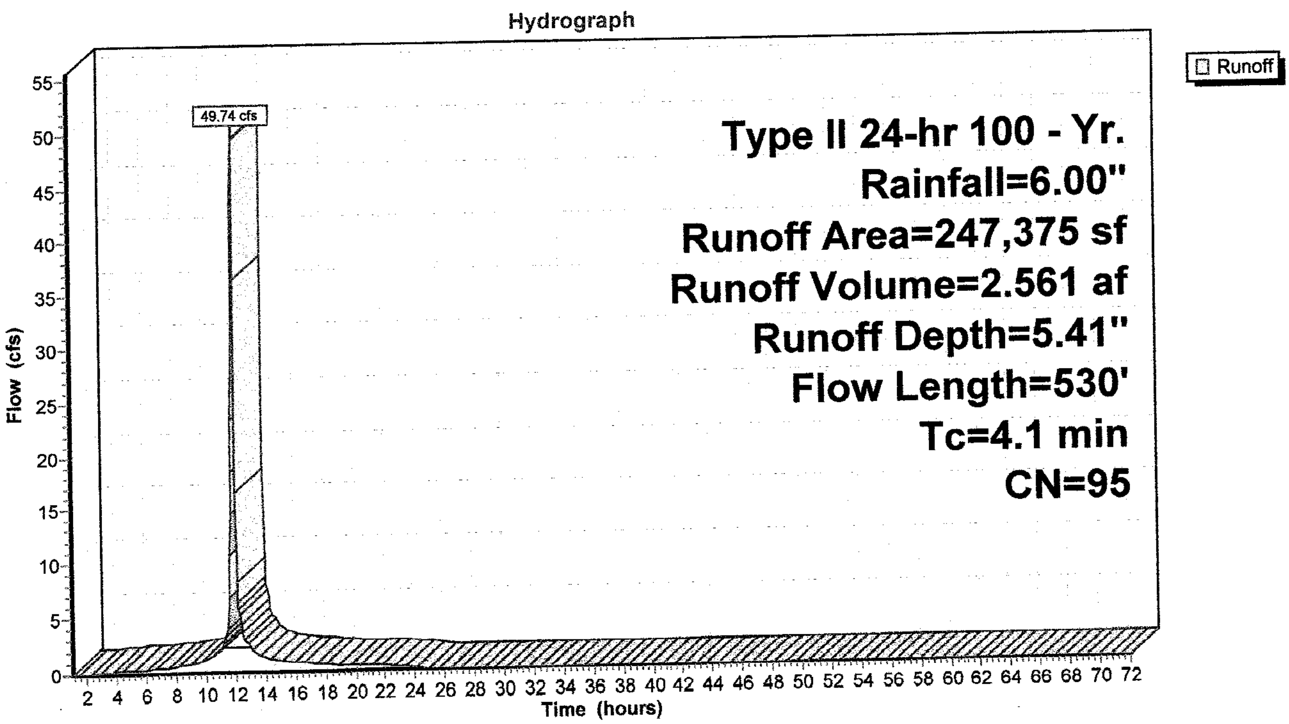
Runoff = 49.74 cfs @ 11.94 hrs, Volume= 2.561 af, Depth= 5.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 - Yr. Rainfall=6.00"

Area (sf)	CN	Description
247,375	95	Urban commercial, 85% imp, HSG D
37,106		Pervious Area
210,269		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0200	1.19		**Sheet Flow, Top of Stockpile Area** Smooth surfaces n= 0.011 P2= 2.40"
2.0	280	0.0200	2.28		**Shallow Concentrated Flow, Stockpile Area** Unpaved Kv= 16.1 fps
0.7	150	0.0100	3.67	52.36	**Trap/Vee/Rect Channel Flow, Stockpile Perimeter** Bot.W=5.00' D=1.50' Z= 3.0 '/' Top.W=14.00' n= 0.040 Earth, cobble bottom, clean sides
4.1	530	Total			

Subcatchment 1S: Plant and Stockpile Area



Summary for Subcatchment 6S: Site

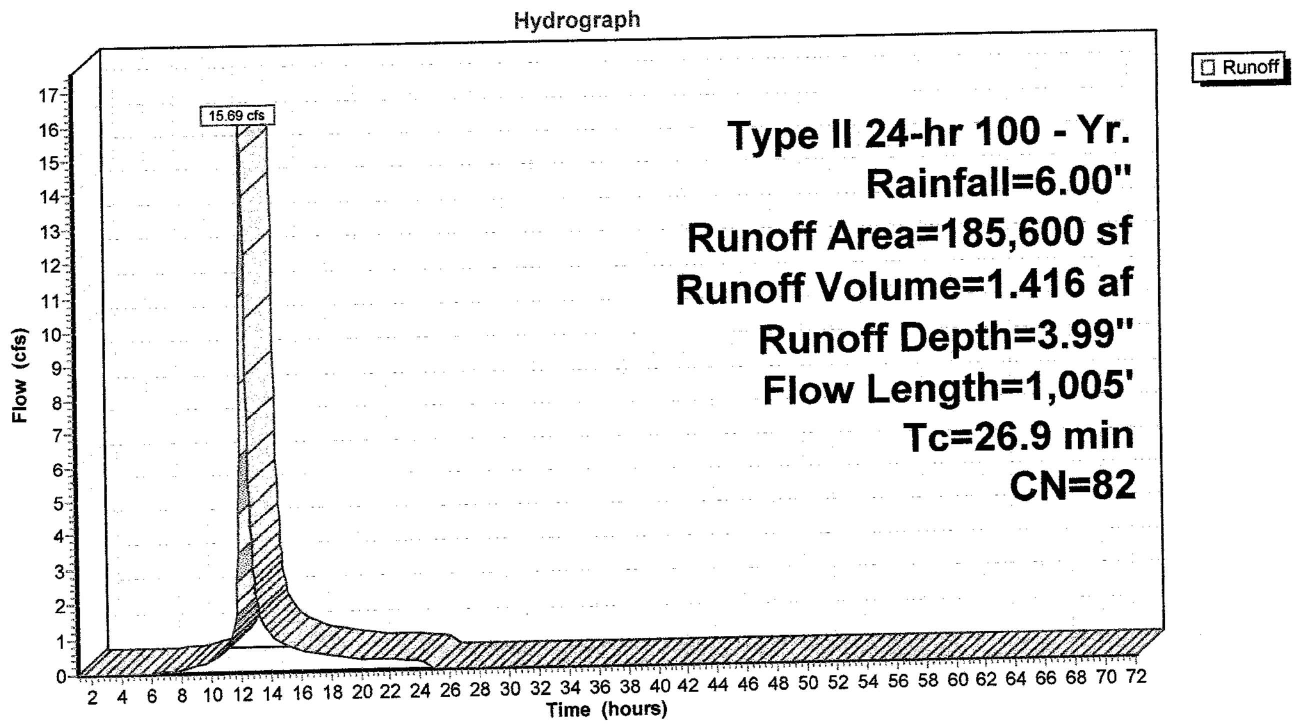
Runoff = 15.69 cfs @ 12.20 hrs, Volume= 1.416 af, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 - Yr. Rainfall=6.00"

Area (sf)	CN	Description
8,940	98	Paved parking & roofs
4,530	98	Paved parking & roofs
18,240	82	Woods/grass comb., Poor, HSG C
153,890	80	>75% Grass cover, Good, HSG D
185,600	82	Weighted Average
172,130		Pervious Area
13,470		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.3300	0.22		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
11.4	420	0.0150	0.61		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
14.0	565	0.0020	0.67		**Shallow Concentrated Flow, Tracks** Grassed Waterway Kv= 15.0 fps
26.9	1,005	Total			

Subcatchment 6S: Site



Summary for Subcatchment 11S: Basin 5

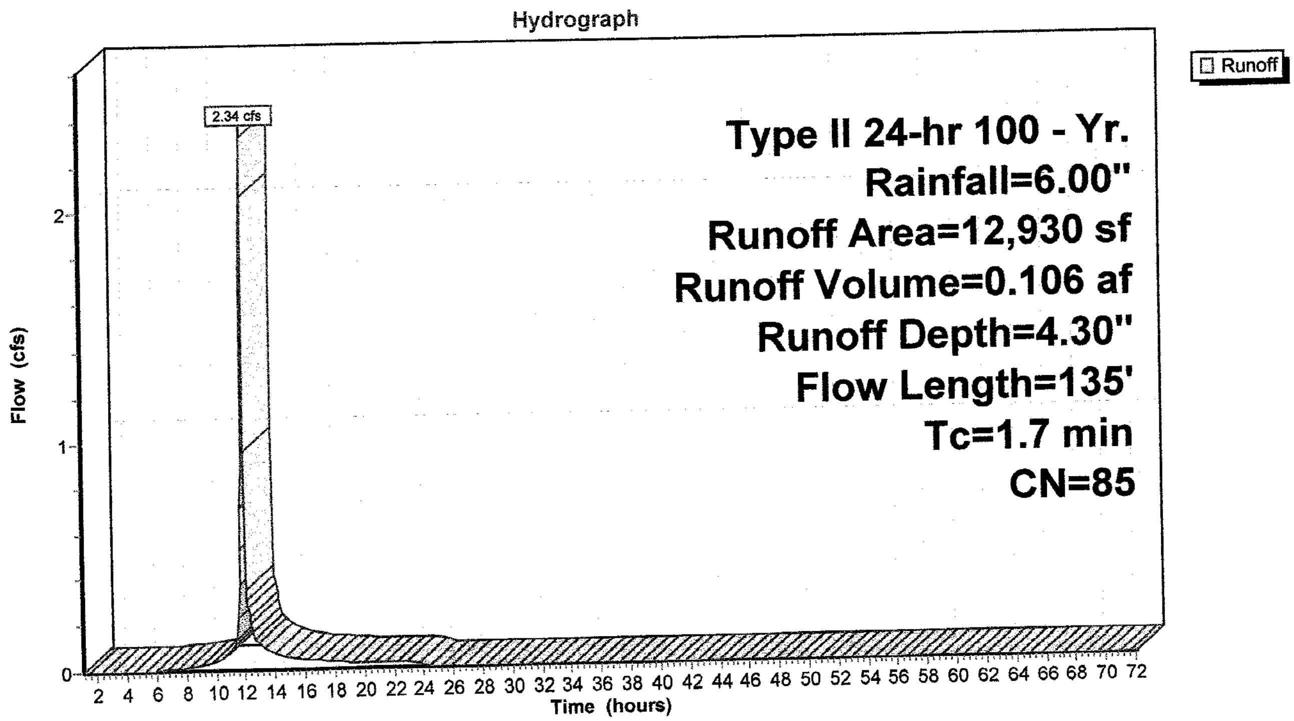
Runoff = 2.34 cfs @ 11.91 hrs, Volume= 0.106 af, Depth= 4.30"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 - Yr. Rainfall=6.00"

Area (sf)	CN	Description
2,460	98	Paved parking & roofs
1,120	98	Paved parking & roofs
9,350	80	>75% Grass cover, Good, HSG D
12,930	85	Weighted Average
9,350		Pervious Area
3,580		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	10	0.3300	0.20		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
0.8	125	0.0280	2.51		**Shallow Concentrated Flow, Outer Area** Grassed Waterway Kv= 15.0 fps
1.7	135	Total			

Subcatchment 11S: Basin 5



Summary for Pond 3P: Sediment Trap

Inflow Area = 5.679 ac, 85.00% Impervious, Inflow Depth = 5.41" for 100 - Yr. event
Inflow = 49.74 cfs @ 11.94 hrs, Volume= 2.561 af
Outflow = 48.66 cfs @ 11.95 hrs, Volume= 2.444 af, Atten= 2%, Lag= 0.4 min
Primary = 8.15 cfs @ 11.95 hrs, Volume= 1.636 af
Secondary = 40.51 cfs @ 11.95 hrs, Volume= 0.808 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 17.35' Surf.Area= 1,162 sf Storage= 1,168 cf
Peak Elev= 20.66' @ 11.95 hrs Surf.Area= 3,319 sf Storage= 8,284 cf (7,116 cf above start)
Flood Elev= 21.00' Surf.Area= 3,600 sf Storage= 9,449 cf (8,281 cf above start)

Plug-Flow detention time= 58.5 min calculated for 2.416 af (94% of inflow)
Center-of-Mass det. time= 21.9 min (780.1 - 758.1)

Volume	Invert	Avail.Storage	Storage Description
#1	16.00'	9,449 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

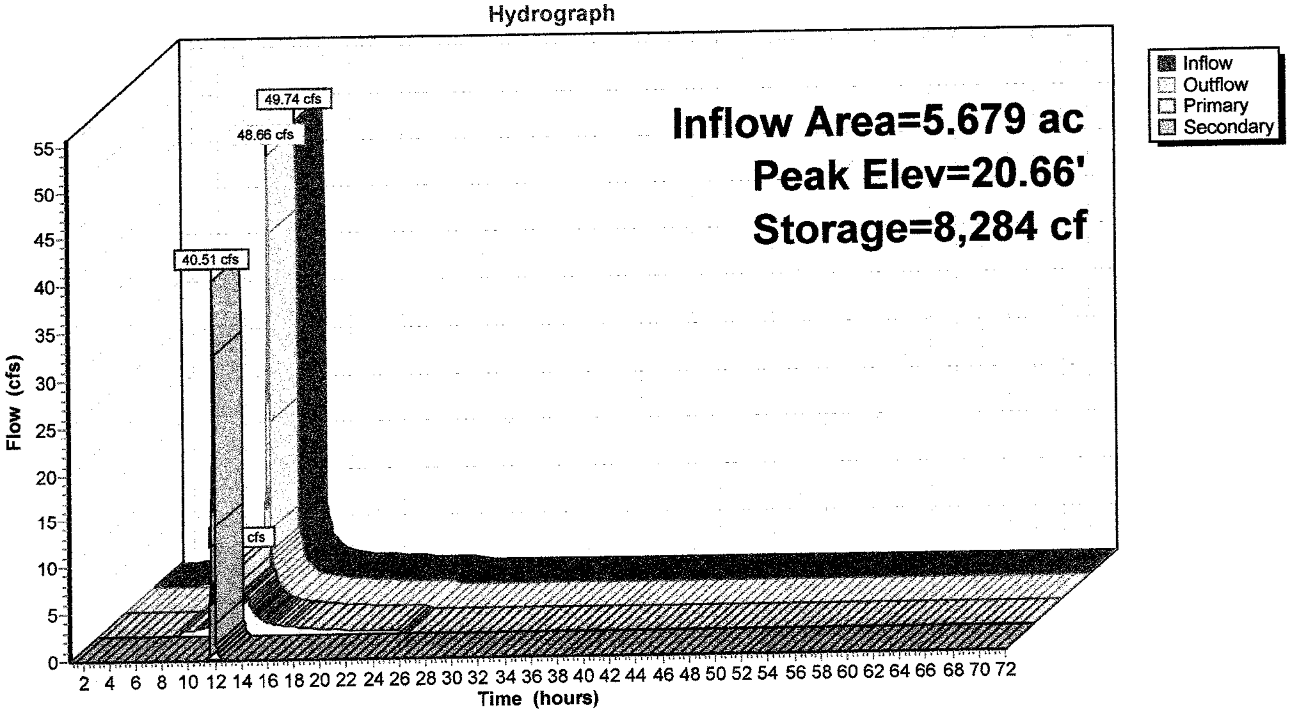
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
16.00	600	140.0	0	0	600
21.00	3,600	260.0	9,449	9,449	4,548

Device	Routing	Invert	Outlet Devices
#1	Primary	15.00'	**12.0" x 40.0' long Culvert** CPP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 15.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	18.50'	**12.0" x 25.0' long Culvert X 2.00** CPP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 18.50' S= 0.0000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#3	Secondary	20.00'	**30.0' long x 21.0' 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
#4	Device 1	17.35'	**12.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=8.14 cfs @ 11.95 hrs HW=20.66' TW=20.00' (Fixed TW Elev= 20.00')
1=Culvert (Inlet Controls 2.71 cfs @ 3.45 fps)
4=Orifice/Grate (Passes 2.71 cfs of 3.08 cfs potential flow)
2=Culvert (Inlet Controls 5.43 cfs @ 3.45 fps)

Secondary OutFlow Max=40.34 cfs @ 11.95 hrs HW=20.66' TW=20.20' (Fixed TW Elev= 20.20')
3=Broad-Crested Rectangular Weir (Weir Controls 40.34 cfs @ 2.03 fps)

Pond 3P: Sediment Trap



Summary for Pond 4P: Sand Filter

Inflow Area = 5.679 ac, 85.00% Impervious, Inflow Depth = 3.46" for 100 - Yr. event
Inflow = 8.15 cfs @ 11.95 hrs, Volume= 1.636 af
Outflow = 4.51 cfs @ 12.33 hrs, Volume= 1.636 af, Atten= 45%, Lag= 22.6 min
Primary = 0.38 cfs @ 12.33 hrs, Volume= 1.003 af
Secondary = 4.13 cfs @ 12.33 hrs, Volume= 0.633 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 20.29' @ 12.33 hrs Surf.Area= 8,183 sf Storage= 26,778 cf
Flood Elev= 21.00' Surf.Area= 9,202 sf Storage= 32,977 cf

Plug-Flow detention time= 535.9 min calculated for 1.636 af (100% of inflow)
Center-of-Mass det. time= 535.7 min (1,348.1 - 812.5)

Volume	Invert	Avail.Storage	Storage Description
#1	15.00'	32,977 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

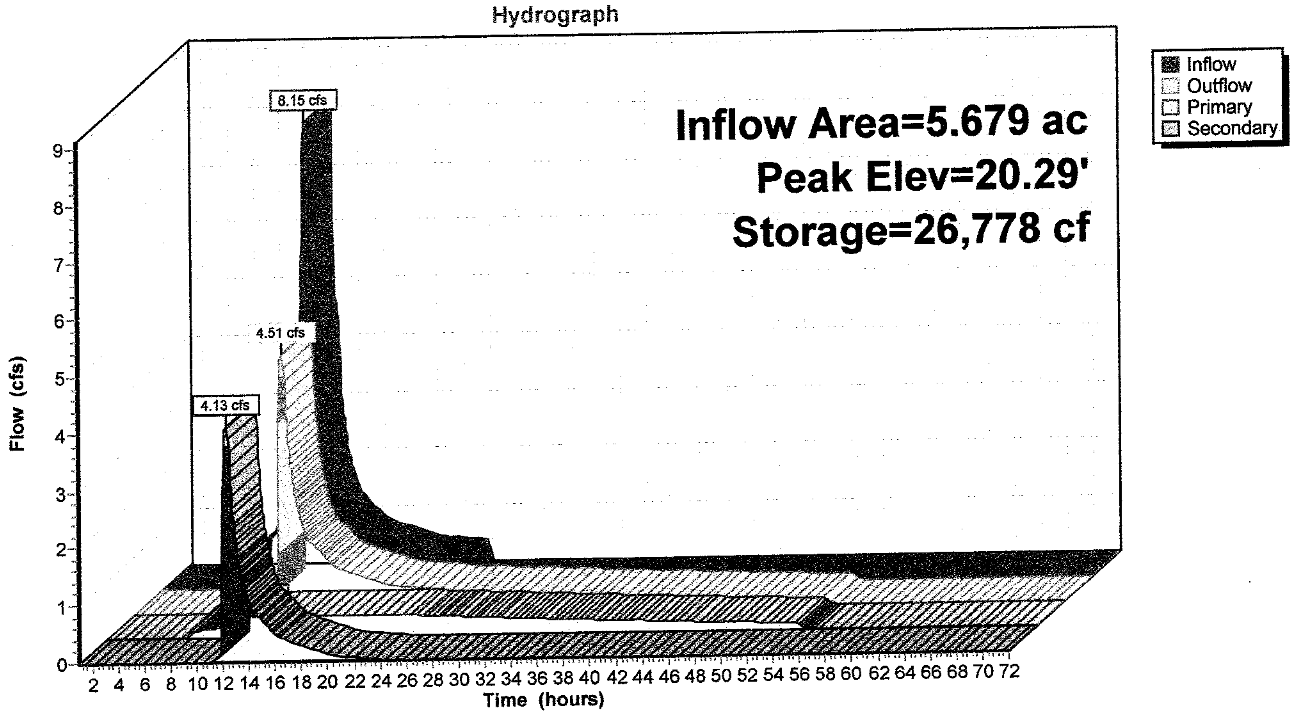
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
15.00	2,495	300.0	0	0	2,495
21.00	9,202	444.0	32,977	32,977	11,308

Device	Routing	Invert	Outlet Devices
#1	Primary	15.00'	**2.000 in/hr Exfiltration over Horizontal area**
#2	Secondary	20.00'	**10.0' long x 27.0' 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=0.38 cfs @ 12.33 hrs HW=20.29' TW=12.40' (Fixed TW Elev= 12.40')
↑—**1=Exfiltration** (Exfiltration Controls 0.38 cfs)

Secondary OutFlow Max=4.12 cfs @ 12.33 hrs HW=20.29' TW=20.00' (Fixed TW Elev= 20.00')
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 4.12 cfs @ 1.44 fps)

Pond 4P: Sand Filter



Summary for Pond 5P: Final Pond

Inflow	=	40.51 cfs @	11.95 hrs, Volume=	1.441 af
Outflow	=	8.46 cfs @	12.11 hrs, Volume=	1.359 af, Atten= 79%, Lag= 9.8 min
Primary	=	8.46 cfs @	12.11 hrs, Volume=	1.359 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 17.00' Surf.Area= 7,024 sf Storage= 11,593 cf
Peak Elev= 20.46' @ 12.11 hrs Surf.Area= 12,291 sf Storage= 44,625 cf (33,032 cf above start)
Flood Elev= 21.00' Surf.Area= 13,236 sf Storage= 51,462 cf (39,870 cf above start)

Plug-Flow detention time= 1,018.4 min calculated for 1.093 af (76% of inflow)
Center-of-Mass det. time= 770.9 min (1,544.5 - 773.6)

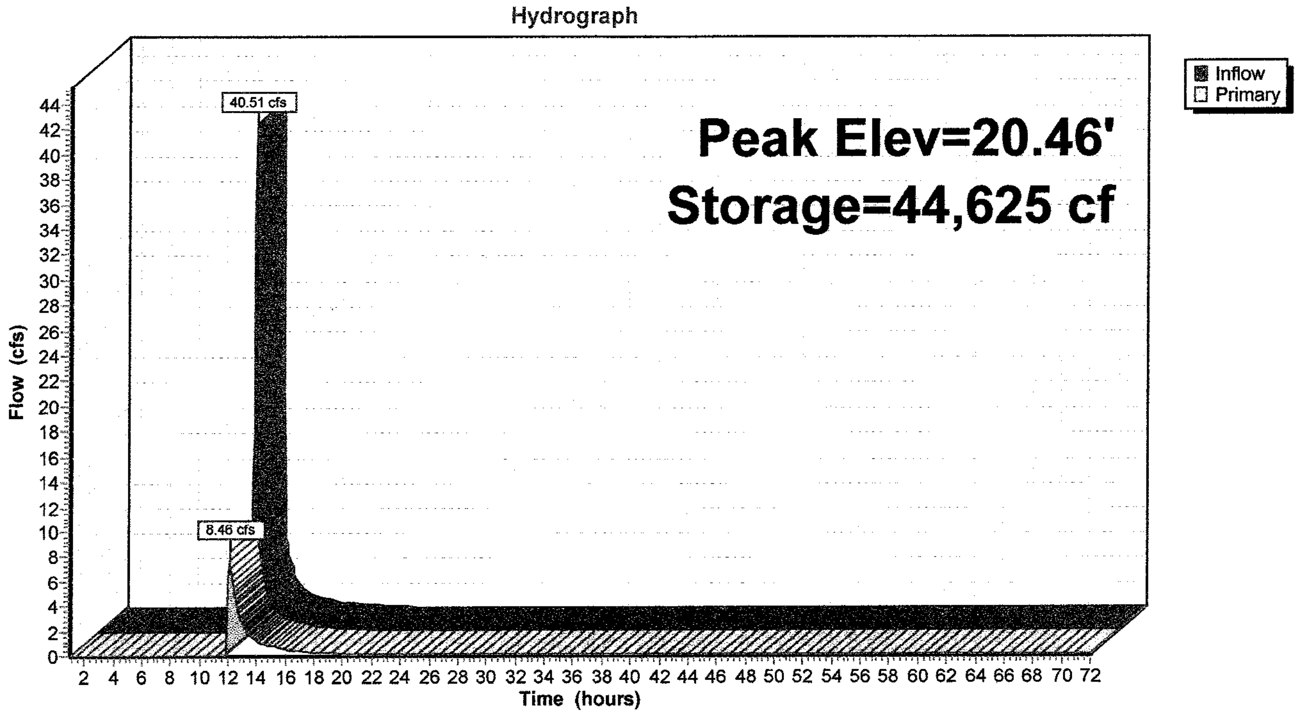
Volume	Invert	Avail.Storage	Storage Description
#1	15.00'	51,462 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
15.00	4,650	378.0	0	0	4,650
21.00	13,236	536.0	51,462	51,462	16,465

Device	Routing	Invert	Outlet Devices
#1	Device 2	20.00'	**2.00' x 2.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#2	Primary	12.00'	**24.0" x 20.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 11.80' S= 0.0100 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior
#3	Device 2	15.00'	**6.0" x 50.0' long Culvert** CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 14.50' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#4	Device 3	17.00'	**2.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=8.21 cfs @ 12.11 hrs HW=20.45' TW=12.35' (Fixed TW Elev= 12.35')
└─**2=Culvert** (Passes 8.21 cfs of 41.30 cfs potential flow)
  ├─**1=Orifice/Grate** (Weir Controls 8.02 cfs @ 2.20 fps)
  └─**3=Culvert** (Passes 0.20 cfs of 1.70 cfs potential flow)
    └─**4=Orifice/Grate** (Orifice Controls 0.20 cfs @ 8.95 fps)

Pond 5P: Final Pond



Summary for Pond 7P: Grate

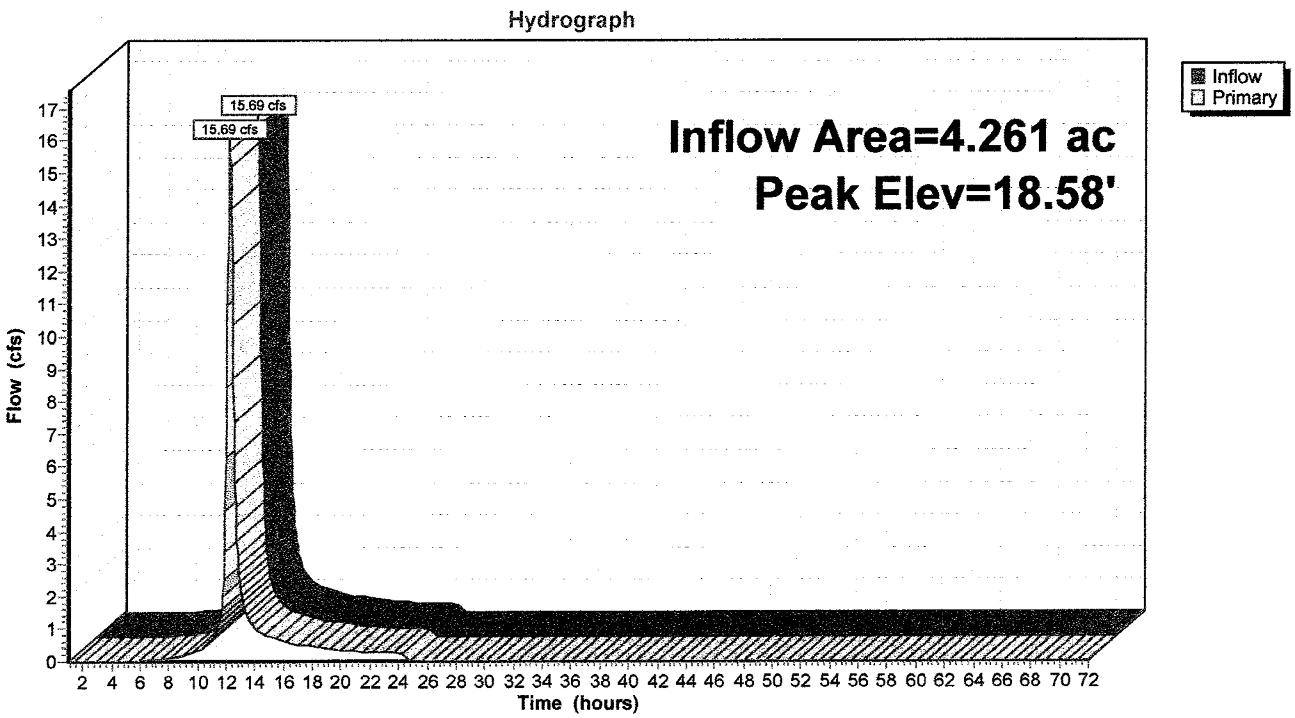
Inflow Area =	4.261 ac,	7.26% Impervious,	Inflow Depth = 3.99"	for 100 - Yr. event
Inflow =	15.69 cfs @	12.20 hrs, Volume=	1.416 af	
Outflow =	15.69 cfs @	12.20 hrs, Volume=	1.416 af,	Atten= 0%, Lag= 0.0 min
Primary =	15.69 cfs @	12.20 hrs, Volume=	1.416 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.58' @ 12.20 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	17.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=15.67 cfs @ 12.20 hrs HW=18.57' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 15.67 cfs @ 4.99 fps)

Pond 7P: Grate



Summary for Pond 8P: CB6

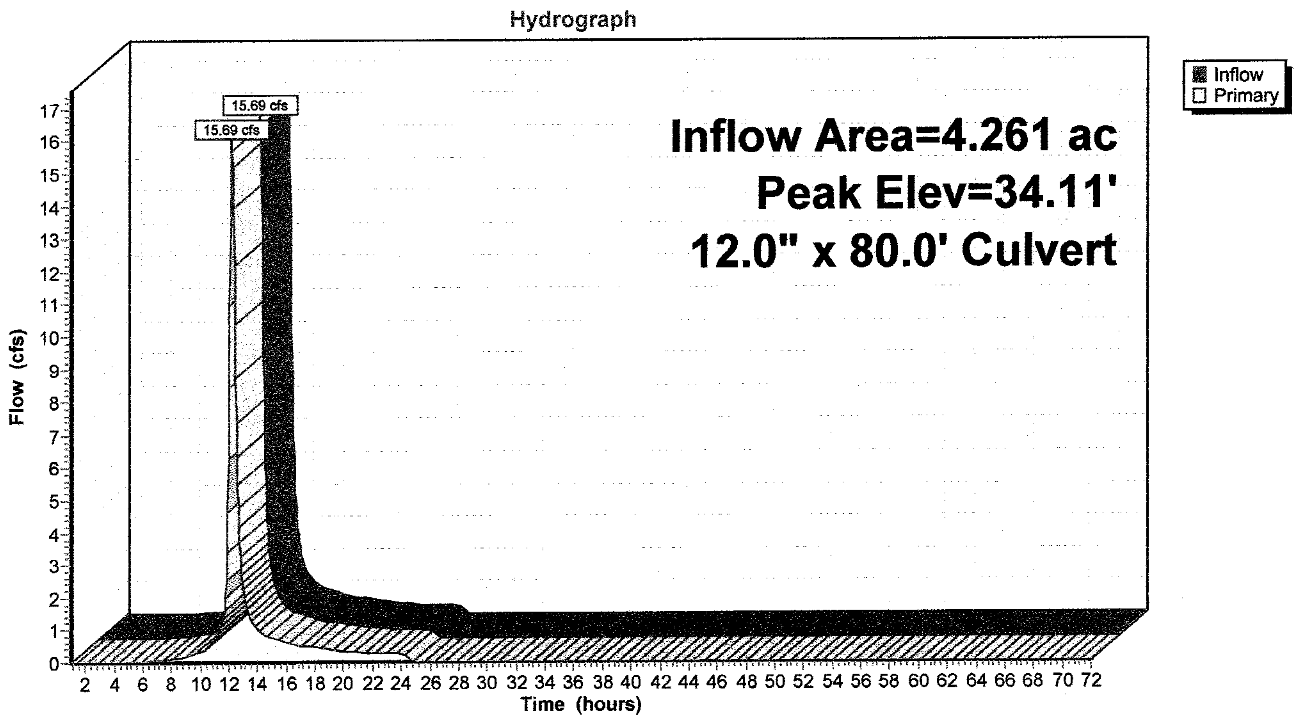
Inflow Area =	4.261 ac,	7.26% Impervious,	Inflow Depth = 3.99"	for 100 - Yr. event	
Inflow =	15.69 cfs @	12.20 hrs,	Volume=	1.416 af	
Outflow =	15.69 cfs @	12.20 hrs,	Volume=	1.416 af,	Atten= 0%, Lag= 0.0 min
Primary =	15.69 cfs @	12.20 hrs,	Volume=	1.416 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 34.11' @ 12.20 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.80' S= 0.0025 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=15.67 cfs @ 12.20 hrs HW=34.05' TW=15.60' (Fixed TW Elev= 15.60')
↑—**1=Culvert** (Outlet Controls 15.67 cfs @ 19.95 fps)

Pond 8P: CB6



Summary for Pond 11P: Grate

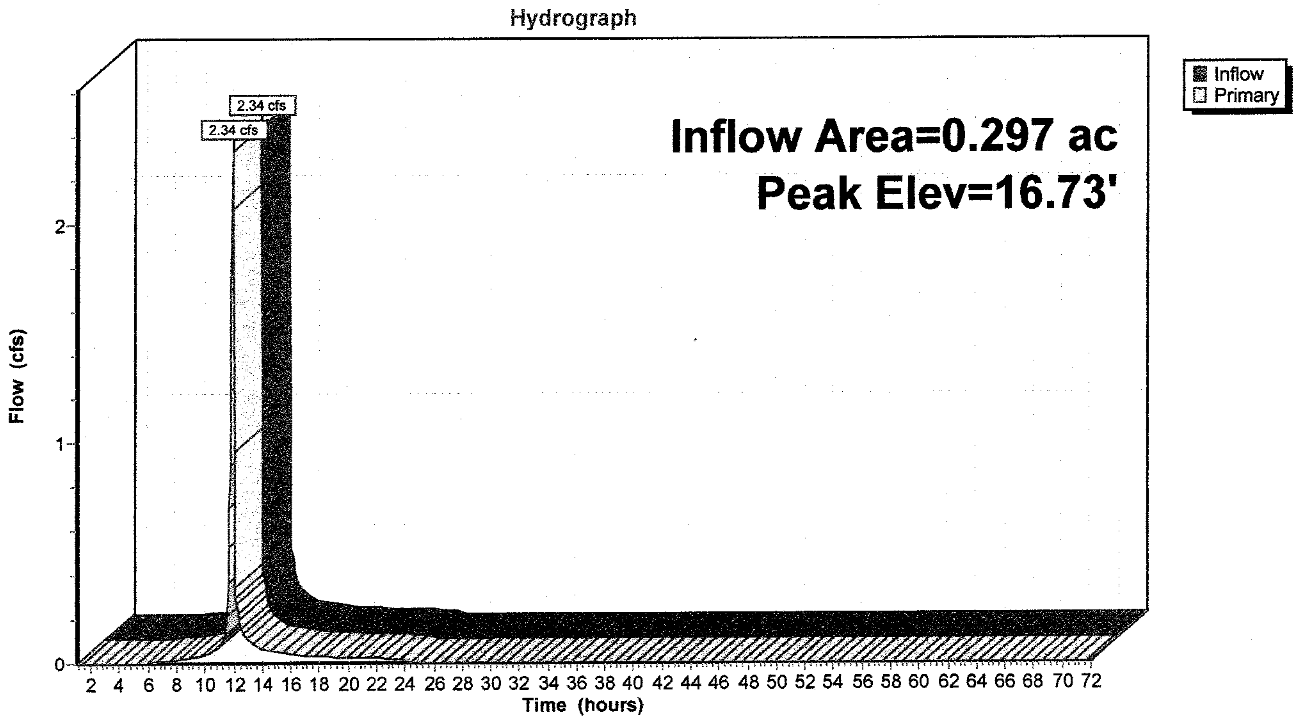
Inflow Area =	0.297 ac,	27.69% Impervious,	Inflow Depth = 4.30"	for 100 - Yr. event	
Inflow =	2.34 cfs @	11.91 hrs,	Volume=	0.106 af	
Outflow =	2.34 cfs @	11.91 hrs,	Volume=	0.106 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.34 cfs @	11.91 hrs,	Volume=	0.106 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 16.73' @ 11.91 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	16.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=2.27 cfs @ 11.91 hrs HW=16.73' (Free Discharge)
↑**1=Orifice/Grate** (Weir Controls 2.27 cfs @ 1.57 fps)

Pond 11P: Grate



Summary for Pond 12P: CB5

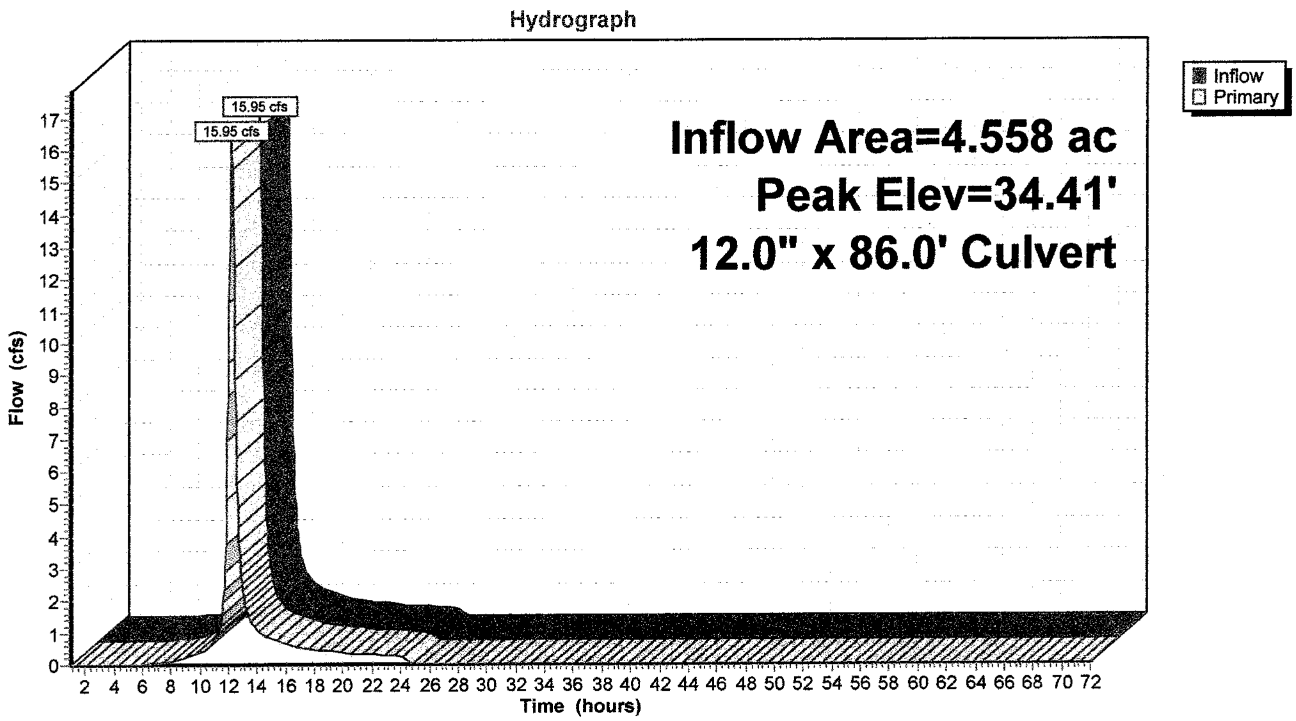
Inflow Area = 4.558 ac, 8.59% Impervious, Inflow Depth = 4.01" for 100 - Yr. event
Inflow = 15.95 cfs @ 12.20 hrs, Volume= 1.522 af
Outflow = 15.95 cfs @ 12.20 hrs, Volume= 1.522 af, Atten= 0%, Lag= 0.0 min
Primary = 15.95 cfs @ 12.20 hrs, Volume= 1.522 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 34.41' @ 12.20 hrs
Flood Elev= 16.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.80'	**12.0" x 86.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.57' S= 0.0027 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=15.94 cfs @ 12.20 hrs HW=34.37' (Free Discharge)
↑**1=Culvert** (Barrel Controls 15.94 cfs @ 20.29 fps)

Pond 12P: CB5



Summary for Pond 13P: CB10

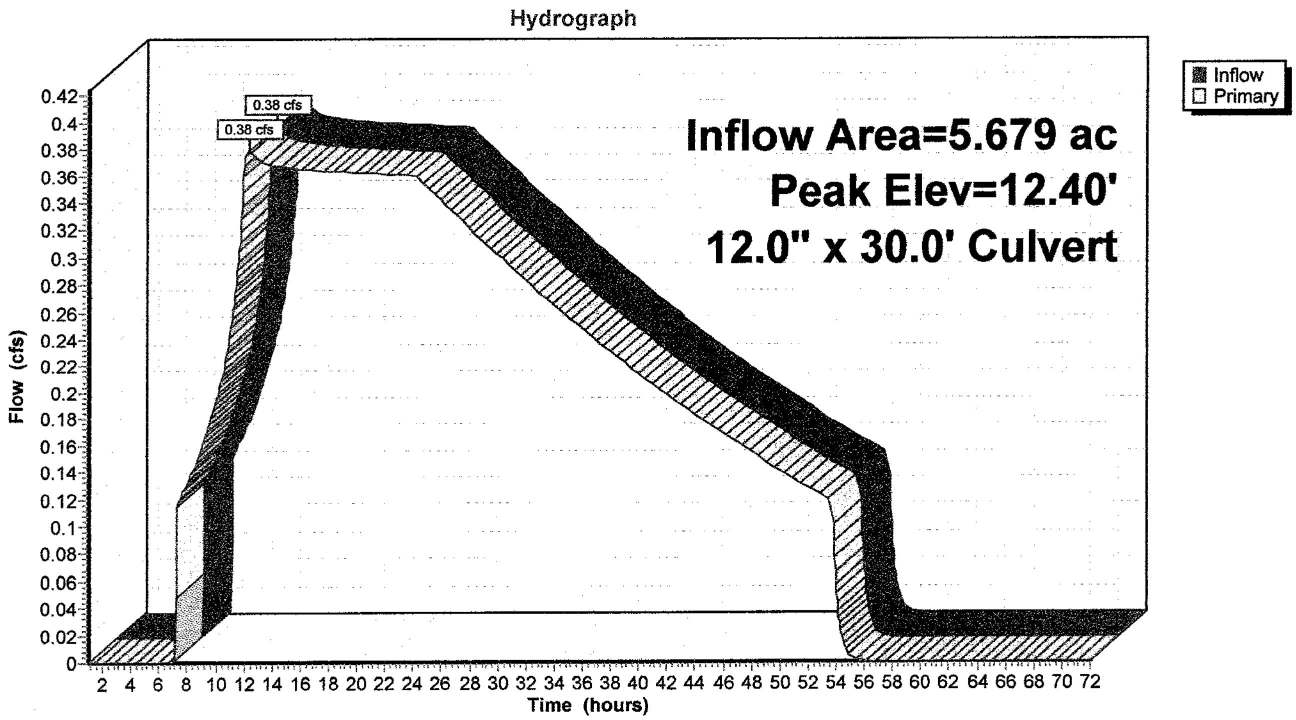
Inflow Area =	5.679 ac, 85.00% Impervious,	Inflow Depth = 2.12"	for 100 - Yr. event	
Inflow =	0.38 cfs @ 12.33 hrs,	Volume=	1.003 af	
Outflow =	0.38 cfs @ 12.33 hrs,	Volume=	1.003 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.38 cfs @ 12.33 hrs,	Volume=	1.003 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 12.40' @ 12.33 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	11.80'	**12.0" x 30.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 10.80' S= 0.0333 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.43 cfs @ 12.33 hrs HW=12.40' TW=12.35' (Fixed TW Elev= 12.35')
└─**1=Culvert** (Outlet Controls 0.43 cfs @ 1.25 fps)

Pond 13P: CB10



Summary for Pond 14P: CB11

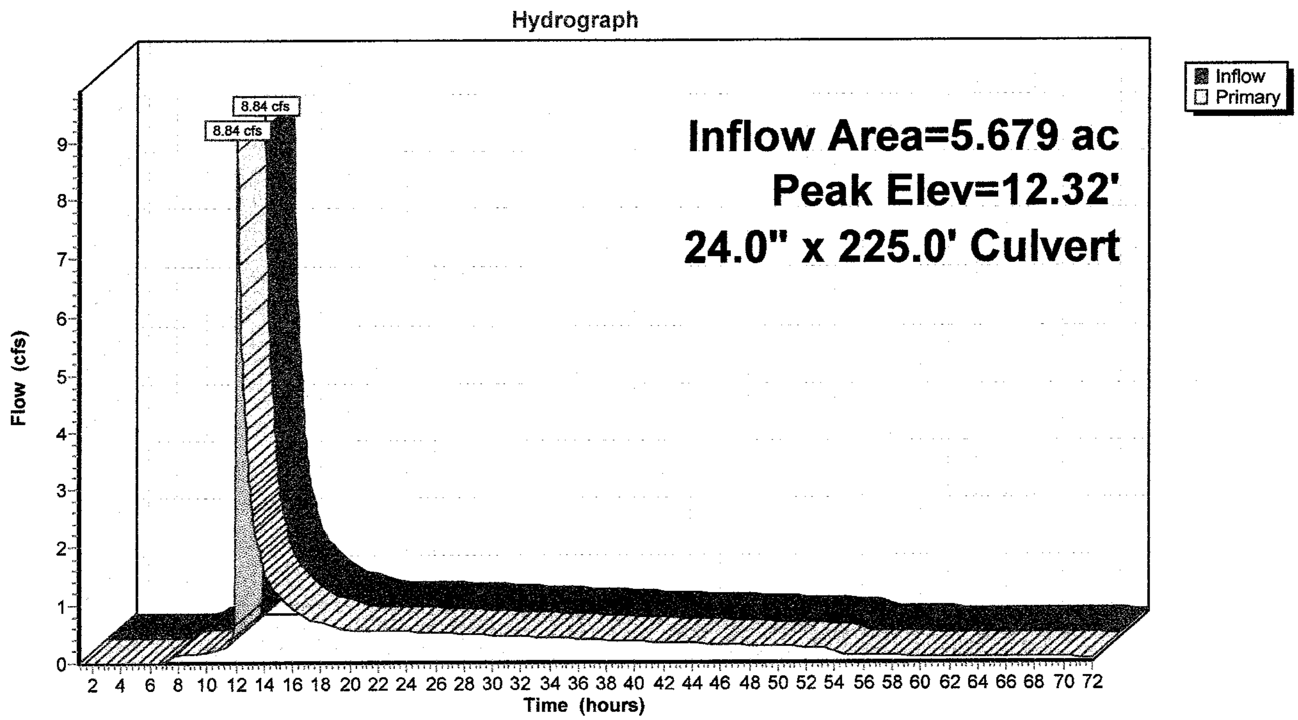
Inflow Area =	5.679 ac,	85.00% Impervious,	Inflow Depth > 4.99"	for 100 - Yr. event
Inflow =	8.84 cfs @	12.11 hrs, Volume=	2.363 af	
Outflow =	8.84 cfs @	12.11 hrs, Volume=	2.363 af,	Atten= 0%, Lag= 0.0 min
Primary =	8.84 cfs @	12.11 hrs, Volume=	2.363 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 12.32' @ 12.11 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	10.80'	**24.0" x 225.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 8.55' S= 0.0100 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior

Primary OutFlow Max=8.60 cfs @ 12.11 hrs HW=12.30' (Free Discharge)
↑1=**Culvert** (Barrel Controls 8.60 cfs @ 4.73 fps)

Pond 14P: CB11

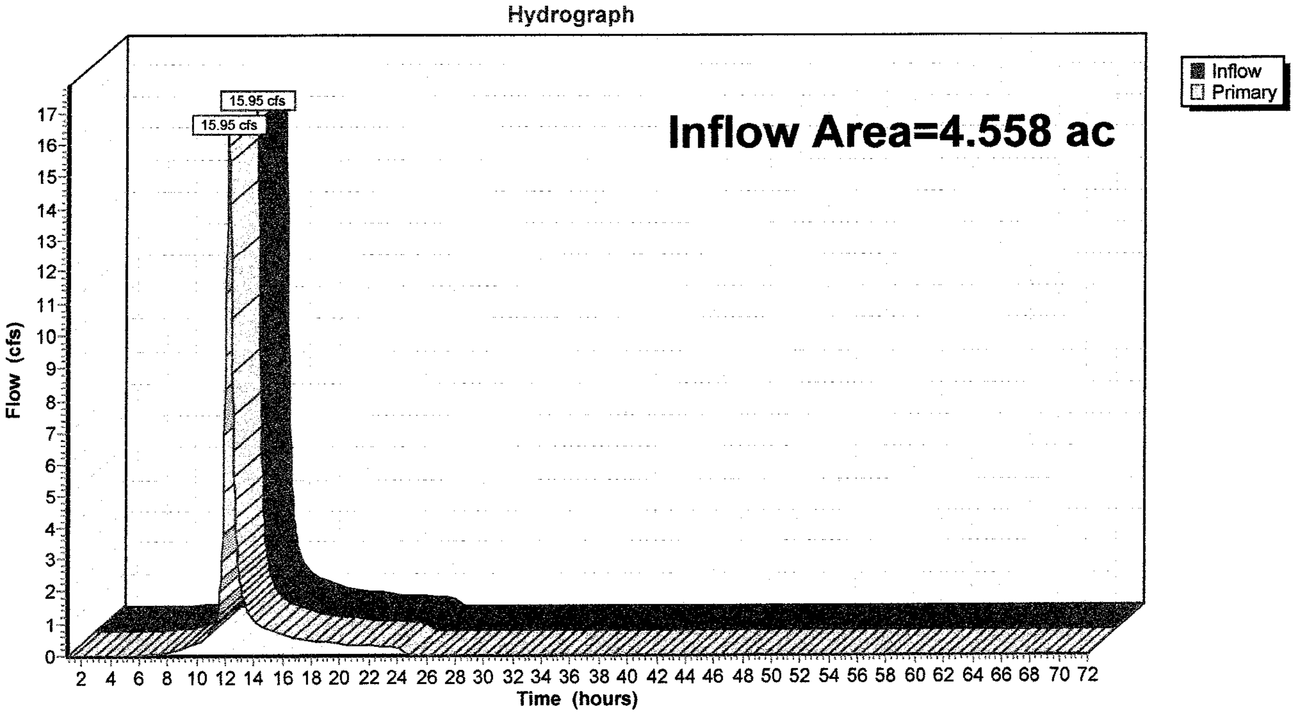


Summary for Link 9L: Outer Site at North and East

Inflow Area =	4.558 ac,	8.59% Impervious, Inflow Depth = 4.01"	for 100 - Yr. event	
Inflow =	15.95 cfs @	12.20 hrs, Volume=	1.522 af	
Primary =	15.95 cfs @	12.20 hrs, Volume=	1.522 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link 9L: Outer Site at North and East

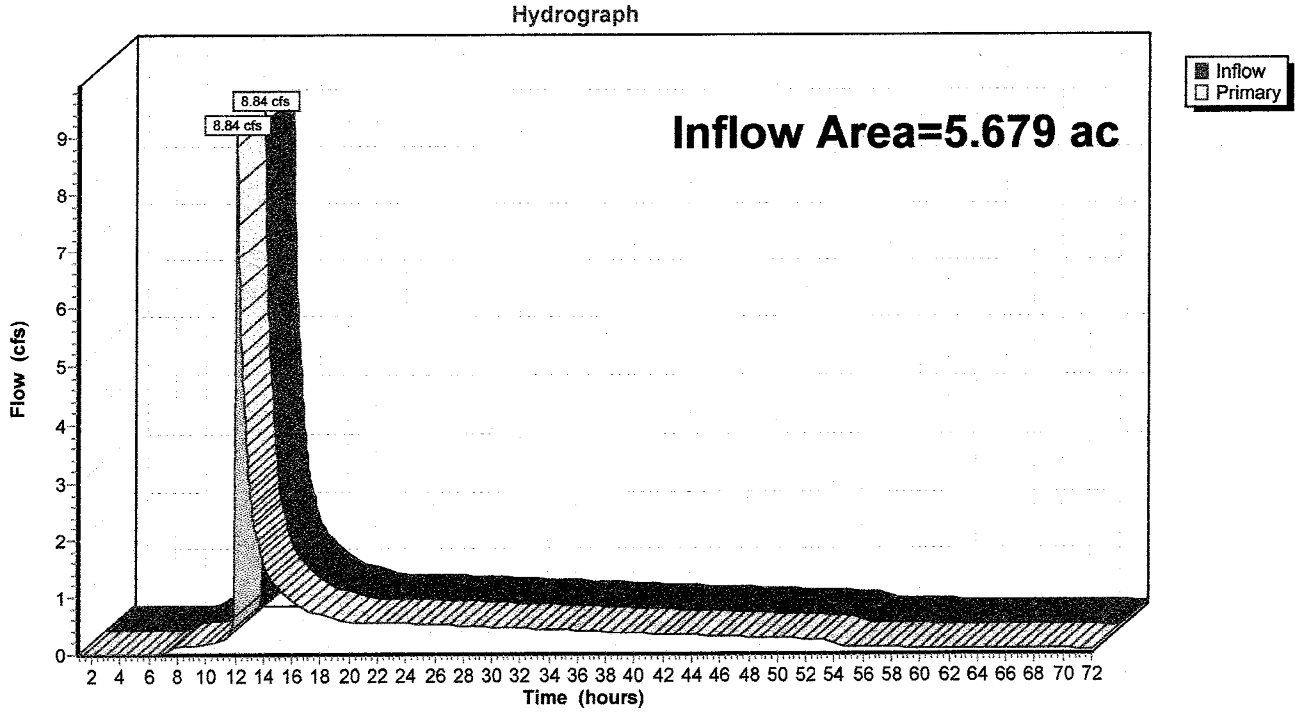


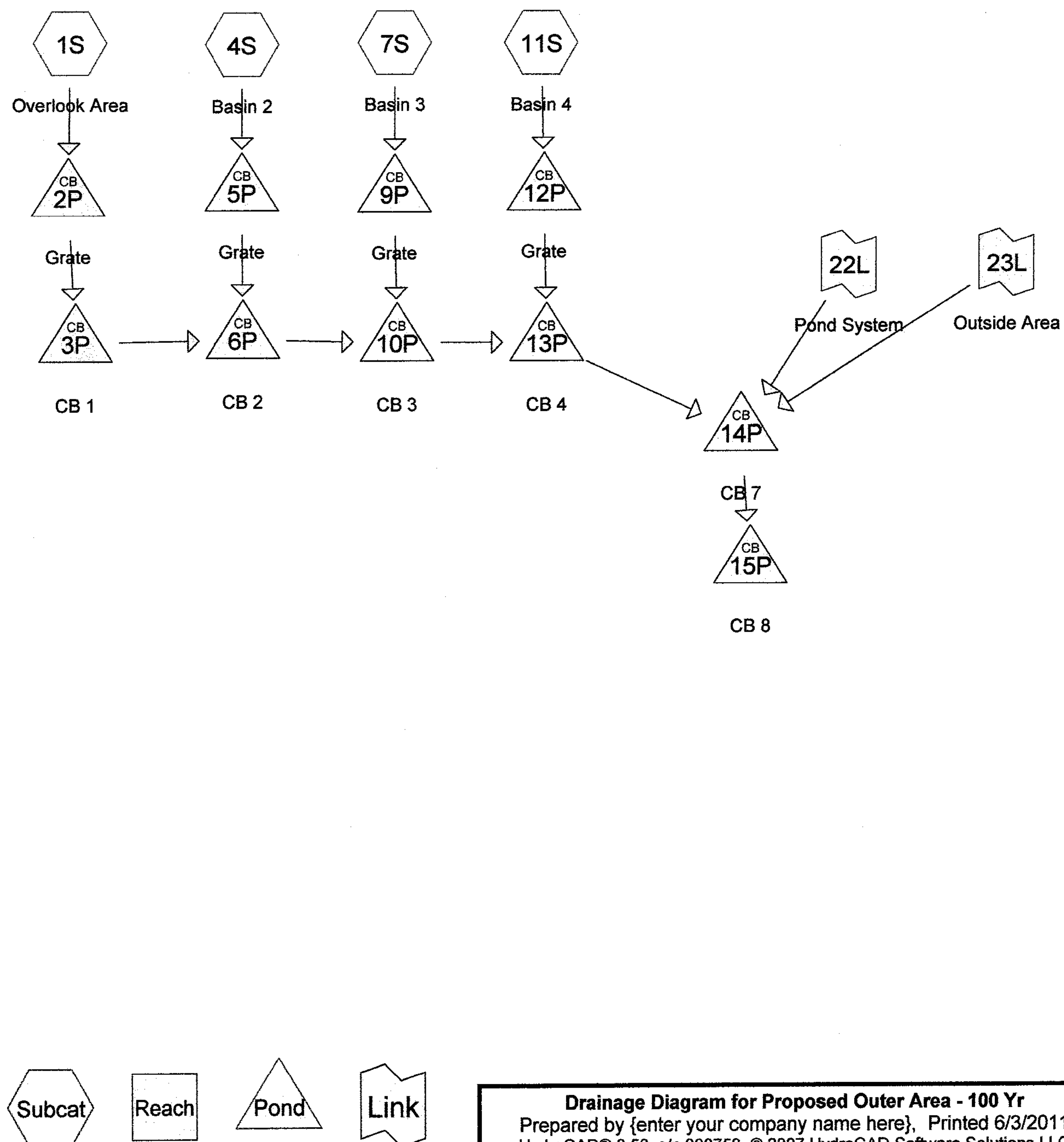
Summary for Link 10L: Pond System

Inflow Area =	5.679 ac,	85.00% Impervious,	Inflow Depth > 4.99"	for 100 - Yr. event	
Inflow =	8.84 cfs @	12.11 hrs,	Volume=	2.363 af	
Primary =	8.84 cfs @	12.11 hrs,	Volume=	2.363 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link 10L: Pond System





Drainage Diagram for Proposed Outer Area - 100 Yr
Prepared by {enter your company name here}, Printed 6/3/2011
HydroCAD® 8.50 s/n 000753 © 2007 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Overlook Area

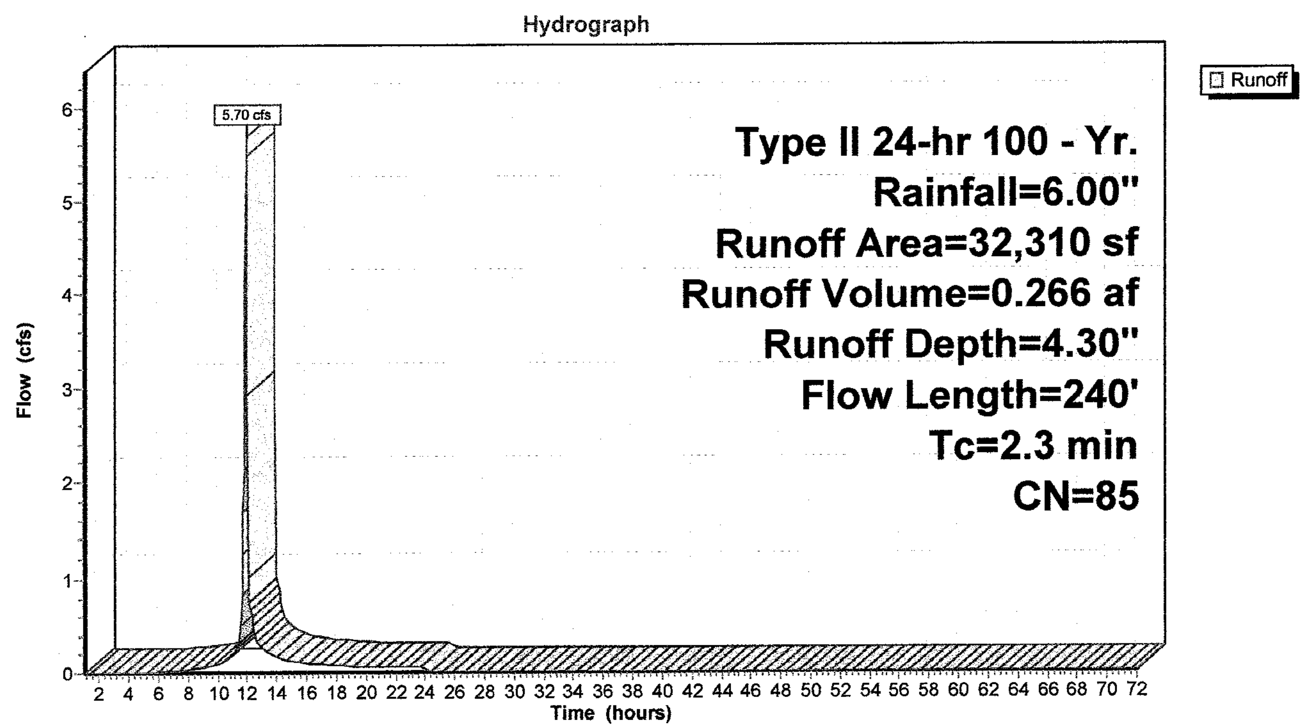
Runoff = 5.70 cfs @ 11.92 hrs, Volume= 0.266 af, Depth= 4.30"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 - Yr. Rainfall=6.00"

Area (sf)	CN	Description
3,300	98	Paved parking & roofs
3,510	98	Paved parking & roofs
950	98	Paved parking & roofs
22,565	80	>75% Grass cover, Good, HSG D
1,985	98	Paved parking & roofs
32,310	85	Weighted Average
22,565		Pervious Area
9,745		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	5	0.3300	0.17		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
1.8	235	0.0200	2.12		**Shallow Concentrated Flow, Vegetated Surface** Grassed Waterway Kv= 15.0 fps
2.3	240	Total			

Subcatchment 1S: Overlook Area



Summary for Subcatchment 4S: Basin 2

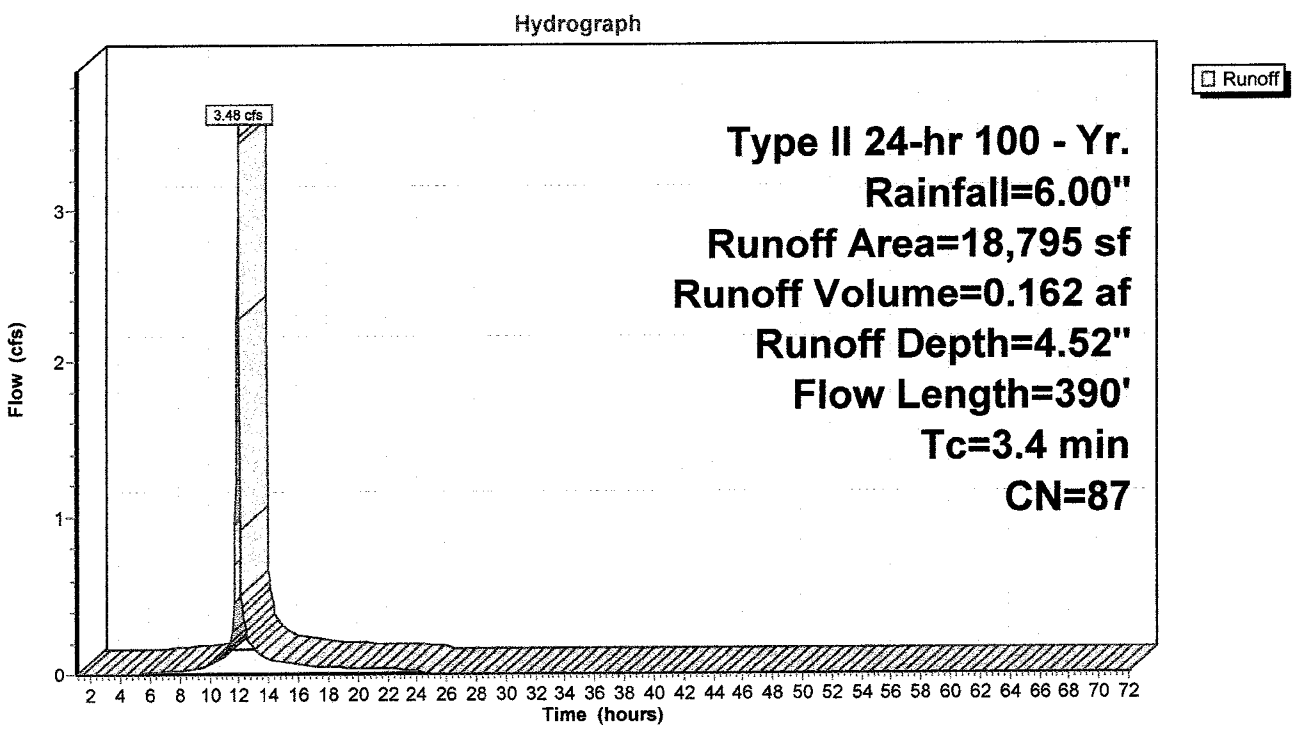
Runoff = 3.48 cfs @ 11.94 hrs, Volume= 0.162 af, Depth= 4.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 - Yr. Rainfall=6.00"

Area (sf)	CN	Description
2,400	98	Paved parking & roofs
3,510	98	Paved parking & roofs
1,800	98	Paved parking & roofs
11,085	80	>75% Grass cover, Good, HSG D
18,795	87	Weighted Average
11,085		Pervious Area
7,710		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	15	0.0050	0.47		**Sheet Flow, Driveway** Smooth surfaces n= 0.011 P2= 2.40"
1.6	225	0.0260	2.42		**Shallow Concentrated Flow, Berm** Grassed Waterway Kv= 15.0 fps
1.3	150	0.0167	1.94		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
3.4	390	Total			

Subcatchment 4S: Basin 2



Summary for Subcatchment 7S: Basin 3

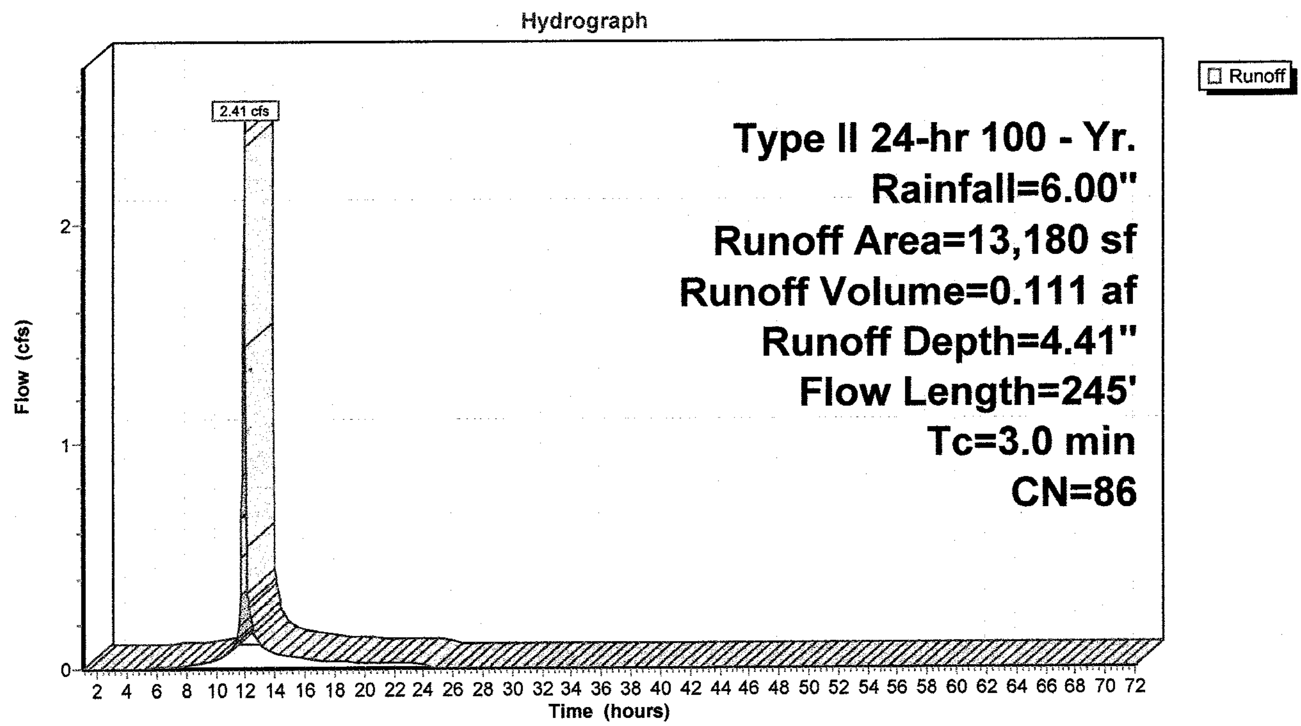
Runoff = 2.41 cfs @ 11.93 hrs, Volume= 0.111 af, Depth= 4.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 - Yr. Rainfall=6.00"

Area (sf)	CN	Description
1,440	98	Paved parking & roofs
2,565	98	Paved parking & roofs
475	98	Paved parking & roofs
8,700	80	>75% Grass cover, Good, HSG D
13,180	86	Weighted Average
8,700		Pervious Area
4,480		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	10	0.3300	0.20		**Sheet Flow, Outer Slope** Grass: Dense n= 0.240 P2= 2.40"
1.3	160	0.0200	2.12		**Shallow Concentrated Flow, Driveway Channel** Grassed Waterway Kv= 15.0 fps
0.8	75	0.0100	1.50		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
3.0	245	Total			

Subcatchment 7S: Basin 3



Summary for Subcatchment 11S: Basin 4

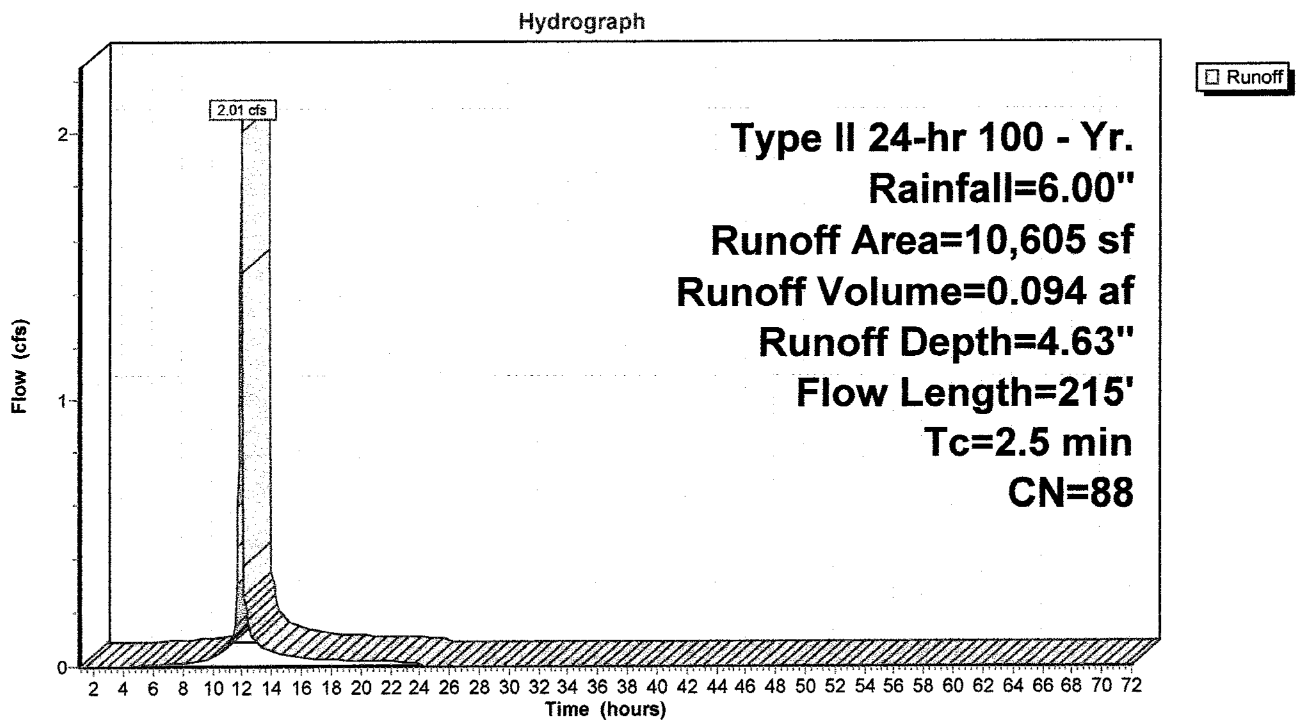
Runoff = 2.01 cfs @ 11.93 hrs, Volume= 0.094 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 - Yr. Rainfall=6.00"

Area (sf)	CN	Description
1,500	98	Paved parking & roofs
2,565	98	Paved parking & roofs
840	98	Paved parking & roofs
5,700	80	>75% Grass cover, Good, HSG D
10,605	88	Weighted Average
5,700		Pervious Area
4,905		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	10	0.3300	0.20		**Sheet Flow, Driveway** Grass: Dense n= 0.240 P2= 2.40"
1.2	150	0.0200	2.12		**Shallow Concentrated Flow, Driveway Channel** Grassed Waterway Kv= 15.0 fps
0.4	55	0.0200	2.12		**Shallow Concentrated Flow, Channel** Grassed Waterway Kv= 15.0 fps
2.5	215	Total			

Subcatchment 11S: Basin 4



Summary for Pond 2P: Grate

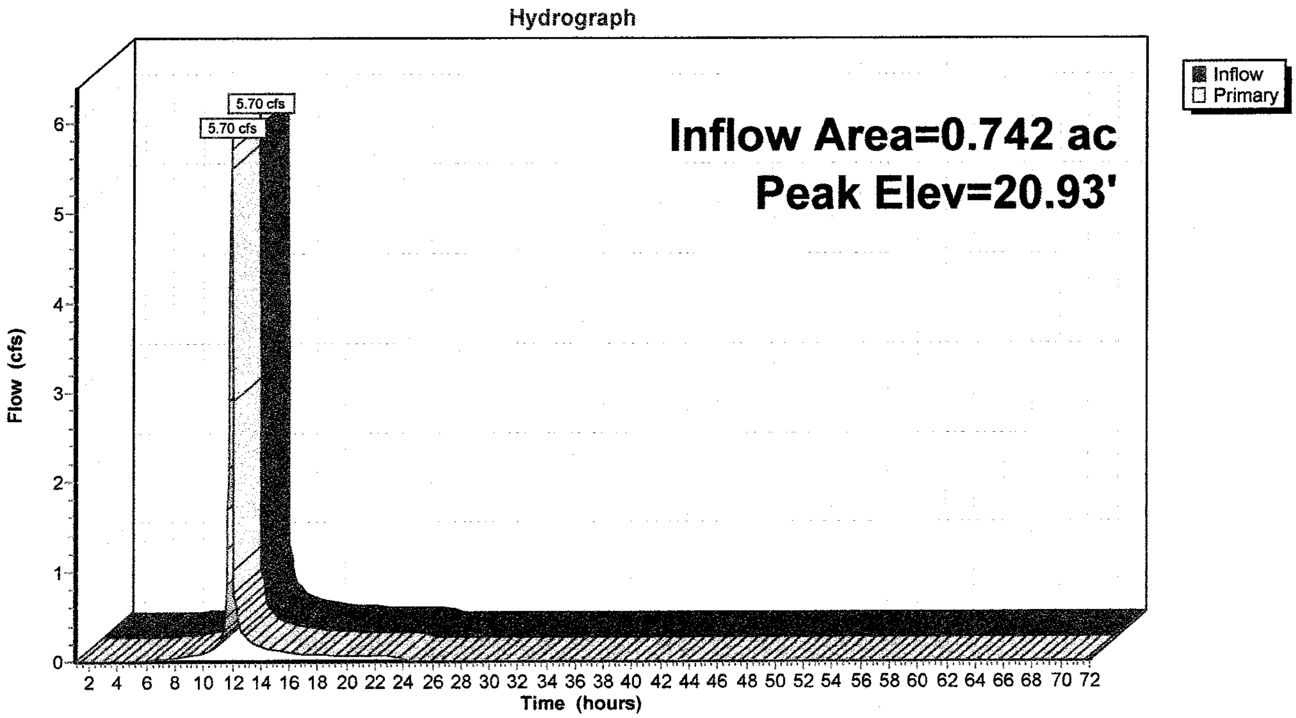
Inflow Area =	0.742 ac,	30.16% Impervious,	Inflow Depth = 4.30"	for 100 - Yr. event	
Inflow =	5.70 cfs @	11.92 hrs,	Volume=	0.266 af	
Outflow =	5.70 cfs @	11.92 hrs,	Volume=	0.266 af,	Atten= 0%, Lag= 0.0 min
Primary =	5.70 cfs @	11.92 hrs,	Volume=	0.266 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 20.93' @ 11.92 hrs
Flood Elev= 21.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	20.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=5.52 cfs @ 11.92 hrs HW=20.92' (Free Discharge)
1=Orifice/Grate (Weir Controls 5.52 cfs @ 2.11 fps)

Pond 2P: Grate



Summary for Pond 3P: CB 1

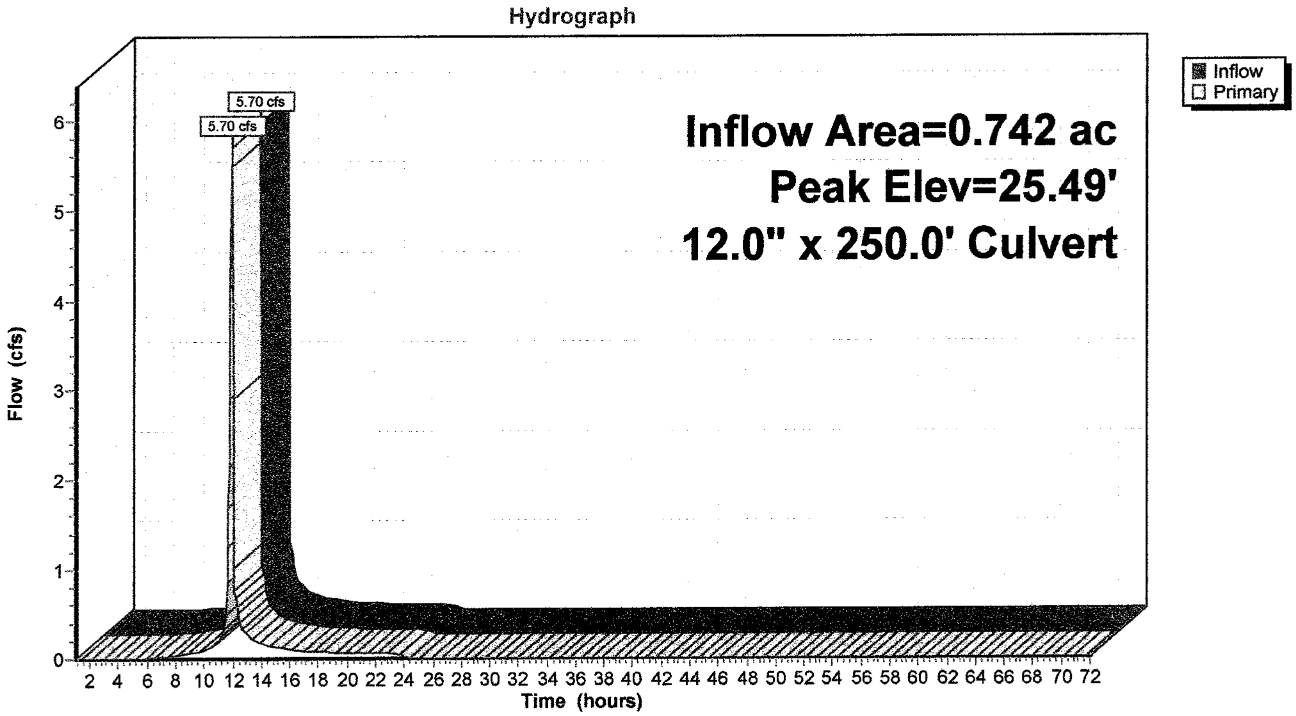
Inflow Area = 0.742 ac, 30.16% Impervious, Inflow Depth = 4.30" for 100 - Yr. event
Inflow = 5.70 cfs @ 11.92 hrs, Volume= 0.266 af
Outflow = 5.70 cfs @ 11.92 hrs, Volume= 0.266 af, Atten= 0%, Lag= 0.0 min
Primary = 5.70 cfs @ 11.92 hrs, Volume= 0.266 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 25.49' @ 11.92 hrs
Flood Elev= 20.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	15.43'	**12.0" x 250.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 14.28' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=5.52 cfs @ 11.92 hrs HW=25.22' TW=20.50' (Fixed TW Elev= 20.50')
1=Culvert (Outlet Controls 5.52 cfs @ 7.03 fps)

Pond 3P: CB 1



Summary for Pond 5P: Grate

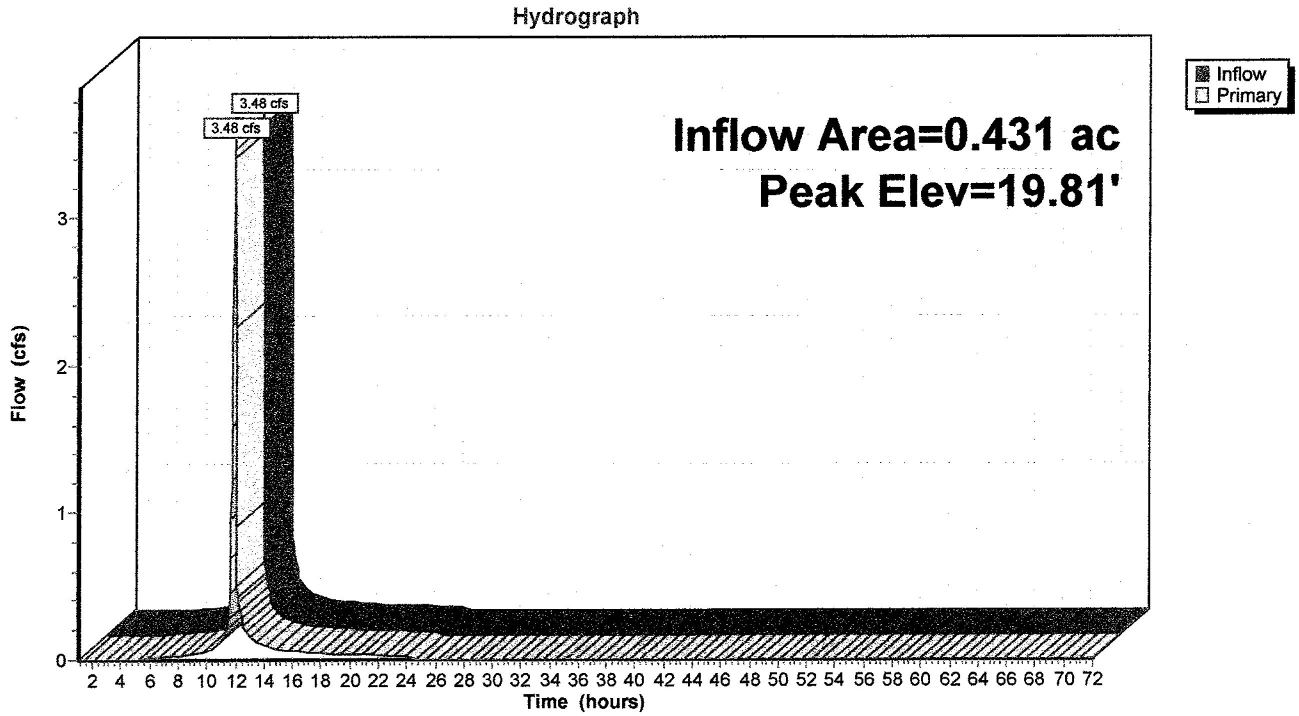
Inflow Area =	0.431 ac,	41.02% Impervious, Inflow Depth = 4.52"	for 100 - Yr. event	
Inflow =	3.48 cfs @	11.94 hrs, Volume=	0.162 af	
Outflow =	3.48 cfs @	11.94 hrs, Volume=	0.162 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.48 cfs @	11.94 hrs, Volume=	0.162 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 19.81' @ 11.94 hrs
Flood Elev= 20.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	19.50'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=3.33 cfs @ 11.94 hrs HW=19.80' (Free Discharge)
└─**1=Orifice/Grate** (Weir Controls 3.33 cfs @ 1.78 fps)

Pond 5P: Grate



Summary for Pond 6P: CB 2

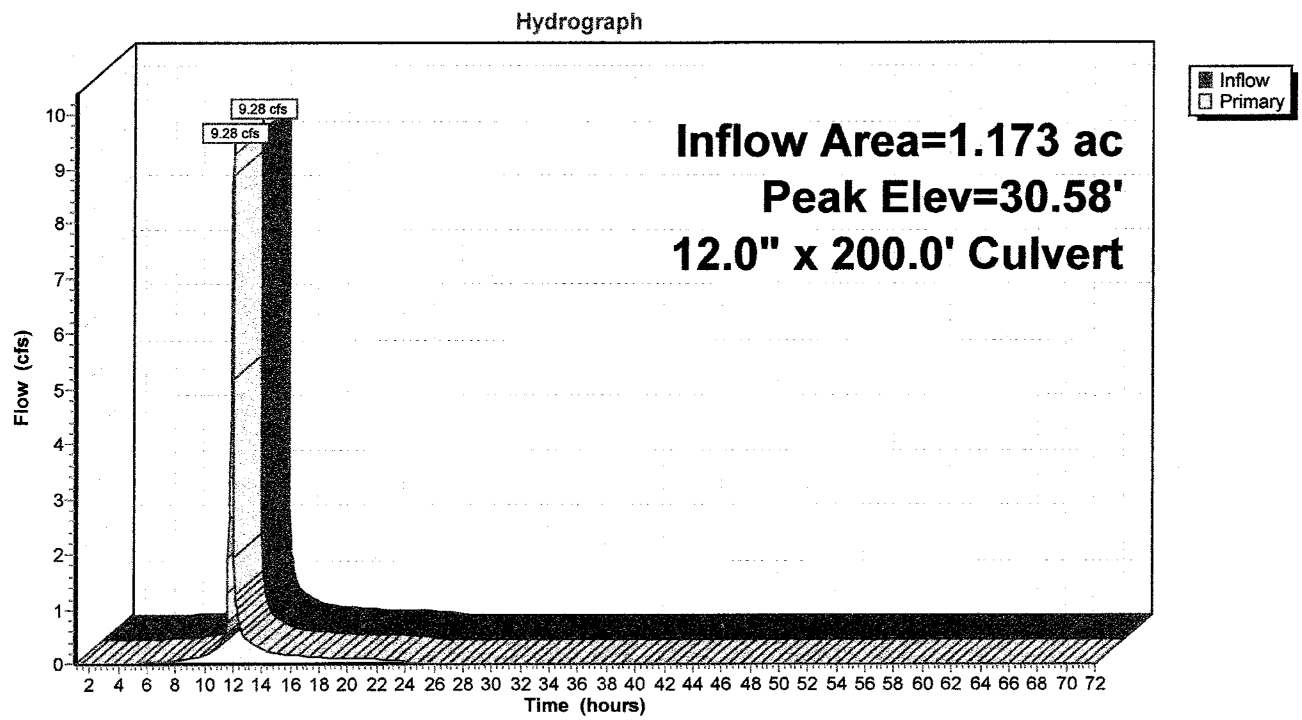
Inflow Area =	1.173 ac,	34.16% Impervious,	Inflow Depth = 4.38"	for 100 - Yr. event	
Inflow =	9.28 cfs @	11.93 hrs,	Volume=	0.428 af	
Outflow =	9.28 cfs @	11.93 hrs,	Volume=	0.428 af,	Atten= 0%, Lag= 0.0 min
Primary =	9.28 cfs @	11.93 hrs,	Volume=	0.428 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 30.58' @ 11.93 hrs
Flood Elev= 19.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	14.58'	**12.0" x 200.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.67' S= 0.0046 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=8.79 cfs @ 11.93 hrs HW=29.65' TW=19.50' (Fixed TW Elev= 19.50')
1=Culvert (Outlet Controls 8.79 cfs @ 11.19 fps)

Pond 6P: CB 2



Summary for Pond 9P: Grate

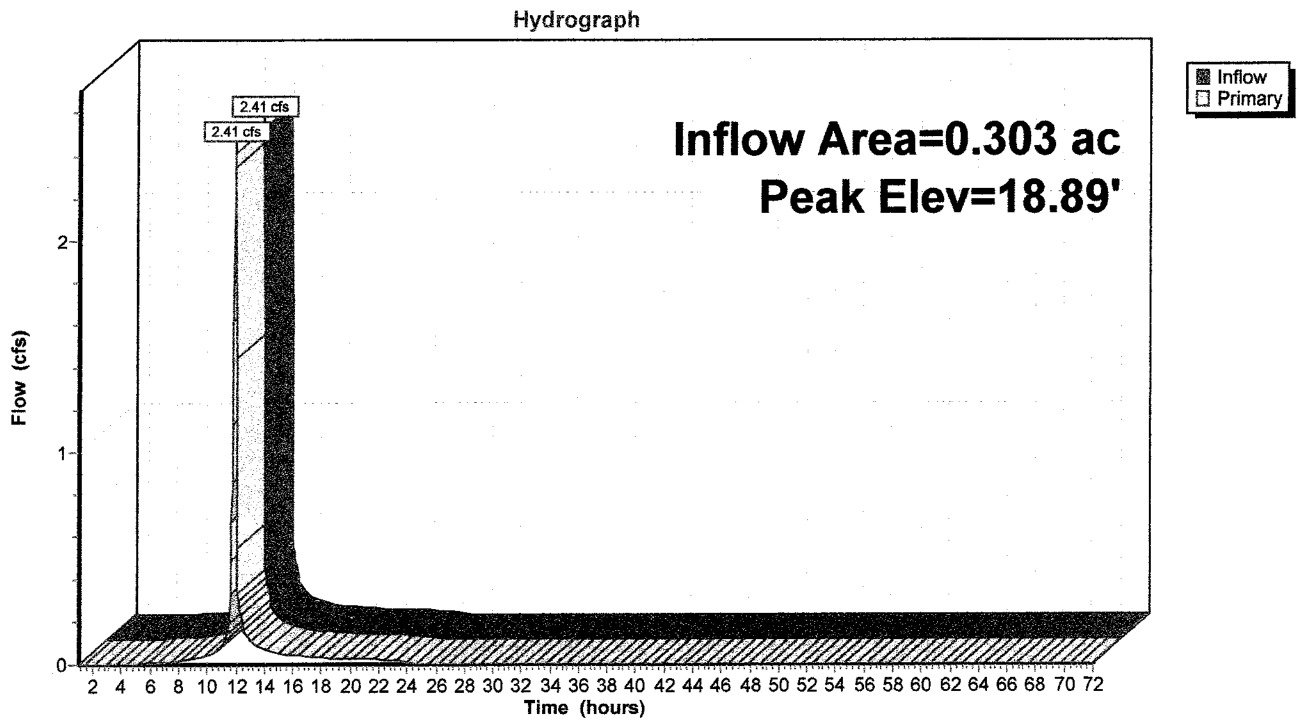
Inflow Area =	0.303 ac,	33.99% Impervious,	Inflow Depth = 4.41"	for 100 - Yr. event
Inflow =	2.41 cfs @	11.93 hrs, Volume=	0.111 af	
Outflow =	2.41 cfs @	11.93 hrs, Volume=	0.111 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.41 cfs @	11.93 hrs, Volume=	0.111 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.89' @ 11.94 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**12.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Primary OutFlow Max=2.32 cfs @ 11.93 hrs HW=18.88' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 2.32 cfs @ 2.95 fps)

Pond 9P: Grate



Summary for Pond 10P: CB 3

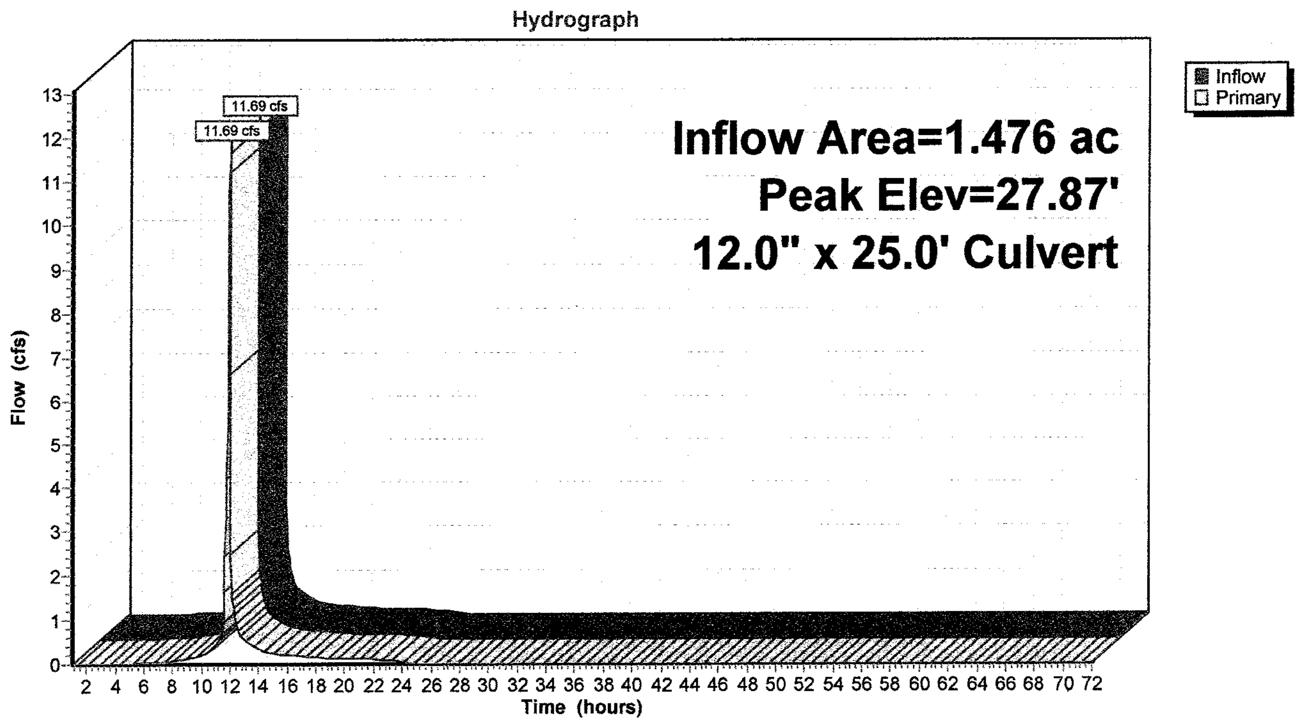
Inflow Area =	1.476 ac,	34.12% Impervious,	Inflow Depth = 4.39"	for 100 - Yr. event
Inflow =	11.69 cfs @	11.93 hrs, Volume=	0.540 af	
Outflow =	11.69 cfs @	11.93 hrs, Volume=	0.540 af,	Atten= 0%, Lag= 0.0 min
Primary =	11.69 cfs @	11.93 hrs, Volume=	0.540 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 27.87' @ 11.93 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.67'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.60' S= 0.0028 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=11.08 cfs @ 11.93 hrs HW=27.09' TW=18.50' (Fixed TW Elev= 18.50')
└**1=Culvert** (Inlet Controls 11.08 cfs @ 14.11 fps)

Pond 10P: CB 3



Summary for Pond 12P: Grate

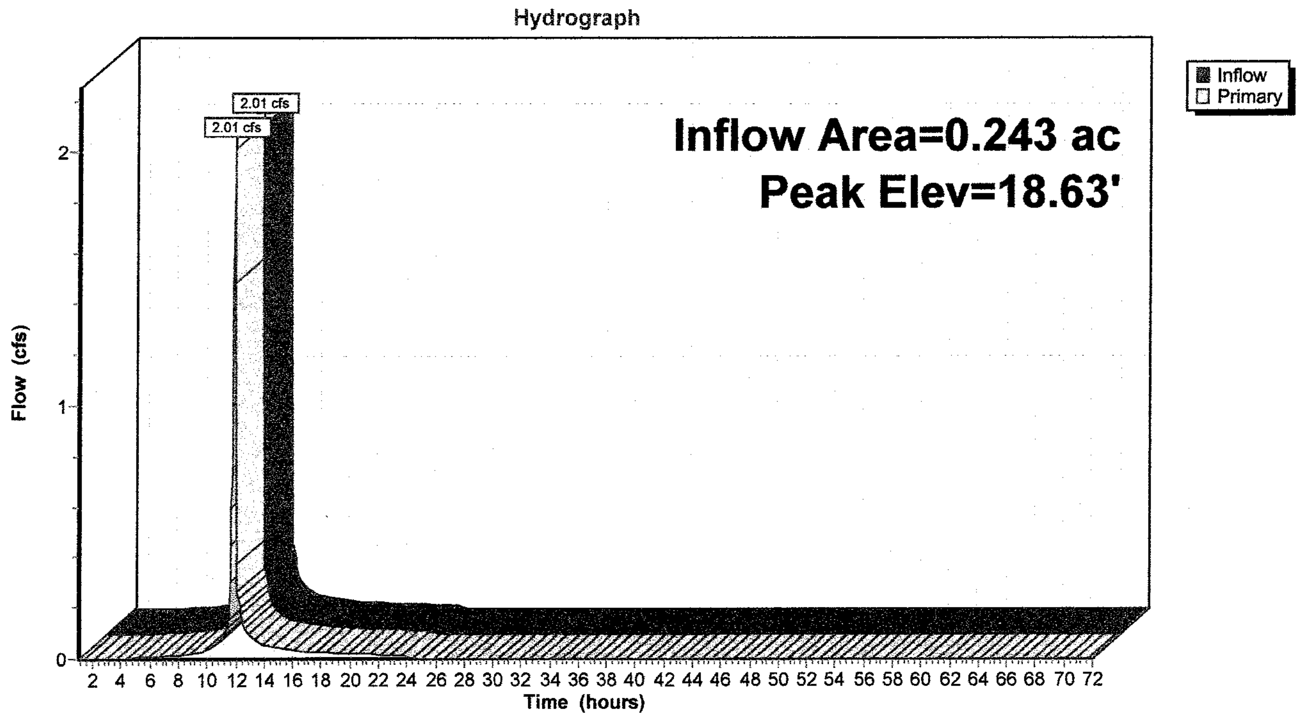
Inflow Area =	0.243 ac, 46.25% Impervious,	Inflow Depth = 4.63"	for 100 - Yr. event
Inflow =	2.01 cfs @ 11.93 hrs, Volume=	0.094 af	
Outflow =	2.01 cfs @ 11.93 hrs, Volume=	0.094 af, Atten= 0%, Lag= 0.0 min	
Primary =	2.01 cfs @ 11.93 hrs, Volume=	0.094 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 18.63' @ 11.93 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.50'	**24.0" Horiz. Orifice/Grate X 2.00** Limited to weir flow C= 0.600

Primary OutFlow Max=1.90 cfs @ 11.93 hrs HW=18.63' (Free Discharge)
1=Orifice/Grate (Weir Controls 1.90 cfs @ 1.17 fps)

Pond 12P: Grate



Summary for Pond 13P: CB 4

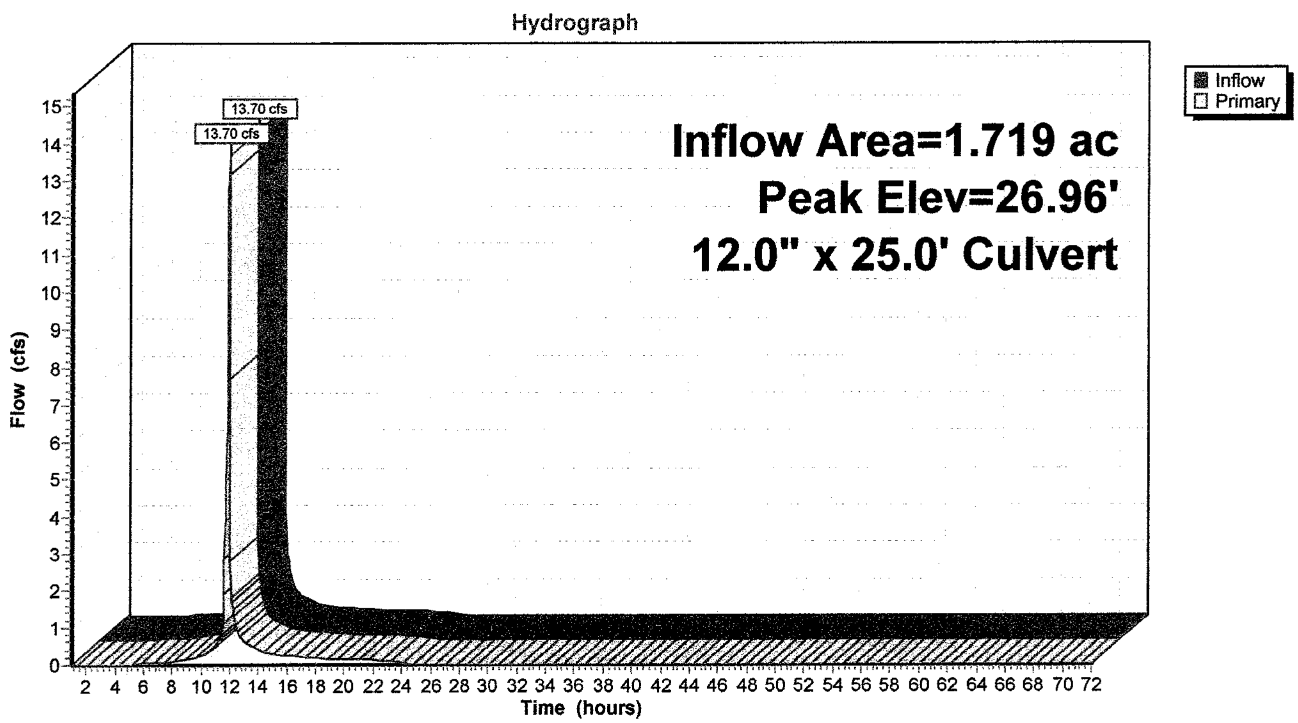
Inflow Area =	1.719 ac, 35.84% Impervious,	Inflow Depth = 4.42"	for 100 - Yr. event	
Inflow =	13.70 cfs @	11.93 hrs, Volume=	0.633 af	
Outflow =	13.70 cfs @	11.93 hrs, Volume=	0.633 af,	Atten= 0%, Lag= 0.0 min
Primary =	13.70 cfs @	11.93 hrs, Volume=	0.633 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 26.96' @ 11.93 hrs
Flood Elev= 18.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	13.60'	**12.0" x 25.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 13.40' S= 0.0080 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=12.98 cfs @ 11.93 hrs HW=25.88' TW=8.66' (Fixed TW Elev= 8.66')
↑—**1=Culvert** (Inlet Controls 12.98 cfs @ 16.53 fps)

Pond 13P: CB 4



Summary for Pond 14P: CB 7

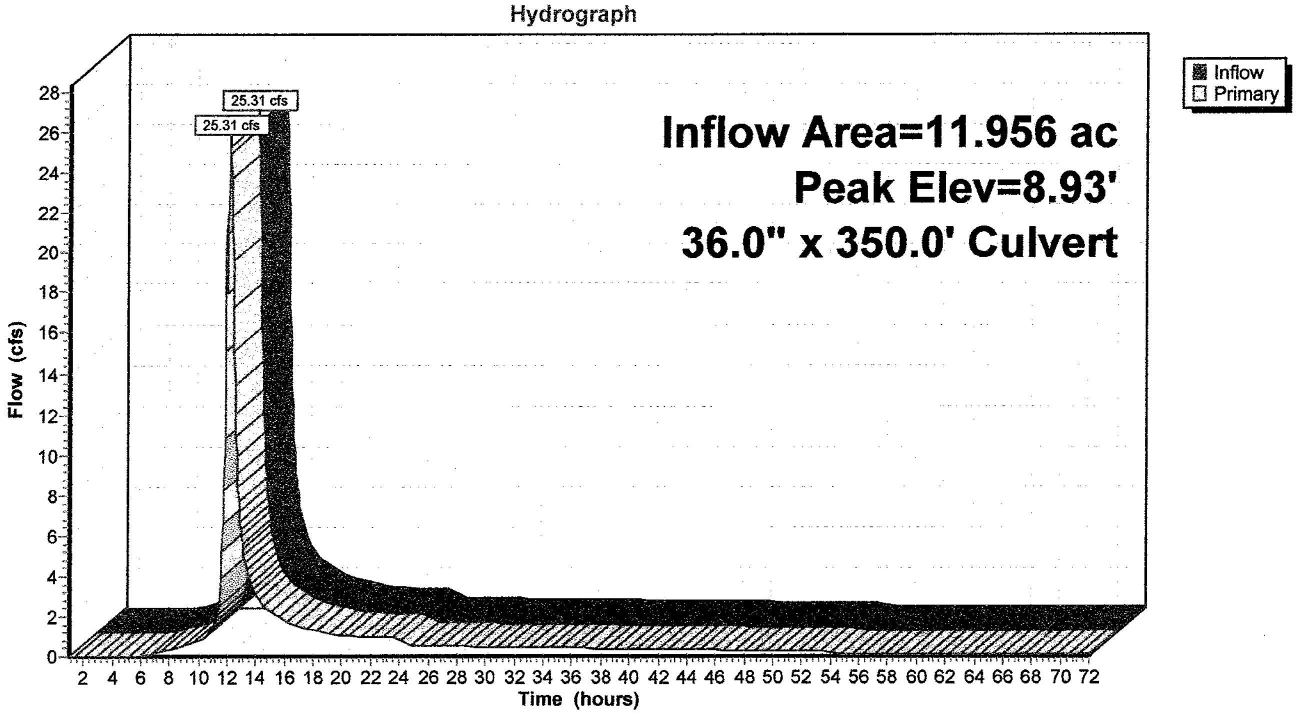
Inflow Area =	11.956 ac,	48.80% Impervious,	Inflow Depth > 4.53"	for 100 - Yr. event
Inflow =	25.31 cfs @	12.16 hrs, Volume=	4.518 af	
Outflow =	25.31 cfs @	12.16 hrs, Volume=	4.518 af,	Atten= 0%, Lag= 0.0 min
Primary =	25.31 cfs @	12.16 hrs, Volume=	4.518 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 8.93' @ 12.16 hrs
Flood Elev= 19.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	6.30'	**36.0" x 350.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 5.37' S= 0.0027 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=25.17 cfs @ 12.16 hrs HW=8.92' TW=7.80' (Fixed TW Elev= 7.80')
1=Culvert (Outlet Controls 25.17 cfs @ 5.13 fps)

Pond 14P: CB 7



Summary for Pond 15P: CB 8

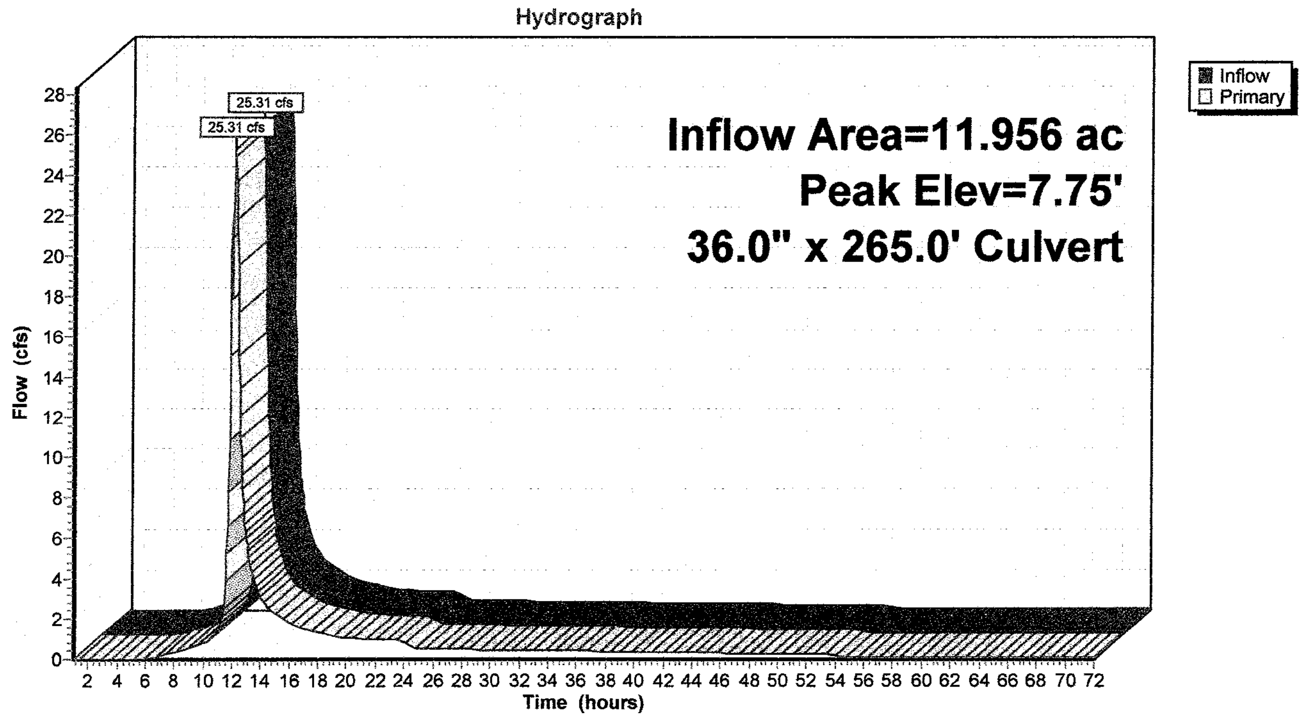
Inflow Area =	11.956 ac,	48.80% Impervious,	Inflow Depth > 4.53"	for 100 - Yr. event
Inflow =	25.31 cfs @	12.16 hrs, Volume=	4.518 af	
Outflow =	25.31 cfs @	12.16 hrs, Volume=	4.518 af, Atten= 0%, Lag= 0.0 min	
Primary =	25.31 cfs @	12.16 hrs, Volume=	4.518 af	

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 7.75' @ 12.16 hrs
Flood Elev= 22.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5.37'	**36.0" x 265.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 4.68' S= 0.0026 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=25.18 cfs @ 12.16 hrs HW=7.75' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 25.18 cfs @ 5.76 fps)

Pond 15P: CB 8



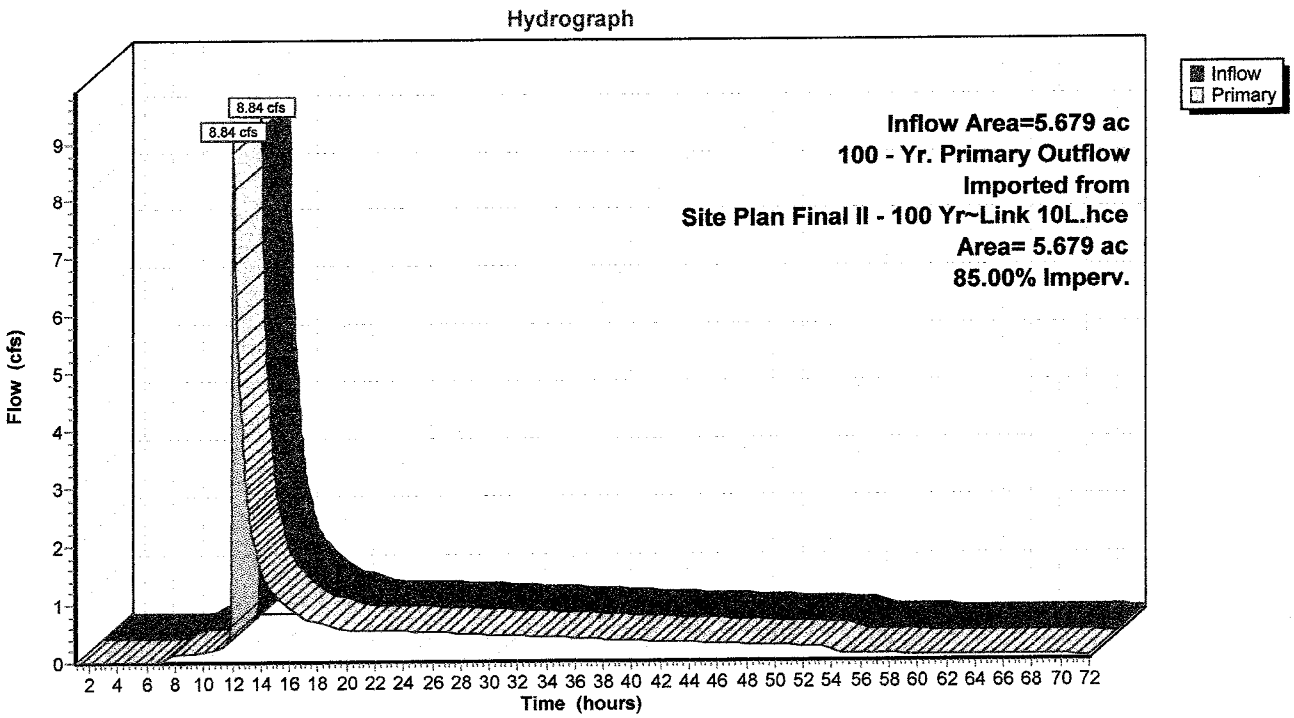
Summary for Link 22L: Pond System

Inflow Area = 5.679 ac, 85.00% Impervious, Inflow Depth > 4.99" for 100 - Yr. event
Inflow = 8.84 cfs @ 12.11 hrs, Volume= 2.363 af
Primary = 8.84 cfs @ 12.11 hrs, Volume= 2.363 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

100 - Yr. Primary Outflow Imported from Site Plan Final II - 100 Yr~Link 10L.hce

Link 22L: Pond System



Summary for Link 23L: Outside Area

Inflow Area =	4.558 ac,	8.59% Impervious, Inflow Depth = 4.01"	for 100 - Yr. event	
Inflow =	15.95 cfs @	12.20 hrs, Volume=	1.522 af	
Primary =	15.95 cfs @	12.20 hrs, Volume=	1.522 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

100 - Yr. Primary Outflow Imported from Site Plan Final II - 100 Yr~Link 9L.hce

Link 23L: Outside Area